

Fresno County Department of Public Works and Planning
Project: Fresno County West Annex Jail
Contract No.: 16-S-04

Bid Opening: 10/20/2017
Conditional Award Date: 11/14/2017

Bidders	
1. Bernards Bros., Inc.	Subcontractors for Apparent Low Bidder - Mass X, Malcolm Drilling, CMC, McGuire, StructureCast, Bratton, Nuno Iron, Four C, Tarlton and Sons, CML Security, New England Sheet Metal, Sebastian, ABG Caulking, Kone, Jerico, Pecoraro, Prime Coat Coating Systems
2. USS Cal Builders	Subcontractors for 2nd Low Bidder - Kone, Inc., Walters & Wolf Precast, Civil Works Corp., Best Contracting Services, Four C's Construction, Design Hardware, Stanton Utilities, Inc., Control Fire protection, Mass X, Shell Electric, Inc., Blue Iron, Simplex Grinnell, Universal Security Products, Bratton Masonry, 3D Datacom, Lawson Mechanical, Platinum, Abdelatiff, Quality Steel

Architect's Estimate		Base Bid	Alternate #1	Alternate #2	Alternate #3	Alternate #4	Alternate #5	Alternate #6	Allowance	Total
		\$76,200,417.00	\$82,850.00	\$148,544.00	\$48,432.00	\$166,149.00	\$0.00	\$0.00	\$300,000.00	\$76,946,392.00
Bernards Bros, Inc		Base Bid	Alternate #1	Alternate #2	Alternate #3	Alternate #4	Alternate #5	Alternate #6	Allowance	Total
		\$80,658,000.00	\$103,000.00	\$430,000.00	\$73,000.00	\$190,000.00	\$1,000.00	\$1,000.00	\$300,000.00	\$81,756,000.00
USS Cal Builders		Base Bid	Alternate #1	Alternate #2	Alternate #3	Alternate #4	Alternate #5	Alternate #6	Allowance	Total
		\$81,680,000.00	\$110,000.00	\$670,000.00	\$65,000.00	\$150,000.00	\$0.00	\$0.00	\$300,000.00	\$82,975,000.00

In order to allow sufficient time for appropriate review, any letter protesting the proposed award to the apparent low bidder is to be submitted no later than seven (7) calendar days after the posting of the bid results on the Department of Public Works and Planning's website. In order to allow full and fair consideration of the issues and a reasonable opportunity for the apparent low bidder to respond, the protest letter shall set forth in detail the basis for the protest. Any issues raised in the protest letter will be determined by the Board of Supervisors at the date and time scheduled for its consideration of the recommended award.



DLR Group

Architecture
Engineering
Planning
Interiors

**FRESNO COUNTY
WEST ANNEX JAIL**
Fresno, California
County Contract No. 16-S-04

**Project Manual Divisions 0-1
Volume 1 of 3**

DLR Group Project No.: 75-15208-00
Issue Date: March 28, 2017

CONSTRUCTION DOCUMENT

JOHN R. WOODS
OSFM III SPL/MA

OFFICE OF THE STATE FIRE MARSHAL APPROVED FIRE AND PANIC ONLY	
Reviewed by _____	DATE _____
4-11-17	
Approval of this plan does not authorize or approve any omission or deviation from applicable regulations. Final approval is subject to field inspection. One set of approved plans shall be available on the project site at all times.	
CSFM FILE NO. 10-0031	
DIVISION OF THE STATE ARCHITECT	
APPL 02-115366	
FILE # _____	
AC _____	FLS _____
SSS _____	DATE _____
IDENTIFICATION STAMP	

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Project Manual

Volume 1 of 3

Fresno County West Annex Jail

WEST ANNEX JAIL

2208 Merced St
Fresno, California 93721

Pre-Bid Conference: 10:00 am, March 17, 2017

Bid Date: 2:00 pm, April 6, 2017

Budget / Account – 8150 / 91157 - SB 1022 (WAJ)
8150 / 91158 – Leasehold Improvements (WAJ)
8150 / 91159 – Central Plant/ Tunnel (WAJ)
8150 / 91160 – Intangibles (WAJ)
8150 / 91161 – Non-Capitalizable Expenditures (WAJ)



Capital Projects Division

Department of Public Works & Planning

Contract: 16-S-04

00 00 10-1

March 28, 2017

1 **PROJECT: FRESNO COUNTY WEST ANNEX JAIL**

2
3
4
5 **CONTRACT NO.: 16-S-04**

6
7
8 Adopted by the Fresno County Board of Supervisors, November 15, 2016

9
10
11 Buddy Mendes, 4th District, Chairman
12 Brian Pacheco, 1st District, Vice Chairman
13 Andres Borgeas, 2nd District
14 Henry R. Perea, 3rd District
15 Deborah A. Poochigian, 5th District

16
17 Jean Rousseau, County Administrative Officer

18
19 Steve E. White, Director
20 Department of Public Works & Planning

21
22
23
24
25
26
27 Stuart G. Seiden, Mgr. C 18719
28 Capital Projects Division Lic. Ren.: March 31, 2017
29 **DEPARTMENT OF PUBLIC WORKS & PLANNING** Phone: (559) 600-4324
30 m/a: 2220 Tulare St., Fax: (559) 600-4458
31 Fresno, CA 93721-2104
32
33
34

35
36 **Architect of Record:**

37
38
39 Andrew Cupples C 25293
40 DLR Group Lic. Ren.: June 30, 2017
41 **700 South Flower Street, 22nd Floor** Phone: (213) 373-6650
42 **Los Angeles, CA 90017** Fax:
43
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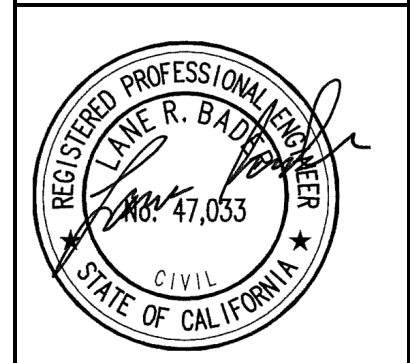
DOCUMENT - SEALS PAGE

1.1 DESIGN PROFESSIONALS OF RECORD

ARCHITECT **DLR Group**
 700 South Flower Street, 22nd Floor
 Los Angeles, CA 90017
 Andrew M. Cupples



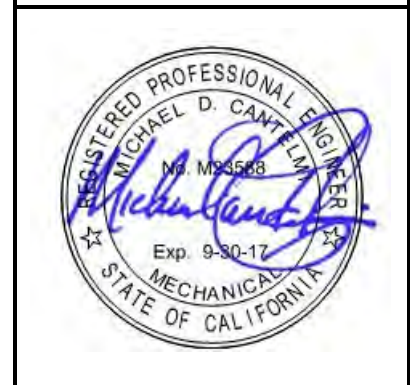
CIVIL ENGINEER **Blair Church & Flynn**
 451 Clovis Ave, Suite 200
 Clovis , CA 93612
 Lane R. Bader



STRUCTURAL ENGINEER **Structcon**
 1700 Fulton
 Fresno, CA 93721
 Kimihiro Sera



MECHANICAL & PLUMBING ENGINEER **Mechanical Design Concepts, Inc.**
 1060 West Sierra Avenue, Suite 101
 Fresno, CA 93711
 Michael Cantelmi



FIRE
PROTECTION
ENGINEER

Lawrence Nye Carlson Associates
7491 N. Remington Ave., Suite 101
Fresno, CA 93711
Ryan W. Carlson



ELECTRICAL
ENGINEER

Electrical Power Systems, Inc.
4049 North Fresno Street
Fresno, CA 93726
Joseph Prevendar



PHYSICAL /
SECURITY
SYSTEMS & FIRE
ALARMS

R & N Systems Design
615 Oakleaf Office Lane
Memphis, Tennessee 38117
Frank A. Niedzwiedz Jr.



END OF DOCUMENT 00 0107

BOARD OF SUPERVISORS COUNTY OF FRESNO STATE OF CALIFORNIA
NOTICE TO BIDDERS

Sealed proposals will be received at the Fresno County Department of Public Works and Planning, Office of the Design Engineer, (7th) Seventh Floor, Fresno County Plaza Building, 2220 Tulare Street, Fresno, CA 93721 until

2:00 P.M., (1400 hours and 00 seconds)
Thursday, April 6, 2017

at which time the bidding will be closed. Promptly following the closing of the bidding, all timely submitted bids will be publicly opened and read at the Department in said building, for construction in accordance with the specifications therefor, to which special reference is made as follows:

Fresno County – West Annex Jail
2208 Merced Street, Fresno, California 93721

Contract No. 16-S-04

The work to be performed consists of: Work includes, but is not limited to: General Conditions, temporary facilities, site preparation, demolition, on-site utilities, concrete, steel, masonry, metals, casework, thermal and moisture protection, doors and windows, hardware, finishes, equipment, specialties, mechanical, plumbing, electrical, fire suppression, fire alarm, CCTV surveillance, telecommunications, energy management system, tunnel to existing North Annex Jail, extension of utilities from existing Central Plant and upgrades of existing Central Plant.

A pre-bid conference will be held at **10:00 a.m., on Friday, March 17, 2017**. A discussion of the project will be held and the project site will be open for examination. Contractors should meet at 2220 Tulare St., Fresno, CA 93721 in the Ballroom at the basement level of the building. Attendance at the pre-bid is not mandatory; however, the scheduled pre-bid will be the only opportunity for prospective bidders to visit the site in the presence of County staff, and requests for individual site visits with County staff will not be granted.

The County of Fresno is committed to increasing the availability of employment and training opportunities, and requires that the Contractor and each subcontractor employed on this Project shall use their best efforts to ensure that thirty-three percent (33%) of apprentice hours are performed by qualified participants in state approved apprenticeship programs who also are current or former “Welfare-to-Work” participants in the CalWORKs program. Attention is directed to “Apprentices” in General Conditions Section 00 72 00, 2.55 of these special provisions.

Incentives whereby the Contractor or subcontractor receives partial reimbursement for the wages paid to apprentices who qualify may be available. The incentive program is administered by the County of Fresno,

CONTRACT NO.:16-S-04 NOTICE TO BIDDERS WEST ANNEX JAIL
00 11 13-1

1 **Department of Social Services, Employment Resource Center. For questions**
2 **regarding the incentive program, contact the Employment Resource Center at**
3 **(559) 600-5370.**
4

5 Project plans and specifications will be available for bidder download along with
6 planholder and exchange/publication names from the Fresno County website at
7 <http://www.co.fresno.ca.us/planholders>.
8

9 A Summary of Bids and a list of subcontractors for the apparent low bidder will be
10 posted at the above listed website, generally within 24 hours of the Bid Opening.
11

12 All questions regarding this project shall be in writing and shall be received by the
13 Department of Public Works and Planning, Design Division, no later than 2:00 P.M.
14 on the tenth (10th) calendar day before bid opening. Any questions received after
15 this deadline will not receive a response unless the Department of Public Works and
16 Planning elects to issue an addendum to revise the bid opening date. In the event
17 that the bid opening date is revised, the deadline for questions will be extended to
18 no later than 2:00 P.M. on the tenth (10th) calendar day before the revised bid
19 opening date. Questions shall be submitted on the "CONTRACTOR REQUEST
20 FOR CLARIFICATION" form provided in the Section 00 63 19 of the Project Manual.
21 e-mail to wajbidding@kitchell.com.
22 or mail/fax to:

23
24 County of Fresno
25 Department of Public Works and Planning
26 Capital Projects Division, 6th Floor
27 West Annex Jail, Request for Clarification
28 2220 Tulare Street,
29 Fresno, Ca. 93721-2104
30 Fax No. 559-600-4548
31

32 Any changes to, or clarification of, the project plans and specifications shall be in the
33 form of a written addendum issued to planholders of record. Questions that prompt
34 a change or clarification shall be included in the addendum with the subsequent
35 answer.
36

37 Any oral explanations or interpretations given to this project are not binding.
38

39 Bids shall be submitted in a sealed envelope addressed to the Department of Public
40 Works and Planning and labeled with the name of the bidder, the name of the
41 project and the statement 'Do Not Open Until The Time Of Bid Opening.'
42

43 Bid security in the amount of ten (10) percent of the amount of the bid, and in the
44 form of a bid bond issued by an admitted surety insurer licensed by the California
45 Department of Insurance, cash, cashier's check or certified check shall accompany
46 the bid. Bid security shall be made in favor of the County of Fresno.
47

48 No contract will be awarded to a contractor who has not been licensed in
49 accordance with the provisions of the Contractors State License Law, California
50 Business and Professions Code, Division 3, Chapter 9, as amended, or whose bid is
51 not on the proposal form included in the contract document. A valid California
52 Contractor's License, **Class B, General Building Contractor** is required for this
53 project.
54

55 The Contractor and his subcontractors shall comply with all applicable statutes and
56 regulations, and all provisions of Sections 2.51, 2.52 and 2.55 of the General

1 Conditions, regarding payment of wages, hours of work and all other labor
2 compliance issues.

3
4 Pursuant to Section 1773 of the Labor Code, the general prevailing wage rates in
5 the county, or counties, in which the work is to be done have been determined by
6 the Director of the California Department of Industrial Relations. These wages are
7 set forth in the General Prevailing Wage Rates for this project, available at County
8 of Fresno, Department of Public Works and Planning, Office of Design Engineer,
9 2220 Tulare Street, Seventh Floor, Fresno CA 93721-2104 and available from the
10 California Department of Industrial Relations' Internet web site at
11 <http://www.dir.ca.gov/DLSR/PWD>. Future effective general prevailing wage rates,
12 which have been predetermined and are on file with the California Department of
13 Industrial Relations are referenced but not printed in the general prevailing wage
14 rates.

15
16 This project is subject to compliance monitoring and enforcement by the Department
17 of Industrial Relations.

18
19 No contractor or subcontractor may be listed on a bid proposal for a public works
20 project unless registered with the Department of Industrial Relations pursuant to
21 Labor Code section 1725.5 [with limited exceptions from this requirement for bid
22 purposes only under Labor Code Section 1771.1(a)].

23
24 No contractor or subcontractor may be awarded a contract for public work on a
25 public works project unless registered with the Department of Industrial Relations
26 pursuant to Labor Code Section 1725.5.

27
28 This contract is subject to state contract nondiscrimination and compliance
29 requirements pursuant to Government Code, Section 12990.

30
31 Minimum wage rates for this project, as predetermined by the Secretary of Labor,
32 are set forth in the Special Provisions. If there is a difference between the minimum
33 wage rates predetermined by the Secretary of Labor and the Prevailing Wage Rates
34 predetermined by the Director of the Department of Industrial Relations of the State
35 of California for similar classifications of labor, the contractor and his subcontractors
36 shall pay not less than the higher wage rate.

37
38 The Board of Supervisors hereby specifies that portions of the work can only be
39 performed outside the regular working hours as defined in the applicable collective
40 bargaining agreement filed with the Director of Industrial Relations in accordance
41 with Labor Code Section 1773.1, and that the overtime requirements for Saturdays,
42 and holidays are hereby waived for these portions of the work, as more particularly
43 described in the specifications. However, this exemption shall not negate the
44 overtime provisions specified in Labor Code Section 1815.

45
46 Bids are required for the entire work described herein, including bids for each of the
47 additive alternate bids and allowance. Bids will be compared, for purposes of
48 identifying the apparent low bidder for proposed award of the project, on the basis of
49 the total of the base bid plus the total of the additive alternate bids and allowance;
50 provided, however, that the ultimate scope of the project, as subsequently
51 determined by the Board of Supervisors at the time of award, may or may not
52 include all or any of the additive alternate bids.

53
54 In addition to the bid bond required by law of all bidders on public works projects,
55 the successful bidder shall furnish a faithful performance bond, a payment bond and

1 a warranty bond in accordance with the provisions of Section 2.36 of the General
2 Conditions.

3
4 The successful bidder shall furnish a faithful performance bond in the amount of 100
5 percent of the contract amount and a payment bond in the amount of 100 percent of
6 the contract amount. Each bond specified in this Notice (bid bond, faithful
7 performance bond and payment bond) shall meet the requirements of all applicable
8 statutes, including but not limited to those specified in Public Contract Code section
9 20129 and Civil Code section 3248.

10
11 Each bond specified in this Notice shall be issued by a surety company designated
12 as an admitted surety insurer in good standing with and authorized to transact
13 business in this state by the California Department of Insurance, and acceptable to
14 the County of Fresno. Bidders are cautioned that representations made by surety
15 companies will be verified with the California Department of Insurance. Additionally,
16 the County of Fresno, in its discretion, when determining the sufficiency of a
17 proposed surety company, may require the surety company to provide additional
18 information supported by documentation. The County generally requires such
19 information and documentation whenever the proposed surety company has either a
20 Best's Key Rating Guide of no less than **A** and a financial size designation of no less
21 than **VIII**. Provided, however, that the County expressly reserves its right to require
22 all information and documentation to which the County is legally entitled from any
23 proposed surety company.

24
25 Pursuant to Public Contract Code Section 22300, substitution of securities for any
26 moneys withheld by the County of Fresno to ensure performance under the contract
27 shall be permitted.

28 29 **NOTICE TO CONTRACTORS**

30
31 In accordance with a directive issued by the Board of Supervisors, the following
32 materials, products or things shall be designated by the specific brand or trade
33 name specified below in the project specifications for the use on this project, based
34 on the Board's finding that such designation is required in order to match existing
35 materials, product and things in use at existing jail facilities and other facilities within
36 the County of Fresno. The purpose of such designation is to ensure integration and
37 compatibility of this new facility with existing systems in use at existing facilities and
38 other facilities within the County of Fresno. The interoperability of those systems
39 with the various systems in use is a critical factor to the efficient operation and
40 maintenance of the facility to be constructed.

41
42 The following table lists the products currently in use at the Fresno County Jail
43 facilities which shall be designated in the project specifications for use on this
44 project by the brand or trade name specified below, based on the findings and
45 purpose referenced in the preceding paragraph, and as authorized by Public
46 Contracts Code, Section 3400(b) and such provisions of the County's Administrative
47 Policies as are applicable.

48 49 **Items to Match Existing Materials, Products and Components**

50 51 Item	52 53 Manufacturer (Contractor installed, Unless otherwise noted:

54 Energy Management System:	Johnson Metasys Control System

55 Detention Hardware:	RR Brink Locking System, Inc

56 **CONTRACT NO.:16-S-04**

NOTICE TO BIDDERS

WEST ANNEX JAIL

00 11 13-4

1 **Non-Detention Locks:** SCHLAGE / Primus (model) with 1248
2 **(including exterior gate locks)** keyway / SCHLAGE latchsets
3
4 **Non-Detention Hinges:** Roton Geared Hinges
5
6 **Door Closures:** Norton 8000 Series
7
8 **Tempered Water Mixing Valves:** Warren Controls (MV-1) & Powers (MV-2)
9
10 **Detention Grade Plumbing**
11 **Cell Fixtures and Valves:** Acorn Manufacturing
12
13 **Electrical 12 KV Switchgear:** Square D
14
15 **Card Access System:** HIRSCH
16

17
18 The Board of Supervisors reserves the right to reject any or all bids.
19

20
21 Board of Supervisors, County of Fresno
22

23 Jean Rousseau, County Administrative Officer
24

25
26 Dated : November 15, 2016

By: Bernice E. Seidel, Clerk to the Board
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INSTRUCTIONS TO BIDDERS

1.01 EXPLANATION TO BIDDERS

An explanation desired by bidders regarding the meaning or interpretation of the drawings and specifications must be requested in writing and within ten (10) days prior to bid opening.

Oral explanations given before the award of the contract will not be binding. Any interpretation made will be in the form of an addendum to the specifications or drawings, said addendum will only be issued by the Director. A copy of the addendum will be furnished to each planholder and its receipt shall be acknowledged on the Bid Proposal.

The base bid listed below will be required to be separated into (3) three categories to track various funding sources. The three apparent low bidders will be required to submit a detailed breakdown within 72 hours of the bid opening to reflect the distribution of funds. During the course of construction, the base bid shown below, along with the approved Alternates shall have their own schedule of values and payment requests submitted and tracked throughout the course of construction in accordance with Division 01. Reference paragraph 1.16 in this Section for additional supplementary requirements.

Base Bid	Description
	All work associated with the Fresno County West Annex Jail, Contract Number 16-S-04

In addition to the Base Bid, bidders shall provide a cost for each of the Alternate Bids listed on the Proposal shown in Section 00 42 13.

1.02 EXAMINATION OF PLANS, SPECIFICATIONS, SPECIAL PROVISIONS AND SITE OF WORK

The bidder is required to examine carefully the site of the proposed work, the proposal, plans, specifications, special provisions and contract forms for submitting a proposal. It is mutually agreed that the submission of a proposal shall be considered prima facie evidence that the bidder has made such examination and is satisfied with the conditions to be encountered in performing the work and as to the requirements of the plan, specifications and special provisions of the contract.

1.03 PROPOSAL GUARANTEE

The bidder shall furnish a proposal guarantee consisting of a bid bond, cash, certified check, or cashier's check for ten percent (10%) of the total amount bid, including additives.

1 In case security is in the form of a certified check or cashier's check, the Owner may
2 make such disposition of same as will accomplish the purpose of which submitted.
3 Checks deposited by unsuccessful bidders will be returned as soon as practicable after
4 the bid opening.

7 1.04 PREPARATION OF PROPOSALS

9 The bidder shall prepare his proposal on the blank proposal form furnished by the
10 Owner. The bidder shall specify a lump sum price in both words and figures for each
11 bid item, including alternates, additives and supplemental items.

13 All words and figures shall be in ink. In case of a discrepancy between the prices
14 written in words and those written in figures, the written words shall govern.

16 Alternate or conditional bids will not be accepted unless called for in the Special
17 Provisions.

19 The bidder's proposals shall be signed in ink by the individual, by one or more partners
20 of the partnership, or by one or more of the officers of the corporation submitting it. If
21 the proposal is made by an individual, his name and post office address must be
22 shown. If made by a partnership, the name of each member of the partnership must be
23 shown. If made by a corporation, the proposal must show the name of the state under
24 which the corporation was chartered and the name of the president, vice president,
25 secretary and treasurer.

27 The required proposal guaranty must accompany the proposal.

30 1.05 SUBCONTRACTORS

32 Every person submitting a bid to perform the work called for in the bid request shall set
33 forth in his bid:

35 a. The name and the location of the place of business of each subcontractor who
36 will perform work or labor or render service to the general contractor in or about the
37 construction of the work or improvement in an amount in excess of one-half (1/2) of one
38 percent (1%) of the general contractor's total bid, and

40 b. The portion of the work which will be done by each subcontractor.

42 The attention of bidders is directed to the provisions of Public Contract Code Section
43 4100 et seq which set forth the consequences and possible penalties which may result
44 from a failure to comply strictly with the foregoing requirements for listing of
45 subcontractors.

47 The attention of bidders is also directed to Section 1-1.16, Post-Bid/Pre-Award
48 Information, of these Instructions to Bidders.

1 1.06 SUBMISSION OF PROPOSAL

2
3 Each proposal shall be submitted in a sealed envelope labeled to clearly indicate the
4 project and contents.
5

6 When sent by mail, a sealed proposal must be addressed to the Fresno County
7 Department of Public Works and Planning, Office of the Design Engineer, Sixth Floor,
8 Fresno County Plaza Building, 2220 Tulare Street, Fresno, CA 93721. All proposals
9 shall be filed prior to the time and at the place specified in the NOTICE TO
10 CONTRACTORS. Proposals received after the time for opening of the proposals will be
11 returned to the bidder unopened.
12

13
14 1.07 IRREGULAR PROPOSALS

15
16 Proposals shall be considered irregular and may be rejected for the following reasons:
17

- 18 a. If the proposal forms furnished by the Owner are not used or are altered.
19
20 b. If there are unauthorized additions, conditional or alternate proposals or
21 irregularities of any kind which tend to make the proposal incomplete or indefinite.
22
23 c. If the bidder adds any provision reserving the right to accept or reject an award,
24 or to enter into a contract pursuant to an award.
25
26 d. If the bid fails to contain a price for each item.
27

28
29 1.08 DISQUALIFICATION OF BIDDERS

30
31 Any one or more of the following causes may be considered as sufficient for
32 disqualification of a bidder and rejection of his proposal or proposals:
33

- 34 a. More than one proposal for the same work from an individual, partnership or
35 corporation.
36
37 b. Evidence of collusion among bidders. Participants in such collusion will receive
38 no recognition as bidders for any future work of the Owner until such participant shall
39 have been reinstated as a qualified bidder.
40
41 c. Lack of competency and adequate machinery, plant or other equipment, as may
42 be revealed by financial statement if required.
43
44 d. For unsatisfactory performance record as shown by past work for the Owner,
45 judged from the standpoint of workmanship and progress.
46
47 e. Prior commitments or obligations which in the judgment of the Owner might
48 hinder or prevent the prompt completion of the work.
49

- 1 f. Failure to pay, or satisfactorily settle, all bills due for labor or materials on former
2 contracts in force at the time of letting the bid.
3
4 g. Failure to comply with any qualification regulation of the Owner.
5
6 h. Omission of proposal guaranty.
7
8

9 1.09 WITHDRAWAL OR REVISION OF PROPOSALS

10
11 A bidder may, without prejudice to himself, withdraw a proposal after it has been
12 deposited, provided the request for such withdrawal is received in writing before the
13 time set for opening proposals. The bidder may then submit a revised proposal
14 provided it is received prior to the time set for opening proposals.
15

16 1.10 PUBLIC OPENING OF PROPOSALS

17
18
19 Proposals will be opened and read publicly at the time and place indicated in the Notice
20 to Contractors. Bidders or their authorized agents are invited to be present.
21

22 1.11 RELIEF OF BIDDER

23
24
25 A bidder who claims a mistake in his bid must follow the procedures in Public Contract
26 Code Section 5100 et seq in seeking relief of his bid.
27

28 1.12 AWARD OF CONTRACT

29
30
31 The award of contract, if it be awarded, will be to the lowest responsible bidder whose
32 proposal complies with all the requirements prescribed. The award if made, will be
33 within 90 days after the opening of proposals.
34

35 If the Owner finds that it will be unable to award the contract within 90 calendar days
36 after the opening of proposals, the Director may request any or all bidders to extend all
37 terms of their proposal(s) to a specified date. Additional such extensions may possibly
38 be requested. If a bidder does not elect to extend the terms of his or her proposal
39 beyond the 90 calendar days following opening of proposals, or does not respond within
40 10 days to a request for an extension, that bidder's proposal will be deemed as having
41 expired 90 calendar days following opening of the proposals, and that bidder's proposal
42 will not be considered for award of the contract.
43

44 The successful bidder will be notified by letter, mailed to the address shown on his
45 proposal, that his bid has been accepted and that he has been awarded the contract.
46

47 The right is reserved to reject any or all proposals, to waive technicalities, to advertise
48 for new proposals, or to proceed to do this work otherwise, if in the judgment of the
49 awarding authorities the best interests of the Owner will be promoted thereby.
50

1
2 1.13 CANCELLATION OF AWARD
3

4 The awarding authority reserves the right to cancel the award of any contract at any
5 time before the execution of said contract by all parties without any liability against the
6 Owner.
7

8
9 1.14 CONTRACT BONDS
10

11 The bidder to whom award is made shall, within ten days, enter into a written contract
12 with the Owner. The bidder shall forfeit the proposal guarantee in case he does not
13 follow through with the contract within ten days after the contract is awarded.
14

15 The successful bidder shall furnish a faithful performance bond in the amount of 100
16 percent of the contract amount and a payment bond in the amount of 100 percent of the
17 contract amount; said bonds shall be submitted in triplicate. The successful bidder shall
18 also furnish, in addition to the performance and payment bonds, a warranty bond in the
19 amount equal to 10 percent of the final Contract price, secured from a surety company
20 admitted in the State of California and satisfactory to the County. Said bond shall
21 protect the County against the result of faulty material or workmanship and shall remain
22 in effect for a period of one year after the date the County's Notice of Completion and is
23 filed with the Clerk of the County of Fresno.
24

25 The payment bond shall contain provisions such that if the Contractor or his
26 subcontractors shall fail to pay (a) amounts due under the Unemployment Insurance
27 Code with respect to work performed under the contract, or (b) any amounts required to
28 be deducted, withheld and paid over to the Employment Development Department and
29 to the Franchise Tax Board from the wages of the employees of the Contractor and
30 subcontractors pursuant to Section 13020 of the Unemployment Insurance Code with
31 respect to such work and labor, then the surety will pay these amounts. In case suit is
32 brought upon the payment bond, the surety will pay a reasonable attorney's fee to be
33 fixed by the court.
34

35 The contract form is attached hereto for the Contractor's information only. Execution of
36 the contract by bidders will not be required until after the bid award is made. Liability
37 and Workers Compensation Insurance requirements shall be as set forth in the
38 Agreement.
39

40
41 1.15 BUILDERS RISK INSURANCE
42

43 Unless otherwise provided, the Contractor shall obtain and maintain in force Builder's
44 Risk insurance against loss or damage from all perils, including earthquake insurance.
45 The policy shall cover the entire structure on which the work of this contract is to be
46 done, up to the full insurable value thereof (except that if the contract is for remodeling,
47 alteration, repair, or maintenance, then the policy shall cover the value of the contract
48 therefore), including items of labor and materials connected therewith on the site,
49 materials in place or to be used as part of the permanent construction including
50 materials stored and partially paid for by the Owner as provided in Section 2.40, surplus

1 materials, shanties, protective fences, bridges, or temporary structures, miscellaneous
2 materials and supplies incident to the work, and such scaffolding, stagings, towers,
3 forms and equipment as are not owned or rented by the Contractor, the cost of which is
4 included in the cost of the work. EXCLUDED: This insurance does not cover any tools
5 owned by mechanics, any tools, equipment, scaffolding, staging, towers, and forms
6 owned or rented by the Contractor, the capital value of which is not included in the cost
7 of the work, or any structures erected for the Contractor's administration of the project.

8
9 All subcontractors shall be insured to the extent of their portion of the work under the
10 Contractor. The Contractor shall request, and is responsible to confirm with its insurer,
11 that the Owner and all subcontractors are named, both as additional insured and as
12 additional loss payees, on the Builder's Risk insurance policy. The Owner, Contractor
13 and all subcontractors waive all rights, each against the others, for damages arising
14 from perils covered by the insurance required under the terms of this article, except
15 such rights as they may have to the proceeds of the Builder's Risk insurance obtained
16 and maintained by the Contractor. The Contractor shall file a certificate of such
17 insurance with the Owner upon issuance of the policy, and with any subcontractors
18 upon its request.

19 20 1.16 POST-BID / PRE-AWARD INFORMATION

21
22 Within twenty four hours after bid opening, the three apparent low bidders shall submit a
23 detailed breakdown of their subcontractor list. Other bidders may also submit this
24 information in order to maintain their bid ranking.

25
26 Within seventy two hours after bid opening, the three apparent low bidders shall submit
27 a detailed breakdown of their bid to reflect costs associated with the various Work
28 Areas as reflected in Exhibits A and B included in this Section. Other bidders may also
29 submit this information in order to maintain their bid ranking.

30
31 Within eight calendar days after bid opening, the three apparent low bidders shall
32 submit the following information to the Engineer:

33
34 a. A cost distribution of the bid by work areas as defined in Exhibits A and B
35 included in this Section, with costs shown for major items of work as defined by either
36 the project specification index, Master Format, or other method as appropriate for the
37 project and approved by the Engineer.

38
39 b. The cost distribution shall distinguish between work to be done by the bidder's
40 own forces and work that will be subcontracted (including those who are to furnish
41 materials or equipment fabricated to a special design); all subcontractors shall be
42 named, regardless of the dollar amount of subcontracted work. Bidders' attention is
43 also directed to California Public Contract Code Section 4100 et seq regarding
44 subcontracting.

45
46 c. Any qualification statement, list of projects, or other material required by
47 specification documents for the purpose of evaluating the competency and
48 qualifications of either the apparent low bidder, or the listed subcontractors and
49 suppliers. Such qualification statements may be in addition to statements required to

1 be submitted with the proposal. Such qualification statements shall be supplemented
2 with additional material, if required by the Engineer.

3
4 d. The Engineer reserves the right to reject any proposed subcontractor, installer,
5 or supplier who cannot show satisfactory evidence of meeting the qualifications required
6 by the specification documents. In the event of such rejection, the apparent low bidder
7 shall, within five working days, submit the name and qualifications of a replacement
8 subcontractor, installer or supplier satisfactory to the Engineer. Such replacement
9 submittal shall be in accordance with all specification requirements.

10
11 e. No adjustment of bid prices shall be made in the event of such replacement.

12
13 This information may be used in the evaluation of bids. If the project is awarded, the
14 cost distribution will be used in determining amounts payable on progress payments
15 and final payment.

16
17 Other bidders, other than the three apparent low bidders may submit similar cost
18 distribution or qualification information, for the purpose of evaluating bids and maintain
19 their bid rankings.

20
21 Upon completion of the bid evaluation process, cost distributions or qualification
22 information submitted by other than the apparent low bidder will be returned upon
23 request.

24
25 The attention of each prospective bidder is directed to the requirements of article 3.17
26 of the Supplemental General Conditions, entitled 'Escrow Bid Documents.'

1
2
3
4 **Exhibit A – Cost Breakdown by Work Areas**
5 **(Refer to Exhibit B for Work Area Boundaries)**
6

7 The three apparent low bidders shall submit to the Owner within 72 hours of the bid
8 opening the base bid broken down by costs into the following categories (Work Areas).
9 The total amount shown in the Base Bid shall match the total costs distributed in the (3)
10 Work Areas shown below. Other bidders, other than the three apparent low bidders,
11 may submit similar cost distribution or qualification information for the purpose of
12 evaluating bids and to maintain their bid rankings.
13

14 **Work Area A**
15

16 Work inside the SB 1022 parcel. Reference bid drawing AS1.1
17
18 _____ Dollars \$ _____
19
20

21 **Work Area B**
22

23 Work in and about the Central Plant up to the SB 1022 property boundary. Tunnel
24 connection between West Annex Jail and Existing North Annex Jail. All work shown on
25 documents that occur within the existing detention facilities. Reference bid drawings
26 AS2.5, A2.1, C1.0, C2.0, C3.0, M1.0, M1.02, P1.0, P2.26, FP0.0 and E1.1 through
27 E1.5.
28
29 _____ Dollars \$ _____
30

31 **Work Area C**
32

33 Improvements within the Right of Way along L and Merced Streets and outside of the
34 SB 1022 boundary. Reference bid drawings C1.0, C2.0, C3.0, C4.0, C5.0, L1.0 and
35 L2.0.
36
37 _____ Dollars \$ _____
38
39
40
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50

1 **BIDDERS' CHECKLIST (CAPITAL IMPROVEMENT PROJECTS)**

2
3 The following checklist is offered for the bidders' information and use in preparing
4 the proposal but this checklist should not be considered all inclusive. This
5 checklist is not to be considered as part of the contract documents. Bidders are
6 cautioned that deleting or not submitting a form supplied in the bid documents
7 (even if the form does not require signature) may result in an irregular bid.
8

9 **PROPOSAL (Page 00 42 13-2)**

10
11 Bidder name on each sheet. Price for each item. Price for additive, deductive,
12 supplemental or alternate items. Make no additions such as "plus tax", "plus
13 freight", or conditions such as "less 2% if paid by 15th". Use ink or typewriter.
14 Acknowledge addenda.
15

16 **BID SECURITY FORM (Page 00 43 13-1)**

17
18 Indicate type of bid security provided.
19 Provide contract license information.
20

21 State business name and if business is a:

22
23 Corporation - list officers

24 Partnership - list partners

25 Joint Venture - list members; if members are corporations or
26 partnerships, list their officers or partners.

27 Individual - list Owner's name and firm name style
28

29 Signature of Bidder - Bid Must Be Signed!

30
31 Corporation - by an officer

32 Partnership - by a partner

33 Joint Venture - by a member

34 Individual - by the Owner

35 If signature is by a Branch Manager, Estimator, Agent, etc., the bid must
36 be accompanied by a power of attorney authorizing the individual to sign
37 bids, otherwise the bid may be rejected.
38

39 Business Address - Firm's Street Address

40
41 Mailing Address - P.O. Box or Street Address

42
43 Ten percent (10%) of the total amount bid (to include allowances and additive
44 items).
45

46 Type of Bid Security:

Cash - Not recommended; cash is deposited in a clearing account and is returned to bidders by County warrant. This process may take several weeks.

Cashier's or Certified Checks - Will be held until the bid is no longer under consideration. If submitted by a potential awardee, they will be returned when the contract bonds are submitted and approved.

Bid Bonds - Must be signed by the bidder and by the attorney-in-fact for the bonding company. Signature of attorney-in-fact should be notarized and the bond should be accompanied by bonding company's affidavit authorizing attorney-in-fact to execute bonds. An unsigned bid bond will be cause for rejection.

SUBCONTRACTOR LIST (Pages 00 43 36-1 to 00 43 36-6)

One firm for each type of work to be subcontracted. Fill out as completely as possible. Name, location and description of work is required.

NON COLLUSION AFFIDAVIT (Page 00 45 19-1)

Must be completed, signed, and returned with bid.

GUARANTY (Page 00 65 36-1)

Must be completed, signed, and returned with bid.

OTHER

If you remove the forms from the specifications booklet, please staple the pages together.

Make sure your bid envelope is sealed and complies with submittal requirements noted in Section 00 21 13.

If you mail your bid, allow time for postal delay. Bids received after the set time will be returned unopened.

End of Section 00 22 13

1 **PROPOSAL TO THE BOARD OF SUPERVISORS**
2
3 **C O U N T Y O F F R E S N O**
4
5
6
7
8
9

10 Facility: **Fresno County West Annex Jail**
11
12

13 Work to be performed: Work includes, but is not limited to: General Conditions,
14 temporary facilities, site preparation, demolition, on-site utilities, concrete, steel,
15 masonry, metals, casework, thermal moisture protection, doors and windows,
16 hardware, finishes, equipment, specialties, Mechanical, Plumbing, Electrical, fire
17 suppression, fire alarm, CCTV surveillance, telecommunications, energy
18 management system, tunnel to existing North Annex Jail, extension of utilities
19 from existing Central Plant, upgrade of existing Central Plant.
20
21

22 Building No.: **606**
23
24

25 Address: **2208 Merced St, Fresno, CA**
26
27

28 Contract No.: **16-S-04**
29
30

31 Fund / Subclass / Org / Account / Program or Memo Nos.:

32 0400 / 10045 / 8845 / 8150 / 91157 - SB 1022 (WAJ)

33 0400 / 10046 / 8846 / 8150 / 91158 – Leasehold Improvements (WAJ)

34 0400 / 10047 / 8847 / 8150 / 91159 – Central Plant / Tunnel (WAJ)

35 0400 / 10048 / 8848 / 8500 / 91160 – Intangibles (WAJ)

36 0400 / 10049 / 8849 / 8150 / 91161 – Non-Capitalizable Expend (WAJ)
37
38

39 In case of a discrepancy between words and figures, the words shall prevail.
40

41 If this proposal shall be accepted and the undersigned shall fail to contract, as
42 aforesaid, and to give the three bonds in the sums to be determined as aforesaid, with
43 surety satisfactory to the Awarding Authority, within ten (10) days after the award of
44 the contract, the Awarding Authority, at its option, may determine that the bidder has
45 abandoned the contract, and thereupon this proposal and the acceptance thereof shall
46 be null and void, and the forfeiture of such security accompanying this proposal shall
47 operate and the same shall be the property of the Owner.
48

49 The undersigned, as bidder declares that all Addenda issued with respect to this bid
50 have been received and incorporated into this Proposal. The bidder's signature on
51 this Proposal also constitutes acknowledgement of all addenda.
52

53 The undersigned, as bidder, declares that the only persons, or parties interested in
54 this proposal as principals are those named herein; that this proposal is made without

CONTRACT NO. 16-S-04

**PROPOSAL
00 42 13-1**

WEST ANNEX JAIL

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collusion with any other person, firm or corporation; that he has carefully examined the location of the proposed work, the annexed proposed form of contract, and the plan therein referred to; and he proposes and agrees if this proposal is accepted, that he will contract with the County of Fresno to provide all necessary machinery, tools, apparatus and other means of construction, and to do all the work and furnish all the materials specified in the contract in the manner and time therein prescribed, and according to the requirements of the Engineer as therein set forth, and that he will take in full payment therefore the following lump sum price, to-wit:

BIDDER: Bernards Bros. Inc.

Contract No.: 16-S-04	
Project: Fresno County West Annex Jail	
Lump Sum Price Written In Words	
Base Bid - Base bid work includes, but is not limited to: General Conditions, Supplemental General Conditions, Demolition, Extension of existing on-site utilities, Grading, Site Work, Irrigation, Concrete, Masonry, Metals, Architectural Wood Work, Thermal and Moisture Protection, Doors and Windows, Hardware, Finishes, Equipment, Specialties, Mechanical, Plumbing, Fire Suppression, Fire Alarm, Vandal Alarm, CCTV Surveillance, Electrical, Telecommunications, Audio-Visual, and Energy Management Electronics.	
<u>EIGHTY MILLION SIX HUNDRED AND FIFTY EIGHT THOUSAND</u> Dollars	<u>\$ 80,658,000</u>
Additive Bid 1 - Added planters/seat walls as indicated on Sheets C3.0A, L1.0A, L2.0A, A14.0, A14.1 and A14.2.	
<u>ONE HUNDRED & THREE THOUSAND</u> Dollars	<u>\$ 103,000</u>
Additive Bid 2 - Prime Coat painting of all inmate cells in lieu of base specification per Section "09 96 03 - Special Coatings".	
<u>FOUR HUNDRED & THIRTY THOUSAND</u> Dollars	<u>\$ 430,000</u>
Additive Bid 3 - Bullet resistive glazing at Lobby Reception as shown on Sheet A14.3 and per Section "13 07 00 - Bullet Resistant Transaction Barriers" in lieu of tempered glass and aluminum base bid as indicated.	
<u>SEVENTY - THREE THOUSAND</u> Dollars	<u>\$ 73,000</u>

CONTRACT NO. 16-S-04

PROPOSAL
00 42 13-3

WEST ANNEX JAIL

BIDDER: Bernards Bros. Inc.

Additive Bid 4 – Added water management system at all inmate cells and inmate showers per Section "22 04 15 – Water Management System".

ONE HUNDRED & NINETY THOUSAND Dollars \$ 190,000

Additive Bid 5 – Trane Chiller (County Preferred Vendor). Note: if base "low" bid is Trane, this cost would be reflected as \$0.

ONE THOUSAND Dollars \$ 1,000

Additive Bid 6 – Cleaver Brooks Boilers (County Preferred Vendor). Note: if base "low" bid is Cleaver Brooks, this cost would be reflected as \$0.

ONE THOUSAND Dollars \$ 1,000

Allowance - CCTV System (Reference Section 01 21 00)

Three hundred thousand Dollars \$ 300,000

6) Total Bid (Base Bid + Additive Bids #1 + #2 + #3 + #4 + #5+ #6 + Allowance)

EIGHTY-ONE MILLION SEVEN HUNDRED & FIFTY-SIX ^{THOUSAND} Dollars \$ 81,756,000

Acknowledgement of Addendum:

Addendum No. <u>1</u>	Dated: <u>08/31/2017</u>
Addendum No. <u>2</u>	Dated: <u>09/19/2017</u>
Addendum No. <u>3</u>	Dated: <u>10/12/2017</u>
Addendum No. <u>4</u>	Dated: <u>10/16/2017</u>
Addendum No. _____	Dated: _____
Addendum No. _____	Dated: _____
Addendum No. _____	Dated: _____
Addendum No. _____	Dated: _____

1 PROJECT: FRESNO COUNTY WEST ANNEX JAIL

2
3 CONTRACT: 16-S-04

4
5 Accompanying this proposal is security (check one only) in amount equal to at least ten
6 percent (10%) of the total amount of the bid:

7
8 Bid Bond (); Certified Check (); Cashier's Check (); Cash (\$_____)

9
10 The names of all persons interested in the foregoing proposal as principals are as
11 follows:

12
13 IMPORTANT NOTICE: If bidder or other interested person is a corporation, state legal
14 name of corporation, also names of the president, secretary, treasurer and manager
15 thereof; if a co-partnership, state true name of firm, also names of all individual co-
16 partners composing firm; if bidder or other interested person is an individual, state first
17 and last name in full.

18
19 FIRM NAME _____

20
21
22
23
24
25 Licensed in accordance with an act providing for the registration of Contractors,

26
27 Class _____ License No. _____ Expires _____

28
29
30 (Furnishing Contractor License information as part of this proposal is optional and is
31 requested to facilitate verification of licensure)

32
33
34
35 _____
36 Signature of Bidder

_____ Dated

37 NOTE: If bidder is a corporation, the legal name of the corporation shall be set forth
38 above together with the signature of the officer or officers authorized to sign contracts
39 on behalf of the corporation; if bidder is a co-partnership, the true name of the firm shall
40 be set forth above together with the signature of the partner or partners authorized to
41 sign contracts on behalf of the co-partnership; and if bidder is an individual, his
42 signature shall be placed above. If signature is by an agent, other than an officer of a
43 corporation or a member of a partnership, a Power of Attorney must be on file with the
44 Owner prior to opening bids or submitted with the bid; otherwise, the bid will be
45 disregarded as irregular and unauthorized.

46
47 BUSINESS ADDRESS: _____
48 _____ Zip Code

49 MAILING ADDRESS: _____
50 _____ Zip Code

51
52 BUSINESS PHONE: (____) _____ FAX NUMBER: (____) _____

53
54 End Section 00 43 13

55
CONTRACT NO. 16-S-04

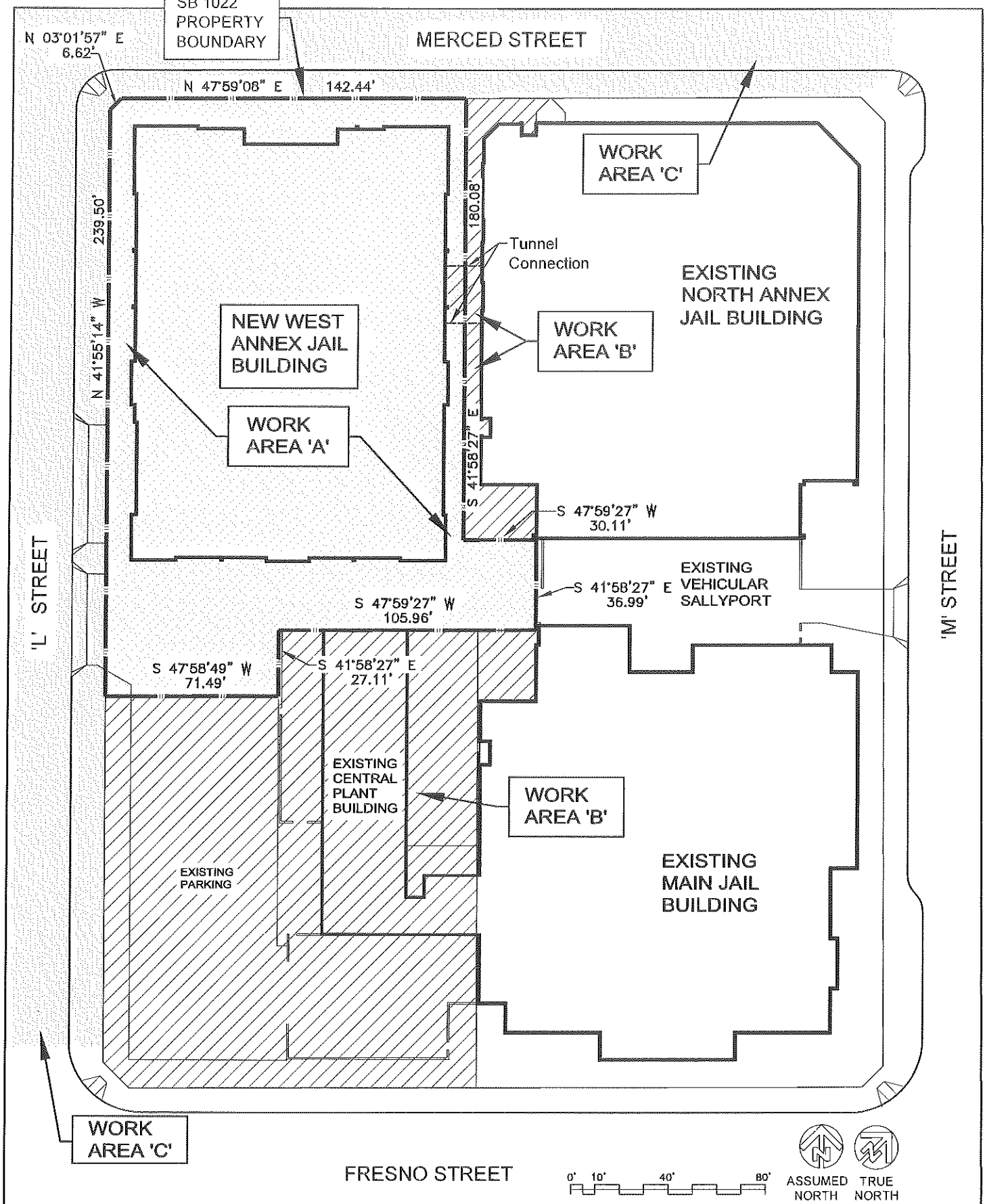
BID SECURITY FORM
00 43 13-1

WEST ANNEX JAIL

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EXHIBIT 'B'



Fresno County Detention Facilities Site Plan

(NOT TO SCALE)

CONTRACT NO. 16-S-04

INSTRUCTIONS TO BIDDERS
00 21 13-9

WEST ANNEX JAIL

PROJECT: FRESNO COUNTY WEST ANNEX JAIL

CONTRACT: 16-S-04

BIDDER: Bernards Bros. Inc.

SUBCONTRACTORS

The following named subcontractor(s) will perform work or labor, or otherwise render service to the general contractor in or about the construction of the work or improvement, in an amount in excess of **one-half of one percent** of the total bid presented herewith. Please fill out as completely as possible when submitting your bid. Use subcontractor's business name style as registered with the License Board. Each listed subcontractor's name, location of business and description of work, and both their contractor's license number and public works contractor registration number are REQUIRED, by Section 4104 of the California Public Contract Code, to be submitted prior to bid opening. (The "location of business" must specify the city in which the subcontractor's business is located, and the state if other than California.) All other requested information shall be submitted, either with the bid or within 24 hours after bid opening.

FAILURE TO LIST SUBCONTRACTORS AS DIRECTED MAY RENDER THE BID NON-RESPONSIVE, OR MAY RESULT IN ASSESSMENT OF A PENALTY AGAINST THE BIDDER IN ACCORDANCE WITH SECTION 4110 OF THE CALIFORNIA PUBLIC CONTRACT CODE."

SUBCONTRACTOR: _____

Business Address: _____

Class _____ License No. _____ DIR Registration No. _____

Item No. or Description of Work _____

Dollar Amount or Percentage of Total Bid _____

Email Address _____

SUBCONTRACTOR: Mass X

Business Address: 2524 N. Fordham Ave., Fresno, CA 93727

Class A License No. 902334 DIR Registration No. 1000005550

Item No. or Description of Work EARTHWORK

Dollar Amount or Percentage of Total Bid 1.349%

Email Address massx2@hotmail.com

SUBCONTRACTOR: Malcolm Drilling Co.

Business Address: 4926 N. Azusa Canyon Road, Irwindale, CA 91706

Class C57,C61,D09,A License No. 259543 DIR Registration No. 1000000389

Item No. or Description of Work SHORING

Dollar Amount or Percentage of Total Bid 0.879%

Email Address brockn@malcolmdrilling.com

PROJECT: FRESNO COUNTY WEST ANNEX JAIL

CONTRACT: 16-S-04

BIDDER: Bernards Bros. Inc.

- 4 1 **SUBCONTRACTOR:** _____
2 Business Address: _____
3 Class _____ License No. _____ DIR Registration No. _____
4 Item No. or Description of Work _____
5 Dollar Amount or Percentage of Total Bid _____
6 Email Address _____
7
- 5 8 **SUBCONTRACTOR:** _____
9 Business Address: _____
10 Class _____ License No. _____ DIR Registration No. _____
11 Item No. or Description of Work _____
12 Dollar Amount or Percentage of Total Bid _____
13 Email Address _____
14
- 6 15 **SUBCONTRACTOR:** CMC Rebar
16 Business Address: 2990 E. Annadale Ave., Fresno, CA 93725
17 Class C50 License No. 778010 DIR Registration No. 100000298
18 Item No. or Description of Work _____ **REBAR**
19 Dollar Amount or Percentage of Total Bid 3.110%
20 Email Address jason.thompson@cmc.com
21
- 7 22 **SUBCONTRACTOR:** McGuire Contracting Inc.
23 Business Address: 16579 Slover Ave., Fontana, CA 92337
24 Class C-8 License No. 818119 DIR Registration No. 1000006002
25 Item No. or Description of Work _____ **STRUCTURAL CONCRETE**
26 Dollar Amount or Percentage of Total Bid 10.149%
27 Email Address manny@mcguirecontracting.com
28
- 8 29 **SUBCONTRACTOR:** Structure Cast
30 Business Address: 8261 McCutchen Road, Bakersfield, CA 93311
31 Class C-8, C13, B License No. 774870 DIR Registration No. 1000000308
32 Item No. or Description of Work _____ **PRE-CAST CONCRETE**
33 Dollar Amount or Percentage of Total Bid 2.082%
34 Email Address anna@structurecast.com
35
36
37
38
39

PROJECT: FRESNO COUNTY WEST ANNEX JAIL

CONTRACT: 16-S-04

BIDDER: Bernards Bros. Inc.

- 9 1 **SUBCONTRACTOR:** Bratton Masonry Inc.
2 Business Address: 2763 N. Argyle Ave., Fresno, CA 93727
3 Class C-29 License No. 274525 DIR Registration No. 1000005266
4 Item No. or Description of Work MASONRY & BRICK VENEER
5 Dollar Amount or Percentage of Total Bid 4.409%
6 Email Address chuck@brattonmasonry.com
7
- 10 8 **SUBCONTRACTOR:** _____
9 Business Address: _____
10 Class _____ License No. _____ DIR Registration No. _____
11 Item No. or Description of Work _____
12 Dollar Amount or Percentage of Total Bid _____
13 Email Address _____
14
- 11 15 **SUBCONTRACTOR:** _____
16 Business Address: _____
17 Class _____ License No. _____ DIR Registration No. _____
18 Item No. or Description of Work _____
19 Dollar Amount or Percentage of Total Bid _____
20 Email Address _____
21
- 12 22 **SUBCONTRACTOR:** Nuno Iron & Mfg. Inc.
23 Business Address: 315 Bitterwater Road, King City, CA 93930
24 Class C23, C51, B License No. 757760 DIR Registration No. 1000007597
25 Item No. or Description of Work STRUCTURAL STEEL & MISC. METALS
26 Dollar Amount or Percentage of Total Bid 2.944%
27 Email Address jr@nunoiron.com
28
- 13 29 **SUBCONTRACTOR:** Four C's Construction
30 Business Address: 1560 H Street, Fresno, CA 93721
31 Class C43 License No. 908294 DIR Registration No. 1000002824
32 Item No. or Description of Work SHEET METAL
33 Dollar Amount or Percentage of Total Bid 0.432%
34 Email Address preston@fourcsmetal.com
35
36
37
38
39

PROJECT: FRESNO COUNTY WEST ANNEX JAIL

CONTRACT: 16-S-04

BIDDER: Bernards Bros. Inc.

- 14 1 **SUBCONTRACTOR:** _____
2 Business Address: _____
3 Class _____ License No. _____ DIR Registration No. _____
4 Item No. or Description of Work _____
5 Dollar Amount or Percentage of Total Bid _____
6 Email Address _____
7
- 15 8 **SUBCONTRACTOR:** _____
9 Business Address: _____
10 Class _____ License No. _____ DIR Registration No. _____
11 Item No. or Description of Work _____
12 Dollar Amount or Percentage of Total Bid _____
13 Email Address _____
14
- 16 15 **SUBCONTRACTOR:** Tarleton & Son
16 Business Address: 3562 S. Elm Ave., Fresno, CA 93706
17 Class B,C-2,C-9,C35 License No. 342341 DIR Registration No. 1000004368
18 Item No. or Description of Work METAL STUD FRAMING / DRYWALL
19 Dollar Amount or Percentage of Total Bid 2.296%
20 Email Address DHolland@tarltonandson.com
21
- 17 22 **SUBCONTRACTOR:** CML Security LLC
23 Business Address: 400 Young Ct., Unit 1, Erie, CO 80516
24 Class B, C10 License No. 1015730 DIR Registration No. 1000040451
25 Item No. or Description of Work DETENTION EQUIPMENT
26 Dollar Amount or Percentage of Total Bid 20.313%
27 Email Address jjramsey@cmlsecurity.us
28
- 18 29 **SUBCONTRACTOR:** CML Security LLC
30 Business Address: 400 Young Ct., Unit 1, Erie, CO 80516
31 Class B, C10 License No. 1015730 DIR Registration No. 1000040451
32 Item No. or Description of Work SECURITY ELECTRONICS (DIV 28)
33 Dollar Amount or Percentage of Total Bid Included w/Detention Equip.
34 Email Address jjramsey@cmlsecurity.us
35
36
37
38
39

PROJECT: FRESNO COUNTY WEST ANNEX JAIL

CONTRACT: 16-S-04

BIDDER: Bernards Bros. Inc.

19 1 **SUBCONTRACTOR:** _____
2 Business Address: _____
3 Class _____ License No. _____ DIR Registration No. _____
4 Item No. or Description of Work _____
5 Dollar Amount or Percentage of Total Bid _____
6 Email Address _____
7

20 8 **SUBCONTRACTOR:** New England Sheet Metal & Mechanical Co.
9 Business Address: 2731 S. Cherry Ave., Fresno, CA 93706
10 Class C20, C36 License No. 433674 DIR Registration No. 1000001449
11 Item No. or Description of Work _____ **PLUMBING**
12 Dollar Amount or Percentage of Total Bid Included w/HVAC
13 Email Address keynaud@nesmw.com
14

21 15 **SUBCONTRACTOR:** New England Sheet Metal & Mechanical Co.
16 Business Address: 2731 S. Cherry Ave., Fresno, CA 93706
17 Class C20, C36 License No. 433674 DIR Registration No. 1000001449
18 Item No. or Description of Work _____ **HVAC**
19 Dollar Amount or Percentage of Total Bid 19.081%
20 Email Address keynaud@nesmw.com
21

22 22 **SUBCONTRACTOR:** Sebastian Corp.
23 Business Address: 7600 N. Palm Ave., Fresno, CA 93711
24 Class C10 License No. 630669 DIR Registration No. 1000001876
25 Item No. or Description of Work _____ **ELECTRICAL**
26 Dollar Amount or Percentage of Total Bid 4.832%
27 Email Address polivarez@sebastiancorp.com
28

23 29 **SUBCONTRACTOR:** ABG Caulking Contractors
30 Business Address: PO Box 544, Goodlettsville, TN 37070
31 Class C33 License No. 526169 DIR Registration No. 1000016206
32 Item No. or Description of Work _____ **JOINT SEALANTS**
33 Dollar Amount or Percentage of Total Bid 1.063%
34 Email Address arles@abgcaulking.com
35
36
37
38
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PROJECT: FRESNO COUNTY WEST ANNEX JAIL

CONTRACT: 16-S-04

BIDDER: Bernards Bros. Inc.

24 1 **SUBCONTRACTOR:** _____
2 Business Address: _____
3 Class _____ License No. _____ DIR Registration No. _____
4 Item No. or Description of Work _____
5 Dollar Amount or Percentage of Total Bid _____
6 Email Address _____
7

25 8 **SUBCONTRACTOR:** KONE, Inc.
9 Business Address: 3727 Bradview Dr., Sacramento, CA 95827
10 Class C11 License No. 179166 DIR Registration No. 1000003806
11 Item No. or Description of Work _____ **ELEVATORS**
12 Dollar Amount or Percentage of Total Bid 3.119%
13 Email Address daniel.shaw@kone.com
14

26 15 **SUBCONTRACTOR:** Jerico Fire Protection Co. Inc.
16 Business Address: 1380 N. Hulbert Ave., Fresno, CA 95728
17 Class C16 License No. 548570 DIR Registration No. 1000000984
18 Item No. or Description of Work _____ **FIRE SPRINKLERS**
19 Dollar Amount or Percentage of Total Bid 1.265%
20 Email Address bruce@jericofire.com
21

27 22 **SUBCONTRACTOR:** Pecoraro, Inc.
23 Business Address: 1728 India St., San Diego, CA 92101
24 Class C33 License No. 868925 DIR Registration No. 1000003195
25 Item No. or Description of Work _____ **PAINTING**
26 Dollar Amount or Percentage of Total Bid 1.106%
27 Email Address onofrio@pecoraroinc.com
28

28 29 **SUBCONTRACTOR:** _____
30 Business Address: _____
31 Class _____ License No. _____ DIR Registration No. _____
32 Item No. or Description of Work _____
33 Dollar Amount or Percentage of Total Bid _____
34 Email Address _____
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PROJECT: FRESNO COUNTY WEST ANNEX JAIL

CONTRACT: 16-S-04

BIDDER: Bernards Bros. Inc.

- 29 1 **SUBCONTRACTOR:** Prime Coat Coating Systems
2 Business Address: 405 Oakwood Ave., Waukegan, IL 60085
3 Class C33 License No. 952144 DIR Registration No. 1000038784
4 Item No. or Description of Work 99602 Cell Coatings ALTERNATE #2 ONLY
5 Dollar Amount or Percentage of Total Bid 0.761%
6 Email Address chrispullos@yahoo.com
7
30 8 **SUBCONTRACTOR:** _____
9 Business Address: _____
10 Class _____ License No. _____ DIR Registration No. _____
11 Item No. or Description of Work _____
12 Dollar Amount or Percentage of Total Bid _____
13 Email Address _____
14
31 15 **SUBCONTRACTOR:** _____
16 Business Address: _____
17 Class _____ License No. _____ DIR Registration No. _____
18 Item No. or Description of Work _____
19 Dollar Amount or Percentage of Total Bid _____
20 Email Address _____
21
32 22 **SUBCONTRACTOR:** _____
23 Business Address: _____
24 Class _____ License No. _____ DIR Registration No. _____
25 Item No. or Description of Work _____
26 Dollar Amount or Percentage of Total Bid _____
27 Email Address _____
28
33 29 **SUBCONTRACTOR:** _____
30 Business Address: _____
31 Class _____ License No. _____ DIR Registration No. _____
32 Item No. or Description of Work _____
33 Dollar Amount or Percentage of Total Bid _____
34 Email Address _____
35
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38 End of Section 00 43 36

1 **PROJECT: FRESNO COUNTY WEST ANNEX JAIL**

2
3 **CONTRACT: 16-S-04**

4
5 To the Board of Supervisors, County of Fresno:

6
7 **NONCOLLUSION AFFIDAVIT**

8
9 TO BE EXECUTED BY BIDDER AND SUBMITTED WITH BID *

10
11 Jerry Higgins

12 _____
13 (Printed or Typed Name)

14
15 being first duly sworn, deposes and says that he or she is

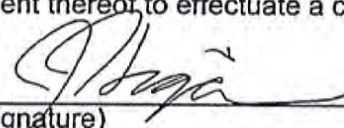
16
17 Vice President

18 _____
19 (Owner, Partner, Corporate Officer (list title), Co-Venturer)

20 of Bernards Bros. Inc.

21 _____
22 (Bidding Entity)

23 the party making the foregoing bid that the bid is not made in the interest of, or on
24 behalf of, any undisclosed person, partnership, company, association, organization, or
25 corporation; that the bid is genuine and not collusive or sham; that the bidder has not
26 directly or indirectly induced or solicited any other bidder to put in a false or sham bid,
27 and has not directly or indirectly colluded, conspired, connived, or agreed with any
28 bidder or anyone else to put in a sham bid, or that anyone shall refrain from bidding;
29 that the bidder has not in any manner, directly or indirectly, sought by agreement,
30 communication, or conference with anyone to fix the bid price of the bidder or any other
31 bidder, or to fix any overhead, profit, or cost element of the bid price, or of that of any
32 other bidder, or to secure any advantage against the public body awarding the contract
33 of anyone interested in the proposed contract; that all statements contained in the bid
34 are true; and, further, that the bidder has not, directly or indirectly, submitted his or her
35 bid price or any breakdown thereof, or the contents thereof, or divulged information or
36 data relative thereto, or paid, and will not pay, any fee to any corporation, partnership,
37 company association, thereto, or paid, and will not pay, any fee to any corporation,
38 partnership, company association, organization, bid depository, or to any member or
39 agent thereof to effectuate a collusive or sham bid.

40
41 
42 _____
43 (Signature)

10/20/2017

(Dated)

44
45 (Title 23 United States Code Section 112)

46
47 (Calif Public Contract Code Section 7106; Stats.1988, c. 1548, Section 1.)

48
49 * NOTE: Completing, signing, and returning the Noncollusion Affidavit is a required part
50 of the Proposal. Bidders are cautioned that making a false certification may subject the
51 certifier to criminal prosecution.

52
53 End Section 00 45 19

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AGREEMENT

THIS AGREEMENT made the 19th day of January, at Fresno, in Fresno County, California, by and between Bernards Bros. Inc. hereinafter called the Contractor, and the County of Fresno hereinafter called the Owner.

WITNESSETH: That the Contractor and the Owner, for the consideration hereinafter named, agree as follows:

ARTICLE I. The Contractor agrees to furnish all labor and materials, including tools, implements, and appliances required, and to perform all the work in a good and workmanlike manner, free from any and all liens and claims of mechanics, material men, subcontractors, artisans, machinists, teamsters, draymen and laborers required for:

CONTRACT NO. 16-S-04

Located at 2208 Merced Street, Fresno, California, 93721 all in strict compliance with the plans, drawings and specifications therefore prepared by the Director of the Fresno County Department of Public Works and Planning and his authorized representatives, hereinafter called the Engineer, and other contract documents relating thereto.

ARTICLE II. The Contractor and the Owner agree that the Advertisement (Notice to Contractors), the Wage Scale, the Proposal hereto attached, the Instructions to Bidders, the General Conditions and Supplemental General Conditions of the contract, the Specifications, the Drawings and the Addenda and Bulletins thereto, the Contract Bonds and Certificates of Liability and Workers Compensation Insurance, and the Contract Change Orders, together with this Agreement, form the Contract Documents, and they are as fully a part of the contract as if hereto attached or herein repeated. The specifications and drawings are intended to cooperate so that any work exhibited in the drawings and not mentioned in the specifications, or vice versa, is to be executed the same as if both are mentioned in the specifications and set forth in the drawings, to the true intent and meaning of the said drawings and specifications when taken together. But no part of said specifications that is in conflict with any portion of this Agreement, or that is not actually descriptive of the work to be done thereunder, or of the manner in which the said work is to be executed, shall be considered as any part of this Agreement, but shall be utterly null and void, and anything that is expressly stated, delineated or shown in or upon the specifications or drawings shall govern and be followed, notwithstanding anything to the contrary in any other source of information or authority to which reference may be made.

ARTICLE III. The Contractor agrees that the work under the contract shall be completed as determined by the Owner within eight hundred eighty-nine (889) calendar days from the date shown in the Notice to Proceed. Time of performance shall be deemed as of the essence hereof and it is agreed that actual damages to the owner from any delay in completion beyond the date provided for herein, or any extension thereof until the work is completed or accepted, shall be all provable damages plus liquidated damages in the amount of **Two Thousand Five Hundred dollars (\$2,500) per day**; that said liquidated damage was arrived at by a studied estimate of loss to the Owner in the event of a delay considering the following damage items which are extremely difficult or impossible to determine: Additional construction expense resulting from delay of completion including, but not limited to, engineering, inspection, rental and utilities; provided, however, the Owner may conditionally accept the work and

1 occupy and use the same if there has been such a degree of completion as shall in its
2 opinion render the same safe, fit and convenient for the use for which it is intended and
3 in such cases the Contractor and Surety shall not be charged for liquidated damages for
4 any period subsequent to such conditional acceptance and occupation by the Owner but
5 Owner may assess actual damages caused by failure of total completion during such
6 period. The time during which the Contractor is delayed in said work by the acts or
7 neglects of the Owner or its employees or those under it by contract or otherwise, or by
8 the acts of God which the Contractor could not have reasonably foreseen and provided
9 for, or by storms and inclement weather which delays the work, or by any strikes,
10 boycotts, or like obstructive action by employee or labor organizations, or by any general
11 lockouts or other defensive action by employers, whether general, or by organizations
12 of employers, shall be added to the time for completion as aforesaid.
13

14
15 **ARTICLE IV.** The Owner agrees to pay the Contractor **EIGHTY-ONE MILLION SEVEN**
16 **HUNDRED FIFTY SIX THOUSAND DOLLARS (\$81,756,000)** in current funds for the
17 performance of the contract, which sum is computed as follows:
18

19 **[TOTAL OF BIDS FOR WORK AREAS A, B AND C AND ADDITIVE BIDS 1, 2, 3, 4,**
20 **5, 6 + ALLOWANCE]**

21 **[Work Area A will include Additive Alternates 1, 2, 3 and 4. Work Area B will**
22 **include Additive Alternates 5 and 6.]**
23

24 and to make payments on account thereof as provided in the General Conditions.
25
26

27 **ARTICLE V.** The Contractor and the Owner agree that changes in this Agreement or in
28 the work to be done under this Agreement shall become effective only when written in
29 the form of a supplemental agreement or change order and approved and signed by the
30 Owner and the Contractor. It is specifically agreed that the Owner shall have the right
31 to request any alterations, deviations, reductions or additions to the contract or the plans
32 or specifications or any of them, and the amount of the cost thereof shall be added to or
33 deducted from the amount of the contract price aforesaid by fair and reasonable
34 valuations thereof.
35

36 And this contract shall be held to be completed when the work is finished in accordance
37 with the original plans and specifications as amended by such changes. No such change
38 or modification shall release or exonerate any surety upon any guaranty or bond given
39 in connection with this contract.
40
41

42 **ARTICLE VI.** In the event of a dispute between the Owner or Engineer and the
43 Contractor as to an interpretation of any of the specifications or as to the quality of
44 sufficiency of material or workmanship, the decision of the Engineer shall for the time
45 being prevail and the Contractor, without delaying the job, shall proceed as directed by
46 the Engineer without prejudice to a final determination by negotiation, arbitration by
47 mutual consent or litigation and should the Contractor be finally determined to be either
48 wholly or partially correct, the Owner shall reimburse him for any added costs he may
49 have incurred by reason of work done or material supplied beyond the terms of the
50 contract as a result of complying with the Engineer's directions as aforesaid. In the event
51 the Contractor shall neglect to prosecute the work properly or fail to perform any
52 provisions of this contract, the Owner, after three days' written notice to the Contractor,
53 may, without prejudice to any other remedy it may have, make good such deficiencies
54 and may deduct the cost thereof from the payment then or thereafter due to the
55 Contractor, subject to final settlement between the parties as in this paragraph
56 hereinabove provided.

1
2
3 **ARTICLE VII.** If the Contractor should be adjudged a bankrupt, or if he should make a
4 general assignment for the benefit of his creditors, or if a receiver should be appointed
5 on account of his insolvency, or if he or any of his subcontractors should persistently
6 violate any of the provisions of the contract, or if he should persistently or repeatedly
7 refuse or should fail, except in cases for which extension of time is provided, to supply
8 enough properly skilled workmen or proper material, or if he should fail to make prompt
9 payment to subcontractors or for material or labor or persistently disregard laws,
10 ordinances or the instructions of the Engineer, then the Owner may, upon the certificate
11 of the Engineer, when sufficient cause exists to justify such action, serve written notice
12 upon the Contractor and his surety of its intention to terminate the contract, such notice
13 to contain the reasons for such intention to terminate the contract, and unless within five
14 days after the serving of such notice, such violations shall cease and satisfactory
15 arrangements for correction thereof be made, the contract shall, upon the expiration of
16 said five days, cease and terminate.

17
18 In the event of any such termination, the Owner shall immediately serve written notice
19 thereof upon the surety and the Contractor, and the surety shall have the right to take
20 over and perform the contract, provided, however, that if the surety within ten (10) days
21 after the serving upon it of notice of termination does not give the Owner written notice
22 of its intention to take over and perform the contract or does not commence performance
23 thereof within the ten (10) days stated above from the date of the serving of such notice,
24 the Owner may take over the work and prosecute the same to completion by contract or
25 by any other method it may deem advisable for the account and at the expense of the
26 Contractor, and the Contractor and his surety shall be liable to the Owner for any excess
27 cost occasioned the Owner thereby, and in such event the Owner may without liability
28 for so doing, take possession of and utilize in completing the work, such materials,
29 appliances, plant and other property belonging to the Contractor as may be on the site
30 or the work and necessary therefore. In such case, the Contractor shall not be entitled
31 to receive any further payment until the work is finished.

32
33 If the unpaid balance of the contract price shall exceed the expense of finishing the work,
34 including compensation for additional managerial and administrative services, such
35 excess shall be paid to the Contractor. If such expense shall exceed such unpaid
36 balance, the Contractor shall pay the difference to the Owner. The expense incurred by
37 the Owner as herein provided, and damage incurred through the Contractor's default,
38 shall be certified by the Engineer.

39
40
41 **ARTICLE VIII.** The Contractor and his subcontractors shall comply with Sections 1770
42 – 1780 of the California Labor Code and the provisions of Sections 2.52 and 2.55 of the
43 General Conditions concerning the payment of wages to all workers and mechanics,
44 and the employment and payment of apprentices by the Contractor or any subcontractor
45 for all work performed on the Project.

46
47
48 **ARTICLE IX.** The Contractor and his subcontractors shall comply with Sections 1810
49 to 1815 of the California Labor Code and the provisions of Section 2.51 of the General
50 Conditions, concerning hours of work and payment of overtime compensation for all
51 work performed on the Project.

52
53 **ARTICLE X.** To the fullest extent permitted by law, Contractor agrees to and shall
54 indemnify, save, hold harmless and at County's request, defend County and its officers,
55 agents and employees, and the Engineer and Construction Manager and their respective
56 officers, agents and employees, from any and all costs and expenses, attorney fees and

1 court costs, damages, liabilities, claims and losses occurring or resulting to County, the
2 Engineer or Construction Manager in connection with the performance, or failure to
3 perform, by Contractor, its officers, agents or employees under this Agreement, and from
4 any and all costs and expenses, attorney fees and court costs, damages, liabilities,
5 claims and losses occurring or resulting to any person, firm or corporation who may be
6 injured or damaged by the performance, or failure to perform, of Contractor, its officers,
7 agents or employees under this Agreement. In addition, Contractor agrees to indemnify
8 County for Federal, State of California and/or local audit exceptions resulting from non-
9 compliance herein on the part of Contractor.

10
11 In any and all claims against the County, the Engineer or Construction Manager, or any
12 of their respective officers, agents or employees, initiated by any employee of the
13 Contractor, any Subcontractor, anyone directly or indirectly employed by any of them or
14 anyone for whose acts any of them may be liable, the indemnification obligation set forth
15 in the immediately preceding paragraph shall not be limited in any way by any limitation
16 on the amount or type of damages, compensation or benefits payable by or for the
17 Contractor or any Subcontractor under workmen's compensation acts, disability benefit
18 acts or other employee benefit acts.

19
20
21 **ARTICLE XI.** Without limiting the Owner's right to obtain indemnification from Contractor
22 or any third parties, Contractor, at its sole expense, in accordance with the provisions of
23 Section 2.40 of the General Conditions, shall maintain in full force and effect the following
24 insurance policies throughout the term of this Agreement, excepting only those policies
25 for which a longer term is specified:

26
27
28 A. Course of Construction (Builder's All Risk) Insurance, with scope and amount of
29 coverage as specified in Section 2.40 of the General Conditions.

30
31 B. Commercial General Liability Insurance, with scope and amount of coverage
32 as specified in Section 2.40 of the General Conditions.

33
34 C. Automobile Liability Insurance, with scope and amount of coverage as specified in
35 Section 2.40 of the General Conditions.

36
37 D. Professional Liability Insurance, with scope and amount of coverage as specified in
38 Section 2.40 of the General Conditions.

39
40 E. Worker's Compensation Insurance, with scope and amount of coverage as specified
41 in Section 2.40 of the General Conditions.

42
43 The Certificate of Insurance shall be issued in triplicate, to the COUNTY OF FRESNO,
44 and all other participating agencies, whether or not said agencies are named herein,
45 who contribute to the cost of the work or have jurisdiction over areas in which the work
46 is to be performed and all officers and employees of said agencies while acting within
47 the course and scope of their duties and responsibilities.

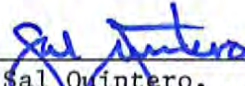
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50 **ARTICLE XII.** The Contractor represents that he has secured the payment of Workers
51 Compensation in compliance with the provisions of the Labor Code of the State of
52 California and Paragraphs B.3, C.3 and D.4 of Section 2.40 of the General Conditions,
53 and that he will continue so to comply with such statutory and contractual provisions for
54 the duration and entirety of the performance of the work contemplated herein.

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2
3 This Contract, 16-S-04 was conditionally awarded by the Board of Supervisors on
4 November 14, 2017, which condition subsequently was satisfied by receipt of Notice of
5 Approval from the State of California Department of Finance. This contract has been
6 reviewed by the Department of Public Works and Planning and is in proper order for
7 signature by the Chairman of the Board of Supervisors.
8
9

10
11 COUNTY OF FRESNO
12 (Owner)

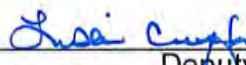
BERNARDS BROS. INC
(Contractor)

95-2920045
Taxpayer Federal I.D. No.

13
14
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16
17 By: 
18 Sal Quintero,
19 Chairman, Board Of Supervisors

By: 
Title: VP

20
21
22 **ATTEST:**
23 Bernice E. Seidel
24 Clerk to the Board of Supervisors
25 County of Fresno, State of California
26
27

28
29 By: 
30 Deputy
31

32 End Section 00 52 13
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CONTRACTOR REQUEST FOR CLARIFICATION

Requests for clarification of the plans and specifications regarding this project shall be submitted on this form. Any change or clarification of the project plans and specifications shall be in the form of a written addendum issued to planholders of record. Contractors requesting clarification shall complete the following:

Email form to: wajbidding@kitchell.com

FIRM NAME: _____

SENDER / CONTACT NAME: _____

MAILING ADDRESS: _____

Zip Code

BUSINESS PHONE: (____) _____ FAX NUMBER: (____) _____

Drawing No.:

Spec Section:

Question Type or print one question below

Response

The following section is for County use only.

Response By: _____ Date: _____

Included in Addendum No. _____ Date: _____

Date Received: _____ Time Received: _____ am / pm RFC Number: _____

This form may be removed from the project specifications and/or reproduced as needed.

PROJECT: FRESNO COUNTY WEST ANNEX JAIL

CONTRACT NO: 16-S-04

(This guaranty shall be executed by the successful bidder in accordance with Article 2.32 of the General Conditions. The bidder shall execute the guaranty on this page at the time of submitting his bid.)

GUARANTY

To the Owner: County of Fresno

The undersigned guarantees the construction and installation of the following work included in this project:

ALL WORK

Should any of the materials or equipment prove defective or should the work as a whole prove defective, due to faulty workmanship, material furnished or methods of installation, or should the work or any part thereof fail to operate properly as originally intended and in accordance with the plans and specifications, due to any of the above causes, all within twelve (12) months unless noted otherwise in contract documents after the date on which this contract is accepted by the Owner, the undersigned agrees to reimburse the Owner, upon demand, for its expenses incurred in restoring said work to the condition contemplated in said project, including the cost of any such equipment or materials replaced and the cost of removing and replacing any other work necessary to make such replacement or repairs, or, upon demand by the Owner, to replace any such material and to repair said work completely without cost to the Owner so that said work will function successfully as originally contemplated.

The Owner shall have the unqualified option to make any needed replacement or repairs itself or to have such replacements or repairs done by the undersigned. In the event the Owner elects to have said work performed by the undersigned, the undersigned agrees that the repairs shall be made and such materials as are necessary shall be furnished and installed within a reasonable time after the receipt of demand from the Owner. If the undersigned shall fail or refuse to comply with his obligations under this guaranty, the Owner shall be entitled to all costs and expenses reasonably incurred by reason of said failure or refusal.

Bernards Bros. Inc.

(Company)

By:

Jerry Higgins

Vice President

(Title)

Date: 10/20/2017

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1 PROJECT: FRESNO COUNTY WEST ANNEX JAIL

2
3 OWNER: COUNTY OF FRESNO

4
5 CONTRACT: 16-S-04

6
7 To the Board of Supervisors, County of Fresno

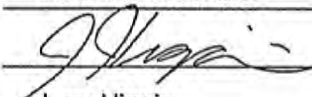
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9 HAZARDOUS MATERIALS CERTIFICATION

10
11 TO BE EXECUTED BY CONTRACTOR AND SUBMITTED WITH THE SIGNED AGREEMENTS

- 12
13 1. The Contractor hereby certifies that no Asbestos, Asbestos-Containing Materials, poly-chlorinated biphenyl ("PCB")
14 products, or any material listed, as of the date of Award of Construction by the Board of Supervisors, County of Fresno,
15 by any Federal and/or State Environmental Protection Agency; and/or any Federal and/or State health agencies as a
16 hazardous material, or any other material defined as being hazardous under Federal and/or State laws, rules or
17 regulation ("Hazardous Material"), shall be furnished, installed or incorporated in any way into the Project, or in any
18 tools, devices, clothing or equipment used to perform any portion of the Work on the Project.
19
20 2. The Contractor further certifies that it has provided notice to and instructed its employees, subcontractors and
21 suppliers with respect to the requirements included in paragraph 1, above, and its employees, subcontractors and
22 suppliers have agreed to comply.
23
24 3. Asbestos and Asbestos-Containing material shall be defined as all items containing, but not limited to, chrysotile,
25 crocidolite, amosite, anthophyllite, tremolite and actinolite. Asbestos-Containing material shall be defined as any
26 material containing more than one-tenth of one percent (0.1%) asbestos, using recognized and accepted standardized
27 test methods.
28
29 4. Anytime a material is suspected of meeting the definition of Hazardous Material and conclusive data does not exist to
30 resolve the concern, the county shall engage an independent, certified, third party to sample and test the material
31 using recognized and accepted standardized test methods. If the material is determined to be Hazardous Material, the
32 costs of any such sampling, testing and related activities shall be borne by the Contractor.
33
34 5. All Work and/or materials found to be Hazardous Material, or Work installed with equipment containing Hazardous
35 Material, shall be immediately rejected, removed and replaced at the Contractor's expense and at no cost to the
36 County.
37
38 6. The Contractor has read, understands and shall comply with all the provisions contained herein.

39
40 DATE: October 20, 2017

41
42 CONTRACTOR NAME: Bernards Bros. Inc.

43
44 SIGNATURE: 
45
46 PRINT NAME: Jerry Higgins

47
48 TITLE: Vice President

49
50
51 END OF DOCUMENT

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1
2 GENERAL CONDITIONS
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4

5 2.01 IDENTIFICATION OF CONTRACT
6

- 7 A. The Agreement shall be signed by the Contractor and the Owner.
8
9 B. The Contract Documents are defined in ARTICLE II of the Agreement.
10
11 C. The Contract Documents form the Contract for Construction. This Contract
12 represents the entire and integrated agreement between the parties hereto and
13 supersedes all prior negotiations, representations or agreements, either written
14 or oral. The Contract may be amended or modified only by a Modification as
15 defined above. The Contract Documents shall not be construed to create any
16 contractual relationship of any kind between the Architect or Engineer and the
17 Contractor, but the Architect or Engineer shall be entitled to performance of the
18 obligations of the Contractor intended for their benefit and to enforcement
19 thereof. Nothing contained in the Contract Documents shall create any
20 contractual relationship between the Owner and any Subcontractor or Sub-
21 subcontractor.
22
23

24 2.02 EXECUTION, CORRELATION, AND INTENT OF CONTRACT DOCUMENTS
25

- 26 A. The Contract Documents are complementary and anything called for by one
27 shall be supplied as if called for by all, providing it comes clearly within the
28 scope of the Contract.
29
30 B. The intent of the Contract Documents is to include all items necessary for the
31 proper execution and completion of the Work. Work not covered in the Contract
32 Documents will not be required unless it is consistent therewith and is
33 reasonably inferable therefrom as being necessary to produce the intended
34 results. Words and abbreviations that have well-known technical or trade
35 meanings are used in the Contract Documents in accordance with such
36 recognized meanings.
37
38 C. Execution of the Contract by the Contractor is a representation that the
39 Contractor has visited the site, become familiar with the local conditions under
40 which the Work is to be performed, and has correlated personal observations
41 with the requirements of the Contract Documents.
42
43 D. All work and material shall be the best of the respective kinds specified or
44 indicated. Should any workmanship or materials be required that are not directly
45 or indirectly called for in the Contract Documents, but which nevertheless are
46 necessary for proper fulfillment of the obvious intent thereof, said workmanship
47 or materials shall be the same for similar parts that are detailed, indicated or
48 specified, and the Contractor shall understand the same to be implied and
49 provide for it in his/her tender as if it were particularly described or delineated.
50
51

52 2.03 OWNERSHIP AND USE OF DOCUMENTS
53

1 All Contract Documents and copies thereof furnished shall remain the property of the
2 Owner. With the exception of one (1) contract set for each party to the Contract, such
3 documents are to be returned by Contractor or suitably accounted for to the Owner on
4 request at the completion of the Work. Submission or distribution to meet official
5 regulatory requirements or for other purposes in connection with the Project is not to be
6 construed as publication in derogation of the Architect's common law copyright or other
7 reserved rights. The Owner's use of the documents will not increase the Architect's
8 design liability beyond the Project and the site for which the design was originally
9 intended.

10 11 12 2.04 DEFINITIONS

13
14 The following words, or variations thereof, as used in these documents have meanings
15 as defined:

16
17 A. The Work - The Work comprises the completed construction required of the
18 Contractor by the Contract Documents, and includes all labor, materials,
19 equipment and services necessary to produce such construction, and all
20 materials, other permits and equipment incorporated or to be incorporated in
21 such construction.

22
23 B. The Project –
24 The work to be done consists of generally of the construction of the West
25 Annex Jail and associated improvements for the County of Fresno. Upon
26 completion the building will consist of a three-story concrete structure that will
27 include two detention housing floors with mezzanines and a full basement.
28 The building will be approximately 119,000 square feet and located adjacent
29 to the existing jail buildings on approximately 0.8 acres of County-owned land
30 on the corner Merced and L Streets in downtown Fresno. The new building
31 will link to the existing North Annex Jail building via a new underground
32 tunnel connection. The new building will receive utility services from the
33 existing Central Plant. This project site is located at 2208 Merced Street,
34 Fresno, CA 93721

35
36 Work includes, but is not limited to: General Conditions, temporary facilities,
37 site preparation, demolition, on-site utilities, concrete, steel, masonry, metals,
38 casework, thermal moisture protection, doors and windows, hardware,
39 finishes, equipment, specialties, Mechanical, Plumbing, Electrical, fire
40 suppression, fire alarm, CCTV surveillance, telecommunications, energy
41 management system, tunnel to existing North Annex Jail, extension of utilities
42 from existing Central Plant, and upgrades of the existing Central Plant,
43

44 C. Owner - The County of Fresno, in the State of California, as represented by the
45 Fresno County Board of Supervisors and so named in the Agreement. The term
46 Owner means the Owner or the Owner's authorized representative for this
47 project.

48
49 D. Construction Manager (CM) – The authorized representative of the Owner, as
50 defined in Section 2.04C, in all aspects of administering the contract on behalf of
51 the Owner.
52

- 1 E. Inspector of Record (IOR) - The person assigned by Owner to perform
2 Quality Assurance inspection of the Work. (Also sometimes referred to as
3 Project Inspector or Owner's Inspector or Owner's Project Inspector.
4
- 5 F. Architect or Engineer – The Owner and his/her authorized representatives, as
6 defined in Section 2.04C, or a duly licensed Architect and/or Engineer providing
7 consultant services in accordance with an agreement with the Owner.
8
- 9 G. Contractor - When used in the General Conditions refers to person(s) or entity
10 (partnership or corporation) so named in Agreement and when used in the body
11 of the Specifications, refers to the Contractor for that specific work, whether it be
12 the General Contractor, Subcontractor, or other Contractor. The term Contractor
13 means the Contractor or the Contractor's authorized representative.
14
- 15 H. Subcontractor - Person, persons, entity, co-partnership or corporation having
16 direct contract with Contractor to perform any of the Work at the site (i.e. a
17 second-tier, third-tier or lower-tier Subcontractor. The term Subcontractor means
18 a Subcontractor or a Subcontractor's authorized representative. The term
19 Subcontractor does not include any separate contractor or any separate
20 contractor's subcontractors.
21
- 22 I. Sub-subcontractor – Person, persons, entity, co-partnership or corporation
23 having a direct or indirect contract with a Subcontractor to perform any of the
24 Work at the site. (The term Sub-subcontractor means a Sub-subcontractor or an
25 authorized representative thereof.)
26

27
28 2.05 SPECIFICATIONS AND DRAWINGS
29

- 30 A. Precedence – Anything mentioned in the Specifications and not shown on the
31 Drawings, or shown on the drawings and not mentioned in the specifications,
32 shall be of like effect as if shown or mentioned in both. Subject to Article 2.02, in
33 cases of discrepancy concerning dimension, quantity and location, the Drawings
34 shall take precedence over the Specifications. Explanatory notes on the
35 Drawings shall take precedence over conflicting drawn indications. Large scale
36 details shall take precedence over smaller scale details and figured dimensions
37 shall take precedence over scaled measurement. Where figures are not shown,
38 scale measurements shall be followed but shall in all cases be verified by
39 measuring actual conditions of Work already in place. In cases of discrepancy
40 concerning quality and application of materials and non-technical requirements
41 over materials, the specifications shall take precedence over Drawings.
42
- 43 B. Division of Specifications - For convenience of reference and to facilitate the
44 letting of independent contracts, this specification may be separated into certain
45 sections; such separation shall not operate to oblige the Owner, Architect or
46 Engineer or Professional Consultant to establish the limits of any contract
47 between the Contractor and Sub-Contractor each of whom shall depend upon
48 his/her own contract stipulations. The General Conditions apply with equal force
49 to all work, including extra work.
50
- 51 C. Governing Factors - Dimensions figured on drawings shall be followed in every
52 case in preference to scale of drawings.
53

- 1 D. Discrepancies - Should the Contractor, at any time, discover a discrepancy in a
2 drawing or specification, or any variation between dimensions on drawings and
3 measurements at site, or any lacking of dimensions or other information, he/she
4 shall report at once to the CM requesting clarification and shall not proceed with
5 the work affected thereby until such clarification has been made. If the
6 Contractor proceeds with work affected by such discrepancies, without having
7 received such clarification, he/she does so at his/her own risk. Any adjustments
8 involving such circumstances made by the Contractor, prior to approval by the
9 IOR, shall be at the Contractor's risk and the settlement of any complications or
10 disputes arising therefrom shall be at the Contractor's sole expense and
11 Contractor shall indemnify, hold harmless and defend Owner, Owner's
12 representatives, and CM from any liability or loss with respect to said
13 adjustments.
14
- 15 E. Scope of Drawings - The drawings shall be held to determine the general
16 character of the Work as well as its details. Parts not detailed shall be
17 constructed in accordance with best standard practice for work of this class, so
18 as to afford the requisite strength and logically complete the parts they compose.
19 Where it is obvious that a drawing illustrates only a part of a given work or of a
20 number of items, the remainder shall be deemed repetitious and so construed.
21 The Contractor shall be responsible for all errors made in using any drawings
22 which have been superseded.
23
- 24 F. Shop Drawings, Product Data and Samples –
25
- 26 1. Shop Drawings are drawings, diagrams, schedules and other data
27 specially prepared for the Work by the Contractor or any Subcontractor,
28 manufacturer, supplier or distributor to illustrate some portion of the
29 Work. Product Data are illustrations, standard schedules, performance
30 charts, instructions, brochures, diagrams and other information furnished
31 by the Contractor to illustrate a material, product or system for some
32 portion of the Work. Samples are physical examples that illustrate
33 materials, equipment or workmanship, and establish standards by which
34 the work will be judged.
35
 - 36 2. The Contractor shall be required to purchase Prolog Converge software
37 for administration of Shop Drawings, Product Data and Samples. The
38 Contractor will be required to purchase as many licenses as needed for
39 the Contractor's use plus, at the Contractor's discretion, any additional
40 licenses as may be needed by his subcontractors.
41
 - 42 3. The Contractor shall prepare, review, approve and submit to the CM,
43 with reasonable promptness and in such sequence as to cause no delay
44 in the Work or in the work of the Owner or any separate contractor, all
45 Shop Drawings, Product Data and Samples required by the Contract
46 Documents.
47
 - 48 4. By preparing, approving and submitting Shop Drawings, Product Data
49 and Samples, the Contractor represents that the Contractor has
50 determined and verified all materials, field measurements and field
51 construction criteria related thereto, or will do so with reasonable
52 promptness, and has checked and coordinated the information contained
53 within such submittals with the requirements of the Work, the Project and
54 the Contract Documents.

5. The Contractor shall not be relieved of responsibility for any deviation from the requirements of the Contract Documents by the Architect's review of Shop Drawings, Product Data or Samples, unless the Contractor has specifically informed the CM in writing of such deviation at the time of submission and the Architect has reviewed the specific deviation. The Contractor shall not be relieved from responsibility for errors or omissions in the Shop Drawings, Product Data or Samples by the Architect's review of them.
6. When professional certification of performance criteria of materials, systems or equipment is required by the Contract Documents, the Architect shall be entitled to rely upon the accuracy and completeness of such calculations and certifications. The cost of such certifications shall be borne by the Contractor. Owner may elect to have an independent certification performed at its own expense. The Owner shall have final approving authority for performance-based items.
7. The Contractor shall direct specific attention, in writing or on resubmitted Shop drawings, Product Data, or Samples, to revisions other than those requested by the Architect on previous submittals.
8. No portion of the Work requiring submission of a Shop Drawing, Product Data or Sample shall be commenced until the submittal has been reviewed by the Architect. All such portions of the Work shall be in accordance with reviewed submittals.
9. Submission of Shop Drawings and Samples to the CM is required for only those items specifically mentioned in the Specification Sections. If Contractor submits Shop Drawings for items other than the above, the CM will not be obligated to distribute or review them. Contractor shall be responsible for the procuring of Shop Drawings for his/her own use as he/she may require for the progress of the Work.
10. The term "Shop Drawings" as used herein also includes but is not limited to fabrication, erection, layout and setting drawings, manufacturer's standard drawings, descriptive literature, catalogs, brochures, performance and test data, wiring and control diagrams, all other drawings and descriptive data pertaining to materials, equipment, piping, duct and conduit systems, and methods of construction as may be required to show that the materials, equipment or systems and the positions and layout of each conform to the Contract requirements. As used herein the term "manufactured" applies to standard units usually mass-produced, and the term "fabricated" means items specifically assembled or made out of selected materials to meet individual design requirements. Shop Drawings shall establish the actual detail of all manufactured or fabricated items; indicate proper relation to adjoining work; amplify design details of mechanical and electrical equipment in proper relation to physical spaces in the structure; and incorporate minor changes of design or construction to suit actual conditions.
11. Drawings: Following Contractor's review and approval, Contractor shall be required to utilize Prolog Converge software for administration of Drawings. The CM will check the submittal to see if it is complete. If

complete, the CM will forward the Drawings to the Owner and the Architect. The Architect and Owner will check the Drawings, note Architect and Owner comments, affix a stamp to the Drawings indicating the status of acceptance, and will process the Drawings through Prolog Converge back to all parties. The Architect or his/her consultants, as applicable, will review the Shop Drawings; and indicate with the affixed stamp; "Reviewed", "Reviewed – Additional Information Required", "Furnish as Corrected", "Revise and Resubmit", or "Rejected. The Contractor shall then print and distribute the appropriate number of copies to his/her job personnel as required. If a drawing is stamped "Rejected" or "Revise and Resubmit", the Contractor shall correct and resubmit as outlined above. When stamped "Furnish as Corrected", or similar instructions, the Contractor shall correct and resubmit electronic files for record only. Also see Technical Specifications, Division 1, General Requirements, Section 01 33 23 - Submittal Procedures.

12. Samples: Following Contractor's review and approval, he/she shall submit to the Architect or Engineer, four (4) samples of all materials in quantities and sizes as specified herein. Submittals shall be given to the Architect or Engineer at a time determined by the Contractor, which allows for any necessary resubmittal and which will not cause any delay in the Work. Samples will be forwarded to the Architect. If a sample is stamped "Rejected" or "Revise and Resubmit", one sample so noted will be returned to the Contractor. The Contractor shall correct and resubmit as outlined above. If a sample is stamped "Make Corrections Noted", one sample so noted will be returned. Corrected samples shall be resubmitted for approval as per the original submittal. Also see General Requirements Section 01 33 23.
 13. Product Data: Following Contractor's review and approval, he/she shall submit Product Data to the Architect or Engineer through Prolog Converge. Corrected copies shall be resubmitted through Prolog Converge for approval as per the original submittal. Also see General Requirements Section 01 33 23.
 14. Manufacturer's Instructions: Where any item or work is required by Specifications to be furnished, installed or performed in accordance with a specified product manufacturer's instructions, Contractor shall procure and distribute the necessary copies of such instructions to all concerned parties.
- G. Materials - All materials, unless otherwise specified, shall be new and of good quality, proof of which shall be furnished by the Contractor; in case of doubt as to kind or quality required, samples shall be submitted to the Architect/Engineer through the Architect or Engineer who will specify the kind and use of the material appropriate to the location and the function of the item in question and Contractor shall furnish such accordingly. Before final payment, all material rejected by the Architect or Engineer or Architect shall be promptly removed from the premises by the Contractor, whether or not completely installed, and promptly and properly replaced with correct materials, including any other work adjoining if disturbed, in accordance with the contract and without expense to the Owner; the Contractor also shall pay for work of other Contractors as is affected by such removals and replacements.

1
2 2.06 THE ARCHITECT
3

- 4 A. The Architect advises the CM in all aspects of the construction phase of the
5 Project. His/Her functions include advice and assistance to the CM in the
6 correct interpretation and application of the Contract Documents. The Architect
7 is not authorized independently to issue Addenda, Clarifications, Field Orders,
8 Work Authorizations, or Change Orders, or in any other way to bind the Owner
9 in discussions with the Contractor.
10
11 B. The Contractor shall deliver all correspondence relating to the proper execution
12 of the Work to the CM. The CM reserves the right to consult with the Architect
13 and Owner prior to responding to the Contractor's correspondence.
14
15 C. When discussions between the Contractor and the CM occur either on the site
16 or elsewhere, but the Architect is not present, the CM reserves the right to
17 consult with the Architect and Owner prior to issuing his/her final decision or
18 instruction.
19
20 D. The Architect shall review or take other appropriate action upon the Contractor's
21 submittals such as Shop Drawings, Product Data and Samples, but only for
22 conformance with the design concept of the Work and the information given in
23 the Contract Documents. Such action shall generally be taken within ten (10)
24 working days, however under certain circumstances such as very complex
25 submittals or if a large number of submittals are submitted at one (1) time it may
26 take longer. In this case the Contractor will be notified and given the opportunity
27 to advise the Engineer and Architect of priorities. The Architect's review of a
28 specific item shall not indicate review of an assembly of which the item is a
29 component.
30

31
32 2.07 CONSTRUCTION MANAGER
33

- 34 A. The CM is the authorized representative of the Owner in all aspects of
35 administering the construction contract on behalf of the Owner. All
36 communications from and to the Contractor will be channeled through the CM.
37 However, the CM does not have the authority to bind the Owner in matters
38 affecting adjustments to the time or cost of the project as defined in the
39 Agreement for Construction.
40
41 B. The CM will be the Owner's representative during the construction and until final
42 payment to all contractors is due. The CM will advise and consult with the
43 Owner. All instructions to the Contractor shall be forwarded through the CM.
44 The CM will have authority to act on behalf of the Owner only to the extent
45 provided in the Contract Documents, unless otherwise modified by written
46 instrument. The County's General Services Department will be the Owner's
47 representative during the warranty periods.
48
49 C. The CM will be on site during construction to monitor the progress and quality of
50 the Work and to determine in general if the Work is proceeding in accordance
51 with the Contract Documents. On the basis of on-site observations and
52 communication with the Contractor, the CM will keep the Owner informed of the
53 progress of the Work, and will endeavor to guard the Owner against defects and
54 deficiencies in the Work of the Contractor.

- 1
2 D. The CM shall at all times have access to the Work wherever it is in preparation
3 and progress. The Contractor shall provide facilities for such access so that the
4 CM may perform its functions under the Contract Documents.
5
6 E. Based on the CM's observations, and an evaluation of the Contractor's
7 Application for Payment, the CM will determine the amount owing to the
8 Contractor and will issue to the Owner Certificates for Payment incorporating
9 such amount.
10
11 F. The CM will be the initial interpreter of the requirements of the Contract
12 Documents and the initial judge of the performance hereunder by the Contractor.
13 The Owner will have final authority of all such matters.
14
15 G. The CM will render interpretations necessary for the proper execution or
16 progress of the Work, with reasonable promptness and in accordance with
17 agreed upon time limits. Either party to the Contract may make written request
18 to the CM for such interpretations.
19
20 H. Claims, disputes and other matters in question between the Contractor and the
21 CM relating to the execution or progress of the Work or the interpretation of the
22 Contract Documents shall be referred to the Owner (or his/her designee).
23
24 I. All interpretations and decisions of the CM will be in writing or in graphic form,
25 and shall be both consistent with the intent of the Contract Documents and
26 reasonably inferable therefrom.
27
28 J. The CM will have the authority to reject, or recommend to the Owner the
29 rejection, of any work that does not conform to the Contract Documents.
30 Whenever, in the CM's opinion, it is considered necessary or advisable for the
31 implementation of the intent of the Contract Documents, the CM will have
32 authority to require special inspection or testing of the Work whether or not such
33 work be then fabricated, installed or completed.
34
35 K. The CM will receive from the Contractor and review all Shop Drawings, Product
36 Data and Samples, and forward same to Architect and Owner for review.
37
38 L. Following consultation with the Owner, the CM will take appropriate action on
39 Change Orders, and will have authority to order minor changes in the Work as
40 provided herein.
41
42 M. The CM will conduct inspections to determine the date of Completion, and will
43 receive and forward to the Owner for the Owner's review written warranties and
44 related documents required by the Contract Documents and assembled by the
45 Contractor. The CM will issue a final Project Certificate for Payment upon
46 compliance with the requirements for completion and final payment. The County
47 Department of General Services will monitor the warranty for a period of one (1)
48 year, unless otherwise specified as a longer term.
49
50 N. The duties, responsibilities and limitations of authority of the CM as the Owner's
51 representatives during construction as set forth in the Contract Documents, will
52 not be modified or extended without written consent of the Owner, the
53 Contractor and the CM, which consent shall not be unreasonably withheld.

1 Failure of the Contractor to respond within ten (10) days to a written request
2 shall constitute consent by the Contractor.
3

4 O. In case of the termination of the employment of the CM, the Owner may appoint
5 a successor CM, whose status and duties under the Contract Documents shall
6 be the same as those of the former CM.
7

8 P. The Inspector of Record (IOR) shall act as an agent for the County at the project
9 site with respect to compliance with code, plans, specifications and quality
10 assurance required of a public works Project. The IOR shall issue correction
11 and stop work notices and notify the CM and County in writing if work does not
12 conform to contract documents. The responsibilities of the IOR shall not relieve
13 the Contractor of compliance with the Contract documents, codes and
14 regulations.
15

16
17 2.08 OWNER
18

19 A. Information and Services Required of the Owner
20

21 1. Unless otherwise provided in the Contract Documents, the Owner shall
22 secure and pay for necessary approvals, easements, assessments and
23 charges required for the construction, use or occupancy of permanent
24 structures or for permanent changes in existing facilities.
25

26 2. Information or services under the Owner's control shall be furnished by
27 the Owner with reasonable promptness to avoid delay in the orderly
28 progress of the Work.
29

30 3. The Owner shall forward all instructions to the Contractor through the
31 CM.
32

33 B. Owner's Right to Stop the Work
34

35 If the Contractor fails to correct defective work as required by Article 2.42 or
36 persistently fails to carry out the Work in accordance with the Contract
37 Documents, the Owner, by a written order signed personally or by an agent
38 specifically so empowered by the Owner in writing, may order the Contractor to
39 stop the Work, or any portion thereof, until the cause for such order has been
40 eliminated; however, this right of the Owner to stop the Work shall not give rise
41 to any duty on the part of the Owner to exercise this right for the benefit of any
42 contractor or any other person or entity, except to the extent required by Article
43 2.12.C.
44

45 C. Owner's Right to Carry Out the Work
46

47 If the Contractor defaults or neglects to carry out the Work in accordance with
48 the Contract Documents, and fails after written notice from the Owner to correct
49 such default or neglect with diligence and promptness, the Owner may, after an
50 additional written notice and without prejudice to any other remedy the Owner
51 may have, make good such deficiencies. In such case an appropriate Change
52 Order shall be issued deducting from the payments then or thereafter due the
53 Contractor the cost of correcting such deficiencies, including compensation for
54 the additional services of the Architect or other professionals made necessary by

1 such default, neglect or failure. Such action by the Owner and the amount
2 charged to the Contractor are both subject to the prior approval of the Architect
3 or Engineer. If the payments then or thereafter due the Contractor are not
4 sufficient to cover such amount, the Contractor shall pay the difference to the
5 Owner, or Owner may require payment by the surety on the performance or
6 warranty bonds as appropriate. Such action shall, in no way, affect the status of
7 either party under contract, nor be held as a basis of any claim by the Contractor
8 for damages or extension of time.
9

10 2.09 CONTRACTOR RESPONSIBILITIES

11 A. Review of Contract Documents and Field Conditions

- 12 1. The Contractor shall carefully study and compare the Contract
13 Documents and shall at once report to the CM any discrepancy or
14 inconsistency that may be discovered. The Contractor shall not be liable
15 to the Owner or the CM for any damage resulting from any such
16 inconsistencies or discrepancies in the Contract Documents unless the
17 Contractor recognized such inconsistencies or discrepancies and
18 knowingly failed to report it to the CM. The Contractor shall perform no
19 portion of the Work at any time unless authorized by the Contract
20 Documents or, where required, approved Shop Drawings, Product Data
21 or Samples for such portion of the Work.
22
- 23 2. Neither the Owner nor the CM or Architect assume any responsibility for
24 an understanding or representation made by any of their agents or
25 representation prior to the execution of the Agreement unless (1) such
26 understanding or representations are expressly stated in the Agreement,
27 and (2) the Agreement expressly provides that responsibility therefore is
28 assumed by the Owner.
29
- 30 3. Failure by the Contractor to acquaint himself/herself with all available
31 information will not relieve him/her from responsibility for estimating
32 properly the difficulty or cost of successfully performing the Work.
33
- 34 4. The Contractor shall take field measurements and verify field conditions
35 and shall carefully compare such field measurements and conditions and
36 other information known to the Contractor with the Contract Documents
37 before commencing activities. Any inconsistencies or discrepancies
38 discovered by the Contractor shall be reported to the CM at once.
39
- 40 5. Before submitting any Request for Information (RFI), or other contractor
41 initiated request for information, the Contractor shall determine that the
42 information requested is not clearly provided in the Contract Documents.
43 RFI's shall be submitted to the CM only from the Contractor, or Owner,
44 and not from any subcontractor, supplier or other vendor, and shall be on
45 a form approved by the CM. The Contractor shall provide a revised and
46 updated RFI Priority Schedule on a weekly basis. The RFI Priority
47 Schedule shall rank RFI's in order of priority and include a brief
48 statement of reason for priority. Owner initiated RFI's will not be listed on
49 the Contractor's RFI Priority Schedule. The Owner will provide the
50 Architect or Engineer a separate list of Owner initiated RFI's upon
51 request of the Architect or Engineer. The Architect or Engineer will
52
53
54

endeavor to respect the order of priorities as requested by the Contractor or Owner for the overall benefit of the Project. The RFI process is for information and clarification only and may not be utilized to obtain approval for changes in Contract price or time. Also see Division 1 - General Requirements.

B. Supervision Procedures

1. The Contractor shall efficiently supervise and direct the Work, using therein the Contractor's best skill and diligence for which he/she is remunerated in the contract price. He/She shall carefully inspect the site and study and compare the Contract Documents, as ignorance of any phase of any of the features or conditions affecting the Contract will not excuse him/her from carrying out its provisions to its full intent.
2. The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the project site during the progress of the Work. The superintendent shall represent the Contractor and all communications given to the superintendent shall be as binding as if given to the Contractor. Important communications shall be confirmed in writing. Other communications shall be so confirmed upon written request in each case. The Superintendent who begins the project shall remain on the project until the project is completed, as long as the Contractor employs that person. The Superintendent shall not be replaced without the approval of the Owner.
3. The Contractor shall be responsible to the Owner for the acts and omissions of his/her employees, subcontractors and their agents and employees, and other persons performing any of the Work under a contract with the Contractor.
4. The Contractor shall at all times enforce strict discipline and good order among his/her employees and shall not employ on the Work any unfit person or anyone not skilled in the task assigned to him/her.
5. The Contractor shall not be relieved from his/her obligations to perform the Work in accordance with the Contract Documents either by the activities or duties of the Owner or the Architect or Engineer in his/her administration of the Contract, or by inspections, tests or approvals required or performed by persons other than the Contractor.

C. Construction Procedures

1. Means and Methods - The Contractor shall be solely responsible for and control of construction means, methods, techniques, sequences, coordination and procedures for all the Work of this contract. Additionally, he/she shall be responsible for safety precautions and programs in connection with the Work.
2. Laws of County and State - The Contractor must comply with all rules, regulations and ordinances of the County in which the Work is being done, and all State laws pertaining to the Work.

3. Safeguards - The Contractor shall provide, in conformity with all local codes and ordinances and as may be required, such temporary walls, fences, guard-rails, barricades, lights, danger signs, enclosures, etc., and shall maintain such safeguards until all work is completed.
4. Housekeeping - Contractor shall keep the premises free of excess accumulated debris. Clean up as required and as directed by the Architect or Engineer. At completion of work all debris shall be removed from the site. Refer to General Requirements for additional requirements.
5. Labor and Materials - Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for all labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for the proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.
6. The Contractor shall deliver to the Architect or Engineer, prior to final acceptance of the Work as a whole, signed certificates from suppliers of materials and manufactured items stating that such items conform to the Contract Documents.
7. The Contractor, immediately upon Notice to Proceed (or where shop drawings, samples, etc., are required, immediately upon receipt of review thereof) shall place orders for all materials, work fabrication, and/or equipment to be employed by him/her in that portion of the Work contracted for. The Contractor shall keep all materials, work fabrications and/or equipment specified and shall advise the Architect or Engineer promptly, in writing, of all orders placed and of such materials, work fabrications and/or equipment which may not be available in a timely manner for the purposes of the Contract.
8. Any worker whose work is unsatisfactory to the Owner or the Architect or Engineer, or are considered by the Owner or Architect or Engineer to be careless, incompetent, unskilled or otherwise unfit shall be dismissed from work under the Contract upon written request to the Contractor from the Owner or the Architect or Engineer.

2.10 SUBCONTRACTORS

- A. Agreements - Agreements between the Contractor, Subcontractors, and Subcontractors of lower tier shall be subject to the approval of the Owner, but in no case does such approval relieve the Contractor of any conditions imposed by the Contract Documents. The Contractor shall only use subcontractors included in his/her sealed bid unless first approved by the Owner pursuant to statute. The Contractor shall not use any subcontractor who is ineligible to perform work on a Public Works Project pursuant to section 1777.1 or 1777.7 of the Labor Code. Notwithstanding any other provision of the Contract Documents, subcontractors may be added, deleted or substituted only in accordance with the provisions of Public Contract Code Section 4100 et seq.

- 1 B. Relation with Subcontractor – By an appropriate agreement, written where
2 legally required for enforceability, the Contractor shall bind every Sub-Contractor
3 and every Subcontractor agrees to be bound by the terms of the Contract
4 Documents to carry out their provisions insofar as applicable to their work; and
5 the Contractor further agrees to pay to each Subcontractor promptly upon
6 issuance of Certificate of Payment, his/her or their due portion. Said agreement
7 shall preserve and protect the rights of the Owner and the Architect or Engineer
8 under the Contract Documents with respect to the work to be performed by the
9 Subcontractor so that the subcontracting thereof will not prejudice such rights,
10 and shall allow to the Subcontractor, unless specifically provided otherwise in
11 the Contractor-Subcontractor Agreement, the benefit of all rights, remedies and
12 redress against the Contractor that the Contractor, under the Contract
13 Documents, has against the Owner. Where appropriate, the Contractor shall
14 require each Subcontractor to enter into similar agreements with their Sub-
15 subcontractors. The Contractor shall make available to each proposed
16 Subcontractor, prior to the execution of the Subcontract, copies of the Contract
17 Documents to which the Subcontractor will be bound by this Paragraph and
18 identify to the Subcontractor any terms and conditions of the proposed
19 Subcontract which may be at variance with the Contract Documents. Each
20 Subcontractor shall similarly make copies of Contract Documents available to
21 their Sub-subcontractors. Nothing contained herein shall be deemed to create
22 an agency relationship between the Owner and any Subcontractor or material
23 supplier.
24
- 25 C. Owner's Relation - Neither the acceptance of the name of Subcontractor nor the
26 suggestion of such name nor any other act of the Owner or Architect or Engineer
27 nor anything contained in any Contract Document is to be construed as creating
28 any contractual relation between the Owner (or Owner's authorized
29 representatives) and any Subcontractor of any tier nor as creating any
30 contractual relation between the Architect or Engineer and any Subcontractor of
31 any tier.
32
- 33 D. All Subcontractors employed by the Contractor shall be appropriately licensed in
34 conformity with the laws of the State of California.
35
- 36 E. Jurisdictional disputes between Subcontractors or between Contractor and
37 Subcontractor shall not be mediated or decided by the Owner, Architect or the
38 Architect or Engineer. The Contractor shall be responsible for the resolution of
39 all such disputes based upon his/her contractual relationship with his/her
40 Subcontractors.
41
42

43 2.11 OWNER'S RIGHT TO PERFORM WORK AND TO AWARD SEPARATE
44 CONTRACTS
45

- 46 A. The Owner reserves the right to perform work related to the Project with the
47 Owner's own forces, and to award separate contracts in connection with other
48 portions of the Project or other work on the site under these or similar Conditions
49 of the Contract. If the Contractor claims that the Owner's action results in delay,
50 damage or additional cost attributable thereto, the Contractor shall make such
51 claim as provided elsewhere in the Contract Documents.
52
- 53 B. When separate contracts are awarded for different portions of the Project or
54 other work on the site, the term Contractor in the Contract Documents in each

case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

- C. The Owner shall provide for coordination of the activities of the Owner's own forces and of each separate contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with other separate contractors and the Owner in reviewing their construction schedules when directed to do so. The Contractor shall make any revisions to the construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, separate contractors and the Owner until subsequently revised.
- D. Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces, the Owner shall be deemed to be subject to the same obligations and to have the same rights which apply to the Contractor under the Conditions of the Contract.

2.12 MUTUAL RESPONSIBILITY

- A. The Contractor shall afford the Owner and separate contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.
- B. When any part of the Contractor's Work depends upon proper execution or results of the work of the Owner or any separate contractor, the Contractor shall, prior to proceeding with the Work, promptly report to the Architect or Engineer any apparent discrepancies or defects in such other work that render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acceptance of the Owner's or separate contractor's work as fit and proper to receive the Work, except as to defects which may subsequently become apparent in such work by others.
- C. If, following the reporting of any discrepancy or defect as required herein above, the Contractor suffers damage due to disruption or delay caused by the separate contractor, without fault by the Owner, the Contractor's remedy shall be limited to seeking recovery from the separate contractor.
- D. Any costs caused by defective or ill-timed work shall be borne by the Contractor responsible therefor.
- E. Should the Contractor cause damage to the work or property of the Owner, or to other work or property on the site, the Contractor shall promptly remedy such damage as provided herein.
- F. Should the Contractor wrongfully delay or cause damage to the work or property of any separate contractor, the Contractor shall, upon due notice, promptly attempt to settle with such other contractor by agreement, or otherwise to resolve the dispute. If such separate contractor sues the Owner on account of any delay or damage alleged to have been caused by the Contractor, the Owner shall notify the Contractor who shall defend such proceedings, and if any judgment or award against the Owner (or Owner's authorized representatives)

1 arises therefrom, the Contractor shall pay or satisfy such judgment or award in
2 full and shall reimburse the Owner for all costs which the Owner has incurred in
3 connection with such matter.
4

5
6 2.13 OWNER'S RIGHT TO CLEAN UP
7

8 If a dispute arises between the Contractor and separate contractors as to their
9 responsibility for cleaning up as required in the Contract Documents, the Owner may
10 clean up and the contractor responsible therefor shall pay Owner such portions of the
11 cost thereof as the IOR shall determine to be just.
12

13 2.14 GOVERNING LAW
14

15 The Contract shall be governed by the law of the State of California.
16

17
18 2.15 INSPECTION
19

20 A. All material and workmanship (if not otherwise designated by the Contract
21 Documents) shall be subject to inspection, examination, and test by the Owner
22 and IOR at any and all times during manufacture and/or construction and at any
23 and all places where such manufacture and/or construction are carried on. The
24 Owner and IOR shall have the right to reject defective material and workmanship
25 or require its correction.
26

27 B. The Contractor shall furnish promptly without additional charge, all reasonable
28 facilities, labor, and materials necessary for the safe and convenient inspection
29 and tests that may be required by the Owner and IOR.
30

31 C. Where the Contract Documents, instructions by the Owner, laws, ordinances, or
32 any public authority having jurisdiction requires work to be inspected, tested or
33 approved before work proceeds, such work shall not proceed, nor shall it be
34 concealed prior to inspection.
35

36 D. The Contractor shall give the IOR at least two (2) days advance notice of the
37 readiness for any Contract compliance inspection by the Inspector. The
38 Contractor shall give notice as required by all other inspecting and testing
39 agencies of jurisdiction for Code and regular compliance inspection. In all
40 cases, the Contractor shall schedule inspections so as not to delay the Work.
41

42 E. If the IOR determines that any work requires additional special inspection
43 beyond that identified in the specifications, the IOR will, upon written
44 authorization from the Owner, instruct the Contractor to order such special
45 inspection, testing or approval, and the Contractor shall give notice as provided
46 above. If such special inspection or testing reveals a failure of the Work to
47 comply with the requirements of the Contract Documents, the Contractor shall
48 bear all costs thereof, including compensation for the IOR's additional services,
49 testing or inspections made necessary by such failure; otherwise the Owner
50 shall bear such costs, and an appropriate Change Order shall be issued.
51

52 F. Should it be considered necessary or advisable by the IOR at any time either
53 before acceptance of the entire Work or after acceptance and within the
54 guaranty period to make an examination of work already completed, by

1 removing or tearing out same, the Contractor shall on request promptly furnish
2 all necessary facilities, labor, and material. If such work is found to be defective
3 in any material respect, due to the fault of the IOR or his/her Subcontractors,
4 he/she shall defray all the expenses of such examination and of satisfactory
5 reconstruction. If, however, such work is found to meet the requirements of the
6 contract, the actual cost of labor and material necessarily involved in the
7 examination and replacement, plus fifteen percent (15%), shall be allowed the
8 Contractor and he/she shall, in addition, if completion of the work has been
9 delayed thereby, be granted a suitable extension of time on account of the
10 additional work involved.

11
12 G. Required certificates of inspection, testing or approval shall be secured by the
13 Contractor and the Contractor shall promptly deliver them to the Construction
14 Manager for review and evaluation of compliance with the appropriate
15 specifications and standards.

16
17 H. When the work is completed the Contractor shall notify the IOR in writing that
18 the work will be ready for final inspection and test on a definite date which shall
19 be stated in such notice.

20
21
22 2.16 TAXES, PERMITS, FEES, AND INDEMNIFICATION FOR PATENT INFRINGEMENT
23 CLAIM

24
25 A. The Contractor shall pay for and include all Federal, State and local taxes direct
26 or indirect for the work or portions thereof provided by the Contractor which are
27 legally enacted at the time bids are opened, whether or not yet enacted, and
28 take out and pay all fees and charges for permits and licenses, unless otherwise
29 specified in Supplemental General Conditions or Technical Specifications of
30 these specifications.

31
32 B. Royalty and license fees incidental to the use of any patented material, device or
33 process shall be paid by the Contractor and in the event of a claim of alleged
34 infringement of patent copyright, or Trade Secret rights, the Contractor shall
35 indemnify, save the Owner (and Owner's authorized representatives) free and
36 harmless, and defend, at the Contractor's own expense, any and all suits that
37 may be brought in such connection.

38
39 C. Unless otherwise provided in the Contract Documents, the Owner shall secure
40 and pay for the building permit, permanent utility connection fees, and right-of-
41 way encroachment permit. The Contractor shall secure and pay for temporary
42 construction utilities, and all other permits and governmental fees, licenses and
43 inspections necessary for the proper execution and completion of the Work
44 which are customarily secured after execution of the Contract and which are
45 legally required at the time bids are opened. Contractor shall be reimbursed by
46 County for "actual" costs for permits obtained for Project.

47
48 D. The Contractor shall give all notices and comply with all laws, ordinances, rules,
49 regulations and lawful orders of any public authority bearing on the performance
50 of the Work.

51
52 E. It is not the responsibility of the Contractor to make certain that the Contract
53 Documents are in accordance with applicable laws, statutes, building codes and
54 regulations. If the Contractor observes that any of the Contract Documents are

at variance therewith in any respect, the Contractor shall promptly notify the IOR in writing, and any necessary changes shall be accomplished by appropriate Modification.

F. If the Contractor performs any work knowing it to be contrary to any laws, ordinances, rules and regulations, without notice to the IOR, the Contractor shall assume full responsibility therefore and shall bear all costs attributable thereto.

G. Any reference in the Contract Documents to codes, standard specifications or manufacturer's instructions shall mean the latest printed edition of each in effect at the Contract date.

2.17 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Within thirty (30) calendar days after receipt of Notice to Proceed, the Contractor shall submit a Construction Schedule in CPM (Critical Path Method) form to the CM for approval. The Construction Schedule shall be sufficiently detailed to accurately depict all the work required by the Contract. CPM Construction Schedule shall reflect shop drawings; submittals due and return dates, fabrication and delivery times, cost loading, crew mix, and equipment loading data. The Contractor shall thereafter adhere to the Construction Schedule, as updated monthly, or as necessary in accordance with the Contract Documents including any scope changes, or changes in the work approved by the Owner during the course of construction. "Slack" or "float" time on the CPM Construction Schedule is neither for the sole benefit of the Owner or Contractor.

B. Within fourteen (14) calendar days after the pre-construction conference, the Contractor shall provide a Submittal and Procurement Schedule indicating time periods for review of Shop Drawings, Data, Samples, and procurement of material and equipment required for the Work. Contractor shall allow time for submittal review in accordance with the General Requirements Section – Construction Progress Documentation. All items that require review by the CM and/or are not readily available from stock and requiring more than thirty-five (35) days lead-time shall be included in the Submittal and Procurement Schedule. Items listed in the Submittal and Procurement Schedule shall also be identified as activities on the CPM Construction Schedule. Contractor shall identify items requiring coordination with work of separate contractors. The working day to calendar date correlation shall be based upon the Contractor's proposed work week with adequate allowance for legal holidays, days lost due to abnormal weather, and any special requirements of the Project.

C. The Construction Schedule shall be prepared and maintained by the Contractor.

D. The Owner, CM, Contractor and other Contractor(s) shall jointly review the progress of the work weekly. Should this review, in the opinion of the CM, indicate that the work is behind the schedule established by currently reviewed Construction Schedule, the Contractor shall either (1) provide a plan to the IOR indicating the steps the Contractor intends to take in order to recover the time behind schedule and conform to the reviewed Construction Schedule; or (2) submit a revised Construction Schedule for completion of the work, remaining within the contract completion time, to the CM for review by the next weekly meeting. If the Contractor's recovery or revised schedule requires work to occur after normal working hours or on other than normal working days, the Contractor

will be responsible for any resulting costs incurred by the Owner, including but not limited to, the costs for construction management, contract administration, inspection, testing and staffing.

- E. The Contractor shall deliver copies of his/her daily job logs to the CM and Owner on a weekly basis. At a minimum, the Contractor's daily job log should include the sub-contractors working onsite, number of workers and their trade classification, description of work, visitors, temperature and weather conditions, accidents, delays, and any other important information pertaining to the project that day. The Contractor will schedule and coordinate the Work of all sub-contractors on the Project. The Contractor will keep the Sub-contractors informed of the Construction Schedule to enable the Contractor to plan and perform the Work properly.

2.18 RECORDS, DOCUMENTS AND SAMPLES AT THE SITE

- A. The Contractor shall maintain all records of required Review Agencies, County or State inspections and shall promptly notify the Architect or Engineer of the results of any inspection. Copies of all such records shall be provided to the Owner.
- B. The Contractor shall secure and maintain required certificates of inspection, testing or approval and shall promptly deliver them to the Architect or Engineer.
- C. The Contractor shall maintain at the Project site, on a daily basis, one (1) record copy of all Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to record all changes made during construction, and reviewed Shop Drawings, Product Data and Samples. These shall be available to the CM, IOR and the Owner and reviewed weekly, and shall be delivered to the CM for forwarding to the Owner upon completion of the Project. The Contractor shall advise the CM on a current basis of all changes in the Work made during construction. Payment may be withheld from Contractor for failure to maintain current Record Documents.

2.19 USE OF SITE

- A. The Contractor shall confine operations at the site to areas permitted by law, ordinances, permits and the Contract Documents, and shall not unreasonably encumber the site with any materials or equipment.
- B. The Contractor shall coordinate all of the Contractor's operations with, and secure approval from, the CM before using any portion of the site. Also see Technical Specifications, Division 1, General Requirements.

2.20 CUTTING AND PATCHING OF WORK

- A. The Contractor shall be responsible for all cutting, fitting or patching that may be required to complete the Work or to make its several parts fit together properly.
- B. The Contractor shall not damage or endanger any portion of the Work or the work of the Owner or any separate contractors by cutting, patching or otherwise

altering any work, or by excavation. The Contractor shall not cut or otherwise alter the work of the Owner or any separate contractor except with the written consent of the Owner and of such separate contractor. The Contractor shall not unreasonably withhold from the Owner or any separate contractor consent to cutting or otherwise altering the Work.

C. In all cases exercise extreme care in any cutting operations, and perform such operations under adequate supervision by competent mechanics skilled in the applicable trade. Openings shall be neatly cut and shall be kept as small as possible to avoid unnecessary damage. Careless and/or avoidable cutting damage, etc., will not be tolerated, and the Contractor will be held responsible for such avoidable or willful damage.

D. All replacing, patching and repairing of all materials and surfaces cut or damaged in the execution of the Work shall be performed by experienced mechanics of the several trades involved. All work of such nature shall be done with the applicable materials, in such a manner that all surfaces so replaced, repaired, or patched, will, upon completion of the Work, match the surrounding similar surfaces.

2.21 CLEANING UP

A. The Contractor shall at all times keep the premises free from accumulation of waste materials or rubbish caused by the Contractor's operations. At the completion of the Work, the Contractor shall remove all the Contractor's waste materials and rubbish from and about the Project as well as all the Contractor's tools, construction equipment, machinery and surplus materials.

B. If the Contractor fails to clean up at the completion of the Work, the Owner may do so and the cost thereof shall be paid by the Contractor.

2.22 INDEMNIFICATION

A. To the fullest extent permitted by law, Contractor agrees to and shall indemnify, save, hold harmless and at Owner's request, defend Owner and its officers, agents and employees, and the Architect and Consultants and their respective officers, agents and employees, from any and all costs and expenses, attorney fees and court costs, damages, liabilities, claims and losses occurring or resulting to Owner, the Architect or Consultants in connection with the performance, or failure to perform, by Contractor, its officers, agents or employees under this Agreement, and from any and all costs and expenses, attorney fees and court costs, damages, liabilities, claims and losses occurring or resulting to any person, firm or corporation who may be injured or damaged by the performance, or failure to perform, of Contractor, its officers, agents or employees under this Agreement. In addition, Contractor agrees to indemnify Owner for Federal, State of California and/or local audit exceptions resulting from non-compliance herein on the part of Contractor.

B. In any and all claims against the Owner, the Architect or Consultants, or any of their respective officers, agents or employees, initiated by any employee of the Contractor, any Subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, the indemnification

obligation set forth in the immediately preceding paragraph shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the Contractor or any Subcontractor under workmen's compensation acts, disability benefit acts or other employee benefit acts.

2.23 FAIR EMPLOYMENT PRACTICES CLAUSE

Nondiscrimination: In connection with the performance of Work under the contract, the Contractor agrees (as prescribed in Chapter 6 of Division 3 of Title II of the Government Code of the State of California, commencing at Section 12900 and by Labor Code Section 1735) not to discriminate against any employee or applicant for employment because of race, religious creed, color, national origin, ancestry, physical disability, mental disability, medical condition, marital status or sex. The aforesaid provisions shall include, but not be limited to, the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination, rates of pay or other forms of compensation, and selection for training, including apprenticeship. The Contractor agrees to post hereafter in conspicuous places, available for employees and applicants for employment, Notices to be provided by the County, setting forth the provisions of this discrimination clause. The Contractor further agrees to insert the foregoing provisions in all subcontracts hereunder, except subcontracts for standard commercial supplies of raw materials.

2.24 PAYMENT

A. CONTRACT SUM

The Contract Sum is stated in the Owner-Contractor Agreement and, including authorized adjustments thereto, is the total amount payable by the Owner to the Contractor for the performance of the Work under the Contract Documents.

B. SCHEDULE OF VALUES

Before the first Application for Payment, the Contractor shall submit to the CM a Schedule of Values allocated to the various portions of the Work, prepared in such form and supported by such data to substantiate its accuracy as the Architect or Engineer may require. This schedule, unless objected to by the CM, shall be used only as a basis for the Contractor's Applications for Payment. The Contractor shall be required to provide a "separate" Schedule of Values for each of the Work Areas and accepted additive alternate bid items referenced in Exhibits A and B of Section 00 21 13, Instructions to Bidders.

C. APPLICATIONS FOR PAYMENT

The Owner will make progress payments to the Contractor upon completion of portions of the Work, as covered by the Contract Documents, in accordance with established Owner procedures. The Contractor shall be required to submit a "separate" Application for Payment for each of the Work Areas noted in Exhibits A and B of Section 00 21 13, Instructions to Bidders.

1. On or about the twentieth (20th) of the month in which the work was performed, the Contractor shall submit to the CM an itemized Application for Payment for each of the Work Areas, notarized if required, supported

1 by such data substantiating the Contractor's right to payment as the
2 Owner or the CM may require, including appropriate updates to the
3 Construction Schedule, and reflecting retainage, if any, as provided
4 elsewhere in the Contract Documents. Payment is expressly
5 conditioned upon submission by the Contractor of conditional and
6 unconditional waivers and release of lien rights upon progress payment
7 as the Owner or the Architect or Engineer may require. Waiver and
8 Release forms must be submitted on forms approved by the Owner.
9 Copies of said forms shall comply with Civil Code §§ 8132 through 8138,
10 inclusive
11

12 2. Unless otherwise provided in the Contract Documents, payments may be
13 made on account of materials or equipment not incorporated in the Work
14 but delivered and suitably stored at the site and, if approved in advance
15 by the Owner, payments may similarly be made for materials or
16 equipment suitably stored at some other location agreed upon in writing.
17 Payments for materials or equipment stored on or off the site shall be
18 conditioned upon submission by the Contractor of bills of sale or such
19 other procedures satisfactory to the Owner to establish the Owner's title
20 to such materials or equipment or otherwise protect the Owner's interest,
21 including applicable insurance and transportation to the site for those
22 materials and equipment stored off the site.
23

24 3. The Contractor warrants that title to all work, materials and equipment
25 covered by an Application for Payment will pass to the Owner either by
26 incorporation in the construction or upon receipt of payment by the
27 Contractor, whichever occurs first, free and clear of all liens, stop
28 notices, claims, security interest or encumbrances, hereinafter referred
29 to as "liens"; and that no work, materials or equipment covered by an
30 Application for Payment will have been acquired by the Contractor, or by
31 any other person performing work at the site or furnishing materials and
32 equipment for the Project, subject to an agreement under which an
33 interest therein or an encumbrance thereon is retained by the seller or
34 otherwise imposed by the Contractor or such other person.
35

36 4. On or about the twentieth (20th) day of the month following the month in
37 which the work was performed, the Owner shall pay to the Contractor
38 ninety-five percent (95%) of the value of said work in place, as checked
39 and approved by the CM. The balance of five percent (5%) of the
40 estimate shall be retained by the Owner until the time of final acceptance
41 of said work. In lieu of the five percent (5%) retainage, the Contractor
42 may substitute securities as provided herein below.
43

44 a. If the Owner does not pay the Contractor within thirty (30) days
45 after receipt of an undisputed and properly submitted payment
46 request for a progress payment, excluding that portion of the final
47 payment designated by the contract as retention earnings, then
48 the Owner shall pay interest to the Contractor as provided by
49 Public Contract Code § 20104.50. Said interest penalty is the
50 sole recourse of Contractor and Contractor shall have no right to
51 stop the Work until payment of the amount owing has been
52 received, nor shall the Contract Time be extended, nor shall the
53 Contract Sum be increased in any way, including by reason of

any costs incurred by Contractor, except to the extent of said interest payment.

- b. Pursuant to Public Contract Code § 7107, in the event of a dispute between the Owner and Contractor, the Owner may withhold from the final payment an amount not to exceed one hundred and fifty percent (150%) of the disputed amount. Except as so provided, the Owner shall release the retention withheld within sixty (60) days after the date of completion of the work of improvement, as "completion" is defined in Public Contract Code § 7107. In the event that retention payments are not made within the time periods required by Public Contract Code § 7107, the Owner may be subject to the interest provisions of Public Contract Code § 7107.

5. Security Substitutions and Escrow for Moneys Withheld to Insure Contractor's Performance. Pursuant to Public Contract Code section 22300, the Contractor may deposit in an escrow, equivalent securities for any moneys withheld to insure performance and have said moneys paid directly to Contractor, or, in the alternative, have the Owner deposit such moneys directly into an escrow. Upon the closing of any such escrow, Contractor shall pay to each Subcontractor, not later than twenty (20) days after receipt of the closing payment, the respective amount of interest earned, net of costs attributed to retention withheld from each Subcontractor, on the amount of retention withheld to insure the performance of the Contractor. Any escrow established pursuant to this article shall be with a state or federally chartered bank, shall be at the sole expense of the Contractor, and shall be established using an escrow agreement in substantially the following form:

1 (Begin Escrow Agreement)

2 **ESCROW AGREEMENT FOR**
3 **SECURITY DEPOSITS IN LIEU OF RETENTION**

4
5
6 This Escrow Agreement is made and entered into by and between the County of Fresno,
7 (hereinafter called "Owner"), _____
8 (hereinafter called "Contractor"); and _____,
9 a state or federally chartered bank in California, (hereinafter called "Escrow Agent").

10
11
12 For the consideration hereinafter set forth, the Owner, Contractor, and Escrow Agent agree as
13 follows:

- 14
15 1. Pursuant to Section 22300 of the Public Contract Code of the State of California,
16 Contractor has the option to deposit securities with Escrow Agent as a substitute for
17 retention earnings required to be withheld by Owner pursuant to the Construction
18 Contract entered into between the Owner and Contractor for _____
19 _____ in the amount of
20 \$_____, and dated _____ (hereinafter referred to as
21 the "Contract"). Alternatively, on written request of the contractor, the owner shall make
22 payments of the retention earnings directly to the escrow agent. When Contractor
23 deposits the securities as a substitute for Contract earnings, the Escrow Agent shall
24 notify the Owner within ten (10) days of the deposit. The market value of the securities
25 at the time of the substitution, as valued by the Owner, shall be at least equal to the
26 cumulative total cash amount then required to be withheld as retention under the terms
27 of the contract between Owner and Contractor. If the Owner determines that the
28 securities are not adequate it will notify Contractor and Escrow Agent, and Contractor
29 shall deposit additional security as further determined by the Owner. Securities shall be
30 held in the name of the Owner and shall designate the Contractor as the beneficial
31 owner.
32
33 2. Securities eligible for investment under subdivision (c) of the above-referenced Section
34 22300 shall include those listed in Section 16430 of the Government Code, and shall
35 also include bank or savings and loan certificates of deposit, interest-bearing demand
36 deposit accounts, and standby letters of credit. Deposit of any other type of security may
37 be permitted only by mutual agreement of the Contractor and the Owner, evidenced by
38 an amendment to this agreement executed by all of the parties hereto.
39
40 3. Upon the deposit of adequate securities, Owner shall make progress payments to the
41 Contractor for such funds which otherwise would be withheld from progress payments
42 pursuant to the Contract provisions.
43
44 4. When the Owner, at Contractor's written request, makes payment of retentions earned
45 directly to the Escrow Agent, the Escrow Agent shall hold them for the benefit of the
46 Contractor until such time as the escrow created under this contract is terminated. The
47 Contractor may direct the investment of the payments into securities. All terms and
48 conditions of this agreement and the rights and responsibilities of the parties shall be
49 equally applicable and binding when the Owner pays the Escrow Agent directly.
50
51 5. Contractor shall be responsible for paying all fees for the expenses incurred by Escrow
52 Agent in administering the Escrow Account and all expenses of the Owner. The Owner,
53 Contractor and Escrow Agent shall determine these expenses and payment terms.
54

- 1 6. The interest earned on the securities or the money market accounts held in escrow and
2 all interest earned on that interest shall be for the sole account of Contractor and shall
3 be subject to withdrawal by Contractor at any time and from time to time without notice
4 to the Owner.
5
6 7. Contractor shall have the right to withdraw all or any part of the principal in the Escrow
7 Account only by written notice to Escrow Agent accompanied by written authorization
8 from Owner to the Escrow Agent that Owner consents to the withdrawal of the amount
9 sought to be withdrawn by Contractor.
10
11 8. The Owner shall have the right to draw upon the securities or any amount paid directly
12 to Escrow Agent in the event of default by the Contractor. Upon seven (7) days written
13 notice to the Escrow Agent from the Owner of the default, the Escrow Agent shall
14 immediately convert the securities to cash and shall distribute the cash, including any
15 amounts paid directly to Escrow Agent, as instructed by the Owner. Escrow Agent shall
16 not be concerned with the validity of any notice of default given by Owner pursuant to
17 this paragraph, and shall promptly comply with Owner's instructions to pay over said
18 escrowed assets. Escrow Agent further agrees not to interplead the escrowed assets in
19 response to conflicting demands and hereby waives any present or future right of
20 interpleader.
21
22 9. Upon receipt of written notification from the Owner certifying that the Contract is final
23 and complete, and that the Contractor has complied with all requirements and
24 procedures applicable to the Contract, Escrow Agent shall release to Contractor all
25 securities and interest on deposit less escrow fees and charges of the Escrow Account.
26 The escrow shall be closed immediately upon disbursement of all moneys and securities
27 on deposit and payment of fees and charges.
28
29 10. Escrow Agent shall rely on the written notifications from the Owner and Contractor
30 pursuant to Sections (3), (5), (6), (7) and (8) of this Agreement and the Owner and
31 Contractor shall hold Escrow Agent harmless from Escrow Agent's release and
32 disbursement of the securities and interest as set forth above.
33
34 11. Securities eligible for investment under this Agreement, as provided by Public Contract
35 Code § 22300, shall be those listed in Section 16430 of the Government Code, bank or
36 savings and loan certificates of deposit, interest bearing demand deposit accounts,
37 standby letters of credit, or any other security mutually agreed to by the Contractor and
38 Owner.
39
40 12. The venue of any litigation concerning the rights and obligations of the parties to this
41 agreement shall be the County of Fresno and the parties hereto waive the removal
42 provisions of Code of Civil Procedure Section 394.
43
44 13. The names of the persons who are authorized to give written notice or to receive written
45 notice on behalf of the Owner and on behalf of Contractor in connection with the
46 foregoing, and exemplars of their respective signatures are as follows:
47

48 **On behalf of Owner:**

48 **On behalf of Contractor:**

49 Title – **Financial Services Manager**

49 Title

50 Name – **Lemuel Asprec**

50 Name

51 Signature

51 Signature

Address- **2220 Tulare, 6th Floor**
Fresno, CA 93721

Address

On behalf of Escrow Agent:

Title
Name
Signature
Address

At the time the Escrow Account is opened, the Owner and Contractor shall deliver to the Escrow Agent a fully executed counterpart of this Agreement.

IN WITNESS WHEREOF, the parties have executed this Agreement by their proper officers on the date first set forth above.

Owner:

Contractor:

Title- **Steve E. White, Director**
Department of Public Works & Planning

Title
Name

Signature

Signature

Address- **2220 Tulare, 6th Floor**
Fresno, CA 93721

Address

Escrow Agent:

Title
Name
Signature
Address

(End Escrow Agreement)

6. Itemized Breakdown: The Contractor shall submit a financial breakdown of the work, itemized by crafts or sections as designated by the Architect or Engineer. The Contractor's payment shall be based upon the monthly percentage of completion of these items.
7. Lien Waivers: The Owner or Architect or Engineer may require the Contractor to submit, along with the progress payment request, notarized lien waivers from each Subcontractor, materials or equipment supplier. Lien waivers shall comply with Civil Code § 8132, et seq., and the aggregate sum thereof shall reflect all progress payments previously made.

1
2
3
4 D. CERTIFICATES FOR PAYMENT
5

- 6 1. The Architect or Engineer shall, within seven (7) days after the receipt of
7 the Project Application for Payment, review the Project Application for
8 Payment and either issue a Project Certificate for Payment to the Owner
9 for such amounts as the Architect or Engineer determines are properly
10 due, or notify the Contractor in writing of the reasons for withholding a
11 Certificate provided in Section F of this Article 2.24.
12
13 2. The issuance of a Project Certificate for Payment will constitute a
14 representation by the CM to the Owner that, based on the CM's
15 observations at the site as provided herein and the data comprising the
16 Project Application for Payment, the Work has progressed to the point
17 indicated and that, to the best of the CM's knowledge, information and
18 belief, the quality and timeliness of the Work is in accordance with the
19 Contract Documents (subject to an evaluation of the Work for
20 conformance with the Contract Documents upon Completion of the
21 Work, to the results of any subsequent tests required by or performed
22 under the Contract Documents, to minor deviations from the Contract
23 Documents correctable prior to completion, and to any specific
24 qualifications stated in the Certificate); and that based upon all currently
25 available information, the Contractor is entitled to payment in the amount
26 certified. However, by issuing a Project Certificate for Payment, the CM
27 shall not thereby be deemed to represent that the CM has made
28 exhaustive or continuous on-site inspections to check the quality or
29 quantity of the Work, has reviewed the construction means, methods,
30 techniques, sequences or procedures, or has made any examination to
31 ascertain how or for what purpose the Contractor has used the monies
32 previously paid on account of the Contract Sum.
33

34
35 E. PROGRESS PAYMENTS
36

- 37 1. After the CM has issued a Project Certificate for Payment, the Owner
38 shall make payment in the manner and within the time provided in the
39 Contract Documents.
40
41 2. The Contractor shall promptly pay each Subcontractor upon receipt of
42 payment from the Owner, out of the amount paid to the Contractor on
43 account of such Subcontractor's Work, the amount to which
44 Subcontractor is entitled, reflecting the percentage actually retained, if
45 any, from payments to the Contract on account of such Subcontractor's
46 Work. The Contractor shall, by an appropriate agreement with each
47 Subcontractor, require each Subcontractor to make payments to their
48 Sub-subcontractors in similar manner.
49
50 3. The CM may on request of any Subcontractor, at the CM's discretion,
51 furnish to that Subcontractor, if practicable, information regarding the
52 percentages of completion or the amounts applied for by the Contractor

1 and the action taken thereon by the CM on account of Work done by
2 such Subcontractor.

- 3
4 4. Neither the Owner nor the CM shall have any obligation to pay or to see
5 to the payment of any monies to any Subcontractor or Material Suppliers
6 except as may otherwise be required by law.
7
8 5. Neither certification of a progress payment, delivery of a progress
9 payment, nor partial or entire use or occupancy of the Project by the
10 Owner, shall constitute an acceptance of any Work not performed in
11 accordance with the Contract Documents.
12

13
14 F. PAYMENTS WITHHELD
15

- 16 1. The CM may decline to certify payment and may withhold the Certificate
17 in whole or in part to the extent necessary to reasonably protect the
18 Owner, if, in the CM's opinion, the CM is unable to make representations
19 to the Owner as provided herein above for Certificates for Payment. If
20 the CM is unable to make representations to the Owner and certify
21 payment in the amount of the Project Application, the CM will notify the
22 Contractor as provided herein. If the Contractor and the CM cannot
23 agree on a revised amount, the CM will promptly issue a Project
24 Certificate for Payment for the amount for which the CM is able to make
25 such representations to the Owner. The CM may also decline to certify
26 payment or, because of subsequently discovered evidence or
27 subsequent observations, the CM may nullify the whole or any part of
28 any Project Certificate for Payment previously issued to such extent as
29 may be necessary, in the CM's opinion, to protect the Owner from loss
30 because of:
31
32 a. Defective Work not remedied;
33 b. Third party claims filed or reasonable evidence indicating
34 probable filing of such claims, including claims by separate
35 contractors;
36 c. Failure of the Contractor to make payments properly to
37 Subcontractors, or for labor, materials or equipment;
38 d. Architect or Engineer's determination, based upon reasonable
39 evidence, that the Work cannot be completed for the unpaid
40 balance of the Contract Sum;
41 e. Damage to the Owner or another contractor;
42 f. Architect or Engineer's determination, based upon reasonable
43 evidence, that the Work will not be accomplished in compliance
44 with the Contract Time;
45 g. Persistent failure to carry out the Work in accordance with the
46 Contract Documents;
47 h. Failure of the Contractor to submit Construction Schedules or
48 Submittal and Procurement Schedules as required;
49 i. Failure of the Contractor to maintain as-built drawings on a
50 current basis;
51 j. Failure of the Contractor to submit notarized lien waivers from
52 each Subcontractor, materials or equipment supplier;
53 k. Failure of the Contractor to submit certified payroll reports;
54 l. Stop notice served upon the Owner.

2. A retention in the amount of one-thousand dollars (\$1,000) will be withheld from the Contractor's monthly progress payment for each and every required document not submitted in a timely manner by the Contractor or its subcontractors up to a maximum of ten-thousand dollars (\$10,000). For purposes of this Paragraph, the term "required document" includes, but is not limited to, certified payrolls, labor compliance documents, Disadvantaged Business Enterprise documents, and any other information or documents required to be submitted by the Contractor or any of its subcontractors under the terms of this Agreement or pursuant to applicable federal, state or local laws or regulations. The retention provided for in this Paragraph shall be in addition to any other deduction or retention allowed under this Agreement, and shall be in addition to any other remedy or consequence provided by law for untimely submission of any required document. Such retention shall remain in effect only until such time as the required documents have been submitted by the Contractor or its subcontractor(s) and have been determined by the Owner to be both complete and acceptable as to form.
3. When the grounds as noted above are removed, payment shall be made for amounts withheld on the basis thereof.

G. COMPLETION AND FINAL PAYMENT

1. Following the Contractor's completion of the Work, the Contractor shall forward to the CM a written notice that the Work is ready for final inspection and acceptance, and shall also forward to the Construction Manager a final Application for Payment. Upon receipt, the Construction Manager will promptly make such inspection. When the Construction Manager finds the Work acceptable under the Contract documents and the Contract fully performed, the CM will issue a Project Certificate for Payment which will certify the final payment due the Contractor. This certification will constitute a representation that, to the best of the IOR's knowledge, information and belief, and on the basis of observations and inspections, the Work has been completed in accordance with the Terms and Conditions of the Contract Documents and that the entire balance found to be due the Contractor, and noted in said Certificate, is due and payable. The CM's certification of said Project Certificate for Payment will constitute a further representation that the conditions precedent to the Contractor's being entitled to final payment as set forth herein below have been fulfilled.
2. Neither the final payment nor the remaining retainage shall become due until the Contractor submits to the CM (1) an affidavit that all payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might in any way be responsible, have been paid or otherwise satisfied, (2) consent of surety, if any, to final payment, and (3) other data establishing payment or satisfaction of all such obligations, such as receipts, releases and waivers of liens arising out of the Contract, to the extent and in such form as may be designated by the Owner. If any Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may

furnish a bond satisfactory to the Owner to indemnify the Owner against any such lien. The bond cannot be from the original surety insurer for the project or any affiliate of the original surety. If any such lien remains unsatisfied after all payments are made, the Contractor shall refund to the Owner all monies that the latter may be compelled to pay in discharging such lien.

3. All provisions of this Agreement, including without limitation those establishing obligations and procedures, shall remain in full force and effect notwithstanding the making or acceptance of final payment, and the making of final payment shall not constitute a waiver of any claims by the Owner.
4. Upon completion and acceptance of all work whatsoever required, and upon the release of all claims against the Owner as specified, the Owner shall file a written Notice of Completion with the County Recorder as to the entire amount of work performed.
5. Final payment will be released within sixty (60) days after the date of acceptance of the Work as reflected in the Notice of Completion filed with the County Recorder's Office; provided, that Owner may withhold from the final payment, in the event of a dispute between Owner and Contractor, retentions in and amount not exceeding 150 percent of the disputed amount.
6. All manufacturer's warranties required by the Contract Documents shall commence on the date of the Notice of Completion for the Work. It shall be the Contractor's responsibility, through appropriate contractual arrangements with all subcontractors, material men and suppliers, to ensure compliance with this requirement.
7. The acceptance by the Contractor of the final payment, after the date of Notice of Completion of the Project, shall be and shall operate as a release to the Owner of all claims and of all liability to the Contractor, under the Contract Documents or otherwise, for all things done or furnished in connection with this Work, excepting only the Contractor's claims for interest upon final payment, if such final payment be improperly delayed. No payments, however, final or otherwise, shall operate to release the Contractor or his/her sureties from any obligations under the Contract Documents, including but not limited to the Performance and Payment Bonds.

2.25 CHANGES TO THE CONTRACT

- A. The Owner, without invalidating the Contract, may order changes in the Work within the general scope of the Contract consisting of additions, deletion or other revisions, the Contract Sum and Contract Time being adjusted accordingly. All such changes in the Work shall be authorized by Change Order, and shall be performed under the applicable conditions of the Contract Documents.
- B. CHANGE ORDER: A Change Order is a written order to the Contractor dually signed to show both the approval of the Architect or Engineer and Authorization of the Owner, issued after execution of the Contract, authorizing a change in the

1 Work or an adjustment in the Contract Sum or the Contract Time. Only an
2 executed Change Order will effectuate change in either the Contract Sum and/or
3 the Contract Time. A Change Order signed by the Contractor indicates the
4 Contractor's agreement therewith, including any adjustment in the Contract Sum
5 or the Contract Time, and the full and final settlement of all costs (direct, indirect
6 and overhead) related to the Work authorized by the Change Order.
7

8 C. All claims for additional compensation to the Contractor shall be presented in
9 writing before the expense is incurred and will be adjusted as provided herein.
10 No work shall be allowed to lag pending such adjustment, but shall be promptly
11 executed as directed, even if a disputed claim arises. No claim will be
12 considered after the work in question has been done unless a written contract
13 change order has been issued or a timely written notice of claim has been made
14 by Contractor. All claims for additional compensation shall be submitted to the
15 Owner separated by each of the base bid categories as noted in Contract
16 Section 00 42 13.
17

18 D. Costs mean an itemized breakdown of all labor (by crafts), materials, sales
19 taxes, equipment rentals, etc., for each portion of the Work which comprises the
20 change order including any Subcontractor's itemized breakdown, plus not more
21 than twenty (20) percent to cover all profits and administration. The cost or
22 credit to the Owner resulting from a change in the Work shall be determined in
23 one or more of the following ways:
24

- 25 1. by mutual acceptance of a lump sum properly itemized and supported by
26 sufficient substantiating data to permit evaluation.
- 27 2. by unit prices stated in the Contract Documents or subsequently agreed
28 upon;
- 29 3. by cost to be determined in a manner agreed upon by the parties and a
30 mutually acceptable fixed or percentage fee; or
- 31 4. by the method provided under Article 2.26.
32

33 E. The amount of credit to be allowed by the Contractor to the Owner, as confirmed
34 by the CM, for any deletion or change that result in a decrease in the Contract
35 Sum will be the amount of the actual cost. When both additions and credits
36 covering related Work or substitutions are involved in any one change, the
37 allowance for overhead and profit shall be figured on the basis of the net
38 increase, if any, with respect to that change.
39

40 F. Variation in Estimated Quantities: If unit prices are stated in the Contract
41 Documents or subsequently agreed upon, and if the quantities originally
42 contemplated are so changed in a proposed Change Order, and application or
43 the agreed unit prices to the quantities of Work proposed will cause substantial
44 inequity to the Owner or the Contractor, the applicable unit prices shall be
45 equitably adjusted.
46

47 2.26 CHANGES TO THE CONTRACT (EXTRA WORK AT FORCE ACCOUNT)

48 A. If none of the methods set forth in Article 2.25 - D.1, D.2, or D.3 above is agreed
49 upon, the Contractor, provided that a written order signed by the Owner is
50 received, shall promptly proceed with the Work involved. The cost of such Work
51 shall then be determined by the CM, on the basis of reasonable expenditures or
52 savings of those performing the Work attributable to the change, including, in the
53
54

1 case of an increase in the Contract Sum, not more than twenty percent (20%) for
2 all overhead and profit. In such case, and also under Article 2.25 - D.3 above,
3 the Contractor shall keep and present, in such form as the Owner or the CM
4 may prescribe, an itemized accounting of actual cost together with appropriate
5 supporting data for inclusion in a Change Order. Unless otherwise provided in
6 the Contract Documents, cost shall be limited to the following:
7
8

- 9 1. Labor Cost is the cost of labor for the workers (including working
10 foremen) used in the actual and direct performance of the extra work,
11 whether employed by the Contractor, or Subcontractors and Specialized
12 Forces of any tier.

13 Labor Cost shall include:
14

- 15 a. Actual Wages paid to the workers, plus employer payments to or
16 on behalf of the workers for health and welfare, pension,
17 vacation, and training. If required by the CM, certified payrolls
18 shall be submitted with extra work reports as verification of
19 wages paid to the workers.
20
21 b. A Labor Surcharge of 20 percent (35 percent for demolition work
22 and roofing work) will be added to the Actual Wages as defined
23 above. The Labor Surcharge shall constitute full compensation
24 for all payments imposed by State and Federal laws, including
25 Workers Compensation Insurance, Social Security, and
26 Unemployment Insurance.
27
28 c. Subsistence and Travel Allowance if actually paid to the workers.
29 Labor Surcharge will not be added to Subsistence and Travel
30 Allowance.
31
32 2. Equipment Cost is the payment made for the equipment actually used in
33 the performance of the extra work.
34
35 a. Equipment valued at three hundred dollars \$300 or less shall be
36 considered as small tools, and no payment will be made therefor.
37
38 b. Equipment costs will be paid in accordance with the rental rates
39 listed in "Cal-Trans Equipment Rental Rates, County of Fresno,
40 Department of Public Works and Planning", in effect at the time
41 of bid, available from the Department, Suite 711, Fresno County
42 Plaza Building, 2220 Tulare Street, Fresno CA 93721.
43
44 c. In the event that any of the equipment to be used is not listed in
45 the above publication, the rental rate shall be agreed upon in
46 writing by the Contractor and the CM before the extra work is
47 begun.
48
49 3. Materials Cost is the payment made for materials incorporated into the
50 work.
51
52

- a. Materials cost shall include sales tax, freight and delivery charges, less any available discounts whether or not said discounts are taken.
 - b. Materials cost shall be based upon supplier's or manufacturer's invoice. If invoices or other satisfactory evidence of cost are not furnished within sixty (60) days of delivery or within fifteen (15) days after acceptance of the contract, whichever occurs first, then the CM shall determine the materials cost, in his/her sole discretion, on the basis of available information and on his/her considered experience.
4. Specialized Services are those services or items of extra work that, by agreement of the Contractor and the CM, cannot be performed by forces of the Contractor or his/her Subcontractors, and may be performed by a specialist.
- a. Specialized services may be paid for by invoice if the established practice of the specialized force industry does not provide complete itemization of labor, equipment and materials costs.
5. Markup for Profit, Home Office and Field Office Overhead, Bond Premium, insurance, taxes and supervision will be added to the total of Labor Cost, Equipment Cost, Materials Cost and Specialized Services.
- a. Markup will be added only once on any extra work at force account, regardless of the number of contractors and subcontractors involved.
 - b. It is recognized that individual contractors and subcontractors have different overhead costs, profit requirements and bond premium rates. The amount to be added to extra work for markup shall include compensation for profit, overhead and bond premium without distinguishing among these items.
 - c. The markup to be added for extra work at force account on this project shall be fifteen percent (15%) plus 1-1/2% for Performance and Payment bonds for Contractor only.
6. Records shall be maintained by the Contractor and Subcontractors in such a manner as to provide a clear distinction between the costs of extra work paid for on a force account basis and the costs of other operations. From these records, the Contractor shall furnish the IOR completed extra work reports for each day's extra work to be paid for on a force account basis. Extra work reports shall itemize the materials used, equipment rental charges, and specialized services costs, and shall provide names or identifications and classifications of workmen, the hourly rate of pay, and hours worked. Extra work reports shall be compiled and submitted to the IOR daily for verification and signature. Extra work reports shall be signed by the Contractor or his/her authorized representative.

- 1 7. If the Contractor disputes the Architect or Engineer's cost determination,
2 the Contractor may initiate a claim in compliance with the claims and
3 disputes resolution provisions of these General Conditions.
4

5
6 2.27 SITE CONDITIONS
7

- 8 A. Where investigations have been conducted by the Owner of existing conditions
9 on the Site, including subsurface conditions, such investigations are made for
10 the purpose of design only and for the information of bidders. The results of
11 such investigations represent only the statement by the Owner as to the
12 circumstance and character of materials actually encountered by the Owner
13 during the investigations. The Owner makes no guarantee or warranty, express
14 or implied, that the conditions indicated are representative of conditions existing
15 throughout the Site of the Project or any part of it, or that unanticipated
16 conditions might not occur.
17
18 B. All excavation work shall be performed on an "unclassified basis"; that is, such
19 work shall include the removal of all material encountered including earth or rock
20 formations, regardless of the type or hardness thereof, or groundwater
21 conditions in the excavation, the cost of such excavations being included in the
22 Contract Price at the time of bidding. Unclassified excavation Work includes
23 drilling or blasting operations.
24
25 C. If site conditions are discovered that materially differ from previous information
26 that the Contractor has received, and that could not have been discovered by
27 the Contractor through prudent and reasonable investigation prior to pricing
28 his/her bid for the work, the Contractor shall be compensated for additional costs
29 incurred in working with the unknown site conditions, but only to the extent that
30 such previously unknown and undiscoverable site conditions cause the
31 Contractor to incur costs in addition to the bid price for that portion of the work.
32 The Contractor must be able to demonstrate clearly the original bid price for that
33 portion of the work (plus any approved change orders applicable to that portion
34 of the work) and the additional costs incurred as a direct result of the unknown
35 site conditions. Only additional costs over and above the amount of the original
36 bid price for that portion of the work will be compensated upon a
37 recommendation of approval by the Architect or Engineer.
38
39

40 2.28 REQUEST FOR EQUITABLE ADJUSTMENT
41

- 42 A. If the Contractor considers a Request for Equitable Adjustment is justified for
43 any increase in the Contract Time, the Contractor shall promptly, upon first
44 observance of the condition giving rise to the request, provide the CM and
45 Owner written notice of such condition and circumstance. This notice shall be
46 given by the Contractor before proceeding to execute the Work, except in
47 emergency endangering life or property, in which case the Contractor shall
48 proceed in accordance with the Emergency provisions of these General
49 Conditions. No such request shall be valid unless so made. A Change Order
50 shall be required to authorize any change in the Contract Time resulting from
51 such request for equitable adjustment.
52
53 B. If the Contractor requests that additional cost or time is involved because of, but
54 not limited to, (1) any written interpretation pursuant to Article 2.07.G, (2) any

order by the Owner to stop the Work pursuant to Article 2.08 where the Contractor was not at fault, or any such order by the CM as the Owner's agent, (3) any written order for a minor change in the Work issued pursuant to Article 2.29, the Contractor shall make such request for equitable adjustment as provided in Article 2.28.A.

2.29 MINOR CHANGES IN THE WORK

The CM will have authority to order minor changes in the Work not involving an adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes shall be enacted by written order issued through the CM, and shall be binding on the Owner and the Contractor. The Contractor shall carry out such written orders promptly.

2.30 SUCCESSORS AND ASSIGNS

The Owner and the Contractor, respectively, bind themselves, their partners, successors, assigns and legal representatives to the other party hereto and to the partners, successors, assigns and legal representatives of such other party with respect to all covenants, agreements and obligations contained in the Contract Documents. Neither party to the Contract shall assign the Contract or sublet it as a whole without the written consent of the other.

2.31 ASSIGNMENT OF MONEYS

The Contractor shall not assign moneys due or to become due him/her under the contract without the written consent of the Auditor-Controller of Fresno County. Any assignment of moneys shall be subject to all proper set-offs in favor of the County of Fresno and to all deductions provided for in the contract and particularly all money withheld, whether assigned or not, shall be subject to being used by the County of Fresno for the completion of the work in the event that the Contractor should be in default therein.

2.32 GUARANTEE OF WORK

A. The Contractor warrants to the Owner that all materials and equipment and the work as a whole furnished under this Contract will be new unless otherwise specified, and that all Work will be of good quality, free from faults and defects and in conformance with the Contract Documents, for one (1) year from the date of Notice of Completion of the Contract, unless a longer period is otherwise specified. All manufacturer's warranties required by the Contract Documents shall commence on the date of the filing of the Notice of Completion for the Work (which date necessarily will follow the performance under separate contracts. It shall be the Contractor's responsibility, through appropriate contractual arrangements with all subcontractors, material men and suppliers, to ensure compliance with this requirement. All Work not conforming to these requirements, including substitutions not properly reviewed and authorized, may be considered defective. If required by the IOR, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

- 1 B. If repairs or changes are required in connection with guaranteed work within any
2 guaranteed period, which, in the opinion of the CM is rendered necessary as
3 the result of the use of materials, equipment or workmanship which are inferior,
4 defective, or not in accordance with the Contract Documents, the Contractor
5 shall, promptly upon receipt of notice from the Owner, and without expense to
6 the Owner (1) place in satisfactory condition in every particular all of such
7 guaranteed work, correct all defects therein, and (2) make good all damage to
8 the building or site, or equipment or contents thereof, which, in the opinion of the
9 IOR, is the result of the use of materials, equipment or workmanship which are
10 inferior, defective, or not in accordance with the Contract Documents; and (3)
11 make good any work or materials, or the equipment and contents of said
12 building or site disturbed in fulfilling any such guarantee.
13
14 C. If the Contractor disturbs any work guaranteed under another contract in fulfilling
15 the requirements of the contract or of any guarantee, embraced in or required
16 thereby, he/she shall restore such disturbed work to a condition satisfactory to
17 the CM and guarantee such restored work to the same extent as it was
18 guaranteed under such other contract.
19
20 D. The Owner may have the defects corrected if the Contractor, after notice, fails to
21 proceed promptly to comply with the terms of the guarantee and the Contractor
22 and his/her surety shall be liable for all costs and expenses incurred in
23 connection therewith.
24
25 E. All special guarantees applicable to definite parts of the work that may be
26 stipulated in the Contract Documents shall be subject to the terms of this
27 paragraph during the first (1st) year of the life of such special guarantee.
28
29

30 2.33 RESPONSIBILITY FOR DAMAGE
31

- 32 A. Neither the Owner, the Architect or Engineer, nor any officer or employee of the
33 County, or officer or employee thereof, within the limits of which the work is
34 being performed, shall be answerable or accountable in any manner, for any
35 loss or damage that may happen to the work or any part thereof; or for any of
36 the materials or other things used or employed in performing the work; or for
37 injury to any person or persons, either workmen or the public, for damage to
38 property from any cause which might have been prevented by the Contractor, or
39 his/her workmen, or anyone employed by him/her, against all of which injuries or
40 damages to persons and property the Contractor having control over such work
41 must properly guard.
42
43 B. The Contractor shall be responsible for any liability imposed by law for any
44 damage to any person or property resulting from defects or obstructions or from
45 any cause whatsoever during the progress of the work or at any time before the
46 issuance of the Notice of Completion.
47
48 C. The Contractor shall indemnify and hold harmless the Owner, the CM, the
49 Architect, and all of their respective officers and employees, from all claims,
50 lawsuits or actions of every kind and nature whatsoever, brought for, or on
51 account of any injuries or damages received or sustained by any person or
52 persons, resulting from any act or admission by the Contractor or his/her
53 servants or agents, in the construction of the work or by or in consequence of
54 any negligence in guarding the same, in improper materials used in its

1 construction, or by or on account of any act or omission of the Contractor or
2 his/her agents in the performance of Contractor's obligations under the Contract
3 Documents. In addition to any remedy authorized by law, so much of the money
4 due the Contractor under and by virtue of the contract as shall be considered
5 necessary by the Owner may be retained by the Owner until disposition has
6 been made of such claims, lawsuits or actions for damages as aforesaid.
7
8

9 2.34 WRITTEN NOTICE

10
11 Written notice shall be deemed to have been duly served if delivered in person to the
12 individual or member of the firm or entity or to an officer of the corporation for whom it
13 was intended, or if delivered at or sent by registered or certified mail.
14

15
16 2.35 [RESOLUTION OF CONTRACT CLAIMS AND DISPUTES, INSERT SB 636 CLAIMS
17 LANGUAGE]
18

- 19 A. A Claim is a demand or assertion by one (1) of the parties seeking, as a matter
20 of right, adjustment or interpretation of Contract terms, payment of money,
21 extension of time, or a request for equitable adjustment or Change Order which
22 can not be resolved per provisions of Article 2.25 - CHANGES TO THE
23 CONTRACT. Any Claim shall be reduced to writing and filed with the IOR,
24 within ten (10) calendar days after the Contractor has notice of the condition
25 giving rise to the Claim, and final action per Article 2.25 - CHANGES TO THE
26 CONTRACT procedures has taken place or has been declared as such in
27 writing, by either party. Such ten (10)-day notice of an asserted claim is in
28 addition to the requirement for prompt notice required per Article 2.25 -
29 CHANGES TO THE CONTRACT.
30
- 31 B. The Contractor shall not claim or recover any overhead cost administrative or
32 otherwise, particularly 'Home Office' expenses, 'Extended site overhead', or any
33 other overhead cost on the basis of any 'Home Office' damages formula,
34 'Eichleay' formula, 'Total Cost' recovery formula or any other such formula.
35
- 36 C. REQUIREMENTS FOR FILING A CLAIM. Claims must be filed within the time
37 specified above, but in no event later than the date of final payment. Claims
38 shall be submitted to the IOR. The claim shall be in writing and shall be a sum
39 certain if known. If unknown, Contractor shall specify the basis for establishing
40 the sum certain. Claim shall include a statement of the reasons for the asserted
41 entitlement, and include the documents necessary to substantiate the claim.
42 Such documents may include but are not limited to payroll records, purchase
43 orders, quotations, invoices, estimates, subcontracts, daily logs, supplier
44 contracts, subcontract billings, bid takeoffs, equipment rental invoices, ledgers,
45 journals, daily reports, job diaries, and any documentation related to the
46 requirements of Article 2.25 - CHANGES TO THE CONTRACT. In the case of
47 a continuing delay, only one (1) claim is necessary. If adverse weather
48 conditions are the basis for a claim for additional time, such claim shall be
49 documented by data substantiating that weather conditions were abnormal for
50 the period of time and could not have been reasonably anticipated, and that
51 weather conditions had an adverse effect on the critical activities on the
52 construction schedule. The Contractor shall certify, at the time of submission of
53 a claim, as follows:
54

1 "I, _____, being the _____
2 (MUST BE AN OFFICER) of _____
3 (GENERAL CONTRACTOR), declare under penalty of perjury under the
4 laws of the State of California, and do personally certify and attest that: I
5 have thoroughly reviewed the attached claim for additional compensation
6 and/or extension of time, and know its contents, and said claim is made
7 in good faith; The supporting data is truthful and accurate; That the
8 amount requested accurately reflects the contract adjustment for which
9 the Contractor believes the Owner is liable; and, further, that I am
10 familiar with California Penal Code Section 72 and California
11 Government Code Section 12560, et seq, pertaining to false claims, and
12 further know and understand that submission or certification of a false
13 claim may lead to fines, imprisonment and/or other severe legal
14 consequences.

15
16 By: _____
17 (Contractor's signature) (Date)
18
19

20 D. Nothing in this subdivision is intended to extend the time limit or supersede
21 notice requirements otherwise provided by contract for the filing of claims. Any
22 formal claim of \$375,000 and under shall be processed as follows in accordance
23 with Public Contract Code Section 20104 et. seq.:
24

25 1. For claims of less than fifty thousand dollars (\$50,000), the Owner (or
26 his/her designee), shall review the facts pertinent to the claim, obtain
27 additional information deemed necessary for a decision (if any), review
28 recommendations of the IOR, coordinate with the contract administrator
29 (if any) and secure assistance from legal and other advisors, and render
30 a written decision on the claim within forty-five (45) days of receipt of the
31 claim. If additional information is thereafter required, it shall be requested
32 and provided pursuant to this subdivision, upon mutual agreement of the
33 Owner (or his/her designee) and claimant. The Owner (or his/her
34 designee's) written response to the claim, as further documented, shall
35 be submitted to the claimant within fifteen (15) days after receipt of the
36 further documentation or within a period of time no greater than that
37 taken by the claimant in producing the additional information, whichever
38 is greater.
39

40 2. For claims of over fifty thousand dollars (\$50,000) and less than or equal
41 to three hundred seventy-five thousand dollars (\$375,000), the Owner
42 (or his/her designee) shall review the facts pertinent to the claim, obtain
43 additional information deemed necessary for a decision (if any), review
44 recommendations of the IOR, coordinate with the contract administrator
45 (if any) and secure assistance from legal and other advisors, and render
46 a written decision on the claim within sixty (60) days of receipt of the
47 claim, or may request, in writing, within thirty (30) days of receipt of the
48 claim, any additional documentation supporting the claim or relating to
49 defenses or claims the Owner may have against the claimant. If
50 additional information is thereafter required, it shall be requested and
51 provided pursuant to this subdivision, upon mutual agreement of the
52 Owner (or his/her designee) and the claimant. The Owner (or his/her
53 designee's) written response to the claim, as further documented, shall
54 be submitted to the claimant within thirty (30) days after receipt of the

1 further documents, or a period of time no greater than that taken by the
2 claimant in producing the additional information or requested
3 documentation, whichever is greater.
4

5 3. If the claimant disputes the written response of Owner (or his/her
6 designee), or fails to respond within the time prescribed, the claimant
7 may so notify the Owner (or his/her designee), in writing, either within
8 fifteen (15) days of receipt of the Owner (or his/her designee's) response
9 or within fifteen (15) days of the Owner (or his/her designee's) failure to
10 respond within the time prescribed, respectively, and demand an
11 informal conference to meet and confer for settlement of the issues in
12 dispute. Upon a demand, the Owner (or his/her designee) shall
13 schedule a meet and confer conference within thirty (30) days for
14 settlement of the dispute.
15

16 4. If following the meet and confer conference the claim or any portion
17 remains in dispute, the claimant may file a claim pursuant to Chapter 1
18 (commencing with Section 900) and Chapter 2 (commencing with
19 Section 910) of Part 3 of Division 3.6 of Title 1 of the Government Code.
20 For purposes of those provisions, the running of the period of time within
21 which a claim must be filed shall be tolled from the time the claimant
22 submits his/her written claim pursuant to subdivision (a) until the time the
23 claim is denied, including any period of time utilized by the meet and
24 confer conference.
25

26 E. Procedures for Civil Actions to Resolve Disputed Claims: Non-binding
27 Mediation: Within sixty (60) days, but no earlier than thirty (30) days, following
28 the filing of a responsive pleading, the court shall submit the matter to
29 non-binding mediation unless waived by mutual stipulation by both parties. The
30 mediation process shall provide for the selection within fifteen (15) days by both
31 parties of a disinterested third person as mediator, shall be commenced within
32 thirty (30) days of the submittal, and shall be concluded within fifteen (15) days
33 from the commencement of the mediation unless a time requirement is extended
34 upon a good cause shown to the court. If the parties fail to select a mediator
35 within the 15-day period, any party may petition the court to appoint the
36 mediator.

37 Judicial Arbitration: If the matter remains in dispute, the case shall be submitted
38 to judicial arbitration pursuant to Chapter 2.5 (commencing with Section
39 1141.10) of Title 3 of Part 3 of the Code of Civil Procedure, notwithstanding
40 Section 1141.11 of the code. The Civil Discovery Act of 1986 (Article 3
41 (commencing with Section 2016) of Chapter 3 of Title 3 of Part 4 of the Code of
42 Civil Procedure) shall apply to any proceeding brought under this subsection
43 consistent with the rules pertaining to judicial arbitration. Arbitrators shall be
44 experienced in construction law.

45 Appeals: As provided by statute (specifically Public Contract Code section
46 20104.4(b)(3) and Code of Civil Procedure section 1141.21), any party
47 appealing an arbitration award who does not obtain a more favorable judgment
48 shall, in addition to payment of costs and fees, also pay the attorneys' fees on
49 appeal of the other party.
50

51 F. CLAIMS AND DISPUTES EXEMPT FROM FILING REQUIREMENTS. The
52

requirements and procedures imposed by this Article do not apply to:

1. Any claims by the Owner;
2. Any claim for or respecting personal injury or death or reimbursement or other compensation arising out of or resulting from liability for personal injury or death;
3. Any claim or dispute relating to stop payment requests or stop notices;
4. Any claim or dispute related to the approval, refusal to approve, or substitution of Subcontractors, regardless of tier, and suppliers; and
5. Any claim in excess of three hundred seventy-five thousand dollars \$375,000.

G. PAYMENT OF UNDISPUTED PORTION OF CLAIM. Owner shall pay claimant such portion of a claim that is undisputed except as otherwise provided in the contract.

H. CONTINUE WORK DURING DISPUTE. In the event of any disputed claim or other dispute between the Owner and the Contractor, the Contractor will not stop work but will prosecute the work diligently to completion in his/her manner directed by the Owner, and the dispute shall be resolved by a court of law after completion of the Work. However, Contractor must submit all disputes in accordance with the provisions of Article 2.35.

I. SUIT IN FRESNO COUNTY ONLY. Any litigation arising out of this Contract shall be brought in Fresno County and Contractor hereby waives the removal provisions of California Code of Civil Procedure Section 394.

2.36 PERFORMANCE BOND, LABOR AND MATERIAL PAYMENT BOND AND WARRANTY BOND

A. The Contractor shall furnish Performance Bond in the amount of one hundred percent (100%) of the Contract amount, Payment Bond in the amount of one hundred percent (100%) of the Contract amount and One Year Warranty Bond in the Amount of ten percent (10%) of the final Contract Amount.

B. All bonds required, whether Bid bonds, Performance, Payment, Warranty or other bonds, shall be issued by an admitted surety insurer. The same admitted surety insurer must issue the Bid Bond, Performance Bond, Payment Bond, and Warranty Bond. The payment, performance and warranty bonds required by these specifications will neither be accepted nor approved by the Owner unless the bonds are underwritten by an admitted surety and the requirements of California Code of Civil Procedure section 995.630 are met. The bonds must include a physical mailing address, phone number, FAX number, and contract person for the admitted surety insurer. The Owner further reserves the right to satisfy itself as to the acceptability of the surety and the form of bond. Upon request of the Owner, the bidder must submit the following documents:

1. The original, or a certified copy, of the unrevoked appointment, power of attorney, bylaws, or other instrument authorizing the person who executed the bond to do so.
2. A certified copy of the certificate of authority of the insurer issued by the California Insurance Commissioner.
3. A certificate from the county clerk that the certificate of authority has not been surrendered, revoked, canceled, annulled, or suspended, or in the event that it has, that renewed authority has been granted.
4. A financial statement of the assets and liabilities of the insurer to the end of the quarter calendar year prior to thirty (30) days next preceding the date of the execution of the bond, in the form of an officers' certificate as defined in Corporations Code § 173.

2.37 RIGHTS AND REMEDIES

- A. The duties and obligations imposed by the Contract Documents and the rights and remedies available hereunder shall be in addition to, and not a limitation of, any duties, obligations, rights and remedies otherwise imposed or available by law.
- B. No action or failure to act by the Owner, or by the CM or Architect, regarding any deficiency, breach or default in performance by the Contractor under the Contract Documents, shall be deemed or construed to constitute acquiescence of the Owner in connection therewith or with regard to any subsequent deficiency, breach or default in performance by the Contractor; nor shall any such prior act of failure to act by or on behalf of Owner be deemed or construed as a waiver of any rights in favor of Owner regarding any such deficiency, breach or default in performance by the Contractor, regardless of the similarity to the prior incident or circumstance when no action was taken regarding any alleged deficiency, breach or default in performance by the Contractor.

2.38 TIME, DELAYS AND LIQUIDATED DAMAGES

A. DEFINITIONS

1. Unless otherwise provided, the Contract Time is the period of time allotted in the Contract Documents for completion of the Work, including authorized adjustments thereto.
2. The Date of Commencement of the Work is the date established in the Notice to Proceed.
3. The Date of Completion of the Work is the date of which the work is certified as complete by the Architect or Engineer as specified in the Notice of Completion.
4. The term "day" as used in the Contract Documents shall mean calendar day unless specifically designated otherwise.

1
2 B. PROGRESS AND COMPLETION
3

- 4 1. Time is of the essence regarding all time limits stated in the Contract
5 Documents. By executing the Agreement the Contractor confirms that
6 the Contract Time is a reasonable period for performing the Work.
7
8 2. The Contractor shall begin the Work on the Date of Commencement.
9 The Contractor shall not knowingly, except by agreement or instruction
10 of the Owner in writing, prematurely commence operations on the site or
11 elsewhere prior to the effective date of insurance required herein to be
12 furnished by the Contractor. The Date of Commencement of the Work
13 shall not be changed by the effective date of such insurance.
14
15 3. The Contractor shall carry the Work forward expeditiously with adequate
16 forces and shall achieve Completion of the Work within the Contract
17 Time.
18

19 C. DELAYS AND EXTENSIONS OF TIME
20

- 21 1. Delays in prosecution of parts or classes of the Work that are not
22 demonstrated to prevent or delay completion of the entire Project or
23 specific milestones within the Contract Time are not "unavoidable
24 delays" for purposes of this section.
25
26 2. In all cases, the time authorized for extension of the Contract Time shall
27 be no greater than the number of days directly attributable to the event
28 or circumstances which causes unavoidable delay in the completion of
29 the Project. Contractor shall be entitled, in the case of unavoidable
30 delays, to an extension in the Contract time, but not to any increase to
31 the Contract price. "Unavoidable delay" for this purpose shall be defined
32 as follows:
33
34 a. Unavailable Materials. That materials or articles called for in the
35 Contract Documents are not obtainable within the time required
36 for timely completion; provided that such materials or articles
37 were listed by the Contractor in the schedule required by Article
38 2.17 - CONTRACTOR'S CONSTRUCTION SCHEDULE; that the
39 Contractor demonstrates that the unavailability of the materials is
40 in fact the cause for the delay, and could not have been avoided
41 by an appropriate adjustment in the Construction Schedule; and
42 that the unavailability of such materials is due to circumstances
43 beyond the Contractor's control. If good cause for delay is
44 demonstrated pursuant to this subsection, the Owner, at its sole
45 discretion, may grant a time extension.
46
47 b. Force Majeure. That delays in construction have resulted from
48 circumstances beyond the control of the Contractor and which
49 the Contractor could not have provided against by the exercise of
50 reasonable care, prudence, foresight, and diligence. Unavoidable delays within the meaning of this subparagraph
51 shall be those caused by acts of God, war, insurrection, civil
52 disorder, fire, floods, epidemic, or strikes.
53
54

- 1 c. Unseasonable Weather. An extension of time may be granted
2 due to weather which is unsuitable for the Work currently in
3 progress, upon the determination of the Owner that the weather
4 conditions in fact caused the delay in completion of the Project
5 and that such weather conditions were not, and could not in the
6 exercise of reasonable diligence, have been foreseen by the
7 Contractor. Seasonable weather that, in the exercise of
8 reasonable foresight and diligence, should be expected in the
9 area at the time of year in question is not cause for an extension
10 of time.
11
12 d. Time Extensions Due to Change Orders or Work Authorizations.
13 A time extension may be granted due to additional work that
14 results in a delay in the Project caused by the approval by the
15 Owner of a Change Order or Work Authorization. The Contractor
16 shall be entitled to a time extension Change Order only when the
17 extra Work is demonstrated by the Contractor to have caused a
18 delay in the Project.
19
20 e. Owner Caused Delays. In the event that the Project is delayed
21 by acts of the Owner not authorized by the Contract Documents
22 which the Contractor demonstrates will or have caused an
23 unavoidable delay, the Contractor shall be entitled to a Contract
24 Time Change Order to offset the extra time incurred by the
25 Contractor. The Contractor will not be entitled to adjustments in
26 the contract price. Extra time shall be limited to that which is
27 directly identified as critical by the delay.
28
29 4. The Contractor specifically agrees that a time extension as provided
30 herein is its sole remedy for Owner-caused delays, and agrees to make
31 no claim or demand for additional damages, nor claim an acceleration of
32 the time for performance.
33
34 5. The Contractor shall not be entitled to any Contract Time extension nor
35 Contract Price adjustment for alleged Owner delays if the Owner has
36 acted within the time limits specified by the Contract Documents.
37

38 D. NOTICE OF DELAYS
39

- 40 1. Contractor shall notify the CM promptly whenever the Contractor
41 foresees any event or circumstance that may delay the prosecution of
42 the Work and in Contractor's opinion may provide grounds for an
43 extension, and shall in any event notify the CM immediately upon the
44 occurrence of any such delay. The Contractor shall take immediate
45 steps to prevent, if possible, the occurrence or continuance of the delay.
46 If this cannot be done, the CM shall determine how long the delay shall
47 continue and to what extent the prosecution and completion of the Work
48 are being delayed thereby. Such notification shall specify with detail the
49 cause asserted by the Contractor to constitute grounds for an extension.
50 Failure of the Contractor to submit such a notice within ten (10) days
51 after the initial occurrence of the event-giving rise to the delay shall
52 constitute a waiver by the Contractor of any request for a time extension,
53 and no extension shall be granted as a consequence of such delay.
54

2. If the Contractor believes that the delay in prosecution in the Work will result in an unavoidable delay in completion of the entire Project, the Contractor shall submit evidence to support that belief, together with its request for a time extension. Such evidence shall include a demonstration that the delayed portion of the Work will affect the Critical Path Scheduling of the entire Project. The Contractor shall also submit a proposed revised Construction Schedule, which accounts for the delay in completion of the entire Project caused by the delay in prosecution of part of the Project, and includes a revised Critical Path demonstrating how the Project will be completed within the proposed revised Contract Time.

E. INVESTIGATION; PROCEDURE.

1. Upon receipt of a request for Contract Time extension, the CM shall conduct an investigation of the facts asserted by the Contractor to constitute grounds for an extension. The results of this investigation shall be reported by the CM to the Contractor and shall indicate whether he/she will recommend for or against such extension to the Owner. The performance of this investigation by the CM shall not be construed as direction or recommendation to the Contractor regarding scheduling of the work. Scheduling this work is the sole responsibility of the Contractor.
2. The CM may, in his/her sole discretion, defer this recommendation to allow the accumulation of time extensions due to Work Authorizations into a periodic or final Change Order request.
3. Upon receiving the Architect or Engineer's recommendation to the Owner regarding the Contractor's request for a time extension, the Contractor may either withdraw its application for extension or request that it be scheduled for action by the Owner. If the Owner disallows the request, there shall be no allowance made for the time during which the request was pending, and the Contractor shall remain obligated to complete the Work in the time specified.
4. If the Owner approves the time extension Change Order, the new Construction Schedule submitted by the Contractor and approved by the Owner shall be deemed to amend the original Construction Schedule approved by the Owner; thereafter, the amended Construction Schedule shall have the same force and effect as the originally approved Progress Schedule.
5. The revised Construction Schedule must be submitted within seven (7) calendar days of the date in which the Owner approves the change.
6. The Contractor agrees that the Owner's determination as to the existence of grounds for an extension and, the duration of any such extension, shall be final and binding upon both Owner and Contractor.

F. DISCRETIONARY TIME EXTENSION FOR BEST INTEREST OF OWNER

1. The Owner reserves the right to extend the Contract Time for completion of the Work if the Board of Supervisors determines that such extension is in the best interest of the Owner.
2. In the event that such discretionary extension is made at the request of the Contractor, the Owner shall have the right to charge to the Contractor all or any part, as the Board may deem proper, of the actual cost to the Owner for engineering, inspection, supervision, contract administration, incidental and other overhead expenses that accrue during period of such extension, and to deduct all or any portion of such amounts from the final payment for the Work.
3. In the event such extension is ordered over the objection of the Contractor, the Contractor shall be entitled to a Change Order adjusting the price paid to reflect the actual costs incurred by the Contractor as a direct and proximate result of the delay, upon his/her written application therefor, accompanied by such verification of costs as the CM requires. Only additional direct costs incurred at the site will be reimbursable by Change Order.

G. LIQUIDATED DAMAGES

1. If the Work is not completed by Contractor in the time specified in the Agreement for Construction or within any period of extension authorized pursuant to this Article, the Contractor acknowledges and admits that the Owner will suffer damage, and that it is impracticable and infeasible to fix the amount of actual damages. Therefore, it is agreed by and between the Contractor and the Owner that the Contractor shall pay to the Owner as fixed and liquidated damages, and not as a penalty, the sum of \$2,500 per day as specified in Section 00 52 13, Agreement, Article III for each calendar day of delay until the Work is completed and accepted, and that both the Contractor and the Contractor's surety shall be liable for the total amount thereof, and that the Owner may deduct said sums from any monies due or that may become due to the Contractor.
2. This liquidated damages provision shall apply to all delays of any nature whatsoever, save and except only unavoidable delays approved by the Owner pursuant to provisions hereinabove, or discretionary time extensions approved by the Board of Supervisors pursuant to provisions hereinabove.

H. EXTENSION OF TIME NOT A WAIVER.

1. Any extension of the Contract Time granted pursuant to this Article shall not constitute a waiver by the Owner, nor a release of the Contractor, from his/her obligations to perform this Contract within the allotted Contract Time.
2. Granting of a time extension due to one (1) circumstance on one (1) request therefore shall not constitute a granting by the Owner of an extension of time for any other circumstance or the same circumstance occurring at some other time, and shall not be interpreted as a precedent for any other request for extension.

2.39 PROTECTION OF PERSONS AND PROPERTY

A. SAFETY PRECAUTIONS AND PROGRAMS

The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work.

B. SAFETY OF PERSONS AND PROPERTY

The Contractor shall take all reasonable precautions for the safety of, and shall provide all reasonable protection to prevent damage, injury or loss to:

1. All employees on the Work and all other persons who may be affected thereby;
2. All the work and all materials and equipment to be incorporated therein, whether in storage or off the site, and that is under the care, custody or control of the Contractor or any of the Contractor's Subcontractors or Sub-subcontractors;
3. Other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction; and
4. The work of the Owner or other separate contractors.

C. The Contractor shall give all notices and comply with all applicable laws, ordinances, rules, regulations and lawful orders of any public authority bearing on the safety of persons or property or their protection from damage, injury or loss.

D. The Contractor shall erect and maintain, as required by existing conditions and the progress of the Work, all reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent facilities.

E. When the use or storage of explosives or other hazardous materials or equipment is necessary for the execution of the Work, the Contractor shall exercise the utmost care and shall carry on such activities under the supervision of properly qualified personnel.

F. The Contractor shall promptly remedy all damage or loss to any property referred to above caused in whole or in part by the Contractor, any Subcontractor, any Sub-subcontractor, anyone directly or indirectly employed by any of them, or any one for whose acts any of them may be liable, and for which the Contractor is responsible under the above noted clauses, except damage or loss attributable solely to the acts or omissions of the Owner, the CM, or anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable, and not attributable in any degree to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in

1 addition to the Contractor's obligations under the Indemnification provisions
2 provided herein.

3
4 G. The Contractor shall designate a responsible member of the Contractor's
5 organization at the site whose duty shall be the prevention of accidents. This
6 person shall be the Contractor's superintendent unless otherwise designated by
7 the Contractor in writing to the Owner and the CM.

8
9 H. The Contractor shall not load or permit any part of the Work to be loaded so as
10 to endanger its safety.

11
12 I. EMERGENCIES

13 In any emergency affecting the safety of persons or property the Contractor shall
14 act, at the Contractor's discretion, to prevent threatened damage, injury or loss.
15 Any additional compensation or extension of time claimed by the Contractor on
16 account of emergency work shall be determined as provided in the provisions
17 herein for Changes in the Work.

18
19
20 2.40 INSURANCE

21
22 A. CONTRACTOR'S INSURANCE

23
24 1. Bidders' attention is directed to the insurance requirements below. It is
25 highly recommended that Bidders confer with their respective insurance
26 carriers or brokers to determine in advance of bid submission the
27 availability of the insurance certificates and endorsements required
28 below. A bidder who is awarded a contract and thereafter fails to comply
29 strictly with the insurance requirements, will be deemed to be in default
30 of its obligations.

31
32 2. Contractor shall procure, and maintain for the duration of the Contract,
33 insurance against claims for injuries to persons or damage to property
34 which may arise from or in connection with the performance of the work
35 hereunder by the Contractor, his/her agents, representatives, employees
36 or Subcontractors. The cost of such insurance shall be included in the
37 Contractor's bid.

38
39 3. No later than ten (10) calendar days following the Award of the Contract,
40 and prior to execution of the Agreement for Construction by the Owner,
41 the Contractor shall submit certificates of insurance, signed by an
42 authorized agent of the insurer, attesting to insurance coverage of the
43 Contractor as required by this Article.

44
45 B. MINIMUM SCOPE OF INSURANCE.

46
47 Coverage shall be at least as broad as:

- 48
49 1. Insurance Services Office Commercial General Liability coverage
50 ("occurrence" form CG0001).
51
52 2. Insurance Services Office Business Auto Coverage form number CA
53 0001 0187 covering Automobile Liability, code 1 "any auto".

- 1
2 3. Workers' Compensation insurance as required by the Labor Code of the
3 State of California and Employers Liability insurance.
4

5 C. MINIMUM LIMITS OF INSURANCE.
6

7 Contractor shall maintain limits no less than:
8

- 9 1. General Liability: One million dollars (\$1,000,000.00) combined single
10 limit per occurrence for bodily injury, personal injury and property
11 damage. If Commercial General Liability Insurance or other form with a
12 general aggregate limit is used, either the general aggregate limit shall
13 apply separately to this project/location or the general aggregate limit
14 shall be three times the required occurrence limit.
15
16 2. Automobile Liability: One million dollars (\$1,000,000.00) combined single
17 limit per accident for bodily injury and property damage.
18
19 3. Workers' Compensation and Employers Liability: Workers'
20 compensation limits as required by the Labor Code of the State of
21 California and Employers Liability limits of one million dollars
22 (\$1,000,000.00) per accident.
23

24 D. DEDUCTIBLES AND SELF-INSURED RETENTIONS.
25

26 Any deductibles or self-insured retentions must be declared to and approved by
27 the Owner. If approved at the option of the Owner, either: the insurer shall
28 reduce or eliminate such deductibles or self-insured retentions as respects the
29 Owner, its officers, officials, employees and volunteers; or the Contractor shall
30 procure a bond guaranteeing payment of losses and related investigations, claim
31 administration and defense expense.
32

33 E. OTHER INSURANCE PROVISIONS.
34

35 The policies are to contain, or be endorsed to contain, the following provisions:
36

- 37 1. Fire Insurance / Builders Risk Insurance.
38
39 a. The Contractor shall secure "All Risk" type Builder's Risk
40 Insurance for the Work to be performed pursuant to this
41 Agreement. The policy shall cover not less than losses due to
42 fire, explosion, vehicle damage, theft, flood, earthquake and civil
43 commotion with no coinsurance penalty provision.
44
45 b. The Contractor shall obtain and keep in force insurance against
46 loss or damage by fire and the customary extended perils
47 including windstorm, hail, explosion, aircraft, vehicle, smoke, riot,
48 and civil commotion, vandalism, sprinkler leakage (including
49 earthquake) as covered under the standard forms of California
50 Standard Fire Insurance Policy for school projects or Factory
51 Insurance Association and/or Factory Mutual Insurance
52 Company for projects other than schools. The policy shall cover
53 the entire structure on which the work of this contract is to be
54 done, up to the full insurable value thereof, including items of

labor and materials connected therewith on the site, materials in place or to be used as part of the permanent construction including materials stored and partially paid for by the Owner as provided in Section 00 21 13 surplus materials, shanties, protective fences, bridges, or temporary structures, miscellaneous materials and supplies incident to the work, and such scaffolding, staging, towers, forms and equipment as are not owned or rented by the Contractor, the cost of which is included in the cost of the work. EXCLUDED: This insurance does not cover any tools owned by mechanics, any tools, equipment, scaffolding, staging, towers, and forms owned or rented by the Contractor, the capital value of which is not included in the cost of the Work, or any structures erected for the Contractor's administration of the Project. The loss, if any, is to be adjustable with and payable to the Owner as trustee for the insured as their interests may appear, except in such cases as may require payment of all or a proportion of said insurance to be made to a mortgagee or trustee as its interest may appear.

c. The Owner shall be named as insured jointly with the Contractor and other proper parties, all as their respective interests may appear. All subcontractors shall be insured to the extent of their portion of the work under the Contractor. The Owner, Contractor and all subcontractors waive all rights, each against the others, for damages caused by fire or other perils covered provided under the terms of this article, except such rights as they may have to the proceeds of the insurance held by the party obtaining and maintaining the insurance policy in force who acts as trustee of said policy. Certificates of such insurance shall be filed with the Owner. If the Contractor fails to effect or maintain insurance as above and so notifies the Owner, the Owner may insure his own interest and charge the cost thereof to the Contractor.

d. In the event of a partial or total destruction by the perils insured against, of any or all of the work and/or materials herein provided for, at any time prior to the final completion of the Contract and the final acceptance by the Owner of the Work or materials to be performed or supplied thereunder, the Contractor shall promptly reconstruct, repair, replace, or restore all work or materials so destroyed or injured at his sole cost and expense. Nothing herein provided for shall in any way excuse the Contractor or his surety from the obligation of furnishing all the required materials and completing the work in full compliance with the terms of the Contract.

2. Commercial General Liability and Automobile Liability Coverages.

a. The Contractor shall secure Commercial General Liability Insurance with limits of not less than One Million Dollars (\$1,000,000.00) per occurrence and an annual aggregate of Three Million Dollars (\$3,000,000.00). This policy shall be issued on a per occurrence basis. The Owner may require specific coverage including completed operations, product liability, contractual liability, XCU, fire legal liability or any other liability

1 insurance deemed necessary because of the nature of the
2 contract. The Owner, its officers, officials, employees, agents,
3 including Consulting Engineers while performing contract
4 administration services, and volunteers are to be covered as
5 insured as respects all of the following: liability arising out of
6 activities performed by or on behalf of the Contractor, including
7 the insured's general supervision of the Contractor; products and
8 completed operations of the Contractor; premises owned,
9 occupied or used by the Contractor; or automobiles owned,
10 leased, hired or borrowed by or on behalf of the Contractor. The
11 coverage shall contain no special limitations on the scope of
12 protection afforded to the Owner, its officers, officials, employees
13 or volunteers.

- 14
- 15 b. The Contractor's insurance coverage shall be primary insurance
16 as respects the owner, its officers, officials, employees, agents,
17 Consulting Engineers, and volunteers. Any insurance or self-
18 insurance maintained by the Owner, its officers, officials,
19 Employees, agents, Consulting Engineers, or volunteers shall be
20 in excess of the Contractor's insurance and shall not contribute
21 with it.
- 22
- 23 c. Any failure to comply with reporting provisions of the policies
24 shall not affect Coverage provided to the Owner, its officers,
25 officials, employees, agents, Engineers, Consulting Engineers, or
26 volunteers.
- 27
- 28 d. The Contractor's insurance shall apply separately to each
29 insured against whom claim is made or suit is brought, except
30 with respect to the limits of the insurer's liability.
- 31
- 32 e. Such Commercial General Liability insurance shall name the
33 County of Fresno, its officers, agents, and employees,
34 individually and collectively, as additional insured, but only
35 insofar as the operations under this Agreement are concerned.
36 Such coverage for additional insured shall apply as primary
37 insurance and any other insurance, or self-insurance, maintained
38 by Owner, its officers, agents and employees shall be excess
39 only and not contributing with insurance provided under
40 Contractor's policies herein. This insurance shall not be
41 cancelled or changed without a minimum of thirty (30) days
42 advance written notice given to Owner. Contractor shall obtain
43 endorsements to the Commercial General Liability insurance
44 policy naming Owner as an additional insured and providing for a
45 thirty (30) day prior written notice of cancellation or change in
46 terms or coverage
- 47
- 48 f. Comprehensive Automobile Liability Insurance with limits of not
49 less than One Million Dollars (\$1,000,000) per accident for bodily
50 injury and property damage. Coverage should include owned
51 and non-owned vehicles used in connection with this Agreement
52 and all applicable endorsements.

53

54 3. Professional Liability Coverage.

1
2 If Contractor employs licensed professional staff, (e.g., Ph.D., R.N.,
3 L.C.S.W., M.F.C.C.) in providing services, the Contractor shall secure
4 Professional Liability Insurance with limits of not less than one million
5 dollars (\$1,000,000.00) per occurrence, and three million dollars
6 (\$3,000,000.00) annual aggregate, with a provision for three (3) year tail
7 coverage.
8

9 4. Worker's Compensation and Employers Liability Coverage.

10
11 The Contractor shall obtain a policy of Worker's Compensation
12 insurance in accordance with applicable provisions of the California
13 Labor Code. The insurer shall agree to waive all rights of subrogation
14 against the Owner, its officers, officials, employees and volunteers for
15 losses arising from work performed by the Contractor for the Owner.
16 Contractor shall supply the Owner with certificates of insurance in
17 triplicate, evidencing that Workers Compensation Insurance is in effect
18 and providing that the Owner will receive 30 days' notice of cancellation.
19 If Contractor self-insures Workers Compensation, Certificate of Consent
20 to Self-Insure shall be provided to the Owner.
21

22 5. All Coverages.

23
24 Prior to the commencement of performing its obligations under this
25 Agreement, Contractor shall provide certificates of insurance and upon
26 request from Owner, formal endorsements for the foregoing policies, as
27 required herein, to the Owner, listing the name and address of the official
28 who will administer this contract, and stating that such insurance
29 coverage have been obtained and are in full force; that the County of
30 Fresno, its officers, agents and employees will not be responsible for any
31 premiums on the policies; that such Commercial General Liability
32 insurance names the County of Fresno, its officers, agents and
33 employees, individually and collectively, as additional insured, but only
34 insofar as the operations under this Agreement are concerned; that such
35 coverage for additional insured shall apply as primary insurance and any
36 other insurance, or self-insurance, maintained by Owner, its officers,
37 agents and employees, shall be excess only and not contributing with
38 insurance provided under Contractor's policies herein; and each
39 insurance policy required by this Section 2.40 shall be endorsed to state
40 that coverage shall not be suspended, voided, canceled by either party,
41 reduced in coverage or in limits except after thirty (30) days' prior written
42 notice has been given to the Owner.
43

44 F. ACCEPTABILITY OF INSURERS

45
46 Contractor shall obtain the policies and coverages specified herein from an
47 admitted insurer in good standing with and authorized to transact business in
48 this state by the California Department of Insurance, and having a Best's rating
49 of no less than **A** and FSC **VIII**.
50

51 G. VERIFICATION OF COVERAGE

52
53 Contractor shall furnish the Owner with certificates of effecting coverage
54 required by this clause. The certificates for each insurance policy are to be

signed by a person authorized by that insurer to bind coverage on its behalf. All certificates are to be received and approved by the owner before work commences. The Owner reserves the right to require complete, certified copies of all required insurance policies, at any time. In the event Contractor fails to keep in effect at all times insurance coverage as herein provided, the Owner may, in addition to other remedies it may have, suspend or terminate this Agreement upon the occurrence of such event. The Certificate of Insurance shall be issued in triplicate, and provided to the Owner within ten (10) days of award, and also shall be provided to all other participating agencies who contribute to the cost of the work or have jurisdiction over areas in which the work is to be performed and all officers and employees of said agencies while acting within the course and scope of their duties and responsibilities.

H. SUBCONTRACTORS

Contractor shall include all Subcontractors as insured under its policies or shall furnish separate certificates and endorsements for each Subcontractor. All coverages for Subcontractors shall be subject to all of the requirements stated herein.

2.41 UNCOVERING WORK

- A. If any portion of the Work should be covered contrary to the request of the CM, IOR, Owner, public authority having jurisdiction, or to requirements specifically expressed in the Contract Documents, it must, if required in writing by the Engineer, be uncovered for their observation and shall be replaced at the Contractor's expense.
- B. If any other portion of the Work has been covered which the Engineer, Owner or public authority having jurisdiction has not specifically requested to observe prior to its being covered, the Engineer may request to see such Work and it shall be uncovered by the Contractor. If such Work is found in accordance with the Contract Documents, the cost of uncovering and replacement shall, by appropriate Change Order, be charged to the Owner. If such Work is found not in accordance with the Contract Documents, the Contractor shall pay such costs unless it be found that this condition was caused by the Owner or a separate contractor as provided herein in these General Conditions, in which event the Owner shall be responsible for the payment of such costs.

2.42 CORRECTION OF WORK

- A. The Contractor shall promptly correct all Work rejected by the Engineer as defective or as failing to conform to the Contract Documents, whether or not fabricated, installed or completed. The Contractor shall submit a plan of action, within twenty-four (24) hours of notification of the rejected work by the Engineer, for correcting the rejected work. The Contractor shall bear all costs of correcting such rejected Work, including compensation for the Engineer's and Architect's additional services made necessary thereby.
- B. If, within one (1) year after the date of acceptance of the Work as specified in the Notice of Completion, or designated portion thereof, or within one (1) year after acceptance by the Owner of designated equipment, or within such longer period

1 of time as may be prescribed by the terms of any applicable special warranty
2 required by the Contract Documents, any of the Work is found by Owner to be
3 defective or not in accordance with the Contract Documents, the Contractor shall
4 correct it promptly after receipt of a written notice from the Owner to do so,
5 unless the Owner has previously given the Contractor a written acceptance of
6 such condition. This obligation shall survive both final payment for the Work or
7 designated portion thereof and termination of the Contract. The Owner shall give
8 such notice promptly after discovery of the condition.
9

- 10 C. The Contractor shall, at his/her sole expense, remove from the site all portions
11 of the Work that are defective or nonconforming and which have not been
12 corrected under Articles 2.32, 2.42.A, and 2.42.B, unless the Owner waives
13 removal.
14
- 15 D. If the Contractor fails to submit a plan of action, within twenty-four (24) hours of
16 notification of the rejected work by the Engineer, for correcting the rejected work,
17 or fails to correct defective or nonconforming Work as provided herein in Articles
18 2.32, 2.42.A, and 2.42.B, the Owner may correct it in accordance with Article
19 2.08.C.
20
- 21 E. If the Contractor does not take action under the plan to initiate such correction of
22 such defective or nonconforming Work within ten (10) days of written notice from
23 the Engineer, the Owner may remove it and may store the materials or
24 equipment at the expense of the Contractor. If the Contractor does not pay the
25 cost of such removal and storage within ten (10) days thereafter, the Owner
26 may, upon ten (10) additional days' written notice, sell such Work at auction or at
27 private sale and shall account for the proceeds thereof, after deducting all the
28 costs that should have been borne by the Contractor, including compensation for
29 the CM, IOR, Architect, or other Professional's additional services made
30 necessary thereby. If such proceeds of sale do not cover all costs that the
31 Contractor should have borne, the difference shall be charged to the Contractor
32 and an appropriate Change Order shall be issued. If the payments then or
33 thereafter due the Contractor are not sufficient to cover such amount, the
34 Contractor shall pay the difference to the Owner.
35
- 36 F. The Contractor shall bear the cost of making good all work of the Owner or
37 separate contractors destroyed or damaged by such correction or removal.
38
- 39 G. Nothing contained in this Article 2.42 shall be construed to establish a period of
40 limitation with respect to any other obligation which the Contractor might have
41 under the Contract Documents, including Article 2.32 hereof. The establishment
42 of the time periods noted in this Article 2.42, or such longer period of time as
43 may be prescribed by law or by the terms of any warranty required by the
44 Contract Documents, relates only to the specific obligation of the Contractor to
45 correct the Work, and has no relationship to the time within which the
46 Contractor's obligation to comply with the Contract Documents may be sought to
47 be enforced, nor to the time within which proceedings may be commenced to
48 establish the Contractor's liability with respect to the Contractor's obligations
49 other than specifically to correct the Work.
50
51

52 2.43 ACCEPTANCE OF DEFECTIVE OR NONCONFORMING WORK
53

1 If the Owner prefers to accept defective or nonconforming Work, the Owner may do so
2 instead of requiring its removal and correction, in which case a Change Order will be
3 issued to reflect a reduction in the Contract Amount where appropriate and equitable.
4 Such adjustment shall be effected whether or not final payment has been made.
5 Engineer shall determine the amount of reduction in the Contract Amount.
6
7

8 2.44 TERMINATION BY THE OWNER
9

- 10 A. If the Contractor is adjudged bankrupt, or makes a general assignment for the
11 benefit of creditors, or if a receiver is appointed on account of the Contractor's
12 insolvency, or stop notices are served upon the Owner, or if the Contractor
13 persistently or repeatedly refuses or fails, except in cases for which extension of
14 time is provided, to supply enough properly skilled workers or proper materials,
15 or fails to make prompt payment to Subcontractors or for materials or labor, or
16 persistently disregards applicable laws, ordinances, rules, regulations or orders
17 of any public authority having jurisdiction, or otherwise is guilty of a substantial
18 violation of a provision of the Contract Documents, and fails after written notice
19 to commence and continue correction of such default, neglect or violation with
20 diligence and promptness, the Owner upon certification by the Engineer that
21 sufficient cause exists to justify such action, may, after an additional written
22 notice and without prejudice to any other remedy the Owner may have,
23 terminate the Contract and take possession of all materials, equipment, tools,
24 construction equipment and machinery thereon owned by the Contractor and
25 may finish the Work by whatever methods the Owner may deem expedient. In
26 such case the Contractor shall not be entitled to receive any further payment
27 until the Work is finished.
28
29 B. If the unpaid balance of the Contract Amount exceeds the costs of finishing the
30 Work, including compensation for the CM's, IOR's and Architect's additional
31 services made necessary thereby, Contractor will only be paid for his/her actual
32 unpaid costs from such excess. If such costs exceed the unpaid balance, the
33 contractor shall pay the difference to the Owner. The amount to be paid to the
34 Contractor or to the Owner, as the case may be, shall be certified by the
35 Engineer, upon application, in the manner provided in Article 2.24 and this
36 obligation for payment shall survive the termination of the Contract.
37
38

39 2.45 SUBSTITUTION OF MATERIALS
40

- 41 A. When a specific manufacturer, trade name or material is specified, or indicated,
42 it is to establish a standard of quality and shall not be construed as limiting
43 competition. The intent of the Contract Documents is to specify high-grade
44 standard material and equipment, and it is not the intent of these Contract
45 Documents to exclude or omit the products of any responsible manufacturer, if
46 such products are equally acceptable in terms of quality, finish, performance,
47 durability, and serviceability, in the judgment of the Owner and the Architect, to
48 those specified herein. Wherever an article, or any class of materials, is
49 specified by the trade name or by the name of any particular patentee,
50 manufacturer or dealer, it shall be taken as intending to mean and specify the
51 article of material described or any other equal thereto in quality, finish,
52 performance, durability, and serviceability, in the judgment of the Owner and the
53 Architect, for the purpose for which it is or they are intended.
54

- 1 B. If the Contractor desires to use material or equipment other than that specified,
2 he/she shall submit a request for approval of such substitution, in writing, to the
3 Architect/Engineer by no later than 10 days prior to bid opening. Substitution
4 requests will not be considered if received after the time stipulated.
5
6 C. The Owner does not guarantee that alternative articles, components, materials
7 or equipment other than the item specified by trade name or other specific
8 identification, will fit within the design parameters of the project without alteration
9 of the project design by the Contractor.
10
11 D. The Owner has the right to reject any proposed alternative material which
12 requires alteration of the project design which impacts the safety of the public or
13 the user of the completed facility. If the proposed alternative material requires
14 alteration of the design of the Project or any aspect thereof and said alterations
15 are acceptable to the Owner, the Contractor shall be responsible for performing
16 said alterations at no additional cost to the Owner.
17
18 E. Submittals for approval of substitute materials shall contain sufficient detailed
19 information, descriptive brochures, drawings, samples or other data as is
20 necessary to provide a detailed side-by-side comparison to the specified
21 materials. It is the sole responsibility of the Contractor to submit complete
22 descriptive and technical information so the Engineer and the Architect can
23 make proper appraisal. Lack of either proper or sufficient information shall
24 constitute cause for rejection. Reference to product data will not be acceptable.
25
26 F. It is the Contractor's responsibility to confirm and correlate all quantities and
27 dimensions and coordinate with all trades whose work may be affected by the
28 requested substitution.
29
30

31 2.46 REFERENCE TO STANDARDS
32

- 33 A. Reference to known standards shall mean and intend the latest edition or
34 amendment published prior to date of these Specifications, unless specifically
35 indicated otherwise, and to such portions of it that relate and apply directly to the
36 material or installation called for on the Project.
37
38 B. Where material is specified solely by reference to standard specifications, the
39 Contractor shall, if requested by the Engineer, submit to the Engineer for his/her
40 approval, data on all such material proposed to be incorporated into the Work of
41 the Contractor, listing the name and address of the vendor, the manufacturer or
42 producer, and the trade or brand names of such materials.
43
44

45 2.47 SPECIFICATIONS
46

- 47 A. The Specifications are organized into Divisions, Sections, and Trade headings
48 based on the Construction Specifications Institute's 49-Division format and the
49 Master format numbering system. This organization shall not control the
50 Contractor in dividing the Work among Subcontractors or in establishing the
51 extent of the Work to be performed by any trade. The Contractor shall be
52 responsible for examining all Sections of the Specifications for inter-related
53 items of the Work, and for furnishing each item identified or specified.
54

- 1 B. No responsibility will be assumed by the Owner, Architect or the CM for
2 omissions or duplications by the Contractor in the completion of the Contract
3 due to any alleged discrepancy in the arrangement of the material in these
4 Specifications, nor shall any such segregation of work and materials operate to
5 make the IOR an arbiter in defining the limits to the agreements between the
6 Contractor and his/her Subcontractors or suppliers.
7
8 C. The misplacement, addition or omission of any letter, word or punctuation mark
9 shall in no way damage the true spirit, intent or meaning of these Specifications.
10
11 D. The words "shown", "indicated", "noted", "scheduled" or words of that effect shall
12 be understood to mean that reference is made to the Drawings accompanying
13 these Specifications.
14
15 E. Where reference herein is made to colors or finishes "as selected", the reference
16 is to the Architect with concurrence by the Owner.
17

18
19 2.48 APPROVED APPLICATORS
20

- 21 A. Where specific instructions in these Specifications require that a particular
22 product and/or materials be installed and/or applied by an "approved applicator"
23 of the manufacturer, it shall be the Contractor's responsibility to insure that any
24 Subcontractors used for such work be approved applicators.
25
26 B. Contractor accordingly shall bear any and all costs, and shall reimburse Owner
27 for any such costs incurred by Owner, resulting from Contractor's failure to
28 insure the use of an "approved applicator".
29
30

31 2.49 DELIVERY AND STORAGE OF MATERIALS
32

- 33 A. Deliver all manufactured materials in the original packages, containers or
34 bundles (with the seals intact), bearing the name or identification mark of all
35 manufacturers.
36
37 B. Deliver fabrications in as large assemblies as practicable and where specified to
38 be shop-primed or shop-finished; they shall be packaged or crated as required
39 to preserve such priming or finish intact and free from abrasion.
40
41 C. Store all materials in such manner as necessary to properly protect same from
42 damage, as materials or equipment damaged by handling, weather, dirt or from
43 any other cause will not be acceptable.
44
45 D. Store materials so as to cause no obstructions (i.e. stored off all sidewalks and
46 other walkways, roadways, and underground services). The Contractor shall be
47 responsible for protecting from damage all material and equipment furnished
48 under the Contract.
49
50

51 2.50 QUALITY OF WORK
52

- 53 A. Where not more specifically described in any of the various Sections of these
54 Specifications, the quality of work shall conform to all of the methods and

operations of best standards and accepted practices of the trade or trades involved, and shall include all items of fabrication, construction, or installation regularly furnished or required for completion of the work (including any finish), and for successful operation as intended of the project and the component thereof corresponding to that work.

B. All Work shall be executed by mechanics skilled in their respective lines of work.

C. When completed, all parts shall have been durably and substantially built and shall present a neat, finished appearance.

2.51 HOURS OF WORK

A. Eight (8) hours of labor shall constitute a legal day's work upon all work done hereunder, and it is expressly stipulated that no worker employed at any time by the Contractor, or by a Subcontractor under this Contract, upon the Work, shall be required or permitted to work thereon more than eight (8) hours in any one (1) calendar day and forty (40) hours in any one (1) calendar week, except as provided in Sections 1810-1815 inclusive, of the Labor Code of the State of California, all the provisions of which are deemed to be incorporated herein as if set forth in full; and it is further expressly stipulated that for each and every violation of said last named stipulation, said Contractor shall forfeit, as a penalty to the Owner, fifty dollars (\$50.00) for each worker employed by the Contractor in the execution of this Contract, for each calendar day during which said worker is required or permitted to labor more than eight (8) hours in any one (1) calendar day and forty (40) hours in any one (1) calendar week in violation of any of said provisions of the Labor Code.

B. Notwithstanding the above stipulations, pursuant to Section 1815 of the Labor Code, work performed by employees of contractors in excess of eight (8) hours per day and forty (40) hours during any one (1) week shall be permitted on the Project upon compensation for all hours worked in excess of eight (8) hours per day at not less than one and a half (1 1/2) times the basic rate of pay.

2.52 WAGE RATES

A. Pursuant to Section 1770-1780 of the Labor Code of the State of California, the Director of the Department of Industrial Relations has determined the general prevailing rates of wages and rates for legal holidays and overtime in the locality in which this work is to be performed, which under Labor Code Section 1773.1 are deemed to include employer payments for health and welfare, pension, vacation, travel time and subsistence pay, and apprenticeship or other authorized training programs, for each craft or type of worker or mechanic needed to perform this contract. Said wage rates are available only at the Fresno County Department of Public Works and Planning, Design Division, and will be made available to any interested person upon request. Minimum wage rates for this Project, as predetermined by the Secretary of Labor, are set forth in the Special Provisions. If there is a difference between the minimum wage rates predetermined by the Secretary of Labor and the Prevailing Wage Rates predetermined by the Director of the Department of Industrial Relations of the State of California for similar classifications of labor, the contractor and his subcontractors shall pay not less than the higher wage rate.

- 1
2 B. It shall be mandatory upon the Contractor to whom the Contract is awarded, and
3 upon any Subcontractor under him/her to pay not less than the said specified
4 rates to all laborers, workers, and mechanics employed by them in the execution
5 of the Contract, and to pay all laborers, workers and mechanics not less often
6 than once weekly. The Contractor to whom the Contract is awarded shall post a
7 copy of the determination of prevailing wages at the job site. The Contractor
8 shall require all Subcontractors to comply with Sections 1770-1780 of the Labor
9 Code of the State of California and shall insert into every subcontract the
10 requirements contained therein.
11
12 C. The Contractor shall comply with Labor Code Section 1775. In accordance with
13 said Section 1775, it is hereby further agreed that the Contractor shall forfeit to
14 the Owner, as a penalty, fifty dollars (\$50.00) for each laborer, worker, or
15 mechanic employed for each calendar day or portion thereof, who is paid less
16 than the said stipulated rates for any work done under the Contract, by him/her
17 or by any Subcontractor under him/her. The difference between said stipulated
18 rates and the amount paid to each worker for each calendar day or portion
19 thereof for which each worker was paid less than said stipulated rate shall be
20 paid to each worker by the Contractor. The Contractor, and each Subcontractor,
21 shall keep or cause to be kept an accurate record showing the name, address,
22 social security number, work classification, straight time and overtime hours
23 worked each day and week, and the actual per diem wages paid to each
24 journeyman, apprentice, worker or other employee employed by him/her or her
25 in connection with the public work. The records shall be open at all reasonable
26 hours to the inspection of the Owner, to its officers and agents, and to the
27 Division of Labor Law Enforcement of the State Department of Industrial
28 Relations, its deputies and agents, or as otherwise provided by applicable law
29 (including but not limited to Labor Code 1776).
30
31 D. In case it becomes necessary for the Contractor or any Subcontractor to employ
32 on the Work under this Contract any person in a trade or occupation (except
33 executive, supervisory, administrative, clerical or other non-manual workers as
34 such) for which no minimum wage rate is specified, the Contractor shall
35 immediately notify the Owner who shall promptly thereafter determine the
36 prevailing rate for such additional trade or occupation from the time of the initial
37 employment of the person affected and during the continuance of such
38 employment.
39
40

41 2.53 APPLICATION OF HIGHEST STANDARDS AND REQUIREMENTS
42

43 Whenever two (2) or more standards or requirements appear in these General
44 Conditions or in any other part of the Contract Documents that form the Contract, the
45 highest standard or requirement shall be applied and followed in the performance under
46 this Contract.
47
48

49 2.54 NONDISCRIMINATION IN EMPLOYMENT
50

- 51 A. Federal and State Laws prohibit discrimination in employment. The California
52 Fair Employment Practices Act (Labor Code Section 1410 to 1433) prohibits
53 discrimination in employment on the basis of race, religion, color, sex, physical

handicap, medical condition, marital status, age, national origin or ancestry, and applies to all employers, employment agencies and labor organizations.

- B. Title VII of the Federal 1964 Civil Rights Act (42 U.S.C. Section 2000e - 2000e - 17) prohibits employment discrimination on the basis of race, color, sex, religion, or national origin, and applies to all employers that employ at least fifteen (15) workers during each working day in each of twenty (20) or more calendars weeks in the current or preceding year.
- C. In addition to these two (2) laws of general application, there are other Federal and State laws that prohibit employment discrimination in particular cases.
- D. The Owner is an Affirmative Action Employer and expects all of its contractors and suppliers to familiarize themselves with, and comply with, all applicable laws relating to employment discrimination.
- E. To the extent required by law, the Contractor shall meet all requirements of law relating to the participation of minority, women, and disabled veteran business enterprise contracting goals, and shall comply with Public Contract Code 10115 et seq. and all applicable regulations. Contractor further agrees that, when required, Contractor shall ensure compliance by all Subcontractors and shall complete all forms required by all agencies exercising jurisdiction over the project.

2.55 APPRENTICES

- A. Pursuant to Sections 1770-1780 of the Labor Code of the State of California, the Director of the Department of Industrial Relations has determined the general prevailing rate of wages in the locality for each craft or type of worker needed to execute the work. Said wage rates pursuant to Section 1773.2 of the Labor Code are on file with the Clerk to the Fresno County Board of Supervisors, and will be made available to any interested person on request. A copy of this wage scale may also be obtained at the following Web Site: www.dir.ca.gov/dlsr.
- B. Pursuant to Section 1775 of the Labor Code of the State of California, nothing in this Article shall prevent the employment of properly registered apprentices upon public works. Every such apprentice shall be paid the standard wage paid to apprentices under the regulations of the craft or trade at which he/she is employed, and shall be employed only at the work of the craft or trade to which he/she is registered.
- C. Only apprentices, as defined in Section 3077, who are in training under apprenticeship standards and written apprentice agreements under Chapter 4 (commencing at Section 3070), Division 3, of the Labor Code, are eligible to be employed on public works. The employment and training of each apprentice shall be in accordance with the provisions of the apprenticeship standards and apprentice agreements under which he/she is training.
- D. Fresno County is committed to increasing the availability of employment of employment and training opportunities, with particular attention to the plight of those who are most economically disadvantaged. In an effort to advance that purpose, the County will require that the Contractor and each subcontractor employed on this Project shall use their best efforts to ensure that thirty-three

percent (33%) of apprentice hours, as determined by California Labor Code Section 1777.5 for each contractor and subcontractor of any tier on this Project are performed by qualified participants in the state approved apprenticeship programs who also are current or former "Welfare-to-Work" participants in the CalWORKs program. Provided, that nothing contained in this Paragraph D shall be interpreted to relieve or in any way diminish the obligation of the Contractor and each subcontractor to comply fully with all applicable apprenticeship laws in accordance with the California Labor Code and the California Code of Regulations; and accordingly such requirements as are contractually imposed by this Paragraph D shall be in addition to such legally mandated requirements, and applicable only to the extent fully consistent therewith.

- E. Incentives whereby the Contractor or Subcontractor receives partial reimbursement for the wages paid to apprentices who qualify may be available. The incentive program is administered by the County of Fresno, Department of Social Services. For questions regarding the incentive program, contact the Department of Social Services at (559) 600-5370.

2.56 PROVISIONS REQUIRED BY LAW DEEMED INSERTED

Every provision of law and clause required by law to be inserted in this contract shall be deemed to be inserted, and this contract shall be read and enforced as though it were included, and if through mistake or otherwise any provision is not inserted or is not correctly inserted, upon application of either party the contract shall be amended to make the insertion or correction.

2.57 DRUG FREE WORKPLACE CERTIFICATION

- A. The Contractor shall comply with Government Code Section 8355 in matters relating to providing a drug-free workplace.
- B. The Contractor shall publish a statement notifying employees that unlawful manufacture, distribution, dispensation, possession, or use of controlled substance is prohibited and specifying actions to be taken against employees for violations, as required by Government Code Section 8355(a).
- C. The Contractor shall establish a Drug-Free Awareness Program as required by Government Code 8355(b), to inform employees about all of the following:
1. The dangers of drug abuse in the workplace,
 2. The Contractor's policy for maintaining a drug-free workplace,
 3. Any available counseling, rehabilitation and employee assistance programs,
 4. Penalties that may be imposed upon employees for drug abuse violations.
- D. Provide as required by Government Code 8355(c), that everyone who provides work under the Agreement.

1. Will receive a copy of the company's drug-free policy statement, and
2. Will agree to abide by the terms of the Contractor's statement as a condition of employment on the contract.

2.58 PROJECT BOOKS AND RECORDS

- A. The Contractor shall maintain adequate fiscal and Project books, records, documents and other evidence pertinent to the Contractor's work on the Project in accordance with generally accepted accounting principles. Adequate supporting documentation shall be maintained in such detail so as to permit tracing transactions from the invoices, to the financial statement, to the accounting records and to the supporting documentation. All of the Contractor's records contained in the official project file must be preserved for a minimum of three years after the last date on which no lease revenue bonds are outstanding. If any litigation, claim, negotiation, audit, or other action involving the records has been started before the expiration of the relevant time period as set forth in the previous sentence, the related records must be retained until the completion of the action and resolution of all issues which arise from it if such date is later than the end of the aforementioned three-year period. These records shall be protected from fire and other damage.
- B. The Contractor's Project books, records, documents and other evidence pertinent to the Contractor's work on the Project shall be subject to inspection, examination, monitoring, copying, excerpting, transcribing, and/or audit by the County or designees, the Board of State and Community Corrections (BSCC) or designees, The Department of Corrections and Rehabilitation or designees, the Department of General Services or designees, the Department of Finance or designees, the Bureau of State Audits or designees, and state government auditors or designees for a minimum of three years after the last date on which no lease revenue bonds are outstanding. If any litigation, claim, negotiation, audit or other action involving the records has been started before the expiration of the relevant time period as set forth in the previous sentence, the related records must be retained until the completion of the action and resolution of all issues which arise from it if such date is later than the end of the aforementioned three-year period. Suitable facilities for access, monitoring, inspection and copying thereof shall be provided to any of the parties listed above.
- C. The Contractor is advised that a partial source of financing for this agreement for construction of the Project is the State SB 1022 financing, and that the County may not have funds to finance this agreement independently of the State financing. The Contractor shall in all ways cooperate with the County and BSCC in maintaining a positive, good working relationship focused on what is best for the Project.

2.59 PARTNERING

Partnering sessions shall be a part of this contract. A one-day initial session, one-day group session and quarterly refresher sessions are planned. The sessions shall be attended by all associated project and executive level staff requested by the County at no additional cost to the County. Dates for these sessions are to be determined. These sessions are planned to be held at the Fresno County Plaza, 2220 Tulare Street, Fresno, CA 93721 and are subject to change. The professional facilitator costs will be borne by the Owner.

END OF GENERAL CONDITIONS

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SUPPLEMENTAL GENERAL CONDITIONS

3.01 GENERAL

The foregoing Supplemental General Conditions shall form a part of this section with the same force and effect as though repeated herein.

Attention is also directed to Division 01 - GENERAL REQUIREMENTS.

Project plans and specifications will be available for bidder download at the Fresno County Public Works website <http://www.co.fresno.ca.us/planholders>

3.02 PRE-BID CONFERENCE

A non-mandatory pre-bid conference will be held **10:00 a.m. on March 17, 2017**. A discussion of the project will be held and the project site will be open for examination. Contractors should meet at the Fresno County Plaza Ballroom located at 2220 Tulare St., CA 93271 at the basement level of the building. A site walk will be held after the meeting.

3.03 BUILDING PERMIT

Project required Permits to be **obtained by Contractor and paid by the County**:

Demolition Permit

Grading Permit

Building Permit

Project required Permits to be **obtained by Contractor with the actual cost of the permit to be reimbursed by the County**.

District Regulation VIII Fugitive Dust Management / Grading Rules

(San Joaquin Valley Air Pollution Control District)

Generator Permit, Notice to Construct and Notice to Operate

(San Joaquin Valley Air Pollution Control District)

Rule 4102 (Nuisance), to address and source operation that emits air contaminants of other materials.

(San Joaquin Valley Air Pollution Control District)

Storm Water Management Plan Approval

(State Regional Water Quality Control Board)

Diesel Tank Removal

(Fresno County Department of Public Health – Environmental Health Division.)

Deferred Approvals of Fire Hydrants, and Automatic Fire Sprinkler system

(Cal Fire, Fresno City Fire)

Deferred Approval of Smoke Detection / Fire Alarm System, Modular Cell Wall Panel System, Smoke Control Systems

(Cal Fire)

ROW Encroachment and Street Closure Permit and all other permits required by the City.

(City of Fresno)

3.04 CODES AND REGULATIONS

All work, materials, and equipment shall be in full compliance with the 2013 edition of the California Code of Regulations, Title 24, Parts 2,3,4,5,6 & 9, NFPA, Cal/OSHA Safety Regulations; and all Federal, State and Local laws, ordinances, regulations, and Fresno County Charter Provisions applicable in the performance of the work.

3.05 COORDINATION OF WORK

The Contractor shall coordinate all work with through the Construction Manager (559)/304-4476), to minimize any interruptions to the normal operation of the existing facilities (North Annex Jail, Main Jail, Central Plant); particularly interruptions to utilities, HVAC, normal & emergency electrical power, alarm systems, communications systems, and computer systems. The Contractor shall provide 2 weeks advanced notice prior to any interruption to existing facilities.

3.06 WORK DAY

All work shall be performed during the regular work week, and between the hours of 7:00AM – 4:00PM.

3.07 SCHEDULE OF OPERATION

Time is of the essence in the performing of this contract. The Contractor shall schedule the work in a manner that will progress to completion without interruption.

3.08 TEMPORARY FACILITIES - See Section 01 50 00

3.09 FIRE PROTECTION AND FIRE INSURANCE

Contractor shall not perform any fire hazardous operation adjacent to combustible materials. Any fire hazardous operation shall have proper fire extinguisher close by and the adjacent area shall be policed before stopping work for the day.

Contractor shall provide not less than one OSHA / NFPA Class 6-ABC fire extinguisher for each 9,000 square feet of project area or fraction thereof.

3.10 DAMAGE TO EXISTING WORK

Damage to existing construction, equipment, planting, etc., by the Contractor in the performance of his work shall be replaced or repaired and restored to original condition by the Contractor at the Contractor's expense. The Contractor will be responsible for the restoration of the Contractor Laydown Area prior to the Notice of Completion as shown on the Civil drawings.

1
2 3.11 PROTECTION OF ALARM, SECURITY, COMMUNICATIONS,
3 AND COMPUTER SYSTEMS

4
5 The Contractor shall be responsible for all costs incurred by the Owner on these
6 systems as a result of work by the Contractor or damage caused by the
7 Contractor's operations, including costs associated with false fire alarms caused by
8 Contractor operations.
9

10 3.12 AS-BUILTS AND RECORD DRAWINGS – SEE SECTION 01 78 39

11
12 The Contractor shall be required to provide a complete set of paper as-builts
13 including full size drawings and specifications. One set shall be maintained on-site
14 and preserved upon which a record of all changes to the project plans shall be
15 made. As the work progresses, the Contractor will be responsible for and shall
16 maintain a record of all deviations in the mechanical, electrical, plumbing and other
17 work from that indicated on the plans. As a condition for considering the project
18 complete, the record drawings must be delivered to the Architect of Record, and
19 deemed acceptable. Provisions in sections 01 29 00 – Payment Procedures and 01
20 32 26 Construction Progress Documentation shall be strictly enforced and will result
21 in additional retention withholdings from requests for progress payment if
22 documentation is not kept current.
23

24 3.13 GUARANTEE / WARRANTY RESPONSE

25
26 Attention is directed to Section 00 72 00 - General Conditions, section 2.32
27 "Guarantee Of Work", the Section 00 65 36 - Guaranty, and Section 01 78 36
28 "Warranties and Bonds" of the Specifications.
29

30 In lieu of any time limits imposed or implied by the above referenced contract
31 documents or stated in standard product warranties or special warranties, the
32 Contractor shall respond within 24 hours to notice from the Owner that repairs or
33 changes are required in connection with guaranteed work or equipment within the
34 guarantee period.
35

36 3.14 TRENCHING AND EXCAVATION

37
38 In accordance with Section 7104 of the California Public Contract Code, the
39 following provisions shall apply to any contract involving digging of trenches or other
40 excavations that extend deeper than five feet below the surface:
41

42 A. The contractor shall promptly, and before the following conditions are
43 disturbed, notify the Owner, in writing, of any:

- 44 1. Material that the contractor believes may be material that is hazardous
45 waste, as defined in Section 25117 of the Health and Safety Code, that is
46 required to be removed to a Class I, Class II, or Class III disposal site in
47 accordance with provisions of existing law.

1 2. Subsurface or latent physical conditions at the site differing from those
2 indicated.

3 3. Unknown physical conditions at the site of any unusual nature, different
4 materially from those ordinarily encountered and generally recognized as
5 inherent in work of the character provided for in the contract.
6

7 B. The Owner shall promptly investigate the conditions, and if it finds that the
8 conditions do materially so differ, or do involve hazardous waste, and cause a
9 decrease or increase in the contractor's cost of, or the time required for,
10 performance of any part of the work, shall issue a change order in accordance with
11 the provisions of Section 2.11 of the General Conditions.
12

13 C. In the event that a dispute arises between the Owner and the contractor
14 whether the conditions materially differ, or involve hazardous waste, or cause a
15 decrease or increase in the contractor's cost of, or time required for, performance of
16 any part of the work, the contractor shall not be excused from any scheduled
17 completion date provided for by the contract, but shall proceed with all work to be
18 performed under the contract. The contractor shall retain any and all rights
19 provided either by contract or by law which pertain to the resolution of disputes and
20 protests between the contracting parties.
21

22 D. In advance of any excavation the Contractor shall submit to the Construction
23 Manager a detailed plan showing the design of shoring, bracing, sloping or other
24 provisions to be made for worker protection from the hazard of caving ground
25 during the excavation of any trench or trenches five feet or more in depth. A
26 registered civil or structural engineer shall prepare the plan. As part of the plan, a
27 note shall be included stating that the registered civil or structural engineer certifies
28 that the plan complies with CAL-OSHA Construction Safety Orders, or stating that
29 the registered civil or structural engineer certifies that the plan is not less effective
30 than the shoring, bracing, sloping, or other provisions of the Safety Orders.
31

32 1. All shoring submittals shall include surcharge loads from adjacent
33 embankments, construction loads and spoil bank. Submittal shall indicate minimum
34 horizontal distance from top of trench to edge of all surcharge loads for all cases of
35 shoring and side slopes.

36 2. Nothing in this Section shall relieve the Contractor of the full
37 responsibility for providing shoring, bracing sloping, or other provisions adequate for
38 worker protection. If such plan varies from the shoring system standards
39 established by the Construction Safety Orders, a registered civil or structural
40 engineer shall prepare the plan. No excavation of such trench or trenches shall be
41 commenced until said plan has been accepted by the Owner or the person to whom
42 authority to accept such plan has been delegated.
43

44 3.15 WORK WITHIN EXISTING DETENTION FACILITIES

45 The Contractor will be required to work within the existing operating facilities. The
46 Contractor will be required to comply with the rules and regulations from the Fresno
47

County Sheriff Department in order to access the facilities. Security clearances may be required at the option of the County.

3.16 ABNORMAL WEATHER CONDITIONS

- A. The contractor shall provide a Notice of Impact and a schedule fragnet submittal to the Construction Manager for all time extension requests due to abnormal weather conditions. Should the Contractor fail to provide Notice of Impact and/or a schedule fragnet submittal for the weather event within (10) ten calendar days of the first delay day, then it is mutually agreed that the weather event has no time impact on the contract completion date and not time extension is required. If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time and could not have been reasonably anticipated, and that weather conditions had an adverse effect on the scheduled construction as illustrated by schedule fragnet.
- B. A rain, windstorm, high water or other natural phenomenon of the specific locality of the work, which might reasonably have been anticipated from historical records of the general locality of the work, shall not be construed as abnormal weather conditions. The contractor shall anticipate the effect of the following rainfall totals provided by the Western Regional Climate Center during the development of the Project Schedule. No allowance for weather related contract time extensions will be considered until the following monthly totals have been surpassed and the adverse weather must have actually caused a delay to the critical path of the project.

Avg. Total Precipitation (in.)/Month			

JAN	2.09	JUL	0.01
FEB	1.90	AUG	0.01
MAR	1.89	SEP	0.15
APR	1.03	OCT	0.53
MAY	0.36	NOV	1.13
JUN	0.16	DEC	1.64

3.17 ESCROW BID DOCUMENTS

A. SCOPE

1. The apparent low Bidder shall submit, within ten (10) days after the day of bid opening, one (1) copy of all documentary information generated in preparation of bid price for this Project. This material is hereinafter referred to as "Escrow Bid Documents." The Escrow Bid Documents of the successful Bidder will be held in escrow for the duration of the Contract. The second and third low bidders shall be

1 prepared to submit Escrow Bid Documents upon request of the
2 Owner.

- 3
- 4 2. The successful Bidder agrees, as a condition of award of the Contract,
5 that the Escrow Bid Documents constitute all of the information used in
6 preparation of the bid, and that no other bid preparation information will
7 be considered in resolving claims.
- 8
- 9 3. Nothing in the Escrow Bid Documents shall change or modify the term or
10 conditions of the Contract.
- 11
- 12 4. If the Bidder's proposal is based on subcontracting any part of the Work,
13 each subcontractor, whose total subcontract price exceeds the lesser of
14 two percent of the total contract price proposed by the Bidder, or
15 \$400,000, shall provide separate Escrow Bid Documents to be submitted
16 with those of the Bidder. These submittals will be examined in the same
17 manner and at the same time as the examination for the apparent
18 successful Bidder.

19

20 B. PURPOSE

21

22 Escrow Bid Documents will be used to assist in the negotiation for the
23 settlement of claims. They will not be used for pre-award evaluation of the
24 Bidder's anticipated methods of construction or to assess the Bidder's
25 qualification for performing the work.

26

27 C. OWNERSHIP AND CONFIDENTIALITY

- 28
- 29 1. The Escrow Bid Documents are and will always remain the property of the
30 Bidder, subject only to joint review by the Owner, the Construction Manager,
31 and the Contractor.
- 32
- 33 2. The Owner stipulates and expressly acknowledges that the Escrow Bid
34 Documents constitute trade secrets, and are proprietary and confidential. This
35 acknowledgement is based on the Owner's express understanding that the
36 information contained in the Escrow Bid Documents is not known outside the
37 Bidder's business, is known only to a limited extent and only by a limited
38 number of employees of the Bidder, is safeguarded while in Bidder's
39 possession, is extremely valuable to Bidder, and could be extremely valuable to
40 Bidder's competitors by virtue of it reflecting the bidder's contemplated
41 techniques of construction. Owner acknowledges that the Bidder expended
42 substantial sums of money in developing the information included in the Escrow
43 Bid Documents and further acknowledges that it would be difficult for a
44 competitor to replicate the information contained herein. Owner further
45 acknowledges that the Escrow Bid Documents and the information contained
46 herein are made available to Owner only because such action is an essential
47 element of the Bidder's responsibility. Owner acknowledges that the Escrow

1 Bid Documents include a compilation of information used in the Bidder's
2 business, intended to give the Bidder an opportunity to obtain an advantage
3 over competitors who do not know of or use the contents of the documentation.
4

- 5 3. Owner agrees to safeguard the Escrow Bid Documents and all information
6 contained herein, against disclosure to the fullest extent permitted by law.
7

8 D. FORMAT AND CONTENTS
9

- 10 1. Bidders may submit Escrow Bid Documents in their usual cost-estimating
11 format. Escrow Bid Documents shall be adequate to enable complete
12 understanding and proper interpretation for their intended use.
13
14 2. Escrow Bid Documents shall clearly itemize the estimates costs of performing
15 the work. Items shall be separated into sub-items as required to present a
16 complete and detailed cost estimate and allow a detailed cost review. The
17 Escrow Bid Documents shall include all quantity takeoffs, labor, equipment,
18 calculations or rate of productions and progress, copies of quotations from
19 subcontractors and suppliers, memoranda, narratives, consultant's reports,
20 add/deduct sheets, and all other information used by the Bidder to arrive at the
21 prices contained in the Bid Proposal. Estimated costs shall be broken down into
22 the Bidder's usual estimate categories such as direct labor, repair labor,
23 material, equipment, construction equipment operation, construction equipment
24 ownership, expendable materials, materials, and subcontract cost as
25 appropriate. Plant and equipment and indirect costs shall be detailed in the
26 Bidder's usual format. The bidder's allocation of plant and equipment, indirect
27 cost, contingencies, markup and other items shall be included.
28
29 3. All costs shall be identified. For items and sub-items amounting to less than
30 \$1,000, estimated unit costs are acceptable without a detailed cost estimate,
31 provided that labor, equipment, materials construction equipment, expendable
32 materials and subcontracts, as applicable, are included and provided that
33 indirect costs, contingencies, and markup, as applicable, are allocated.
34
35 4. Bidding materials provided by the Owner shall not be included in the Escrow Bid
36 Documents unless needed to comply with the requirements of this Specification.
37

38 E. SUBMITTAL
39

- 40 1. The Escrow Bid Documents shall be submitted by the low Bidder in a sealed
41 container. The container shall be clearly marked on the outside with the
42 Bidder's name, date of submittal, project name, and the words "Escrow Bid
43 Documents."
44
45 2. The Escrow Bid Documents shall be accompanied with an index to inventory the
46 contents of the submittal and the Bid Documents Certification, signed by an

individual authorized by the Bidder to execute the Bid Proposal. The following Bid Documentation Certification form shall be used:

BID DOCUMENTATION CERTIFICATION

The undersigned hereby certifies that the Escrow Bid Documents contained herein constitute all the documentary information used in preparation of the bid and that I have personally examined the contents of the Escrow Bid Documents container and have found that the documents in the container are complete and organized as shown by the index.

BY: _____

TITLE: _____

FIRM: _____

DATE: _____

3. Prior to award, only the index to Escrow Bid Documents of the apparent successful Bidder will be examined, by representatives of the Owner. This examination is to ensure that the index is detailed and complete, and conforms to the format and contents requirements set forth herein.
4. If all the required documentation has not been indexed in the original submittal, a revised index shall be submitted at the Owner's discretion, prior to award of the Contract.
5. If the Contract is not awarded to the apparent successful Bidder, the Bidder next to be considered for award shall, upon request of the Owner, submit Escrow Bid Documents for processing.
6. Timely submission of complete Escrow Bid Documents is an essential element of the Bidder's responsibility. Failure to provide the necessary Escrow Bid Documents may be sufficient cause of the Owner to reject the bid.
7. Escrow Bid Documents submitted by unsuccessful bidders will be returned unopened, following award of the Contract.

F. STORAGE

1 The Escrow Bid Documents will be placed in escrow, for the life of the Contract,
2 in an institution acceptable to both the Owner and the Contractor. The cost of
3 storage will be paid by the Owner.
4

5 G EXAMINATION AFTER AWARD OF CONTRACT
6

- 7 1. The Escrow Bid Documents shall be examined by the Owner, the
8 Construction Manager, and the Contractor, at any time deemed
9 necessary by either the Owner or the Contractor, to assist in the
10 negotiation for the settlement of claims.
11
12 2. Examination of the Escrow Bid Documents is subject to the following
13 conditions:
14
15 a. As trade secrets, the Escrow Bid Documents are proprietary and
16 confidential.
17
18 b. The Owner and the Contractor shall each designate, in writing to
19 the other party and a minimum of five days prior to examination,
20 representatives who are authorized to examine the Escrow Bid
21 Documents. No other person shall have access to the Escrow
22 Bid Documents.
23
24 c. Access to the Escrow Bid Documents will take place only in the
25 presence of duly designated representatives of both the Owner
26 and the Contractor.
27

28 H. FINAL DISPOSITION
29

- 30 1. The Escrow Bid Documents will be returned to the Contractor at such
31 time as the contract has been completed and final settlement has been
32 achieved.
33

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35 End Section 00 73 00
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1 SECTION 01 10 00 - SUMMARY

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and other Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY

- 7 A. Section Includes:

- 8 1. Project information.
9 2. Work covered by Contract Documents.
10 3. Work by Owner.
11 4. Work under separate contracts.
12 5. Owner-furnished, Contractor-installed products.
13 6. Owner-furnished, Owner-installed products.
14 7. Access to site.
15 8. Coordination with occupants.
16 9. Work restrictions.
17 10. Specification and drawing conventions.
18 11. Miscellaneous provisions
19 12. Sequence of Construction Constraints

- 20 B. Related Requirements: Section 01 50 00 "Temporary Facilities and Controls" for limitations and
21 procedures governing temporary use of Owner's facilities.

22 1.3 PROJECT INFORMATION

- 23 A. Project Identification: Fresno County West Annex Jail

- 24 B. Owner: County of Fresno
25 Department of Public Works & Planning
26 2220 Tulare Street, 8th Floor Fresno, California, 93721
27 Owner's Representative: Stuart Seiden, Project Manager

- 28 C. Architect: DLR Group
29 700 S Flower, 22nd Floor
30 Los Angeles, California, 90017
31 Project Manager: Gregg Williams
32 Project Architect: Diane Castruita

- 33 D. Construction Manager: Kitchell CEM
34 2750 Gateway Oaks, Suite 300
35 Sacramento, CA 95833
36 Project Director, Rick Barton
37 Project Manager: Jim Anderson

1. Construction Manager has been engaged for this Project to serve as an advisor to Owner and to provide assistance in administering the Contract for Construction between Owner and Contractor, according to a separate contract between Owner and Construction Manager.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

- A. The construction of the Fresno County – West Annex Jail consisting of an approximately 119,000 sq. ft. detention facility including renovation of an existing central plant to serve its needs, connection of an underground tunnel to the existing North Annex Jail, and all associated site work, utilities, access roads, drives, fencing and parking areas. The facility will contain administrative areas and inmate housing units having two levels classified as one story structures with upper tiers.

1. The West Annex Jail building is a concrete structure with exterior pre-cast and cast-in-place architectural panels. The building is designed to accommodate future building additions.
2. The housing areas will contain housing cells that are primarily composed of steel panel modular construction with some use of reinforced concrete masonry unit construction.
3. Renovation will include minor alterations to the existing county jail structures. Work includes the construction of an opening in the existing North Annex Jail wall for access from existing building to the new building via an underground tunnel.
4. The project will also include, but is not limited to, electrical; plumbing; mechanical; heating, ventilation, and air conditioning; security; and fire protection systems; as well as all necessary appurtenances.
5. The new building and renovation of the existing Central Plant will be dependent upon the existing facility for several core operational components, including release, transportation, visiting, administration and staff support facilities.
6. The scope of work required for the renovation of the existing Central Plant will affect the operation of the existing facilities and the contractor must plan their work to minimize impacts accordingly.

- B. Type of Contract: Project will be constructed under a single prime contract.

1.5 WORK BY OWNER

- A. General: Cooperate fully with Owner so work may be carried out smoothly, without interfering with or delaying work under this Contract or work by the Owner. Coordinate the Work of this Contract with work performed by Owner.

1.6 WORK UNDER SEPARATE CONTRACTS

- A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under separate contracts.

1.7 OWNER-FURNISHED PRODUCTS

- A. Owner will furnish products indicated. The Work includes receiving, unloading, handling, storing, protecting, and installing Owner-furnished products and making building services connections.

B. Owner-Furnished, Contractor-Installed Products:

1. Display Rails, Marker Boards, Display Tack Boards, Display Enclosed Tack Boards
2. Therapeutic Treatment Modules, Therapeutic Treatment Modules-ADA
3. Law Library Kiosks
4. Sharps Receptacles
5. Wall-Mounted, Fold-Down Desks

C. Owner-Furnished, Owner-Installed Products:

1. Hand Sanitizer Dispensers
2. Non-mounted Fire Extinguishers
3. Non-Lethal Asset Lockers
4. Laundry Carts
5. Sewing Tables, Sewing Machines
6. Bed Mattresses
7. Detention Public Beam Seating
8. Analog Clocks
9. Large Televisions, Medium Televisions
10. Balance Scales
11. Mayo Instrument Stands
12. Biohazard Waste Receptacles
13. Exam Stools, Exam Chairs, Exam Tables
14. Appliances; Microwaves, Refrigerators-Large, Refrigerators-Small, Under-Counter Refrigerator, Coffee Maker, Ice Maker
15. Waste and Recycle Receptacles-Small & Large
16. Seating; Side Chairs, Task Chairs, Conference Chairs, Public Side Chairs, Inmate Side Chairs, Stackable Side Chairs, Inmate Stools, Seating Mats
17. Desks; 72x30, L-Shape 78x60, Workstation Panel System 72x72, Workstation Panel System 96x96
18. Tables; 30" Round, 36" Round, Folding-Training, 42" Square, Folding-Media, Conference-8, Industrial 72x48, Convertible Bench 96L, Single ADA
19. Storage Units; Shelving, Desk-Height Drawers, Heavy Duty Shelving 48x18x72, Heavy Duty Shelving 36x18x72, Heavy Duty Shelving 48x24x96, Heavy Duty Shelving 60x24x96, Lateral Filing Cabinets, Garment Rack, Heavy Duty Cabinets, Equipment Hook Bars, Wall-Hung Shelves-36"
20. Cleaning Carts
21. Copiers
22. Shredders

1.8 ACCESS TO SITE

A. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.

B. Use of Site: Limit use of Project site to the area where work on the building addition will be proceeding. Do not disturb portions of Project site beyond areas in which the Work is indicated, or as may be further defined by the Sheriff's Department.

C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.

1.9 COORDINATION WITH OCCUPANTS

A. Full Owner Occupancy: Owner will occupy site and existing adjacent building during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain existing exits unless otherwise indicated.

1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction.
2. Notify Owner not less than 72 hours in advance of activities that will affect Owner's operations.

B. Owner Limited Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed portions of the Work, prior to Notice of Completion of the Work, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and limited occupancy shall not constitute acceptance of the total Work.

1.10 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.

B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:

1. Notify Architect, Construction Manager and Owner not less than three days in advance of proposed utility interruptions.
2. Obtain Owner's written permission before proceeding with utility interruptions.
3. Contractor's impairment coordinator shall keep permanent records of systems out of service.
4. See Article 1.10.B for additional instructions.

C. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.

1. Notify Architect, Construction Manager and Owner not less than two days in advance of proposed disruptive operations.
2. Obtain Owner's written permission before proceeding with disruptive operations.

D. Nonsmoking Building: Smoking is not permitted within the building or within 25 feet of entrances, operable windows, or outdoor-air intakes.

E. Controlled Substances: Use of tobacco products and other controlled substances within the existing building is not permitted.

F. Workforce Tracking: Contractor shall be required to track all jobsite personnel and provide a list on an as needed basis to the Owner. Information shall include Name, Company and Drivers License number.

- G. Employee Identification: Contractor shall provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times. Tags shall include a recent photo ID, Name and Company. For personnel providing extensive work in secure areas, the Owner will require background screening and County-issued security badges.
- H. Contractor shall provide an alcohol and drug free project site.
- I. Contractor shall provide designated smoking areas at least 20 feet from openings to existing buildings.
- J. Fresno County will designate spaces and routes for the storage of materials and the ingress and egress of workers and equipment to the project site. Materials and equipment shall be kept strictly within these limits. During construction, entrances and access to adjacent facilities shall at all times be kept clean and clear of materials, equipment, refuse, etc.
- K. Do not unreasonably encumber site with materials and equipment. Contractor must schedule delivery of materials, furniture, equipment etc. so that installation of each can occur within (1) week of delivery.
- L. All materials delivered to the site shall be received by the Contractor and inspected by the Contractor. It is not the responsibility of the County, or its representatives, to receive or accept materials for the Contractor. The Contractor shall notify his vendors and subcontractors of the site location. Fresno County and its representatives shall not be held responsible for any damage to materials otherwise delivered.
- M. Assume full responsibility for protection and safekeeping of products stored on premises.
- N. Move any stored products or equipment which interferes with operations of the existing facility or other Contractors in a timely manner.
- O. Obtain and pay for use of additional storage, work areas or parking needed for operations and employees.
- P. Provide a secure temporary chain link fence with a top and bottom rail, 6' high, without barbed wire around open trenches to prevent public access.
- Q. Excess excavated earth shall be removed from the site.

1.11 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
 2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard and scheduled on Drawings.

1.12 MISCELLANEOUS PROVISIONS

A. Construction operations for this project will be located within and adjacent to a secure detention facility. The Contractor must use the utmost care in notifying the Fresno County Sheriff's Office of operations that could affect the ongoing operations of the facility.

1. The Contractor must comply with all rules and regulations set forth by the Fresno County Sheriff Department which is published as part of bid documents.
2. The Contractor must produce a schedule with the least impact to the daily operation of the jail facility for Owner's review and written acceptance.
3. Contractor's staff entering the secure facility to perform work will be subject to background checks prior to being allowed to work within the facility. Daily tool checks upon entering and upon leaving the existing facility will be conducted.
4. Temporary partitions may be needed to separate Contractor's employees from inmates.

B. In consideration of the full-time occupancy of the existing jail, disturbances to existing utility services shall be kept to a minimum.

1. Domestic water may be shut off for no longer than four hours per occurrence and may only be shut off between the hours of 11:30 PM and 3:30 AM.
2. Fire water may be shut off for no more than eight hours per occurrence. Notify Fresno Fire Department and State Fire Marshal representative of shutoff no less than 24 hours in advance. While fire line is inoperative, post a fire watch.
3. If the fire loop is to be interrupted and capped during the course of construction, GC shall perform water pressure test after capping the loop. Provide documentation to Owner and Fresno Fire Department and State Fire Marshal representative showing that 1,150 GPM minimum is available to the existing building.
4. Gas service may be shut off for no more than four hours per occurrence, and may only be shut off between the hours of 11:30 PM and 3:30 AM.
5. Provide no less than 24 hours' notice to Fresno Fire Department and State Fire Marshal representative before demolition of portion of existing fire road. Fire road is to be completed and returned to service per State Fire Marshal requirements prior to commencing building construction. The fire road shall not be used for parking or storage.
6. Fire alarm system may be shut off for no more than eight hours per occurrence. Notify Fresno Fire Department and State Fire Marshal representative of shutoff no less than 24 hours in advance. While fire alarm is inoperative, post a fire watch.
7. During all interruptions in service, all fire hydrants, FDC's, PIV's, and other components of fire water and fire alarm systems shall be tagged and/or bagged as out of service.
8. Contractor will be required to construct, and leave in place throughout construction at least one temporary lighted stairwell unless one or more of the permanent stairwells are erected as the construction progresses.

C. Site Security: The Contractor shall have sole responsibility for jobsite security.

1. During Work Hours: Protect the work from theft, vandalism, and unauthorized entry.

2. During Off-work Hours: During all hours that Work is not being prosecuted, furnish such watchman's services as Contractor may consider necessary to safeguard materials and equipment in storage on the Project site, including Work in place and in process of fabrication, against theft, acts of malicious mischief, vandalism, and other losses or damages.

1.13 SEQUENCE OF CONSTRUCTION CONSTRAINTS

- A. The following table lists a series of activities and constraints which will determine the sequence of construction in broad terms. This table defines criteria the Contractor must review, understand and incorporate into the project work plan.

Item	Work Element	Constraints	Timing	Milestone Requirements
1	Relocation of Fire Department Connections shown on C4.0	Completed first	ASAP	
2	Demolition of certain site elements (paving, landscaping, site walls, general site prep, and temporary facilities and controls requirements	Completed second	ASAP	
3	Installation of new diesel fuel tank, then demolition of existing diesel fuel tank.	Completed third	ASAP	
4	Construction of new sewer line segment and on-site sewer manholes prior to the demolition of existing sewer system	Completed fourth	ASAP	
5	Construction of new utility trench and associated utilities in order to allow demolition of the balance of site elements	Completed fifth	ASAP	
6	Demolition of existing utility trench and associated utilities	Completed sixth	ASAP	
7	Demolition of existing cooling tower and chiller and replacement of new cooling tower and chiller	Winter Months		

Item	Work Element	Constraints	Timing	Milestone Requirements
8	Demolition of existing hot water boiler and replacement of new hot water boilers	Summer Months		

1 PART 2 - PRODUCTS (Not Used)

2 PART 3 - EXECUTION (Not Used)

3 END OF SECTION 01 10 00

1 SECTION 01 21 00 - ALLOWANCES

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and other Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY

- 7 A. Section includes administrative and procedural requirements governing allowances.

- 8 1. Certain items are specified in the Contract Documents by allowances. Allowances have
9 been established in lieu of additional requirements and to defer selection of actual
10 materials and equipment to a later date when direction will be provided to Contractor. If
11 necessary, additional requirements will be issued by Change Order.

- 12 B. Types of allowances include the following:

- 13 1. Lump-sum allowances.
14 2. Unit-cost allowances.

- 15 C. Related Requirements:

- 16 1. Section 01 22 00 "Unit Prices" for procedures for using unit prices.
17 2. Section 01 40 00 "Quality Requirements" for procedures governing the use of allowances
18 for testing and inspecting.

19 1.3 SELECTION AND PURCHASE

- 20 A. At the earliest practical date after award of the Contract, advise Construction Manager of the
21 date when final selection and purchase of each product or system described by an allowance
22 must be completed to avoid delaying the Work.

- 23 B. At Construction Manager's request, obtain proposals for each allowance for use in making final
24 selections. Include recommendations that are relevant to performing the Work.

- 25 C. Purchase products and systems selected by Architect from the designated supplier.

26 1.4 ACTION SUBMITTALS

- 27 A. Submit proposals for purchase of products or systems included in allowances, in the form
28 specified for Change Orders.

1 1.5 INFORMATIONAL SUBMITTALS

- 2 A. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for
3 use in fulfillment of each allowance.
- 4 B. Submit time sheets and other documentation to show labor time and cost for installation of
5 allowance items that include installation as part of the allowance.
- 6 C. Coordinate and process submittals for allowance items in same manner as for other portions of
7 the Work.

8 1.6 COORDINATION

- 9 A. Coordinate allowance items with other portions of the Work. Furnish templates as required to
10 coordinate installation.

11 1.7 LUMP-SUM ALLOWANCES

- 12 A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner
13 or selected by Architect under allowance and shall include labor, installation, taxes, freight, and
14 delivery to Project site, if applicable.
- 15 B. Unused Materials: Return unused materials purchased under an allowance to manufacturer or
16 supplier for credit to Owner, after installation has been completed and accepted.
- 17 1. If requested by Construction Manager, retain and prepare unused material for storage by
18 Owner. Deliver unused material to Owner's storage space as directed.

19 1.8 ADJUSTMENT OF ALLOWANCES

- 20 A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based
21 on the difference between purchase amount and the allowance, multiplied by final measurement
22 of work-in-place where applicable. If applicable, include reasonable allowances for cutting
23 losses, tolerances, mixing wastes, normal product imperfections, and similar margins.
- 24 1. Include installation costs in purchase amount only where indicated as part of the
25 allowance.
- 26 2. If requested, prepare explanation and documentation to substantiate distribution of
27 overhead costs and other margins claimed.
- 28 3. Submit substantiation of a change in scope of work, if any, claimed in Change Orders
29 related to unit-cost allowances.
- 30 4. Owner reserves the right to establish the quantity of work-in-place by independent
31 quantity survey, measure, or count.
- 32 B. Submit claims for increased costs because of a change in scope or nature of the allowance
33 described in the Contract Documents, whether for the purchase order amount or Contractor's
34 handling, labor, installation, overhead, and profit.
- 35 1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost
36 amount unless it is clearly shown that the nature or extent of work has changed from
37 what could have been foreseen from information in the Contract Documents.

1 SECTION 01 23 00 - ALTERNATES

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and other Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY

- 7 A. Section includes administrative and procedural requirements for alternates.

8 1.3 DEFINITIONS

- 9 A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined
10 in the bidding requirements that may be added to or deducted from the base bid amount if
11 Owner decides to accept a corresponding change either in the amount of construction to be
12 completed or in the products, materials, equipment, systems, or installation methods described
13 in the Contract Documents.

- 14 1. Alternates described in this Section are part of the Work only if enumerated in the
15 Agreement.
16 2. The cost or credit for each alternate is the net addition to or deduction from the Contract
17 Sum to incorporate alternate into the Work. No other adjustments are made to the
18 Contract Sum.

19 1.4 PROCEDURES

- 20 A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate
21 work of the alternate into Project.

- 22 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar
23 items incidental to or required for a complete installation whether or not indicated as part
24 of alternate.

- 25 B. Notification: Immediately following award of the Contract, notify each party involved, in writing,
26 of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred
27 for later consideration. Include a complete description of negotiated revisions to alternates.

- 28 C. Execute accepted alternates under the same conditions as other work of the Contract.

- 29 D. Schedule: A schedule of alternates is included at the end of this Section.

1 PART 2 - PRODUCTS (Not Used)

2 PART 3 - EXECUTION

3 3.1 SCHEDULE OF ALTERNATES

4 A. **Additive Bid 1** – Added Planter/Seat Walls as Indicated on sheets C3.0A, L1.0A, L2.0A, A14.0,
5 A14.1 and A14.2.

6 B. **Additive Bid 2** – Prime coat painting in all inmate cells in lieu of Base specification per Section
7 09 96 03 – Special Coatings.

8 C. **Additive Bid 3** – Bullet resistive glazing at Lobby Reception Desk as shown on A14.3 and per
9 Section 13 07 00 0 Bullet Resistant Transaction Barriers in lieu of Tempered Glass and
10 Aluminum Base bid as indicated on Sheet A4.1.

11 D. **Additive Bid 4** – Added Water Management System at All Cells and Inmate Showers per
12 Section 22 04 15 – Water Management System.

13 E. **Additive Bid 5** – Chillers as TRANE per Owner's preference per Section 23 08 50 – Water
14 Chiller.

15 F. **Additive Bid 6** – Boilers as CLEVER BROOKS per Owner's preference Per Sections 23 08 60
16 – Water Boilers, 23 08 62 – Small Capacity Steam Boilers, and 23 08 64 – Large Capacity
17 Steam Boilers.

18 END OF SECTION 01 23 00

1 SECTION 01 25 00 - SUBSTITUTIONS

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and other Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY

- 7 A. This Section specifies administrative and procedural requirements for handling requests for
8 substitutions.
- 9 B. The Contractor's Construction Schedule and the Schedule of Submittals are included under
10 Section 01 33 23 "Submittal Procedures."
- 11 C. Procedural requirements governing the Contractor's selection of products and product options
12 are included under the General Conditions.

13 1.3 DEFINITIONS

- 14 A. Definitions used in this Article are not intended to change or modify the meaning of other terms
15 used in the Contract Documents.
- 16 B. Substitutions: Requests for changes in products, materials, equipment, and methods of
17 construction required by Contract Documents are considered requests for "substitutions." The
18 following are not considered substitutions:
19
- 20 1. Revisions to Contract Documents requested by the Owner or Architect.
 - 21 2. Specified options of products and construction methods included in Contract Documents.
 - 22 3. The Contractor's determination of and compliance with governing regulations and orders
23 issued by governing authorities.

24 1.4 SUBMITTALS

- 25 A. Substitution Request Submittal: Requests for substitution will be considered if received no later
26 than C.O.B. 10 County business days prior to bid opening. Requests received by the
27 Construction Manager after this date will not be considered.
- 28 B. Submit three copies of each request for consideration. Identify the product, or the fabrication or
29 installation method to be replaced in each request. Include related Specification Section and
30 Drawing numbers. Provide complete documentation showing
31
- 32 1. Product Data, including Drawings and descriptions of products, fabrication and
33 installation procedures.
 - 34 2. Samples where applicable or requested.
 - 35 3. A detailed, side-by-side comparison of the significant qualities of the proposed
36 substitution with those of the Work specified. Significant qualities may include but is not

- 1 necessarily limited to elements such as size, weight, durability, performance and visual
- 2 effect.
- 3 4. Coordination information, including a list of changes or modifications needed to other
- 4 parts of the Work and to construction performed by the Owner and separate Contractors
- 5 will become necessary to accommodate the proposed substitution.
- 6 5. Indicate the effect of the proposed substitution on overall Contract Time.
- 7 6. Certification by the Contractor that the substitution proposed is equal-to or better in every
- 8 significant respect to that required by the Contract Documents, and that it will perform
- 9 adequately in the application indicated
- 10 7. The contractor warrants that he/she has investigated the proposed product and
- 11 determined that it is equal to or superior in all respects to that indicated or specified.
- 12 8. The Contractor shall provide a signed statement that the proposed product is in full
- 13 compliance with the Contract Documents, and applicable regulatory requirements,
- 14 requires no changes to specified controls and monitoring systems that may be specified
- 15 in other Sections.
- 16 9. The Contractor shall provide information on availability of maintenance service, and
- 17 source of replacement materials, and provide a sample of Manufacturer's standard form
- 18 of guarantee or warranty for proposed product.

19 1.5 CONSTRUCTION MANAGER'S ACTION

- 20 A. Within one (1) week of receipt of the request for substitution, the Construction Manager (CM)
- 21 will request additional information or documentation necessary for evaluation of the request.
- 22 Within ten (10) days of receipt of the request, or one (1) week of receipt of the additional
- 23 information or documentation, whichever is later, the CM will notify the Contractor of acceptance
- 24 or rejection of the proposed substitution. The Architect at his/her sole discretion will determine
- 25 the acceptability of proposed products and his/her determination shall be final. If a decision on
- 26 use of a proposed substitution cannot be made or obtained within the time allocated, use the
- 27 product specified by name in the Contract Documents.
- 28 B. No consideration will be given to a substitute product unless, in the Architect's judgment, it
- 29 complies with the following conditions.
- 30 1. Substitution Request is complete.
- 31 2. It is equal in quality, performance and serviceability.
- 32 3. Its use does not entail changes in details or related construction.
- 33 4. It is acceptable in regards to design and aesthetic effect.
- 34 5. There is cost, time or both, advantage to the Owner.
- 35 C. Acceptance of a product shall not relieve the contractor from responsibility for the proper
- 36 execution of the Work and any other requirements of the Contract Documents.
- 37 D. If a proposed product is not accepted, use the product originally specified or indicated in the
- 38 Contract Documents.
- 39 E. No products other than those indicated or specified in the Contract Documents shall be
- 40 purchased or incorporated in the Work without the Architect's prior written acceptance.

1 PART 2 - PRODUCTS

2 2.1 SUBSTITUTIONS

3 A. Conditions: The Contractor's substitution request will be received and considered by the
4 Architect when one or more of the following conditions are satisfied, as determined by the
5 Architect; otherwise requests will be returned without action except to record noncompliance
6 with these requirements.

- 7 1. Extensive revisions to Contract Documents are not required.
- 8 2. Proposed changes are in keeping with the general intent of the Contract Documents.
- 9 3. The request is timely, fully documented and properly submitted.
- 10 4. The request is directly related to an "or equal" clause or similar language in the Contract
11 Documents.
- 12 5. The Specified product or method of construction cannot be provided within the Contract
13 Time. The request will not be considered if the product or method cannot be provided as
14 a result of failure to pursue the Work promptly or coordinate activities properly.
- 15 6. The specified product or method of construction cannot receive necessary approval by
16 a governing authority, and the requested substitution can be approved.
- 17 7. A substantial advantage is offered the Owner, in terms of cost, time, energy conservation
18 or other considerations of merit, after deducting offsetting responsibilities the Owner may
19 be required to bear. Additional responsibilities for the Owner may include additional
20 compensation to the Architect for redesign and evaluation services, increased cost of
21 other construction by the Owner or Separate Contractors, and similar considerations.
- 22 8. The specified product or method of construction cannot be provided in a manner which is
23 compatible with other materials, and where the Contractor certifies that the substitution
24 will overcome the incompatibility.
- 25 9. The specified product or method of construction cannot be coordinated with other
26 materials, and where the Contractor certifies that the proposed substitution can be
27 coordinated.
- 28 10. The specified product or method of construction cannot provide a warranty required by
29 the Contract Documents and where the Contractor certifies that the proposed substitution
30 provides the required warranty.

31 B. The Contractor's submittal and Architect's acceptance of Shop Drawings, Product Data or
32 Samples that relate to construction activities not complying with the Contract Documents, does
33 not constitute an acceptable or valid request for substitution, nor does it constitute approval.

34 PART 3 - EXECUTION (not used)

35 END OF SECTION 01 25 00

1 SECTION 01 26 00 – CONTRACT MODIFICATION PROCEDURES

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

4 A. Drawings and general provisions of the Contract, including General Conditions and
5 Supplemental General Conditions and other Division 01 General Requirements, apply to this
6 Section.

7 B. Refer to General Conditions for additional provisions regarding changes in the Work. If any
8 provision in this Section should conflict with any provision in the General Conditions, this
9 Section shall control.

10 1.2 NO CHANGES WITHOUT CONSENT; PERFORMING WORK ORDERED

11 A. No extra work shall be performed, and no change shall be made, except pursuant to a written
12 Change Order, Work Authorization, or Field Order from the Owner stating that the extra work or
13 change is authorized, and no claim for any addition to the Contract Price or Time for Completion
14 shall be valid unless ordered. However, nothing in this Section shall excuse the Contractor from
15 diligently proceeding and fully completing the Project.

16 1.3 PROPOSAL REQUESTS; PROCEDURES

17 A. A. Proposal Requests Authorized. Subject to legal requirements relating to competitive bidding,
18 the Owner may require changes in, additions to, or deletions from the scope of the Work to be
19 performed or the materials to be furnished pursuant to the Contract Documents.
20

21 1. The Owner may, at any time, without notice to the sureties, by written order designated or
22 indicated to be a Change Order, make any change or modification in the Work, or add to
23 the Work within the general scope of the Contract, including, but not limited to changes:

- 24 a. In the Specifications or Drawings;
25 b. In the sequence, method or manner of performance of the Work;
26 c. In the Owner-furnished facilities, equipment, materials, service, or site.

27 2. Owner Directed Changes Requiring an Increase in Contract Sum. If the Change in or
28 addition to the Work will result in an increase in the Contract Sum, the Owner shall have
29 the right to require the performance thereof on a Lump Sum basis or a Time and Material
30 basis, all as hereinafter more particularly described. The right of the Owner as aforesaid
31 shall apply with respect to each Change in the Work.

32 B. Methods of Calculation. Adjustments, if any, to the Contract Price by reason of any such
33 change, addition or deletion, shall be determined by one (1) or more of the following methods,
34 at the Owner's sole discretion. The Contractor shall provide sufficient substantiating data to
35 allow the Owner to evaluate the Contractor's Proposal Request.
36

1. By a lump sum proposal by the Contractor accepted or amended by formal action by the Owner; and/or;
2. By time and materials charges, limited to the "Actual Cost" to perform the Work, as defined herein, plus overhead and profit as defined in this Section.

C. Overhead/Profit and Allowable Time Limitations on Proposal Requests. If the Owner elects to have the Change in the Work performed on a Lump Sum basis, its election shall be based on a lump sum proposal which shall be submitted by the Contractor to the Construction Manager within ten (10) days of the Contractor's receipt of a request therefore, and the Owner reserves the right to request the Contractor to adjust the price of the proposed change order if the Owner disagrees with the Contractor's quoted price. The Owner's request for a lump sum proposal shall not be deemed an election by the Owner to have the change in the Work performed on a lump sum basis. The Contractor's and the Contractor's subcontractor's (all tiers) proposal shall be itemized and segregated by labor, equipment and materials for the various components of the change in, or addition to, the Work (no aggregate labor total will be acceptable) and shall be accompanied by signed proposals of any subcontractors who will perform any portion of the change in, or addition to, the Work and of any persons who will furnish materials or equipment for incorporation therein. The proposal shall also include the Contractor's estimate of the time required to perform said changes or additional work.

D. Labor Limitations. The portion of the proposal relating to labor, whether by the Contractor's forces or the forces of any of its subcontractors, may include reasonable anticipated costs of job site labor, including foremen, who will be directly involved in the change in the Work, for such time as they will be so involved. The Contractor's cost for Construction Managers, Project Engineers, Superintendents, Home Office personnel, Clerical, and like personnel are considered as contained in overhead.

E. Proposal Request Document Requirements. The Contractor's proposal for additional work shall include by itemized breakdown for work to be done by Contractor's own forces and including subcontractors with lower tier subcontractors' itemized breakdowns:

1. Cost of labor, including: hourly base wages, Social Security taxes, Federal or State unemployment taxes, workers' compensation insurance, and fringe benefits required by collective bargaining agreements effective for the Contractor and subcontractor(s).
2. Cost of materials and equipment or furnishings which will be incorporated into the permanent Work, including manufacturers or supplier's cost, sales taxes, and cost of delivery.
3. Construction equipment costs (not small tools) for time of use required at Contractor's or subcontractor's unit rates or at discounted local published rates, whichever are less.
4. General Conditions, General Requirements, supervision, overhead (excluding small tools) and profit applied to the cost of labor, materials and equipment as defined above for:
 - a. Work done by Contractor's own forces, not including bond and insurance premiums, fifteen percent (15%);
 - b. Work done by subcontractors, all tiers, including bond and insurance premiums, if any, shall not exceed a cumulative total of fifteen percent (15%);
 - c. General Conditions, General Requirements, Supervision, Overhead and Profit for Contractor on Subcontractor's work, five percent (5%);
 - d. Under no circumstance will the sum total allowable mark up for General Conditions, General Requirements, supervision, overhead (excluding small tools) and profit, exceed a cumulative total of twenty percent (20%), including markups for all parties involved in a change.
5. Contractor's Performance and Payment Bond premiums, one-and-a-half percent (1.5 %).

- F. In the event that the Contractor fails to submit his/her proposal within the designated period, the Owner may order the Contractor to proceed with the Change or Addition to the Work and the Contractor shall so proceed. The Owner shall unilaterally determine the reasonable cost and time to perform the work in question, which determination shall be final and binding upon the Contractor. In no event shall the Contractor allow an unresolved change in the Work to hamper the progress of the Work.
- G. In the event that the parties are unable to agree as to the reasonable cost and time to perform the change in, or addition to, the Work based upon the Contractor's Proposal, and the Owner does not elect to have the Change in the Work performed on a Time and Materials basis, the Owner shall make a unilateral determination of the reasonable cost and time to perform the change in the Work, based on its own estimates, the Contractor's submission, or a combination thereof. A Change Order shall be issued for the amounts of cost and time determined by the Owner and shall become binding upon the Contractor unless the Contractor submits his/her protest in writing to the Owner within thirty (30) days of the issuance of the Change Order. Owner has the right to direct in writing the Contractor to perform the change in the Work, which is the subject of such Change Order. Failure of the parties to reach agreement regarding the cost and time of performing the change in the Work and/or any pending protest, shall not relieve the Contractor from performing the change in the Work promptly and expeditiously.
- H. If the Owner elects to have the change in the Work performed on a Time and Materials basis, the same shall be performed, whether by the Contractor's forces or the forces of any of its subcontractor or lower tier subcontractors, at actual cost to entity performing the change in Work, without any charge for administration, clerical expense, supervision, or superintendence of any nature whatsoever, or the cost, use or rental of tools or plant. The cost of a Change Order on a Time and Materials basis shall be evaluated according to the limitations defined in this Section. The Contractor shall submit to the Owner daily Time and Material tickets, to include the identification number assigned to the change in work, the location and description of the change in the Work, the classification of labor employed with names, the materials used, the equipment rented (not small tools) and such other evidence of cost as the Owner may require. The Owner may require authentication of all Time and Material tickets and invoices by persons designated by the Owner for such purpose. The failure of the Contractor to secure any required authentication shall, if the Owner elects to treat it as such, constitute a waiver by the Contractor of any claim for the cost of that portion of the change in the Work covered by a non-authenticated ticket or invoice; provided, however, that the authentication of any such ticket or invoice by the Owner shall not constitute an acknowledgment by the Owner that the items thereof were reasonably required for the change in the Work.
- I. No costs for General Conditions, General Requirements, supervision, overhead, and profit will be paid by the Owner on account of a change in the Work, except as specifically provided in this Section, and shall be deemed to include all costs and expenses which the Contractor or any of its subcontractors may incur in the performance of a change in the Work and which are not otherwise specifically recoverable by them as provided herein.
- J. "Actual Costs" Defined. The actual cost to perform the Work for purposes of this Section is limited to the applicable labor rates set forth in these Specifications hereof, including Contractor's contributions directly attributable to the work authorized; and the material supplier's invoice amount for all material and equipment actually used to accomplish the work authorized. All other direct and indirect costs, all costs attributable to the time needed to perform the Work ordered by such Change Orders, and all profit associated with such work shall be included in the maximum overhead and profit amounts stated hereinabove.
- K. Audit and Verification. With respect to any change in the Work resulting in a change in the Contract Sum, the Contractor shall afford and shall require its subcontractors to afford access to the Owner at all reasonable times to any books, correspondence, instructions, receipts, vouchers, memoranda, and records of any kind relating thereto, all of which shall be maintained

by the appropriate parties for a period of at least three (3) years from and after the date the Owner makes payment on account of such change in work. The Contractor authorizes the Owner and shall require its subcontractors to authorize the Owner to check directly with any suppliers of labor and material with respect to, and to obtain, sworn statements and waivers of lien.

L. Changes Requiring a Decrease in Contract Sum. If the change in the Work will result in a decrease in the Contract Sum, the Owner shall require a quotation by the Contractor of the amount of such decrease for use in preparing a Change Order. The Contractor's quotation shall be forwarded to the Owner within ten (10) days of the Construction Manager's (CM) request and, if acceptable to the CM, shall be incorporated in the Change Order. If not acceptable, the parties shall make every reasonable effort to agree as to the amount of such decrease, which may be based on a Lump Sum, properly itemized basis in accordance with this Section.

1. If the CM and the Contractor are unable to agree on the amount of such decrease, the decrease shall be the total estimated reduction in actual cost of the work, as determined by the CM in his/her reasonable judgment and the Contractor shall be bound to credit this amount to the Owner.

M. Periodic Change Orders. The CM is authorized to cumulate Proposal Requests and to process periodic Change Orders including additions and deletions, and to develop procedures providing the methods for such processing in addition to and consistent with those set forth herein.

1.4 WORK AUTHORIZATIONS; PROCEDURES

A. Work Authorizations Authorized. The Owner or its designee is authorized to issue Work Authorizations instructing the Contractor to proceed with extra work.

B. Maximum Amounts. The Owner may approve a work authorization up to the limit as described in Public Contract Code Section 20142. The Owner may approve a time allocation for such work based upon the recommendation of the CM and Architect.

C. Quotation by Contractor. Other than in extraordinary circumstances, as described below, before a Work Authorization is issued, the Contractor shall submit a quotation setting forth an estimated cost of the Work to be performed with sufficient substantiating data to allow the Owner to evaluate the quotation, and an estimate of the time necessary to perform the Work. If requested by the CM, the Contractor shall provide additional data to support the quotation. The Contractor shall acknowledge the quotation as binding.

D. Request for Time Adjustment. If the Contractor claims that the Work Authorization has delayed the construction completion time, he shall verify the claimed delay by submitting a schedule fragnet and supporting information demonstrating with reference to the approved Project Progress Schedule that the Work Authorization in fact caused a delay in the overall completion date of the Project. Upon such demonstration, the CM shall process a request for a Contract Time extension Change Order pursuant to these Specifications.

E. Accumulation of Work Authorizations. At the CM's sole discretion, the Contractor's claims for Change Orders arising from several Work Authorizations may be cumulated into periodic Change Orders adjusting Contract Price, Time, or both, separately or in one Change Order

1. Such periodic Change Orders shall include deductions for Changes which constitute Deductive Change Orders as defined hereinabove, during the time period being considered in the periodic Change Order.

- 1 F. Immediate Work Authorizations. In the event extraordinary circumstances arise which require
2 extra work to be authorized before a quotation is prepared by the Contractor, the Owner or its
3 designee may issue an immediate Work Authorization without such quotation. Such Work
4 Authorization shall include a maximum authorized sum over which no price adjustment will be
5 authorized. The determination as to whether circumstances as described above exist is
6 discretionary with the Owner. Such Work Authorizations otherwise shall be processed as
7 specified in this Section.

8 1.5 FIELD ORDERS; PROCEDURES

- 9 A. Field Orders Authorized. The Owner may issue Field Orders instructing the Contractor to
10 proceed with work differing from that shown in the Contract Documents, and which changes the
11 Scope of the Work, by adding or deleting Work, by instructing Work to be located differently
12 than shown on the Contract Drawings, or making other minor changes which the Owner
13 determines are in the Owner's best interests.
- 14 B. No Price or Time Adjustment Authorized. Field Orders are not authorized to change the
15 Contract Price or Time, or to bind the Owner to the payment of any sum to the Contractor.
- 16 C. No Cost Adjustments Required. If the change ordered in the Field Order will neither delete nor
17 add costs to the Project, the Field Order shall so note. If the Contractor contends that extra
18 work is required, Article 1.03 of this Section shall apply.
- 19 D. Cost Adjustments Required. If the change ordered in the Field Order will either delete or add
20 costs to the Project, the Field Order shall instruct the Contractor to submit its quotation.
21 Thereafter, either Article 1.02 or Article 1.03 of this Section, as specified by the CM, shall apply.
- 22 E. Proceeding Before Decision. If the Contractor proceeds with work noted on a Field Order
23 without notifying the CM of its claims that the Work is extra work, the Contractor shall have
24 waived its right to request an adjustment to the Contract Price and/or Time. Such notification
25 must be made prior to commencing any of the Work noted on the Field Order.

26 1.6 EXTRA WORK REQUESTS; PROCEDURE

- 27 A. If the Contractor claims that any Clarification, Field Order, or other instruction issued by the
28 Owner requires work beyond the Scope of the Agreement for Construction, the following
29 provisions shall apply.
- 30 1. Notice to CM. Within ten (10) calendar days, the Contractor shall notify the CM of its
31 request, and submit a quotation for the requested costs, pursuant to Article 1.03 of this
32 Section. The Contractor shall submit additional information requested by the CM to
33 decide the request.
- 34 2. Action by CM. The CM shall review the Contractor's submittals and either recommend
35 for approval or deny Contractor's request. If the request is approved, the CM may
36 process either a Change Order or Work Authorization, pursuant to this Section. If the
37 request is denied, the CM shall so advise the Contractor. Thereafter, the Contractor shall
38 proceed with the Work in issue. The CM shall issue his/her decision within twenty-one
39 (21) days of receipt of a complete submittal from the Contractor. The CM shall
40 recommend final action to the Owner and the Owner's decision shall be binding on the
41 Contractor.
- 42 3. Time. If the request is approved, the time during which the request was being considered
43 shall be included in the time allocation for the Work Authorization adjusting the request,
44 and Article 1.03 of this Section shall apply thereto; if the request is adjusted by Change

- Order, any Time extension authorized thereby shall include the Time during which the request was pending. If the request is denied, no Time adjustment shall be authorized.
4. Effect of Proceeding. If the Contractor proceeds with the Work without notifying the CM pursuant to Article 1.06.A.1, or before a decision pursuant to Article 1.06.A.2, any claim for a Contract Price and/or Time adjustment shall be waived.
5. Scheduling. The Contractor is responsible to schedule the Work and submit extra-work requests so the time required for decision, as specified in Article 1.06.A.2, does not delay the Work in general.
6. Contractor Notice of Change. If the Contractor asserts that any event or occurrence has caused a change in, or addition to, the Work which change causes an increase or decrease in the Contractor's cost or the time required for the performance of any part of the Work under the contract, the Contractor shall, within ten (10) days of such event, give the Owner written notice as herein required. Said notice shall include the instructions or circumstances that are the basis of the change and the Contractor's best estimate of the cost and time involved.
- a. If the Contractor intends to assert a claim under this Section, he/she must, within ten (10) days after receipt of a written Change Order under Article 1.02 above or the furnishing of a written notice under Article 1.06 submit to the CM a written statement setting forth the specific nature and cost of such claim, unless this period is extended by the CM. The statement of claim hereunder may be included in the notice under Article 1.06 above. Failure to submit such written notice within the specified time frame shall be deemed a waiver of the claim.
- 1) The statement of claim shall include all direct, indirect and impact costs associated with the change, as well as the Contractor's estimate of the schedule impact of the change, if any.
7. If the parties are unable to agree to the reasonable cost and time to perform the Change, or are unable to agree as to whether a change occurred, the Owner shall make a unilateral determination as described in Paragraph 1.03G, and the Contractor shall proceed in accordance therewith.

1.7 CHANGE ORDERS REGARDING TIME FOR COMPLETION

- A. Any time extension authorized by the Owner pursuant to Article 2.38 of the General Conditions, herein shall be set forth in a Change Order.

1.8 CHANGE ORDERS DUE TO UNAVAILABLE MATERIALS

- A. In the event that the Contractor demonstrates good cause for a delay in the Contract Time due to the unavailability of materials, and provides the necessary documentation substantiating said cause for delay, the Owner, in its sole discretion, may either grant a Contract Time extension, or utilize this Section.
- B. In the event that the Work is unable to be completed due to unavailable materials, and if all other aspects of the Work have been completed, the Contractor may request to delete the portion of the Work not yet completed from the Agreement for Construction, thereby allowing a Notice of Completion to be filed on the Project. The Owner shall approve no such Change Order unless the Contractor's request is accompanied by an offer to perform the Work so deleted for a price not to exceed the value of the Work deleted by such Change Order, such work to be commenced upon delivery of the materials, and diligently prosecuted to completion.

C. In the event the Owner elects to accept the Contractor's offer, work done pursuant thereto shall not be construed as Work done on the Project. The application of this Section is limited as follows:

1. No Change Order shall be issued pursuant to this Section until the Contractor has submitted all documents required for final payment.
2. This Section shall apply only to Work, the completion of which is precluded due to unavailable materials.
3. Utilization of this Section lies solely within the discretion of the Owner, and such discretion hereby is delegated to the CM.

1.9 EFFECT OF CONTRACTOR'S ACCEPTANCE OF CHANGE ORDER

A. By accepting a Change Order, Contractor agrees to the changes, if any, in the Contract Price specified for each item and to the specified Extension of Time allowed, if any, for completion of the entire Work on account of such Change Order, and agrees to furnish all labor and materials and perform all Work necessary to complete all additional Work specified therein for the price adjustment and within the time specified therein. Contractor shall make no additional claim for adjustment to the Contract Price or Contract Time, nor for additional costs or damages, on account of the work referenced in such Change Order. A Change Order duly issued by the Owner and accepted by the Contractor shall constitute a complete accord and satisfaction as to the Work, Contract Price, and Contract Time changed thereby. Contractor shall defend and indemnify the Owner, its officers, employees, agents and consultants, if any Subcontractor asserts any claim against the Owner that contradicts, or is inconsistent with, a duly issued Change Order accepted by Contractor.

1.10 EFFECT ON SURETIES

- A. All changes authorized by the Contract Documents may be made without notice to, or consent of, the sureties on the Performance and Payment bonds, and shall not reduce their liability on the bonds.
- B. The Owner reserves the right to require additional Performance or Payment bonds to secure a Change Order. In this event, the Change Order shall be increased by the actual cost of the bond premium for the additional bond amounts if any.

1.11 GENERAL PROVISIONS RELATED TO CHANGES

A. The Contractor shall not be entitled to any amount for indirect costs, damages, or expenses of any nature, including, but not limited to, so-called "impact" or "cumulative" costs, labor inefficiency, wage, material or other escalations beyond the prices upon which the proposal is based and to which the parties have agreed pursuant to the provisions of Section 01 26 00, and which the Contractor, its subcontractors or sub-subcontractors or any other person may incur as a result of delay, interferences, suspensions, changes in sequence or the like, for whatever cause, whether reasonable or unreasonable, foreseeable or unforeseeable, or avoidable or unavoidable, arising from the performance of any and all changes in the Work performed pursuant to this Section 01 26 00. It is understood and agreed that the Contractor's sole and exclusive remedy in such event shall be recovery of his/her direct costs as compensable hereunder and an extension of the Contract Time, but solely in accordance with the provisions of the Contract Documents.

1 B. No claim by the Contractor hereunder shall be allowed if asserted after final payment under this
2 Contract. No claim relating to or flowing from a particular change to the work shall be allowed
3 after execution of the Change Order relating to that change.

4 C. If any disputes should arise between the parties with respect to an increase or decrease in the
5 Contract Sum or an expansion or contraction in the Contract Time as a result of a change in the
6 Work, the Contractor shall not suspend performance of a change in the Work or the Work itself
7 unless otherwise so ordered by the Owner in writing. The Owner shall, however, pay to the
8 Contractor up to the Owner's reasonable estimated value of the change in the work, regardless
9 of the dispute, if said change in the Work results in an increase in the Contract Amount; and the
10 Owner shall have the right to decrease the Contract Amount up to the Owner's reasonable
11 estimated value of the change in the Work, regardless of the dispute, if said change in the Work
12 results in a decrease in the Contract Sum, and the Contractor shall be bound by the Owner's
13 decision as to amount of payment or credit.

14 1.12 MINOR CHANGES IN THE WORK

15 A. The Owner and/or CM shall have authority to order minor changes in the Work not involving an
16 adjustment in the Contract Amount or an extension of the Contract Time, and not inconsistent
17 with the Contract Documents. Such changes shall be effected by written order, and shall be
18 binding on the Owner and the Contractor. The Contractor shall carry out such written orders
19 promptly.

20 1.13 PART 2- PRODUCTS (not used)

21 1.14 PART 3 – EXECUTION (not used)

22 1.15 END OF SECTION 01 26 00

1 SECTION 01 26 13 – REQUEST FOR INFORMATION

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of Contract, including General Conditions and
5 Supplemental General Conditions and other Division 01 General Requirements, apply to
6 this Section.

7 1.2 SUMMARY

- 8 A. This Section specifies administrative and procedural requirements for Request for
9 Information (RFI), including:

- 10 1. Definitions.
11 2. The Request for Information Procedure.
12 3. Request for Information Review System.

13 1.3 DEFINITIONS:

- 14 A. General: To prevent misunderstanding between the Owner and the Contractor over project
15 procedures, the following definitions are provided:

- 16 1. Contract Document Clarification: An answer from the Construction Manager (CM)
17 and/or Architect, in response to an inquiry from the Contractor, intended to make
18 some requirement(s) of the Contract Documents clearly understood. Contract
19 Documents clarifications may be sketches, drawings, or in narrative form and will
20 NOT change any requirements of the drawings or plans. Responses to Contractor
21 inquiries shall be outlined elsewhere in this Section.
22 2. Project Communications: Routine written communications between the Owner and
23 the Contractor shall be in letter, field memo or mail. Email is also an acceptable form
24 of communication. All such communications shall be processed through the CM and
25 shall NOT be identified as Request for Information nor shall they substitute for any
26 other written provisions of these Contract Documents.
27 3. Requests for Information: A written request from the Contractor, to the Owner,
28 seeking an interpretation or a clarification of some requirement of the contract
29 documents. The Contractor shall clearly and concisely set forth the issue for which
30 he/she seeks clarification or interpretation and why he/she believes a clarification is
31 needed. Responses from the Owner will not change any requirements of the Contract
32 Documents. Responses to Contractor inquiries shall be outlined elsewhere in this
33 section.
34 4. Submittals: Refer to Section 01 33 23 "Submittal Procedures".
35 5. Construction Schedule Submittals: Refer to Section 01 32 26 "Construction Progress
36 Documentation".

37 1.4 THE REQUEST FOR INFORMATION PROCEDURE

- 38 A. General: The following establishes the process and timing concerning RFI's and their
39 responses

1. In the event that the General Contractor or Subcontractor, at any tier, determines that some portion of the Contract Documents requires clarification or interpretation by the Architect, the General Contractor shall submit a Request for Information in writing to the CM. The written request shall be clearly titled "REQUEST FOR INFORMATION," in capital letters. Requests for Information may only be submitted by the General Contractor. The Contractor shall clearly and concisely set forth the issue for which clarification or interpretation is sought and why a response is needed from the Owner.
2. The Construction Manager will review all Requests for Information to determine whether they are Requests for Information within the meaning of this term. If the CM determines that the document is not a Request for Information, it will be returned to the Contractor, un-reviewed as to content, for resubmittal in the proper manner.
3. Responses to Requests for Information shall be issued within fourteen (14) calendar days of receipt of the request from the Contractor unless the CM determines that a longer time is necessary to provide an adequate response. The Contractor shall not be entitled to any time extension due to the time it takes the CM to respond to the request provided that the CM's responds within the fourteen (14) working days set forth above.
4. Responses from the CM will not change any requirement of the Contract Documents. In the event the Contractor believes that a response to a Request for Information will cause a change to the requirements of the Contract Documents, the Contractor shall immediately give written notice to the CM and Owner stating that the Contractor considers the response to be a change in scope of work. Failure to give such written notice immediately shall waive the Contractor's right to seek additional time or cost under the Changes article found in the General Conditions.

1.5 THE REQUEST FOR INFORMATION REVIEW SYSTEM

- A. General: All documents labeled as RFI will be reviewed by the CM to determine whether or not the document meets the definition of an RFI, as stated previously. If the document submitted is an RFI, the document will be entered into the RFI Log and processed for a response.
- B. If the document submitted is not an RFI, it will be returned to the Contractor immediately with a standard letter of transmittal stating the following:
 1. "This document is not an RFI and therefore is being returned to you without a response. This document has not been entered into the project's RFI Log. Resubmit document in the proper format as (circle one) Project Communications, Submittals, Substitution, Schedule Submittal or other, for processing."
- C. The Contractor shall utilize Prolog Converge for the administration of all RFI's.

PART 2 - PRODUCTS (not used)

PART 3 - EXECUTION (not used)

END OF SECTION 01 26 13

1 SECTION 01 29 00 – PAYMENT PROCEDURES

2 PART 1 - GENERALL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General Conditions and
5 Supplemental General Conditions and other Division 01 General Requirements, apply to this
6 Section.

7 1.2 SUMMARY

- 8 A. This Section specifies administrative and procedural requirements governing the Contractor's
9 Applications for Payment.

- 10 1. Coordinate the Schedule of Values and Applications for Payment with the Contractor's
11 Construction Schedule, List of Subcontracts, and Submittal Schedule.

- 12 B. The Contractor's Construction Schedule requirements are included in Section 01 32 00,
13 "Construction Progress Documentation"; and Submittal Schedule requirements are included in
14 Section 01 33 23, "Submittal Procedures".

15 1.3 SCHEDULE OF VALUES

- 16 A. Coordinate preparation of the Schedule of Values with preparation of the Contractor's
17 Construction Schedule. See Section 01 32 00 "Construction Progress Documentation" for
18 additional information.

- 19 1. Within thirty (30) calendar days after the Award of Contract, the Contractor shall submit
20 Schedule of Values for review by Construction Manager (CM), allocating a dollar value
21 for each activity on the Construction Schedule.

- 22 B. Format and Content: Use the Construction Schedule as a guide to establish the format for the
23 Schedule of Values.

- 24 1. Identification: Include the following identification on the Schedule of Values:

- 25 a. Project name and location.
26 b. Name of the Owner.
27 c. Project number.
28 d. Contractor's name and address.
29 e. Date of submittal.

- 30 2. Arrange the Schedule of Values in a tabular form with separate columns to indicate the
31 following for each item listed:

- 32 a. Generic name.
33 b. Related Specification Section.
34 c. Name of subcontractor.

- 1 d. Name of manufacturer or fabricator.
- 2 e. Name of supplier.
- 3 f. Change Orders (numbers) that have affected value.
- 4 g. Dollar value.
- 5 h. Percentage of Contract Sum to the nearest one hundredth percent, adjusted to
- 6 total one hundred (100) percent.
- 7 3. The Schedule of Values shall be a product of the CPM Schedule and provide sufficient
- 8 detail to facilitate continued evaluation of Applications for Payment and progress reports.
- 9 The following information shall be minimally illustrated in the Schedule of Values and be
- 10 subject to approval by the CM.
- 11 a. Dollar value for each activity will be cost including labor and materials. The dollar
- 12 value of the General Conditions as well as Overhead and Profit shall be a single
- 13 line item. The Contractor must provide a dollar value for close-out activities to
- 14 include as-builts, O&M documentation, Owner Training, Spare Materials etc.
- 15 b. Make sum of activity costs equal the Contract Amount.
- 16 c. Separate line items for General Conditions and may be required by the Owner.
- 17 d. Incorporate funding breakdown as required by County into Schedule of Values and
- 18 Applications for Payment for County tracking. The Contractor will be required to
- 19 track costs within their Schedule of Values as shown on their Bid Proposal Sheet
- 20 shown in the Instructions to Bidders, Section 00 21 13, Exhibit B.
- 21 4. Component amounts shall be rounded off to the nearest whole dollar, and the cumulative
- 22 total thereof shall equal the Contract Amount.
- 23 5. All material storage will be the responsibility of the Contractor.
- 24 6. The CPM Schedule shall be progressed in accordance with the General Requirements
- 25 Section "Construction Progress Documentation" 01 32 00 and the schedule update shall
- 26 be utilized as the basis for the Contractor's Application for Payment.
- 27 1.4 APPLICATIONS FOR PAYMENT
- 28 A. Each Application for Payment shall be consistent with previous applications and payments as
- 29 reviewed by the Owner, CM and Architect, and paid for by the Owner. See General Conditions
- 30 for additional information regarding progress payments and final payment.
- 31 1. The initial Application for Payment, the Application for Payment at time of Completion,
- 32 and the final Application for Payment involve additional requirements as listed below.
- 33 B. Payment Application Times: Each progress payment date is as indicated in the Agreement.
- 34 The period of construction Work covered by each Application or Payment is the period indicated
- 35 in the Agreement.
- 36 C. Payment Application Forms: Use AIA Document G702 and Continuation Sheets G 703 as the
- 37 form for Application for Payment.
- 38 D. Incorporate funding breakdown as required by County into the Applications for Payment for
- 39 County tracking. The Contractor will be required to track costs within their Pay Applications as
- 40 shown on their Bid Proposal Sheet shown in the Instructions to Bidders, Section 00 21 13,
- 41 Exhibit B.
- 42 E. Application Preparation: Complete every entry on the form, including notarization and execution
- 43 by person authorized to sign legal documents on behalf of the Contractor. Incomplete
- 44 applications will be returned without action.

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1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions have been made.
 2. Include amounts of Change Orders issued prior to the last day of the construction period covered by the Application.
- F. Transmittal: Submit three (3) executed copies of each Application for Payment to the CM by means ensuring receipt within twenty-four (24) hours; one (1) copy shall be complete, including waivers of lien and similar attachments, when required.
1. Transmit each copy with a transmittal form listing attachments, and recording appropriate information related to the application in a manner acceptable to the Construction Manager.
- G. Waivers of Mechanics Lien and Stop Notice: With each Application for Payment, submit waivers of mechanics lien and stop notices from every entity who may lawfully be entitled to file a mechanics lien or stop notice arising out of the Contract, and related to the Work covered by the payment. Include with each application both Conditional and Non-Conditional Lien Releases for the Contractor and Subcontractors.
1. Submit partial waivers on each item for the amount requested on each item.
 2. When an application shows completion of an item, submit final or full waivers.
 3. The Owner reserves the right to designate which entities involved in the Work must submit waivers.
- H. Initial Application for Payment: Administrative actions and submittals that must precede the submittal of the first Application for Payment include the following:
1. List of subcontractors, including names, addresses and contact persons.
 2. List of principal suppliers and fabricators.
 3. Schedule of Values.
 4. Contractor's Construction Schedule (preliminary if not final).
 5. Submittal Schedule (preliminary if not final).
 6. List of Contractor's staff assignments.
 7. List of Contractor's principal consultants.
 8. Copies of authorizations and licenses from governing authorities for performance of the Work.
 9. Initial survey and damage report.
- I. Final Payment Application: Administrative actions and submittals which must precede submittal of the final payment Application for Payment include the following:
1. All pertinent permits and similar approvals such as State Fire Marshal / Division of Forestry, Department of Health and Environmental Services, SJVAPCD, and RWQCB sign-off.
 2. Warranties (guarantees) and maintenance agreements.
 3. Test/adjust/balance records.
 4. Maintenance instructions.
 5. Start up performance reports.
 6. Change over information related to Owner's occupancy, use, operation and maintenance.
 7. Final cleaning.
 8. Extra materials.
 9. Application for reduction of retainage, and consent of surety.
 10. Completion of Project closeout requirements.
 11. Completion of items specified in order to achieve Completion.
 12. Assurance that unsettled claims will be settled.

- 1 13. Transmittal of required Project construction records to Owner.
- 2 14. Proof that taxes, fees and similar obligations have been paid.
- 3 15. Removal of temporary facilities and services.
- 4 16. Removal of surplus materials, rubbish and similar elements.
- 5 17. Ensure Owner's exclusive access.
- 6 18. Post Warranty Bond in the amount of ten (10%) percent of Final Contract Amount.

7 PART 2 - PRODUCTS (Not Used)

8 PART 3 - EXECUTION (Not Used)

9 END OF SECTION 01 10 00

1 SECTION 01 31 13 – PROJECT COORDINATION

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and other Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY:
7

- 8 A. This Section specifies administrative and supervisory requirements necessary for Project
9 coordination including, but not necessarily limited to:

- 10 1. General project coordination procedures.
11 2. Conservation.
12 3. Coordination Drawings.
13 4. Administrative and supervisory personnel.
14 5. Project meetings.
15 6. General installation provisions.
16 7. Cleaning and protection.

17 1.3 PROGRESS MEETINGS

- 18 A. Progress meetings, coordination meetings and pre-installation conferences are included in
19 Section 01 31 19 – Project Meetings.

20 1.4 CONSTRUCTION SCHEDULE

- 21 A. Requirements for the Contractor's construction schedule are included in Section 01 32 00-
22 Construction Progress Documentation.

23 1.5 CONTRACTOR'S ON-SITE PERSONNEL

- 24 A. At minimum, Contractor must provide key, full-time staff, to manage the project. These key staff
25 include: Project Manager, General Superintendent, Project Engineer, QC Manager with CASp
26 certification issued by the Department of General Services and Administrative Assistant. No
27 Work may begin on-site until the Contractor submits, and the Owner approves, these key staff.

- 28 B. The following key personnel must be on-site at all times when Work is being performed:

- 29 1. Contractor's General Superintendent:

- 30 a. Responsibilities: Responsible for administration of the Contractor's Work and the
31 coordination of the Work of the Contractor, Subcontractors and suppliers. The
32 General Superintendent must be on site at all times work is being performed. No

Work may proceed on the site without the presence of the Superintendent or his Owner-accepted Alternate. The Superintendent may not be absent from the project site for more than two consecutive weeks and/or 20 total work days in the course of any 12-month period. Any absence beyond these periods may be cause for the Owner to direct the removal as the Project Superintendent. The General Superintendent may also function as the Responsible Person for accident prevention and as the Contractor's Authorized Representative. If the General Superintendent does function in these latter two capacities, the appointment letter, described below, must so state these additional duties.

b. At least fifteen (15) days prior to the start date for the Work identified in the NTP, Contractor must submit for acceptance by the Owner, the individual proposed for the position of General Superintendent. The submittal shall include four (4) copies of a resume and an Appointment letter for the Superintendent. The Appointment letter must be accompanied by a detailed resume for the candidate, documenting their relevant experience and providing at least three current references.

c. Duties will include, but not be limited to:

- 1) Be on the Work site at all times during performance of Work, with complete authority to take any action necessary to ensure conformance with the requirements of the Contract Documents.
- 2) Confer with Construction Manager, Contractor's personnel and subcontractors to discuss and resolve matters such as work procedures and construction problems.
- 3) Plan, organize and direct activities concerned with the construction and maintenance of the project.
- 4) Immediately stop any work that does not comply with requirements of the Contract Documents, and direct removal and replacement of any defective Work.
- 5) Supervise, coordinate, direct and lead workers engaged in construction activities.
- 6) Work with the project scheduler to prepare the preliminary and baseline project schedules in a logical sequence of activities to meet the project milestones.
- 7) Review and monitor the activities of all trades to assure compliance with safety plans, building codes and regulatory agency requirements.
- 8) Investigate damages, accidents or delays. Take necessary action to prevent their recurrences and take corrective action as warranted.
- 9) Take actions to deal with the results of delays, bad weather and emergencies on the site.
- 10) Coordinate the scheduling of work activities to facilitate testing and inspection by Contractor's Quality Control (QC) Manager, QC Specialists and Testing Labs.
- 11) Assist, prepare and oversee the preparation of all submittals required by Section 01 50 00 "Temporary Facilities and Controls".
- 12) Assure that work areas and project site is cleaned and maintained.
- 13) Attend all key Project Meetings including, but not limited to, Preconstruction Conference, Schedule Orientation Meeting, Progress Meetings, Commissioning Meetings, Demonstration and Training Meetings, and Closeout Conference.

d. Qualifications:

- 1) A minimum of 15 years experience as a superintendent, construction project manager, or construction manager on similar size and type of construction projects that included the major trades involved with this Project.

2) Quality Control Manager. See the requirements of Section 014000.

C. The following personnel must be on the job site full-time, 40 hours per week:

1. Project Manager:

- a. At least fifteen (15) days prior to the start date for the Work identified in the NTP, Contractor must submit for acceptance by the Owner, the individual proposed for the position of Project Manager. The submittal shall include four (4) copies of a resume and an Appointment letter for the PM. The Appointment letter must be accompanied by a detailed resume for the candidate, documenting their relevant experience and providing at least three current references..
- b. Duties: The Contractor's Project Manager will be responsible for the Contractor's personnel and will have overall responsibility to manage and administer the Contract. The Contractor's Project Manager will have the authority to legally bind the Contractor.
- c. Qualifications:
 - 1) A minimum of 10 year's experience as a Project Manager on similar size and type of construction projects that included the major trades involved with this Project.
 - 2) A Bachelor's Degree from an accredited university in Architecture, Civil, Mechanical or Electrical Engineering, Construction Management, or equivalent experience.

2. Project Engineer:

- a. At least fifteen (15) days prior the start date for the Work identified in the NTP, Contactor must submit for acceptance by the Owner, four (4) copies of an Appointment letter for the Project Engineer. The Appointment letter must be accompanied by a detailed resume for the candidate documenting their relevant experience and providing at least three current references.
- b. Duties will include, but not be limited to:
 - 1) Be on the Work site at all times during performance of Work.
 - 2) Confer with General Superintendent and subcontractors to discuss and resolve matters such as work procedures and construction problems.
 - 3) Assist and support the General Superintendent in the performance of the Superintendent's duties with complete authority to take necessary action to assure conformance with the contract requirements.
 - 4) Interpret and explain plans and specification requirements to Contractor's personnel and subcontractors.
 - 5) Prepare and or assist in the preparation of monthly reports, meeting minutes, cost and other administrative reports required by the contract documents.
 - 6) Assist and/or requisition supplies and material required to complete construction.
 - 7) Prepare and/or assist in the preparation of change orders, cost estimates, cost reduction proposals.
 - 8) Assist the project scheduler in updating the monthly progress schedule and the preparation of schedule reports.
 - 9) Prepare Requests for Information (RFI), issue to owner, track disposition and distribute to contractor's appropriate personnel.
 - 10) Oversee the preparation of coordination drawings.
 - 11) Maintain As-Built Documents.

1 12) Attend all key Project Meetings including, but not limited to, Preconstruction
2 Conference, Schedule Orientation Meeting, Progress Meetings,
3 Commissioning Meetings, Demonstration and Training Meetings, and
4 Closeout Conference.

5 3. Administrative Assistant (full time on site):

6 a. Duties will include, but not be limited to: Perform administrative duties as needed
7 to support Contractor's Work.

8 1.6 OTHER PERSONNEL

9 A. The above listed staff is a minimum requirement. Contractor must provide all other
10 administrative and supervisory personnel as needed or required for timely compliance with all of
11 the requirements of the Contract Documents and proper coordination of the performance of the
12 Work.

13 B. Contractor must ensure that each Subcontractor provides personnel as reasonably required for
14 management and coordination of the Subcontractor's Work and for coordination of the
15 Subcontractor's Work with the Work of the entire Project.

16 1.7 COORDINATION:

17 A. Coordination: Coordinate construction activities included under various sections of these
18 Specifications to assure efficient and orderly installation of each part of the Work. Coordinate
19 construction operations included under different sections of the Specifications that are
20 dependent upon each other for proper installation, connection, and operation. Contractor must
21 not delegate Contractor's responsibility for coordination of the Work to any Subcontractor.

22 B. Each Contractor shall coordinate his/her construction operations with those of other contractors
23 and entities, including those performing work under other contracts, to ensure efficient and
24 orderly installation of each part of the Work. Each Contractor shall coordinate his/her
25 operations with operations included in different sections that depend on each other for proper
26 installation, connection, and operation. Special attention is given to Section 01 11 00 –
27 Summary of Work, regarding Contractor's use of premises and work to be performed under
28 separate contracts.

29 C. Where installation of one part of the Work is dependent on installation of other components,
30 either before or after its own installation, schedule construction activities in the sequence
31 required to obtain the best results.

32 D. Where availability of space is limited, coordinate installation of different components to assure
33 maximum accessibility for required maintenance, service and repair.

34 E. Make adequate provisions to accommodate items scheduled for later installation by Contractor,
35 Owner, or other contractors.

36 F. Where necessary, prepare memoranda for distribution to each party involved outlining special
37 procedures required for coordination. Include such items as required notices, reports, and
38 attendance at meetings.

39 G. Utilize the Contract Documents and Owner accepted Submittals to check and coordinate the
40 Work so that no interferences or conflicts between trades occur. This checking and coordination

must be performed and completed before construction is commenced in each affected area and may require the preparation and submission of Coordination Drawings.

H. Requirements for coordination drawings are included in Section 01 32 23 – Coordination Drawings.

1.8 PRE-WORK VERIFICATION

A. Prior to starting a particular type or kind of Work:

1. Review all Contract Documents and other relevant data related to the type or kind of Work to be performed;
2. Check Owner accepted Submittals and verify dimensions at Project Site;
3. Review manufacturer's instructions applicable to conditions under which Work is to be installed;
4. Inspect areas, surfaces or construction receiving the Work.
5. Report to Owner in writing and concerns, issues, or problems observed during Contractor's Pre-Work verification.

B. Start of Work shall signify compliance with the above requirements and acceptance of previously placed construction or substrates as being in satisfactory condition to achieve proper installations and first quality workmanship as intended under these Contract Documents. Failure to so inspect and report to Owner shall constitute an acceptance of the previously placed construction or substrates.

1.9 ADMINISTRATIVE PROCEDURES:

A. Coordinate scheduling and timing of required administrative procedures with other construction activities, including those of other contracts, to avoid conflicts and ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's Construction Schedule.
2. Preparation of the Schedule of Values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Pre-installation conferences.
7. Project closeout activities.

B. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water and materials.

C. Salvage materials and equipment involved in performance of, but not actually incorporated in, the Work. Refer to other sections for disposition of salvaged materials that are designated as Owner's property.

1.10 SUBMITTALS:

A. Staff Names: Within fifteen (15) days of Notice to Proceed, submit a list of the Contractor's principal staff assignments, including the Superintendent and other personnel in attendance at the Project site; identify individuals, their duties and responsibilities; list their addresses and

telephone numbers, including home and office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.

1. Post copies of the list in the Project meeting room, the temporary field office, and each temporary telephone.

1.11 PROJECT MANAGEMENT CONTROLS SYSTEM

A. Construction Manager will host the Project Management Controls System for purposes of hosting and managing project communication and documentation until Final Completion. The Project Management Controls System will consist of Prolog Converge and SharePoint. The Contractor will utilize the Website interface to connect and communicate with the CM's program. The Contractor will cooperate and provide assistance with the use of the PMCS. The CM will provide at least one PMCS Website training session. The administrative and procedural requirements for documenting the progress of construction during performance of the Work using the PMCS shall include, but not be limited to, the following:

1. Project directory.
2. Project correspondence.
3. Meeting minutes
4. Contract modifications forms and logs.
5. Requests for Interpretation / Information (RFI) forms and logs.
6. Schedule and calendar management.
7. Submittal register, packages, forms and logs.
8. Daily Construction Reports.
9. Payment Applications.
10. Document management.
11. Issues List.
12. Drawings and Specifications document hosting, viewing.
13. Punch List.
14. Inspection Requests, reports.
15. Cost Control.

B. Contractor to pay for usage cost for each of its employees and subcontractors that need access to the system. Cost is \$60 per month per person having access. Contractor shall also pay for service for Owner Team (Owner, Construction Manager, Architect, Inspector, etc., assume 10 Owner Team licenses).

PART 2 - PRODUCTS (not used)

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION PROVISIONS:

A. Inspection of Conditions: Require the Installer of each major component to inspect both the substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.

- 1 B. Manufacturer's Instructions: Comply with the manufacturer's installation instructions and
2 recommendations, to the extent that these instructions and recommendations are more explicit
3 or more stringent than requirements contained in Contract Documents.
- 4 C. Verify characteristics of interrelated assemblies and equipment for compatibility. Coordinate
5 Work having independent responsibilities for installation connection, or servicing access.
- 6 D. Inspect materials or equipment immediately upon delivery and again prior to installation. Reject
7 damaged and defective items.
- 8 E. Provide attachment and connection devices and methods necessary for securing work. Secure
9 work true to line and level. Allow for expansion and building movement.
- 10 F. Visual Effects: Provide uniform joint width in exposed Work. Arrange joints in exposed Work to
11 obtain the best visual effect. Refer questionable choices to the Construction Manager for final
12 decision.
- 13 G. Recheck measurements and dimensions, before starting each installation.
- 14 H. Install each component during weather conditions and Project status that will ensure the best
15 possible results. Isolate each part of the completed construction from incompatible material as
16 necessary to prevent deterioration.
- 17 I. Coordinate temporary enclosures with required inspections and tests, to minimize the necessity
18 of uncovering completed construction for that purpose.
- 19 J. Mounting Heights: Where mounting heights are not indicated, install individual components at
20 standard mounting heights recognized within the industry for the particular application indicated.
21 Refer questionable mounting height decisions to the Architect for final decision.
22
- 23 3.2 CLEANING AND PROTECTION:
- 24 A. A. During handling and installation, clean and protect construction in progress and adjoining
25 materials in place. Apply protective covering where required to ensure protection from damage
26 or deterioration prior to Final Acceptance.
- 27 B. Clean and maintain completed construction as frequently as necessary through the remainder
28 of the construction period. Adjust and lubricate operable components to ensure operability
29 without damaging effects.
- 30 C. Limiting Exposures: Supervise construction activities to ensure that no part of the construction,
31 completed or in progress, is subject to harmful, dangerous, damaging or otherwise deleterious
32 exposure during the construction period.
- 33 D. Execute periodic cleaning to keep Work, Site and adjacent properties free from accumulations
34 of waste materials, rubbish and windblown debris, resulting from construction operations. Leave
35 the work "broom clean".
- 36 E. Provide onsite containers for collection of waste materials, debris and rubbish.
- 37 F. Remove waste materials, debris and rubbish from site periodically and as often as necessary to
38 maintain an orderly construction site, and dispose of at legal disposal areas away from site.

- 1 G. Do not allow trash containers to overflow.
- 2 H. Clean interior spaces prior to start of finish painting and continue cleaning on as-needed basis
- 3 until painting is finished.
- 4 I. Schedule operations so that dust and other contaminants resulting from cleaning process will
- 5 not fall on wet or newly coated surfaces.
- 6 END OF SECTION 01 31 13

1 SECTION 01 31 19 – PROJECT MEETINGS

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and other Division 01 Specification Sections, apply to this Section.

6 1.2 RELATED DOCUMENTS

- 7 A. Drawings and general provisions of the Contract, including General Conditions and
8 Supplemental General Conditions and other Division 01 General Requirements, apply to this
9 Section.

10 1.3 PRECONSTRUCTION CONFERENCES

- 11 A. Prior to commencement of work, a pre-construction conference will be held to discuss
12 procedures to be followed during the progress of the Work. The meeting will be scheduled after
13 execution of the agreement and prior to commencement of work.

- 14 B. Location: To be determined by Construction Manager.

- 15 C. Attending shall be:

- 16
17 1. Inspector of Record
18 2. Architect and his/her professional consultants, as needed
19 3. Contractor
20 4. Contractor's Superintendent
21 5. Major subcontractors
22 6. Owner Representatives
23 7. Others as appropriate

- 24 D. Agenda: Following is suggested agenda. Actual agenda will be prepared and distributed by
25 Construction Manager prior to meeting:
26

- 27 1. Introductions.
28 2. Distribution and discussion of:
29 a. List of major subcontractors and suppliers.
30 b. Projected Construction Schedules.
31 3. Critical work sequencing and reiteration of contract obligation toward meeting milestones.
32 4. Major equipment deliveries and priorities.
33 5. Project Coordination.
34 6. Designation of responsible personnel.
35 7. Procedures and processing of:
36 a. Correspondence.

- 1 b. Submittals.
- 2 c. Field Orders and clarifications.
- 3 d. Proposal requests and quotations.
- 4 e. Change Orders and Work Authorizations.
- 5 f. Applications for Payment.
- 6 g. Requests for Information.

- 7 8. Procedures for maintaining Record Documents
- 8 9. Use of premises:

- 9 a. Office, work and storage areas.
- 10 b. Owner requirements.

- 11 10. Construction facilities.
- 12 11. Temporary utilities.
- 13 12. Security considerations.
- 14 13. Housekeeping and clean-up procedures.
- 15 14. Insurance requirements.
- 16 15. Wage and hour compliance.
- 17 16. Noise and dust control.
- 18 17. Testing and Inspection.
- 19 18. Survey control.
- 20 19. Other Subjects as appropriate.

21 1.4 PROGRESS MEETINGS

22

23 A. The Construction Manager will schedule and hold meetings weekly. Construction Manager will

24 prepare Agenda for such meetings and distribute to the interested parties at the next successive

25 meeting.

26 B. Location: Contractor's field office or other acceptable location. Time and location of the meeting

27 will be determined during the Pre-construction Conference.

28 C. Attending shall be:

- 29 1. Inspector of Record
- 30 2. Contractor
- 31 3. Contractor's Superintendent
- 32 4. Subcontractors, as appropriate to the Agenda
- 33 5. Suppliers, as appropriate to the Agenda
- 34 6. Owner, as needed
- 35 7. User Department representatives as needed
- 36 8. Architect, and his/her professional consultants as needed
- 37 9. Others, as appropriate to the Agenda

38 D. Agenda: Review and correct or approve minutes of the previous progress meeting. Review

39 other items of significance that could affect progress. Include topics for discussion as

40 appropriate to the current status of the Project.

- 41 1. Contractor's Construction Schedule: Review progress since the last meeting. Determine
- 42 where each activity is in relation to the Contractor's Construction Schedule, whether on
- 43 time or ahead or behind schedule.

- 1 a. Determine how construction behind schedule will be expedited; secure
2 commitments from parties involved to do so. Discuss whether schedule revisions
3 are required to ensure that current and subsequent activities will be completed
4 within the Contract Time.
- 5 2. Review the present and future needs of each entity present, including such items as:
 - 6 a. Interface requirements
 - 7 b. Time
 - 8 c. Sequences
 - 9 d. Deliveries
 - 10 e. Off-site fabrication problems
 - 11 f. Access
 - 12 g. Site utilization
 - 13 h. Temporary facilities and services
 - 14 i. Hours of work
 - 15 j. Hazards and risks (Contractor's Responsibility)
 - 16 k. Housekeeping
 - 17 l. Quality and work standards
 - 18 m. Change Orders
 - 19 n. Documentation of information for payment requests
 - 20 o. RFI's
 - 21 p. Submittals
 - 22 q. Correction Notices
 - 23 r. Disputed items
- 24 3. Reporting: No later than each successive meeting, Construction Manager will distribute
25 copies of minutes of the meeting to each party present. Included will be a brief summary,
26 in narrative form, of progress since the previous meeting and report.
- 27 4. Schedule Updating: Contractor to revise the construction schedule after each progress
28 meeting where revisions to the schedule have been made or recognized. Issue the
29 revised schedule concurrently with the report of each meeting.

30 1.5 QUALITY ASSURANCE / QUALITY CONTROL MEETINGS
31

- 32 A. The Construction Manager will schedule and hold meetings weekly. Construction Manager will
33 prepare Agenda for such meetings and distribute to the interested parties at the next successive
34 meeting.
- 35 B. Location: Contractor's field office or other acceptable location. Time and location of the meeting
36 will be determined during the Pre-construction Conference.
- 37 C. Attending shall be:
 - 38 1. Inspector of Record
 - 39 2. Quality Control Manager
 - 40 3. Contractor
 - 41 4. Contractor's Superintendent
 - 42 5. Subcontractors, as appropriate to the Agenda
 - 43 6. Owner, as needed
 - 44 7. Architect, and his/her professional consultants as needed
 - 45 8. Inspector of Record

9. Others, as appropriate to the Agenda

D. Agenda: Review deficiencies in construction work and set deadlines to complete the deficient work. Deficiencies to be reviewed will have been noted by the Inspector of Record, Testing Laboratory, Construction Manager, Contractor and its subcontractors. Progress will be tracked by the Construction Manager and reviewed weekly by all parties.

1. Reporting: No later than each successive meeting, Construction Manager will distribute copies of minutes of the meeting to each party present. Included will be a brief summary, in narrative form, of progress of each deficient item since the previous meeting and report.

2. Deficiency Corrections: In addition to the other requirements of the contractor's contract with the County of Fresno for this Project, contractor will make every effort to have each deficiency expedited in a manner that will not delay the Work. If the contractor fails to complete the deficiencies in a timely manner that results in delays to the Project Schedule, contractor shall fully bear the time and cost impacts of such actions.

1.6 PROGRESS PAYMENT MEETINGS

A. Schedule and hold a billing meeting each month prior to submittal of Application for Payment. Billing meetings shall coincide with last of month progress meeting, whenever possible.

B. Location: Contractor's field office or other acceptable location.

C. Attending shall be:

1. Inspector of Record
2. Construction Manager
3. Architect, as needed
4. Contractor
5. Owner, as needed

D. Prepare an itemized draft of the month's proposed billing for review with the Construction Manager, Architect and Owner at the billing meeting. Refer to Section 01 29 00 – Payment Procedures, for further requirements.

E. Following review of the proposed billing, revise as required, prepare Application for Payment, and submit to the CM. The CM will certify and forward it to the Owner, who will authorize payment upon receipt of partial waivers of lien from the Contractor and all Subcontractors for previous payment.

1.7 PRE-INSTALLATION CONFERENCES

A. Contractor shall convene a pre-installation conference for items of work contained in each division of the specifications, each trade within the division, and each subcontractor within the division.

1. Contractor shall convene a pre-installation conference prior to commencing the Work of the section, trade or subcontractor.
2. Contractor shall require attendance of each subcontractor and each trade directly affecting or affected by the Work within the division.

3. Construction Manager, Inspector of Record, Architect and Owner may attend pre-installation conferences.
4. Contractor shall convene additional conferences when required by individual section of the specification.
5. Contractor shall prepare an agenda, preside over the conference, and record minutes, and distribute copies within two (2) days after the conference to participants, with three (3) copies to the Construction Manager.
6. At a minimum, Contractor shall review conditions of installation, coordination, preparation, approved submittals, contract documents, schedule, testing and inspection, and means and methods planned to be used to perform the work.
7. Within forty-five (45) days after Notice to Proceed, submit a proposed list of pre-installation conferences, the approximate dates of the conferences, and items of work to be covered, for approval by the CM. Provide the CM with the actual date, time, and location of each conference at least one (1) week in advance of each conference.

1.8 GUARANTEE/WARRANTIES, BONDS, AND SERVICE AND MAINTENANCE CONTRACTS
REVIEW MEETING

- A. Eleven (11) months following date of Notice of Completion, hold a meeting for the purpose of review of guarantees/warranties, bonds, and service and maintenance contracts for materials and equipment. Take action as appropriate to implement repair or replacement of defective items, and to extend service and maintenance contracts.
- B. Attending shall be:
 1. Construction Manager
 2. Architect
 3. Owner's and Architect's Consultants, as appropriate
 4. Contractor
 5. Subcontractors, as appropriate to the Agenda
 6. Suppliers, as appropriate to the Agenda
 7. Others, as appropriate to the Agenda
 8. Owner

PART 2 - PRODUCTS (not used)

EXECUTION (not used)

END OF SECTION 01 31 19

1 SECTION 01 32 00 - CONSTRUCTION PROGRESS DOCUMENTATION

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and other Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY

- 7 A. Section includes administrative and procedural requirements for documenting the progress of
8 construction during performance of the Work, including the following:

- 9 1. Startup construction schedule.
10 2. Contractor's construction schedule.
11 3. Construction schedule updating reports.
12 4. Daily construction reports.
13 5. Material location reports.
14 6. Site condition reports.
15 7. Special reports.

- 16 B. Related Requirements:

- 17 1. Section 01 10 00 "Summary" for Sequence of Construction Events
18 2. Section 01 33 00 "Submittal Procedures" for submitting schedules and reports.
19 3. Section 01 40 00 "Quality Requirements" for submitting a schedule of tests and
20 inspections.
21 4. Section 01 31 00 "Project Management and Coordination" for submitting and distributing
22 meetings and conference minutes.
23 5. Section 01 32 33 "Photographic Documentation" for submitting construction photos.

24 1.3 DEFINITIONS

- 25 A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring,
26 and controlling the construction project. Activities included in a construction schedule consume
27 time and resources.

- 28 1. Critical Activity: An activity on the critical path that must start and finish on the planned
29 early start and finish times.
30 2. Predecessor Activity: An activity that precedes another activity in the network.
31 3. Successor Activity: An activity that follows another activity in the network.

- 32 B. CPM: Critical path method, which is a method of planning and scheduling a construction project
33 where activities are arranged based on activity relationships. Network calculations determine
34 when activities can be performed and the critical path of Project.

- 35 C. Critical Path: The longest connected chain of interdependent activities through the network
36 schedule that establishes the minimum overall Project duration and contains no float.

- 1 D. Event: The starting or ending point of an activity.
- 2 E. Float: The measure of leeway in starting and completing an activity.
- 3 1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a
4 jointly owned, expiring Project resource available to both parties as needed to meet
5 schedule milestones and Contract completion date.
- 6 2. Free float is the amount of time an activity can be delayed without adversely affecting the
7 early start of the successor activity.
- 8 3. Total float is the measure of leeway in starting or completing an activity without adversely
9 affecting the planned Project completion date.
- 10 F. Resource Loading: The allocation of manpower and equipment necessary for the completion of
11 an activity as scheduled.

12 1.4 INFORMATIONAL SUBMITTALS

- 13 A. Format for Submittals: Submit required submittals in the following format:
- 14 1. Working electronic copy of schedule file, where indicated.
15 2. PDF electronic file.
16 3. Two paper copies.
- 17 B. Startup Network Diagram: Of size required to display entire network for entire construction
18 period. Show logic ties for activities.
- 19 C. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule
20 for entire construction period.
- 21 1. Submit a working electronic copy of schedule, using software indicated, and labeled to
22 comply with requirements for submittals. Include type of schedule (initial or updated) and
23 date on label.
- 24 D. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for
25 each activity in reports shall contain activity number, activity description, cost and resource
26 loading, original duration, remaining duration, early start date, early finish date, late start date,
27 late finish date, and total float in calendar days.
- 28 1. Activity Report: List of all activities sorted by activity number and then early start date, or
29 actual start date if known.
- 30 2. Logic Report: List of preceding and succeeding activities for all activities, sorted in
31 ascending order by activity number and then early start date, or actual start date if
32 known.
- 33 3. Total Float Report: List of all activities sorted in ascending order of total float.
- 34 4. Earnings Report: Compilation of Contractor's total earnings from the Notice to Proceed
35 until most recent Application for Payment.
- 36 E. Construction Schedule Updating Reports: Submit with Applications for Payment.
- 37 F. Daily Construction Reports: Submit at weekly intervals.
- 38 G. Material Location Reports: Submit at monthly intervals.
- 39 H. Site Condition Reports: Submit at time of discovery of differing conditions.

I. Special Reports: Submit at time of unusual event.

J. Qualification Data: For scheduling consultant.

1.5 QUALITY ASSURANCE

A. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams within 24 hours of Construction Manager's request.

B. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Section 01 31 00 "Project Management and Coordination." Review methods and procedures related to the preliminary construction schedule and Contractor's construction schedule, including, but not limited to, the following:

1. Review software limitations and content and format for reports.
2. Verify availability of qualified personnel needed to develop and update schedule.
3. Discuss constraints, including phasing, work stages, area separations, interim milestones, and partial Owner occupancy.
4. Review delivery dates for Owner-furnished products.
5. Review schedule for work of Owner's separate contracts.
6. Review submittal requirements and procedures.
7. Review time required for review of submittals and resubmittals.
8. Review requirements for tests and inspections by independent testing and inspecting agencies.
9. Review time required for Project closeout and Owner startup procedures, including commissioning activities.
10. Review and finalize list of construction activities to be included in schedule.
11. Review procedures for updating schedule.

1.6 COORDINATION

A. Coordinate Contractor's construction schedule with the schedule of values, submittal schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from entities involved.
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of final completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

B. Activities: Treat each story or separate area as a separate numbered activity for each main element of the Work. Comply with the following:

1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Construction Manager/Architect.
2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
3. Submittal Review Time: Include review and resubmittal times indicated in Section 01 33 00 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
4. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
5. Project Completion: Indicate completion in advance of date established for Project Completion, and allow time for Architect's administrative procedures necessary for certification of Project Completion.
6. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.

C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.

1. Phasing: Arrange list of activities on schedule by phase.
2. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
3. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Section 01 10 00 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
4. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Section 01 10 00 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
5. Work Restrictions: Show the effect of the following items on the schedule.
 - a. Coordination with existing construction.
 - b. Limitations of continued occupancies.
 - c. Uninterruptible services.
 - d. Partial occupancy before Project Completion.
 - e. Use of premises restrictions.
 - f. Provisions for future construction.
 - g. Seasonal variations.
 - h. Environmental control.
6. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
 - a. Subcontract awards.
 - b. Submittals.
 - c. Purchases.
 - d. Mock-ups.
 - e. Fabrication.
 - f. Sample testing.
 - g. Deliveries.
 - h. Installation.
 - i. Tests and inspections.
 - j. Adjusting.
 - k. Curing.

1. Building flush-out.
 - m. Startup and placement into final use and operation.
7. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
- a. Structural completion.
 - b. Temporary enclosure and space conditioning.
 - c. Permanent space enclosure.
 - d. Completion of mechanical installation.
 - e. Completion of electrical installation.
 - f. Project Completion.
 - g. Insert a list of major areas here if specific scheduling is required. List might include nonbuilding work, such as roads, parking, landscape development, and similar work.
- D.
1. Start date in Master Schedule are for planning purposes. Contractor shall utilize the Notice to Proceed date as the start date and use the durations within the Master Schedule. Any changes to the durations must be approved by the Owner prior to the Contractor's Construction Schedule being accepted.
 2. Contractor must ensure that the durations for start-up, TAB, commissioning, punchlist and correction, final cleaning and turnover are accurately accounted for in the Contractor's Construction Schedule and not rely solely on the Master Schedule.
 3. Contractor shall include a weather allowance for normal inclement weather days in the schedule of twenty (20) working days. The weather allowance shall be included as part of the total contract duration. Weather days can only be used when the activity affected by the inclement weather is on the critical path. No time extension will be allowed for normal inclement weather where totals are below the average rain reflected in the Western Regional Climate Center website for the Fresno, CA area. Extension of time due to weather delays is considered non-compensable.
- E. Cost Correlation: Superimpose a cost correlation timeline, indicating planned and actual costs. On the line, show planned and actual dollar volume of the Work performed as of planned and actual dates used for preparation of payment requests.
1. See Section 01 29 00 "Payment Procedures" for cost reporting and payment procedures.
- F. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
1. Unresolved issues.
 2. Unanswered Requests for Information.
 3. Rejected or unreturned submittals.
 4. Notations on returned submittals.
 5. Pending modifications affecting the Work and Contract Time.
- G. Recovery Schedule: When a periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.

- H. Computer Scheduling Software: Prepare schedules using the latest Primavera P6 scheduling software, release 8.3 or latest version release.

2.2 STARTUP CONSTRUCTION SCHEDULE

- A. Bar-Chart Schedule: Submit startup, horizontal, bar-chart-type construction schedule within seven days of date established for commencement of the Work.

- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

2.3 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's construction schedule within 30 days of date established for commencement of the Work. Base schedule on the startup construction schedule and additional information received since the start of Project.

- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.

1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.
2. Construction schedule shall have no more than 20% of activities that are critical.

- C. Other methods of construction scheduling may be used by the Contractor. Submit alternate methods for schedule tracking to the Construction Manager for approval prior to implementation.

2.4 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:

1. List of subcontractors at Project site.
2. List of separate contractors at Project site.
3. Approximate count of personnel at Project site.
4. Equipment at Project site.
5. Material deliveries.
6. High and low temperatures and general weather conditions, including presence of rain or snow.
7. Accidents.
8. Meetings and significant decisions.
9. Unusual events (see special reports).
10. Stoppages, delays, shortages, and losses.
11. Meter readings and similar recordings.
12. Emergency procedures.
13. Orders and requests of authorities having jurisdiction.
14. Change Orders received and implemented.
15. Construction Change Directives received and implemented.

- 1 16. Services connected and disconnected.
- 2 17. Equipment or system tests and startups.
- 3 18. Partial completions and occupancies.
- 4 19. Notice of Project Completions authorized.

5 B. Material Location Reports: At monthly intervals, prepare and submit a comprehensive list of
6 materials delivered to and stored at Project site. List shall be cumulative, showing materials
7 previously reported plus items recently delivered. Include with list a statement of progress on
8 and delivery dates for materials or items of equipment fabricated or stored away from Project
9 site. Indicate the following categories for stored materials:

- 10 1. Material stored prior to previous report and remaining in storage.
- 11 2. Material stored prior to previous report and since removed from storage and installed.
- 12 3. Material stored following previous report and remaining in storage.

13 C. Site Condition Reports: Immediately on discovery of a difference between site conditions and
14 the Contract Documents, prepare and submit a detailed report. Submit with a Request for
15 Information. Include a detailed description of the differing conditions, together with
16 recommendations for changing the Contract Documents.

17 2.5 SHORT INTERVAL SCHEDULE

18 A. Short interval scheduling (SIS) shall be used throughout onsite construction activities.

19 B. Develop and provide a SIS directly from the Contractor's Construction Schedule. SIS shall
20 contain sufficient detail to evaluate daily milestones and manpower/equipment loading and shall
21 cross reference and identify/tie into monthly updated schedule's tasks.

22 C. Interval shall be a 4 week duration, including prior week, week submitted and two weeks
23 thereafter.

24 D. SIS shall be submitted weekly 24 hours prior to the Weekly Progress Meetings where one of the
25 items of discussion will be the Contractor's schedule.

26 E. A separate Weekly Scheduling Meeting may be required beyond the Weekly Progress Meeting
27 to review in more detail the Contractor's Construction Schedule.

28 2.6 SPECIAL REPORTS

29 A. General: Submit special reports directly to Owner within one day of an occurrence. Distribute
30 copies of report to parties affected by the occurrence.

31 B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at
32 Project site, whether or not related directly to the Work, prepare and submit a special report. List
33 chain of events, persons participating, response by Contractor's personnel, evaluation of results
34 or effects, and similar pertinent information. Advise Owner in advance when these events are
35 known or predictable.

36 2.7 TIME EXTENSIONS

37 A. When a Proposed Change Order is issued, which has the potential to impact specified
38 completion dates, a CPM Network Fragment shall be prepared by Contractor to reflect impact of

such changes. After a Network Window has been accepted and Contractor authorized to proceed with proposed Change Order, it shall be incorporated into the Schedule. No additional cost beyond that provided in the General Conditions will be allowed for incorporation of approved proposed Change Orders into Schedule. In addition to provisions of the General Conditions and Supplementary Conditions, the time for completion of the work will be adjusted in accordance with these procedures:

1. Any request for an adjustment of the Contract Time for completion submitted by Contractor for changes or alleged delays shall be accompanied by a complete Time Impact Analysis, which shall be submitted by Contractor for review within twenty-one (21) calendar days after the request. Time extensions will not be granted unless substantiated by the CPM Schedule, and then not until the CPM project float becomes zero.
2. Each Time Impact Analysis shall provide information justifying the request and stating the extent of the adjustment requested for each specific change or alleged delay. Each Time Impact Analysis shall be in form and content acceptable to the CM, and shall include, but not be limited to, the following:
 - a. A fragmentary CPM type network (Fragment) illustrating how Contractor proposed to incorporate the change or alleged delay into the current updated Official Schedule.
 - b. Identification of activities in the current updated Contract Progress Schedule, which are proposed to be amended due to the change or alleged delay, together with engineering estimates and other appropriate data justifying the proposal.
3. The Time Impact Analysis shall be determined on the basis of the date or dates when the change or changes were issued, or the date or dates when the alleged delay or delays began. The status of the construction project and Time Impact Analysis shall include event time computations for all affected activities including but not limited to work around sequencing, or recovery options to maintain the original Contract completion date.
4. The CM may require that Time Impact Analyses be provided in order to demonstrate the time impact upon the overall project and the time for completion, at no additional cost to the County.
5. If the County finds after review of the Time Impact Analysis that Contractor is entitled to any extension of time for completion, the time for completion will be adjusted accordingly by the County, and Contractor shall then revise the Official Schedule accordingly.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Scheduling Consultant: Engage a consultant to provide planning, evaluation, and reporting using CPM scheduling.
 1. In-House Option: Owner may waive the requirement to retain a consultant if Contractor employs skilled personnel with experience in CPM scheduling and reporting techniques. Submit qualifications. Contractor will be required to provide backup to support experience of in-house personnel.
 2. Meetings: Scheduling consultant shall attend all meetings related to Project progress, alleged delays, and time impact.
- B. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting and prior to each monthly payment application.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
 3. As the Work progresses, indicate final completion percentage for each activity.
- C. Distribution: Distribute copies of approved schedule to Architect, Construction Manager, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
1. Post copies in Project meeting rooms and temporary field offices.
 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

3.2 PAYMENTS WITHHELD

- A. Progress payment may be withheld in whole or in part should Contractor fail to comply with requirements of this section.

END OF SECTION 01 32 00

1 SECTION 01 32 33 - PHOTOGRAPHIC DOCUMENTATION

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and other Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY

- 7 A. Section includes administrative and procedural requirements for the following:

- 8 1. Preconstruction photographs.
9 2. Preconstruction video recordings.

- 10 B. Related Requirements:

- 11 1. Section 01 33 00 "Submittal Procedures" for submitting photographic documentation.
12 2. Section 01 78 00 "Closeout Procedures" for submitting photographic documentation as
13 project record documents at Project closeout.
14 3. Section 02 41 19 "Selective Structure Demolition" for photographic documentation before
15 selective demolition operations commence.
16 4. Section 31 11 00 "Site Clearing" for photographic documentation before site clearing
17 operations commence.

18 1.3 INFORMATIONAL SUBMITTALS

- 19 A. Key Plan: Submit key plan of Project site and building with notation of vantage points marked
20 for location and direction of each photograph and video recording. Indicate elevation or story of
21 construction. Include same information as corresponding photographic documentation.

- 22 B. Digital Photographs: Submit image files within three days of taking photographs.

- 23 1. Digital Camera: Minimum sensor resolution of 8 megapixels.
24 2. Format: Minimum 3200 by 2400 pixels, in unaltered original files, with same aspect ratio
25 as the sensor, uncropped, date and time stamped, in folder named by date of
26 photograph, accompanied by key plan file.
27 3. Identification: Provide the following information with each image description in file
28 metadata tag:

- 29 a. Name of Project.
30 b. Name of Owner, Construction Manager, and Architect.
31 c. Name of Contractor.
32 d. Date photograph was taken.
33 e. Description of vantage point, indicating location, direction (by compass point), and
34 elevation or story of construction.
35 f. Unique sequential identifier keyed to accompanying key plan.

- 36 C. Video Recordings: Submit video recordings within seven days of recording.

1. Submit video recordings in digital video disc format acceptable to Owner.
2. Identification: With each submittal, provide the following information:
 - a. Name of Project.
 - b. Name of Owner, Construction Manager, and Architect.
 - c. Name of Contractor.
 - d. Date video recording was recorded.
 - e. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.

PART 2 - PRODUCTS

2.1 PHOTOGRAPHIC MEDIA

- A. Digital Images: Provide images in JPG format, produced by a digital camera with minimum sensor size of 8 megapixels, and at an image resolution of not less than 3200 by 2400 pixels.
- B. Digital Video Recordings: Provide high-resolution, digital video disc in format acceptable to Architect.

PART 3 - EXECUTION

3.1 CONSTRUCTION PHOTOGRAPHS

- A. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted. Coordinate with Construction Manager and Sheriff Representative to ensure no sensitive areas outside of the limits of construction are photographed.
 1. Maintain key plan with each set of construction photographs that identifies each photographic location.
- B. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
 1. Date and Time: Include date and time in file name for each image.
 2. Field Office Images: Maintain one set of images accessible in the field office at Project site, available at all times for reference. Identify images in the same manner as those submitted to Architect and Construction Manager.
- C. Preconstruction Photographs: Before starting construction, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points. Coordinate with Construction Manager and Sheriff Representative to ensure no sensitive areas outside of the limits of construction are photographed.
 1. Flag construction limits before taking construction photographs.
 2. Take a sufficient number of photographs to show existing conditions adjacent to property before starting the Work.
 3. Take a sufficient number of photographs of the existing building to accurately record physical conditions at start of construction.

4. Take additional photographs as required to record settlement or cracking of the existing structures, pavements, and improvements.

- D. Final Completion Construction Photographs: Take forty-eight (48) digital photographs after date of Project Completion for submission as Project Record Documents. Construction Manager will direct photographer for desired vantage points.

3.2 CONSTRUCTION VIDEO RECORDINGS

- A. Preconstruction Video Recording: Before starting construction, record video recording of Project site and surrounding properties from sufficiently different vantage points to completely record the state of the site and existing building in and around the construction area. Coordinate with Construction Manager and Sheriff Representative to ensure no sensitive areas outside of the limits of construction are videotaped.

1. Flag construction limits before recording construction video recordings.
2. Show existing conditions adjacent to Project site before starting the Work.
3. Show existing building on site to accurately record physical conditions at the start of construction.
4. Show protection efforts by Contractor.

- B. Periodic Construction Video Recordings: Record video recording monthly with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last video recordings were recorded.

1. Video shall sufficiently show how construction is affecting the existing structure and site, and the efforts of the Contractor to protect existing site and structures.
2. Minimum recording time shall be 15 minutes.

END OF SECTION 01 32 33

1 SECTION 01 33 00 - SUBMITTAL PROCEDURES

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and other Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY

- 7 A. Section includes requirements for the submittal schedule and administrative and procedural
8 requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

9 B. Related Requirements:

- 10 1. Section 01 29 00 "Payment Procedures" for submitting Applications for Payment and the
11 schedule of values.
12 2. Section 01 78 23 "Operation and Maintenance Data" for submitting operation and
13 maintenance manuals.
14 3. Section 01 78 39 "Project Record Documents" for submitting record Drawings, record
15 Specifications, and record Product Data.
16 4. Section 01 78 00 "Project Closeout" for submitting video recordings of demonstration of
17 equipment and training of Owner's personnel.
18 5. Section 01 31 00 "Project Management and Coordination" for utilizing Prolog Converge
19 web-based software.

20 1.3 DEFINITIONS

- 21 A. Action Submittals: Written and graphic information and physical samples that require Architect's
22 responsive action. Action submittals are those submittals indicated in individual Specification
23 Sections as "action submittals."

- 24 B. Informational Submittals: Written and graphic information and physical samples that do not
25 require Architect's responsive action. Submittals may be rejected for not complying with
26 requirements. Informational submittals are those submittals indicated in individual Specification
27 Sections as "informational submittals."

- 28 C. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from
29 another computer over a network and that serves as the basis for standard Internet protocols.
30 An FTP site is a portion of a network located outside of network firewalls within which internal
31 and external users are able to access files.

- 32 D. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems
33 used for representing documents in a device-independent and display resolution-independent
34 fixed-layout document format.

1.4 ACTION SUBMITTALS

- A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.
1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
 2. Initial Submittal: Submit concurrently with start-up construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
 3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.
 - a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.
 4. Format: Arrange the following information in a tabular format:
 - a. Scheduled date for first submittal.
 - b. Specification Section number and title.
 - c. Submittal category: Action; informational.
 - d. Name of subcontractor.
 - e. Description of the Work covered.
 - f. Scheduled date for Architect's final release or approval.
 - g. Scheduled date of fabrication.
 - h. Scheduled dates for purchasing.
 - i. Scheduled dates for installation.
 - j. Activity or event number.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Architect's Digital Data Files: Electronic digital data files of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals.
1. Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings and Project record drawings.
 - a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
 - b. Contractor shall execute a data licensing agreement in the form of AIA Document C106, Digital Data Licensing Agreement as provided by Architect.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.

3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

- a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow 15 days for review of each resubmittal.
4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.
5. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow 15 days for review of each submittal. Submittal will be returned through Architect, before being returned to Contractor.
6. The Contractor is herein made aware that deferred approval submittals, including but not limited to submittals requiring design review by the State's consultants and/or controlling agencies, such as the SFM or BSCC, will have minimum 16 weeks review periods. The Contractor shall appropriately include this time in their Project Schedule to avoid delays. Subsequent reviews may be required if initial submittal is not approved. Contractor shall schedule activities and approvals accordingly and no additional Contract Time will be given to Contractor as a result of such submittal and approval.

- D. Paper Submittals: Place a permanent label or title block on each submittal item for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
3. Include the following information for processing and recording action taken:

- a. Project name.
- b. Date.
- c. Name of Architect.
- d. Name of Construction Manager.
- e. Name of Contractor.
- f. Name of subcontractor.
- g. Name of supplier.
- h. Name of manufacturer.
- i. Submittal number or other unique identifier, including revision identifier.

- 1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).

- j. Number and title of appropriate Specification Section.
 - k. Drawing number and detail references, as appropriate.
 - l. Location(s) where product is to be installed, as appropriate.
 - m. Other necessary identification.
4. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
- a. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect.
5. Transmittal for Paper Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return without review submittals received from sources other than Contractor.
- a. Transmittal Form for Paper Submittals: Provide locations on form for the following information:
 - 1) Project name.
 - 2) Date.
 - 3) Destination (To:).
 - 4) Source (From:).
 - 5) Name and address of Architect.
 - 6) Name of Construction Manager.
 - 7) Name of Contractor.
 - 8) Name of firm or entity that prepared submittal.
 - 9) Names of subcontractor, manufacturer, and supplier.
 - 10) Category and type of submittal.
 - 11) Submittal purpose and description.
 - 12) Specification Section number and title.
 - 13) Specification paragraph number or drawing designation and generic name for each of multiple items.
 - 14) Drawing number and detail references, as appropriate.
 - 15) Indication of full or partial submittal.
 - 16) Transmittal number, numbered consecutively.
 - 17) Submittal and transmittal distribution record.
 - 18) Remarks.
 - 19) Signature of transmitter.
- E. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:
1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
 2. Name file with submittal number or other unique identifier, including revision identifier.
 - a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., WAJ-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., WAJ-061000.01.A).
 3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.

- 1 4. Transmittal Form for Electronic Submittals: Use electronic form acceptable to Owner,
2 containing the following information:
 - 3 a. Project name.
 - 4 b. Date.
 - 5 c. Name and address of Architect.
 - 6 d. Name of Construction Manager.
 - 7 e. Name of Contractor.
 - 8 f. Name of firm or entity that prepared submittal.
 - 9 g. Names of subcontractor, manufacturer, and supplier.
 - 10 h. Category and type of submittal.
 - 11 i. Submittal purpose and description.
 - 12 j. Specification Section number and title.
 - 13 k. Specification paragraph number or drawing designation and generic name for each
14 of multiple items.
 - 15 l. Drawing number and detail references, as appropriate.
 - 16 m. Location(s) where product is to be installed, as appropriate.
 - 17 n. Related physical samples submitted directly.
 - 18 o. Indication of full or partial submittal.
 - 19 p. Transmittal number, numbered consecutively.
 - 20 q. Submittal and transmittal distribution record.
 - 21 r. Other necessary identification.
 - 22 s. Remarks.
- 23 5. Metadata: Include the following information as keywords in the electronic submittal file
24 metadata:
 - 25 a. Project name.
 - 26 b. Number and title of appropriate Specification Section.
 - 27 c. Manufacturer name.
 - 28 d. Product name.
- 29 F. Options: Identify options requiring selection by Architect.
- 30 G. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's
31 letterhead, record relevant information, requests for data, revisions other than those requested
32 by Architect on previous submittals, and deviations from requirements in the Contract
33 Documents, including minor variations and limitations. Include same identification information as
34 related submittal.
- 35 H. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
 - 36 1. Note date and content of previous submittal.
 - 37 2. Note date and content of revision in label or title block and clearly indicate extent of
38 revision.
 - 39 3. Resubmit submittals until they are marked with approval notation from Architect's action
40 stamp.
- 41 I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers,
42 fabricators, installers, authorities having jurisdiction, and others as necessary for performance of
43 construction activities. Show distribution on transmittal forms.
- 44 J. Use for Construction: Retain complete copies of submittals on Project site. Use only final action
45 submittals that are marked with approval notation from Architect's action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

1. Submit electronic submittals via Prolog Converge as PDF electronic files.

a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.

2. Contractor will be required to print out two paper copies of all “approved” or “make corrections noted” submittals for use by the Architect and Inspector of Record and deliver copies within three business days to the CM for distribution.

3. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

a. Provide a digital signature with digital certificate on electronically submitted certificates and certifications where indicated.

b. Provide a notarized statement on original paper copy certificates and certifications where indicated.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.

2. Mark each copy of each submittal to show which products and options are applicable.

3. Include the following information, as applicable:

a. Manufacturer's catalog cuts.

b. Manufacturer's product specifications.

c. Standard color charts.

d. Statement of compliance with specified referenced standards.

e. Testing by recognized testing agency.

f. Application of testing agency labels and seals.

g. Notation of coordination requirements.

h. Availability and delivery time information.

4. For equipment, include the following in addition to the above, as applicable:

a. Wiring diagrams showing factory-installed wiring.

b. Printed performance curves.

c. Operational range diagrams.

d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.

5. Submit Product Data before or concurrent with Samples.

6. Submit Product Data in the following format.

a. PDF electronic file.

- b. Three paper copies of Product Data unless otherwise indicated. Architect will return two copies.
 - C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data, unless submittal based on Architect's digital data drawing files is otherwise permitted.
 1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Identification of products.
 - b. Schedules.
 - c. Compliance with specified standards.
 - d. Notation of coordination requirements.
 - e. Notation of dimensions established by field measurement.
 - f. Relationship and attachment to adjoining construction clearly indicated.
 - g. Seal and signature of professional engineer if specified.
 2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than 30 by 42 inches.
 3. Submit Shop Drawings in the following format:
 - a. PDF electronic file.
 - D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
 1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 2. Identification: Attach label on unexposed side of Samples that includes the following:
 - a. Generic description of Sample.
 - b. Product name and name of manufacturer.
 - c. Sample source.
 - d. Number and title of applicable Specification Section.
 - e. Specification paragraph number and generic name of each item.
 3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
 4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
 5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

- a. Number of Samples: Submit one full set of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Number of Samples: Submit three sets of Samples. Architect will retain two Sample sets; remainder will be returned.
 - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.
- E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
 1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
 2. Manufacturer and product name, and model number if applicable.
 3. Number and name of room or space.
 4. Location within room or space.
 5. Submit product schedule in the following format:
 - a. PDF electronic file.
 - b. Two paper copies of product schedule or list unless otherwise indicated. Architect will return one copy.
- F. Coordination Drawing Submittals: Comply with requirements specified in Section 01 31 00 "Project Management and Coordination."
- G. Contractor's Construction Schedule: Comply with requirements specified in Section 01 32 00 "Construction Progress Documentation."
- H. Application for Payment and Schedule of Values: Comply with requirements specified in Section 01 29 00 "Payment Procedures."
- I. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 01 40 00 "Quality Requirements."
- J. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 01 78 00 "Project Closeout"
- K. Maintenance Data: Comply with requirements specified in Section 01 78 23 "Operation and Maintenance Data."

- 1 L. Qualification Data: Prepare written information that demonstrates capabilities and experience of
2 firm or person. Include lists of completed projects with project names and addresses, contact
3 information of architects and owners, and other information specified.
- 4 M. Welding Certificates: Prepare written certification that welding procedures and personnel
5 comply with requirements in the Contract Documents. Submit record of Welding Procedure
6 Specification and Procedure Qualification Record on AWS forms. Include names of firms and
7 personnel certified.
- 8 N. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that
9 Installer complies with requirements in the Contract Documents and, where required, is
10 authorized by manufacturer for this specific Project.
- 11 O. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that
12 manufacturer complies with requirements in the Contract Documents. Include evidence of
13 manufacturing experience where required.
- 14 P. Product Certificates: Submit written statements on manufacturer's letterhead certifying that
15 product complies with requirements in the Contract Documents.
- 16 Q. Material Certificates: Submit written statements on manufacturer's letterhead certifying that
17 material complies with requirements in the Contract Documents.
- 18 R. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's
19 standard form, indicating and interpreting test results of material for compliance with
20 requirements in the Contract Documents.
- 21 S. Product Test Reports: Submit written reports indicating that current product produced by
22 manufacturer complies with requirements in the Contract Documents. Base reports on
23 evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or
24 on comprehensive tests performed by a qualified testing agency.
- 25 T. Research Reports: Submit written evidence, from a model code organization acceptable to
26 authorities having jurisdiction, that product complies with building code in effect for Project.
27 Include the following information:
 - 28 1. Name of evaluation organization.
 - 29 2. Date of evaluation.
 - 30 3. Time period when report is in effect.
 - 31 4. Product and manufacturers' names.
 - 32 5. Description of product.
 - 33 6. Test procedures and results.
 - 34 7. Limitations of use.
- 35 U. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing
36 agency's standard form, indicating and interpreting results of tests performed before installation
37 of product, for compliance with performance requirements in the Contract Documents.
- 38 V. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing
39 agency's standard form, indicating and interpreting results of compatibility tests performed
40 before installation of product. Include written recommendations for primers and substrate
41 preparation needed for adhesion.

W. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

X. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

2.2 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file and three paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.1 SUBMISSION REQUIREMENTS

A. Submit to the Construction Manager a submittal schedule of all submittals separate from the project schedule. Schedule submittal submissions at least three weeks before reviewed and accepted submittals (taking into consideration the possibility of re-submission) will be needed for the execution of the work.

B. Except as otherwise specified for substitutions in Section 01 25 00, General Conditions of the Contract for Construction, Clause 2.45, and for certain other items in this Section 01 33 00, make submissions no later than the number of days outlined below after the Start Date of the Work.

1. Items needed in initial stages of Work or requiring long lead-time for ordering: 45 calendar days.

2. Deferred Approval submittals, for review and approval by agencies such as State Fire Marshal, BSCC, etc.: 60 calendar days.

3. All other items: 90 calendar days.

- 1 3.2 CONTRACTOR'S REVIEW
- 2 A. Action and Informational Submittals: Review each submittal and check for coordination with
3 other Work of the Contract and for compliance with the Contract Documents. Note corrections
4 and field dimensions. Mark with approval stamp before submitting to Architect.
- 5 B. Project Closeout and Maintenance Material Submittals: See requirements in Section 01 78 00
6 "Project Closeout."
- 7 C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name
8 and location, submittal number, Specification Section title and number, name of reviewer, date
9 of Contractor's approval, and statement certifying that submittal has been reviewed, checked,
10 and approved for compliance with the Contract Documents.
- 11 3.3 ARCHITECT'S ACTION
- 12 A. Action Submittals: Architect will review each submittal, make marks to indicate corrections or
13 revisions required, and return it. Architect will stamp each submittal with an action stamp and
14 will mark stamp appropriately to indicate action.
- 15 B. Informational Submittals: Architect will review each submittal and will not return it, or will return it
16 if it does not comply with requirements. Architect will forward each submittal to appropriate
17 party.
- 18 C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial
19 submittals has received prior approval from Architect.
- 20 D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned
21 for resubmittal without review.
- 22 E. Submittals not required by the Contract Documents may be returned by the Architect without
23 action.
- 24 END OF SECTION 01 33 00

1 SECTION 01 33 33 - ELECTRONIC DRAWINGS

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and other Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY
7

- 8 A. The Architect-Engineer, if requested, will provide the Contractor with one (1) electronic copy of
9 the BIM Models for distribution to subcontractors and suppliers. The electronic copy will be
10 provided in Revit 2015 format. Fee for the electronic copy shall be in accordance with
11 Paragraph B. below.
12
13 1. The Architect's BIM model will be provided in an "as-is" condition (see attachment of
14 indicated level of model development at the end of this section) and the Contractor may
15 use the model at their discretion, and shall assume all responsibility for its use.
16 2. The model shall be provided to the Contractor as a convenience and shall not be
17 construed to take precedent over the Construction Documents. The contractor shall be
18 responsible to follow the Construction Documents and not make decisions based on the
19 model provided. If information is not contained within the construction documents then
20 the required additional information shall be obtained from the Architect.
21 3. The models provided shall include all views and sheets that were created within the Revit
22 software at the conclusion of design. Some drawing sheets may have been created in
23 AutoCAD and therefore may not be included in the Revit model.
24 4. Models will only be provided for the Architectural, Structural, Mechanical, Electrical and
25 any other major specialty item provided in the drawings such as food service equipment.
26 Civil will not provide any models other than information to create a topo surface or a
27 model of the topo surface.
28 5. Models provided to LOD 300 are design models and are not construction models. They
29 are not intended to show methods and means of construction. They show specific
30 desired location of elements and general representation of the arrangement of elements.
31 It shall be the sole responsibility of the contractor to arrange the final position of all model
32 elements to conform to all Construction Documents and Specifications as well as
33 coordination of all model elements.
34 B. The Architect-Engineer, if requested, will provide the Contractor with one (1) electronic copy of
35 the Contract Document Drawings for distribution to subcontractors and suppliers. The electronic
36 copy will be provided in AutoCAD format.

37 1.3 REFERENCES

- 38 A. A copy of the DLR Digital Licensing Agreement is included at the end of this Section.

39 END OF SECTION 01 33 33
40



DLR Group

Architecture Engineering Planning Interiors

AGREEMENT FOR TRANSFER OF DIGITAL MODEL FILES

Name of Project: FRESNO COUNTY - WEST ANNEX JAIL

Project No: 75-15208-00

This Agreement governs the transfer and use of the enclosed files in digital form (the "DIGITAL MODEL FILES"), by and between DLR Group, Inc. known as the "Architect" and Fresno County Public Works known as the "Owner" of the above referenced Project, and _____ known as the "General Contractor" listed below for the above referenced Project. All rights not expressly granted herein are reserved to and for DLR GROUP. Consultants under a fully executed written contract with DLR GROUP for the above-referenced project are excepted from this transfer agreement.

Whereas Owner of the Project, has requested that DLR GROUP, make copies of DIGITAL MODEL FILES to make available to the General Contractor exclusively for purposes of maintaining a project Building Information Model for determining clash detection of building systems and components, the quantity of components, calculating the surface area or volumes of materials or assemblies necessary for the completion of the project, optimum construction sequencing, material logistics, and construction equipment placement (the "Reference Uses"); and

Whereas, the DIGITAL MODEL FILES were developed by DLR GROUP for use in preparation of two-dimensional construction documents for the above-referenced Project; and

Whereas, The General Contractor of the Project understands and acknowledges that the DIGITAL MODEL FILES were not created or intended for use directly as construction documentation by Owner of the Project or third parties, and after the DIGITAL MODEL FILES are provided they can become digitally modified or corrupted without detection, can be modified without DLR GROUP's knowledge, may not be readable by Owner of the Project or by third parties due to file format incompatibilities, and the original DIGITAL MODEL FILES may be modified by DLR GROUP after the DIGITAL MODEL FILES are transferred pursuant to the protocol described in this Agreement, any of which circumstance could cause damage or loss to Owner of the Project; and whereas, General Contractor of the Project understands and acknowledges that these risks are inherent with any use of the DIGITAL MODEL FILES and that use of the DIGITAL MODEL FILES will save the Owner of the Project considerable time and expense in the coordination and management of the Project, which represents good and valuable consideration for the following indemnification and release;

Therefore, in consideration of DLR GROUP, under this Agreement, to transfer the DIGITAL MODEL FILES to the General Contractor of the Project exclusively for Reference Uses, The General Contractor of the Project understands and acknowledges that the DIGITAL MODEL FILES will continue to be modified and refined during the design process and the transferred DIGITAL MODEL FILES only represent a transitory state in that evolution. Not all documents are developed in BIM (Electrical), nor to a complete LOD of 300. Owner of the Project understands and acknowledges that the DIGITAL MODEL FILES developed by the DLR GROUP and Consultants have been created for the purposes of developing and communicating the design intent of the project. Therefore, DLR GROUP make no warrantee, express or implied, that the DIGITAL MODEL FILES contain all architectural elements that may have an impact on the Referenced Uses nor that the DIGITAL MODEL FILES are absolutely coordinated with the two-

dimensional construction documents. In the event of conflicts between the two-dimensional contract documents and the DIGITAL MODEL FILES, the contract documents take precedence.

The DIGITAL MODEL FILES have been prepared in accordance with the standard of care in the industry for similar projects under similar circumstances. While the DIGITAL MODEL FILES can be used to detect potential conflicts between elements, they may not accurately reflect all quantities, surface areas, and volumes, and may not accurately or completely describe all architectural elements that may have an impact on the Referenced Uses in the actual construction of the project.

The General Contractor of Project agrees that unless agreed to in other transfer agreements, the Digital Model Files will NOT be used for permitting, regulatory approval, construction purposes, submittal preparation, for modification or reuse on the Project, use for additions to the Project, use for completion of the Project by others, or use for other projects, hereinafter called "Drawing Uses". Where used as the basis for "As-built" information, it is understood that the development of the model for this purpose is solely the General Contractor's responsibility. The use of the model provided by DLR Group is covered under the acknowledgement below.

Based on the foregoing, THE GENERAL CONTRACTOR OF THE PROJECT AGREES, JOINTLY AND SEVERALLY, TO RELEASE, INDEMNIFY, AND DEFEND DLR GROUP AND CONSULTANTS, THEIR RESPECTIVE OFFICERS, SHAREHOLDERS, AND EMPLOYEES, COLLECTIVELY CALLED "INDEMNITEES, FROM ANY AND ALL CLAIMS, DEMANDS, SUITS, LIABILITIES, LOSSES, DAMAGES, AND COSTS, INCLUDING BUT NOT LIMITED TO ATTORNEYS' FEES, EXPERT WITNESS FEES, AND COURT COSTS ARISING OUT OF OR IN ANY WAY CONNECTED WITH ANY USE OR DRAWING USES OF THE DIGITAL MODEL FILES PROVIDED BY DLR GROUP AND/OR CONSULTANTS PURSUANT TO THIS AGREEMENT.

THE GENERAL CONTRACTOR OF THE PROJECT ACKNOWLEDGES THAT THE TRANSFER OF DIGITAL MODEL FILES IS A SERVICE AND SHALL NOT CONSTITUTE A SALE OF GOODS; AND, DLR GROUP MAKES NO WARRANTY, EXPRESS OR IMPLIED, OF MERCHANTABILITY OR FITNESS FOR ANY PURPOSE IN CONNECTION WITH THE SERVICE OF PROVIDING ACCESS TO, AND THE TRANSFER OF, THE DIGITAL MODEL FILES, OR THAT THE DIGITAL MODEL FILES WILL BE USABLE OR ACCURATE, WHICH WARRANTIES AND REPRESENTATIONS ARE EXPRESSLY DISCLAIMED.

THE GENERAL CONTRACTOR OF THE PROJECT AS NOTED BELOW AGREES TO THE TERMS AND CONDITIONS OF ACCESS TO AND USE OF, THE DIGITAL MODEL FILES UNDER THIS AGREEMENT.

GENERAL CONTRACTOR: _____

Address: _____

Authorized Representative: _____

Signature: _____ DATE: _____

Notary Public: _____ DATE: _____

1 SECTION 01 35 13.16 – SPECIAL PROJECT PROCEDURES FOR DETENTION FACILITIES

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and Division 1 Specification Sections, apply to this Section.

6 B. Limits and scope of work under the Detention Equipment Contractor (DEC) Section shall be
7 defined in these specifications and correspondingly shown on the drawings.

8 C. Provide materials, labor, equipment and services necessary to furnish, deliver and install a
9 completely functional integrated system.

10 D. All equipment and work shall comply with all applicable codes.

11 1.2 SUMMARY

12 A. This Section includes the responsibilities for a single-source Detention Equipment Contractor
13 (DEC) for detention work.

14 1. The DEC shall submit an aggregate bid for Work described in the following specification
15 sections. The details and specific Scope of Work related to the installation of the
16 equipment in sections 09 57 53, 12 55 00 and 13 50 00, shall be defined between the
17 DEC and General Contractor at the time of Bid. The DEC shall be responsible for
18 performing the coordination required between detention equipment and the security
19 electronic systems, hollow metal wall panels, as well as the Electrical work as it relates to
20 security hardware.

21 a. Detention Equipment Work required by, but not specified in, this Section includes
22 the following:

- 23 1) Section 08 34 63, Detention Doors and Frames including Sidelites and
24 interior Security Windows
25 2) Section 08 71 63, Detention Door Hardware
26 3) Section 08 88 53, Security Glazing
27 4) Section 09 57 53, Security Ceiling Assemblies
28 5) Section 12 55 00, Detention Furniture
29 6) Section 13 50 00, Modular Metal Detention Wall Panel System

30 2. Approved DEC firms must base their bid on the equipment and products specified herein.
31 Design changes or substitutions will not be allowed unless approved prior to bidding.
32 Value engineering proposals will not be considered.

33 3. The DEC shall have in their employ a full time project manager and superintendent to
34 supervise the work of this section. The superintendent's sole responsibility shall be to
35 supervise and coordinate the scope of work of the DEC. The superintendent shall be at
36 the site at all times when the work is being performed.

37 4. If any portion of the work listed in paragraph 1.2.A.1.a above is subcontracted, the
38 responsibility for equipment and system coordination remains with the DEC.

5. The DEC shall be fully responsible for review and coordination of detention devices with the security electronic drawings and specifications. The DEC shall notify the Architect / Consultant if any modifications are required prior to hardware or device installation.
6. The DEC shall be fully responsible for acquiring and paying for any and all licenses and permits required to perform their Work. If licenses are required before bidding, then the DEC shall not bid any portion of the Work until the required licenses are obtained.

B. Related Work:

1. Division 03 Section 03 30 00 "Cast-In-Place Concrete" for concrete requirements for floors.
2. Division 03 Section 03 45 00 "Pre-Cast Architectural Concrete" for precast concrete wall panel requirements.
3. Division 04 Section 04 20 00 "Unit Masonry."
4. Division 05 Section 05 50 00 "Metal Fabrications" for embeds and anchor bolt requirements.
5. Division 07 Section 07 92 00 "Joint Sealants" for security sealants.
6. Division 08 Section 08 11 13 "Hollow Metal Doors and Frames."
7. Division 08 Section 08 31 13 "Access Doors and Frames" for requirements for security access doors installed in walls.
8. Division 09 Section 09 96 01 "High Performance Coatings."
9. Division 09 Section 09 96 03 "Special Coatings" for painting requirements.
10. Division 10 Section 10 28 13.63 "Detention Toilet Accessories."
11. Division 22 Section 22 04 00 "Security Plumbing Fixtures."
12. Division 26 for electrical requirements.
13. Division 28 Section 28 13 00 "Access Control."
14. Division 28 Section 28 46 19 "PLC Electronic Detention Monitoring and Control Systems."

1.3 SCOPE AND RESPONSIBILITY:

- A. The DEC shall be fully responsible for performing the coordination required between the Division 08 Detention Scope of Work with the Division 28 Security Electronics Scope of Work.
- B. The DEC shall be responsible for the coordination, integration and interfacing of the products and systems specified in Division 8 and Division 28, and in accordance with shop drawings and submittals approved by the Architect / Consultant.
- C. The DEC shall be responsible for all labor and equipment for receiving, unloading, distributing, setting and installation of all security related items. This includes, but may not be limited to, bars, plates, angles, access frames and doors, security frames and security sidelights, and miscellaneous security frames specified in Division 8.
- D. Under the requirements of this Section, the DEC shall be responsible for furnishing and installing the following, as specified in all locations. The details and specific scope of work related to a portion of the installation of this equipment shall be defined between the DEC and General Contractor at the time of Bid.
 1. Detention Hollow Metal Frames, Sidelights, and Interior Security Windows.
 2. Detention Hollow Metal Doors.
 3. Detention Hardware.
 4. Security and Non-Security Glass and Glazing for Security Hollow Metal and Security Windows.

E. Installation of all systems and equipment is subject to clarifications as indicated in the reviewed shop drawings and field coordination drawings.

F. The DEC shall be fully responsible for acquiring and paying for all licenses and permits required to perform their Work. If licenses are required before bidding, then the DEC shall not bid any portion of the Work until the required licenses are obtained.

1.4 SUBMITTALS

A. General: Submittals shall be made in accordance with Conditions of Contract and Division 1 Sections. DEC shall review Detention Work submittals and verify construction details and provide answers to manufacturer's questions prior to submission to the General Contractor. Submittals shall be supplied on USB drive and in accordance with Section 01 33 00 "Submittal Procedures.

B. Product Data: Mark each copy to show applicable choices and options where printed product data includes information on several products, some of which are not required, mark copies to indicate the applicable information.

C. Shop Drawings: Highlight, encircle, or otherwise indicate deviations from the Contract Documents.

D. Coordination Drawings: Prepare and submit Project-specific Coordination Drawings, drawn accurately to scale, for installation of detention work. Include the following information, as applicable:

1. Show relationship of components shown on separate Shop Drawings.
2. Show dimensions and clearances of interrelated detention work. The contractor will be held to the requirements as noted in Title 24 from the California Code of Regulations as it relates to the area within the I-3 occupied spaces.
3. Provide templates and patterns.
4. Indicate required operation sequences of interrelated detention work.
5. Indicate required installation sequences.
6. Refer to Division 26 for specific Coordination Drawing requirements for electrical installations required for detention work.

E. The submittal shall reflect the equipment and material as they are defined by the project plans and specifications, contract and signed/documented clarifications, substitutions and changes to the above documents by the Architect.

F. Qualified installers trained by the manufacturer shall perform the installation of all detention hardware and sliding devices. Submittal of written confirmation from the manufacturer showing individual field technicians as approved installers shall be required.

G. The submittal documents shall be updated throughout the project construction. These documents shall be included with the operation and maintenance manuals to provide accurate as-built documentation of all installed equipment and material.

H. Other Informational Submittals:

1. Examination reports documenting inspections of substrates, areas, and conditions.

I. Submittals not organized as specified shall be considered incomplete and will be rejected.

- J. It is the DEC's responsibility to coordinate detention/security items in this scope of work, and to answer all manufacturer questions or concerns that are not strictly design related. The DEC shall redline the manufacturers' individual shop drawings and/or schedules, and note corrections prior to submittal for Architectural/Consultant review. When multiple items are submitted by the manufacturer on a single cutsheet, the DEC shall note with an arrow, circle or note cloud, to show which product on the sheet is submitted for this scope of work. DEC submittals not reviewed and redlined prior to submittal to Architect/Consultant for final review, will be returned rejected.

1.5 OPERATING/MAINTENANCE MANUALS

- A. DEC shall furnish three (3) copies of Operation and Maintenance Manuals for all security and non-security items furnished under this specification. These manuals shall include:

1. Instructions for the care and operation of the materials.
2. Parts list with exploded views of material with moving parts to aid the Owner with ordering replacement parts.
3. Telephone, Fax, Address, website and instructions for contacting the appropriate personnel during the warranty period as well as for service.
4. Refer to division 1 specification for additional requirements.

- B. Operation and Maintenance Manual shall include information for every mechanical item with moving parts and every electrical item submitted in the approved hardware schedule. This is to include all material in the related submittal and is not limited to "detention" equipment.

- C. Submittals shall be "AS BUILT" documents and shall include all changes from approved submittal documents clearly noted on each sheet. The document type and the document number that initiated the final change shall be clearly noted on these as built.

- D. The owner has the right to request an interactive Operation Manual in place of the printed hard copy manuals described above. The interactive manual will utilize the files described above as a basis for an interactive document utilizing a web browser. All manuals, files, and data sheets would be published in a format compatible with Internet Browsers equal to Microsoft Internet Explorer. Hyperlinks would link each item in a master table of contents to individual manuals, shop drawings, and files. The DEC shall clarify with the owner the type of documentation required.

- E. Submittals not organized as specified shall be considered incomplete and will be rejected.

1.6 SUBSTITUTIONS

- A. Substitutions shall be submitted in accordance with the requirements noted in Section 01 25 00 - Substitutions

- B. No substitutions of equipment or material will be permitted where specific trade names or a manufacturer is listed, unless the architect adds them by an addendum.

- C. Materials and products specified by name of manufacturer or brand trade name shall be the basis of the bids received unless changed by addendum prior to the bid dates.

- D. In the event a contractor wishes to use any materials or products other than those specified he shall make a written request to the Architect, naming the proposed substitution. All substitutions of lock sets, must be accompanied by a written letter from the manufacturer stating that the

substituted lockset matches the specified lockset function exactly as shown in the individual hardware sets per specification section 08 71 63.

- E. All additional costs resulting from the use of an approved substitution shall be borne by the contractor without additional expense to the Owner. Such additional costs shall include necessary modifications and alterations to structures, equipment, raceways and furnishing of all additional materials required to affect the substitution.

1.7 QUALITY ASSURANCE

- A. The following DEC's are pre-approved to perform the work of this Section. Any other contractors interested in bidding the Project as a DEC shall submit Statement of Qualifications (Section 01 35 13.16) fourteen days prior to bid.

1. CML Security, Erie, CO.: Phone 720-466-3650
2. Cornerstone Detention Products, Inc., Decatur, AL: Phone 256-355-2396
3. ISI Detention Contracting, San Antonio, TX: Phone 210-495-5245
4. Sierra Detention Systems, Brighton, CO: 303-278-6879
5. Universal Security Products, San Ramon, CA: Phone 510-785-8222

- B. Approval of a firm as a DEC does not relieve that DEC from furnishing all materials from the manufacturers as herein specified.

- C. All materials and labor specified in this Section of the Specifications shall be furnished by a single qualified DEC who shall assume responsibility for the detailing, coordinating, erecting, performance, and warranty of this work, in accordance with this specification.

- D. Qualified installers trained by the manufacturer shall perform the installation of all detention hardware and sliding devices. Submittal of written confirmation from the manufacturer showing individual field technicians as approved installers shall be required.

1.8 COORDINATION

- A. Coordinate work to ensure efficient and orderly installation of each part of detention work. Coordinate and schedule detention work that depends on other work for proper and timely installation, connection, and operation.

1. Coordinate installation of different detention components to ensure maximum accessibility for required maintenance, service, and repair.
2. Coordinate provisions to accommodate detention work scheduled for later installation.
3. Coordinate detention work with work by the Electronic Security Contractor (ESC).

- B. Coordinate selection of detention products for compatibility.

- C. Assemble and coordinate Shop Drawings for detention work provided by separate entities.

- D. Coordinate sequencing and scheduling of detention work. Secure time commitments for performing critical construction activities from separate entities responsible for detention work.

1. Schedule construction operations in sequence required to obtain best results where installation of one part of detention work depends on installation of other components, before or after its own installation.
2. Coordinate sequence of detention work activities to accommodate tests and inspections.

- E. Coordinate installation of anchorages and embedments for detention work. Obtain and distribute, to parties involved, setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation so as not to delay progress of the Work.
 - 1. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing detention work to comply with indicated requirements.
- F. Coordinate temporary facilities and controls required by detention work.
 - 1. Maintain an ongoing inventory of all material.
 - 2. Arrange for a secure, dry, locked storage area or room in the building for storing detention equipment products prior to installation.
 - 3. Receive, unload and distribute products to site storage location and/or installation locations. Minor scratches on painted surfaces shall be cleaned and touched-up with rust-inhibitive primer. Defective disfigured products shall be rejected.
 - 4. Tag all products with markings that show proper installation locations.
- G. Coordinate protection of installed detention work.
- H. Coordinate preparation of Project Record Documents for detention work and integrate information from entities responsible for detention work to form one combined record.
- I. Coordinate preparation of operation and maintenance manuals for detention work and integrate information from entities responsible for detention work to form one combined record.
- J. Defective Products: Items found to be defective, either through manufacturing, damage in transit or by field installation, shall be replaced prior to final completion. DEC shall make special manufacturing and shipping arrangements to accomplish this replacement prior to completion.
- K. Coordination Meetings: Conduct coordination meetings specifically for detention work at regular intervals. Coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and pre-installation conferences.

1.9 WARRANTY

- A. The DEC shall warrant the material and equipment and labor furnished by the DEC under this Section and in accordance with Section 01 78 36 to be free from defects in material and workmanship for a period of one (1) year after Notice of Completion. Should written notice be served on the DEC during the warranty period of any such defect, the DEC shall make good the defect at its own expense. Coordination of warranty problems between division 8 and 27/28 shall be the responsibility of the DEC.
- B. The DEC must have full-time employees trained in and devoted to the maintenance and repair of systems and equipment furnished.
- C. The DEC shall provide warranty service throughout the warranty period in a timely manner.
 - 1. Service response requirements shall include the following:
 - a. Twenty-four (24) hour phone number.
 - b. DEC shall respond to warranty call within twenty-four (24) hours of notification.

- c. Response personnel shall be factory technicians trained by the manufacturers of the equipment, with five years experience, servicing equipment of the type included in this project.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Ensure quality of field welding of detention work and anchorages.
- B. Verify that detention work is installed and connected according to the Contract Documents.
- C. Verify that wiring installation complies with manufacturer's submittal and written installation requirements in Division 26 and 28 Sections.
- D. Observe startup service of detention work.
- E. Observe installation and startup checks of detention work according to manufacturer's written instructions.
- F. Inspect installed detention work to verify compliance with requirements. Prepare inspection reports and indicate compliance with and deviations from the Contract Documents.
1. Perform additional inspections to determine compliance of replaced or additional work.
2. Prepare field quality-control certification that states installed detention work and its installation complies with requirements in the Contract Documents.
- G. Testing: After installing electrified detention work and after electrical circuitry has been installed, energized and is functional, test detention work for compliance with requirements.
1. When testing reveals detention work is not in compliance with requirements, perform additional random testing to determine extent of noncompliance.
2. Where test results indicate that detention work does not comply with specified requirements, retest after repairs or replacements are made.
- H. Perform additional testing and inspecting, at Contractor's expense, to determine compliance of replaced or additional work.

3.2 INSPECTIONS AND TESTING

- A. The General Contractor and DEC shall be responsible for issuing a letter to the Architect and R&N Systems Design, LLC confirming that the work is complete and ready for inspection and testing. If the project is completed in phases, a letter will be submitted for each phase to be inspected. As an attachment to the letter confirming the work is "complete" and ready for inspection, the DEC must attach a self generated "field test" report for each device which confirms in detail that the DEC has performed their own inspection and test prior to the inspection by the Architect / Consultant.

B. The inspection shall include control and monitoring of the hardware, as well as the installation and adjustments of the mechanical functions.

C. The Superintendent and Project Manager shall be present and assist in the inspection / testing of the Work.

1. If additional inspections are required because the Work is incomplete at the time of the scheduled inspection or if any portion of the system fails to function as designed, the DEC shall be responsible for paying for the time and expenses for the Architect and Security Consultant to re-schedule and re-inspect the Work. This cost shall include time and expense for all personnel of the Architectural and Security Consulting firm. The "time" cost shall include an hourly rate of \$190 per hour. This time will include travel time and inspection time. An estimated amount of this time and expense must be paid prior to re-scheduling the inspection.

3.3 SPARE PARTS

A. The DEC shall deliver all spare parts at the completion of the project. The spare parts shall be clearly marked as to content and packaged for ease of handling by one (1) person without the use of forklifts or other equipment. The DEC shall obtain a signature from the owner's representative receiving the spare parts.

B. The DEC shall furnish the parts described in each subsection of the specifications provided by the DEC. Mark the specification section on the packaging for each device. Refer to individual specification sections for spare parts to be provided as a requirement for each section.

3.4 TRAINING

A. The DEC shall provide without additional cost to the Owner, representatives specially trained in the operation of detention hardware and devices provided. The representatives shall train the Owner's personnel in operations, repair, and upkeep of all Detention Work. Coordinate dates for training sessions with the Owner prior to scheduling dates.

B. The DEC shall be responsible for notifying the Architect five (5) weeks prior to Notice of Completion of the total security system that training is scheduled. The DEC will coordinate the number to be trained with the Owner's representative.

C. The inspection shall include Systems, Subsystems, Equipment, and Components. Where these terms are used together or separately, they shall be referred to as "the system". The DEC shall be prepared to test every point for each system.

D. On-Site Training: Provide qualified personnel for instruction and a training period involving the Owner's designated personnel and the DEC as designated by the user. Representatives must be capable of training Owner's personnel in the adjustment, operation and repair of detention work, including pertinent safety requirements. Instruction shall be given during the first week after detention work has been accepted and turned over to the Owner for regular operation, except if adjustment and/or repairs are required for its use. In such case, training sessions are not to occur until such adjustments and/or repairs have been satisfactorily completed.

1. On-site instruction and training shall include a minimum of four (4) consecutive eight (8) hour days.

2. Training shall be coordinated with the scheduled training period for Division 27/28 work.

3. Training sessions to be videotaped. Tapes to be given to Owner.

4. In addition to the training requirements listed above the DEC shall include all associated cost to provide additional onsite owner training following Notice of Completion. The additional training shall occur at the three (3) month period and shall cover topics as referenced in paragraph "D" above. Coordinate this additional training with the owner.
- E. During the warranty period, if significant changes or modifications take place in the equipment or system, additional instruction shall be provided at no cost to the Owner (unless such changes or modifications are Owner initiated) to acquaint the operating personnel with the changes or modifications.
- F. Training Certification:
 1. Each facility employee shall receive at the conclusion of the security systems training program a certificate certifying his attendance of the total session or portion thereof.
- G. DEC shall maintain attendance records of each class. This attendance shall be submitted to the Architect at the completion of training.

END OF SECTION 01 35 13.16

2017
Detention Equipment Contractor
STATEMENT OF QUALIFICATIONS

The Undersigned certifies that the information provided herein is true and sufficiently complete so as not to be misleading.

Submission Due Date: Fourteen (14) days prior to bid date

SUBMITTED BY:	Corporation	☐
NAME:	Partnership	☐
ADDRESS:	Individual	☐
TELEPHONE NO.:	Joint Venture	☐
FAX NO.:	Other	☐
PRINCIPAL OFFICE:		

NAME OF PROJECT: Fresno County West Annex Jail Fresno, California.

TYPE OF WORK:

The Detention Equipment Contractor (DEC) shall furnish project references for correctional facilities that have occupancy **greater than 250 beds with a minimum of 125 within cell type construction**. Include only project references where the DEC **self performed** the detention equipment scope of work.

Type of Work: (If your company performs multiple scopes of work as defined below, please specify scope of work for each job reference provided.)

- ☐ Detention Equipment
- ☐ Other: (please specify)

1. ORGANIZATION

1.1 How many years has your organization been in business as a Detention Equipment Contractor (DEC)?

1.2 How many years has your organization been in business under its present business name?

1.2.1 Under what other or former names has your organization operated?

<u>Year</u>	<u>Name of Organization</u>	<u>Principal Owners</u>

1.3 If your organization is a corporation, answer the following:

1.3.1 Date of incorporation:

1.3.2 State of incorporation:

1.3.3 President's name:

1.3.4 Vice-president's name(s):

1.3.5 Secretary's name:

1.3.6 Treasurer's name:

1.3.7 ESOP Companies (list Board of Directors and Trustee)

1.4 If your organization is a partnership, answer the following:

1.4.1 Date of organization:

1.4.2 Type of partnership (if applicable):

1.4.3 Name(s) of general partner(s):

1.5 If your organization is individually owned, answer the following:

1.5.1 Date of organization:

1.5.2 Name of owner:

1.6 If the form of your organization is other than those listed above, describe it and name the principals or owner:

2. LICENSING

2.1 List jurisdictions and trade categories in which your organization is legally qualified to do business, and indicate registration or license numbers, if applicable.

2.2 List license information for the State of California.

2.3 List jurisdictions in which your organization's partnership or trade name is filed.

3. EXPERIENCE

3.1 List the construction projects involving detention equipment installations. (Design / Build projects do not apply.) Provide the following.

1. Name of project.

2. Name of Owner. (Provide contact name and phone number.)

3. Name of Architect / Engineer. (Provide contact name and phone number.)

4. Name of General Contractor (If applicable) (Provide contact name and phone number.)

5. Contract Amount.

6. Occupancy.

7. List the year the project was completed.

3.2 List the major construction projects the organization has completed and that currently have in progress with detention equipment subcontracts for correctional facilities that have occupancy **greater than 250 beds with a minimum of 125 within cell type construction**. Provide the following:

1. Name of project:

2. Name of Owner. (Provide contact name and phone number.)

3. Name of Architect / Engineer. (Provide contact name and phone number.)

4. Name of General Contractor (If applicable) (Provide contact name and phone number.)

5. Contract Amount.

6. Occupancy.

7. List the year the project was completed.

3.4 State annual amount of detention equipment work performed during the past five years:

2010:

2011:

2012:

- 1 2013:
- 2 2014:
- 3 3.5 State total worth of detention equipment work currently under contract and in progress as
- 4 of January 2017.
- 5 3.6 Claims and Suits. List separately for each category listed above. (If the answer to any of
- 6 the questions below is yes, please attach details with reference to this paragraph
- 7 number).
- 8 3.6.1 Has your organization ever failed to complete any work awarded to it?
- 9 3.6.2 Are there any judgments, claims, arbitration proceedings or suits pending or
- 10 outstanding against your organization or its officers?
- 11 3.6.3 Has your organization filed any law suits or requested arbitration with regard to
- 12 construction contracts within the last five years?
- 13 3.7 Within the last five years, has any officer or principal of your organization ever been an
- 14 officer or principal in another organization when it failed to complete a construction
- 15 contract? (If the answer is yes, please attach details.)
- 16 3.8 Check (✓) the categories of work that your organization normally performs with its own
- 17 forces:

Manufacturer	Supply	Installation	DETENTION EQUIPMENT
			Security Hollow Metal Doors
			Security Hollow Metal Frames
			Security Woven Rod Mesh Partitions and Doors
			Steel Grate Partitions and Doors
			Security Doors and Frames
			Security Metal Windows
			Security Hardware
			Locking Devices for Sliding Doors
			Security Glazing
			Security Furnishings
			Detention Hollow Metal Wall Panel Systems
			Security Ceilings

18

19 **4. PERSONNEL**

- 20 4.1 On Attachment “#”, and include herein, provide the following:

4.1.1 Specifically designate the superintendent that will be assigned to this project. This person must have experience in the past 5 years with medium security correctional facilities having a minimum of **250 beds with a minimum of 125 within cell type construction**. Provide a brief resume of this person, highlighting their experience.

4.2 On Attachment “#”, and include herein, provide the following:

4.2.1 Specifically designate the senior project manager that will be assigned to this project. This person must have experience in the past 5 years with medium security correctional facilities having a minimum of **250 beds with a minimum of 125 within cell type construction**. Provide a brief resume of this person, highlighting their experience.

5. REFERENCES

5.1 Architect/Engineer References (list three):

5.1.1 Name:
Contact:
Address:
Telephone:

5.1.2 Name:
Contact:
Address:
Telephone:

5.1.3 Name:
Contact:
Address:
Telephone:

5.2 Owner References (list three):

5.2.1 Name:
Address:
Telephone:

5.2.2 Name:
Address:
Telephone:

5.2.3 Name:
Address:
Telephone:

6. SURETY

6.1 Name of bonding company:

6.2 Name and address of agent:

6.3 Provide a letter from your bonding company that states your current bonding capacity:

7. FINANCING

7.1 Bankruptcy

7.1.1 Has your organization filed bankruptcy in the past five (5) years?

If yes, list the year in which bankruptcy was filed.

7.1.2 Has your organization under a previous name or other organization that you have acquired ever filed bankruptcy?

If yes, list the organization's name and the year in which bankruptcy was filed.

8. SIGNATURE

8.1 Dated this _____ day of _____ 2013.

Name of Organization:

By: _____

Title: _____

8.2

_____ certifies that the information provided herein is true and sufficiently complete so as not to be misleading.

Subscribed and sworn before me this _____ day of _____ 2013.

Notary Public: _____

My Commission Expires:

(Seal)

**2017
Detention Equipment Contractor
STATEMENT OF QUALIFICATIONS**

The Undersigned certifies that the information provided herein is true and sufficiently complete so as not to be misleading.

Submission Due Date: Fourteen (14) days prior to bid date

SUBMITTED BY:	Corporation	☐
NAME:	Partnership	☐
ADDRESS:	Individual	☐
TELEPHONE NO.:	Joint Venture	☐
FAX NO.:	Other	☐
PRINCIPAL OFFICE:		

NAME OF PROJECT: Fresno County West Annex Jail, Fresno County, California.

RESPONSE MEDIUM: A single PDF searchable for keywords.

TYPE OF WORK:

The Detention Equipment Contractor (DEC): The DEC shall be responsible for furnishing and installing custom fabricated detention hollow metal frames, detention doors, security/detention glazing and detention metal wall panels. The DEC shall be responsible for final installation adjustment of doors and hardware and final installation of detention glazing. The Scope of Work for this contractor will be defined in the drawings and specifications prepared by R&N Systems Design, LLC.

The Detention Equipment Contractor (DEC) shall furnish project references for correctional facilities that have occupancy **greater than 250 beds with a minimum of 125 within cell type construction**. Include only project references where the DEC **self-performed** the detention equipment scope of work. **Include only those green field projects that were designed by independent Architects and Engineers, competitively bid, and then built by the contractor.** Detention hollow metal, detention doors and frames, security/detention glazing, and metal wall panels, if any, must have all been furnished and installed by this contractor as a complete package.

Where there is not sufficient space in the form for a complete answer, insert the words "Refer to attached sheet" and add a page copying the referenced question and paragraph number at the top of the page. Each page shall reference one question for clarity.

1. ORGANIZATION

1.1 How many years has your organization been in business as a Detention Equipment Contractor (DEC)?

1.2 How many years has your organization been in business under its present business name?

1.2.1 Under what other or former names has your organization operated?
(Attach additional details with reference to this paragraph number if required.)

<u>Year</u>	<u>Name of Organization</u>	<u>Principal Owners</u>

1.3 If your organization is a corporation, answer the following:

1.3.1 Date of incorporation:

1.3.2 State of incorporation:

1.3.3 President's name:

1.3.4 Vice-president's name(s):

1.3.5 Secretary's name:

1.3.6 Treasurer's name:

1.3.7 ESOP Companies (list Board of Directors and Trustee)

1.4 If your organization is a partnership, answer the following:

1.4.1 Date of organization:

1.4.2 Type of partnership (if applicable):

1.4.3 Name(s) of general partner(s):

1.5 If your organization is individually owned, answer the following:

1.5.1 Date of organization:

1.5.2 Name of owner:

1.6 If the form of your organization is other than those listed above, describe it and name the principals or owner: (Attach additional details with reference to this paragraph number if required.)

2. LICENSING

- 2.1 List jurisdictions and trade categories in which your organization is legally qualified to do business, and indicate registration or license numbers, if applicable. (Attach additional details with reference to this paragraph number if required.)
- 2.2 List license information for the State of California.
- 2.3 List jurisdictions in which your organization's partnership or trade name is filed.

3. EXPERIENCE

Check (✓) the categories of work that your organization normally performs with its own forces:

Manufacturer	Supply	Installation	DETENTION EQUIPMENT
			Security Hollow Metal Doors
			Security Hollow Metal Frames
			Security Woven Rod Mesh Partitions and Doors
			Steel Grate Partitions and Doors
			Security Doors and Frames
			Security Metal Windows
			Security Hardware
			Locking Devices for Sliding Doors
			Security Glazing
			Security Furnishings
			Detention Hollow Metal Wall Panel Systems
			Security Ceilings
			Additional, Please List

- 3.1 List 5 completed construction projects involving detention equipment installations as defined above. (Design / Build projects do not apply.) (Attach additional pages giving details with reference to this paragraph number.) Provide the following:

1. Name of project.

2. Name of Owner. (Provide contact name and phone number.)

3. Name of Architect / Engineer. (Provide contact name and phone number.)
 4. Name of General Contractor (If applicable) (Provide contact name and phone number.)
 5. Contract Amount.
 6. Occupancy.
 7. List the year the project was completed.
- 3.2 List the major construction projects the organization currently has in progress with detention equipment subcontracts for correctional facilities that have occupancy **greater than 250 beds with a minimum of 125 beds within cell type construction**. Provide the following:
1. Name of project:
 2. Name of Owner. (Provide contact name and phone number.)
 3. Name of Architect / Engineer. (Provide contact name and phone number.)
 4. Name of General Contractor (If applicable) (Provide contact name and phone number.)
 5. Contract Amount.
 6. Occupancy.
 7. List the anticipated year the project will be completed.
- 3.4 State annual amount of detention equipment work performed during the past five years:
- 2016:
- 2015:
- 2014:
- 2013:
- 2012:
- 3.5 State total worth of detention equipment work currently under contract and in progress as of January 1, 2017.
- 3.6 Claims and Suits. List separately for each scope category listed above. (If the answer to any of the questions below is yes, please attach details with reference to the paragraph number).
- 3.6.1 Has your organization ever failed to complete any work awarded to it?

- 3.6.2 Are there any judgments, claims, arbitration proceedings or suits pending or outstanding against your organization or its officers?
- 3.6.3 Has your organization filed any law suits or requested arbitration with regard to construction contracts within the last five years?
- 3.7 Within the last five years, has any officer or principal of your organization ever been an officer or principal in another organization when it failed to complete a construction contract? (If the answer is yes, please attach details referencing this paragraph number.)

4. PERSONNEL

- 4.1 Provide an Attachment referencing this paragraph number, providing the following:
 - 4.1.1 Specifically designate the superintendent that will be assigned to this project. This person must have experience in the past 5 years with medium security correctional facilities having a minimum of **250 beds with a minimum of 125 within cell type construction**. Provide a brief resume of this person, highlighting their experience. This person may not be changed without the approval of the Owner.
- 4.2 Provide an Attachment referencing this paragraph number, providing the following:
 - 4.2.1 Specifically designate the senior project manager that will be assigned to this project. This person must have experience in the past 5 years with medium security correctional facilities having a minimum of **250 beds with a minimum of 125 within cell type construction**. Provide a brief resume of this person, highlighting their experience. This person may not be changed without the approval of the Owner.

5. REFERENCES

- 5.1 Architect/Engineer References (list three):
 - 5.1.1 Name:
Contact:
Address:
Telephone:
 - 5.1.2 Name:
Contact:
Address:
Telephone:
 - 5.1.3 Name:
Contact:
Address:
Telephone:
- 5.2 Owner References (list three):
 - 5.2.1 Name:

Address:
Telephone:

5.2.2 Name:
Address:
Telephone:

5.2.3 Name:
Address:
Telephone:

6. SURETY

- 6.1 Name of bonding company:
- 6.2 Name and address of agent:
- 6.3 Provide a letter from your bonding company that states your current bonding capacity:

7. FINANCING

- 7.1 Bankruptcy
- 7.1.1 Has your organization filed bankruptcy in the past five (5) years?
- If yes, list the year in which bankruptcy was filed.
- 7.1.2 Has your organization under a previous name or other organization that you have acquired ever filed bankruptcy?
- If yes, list the organization's name and the year in which bankruptcy was filed.

8. SIGNATURE

8.1 Dated this _____ day of _____ 2017.

Name of Organization:

By: _____

Title: _____

8.2

_____ certifies that the information provided herein is true and sufficiently complete so as not to be misleading.

Subscribed and sworn before me this _____ day of _____ 2017.

Notary Public: _____

(Seal)

My Commission Expires:

SECTION 01 35 54 - BUILDING INFORMATION MODELING (BIM)

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section describes the BIM requirements and guidelines for the project including:

1. Definitions and Acronyms
2. Level of Development
3. BIM Execution Plan
4. Project Construction Coordination
5. As-Built Documents

- B. Related Sections:

1. Section 01 10 00 – Summary.
2. Section 01 31 00 – Project Management and Coordination.
3. Section 01 32 00 – Construction Progress Documentation.
4. Section 01 33 00 – Submittal Procedures.
5. Section 01 33 33 – Electronic Drawings
6. Section 01 35 13.16 – Special Project Procedures for Detention Facilities.
7. Section 01 50 00 – Temporary Facilities and Controls
8. Section 01 77 00 – Closeout Procedures.
9. Section 01 78 23 – Operation and Maintenance Data.
10. Section 01 78 39 – Project Record Documents.

- C. BIM Intent:

1. The project team, including all Contractor and sub-contractors, shall utilize Building Information Modeling (BIM) at all phases of the project and all deliverables, as defined in the BIM Execution Plan Requirements. The intent is to have a shared master 3D model that contains all of the building and/or site information together (including all design attribute information).
2. The selected Contractor will work together with the Owners Representative to agree on a BIM Execution Plan. This plan will contain the details of each Project participants responsibilities and contributions to the BIM process throughout project delivery.
3. After award the Architect's BIM model will be available to the Contractor, upon execution of the "Electronic Data Transfer Agreement", Specification Section 017839.02. The Architect's BIM model will be provided in an "as-is" condition (see attachment of indicated level of model development at the end of this section) and the Contractor may use the model at their discretion.
4. Model Level of Development (LOD) during construction development, leading to model completion, shall be to level 400 (shop drawings where applicable) and 500 (as built) as defined by The American Institute of Architects.
5. The Owner and Owner's Representative shall be entitled to use, or add to the design model during the design and construction process as well as after project completion. This includes any model produced by the efforts of either the design team or the contractor.

6. The BIM model will be a deliverable to the Owner, for their exclusive use, after construction completion.
7. In the event that the Contractor selected is not utilizing BIM, the Owner or Owner's Representative may choose to allow the Contractor to have the project modeling completed by a BIM consulting firm hired and paid by the Contractor.

1.3 DEFINITIONS AND ACRONYMS

A. Definitions and Acronyms will be defined and used throughout the BIM Requirements.

1. AS-BUILT MODEL: The final Federated Model incorporating all design and construction phase modifications to the specified LOD.
2. BID MODEL: The Federated Model from which drawings are produced that are incorporated into the Bid Documents.
3. BIM (Process): A collection of defined model uses, workflows, and modeling methods used to achieve specific repeatable and reliable information results from the model.
4. BIM MANAGER: The individual representing a member of the Project team responsible for managing their modeling and coordination processes for the Project.
5. COBie 2: Construction Operations Business Information Exchange. A structured process and format for the collection of facility data developed by the Corp. of Engineers (COBie 2 is not a requirement of this project).
6. COLLABORATION MODEL: The Federated Model used during the Contractor's trade coordination phase.
7. FEDERATED MODEL: The Federated Model combines different modeled elements or assemblies through the process of linking files from their native platforms, maintaining their native properties. It is a virtual representation of the entire Project developed to a specified LOD. On multi-building projects, each building will have its own standalone Federated Model and the overall site will have a combined Federated Model incorporating all individual buildings located on the site plan.
8. LINKING FILES: A process of externally reference a native file into the Federated Model.
9. LEVEL of DEVELOPMENT (LOD): The term used to describe the fullness and definitiveness of the Model. The LOD definition is based on the AIA E 202 – 2008 document and expanded in the Section 1.4.
10. MEPF: Mechanical, Electrical, Plumbing, and Fire Protection systems.
11. MODEL: The term used to describe the 3D virtual representation of a Project and its Objects.
12. MODEL ELEMENT: A Model Element is a portion of the BIM representing a component, system or assembly within a building or building site.
13. MODEL ELEMENT AUTHOR: The Model Element Author (MEA) is the primary party who will develop the content of a specific Model Element to the LOD listed for a particular phase of the project.
14. NATIVE MODEL: A Model created in a specific CAD platform. For example, a model made in Revit®.
15. NOMENCLATURE: This is a term that applies to a system of principles, procedures and terms related assignment of a location, object or property.
16. OBJECT: The term used to describe the 3D virtual representation of each of the separate sub-parts of Model such as doors, walls, equipment etc. If an Object is, in itself, comprised of several sub-elements, the sub-elements will be grouped into one virtual representation of that Object.
17. ROOM: The term used to describe any space within the enclosing walls of the building. The space may be rectangular or more complex

1.4 LEVEL OF DEVELOPMENT (LOD)

- 1 A. The American Institute of Architects has developed a Level of Development (LOD) system
2 which serves as a standard for describing the steps through which a BIM element can
3 logically progress from the lowest level of conceptual approximation to the highest level of
4 representational precision.
- 5 B. LOD 100: This is the “programming” level. Buildings and/or structures must be modeled as
6 masses indicative of area, height, volume, spatial location, and orientation.
- 7 C. LOD 200: This is the “planning” level. Buildings and/or structures including major
8 architectural, structural, mechanical, electrical, and plumbing objects must be modeled as
9 generalized systems or assemblies with approximate quantities, approximate configuration,
10 spatial location, and orientation. Each enclosed space must be identified as a unique Room
11 with associated parameters.
- 12 D. LOD 300: This is the “design” level as provided to Contractor by Design Team per
13 requirements of Section 01 33 33 “Electronic Drawings”. Buildings and/or structures including
14 all objects must be modeled as specific systems or assemblies with accurate quantities,
15 recognizable configuration, spatial location, and orientation. Each enclosed space must be
16 identified as a unique Room with associated parameters. This level of development is a
17 design level and should be considered a representative representation. Information provided
18 is basis of design only.
- 19 E. LOD 400: This is the “construction” level. Buildings and/or structures including all objects
20 must be modeled as specific systems or assemblies with accurate quantities, recognizable
21 configuration, spatial location, and orientation, with complete fabrication, assembly, and
22 detailing information. Each enclosed space must be identified as a unique Room with
23 associated parameters.
- 24 F. LOD 500: This is the “as-built” level. Buildings and/or structures including all objects shall be
25 modeled as constructed systems or assemblies with accurate quantities, shape, and spatial
26 location. All model elements previously modeled to a LOD 300 or LOD 400 must include any
27 quantity or configuration changes made during construction to achieve a LOD 500.

28 1.5 SUBMITTALS

- 29 A. Submit under provisions of Section 01 33 00.
- 30 B. Provide a BIM Execution Plan within 14 days of the Notice to Proceed, for approval by the
31 Owners representative in accordance with the requirements of this Section
- 32 C. BIM Submittals identified in BIM Execution Plan
- 33 D. Contractor must provide As-Built documentation in accordance with the requirements in this
34 Section.

35 1.6 BIM WORK ROOM

- 36 A. The Contractor shall provide the use of their job site trailer Conference Room as a BIM Work
37 Room on-site, sized to provide work space for BIM modelers and function as a collaborative
38 conference room for design reviews, presentations and BIM coordination work sessions. The
39 BIM Work Room shall accommodate trade subcontractors, the Contractor's team, the
40 Contractor's BIM staff, plus representatives from the Owner.
- 41 B. Contractor's Responsibilities:

1. Provide hardware to support BIM modeling, presentations and coordination work sessions.
2. Provide projectors and large interactive viewing screens for reviewing and/or modifying BIM models.
3. Provide web and voice conferencing capabilities for the duration of the Project and allow up to twelve (12) concurrent participants.

1.7 COORDINATION PROCEDURE

- A. The Contractor shall be prepared to accommodate weekly meetings (the Field Supervision that will be onsite running the work, Project Management authorized to make cost related decisions and Personnel that will be completing the modeling of work are expected to attend) to resolve model conflicts and sign off on a 'Master Model'. 'Master Model' is to be considered the basis for construction for an area and will be completed and signed off on a floor by floor basis consistent with the Project Schedule.
- B. The Construction Manager will provide a clash detection report to accommodate the above. The 3D models submitted by the Contractors for overall coordination are required to be checked and coordinated with the structure, architectural components, other systems in the model and the Contractor's own work prior to submittal.
- C. The 3D Model shall **include access areas** for equipment – included as a modeled element such that clash detection and coordination can be accommodated relating to access. The access area must be modeled from the access point down to the finished floor on that given level and colored red.
- D. Coordinated submittal data shall be distributed as necessary utilizing the Construction Managers portal, and full clash reports shall be posted 2 days prior to coordination meetings.
- E. Penetration through building systems such as cast-in-place concrete, precast concrete, fire and acoustic walls and CMU walls shall be identified in the Contractor's model by means of a modeled sleeve or a mass opening where groups of pipes or conduits penetrate the wall (with a defined tolerance).
- F. The coordination 3D model shall include, at a minimum: all systems and components modeled to a level-of-detail consistent with objects represented by a 1/8" plan/elevation/section drawing or as detailed in the model detail direction. The Architect and Construction Manager reserves the right to request more detail where required.
- G. The 3-D model and layering convention shall be set by the Construction Manager and will be discussed at the coordination kick-off meeting involving all Contractors that will be a part of the process.
- H. The Contractors are responsible for insuring their submitted models meet all the stated requirements. Though the Construction Manager is committed to supporting the process of 3D coordination, it is the Contractor's duty to rectify any issues stemming from lack of interoperability or modeling inaccuracy.
- I. Update/Maintenance of electronic data/3D model throughout construction shall include but not be limited to:
 1. Incorporation of RFI's
 2. Incorporation of ASI's
 3. Incorporation of submittal comments and revisions on approved shop drawings
 4. Incorporation of as-built field conditions/modifications.

- J. Contractors are to provide the Construction Manager with an updated model weekly or as required by the Construction Manager throughout the coordination and installation of work.

1.8 OBJECT PARAMETRIC ATTRIBUTES – MINIMUM REQUIREMENTS

- A. The following attributes shall be attached to each Object as described in 2.1 B: If a required attribute is not automatically generated by Native Model software, it shall be manually input in the Native Model, or provided in an Excel or Access document that includes the UID.

1. Unique Identification (Instance parameter)
2. Common Name (Type parameter)
3. Unifomat II Classification Code levels 1, 2, and 3 Manufacturer
4. Model Number
5. Serial Number (where applicable)
6. Fixture tag ID number (where applicable)

- B. Contractor shall provide all **Attributes listed above for all objects that are maintainable and / or serviceable.** Objects such as steel, drywall, concrete, piping, ductwork, casework are examples of items that shall not be included in this requirement. **An Asset List shall be developed as part of the BIM Execution Plan by the Owner, Architect, and Contractor to define which objects must have the attribute information.**

1.9 OBJECT ASSOCIATION

- A. Every Object in the Model shall be associated with either a Room or a Floor and shall have an association "Instance" parameter attached to it in the Native Model.

1. Room Association: Any Object that will be visible in a Room of the completed facility shall be associated with that specific Room. This includes all Objects regardless of responsible discipline; examples include without limitation: electrical switches and outlets, electrical switch gear and panel boards, plumbing equipment and fixtures, access panels to concealed Objects, cabinets, doors and frames, wainscot, light fixtures, HVAC supply and return grilles, fire sprinkler heads and valves, etc.
2. Floor Association: Any Object that will be concealed in a wall or interstitial space (but would be visible if the finish surface or item was non-existent) shall be associated with the specific Floor level that it is within. This includes all Objects regardless of responsible discipline; examples include without limitation: electrical conduit, plumbing piping and valves, HVAC supply and return ducts, HVAC equipment, fire sprinkler lines and valves, etc.
3. Objects Extending Beyond Room Boundaries: Floors, walls, and/or ceilings are sometimes modeled as objects that extend beyond individual Room boundaries.

1.10 LEVEL OF DEVELOPMENT

- A. All objects listed in section 2.4 shall be in the Model and shall be developed to LOD 400. No objects regardless of source of that element shall be exempt from this requirement. This includes items listed in the specification as a deferred submittal. There will be elements the contractor will be required to model that will not be present within the design model provided by the design team. **These items will be modeled by the contractor or the contractor's subconsultant at no additional charge to the Owner.**

1.11 GENERAL MODELING REQUIREMENTS

- A. All contractors shall provide the construction manager with a 3d computer model of their respective work scope in a format compatible with navisworks software. A listing of compatible formats can be found at: <http://www.navisworks.com/en/support/formats>.

- Compatibility shall be maintained through the duration of the project. The construction manager reserves the right to request any of the specific file formats compatible with navisworks software.
- B. The 3d model shall provide a complete representation of all work as an intelligent object or solid element and shall be compatible with navisworks for clash detection purposes. (refer to the attached model detail guidelines section)
- C. The 3d model shall be located and oriented to the pre-determined world coordinates for the project. All contractors are responsible for ensuring their work is at the appropriate x, y & z coordinates to allow for coordination across disciplines. The x, y, z coordinate will be determined and discussed by the coordination team during the coordination kick-off meeting.
- D. The 3d model shall be dimensionally accurate. Dimension unit format for 3d model will be feet and inches.
- E. All contractors shall actively participate in the 3-d modeling and coordination process and work in concert wherein all relevant information shall be captured for use in constructing the work. The field supervision that will be onsite running the work, project management authorized to make cost related decisions and personnel completing the modeling of work are expected to attend all coordination meetings. Coordination considerations and process are discussed more specifically in the model detail summary section.
- F. The 3d model shall be transmitted to the construction manager with consistent file naming convention (refer to exhibit c).
- G. The 3d modeling requirements in this section do not relieve the contractors of any other requirements for submittals, as-built drawings, close-out documentation, etc... as shown on the contract documents.
- H. Any and all changes made in the field for whatever reason shall be made in the completed 3d model to keep the model 100% current and accurate at all times. A final complete as-built 3d model shall be provided to the construction manager at the end of the project reflecting all as-built conditions that exist in the field.
- I. The construction manager will have a 3d model of the building and structural steel available upon request as a background for all prime contractors' use in building its respective 3d model.
- J. All contractors shall provide a fixed unit rate cost for personnel that will be completing modeling/coordination activities including all labor, overhead profit and all other costs of whatever nature. Unit prices shall be used for adding, changing or deleting quantities of work items.

1.12 CONTRACTOR REQUIREMENTS

- A. The contractors shall deliver a 3D computer model that is complete, as outlined in scope of work. Any elements not included will become the contractor's responsibility to coordinate in the field at no additional cost and will be financially responsible for the rework and all added time by other affected trades. This does not alleviate the contractor from including uncoordinated elements in the as-built model.
- B. The contractor shall provide a list of minimum typical code and access clearances for all model components to be used by others in modeling and coordinating work. This list shall be provided to the construction manager prior to the start of 3d coordination efforts.

1.13 MODEL SCOPE:

- A. Extent of model: All Contractors Models shall cover full extents of the Contractor's work scope. All systems shall be included to the full horizontal and vertical extents of the model including underground utilities and roof-top mounted items.
- B. Systems Modeled and level of Detail: The level of detail is defined in the Model Detail Guidelines section below. A spreadsheet and description by trade indicating the level of detail necessary for all Contractors follows

1.14 MODEL CONTENT REQUIRMENTS

A. General:

1. All Hanger, supports, Trapeze, etc. to be modeled.
2. Model Elements are modeled as constructed assemblies actual and accurate in terms of size, shape, location, quantity, and orientation. Non-geometric information may also be attached to modeled elements.
3. All equipment shall be modeled to its overall height, width and depth. When available from the equipment manufacturer, actual equipment models shall be placed in the model.
4. Conduits shall be modeled to the outside diameter of the pipe or the pipe insulation, whichever is greater.
5. Overhead j-boxes with clear space shall be modeled.
6. Conduit support systems/racks shall be modeled.
7. Light fixture locations and space requirements shall be modeled. Light fixtures that hang below the finished ceiling or mount on the exterior of finished walls are not required to be modeled. The model shall, however, show the box, mounting location and any space requirements around these fixtures.
8. Pipe/conduit slope shall be incorporated in the model.
9. Fittings and connections are not required to be modeled.
10. Specific dimensional location of conduits/piping is often not included in the design documents. To the extent the location can be determined from the design documents; the model will reflect that location.
11. Cable tray and all raceways shall be modeled.
12. Housekeeping pads, equipment frames, bases curbs, isolators and isolation devices, etc... shall be modeled.
13. Access panels shall be modeled by the Framing contractor and coordinated in conjunction with all trades specific access requirements. In the case that a framing model is not made available, then the specific trades shall model Access panels for their own specific needs.
14. Access zones shall be modeled.

B. Civil:

1. Complete Civil work scope, including all components and equipment shall be modeled. This includes all systems outside the building.
2. All equipment shall be modeled to its overall height, width and depth. When available from the equipment manufacturer, actual equipment models shall be placed in the model.
3. Pipes shall be modeled to the outside diameter of the pipe or the pipe insulation, whichever is greater.
4. Pipe slope shall be incorporated in the model.
5. Fittings and connections are not required to be modeled unless there is a required clearance/access space associated with the fitting/connection.

6. Specific dimensional location of piping is often not included in the design documents. To the extent the location can be determined from the design documents; the model will reflect that location.
7. All valves with valve handles and clean outs shall be modeled.
8. Storm Water and Sanitary Sewers:
 9. Existing lines (over 3" diameter), boxes and structures within project area,
 10. All new lines, boxes and structures
 11. Existing public lines, boxes and structures beyond the project area but serving as points of connection for the project.
 12. Utilities:
 - a. Existing domestic and fire water main and branch lines (2" and larger diameter) within project area
 - b. All new domestic and fire water lines
 - c. Existing electrical overhead and underground lines within project area, all new electrical lines outside buildings
 - d. Existing telephone and data lines within project area
 - e. All new telephone and data lines outside buildings
 - f. Existing gas lines within project area
 - g. All new gas lines outside buildings.
13. Access zones shall be modeled in coordination with this Prime Contractor.

C. Plumbing:

1. All Hanger, supports, Trapeze, etc. to be modeled.
2. Complete Plumbing work scope, including all components and equipment shall be modeled. This includes the storm main from 5' outside the building to and including the sump pit and equipment.
3. All equipment shall be modeled to its overall height, width and depth. When available from the equipment manufacturer, actual equipment models shall be placed in the model.
4. Pipes shall be modeled to the outside diameter of the pipe or the pipe insulation, whichever is greater.
5. Pipe slope shall be incorporated in the model.
6. Fittings and connections are not required to be modeled unless there is a required clearance/access space associated with the fitting/connection.
7. Specific dimensional location of piping is often not included in the design documents. To the extent the location can be determined from the design documents; the model will reflect that location.
8. All valves with valve handles and clean outs shall be modeled.
9. Pipe support/rack systems shall be modeled.
10. Housekeeping pads, equipment frames, bases curbs, isolators and isolation devices, etc... shall be modeled.
11. Access panels shall be modeled by others in coordination with this Prime Contractor.
12. Access zones shall be modeled – from floor to object requiring access.

D. Hvac Piping:

1. All Hanger, supports, Trapeze, etc. to be modeled.
2. Complete HVAC Piping work scope including all components and equipment shall be modeled.
3. All equipment shall be modeled to its overall height, width and depth. When available from the equipment manufacturer, actual equipment models shall be placed in the model.

4. Pipes shall be modeled to the outside diameter of the pipe or the pipe insulation, whichever is greater
5. Pipe slope shall be incorporated in the model.
6. Fittings and connections are not required to be modeled unless there is a required clearance/access space associated with the fitting/connection.
7. Specific dimensional location of piping is often not included in the design documents. To the extent the location can be determined from the design documents; the model will reflect that location.
8. Access panels shall be modeled by others in coordination with this Prime Contractor.
9. Access zones shall be modeled – from floor to Object requiring access.

E. Fire Suppression:

1. All Hanger, supports, Trapeze, etc. to be modeled.
2. Complete Fire Suppression work scope, including all components and equipment shall be modeled.
3. All equipment shall be modeled to its overall height, width and depth. When available from the manufacturer, actual equipment models shall be placed in the model.
4. Pipes shall be modeled to the outside diameter of the pipe or the pipe insulation, whichever is greater.
5. Pipe slope shall be incorporated in the model.
6. Fittings and connections are not required to be modeled unless there is a required clearance/access space associated with the fitting/connection.
7. Specific dimensional location of piping is often not included in the design documents. To the extent the location can be determined from the design documents; the model will reflect that location.
8. All valves with valve handles and clean outs shall be modeled.
9. Pipe support/rack systems shall be modeled.
10. All sleeves shall be modeled.
11. Housekeeping pads, equipment frames, bases curbs, isolators and isolation devices, etc... shall be modeled.
12. Access panels shall be modeled by others in coordination with this Prime Contractor.
13. Access zones shall be modeled – from floor to Object requiring access

F. Hvac Sheet Metal:

1. All Hanger, supports, Trapeze, etc. to be modeled.
2. Complete HVAC Sheet Metal work scope including all components and equipment shall be modeled.
3. All equipment shall be modeled to its overall height, width and depth. When available from the equipment manufacturer, actual equipment models shall be placed in the model.
4. Pipes shall be modeled to the outside diameter of the pipe or the pipe insulation, whichever is greater.
5. Ducts shall be modeled to the outside face dimension of the duct or the duct insulation, whichever is greater.
6. Duct and pipe support/rack systems shall be modeled.
7. Pipe slope shall be incorporated in the model.
8. Fittings and connections are not required to be modeled unless there is a required clearance/access space associated with the fitting/connection.
9. All dampers with clear space shall be modeled.
10. Specific dimensional location of piping is often not included in the design documents. To the extent the location can be determined from the design documents; the model will reflect that location.
11. All valves and clean outs shall be modeled.

12. Housekeeping pads, equipment frames, bases curbs, isolators and isolation devices, etc... shall be modeled.
13. Access panels shall be modeled by others in coordination with this Prime Contractor.
14. Access zones shall be modeled – from floor to Object requiring access.

G. Electrical/Low Voltage Cabling & Lighting:

1. All Hanger, supports, Trapeze, etc. to be modeled.
2. Complete Electrical work scope including all components, fixtures and equipment shall be modeled. This includes all power feeds to this Prime Contractor's and other Prime Contractor's equipment.
3. Light Fixture Clearances shall be modeled above all fixtures requiring clearance for installation – approx. 6" above fixtures or as determined necessary for fixture installation.
4. Cable tray and all raceways shall be modeled – including all required access clearances, above and to the sides as needed for installation.
5. Housekeeping pads, equipment frames, bases curbs, isolators and isolation devices, etc... shall be modeled.
6. Access panels shall be modeled by others in coordination with this Prime Contractor.
7. Access zones shall be modeled – from floor to Object requiring access.

H. Steel:

1. Complete Steel work scope including all primary and secondary steel members including, but not limited to, standard steel member sizes, gusset plates, braces, equipment supports, deck penetration reinforcement and kickers.
2. Edge of all slabs and penetrations of structural systems shall be modeled and accurately located.
3. All fire proofing with actual thickness shall be modeled when available – all clashes will be run with a 2" clearance.

I. Concrete:

1. Complete Concrete work scope including foundations, footings, column, beams and walls.
2. Penetrations and openings identified in construction documents shall be modeled.
3. Slabs and Decks will be modeled as overall thickness of slab or deck with PT reinforcement if applicable.
4. Penetrations in slabs will be modeled as shown in construction documents and updated throughout coordination to reflect coordinated penetrations.
5. Stairs and ramps shall include openings, framing and railing supports.
6. Expansion, contraction and seismic joints.
7. Rebar locations modeled when available.

J. Framing:

1. Complete Framing work scope, including all components shall be modeled.
2. Studs, Headers, Joists, kickers, Sill plates, Top/Bottom Plates, etc required to frame the wall are represented in the framing model.
3. Kingstuds, Doublestuds are modeled accurately and shown from Floor to structure.
4. Accurate wall types per the Architectural Construction Documents are represented in the framing model – including all rated wall assembly requiring non penetration areas.
5. Wall types are color coded in the framing model per rated wall type.
6. Access panels shall be coordinated with all trades and represented in the framing model.

7. All framed wall openings for large penetrations; Duct, Cable tray, Structural Steel, etc are modeled and coordinated to allow spacing for penetration sealing, fire caulking, etc.
8. Drywall, sheetrock, gypboard, etc needs to be modeled and on a separate layer.
9. All framing required for Hardlid Ceilings are shown, Joists, Gypbd, etc.
10. Backing at areas that require coordination with other trades shall be represented in the framing modeled.

K. Ceiling – Acoustical Tile

1. Complete ACT (Acoustical Ceiling Tile) Ceiling work scope, including all components shall be modeled.
2. ACT Tees, Compression Posts, Ceiling Joists, etc. are to be represented in the framing model.
3. Individual ceiling tiles are not required to be modeled.
4. Splay Wires are not required to be modeled.

L. Modular Steel Detention Cells and Mezzanine

1. Complete Steel work scope including all primary and secondary steel members including, but not limited to, standard steel member sizes, gusset plates, braces, equipment supports.
2. Systems shall be modeled and accurately located.
3. Equipment Clearances: equipment clearances as model objects for conflict detection and maintenance access requirements.
4. Related mechanical and electrical requirements.

M. Specialty Equipment:

1. The Specialty Equipment Model shall be a sub-system model. Specialty Equipment include medical equipment and systems, security equipment and systems, conveyance equipment and systems, manufacturing equipment and systems, etc. and provide for the following:
2. Model of the overall dimensions of Specialty Equipment.
3. Equipment Clearances: equipment clearances as model objects for conflict detection and maintenance access requirements.
4. Related mechanical, plumbing, and electrical requirements.

PART 2 – PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 BIM EXECUTION PLAN

- A. Submit the BIM Execution Plan as herein described.
- B. The BIM Execution Plan must clearly identify and contain, at a minimum, the following information:
 1. BIM Management:
 - a. Identify the BIM coordinator/team leader who will act as the primary point of contact for all BIM related activities.
 - b. Identify the BIM team which must include representatives of the Contractor and all subcontractors who will be involved in the BIM process. Provide a contact list

including each representative's name, company, role, e-mail address, and telephone number. The contact list must be periodically updated to include representatives of any fabricators or suppliers who become involved in the BIM process, if any.

- c. Establish communication procedures.
- d. Indicate BIM processes specific to the Project for project coordination and as built documenting.
- e. Include a schedule of BIM submittals.

2. BIM Standards:

- a. Identify the software (including version) used by all parties.
- b. List all file naming conventions
- c. Identify common coordinate points among the various models and provide instructions for consolidating the models.
- d. Identify file management and file-sharing security measures.
- e. Identify Quality Control procedures.

3. Modeling Goals:

- a. Identify intended uses of the model(s) (construction sequencing, scheduling, coordination, fabrication, etc.). This should include how the contractor shall incorporate fabrication modeling into the as built model for coordination of the project.
- b. Identify the BIM Scope Definition: the Level of Development (LOD) to be established for each building component and object type, by discipline. Refer to Attachment A of this specification section (BIM Level of Development Matrix) for minimum construction related activity LOD requirements.
- c. Identify the method of incorporating Equipment Operation and Maintenance Data pursuant to Section 01 78 23 into the model.

- C. For additional information and explanation of the contents of a successful BIM Execution Plan, refer to the current publication of the BIM Project Execution Planning Guide developed by Penn State University: <http://www.engr.psu.edu/ae/cic/BIMEx/>

3.2 PROJECT CONSTRUCTION COORDINATION

- A. Use of BIM on the Project is intended to improve the quality and coordination of the Project's construction. Contractor must coordinate Work using Models prior to proceeding with construction. The Contractor must continue to coordinate the work using models through the entire duration of construction until the final as built model is accepted by the Owner representative.

- 1. Coordinate the schedule of BIM submittals identified in the Contractor's BIM Execution Plan with Preliminary and Contract Schedules to allow adequate time for Model reviews and Quality Control procedures.

- B. Owner Representative will provide Contractor with the following:

- 1. Electronic files of the "Bid Set" drawings, with addenda items incorporated and identified, on Digital Versatile Disc(s) (DVD) as provided to Contractor by Design Team per requirements of Section 01 33 33 "Electronic Drawings" as indicated below:

<u>Discipline</u>	<u>Electronic Files</u>	<u>Software (Autodesk unless otherwise noted)</u>

1	Architectural	Building Model	Revit Architecture (Current Version) (.rvt)
2			
3	Structural	Building Model	Revit Structure (Current Version) (.rvt)
4			
5	Mechanical/	Building Model	Revit MEP (Current Version) (.rvt)
6	Plumbing		CADDuct (Current Version) (.dwg)
7			CADPipe (Current Version) (.dwg)
8			
9	Electrical	Building Model	Revit MEP (Current Version) (.rvt)
10			
11	Civil	Drawing Files	AutoCAD (Current Version) (.dwg)
12	2. Electronic files of the "Bid Set" specifications, with addenda items incorporated and		
13	identified, on Digital Versatile Disk (DVD) using the software program Adobe Acrobat		
14	(pdf).		
15	3. All files provided in electronic format are for Contractor's use in preparing coordination		
16	and as-built models and documents only. Use for any other purpose must be solely at		
17	the Contractor's risk. In addition, the following Terms and Conditions will govern		
18	Contractor's use of the electronic media:		
19	a.	Owner makes no representation as to the compatibility of the electronic media	
20		with any hardware or software.	
21	b.	Owner Representative will not provide multiple copies of electronic media for the	
22		convenience of the Contractor's subcontractors. If the Contractor wishes to	
23		transmit these electronic media to others, the Contractor may do so at its own	
24		risk and these terms and conditions must apply to any and all recipients of these	
25		electronic media.	
26	c.	Since the information set forth in the electronic media can be modified	
27		unintentionally or otherwise, Owner reserves the right to remove all identification	
28		of ownership and/or involvement from each electronic display. This media should	
29		not be considered as a certified document.	
30	d.	All information on the electronic media is provided for use in conjunction with this	
31		Project only. The electronic media is to remain the property of the Owner.	
32	e.	Owner makes no representation regarding the accuracy, completeness, or	
33		permanence of the electronic media. In the event of a conflict between the	
34		electronic media and the Contract Drawings signed and sealed by the Office of	
35		the State Fire Marshal and/or the Architect and Engineers of Record, the signed	
36		and sealed Contract Drawings will govern. It is the Contractor's responsibility to	
37		determine if any conflicts exist. The electronic media is not to be considered, in	
38		any way, part of the Contract Documents as defined by the General Conditions of	
39		the Contract.	
40	f.	The use of this electronic media will not in any way alleviate the Contractor's	
41		responsibility for the proper checking and coordination of dimensions, details,	
42		member sizes and gage, and quantities of materials as required to facilitate	
43		complete and accurate fabrication and erection.	

44 3.3 COORDINATION DIGITAL DATA FILES

- 45 A. Use of BIM on the Project is intended to improve the quality and coordination of the Project's
- 46 construction. Contractor must coordinate Work using Models prior to proceeding with
- 47 construction. The Contractor must continue to coordinate the work using models through the
- 48 entire duration of construction until the final as built model is accepted by the Owner
- 49 representative. Contractor shall develop a process of project coordination from the initial

coordination models and outline the continued development process of the model through the course of construction. This process shall be detailed in the BIM Execution plan.

B. Prepare coordination digital data files according to the following requirements:

1. File Preparation Format: Autodesk Revit, Navisworks (format as provided by design team) or better operating in Microsoft Windows operating system.
2. File Submittal Format: Submit or post coordination drawing files using format same as file preparation format (RVT and NWD) and Portable Data File (PDF) format.
3. BIM File Incorporation: Develop and incorporate coordination drawing files into Building Information Model established for Project.
4. Navisworks: Perform three-dimensional component conflict analysis as part of preparation of coordination drawings. Resolve component conflicts prior to submittal. Indicate where conflict resolution requires modification of design requirements by Architect.

3.4 AS-BUILT DOCUMENTS

A. Contractor must provide as-built documents as described in 01 78 39 PROJECT RECORD DOCUMENTS.

B. Contractor must also provide interim and final as-built models of the building utilizing Building Information Modeling (BIM) in accordance with the approved BIM Execution Plan and 01 78 39 PROJECT RECORD DOCUMENTS.

C. Contractor must verify before transmitting all electronic files and media that they are free of electronic "viruses," "worms," "Trojan Horses" and other programs or data which may cause undesirable effects to the host computer by using the latest version of anti-virus software Avast and either McAfee Anti-Virus or Norton Anti-Virus. OWNER Representatives will check incoming electronic submittals for such afflictions and at the first indication of such an affliction, the entire electronic submittal will be considered unacceptable and will be returned to the Contractor. Contractor must remove the unwanted programs or data and further verify the integrity of the electronic submittal. Contractor must bear the expense of correction, checking, and resubmittal, and will not be released from contracted submittal requirements.

END OF SECTION 01 35 54

1 SECTION 01 4000 - QUALITY REQUIREMENTS

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and other Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY

- 7 A. Section includes administrative and procedural requirements for quality assurance and quality
8 control.
- 9 B. Testing and inspecting services are required to verify compliance with requirements specified or
10 indicated. These services do not relieve Contractor of responsibility for compliance with the
11 Contract Document requirements.
- 12 1. Specific quality-assurance and quality-control requirements for individual construction
13 activities are specified in the Sections that specify those activities. Requirements in those
14 Sections may also cover production of standard products.
- 15 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-
16 assurance and quality-control procedures that facilitate compliance with the Contract
17 Document requirements.
- 18 3. Requirements for Contractor to provide quality-assurance and quality-control services
19 required by Architect, Owner, Commissioning Agent, Construction Manager, or
20 authorities having jurisdiction are not limited by provisions of this Section.
- 21 4. Specific test and inspection requirements are not specified in this Section.

22 1.3 DEFINITIONS

- 23 A. Quality-Assurance Services: Activities, actions, and procedures performed before and during
24 execution of the Work to guard against defects and deficiencies and substantiate that proposed
25 construction will comply with requirements.
- 26 B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after
27 execution of the Work to evaluate that actual products incorporated into the Work and
28 completed construction comply with requirements. Services do not include contract enforcement
29 activities performed by Architect or Construction Manager.
- 30 C. Mockups: Full-size physical assemblies that are constructed on-site or at manufacturer's plant.
31 Mockups are constructed to verify selections made under Sample submittals; to demonstrate
32 aesthetic effects and, where indicated, qualities of materials and execution; to review
33 coordination, testing, or operation; to show interface between dissimilar materials; and to
34 demonstrate compliance with specified installation tolerances. Mockups are not Samples.
35 Unless otherwise indicated, approved mockups establish the standard by which the Work will be
36 judged.
- 37 1. Laboratory Mockups: Full-size physical assemblies constructed at testing facility to verify
38 performance characteristics.

2. Integrated Exterior Mockups: Mockups of the exterior envelope erected separately from the building but on Project site, consisting of multiple products, assemblies, and subassemblies.
 3. Room Mockups: Mockups of typical interior spaces complete with wall, floor, and ceiling finishes, doors, windows, millwork, casework, specialties, furnishings and equipment, and lighting.
- D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.
- E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- F. Source Quality-Control and Quality Assurance Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.
- G. Field Quality-Control and Quality Assurance Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).
- J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of **five** previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

- A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.5 ACTION SUBMITTALS

- A. Shop Drawings: For integrated exterior mockups, provide plans, sections, and elevations, indicating materials and size of mockup construction.
1. Indicate manufacturer and model number of individual components.
 2. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

1.6 INFORMATIONAL SUBMITTALS

- A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.
- B. Qualification Data: For Contractor's quality-control personnel.
- C. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, as in deferred submittals, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems:
1. Seismic-force-resisting system, designated seismic system, or component listed in the designated seismic system quality-assurance plan prepared by Architect.
 2. Main wind-force-resisting system or a wind-resisting component listed in the wind-force-resisting system quality-assurance plan prepared by Architect.
- D. Testing Agency Qualifications: For testing agencies specified in "Quality Control" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- E. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
1. Specification Section number and title.
 2. Entity responsible for performing tests and inspections.
 3. Description of test and inspection.
 4. Identification of applicable standards.
 5. Identification of test and inspection methods.
 6. Number of tests and inspections required.
 7. Time schedule or time span for tests and inspections.
 8. Requirements for obtaining samples.
 9. Unique characteristics of each quality-control service.

1.7 CONTRACTOR'S QUALITY-CONTROL PLAN

- A. Quality-Control Plan, General: Submit quality-control plan within 20 days of Notice to Proceed, and not less than three days prior to preconstruction conference. Submit in format acceptable to Architect and Construction Manager. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities. Coordinate with Contractor's construction schedule.
- B. Quality-Control Personnel Qualifications: Engage qualified full-time personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.
1. Project quality-control manager shall not have other Project responsibilities.

2. Qualifications include:

- a. Degree in architecture, engineering, or construction management is required with 10 years of similar experience in the construction industry OR
- b. 20 years of similar experience in construction industry as project superintendent OR
- c. 10 years of similar experience as Quality Control Manager.

C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.

D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:

1. Contractor-performed tests and inspections including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections.
2. Special inspections required by authorities having jurisdiction and indicated on the "Statement of Special Inspections."
3. Owner-performed tests and inspections indicated in the Contract Documents, including tests and inspections indicated to be performed by the Commissioning Agent.

E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring work into compliance with standards of workmanship established by Contract requirements and approved mockups.

F. Monitoring and Documentation: Maintain testing and inspection reports including log of approved and rejected results. Include work Architect has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.8 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of technical representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of factory-authorized service representative making report.
2. Statement that equipment complies with requirements.
3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
4. Statement whether conditions, products, and installation will affect warranty.
5. Other required items indicated in individual Specification Sections.

D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.9 QUALITY QUALIFICATIONS

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections may specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.

- 1 F. Specialists: Certain Specification Sections require that specific construction activities shall be
2 performed by entities who are recognized experts in those operations. Specialists shall satisfy
3 qualification requirements indicated and shall be engaged for the activities indicated.
- 4 1. Requirements of authorities having jurisdiction shall supersede requirements for
5 specialists.
- 6 G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the
7 experience and capability to conduct testing and inspecting indicated, as documented according
8 to ASTM E 329; and with additional qualifications specified in individual Sections; and, where
9 required by authorities having jurisdiction, that is acceptable to authorities (see Section 1.9G
10 below)..
- 11 1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
12 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory
13 Accreditation Program.
- 14 H. Manufacturer's Technical Representative Qualifications: An authorized representative of
15 manufacturer who is trained and approved by manufacturer to observe and inspect installation
16 of manufacturer's products that are similar in material, design, and extent to those indicated for
17 this Project.
- 18 I. Factory-Authorized Service Representative Qualifications: An authorized representative of
19 manufacturer who is trained and approved by manufacturer to inspect installation of
20 manufacturer's products that are similar in material, design, and extent to those indicated for
21 this Project.
- 22 J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing
23 for compliance with specified requirements for performance and test methods, comply with the
24 following:
- 25 1. Contractor responsibilities include the following:
- 26 a. Provide test specimens representative of proposed products and construction.
27 b. Submit specimens in a timely manner with sufficient time for testing and analyzing
28 results to prevent delaying the Work.
29 c. Provide sizes and configurations of test assemblies, mockups, and laboratory
30 mockups to adequately demonstrate capability of products to comply with
31 performance requirements.
32 d. Build site-assembled test assemblies and mockups using installers who will
33 perform same tasks for Project.
34 e. Build laboratory mockups at testing facility using personnel, products, and methods
35 of construction indicated for the completed Work.
36 f. When testing is complete, remove test specimens, assemblies, and mockups; do
37 not reuse products on Project.
- 38 2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection,
39 and similar quality-assurance service to Architect and Commissioning Agent, through
40 Construction Manager, with copy to Contractor. Interpret tests and inspections and state
41 in each report whether tested and inspected work complies with or deviates from the
42 Contract Documents.
- 43 K. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form
44 of construction and finish required to comply with the following requirements, using materials
45 indicated for the completed Work or alternative materials as approved by the CM:

1. Build mockups in location and of size indicated or, if not indicated, as directed by Construction Manager. Mock ups shall appear on the master schedule and all schedule updates .
 2. Notify Construction Manager seven (7) days in advance of dates and times when mockups will be constructed.
 3. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed during the construction at Project.
 4. Demonstrate the proposed range of aesthetic effects and workmanship. Any appearance issues to be represented as “inherent” shall be represented on the mock up, e.g., “tempering distortions in ballistic glazing”, or paint finish difference between taped joints and sanded gypsum board surfaces.
 5. Obtain Architect's and Construction Manager's approval of mockups before starting work, fabrication, or construction.
 - a. Allow seven (7) days for initial review and each re-review of each mockup.
 6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 7. Demolish and remove mockups when directed unless otherwise indicated.
- L. Integrated Exterior Mockups: Construct integrated exterior mockup according to approved Shop Drawings and as indicated on Drawings. Coordinate installation of exterior envelope materials and products for which mockups are required in individual Specification Sections, along with supporting materials.
- M. Room Mockups: Construct room mockups incorporating required materials and assemblies, finished according to requirements. Provide required lighting and additional lighting where required to enable Architect to evaluate quality of the Work. Provide room mockups of the following rooms:
1. Typical Inmate Cell to be selected by the Construction Manager.
- N. Laboratory Mockups: Comply with requirements of preconstruction testing and those specified in individual Specification Sections.

1.10 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-assurance services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
 2. Costs for retesting and re-inspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements.

1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction.
2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.

- a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.

3. Notify testing agencies at least 48 hours in advance of time when Work that requires testing or inspecting will be performed.
4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
6. Submit to the owner's designated representative copies of all Contractor Testing and Inspection reports pertaining to the work.
7. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 013300 "Submittal Procedures."

D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

E. Retesting/Re-inspecting: The Owner shall be reimbursed by the contractor for cost of any necessary re-inspection or retesting.

F. Testing Agency Responsibilities: Cooperate with, Commissioning Authority, Construction Manager, and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Construction Manager and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform any duties of Contractor.

G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
 2. Incidental labor and facilities necessary to facilitate tests and inspections. Including ladders, lifts etc. for inspection of work by testing inspectors.
 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 4. Facilities for storage and field curing of test samples.
 5. Delivery of samples to testing agencies.
 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 7. Security and protection for samples and for testing and inspecting equipment at Project site.
- H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of Contractor's quality-control plan. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses.
1. Distribution: Distribute schedule to Construction Manager testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.11 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Owner will engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, as indicated in the drawings and specifications, and as follows:
- B. Special Tests and Inspections: Conducted by a qualified testing agency or special inspector as required by authorities having jurisdiction, as indicated in individual Specification Sections, and as follows:
1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviews the completeness and adequacy of those procedures to perform the Work.
 2. Notifying Construction Manager and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
 3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect and Commissioning Authority, through Construction Manager, with copy to Contractor and to authorities having jurisdiction.
 4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
 5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
 6. Retesting and re-inspecting corrected work.

1 PART 2 - PRODUCTS (Not Used)

2 PART 3 - EXECUTION

3 3.1 REPAIR AND PROTECTION

4 A. General: On completion of testing, inspecting, sample taking, and similar services, repair
5 damaged construction and restore substrates and finishes.

6 1. Provide materials and comply with installation requirements specified in other
7 Specification Sections or matching existing substrates and finishes. Restore patched
8 areas and extend restoration into adjoining areas with durable seams that are as invisible
9 as possible. Comply with the Contract Document requirements for cutting and patching in
10 Section 017300 "Execution."

11 B. Protect construction exposed by or for quality-control service activities.

12 C. Repair and protection are Contractor's responsibility, regardless of the assignment of
13 responsibility for quality-control services.

14 END OF SECTION 01 40 00

1 SECTION 01 42 00 - REFERENCES

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and other Division 01 Specification Sections, apply to this Section.

6 1.2 DEFINITIONS

- 7 A. General: Basic Contract definitions are included in the Conditions of the Contract.
- 8 B. "Approved": When used to convey Architect's action on Contractor's submittals, applications,
9 and requests, "approved" is limited to Architect's duties and responsibilities as stated in the
10 Conditions of the Contract.
- 11 C. "Directed": A command or instruction by Architect. Other terms including "requested,"
12 "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
- 13 D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings,
14 in Specifications, and in other Contract Documents. Other terms including "shown," "noted,"
15 "scheduled," and "specified" have the same meaning as "indicated."
- 16 E. "Regulations": Laws, ordinances, statutes, regulations, and lawful orders issued by authorities
17 having jurisdiction, and rules, conventions, and agreements within the construction industry that
18 control performance of the Work.
- 19 F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly,
20 installation, and similar operations.
- 21 G. "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to
22 dimension, finish, cure, protect, clean, and similar operations at Project site.
- 23 H. "Provide": Furnish and install, complete and ready for the intended use.
- 24 I. "Project Site": Space available for performing construction activities. The extent of Project site is
25 shown on Drawings and may or may not be identical with the description of the land on which
26 Project is to be built.

27 1.3 INDUSTRY STANDARDS

- 28 A. Applicability of Standards: Unless the Contract Documents include more stringent requirements,
29 applicable construction industry standards have the same force and effect as if bound or copied
30 directly into the Contract Documents to the extent referenced. Such standards are made a part
31 of the Contract Documents by reference.
- 32 B. Publication Dates: Comply with standards in effect as of date of the Construction Agreement
33 unless otherwise indicated.

C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.4 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. AABC - Associated Air Balance Council; www.aabc.com.
2. AAMA - American Architectural Manufacturers Association; www.aamanet.org.
3. AAPFCO - Association of American Plant Food Control Officials; www.aapfco.org.
4. AASHTO - American Association of State Highway and Transportation Officials; www.transportation.org.
5. AATCC - American Association of Textile Chemists and Colorists; www.aatcc.org.
6. ABMA - American Bearing Manufacturers Association; www.americanbearings.org.
7. ACI - American Concrete Institute; (Formerly: ACI International); www.concrete.org.
8. ACPA - American Concrete Pipe Association; www.concrete-pipe.org.
9. AEIC - Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
10. AF&PA - American Forest & Paper Association; www.afandpa.org.
11. AGA - American Gas Association; www.aga.org.
12. AHAM - Association of Home Appliance Manufacturers; www.aham.org.
13. AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); www.ahrinet.org.
14. AI - Asphalt Institute; www.asphaltinstitute.org.
15. AIA - American Institute of Architects (The); www.aia.org.
16. AISC - American Institute of Steel Construction; www.aisc.org.
17. AISI - American Iron and Steel Institute; www.steel.org.
18. AITC - American Institute of Timber Construction; www.aitc-glulam.org.
19. AMCA - Air Movement and Control Association International, Inc.; www.amca.org.
20. ANSI - American National Standards Institute; www.ansi.org.
21. AOSA - Association of Official Seed Analysts, Inc.; www.aosaseed.com.
22. APA - APA - The Engineered Wood Association; www.apawood.org.
23. APA - Architectural Precast Association; www.archprecast.org.
24. API - American Petroleum Institute; www.api.org.
25. ARI - Air-Conditioning & Refrigeration Institute; (See AHRI).
26. ARI - American Refrigeration Institute; (See AHRI).
27. ARMA - Asphalt Roofing Manufacturers Association; www.asphaltroofing.org.
28. ASCE - American Society of Civil Engineers; www.asce.org.
29. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
30. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; www.ashrae.org.
31. ASME - ASME International; (American Society of Mechanical Engineers); www.asme.org.
32. ASSE - American Society of Safety Engineers (The); www.asse.org.
33. ASSE - American Society of Sanitary Engineering; www.asse-plumbing.org.
34. ASTM - ASTM International; (American Society for Testing and Materials International); www.astm.org.
35. ATIS - Alliance for Telecommunications Industry Solutions; www.atis.org.
36. AWEA - American Wind Energy Association; www.awea.org.

- 1 37. AWI - Architectural Woodwork Institute; www.awinet.org.
- 2 38. AWMAC - Architectural Woodwork Manufacturers Association of Canada;
- 3 www.awmac.com.
- 4 39. AWPA - American Wood Protection Association; (Formerly: American Wood-Preservers'
- 5 Association); www.awpa.com.
- 6 40. AWS - American Welding Society; www.aws.org.
- 7 41. AWWA - American Water Works Association; www.awwa.org.
- 8 42. BHMA - Builders Hardware Manufacturers Association; www.buildershardware.com.
- 9 43. BIA - Brick Industry Association (The); www.gobrick.com.
- 10 44. BICSI - BICSI, Inc.; www.bicsi.org.
- 11 45. BIFMA - BIFMA International; (Business and Institutional Furniture Manufacturer's
- 12 Association); www.bifma.com.
- 13 46. BISSC - Baking Industry Sanitation Standards Committee; www.bissc.org.
- 14 47. BOCA - BOCA; (Building Officials and Code Administrators International Inc.); (See ICC).
- 15 48. BWF - Badminton World Federation; (Formerly: International Badminton Federation);
- 16 www.bwfbadminton.org.
- 17 49.
- 18 50. CDA - Copper Development Association; www.copper.org.
- 19 51. CEA - Canadian Electricity Association; www.electricity.ca.
- 20 52. CEA - Consumer Electronics Association; www.ce.org.
- 21 53. CFFA - Chemical Fabrics & Film Association, Inc.; www.chemicalfabricsandfilm.com.
- 22 54. CFSEI - Cold-Formed Steel Engineers Institute; www.cfsei.org.
- 23 55. CGA - Compressed Gas Association; www.cganet.com.
- 24 56. CIMA - Cellulose Insulation Manufacturers Association; www.cellulose.org.
- 25 57. CISCA - Ceilings & Interior Systems Construction Association; www.cisca.org.
- 26 58. CISPI - Cast Iron Soil Pipe Institute; www.cispi.org.
- 27 59. CLFMI - Chain Link Fence Manufacturers Institute; www.chainlinkinfo.org.
- 28 60. CPA - Composite Panel Association; www.pbmdf.com.
- 29 61. CRI - Carpet and Rug Institute (The); www.carpet-rug.org.
- 30 62. CRRC - Cool Roof Rating Council; www.coolroofs.org.
- 31 63. CRSI - Concrete Reinforcing Steel Institute; www.crsi.org.
- 32 64. CSA - Canadian Standards Association; www.csa.ca.
- 33 65. CSA - CSA International; (Formerly: IAS - International Approval Services); www.csa-international.org.
- 34 66.
- 35 67. CSI - Construction Specifications Institute (The); www.csinet.org.
- 36 68. CSSB - Cedar Shake & Shingle Bureau; www.cedarbureau.org.
- 37 69. CTI - Cooling Technology Institute; (Formerly: Cooling Tower Institute); www.cti.org.
- 38 70. CWC - Composite Wood Council; (See CPA).
- 39 71. DASHA - Door and Access Systems Manufacturers Association; www.dasma.com.
- 40 72. DHI - Door and Hardware Institute; www.dhi.org.
- 41 73. ECA - Electronic Components Association; www.ec-central.org.
- 42 74. ECAMA - Electronic Components Assemblies & Materials Association; (See ECA).
- 43 75. EIA - Electronic Industries Alliance; (See TIA).
- 44 76. EIMA - EIFS Industry Members Association; www.eima.com.
- 45 77. EJMA - Expansion Joint Manufacturers Association, Inc.; www.ejma.org.
- 46 78. ESD - ESD Association; (Electrostatic Discharge Association); www.esda.org.
- 47 79. ESTA - Entertainment Services and Technology Association; (See PLASA).
- 48 80. EVO - Efficiency Valuation Organization; www.evo-world.org.
- 49 81. FIBA - Federation Internationale de Basketball; (The International Basketball Federation);
- 50 www.fiba.com.
- 51 82. FIVB - Federation Internationale de Volleyball; (The International Volleyball Federation);
- 52 www.fivb.org.
- 53 83. FM Approvals - FM Approvals LLC; www.fmglobal.com.
- 54 84. FM Global - FM Global; (Formerly: FMG - FM Global); www.fmglobal.com.
- 55 85. FRSA - Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc.;
- 56 www.floridarroof.com.

- 1 85. FSA - Fluid Sealing Association; www.fluidsealing.com.
- 2 86. FSC - Forest Stewardship Council U.S.; www.fscus.org.
- 3 87. GA - Gypsum Association; www.gypsum.org.
- 4 88. GANA - Glass Association of North America; www.glasswebsite.com.
- 5 89. GS - Green Seal; www.greenseal.org.
- 6 90. HI - Hydraulic Institute; www.pumps.org.
- 7 91. HI/GAMA - Hydronics Institute/Gas Appliance Manufacturers Association; (See AHRI).
- 8 92. HMMA - Hollow Metal Manufacturers Association; (See NAAMM).
- 9 93. HPVA - Hardwood Plywood & Veneer Association; www.hpva.org.
- 10 94. HPW - H. P. White Laboratory, Inc.; www.hpwhite.com.
- 11 95. IAPSC - International Association of Professional Security Consultants; www.iapsc.org.
- 12 96. IAS - International Approval Services; (See CSA).
- 13 97. ICBO - International Conference of Building Officials; (See ICC).
- 14 98. ICC - International Code Council; www.iccsafe.org.
- 15 99. ICEA - Insulated Cable Engineers Association, Inc.; www.icea.net.
- 16 100. ICPA - International Cast Polymer Alliance; www.icpa-hq.org.
- 17 101. ICRI - International Concrete Repair Institute, Inc.; www.icri.org.
- 18 102. IEC - International Electrotechnical Commission; www.iec.ch.
- 19 103. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); www.ieee.org.
- 20 104. IES - Illuminating Engineering Society; (Formerly: Illuminating Engineering Society of North America); www.ies.org.
- 21 105. IESNA - Illuminating Engineering Society of North America; (See IES).
- 22 106. IEST - Institute of Environmental Sciences and Technology; www.iest.org.
- 23 107. IGMA - Insulating Glass Manufacturers Alliance; www.igmaonline.org.
- 24 108. IGSHPA - International Ground Source Heat Pump Association; www.igshpa.okstate.edu.
- 25 109. ILI - Indiana Limestone Institute of America, Inc.; www.iliai.com.
- 26 110. Intertek - Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA); www.intertek.com.
- 27 111. ISA - International Society of Automation (The); (Formerly: Instrumentation, Systems, and Automation Society); www.isa.org.
- 28 112. ISAS - Instrumentation, Systems, and Automation Society (The); (See ISA).
- 29 113. ISFA - International Surface Fabricators Association; (Formerly: International Solid Surface Fabricators Association); www.isfanow.org.
- 30 114. ISO - International Organization for Standardization; www.iso.org.
- 31 115. ISSFA - International Solid Surface Fabricators Association; (See ISFA).
- 32 116. ITU - International Telecommunication Union; www.itu.int/home.
- 33 117. KCMA - Kitchen Cabinet Manufacturers Association; www.kcma.org.
- 34 118. LMA - Laminating Materials Association; (See CPA).
- 35 119. LPI - Lightning Protection Institute; www.lightning.org.
- 36 120. MBMA - Metal Building Manufacturers Association; www.mbma.com.
- 37 121. MCA - Metal Construction Association; www.metalconstruction.org.
- 38 122. MFMA - Maple Flooring Manufacturers Association, Inc.; www.maplefloor.org.
- 39 123. MFMA - Metal Framing Manufacturers Association, Inc.; www.metalframingmfg.org.
- 40 124. MHIA - Material Handling Industry of America; www.mhia.org.
- 41 125. MIA - Marble Institute of America; www.marble-institute.com.
- 42 126. MMPA - Moulding & Millwork Producers Association; (Formerly: Wood Moulding & Millwork Producers Association); www.wmmpa.com.
- 43 127. MPI - Master Painters Institute; www.paintinfo.com.
- 44 128. MSS - Manufacturers Standardization Society of The Valve and Fittings Industry Inc.; www.mss-hq.org.
- 45 129. NAAMM - National Association of Architectural Metal Manufacturers; www.naamm.org.
- 46 130. NACE - NACE International; (National Association of Corrosion Engineers International); www.nace.org.
- 47 131. NADCA - National Air Duct Cleaners Association; www.nadca.com.
- 48 132. NAIMA - North American Insulation Manufacturers Association; www.naima.org.
- 49 133. NBGQA - National Building Granite Quarries Association, Inc.; www.nbgqa.com.
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- 1 134. NCAA - National Collegiate Athletic Association (The); www.ncaa.org.
- 2 135. NCMA - National Concrete Masonry Association; www.ncma.org.
- 3 136. NEBB - National Environmental Balancing Bureau; www.nebb.org.
- 4 137. NECA - National Electrical Contractors Association; www.necanet.org.
- 5 138. NeLMA - Northeastern Lumber Manufacturers Association; www.nelma.org.
- 6 139. NEMA - National Electrical Manufacturers Association; www.nema.org.
- 7 140. NETA - InterNational Electrical Testing Association; www.netaworld.org.
- 8 141. NFHS - National Federation of State High School Associations; www.nfhs.org.
- 9 142. NFPA - NFPA; (National Fire Protection Association); www.nfpa.org.
- 10 143. NFPA - NFPA International; (See NFPA).
- 11 144. NFRC - National Fenestration Rating Council; www.nfrc.org.
- 12 145. NHLA - National Hardwood Lumber Association; www.nhla.com.
- 13 146. NLGA - National Lumber Grades Authority; www.nlga.org.
- 14 147. NOFMA - National Oak Flooring Manufacturers Association; (See NWFA).
- 15 148. NOMMA - National Ornamental & Miscellaneous Metals Association; www.nomma.org.
- 16 149. NRCA - National Roofing Contractors Association; www.nrca.net.
- 17 150. NRMCA - National Ready Mixed Concrete Association; www.nrmca.org.
- 18 151. NSF - NSF International; (National Sanitation Foundation International); www.nsf.org.
- 19 152. NSPE - National Society of Professional Engineers; www.nspe.org.
- 20 153. NSSGA - National Stone, Sand & Gravel Association; www.nssga.org.
- 21 154. NTMA - National Terrazzo & Mosaic Association, Inc. (The); www.ntma.com.
- 22 155. NWFA - National Wood Flooring Association; www.nwfa.org.
- 23 156. PCI - Precast/Prestressed Concrete Institute; www.pci.org.
- 24 157. PDI - Plumbing & Drainage Institute; www.pdionline.org.
- 25 158. PLASA - PLASA; (Formerly: ESTA - Entertainment Services and Technology Association); www.plasa.org.
- 26 159. RCSC - Research Council on Structural Connections; www.boltcouncil.org.
- 27 160. RFCI - Resilient Floor Covering Institute; www.rfci.com.
- 28 161. RIS - Redwood Inspection Service; www.redwoodinspection.com.
- 29 162. SAE - SAE International; (Society of Automotive Engineers); www.sae.org.
- 30 163. SCTE - Society of Cable Telecommunications Engineers; www.scte.org.
- 31 164. SDI - Steel Deck Institute; www.sdi.org.
- 32 165. SDI - Steel Door Institute; www.steeldoor.org.
- 33 166. SEFA - Scientific Equipment and Furniture Association; www.sefalabs.com.
- 34 167. SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (See ASCE).
- 35 168. SIA - Security Industry Association; www.siaonline.org.
- 36 169. SJI - Steel Joist Institute; www.steeljoist.org.
- 37 170. SMA - Screen Manufacturers Association; www.smainfo.org.
- 38 171. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; www.smacna.org.
- 39 172. SMPTE - Society of Motion Picture and Television Engineers; www.smpte.org.
- 40 173. SPFA - Spray Polyurethane Foam Alliance; www.sprayfoam.org.
- 41 174. SPIB - Southern Pine Inspection Bureau; www.spib.org.
- 42 175. SPRI - Single Ply Roofing Industry; www.spri.org.
- 43 176. SRCC - Solar Rating and Certification Corporation; www.solar-rating.org.
- 44 177. SSINA - Specialty Steel Industry of North America; www.ssina.com.
- 45 178. SSPC - SSPC: The Society for Protective Coatings; www.sspc.org.
- 46 179. STI - Steel Tank Institute; www.steeltank.com.
- 47 180. SWI - Steel Window Institute; www.steelwindows.com.
- 48 181. SWPPP – Storm Water Pollution Prevention Plan
- 49 182. SWPA - Submersible Wastewater Pump Association; www.swpa.org.
- 50 183. TCA - Tilt-Up Concrete Association; www.tilt-up.org.
- 51 184. TCNA - Tile Council of North America, Inc.; (Formerly: Tile Council of America); www.tileusa.com.
- 52 185. TEMA - Tubular Exchanger Manufacturers Association, Inc.; www.tema.org.

186. TIA - Telecommunications Industry Association; (Formerly: TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance); www.tiaonline.org.
187. TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance; (See TIA).
188. TMS - The Masonry Society; www.masonrysociety.org.
189. TPI - Truss Plate Institute; www.tpinst.org.
190. TPI - Turfgrass Producers International; www.turfgrasssod.org.
191. TRI - Tile Roofing Institute; www.tilerroofing.org.
192. UL - Underwriters Laboratories Inc.; www.ul.com.
193. UNI - Uni-Bell PVC Pipe Association; www.uni-bell.org.
194. USAV - USA Volleyball; www.usavolleyball.org.
195. USGBC - U.S. Green Building Council; www.usgbc.org.
196. USITT - United States Institute for Theatre Technology, Inc.; www.usitt.org.
197. WASTEC - Waste Equipment Technology Association; www.wastec.org.
198. WCLIB - West Coast Lumber Inspection Bureau; www.wclib.org.
199. WCMA - Window Covering Manufacturers Association; www.wcmanet.org.
200. WDMA - Window & Door Manufacturers Association; www.wdma.com.
201. WI - Woodwork Institute; (Formerly: WIC - Woodwork Institute of California); www.wicnet.org.
202. WMMPA - Wood Moulding & Millwork Producers Association; (See MMPA).
203. WSRCA - Western States Roofing Contractors Association; www.wsrca.com.
204. WPA - Western Wood Products Association; www.wwpa.org.

B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.

1. DIN - Deutsches Institut für Normung e.V.; www.din.de.
2. IAPMO - International Association of Plumbing and Mechanical Officials; www.iapmo.org.
3. ICC - International Code Council; www.iccsafe.org.
4. ICC-ES - ICC Evaluation Service, LLC; www.icc-es.org.

C. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Information is subject to change and is up-to-date as of the date of the Contract Documents.

1. COE - Army Corps of Engineers; www.usace.army.mil.
2. CPSC - Consumer Product Safety Commission; www.cpsc.gov.
3. DOC - Department of Commerce; National Institute of Standards and Technology; www.nist.gov.
4. DOD - Department of Defense; <http://dodssp.daps.dla.mil>.
5. DOE - Department of Energy; www.energy.gov.
6. EPA - Environmental Protection Agency; www.epa.gov.
7. FAA - Federal Aviation Administration; www.faa.gov.
8. FG - Federal Government Publications; www.gpo.gov.
9. GSA - General Services Administration; www.gsa.gov.
10. HUD - Department of Housing and Urban Development; www.hud.gov.
11. LBL - Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; <http://eetd.lbl.gov>.
12. OSHA - Occupational Safety & Health Administration; www.osha.gov.
13. SD - Department of State; www.state.gov.
14. TRB - Transportation Research Board; National Cooperative Highway Research Program; www.trb.org.

15. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.
16. USDA - Department of Agriculture; Rural Utilities Service; www.usda.gov.
17. USDJ - Department of Justice; Office of Justice Programs; National Institute of Justice; www.ojp.usdoj.gov.
18. USP - U.S. Pharmacopeia; www.usp.org.
19. USPS - United States Postal Service; www.usps.com.

D. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. CBC - California Building Code.
2. CFR - Code of Federal Regulations; Available from Government Printing Office; www.gpo.gov/fdsys.
3. DOD - Department of Defense; Military Specifications and Standards; Available from Department of Defense Single Stock Point; <http://dodssp.daps.dla.mil>.
4. DSCC - Defense Supply Center Columbus; (See FS).
5. FED-STD - Federal Standard; (See FS).
6. FS - Federal Specification; Available from Department of Defense Single Stock Point; <http://dodssp.daps.dla.mil>.
 - a. Available from Defense Standardization Program; www.dsp.dla.mil.
 - b. Available from General Services Administration; www.gsa.gov.
 - c. Available from National Institute of Building Sciences/Whole Building Design Guide; www.wbdg.org/ccb.
7. MILSPEC - Military Specification and Standards; (See DOD).
8. USAB - United States Access Board; www.access-board.gov.
9. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).

E. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. BSCC – Board of State and Community Corrections.
2. Retain entries below if referenced in Specifications. List has been checked against information obtained from the Internet; it includes only those agencies referenced in the Section Text in MasterSpec Sections. Insert abbreviations, acronyms, and names, such as state highway departments, used in Specifications or added to the office master.
3. CBHF - State of California; Department of Consumer Affairs; Bureau of Electronic Appliance and Repair, Home Furnishings and Thermal Insulation; www.bearhfti.ca.gov.
4. CCR - California Code of Regulations; Office of Administrative Law; California Title 24 Energy Code; www.calregs.com.
5. CDCR – California Department of Corrections and Rehabilitation.
6. CDHS - California Department of Health Services; (See CDPH).
7. CDPH - California Department of Public Health; Indoor Air Quality Program; www.cal-iaq.org.
8. CPUC - California Public Utilities Commission; www.cpuc.ca.gov.
9. DOF – California Department of Finance.
10. SCAQMD - South Coast Air Quality Management District; www.aqmd.gov.
11. San Joaquin Valley Air Pollution Control District, www.valleyair.org
12. CSFM, SFM, or OSFM – California State Fire Marshal's Office.

- 1 PART 2 - PRODUCTS (Not Used)
- 2 PART 3 - EXECUTION (Not Used)
- 3 END OF SECTION 01 42 00

SECTION 01 42 13 - GENERAL ABBREVIATIONS

1.01 GENERAL

Interpret abbreviations used on the drawings and in the specifications as tabulated below. If an abbreviation on a drawing is not explained below, it shall be as explained in ANSI Y1.1. The interpretation of abbreviations shall consider the context or discipline in which they are used, for example:

A. FF usually means "finish floor" when referring to a floor slab.

B. FF usually means "flat face" when referring to a pipe flange.

1.02 LIST OF GENERAL ABBREVIATIONS

Abbreviation	Term
A	
A	Ampere/Area
AA	Aluminum Association
AABC	Associated Air Balance Council
AAMA	Architectural Aluminum Manufacturer's Association
AAS	Airport Advisory Service
AASHTO	American Association of State Highway and Transportation Officials
AB	Anchor Bolt/Aggregate Base
ABAN	Abandoned
ABC	Asphalt Base Course
ABT	About
AC	Acre/Asphaltic Concrete/Alternating Current/Air Conditioning
ACCU	Air Cooled Condensing Unit
ACGIH	American Conference of Governmental Industrial Hygienists
ACI	American Concrete Institute
ACP	Asbestos-Cement Pipe
ACU	Air Conditioning Unit
AD	Access Door
ADDL	Additional
AE	Architect-Engineer
AF	Air Filter/Ampere Frame
AFF	Above Finish Floor
AFB	Air Force Base
AFBMA	Anti-Friction Bearing Manufacturer's Association
AGA	American Gas Association
AGMA	American Gear Manufacturer's Association
AHD	Ahead
AHU	Air Handling Unit

Abbreviation	Term
AI	The Asphalt Institute
AIA	American Institute of Architects
AICS	Amperes Interrupting Capacity, Symmetrical
AIEE	American Institute of Electrical Engineers
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AL	Aluminum
ALIGN	Alignment
ALM	Alarm
ALTN	Alternate
AMB	Ambient
AMCA	Air Movement and Control Association
AMP	Ampere
ANCH	Anchor
ANG	Angle
ANSI	American National Standards Institute
API	American Petroleum Institute
APPROX	Approximate
APWA	American Public Works Association
ARCH	Architecture/Architectural
AREA	American Railway Engineering Association
ARI	Air Conditioning and Refrigeration Institute
ARV	Air-Release Valve
ARVV	Air-Release/Vacuum Valve
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating, and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASPH	Asphalt
ASSY	Assembly
ASTM	American Society of Testing and Materials
ATS	Automatic Transfer Switch
AVE	Avenue
AVG	Average
AWG	American Wire Gauge
AWPA	American Wood Preservers Association
AWPB	American Wood Preservers Bureau
AWS	American Welding Society
AWWA	American Water Works Association

Abbreviation	Term
B	
BB	Back-to-Back
BC	Beginning of Curve/Back of Curve/Bolt Circle
BCR	Begin Curb Return
BEG	Begin
BETW	Between
BF	Blind Flange
BHP	Brake Horsepower
BK	Back/Brake
BKR	Breaker
BL	Base Line
BLDG	Building
BLK	Block
BM	Bench Mark/Beam
BO	Blowoff
BOCA	Building Officials Code Administration International, Inc.
BOD	Biochemical Oxygen Demand
BOT	Bottom
BP	Baseplate
BR	Bronze/Branch
BRG	Bearing
BTN	Button
BTU	British Thermal Unit
BUR CBL	Buried Cable
BV	Butterfly Valve
BVC	Begin Vertical Curve
BW	Block Wall
C	
C	Conduit/Celsius
CAB	Crushed Aggregate Base
CALTRANS	California Department of Transportation
CANTIL	Cantilevered
CAP	Capacity
CATV	Cable Television
CB	Catch Basin/Circuit Breaker
CC	Cooling Coil
C-C	Center-to-Center
CCB	Concrete Block
CCP	Concrete Cylinder Pipe

Abbreviation	Term
CCS	Central Control Station
CD	Cross Drain/Condensate Drain/Ceiling Diffuser
CEM	Cement
CF	Cubic Feet/Curb Face
CFH	Cubic Feet Per Hour
CFM	Cubic Feet Per Minute
CFS	Cubic Feet Per Second
CG	Ceiling Grill
C & G	Curb and Gutter
CH	Chiller
CHG	Change
CHKD PL	Checkered Plate
CI	Cast Iron
CIP	Cast in Place/Cast-Iron Pipe
CISP	Cast Iron Soil Pipe
CISPI	Cast-Iron Soil Pipe Institute
CJ	Construction Joint
CL	Centerline/Class/Clearance
CLR	Clear
CMAA	Crane Manufacturer's Association of America
CMC	Cement-Mortar Coated or Coating
CML	Cement-Mortar Lined or Lining
CMLCSP	Cement-Mortar Lined and Coated Steel Pipe
CMP	Corrugated Metal Pipe
CMPA	Corrugated Metal Pipe Arch
CMU	Concrete Masonry Unit
CO	Cleanout/Conduit Only
COL	Column
COMM	Communication
COMP	Composite
COMPL	Complete
CONC	Concrete
CONN	Connection
CONST	Construct or Construction
CONT	Continuous
CONTR	Contractor
COORD	Coordinate/Coordinated
COP	Copper
COR	Corner

Abbreviation	Term
CPLG	Coupling
CPU	Central Processing Unit
CRES	Corrosion Resistant Steel
CRSI	Concrete Reinforcing Steel Institute
CS	Carbon Steel/Commercial Standard
CSP	Corrugated Steel Pipe
CT	Center Top/Current Transformer
CTG	Coating
CTR	Center
CTV	Cable Television
CULV	Culvert
CU YD, CY	Cubic Yard
CYL	Cylinder
D	
D	Degree of Curvature
DB	Direct Buried/Decibel
DBL	Double
DC	Direct Current
DEPT	Department
DET	Detail/Detour
DG	Decomposed Granite
DI	Drop Inlet/Ductile Iron
DIA	Diameter
DIAG	Diagonal
DIM	Dimension
DIMJ	Ductile-Iron Mechanical Joint
DIP	Ductile-Iron Pipe
DIPRA	Ductile-Iron Pipe Research Association
DISCH	Discharge
DIST	Distance
DIV	Divide/Division
DO	Dissolved Oxygen
DMH	Drop Manhole
DN	Down
DP	Differential Pressure
DPI	Differential Pressure Indicator
DPNL	Distribution Panel
DR	Drain/Door
DSL	Diesel

Abbreviation	Term
DWG	Drawing
DWY	Driveway
E	
E	East
EA	Each
EC	End of Curve
ECC	Eccentric
ECR	End of Curb Return
ED	External Distance
EDUC	Eductor
EE	Each End
EF	Each Face/Exhaust Fan
EFF	Efficiency
EFL	Effluent
EG	Exhaust Grill
EGL	Energy Grade Line
EL	Elevation/Each Layer
E/L	Easement Line
ELEC	Electric
ELEV	Elevation
ELP	Elliptical
EMB	Embankment
ENC	Encasement
ENCL	Enclosure
ENG	Engine
ENGR	Engineer
EOP	Edge of Pavement
EOS	Equivalent Opening Size
EOTW	Edge of Traveled Way
EP	Explosion Proof/Edge of Pavement
EPA	Environmental Protection Agency (Federal)
EQ	Equation
EQL	Equal
ESMT	Easement
EST	Estimate or Estimated
ETC	And so Forth
ETM	Elapsed Time Meter
EVAP	Evaporator
EVC	End Vertical Curve

Abbreviation	Term
EW	Each Way
EWC	Electric Water Cooler
EXC	Excavate or Excavation
EXP	Expansion
EXST	Existing
EXT	Exterior/Extension
F	
F	Fahrenheit/Floor
FAA	Federal Aviation Administration
FAB	Fabricate
FBRBD	Fiberboard
FC	Foot-Candle
FCC	Filter Control Console
FCO	Floor Cleanout
FCV	Flow Control Valve
FD	Floor Drain
FDN	Foundation
FE	Flanged End
FF	Finished Floor/Flat Face
FG	Finished Grade
FHY	Fire Hydrant
F&I	Furnish and Install
FIG	Figure
FIN	Final
FIT	Fitting
FL	Floor/Flow Line
FLEX	Flexible/Flexure
FLG	Flange
FLT	Float
FLUOR	Fluorescent
FM	Force Main/Factory Mutual
FMH	Flexible Metal Hose
FNSH	Finish
FOC	Face of Concrete
FOS	Face of Stud
FPC	Flexible Pipe Coupling
FPM	Feet Per Minute
FPS	Feet Per Second
FPT	Female Pipe Thread

Abbreviation	Term
FS	Finished Surface/Floor Sink/Federal Specifications
FSTNR	Fastener
FT	Feet or Foot
FTG	Footing
FUT	Future
FWY	Freeway
G	
G	Gas
GA	Gauge
GAL	Gallon
GALV	Galvanized
GAS	Gasoline
GB	Grade Break
GDR	Guard Rail
GE	Grooved End
GEN	Generator
GENL	General
GFI	Ground Fault Interrupter
GM	Gas Main
GMT	Greenwich Mean Time
GND	Ground
GPD	Gallons Per Day
GPM	Gallons Per Minute
GR	Grade
GRTG	Grating
GSKT	Gasket
GUT	Gutter
GV	Gate Valve
GWB	Gypsum Wallboard
GWBX	Gypsum Wallboard, Fire Rated
GYP	Gypsum
H	
H	Humidistat
HARN	Harness
HB	Hose Bibb
HC	Heating Coil
HD	Heavy Duty
HDPE	High Density Polyethylene
HEPA	High Efficiency Particulate Air

Abbreviation	Term
HGL	Hydraulic Grade Line
HGT	Height
HID	High Intensity Discharge
HOA	Hand-Off-Automatic
HOR	Hand-Off-Remote
HORIZ	Horizontal
HP	Horsepower/High Pressure
HPS	High Pressure Sodium
HPT	High Point
HR	Hour/Handrail
HS	High Strength
HTG	Heating
HTR	Heater
HV	Hose Valve
HVAC	Heating, Ventilating, and Air Conditioning
HVY	Heavy
HW	Headwall/Hot Water
HWL	High Water Level
HWY	Highway
HYDR	Hydraulic
HZ	Hertz (cycles per second)
I	
I	Intersection Angle
ICBO	International Conference of Building Officials
ID	Inside Diameter
IE	Invert Elevation
IEEE	Institute of Electrical and Electronics Engineers
IN	Inches
INCAND	Incandescent
INCL	Include
INL	Inlet
INS	Insulating
INSTL	Install or Installation
INTR	Interior/Intersection
INV	Invert
IP	Iron Pipe
IPS	Iron Pipe Size
IPT	Iron Pipe Thread
IRR	Irrigation

Abbreviation	Term
ISA	Instrument Society of America
J	
J	Joist
JB	Junction Box
JCT	Junction
JN	Join
JT	Joint
K	
KG	Kilogram
KM	Kilometer
KIPS	Thousands of Pounds
KV	Kilovolt
KVA	Kilovolt-Ampere
KW	Kilowatt
KWH	Kilowatt-Hour
KWHM	Kilowatt-Hour Meter
L	
L	Length of Curve/Long/Left
LATL	Lateral
LAV	Lavatory
LB	Pound
LBR	Lumber
LCL	Local
LF	Linear Foot
LG	Long
LI	Level Indicator
LLO	Long Leg Outstanding
LOC	Location/Locate
LOS	Lockout Stop
LP	Light Pole
LPT	Low Point
LR	Long Radius
LS	Lift Station
LT	Left/Light
LTG	Lighting
LWC	Lightweight Concrete
LWIC	Lightweight Insulating Concrete
LWL	Low Water Level
M	

Abbreviation	Term
MA	Milliampere
MAG	Magnet/Magnetic
MATL	Material
MAX	Maximum
MB	Machine Bolt/Megabyte/Millibars
MBH	Thousand BTU Per Hour
MECH	Mechanical
MC	Metal Channel
MCC	Motor Control Center
MCM	Thousand Circular Mils
MCP	Motor Circuit Protector
MD	Motorized Damper
MFR	Manufacturer
MG	Million Gallons/Milligram
MGD	Million Gallons Per Day
MH	Manhole
MHZ	Megahertz
MI	Malleable Iron/Mile
MIL	Military Specifications
MIN	Minimum
MISC	Miscellaneous
MLSS	Mixed Liquor Suspended Solids
MLVSS	Mixed Liquor Volatile Suspended Solids
MJ	Mechanical Joint
MMA	Monorail Manufacturer's Association
MO	Motor Operator/Motor Operated/Masonry Opening
MOD	Modification
MON	Monument
MOT	Motor
MPT	Male Pipe Thread
MSL	Mean Sea Level
MSS	Manufacturer's Standardization Society
MTD	Mounted
N	
N	North/Neutral/Nitrogen
NA	Not Applicable
NBFU	National Board of Fire Underwriters
NBS	National Bureau of Standards
N & C	Nail and Cap

Abbreviation	Term
NC	Normally Closed
NE	Northeast
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NFC	National Fire Code
NIC	Not in Contract
NIP	Nipple
NO	Number/Normally Open
NOM	Nominal
NPT	National Pipe Taper
NPSH	Net Positive Suction Head
NRS	Nonrising Stem
NTS	Not to Scale
NW	Northwest
NWL	Normal Water Level
O	
OA	Overall/Outside Air
OC	On Center/Overcurrent
OD	Outside Diameter
ODP	Open Dripproof
OE	Or Equal
OF	Outside Face
OPER	Operator
OPNG	Opening
OPP	Opposite
ORIG	Original
OSA	Outside Air
OSHA	Occupational Safety and Health Administration
O TO O	Out to Out
OVFL	Overflow
OVHD	Overhead
P	
P	Pole
PARA	Paragraph
PB	Push Button/Pull Box
PC	Point of Curvature/Programmable Controller
PCA	Portland Cement Association
PCC	Point of Compound Curvature/Portland Cement Concrete
PDI	Plumbing and Drainage Institute

Abbreviation	Term
PE	Plain End/Polyethylene/Professional Engineer
PEN	Penetration
PERF	Perforated
PF	Power Factor
PG	Pressure Gauge
PI	Point of Intersection
PJTN	Projection
PKWY	Parkway
PL	Plate/Property Line
PLATF	Platform
PLF	Pounds Per Lineal Foot
PNL	Panel
POB	Point of Beginning
POC	Point of Connection
POJ	Push-On Joint
PP	Power Pole/Polypropylene
PPB	Parts Per Billion
PPM	Parts Per Million
PR	Pair
PRC	Point of Reverse Curve
PRESS	Pressure
PRL	Parallel
PROV	Provisions
PRPSD	Proposed
PRVC	Point of Reverse Vertical Curve
PSI	Pounds Per Square Inch
PSIG	Pounds Per Square Inch Gauge
PSF	Pounds Per Square Foot
PT	Point of Tangency
PV	Plug Valve
PVC	Polyvinyl Chloride
PVMT	Pavement
PWR	Power
Q	
Q	Flow Rate
QTY	Quantity
R	
R	Right/Radius
RAD	Radius/Radial

Abbreviation	Term
RAF	Return Air Fan
RAG	Return Air Grille
RC	Reinforced Concrete
RCB	Reinforced Concrete Box
RCP	Reinforced Concrete Pipe
RCPA	Reinforced Concrete Pipe Arch
RD	Road
RDC	Reduce
RDCR	Reducer
RDWY	Roadway
REF	Reference
REINF	Reinforce or Reinforced
RELOC	Relocated
REQ	Required/Requirement
REQD	Required
REV	Revise/Revision
RF	Raised Face
RH	Relative Humidity
RND	Round
RJ	Restrained Joint
RLG	Railing
RPM	Revolutions Per Minute
RR	Railroad
RST	Reinforcing Steel
RT	Right
RTD	Resistance Temperature Detector
R/W	Right-of-Way
S	
S	South/Slope in Feet Per Foot/Sewer
SAE	Society of Automotive Engineers
SAN	Sanitary
SAR	Supply Air Register
SBCCI	Southern Building Codes Congress International
SC	Seal Coat
SCFM	Standard Cubic Feet Per Minute
SCHED	Schedule
SCR	Silicon-Controlled Rectifier
SCRN	Screen
SD	Storm Drain

Abbreviation	Term
SDG	Siding
SDI	Steel Deck Institute
SDWK	Sidewalk
SE	Southeast
SECT	Section
SF	Square Feet
SGL	Single
SH	Sheet/Sheeting/Shielded
SIM	Similar
SLP	Slope
SLV	Sleeve
SM	Sheet Metal
SOL	Solenoid
SOV	Solenoid-Operated Valve
SP	Space/Steel Pipe/Static Pressure/Spare
SPCG	Spacing
SPEC	Specification
SPLC	Splice
SPRT	Support
SQ	Square
SQ FT	Square Feet
SR	Short Radius
SS	Sanitary Sewer
SSPC	Steel Structures Painting Council
SST	Stainless Steel
ST	Street
STA	Station
STBY	Standby
STD	Standard
STK	Stake
STL	Steel
STR	Straight
STRL	Structural
STRUCT	Structure
STS	Storm Sewer
STGR	Stringer
STWY	Stairway
SURF	Surface
SW	Southwest

Abbreviation	Term
SWG	Swing
SYMM	Symmetrical
SYS	System
T	
T	Ton/Tangent Length of Curve/Telephone
TAN	Tangent
T/B	Top of Beam
TB	Top of Bank/Terminal Board
T & B	Top and Bottom
TBG	Tubing
TBM	Temporary Bench Mark
TC	Top of Curb
TD	Time Delay
TDH	Total Dynamic Head
TDS	Total Dissolved Solids
TEFC	Totally Enclosed Fan Cooled
TEL	Telephone
TEMP	Temperature/Temporary
TENV	Totally Enclosed Nonventilated
THB	Thrust Block
THD	Thread or Threaded
THH	Thrust Harness
THK	Thick
TIR	Total Indicator Reading
TO	Turnout
T/O	Top of
TOC	Top of Concrete
TOS	Top of Slab
TOT	Total
TP	Telephone Pole
TRD	Tread
TRA	Tie Rod Assembly
TS	Tube Steel
TV	Television
TYP	Typical
U	
UBC	Uniform Building Code
UD	Underdrain
UG	Underground

Abbreviation	Term
UH	Unit Heater
UL	Underwriters' Laboratories, Inc.
ULT	Ultimate
UNO	Unless Noted Otherwise
UPS	Uninterruptible Power Supply
UR	Urinal
USGS	United States Geological Survey
UTC	Underground Telephone Cable
UTR	Up Through Roof
V	
V	Vent/Valve/Volt
VAC	Vacuum/Volts, Alternating Current
VC	Vertical Curve
VCP	Vitrified Clay Pipe
VEL	Velocity
VERT	Vertical
VFD	Variable Frequency Drive
VOL	Volume
VPC	Vertical Point of Curve
VPI	Vertical Point of Intersection
VPT	Vertical Point of Tangency
VSS	Volatile Suspended Solids
VTR	Vent Through Roof
W	
W	West/Watt/Wide/Water
W/	With
WC	Water Closet
WCO	Wall Cleanout
WG	Water Gauge
WH	Wall Hydrant
WL	Waterline
WLD	Welded
WM	Water Meter/Water Main
W/O	Without
WP	Waterproof/Working Point
WRGWB	Water-Resistant Gypsum Wallboard
WSE	Water Surface Elevation
WSP	Water Stop
WT	Weight

Abbreviation	Term
WTR	Water
WWF	Welded Wire Fabric
WWM	Woven Wire Mesh
X	
XFMR	Transformer
XFR	Transfer
Y	
YCO	Yard Cleanout
YD	Yard
YP	Yield Point
YR	Year
YS	Yield Strength
Z	

1

END OF SECTION 01 42 13

1 SECTION 01 5000 - TEMPORARY FACILITIES AND CONTROLS

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and other Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY

- 7 A. Section includes requirements for temporary utilities, support facilities, and security and
8 protection facilities.
- 9 B. Related Sections: Section 01 10 00 "Summary" for work restrictions and limitations on utility
10 interruptions.

11 1.3 USE CHARGES

- 12 A. General: Installation and removal of temporary facilities shall be included in the Contract Sum
13 unless otherwise indicated. Allow other entities to use temporary services and facilities without
14 cost, including, but not limited to, Owner's representative and construction forces, Architect,
15 testing agencies, and authorities having jurisdiction.
- 16 B. Electric Power Service from Existing System: Electric power from Owner's existing system is
17 available for on-site operations only. Charges for temporary electric services to be paid by the
18 County. Provide connections and extensions of services as required for construction
19 operations.

20 1.4 INFORMATIONAL SUBMITTALS

- 21 A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for
22 construction personnel.
- 23 B. Erosion and Sedimentation Control Plan: The State of California Regional Water Quality Board
24 requires that all projects disturbing one acre or more of land shall file a Notice of Intent to the
25 Board and must implement a Storm Water Pollution Prevention Plan (SWPPP) in order to meet
26 the requirements of the Construction General Permit 2009-0009-DWQ. Construction work shall
27 not commence until the SWPPP is completed. It shall be the Contractor's responsibility to
28 insure that the SWPPP implementation and documents are kept up to date and in compliance
29 with State requirements. In addition, Contractor shall comply with any additional regulations
30 under the authority having jurisdiction, including local authorities.
- 31 C. SWPPP Permit Registration Documents to be completed and filed by Owner.
- 32 D. Installation and maintenance of BMPs, Preparation and Submission of all required Annual
33 Reports, implementation of the CSMP in the SWPPP, are the responsibilities of the general
34 contractor.
- 35 E. SWPPP is Risk Level 1.

F. Moisture-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage, including delivery, handling, and storage provisions for materials subject to water absorption or water damage, discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water damaged Work.

G. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.

H. The San Joaquin Valley Air Pollution Control District regulates all dust control and emission standards throughout the Central Valley. Regulation VIII – Fugitive PM10 Prohibitions requires that a Dust Control Plan be completed for a large majority of construction projects. District Rule 9510-Indirect Source Review (ISR) is applicable to many development projects as well. It shall be the Contractor's responsibility to implement all measures listed in the Dust Control Plan and ISR Plan if required for the project. At this time, a Dust Control Plan and ISR Plan are not required under Rule 9510 due to the nature of the Projection. However, in the event that this determination changes and an ISR Plan and Dust Control Plan are required, the following shall apply: Construction work shall not commence until the Dust Control plan is completed and approved by the County. Whether a Dust Control Plan is required for the project or not, the Contractor shall be responsible for meeting the requirements of Rule 8021 by providing written notification to the District at least 48 hours prior to commencing any earthmoving activity for any project which involves a residential development site of 1.0 acres to 10.0 acres in area or a non-residential development site 1.0 acres to 5.0 acres in area. Contractor shall pay for all fees related to the dust control plan permit.

I. Dust-Control and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust-control and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Identify further options if proposed measures are later determined to be inadequate. Include the following:

1. Locations of dust-control partitions at each phase of the work.
2. HVAC system isolation schematic drawing.
3. Other dust-control measures.
4. Waste management plan.

1.5 QUALITY ASSURANCE

A. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

B. Accessible Temporary Egress: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines.

1.6 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Engage installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

1.7 TEMPORARY FACILITIES

- A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
- C. Store combustible materials apart from building, in compliance with all applicable codes.
- D. County Field Office: It shall be equivalent to a mobile trailer having an area of at least 1,000 square feet. Each window shall be protected with a minimum one-half inch square security bars spaced at two inch centers. The field office shall have four (4) office rooms plus a toilet room. Provide (4) designated parking spaces for Construction Manager and County personnel. Provide janitorial type services to keep office clean and orderly throughout duration of the project. Furnish and equip the field office as follows for the duration of the project:
 - 1. Furniture required includes: (3) 4 drawer lateral file cabinets, (1) wall mounted sloped plan table (3 feet by 7 feet), (2) metal plan racks capable of holding the entire set of construction drawings, (4) 5 shelf bookcases, (4) desks with return, (4) padded desk chairs, (1) conference table capable of allowing 12 attendees, (12) padded folding chairs, (4) 4 foot x 3 foot whiteboards, (1) colored copier/scanner to include toner supplies and service through final Contract completion (copier to be equivalent or better than a Ricoh MPC 3001), (1) InFocus Portable widescreen projector, Infocus Model # IN120A (or equivalent), with ceiling bracket and carrying case and projection screen in conference room and (1) 4 foot square tack board. Furniture to be in near new or new condition and approved by the CM prior to installation in the trailer.
 - a. High-speed wireless internet connection (100 Mbps minimum) for the duration of the project with internet outlets provided in each office and (2) outlets located in conference area and (1) outlet near main entrance door.
 - b. Provide electrical power service and 120-V ac duplex receptacles, with not less than 1 receptacle on each wall.
 - c. Drinking water and dispensing unit.
 - d. (1) Coat rack
 - e. Provide and install at least (3) 5lb dry chemical fire extinguishers within the trailer. Extinguishers shall be UL rated. Contractor shall be required to service the extinguishers in accordance with manufacturer's recommendations and local fire standards.
 - f. Lighting fixtures capable of maintaining average illumination of 35 foot-candles at desk height.
 - 2. Land roll-over phone lines one outlet for conference table, one outlet for plan table). Speaker phones (2 each) and integral answering machine.
 - 3. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F
- E. Design, construct, connect, maintain, operate and pay for an at-grade sanitary sewage disposal system for the County Field Office's consisting of all piping, connections, clean outs, and at-grade holding tank(s) as required. Design shall be based on a minimum flow of 1,000 gallons per day of waste and/or occupancy of 50 people, whichever is the greater.

1. Locate holding tanks under the office trailer as an integral component of the trailer. Components shall not create a safety hazard, obnoxious odors during use and/or while servicing, be an impediment to surface construction vehicle parking and traffic, and installation of construction work.
2. Arrange and pay for weekly removal of waste as required to maintain a sanitary and functionally operating waste system. Disposal of waste material shall be in full accordance with all applicable codes and requirements
3. Obtain and comply with all permits for operation of the system.

1.8 TEMPORARY SIGNS

- A. Signs of Contractors and Subcontractors: Subject submission by Contractor prior to approval of the Architect-Engineer as to size, design, type, location and local regulations, the Contractor and his Subcontractors may erect temporary signs for purposes of identification and controlling traffic. The Contractor shall furnish, erect and maintain such signs required by safety regulations and necessary to safeguard life and property.
- B. Contractor is required to furnish and install one (1) 4 ft. by 8 ft. project sign, design for which to be provided by Architect. Location to be coordinated and approved by Owner. Project sign to be securely installed on posts to avoid being blocked by low vegetation. Project sign to be visible from outside of project gate entry, and to be maintained from groundbreaking thru project completion.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
- B. Locate facilities to limit site disturbance as specified in Division 01 Section "Summary."
- C. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
- B. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- C. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations. Power to be metered.
- D. Install electric power service overhead, unless otherwise indicated.

- 1 E. Connect temporary service to Owner's existing power source, as directed by Owner.
- 2 F. Telephone Service: Provide temporary telephone service in common-use facilities for use by all
3 construction personnel. Install one telephone line for each contractor field office.
- 4 1. Provide additional telephone lines for the following:
- 5 a. Provide a dedicated telephone line for each facsimile machine in each field office.
6 b. Provide telephone lines for Owner's use. See Section 2.1 for County Field Office.
- 7 2. At each telephone, post a list of important telephone numbers.
8 a. Police and fire departments.
9 b. Ambulance service.
10 c. Contractor's home office.
11 d. Provide contractor's project manager and superintendent with cellular telephone or
12 portable two-way radio for use when away from field office.
- 13 G. Provide temporary water service as necessary from an approved water source. If utilizing water
14 provided by the City, the contractor shall be required to coordinate and comply with all City
15 regulations.

16 3.3 SUPPORT FACILITIES INSTALLATION

- 17 A. General: Comply with the following:
- 18 1. Maintain support facilities until the County schedules Notice of Project Completion
19 inspection. Remove only after Notice of Project Completion.
- 20 2. Temporary Use of Permanent Roads and Paved Areas: Locate temporary roads and
21 paved areas in same location as permanent roads and paved areas. Construct and
22 maintain temporary roads and paved areas adequate for construction operations. Extend
23 temporary roads and paved areas, within construction limits indicated, as necessary for
24 construction operations.
- 25 a. Coordinate elevations of temporary roads and paved areas with permanent roads
26 and paved areas.
- 27 b. Prepare subgrade and install subbase and base for temporary roads and paved
28 areas according to Division 31 Section "Earth Moving."
- 29 c. Recondition base after temporary use, including removing contaminated material,
30 regrading, proofrolling, compacting, and testing.
- 31 3. Traffic Controls:
- 32 a. Comply with requirements of authorities having jurisdiction.
33 b. Protect existing site improvements to remain including curbs, pavement, and
34 utilities.
35 c. Maintain access for fire-fighting equipment and access to fire hydrants.
- 36 4. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to
37 handle waste from construction operations. Comply with requirements of authorities
38 having jurisdiction. Comply with Division 01 Section "Execution" for progress cleaning
39 requirements.

40 3.4 OPERATION, TERMINATION, AND REMOVAL

- 1 A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and
2 abuse, limit availability of temporary facilities to essential and intended uses.
- 3 B. Maintenance: Maintain facilities in good operating condition until removal.
- 4 C. Temporary Facility Changeover: Do not change over from using temporary security and
5 protection facilities to permanent facilities until Notice of Project Completion.
- 6 D. Termination and Removal: Remove each temporary facility when need for its service has
7 ended, when it has been replaced by authorized use of a permanent facility, or no later than
8 Notice of Project Completion. Complete or, if necessary, restore permanent construction that
9 may have been delayed because of interference with temporary facility. Repair damaged Work,
10 clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
- 11 E. Materials and facilities that constitute temporary facilities are property of Contractor. Owner
12 reserves right to take possession of Project identification signs.
- 13 F. At Notice of Project Completion, repair, renovate, and clean permanent facilities used during
14 construction period. Comply with final cleaning requirements specified in Division 01 Section
15 "Project Closeout".
- 16 END OF SECTION 01 50 00

1 SECTION 01 61 00 – PRODUCT REQUIREMENTS

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and other Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY

- 7 A. This Section specifies administrative and procedural requirements governing the Contractor's
8 selection of products for use in the Project.

- 9 B. The Contractor's Construction Schedule is included in Section 01 32 26, "Construction Progress
10 Documentation"; and the Schedule of Submittals is included under Section 01 33 23, "Submittal
11 Procedures."

- 12 C. Administrative procedures for handling requests for substitutions are included under Section 01
13 25 00, "Substitution Procedures."

14 1.3 DEFINITIONS

- 15 A. Definitions used in this Article are not intended to change the meaning of other terms used in
16 the Contract Documents, such as "specialties," "systems," "structure," "finishes," "accessories,"
17 and similar terms. Such terms are self-explanatory and have well recognized meanings in the
18 construction industry.

- 19 1. "Products" are items purchased for incorporation in the Work, whether purchased for the
20 Project or taken from previously purchased stock. The term "product" includes the terms
21 "material," "equipment," "system," and terms of similar intent.

- 22 a. "Named Products" are items identified by manufacturer's product name, including
23 make or model designation, indicated in the manufacturer's published product
24 literature, that is current as of the date of the Contract Documents.

- 25 2. "Materials" are products that are substantially shaped, cut, worked, mixed, finished,
26 refined or otherwise fabricated, processed, or installed to form a part of the Work.

- 27 3. "Equipment", is a product with operational parts, whether motorized or manually
28 operated, that requires service connections such as wiring or piping.

29 1.4 DESCRIPTION

- 30 A. Material and equipment incorporated in the Work shall be:

- 31 1. New, unless otherwise specified.
32 2. In a condition acceptable to the Owner and the Architect.
33 3. Suitable for the use intended.
34 4. In conformance with EPA codes and regulations and applicable air quality control district.

- 1 B. No material or equipment shall be used for any purpose other than that for which it is designed
2 or specified.
- 3 C. No material shall contain asbestos.
- 4 D. No materials or products shall contain formaldehyde in excess of the amount recommended by
5 the State of California Department of Health Services (DOHS).

6 1.5 TRANSPORTATION AND HANDLING

- 7 A. Deliver manufactured products in the manufacturer's original, unbroken containers or
8 packaging, with identifying labels intact and legible.
- 9 B. Immediately on delivery, inspect shipments to assure compliance with the requirements of the
10 Contract Documents and reviewed submittals, and to verify that products are properly protected
11 and undamaged.
- 12 C. Handle products in a manner to avoid soiling and damaging the products and their packaging.
- 13 D. Promptly remove damaged and defective products from the site, and replace at no increase in
14 Contract Sum.

15 1.6 STORAGE

- 16 A. Store manufactured products in accordance with the manufacturers' printed instructions, with
17 seals and labels intact and legible.
- 18 1. Store products subject to damage by the elements in weathertight enclosures.
19 2. Maintain temperature and humidity within the ranges specified by the manufacturers.
- 20 B. Exterior Storage:
- 21 1. Store fabricated products above the ground, on blocking or skids, to prevent soiling and
22 staining.
23 2. Cover products which are subject to deterioration with impervious sheet coverings;
24 provide adequate ventilation to avoid condensation.
25 3. Store loose granular material in a well-drained area on solid surfaces to prevent mixing
26 with foreign matter.
- 27 C. Arrange storage to facilitate inspection.
- 28 D. Periodically inspect stored products to assure that products are maintained under specified
29 conditions and free from damage and deterioration.
- 30 E. Protection After Installation:
- 31 1. Provide substantial coverings as necessary to protect installed products from damage
32 from traffic and construction operations. Remove coverings when no longer needed.
33 2. Maintain temperature and humidity conditions for interior equipment and finish products
34 in accordance with the manufacturers' printed instructions.
35

1.7 PRODUCT OPTIONS

- A. For products indicated or specified only by reference standard, select any product meeting such standard.
- B. For products indicated or specified by naming several products or manufacturers, select any one (1) of the products or manufacturers named which complies with the specified requirements. Products or manufacturers listed first or as "Basis of Design" are the County's preferred products or manufacturers.
- C. For products indicated as "no known equal" indicate only that there is no alternative product that the Architect/Engineer is aware of. It is not intended to limit potential substitutions.
- D. Products not meeting the criteria hereinabove, shall be considered Substitutions, and shall be submitted as specified under Section 01 25 00 "Substitutions".
- E. "Or accepted equal" means a product accepted in writing by the Architect prior to bid opening for use in the Work as being equivalent in essential attributes to the product indicated or specified in the Contract Documents. Reference Section 01 25 00 "Substitutions".

1.8 QUALITY ASSURANCE

- A. Source Limitations: To the fullest extent possible, provide products of the same kind, from a single source.
- B. Compatibility of Options: When the Contractor is given the option of selecting between two or more products for use on the Project, the product selected shall be compatible with products previously selected, even if previously selected products were also options.
- C. Each Contractor is responsible for providing products and construction methods compatible with products and construction methods of other Contractors.
- D. If a dispute arises between Contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.
- E. Nameplates: Except for required labels and operating data, do not attach or imprint manufacturer's or producer's nameplates or trademarks on exposed surfaces of products which will be exposed to view in occupied spaces or on the exterior.
 - 1. Labels: Locate required product labels and stamps on a concealed surface or, where required for observation after installation, on an accessible surface that is not conspicuous.
 - 2. Equipment Nameplates: Provide a permanent nameplate on each item of service-connected or power-operated equipment. Locate on an easily accessible surface which is inconspicuous in occupied spaces. The nameplate shall contain the following information and other essential operating data:
 - a. Name of product and manufacturer.
 - b. Model and serial number.
 - c. Capacity
 - d. Speed.
 - e. Ratings.

1 PART 2 - PRODUCTS

2 2.1 PRODUCT SELECTION

3 A. General Product Requirements: Provide products that comply with the Contract Documents
4 that are new and undamaged and unused at the time of installation.

5 1. Provide products complete with all accessories, trim, finish, safety guards and other
6 devices and details needed for a complete installation and for the intended use and
7 effect.

8 2. Standard Products: Where available, provide standard products of types that have been
9 produced and used successfully in similar situations on other projects.

10 B. Product Selection Procedures: Product selection is governed by the Contract Documents and
11 governing regulations, not by previous Project experience.

12 1. Visual Matching: Where Specifications require matching an established Sample, the
13 Architect's decision will be final on whether a proposed product matches satisfactorily.

14 a. Where no product available within the specified category matches satisfactorily
15 and also complies with other specified requirements, comply with provisions of the
16 Contract Documents concerning "Substitutions" for selection of a matching product
17 in another product category, or for noncompliance with specified requirements.

18 2. Visual Selection: Where specified product requirements include the phrase "...as
19 selected from manufacturer's standard colors, patterns, textures..." or a similar phrase,
20 select a product and manufacturer that complies with other specified requirements. The
21 Architect will select the color, pattern and texture from the product line selected.

22 PART 3 - EXECUTION

23 3.1 INSTALLATION OF PRODUCTS

24 A. Comply with manufacturer's instructions and recommendations for installation of products in the
25 applications indicated. Anchor each product securely in place, accurately located and aligned
26 with other Work.

27 1. Clean exposed surfaces and protect as necessary to ensure freedom from damage and
28 deterioration at time of Notice of Completion.

29 END OF SECTION 01 61 00

1 SECTION 01 73 00 - EXECUTION

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and other Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY

- 7 A. Section includes general administrative and procedural requirements governing execution of the
8 Work including, but not limited to, the following:

- 9 1. Construction layout.
10 2. Field engineering and surveying.
11 3. Installation of the Work.
12 4. Cutting and patching.
13 5. Coordination of Owner-installed products.
14 6. Progress cleaning.
15 7. Starting and adjusting.
16 8. Protection of installed construction.

- 17 B. Related Requirements:

- 18 1. Section 01 10 00 "Summary" for limits on use of Project site.
19 2. Section 01 33 00 "Submittal Procedures" for submitting surveys.
20 3. Section 01 78 00 "Closeout Procedures" for submitting final property survey with Project
21 Record Documents, recording of Owner-accepted deviations from indicated lines and
22 levels, and final cleaning.
23 4. Section 02 41 19 "Selective Demolition" for demolition and removal of selected portions
24 of the building.
25 5. Section 07 84 13 "Penetration Firestopping" for patching penetrations in fire-rated
26 construction.

27 1.3 DEFINITIONS

- 28 A. Cutting: Removal of in-place construction necessary to permit installation or performance of
29 other work.

- 30 B. Patching: Fitting and repair work required to restore construction to original conditions after
31 installation of other work.

32 1.4 INFORMATIONAL SUBMITTALS

- 33 A. Certificates: Submit certificate signed by land surveyor or professional engineer certifying that
34 location and elevation of improvements comply with requirements.

B. Cutting and Patching Plan: Submit plan describing procedures at least 7 days prior to the time cutting and patching will be performed. Include the following information:

1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
3. Products: List products to be used for patching and firms or entities that will perform patching work.
4. Dates: Indicate when cutting and patching will be performed.
5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.

- a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.

C. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

D. Certified Surveys: Submit two copies signed by land surveyor or professional engineer.

E. Final Property Survey: Submit 10 copies showing the Work performed and record survey data.

1.5 QUALITY ASSURANCE

A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.

- a. Area to be considered: Tunnel at North Annex Jail

2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include the following:

- a. Primary operational systems and equipment.
- b. Detention security and operating systems.
- c. Fire separation assemblies.
- d. Air or smoke barriers.
- e. Fire-suppression systems.
- f. Mechanical systems piping and ducts.
- g. Control systems.

- h. Communication systems.
 - i. Fire-detection and other alarm systems.
 - j. Conveying systems.
 - k. Electrical wiring systems.
 - l. Operating systems of special construction.
 - m. Central Plant and associated systems.
3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:
- a. Water, moisture, or vapor barriers.
 - b. Membranes and flashings.
 - c. Exterior curtain-wall construction.
 - d. Sprayed fire-resistive material.
 - e. Equipment supports.
 - f. Piping, ductwork, vessels, and equipment.
 - g. Noise- and vibration-control elements and systems.
4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- C. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.
- D. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
- B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

1 PART 3 - EXECUTION

2 3.1 EXAMINATION

3 A. Existing Conditions: The existence and location of underground and other utilities and
4 construction indicated as existing are not guaranteed. Before beginning sitework, investigate
5 and verify the existence and location of underground utilities, mechanical and electrical
6 systems, and other construction affecting the Work.

7 1. Before construction, verify the location and invert elevation at points of connection of
8 sanitary sewer, storm sewer, and water-service piping; underground electrical services,
9 and other utilities.

10 2. Furnish location data for work related to Project that must be performed by public utilities
11 serving Project site.

12 B. Examination and Acceptance of Conditions: Before proceeding with each component of the
13 Work, examine substrates, areas, and conditions, with Installer or Applicator present where
14 indicated, for compliance with requirements for installation tolerances and other conditions
15 affecting performance. Record observations.

16 1. Examine roughing-in for mechanical and electrical systems to verify actual locations of
17 connections before equipment and fixture installation.

18 2. Examine walls, floors, and roofs for suitable conditions where products and systems are
19 to be installed.

20 3. Verify compatibility with and suitability of substrates, including compatibility with existing
21 finishes or primers.

22 C. Written Report: Where a written report listing conditions detrimental to performance of the Work
23 is required by other Sections, include the following:

24 1. Description of the Work.

25 2. List of detrimental conditions, including substrates.

26 3. List of unacceptable installation tolerances.

27 4. Recommended corrections.

28 D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding
29 with the Work indicates acceptance of surfaces and conditions.

30 3.2 PREPARATION

31 A. Existing Utility Information: Furnish information to local utility that is necessary to adjust, move,
32 or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances
33 located in or affected by construction. Coordinate with authorities having jurisdiction.

34 B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck
35 measurements before installing each product. Where portions of the Work are indicated to fit to
36 other construction, verify dimensions of other construction by field measurements before
37 fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the
38 Work.

39 C. Space Requirements: Verify space requirements and dimensions of items shown
40 diagrammatically on Drawings.

- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 01 31 13 "Project Coordination."

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.

- B. General: Engage a land surveyor or professional engineer to lay out the Work using accepted surveying practices.

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
2. Establish limits on use of Project site.
3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
4. Inform installers of lines and levels to which they must comply.
5. Check the location, level and plumb, of every major element (to include column plumbness) as the Work progresses.
6. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

- E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

- A. Identification: Owner will identify existing benchmarks, control points, and property corners.

- B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.

1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.

- 1 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base
2 replacements on the original survey control points.
- 3 C. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site,
4 referenced to data established by survey control points. Comply with authorities having
5 jurisdiction for type and size of benchmark.
- 6 1. Record benchmark locations, with horizontal and vertical data, on Project Record
7 Documents.
- 8 2. Where the actual location or elevation of layout points cannot be marked, provide
9 temporary reference points sufficient to locate the Work.
- 10 3. Remove temporary reference points when no longer needed. Restore marked
11 construction to its original condition.
- 12 D. Certified Survey: On completion of foundation walls, major site improvements, and other work
13 requiring field-engineering services, prepare a certified survey showing dimensions, locations,
14 angles, and elevations of construction and sitework.
- 15 E. Final Property Survey: Engage a land surveyor or professional engineer to prepare a final
16 property survey showing significant features (real property) for Project. Include on the survey a
17 certification, signed by land surveyor or professional engineer, that principal metes, bounds,
18 lines, and levels of Project are accurately positioned as shown on the survey.
- 19 1. Show boundary lines, monuments, streets, site improvements and utilities, existing
20 improvements and significant vegetation, adjoining properties, acreage, grade contours,
21 and the distance and bearing from a site corner to a legal point.
- 22 2. Recording: At Notice of Completion, have the final property survey recorded by or with
23 authorities having jurisdiction as the official "property survey."
- 24 3.5 INSTALLATION
- 25 A. General: Locate the Work and components of the Work accurately, in correct alignment and
26 elevation, as indicated.
- 27 1. Make vertical work plumb and make horizontal work level.
- 28 2. Where space is limited, install components to maximize space available for maintenance
29 and ease of removal for replacement.
- 30 3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
- 31 4. Maintain minimum headroom clearance of 96 inches in occupied spaces and 90 inches in
32 unoccupied spaces.
- 33 B. Comply with manufacturer's written instructions and recommendations for installing products in
34 applications indicated.
- 35 C. Install products at the time and under conditions that will ensure the best possible results.
36 Maintain conditions required for product performance until Notice of Project Completion.
- 37 D. Conduct construction operations so no part of the Work is subjected to damaging operations or
38 loading in excess of that expected during normal conditions of occupancy.
- 39 E. Sequence the Work and allow adequate clearances to accommodate movement of construction
40 items on site and placement in permanent locations.
- 41 F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

- 1 G. Templates: Obtain and distribute to the parties involved templates for work specified to be
2 factory prepared and field installed. Check Shop Drawings of other work to confirm that
3 adequate provisions are made for locating and installing products to comply with indicated
4 requirements.
- 5 H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate
6 size and number to securely anchor each component in place, accurately located and aligned
7 with other portions of the Work. Where size and type of attachments are not indicated, verify
8 size and type required for load conditions.
- 9 1. Mounting Heights: Where mounting heights are not indicated, mount components at
10 heights directed by Architect.
11 2. Allow for building movement, including thermal expansion and contraction.
12 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions
13 for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with
14 integral anchors, that are to be embedded in concrete or masonry. Deliver such items to
15 Project site in time for installation.
- 16 I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated,
17 arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- 18 J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered
19 hazardous.

20 3.6 CUTTING AND PATCHING

- 21 A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed
22 with cutting and patching at the earliest feasible time, and complete without delay.
- 23 1. Cut in-place construction to provide for installation of other components or performance
24 of other construction, and subsequently patch as required to restore surfaces to their
25 original condition.
- 26 B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged
27 during installation or cutting and patching operations, by methods and with materials so as not
28 to void existing warranties.
- 29 C. Temporary Support: Provide temporary support of work to be cut.
- 30 D. Protection: Protect in-place construction during cutting and patching to prevent damage.
31 Provide protection from adverse weather conditions for portions of Project that might be
32 exposed during cutting and patching operations.
- 33 E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free
34 passage to adjoining areas is unavoidable, coordinate cutting and patching according to
35 requirements in Section 01 10 00 "Summary."
- 36 1. Any operations within, effecting, or interfering with the functioning of the existing jail
37 facility must be submitted to and approved by the Sheriff's office a minimum of 5 days
38 prior to the commencement of such operations.
- 39 F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems
40 are required to be removed, relocated, or abandoned, bypass such services/systems before
41 cutting to prevent interruption to occupied areas.

- 1 G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar
2 operations, including excavation, using methods least likely to damage elements retained or
3 adjoining construction. If possible, review proposed procedures with original Installer; comply
4 with original Installer's written recommendations.
- 5 1. In general, use hand or small power tools designed for sawing and grinding, not
6 hammering and chopping. Cut holes and slots neatly to minimum size required, and with
7 minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
8 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
9 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a
10 diamond-core drill.
11 4. Excavating and Backfilling: Comply with requirements in applicable Sections where
12 required by cutting and patching operations.
13 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be
14 removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent
15 entrance of moisture or other foreign matter after cutting.
16 6. Proceed with patching after construction operations requiring cutting are complete.
- 17 H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations
18 following performance of other work. Patch with durable seams that are as invisible as
19 practicable. Provide materials and comply with installation requirements specified in other
20 Sections, where applicable.
- 21 1. Inspection: Where feasible, test and inspect patched areas after completion to
22 demonstrate physical integrity of installation.
23 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish
24 restoration into retained adjoining construction in a manner that will minimize evidence of
25 patching and refinishing.
- 26 a. Clean piping, conduit, and similar features before applying paint or other finishing
27 materials.
28 b. Restore damaged pipe covering to its original condition.
- 29 3. Floors and Walls: Where walls or partitions that are removed extend one finished area
30 into another, patch and repair floor and wall surfaces in the new space. Provide an even
31 surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall
32 coverings and replace with new materials, if necessary, to achieve uniform color and
33 appearance.
- 34 a. Where patching occurs in a painted surface, prepare substrate and apply primer
35 and intermediate paint coats appropriate for substrate over the patch, and apply
36 final paint coat over entire unbroken surface containing the patch. Provide
37 additional coats until patch blends with adjacent surfaces.
38
- 39 4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane
40 surface of uniform appearance.
41 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a
42 weathertight condition and ensures thermal and moisture integrity of building enclosure.
- 43 I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint,
44 mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 OWNER-INSTALLED PRODUCTS

- A. Site Access: Provide access to Project site for Owner's construction personnel.
- B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.
 - 1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
 - 2. Pre-installation Conferences: Include Owner's construction personnel at pre-installation conferences covering portions of the Work that are to receive Owner's work. Attend pre-installation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

3.8 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
 - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 - 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
 - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
 - a. Use containers intended for holding waste materials of type to be stored.
 - 4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 - 1. Remove liquid spills promptly.
 - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Project Completion.

- 1 G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials
2 down sewers or into waterways.
- 3 H. During handling and installation, clean and protect construction in progress and adjoining
4 materials already in place. Apply protective covering where required to ensure protection from
5 damage or deterioration at Project Completion.
- 6 I. Clean and provide maintenance on completed construction as frequently as necessary through
7 the remainder of the construction period. Adjust and lubricate operable components to ensure
8 operability without damaging effects.
- 9 J. Limiting Exposures: Supervise construction operations to ensure that no part of the
10 construction, completed or in progress, is subject to harmful, dangerous, damaging, or
11 otherwise deleterious exposure during the construction period.
- 12 3.9 STARTING AND ADJUSTING
- 13 A. Coordinate startup and adjusting of equipment and operating components with requirements in
14 Section 01 91 13 "General Commissioning Requirements."
- 15 B. Start equipment and operating components to confirm proper operation. Remove malfunctioning
16 units, replace with new units, and retest.
- 17 C. Adjust equipment for proper operation. Adjust operating components for proper operation
18 without binding.
- 19 D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties.
20 Replace damaged and malfunctioning controls and equipment.
- 21 E. Manufacturer's Field Service: Comply with qualification requirements in Section 01 40 00
22 "Quality Requirements."
- 23 3.10 PROTECTION OF INSTALLED CONSTRUCTION
- 24 A. Provide final protection and maintain conditions that ensure installed Work is without damage or
25 deterioration at time of Project Completion.
- 26 B. Comply with manufacturer's written instructions for temperature and relative humidity.
- 27 END OF SECTION 01 73 00

1 SECTION 01 78 00 – PROJECT CLOSEOUT

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and other Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY:

- 7 A. This Section specifies administrative and procedural requirements for project closeout, including
8 but not limited to:

- 9 1. Inspection procedures
10 2. Instruction of Owner's personnel
11 3. Final Cleaning
12 4. Restoration of damaged and remedial work
13 5. Delivery of extra materials

- 14 B. Related Requirements:

- 15
16 1. Section 01 29 00 "Payment Procedures"
17 2. Section 01 78 23 "Operation and Maintenance Data"
18 3. Section 01 78 36 "Warranties and Bonds"
19 4. Section 01 78 39 "Project Record Documents"

20 1.3 FINAL COMPLETION:

- 21 A. Preliminary Procedures: Before requesting inspection for certification of Final Completion,
22 complete the following. List exceptions in the request.

- 23 1. In the Application for Payment that coincides with, or first follows, the date Final
24 Completion is claimed, show 100 percent (100%) completion for the portion of the Work
25 claimed as complete. Include supporting documentation for completion as indicated in
26 these Contract Documents and a statement showing an accounting of charges to the
27 Contract Sum.

- 28 a. If 100 percent (100%) completion cannot be shown, include a list of incomplete
29 items, the value of incomplete construction, and reasons the Work is not complete.

- 30 2. Advise Construction Manager (CM) of pending insurance changeover requirements.
31 3. Submit specific warranties, workmanship bonds, maintenance agreements, final
32 certifications and similar documents.
33 4. Submit closeout submittals specified in other Division 01 Sections, including project
34 record documents, operation and maintenance manuals, final completion construction
35 photographic documentation, damage or settlement surveys, property surveys, and
36 similar final record information.
37 5. Submit closeout submittals specified in individual Sections, including specific warranties,
38 workmanship bonds, maintenance service agreements, final certifications, and similar
39 documents.

6. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to locations designated by Construction Manager. Label with manufacturer's name and model number where applicable.
7. Submit test/adjust/balance records.
8. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
9. Complete startup and testing of systems and equipment.
10. Perform preventive maintenance on equipment used prior to Notice of Final Completion.
11. Advise Owner of changeover in heat and other utilities.
12. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
13. Terminate and remove temporary facilities from Project site.
14. Obtain and submit releases enabling the Owner unrestricted use of the Work and access to services and utilities; include occupancy permits, operating certificates and similar releases.
15. Complete final clean up requirements, including touch-up painting. Touch up and otherwise repair and restore marred exposed finishes.

B. Inspection Procedures: On receipt of a request for inspection, the IOR will either proceed with inspection scheduling or advise the Contractor of unfilled requirements. The IOR will work with the CM to prepare the Notice of Completion following inspection, or advise the Contractor of construction that must be completed or corrected before the Notice will be issued.

1. The IOR will repeat inspection scheduling when requested and assured that the Work has been completed.
2. Results of the completed inspection will form the basis of requirements for final acceptance.

1.4 FINAL ACCEPTANCE:

A. Preliminary Procedures: Before requesting final inspection for certification of final acceptance and final payment, complete the following. List exceptions in the request.

1. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.
2. Submit an updated final statement, accounting for final additional changes to the Contract Sum.
3. Submit a certified copy of the IOR's and Architect's final inspection list of items to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance, and the list has been endorsed and dated by the IOR and Architect.
4. Submit record drawings, damage or settlement survey, property survey, and similar final record information.
5. Submit consent of surety to final payment.
6. Submit a final liquidated damages settlement statement.
7. Submit evidence of final, continuing insurance coverage complying with insurance requirements.

B. Re-inspection Procedure: The Construction Manager will re-inspect the Work upon receipt of notice that the work, including inspection list items from earlier inspections, has been completed, except items whose completion has been delayed because of circumstances acceptable to the Construction Manager.

- 1 1. Upon completion of re-inspection, the Construction Manager will prepare a Notice of
- 2 Completion, or advise the Contractor of Work that is incomplete or of obligations that
- 3 have not been fulfilled but are required for final completion.
- 4 2. If necessary, the re-inspection procedure will be repeated.

5 PART 2 - PRODUCTS (not used)

6 PART 3 - EXECUTION

7 3.1 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

8 A. Owner's Training Sessions: Arrange for each installer of equipment that requires regular
9 maintenance to provide DVD-recorded Owner's training sessions. Arrange for each installer of
10 equipment that requires regular maintenance, to meet with the Owner's personnel to review
11 contractor furnished DVD-recorded instruction in the proper operation and maintenance of each
12 component of each system. If installers are not experienced in procedures, provide instruction
13 by manufacturer's representatives. Include a detailed review of the following items:

- 14 1. Maintenance manuals.
- 15 2. Record documents.
- 16 3. Spare parts and materials.
- 17 4. Tools.
- 18 5. Lubricants.
- 19 6. Fuels.
- 20 7. Identification systems.
- 21 8. Control sequences.
- 22 9. Hazards.
- 23 10. Cleaning.
- 24 11. Warranties, bonds.
- 25 12. Maintenance agreements and similar continuing commitments.

26 B. As part of instruction for operating equipment, demonstrate the following procedures:

- 27 1. Start up.
- 28 2. Shut down.
- 29 3. Emergency operations.
- 30 4. Noise and vibration adjustments.
- 31 5. Safety procedures.
- 32 6. Economy and efficiency adjustments.
- 33 7. Effective and energy utilization.

34 C. Schedule training to conform to personnel availability at the facility and to conclude prior to start
35 up of system. The base duration of training shall be determined by the complexity of the system
36 or equipment and shall be done by qualified instructors from the manufacturer or contractor.

37 D. As part of the operator's training, one (1) lesson plan shall be devoted to reviewing of DVD,
38 which shall be incorporated into the training program to allow new employees to view the DVD
39 at their own convenience and be able to comprehend the system without the need for an
40 instructor in attendance.

- 1 E. Prepare one (1) set of DVD's to assist maintenance personnel in trouble shooting the systems
2 and making routine repairs. All DVD's shall be made at the Project facility to ensure that the
3 video portrayal is representative of the true systems.
- 4 F. In addition to written technical descriptions, the training shall lay out prescribed hands on
5 training under the supervision of others who have previously completed the training program.
6 The foregoing techniques are to be developed to produce a program that is self perpetuating
7 and permits a high level of operator training in the event of high turnover rates among those
8 who are assigned to duties in maintenance.
- 9 G. General: Engage a qualified commercial videographer to record demonstration and training
10 video recordings. Record each training module separately. Include classroom instructions and
11 demonstrations, board diagrams, and other visual aids, but not student practice.
- 12 H. At beginning of each training module, record each chart containing learning objective and
13 lesson outline.
- 14 I. Video: Provide minimum 640 x 480 video resolution converted to format file type acceptable to
15 Owner, on electronic media.
- 16 J. Electronic Media: Read-only format compact disc acceptable to Owner, with commercial-grade
17 graphic label.
- 18 K. File Hierarchy: Organize folder structure and file locations according to project manual table of
19 contents. Provide complete screen-based menu.
- 20 L. File Names: Utilize file names based upon name of equipment generally described in video
21 segment, as identified in Project specifications.
- 22 M. Contractor and Installer Contact File: Using appropriate software, create a file for inclusion on
23 the Equipment Demonstration and Training DVD that describes the following for each
24 Contractor involved on the Project, arranged according to Project table of contents:
 - 25 1. Name of Contractor/Installer.
 - 26 2. Business address.
 - 27 3. Business phone number.
 - 28 4. Point of contact.
 - 29 5. E-mail address.
- 30 N. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to
31 adequately cover area of demonstration and training. Display continuous running time.
- 32 O. Film training session(s) in segments not to exceed 15 minutes.
- 33 P. Produce segments to present a single significant piece of equipment per segment.
- 34 Q. Organize segments with multiple pieces of equipment to follow order of Project Manual table of
35 contents.
- 36 R. Where a training session on a particular piece of equipment exceeds 15 minutes, stop filming
37 and pause training session. Begin training session again upon commencement of new filming
38 segment.
- 39 S. Light Levels: Verify light levels are adequate to properly light equipment. Verify equipment
40 markings are clearly visible prior to recording.

T. Furnish additional portable lighting as required.

3.2 FINAL CLEANING:

A. General: General cleaning during construction is required by the General Conditions and included Section "Temporary Facilities and Controls".

1. Comply with applicable regulatory requirements during the cleaning and disposal operations. Special cleaning requirements for specific elements of the Work are included in appropriate Sections of Division 3 through 40.
2. Use cleaning materials, which will not create hazards to health or property or cause damage to products or Work. Conduct cleaning and waste disposal operations in compliance with local laws and ordinances. Comply fully with federal and local environmental and anti-pollution regulations.
3. Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to a condition acceptable to the IOR. Use cleaning materials and methods recommended by the manufacturer of the products to be cleaned.
4. Schedule operations with sufficient time for surfaces to dry thoroughly to prevent dust, and other contaminants resulting from cleaning operations from adhering to wet or newly finished surfaces.
5. Complete the following cleaning operations before requesting inspection for Certificate of Completion.
 - a. Remove labels that are not permanent labels.
 - b. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compound and other substances that are noticeable as vision obscuring materials. Replace chipped or broken glass and other damaged transparent materials.
 - c. Clean exposed exterior and interior hard surfaced finishes to a dust free condition, free of stains, grease, fingerprints, labels, spills, spatters, films and similar foreign substances. Restore reflective surfaces to their original reflective condition. Mop clean concrete floors. Vacuum carpeted surfaces.
 - d. Wipe surfaces of mechanical and electrical equipment, elevator equipment and similar equipment. Remove excess lubrication, paint, mortar droppings and other foreign substances. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps, vacuum inside of electrical panels and cabinetwork.
 - e. Clean the Site, including landscape development areas, of rubbish, litter and other foreign substances. Sweep paved areas broom clean; remove stains, spills, and other foreign deposits. Rake grounds that are neither paved nor planted, to a smooth even textured surface.
 - f. Clean permanent filters and replace disposable filters of units operated during construction.
 - g. Clean ducts, blowers, and coils if units were operated without filters during construction.
 - h. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics and similar spaces.
 - i. Touch up and otherwise repair and restore marred exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored, or show evidence of repair or restoration. Do not paint over "UL" and similar labels including mechanical and electrical nameplates.
6. Pest Control: Engage an experienced exterminator to make a final inspection, and to rid Project of rodents, insects, and other pests.
7. Removal of Protection: Remove temporary protection and facilities installed for protection of the Work during construction.

- 1 8. Compliances: Comply with regulations of authorities having jurisdiction and safety
2 standards for cleaning. Do not burn waste materials. Do not bury debris or excess
3 materials on the Owner's property. Do not discharge volatile, harmful or dangerous
4 materials into drainage systems. Remove waste materials from the site and dispose of in
5 a lawful manner.
- 6 9. Materials remaining after completion of associated Work shall be disposed of or stored as
7 directed by the CM.
- 8 END OF SECTION 01 78 00

1 SECTION 01 78 23 - OPERATION AND MAINTENANCE DATA

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and other Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY

- 7 A. Section includes administrative and procedural requirements for preparing operation and
8 maintenance manuals, including the following:

- 9 1. Operation and maintenance documentation directory.
10 2. Emergency manuals.
11 3. Operation manuals for systems, subsystems, and equipment.
12 4. Product maintenance manuals.
13 5. Systems and equipment maintenance manuals.

- 14 B. Related Requirements:

- 15 1. Section 01 33 00 "Submittal Procedures" for submitting copies of submittals for operation
16 and maintenance manuals.
17 2. Section 01 91 13 "Commissioning Requirements" for verification and compilation of data
18 into operation and maintenance manuals.

19 1.3 DEFINITIONS

- 20 A. System: An organized collection of parts, equipment, or subsystems united by regular
21 interaction.

- 22 B. Subsystem: A portion of a system with characteristics similar to a system.

23 1.4 CLOSEOUT SUBMITTALS

- 24 A. Manual Content: Operations and maintenance manual content is specified in individual
25 Specification Sections to be reviewed at the time of Section submittals. Submit reviewed
26 manual content formatted and organized as required by this Section.

- 27 1. Architect and Commissioning Authority will comment on whether content of operations
28 and maintenance submittals are acceptable.
29 2. Where applicable, clarify and update reviewed manual content to correspond to revisions
30 and field conditions.

- 31 B. Format: Submit operations and maintenance manuals in the following format:

- 32 1. PDF electronic file. Assemble each manual into a composite electronically indexed file.
33 Submit on digital media acceptable to Architect.

- 1 a. Name each indexed document file in composite electronic index with applicable
- 2 item name. Include a complete electronically linked operation and maintenance
- 3 directory.
- 4 b. Enable inserted reviewer comments on draft submittals.
- 5 2. Three paper copies. Include a complete operation and maintenance directory. Enclose
- 6 title pages and directories in clear plastic sleeves. Architect will return two copies.
- 7 C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing
- 8 demonstration and training. Architect and Commissioning Authority will comment on whether
- 9 general scope and content of manual are acceptable.
- 10 D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for
- 11 Notice of Completion and at least 15 days before commencing demonstration and training.
- 12 Architect and Commissioning Authority will return copy with comments.
- 13 1. Correct or revise each manual to comply with comments. Submit copies of each
- 14 corrected manual within 15 days of receipt of comments and prior to commencing
- 15 demonstration and training.

16 PART 2 - PRODUCTS

17 2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

- 18 A. Directory: Prepare a single, comprehensive directory of emergency, operation, and
- 19 maintenance data and materials, listing items and their location to facilitate ready access to
- 20 desired information. Include a section in the directory for each of the following:
- 21 1. List of documents.
- 22 2. List of systems.
- 23 3. List of equipment.
- 24 4. Table of contents.
- 25 B. List of Systems and Subsystems: List systems alphabetically. Include references to operation
- 26 and maintenance manuals that contain information about each system.
- 27 C. List of Equipment: List equipment for each system, organized alphabetically by system. For
- 28 pieces of equipment not part of system, list alphabetically in separate list.
- 29 D. Tables of Contents: Include a table of contents for each emergency, operation, and
- 30 maintenance manual.
- 31 E. Identification: In the documentation directory and in each operation and maintenance manual,
- 32 identify each system, subsystem, and piece of equipment with same designation used in the
- 33 Contract Documents. If no designation exists, assign a designation according to
- 34 ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building
- 35 Systems."

36 2.2 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

- 37 A. Organization: Unless otherwise indicated, organize each manual into a separate section for
- 38 each system and subsystem, and a separate section for each piece of equipment not part of a
- 39 system. Each manual shall contain the following materials, in the order listed:

1. Title page.
 2. Table of contents.
 3. Manual contents.
- B. Title Page: Include the following information:
1. Subject matter included in manual.
 2. Name and address of Project.
 3. Name and address of Owner.
 4. Date of submittal.
 5. Name and contact information for Contractor.
 6. Name and contact information for Construction Manager.
 7. Name and contact information for Architect.
 8. Name and contact information for Commissioning Authority.
 9. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
 10. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
- E. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
 2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.
- F. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.
1. Binders: Heavy-duty, three-ring, vinyl-covered, post-type binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
 - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.

- 1 b. Identify each binder on front and spine, with printed title "OPERATION AND
2 MAINTENANCE MANUAL," Project title or name, and subject matter of
3 contents, and indicate Specification Section number on bottom of spine. Indicate
4 volume number for multiple-volume sets.
- 5 2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual.
6 Mark each tab to indicate contents. Include typed list of products and major components
7 of equipment included in the section on each divider, cross-referenced to Specification
8 Section number and title of Project Manual.
- 9 3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic
10 software storage media for computerized electronic equipment.
- 11 4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
- 12 5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
- 13 a. If oversize drawings are necessary, fold drawings to same size as text pages and
14 use as foldouts.
- 15 b. If drawings are too large to be used as foldouts, fold and place drawings in labeled
16 envelopes and bind envelopes in rear of manual. At appropriate locations in
17 manual, insert typewritten pages indicating drawing titles, descriptions of contents,
18 and drawing locations.
- 19 2.3 EMERGENCY MANUALS
- 20 A. Content: Organize manual into a separate section for each of the following:
 - 21 1. Type of emergency.
 - 22 2. Emergency instructions.
 - 23 3. Emergency procedures.
- 24 B. Type of Emergency: Where applicable for each type of emergency indicated below, include
25 instructions and procedures for each system, subsystem, piece of equipment, and component:
 - 26 1. Fire.
 - 27 2. Flood.
 - 28 3. Gas leak.
 - 29 4. Water leak.
 - 30 5. Power failure.
 - 31 6. Water outage.
 - 32 7. System, subsystem, or equipment failure.
 - 33 8. Chemical release or spill.
- 34 C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages,
35 and similar codes and signals. Include responsibilities of Owner's operating personnel for
36 notification of Installer, supplier, and manufacturer to maintain warranties.
- 37 D. Emergency Procedures: Include the following, as applicable:
 - 38 1. Instructions on stopping.
 - 39 2. Shutdown instructions for each type of emergency.
 - 40 3. Operating instructions for conditions outside normal operating limits.
 - 41 4. Required sequences for electric or electronic systems.
 - 42 5. Special operating instructions and procedures.

2.4 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:

1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
2. Performance and design criteria if Contractor has delegated design responsibility.
3. Operating standards.
4. Operating procedures.
5. Operating logs.
6. Wiring diagrams.
7. Control diagrams.
8. Piped system diagrams.
9. Precautions against improper use.
10. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:

1. Product name and model number. Use designations for products indicated on Contract Documents.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.5 PRODUCT MAINTENANCE MANUALS

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:

1. Standard maintenance instructions and bulletins.
2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3. Identification and nomenclature of parts and components.
4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

1. Test and inspection instructions.
 2. Troubleshooting guide.
 3. Precautions against improper maintenance.
 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 5. Aligning, adjusting, and checking instructions.
 6. Demonstration and training video recording, if available.
- E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
 2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
- F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

- A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.
- B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
- C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format,

- 1 identify each item using appropriate references from the Contract Documents. Identify data
2 applicable to the Work and delete references to information not applicable.
- 3 1. Prepare supplementary text if manufacturers' standard printed data are not available and
4 where the information is necessary for proper operation and maintenance of equipment
5 or systems.
- 6 F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the
7 relationship of component parts of equipment and systems and to illustrate control sequence
8 and flow diagrams. Coordinate these drawings with information contained in record Drawings to
9 ensure correct illustration of completed installation.
- 10 1. Do not use original project record documents as part of operation and maintenance
11 manuals.
12 2. Comply with requirements of newly prepared Record Drawings in Section 01 78 39
13 "Project Record Documents."
- 14 END OF SECTION 01 78 23

1 SECTION 01 78 36 – WARRANTIES AND BONDS

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and other Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY:

- 7 A. This Section specifies general administrative and procedural requirements for warranties and
8 bonds required by the Contract Documents, including manufacturer's standard warranties on
9 products and special warranties. Contractor will review guarantee/warranty and bonds to verify
10 compliance with Contract Documents.

- 11 1. Refer to Article 2.32 of the General Conditions and the separate Guaranty of
12 workmanship and materials.
13 2. General closeout requirements are included in Section 01 78 00 "Project Closeout."
14 3. Specific requirements for warranties of the Work and products and installations that are
15 specified to be warranted are included in the individual Sections of Division - 3 through
16 Division -40. If no specific information is included in individual sections of the
17 specifications, warranty period shall be as follows: Manufacturer's warranties
18 notwithstanding, warrant the entire Work against defects in materials and workmanship
19 for twelve (12) months from date of Notice of Completion.
20 4. Certifications and other commitments and agreements for continuing services to the
21 Owner are specified elsewhere in the Contract Documents.
22 5. The Contractor will not be responsible for defects due to misuse, negligence, willful
23 damage, improper maintenance, or accident caused by others, nor shall he be
24 responsible for defective parts whose replacement is necessitated by failure of the
25 Owner's maintenance forces to properly clean and service them, provided the Contractor
26 has furnished complete maintenance instructions to the Owner.

- 27 B. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties
28 do not relieve the Contractor of the warranty on the Work that incorporates the products, nor
29 does it relieve suppliers, manufacturers, and subcontractors required to countersign special
30 warranties with the Contractor.

31 1.3 BOND REQUIREMENTS

- 32 A. Each bond specified in this Article (faithful performance bond, payment bond and warranty
33 bond) shall meet the requirements of all applicable statutes, including but not limited to those
34 specified in Public Contract Code section 20129 and Civil Code section 3248.
- 35 B. Each bond specified in this Article shall be issued by a surety company designated as an
36 admitted surety insurer in good standing with and authorized to transact business in this state
37 by the California Department of Insurance, and acceptable to the County of Fresno. Bidders
38 are cautioned that representations made by surety companies will be verified with the California
39 Department of Insurance. Additionally, the County of Fresno, in its discretion, when determining

the sufficiency of a proposed surety company, may require the surety company to provide additional information supported by documentation. The County generally requires such information and documentation whenever the proposed surety company has either a Best's Key Rating Guide of less than B+ or a financial size designation of less than VIII. Provided, however, that the County expressly reserves its right to require all information and documentation to which the County is legally entitled from any proposed surety company.

C. Payment and Performance Bonds. The successful bidder shall furnish a faithful performance bond in the amount of 100 percent of the Contract Amount and a payment bond in the amount of 100 percent of the Contract Amount.

D. Warranty Bond. Prior to Final Payment, Contractor shall post a one (1) year Warranty Bond, issued by the surety company that issued the payment and performance bonds, or if approved by Owner, by another surety company that meets the requirements of this Article and is acceptable to Owner, in the amount of ten percent (10%) of the Final Contract Price.

1.4 DEFINITIONS RE: WARRANTIES:

A. Standard Product Warranties are pre-printed written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.

B. Special Warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

1.5 WARRANTY REQUIREMENTS:

A. Related Damages and Losses: When correcting warranty Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranty Work.

B. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding; reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

C. Replacement Costs: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.

D. Owner's Recourse: Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, rights and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.

1. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.

- E. The Owner reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.

1.6 SUBMITTALS RE: WARRANTIES:

- A. Submit written warranties to the Construction Manager upon request of the Construction Manager, and in any event prior to any request by Contractor for final acceptance of the Work. The commencement date for warranties applicable to the Work shall be the date of acceptance of the Work as specified in the Notice of Completion, unless otherwise noted in the Contract Documents (e.g., as to manufacturer's warranties for equipment).

1. When a designated portion of the Work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Construction Manager within ten (10) days of completion of that designated portion of the Work.
2. Submit an updated final statement, accounting for final additional changes to the Contract Sum.

- B. When a special warranty is required to be executed by the Contractor, or the Contractor and a subcontractor, supplier or manufacturer, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Owner through the Construction Manager for approval prior to final execution.

1. Refer to individual Sections of Division - 3 through Division - 40 for specific content requirements, and particular requirements for submittal of special warranties.
2. Submit the Guarantee/Warranty typed on the Contractor's letterhead if for the entire Work, or on the Subcontractor's letterhead if for the Work of a Specification Section.

- C. Form of Submittal: At Final Completion compile two (2) copies of each required warranty and bond properly executed by the Contractor, or by the Contractor, subcontractor, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of the Project Manual.

- D. Bind warranties and bonds into heavy-duty, commercial quality, durable 3-ring vinyl covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2" by 11" paper. Provide separate binders for each building, site and landscape package.

1. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product, and the name address and telephone number of the installer.
2. Identify each binder on the front and the spine with the typed or printed title "WARRANTIES AND BONDS," the Project title or name, and the name of the Contractor.
3. When operating and maintenance manuals are required for warranted construction, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

- E. Time of Submittal:

1. Submit guarantees/warranties within ten (10) days after date of Notice of Completion, prior to request for Final Payment.
2. For items of Work where acceptance is delayed materially beyond the date of Notice of Completion, furnish updated submittal within ten (10) days after such delayed

1 acceptance, listing the date of delayed acceptance as the start of the guarantee/warranty
2 period.

3 1.7 REVIEW MEETING:

4 A. Eleven (11) months following date of acceptance of the Work, hold a meeting for the purpose of
5 review of, and action upon, guarantees/ warranties, bonds, and service and maintenance
6 contracts, as specified in Section 01 31 13 "PROJECT MEETINGS".

7 1.8 SERVICE AND MAINTENANCE CONTRACTS

8 A. Compile, review, and transmit specified service and maintenance contracts as specified for
9 guarantees/warranties and bonds.

10 1.9 PREPARATION FOR FINAL INSPECTION

11 A. Perform final cleaning as specified hereinbefore.

12 B. Assemble guarantees/warranties, service and maintenance contracts, operating and
13 maintenance instructions, and other items as specified, and transmit to the Construction
14 Manager, who will forward them to the Owner after final acceptance of the Work.

15 1.10 RESTORATION OF DAMAGED WORK

16 A. Restore or replace, as specified or determined by the Architect, material and finishes damaged
17 from construction activities at no additional expense to the Owner.

18 B. Restoration shall be equal to the original Work, and finishes shall match the appearance of
19 existing adjacent Work.

20 1.11 REMEDIAL WORK

21 A. Remedial Work necessary owing to faulty workmanship or materials shall be at no additional
22 expense to the Owner.

23 B. Work shall be coordinated with the Owner and performed at such time and in such manner to
24 cause minimal interruption and inconvenience to the Owner's operations.

25 C. PART 2 PRODUCTS (not used)

26 D. PART 3 EXECUTION (not used)

27 END OF SECTION 01 78 36

1 SECTION 01 78 39 - PROJECT RECORD DOCUMENTS

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and other Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY

- 7 A. Section includes administrative and procedural requirements for project record documents,
8 including the following:

- 9 1. Record Drawings.
10 2. Record Specifications.
11 3. Record Product Data.
12 4. Record BIM Models
13 5. Miscellaneous record submittals.

- 14 B. Related Requirements:

- 15 1. Section 01 35 54 "Building Information Modeling (BIM)"
16 2. Section 01 73 00 "Execution" for final property survey.
17 3. Section 01 78 00 "Project Closeout" for general closeout procedures.
18 4. Section 01 78 23 "Operation and Maintenance Data" for operation and maintenance
19 manual requirements.

20 1.3 CLOSEOUT SUBMITTALS

- 21 A. Record Drawings: Comply with the following:

- 22 1. Number of Copies: Submit one set(s) of marked-up record prints.

- 23 B. Record Specifications: Submit annotated PDF electronic files of Project's Specifications,
24 including addenda and contract modifications.

- 25 C. Record Product Data: Submit annotated PDF electronic files and directories of each submittal.

- 26 1. Where record Product Data are required as part of operation and maintenance manuals,
27 submit duplicate marked-up Product Data as a component of manual.

- 28 D. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-
29 keeping requirements and submittals in connection with various construction activities. Submit
30 annotated PDF electronic files and directories of each submittal.

- 31 E. Reports: Submit written report bi-weekly indicating items incorporated into project record
32 documents concurrent with progress of the Work, including revisions, concealed conditions,
33 field changes, product selections, and other notations incorporated.

1 PART 2 - PRODUCTS

2 2.1 RECORD DRAWINGS

3 A. Contractor must provide as-built documents as herein described.

4 B. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop
5 Drawings, incorporating new and revised drawings as modifications are issued.

6 1. Preparation: Mark record prints to show the actual installation where installation varies
7 from that shown originally. Require individual or entity who obtained record data, whether
8 individual or entity is Installer, subcontractor, or similar entity, to provide information for
9 preparation of corresponding marked-up record prints.

- 10 a. Give particular attention to information on concealed elements that would be
11 difficult to identify or measure and record later.
12 b. Accurately record information in an acceptable drawing technique.
13 c. Record data as soon as possible after obtaining it.
14 d. Record and check the markup before enclosing concealed installations.
15 e. Cross-reference record prints to corresponding archive photographic
16 documentation.

17 2. Content: Types of items requiring marking include, but are not limited to, the following:

- 18 a. Dimensional changes to Drawings.
19 b. Revisions to details shown on Drawings.
20 c. Depths of foundations below first floor.
21 d. Locations and depths of underground utilities.
22 e. Revisions to routing of piping and conduits.
23 f. Revisions to electrical circuitry.
24 g. Actual equipment locations.
25 h. Duct size and routing.
26 i. Locations of concealed internal utilities.
27 j. Changes made by Change Order or Construction Change Directive.
28 k. Changes made following Architect's written orders.
29 l. Details not on the original Contract Drawings.
30 m. Field records for variable and concealed conditions.
31 n. Record information on the Work that is shown only schematically.

32 3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use
33 personnel proficient at recording graphic information in production of marked-up record
34 prints.

35 4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish
36 between changes for different categories of the Work at same location.

37 5. Mark important additional information that was either shown schematically or omitted
38 from original Drawings.

39 6. Note Construction Change Directive numbers, alternate numbers, Change Order
40 numbers, and similar identification, where applicable.

41 2.2 RECORD BIM MODELS

42 A. Contractor must provide interim and final as-built models of the building utilizing Building
43 Information Modeling (BIM) in accordance with the approved BIM Execution Plan.

B. Contractor must maintain the following documents at the work site:

1. One marked-up set of the Contract Documents (drawings and specifications) with handwritten annotations indicating as-built conditions. Mark-ups must be incorporated onto this set as changes occur.
2. One hard copy of the latest electronically updated drawings and specifications. As-built information must be transferred to the electronic files (drawings, building models, and specifications) at least once every three months; hard copies and electronic files must be submitted as described below, or as otherwise agreed.
 - a. Electronic files must be updated utilizing the software programs identified above, for each discipline, and in accordance with the approved BIM Execution Plan, as applicable. Updated versions of the software and/or alternate software programs must not be used unless approved by the Owner Representative.
 - b. Revisions must be identifiable by color coding or "clouding" what has been revised.
 - c. Revisions must be related to document which initiated it, such as the RFI, PCO, Bulletin or other document.

C. Updated information must include:

1. Any deviations in construction caused by change orders or field instructions including, but not limited to, construction bulletins and Request for Information responses.
2. Dimensional locations from a fixed reference point to work buried under or outside each building.
3. Locations of plumbing, electrical lines and conduits, cathodic protection anodes, points of connection of existing/new utilities, valves, capped stub outs, catch basins, manholes with invert elevations, etc.
4. Actual numbering of each electrical feeder/branch circuit.
5. Sufficient information to locate work concealed in each building with ease and accuracy. In some instances this may be by dimension, in others, it may be in relation to the spaces in the building near which it was installed. Concealed work must be accurately depicted in the building models.
6. Deviations from the sizes, locations, and other features of installations shown.
7. Deviations from specified items, i.e., substitution of manufacturer, supplier, trade name, catalog number, etc.
8. For each specification section the trade name, catalog number, and supplier of each product and item of equipment actually installed.
9. Equipment Operation and Maintenance Data in accordance with Section 01 7823 and the approved BIM Execution Plan.

D. On a monthly basis, Contractor must submit copies of the marked-up drawings and specification pages that required updating for work performed during the previous month. Drawings and specification pages that were not updated during the previous month need not be submitted.

E. Changes must be done in a neat legible manner.

F. Shop drawing information including but not limited to steel erection, HVAC, fire sprinkler piping, functional point-to-point wiring diagrams, and fire alarm device locations must be incorporated into the updated as-built documents and models. Incorporate any additional coordination model/drawing information pursuant to Section 01 3100.

G. At least once every three months, and sixty days prior to project completion, Contractor must submit electronically updated as-built building models, drawings, and specifications for review by OWNER Representative that include all updated project information available as of thirty days prior to the submittal. Submittals must include two (2) copies of the following:

1. DVDs with the following data:

- a. Electronic drawing files (.dwg) for Civil and Demolition/Hazardous Materials disciplines.
- b. Electronic building 3D model ([Architect to provide actual version] or higher) and Navisworks model (.nwc and .nwf) for the Architectural discipline.
- c. Electronic building 3D models ([Architect to provide actual version] or higher) and Navisworks models (.nwc) for the Structural, Mechanical, Plumbing, and Electrical disciplines.
- d. Electronic PDF file (bookmarked) containing all as-built drawings.
- e. Electronic PDF file (bookmarked) containing all specification files, except Divisions 0 and 1.
- f. CAD files of all final reviewed shop drawings (with corrections incorporated) where shop drawings were produced using CAD software (sixty days prior to project completion only).
- g. Electronic PDF file (bookmarked) containing all final reviewed shop drawings (with corrections incorporated), organized by specification section (sixty days prior to project completion only).
- h. Electronic PDF file with index of building models, Navisworks models, and as-built drawings which includes project name and a tabular list of all models and drawings with file names, sheet numbers, and sheet titles.

2. Drawing printed sets: 15" x 21".

3. Specification printed sets: 8-1/2" x 11".

4. Upon approval by Owner Representative, the number of printed paper copies of submittals may be reduced.

5. Owner Representative will review the submittal and provide comments to the Contractor within 21 days of receipt

H. Upon requesting final inspection, or within ten days after OWNER use prior to acceptance, Contractor must furnish to the OWNER Representative complete and final as-built documents which must include four (4) copies of the following:

1. DVDs with the following data:

- a. Electronic drawing files (.dwg) for Civil and Demolition/Hazardous Materials disciplines.
- b. Electronic building 3D model ([Architect to provide actual version] or higher) and Navisworks model (.nwc, .nwd, and .nwf) for the Architectural discipline.
- c. Electronic building 3D models ([Architect to provide actual version] or higher) Navisworks models (.nwc) for the Structural, Mechanical, Plumbing, and Electrical disciplines.
- d. Electronic PDF file (bookmarked) containing all as-built drawings.
- e. Electronic PDF file (bookmarked) containing all specification files, except Divisions 0 and 1.
- f. CAD files of all final reviewed shop drawings (with corrections incorporated) where shop drawings were produced using CAD software.
- g. Electronic PDF file (bookmarked) containing all final reviewed shop drawings (with corrections incorporated), organized by specification section.
- h. Electronic PDF file with index of building models, Navisworks models, and as-built drawings which includes project name and a tabular list of all models and drawings with file names, sheet numbers, and sheet titles.

2. Drawing printed sets: 30" x 42" and 15" x 21".

3. Specification printed sets: 8-1/2" x 11".

- I. The building models, drawings, and specifications must be a true, complete, and accurate record of the project.
- J. Each document must be labeled electronically with "AS-BUILT DOCUMENT" and the current date located on the lower right hand corner of each drawing or page. Those drawings or pages that are not changed by as-built conditions must be so noted above the "AS-BUILT DOCUMENT" and current date, and labeled with the word "UNCHANGED".
- K. Newly Prepared Record Drawings: Prepare new Drawings instead of preparing record Drawings where Architect determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.
 1. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or other modification.
 2. Consult Architect for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate newly prepared record Drawings into record Drawing sets; comply with procedures for formatting, organizing, copying, binding, and submitting.
- L. BIM Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
 1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
 2. Format: Annotated PDF electronic file with comment function enabled.
 3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
 4. Identification: As follows:
 - a. Project name.
 - b. Date.
 - c. Designation "PROJECT RECORD DRAWINGS."
 - d. Name of Architect and Construction Manager.
 - e. Name of Contractor.

2.3 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
 4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
 5. Note related Change Orders, record Product Data, and record Drawings where applicable.
- B. Format: Submit record Specifications as annotated PDF electronic file.

2.4 RECORD PRODUCT DATA

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders, record Specifications, and record Drawings where applicable.

- B. Format: Submit record Product Data as annotated PDF electronic file.

1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

2.5 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

- B. Format: Submit miscellaneous record submittals as PDF electronic file.

1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

- A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

- B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's and Construction Manager's reference during normal working hours.

END OF SECTION 01 78 39

SECTION 01 91 13 – GENERAL COMMISSIONING REQUIREMENTS

PART 1 GENERAL

1.1 SCOPE

- A. This section describes the elements of Commissioning common to all Divisions of the project. The requirements listed here are in addition to, or are expected to coordinate with, the requirements in the related documents and specifications.

1.2 RELATED DOCUMENTS

- A. Section 01 78 00 - Project Closeout
- B. Section 01 78 23 – Operation and Maintenance Data
- C. Section 20 01 00- General Mechanical Provisions
- D. Section 22 04 05 - Commissioning of Plumbing
- E. Section 23 08 05 - Commissioning of HVAC
- F. Section 25 09 00 – Direct Digital Control System
- G. Section 26 08 01 - Commissioning of Lighting and Daylighting Controls
- H. Section 26 96 09 – Electrical Commissioning and Field Testing and NFPA 70E Requirements

1.3 RELATED DOCUMENTS

- A. Commissioning Plan

1.4 DEFINITIONS

- A. Acceptance Testing
- B. BoD: Basis of Design. A document that records concepts, calculations, decisions and product selections used to meet the OPR and to satisfy applicable regulatory requirements, standards, and guidelines. The document both narrative descriptions and lists individual items that support design process.
- C. Commissioning: The systematic process of ensuring that the building's systems are operating in accordance with the Contract Documents, that the systems perform interactively in accordance with the Contract Documents and that Facility Personnel are prepared to operate and maintain the building and its systems. This includes, but may not be limited to, pre-functional testing of equipment, functional testing of systems, system interoperability testing, training of Facility personnel, delivering Operation and Maintenance (O&M) documentation and the turnover of completed systems.
- D. Commissioning Authority (CxA): The designated third-party entity that provides oversight and review of the commissioning process in concert with the commissioning team. Owner will engage the CxA under a separate contract.
- E. Commissioning Plan: A document that outlines the organization, schedule, allocation of resources, and documentation requirements of the commissioning process.
- F. Contractor: As used in this specification, Contractor refers to the General Contractor, subcontractors, or vendors based on usage
- G. FPT
- H. Non-Conformance

- I. OPR: Owner's Project Requirements. A document that details the functional requirements of a project and the expectations of how it will be used and operated. These include Project goals, measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information.
- J. PFT
- K. Systems, subsystems, assemblies, components, and equipment: Where these terms are used together or separately, they shall mean "installed" systems, subsystems, and equipment.
- L. Systems Manual: The Systems Manual is the final deliverable from the Commissioning process and provides the information needed to understand, operate, and maintain the facility and its systems. It should be the repository of all updates and corrections as they occur, including those through occupancy. The Systems Manual expands the scope of standard O&M documentation to incorporate additional information developed through the commissioning process and is prepared by the CxA.
- M. TAB: Testing, Adjusting, and Balancing.
- N. AHJ – Authority Having Jurisdiction.
- O. TIO - Testing, Inspection, and Observation Program.

1.5 COMMISSIONING TEAM

- A. Members Appointed by Owner:
 - 1. Commissioning Agent
 - 2. Representative of Facility Operations
 - 3. Discipline Engineers of Record
 - 4. Owner
 - 5. AHJ
- B. Members Appointed by Contractor: Individuals, each having the authority to act on behalf of the entity he or she represents, explicitly organized to implement the commissioning process through coordinated action. The commissioning team shall consist of, but not be limited to, representatives of Contractor, including Project superintendent and subcontractors, installers, suppliers, and specialists deemed appropriate by the CxA.
 - 1. General Contractor's Commissioning Authority
 - 2. Project Superintendent
 - 3. TAB Representative
 - 4. Mechanical Contractor
 - 5. Plumbing Contractor
 - 6. Electrical Contractor
 - 7. Controls Contractor
 - 8. Life Safety Contractors
 - 9. Low Voltage System Contractor(s)
 - 10. Major Equipment Suppliers.

Table 1. Commissioning Matrix

Activity	GC	Owner	TI	A/E	CxA
OPR review		X			R
BOD review				X	R
Cx Specifications		R		X	R
Develop Cx Plan	R	R		R	X
Submittal Review	X			X	R

O&M Manual	X	R	V	R	R
Coordinate Cx schedule	X		V		R
Review test procedure and prepare Full Startup Plan	X				X
Pre-functional Check (PFT) – Full Startup	X		V		R
Compile PC Record	X		V	R	R
Issues Log (PFT & FPT)	R	R	V	R	X
Forms Log (PFT & FPT)	R		V		X
Review test procedure and prepare Full Functional Test Procedure	X		V	R	X
Functional Test (FT) – Full Functional Test	X		V		W
Compile FT Record	X		V	R	R
Sign Off (PFT and FPT)	X	X	X1	X	X
Cx Report		R			X
Systems Manual		R		R	X
Training Enhanced Commissioning	X	R	V	X	R
Warranty (deferred & seasonal test/correction)	X	R	W		R

Note: This table shows only responsibilities for major activities. See the Cx Plan and Specifications for additional responsibilities. In case of conflict, the Cx Specifications govern.

X = Primary Responsibility

R = Review of documents and comments.

W = Witness of the tests/training.

V = Verification

1.6 OWNER'S RESPONSIBILITIES

- A. Select CxA and oversee work product.
- B. Prepare the Owner's Project Requirements (OPR) document. Update the OPR as required throughout the project.
- C. Review and approve the Commissioning plan.
- D. Provide the BOD documentation, prepared by Architect and approved by the Owner, to the CxA and Contractor.
- E. Assign operation and maintenance personnel and schedule them to participate in the commissioning team activities including, but not limited to, coordination meetings, training, testing, and any other demonstrations deemed important.
- F. Participate in project commissioning and coordination meetings as required.

1.7 FACILITY OPERATIONS REPRESENTATIVE RESPONSIBILITIES

- A. Attend commissioning meetings.
- B. Observe Pre-Functional Tests (PFT) and Functional Performance Tests (FPTs) at their discretion.
- C. Review training plans, schedule training classes with CxA, attend training sessions.

D. Review Operation & Maintenance manuals.

1.8 COMMISSIONING AUTHORITY'S RESPONSIBILITIES (CXA)

The primary role of the CxA is to provide oversight, support, coordination, review and acceptance of commissioning process and documentation as defined in Specification Sections DIVs 22, 23, 26 with reference to DIVs 11, 13, 14, and 33. The CxA's responsibilities include:

A. Review OPR and BOD for completeness and consistency.

B. Perform Commissioning Design Review prior to mid-construction documents and back-check the review comments in subsequent design submissions.

C. Prepare and update project Commissioning Plan throughout project.

D. Organize and lead the commissioning team.

E. Provide schedule input to the Contractor so that commissioning activities are properly reflected in the construction schedule.

F. Convene commissioning team meetings as required for the purpose of coordination, communication, and conflict resolution; discuss progress of the commissioning processes.

G. Review submittals for commissioned systems concurrent with Architect and Engineer review.

H. Review Pre-functional Test checklists prepared by others or prepare Pre-functional Test checklists for the systems as indicated on the Commissioning Matrix (Table 1), from manufacturer's Field Installation Verification checklist and Equipment Startup Verification checklist furnished by equipment supplier through the installation contractor.

I. Verify that equipment Pre-functional Testing supports initial startup.

J. Witness Pre-functional test execution and start-up of systems and components at the discretion of the CxA.

K. Review and accept completed Pre-functional Test Procedures.

L. Review Functional Performance Test checklist prepared by others or Prepare Functional Performance Test Procedures for the systems as indicated on the Table 1 - Commissioning Matrix. Submit Functional Performance Test procedures for review and acceptance by the Engineer of Record and contractors.

M. Witness, direct, and document Functional Performance Tests.

N. Document all testing deficiencies in a Commissioning Issues Log which describes design, installation, and performance issues that are at variance with the Contract Documents, and is used to track issues as they are encountered, documenting the status of corrective actions and unresolved issues.

O. Prepare Systems Manual from input from Contractor.

P. Review and comment on O&M Manuals submitted by Contractor.

Q. Provide oversight and verification of Facility and Staff Training by reviewing the training plan, instructional materials, and instructor's qualifications; participating in pre-instruction conference, coordinating of the training scheduling meeting, confirming training took place, and reviewing training video.

R. Attend pre-substantial completion meetings as required.

S. Prepare a Final Commissioning Report.

T. Review building operation 10 months after substantial completion.

U. Perform site observations of MEP installation.

1.9 AHJ RESPONSIBILITIES

- A. Attend commissioning team meetings.
- B. Perform tests and inspections as outlined in TIO.
- C. Coordinate planned tests and inspections with CxA to maximize efficiency of both parties and to eliminate duplication of effort wherever possible.

1.10 ARCHITECT/ENGINEER OF RECORD RESPONSIBILITIES

- A. Participate in Commissioning Meetings.
- B. Respond to issues identified in the Commissioning Design Review.
- C. Provide Design Intent and Acceptance Criteria as required to support development and performance of Functional Performance Tests.
- D. Review and accept Functional Performance Test procedures.
- E. Review the operation and maintenance manuals and provide comments and final acceptance of package.
- F. Provide Final Approval of TAB report.

1.11 CONTRACTOR'S RESPONSIBILITIES (GC AND SUB-CONTRACTORS)

- A. Provide a CxA as a single point contact for the General Contractor.
- B. CxA to coordinate subcontractors, vendors, manufacturers, and testing agencies as required to support Commissioning activities.
- C. Provide schedule for operation and maintenance data submittals, equipment startup, and testing to CxA for incorporation into the Commissioning Plan. Update the schedule as required throughout the construction period.
- D. Create a Master Equipment List that identifies all commissionable equipment by tag number, manufacturer, model number, location and drawing number.
- E. Review the Commissioning Plan.
- F. Provide submittals, RFIs, operation and maintenance manuals, and as-built drawings of commissioned systems to the CxA for review.
- G. Incorporate Commissioning activities and testing pre-requisites into the general construction schedule and provide updated schedules on a periodic basis.
- H. Provide manufacturer's checklists including Field Installation Verification checklists and Equipment Startup checklists to the CxA upon approval of submittals for Pre-functional checklist development. In the absence of a supplier provided Checklist, the contractor can submit their own manufacturer approved.
- I. Prepare Pre-functional Test checklist for the systems as indicated on the Commissioning Matrix (Table 1), from manufacturer's Field Installation Verification checklist and Equipment Startup Verification checklist furnished by equipment supplier through the installation contractor and submit PFTs to CxA for review.
- J. Submit sample TAB balancing forms for review prior to starting work.
- K. Notify Architect and Commissioning team two weeks prior to initial startup of equipment.
- L. Perform Pre-Functional Tests and Manufacturer start-up checklists and submit to CxA for review.
- M. CxA to collect and compile the completed pre-functional checklists from the contractors and maintain a log of the progress of these checklists for CxA review upon request.

- N. Evaluate performance deficiencies identified in test reports and, in collaboration with the Commissioning Agent and entity responsible for system and equipment installation, recommend corrective action.
- O. Certify in writing that the system is operational and complete and ready for acceptance testing (TAB complete, BMS complete, PFT complete) and equipment Startup complete.
- P. Review, comment, and accept CxA developed Functional Performance Tests.
- Q. Prepare Functional Performance Test Procedures for the systems as indicated on the Table 1 - Commissioning Matrix. Submit Functional Performance Test procedure for review and acceptance by the Engineer of Record and CxA.
- R. Execute Functional Performance Tests at the direction of the CxA and the Table 1 - Commissioning Matrix.
- S. Operate and maintain the equipment/systems during Commissioning process and until turn over to Owner.
- T. Provide training plans, materials, and training as specified in Section 01 78 00, "Project Closeout".
- U. Assemble the O&M Manuals and System Manual input as specified in Section 01 78 23, "Operation and Maintenance Data" and as described in this specification.
- V. Notify the CxA as soon as possible of any issue identified during construction that may affect the Commissioning or final system performance.
- W. Coordinate installation of systems and equipment suppliers, suppliers, control contractor, mechanical contractor, and electrical contractor. Verify that coordination, installation, quality control, and contractor testing have been completed such that installed systems and equipment comply with construction documents.

1.12 CONTROLS CONTRACTOR RESPONSIBILITIES

- A. Provide CxA and mechanical contractor with controls wiring diagrams, sequences of operations, graphics, and software documentation and printouts, prior to the performance of the Functional Performance procedures.
- B. Provide written checklists and procedures to be used performance of Control System Checkout and Testing and Control System Demonstration and Acceptance, to CxA for review prior to execution.
- C. Complete Control System Checkout and Testing and submit completed startup checklists to CxA.
- D. Perform Control System Demonstration and Acceptance Testing as described in Section 26 96 09. Testing to address and include all testing in CxA prepared FPTs.
- E. Assist in performance of Functional Performance Testing of **all** systems controlled and monitored by BMS by demonstrating satisfactory compliance with Sequence of Operations.
- F. Participate in the correction, fine-tuning or troubleshooting of system performance if either of these measures becomes necessary. Loop tuning is a specific requirement of the final commissioning work.
- G. Train the owner, TAB contractor, and the CxA, in basic operation of the control system and provide required passwords.
- H. Provide as-built Sequence of Operations for CxA to incorporate into systems manual.

1.13 TEST, ADJUST, AND BALANCE (TAB) CONTRACTOR RESPONSIBILITIES

- A. Provide CxA and mechanical contractor with TAB plan and associated balancing documentation, preliminary if necessary, in time for use in performing functional testing.

- B. Coordinate balance activities with activities of the mechanical and controls contractors. Verify that coordination, installation, quality control and final subcontractor's testing have been complete to allow proper balancing work to be performed.
- C. Test and balance the system per specification requirements.

1.14 MAJOR EQUIPMENT SUPPLIERS AND/OR THIRD PARTY TESTING AGENCIES RESPONSIBILITIES

- A. Provide Installation Checklists and Startup checklist from manufacturer to the purchaser/installing contractor or prepare Pre-functional Test checklist for the systems and submit to CxA for review.
- B. Provide documentation of inspections of the installation when required.
- C. Provide documented reports of proper startup when required.
- D. Perform startup when required by the specs for equipment provided with document report.
- E. Prepare Functional Performance Test Procedures for the systems. Submit Functional Performance Test procedure for review and acceptance by the Engineer of Record and CxA.
- F. Execute Functional Performance Tests at the direction of the CxA.

1.15 COMMISSIONING DOCUMENTATION

- A. Owner's Project Requirements prepared by Owner.
- B. Basis of Design document prepared by Design Team.
- C. Commissioning Design Review and Back Check Documentation.
- D. Commissioning Plan.
- E. Completed Pre-functional Tests and Checklists.
- F. Completed Functional Performance Tests.
- G. Commissioning Issues Log.
- H. Final Commissioning Report.
- I. Operation and Maintenance (O&M) Manuals as described in Section 01 78 23, "Operation and Maintenance Data."
- J. Systems Manual: A supplement to the O&M manual prepared by the CxA with information furnished by the Contractor.
- K. Training Plan, materials, instruction, evaluations, attendance lists and videography in accordance with Section 01 78 00, "Project Closeout".

PART 2 EXECUTION

2.1 COMMISSIONED SYSTEMS

- A. The systems to be commissioned are shown in the Commissioning Plan. The Commissioning Plan also shows the lead responsible party for execution of the various commissioning tasks on a system basis.

2.2 OVERVIEW OF COMMISSIONING PROCESS

- A. This section describes the general sequence of events for commissioning activities, including but not limited to, the following:
 - 1. Design Phase
 - a. OPR is prepared by Owner and updated throughout project as needed.

- b. BOD is prepared by Design Team and updated throughout project as needed to document how Owner's Project Requirements are satisfied.
- c. CxA performs review of OPR and BOD for consistency and completeness.
- d. CxA prepares Commissioning Plan.
- e. CxA performs Commissioning Design Review prior to 50% CD phase and documents incorporation of comments in subsequent design submission.
2. Construction Phase
 - a. CxA performs submittal review of commissioned systems concurrent with Architect and Engineers review.
 - b. Contractor provides manufacturer's installation and start-up checklists to CxA to support development of Pre-Functional Test Procedures.
 - c. CxA develops Pre-Functional Test Procedures.
 - d. Contractor executes Pre-functional Test Procedures and submits to CxA for review.
 - e. CxA develops Functional Performance Test procedures.
 - f. Contractor and Architect review and accept Functional Performance Test Procedures.
 - g. Pre-functional testing complete, TAB testing complete, BMS acceptance testing complete.
 - h. Contractor certifies systems are ready for testing (all PFTs complete, TAB complete, BMS acceptance testing complete).
3. Acceptance Phase
 - a. Functional Performance Testing performed.
 - b. Training of Operations and Facility Staff performed.
 - c. O&M and System Manuals prepared and submitted.
4. Occupancy Phase
 - a. Submit Final Commissioning Report.
 - b. Perform 10-month post-substantial completion review.

2.3 SYSTEMS COMMISSIONING REQUIREMENTS

- A. This section provides additional details on the execution of several commissioning processes that are not defined elsewhere
- B. General: System and equipment commissioning includes all requirements noted in Section 22 04 05, "Commissioning of Plumbing", section 23 08 05, "Commissioning of HVAC ", section 26 96 09, "Electrical Commissioning and Field Testing and NFPA 70E Requirements ", and as described here.
- C. Commissioning Plan
 1. Commissioning Plan is prepared by CxA prior to Construction-Phase Commissioning Kick-off meeting.
 2. Draft Commissioning Plan is coordinated with General Contractor and Owner for review and comment.
 3. CxA issues Commissioning Plan.
 4. CxA updates Commissioning Plan throughout project as required.
- D. Incorporation of Commissioning Requirements in Construction Documents
 1. The CxA will develop and incorporate the commissioning requirements into the construction documents.
 2. Commissioning Requirements to include: Commissioning Team involvement, Contractor's responsibilities, Submittal review procedures for commissioned systems, Operations and Maintenance documentation including systems manuals, Meetings, Construction verification procedures, Startup plan development and implementation, Functional Performance Testing, Acceptance and Closeout, Training, and Warranty review site visit.
- E. Commissioning Design Review
 1. CxA performs review of commissioned systems prior to mid-construction document phase
 2. Review findings are documented in log and provided to Owner.

3. Architect/Engineer reviews and responds to review findings and updates construction documents as required.
4. CxA performs back-check review of subsequent issue of construction documents to confirm incorporation of resolved items.

F. Commissioning Agent Review of Submittal Documents

1. CxA identifies submittals associated with commissioned systems that will be reviewed.
2. Contractor provides CxA copies of requested submittals concurrent with review performed by Architect and Engineer.
3. CxA provides comments to Owner and Architect.
4. Architect incorporates CxA comments at their discretion.

G. Pre-Functional Testing

1. The Contractor is responsible for completing systems and sub-systems so they are fully functional and meet the design intent of the contract documents. This is demonstrated in part by the successful completion of pre-functional testing, including the manufacturers start-up checklist. The responsibility for the operation of the system and components remains with the Contractor throughout the performance of the commissioning.
 - a. Contractor provides CxA with Manufacturer's instructions including installation and start-up checklists upon submittal approval (Ref. Specification 01 33 00).
 - b. CxA or GC develops PFT checklists for each Commissioned system and component.
 - c. Contractor reviews and approves CxA prepared PFT checklists.
 - d. Contractor executes PFT and manufacturers start-up checklists. Executed PFT, manufacturer's checklist and log are maintained by Contractor for review by CxA.
 - e. Pre-functional test results will be reviewed by the CxA and provided to AE/Owner for review. If test results are not satisfactory, the General Contractor/responsible subcontractor shall see that corrections are made and reschedule pre-functional testing as soon as possible after corrective work is completed.
 - f. Contractor resolves all issues identified during testing and retests system.
 - g. Contractor provides all completed PFTs to CxA at the end of Construction Phase for inclusion in final commissioning report.

H. Functional Performance Testing

1. Where applicable, the functional performance tests and checklists are developed in accordance with the acceptance testing requirements as specified in the BEES. Acceptance testing is required by the BEES to ensure that equipment, controls, and systems operate as required by the standards. Similar to commissioning, the acceptance testing process includes visual inspection of equipment and the functional testing of equipment per the prescribed testing procedures found in the standards. The systems covered by the acceptance testing requirement are detailed in Sections 120.5, 120.6, 130.4 and 140.9. While the acceptance testing requirements may overlap, the Commissioning requirements may go beyond the acceptance test requirements. The acceptance testing is mandatory for certain nonresidential lighting. Only a lighting Acceptance Test Technician (ATT) certified by an ATT Certification Provider (ATTCP) may perform testing for indoor and outdoor lighting systems and controls. Refer to specification Section 26 96 09 for Electrical Commissioning and Field Testing and NFPA 70E requirements.
2. Functional testing is intended to begin upon completion of a system. Functional testing may proceed prior to the completion of systems or sub-systems if both CxA and GC concur. The commencement of system testing before full completion does not relieve the Contractor of the responsibility of fully completing the system, including all pre-functional checklists as soon as possible.
 - a. CxA or GC prepares Functional Performance Test (FPT) for all systems which are not tested by third-party or the sub-contractor/manufacturer.
 - b. Engineer and Contractor review and accept FPTs.
 - c. Contractor and CxA certify that all PFTs and start-up tests are complete and accepted.
 - d. Contractor and CxA certify that TAB is complete and accepted.

- e. FPTs developed by the CxA are performed by Contractor under the direction of the CxA. Third-party testing, and sub-contractor/manufacturer testing described in Table 1 – Commissioning Matrix is subject to CxA oversight and review of testing results.
 - f. CxA documents results of all CxA-prepared Functional Performance Tests.
 - g. Functional Performance Test results will be reviewed by the CxA and submitted to AE/Owner for review and approval. If test results are not satisfactory, exceptions will be identified and documented in the issues log. The General Contractor/responsible subcontractor shall see that corrections are made and reschedule functional performance testing as soon as possible after corrective work is complete.
 - h. Unforeseen Deferred Tests: If any check or test cannot be completed due to the building structure, required occupancy condition or other deficiency, execution of pre-functional checklists and functional testing may be delayed upon approval by the CxA and Owner.
 - i. When the testing plan indicates specific seasonal testing, appropriate initial performance tests shall be completed and documented and additional tests scheduled.
- I. O&M and System Manuals
1. O&M Manuals shall be provided as described in Specification 01 78 23.
 2. Contractor shall provide input for the System Manual including:
 - a. System single-line drawings
 - b. As-built sequence of operations
 - c. Control Shop Drawings
 - d. Original Control Set-points
 - e. Operating Instructions for integrated systems
 - f. Recommended schedule for maintenance requirements if not already included in O&M Manuals
 - g. Recommended retesting schedule and blank test forms
 - h. Sensor and actuator calibration schedules
 - i. General operating procedures
 - j. Recommended operational record keeping procedures
- J. Training
1. Training shall be provided to Maintenance and Staff Personnel as described in Specification 01 78 00 and as required by the individual specification sections.
- K. Post-Occupancy Review
1. CxA performs post-occupancy review of building operations 10 months after substantial completion.
 2. Contractors shall correct identified deficiencies under manufacturer's or contractor warranties.
 3. Contractors shall update System Manual submittals as required to address findings of Post-Occupancy Review.

END OF SECTION



DLR Group

Architecture
Engineering
Planning
Interiors

**FRESNO COUNTY
WEST ANNEX JAIL**
Fresno, California
County Contract No. 16-S-04

**Project Manual Divisions 2-14
Volume 2 of 3**

DLR Group Project No.: 75-15208-00
Back Check Review: March 28, 2017

*JOHN E WOODS
DSFM III SPL (RA)*

CONSTRUCTION DOCUMENT

OFFICE OF THE STATE FIRE MARSHAL APPROVED FIRE AND PANIC ONLY	
Reviewed by:	<i>[Signature]</i>
DATE:	4-11-17
Approval of this plan does not authorize or approve any omission or deviation from applicable regulations. Final approval is subject to field inspection. One set of approved plans shall be available on the project site at all times.	
CSFM FILE NO. 10-9031	
DIVISION OF THE STATE ARCHITECT	
APPL 02-115366	
FILE #	
AC	FLS
SSS	DATE
IDENTIFICATION STAMP	

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1 SECTION 02 41 19-SELECTIVE DEMOLITION

2 PART 1 - GENERAL

3 1.1 SUMMARY

4 A. Section Includes:

- 5 1. Demolition and removal of selected site elements.
- 6 2. Salvage of existing items to be reused or recycled.

7 B. Related Requirements:

- 8 1. Section 01 10 00 "Summary" for restrictions on the use of the premises, Owner-
9 occupancy requirements, and phasing requirements.
- 10 2. Section 01 73 00 "Execution" for cutting and patching procedures.
- 11 3. Section 31 10 00 "Site Clearing" for site clearing and removal of above- and below-grade
12 improvements.

13 1.2 DEFINITIONS

- 14 A. Remove: Detach items from existing construction and legally dispose of them off-site unless
15 indicated to be removed and salvaged or removed and reinstalled.
- 16 B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent
17 damage, and deliver to Owner.
- 18 C. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall
19 where indicated.
- 20 D. Existing to Remain: Existing items of construction that are not to be permanently removed and
21 that are not otherwise indicated to be removed, removed and salvaged, or removed and
22 reinstalled.

23 1.3 MATERIALS OWNERSHIP

- 24 A. Unless otherwise indicated, demolition waste becomes property of Contractor.
- 25 B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones
26 and their contents, commemorative plaques and tablets, and other items of interest or value to
27 Owner that may be uncovered during demolition remain the property of Owner.
- 28 1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

29 1.4 CLOSEOUT SUBMITTALS

- 30 A. Inventory: Submit a list of items that have been removed and salvaged.

31 1.5 FIELD CONDITIONS

- 32 A. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far
33 as practical.

B. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

C. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

D. Storage or sale of removed items or materials on-site is not permitted.

E. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Refer to Fresno County Construction and Demolition Debris Recycling requirements including submission of a Waste Management Plan (WMP).

C. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

B. Review record documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in record documents.

C. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

E. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs.

1. Comply with requirements specified in Section 01 3233 "Photographic Documentation."
2. Inventory and record the condition of items to be removed and salvaged. Provide photographs of conditions that might be misconstrued as damage caused by salvage operations.

3.2 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
5. Maintain adequate ventilation when using cutting torches.
6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
9. Dispose of demolished items and materials promptly. Comply with requirements in Sections 01 5000 "Temporary Facilities and Controls" and 01 7300 "Execution."

B. Reuse of Building Elements: Project has been designed to result in end-of-Project rates for reuse of building elements as follows. Do not demolish building elements beyond what is indicated on Drawings without Architect's approval.

C. Removed and Salvaged Items:

1. Transport items to Owner's storage area.

D. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

- 1 3.3 DISPOSAL OF DEMOLISHED MATERIALS
- 2 A. General: Except for items or materials indicated to be reused, salvaged, reinstalled, or
- 3 otherwise indicated to remain Owner's property, remove demolished materials from Project site
- 4 and legally dispose of them in an EPA-approved landfill.
- 5 1. Do not allow demolished materials to accumulate on-site.
- 6 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces
- 7 and areas.
- 8 3. Remove debris from elevated portions of building by chute, hoist, or other device that will
- 9 convey debris to grade level in a controlled descent.
- 10 4. Comply with requirements specified in Sections 01 5000 "Temporary Facilities &
- 11 Controls" and 01 7300 "Execution."
- 12 B. Burning: Do not burn demolished materials.
- 13 C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.
- 14 3.4 CLEANING
- 15 A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective
- 16 demolition operations. Return adjacent areas to condition existing before selective demolition
- 17 operations began.
- 18 END OF SECTION 02 41 19

1 SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY

- 7 A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials,
8 mixture design, placement procedures, and finishes.

9 B. Related Requirements:

- 10 1. Section 033300 "Architectural Concrete" for general building applications of specially
11 finished formed concrete.

12 1.3 DEFINITIONS

- 13 A. Cementitious Materials: Portland cement alone or in combination with one or more of the
14 following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume;
15 materials subject to compliance with requirements.

- 16 B. W/C Ratio: The ratio by weight of water to cementitious materials.

17 1.4 PRE-INSTALLATION MEETINGS

- 18 A. Pre-installation Conference: Conduct conference at Project site.

- 19 1. Before submitting design mixtures, review concrete design mixture and examine
20 procedures for ensuring quality of concrete materials. Require representatives of each
21 entity directly concerned with cast-in-place concrete to attend, including the following:

- 22 a. Contractor's superintendent.
23 b. Independent testing agency responsible for concrete design mixtures.
24 c. Ready-mix concrete manufacturer.
25 d. Concrete Subcontractor.
26 e. Special concrete finish Subcontractor.

- 27 2. Review special inspection and testing and inspecting agency procedures for field quality
28 control, concrete finishes and finishing, cold- and hot-weather concreting procedures,
29 curing procedures, construction contraction and isolation joints, and joint-filler strips,
30 semi-rigid joint fillers, forms and form removal limitations, shoring and re-shoring
31 procedures, vapor-retarder installation, steel reinforcement installation, methods for
32 achieving specified floor and slab flatness and levelness floor and slab flatness and
33 levelness measurement, concrete repair procedures, and concrete protection.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
 - 1. Indicate amounts of mixing water to be withheld for later addition at Project site.
- C. Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
- D. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
 - 1. Location of construction joints is subject to approval of the Architect.
- E. Samples: For waterstops.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Welding certificates.
- C. Material Certificates: For each of the following, signed by manufacturers:
 - 1. Cementitious materials.
 - 2. Admixtures.
 - 3. Form materials and form-release agents.
 - 4. Steel reinforcement and accessories.
 - 5. Fiber reinforcement.
 - 6. Waterstops.
 - 7. Curing compounds.
 - 8. Floor and slab treatments.
 - 9. Bonding agents.
 - 10. Adhesives.
 - 11. Vapor retarders.
 - 12. Semi-rigid joint filler.
 - 13. Joint-filler strips.
 - 14. Repair materials.
- D. Material Test Reports: For the following, from a qualified testing agency:
 - 1. Aggregates: Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.
- E. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer, detailing fabrication, assembly, and support of formwork.

- 1 1. Shoring and Re-shoring: Indicate proposed schedule and sequence of stripping
2 formwork, shoring removal, and re-shoring installation and removal.
- 3 F. Floor surface flatness and levelness measurements indicating compliance with specified
4 tolerances.
- 5 G. Field quality-control reports.
- 6 H. Minutes of pre-installation conference.

7 1.7 QUALITY ASSURANCE

- 8 A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-
9 certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete
10 Flatwork Technician.
- 11 B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete
12 products and that complies with ASTM C 94 requirements for production facilities and
13 equipment.
- 14 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete
15 Production Facilities."
- 16 C. Testing Agency Qualifications: An independent agency, acceptable to authorities having
17 jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
- 18 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing
19 Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
- 20 2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing
21 Technician and Concrete Laboratory Testing Technician, Grade I. Testing agency
22 laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician,
23 Grade II.
- 24 D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4.
- 25 E. Mockups: Cast concrete formed-surface panels to demonstrate typical joints, form liner
26 appearance, surface finish, texture, tolerances, floor treatments, and standard of workmanship.
- 27 1. Build panel approximately 200 sq. ft. for formed surface in the location indicated or, if not
28 indicated, as directed by Architect.

29 1.8 PRECONSTRUCTION TESTING

- 30 A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction
31 testing on concrete mixtures.

32 1.9 DELIVERY, STORAGE, AND HANDLING

- 33 A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and
34 damage.

- B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

1.10 FIELD CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

- B. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

- A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301.
2. ACI 117.

2.2 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
 - a. High-density overlay, Class 1 or better.
 - b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
 - c. Structural 1, B-B or better; mill oiled and edge sealed.
 - d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.

- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Pan-Type Forms: Glass-fiber-reinforced plastic or formed steel, stiffened to resist plastic concrete loads without detrimental deformation.
- D. Void Forms: Biodegradable paper surface, treated for moisture resistance, structurally sufficient to support weight of plastic concrete and other superimposed loads.
- E. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.
- F. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.
- G. Form-Release Agent: Commercially formulated form-release agent that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.
 - 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- H. Form Ties: Factory-fabricated, removable or snap-off glass-fiber-reinforced plastic or metal form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
 - 1. Furnish units that leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
 - 2. Furnish ties that, when removed, leave holes no larger than 1 inch in diameter in concrete surface.
 - 3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.3 STEEL REINFORCEMENT

- A. Reinforcing Bars:
 - 1. Number 3 Bars: ASTM A615, Grade 60 deformed for stirrups and ties (other bars may be Grade 40), provide smooth bars where indicated on drawings.
 - 2. Number 4 and Larger: ASTM A 615, Grade 60, deformed.
- B. Low-Alloy-Steel Reinforcing Bars: ASTM A 706, deformed.
- C. Deformed-Steel Wire: ASTM A 1064.

2.4 REINFORCEMENT ACCESSORIES

- A. Joint Dowel Bars: ASTM A 615, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.
- B. Epoxy-Coated Joint Dowel Bars: ASTM A 615, Grade 60, plain-steel bars, ASTM A 775 epoxy coated.
- C. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating; compatible with epoxy coating on reinforcement and complying with ASTM A 775.

D. Zinc Repair Material: ASTM A 780.

E. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

1. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

2.5 CONCRETE MATERIALS

A. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

B. Cementitious Materials:

1. Portland Cement: ASTM C 150, Type II, gray.
2. Fly Ash: ASTM C 618, Class F.
3. Slag Cement: ASTM C 989, Grade 100 or 120.
4. Silica Fume: ASTM C 1240, amorphous silica.

C. Normal-Weight Aggregates: ASTM C 33, coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.

1. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

D. Air-Entraining Admixture: ASTM C 260.

E. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017, Type II.

F. Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C 494, Type C.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. BASF Corporation; Construction Systems.
- b. Euclid Chemical Company (The); an RPM company.

- 1 c. Grace Construction Products; W.R. Grace & Co. -- Conn.
- 2 d. Sika Corporation.
- 3 G. Color Pigment: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing
- 4 admixtures; color stable, free of carbon black, nonfading, and resistant to lime and other alkalis.
- 5 1. Lanxess Subject to compliance with requirements, available manufacturers offering
- 6 products that may be incorporated into the Work include, but are not limited to, the
- 7 following:
- 8 a. **Bayer AG, Bayferrox**
- 9 b. **Solomon Colors, Inc**
- 10 Color: As selected by Architect from manufacturer's full range.
- 11 H. Water: ASTM C 94 and potable.
- 12 2.6 WATERSTOPS
- 13 A. Flexible Rubber Waterstops: CE CRD-C 513, for embedding in concrete to prevent passage of
- 14 fluids through joints. Factory fabricate corners, intersections, and directional changes.
- 15 1. Manufacturers: Subject to compliance with requirements, provide products by the
- 16 following:
- 17 a. Williams Products, Inc.
- 18 2. Profile: Flat dumbbell with center bulb.
- 19 3. Dimensions: 9 inches by 3/8 inch thick; non-tapered.
- 20 2.7 VAPOR RETARDERS
- 21 A. Sheet Vapor Retarder: ASTM E 1745, Class A. Include manufacturer's recommended adhesive
- 22 or pressure-sensitive tape.
- 23 1. Manufacturers: Subject to compliance with requirements, provide products by one of the
- 24 following:
- 25 a. Fortifiber Building Systems Group.
- 26 b. Stego Industries, LLC.
- 27 c. W. R. Meadows, Inc.
- 28
- 29 2. Puncture Resistance: 90 lbf; ASTM E 154.
- 30 2.8 LIQUID FLOOR TREATMENTS
- 31 A. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic
- 32 silicate or silicate materials and proprietary components; odorless; that penetrates, hardens,
- 33 and densifies concrete surfaces.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. BASF Corporation; Construction Systems.
- b. Dayton Superior.
- c. Euclid Chemical Company (The); an RPM company.
- d. L&M Construction Chemicals, Inc.
- e. PROSOCO, Inc.

2.9 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

- a. BASF Corporation; Construction Systems.
- b. Dayton Superior.
- c. Euclid Chemical Company (The); an RPM company.
- d. L&M Construction Chemicals, Inc.
- e. Sika Corporation.

- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

- D. Water: Potable.

- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

- a. BASF Corporation; Construction Systems.
- b. Dayton Superior.
- c. Euclid Chemical Company (The); an RPM company.
- d. L&M Construction Chemicals, Inc.
- e. W. R. Meadows, Inc.

2.10 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.

- B. Semi-rigid Joint Filler: Two-component, semi-rigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 according to ASTM D 2240.

- C. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

D. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:

1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

E. Reglets: Fabricate reglets of not less than 0.022-inch-thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

F. Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than 0.034 inch thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

2.11 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C 150, Portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than 4100 psi at 28 days when tested according to ASTM C 109.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent floor elevations.

1. Cement Binder: ASTM C 150, Portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109.

2.12 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 318.

1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Cementitious Materials: Use fly ash, pozzolan, slag cement, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.

1. Fly Ash: 25 percent.
 2. Combined Fly Ash and Pozzolan: 25 percent.
 3. Slag Cement: 50 percent.
 4. Combined Fly Ash or Pozzolan and Slag Cement: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.
 5. Silica Fume: 10 percent.
 6. Combined Fly Ash, Pozzolans, and Silica Fume: 35 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
 7. Combined Fly Ash or Pozzolans, Slag Cement, and Silica Fume: 50 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
- C. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
- D. Admixtures: Use admixtures according to manufacturer's written instructions.
1. Use plasticizing admixture in concrete, as required, for placement and workability.
 2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a w/c ratio below 0.50.
 4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.
- E. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

2.13 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Footings: Normal-weight concrete.
1. Minimum Compressive Strength: 4000 psi at 28 days.
 2. Maximum W/C Ratio: 0.50.
 3. Slump Limit: 4 inches, plus or minus 1 inch.
- B. Foundation Walls: Normal-weight concrete.
1. Minimum Compressive Strength: 4000 psi at 28 days.
 2. Maximum W/C Ratio: 0.50.
 3. Slump Limit: 4 inches, plus or minus 1 inch.
- C. Slabs-on-Grade: Normal-weight concrete.
1. Minimum Compressive Strength: 4000 psi at 28 days.
 2. Maximum W/C Ratio: 0.50.
 3. Minimum Cementitious Materials Content: 520 lb/cu. yd..
 4. Slump Limit: 4 inches, plus or minus 1 inch.
- D. Suspended Slabs: Normal-weight concrete.
1. Minimum Compressive Strength: 4000 psi at 28 days.
 2. Maximum W/C Ratio: 0.50.
 3. Minimum Cementitious Materials Content: 520 lb/cu. yd..
 4. Slump Limit: 4 inches, plus or minus 1 inch.

E. Concrete Toppings: Normal-weight concrete.

1. Minimum Compressive Strength: 4000 psi at 28 days.
2. Minimum Cementitious Materials Content: 520 lb/cu. yd..
3. Slump Limit: 4 inches, plus or minus 1 inch.

F. Building Frame Members: Normal-weight concrete.

1. Minimum Compressive Strength: 4000 psi at 28 days.
2. Maximum W/C Ratio: 0.50.
3. Slump Limit: 4 inches, plus or minus 1 inch.

G. Building Walls: Normal-weight concrete.

1. Minimum Compressive Strength: 4000 psi at 28 days.
2. Maximum W/C Ratio: 0.50.
3. Slump Limit: 4 inches, plus or minus 1 inch.

2.14 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.15 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94 and ASTM C 1116, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94. Mix concrete materials in appropriate drum-type batch machine mixer.

1. For mixer capacity of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
2. For mixer capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd.
3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.1 FORMWORK INSTALLATION

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

- 1 B. Construct formwork so concrete members and structures are of size, shape, alignment,
2 elevation, and position indicated, within tolerance limits of ACI 117.
- 3 C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:
 - 4 1. Class A, 1/8 inch for smooth-formed finished surfaces.
 - 5 2. Class B, 1/4 inch for rough-formed finished surfaces.
- 6 D. Construct forms tight enough to prevent loss of concrete mortar.
- 7 E. Construct forms for easy removal without hammering or prying against concrete surfaces.
8 Provide crush or wrecking plates where stripping may damage cast-concrete surfaces. Provide
9 top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
 - 10 1. Install keyways, reglets, recesses, and the like, for easy removal.
 - 11 2. Do not use rust-stained steel form-facing material.
- 12 F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required
13 elevations and slopes in finished concrete surfaces. Provide and secure units to support screed
14 strips; use strike-off templates or compacting-type screeds.
- 15 G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork
16 is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent
17 loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- 18 H. Chamfer exterior corners and edges of permanently exposed concrete.
- 19 I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads
20 required in the Work. Determine sizes and locations from trades providing such items.
- 21 J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and
22 other debris just before placing concrete.
- 23 K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and
24 maintain proper alignment.
- 25 L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written
26 instructions, before placing reinforcement.

27 3.2 EMBEDDED ITEM INSTALLATION

- 28 A. Place and secure anchorage devices and other embedded items required for adjoining work
29 that is attached to or supported by cast-in-place concrete. Use setting drawings, templates,
30 diagrams, instructions, and directions furnished with items to be embedded.
 - 31 1. Install anchor rods, accurately located, to elevations required and complying with
32 tolerances in Section 7.5 of AISC 303.
 - 33 2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face
34 of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and
35 other conditions.
 - 36 3. Install dovetail anchor slots in concrete structures as indicated.

3.3 REMOVING AND REUSING FORMS

- A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations, and curing and protection operations need to be maintained.
1. Leave formwork for beam soffits, joists, slabs, and other structural elements that support weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
 2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing materials are not acceptable for exposed surfaces. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.4 SHORING AND RESHORING INSTALLATION

- A. Comply with ACI 318 and ACI 301 for design, installation, and removal of shoring and reshoring.
1. Do not remove shoring or reshoring until measurement of slab tolerances is complete.
- B. In multistory construction, extend shoring or reshoring over a sufficient number of stories to distribute loads in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members without sufficient steel reinforcement.
- C. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

3.5 VAPOR-RETARDER INSTALLATION

- A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.
1. Lap joints 6 inches and seal with manufacturer's recommended tape.
- B. Bituminous Vapor Retarders: Place, protect, and repair bituminous vapor retarder according to manufacturer's written instructions.

3.6 STEEL REINFORCEMENT INSTALLATION

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
 - 1. Weld reinforcing bars according to AWS D1.4, where indicated.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded-wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.
- F. Epoxy-Coated Reinforcement: Repair cut and damaged epoxy coatings with epoxy repair coating according to ASTM D 3963. Use epoxy-coated steel wire ties to fasten epoxy-coated steel reinforcement.
- G. Zinc-Coated Reinforcement: Repair cut and damaged zinc coatings with zinc repair material according to ASTM A 780. Use galvanized-steel wire ties to fasten zinc-coated steel reinforcement.

3.7 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
 - 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
 - 2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
 - 3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
 - 4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
 - 5. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
 - 6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
 - 7. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
 - 1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.

2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.
2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.
3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

- E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.8 WATERSTOP INSTALLATION

- A. Flexible Waterstops: Install in construction joints and at other joints indicated to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed waterstops during progress of the Work. Field fabricate joints in waterstops according to manufacturer's written instructions.

- B. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions, adhesive bonding, mechanically fastening, and firmly pressing into place. Install in longest lengths practicable.

3.9 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.

- B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.

- C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

- D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.

3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
4. Take special care with concrete placement and vibration where form liners are used to provide proper consolidation into the form liner profiles to eliminate voids and ensure filling of the entire form liner profile.

- E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

3.10 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces not exposed to public view.

- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to public view,[to receive a rubbed finish, or to be covered with a coating or covering material applied directly to concrete.

- C. Rubbed Finish: Apply the following to smooth-formed-finished as-cast concrete where indicated:

1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix 1 part portland cement to 1-1/2 parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix 1 part portland cement and 1 part fine sand with a 1:1 mixture of bonding agent and water. Add white portland cement in amounts determined by trial patches, so color of dry grout matches

1 adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion,
2 finish surface with a cork float.

3 D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces
4 adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent
5 formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent
6 unformed surfaces unless otherwise indicated.

7 3.11 FINISHING FLOORS AND SLABS

8 A. General: Comply with ACI 302.1R recommendations for screeding, re-straightening, and
9 finishing operations for concrete surfaces. Do not wet concrete surfaces.

10 B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-
11 floated or darried. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch
12 in one direction.

13 1. Apply scratch finish to surfaces to receive concrete floor toppings or to receive mortar
14 setting beds for bonded cementitious floor finishes.

15 C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or
16 inaccessible to power-driven floats. Re-straighten, cut down high spots, and fill low spots.
17 Repeat float passes and re-straightening until surface is left with a uniform, smooth, granular
18 texture.

19 1. Apply float finish to surfaces to be covered with fluid-applied or sheet waterproofing.

20 D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand
21 or power-driven trowel. Continue troweling passes and re-straighten until surface is free of
22 trowel marks and uniform in texture and appearance. Grind smooth any surface defects that
23 would telegraph through applied coatings or floor coverings.

24 1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring,
25 carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-
26 finish coating system.

27 2. Finish surfaces to the following tolerances, according to ASTM E 1155, for a randomly
28 trafficked floor surface:

29 a. General Floor Flatness Requirement: Specified overall values of flatness, F(F) 35;
30 and of levelness, F(L) 25; with minimum local values of flatness, F(F) 24; and of
31 levelness, F(L) 17; for slabs-on-grade.

32 b. For Surfaces to Receive Modular Metal Wall Panel System (including similar roof
33 level areas): Specified overall values of flatness, F(F) 45; and of levelness,
34 F(L) 35; with minimum local values of flatness, F(F) 30; and of levelness, F(L) 24.

36 E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry
37 tile is to be installed by either thickset or thinset method. While concrete is still plastic, slightly
38 scarify surface with a fine broom.

39 1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

40 F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere
41 as indicated.

- 1 1. Immediately after float finishing, slightly roughen trafficked surface by brooming with
2 fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with
3 Architect before application.

4 3.12 MISCELLANEOUS CONCRETE ITEM INSTALLATION

- 5 A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in
6 place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-
7 place construction. Provide other miscellaneous concrete filling indicated or required to
8 complete the Work.

- 9 B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green
10 and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and
11 terminations slightly rounded.

- 12 C. Equipment Bases and Foundations:

- 13 1. Coordinate sizes and locations of concrete bases with actual equipment provided.
14 2. Construct concrete bases 6 inches high unless otherwise indicated, and extend base not
15 less than 6 inches in each direction beyond the maximum dimensions of supported
16 equipment unless otherwise indicated or unless required for seismic anchor support.
17 3. Minimum Compressive Strength: 4000 psi at 28 days.
18 4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated,
19 install dowel rods on 18-inch centers around the full perimeter of concrete base.
20 5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete
21 base and anchor into structural concrete substrate.
22 6. Prior to pouring concrete, place and secure anchorage devices. Use setting drawings,
23 templates, diagrams, instructions, and directions furnished with items to be embedded.
24 7. Cast anchor-bolt insert into bases. Install anchor bolts to elevations required for proper
25 attachment to supported equipment.

- 26 D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items.
27 Cast-in inserts and accessories as shown on Drawings. Screed, tamp, and trowel finish
28 concrete surfaces.

29 3.13 CONCRETE PROTECTING AND CURING

- 30 A. General: Protect freshly placed concrete from premature drying and excessive cold or hot
31 temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather
32 protection during curing.

- 33 B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or
34 windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing
35 operations. Apply according to manufacturer's written instructions after placing, screeding, and
36 bull floating or darbying concrete, but before float finishing.

- 37 C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported
38 slabs, and other similar surfaces. If forms remain during curing period, moist cure after
39 loosening forms. If removing forms before end of curing period, continue curing for remainder of
40 curing period.

- 41 D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces,
42 including floors and slabs, concrete floor toppings, and other surfaces.

E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

- a. Water.
- b. Continuous water-fog spray.
- c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.

- a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
- b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
- c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies does not interfere with bonding of floor covering used on Project.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

- a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound does not interfere with bonding of floor covering used on Project.

4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.14 LIQUID FLOOR TREATMENT APPLICATION

A. Penetrating Liquid Floor Treatment Scope: Where slabs in detention areas, warehouse and laundry are to remain exposed, provide penetrating liquid floor treatment.

B. Application: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions.

- 1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
- 2. Do not apply to concrete that is less than seven days' old.
- 3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water; remove excess material until surface is dry. Apply a second coat in a similar manner if surface is rough or porous.

- C. Sealing Coat: Uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete by power spray or roller according to manufacturer's written instructions.

3.15 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
1. Defer joint filling until concrete has aged at least one month(s). Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.
- C. Install semi-rigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.16 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete. Limit cut depth to 3/4 inch. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white portland cement and standard Portland cement so that, when dry, patching mortar matches surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.

3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
 4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
 5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
 7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.17 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Inspections:
1. Steel reinforcement placement.
 2. Steel reinforcement welding.
 3. Headed bolts and studs.
 4. Verification of use of required design mixture.
 5. Concrete placement, including conveying and depositing.
 6. Curing procedures and maintenance of curing temperature.
 7. Verification of concrete strength before removal of shores and forms from beams and slabs.
- C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.

2. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.
 - a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
3. Slump: ASTM C 143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below or 80 deg F and above, and one test for each composite sample.
5. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
6. Compression Test Specimens: ASTM C 31.
 - a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
 - b. Cast and field cure two sets of two standard cylinder specimens for each composite sample.
7. Compressive-Strength Tests: ASTM C 39; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
 - a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
 - b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
8. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
9. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
10. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
11. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
12. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
13. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
14. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

- 1 15. Retain paragraph below if measurements of floor flatness and levelness tolerances are
- 2 required.
- 3 16. Measure floor and slab flatness and levelness according to ASTM E 1155 within 48 hours
- 4 of finishing.

5 3.18 PROTECTION OF LIQUID FLOOR TREATMENTS

- 6 A. Protect liquid floor treatment from damage and wear during the remainder of construction
- 7 period. Use protective methods and materials, including temporary covering, recommended in
- 8 writing by liquid floor treatments installer.

9 END OF SECTION 033000
10

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1 SECTION 03 33 00 - ARCHITECTURAL CONCRETE

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY

- 7 A. Section includes cast-in-place architectural concrete, including form facings, reinforcement and
8 accessories, concrete materials, concrete mixture design, placement procedures, and finishes.

- 9 1. Requirements in Section 033000 "Cast-in-Place Concrete" apply to architectural
10 concrete.

- 11 B. Related Requirements:

- 12 1. Section 033000 "Cast-in-Place Concrete" for concrete not designated as architectural
13 concrete.

14 1.3 DEFINITIONS

- 15 A. Cast-in-Place Architectural Concrete: Formed concrete that is exposed to view on surfaces of
16 completed structure or building and that requires special concrete materials, formwork,
17 placement, or finishes to obtain specified architectural appearance.

- 18 B. Cementitious Materials: Portland cement alone or in combination with one or more of the
19 following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume;
20 materials subject to compliance with requirements.

- 21 C. Design Reference Sample: Sample designated by Architect in the Contract Documents that
22 reflects acceptable surface quality and appearance of cast-in-place architectural concrete.

- 23 D. Reveal: Projection of coarse aggregate from matrix or mortar after completion of exposure
24 operations.

- 25 E. W/C Ratio: The ratio by weight of water to cementitious materials.

26 1.4 PRE-INSTALLATION MEETINGS

- 27 A. Pre-installation Conference: Conduct conference at Project site.

- 28 1. Require representatives of each entity directly concerned with cast-in-place architectural
29 concrete to attend, including the following:

- 30 a. Architect.

- 1 b. Construction Manager.
 - 2 c. Contractor's superintendent.
 - 3 d. Independent testing agency responsible for concrete design mixtures.
 - 4 e. Ready-mix concrete manufacturer.
 - 5 f. Cast-in-place architectural concrete Subcontractor.
-
- 6 2. Review concrete finishes and finishing, cold- and hot-weather concreting procedures,
 - 7 curing procedures, construction joints, forms and form-removal limitations, reinforcement
 - 8 accessory installation, concrete repair procedures, and protection of cast-in-place
 - 9 architectural concrete.
 - 10 3. Before submitting design mixtures, review concrete design mixture and examine
 - 11 procedures for ensuring quality of concrete materials.

12 1.5 ACTION SUBMITTALS

- 13 A. Product Data: For each type of product.
- 14 B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when
- 15 characteristics of materials, Project conditions, weather, test results, or other circumstances
- 16 warrant adjustments.
- 17 1. Indicate amounts of mixing water to be withheld for later addition at Project site.
- 18 C. Formwork Shop Drawings: Show formwork construction, including form-facing joints,
- 19 rustications, construction and contraction joints, form joint-sealant details, form tie locations and
- 20 patterns, inserts and embedments, cutouts, cleanout panels, and other items that visually affect
- 21 cast-in-place architectural concrete.
- 22 D. Placement Schedule: Submit concrete placement schedule before start of placement
- 23 operations. Include locations of all joints, including construction joints.
- 24 E. Samples: For each of the following materials:
- 25 1. Form-facing panels.
 - 26 2. Form ties.
 - 27 3. Form liners.
 - 28 4. Exposed aggregates.
 - 29 5. Coarse- and fine-aggregate gradations.
 - 30 6. Chamfers and rustications.
- 31 F. Samples for Verification: Architectural concrete Samples, cast vertically, approximately 18 by 18
- 32 by 2 inches, of finishes, colors, and textures to match design reference sample. Include Sample
- 33 sets showing the full range of variations expected in these characteristics.

34 1.6 INFORMATIONAL SUBMITTALS

- 35 A. Qualification Data: For manufacturer.
- 36 B. Material Certificates: For each of the following, signed by manufacturers:
- 37 1. Cementitious materials.
 - 38 2. Admixtures.
 - 39 3. Form materials and form-release agents.

4. Repair materials.

C. Material Test Reports: For the following, by a qualified testing agency:

1. Aggregates. Include service-record data indicating absence of deleterious expansion of concrete due to alkali-aggregate reactivity.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "NRMCA Quality Control Manual - Section 3, Certification of Ready Mixed Concrete Production Facilities."

B. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.

C. Field Sample Panels: After approval of verification sample and before casting architectural concrete, produce field sample panels to demonstrate the approved range of selections made under Sample submittals. Produce a minimum of three sets of full-scale panels, cast vertically, approximately 48 by 48 by 6 inches minimum, to demonstrate the expected range of finish, color, and texture variations.

1. Locate panels as indicated or, if not indicated, as directed by Architect.

2. Demonstrate methods of curing, aggregate exposure, sealers, and coatings, as applicable.

3. In presence of Architect, damage part of an exposed-face surface for each finish, color, and texture, and demonstrate materials and techniques proposed for repair of tie holes and surface blemishes to match adjacent undamaged surfaces.

4. Maintain field sample panels during construction in an undisturbed condition as a standard for judging the completed Work.

5. Demolish and remove field sample panels when directed.

D. Mockups: Before casting architectural concrete, build mockups to verify selections made under Sample submittals and to demonstrate typical joints, surface finish, texture, tolerances, and standard of workmanship. Build mockups to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in a minimum of 200 square feet in the location directed by Construction Manager.

2. Build mockups of typical exterior wall of cast-in-place architectural concrete as shown on Drawings.

3. Demonstrate curing, cleaning, and protecting of cast-in-place architectural concrete, finishes, and contraction joints, as applicable.

4. In presence of Architect, damage part of the exposed-face surface for each finish, color, and texture, and demonstrate materials and techniques proposed for repair of tie holes and surface blemishes to match adjacent undamaged surfaces.

5. Obtain Architect's and Construction Manager's approval of mockups before casting architectural concrete.

1.8 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on concrete mixtures.

1.9 FIELD CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents.
4. Do not use chemical accelerators unless otherwise specified and approved in design mixtures.

- B. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

- A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301.
2. ACI 303.1.

2.2 FORM-FACING MATERIALS

- A. General: Comply with Section 033000 "Cast-in-Place Concrete" for formwork and other form-facing material requirements.

- B. Source Limitations: Obtain each type form-facing material from single source from single manufacturer.

- C. Form-Facing Panels for As-Cast Finishes: Exterior-grade plywood panels, nonabsorptive, that will provide continuous, true, and smooth architectural concrete surfaces, high-density overlay, Class 1, or better, complying with DOC PS 1.

- 1 D. Form Liners (AFL2): Units of face design, texture, arrangement, and configuration indicated.
2 Furnish with manufacturer's recommended liquid-release agent that will not bond with, stain, or
3 adversely affect concrete surfaces and will not impair subsequent surface treatments of
4 concrete.
5
6 1. Pattern Choices: As selected by the Architect from custom patterns including but not
7 limited to products manufactured by the following manufacturers.
8
9 a. Customrock Formliners; St Paul, MN, Phone 651-699-1345.
10 b. Fitzgerald Formliners; Santa Ana, CA 92701 USA, Phone: 714-547-6710.
11 c. Greenstreak Group, Inc.; St Louis, MO, Phone 800-325-9504.
12 d. US Formliner; Athens, GA 30606 USA, Phone 706-549-6787.
13
14 2. "Running Bond" Pattern (AFL2): Custom high reuse form liner with nominal 16 inch high
15 and nominal 8 inch high by 24 inch wide pattern with maximum 3/4 inch deep reveals and
16 [honed/weathered] limestone texture.
- 17 E. Chamfer Strips: Metal, rigid plastic, elastomeric rubber, or dressed wood, 3/4 by 3/4 inch,
18 minimum; non-staining; in longest practicable lengths.
- 19 F. Form Joint Tape: Compressible foam tape; pressure sensitive; AAMA 800; minimum 1/4 inch
20 thick.
- 21 G. Form Joint Sealant: Elastomeric sealant complying with ASTM C 920, Type M or Type S,
22 Grade NS, that adheres to form joint substrates.
- 23 H. Sealer: Penetrating, clear, polyurethane wood form sealer formulated to reduce absorption of
24 bleed water and prevent migration of set-retarding chemicals from wood.
- 25 I. Form-Release Agent: Commercially formulated, colorless form-release agent that will not bond
26 with, stain, or adversely affect architectural concrete surfaces and will not impair subsequent
27 treatments of those surfaces.
- 28 1. Basis-of-Design Product: Subject to compliance with requirements, provide BASF
29 Corporation; MasterFinish Series or comparable product.
- 30 A. Form Ties: Factory-fabricated, glass-fiber-reinforced plastic ties designed to resist lateral
31 pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
- 32 1. Furnish ties with tapered tie cone spreaders that, when removed, will leave holes 3/4 inch
33 in diameter on concrete surface.
34 2. Furnish internally disconnecting ties that will leave no metal closer than 1-1/2 inches from
35 the architectural concrete surface.
36 3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing
37 or waterproofing.

38 2.3 STEEL REINFORCEMENT AND ACCESSORIES

- 39 A. General: Comply with Section 033000 "Cast-in-Place Concrete" for steel reinforcement and
40 other requirements for reinforcement accessories.
- 41 B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and
42 fastening reinforcing bars and welded-wire fabric in place; manufactured according to CRSI's
43 "Manual of Standard Practice."

- 1 1. Where legs of wire bar supports contact forms, use CRSI Class 1, gray, plastic-protected
2 or CRSI Class 2, stainless-steel bar supports.

3 2.4 CONCRETE MATERIALS

- 4 A. Source Limitations: Obtain each type or class of cementitious material of the same brand from
5 the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures
6 from single source from single manufacturer.

- 7 B. Cementitious Materials:

- 8 1. Portland Cement: ASTM C 150, Type II,.
9 2. Fly Ash: ASTM C 618, Class F.
10 3. Slag Cement: ASTM C 989, Grade 100 or Grade 120.
11 4. Silica Fume: ASTM C 1240 amorphous silica.

- 12 a. Basis-of-Design Product: Subject to compliance with requirements, provide BASF
13 Corporation; MasterLife SF 100 or comparable product.

- 15 C. Normal-Weight Aggregates: ASTM C 33, Class 5S coarse aggregate or better, graded. Provide
16 aggregates from single source.

- 17 1. Maximum Coarse-Aggregate Size: 1/2 inch.
18 2. Gradation: Uniformly graded.

- 19 D. Normal-Weight Fine Aggregate: ASTM C 33, manufactured or natural sand, from same source
20 for entire Project.

- 21 E. Air-Entraining Admixture: ASTM C 260.

- 22 1. Basis-of-Design Product: Subject to compliance with requirements, provide BASF
23 Corporation; MasterAir Series or other comparable product.

- 25 F. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and
26 that does not contribute water-soluble chloride ions exceeding those permitted in hardened
27 concrete. Do not use calcium chloride or admixtures containing calcium chloride.

- 28 1. Water-Reducing Admixture: ASTM C 494, Type A.

- 29 a. Basis-of-Design Product: Subject to compliance with requirements, provide BASF
30 Corporation; Master Pozzolith Series or comparable product.

- 31 2. Plasticizing and Retarding Admixture: ASTM C 1017, Type II.

- 32 a. Basis-of-Design Product: Subject to compliance with requirements, provide BASF
33 Corporation; MasterSet AC 534 MasterSet or FP 20 or comparable product.

- 34 3. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.

- 35 a. Basis-of-Design Product: Subject to compliance with requirements, provide BASF
36 Corporation; MasterGlenium Series or MasterRheobuild 1000 or comparable
37 product .

- 38 4. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494, Type G.

5. Permeability-Reducing Admixture:

- a. Shall be a Portland cement-based crystalline capillary waterproofing admixture that reacts in concrete to form non-soluble crystalline hydration products in the capillary pores of the concrete.
- b. Shall show a reduction in permeability of concrete compared to an identical concrete mixture without the admixture, when tested in accordance with CRD-C 48 at a pressure of 200 psi, equivalent to 460 ft of head.
- c. Shall reduce or have no penetration of water compared to an identical concrete mixture without the admixture, when tested in accordance with DIN 1048 for a duration of 96 hours.
- d. Shall be certified to NSF/ANSI 61.
- e. Basis-of-Design Product: Subject to compliance with requirements, provide BASF Corporation; MasterLife 300D or a comparable product.

- G. Water: Potable, complying with ASTM C 94, except free of wash water from mixer washout operations.

2.5 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.
 1. For concrete indicated to be sealed, curing compound shall be compatible with sealer.

2.6 REPAIR MATERIALS

- A. Bonding Agent: ASTM C 1059/C 1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- B. Epoxy Bonding Adhesive: ASTM C 881/C 881M two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements.
 1. Basis-of-Design Product: Subject to compliance with requirements, provide BASF Corporation; MasterEmaco ADH (Pre-2014: Concrecive Series) or a comparable product.
 2. Types I and II, nonload bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

2.7 CONCRETE MIXTURES

- A. Obtain each color, size, type, and variety of concrete mixture from single manufacturer with resources to provide cast-in-place architectural concrete of consistent quality in appearance and physical properties.
- B. Prepare design mixtures for each type and strength of cast-in-place architectural concrete proportioned on basis of laboratory trial mixture or field test data, or both, according to ACI 301.

- 1 1. Use a qualified independent testing agency for preparing and reporting proposed design
2 mixtures based on laboratory trial mixtures.
- 3 C. Cementitious Materials: For cast-in-place architectural concrete exposed to deicers, limit
4 percentage, by weight, of cementitious materials other than portland cement according to
5 ACI 301 requirements. Use fly ash, pozzolan, slag cement, and silica fume as needed to reduce
6 the total amount of portland cement, which would otherwise be used, by not less than 40
7 percent.
- 8 D. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of
9 cement.
- 10 E. Admixtures: Use admixtures according to manufacturer's written instructions.
- 11 F. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written
12 instructions and to result in hardened concrete color consistent with approved mockup.
- 13 G. Concrete Mixtures:
 - 14 1. Compressive Strength (28 Days): 4000 psi.
 - 15 2. Maximum W/C Ratio: 0.46.
 - 16 3. Slump Limit: 4 inches, plus or minus 1 inch.
 - 17 4. Air Content: 5-1/2 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch
18 nominal maximum aggregate size.

19 2.8 CONCRETE MIXING

- 20 A. Ready-Mixed Architectural Concrete: Measure, batch, mix, and deliver concrete according to
21 ASTM C 94/C 94M and furnish batch ticket information.
 - 22 1. Clean equipment used to mix and deliver cast-in-place architectural concrete to prevent
23 contamination from other concrete.
 - 24 2. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from
25 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and
26 delivery time to 60 minutes.

27 PART 3 - EXECUTION

28 3.1 FORMWORK INSTALLATION

- 29 A. General: Comply with Section 033000 "Cast-in-Place Concrete" for formwork, embedded items,
30 and shoring and reshoring.
- 31 B. Limit deflection of form-facing panels to not exceed ACI 303.1 requirements.
- 32 C. In addition to ACI 303.1 limits on form-facing panel deflection, limit cast-in-place architectural
33 concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:
 - 34 1. Class A, 1/8 inch.
- 35 D. Construct forms to result in cast-in-place architectural concrete that complies with ACI 117
36 (ASI 117M).

- 1 E. Construct forms for easy removal without hammering or prying against concrete surfaces.
2 Provide crush or wrecking plates where stripping may damage cast-in-place surfaces. Provide
3 top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical. Kerf wood rustications,
4 keyways, reglets, recesses, and the like, for easy removal.
- 5 1. Seal form joints and penetrations at form ties with form joint tape or form joint sealant to
6 prevent cement paste leakage.
7 2. Do not use rust-stained steel form-facing material.
- 8 F. Provide temporary openings for cleanouts and inspection ports where interior area of formwork
9 is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent
10 loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- 11 G. Chamfer exterior corners and edges of cast-in-place architectural concrete.
- 12 H. Coat contact surfaces of wood rustications and chamfer strips with sealer before placing
13 reinforcement, anchoring devices, and embedded items.
- 14 I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads
15 required in the Work. Determine sizes and locations from trades providing such items.
- 16 J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and
17 other debris just before placing concrete.
- 18 K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and
19 maintain proper alignment.
- 20 L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written
21 instructions, before placing reinforcement.
- 22 M. Place form liners accurately to provide finished surface texture indicated. Provide solid backing
23 and attach securely to prevent deflection and maintain stability of liners during concreting.
24 Prevent form liners from sagging and stretching in hot weather. Seal joints of form liners and
25 form-liner accessories to prevent mortar leaks. Coat form liner with form-release agent.

26 3.2 REINFORCEMENT AND INSERT INSTALLATION

- 27 A. General: Comply with Section 033000 "Cast-in-Place Concrete" for fabricating and installing
28 steel reinforcement. Securely fasten steel reinforcement and wire ties against shifting during
29 concrete placement.
- 30 B. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

31 3.3 REMOVING AND REUSING FORMS

- 32 A. Formwork for sides of beams, walls, columns, and similar parts of the Work that does not
33 support weight of concrete may be removed after cumulatively curing at not less than 50 deg F
34 for 24 hours after placing concrete if concrete is hard enough to not be damaged by form-
35 removal operations and curing and protection operations are maintained.
- 36 1. Schedule form removal to maintain surface appearance that matches approved mockups.
37 2. Cut off and grind glass-fiber-reinforced plastic form ties flush with surface of concrete.

- 1 B. Leave formwork for beam soffits, joists, slabs, and other structural elements that support weight
2 of concrete in place until concrete has achieved at least 70 percent of 28-day design
3 compressive strength. Remove forms only if shores have been arranged to permit removal of
4 forms without loosening or disturbing shores.
- 5 C. Clean and repair surfaces of forms to be reused in the Work. Do not use split, frayed,
6 delaminated, or otherwise damaged form-facing material. Apply new form-release agent.
- 7 D. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints.
8 Align and secure joints to avoid offsets. Do not use patched forms for cast-in-place architectural
9 concrete surfaces.

10 3.4 JOINTS

- 11 A. Construction Joints: Install construction joints true to line, with faces perpendicular to surface
12 plane of cast-in-place architectural concrete, so strength and appearance of concrete are not
13 impaired, at locations indicated or as approved by Architect.
- 14 1. Place joints perpendicular to main reinforcement. Continue reinforcement across
15 construction joints unless otherwise indicated.
- 16 2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete. Align
17 construction joint within rustications attached to form-facing material.
- 18 3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset
19 joints in girders a minimum distance of twice the beam width from a beam-girder
20 intersection.
- 21 4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and
22 girders and at the top of footings or floor slabs.
- 23 5. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls,
24 near corners, and in concealed locations where possible.
- 25 6. Use bonding agent at locations where fresh concrete is placed against hardened or
26 partially hardened concrete surfaces.
- 27 B. Contraction Joints: Form weakened-plane contraction joints true to line, with faces
28 perpendicular to surface plane of cast-in-place architectural concrete, so strength and
29 appearance of concrete are not impaired, at locations indicated or as approved by Architect.

30 3.5 CONCRETE PLACEMENT

- 31 A. Before placing concrete, verify that installation of formwork, form-release agent, reinforcement,
32 and embedded items is complete and that required inspections have been performed.
- 33 B. Do not add water to concrete during delivery, at Project site, or during placement unless
34 approved by Architect.
- 35 C. Before test sampling and placing concrete, water may be added at Project site, subject to
36 limitations of ACI 301.
- 37 1. Do not add water to concrete after adding high-range water-reducing admixtures to
38 mixture.
- 39 D. Deposit concrete continuously between construction joints. Deposit concrete to avoid
40 segregation.

1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 303.1.
3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. Do not permit vibrators to contact forms.

3.6 FINISHES, GENERAL

- A. Architectural Concrete Finish: Match Architect's design reference sample, identified and described as indicated, to satisfaction of Architect.
- B. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces.
 1. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.
- C. Maintain uniformity of special finishes over construction joints unless otherwise indicated.

3.7 AS-CAST FORMED FINISHES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections exceeding specified limits on formed-surface irregularities.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Remove fins and other projections exceeding specified limits on formed-surface irregularities. Repair and patch tie holes and defects.
- C. Rubbed Finish: Apply the following to smooth-form-finished as-cast concrete where indicated:
 1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
 2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix 1 part portland cement to 1-1/2 parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
 3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix 1 part portland cement and 1 part fine sand with a 1:1 mixture of bonding agent and water. Add white portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.

- D. Form-Liner Finish: Produce a textured surface free of pockets, streaks, and honeycombs, and of uniform appearance, color, and texture.
1. AFL1 - "Fractured Rib" Pattern: High reuse form liner with 1 inch high ribs at approximately 2 inches on center to approximate those on the adjacent building.
 2. AFL2 - "Running Bond" Pattern: Custom high reuse form liner with nominal 16 inch high and nominal 8 inch high by 24 inch wide pattern with maximum 3/4 inch deep reveals and [honed/weathered] limestone texture.

3.8 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and with ACI 301 for hot-weather protection during curing.
- B. Begin curing cast-in-place architectural concrete immediately after removing forms from concrete. Cure according to ACI 308.1, by one or a combination of the following methods that will not mottle, discolor, or stain concrete:
1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
 3. Curing Compound: Mist concrete surfaces with water. Apply curing compound uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating, and repair damage during curing period.

3.9 FIELD QUALITY CONTROL

- A. General: Comply with field quality-control requirements in Section 033000 "Cast-in-Place Concrete."

3.10 REPAIR, PROTECTION, AND CLEANING

- A. Repair and cure damaged finished surfaces of cast-in-place architectural concrete when approved by Architect. Match repairs to color, texture, and uniformity of surrounding surfaces and to repairs on approved mockups.
1. Remove and replace cast-in-place architectural concrete that cannot be repaired and cured to Architect's approval.
- B. Protect corners, edges, and surfaces of cast-in-place architectural concrete from damage; use guards and barricades.

- 1 C. Protect cast-in-place architectural concrete from staining, laitance, and contamination during
2 remainder of construction period.
- 3 D. Clean cast-in-place architectural concrete surfaces after finish treatment to remove stains,
4 markings, dust, and debris.
- 5 E. Wash and rinse surfaces according to concrete finish applicator's written instructions. Protect
6 other Work from staining or damage due to cleaning operations.
- 7 1. Do not use cleaning materials or processes that could change the appearance of cast-in-
8 place architectural concrete finishes.

9 END OF SECTION 03 33 00
10

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1 SECTION 03 45 00 - PRECAST ARCHITECTURAL CONCRETE

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY

- 7 A. Section Includes: Architectural precast concrete cladding units.

- 8 B. Related Requirements:

- 9 1. Section 033000 "Cast-in-Place Concrete" for installing connection anchors in concrete.
10 2. Section 033300 "Architectural Concrete".
11 3. Section 051200 "Structural Steel Framing" for furnishing and installing connections
12 attached to structural-steel framing.

13 1.3 DEFINITIONS

- 14 A. Design Reference Sample: Sample of approved architectural precast concrete color, finish and
15 texture, preapproved by Architect.

16 1.4 PRE-INSTALLATION MEETINGS

- 17 A. Pre-installation Conference: Conduct conference at Project site.

- 18
19 1. Require representatives of each entity directly concerned with precast architectural
20 concrete to attend, including the following:

- 21 a. Architect.
22 b. Construction Manager.
23 c. Contractor's superintendent.
24 d. Precast architectural concrete Subcontractor

25 1.5 ACTION SUBMITTALS

- 26 A. Product Data: For each type of product.

- 27 B. Design Mixtures: For each precast concrete mixture. Include compressive strength and water-
28 absorption tests.

- 29 C. Shop Drawings:

- 30 1. Detail fabrication and installation of architectural precast concrete units.

2. Indicate locations, plans, elevations, dimensions, shapes, and cross sections of each unit.
 3. Indicate joints, reveals, drips, chamfers, and extent and location of each surface finish.
 4. Indicate details at building corners.
 5. Indicate separate face and backup mixture locations and thicknesses.
 6. Indicate type, size, and length of welded connections by AWS standard symbols. Detail loose and cast-in hardware and connections.
 7. Indicate locations, tolerances, and details of anchorage devices to be embedded in or attached to structure or other construction.
 8. Indicate locations, extent, and treatment of dry joints if two-stage casting is proposed.
 9. Include plans and elevations showing unit location and sequence of erection for special conditions.
 10. Indicate location of each architectural precast concrete unit by same identification mark placed on panel.
 11. Indicate relationship of architectural precast concrete units to adjacent materials.
 12. If design modifications are proposed to meet performance requirements and field conditions, submit design calculations and Shop Drawings. Do not adversely affect the appearance, durability, or strength of units when modifying details or materials and maintain the general design concept.
- D. Samples: Design reference samples for initial verification of design intent, for each type of finish indicated on exposed surfaces of architectural precast concrete units, in sets of three, representative of finish, color, and texture variations expected; approximately 12 by 12 by 2 inches.
1. When other faces of precast concrete unit are exposed, include Samples illustrating workmanship, color, and texture of backup concrete as well as facing concrete.
 2. Samples for each thin-brick unit required, showing full range of color and texture expected. Include Sample showing color and texture of joint treatment.
 - a. Grout Samples for Initial Selection: Color charts consisting of actual sections of grout showing manufacturer's full range of colors.
 - b. Grout Samples for Verification: Showing color and texture of joint treatment.
- E. Delegated-Design Submittal: For architectural precast concrete indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
1. Show governing panel types, connections, types of reinforcement, including special reinforcement, and concrete cover on reinforcement. Indicate location, type, magnitude, and direction of loads imposed on the building structural frame from architectural precast concrete.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and fabricator.
- B. Welding certificates.
- C. Material Certificates: For the following items:
 1. Cementitious materials.
 2. Reinforcing materials.
 3. Admixtures.

- 1 4. Bearing pads.
- 2 5. Structural-steel shapes and hollow structural sections.

3 D. Material Test Reports: For aggregates.

4 E. Pre-construction test reports.

5 F. Source quality-control test reports.

6 G. Field quality-control and special inspection reports.

7 1.7 QUALITY ASSURANCE

8 A. Installer Qualifications: A precast concrete erector qualified and designated by PCI's Certificate
9 of Compliance to erect Category A (Architectural Systems) for non-load-bearing members.

10 B. Fabricator Qualifications: A firm that assumes responsibility for engineering architectural precast
11 concrete units to comply with performance requirements. This responsibility includes
12 preparation of Shop Drawings and comprehensive engineering analysis by a qualified
13 professional engineer.

14 1. Designated as a PCI-certified plant for Group A, Category A1 - Architectural Cladding
15 and Load Bearing Units at time of bidding or designated as an APA-certified plant for
16 production of architectural precast concrete products.

17 C. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having
18 jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

19 D. Quality-Control Standard: For manufacturing procedures and testing requirements, quality-
20 control recommendations, and dimensional tolerances for types of units required, comply with
21 PCI MNL 117, "Manual for Quality Control for Plants and Production of Architectural Precast
22 Concrete Products."

23 E. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M,
24 "Structural Welding Code - Steel"; and AWS D1.4/D1.4M, "Structural Welding Code -
25 Reinforcing Steel."

26 F. Sample Panels: After sample approval and before fabricating architectural precast concrete
27 units, produce a minimum of two sample panels approximately 16 sq. ft. in area for review by
28 Architect. Incorporate full-scale details of architectural features, finishes, textures, and
29 transitions in sample panels.

- 30 1. Locate panels where indicated or, if not indicated, as directed by Architect. Panels may
31 be held at the precast plant if within 100 miles of Fresno County.
- 32 2. Damage part of an exposed-face surface for each finish, color, and texture, and
33 demonstrate adequacy of repair techniques proposed for repair of surface blemishes.
- 34 3. After acceptance of repair technique, maintain one sample panel at manufacturer's plant
35 and one at Project site in an undisturbed condition as a standard for judging the
36 completed Work.
- 37 4. Demolish and remove sample panels when directed.

38 G. Range Samples: After sample panel approval and before fabricating architectural precast
39 concrete units, produce a minimum of three sets of samples, approximately 16 sq. ft. in area,
40 representing anticipated range of each color and texture on Project's units. Maintain one set of

range samples at Project site and remaining range sample sets at manufacturer's plant as color and texture approval reference.

H. Mockups: After sample panel and range sample approval but before production of architectural precast concrete units, construct full-sized mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and to set quality standards for materials and execution.

1. Build mockup as indicated on Drawings including architectural precast concrete complete with anchors, connections, flashings, and joint fillers.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undamaged at time of Substantial Completion.

1.8 COORDINATION

A. Furnish loose connection hardware and anchorage items to be embedded in or attached to other construction without delaying the Work. Provide locations, setting diagrams, templates, instructions, and directions, as required, for installation.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver architectural precast concrete units in such quantities and at such times to limit unloading units temporarily on the ground or other rehandling.

B. Support units during shipment on nonstaining shock-absorbing material.

C. Store units with adequate dunnage and bracing and protect units to prevent contact with soil, to prevent staining, and to prevent cracking, distortion, warping or other physical damage.

D. Place stored units so identification marks are clearly visible, and units can be inspected.

E. Handle and transport units in a manner that avoids excessive stresses that cause cracking or damage.

F. Lift and support units only at designated points indicated on Shop Drawings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design architectural precast concrete units.

B. Design Standards: Comply with ACI 318 and design recommendations of PCI MNL 120, "PCI Design Handbook - Precast and Pre-stressed Concrete," applicable to types of architectural precast concrete units indicated.

C. Structural Performance: Provide architectural precast concrete units and connections capable of withstanding the following design loads within limits and under conditions indicated:

1. Loads: As indicated on structural drawings Sheet S1.1,
2. Design precast concrete units and connections to maintain clearances at openings, to allow for fabrication and construction tolerances, to accommodate live-load deflection, shrinkage and creep of primary building structure, and other building movements as follows:

a. Upward and downward movement of 1/2 inch.

3. Thermal Movements: Provide for in-plane thermal movements resulting from annual ambient temperature changes of 120 deg F.
4. Window Washing System: Design precast units supporting window washing system indicated to resist pull-out and horizontal shear forces transmitted from window washing equipment.

2.2 MOLD MATERIALS

A. Molds: Rigid, dimensionally stable, non-absorptive material, warp and buckle free, that provides continuous and true precast concrete surfaces within fabrication tolerances indicated; nonreactive with concrete and suitable for producing required finishes.

1. Mold-Release Agent: Commercially produced form-release agent that does not bond with, stain or adversely affect precast concrete surfaces and does not impair subsequent surface or joint treatments of precast concrete.

B. Form Liners (AFL-1 and AFL-2): Units of face design, texture, arrangement, and configuration indicated. Use with manufacturer's recommended form-release agent that does not bond with, stain, or adversely affect precast concrete surfaces and does not impair subsequent surface or joint treatments of precast concrete.

1. Pattern Choices: As selected by the Architect from standard or custom patterns including but not limited to products manufactured by the following manufacturers.
 - a. Customrock Formliners; St Paul, MN, Phone 651-699-1345.
 - b. Fitzgerald Formliners; Santa Ana, CA 92701 USA, Phone: 714-547-6710.
 - c. Greenstreak Group, Inc.; St Louis, MO, Phone 800-325-9504.
 - d. US Formliner; Athens, GA 30606 USA, Phone 706-549-6787.
2. "Running Bond" Pattern (AFL-2): Custom high reuse form liner with nominal 16 inch high and nominal 8 inch high by 24 inch wide pattern with maximum 3/4 inch deep reveals and [honed/weathered] limestone texture.
3. "Fractured Rib" Pattern (AFL-1): High reuse form liner with 1 inch high ribs at approximately 2 inches on center to approximate those on the adjacent building.

2.3 REINFORCING MATERIALS

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

B. Low-Alloy-Steel Reinforcing Bars: ASTM A 706, deformed.

- 1 C. Steel Bar Mats: ASTM A 184 fabricated from ASTM A 615, Grade 60, deformed bars,
2 assembled with clips.
- 3 D. Plain-Steel Welded Wire Reinforcement: ASTM A 185, fabricated from as-drawn steel wire into
4 flat sheets.
- 5 E. Deformed-Steel Welded Wire Reinforcement: ASTM A 497, flat sheet.
- 6 F. Epoxy-Coated-Steel Wire: ASTM A 884, Class A coated, deformed, flat sheet, Type 2 non-
7 bendable coating.
- 8 G. Supports: Suspend reinforcement from back of mold or use bolsters, chairs, spacers, and other
9 devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in
10 place according to PCI MNL 117.

11 2.4 CONCRETE MATERIALS

- 12 A. Portland Cement: ASTM C 150, Type I or Type III, gray, unless otherwise indicated.
- 13 1. For surfaces exposed to view in finished structure, use gray or white cement, of same
14 type, brand, and mill source.
- 15 B. Supplementary Cementitious Materials:
- 16 1. Fly Ash: ASTM C 618, Class C or F, with maximum loss on ignition of 3 percent.
17 2. Metakaolin: ASTM C 618, Class N.
18 3. Silica Fume: ASTM C 1240, with optional chemical and physical requirement.
19 4. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
- 20 C. Normal-Weight Aggregates: Except as modified by PCI MNL 117, ASTM C 33, with coarse
21 aggregates complying with Class 5S. Stockpile fine and coarse aggregates for each type of
22 exposed finish from a single source (pit or quarry) for Project.
- 23 1. Face-Mixture-Coarse Aggregates: Selected, hard, and durable; free of material that
24 reacts with cement or causes staining; to match selected finish sample.
- 25 a. Gradation: Uniformly graded.
- 26 2. Face-Mixture-Fine Aggregates: Selected, natural or manufactured sand compatible with
27 coarse aggregate; to match approved finish sample.
- 28 D. Water: Potable; free from deleterious material that may affect color stability, setting, or strength
29 of concrete and complying with chemical limits of PCI MNL 117.
- 30 E. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other
31 required admixtures.
- 32 F. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and to
33 not contain calcium chloride, or more than 0.15 percent chloride ions or other salts by weight of
34 admixture.
- 35 1. Water-Reducing Admixtures: ASTM C 494, Type A.
36 2. Retarding Admixture: ASTM C 494, Type B.
37 3. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.

- 1 4. Water-Reducing and Accelerating Admixture: ASTM C 494, Type E.
- 2 5. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.
- 3 6. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494, Type G.
- 4 7. Plasticizing Admixture: ASTM C 1017, Type I.
- 5 8. Plasticizing and Retarding Admixture: ASTM C 1017, Type II.
- 6 9. Corrosion Inhibiting Admixture: ASTM C 1582.

- 7 G. Water Retardant: Include water retardant in admixture for all exterior precast.

8 2.5 STEEL CONNECTION MATERIALS

- 9 A. Carbon-Steel Shapes and Plates: ASTM A 36/A 36M.
- 10 B. Carbon-Steel-Headed Studs: ASTM A 108, AISI 1018 through AISI 1020, cold finished,
11 AWS D1.1, Type A or Type B, with arc shields and with minimum mechanical properties of
12 PCI MNL 117, Table 3.2.3.
- 13 C. Carbon-Steel Plate: ASTM A 283, Grade C.
- 14 D. Malleable Iron Castings: ASTM A 47, Grade 32510 or Grade 35028.
- 15 E. Carbon-Steel Castings: ASTM A 27, Grade 60-30.
- 16 F. High-Strength, Low-Alloy Structural Steel: ASTM A 572.
- 17 G. Carbon-Steel Structural Tubing: ASTM A 500, Grade B or Grade C.
- 18 H. Wrought Carbon-Steel Bars: ASTM A 675, Grade 65.
- 19 I. Deformed-Steel Wire or Bar Anchors: ASTM A 496 or ASTM A 706.
- 20 J. Carbon-Steel Bolts and Studs: ASTM A 307, Grade A or ASTM F 1554, Grade 36; carbon-steel,
21 hex-head bolts and studs; carbon-steel nuts, ASTM A 563; and flat, unhardened steel washers,
22 ASTM F 844.
- 23 K. High-Strength Bolts and Nuts: ASTM A 325, Type 1, heavy hex steel structural bolts; heavy hex
24 carbon-steel nuts, ASTM A 563; and hardened carbon-steel washers, ASTM F 436.
- 25 L. Zinc-Coated Finish: For exterior steel items, steel in exterior walls, and items indicated for
26 galvanizing, apply zinc coating by hot-dip process according to ASTM A 123 or ASTM A 153.
- 27 1. For steel shapes, plates, and tubing to be galvanized, limit silicon content of steel to less
28 than 0.03 percent or to between 0.15 and 0.25 percent or limit sum of silicon and 2.5
29 times phosphorous content to 0.09 percent.
- 30 2. Galvanizing Repair Paint: High-zinc-dust-content paint with dry film containing not less
31 than 94 percent zinc dust by weight, and complying with DOD-P-21035B or SSPC-
32 Paint 20.
- 33 M. Shop-Primed Finish: Prepare surfaces of non-galvanized steel items, except those surfaces to
34 be embedded in concrete, according to requirements in SSPC-SP 3 and shop-apply lead- and
35 chromate-free, rust-inhibitive primer, complying with performance requirements in MPI 79
36 SSPC-Paint 25 according to SSPC-PA 1.
- 37 N. Welding Electrodes: Comply with AWS standards.

2.6 STAINLESS-STEEL CONNECTION MATERIALS

- A. Stainless-Steel Plate: ASTM A 666, Type 304, Type 316, or Type 201.
- B. Stainless-Steel Bolts and Studs: ASTM F 593, Alloy Group 1 or 2 hex-head bolts and studs; ASTM F 594, Alloy Group 1 or 2 stainless-steel nuts; and flat, stainless-steel washers.
 - 1. Lubricate threaded parts of stainless-steel bolts with an antiseize thread lubricant during assembly.
- C. Stainless-Steel-Headed Studs: ASTM A 276, Alloy 304 or Alloy 316, with minimum mechanical properties of PCI MNL 117, Table 3.2.3.

2.7 BEARING PADS

- A. Provide one of the following bearing pads for architectural precast concrete units as recommended by precast fabricator for application:
 - 1. Elastomeric Pads: AASHTO M 251, plain, vulcanized, 100 percent polychloroprene (neoprene) elastomer, molded to size or cut from a molded sheet, Type A durometer hardness of 50 to 70, ASTM D 2240, minimum tensile strength 2250 psi, ASTM D 412.
 - 2. Random-Oriented-Fiber-Reinforced Elastomeric Pads: Preformed, randomly oriented synthetic fibers set in elastomer. Type A durometer hardness of 70 to 90, ASTM D 2240; capable of supporting a compressive stress of 3000 psi with no cracking, splitting, or delaminating in the internal portions of pad. Test one specimen for every 200 pads used in Project.
 - 3. Cotton-Duck-Fabric-Reinforced Elastomeric Pads: Preformed, horizontally layered cotton-duck fabric bonded to an elastomer; Type A durometer hardness of 80 to 100, ASTM D 2240; complying with AASHTO's "AASHTO LRFD Bridge Design Specifications," Division II, Section 18.10.2; or with MIL-C-882E.
 - 4. Frictionless Pads: PTFE, glass-fiber reinforced, bonded to stainless or mild-steel plate, or random-oriented-fiber-reinforced elastomeric pads; of type required for in-service stress.
 - 5. High-Density Plastic: Multimonomer, nonleaching, plastic strip.

2.8 ACCESSORIES

- A. Precast Accessories: Provide clips, hangers, high-density plastic or steel shims, and other accessories required to install architectural precast concrete units.

2.9 GROUT MATERIALS

- A. Sand-Cement Grout: Portland cement, ASTM C 150/C 150M, Type I, and clean, natural sand, ASTM C 144 or ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 to 3 parts sand, by volume, with minimum water required for placement and hydration. Water-soluble chloride ion content less than 0.06 percent by weight of cement when tested according to ASTM C 1218/C 1218M.
- B. Nonmetallic, Non-shrink Grout: Packaged, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, Portland cement, shrinkage-compensating agents, plasticizing and water-reducing agents, complying with ASTM C 1107/C 1107M, Grade A for drypack and Grades B and C for flowable grout and of consistency suitable for application within a 30-minute working time. Water-soluble chloride ion content less than 0.06 percent by weight of cement when tested according to ASTM C 1218/C 1218M.

- 1 C. Epoxy-Resin Grout: Two-component, mineral-filled epoxy resin; ASTM C 881/C 881M, of type,
2 grade, and class to suit requirements.

3 2.10 CONCRETE MIXTURES

- 4 A. Prepare design mixtures for each type of precast concrete required.

- 5 1. Use a single design mixture for units with more than one major face or edge exposed.
6 2. Where only one face of unit is exposed use either a single design mixture or separate
7 mixtures for face and backup.

- 8 B. Limit use of fly ash and ground granulated blast-furnace slag to 20 percent of portland cement
9 by weight; limit metakaolin and silica fume to 10 percent of portland cement by weight.

- 10 C. Design mixtures may be prepared by a qualified independent testing agency or by qualified
11 precast plant personnel at architectural precast concrete fabricator's option.

- 12 D. Limit water-soluble chloride ions to maximum percentage by weight of cement permitted by
13 ACI 318 or PCI MNL 117 when tested according to ASTM C 1218.

- 14 E. Normal-Weight Concrete Mixtures: Proportion full-depth mixture by either laboratory trial batch
15 or field test data methods according to ACI 211.1, with materials to be used on Project, to
16 provide normal-weight concrete with the following properties:

- 17 1. Compressive Strength (28 Days): 5000 psi minimum.
18 2. Maximum Water-Cementitious Materials Ratio: 0.45.

- 19 F. Water Absorption: 6 percent by weight or 14 percent by volume, tested according to
20 ASTM C 642, except for boiling requirement.

- 21 1. Unit Weight: Calculated equilibrium unit weight of 115 lb/cu. ft., plus or minus 3 lb/cu. ft.,
22 according to ASTM C 567.
23

- 24 G. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of
25 placement having an air content complying with PCI MNL 117.

- 26 H. When included in design mixtures, add other admixtures to concrete mixtures according to
27 manufacturer's written instructions.

28 2.11 MOLD FABRICATION

- 29 A. Molds: Accurately construct molds, mortar tight, of sufficient strength to withstand pressures
30 due to concrete-placement operations and temperature changes operations. Coat contact
31 surfaces of molds with release agent before reinforcement is placed. Avoid contamination of
32 reinforcement by release agent.

- 33 1. Place form liners accurately to provide finished surface texture indicated. Provide solid
34 backing and supports to maintain stability of liners during concrete placement. Coat form
35 liner with form-release agent.

- 36 B. Maintain molds to provide completed architectural precast concrete units of shapes, lines, and
37 dimensions indicated, within fabrication tolerances specified.

- 1 1. Form joints are not permitted on faces exposed to view in the finished work.
- 2 2. Edge and Corner Treatment: Uniformly chamfered.

3 2.12 FABRICATION

- 4 A. Cast-in Anchors, Inserts, Plates, Angles, and Other Anchorage Hardware: Fabricate anchorage
5 hardware with sufficient anchorage and embedment to comply with design requirements.
6 Accurately position for attachment of loose hardware, and secure in place during pre-casting
7 operations. Locate anchorage hardware where it does not affect position of main reinforcement
8 or concrete placement.
- 9 1. Weld-headed studs and deformed bar anchors used for anchorage according to
10 AWS D1.1/D1.1M and AWS C5.4, "Recommended Practices for Stud Welding."
- 11 B. Furnish loose hardware items including steel plates, clip angles, seat angles, anchors, dowels,
12 cramps, hangers, and other hardware shapes for securing architectural precast concrete units
13 to supporting and adjacent construction.
- 14 C. Cast-in slots, holes, and other accessories in architectural precast concrete units as indicated
15 on the Contract Drawings.
- 16 D. Cast-in openings larger than 10 inches in any dimension.
- 17 E. Reinforcement: Comply with recommendations in PCI MNL 117 for fabricating, placing, and
18 supporting reinforcement.
- 19 1. Clean reinforcement of loose rust and mill scale, earth, and other materials that reduce or
20 destroy the bond with concrete. When damage to epoxy-coated reinforcing exceeds limits
21 specified in ASTM A 775, repair with patching material compatible with coating material
22 and epoxy coat bar ends after cutting.
- 23 2. Accurately position, support, and secure reinforcement against displacement during
24 concrete-placement and consolidation operations. Completely conceal support devices to
25 prevent exposure on finished surfaces.
- 26 3. Place reinforcing steel strands to maintain at least 3/4-inch minimum concrete cover.
27 Increase cover requirements for reinforcing steel to 1-1/2 inches when units are exposed
28 to corrosive environment or severe exposure conditions. Arrange, space, and securely tie
29 bars and bar supports to hold reinforcement in position while placing concrete. Direct wire
30 tie ends away from finished, exposed concrete surfaces.
- 31 4. Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces
32 at least one full mesh spacing and wire tie laps, where required by design. Offset laps of
33 adjoining widths to prevent continuous laps in either direction.
- 34 F. Reinforce architectural precast concrete units to resist handling, transportation, and erection
35 stresses and specified in-place loads.
- 36 G. Comply with requirements in PCI MNL 117 and requirements in this Section for measuring,
37 mixing, transporting, and placing concrete. After concrete batching, no additional water may be
38 added.
- 39 H. Place face mixture to a minimum thickness after consolidation of the greater of 1 inch or 1.5
40 times the maximum aggregate size, but not less than the minimum reinforcing cover specified.
- 41 I. Place concrete in a continuous operation to prevent cold joints or planes of weakness from
42 forming in precast concrete units.

1. Place backup concrete mixture to ensure bond with face-mixture concrete.
- J. Thoroughly consolidate placed concrete by internal and external vibration without dislocating or damaging reinforcement and built-in items, and minimize pour lines, honeycombing, or entrapped air voids on surfaces. Use equipment and procedures complying with PCI MNL 117.
1. Place self-consolidating concrete without vibration according to PCI TR-6, "Interim Guidelines for the Use of Self-Consolidating Concrete in Precast/Prestressed Concrete Institute Member Plants." Ensure adequate bond between face and backup concrete, if used.
- K. Comply with PCI MNL 117 for hot- and cold-weather concrete placement.
- L. Identify pickup points of architectural precast concrete units and orientation in structure with permanent markings, complying with markings indicated on Shop Drawings. Imprint or permanently mark casting date on each architectural precast concrete unit on a surface that does not show in finished structure.
- M. Cure concrete, according to requirements in PCI MNL 117, by moisture retention without heat or by accelerated heat curing using low-pressure live steam or radiant heat and moisture. Cure units until compressive strength is high enough to ensure that stripping does not have an effect on performance or appearance of final product.
- N. Discard and replace architectural precast concrete units that do not comply with requirements, including structural, manufacturing tolerance, and appearance, unless repairs meet requirements in PCI MNL 117 and Architect's approval.

2.13 FABRICATION TOLERANCES

- A. Fabricate architectural precast concrete units to shapes, lines, and dimensions indicated so each finished unit complies with PCI MNL 117 product tolerances as well as position tolerances for cast-in items.
- B. Fabricate architectural precast concrete units to shapes, lines, and dimensions indicated so each finished unit complies with the following product tolerances:
 1. Overall Height and Width of Units, Measured at the Face Exposed to View: As follows:
 - a. 10 feet or under, plus or minus 1/8 inch.
 - b. 10 to 20 feet, plus 1/8 inch, minus 3/16 inch.
 - c. 20 to 40 feet, plus or minus 1/4 inch.
 - d. Each additional 10 feet, plus or minus 1/16 inch.
 2. Overall Height and Width of Units, Measured at the Face Not Exposed to View: As follows:
 - a. 10 feet or under, plus or minus 1/4 inch.
 - b. 10 to 20 feet, plus 1/4 inch, minus 3/8 inch.
 - c. 20 to 40 feet, plus or minus 3/8 inch.
 - d. Each additional 10 feet, plus or minus 1/8 inch.
 3. Total Thickness or Flange Thickness: Plus 1/4 inch, minus 1/8 inch.
 4. Rib Thickness: Plus or minus 1/8 inch.
 5. Rib to Edge of Flange: Plus or minus 1/8 inch.

- 1 6. Distance between Ribs: Plus or minus 1/8 inch.
- 2 7. Variation from Square or Designated Skew (Difference in Length of the Two Diagonal
- 3 Measurements): Plus or minus 1/8 inch/72 inches or 1/2 inch total, whichever is greater.
- 4 8. Length and Width of Block-outs and Openings within One Unit: Plus or minus 1/4 inch.
- 5 9. Location and Dimension of Block-outs Hidden from View and Used for HVAC and Utility
- 6 Penetrations: Plus or minus 3/4 inch.
- 7 10. Dimensions of Haunches: Plus or minus 1/4 inch.
- 8 11. Haunch Bearing Surface Deviation from Specified Plane: Plus or minus 1/8 inch.
- 9 12. Difference in Relative Position of Adjacent Haunch Bearing Surfaces from Specified
- 10 Relative Position: Plus or minus 1/4 inch.
- 11 13. Bowing: Plus or minus L/360, maximum 1 inch.
- 12 14. Local Smoothness: 1/4 inch/10 feet.
- 13 15. Warping: 1/16 inch/12 inches of distance from nearest adjacent corner.
- 14 16. Tipping and Flushness of Plates: Plus or minus 1/4 inch.
- 15 17. Dimensions of Architectural Features and Rustications: Plus or minus 1/8 inch.
- 16 C. Position Tolerances: For cast-in items measured from datum line location, as indicated on Shop
- 17 Drawings.
- 18 1. Weld Plates: Plus or minus 1 inch.
- 19 2. Inserts: Plus or minus 1/2 inch.
- 20 3. Handling Devices: Plus or minus 3 inches.
- 21 4. Reinforcing Steel and Welded Wire Reinforcement: Plus or minus 1/4 inch where position
- 22 has structural implications or affects concrete cover; otherwise, plus or minus 1/2 inch.
- 23 5. Reinforcing Steel Extending out of Member: Plus or minus 1/2 inch of plan dimensions.
- 24 6. Tendons: Plus or minus 1/4 inch, vertical; plus or minus 1 inch, horizontal.
- 25 7. Location of Rustication Joints: Plus or minus 1/8 inch.
- 26 8. Location of Opening within Panel: Plus or minus 1/4 inch.
- 27 9. Location of Flashing Reglets: Plus or minus 1/4 inch.
- 28 10. Location of Flashing Reglets at Edge of Panel: Plus or minus 1/8 inch.
- 29 11. Reglets for Glazing Gaskets: Plus or minus 1/8 inch.
- 30 12. Electrical Outlets, Hose Bibs: Plus or minus 1/2 inch.
- 31 13. Location of Bearing Surface from End of Member: Plus or minus 1/4 inch.
- 32 14. Allowable Rotation of Plate, Channel Inserts, and Electrical Boxes: 2-degree rotation or
- 33 1/4 inch maximum over the full dimension of unit.
- 34 15. Position of Sleeve: Plus or minus 1/2 inch.
- 35 16. Location of Window Washer Track or Buttons: Plus or minus 1/8 inch.

36 2.14 FINISHES

- 37 A. Exposed faces shall be free of joint marks, grain, and other obvious defects. Corners, including
- 38 false joints shall be uniform, straight, and sharp. Finish exposed-face surfaces of architectural
- 39 precast concrete units to match approved mockups and as follows:
 - 40 1. PCI's "Architectural Precast Concrete - Color and Texture Selection Guide," of plate
 - 41 numbers indicated.
 - 42 2. Textured-Surface Finish: Impart by form liners or inserts.
- 43 B. Finish exposed back surfaces of architectural precast concrete units with smooth, steel-trowel
- 44 finish.
- 45 C. Finish unexposed surfaces of architectural precast concrete units with as cast finish.

2.15 SOURCE QUALITY CONTROL

- A. Quality-Control Testing: Test and inspect precast concrete according to PCI MNL 117 requirements. If using self-consolidating concrete, also test and inspect according to PCI TR-6, ASTM C 1610, ASTM C 1611, ASTM C 1621, and ASTM C 1712.
- B. Owner will employ an independent testing agency to evaluate architectural precast concrete fabricator's quality-control and testing methods.
1. Allow Owner's testing agency access to material storage areas, concrete production equipment, concrete placement, and curing facilities. Cooperate with Owner's testing agency and provide samples of materials and concrete mixtures as may be requested for additional testing and evaluation.
- C. Strength of precast concrete units is considered deficient if units fail to comply with ACI 318 requirements for concrete strength.
- D. Testing: If there is evidence that strength of precast concrete units may be deficient or may not comply with ACI 318 requirements, pre-caster will employ an independent testing agency to obtain, prepare, and test cores drilled from hardened concrete to determine compressive strength according to ASTM C 42 and ACI 318.
1. A minimum of three representative cores shall be taken from units of suspect strength, from locations directed by Architect.
2. Test cores in an air-dry condition.
3. Report test results in writing on same day that tests are performed, with copies to Architect, Contractor, and precast concrete fabricator. Test reports include the following:
- a. Project identification name and number.
- b. Date when tests were performed.
- c. Name of precast concrete fabricator.
- d. Name of concrete testing agency.
- e. Identification letter, name, and type of precast concrete unit(s) represented by core tests; design compressive strength; type of break; compressive strength at breaks, corrected for length-diameter ratio; and direction of applied load to core in relation to horizontal plane of concrete as placed.
- E. Patching: If core test results are satisfactory and precast concrete units comply with requirements, clean and dampen core holes and solidly fill with precast concrete mixture that has no coarse aggregate, and finish to match adjacent precast concrete surfaces.
- F. Defective Units: Discard and replace recast architectural concrete units that do not comply with acceptability requirements in PCI MNL 117, including concrete strength, manufacturing tolerances, and color and texture range. Chipped, spalled, or cracked units may be repaired, subject to Architect's approval. Architect reserves the right to reject precast units that do not match approved samples, sample panels, and mockups. Replace unacceptable units with precast concrete units that comply with requirements.

1 PART 3 - EXECUTION

2 3.1 EXAMINATION

- 3 A. Examine supporting structural frame or foundation and conditions for compliance with
4 requirements for installation tolerances, bearing surface tolerances, and other conditions
5 affecting performance of the Work.
- 6 B. Do not install precast concrete units until supporting cast-in-place concrete has attained
7 minimum allowable design compressive strength and supporting steel or other structure is
8 structurally ready to receive loads from precast concrete units.
- 9 C. Proceed with installation only after unsatisfactory conditions have been corrected.

10 3.2 INSTALLATION

- 11 A. Install clips, hangers, bearing pads, and other accessories required for connecting architectural
12 precast concrete units to supporting members and backup materials.
- 13 B. Erect architectural precast concrete level, plumb, and square within specified allowable
14 tolerances. Provide temporary supports and bracing as required to maintain position, stability,
15 and alignment of units until permanent connections are completed.
- 16 1. Install temporary steel or plastic spacing shims as precast concrete units are being
17 erected. Tack weld steel shims to each other to prevent shims from separating.
- 18 2. Maintain horizontal and vertical joint alignment and uniform joint width as erection
19 progresses.
- 20 3. Remove projecting lifting devices and grout fill voids within recessed lifting devices flush
21 with surface of adjacent precast surfaces when recess is exposed.
- 22 4. Unless otherwise indicated, maintain uniform joint widths of 3/4 inch.
- 23 C. Connect architectural precast concrete units in position by bolting, welding, grouting, or as
24 otherwise indicated on Shop Drawings. Remove temporary shims, wedges, and spacers as
25 soon as practical after connecting and grouting are completed.
- 26 1. Do not permit connections to disrupt continuity of roof flashing.
- 27 D. Welding: Comply with applicable requirements in AWS D1.1 and AWS D1.4 for welding, welding
28 electrodes, appearance, quality of welds, and methods used in correcting welding work.
- 29 1. Protect architectural precast concrete units and bearing pads from damage by field
30 welding or cutting operations, and provide noncombustible shields as required.
- 31 2. Welds not specified shall be continuous fillet welds, using no less than the minimum fillet
32 as specified by AWS.
- 33 3. Clean weld-affected metal surfaces with chipping hammer followed by brushing, and re-
34 prime damaged painted surfaces.
- 35 4. Visually inspect welds and remove, reweld, or repair incomplete and defective welds.
- 36 E. At bolted connections, use lock washers, tack welding, or other approved means to prevent
37 loosening of nuts after final adjustment.
- 38 1. Where slotted connections are used, verify bolt position and tightness. For sliding
39 connections, properly secure bolt but allow bolt to move within connection slot.

2. For slip-critical connections, use one of the following methods to assure proper bolt pretension:

- a. Turn-of-Nut: According to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- b. Calibrated Wrench: According to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- c. Twist-off Tension Control Bolt: ASTM F 1852.
- d. Direct-Tension Control Bolt: ASTM F 1852.

3. For slip-critical connections, use method and inspection procedure approved by Architect and coordinated with inspection agency.

- F. Grouting or Dry-Packing Connections and Joints: Grout connections where required or indicated. Retain flowable grout in place until hard enough to support itself. Alternatively, pack spaces with stiff dry-pack grout material, tamping until voids are completely filled. Place grout and finish smooth, level, and plumb with adjacent concrete surfaces. Promptly remove grout material from exposed surfaces before it affects finishes or hardens. Keep grouted joints damp for not less than 24 hours after initial set.

3.3 ERECTION TOLERANCES

- A. Erect architectural precast concrete units level, plumb, square, and in alignment without exceeding the noncumulative erection tolerances of PCI MNL 117, Appendix I.

- B. Erect architectural precast concrete units level, plumb, square, and in alignment, without exceeding the following noncumulative erection tolerances:

1. Plan Location from Building Grid Datum: Plus or minus 1/2 inch.
2. Plan Location from Centerline of Steel: Plus or minus 1/2 inch.
3. Top Elevation from Nominal Top Elevation: As follows:
 - a. Exposed Individual Panel: Plus or minus 1/4 inch.
 - b. Non-Exposed Individual Panel: Plus or minus 1/2 inch.
 - c. Exposed Panel Relative to Adjacent Panel: 1/4 inch.
 - d. Non-Exposed Panel Relative to Adjacent Panel: 1/2 inch.
4. Support Elevation from Nominal Support Elevation: As follows:
 - a. Maximum Low: 1/2 inch.
 - b. Maximum High: 1/4 inch.
5. Maximum Plumb Variation over the Lesser of Height of Structure or 100 Feet: 1 inch.
6. Plumb in Any 10 Feet of Element Height: 1/4 inch.
7. Maximum Jog in Alignment of Matching Edges: 1/4 inch.
8. Joint Width (Governs over Joint Taper): Plus or minus 1/4 inch.
9. Maximum Joint Taper: 3/8 inch.
10. Joint Taper in 10 Feet: 1/4 inch.
11. Maximum Jog in Alignment of Matching Faces: 1/4 inch.
12. Differential Bowing or Camber, as Erected, between Adjacent Members of Same Design: 1/4 inch.
13. Opening Height between Spandrels: Plus or minus 1/4 inch.

3.4 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections and prepare reports:
 - 1. Erection of loadbearing precast concrete members.
- B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections and prepare test reports.
- C. Visually inspect field welds and test according to ASTM E 165 or to ASTM E 709 and ASTM E 1444. High-strength bolted connections are subject to inspections.
- D. Testing agency will report test results promptly and in writing to Contractor and Architect.
- E. Repair or remove and replace work where tests and inspections indicate that it does not comply with specified requirements.
- F. Additional testing and inspecting, at Contractor's expense, shall be performed to determine compliance of replaced or additional work with specified requirements.

3.5 REPAIRS

- A. Repair architectural precast concrete units if permitted by Architect. Architect reserves the right to reject repaired units that do not comply with requirements.
- B. Mix patching materials and repair units so cured patches blend with color, texture, and uniformity of adjacent exposed surfaces and show no apparent line of demarcation between original and repaired work, when viewed in typical daylight illumination from a distance of 20 feet .
- C. Prepare and repair damaged galvanized coatings with galvanizing repair paint according to ASTM A 780.
- D. Wire brush, clean, and paint damaged prime-painted components with same type of shop primer.
- E. Remove and replace damaged architectural precast concrete units when repairs do not comply with requirements.

3.6 CLEANING

- A. Clean surfaces of precast concrete units exposed to view.
- B. Clean mortar, plaster, fireproofing, weld slag, and other deleterious material from concrete surfaces and adjacent materials immediately.
- C. Clean exposed surfaces of precast concrete units after erection and completion of joint treatment to remove weld marks, other markings, dirt, and stains.
 - 1. Perform cleaning procedures, if necessary, according to precast concrete fabricator's recommendations. Protect other work from staining or damage due to cleaning operations.

- 1 2. Do not use cleaning materials or processes that could change the appearance of
2 exposed concrete finishes or damage adjacent materials.

3 END OF SECTION 03 45 00
4

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1 SECTION 04 22 00 - UNIT MASONRY

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY

- 7 A. Section Includes:

- 8
9 1. Hollow brick.
10 2. Concrete masonry units.
11 3. Mortar and grout.
12 4. Steel reinforcing bars.
13 5. Masonry-joint reinforcement.
14 6. Ties and anchors.
15 7. Embedded flashing.
16 8. Miscellaneous masonry accessories.

- 17 B. Products Installed but not Furnished under This Section:

- 18
19 1. Steel lintels in unit masonry.
20 2. Steel shelf angles for supporting unit masonry.
21 3. Cavity wall insulation.

- 22 C. Related Requirements:

- 23
24 1. Section 07 19 00 "Water Repellents" for water repellents applied to unit masonry
25 assemblies.
26 2. Section 07 62 00 "Sheet Metal Flashing and Trim" for exposed sheet metal flashing and
27 for furnishing manufactured reglets installed in masonry joints.

28 1.3 DEFINITIONS

- 29 A. CMU(s): Concrete masonry unit(s).

- 30 B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

31 1.4 PREINSTALLATION MEETINGS

- 32 A. Pre-installation Conference: Conduct conference at Project site.

- 33 1. Require representatives of each entity directly concerned with cast-in-place architectural
34 concrete to attend, including the following:

- 35 a. Architect.

- 1 b. Construction Manager.
- 2 c. Contractor's superintendent.
- 3 d. Masonry Subcontractor.

4 1.5 ACTION SUBMITTALS

5 A. Product Data: For each type of product.

6 B. Shop Drawings: For the following:

- 7 1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
- 8 2. Reinforcing Steel: Detail bending, lap lengths, and placement of unit masonry reinforcing
- 9 bars. Comply with ACI 315.
- 10 3. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.

11 C. Samples for Verification: For each type and color of the following:

- 12 1. Hollow brick.
- 13 2. Special brick shapes.
- 14 3. Pigmented mortar. Make Samples using same sand and mortar ingredients to be used on
- 15 Project.
- 16 4. Accessories embedded in masonry.

17 1.6 INFORMATIONAL SUBMITTALS

18 A. Qualification Data: For testing agency.

19 B. Material Certificates: For each type and size of the following:

20 1. Masonry units.

- 21 a. Include data on material properties.
- 22 b. For brick, include size-variation data verifying that actual range of sizes falls within
- 23 specified tolerances.
- 24 c. For exposed brick, include test report for efflorescence according to ASTM C 67.
- 25 d. For surface-coated brick, include test report for durability of surface appearance
- 26 after 50 cycles of freezing and thawing according to ASTM C 67.
- 27 e. For masonry units, include data and calculations establishing average net-area
- 28 compressive strength of units.

29 2. Integral water repellent used in CMU.

30 3. Cementitious materials. Include name of manufacturer, brand name, and type.

31 4. Mortar admixtures.

32 5. Pre-blended, dry mortar mixes. Include description of type and proportions of ingredients.

33 6. Grout mixes. Include description of type and proportions of ingredients.

34 7. Reinforcing bars.

35 8. Joint reinforcement.

36 9. Anchors, ties, and metal accessories.

37 C. Mix Designs: For each type of mortar and grout. Include description of type and proportions of

38 ingredients.

1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109 for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content.
2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.

D. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to TMS 602/ACI 530.1/ASCE 6.

E. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.7 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM C 1093 for testing indicated.

B. Sample Panels: Build sample panels to verify selections made under Sample submittals and to demonstrate aesthetic effects. Comply with requirements in Section 014000 "Quality Requirements" for mockups.

1. Build sample panels for each type of exposed unit masonry construction typical exterior and interior walls in sizes approximately 60 inches long by 48 inches high by full thickness.
2. Build sample panels facing south.
3. Where masonry is to match existing, build panels adjacent and parallel to existing surface.
4. Protect approved sample panels from the elements with weather-resistant membrane.
5. Approval of sample panels is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; and other material and construction qualities specifically approved by Architect in writing.
 - a. Approval of sample panels does not constitute approval of deviations from the Contract Documents contained in sample panels unless Architect specifically approves such deviations in writing.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Deliver pre-blended, dry mortar mix in moisture-resistant containers. Store pre-blended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.

- E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.9 FIELD CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

1. Extend cover a minimum of 24 inches down both sides of walls, and hold cover securely in place.

- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.

- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

- D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.

- E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.

2.2 PERFORMANCE REQUIREMENTS

- A. Provide unit masonry that develops indicated net-area compressive strengths at 28 days.

1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to TMS 602/ACI 530.1/ASCE 6.
2. Determine net-area compressive strength of masonry by testing masonry prisms according to ASTM C 1314.

2.3 UNIT MASONRY, GENERAL

- A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6, except as modified by requirements in the Contract Documents.
- B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work.
- C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.
 1. Where fire-resistance-rated construction is indicated, units shall be listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction.

2.4 CONCRETE MASONRY UNITS

- A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
 1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
 2. Provide square-edged units for outside corners unless otherwise indicated.
 3. Provide rounded/bullnose corners and edges where indicated in the drawings.
- B. Insulated CMUs: Where indicated, units shall contain rigid, specially shaped, cellular thermal insulation units complying with ASTM C 578, Type I, designed for installing in cores of masonry units.
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Concrete Products Group, HI-R H Block (no known equal).
 2. Unit Masonry: ASTM C 90 Standard Specification for Load-bearing Concrete Masonry Units, Normal weight.
 3. Insulation: ASTM C 578, Type X, replacing Federal Specifications HH-I524C, Specification for Rigid, Cellular Polystyrene Thermal Insulation.
 4. System U Value: 0.081.
 5. Thickness: Nominal 12 inches.
 6. Face Dimension: Nominal 8 inch by 16 inch.
- C. CMU: ASTM C 90.
 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 1500 psi.

- 1 2. Density Classification: Normal weight.
- 2 3. Size (8 inches x 8 inches by 16 inches): Manufactured to dimensions 3/8 inch less-than-
- 3 nominal dimensions.
- 4 4. Exposed Faces: Provide color and texture matching the range represented by Architect's
- 5 sample.

6 2.5 MASONRY LINTELS

- 7 A. General: Provide one of the following:
- 8 B. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam CMUs
- 9 matching adjacent CMUs in color, texture, and density classification, with reinforcing bars
- 10 placed as indicated and filled with coarse grout. Cure precast lintels before handling and
- 11 installing. Temporarily support built-in-place lintels until cured.

12 2.6 BRICK (BK)

- 13 A. General: Provide shapes indicated and as follows, with exposed surfaces matching finish and
- 14 color of exposed faces of adjacent units:
 - 15 1. For ends of sills and caps and for similar applications that would otherwise expose
 - 16 unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces
 - 17 finished.
 - 18 2. Provide special shapes for applications where stretcher units cannot accommodate
 - 19 special conditions, including those at corners, movement joints, bond beams, sashes,
 - 20 and lintels.
 - 21 3. Provide special shapes for applications requiring brick of size, form, color, and texture on
 - 22 exposed surfaces that cannot be produced by sawing.
 - 23 4. Provide special shapes for applications where shapes produced by sawing would result
 - 24 in sawed surfaces being exposed to view.
- 25 B. Hollow Brick: ASTM C 652, Grade SW, Class H60V (void areas between 40 and 60 percent of
- 26 gross cross-sectional area), Type HBX, HBS, or HBA.
 - 27 1. Manufacturers: Subject to compliance with requirements, available manufacturers
 - 28 offering products that may be incorporated into the Work include, but are not limited to
 - 29 the following:
 - 30 a. Interstate Brick – Atlas 6x4x16 (BK-1)
 - 31 b. Interstate Brick – Atlas 8x4x16 (BK-2)
 - 32 c. Interstate Brick – Atlas 4x8x16 (BK-3)
 - 33
 - 34
 - 35 2. Color and Texture: Match brick on adjacent North Annex Jail building (Golden Buff –
 - 36 Verify).

37 2.7 MORTAR AND GROUT MATERIALS

- 38 A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather
- 39 construction. Provide natural color or white cement as required to produce mortar color
- 40 indicated.
- 41 1. Alkali content shall not be more than 0.1 percent when tested according to ASTM C 114.

- 1 B. Hydrated Lime: ASTM C 207, Type S.
- 2 C. Portland Cement-Lime Mix: Packaged blend of Portland cement and hydrated lime containing
3 no other ingredients.
- 4 D. Masonry Cement: ASTM C 91.
- 5 1. Manufacturers: Subject to compliance with requirements, provide products by one of the
6 following:
- 7 a. Cemex S.A.B. de C.V.
8 b. Essroc.
9 c. Holcim (US) Inc.
10 d. Lafarge North America Inc.
11 e. Lehigh Hanson; Heidelberg Cement Group.
- 12 E. Mortar Cement: ASTM C 1329.
- 13 1. Manufacturers: Subject to compliance with requirements, provide products by the
14 following:
- 15 a. Lafarge North America Inc.
- 16 F. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use
17 in mortar mixes and complying with ASTM C 979. Use only pigments with a record of
18 satisfactory performance in masonry mortar.
- 19 1. Manufacturers: Subject to compliance with requirements, provide products by one of the
20 following:
- 21 a. Davis Colors.
22 b. Lanxess Corporation.
23 c. Solomon Colors, Inc.
- 24 G. Aggregate for Mortar: ASTM C 144.
- 25 1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or
26 crushed stone.
27 2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the
28 No. 16 sieve.
29 3. White-Mortar Aggregates: Natural white sand or crushed white stone.
30 4. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce
31 required mortar color.
- 32 H. Aggregate for Grout: ASTM C 404.
- 33 I. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with
34 CMUs containing integral water repellent from same manufacturer.
- 35 1. Manufacturers: Subject to compliance with requirements, provide products by one of the
36 following:
- 37 a. ACM Chemistries.
38 b. BASF Corporation; Construction Systems.
39 c. GCP Applied Technologies (formally Grace Construction Products).

1 J. Water: Potable.

2 2.8 REINFORCEMENT

3 A. Uncoated-Steel Reinforcing Bars: ASTM A 615 or ASTM A 996, Grade 60.

4 B. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry
5 unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch steel
6 wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.

7 1. Manufacturers: Subject to compliance with requirements, available manufacturers
8 offering products that may be incorporated into the Work include, but are not limited to,
9 the following:

- 10 a. Dur-O-Wal; a Hohmann & Barnard company.
- 11 b. Heckmann Building Products, Inc.
- 12 c. Hohmann & Barnard, Inc.
- 13 d. Wire-Bond.

14 C. Masonry-Joint Reinforcement, General: ladder type complying with ASTM A 951.

- 15 1. Interior Walls: Hot-dip galvanized carbon steel.
- 16 2. Exterior Walls: Hot-dip galvanized carbon steel.
- 17 3. Wire Size for Side Rods: 0.187-inch diameter.
- 18 4. Wire Size for Cross Rods: 0.187-inch diameter.
- 19 5. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
- 20 6. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units.

21 2.9 TIES AND ANCHORS

22 A. General: Ties and anchors shall extend at least 1-1/2 inches into veneer but with at least a 5/8-
23 inch cover on outside face.

24 B. Materials: Provide ties and anchors specified in this article that are made from materials that
25 comply with the following unless otherwise indicated:

- 26 1. Mill-Galvanized, Carbon-Steel Wire: ASTM A 82, with ASTM A 641, Class 1 coating.
- 27 2. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82, with ASTM A 153, Class B-2
28 coating.
- 29 3. Galvanized-Steel Sheet: ASTM A 653, Commercial Steel, G60 zinc coating.
- 30 4. Steel Sheet, Galvanized after Fabrication: ASTM A 1008, Commercial Steel, with
31 ASTM A 153, Class B coating.
- 32 5. Steel Plates, Shapes, and Bars: ASTM A 36.

33 C. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow
34 vertical or horizontal adjustment but resist tension and compression forces perpendicular to
35 plane of wall.

36 D. Adjustable Anchors for Connecting to Concrete: Provide anchors that allow vertical or horizontal
37 adjustment but resist tension and compression forces perpendicular to plane of wall.

38 1. Connector Section: Dovetail tabs for inserting into dovetail slots in concrete and attached
39 to tie section; formed from 0.105-inch-thick steel sheet, galvanized after fabrication.

- 1 a. 0.108-inch-thick, galvanized-steel sheet may be used at interior walls unless
2 otherwise indicated.
- 3 2. Tie Section: Triangular-shaped wire tie made from 0.25-inch-diameter, hot-dip galvanized
4 steel wire. Mill-galvanized wire may be used at interior walls unless otherwise indicated.
- 5 E. Partition Top Anchors: 0.105-inch-thick metal plate with a 3/8-inch-diameter metal rod 6 inches
6 long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in
7 and out of tube. Fabricate from steel, hot-dip galvanized after fabrication.
- 8 1. Corrosion Protection: Hot-dip galvanized to comply with ASTM A 153.
- 9 2.10 EMBEDDED FLASHING MATERIALS
- 10 A. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal
11 Manual" and Section 076200 "Sheet Metal Flashing and Trim" and as follows:
 - 12 1. Stainless Steel: ASTM A 240 or ASTM A 666, Type 304, 0.016 inch thick.
 - 13 2. Fabricate continuous flashings in sections 96 inches long minimum, but not exceeding 12
14 feet. Provide splice plates at joints of formed, smooth metal flashing.
 - 15 3. Fabricate through-wall flashing with drip edge unless otherwise indicated. Fabricate by
16 extending flashing 1/2 inch out from wall, with outer edge bent down 30 degrees and
17 hemmed.
 - 18 4. Fabricate metal drip edges from stainless steel. Extend at least 3 inches into wall and 1/2
19 inch out from wall, with outer edge bent down 30 degrees and hemmed.
 - 20 5. Fabricate metal sealant stops from stainless steel. Extend at least 3 inches into wall and
21 out to exterior face of wall. At exterior face of wall, bend metal back on itself for 3/4 inch
22 and down into joint 1/4 inch to form a stop for retaining sealant backer rod.
- 23 B. Flexible Flashing: Use the following unless otherwise indicated:
 - 24 1. Butyl Rubber Flashing: Composite, self-adhesive, flashing product consisting of a pliable,
25 butyl rubber compound, bonded to a high-density polyethylene film, aluminum foil, or
26 spun-bonded polyolefin to produce an overall thickness of not less than 0.040 inch.
 - 27 a. Manufacturers: Subject to compliance with requirements, provide products by one
28 of the following:
 - 29 1) DuPont Building Innovations: E. I. du Pont de Nemours and Company.
 - 30 2) GCP Applied Technologies Inc. (formerly Grace Construction Products).
 - 31 3) Wire-Bond.
 - 32 b. Accessories: Provide preformed corners, end dams, other special shapes, and
33 seaming materials produced by flashing manufacturer.
 - 34 C. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products
35 or products recommended by flashing manufacturer for bonding flashing sheets to each other
36 and to substrates.
 - 37 D. Termination Bars for Flexible Flashing: Stainless-steel sheet 0.019 inch by 1-1/2 inches with a
38 3/8 inch sealant flange at top.

2.11 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Pre-molded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene urethane or PVC.
- B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 or PVC, complying with ASTM D 2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
- C. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D 226/D 226M, Type I (No. 15 asphalt felt).

2.12 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
 - 1. Do not use calcium chloride in mortar or grout.
 - 2. Use Portland cement-lime mortar unless otherwise indicated.
 - 3. For exterior masonry, use Portland cement-lime mortar.
 - 4. For reinforced masonry, use Portland cement-lime mortar.
 - 5. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
- B. Pre-blended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a pre-blended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
- C. Mortar for Unit Masonry: Comply with ASTM C 270, Property Specification. Provide the following types of mortar for applications stated unless another type is indicated or needed to provide required compressive strength of masonry.
 - 1. For masonry below grade or in contact with earth, use Type M.
 - 2. For reinforced masonry, use Type S.
 - 3. For mortar parge coats, use Type S.
 - 4. For exterior, above-grade, load-bearing and non-load-bearing walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N.
 - 5. For interior non-load-bearing partitions, Type O may be used instead of Type N.
- D. Grout for Unit Masonry: Comply with ASTM C 476.
 - 1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.
 - 2. Proportion grout in accordance with ASTM C 476, Table 1 or paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 2000 psi.
 - 3. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143.

1 PART 3 - EXECUTION

2 3.1 EXAMINATION

3 A. Examine conditions, with Installer present, for compliance with requirements for installation
4 tolerances and other conditions affecting performance of the Work.

5 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental
6 to performance of the Work.

7 2. Verify that foundations are within tolerances specified.

8 3. Verify that reinforcing dowels are properly placed.

9 4. Verify that substrates are free of substances that impair mortar bond.

10 B. Before installation, examine rough-in and built-in construction for piping systems to verify actual
11 locations of piping connections.

12 C. Proceed with installation only after unsatisfactory conditions have been corrected.

13 3.2 INSTALLATION, GENERAL

14 A. Build chases and recesses to accommodate items specified in this and other Sections.

15 B. Leave openings for equipment to be installed before completing masonry. After installing
16 equipment, complete masonry to match construction immediately adjacent to opening.

17 C. Use full-size units without cutting if possible. If cutting is required to provide a continuous
18 pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp,
19 unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut
20 units with cut surfaces and, where possible, cut edges concealed.

21 D. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and
22 textures. Mix units from several pallets or cubes as they are placed.

23 E. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.

24 F. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. per
25 minute when tested according to ASTM C 67. Allow units to absorb water so they are damp but
26 not wet at time of laying.

27 3.3 TOLERANCES

28 A. Dimensions and Locations of Elements:

29 1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch or
30 minus 1/4 inch.

31 2. For location of elements in plan, do not vary from that indicated by more than plus or
32 minus 1/2 inch.

33 3. For location of elements in elevation, do not vary from that indicated by more than plus or
34 minus 1/4 inch in a story height or 1/2 inch total.

35 B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet, or 1/2-inch maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet or 1/2-inch maximum.
7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch.
5. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch from one masonry unit to the next.

3.4 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond.
- C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 4 inches. Bond and interlock each course of each wythe at corners. Do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.
- D. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.
- E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- F. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and rod mortar or grout into core.

- 1 G. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and
2 similar items unless otherwise indicated.
- 3 H. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof
4 structure above unless otherwise indicated.
- 5 1. Install compressible filler in joint between top of partition and underside of structure
6 above.
- 7 2. Fasten partition top anchors to structure above and build into top of partition. Grout cells
8 of CMUs solidly around plastic tubes of anchors and push tubes down into grout to
9 provide 1/2-inch clearance between end of anchor rod and end of tube. Space anchors
10 48 inches o.c. unless otherwise indicated.
- 11 3. Wedge non-load-bearing partitions against structure above with small pieces of tile, slate,
12 or metal. Fill joint with mortar after dead-load deflection of structure above approaches
13 final position.
- 14 4. At fire-rated partitions, treat joint between top of partition and underside of structure
15 above to comply with Section 07 84 43 "Joint Firestopping."

16 3.5 MORTAR BEDDING AND JOINTING

- 17 A. Lay solid masonry units and hollow brick with completely filled bed and head joints; butter ends
18 with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or
19 slush head joints.
- 20 B. Rake out mortar joints at brick and CMUs to a uniform depth of 1/4 inch and point with epoxy
21 mortar to comply with epoxy-mortar manufacturer's written instructions.
- 22 C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint
23 thickness unless otherwise indicated.
- 24 1. For glazed masonry units, use a nonmetallic jointer 3/4 inch or more in width.
- 25 D. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than
26 paint) unless otherwise indicated.
- 27 E. Cut joints flush where indicated to receive waterproofing unless otherwise indicated.

28 3.6 MASONRY-JOINT REINFORCEMENT

- 29 A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch
30 on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.
- 31 1. Space reinforcement not more than 16 inches o.c., but not less than noted on structural
32 or architectural drawings.
- 33 2. Provide reinforcement not more than 8 inches above and below wall openings and
34 extending 12 inches beyond openings in addition to continuous reinforcement.
- 35 B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.
- 36 C. Provide continuity at wall intersections by using prefabricated T-shaped units.
- 37 D. Provide continuity at corners by using prefabricated L-shaped units.

- E. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.7 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

- A. Anchor masonry to structural steel and concrete, where masonry abuts or faces structural steel or concrete, to comply with the following:

1. Provide an open space not less than 1/2 inch wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

3.8 CONTROL AND EXPANSION JOINTS

- A. General: Install control- and expansion-joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.

- B. Form control joints in concrete masonry as follows:

1. Install preformed control-joint gaskets designed to fit standard sash block.
2. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar, or rake out joint for application of sealant.
3. Install temporary foam-plastic filler in head joints, and remove filler when unit masonry is complete for application of sealant.

- C. Form expansion joints in brick as follows:

1. Build flanges of factory-fabricated, expansion-joint units into masonry.
2. Build in compressible joint fillers where indicated.
3. Form open joint full depth of brick wythe and of width indicated, but not less than 3/8 inch for installation of sealant and backer rod specified in Section 07 92 00 "Joint Sealants."

- D. Provide horizontal, pressure-relieving joints by either leaving an airspace or inserting a compressible filler of width required for installing sealant and backer rod specified in Section 07 92 00 "Joint Sealants," but not less than 3/8 inch.

1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.

3.9 LINTELS

- A. Install steel lintels where indicated.

- B. Provide masonry lintels where shown and where openings of more than 12 inches for brick-size units and 24 inches for block-size units are shown without structural steel or other supporting lintels.

- C. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.

3.10 FLASHING, WEEP HOLES, AND CAVITY VENTS

- A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.
- B. Install flashing as follows unless otherwise indicated:
1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
 2. At lintels and shelf angles, extend flashing a minimum of 6 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.
 3. Interlock end joints of ribbed sheet metal flashing by overlapping ribs not less than 1-1/2 inches or as recommended by flashing manufacturer, and seal lap with elastomeric sealant complying with requirements in Section 079200 "Joint Sealants" for application indicated.
 4. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall, and adhere flexible flashing to top of metal drip edge.
 5. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall, and adhere flexible flashing to top of metal flashing termination.
 6. Cut flexible flashing off flush with face of wall after masonry wall construction is completed.
- C. Install single-wythe CMU flashing system in bed joints of CMU walls where indicated to comply with manufacturer's written instructions. Install CMU cell pans with upturned edges located below face shells and webs of CMUs above and with weep spouts aligned with face of wall. Install CMU web covers so that they cover upturned edges of CMU cell pans at CMU webs and extend from face shell to face shell.
- D. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.

3.11 REINFORCED UNIT MASONRY INSTALLATION

- A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
 2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and that of other loads that may be placed on them during construction.
- B. Placing Reinforcement: Comply with requirements in TMS 602/ACI 530.1/ASCE 6.
- C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

1. Comply with requirements in TMS 602/ACI 530.1/ASCE 6 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
2. Limit height of vertical grout pours to not more than 60 inches.

3.12 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.
- B. Inspections: Special inspections according to Level B in TMS 402/ACI 530/ASCE 5.
 1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
 2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
 3. Place grout only after inspectors have verified proportions of site-prepared grout.
- C. Testing Prior to Construction: One set of tests.
- D. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.
- E. Clay and Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 67 for compressive strength.
- F. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for compressive strength.
- G. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.
- H. Prism Test: For each type of construction provided, according to ASTM C 1314 at 7 days and at 28 days.

3.13 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.
- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.

- 1 2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for
2 comparison purposes. Obtain Architect's approval of sample cleaning before proceeding
3 with cleaning of masonry.
- 4 3. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering
5 them with liquid strippable masking agent or polyethylene film and waterproof masking
6 tape.
- 7 4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by
8 rinsing surfaces thoroughly with clear water.
- 9 5. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical
10 Notes 20.
- 11 6. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.

12 3.14 MASONRY WASTE DISPOSAL

- 13 A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's
14 property. At completion of unit masonry work, remove from Project site.
- 15 B. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-
16 contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill
17 material as fill is placed.
- 18 1. Crush masonry waste to less than 4 inches in each dimension.
- 19 2. Do not dispose of masonry waste as fill within 18 inches of finished grade.
- 20 C. Masonry Waste Recycling: Return broken CMUs not used as fill to manufacturer for recycling.
- 21 D. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as
22 described above or recycled, and other masonry waste, and legally dispose of off Owner's
23 property.

24 END OF SECTION 04 22 00

SECTION 05 05 55 – SECURITY FASTENERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Security fasteners.
2. Maintenance tools and spare replacement fasteners.

B. Scope of Work Described Under this Section (may be provided under other sections by reference to this section):

1. Exposed fasteners within detention portion of Project including fasteners of Project components shall be security screws, except at following locations:
 - a. Mechanical and electrical rooms and closets including roof mounted equipment.
 - b. Inside control rooms.
 - c. Above suspended ceilings, behind access panels, and within pipe chases.
 - d. Fasteners within manholes and catch basins.

1.2 SUBMITTALS

A. Product Data. Submit in accordance with Section 01 30 00.

1.3 MAINTENANCE

A. Extra Materials:

1. Maintenance Tools: Provide Owner with three sets of tools for security screws in accordance with Section 01 78 23 Operation and Maintenance Data. Package each set in tool kit for easy handling and storage.
2. Spare Replacement Fasteners: Provide 50 spare screws for each style, material and size of removable fasteners used on the project. Package in sturdy boxes marked with detailed information on each fastener type for ease of selection.

PART 2 – PRODUCTS

2.1 NON-REMOVABLE FASTENERS

A. Type A: Tamper proof bolt and/or nut; ASTM A 307 solid bar steel, standard course tread, non corrosive zinc nickel coated or Type 316 stainless steel with break-off "button" style head at bolts and break-off hex head nuts leaving a "round" or "conical" nut body that cannot be removed unless the bolts are drilled and extracted and the nuts are cut off. Provide at the following locations and installations:

1. At bunks, clothes hooks, shelf units, stools, wall shelf, wall bench, TV monitor stands, writing surfaces, privacy screen panels, woven rod panels, and all other floor or wall mounted items that are exposed to view in the defined security/detention areas.
2. Types:

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- a. Type A1: Machine bolt and nut pairs or individually for engagement with pre-installed pre-threaded sockets or studs.
 - b. Type A2: Machine bolt or nut for use with expansion shields, chemical setting, or other blind hole fastening devices.
3. Acceptable Manufacturers:
- a. J. P. Ruklic, 17200 Palmer Road, Homewood, IL.
 - b. B & G Manufacturing, 3067 Unionville Pike, Hatfield, PA.
 - c. Guardnut, Inc., Santa Rosa, CA.
- B. Type B: Drive-pin fasteners designed for blind hole installation in solid substrates for use where specifically indicated.
1. Acceptable types:
- a. Type B1 Deformed Spikes: Headed steel shafts with deformed shanks designed to drive into pre-drilled holes in cementitious substrates such as concrete and routed masonry and wedge into the material through .
Basis of Design: Rawl Spike as manufactured by Powers.
 - b. Type B2 Alloy Shield Drive Pin Fasteners: Headed alloy expansion shield with headed steel drive pin designed to easily insert into a pre-drilled hole but secure upon driving the pin flush with the shield head.
Basis of Design: Zamac (plastic types not allowed).
- C. Type C: Blind rivet fasteners for hollow metal substrates.
- a. Material: Stainless Steel.
 - b. Diameter and Length: As required for particular use.
- 2.2 REMOVABLE SECURITY FASTENERS BOLTS, NUTS and SCREWS
- A. General: Provide security type fasteners throughout the facility inclusive of factory fabricated products, assemblies, and for installations such as door hardware, hinges, equipment and other items accessible to inmates, unless specifically excluded.
- B. Manufacturers/Suppliers:
1. Camcar Division of Textron, Inc., Rockford, Illinois, 815/226/7721.
 2. Holo-Krome Company, West Hartford, Connecticut, 203/523-5235.
 3. Riteloc Company, Freeport, New York, 516/378-1020.
 4. Safety Socket Screw Corporation, Chicago, Illinois, 312/763-2020.
 5. Tamper-Pruf Screws, Inc., Paramount, California, 213/531-9364.
 6. Accepted substitute in accordance with Section 01600.
- C. Security Screws Performance: Operable by tools produced for use on security screws.
1. Security screws: Withstand numerous removals and replacements with security screw tools.
 2. Contractor: Provide security screws for Project; operable by maximum two different sets of tools.
- D. Diameters: No. 4 through 3/4 inch.
- E. Length: As required for the particular use.

- 1
2 F. Base Material: As required for strength, durability, and corrosion resistance.
3
4 1. Black Grade 9 Alloy Steel: Where specific corrosion resistance is not an issue.
5 2. Plating: Provide plated alloy steel where additional corrosion resistance is
6 required at exterior or wet areas.
7 3. Stainless Steel for use in stainless steel substrates. Use thread compound to
8 reduce galling and ensure ease of installation without over-stressing the fastener.
9
10 G. Head Shapes: Socket head cap, button, flat, or low head as required by application or as
11 specified. Provide Allen head type for screw sizes No. 6, No. 8, and No. 10.
12
13 H. Tool Style:
14
15 1. Type 1: Not used.
16
17 2. Type 2: Tamper-resistant center-pin reject style that may be removed only with
18 manufacturer's specially designed extraction tool. Provide at the following
19 locations and installations:
20
21 a. Building exterior.
22 b. Within interior Security Perimeter, including inmate areas, and
23 correctional officer areas, (inclusive of stairwells), interior of inmate cells,
24 and exterior of mechanical, elevator equipment, and electrical rooms
25 where incidental or common contact by inmates is anticipated. Use of
26 security screws in the interior of rooms where inmates are not allowed is
27 not required. Review locations with the Architect and Construction
28 Manager.
29 c. Acceptable Product: "Torx Style 2" security fasteners by Camcar Division
30 of Textron, Inc.
31 d. Type F thread cutting screws are acceptable for thread cleaning
32 purposes, but shall not be used for field cutting threads.
33

34 2.3 THREAD COMPOUNDS

- 35
36 A. Provide thread compounds to ensure corrosion resistance and additional locking
37 properties for the security screws.
38
39 1. Anti-galling compound: For use on stainless steel fasteners.
40
41 a. Products: Permatex Never Seez or equal.
42
43 2. Thread locker: For use as required to ensure tight securement and additional
44 tamper resistance.
45
46 a. Manufacturers:
47
48 1) Permatex Threadlocker Red
49 2) Loctite Threadlocker Red 271
50 3) 3M Scotch-Weld Threadlocker TL 71.
51
52 b. Use only for seldom accessed threads such as window stops and
53 detention furnishings. Do not use on detention grade hardware.
54
55
56

PART 3 – EXECUTION

3.1 PREPARATION

- A. Cleaning: Clean threads of fasteners and screw holes prior to

3.2 INSTALLATION

- A. Anti-galling and thread locker Compounds: Apply in accordance with manufacturer's instructions.

- B. Security Screws: Install security screws to proper torque levels as recommended by manufacturer. Architect may require witnessed torque testing of any screws in the facility.

- C. Broken Fasteners: Remove broken fasteners and repair substrate to allow installation of replacement fasteners. Do not leave broken fasteners in place.

END OF SECTION

END OF SECTION 05 05 55

1 SECTION 05 12 00 - STRUCTURAL STEEL FRAMING

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY

- 7 A. Section Includes:

- 8 1. Structural steel.
9 2. Field-installed shear connectors.
10 3. Grout.

- 11 B. Related Requirements:

- 12 1. Section 05 31 00 "Steel Decking".
13 2. Section 05 50 00 "Metal Fabrications" for steel lintels and shelf angles not attached to
14 structural-steel frame miscellaneous steel fabrications and other steel items not defined
15 as structural steel.
16 3. Section 09 91 23 "Interior Painting" and for surface-preparation and priming
17 requirements.

18 1.3 DEFINITIONS

- 19 A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in
20 AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

- 21 B. Seismic-Load-Resisting System: Elements of structural-steel frame designated as "SLRS" or
22 along grid lines designated as "SLRS" on Drawings, including columns, beams, and braces and
23 their connections.

- 24 C. Heavy Sections: Rolled and built-up sections as follows:

- 25 1. Shapes included in ASTM A 6/A 6M with flanges thicker than 1-1/2 inches.
26 2. Welded built-up members with plates thicker than 2 inches.
27 3. Column base plates thicker than 2 inches.

- 28 D. Protected Zone: Structural members or portions of structural members indicated as "Protected
29 Zone" on Drawings. Connections of structural and nonstructural elements to protected zones
30 are limited.

- 31 E. Demand Critical Welds: Those welds, the failure of which would result in significant degradation
32 of the strength and stiffness of the Seismic-Load-Resisting System and which are indicated as
33 "Demand Critical" or "Seismic Critical" on Drawings.

1 1.4 COORDINATION

2 A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint
3 and coating manufacturers' written recommendations to ensure that shop primers and topcoats
4 are compatible with one another.

5 B. Coordinate installation of anchorage items to be embedded in or attached to other construction
6 without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and
7 directions for installation.

8 1.5 ACTION SUBMITTALS

9 A. Product Data: For each type of product.

10 B. Shop Drawings: Show fabrication of structural-steel components.

- 11 1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
12 2. Include embedment Drawings.
13 3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds,
14 and show size, length, and type of each weld. Show backing bars that are to be removed
15 and supplemental fillet welds where backing bars are to remain.
16 4. Indicate locations and dimensions of protected zones.
17 5. Identify demand critical welds.

18 C. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs):
19 Provide according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for each welded joint
20 whether prequalified or qualified by testing, including the following:

- 21 1. Power source (constant current or constant voltage).
22 2. Electrode manufacturer and trade name, for demand critical welds.

23 1.6 INFORMATIONAL SUBMITTALS

24 A. Qualification Data: For fabricator.

25 B. Welding certificates.

26 C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers,
27 certifying that shop primers are compatible with topcoats.

28 D. Mill test reports for structural steel, including chemical and physical properties.

29 E. Product Test Reports: For the following:

- 30 1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
31 2. Shear stud connectors.
32 3. Shop primers.
33 4. Non-shrink grout.

34 F. Survey of existing conditions.

35 G. Source quality-control reports.

1 H. Field quality-control reports.

2 1.7 QUALITY ASSURANCE

3 A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification
4 Program and is designated an AISC-Certified Plant, Category STD.

5 B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification
6 Program and is designated an AISC-Certified Erector, Category ACSE.

7 C. Shop-Painting Applicators: Qualified according to AISC's Sophisticated Paint Endorsement P2
8 or to SSPC-QP 3, "Standard Procedure for Evaluating Qualifications of Shop Painting
9 Applicators."

10 D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M,
11 "Structural Welding Code - Steel."

12 1. Welders and welding operators performing work on bottom-flange, demand-critical welds
13 shall pass the supplemental welder qualification testing, as required by
14 AWS D1.8/D1.8M. FCAW-S and FCAW-G shall be considered separate processes for
15 welding personnel qualification.

16 E. Comply with applicable provisions of the following specifications and documents:

- 17 1. AISC 303.
18 2. AISC 360.
19 3. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

20 1.8 DELIVERY, STORAGE, AND HANDLING

21 A. Store materials to permit easy access for inspection and identification. Keep steel members off
22 ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel
23 members and packaged materials from corrosion and deterioration.

24 1. Do not store materials on structure in a manner that might cause distortion, damage, or
25 overload to members or supporting structures. Repair or replace damaged materials or
26 structures as directed.

27 B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.

- 28 1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes
29 repackaging and seals containers.
30 2. Clean and re-lubricate bolts and nuts that become dry or rusty before use.
31 3. Comply with manufacturers' written recommendations for cleaning and lubricating
32 ASTM F 1852 fasteners and for retesting fasteners after lubrication.

33 PART 2 - PRODUCTS

34 2.1 STRUCTURAL-STEEL MATERIALS

35 A. W-Shapes: ASTM A 992.

- 1 B. Channels, Angles, M, S-Shapes: ASTM A 36.
- 2 C. Plate and Bar: ASTM A 36.
- 3 D. Corrosion-Resisting Structural-Steel Shapes, Plates, and Bars: ASTM A 588, Grade 50.
- 4 E. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B, structural tubing.
- 5 F. Corrosion-Resisting, Cold-Formed Hollow Structural Sections: ASTM A 847, structural tubing.
- 6 G. Steel Pipe: ASTM A 53, Type E or Type S, Grade B.
 - 7 1. Weight Class: As indicated on the drawings.
 - 8 2. Finish: Black except where indicated to be galvanized.
- 9 H. Welding Electrodes: Comply with AWS requirements.
- 10 2.2 BOLTS, CONNECTORS, AND ANCHORS
 - 11 A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts;
12 ASTM A 563, Grade C, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened
13 carbon-steel washers; all with plain finish.
 - 14 1. Direct-Tension Indicators: ASTM F 959, Type 325, compressible-washer type with plain
15 finish.
 - 16 B. Zinc-Coated High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel
17 structural bolts; ASTM A 563, Grade DH heavy-hex carbon-steel nuts; and ASTM F 436,
18 Type 1, hardened carbon-steel washers.
 - 19 1. Finish: Hot-dip or mechanically deposited zinc coating.
 - 20 2. Direct-Tension Indicators: ASTM F 959, Type 325, compressible-washer type with
21 mechanically deposited zinc coating finish.
 - 22 C. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, heavy-hex
23 head assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon-steel
24 nuts, and hardened carbon-steel washers.
 - 25 1. Finish: Mechanically deposited zinc coating.
 - 26 D. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished
27 carbon steel; AWS D1.1, Type B.
 - 28 E. Un-headed Anchor Rods: ASTM F 1554, Grade 55, weldable.
 - 29 1. Configuration: Straight.
 - 30 2. Nuts: ASTM A 563 heavy-hex carbon steel.
 - 31 3. Plate Washers: ASTM A 36 carbon steel.
 - 32 4. Washers: ASTM F 436, Type 1, hardened carbon steel.
 - 33 5. Finish: Hot-dip zinc coating, ASTM A 153, Class C.
 - 34 F. Headed Anchor Rods: ASTM F 1554, Grade 55, weldable, straight.
 - 35 1. Nuts: ASTM A 563 heavy-hex carbon steel.

- 1 2. Plate Washers: ASTM A 36 carbon steel.
- 2 3. Washers: ASTM F 436, Type 1, hardened carbon steel.
- 3 4. Finish: Hot-dip zinc coating, ASTM A 153, Class C.

- 4 G. Threaded Rods: ASTM A 36.

- 5 1. Nuts: ASTM A 563 heavy-hex carbon steel.
- 6 2. Washers: ASTM A 36 carbon steel.
- 7 3. Finish: Hot-dip zinc coating, ASTM A 153, Class C.

- 8 H. Clevises and Turnbuckles: Made from cold-finished carbon steel bars, ASTM A 108,
9 Grade 1035.

- 10 I. Eye Bolts and Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1030.

- 11 J. Sleeve Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1018.

- 12 2.3 PRIMER

- 13 A. Shop Primers: Provide product compatible with system as required per Sections 09 91 13
14 "Exterior Painting," 09 91 23 "Interior Painting," or 09 96 01 "High-Performance Coatings" as
15 appropriate for location and painting system indicated.

- 16 2.4 GROUT

- 17 A. Metallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, metallic aggregate grout,
18 mixed with water to consistency suitable for application and a 30-minute working time.

- 19 B. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic
20 aggregate grout, noncorrosive and non-staining, mixed with water to consistency suitable for
21 application and a 30-minute working time.

- 22 2.5 FABRICATION

- 23 A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate
24 according to AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," and to
25 AISC 360.

- 26 1. Camber structural-steel members where indicated.
- 27 2. Fabricate beams with rolling camber up.
- 28 3. Identify high-strength structural steel according to ASTM A 6 and maintain markings until
29 structural steel has been erected.
- 30 4. Mark and match-mark materials for field assembly.
- 31 5. Complete structural-steel assemblies, including welding of units, before starting shop-
32 priming operations.

- 33 B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.

- 34 1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1.

- 35 C. Bolt Holes: Cut, drill, mechanically thermal cut, or punch standard bolt holes perpendicular to
36 metal surfaces.

- 1 D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- 2 E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-
3 SP 3, "Power Tool Cleaning."
- 4 F. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear
5 connectors. Use automatic end welding of headed-stud shear connectors according to
6 AWS D1.1/D1.1M and manufacturer's written instructions.

7 2.6 SHOP CONNECTIONS

- 8 A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for
9 Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
- 10 1. Joint Type: As indicated on drawings.
- 11 B. Weld Connections: Comply with AWS D1.1 for tolerances, appearances, welding procedure
12 specifications, weld quality, and methods used in correcting welding work.
- 13 1. Assemble and weld built-up sections by methods that maintain true alignment of axes
14 without exceeding tolerances in AISC 303 for mill material.

15 2.7 SHOP PRIMING

- 16 A. Preparation for Shop Priming: Clean surfaces to be painted per primer manufacturer's written
17 instructions. Remove loose rust and mill scale and other spatter, slag, flux deposits, and any
18 other potential bond-breaking materials.

19 2.8 GALVANIZING

- 20 A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel
21 according to ASTM A 123.
- 22 1. Fill vent and drain holes that are exposed in the finished Work unless they function as
23 weep holes, by plugging with zinc solder and filing off smooth.
- 24 2. Galvanize lintels and shelf angles and attached to structural-steel frame and located in
25 exterior walls.

26 2.9 SOURCE QUALITY CONTROL

- 27 A. Testing Agency: Owner will engage a qualified testing agency to perform shop tests and
28 inspections.
- 29 1. Provide testing agency with access to places where structural-steel work is being
30 fabricated or produced to perform tests and inspections.
- 31 B. Bolted Connections: Inspect and test shop-bolted connections according to RCSC's
32 "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- 33 C. Welded Connections: Visually inspect shop-welded connections according to AWS D1.1 and
34 the following inspection procedures, at testing agency's option:

1. Liquid Penetrant Inspection: ASTM E 165.
 2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
 3. Ultrasonic Inspection: ASTM E 164.
 4. Radiographic Inspection: ASTM E 94.
- D. In addition to visual inspection, test and inspect shop-welded shear connectors according to requirements in AWS D1.1 for stud welding and as follows:
1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
 2. Conduct tests according to requirements in AWS D1.1 on additional shear connectors if weld fracture occurs on shear connectors already tested.
- E. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
1. Prepare a certified survey of existing conditions. Include bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.
1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
- B. Baseplates Bearing Plates and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
1. Set plates for structural members on wedges, shims, or setting nuts as required.
 2. Weld plate washers to top of baseplate.

3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
 4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- C. Maintain erection tolerances of structural steel within AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."
- D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
1. Level and plumb individual members of structure.
 2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.
- E. Splice members only where indicated.
- F. Do not use thermal cutting during erection unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS D1.1.
- G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.
- H. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

3.4 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
1. Joint Type: As indicated on Drawings.
- B. Weld Connections: Comply with AWS D1.1 and AWS D1.8 for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
 2. Remove backing bars or runoff tabs where indicated, back gouge, and grind steel smooth.
 3. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," for mill material.

3.5 PREFABRICATED BUILDING COLUMNS

- A. Install prefabricated building columns to comply with AISC 360, manufacturer's written recommendations, and requirements of testing and inspecting agency that apply to the fire-resistance rating indicated.

3.6 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:

1. Verify weld materials and inspect welds.
2. Verify connection materials and inspect high-strength bolted connections.

- B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

- C. Bolted Connections: Inspect and test bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

- D. Welded Connections: Visually inspect field welds according to AWS D1.1.

1. In addition to visual inspection, test and inspect field welds according to AWS D1.1 and the following inspection procedures, at testing agency's option:

- a. Liquid Penetrant Inspection: ASTM E 165.
- b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
- c. Ultrasonic Inspection: ASTM E 164.
- d. Radiographic Inspection: ASTM E 94.

- E. In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1 for stud welding and as follows:

1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
2. Conduct tests according to requirements in AWS D1.1 on additional shear connectors if weld fracture occurs on shear connectors already tested.

3.7 REPAIRS AND PROTECTION

- A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780.

- B. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

- C. Touchup Painting: Cleaning and touchup painting are specified in Section 09 91 23 "Interior Painting."

1 END OF SECTION 051200

1 SECTION 053100 - STEEL DECKING

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY

- 7 A. Section Includes:

- 8 1. Roof deck.
9 2. Composite floor deck.

- 10 B. Related Requirements:

- 11
12 1. Section 05 12 00 "Structural Steel Framing".
13 2. Section 05 50 00 "Metal Fabrications" for framing deck openings with miscellaneous steel
14 shapes.
15 3. Section 09 91 23 "Interior Painting" for repair painting of primed deck and finish painting
16 of deck.

17 1.3 ACTION SUBMITTALS

- 18 A. Product Data: For each type of deck, accessory, and product indicated.

- 19 B. Shop Drawings:

- 20 1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans,
21 cut deck openings, special jointing, accessories, and attachments to other construction.

22 1.4 INFORMATIONAL SUBMITTALS

- 23 A. Welding certificates.

- 24 B. Product Certificates: For each type of steel deck.

- 25 C. Product Test Reports: For tests performed by a qualified testing agency, indicating that each of
26 the following complies with requirements:

- 27 1. Power-actuated mechanical fasteners.
28 2. Acoustical roof deck.

- 29 D. Evaluation Reports: For steel deck, from ICC-ES.

- 30 E. Field quality-control reports.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.
- B. Electrical Raceway Units: Provide UL-labeled cellular floor-deck units complying with UL 209 and listed in UL's "Electrical Construction Equipment Directory" for use with standard header ducts and outlets for electrical distribution systems.
- C. FM Global Listing: Provide steel roof deck evaluated by FM Global and listed in its "Approval Guide, Building Materials" for Class 1 fire rating and Class 1-90 windstorm ratings.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."
- B. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 ROOF DECK

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. ASC Profiles, Inc.
 - 2. Cordeck.
 - 3. Epic Metals Corporation.
 - 4. Nucor Corp.
 - 5. Verco Decking, Inc., a Nucor company.
- B. Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following:
 - 1. Prime-Painted Steel Sheet: ASTM A 1008, Structural Steel (SS), Grade 45 minimum, shop primed with manufacturer's standard baked-on, rust-inhibitive primer.
 - a. Color: Manufacturer's standard.

- 1 2. Galvanized and Shop-Primed Steel Sheet: ASTM A 653, Structural Steel (SS), Grade 40,
2 G60 zinc coating; cleaned, pretreated, and primed with manufacturer's standard baked-on,
3 rust-inhibitive primer.
- 4 a. Color: Manufacturer's standard.
- 5
- 6 3. Deck Profile: As indicated.
- 7 4. Profile Depth: As indicated.
- 8 5. Design Uncoated-Steel Thickness: As indicated.
- 9 6. Span Condition: As indicated.
- 10 7. Side Laps: Overlapped.

11 2.3 COMPOSITE FLOOR DECK

- 12 A. Manufacturers: Subject to compliance with requirements, available manufacturers offering
13 products that may be incorporated into the Work include, but are not limited to the following:
- 14 1. ASC Profiles, Inc.
 - 15 2. Cordeck.
 - 16 3. Epic Metals Corporation.
 - 17 4. Nucor Corp.
 - 18 5. Verco Decking, Inc., a Nucor company.
- 19 B. Composite Floor Deck: Fabricate panels, with integrally embossed or raised pattern ribs and
20 interlocking side laps, to comply with "SDI Specifications and Commentary for Composite Steel
21 Floor Deck," in SDI Publication No. 31, with the minimum section properties indicated, and with
22 the following:
- 23
 - 24 1. Galvanized and Shop-Primed Steel Sheet: ASTM A 653, Structural Steel (SS), Grade 33,
25 G60 zinc coating; with unpainted top surface and cleaned and pretreated bottom surface
26 primed with manufacturer's standard gray baked-on, rust-inhibitive primer.
 - 27 2. Profile Depth: As indicated.
 - 28 3. Design Uncoated-Steel Thickness: As indicated.
 - 29 4. Span Condition: Simple span.

30 2.4 ACCESSORIES

- 31 A. General: Provide manufacturer's standard accessory materials for deck that comply with
32 requirements indicated.
- 33 B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically
34 driven carbon-steel fasteners; or self-drilling, self-threading screws.
- 35 C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel
36 screws, No. 10 minimum diameter.
- 37 D. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000
38 psi, not less than 0.0359-inch uncoated thickness, of same material and finish as deck; of profile
39 indicated or required for application.
- 40 E. Weld Washers: Uncoated steel sheet, shaped to fit deck rib, 0.0598 inch thick, with factory-
41 punched hole of 3/8-inch minimum diameter.

1 F. Galvanizing Repair Paint: ASTM A 780.

2 G. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

3 PART 3 - EXECUTION

4 3.1 EXAMINATION

5 A. Examine supporting frame and field conditions for compliance with requirements for installation
6 tolerances and other conditions affecting performance of the Work.

7 B. Proceed with installation only after unsatisfactory conditions have been corrected.

8 3.2 INSTALLATION, GENERAL

9 A. Install deck panels and accessories according to applicable specifications and commentary in
10 SDI Publication No. 31, manufacturer's written instructions, and requirements in this Section.

11 B. Install temporary shoring before placing deck panels if required to meet deflection limitations.

12 C. Locate deck bundles to prevent overloading of supporting members.

13 D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned
14 and bearing on supporting frame before being permanently fastened. Do not stretch or contract
15 side-lap interlocks.

16 E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.

17 F. Cut and neatly fit deck panels and accessories around openings and other work projecting
18 through or adjacent to deck.

19 G. Provide additional reinforcement and closure pieces at openings as required for strength,
20 continuity of deck, and support of other work.

21 H. Comply with AWS requirements and procedures for manual shielded metal arc welding,
22 appearance and quality of welds, and methods used for correcting welding work.

23 3.3 ROOF-DECK INSTALLATION

24 A. Fasten roof-deck panels to steel supporting members by arc spot (puddle) welds of the surface
25 diameter indicated or arc seam welds with an equal perimeter that is not less than 1-1/2 inches
26 long, and as follows:

27 1. Weld Diameter: 3/4 inch, nominal.

28 2. Weld Spacing: Weld edge and interior ribs of deck units with a minimum of two welds per
29 deck unit at each support. Space welds 12 inches apart in the field of roof and 6 inches
30 apart in roof corners and perimeter, based on roof-area definitions in FMG Loss
31 Prevention Data Sheet 1-28.

B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of one-half of the span or 18 inches, and as follows:

1. Mechanically fasten with self-drilling, No. 10 diameter or larger, carbon-steel screws.
2. Mechanically clinch or button punch.
3. Fasten with a minimum of 1-1/2-inch-long welds.

C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:

1. End Joints: Butted.

D. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and weld flanges to top of deck. Space welds not more than 12 inches apart with at least one weld at each corner.

1. Install reinforcing channels or zees in ribs to span between supports and weld.

E. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld to substrate to provide a complete deck installation.

1. Weld cover plates at changes in direction of roof-deck panels unless otherwise indicated.

3.4 FLOOR-DECK INSTALLATION

A. Fasten floor-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated and as follows:

1. Weld Diameter: 3/4 inch, nominal.
2. Weld Spacing: Space and locate welds as indicated.

B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of one-half of the span or 36 inches, and with one of the following methods:

1. Mechanically fasten with self-drilling, No. 10 diameter or larger, carbon-steel screws.
2. Mechanically clinch or button punch.
3. Fasten with a minimum of 1-1/2-inch-long welds.

C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:

1. End Joints: Butted.

D. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations unless otherwise indicated.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

1 B. Field welds will be subject to inspection.

2 3.6 REPAIRS

3 A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of
4 deck with galvanized repair paint according to ASTM A 780 and manufacturer's written
5 instructions.

6 B. Repair Painting: Wire brushing, cleaning, and repair painting of rust spots, welds, and abraded
7 areas of both deck surfaces are included in Section 09 91 23 "Interior Painting."

8 END OF SECTION 05 31 00

1 SECTION 05 50 00 - METAL FABRICATIONS

2 PART 1 - GENERAL

3 1.1 GENERAL REQUIREMENTS

- 4 A. Drawings and Conditions of Contract, including General and Supplementary Conditions and
5 Division 1 Administration Sections, apply to this Division.

6 1.2 SUMMARY

- 7 A. This Section includes the following:

- 8 1. Steel framing and supports for applications where framing and supports are not specified
9 in other Sections.
10 2. Loose bearing and leveling plates.
11 3. Steel weld plates and angles for casting into concrete not specified in other Sections.
12 4. Steel bollards.
13 5. Steel corner guards.
14 6. Abrasive metal nosings.
15 7. Fasteners and Anchors.
16 8. Metal ladders.

- 17 B. Products furnished, but not installed, under this Section include the following:

- 18 1. Anchor bolts, steel pipe sleeves, and wedge-type inserts indicated to be cast into
19 concrete or built into unit masonry.
20 2. Security and non-security fasteners and anchors.

- 21 C. Related Sections include the following:

- 22 1. Division 03 30 00 Section "Cast-in-Place Concrete" for installing anchor bolts, steel pipe
23 sleeves, wedge-type inserts and other items indicated to be cast into concrete.
24 2. Division 04 22 00 Section "Unit Masonry" for installing loose lintels, anchor bolts, and
25 other items indicated to be built into unit masonry.
26 3. Division 06 10 00 Section "Rough Carpentry" for metal framing anchors.
27 4. Division 09 91 13 and 09 91 23 Section "Exterior and Interior Painting" for field painting.

28 1.3 PERFORMANCE REQUIREMENTS

- 29 A. Thermal Movements: Provide exterior metal fabrications that allow for thermal movements
30 resulting from the following maximum change (range) in ambient and surface temperatures by
31 preventing buckling, opening of joints, overstressing of components, failure of connections, and
32 other detrimental effects. Base engineering calculation on surface temperatures of materials
33 due to both solar heat gain and nighttime-sky heat loss.

- 34 1. Temperature Change (Range): 120 degrees F, ambient; 180 degrees F, material
35 surfaces.

1.4 SUBMITTALS

A. Product Data: For the following:

1. Nonslip aggregates and nonslip-aggregate surface finishes.
2. Metal nosings and treads.
3. Grout.

B. Shop Drawings: Show fabrication and installation details for metal fabrications.

1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
2. Provide templates for anchors and bolts specified for installation under other Sections.
3. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Samples for Verification: For each type and finish of extruded nosing and tread.

D. Mill Certificates: Signed by manufacturers of stainless-steel sheet certifying that products furnished comply with requirements.

E. Welding certificates.

F. Qualification Data: For professional engineer.

1.5 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to the following:

1. AWS D1.1, "Structural Welding Code--Steel."
2. AWS D1.2, "Structural Welding Code--Aluminum."
3. AWS D1.3, "Structural Welding Code--Sheet Steel."
4. AWS D1.6, "Structural Welding Code--Stainless Steel."

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication and indicate measurements on Shop Drawings.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating metal fabrications without field measurements. Coordinate wall and other contiguous construction to ensure that actual dimensions correspond to established dimensions.
2. Provide allowance for trimming and fitting at site.

1.7 COORDINATION

A. Coordinate installation of anchorages for metal fabrications. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor

1 bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver
2 such items to Project site in time for installation.

3 B. Coordinate installation of steel weld plates and angles for casting into concrete that are
4 specified in this Section but required for work of another Section. Deliver such items to Project
5 site in time for installation.

6 PART 2 - PRODUCTS

7 2.1 MANUFACTURERS

8 A. In other Part 2 articles where titles below introduce lists, the following requirements apply to
9 product selection:

10 1. Available Manufacturers: Subject to compliance with requirements, manufacturers
11 offering products that may be incorporated into the Work include, but are not limited to,
12 manufacturers specified.

13 2.2 METALS, GENERAL

14 A. Metal Surfaces, General: Provide materials with smooth, flat surfaces, unless otherwise
15 indicated. For metal fabrications exposed to view in the completed Work, provide materials
16 without seam marks, roller marks, rolled trade names, or blemishes.

17 2.3 FERROUS METALS

18 A. Steel Plates, Shapes, and Bars: ASTM A 36.

19 B. High Strength, Low Alloy Steel Plate, Shape and Bars: ASTM A 572 Grade 50.

20 C. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 304.

21 D. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.

22 E. Rolled-Steel Floor Plate: ASTM A 786, rolled from plate complying with ASTM A 36 or
23 ASTM A 283, Grade C or D.

24 F. Rolled-Stainless-Steel Floor Plate: ASTM A 793.

25 G. Steel Tubing: ASTM A 500, cold-formed steel tubing.

26 H. Steel Pipe: ASTM A 53, standard weight (Schedule 40), unless another weight is indicated or
27 required by structural loads.

28 I. Slotted Channel Framing: Cold-formed metal channels with continuous slot complying with
29 MFMA-3.

30 1. Size of Channels: 1-5/8 by 1-5/8 inches.

31 2. Material: Galvanized steel complying with ASTM A 653, commercial steel, Type B, with
32 G90 coating; 0.079-inch nominal thickness.

1 J. Cast Iron: ASTM A 48, Class 30, unless another class is indicated or required by structural
2 loads.

3 K. Homogenous Tool Resisting Steel Bars: ASTM A 627.

4 2.4 FASTENERS

5 A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior
6 use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, at
7 exterior walls. Provide stainless-steel fasteners for fastening aluminum. Select fasteners for
8 type, grade, and class required.

9 B. Expansion Anchors: Anchor bolt and sleeve assembly with capability to sustain, without failure,
10 a load equal to six times the load imposed when installed in unit masonry and four times the
11 load imposed when installed in concrete, as determined by testing according to ASTM E 488,
12 conducted by a qualified independent testing agency.

- 13 1. Material for Anchors in Interior Locations: Carbon-steel components zinc-plated to
14 comply with ASTM B 633, Class Fe/Zn 5.
- 15 2. Material for Anchors in Exterior Locations: Alloy Group 1 (A1) stainless-steel bolts
16 complying with ASTM F 593 (ASTM F 738M) and nuts complying with ASTM F 594
17 (ASTM F 836M).

18 C. Fasteners and Anchors:

19 1. Chemical anchors: System consisting of threaded rod, breakoff security nut and epoxy
20 adhesive.

- 21 a. Epoxy adhesive: ASTM C881, Type I, II, IV or V, Grade 3, Class A, B and C.
- 22 b. Threaded rod: ASTM A325 or A490 steel, minimum ½ inch (13 mm) diameter.
- 23 c. Breakoff security nuts as indicated above.
- 24 d. Use for all floor mounted detention equipment inside the secure perimeter and
25 where indicated.

26 2. Provide zinc-coated fasteners for exterior use or where built into exterior walls. Select
27 fasteners for the type, grade, and class required.

28 2.5 MISCELLANEOUS MATERIALS

29 A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy
30 welded.

31 B. Shop Primers: Provide primers that comply with Division 09 painting Sections.

32 C. Zinc-Rich Primer: Complying with SSPC-Paint 20 or SSPC-Paint 29 and compatible with
33 topcoat.

- 34 1. Use primer with a VOC content of 420 g/L (3.5 lb/gal.) or less when calculated according
35 to 40 CFR 59, Subpart D (EPA Method 24).

36 D. Galvanizing Repair Paint: High-zinc-dust-content paint for reglazing welds in steel,
37 complying with SSPC-Paint 20.

- 1 E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
- 2 F. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout
3 complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for
4 interior and exterior applications.
- 5 G. Concrete Materials and Properties: Comply with requirements in Division 03 Section "Cast-in-
6 Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day
7 compressive strength of 3000 psi (20 MPa), unless otherwise indicated.

8 2.6 FABRICATION, GENERAL

- 9 A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units
10 only as necessary for shipping and handling limitations. Use connections that maintain
11 structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- 12 B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius
13 of approximately 1/32 inch (1 mm), unless otherwise indicated. Remove sharp or rough areas
14 on exposed surfaces.
- 15 C. Form bent-metal corners to smallest radius possible without causing grain separation or
16 otherwise impairing work.
- 17 D. Form exposed work true to line and level with accurate angles and surfaces and straight edges.
- 18 E. Weld corners and seams continuously to comply with the following:
- 19 1. Use materials and methods that minimize distortion and develop strength and corrosion
20 resistance of base metals.
- 21 2. Obtain fusion without undercut or overlap.
- 22 3. Remove welding flux immediately.
- 23 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no
24 roughness shows after finishing and contour of welded surface matches that of adjacent
25 surface.
- 26 F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners
27 where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk)
28 screws or bolts, unless otherwise indicated. Locate joints where least conspicuous.
- 29 G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude
30 water. Provide weep holes where water may accumulate.
- 31 H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws,
32 and similar items.
- 33 I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring
34 devices to secure metal fabrications rigidly in place and to support indicated loads.
- 35 1. Where units are indicated to be cast into concrete or built into masonry, equip with
36 integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch
37 embedment and 2-inch hook, not less than 8 inches from ends and corners of units and
38 24 inches o.c., unless otherwise indicated.

2.7 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction, unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.
- C. Galvanize miscellaneous framing and supports where indicated.
- D. Prime miscellaneous framing and supports with zinc-rich primer where indicated.

2.8 LOOSE STEEL LINTELS

- A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Weld adjoining members together to form a single unit where indicated.
- B. Size loose lintels to provide bearing length at each side of openings equal to 1/12 of clear span but not less than 8 inches (200 mm), unless otherwise indicated.
- C. Galvanize loose steel lintels located in exterior walls.

2.9 LOOSE BEARING AND LEVELING PLATES

- A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.
- B. Galvanize plates after fabrication.

2.10 STEEL WELD PLATES AND ANGLES

- A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with not less than two integrally welded steel strap anchors for embedding in concrete.

2.11 STEEL BOLLARDS (BOL-1)

- A. Bollard Construction:
 - 1. Material: Schedule 80 galvanized pipe.
 - 2. Pipe OD: Not less than 6 inches.
 - 3. Overall Exposed Height: 42 inches.
 - 4. Overall Width: As indicated.
 - 5. Overall Depth: As indicated.
 - 6. Installation Method: Surface flange anchored below finished grade to substrate indicated. Fill with Concrete. Dome top of concrete to drain.
- B. Steel Finish: Factory primer to receive field painting

2.12 MISCELLANEOUS STEEL TRIM

- A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.
- B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.
- C. Galvanize exterior miscellaneous steel trim and interior miscellaneous steel trim, where indicated.

2.13 STEEL CORNER GUARDS (CG)

- A. Fabricate galvanized steel corner guards as follows:
1. 3/8 inch thick galvanized steel x 6 inch wide (each face) x 48 inch high
2. Weld 1/2 inch diameter x 4 inch long studs to back of corner guard (minimum 3 studs to be provided per corner guard)

2.14 ABRASIVE METAL NOSINGS

- A. Extruded Units: Aluminum, with abrasive filler consisting of aluminum oxide, silicon carbide, or a combination of both, in an epoxy-resin binder. Fabricate units in lengths necessary to accurately fit openings or conditions.
1. Available Manufacturers:
- a. American Safety Tread Co., Inc.
- b. Babcock Davis
- c. Balco Inc.
- d. Granite State Casting Co.
- e. Nystrom, Inc.
- f. Wooster Products Inc.
2. Provide ribbed units, with abrasive filler strips projecting 1/16 inch (1.5 mm) above aluminum extrusion.
3. Nosings: Square-back units, 1-7/8 inches (48 mm) wide, for casting into concrete steps.
- B. Provide anchors for embedding units in concrete, integral to units.
- C. Apply clear lacquer to concealed surfaces of extruded units.

2.15 METAL LADDERS (LAD)

- A. General:
1. Comply with ANSI A14.3, except for elevator pit ladders.
2. For elevator pit ladders, comply with ASME A17.1/CSA B44.

B. Steel Ladders:

1. Space siderails 18 inches apart unless otherwise indicated.
2. Siderails: Continuous, 1/2-by-2-1/2-inch steel flat bars, with eased edges.
3. Rungs: 3/4-inch- diameter steel bars.
4. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.
5. Provide nonslip surfaces on top of each rung, either by coating rung with aluminum-oxide granules set in epoxy-resin adhesive or by using a type of manufactured rung filled with aluminum-oxide grout.
6. Provide nonslip surfaces on top of each rung by coating with abrasive material metallically bonded to rung.
7. Provide platforms as indicated fabricated from welded or pressure-locked steel bar grating, supported by steel angles. Limit openings in gratings to no more than 1/2 inch in least dimension.
8. Support each ladder at top and bottom and not more than 60 inches o.c. with welded or bolted steel brackets.
9. Galvanize ladders, including brackets and fasteners.

2.16 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

- B. Finish metal fabrications after assembly.

2.17 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with applicable standard listed below:

1. ASTM A 123, for galvanizing steel and iron products.
2. ASTM A 153, for galvanizing steel and iron hardware.

- B. Preparation for Shop Priming: Clean surfaces to be painted per primer manufacturer's written instructions. Remove loose rust and mill scale and other spatter, slag, flux deposits, and any other potential bond-breaking materials

- C. Shop Priming: Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes and those to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with primer manufacturer's written instructions and SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

2.18 STAINLESS-STEEL FINISHES

- A. Remove tool and die marks and stretch lines or blend into finish.

- B. Dull Satin Finish: No. 6.

- C. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

1 PART 3 - EXECUTION

2 3.1 INSTALLATION, GENERAL

3 A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal
4 fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges
5 and surfaces level, plumb, true, and free of rack; and measured from established lines and
6 levels.

7 B. Fit exposed connections accurately together to form hairline joints. Weld connections that are
8 not to be left as exposed joints but cannot be shop welded because of shipping size limitations.
9 Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after
10 fabrication and are for bolted or screwed field connections.

11 C. Field Welding: Comply with the following requirements:

- 12 1. Use materials and methods that minimize distortion and develop strength and corrosion
13 resistance of base metals.
14 2. Obtain fusion without undercut or overlap.
15 3. Remove welding flux immediately.
16 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no
17 roughness shows after finishing and contour of welded surface matches that of adjacent
18 surface.

19 D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal
20 fabrications are required to be fastened to in-place construction. Provide threaded fasteners for
21 use with concrete and masonry inserts, toggle bolts, through bolts, lag bolts, wood screws, and
22 other connectors.

23 E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete,
24 masonry, or similar construction.

25 3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

26 A. General: Install framing and supports to comply with requirements of items being supported,
27 including manufacturers' written instructions and requirements indicated on Shop Drawings.

28 B. Install pipe columns on concrete footings with grouted baseplates. Position and grout column
29 baseplates as specified in "Installing Bearing and Leveling Plates" Article.

- 30 1. Grout baseplates of columns supporting steel girders after girders are installed and
31 leveled.

32 3.3 INSTALLING BEARING AND LEVELING PLATES

33 A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to
34 improve bond to surfaces. Clean bottom surface of plates.

35 B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members
36 have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but,
37 if protruding, cut off flush with edge of bearing plate before packing with grout.

- 1 1. Use non-shrink grout, either metallic or nonmetallic, in concealed locations where not
- 2 exposed to moisture; use non-shrink, nonmetallic grout in exposed locations, unless
- 3 otherwise indicated.
- 4 2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

5 3.4 INSTALLING METAL BOLLARDS

- 6 A. Anchor bollards in place with concrete footings. Center and align bollards in holes 3 inches (75
- 7 mm) above bottom of excavation. Place concrete and vibrate or tamp for consolidation.
- 8 Support and brace bollards in position until concrete has cured.
- 9 B. Fill bollards solidly with concrete, mounding top surface to shed water.

10 3.5 INSTALLING NOSINGS

- 11 A. Center nosings on tread widths.
- 12 B. For nosings embedded in concrete steps or curbs, align nosings flush with riser faces and level
- 13 with tread surfaces.

14 3.6 ADJUSTING AND CLEANING

- 15 A. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and
- 16 abraded areas of shop paint are specified in Division 09 painting Sections.
- 17 B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair
- 18 galvanizing to comply with ASTM A780.

19 END OF SECTION 05 50 00

1 SECTION 05 51 13 - METAL PAN STAIRS

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY

- 7 A. Section Includes:

- 8 1. Preassembled steel stairs with concrete-filled treads.
9 2. Steel tube railings attached to metal stairs.
10 3. Steel tube handrails attached to walls adjacent to metal stairs.
11 4. Railing gates at the level of exit discharge.

- 12 B. Related Requirements:

- 13 1. Section 03 30 00 "Cast-in-Place Concrete" for concrete fill for stair treads and platforms.
14 2. Section 05 52 13 "Pipe and Tube Railings" for pipe and tube railings.
15 3. Section 13 42 60 "Modular Detention Wall System" to coordinate any metal stair supports
16 and/or connections.

17 1.3 COORDINATION

- 18 A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint
19 and coating manufacturers' written recommendations to ensure that shop primers and topcoats
20 are compatible with one another.

- 21 B. Coordinate installation of anchorages for metal stairs. Furnish setting drawings, templates, and
22 directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items
23 with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to
24 Project site in time for installation.

- 25 C. Coordinate locations of hanger rods and struts with other work so that they do not encroach on
26 required stair width and are within the fire-resistance-rated stair enclosure.

27 1.4 ACTION SUBMITTALS

- 28 A. Product Data: For metal pan stairs and the following:

- 29 1. Prefilled metal-pan-stair treads.
30 2. Abrasive nosings (with luminous lines).
31 3. Paint products.

- 32 B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

- 1 C. Samples for Verification: For each type and finish of nosing.
- 2 D. Delegated-Design Submittal: For stairs and railings, including analysis data signed and sealed
- 3 by the qualified professional California engineer responsible for their preparation.

4 1.5 INFORMATIONAL SUBMITTALS

- 5 A. Welding certificates.
- 6 B. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers
- 7 certifying that shop primers are compatible with topcoats.

8 1.6 QUALITY ASSURANCE

- 9 A. Installer Qualifications: Fabricator of products.
- 10 B. Welding Qualifications: Qualify procedures and personnel according to the following:
- 11 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- 12 2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

13 PART 2 - PRODUCTS

14 2.1 MANUFACTURERS

- 15 A. Manufacturers: Subject to compliance with requirements, provide products by one but not
- 16 limited to the following:
- 17 1. American Stair, Inc.
- 18 2. Lapeyre Stair Inc.
- 19 3. Pacific Stair Corporation.
- 20 B. Fabricators: Subject to conformance with requirements, stairs may also be fabricated by the
- 21 structural steel shop for the project.

22 2.2 METALS

- 23 A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise
- 24 indicated. For components exposed to view in the completed Work, provide materials without
- 25 seam marks, roller marks, rolled trade names, or blemishes.
- 26 B. Steel Plates, Shapes, and Bars: ASTM A 36.
- 27 C. Steel Tubing: ASTM A 500 (cold formed) or ASTM A 513.
- 28 D. Cast Iron: Either gray iron, ASTM A 48, or malleable iron, ASTM A 47, unless otherwise
- 29 indicated.

- 1 E. Uncoated, Cold-Rolled Steel Sheet: ASTM A 1008, either commercial steel, Type B, or
2 structural steel, Grade 25, unless another grade is required by design loads; exposed.
- 3 F. Uncoated, Hot-Rolled Steel Sheet: ASTM A 1011, either commercial steel, Type B, or structural
4 steel, Grade 30, unless another grade is required by design loads.
- 5 G. Galvanized-Steel Sheet: ASTM A 653, G90 coating, either commercial steel, Type B, or
6 structural steel, Grade 33, unless another grade is required by design loads.

7 2.3 ABRASIVE NOSINGS

- 8 A. Extruded Units: Aluminum units with abrasive filler consisting of aluminum oxide, silicon
9 carbide, or a combination of both, in an epoxy-resin binder. Fabricate units in lengths necessary
10 to accurately fit openings or conditions.

- 11 1. Manufacturers: Subject to compliance with requirements, available manufacturers
12 offering products that may be incorporated into the Work include, but are not limited to
13 the following:

- 14 a. American Safety Tread Co., Inc.
15 b. Babcock-Davis (model P1.875E – basis of design)
16 c. Balco, Inc.
17 d. Wooster Products Inc.

- 18 B. Provide ribbed units, with abrasive filler strips projecting 1/16 inch above aluminum extrusion.
- 19 C. Provide anchors for embedding units in concrete, either integral or applied to units, as standard
20 with manufacturer.
- 21 D. Apply bituminous paint to concealed surfaces of cast-metal units set into concrete.
- 22 E. Apply clear lacquer to concealed surfaces of extruded units set into concrete.
- 23 F. Provide luminescent lines which glow in the dark.

24 2.4 FASTENERS

- 25 A. General: Provide zinc-plated fasteners with coating complying with ASTM B 633 or
26 ASTM F 1941, Class Fe/Zn 12 for exterior use, and Class Fe/Zn 5 where built into exterior
27 walls. Select fasteners for type, grade, and class required.
- 28 B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts,
29 ASTM A 563; and, where indicated, flat washers.
- 30 C. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563; and,
31 where indicated, flat washers.
- 32 D. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors capable of
33 sustaining, without failure, a load equal to six times the load imposed when installed in unit
34 masonry and four times the load imposed when installed in concrete, as determined by testing
35 according to ASTM E 488, conducted by a qualified independent testing agency.

1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.

2.5 MISCELLANEOUS MATERIALS

- A. Shop Primers: Provide product compatible with system as required per Section 09 91 23 "Interior Painting," or Section 09 96 01 "High-Performance Coatings" as appropriate for location and painting system indicated.
- B. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.
- C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.6 FABRICATION, GENERAL

- A. Provide complete stair assemblies, including metal framing, hangers, struts, [railings,] clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.
1. Join components by welding unless otherwise indicated.
2. Use connections that maintain structural value of joined pieces.
- B. Preamsembled Stairs: Assemble stairs in shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- D. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- E. Form exposed work with accurate angles and surfaces and straight edges.
- F. Weld connections to comply with the following:
1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Weld exposed corners and seams continuously unless otherwise indicated.
5. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 4 welds: good quality, uniform undressed weld with minimal splatter.

- G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts unless otherwise indicated. Locate joints where least conspicuous.

2.7 STEEL-FRAMED STAIRS

- A. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM AMP 510, "Metal Stairs Manual," Commercial Class, unless more stringent requirements are indicated.

B. Stair Framing:

1. Fabricate stringers of steel channels.

- a. Provide closures for exposed ends of channel stringers.

2. Construct platforms of steel channel headers and miscellaneous framing members as needed to comply with performance requirements.
3. Weld stringers to headers; weld framing members to stringers and headers.
4. Where masonry walls support metal stairs, provide temporary supporting struts designed for erecting steel stair components before installing masonry.

- C. Metal Pan Stairs: Form risers (open risers at dayroom stairs), sub-tread pans, and sub-platforms to configurations shown from steel sheet of thickness needed to comply with performance requirements, but not less than 0.067 inch.

1. Steel Sheet: Uncoated hot-rolled steel sheet unless otherwise indicated.
2. Steel Sheet: Galvanized-steel sheet, where indicated.
3. Directly weld metal pans to stringers; locate welds on top of sub-treads where they are concealed by concrete fill. Do not weld risers to stringers.
4. Fabricate risers of perforated metal.
5. Attach risers and sub-treads to stringers with brackets made of steel angles or bars (except at dayroom stairs, which will have open risers). Weld brackets to stringers and attach metal pans to brackets by welding, riveting, or bolting.
6. Attach abrasive nosings to risers.
7. At Contractor's option, provide stair assemblies with metal pan sub-treads filled with reinforced concrete during fabrication.
8. Provide epoxy-resin-filled treads, reinforced with glass fibers, with slip-resistant, abrasive surface.
9. Provide sub-platforms of configuration indicated or, if not indicated, the same as sub-treads. Weld sub-platforms to platform framing.

- D. Abrasive-Coating-Finished, Formed-Metal Stairs: Form risers, treads, and platforms to configurations shown from steel sheet of thickness needed to comply with performance requirements, but not less than 0.097 inch.

1. Steel Sheet: Uncoated hot-rolled steel sheet unless otherwise indicated.
2. Directly weld risers and treads to stringers; locate welds on underside of stairs.
3. Provide platforms of configuration indicated or, if not indicated, the same as treads. Weld platforms to platform framing.
4. Finish tread and platform surfaces with manufacturer's standard epoxy-bonded abrasive finish.

2.8 STAIR RAILINGS

- A. Steel Tube Railings: Fabricate railings to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of tube, post spacings, and anchorage, but not less than that needed to withstand indicated loads.
1. Rails and Posts: 2 inch diameter top rail, and 1-1/2-inch-square intermediate and bottom rails and 1-1/2-inch-square posts.
 2. Intermediate Rails Infill: 1-1/2-inch-square intermediate rails spaced less than 12 inches clear.
 3. Handrails: 1-1/2 inch outside diameter stainless steel tube.
 4. Gates: Form gates from steel tube of same size and shape as top rails, with infill to match guards. Provide with cam-type, self-closing hinges for fastening to wall and overlapping stop with rubber bumper to prevent gate from opening in direction opposite egress.
- B. Welded Connections: Fabricate railings with welded connections. Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
1. Finish welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 3 welds: partially dressed weld with spatter removed as shown in NAAMM AMP 521.
- C. Form changes in direction of railings as detailed.
- D. For changes in direction made by bending, use jigs to produce uniform curvature for each repetitive configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- E. Close exposed ends of railing members with prefabricated end fittings.
- F. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.
- G. Connect posts to stair framing by direct welding unless otherwise indicated.
- H. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnecting components and for attaching to other work. Furnish inserts and other anchorage devices for connecting to concrete or masonry work.
1. For galvanized railings, provide galvanized fittings, brackets, fasteners, sleeves, and other ferrous-metal components.
 2. For nongalvanized railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves, except galvanize anchors embedded in exterior masonry and concrete construction.
 3. Provide type of bracket with predrilled hole for exposed bolt anchorage and that provides 1-1/2-inch clearance from inside face of handrail to finished wall surface.
- I. Fillers: Provide fillers made from steel plate, or other suitably crush-resistant material, where needed to transfer wall bracket loads through wall finishes to structural supports. Size fillers to suit wall finish thicknesses and to produce adequate bearing area to prevent bracket rotation and overstressing of substrate.

2.9 FINISHES

- A. Finish metal stairs after assembly.
- B. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153 for steel and iron hardware and with ASTM A 123 for other steel and iron products.
 - 1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
 - 2. Fill vent and drain holes that are exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.
- C. Preparation for Shop Priming: Clean surfaces to be painted per primer manufacturer's written instructions. Remove loose rust and mill scale and other spatter, slag, flux deposits, and any other potential bond-breaking materials.
- D. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 3, "Power Tool Cleaning."
- E. Apply shop primer to uncoated surfaces of metal stair components, except those with galvanized finishes and those to be embedded in concrete or masonry unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

PART 3 - EXECUTION

3.1 INSTALLING METAL PAN STAIRS

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.
- C. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete unless otherwise indicated.
- D. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- E. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- F. Field Welding: Comply with requirements for welding in "Fabrication, General" Article.
- G. Place and finish concrete fill for treads and platforms to comply with Section 033000 "Cast-in-Place Concrete."

1 1. Install abrasive nosings with anchors fully embedded in concrete. Center nosings on
2 tread width.

3 H. Install precast concrete treads with adhesive supplied by manufacturer.

4 3.2 INSTALLING RAILINGS

5 A. Adjust railing systems before anchoring to ensure matching alignment at abutting joints. Space
6 posts at spacing indicated or, if not indicated, as required by design loads. Plumb posts in each
7 direction. Secure posts and rail ends to building construction as follows:

8 1. Anchor posts to steel by welding to steel supporting members.
9 2. Anchor handrail ends to concrete and masonry with steel round flanges welded to rail
10 ends and anchored with post-installed anchors and bolts.

11 B. Attach handrails to wall with wall brackets. Locate brackets as indicated or, if not indicated, at
12 spacing required to support structural loads. Secure wall brackets to building construction as
13 required to comply with performance requirements.

14 1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger
15 or lag bolts.

16 3.3 ADJUSTING AND CLEANING

17 A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and
18 abraded areas of shop paint, and paint exposed areas with same material as used for shop
19 painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

20 1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

21 B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and
22 abraded areas of shop paint are specified in Section 099123 "Interior Painting."

23 C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair
24 galvanizing to comply with ASTM A 780.

25 END OF SECTION 05 51 13

1 SECTION 05 52 13 - PIPE AND TUBE RAILINGS

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY

- 7 A. Section Includes:

- 8 1. Steel pipe railings. (SPR)
9 2. Stainless-steel pipe railings (SSPR)
10 3. Hand rails (HR)
11 4. Tier rails and railings (TR)

- 12 B. Related Requirements: Section 05 51 13 "Metal Pan Stairs" for steel tube railings associated
13 with metal pan stairs.

14 1.3 COORDINATION

- 15 A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint
16 and coating manufacturers' written recommendations to ensure that shop primers and topcoats
17 are compatible with one another.

- 18 B. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and
19 directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items
20 with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to
21 Project site in time for installation.

- 22 C. Schedule installation so wall attachments are made only to completed walls. Do not support
23 railings temporarily by any means that do not satisfy structural performance requirements.

24 1.4 ACTION SUBMITTALS

- 25 A. Product Data: For the following:

- 26 1. Manufacturer's product lines of mechanically connected railings.
27 2. Railing brackets.
28 3. Grout, anchoring cement, and paint products.

- 29 B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

- 30 C. Samples: For each type of exposed finish required.

- 31 1. Sections of each distinctly different linear railing member, including handrails, top rails,
32 posts, and balusters.
33 2. Fittings and brackets.
34 3. Assembled Sample of railing system, made from full-size components, including top rail,
35 post, handrail, and infill. Sample need not be full height.
36 a. Show method of connecting and finishing members at intersections.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Welding certificates.
- C. Mill Certificates: Signed by manufacturers of stainless-steel products certifying that products furnished comply with requirements.
- D. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.
- E. Product Test Reports: For pipe and tube railings, for tests performed by a qualified testing agency, according to ASTM E 894 and ASTM E 935.
- F. Evaluation Reports: For post-installed anchors, from ICC-ES.

1.6 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1, "Structural Welding Code - Steel."
 - 2. AWS D1.6, "Structural Welding Code - Stainless Steel."

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

1.8 FIELD CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
- B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.
 - 1. Provide type of bracket with predrilled hole for exposed bolt anchorage and that provides 1-1/2-inch clearance from inside face of handrail to finished wall surface.

2.2 STEEL AND IRON

- A. Tubing (round and square): ASTM A 500 (cold formed) or ASTM A 513.
- B. Pipe: ASTM A 53, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.
 - 1. Provide galvanized finish for exterior installations and where indicated.

C. Plates, Shapes, and Bars: ASTM A 36.

D. Cast Iron: Either gray iron, ASTM A 48, or malleable iron, ASTM A 47, unless otherwise indicated.

2.3 FASTENERS

A. General: Provide the following:

1. Ungalvanized-Steel Railings: Plated steel fasteners complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5 for zinc coating.
2. Stainless Steel Railings: Type 304 stainless-steel.
3. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.

C. Fasteners for Interconnecting Railing Components:

1. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless otherwise indicated.
2. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless exposed fasteners are unavoidable or are the standard fastening method for railings indicated.
3. Provide security fastener flat-head machine screws for exposed fasteners unless otherwise indicated.

D. Post-Installed Anchors: chemical anchors capable of sustaining, without failure, a load equal to 6 times the load imposed when installed in unit masonry and 4 times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

1. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.
2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

2.4 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Etching Cleaner for Galvanized Metal: Complying with MPI#25.

C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

D. Shop Primers: Provide product compatible with system as required per Sections 09 91 13 "Exterior Painting," 09 91 23 "Interior Painting," or 09 96 01 "High-Performance Coatings" as appropriate for location and painting system indicated.

E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

- 1 F. Non-shrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout
2 complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for
3 interior and exterior applications.
- 4 G. Anchoring Cement: Factory-packaged, non-shrink, non-staining, hydraulic-controlled expansion
5 cement formulation for mixing with water at Project site to create pourable anchoring, patching,
6 and grouting compound.
- 7 1. Water-Resistant Product: At exterior locations and where indicated provide formulation
8 that is resistant to erosion from water exposure without needing protection by a sealer or
9 waterproof coating and that is recommended by manufacturer for exterior use.

10 2.5 FABRICATION

- 11 A. General: Fabricate railings to comply with requirements indicated for design, dimensions,
12 member sizes and spacing, details, finish, and anchorage, but not less than that required to
13 support structural loads.
- 14 B. Shop assemble railings to greatest extent possible to minimize field splicing and assembly.
15 Disassemble units only as necessary for shipping and handling limitations. Clearly mark units
16 for reassembly and coordinated installation. Use connections that maintain structural value of
17 joined pieces.
- 18 C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius
19 of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on
20 exposed surfaces.
- 21 D. Form work true to line and level with accurate angles and surfaces.
- 22 E. Fabricate connections that are exposed to weather in a manner that excludes water. Provide
23 weep holes where water may accumulate.
- 24 F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.
- 25 G. Connections: Fabricate railings with welded connections unless otherwise indicated.
- 26 H. Welded Connections: Cope components at connections to provide close fit, or use fittings
27 designed for this purpose. Weld all around at connections, including at fittings.
- 28 1. Use materials and methods that minimize distortion and develop strength and corrosion
29 resistance of base metals.
- 30 2. Obtain fusion without undercut or overlap.
- 31 3. Remove flux immediately.
- 32 4. At exposed connections, finish exposed surfaces smooth and blended so no roughness
33 shows after finishing and welded surface matches contours of adjoining surfaces.
- 34 I. Form Changes in Direction as Follows: By flush bends or by inserting prefabricated flush-elbow
35 fittings.
- 36 J. For changes in direction made by bending, use jigs to produce uniform curvature for each
37 repetitive configuration required. Maintain cross section of member throughout entire bend
38 without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- 39 K. Close exposed ends of railing members with prefabricated end fittings.

- 1 L. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends
2 of returns unless clearance between end of rail and wall is 1/4 inch (6 mm) or less.
- 3 M. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings,
4 and anchors to interconnect railing members to other work unless otherwise indicated.
- 5 1. At brackets and fittings fastened to plaster or gypsum board partitions, provide crush-
6 resistant fillers or other means to transfer loads through wall finishes to structural
7 supports and prevent bracket or fitting rotation and crushing of substrate.
- 8 N. Provide inserts and other anchorage devices for connecting railings to concrete or masonry
9 work. Fabricate anchorage devices capable of withstanding loads imposed by railings.
10 Coordinate anchorage devices with supporting structure.
- 11 O. For railing posts set in concrete, provide steel sleeves not less than 6 inches long with inside
12 dimensions not less than 1/2 inch greater than outside dimensions of post, with metal plate
13 forming bottom closure.
- 14 P. Toe Boards: Where indicated, provide toe boards at railings around openings and at edge of
15 open-sided floors and platforms. Fabricate to dimensions and details indicated.

16 2.6 STEEL AND IRON FINISHES

- 17 A. Preparation for Shop Priming: Clean surfaces to be painted per primer manufacturer's written
18 instructions. Remove loose rust and mill scale and other spatter, slag, flux deposits, and any
19 other potential bond-breaking materials

20 2.7 STAINLESS STEEL RAILING FINISHES.

- 21 A. Stainless Steel: Manufacturer's standard directional polish normal to the pipe length.

22 PART 3 - EXECUTION

23 3.1 EXAMINATION

- 24 A. Examine plaster and gypsum board assemblies, where reinforced to receive anchors, to verify
25 that locations of concealed reinforcements are clearly marked for Installer. Locate
26 reinforcements and mark locations if not already done.

27 3.2 INSTALLATION, GENERAL

- 28 A. Fit exposed connections together to form tight, hairline joints.
- 29 B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in
30 location, alignment, and elevation; measured from established lines and levels and free of rack.
- 31 1. Do not weld, cut, or abrade surfaces of railing components that are coated or finished
32 after fabrication and that are intended for field connection by mechanical or other means
33 without further cutting or fitting.
- 34 2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
- 35 3. Align rails so variations from level for horizontal members and variations from parallel
36 with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.
- 37 C. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals
38 and other materials from direct contact with incompatible materials.

- 1 1. Coat, with a heavy coat of bituminous paint, concealed surfaces of aluminum that are in
2 contact with grout, concrete, masonry, wood, or dissimilar metals.

- 3 D. Adjust railings before anchoring to ensure matching alignment at abutting joints.

- 4 E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for
5 securing railings and for properly transferring loads to in-place construction.

6 3.3 RAILING CONNECTIONS

- 7 A. Non-welded Connections: Use mechanical or adhesive joints for permanently connecting railing
8 components. Seal recessed holes of exposed locking screws using plastic cement filler colored
9 to match finish of railings.

- 10 B. Welded Connections: Use fully welded joints for permanently connecting railing components.
11 Comply with requirements for welded connections in "Fabrication" Article whether welding is
12 performed in the shop or in the field.

13 3.4 ANCHORING POSTS

- 14 A. Form or core-drill holes not less than 5 inches deep and 3/4 inch larger than OD of post for
15 installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space
16 between post and concrete with non-shrink, nonmetallic grout, mixed and placed to comply with
17 anchoring material manufacturer's written instructions.

- 18 B. Cover anchorage joint with flange of same metal as post, welded to post after placing anchoring
19 material.

- 20 C. Anchor posts to metal surfaces with oval flanges, angle type, or floor type as required by
21 conditions, connected to posts and to metal supporting members as follows:

- 22 1. For steel pipe railings, weld flanges to post and bolt to metal supporting surfaces.

- 23 D. Install removable railing sections, where indicated, in slip-fit metal sockets cast in concrete.

24 3.5 ATTACHING RAILINGS

- 25 A. Anchor railing ends at walls with round flanges anchored to wall construction and welded to
26 railing ends.

- 27 B. Attach railings to wall with wall brackets. Locate brackets as indicated or, if not indicated, at
28 spacing required to support structural loads.

- 29 C. Secure wall brackets and railing end flanges to building construction as follows:

- 30 1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger
31 or lag bolts.

- 32 2. For hollow masonry anchorage, use toggle bolts.

- 33 3. For steel-framed partitions, use self-tapping screws fastened to steel framing or to
34 concealed steel reinforcements.

35 3.6 ADJUSTING AND CLEANING

- 36 A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas, and repair
37 galvanizing to comply with ASTM A 780.

1 3.7 PROTECTION

- 2 A. Protect finishes of railings from damage during construction period with temporary protective
3 coverings approved by railing manufacturer. Remove protective coverings at time of Project
4 completion.

5 END OF SECTION 05 52 13
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1 SECTION 05 53 13 - BAR GRATINGS

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY

- 7 A. Section includes metal bar gratings.

- 8 B. Related Requirements:

- 9 1. Section 05 50 00 "Metal Fabrications" for steel framing system components.

10 1.3 COORDINATION

- 11 A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint
12 and coating manufacturers' written instructions to ensure that shop primers and topcoats are
13 compatible with one another.

- 14 B. Coordinate installation of anchorages for gratings, grating frames, and supports. Furnish setting
15 drawings, templates, and directions for installing anchorages, including sleeves, concrete
16 inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or
17 masonry. Deliver such items to Project site in time for installation.

18 1.4 ACTION SUBMITTALS

- 19 A. Product Data: For the following:

- 20 1. Clips and anchorage devices for gratings.
21 2. Paint products.

- 22 B. Shop Drawings: Include plans, sections, details, and attachments to other work.

23 1.5 INFORMATIONAL SUBMITTALS

- 24 A. Mill Certificates: Signed by manufacturers of stainless steel certifying that products furnished
25 comply with requirements.

- 26 B. Welding certificates.

27 1.6 QUALITY ASSURANCE

- 28 A. Welding Qualifications: Qualify procedures and personnel according to the following:

1 1. AWS D1.1, "Structural Welding Code - Steel."

2 1.7 FIELD CONDITIONS

3 A. Field Measurements: Verify actual locations of walls and other construction contiguous with
4 gratings by field measurements before fabrication.

5 PART 2 - PRODUCTS

6 2.1 MANUFACTURERS

7 A. Basis-of-Design Product: Subject to compliance with requirements, provide McNichols GCM-4
8 or comparable product.

9 2.2 METAL BAR GRATINGS

10 A. Metal Bar Grating Standards: Comply with NAAMM MBG 531, "Metal Bar Grating Manual."

11 B. Welded Steel Grating:

- 12 1. Bearing Bar Spacing: 1 3/16 inch o.c.
- 13 2. Bearing Bar Depth: 2 inches.
- 14 3. Bearing Bar Thickness: 3/16 inch.
- 15 4. Crossbar Spacing: 4 inches o.c.
- 16 5. Traffic Surface: Plain.
- 17 6. Steel Finish: Hot-dip galvanized with a coating weight of not less than 1.8 oz./sq. ft. of
18 coated surface.

19 2.3 FASTENERS

20 A. General: Unless otherwise indicated, provide zinc-plated fasteners with coating complying with
21 ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, at exterior walls. Provide security fasteners for
22 type, grade, and class required.

23 B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts,
24 ASTM A 563 and, where indicated, flat washers.

25 C. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563 and,
26 where indicated, flat washers.

- 27 1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being
28 fastened is indicated to be galvanized.

29 2.4 MISCELLANEOUS MATERIALS

30 A. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and
31 compatible with paints specified to be used over it.

2.5 FABRICATION

- A. Shop Assembly: Fabricate grating sections in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch material cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form from materials of size, thickness, and shapes indicated, but not less than that needed to support indicated loads.
- D. Fit exposed connections accurately together to form hairline joints.
- E. Welding: Comply with AWS recommendations and the following:
1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.
- F. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space the anchoring devices to secure gratings, frames, and supports rigidly in place and to support indicated loads.
1. Fabricate toeplates for attaching in the field.
- G. Removable Grating Sections: Fabricate with banding bars attached by welding to entire perimeter of each section. Include anchors and fasteners of type indicated or, if not indicated, as recommended by manufacturer for attaching to supports.
1. Provide no fewer than four saddle clips for each grating section containing rectangular bearing bars 3/16 inch or less in thickness and spaced 15/16 inch or more o.c., with each clip designed and fabricated to fit over two bearing bars. Secure clips with security fasteners.
 2. Furnish threaded bolts with nuts and washers for securing grating to supports.

2.6 STEEL FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153 for steel and iron hardware and with ASTM A 123 for other steel and iron products.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing gratings to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.

- 1 B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing
2 gratings. Set units accurately in location, alignment, and elevation; measured from established
3 lines and levels and free of rack.
- 4 C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete or
5 masonry.
- 6 D. Fit exposed connections accurately together to form hairline joints.
- 7 1. Weld connections that are not to be left as exposed joints but cannot be shop welded
8 because of shipping size limitations. Do not weld, cut, or abrade the surfaces of exterior
9 units that have been hot-dip galvanized after fabrication and are for bolted or screwed
10 field connections.
- 11 E. Attach toeplates to gratings by welding at locations indicated.
- 12 F. Field Welding: Comply with AWS recommendations and the following:
- 13 1. Use materials and methods that minimize distortion and develop strength and corrosion
14 resistance of base metals.
- 15 2. Obtain fusion without undercut or overlap.
- 16 3. Remove welding flux immediately.

17 3.2 INSTALLING METAL BAR GRATINGS

- 18 A. General: Install gratings to comply with recommendations of referenced metal bar grating
19 standards that apply to grating types and bar sizes indicated, including installation clearances
20 and standard anchoring details.
- 21 B. Attach removable units to supporting members with type and size of clips and fasteners
22 indicated or, if not indicated, as recommended by grating manufacturer for type of installation
23 conditions shown.

24 3.3 ADJUSTING AND CLEANING

- 25 A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair
26 galvanizing to comply with ASTM A 780.

27 END OF SECTION 05 53 13

1 SECTION 05 58 13 - COLUMN COVERS

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY

- 7 A. Section includes snap-together metal column covers.

8 1.3 ACTION SUBMITTALS

- 9 A. Product Data: For each type of product, including finishing materials.
10 B. Shop Drawings: Show fabrication and installation details for column covers.
11 C. Samples for Initial Selection: For products involving selection of color, texture, or design.
12 D. Samples for Verification: For each type of exposed finish required, prepared on 6-inch-square
13 Samples of metal of same thickness and material indicated for the Work.

14 1.4 INFORMATIONAL SUBMITTALS

- 15 A. Mill Certificates: Signed by stainless-steel manufacturers certifying that products furnished
16 comply with requirements.

17 1.5 QUALITY ASSURANCE

- 18 A. Fabricator Qualifications: A firm experienced in producing column covers similar to that
19 indicated for this Project and with a record of successful in-service performance, as well as
20 sufficient production capacity to produce required units.
21 B. Powder-Coating Applicator Qualifications: A firm experienced in successfully applying powder
22 coatings of type indicated to metals of types indicated and that employs competent control
23 personnel to conduct continuing, effective quality-control program to ensure compliance with
24 requirements.
25 C. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate
26 aesthetic effects, and to set quality standards for fabrication and installation.
27 1. Build mockups of typical column covers.
28 2. Subject to compliance with requirements, approved mockups may become part of the
29 completed Work if undisturbed at time of Substantial Completion.

1 1.6 DELIVERY, STORAGE, AND HANDLING

- 2 A. Deliver column covers wrapped in protective coverings and strapped together in suitable packs
3 or in heavy-duty cartons. Remove protective coverings before they stain or bond to finished
4 surfaces.

5 PART 2 - PRODUCTS

6 2.1 SNAP-TOGETHER COLUMN COVERS

- 7 A. Basis-of-Design Product: Subject to compliance with requirements, provide Gordon
8 Incorporated, N-gage connection system or comparable product by one of the following:

- 9 1. CR Lawrence, Co.
10 2. Pittcon Industries.
11 3. MM Systems Corporation.

- 12 B. Form column covers to shapes indicated from metal of type and minimum thickness indicated
13 below. Return vertical edges and bend to form hook that engages continuous mounting clips.

- 14 1. Aluminum Sheet: ASTM B 209, with not less than strength and durability properties of
15 Alloy 5005-H32, 0.063 inch thick.

- 16 a. Finish: Baked enamel or powder coat.

- 17 2. Column covers may be fabricated from prefinished metal sheet in lieu of finishing after
18 fabrication provided unfinished edges are concealed from view.
19 3. Increase metal thickness or reinforce with concealed stiffeners, backing materials, or
20 both, as needed to provide flat surfaces where indicated.
21 4. Support joints with concealed stiffeners as needed to hold exposed faces of adjoining
22 sheets in flush alignment.
23 5. Form returns at vertical joints to provide 1/2-inch- wide reveal at joints. Provide snap-in
24 metal filler strips at reveals that leave reveals 1/2 inch deep.
25 6. Form returns at vertical joints to accommodate backer rod and sealant.
26 7. Fabricate column covers without horizontal joints.
27 8. Fabricate base ring to match column covers.
28 9. Apply manufacturer's recommended sound-deadening mastic to backs of column covers.

29 2.2 MISCELLANEOUS MATERIALS

- 30 A. Fasteners: Fabricated from same basic metal and alloy as fastened metal unless otherwise
31 indicated. Do not use metals that are incompatible with materials joined.

- 32 1. Provide concealed fasteners for interconnecting column covers and for attaching them to
33 other work unless otherwise indicated.
34 2. Provide tamper-resistant flat-head machine screws for exposed fasteners unless
35 otherwise indicated.

- 36 B. Sound-Deadening Materials:

- 37 1. Mastic: Cold-applied asphalt emulsion complying with ASTM D 1187.

1 C. Backing Materials: Provided or recommended by column cover manufacturer.

2 2.3 PAINTS AND COATINGS

3 A. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

4 2.4 FABRICATION, GENERAL

5 A. Coordinate dimensions and attachment methods of column covers with those of adjoining
6 construction to produce integrated assemblies with closely fitting joints and with edges and
7 surfaces aligned unless otherwise indicated.

8 B. Form metal to profiles indicated, in maximum lengths to minimize joints. Produce flat, flush
9 surfaces without cracking or grain separation at bends.

10 2.5 GENERAL FINISH REQUIREMENTS

11 A. Apply organic and anodic finishes to formed metal after fabrication unless otherwise indicated.

12 B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are
13 acceptable if they are within one-half of the range of approved Samples. Noticeable variations in
14 the same piece are not acceptable. Variations in appearance of other components are
15 acceptable if they are within the range of approved Samples and are assembled or installed to
16 minimize contrast.

17 2.6 ALUMINUM FINISHES

18 A. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of
19 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion
20 coating, and applying and baking finish.

21 1. Color and Gloss: As selected by Architect from manufacturer's full range.

22 PART 3 - EXECUTION

23 3.1 EXAMINATION

24 A. Examine substrates, areas, and conditions, with Installer present, for compliance with
25 requirements for installation tolerances and other conditions affecting performance of column
26 covers.

27 B. Proceed with installation only after unsatisfactory conditions have been corrected.

28 3.2 INSTALLATION

29 A. Locate and place column covers plumb and in alignment with adjacent construction. Perform
30 cutting, drilling, and fitting required to install column covers.

1 1. Do not cut or abrade finishes that cannot be completely restored in the field. Return items
2 with such finishes to the shop for required alterations, followed by complete refinishing, or
3 provide new units as required.

4 B. Use concealed anchorages where possible.

5 C. Form tight joints with exposed connections accurately fitted together. Provide reveals and
6 openings for sealants and joint fillers as indicated.

7 D. Corrosion Protection: Apply bituminous paint or other permanent separation materials on
8 concealed surfaces where metals would otherwise be in direct contact with substrate materials
9 that are incompatible or could result in corrosion or deterioration of either material or finish.

10 3.3 ADJUSTING AND CLEANING

11 A. Touchup Painting: Immediately after erection, clean abraded areas of shop paint and paint
12 exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 for
13 touching up shop-painted surfaces.

14 1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

15 B. Restore finishes damaged during installation and construction period so no evidence remains of
16 correction work. Return items that cannot be refinished in the field to the shop; make required
17 alterations and refinish entire unit or provide new units.

18 3.4 PROTECTION

19 A. Protect finishes from damage during construction period. Remove temporary protective
20 coverings at time of Final Completion.

21 END OF SECTION 05 58 13

1 SECTION 05 59 63 - DETENTION ENCLOSURES

2 PART 1 - GENERAL

3 1.1 GENERAL REQUIREMENTS

- 4 A. Drawings and Conditions of Contract, including General and Supplementary Conditions and
5 Division 1 Administration Sections, apply to this Division.

6 1.2 SUMMARY

- 7 A. This Section includes the following for detention/security applications:

- 8 1. Man Bar Barriers (MBB).
9 2. Woven-rod-mesh assemblies (WRM)

- 10 B. Related Sections include the following:

- 11 1. Division 01 35 13.16 Section "Special Project Procedures for Detention Facilities" for
12 general requirements of detention work, including responsibilities of a single-source
13 detention specialist.
14 2. Division 03 30 00 Section "Cast-in-Place Concrete" for building anchors into concrete
15 construction.

16 1.3 SUBMITTALS

- 17 A. Product Data: Include construction details, material descriptions, dimensions of individual
18 components and profiles, and finishes for each type of detention enclosure indicated.

- 19 B. Shop Drawings: For each type of detention enclosure. Include plans, elevations, sections,
20 details, and attachments to other Work. Indicate type of steel for each detention enclosure
21 component.

- 22 1. Indicate requirements for cast-in anchors to be installed as work of other Sections.

- 23 C. Coordination Drawings: Drawings of each opening in detention enclosures, drawn to scale and
24 coordinating detention door hardware. Show the following:

- 25 1. Locations, dimensions, and profiles of detention door hardware reinforcements.
26 2. Locations and installation details of detention door hardware.
27 3. Elevations of each detention enclosure door design type showing dimensions, locations
28 of detention door hardware, and preparations for power, signal, and electrified control
29 systems.
30 4. Details of each detention enclosure frame.

- 31 D. Welding certificates.

- 32 E. Qualification Data: For Installer.

- 33 F. Material Test Reports: For homogeneous tool-resisting steel.

- 34 G. Material Certificates: For homogeneous tool-resisting steel, signed by manufacturers, indicating
35 compliance with performance requirements for complete test sequence according to applicable
36 ASTM standard.

H. Mill Certificates: For homogeneous tool-resisting steel rods, certifying that rods were fabricated from material with same chemical and physical properties as material used to fabricate homogeneous tool-resisting steel round bars.

I. Maintenance Data: For doors in man bar barriers and doors in woven-rod-mesh assemblies to include in maintenance manuals.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative of detention enclosure manufacturer for installation and maintenance of units required for this Project.

B. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing homogeneous tool-resisting steel, as documented according to ASTM E 548.

C. Source Limitations: Obtain each type and variety of detention enclosure through one source from a single manufacturer, unless otherwise indicated.

D. Product Options: Drawings indicate size, profiles, and dimensional requirements of man bar barriers and woven-rod-mesh assemblies and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements."

1. Do not modify intended security performance, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

E. Welding: Qualify procedures and personnel according to the following:

1. AWS D1.1, "Structural Welding Code--Steel."
2. AWS D1.3, "Structural Welding Code--Sheet Steel."

F. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver each woven-rod-mesh assembly securely enclosed in a dimension-lumber crate, packaged at the factory, to provide protection during transit and job storage.

1. Provide additional interior bracing as required to protect locksets.

B. Inspect woven-rod-mesh assemblies on delivery for damage. Minor damage may be repaired provided refinished items match new work and are acceptable to Architect; otherwise, remove and replace damaged items as directed.

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify detention enclosure openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish opening dimensions and proceed with fabricating detention enclosures without field measurements. Coordinate wall and floor construction to ensure that actual opening dimensions correspond to established dimensions.

1 1.7 COORDINATION

- 2 A. Coordinate installation of anchorages for detention enclosures. Furnish setting drawings,
3 templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor
4 bolts, and items with integral anchors that are to be embedded in concrete or masonry. Deliver
5 such items to Project site in time for installation.

6 PART 2 - PRODUCTS

7 2.1 MANUFACTURERS

- 8 A. In other Part 2 articles where titles below introduce lists, the following requirements apply for
9 product selection:

- 10 1. Available Products: Subject to compliance with requirements, products that may be
11 incorporated into the Work include, but are not limited to, the products specified.
12 2. Available Manufacturers: Subject to compliance with requirements, manufacturers
13 offering products that may be incorporated into the Work include, but are not limited to,
14 the manufacturers specified.

15 2.2 MATERIALS

- 16 A. Mild Steel Plates, Shapes, and Bars: ASTM A 36.
17 B. Hot-Rolled Steel Sheet: ASTM A 569.
18 C. Cold-Rolled Steel Sheet: ASTM A 366.
19 D. Steel Tubing: ASTM A 501 or ASTM A 513, Type B, unless otherwise indicated.
20 E. High Strength, Low Alloy Steel Plate, Shape and Bars: ASTM A 572 Grade 50.
21 F. Homogeneous Tool-Resisting Steel Round Bars: ASTM A 627.
22 G. Homogeneous Tool-Resisting Steel Flat Bars: ASTM A 627.
23 H. Homogeneous Tool-Resisting Steel Round Rods: Fabricated from material with same chemical
24 and physical properties as homogeneous tool-resisting steel round bars.
25 I. Security Fasteners: Refer to Section 05 55 00.
26 J. Concealed Bolts: ASTM A 307, Grade A, unless otherwise indicated.
27 K. Cast-in-Place Anchors in Concrete: Anchors of type indicated below, fabricated from corrosion-
28 resistant materials capable of sustaining, without failure, a load equal to 4 times the load
29 imposed, as determined by testing per ASTM E 488, conducted by a qualified independent
30 testing agency.
31 1. Threaded or wedge type; galvanized ferrous castings, either ASTM A 47, malleable iron
32 or ASTM A 27, cast steel. Provide bolts, washers, and shims as needed, hot-dip
33 galvanized per ASTM A 153.
34 L. Embedded Plate Anchors: Fabricated from mild steel shapes and plates, minimum 3/16 inch
35 thick; with minimum 1/2-inch- diameter headed studs welded to back of plate.
36 M. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy
37 welded.

2.3 MAN-BAR-BARRIERS (MBB)

A. Available Manufacturers:

1. Maximum Security Products Corp.
2. Southern Folger Detention Equipment Company
3. Petersen Enterprises, Inc.
4. Willo Products Company Inc.
5. Viking

B. Tool-Resisting Steel Bar Grilles, ASTM A 627 Type A:

1. Vertical Bars: 7/8-inch- diameter, double-ribbed, round homogeneous tool-resisting steel bars at 6 inches o.c.
2. Horizontal Flat Bars: 3/8-by-2-1/4-inch homogeneous tool-resisting steel flat bars at 12 inches o.c.
3. Framing: 3/8-by-2-1/4-inch homogeneous tool-resisting steel flat bars.

C. Finish: galvanized finish.

2.4 WOVEN-ROD-MESH PANEL ASSEMBLIES (WRM1)

A. Available Manufacturers:

1. G-S Company (The).
2. Kane Manufacturing Corp. (Basis of Design).
3. Maximum Security Products Corp.
4. Norment Industries; Div. of Norment Security Group.
5. Southern Folger Detention Equipment Company.
6. Willo Products Company Inc.
7. Petersen Enterprises, Inc.
8. Viking

B. General: Provide woven rod mesh assemblies for Recreation Yard exterior wall openings consisting of main framing, woven-rod panels, concealment plates, woven wire screening, and other fittings necessary for a complete assembly.

C. Main Frame: Built-up tubular type, measuring 1-3/4 inch x 2-1/2 inch, with fixed concealment plates. Open channel frame members formed of not less than 13-gauge type 304-sheet stainless steel with individual slots along the inner edges to support the woven rod panel. Notched corners of the main frame for self-alignment and then robotically welded. Braces, which are similar to the frame, furnished when required.

1. Concealment Plates: 13-gauge type 304 stainless steel welded to the back of the main frame approximately 8" on center to complete the tubular shape.
2. Braces: Built-up tubular type, measuring 1-1/4 inch x 2-1/2 inch not less than 13-gauge type 304 stainless steel, with fixed concealment plates furnished where required.

D. Perimeter Channel: Formed channel 1-3/4 inch x 2 inch of not less than 13-gauge type 304 stainless steel. Channels provided in stock lengths with factory punched 1/4 inch diameter holes approximately 12" on center for attachment to structure.

E. Rod Attachment: Install woven rod panels symmetrically into the slotted main frame. Slots shall be centered according to the rod pattern. Each rod shall penetrate into the slots at both ends where it penetrates the main frame. Every other rod shall be welded into the slot at both ends where it penetrates the main frame.

- F. Woven Rod Panels with Screening (WRM1): Panels at recreation yard exterior wall openings with screening.

1. Woven Rod Panels shall be fabricated from double crimped, type 304 stainless steel 1/4 inch diameter rods, woven with 2 inch clear spacing.
2. Stainless Steel Screening:
 - a. Wire Cloth: Woven 10- mesh, 0.047-inch wire screen. Type 304 stainless steel wire and double crimped.
 - b. Perimeter Framing: 16 gage stainless steel by 1 inch folded steel framework.

G. Finish:

1. Main Frame: Both face sides of the main frame shall be directional belt sanded. (Satin)
2. Woven Rods: Mill finish
3. Screening: Stainless steel finish.

2.5 SECURITY MESH PANEL ASSEMBLIES (SM)

A. Available Manufacturers:

1. Amico (Alabama Metal Industries Corporation).
2. BetaFence USA
3. McNichols

B. General: Provide security wire mesh assemblies where indicated on the drawings.

C. Security Mesh (SM1):

1. Galvanealed Maximum Security Steel Mesh (basis of design is Amico ASM .50-13F):
 - a. Attachment: provide holding clips to secure mesh to subframing (Amico Secura Clip or equivalent)
 - b. Overall thickness: .070 inch
 - c. Open area: 57 percent

D. Security Mesh (SM2):

1. Plain Steel Maximum Security Mesh (basis of design is Amico ASM .50-13F):
 - a. Attachment: provide holding clips to secure mesh to subframing (Amico Secura Clip or equivalent)
 - b. Overall thickness: .070 inch
 - c. Open area: 57 percent

E. Security Mesh (SM3):

1. Galvanized Steel Mesh (basis of design is Betafence USA DutyGuard 3-5-8):
 - a. Wire: Woven 3 inch by 1/2 inch by 8 gauge double layer mesh.
 - b. Perimeter Framing: 18 gage galvanized steel by 1 inch folded steel framework, painted to match surrounding detention framework.
 - c. Wire thickness: .162 inch
 - d. Open Area: 70 percent

2.6 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling

1 limitations. Use connections that maintain structural value of joined pieces. Clearly mark units
2 for reassembly and coordinated installation.

3 B. Coordinate dimensions and attachment methods of detention enclosures with those of adjoining
4 construction to produce integrated assemblies with closely fitting joints and with edges and
5 surfaces aligned, unless otherwise indicated.

6 C. Shear and punch metals cleanly and accurately. Remove burrs.

7 D. Form edges and corners to be free of sharp edges or rough areas. Fold back exposed edges of
8 unsupported sheet metal to form a 1/2-inch-wide hem on the concealed side, or ease edges to
9 a radius of approximately 1/32 inch and support with concealed stiffeners.

10 E. Form metal in maximum lengths to minimize joints. Form bent-metal corners to smallest radius
11 possible without causing grain separation or otherwise impairing work.

12 F. Weld corners and seams continuously to comply with referenced AWS standard and the
13 following:

- 14 1. Use materials and methods that minimize distortion and develop strength and corrosion
15 resistance of base metals.
- 16 2. Obtain fusion without undercut or overlap.
- 17 3. Remove welding flux immediately.
- 18 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no
19 roughness shows after finishing and contour of welded surface matches that of adjacent
20 surface.
- 21 5. Weld before finishing components to greatest extent possible. Remove weld spatter and
22 welding oxides from exposed surfaces by descaling or grinding.

23 G. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and
24 space anchoring devices to secure metal fabrications rigidly in place and to support indicated
25 loads. Build in straps, plates, and brackets as needed to support and anchor fabricated items to
26 adjoining construction. Reinforce formed-metal units as needed to attach and support other
27 construction.

28 H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive hardware, security
29 fasteners, and similar items.

30 I. Form exposed work true to line and level with accurate angles and surfaces and straight sharp
31 edges.

32 J. Form exposed connections with hairline joints flush and smooth, using concealed fasteners
33 where possible. Use exposed security fasteners of type indicated or, if not indicated, flat-head
34 (countersunk) security screws. Locate joints where least conspicuous.

35 K. Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep
36 holes where water may accumulate.

37 L. Provide detention enclosures that allow for thermal movement resulting from the following
38 maximum change (range) in ambient and surface temperatures by preventing buckling, opening
39 up of joints, overstressing of components, failure of connections, and other detrimental effects.
40 Base engineering calculation on surface temperatures of materials due to both solar heat gain
41 and nighttime-sky heat loss.

- 42 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

2.7 FABRICATION OF MAN BAR BARRIERS

- A. General: Fabricate man bar barriers with materials and to sizes and configurations indicated, complete with mounting flanges and anchors.
1. Pass vertical round bars through, and positively interlock them with, horizontal flat bars at each intersection without reducing circumference of round bars at these intersections and without using pipe sleeves, swedging, calking, or interlocks that depend on friction.
 2. Pass ends of round bars through framing at least 1 inch , and weld bars to framing from back side of framing.
 3. Fabricate cutouts and openings in man bar barriers for penetrations of sizes and at locations indicated. Frame openings with flat bars of same material and size as horizontal flat bars.
 4. Frame connections with plates; use flat bars of same material and size as horizontal flat bars.
- B. Partitions: Connect top horizontal flat bar to vertical flat bar framing members with 2-by-2-by-1/4-inch- thick, steel plate angle knee welded into place. Connect intersections of horizontal flat bars with vertical flat bar framing members by 3/16-inch fillet welds. Weld vertical bars securely to top and bottom flat bar framing members.
- C. Doors: Fabricate doors of same type bar-grille assembly as bar-grille partition in which they are installed. Weld lockbox at lock jamb of door, fabricated of steel plate to match horizontal flat bars.

2.8 FABRICATION OF STAINLESS STEEL WOVEN-ROD-MESH ASSEMBLIES

- A. Main Framing: Before installing woven-rod panels, weld and grind smooth corners of open channel elements.
- B. Woven-Rod Panels: Install panels symmetrically in main framing. Extend end of each rod into main framing at least 1 inch (25 mm) and weld, from inside of channel, into each slot where it contacts main framing.
- C. Concealment Plates: Weld plates to main framing with minimum 1 inch welds at 10 inches o.c., staggered side to side and ground smooth, to form a fully enclosed tubular steel frame.
- D. Anchor Clips: For each enclosure panel, weld one anchor clip to secure side of main framing in line with vertical framing.

2.9 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish detention enclosures after assembly.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of detention enclosures.

1. Examine roughing-in for embedded and built-in anchors to verify actual locations of detention enclosure connections before detention enclosure installation.
 2. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of detention enclosures.
- B. Inspect built-in and cast-in anchor installations before installing detention enclosures to verify that anchor installations comply with requirements. Prepare inspection reports.
1. Remove and replace anchors where inspections indicate that they do not comply with specified requirements. Reinspect after repairs or replacements are made.
 2. Perform additional inspections to determine compliance of replaced or additional work. Prepare inspection reports.
- C. Verify locations of detention enclosures with those indicated on Coordination Drawings.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.
- 3.2 INSTALLATION, GENERAL
- A. General: Install detention enclosures plumb, rigid, properly aligned, and securely fastened in place, complying with Drawings, Coordination Drawings, and manufacturer's written recommendations.
- B. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing detention enclosures to in-place construction. Include threaded fasteners for concrete and masonry inserts, security fasteners, and other connectors.
- C. Cutting, Fitting, and Placement: Obtain manufacturer's written approval for cutting, drilling, and fitting required for installing detention enclosures. Set detention enclosures accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- D. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping-size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- E. Field Welding: Comply with the following requirements:
1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.
 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- 3.3 INSTALLATION OF MAN BAR BARRIERS
- A. Wall and Ceiling Anchorage: Weld framing to continuous angles with continuous welds. Anchor angles to embedded anchors by welding.
- B. Partitions: Weld adjacent framing members to each other with continuous 1/4-inch deep welds on both sides; grind smooth.

- 1 3.4 INSTALLATION OF WOVEN-ROD-MESH ASSEMBLIES
- 2 A. Woven Rod Panel Anchorage to Segregation Recreation Cage Gate framing:
- 3 1. Weld main framing to tube steel gate framing with 1-inch welds at 8 inches o.c.
- 4 3.5 FIELD QUALITY CONTROL
- 5 A. Inspect installed products to verify compliance with requirements. Prepare inspection reports
- 6 and indicate compliance with and deviations from the Contract Documents.
- 7 B. Remove and replace detention work where inspections indicate that work does not comply with
- 8 specified requirements.
- 9 C. Perform additional inspections to determine compliance of replaced or additional work. Prepare
- 10 inspection reports.
- 11 D. Prepare field quality-control certification that states installed products and their installation
- 12 comply with requirements in the Contract Documents.
- 13 END OF SECTION 05 59 63
- 14

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1 SECTION 06 10 00 - ROUGH CARPENTRY

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY

7 A. Section Includes:

- 8 1. Wood blocking, cants, and nailers.
9 2. Wood furring and grounds.
10 3. Plywood backing panels.

11 1.3 DEFINITIONS

- 12 A. Boards or Strips: Lumber of less than 2 inches nominal (38 mm actual) size in least dimension.

- 13 B. Dimension Lumber: Lumber of 2 inches nominal (38 mm actual) size or greater but less than 5
14 inches nominal (114 mm actual) size in least dimension.

- 15 C. Exposed Framing: Framing not concealed by other construction.

- 16 D. OSB: Oriented strand board.

17 1.4 INFORMATIONAL SUBMITTALS

- 18 A. Evaluation Reports: For the following, from ICC-ES:

- 19 1. Power-driven fasteners.
20 2. Post-installed anchors.
21 3. Metal framing anchors.

22 1.5 DELIVERY, STORAGE, AND HANDLING

- 23 A. Stack wood products flat with spacers beneath and between each bundle to provide air
24 circulation. Protect wood products from weather by covering with waterproof sheeting, securely
25 anchored. Provide for air circulation around stacks and under coverings.

26 PART 2 - PRODUCTS

27 2.1 WOOD PRODUCTS, GENERAL

- 28 A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is
29 indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC
30 Board of Review. Grade lumber by an agency certified by the ALSC Board of Review to inspect
31 and grade lumber under the rules indicated.

- 32 1. Factory mark each piece of lumber with grade stamp of grading agency.
33 2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on
34 end or back of each piece or omit grade stamp and provide certificates of grade
35 compliance issued by grading agency.

- 1 3. Dress lumber, S4S, unless otherwise indicated.
- 2 B. Maximum Moisture Content of Lumber: 19 percent, unless otherwise indicated.
- 3 2.2 WOOD-PRESERVATIVE-TREATED LUMBER
- 4 A. Preservative Treatment by Pressure Process: AWP A U1; Use Category UC2 for interior
- 5 construction not in contact with ground, Use Category UC3b for exterior construction not in
- 6 contact with ground, and Use Category UC4a for items in contact with ground.
- 7 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no
- 8 arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
- 9 B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use
- 10 material that is warped or that does not comply with requirements for untreated material.
- 11 C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board
- 12 of Review.
- 13 D. Application: Treat items indicated on Drawings, and the following:
- 14 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar
- 15 members in connection with roofing, flashing, vapor barriers, and waterproofing.
- 16 2. Wood sills, sleepers, blocking, and similar concealed members in contact with masonry
- 17 or concrete.
- 18 3. Wood floor plates that are installed over concrete slabs-on-grade.
- 19 2.3 MISCELLANEOUS LUMBER
- 20 A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other
- 21 construction, including the following:
- 22 1. Blocking.
- 23 2. Nailers.
- 24 3. Cants.
- 25 4. Furring.
- 26 5. Grounds.
- 27 B. Dimension Lumber Items: Construction or No. 2 grade lumber of any of the following species:
- 28 1. Hem-fir (north); NLGA.
- 29 2. Hem-fir; WCLIB or WWP A.
- 30 3. Western woods; WCLIB or WWP A.
- 31 4. Northern species; NLGA.
- 32 C. Concealed Boards: 19 percent maximum moisture content and any of the following species and
- 33 grades:
- 34 1. Hem-fir or hem-fir (north); Construction or No. 2 Common grade; NLGA, WCLIB, or
- 35 WWP A.
- 36 2. Northern species; No. [2] [3] Common grade; NLGA.
- 37 3. Western woods; Construction or No. 2 Common grade; WCLIB or WWP A.
- 38 D. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber
- 39 of any species may be used provided that it is cut and selected to eliminate defects that will
- 40 interfere with its attachment and purpose.
- 41 E. For blocking and nailers used for attachment of other construction, select and cut lumber to
- 42 eliminate knots and other defects that will interfere with attachment of other work.

- F. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.4 PLYWOOD BACKING PANELS

- A. Equipment Backing Panels: Plywood, DOC PS 1, Exposure 1, C-D Plugged, in thickness indicated or, if not indicated, not less than 3/4-inch (19-mm) nominal thickness.

2.5 FASTENERS

- A. General: Fasteners shall be of size and type indicated and shall comply with requirements specified in this article for material and manufacture.

1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

- B. Nails, Brads, and Staples: ASTM F 1667.

- C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

- D. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01, ICC-ES AC58, ICC-ES AC193 or ICC-ES AC308 as appropriate for the substrate.

1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Grade A1 or A4).

2.6 METAL FRAMING ANCHORS

- A. Simpson Strong-Tie is the approved connector manufacture.

- B. Allowable design loads, as published by manufacturer, shall meet or exceed those of products of manufacturers listed. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency. Framing anchors shall be punched for fasteners adequate to withstand same loads as framing anchors.

- C. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 (Z180) coating designation.

1. Use for interior locations unless otherwise indicated.

- D. Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A 653/A 653M; structural steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 (Z550) coating designation; and not less than 0.036 inch (0.9 mm) thick.

1. Use for wood-preservative-treated lumber and where indicated.

2.7 MISCELLANEOUS MATERIALS

- A. Sill-Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch (6.4 mm) thick, selected from manufacturer's standard widths to suit width of sill members indicated.

- B. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber or rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch (0.6 mm).
- C. Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3-iodo-2-propynyl butyl carbamate, combined with an insecticide containing chlorpyrifos as its active ingredient.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- B. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels.
- C. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- D. Install sill sealer gasket to form continuous seal between sill plates and foundation walls.
- E. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
 - 1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches (406 mm) o.c.
- F. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
 - 1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches (2438 mm) o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
 - 2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches (2438 mm) o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal (38-mm actual) thickness.
 - 3. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than 100 sq. ft. (9.3 sq. m) and to solidly fill space below partitions.
 - 4. Fire block concealed spaces behind combustible cornices and exterior trim at not more than 20 feet (6 m) o.c.
- G. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- H. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
 - 1. Use copper naphthenate for items not continuously protected from liquid water.

- I. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- J. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
1. See Fastening Schedule on the Drawings.
 2. ICC-ES evaluation report for fastener.
- K. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.
- L. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.
1. Comply with indicated fastener patterns where applicable
 2. Use finishing nails unless otherwise indicated. Countersink nail heads and fill holes with wood filler.
 3. Use common nails unless otherwise indicated. Drive nails snug but do not countersink nail heads.

3.2 WOOD BLOCKING, AND NAILER INSTALLATION

- A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.
- C. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches (38 mm) wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 PROTECTION

- A. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet enough that moisture content exceeds that specified, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 06 10 00

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1 SECTION 07 11 13 - BITUMINOUS DAMPPROOFING

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY

- 7 A. Section Includes: Hot-applied asphalt dampproofing at exterior planters.

- 8 B. Related Requirements:

- 9 1. Section 033000 "Cast-in-Place Concrete" for bituminous vapor retarders.
10 2. Section 042200 "Unit Masonry" for mortar parge coat on masonry surfaces.
11 3. Section 071326 "Self-Adhering Sheet Waterproofing" for waterproofing.

12 1.3 ACTION SUBMITTALS

- 13 A. Product Data: For each type of product.

14 1.4 FIELD CONDITIONS

- 15 A. Weather Limitations: Proceed with application only when existing and forecasted weather
16 conditions permit dampproofing to be performed according to manufacturers' written
17 instructions.

- 18 B. Ventilation: Provide adequate ventilation during application of dampproofing in enclosed
19 spaces. Maintain ventilation until dampproofing has cured.

20 PART 2 - PRODUCTS

21 2.1 MATERIALS, GENERAL

- 22 A. Source Limitations: Obtain primary dampproofing materials and primers from single source from
23 single manufacturer. Provide protection course molded-sheet drainage panels and auxiliary
24 materials recommended in writing by manufacturer of primary materials.

- 25 B. VOC Content: Products shall comply with VOC content limits of authorities having jurisdiction
26 unless otherwise required.

27 2.2 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

- 28 A. Basis-of-Design Product: Subject to compliance with requirements, provide Henry 789 or
29 comparable product by one of the following:

- 1 a. W.R. Meadows Sealmastic 505 or 520
- 2 b. Karnak 83AF or 86AF
- 3 c. Lambert Corporation Waterban 60

4 B. Trowel Coats: ASTM D 1227, Type II, Class 1.

5 C. Fibered Brush and Spray Coats: ASTM D 1227, Type II, Class 1.

6 D. Brush and Spray Coats: ASTM D 1227, Type III, Class 1.

7 2.3 AUXILIARY MATERIALS

8 A. General: Furnish auxiliary materials recommended in writing by dampproofing manufacturer for
9 intended use and compatible with bituminous dampproofing.

10 B. Emulsified-Asphalt Primer: ASTM D 1227, Type III, Class 1, except diluted with water as
11 recommended in writing by manufacturer.

12 C. Asphalt-Coated Glass Fabric: ASTM D 1668, Type I.

13 D. Patching Compound: Epoxy or latex-modified repair mortar of type recommended in writing by
14 dampproofing manufacturer.

15 E. Protection Course: ASTM D 6506, 1/8-inch-thick, semirigid sheets of fiberglass or mineral-
16 reinforced-asphaltic core, pressure laminated between two asphalt-saturated fibrous liners.

17 F. Protection Course: Fan folded, with a core of extruded-polystyrene board insulation faced on
18 both sides with plastic film, nominal thickness 1/4 inch, with a compressive strength of not less
19 than 8 psi per ASTM D 1621, and maximum water absorption by volume of 0.6 percent per
20 ASTM C 272.

21 G. Protection Course: Extruded-polystyrene board insulation, unfaced, ASTM C 578, Type X, 1/2
22 inch thick.

23 2.4 MOLDED-SHEET DRAINAGE PANELS

24 A. Molded-Sheet Drainage Panel: Comply with Section 334600 "Subdrainage."

25 B. Nonwoven-Geotextile-Faced, Molded-Sheet Drainage Panel: Composite subsurface drainage
26 panel consisting of a studded, non-biodegradable, molded-plastic-sheet drainage core; with a
27 nonwoven, needle-punched geotextile facing with an apparent opening size not exceeding
28 No. 70 sieve laminated to one side of the core; and with a vertical flow rate of 9 to 15 gallons
29 per minute per ft..

30 1. Basis-of-Design Product: Subject to compliance with requirements, provide American
31 Hydrotech, Inc. 400/420 or comparable product by one of the following:

- 32 a. Carlisle MiraDrain
- 33 b. W.R. Meadows Mel Drain
- 34 c. Epro EcoShield

1 PART 3 - EXECUTION

2 3.1 EXAMINATION

3 A. Examine substrates, areas, and conditions with Applicator present, for compliance with
4 requirements for surface smoothness, surface moisture, and other conditions affecting
5 performance of bituminous dampproofing work.

6 1. Test for surface moisture according to ASTM D 4263.

7 B. Proceed with application only after substrate construction and penetrating work have been
8 completed and unsatisfactory conditions have been corrected.

9 3.2 PREPARATION

10 A. Mask or otherwise protect adjoining exposed surfaces from being stained, spotted, or coated
11 with dampproofing. Prevent dampproofing materials from entering and clogging weep holes and
12 drains.

13 B. Clean substrates of projections and substances detrimental to the dampproofing work; fill voids,
14 seal joints, and remove bond breakers if any, as recommended in writing by prime material
15 manufacturer.

16 C. Apply patching compound to patch and fill tie holes, honeycombs, reveals, and other
17 imperfections; cover with asphalt-coated glass fabric.

18 3.3 APPLICATION, GENERAL

19 A. Comply with manufacturer's written instructions for dampproofing application, cure time
20 between coats, and drying time before backfilling unless more stringent requirements are
21 indicated.

22 1. Apply dampproofing to provide continuous plane of protection.
23 2. Apply additional coats if recommended in writing by manufacturer or to achieve a smooth
24 surface and uninterrupted coverage.

25 B. Where dampproofing footings and foundation walls, apply from finished-grade line to top of
26 footing; extend over top of footing and down a minimum of 6 inches over outside face of footing.

27 1. Extend dampproofing 12 inches onto intersecting walls and footings, but do not extend
28 onto surfaces exposed to view when Project is completed.

29 2. Install flashings and corner protection stripping at internal and external corners, changes
30 in plane, construction joints, cracks, and where shown as "reinforced," by embedding an
31 8-inch-wide strip of asphalt-coated glass fabric in a heavy coat of dampproofing.
32 Dampproofing coat for embedding fabric is in addition to other coats required.

33 C. Where dampproofing exterior face of inner wythe of exterior masonry cavity walls, lap
34 dampproofing at least 1/4 inch onto flashing, masonry reinforcement, veneer ties, and other
35 items that penetrate inner wythe.

36 1. Extend dampproofing over outer face of structural members and concrete slabs that
37 interrupt inner wythe.

38 2. Lap dampproofing at least 1/4 inch onto shelf angles supporting veneer.

- D. Where dampproofing interior face of above-grade, exterior concrete and masonry single-wythe masonry walls, continue dampproofing through intersecting walls by keeping vertical mortar joints at intersection temporarily open or by dampproofing wall before constructing intersecting walls.

3.4 HOT-APPLIED ASPHALT DAMPPROOFING

- A. Do not apply hot asphalt when substrate condition causes foaming.
- B. Kettle Temperature: Comply with dampproofing-material manufacturer's written instructions, and keep at least 25 deg F below the flash point.
- C. Prime masonry and other porous substrates.
- D. Apply a uniform coat of hot asphalt by mopping or spraying at not less than 20 lb or 2.5 gal./100 sq. ft..
1. Apply a second coat to below-grade foundation walls and where first application has failed to produce a smooth surface and uninterrupted coverage. Apply second coat at the rate specified for first coat.

3.5 INSTALLATION OF PROTECTION COURSE

- A. Where indicated, install protection course over completed-and-cured dampproofing. Comply with dampproofing-material and protection-course manufacturers' written instructions for attaching protection course.
1. Support protection course over cured coating with spot application of adhesive type recommended in writing by protection-board manufacturer.
2. Install protection course on same day of installation of dampproofing (while coating is tacky) to ensure adhesion.

3.6 INSTALLATION OF MOLDED-SHEET DRAINAGE PANELS

- A. Place and secure molded-sheet drainage panels, with geotextile facing away from wall substrate, according to manufacturer's written instructions. Use adhesives or other methods that do not penetrate dampproofing. Lap edges and ends of geotextile to maintain continuity. Protect installed molded-sheet drainage panels during subsequent construction.
1. Install protection course before installing drainage panels.

3.7 CLEANING

- A. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended in writing by manufacturer of affected construction.

END OF SECTION 07 11 13

1 SECTION 07 14 13 - HOT FLUID-APPLIED RUBBERIZED ASPHALT WATERPROOFING

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY

- 7 A. Section Includes:

- 8 1. Rubberized-asphalt waterproofing membrane, reinforced.
9 2. Molded-sheet drainage panels.
10 3. Insulation.
11 4. Plaza-deck pavers supported on pedestals.

- 12 B. Related Requirements:

- 13 1. Section 079200 "Joint Sealants" for joint sealants, joint fillers, and joint preparation.

14 1.3 PREINSTALLATION MEETINGS

- 15 A. Pre-installation Conference: Conduct conference at Project site.

- 16 1. Review waterproofing requirements, including surface preparation, substrate condition
17 and pretreatment, minimum curing period, forecasted weather conditions, special details
18 and sheet flashings, installation procedures, testing and inspection procedures, and
19 protection and repairs.

- 20 2. Require representatives of each entity directly concerned with cast-in-place architectural
21 concrete to attend, including the following:

- 22 a. Architect.
23 b. Construction Manager.
24 c. Contractor's superintendent.
25 d. Hot Rubberized Asphalt Subcontractor.

26 1.4 ACTION SUBMITTALS

- 27 A. Product Data: For each type of product. Include manufacturer's written instructions for
28 evaluating, preparing, and treating substrate, technical data, and tested physical and
29 performance properties of waterproofing.

- 30 B. Shop Drawings: Show locations and extent of waterproofing. Include details for substrate joints
31 and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins to adjoining
32 waterproofing, and other termination conditions.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Field quality-control reports.
- C. Sample Warranties: For special warranties.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by waterproofing manufacturer.
- B. Remove and replace liquid materials that cannot be applied within their stated shelf life.
- C. Protect stored materials from direct sunlight.

1.8 FIELD CONDITIONS

- A. Weather Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate, or when temperature is below zero deg F.
 - 1. Do not apply waterproofing in snow, rain, fog, or mist.
- B. Maintain adequate ventilation during application and curing of waterproofing materials.

1.9 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace waterproofing and sheet flashings that do not comply with requirements or that fail to remain watertight within specified warranty period.
 - 1. Warranty includes removing and reinstalling protection board, and drainage panels.
 - 2. Warranty insulation retains 80 percent of original published thermal value.
 - 3. Warranty pavers do not dish or warp and do not crack, split, or disintegrate in freeze-thaw conditions.
 - 4. Warranty Period: Five years from date of Final Completion.
- B. Special Installer's Warranty: Specified form, signed by Installer, covering Work of this Section, for warranty period of two years.
 - 1. Warranty includes removing and reinstalling protection board, drainage panels, insulation, pedestals, and pedestal-mounted pavers on plaza decks.

1 PART 2 - PRODUCTS

2 2.1 MANUFACTURERS

- 3 A. Source Limitations: Obtain waterproofing materials - sheet flashings, protection course, molded-
4 sheet drainage panels from single source from single manufacturer.

5 2.2 WATERPROOFING MEMBRANE

- 6 A. Hot Fluid-Applied, Rubberized-Asphalt Waterproofing Membrane: Single component; 100
7 percent solids; hot fluid-applied, rubberized asphalt.

- 8 B. Basis-of-Design Product: Subject to compliance with requirements, provide American
9 Hydrotech, Inc.; Monolithic Membrane 6125 or comparable product by one of the following:

- 10 1. BASF Construction Chemicals
11 2. Dex-O-Tex
12 3. Epro Waterproofing Systems
13 4. GAF
14 5. Tremco
15 6. W.R. Meadows

16 2.3 AUXILIARY MATERIALS

- 17 A. General: Auxiliary materials recommended by waterproofing manufacturer for intended use and
18 compatible with waterproofing.

- 19 B. Primer: ASTM D 41/D 41M, asphaltic primer.

- 20 C. Elastomeric Sheet: 50-mil-minimum, uncured sheet neoprene with manufacturer's
21 recommended contact adhesives as follows:

- 22 1. Tensile Strength: 1400 psi minimum; ASTM D 412, Die C.
23 2. Elongation: 300 percent minimum; ASTM D 412.
24 3. Tear Resistance: 125 psi minimum; ASTM D 624, Die C.
25 4. Brittleness: Does not break at minus 30 deg F; ASTM D 2137.

- 26 D. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum
27 termination bars; approximately 1 by 1/8 inch thick; with stainless-steel anchors.

- 28 E. Sealants and Accessories: Manufacturer's recommended sealants and accessories.

- 29 F. Reinforcing Fabric: Manufacturer's recommended, spun-bonded polyester fabric.

- 30 G. Protection Course: ASTM D 6506, semirigid sheets of fiberglass or mineral-reinforced-asphaltic
31 core, pressure laminated between two asphalt-saturated fibrous liners and as follows:

- 32 1. Thickness: 1/8 inch, nominal, for vertical applications; 1/4 inch, nominal, elsewhere.

2.4 MOLDED-SHEET DRAINAGE PANELS

- A. Nonwoven-Geotextile-Faced, Molded-Sheet Drainage Panel: Manufactured composite subsurface drainage panels consisting of a nonwoven, needle-punched geotextile facing with an apparent opening size not exceeding No. 70 sieve, laminated to one side with a polymeric film bonded to the other side of a studded, nonbiodegradable, molded-plastic-sheet drainage core, with a vertical flow rate of 9 to 15 gpm/ft..

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
1. Verify that concrete has cured and aged for minimum time period recommended by waterproofing manufacturer.
 2. Verify that substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean and prepare substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for waterproofing application.
- B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.
- C. Close off deck drains and other deck penetrations to prevent spillage and migration of waterproofing fluids.
- D. Remove grease, oil, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
1. Abrasive blast clean concrete surfaces uniformly to expose top surface of fine aggregate according to ASTM D 4259 with a self-contained, recirculating, blast-cleaning apparatus. Remove material to provide a sound surface free of laitance, glaze, efflorescence, curing compounds, concrete hardeners, or form-release agents. Remove remaining loose material and clean surfaces according to ASTM D 4258.
- E. Remove fins, ridges, and other projections, and fill honeycomb, aggregate pockets, and other voids.

3.3 JOINTS, CRACKS, AND TERMINATIONS

- A. Prepare and treat substrates to receive waterproofing membrane, including joints and cracks, deck drains, corners, and penetrations according to manufacturer's written instructions.

1. Rout and fill joints and cracks in substrate. Before filling, remove dust and dirt according to ASTM D 4258.
2. Adhere strip of elastomeric sheet to substrate in a layer of hot rubberized asphalt. Extend elastomeric sheet a minimum of 6 inches on each side of moving joints and cracks or joints and cracks exceeding 1/8 inch thick, and beyond deck drains and penetrations. Apply second layer of hot fluid-applied, rubberized asphalt over elastomeric sheet.
3. Embed strip of reinforcing fabric into a layer of hot rubberized asphalt. Extend reinforcing fabric a minimum of 6 inches on each side of nonmoving joints and cracks not exceeding 1/8 inch thick, and beyond roof drains and penetrations.

a. Apply second layer of hot fluid-applied, rubberized asphalt over reinforcing fabric.

- B. At expansion joints and discontinuous deck-to-wall or deck-to-deck joints, bridge joints with elastomeric sheet extended a minimum of 6 inches on each side of joints and adhere to substrates in a layer of hot rubberized asphalt. Apply second layer of hot fluid-applied, rubberized asphalt over elastomeric sheet.

3.4 FLASHING INSTALLATION

- A. Install elastomeric sheets at terminations of waterproofing membrane according to manufacturer's written instructions.
- B. Prime substrate with asphalt primer.
- C. Install elastomeric sheet and adhere to deck and wall substrates in a layer of hot rubberized asphalt.
- D. Extend elastomeric sheet up walls or parapets a minimum of 8 inches above plaza-deck pavers and 6 inches onto deck to be waterproofed.
- E. Install termination bars and mechanically fasten to top of elastomeric flashing sheet at terminations and perimeter of waterproofing.

3.5 MEMBRANE APPLICATION

- A. Apply primer, at manufacturer's recommended rate, over prepared substrate and allow it to dry.
- B. Heat and apply rubberized asphalt according to manufacturer's written instructions.
1. Heat rubberized asphalt in an oil- or air-jacketed melter with mechanical agitator specifically designed for heating rubberized asphalt.
- C. Start application with manufacturer's authorized representative present.
- D. Unreinforced Membrane: Apply hot rubberized asphalt to substrates and adjoining surfaces indicated. Spread to form a uniform, unreinforced, seamless membrane, 180-mil minimum thickness.
- E. Reinforced Membrane: Apply hot rubberized asphalt to substrates and adjoining surfaces indicated. Spread to a thickness of 90 mils; embed reinforcing fabric, overlapping sheets 2 inches; spread another 125-mil-thick layer to provide a uniform, reinforced, seamless membrane 215 mils thick.

1 F. Apply waterproofing over prepared joints and up wall terminations and vertical surfaces to
2 heights indicated or required by manufacturer.

3 G. Cover waterproofing with protection course with overlapped joints before membrane is subject
4 to backfilling.

5 3.6 MOLDED-SHEET DRAINAGE PANEL INSTALLATION

6 A. Place and secure molded-sheet drainage panels, with geotextile facing away from wall or deck
7 substrate according to manufacturer's written instructions. Use methods that do not penetrate
8 waterproofing. Lap edges and ends of geotextile to maintain continuity. Protect installed
9 molded-sheet drainage panels during subsequent construction.

10 1. For vertical applications, install protection course before installing drainage panels.

11 3.7 FIELD QUALITY CONTROL

12 A. Engage a full-time site representative qualified by waterproofing membrane manufacturer to
13 inspect substrate conditions; surface preparation; and application of membrane, flashings,
14 protection, and drainage components; furnish daily reports to Architect.

15 1. Site representative shall measure membrane thickness with pin tester or other suitable
16 device at least once for every 100 sq. ft. and include measurements in reports.

17 B. Testing Agency: Owner will engage a qualified testing agency to inspect substrate conditions,
18 surface preparation, waterproofing application, protection, and drainage components, and to
19 furnish reports to Architect.

20 3.8 CLEANING AND PROTECTION

21 A. Protect waterproofing from damage and wear during remainder of construction period.

22 B. Protect installed insulation drainage panels from damage due to UV light, harmful weather
23 exposures, physical abuse, and other causes. Provide temporary coverings where insulation is
24 subject to abuse and cannot be concealed and protected by permanent construction
25 immediately after installation.

26 C. Clean spillage and soiling from adjacent construction using cleaning agents and procedures
27 recommended by manufacturer of affected construction.

28 END OF SECTION 07 14 13

1 SECTION 071800 - TRAFFIC COATINGS

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY

- 7 A. Section includes traffic coatings for the following applications:

- 8 1. Pedestrian traffic.
9 2. Equipment-room floor.

- 10 B. Related Requirements:

- 11 1. Section 096723 "Resinous Flooring" for fluid-applied, resinous flooring that does not
12 serve as a waterproofing membrane with integral wearing surface.

13 1.3 PREINSTALLATION MEETINGS

- 14 A. Preinstallation Conference: Conduct conference at Project site.

15 1.4 ACTION SUBMITTALS

- 16 A. Product Data: For each type of product.

- 17 1. Include installation instructions and details, material descriptions, dry or wet film
18 thickness requirements, and finish.

- 19 B. Shop Drawings: For traffic coatings.

- 20 1. Include details for treating substrate joints and cracks, flashings, deck penetrations, and
21 other termination conditions that are not included in manufacturer's product data.

- 22 C. Samples for Initial Selection: For each type of exposed finish.

- 23 D. Samples for Verification: For each type of exposed finish, prepared on rigid backing.

- 24 1. Provide stepped Samples on backing to illustrate buildup of traffic coatings.

25 1.5 INFORMATIONAL SUBMITTALS

- 26 A. Qualification Data: For Installer.

- 27 B. Product Certificates: For each type of traffic coating.

1 C. Field quality-control reports.

2 D. Sample Warranty: For manufacturer's warranty.

3 1.6 CLOSEOUT SUBMITTALS

4 A. Maintenance Data: For traffic coatings to include in maintenance manuals.

5 1.7 QUALITY ASSURANCE

6 A. Installer Qualifications: An entity that employs installers and supervisors who are trained and
7 approved by manufacturer.

8 1.8 FIELD CONDITIONS

9 A. Environmental Limitations: Apply traffic coatings within the range of ambient and substrate
10 temperatures recommended in writing by manufacturer. Do not apply traffic coatings to damp or
11 wet substrates, when temperatures are below 40 deg F, when relative humidity exceeds 85
12 percent, or when temperatures are less than 5 deg F above dew point.

13 1. Do not apply traffic coatings in snow, rain, fog, or mist, or when such weather conditions
14 are imminent during the application and curing period. Apply only when frost-free
15 conditions occur throughout the depth of substrate.

16 B. Do not install traffic coating until items that penetrate membrane have been installed.

17 1.9 WARRANTY

18 A. Manufacturer's Warranty: Manufacturer agrees to repair or replace traffic coating that fails in
19 materials or workmanship within specified warranty period.

20 1. Failures include, but are not limited to, the following:

- 21 a. Adhesive or cohesive failures.
22 b. Abrasion or tearing failures.
23 c. Surface crazing or spalling.
24 d. Intrusion of water, oils, gasoline, grease, salt, deicer chemicals, or acids into deck
25 substrate.

26 2. Warranty Period: Five years from date of Project Completion.

27 PART 2 - PRODUCTS

28 2.1 MANUFACTURERS

29 A. Source Limitations:

30 1. Obtain traffic coatings from single source from single manufacturer.

2. Obtain primary traffic-coating materials, including primers, from traffic-coating manufacturer. Obtain accessory materials including aggregates, sheet flashings, joint sealants, and substrate repair materials of types and from sources recommended in writing by primary material manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Material Compatibility: Provide primers; base coat, intermediate coat, and topcoat; and accessory materials that are compatible with one another and with substrate under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

2.3 TRAFFIC COATING (TC)

- A. Traffic Coating: Manufacturer's standard, traffic-bearing, seamless, high-solids-content, cold liquid-applied, elastomeric, water-resistant membrane system with integral wearing surface for pedestrian traffic and equipment-room (plumbing chase) floor; according to ASTM C 957/C 957M.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Advanced Polymer Technology Corporation.
- b. BASF Corporation; Construction Systems.
- c. Euclid Chemical Company (The); an RPM company.
- d. Gaco Western LLC.
- e. Sherwin-Williams Company (The).
- f. Soprema, Inc.

- B. Primer: Liquid primer as recommended in writing for substrate and conditions by traffic-coating manufacturer.

1. Material: Polyurethane.

- C. Preparatory and Base Coats: Polyurethane or epoxy.

1. Thicknesses: Minimum dry- or wet- film thickness as recommended in writing by manufacturer for substrate and service conditions indicated.

- D. Intermediate Coat: Polyurethane or epoxy.

1. Thicknesses: Minimum dry- or wet- film thickness as recommended in writing by manufacturer for substrate and service conditions indicated, measured excluding aggregate.
2. Aggregate Content: Not less than 8 to 10 lb/100 sq. ft..

- E. Topcoat: Polyurethane or epoxy.

1. Thicknesses: Minimum dry- or wet- film thickness as recommended in writing by manufacturer for substrate and service conditions indicated, measured excluding aggregate.
2. Aggregate Content: As required to achieve slip-resistant finish 8 to 10 lb/100 sq. ft..
3. Color: As selected by Architect from manufacturer's full range.

F. Aggregate: Manufacturer's standard aggregate for each use indicated or Aluminum-oxide grit of particle sizes, shape, and minimum hardness recommended in writing by traffic-coating manufacturer.

G. Fire-Test-Response Characteristics: Provide traffic-coating materials with the fire-test-response characteristics as determined by testing identical products according to test method below for deck type and slopes indicated by an independent testing and inspecting agency that is acceptable to authorities having jurisdiction.

1. Class A roof covering according to ASTM E 108.

2.4 ACCESSORY MATERIALS

A. Joint Sealants: As specified in Section 079200 "Joint Sealants." ASTM C 920.

B. Sheet Flashing: Non-staining sheet material recommended in writing by traffic-coating manufacturer.

1. Thickness: Minimum 60 mils.

C. Adhesive: Contact adhesive recommended in writing by traffic-coating manufacturer.

D. Reinforcing Strip: Fiberglass mesh recommended in writing by traffic-coating manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, surface smoothness, and other conditions affecting performance of traffic-coating work.

B. Verify that substrates are visibly dry and free of moisture.

1. Test for moisture according to ASTM D 4263.

2. Test for moisture content by measuring with an electronic moisture meter.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of traffic-coating work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

1. Begin coating application only after substrate construction and penetrating work have been completed.

2. Begin coating application only after minimum concrete-curing and -drying period recommended in writing by traffic-coating manufacturer has passed and after substrates are dry.

3. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Clean and prepare substrates according to ASTM C 1127 and manufacturer's written instructions to produce clean, dust-free, dry substrate for traffic-coating application. Remove projections, fill voids, and seal joints if any, as recommended in writing by traffic-coating manufacturer.
- B. Priming: Unless manufacturer recommends in writing against priming, prime substrates according to manufacturer's written instructions.
 - 1. Limit priming to areas that will be covered by traffic-coating material on same day. Re-prime areas exposed for more time than recommended by manufacturer.
- C. Schedule preparation work so dust and other contaminants from process do not fall on wet, newly coated surfaces.
- D. Mask adjoining surfaces not receiving traffic coatings to prevent overspray, spillage, leaking, and migration of coatings. Prevent traffic-coating materials from entering deck substrate penetrations and clogging weep holes and drains.
- E. Concrete Substrates: Mechanically abrade surface to a uniform profile acceptable to manufacturer, according to ASTM D 4259. Do not acid etch.
 - 1. Remove grease, oil, paints, and other penetrating contaminants from concrete.
 - 2. Remove concrete fins, ridges, and other projections.
 - 3. Remove laitance, glaze, efflorescence, curing compounds, concrete hardeners, form-release agents, and other incompatible materials that might affect coating adhesion.
 - 4. Remove remaining loose material to provide a sound surface, and clean surfaces according to ASTM D 4258.

3.3 TERMINATIONS AND PENETRATIONS

- A. Prepare vertical and horizontal surfaces at terminations and penetrations through traffic coatings and at expansion joints, drains, and sleeves according to ASTM C 1127 and manufacturer's written instructions.
- B. Provide sealant cants at penetrations and at reinforced and non-reinforced, deck-to-wall butt joints.
- C. Terminate edges of deck-to-deck expansion joints with preparatory base-coat strip.
- D. Install sheet flashings at deck-to-wall expansion and dynamic joints, and bond to deck and wall substrates according to manufacturer's written recommendations.

3.4 JOINT AND CRACK TREATMENT

- A. Prepare, treat, rout, and fill joints and cracks in substrates according to ASTM C 1127 and manufacturer's written recommendations. Before coating surfaces, remove dust and dirt from joints and cracks according to ASTM D 4258.
 - 1. Comply with recommendations in ASTM C 1193 for joint-sealant installation.

- 1 B. Apply reinforcing strip in traffic-coating system where recommended in writing by traffic-coating
2 manufacturer.

3 3.5 TRAFFIC-COATING APPLICATION

- 4 A. Apply traffic coating according to ASTM C 1127 and manufacturer's written instructions.

- 5 B. Apply coats of specified compositions for each type of traffic coating at locations as indicated on
6 Drawings.

- 7 C. Start traffic-coating application in presence of manufacturer's technical representative.

- 8 D. Verify that wet-film thickness of each coat complies with requirements every 100 sq. ft..

- 9 E. Uniformly broadcast and embed aggregate in each coat indicated to receive aggregate
10 according to manufacturer's written instructions. After coat dries, sweep away excess
11 aggregate.

- 12 F. Apply traffic coatings to prepared wall terminations and vertical surfaces to height indicated;
13 omit aggregate on vertical surfaces.

- 14 G. Cure traffic coatings. Prevent contamination and damage during coating application and curing.

15 3.6 FIELD QUALITY CONTROL

- 16 A. Testing Agency: Owner will engage a qualified testing agency to perform the following field
17 tests and inspections:

18 1. Materials Testing:

- 19 a. Samples of material delivered to Project site shall be taken, identified, sealed, and
20 certified in presence of Owner and Contractor.
21 b. Testing agency shall perform tests for characteristics specified, using applicable
22 referenced testing procedures.
23 c. Testing agency shall verify thickness of coatings during traffic-coating application
24 for each 600 sq. ft. of installed traffic coating or part thereof.

25 2. Electronic Leak-Detection Testing:

- 26 a. Testing agency shall test each deck area for leaks using an electronic leak-
27 detection method that locates discontinuities in the traffic-coating membrane.
28 b. Testing agency shall perform tests on abutting or overlapping smaller areas as
29 necessary to cover entire test area.
30 c. Testing agency shall create a conductive electronic field over the area of traffic
31 coating to be tested and electronically determine locations of discontinuities or
32 leaks, if any, in the traffic coating.
33 d. Testing agency shall provide survey report indicating locations of discontinuities, if
34 any.

- 35 B. Final Traffic-Coating Inspection: Arrange for traffic-coating manufacturer's technical personnel
36 to inspect membrane installation on completion.

- 37 1. Notify Architect or Owner 48 hours in advance of date and time of inspection.

- 1 C. Waterproofing will be considered defective if it does not pass tests and inspections.
- 2 D. Prepare test and inspection reports.
- 3 3.7 PROTECTING AND CLEANING
- 4 A. Protect traffic coatings from damage and wear during remainder of construction period.
- 5 B. Clean spillage and soiling from adjacent construction using cleaning agents and procedures
- 6 recommended by manufacturer of affected construction.
- 7 END OF SECTION 07 18 00
- 8

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1 SECTION 07 21 00 - THERMAL AND ACOUSTIC INSULATION

2 PART 1 - GENERAL

3 1.1 GENERAL REQUIREMENTS

4 A. Drawings and Conditions of Contract, including General and Supplementary Conditions and
5 Division 1 Administration Sections, apply to this Division.

6 B. Refer to Division 07 55 52 Section "Modified Bitumen Roofing System" for roof insulation.

7 1.2 SUMMARY

8 A. This Section includes the following:

- 9 1. Blanket/batt insulation.
10 2. Acoustic blanket / batt insulation.
11 3. Fire safing insulation.

12 1.3 SUBMITTALS

13 A. Product Data: For each type of insulation product specified.

14 1.4 QUALITY ASSURANCE

15 A. Fire Performance Characteristics: Provide insulation materials identical to those whose
16 indicated fire performance characteristics have been determined per the ASTM test method
17 indicated below, by UL or other testing and inspecting organizations acceptable to authorities
18 having jurisdiction. Identify products with appropriate markings of applicable testing and
19 inspecting organization.

- 20 1. Surface Burning Characteristic: ASTM E 84, 2007 edition.
21 2. Fire Resistance Ratings: ASTM E 119, 2007 edition.
22 3. Combustion Characteristics: ASTM E 136, 2004 edition.

23 B. Single-Source Responsibility for Insulation Products: Obtain each type of building insulation
24 from a single source with resources to provide products of consistent quality in appearance
25 and physical properties without delaying progress of the Work.

26 1.5 DELIVERY, STORAGE, AND HANDLING

27 A. Protect insulation materials from physical damage and from deterioration by moisture, soiling,
28 and other sources. Store inside and in a dry location. Comply with manufacturer's
29 recommendations for handling, storage, and protection during installation.

30 PART 2 - PRODUCTS

31 2.2 MANUFACTURERS

32 A. Manufacturers: Subject to compliance with requirements, provide insulation products of one of
33 the following:

1. Manufacturers of Glass Fiber Insulation:

- a. CertainTeed Corp.
- b. Johns Manville Insulations.
- c. Knauf Insulation.
- d. Owens-Corning Fiberglas Corp.

2. Manufacturer of Fire Safing Insulation:

- a. Thermafiber, Inc.

2.3 INSULATING MATERIALS

A. General: Provide insulating materials that comply with requirements and with referenced standards.

1. Preformed Units: Sizes to fit applications indicated, selected from manufacturer's standard thicknesses, widths, and lengths.

2. Typical R-values:

- a. Batts at exterior stud walls shall be 6 inches thick, R-19, typically unfaced unless otherwise specified, required by code or shown.

3. Acoustic batts shall be 6 inches thick, R-19, typically unfaced unless otherwise specified, required by code or shown

B. Polypropylene-Scrim-Kraft-Faced, Glass-Fiber Blanket Insulation: ASTM C 665, Type II (non-reflective faced), Class A (faced surface with a flame-spread index of 25 or less); Category 1 (membrane is a vapor barrier).

C. Glass-Fiber Board, Faced <Insert drawing designation>: ASTM C 612, Type IA; faced on one side with foil-scrim-kraft or foil-scrim-polyethylene vapor retarder, with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84. Nominal density of 6 lb/cu. ft., thermal resistivity of not less than 4.34 deg F x h x sq. ft./Btu x in. at 75 deg F.

2.4 SAFING INSULATION AND ACCESSORIES

A. Safing insulation shall be Thermafiber, Inc. mineral fiber safing insulation, unfaced. Insulation shall comply with ASTM C 612, Types 1A and 1B; and have nominal 4.0 pcf density.

B. Adhesive for Bonding Insulation: Product compatible with insulation and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

- 1. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers.

C. Sealant shall be as approved by manufacturer of safing insulation for conditions shown.

PART 3 - EXECUTION

3.2 EXAMINATION

A. Examine substrates and conditions with Installer present, for compliance with requirements of the Sections in which substrates and related work are specified and to determine if other

conditions affecting performance of insulation are satisfactory. Do not proceed with installation of insulation until unsatisfactory conditions have been corrected.

3.3 PREPARATION

- A. Clean substrates of substances harmful to insulations or vapor retarders, including removal of projections that might puncture vapor retarders.

3.4 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's instructions applicable to products and application indicated. If printed instructions are not available or do not apply to project conditions, consult manufacturer's technical representative for specific recommendations before proceeding with installation of insulation.
- B. Extend insulation full thickness as indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions, and fill voids with insulation. Remove projections that interfere with placement.
- C. Apply a single layer of insulation of required thickness, unless otherwise shown or required to make up total thickness.

3.5 INSTALLATION OF GENERAL BUILDING INSULATION

- A. Apply insulation units to substrate / bays by method complying with manufacturer's recommendations. If no specific method is indicated, use mechanical anchorage to provide permanent placement and support of units. Place insulation on soffits, at roof framing, at exterior wall construction, and where shown on Drawings in manner to insure continuous thermal barrier.
- B. Install unfaced batts and boards in wall framing, typical. Friction fit.
 - 1. Install batts above termination of gypsum wallboard utilizing 18 gauge wire perpendicular to the batt at 18 inches on center, or attach pin anchor at intervals required by insulation manufacturer.
- C. Install faced batts and boards in wall framing in attics / plenum spaces, where insulation is exposed to view and where otherwise indicated. Friction fit.
 - 1. Install batts above termination of wall sheathing utilizing 18 gauge wire perpendicular to the batt at 18 inches on center, or attach pin anchor at intervals required by insulation manufacturer.

3.6 INSTALLATION OF FOUNDATION WALL INSULATION

- A. Butt panels together for tight fit.
- B. Adhesive Installation: Install with adhesive or press into tacky waterproofing or dampproofing according to manufacturer's written instructions.
- C. Tape Joints with foil faced tape matching the foil face of the insulation.

3.7 INSTALLATION OF SAFING INSULATION

- A. Install safing insulation to fill gap between top of partition and horizontal material above, to fill hollow metal frames, to fill gaps between floor framing and exterior walls and windows, or as otherwise shown on Drawings. Apply sealant to complete safing assembly, as shown in

1 Gypsum Association Fire Resistance Design Manual (18th Edition), Section II (Requirements
2 for Fire Protection).

3 3.8 TESTING

4 A. Thermographic Insulation Inspection:

- 5 1. ASTM C 1060-90 Standard Practice for Thermographic Inspection of Insulation
6 Installations in Envelope Cavities of Framed Buildings.
7 2. Using a FLIR Systems B20 thermal imaging camera, insulation within envelope cavities
8 shall be inspected for thermal anomalies. Perform imaging test when the outside
9 temperature is at least 15 degrees different from interior temperatures. Field image 20%
10 of the total insulated framed exterior wall area. Document locations of tests and include
11 with test report. If CxA doesn't perform this test provide test report to CxA for review and
12 comment.

13 3.9 PROTECTION

- 14 A. General: Protect installed insulation from damage due to harmful weather exposures, physical
15 abuse, and other causes. Provide temporary coverings or enclosures where insulation will be
16 subject to abuse and cannot be concealed and protected by permanent construction
17 immediately after installation.

18 END OF SECTION 07 21 00

1 SECTION 07 26 00 – VAPOR BARRIER

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

4 A. Drawings and general provisions of the Contract, including General Conditions and Division 01
5 Specification Sections, apply to this Section.

6 B. Refer to Division 03 Sections "Cast-In-Place Concrete" for concrete slabs.

7 1.2 SUMMARY

8 A. Section includes under-slab vapor retarder, seam tape, mastic, pipe boots for installation under
9 concrete slabs.

10 1.3 REFERENCES

11 A. American Society for Testing and Materials (ASTM):

- 12 1. ASTM E 1745-11 Standard Specification for Plastic Water Vapor Retarders Used in
13 Contact with Soil or Granular Fill Under Concrete Slabs.
14 2. ASTM E 154-08a (2013) Standard Test Methods for Water Vapor Retarders Used in
15 Contact with Earth Under Concrete Slabs.
16 3. ASTM E 1249-15 Standard Test Method for Water Vapor Transmission Rate Through
17 Plastic Film and Sheeting Using a Modulated Infrared Sensor.
18 4. ASTM E 1643-11 Standard Practice for Installation of Water Vapor Retarders Used in
19 Contact with Earth or Granular Fill Under Concrete Slabs.

20 B. American Concrete Institute (ACI):

- 21 1. ACI 302.1R-15 Vapor Barrier Component (plastic membrane) is not less than 10 mils
22 thick.

23 1.4 SUBMITTALS

24 A. Product Data: For each type and component of vapor retarder indicated.

25 B. Qualification Data: For Installer and testing agency.

26 C. Manufacturer Certificates: Signed by manufacturers certifying that vapor retarder complies with
27 requirements.

28 D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified
29 testing agency, for each vapor retarder.

30 E. Manufacturer's installation instructions for placement, seaming and pipe boot installation.

31 1.5 DELIVERY, STORAGE, AND HANDLING

32 A. Deliver materials in original, unopened packages with manufacturers' labels intact and clearly
33 identifying products.

- B. Store materials inside and under cover; keep them dry and protected from weather, direct sunlight, surface contamination, aging, corrosion, damaging temperatures, construction traffic, and other causes.

1. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

1.6 QUALITY ASSURANCE

- A. Single-Source Responsibility: Obtain materials for system from one source and by a single manufacturer or by manufacturers approved by the system manufacturer as compatible with other system components.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Insulation Solutions, Inc.
2. Raven Industries.
3. Stego Industries.
4. W.R. Meadows, Inc.
5. Poly America.

2.2 MATERIALS

- A. Vapor retarder membrane must have the following properties:

1. Minimum Permeance	ASTM E96	0.04 Perms
2. Water Vapor Barrier	ASTM E1745	Meets or exceeds Class C.
3. Thickness of Barrier (plastic)	ACI 302.1 R96	Not less than 15 mils

2.3 ACCESSORIES

- A. Seaming Tape: Manufacturer's standard 4-inch seaming tape.
- B. Pipe Boot Kits: Manufacturer's standard pipe boot kits.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Ensure that subsoil is approved by architect or geotechnical firm.
1. Level and tamp or roll aggregate, sand or tamped earth base.

3.2 INSTALLATION

- A. Install under-slab vapor retarder in accordance with manufacturer's instructions and ASTM E 1643.
1. Unroll vapor retarder with the longest dimension parallel with the direction of the pour.
 2. Lap vapor retarder over footings and seal to foundation walls per manufacturer's written instructions.

- 1 3. Overlap joints 6 inches and seal with manufacturer's tape.
- 2 4. Seal all penetrations (including pipes) per manufacturer's instructions.
- 3 5. No penetration of the vapor retarder is allowed except for reinforcing steel and permanent
- 4 utilities.
- 5 6. Repair damaged areas by cutting patches of vapor retarder, overlapping damaged area
- 6 6 inches and taping all four sides with tape.

7 END OF SECTION 07 26 00
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1 SECTION 07 41 13.16 - STANDING-SEAM METAL ROOF PANELS

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY

- 7 A. Section includes standing-seam metal roof panels.

- 8 B. Related Sections:

9 1.3 PREINSTALLATION MEETINGS

- 10 A. Preinstallation Conference: Conduct conference at Project site.

- 11 1. Meet with Owner, Architect, Owner's insurer if applicable, metal panel Installer, metal
12 panel manufacturer's representative, structural-support Installer, and installers whose
13 work interfaces with or affects metal panels, including installers of roof accessories and
14 roof-mounted equipment.
15 2. Review and finalize construction schedule and verify availability of materials, Installer's
16 personnel, equipment, and facilities needed to make progress and avoid delays.
17 3. Review methods and procedures related to metal panel installation, including
18 manufacturer's written instructions.
19 4. Examine support conditions for compliance with requirements, including alignment
20 between and attachment to structural members.
21 5. Review structural loading limitations of deck, purlins and rafters during and after roofing.
22 6. Review flashings, special details, drainage, penetrations, equipment curbs, and condition
23 of other construction that affect metal panels.
24 7. Review governing regulations and requirements for insurance, certificates, and tests and
25 inspections if applicable.
26 8. Review temporary protection requirements for metal panel systems during and after
27 installation.
28 9. Review procedures for repair of metal panels damaged after installation.
29 10. Document proceedings, including corrective measures and actions required, and furnish
30 copy of record to each participant.

31 1.4 ACTION SUBMITTALS

- 32 A. Product Data: For each type of product.

- 33 1. Include construction details, material descriptions, dimensions of individual components
34 and profiles, and finishes for each type of panel and accessory.

- 35 B. Shop Drawings:

1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
2. Accessories: Include details of the flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches.

- C. Samples for Initial Selection: For each type of metal panel indicated with factory-applied color finishes.

1. Include similar Samples of trim and accessories involving color selection.

- D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.

1. Metal Panels: 12 inches long by actual panel width. Include clips, fasteners, closures, and other metal panel accessories.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- C. Field quality-control reports.
- D. Sample Warranties: For special warranties.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For metal panels to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. UL-Certified, Portable Roll-Forming Equipment: UL-certified, portable roll-forming equipment capable of producing metal panels warranted by manufacturer to be the same as factory-formed products. Maintain UL certification of portable roll-forming equipment for duration of work.
- C. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 1. Build mockup of typical roof area and eave, including fascia, as shown on Drawings; approximately 12 feet square by full thickness, including attachments, underlayment, and accessories.
 2. Build mockups for typical roof area only, including accessories.
 - a. Size: 12 feet long by 6 feet.
 - b. Each type of exposed seam and seam termination.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.
- B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.
- D. Retain strippable protective covering on metal panels during installation.
- E. Copper Panels: Wear gloves when handling to prevent fingerprints and soiling of surface.

1.9 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.10 COORDINATION

- A. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.
- B. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.11 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
 - a. Structural failures including rupturing, cracking, or puncturing.
 - b. Deterioration of metals and other materials beyond normal weathering.
2. Warranty Period: Two years from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

- a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
- b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
- c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

C. Special Weathertightness Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.

1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Energy Performance: Provide roof panels that are listed on the EPA/DOE's ENERGY STAR "Roof Product List" for low and steep-slope roof products.

B. Energy Performance: Provide roof panels according to one of the following when tested according to CRRC-1:

1. Three-year, aged solar reflectance of not less than 0.55 and emissivity of not less than 0.75.
2. Three-year, aged Solar Reflectance Index of not less than 64 when calculated according to ASTM E 1980.

C. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E 1592:

1. Wind Loads: As indicated on Drawings.
2. Other Design Loads: As indicated on Drawings.
3. Deflection Limits: For wind loads, no greater than 1/240 of the span.
4. .

D. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E 1680 or ASTM E 283 at the following test-pressure difference:

1. Test-Pressure Difference: 6.24 lbf/sq. ft..

E. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 1646 or ASTM E 331 at the following test-pressure difference:

1. Test-Pressure Difference: 6.24 lbf/sq. ft..

F. Hydrostatic-Head Resistance: No water penetration when tested according to ASTM E 2140.

- G. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.

1. Uplift Rating: UL 90.

- H. FM Global Listing: Provide metal roof panels and component materials that comply with requirements in FM Global 4471 as part of a panel roofing system and that are listed in FM Global's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Global markings.

1. Fire/Windstorm Classification: Class 1A- 90.
2. Hail Resistance: MH.

- I. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

2.2 STANDING-SEAM METAL ROOF PANELS

- A. General: Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.

1. Steel Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E 1514.
2. Aluminum Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E 1637.

- B. Vertical-Rib, Snap-Joint, Standing-Seam Metal Roof Panels: Formed with vertical ribs at panel edges and a flat pan between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels, engaging opposite edge of adjacent panels, and snapping panels together.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

- a. Advanced Architectural Products.
b. Architectural Building Components.
c. Architectural Metal Systems.
d. Berridge Manufacturing Company.
e. CENTRIA Architectural Systems.
f. Dimensional Metals, Inc.
g. Englert, Inc.
h. Garland Company, Inc. (The).
i. IMETCO.
j. MBCI; a division of NCI Group, Inc.
k. McElroy Metal, Inc.
l. Morin - A Kingspan Group Company.
m. Petersen Aluminum Corporation.

- n. [Ultra Seam Incorporated.](#)
 - o. [VICWEST.](#)
2. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A 653/A 653M, G90 coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A 792/A 792M, Class AZ50 coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
 - a. Nominal Thickness: 0.040 inch.
 - b. Exterior Finish: Two-coat fluoropolymer Metallic fluoropolymer.
 - c. Color: As selected by Architect from manufacturer's full range.
 3. Clips: Two-piece floating to accommodate thermal movement.
 - a. Material: 0.064-inch- nominal thickness, zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet.
 - b. Material: 0.062-inch- thick, stainless-steel sheet.
 4. Panel Coverage: 24 inches.
 5. Panel Height: 1.0 inch.

2.3 UNDERLAYMENT MATERIALS

- A. Self-Adhering, High-Temperature Underlayment: Provide self-adhering, cold-applied, sheet underlayment, a minimum of 30 mils thick, consisting of slip-resistant, polyethylene-film top surface laminated to a layer of butyl or SBS-modified asphalt adhesive, with release-paper backing. Provide primer when recommended by underlayment manufacturer.
 1. Thermal Stability: Stable after testing at 240 deg F; ASTM D 1970.
 2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F; ASTM D 1970.
 3. [Manufacturers:](#) Subject to compliance with requirements, provide products by one of the following:
 - a. [Carlisle Residential; a division of Carlisle Construction Materials.](#)
 - b. [Drexel Metals.](#)
 - c. [Henry Company.](#)
 - d. [Owens Corning.](#)
- B. Felt Underlayment: ASTM D 226/D 22M, Type II (No. 30), asphalt-saturated organic felts.
- C. Slip Sheet: Manufacturer's recommended slip sheet, of type required for application.

2.4 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Subframing and Furring: ASTM C 645; cold-formed, metallic-coated steel sheet, ASTM A 653/A 653M, G90 coating designation or ASTM A 792/A 792M, Class AZ50 coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.
- B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets,

fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.

1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal panels.
2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch-thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.

D. Panel Fasteners: Self-tapping screws designed to withstand design loads.

E. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.

1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
2. Joint Sealant: ASTM C 920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.
3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

2.5 FABRICATION

A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. On-Site Fabrication: Subject to compliance with requirements of this Section, metal panels may be fabricated on-site using UL-certified, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-formed panels. Fabricate according to equipment manufacturer's written instructions and to comply with details shown.

C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

D. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.

E. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
4. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.
 - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal panel manufacturer for application, but not less than thickness of metal being secured.

2.6 FINISHES

- A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are unacceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Steel Panels and Accessories:
 1. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 2. Three-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 3. Mica Fluoropolymer: AAMA 621. Two-coat fluoropolymer finish with suspended mica flakes containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 4. Metallic Fluoropolymer: AAMA 621. Three-coat fluoropolymer finish with suspended metallic flakes containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 5. FEVE Fluoropolymer: AAMA 621. Two-coat fluoropolymer finish containing 100 percent fluorinated ethylene vinyl ether resin in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 6. Siliconized Polyester: Epoxy primer and silicone-modified, polyester-enamel topcoat; with a dry film thickness of not less than 0.2 mil for primer and 0.8 mil for topcoat.

- 1 7. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored
2 acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum
3 total dry film thickness of 0.5 mil.

4 PART 3 - EXECUTION

5 3.1 EXAMINATION

- 6 A. Examine substrates, areas, and conditions, with Installer present, for compliance with
7 requirements for installation tolerances, metal panel supports, and other conditions affecting
8 performance of the Work.

- 9 1. Examine primary and secondary roof framing to verify that rafters, purlins, angles,
10 channels, and other structural panel support members and anchorages have been
11 installed within alignment tolerances required by metal roof panel manufacturer.
12 2. Examine solid roof sheathing to verify that sheathing joints are supported by framing or
13 blocking and that installation is within flatness tolerances required by metal roof panel
14 manufacturer.

- 15 a. Verify that air- or water-resistive barriers have been installed over sheathing or
16 backing substrate to prevent air infiltration or water penetration.

- 17 B. Examine roughing-in for components and systems penetrating metal panels to verify actual
18 locations of penetrations relative to seam locations of metal panels before installation.

- 19 C. Proceed with installation only after unsatisfactory conditions have been corrected.

20 3.2 PREPARATION

- 21 A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support
22 members and anchorages according to ASTM C 754 and metal panel manufacturer's written
23 recommendations.

24 3.3 UNDERLAYMENT INSTALLATION

- 25 A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with
26 temperature restrictions of underlayment manufacturer for installation. Apply at locations
27 indicated on Drawings, wrinkle free, in shingle fashion to shed water, and with end laps of not
28 less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-
29 1/2 inches. Roll laps with roller. Cover underlayment within 14 days.

- 30 1. Apply over the entire roof surface.
31 2. Apply over the roof area indicated below:
32 a. Roof perimeter for a distance up from eaves of 24 inches beyond interior wall line.
33 b. Valleys, from lowest point to highest point, for a distance on each side of 18
34 inches. Overlap ends of sheets not less than 6 inches.
35 c. Rake edges for a distance of 18 inches.
36 d. Hips and ridges for a distance on each side of 12 inches.
37 e. Roof-to-wall intersections for a distance from wall of 18 inches.

- 1 f. Around dormers, chimneys, skylights, and other penetrating elements for a
2 distance from element of 18 inches.

- 3 B. Slip Sheet: Apply slip sheet over underlayment before installing metal roof panels.

- 4 C. Flashings: Install flashings to cover underlayment to comply with requirements specified in
5 Section 076200 "Sheet Metal Flashing and Trim."

6 3.4 METAL PANEL INSTALLATION

- 7 A. General: Install metal panels according to manufacturer's written instructions in orientation,
8 sizes, and locations indicated. Install panels perpendicular to supports unless otherwise
9 indicated. Anchor metal panels and other components of the Work securely in place, with
10 provisions for thermal and structural movement.

- 11 1. Shim or otherwise plumb substrates receiving metal panels.
12 2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws.
13 Do not begin installation until air- or water-resistive barriers and flashings that will be
14 concealed by metal panels are installed.
15 3. Install screw fasteners in predrilled holes.
16 4. Locate and space fastenings in uniform vertical and horizontal alignment.
17 5. Install flashing and trim as metal panel work proceeds.
18 6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices
19 and end laps to avoid a four-panel lap splice condition.
20 7. Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws.
21 Fasten flashings and trim around openings and similar elements with self-tapping screws.
22 8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

- 23 B. Fasteners:

- 24 1. Steel Panels: Use stainless-steel fasteners for surfaces exposed to the exterior; use
25 galvanized-steel fasteners for surfaces exposed to the interior.
26 2. Aluminum Panels: Use aluminum or stainless-steel fasteners for surfaces exposed to the
27 exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.
28 3. Copper Panels: Use copper, stainless-steel, or hardware-bronze fasteners.
29 4. Stainless-Steel Panels: Use stainless-steel fasteners.

- 30 C. Anchor Clips: Anchor metal roof panels and other components of the Work securely in place,
31 using manufacturer's approved fasteners according to manufacturers' written instructions.

- 32 D. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect
33 against galvanic action as recommended in writing by metal panel manufacturer.

- 34 E. Standing-Seam Metal Roof Panel Installation: Fasten metal roof panels to supports with
35 concealed clips at each standing-seam joint at location, spacing, and with fasteners
36 recommended in writing by manufacturer.

- 37 1. Install clips to supports with self-tapping fasteners.
38 2. Install pressure plates at locations indicated in manufacturer's written installation
39 instructions.
40 3. Snap Joint: Nest standing seams and fasten together by interlocking and completely
41 engaging factory-applied sealant.
42 4. Seamed Joint: Crimp standing seams with manufacturer-approved, motorized seamer
43 tool so clip, metal roof panel, and factory-applied sealant are completely engaged.

5. Watertight Installation:

- a. Apply a continuous ribbon of sealant or tape to seal joints of metal panels, using sealant or tape as recommend in writing by manufacturer as needed to make panels watertight.
- b. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
- c. At panel splices, nest panels with minimum 6-inch end lap, sealed with sealant and fastened together by interlocking clamping plates.

F. Clipless Metal Panel Installation: Fasten metal panels to supports with screw fasteners at each lapped joint at location and spacing recommended by manufacturer.

G. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal roof panel manufacturers; or, if not indicated, types recommended by metal roof panel manufacturer.

H. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

1. Install exposed flashing and trim that is without buckling and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and achieve waterproof and weather-resistant performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

I. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to metal roof panels as recommended by manufacturer.

3.5 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align metal panel units within installed tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.6 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect metal roof panel installation, including accessories. Report results in writing.

- 1 B. Remove and replace applications of metal roof panels where tests and inspections indicate that
2 they do not comply with specified requirements.
- 3 C. Additional tests and inspections, at Contractor's expense, are performed to determine
4 compliance of replaced or additional work with specified requirements.
- 5 D. Prepare test and inspection reports.

6 3.7 CLEANING AND PROTECTION

- 7 A. Remove temporary protective coverings and strippable films, if any, as metal panels are
8 installed, unless otherwise indicated in manufacturer's written installation instructions. On
9 completion of metal panel installation, clean finished surfaces as recommended by metal panel
10 manufacturer. Maintain in a clean condition during construction.
- 11 B. Replace metal panels that have been damaged or have deteriorated beyond successful repair
12 by finish touchup or similar minor repair procedures.

13 END OF SECTION 07 41 13.16

1 SECTION 07 42 13.13 - FORMED METAL WALL PANELS

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY

- 7 A. Section Includes:

- 8 1. Exposed-fastener, lap-seam metal wall panels.
9 2. Concealed-fastener, lap-seam metal wall panels.
10 3. Metal liner panels.

- 11 B. Related Sections:

- 12 1. Section 07 42 93 "Soffit Panels" for metal panels used in horizontal soffit applications.

13 1.3 PREINSTALLATION MEETINGS

- 14 A. Preinstallation Conference: Conduct conference at Project site.

- 15 1. Meet with Owner, Architect, Owner's insurer if applicable, metal panel Installer, metal
16 panel manufacturer's representative, structural-support Installer, and installers whose
17 work interfaces with or affects metal panels, including installers of doors, windows, and
18 louvers.
19 2. Review and finalize construction schedule and verify availability of materials, Installer's
20 personnel, equipment, and facilities needed to make progress and avoid delays.
21 3. Review methods and procedures related to metal panel installation, including
22 manufacturer's written instructions.
23 4. Examine support conditions for compliance with requirements, including alignment
24 between and attachment to structural members.
25 5. Review flashings, special siding details, wall penetrations, openings, and condition of
26 other construction that affect metal panels.
27 6. Review governing regulations and requirements for insurance, certificates, and tests and
28 inspections if applicable.
29 7. Review temporary protection requirements for metal panel assembly during and after
30 installation.
31 8. Review of procedures for repair of metal panels damaged after installation.
32 9. Document proceedings, including corrective measures and actions required, and furnish
33 copy of record to each participant.

34 1.4 ACTION SUBMITTALS

- 35 A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.
 - B. Shop Drawings:
 1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
 2. Accessories: Include details of the flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches.
 - C. Samples for Initial Selection: For each type of metal panel indicated with factory-applied finishes.
 1. Include Samples of trim and accessories involving color selection.
 - D. Samples for Verification: For each type of exposed finish, prepared on Samples of size indicated below:
 1. Metal Panels: 12 inches long by actual panel width. Include fasteners, closures, and other metal panel accessories.
- 1.5 INFORMATIONAL SUBMITTALS
- A. Qualification Data: For Installer.
 - B. Product Test Reports: For each product, for tests performed by a qualified testing agency.
 - C. Field quality-control reports.
 - D. Sample Warranties: For special warranties.
- 1.6 CLOSEOUT SUBMITTALS
- A. Maintenance Data: For metal panels to include in maintenance manuals.
- 1.7 QUALITY ASSURANCE
- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
 - B. UL-Certified, Portable Roll-Forming Equipment: UL-certified, portable roll-forming equipment capable of producing metal panels warranted by manufacturer to be the same as factory-formed products. Maintain UL certification of portable roll-forming equipment for duration of work.
- 1.8 DELIVERY, STORAGE, AND HANDLING
- A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.

- B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.
- D. Retain strippable protective covering on metal panels during installation.

1.9 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.10 COORDINATION

- A. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.11 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

- a. Structural failures including rupturing, cracking, or puncturing.
- b. Deterioration of metals and other materials beyond normal weathering.

2. Warranty Period: Two years from date of Project completion.

- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

- a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
- b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
- c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Project completion.

1 PART 2 - PRODUCTS

2 2.1 PERFORMANCE REQUIREMENTS

3 A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the
4 following loads, based on testing according to ASTM E 1592:

- 5 1. Wind Loads: As indicated on Drawings.
6 2. Other Design Loads: As indicated on Drawings.
7 3. Deflection Limits: For wind loads, no greater than 1/180 of the span.

8 B. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to
9 ASTM E 283 at the following test-pressure difference:

- 10 1. Test-Pressure Difference: 2.86 lbf/sq. ft..

11 C. Water Penetration under Static Pressure: No water penetration when tested according to
12 ASTM E 331 at the following test-pressure difference:

- 13 1. Test-Pressure Difference: 2.86 lbf/sq. ft..

14 D. Thermal Movements: Allow for thermal movements from ambient and surface temperature
15 changes by preventing buckling, opening of joints, overstressing of components, failure of joint
16 sealants, failure of connections, and other detrimental effects. Base calculations on surface
17 temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

- 18 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

19 E. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency.
20 Identify products with appropriate markings of applicable testing agency.

- 21 1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of
22 another qualified testing agency.

23 2.2 CONCEALED-FASTENER, LAP-SEAM METAL WALL PANELS

24 A. General: Provide factory-formed metal panels designed to be field assembled by lapping and
25 interconnecting side edges of adjacent panels and mechanically attaching through panel to
26 supports using concealed fasteners in side laps. Include accessories required for weathertight
27 installation.

28 B. Flush-Profile, Concealed-Fastener Metal Wall Panels: Formed with vertical panel edges and
29 intermediate stiffening ribs symmetrically spaced between panel edges; with flush joint between
30 panels.

- 31 1. Manufacturers: Subject to compliance with requirements, provide products by the
32 following:

- 33 a. Berridge Manufacturing Company.
34 b. Gordon Industries, Soffit-Shield (basis of design)
35 c. ATAS International
36 d. Petersen Aluminum Corporation

- 37 2. Aluminum Sheet: Coil-coated sheet, ASTM B 209, alloy as standard with manufacturer,
38 with temper as required to suit forming operations and structural performance required.

- 1 a. Thickness: 0.040 inch.
- 2 b. Surface: Smooth, flat finish.
- 3 c. Exterior Finish: Two-coat fluoropolymer Three-coat fluoropolymer.
- 4 d. Color: As selected by Architect from manufacturer's full range.

- 5 3. Panel Coverage: 12 inches.
- 6 4. Panel Height: 1.0 inch.

7 2.3 MISCELLANEOUS MATERIALS

- 8 A. Miscellaneous Metal Subframing and Furring: ASTM C 645, cold-formed, metallic-coated steel
9 sheet, ASTM A 653/A 653M, G90 coating designation or ASTM A 792/A 792M, Class AZ50
10 aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's
11 standard sections as required for support and alignment of metal panel system.
- 12 B. Panel Accessories: Provide components required for a complete, weathertight panel system
13 including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets,
14 fillers, closure strips, and similar items. Match material and finish of metal panels unless
15 otherwise indicated.
 - 16 1. Closures: Provide closures at eaves and rakes, fabricated of same metal as metal
17 panels.
 - 18 2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from
19 material recommended by manufacturer.
 - 20 3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or
21 closed-cell laminated polyethylene; minimum 1-inch-thick, flexible closure strips; cut or
22 premolded to match metal panel profile. Provide closure strips where indicated or
23 necessary to ensure weathertight construction.
- 24 C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as
25 required to seal against weather and to provide finished appearance. Locations include, but are
26 not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae,
27 parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as
28 adjacent metal panels.
- 29 D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed
30 fasteners with heads matching color of metal panels by means of plastic caps or factory-applied
31 coating. Provide EPDM or PVC sealing washers for exposed fasteners.
- 32 E. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with
33 panel materials, are nonstaining, and do not damage panel finish.
 - 34 1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound
35 sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic,
36 nonstaining tape 1/2 inch wide and 1/8 inch thick.
 - 37 2. Joint Sealant: ASTM C 920; elastomeric polyurethane or silicone sealant; of type, grade,
38 class, and use classifications required to seal joints in metal panels and remain
39 weathertight; and as recommended in writing by metal panel manufacturer.
 - 40 3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

2.4 FABRICATION

- A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. On-Site Fabrication: Subject to compliance with requirements of this Section, metal panels may be fabricated on-site using UL-certified, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-formed panels. Fabricate according to equipment manufacturer's written instructions and to comply with details shown.
- C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- D. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.
- E. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.
1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
 2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
 3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
 4. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
 5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
 6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.
- a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.

2.5 FINISHES

- A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Aluminum Panels and Accessories:

1. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
2. Three-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.
 1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal wall panel manufacturer.
 2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal wall panel manufacturer.
 - a. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.

3.3 METAL PANEL INSTALLATION

- A. General: Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
 1. Shim or otherwise plumb substrates receiving metal panels.
 2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
 3. Install screw fasteners in predrilled holes.
 4. Locate and space fastenings in uniform vertical and horizontal alignment.

5. Install flashing and trim as metal panel work proceeds.
 6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
 7. Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
 8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.
- B. Fasteners:
1. Steel Panels: Use stainless-steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.
 2. Aluminum Panels: Use aluminum or stainless-steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.
 3. Copper Panels: Use copper, stainless-steel, or hardware-bronze fasteners.
 4. Stainless-Steel Panels: Use stainless-steel fasteners.
- C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.
- D. Lap-Seam Metal Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.
1. Lap ribbed or fluted sheets one full rib. Apply panels and associated items true to line for neat and weathertight enclosure.
 2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal panels.
 3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
 4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
 5. Flash and seal panels with weather closures at perimeter of all openings.
- E. Watertight Installation:
1. Apply a continuous ribbon of sealant or tape to seal lapped joints of metal panels, using sealant or tape as recommend by manufacturer on side laps of nesting-type panels; and elsewhere as needed to make panels watertight.
 2. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
 3. At panel splices, nest panels with minimum 6-inch end lap, sealed with sealant and fastened together by interlocking clamping plates.
- F. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
1. Install components required for a complete metal panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal wall panel manufacturer; or, if not indicated, provide types recommended by metal panel manufacturer.
- G. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners

where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.

1. Install exposed flashing and trim that is without buckling and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and achieve waterproof performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Water-Spray Test: After installation, test area of assembly as directed by Architect for water penetration according to AAMA 501.2.
- C. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect completed metal wall panel installation, including accessories.
- D. Remove and replace metal wall panels where tests and inspections indicate that they do not comply with specified requirements.
- E. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.
- F. Prepare test and inspection reports.

3.5 CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.
- B. After metal panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.
- C. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07 42 13.13

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1 SECTION 07 42 93 – METAL WALL AND SOFFIT PANELS

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY

- 7 A. Section includes reveal profile flat metal wall and soffit panels.

8 1.3 PRE-INSTALLATION MEETINGS

- 9 A. Pre-installation Conference: Conduct conference at Project site.

- 10 1. Require representatives of each entity directly concerned with cast-in-place architectural
11 concrete to attend, including the following:

- 12 a. Architect.
13 b. Construction Manager.
14 c. Contractor's superintendent.
15 d. Metal Wall Panel and Soffit Subcontractor.

16 1.4 ACTION SUBMITTALS

- 17 A. Product Data: For each type of product.

- 18 1. Include construction details, material descriptions, dimensions of individual components
19 and profiles, and finishes for each type of panel and accessory.

- 20 B. Shop Drawings:

- 21 1. Include fabrication and installation layouts of metal panels; details of edge conditions,
22 joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures,
23 and accessories; and special details.
24 2. Accessories: Include details of flashing, trim, and anchorage systems, at a scale of not
25 less than 1-1/2 inches per 12 inches.

- 26 C. Samples for Initial Selection: For each type of metal panel indicated with factory-applied color
27 finishes.

- 28 1. Include similar Samples of trim and accessories involving color selection.

- 29 D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size
30 indicated below:

- 1 1. Metal Panels: 12 inches long by actual panel width. Include fasteners, closures, and
2 other metal panel accessories.

3 1.5 INFORMATIONAL SUBMITTALS

- 4 A. Qualification Data: For Installer.
- 5 B. Product Test Reports: For each product, tests performed by a qualified testing agency.
- 6 C. Sample Warranties: For special warranties.

7 1.6 CLOSEOUT SUBMITTALS

- 8 A. Maintenance Data: For metal panels to include in maintenance manuals.

9 1.7 QUALITY ASSURANCE

- 10 A. Installer Qualifications: An entity that employs installers and supervisors who are trained and
11 approved by manufacturer.
- 12 B. Mockups: Build mockups to verify selections made under Sample submittals and to
13 demonstrate aesthetic effects and set quality standards for fabrication and installation.
- 14 1. Build mockup of typical wall panel and soffit approximately two panels wide by full eave
15 width, including attachments and accessories.
- 16 2. Approval of mockups does not constitute approval of deviations from the Contract
17 Documents contained in mockups unless Architect specifically approves such deviations
18 in writing.
- 19 3. Subject to compliance with requirements, approved mockups may become part of the
20 completed Work if undisturbed at time of Substantial Completion.

21 1.8 DELIVERY, STORAGE, AND HANDLING

- 22 A. Deliver components, metal panels, and other manufactured items so as not to be damaged or
23 deformed. Package metal panels for protection during transportation and handling.
- 24 B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and
25 surface damage.
- 26 C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and
27 ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of
28 water. Do not store metal panels in contact with other materials that might cause staining,
29 denting, or other surface damage.
- 30 D. Retain strippable protective covering on metal panels during installation.

1.9 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.10 COORDINATION

- A. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of walls, and other adjoining work to provide a leak-proof, secure, and noncorrosive installation.

1.11 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

- a. Structural failures including rupturing, cracking, or puncturing.
- b. Deterioration of metals and other materials beyond normal weathering.

2. Warranty Period: Two years from date of Substantial Completion.

- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

- a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
- b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
- c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E 1592:

- 1. Wind Loads: As indicated on Drawings.
- 2. Other Design Loads: As indicated on Drawings.
- 3. Deflection Limits: For wind loads, no greater than 1/240 of the span.

- B. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 331 at the following test-pressure difference:

1. Test-Pressure Difference: 2.86 lbf/sq. ft..

- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

2.2 METAL WALL AND SOFFIT PANELS

- A. General: Provide metal soffit panels designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners in side laps. Include accessories required for weathertight installation.

- B. Metal Soffit Panels: Match material and color of metal column covers.

- C. Reveal-Joint-Profile Metal Soffit Panels: Solid panels formed with vertical panel edges and intermediate stiffening ribs symmetrically spaced between panel edges; with recessed reveal joint between panels.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Gordon Industries Soffit-Shield or comparable product by but no limited to one of the following:

- a. ATAS International
- b. Petersen Aluminum Corporation.

2. Material: Same material, finish, and color as metal column covers.

3. Aluminum Sheet: Coil-coated sheet, ASTM B 209, alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.

- a. Thickness: 0.063 inch.
- b. Surface: Smooth, flat finish.
- c. Exterior Finish: Two-coat fluoropolymer.
- d. Color: As selected by Architect from manufacturer's full range.

4. Panel Coverage: As indicated.

5. Panel Depth: 1.0 inch.

2.3 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Subframing and Furring: ASTM C 645, cold-formed, metallic-coated steel sheet, ASTM A 653/A 653M, G90 coating designation or ASTM A 792, Class AZ50 aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.

- B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.

- C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Finish flashing and trim with same finish system as adjacent metal panels.

D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Design is intended for concealed fastener use throughout to the greatest extent possible.

E. Panel Sealants: Provide sealant types recommended by manufacturer that are compatible with panel materials, are non-staining, and do not damage panel finish.

1. Sealant Tape (concealed use only): Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, non-sag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
2. Joint Sealant: ASTM C 920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.

2.4 FABRICATION

A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

C. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.

D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
4. Sealed Joints: Form non-expansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.
 - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal soffit panel manufacturer for application but not less than thickness of metal being secured.

2.5 FINISHES

- A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Aluminum Panels and Accessories:
 - 1. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.
 - 1. Examine framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal panel manufacturer.
 - 2. Examine sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal panel manufacturer.
 - a. Verify that air- or water-resistive barriers been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Miscellaneous Supports: Install sub framing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.
 - 1. Soffit Framing: Wire tie or clip furring channels to supports, as required to comply with requirements for assemblies indicated.

3.3 METAL PANEL INSTALLATION

- A. General: Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
1. Shim or otherwise plumb substrates receiving metal panels.
 2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
 3. Install screw fasteners in predrilled holes.
 4. Locate and space fastenings in uniform vertical and horizontal alignment.
 5. Install flashing and trim as metal panel work proceeds.
 6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
 7. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.
- B. Fasteners:
1. Steel Panels: Use stainless-steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.
 2. Aluminum Panels: Use aluminum or stainless-steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.
 3. Copper Panels: Use copper, stainless-steel, or hardware-bronze fasteners.
 4. Stainless-Steel Panels: Use stainless-steel fasteners.
- C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.
- D. Watertight Installation:
1. Apply a continuous ribbon of sealant or tape to seal lapped joints of metal panels, using sealant or tape as recommend by manufacturer on side laps of nesting-type panels and elsewhere as needed to make panels watertight.
 2. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
 3. At panel splices, nest panels with minimum 6-inch end lap, sealed with sealant and fastened together by interlocking clamping plates.
- E. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
1. Install components required for a complete metal panel system including trim, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal panel manufacturer; or, if not indicated, provide types recommended by metal panel manufacturer.
- F. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.

- 1 1. Install exposed flashing and trim that is without buckling, and tool marks, and that is true
2 to line and levels indicated, with exposed edges folded back to form hems. Install sheet
3 metal flashing and trim to fit substrates and to achieve waterproof performance.
- 4 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space
5 movement joints at a maximum of 10 feet with no joints allowed within 24 inches of
6 corner or intersection. Where lapped expansion provisions cannot be used or would not
7 be waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch
8 deep, filled with mastic sealant (concealed within joints).

9 3.4 CLEANING AND PROTECTION

- 10 A. Remove temporary protective coverings and strippable films, if any, as metal panels are
11 installed unless otherwise indicated in manufacturer's written installation instructions. On
12 completion of metal panel installation, clean finished surfaces as recommended by metal panel
13 manufacturer. Maintain in a clean condition during construction.
- 14 B. After metal panel installation, clear weep holes and drainage channels of obstructions, dirt, and
15 sealant.
- 16 C. Replace metal panels that have been damaged or have deteriorated beyond successful repair
17 by finish touchup or similar minor repair procedures.

18 END OF SECTION 07 42 93

1 SECTION 07 55 52 - STYRENE-BUTADIENE-STYRENE (SBS) MODIFIED BITUMINOUS MEMBRANE
2 ROOFING

3 PART 1 - GENERAL

4 1.1 RELATED DOCUMENTS

- 5 A. Drawings and general provisions of the Contract, including General and Supplementary
6 Conditions and Division 01 Specification Sections, apply to this Section.

7 1.2 SUMMARY

- 8 A. Section includes styrene-butadiene-styrene (SBS)-modified bituminous protected membrane
9 roofing including:

- 10 1. Installation of vapor retarder, roof insulation and protection board materials.
11 2. Roofing membrane.
12 3. Base flashings.
13 4. Accessory products.

- 14 B. Related Sections:

- 15 1. Section 06 10 00 - Rough Carpentry.
16 2. Section 07 60 00 – Flashing and Sheet Metal
17 3. Section 07 90 00 – Joint Sealants
18 4. Refer to Requirements of Division 22: Roof drains and rain water leaders.

19 C. DEFINITIONS

- 20 1. Roofing Terminology: Refer to ASTM D 1079 for definitions of terms related to roofing
21 work not otherwise defined in this Section.

22 D. REFERENCES

- 23 1. American Society for Testing and Materials:
- 24 a. ASTM C 208 - Specification for Cellulosic Fiber Insulating Board.
25 b. ASTM C 920 - Specification for Elastomeric Joint Sealants.
26 c. ASTM D 41 - Asphalt Primer Used in Roofing, Damp Proofing, and
27 Waterproofing.
28 d. ASTM D 70 - Test Method for Density of Semi-Solid Bituminous Materials
29 (Pycnometer Method).
30 e. ASTM D 92 - Test Method for Flash and Fire Points by Cleveland Open Cup
31 Tester.
32 f. ASTM D 276 - Test Methods for Identification of Fibers in Textiles.
33 g. ASTM D 2196 - Methods for Rheological Properties of Non-Newtonian Materials
34 by Rotational (Brookfield type) Viscometer.
35 h. ASTM D 4479 - Specification for Asphalt Roof Coatings - Asbestos-Free.
36 i. ASTM D 4586 - Asphalt Roof Cement, Asbestos-Free.
37 j. ASTM D 4601 - Asphalt-Coated Glass Fiber Base Sheet Used in Roofing.

- k. ASTM D 5147 - Test Methods for Sampling and Testing Modified Bituminous Sheet Material.
 - l. ASTM D 6164 - Styrene-Butadiene-Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements.
 - m. ASTM E 108 - Test for Fire Tests of Roof Coverings.
 - n. ASTM E 408 - Test Methods for Total Normal Emittance of Surfaces Using Inspection-Meter Techniques.
 - o. ASTM E 1980 - Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces
- 2. NBS-BSS #55 - Tensile strength for fully adhered, asphalt based roof systems.
 - 3. NRCA Roofing & Waterproofing Manual, latest edition
 - 4. SMACNA Architectural Sheet Metal Manual, latest Edition
 - 5. Membrane Immersion Test - Modified bitumen membrane, asphaltic impregnation evaluation, by PRS, Inc.

1.3 PERFORMANCE REQUIREMENTS

- A. General: Install a watertight, modified bituminous membrane roofing and base flashing system with compatible components that will not permit the passage of liquids and will withstand wind loads, thermally induced movement, and exposure to weather without failure.
- B. External Fire Resistance: UL Class A or Class B as noted on the drawings including field and all parapet curbs.
- C. Comply with NRCA Roofing and Waterproofing Manual Construction Details and manufacturers most current specification manual.
- D. Installation for wind design of 120 mph (3 second gust),
- E. Exposure C meeting FMG 1-60 and as specified and shown, but due to perimeter Zone 2 governing tested uplift design, tested listing meet FMG I-120.
- F. Completed roof surfaces shall not pond water.

1.4 REGULATORY REQUIREMENTS

- A. Underwriter's Laboratories: All products must be UL listed and labeled, and the system must be approved and listed by UL as a Class A fire rated system.
- B. Factory Mutual: The roof system must be listed by Factory Mutual as Class 1 approved with a wind uplift resistance of I-90.
- C. Roof membrane adhesives must be compliant to minimum standards for Local Coast Air Quality Management District. (LAQMD)
- D. Roofing membrane must meet or exceed standards set forth by California Title 24 regulations with minimum initial reflectivity of 76 percent and initial emissivity of 0.94.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.

- 1 B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and
2 attachments to other work, including:
- 3 1. Base flashings, cants, and membrane terminations.
4 2. Crickets, saddles, and slopes.
5 3. Fastening type and pattern to meet wind uplift, along with engineering calculations signed
6 by a structural engineer, registered in the state of California.
7 4. Deck type.
8 5. Layout of protection board.
9 6. Vapor retarder locations.
- 10 C. Samples for Verification: For the following products:
- 11 1. Cap sheet, of color required.
12 2. Flashing sheet, of color required.
- 13 1.6 INFORMATIONAL SUBMITTALS
- 14 A. Qualification Data: For Installer and manufacturer.
- 15 B. Manufacturer's Certificates:
- 16 1. Certify that the products and system meet or exceed specified requirements.
17 2. Certify that products and system meet identified code requirements.
18 3. Certify that membrane and other components used in conjunction with the work of this
19 Section are compatible with substrates over which they are to be applied.
20 4. Certify that the SBS membrane being submitted has been made successfully in U.S.A for
21 a minimum of 20 years.
- 22 C. Product Test Reports: For components of roofing system, for tests performed by manufacturer
23 and witnessed by a qualified testing agency.
- 24 D. Research/Evaluation Reports: For components of roofing system, from ICC-ES.
- 25 E. Sample Warranties: For manufacturer's special warranties.
- 26 1.7 CLOSEOUT SUBMITTALS
- 27 A. Maintenance Data: For roofing system to include in maintenance manuals.
- 28 B. Factory Mutual Assembly verification from a reputable third party testing authority. Submit
29 calculations, stamped and signed by a licensed engineer, showing the type of fasteners,
30 spacing and locations to achieve the FM 1-90 wind uplift requirement.
- 31 C. Samples for Verification: Of the following products:
- 32 1. 8" X 11" of modified bituminous, granule-surfaced cap sheets, of color specified. Submit
33 two samples of each flashing material.
- 34 D. Submit Material Safety Data Sheets on all roofing materials to be used.
- 35 E. Manufacturer's Field Reports:

1. Indicate procedures followed, ambient temperatures, humidity, wind velocity during application, results of fastener pull-out tests, and other items with possible effect on installation or performance.
2. Submit after each inspection of roofing system to verify satisfactory conditions for start of installation, satisfactory installation methods, and satisfactory completed installation.

F. Quality Control Submittals:

1. Credentials: Prior to starting roofing, submit credentials from roofing manufacturer for approval of applicator including length of time roofs have been installed with this product; list not less than 5 equivalent projects; year of installation with name, title and telephone number of person in charge; and letter from manufacturer signed by an officer of the company indicating willingness to provide 10 year warranty jointly and severally with installer and Contractor.

G. Design and Specification Approval: Prior to starting roofing, submit signed statement that roofing design and specifications are suitable for this project.

H. Warranties: Sample of special warranties.

1.8 PERFORMANCE REQUIREMENTS

A. General Performance: Installed roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roofing and base flashings shall remain watertight.

1. Accelerated Weathering: Roofing system shall withstand 2000 hours of exposure when tested according to ASTM G 152, ASTM G 154, or ASTM G 155.
2. Impact Resistance: Roofing system shall resist impact damage when tested according to ASTM D 3746 or ASTM D 4272.

B. Material Compatibility: Roofing materials shall be compatible with one another under conditions of service and application required, as demonstrated by roofing manufacturer based on testing and field experience.

C. FM Global Listing: Roofing, base flashings, and component materials shall comply with requirements in FM Global 4450 or FM Global 4470 as part of a built-up roofing system, and shall be listed in FM Global's "RoofNav" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Global markings.

1. Fire/Windstorm Classification: Class 1A-90.
2. Hail-Resistance Rating: MH.

D. Solar Reflectance Index (SRI): Compliant with California Title 24 with SRI not less than 78 when calculated according to ASTM E 1980, based on testing identical products by a qualified testing agency.

E. Energy Performance: Roofing system shall have an initial solar reflectance of not less than 0.70 and an emissivity of not less than 0.75 when tested according to CRRC-1.

F. Exterior Fire-Test Exposure: ASTM E 108 or UL 790, Class A; for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

- 1 G. Fire-Resistance Ratings: Comply with fire-resistance-rated assembly designs indicated. Identify
2 products with appropriate markings of applicable testing agency.

3 1.9 QUALITY ASSURANCE

- 4 A. Installer Qualifications: Engage an experienced installer to perform Work of this Section who
5 has a minimum of 5 year's experience with the specified manufacturer's system, or similar
6 systems, and who is approved, authorized, or licensed by the roofing system manufacturer to
7 install manufacturer's product; and who is eligible to receive the standard roofing manufacturer's
8 warranty.

- 9 B. Manufacturer: Obtain primary products, including roof membrane, base plies, base flashings,
10 membrane adhesives, roof insulation boards, roof insulation fasteners and adhesives products
11 from a single manufacturer. Provide secondary products recommended by the manufacturer of
12 primary products for use with roofing system provided.

- 13 1. ISO 9001-2000 Certification: The manufacturer must provide documentation showing the
14 manufacturer has current ISO 9001-2000 (Quality Management) certification and
15 registration for the specific manufacturing plant where the modified bitumen membrane
16 products are produced.
17 2. ISO 14000 Certification: The manufacturer must provide documentation showing the
18 manufacturer has current ISO 14000 certification and registration (Environmental
19 Management Program) for the specific plant where the modified bitumen products are
20 produced.
21 3. The manufacturer must have 3 years minimum of documented in-field experience with
22 the white surface top ply.

- 23 C. Work of this section to conform to recommendations of the NRCA Roofing and Waterproofing
24 Manual.

- 25 D. The roofing systems manufacturer shall provide qualified company personnel to attend pre-
26 construction & in-progress meetings, and to perform periodic job site visits as necessary. The
27 manufacturer shall also provide non-sales related field auditors for the purpose of performing
28 quality assurance inspections, both in-progress and final inspections. Provide copies of the
29 manufacturer's field auditor inspection report to the contractor, specifier, and building owner.

30 1.10 MANUFACTURER'S RESPONSIBILITY

- 31 A. Manufacturer shall inspect and direct the installation of their products with the installer. They
32 shall also provide annual inspections during the life of the warranty.

33 1.11 PRE-INSTALLATION CONFERENCE

- 34 A. A pre-installation conference shall be held approximately two weeks prior to commencing work
35 of Section 01 31 19 - Project Meetings. The General Contractor, Construction Manager,
36 Architect, roofing contractor, sub-contractors, and manufacturer must be present.

- 37 B. Review installation procedures, materials to be used, submittals, schedules, and all related work
38 required under this section. Finalize construction schedule and confirm availability of materials,
39 equipment, contractor's personnel, and facilities needed to complete work as planned.

- C. Review forecasted weather conditions and procedures for coping with unfavorable conditions, and maintaining the water tightness of the roof system.
- D. Tour representative areas of roofing substrates, inspect and discuss condition of substrate, roof drains, penetrations, curbs, and any work performed by other trades.
- E. Review structural loading limitations of deck and inspect deck for acceptability as roof substrate.
- F. Review inspection and quality control procedures to be used.
- G. Record discussions of conference, including decisions and agreements reached. Furnish copy of record to each party attending. If disagreements exist at the conclusion of the conference, determine how disagreements will be resolved, and set a date for reconvening conference.

1.12 DELIVERY, STORAGE, AND HANDLING

- A. Store roofing materials in a dry, well-ventilated, weather tight location to ensure no significant moisture pickup and maintain at a temperature exceeding roofing system manufacturer's written instructions.
- B. Store roll goods and other sheet materials on end on pallets or other raised surfaces. Do not double-stack rolls.
- C. Handle and store roofing materials and place equipment in a manner to avoid significant or permanent damage to deck or structural supporting members.
- D. Do not leave unused felts and other sheet materials on the roof overnight or when roofing work is not in progress unless protected from weather and moisture and unless maintained at a temperature exceeding 40° F.
- E. Deliver and store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer.
- F. Protect roofing insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturers written instructions for handling, storing, and protecting during installation.
- G. Strictly comply with manufacturer's instruction for storage and handling.
- H. Remove products from job site that show indications of moisture damage and replace with undamaged materials.

1.13 PROJECT CONDITIONS

- A. Weather Limitations:
 - 1. Proceed with roofing work only when existing and forecasted weather conditions will permit the roof system to be installed in accordance with manufacturer's recommendations and warranty requirements.
 - 2. Work shall be stopped if moisture is present in any form (snow, water, and dew), or if conditions do not allow the proper application rates of adhesives.
 - 3. Follow manufacturer's instructions for cold weather installation when applicable.

1.14 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which installer and manufacturer agrees to repair or replace roof assemblies that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
- a. Structural failures including rupturing, cracking, or puncturing.
- b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
- B. Warranty Period: Two (2) years from date of Project Completion.
- C. Special Roofing Manufacturer's Warranty: Manufacturer's standard or customized form, without monetary limitation, in which manufacturer agrees to repair or replace components of membrane roofing system that fail in materials or workmanship within specified warranty period.
- D. Special systems warranty includes membrane roofing, base flashings, roof insulation, fasteners, cover boards, substrate board, roofing accessories, and other components of membrane roofing system.
- E. Clearly state procedures for the owner to follow for immediate repairs if leaks occur. If emergency repairs are performed, and the cause of the leak is covered by the warranty, the manufacturer will pay for the emergency repair, as well as the permanent repairs.
- F. In the event of a dispute between the County and the manufacturer, the warranty shall require both parties to resolve the dispute through third party arbitration. The warranty must clearly describe the process of selecting an arbitrator, and the obligation of each party under the arbitration process.
- G. Warranty Period: 20 years from date of Project completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: The finished assembly base and ply shall weigh a minimum of 210-lbs/100 square feet and have a minimum thickness of 290 mils. Subject to compliance with requirements, provide products by one of the following:
1. Soprema, Inc.
2. Firestone
3. Siplast
4. John's Manville
5. Malarkey Roofing Products (R3-CI-BBN-H at concrete roof and R3-MI-BBN-H at metal deck, Basis of Design)
6. Accepted Substitute in accordance with Section 01 60 00.
- B. Source Limitations: Obtain components including roof insulation fasteners for roofing system from same manufacturer as roofing or manufacturer approved by roofing manufacturer.

2.2 SBS-MODIFIED BITUMINOUS SHEETING SYSTEM

A. SBS-Modified Interply and Base for flashing Bituminous Sheet, Smooth Surfaced: Styrene-Butadiene-Styrene modified asphalt sheet, smooth surfaced; suitable for application method specified; manufacturer's minimum 60 pounds / 100 square feet (two ply combined) standard weight; for use and of reinforcing type as follows:

1. Use: 2 plies of heat welded base sheet.
2. Reinforcing: polyester or fiberglass.
3. Factory applied burn off film on the top and underside of ply sheet.
4. Comply with ASTM D 4601.
5. Mil thickness 120 (to meet 1-120 uplift Roofnav Assembly # 281020-224869-0)

B. SBS-Modified Bituminous Cap Sheet with Mineral Granule Surface: Styrene-Butadiene-Styrene modified asphalt sheet, reinforced, with layer of mineral granules factory applied to top exposed surface and suitable for application method specified; manufacturer's 100 pounds / 100 square feet standard weight; for use and of reinforcing type and granule color as follows:

1. Class A rated membrane.
2. Reinforcing: Polyester or fiberglass.
3. Factory applied burn off film on the underside of ply sheet.
4. Comply with ASTM D 3909
5. Flashing Cap Sheet Color: Title 24 reflective cap (minimum 78% reflective, .89 emissivity).

C. SBS-Modified Flashing: Styrene-Butadiene-Styrene modified asphalt sheet, finished with layer of mineral granules factory applied to top exposed surface and suitable for application method specified; manufacturer's 100 pounds / 100 square feet standard weight. All flashing and parapet walls, curbs refer to drawing.

1. Class A rated membrane.
2. Use: Finish ply of 3-ply, modified bituminous membrane roofing and base flashing.
3. Reinforcing: Polyester or fiberglass.
4. Factory applied burn off film on the underside of ply sheet.
5. Cap Sheet Color: Title 24 reflective cap (minimum 78% reflective, .89 emissivity)
6. Comply with ASTM D 3909.

D. Cap Sheet:

1. Tensile Strength: Average 162 lbf/in. in machine direction (MD) and in cross direction (XD) at 117 / 0 degrees F.
2. Tear Strength average of 138 lb/in MD and XD 162 at room temperature of 73.4 degrees F.
3. Elongation at room temperature: 49 percent nominal MD and 30 XD at 0 deg F.
4. Low-Temperature Flexibility: Pass at -15 deg F.

E. Smooth Membrane and Base for Flashing:

1. Tensile Strength: Average of 117 lbf/in. in MD and 83 XD at 0 degrees F.
2. Tear Strength average of 120 lbf/in MD and 87 XD at room temperature of 73.4 degrees F.
3. Elongation at room temperature: 56 percent nominal MD and 61 XD at 73.4 deg F.
4. Low-Temperature Flexibility: Pass at -15 deg F.

F. Flashing:

1. Tensile Strength: Average 162 lbf/in. in machine direction (MD) and in cross direction (XD) at 117 / 0 degrees F.
2. Tear Strength average of 138 lb/in MD and XD 162 at room temperature of 73.4 degrees F.
3. Elongation at room temperature: 49 percent nominal MD and 30 XD at 0 deg F.
4. Low-Temperature Flexibility: Pass at -15 deg F.
5. Top Surfacing: White embossed aluminum foil meeting the minimum requirement for reflectivity and emissivity as required by California Title 24 part 6: Reflectivity greater than 0.70 in accordance to ASTM C1549. Emissivity greater than 0.75 in accordance to ASTM C1371.

- G. Membrane Immersion Test: All modified bitumen membrane products supplied must be tested and conform to the Membrane Immersion Test. Maximum blister area allowed after completion of the test will be 5 percent of the sample area tested. Manufacturer must provide documentation showing compliance with this standard for a minimum of the past 2 years for each product supplied for the Project.

2.3 ROOF INSULATION

- A. General: Preformed roof insulation boards manufactured or approved by roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated.
- B. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1.
1. Compatible with roofing manufacturers requirements for roofing system.
 2. Flame Spread Index: 75 or less, ASTM E 84.
 3. Smoke Developed Index: 450 or less, ASTM E 84.
 4. Compressive Strength: 25 pounds per square inch
 5. FM I-90 wind uplift classification.

2.4 INSULATION ACCESSORIES

- A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatible with roofing.
- B. Protection Mat: Woven or nonwoven polypropylene, polyolefin, or polyester fabric, water permeable and resistant to UV degradation, type and weight as recommended by roofing system manufacturer for application.

2.5 SUBSTRATE BOARDS

- A. Substrate (Cover) Board: ASTM C 208, wood fiberboard, composed of random laid wood fiber strands and primed on the mopping surface, minimum 1/2 inch thick.
- B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening substrate board to metal roof deck.

2.6 AUXILIARY MEMBRANE MATERIALS

- A. General: Furnish auxiliary materials recommended by roofing system manufacturer for intended use and compatible with SBS-modified bituminous roofing.
1. Furnish liquid-type auxiliary materials that meet VOC limits of authorities having jurisdiction.
 2. Asphalt Primer: ASTM D 41.
 3. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required by roofing system manufacturer for application.
 4. Rigid Insulation Cement: Cold-applied adhesive must be compatible with extruded polystyrene foam and protection board. It must demonstrate no cavitation to extruded polystyrene foam at cure temperatures below 100 degrees Fahrenheit. The bond strength after cure shall be greater than the tensile strength of the extruded polystyrene foam.
- B. Approved manufacturers:
1. HVIII Insulation Adhesive by Soprema
 2. Instastik by Dow Chemical
 3. Roof Bond by Henry Company
 4. Malarkey Roofing approved asphalt/adhesive
- C. Roofing Asphalt: ASTM D 312, Type III or IV as recommended by roofing manufacturer for application.
- D. Roofing Asphalt: ASTM D 6152, SEBS modified.
- E. Cold-Applied Adhesive: Roofing manufacturer's standard asphalt-based, one- or two-part, asbestos-free, cold-applied adhesive specially formulated for compatibility and use with roofing and base flashings.
- F. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required by roofing system manufacturer for application.
- G. Mastic Sealant: Polyisobutylene, plain or modified bitumen; nonhardening, nonmigrating, nonskinning, and nondrying.
- H. Cover Board: Cover Board: ASTM C 1177, glass-mat, water-resistant gypsum substrate, 1/2 inch thick.
- I. Insulation Cant Strips: One of the following:
1. ASTM C 728, perlite insulation board.
 2. ASTM C 208, Type II, Grade 1, cellulosic-fiber insulation board.
- J. Metal Flashing Sheet: As specified in Section 07 71 00 "Roof Specialties."
- K. Roofing Granules: Ceramic-coated roofing granules, No. 11 screen size with 100 percent passing No. 8 sieve and 98 percent of mass retained on No. 40 sieve, color to match roofing.
- L. Separator Sheet: Polyethylene sheet, 4 mils thick, minimum.
- M. Miscellaneous Accessories: Provide accessories recommended by roofing system manufacturer.

- N. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions of FM 4470; designed for fastening base sheets, base-ply felts, and base flashings and for back-nailing modified bituminous membrane to substrate; tested by manufacturer for required pullout strength; and acceptable to roofing system manufacturer. Provide treated wood nailer strip at size and spacing at manufacturer's recommendations.
- O. Miscellaneous Accessories: Provide miscellaneous accessories recommended by roofing system manufacturer for intended use.
1. Parapet Cap Wood Nailers & Curbs: Shall be #2 wolmanized pressure treated wood.
 2. Flashing Nails: For parapet cap wood nailers and curbs, flashing nails shall be 11 gauge, barbed galvanized with 1-inch diameter heads and of sufficient length to penetrate the full depth of the nailer. For concrete and masonry substrates, case hardened nails for concrete shall be used. Tin caps must be used with all flashing nails. Large head Simplex nails may be used without tin caps.
 3. Base Ply Fasteners, for Lightweight Concrete Decks and Metal Deck: Perlok/ES, Perlok 12 Hex FM-90 fasteners, as manufactured by Performance Roof Systems, Inc. Coated base ply fasteners made from galvanized steel (G-90) with supplemental plates for FM 1-90 compliance.
- P. Stack Vent & Drain Lead: Shall be minimum 4-pound lead.
- Q. Roof Drains: Follow recommendations for installation of roof drains contained in the latest edition of NRCA Roofing and Waterproofing Manual.
- R. Walkway Pads: Shall be additional layer of granule surfaced, fire resistant SBS-modified bitumen membrane, color to contrast with field membrane cap sheet.
1. Description:
 - a. Thickness: Minimum 180 mils.
 - b. Tensile Strength - Weakest Direction: Minimum 260/240-pounds per inch of width, at 0 degrees F., as tested by ASTM D6223.
 - c. Tear Resistance - Weakest Direction: Minimum 200 pounds, as tested by ASTM D6223.
 - d. Reinforcement: Triple reinforcement with a glass mat along with a glass and polyester composite mat.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work:
1. Verify that roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely clamped in place.
 2. Verify that wood cants, blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations.
 3. Verify that minimum concrete drying period recommended by roofing system manufacturer has passed.
 4. Verify that concrete substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263 and/or ASTM F 2170.

- a. Test for moisture by pouring 1 pint of hot roofing asphalt on deck at start of each day's work and at start of each roof area or plane. Do not proceed with roofing work if test sample foams or can be easily and cleanly stripped after cooling.

5. Verify that concrete-curing compounds that will impair adhesion of roofing components to roof deck have been removed.

- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 GENERAL ROOFING INSTALLATION REQUIREMENTS

- A. Install modified bituminous membrane roofing system according to roofing system manufacturer's written instructions and applicable recommendations of NRCA/ARMA's "Quality Control Recommendations for Polymer Modified Bitumen Roofing."

1. Install roofing system according to applicable specification plates of NRCA's "The NRCA Roofing and Waterproofing Manual."
2. Start installation of modified bituminous membrane roofing in presence of roofing system manufacturer's technical personnel.

- B. Start installation of roofing in presence of manufacturer's technical personnel.

- C. Coordinate installation of roofing system so insulation and other components of the roofing system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is forecast.

1. Provide tie-offs at end of each day's work to cover exposed roofing sheets with a course of coated felt set in roofing cement or hot roofing asphalt, with joints and edges sealed.
2. Complete terminations and base flashings, and provide temporary seals to prevent water from entering completed sections of roofing system.
3. Remove and discard temporary seals before beginning work on adjoining roofing.

- D. Asphalt Heating: Heat asphalt to its equiviscous temperature, measured at the mop cart or mechanical spreader immediately before application. Circulate asphalt during heating. Do not raise roofing asphalt temperature above equiviscous temperature range more than one hour before time of application. Do not exceed roofing asphalt manufacturer's recommended temperature limits during roofing asphalt heating. Do not heat roofing asphalt within 25 deg F of flash point. Discard roofing asphalt maintained at a temperature exceeding finished blowing temperature for more than four hours.

1. Apply hot roofing asphalt within plus or minus 25 deg F of equiviscous temperature.

- E. Asphalt Heating: Heat and apply SEBS-modified roofing asphalt according to roofing system manufacturer's written instructions.

- F. Substrate-Joint Penetrations: Prevent roofing asphalt from penetrating substrate joints, entering building, or damaging roofing system components or adjacent building construction.

- G. Plan the flow of work, equipment, materials, and personnel to eliminate traffic across the completed new roof system. Provide plywood walkways for the movement of personnel, equipment, and materials to avoid damage to the existing roof system that is yet to be removed.

H. Cant Strips: Install and secure preformed 45-degree cant strips at junctures of modified bituminous membrane roofing system with vertical surfaces or angle changes greater than 45 degrees. Secure cant strips in bed of mastic.

I. Remove and discard temporary seals before beginning work on adjoining roofing.

3.3 SUBSTRATE PREPARATION

A. Examine substrates to receive new roof membrane and base flashings. Verify that substrates are clean and acceptable to receive new work. Do not proceed with roofing until all unsatisfactory conditions have been reported to the building owner and corrected. Remove sharp projections.

3.4 VAPOR RETARDER APPLICATION

A. Apply vapor retarder to deck surface in accordance with manufacturer's instructions. Extend vapor retarder under blocking to deck edge.

3.5 INSULATION APPLICATION

A. Ensure substrate and insulation is clean and dry.

B. Install insulation in accordance with Manufacturer's printed instructions.

1. The insulation can be fastened with cold-applied adhesive to concrete decks in accordance with UL, and manufacturer's instructions.
2. The insulation can be mechanically fastened or otherwise secured in accordance with, UL, FM and manufacturer's instructions at metal and wood decks.
3. Place the constant thickness primary layer(s) and the tapered thickness insulation final layer(s) to the required slope pattern in accordance with manufacturer's instructions.
4. Minimum Total Insulation Thickness: Match existing insulation thickness.
5. Lay boards with edges in moderate contact without forcing, 1/4 inch maximum joint width. Cut insulation to fit neatly to perimeter blocking and around penetrations through roof.

C. Tapered Insulation:

1. Install tapered insulation to form slopes or crickets as indicated or required.
2. Lay tapered boards for a distance of 24 inches back from roof drains for positive drainage.
3. Secure to base insulation if necessary to prevent shifting and in accordance with UL, and manufacturer's instructions.
4. Minimum Slope: 1/4 inch per foot.
5. Provide smooth transitions. Abrupt or vertical drops not allowed at joints.

D. Apply no more insulation than can be covered with membrane in same day, and before approaching precipitation.

E. Install temporary water cutoffs at completion of work each day and remove upon resumption of work.

3.6 PROTECTION BOARD APPLICATION

- A. Install one layer protection board over thermal insulation and attach in accordance with roof membrane manufacturer's recommendations.
- B. Butt joints to ensure gaps less than 1/4 inch wide.
- C. Install with fastener type and spacing as recommended by the manufacturer for the wind uplift requirement listed above. Minimum requirement shall be 18 fasteners per board. Fastener density shall be increased 50% at the roof corners and perimeter in compliance with Class 1-120, FMEC Loss Prevention Data Sheet 1-28.
- D. Cut sheathing cleanly and accurately at roof breaks and protrusions to provide smooth surface. Tape joints.
- E. Cant Strips: Cant strips are required at the transition of vertical intersections of roof deck and wall/curb surfaces in all membrane flashing applications.

3.7 ROOF MEMBRANE INSTALLATION

- A. General: Install modified bituminous membrane over area to receive roofing, according to manufacturer's written instructions. Extend modified bituminous membrane over and terminate beyond cants.
 - 1. Unroll sheet and allow it to relax for the minimum time period required by manufacturer.
 - 2. Administration building roof is in a very visible area and all work is to be of the utmost craftsmanship to keep all lines straight, true and parallel with the existing roof trim and edge.
 - 3. Two-Ply, Modified Bituminous Membrane: Install 2 plies of modified bituminous membrane, consisting of a base ply and a finish ply, starting at low point of roofing system.
- B. Base- and Finish-Ply Application to protection board: Torch apply each ply to substrate. Fully prime the upper surface of protection board with an asphalt primer (as recommended by insulation and membrane manufacturer) prior to torching the first layer.
- C. Laps: Accurately align sheets, without stretching, and maintain uniform side and end laps. Stagger end laps. Heat-weld side and end laps and completely seal by rolling, leaving no voids.
 - 1. Surfacing sheet side and end laps shall be offset from the base ply side and end laps by a minimum of 12 inches.
 - 2. Repair tears and voids in laps and lapped seams not completely sealed.
 - 3. Apply granules, while asphalt is hot, to cover any asphalt bead extruded at laps that are exposed beyond the underlying sheet.
 - 4. Install modified bituminous membranes with side laps shingled with slope of roof deck where possible.
- D. Install modified bituminous membranes with side laps shingled in direction to shed water on each large area of roofing.
- E. Back nail all the head laps and side laps to treated wood nailers as recommended by the roofing manufacturer.
- F. Install roofing surface granules at all exposed asphalt.

- G. Membrane Walkways: Install another ply of modified bituminous membrane, approximately 36 inches wide and in lengths not exceeding 10 feet, leaving a space of 6 inches between strips, at all mechanical equipment. Adhere walkways by same method used to adhere roof membrane. Location of walkways shall be on the backside of roof, not exposed from the front, parking lot side.

3.8 FLASHING AND STRIPPING INSTALLATION

- A. Install modified bituminous membrane base flashing over cant strips and other sloping and vertical surfaces, at roof edges, and at penetrations through roof, and secure to substrates according to roofing system manufacturer's written instructions and as follows:
- B. Prime substrates with asphalt primer if required by roofing system manufacturer.
- C. Base Flashing Application: Torch apply modified bituminous membrane base flashing to substrate.
- D. Extend base flashing up the wall a minimum of 8 inches above roof membrane and 4 inches onto field of roof membrane.
- E. Mechanically fasten top of modified bituminous membrane base flashing securely at terminations and perimeter of roofing.
- F. Seal top termination of base flashing.
- G. Install modified bituminous stripping where metal flanges and edgings are set on membrane roofing, according to roofing system manufacturer's written instructions.
- H. All penetration vents shall be capped with a preformed cap that is straight, true and plumb, matching similar caps indicated.
- I. All fans, ducts, and other metal penetration covers shall be lifted off the curb prior to application of the base flashing membrane. After application of the base flashing membrane, reset the penetration cover.
- J. Parapet Walls: On top of the parapet walls, apply a layer of self-adhered membrane up and over the top of the walls to act as a secondary water barrier. The parapet wall coping will be installed over the self-adhered membrane.

3.9 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to inspect substrate conditions, surface preparation, membrane application, flashings, protection, and drainage components, and to furnish reports to Architect.
1. Electric Field Vector Mapping (EFVM): Testing agency shall survey entire roof area for potential leaks using electric field vector mapping (EFVM).
- B. Test Cuts: Test specimens will be removed to evaluate problems observed during quality-assurance inspections of roofing membrane as follows:
1. Approximate quantities of components within roofing membrane will be determined according to ASTM D 3617.

2. Test specimens will be examined for interply voids according to ASTM D 3617 and to comply with criteria established in Appendix 3 in ARMA/NRCA's "Quality Control Guidelines for the Application of Polymer Modified Bitumen Roofing."
3. Repair areas where test cuts were made according to roofing system manufacturer's written instructions.

C. Manufacturer's Field Representative Inspection Frequency: The manufacturer's representative shall perform a minimum of three (3) inspections during the course of the project. One inspection shall be made at the start of the project, one inspection at the mid-point of the project, and one inspection upon completion of the project.

D. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.

1. Notify Architect and Owner 48 hours in advance of date and time of inspection.

E. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.

F. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

G. Flood Testing: Flood test each roofing area for leaks, according to recommendations in ASTM D 5957, after completing roofing and flashing but before overlying construction is placed. Install temporary containment assemblies, plug or dam drains, and flood with potable water.

1. Flood to an average depth of 2-1/2 inches with a minimum depth of 1 inch and not exceeding a depth of 4 inches. Maintain 2 inches of clearance from top of base flashing.
2. Flood each area for 72 hours.
3. After flood testing, repair leaks, repeat flood tests, and make further repairs until roofing and flashing installations are watertight.

3.10 PROTECTION AND CLEANING

A. Protect modified bituminous membrane roofing from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

B. Provide protection for architectural concrete and other building surfaces against damage of staining from roofing operations. Any surfaces damaged or stained as a result of roofing operations shall be cleaned, repaired or replaced as necessary by the roofing contractor.

C. Correct deficiencies in or remove modified bituminous roofing that does not comply with requirements, repair substrates, reinstall roofing, and repair base flashings to a condition free of damage and deterioration at the time of Substantial Completion and according to warranty requirements.

D. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

3.11 FIRE WATCH

- A. Fire watch shall be provided continuously during and for at least 2 hour following torch application. At least two 2-1/2 gallon containers of water and two 15-pound carbon dioxide extinguishers shall be available during the fire watch. When work is interrupted, or at the end of a section of roofing, and at the end of each day's work, areas which had been subjected to torch applications shall be surveyed with an infra-red sensing device. Hot spots shall be cooled and re-surveyed. If a hot spot persists, the roof shall be cut open and any smoldering shall be extinguished before the foreman leaves the site.

3.12 ROOFING INSTALLER'S WARRANTY

- A. WHEREAS _____ of _____, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:

1. Owner: **<Insert name of Owner>**.
2. Address: **<Insert address>**.
3. Building Name/Type: **<Insert information>**.
4. Address: **<Insert address>**.
5. Area of Work: **<Insert information>**.
6. Acceptance Date: _____.
7. Warranty Period: **<Insert time>**.
8. Expiration Date: _____.

- B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

- C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.

- D. This Warranty is made subject to the following terms and conditions:

1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:
 - a. lightning;
 - b. peak gust wind speed exceeding **<Insert mph>**;
 - c. fire;
 - d. failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
 - e. faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
 - f. vapor condensation on bottom of roofing; and
 - g. activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.
2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.

3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.
4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.
5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.
6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this _____ day of _____, _____.

1. Authorized Signature: _____.
2. Name: _____.
3. Title: _____.

END OF SECTION 07 55 52

1 SECTION 07 71 00 - ROOF SPECIALTIES

2 PART 1 - GENERAL

3 1.1 GENERAL REQUIREMENTS

- 4 A. Drawings and Conditions of Contract, including General and Supplementary Conditions and
5 Division 1 Administration Sections, apply to this Division.

6 1.2 SUMMARY

- 7 A. This Section includes the following manufactured roof specialties:

- 8 1. Copings.
9 2. Roof edge flashings.
10 3. Roof edge drainage systems.
11 4. Counterflashings and reglets.

- 12 B. Related Sections include the following:

- 13 1. Division 03 30 00 Section "Cast-in-Place Concrete" for installing reglets.
14 2. Division 06 10 00 Section "Rough Carpentry" for wood nailers, curbs, and blocking.
15 3. Division 07 92 00 Section "Joint Sealants" for field-applied sealants.

16 1.3 PERFORMANCE REQUIREMENTS

- 17 A. General: Manufacture and install manufactured roof specialties to resist thermally induced
18 movement and exposure to weather without failing, rattling, leaking, and fastener
19 disengagement.

- 20 B. FMG Listing: Manufacture and install copings and roof edge flashings that are listed in FMG's
21 "Approval Guide" and approved for Windstorm Classification, Class 1-60. Identify materials with
22 FMG markings.

- 23 1. Ground Roughness: As indicated on Drawings.
24 2. Wind Speed: As indicated on Drawings.

- 25 A. SPRI Wind Design Standard: Manufacture and install copings tested according to SPRI ES-1
26 and capable of resisting the following design pressure:

- 27 1. Horizontal: 30 psf.
28 2. Vertical: 79 psf.

- 29 B. Thermal Movements: Provide manufactured roof specialties that allow for thermal movements
30 resulting from the following maximum change (range) in ambient and surface temperatures by
31 preventing buckling, opening of joints, hole elongation, overstressing of components, failure of
32 joint sealants, failure of connections, and other detrimental effects. Provide clips that resist
33 rotation and avoid shear stress as a result of thermal movements. Base engineering calculation
34 on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

- 35 1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C),
36 material surfaces.

- 37 C. Water Infiltration: Provide manufactured roof specialties that do not allow water infiltration to
38 building interior.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: Show layouts of manufactured roof specialties, including plans and elevations. Identify factory- vs. field-assembled work. Include the following:
 - 1. Details for fastening, joining, supporting, and anchoring manufactured roof specialties including fasteners, clips, cleats, and attachments to adjoining work.
 - 2. Details for expansion and contraction.
- C. Fabrication Samples: For copings roof edge flashings roof edge drainage systems counterflashings and reglets made from 12-inch (300-mm) lengths of full-size components including fasteners, cover joints, accessories, and attachments.
- D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, verifying compliance of copings roof edge flashings with performance requirements.
- E. Warranty: Special warranty specified in this Section.

1.5 QUALITY ASSURANCE

- A. Product Options: Information on Drawings and in Specifications establishes requirements for system's aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.
 - 1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

1.6 COORDINATION

- A. Coordinate installation of manufactured roof specialties with interfacing and adjoining construction to provide a leakproof, secure, and noncorrosive installation.

1.7 WARRANTY

- A. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace manufactured roof specialties that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: 20 years from date of Project completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified. (Fire-stone Uniclad)

2.2 EXPOSED METALS

- A. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy and temper recommended by manufacturer for use and finish indicated, finished as follows:

1. Surface: Smooth, flat finish.
2. High-Performance Organic Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - a. Fluoropolymer 2-Coat System: Manufacturer's standard 2-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2605.
3. Anodic Finish: Apply the following finish:
 - a. Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 611.

- B. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), alloy and temper recommended by manufacturer for type of use and finish indicated, finished as follows:

1. High-Performance Organic Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - a. Fluoropolymer 2-Coat System: Manufacturer's standard 2-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2605.
2. Anodic Finish: Apply the following finish:
 - a. Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 611.

- C. Prepainted, Zinc-Coated Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating designation, structural quality, and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.

1. Surface: Smooth, flat finish.
2. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

- a. Fluoropolymer 2-Coat System: Manufacturer's standard 2-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with physical properties and coating performance requirements of AAMA 2605, except as modified below:
- 1) Humidity Resistance: 2000 hours.

2.3 CONCEALED METALS

- A. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy and temper recommended by manufacturer for use and structural performance indicated, mill finished.
- B. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), alloy and temper recommended by manufacturer for type of use and structural performance indicated, mill finished.
- C. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304.
- D. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating designation; structural quality.

2.4 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, protective coatings, separators, sealants, and other miscellaneous items required by manufacturer for a complete installation.
- B. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to withstand design loads.
1. Exposed Penetrating Fasteners: Gasketed screws with hex washer heads matching color of sheet metal.
- C. Sealing Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealing tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape.
- D. Elastomeric Sealant: ASTM C 920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- E. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant, polyisobutylene plasticized, heavy bodied for hooked-type expansion joints with limited movement.
- F. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
- G. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
- H. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.
- I. Polyethylene Sheet: 6-mil- (0.15-mm-) thick polyethylene sheet complying with ASTM D 4397.
- J. Felt: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
1. Slip Sheet: Rosin-sized paper, minimum 3 lb/100 sq. ft. (0.16 kg/sq. m).

2.5 COPINGS

- A. Copings: Manufactured coping system consisting of formed-metal coping cap in section lengths not exceeding 12 feet (3.6 m), concealed anchorage, concealed splice plates with same finish as coping caps, mitered corner units, and end cap units.
1. Available Manufacturers:
 - a. Architectural Products Co.
 - b. ATAS International, Inc.
 - c. Castle Metal Products.
 - d. Cheney Flashing Company.
 - e. Hickman, W. P. Company.
 - f. Merchant & Evans, Inc.
 - g. Metal-Era, Inc.
 - h. Metal-Fab Manufacturing LLC.
 - i. MM Systems Corporation.
 - j. Perimeter Systems, a division of Southern Aluminum Finishing Co.
 - k. Petersen Aluminum Corp.
 2. Coping Caps: Snap-on, fabricated from the following exposed metal:
 - a. Aluminum: 0.040 inch (1.0 mm) thick.
 - b. Prepainted, Zinc-Coated Steel: 0.040 inch (1.0 mm) thick.
 3. Coping Cap Color: Match paint colors as indicated on drawings.
 4. Corners: Continuously welded.
 5. Snap-on Coping Anchor Plates: Concealed, galvanized steel sheet, 12 inches (300 mm) wide, 0.028 inch (0.7 mm) thick, with integral cleats.
 6. Face Leg Cleats: Concealed, continuous galvanized steel sheet.

2.6 ROOF EDGE FLASHING

2.7 COUNTERFLASHINGS AND REGLETS

- A. Available Manufacturers:
1. Castle Metal Products.
 2. Cheney Flashing Company.
 3. Fry Reglet Corporation.
 4. Hickman, W. P. Company.
 5. Keystone Flashing Company.
 6. Merchant & Evans, Inc.
 7. Metal-Era, Inc.
 8. MM Systems Corporation.
- B. Counterflashings: Manufactured units in lengths not exceeding 12 feet (3.6 m) < designed to snap into reglets and compress against base flashings with joints lapped, from the following exposed metal in thickness indicated:
1. Aluminum: 0.024 inch (0.6 mm) thick.
 2. Prepainted, Zinc-Coated Steel: 0.028 inch (0.7 mm) thick.
- C. Reglets: Manufactured units formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashings indicated with factory-mitered and -welded corners and junctions, from the following exposed metal in thickness indicated:
1. Aluminum: 0.050 inch (1.2 mm) thick.
 2. Prepainted, Zinc-Coated Steel: 0.028 inch (0.7 mm) thick.
 3. Type: For concrete application with temporary closure tape to keep reglet free of concrete materials, special fasteners for attaching reglet to concrete forms, and guides to ensure alignment of reglet section ends.

4. Type: For masonry application, with offset top flange for embedment in masonry mortar joint.
5. Type: Multiuse, for embedment in masonry mortar joints.

D. Accessories: Counterflashing wind-restraint clips.

2.8 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of work.
 1. Examine walls, roof edges, and parapets for suitable conditions for manufactured roof specialties.
 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
 3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install manufactured roof specialties according to manufacturer's written instructions. Anchor manufactured roof specialties securely in place and capable of resisting forces specified in performance requirements. Use fasteners, separators, sealants, and other miscellaneous items as required to complete manufactured roof specialty systems.
 1. Install manufactured roof specialties with provisions for thermal and structural movement.
 2. Torch cutting of manufactured roof specialties is not permitted.
- B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
 1. Coat concealed side of uncoated aluminum manufactured roof specialties with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
 2. Underlayment: Where installing exposed-to-view components of manufactured roof specialties directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet, or install a course of polyethylene underlayment.
 3. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof specialties for waterproof performance.

- 1 C. Install manufactured roof specialties level, plumb, true to line and elevation, and without
2 warping, jogs in alignment, excessive oil-canning, buckling, or tool marks.
- 3 D. Install manufactured roof specialties to fit substrates and to result in watertight performance.
4 Verify shapes and dimensions of surfaces to be covered before manufacture.
- 5 E. Expansion Provisions: Provide for thermal expansion of exposed manufactured roof specialties.
6 Space movement joints at a maximum of 12 feet (3.6 m) with no unplanned joints within 24
7 inches (600 mm) of corners or intersections.
- 8 F. Fasteners: Use fasteners of type and size recommended by manufacturer but of sizes that will
9 penetrate substrate not less than 1-1/4 inches for nails and not less than 3/4 inch for screws.
- 10 G. Seal joints with elastomeric or butyl sealant as required by manufacturer of roofing specialties.

11 3.3 COPING INSTALLATION

- 12 A. Install cleats, anchor plates, and other anchoring and attachment accessories and devices with
13 concealed fasteners.
- 14 B. Anchor copings to resist uplift and outward forces according to performance requirements.
15 1. Interlock face and back leg drip edges of snap-on coping cap into cleated anchor plates
16 anchored to substrate at 30-inch (760-mm) centers.

17 3.4 ROOF EDGE FLASHING INSTALLATION

- 18 A. Install cleats, cant dams, and other anchoring and attachment accessories and devices with
19 concealed fasteners.
- 20 B. Anchor roof edgings to resist uplift and outward forces according to performance requirements.

21 3.5 COUNTERFLASHING AND REGLET INSTALLATION

- 22 A. Counterflashings: Coordinate installation of counterflashings with installation of base flashings.
23 Insert counterflashings in reglets or receivers and fit tightly to base flashings. Extend
24 counterflashings 4 inches (100 mm) over base flashings. Lap counterflashing joints a minimum
25 of 4 inches (100 mm) and bed with elastomeric or butyl sealant.

26 3.6 CLEANING AND PROTECTION

- 27 A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and
28 weathering.
- 29 B. Clean and neutralize flux materials. Clean off excess solder and sealants.
- 30 C. Remove temporary protective coverings and strippable films as manufactured roof specialties
31 are installed. On completion of installation, clean finished surfaces, including removing unused
32 fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain in a clean condition
33 during construction.
- 34 D. Replace manufactured roof specialties that have been damaged or that cannot be successfully
35 repaired by finish touchup or similar minor repair procedures.

36 END OF SECTION 07 71 00
37

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1 SECTION 07 81 00 - APPLIED FIREPROOFING

2 PART 1 - GENERAL

3 1.1 GENERAL REQUIREMENTS

- 4 A. Drawings and Conditions of Contract, including General and Supplementary Conditions and
5 Division 1 Administration Sections, apply to this Division.

6 1.2 SUMMARY

- 7 A. Section includes sprayed fire-resistive materials (SFRM) for use at steel structure components
8 that are concealed from view at completion of construction.

9 1.3 PREINSTALLATION MEETINGS

- 10 A. Preinstallation Conference: Conduct conference at Project site
11 1. Review products, design ratings, restrained and unrestrained conditions, densities,
12 thicknesses, bond strengths, and other performance requirements.

13 1.4 ACTION SUBMITTALS

- 14 A. Product Data: For each type of product.
15 B. Shop Drawings: Framing plans, schedules, or both, indicating the following:
16 1. Extent of fireproofing for each construction and fire-resistance rating.
17 2. Applicable fire-resistance design designations of a qualified testing and inspecting
18 agency acceptable to authorities having jurisdiction.
19 3. Minimum fireproofing thicknesses needed to achieve required fire-resistance rating of
20 each structural component and assembly.
21 4. Treatment of fireproofing after application.
22 C. Samples: For each exposed product and for each color and texture specified, in manufacturer's
23 standard dimensions in size.

24 1.5 INFORMATIONAL SUBMITTALS

- 25 A. Qualification Data: For Installer
26 B. Product Certificates: For each type of fireproofing.
27 C. Evaluation Reports: For fireproofing, from ICC-ES.
28 D. Preconstruction Test Reports: For fireproofing.
29 E. Field quality-control reports.

30 1.6 QUALITY ASSURANCE

- 31 A. Installer Qualifications: A firm or individual certified, licensed, or otherwise qualified by
32 fireproofing manufacturer as experienced and with sufficient trained staff to install
33 manufacturer's products according to specified requirements.

1.7 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Owner will engage a qualified testing agency to perform preconstruction testing on fireproofing.
1. Provide test specimens and assemblies representative of proposed materials and construction.
- B. Preconstruction Adhesion and Compatibility Testing: Test for compliance with requirements for specified performance and test methods.
1. Bond Strength: Test for cohesive and adhesive strength according to ASTM E 736. Provide bond strength indicated in referenced fire-resistance design, but not less than minimum specified in Part 2.
2. Density: Test for density according to ASTM E 605. Provide density indicated in referenced fire-resistance design, but not less than minimum specified in Part 2.
3. Verify that manufacturer, through its own laboratory testing or field experience, attests that primers or coatings are compatible with fireproofing.
4. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
5. For materials failing tests, obtain applied-fireproofing manufacturer's written instructions for corrective measures including the use of specially formulated bonding agents or primers.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not apply fireproofing when ambient or substrate temperature is 44 deg F (7 deg C) or lower unless temporary protection and heat are provided to maintain temperature at or above this level for 24 hours before, during, and for 24 hours after product application.
- B. Ventilation: Ventilate building spaces during and after application of fireproofing, providing complete air exchanges according to manufacturer's written instructions. Use natural means or, if they are inadequate, forced-air circulation until fireproofing dries thoroughly.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Assemblies: Provide fireproofing, including auxiliary materials, according to requirements of each fire-resistance design and manufacturer's written instructions.
- B. Source Limitations: Obtain fireproofing for each fire-resistance design from single source.
- C. Fire-Resistance Design: Indicated on Drawings, tested according to ASTM E 119 or UL 263 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
1. Steel members are to be considered unrestrained unless specifically noted otherwise.
- D. Asbestos: Provide products containing no detectable asbestos.

2.2 SPRAYED FIRE-RESISTIVE MATERIALS

- A. SFRM: Manufacturer's standard, factory-mixed, lightweight, dry formulation, complying with indicated fire-resistance design, and mixed with water at Project site to form a slurry or mortar before conveyance and application or conveyed in a dry state and mixed with atomized water at place of application.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Grace Construction Products; W.R. Grace & Co. -- Conn.; Grace Construction Products; Monokote Z106/HY or a comparable product by one of the following:
 - a. Carboline Company; a subsidiary of RPM International.
 - b. Isolatek International.
 - c. Pyrok, Inc.
2. Bond Strength: Minimum 2,000 psf (94.5 kN/m²) cohesive and adhesive strength based on field testing according to ASTM E 736.
3. Density: Not less than 22 lb/cu. ft. (350 kg/cu. m) and as specified in the approved fire-resistance design, according to ASTM E 605.
4. Thickness: As required for fire-resistance design indicated, measured according to requirements of fire-resistance design or ASTM E 605, whichever is thicker, but not less than 0.375 inch (9 mm).
5. Combustion Characteristics: ASTM E 136.
6. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 10 or less.
 - b. Smoke-Developed Index: 10 or less.
7. Compressive Strength: Minimum 100 lbf/sq. in. (680 kPa) according to ASTM E 761.
8. Corrosion Resistance: No evidence of corrosion according to ASTM E 937.
9. Deflection: No cracking, spalling, or delamination according to ASTM E 759 and 760 respectively.
10. Effect of Impact on Bonding: No cracking, spalling, or delamination according to ASTM E 760.
11. Air Erosion: Maximum weight loss of 0.025 g/sq. ft. (0.270 g/sq. m) in 24 hours according to ASTM E 859.
12. Fungal Resistance: Treat products with manufacturer's standard antimicrobial formulation to result in no growth on specimens per ASTM G 21

2.3 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that are compatible with fireproofing and substrates and are approved by UL or another testing and inspecting agency acceptable to authorities having jurisdiction for use in fire-resistance designs indicated.
- B. Substrate Primers: Primers approved by fireproofing manufacturer and complying with one or both of the following requirements:
 1. Primer and substrate are identical to those tested in required fire-resistance design by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 2. Primer's bond strength in required fire-resistance design complies with specified bond strength for fireproofing and with requirements in UL's "Fire Resistance Directory" or in the listings of another qualified testing agency acceptable to authorities having jurisdiction, based on a series of bond tests according to ASTM E 736.
- C. Bonding Agent: Product approved by fireproofing manufacturer and complying with requirements in UL's "Fire Resistance Directory" or in the listings of another qualified testing agency acceptable to authorities having jurisdiction.
- D. Reinforcing Fabric: Glass- or carbon-fiber fabric of type, weight, and form required to comply with fire-resistance designs indicated; approved and provided by fireproofing manufacturer.
- E. Reinforcing Mesh: Metallic mesh reinforcement of type, weight, and form required to comply with fire-resistance design indicated; approved and provided by fireproofing manufacturer. Include pins and attachment.

- 1 F. Topcoat: Suitable for application over applied fireproofing; of type recommended in writing by
2 fireproofing manufacturer for each fire-resistance design.
- 3 1. Cement-Based Topcoat: Factory-mixed, cementitious hard-coat formulation for trowel or
4 spray application over SFRM.
5 a. Product: Subject to compliance with requirements, provide manufacturer's
6 standard cementitious topcoat.

7 PART 3 - EXECUTION

8 3.1 EXAMINATION

- 9 A. Examine substrates, areas, and conditions, with Installer present, for compliance with
10 requirements for substrates and other conditions affecting performance of the Work and
11 according to each fire-resistance design. Verify compliance with the following:
- 12 1. Substrates are free of dirt, oil, grease, release agents, rolling compounds, mill scale,
13 loose scale, incompatible primers, paints, and encapsulants, or other foreign substances
14 capable of impairing bond of fireproofing with substrates under conditions of normal use
15 or fire exposure.
16 2. Objects penetrating fireproofing, including clips, hangers, support sleeves, and similar
17 items, are securely attached to substrates.
18 3. Substrates receiving fireproofing are not obstructed by ducts, piping, equipment, or other
19 suspended construction that will interfere with fireproofing application.
- 20 B. Verify that concrete work on steel deck has been completed before beginning fireproofing work.
- 21 C. Verify that roof construction, installation of roof-top HVAC equipment, and other related work is
22 complete before beginning fireproofing work.
- 23 D. Conduct tests according to fireproofing manufacturer's written recommendations to verify that
24 substrates are free of substances capable of interfering with bond.
- 25 E. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the
26 Work.
- 27 F. Proceed with installation only after unsatisfactory conditions have been corrected.

28 3.2 PREPARATION

- 29 A. Cover other work subject to damage from fallout or overspray of fireproofing materials during
30 application.
- 31 B. Clean substrates of substances that could impair bond of fireproofing.
- 32 C. Prime substrates where included in fire-resistance design and where recommended in writing
33 by fireproofing manufacturer unless compatible shop primer has been applied and is in
34 satisfactory condition to receive fireproofing.
- 35 D. For applications visible on completion of Project, repair substrates to remove surface
36 imperfections that could affect uniformity of texture and thickness in finished surface of
37 fireproofing. Remove minor projections and fill voids that would telegraph through fire-resistive
38 products after application.

3.3 APPLICATION

- A. Construct fireproofing assemblies that are identical to fire-resistance design indicated and products as specified, tested, and substantiated by test reports; for thickness, primers, sealers, topcoats, finishing, and other materials and procedures affecting fireproofing work.
- B. Comply with fireproofing manufacturer's written instructions for mixing materials, application procedures, and types of equipment used to mix, convey, and apply fireproofing; as applicable to particular conditions of installation and as required to achieve fire-resistance ratings indicated.
- C. Coordinate application of fireproofing with other construction to minimize need to cut or remove fireproofing.
 - 1. Do not begin applying fireproofing until clips, hangers, supports, sleeves, and other items penetrating fireproofing are in place.
 - 2. Defer installing ducts, piping, and other items that would interfere with applying fireproofing until application of fireproofing is completed.
- D. Metal Decks:
 - 1. Do not apply fireproofing to underside of metal deck substrates until concrete topping, if any, has been completed.
 - 2. Do not apply fireproofing to underside of metal roof deck until roofing has been completed; prohibit roof traffic during application and drying of fireproofing.
- E. Install auxiliary materials as required, as detailed, and according to fire-resistance design and fireproofing manufacturer's written recommendations for conditions of exposure and intended use. For auxiliary materials, use attachment and anchorage devices of type recommended in writing by fireproofing manufacturer.
- F. Spray apply fireproofing to maximum extent possible. Following the spraying operation in each area, complete the coverage by trowel application or other placement method recommended in writing by fireproofing manufacturer.
- G. Extend fireproofing in full thickness over entire area of each substrate to be protected.
- H. Install body of fireproofing in a single course unless otherwise recommended in writing by fireproofing manufacturer.
- I. Where sealers are used, apply products that are tinted to differentiate them from fireproofing over which they are applied.
- J. Provide a uniform finish complying with description indicated for each type of fireproofing material and matching finish approved for required mockups.
- K. Cure fireproofing according to fireproofing manufacturer's written recommendations.
- L. Do not install enclosing or concealing construction until after fireproofing has been applied, inspected, and tested and corrections have been made to deficient applications.
- M. Finishes: Where indicated, apply fireproofing to produce the following finishes:
 - 1. Manufacturer's Standard Finishes: Finish according to manufacturer's written instructions for each finish selected.
- N. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:

- 1 1. Test and inspect as required by the 2013 CBC, 1705.13.
- 2 O. Perform the tests and inspections of completed Work in successive stages. Do not proceed with
- 3 application of fireproofing for the next area until test results for previously completed
- 4 applications of fireproofing show compliance with requirements. Tested values must equal or
- 5 exceed values as specified and as indicated and required for approved fire-resistance design.
- 6 P. Fireproofing will be considered defective if it does not pass tests and inspections.
- 7 1. Remove and replace fireproofing that does not pass tests and inspections, and retest.
- 8 2. Apply additional fireproofing, per manufacturer's written instructions, where test results
- 9 indicate insufficient thickness, and retest.
- 10 Q. Prepare test and inspection reports.
- 11 3.4 CLEANING, PROTECTING, AND REPAIRING
- 12 A. Cleaning: Immediately after completing spraying operations in each containable area of Project,
- 13 remove material overspray and fallout from surfaces of other construction and clean exposed
- 14 surfaces to remove evidence of soiling.
- 15 B. Protect fireproofing, according to advice of manufacturer and Installer, from damage resulting
- 16 from construction operations or other causes, so fireproofing will be without damage or
- 17 deterioration at time of Project completion.
- 18 C. As installation of other construction proceeds, inspect fireproofing and repair damaged areas
- 19 and fireproofing removed due to work of other trades.
- 20 D. Repair fireproofing damaged by other work before concealing it with other construction.
- 21 E. Repair fireproofing by reapplying it using same method as original installation or using
- 22 manufacturer's recommended trowel-applied product.
- 23 END OF SECTION 07 81 00

SECTION 07 84 13 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. Drawings and Conditions of Contract, including General and Supplementary Conditions and Division 1 Administration Sections, apply to this Division.

1.2 SUMMARY

- A. This Section includes through-penetration firestop systems for penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items.
- B. Related Sections include the following:
1. Division 07 84 46 Section "Fire-Resistive Joint Systems."
 2. Division 21 Sections specifying fire-suppression piping penetrations.
 3. Division 22 and 23 Sections specifying duct and piping penetrations.
 4. Division 26, 27, and 28 Sections specifying cable and conduit penetrations.

1.3 PERFORMANCE REQUIREMENTS

- A. General: For penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items, provide through-penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated.
1. Fire-resistance-rated walls including fire partitions, fire barriers and smoke barriers.
 2. Fire-resistance-rated horizontal assemblies including floor/ceiling assemblies and ceiling membranes of roof/ceiling assemblies.
- B. Rated Systems: Provide through-penetration firestop systems with the following ratings determined per ASTM E 814, 2007 edition or UL 1479:
1. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.
 2. T-Rated Systems: For the following conditions, provide through-penetration firestop systems with T-ratings indicated, as well as F-ratings, where systems protect penetrating items exposed to potential contact with adjacent materials in occupiable floor areas:
 - a. Penetrations located outside wall cavities.
 - b. Penetrations located outside fire-resistance-rated shaft enclosures.
- C. For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that, after curing, do not deteriorate when exposed to these conditions both during and after construction.
1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
 2. For floor penetrations with annular spaces exceeding 4 inches (100 mm) in width and exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved, either by installing floor plates or by other means.

3. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.

D. For through-penetration firestop systems exposed to view, provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84, 2007 edition .

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For each through-penetration firestop system, show each type of construction condition penetrated, relationships to adjoining construction, and type of penetrating item. Include firestop design designation of qualified testing and inspecting agency that evidences compliance with requirements for each condition indicated.

1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each through-penetration firestop system configuration for construction and penetrating items.

2. Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular through-penetration firestop condition, submit illustration, with modifications marked, approved by through-penetration firestop system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

C. Through-Penetration Firestop System Schedule: Indicate locations of each through-penetration firestop system, along with the following information:

1. Types of penetrating items.

2. Types of constructions penetrated, including fire-resistance ratings and, where applicable, thicknesses of construction penetrated.

3. Through-penetration firestop systems for each location identified by firestop design designation of qualified testing and inspecting agency.

D. Qualification Data: For Installer.

E. Product Certificates: For through-penetration firestop system products, signed by product manufacturer.

F. Product Test Reports: From a qualified testing agency indicating through-penetration firestop system complies with requirements, based on comprehensive testing of current products.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A firm that has been approved by FMG according to FMG 4991, "Approval of Firestop Contractors."

B. Installer Qualifications: A firm experienced in installing through-penetration firestop systems similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements. Manufacturer's willingness to sell its through-penetration firestop system products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.

C. Installation Responsibility: Assign installation of through-penetration firestop systems and fire-resistive joint systems in Project to a single qualified installation contractor.

- 1 D. Source Limitations: Obtain through-penetration firestop systems, for each kind of penetration
2 and construction condition indicated, through one source from a single manufacturer, with all
3 penetration firestopping installed by a single installer.
- 4 E. Fire-Test-Response Characteristics: Provide through-penetration firestop systems that comply
5 with the following requirements and those specified in Part 1 "Performance Requirements"
6 Article:
- 7 1. Firestopping tests are performed by a qualified testing and inspecting agency. A qualified
8 testing and inspecting agency is UL, or another agency performing testing and follow-up
9 inspection services for firestop systems acceptable to authorities having jurisdiction.
- 10 2. Through-penetration firestop systems are identical to those tested per testing standard
11 referenced in "Part 1 Performance Requirements" Article. Provide rated systems
12 complying with the following requirements:
- 13 a. Through-penetration firestop system products bear classification marking of
14 qualified testing and inspecting agency.
- 15 b. Through-penetration firestop systems correspond to those indicated by reference
16 to through-penetration firestop system designations listed by the following:
17 1) UL in its "Fire Resistance Directory."
- 18 F. Preinstallation Conference: Conduct conference at Project site to comply with requirements in
19 Division 013100 Section "Project Management and Coordination."

20 1.6 DELIVERY, STORAGE, AND HANDLING

- 21 A. Deliver through-penetration firestop system products to Project site in original, unopened
22 containers or packages with intact and legible manufacturers' labels identifying product and
23 manufacturer, date of manufacture, lot number, shelf life if applicable, qualified testing and
24 inspecting agency's classification marking applicable to Project, curing time, and mixing
25 instructions for multicomponent materials.
- 26 B. Store and handle materials for through-penetration firestop systems to prevent their
27 deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

28 1.7 PROJECT CONDITIONS

- 29 A. Environmental Limitations: Do not install through-penetration firestop systems when ambient or
30 substrate temperatures are outside limits permitted by through-penetration firestop system
31 manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- 32 B. Install and cure penetration firestopping per manufacturer's written instructions using natural
33 means of ventilations or, where this is inadequate, forced-air circulation..

34 1.8 COORDINATION

- 35 A. Coordinate construction of openings and penetrating items to ensure that through-penetration
36 firestop systems are installed according to specified requirements.
- 37 B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate
38 through-penetration firestop systems.
- 39 C. Notify Owner's inspecting agency at least seven days in advance of through-penetration firestop
40 system installations; confirm dates and times on days preceding each series of installations.
- 41 D. Do not cover up through-penetration firestop system installations that will become concealed
42 behind other construction until each installation has been examined by Owner's inspecting
43 agency and building inspector, if required by authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, through-penetration firestop systems that may be incorporated into the Work include, but are not limited to, those systems indicated that are produced by one of the following manufacturers:

1. A/D Fire Protection Systems Inc.
2. Grace, W. R. & Co. - Conn.
3. Hilti, Inc.
4. Johns Manville.
5. Nelson Firestop Products.
6. NUCO Inc.
7. RectorSeal Corporation (The).
8. Specified Technologies Inc.
9. 3M; Fire Protection Products Division.
10. Tremco; Sealant/Weatherproofing Division.
11. USG Corporation.
12. Pecora.

2.2 FIRESTOPPING, GENERAL

- A. Compatibility: Provide through-penetration firestop systems that are compatible with one another; with the substrates forming openings; and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.

- B. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by qualified testing and inspecting agency for firestop systems indicated. Accessories include, but are not limited to, the following items:

1. Permanent forming/damming/backing materials, including the following:
 - a. Slag-/rock-wool-fiber insulation.
 - b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
 - c. Fire-rated form board.
 - d. Fillers for sealants.
2. Temporary forming materials.
3. Substrate primers.
4. Collars.
5. Steel sleeves.

2.3 FILL MATERIALS

- A. General: Provide through-penetration firestop systems containing the types of fill materials indicated in the Through-Penetration Firestop System Schedule at the end of Part 3 by referencing the types of materials described in this Article. Fill materials are those referred to in directories of referenced testing and inspecting agencies as "fill," "void," or "cavity" materials.

- B. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.

- C. Latex Sealants: Single-component latex formulations that after cure do not re-emulsify during exposure to moisture.
- D. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- E. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized steel sheet.
- F. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
- G. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
- H. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.
- I. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives.
- J. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
- K. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:
1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces, and nonsag formulation for openings in vertical and other surfaces requiring a nonslumping, gunnable sealant, unless indicated firestop system limits use to nonsag grade for both opening conditions.
 2. Grade for Horizontal Surfaces: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces.
 3. Grade for Vertical Surfaces: Nonsag formulation for openings in vertical and other surfaces.

2.4 MIXING

- A. For those products requiring mixing before application, comply with through-penetration firestop system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of work.
1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning: Clean out openings immediately before installing through-penetration firestop systems to comply with firestop system manufacturer's written instructions and with the following requirements:

1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of through-penetration firestop systems.
2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with through-penetration firestop systems. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Priming: Prime substrates where recommended in writing by through-penetration firestop system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Masking Tape: Use masking tape to prevent through-penetration firestop systems from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestop system materials. Remove tape as soon as possible without disturbing firestop system's seal with substrates.

3.3 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION

A. General: Install through-penetration firestop systems to comply with Part 1 "Performance Requirements" Article and with firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.

C. Install fill materials for firestop systems by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

A. Identify through-penetration firestop systems with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of edge of the firestop systems so that labels will be visible to anyone seeking to remove penetrating items or firestop systems. Use mechanical fasteners for metal labels. For plastic labels, use self-adhering type with adhesives capable of permanently bonding labels to surfaces on which labels are placed and, in combination with label material, will result in partial destruction of label if removal is attempted. Include the following information on labels:

1. The words "Warning - Through-Penetration Firestop System - Do Not Disturb. Notify Building Management of Any Damage."

2. Contractor's name, address, and phone number.
3. Through-penetration firestop system designation of applicable testing and inspecting agency.
4. Date of installation.
5. Through-penetration firestop system manufacturer's name.
6. Installer's name.

3.5 FIELD QUALITY CONTROL

- A. Inspecting Agency: Owner will engage a qualified, independent inspecting agency to inspect through-penetration firestops. Independent inspecting agency shall comply with ASTM E 2174 requirements including those related to qualifications, conducting inspections, and preparing test reports.
- B. Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements.
- C. Proceed with enclosing through-penetration firestop systems with other construction only after inspection reports are issued and firestop installations comply with requirements.

3.6 CLEANING AND PROTECTING

- A. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by through-penetration firestop system manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure that through-penetration firestop systems are without damage or deterioration at time of Project completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce systems complying with specified requirements.

3.7 THROUGH-PENETRATION FIRESTOP SYSTEM SCHEDULE

- A. Where UL-classified systems are indicated, they refer to alpha-alpha-numeric designations listed in UL's "Fire Resistance Directory" under product Category XHEZ.
- B. Firestop systems are per schedules on Drawings. Firestop systems not on schedule shall comply with the following, subject to approval by authorities having jurisdiction:
- C. Firestop Systems with No Penetrating Items:
 1. Available UL-Classified Systems: C-AJ, C-BJ, F-A, W-J and W-L.
 2. Type of Fill Materials: One or more of the following:
 - a. Latex sealant.
 - b. Silicone sealant.
 - c. Intumescent putty.
 - d. Mortar.
- D. Firestop Systems for Metallic Pipes, Conduit, or Tubing:
 1. Available UL-Classified Systems: C-AJ, C-BJ, C-BK, F-A, F-B, F-C, W-J, W-K, and W-L.
 2. Type of Fill Materials: One or more of the following:
 - a. Latex sealant.
 - b. Silicone sealant.
 - c. Intumescent putty.
 - d. Mortar.

E. Firestop Systems for Nonmetallic Pipe, Conduit, or Tubing:

1. Available UL-Classified Systems: C-AJ, C-BJ, F-A, F-B, F-C, W-J, and W-L.
2. Type of Fill Materials: One or more of the following:
 - a. Latex sealant.
 - b. Silicone sealant.
 - c. Intumescent putty.
 - d. Intumescent wrap strips.
 - e. Firestop device.

F. Firestop Systems for Electrical Cables:

1. Available UL-Classified Systems: C-AJ, C-BJ, F-A, F-B, F-C, W-J, and W-L.
2. Type of Fill Materials: One or more of the following:
 - a. Latex sealant.
 - b. Silicone sealant.
 - c. Intumescent putty.
 - d. Silicone foam.
 - e. Pillows/bags.

G. Firestop Systems for Cable Trays:

1. Available UL-Classified Systems: C-AJ, C-BJ, F-A, F-B, F-C, W-J, W-K, and W-L.
2. Type of Fill Materials: One or more of the following:
 - a. Latex sealant.
 - b. Intumescent putty.
 - c. Silicone foam.
 - d. Pillows/bags.
 - e. Mortar.

H. Firestop Systems for Insulated Pipes:

1. Available UL-Classified Systems: C-AJ, C-BJ, F-A, F-C, W-J, and W-L.
2. Type of Fill Materials: One or more of the following:
 - a. Latex sealant.
 - b. Intumescent putty.
 - c. Silicone foam.
 - d. Intumescent wrap strips.

I. Firestop Systems for Miscellaneous Electrical Penetrants:

1. Available UL-Classified Systems: C-AJ, F-A, and W-L.
2. Type of Fill Materials: One or more of the following:
 - a. Latex sealant.
 - b. Intumescent putty.
 - c. Mortar.

J. Firestop Systems for Miscellaneous Mechanical Penetrants:

1. Available UL-Classified Systems: C-AJ, F-C, W-J, and W-L.
2. Type of Fill Materials: One or both of the following:
 - a. Latex sealant.
 - b. Mortar.
3. Firestop Systems for Groupings of Penetrants:
4. Available UL-Classified Systems: C-AJ, C-BJ, F-A, F-C, W-J, and W-L.
5. Type of Fill Materials: One or more of the following:
 - a. Latex sealant.
 - b. Mortar.
 - c. Intumescent wrap strips.

- 1 d. Firestop device.
- 2 e. Intumescent composite sheet.

3 END OF SECTION 07 84 13
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1 SECTION 07 92 00 - JOINT SEALANTS

2 PART 1 - GENERAL

3 1.1 GENERAL REQUIREMENTS

- 4 A. Drawings and Conditions of Contract, including General and Supplementary Conditions and
5 Division 1 Administration Sections, apply to this Division.

6 1.2 SUMMARY

- 7 A. This Section includes joint sealants for the applications indicated in the Joint-Sealant Schedule
8 at the end of Part 3.

- 9 B. Related Sections include the following:

- 10 1. Division 04 22 00 Section "Unit Masonry" for masonry control and expansion joint fillers
11 and gaskets.
12 2. Division 07 84 46 Section "Fire-Resistive Joint Systems" for sealing joints in fire-
13 resistance-rated construction.
14 3. Division 08 80 00 Section "Glazing" for glazing sealants.
15 4. Division 09 29 00 Section "Gypsum Board" for sealing perimeter joints of gypsum board
16 partitions to reduce sound transmission.
17 5. Division 09 51 13 Section "Acoustical Panel Ceilings" for sealing edge moldings at
18 perimeters of acoustical ceilings.
19 6. Division 32 13 13 Section "Concrete Paving Joint Sealants" for sealing joints in
20 pavements, walkways, and curbing.

21 1.3 DEFINITIONS

- 22 A. Non-Security Rated Areas: Any surface located outside the confines of the security areas as
23 defined by the security plans and not typically used by inmates.

- 24 B. Security Rated Areas: Any surface located within the confines of security areas, including
25 security rated walls, floors, ceiling and roof as defined by the security plans and other areas
26 typical for inmate use.

- 27 1. On vertical surfaces, security rating ends at 10 feet (3 M) above any floor surface, or at
28 ceiling or roof line lower than 10 feet (3 M).

29 1.4 PERFORMANCE REQUIREMENTS

- 30 A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous
31 joint seals without staining or deteriorating joint substrates.

- 32 B. Provide joint sealants for interior applications that establish and maintain airtight and water-
33 resistant continuous joint seals without staining or deteriorating joint substrates.

34 1.5 SUBMITTALS

- 35 A. Product Data: For each joint-sealant product indicated.

- 36 B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants
37 showing the full range of colors available for each product exposed to view.

- 1 C. Samples for Verification: For each type and color of joint sealant required, provide Samples
2 with joint sealants in 1/2-inch- (13-mm-) wide joints formed between two 6-inch- (150-mm-) long
3 strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- 4 D. Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
- 5 1. Materials forming joint substrates and joint-sealant backings have been tested for
6 compatibility and adhesion with joint sealants.
- 7 2. Interpretation of test results and written recommendations for primers and substrate
8 preparation needed for adhesion.
- 9 E. Warranties: Special warranties specified in this Section.

10 1.6 QUALITY ASSURANCE

- 11 A. Installer Qualifications: Manufacturer's authorized Installer who is approved or licensed for
12 installation of elastomeric sealants required for this Project.
- 13 B. Source Limitations: Obtain each type of joint sealant through one source from a single
14 manufacturer.
- 15 C. Preinstallation Conference: Conduct conference at Project site to comply with requirements in
16 Division 01 Section "Project Management and Coordination."

17 1.7 PROJECT CONDITIONS

- 18 A. Do not proceed with installation of joint sealants under the following conditions:
- 19 1. When ambient and substrate temperature conditions are outside limits permitted by joint-
20 sealant manufacturer or are below 40 deg F (5 deg C).
- 21 2. When joint substrates are wet.
- 22 3. Where joint widths are less than those allowed by joint-sealant manufacturer for
23 applications indicated.
- 24 4. Contaminants capable of interfering with adhesion have not yet been removed from joint
25 substrates.

26 1.8 WARRANTY

- 27 A. Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or
28 replace elastomeric joint sealants that do not comply with performance and other requirements
29 specified in this Section within specified warranty period.
- 30 1. Warranty Period: Five (5) years from date of Project completion.
- 31 B. Special Manufacturer's Warranty: Manufacturer's standard form in which elastomeric sealant
32 manufacturer agrees to furnish elastomeric joint sealants to repair or replace those that do not
33 comply with performance and other requirements specified in this Section within specified
34 warranty period.
- 35 1. Warranty Period: Five (5) years from date of Project completion.
- 36 C. Special warranties specified in this Article exclude deterioration or failure of elastomeric joint
37 sealants from the following:
- 38 1. Movement of the structure resulting in stresses on the sealant exceeding sealant
39 manufacturer's written specifications for sealant elongation and compression caused by
40 structural settlement or errors attributable to design or construction.
- 41 2. Disintegration of joint substrates from natural causes exceeding design specifications.

- 1 3. Mechanical damage caused by individuals, tools, or other outside agents.
- 2 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric
- 3 contaminants.

4 PART 2 - PRODUCTS

5 2.1 MANUFACTURERS

- 6 A. Available Products: Subject to compliance with requirements, products that may be
- 7 incorporated into the Work include, but are not limited to, products listed in other Part 2 articles.

8 2.2 MATERIALS, GENERAL

- 9 A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible
- 10 with one another and with joint substrates under conditions of service and application, as
- 11 demonstrated by sealant manufacturer, based on testing and field experience.

- 12 B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

- 13 1. Refer to Joint Sealant Schedule in Part 3 article.

14 2.3 ELASTOMERIC JOINT SEALANTS

- 15 A. Elastomeric Sealants: Comply with ASTM C 920 and other requirements indicated for each
- 16 liquid-applied chemically curing sealant specified, including those referencing ASTM C 920
- 17 classifications for type, grade, class, and uses related to exposure and joint substrates.

- 18 B. Stain-Test-Response Characteristics: Where elastomeric sealants are specified to be
- 19 nonstaining to porous substrates, provide products that have undergone testing according to
- 20 ASTM C 1248 and have not stained porous joint substrates indicated for Project.

- 21 C. Suitability for Contact with Food: Where elastomeric sealants are indicated for joints that will
- 22 come in repeated contact with food, provide products that comply with 21 CFR 177.2600.

- 23 D. Single-Component Pourable Neutral-Curing Silicone Sealant:

- 24 1. Available Products:
 - 25 a. Dow Corning Corporation; 890-SL.
 - 26 b. Pecora Corporation; 300 Pavement Sealant (Self Leveling).
 - 27 c. Dow Corning Corporation; SL Parking Structure Sealant.
- 28 2. Type and Grade: S (single component) and P (pourable).
- 29 3. Class: 100/50.
- 30 4. Uses Related to Exposure: NT and T (traffic).
- 31 5. Uses Related to Joint Substrates: M and O, as applicable to joint substrates indicated.
- 32 a. Use O Joint Substrates: Concrete and asphaltic concrete.

- 33 E. Single-Component Low-Modulus Neutral-Curing Silicone Sealant:

- 34 1. Available Products:
 - 35 a. Dow Corning Corporation; 790.
 - 36 b. GE Silicones; SilPruf LM SCS2700.
 - 37 c. GE Silicones; SilPruf SCS2000.
 - 38 d. Pecora Corporation; 864.
 - 39 e. Pecora Corporation; 890.
 - 40 f. Polymeric Systems Inc.; PSI-641.
 - 41 g. Sonneborn, Division of ChemRex Inc.; Omniseal.

- h. Tremco; Spectrem 3.
2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 50 or 100/50.
4. Use Related to Exposure: NT (nontraffic).
5. Uses Related to Joint Substrates: M, G, A, and O as applicable to joint substrates indicated.
 - a. Use O Joint Substrates: color or clear anodic aluminum, galvanized steel, stainless steel, concrete and masonry.
6. Stain-Test-Response Characteristics: Nonstaining to porous substrates per ASTM C 1248.

F. Single-Component Medium-Modulus Neutral-Curing Silicone Sealant:

1. Available Products:
 - a. Dow Corning Corporation; 799.
 - b. GE Silicones; UltraGlaze SSG4000.
 - c. Polymeric Systems Inc.; PSI-631.
 - d. Tremco; Proglaze SG.
 - e. Tremco; Spectrem 2.
 - f. Tremco; Tremsil 600.
2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 25.
4. Use Related to Exposure: NT (nontraffic).
5. Uses Related to Joint Substrates: G, A, and O as applicable to joint substrates indicated.
 - a. Use O Joint Substrates: Coated glass, color or clear anodic aluminum, galvanized steel and stainless steel.

G. Single-Component Mildew-Resistant Neutral-Curing or Acid-Curing Silicone Sealant:

1. Available Products:
 - a. Pecora Corporation; 898.
 - b. Tremco; Tremsil 600 or Tremsil 200 White.
 - c. Dow Corning Corporation; 786 Mildew Resistant.
 - d. GE Silicones; Sanitary SCS1700.
2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 25.
4. Use Related to Exposure: NT (nontraffic).
5. Uses Related to Joint Substrates: G, A, and O as applicable to joint substrates indicated.
 - a. Use O Joint Substrates: Stainless steel, porcelain ceramic, concrete, masonry, plastic laminate and gypsum wall board.

H. Multicomponent Nonsag Urethane Sealant:

1. Available Products:
 - a. Pecora Corporation; Dynatrol II.
 - b. Tremco; Dymeric 511.
 - c. Sika Corporation, Inc.; Sikaflex - 2c NS TG.
 - d. Sonneborn, Division of ChemRex Inc.; NP 2.
2. Type and Grade: M (multicomponent) and NS (nonsag).
3. Class: 25 or 50.
4. Use Related to Exposure: NT (nontraffic).
5. Uses Related to Joint Substrates: M, A, and O as applicable to joint substrates indicated.
 - a. Use O Joint Substrates: Color or clear anodic aluminum, galvanized steel, stainless steel, concrete and masonry.

I. Multicomponent Pourable Urethane Sealant:

1. Available Products:

- a. Pecora Corporation; Urexpan NR-200.
- b. Tremco; THC-900 or THC-901.
- c. Sika Corporation, Inc.; Sikaflex - 2c SL.
- d. Sonneborn, Division of ChemRex Inc.; SL 2.
2. Type and Grade: M (multicomponent) and P (pourable).
3. Class: 25.
4. Use Related to Exposure: T (traffic).
5. Uses Related to Joint Substrates: M, A, and O as applicable to joint substrates indicated.
 - a. Use O Joint Substrates: Concrete, quarry tile and ceramic tile.

2.4 LATEX JOINT SEALANTS

A. Latex Sealant: Comply with ASTM C 834, Type OP, Grade NF.

1. Available Products:
 - a. Pecora Corporation; AC-20+.
 - b. Sonneborn, Division of ChemRex Inc.; Sonolac.
 - c. Tremco; Tremflex 834.

B. Latex Acoustical Sealant: Comply with ASTM C 834, Type OP, Grade NF.

1. Available Products:
 - a. Pecora Corporation; AIS919.
2. Sealant to be paintable at exposed conditions.

2.5 SECURITY JOINT SEALANTS

A. Flexible Polyurethane Security Sealant:

1. Available Products:
 - a. Pecora; Dynaflex.
 - b. Sonneborn, Division of ChemRex, Inc.; Ultra.
2. Type and Grade: S (Single component) Grade NS.
3. Class: 12-1/2.
4. Uses related to exposure: T (traffic) and NT (non-traffic).
5. Hardness, Shore A: 55 minimum.
6. Uses related to joint substrates: M, G, A and O as applicable to joint substrates indicated.
 - a. Use O Joint Substrates: Galvanized steel, steel, stainless steel, ceramic, concrete, and masonry.

B. Rigid Epoxy Security Sealant:

1. Available Products:
 - a. Pecora; Dynapoxy EP-1100.
 - b. Pecora; Dynapoxy EP-1200.
 - c. Sika Corporation, Inc.; Sakador 31-Hi-Mod Gel.
 - d. Sonneborn, Division of ChemRex, Inc.; Epolith (R)-Por-G.
2. Type and grade: M (multi-component) Grade NS.
3. Uses related to exposure: T (traffic) and NT (non-traffic).
4. Hardness, Shore D: 70 minimum.
5. Uses related to joint substrates: M, A and O as applicable to joint substrates indicated.
 - a. Use O Substrates: Galvanized steel, steel and stainless steel.

2.6 JOINT-SEALANT BACKING

- ##### A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), O (open-cell material), B (bicellular material with a surface skin), or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.7 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
 - b. Masonry.
 - c. Unglazed surfaces of ceramic tile.
3. Remove laitance and form-release agents from concrete.

4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a. Metal.
 - b. Glass.
 - c. Porcelain enamel.
 - d. Glazed surfaces of ceramic tile.

B. Joint Priming: Prime joint substrates, where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.
4. Provide flush joint configuration where indicated per Figure 5B in ASTM C 1193.

5. Provide recessed joint configuration of recess depth and at locations indicated per Figure 5C in ASTM C 1193.
 - a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

3.4 FIELD QUALITY CONTROL

A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:

1. Extent of Testing: Test completed elastomeric sealant joints as follows:
 - a. Perform 10 tests for the first 1000 feet (300 m) of joint length for each type of elastomeric sealant and joint substrate.
 - b. Perform 1 test for each 1000 feet (300 m) of joint length thereafter or 1 test per each floor per elevation.
2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab in Appendix X1 in ASTM C 1193.
 - a. For joints with dissimilar substrates, verify adhesion to each substrate separately; do this by extending cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
3. Inspect joints for complete fill, for absence of voids, and for joint configuration complying with specified requirements. Record results in a field-adhesion-test log.
4. Inspect tested joints and report on the following:
 - a. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer's field-adhesion hand-pull test criteria.
 - b. Whether sealants filled joint cavities and are free of voids.
 - c. Whether sealant dimensions and configurations comply with specified requirements.
5. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions. Provide test report to CxA for review and comment.
6. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.

B. Evaluation of Field Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.5 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.6 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Project completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.7 JOINT-SEALANT SCHEDULE

A. Sealants systems for non-security rated areas.

1. Exterior horizontal nontraffic and traffic isolation and contraction joints in cast-in-place concrete slabs.
 - a. Joint Sealant: Single-component pourable neutral-curing silicone sealant.
 - b. Joint-Sealant Color: Match color of exposed concrete.
 - 1) Pecora, Pavement Grey.
2. Exterior vertical and horizontal joints between plant-precast concrete units.
 - a. Joint Sealant: Single-component low-modulus neutral-curing silicone sealant.
 - b. Joint-Sealant Color: Match Color of finish paint.
3. Exterior vertical control and expansion joints in EIFS
 - a. Joint Sealant: Single-component low-modulus neutral-curing silicone sealant.
 - b. Joint-Sealant Color: Match Color of finish paint.
4. Exterior perimeter joints between different materials listed above and frames of doors, windows and louvers.
 - a. Joint Sealant: Single-component medium-modulus neutral-curing silicone sealant.
 - b. Joint-Sealant Color: Match Color of finish paint.
5. Exterior perimeter joints of surface mounted items, including surface mounted lights, enclosures, housings, intercoms, etc. with a gap that exceeds 1/32 inch (1.0mm) wide.
 - a. Joint Sealant: Single-component medium-modulus neutral-curing silicone sealant.
 - b. Joint-Sealant Color: Match Color of finish paint.
6. Other exterior joints.
 - a. Joint Sealant: Single-component low-modulus neutral-curing silicone sealant.
 - b. Joint-Sealant Color: Match Color of surface on which they occur.
7. Interior vertical and horizontal joints between plant-precast concrete units, and vertical control and expansion joints in unit masonry on interior surfaces of exterior walls.
 - a. Joint Sealant: Multicomponent nonsag urethane sealant.
 - b. Joint-Sealant Color: Match Color of finish paint.
8. Interior vertical and horizontal joints in plant-precast concrete units, cast-in-place concrete and unit masonry walls.
 - a. Joint Sealant: Multicomponent nonsag urethane sealant.
 - b. Joint-Sealant Color: Match Color of finish paint.
9. Interior perimeter joints of door and window frames in unit masonry and concrete walls.
 - a. Joint Sealant: Multicomponent nonsag urethane sealant.
 - b. Joint-Sealant Color: Match Color of finish paint.
10. Interior joints between plumbing fixtures and adjoining walls, floors, and counters.
 - a. Joint Sealant: Single-component mildew-resistant neutral or acid-curing silicone sealant.
 - b. Joint-Sealant Color: Match Color of finish paint.
11. Interior perimeter joints between wall finish and door and window frames in metal stud framed walls.
 - a. Joint Sealant: Latex sealant.
 - b. Joint-Sealant Color: Match Color of finish paint.
12. Interior control and casing bead joints in gypsum board walls and ceilings.
 - a. Joint Sealant: Latex sealant.
 - b. Joint-Sealant Color: Match Color of finish paint.
13. Interior control, expansion, and isolation joints in horizontal traffic surfaces of exposed concrete floor, quarry tile flooring and resilient tile flooring.
 - a. Joint Sealant: Multicomponent pourable urethane sealant.
 - b. Joint-Sealant Color:
 - 1) Match color of exposed concrete.
 - 2) Match color of tile grout
 - 3) Match field color of resilient tile flooring.
14. Interior perimeter joints where indicated for sound control.

- a. Joint Sealant: Latex acoustical sealant.
 - b. Joint-Sealant Color:
 - 1) Manufacturer's standard color, paintable where exposed.
- B. Sealant Systems for Security Rated Areas.
1. Exterior vertical and horizontal joints between plant-precast concrete units to 10 feet (3M) above finish grade.
 - a. Joint Sealant: Flexible polyurethane security sealant.
 - b. Joint Sealant Color: Match Color of finish paint.
 2. Exterior vertical control and expansion joints in unit masonry to 10 feet (3M) above finish grade.
 - a. Joint Sealant: Flexible polyurethane security sealant.
 - b. Joint Sealant Color: Match Color of finish paint.
 3. Exterior perimeter joints between different materials listed above and frames of doors, windows and louvers located within 10 feet (3M) above finish grade.
 - a. Joint Sealant: Flexible polyurethane security sealant.
 - b. Joint Sealant Color: Match Color of finish paint.
 4. Exterior perimeter joints of surface mounted items on concrete, unit masonry or precast concrete walls, located at 10 feet (3M) or less above finish grade, including surface mounted lights, enclosures, housings, intercoms, etc. with a gap that exceeds 1/32 inch (1.0mm) wide.
 - a. Joint Sealant: Flexible polyurethane security sealant.
 - b. Joint Sealant Color: Match Color of finish paint.
 5. Interior vertical and horizontal joints between plant-precast concrete units, and vertical control and expansion joints in unit masonry on interior surfaces of exterior walls.
 - a. Joint Sealant: Flexible polyurethane security sealant.
 - b. Joint Sealant Color: Match Color of finish paint.
 6. Interior vertical and horizontal joints in plant-precast concrete units, cast-in-place concrete and unit masonry walls.
 - a. Joint Sealant: Flexible polyurethane security sealant.
 - b. Joint Sealant Color: Match Color of finish paint.
 7. Interior perimeter joints of door and window frames in unit masonry and concrete walls.
 - a. Joint Sealant: Flexible polyurethane security sealant.
 - b. Joint Sealant Color: Match Color of finish paint.
 8. Interior joints between plumbing fixtures and adjoining walls, floors and counters.
 - a. Joint Sealant: Flexible polyurethane security sealant.
 - b. Joint Sealant Color: Match Color of finish paint.
 9. Interior floor joints.
 - a. Joint Sealant: Flexible polyurethane security sealant.
 - b. Joint Sealant Color: Match color of exposed concrete.
 10. Interior perimeter joints of surface mounted items on concrete, unit masonry or precast concrete walls, floors or ceilings, including surface mounted lights, grilles, registers, wall mounted furniture, enclosures, housings, mirrors, shelves, intercoms, sprinkler escutcheons, etc. with a gap that exceeds 1/32 inch (1.0mm) wide.
 - a. Joint Sealant: Flexible polyurethane security sealant.
 - b. Joint Sealant Color: Match Color of finish paint.
 11. Nylon electrical, data and communication device cover plates. Seal back side perimeter of cover plate to wall with sealant.
 - a. Joint Sealant: Flexible polyurethane security sealant.
 - b. Joint Sealant Color: Match Color of finish paint.
 12. Floor joint between second level walkway slab and steel edge plate.
 - a. Joint Sealant: Flexible polyurethane security sealant.
 - b. Joint Sealant Color: Match color of exposed concrete.
 13. Joint between modular metal detention wall panels and concrete or unit masonry surfaces.

- 1 a. Joint Sealant: Flexible polyurethane security sealant.
- 2 b. Joint Sealant Color: Match Color of finish paint.
- 3 14. Joints in modular metal detention wall panels.
- 4 a. Joint Sealant: Rigid epoxy security sealant.
- 5 b. Joint Sealant Color: Match Color of finish paint.
- 6 15. Interior perimeter joints of door and window frames in modular metal detention wall
- 7 panels.
- 8 a. Joint Sealant: Rigid epoxy security sealant.
- 9 b. Joint Sealant Color: Match Color of finish paint.
- 10 END OF SECTION 07 92 00
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1 SECTION 08 11 13 - HOLLOW METAL DOORS AND FRAMES

2 PART 1 - GENERAL

3 1.1 GENERAL REQUIREMENTS

- 4 A. Drawings and Conditions of Contract, including General and Supplementary Conditions and
5 Division 1 Administration Sections, apply to this Division.

6 1.2 SUMMARY

7 A. Section Includes:

- 8 1. Standard hollow metal doors and frames.

9 B. Related Sections:

- 10 1. Division 04 42 00 Section "Unit Masonry" for embedding anchors for hollow metal work
11 into masonry construction.
12 2. Division 08 71 00 Section "Door Hardware for door hardware for hollow metal doors.
13 3. Division 09 Sections "Exterior Painting" and "Interior Painting" for field painting hollow
14 metal doors and frames.
15 4. Division 26 Sections for electrical connections including conduit and wiring for door
16 controls and operators.

17 1.3 DEFINITIONS

- 18 A. Minimum Thickness: Minimum thickness of base metal without coatings.

- 19 B. Standard Hollow Metal Work: Hollow metal work fabricated according to ANSI/SDI A250.8.

20 1.4 SUBMITTALS

- 21 A. Product Data: For each type of product indicated. Include construction details, material
22 descriptions, core descriptions, fire-resistance rating, and finishes.

23 B. Shop Drawings: Include the following:

- 24 1. Elevations of each door design.
25 2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
26 3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
27 4. Locations of reinforcement and preparations for hardware.
28 5. Details of each different wall opening condition.
29 6. Details of anchorages, joints, field splices, and connections.
30 7. Details of accessories.
31 8. Details of moldings, removable stops, and glazing.
32 9. Details of conduit and preparations for power, signal, and control systems.

33 C. Other Action Submittals:

- 34 1. Schedule: Provide a schedule of hollow metal work prepared by or under the supervision
35 of supplier, using same reference numbers for details and openings as those on
36 Drawings. Coordinate with door hardware schedule.

- 37 D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified
38 testing agency, for each type of hollow metal door and frame assembly.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain hollow metal work from single source from single manufacturer.
- B. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80, 2013 edition that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at as close to neutral pressure as possible according to NFPA 252, 2003 edition.
- C. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257, 2007 edition or UL 9. Label each individual glazed lite.
- D. Smoke-Control Door Assemblies: Comply with NFPA 105, 2013 edition or UL 1784.
- E. Preinstallation Conference: Conduct conference at Project site.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
 - 1. Provide additional protection to prevent damage to finish of factory-finished units.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch-high wood blocking. Do not store in a manner that traps excess humidity.
 - 1. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.8 COORDINATION

- A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Amweld Building Products, LLC.
 - 2. Benchmark; a division of Therma-Tru Corporation.
 - 3. Ceco Door Products; an Assa Abloy Group company.
 - 4. Curries Company; an Assa Abloy Group company.
 - 5. Deansteel Manufacturing Company, Inc.
 - 6. Firedoor Corporation.

7. Fleming Door Products Ltd.; an Assa Abloy Group company.
8. Habersham Metal Products Company.
9. Kewanee Corporation (The).
10. Mesker Door Inc.
11. Pioneer Industries, Inc.
12. Security Metal Products Corp.
13. Steelcraft; an Ingersoll-Rand company.
14. Windsor Republic Doors.

2.2 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum A40 metallic coating.
- D. Frame Anchors: ASTM A 591/A 591M, Commercial Steel (CS), 40Z coating designation; mill phosphatized.
 1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.
- E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.
- F. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M.
- G. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool with 6- to 12-lb/cu. ft. density; with maximum flame-spread and smoke-development indexes of 25 and 50, respectively; passing ASTM E 136, 2007 edition for combustion characteristics.
- H. Glazing: Comply with requirements in Division 08 Section "Glazing."
- I. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.3 STANDARD HOLLOW METAL DOORS

- A. General: Provide doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8.
 1. Design: Flush panel.
 2. Core Construction: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core.
 - a. Fire Door Core: As required to provide fire-protection ratings indicated.
 - b. Thermal-Rated (Insulated) Doors: Where indicated, provide doors fabricated with thermal-resistance value (R-value) of not less than 6.0 deg F x h x sq. ft./Btu when tested according to ASTM C 1363.

- 1) Locations: Exterior doors.
- Vertical Edges for Single-Acting Doors: Square edge.
- Vertical Edges for Double-Acting Doors: Round vertical edges with 2-1/8-inch radius.
- Top and Bottom Edges: Closed with flush or inverted 0.042-inch-thick, end closures or channels of same material as face sheets.
- Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."
- B. Exterior Doors: Face sheets fabricated from metallic-coated steel sheet. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
 1. Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 1 (Full Flush).
- C. Interior Doors: Face sheets fabricated from cold-rolled steel sheet unless metallic-coated sheet is indicated. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
 1. Level 2 and Physical Performance Level B (Heavy Duty), Model 1 (Full Flush).
- D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.
- E. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.
- 2.4 STANDARD HOLLOW METAL FRAMES
 - A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.
 - B. Exterior Frames: Fabricated from metallic-coated steel sheet.
 1. Fabricate frames with mitered or coped corners.
 2. Frames for Level 3 Steel Doors: 0.053-inch-thick steel sheet.
 - C. Interior Frames: Fabricated from cold-rolled steel sheet unless metallic-coated sheet is indicated.
 1. Fabricate frames with mitered or coped corners.
 2. Fabricate knocked-down, drywall slip-on frames for in-place gypsum board partitions.
 3. Frames for Level 2 Steel Doors: 0.053-inch-thick steel sheet.
 4. Frames for Wood Doors: 0.053-inch-thick steel sheet.
 5. Frames for Borrowed Lights: 0.053-inch-thick steel sheet.
 - D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as frames.
- 2.5 FRAME ANCHORS
 - A. Jamb Anchors:
 1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
 2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
 3. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.

4. Post-installed Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch-diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

- B. Floor Anchors: Formed from same material as frames, not less than 0.042 inch thick, and as follows:

1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

2.6 STOPS AND MOLDINGS

- A. Moldings for Glazed Lites in Doors: Minimum 0.032 inch thick, fabricated from same material as door face sheet in which they are installed.

- B. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch high unless otherwise indicated.

- C. Loose Stops for Glazed Lites in Frames: Minimum 0.032 inch thick, fabricated from same material as frames in which they are installed.

2.7 ACCESSORIES

- A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.

- B. Ceiling Struts: Minimum 1/4-inch-thick by 1-inch-wide steel.

- C. Grout Guards: Formed from same material as frames, not less than 0.016 inch thick.

2.8 FABRICATION

- A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

- B. Tolerances: Fabricate hollow metal work to tolerances indicated in SDI 117.

- C. Hollow Metal Doors:

1. Exterior Doors: Provide weep-hole openings in bottom of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
2. Glazed Lites: Factory cut openings in doors.
3. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted.

- D. Hollow Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
2. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
3. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.

- a. Provide pinned Torx drive type fasteners at door hardware for doors and frames located in inmate accessible areas. Administration and Visitation areas are the only areas not accessible to inmates.
4. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
5. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
6. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Provide pinned Torx drive type fasteners at stops and moldings located in inmate accessible areas. Administration and Visitation areas are the only areas not accessible to inmates.
 - b. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 1) Two anchors per jamb up to 60 inches high.
 - 2) Three anchors per jamb from 60 to 90 inches high.
 - 3) Four anchors per jamb from 90 to 120 inches high.
 - 4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.
 - c. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 1) Three anchors per jamb up to 60 inches high.
 - 2) Four anchors per jamb from 60 to 90 inches high.
 - 3) Five anchors per jamb from 90 to 96 inches high.
 - 4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
 - 5) Two anchors per head for frames above 42 inches wide and mounted in metal-stud partitions.
 - d. Compression Type: Not less than two anchors in each jamb.
 - e. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.
7. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Keep holes clear during construction.
 - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
 - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
- E. Fabricate concealed stiffeners, edge channels, and hardware reinforcement from either cold- or hot-rolled steel sheet.
- F. Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."
 1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
 2. Reinforce doors and frames to receive nontemplated, mortised and surface-mounted door hardware.
 3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.

4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.

- G. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.

1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow metal work.
2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
4. Provide loose stops and moldings on inside of hollow metal work.
5. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.
6. Provide pinned Torx-Plus or pinned Torx drive type fasteners at stops and moldings located in inmate accessible areas. Administration and Visitation areas are the only areas not accessible to inmates.

2.9 STEEL FINISHES

- A. Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.
1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.
- C. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
- B. Prior to installation, adjust and securely brace welded hollow metal frames for squareness, alignment, twist, and plumbness to the following tolerances:
1. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 2. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.

3. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 4. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.
- C. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
- 3.3 INSTALLATION
- A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.
- B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11.
1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - a. At fire-protection-rated openings, install frames according to NFPA 80, 2007 edition
 - b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
 - c. Install frames with removable glazing stops located on secure side of opening.
 - d. Install door silencers in frames before grouting.
 - e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - f. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
 - g. Field apply bituminous coating to backs of frames that are filled with grout containing antifreezing agents. (RFI #327 – This is required)
 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
 3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
 4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
 5. Concrete Walls: Solidly fill space between frames and concrete with grout. Take precautions, including bracing frames, to ensure that frames are not deformed or damaged by grout forces.
 6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
 7. Installation Tolerances: Adjust hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Standard Steel Doors:
2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
3. Smoke-Control Doors: Install doors according to NFPA 105.

D. Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow metal manufacturer's written instructions.

1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

- a. Provide pinned Torx-Plus or pinned Torx drive type fasteners at stops located in inmate accessible areas. Administration and Visitation areas are the only areas not accessible to inmates.

3.4 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow metal work immediately after installation.

C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

D. Metallic-Coated Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION 08 11 13

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1 SECTION 08 14 16 - FLUSH WOOD DOORS

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and
5 Supplementary Conditions and Division 01 Specification Sections, apply to this
6 Section.

7 1.2 SUMMARY

- 8 A. Section Includes: Solid-core doors with plastic-laminate faces.
- 9 B. Related Requirements: Section 08 80 00 "Glazing" for glass view panels in flush wood
10 doors.

11 1.3 ACTION SUBMITTALS

- 12 A. Product Data: For each type of door. Include details of core and edge construction and
13 trim for openings. Include factory-finishing specifications.
- 14 B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind
15 of door; construction details not covered in Product Data; and the following:

- 16 1. Dimensions and locations of blocking.
- 17 2. Dimensions and locations of mortises and holes for hardware.
- 18 3. Dimensions and locations of cutouts.
- 19 4. Undercuts.
- 20 5. Doors to be factory finished and finish requirements.
- 21 6. Fire-protection ratings for fire-rated doors.

- 22 C. Samples for Initial Selection: For plastic-laminate door faces and factory-finished
23 doors.

- 24 D. Samples for Verification:

- 25 1. Factory finishes applied to actual door face materials, approximately 8 by 10
26 inches, for each material and finish.
- 27 2. Plastic laminate, 6 inches square, for each color, texture, and pattern selected.
- 28 3. Corner sections of doors, approximately 8 by 10 inches, with door faces and
29 edges representing actual materials to be used.
- 30 a. Provide Samples for each color, texture, and pattern of plastic laminate
31 required.
- 32 4. Frames for light openings, 6 inches long, for each material, type, and finish
33 required.

1 1.4 INFORMATIONAL SUBMITTALS

2 A. Sample Warranty: For special warranty.

3 B. Quality Standard Compliance Certificates: WI Certified Compliance Program
4 certificates.

5 1.5 DELIVERY, STORAGE, AND HANDLING

6 A. Comply with requirements of referenced standard and manufacturer's written
7 instructions.

8 B. Package doors individually in cardboard cartons and wrap bundles of doors in plastic
9 sheeting.

10 C. Mark each door on bottom rail with opening number used on Shop Drawings.

11 1.6 FIELD CONDITIONS

12 A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and
13 weathertight, wet work in spaces is complete and dry, and HVAC system is operating
14 and maintaining ambient temperature and humidity conditions at occupancy levels
15 during remainder of construction period.

16 1.7 WARRANTY

17 A. A. Special Warranty: Manufacturer agrees to repair or replace doors that fail in
18 materials or workmanship within specified warranty period.

19 1. Failures include, but are not limited to, the following:

- 20 a. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
21 b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a
22 3-inch span.

23 2. Warranty shall also include installation and finishing that may be required due to
24 repair or replacement of defective doors.

25 3. Warranty Period for Solid-Core Interior Doors: Life of installation.

26 PART 2 - PRODUCTS

27 2.1 MANUFACTURERS

28 A. Manufacturers: Subject to compliance with requirements, provide products by one of
29 the following:

30 1. Algoma Hardwoods, Inc.

2. Eggers Industries.
3. Mohawk Flush Doors, Inc.
4. VT Industries Inc.

B. Source Limitations: Obtain flush wood doors from single manufacturer.

2.2 FLUSH WOOD DOORS, GENERAL

A. Quality Standard: In addition to requirements specified, comply with AWI's, AWMAC's, or WI's "Architectural Woodwork Standards."

1. Provide WI Certified Compliance Labels indicating that doors comply with requirements of grades specified.
2. Contract Documents contain selections chosen from options in quality standard and additional requirements beyond those of quality standard. Comply with those selections and requirements in addition to quality standard.

B. WDMA I.S.1-A Performance Grade: Extra Heavy Duty.

C. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.

1. Temperature-Rise Limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.
2. Cores: Provide core specified or mineral core as needed to provide fire-protection rating indicated.

D. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control, based on testing according to UL 1784.

E. Mineral-Core Doors:

1. Core: Noncombustible mineral product complying with requirements of referenced quality standard and testing and inspecting agency for fire-protection rating indicated.
2. Blocking: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated as needed to eliminate through-bolting hardware.
3. Edge Construction: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.

- a. Screw-Holding Capability: 550 lbf per WDMA T.M.-10.

2.3 PLASTIC-LAMINATE-FACED DOORS

A. Interior Solid-Core Doors

1. Grade: Premium.
2. Plastic-Laminate Faces: High-pressure decorative laminates complying with NEMA LD 3, Grade HGS.
3. Colors (laminate), Patterns, and Finishes: As selected by Architect from laminate manufacturer's full range of products.
4. Exposed Vertical Plastic laminate that matches faces, applied before faces
5. Core: Either glued wood stave lumber.
6. Construction: Three plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before faces are applied. Faces are bonded to core using a hot press.
7. Construction: Five plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before faces and cross bands are applied. Faces are bonded to core using a hot press.
8. WDMA I.S.1-A Performance Grade: Extra Heavy Duty.

2.4 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
 1. Comply with NFPA 80 requirements for fire-rated doors.
- B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, BHMA-156.115-W, and hardware templates.
 1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.
- C. Openings: Factory cut and trim openings through doors.
 1. Light Openings: Trim openings with metal frames that attach to the door.
 2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Section 088000 "Glazing."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and installed door frames, with Installer present, before hanging doors.
 1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
 2. Reject doors with defects.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Hardware: For installation, see Section 087100 "Door Hardware."
- B. Installation Instructions: Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
 - 1. Install fire-rated doors according to NFPA 80.
 - 2. Install smoke- and draft-control doors according to NFPA 105.
- C. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
 - 1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold unless otherwise indicated.
 - a. Comply with NFPA 80 for fire-rated doors.
 - b. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.
 - ~~2.~~ Bevel fire-rated doors 1/8 inch in 2 inches at lock edge;

3.3 ADJUSTING

- A. Operation: Rehang or replace doors that do not swing or operate freely.
- B. Door Replacement: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired if Work complies with requirements and shows no evidence of repair.

END OF SECTION 08 14 16

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SECTION 08 31 13 - ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. Drawings and Conditions of Contract, including General and Supplementary Conditions and Division 1 Administration Sections, apply to this Division.

1.2 SUMMARY

- A. This Section includes the following:

1. Access doors and frames for walls and ceilings in non-inmate accessible locations.

- B. Related Sections include the following:

1. Division 03 30 00 Section "Cast-in-Place Concrete" for blocking out openings for access doors and frames in concrete.
2. Division 04 22 00 Section "Unit Masonry" for anchoring and grouting access door frames set in masonry construction.
3. Division 08 31 13.53 "Security Access Doors" for access doors and frames at inmate accessible locations.
4. Division 08 71 00 Section "Door Hardware" for mortise or rim cylinder locks and master keying.
5. Divisions 22 and 23 for units and systems requiring access doors and frames.

1.3 SUBMITTALS

- A. Product Data: For each type of access door and frame indicated. Include construction details, fire ratings, materials, individual components and profiles, and finishes.

- B. Shop Drawings: Show fabrication and installation details of access doors and frames for each type of substrate. Include plans, elevations, sections, details, and attachments to other work.

- C. Access Door and Frame Schedule: Provide complete access door and frame schedule, including types, locations, sizes, latching or locking provisions, and other data pertinent to installation.

- D. Ceiling Coordination Drawings: Reflected ceiling plans, drawn to scale, on which ceiling-mounted items including access doors and frames, lighting fixtures, diffusers, grilles, speakers, sprinklers, and special trim are shown and coordinated with each other.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain access doors and frames through one source from a single manufacturer.

- B. Fire-Rated Access Doors and Frames: Units complying with NFPA 80, 2013 edition that are identical to access door and frame assemblies tested for fire-test-response characteristics per the following test method and that are listed and labeled by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

1. NFPA 252, 2003 edition for vertical access doors and frames.
2. ASTM E 119, 2007 edition for horizontal access doors and frames.

- C. Size Variations: Obtain Architect's acceptance of manufacturer's standard-size units, which may vary slightly from sizes indicated.

1.5 COORDINATION

- A. Verification: Determine specific locations and sizes for access doors needed to gain access to concealed plumbing, mechanical, or other concealed work, and indicate in the schedule specified in "Submittals" Article.

PART 2 - PRODUCTS

2.1 STEEL MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

1. ASTM A 123/A 123M, for galvanizing steel and iron products.
2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.

- B. Steel Sheet: Uncoated or electrolytic zinc-coated, ASTM A 591/A 591M with cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.

- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS) with A60 zinc-iron-alloy (galvannealed) coating or G60 mill-phosphatized zinc coating; stretcher-leveled standard of flatness; with minimum thickness indicated representing specified thickness according to ASTM A 924/A 924M.

- D. Steel Finishes: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

1. Surface Preparation for Steel Sheet: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning," to remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or SSPC-SP 8, "Pickling."
2. Surface Preparation for Metallic-Coated Steel Sheet: Clean surfaces with nonpetroleum solvent so surfaces are free of oil and other contaminants. After cleaning, apply a conversion coating suited to the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas, and apply galvanizing repair paint specified below to comply with ASTM A 780.

- a. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.

3. Factory-Primed Finish: Apply shop primer immediately after cleaning and pretreating.

- E. Drywall Beads: Edge trim formed from 0.0299-inch zinc-coated steel sheet formed to receive joint compound and in size to suit thickness of gypsum board.

2.2 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Acudor Products, Inc.
2. Babcock-Davis; A Cierra Products Co.

- 1 3. Bar-Co, Inc. Div.; Alfab, Inc.
 - 2 4. Cendrex Inc.
 - 3 5. Dur-Red Products.
 - 4 6. Elmdor/Stoneman; Div. of Acorn Engineering Co.
 - 5 7. Jensen Industries.
 - 6 8. J. L. Industries, Inc.
 - 7 9. Karp Associates, Inc.
 - 8 10. Larsen's Manufacturing Company.
 - 9 11. MIFAB, Inc.
 - 10 12. Milcor Inc.
 - 11 13. Nystrom, Inc.
 - 12 14. Williams Bros. Corporation of America (The).
- 13 C. Flush Access Doors and Frames with Exposed Trim: Fabricated from metallic-coated steel
- 14 sheet.
- 15 1. Locations: Concrete and masonry wall and ceiling surfaces.
 - 16 2. Door: Minimum 0.060-inch-thick sheet metal, set flush with exposed face flange of
 - 17 frame.
 - 18 3. Frame: Minimum 0.060-inch-thick sheet metal with manufacturer's standard 1-inch-or 1-
 - 19 1/4-inch-wide, surface-mounted trim.
 - 20 4. Hinges: Continuous piano.
 - 21 5. Latch: Self-latching bolt operated by flush key with interior release.
 - 22 6. Lock: Cylinder.
- 23 D. Flush Access Doors and Trimless Frames: Fabricated from metallic-coated steel sheet.
- 24 1. Locations: Gypsum board wall and ceiling surfaces.
 - 25 2. Door: Minimum 0.060-inch-thick sheet metal, set flush with surrounding finish surfaces.
 - 26 3. Frame: Minimum 0.060-inch-thick sheet metal with drywall bead flange.
 - 27 4. Hinges: Continuous piano.
 - 28 5. Latch: Self-latching bolt operated by flush key with interior release.
 - 29 6. Lock: Cylinder.
- 30 E. Fire-Rated, Insulated, Flush Access Doors and Frames with Exposed Trim: Fabricated from
- 31 metallic-coated steel sheet.
- 32 1. Locations: Concrete and masonry wall and ceiling surfaces.
 - 33 2. Fire-Resistance Rating: Not less than that of wall installed in.
 - 34 3. Temperature Rise Rating: 250 deg F at the end of 30 minutes.
 - 35 4. Door: Flush panel with a core of mineral-fiber insulation enclosed in sheet metal with a
 - 36 minimum thickness of 0.036 inch.
 - 37 5. Frame: Minimum 0.060-inch-thick sheet metal with manufacturer's standard 1-inch-or 1-
 - 38 1/4-inch-wide, surface-mounted trim.
 - 39 6. Hinges: Continuous piano.
 - 40 7. Automatic Closer: Spring type.
 - 41 8. Latch: Self-latching device operated by flush key with interior release.
 - 42 9. Lock: Self-latching device with cylinder lock.
- 43 F. Fire-Rated, Insulated, Flush Access Doors and Trimless Frames: Fabricated from metallic-
- 44 coated steel sheet.
- 45 1. Locations: Gypsum board wall and ceiling surfaces.
 - 46 2. Fire-Resistance Rating: Not less than that of wall installed in.
 - 47 3. Temperature Rise Rating: 250 deg F at the end of 30 minutes.
 - 48 4. Door: Flush panel with a core of mineral-fiber insulation enclosed in sheet metal with a
 - 49 minimum thickness of 0.036 inch.
 - 50 5. Frame: Minimum 0.060-inch-thick sheet metal with drywall bead.

6. Hinges: Continuous piano.
 7. Automatic Closer: Spring type.
 8. Latch: Self-latching device operated by flush key with interior release.
 9. Lock: Self-latching device with cylinder lock.
- G. Medium-Security, Flush Access Doors and Frames with Exposed Trim: Fabricated from metallic-coated steel sheet.
1. Locations: Typical wall and ceiling surfaces with security rating.
 2. Door: Minimum 0.105-inch-thick sheet metal, flush construction.
 3. Frame: Minimum 0.105-inch-thick sheet metal with manufacturer's standard 1-inch-or 1-1/4-inch-wide, surface-mounted trim.
 4. Hinges: Concealed continuous piano.
 5. Lock: Detention.
 - a. Lock Preparation: Prepare door panel to accept lock specified in Division 08 Section "Detention Door Hardware."
- H. Fire-Rated, Insulated, Medium-Security, Flush Access Doors and Frames with Exposed Trim: Fabricated from metallic-coated steel sheet.
1. Locations: Typical wall surfaces with security and fire rating.
 2. Fire-Resistance Rating: Not less than that of wall installed in.
 3. Temperature Rise Rating: 250 deg F at the end of 30 minutes.
 4. Door: Flush panel with a core of 2-inch-thick, mineral-fiber insulation enclosed in sheet metal with a minimum thickness of 0.075 inch.
 5. Frame: Minimum 0.060-inch-thick sheet metal with manufacturer's standard 1-inch-or 1-1/4-inch-wide, surface-mounted trim.
 6. Hinges: Continuous piano.
 7. Automatic Closer: Spring type.
 8. Lock: Self-latching device with detention lock.
 - a. Lock Preparation: Prepare door panel to accept lock specified in Division 08 Section "Detention Door Hardware."
- I. Maximum-Security, insulated Flush Access Doors and Frames with Exposed Trim: Fabricated from steel sheet and angles.
1. Locations: Cell Module and Shower Module wall surfaces.
 2. Door: Minimum 0.180-inch-thick sheet metal, flush construction.
 3. Frame: Minimum 3/16-by-2-by-2-inch angle welded with joints ground smooth.
 - a. Provide continuous stop all four sides of frame.
 - b. Provide continuous smoke gasket between door and continuous stop all four sides of frame
 4. Hinges: Continuous heavy-duty steel welded to door and frame
 - a. With non-removable hinge pin.
 5. Lock: Heavy-duty, detention deadbolt.
 - a. Lock Preparation: Prepare door panel to accept lock specified in Division 08 Section "Detention Door Hardware."
- 2.3 FABRICATION
- A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.

- 1 B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials
2 with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam
3 marks, roller marks, rolled trade names, or roughness.
- 4 C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish
5 attachment devices and fasteners of type required to secure access panels to types of supports
6 indicated.
- 7 1. Exposed Flanges: As indicated.
8 2. For trimless frames with drywall bead, provide edge trim for gypsum board securely
9 attached to perimeter of frames.
10 3. Provide mounting holes in frames for attachment of units to metal framing.
11 4. Provide mounting holes in frame for attachment of masonry anchors. Furnish adjustable
12 metal masonry anchors.
- 13 D. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when
14 closed.
- 15 1. For cylinder lock, furnish two keys per lock and key all locks alike.

16 PART 3 - EXECUTION

17 3.1 INSTALLATION

- 18 A. Comply with manufacturer's written instructions for installing access doors and frames.
- 19 B. Set frames accurately in position and attach securely to supports with plane of face panels
20 aligned with adjacent finish surfaces.
- 21 C. Install doors flush with adjacent finish surfaces or recessed to receive finish material.
- 22 3.2 ADJUSTING AND CLEANING
- 23 A. Adjust doors and hardware after installation for proper operation.
- 24 B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

25 END OF SECTION 08 31 13
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SECTION 08 51 13.53 - SECURITY ACCESS DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.
- B. Refer to Section 01 35 133.16 for General Requirements relating to Work of this Section.

1.2 SUMMARY

- A. This Section includes security access doors.

1.3 REFERENCES

- A. UL 10 B-08 Standard for Safety Fire Tests of Door Assemblies.

1.4 SUBMITTALS

- A. Product data in form of manufacturer's technical data and installation instructions for each type of access door assembly, including setting drawings, templates, instructions, and directions for installation of anchorage devices.
 - 1. Include complete schedule, including types, general locations, sizes, construction details, finishes, latching or locking provisions, and other data pertinent to installation.
- B. Shop Drawings: Submit shop drawings in compliance with Section 01 3323 "Shop Drawings, Product Data, and Samples."

1.5 QUALITY ASSURANCE

- A. Fire-Resistance Ratings: At rated walls, provide access door assemblies with panel door, frame, hinge, and latch from manufacturer listed in Underwriters Laboratories, Inc.'s, *Building Materials Directory* for a "B" classification and at least a 1-hour rating. Provide UL label on each fire-rated access door.
- B. Coordination: Furnish inserts and anchoring devices that must be built into other work for installation of access doors. Coordinate delivery with other work to avoid delay.

1.6 PROJECT CONDITIONS

- A. Verification: Obtain specific locations and sizes for required access doors from trades requiring access to concealed equipment, and indicate on submittal schedule.

PART 2 - PRODUCTS

2.1 SECURITY ACCESS DOORS AND FRAMES

- A. Doors shall be flush 7-gauge steel plate 1/4-inch x 10 GA. security piano hinge or 4x4 heavy duty butt hinges welded to door and frame, set for open to 125 degrees. Finish shall be phosphate protective coating and factory primer ready for field painting.

1. Size to be as follows: AP-1 32"W x 48" H (at cell chase doors), AP-2 32"W x 48" H, AP-3 32"W x 48" H, AP-4 32"W x 48" H, AP-5 24" W x 48" H, provide gasketing weather-stripping (at cell interstitial exterior door).
- B. Frames shall be 2 x 3 x 3/16 inch steel angle mitered and welded at corners, ground smooth. Finish shall be the same as doors. Provide anchor straps for type of wall construction as required and shown on the plans.
- C. Provide 1010A-1 deadlock Series paracentric lever tumbler security lock as manufactured by Sothorn steel in each security access door with steel plate mounting hardware.
- D. Fire-Rated Units: Provide insulated flush panel doors, with continuous 1/4 inch x 10 GA. security piano hinge with rod welded in place. Provide fire rated gasketing.
- E. Acceptable manufacturers are:
 1. Karp Associates, 5454 43rd Street, Maspeth, NY
 2. Nystrom, Inc., 1207 N.E. Madison Street, Minneapolis, MN
 3. American Security, P.O. Box 6633, Phoenix, AZ 85005
 4. J.L. Industries, 4450 West 78th Street Circle, Bloomington, MN 55435
 5. Milcor Limited Partnership, 1150 N. Cable Road, Lima, OH 45804
 6. Southern Steel, 4634 S. Presa, San Antonio, TX 78223
 7. Peterson Enterprises, 1901 East Edinger, Santa Ana, CA 92705

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install access doors at locations shown in accordance with the access door manufacturer's recommendations.

END OF SECTION 08 31 13.53

1 SECTION 08 33 13 - COILING COUNTER DOORS

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY

- 7 A. Section Includes:

- 8 1. Counter doors.
9 2. Fire-rated counter doors.

- 10 B. Related Requirements:

- 11 1. Section 055000 "Metal Fabrications" for miscellaneous steel supports.

12 1.3 ACTION SUBMITTALS

- 13 A. Product Data: For each type and size of coiling counter door and accessory.

- 14 1. Include construction details, material descriptions, dimensions of individual components,
15 profiles for slats, and finishes.
16 2. Include rated capacities, operating characteristics, electrical characteristics, and
17 furnished accessories.
18 3. Include description of automatic closing device and testing and resetting instructions.

- 19 B. Shop Drawings: For each installation and for special components not dimensioned or detailed in
20 manufacturer's product data.

- 21 1. Include plans, elevations, sections, and mounting details.
22 2. Include details of equipment assemblies, and indicate dimensions, required clearances,
23 method of field assembly, components, and location and size of each field connection.
24 3. Include points of attachment and their corresponding static and dynamic loads imposed
25 on structure.
26 4. Show locations of controls, locking devices, detectors or replaceable fusible links, and
27 other accessories.
28 5. Include diagrams for power, signal, and control wiring.

- 29 C. Samples for Initial Selection: Manufacturer's finish charts showing full range of colors and
30 textures available for units with factory-applied finishes.

- 31 1. Include similar Samples of accessories involving color selection.

- 32 D. Samples for Verification: For each type of exposed finish on the following components, in
33 manufacturer's standard sizes:

1. Curtain slats.
2. Guides.
3. Brackets.
4. Hood.
5. Laminate-clad counter panel product for each type, color, pattern, and surface finish; laminated to core.
6. Locking device(s).
7. Include similar Samples of accessories involving color selection.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Oversize Construction Certification: For door assemblies required to be fire-rated and that exceed size limitations of labeled assemblies.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For coiling counter doors to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer for both installation and maintenance of units required for this Project.
- B. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at as close to neutral pressure as possible according to NFPA 252 or UL 10B.
 1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
 2. Temperature-Rise Limit: At exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F above ambient after 30 minutes of standard fire-test exposure.
 3. Smoke Control: In corridors and smoke barriers, provide doors that are listed and labeled with the letter "S" on the fire-rating label by a qualified testing agency for smoke- and draft-control based on testing according to UL 1784; with maximum air-leakage rate of 3.0 cfm/sq. ft. of door opening at 0.10-inch wg for both ambient and elevated temperature tests.

PART 2 - PRODUCTS

2.1 MANUFACTURERS, GENERAL

- A. Source Limitations: Obtain coiling counter doors from single source from single manufacturer.

1. Obtain operators and controls from coiling counter door manufacturer.

2.2 FIRE-RATED COUNTER DOOR ASSEMBLY

- A. Fire-Rated Counter Door: Overhead fire-rated coiling door formed with curtain of interlocking metal slats.
- a. C.H.I. Overhead Doors, Inc.
 - b. Clopay Building Products.
 - c. Cookson Company (with Firefly 3 release device as basis of design).
 - d. McKeon Rolling Steel Door Company, Inc.
 - e. Overhead Door Corporation.
- B. Operation Cycles: Door components and operators capable of operating for not less than 100,000. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.
1. Include tamperproof cycle counter.
- C. Fire Rating: 1-1/2 hours with temperature-rise limit and with smoke control.
- D. Door Curtain Material: Stainless steel.
- E. Door Curtain Slats: Flat profile slats of 1-1/2-inch center-to-center height.
- F. Hood: Stainless steel.
- 1. Shape: Rectangular.
 - 2. Mounting: Face of wall, but concealed above ceiling.
- G. Integral Frame, Hood, and Fascia: Stainless steel.
- 1. Mounting: Face of wall.
- H. Sill Configuration: Solid surfacing by others.
- I. Locking Devices: Equip door with slide bolt for padlock.
- J. Fire Release Device: the counter door shall be released by a device connected to the fire alarm system that releases the door by fail safe means (Cookson Firefly 3 as basis of design).
- 1. 24 V DC device
 - 2. UL rated and listed for use
 - 3. Connected to fusible link cables for operation
- K. Manual Door Operator: Push-up operation and Manufacturer's standard crank operator.
- 1. Provide operator with manufacturer's standard removable operating arm.
- L. Curtain Accessories: Equip door with smoke seals, automatic closing device, and push/pull handles.
- M. Door Finish:
- 1. Stainless-Steel Finish: No. 4 (polished directional satin).

2.3 MATERIALS, GENERAL

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.4 DOOR CURTAIN MATERIALS AND CONSTRUCTION

- A. Door Curtains: Fabricate coiling counter-door curtain of interlocking metal slats in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:

1. Stainless-Steel Door Curtain Slats: ASTM A 666, Type 304; sheet thickness of 0.025 inch; and as required.

- B. Curtain Jamb Guides: Manufacturer's standard angles or channels and angles of same material and finish as curtain slats unless otherwise indicated, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain.

1. Removable Posts and Jamb Guides: Manufacturer's standard.

2.5 HOODS

- A. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.

1. Stainless Steel: 0.025-inch-thick stainless-steel sheet, Type 304, complying with ASTM A 666.
2. Include automatic drop baffle on fire-rated doors to guard against passage of smoke or flame.

- B. Integral Frame, Hood, and Fascia: Welded sheet metal assembly of the following sheet metal(s): Stainless Steel: Type 304, complying with ASTM A 666.

2.6 LOCKING DEVICES

- A. Slide Bolt: Fabricate with side-locking bolts to engage through slots in tracks for locking by padlock, located on both left and right jamb sides, operable from coil side.

2.7 CURTAIN ACCESSORIES

- A. Smoke Seals: Equip each fire-rated door with replaceable smoke-seal perimeter gaskets or brushes for smoke and draft control as required for door listing and labeling by a qualified testing agency.

- 1 B. Push/Pull Handles: Equip each push-up-operated or emergency-operated door with lifting
2 handles on each side of door, finished to match door.
- 3 C. Automatic-Closing Device: Equip each fire-rated door with an automatic-closing device or
4 holder-release mechanism and governor unit complying with NFPA 80 and an easily tested and
5 reset release mechanism. Testing for manually operated doors shall allow resetting by opening
6 the door without re-tensioning the counterbalancing mechanism. Automatic-closing device shall
7 be designed for activation by the following:
- 8 1. Replaceable fusible links with temperature rise and melting point of 165 deg F
9 interconnected and mounted on both sides of door opening.
10 2. Manufacturer's standard UL-labeled smoke detector and door-holder-release devices.
11 3. Manufacturer's standard UL-labeled heat detector and door-holder-release devices.
12 4. Building fire-detection, smoke-detection, and -alarm systems.

13 2.8 COUNTER DOOR ACCESSORIES

- 14 A. Fire-Rated, Laminate Counter: Fire-door manufacturer's high-pressure decorative laminate-
15 covered countertop, UL or ITS tested and labeled for 1-1/2-hour fire rating for approved use with
16 fire-door assembly.

17 2.9 COUNTERBALANCING MECHANISM

- 18 A. General: Counterbalance doors by means of manufacturer's standard mechanism with an
19 adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a
20 spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-
21 lubricating graphite bearings for rotating members.
- 22 B. Counterbalance Barrel: Fabricate spring barrel of manufacturer's standard hot-formed,
23 structural-quality, seamless or welded carbon-steel pipe, of sufficient diameter and wall
24 thickness to support rolled-up curtain without distortion of slats and to limit barrel deflection to
25 not more than 0.03 in./ft. of span under full load.
- 26 C. Counterbalance Spring: One or more oil-tempered, heat-treated steel helical torsion springs.
27 Size springs to counterbalance weight of curtain, with uniform adjustment accessible from
28 outside barrel. Secure ends of springs to barrel and shaft with cast-steel barrel plugs.
- 29 1. Fire-Rated Doors: Equip with auxiliary counterbalance spring and prevent tension release
30 from main counterbalance spring when automatic closing device operates.
- 31 D. Torsion Rod for Counterbalance Shaft: Fabricate of manufacturer's standard cold-rolled steel,
32 sized to hold fixed spring ends and carry torsional load.
- 33 E. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel
34 plate.

35 2.10 MANUAL DOOR OPERATORS

- 36 A. General: Equip door with manual door operator by door manufacturer.

- 1 B. Push-up Door Operation: Design counterbalance mechanism so that required lift or pull for door
2 operation does not exceed 25 lb.
- 3 C. Crank Operator: Consisting of crank and crank gearbox, steel crank drive shaft, and gear-
4 reduction unit, of type indicated. Size gears to require not more than 25-lbf force to turn crank.
5 Fabricate gearbox to be oil tight and to completely enclose operating mechanism. Provide
6 manufacturer's standard crank-locking device.
- 7 D. Fire Release Device: the counter door shall be released by a device connected to the fire alarm
8 system that releases the door by fail safe means (Cookson Firefly 3 as basis of design).

9 2.11 GENERAL FINISH REQUIREMENTS

- 10 A. Comply with NAAMM/NOMMA's "Metal Finishes Manual for Architectural and Metal Products
11 (AMP 500-06)" for recommendations for applying and designating finishes.
- 12 B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable.
13 Variations in appearance of adjoining components are acceptable if they are within the range of
14 approved Samples and are assembled or installed to minimize contrast.

15 2.12 STAINLESS-STEEL FINISHES

- 16 A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
- 17 B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
- 18 1. Run grain of directional finishes with long dimension of each piece.
19 2. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign
20 matter and leave surfaces chemically clean.
21 3. Directional Satin Finish: No. 4.

22 PART 3 - EXECUTION

23 3.1 EXAMINATION

- 24 A. Examine substrates areas and conditions, with Installer present, for compliance with
25 requirements for substrate construction and other conditions affecting performance of the Work.
- 26 B. Examine locations of electrical connections.
- 27 C. Proceed with installation only after unsatisfactory conditions have been corrected.

28 3.2 INSTALLATION

- 29 A. Install coiling counter doors and operating equipment complete with necessary hardware,
30 anchors, inserts, hangers, and equipment supports; according to manufacturer's written
31 instructions and as specified.

1 B. Install coiling counter doors, hoods, controls, and operators at the mounting locations indicated
2 for each door.

3 C. Fire-Rated Doors: Install according to NFPA 80.

4 D. Smoke-Control Doors: Install according to NFPA 80 and NFPA 105.

5 3.3 STARTUP SERVICE

6 A. Engage a factory-authorized service representative to perform startup service.

7 1. Perform installation and startup checks according to manufacturer's written instructions.

8 2. Test and adjust controls and safety devices. Replace damaged and malfunctioning
9 controls and equipment.

10 3. Test door closing when activated by detector or alarm-connected fire-release system.
11 Reset door-closing mechanism after successful test.

12 3.4 ADJUSTING

13 A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of
14 warp, twist, or distortion.

15 B. Lubricate bearings and sliding parts as recommended by manufacturer.

16 C. Adjust seals to provide tight fit around entire perimeter.

17 3.5 MAINTENANCE SERVICE

18 A. Initial Maintenance Service: Beginning at Project Completion, maintenance service shall include
19 12 months' full maintenance by skilled employees of coiling-door Installer. Include quarterly
20 preventive maintenance, repair or replacement of worn or defective components, lubrication,
21 cleaning, and adjusting as required for door operation. Parts and supplies shall be
22 manufacturer's authorized replacement parts and supplies.
23

24 1. Include 24-hour-per-day, seven-day-per-week, emergency callback service.

25 3.6 DEMONSTRATION

26 A. Engage a factory-authorized service representative to train Owner's maintenance personnel to
27 adjust, operate, and maintain coiling counter doors.

28 END OF SECTION 08 33 13
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1 SECTION 08 33 23 - OVERHEAD COILING DOORS

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY

- 7 A. This Section includes the following types of manually and electric-motor-operated overhead
8 coiling doors:

- 9 1. Fire-rated coiling doors.
10 2. Exterior, insulating coiling doors.

- 11 B. Related Sections include the following:

- 12 1. Division 05 50 00 Section "Metal Fabrications" for miscellaneous steel supports.
13 2. Division 08 71 00 Section "Door Hardware" for lock cylinders and keying.
14 3. Division 09 91 23 Section "Interior Painting".
15 4. Division 26 Sections for electrical service and connections for powered operators and
16 accessories.

17 1.3 DEFINITIONS

- 18 A. Operation Cycle: One cycle of a door is complete when it is moved from the closed position to
19 the fully open position and returned to the closed position.

20 1.4 PERFORMANCE REQUIREMENTS

- 21 A. Operation-Cycle Requirements: Provide overhead coiling door components and operators
22 capable of operating for not less than 1,000,000 cycles and for 50 cycles per day.

- 23 1. Include tamperproof cycle counter.

- 24 B. Operation Speed: Design doors of construction for high speed operation to achieve an
25 operation speed of 24 inches per second open and 12 inches per second close.

- 26 C. Thermal Performance: Insulated service doors shall have a minimum R-Value of 8 as
27 calculated using the ASHRAE Handbook of Fundamentals.

- 28 D. STC Rating: 27.

- 29 E. Insulation used in insulated service doors shall be CFC Free with an ODP rating of zero.

30 1.5 SUBMITTALS

- 31 A. Product Data: For each type and size of overhead coiling door and accessory. Include the
32 following:

- 33 1. Include construction details, material descriptions, dimensions of individual components,
34 profiles for slats, and finishes.
35 2. Include rated capacities, operating characteristics, electrical characteristics, and
36 furnished accessories.

3. Summary of forces and loads on walls and jambs.
4. Fire-Rated Doors: Include description of fire-release system including testing and resetting instructions.
- A. Shop Drawings: For special components and installations not dimensioned or detailed in manufacturer's product data. Include plans, elevations, sections, and mounting details.
 1. Include details of equipment assemblies, and indicate dimensions, required clearances, method of field assembly, components, and location and size of each field connection.
 2. Include points of attachment and their corresponding static and dynamic loads imposed on structure.
 3. For exterior components, include details of provisions for assembly expansion and contraction and for excluding and draining moisture to the exterior.
 4. Show locations of controls, locking devices, detectors or replaceable fusible links, and other accessories.
 5. Include diagrams for power, signal, and control wiring.
- B. Samples for Initial Selection: Manufacturer's color charts showing full range of colors available for units with factory-applied finishes.
- C. Qualification Data: For Installer.
- 1.6 QUALITY ASSURANCE
 - A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.
 - B. Source Limitations: Obtain overhead coiling doors through one source from a single manufacturer.
 - C. Fire-Test-Response Characteristics: Provide assemblies complying with NFPA 80, 2013 edition that are identical to door and frame assemblies tested for fire-test-response characteristics per UL 10b and NFPA 252, 2003 edition, and that are listed and labeled for fire ratings indicated by UL, FMG, ITS, or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - D. Listing and Labeling: Provide electrically operated fixtures specified in this Section that are listed and labeled.
 1. The Terms "Listed" and "Labeled": As defined in California Electrical Code (CEC) 2013 edition Article 100.
 2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" as defined in OSHA Regulation 1910.7.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain overhead coiling doors from single source from single manufacturer.
 1. Obtain operators and controls from overhead coiling door manufacturer.
- B. Basis-of-Design Product: Subject to compliance with requirements, provide Clopay Building Products; Extreme Performance doors or a comparable product by one of the following:
 1. Cookson Company.
 2. Cornell Iron Works, Inc.

3. Overhead Door Corporation.

2.2 DOOR CURTAIN MATERIALS AND CONSTRUCTION

A. Door Curtains: Fabricate overhead coiling door curtain of interlocking slats, designed to withstand wind loading indicated, in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:

1. Steel Door Curtain Slats: Zinc-coated (galvanized), cold-rolled structural steel sheet; complying with ASTM A 653/A 653M, G90 (Z275) coating designation.

a. Minimum Base-Metal (Uncoated) Thickness: 0.029 inch.

b. Flat profile slats.

c. Curtain shall be furnished with retractable anti-wear device, not visible to user, installed at shaft assembly to prolong curtain aesthetics.

B. Curtain Jamb Guides: Manufacturer's standard angles or channels and angles of same material and finish as curtain slats unless otherwise indicated, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain.

2.3 FIRE-RATED DOOR ASSEMBLY

A. Fire-Rated Door: Overhead fire-rated coiling door formed with curtain of interlocking metal slats.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. C.H.I. Overhead Doors, Inc.

b. Clopay Building Products.

c. Cookson Company.

d. Cornell Iron Works, Inc.

e. Overhead Door Corporation.

B. Operation Cycles: Door components and operators capable of operating for not less than 100,000. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.

1. Include tamperproof cycle counter.

C. Fire Rating: 3/4 hour, 1 hour, and/or 1-1/2 hours with temperature-rise limit and with smoke control.

2.4 HOODS AND ACCESSORIES

A. Hood: Form to act as weather seal and entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Provide closed ends for surface-mounted hoods and provide fascia for any portion of between-jamb mounting projecting beyond wall face. Provide intermediate support brackets as required to prevent sagging.

1. Fabricate hoods for steel doors of minimum 0.024-inch-thick, hot-dip galvanized steel sheet with G90 zinc coating, complying with ASTM A 653/A 653M.

2. At doors indicated to be fire-rated, include automatic drop baffle to guard against passage of smoke or flame.

3. Shape: Round.

- 1 B. Smoke Seals: Provide UL-listed and -tested smoke-seal perimeter gaskets.
- 2 C. Provide automatic-closing device that is inoperative during normal door operations, with
- 3 oscillating governor unit complying with requirements of NFPA 80, 2010 edition and with an
- 4 easily tested and reset release mechanism, and designed to be activated by the following:
- 5 1. Replaceable fusible links with temperature rise and melting point of 165 deg F;
- 6 interconnected and mounted on both sides of door opening.
- 7 2. Building fire alarm and detection system and door-holder-release devices.

8 2.5 COUNTERBALANCING MECHANISM

- 9 A. General: Counterbalance doors by means of adjustable-tension, steel helical torsion spring
- 10 mounted around a steel shaft and contained in a spring barrel connected to door curtain with
- 11 barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating
- 12 members.
- 13 B. Counterbalance Barrel: Fabricate spring barrel of hot-formed, structural-quality, welded or
- 14 seamless carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up
- 15 curtain without distortion of slats and to limit barrel deflection to not more than 0.03 in./ft. of
- 16 span under full load.
- 17 C. Provide spring balance of one or more oil-tempered, heat-treated steel helical torsion springs.
- 18 Size springs to counterbalance weight of curtain, with uniform adjustment accessible from
- 19 outside barrel. Provide cast-steel barrel plugs to secure ends of springs to barrel and shaft.
- 20 D. Fabricate torsion rod for counterbalance shaft of cold-rolled steel, sized to hold fixed spring
- 21 ends and carry torsional load.
- 22 E. Brackets: Provide mounting brackets of manufacturer's standard design, either cast iron or
- 23 cold-rolled steel plate.

24 2.6 ELECTRIC DOOR OPERATORS

- 25 A. General: Electric door operator assembly of size and capacity recommended and provided by
- 26 door manufacturer for door and operation-cycles requirement specified, with electric motor and
- 27 factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch,
- 28 control stations, control devices, integral gearing for locking door, and accessories required for
- 29 proper operation.
- 30 1. Comply with CEC .
- 31 2. Control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with
- 32 CEC Class 2 control circuit, maximum 24-V ac or dc.
- 33 B. Usage Classification: Electric operator and components capable of operating for not less than
- 34 number of cycles per hour indicated for each door.
- 35 C. Door Operator Location(s): Operator location indicated for each door.
- 36 1. Top-of-Hood Mounted: Operator is mounted to the right or left door head plate with the
- 37 operator on top of the door-hood assembly and connected to the door drive shaft with
- 38 drive chain and sprockets. Headroom is required for this type of mounting.
- 39 2. Front-of-Hood Mounted: Operator is mounted to the right or left door head plate with the
- 40 operator on coil side of the door-hood assembly and connected to the door drive shaft
- 41 with drive chain and sprockets. Front clearance is required for this type of mounting.
- 42 3. Wall Mounted: Operator is mounted to the inside front wall on the left or right side of door
- 43 and connected to door drive shaft with drive chain and sprockets. Side room is required

- 1 for this type of mounting. Wall mounted operator can also be mounted above or below
2 shaft; if above shaft, headroom is required.
- 3 4. Bench Mounted: Operator is mounted to the right or left door head plate and connected
4 to the door drive shaft with drive chain and sprockets. Side room is required for this type
5 of mounting.
- 6 5. Through-Wall Mounted: Operator is mounted on other side of wall from coil side of door.
- 7 D. Motors: Reversible-type motor with controller (disconnect switch) for motor exposure indicated.
8 1. Electrical Characteristics:
9 a. Phase: [Single phase] [Polyphase].
10 b. Volts: 208 V.
11 c. Hertz: 60.
12 2. Motor Size: Minimum size as indicated. If not indicated, large enough to start, accelerate,
13 and operate door in either direction from any position, at a speeds as indicated in
14 Performance Requirements article above, without exceeding nameplate ratings or service
15 factor.
16 3. Operating Controls, Controllers, Disconnect Switches, Wiring Devices, and Wiring:
17 Manufacturer's standard unless otherwise indicated.
18 4. Coordinate wiring requirements and electrical characteristics of motors and other
19 electrical devices with building electrical system and each location where installed.
- 20 E. Limit Switches: Equip each motorized door with adjustable switches interlocked with motor
21 controls and set to automatically stop door at fully opened and fully closed positions.
- 22 F. Obstruction Detection Devices: External entrapment protection consisting of indicated automatic
23 safety sensor capable of protecting full width of door opening. For non-fire-rated doors,
24 activation of device immediately stops and reverses downward door travel. For fire-rated doors,
25 activation delays closing.
26 1. Photoelectric Sensor: Manufacturer's standard system designed to detect an obstruction
27 in door opening without contact between door and obstruction.
28 a. Self-Monitoring Type: Designed to interface with door operator control circuit to
29 detect damage to or disconnection of sensing device. When self-monitoring feature
30 is activated, door closes only with sustained or constant pressure on close button.
31 2. Electric Sensor Edge: Automatic safety sensor edge, located within astragal or weather
32 stripping mounted to bottom bar. Contact with sensor activates device. Connect to control
33 circuit using manufacturer's standard take-up reel or self-coiling cable.
34 a. Self-Monitoring Type: Four-wire configured device designed to interface with door
35 operator control circuit to detect damage to or disconnection of sensor edge.
- 36 G. Control Station: Three-button control station in fixed location with momentary-contact push-
37 button controls labeled "Open" and "Stop" and sustained- or constant-pressure push-button
38 control labeled "Close."
39 1. Interior-Mounted Units: Full-guarded, surface-mounted, heavy-duty type, with general-
40 purpose NEMA ICS 6, Type 1 enclosure.
- 41 H. Emergency Manual Operation: Equip each electrically powered door with capability for
42 emergency manual operation. Design manual mechanism so required force for door operation
43 does not exceed 25 lbf.
- 44 I. Emergency Operation Disconnect Device: Equip operator with hand-operated disconnect
45 mechanism for automatically engaging manual operator and releasing brake for emergency
46 manual operation while disconnecting motor without affecting timing of limit switch. Mount
47 mechanism so it is accessible from floor level. Include interlock device to automatically prevent
48 motor from operating when emergency operator is engaged.

- J. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.

2.7 FINISHES, GENERAL

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.8 STEEL AND GALVANIZED STEEL FINISHES

- A. Factory Primer for Field Finish: Manufacturer's standard primer, compatible with field-applied finish according to coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.

1. Apply to ferrous surfaces except zinc-coated metal.

- B. Baked Finish: Manufacturer's standard baked finish consisting of primer and topcoat according to coating manufacturer's written instructions for cleaning, pretreatment, application, thermosetting, and minimum dry film thickness.

- OR -

- C. Powder-Coat Finish: Manufacturer's standard powder-coat finish consisting of primer and topcoat according to coating manufacturer's written instructions for cleaning, pretreatment, application, thermosetting, and minimum dry film thickness.

1. Color and Gloss: Match adjacent window frame color.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install coiling doors and operating equipment complete with necessary hardware, jamb and head molding strips, anchors, inserts, hangers, and equipment supports.

1. Install fire-rated doors to comply with NFPA 80, 2010 edition.

3.2 ADJUSTING

- A. Lubricate bearings and sliding parts; adjust doors to operate easily, free of warp, twist, or distortion and with weather tight fit around entire perimeter.

3.3 STARTUP SERVICES

- A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - a. Test door closing when activated by detector or alarm-connected fire-release system. Reset door-closing mechanism after successful test.

1 3.4 DEMONSTRATION

2 A. Engage a factory-authorized service representative to train Owner's maintenance personnel to
3 adjust, operate, and maintain overhead coiling doors. Refer to 017900 Section "Demonstration
4 and Training."

5 END OF SECTION 08 33 23
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SECTION 08 34 63 – DETENTION DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section 013513.16, "Special Project Procedures for Detention Facilities".

1.2 SUMMARY

- A. This Section includes the following:

- 1. Swinging and sliding steel detention doors.
- 2. Steel detention door frames.
- 3. Steel detention sidelight frames.
- 4. Steel detention borrowed-light frames.

- B. Related Sections include the following.

- 1. Division 01 Section 013513.16, "Special Project Procedures for Detention Facilities" for general requirements for detention work, including responsibilities of a single-source detention specialist.
- 2. Division 01 Section "Sustainable Design Requirements" for additional LEED requirements.
- 3. Division 03 Section 033000 "Cast-in-Place Concrete" for blocking out openings for doors and frames in concrete.
- 4. Division 03 Section 034100 "Precast Structural Concrete" for blocking out openings for doors and frames in precast concrete.
- 5. Division 04 Section 042000 "Unit Masonry" for anchoring and grouting detention door frames set in masonry construction.
- 6. Division 05 Section 055000 "Metal Fabrications" for embeds and anchor bolt requirements.
- 7. Division 05 Section 050555 "Security Fasteners."
- 8. Division 05 Section 055963 "Detention Enclosures."
- 9. Division 07 Section 079200 "Joint Sealants" for security sealants.
- 10. Division 08 Section 087163 "Detention Door Hardware" for door hardware for detention doors.
- 11. Division 08 Section 088853 "Security Glazing" for glazing in detention doors, sidelights, and borrowed lights.
- 12. Division 09 Section 099603 "Special Coatings" for painting requirements.
- 13. Division 13 Section 135000 "Modular Metal Detention Wall Panel System."
- 14. Division 26 for Electrical requirements.
- 15. Divisions 27 and 28 for Security Electronic device wiring and conduit requirements.
- 16. Division 284619 "PLC" for frame mounted Security Electronic devices.

1.3 SCOPE AND RESPONSIBILITIES

- A. Under the requirements of this specification, the DEC shall be responsible for furnishing and installing all Detention hollow metal doors, frames and door accessories, as specified, in all locations unless shown to be the responsibility of the Modular Metal Detention Wall Panel System manufacturer.

- 1 B. Fully coordinate this Scope of Work with the Scope of Work shown in the Modular Metal
2 Detention Wall Panel System sections.

3 1.4 DEFINITIONS

- 4 A. Uncoated Steel Sheet Thicknesses: Indicated as the minimum thicknesses.

- 5 B. Metallic-Coated Steel Sheet Thicknesses: Indicated as the minimum thicknesses of
6 uncoated base metals.

- 7 C. Stainless-Steel Sheet Thicknesses: Indicated as the specified thicknesses for which over-
8 and under-thickness tolerances apply, according to ASTM A 480/A 480M.

- 9 D. Nominal Surface of Floor Covering: Top surface of floor; for resilient tile and carpet, nominal
10 surface of floor covering is defined as top of concrete slab.

11 1.5 REFERENCES

- 12 A. ASTM A366/A 366M-97 Standard Specification for Commercial Steel (CS), Carbon (0.15
13 Maximum Percent), Cold Rolled

- 14 B. ASTM A569A 569M-97 Standard Specification for Steel, Carbon, (0.15 Maximum Percent),
15 Hot Rolled Sheet and Strip, Commercial Quality

- 16 C. ASTM A653/A, 653M-96, Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron
17 Alloy-Coated (Galvannealed) by Hot Dip Process, Commercial Quality

- 18 D. ASTM A 666-96b Standard Specification for Annealed or Cold-Worked Austenitic Stainless
19 Steel Sheet, Strip, Plate and Flat Bar

- 20 E. ASTM B 117-95 Standard Practice for Operation salt Spray (Fog) Apparatus

- 21 F. ASTM 143-90a (1990) Standard Test Method for Slump of Hydraulic Cement Concrete

- 22 G. ASTM D610-95 Standard Test Method for Evaluating Degree of Rusting on Painted Steel
23 Surfaces

- 24 H. ASTM D 714-87 (1994), Standard Test Method for Evaluating Degree of Blistering of Paints

- 25 I. ASTM D 1735-92, Standard Practice for Testing Water Resistance of Coatings Using Water
26 Fog Apparatus

- 27 J. ASTM E 152-81a Method for Fire Tests of Door Assemblies

- 28 K. ASTM F1450-12a, Standard Test Methods for Hollow Metal Swinging Door Assemblies for
29 Detention Facilities

- 30 L. ASTM 1577-96, Standard Test Methods for Detention Locks for Swinging Doors

- 31 M. ASTM A167 and A240, Stainless Steel Type 304

- 32 N. NAAAM Hollow Metal Manual, all sections.

- 33 O. NAAAM HMMA 850-83 Fire-Rated Hollow Metal Doors and Frames, Second Edition

P. ANSI / NFPA 80-2013 Fire Door and Windows

Q. ANSI / NFPA 252-2003 Standard Methods for Fire Test of Door Assemblies

R. ANSI / NFPA 257-2007 Methods for Fire Test of Window Assemblies

S. ANSI/UL 10 (B)-97 through 2001, 10 (C)-98 through 2001, Fire Tests of Window Assemblies

T. ANSI / UL 752 Bullet-Resistance Equipment

1.6 PERFORMANCE REQUIREMENTS

A. Detention Doors: Provide detention doors and frames that comply with Security Grade 1, or Security Grade 3, whichever applies, according to the latest edition of ASTM F 1450-12a, as determined by testing manufacturer's standard products representing those indicated for this Project.

B. Detention Sidelight and Borrowed-Light Frames: Provide detention vision frames that comply with ASTM F 1592 and removable glazing stop test according to HMMA 863-04, based on testing manufacturer's standard units.

1.7 SUBMITTALS

A. Product Data: Include construction details, material descriptions, core descriptions, label compliance, fire-resistance rating, and finishes for each type of detention door, frame and access panel, as specified.

B. Provide performance testing reports which support the testing requirements specified.

C. Shop Drawings: For detention doors and frames. Include conditions at openings, details of construction, dimensions of profiles, and details of joints and connections. Show anchorage and accessories. Include fastener types, sizes and spacing. Identify each detention door and frame using same reference numbers for openings as those on Drawings.

D. It is the DEC's responsibility to coordinate detention/security items in this scope of work, and to answer all manufacturer questions or concerns that are not strictly design related. The DEC shall redline the manufacturers' individual shop drawings and/or schedules, and note corrections prior to submittal for Architectural/Consultant review. When multiple items are submitted by the manufacturer on a single cutsheet, the DEC shall note with an arrow, circle or note cloud, to show which product on the sheet is submitted for this scope of work. DEC submittals not reviewed and redlined prior to submittal to Architect/Consultant for final review, will be returned rejected.

E. Shop Drawings: For access panels.

1. Door and panel units: Show types, elevations, lock type, thickness of metals, and full size profiles of door members.

2. General: Show connections of units and hardware to other Work. Include schedules showing location of each type and size of door and panel units.

F. Coordination Drawings: Drawings of each opening, including detention door and frame, drawn to scale and coordinating detention door hardware. Show the following:

1. Locations, dimensions, and profiles of detention door hardware reinforcements.

2. Locations and installation details of detention door hardware.

3. Elevations of each detention door design type showing dimensions, locations of detention door hardware, and preparations for power, signal, and electrified and pneumatic control systems.
4. Details of each detention frame type.
5. Details of mortar boxes in detention frames for hardware and communication devices.
6. Oversize Construction Certification: For detention door assemblies required to be fire rated and exceeding limitations of labeled assemblies, submit certification of a testing agency acceptable to authorities having jurisdiction that each detention door and frame assembly has been constructed to comply with design, materials, and construction equivalent to requirements for labeled construction.

1.8 QUALIFICATION OF MANUFACTURERS

A. Qualifications of Detention Hollow Metal Manufacturers: Detention hollow metal manufacturing firms who have not been pre-qualified, shall have not less than five (5) years continuous successful experience with manufacturing hollow metal. These firms shall now be actively engaged in the manufacture of Detention hollow metal doors and frames of the type required for this project. Fabrication methods and product quality shall meet or exceed standards set by the Hollow Metal Manufacturers Association, (HMMA), a division of the National Association of Architectural Metal Manufacturers (NAAMM), and be tested in accordance with ASTM F 1450-12a.

1. Submittal Requirements: In addition to a written request for substitutions, a full size corner sample of each type door and frame showing door construction, face stiffening, insulation, and top hinge reinforcements shall be provided. Provide details of each type of door and frame. Provide a list of 10 facilities of similar scope and size where the product has been installed for a minimum of 5 years. Provide the following information on the 10 facilities:

- a. List name and location of installation.
- b. Date of occupancy by Owner.
- c. Owner's representative to contact and telephone number.
- d. Name of DEC, Construction Manager or General Contractor, and Architect including names of contacts and phone numbers.
- e. The manufacturer shall also submit an audited and certified financial statement indicating a consolidated net worth of \$1,000,000.
- f. Provide performance data and tests: All Detention hollow-metal door manufacturers shall submit to the Architect / Consultant evidence of compliance with ASTM F 1450-12a and HMMA 863-04. Test reports and documentation shall be in accordance with ASTM F 1450-12a.

- 1) Test Specimens: Test doors shall be 3'-0" W x 7'-0" H with 100 square inch vision panel, 4" x 25" clear opening, positioned generally as shown in ASTM F 1450-12a, figure 3. Test doors and frames shall be prepared for hardware as specified in ASTM F 1450-12a, Section 6 "Specimen Preparation".
- 2) Testing Procedures: Test doors and frames shall be furnished with hardware in accordance ASTM F 1450-12a, Section 6 – "Specimen Preparation". Latch throw of the lock shall not exceed 1". Assemblies shall be tested in accordance with procedures outlined in ASTM F 1450-12a, 7.2 – "Door Assembly Impact Test".
- 3) Door Static Load Test: Doors shall be tested in accordance with procedures outlined in ASTM F 1450-12a, 7.3 – "Door Static Load Test".
- 4) Door Rack Test: Doors shall be tested in accordance with procedures outlined in ASTM F 1450-12a, 7.4 – "Door Rack Test".

- 5) Performance Criteria for load testing shall be in accordance with applicable paragraphs of ASTM F 1450-12a, Section 7 – "Procedures".
 - 6) Glass Stop Test: A rectangular view window test frame shall be constructed with a glass opening size of 28" x 33" (± 1 "). The frame shall be constructed of commercial quality steel meeting ASTM standard A366 or A569, 12-gauge maximum. Refer to HMMA 863-04, Figure 5, for test frame configuration.
 - 7) A steel plate of 3/8" minimum thickness shall be glazed in place using the specified glass stop.
 - 8) The test frame assembly shall then be rigidly fixed in the vertical position with the removable glass stop on the opposite side of the 3/8" plate from the impact ram.
 - 9) A target on the side of the 3/8" plate shall be marked in one corner no more than 6" away from the stops.
 - 10) Using the door ram pendulum system specified in ASTM F 1450-12a, Figure 2 deliver four hundred (400) impacts of 200 Ft-lbs. each, on the target area. Removable glass stops and the 3/8" plate shall remain firmly in place so that removal cannot be accomplished without removing the retaining screws. There shall be no more than one (1) broken screw in the assembly after impact test.
 - 11) Fire rated doors and frames shall be provided for those openings indicated in the schedule as requiring fire protection ratings. Such doors and frames shall be constructed as tested in accordance with ASTM E-152, UL-10B or NFPA-252 and labeled by a recognized testing agency having a factory inspection service.
- g. Substitution after the bid date will not be allowed.
- h. Approval of a Hollow Metal Manufacturer does not relieve that company from fully complying with the product as specified.

1.9 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative of detention door and frame manufacturer for installation of units required for this Project.
- B. Source Limitations: Obtain detention doors and frames through one source from a single manufacturer.
- C. Welding: Qualify procedures and personnel according to the following:
 1. AWS D1.3, "Structural Welding Code--Sheet Steel."
- D. Fire-Rated Detention Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252 or UL 10B.
 1. Test Pressure: Test at atmospheric pressure.
 2. Oversize Fire-Rated Detention Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a testing agency acceptable to authorities having jurisdiction that detention doors comply with standard construction requirements for tested and labeled, fire-rated detention door assemblies except for size.
 3. Temperature-Rise Rating: If indicated, provide detention doors that have a temperature-rise rating of 450 deg F (250 deg C) maximum in 30 minutes of fire exposure.
- E. Fire-Rated Detention Sidelight and Borrowed-Light Frames: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 257.

- F. Fire-Resistance Ratings for Access Panels: Wherever a fire-resistance classification is indicated, provide access door and panel assemblies with panel door, frame, hinge, and latch from manufacturer listed in Underwriter's Laboratories (UL), "Building Materials Directory" for rating shown.

1. Provide 90 minute UL label at 2-hour rated partitions.

- G. Smoke-Control Detention Door Assemblies: Comply with NFPA 105.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Deliver detention doors and frames palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use non-vented plastic.

- B. Deliver detention frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

1. Where frames are to be cast into precast concrete modules, take additional precautions, including bracing for detention frames, to ensure that detention frames are not deformed or damaged by concrete forces.

- C. Inspect detention doors and frames, on delivery, for damage. Minor damage may be repaired provided refinished items match new work and are approved by Architect; otherwise, remove and replace damaged items as directed.

- D. Store detention doors and frames under cover at building site. Place units in a vertical position with heads up, spaced by blocking, on minimum 4-inch- (100-mm-) high wood blocking. Avoid using non-vented plastic or canvas shelters that could create a humidity chamber.

1. If wrappers on detention doors become wet, remove cartons immediately. Provide minimum 1/4-inch (6-mm) space between each stacked detention door to permit air circulation.

1.11 COORDINATION

- A. Coordinate installation of anchorages for detention frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

- B. Coordinate intercom backboxes with the Electronic Security Contractor drawings for locations of frame mounted intercoms. Intercom backboxes shall be shallow style, installed back to back, rotated so the intercom call button is at the lowest point of the intercom cover plate, and the call button is no greater than 48" (centerline) above the finished floor.

1.12 MAINTENANCE TOOLS

- A. Tool Kit: Provide **security** bits for use with security fasteners, each packaged in a compartmented kit configured for easy handling and storage, **as required in Section 050555**.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Detention Hollow Metal Manufacturers: Unless pre-approved prior to bidding, provide products by one of the following:

1. Habersham Metal Products Company, Inc.; Cornelia, GA

2. Trussbilt, LLC: Vadnais Heights, MN
3. American Steel Products: Swainsboro, GA
4. Slate Steel Door Industries: Hartselle, AL

2.2 MATERIALS

- A. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, CS (Commercial Steel), Type B: Free of scale, pitting or surface defects: Pickled and oiled.
- B. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, CS (Commercial Steel), Type B.
- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M CS (Commercial Steel), Type B; G60 (Z180) zinc galvanized or A60 (ZF180) zinc-iron-alloy glavannealed coating by hot dipped Process.
- D. Stainless-Steel Sheet: ASTM A 240/A 240M, austenitic stainless steel, Type 304, No. 3 finish unless otherwise indicated.
- E. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- F. Concealed Bolts: ASTM A 307, Grade A, unless otherwise indicated.
- G. Post-installed Expansion Anchors in Concrete: With capability to sustain, without failure, a load equal to 4 times the load imposed, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
 1. Corrosion Protection: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (0.005 mm) for Class SC 1 service condition (mild).
 2. Corrosion Protection: Stainless-steel components complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Alloy Group 1 or 4) for bolts and nuts; ASTM A 666 or ASTM A 276, Type 304 or 316, for anchors.
 3. Corrosion Protection: Components fabricated from nickel-copper-alloy rods complying with ASTM B 164 for UNS No. N04400 alloy.
- H. Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching detention frames of type indicated. **Refer to Section 050555.**
- I. Cast-in-Place Anchors in Concrete: Anchors of type indicated below, fabricated from corrosion-resistant materials capable of sustaining, without failure, a load equal to 4 times the load imposed, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
 1. Threaded or wedge type; galvanized ferrous castings, either ASTM A 47 (ASTM A 47M) malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, hot-dip galvanized per ASTM A 153/A 153M.
- J. Embedded Plate Anchors: Fabricated from mild steel shapes and plates, minimum 3/16 inch (4.8 mm) thick; with minimum 1/2-inch- (12.7-mm-) diameter headed studs welded to back of plate.
- K. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- L. Detention Door, Sidelight and Borrowed-Light Glazing: Comply with Section 088853 "Security Glazing."
- M. Grout-field installed by general contractor: Comply with ASTM C 476, with a slump of 4 inches (102 mm) for detention frames built into masonry, 8 to 11 inches (200 to 280 mm) for detention frames installed in concrete as measured according to ASTM C 143/C 143M.
- N. Epoxy Filler: Bondo or other substitution acceptable to the Architect.

O. Electrical Conduit:

1. Raceways: Circular raceways shall be 3/4" diameter U.L. approved rigid steel conduit, intermediate metal conduit (IMC) or electrical metallic tubing (EMT), galvanized inside and outside.
2. Raceway Fittings: Fittings and couplings for conduit shall be galvanized or cadmium plated compatible with conduit materials. Fittings for rigid conduit and IMC shall be threaded.

2.3 DETENTION DOORS

A. General: Provide flush-design detention doors, 2 inches (50 mm) thick, of seamless hollow construction, unless otherwise indicated. Construct detention doors with smooth, flush surfaces without visible joints or seams on exposed faces or stile edges.

1. Visible joints or seams around glazed, louvered panel inserts are permitted.
2. For single-acting swinging detention doors, bevel both vertical edges 1/8 inch in 2 inches (3 mm in 50 mm).
3. For sliding detention doors, square both vertical edges.

B. Metallic Core Construction: Provide the following core construction welded to both detention door faces:

1. Steel-Stiffened Core: 0.042-inch- (1.0-mm-) thick, steel vertical stiffeners extending full-door height, with vertical webs spaced not more than 4 inches (102 mm) apart, spot welded to face sheets a maximum of 3 inches (76 mm) o.c. Fill spaces between stiffeners with insulation of minimum 0.6-lb/cu. ft. (9.6-kg/cu. m) density.
2. Truss-Stiffened Core: 0.013-inch- (0.3-mm-) thick steel, truncated triangular stiffeners extending between face sheets and for full height and width of door; with stiffeners welded to face sheets not more than 3 inches (76 mm) o.c. vertically and 2-3/4 inches (70 mm) horizontally. Fill spaces between stiffeners with insulation of minimum 0.8-lb/cu. ft. density.
3. Fire Detention Door Cores: As required to provide fire-protection and temperature-rise ratings indicated.

C. Vertical Edge Channels: 0.123-inch- (3.1-mm-) thick, continuous steel channel extending full-door height at each vertical edge, with webs of channels flush with door edges; welded to top and bottom channels to create a fully welded perimeter channel.

D. Top and Bottom Channels: 0.123-inch- (3.1-mm-) thick metal channel spot welded, not more than 4 inches (102 mm) o.c., to face sheets.

1. Reinforce tops and bottoms of detention doors with inverted horizontal channels of same material as face sheet so flanges of channels are even with bottom and top edges of face sheets.
2. Close top edge with 0.074-inch- (1.8-mm-) thick closing channel of same material as face sheet; welded so webs of channels are flush with top door edges.
3. Close bottom edge with 0.074-inch- (1.8-mm-) thick closing channel of same material as face sheet; welded so webs of channels are flush with bottom door edges.

E. Hardware Reinforcement: Fabricate reinforcing plates from same material as detention door face sheets to comply with the following minimum thickness:

1. Full-Mortise Hinges and Pivots: 0.187 inch (4.7 mm) thick.
2. Maximum-Security Surface Hinges: 12 Ga. 10"channel with 3/8" x 1" x 6" back-up at each hinge.
3. Strike Reinforcements: 10 ga. thick.
4. Slide-Device Hanger Attachments: As recommended by device manufacturer.

5. Lock Fronts, Concealed Holders, and Surface-Mounted Closers: 0.093 inch (2.3 mm) thick.
 6. All Other Surface-Mounted Hardware: 0.093 inch (2.3 mm) thick.
 7. Lock Pockets: 0.123 inch (3.1 mm) thick at secure side; welded to face sheet.
- F. Frames shall be reinforced, drilled and tapped for all templated mortised hardware only, in accordance with the final approved hardware schedule and templates provided by the hardware supplier.
- G. Loose Glazing Stops: Loose glazing stops shall be pressed steel angles, no less than 1 ¼" X 1 ¼" X 10 gauge.
1. Angle tops shall be butt and notch and tight fitting at the corner joints, and secured in place with 1/4-28 special hardened tamperproof button head Torx security screws spaced 8" o.c. maximum and not more than 2 inches from each corner.
 2. The frame underneath the glazing stops and the inside of the glazing stop shall be chemically treated for maximum paint adhesion and painted with a rust-inhibitive primer prior to installation in the frame.
- H. Hardware Enclosures: Provide enclosures and junction boxes for electrically operated detention door hardware, interconnected with UL-approved, 1/2-inch- (12.7-mm-) diameter conduit and connectors.
1. Enclosures for mechanical paracentric locks with lock mountings. Provide unitized pocket preparation, which after fabrication forms a one-piece box that provides for the lock mounting plate to be recessed into the door such that, when secured in place, the mounting plate outside surface is flush with the door face sheet.
 - a. Lock preparation shall be constructed from 0.123 inch (3.1 mm) steel, punched for keying options as required, and drilled and tapped to receive lock mounting plate.
 - b. Finished preparation shall be a unitized lock pocket, which completely surrounds the lock and is securely welded to both face sheets and the perimeter edge channel.
 2. Provide 0.067 inch (1.7 mm) enclosed lock bolt keeper in edge of door for jamb-mounted locks.
- I. Interior Steel Detention Door Face Sheets: Fabricated from hot-rolled steel sheets, metallic-coated steel sheets where indicated and stainless steel sheets where indicated and other metal components from hot- or cold-rolled steel sheets.
1. Security Grade 1: 12 gauge thick steel, – provided at Segregation Cell doors only. Provide galvanealed material where noted on architectural door schedule.
 2. Security Grade 3: 14 gauge thick steel – provided at all other Detention Hollow Metal (SHM) doors. Provide galvanealed material where noted on architectural door schedule.
- J. Exterior Steel Detention Door Face Sheets: Fabricated from metallic-coated steel sheets, and other metal components from hot- or cold-rolled steel sheets.
1. Security Grade 3: 14 gauge thick steel, galvanealed.
- K. Astragals: As required by NFPA 80 to provide fire ratings indicated.

2.4 DETENTION FRAMES

- A. General: Fabricate detention frames of full-welded unit construction, with corners mitered, reinforced, and continuously welded full depth and width of detention frame. Knockdown frames are not acceptable.

- 1 B. Interior Steel Detention Frames: Fabricated from hot-rolled steel sheets, metallic-coated
2 steel sheets where indicated and stainless steel sheets for stainless-steel detention doors,
3 and other metal components from hot- or cold-rolled steel sheets.
- 4 1. Security Grade 1: 12 gauge thick steel. Provide galvanealed material where noted on
5 architectural door schedule.
- 6 C. Exterior Steel Detention Frames: Fabricated from metallic-coated steel sheets, and other
7 metal components from hot- or cold-rolled steel sheets.
- 8 1. Security Grade 1: 12 gauge thick steel, galvanealed.
- 9 D. Hardware Reinforcement: Fabricate reinforcing plates from same material as detention
10 frame to comply with the following minimum thickness:
- 11 1. Full-Mortise Hinges and Pivots: 3/16" x full width of jamb x 10" in length. The top hinge
12 shall be additionally reinforced with 3/16" formed angle welded both to hinge reinforcing
13 and frame face.
- 14 2. Strikes, Flush Bolts, and Closers: 0.187 inch (4.7 mm) thick.
- 15 3. Surface-Mounted Hardware: 12 ga. (2.66 mm) thick.
- 16 4. Provide a key cylinder protection pipe extension on both sides of the frame for all wide
17 jamb electric locks. Where a recessed pocket is provided on the stop side of the frame,
18 the cylinder protection pipe will only be required on the side of the frame with the lock
19 cover plate. Provide a 3/16" steel pipe that extends 1/4" beyond the face of the key
20 cylinder. Weld attach the 3" diameter pipe extension to the cover plate at four locations.
- 21 E. Hardware Enclosures: Provide enclosures and junction boxes for electrically operated
22 detention door hardware, and frame mounted communication devices interconnected with
23 UL-approved, 1/2 inch diameter conduit and connectors.
- 24 1. Provide enclosures with access for conduit, tapped holes for hardware and internal
25 fastener protection so fasteners will seat after frame is grouted full.
- 26 2. Electrical access boxes will not be permitted except at hardware pockets or
27 communication mortar boxes. Provide knockout at top and bottom of each box to accept
28 conduit.
- 29 3. Lock pockets for jamb mounted locks: Provide 0.123 inch (3.1 mm) thick steel enclosure
30 with:
- 31 a. Surface mounted cover, minimum 10 ga. thick steel plate with uniform beveled
32 edges on the side closest to the lock strike or frame rabbet, secured with a
33 minimum of 8 flathead Torx security screws.
- 34 b. Secure lock to frame or pocket in accordance with lock manufacturer's
35 recommendations for each lock type.
- 36 c. Provide concealed lock front preparation with frame rabbet cutout only to allow
37 passage of latch bolt and deadbolt actuator. Lock front and case are not exposed.
- 38 d. Provide key access ports at locks keyed two sides or side opposite the door swing.
39 Size key access port to accommodate paracentric keys on a key ring.
- 40 4. Provide conduit between electric lock pocket and door position switch and between back-
41 to-back communication boxes where scheduled for each frame. All other conduit will be
42 field installed.
- 43 a. Coordinate intercom backboxes with the Electronic Security Contractor drawings
44 for locations of frame mounted intercoms. Intercom backboxes shall be shallow
45 style, installed back to back, rotated so the intercom call button is at the lowest
46 point of the intercom cover plate, and the call button is no greater than 48"
47 (centerline) above the finished floor.
- 48 F. Mullions and Transom Bars: Provide closed or tubular mullions and transom bars where
49 indicated. Fasten mullions and transom bars at crossings and to jambs by butt-welding.

- 1 Reinforce joints between detention frame members with concealed clip angles or sleeves of
2 same metal and thickness as detention frame.
- 3 G. Head Reinforcement: Leave vertical mullions in detention frames open at top for grouting.
- 4 H. Grout Holes: Provide grout holes in frames to be installed in existing wall or concrete wall
5 openings. Weld 0.093-inch back reinforcing plate with 1-3/8" diameter hole to inside of
6 frame. Flush cover plate, same gauge as frame, to be shipped loose for field installation after
7 frame is grouted full. Weld cover plate to frame and grind smooth for a seamless finish.
- 8 I. Supports and Anchors: After fabricating, galvanize units to be built into exterior walls
9 according to ASTM A 153/A 153M, Class B.
- 10 J. Jamb Anchors: Weld jamb anchors to detention frames near hinges and directly opposite on
11 strike jamb as required to secure detention frames to adjacent construction. Locate jamb
12 anchors at 16" on center and as follows:
- 13 1. Detention Door Frames: One additional anchor for each 16 inches (406 mm) or fraction
14 thereof more than 40 inches (1016 mm) in height.
- 15 2. Detention Sidelight and Borrowed-Light Frames: One additional anchor for each 16
16 inches (406 mm) or fraction thereof more than 40 inches (1016 mm) in height.
- 17 3. Masonry Type: Adjustable, corrugated or perforated, strap-and-stirrup anchors to suit
18 detention frame size; formed of same material and thickness as detention frame; with
19 strap not less than 2 inches (50 mm) wide by 10 inches (250 mm) long with hole in strap
20 for vertical wall reinforcing.
- 21 4. Embedment Type for Precast Concrete Walls: 0.187 inch (4.7 mm) thick x 6 inch long
22 embed, plates with two 0.375 inch diameter x 4" headed studs per embed.
- 23 a. Width of plate to be 1/2" greater than the depth of the frame.
- 24 b. Provide shims and weld both sides of frame to embed.
- 25 5. Post-installed Expansion Anchors for In-Place Concrete or Masonry: Minimum 1/2-inch-
26 (12.7-mm-) diameter concealed bolts with expansion shields or inserts. Provide conduit
27 spacer from detention frame to wall, welded to detention frame. Reinforce detention
28 frames at anchor locations.
- 29 K. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, formed
30 of same material and thickness as detention frame, and as follows:
- 31 1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners,
32 welded to bottom of jambs and mullions with at least four spot welds per anchor.
- 33 2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips,
34 allowing not less than 2-inch (50-mm) height adjustment, welded to jambs and mullions
35 with at least 4 spot welds per anchor. Terminate bottom of detention frames at finish
36 floor surface.
- 37 L. Rubber Door Silencers: Except on weather-stripped detention doors, drill stops in strike
38 jambs to receive three silencers on single-detention-door frames and drill head jamb stop to
39 receive two silencers on double-detention-door frames. Install plastic plugs to keep holes
40 clear during construction.
- 41 M. Grout Guards: Provide grout guards of same material as detention frame, welded to
42 detention frame at back of hardware cutouts and glazing-stop screw and silencer
43 preparations to close off interior of openings and prevent mortar or other materials from
44 obstructing hardware operation or installation.

2.5 BAR GRILLS IN DETENTION DOORS AND FRAMES – N/A

2.6 WOVEN ROD MESH IN DETENTION DOORS – N/A

2.7 PERFORATED PLATE IN DETENTION FRAMES – N/A

2.8 STOPS AND MOLDINGS

A. General: Provide stops and moldings around glazed panels where indicated.

1. Frame Stops for Detention Doors: Minimum 5/8 inch high, unless otherwise indicated.
2. Frame Stops for Detention Sidelights and Borrowed Lights: Minimum 5/8 inch high, unless otherwise indicated.
3. Glazing stops shall be 1 1/4" X 1 1/4" X 10 gauge.

B. Fixed Detention Door Moldings: Formed from 12 ga. thick sheet reinforcing 'Z', of same material as detention door face sheets, spot-welded to face sheets a maximum of 5 inches o.c.

C. Fixed Detention Frame Moldings: Formed integral with detention frames, unless otherwise indicated. Form corners with butted or mitered hairline joints.

D. Stops for Security Glazing: Formed from 0.123-inch thick, pressed-steel angle. Form corners with butt and notch ends to be tight fitting at the corner joints. Secure with minimum 1/4-28 pinned torx button head security machine screws spaced uniformly not more than 8 inches o.c. and not more than 2 inches from each corner.

E. Deliver frames to project site with stops temporarily secured with 2 Torx 1/4-28 security screws. Ship security screws (plus 10% spare) in appropriate containers labeled and tagged to match detention frames.

F. Coordinate rabbet width between fixed and removable stops with type of glass or panel and type of installation indicated.

2.9 ACCESSORIES

A. Food Pass / Cuff Port Openings: Provide a flush mounted food pass door at the center of fire rated hollow metal doors or leading edge for non-fire rated doors. The food pass opening shall be fabricated from 10 gauge interior channels securely welded to the inside of both face sheets. Reinforcing for food pass locks shall be 10ga. channels or pockets. The clear opening shall be as depicted on the architectural drawings. The door shall be constructed of minimum 10ga. body and shall have a 10ga. backup plate securely welded and finished smooth so as to be flush to the inside and outside door skins. Door to contain formed metal recessed pull for outside access. Door flap to be affixed with two hinges on food pass equal to Southern Folger type 203FP (for 90 degree open). Provide a snap lock equal to Southern Folger 1017A at fire rated openings, and a dead bolt lock equal to Southern Folger 1010A at non-rated doors:

2.10 FABRICATION

A. Fabricate detention doors and frames rigid, neat in appearance, and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Weld exposed joints continuously; grind, fill, dress, and make smooth, flush, and invisible. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

1. Exterior Detention Doors: Provide weep-hole openings in bottom of detention doors to permit entrapped moisture to escape. Seal joints in top edges of detention doors against water penetration.
2. Fabricate detention doors and frames to comply with manufacturing tolerances indicated in HMMA 863-04.
- B. Continuously weld detention frame corners, with contact edges closed tight and faces mitered.
- C. Fabricate multiple-opening detention frames with mullions that have closed tubular shapes and with no visible seams or joints.
- D. Exposed Fasteners: Provide countersunk security fasteners for exposed screws and bolts, unless otherwise indicated.
- E. Hardware Preparation: Factory-prepare detention doors and frames to receive mortised hardware, including cutouts, reinforcement, mortising, drilling, and tapping, according to final door hardware schedule and templates provided by detention door hardware supplier. Comply with applicable requirements in DHI A115 Series for detention door and frame preparation for door hardware.
 1. Reinforce detention doors and frames to receive surface-mounted door hardware. Drilling and tapping may be done at Project site.
 2. Locate door hardware as indicated or, if not indicated, according to HMMA 863-04, "Guide Specifications for Detention Hollow Metal Doors and Frames."
- F. Factory-cut openings in detention doors for accessories.
- G. Welding: Weld components to comply with referenced AWS standard. Weld before finishing components to greatest extent possible. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
 1. Welds shall be administered using a minimum 240-volt 225 amps welder. No 110 VAC welds will be allowed.
- H. Glazing Channels: Provide minimum clearances for thickness and type of glass indicated, according to GANA's "Glazing Manual."
- I. Security Fasteners: Fabricate detention doors and frames using security fasteners with head style appropriate for fabrication requirements, strength, and finish of adjacent materials, except that a maximum of two different sets of tools shall be required to operate security fasteners for Project. Provide stainless-steel security fasteners in stainless-steel materials, exterior doors and frames and interior doors and frames located in wet areas. **Refer to Section 050555.**

2.11 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish detention doors and frames after assembly.

2.12 METALLIC-COATED STEEL FINISHES

- A. Surface Preparation: Clean surfaces with non-petroleum solvent so surfaces are free of oil and other contaminants. After cleaning, apply a conversion coating suited to organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas and apply galvanizing repair paint specified below to comply with ASTM A 780.
 1. Galvanizing Repair Paint: High-zinc-dust-content paint for reglazing welds in steel, complying with SSPC-Paint 20.

2. Factory Priming for Field-Painted Finish: Apply shop primer specified below immediately after surface preparation and pretreatment. Apply a smooth coat of even consistency to provide a uniform dry film thickness of not less than 0.7 mils (0.02 mm).
3. Shop Primer: Manufacturer's or fabricators standard, fast-curing, lead- and chromate-free primer complying with ANSI A224.1 acceptance criteria; recommended by primer manufacturer for zinc-coated steel; compatible with substrate and field-applied finish paint system indicated; and providing a sound foundation for field-applied topcoats despite prolonged exposure.

B. Steel Sheet Finishes

1. Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning"; remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 3, "Power Tool Cleaning," or SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
2. Factory Priming for Field-Painted Finish: Apply shop primer specified below immediately after surface preparation and pretreatment. Apply a smooth coat of even consistency to provide a uniform dry film thickness of not less than 0.7 mils (0.02 mm).
3. Shop Primer: Manufacturer's or fabricators standard, fast-curing, corrosion-inhibiting, lead- and chromate-free, universal primer complying with ANSI A224.1 acceptance criteria; compatible with substrate and field-applied finish paint system indicated; and providing a sound foundation for field-applied topcoats despite prolonged exposure.

2.13 STAINLESS-STEEL FINISHES (WHERE SCHEDULED)

- A. General: Remove tool and die marks and stretch lines or blend into finish. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.
 1. Bright, Directional Polish: No. 3 finish, unless otherwise indicated.
- B. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

2.14 SOURCE QUALITY CONTROL

- A. Owner may select one detention door at random from detention doors delivered to Project and have it cut in half or otherwise taken apart for verification that construction complies with requirements.
 1. Should examination disclose door construction at variance from that specified, the door manufacturer shall, upon direction of the Architect-Engineer, replace all doors shipped to the project, as of the date of inspection, with doors constructed in conformance with project specifications. Under conditions of non-conformity, the door manufacturer shall pay for the destroyed door, replacement doors and related labor.
 2. Should examination prove the door was constructed in conformance with the specifications, the Owner will pay to replace the destroyed door and related labor.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of detention doors and frames.
 1. Examine rough-ins for embedded and built-in anchors to verify actual locations of detention frame connections before detention frame installation.

2. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of detention doors and frames.
- B. Inspect built-in and cast-in anchor installations before installing detention frames to verify that anchor installations comply with requirements. Prepare inspection reports.
 1. Remove and replace anchors where inspections indicate that they do not comply with specified requirements. Reinspect after repairs or replacements are made.
 2. Perform additional inspections to determine compliance of replaced or additional work. Prepare inspection reports.
- C. Verify locations of detention doors and frames with those indicated on Coordination Drawings.
- D. For material whose orientation is critical for its performance as a ballistic barrier, verify installation orientation.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prior to installation and with spreaders removed, adjust detention frames for squareness, alignment, twist, and plumb to the following tolerances:
 1. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb and perpendicular to frame head.
 2. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of face.
 3. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of door rabbet.
 4. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a perpendicular line from head to floor.

3.3 INSTALLATION

- A. General: Install detention doors and frames plumb, rigid, properly aligned, and securely fastened in place, complying with Drawings, Coordination Drawings, DHI A115.IG, and manufacturer's written recommendations.
- B. Detention Frames: Install detention frames for detention doors, transoms, sidelights, borrowed lights and other openings, of sizes and profiles indicated.
 1. Set masonry anchorage devices where required for securing detention frames to in-place concrete or masonry construction.
 - a. Set anchorage devices opposite each anchor location according to details on Shop Drawings and anchorage device manufacturer's written instructions. Leave drilled holes rough, not reamed, and free of dust and debris.
 2. Embedment-Masonry-Type Jamb Anchors: Weld wall angle anchors to embedded steel plates to match locations of detention frame angle anchors. Remove jamb faces from detention frames and set detention frames into opening until detention frame anchors contact and match embedded anchors. Weld detention frame anchors to embedded anchors with 1-inch- (25-mm-) long welds at each end of angle. Reinstall jamb faces of detention frames.
 3. Post-installed Expansion Jamb Anchors: After bolt is tightened, weld bolt head to provide non-removable condition. Grind, dress, and finish smooth welded bolt head.
 4. Floor anchors may be set with powder-actuated fasteners instead of post-installed expansion anchors if so indicated on Shop Drawings. **Refer to Section 050555.**

5. Placing Detention Frames: Set detention frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.
 - a. At fire-rated openings, install detention frames according to NFPA 80.
 - b. Field splice only at approved locations. Weld, grind, and finish as required to conceal evidence of splicing on exposed faces.
 - c. Install detention frames with removable stops located on secure (non-inmate) side of opening.
 6. Assemble detention frames fabricated in sections. Install angle splices at each corner, of same material and thickness as detention frame, and extend at least 4 inches (102 mm) on both sides of joint.
 7. Continuously weld and finish smooth joints between faces of abutted, multiple-opening, detention frame members.
 8. Field Welding: Comply with the following requirements:
 - a. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - b. Obtain fusion without undercut or overlap.
 - c. Remove welding flux immediately.
 - d. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
 9. Grout-field installed by general contractor: Fill space between detention frames and concrete or masonry with grout. Install grout in lifts and take other precautions, including bracing detention frames, to ensure that detention frames are not deformed or damaged by grout forces. If a light consistency grout (greater than 5.0 inch slump in accordance with ASTM C 143) is to be used, special precautions shall be taken in the field by the installer to protect tapped holes, electrical knock-outs, lock pockets, grout guards, junction boxes, etc., in the frames.
 - C. Swinging Detention Doors: Fit non-fire-rated detention doors accurately in their respective detention frames, with the following clearances:
 1. Between Doors and Frames at Jambs and Head: 1/8 inch (3.2 mm).
 2. Between Edges of Pairs of Doors: 1/8 inch (3.2 mm).
 3. At Door Sills with Threshold: 1/8 inch over threshold.
 4. At Door Sills without Threshold: 5/8 inch (15.9 mm).
 - D. Fire-Rated Detention Doors: Install with clearances as specified in NFPA 80.
 - E. Smoke-Control Detention Doors: Install according to NFPA 105.
 - F. Comply with installation tolerances indicated in HMMA 863-04.
 - G. Glazing: Comply with installation requirements in Division 8 Section "Security Glazing," unless otherwise indicated.
- 3.4 FIELD QUALITY CONTROL
- A. Inspect installed products to verify compliance with requirements. Prepare inspection reports and indicate compliance with and deviations from the Contract Documents.
 - B. Remove and replace detention work where inspections indicate that work does not comply with specified requirements.

- 1 C. Perform additional inspections to determine compliance of replaced or additional work.
2 Prepare inspection reports.
- 3 D. Prepare field quality-control certification that states installed products and their installation
4 comply with requirements in the Contract Documents.
- 5 3.5 ADJUSTING AND CLEANING
- 6 A. Final Adjustments: Check and readjust operating hardware items just before final inspection.
7 Leave work in complete and proper operating condition. Remove and replace defective work,
8 including detention doors, frames, steel grating, and door accessories, that are warped,
9 bowed, or otherwise unacceptable.
- 10 B. Clean grout and other bonding material off detention doors and frames immediately after
11 installation.
- 12 C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of
13 prime coat and apply touchup of compatible air-drying primer.
- 14 1. After finishing smooth field welds, apply air-drying primer.
- 15 D. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair
16 galvanizing to comply with ASTM A 780.
- 17 END OF SECTION 083463

1 SECTION 08 34 83 – ELEVATOR DOOR SMOKE CONTAINMENT SYSTEM

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY

- 7 A. Section includes floor doors.

- 8 B. Section Includes: Smoke detector-activated hoistway door smoke containment screen and
9 control system designed to provide a tight-fitting, smoke- and draft-control assembly.

- 10 C. Products Supplied But Not Installed Under This Section:

- 11 1. End-of-line diode (3.9V, 2W). Installed at smoke detector to monitor the circuit.

- 12 D. Related Requirements:

- 13 1. Retain subparagraphs below to cross-reference requirements Contractor might expect to
14 find in this Section but are specified in other Sections.
15 2. 08 3100–Access Panels.
16 3. 09 2200–Non-Load Bearing Wall Framing: Metal backing in housing mounting area.
17 4. 09 9100–Paints: Field painting of specified components; repainting of existing field
18 painted elevator door frames.
19 5. 28 3000–Detection and Alarm: Provision of smoke detectors.
20 6. 14 2100–Electric Traction Elevators.
21 7. 14 2400–Hydraulic Elevators.
22 8. Division 26 Sections for 120v and control circuit power including conduit, boxes,
23 conductors, wiring devices, and emergency power.

24 1.3 REFERENCES

- 25 A. ASTM A240/240M – Standard Specification for Heat Resisting Chromium and Chromium-Nickel
26 Stainless Steel Plate, Sheet and Strip for Pressure Vessels.

- 27 B. ICC Evaluation Service ES-AC77 – Acceptance Criteria for Smoke-Containment Systems Used
28 With Fire-Resistive Elevator Hoistway Doors and Frames.

- 29 C. ICC Evaluation Service report ESR-1136

- 30 D. NFPA Codes and Standards:

- 31 1. CEC – California Electrical Code.
32 2. 105 – Recommended Practice for the Installation of Smoke-Control Door Assemblies.
33 3. 72- 2013 – National Fire Alarm Code (With California Amendments)

- 34 E. California Building Code

- 35 1. 2013.

- F. UL Standards:
1. 268 – Smoke Detectors for Fire Protective Signaling Systems.
 2. 864 – Control Units for Fire Protective Signaling Systems.
 3. 1784 – Air Leakage Tests for Door Assemblies.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, fire ratings, materials, individual components and profiles, and finishes.
2. Shop Drawings: Include door width and height, jamb width, head projection, screen width, mounting height, housing width, and motor location. Show and identify related work performed under other sections of the specifications.
3. Quality Assurance/Control Submittals:
 - a. Qualifications:
 - 1) Proof of manufacturer qualifications.
 - 2) Proof of Installer qualifications.
 - b. Certifications: Copy of specified items.
 - c. Manufacturer's installation instructions and testing procedures

B. Product Schedule: For floor doors. Use same designations indicated on Drawings.

1.5 QUALITY ASSURANCE

A. Overall Standards:

1. Manufacturer shall maintain a quality control program in accordance with ICC-ES Acceptance Criteria 77.

B. Qualifications:

1. Manufacturer Qualifications: Minimum five years of experience in producing smoke containment systems of the type specified.
2. Installer Qualifications: Factory trained by manufacturer.

C. Certifications:

1. Manufacturer's ICC Evaluation Service report ESR-1136 showing compliance with:
 - a. ICC-ES AC77
 - b. UL standard 1784
 - c. AST, E84
 - d. NFPA 105
2. IAS (IAS is a trademark of International Accreditation Service) Accredited Testing Laboratory Labels for UL Standard 1784
3. IAS (IAS is a trademark of International Accreditation Service) Accredited Testing Laboratory Labels for UL Standard 864
4. California Department of Forestry and Fire Protection and Office of the State Fire Marshal Listing.

1 5. OSHPD Anchorage Pre-Approval No. OPA-0318

2 1.6 DELIVERY, STORAGE, AND HANDLING

3 A. Comply with Section 01 6600–Delivery, Storage, and Handling.

4 B. Comply with manufacturer’s instructions.

5 1.7 WARRANTY

6 A. Provide manufacturer’s standard one year warranty.

7 B. Maintenance and Testing:

8 1. Perform minimum semi-annual maintenance and testing on each smoke containment
9 system as required by the manufacturer’s warranty, code agency evaluation reports, and
10 as required by local authority having jurisdiction.

11 2. Backup Battery: Test semi-annually during warranty period.

12 3. Provide test documentation.

13 PART 2 - PRODUCTS

14 2.1 MANUFACTURER

15 A. Model 600

16 B. Manufacturer:

17 1. Smoke Guard, 287 Maple Grove, Boise, Idaho 83704 <http://www.smokeguard.com/>

18 2. Distributor: Rudimar de Ocampo and/or Mike Butler, Santa Fe Springs and Concord, CA
19 877.345.1276 rudimard@sgcal.com and mikeb@sgcal.com (<http://www.sgcal.com>)

20 C. Label each smoke containment system with following information:

21 1. Manufacturer’s name.

22 2. Maximum leakage rating at specified pressure and temperature conditions.

23 3. Label of quality control agency.

24 2.2 PERFORMANCE REQUIREMENTS

25 A. Air Leakage: Not to exceed 3 cfm (0.001416 m3/s) per sf of door opening at 0.1 in (25 Pa)
26 water pressure differential at ambient temperature and 400 degrees F (204 degrees C) tested
27 per IBC 2006, 2009, and 2012.

28 2.3 COMPONENTS

29 A. Screen:

30 1. Film: Minimum 1 mil (0.025 mm) thick transparent polyimide film reinforced with 100
31 denier nomex yarn at .25 in (6.35 mm) each way.

32 2. Magnetic Strips: Flexible multi-pole strips attached to longitudinal edges of film with low
33 modulus silicone adhesive.

- 1 B. Housing: 20 gage, powder coated, cold rolled or stainless steel container and door with
2 concealed hinges, and latch.
- 3 C. Auxiliary Rails:
 - 4 1. Material: 16 gage ASTM A 240/240M, Type 430, ferritic stainless steel.
 - 5 2. Size: [2 in (51 mm) wide by depth as required to project beyond face of elevator door
6 frame] [As shown on Drawings].
- 7 D. Rewind Motor: CEC,
- 8 E. Release Mechanism: IAS (IAS is a trademark of International Accreditation Service) Accredited
9 Testing Laboratory Labels for UL Standard 864
- 10 F. Control: Metal box in housing with battery backup, power disconnect with integral circuit
11 breaker, step down power transformer (120v AC to 24 v DC), and controller circuit board.
 - 12 1. Emergency Power Supply: 12v DC battery with charger.
- 13 G. Screen Rewind Switch: Include switch to rewind screen into housing.

14 PART 3 - EXECUTION

15 3.1 EXAMINATION

- 16 A. Examine substrates upon which work will be installed.
 - 17 1. Verify related work performed under other sections is complete and in accordance with
18 Shop Drawings.
 - 19 2. Verify wall surfaces and elevator door frames are acceptable for installation of smoke
20 containment system components.
 - 21 3. Verify existing field painted elevator door frames to be used for screen adherence have
22 been repainted in accordance with smoke containment system manufacturer's
23 instructions or they have the original factory paint.
- 24 B. Coordinate with responsible entity to perform corrective work on unsatisfactory substrates.
- 25 C. Commencement of work by installer is acceptance of substrate.

26 3.2 INSTALLATION

- 27 A. Install smoke containment system components in accordance with manufacturer's installation
28 instructions.

29 3.3 FIELD QUALITY CONTROL

- 30 A. Field Test: Follow manufacturer's cycle test procedures.
 - 31 1. Notify Owner's Representative, State Fire Marshal, alarm sub-contractor and [elevator
32 sub-contractor] [elevator service company] minimum one week in advance of scheduled
33 testing.
 - 34 2. Complete maintenance service record.

3.4 DEMONSTRATION

A. Demonstrate required testing and maintenance procedures to Owner's Representative.

B. Maintenance and Testing:

1. Perform minimum semi-annual maintenance and testing on each smoke containment system as required by the manufacturer's warranty, code agency evaluation reports, and as required by State Fire Marshal.
2. Backup Battery: Test semi-annually and replace every three years minimum.
3. Retain permanent record of tests.

C. Future Painting: Paint elevator door frame and/or auxiliary rails in accordance with Operation and Maintenance Manual.

D. Qualified Smoke Guard Inspector assesses unit(s) after exposure to a fire event.

END OF SECTION 08 34 83

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1 SECTION 08 41 13 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

2 PART 1 - GENERAL

3 1.1 GENERAL REQUIREMENTS

4 A. Drawings and Conditions of Contract, including General and Supplementary Conditions and
5 Division 1 Administration Sections, apply to this Division.

6 B. Division 107314 Section "Exterior Sun Control Devices" for attachment of Sun Shade to
7 Aluminum-Framed Storefront.

8 1.2 SUMMARY

9 A. Section Includes:

- 10 1. Exterior storefront framing.
11 2. Storefront framing for punched openings.
12 3. Exterior manual-swing entrance doors and door-frame units.

13 1.3 DEFINITIONS

14 A. ADA/ABA Accessibility Guidelines: California Accessibility Code (CAC), U.S. Architectural &
15 Transportation Barriers Compliance Board's "Americans with Disability Act (ADA) and
16 Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities."

17 1.4 PERFORMANCE REQUIREMENTS

18 A. General Performance: Aluminum-framed systems shall withstand the effects of the following
19 performance requirements without exceeding performance criteria or failure due to defective
20 manufacture, fabrication, installation, or other defects in construction:

- 21 1. Movements of supporting structure indicated on Drawings including, but not limited to,
22 story drift and deflection from uniformly distributed and concentrated live loads.
23 2. Dimensional tolerances of building frame and other adjacent construction.
24 3. Failure includes the following:
25 a. Deflection exceeding specified limits.
26 b. Thermal stresses transferring to building structure.
27 c. Framing members transferring stresses, including those caused by thermal and
28 structural movements to glazing.

29 B. Structural Loads:

30 1. Wind Loads: As indicated on Drawings.

31 a. Importance Factor: 1.15.

32 C. Deflection of Framing Members:

1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane shall not exceed $L/175$ of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to $3/4$ inch, whichever is less.
2. Deflection Parallel to Glazing Plane: Limited to $L/360$ of clear span or $1/8$ inch, whichever is smaller.

D. Air Infiltration: Provide aluminum-framed systems with maximum air leakage through fixed glazing and framing areas of 0.06 cfm/sq. ft of fixed wall area when tested according to ASTM E 283 at a minimum static-air-pressure difference of 1.57 lbf/sq. ft..

E. Water Penetration under Static Pressure: Provide aluminum-framed systems that do not evidence water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure difference of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft..

F. Water Penetration under Dynamic Pressure: Provide aluminum-framed systems that do not evidence water leakage through fixed glazing and framing areas when tested according to AAMA 501.1 under dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft..

1. Maximum Water Leakage: No uncontrolled water penetrating aluminum-framed systems or water appearing on systems' normally exposed interior surfaces from sources other than condensation. Water leakage does not include water controlled by flashing and gutters that is drained to exterior and water that cannot damage adjacent materials or finishes.

G. Thermal Movements: Provide aluminum-framed systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

H. Condensation Resistance: Provide aluminum-framed systems with fixed glazing and framing areas having condensation-resistance factor (CRF) of not less than 45 when tested according to AAMA 1503.

I. Thermal Conductance: Provide aluminum-framed systems with fixed glazing and framing areas having an average U-factor of not more than 0.69 Btu/sq. ft. x h x deg F when tested according to AAMA 1503.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for aluminum-framed systems.

B. Shop Drawings: For aluminum-framed systems. Include plans, elevations, sections, details, and attachments to other work.

1. Include details of provisions for system expansion and contraction and for drainage of moisture in the system to the exterior.

- 1 C. Samples for Verification: For each type of exposed finish required, in manufacturer's standard
2 sizes.
- 3 D. Qualification Data: For qualified Installer and testing agency.
- 4 E. Seismic Qualification Certificates: For aluminum-framed systems, accessories, and
5 components, from manufacturer.
- 6 1. Basis for Certification: Indicate whether withstand certification is based on actual test of
7 assembled components or on calculation.
- 8 F. Welding certificates.
- 9 G. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified
10 testing agency, for aluminum-framed systems, indicating compliance with performance
11 requirements.
- 12 H. Source quality-control reports.
- 13 I. Field quality-control reports.
- 14 J. Maintenance Data: For aluminum-framed systems to include in maintenance manuals.
- 15 K. Warranties: Sample of special warranties.
- 16 L. Delegated-Design Submittal: For aluminum-framed entrances and storefronts indicated to
17 comply with performance requirements and design criteria, including analysis data signed and
18 sealed by the qualified professional engineer responsible for their preparation.

19 1.6 QUALITY ASSURANCE

- 20 A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved
21 for installation of units required for this Project.
- 22 B. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated.
- 23 C. Engineering Responsibility: Prepare data for aluminum-framed systems, including Shop
24 Drawings, based on testing and engineering analysis of manufacturer's standard units in
25 systems similar to those indicated for this Project.
- 26 D. Product Options: Information on Drawings and in Specifications establishes requirements for
27 systems' aesthetic effects and performance characteristics. Aesthetic effects are indicated by
28 dimensions, arrangements, alignment, and profiles of components and assemblies as they
29 relate to sightlines, to one another, and to adjoining construction. Performance characteristics
30 are indicated by criteria subject to verification by one or more methods including
31 preconstruction testing, field testing, and in-service performance.
- 32 1. Do not revise intended aesthetic effects, as judged solely by Architect, except with
33 Architect's approval. If revisions are proposed, submit comprehensive explanatory data
34 to Architect for review.
- 35 E. Accessible Entrances: Comply with applicable provisions in the U.S. Architectural &
36 Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines.

- F. Source Limitations for Aluminum-Framed Systems: Obtain from single source from single manufacturer.
- G. Welding Qualifications: Qualify procedures and personnel according to AWS D1.2, "Structural Welding Code - Aluminum."
- H. Pre-installation Conference: Conduct conference at Project site .

1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of structural supports for aluminum-framed systems by field measurements before fabrication and indicate measurements on Shop Drawings.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of aluminum-framed systems that do not comply with requirements or that fail in materials or workmanship within specified warranty period.

- 1. Failures include, but are not limited to, the following:

- a. Structural failures including, but not limited to, excessive deflection.
- b. Noise or vibration caused by thermal movements.
- c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

- 2. Warranty Period: Two years from date of Project completion.

- B. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes do not comply with requirements or that fail in materials or workmanship within specified warranty period. Warranty does not include normal weathering.

- 1. Warranty Period: Five years from date of Project completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- 1. Arcadia
- 2. EFCO Corporation.
- 3. Kawneer North America; an Alcoa company.

- a. Basis of Design: Kawneer 451 Storefront system at administration offices and entrance in area D.

- 4. Tubelite.

1 5. YKK AP America Inc.

2 2.2 MATERIALS

3 A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish
4 indicated.

- 5 1. Sheet and Plate: ASTM B 209.
- 6 2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
- 7 3. Extruded Structural Pipe and Tubes: ASTM B 429.
- 8 4. Structural Profiles: ASTM B 308.
- 9 5. Welding Rods and Bare Electrodes: AWS A5.10.

10 B. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer, complying
11 with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and
12 pretreatment. Select surface preparation methods according to recommendations in SSPC-
13 SP COM and prepare surfaces according to applicable SSPC standard.

- 14 1. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
- 15 2. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
- 16 3. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

17 2.3 FRAMING SYSTEMS

18 A. Framing Members: Manufacturer's standard extruded-aluminum framing members of thickness
19 required and reinforced as required to support imposed loads.

- 20 1. Construction: Thermally broken.
- 21 2. Glazing System: Retained mechanically with gaskets on four sides.
- 22 3. Glazing Plane: Center.

23 B. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with non-
24 staining, nonferrous shims for aligning system components.

25 C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining,
26 nonbleeding fasteners and accessories compatible with adjacent materials.

- 27 1. Use self-locking devices where fasteners are subject to loosening or turning out from
28 thermal and structural movements, wind loads, or vibration.
- 29 2. Reinforce members as required to receive fastener threads.
- 30 3. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing
31 system.

32 D. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts,
33 complying with ASTM A 123 or ASTM A 153.

34 E. Concealed Flashing: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding
35 flashing compatible with adjacent materials.

36 F. Framing System Gaskets and Sealants: Manufacturer's standard, recommended by
37 manufacturer for joint type.

2.4 GLAZING SYSTEMS

- A. Glazing: As specified in Division 08 Section "Glazing."
- B. Glazing Gaskets: Manufacturer's standard compression types; replaceable, molded or extruded, of profile and hardness required to maintain watertight seal.
- C. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.

2.5 EXTERIOR ENTRANCE DOOR SYSTEMS

- A. Basis of Design Product: Kawneer 50 Tuffline Entrances
- B. Entrance Door Frames: Manufacturer's standard heavy duty entrance door frames for manual-swing operation.
 - 1. Door Construction: 2-inch overall thickness by 4-1/2" deep framing, with minimum 0.1875-inch-thick walls. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.
- C. Entrance Doors: Manufacturer's standard heavy duty wide stile glazed entrance doors for manual-swing operation.
 - 1. Door Construction: 2-inch overall thickness, with minimum 0.1875-inch-thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.
 - 2. Door Design: As indicated.
 - a. Accessible Doors: Smooth surfaced for width of door in area within 10 inches above floor or ground plane.
 - 3. Glazing Stops and Gaskets: Square, snap-on, extruded-aluminum stops and preformed gaskets.
 - a. Provide non-removable glazing stops on outside of door.
- D. Entrance Door Hardware: As specified in Division 08 Section "Door Hardware."

2.6 ENTRANCE DOOR HARDWARE

- A. General: Provide entrance door hardware and entrance door hardware sets indicated in Section 08 71 00.
- B. Opening-Force Requirements: Latches and Exit Devices: Not more than 15 lbf required to release latch.
- C. Continuous-Gear Hinges: Manufacturer's standard with stainless-steel bearings between knuckles, fabricated to full height of door and frame. (Hager 780-111).
- D. Mortise Auxiliary Locks: As specified in Section 08 71 00 "Door Hardware".
- E. Panic Exit Devices: As specified in Section 08 71 00 "Door Hardware".

- 1 F. Retain first option in first paragraph below to allow keying for aluminum-framed entrances to be
2 coordinated with building keying system.
- 3 G. Cylinders: As specified in Section 08 71 00 "Door Hardware".
- 4 H. Closers: As provided by division 087100 Section "Door Hardware".
- 5 I. Door Stops: BHMA A156.16, Grade 1, floor or wall mounted, as appropriate for door location
6 indicated, with integral rubber bumper. (Ives FS436)
- 7 J. Weather Stripping: Manufacturer's standard replaceable components.
- 8 K. Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed
9 fasteners on mounting strip.
- 10 L. Thresholds: BHMA A156.21, raised thresholds beveled with a slope of not more than 1:2, with
11 maximum height of 1/2 inch. (PEMKO 158A).
- 12 M. Automatic Door Operator: Low impact door operator with pushbutton control.

13 2.7 ACCESSORY MATERIALS

- 14 A. Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in
15 Division 079200 Section "Joint Sealants."
- 16 B. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12
17 requirements except containing no asbestos; formulated for 30-mil thickness per coat.

18 2.8 FABRICATION

- 19 A. Form or extrude aluminum shapes before finishing.
- 20 B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of
21 finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or
22 grinding.
- 23 C. Framing Members, General: Fabricate components that, when assembled, have the following
24 characteristics:
- 25 1. Profiles that are sharp, straight, and free of defects or deformations.
- 26 2. Accurately fitted joints with ends coped or mitered.
- 27 3. Means to drain water passing joints, condensation within framing members, and moisture
28 migrating within the system to exterior.
- 29 4. Physical and thermal isolation of glazing from framing members.
- 30 5. Accommodations for thermal and mechanical movements of glazing and framing to
31 maintain required glazing edge clearances.
- 32 6. Provisions for field replacement of glazing from exterior.
- 33 7. Fasteners, anchors, and connection devices that are concealed from view to greatest
34 extent possible.
- 35 D. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and
36 for installing entrance door hardware.

1. At exterior doors, provide compression weather stripping at fixed stops.
- E. Entrance Doors: Reinforce doors as required for installing entrance door hardware.
 1. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.
 2. At exterior doors, provide weather sweeps applied to door bottoms.
- F. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.
- G. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.9 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General:

1. Comply with manufacturer's written instructions.
2. Do not install damaged components.
3. Fit joints to produce hairline joints free of burrs and distortion.
4. Rigidly secure non-movement joints.
5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.
6. Seal joints watertight unless otherwise indicated.

B. Metal Protection:

1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or applying sealant or tape, or by installing nonconductive spacers as recommended by manufacturer for this purpose.
2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

- C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.

- D. Set continuous sill members and flashing in full sealant bed as specified in Division 07 Section "Joint Sealants" to produce weathertight installation.
- E. Install components plumb and true in alignment with established lines and grades, and without warp or rack.
- F. Install glazing as specified in Division 08 Section "Glazing."
- G. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.
 - 1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
 - 2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.
- H. Install perimeter joint sealants as specified in Division 07 Section "Joint Sealants" to produce weathertight installation.

3.3 ERECTION TOLERANCES

- A. Install aluminum-framed systems to comply with the following maximum erection tolerances:
 - 1. Location and Plane: Limit variation from true location and plane to 1/8 inch in 12 feet; 1/4 inch over total length.
 - 2. Alignment:
 - a. Where surfaces abut in line, limit offset from true alignment to 1/16 inch.
 - b. Where surfaces meet at corners, limit offset from true alignment to 1/32 inch.
- B. Diagonal Measurements: Limit difference between diagonal measurements to 1/8 inch.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field tests and inspections.
- B. Field Water Spray Testing:
 - 1. AAMA 501.2, Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems
 - 2. Perform nozzle water testing by applying water using a hand held spray assembly employing a Type B2 #6.030 nozzle, pressure gauge, control valve, and a 3/4" garden hose. Adjust water flow to the nozzle to produce 30 psi at the nozzle. Direct water at the joint under test perpendicular to the face of the storefront. Move the nozzle slowly back and forth above the joint, at a distance of 1'-0" for a period of five minutes for each 5'-0" of joint. An observer on the inside checks for water leakage. Perform field water spray testing on 20% of the total area of installed storefront. Document locations of tests and include with test report. Provide test report to CxA for review and comment.
- C. Repair or remove work if test results and inspections indicate that it does not comply with specified requirements.

1 D. Additional testing and inspecting, at Contractor's expense, will be performed to determine
2 compliance of replaced or additional work with specified requirements.

3 E. Aluminum-framed assemblies will be considered defective if they do not pass tests and
4 inspections.

5 F. Prepare test and inspection reports.

6 3.5 ADJUSTING

7 A. Adjust operating entrance door hardware to function smoothly as recommended by
8 manufacturer.

9 1. For entrance doors accessible to people with disabilities, adjust closers to provide a 3-
10 second closer sweep period for doors to move from a 70-degree open position to 3
11 inches from the latch, measured to the leading door edge.

12 END OF SECTION 08 41 13

1 SECTION 08 71 00 - DOOR HARDWARE

2 PART 1 - GENERAL

3 1.1 GENERAL REQUIREMENTS

- 4 A. Drawings and Conditions of Contract, including General and Supplementary Conditions and
5 Division 1 Administration Sections, apply to this Division.

6 1.2 SUMMARY

- 7 A. This Section includes the following:

- 8 1. Commercial door hardware for the following:

- 9
10 a. Swinging doors.
11 b. Other doors to the extent indicated.

- 12 2. Cylinders for doors specified in other Sections.

- 13 B. Related Sections include the following:

- 14 1. Division 08 14 16 Section "Flush Wood Doors" for astragals and integral intumescent
15 seals provided as part of fire-rated labeled assemblies.
16 2. Division 08 31 13 Section "Access Doors and Frames" for access door hardware, except
17 cylinders.
18 3. Division 08 34 63 Section "Detention Doors and Frames".
19 4. Division 08 41 13 Section "Aluminum-Framed Entrances and Storefronts" for entrance
20 door hardware not included in this section.
21 5. Division 08 71 63 Section "Detention Door Hardware" for hardware for detention doors.
22 6. Division 28 13 00 Section "Access Control System" for access control devices installed at
23 door openings and provided as part of a security access system.
24 7. Division 28 31 11 Section "Digital Addressable Fire Alarm System" for connections to
25 building fire alarm system.

- 26 C. Products furnished, but not installed, under this Section include the following. Coordinating,
27 purchasing, delivering, and scheduling remain requirements of this Section.

- 28 1. Thresholds, weather stripping and cylinders for locks specified in other Sections.
29 2. Permanent cores to be installed by Owner.

30 1.3 SUBMITTALS

- 31 A. Product Data: Include construction and installation details, material descriptions, dimensions of
32 individual components and profiles, and finishes.

- 33 B. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer
34 and witnessed by a qualified testing agency, for locks, latches, delayed-egress locks and
35 closers.

- 36 C. Maintenance Data: For each type of door hardware to include in maintenance manuals.
37 Include final hardware schedule.

- 38 D. Warranty: Special warranty specified in this Section.

E. Other Action Submittals:

1. Door Hardware Sets: Prepared by or under the supervision of Architectural Hardware Consultant, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final door hardware sets with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
 - a. Format: Use same scheduling sequence and format and use same door numbers as in the Contract Documents.
 - b. Content: Include the following information:
 - 1) Identification number, location, hand, fire rating, and material of each door and frame.
 - 2) Type, style, function, size, quantity, and finish of each door hardware item. Include description and function of each lockset and exit device.
 - 3) Complete designations of every item required for each door or opening including name and manufacturer.
 - 4) Fastenings and other pertinent information.
 - 5) Location of each door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
 - 6) Explanation of abbreviations, symbols, and codes contained in schedule.
 - 7) Mounting locations for door hardware.
 - 8) Door and frame sizes and materials.
 - 9) List of related door devices specified in other Sections for each door and frame.
 - c. Submittal Sequence: Submit the final door hardware sets at earliest possible date, particularly where approval of the door hardware sets must precede fabrication of other work that is critical in Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the door hardware sets.
2. Keying Schedule: Prepared by or under the supervision of Installer's Architectural Hardware Consultant, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by lock manufacturer.
1. Installer's responsibilities include supplying and installing door hardware and providing a qualified Architectural Hardware Consultant available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.
 2. Installer shall have warehousing facilities in Project's vicinity.
 3. Scheduling Responsibility: Preparation of door hardware and keying schedules.
 4. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
- B. Architectural Hardware Consultant Qualifications: A person who is currently certified by DHI as an Architectural Hardware Consultant and who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project.
- C. Source Limitations: Obtain each type and variety of door hardware from a single manufacturer, unless otherwise indicated.

D. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80, 2007 edition that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252, 2003 edition.

1. Test Pressure: After 5 minutes into the test, neutral pressure level in furnace shall be established at 40 inches or less above the sill.

E. Keying Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." In addition to Owner, Contractor, and Architect, conference participants shall also include Installer's Architectural Hardware Consultant and Owner's security consultant. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including, but not limited to, the following:

1. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
2. Preliminary key system schematic diagram.
3. Requirements for key control system.
4. Address for delivery of keys.

F. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.5 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.

B. Tag each item or package separately with identification related to the final door hardware sets, and include basic installation instructions, templates, and necessary fasteners with each item or package.

C. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

D. Deliver keys and permanent cores to Owner by registered mail or overnight package service.

1. Verify Name and Address of person to receive keys.

1.6 COORDINATION

E. Templates: Distribute door hardware templates for doors, frames, and other work specified to be factory prepared for installing door hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

- a. Structural failures including excessive deflection, cracking, or breakage.
- b. Faulty operation of operators and door hardware.
- c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.

2. Warranty Period: Three years from date of Project completion, except as follows:

- 1 a. Exit Devices: Two years from date of Project completion.
- 2 b. Manual Closers: 10 years from date of Project completion.

3 1.7 MAINTENANCE SERVICE

- 4 A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and
- 5 maintenance instructions as needed for Owner's continued adjustment, maintenance, and
- 6 removal and replacement of door hardware.
- 7 B. Maintenance Service: Beginning at Project completion, provide six months' full maintenance by
- 8 skilled employees of door hardware Installer. Include quarterly preventive maintenance, repair
- 9 or replacement of worn or defective components, lubrication, cleaning, and adjusting as
- 10 required for proper door hardware operation. Provide parts and supplies same as those used in
- 11 the manufacture and installation of original products.

12 PART 2 - PRODUCTS

13 2.1 SCHEDULED DOOR HARDWARE

- 14 A. General: Provide door hardware for each door to comply with requirements in this Section and
- 15 door hardware sets indicated in Part 3 "Door Hardware Sets" Article.
- 16 1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and named
- 17 manufacturers' products.
- 18 B. In other Part 2 articles where titles below introduce lists, the following requirements apply to
- 19 product selection:
- 20 1. Manufacturers: Subject to compliance with requirements, provide products by the
- 21 manufacturers specified.

22 2.2 HINGES, GENERAL

- 23 A. Quantity: Provide the following, unless otherwise indicated:
- 24 1. Three Hinges: For doors with heights 61 to 90 inches.
- 25 B. Template Requirements: Except for hinges and pivots to be installed entirely (both leaves) into
- 26 wood doors and frames, provide only template-produced units.
- 27 C. Hinge Weight: Unless otherwise indicated, provide the following:
- 28 1. Entrance Doors: Heavy-weight hinges.
- 29 2. Interior Doors: Standard-weight hinges for openings to 40 inches wide.
- 30 3. Interior Doors: Heavy-weight hinges for openings over 40 inches wide.
- 31 D. Hinge Base Metal: Unless otherwise indicated, provide the following:
- 32 1. Exterior Hinges: Stainless steel, with stainless-steel pin.
- 33 2. Interior Hinges: Stainless steel, with stainless-steel pin.
- 34 3. Hinges for Fire-Rated Assemblies: Stainless steel, with stainless-steel pin.
- 35 E. Hinge Options: Where indicated in door hardware sets or on Drawings:
- 36 1. Tips: Flat bottom and matching plug, finished to match leaves.
- 37 2. Nonremovable Pins: Provide set screw in hinge barrel that, when tightened into a groove
- 38 in hinge pin, prevents removal of pin while door is closed.

F. Fasteners: Comply with the following:

1. Screws: Phillips flat-head; machine screws (drilled and tapped holes) for metal doors and wood screws for wood doors and frames. Finish screw heads to match surface of hinges.
 - a. Provide pinned Torx-Plus or pinned Torx drive type fasteners at door hardware for doors and frames located in inmate accessible areas. Administration and visitation areas are the only areas not accessible to inmates.

2.3 HINGES

A. Butts and Hinges: BHMA A156.1.

B. Template Hinge Dimensions: BHMA A156.7.

C. Manufacturers:

1. Ives; an Allegion Company (IVE).
2. Bommer Industries, Inc..
3. McKinney Products Company; an ASSA ABLOY Group company.
4. Stanley Commercial Hardware; Div. of The Stanley Works.

D. Antifriction-Bearing, Full-Mortise (Butt) Hinges: BHMA A156.1

1. Heavy weight; Grade 1, with 4 ball bearings
2. Standard weight; Grade 2, with 2 ball bearings
3. Hinge Options:
 - a. Tips: Flat bottom and matching plug, finished to match leaves.
 - b. Non-removable Pins.
4. Base Metal: Stainless steel.

2.4 LOCKS AND LATCHES, GENERAL

A. Accessibility Requirements: Where indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)."

1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.

B. Latches and Locks for Means of Egress Doors: Comply with CBC 1003.1. Latches shall not require more than 15 lbf to release the latch. Locks shall not require use of a key, tool, or special knowledge for operation.

C. Lock Trim:

1. Levers: Forged.
 - a. Schlage (SCH), Standard Longitude (LONG) lever.
2. Escutcheons (Roses): Forged.
3. Dummy Trim: Match lever lock trim and escutcheons.

D. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:

1. Mortise Locks: Minimum 3/4-inch latchbolt throw.
2. Deadbolts: Minimum 1-inch bolt throw.

- 1 E. Backset: 2-3/4 inches, unless otherwise indicated.
- 2 F. Rabbeted Meeting Doors: Provide special rabbeted front and strike on locksets for rabbeted
3 meeting stiles.
- 4 G. Strikes: Manufacturer's standard strike with strike box for each latchbolt or lock bolt, with
5 curved lip extended to protect frame, finished to match door hardware set, and as follows:
 - 6 1. Strikes for Mortise Locks and Latches: BHMA A156.13.
 - 7 2. Strikes for Auxiliary Deadlocks: BHMA A156.5.
- 8 2.5 MECHANICAL LOCKS AND LATCHES
- 9 A. Lock Functions: Function numbers and descriptions indicated in door hardware sets comply
10 with the following:
 - 11 1. Mortise Locks: BHMA A156.13.
- 12 B. Mortise Locks: Stamped steel case with steel or brass parts; BHMA A156.13, Grade 1;
13 Series 1000. Security locksets to also meet security grade 1.
 - 14 1. Manufacturers and respective products:
 - 15 a. Schlage (SCH); L Series. No substitutions
- 16 2.6 AUXILIARY LOCKS AND LATCHES
- 17 A. Auxiliary Locks: BHMA A156.5, Grade 1.
 - 18 1. Manufacturers:
 - 19 a. Schlage (SCH); No substitutions
- 20 2.7 EXIT DEVICES
- 21 A. Exit Devices: BHMA A156.3, Grade 1.
- 22 B. Accessibility Requirements: Where handles, pulls, latches, locks, and other operating devices
23 are indicated to comply with accessibility requirements, comply with the U.S. Architectural &
24 Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA),
25 Accessibility Guidelines for Buildings and Facilities (ADAAG)."
 - 26 1. Provide operating devices that do not require tight grasping, pinching, or twisting of the
27 wrist and that operate with a force of not more than 5 lbf.
- 28 C. Exit Devices for Means of Egress Doors: Comply with 2013 edition of CBC (Chapter 10). Exit
29 devices shall not require more than 15 lbf to release the latch. Locks shall not require use of a
30 key, tool, or special knowledge for operation.
- 31 D. Panic Exit Devices: Listed and labeled by a testing and inspecting agency acceptable to
32 authorities having jurisdiction, for panic protection, based on testing according to UL 305.
- 33 E. Fire Exit Devices: Devices complying with latest edition of NFPA Standard 80 that are listed
34 and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for
35 fire and panic protection, based on testing according to UL 305 and latest edition of NFPA 252.
- 36 F. Outside Trim: Lever with cylinder; material and finish to match locksets, unless otherwise
37 indicated.
 - 38 1. Match design for locksets and latchsets, unless otherwise indicated.

G. Through Bolts: For exit devices and trim on doors.

H. Manufacturers:

1. Von Duprin; an Allegion Company (VON).
2. SARGENT Manufacturing Company; an ASSA ABLOY Group company.

2.8 Mortise Exit Devices:

A. Type: BHMA A156.3, Type 3.

B. Actuating Bar: Push pad.

C. Material: Brass or Bronze.

2.9 LOCK CYLINDERS

A. Standard Lock Cylinders: BHMA A156.5, Grade 1.

B. Cylinders: Manufacturer's standard tumbler type, constructed from brass or bronze, stainless steel, or nickel silver, and complying with the following:

1. Number of Pins: Six.
2. Mortise Type: Threaded cylinders with rings and straight- or clover-type cam.
3. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.

C. Permanent Cores: Manufacturer's standard; finish face to match lockset; complying with the following:

1. Schlage Primus High Security Interchangeable Cores with patented restricted keyway: Core insert, removable by use of a special key; usable with other manufacturers' cylinders.
2. Stamping: Permanently inscribe each permanent core with a visual key control number and include the following notation:
 - a. Notation: "DO NOT DUPLICATE." These visual key control marks or codes will not include the actual key cuts.

D. Construction Keying: Comply with the following:

1. Construction Cores: Provide construction cores that are replaceable by permanent cores. Provide 5 construction master keys.
 - a. Furnish permanent cores to Owner for installation.

E. Manufacturer: Same manufacturer as for locks and latches.

2.10 KEYING

A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, Appendix A. Incorporate decisions made in keying conference, and as follows:

1. Great-Grand Master Key System: Cylinders are operated by a change key, a master key, a grand master key, and a great-grand master key.

B. Keys: Nickel silver.

1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:

- a. Notation: "DO NOT DUPLICATE." These visual key control marks or codes will not include the actual key cuts.

2. Quantity: In addition to one extra key blank for each lock, provide the following:

- a. Cylinder Change Keys: Three.
- b. Master Keys: Two
- c. Grand Master Keys: Two
- d. Great-Grand Master Keys: Two
- e. Construction Master Keys: Six each

2.11 KEY CONTROL SYSTEM

- A. Key Control Cabinet: BHMA A156.5, Grade 1; metal cabinet with baked-enamel finish; containing key-holding hooks, labels, 2 sets of key tags with self-locking key holders, key-gathering envelopes, and temporary and permanent markers; with key capacity of 150 percent of the number of locks.

1. Wall-Mounted Cabinet: Cabinet with hinged-panel door equipped with key-holding panels and pin-tumbler cylinder door lock.
2. Available Manufacturers:

- a. Key control Systems, Inc.
- b. Lund Equipment Co., Inc.
- c. MMF Industries.

2.12 CLOSERS, GENERAL

- A. Accessibility Requirements: Where handles, pulls, latches, locks, and other operating devices are indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)" and CBC 11B-404.2.7.

1. Comply with the following maximum opening-force requirements:

- a. Interior and exterior Non-Fire-Rated Hinged Doors: 5 lbf applied perpendicular to door.
- b. Fire Doors: Minimum opening force allowable by authorities having jurisdiction, not to exceed 15 pounds, per CBC 11B 404.2.9.

- B. Door Closers for Means of Egress Doors: Comply with CDC. Door closers shall not require more than 30 lbf to set door in motion and not more than 15 lbf to open door to minimum required width.

- C. Size of Units: Unless otherwise indicated, comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.

- D. Surface Closers: BHMA A156.4, Grade 1. Provide parallel arm type with brackets as required for closer to be located on non-public side of door, unless otherwise indicated.

1. Manufacturers and respective products:

1 a. LCN Closers; an Ingersoll-Rand Company (LCN); 4110/ 4500 Series. No
2 substitutions.

3 E. Coordinators: BHMA A156.3.

4 2.13 CLOSERS

5 A. Traditional Surface Closers: Rack-and-pinion hydraulic type; with adjustable sweep and latch
6 speeds controlled by key-operated valves; with forged-steel main arm; enclosed in a cast-
7 aluminum alloy shell; complying with the following:

- 8 1. Manufacturer: LCN. No Substitutions.
9 2. Mounting: Opposite hinge side (Push side).
10 3. Type: Parallel Arm.

11 a. Delayed action closing where indicated shall comply with CBC 11B-404.2.8.

12 4. Backcheck: Adjustable, effective between 60 and 85 degrees of door opening.

14 2.14 PROTECTIVE TRIM UNITS, GENERAL

15 A. Size: 1-1/2 inches less than door width on push side and 1/2 inch less than door width on pull
16 side, by height specified in door hardware sets.

17 B. Fasteners: Manufacturer's standard machine or self-tapping screws.

18 C. Metal Protective Trim Units: BHMA A156.6; beveled top and 2 sides; fabricated from the
19 following material:

- 20 1. Material: 0.050-inch-thick stainless steel.
21 2. Manufacturers:
22 a. IVES Hardware; an Allegion Company (IVE).
23 b. Rockwood Manufacturing Company.
24 c. Trimco.

26 2.15 PROTECTIVE TRIM UNITS

27 A. Kick Plates: 10 inches high by door width, with allowance for frame stops.

28 2.16 STOPS AND HOLDERS

29 A. Stops and Bumpers: BHMA A156.16, Grade 1.

- 30 1. Provide wall stops for doors unless other type stops are scheduled or indicated. Where
31 floor or wall stops are not appropriate, provide overhead holders.

32 B. Combination Overhead Stops and Holders: BHMA A156.8, Grade 1.

33 C. Manufacturers:

- 34 1. Glynn-Johnson; an Allegion Company (GLY).
35 2. Rixson Specialty Door Controls; an ASSA ABLOY Group company (RIX).

36 2.17 STOPS

37 A. Wall Bumpers: Polished cast brass or aluminum with rubber bumper; 2-1/2-inch diameter,
38 minimum 3/4-inch projection from wall, with backplate for concealed fastener installation; with
39 convex bumper configuration.

2.18 OVERHEAD STOPS

- A. Overhead Surface-Mounted, Concealed Slide Stops: BHMA A156.8, Type 2; release by push and pull of door unless control is set in inactive position; with stop and shock absorber; adjustable holding pressure; for single-acting doors opening 110 degrees.

2.19 DOOR GASKETING

- A. Standard: BHMA A156.22.

- B. General: Provide continuous weather-strip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated or scheduled. Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

1. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

- C. Air Leakage: Not to exceed 0.50 cfm per foot of crack length for gasketing other than for smoke control, as tested according to ASTM E 283.

- D. Smoke-Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke-control ratings indicated, based on testing according to UL 1784.

1. Provide smoke-labeled gasketing on 20-minute-rated doors and on smoke-labeled doors.

- E. Fire-Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.

1. Test Pressure: After 5 minutes into the test, neutral pressure level in furnace shall be established at 40 inches or less above the sill.

- F. Gasketing Materials: ASTM D 2000 and AAMA 701/702.

- G. Manufacturers:

1. Zero International (ZER).
2. National Guard Products.
3. Pemko Manufacturing Co.
4. Reese Enterprises

2.20 THRESHOLDS

- A. Standard: BHMA A156.21.

- B. Accessibility Requirements: Where thresholds are indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)."

1. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch high.

- C. Thresholds for Means of Egress Doors: Comply with CBC. Maximum 1/2 inch high.

- D. Manufacturers:

1. Zero International (ZER).
2. National Guard Products.

- 1 3. Pemko Manufacturing Co.
- 2 4. Reese Enterprises

3 2.21 FABRICATION

4 A. Base Metals: Produce door hardware units of base metal, fabricated by forming method
5 indicated, using manufacturer's standard metal alloy, composition, temper, and hardness.
6 Furnish metals of a quality equal to or greater than that of specified door hardware units and
7 BHMA A156.18. Do not furnish manufacturer's standard materials or forming methods if
8 different from specified standard.

9 B. Fasteners: Provide door hardware manufactured to comply with published templates generally
10 prepared for machine, wood, and sheet metal screws. Provide screws according to
11 commercially recognized industry standards for application intended, except aluminum
12 fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match
13 surface of door hardware, unless otherwise indicated.

14 1. Steel Machine or Wood Screws: For the following fire-rated applications:

- 15 a. Mortise hinges to doors.
- 16 b. Strike plates to frames.
- 17 c. Closers to doors and frames.

18 2. Steel Through Bolts: For the following fire-rated applications unless door blocking is
19 provided:

- 20 a. Surface hinges to doors.
- 21 b. Closers to doors and frames.
- 22 c. Surface-mounted exit devices.

23 3. Spacers or Sex Bolts: For through bolting of hollow-metal doors.

24 4. Provide pinned Torx drive type fasteners at door hardware for doors and frames located
25 in inmate accessible areas. Administration and visitation areas are the only areas not
26 accessible to inmates.

27 2.22 FINISHES

28 A. Standard: BHMA A156.18.

29 1. Finish and Base Metal Table: (BHMA/US number).

- 30 a. Hinges: 652 satin chrome steel
- 31 630-US32D on stainless steel.
- 32 b. Exit Devices: 626-US26D on brass or bronze.
- 33 c. Locks: 630-US32D on stainless steel.
- 34 d. Pulls and Push Plates/Bars: 630-US32D on stainless steel.
- 35 e. Coordinators: 600-USP on steel.
- 36 f. Closers: 689-Sprayed AL.
- 37 g. Protective Plates: 630-US32D on stainless steel.
- 38 h. Overhead Stops: 626-US26D on brass, bronze, or steel.
- 39 i. Stops 626-US26D on brass or bronze or.
- 40 j. Thresholds: Mill Aluminum.
- 41 k. Weatherstrips and Sweeps: 628-Clear anodized aluminum.
- 42 l. Cabinets: Enamel on steel.
- 43 m. Miscellaneous: 626-US26D on brass or bronze,
- 44 630-US32D on stainless steel..

45 B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable,
46 temporary protective covering before shipping.

- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Steel Doors and Frames: Comply with DHI A115 Series.
1. Surface-Applied Door Hardware: Drill and tap doors and frames according to ANSI A250.6.
- B. Wood Doors: Comply with DHI A115-W Series.

3.3 INSTALLATION

- A. Mounting Heights: Mount door hardware units at heights indicated as follows unless otherwise indicated or required to comply with governing regulations.
1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 09 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- C. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
- D. Thresholds: Set thresholds for exterior doors in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."

- E. (ASI-3)Door Hardware located in inmate accessible areas: Install door hardware with pinned Torx drive type fasteners per Section 05 55 00. Administration and Visitation areas are the only areas not accessible to inmates."

3.4 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

1. Door Closers: Unless otherwise required by authorities having jurisdiction, adjust sweep period so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the leading edge of the door.

- B. Occupancy Adjustment: Approximately six months after date of Project completion, Installer's Architectural Hardware Consultant shall examine and readjust, including adjusting operating forces, each item of door hardware as necessary to ensure function of doors, door hardware, and electrified door hardware.

3.5 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items as necessary to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Project completion.

3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes. Refer to Division 01 Section "Demonstration and Training."

3.7 DOOR HARDWARE SCHEDULE

HARDWARE GROUP NO. 01 - EXTERIOR TO UTILITY/STORAGE/NON-OCCUPIED SPACE

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP SEC	630	IVE
1	EA	STOREROOM LOCK	LV9080T LATA TORX	630	SCH
1	EA	PRIMUS CORE	20-740-XP EV29 T	626	SCH
1	EA	SURFACE CLOSER	4111 SHCUSH MC TORX	689	LCN
1	EA	RAIN DRIP	142A TORX (OMIT WHERE SHELTERED)	719	ZER
1	SET	HEAD/JAMB SEAL	105-B	BLK	DHS
1	EA	CNCLD BTM SWEEP	AMDB3-3 + CC (HM)		DHS
1	EA	EXT THRSILD	6570-E-V3 #226	719	ZER

1 HARDWARE GROUP NO. 02 - EXTERIOR - MECHANICAL ROOM

2 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP SEC	630	IVE
2	EA	MANUAL FLUSH BOLT	FB457	626	IVE
1	EA	DUST PROOF STRIKE	DP1/DP2 AS REQ'D	626	IVE
1	EA	STOREROOM LOCK	L9080T LONA TORX	630	SCH
1	EA	PRIMUS CORE	20-740-XP EV29 T	626	SCH
2	EA	OH STOP	100S SOC	630	GLY
2	EA	ARMOR PLATE	8400 30" X 1" LDW B-CS TKTX	630	IVE
1	EA	RAIN DRIP	142A TORX (OMIT WHERE SHELTERED)	719	ZER
1	SET	HEAD/JAMB SEAL	105-B	BLK	DHS
1	EA	ASTRAGAL	43SP	SP	ZER
2	EA	CNCLD BTM SWEEP	AMDB3-3 + CC (HM)		DHS
1	EA	THRESHOLD	AS DETAILED	628	ZER
2		DOOR CONTACT(S) - WORK OF DIVISION 28			

4

5 HARDWARE GROUP NO. 03 - INTERIOR - RESTROOMS

6 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP SEC	630	IVE
1	EA	PUSH PLATE	8200 4" X 16"	630	IVE
1	EA	PULL PLATE	8303 8" 4" X 16"	630	IVE
1	EA	SURFACE CLOSER	4011 MC TORX	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS TKTX	630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS TKTX	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

7

8 HARDWARE GROUP NO. 04 - INTERIOR - RECEPTION ENTRY

9 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP SEC	652	IVE
1	EA	OFFICE/ENTRY LOCK	L9050T LONA TORX	630	SCH
1	EA	PRIMUS CORE	20-740-XP EV29 T	626	SCH
1	EA	SURFACE CLOSER	4111 EDA MC TORX	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS TKTX	630	IVE
1	EA	FLOOR STOP	FS438	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

11

1 HARDWARE GROUP NO. 05 - INTERIOR - ALUMINUM STOREFRONT

2 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP SEC	652	IVE
1	EA	CLASSROOM LOCK	L9070T LONA TORX	630	SCH
1	EA	PRIMUS CORE	20-740-XP EV29 T	626	SCH
1	EA	SURFACE CLOSER	4111 EDA MC TORX	689	LCN
1	EA	FLOOR STOP	FS438	626	IVE
3	EA	SILENCER	PER ALUMINUM DOOR MFR		

4

5 HARDWARE GROUP NO. 06 - EXTERIOR - ALUMINUM STOREFRONT – ENTRY-AUTO OPERATOR-
6 CARD READER

7 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
2	EA	ELECTRIC HW HINGE	5BB1HW 4.5 X 4.5 CON TW8 SEC	630	IVE
1	EA	ELEC PANIC HARDWARE	RX-LC-QEL-9847-EO-SNB-SEC-CON	630	VON
1	EA	ELEC PANIC HARDWARE	RX-LC-QEL-9847-NL-OP-110MD-CON	630	VON
1	EA	RIM CYLINDER	20-057-ICX	626	SCH
1	EA	PRIMUS CORE	20-740-XP EV29 T	626	SCH
2	EA	LONG DOOR PULL	9266 36" 20" STD	630	IVE
1	EA	CONCEALED CLOSER	2031 TORX	689	LCN
1	EA	SURF. AUTO OPERATOR	9542 DD HL/D MS	ANCLR	LCN
4	EA	ACTUATOR, WALL MOUNT	8310-853T	630	LCN
4	EA	SURFACE MOUNT BOX	8310-867S	689	LCN
1	EA	FLOOR STOP	FS18S / FS18L	BLK	IVE
1	SET	SEAL	PER ALUMINUM DOOR MFR		ZER
	EA	ASTRAGAL	328AA	AL	ZER
2	EA	DOOR SWEEP	39 TORX	628	ZER
1	EA	THRESHOLD	AS DETAILED	628	ZER
1	EA	POWER SUPPLY	PS902-2RS-FA-BBK-KL	LGR	VON
1		CARD READER - WORK OF DIVISION 28			

8

9

10 HARDWARE GROUP NO. 07 - EXTERIOR – DAY REPORTING, DOCK / RECEIVING

11 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	OFFICE/ENTRY LOCK	L9050T LONA TORX	630	SCH
1	EA	PRIMUS CORE	20-740-XP EV29 T	626	SCH
1	EA	SURFACE CLOSER	4111 SCUSH MC TORX	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	SET	HEAD/JAMB SEAL	105-B	BLK	DHS
1	EA	CNCLD BTM SWEEP	AMDB3-3 + CC (HM)		DHS
1	EA	THRESHOLD	AS DETAILED	628	ZER

13

1 HARDWARE GROUP NO. 08 - INTERIOR - STORAGE

2 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP SEC	652	IVE
1	EA	STOREROOM LOCK	L9080T LONA TORX	630	SCH
1	EA	OH STOP	100S SOC	630	GLY
1	EA	SURFACE CLOSER	4111 EDA MC TORX	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS TKTX	630	IVE
1	SET	HEAD/JAMB SEAL	105-B	BLK	DHS

4

5 HARDWARE GROUP NO. 09 – NOT USED

6 HARDWARE GROUP NO. 10 - INTERIOR - STAFF COMPUTER STATION

7 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	GATE SPRING PIVOT HI	4007MRB	630	MCK
1	EA	ROLLER LATCH	RL32	626	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE

9

10 HARDWARE GROUP NO. 11 - INTERIOR - STAFF TOILETS

11 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP SEC	652	IVE
1	EA	PRIVACY LOCK	L9040 LONA L583-363 TORX	630	SCH
1	EA	OH STOP	100S SOC	630	GLY
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS TKTX	630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS TKTX	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

13

14 HARDWARE GROUP NO. 12 - INTERIOR - OVERHEAD COUNTER DOOR - HEALTH

15 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	NOTE	HARDWARE BY DOOR MANUFACTURER		

16 HARDWARE GROUP NO. 12A - EXTERIOR ROLL-UP DOORS

17 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	NOTE	HARDWARE BY DOOR MANUFACTURER		

18 HARDWARE GROUP NO. 13 - INTERIOR - RATED - JANITOR

19 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP SEC	652	IVE

1	EA	STOREROOM LOCK	L9080T LONA TORX	630	SCH
1	EA	PRIMUS CORE	20-740-XP EV29 T	626	SCH
1	EA	SURFACE CLOSER	4111 EDA MC TORX	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS TKTX	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	SET	HEAD/JAMB SEAL	105-B	BLK	DHS

1

2 HARDWARE GROUP NO. 14 - INTERIOR - RATED - STAFF TOILETS

3 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP SEC	652	IVE
1	EA	PRIVACY W/DEADBOLT	L9440 LONA L583-363 TORX L283-722	630	SCH
1	EA	SURFACE CLOSER	4011 MC TORX	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS TKTX	630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS TKTX	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	SET	HEAD/JAMB SEAL	105-B	BLK	DHS

5

6 HARDWARE GROUP NO. 15 - INTERIOR - RATED – MECHANICAL

7 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP SEC	652	IVE
1	EA	STOREROOM LOCK	L9080T LONG TORX	630	SCH
1	EA	OH STOP	100S SOC	630	GLY
1	EA	SURFACE CLOSER	4011 MC TORX	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS TKTX	630	IVE
1	SET	HEAD/JAMB SEAL	105-B	BLK	DHS

8

9 HARDWARE GROUP NO. 16 - EXTERIOR - ROOF - STAIRS

10 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	DBL CYL STORE W/DB	L9466T LONA L283-721	630	SCH
2	EA	PRIMUS CORE	20-740-XP EV29 T	626	SCH
1	EA	SURFACE CLOSER	4111 SCUSH MC TORX	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS TKTX	630	IVE
1	EA	RAIN DRIP	142A TORX (OMIT WHERE SHELTERED)	719	ZER
1	SET	HEAD/JAMB SEAL	105-B	BLK	DHS
1	EA	CNCLD BTM SWEEP	AMDB3-3 + CC (HM)		DHS
1	EA	THRESHOLD	AS DETAILED	628	ZER

12

13 HARDWARE GROUP NO. 17 - INTERIOR - PROGRAM ROOM

14 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP SEC	652	IVE
1	EA	CLASSROOM LOCK	L9070T LONA TORX	630	SCH

1	EA	PRIMUS CORE	20-740-XP EV29 T	626	SCH
1	EA	SURFACE CLOSER	4011 MC TORX	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS TKTX	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	SET	HEAD/JAMB SEAL	105-B	BLK	DHS

1

2 HARDWARE GROUP NO. 17A - INTERIOR - TRAINING OFFICE

3 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP SEC	652	IVE
1	EA	OFFICE/ENTRY LOCK	L9050T LONA TORX	630	SCH
1	EA	PRIMUS CORE	20-740-XP EV29 T	626	SCH
1	EA	SURFACE CLOSER	4011 MC TORX	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS TKTX	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	SET	HEAD/JAMB SEAL	105-B	BLK	DHS

4 HARDWARE GROUP NO. 18 - INTERIOR - SGL, VESTIBULE/STAIRS

5

6 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP SEC	630	IVE
1	EA	FIRE EXIT HARDWARE	AX-98L-BE-F X 996L-LON SNB SEC	630	VON
1	EA	SURFACE CLOSER	4111 EDA MC TORX	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS TKTX	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	SET	HEAD/JAMB SEAL	105-B	BLK	DHS

8

9 HARDWARE GROUP NO. 18A - INTERIOR - SGL, RATED - STAIRS

10 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP SEC	630	IVE
1	EA	STOREROOM LOCK	L9080T LONA TORX	630	SCH
1	EA	PRIMUS CORE	20-740-XP EV29 T	626	SCH
1	EA	SURFACE CLOSER	4011 MC TORX	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS TKTX	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	SET	HEAD/JAMB SEAL	105-B	BLK	DHS

11 THE LATITUDE LEVER DOES NOT HAVE THE RETURN THAT COMES WITHIN 1/2" OF THE FACE
12 OF THE DOOR THAT IS REQUIRED IN CALIFORNIA.

13

14 HARDWARE GROUP NO. 19 - INTERIOR - BREAK ROOM

15 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP SEC	652	IVE
1	EA	CLASSROOM LOCK	L9070T LONA TORX	630	SCH
1	EA	PRIMUS CORE	20-740-XP EV29 T	626	SCH
1	EA	SURFACE CLOSER	4111 EDA MC TORX	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS TKTX	630	IVE
1	EA	FLOOR STOP	FS438	626	IVE

1 SET HEAD/JAMB SEAL 105-B BLK DHS

1

2 HARDWARE GROUP NO. 20 - INTERIOR - FOLDING WALL SYSTEM

3 EACH TO HAVE:

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1 EA	NOTE	HARDWARE BY DOOR MANUFACTURER		

4 DOOR IS PART OF FOLDING WALL SYSTEM.

5 HARDWARE GROUP NO. 21 - INTERIOR - SGL - LOCKER ROOM

6 EACH TO HAVE:

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3 EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP SEC	652	IVE
1 EA	PUSH PLATE	8200 4" X 16"	630	IVE
1 EA	PULL PLATE	8303 8" 4" X 16"	630	IVE
1 EA	SURFACE CLOSER	4111 EDA MC TORX	689	LCN
1 EA	KICK PLATE	8400 10" X 2" LDW B-CS TKTX	630	IVE
1 EA	FLOOR STOP	FS438	626	IVE
3 EA	SILENCER	SR64	GRY	IVE

8

9 HARDWARE GROUP NO. 22 - INTERIOR - SGL - LOCKER ROOM ENTRY

10 EACH TO HAVE:

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3 EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP SEC	652	IVE
1 EA	PASSAGE SET	L9010 LONA TORX	630	SCH
1 EA	SURFACE CLOSER	4011 MC TORX	689	LCN
1 EA	KICK PLATE	8400 10" X 2" LDW B-CS TKTX	630	IVE
1 EA	WALL STOP	WS406/407CVX	630	IVE
3 EA	SILENCER	SR64	GRY	IVE

12

13 HARDWARE GROUP NO. 22A - INTERIOR - SGL - LOCKER ROOM ENTRY

14 EACH TO HAVE:

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3 EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP SEC	652	IVE
1 EA	PASSAGE SET	L9010 LONA TORX	630	SCH
1 EA	SURFACE CLOSER	4111 EDA MC TORX	689	LCN
1 EA	KICK PLATE	8400 10" X 2" LDW B-CS TKTX	630	IVE
1 EA	WALL STOP	WS406/407CVX	630	IVE
3 EA	SILENCER	SR64	GRY	IVE

15

16

17

18

1

2 HARDWARE GROUP NO. 23 - INTERIOR - SGL - STORAGE

3 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 SH 4.5 X 4.5 NRP SEC	652	IVE
1	EA	STOREROOM LOCK	L9080T LONA TORX	630	SCH
1	EA	PRIMUS CORE	20-740-XP EV29 T	626	SCH
1	EA	SURFACE CLOSER	4011 MC TORX	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS TKTX	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

4

5

6 HARDWARE GROUP NO. 24 – ELEVATOR MACHINE ROOM

7 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 SH 4.5 X 4.5 NRP SEC	652	IVE
1	EA	STOREROOM LOCK	L9080T LONA TORX	630	SCH
1	EA	PRIMUS CORE	20-740-XP EV29 T	626	SCH
1	EA	SURFACE CLOSER	4111 SCUSH MC TORX	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS TKTX	630	IVE
1	SET	HEAD/JAMB SEAL	105-B	BLK	DHS
1	EA	AUTO DOOR BOTTOM	355A	628	ZER

8

9

10 HARDWARE GROUP NO. 25 – INTERIOR / RATED / STAFF BREAK ROOM

11 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP SEC	652	IVE
1	EA	FIRE EXIT HARDWARE	AX-98L-F X 996L-LON SNB SEC	630	VON
1	EA	PRIMUS CORE	20-740-XP EV29 T	626	SCH
1	EA	SURFACE CLOSER	4111 EDA MC TORX	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS TKTX	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	SET	HEAD/JAMB SEAL	105-B	BLK	DHS

13

14 HARDWARE GROUP NO. 25A - INTERIOR / BRIEFING

15 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP SEC	652	IVE
1	EA	PANIC HARDWARE	AX-98-L-LON-SNB-SEC	630	VON
1	EA	PRIMUS CORE	20-740-XP EV29 T	626	SCH
1	EA	SURFACE CLOSER	4111 EDA MC TORX	689	LCN

1	EA	KICK PLATE	8400 10" X 2" LDW B-CS TKTX	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

1

2 HARDWARE GROUP NO. 26 - INTERIOR - PR - STORAGE

3 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
1	EA	AUTO FLUSH BOLT	FB41T	630	IVE
1	EA	PASSAGE SET	L9010 LONA TORX	630	SCH
2	EA	OH STOP	100S	630	GLY
2	EA	SILENCER	SR64	GRY	IVE

5

6 HARDWARE GROUP NO. 27 – INTERIOR RATED – TELEPHONE, ELEC.

7 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 SH 4.5 X 4.5 NRP SEC	652	IVE
1	EA	STOREROOM LOCK	L9080T LONA TORX	630	SCH
1	EA	PRIMUS CORE	20-740-XP EV29 T	626	SCH
1	EA	SURFACE CLOSER	4111 EDA MC TORX	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS TKTX	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	SET	HEAD/JAMB SEAL	105-B	BLK	DHS

8

9 HARDWARE GROUP NO. 27A - INTERIOR / JANITOR

10 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 SH 4.5 X 4.5 NRP SEC	652	IVE
1	EA	STOREROOM LOCK	L9080T LONA TORX	630	SCH
1	EA	PRIMUS CORE	20-740-XP EV29 T	626	SCH
1	EA	SURFACE CLOSER	4111 EDA MC TORX	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS TKTX	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

11

12 HARDWARE GROUP NO. 28 - INTERIOR - JANITOR - STORAGE

13 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP SEC	652	IVE
1	EA	STOREROOM LOCK	L9080T LONA TORX	630	SCH
1	EA	PRIMUS CORE	20-740-XP EV29 T	626	SCH
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS TKTX	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

15

1 HARDWARE GROUP NO. 29 - INTERIOR - JANITOR – STORAGE (NOT USED)

2 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP SEC	652	IVE
1	EA	STOREROOM LOCK	L9080T LONG TORX	630	SCH
1	EA	PRIMUS CORE	20-740-XP EV29 T	626	SCH
1	EA	WALL STOP	WS406/407CVX	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

3

4 HARDWARE GROUP NO. 30 - INTERIOR - JANITOR - STORAGE

5 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 5 X 4.5 NRP SEC	630	IVE
1	EA	STOREROOM LOCK	L9080T LONA TORX	630	SCH
1	EA	PRIMUS CORE	20-740-XP EV29 T	626	SCH
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS TKTX	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

7

8 HARDWARE GROUP NO. 31

9 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 SH 4.5 X 4.5 NRP SEC	652	IVE
1	EA	STOREROOM LOCK	L9080T LONA TORX	630	SCH
1	EA	PRIMUS CORE	20-740-XP EV29 T	626	SCH
1	EA	SURFACE CLOSER	4111 EDA MC TORX	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS TKTX	630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS TKTX	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

11

12 HARDWARE GROUP NO. 32 - INTERIOR - INMATE TOILET

13 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP SEC	652	IVE
1	EA	PRIVACY LOCK	L9040 LONA L583-363 TORX	630	SCH
1	EA	H-SEC SURFACE CLOSER	4211 AVB CUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS TKTX	630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS TKTX	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

15

16 HARDWARE GROUP NO. 32A - INTERIOR - INMATE TOILET

17 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP SEC	652	IVE
1	EA	PRIVACY LOCK	L9040 LONA L583-363 TORX	630	SCH

1	EA	H-SEC SURFACE CLOSER	4211 AVB EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS TKTX	630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS TKTX	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

1 HARDWARE GROUP NO. 33 - INTERIOR - INMATE TOILET

2 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP SEC	652	IVE
1	EA	PRIVACY LOCK	L9040 LONA L583-363 TORX	630	SCH
1	EA	OH STOP	100S SOC	630	GLY
1	EA	H-SEC SURFACE CLOSER	4511 AVB EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS TKTX	630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS TKTX	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

3

4

5

1 HARDWARE GROUP NO. 34

2 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP SEC	652	IVE
1	EA	CLASSROOM LOCK	L9070T LONA TORX	630	SCH
1	EA	PRIMUS CORE	20-740-XP EV29 T	626	SCH
1	EA	SURFACE CLOSER	4111 SHCUSH MC TORX	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS TKTX	630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS TKTX	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

4

5 HARDWARE GROUP NO. 35

6 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4 NRP SEC	652	IVE
1	EA	OFFICE/ENTRY LOCK	L9050T LONA TORX	630	SCH
1	EA	PRIMUS CORE	20-740-XP EV29 T	626	SCH
1	EA	SURFACE CLOSER	4111 SCUSH MC TORX	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS TKTX	630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS TKTX	630	IVE
1	SET	HEAD/JAMB SEAL	105-B	BLK	DHS

8

9 HARDWARE GROUP NO. 36

10 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP SEC	652	IVE
1	EA	PRIVACY LOCK	L9040 LONA L583-363 TORX	630	SCH
1	EA	SURFACE CLOSER	4011 MC TORX	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS TKTX	630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS TKTX	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	SET	HEAD/JAMB SEAL	105-B	BLK	DHS

12

13 HARDWARE GROUP NO. 37

14 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
7	EA	HW HINGE	5BB1HW 5 X 4.5 NRP SEC	652	IVE
1	EA	ELECTRIC HW HINGE	5BB1HW 5 X 4.5 CON TW8 SEC	652	IVE
1	EA	FIRE EXIT HARDWARE	9847-EO-F-SNB-SEC	630	VON
1	EA	ELEC FIRE EXIT HARDWARE	9875-L-F-E996-LON-FSE-SNB-SEC	630	VON
1	EA	MORTISE CYLINDER	20-061-ICX	626	SCH
1	EA	PRIMUS CORE	20-740-XP EV29 T	626	SCH
1	EA	COORDINATOR	COR X FL SEC	628	IVE
2	EA	MOUNTING BRACKET	MB	689	IVE
2	EA	SURFACE CLOSER	4111 SCUSH MC TORX	689	LCN
2	EA	ARMOR PLATE	8400 30" X 1" LDW B-CS TKTX	630	IVE
1	SET	HEAD/JAMB SEAL	105-B	BLK	DHS

1	EA	ASTRAGAL	PER HM DOOR MFR		
1	EA	POWER SUPPLY	PS902	LGR	VON

2

3 HARDWARE GROUP NO. 38

4 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HINGE	5BB1 4.5 X 4.5 NRP SEC	652	IVE
1	SET	AUTO FLUSH BOLT	FB31P	630	IVE
1	EA	DUST PROOF STRIKE	DP1/DP2 AS REQ'D	626	IVE
1	EA	STOREROOM LOCK	L9080T LONA TORX	630	SCH
1	EA	PRIMUS CORE	20-740-XP EV29 T	626	SCH
1	EA	COORDINATOR	COR X FL SEC	628	IVE
2	EA	MOUNTING BRACKET	MB	689	IVE
2	EA	SURFACE CLOSER	4111 SCUSH MC TORX	689	LCN
2	EA	ARMOR PLATE	8400 30" X 1" LDW B-CS TKT	630	IVE
1	SET	HEAD/JAMB SEAL	105-B	BLK	DHS

6

7 HARDWARE GROUP NO. 39

8 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	NOTE	HARDWARE BY DOOR MANUFACTURER		

9

10 HARDWARE GROUP NO. 40 - INTERIOR - JANITOR - STORAGE

11 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4 NRP SEC	652	IVE
1	EA	STOREROOM LOCK	L9080T LONA TORX	630	SCH
1	EA	PRIMUS CORE	20-740-XP EV29 T	626	SCH
1	EA	SURFACE CLOSER	4111 EDA MC TORX	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS TKT	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

13

14 HARDWARE GROUP NO. 41 - INTERIOR - STAFF TOILET - NON-RATED

15 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP SEC	652	IVE
1	EA	PRIVACY LOCK	L9040 LONA L583-363 TORX	630	SCH
1	EA	SURFACE CLOSER	4011 MC TORX	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS TKT	630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS TKT	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

17

1 HARDWARE GROUP NO. 42

2 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
8	EA	HW HINGE	5BB1HW 5 X 4.5 NRP SEC	652	IVE
1	EA	AUTO FLSH BLT, TOP	FB31T	630	IVE
1	EA	FLUSH BOLT, BTM	FB458 18"	626	IVE
1	EA	DUST PROOF STRIKE	DP1/DP2 AS REQ'D	626	IVE
1	EA	STOREROOM LOCK	L9080T LONA TORX	630	SCH
2	EA	OH STOP	100S SOC	630	GLY
2	EA	ARMOR PLATE	8400 30" X 1" LDW B-CS TKTX	630	IVE
2	EA	SILENCER	SR64	GRY	IVE

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5 HARDWARE GROUP NO. 43 - INTERIOR - SGL - CLOSET

6 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
1	EA	CLASSROOM DEAD LOCK	L463T	626	SCH
1	EA	PRIMUS CORE	20-740-XP EV29 T	626	SCH
1	EA	OH STOP	100S SOC	630	GLY
1	EA	SURFACE CLOSER	4111 EDA MC TORX	689	LCN
1	SET	HEAD/JAMB SEAL	105-B	BLK	DHS

8

9 HARDWARE GROUP NO. 44 – EXTERIOR – STAFF LOBBY-ACCESS CONTROL

10 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP SEC	652	IVE
1	EA	POWER TRANSFER	EPT10 CON	689	VON
1	EA	ELEC PANIC HARDWARE	LX-RX-LC-QEL+-98-NL-SNB-SEC-CON	626	VON
1	EA	RIM CYLINDER	20-057-ICX	626	SCH
1	EA	PRIMUS CORE	20-740-XP EV29 T	626	SCH
1	EA	SURFACE CLOSER	4111 EDA MC TORX	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS TKTX	630	IVE
1	EA	FLOOR STOP	FS18S / FS18L	BLK	IVE
1	EA	RAIN DRIP	142A TORX (OMIT WHERE SHELTERED)	719	ZER
1	SET	HEAD/JAMB SEAL	105-B	BLK	DHS
1	EA	CNCLD BTM SWEEP	AMDB3-3 + CC (HM)		DHS
1	EA	THRESHOLD	AS DETAILED	628	ZER
1	EA	POWER SUPPLY	PS902	LGR	VON
1			CARD READER - WORK OF DIVISION 28		

12

1 HARDWARE GROUP NO. 45 - INTERIOR - ACCESS CONTROL - LOBBY TO CORRIDOR

2 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP SEC	652	IVE
1	EA	ELECTRIC HW HINGE	5BB1HW 4.5 X 4.5 CON TW8 SEC	652	IVE
1	EA	EU MORTISE LOCK	L9092TEU LATA XL12-246 TORX RX	630	SCH
1	EA	PRIMUS CORE	20-740-XP EV29 T	626	SCH
1	EA	SURFACE CLOSER	4111 SCUSH MC TORX	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS TKTX	630	IVE
1	SET	HEAD/JAMB SEAL	105-B	BLK	DHS
1	EA	POWER SUPPLY	PS902 900-BBK KL900	LGR	SCE
1		CARD READER - WORK OF DIVISION 28			

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4 HARDWARE GROUP NO. 45A - INTERIOR - ACCESS CONTROL -

5 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP SEC	652	IVE
1	EA	ELECTRIC HW HINGE	5BB1HW 4.5 X 4.5 CON TW8 SEC	652	IVE
1	EA	EU MORTISE LOCK	L9092TEU LATA XL12-246 TORX RX	630	SCH
1	EA	PRIMUS CORE	20-740-XP EV29 T	626	SCH
1	EA	SURFACE CLOSER	4111 EDA MC TORX	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS TKTX	630	IVE
1	EA	FLOOR STOP	FS438	626	IVE
3	EA	SILENCER	SR64	GRY	IVE
1	EA	POWER SUPPLY	PS902 900-BBK KL900	LGR	SCE
1		CARD READER - WORK OF DIVISION 28			

6

7 HARDWARE GROUP NO. 46 - INTERIOR - TOILET

8 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP SEC	652	IVE
1	EA	PRIVACY W/DEADBOLT	L9440 LONA L583-363 TORX L283-722	630	SCH
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS TKTX	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

10

11 HARDWARE GROUP NO. 47 - INTERIOR - TOILET

12 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP SEC	652	IVE
1	EA	PRIVACY W/DEADBOLT	L9440 LONA L583-363 TORX L283-722	630	SCH
1	EA	SURFACE CLOSER	4111 EDA MC TORX	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS TKTX	630	IVE
1	EA	FLOOR STOP	FS438	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

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14

1 HARDWARE GROUP NO. 48 - INTERIOR - TOILET

2 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP SEC	652	IVE
1	EA	PRIVACY W/DEADBOLT	L9440 LONA L583-363 TORX L283-722	630	SCH
1	EA	OH STOP	100S SOC	630	GLY
1	EA	SURFACE CLOSER	4111 EDA MC TORX	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS TKTX	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

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5 HARDWARE GROUP NO. 49 - INTERIOR - RATED-NON-CONTACT VISITATION

6 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP SEC	652	IVE
1	EA	PASSAGE SET	L9010 LONA TORX	630	SCH
1	EA	SURFACE CLOSER	4111 SCUSH MC TORX	689	LCN
1	SET	HEAD/JAMB SEAL	105-B	BLK	DHS

7 HARDWARE GROUP NO. 49A - INTERIOR - RATED - NON-CONTACT VISITATION-ACCESSIBLE,
8 INTERVIEW ROOM

9 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP SEC	652	IVE
1	EA	PASSAGE SET	L9010 LONA TORX	630	SCH
1	EA	SURFACE CLOSER	4011 MC TORX	689	LCN
1	EA	WALL STOP	WS406/407CVX	630	IVE
	SET	HEAD/JAMB SEAL	105-B	BLK	DHS

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11 HARDWARE GROUP NO. 49B - INTERIOR - INTERVIEW, WORK ROOM

12 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP SEC	652	IVE
1	EA	PASSAGE SET	L9010 LONA TORX	630	SCH
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	SET	HEAD/JAMB SEAL	105-B	BLK	DHS

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14

15 HARDWARE GROUP NO. 50 - INTERIOR - OFFICES

16 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP SEC	652	IVE
1	EA	OFFICE/ENTRY LOCK	L9050T LONA TORX	630	SCH
1	EA	PRIMUS CORE	20-740-XP EV29 T	626	SCH
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	SET	HEAD/JAMB SEAL	105-B	BLK	DHS

18

1 HARDWARE GROUP NO. 51 - INTERIOR - INMATE SERVICES

2 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP SEC	652	IVE
1	EA	OFFICE/ENTRY LOCK	L9050T LONA TORX	630	SCH
1	EA	PRIMUS CORE	20-740-XP EV29 T	626	SCH
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS TKTX	630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS TKTX	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	SET	HEAD/JAMB SEAL	105-B	BLK	DHS

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5 HARDWARE GROUP NO. 52 - INTERIOR - ACCESS CONTROL

6 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP SEC	652	IVE
1	EA	ELECTRIC HW HINGE	5BB1HW 4.5 X 4.5 CON TW8 SEC	652	IVE
1	EA	EU MORTISE LOCK	L9092TEU LATA XL12-246 TORX RX	630	SCH
1	EA	PRIMUS CORE	20-740-XP EV29 T	626	SCH
1	EA	OH STOP	100S SOC	630	GLY
1	EA	SURFACE CLOSER	4011 MC TORX	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS TKTX	630	IVE
1	EA	POWER SUPPLY	PS902 900-BBK KL900	LGR	SCE
1		CARD READER - WORK OF DIVISION 28			

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9 HARDWARE GROUP NO. 52A - INTERIOR - EXAM LAB - ACCESS CONTROL

10 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP SEC	652	IVE
1	EA	ELECTRIC HW HINGE	5BB1HW 4.5 X 4.5 CON TW8 SEC	652	IVE
1	EA	EU MORTISE LOCK	L9092TEU LATA XL12-246 TORX RX	630	SCH
1	EA	PRIMUS CORE	20-740-XP EV29 T	626	SCH
1	EA	SURFACE CLOSER	4011 MC TORX	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS TKTX	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	POWER SUPPLY	PS902 900-BBK KL900	LGR	SCE
1		CARD READER - WORK OF DIVISION 28			

11

12 HARDWARE GROUP NO. 53 - INTERIOR - CLIENT WAITING (NOT USED)

13 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
1	EA	OFFICE/ENTRY LOCK	L9050T LONG TORX	630	SCH
1	EA	PRIMUS CORE	20-740-XP EV29 T	626	SCH
1	EA	ELECTRIC STRIKE	6213 FS DSLC CON	630	VON
1	EA	OH STOP	100S SOC	630	GLY
1	EA	SURFACE CLOSER	4111 EDA MC TORX	689	LCN
3	EA	SILENCER	PER ALUMINUM DOOR MFR		
1	EA	POWER SUPPLY	PS902 900-BBK KL900	LGR	SCE

1 CARD READER - WORK OF DIVISION 28

2 HARDWARE GROUP NO. 54 - INTERIOR - CLIENT WAITING

3 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP SEC	652	IVE
1	EA	CLASSROOM LOCK	L9070T LONA TORX	630	SCH
1	EA	PRIMUS CORE	20-740-XP EV29 T	626	SCH
1	EA	OH STOP	100S SOC	630	GLY
1	EA	SURFACE CLOSER	4111 EDA MC TORX	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS TKT	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

6 HARDWARE GROUP NO. 55 - INTERIOR - CLOSET/STORAGE

7 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP SEC	652	IVE
1	EA	STOREROOM LOCK	L9080T LONA TORX	630	SCH
1	EA	OH STOP	100S SOC	630	GLY
3	EA	SILENCER	SR64	GRY	IVE

10 HARDWARE GROUP NO. 56 - INTERIOR - CONFERENCE ROOM

11 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP SEC	652	IVE
1	EA	CLASSROOM LOCK	L9070T LONA TORX	630	SCH
1	EA	PRIMUS CORE	20-740-XP EV29 T	626	SCH
1	EA	WALL STOP	WS406/407CVX	630	IVE
	SET	HEAD/JAMB SEAL	105-B	BLK	DHS

14 HARDWARE GROUP NO. 57 - INTERIOR - CONFERENCE ROOM

15 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP SEC	652	IVE
1	EA	CLASSROOM LOCK	L9070T LONA TORX	630	SCH
1	EA	PRIMUS CORE	20-740-XP EV29 T	626	SCH
1	EA	OH STOP	100S SOC	630	GLY
1	SET	HEAD/JAMB SEAL	105-B	BLK	DHS

18 HARDWARE GROUP NO. 58 - INTERIOR - CONFERENCE ROOM

19 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP SEC	652	IVE
1	EA	CLASSROOM LOCK	L9070T LONA TORX	630	SCH

1	EA	PRIMUS CORE	20-740-XP EV29 T	626	SCH
1	EA	SURFACE CLOSER	4111 EDA MC TORX	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS TKTX	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	SET	HEAD/JAMB SEAL	105-B	BLK	DHS

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5 GROUP NO. 59

6 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	STOREROOM LOCK	L9080T LONA TORX	630	SCH
1	EA	PRIMUS CORE	20-740-XP EV29 T	626	SCH
1	EA	SURFACE CLOSER	4111 EDA MC TORX	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS TKTX	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	SET	HEAD/JAMB SEAL	105-B	BLK	DHS
1	EA	CNCLD BTM SWEEP	AMDB3-3 + CC (HM)		DHS

8

9 HARDWARE GROUP NO. 60

10 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	PANIC HARDWARE	AX-98-L-LON-SNB-SEC	630	VON
1	EA	RIM CYLINDER	20-057-ICX	626	SCH
1	EA	PRIMUS CORE	20-740-XP EV29 T	626	SCH
1	EA	SURFACE CLOSER	4111 EDA MC TORX	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS TKTX	630	IVE
1	EA	FLOOR STOP	FS18S / FS18L	BLK	IVE
1	EA	RAIN DRIP	142A TORX (OMIT WHERE SHELTERED)	719	ZER
1	SET	HEAD/JAMB SEAL	105-B	BLK	DHS
1	EA	CNCLD BTM SWEEP	AMDB3-3 + CC (HM)		DHS
1	EA	THRESHOLD	AS DETAILED	628	ZER

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13 HARDWARE GROUP NO. 61 - EXTERIOR GATE - EXIT ONLY PANIC HARDWARE

14 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	PANIC HARDWARE	LD-AX-98-EO-SNB-SEC	630	VON
1	EA	SURFACE CLOSER	4021 SRI	689	LCN
1	EA	MOUNTING PLATE	4020-18G	689	LCN
1	EA	FLOOR STOP	FS18L	BLK	IVE
1		BALANCE OF HARDWARE BY GATE MANUFACTURER			

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1 HARDWARE GROUP NO. 62 - EXTERIOR GATE - PANIC HARDWARE / CARD READER

2 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	PANIC HARDWARE	LD-AX-98-NL-OP-110MD-SNB-SEC	630	VON
1	EA	RIM CYLINDER	20-057-ICX	626	SCH
1	EA	PRIMUS CORE	20-740-XP EV29 T	626	SCH
1	EA	ELECTRIC STRIKE	6111 FSE	630	VON
1	EA	DOOR PULL	VR910 NL	630	IVE
1	EA	SURFACE CLOSER	4021 SRI	689	LCN
1	EA	MOUNTING PLATE	4020-18G	689	LCN
1	EA	FLOOR STOP	FS18L	BLK	IVE
1	EA	POWER SUPPLY	PS902	LGR	VON
1		BALANCE OF HARDWARE BY GATE			
		MANUFACTURER			
1		CARD READER - WORK OF DIVISION 28			

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6 HARDWARE GROUP NO. 63 - EXTERIOR PAIR OF GATES

7 EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1		HARDWARE BY GATE			
		MANUFACTURER			

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1 SECTION 08 71 63 – DETENTION DOOR HARDWARE

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

4 A. Drawings and provisions of contract, including General and Supplementary Conditions and
5 Division 1 specification Sections apply to Work in this Section.

6 B. Section 013513.16, "Special Project Procedures for Detention Facilities".

7 1.2 SUMMARY

8 A. This Section includes the following:

- 9 1. Electrical and Mechanical Security Hardware for Swinging Doors and Gates.
10 2. Sliding Devices
11 3. Miscellaneous Hardware for Security Doors
12 4. Hardware Schedule for Security Doors.

13 B. Related Sections include the following:

- 14 1. Division 01 Section 013513.16 "Special Project Procedures for Detention Facilities."
15 2. Division 01 Section "Sustainable Design Requirements" for additional LEED
16 requirements.
17 3. Division 07 Section 077200 "Roof Accessories" for security roof hatch lock requirements.
18 4. Division 08 Section 083113 "Access Doors and Frames" for security rated access panel
19 lock requirements.
20 5. Division 08 Section 083463 "Detention Doors and Frames."
21 6. Division 12 Section 125500 "Detention Furniture."
22 7. Division 13 Section 135000 "Modular Metal Detention Wall Panel System."
23 8. Division 26 for Electrical requirements.
24 9. Divisions 27 and 28 for Security Electronic requirements.
25 10. Division 32 Section 323113.53 "High Security Chain Link Fences and Gates."

26 1.3 SCOPE AND RESPONSIBILITIES

27 A. Fully coordinate this Scope of Work with the Scope of Work shown in the Modular Metal
28 Detention Wall Panel System scope of work. Provide copies of approved shop drawings to
29 Modular Metal Detention Wall Panel System manufacturer for coordination.

30 B. Under the requirements of this specification, the DEC shall be responsible for furnishing and
31 installing all hardware as specified, in all locations unless the hardware is furnished and installed
32 by the Modular Metal Detention Wall Panel System manufacturer.

33 C. Refer to Division 135000 "Modular Metal Detention Wall Panel System" Section for related
34 Scope of Work provided in that Section.

35 1.4 SUBMITTALS

- A. General: Submit the following according to Conditions of the Contract and Division 1 Specification Sections. All submittals shall be supplied on USB drive.
- B. Product Data: Manufacturer's printed product data and catalog cuts indicating product characteristics, performance and limiting criteria.
- C. Shop Drawings: For each type of hardware item: Include plans, wiring diagrams, method of construction, installation and attachment details and other information necessary to show compliance with requirements.
- D. It is the DEC's responsibility to coordinate detention/security items in this scope of work, and to answer all manufacturer questions or concerns that are not strictly design related. The DEC shall redline the manufacturers' individual shop drawings and/or schedules, and note corrections prior to submittal for Architectural/Consultant review. When multiple items are submitted by the manufacturer on a single cutsheet, the DEC shall note with an arrow, circle or note cloud, to show which product on the sheet is submitted for this scope of work. DEC submittals not reviewed and redlined prior to submittal to Architect/Consultant for final review, will be returned rejected.
- E. Samples: Provide samples of each item of security hardware as requested by the Architect-Engineer. Samples shall be shipped as directed, to the location as directed, and shall be shipped within 10 days of receipt of notification of the requirement to provide samples. In addition, if required, provide hardware for all mockups. All mockups shall be completely functional, wired to temporary switches prior to Architect-Consultant's inspection.
- F. Hardware schedule coordinated with doors, frames, and related work to ensure proper size, thickness, hand and function of door hardware.
 1. Hardware Schedule Content: Based on hardware indicated, organize schedule into "hardware sets" indicating complete designations of every item required for each door or opening. Include the following information:
 - a. Type, style, exact function, size, and finish of each hardware item.
 - b. Name and manufacturer of each item.
 - c. Fastenings and other pertinent information.
 - d. Location of each hardware set cross-referenced to indications on Drawings both on floor plans and in door and frame schedule.
 - 1) Door numbers and frame types in schedule to match door numbers and frame types shown on Drawings.
 - 2) Hardware sets shall match specified hardware sets found at the end of this specification section. Hardware set extensions (i.e.: "SH1_a") used to signify hardware sets with additional hardware requirements are acceptable.
 - e. Explanation of all abbreviations, symbols, and codes contained in schedule.
 - f. Mounting locations for hardware.
 - g. Door and frame sizes and materials.
 2. Submittal Sequence: Submit schedule at earliest possible date, particularly where acceptance of Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include with schedule the product data, shop drawings of other work affected by door hardware, and other information essential to the coordinated review of schedule.
 3. Fire Rated Openings: Provide hardware for fire-rated openings in compliance with NFPA Standard 80. This requirement takes precedence over other requirements for such hardware. Provide only hardware which has been tested and listed by UL bears appropriate label or symbol for the types and sizes of doors required and compliance with the requirements of the required label and function of the opening wherever possible.
 4. The DEC is responsible for counts, quantities, proper handing and correct nomenclature of all material provided under, and related to, this scope of work.

G. Keying Schedule: The owner shall provide an approved key schedule to the DEC at the time of detention hardware submittal review.

H. Submittal of written confirmation from the hardware manufacturer showing individual field technicians as approved installers shall be required.

I. Operating/Maintenance Manuals: Furnish O&M Manuals, as outlined in Division 1, for all security hardware and all security locking devices. Provide detailed parts lists and cutsheets for all items with mechanical moving parts or electrical components on the approved security hardware schedule. These manuals shall include instructions for the care of the materials, parts list to aid the Owner in ordering replacement parts, as well as instructions for contacting the appropriate personnel not only during the warranty period, but beyond. Manuals shall also include the final approved key schedule and "as built" shop drawings of all components. The Detention Equipment Contractor must have full time employees trained in the maintenance and repair of this equipment.

1.5 DELIVERY, STORAGE AND HANDLING

A. Packing and Marking: Each piece of security hardware furnished under this Section shall be packaged and marked according to the hardware set and door number listed in the approved hardware schedule.

B. Deliver all components cartoned or crated to provide protection during transit and job storage.

C. Inspect all components upon delivery for damage. Damages may be repaired, provided the repaired items are equal in all respects to new work and acceptable to the Architect-Engineer; otherwise, remove and replace damaged items as directed.

D. Store all components in a locked storage area for all components deemed necessary by the Detention Equipment Contractor. Do not store any materials directly on the ground or concrete. Provide adequate ventilation and protection to insure materials are kept dry, clean and secure. Store all materials in the manner and order as prescribed by the Detention Equipment Contractor and/or manufacturer.

1.6 COORDINATION

A. Examine the drawings and specifications of other trades whose work may influence the installation and/or operation of the detention hardware. Prior to the start of work, review the project drawings and specifications and coordinate work with all other trades and Divisions of the Specifications affecting Work of this Section.

1. Responsibilities for electrical and mechanical hardware installation shall include the following:

a. Furnish and install door locks, door position switches, limit switches, lock feature switches and push buttons, as required for the system to perform the functions as defined in the "Door Control" section of the Division 28 specifications.

b. Coordinate the integration and interfacing of the products and equipment specified in this section with Division 28 Contractor specified, and in accordance with shop drawings and submittals approved by the Architect / Consultant.

c. Review all control submittals submitted by Division 28 Contractor and confirm that all scheduled controls and monitoring will function in accordance with the specified function. A written confirmation of this review shall be submitted to the Architect / Consultant.

- 1 d. Coordinate the power requirements with all equipment furnished in this section.

2 1.7 MAINTENANCE

- 3 A. Contractor shall furnish spare parts required in each section, packaged to protect parts from
4 damage and to allow for easy storage.

- 5 B. Supplier of equipment shall stock replacement parts for each system and be able to replace any
6 part of the system within 24 hours.

- 7 C. Provide spare door hardware parts as follows:

- 8 1. Hinges: 10 pair
9 2. Closers: 1 each hand, type and size used
10 3. Door position switches: 2 % of total doors, or minimum of 10 (whichever is greater)
11 4. Furnish the following material:
12 a. Two (2) each of all locks specified (less cylinder).
13 b. All parts shall be packaged and labeled to provide for long term storage.

14 PART 2 - PRODUCTS

15 2.1 GENERAL

- 16 A. Security design criteria are based upon the requirements and features of the products listed
17 herein. The use of one manufacturer's numeric designation does not imply other manufacturer's
18 products will not be accepted.

- 19 B. Fire Rated Openings: Provide hardware for fire-rated openings in compliance with NFPA
20 Standard 80. This requirement takes precedence over other requirements for such hardware.
21 Provide only hardware which has been tested and listed by UL, bears appropriate label or
22 symbol for the types and sizes of doors required and compliance with the requirements of the
23 required label and function of the opening wherever possible.

24 2.2 MISCELLANEOUS HARDWARE FOR SECURITY DOORS

- 25 A. Acceptable Manufacturers

- 26 1. Except as otherwise specified herein, the equipment and materials of this section shall be
27 products manufactured by one of the listed manufacturers and must be equal to the part
28 specified in the product description.

- 29 B. Products/Manufacturers

- 30 1. Hinges: Portland, Northwest Specialty Hardware, RR Brink
31 2. Pulls: Portland, Northwest Specialty Hardware, RR Brink
32 3. Door Position Switches (DPS): Sentrol, RR Brink
33 4. Door Closers: LCN (No substitutions)
34 5. Door Stops: Ives
35 6. Thresholds: Reese, National Guard and Pemko
36 7. Weatherstrip: Reese, National Guard and Pemko
37 8. Smoke Seal: Reese, National Guard and Pemko
38 9. Silencers: Ives

C. Product Description

1. Hinges: RR Brink 4-1/2SRS:

- a. Full Mortise Detention Hinges shall be 4-1/2" x 4-1/2" x 0.188" thick investment cast 304 stainless steel with hospital tips and integral studs on both leaves. Pins shall be hardened stainless or alloy steel, concealed and non-removable. Each hinge shall be supplied with eight (8) 1/4-20 flat head machine screws. All hinges and screws shall be US32D finished.
- b. Furnish three hinges for door through 84-inches in height and one additional hinge for each additional 30-inches of height or fraction thereof. Furnish three hinges for doors through 36-inches in width and one additional hinge for each additional 12-inches of width or fraction thereof.
- c. Except where otherwise indicated, hinges shall be mortised, 4-1/2" x 4-1/2", cast steel or stainless steel, ball bearing, with pins made non-removable by a concealed hardened roll pin. All hinges shall be furnished with 1/4-20 TORX FHMS.
- d. Hinges shall be certified, by an independent testing lab, to meet or exceed the cycle requirements of ASTM 1758, Grade 1A.
- e. Hinges furnished for use on labeled fire doors shall also comply with the requirements of NFPA 80.

2. Electric Power Transfer Hinge, RRB ##4-1/2SRS-CE

3. Full surface hinges, equal to RR Brink #3/#3FP where indicated on architectural details for food pass applications in rated openings.

4. Strikes: All locks and latches shall be furnished with manufacturer's standard strikes complete with dust boxes to fully conceal the strike pocket. Where monitor strikes are specified, provide strikes as appropriate for the lock specified. All monitor strikes shall be designed to fit within a 2" face frame without protruding beyond the 2" frame depth.

5. Fasteners:

- a. Manufacturer hardware to conform to published template, generally prepared for machine screw installation. Do not provide hardware, which has been prepared for self-tapping of sheet metal screws.
- b. Furnish screws for installation with each hardware item. All exposed screw heads, whether door is open or closed, shall be Torx (with security stud) flat-head or oval head screws except as otherwise indicated. Screws shall be the same material and finished to match the applied hardware item. Other types of security screws are unacceptable unless specifically approved by the Architect-Consultant.

6. Pull:

- a. Grip Type Door Pulls shall be cast of brass or bronze with satin finish of approximately US26D unless specified otherwise in hardware schedule. Approximate overall length, 8-11/16"; handhold, 5-1/4"; grip clearance, 1-1/2"; attachment holes, 7-3/4" o.c. Provide two (2) 3/8-16 x 5/8" flat head torx screws of same finish and material as pull.
- b. Flush Type Door Pulls shall be cast of brass or bronze with satin finish of approximately US26D unless specified otherwise in hardware schedule. Size 4" x 5" x 1/8" x pocket rip 1" deep. Provide four (4) 1/4-20 x 3/8" flat head torx screws of same finish and material as pull.

7. Door Position Switch, RR Brink 201023, or as required by hardware schedule:

- a. Recessed Magnetic Door Position Switch-Triple Biased shall be a five-reed switch magnet mortised type assembly used for remotely monitoring the door status/position. The device shall be triple bias for tamper resistance.
- b. The device shall be moisture resistant and fit within a 2" hollow metal jamb or head. The device shall be field adjustable on 2 axis and supplied with a 5' vinyl jacketed lead wire and a 3-pin Molex connector. The device shall be all steel construction. The switch and magnet shall be encased in epoxy resin.
- c. Where this device is used in an exterior location, provide a complete water-tight installation.

8. High Security Closer (LCN #4210/4510T series) shall be surface mounted with security screws at all exposed locations and shall have fully adjustable spring tension. Closers shall have cast iron cylinders and two separately adjustable non-critical valves for closing speed and latching speed, plus a third valve for adjusting the hydraulic back-check. Closers shall be sized appropriately based on scheduled door width, per manufacturer's recommendations. A smooth molded case cover shall conceal the closer body. Closer to be located on the side of door/frame farthest from inmate contact, unless an exterior door. Mount closer for exterior doors on interior side of the door. Maximum opening clearance shall be 180-degrees. Parallel arm shall be used on the 4210 series closer, this closer shall be used at all locations not in direct contact with inmates. A track arm shall be used on the 4510T series closer, which shall be provided at dayrooms, and locations with direct inmate contact. Provide finish of standard powder coated aluminum. DEC shall be responsible for coordinating the installation of the closer with jobsite frame installation conditions prior to installation. Closer shall have sufficient force to fully close door to achieve a secured and locked indication. Closer body shall not be inhibited by, or touch the wall or any other object after installation. If the above conditions cannot be achieved, request direction from the Architect/Consultant, by providing suggested solution using LCN security grade products. DEC is responsible for proper closer placement and installation.
9. Concealed Door Closers (LCN #2210 series) shall be concealed in surface of door and frame with security screws and shall have fully adjustable spring tension. Maximum opening allowed shall be 180 degrees. Provide standard finish of powder coat aluminum. Closer shall be mounted with Torx head security screws. The 2210DPS combo closer is not acceptable and shall not be permitted.
10. Wall Mounted Door Stops (**Wall mount only**) (Ives FS18L) shall be a tamper resistant device that is embedded into the wall with an epoxy resin adhesive. Bumper shall be 2" diameter x 3-1/2" long and made from a non-hazardous silicone elastomer, 80 durometer. The threaded and grooved steel mounting shank shall be 5/8" in diameter and embedded into the bumper at least half the length of the bumper. Mounting shank shall extend 2-1/2" beyond the bumper bottom for embedding into the wall.
 - a. At Cell Doors: Provide wall-mounted door bumper 80" off of the floor and 8" from edge of door when in the opened position. If the above conditions cannot be achieved, request direction from the Architect.
 - b. At all Other Security Doors: Provide wall-mounted door bumper 8" off of the floor and 8" from edge of door when in the opened position. If the above conditions cannot be achieved, request direction from the Architect.
11. Thresholds: Provide thresholds as in "Security Hardware Schedule", and where required on security doors per architectural details. All doors into rated stairways shall be provided with Reese S204A thresholds (or approved equal).
12. Weatherstripping:
 - a. Provide weatherstripping at all exterior doors equal to Reese DB469C door sweep plus 797B weatherstrip, or approved, at all heads and jambs (and astragals if pairs), After installation, razor cut gasketing into pieces not over 12" in length, installed per manufacturer's recommendations. Do not break weatherstrip at head of frame for closer installation. SILL SWEEP MUST BE FASTENED WITHIN 1/2" MAXIMUM FROM EDGE OF DOOR ON EACH SIDE.
 - b. Provide rain drips equal to Reese R199A and R201A at frame head and door bottom at all exterior doors installed per manufacturer's recommendations. Apply head drip directly to door frame header 1/4" above door opening.
13. Interlocking Threshold: Equal to Reese TJ3A/T550A provided as noted in hardware sets and at all dayroom separation doors.
14. Smoke/Fire Gasket: Provide head and jamb gasketing equal to Reese 797B weatherstrip and Reese 964C Sill sweep, or approved equal, at all fire and/or smoke rated openings. After installation, razor cut gasketing into pieces not over 12" in length, installed per manufacturer's recommendations. Do not break weatherstrip at head of frame for closer

- 1 installation. SILL SWEEP MUST BE FASTENED WITHIN ½" MAXIMUM FROM EDGE
2 OF DOOR ON EACH SIDE.
3 15. Door Silencers: (Ives SR64) shall be standard resilient type and removable for
4 replacement.

5 2.3 MECHANICAL LOCKS FOR SECURITY DOORS

6 A. Acceptable Manufacturers

- 7 1. Except as otherwise specified herein as "No Substitution", the equipment and materials
8 of this section shall be products manufactured by one of the listed manufacturers and
9 must be equal to the part outlined in the product description:
10 a. RR Brink Locking System (RRB), Shorewood, Ill

11 B. Mechanical Locks and Accessories for Swinging and sliding Doors

12 1. Standard Features

- 13 a. Lock case to be high tensile strength alloy steel with cold rolled steel cover
14 b. All locks to operate by inserting a key into matching cylinder and rotating key to
15 unlock the lock.
16 c. All lock steel parts shall be zinc plated for corrosion protection and are suitable for
17 both interior and exterior applications.
18 d. Keyed One Side (K1) or Keyed Two Sides (K2).
19 e. At rated locations, provide smoke gasketing, weather strip, sweeps, sill threshold,
20 door skirts, plates, angles, closers and/or additional material as required per the
21 manufacturer's recommendations to obtain the appropriate label as per the
22 architectural drawings. This requirement takes precedence over other
23 requirements for scheduled hardware. Provide only hardware which has been
24 tested and listed by UL bears the appropriate label or symbol for the types and
25 sizes of doors required and compliance with the requirements of the required label
26 and function of the opening wherever possible.

27 C. Products

28 1. Mechanical Deadbolt, RRB 9010:

- 29 a. Lock size to be approximately 4-1/4" x 3" x 1-1/4". Deadbolt to be ¾" x 1" hot
30 rolled steel with 5/8" throw. Deadbolt locking and unlocking activated by key only.
31 b. The lock shall be supplied with MEDECO high security small format mogul
32 cylinders.
33 c. Provide extended bolt throw at food pass locations as required by hollow metal
34 fabrication. DEC shall fully coordinate with hardware and hollow metal
35 manufacturers.

36 2. Mechanical Latch, RRB 9017:

- 37 a. Lock size to be approximately 4-1/4" x 3" x 1-1/4". Beveled dead-latching latchbolt
38 to be 7/16" x 1" stainless steel with 5/8" throw.
39 b. Beveled latch bolt to be retracted by key operation only. Latchbolt to snap-lock on
40 closing.
41 c. The lock shall be supplied with MEDECO high security small format mogul key
42 cylinders to match the existing facility.
43 d. Provide extended bolt throw at food pass locations as required by hollow metal
44 fabrication. DEC shall fully coordinate with hardware and hollow metal
45 manufacturers.

46 3. Mechanical Deadlock, RRB 7080:

- 47 a. Lock size to be approximately 5-1/2" x 3-3/4" x 1-1/2". Deadbolts to be ¾" x 2" with
48 ¾" throw. Deadbolt locking and unlocking activated by key only.

- b. Deadbolt to be made of cold rolled steel with 1/4" diameter hardened steel inserts (2 each) unless otherwise specified.
 - c. The lock shall be supplied with a six (6)-pin paracentric key cylinder.
 - d. Provide 1-1/2" x 1-1/2" x 1/4" x 10" high custom galvanized angle strike to receive lock bolt where installed in fence system. Weld custom strike to fence frame.
 - e. Provide 3" x 3" gate stop gusset angles where required to stop gate swing. Welded at corners of gate opening.
4. Institutional Mortise Lockset, RRB 1020:
- a. A security mortise lockset for 2" thick individual swing doors that comply with the standard test methods defined in ASTM F1577-05. Locksets shall be supplied with high security rose and functions as specified by the door and/or hardware schedule. Lockset shall be UL listed for use with fire-rated doors where specified.
 - b. Lockset case and cover shall be 12-gauge (minimum) heavy-duty wrought steel, zinc dichromate plated. Latchbolt shall be one-piece stainless steel anti-friction type with 3/4" throw, meeting ANSI A156.13. Deadbolt shall be investment cast stainless steel with hardened steel insert and a 1" throw. Deadlock actuator shall be stainless steel. Strike shall be ANSI standard, universal brass or stainless steel. Faceplate shall be 16 gauge (Minimum) stainless steel, US32D finish.
 - c. Latchset shall be supplied with solid stainless steel (US32D finish) steel lever handles (both sides) unless otherwise specified.
 - d. Lockset shall be supplied with MEDECO high security small format Mogul Key Cylinders to match existing, unless otherwise specified. All exposed fasteners shall be stainless steel tamper proof.
 - e. Lock functions must match EXACTLY with functions specified herein.
5. Galvanized Material
- a. All exterior material shall be hot dipped galvanized.

2.4 ELECTRO-MECHANICAL LOCKS AND SLIDING DEVICES FOR SECURITY DOORS

A. Acceptable Manufacturers:

1. Except as otherwise specified herein as "No Substitution", the equipment and materials of this section shall be products manufactured by one of the listed manufacturers and must be equal to the part outlined in the product description.
 - a. RR Brink Locking System (RRB), Shorewood, Ill

B. The lock shall be 24 VDC motor operated security locks for individual swinging doors: Locks shall be frame mounted, complete with integral electronic components. RRB 5020M:

1. Functions:
 - a. Locks to operate electrically through either 24 VDC constant duty motors. Locks to be remotely unlocked electrically by momentary contact switch, or mechanically operated by key at the lock.
 - b. Refer to the requirements of the Emergency Release function of the door control system specified in Division 28. The electrically controlled locks shall be furnished with the capabilities of a half cycle function (maintained and momentary) when controlled with the Emergency Release control function. The lock shall operate through PLC as if it's a full cycle lock with normal door control function.
 - c. Half Cycle Operation
 - 1) When a momentary signal is applied to the unlock input, the latchbolt shall retract. The latchbolt shall remain mechanically retracted. When power is removed, the latchbolt remains retracted.
 - 2) When a momentary signal is applied to the lock input, the latchbolt shall extend, locking the door if closed and allowing the door to be slam-locked if open.
 - d. Manual Operation

- 1) Each lock shall have local manual key override lock/unlock feature. Keyed one side (K1), Keyed two sides (K2).
 - 2) Rotating the key shall mechanically retract the latchbolt. Removing the key shall extend the bolt, locking the door if closed and allowing the door to be slam-locked if open.
2. Components
- a. Mechanical
 - 1) Lock shall operate as a fail-secure slam-lock. Unlocks when energized.
 - 2) Lock body shall be made of steel or stainless steel.
 - 3) Lock shall be supplied with a security key cylinder protection pipe to protect the key cylinder. The protection pipe will be supplied unpainted for installation in the hollow metal frame by the hollow metal manufacturer.
 - 4) Cylinder extensions shall be provided for locks keyed two sides or keyed stop side unless provisions are allowed for recessed pocket in hollow metal.
 - b. Electrical
 - 1) Motor Operated Lock:
 - a) Lock shall operate when supplied with 24 VDC.
 - b) Single Phase, 3.3 amp max.
 - c) Lock shall be provided with a lock status switch to provide interlocking capabilities.
 - d) Switches shall be of the snap acting mechanical type. UL listed and rated at least 5 amps.
 - e) Locks shall be factory wired to a plug disconnect.
 - f) Lock status switch shall be capable of providing the following indications:
 - g) a. Deadlocked indication
 - h) b. Unsecure indication
 - c. Features: Where specified by the security hardware/door schedule, the following features shall be provided:
 - 1) Local Electric Keyswitch (CKS): Day key provides local electric operation ONLY and may be disabled remotely via central control point. Master key provides both electric and Mechanical operation.
 - 2) Remote Latch Holdback (RLHB): Latchbolt is retracted by the PLC and remains mechanically retracted until the PLC locks extends and locks the device. Refer to the Division 28 descriptions for unlock operation and Emergency Release.
 - 3) Provide MEDECO high security small format mogul cylinders as directed by owner to match existing.
 - d. Weather resistant motor housing shall be constructed of a minimum ¼" (6.4MM) steel plate, framed and stiffened as required.
 - e. Removable front cover panel shall be constructed of 10-gauge galvanized steel.
 - f. The doorjamb and vertical members shall be free of hooks or lugs used for locking or any other purpose.

C. Fully Electric Sliding Corridor Door Operator, RRB 57700ECP:

1. Function:
 - a. Unlock, open and lock open a 3'-0" door in not more than six (6) seconds.
 - b. Unlock, close and deadlock closed a 2'-0" door in not more than five (5) seconds.
 - c. Stop the movement of any door in mid-travel so that it may be manually opened or closed by applying approximately 35 lbs. of pressure on the door.
 - d. After the blocking obstruction is removed, the door will continue to move in the selected direction and lock automatically, unless power has timed-out. The blocking of one or more doors will not affect the operation of other doors.
 - e. Although the door movement can be stopped by the application of approximately 35 lbs. of pressure, the direction cannot be reversed at the door. However, the

- operator, by use of electronic controls, can reverse the direction electrically from control panel, with a minimum of 1.5 seconds delay (contingent on controls provided with system
- f. Loss of electrical power will cause a door or doors in transit to be held in that location. A freewheeling door shall not be acceptable, whether in electric, manual or emergency release position.
 - g. Normal force exerted by a door in travel is 40 lbs. This force shall be field adjustable from 15 lbs. to 110 lbs. to accommodate various door conditions.
 - h. Device shall hold preset pressure on door at all times of operation regardless of voltage.
 - i. The locking device shall be designed so that there will be no projecting lugs on the receiver column. Door shall automatically deadlock closed at two points at rear of door.
 - j. Local Electric Keyswitch (CKS): Day key provides local electric operation ONLY and may be disabled remotely via central control point. Master key provides both electric and Mechanical operation.
 - k. In event of a power failure, each door shall have capabilities of being unlocked with a Paracentric key from either side of the door. This shall enable the door to be moved manually to an open position. At rated locations, provide smoke gasketing, weather strip, sweeps, sill threshold, door skirts, plates, angles and/or additional material as required per the manufacturer's recommendations to obtain the appropriate label as per the architectural drawings. This requirement takes precedence over other requirements for scheduled hardware. Provide only hardware which has been tested and listed by UL and bears the appropriate label or symbol for the types and sizes of doors required and compliance with the requirements of the required label and function of the opening wherever possible.
2. Components:
- a. All motors shall be 1/8 horsepower, 115 VAC single phase, as manufactured by a nationally recognized manufacturer.
 - b. Drives mechanism shall be rack and pinion.
 - c. Hanger guides shall be 1/4" thick steel plates.
 - d. Hanger shall interlock with track support with a clearance of not more than 1/4".
 - e. Hanger support rollers shall be milled from solid steel 3" O.D. grooved 5/8" deep to engage 1/2" cold drawn track.
 - f. Rollers shall have anti-friction ball bearings with hardened members and grease shields on both sides.
 - g. Roller studs shall be high alloy treated steel with eccentric bushing for adjustment and an automatic self-locking nut.
 - h. Include rubber bumpers to cushion doors.
 - i. Paint entire assembly, except track, rollers and drive mechanism with rust inhibitive primer.
 - j. Door bottom guide shall be equal to full length of door travel.
 - k. Receiver jamb to be 7 gauge plate.
3. At devices not installed in Bar Grating provide the following:
- a. Provide 1/16" mild steel Door Skirt to decrease standard door undercut to a maximum of 1/2" from finished floor. Plate to be applied at screw slots with 1/4-28 BH Torx and tac welded with 2" welds every 12" on face and full at ends. Notch as required for receiver jamb, and ease bottom corners of plate to avoid injury. After final inspection, tac-weld screw slots. Door skirts by Hollow Metal Manufacturer.
 - b. Receiver Jamb to be 7ga plate. 2" depth (bent flat toward the door panel) on inmate side, by 1-1/4" depth on non-secure side.
4. Housings:
- a. The horizontal mechanism housing shall be constructed of 3/16" mild steel plate.
 - b. Housing covers shall be constructed of 10-gauge sheet steel. All openings shall be baffled.

- c. All removable housing covers shall be hinged to allow access to mechanism without removal of housing cover. Hinged covers are required at all interior locations and shall only be used at interior locations.
- d. The vertical lock bar housing and cover shall be constructed of 7 gauge steel tube.
 - 1) After installation, installer shall maintain a maximum gap between door and face of wall of no more than 3/16". Provide filler plate as required to reduce gap.
- e. The vertical lock cover shall be removable only when the horizontal cover has been removed.
- f. Provide split covers for device header cover box lengths in excess of 36".
- g. All moving parts shall be concealed within the horizontal housing and the locking pilaster.

D. Electric Mortise Lock, RRB 1050FSE:

- 1. Function:
 - a. A 24 VDC, 0.3 AMP electric security mortise lockset for 2" thick individual swing doors that comply with the standard test methods defined in ASTM F1577-05. Locksets shall be supplied with high security rose trim, levers and functions as specified by the door and/or hardware schedule. Lockset shall be UL listed for use with fire-rated doors where specified. Lockset shall fit standard ANSI (A115.1) door edge and frame preparation.
 - b. Lever handles retract latchbolt from one side or both sides.
 - c. Electrically locks or unlocks levers.
 - d. Stainless steel latchbolt and deadlock actuator.
 - e. Functions to be as specified in the hardware schedule.
 - f. Lockset case and cover shall be 12-gauge (minimum) heavy-duty wrought steel, zinc dichromate plated. Latchbolt shall be one-piece stainless steel anti-friction type with 3/4" throw, meeting ANSI A156.13. Deadlock actuator shall be stainless steel. Strike shall be ANSI standard, universal brass or stainless steel. Faceplate shall be 16 gauge (Minimum) stainless steel, US32D finish.
 - g. Latchset shall be supplied with solid stainless steel (US32D finish) steel lever handles (both sides) unless otherwise specified.
 - h. Lockset shall be supplied with MEDECO high security small format mogul cylinders as directed by owner to match existing, except as otherwise indicated on the hardware schedule.
 - i. All exposed fasteners shall be stainless steel tamper proof.
 - j. Lock shall be provided with fail secure function.

2.5 KEYING AND KEYS

A. Keying and Keys

- 1. The DEC is responsible for scheduling and meeting with the Owner, Architect/Consultant and other involved parties to determine keying requirements. A complete keying schedule shall be submitted to the owner for review and approval. During the submittal review, the key schedule may be modified as desired by the Owner. Up to 25 key codes could be added with no additional cost.
- 2. Mogul type cylinders shall be keyed in sets and master keyed, sub-master keyed etc. to level as directed by the Owner.
- 3. MEDECO High Security small format Mogul Cylinders shall be keyed in sets and master keyed, sub-master keyed etc., to the level as directed by the Owner. Key cylinders shall match the existing facility keying.
 - a. Provide five (5) keys per master code.
 - b. Provide eight (8) keys per change key code.

4. Paracentric prison locks or keys shall not be allowed EXCEPT on the emergency release pilaster of the 57700 sliders.

B. Key Control System:

1. Keying: Provide key system as directed by the Owner.
2. The DEC shall be responsible for all keys and in the unlikely event any key is lost, the DEC shall bear all costs incurred in having locks re-keyed. The DEC shall turn all keys over to the Owner as directed by the Owner for inclusion into the key cabinet.
3. Provide key cabinets equal to Viking Key Cabinet with capacity for all keys required herein, plus 100%, installed in a location (or locations) as directed by the owner. Multiple cabinets may be required. Cabinets shall carry all required mogul, paracentric and commercial keys for each area.
4. Key cabinet shall be provided with RRB 9010 deadbolt lock and must include MEDECO small format mogul cylinder. Snap locks will not be accepted, paracentric locks will not be accepted.
 - a. Cabinet shall be fabricated from 10 gauge steel with 10 gauge leaf panels, carrying keys on both sides, and shall hold all keys assigned to each area unless otherwise instructed by the owner.
 - b. Provide a printed index for recording the location of each key, and the lock it operates.
5. When requested by the Owner, in writing, the DEC shall surrender any or all keys assigned to them.
6. All keys shall be stamped with a maximum of six (6) characters, as directed by Owner. Each key shall be such that meets the 2006 NFPA-101 Life Safety Code (22.7.5) to identify key(s) by touch and sight. This system shall be coordinated and installed by the facility maintenance staff after closeout to satisfy this code requirement.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

- A. Examine and inspect all surfaces, anchors, and grounds that are to receive materials, fixtures, assemblies, and equipment specified herein. Check location, "rough in", and field dimensions prior to beginning work. Report all unsatisfactory conditions in writing to the Architect-Engineer and general contractor.
1. Do not begin installation until all unsatisfactory conditions have been corrected.
- B. Verify all dimensions and be responsible for their correctness. No extra compensation will be allowed for differences between actual measurements and the dimensions indicated on the drawings.

3.2 INSTALLATION

- A. Install security materials and accessories in accordance with the final shop drawings, manufacturer's data, and as herein specified.
1. Provide manufacturer's supervision of installation, including testing and interfacing of systems.
- B. Install all components and complete system as indicated and in accordance with manufacturer's recommendations and instructions.

- C. Nuts of all bolted work shall be drawn tight and threads battered or welded. Bolting may be used in the installation of detention equipment provided that the nuts are not accessible to inmates or exposed to view. Bolts shall be special oval head or flat head Torx security type. Screws shall be the same material and finished to match the applied hardware item. Other types of security bolts are unacceptable unless specifically approved by the Architect-Engineer. Provide two sets of wrenches for each size bolt used.

3.3 ADJUSTING

- A. Final Adjustments: Prior to final inspection check and re-adjust all components to operate within their designed capacity. All components shall be adjusted and tested to verify correct operation prior to final inspection.
- B. All devices shall be tested for specified and manufacturer described operation.
- C. All tests required by local agencies shall be performed.
- D. All tests required by Owner and Owner's representative shall be performed.
- E. Systems not meeting the minimum level of acceptability as defined in the test procedures shall be repaired and retested.
- F. Provide documentation of test procedures and results.
- G. Equipment manufacturer's representative shall certify that the systems are installed and operate as specified.
- H. All costs to test and retest systems shall be the responsibility of the Detention Equipment Contractor.

3.4 SECURITY HARDWARE SCHEDULE

A. GENERAL NOTES:

1. Provide smoke & fire rated materials in accordance with 087163.2.2.C.9, and 11, unless otherwise instructed by the Architect/Consultant.
2. Closers shall be provided at all controlled and monitored and rated doors.
3. Provide threshold, weatherstrip equal to Reese 797B/DB469C at exterior door openings.
4. Provide appropriate cylinder shield at exterior door openings except in recreation yards and dayrooms.
5. Provide a doorstop equal to Ives FS18L at all door openings in accordance with 087163.2.2.C.8, unless otherwise instructed by the Architect/Consultant.
6. Any door greater than 3'-0" in width and/or 7'-4" in height shall receive four (4) hinges.
7. Pulls shall be provided with flat head Torx security screws, same finish material as pull.
8. DEC is responsible for counts, quantities, handing and correct nomenclature of all material provided under and related to this scope of work.

SH1

UNIT	PART	CATALOG NO.	FINISH	MANUFACTURER
3EA	HINGE	#4-1/2SRS	US32D	RR BRINK
1EA	LOCK	5020M MSLH/MCLH-E	US26D	RR BRINK
1EA	CYLINDER	MOGUL	US26D	MEDECO
1EA	DPS	201023	US26D	RR BRINK
1EA	RAISED PULL	30021	US26D	RR BRINK

1EA RECESSED PULL INTEGRAL US32D BY HM MANUF.
3EA SILENCERS SR64 ---- IVES

SH1A

UNIT	PART	CATALOG NO.	FINISH	MANUFACTURER

3EA	HINGE	#4-1/2SRS	US32D	RR BRINK
1EA	LOCK	5020M MSLH/MCLH-E	US26D	RR BRINK
2EA	CYLINDER	SM FMT MOGUL	US26D	MEDECO
1EA	CLOSER	4210/4510T	AL	LCN
1EA	DPS	201023	US26D	RR BRINK
1EA	CUFF PORT	9017	GALV	RR BRINK
2EA	CUFF PORT HINGE	#3FP	US26D	RR BRINK
1EA	RAISED PULL	30021	US26D	RR BRINK
1EA	RECESSED PULL	INTEGRAL	US32D	BY HM MANUF.
1EA	SMOKE GASKET	797B	AL	REESE
1EA	DOOR SWEEP	964C	AL	REESE

NOTE: ROTATE CUFF PORT 180° SO CUFF PORT DROPS AND SNAP-LOCKS CLOSED AT CONTROL ROOM DOORS. AT DAYROOM TO DAYROOM DOORS, PROVIDE 2210 CLOSER IN LIEU OF 4210/4510. AT SAFETY CELL DOORS, AND SAFETY CELL DAYROOM DOORS, PROVIDE WEATHERSTRIP GASKETING AND DOOR BOTTOM FOR AN AIR-TIGHT SEAL. PROVIDE 797B/DB469C/ S204A WEATHERSTRIP AND THRESHOLD AT EXTERIOR DOORS. CUFF PORT CYLINDERS SHALL BE SMALL FORMAT MOGUL. AT DAYROOM ENTRY DOORS OFF THE MAIN CONTROL CORRIDOR UNDER HOUSING CONTROL, **AND DAYROOM TO SUB-DAYROOM**, PROVIDE CKS FEATURE FOR DAY KEYING – COORDINATE CONTROLS WITH DIVISION 28.

SH2

UNIT	PART	CATALOG NO.	FINISH	MANUFACTURER

3EA	HINGE	#4-1/2SRS	US32D	RR BRINK
1EA	LOCK	5020M MSLH/MCLH-E	US26D	RR BRINK
2EA	CYLINDER	SM FMT MOGUL	US26D	MEDECO
1EA	CLOSER	4210/4510T	AL	LCN
1EA	DPS	201023	US26D	RR BRINK
1EA	RAISED PULL	30021	US26D	RR BRINK
1EA	RECESSED PULL	INTEGRAL	US32D	BY HM MANUF.
1EA	THRESHOLD	S204A	AL	REESE
1EA	WEATHERSTRIP	797B/DB469C	AL	REESE
1EA	RAIN DRIP	R201A/R199A	AL	REESE

NOTE: OMIT CYLINDER SHIELD ON RECREATION YARDS AND DAYROOM DOORS.

SH3

UNIT	PART	CATALOG NO.	FINISH	MANUFACTURER

3EA	HINGE	#4-1/2SRS	US32D	RR BRINK
1EA	LOCK	5020M MSLH/MCLH-E/CKS	US26D	RR BRINK
1EA	CYLINDER	SM FMT MOGUL	US26D	MEDECO
1EA	DPS	201023	US26D	RR BRINK
1EA	FOOD PASS LOCK	9010	GALV	RR BRINK
2EA	FOOD PASS HINGE	#3FP	US26D	RR BRINK
1EA	ESCUTCHEON		US32D	RR BRINK
1EA	RAISED PULL	30021	US26D	RR BRINK
1EA	RECESSED PULL	INTEGRAL	US32D	BY HM MANUF.
3EA	SILENCERS	SR64	----	IVES

NOTE: PROVIDE CKS FEATURE FOR DAY KEYING – COORDINATE CONTROLS WITH DIVISION 28.

1

SH4 UNIT	PART	CATALOG NO.	FINISH	MANUFACTURER
3EA	HINGE	#4-1/2SRS	US32D	RR BRINK
1EA	LOCK	1020-214*Modified	US26D	RR BRINK
1EA	STRIKE	MONITORED-KS	US26D	RR BRINK
1EA	CYLINDER	SM FMT MOGUL	US26D	MEDECO
1EA	CLOSER	4210/4510T	AL	LCN
1EA	DPS	201023	US26D	RR BRINK

2 NOTE: *MODIFY 214 LOCK FUNCTION AND REMOVE THUMBTURN. LOCK BOLT MUST BE
3 MONITORED THROUGH THE STRIKE. PROVIDED WITH LEVER TRIM. OMIT DPS AND PROVIDE
4 STANDARD STRIKE AT DOORS 2013 AND 3013.

5

6 SH4A & SH4B NOT USED

7

SH4C UNIT	PART	CATALOG NO.	FINISH	MANUFACTURER
3EA	HINGE	#4-1/2SRS	US32D	RR BRINK
1EA	LOCK	1020-214*Modified	US26D	RR BRINK
1EA	STRIKE	MONITORED-KS	US26D	RR BRINK
1EA	CYLINDER	SM FMT MOGUL	US26D	MEDECO
1EA	CLOSER	4210/4510T	AL	LCN
1EA	DPS	201023	US26D	RR BRINK
1EA	THRESHOLD	S204A	AL	REESE
1EA	WEATHERSTRIP	701A/DS78A	AL	REESE

8 NOTE: *MODIFY 214 LOCK FUNCTION AND REMOVE THUMBTURN. LOCK BOLT MUST BE
9 MONITORED THROUGH THE STRIKE. PROVIDED WITH LEVER TRIM. **AT DOOR 0057B ONLY,
10 PROVIDE 210 FUNCTION WITH MONITOR THROUGH DEADBOLT – THIS DOOR WILL BE “SEMI-
11 INTERLOCKED” WITH DOOR 0057A. WHEN 0057B DEADBOLT IS IN UNSECURE POSITION, DOOR
12 0057A WILL NOT OPEN UNTIL A SECURE INDICATION IS RECEIVED FROM 0057B.
13

SH5 UNIT	PART	CATALOG NO.	FINISH	MANUFACTURER
1EA	SLIDING DEVICE	57700ECM-2KSC	----	RR BRINK
1EA	RAISED PULL	30021	US26D	RR BRINK
2EA	CYLINDER	SM FMT MOGUL	US26D	MEDECO
1EA	CKS KEYSWITCH	MOGUL	US26D	RR BRINK
1EA	RECESSED PULL	INTEGRAL	US32D	BY HM MANUF.

14 NOTE: PILASTER RELEASE SHALL BE PROVIDED WITH SMALL FORMAT MOGUL CYLINDERS.
15 PROVIDE CKS FEATURE FOR DAY KEYING – COORDINATE CONTROLS WITH DIVISION 28.
16

SH6A Shower UNIT	PART	CATALOG NO.	FINISH	MANUFACTURER
3EA	HINGE	#4-1/2SRS	US32D	RR BRINK
1EA	LOCK	7080M-1	GALV	RR BRINK
1EA	CYLINDER	SM FMT MOGUL	US26D	MEDECO
1EA	FOOD PASS LOCK	9010	GALV	RR BRINK
2EA	FOOD PASS HINGE	#3FP	US26D	RR BRINK
1EA	RAISED PULL	30021	US26D	RR BRINK
1EA	RECESSED PULL	INTEGRAL	US32D	BY HM MANUF.
1EA	BOLT KEEPER	7080KD	US32D	RR BRINK
3EA	SILENCERS	SR64	----	IVES

1

SH7 Access Panel

UNIT	PART	CATALOG NO.	FINISH	MANUFACTURER
1EA	LOCK	9010-1	GALV	RR BRINK
1EA	CYLINDER	SM FMT MOGUL	US26D	MEDECO
1EA	WEATHERSTRIP	797B/DB469C	AL	REESE

2

NOTE: CYLINDER MUST BE SMALL FORMAT MOGUL.

3

SH7A Rated Access Panel

UNIT	PART	CATALOG NO.	FINISH	MANUFACTURER
1EA	LOCK	9017-1	GALV	RR BRINK
1EA	GASKET	797B	AL	REESE
1EA	CYLINDER	SM FMT MOGUL	US26D	MEDECO

4

NOTE: CYLINDER MUST BE SMALL FORMAT MOGUL. PROVIDE WITH AUTOMATIC CLOSING DEVICE.

5

6

SH7B Roof Hatch

UNIT	PART	CATALOG NO.	FINISH	MANUFACTURER
1EA	LOCK	9010-2	GALV	RR BRINK
1EA	CYLINDER	SM FMT MOGUL	US26D	MEDECO
2EA	CYLINDER SHIELD	BY RR BRINK	US26D	RR BRINK

7

SH8

UNIT	PART	CATALOG NO.	FINISH	MANUFACTURER
3EA	HINGE	#4-1/2SRS	US32D	RR BRINK
1EA	EPT HINGE	#4-1/2SRS-CE	US32D	RR BRINK
1EA	LOCK	1056FSE-503	US26D	RR BRINK
1EA	STRIKE	MONITORED-KS	US26D	RR BRINK
2EA	CYLINDER	SM FMT MOGUL	US26D	MEDECO
1EA	CLOSER	4210/4510T	AL	LCN
1EA	DPS	201023	US26D	RR BRINK
3EA	SILENCERS	SR64	----	IVES

8

NOTE: PROVIDED WITH LEVER TRIM.

9

SH8A

UNIT	PART	CATALOG NO.	FINISH	MANUFACTURER
3EA	HINGE	#4-1/2SRS	US32D	RR BRINK
1EA	EPT HINGE	#4-1/2SRS-CE	US32D	RR BRINK
1EA	LOCK	1052FSE-501	US26D	RR BRINK
1EA	STRIKE	MONITORED-KS	US26D	RR BRINK
1EA	CYLINDER	SM FMT MOGUL	US26D	MEDECO
1EA	CLOSER	4210/4510T	AL	LCN
1EA	DPS	201023	US26D	RR BRINK
3EA	SILENCERS	SR64	----	IVES

10

NOTE: PROVIDED WITH LEVER TRIM. ALWAYS FREE EGRESS FROM INMATE WAITING TO NURSE CORRIDOR 2002/3002. DOOR HELD OPEN WITH MAGNETIC HOLD-OPEN ON CORRIDOR 2002/3002 SIDE DURING DAY HOURS (REFER TO DIVISION 28). DURING NIGHT HOURS, ENTRY FROM CORRIDOR 2002/3002 TO INMATE WAITING BY CARD READER ONLY.

11

12

13

14

END OF SECTION 087163

1 SECTION 08 80 00 - GLAZING

2 PART 1 - GENERAL

3 1.1 GENERAL REQUIREMENTS

- 4 A. Drawings and Conditions of Contract, including General and Supplementary Conditions and
5 Division 1 Administration Sections, apply to this Division.

6 1.2 SUMMARY

- 7 A. Types of glazing included:

- 8 1. Heat-treated (tempered) float glass.
9 2. Insulating glass units
10 3. Wire glass.

11 1.3 DEFINITIONS

- 12 A. Manufacturer is used in this Section to refer to a firm that produces primary glass or fabricated
13 glass as defined in the referenced glazing standard.

- 14 B. Deterioration of Insulating Glass: Failure of the hermetic seal under normal use due to causes
15 other than glass breakage and improper practices for maintaining, and cleaning insulating glass.
16 Evidence of failure is the obstruction of vision by dust, moisture, or film on the interior surfaces
17 of glass. Improper practices for maintaining and cleaning glass do not comply with the
18 manufacturer's directions.

19 1.4 SYSTEM PERFORMANCE REQUIREMENTS

- 20 A. General: Provide glazing systems that are produced, fabricated, and installed to withstand
21 normal thermal movement, wind loading, and impact loading (where applicable), without failure
22 including loss or glass breakage attributable to the following: defective manufacture,
23 fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight;
24 deterioration of glazing materials; and other defects in construction.

- 25 B. Normal thermal movement results from the following maximum change (range) in ambient and
26 surface temperatures acting on glass-framing members and glazing components. Base
27 engineering calculation on materials' actual surface temperatures due to both solar heat gain
28 and nighttime sky heat loss.

- 29 1. Temperature Change (Range): 120 F deg, ambient; 180 F deg, material surfaces.

30 1.5 SUBMITTALS

- 31 A. Product Data: For each glass product and glazing material indicated.

- 32 B. Samples for verification purposes of 12-inch square samples of each type of glass indicated
33 except for clear monolithic glass products, and 12-inch-long samples of each color required
34 (except black) for each type of sealant or gasket exposed to view. Install sealant or gasket
35 sample between two strips of material representative in color of the adjoining framing system.

- 36 C. Glass fabricator shall submit copy of his glass manufacturer's certification for insulating
37 products.

D. Product certificates signed by glazing materials manufacturers certifying that their products comply with specified requirements.

E. Maintenance data for glass and other glazing materials to include in Operating and Maintenance Manual specified in Division 01.

1.6 QUALITY ASSURANCE

A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, except where more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. GANA Publications: "GANA Glazing Manual."
2. LSGA Publications: "LSGA Design Guide."
3. GANA Laminated Division Publication: "Laminated Glass Design Guide."
4. IGMA Publications: TM-3000 "Vertical Glazing Guidelines" and TB-3001 "Sloped Glazing Guidelines."

B. Safety Glass: Products complying with ANSI Z97.1 and testing requirements of 16 CFR Part 1201 for Category II materials.

1. Subject to compliance with requirements, provide safety glass permanently marked with certification label of Safety Glazing Certification Council (SGCC) or other certification agency acceptable to authorities having jurisdiction.

C. Insulating Glass Certification Program: Provide insulating glass units permanently marked either on spacers or at least one component lite of units with appropriate certification label of inspecting and testing agency indicated below:

1. Insulating Glass Certification Council (IGCC).
2. Associated Laboratories, Inc. (ALI).
3. National Certified Testing Laboratories (NCTL).

D. Glass Fabricator Qualifications: Fabricator of insulating units shall be certified by glass manufacturer.

E. Glazier Qualifications: Engage an experienced glazier who has completed glazing similar in material, design, and extent to that indicated for Project with a record of successful in-service performance.

F. Single-Source Responsibility for Glass: Obtain glass from one source for each product indicated below:

1. Primary glass of each (ASTM C 1036) type and class indicated.
2. Heat-treated glass of each (ASTM C 1048) condition indicated.
3. Insulating glass of each construction indicated.

G. Single-Source Responsibility for Glazing Accessories: Obtain glazing accessories from one source for each product and installation method indicated.

H. Pre-Installation Conference: Conduct conference at Project site to comply with requirements of Division 01 Section "Project Meetings."

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials to comply with manufacturer's directions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

1. Where insulating glass units will be exposed to substantial altitude changes, comply with insulating glass fabricator's recommendations for venting and sealing to avoid hermetic seal ruptures.

1.8 PROJECT CONDITIONS

- A. Environmental Conditions: Do not proceed with glazing when ambient and substrate temperature conditions are outside the limits permitted by glazing materials manufacturer or when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1. Install liquid sealants at ambient and substrate temperatures above 40 deg F.

1.9 WARRANTY

- A. General: Warranties specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under requirements of the Contract Documents.

- B. Manufacturer's Warranty on Insulating Glass: Submit written warranty signed by manufacturer of insulating glass agreeing to furnish replacements for insulating glass units that deteriorate as defined in "Definitions" article, f.o.b. point of manufacture, freight allowed Project site, within specified warranty period indicated below. Warranty covers only deterioration due to normal conditions of use and not to handling, installing, protecting, and maintaining practices contrary to glass manufacturer's published instructions.

1. Warranty Period: Manufacturer's standard but not less than 10 years after date of Completion.

PART 2 - PRODUCTS

2.1 GLASS PRODUCTS, GENERAL

- A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.

1. Minimum Glass Thickness for Exterior Lites: Not less than 1/4-inch.

2. Thickness of Tinted Glass: Provide same thickness for each tint color indicated throughout Project.

- B. Strength: Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.

- C. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:

1. For monolithic-glass lites, properties are based on units with lites 1/4-inch thick.

2. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.

3. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F.

4. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
5. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.2 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide products of one of the following manufacturers:

1. Manufacturers of Glass:

- a. Guardian Industries Corp.
- b. LOF Glass, Inc.
- c. PPG Industries, Inc.
- d. AFG Industries, Inc.

2. Fabricators:

- a. Oldcastle Glass Group.
- b. Viracon, Inc.
- c. Interpane.

2.3 WIRE GLASS (WG)

- A. Fire Rated Glazing: Composed of wired glass.

B. Properties:

1. Thickness: 1/4".
2. Weight: 2.4 lbs./sq. ft.
3. Approximate Visible Transmission: 88 percent.
4. Approximate Visible Reflection: 9 percent.
5. Fire-rating: 45 minutes for applications other than doors and sidelites.
6. Positive Pressure Test: UL 10C; passes.

- C. Listings and Labels: Under current follow-up service by Underwriters Laboratories® maintaining a current listing or certification. Label assemblies accordance with limits of manufacturer's listing.

- D. Fire Rating: Fire rating classified and labeled by UL for fire rating scheduled at opening locations on drawings, when tested in accordance with ASTM E2010-01 NFPA 257 UL 9 and UL 10C.

2.4 HEAT-TREATED FLOAT GLASS (CTG)

- A. Fabrication Process: By horizontal (roller-hearth) process.

- B. Uncoated, Clear, Heat-Treated Float Glass: ASTM C 1048, Condition A (uncoated surfaces), Type I (transparent glass, flat), Class 1 (clear), Quality q3 (glazing select), 6 mm thick, kind as indicated below.

1. Kind FT (fully tempered) where indicated.

- C. Manufacturers: Provide heat-treated glass by manufacturer of clear float glass listed in paragraph 2.1 above.

2.5 INSULATING GLASS PRODUCTS (TIG, TTIG)

A. Sealed Insulating Glass Units: Preassembled units consisting of organically sealed lites of glass separated by dehydrated air spaces complying with ASTM E 774 and with other requirements indicated.

1. For properties of individual glass lites making up units, refer to requirements specified elsewhere in this Section applicable to types, classes, kinds, and conditions of glass products comprising lites of insulating glass units.
2. Provide float glass or heat-treated float glass of kind indicated or, if not otherwise indicated, Kind FT (fully tempered) where safety glass is designated or required.
3. Performance characteristics designated for insulating glass are nominal values based on manufacturer's published test data for units with lites 6 mm thick and nominal 1/2-inch dehydrated space between lites, unless otherwise indicated.
4. U-values are expressed as Btu/hr x sq. ft. x deg F.

B. Insulating Glass Unit 1: 1-inch thick PPG "Graylite II" Low-E Insulating Glass, with Low-E coating on #3 surface. Manufacturer's standard Low-E units complying with the following requirements:

1. Exterior Pane: Gray tinted float glass (TIG).
 - a. Kind FT (fully tempered) (TTIG).
2. Interior Pane: Clear float glass, typically.
 - a. Kind FT (fully tempered)
3. Nominal Performance Characteristics:
 - a. Visible light transmittance: 12%.
 - b. Visible light reflectance: 5%.
 - c. Winter night-time U-Value: 0.47.
 - d. Summer daytime U-Value: 0.50.
 - e. Shading Coefficient: 0.39.
 - f. Solar Heat Gain Coefficient: 0.34.

C. Insulating Glass Unit 2: 1-inch thick clear Low-E Insulating Glass, with Low-E coating on #3 surface. Manufacturer's standard Low-E units complying with the following requirements:

1. Exterior Pane: clear float glass (CTG).
 - a. Kind FT (fully tempered)
2. Interior Pane: Clear float glass.
 - a. Kind FT (fully tempered)
3. Nominal Performance Characteristics:
 - a. Visible light transmittance: 79%.
 - b. Visible light reflectance: 14%.
 - c. Winter night-time U-Value: 0.47.
 - d. Summer daytime U-Value: 0.49.
 - e. Shading Coefficient: 0.81.
 - f. Solar Heat Gain Coefficient: 0.70.

2.6 ELASTOMERIC GLAZING SEALANTS

A. General: Provide products of type indicated, complying with the following requirements:

1. Compatibility: Select glazing sealants and tapes of proven compatibility with other materials they will contact, including glass products, seals of insulating glass units, and glazing channel substrates, under conditions of installation and service, as demonstrated by testing and field experience.
2. Suitability: Comply with sealant and glass manufacturer's recommendations for selecting glazing sealants that are suitable for applications indicated and conditions existing at time of installation.
3. Colors of Exposed Glazing Sealants: Provide selections made by Architect from manufacturer's full range for products of type indicated.

B. Elastomeric Glazing Sealant Standard: Provide manufacturer's standard chemically curing, elastomeric sealants of base polymer indicated that comply with ASTM C 920 requirements indicated below:

1. Two-Part Polysulfide Glazing Sealant: Type M; Grade NS; Class 25; Uses NT, M, G, A, and, as applicable to uses indicated, O.
2. One-Part Acid-Curing Silicone Glazing Sealant: Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to uses indicated, O.
3. One-Part Non-Acid-Curing Silicone Glazing Sealant: Type S; Grade NS, Class 25; Uses NT, G, A, and, as applicable to uses indicated, O; and complying with the following requirements for modulus and additional joint movement capability.
 - a. Medium Modulus: Tensile strength of not less than 45 nor more than 75 psi at 100 percent elongation when tested per ASTM D 412 after 14 days at 77 deg. F and 50 percent relative humidity.
 - b. Additional capability, when tested per ASTM C 719 for adhesion and cohesion under maximum cyclic movement, to withstand the following percentage increase and decrease of joint width, as measured at time of application, and remain in compliance with other requirements of ASTM C 920: 50 percent.

C. Glazing Sealant for Fire-Resistive Glazing Products: Identical to product used in test assembly to obtain fire-protection rating.

2.7 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tape: Preformed, butyl-based elastomeric tape with a solids content of 100 percent; non-staining and non-migrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; packaged on rolls with a release paper backing; and complying with ASTM C 1281 and AAMA 800 for products indicated below:

1. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
2. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

B. Expanded Cellular Glazing Tape: Closed-cell, PVC foam tape; factory coated with adhesive on both surfaces; packaged on rolls with release liner protecting adhesive; and complying with AAMA 800 for the following types:

1. Type 1, for glazing applications in which tape acts as the primary sealant.
2. Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.8 GLAZING GASKETS

- A. Lock-Strip Gaskets: Neoprene extrusions in size and shape indicated, fabricated into frames with molded corner units and zipper lock strips, complying with ASTM C 542, black.
- B. Dense Compression Gaskets: Molded or extruded gaskets of material indicated below, complying with standards referenced with name of elastomer indicated below, and of profile and hardness required to maintain watertight seal:
1. EPDM, ASTM C 864.
 2. Silicone, ASTM C 1115.
 3. Thermoplastic polyolefin rubber, ASTM C 1115.
 4. Any material indicated above.
- C. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned gaskets of material indicated below; complying with ASTM C 509, Type II, black; and of profile and hardness required to maintain watertight seal:
1. EPDM.
 2. Silicone.
 3. Thermoplastic polyolefin rubber.
 4. Any material indicated above.

2.9 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks: Elastomeric material with a Shore A durometer hardness of 85, plus or minus 5.
- D. Spacers: Elastomeric blocks or continuous extrusions with a Shore A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.
- G. Perimeter Insulation for Fire-Resistive Glazing: Identical to product used in test assembly to obtain fire-resistance rating.

2.10 FABRICATION OF GLASS AND OTHER GLAZING PRODUCTS

- A. Fabricate glass and other glazing products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing standard, to comply with system performance requirements.
- B. Grind smooth and polish exposed glass edges.

1 PART 3 - EXECUTION

2 3.1 EXAMINATION

- 3 A. Examine glass framing, with glazier present, for compliance with the following:
- 4 1. Manufacturing and installation tolerances, including those for size, squareness, offsets at
- 5 corners.
- 6 2. Presence and functioning of weep system.
- 7 3. Minimum required face or edge clearances.
- 8 4. Effective sealing between joints of glass-framing members.
- 9 B. Do not proceed with glazing until unsatisfactory conditions have been corrected.

10 3.2 PREPARATION

- 11 A. Clean glazing channels and other framing members receiving glass immediately before glazing.
- 12 Remove coatings that are not firmly bonded to substrates.

13 3.3 GLAZING, GENERAL

- 14 A. Comply with combined recommendations of manufacturers of glass, sealants, gaskets, and
- 15 other glazing materials, except where more stringent requirements are indicated, including
- 16 those in referenced glazing publications.
- 17 B. Glazing channel dimensions as indicated on Drawings provide necessary bite on glass,
- 18 minimum edge and face clearances, and adequate sealant thicknesses, with reasonable
- 19 tolerances. Adjust as required by Project conditions during installation.
- 20 C. Protect glass from edge damage during handling and installation. Remove damaged glass from
- 21 Project site and legally dispose of off site. Damaged glass is glass with edge damage or other
- 22 imperfections that, when installed, weaken glass and impair performance and appearance.
- 23 D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by
- 24 preconstruction sealant-substrate testing.
- 25 E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing
- 26 standard, unless otherwise required by glass manufacturer. Set blocks in thin course of
- 27 compatible sealant suitable for heel bead.
- 28 F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- 29 G. Provide spacers for glass sizes larger than 50 united inches (length plus height) as follows:
- 30 1. Locate spacers inside, outside, and directly opposite each other. Install correct size and
- 31 spacing to preserve required face clearances, except where gaskets and glazing tapes
- 32 are used that have demonstrated ability to maintain required face clearances and comply
- 33 with system performance requirements.
- 34 2. Provide 3-mm (1/8-inch) minimum bite of spacers on glass and use thickness equal to
- 35 sealant width. With glazing tape, use thickness slightly less than final compressed
- 36 thickness of tape.
- 37 H. Provide edge blocking to comply with requirements of referenced glazing publications, unless
- 38 otherwise required by glass manufacturer.
- 39 I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

K. Square cut wedge-shaped gaskets at corners and install gaskets in manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are slightly below sightline of stops.

B. Install tapes continuously but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Where framing joints are vertical, cover these joints by applying tapes to heads and sills first and then to jambs. Where framing joints are horizontal, cover these joints by applying tapes to jambs and then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until just before each lite is installed.

F. Apply heel bead of elastomeric sealant.

G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)

A. Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with stretch allowance during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

D. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

- 1 B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond
2 of sealant to glass and channel surfaces.
- 3 C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.
- 4 3.7 LOCK-STRIP GASKET GLAZING
- 5 A. Comply with ASTM C 716 and gasket manufacturer's printed recommendations. Provide
6 supplementary wet seal and weep system, unless otherwise indicated.
- 7 3.8 PROTECTION AND CLEANING
- 8 A. Protect exterior glass from damage immediately after installation by attaching crossed
9 streamers to framing held away from glass. Do not apply markers to glass surface. Remove
10 nonpermanent labels, and clean surfaces.
- 11 B. Protect glass from contact with contaminating substances resulting from construction operations
12 including weld splatter. If, despite such protection, contaminating substances do come into
13 contact with glass, remove them immediately as recommended by glass manufacturer.
- 14 C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at
15 frequent intervals during construction, but not less than once a month, for build-up of dirt, scum,
16 alkali deposits, or stains; remove as recommended by glass manufacturer.
- 17 D. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged in any way,
18 including natural causes, accidents and vandalism, during construction period.
- 19 E. Wash glass on both exposed surfaces in each area of Project not more than 4 days before date
20 scheduled for inspections that establish date of Completion. Wash glass as recommended by
21 glass manufacturer.
- 22 END OF SECTION 08 80 00

1 SECTION 08 88 53 - SECURITY GLAZING

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and Division 1 Specification Sections, apply to this Section.

6 B. Section 013513.16, General Detention Work Requirements.

7 1.2 SUMMARY

8 A. This Section includes the following:

- 9 1. Security glazing.
10 2. Glazing accessories.

11 B. Related Sections: The following Sections contain requirements that relate to this Section.

- 12 1. Division 07 Section 079200 "Joint Sealants" for security sealants.
13 2. Division 08 Section 081113 "Hollow Metal Doors and Frames."
14 3. Division 08 Section 083463 "Detention Doors & Frames."
15 4. Division 12 Section 125500 "Detention Furniture" for coordination with speak-port
16 locations.
17 5. Division 13 Section 135000 "Modular Metal Detention Wall Panel System."
18 6. Division 01 Section "Sustainable Design Requirements" for additional LEED
19 requirements.

20 1.3 SCOPE AND RESPONSIBILITIES

21 A. Refer to the Modular Metal Detention Wall Panel System section for the related Scope of
22 Work provided in that Section. Fully coordinate this Scope of Work with the Scope of Work
23 shown in the Modular Metal Detention Wall Panel System sections.

24 B. Refer to Prefabricated Pre-Cast Cell Modules Section for the related Scope of Work provided
25 in that Section. Fully coordinate this Scope of Work with the Scope of Work shown in the
26 Prefabricated Pre-Cast Cell Modules Section.

27 C. Under the requirements of this specification, the DEC shall be responsible for furnishing and
28 installing all glass and glazing accessories, as specified, in all locations, unless indicated
29 otherwise.

30 1.4 PERFORMANCE REQUIREMENTS

31 A. Provide security glazing that complies with the requirements listed below as indicated by the
32 test ratings for specific glazing types.

- 33 1. H.P. White Laboratory, Inc.; HPW TP-0500.00.
34 2. American Society for Testing and Materials; ASTM F-1915-12.
35 3. Underwriter's Laboratories, Inc.; UL 752, UL 972.

36 1.5 SUBMITTALS

- 1 A. General: Submit the following according to Conditions of Contract and Division 1
2 Specification Sections.
- 3 B. Product data for each security glazing type, including type of materials, thickness, installation
4 requirements, method of test, and performance. Submit 2 copies of the most recent literature
5 & cleaning instructions and any other documentation deemed necessary to demonstrate
6 compliance to the specification.
- 7 C. Test reports showing compliance with specified requirements.
- 8 D. Certification by manufacturer that products supplied comply with performance requirements
9 specified.
- 10 E. Maintenance data covering cleaning and protection requirements to include in the Operation
11 and Maintenance Manual specified in Division 1.
- 12 F. Upon **request** of the Architect, submit 2 samples, 12" square, of each type of security glazing
13 product.
- 14 G. Submit a composite detail of the glass and frame assembly. This detail shall show and define
15 all products in the assembly including, but not limited to, the following: Frame, glass stop,
16 glass, setting blocks, glazing tape, and sealant. All products used in the glazing composite
17 must be compatible.
- 18 H. Product Data for Credit MR 4.1 and Credit MR 4.2: For products having recycled content,
19 documentation indicating percentage by weight of postconsumer and preconsumer recycled
20 content. a. Include statements indicating cost for each product having recycled content.

21 1.6 QUALITY ASSURANCE

- 22 A. Comply with ASTM F-1915-12 containment test for forced entry performance. Round robin
23 testing is not acceptable.
- 24 B. Certified Safety Glazing: Category II products complying with test requirements of 16 CFR
25 1201 and ANSI Z97.1, certified by Safety Glazing Certification Council, and permanently
26 labeled.
- 27 C. Manufacturer Qualifications: Firm with minimum 5 years experience in manufacturing security
28 glazing products that are similar to those indicated for this Project and that have a record of
29 successful in-service performance.
- 30 D. Installer Qualifications: Engage an experienced Installer who has a minimum of 5 years
31 experience in installing security glazing similar to that required for this Project.

32 1.7 DELIVERY, STORAGE, AND HANDLING

- 33 A. Protect products according to manufacturer's recommendations. Specifically, avoid damage
34 to glass edges, and prevent damage from temperature changes, sunlight, and moisture.
- 35 1. Furnish polycarbonate materials with a strippable water resistant masking paper on
36 exposed surfaces.

37 1.8 PROJECT CONDITIONS

- A. Environmental Conditions: Do not install glazing when either air or substrate temperature exceeds the range recommended by sealant manufacturer or when substrate is wet, damp, or covered with snow, ice, or frost.

- B. Install bulk sealants only at air and substrate temperatures above 40 deg F (4 deg C).

1.9 WARRANTY – LAMINATED PRODUCTS

- A. Warranty: Submit a written warranty, executed by manufacturer, agreeing to replace laminates that delaminate within 5 years from date of Substantial Completion. If delamination damage occurs and upon inspection is found beyond a reasonable doubt to be caused by security sealant contact with raw glazing edge, the DEC shall be responsible for replacing the glazing at their expense.

- B. Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:

1. Global Security Glazing (Polycarbonate, Laminated Polycarbonate, Glass-Clad Polycarbonate & Laminated Fire Rated Glass, including wire and Ultimax)
2. Sheffield Plastics (Polycarbonate & Laminated Polycarbonate) Ultimax equal products, are pending testing, and therefore must be provided by Global.
3. LTI Smart Glass/Safety First (Glass-Clad Polycarbonate & Laminated Fire Rated Wire Glass) Ultimax equal products, are pending testing, and therefore must be provided by Global.

- B. Acceptable Distributors:

1. Global Security Glazing, Selma, AL (800) 633-2513
2. Allied Protective Glazing LLC., Pittsfield, MA (413) 769-2909
3. Cope Plastics, Hazelwood, MO (877) 528-2594
4. LTI Smart Glass, Pittsfield, MA (413) 637-5001

- C. Available Products: Unless pre-approved prior to bidding, provide the products specified.

1. Products submitted from manufacturers without complete supporting test reports from an independent testing facility, are unacceptable, and will be returned rejected. The DEC shall then be responsible for providing glass and material from a manufacturer with complete, and current, test reports that meet these specifications.

- D. The DEC and glazing manufacturer agree to comply with the requirements as defined in section 3.4 and to provide materials and warranty as required by the contract documents using the materials listed in section 2.5.

2.2 MATERIALS

- A. Float Glass:

1. Clear Heat Strengthened Glass: ASTM C 1048, Condition A (uncoated surfaces), Class 1 (clear), Kind HS (heat strengthened).

2. Tinted Heat-Strengthened Glass: ASTM C 1048, Condition A (uncoated surfaces), Class 2 (tinted, heat-absorbing, and light-reducing), Kind HS (heat strengthened), tint color as specified with security glazing type.
3. Clear Tempered Glass: ASTM C 1048, Condition A (uncoated surfaces), Class 1 (clear), Kind FT (fully tempered).
4. Chemically Tempered Glass: ASTM C 1036, Class 1 (clear) chemically tempered; edges seamed prior to tempering
5. ASTM C 1048, Condition A (uncoated surfaces), Class 1 (clear), Kind HS (heat strengthened).

B. Polycarbonate Sheet: Rigid, flat polycarbonate sheet; thickness as indicated.

1. Relative Burning Characteristics: Average extent of burning less than 1 inch, when tested per ASTM D 635, using the thickness of material indicated for Project.

C. NOTE: Where detention glass and products are scheduled in commercial grade frames, all testing, containment, and attack ratings are diminished, or may be void entirely by the glass manufacturer. Proceed at your own risk.

2.3 GLASS CLAD POLYCARBONATE LAMINATES

A. Type SG1 – Interior

1. 1" clear glass clad polycarbonate laminate, to Global Security Glazing Secur-Tem + Poly SP028, or approved equal. H.P. White (TP-0500-03) Level B ballistics, WMFL Level II – 60 minute physical attack, ASTM 1915-12 Grade 1 - 60 minute containment rated; of the following make up:

1/8" Clear heat strengthened glass
.050" Urethane
1/4" Polycarbonate
.025" Urethane
3/8" Polycarbonate
.050" Urethane
1/8" Clear heat strengthened glass

B. Type SG1A – Exterior, Graylite, Insulated, Obscured view

1. 1-1/2" Graylite 14, air gap unit with Obscure view glass, laminated to Global Security Glazing Secur-Tem + Poly SP028, or approved equal. H.P. White (TP-0500-03) Level B ballistics, WMFL Level II – 60 minute physical attack, ASTM 1915-12 Grade 1 - 60 minute containment rated, of the following make up:

1/4" Graylite 14 (temp or HS)
.030" arctic snow PVB
.030" clear PVB
1/8" Clear Heat Strengthened
1/4" Airspace
1/4" Polycarbonate
.025" Urethane
3/8" Polycarbonate
.050" Urethane
1/8" Clear heat strengthened glass

C. Type SG1F45 – Interior, Fire Rated 20-45 minutes

1. 1" UL fire rated glazing for 3/4 hour in 1 hour rated masonry and door openings, equal to Global Security Glazing Inferno-Lite FRP-4540. ASTM-1915-12 level 1, 40 minute containment. Glazing shall be installed with UL classified Rectorseal Blaze Seal. 1296 sq. in. max., with no more than 42" clear in any single dimension.

D. Type SG2 – Interior

1. 3/4" clear glass clad polycarbonate laminate, equal to Global Security Glazing Secur-Tem + Poly SP019, or approved equal. H.P. White TP-0500.02 Level IV forced entry, WMFL Level III, ASTM F1915-12 Grade 2 – 40 minute containment, ASTM F 1233 9mm ballistic rating.

1/8" Clear heat strengthened glass
.050" Urethane
1/4" Polycarbonate
.025" Urethane
1/8" Polycarbonate
.050" Urethane
1/8" Clear heat strengthened glass

E. Type SG2A – Exterior, Graylite, Insulated, Obscured view (REC YARD)

1. 1-7/16" Obscure view, air gap unit laminated to Global Security Glazing equal to Global Security Glazing Secur-Tem + Poly SP019, or approved equal. H.P. White TP-0500.02 Level IV forced entry, WMFL Level III, ASTM F1915-12 Grade 2 – 40 minute containment, ASTM F 1233 9mm ballistic rating, of the following make up:

1/4" Graylite 14 (temp or HS)
.030" arctic snow PVB
.030" clear PVB
1/8" Clear Heat Strengthened
1/4" Air Space
3/4" SP019

F. Type SG2AF45 – Exterior, Graylite, Insulated, Obscured view, Fire Rated 20-45 minutes (REC YARD)

1. 2-1/4" Clear HS glass, with Obscure view air-gap unit, laminated to Global Security Glazing Ultimax 45 - Grade 2, or approved equal. H.P. White TP-0500.02 Level IV forced entry, WMFL Level III, ASTM F1915-12 Grade 2 – 40 minute containment, ASTM F 1233 9mm ballistic rating, per the following make up:

1/4" Graylite 14 (temp or HS)
.030" arctic snow PVB
.030" clear PVB
1/8" Clear Heat Strengthened
1/4" Air Space
Ultimax 45 grade II (1-9/16")

G. Type SG3 – Interior

1. 11/16" (Nominal) clear glass clad polycarbonate equal to Global Security Glazing Secur-Tem + Poly 2116 or approved equal. H.P. White TP-0500.02 Level II forced entry, ASTM F1915-12 Grade 3 – 20 minute containment, H.P. White TP-0500.02 Level B ballistic rating (Spall; no penetration); of the following makeup:

- 1 1/8" Clear heat strengthened glass
- 2 .050" Urethane
- 3 3/8" Polycarbonate
- 4 .050" Urethane
- 5 1/8" Clear heat strengthened glass

6 H. Type SG3F45 – Interior, Fire Rated 20-45 minutes

- 7 1. 13/16" UL fire rated glazing for 3/4 hour in 1 hour rated masonry and door openings,
- 8 equal to Global Security Glazing Inferno-Lite FRP-4510. ASTM 1915-12 level 3, 10
- 9 minute containment. Glazing shall be installed with UL classified Rectorseal Blaze Seal.
- 10 1296 sq. in. max., with no more than 42" clear in any single dimension.

11 I. Type SG4 - For Narrow Vision Lites in doors only

- 12 1. 1/4" MARGARD® shall be 1-ply, clear, extruded monolithic polycarbonate of 1/4"
- 13 LEXAN® monolithic sheet with a MARGARD® surface.

14 J. Type SG5F180 – For Narrow Vision Lites in Fire Rated doors only

- 15 1. 5/16" (8mm) thick laminated fire-rated and impact safety-rated glazing material. Listed
- 16 for use in doors, sidelites, transoms and borrowed lites with fire rating requirements
- 17 ranging from 20 minutes to 3 hours as provided by FireLite Plus®. Install with UL
- 18 classified Rectorseal Blaze Seal.

19 2.4 FABRICATION

- 20 A. Fabricate glazing with bite and edge clearance dimensions, including tolerances, as
- 21 recommended by manufacturer and GANA "Glazing Manual." Exception: Where specific bite
- 22 dimensions are indicated on drawings, as required for proper securement of glazing in
- 23 frames, comply with those dimensions.

- 24 B. Cut or drill holes in laminated units as required or indicated.

- 25 C. Grind exposed edges smooth, using methods recommended by manufacturer.

- 26 D. Coordinate speak-port locations as indicated on architectural drawings, with glass
- 27 manufacturer.

28 2.5 GLAZING ACCESSORIES

- 29 A. Installation Materials-General: Select products that have appropriate performance
- 30 characteristics as recommended by glazing manufacturer and that are compatible with
- 31 materials they will contact.

- 32 1. Provide a letter from the glass manufacturer that states all glazing materials submitted
- 33 are compatible with the glass submitted.

34 B. Glazing Tape:

- 35 1. Pre-shimmed, 100 percent solids, polyisobutylene-butyl rubber with internal spacer rod.
- 36 2. At fire rated openings, provide only Kerafix Flexlit at all Ultimax products, and Rectorseal
- 37 Blaze Seal at FRP Inferno-Lite and Fire Lite Plus.

38 C. Glazing Sealant:

1. Provide at exterior side of exterior security glazing only: One part silicone rubber meeting Federal Specification TT-S-00230C, Class A, ASTM C-920 Type S, Grade NS, Class 25; Equal to Dow Corning 795.

D. Security Sealant:

1. Provide at all interior security glazing only: Dynaflex SC. One part non-sag tamper resistant elastomeric STPU meeting Federal Specifications TT-S-00230C, Type II, Class B and ASTM C-920-98, Type S, Grade NS, Class 12.5 as manufactured by Picora. When applying directly to a polycarbonate surface, application area must be primed with Picora P-120 primer prior to use as required per published manufacturer recommendations.

E. Setting Blocks:

1. TPR (Thermoplastic rubber) with 70-90 shore "A" durometer hardness, chemically compatible with glazing components.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine frames and rabbets in which glazing is to be installed for possible damaging conditions. In particular, check for conditions that would void the manufacturer's warranty.

1. Verify that minimum edge engagement of framing is 1 inch (25 mm).

- B. Submit Installer's report describing unacceptable conditions.

- C. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean surfaces to receive glazing just before installing glazing.

3.3 INSTALLATION – GENERAL

- A. Comply with recommendations for installation contained in the GANA "Glazing Manual" and "Sealant Manual" except when specifically not recommended or prohibited by the glazing or glazing accessory manufacturer; comply with manufacturers' recommendations.

- B. Protect glazing from edge and surface damage during handling and installation.

- C. Do not install glazing that has edge or surface damage or defects that reduce glazing strength or diminish appearance.

- D. Permanently adhere setting and edge blocks to frame.

- E. Do not block weep holes.

- F. Applied Stops: Fasten as indicated, after glazing has been set in frame. Do not exert excess force on glazing and glazing spacers.

- G. Remove protective masking paper on polycarbonate materials only as required to set glazing.

3.4 TAPE GLAZING

- 1 A. Install tape continuously, placed so that when compressed the exposed face will be 1/8 inch
2 (3 mm nominal) below face of framing.
- 3 B. Do not use joints in tape, except at corners; seal joints with compatible sealant
- 4 C. After installation of stops, install security sealant over exposed tape on both sides of all
5 security glass/polycarbonate provided per this specification section and per 2.5.D.1 above.
- 6 1. Security sealant shall be installed as a cap bead only and is never to come in contact
7 with the raw cut edge of the glazing material. Setting blocks shall be installed in a heel
8 bead of glazing sealant equal to Dow Corning 795 per 3.3.D above. If security sealant is
9 found on raw glazing edge during inspection, the DEC shall be responsible for replacing
10 the glass at their expense.
- 11 D. Apply fillet bead of Dow Corning 795 glazing sealant over exposed tape on exterior side of
12 exterior glazing.

13 3.5 PROTECTION AND CLEANING

- 14 A. Apply warning tape or bands across opening without touching glazing, immediately after
15 installing glazing in frames.
- 16 B. Do not apply tape or labels to glazing; remove temporary labels.
- 17 C. Protect glazing during subsequent construction operations; remove dirt, contaminants,
18 staining agents and other deposits promptly using manufacturer's recommended procedures.
- 19 D. Replace glazing that is damaged.
- 20 E. Provide final protection and maintain conditions in a manner acceptable to manufacturer and
21 Installer that ensures that security glazing is without damage or deterioration at the time of
22 Substantial Completion.
- 23 F. Remove protective masking paper from polycarbonate glazing just prior to cleaning.
- 24 G. Wash both sides of glazing not more than 10 days before inspections for Substantial
25 Completion.

26 3.6 OWNER PERSONNEL INSTRUCTION

- 27 A. Have manufacturers' maintenance instructions on hand at time of instruction.
- 28 B. Instruct designated Owner personnel on maintaining security glazing.

29 END OF SECTION

1 SECTION 08 91 19 - FIXED LOUVERS

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY

- 7 A. Section Includes: Fixed, extruded-aluminum louvers.

8 1.3 DEFINITIONS

- 9 A. Louver Terminology: Definitions of terms for metal louvers contained in AMCA 501 apply to this
10 Section unless otherwise defined in this Section or in referenced standards.

- 11 B. Horizontal Louver: Louver with horizontal blades (i.e., the axes of the blades are horizontal).

- 12 C. Vertical Louver: Louver with vertical blades (i.e., the axes of the blades are vertical).

- 13 D. Drainable-Blade Louver: Louver with blades having gutters that collect water and drain it to
14 channels in jambs and mullions, which carry it to bottom of unit and away from opening.

- 15 E. Wind-Driven-Rain-Resistant Louver: Louver that provides specified wind-driven rain
16 performance, as determined by testing according to AMCA 500-L.

17 1.4 ACTION SUBMITTALS

- 18 A. Product Data: For each type of product.

- 19 1. For louvers specified to bear AMCA seal, include printed catalog pages showing
20 specified models with appropriate AMCA Certified Ratings Seals.

- 21 B. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and
22 attachments to other work. Show frame profiles and blade profiles, angles, and spacing.

- 23 1. Show weep paths, gaskets, flashing, sealant, and other means of preventing water
24 intrusion.

- 25 2. Show mullion profiles and locations.

- 26 C. Samples: For each type of metal finish required.

27 1.5 QUALITY ASSURANCE

- 28 A. Welding Qualifications: Qualify procedures and personnel according to the following:

- 29 1. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."

- 30 2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

31 1.6 FIELD CONDITIONS

- 32 A. Field Measurements: Verify actual dimensions of openings by field measurements before
33 fabrication.

1 PART 2 - PRODUCTS

2 2.1 MANUFACTURERS

- 3 A. Source Limitations: Obtain louvers from single source from a single manufacturer where
4 indicated to be of same type, design, or factory-applied color finish.

5 2.2 PERFORMANCE REQUIREMENTS

- 6 A. Structural Performance: Louvers shall withstand the effects of gravity loads and the following
7 loads and stresses within limits and under conditions indicated without permanent deformation
8 of louver components, noise or metal fatigue caused by louver-blade rattle or flutter, or
9 permanent damage to fasteners and anchors. Wind pressures shall be considered to act normal
10 to the face of the building.

- 11 1. Wind Loads: Determine loads based on pressures as indicated on Drawings.

- 12 B. Thermal Movements: Allow for thermal movements from ambient and surface temperature
13 changes.

- 14 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

- 15 C. SMACNA Standard: Comply with recommendations in SMACNA's "Architectural Sheet Metal
16 Manual" for fabrication, construction details, and installation procedures.

17 2.3 FIXED, EXTRUDED-ALUMINUM LOUVERS

- 18 A. Horizontal, Drainable-Blade Louver:

- 19 1. Basis-of-Design Product: Subject to compliance with requirements, provide Construction
20 Specialties, Inc.; Model A2097 or a comparable product by one of the following:

- 21 a. Greenheck Fan Corporation.
22 b. Nystrom, Inc.
23 c. Ruskin Company.

- 24 2. Louver Depth: 2 inches (50.8mm).

- 25 3. Frame and Blade Nominal Thickness: Not less than 0.060 inch (1.52 mm) for blades and
26 frames.

- 27 4. Mullion Type: Exposed.

- 28 5. Louver Performance Ratings:

- 29 a. Free Area: Not less than 55% for 48-inch-wide by 48-inch- high louver.

- 30 b. Point of Beginning Water Penetration: Not less than 600 fpm.

- 31 c. Air Performance: Not more than 0.10-inch wg static pressure drop at 700-fpm free-
32 area exhaust velocity.

- 33 6. AMCA Seal: Mark units with AMCA Certified Ratings Seal.

34 2.4 LOUVER SCREENS

- 35 A. General: Provide screen at each exterior louver.

- 36 1. Screen Location for Fixed Louvers: Interior face.

- 37 2. Screening Type: Bird screening.

- 38 B. Secure screen frames to louver frames with stainless-steel machine screws, spaced a
39 maximum of 6 inches from each corner and at 12 inches o.c.

- C. Louver Screen Frames: Fabricate with mitered corners to louver sizes indicated.
1. Metal: Same type and form of metal as indicated for louver to which screens are attached. Reinforce extruded-aluminum screen frames at corners with clips.
 2. Finish: Same finish as louver frames to which louver screens are attached.

D. Louver Screening for Aluminum Louvers:

1. Bird Screening: Flattened, expanded aluminum, 3/4 by 0.050 inch thick.

2.5 BLANK-OFF PANELS

A. Uninsulated, Blank-Off Panels: Metal sheet attached to back of louver.

1. Aluminum sheet for aluminum louvers, not less than 0.050-inch nominal thickness.
2. Panel Finish: Same finish applied to louvers.
3. Attach blank-off panels with sheet metal screws.

2.6 MATERIALS

A. Aluminum Extrusions: ASTM B 221, Alloy 6063-T5, T-52, or T6.

B. Aluminum Sheet: ASTM B 209, Alloy 3003 or 5005 with temper as required for forming, or as otherwise recommended by metal producer for required finish.

C. Fasteners: Use types and sizes to suit unit installation conditions.

1. Use tamper-resistant screws for exposed fasteners unless otherwise indicated.
2. For fastening aluminum, use aluminum or 300 series stainless-steel fasteners.
3. For color-finished louvers, use fasteners with heads that match color of louvers.

D. Post-installed Fasteners for Concrete and Masonry: Torque-controlled expansion anchors, made from stainless-steel components, with capability to sustain, without failure, a load equal to 4 times the loads imposed, for concrete, or 6 times the load imposed for masonry, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.7 FABRICATION

A. Factory assemble louvers to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

B. Vertical Assemblies: Where height of louver units exceeds fabrication and handling limitations, fabricate units to permit field-bolted assembly with close-fitting joints in jambs and mullions, reinforced with splice plates.

C. Maintain equal louver blade spacing to produce uniform appearance.

D. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.

1. Frame Type: Channel unless otherwise indicated.

E. Include supports, anchorages, and accessories required for complete assembly.

- 1 F. Provide sub sills made of same material as louvers for recessed louvers.
- 2 G. Join frame members to each other and to fixed louver blades with fillet welds concealed from
- 3 view unless otherwise indicated or size of louver assembly makes bolted connections between
- 4 frame members necessary.

5 2.8 ALUMINUM FINISHES

- 6 A. Finish louvers after assembly.
- 7 B. High-Performance Organic Finish: Two-coat fluoropolymer finish complying with AAMA 2604
- 8 and containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat,
- 9 and apply coating to exposed metal surfaces to comply with coating and resin manufacturers'
- 10 written instructions.
- 11 1. Color and Gloss: As selected by Architect from manufacturer's full range.

12 PART 3 - EXECUTION

13 3.1 EXAMINATION

- 14 A. Examine substrates and openings, with Installer present, for compliance with requirements for
- 15 installation tolerances and other conditions affecting performance of the Work.
- 16 B. Proceed with installation only after unsatisfactory conditions have been corrected.

17 3.2 PREPARATION

- 18 A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of
- 19 anchorages that are to be embedded in concrete or masonry construction. Coordinate delivery
- 20 of such items to Project site.

21 3.3 INSTALLATION

- 22 A. Locate and place louvers level, plumb, and at indicated alignment with adjacent work.
- 23 B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws
- 24 where required to protect metal surfaces and to make a weathertight connection.
- 25 C. Form closely fitted joints with exposed connections accurately located and secured.
- 26 D. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as
- 27 indicated.
- 28 E. Protect unpainted galvanized and nonferrous-metal surfaces that are in contact with concrete,
- 29 masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of
- 30 bituminous paint or by separating surfaces with waterproof gaskets or nonmetallic flashing.
- 31 F. Install concealed gaskets, flashings, joint fillers, and insulation as louver installation progresses,
- 32 where weathertight louver joints are required. Comply with Section 079200 "Joint Sealants" for
- 33 sealants applied during louver installation.

1 3.4 ADJUSTING AND CLEANING

2 A. Clean exposed louver surfaces that are not protected by temporary covering, to remove
3 fingerprints and soil during construction period. Do not let soil accumulate during construction
4 period.

5 B. Before final inspection, clean exposed surfaces with water and a mild soap or detergent not
6 harmful to finishes. Thoroughly rinse surfaces and dry.

7 C. Restore louvers damaged during installation and construction so no evidence remains of
8 corrective work. If results of restoration are unsuccessful, as determined by Architect, remove
9 damaged units and replace with new units.

10 1. Touch up minor abrasions in finishes with air-dried coating that matches color and gloss
11 of, and is compatible with, factory-applied finish coating.

12 END OF SECTION 08 91 19

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SECTION 09 91 00 - PHOTOLUMINESCENT EGRESS PATH MARKINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Luminous (Photoluminescent) egress path markings:

- a. Stair markers.
- b. Handrail, obstacle, perimeter demarcation, and directional markers
- c. Door handle, push bar, and door frame markers.

B. Related Sections:

1. Division 01: Administrative, procedural, and temporary work requirements.
2. Section 05 5113 – Photoluminescent Metal Pan Stair for photoluminescent stair nosings.

1.2 REFERENCES

- A. National Fire Protection Association (NFPA) (www.nfpa.org) 101 - Life Safety Code.
- B. Underwriters Laboratories, Inc. (UL) (www.ul.com) 1994 - Standard for Luminous Egress Path Marking Systems, 410 – Standard for Slip Resistance for Floor Surface Materials.
- C. American Society for Testing & Materials (ASTM) (www.astm.org) E2072 – Standard Specification for Photoluminescent (Phosphorescent) Safety Systems and E2073 – Standard
- D. Test Method for Photopic Luminance of Photoluminescent (Phosphorescent) Markings.

1.3 QUALITY ASSURANCE

- A. Provide stair directional and egress markings in accordance with California Building Code (section 1024), NFPA 101, and Fire Code.

1.4 SUBMITTALS

A. Submittals for Review:

1. Shop Drawings: Indicate sign locations, content, mounting heights, and attachments.
2. Product Data: Include product description, materials, finishes, and performance characteristics.
3. Samples:
 - a. Stair markers.
 - b. Minimum 12 inches long.
 - c. Handrail obstacle perimeter demarcation directional and markers: Minimum 12 inches long.
 - d. Door handle push bar and door frame markers: 4 x 4 inches.

1.5 DELIVERY, STORAGE AND HANDLING

- 1 A. Store materials, stair markings, signs and markings in cool, dry location until applied or installed.

2 1.6 WARRANTIES
3

- 4 A. Provide manufacturer's limited warranty
5 1. Stair markings, signs and other markings installed in interior locations: 25 years.

6 PART 2 - PRODUCTS

7 2.1 MANUFACTURERS

- 8 A. Contract Documents are based on products by EverGlow NA, Inc. (www.everglow.us)
9 B. Substitutions: Under provisions of Division 01

10 2.2 MATERIALS
11

- 12 A. Photoluminescent (Luminous) Stair and Egress Path Markings:
13 1. Photoluminescent material absorbs and stores energy from ambient light – interior lighting and
14 sunlight, does not require any external power supply.
15 2. Non-toxic, non-radioactive.
16 3. Free from vinyl and polyvinyl chloride compounds.
17 4. Manufactured using low-VOC inks and coatings. High solid coatings.
18 5. High-visibility illumination.
19 6. Tested and listed to UL 1994.
20 7. UL approved for use in interior locations with fluorescent lighting.
21 8. Stair markings that can be used on stairwells are listed to UL1994 and UL410, or,
22 9. Tested to meet ASTM E2072 or E2073 luminance requirements.
23
24 B. Adhesives:
25 1. Adhesive: use additional construction adhesive as necessary.
26
27 C. Refer to Schedule at end of Section for specific components.

28 PART 3 - EXECUTION

29 3.1 PREPARATION
30

- 31 A. Clean installation surfaces of dirt, oil, grease, and loose matter that could impair adhesion.
32

33 3.2 INSTALLATION
34

- 35 A. Install markings in accordance with manufacturer's instructions and approved Shop Drawings.
36
37 B. Locate markings in accordance with NFPA 101. Building Code. Fire Code.
38 C. Install markings level, straight, and true to line.

3.3 SCHEDULE

LOCATION	MARKING TYPE	MODEL NO.	REMARKS
Landings and Door Frames	Marking Strip (Demarcation Lines)	15.US7655 (1" wide) 15.US7695 (2" wide)	Perimeter of landings, door frames, push bars on doors and as required by CBC 1204
Landings, Guidance Door Frames, and Push Bars on Doors	Tape (Demarcation Lines)	59.US7401 49.US7401	Perimeter of landings, door frames, push bars on doors and as required by CBC 1204
Handrails	Guidance Tape	59.US7401 49.US7401	Top of handrails, entire length and returns
Obstacles	Obstacle Tape	59.US7416 49.US7416	Obstacles protruding into the egress path
Door Hardware	4x4 inch Marker	15.US3010	Door handles on intermediate and final exit doors; use 59.US7401 on push bars
Directional Changes within Exits	Directional Marker	15.US3005 15.US3008 Various	Exit to the left Exit to the right All directions available
Doors from Exit Enclosures	Exit Sign ISO (International Egress)	15.0029 15.0031 6x6 inches or larger	EXIT right EXIT left On final exit door(s) only
Doors from Exit Enclosures	Exit Sign ISO Egress Symbol and EXIT	15.US3163 15.US3162 9.5x4.5 inches or larger	EXIT right EXIT left On final exit door(s) only
Walls, near the Door on each Floor Landing	Floor Identification Sign	Various, 18x12 inches or larger (Custom)	As required inside exit, each floor, each exit and as required by CBC 1204
Information Signs As Required	No Roof Access No Re-entry Re-entry on XX	Various (Custom)	As required inside exit, each floor, each exit
Fire Safety, Communications Equipment	Fire Extinguisher Fire Hose	15.US0900 15.US1120	As required inside exit

NOTE: 59.US7401 and 59.US7416 are EverGlow Tamper Resistant Tapes (1 in x 100 ft)
49.US7401 and 49.US7416 are EverGlow Premium Tapes (1 in x 100 ft)

- 1
- 2 END OF SECTION 09 10 00

1 SECTION 09 21 16.23 - GYPSUM BOARD SHAFT WALL ASSEMBLIES

2 PART 1 - GENERAL

3 1.1 GENERAL REQUIREMENTS

- 4 A. Drawings and Conditions of Contract, including General and Supplementary Conditions and
5 Division 1 Administration Sections, apply to this Division.

6 1.2 SUMMARY

- 7 A. This Section includes gypsum board shaft-wall assemblies for the following:

- 8 1. Shaft walls.
9 2. Chase enclosures with acoustic treatment.
10 3. Sound wall assembly.

- 11 B. Related Sections include the following:

- 12 1. Division 07 84 6 Section "Fire-Resistive Joint Systems" for head-of-wall assemblies that
13 incorporate gypsum board shaft-wall assemblies.
14 2. Section 09 29 00 for fire-rated standard gypsum board.

15 1.3 SUBMITTALS

- 16 A. Product Data: For each gypsum board shaft-wall assembly indicated.

17 1.4 QUALITY ASSURANCE

- 18 A. Fire-Resistance Ratings: Provide materials and construction identical to those of assemblies
19 with fire-resistance ratings determined according to ASTM E 119, 2007 edition by a testing and
20 inspecting agency.

- 21 B. STC-Rated Assemblies: Provide materials and construction identical to those of assemblies
22 tested according to ASTM E 90, 2004 edition and classified according to ASTM E 413 by a
23 testing and inspecting agency.

- 24 C. Preinstallation Conference: Conduct conference at Project site to comply with requirements in
25 Division 01 Section "Project Management and Coordination." Review methods and procedures
26 for installing gypsum board shaft-wall assemblies including, but not limited to, the following:

- 27 1. Fasteners proposed for anchoring nonstructural steel framing to building structure.
28 2. Wiring devices in shaft-wall assemblies.
29 3. Doors and other items penetrating shaft-wall assemblies.
30 4. Mechanical work enclosed within shaft-wall assemblies.

31 1.5 DELIVERY, STORAGE, AND HANDLING

- 32 A. Deliver materials in original packages, containers, and bundles bearing brand name and
33 identification of manufacturer or supplier.

- 34 B. Store materials inside under cover and keep them dry and protected against damage from
35 weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes.

- 36 C. Stack panels flat on leveled supports off floor or slab to prevent sagging.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840, 2007 edition requirements or with gypsum board manufacturer's written recommendations, whichever are more stringent.
- B. Do not install panels that are wet, moisture damaged, or mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Gypsum Shaft-wall Assemblies
 - a. American Gypsum Company.
 - b. BPB America Inc.
 - c. G-P Gypsum.
 - d. Lafarge North America Inc.
 - e. National Gypsum Company.
 - f. PABCO Gypsum.
 - g. Temple-Inland Forest Products Corporation.
 - h. USG Corporation.

2.2 GYPSUM BOARD SHAFT-WALL ASSEMBLIES, GENERAL

- A. Provide materials and components complying with requirements of fire-resistance-rated assemblies indicated.
 - 1. Provide panels in maximum lengths available to eliminate or minimize end-to-end butt joints.
 - 2. Provide auxiliary materials complying with gypsum board shaft-wall assembly manufacturer's written recommendations.

2.3 PANEL PRODUCTS

- A. Gypsum Liner Panels: Comply with ASTM C 442/C 442M.
 - 1. Comply with requirements in Section 09 29 00 Gypsum Board.
 - 2. Moisture- and Mold-Resistant Type X: Manufacturer's proprietary liner panels with moisture- and mold-resistant core and surfaces; comply with ASTM D 3273.
 - a. Core: 1 inch thick.
 - b. Long Edges: Double bevel.

2.4 NON-LOAD-BEARING STEEL FRAMING

- A. Framing Members: Comply with ASTM C 754 for conditions indicated.
- B. Steel Sheet Components: Comply with ASTM C 645 requirements for metal, unless otherwise indicated.
 - 1. Protective Coating: ASTM A 653/A 653M, G60, hot-dip galvanized, unless otherwise indicated.

2.5 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced product standards and manufacturer's written recommendations.
- B. Trim Accessories: Cornerbead, edge trim, and control joints of material and shapes specified in Division 09 Section "Gypsum Board" that comply with gypsum board shaft-wall assembly manufacturer's written recommendations for application indicated.
- C. Gypsum Board Joint-Treatment Materials: As specified in Division 09 Section "Gypsum Board."
- D. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
- E. Track Fasteners: Power-driven fasteners of size and material required to withstand loading conditions imposed on shaft-wall assemblies without exceeding allowable design stress of track, fasteners, or structural substrates in which anchors are embedded.
 - 1. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified testing agency.
 - 2. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.
- F. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing), produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
 - 1. Color: Provide white color sound attenuation blankets.
- G. Acoustical Sealant: As specified in Division 07 Section "Joint Sealants."

2.6 GYPSUM BOARD SHAFT-WALL ASSEMBLIES

- A. Fire or Smoke-Resistance Rating: As indicated.
- B. STC Rating: 51, minimum.
- C. Studs: Manufacturer's standard profile for repetitive members, corner and end members, and fire-resistance-rated assembly indicated.
 - 1. Depth: 4 inches.
 - 2. Minimum Base-Metal Thickness: 0.0329 inch.
- D. Runner Tracks: Manufacturer's standard J-profile track with long-leg length as standard with manufacturer, but at least 2 inches long and in depth matching studs.
 - 1. Minimum Base-Metal Thickness: Matching steel studs.
- E. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Dietrich Metal Framing; The System by Metal-Lite, Inc.
 - b. Fire Trak Corp.; Fire Trak.

- F. Jamb Struts: Manufacturer's standard J-profile strut with long-leg length of 3 inches, in depth matching studs, and not less than 0.0329 inch thick.
- G. Room-Side Finish: Corrugated Perforated Metal Panel.
- H. Shaft-Side Finish: Taped and sealed to provide smoke rated assembly.
- I. Insulation: Sound attenuation blankets.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates to which gypsum board shaft-wall assemblies attach or abut, with Installer present, including hollow-metal frames, elevator hoistway door frames, cast-in anchors, and structural framing. Examine for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install gypsum board shaft-wall assemblies to comply with requirements of fire-resistance-rated assemblies indicated, manufacturer's written installation instructions, and the following:
 - 1. ASTM C 754 for installing steel framing except comply with framing spacing indicated.
 - 2. Division 09 Section "Gypsum Board" for applying and finishing panels.
- B. Do not bridge architectural or building expansion joints with shaft-wall assemblies; frame both sides of expansion joints with furring and other support.
- C. Install supplementary framing in gypsum board shaft-wall assemblies around openings and as required for blocking, bracing, and support of gravity and pullout loads of fixtures, equipment, services, heavy trim, furnishings, and similar items that cannot be supported directly by shaft-wall assembly framing.
 - 1. For attachment of Corrugated Metal Panels to shaft-wall assemblies, provide galvanized steel reinforcing strip with 0.0312-inch minimum thickness of base (uncoated) metal, accurately positioned and secured behind Corrugated Metal Panels. Attach reinforcing strips directly to shaft-wall studs at 16 inches on center vertically.
- D. At penetrations in shaft wall, maintain fire and/or smoke-resistance rating of shaft-wall assembly by installing supplementary steel framing around perimeter of penetration and fire protection behind boxes containing wiring devices, elevator call buttons, elevator floor indicators, and similar items.
- E. Isolate perimeter of gypsum panels from building structure to prevent cracking of panels, while maintaining continuity of fire-rated construction.
- F. Firestop Tracks: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.

- 1 G. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved
2 by Architect, while maintaining fire-resistance rating of gypsum board shaft-wall assemblies.
- 3 H. Seal gypsum board shaft walls with acoustical sealant at perimeter of each assembly where it
4 abuts other work and at joints and penetrations within each assembly. Install acoustical sealant
5 to withstand dislocation by air-pressure differential between shaft and external spaces; maintain
6 an airtight and smoke-tight seal; and comply with ASTM C 919 requirements or with
7 manufacturer's written instructions, whichever are more stringent.
- 8 I. Installation Tolerance: Install each framing member so fastening surfaces vary not more than
9 1/8 inch from the plane formed by faces of adjacent framing.

10 3.3 PROTECTION

- 11 A. Protect installed products from damage from weather, condensation, direct sunlight,
12 construction, and other causes during remainder of the construction period.
- 13 B. Remove and replace panels that are wet, moisture damaged, or mold damaged.
- 14 1. Indications that panels are wet or moisture damaged include, but are not limited to,
15 discoloration, sagging, and irregular shape.
- 16 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or
17 splotchy surface contamination and discoloration.

18 END OF SECTION 09 21 16.23
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1 SECTION 09 22 16 - NON-STRUCTURAL METAL FRAMING

2 PART 1 - GENERAL

3 1.1 GENERAL REQUIREMENTS

- 4 A. Drawings and Conditions of Contract, including General and Supplementary Conditions and
5 Division 1 Administration Sections, apply to this Division.

6 1.2 SUMMARY

- 7 A. Section Includes:

- 8 1. Non-load-bearing steel framing systems for interior gypsum board assemblies.
9 2. Suspension systems for interior gypsum ceilings, soffits, and grid systems.

10 1.3 ACTION SUBMITTALS

- 11 A. Product Data: For each type of product.

12 PART 2 - PRODUCTS

13 2.1 PERFORMANCE REQUIREMENTS

- 14 A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-
15 load-bearing steel framing, provide materials and construction identical to those tested in
16 assembly indicated, according to ASTM E 119, 2007 edition by an independent testing agency.
- 17 B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction
18 identical to those tested in assembly indicated, according to ASTM E 90, 2004 edition and
19 classified according to ASTM E 413 by an independent testing agency.

20 2.2 FRAMING SYSTEMS

- 21 A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.

- 22 1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless
23 otherwise indicated.
24 2. Protective Coating: Hot-dip galvanized unless otherwise indicated.

- 25 B. Studs and Runners: ASTM C 645. Use either steel studs and runners or dimpled steel studs
26 and runners.

- 27 1. Steel Studs and Runners:

- 28 a. Minimum Base-Metal Thickness: As indicated on Drawings. If not indicated, use
29 0.033 inch.
30 b. Depth: As indicated on Drawings. Where not indicated, use 3-5/8 inches.

- 31 2. Dimpled Steel Studs and Runners:

- 32 a. Minimum Base-Metal Thickness: As indicated on Drawings. If not indicated, use
33 0.025 inch.
34 b. Depth: As indicated on Drawings. Where not indicated, use 3-5/8 inches.

- 35 C. Slip-Type Head Joints: Where indicated, provide one of the following:

- 36 1. Single Long-Leg Runner System: ASTM C 645 top runner with 2-inch-deep flanges in
37 thickness not less than indicated for studs, installed with studs friction fit into top runner
38 and with continuous bridging located within 12 inches of the top of studs to provide lateral
39 bracing.

2. Double-Runner System: ASTM C 645 top runners, inside runner with 2-inch-deep flanges in thickness not less than indicated for studs and fastened to studs, and outer runner sized to friction fit inside runner.
3. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
 - a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) Dietrich Metal Framing; SLP-TRK Slotted Deflection Track.
 - 2) MBA Building Supplies; Slotted Deflecto Track.
 - 3) Steel Network Inc. (The); VertiTrack VTD Series.
 - 4) Superior Metal Trim; Superior Flex Track System (SFT).
 - 5) Telling Industries; Vertical Slip Track II.
- D. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Fire Trak Corp.; Fire Trak System attached to studs with Fire Trak Posi Klip.
 - b. Grace Construction Products; FlameSafe FlowTrak System.
 - c. Metal-Lite, Inc.; The System.
- E. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
 1. Minimum Base-Metal Thickness: 0.027 inch.
- F. Cold-Rolled Channel Bridging: Steel, 0.053-inch minimum base-metal thickness, with minimum 1/2-inch-wide flanges.
 1. Depth: 1-1/2 inches.
 2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches 0.068-inch-thick, galvanized steel.
- G. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
 1. Minimum Base-Metal Thickness: 0.033 inch.
 2. Depth: 7/8 inch or as indicated on drawings.
- H. Resilient Furring Channels: 1/2-inch-deep, steel sheet members designed to reduce sound transmission.
 1. Configuration: Asymmetrical or hat shaped.
- I. Cold-Rolled Furring Channels: 0.053-inch uncoated-steel thickness, with minimum 1/2-inch-wide flanges.
 1. Depth: 3/4 inch or as indicated on drawings..
 2. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum uncoated-steel thickness of 0.033 inch.
 3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch-diameter wire, or double strand of 0.048-inch-diameter wire.
- J. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, minimum uncoated-metal thickness of 0.018 inch, and depth required to fit insulation thickness indicated.

2.3 SUSPENSION SYSTEMS

- A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch-diameter wire, or double strand of 0.048-inch-diameter wire.
- B. Hanger Attachments to Concrete:
1. Anchors: Fabricated from corrosion-resistant materials with holes or loops for attaching wire hangers and capable of sustaining, without failure, a load equal to 5 times that imposed by construction as determined by testing according to ASTM E 488 by an independent testing agency.
 - a. Type: As required for the surrounding construction.
 2. Powder-Actuated Fasteners: Suitable for application indicated, fabricated from corrosion-resistant materials with clips or other devices for attaching hangers of type indicated, and capable of sustaining, without failure, a load equal to 10 times that imposed by construction as determined by testing according to ASTM E 1190 by an independent testing agency.
- C. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.16 inch in diameter.
- D. Flat Hangers: Steel sheet, 1 by 3/16 inch by length indicated.
- E. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.053 inch and minimum 1/2-inch-wide flanges.
1. Depth: 2-1/2 inches or as indicated on drawings.
- F. Furring Channels (Furring Members):
1. Cold-Rolled Channels: 0.053-inch (1.34-mm) uncoated-steel thickness, with minimum 1/2-inch- (13-mm-) wide flanges, 3/4 inch (19 mm) deep.
 2. Steel Studs and Runners: ASTM C 645.
 - a. Minimum Base-Metal Thickness: 0.033 inch.
 - b. Depth: 2-1/2 inches or as indicated on drawings.
 3. Dimpled Steel Studs and Runners: ASTM C 645.
 - a. Minimum Base-Metal Thickness: 0.025 inch.
 - b. Depth: 2-1/2 inches or as indicated on drawings.
 4. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch deep.
 - a. Minimum Base-Metal Thickness: 0.033 inch.
 5. Resilient Furring Channels: 1/2-inch-deep members designed to reduce sound transmission.
 - a. Configuration: Asymmetrical or hat shaped.
- G. Grid Suspension System for Gypsum Board Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Armstrong World Industries, Inc.; Drywall Grid Systems.
 - b. Chicago Metallic Corporation; Drywall Grid System.
 - c. USG Corporation; Drywall Suspension System.

2.4 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards.
1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
- B. Isolation Strip at Exterior Walls: Provide the following:
1. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.
 - 1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.
- B. Coordination with Sprayed Fire-Resistive Materials:
 - 1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling runners (tracks) to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches o.c.
 - 2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

3.3 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C 754.
 - 1. Gypsum Plaster Assemblies: Also comply with requirements in ASTM C 841 that apply to framing installation.
 - 2. Portland Cement Plaster Assemblies: Also comply with requirements in ASTM C 1063 that apply to framing installation.
 - 3. Gypsum Veneer Plaster Assemblies: Also comply with requirements in ASTM C 844 that apply to framing installation.
 - 4. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.
- B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- C. Install bracing at terminations in assemblies.
- D. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.4 INSTALLING FRAMED ASSEMBLIES

- A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
 - 1. Single-Layer Application: 16 inches o.c. unless otherwise indicated.
 - 2. Multilayer Application: 16 inches o.c. unless otherwise indicated.
 - 3. Tile Backing Panels: 16 inches o.c. unless otherwise indicated.
- B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- C. Install studs so flanges within framing system point in same direction.

- 1 D. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural
2 supports or substrates above suspended ceilings except where partitions are indicated to
3 terminate at suspended ceilings. Continue framing around ducts penetrating partitions above
4 ceiling.
- 5 1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to
6 produce joints at tops of framing systems that prevent axial loading of finished
7 assemblies.
- 8 2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install
9 runner track section (for cripple studs) at head and secure to jamb studs.
- 10 a. Install two studs at each jamb unless otherwise indicated.
- 11 b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch
12 clearance from jamb stud to allow for installation of control joint in finished
13 assembly.
- 14 c. Extend jamb studs through suspended ceilings and attach to underside of
15 overhead structure.
- 16 3. Other Framed Openings: Frame openings other than door openings the same as
17 required for door openings unless otherwise indicated. Install framing below sills of
18 openings to match framing required above door heads.
- 19 4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated
20 assembly indicated and support closures and to make partitions continuous from floor to
21 underside of solid structure.
- 22 a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-
23 rated assembly indicated.
- 24 5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
- 25 6. Curved Partitions:
- 26 a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
- 27 b. Begin and end each arc with a stud, and space intermediate studs equally along
28 arcs. On straight lengths of no fewer than two studs at ends of arcs, place studs 6
29 inches o.c.
- 30 E. Direct Furring:
- 31 1. Screw to wood framing.
- 32 2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment,
33 or powder-driven fasteners spaced 24 inches o.c.
- 34 F. Z-Furring Members:
- 35 1. Erect insulation, specified in Section 07 21 00 "Thermal Insulation," vertically and hold in
36 place with Z-furring members spaced 24 inches o.c.
- 37 2. Except at exterior corners, securely attach narrow flanges of furring members to wall with
38 concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners
39 spaced 24 inches o.c.
- 40 3. At exterior corners, attach wide flange of furring members to wall with short flange
41 extending beyond corner; on adjacent wall surface, screw-attach short flange of furring
42 channel to web of attached channel. At interior corners, space second member no more
43 than 12 inches from corner and cut insulation to fit.
- 44 G. Installation Tolerance: Install each framing member so fastening surfaces vary not more than
45 1/8 inch from the plane formed by faces of adjacent framing.
- 46 3.5 INSTALLING SUSPENSION SYSTEMS
- 47 A. Install suspension system components according to spacings indicated, but not greater than
48 spacings required by referenced installation standards for assembly types.

1. Hangers: 48 inches o.c.
 2. Carrying Channels (Main Runners): 48 inches o.c.
 3. Furring Channels (Furring Members): 16 inches o.c.
- B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.
- C. Suspend hangers from building structure as follows:
1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
 - a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
 - a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.
 3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 5. Do not attach hangers to steel roof deck.
 6. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
 7. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
 8. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.
- E. Seismic Bracing: Sway-brace suspension systems with hangers used for support.
- F. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.
- G. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 09 22 16

1 SECTION 092400 - CEMENT PLASTERING

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY

- 7 A. Section Includes:

- 8 1. Exterior vertical plasterwork (stucco).

9 1.3 PREINSTALLATION MEETINGS

- 10 A. Preinstallation Conference: Conduct conference at Project site.

11 1.4 ACTION SUBMITTALS

- 12 A. Product Data: For each type of product.

- 13 B. Shop Drawings: Show locations and installation of control and expansion joints, including plans,
14 elevations, sections, details of components, and attachments to other work.

- 15 C. Samples: For each type of factory-prepared finish coat and for each color and texture specified.

- 16 D. Samples for Verification: For each type of factory-prepared finish coat and for each color and
17 texture specified, 12 by 12 inches, and prepared on rigid backing.

18 1.5 QUALITY ASSURANCE

- 19 A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate
20 aesthetic effects, and to set quality standards for materials and execution.

- 21 1. For interior plasterwork, simulate finished lighting conditions for review of mockups.
22 2. Approval of mockups does not constitute approval of deviations from the Contract
23 Documents contained in mockups unless Architect specifically approves such deviations
24 in writing.
25 3. Subject to compliance with requirements, approved mockups may become part of the
26 completed Work if undisturbed at time of Project Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store materials inside under cover, and keep them dry and protected against damage from weather, moisture, direct sunlight, surface contamination, corrosion, construction traffic, and other causes.

1.7 FIELD CONDITIONS

- A. Comply with ASTM C 926 requirements.

- B. Exterior Plasterwork:

1. Apply and cure plaster to prevent plaster drying out during curing period. Use procedures required by climatic conditions, including moist curing, providing coverings, and providing barriers to deflect sunlight and wind.
2. Apply plaster when ambient temperature is greater than 40 deg F.
3. Protect plaster coats from freezing for not less than 48 hours after set of plaster coat has occurred.

- C. Interior Plasterwork: Maintain room temperatures at greater than 40 deg F for at least 48 hours before plaster application, and continuously during and after application.

1. Avoid conditions that result in plaster drying out during curing period. Distribute heat evenly; prevent concentrated or uneven heat on plaster.
2. Ventilate building spaces as required to remove water in excess of that required for hydrating plaster in a manner that prevents drafts of air from contacting surfaces during plaster application and until plaster is dry.

- D. Factory-Prepared Finishes: Comply with manufacturer's written recommendations for environmental conditions for applying finishes.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance Ratings: Where indicated, provide cement plaster assemblies identical to those of assemblies tested for fire resistance according to ASTM E 119 by a qualified testing agency.

2.2 METAL LATH

- A. Expanded-Metal Lath: ASTM C 847, cold-rolled carbon-steel sheet with ASTM A 653/A 653M, G60, hot-dip galvanized-zinc coating.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Alabama Metal Industries Company; a Gibraltar Industries company.
- b. CEMCO; California Expanded Metal Products Co.
- c. ClarkDietrich Building Systems.
- d. MarinoWARE.
- e. Phillips Manufacturing Co.

2. Diamond-Mesh Lath: Flat, 2.5 lb/sq. yd..

B. Paper Backing: FS UU-B-790a, Type I, Grade B, Style 1a vapor-retardant paper.

1. Provide paper-backed lath at exterior locations.

2.3 ACCESSORIES

A. General: Comply with ASTM C 1063, and coordinate depth of trim and accessories with thicknesses and number of plaster coats required.

B. Metal Accessories:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Alabama Metal Industries Company; a Gibraltar Industries company.
- b. CEMCO; California Expanded Metal Products Co.
- c. ClarkDietrich Building Systems.
- d. MarinoWARE.
- e. Phillips Manufacturing Co.

2. Foundation Weep Screed: Fabricated from hot-dip galvanized-steel sheet, ASTM A 653/A 653M, G60 zinc coating.

3. Cornerite: Fabricated from metal lath with ASTM A 653/A 653M, G60, hot-dip galvanized-zinc coating.

4. External- (Outside-) Corner Reinforcement: Fabricated from metal lath with ASTM A 653/A 653M, G60, hot-dip galvanized-zinc coating.

5. Cornerbeads: Fabricated from zinc or zinc-coated (galvanized) steel.

a. Smallnose cornerbead with expanded flanges; use unless otherwise indicated.

6. Casing Beads: Fabricated from zinc or zinc-coated (galvanized) steel; square-edged style; with expanded flanges.

7. Control Joints: Fabricated from zinc or zinc-coated (galvanized) steel; one-piece-type, folded pair of unperforated screeds in M-shaped configuration; with perforated flanges and removable protective tape on plaster face of control joint.

2.4 MISCELLANEOUS MATERIALS

A. Water for Mixing and Finishing Plaster: Potable and free of substances capable of affecting plaster set or of damaging plaster, lath, or accessories.

B. Fiber for Base Coat: Alkaline-resistant glass or polypropylene fibers, 1/2 inch long, free of contaminants, manufactured for use in cement plaster.

C. Bonding Compound: ASTM C 932.

D. Fasteners for Attaching Metal Lath to Substrates: ASTM C 1063.

E. Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, not less than 0.0475-inch diameter unless otherwise indicated.

F. Sound-Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

2.5 PLASTER MATERIALS

A. Portland Cement: ASTM C 150/C 150M, Type II.

1. Color for Finish Coats: Gray.

B. Masonry Cement: ASTM C 91, Type N.

1. Color for Finish Coats: Gray.

C. Plastic Cement: ASTM C 1328.

D. Lime: ASTM C 206, Type S; or ASTM C 207, Type S.

E. Sand Aggregate: ASTM C 897.

1. Color for Job-Mixed Finish Coats: White.

F. Perlite Aggregate: ASTM C 35.

G. Ready-Mixed Finish-Coat Plaster: Mill-mixed portland cement, aggregates, coloring agents, and proprietary ingredients.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. California Stucco Products Corp.
- b. El Rey Stucco Solutions; a Parex USA, Inc. brand.
- c. LaHabra Stucco Solutions; Parex USA.
- d. Omega Products International, Inc.
- e. QUIKRETE.
- f. Shamrock Stucco LLC.
- g. SonoWall, BASF Corp.

2. Color: As selected by Architect from manufacturer's full range.

2.6 PLASTER MIXES

A. General: Comply with ASTM C 926 for applications indicated.

1. Fiber Content: Add fiber to base-coat mixes after ingredients have mixed at least two minutes. Comply with fiber manufacturer's written instructions for fiber quantities in mixes, but do not exceed 1 lb of fiber/cu. yd. of cementitious materials.

B. Base-Coat Mixes for Use over Metal Lath: Scratch and brown coats for three-coat plasterwork as follows:

1. Portland Cement Mixes:

- a. Scratch Coat: For cementitious material, mix 1 part portland cement and 3/4 to 1-1/2 parts lime. Use 2-1/2 to 4 parts aggregate per part of cementitious material.
- b. Brown Coat: For cementitious material, mix 1 part portland cement and 3/4 to 1-1/2 parts lime. Use 3 to 5 parts aggregate per part of cementitious material, but not less than volume of aggregate used in scratch coat.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Protect adjacent work from soiling, spattering, moisture deterioration, and other harmful effects caused by plastering.
- B. Prepare smooth, solid substrates for plaster according to ASTM C 926.

3.3 INSTALLATION, GENERAL

- A. Fire-Resistance-Rated Assemblies: Install components according to requirements for design designations from listing organization and publication indicated on Drawings.
- B. Sound-Attenuation Blankets: Where required, install blankets before installing lath unless blankets are readily installed after lath has been installed on one side.

3.4 INSTALLING METAL LATH

- A. Metal Lath: Install according to ASTM C 1063.
 1. Partition Framing and Vertical Furring: Install flat-diamond-mesh lath.
 2. On Solid Surfaces, Not Otherwise Furred: Install self-furring, diamond-mesh lath.

3.5 INSTALLING ACCESSORIES

- A. Install according to ASTM C 1063 and at locations indicated on Drawings.
- B. Reinforcement for External (Outside) Corners:
 1. Install lath-type, external-corner reinforcement at exterior locations.
 2. Install cornerbead at interior locations.
- C. Control Joints: Locate as approved by Architect for visual effect and as follows:

1. As required to delineate plasterwork into areas (panels) of the following maximum sizes:
 - a. Vertical Surfaces: 144 sq. ft..
 - b. Horizontal and Other Nonvertical Surfaces: 100 sq. ft..
2. At distances between control joints of not greater than 18 feet o.c.
3. As required to delineate plasterwork into areas (panels) with length-to-width ratios of not greater than 2-1/2:1.
4. Where control joints occur in surface of construction directly behind plaster.
5. Where plasterwork areas change dimensions, to delineate rectangular-shaped areas (panels) and to relieve the stress that occurs at the corner formed by the dimension change.

3.6 PLASTER APPLICATION

A. General: Comply with ASTM C 926.

1. Do not deviate more than plus or minus 1/4 inch in 10 feet from a true plane in finished plaster surfaces when measured by a 10-foot straightedge placed on surface.
2. Finish plaster flush with metal frames and other built-in metal items or accessories that act as a plaster ground unless otherwise indicated. Where casing bead does not terminate plaster at metal frame, cut base coat free from metal frame before plaster sets and groove finish coat at junctures with metal.
3. Provide plaster surfaces that are ready to receive field-applied finishes indicated.

B. Bonding Compound: Apply on substrates for direct application of plaster.

C. Walls; Base-Coat Mixes for Use over Metal Lath: For scratch and brown coats, for three-coat plasterwork with 3/4-inch total thickness, as follows:

1. Portland cement mixes.
2. Masonry cement mixes.
3. Portland and masonry cement mixes.
4. Plastic cement mixes.
5. Portland and plastic cement mixes.

D. Plaster Finish Coats: Apply to provide float finish to match Architect's sample.

3.7 PLASTER REPAIRS

A. Repair or replace work to eliminate cracks, dents, blisters, buckles, crazing and check cracking, dry outs, efflorescence, sweat outs, and similar defects and where bond to substrate has failed.

3.8 CLEANING AND PROTECTION

A. Remove temporary protection and enclosure of other work after plastering is complete. Promptly remove plaster from door frames, windows, and other surfaces not indicated to be plastered. Repair floors, walls, and other surfaces stained, marred, or otherwise damaged during plastering.

END OF SECTION 09 24 00

1 SECTION 09 29 00 - GYPSUM BOARD

2 PART 1 - GENERAL

3 1.1 GENERAL REQUIREMENTS

- 4 A. Drawings and Conditions of Contract, including General and Supplementary Conditions and
5 Division 1 Administration Sections, apply to this Division.

6 1.2 SUMMARY

- 7 A. This Section includes the following:

- 8 1. Interior gypsum board.
9 2. Tile backing panels/cementitious backer units.
10 3. Gypsum Board Assemblies with Security Barrier Mesh

- 11 B. Related Sections include the following:

- 12 1. Division 07 21 00 Section "Thermal Insulation" for insulation and vapor retarders installed
13 in assemblies that incorporate gypsum board.
14 2. Division 07 84 46 Section "Fire-Resistive Joint Systems" for head-of-wall assemblies that
15 incorporate gypsum board.
16 3. Division 09 22 16 Section "Non-Structural Metal Framing" for non-structural framing and
17 suspension systems that support gypsum board.
18 4. Division 09 21 16.23 Section "Gypsum Board Shaft-Wall Assemblies" for metal shaft-wall
19 framing, gypsum shaft liners, and other components of shaft-wall assemblies.
20 5. Division 09 painting Sections for primers applied to gypsum board surfaces.

21 1.3 SUBMITTALS

- 22 A. Product Data: For each type of product indicated.

23 1.4 QUALITY ASSURANCE

- 24 A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and
25 construction identical to those tested in assembly indicated according to ASTM E 119, 2007
26 edition by an independent testing agency.
27 B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction
28 identical to those tested in assembly indicated according to ASTM E 90 and classified according
29 to ASTM E 413 by an independent testing agency.

30 1.5 STORAGE AND HANDLING

- 31 A. Store materials inside under cover and keep them dry and protected against damage from
32 weather, condensation, direct sunlight, construction traffic, and other causes. Stack panels flat
33 to prevent sagging.

34 1.6 PROJECT CONDITIONS

- 35 A. Environmental Limitations: Comply with ASTM C 840, 2007 edition requirements or gypsum
36 board manufacturer's written recommendations, whichever are more stringent.
37 B. Do not install interior products until installation areas are enclosed and conditioned.
38 C. Do not install panels that are wet, those that are moisture damaged, and those that are mold
39 damaged.

- 1 1. Indications that panels are wet or moisture damaged include, but are not limited to,
- 2 discoloration, sagging, or irregular shape.
- 3 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or
- 4 splotchy surface contamination and discoloration.

5 PART 2 - PRODUCTS

6 2.1 PANELS, GENERAL

- 7 A. Size: Provide in maximum lengths and widths available that will minimize joints in each area
- 8 and that correspond with support system indicated.

9 2.2 INTERIOR GYPSUM BOARD

- 10 A. General: Complying with ASTM C 36/C 36M or ASTM C 1396/C 1396M, 2006 edition as
- 11 applicable to type of gypsum board indicated and whichever is more stringent.
- 12 1. Available Manufacturers: Subject to compliance with requirements, manufacturers
- 13 offering products that may be incorporated into the Work include, but are not limited to,
- 14 the following:
- 15 2. Manufacturers: Subject to compliance with requirements, provide products by one of the
- 16 following:
- 17 a. American Gypsum Co.
- 18 b. BPB America Inc. (Certainteed GlasRoc)
- 19 c. G-P Gypsum.
- 20 d. Lafarge North America Inc.
- 21 e. National Gypsum Company.
- 22 f. PABCO Gypsum.
- 23 g. Temple.
- 24 h. USG Corporation.
- 25 B. Type X:
- 26 1. Thickness: 5/8 inch (15.9 mm).
- 27 2. Long Edges: Tapered.
- 28 C. Abuse-Resistant Type: Manufactured to produce greater resistance to surface indentation,
- 29 through-penetration (impact resistance), and abrasion than standard, regular-type and Type X
- 30 gypsum board.
- 31 1. Core: 5/8 inch, Type X.
- 32 2. Long Edges: Tapered.
- 33 3. Abrasion Resistance: ASTM D 4977-03 (2009) (Modified), not more than 0.284-inch
- 34 abrasion depth at 30 cycles with 25 lb added weight.
- 35 4. Impact Resistance: ASTM D 5420-10; not more than 0.11 inch indentation with 5/8-inch
- 36 die at 72 in/lb of force.
- 37 D. Moisture- and Mold-Resistant Type: With moisture- and mold-resistant core and surfaces.
- 38 1. Core: 5/8 inch (15.9 mm), Type X.
- 39 2. Long Edges: Tapered.
- 40 3. Mold Resistance: ASTM D 3273-12, score of 10 as rated according to ASTM D 3274-09
- 41 (2013).
- 42 2.3 TILE BACKING PANELS
- 43 A. Cementitious Backer Units: ANSI A118.9.
- 44 1. Available Products: Subject to compliance with requirements, products that may be
- 45 incorporated into the Work include, but are not limited to, the following:

2. Products: Subject to compliance with requirements, provide one of the following:
 - a. Custom Building Products; Wonderboard.
 - b. FinPan, Inc.; Util-A-Crete Concrete Backer Board. (Certaineed Glasroc tile backer)
 - c. USG Corporation; DUROCK Cement Board.
3. Thickness: 5/8 inch.

2.4 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
2. Shapes:
 - a. Cornerbead. (Award Metals)
 - b. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - c. Expansion (control) joint.

B. Exterior Trim: ASTM C 1047.

1. Material: [Hot-dip galvanized steel sheet, plastic, or rolled zinc] <Insert material>.
2. Shapes:
 - a. Cornerbead.
 - b. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - c. Expansion (Control) Joint: One-piece, rolled zinc with V-shaped slot and removable strip covering slot opening.

2.5 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475, 2005 edition

B. Joint Tape:

1. Interior Gypsum Wallboard: Paper. (Westpac)
2. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.
 - a. Use setting-type compound for installing paper-faced metal trim accessories.
3. Fill Coat: For second coat, use drying-type, all-purpose compound.
4. Finish Coat: For third coat, use drying-type, all-purpose compound.
5. Skim Coat: For final coat of Level 5 finish, use high-build interior coating product designed for application by airless sprayer and to be used instead of skim coat to produce Level 5 finish.

D. Joint Compound for Tile Backing Panels:

1. Cementitious Backer Units: As recommended by backer unit manufacturer.

E. Security Barrier Mesh: Carbon steel security mesh complying with ASTM A569/569M, ASTM F1267, Type II, Class 1.

1. Basis of Design: Subject to compliance with requirements provide AMICO; ASM .75-13F security mesh.
2. Medium security mesh with maximum 3/4 inch (19mm) holes.
3. Accessories
 - a. Screws: Manufacturer's standard screws for fastening mesh to substrate.

A. b. Clips: Manufacturer's standard security clip for use with screws.

2.6 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
- C. Steel Drill Screws: ASTM C 1002, 2004 edition, unless otherwise indicated.
 - 1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.
 - 2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
- D. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
 - 1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly. (Knauf Ecobatt)
- E. Acoustical Sealant: As specified in Division 07 Section "Joint Sealants." (Hilti CF 810)
- F. Thermal Insulation: As specified in Division 07 Section "Thermal Insulation."
- G. Vapor Retarder: As specified in Division 07 Section "Thermal Insulation."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames and framing, for compliance with requirements and other conditions affecting performance.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C 840, 2007 edition.
- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
 - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. (0.7 sq. m) in area.

2. Fit gypsum panels around ducts, pipes, and conduits.
 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- (6.4- to 9.5-mm-) wide joints to install sealant.
- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at these locations, and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- I. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

3.3 APPLYING INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
1. Type X: Vertical and ceiling surfaces, unless otherwise indicated.
 2. Abuse-Resistant/Impact-Penetration Resistant Type: At all inmate accessible spaces.
 3. Moisture- and Mold-Resistant Type: At moist environment rooms, including but not limited to toilet rooms, shower rooms, janitor closets, mechanical rooms and utility rooms.
- B. Single-Layer Application:
1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing, unless otherwise indicated.
 2. On partitions/walls, apply gypsum panels vertically (parallel to framing), unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
 - b. At high walls, install panels horizontally, unless otherwise indicated or required by fire-resistance-rated assembly.
 3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
 4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.
- C. Multilayer Application:
1. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
 2. Fastening Methods: Fasten base layers and face layers separately to supports with screws.
- D. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.

3.4 APPLYING TILE BACKING PANELS

- A. Cementitious Backer Units: ANSI A108.11, at locations indicated on drawings.

- B. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.5 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install control joints according to ASTM C 840, 2007 edition and at locations indicated on drawings.
- C. Interior Trim: Install in the following locations:
1. Cornerbead: Use at outside corners.
 2. LC-Bead: Use at exposed panel edges.

3.6 Installing Security Barrier Mesh

- A. Where indicated install security barrier mesh under gypsum wall board per manufacturer's recommendations.
- B. But adjoining panels vertically on studs and attaché with screws and clips.
- C. Lap adjoining panels horizontally per manufacturer's recommendations.
- D. When installed in ceilings install similar to vertical stud requirements.

3.7 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840, 2013 edition:
1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
 2. Level 4: At panel surfaces that will be exposed to view, unless otherwise indicated.
 - a. Primer and its application to surfaces are specified in other Division 09 painting Sections.
- E. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.8 PROTECTION

- A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- B. Remove and replace panels that are wet, moisture damaged, and mold damaged.
1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 09 29 00

1 SECTION 09 30 00 - TILING

2 PART 1 - GENERAL

3 1.1 GENERAL REQUIREMENTS

- 4 A. Drawings and Conditions of Contract, including General and Supplementary Conditions and
5 Division 1 Administration Sections, apply to this Division.

6 1.2 SUMMARY

- 7 A. This Section includes the following:

- 8 1. Porcelain floor tile pavers.
9 2. Ceramic Mosaic floor tile

- 10 B. Glazed wall tile.

- 11 1. Ceramic-tiles for interior installation.
12 2. Cementitious backer board.

13 1.3 SUBMITTALS

- 14 A. Samples for Verification: Of each item listed below, prepared on Samples of size and
15 construction indicated, products involving color and texture variations, in sets showing full range
16 of variations expected.

- 17 B. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile
18 manufacturer and Installer.

- 19 C. Product Data: For each type of tile, mortar, grout and other products specified.

20 1.4 DELIVERY, STORAGE, AND HANDLING

- 21 A. Deliver and store packaged materials in original containers with seals unbroken and labels
22 intact until time of use. Comply with requirement of ANSI A137.1 for labeling sealed tile
23 packages.

- 24 B. Prevent damage or contamination to materials by water, freezing, foreign matter, and other
25 causes.

26 1.5 PROJECT CONDITIONS

- 27 A. Maintain environmental conditions and protect work during and after installation to comply with
28 referenced standards and manufacturer's printed recommendations.

- 29 B. Vent temporary heaters to exterior to prevent damage to tile work from carbon dioxide buildup.

- 30 C. Maintain temperatures at 50 deg F or more in tiled areas during installation and for 7 days after
31 completion, unless higher temperatures are required by referenced installation standard or
32 manufacturer's instructions.

33 PART 2 - PRODUCTS

34 2.1 MANUFACTURERS

- 35 A. Manufacturers: Subject to compliance with requirements, provide products by one of the
36 following:

1. Tile:

- a. Dal-Tile Corporation.
- b. American Olean Tile Co., Inc.
- c. Interceramic.
- d. Crossville Ceramics.
- e. Stone Source

2. Mortars and Grouts:

- a. American Olean Tile Co., Inc.
- b. Bostik Construction Products Div.
- c. C-Cure Chemical Co.
- d. Laticrete International Inc.
- e. Mapei Corp.
- f. Custom Building Products

2.2 PRODUCTS, GENERAL

- A. ANSI Standard for Ceramic Tile: Comply with ANSI A137.1 "American National Standard Specifications for Ceramic Tile" for types, compositions, and grades of tile indicated.

1. Furnish tile complying with "Standard Grade" requirements unless otherwise indicated.

- B. ANSI Standard for Tile Installation Materials: Comply with ANSI standard referenced with products and materials indicated for setting and grouting.

- C. Factory Blending: For tile exhibiting color variations within the ranges selected during sample submittals, blend tile in factory and package accordingly so that tile units taken from one package show the same range in colors as those taken from other packages and match approved samples.

- D. Mounting: Where factory-mounted tile is required, provide back- or edge-mounted tile assemblies as standard with manufacturer unless another mounting method is indicated.

2.3 TILE PRODUCTS

- A. Glazed Wall Tile: Provide wall tile complying with the following requirements:

1. Basis-of-Design: REFER TO FINISH SCHEDULE
2. Nominal Face Dimensions: 3" x 6".
3. Nominal Thickness: 1/4"
4. Face: Plain with cushioned edge. Matte finish.
5. Colors:

- a. Field: as shown on drawings. (CT-1)

- b. Accent: as shown on drawings. (CT-2)

- B. Ceramic Mosaic Floor Tile

1. Basis-of-Design: REFER TO FINISH SCHEDULE
2. Nominal Face Dimensions: 1" x 1".
3. Colors:
 - a. Field: as shown on drawings (CMT-1)

- C. Porcelain Floor Tile (large format): Provide porcelain tiles complying with the following requirements:

1. Basis-of-Design: REFER TO FINISH SCHEDULE
2. Nominal Face Dimensions: 12" x 24".

3. Rectified edges.
 4. Coefficient of friction (DCOF): Min. 0.42.
 5. Color: as shown on drawings. (PT-1)
- D. Trim Units: Provide trim units to match characteristics of adjoining flat tile and to comply with the following requirements:
1. Size: As indicated, coordinated with sizes and coursing of adjoining flat tile where applicable.
 2. Shapes: As follows, selected from manufacturer's standard shapes:
 - a. Base: Sanitary coved base, ceramic tile.
 - 1) Size: 6"x6".
 - 2) Coved base at Toilet rooms shall have 3/8-inch radius cove to comply with applicable Health Department codes.
 - b. External Corners for Thinset Installations: Surface bullnose.
 - c. Internal Corners: Field-buttet square corners.
 - d. Tapered Transition Tile: Shape designed to effect transition between thickness of tile floor and adjoining floor finishes of different thickness, tapered to provide a reduction in thickness from 1/2 inch to 1/4 inch across nominal 4-inch dimension.
 - e. Surface Bullnose: At top of wainscot tile where required.
 - f. Other trim as required to achieve patterns shown.

2.4 SETTING MATERIALS

- A. Portland Cement Mortar Installation Materials: Provide materials complying with ANSI A108.1 and as specified below.
1. Latex additive (water emulsion) described below, of type specifically recommended by latex additive manufacturer for use with job-mixed portland cement and aggregate mortar bed.
 - a. Latex Additive: Manufacturer's standard.
- B. Latex-Portland Cement Mortar: ANSI A118.4, composition as follows:
1. Latex additive (water emulsion) of type described below, combined at job site with prepackaged dry mortar mix supplied or specified by latex additive manufacturer.
 - a. Latex Type: Manufacturer's standard.
 - b. Latex-Portland Cement Mortar shall be quality similar to Mapei Kerabond with Keralastic.

2.5 GROUTING MATERIALS

- A. Chemical-Resistant Epoxy Grout: ANSI A118.3. Color for floors and walls shall be selected by the Architect from the manufacturer's full range of colors.
1. Colors for walls shall be different than that selected for floors.
- B. Manufacturers: Refer to Paragraph 2.1.A.3 above. Quality of epoxy grout used on this Project shall be similar to Mapei Kerapoxy.

2.6 ELASTOMERIC SEALANTS

- A. General: Provide manufacturer's standard chemically curing, elastomeric sealants of base polymer indicated that comply with requirements of Division 07 Section "Joint Sealants," including ASTM C 920 as referenced by Type, Grade, Class, and Uses.
- B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints unless otherwise indicated.

C. One-Part Mildew-Resistant Silicone Sealant: Type S; Grade NS; Class 25; Uses NT, G, A, and as applicable to nonporous joint substrates indicated, O; formulated with fungicide, intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposures of high humidity and temperature extremes.

D. Products: Subject to compliance with requirements, provide one of the following:

1. One-Part Mildew-Resistant Silicone Sealant:

a. "Dow Corning 786"; Dow Corning Corp.

b. "Sanitary 1700"; GE Silicones.

c. "898 Sanitary Silicone Sealant"; Pecora Corp.

d. "Rhodorsil 6B White"; Rhone-Poulenc Inc.

e. "Tremsil 600 White"; Tremco Corp.

2.7 CEMENTITIOUS BACKER UNITS

A. Cementitious Backer Units (Glass Mesh Mortar Units): Reference Division 09 Section "Gypsum Board".

2.8 MISCELLANEOUS MATERIALS

A. Metal Edge Strips: Zinc alloy or stainless steel terrazzo strips, 1/8-inch wide at top edge with integral provision for anchorage to mortar bed or substrate unless otherwise indicated.

2.9 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with requirements of referenced standards and manufacturers including those for accurate proportioning of materials, water, or additive content; type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other procedures needed to produce mortars and grouts of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and areas where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.

1. Verify that substrates for setting tile are firm, dry, clean, and free from oil or waxy films and curing compounds and are within flatness tolerances required by ANSI A108.

2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed before installing tile.

B. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Blending: For tile exhibiting color variations within the ranges selected during sample submittals, verify that tile has been blended in factory and packaged accordingly so that tile units taken from one package show the same range in colors as those taken from other packages and match approved samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 INSTALLATION, GENERAL

- A. ANSI Tile Installation Standard: Comply with parts of ANSI 108 series of tile installation standards included under "American National Standard Specifications for the Installation of Ceramic Tile" that apply to type of setting and grouting materials and methods indicated.
1. Floor and wall tile joints shall align with one another.
 2. Tolerances: Install cementitious backer units with surface plane to within 1/8 inch in 8 feet. Glue unit to metal framing prior to screwing. Tape joints.
- B. Tile Council of North America, Inc. (TCNA) Installation Guidelines: TCNA "Handbook for Ceramic Tile Installation"; comply with TCNA installation methods indicated.
- C. Install cementitious backer units in lieu of gypsum wallboard on walls in restroom and wet areas scheduled to receive ceramic tile on the Room Finish Schedule.
- D. Extend tile work into recesses and under or behind equipment and fixtures to form a complete covering without interruptions except as otherwise shown. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- E. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so that plates, collars, or covers overlap tile.
- F. Jointing Pattern: Unless otherwise shown, lay tile in grid pattern. Align joints when adjoining tiles on floor, base, walls, and trim are same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths unless otherwise shown.
1. Install in accordance with tile patterns on Drawings.
- G. Expansion Joints: Locate expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated during installation of setting materials, mortar beds, and tile. Do not saw cut joints after installation of tiles.
1. Locate joints in tile surfaces directly above joints in concrete substrates.
 2. Prepare joints and apply sealants to comply with requirements of Division 07 Section "Joint Sealants."
- H. Grout tile to comply with the requirements of the following installation standards:
1. For chemical-resistant epoxy grouts, comply with ANSI A108.6.
- I. Install mildew-resistant silicone sealant at inside corners of wall tile. Sealant color shall match color of grout.

3.4 FLOOR INSTALLATION METHODS

- A. Floor Tile: Install tile to comply with requirements indicated below for setting bed methods, TCNA installation methods related to types of subfloor construction, and grout types:
1. Portland Cement Mortar: ANSI A108.1
 - a. Bond Coat: Latex-portland cement mortar, ANSI A108.1 or ANSI A108.5.
 - b. Concrete Subfloors, Typical: TCNA F115-07 (with tile installed by Method F112-07 on cured bed)
 - c. Concrete Subfloors, Thinset: TCNA F115-07 (with tile installed by Method F113-07)
 - d. Grout: Epoxy.
- B. Metal Edge Strips: Install at locations indicated or where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with top of tile.
- C. Expansion Joints: TCNA EJ171-07 (mandatory at exterior tile construction).

3.5 WALL TILE INSTALLATION METHODS

- A. Install types of tile designated for wall application to comply with requirements indicated below for setting-bed methods, TCNA installation methods related to subsurface wall conditions, and grout types:

1. Latex-Portland Cement Mortar: ANSI A108.5.
 - a. Metal Studs, Interior: TCNA W244C-07.
 - b. Grout: Epoxy.

- B. Refer to Drawing for wall tile patterns.

3.6 CLEANING AND PROTECTION

- A. Cleaning: Upon completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

- B. Finished Tile Work: Leave finished installation clean and free of cracked, chipped, broken, unbonded, and otherwise defective tile work.

- C. Provide final protection and maintain conditions in a manner acceptable to manufacturer and installer that ensures that tile is without damage or deterioration at time of Project completion.

1. When recommended by tile manufacturer, apply a protective coat of neutral protective cleaner to completed tile walls and floors. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear.
2. Prohibit foot and wheel traffic from tiled floors for at least 7 days after grouting is completed.

- D. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

3.7 EXTRA MATERIALS

- A. Supply extra 2 percent of each tile used in clean, marked carton for Owner's use.

3.8 MATERIAL FINISH SCHEDULE

- A. CT-1

1. Manufacturer: DalTile
2. Color: DT K775 – White 3"x6"

- B. CT-2

1. Manufacturer: DalTile
2. Color: 0182 Suede Gray – Wall Tile 3"x6"

- C. CMT-1

1. Manufacturer: DalTile
2. Color: DK14 Moonlight Blend STD – 1"x1" Mosaic

- D. PT-1

1. Manufacturer: Stone Source
2. Color: Q-Stone Gray – Natural - Procelain

- E. Grout (Wall and Floor - Toilets)

1. Manufacturer: Mapei
2. Color: TBD

END OF SECTION 09 30 00

1 SECTION 09 51 13 - ACOUSTICAL PANEL CEILINGS

2 PART 1 - GENERAL

3 1.1 GENERAL REQUIREMENTS

- 4 A. Drawings and Conditions of Contract, including General and Supplementary Conditions and
5 Division 1 Administration Sections, apply to this Division.

6 1.2 SUMMARY

- 7 A. This Section includes acoustical panels and exposed suspension systems for ceilings.
8 B. Products furnished, but not installed under this Section, include anchors, clips, and other
9 ceiling attachment devices to be cast in concrete at ceilings.

10 1.3 DEFINITIONS

- 11 A. AC: Articulation Class.
12 B. CAC: Ceiling Attenuation Class.
13 C. LR: Light Reflectance coefficient.
14 D. NRC: Noise Reduction Coefficient.

15 1.4 SUBMITTALS

- 16 A. Product Data: For each type of product indicated.
17 B. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items
18 are shown and coordinated with each other, based on input from installers of the items
19 involved:
20 1. Ceiling suspension system members.
21 2. Method of attaching hangers to building structure.
22 a. Furnish layouts for cast-in-place anchors, clips, and other ceiling attachment
23 devices whose installation is specified in other Sections.
24 3. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers,
25 access panels, and special moldings.
26 4. Minimum Drawing Scale: 1/8 inch = 1 foot (1:96).
27 C. Samples for Verification: For each component indicated and for each exposed finish required,
28 prepared on Samples of size indicated below.
29 1. Acoustical Panel: Set of 6-inch- square Samples of each type, color, pattern, and
30 texture.
31 2. Exposed Suspension System Members, Moldings, and Trim: Set of 12-inch- long
32 Samples of each type, finish, and color.
33 D. Qualification Data: For testing agency.
34 E. Field quality-control test reports.
35 F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified
36 testing agency, for each acoustical panel ceiling.
37 G. Maintenance Data: For finishes to include in maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of acoustical ceiling panel and supporting suspension system through one source from a single manufacturer.
- B. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical panels, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical panels, permit them to reach room temperature and stabilized moisture content.
- C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.8 COORDINATION

- A. Coordinate layout and installation of acoustical panels and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

1.9 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Acoustical Ceiling Panels: Full-size panels equal to 2.0 percent of quantity installed.
 - 2. Suspension System Components: Quantity of each exposed component equal to 2.0 percent of quantity installed.
 - 3. Hold-Down Clips: Equal to 2.0 percent of quantity installed.

PART 2 - PRODUCTS

2.1 ACOUSTICAL PANELS, GENERAL

- A. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances, unless otherwise indicated.
 - 1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches away from test surface per ASTM E 795.
- B. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type.

2.2 ACOUSTICAL PANELS FOR ACOUSTICAL PANEL CEILING

- A. Products: Subject to compliance with requirements, provide one of the following:
 - 1. Armstrong World Industries, Inc.:

- 1 a. APC-1: Ultima . High NRC
- 2 b. APC-2: Ultima .
- 3 c. APC-3: Armatuff 861.
- 4 d. APC-4: Optima 3352.
- 5 2. USG Interiors, Inc.
- 6 a. APC-1: Mars 887 __.HIGH NRC
- 7 b. APC-2: Mars 887 __.
- 8 c. APC-3: Rock Face Panels 56335.
- 9 d. APC-4: Halcyon Panels, Foil-Back 88221.
- 10 e. APC-5: Halcyon Panels, Foil-Back 88221.
- 11 B. Classification: Provide panels complying with ASTM E 1264 for type, form, and pattern as
- 12 follows:
- 13 1. Type and Form:
- 14 a. APC-1 and APC-2: Type IV, mineral base with soil-resistant polyester or vinyl film
- 15 membrane face; Form 2 water-felted.
- 16 b. APC-3: Type III, mineral based high density mineral fiber; Form 2 water-felted.
- 17 c. APC-4: Type IV, mineral base with soil-resistant polyester or vinyl film membrane
- 18 face; Form 2 water-felted.
- 19 C. Color:
- 20 1. APC-1: White
- 21 2. APC-2: White
- 22 3. APC-3: White.
- 23 4. APC-4: White.
- 24 5. APC-5: Black
- 25 D. LR:
- 26 1. APC-1 (White) Not less than 0.80.
- 27 2. APC-2 (White) Not less than 0.75.
- 28 E. (APC-3 IS 24x24 Impact resistant w/hold down clips) Face of APC-2 shall be scrubbable,
- 29 water-resistant, and appropriate for use as stipulated by panel manufacturer.
- 30 F. NRC: Not less than 0.60, minimum.
- 31 G. CAC: Not less than 35, minimum.
- 32 H. Edge/Joint Detail:
- 33 1. APC-1 and APC-2: Tegular.
- 34 2. APC-3, APC-4, and APC-5: Square.
- 35 I. Thickness: 3/4 inch.
- 36 J. Modular Size:
- 37 1. APC-1, APC-3 and : 24 inches by 24 inches (APC-2)
- 38 2. ~~APC-2~~, APC-4 and APC-5: 24 inches by 48 inches.
- 39 2.3 METAL SUSPENSION SYSTEMS, GENERAL
- 40 A. Metal Suspension System Standard: Provide manufacturer's standard direct-hung metal
- 41 suspension systems of types, structural classifications, and finishes indicated that comply with
- 42 applicable requirements in ASTM C 635.

- 1 B. Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for
2 Architectural and Metal Products" for recommendations for applying and designating finishes.
3 Provide manufacturer's standard factory-applied finish for type of system indicated.
- 4 C. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1,
5 "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
- 6 1. Anchors in Concrete: Anchors of type and material indicated below, with holes or loops
7 for attaching hangers of type indicated and with capability to sustain, without failure, a
8 load equal to five times that imposed by ceiling construction, as determined by testing per
9 ASTM E 488 or ASTM E 1512 as applicable, conducted by a qualified testing and
10 inspecting agency.
11 a. Type: Post-installed expansion or Post-installed bonded anchors.
12 b. Corrosion Protection: Carbon-steel components zinc plated to comply with
13 ASTM B 633, Class Fe/Zn 5 for Class SC 1 service condition.
- 14 2. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application
15 indicated, fabricated from corrosion-resistant materials, with clips or other accessory
16 devices for attaching hangers of type indicated, and with capability to sustain, without
17 failure, a load equal to 10 times that imposed by ceiling construction, as determined by
18 testing per ASTM E 1190, conducted by a qualified testing and inspecting agency.
- 19 D. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
- 20 1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641, Class 1 zinc coating, soft temper.
21 2. Size: Select wire diameter so its stress at 3 times hanger design load (ASTM C 635,
22 Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than
23 0.106-inch- diameter wire.
- 24 E. Hold-Down Clips: Where indicated, provide manufacturer's standard hold-down clips spaced
25 24 inches o.c. on all cross tees.

26 2.4 METAL SUSPENSION SYSTEM FOR ACOUSTICAL PANEL CEILING

- 27 A. Products: Subject to compliance with requirements, provide one of the following:
- 28 1. Armstrong World Industries, Inc.; Prelude 15/16 inch Exposed Tee System.
29 2. BPB USA; 15/16" (24mm) Classic Stab System.
30 3. Chicago Metallic Corporation; Seismic 1200.
31 4. USG Interiors, Inc.; DONN Brand DX/DXL.
- 32 B. Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll
33 formed from cold-rolled steel sheet, pre-painted, electrolytically zinc coated, or hot-dip
34 galvanized according to ASTM A 653/A 653M, not less than G30 (Z90) coating designation,
35 with prefinished 15/16-inch-wide metal caps on flanges.
- 36 1. Structural Classification: Intermediate-duty system.
37 2. End Condition of Cross Runners: Override (stepped) or butt-edge type.
38 3. Face Design: Flat, flush.
39 4. Cap Material: Steel cold-rolled sheet.
40 5. Cap Finish: White. (Black at ACP-5).

41 2.5 METAL EDGE MOLDINGS AND TRIM

- 42 A. Products: Subject to compliance with requirements, provide one of the following:
- 43 1. Armstrong World Industries, Inc.; Prelude 15/16 inch Exposed Tee System.
44 2. BPB USA; 15/16 inch Classic Stab System.
45 3. Chicago Metallic Corporation; Seismic 1200.
46 4. USG Interiors, Inc.; DONN Brand DX/DXL.
- 47 B. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not
48 indicated, manufacturer's standard moldings for edges and penetrations that comply with

seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.

1. Provide manufacturer's standard edge moldings that fit acoustical panel edge details and suspension systems indicated and that match width and configuration of exposed runners, unless otherwise indicated.
2. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

3.3 INSTALLATION

- A. General: Install acoustical panel ceilings to comply with ASTM C 636, State of California DSA IR 25 (attached following Section) and seismic design requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

- B. Suspend ceiling hangers from building's structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, counter-splaying, or other equally effective means.
3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
5. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, post-installed mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
6. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
7. Do not attach hangers to steel roof deck. Attach hangers to structural members.
8. Space hangers not more than 48 inches o.c. along each member supported directly from hangers, unless otherwise indicated; provide hangers not more than 8 inches (200 mm) from ends of each member.
9. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.

- 1 C. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and
2 where necessary to conceal edges of acoustical panels.
- 3 1. Screw attach moldings to substrate at intervals not more than 16 inches (400 mm) o.c.
4 and not more than 3 inches from ends, leveling with ceiling suspension system to a
5 tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.
- 6 2. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- 7 D. Install suspension system runners so they are square and securely interlocked with one
8 another. Remove and replace dented, bent, or kinked members.
- 9 E. Install acoustical panels with undamaged edges and fit accurately into suspension system
10 runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a
11 neat, precise fit.
- 12 1. For square-edged panels, install panels with edges fully hidden from view by flanges of
13 suspension system runners and moldings.
- 14 2. Install hold-down clips in areas indicated, in areas required by authorities having
15 jurisdiction, and for fire-resistance ratings; space as recommended by panel
16 manufacturer's written instructions, unless otherwise indicated.

17 3.4 CLEANING

- 18 A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and
19 suspension system members. Comply with manufacturer's written instructions for cleaning
20 and touchup of minor finish damage. Remove and replace ceiling components that cannot be
21 successfully cleaned and repaired to permanently eliminate evidence of damage.

22 END OF SECTION 09 51 13

1 SECTION 09 57 53 - SECURITY CEILING ASSEMBLIES

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY

- 7 A. Section Includes:

- 8 1. Security-plank security ceiling assemblies.

- 9 B. Related Requirements:

- 10 1. Section 01 35 13.16 "Special Project Procedures for Detention Facilities" for additional
11 requirements for detention facilities.

12 1.3 COORDINATION

- 13 A. Coordinate layout and installation of security ceiling assemblies with other construction that
14 penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-
15 suppression system, and partition assemblies.

16 1.4 PREINSTALLATION MEETINGS

- 17 A. Preinstallation Conference: Conduct conference at **Project site**.

18 1.5 ACTION SUBMITTALS

- 19 A. Product Data: For each type of product.

- 20 B. Samples for Verification: For the following products, of size indicated below:

- 21 1. Security Ceiling Panel Units: Full cross section by 12 inches long for each type of panel.
22 2. Perimeter Supports, Closures, and Exposed Molding: 12 inches long for each type.
23 3. Suspension System: 12 inches long.

24 1.6 INFORMATIONAL SUBMITTALS

- 25 A. Coordination Drawings: Reflected ceiling plans drawn, on which the following items are shown
26 and coordinated with each other, using input from installers of the items involved:

- 27 1. Layout of panels, joint pattern, transitions.
28 2. Suspension system members.
29 3. Method of attaching hangers to building structure.
30 4. Size and location of access panels.
31 5. Ceiling-mounted items including light fixtures, diffusers, grilles, speakers, sprinklers,
32 access panels, and special moldings.

- 33 B. Qualification Data: For Installer.

- 34 C. Welding certificates.

- D. Product Test Reports: For each security ceiling assembly, for tests performed by a qualified testing agency.
- E. Attachment Device Test Reports: Indicating capability to sustain, without failure, load indicated without pulling out from substrate.
- F. Field quality-control reports.
- G. Examination reports documenting inspection of substrates, areas, and conditions.
- H. Anchor inspection reports documenting inspections of built-in and cast-in anchors.
- I. Field quality-control certification signed by Contractor and Detention Specialist.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Security Ceiling Panels: Full-size units equal to 2.0 percent of amount installed.
 - 2. Suspension System Components: Quantity of each grid and exposed component equal to 2.0 percent of amount installed.
 - 3. Security Fasteners: Furnish not less than 1 box for each 50 boxes or fraction thereof, of each type and size of security fastener installed.
 - 4. Tools: Provide two sets of tools for installing and removing security fasteners, packaged for easy handling and storage.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer.
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1, "Structural Welding Code - Steel."
 - 2. AWS D1.2, "Structural Welding Code - Aluminum."
 - 3. AWS D1.3, "Structural Welding Code - Sheet Steel."

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical metal panels, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Handle acoustical metal panels, suspension system components, and accessories carefully to avoid damaging units and finishes in any way.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Security ceiling assemblies shall withstand normal thermal movement and structural loads without failure, including permanent deformation of security ceiling assembly components including pans and suspension system; noise or metal fatigue caused by vibration, deflection, and displacement of security ceiling units; and permanent damage to fasteners and anchors.

- 1 B. Acoustical Performance: Provide security ceiling assemblies with acoustical ratings indicated,
2 as determined according to ASTM E 1264 and the following:
- 3 1. Noise Reduction Coefficient: ASTM C 423 and ASTM E 795 in Type E-400 mounting.
4 2. Ceiling Attenuation Class: ASTM E 1414.
- 5 C. Structural Performance: Security ceiling assemblies shall withstand the effects of gravity loads
6 and the following loads and stresses within limits and under conditions indicated:
- 7 1. Live Load for Security Ceiling Assemblies: Panel dead weight plus a uniform load of 60
8 psf, acting upward or downward, with a deflection not more than L/360.
- 9 D. Seismic Standard: Provide ceilings designed and installed to withstand the effects of
10 earthquake motions according to ASCE/SEI 7.

11 2.2 DOUBLE SKIN PLANK SECURITY CEILING ASSEMBLY

- 12 A. Double-Configuration Panels: Factory-assembled units with cold-rolled steel top face sheet and
13 metallic-coated steel bottom face sheet, welded to a truss core. Fabricate panels with a self-
14 locking male/female lap joint for joining panels.
- 15 1. Basis-of-Design Product: Subject to compliance with requirements, provide Trussbilt ;
16 TrussDek. or a comparable product by one of the following:
- 17 a. Habersham Metal Products Company.
- 18 2. Panel Width: 24 inches wide by length indicated.
- 19 3. Overall Panel Thickness: As required by indicated spans.
- 20 4. Minimum Uncoated Top Face Sheet Thickness: 0.043 inch.
- 21 5. Minimum Uncoated Bottom Face Sheet Thickness: 0.033 inch.
- 22 6. Truss Core: Fabricated from 0.015-inch-thick, cold-rolled steel sheet bent into corrugated
23 shape; welded to top and bottom face sheets at even spacings across and along length
24 of panel.
- 25 7. Alternative Core: Paired hat channels s manufactured by Habersham Metal Products
26 Company.
- 27 8. Noise Reduction Coefficient: 0.65.
- 28 B. Materials:
- 29 1. Metallic-Coated Steel Sheet (at cells): ASTM A 653, A60 zinc-iron-alloy (galvannealed)
30 coating designation.
- 31 2. Stainless-Steel Sheet, Strip, Plate, and Flat Bars (at Showers): ASTM A 666 or
32 ASTM A 240, austenitic stainless steel, Type 304.
- 33 3. Steel Tubing: ASTM A 513, Type B.
- 34 C. Access Panels: Material, perforation pattern, and finish same as security ceiling panels;
35 designed for installation by continuously welding access panel frame to security ceiling panel.
- 36 1. Lock Preparation: Prepare door panel to accept cylinder specified in Section 08 71 63
37 "Detention Door Hardware."
- 38 D. Closures: Fabricated from minimum 0.053-inch- thick steel sheet, finished to match security
39 ceiling panels. Fasten with security fasteners or by welding.
- 40 E. Suspension System: Heavy-duty exposed system consisting of intermediate carriers supported
41 by secondary support system attached to building structure.

1. Intermediate Carriers: Formed from tees with a nominal 4-inch- wide exposed face or built up from back-to-back angles or channels each with a nominal 2-inch- wide exposed face; fabricated from 0.068-inch- thick, cold-rolled steel sheet.
 - a. Finish: Match security ceiling panels.
 2. Secondary Support System:
 - a. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.
 - b. Angle Hangers: 1-1/2-by-1-1/2-inch galvanized-steel angles, G90 (Z275) zinc coating, bolted to intermediate carriers and building structure.
 - F. Perimeter Supports: Wall-mounted angles, tees, and bearing plates; fabricated from minimum 0.068-inch- thick, cold-rolled steel sheet; finished to match security ceiling panels.
 - G. Exposed Edge Moldings and Trim: Provide exposed members as indicated or required for edges of security ceiling, fixture trim, beams, fasciae at changes in security ceiling height, and other conditions, of metal and finish matching security ceiling panels.
- 2.3 SINGLE SKIN PLANK SECURITY CEILING ASSEMBLY
- A. Single Skin Panels: Factory-assembled units with cold-rolled steel top face sheet and metallic-coated steel bottom face sheet, welded to a truss core. Fabricate panels with a self-locking male/female lap joint for joining panels.
 1. Basis-of-Design Product: Subject to compliance with requirements, provide Trussbilt ; TrussDek. or a comparable product by one of the following:
 - a. Habersham Metal Products Company.
 2. Panel Width: 24 inches wide by length indicated.
 3. Overall Panel Thickness: As required by indicated spans.
 4. Minimum Uncoated Face Sheet Thickness: 0.033 inch.
 5. Perforation Pattern for Bottom Face Sheet: Manufacturer's standard.
 6. Noise Reduction Coefficient: 0.65.
 - B. Materials:
 1. Metallic-Coated Steel Sheet: ASTM A 653, A60 zinc-iron-alloy (galvannealed) coating designation.
 2. Steel Tubing: ASTM A 513, Type B.
 - C. Access Panels: Material, perforation pattern, and finish same as security ceiling panels; designed for installation by continuously welding access panel frame to security ceiling panel.
 1. Lock Preparation: Prepare door panel to accept cylinder specified in Section 08 71 63 "Detention Door Hardware."
 - D. Closures: Fabricated from minimum 0.053-inch- thick steel sheet, finished to match security ceiling panels. Fasten with security fasteners or by welding.
 - E. Suspension System: Heavy-duty exposed system consisting of intermediate carriers supported by secondary support system attached to building structure.
 1. Intermediate Carriers: Formed from tees with a nominal 4-inch- wide exposed face or built up from back-to-back angles or channels each with a nominal 2-inch- wide exposed face; fabricated from 0.068-inch- thick, cold-rolled steel sheet.
 - a. Finish: Match security ceiling panels.

2. Secondary Support System:

- a. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.
- b. Angle Hangers: 1-1/2-by-1-1/2-inch galvanized-steel angles, G90 zinc coating, bolted to intermediate carriers and building structure.

F. Perimeter Supports: Wall-mounted angles, tees, and bearing plates; fabricated from minimum 0.068-inch- thick, cold-rolled steel sheet; finished to match security ceiling panels.

G. Exposed Edge Moldings and Trim: Provide exposed members as indicated or required for edges of security ceiling, fixture trim, beams, fasciae at changes in security ceiling height, and other conditions, of metal and finish matching security ceiling panels.

H. Finish: Factory powder coat finish.

1. Color: White.

2.4 SINGLE SKIN METAL PANEL SECURITY CEILING ASSEMBLY

A. Single Skin Metal Panels: Factory-assembled units with cold-rolled steel top face sheet and metallic-coated steel bottom face sheet, welded to a truss core. Fabricate panels with a self-locking male/female lap joint for joining panels.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Trussbilt ; SecureDek. or a comparable product by one of the following:
 - a. Habersham Metal Products Company.

2. Panel Size: 24 inches wide by 24 inches long.

3. Overall Panel Thickness: 18 gauge.

4. Minimum Uncoated Face Sheet Thickness: 18 gauge.

5. Perforation Pattern for Bottom Face Sheet: Manufacturer's standard.

6. Noise Reduction Coefficient (minimum): 0.65.

B. Materials:

1. Metallic-Coated Steel Sheet: ASTM A 653, A60 zinc-iron-alloy (galvannealed) coating designation.

2. Steel Tubing: ASTM A 513, Type B.

C. Closures: Fabricated from minimum 0.053-inch- thick steel sheet, finished to match security ceiling panels. Fasten with security fasteners or by welding.

D. Suspension System: Heavy-duty exposed system consisting of intermediate carriers supported by secondary support system attached to building structure.

1. Intermediate Carriers: Formed from tees with a nominal 4-inch- wide exposed face or built up from back-to-back angles or channels each with a nominal 2-inch- wide exposed face; fabricated from 0.068-inch- thick, cold-rolled steel sheet.

- a. Finish: Match security ceiling panels.

2. Secondary Support System:

- a. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.

- b. Angle Hangers: 1-1/2-by-1-1/2-inch galvanized-steel angles, G90 zinc coating, bolted to intermediate carriers and building structure.

E. Perimeter Supports: Wall-mounted angles, tees, and bearing plates; fabricated from minimum 0.068-inch- thick, cold-rolled steel sheet; finished to match security ceiling panels.

- F. Exposed Edge Moldings and Trim: Provide exposed members as indicated or required for edges of security ceiling, fixture trim, beams, fasciae at changes in security ceiling height, and other conditions, of metal and finish matching security ceiling panels.

- G. Finish: Factory powder coat finish.

1. Color: White.

2.5 SOUND-ABSORPTIVE PADS

- A. Plastic-Sheet-Wrapped, Mineral-Fiber Insulation: Pads consisting of nonrigid, vinyl chloride plastic sheet encapsulating unfaced mineral-fiber insulation.

1. Plastic Sheet: Not less than 0.003 inch thick; flat black.
2. Mineral Fiber: Glass fiber or fiber made from slag (mineral wool), complying with ASTM C 553, Type I, II, or III.
3. Thickness: As required to meet NRC rating.
4. Mineral-Fiber Density: As required to meet NRC rating.
5. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 450 or less.

2.6 FABRICATION

- A. Panels: Form metal panels from sheet metals selected for their surface flatness, smoothness, and freedom from surface blemishes where exposed to view in finished unit. Do not use materials whose exposed surfaces exhibit pitting, seam marks, roller marks, or variations in flatness exceeding those permitted by referenced standards for stretcher-leveled metal sheet.

1. Security Planks: Factory fabricate double-configuration security planks and join top and bottom face sheets by welding.

2.7 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM/NOMMA 500 for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.8 STEEL FINISHES

- A. Surface Preparation: Remove mill scale and rust, if present, from uncoated steel, complying with primer manufacturer's written instructions.
- B. Factory Prime Finish: After surface preparation and pretreatment, apply primer compatible with top coats as specified in Section 09 91 12 "Interior Painting."

2.9 SECURITY FASTENERS

- A. Operable only by tools produced by fastener manufacturer or other licensed fabricator for use on specific type of fastener. Drive-system type, head style, material, and protective coating as required for assembly, installation, and strength, and as follows:

1. Drive-System Type: Pinned Torx.
2. Fastener Strength: 120,000 psi.

2.10 SECURITY SEALANTS

- A. Security Sealants: As specified in Section 07 95 00 "Joint Sealants."

2.11 ACCESSORIES

- A. Concealed Bolts: ASTM A 307, Grade A unless otherwise indicated.
- B. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welding.
- C. Attachment Devices: Size for five times the design load indicated in ASTM C 635/C 635M, Table 1, Direct Hung, unless otherwise indicated.
1. Cast-in-Place and Post-installed Expansion Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times the load imposed by security ceiling construction, as determined by testing according to ASTM E 488, conducted by a qualified testing agency.
 - a. Type: Cast-in-place, or post-installed expansion or chemical anchors.
 - b. Corrosion Protection: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 for Class SC service condition (mild).
 - c. Corrosion Protection: Stainless-steel components complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Alloy Group 1 or 4) for bolts and nuts; ASTM A 666 or ASTM A 276, Type 304 or 316, for anchors.
 - d. Corrosion Protection: Components fabricated from nickel-copper-alloy rods complying with ASTM B 164 for UNS No. N04400 alloy.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of security ceiling assemblies.
- B. Examine roughing-in for embedded and built-in anchors to verify actual locations of security ceiling assembly connections before security ceiling assembly installation.
- C. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of security ceiling assemblies.
- D. Inspect built-in and cast-in anchor installations before installing security ceiling assemblies to verify that anchor installations comply with requirements. Prepare inspection reports.

1. Repair, or remove and replace, anchors where inspections indicate noncompliance with specified requirements. Re-inspect after repair or replacement.
2. Perform additional inspections to determine compliance of replaced or additional work. Prepare inspection reports.

E. Verify locations and layouts of security ceiling assemblies with those indicated on reflected ceiling plans and coordination drawings.

F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Coordination: Furnish layouts for cast-in-place anchors, clips, and other security ceiling anchors whose installation is specified in other Sections.

1. Furnish cast-in-place anchors and similar devices to other trades for installation well in advance of time needed for coordinating other work.

B. Measure each security ceiling area and establish layout of security ceiling panels to balance border widths at opposite edges of each security ceiling. Avoid using less-than-half-width panels at borders and comply with layout shown on reflected ceiling plans and Coordination Drawings.

3.3 GENERAL INSTALLATION

A. Comply with CISCA's "Ceiling Systems Handbook" for installation of security ceiling assemblies.

B. Install perimeter supports around perimeter of security ceiling area.

1. Sealant: Apply security sealant in a continuous ribbon concealed on back of vertical legs of supports before they are installed.
2. Attach supports with anchor bolts or expansion anchors spaced not more than 12 inches o.c. and not more than 3 inches from ends. Miter corners accurately.
 - a. Level perimeter supports with suspension system to a tolerance of 1/8 inch in 12 feet.
3. Do not use exposed fasteners, including pop rivets, on moldings and trim. If exposed fasteners are unavoidable, obtain approval from Architect for their use and use security fasteners.

C. Install accessories where indicated and as required to comply with performance requirements.

1. Sound-Absorptive Pads: For security ceiling panels indicated, provide sound-absorptive pads of width and length to completely fill inside of each security ceiling panel.
 - a. Install sound-absorptive pads over metal spacer grids with support clips.

D. Seismic Installation: Comply with seismic standard indicated, manufacturer's written instructions, and CISCA's "Ceiling Systems Handbook."

3.4 SECURITY-PLANK SECURITY CEILING ASSEMBLY INSTALLATION

A. Install security planks with long edges continuously interlocked. Adjust security planks to final position before permanently fastening. Provide minimum 1-1/2-inch end bearing.

1. Attach adjacent security planks to each other with security fasteners spaced not more than 12 inches o.c. and not more than 6 inches from ends.

2. Continuously weld ends of security planks to perimeter supports. Remove exposed projecting burrs, edges, and rough spots resulting from welding operations by grinding smooth.
3. Attach ends of security planks to perimeter supports with security fasteners not more than 3 inches from edges of security plank. Fasten through exposed face of supports into security planks.
4. Provide intermediate carriers for ends of security planks that are not supported by perimeter supports. To attach security planks to intermediate carriers, use same method as that used for attaching security planks to perimeter supports.
 - a. Support intermediate carriers from structure above by secondary support system spaced at 48 inches o.c. and bolted to carriers.

B. Access Panels: Install each access panel only where indicated and within one security plank.

C. Provide steel angle reinforcement on each side of openings that exceed 12 inches in any direction.

3.5 FIELD QUALITY CONTROL

A. Inspect installed products to verify compliance with requirements. Prepare inspection reports and indicate compliance with and deviations from the Contract Documents.

B. Remove and replace security ceiling assemblies where inspections indicate that work does not comply with specified requirements.

C. Perform additional inspections to determine compliance of replaced or additional work. Prepare inspection reports.

D. Prepare field quality-control certification endorsed by Detention Specialist that states installed products and their installation comply with requirements in the Contract Documents.

E. Field Quality-Control Testing: Owner will engage a qualified independent testing agency to perform field quality-control testing.

F. Extent and Testing Frequency: Testing will take place in successive stages in areas described below. Proceed with installation of security ceiling assemblies only after test results for previously installed hangers comply with requirements.

1. Extent of Each Test Area: When installation of security ceiling suspension systems on each floor has reached 20 percent completion but no security panel units have been installed.

2. Within each test area, testing agency will select one of every ten anchors used to attach hangers to concrete and will test them for 200 lbf of tension; it will also select one of every two post-installed anchors used to attach bracing wires to concrete and will test them for 440 lbf of tension.

3. When testing discovers fasteners and anchors that do not comply with requirements, testing agency will test those fasteners and anchors not previously tested until 20 consecutively pass and then will resume initial testing frequency.

G. Fasteners and anchors will be considered defective if they do not pass tests and inspections.

H. Prepare test and inspection reports.

I. Additional Testing: Where fasteners and anchors are removed and replaced, additional testing will be performed to determine compliance with specified requirements.

- 1 3.6 CLEANING
- 2 A. Remove and replace work that cannot be successfully cleaned and repaired to permanently
3 eliminate evidence of damage, including dented and bent units.
- 4 B. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and
5 abraded areas of shop paint, and paint exposed areas with same material as that used for shop
6 painting; comply with SSPC-PA 1 for touching up shop-painted surfaces.
- 7 1. Apply by brush or spray to provide a minimum dry film thickness of 2 mils.
- 8 C. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and
9 abraded areas of shop paint are specified in Section 09 91 23 "Interior Painting."
- 10 D. Metallic-Coated Steel Surfaces: Clean field welds, bolted connections, and abraded areas and
11 repair zinc or zinc-iron coating to comply with ASTM A 780.
- 12 END OF SECTION 09 57 53

1 SECTION 09 6513 - RESILIENT BASE AND ACCESSORIES

2 PART 1 - GENERAL

3 A. GENERAL REQUIREMENTS

4 B. Drawings and Conditions of Contract, including General and Supplementary Conditions and
5 Division 1 Administration Sections, apply to this Division.

6 C. SUMMARY

7 D. This Section contains Specifications for the following:

- 8 1. Rubber wall base (Type TS - Rubber, Vulcanized, Thermoset).
9 2. Molding accessories.

10 E. SUBMITTALS

11 F. Product Data: For each type of product specified.

12 G. Samples: For verification purposes in manufacturer's standard sample sets, but not less than
13 12 inches long, of each resilient product color, texture and pattern required.

14 H. QUALITY ASSURANCE

15 I. Single-Source Responsibility for Products: Obtain each type and color of product specified
16 from a single source with resources to provide products of consistent quality in appearance
17 and physical properties without delaying progress of the Work.

18 J. Fire Performance Characteristics: Provide products with the following fire performance
19 characteristics as determined by testing products per ASTM test method indicated below by
20 UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

- 21 1. Critical Radiant Flux: 0.45 watts per sq. cm or more per ASTM E 648.
22 2. Smoke Density: Less than 450 per ASTM E 662.

23 K. DELIVERY, STORAGE, AND HANDLING

24 L. Deliver products to Project site in original manufacturer's unopened cartons and containers,
25 each bearing names of product and manufacturer, Project identification, and shipping and
26 handling instructions.

27 M. Store products in dry spaces protected from the weather with ambient temperatures
28 maintained between 50 deg F and 90 deg F.

29 N. Move products into spaces where they will be installed at least 48 hours in advance of
30 installation.

31 O. PROJECT CONDITIONS

32 P. Maintain a minimum temperature of 70 deg F in spaces to receive products specified in this
33 Section for at least 48 hours prior to installation, during installation, and for not less than
34 48 hours after installation. After this period, maintain a temperature of not less than 55 deg F.

35 Q. Do not install products until they are at the same temperature as that of the space where they
36 are to be installed.

37 R. Close spaces to traffic during installation of products specified in this Section.

1 S. SEQUENCING AND SCHEDULING

2 T. Sequence installing products specified in this Section with other construction to minimize
3 possibility of damage and soiling during remainder of construction period.

4 U. EXTRA MATERIALS

5 V. Deliver extra materials to Owner. Furnish extra materials matching products installed as
6 described below, packaged with protective covering for storage, and identified with labels
7 clearly describing contents.

8 1. Furnish not less than 10 linear feet for each 500 linear feet or fraction thereof, of each
9 type, color, pattern and size of resilient product installed.

10 2. Deliver extra materials to Owner.

11 PART 2 - PRODUCTS

12 A. MANUFACTURERS

13 B. Products: Subject to compliance with requirements, provide one of the products specified in
14 each Product Data Sheet at end of this Section.

15 C. RESILIENT WALL BASE

16 D. Rubber Wall Base: Products complying with ASTM F 1861, Type TS, Group I, and
17 requirements specified in the Rubber Wall Base Product Data Sheet at end of this Section.

18 1. Roll base only – sticks not acceptable.

19 2. Preformed inside and outside corners to be used throughout.

20 E. INSTALLATION ACCESSORIES

21 F. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or
22 blended hydraulic cement-based formulation provided or approved by resilient product
23 manufacturers for applications indicated.

24 G. Adhesives: Water-resistant type recommended by manufacturer to suit resilient base product
25 and substrate conditions indicated.

26 PART 3 - EXECUTION

27 A. EXAMINATION

28 B. Examine areas where installation of products specified in this Section will occur, with Installer
29 present, to verify that substrates and conditions are satisfactory for installation and comply
30 with manufacturer's requirements and those specified in this Section.

31 C. PREPARATION

32 D. General: Comply with manufacturer's installation specifications for preparing substrates
33 indicated to receive products indicated.

34 E. Use trowelable leveling and patching compounds per manufacturer's directions to fill cracks,
35 holes, and depressions in substrates.

36 F. Broom or vacuum clean substrates to be covered immediately before installing products
37 specified in this Section. Following cleaning, examine substrates for moisture, alkaline salts,
38 carbonation, or dust.

1 G. RESILIENT WALL BASE INSTALLATION

2 H. General: Install products specified in this Section using methods indicated according to
3 manufacturer's installation directions.

4 I. Apply resilient wall base to walls, columns, pilasters, casework, and other permanent fixtures
5 in rooms and areas where base is required. Install wall base in lengths as long as practicable.
6 Tightly adhere wall base to substrate throughout length of each piece, with base in continuous
7 contact with horizontal and vertical substrates.

8 1. On masonry surfaces or other similar irregular substrates, fill voids along top edge of
9 resilient wall base with manufacturer's recommended adhesive filler material.

10 2. Install inside and exterior corners before installing straight pieces.

11 J. Place resilient accessories so they are butted to adjacent materials of type indicated and bond
12 to substrates with adhesive. Install reducer strips at edges of flooring that otherwise would be
13 exposed.

14 K. RESILIENT ACCESSORY INSTALLATION

15 L. CLEANING AND PROTECTION

16 M. Perform the following operations immediately after completing installation:

17 1. Remove adhesive and other blemishes from exposed surfaces.

18 2. Sweep and vacuum surfaces thoroughly.

19 N. Clean products specified in this Section not more than 4 days prior to dates scheduled for
20 inspections intended to establish date of Completion in each area of Project. Clean products
21 using method recommended by manufacturer.

22 O. RUBBER WALL BASE SCHEDULE

23 P. Designation: RB

24 1. Style: Cove with top-set toe (ASTM F 1861, Style B).

25 2. Height: 4".

26 3. Nominal Thickness: 1/8 inch.

27 4. Lengths: Coils in lengths standard with manufacturer but not less than 100 feet.

28 5. Exterior Corners: Pre-molded.

29 6. Interior Corners: Mitered.

30 7. Color: As selected by Architect from manufacturer's full range of colors.

31 8. Acceptable Products:

32 a. Roppe Corporation.

33 b. Marley Flexco.

34 c. Burke Mercer.

35 d. Johnsonite.

36
37
38 END OF SECTION 09 65 13
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1 SECTION 09 65 19 - RESILIENT TILE FLOORING

2 PART 1 - GENERAL

3 1.1 GENERAL REQUIREMENTS

- 4 A. Drawings and Conditions of Contract, including General and Supplementary Conditions and
5 Division 1 Administration Sections, apply to this Division.

6 1.2 SUMMARY

- 7 A. Section Includes:

- 8 1. Vinyl sheet flooring

- 9 B. Related Sections:

- 10 1. Division 09 6513 Section "Resilient Base and Accessories" for resilient base, reducer
11 strips, and other accessories installed with resilient floor coverings.

12 1.3 SUBMITTALS

- 13 A. Product Data: For each type of product indicated.

- 14 B. Shop Drawings: For each type of floor tile. Include floor tile layouts, edges, columns,
15 doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.

- 16 1. Show details of special patterns.

- 17 C. Samples for Verification: Full-size units of each color and pattern of floor tile required.

- 18 1. For heat-welding bead, manufacturer's standard-size Samples, but not less than 9
19 inches long, of each color required.

- 20 D. Product Schedule: For floor tile.

- 21 E. Qualification Data: For qualified Installer.

- 22 F. Maintenance Data: For each type of floor tile to include in maintenance manuals.

23 1.4 QUALITY ASSURANCE

- 24 A. Installer Qualifications: A qualified installer who employs workers for this Project who are
25 competent in techniques required by manufacturer for floor tile installation indicated.

- 26 B. Fire-Test-Response Characteristics: As determined by testing identical products according to
27 ASTM E 648 or NFPA 253 by a qualified testing agency.

- 28 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

29 1.5 DELIVERY, STORAGE, AND HANDLING

- 30 A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient
31 temperatures maintained within range recommended by manufacturer, but not less than 50
32 deg F or more than 90 deg F. Store floor tiles on flat surfaces.

33 1.6 PROJECT CONDITIONS

- 34 A. Maintain ambient temperatures within range recommended by manufacturer, but not less than
35 70 deg F or more than 95 deg F, in spaces to receive floor tile during the following time periods:

- 36 1. 48 hours before installation.

- 37 2. During installation.

- 38 3. 48 hours after installation.

- 1 B. Until Project completion, maintain ambient temperatures within range recommended by
- 2 manufacturer, but not less than 55 deg F or more than 95 deg F.
- 3 C. Close spaces to traffic during floor tile installation.
- 4 D. Close spaces to traffic for 48 hours after floor tile installation.
- 5 E. Install floor tile after other finishing operations, including painting, have been completed.

6 1.7 EXTRA MATERIALS

- 7 A. Furnish extra materials that match products installed and that are packaged with protective
- 8 covering for storage and identified with labels describing contents.
- 9 1. Floor Tile: Furnish 1 box for every 50 boxes or fraction thereof, of each type, color, and
- 10 pattern of floor tile installed.

11 PART 2 - PRODUCTS

12 SHEET VINYL FLOORING (SVF-1 AND SVF-2)

- 13 A. Products: Subject to compliance with requirements, provide product by one of the following:
- 14 1. Armstrong World Industries, Inc.
- 15 2. Congoleum Corporation.
- 16 3. Mannington Mills, Inc.
- 17 4. Tarkett, Inc..
- 18 5. Johnsonite Optima
- 19 6. Shaw Biolife
- 20 B. Tile Standard: ASTM F 1066, Class 2, through-pattern tile.
- 21 C. Wearing Surface: Smooth.
- 22 D. Thickness: 0.125 inch.
- 23 E. Size: 12 by 12 inches.
- 24 F. Colors and Patterns:
- 25 1. VCT-1: Match the following:
- 26 a. TBD

27 2.2 INSTALLATION MATERIALS

- 28 A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or
- 29 blended hydraulic-cement-based formulation provided or approved by manufacturer for
- 30 applications indicated.
- 31 B. Adhesives: Water-resistant type recommended by manufacturer to suit floor tile and substrate
- 32 conditions indicated. (Henry 430 Greenline)
- 33 C. Floor Polish: Provide protective liquid floor polish products as recommended by manufacturer.

34 PART 3 - EXECUTION

35 3.1 EXAMINATION

- 36 A. Examine substrates, with Installer present, for compliance with requirements for maximum
- 37 moisture content and other conditions affecting performance of the Work.

- 1 B. Verify that finishes of substrates comply with tolerances and other requirements specified in
2 other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign
3 deposits that might interfere with adhesion of floor tile.

- 4 C. Proceed with installation only after unsatisfactory conditions have been corrected.

5 3.2 PREPARATION

- 6 A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of
7 resilient products.

- 8 B. Concrete Substrates: Prepare according to ASTM F 710.

- 9 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
10 2. Remove substrate coatings and other substances that are incompatible with adhesives
11 and that contain soap, wax, oil, or silicone, using mechanical methods recommended by
12 manufacturer. Do not use solvents.
13 3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer.
14 Proceed with installation only after substrates pass testing.
15 4. Moisture Testing: Perform tests recommended by manufacturer and as follows.
16 Proceed with installation only after substrates pass testing.

- 17 a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation
18 only after substrates have maximum moisture-vapor-emission rate of 3 lb of
19 water/1000 sq. ft. in 24 hours.

- 20 b. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with
21 installation only after substrates have a maximum 75% relative humidity level
22 measurement.

- 23 C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching
24 compound and remove bumps and ridges to produce a uniform and smooth substrate.

- 25 D. Do not install floor tiles until they are same temperature as space where they are to be installed.

- 26 1. Move resilient products and installation materials into spaces where they will be
27 installed at least 48 hours in advance of installation.

- 28 E. Sweep and vacuum clean substrates to be covered by resilient products immediately before
29 installation.

- 30 F. Install and provide a vapor barrier compatible with the flooring and substrate to achieve
31 maximum adhesion without the transmission of vapor.

32 3.3 FLOOR TILE INSTALLATION

- 33 A. Comply with manufacturer's written instructions for installing floor tile.

- 34 B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets,
35 so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut
36 widths that equal less than one-half tile at perimeter.

- 37 1. Lay tiles square with room axis.

- 38 C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as
39 manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed
40 tiles.

- 41 1. Lay tiles with grain direction alternating in adjacent tiles (basket-weave pattern).

- 42 D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures
43 including built-in furniture, cabinets, pipes, outlets, and door frames.

- 44 E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles
45 to center of door openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent, nonstaining marking device.

G. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.4 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of floor tile.

B. Perform the following operations immediately after completing floor tile installation:

1. Remove adhesive and other blemishes from exposed surfaces.
2. Sweep and vacuum surfaces thoroughly.
3. Damp-mop surfaces to remove marks and soil.

C. Protect floor tile products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Floor Polish: Remove soil, visible adhesive, and surface blemishes from floor tile surfaces before applying liquid floor polish.

1. Apply one coat.

E. Cover floor tile until Project completion.

3.5 MATERIAL FINISH SCHEDULE

A. SVF-1

1. Manufacturer: Johnsonite Optima
2. Color: 904 Camouflage

B. SVF-2

1. Manufacturer: Shaw Biolife
2. Color: 001V-Oats 01013

END OF SECTION 09 65 19

1 SECTION 09 67 23 - RESINOUS FLOORING

2 PART 1 - GENERAL

3 1.1 GENERAL REQUIREMENTS

- 4 A. Drawings and Conditions of Contract, including General and Supplementary Conditions and
5 Division 1 Administration Sections, apply to this Division.

6 1.2 SUMMARY

- 7 A. This Section includes resinous flooring systems with epoxy body coat(s).

- 8 1. Application Method: Trowel-applied slurry with broadcast aggregates.

- 9 B. Related Sections include the following:

- 10 1. Division 07 92 00 Section "Joint Sealants" for sealants installed at joints in resinous
11 flooring systems.

12 1.3 SUBMITTALS

- 13 A. Product Data: For each type of product indicated. Include manufacturer's technical data,
14 application instructions, and recommendations for each resinous flooring component required.

- 15 B. Samples for Initial Selection.

- 16 C. Installer Certificates: Signed by manufacturer certifying that installers comply with specified
17 requirements.

- 18 D. Material Test Reports: For each resinous flooring component.

- 19 E. Maintenance Data: For resinous flooring to include in maintenance manuals.

20 1.4 QUALITY ASSURANCE

- 21 A. Installer Qualifications: Engage an experienced installer (applicator) who is experienced in
22 applying resinous flooring systems similar in material, design, and extent to those indicated for
23 this Project, whose work has resulted in applications with a record of successful in-service
24 performance, and who is acceptable to resinous flooring manufacturer.

- 25 1. Engage an installer who employs only persons trained and approved by resinous
26 flooring manufacturer for applying resinous flooring systems indicated.

- 27 B. Source Limitations: Obtain primary resinous flooring materials, including primers, resins,
28 hardening agents, grouting coats, and aggregate, through one source from a single
29 manufacturer. Provide secondary materials, including patching and fill material, joint sealant,
30 and repair materials, of type and from source recommended by manufacturer of primary
31 materials.

- 32 C. Federal Agency Approvals: Where indicated, provide resinous flooring systems approved by
33 the USDA for use indicated.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storage and mixing with other components.

B. Store materials to prevent deterioration from moisture, heat, cold, direct sunlight, or other detrimental effects.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Comply with resinous flooring manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous flooring application.

B. Close spaces to traffic during resinous flooring application and for not less than 24 hours after application, unless manufacturer recommends a longer period.

PART 2 - PRODUCTS

2.1 RESINOUS FLOORING (RF)

A. Basis of Design Product: Subject to compliance with requirements provide Prime Cast 2410 as manufactured by Prime Coat (Basis of Design) or a comparable product by one of the following:

1. Sherwin-Williams Company, FasTop.
2. Stonhard, Stonclad UT.

B. System Characteristics:

1. Color and Pattern: Grey
2. Wearing Surface: Textured for slip resistance.
3. Integral Cove Base: 4 inches high.
4. Overall System Thickness: 1/4 inch minimum.
5. Federal Agency Approvals: USDA approved for food-processing environments.

C. System Components: Manufacturer's standard components that are compatible with each other and as follows:

1. Base Coat:
 - a. Urethane Mortar.
 - b. Application Method: Primer (cove), Binders, Aggregate, Primer Sealer, Binder Resin, Self-leveling slurry with aggregates, and seal coat.
 - c. Aggregates: Colored quartz.
2. Primer: Type recommended by manufacturer for substrate as required.
3. Sealcoat: UV-resistant sealing coat.
 - a. Resin: Urethane
 - b. Type: Pigmented.
 - c. Finish: Gloss.
 - d. Number of Coats: One.

D. System Physical Properties: Provide resinous flooring system with the following minimum physical property requirements when tested according to test methods indicated:

1. Compressive Strength: 5,000 PSI per ASTM C 579, minimum.
2. Tensile Strength: 550 PSI per ASTM C 307, minimum.
3. Flexural Modulus of Elasticity: 3.7 x 10³ PSI per ASTM C 580.
4. Water Absorption: 0 per ASTM C 413.
5. Coefficient of Thermal Expansion: 1.1 x 10⁻⁵ mm/mm degrees C per ASTM C 531.
6. Impact Resistance: Impact Resistance: No chipping, cracking, or delamination and not more than 1/16-inch permanent indentation from 16 ft lbs per MIL-D-3134.
7. Abrasion Resistance: mg maximum weight loss per ASTM D 4060.
8. Flammability: Self-extinguishing per ASTM D 635.
9. Hardness: 75, Shore D per ASTM D 2240.
10. Service Temperature: -50°F - 300°F at 3/16"

2.2 ACCESSORY MATERIALS

- A. Primer: Type recommended by manufacturer for substrate and body coats indicated.
- B. Waterproofing Membrane: Type recommended by manufacturer for substrate and primer and body coats indicated.
- C. Patching and Fill Material: Resinous product of or approved by resinous flooring manufacturer and recommended by manufacturer for application indicated.

PART 3 - EXECUTION

3.1 PREPARATION

- A. General: Prepare and clean substrates according to resinous flooring manufacturer's written instructions for substrate indicated. Provide clean, dry, and neutral Ph substrate for resinous flooring application.
- B. Concrete Substrates: Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with resinous flooring.
 1. If substrate is unacceptable, roughen concrete as follows:
 - a. Shot-blast surfaces with an apparatus that abrades the concrete surface, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup.
 2. Repair damaged and deteriorated concrete according to resinous flooring manufacturer's written recommendations.
 3. For applying impermeable resinous flooring systems, 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) of slab in 24 hours is generally considered a safe moisture-vapor-emission rate. Consult manufacturers for appropriate rates for permeable systems that will allow moisture vapor to continue through them once cured.
 4. Verify that concrete substrates are dry and moisture-vapor emissions are within acceptable levels according to manufacturer's written instructions, or per one of the following:
 - a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with application of resinous flooring only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. of slab area in 24 hours.
 5. Alkalinity and Adhesion Testing: Verify that concrete substrates have pH within acceptable range. Perform tests recommended by manufacturer. Proceed with application only after substrates pass testing.
 6. Install and provide a vapor barrier compatible with the flooring and substrate to achieve maximum adhesion without the transmission of vapor.

- 1 C. Resinous Materials: Mix components and prepare materials according to resinous flooring
2 manufacturer's written instructions.
- 3 D. Use patching and fill material to fill holes and depressions in substrates according to
4 manufacturer's written instructions.
- 5 E. Treat control joints and other nonmoving substrate cracks to prevent cracks from reflecting
6 through resinous flooring according to manufacturer's written recommendations.

7 3.2 APPLICATION

- 8 A. General: Apply components of resinous flooring system according to manufacturer's written
9 instructions to produce a uniform, monolithic wearing surface of thickness indicated.
- 10 1. Coordinate application of components to provide optimum adhesion of resinous flooring
11 system to substrate, and optimum intercoat adhesion.
- 12 2. Cure resinous flooring components according to manufacturer's written instructions.
13 Prevent contamination during application and curing processes.
- 14 3. At substrate expansion and isolation joints, provide joint in resinous flooring to comply
15 with resinous flooring manufacturer's written recommendations.
- 16 B. Apply primer over prepared substrate at manufacturer's recommended spreading rate.
- 17 C. Integral Cove Base: Apply cove base mix to wall surfaces before applying flooring. Apply
18 according to manufacturer's written instructions and details including those for taping, mixing,
19 priming, troweling, sanding, and topcoating of cove base. Round internal and external
20 corners.
- 21 D. Apply self-leveling slurry body coats in thickness indicated for flooring system.
- 22 1. Broadcast aggregates at rate recommended by manufacturer and, after resin is cured,
23 remove excess aggregates to provide surface texture indicated.
- 24 E. Apply troweled or screeded body coats in thickness indicated for flooring system. Hand or
25 power trowel and grout to fill voids. When cured, remove trowel marks and roughness using
26 method recommended by manufacturer.
- 27 F. Apply grout coat, of type recommended by resinous flooring manufacturer, to fill voids in
28 surface of final body coat and to produce wearing surface indicated.
- 29 G. Apply topcoats in number indicated for flooring system and at spreading rates recommended
30 in writing by manufacturer.

31 3.3 CLEANING AND PROTECTING

- 32 A. Protect resinous flooring from damage and wear during the remainder of construction period.
33 Use protective methods and materials, including temporary covering, recommended in writing
34 by resinous flooring manufacturer.

35 END OF SECTION 09 67 23
36

1 SECTION 09 68 13 - TILE CARPETING

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY

- 7 A. Section includes modular, looped, bonded carpet tile.

- 8 B. Related Requirements:

- 9 1. Division 09 Section "Resilient Base and Accessories" for resilient wall base and
10 accessories installed with carpet tile.

11 1.3 PREINSTALLATION MEETINGS

- 12 A. Preinstallation Conference: Conduct conference at Project site.

- 13 1. Review methods and procedures related to carpet tile installation including, but not
14 limited to, the following:
15 a. Review delivery, storage, and handling procedures.
16 b. Review ambient conditions and ventilation procedures.
17 c. Review subfloor preparation procedures.

18 1.4 ACTION SUBMITTALS

- 19 A. Product Data: For each type of product.

- 20 1. Include manufacturer's written data on physical characteristics, durability, and fade
21 resistance.
22 2. Include installation recommendations for each type of substrate.

- 23 B. Shop Drawings: Show the following:

- 24 1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where
25 cutouts are required in carpet tiles.
26 2. Carpet tile type, color, and dye lot.
27 3. Type of subfloor.
28 4. Type of installation.
29 5. Pattern type, location, and direction.
30 6. Pile direction.
31 7. Type, color, and location of edge, transition, and other accessory strips.
32 8. Transition details to other flooring materials.

- 33 C. Samples: For each of the following products and for each color and texture required. Label
34 each Sample with manufacturer's name, material description, color, pattern, and designation
35 indicated on Drawings and in schedules.

- 36 1. Carpet Tile: Full-size Sample.
37 2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch- (300-mm-) long
38 Samples.

- 39 D. Product Schedule: For carpet tile. Use same designations indicated on Drawings. Coordinate.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For carpet tile, for tests performed by a qualified testing agency.
- C. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:
 - 1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
 - 2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is certified by the International Certified Floorcovering Installers Association at the Commercial II certification level.
- B. Fire-Test-Response Ratings: Where indicated, provide carpet tile identical to those of assemblies tested for fire response according to NFPA 253 by a qualified testing agency.
- C. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 - 1. Build mockups at locations and in sizes shown on Drawings.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Project completion.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Comply with CRI 104.

1.10 FIELD CONDITIONS

- A. Comply with CRI 104 for temperature, humidity, and ventilation limitations.
- B. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at occupancy levels during the remainder of the construction period.
- C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.
- D. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

1.11 WARRANTY

- A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.
1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
 2. Failures include, but are not limited to, more than 10 percent edge raveling, snags, runs, dimensional stability, excess static discharge, loss of tuft bind strength, loss of face fiber, and delamination.
 3. Warranty Period: 10 years from date of Completion.

PART 2 - PRODUCTS

2.1 CARPET TILE – Refer to drawing **A13.1** for locations.

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Tandus and Mohawk carpet tile:
1. CPT-1: Mohawk Character Lines GT-099 – 231 Industrial Patina
 2. CPT-2: Tandus Assertive Stria 04839 – Chromium 26201
- B. Subject to compliance with requirements, provide Interface, or approved equal by one of the following:
1. Shaw.
 2. Tandus C & A.
 3. Masland Modular.
 4. Chaw Malang EW24.
 5. Mohawk
- C. Pattern: Match Architect's samples.
- D. Fiber Content: TBD
- E. Fiber Type: TBD
- F. Pile Characteristic: TBD .
- G. Pile Density: TBD .
- H. Pile Thickness: TBD .
- I. Stitches: TBD .
- J. Gage: TBD
- K. Primary Backing/Backcoating: Manufacturer's standard composite materials.
- L. Secondary Backing: Manufacturer's standard material.
- M. Size: 24 inch by 24 inch.
- N. Applied Soil-Resistance Treatment: Manufacturer's standard material.
- O. Antimicrobial Treatment: Manufacturer's standard material

P. Performance Characteristics: As follows:

1. Appearance Retention Rating: Heavy traffic, 3.0 minimum according to ASTM D 7330.
2. Critical Radiant Flux Classification: Not less than 0.45 W/sq. cm.
3. Dry Breaking Strength: Not less than 100 lbf (445 N) according to ASTM D 2646.
4. Tuft Bind: TBD .
5. Delamination: Not less than 4 lbf/in. according to ASTM D 3936.
6. Dimensional Tolerance: Within 1/32 inch of specified size dimensions, as determined by physical measurement.
7. Dimensional Stability: 0.2 percent or less according to ISO 2551 (Aachen Test).
8. Resistance to Insects: Comply with AATCC 24.
9. Noise Reduction Coefficient (NRC): .50 NRC according to ASTM C 423.
10. Colorfastness to Crocking: Not less than 4, wet and dry, according to AATCC 165.
11. Colorfastness to Light: Not less than 4 after 40 AFU (AATCC fading units) according to AATCC 16, Option E.
12. Antimicrobial Activity: Not less than 2-mm halo of inhibition for gram-positive bacteria, not less than 1-mm halo of inhibition for gram-negative bacteria, and no fungal growth, according to AATCC 174.
13. Electrostatic Propensity: Less than 3.5 kV according to AATCC 134.
14. Emissions: Provide carpet tile that complies with testing and product requirements of CRI's "Green Label Plus" program.

2.2 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.
- B. Adhesives: Water-resistant, mildew-resistant, non-staining, pressure-sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and is recommended by carpet tile manufacturer for releasable installation.
1. Adhesives shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Metal Edge/Transition Strips: Extruded aluminum with mill finish of profile and width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance. Examine carpet tile for type, color, pattern, and potential defects.
- B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:
1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by carpet tile manufacturer.
 2. Subfloor finishes comply with requirements specified in Division 03 Section "Cast-in-Place Concrete" for slabs receiving carpet tile.
 3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.

- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General: Comply with CRI 104, Section 6.2, "Site Conditions; Floor Preparation," and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile installation.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch wide or wider and protrusions more than 1/32 inch unless more stringent requirements are required by manufacturer's written instructions.
- C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet tile manufacturer.
- D. Clean metal substrates of grease, oil, soil and rust, and prime if directed by adhesive manufacturer. Rough sand painted metal surfaces and remove loose paint. Sand aluminum surfaces, to remove metal oxides, immediately before applying adhesive.
- E. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.3 INSTALLATION

- A. General: Comply with CRI 104, Section 14, "Carpet Modules," and with carpet tile manufacturer's written installation instructions.
- B. Installation Method: Glue down; install every tile with full-spread, releasable, pressure-sensitive adhesive.
- C. Maintain dye lot integrity. Do not mix dye lots in same area.
- D. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, and threshold. Bind or seal cut edges as recommended by carpet tile manufacturer.
- E. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.
- G. Install pattern parallel to walls and borders.

3.4 CLEANING AND PROTECTION

- A. Perform the following operations immediately after installing carpet tile:
1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet tile manufacturer.
 2. Remove yarns that protrude from carpet tile surface.
 3. Vacuum carpet tile using commercial machine with face-beater element.
- B. Protect installed carpet tile to comply with CRI 104, Section 16, "Protecting Indoor Installations."

- 1 C. Protect carpet tile against damage from construction operations and placement of equipment
 - 2 and fixtures during the remainder of construction period. Use protection methods indicated or
 - 3 recommended in writing by carpet tile manufacturer.
 - 4
-
- 5 END OF SECTION 09 68 13

1 SECTION 09 69 00 - ACCESS FLOORING

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY

- 7 A. Section Includes:

- 8 1. Access-flooring panels.
9 2. Floor panel coverings.

- 10 B. Related Requirements:

- 11 1. Section 26 05 26 "Grounding and Bonding for Electrical Systems" for connection to
12 ground of access-flooring understructure.

13 1.3 UNIT PRICES

- 14 A. Work of this Section is affected by cutouts in floor panels and service outlets.

15 1.4 COORDINATION

- 16 A. Coordinate location of mechanical and electrical work in underfloor cavity to prevent
17 interference with access-flooring pedestals.

- 18 B. Mark pedestal locations on subfloor using a grid to enable mechanical and electrical work to
19 proceed without interfering with access-flooring pedestals.

20 1.5 PREINSTALLATION MEETINGS

- 21 A. Pre-installation Conference: Conduct conference at Project site.

- 22 1.

23 1.6 ACTION SUBMITTALS

- 24 A. Product Data: For each type of product.

- 25 B. Shop Drawings: Include layout of access-flooring system and relationship to adjoining Work
26 based on field-verified dimensions.

- 27 1. Details and sections with descriptive notes indicating materials, finishes, fasteners,
28 typical and special edge conditions, accessories, and understructures.

- 29 C. Samples:

- 30 1. Floor Covering: Full-size units for each color and texture specified.
31 2. Exposed Metal Accessories: Approximately 10 inches in length.
32 3. One complete full-size floor panel, pedestal, and understructure unit for each type of
33 access-flooring system required.

D. Samples for Initial Selection: For each type of product and exposed finish.

E. Samples for Verification: For the following products:

1. Floor Covering: Full-size units.
2. Exposed Metal Accessories: Approximately 10 inches in length.
3. One complete full-size floor panel, pedestal, and understructure unit for each type of access-flooring system required.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates: For each type of access-flooring system.

C. Product Test Reports: For each type of flooring material and exposed finish, for tests performed by a qualified testing agency.

D. Seismic Design Calculations: For seismic design of access-flooring systems including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

E. Preconstruction Test Reports: For preconstruction adhesive field test.

1.8 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Flooring Panels: 3 panels
2. Pedestals: 12 pedestals
3. Stringers: 12 stringers.

1.9 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

B. Mockups: Build mockups to verify selections made under Sample submittals to demonstrate aesthetic effects and to set quality standards for materials and execution.

1. Build mockup of typical access-flooring assembly as shown on Drawings. Size to be an area no fewer than five floor panels in length by five floor panels in width.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Project completion.

1.10 FIELD CONDITIONS

A. Environmental Limitations: Do not install access flooring until spaces are enclosed, subfloor has been sealed, ambient temperature is between 50 and 90 deg F, and relative humidity is not less than 20 and not more than 70 percent.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Access flooring shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- B. Structural Performance: Provide access-flooring systems capable of complying with the following performance requirements according to testing procedures in CISCA's "Recommended Test Procedures for Access Floors":
1. Concentrated Loads: 2000 lbf with the following deflection and permanent set:
 - a. Top-Surface Deflection: 0.10 inch.
 - b. Permanent Set: 0.010 inch.
 2. Ultimate Loads: 4000 lbf.
 3. Rolling Loads: With local or overall deformation not to exceed 0.040 inch.
 - a. CISCA Wheel 1: 10 passes at 2000 lbf.
 - b. CISCA Wheel 2: 10,000 passes at 1000 lbf.
 4. Stringer Load Test: 350 lbf at center of span with a permanent set not to exceed 0.010 inch.
 5. Pedestal Axial Load Test: 5000 lbf.
 6. Pedestal Overturning Moment Test: 1000 lbf x inches.
 7. Uniform Load Test: 500 lbf/sq. ft. with a maximum top-surface deflection not to exceed 0.040 inch and a permanent set not to exceed 0.010 inch.
 8. Drop Impact Load Test: 150 lb.
- C. Fire Performance:
1. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 50 or less.
 2. Combustion Characteristics: ASTM E 136.

2.2 MANUFACTURERS [TO BE WRITTEN AROUND GRIDD SYSTEM BY FREEAXEZ] AFS
(access floor systems)

- A. Source Limitations: Obtain access-flooring system from single source from single manufacturer.

2.3 FLOOR PANELS

- A. Floor Panels, General: Provide modular panels interchangeable with other field panels without disturbing adjacent panels or understructure.
1. Size:
 2. Attachment to Understructure: By gravity.
- B. Unfilled Steel Panels: Fabricated from cold-rolled steel sheet, with the die-cut flat top sheet and die-formed and stiffened bottom pan welded together, and with metal surfaces protected against corrosion by manufacturer's standard factory-applied finish.

1. Basis of Design Manufacturer: Subject to compliance Freeaxe Gridd Power system requirements, or similar products by one of the following:
 - a. ASM Modular Systems, Inc.
 - b. Computer Environments, Inc.
 - c. Haworth, Inc.
 - d. Tate Access Floors, Inc.
2. Solid Panels: Flat, solid top surface.
3. Plated Finish: Nickel-chrome electrodeposited plating, 0.000005-inch chrome over 0.0008-inch nickel, without copper or brass strike, to produce complete coverage over significant surfaces with a matte metallic appearance.

2.4 FLOOR PANEL COVERINGS

- A. Conductive Vinyl Tile: Factory applied, ASTM F 1700, Class I (Monolithic Vinyl Tile), Type A (Smooth Surface), fabricated in one piece to cover panel face with monolithic edging.
 1. Electrical Resistance: Average no less than 25,000 ohms and no more than 1 megohm when installed floor coverings are surface-to-ground tested according to ASTM F 150 with 100-V applied voltage.
 2. Colors, Textures, and Patterns: [As indicated by manufacturer's designations] [Match Architect's samples] [As selected by Architect from manufacturer's full range] <Insert colors, textures, and patterns>.

2.5 FABRICATION

- A. Fabrication Tolerances:
 1. Size: Plus or minus 0.020 inch of required size.
 2. Squareness: Plus or minus 0.015 inch between diagonal measurements across top of panel.
 3. Flatness: Plus or minus 0.035 inch, measured on a diagonal on top of panel.
- B. Panel Markings: Clearly and permanently mark floor panels on their underside with panel type and concentrated-load rating.
- C. Bolted Panels: Provide panels with holes drilled in corners to align precisely with threaded holes in pedestal heads and to accept countersunk screws with heads flush with top of panel.
 1. Captive Fasteners: Provide fasteners held captive to panels.
- D. Cutouts: Fabricate cutouts in floor panels for cable penetrations and service outlets. Provide reinforcement or additional support, if needed, to make panels with cutouts comply with structural performance requirements.
 1. Number, Size, Shape, and Location: [As indicated.] [As specified in Section 012100 "Allowances" and Section 012200 "Unit Prices."]
 2. Grommets: Where indicated, fit cutouts with manufacturer's standard grommets; or, if size of cutouts exceeds maximum grommet size available, trim edge of cutouts with manufacturer's standard plastic molding with tapered top flange. **[Furnish removable covers for grommets.]**
 3. Provide foam-rubber pads for sealing annular space formed in cutouts by cables.

2.6 ACCESSORIES

- A. Post-Installed Anchors: For anchoring pedestal bases to subfloor, provide four post-installed expansion anchors or threaded concrete screws made from carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (5 microns) for Class SC 1 (Mild), with the capability to sustain, without failure, a load equal to 1.5 times the loads imposed by pedestal overturning moment on fasteners, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
- B. Service Outlets: Standard UL-listed and -labeled assemblies, for recessed mounting flush with top of floor panels; for power, communication, and signal services; and complying with the following requirements:
1. Structural Performance: Cover capable of supporting a 1000-lbf concentrated load.
 2. Cover and Box Type: Hinged polycarbonate cover with opening for passage of cables when cover is closed and including frame and steel box or formed-steel plate for mounting electrical receptacles.
 3. Location: In center of panel quadrant unless otherwise indicated.
 4. Receptacles and Wiring: Electrical receptacles and wiring for service outlets are specified elsewhere.
 5. Receptacles and Wiring: Equip each service outlet with power receptacles to comply with the following requirements:
 - a. Type of Receptacle: Heavy-duty duplex, two-pole, three-wire grounding, 20 A, 125 V, NEMA WD 6, Configuration 5-20R unless otherwise indicated.
 - b. Number of Receptacles for Outlet: Two.
 - c. Wiring Method: Factory wired for hardwiring in field with armored cable, containing three insulated No. 12 AWG solid-copper conductors, terminated with a 6-inch-long pigtail.
 - d. Wiring Method: Power-in connectors, built into outlet housing, of type to fit power-in and power-out connectors of branch-circuit cables supplied with building electrical system.
- C. Closures: Where underfloor cavity is not enclosed by abutting walls or other construction, provide metal-closure plates with manufacturer's standard finish.
- D. Ramps: Manufacturer's standard ramp construction of width and slope indicated, but not steeper than 1:12, with raised-disc or textured rubber or vinyl-tile floor coverings, and of same materials, performance, and construction requirements as access flooring.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer and manufacturer's representative present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
1. Verify that substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, foreign deposits, and debris that might interfere with attachment of pedestals.
 2. Verify that concrete floor sealer and finish have been applied and cured.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

1 3.2 PREPARATION

- 2 A. Lay out floor panel installation to keep the number of cut panels at floor perimeter to a minimum.
3 Avoid using panels cut to less than 6 inches.

4 3.3 INSTALLATION

- 5 A. Install access-flooring system and accessories under supervision of access-flooring
6 manufacturer's authorized representative to produce a rigid, firm installation that complies with
7 performance requirements and is free of instability, rocking, rattles, and squeaks.

- 8 B. Adhesive Attachment of Pedestals: Set pedestals in adhesive, according to access-flooring
9 manufacturer's written instructions, to provide full bearing of pedestal base on subfloor.

- 10 C. Mechanical Attachment of Pedestals: Attach pedestals to subfloor with post-installed
11 mechanical anchors.

- 12 D. Scribe perimeter panels to provide a close fit with adjoining construction with no voids greater
13 than 1/8 inch where panels abut vertical surfaces.

- 14 1. To prevent dusting, seal cut edges of steel-encapsulated, wood-core panels with sealer
15 recommended in writing by panel manufacturer.

- 16 E. Cut and trim access flooring and perform other dirt-or-debris-producing activities at a remote
17 location or as required to prevent contamination of subfloor under already-installed access
18 flooring.

- 19 F. Grounded Flooring Access Panel Systems: Ground flooring system as recommended by
20 manufacturer and as needed to comply with performance requirements for electrical resistance
21 of floor coverings.

- 22 1. Panel-to-Understructure Resistance: Not more than 10 ohms as measured without floor
23 coverings.

- 24 G. Closures: Scribe closures to closely fit against subfloor and adjacent finished-floor surfaces. Set
25 in mastic and seal to maintain plenum effect within underfloor cavity.

- 26 H. Clean dust, dirt, and construction debris caused by floor installation, and vacuum subfloor area
27 as installation of floor panels proceeds.

28 3.4 PROTECTION

- 29 A. After completing installation, vacuum access flooring and cover with continuous sheets of
30 reinforced paper or plastic. Maintain protective covering until time of Project completion.

- 31 B. Replace access-flooring panels that are stained, scratched, or otherwise damaged or that do
32 not comply with specified requirements.

33 END OF SECTION 09 69 00

SECTION 09 82 00 – ACOUSTICAL WALL TREATMENT

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. Section Includes: Cementitious wood fiber plank acoustical Wall panel system and Baffles and installation accessories.

1.2 SUMMARY

- A. Section includes surface preparation and application of fire-retardant intumescent paint to interior items exposed to view and exterior items and surfaces.

B. Related Sections:

1. Division 9 Sections: Acoustical Suspension
2. Division 9 Sections: Acoustical Ceilings.

1.3 ACTION SUBMITTALS

- A. Product Data: Submit manufacturer's product data and installation instructions.

1. Recommended procedures for normal cleaning and removal of stains including precautions in use of cleaning materials that may be detrimental to surfaces.

- B. Samples: Submit selection and verification samples: 6 inch × 6 inch sample for each wall panel unit required, showing full range of exposed texture to be expected in completed work and one 8 inch × 10 inch sample for each fabric color is available.

1.4 INFORMATIONAL SUBMITTALS

1. Test Reports: Upon request, submit certified test reports from recognized test laboratories.
2. Certificates: Submit manufacturer's certificate that products meet or exceed specified requirements.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Extra Materials: Furnish additional materials, from the same product run, that matches products installed for use by owner in building maintenance and repair.

- B. Provide new unopened cartons of extra materials, packaged with protective covering for storage, identified with appropriate labels.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Utilize an installer having demonstrated experience on projects of similar size and complexity.

1. Regulatory Requirements and Approvals: Comply with requirements below.

1. International Code Council (ICC):

- a. ICC-ES Evaluation Report ESR-1112.

2. State of California:

- a. DSA Number PA-008.

3. Underwriters' Laboratories of Canada (ULC) label.

- a. Structural Cement-Fiber Unit-535X

- C. Pre-installation Meetings: at the project site.

1.7 REFERENCES

- A. ASTM International:

1. ASTM C635 Standard Specification for the Manufacture, Performance, and Testing of Metal Sus-

- 1 pension Systems for Acoustical Tile and Lay-in Panel Ceilings.
- 2 2. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.
- 3 3. ASTM E1264 Standard Classification for Acoustical Ceiling Products.
- 4 B. Ceilings and Interior Systems Construction Association (CISCA):
- 5 1. CISCA Code of Practices.
- 6 1.8 DELIVERY, STORAGE, AND HANDLING
- 7 A. General: Comply with Division 1 Product Requirement Section.
- 8 B. Storage and Protection: Store materials protected from exposure to harmful environmental
- 9 conditions and at temperature and humidity conditions recommended by the manufacturer.
- 10 1. Prevent soiling, physical damage or wetting.
- 11 2. Store cartons open at each end to stabilize moisture content and temperature.
- 12 1.9 PROJECT CONDITIONS
- 13 A. Environmental Requirements:
- 14 1. Do not install acoustical panels until building is closed in and HVAC system is operational.
- 15 2. Locate materials onsite at least 24 hours before beginning installation to allow materials to reach
- 16 temperature and moisture content equilibrium.
- 17 3. Maintain the following conditions in areas where acoustical materials are to be installed 24 hours be-
- 18 fore, during and after installation:
- 19 a. Relative Humidity: 65 - 75%.
- 20 b. Uniform Temperature: 55 - 70 degrees F (13 - 21 degrees C).

PART 2 - PRODUCTS

- 22 2.1 ACOUSTICAL WALL PANEL SYSTEM (AWP-1)
- 23 (AWP-2) Acoustical Wall Panel System High Impact Acoustical Panel (HIAPS-3) Guilford of
- 24 Main FR701 2100-Dune 749 (Working Walls Solutions Manufacture)
- 25 (AWP-3) Acoustical Wall Panel System High Impact Acoustical Panel (HIAPS-3) Guilford of
- 26 Main FR701 2100-Cement Mix (Working Walls Solutions Manufacture)
- 27
- 28 A. Manufacturer: Tectum Inc. (AWP-1)
- 29 1. Contact: 105 South Sixth Street, Newark, OH 43055; Telephone: (888) 977-9691, (740) 345-9691;
- 30 Fax: (800) 832-8869; E-mail: info@tectum.com; website: www.tectum.com.
- 31
- 32 B. Proprietary Systems. Acoustical Wall panel system:
- 33 2. Tectum Correctional Panel Wall System: (total thickness of 2-1/2")
- 34 a. Panel Material: Aspen wood fibers bonded with inorganic hydraulic cement.
- 35 b. Backing: 24 gauge galvanized steel laminated.
- 36 c. Flamespread: Conforms to ASTM E1264.
- 37 d. Panel Thickness: 1 inch.
- 38 e. Panel Width: 24 inches or 48 inches as indicated.
- 39 f. Panel Length: Specify length from 48 inches – 120 inches in 1 inch increments, and as shown

on the plans.

g. Mounting Style: C-40 Provide all fasteners, furring strips and OCF 703 fiberglass insulation for a complete single source installation.

h. Continuous Perimeter Channel: 8 gauge aluminum with 2" perimeter.

2.2 ACCESSORIES

A. Provide accessories as follows:

1. Torx Tamper-Resistant Screws:

a. Material: Steel.

b. Length: 2¾ inches.

c. Color: White.

2.3 ACOUSTICAL CEILING PANEL SYSTEM (ACP)

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

A. Comply with the instructions and recommendations of the acoustical wall panel system manufacturer.

B. Install materials in accordance with governing regulations, fire resistance rating requirements and industry standards applicable to work.

1. Comply with CISCA Code of Practices.

3.2 EXAMINATION

A. Site Verification of Conditions:

1. Examine surfaces scheduled to receive suspended or directly attached acoustical units for unevenness, irregularities and dampness that would affect quality and execution of work.

2. Do not proceed with installation of wall panel system until unacceptable conditions are corrected.

3.3 INSTALLATION

A. Screw head to be flush with panel surface.

B. Screw placement every 24 inches on center.

3.4 CLEANING

A. Clean exposed surfaces of acoustical panel, trim, moldings and suspension members to comply with manufacturer's instructions for cleaning.

B. Touch up any minor finish damage.

C. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

3.5 PROTECTION

A. Protect installed work from damage due to subsequent construction activity, including temperature and humidity limitations and dust control, so that the work will be without damage and deterioration at the time of acceptance by the Owner.

END OF SECTION 09 82 00

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1 SECTION 09 91 13 - EXTERIOR PAINTING

2 PART 1 - GENERAL

3 1.1 GENERAL REQUIREMENTS

- 4 A. Drawings and Conditions of Contract, including General and Supplementary Conditions and
5 Division 1 Administration Sections, apply to this Division.

6 1.2 SUMMARY

- 7 A. This Section includes surface preparation and the application of paint systems on the following
8 exterior substrates:

- 9 1. Concrete
10 2. Concrete masonry units (CMU).
11 3. Steel.
12 4. Galvanized metal.

- 13 B. Related Sections include the following:

- 14 1. Division 05 Sections for shop priming of metal substrates with primers specified in this
15 Section.
16 2. Division 08 Sections for factory priming windows and doors with primers specified in this
17 Section.
18 3. Division 09 96 01 painting Sections for special-use and high-performance coatings.
19 4. Division 09 91 23 Section "Interior Painting" for surface preparation and the application
20 of paint systems on interior substrates.

21 1.3 ACTION SUBMITTALS

- 22 A. Product Data: For each type of product indicated. Include listing of VOC content and chemical
23 components.
24 B. Samples for Initial Selection: For each type of topcoat product indicated.
25 C. Product List: For each product indicated, include the following:
26 1. Cross-reference to paint system and locations of application areas. Use same
27 designations indicated on Drawings and in schedules.
28 2. Printout of current "MPI Evaluation of Exterior Systems" for each product category
29 specified in Part 2.

30 1.4 MAINTENANCE MATERIAL SUBMITTALS

- 31 A. Furnish extra materials, from the same product run, that match products installed and that are
32 packaged with protective covering for storage and identified with labels describing contents.
33 1. Paint: 5 percent, but not less than 1 gal. of each material and color applied.
34 2. Literature: At completion of Work of this Section, submit the following schedules for
35 inclusion in O&M Manuals.
36 a. System description for system used on each substrate.
37 b. Color and sheen.
38 c. Material safety data sheets.
39 d. Care and maintenance instructions for painted surfaces.

40 1.5 QUALITY ASSURANCE

- 41 A. MPI Standards:

1. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.7 PROJECT CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Benjamin Moore & Co.
2. PPG Architectural Finishes, Inc.
3. Pratt & Lambert Paints.
4. Sherwin-Williams Company (The). (Basis of Design)

2.2 PAINT, GENERAL

- A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

- B. VOC Content: Provide materials that comply with VOC limits of authorities having jurisdiction.

- C. Colors: As selected by Architect from manufacturer's full range

2.3 BLOCK FILLERS

- A. Interior/Exterior Latex Block Filler:

1. Basis of Design: Sherwin Williams; Heavy Duty Block Filler, B42W46
2. VOC Content (maximum): 100 g/L.

2.4 PRIMERS/SEALERS

- A. Alkali-Resistant Primer:

1. Basis of Design: Sherwin-Williams; Loxon, Acrylic Primer A24W300.
2. VOC Content: E Range of E3.

2.5 METAL PRIMERS

- A. Rust-Inhibitive Metal Primer:

1. Basis of Design: Sherwin Williams Pro Industrial Pro-Cryl Universal Primer, B66-310 Series.
2. VOC Content (maximum): 100 g/L.

2.6 EXTERIOR LATEX PAINTS

A. Exterior Elastomeric Coating:

1. Basis of Design: Sherwin Williams; SherLastic Elastomeric Coating A05-006 Series.
2. VOC Content (maximum): 50 g/L.

B. Exterior Latex (Flat):

1. Basis of Design: Sherwin Williams; A0199 Exterior Latex Flat A6-100 Series.
2. VOC Content (maximum): 50 g/L.

C. Exterior Latex (Semigloss):

1. Basis of Design: Sherwin Williams; Pro Industrial 0 VOC Acrylic B66-650 Series.
2. VOC Content (maximum): 50 g/L.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 1. Masonry (Clay and CMU): 12 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
 1. Verify PH of concrete surfaces.
- D. Proceed with coating application only after unsatisfactory conditions have been corrected.
 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Remove plates, machined surfaces, and similar items already in place that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.
 1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

1. Verify with Contractor that surface meets requirements for surfaces receiving a painted finish as defined in Division 3 Sections for concrete finishes.
- E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content of surfaces or alkalinity of mortar joints to be painted exceed that permitted in manufacturer's written instructions.
- F. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer. but not less than the following:
 1. SSPC-SP 2, "Hand Tool Cleaning."
 2. SSPC-SP 3, "Power Tool Cleaning."
 3. SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
 4. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."
- G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions.
 1. Use applicators and techniques suited for paint and substrate indicated.
 2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
 3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
 4. Paint entire exposed surface of window frames and sashes.
 5. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 6. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
 1. Contractor shall touch up and restore painted surfaces damaged by testing.
 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINTING SCHEDULE

- A. Precast Concrete Substrates:
 - 1. Elastomeric Over Alkali-Resistant Primer System :MPI EXT 3.1F.
 - a. Prime Coat: Alkali-resistant primer.
 - b. Intermediate Coat: Elastomeric matching topcoat.
 - c. Topcoat: Elastomeric.
- B. Concrete Substrates, Nontraffic Surfaces:
 - 1. Latex Over Alkali-Resistant Primer System: MPI EXT 3.1K.
 - a. Prime Coat: Alkali-resistant primer.
 - b. Intermediate Coat: Exterior latex matching topcoat.
 - c. Topcoat: Exterior latex (flat).
- C. CMU Substrates:
 - 1. Latex Over Alkali-Resistant Primer System: MPI EXT 4.2L.
 - a. Prime Coat: Alkali-resistant primer.
 - b. Intermediate Coat: Exterior latex matching topcoat.
 - c. Topcoat: Exterior latex flat.
- D. Steel Substrates:
 - 1. Acrylic System: Similar to MPI EXT 5.1M.
 - a. Prime Coat: Rust-Inhibitive acrylic.
 - b. Intermediate Coat: Exterior latex matching topcoat.
 - c. Topcoat: Exterior latex enamel (semigloss).
- E. Galvanized-Metal Substrates:
 - 1. Latex System: MPI EXT 5.3H.
 - a. Prime Coat: Rust-Inhibitive acrylic primer.
 - b. Intermediate Coat: Exterior latex matching topcoat.
 - c. Topcoat: Exterior latex (semigloss).

3.7 EXTERIOR PAINTING COLOR SCHEDULE

- A. See finish schedule and exterior elevations.
- B. Bollards and Gas Piping.
 - 1. SW6911, Confident yellow.
- C. Exposed Fire Suppression System Piping.
 - 1. SW6867, Fireworks.

1 END OF SECTION 09 91 13

1 SECTION 09 91 23 - INTERIOR PAINTING

2 PART 1 - GENERAL

3 1.1 GENERAL REQUIREMENTS

- 4 A. Drawings and Conditions of Contract, including General and Supplementary Conditions and
5 Division 1 Administration Sections, apply to this Division.

6 1.2 SUMMARY

- 7 A. This Section includes surface preparation and the application of paint systems on the following
8 interior substrates:

- 9 1. Concrete.
- 10 2. Concrete masonry units (CMU).
- 11 3. Steel.
- 12 4. Galvanized metal.
- 13 5. Aluminum (not anodized or otherwise coated).
- 14 6. Wood.
- 15 7. Gypsum board.

- 16 B. Related Sections include the following:

- 17 1. Division 05 Sections for shop priming of metal substrates with primers specified in this
18 Section.
- 19 2. Division 08 Sections for factory priming windows and doors with primers specified in this
20 Section.
- 21 3. Division 09 9113 Section "Exterior Painting" for surface preparation and the application
22 of paint systems on exterior substrates.

23 1.3 ACTION SUBMITTALS

- 24 A. Product Data: For each type of product indicated.

- 25 B. Samples for Initial Selection: For each type of topcoat product indicated.

- 26 C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat
27 indicated.

- 28 1. Submit Samples on rigid backing, 12 inches square.
- 29 2. Step coats on Samples to show each coat required for system.
- 30 3. Label each coat of each Sample.
- 31 4. Label each Sample for location and application area.

- 32 D. Product List: For each product indicated, include the following:

- 33 1. Cross-reference to paint system and locations of application areas. Use same
34 designations indicated on Drawings and in schedules.
- 35 2. Printout of current "MPI Interior systems" for each product category specified in Part 2,
36 with the proposed product highlighted.

37 1.4 MAINTENANCE MATERIAL SUBMITTALS

- 38 A. Furnish extra materials, from the same product run, that match products installed and that are
39 packaged with protective covering for storage and identified with labels describing contents.

- 40 1. Paint: 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.

1.5 QUALITY ASSURANCE

A. MPI Standards:

1. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for paint systems indicated.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).
- B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Benjamin Moore & Co.
2. ICI Paints.
3. PPG Architectural Finishes, Inc.
4. Pratt & Lambert Paints.
5. Sherwin-Williams Company (The). (Basis of Design)

2.2 PAINT, GENERAL

- A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

- A. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction.

1. Flat Paints and Coatings: 50 g/L.
2. Nonflat Paints and Coatings: 150 g/L.
3. Dry-Fog Coatings: 400 g/L.
4. Primers, Sealers, and Undercoaters: 200 g/L.
5. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
6. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
7. Pretreatment Wash Primers: 420 g/L.
8. Floor Coatings: 100 g/L.
9. Shellacs, Clear: 730 g/L.
10. Shellacs, Pigmented: 550 g/L.

- B. Colors: As selected by Architect from manufacturer's full range and As indicated in a color schedule. Colors will be selected to match existing construction.

2.3 BLOCK FILLERS

A. Interior/Exterior Latex Block Filler:

1. Basis of Design: Sherwin Williams; Heavy Duty Block Filler B42W46.

2.4 PRIMERS/SEALERS

A. Interior Latex Primer/Sealer:

1. Basis of Design: Sherwin Williams; ProGreen 200 Interior Latex Primer B28W600.

B. Interior Acrylic Primer/Sealer:

1. Basis of Design: Sherwin Williams; Loxon Block Surfacer A42W200.

2.5 METAL PRIMERS

A. Rust-Inhibitive Acrylic Primer:

1. Basis of Design: Sherwin Williams; Pro Industrial Pro-Cryl Universal Primer B66-310 Series.

2.6 LATEX PAINTS

A. High Performance Architectural Interior Latex (Semigloss):

1. Basis of Design: Sherwin Williams; Pro Industrial 0 Voc Acrylic, B66-650 Series.

2.7 FLOOR COATINGS

A. Exterior/Interior Acrylic Floor Enamel (Gloss):

1. Basis of Design: Sherwin Williams; Porch & Floor Enamel A32-100 Series.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.
2. Masonry (Clay and CMU): 12 percent.
3. Wood: 15 percent.
4. Gypsum Board: 12 percent.

C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

1. Verify ph range of concrete surfaces.

D. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

E. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

F. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
 - 1. Verify with Contractor that surface meets requirements for surfaces receiving a painted finish as defined in Division 3 Sections for concrete finishes.
- E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content of surfaces or alkalinity of mortar joints to be painted exceed that permitted in manufacturer's written instructions.
- F. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:
 - 1. SSPC-SP 2, "Hand Tool Cleaning."
 - 2. SSPC-SP 3, "Power Tool Cleaning."
 - 3. SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
 - 4. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."
- G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- I. Aluminum Substrates: Remove surface oxidation.
- J. Wood Substrates:
 - 1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
 - 2. Sand surfaces that will be exposed to view, and dust off.
 - 3. Prime edges, ends, faces, undersides, and backsides of wood.
 - 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.
- K. Gypsum Board Substrates: Do not begin paint application until finishing compound is dry and sanded smooth.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions.
 - 1. Use applicators and techniques suited for paint and substrate indicated.

2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 3. Paint front and backsides of access panels and doors, removable or hinged covers, and similar hinged items to match exposed surfaces.
 4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
1. Paint the following work where exposed in equipment rooms:
 - a. Uninsulated metal piping.
 - b. Tanks that do not have factory-applied final finishes.
 - c. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 2. Paint the following work where exposed in occupied spaces:
 - a. Equipment, including panelboards.
 - b. Uninsulated metal piping.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Metal conduit.
 - f. Plastic conduit.
 - g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 - h. Other items as directed by Architect.
 3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.
- F. Painting Fire and/or Smoke ratings on Walls: Indicate fire rating and/or smoke rating on all fire and/or smoke rated walls by painting in 2-inch high block lettering the fire and/or smoke rating of the wall as indicated on the code plans in the drawings.
1. Use same designation for wall rating as indicated on the code plans in the drawings, examples as follows:
 - a. Code plan designation "1-C". Wall labeling "1-HOUR CORRIDOR".
 - b. Code plan designation "1-FB". Wall labeling "1-HOUR FIRE BARRIER".
 - c. Code plan designation "1-SB". Wall labeling "1-HOUR SMOKE BARRIER".
 2. Locate painted rating above ceiling line or 12 feet above floor where no ceiling exists.
 - a. Do not paint rating designations of walls inside of cells and dayroom areas.
- 3.4 FIELD QUALITY CONTROL
- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.

1. Contractor shall touch up and restore painted surfaces damaged by testing.
2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

A. Concrete Substrates, Walls and Ceilings:

1. High-Performance Architectural Latex System: MPI INT 3.1C.
 - a. Prime Coat: Interior acrylic primer/sealer.
 - b. Intermediate Coat: High-performance architectural latex matching topcoat.
 - c. Topcoat: High-performance architectural latex (semigloss).

B. Concrete Substrates, Traffic Surfaces:

1. Floor Enamel System: MPI INT 3.2A.
 - a. Prime Coat: Exterior/interior floor enamel (gloss).
 - b. Topcoat: Exterior/interior floor enamel (gloss).

C. CMU Substrates:

1. High-Performance Architectural Latex System: MPI INT 4.2D.
 - a. Prime Coat: Interior/exterior latex block filler.
 - b. Intermediate Coat: High-performance architectural latex matching topcoat.
 - c. Topcoat: High-performance architectural latex (semigloss).

D. Steel Substrates:

1. High-Performance Architectural Latex System: MPI INT 5.1R.
 - a. Prime Coat: Rust inhibitive Acrylic metal primer.
 - b. Intermediate Coat: High-performance architectural latex matching topcoat.
 - c. Topcoat: High-performance architectural latex (semigloss).

E. Galvanized-Metal Substrates:

1. High-Performance Architectural Latex System: MPI INT 5.3M.
 - a. Prime Coat: Rust inhibitive Acrylic metal primer.
 - b. Intermediate Coat: High-performance architectural latex matching topcoat.
 - c. Topcoat: High-performance architectural latex (semigloss).

F. Aluminum (Not Anodized or Otherwise Coated) Substrates:

1. High-Performance Architectural Latex System: MPI INT 5.4F.
 - a. Prime Coat: High-performance architectural latex matching topcoat.
 - b. Topcoat: High-performance architectural latex (semigloss).

G. Dressed Lumber Substrates: Including architectural woodwork

1. High-Performance Architectural Latex System: MPI INT 6.3A.
 - a. Prime Coat: Wood-Knot Sealer.
 - b. Intermediate Coat: High-performance architectural latex matching topcoat.
 - c. Topcoat: High-performance architectural latex (semigloss).
 - H. Wood Panel Substrates: Including painted plywood, medium-density fiberboard, hardboard.
 1. High-Performance Architectural Latex System: MPI INT 6.4S.
 - a. Prime Coat: Wood Knot Sealer.
 - b. Intermediate Coat: High-performance architectural latex matching topcoat.
 - c. Topcoat: High-performance architectural latex (semigloss).
 - I. Gypsum Board Substrates:
 1. High-Performance Architectural Latex System: MPI INT 9.2B.
 - a. Prime Coat: [Interior latex primer/sealer][Vinyl Acrylic Latex coating for Level 5 finish].
 - b. Intermediate Coat: High-performance architectural latex matching topcoat.
 - c. Topcoat: High-performance architectural latex (semigloss).
- 3.7 INTERIOR PAINTING COLOR SCHEDULE
- A. SEE FINISH SCHEDULE
 - B. Gas Piping.
 1. SW6911, Confident yellow.
 - C. Exposed Fire Suppression System Piping and fire/smoke rating lettering on walls.
 1. SW6867, Fireworks.
- END OF SECTION 09 91 23

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1 SECTION 09 96 01 - HIGH-PERFORMANCE COATINGS FOR INTERIORS

2 PART 1 - GENERAL

3 1.1 GENERAL REQUIREMENTS

- 4 A. Drawings and Conditions of Contract, including General and Supplementary Conditions and
5 Division 1 Administration Sections, apply to this Division.

6 1.2 SUMMARY

- 7 A. This Section includes surface preparation and application of high-performance epoxy coating
8 systems on the following substrates:

9 1. Interior Substrates:

- 10 a. Concrete masonry units (CMU).
11 b. Concrete, vertical and horizontal surfaces
12 c. Steel.
13 d. Galvanized metal.
14 e. Aluminum (not anodized or otherwise coated).
15 f. Gypsum board.

- 16 B. Related Sections include the following:

- 17 1. Division 05 Sections for shop priming of metal substrates with primers specified in this
18 Section.
19 2. Division 09 painting Sections for special-use coatings and general exterior and interior
20 painting.

21 1.3 ACTION SUBMITTALS

- 22 A. Product Data: For each type of product indicated.
23 B. Samples for Initial Selection: For each type of finish-coat product indicated.
24 C. Product List: For each product indicated. Cross-reference products to coating system and
25 locations of application areas. Use same designations indicated on Drawings and in schedules.

26 1.4 MAINTENANCE MATERIAL SUBMITTALS

- 27 A. Furnish extra materials, from the same product run, that match products installed and that are
28 packaged with protective covering for storage and identified with labels describing contents.

- 29 1. Coatings: 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.

30 1.5 QUALITY ASSURANCE

- 31 A. Master Painters Institute (MPI) Standards:

- 32 1. Preparation and Workmanship: Comply with requirements in "MPI Architectural
33 Painting Specification Manual" for coating systems indicated.

34 1.6 DELIVERY, STORAGE, AND HANDLING

- 35 A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient
36 temperatures continuously maintained at not less than 45 deg F (7 deg C).

- 37 1. Maintain containers in clean condition, free of foreign materials and residue.
38 2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

- A. Apply coatings only when temperature of surfaces to be coated and surrounding air temperatures are between 50 and 95 deg F (10 and 35 deg C).
- B. Do not apply coatings in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. ICI Paints.
 - 2. PPG Architectural Finishes, Inc.
 - 3. Sherwin-Williams Company (The).
 - 4. Tnemec.

2.2 HIGH-PERFORMANCE COATINGS, GENERAL

- A. Material Compatibility:
 - 1. Provide materials for use within each coating system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a coating system, provide products recommended in writing by manufacturers of topcoat for use in coating system and on substrate indicated.
 - 3. Provide products of same manufacturer for each coat in a coating system.
- B. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction[and, for interior coatings applied at project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24)].
 - 1. Flat Paints and Coatings: 50 g/L.
 - 2. Nonflat Paints and Coatings: 150 g/L.
 - 3. Primers, Sealers, and Undercoaters: 200 g/L.
 - 4. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: 250 g/L.
 - 5. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
 - 6. Pre-Treatment Wash Primers: 420 g/L.

- C. Colors: As selected by Architect from manufacturer's full range and indicated in color schedule.

2.3 BLOCK FILLERS

- A. Interior/Exterior Acrylic Block Filler:
 - 1. Basis of Design: Sherwin Williams; Heavy Duty Block Filler B42W46.

2.4 PRIMERS/SEALERS

- A. Acrylic Primer/Sealer:
 - 1. Basis of Design: Sherwin Williams, Loxon Block Surfacer A42W200.
- B. Gypsum Wall Board Primer:
 - 1. Basis of Design: Sherwin Williams; Prep Rite 200 Interior Latex Primer B28W200.

2.5 METAL PRIMERS

A. Rust-Inhibitive Acrylic Primer:

1. Basis of Design: Sherwin-Williams; Pro Industrial Pro-Cyrl Universal Primer, B66-310 Series.

2.6 EPOXY COATINGS

A. Water-Based Epoxy:

1. Basis of Design: Sherwin Williams, Waterbased Catalyzed Epoxy B70W211/B60V25.

2.7 SOURCE QUALITY CONTROL

A. Testing of Coating Materials: Owner reserves the right to invoke the following procedure:

1. Owner will engage the services of a qualified testing agency to sample coating materials. Contractor will be notified in advance and may be present when samples are taken. If coating materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
2. Testing agency will perform tests for compliance with product requirements.
3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying coating materials from Project site, pay for testing, and recoat surfaces coated with rejected materials. Contractor will be required to remove rejected materials from previously coated surfaces if, on recoating with complying materials, the two coatings are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.

1. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - a. Concrete: 12 percent.
 - b. Masonry (Clay and CMU): 12 percent.
 - c. Wood: 15 percent.
 - d. Gypsum Board: 12 percent.

B. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

C. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

D. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.
 - C. Clean substrates of substances that could impair bond of coatings, including dirt, oil, grease, and incompatible paints and encapsulants.
 1. Remove incompatible primers and reprime substrate with compatible primers as required to produce coating systems indicated.
 - D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
 1. If required by manufacturer, use one of the following methods for cleaning.
 - a. Clean surfaces with pressurized water. Use pressure range of 1500 to 4000 psi (10 350 to 27 580 kPa) at 6 to 12 inches (150 to 300 mm).
 - b. Abrasive blast clean surfaces to comply with SSPC-SP 7/NACE No. 4, "Brush-Off Blast Cleaning."
 - E. Masonry Substrates: Remove efflorescence and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
 1. If required by manufacturer, clean surfaces with pressurized water. Use pressure range of 100 to 600 psi (690 to 4140 kPa) at 6 to 12 inches (150 to 300 mm).
 - F. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:
 1. SSPC-SP 7/NACE No. 4, "Brush-Off Blast Cleaning."
 2. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."
 3. SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 4. SSPC-SP 10/NACE No. 2, "Near-White Blast Cleaning."
 5. SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning."
 - G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
 - H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied coatings.
 - I. Aluminum Substrates: Remove surface oxidation.
- 3.3 APPLICATION
- A. Apply high-performance coatings according to manufacturer's written instructions.
 1. Use applicators and techniques suited for coating and substrate indicated.
 2. Coat surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, coat surfaces behind permanently fixed equipment or furniture with prime coat only.
 3. Coat back sides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 4. Do not apply coatings over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 - B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of the same material are to be applied. Tint undercoats to match color of finish coat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance.

D. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass lines and color breaks.

3.4 FIELD QUALITY CONTROL

A. Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when coatings are being applied:

1. Dry Film Thickness Testing: Owner will engage the services of a qualified testing and inspecting agency to inspect and test coatings for dry film thickness.

a. Contractor shall touch up and restore coated surfaces damaged by testing.

b. If test results show that dry film thickness of applied coating does not comply with coating manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with coating manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from coating operation. Correct damage by cleaning, repairing, replacing, and recoating, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

3.6 INTERIOR HIGH-PERFORMANCE COATING SCHEDULE

A. Concrete Substrates, Vertical Surfaces:

1. Water-Based Epoxy Coating System:

a. Prime Coat: Water-based epoxy.

1) Where required due to high alkalinity, apply coat of Acrylic Primer sealer to surface.

b. Intermediate Coat: Water-based epoxy (interior and exterior).

c. Topcoat: Water-based epoxy (interior and exterior).

B. CMU Substrates:

1. Water-Based Epoxy Coating System:

a. Prime Coat: Interior/exterior acrylic block filler.

b. Intermediate Coat: Water-based epoxy (interior and exterior).

c. Topcoat: Water-based epoxy (interior and exterior).

C. Steel Substrates:

1. Water-Based Epoxy Coating System:

a. Prime Coat: Rust-inhibitive acrylic primer.

b. Intermediate Coat: Water-based epoxy (interior and exterior).

c. Topcoat: Water-based epoxy (interior and exterior).

D. Galvanized-Metal Substrates:

1. Water-Based Epoxy Coating System:

a. Prime Coat: Rust-inhibitive acrylic primer.

- 1 b. Intermediate Coat: Water-based epoxy (interior and exterior).
- 2 c. Topcoat: Water-based epoxy (interior and exterior).
- 3 E. Gypsum Board Substrates:
- 4 1. Water-Based Epoxy Coating System:
- 5 a. Prime Coat: Gypsum Wall Board Primer.
- 6 b. Intermediate Coat: Water-based epoxy.
- 7 c. Topcoat: Water-based epoxy.
- 8 3.7 INTERIOR HIGH PERFORMANCE COATINGS COLOR SCHEDULE
- 9 A. Water-Based Epoxy Coating System.
- 10 1. HPC-1: Typical interior wall and ceiling paint.
- 11 Including cell module door frames and access doors in walls and ceiling surfaces.
- 12 a. New Construction: Match existing paint color.
- 13 b. Existing/Remodel Construction: Match existing paint color.
- 14 2. HPC-2: Typical interior accent paint color at cell doors, frames, metal fabrications etc.
- 15 a. New Construction: Match existing paint color.
- 16 b. Existing/Remodel Construction: Match existing paint color.
- 17 END OF SECTION 09 96 01

1 SECTION 09 96 03 – SPECIAL COATINGS

2 PART 1 - GENERAL

3 1.1 GENERAL REQUIREMENTS

- 4 A. Drawings and Conditions of Contract, including General and Supplementary Conditions and
5 Division 1 Administration Sections, apply to this Division.

6 1.2 SUMMARY

- 7 A. This Section includes surface preparation and application of special coating systems for
8 showers on the following substrates:

9 1. Interior Substrates:

- 10 a. Concrete, vertical and horizontal surfaces.
11 b. Concrete masonry units (CMU).
12 c. Steel.
13 d. Galvanized metal.
14 e. Cement backer units.

- 15 B. Related Sections include the following:

- 16 1. Division 03 30 00 Section "Cast-in-Place Concrete" for concrete finishes for floor slabs.
17 2. Division 04 22 00 Section "Unit Masonry" for requirements for concrete masonry work.
18 3. Division 13 50 00 Section "Modular Metal Detention Wall Panel System" for metal
19 requirements for wall and ceiling panels.

20 1.3 SUBMITTALS

- 21 A. Product Data: For each type of product indicated including generic description, technical data,
22 surface preparation, and application instructions.

- 23 B. Color Samples: Full range of manufacturer's standard colors.

- 24 C. Samples for Verification: For each type of coating system and in each color and gloss of finish
25 coat indicated.

- 26 1. Submit Samples on rigid backing, 8 inches square.
27 2. Step coats on Samples to show each coat required for system.
28 3. Label each coat of each Sample.
29 4. Label each Sample for location and application area.

- 30 D. Qualification Data: For Installer and Manufacturer.

31 1.4 QUALITY ASSURANCE

- 32 A. Single-source Responsibility: Coatings and coating application accessories to be products of a
33 single manufacturer.

- 34 B. Installer's Qualification: Furnish list of projects using materials specified for this project that
35 applicator has furnished during the past five years. Include the following:

- 36 1. Letter of training certification from the manufacturer/distributor stating that contractor is
37 an approved installer of the products specified in this Section.
38 2. Submit written description of the contractors' experience with the specified material over
39 the last five (5) years. Include job size (in square feet) and complexity of projects. List a
40 minimum of five (5) projects with different Owners giving contact names and phone
41 numbers.

3. Submit resume of the key person(s) who will be performing the actual work and list a minimum of five (5) projects with different Owners giving contact names and phone numbers that this key person has performed work for.

- C. Manufacturer's Qualifications: Specializing in manufacture of coatings with minimum of ten years successful in-service performance.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained between 65 deg F and 90 deg F or as recommended by product manufacturer.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.6 PROJECT CONDITIONS

- A. Apply coatings only when temperature of surfaces to be coated and surrounding air temperatures are between 65 and 90 deg F and surface temperature is a minimum of 5 deg F above dew point.

- B. Do not apply coatings in areas where dust is being generated, to damp or wet surfaces, or where relative humidity is outside range per manufacturer's instructions.

- C. Provide ventilation during coating evaporation stage in confined or enclosed areas in accordance with manufacturer's instructions.

- D. Cover or otherwise protect finish work of other trades and surfaces not to be coated concurrently or not to be coated.

PART 2 - PRODUCTS

2.1 SPECIAL COATINGS, GENERAL

- A. Material Compatibility:

1. Provide materials for use within each coating system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.

2.2 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the work include, but are not limited to, the following:

1. Prime Coat Coating Systems, Libertyville, IL. (Basis of Design)
2. Tnemec Company, Inc., Kansas City, MO.

2.3 MATERIALS

- A. Wall and Ceilings Coating: Spray applied fiber-reinforced, 100% solids, accelerated aliphatic amine cured epoxy system.

- B. Floor Coating: High performance 100% solids floor coating system of aggregate-filled polyamine epoxy.

- C. Product Characteristics and Composition:

1. Epoxy Wall and Ceiling System (SC-1).
 - a. Compressive Strength: 11,700 psi (ASTM D-695-77).
 - b. Tensile Strength: 3,900 psi (ASTM D638-77a).

- 1 c. Tensile Elongation: 2% (ASTM D638-77a).
- 2 d. Flexural Modulus: 1.8 x 10⁶ psi (ASTM D 790-71).
- 3 e. Flexural Strength: 10,400 psi (ASTM D 790-71).
- 4 f. Water Absorption: 0.1% (ASTM C413).
- 5 g. Heat Resistance Limitation: Continuous exposure: 140 F; Intermittent spills 200 F.
- 6 h. Abrasion Resistance: 0.03 gm. Maximum weight loss (ASTM D 4060, Taber
- 7 Abrader CS-17 wheel, 1,000 gm load, 1,000 revolutions).
- 8 i. Flammability: Self-extinguishing (ASTM D 635).
- 9 j. Hardness: 88 Shore D (ASTM D 2240) minimum.
- 10 k. Bond Strength: >400 psi or substrate failure (ASTM D4542).
- 11 l. Chopped fiberglass strands, premixed into the material.
- 12 m. Form a horizontal matrix within the finished coating.
- 13 n. 100% solids products.
- 14 o. Color continuous throughout the entire system.

15 2. Aggregate Filled Epoxy Floor Coating (SC-2).

- 16 a. Integral Cove Base: Cant or radius 4 inches high.
- 17 b. Compressive Strength: 12,400 psi after 7 days (ASTM C-579).
- 18 c. Tensile Strength: 2,200 psi (ASTM C-307).
- 19 d. Flexural Strength: 4,800 psi (ASTM C-307).
- 20 e. Bond Strength: >400 psi or substrate failure (ASTM D-4541).
- 21 f. Indentation: No indentation (MIL-D-3134F).
- 22 g. Abrasion Resistance: 0.04 gm max. loss (ASTM D-4060, Taber Abrader).
- 23 h. Hardness: 85-90 Shore D (ASTM D2240).
- 24 i. Flammability: Self-extinguishing. Burning 0.25 inches max. (ASTM D-635).
- 25 j. Thermal Coefficient of Linear Expansion: 3.5 x 10⁻⁵ C (ASTM E-831).
- 26 k. Water Absorption: 0.1% (ASTM C-413).
- 27 l. All 100% solids material.
- 28 m. Color quartz throughout the entire floor system.
- 29 n. Capable of achieving a chemical bond with wall system.
- 30 o. Finish coat to be manufacturer's clear finish coat material.

31 2.4 MIXES

32 A. Walls and Ceilings (SC-1).

- 33 1. Mix components in containers furnished by the manufacturer.
- 34 2. Proportioning of two-part and three-part coatings shall be done in accordance with
- 35 manufacturer's recommended procedures.
- 36 3. Mix prime coat using a variable speed drill. Parts A and B shall be pre-mixed and then
- 37 combined and mixed together a minimum of two minutes. Ensure full blending of both
- 38 parts with all material measured into the mixing container. Apply the mixed material
- 39 within the pot life and temperatures recommended by the manufacturer.
- 40 4. Intermediate fiber reinforced coats shall be mixed similar to that method employed for the
- 41 prime coat.
- 42 5. Glaze coat, consisting of Parts A and B, shall be mixed similar to that method employed
- 43 for the prime coat.
- 44 6. For all mixing operations, the system components shall be considered as hazardous
- 45 materials. Read and observe container label warnings and Material Safety Data Sheets
- 46 for health and safety information prior to starting mixing operations.
- 47 7. Do not reseal mixed material. Permit final chemical set to occur in the container and
- 48 when set has been achieved, dispose of hardened material by legal means.
- 49 8. Do not apply any material that has exceeded shelf and pot life as determined by
- 50 manufacturer.

51 B. Floors (SC-2):

1. Mix components only in containers furnished by the manufacturer.
2. Proportioning of two-part and three-part coatings shall be done in strict accordance with manufacturer's recommended procedures.
3. Mix prime coat using a variable speed drill. Parts A and B shall be mixed with a variable speed drill for a minimum of two minutes. Ensure full blending of both parts with all material measured into the mixing container. Apply the mixed material within the pot life and temperature recommended by the manufacturer.
4. Intermediate coats shall be mixed similar to that method employed for the prime coat.
5. Glaze coat, consisting of Parts A and B, shall be mixed for a minimum of two minutes using a variable speed drill.
6. For all mixing operations, the system components shall be considered as hazardous materials. Read and observe container label warnings and Material Safety Data Sheets for health and safety information prior to starting mixing operations.
7. Do not reseal mixed material. Permit final chemical set to occur in the container and when set has been achieved, dispose of hardened material by legal means.
8. Do not apply any material that has exceeded shelf and pot life as determined by manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.
 1. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - a. Concrete: 12 percent.
 - b. Masonry: 12 percent.
 2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 3. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
 4. Coating application indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations applicable to substrates indicated.
- B. Remove plates, machined surfaces, and similar items already in place that are not to be coated. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and coating.
 1. After completing coating operations, reinstall items that were removed; use workers skilled in the trades involved.
- C. Clean substrates of substances that could impair bond of coatings, including dirt, oil, grease, and incompatible paints and encapsulants.
- D. Concrete Wall and Ceiling Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
 1. Prepare surfaces in accordance with manufacturer's instructions, SSPC-SP13/NACE 6 and ICRI 03732.
 2. Surface to be clean, dry and free of contaminants prior to installing coating system.

E. Concrete Floor Slabs-on-Grade Substrates:

1. Smooth troweled dense finish concrete that shall have been properly cured not less than twenty-eight (28) days after placement.
2. Employ a radio frequency moisture meter to determine that residual uncombined moisture content of concrete slab is less than five (5) percent by weight. Conduct ASTM F1869 to further record the Moisture Vapor Emission Rate. Do not apply high performance floor coatings to floor slabs that exceed 5 percent moisture content or 3 pounds per 1,000 square feet per 24 hours unless approved by the material manufacturer.
3. Prepare all concrete floor surfaces per SSPC-SP13/NACE 6.
4. Remove and legally dispose of all debris and contaminants produced by the surface preparation process.

F. CMU Substrates: Remove efflorescence and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.

1. Verify mortar joints are struck clean and filled tightly to avoid gaps or holes and provide a uniform appearance.
2. Remove mortar spatter, protruding mortar edges and other excessive mortar.
3. Grind rough edges smooth.
4. Clean CMU as specified.
5. Verify all surfaces are clean, dry and free of contaminants prior to installing coating system.

G. Steel Substrates: Remove rust and loose mill scale.

1. Clean using methods recommended by coating manufacturer and in accordance with SSPC guidelines.

H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied coatings, in accordance with SSPC guidelines.

3.3 APPLICATION

A. Apply special coatings according to manufacturer's written instructions and approved shop drawings.

1. Use applicators and techniques suited for coating and substrate indicated.

B. Walls and Ceilings:

1. Do not apply initial coating until moisture content of surface is within limitations recommended by coating manufacturer.
2. Apply primer at coverage rates recommended by manufacturer but at a rate that will produce a dry film thickness not less than 8 mils. Airless spray, brush or rollers may be used to apply the primer.
3. After primer has become tacky, apply the fiber reinforced epoxy system using an air powered airless spray rig with a gravity fed hopper attachment.
4. When the fiber reinforced epoxy system has cured, abrade the substrates to remove exposed fiberglass and other surface imperfections. Apply glazing coat with a brush, roller or airless sprayer. A total DFT of the complete system shall be a minimum 45 mils thick.
5. Keep all application equipment free from contaminants and suitable for the finish required.
6. Comply with recommendation of product manufacturer for cure times and re-coat windows. Unless specifically allowed by the manufacturer, re-coat windows will not be violated.
7. Finish coats shall be smooth to the touch and free of skipped or missed areas. An orange peel texture with occasional fiberglass lumps is normal and acceptable.

8. Make edges where adjoining other materials or colors, clean and sharp with no overlapping.
9. Change colors at points designated by Owner's agent and/or on color schedule where colors differ between adjoining spaces or rooms and where door frames match wall colors.

C. Floors:

1. Do not apply initial coating until moisture content of surface is within limitations recommended by coating manufacturer.
2. Apply primer at coverage rates as recommended by manufacturer. Airless spray, brushes, rollers or squeegee may be used in coating application.
3. Apply two intermediate coats of clear, mixed liquids at a rate to achieve approximately 20 mils wet film thickness. After each intermediate coat, broadcast onto the liquid surface colored quarts aggregate passing 40 to 60 mesh screen to rejection. Remove excess aggregate after film is dried by broom sweeping or industrial grade vacuum. A total dry film thickness of the intermediate coat shall be not less than 40 mils including encapsulated aggregate.
4. When the intermediate coats have cured and excess aggregate thoroughly removed, apply the final clear glazing coat to a minimum dry film thickness of 10 mils. Apply glazing coat with a brush, roller or airless sprayer. The finished floor to meet ADA specifications for this project. Use a Sullmair FSC 2000-1346 floor tester to validate ADA requirements.

- a. Please note to achieve the required ADA coefficient of friction, additional topcoat material or anti-slip additives may be necessary.

5. A total DFT of the broadcast system shall be a minimum 250 mils thick.
6. Comply with recommendations of manufacturer of high performance floor system for drying time between prime and succeeding coats.
7. Finished product shall be uniform in color and texture and free of skipped or missed areas.
8. Where walls and floors abut insure a seamless installation.

D. Finished Work Requirements:

1. Curtaining on face not permitted.
2. Damage to finished surfaces caused by other than coating contractor shall be repaired to acceptable condition by coating contractor under cost reimbursement by Contractor.

3.4 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from coating operation. Correct damage by cleaning, repairing, replacing, and recoating, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

3.5 Color Schedule

- A. SC-1: Match Tnemec color 00WH Tnemec White.
- B. SC-2: Match Tnemec color 32GR Light Gray.

END OF SECTION 09 96 03

1 SECTION 10 11 00 - VISUAL DISPLAY SURFACES

2 PART 1 - GENERAL

3 1.1 GENERAL REQUIREMENTS

- 4 A. Drawings and Conditions of Contract, including General and Supplementary Conditions and
5 Division 1 Administration Sections, apply to this Division.

6 1.2 SUMMARY

- 7 A. This Section includes markerboards.

8 1.3 SUBMITTALS

- 9 A. Shop Drawings: Provide for each type of markerboard required. Include sections of typical trim
10 members and dimensioned elevations. Show anchors, grounds, reinforcement, accessories,
11 layout, and installation details.

- 12 B. Product Data: Submit for all products in this Section.

13 1.4 QUALITY ASSURANCE

- 14 A. Design Criteria: The drawings indicate size, profiles, and dimensional requirements of visual
15 display boards and are based on the specific type and model indicated. Other visual display
16 boards having equal performance characteristics by other manufacturers may be considered
17 provided that deviations in dimensions and profiles are minor and do not change the design
18 concept or intended performance as judged by the Architect. The burden of proof of equality is
19 on the proposer.

20 1.5 WARRANTY

- 21 A. Porcelain Enamel Markerboard Warranty: Furnish the manufacturer's written warranty,
22 agreeing to replace porcelain enamel markerboards that do not retain their original writing and
23 erasing qualities, become slick and shiny, or exhibit crazing, cracking, or flaking, provided the
24 manufacturer's instructions with regard to handling, installation, protection, and maintenance
25 have been followed.

- 26 1. Warranty Period: Life of the building.

27 PART 2 - PRODUCTS

28 2.1 MANUFACTURERS

- 29 A. Manufacturer: Subject to compliance with requirements, provide products of one of the
30 following:

- 31 1. Porcelain Enamel Marker Boards and Tackboards:
32 a. Claridge Products and Equipment, Inc.
33 b. Allied Visual Display Boards.
34 c. Lemco.
35 d. NACO/GSI (Polyvision).
36 e. Venus Manufacturing Co.

2.2 MATERIALS

- A. Porcelain Enamel Markerboard: Provide balanced, high-pressure-laminated porcelain enamel markerboards of 3-ply construction consisting of face sheet, core material, and backing.
1. Face Sheet: 0.024-inch enameling grade steel especially processed for temperatures used in coating porcelain on steel. Coat exposed face and edges with a 3-coat process consisting of primer, ground coat, and color cover coat. Coat concealed face with a 2-coat process consisting of primer and ground coat. Fuse cover and ground coats to steel at manufacturer's standard firing temperatures, but not less than 1200 deg F.
 - a. Cover Coat (Markerboards): Provide the manufacturer's standard light-colored special writing surface with gloss finish intended for use with liquid felt-tipped markers.
 - b. Color: Similar to Claridge No. 32 LCS White.
 2. Core: 3/8-inch-thick particleboard core material complying with the requirements of ANSI A208.1, Grade 1-M-1.
 3. Backing Sheet: Provide the manufacturer's standard .002 aluminum foil sheet backing.
 4. Laminating Adhesive: Manufacturer's standard moisture-resistant thermoplastic-type adhesive.
 5. Markings: Provide permanently affixed music staff markings at boards in Music Rooms.

2.3 ACCESSORIES

- A. Metal Trim and Accessories: Claridge trim and accessory numbers are specified to establish the standard required by other listed manufacturers. Fabricate frames and trim of not less than 0.062-inch-thick aluminum alloy, size and shape as indicated, to suit type of installation. Provide straight, single-length units wherever possible; keep joints to a minimum. Miter corners to a neat, hairline closure. Aluminum finish: Satin anodized.
1. Chalktray: Claridge No. 263 for each board (full length of board).
 2. Map Rail: Claridge No. 275; furnish map rail at the top of each unit, complete with the following accessories:
 - a. Display Rail: Provide continuous cork display rail approximately 1 or 2 inches wide, as indicated, integral with the map rail.
 - b. End Stops: Provide one end stop at each end of the map rail.
 - c. Map Hooks: Provide 4 map hooks with flexible metal clips for each 4 feet by 8 feet board.
 - d. Flagholder: Provide one flagholder for each room.
 3. Trim: Claridge No. 272 and No. 273.
 4. Mullion: Claridge No. 186A.

2.4 FABRICATION

- A. Porcelain Enamel Markerboards: Laminate facing sheet and backing sheet to core material under pressure with manufacturer's recommended flexible, waterproof adhesive.
- B. Assembly: Provide factory-assembled markerboard and tackboard units, except where field-assembled units are required.
1. Make joints only where total length exceeds maximum manufactured length. Fabricate with the minimum number of joints, balanced around the center of the board, as acceptable to the Architect.
 2. Provide the manufacturer's standard vertical joint system between abutting sections of markerboard.
 3. Provide manufacturer's standard mullion trim at joints between markerboard and tackboard.

1 2.5 FINISHES

- 2 A. General: Comply with NAAMM "Metal Finishes Manual" for recommendations relative to
3 application and designations of finishes.
- 4 B. Finish designations prefixed by "AA" conform to the system established by the Aluminum
5 Association for designating aluminum finishes.
- 6 C. Class II Clear Anodized Finish: AA-M12C22A31 (Mechanical Finish: as fabricated,
7 nonspecular; Chemical Finish: etched, medium matte, Anodic Coating: Class II Architectural,
8 clear film thicker than 0.4 mil).

9 PART 3 - EXECUTION

10 3.1 INSTALLATION

- 11 A. Deliver factory-built visual display board units completely assembled in one piece without joints,
12 wherever possible. Where dimensions exceed panel size, provide 2 or more pieces of equal
13 length as acceptable to the Architect. When overall dimensions require delivery in separate
14 units, prefit components at the factory, disassemble for delivery, and make final joints at the
15 site. Use splines at joints to maintain surface alignment.
- 16 B. Install units and accessories in locations and at mounting heights indicated and in accordance
17 with the manufacturer's instructions. Keep perimeter lines straight, plumb, and level. Provide
18 grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories
19 necessary for a complete installation.

20 3.2 ADJUST AND CLEAN

- 21 A. Verify that accessories required for each unit have been properly installed and that operating
22 units function properly.
- 23 B. Clean units in accordance with the manufacturer's instructions.

24 END OF SECTION 10 11 00
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1 SECTION 10 14 00 - SIGNAGE

2 PART 1 - GENERAL

3 1.1 GENERAL REQUIREMENTS

- 4 A. Drawings and Conditions of Contract, including General and Supplementary Conditions and
5 Division 1 Administration Sections, apply to this Division.

6 1.2 SUMMARY

- 7 A. This Section includes the following types of signs:

- 8 1. Interior panel signs (ADA compliant).
9 2. Signage for Fire compliance.
10 3. Toilet room signage (ADA compliant).
11 4. Entry decals.
12 5. Exit door signage.
13 6. Building plaque
14 7. Dimensional letter signage

15 1.3 SUBMITTALS

- 16 A. Product Data: For each type of sign specified, including details of construction relative to
17 materials, dimensions of individual components, profiles, and finishes.
18 B. Shop Drawings: Show fabrication and erection of signs. Include plans, elevations, and large-
19 scale sections of typical members and other components. Show anchors, grounds, layout,
20 reinforcement, accessories, and installation details.

- 21 1. Provide message list for each sign required, including large-scale details of wording and
22 lettering layout.
23 2. For signs supported by or anchored to permanent construction, provide setting drawings,
24 templates, and directions for installation of anchor bolts and other anchors to be installed
25 as a unit of Work in other Sections.
26 3. Templates: Furnish full-size spacing templates for individually mounted dimensional
27 letters and numbers.
28 4. Furnish full-size rubbings for metal plaques.

- 29 C. Samples: Provide the following samples of each sign component for initial selection of color,
30 pattern and surface texture as required and for verification of compliance with requirements
31 indicated.

- 32 1. Samples for verification of color, pattern, and texture:
33 a. Etched Zinc: Manufacturer's color samples consisting of actual sections of
34 material including the specified background colors selected for panel signs.
35 b. Bronze Casting: Manufacturer's samples consisting of actual sections of material,
36 minimum 6" x 6". Submit samples showing specified borders, background and
37 letter style.

38 1.4 QUALITY ASSURANCE

- 39 A. Sign Fabricator Qualifications: Firm experienced in producing signs similar to those indicated
40 for this Project, with a record of successful in-service performance, and sufficient production
41 capacity to produce sign units required without causing delay in the Work.

1. Signage shall be ADA compliant. California Grade 2 Braille is to be used at all signs requiring the use of Braille.
2. Signage shall be compliant with 2013 CBC.

- B. Single-Source Responsibility: For each separate sign type required, obtain signs from one source of a single manufacturer.
- C. Design Concept: The Drawings indicate sizes, profiles, and dimensional requirements of signs and are based on the specific types and models indicated. Sign units by other manufacturers may be considered provided deviations in dimensions and profiles do not change the design concept as judged by the Architect. The burden of proof of equality is on the proposer.

1.5 PROJECT CONDITIONS

- A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication to ensure proper fitting. Show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers of Panel Signs: Products specified herein in Paragraph 2.4.A. are manufactured by VisionMark, Inc. and establish the appearance and quality desired by the Owner for this project. Subject to compliance with requirements, products of the following manufacturers are also acceptable:
 1. ASI Modulex, Inc.
 2. Best Sign Systems, Inc.
 3. Mohawk Sign Systems.
 4. Sign Source (cast aluminum signage with smooth background and custom border/logo).
 5. Vomar.

2.2 MATERIALS

- A. Zinc: Provide sign material of 99 percent zinc alloy, 0.125 inch thick. Material shall be as recommended by the sign manufacturer for the chemical etching process used and for the use and finish indicated.
- B. Plastic Laminate: Provide high-pressure plastic laminate engraving stock with face and core plies in contrasting colors, in finishes and color combinations indicated or, if not indicated, as selected from the manufacturer's standards.
- C. Aluminum Castings: Provide aluminum castings of alloy and temper recommended by the sign manufacturer for the casting process used and for the use and finish indicated.
- D. Fasteners: Use concealed fasteners fabricated from metals that are not corrosive to the sign material and mounting surface.
- E. Anchors and Inserts: Use nonferrous metal or hot-dipped galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

2.3 PANEL SIGNS

- A. Typical interior signs shall be 0.125 square corner, solid photo-etched zinc. Signage shall have background color, with natural stain zinc highlights. Cast sign shall meet all the requirements of ADA 101-336, Public Law of 1990, sections 4.30 through 4.30-5. Etched zinc

signs shall incorporate raised graphics, symbols, and Braille. Sign panel background color shall be custom color to meet the 70 percent contrast with a non-glare finish requirement of ADA 101-336, Section 4.30-5. All restrooms identified as accessible shall be provided with correct gender sign, one each per type of restroom. Manufacturer shall submit detail drawings for approval showing layout of signs, mounting method, graphic applications and letter style.

1. Nominal etching depth: 0.032 inch.
2. Fasteners shall be copper studs flash-welded to back of plate for blind stud mounting.
3. Panel sign characters and Braille shall comply with ADAAG and CBC Chapter 11.
 - a. Characters on signs shall be raised 1/32-inch minimum and shall be sans serif uppercase characters accompanied by California Grade 2 Braille.
 - b. Raised characters shall be a minimum of 5/8-inch and a max. of 2-inches high.
 - c. Characters on signs shall comply with CBC Sect. 11B-703.2.
 - d. California Grade 2 Braille shall be used wherever Braille is required in other portions of these standards. Braille shall comply with CBC 11B-703.3, 11B-703.4 and table 11B-703.3.1.

B. Signage for Fire compliance: Signs shall be plastic laminate with engraved copy. Refer to Detail. Machine-engrave letters, numbers, symbols, and other graphic devices into sign panel on the face indicated to produce precisely formed copy, incised to uniform depth. Use high-speed cutters mechanically linked to master templates in a pantographic system or equivalent process capable of producing characters of the style indicated with sharply formed edges. Size: 6" x 12".

1. Engraved Plastic Laminate: Engrave through the exposed face ply of the plastic laminate sheet to expose the contrasting core ply.

C. Toilet Room Signage: Signs shall be plastic laminate conforming to California Title 24 regulations for signs for toilet rooms. Provide with inset symbols and raised Braille characters. Minimum total thickness of .25-inch, adhesive type as recommended by sign manufacturer for type of substrate to which sign will be applied.

1. Men's Room: 12-inch equilateral triangle, vertex pointing up.
2. Ladies' Room: 12-inch diameter circle.
3. Unisex Toilet: 12-inch diameter circle with equilateral triangle, vertex pointing up inscribed in circle. Circle and triangle each .25-inch thick.
4. Colors: As selected by Architect. Colors shall contrast with background color.

D. ADAAG Toilet Room Signs: Signs shall be plastic laminate conforming to ADAAG requirements for signs for permanent rooms. Comply with ADAAG requirements for raised and Braille characters, pictorial symbols, finish and contrast requirements. Colors as selected by Architect from manufacturer's standards.

E. Entry Decals: Provide min. 6-inch square decals with international symbol of accessibility, white on blue background with white border, applied to glass at accessible entry doors.

F. Braille Exit Door Signs: Signs shall be plastic laminate conforming to ADAAG requirements for signs for permanent rooms. Comply with ADAAG requirements for raised and Braille characters, finish and contrast requirements. Colors as selected by Architect from manufacturer's standards.

2.4 FINISHES

A. Colors and Surface Textures: For exposed sign material that requires selection of materials with integral or applied colors, surface textures or other characteristics related to appearance, provide color matches indicated, or if not indicated, as selected by the Architect from the manufacturer's standards.

B. Metal Finishes: Comply with NAAMM "Metal Finishes Manual" for finish designations and applications recommendations.

- C. Aluminum Finishes: Finish designations prefixed by “AA” conform to the system established by the Aluminum Association for designating aluminum finishes.

1. Class II Clear Anodized Medium Satin Finish: AA-M31C22A31 (Mechanical Finish: Fine satin directional textured; Chemical Finish: Medium matte etched finish; Anodic Coating: Class II Architectural, clear film thicker than 0.4 mil).

2.5 PLAQUES

- A. Cast Plaque **<Insert drawing designation>**: Cast-metal plaque with background texture, border, and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:

1. Plaque Material: Cast aluminum.
2. Plaque Thickness: 0.25 inch.
3. Finishes:
 - a. Integral Aluminum Finish: Clear anodized.
 - b. Overcoat: Manufacturer's standard baked-on clear coating.
4. Background Texture: Pebble.
5. Integrally Cast Border Style: As indicated on Drawings.
6. Applied Frame Material, Style, and Finish: As indicated on Drawings.
7. Mounting: Concealed studs.
8. Text and Typeface: Typeface matching Architect's sample.

2.6 DIMENSIONAL CHARACTERS

- A. Cast Characters: Characters with uniform faces, sharp corners, and precisely formed lines and profiles, and as follows:

1. Character Material: Cast aluminum.
2. Character Height: As indicated on Drawings.
3. Thickness: As indicated on Drawings.
4. Finishes:
 - a. Integral Aluminum Finish: Clear anodized.
 - b. Overcoat: Manufacturer's standard baked-on clear coating.
5. Mounting: Concealed studs.
6. Typeface: As selected by the architect from a full range of font types.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Locate sign units and accessories where indicated, using mounting methods of the type described and in compliance with the manufacturer's recommendations and instructions.

1. Install signs level, plumb, and at the height indicated, with sign surfaces free from distortion or other defects in appearance.
2. Provide continuous clear silicone bead at perimeter of sign in all exterior signage locations.

B. Wall-Mounted Panel Signs: Attach panel signs to wall surfaces using the methods indicated below:

1. Mount signs 60" max to baseline of highest raised characters per CBC 11B-703.4.1. Attach signs as shown with mechanical fasteners.

C. Toilet Room Signage: Install signs on doors after doors are painted and finished.

1. Mount signs 60" max to baseline of highest raised characters per CBC 11B-703.4.1. Install centered on door width and in-line with adjacent door-mounted signs.
2. Install in accordance with manufacturer's recommendations for substrate involved.

D. Toilet Room Signs: Install signs on walls after surfaces to which they are to be mounted are painted and finished.

1. Mount signs 60" max to baseline of highest raised characters per CBC 11B-703.4.1.
2. Install level and in-line with adjacent toilet room signage.
3. Install in accordance with ADAAG requirements to allow a person to approach within 3-inches of signs without being within a door swing.

E. Entry Decals: Install in locations as approved by the Architect.

F. Braille Exit Door Signs: Install at doors with lighted "Exit" signs. Apply only after walls to which signs are to be mounted are painted and finished.

1. Mount signs 60" max to baseline of highest raised characters per CBC 11B-703.4.1.
2. Install level and in-line with adjacent signage.
3. Install in accordance with ADAAG requirements to allow a person to approach within 3-inches of signs without being within a door swing.

3.2 CLEANING AND PROTECTION

A. After installation, clean soiled sign surfaces according to the manufacturer's instructions. Protect units from damage until acceptance by the Owner.

END OF SECTION 10 14 00

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1 SECTION 10 21 13 – TOILET COMPARTMENTS

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY

- 7 A. Section Includes: Solid-plastic toilet compartments configured as toilet enclosures entrance
8 screens and urinal screens.

- 9 B. Related Requirements:

- 10 1. Section 102800 "Toilet, Bath, and Laundry Accessories" for toilet tissue dispensers, grab
11 bars, purse shelves, and similar accessories mounted on toilet compartments.

12 1.3 ACTION SUBMITTALS

- 13 A. Product Data: For each type of product.

- 14 1. Include construction details, material descriptions, dimensions of individual components
15 and profiles, and finishes for toilet compartments.

- 16 B. Shop Drawings: For toilet compartments.

- 17 1. Include plans, elevations, sections, details, and attachment details.
18 2. Show locations of cutouts for compartment-mounted toilet accessories.
19 3. Show locations of centerlines of toilet fixtures.
20 4. Show locations of floor drains.
21 5. Show overhead support or bracing locations.

- 22 C. Samples for Initial Selection: For each type of toilet compartment material indicated.

- 23 1. Include Samples of hardware and accessories involving material and color selection.

- 24 D. Samples for Verification: For the following products, in manufacturer's standard sizes unless
25 otherwise indicated:

- 26 1. Each type of material, color, and finish required for toilet compartments, prepared on 6-
27 inch-square Samples of same thickness and material indicated for Work.
28 2. Each type of hardware and accessory.

- 29 E. Product Schedule: For toilet compartments, prepared by or under the supervision of supplier,
30 detailing location and selected colors for toilet compartment material.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of toilet compartment.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For toilet compartments to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents and source.

1. Door Hinges: One hinge(s) with associated fasteners.
2. Latch and Keeper: One latch(es) and keeper(s) with associated fasteners.
3. Door Bumper: One bumper(s) with associated fasteners.
4. Door Pull: One door pull(s) with associated fasteners.
5. Fasteners: Ten fasteners of each size and type.

1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less.
2. Smoke-Developed Index: 450 or less.

- B. Regulatory Requirements: Comply with applicable provisions in Title 24 California Building Code for toilet compartments designated as accessible.

2.2 SOLID-PLASTIC TOILET COMPARTMENTS (TE)

- A. Copy this article and re-edit for each product.

- B. Insert drawing designation. Use these designations on Drawings to identify each product.

- C. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Scranton Products.

- D. Toilet-Enclosure Style: Overhead braced.

- E. Entrance-Screen Style: Overhead braced.
- F. Urinal-Screen Style (US): Wall hung.
- G. Door, Panel, Screen, and Pilaster Construction: Solid, high-density polyethylene (HDPE) panel material, not less than 1 inch thick, seamless, with eased edges, no-sightline system, and with homogenous color and pattern throughout thickness of material.
 - 1. Integral Hinges: Configure doors and pilasters to receive integral hinges.
 - 2. Heat-Sink Strip: Manufacturer's standard continuous, stainless-steel strip fastened to exposed bottom edges of solid-plastic components to hinder malicious combustion.
 - 3. Color and Pattern: One color and pattern in each room as selected by Architect from manufacturer's full range.
- H. Pilaster Shoes and Sleeves (Caps): Manufacturer's standard design; polymer.
 - 1. Polymer Color and Pattern: Matching pilaster.
- I. Brackets (Fittings):
 - 1. Stirrup Type: Ear or U-brackets, stainless steel.
 - 2. Full-Height (Continuous) Type: Manufacturer's standard design; stainless steel.
- J. Overhead Cross Bracing for Ceiling-Hung Units: As recommended by manufacturer and fabricated from solid polymer.

2.3 HARDWARE AND ACCESSORIES

- A. Hardware and Accessories: Manufacturer's standard operating hardware and accessories at public toilets (hardware height at 34" to 44" above finished floor).
 - 1. Material: Stainless steel..
 - 2. Hinges: Manufacturer's standard continuous, cam type that swings to a closed or partially open position, allowing emergency access by lifting door.
 - 3. Latch and Keeper: Manufacturer's standard surface-mounted latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.
 - 4. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories.
 - 5. Door Bumper: Manufacturer's standard rubber-tipped bumper at out-swinging doors.
 - 6. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible.
- B. Hardware and Accessories: Manufacturer's heavy-duty operating hardware and accessories at inmate showers (hardware height at 34" to 44" above finished floor).
 - 1. Hinges: Manufacturer's minimum 0.062-inch-thick stainless-steel continuous, cam type that swings to a closed or partially open position, allowing emergency access by lifting door. Mount with through-bolts.
 - 2. Latch and Keeper: Manufacturer's heavy-duty surface-mounted cast-stainless-steel latch unit designed to resist damage due to slamming, with combination rubber-faced door strike and keeper, and with provision for emergency access. Provide units that comply

- 1 with regulatory requirements for accessibility at compartments designated as accessible.
2 Mount with through-bolts.
- 3 3. Door Bumper: Manufacturer's heavy-duty rubber-tipped cast-stainless-steel bumper at
4 out-swinging doors. Mount with through-bolts.
- 5 4. Door Pull: Manufacturer's heavy-duty cast-stainless-steel pull at out-swinging doors that
6 complies with regulatory requirements for accessibility. Provide units on both sides of
7 doors at compartments designated as accessible. Mount with one-way through-bolts.
- 8 C. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with
9 antigrip profile and in manufacturer's standard finish.
- 10 D. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel,
11 finished to match the items they are securing, with theft-resistant-type heads. Provide sex-type
12 bolts for through-bolt applications. For concealed anchors, use stainless-steel, hot-dip
13 galvanized-steel, or other rust-resistant, protective-coated steel compatible with related
14 materials.

15 2.4 MATERIALS

- 16 A. Aluminum Castings: ASTM B 26/B 26M.
- 17 B. Aluminum Extrusions: ASTM B 221.
- 18 C. Brass Castings: ASTM B 584.
- 19 D. Brass Extrusions: ASTM B 455.
- 20 E. Stainless-Steel Sheet: ASTM A 666, Type 304, stretcher-leveled standard of flatness.
- 21 F. Stainless-Steel Castings: ASTM A 743.
- 22 G. Zamac: ASTM B 86, commercial zinc-alloy die castings.

23 2.5 FABRICATION

- 24 A. Fabrication, General: Fabricate toilet compartment components to sizes indicated. Coordinate
25 requirements and provide cutouts for through-partition toilet accessories where required for
26 attachment of toilet accessories.
- 27 B. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling
28 mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to
29 conceal supports and leveling mechanism.
- 30 C. Floor-Anchored Units: Provide manufacturer's standard corrosion-resistant anchoring
31 assemblies with leveling adjustment nuts at pilasters for structural connection to floor. Provide
32 shoes at pilasters to conceal anchorage.
- 33 D. Ceiling-Hung Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies
34 with leveling adjustment nuts at pilasters for connection to structural support above finished
35 ceiling. Provide assemblies that support pilasters from structure without transmitting load to
36 finished ceiling. Provide sleeves (caps) at tops of pilasters to conceal anchorage.

- 1 E. Floor-and-Ceiling-Anchored Units: Provide manufacturer's standard corrosion-resistant
2 anchoring assemblies with leveling adjustment nuts at tops and bottoms of pilasters. Provide
3 shoes and sleeves (caps) at pilasters to conceal anchorage.
- 4 F. Urinal-Screen Posts: Provide manufacturer's standard corrosion-resistant anchoring assemblies
5 with leveling adjustment nuts at **[tops and]** bottoms of posts. Provide shoes **[and sleeves**
6 **(caps)]** at posts to conceal anchorage.
- 7 G. Door Size and Swings: Unless otherwise indicated, provide 24-inch-wide, in-swinging doors for
8 standard toilet compartments and 36-inch-wide, out-swinging doors with a minimum 32-inch-
9 wide for end-opening, 34" clear width for side entry compartment, clear opening for
10 compartments designated as accessible.

11 PART 3 - EXECUTION

12 3.1 EXAMINATION

- 13 A. Examine areas and conditions, with Installer present, for compliance with requirements for
14 fastening, support, alignment, operating clearances, and other conditions affecting performance
15 of the Work.
- 16 1. Confirm location and adequacy of blocking and supports required for installation.
- 17 B. Proceed with installation only after unsatisfactory conditions have been corrected.

18 3.2 INSTALLATION

- 19 A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight,
20 level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.
- 21 1. Maximum Clearances:
- 22 a. Pilasters and Panels: 1/2 inch.
23 b. Panels and Walls: 1 inch.
- 24 2. Full-Height (Continuous) Brackets: Secure panels to walls and to pilasters with full-height
25 brackets.
- 26 a. Locate bracket fasteners so holes for wall anchors occur in masonry or tile joints.
27 b. Align brackets at pilasters with brackets at walls.
- 28 B. Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Set pilasters
29 with anchors penetrating not less than 1-3/4 inches into structural floor unless otherwise
30 indicated in manufacturer's written instructions. Secure continuous head rail to each pilaster
31 with no fewer than two fasteners. Hang doors to align tops of doors with tops of panels, and
32 adjust so tops of doors are parallel with overhead brace when doors are in closed position.
- 33 C. Floor-Anchored Units: Set pilasters with anchors penetrating not less than 2 inches into
34 structural floor unless otherwise indicated in manufacturer's written instructions. Level, plumb,
35 and tighten pilasters. Hang doors and adjust so tops of doors are level with tops of pilasters
36 when doors are in closed position.

- 1 D. Ceiling-Hung Units: Secure pilasters to supporting structure and level, plumb, and tighten. Hang
2 doors and adjust so bottoms of doors are level with bottoms of pilasters when doors are in
3 closed position.
- 4 E. Floor-and-Ceiling-Anchored Units: Secure pilasters to supporting construction and level, plumb,
5 and tighten. Hang doors and adjust so doors are level and aligned with panels when doors are
6 in closed position. For toe clearance, at least one side partition shall be 9 inch minimum clear
7 above finish floor and 6 inches deep minimum beyond the compartment-side face of partition
8 per CBC 11B-604.8.1.4.
- 9 F. Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and
10 plumb, rigid, and secured to resist lateral impact.
- 11 3.3 ADJUSTING
- 12 A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's
13 written instructions for proper operation. Set hinges on in-swinging doors to hold doors open
14 approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging
15 doors to return doors to fully closed position. Doors at accessible compartments to be self-
16 closing.
- 17 END OF SECTION 10 21 13

SECTION 10 21 23 – CUBICLE TRACKS AND CURTAINS

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. Drawings and Conditions of Contract, including General and Supplementary Conditions and Division 1 Administration Sections, apply to this Division.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Curtain tracks and curtain carriers.
 - 2. Cubicle and shower curtains.
- B. Related Sections include the following:
 - 1. Division 061000 Section "Rough Carpentry" for wood blocking for mounting items requiring anchorage.
 - 2. Division 095113 Section "Acoustical Panel Ceilings" for metal framing and furring for mounting items requiring anchorage.

1.3 PERFORMANCE REQUIREMENTS

- A. Curtains: Provide curtain fabrics with the following characteristics:
 - 1. Fabrics are launderable to a temperature of not less than 160 deg F.
 - 2. Fabrics are flame resistant and are identical to those that have passed NFPA 701, 2004 edition and T-19 CCR Division 1, Chapter 8 when tested by a testing and inspecting agency acceptable to authorities having jurisdiction.
 - a. Identify fabrics with appropriate markings of applicable testing and inspecting agency.

1.4 SUBMITTALS

- A. Product Data: Include durability, laundry temperature limits, fade resistance, and fire-test-response characteristics for each type of curtain fabric indicated.
 - 1. Include data on each type of applied curtain treatment.
- B. Shop Drawings: Show layout and types of cubicles, sizes of curtains, number of carriers, anchorage details, and conditions requiring accessories. Indicate dimensions taken from field measurements.
 - 1. Include details on blocking above ceiling.
- C. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
 - 1. Suspended ceiling components.
 - 2. Structural members to which suspension systems will be attached.
 - 3. Items penetrating finished ceiling, including the following:
 - a. Lighting fixtures.

- b. Air outlets and inlets.
- c. Speakers.
- d. Sprinklers.
- e. Access panels.

- D. Samples for Initial Selection: For each type of curtain material indicated.
- E. Curtain and Track Schedule: Use same designations indicated on Drawings.
- F. Manufacturer Certificates: Signed by manufacturers certifying that products comply with requirements.
- G. Operation and Maintenance Data: For curtains, track, and hardware to include in operation and maintenance manuals.

1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install cubicles until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.6 EXTRA MATERIALS

- A. Furnish extra materials described below, before installation begins, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Curtain Carriers and Track End Caps: Full-size units equal to 3 percent of amount installed for each size indicated, but no fewer than 10 units.
 - 2. Curtains: Full-size units equal to 10 percent of amount installed for each size indicated, but no fewer than 2 units.

PART 2 - PRODUCTS (BSCT)

2.1 CURTAIN TRACKS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Coldraco, Inc.
 - 2. Cubicle Curtain Factory, Inc.
 - 3. General Cubicle Company, Inc.
 - 4. Imperial Fastener Company, Inc.
 - 5. InPro Corporation.
- B. Extruded-Aluminum Track: Not less than 1-1/4 inches wide by 3/4 inch; with minimum wall thickness of 0.050 inch.
 - 1. Curved Track: Factory-fabricated, 12-inch- radius bends.
 - 2. Finish: Clear anodized.

- C. Track Accessories: Fabricate splices, end caps, connectors, end stops, coupling and joining sleeves, wall flanges, brackets, ceiling clips, and other accessories from same material and with same finish as track.
 - 1. End Stop: Non-removable.
- D. Breakaway Curtain Carriers: One-piece nylon or Velcro breakaway curtain carriers designed to allow curtains to detach from tracks with a pulling force of no more the 5 lbf.
- E. Exposed Fasteners: Stainless steel.
- F. Concealed Fasteners: Hot-dip galvanized or Stainless steel.

2.2 CURTAINS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Coldraco, Inc.
 - 2. Cubicle Curtain Factory, Inc.
 - 3. General Cubicle Company, Inc.
 - 4. Imperial Fastener Company, Inc.
 - 5. InPro Corporation.
- B. Cubicle Curtain Fabric: Curtain manufacturer's standard, 100 percent polyester, inherently and permanently flame resistant, stain resistant, and antimicrobial.
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Color and Pattern: As selected by Architect from manufacturer's full range.
- C. Shower Curtain Fabric: Curtain manufacturer's standard. Polyester-reinforced vinyl fabric; flame resistant, stain resistant, and antimicrobial.
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Color and Pattern: Translucent vinyl fabric as selected by Architect from manufacturer's full range.
- D. Curtain Grommets: Two-piece, rolled-edge, rustproof, nickel-plated brass; spaced not more than 6 inches o.c.; machined into top hem.
- E. Mesh Top: No. 50 nylon mesh.
 - 1. Color and Pattern: As selected by Architect from manufacturer's full range.

2.3 CURTAIN FABRICATION

- A. Fabricate curtains to comply with the following requirements:
 - 1. Width: Equal to track length from which curtain is hung plus 10 percent added fullness, but not less than 12 inches added fullness.
 - 2. Length: Equal to floor-to-ceiling height minus depth of track and carrier at top and distance above finished floor at bottom of 12 inches.
 - a. Mesh Top:
 - 1) Height: Provide height of mesh fabric at top of curtain as required to provide from track and carrier to start of curtain fabric at 5'-0" above floor.
 - b. Curtain Fabric:
 - 1) Height: 48 inches.

- 2) Distance above finished floor at bottom: 12 inches.
 3. Top Hem: Not less than 1 inch and not more than 1-1/2 inches wide, triple thickness, reinforced with integral web, and double lock stitched.
 4. Mesh Top: Top hem not less than 1 inch and not more than 1-1/2 inches wide, triple thickness, reinforced with integral web, and double lock stitched. Double lock stitch bottom of mesh directly to 1/2-inch triple thickness, top hem of curtain fabric.
 5. Bottom Hem: Not less than 1 inch and not more than 1-1/2 inches wide, triple thickness, reinforced, and double lock stitched.
 6. Side Hems: Not less than 1/2 inch and not more than 1-1/4 inches wide, with double turned edges, and single lock stitched.
- B. Vertical Seams: Not less than 1/2 inch wide, double turned and double stitched.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances, and other conditions affecting performance of work.
1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install tracks level and plumb, according to manufacturer's written instructions.
- B. Up to 16 feet in length, provide track fabricated from 1 continuous length.
1. Curtain Track Mounting: Surface.
- C. Surface Track Mounting: Fasten surface-mounted tracks at intervals of not less than 24 inches. Fasten support at each splice and tangent point of each corner. Center fasteners in track to ensure unencumbered carrier operation. Attach track to ceiling as follows:
1. Mechanically fasten directly to bottom of concrete deck with post-installed anchors.
 2. Mechanically fasten to suspended ceiling grid with screws.
- D. Track Accessories: Install splices, end caps, connectors, end stops, coupling and joining sleeves, and other accessories as required for a secure and operational installation.
- E. Curtain Carriers: Provide curtain carriers adequate for 6-inch spacing along full length of curtain plus an additional carrier.
- F. Curtains: Hang curtains on each curtain track.
- G. Curtains are not to obstruct automatic fire sprinkler heads.

END OF SECTION 10 21 23

1 SECTION 10 22 26 - OPERABLE PARTITIONS

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY

7 A. Section Includes:

- 8 1. Manually operated, acoustical panel partitions.

9 B. Related Requirements:

- 10 1. Section 05 5000 "Metal Fabrications" for supports that attach supporting tracks to
11 overhead structural system.

12 1.3 DEFINITIONS

- 13 A. NIC: Noise Isolation Class.

- 14 B. NRC: Noise Reduction Coefficient.

- 15 C. STC: Sound Transmission Class.

16 1.4 PREINSTALLATION MEETINGS

- 17 A. Preinstallation Conference: Conduct conference at Project site.

18 1.5 ACTION SUBMITTALS

- 19 A. Product Data: For each type of product.

- 20 B. Shop Drawings: For operable panel partitions.

- 21 1. Include plans, elevations, sections, details, and attachments to other work.
22 2. Indicate stacking and operating clearances. Indicate location and installation
23 requirements for hardware and track, blocking, and direction of travel.

- 24 C. Samples for Initial Selection: For each type of exposed material, finish, covering, or facing.

- 25 1. Include Samples of accessories involving color selection.
26 2. Panel Edge Material: Not less than 3 inches long.
27 3. Hardware: One of each exposed door-operating device.

28 1.6 INFORMATIONAL SUBMITTALS

- 29 A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items
30 are shown and coordinated with each other, using input from installers of the items involved:

- 31 1. Partition track, track supports and bracing, switches, turning space, and storage layout.
32 2. Suspended ceiling components.
33 3. Structural members to which suspension systems are attached.
34 4. Items penetrating finished ceiling, including the following:

- 1 a. Lighting fixtures.
- 2 b. HVAC ductwork, outlets, and inlets.
- 3 c. Speakers.
- 4 d. Sprinklers.
- 5 e. Smoke detectors.

6 B. Setting Drawings: For embedded items and cutouts required in other work, including support-
7 beam, mounting-hole template.

8 C. Qualification Data: For qualified Installer.

9 D. Product Certificates: For each type of operable panel partition.

- 10 1. Include approval letter signed by manufacturer acknowledging Owner-furnished panel
11 facing material complies with requirements.

12 E. Sample Warranty: For manufacturer's special warranty.

13 1.7 CLOSEOUT SUBMITTALS

14 A. Operation and Maintenance Data: For operable panel partitions to include in maintenance
15 manuals.

- 16 1. In addition to items specified in Section 01 7823 "Operation and Maintenance Data,"
17 include the following:

- 18 a. Panel finish facings and finishes for exposed trim and accessories. Include
19 precautions for cleaning materials and methods that could be detrimental to
20 finishes and performance.
- 21 b. Seals, hardware, track, track switches, carriers, and other operating components.

22 1.8 MAINTENANCE MATERIAL SUBMITTALS

23 A. Furnish extra materials, from the same production run, that match products installed and that
24 are packaged with protective covering for storage and identified with labels describing contents.

- 25 1. Panel Finish-Facing Material: Furnish full width in quantity to cover one side of two
26 panels when installed.

27 1.9 QUALITY ASSURANCE

28 A. Installer Qualifications: An entity that employs installers and supervisors who are trained and
29 approved by manufacturer.

30 1.10 DELIVERY, STORAGE, AND HANDLING

31 A. Protectively package and sequence panels in order for installation. Clearly mark packages and
32 panels with numbering system used on Shop Drawings. Do not use permanent markings on
33 panels.

34 1.11 PROJECT CONDITIONS

35 A. Field Measurements: Verify actual dimensions of operable panel partition openings by field
36 measurements before fabrication.

37 1.12 WARRANTY

38 A. Special Warranty: Manufacturer agrees to repair or replace components of operable panel
39 partitions that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
 - a. Faulty operation of operable panel partitions.
 - b. Deterioration of metals, metal finishes, and other materials beyond normal use.
2. Partition Warranty: Two years from date of Project completion.
3. Suspension System Warranty: Five years from date of Project completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Acoustical Performance: Provide operable panel partitions tested by a qualified testing agency for the following acoustical properties according to test methods indicated:

1. Sound-Transmission Requirements: Operable panel partition assembly tested for laboratory sound-transmission loss performance according to ASTM E 90, determined by ASTM E 413, and rated for not less than the STC indicated.
 - a. Sound Transmission Class (STC): 45, minimum.

2.2 OPERABLE ACOUSTICAL PANELS (WC-1) Design Tex Prisma 5154-013-Conch Shell

(WC-2) Operable Magnetic Marker Board panel

- A. Operable Acoustical Panels: Partition system, including panels, seals, finish facing, suspension system, operators, and accessories.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Advanced Equipment Corporation.
 - b. Hufcor Inc.
 - c. Modernfold, Inc.
2. Basis-of-Design Product: Acousti-Seal 932, Paired-Panel partition as manufactured by Modernfold, Inc.

- B. Panel Operation: Manually operated, paired panels.

- C. Panel Construction: As required to support panel from suspension components and with reinforcement for hardware attachment. Fabricate panels with tight hairline joints and concealed fasteners. Fabricate panels so finished in-place partition is rigid; level; plumb; aligned, with tight joints and uniform appearance; and free of bow, warp, twist, deformation, and surface and finish irregularities.

- D. Dimensions: Fabricate operable acoustical panel partitions to form an assembled system of dimensions indicated and verified by field measurements.

1. Panel Width: Standard widths.

- E. Panel Weight: 8 lb/sq. ft. maximum.

- F. Panel Thickness: Not less than 3 inches.

- G. Panel Materials:

1. Steel Frame: Steel sheet, 0.0598-inch nominal minimum thickness for uncoated steel with overlapped and welded corners. Top channel shall be reinforced as required to support suspension system components.

2. Gypsum Face/Liner Sheets: 1/2-inch tackable gypsum board, Class A rated single material or composite layers continuously bonded to panel frame with minimum STC as indicated in article 2.1 above.

H. Panel Closure: Manufacturer's standard unless otherwise indicated.

1. Initial Closure: Fixed jamb.
2. Final Closure: Constant-force, crank-operated mechanical closure expanding from panel edge to create a constant-pressure acoustical seal.

I. Hardware: Manufacturer's standard as required to operate operable panel partition and accessories; with decorative, protective finish and accessible hardware complying with 11B-404.2.7.

2.3 SEALS

A. General: Provide seals that produce operable panel partitions complying with performance requirements and the following:

1. Manufacturer's standard seals unless otherwise indicated.
2. Seals made from materials and in profiles that minimize sound leakage.
3. Seals fitting tight at contact surfaces and sealing continuously between adjacent panels and between operable panel partition perimeter and adjacent surfaces, when operable panel partition is extended and closed.

B. Vertical Seals: Deep-nesting, interlocking steel astragals mounted on each edge of panel, with continuous PVC acoustical seal. Rigid plastic seal are not permitted.

C. Horizontal Top Seals: Continuous contact extruded vinyl bulb shapes with pairs of non-contacting vinyl fingers to prevent distortion. Mechanically operated top seals are not permitted.

D. Horizontal Bottom Seals: PVC-faced, mechanical, retractable, constant-force-contact seal exerting uniform constant pressure on floor when extended, ensuring horizontal and vertical sealing and resisting panel movement. Extended seal shall exert nominal 120 pounds downward force to floor throughout operating range.

1. Automatically Operated for Acoustical Panels: Extension and retraction of bottom seal automatically operated by movement of partition, with operating range not less than 2 inches between retracted seal and floor finish.

2.4 PANEL FINISH FACINGS

A. General: Provide finish facings for panels that comply with indicated fire-test-response characteristics and that are factory applied to operable panel partitions with appropriate backing, using mildew-resistant non-staining adhesive as recommended by facing manufacturer's written instructions.

1. Apply one-piece, seamless facings free of air bubbles, wrinkles, blisters, and other defects, with no gaps or overlaps. Horizontal seams are not permitted. Tightly secure and conceal raw and selvage edges of facing for finished appearance.
2. Where facings with directional or repeating patterns or directional weave are indicated, mark facing top and attach facing in same direction.

B. Vinyl-Coated Fabric Wall Covering: Manufacturer's standard, mildew-resistant, washable, vinyl-coated fabric wall covering; complying with CFFA-W-101-D for type indicated; Class A.

1. Color/Pattern: As selected by Architect from manufacturer's full range of colors.

- C. Trimless Edges: Fabricate exposed panel edges so finish facing wraps uninterrupted around panel, covering edge and resulting in an installed partition with facing visible on vertical panel edges, without trim, for minimal sightlines at panel-to-panel joints.

2.5 SUSPENSION SYSTEMS

- A. Tracks: Steel with adjustable steel hanger rods for overhead support, designed for operation, size, and weight of operable panel partition indicated. Size track to support partition operation and storage without damage to suspension system, operable panel partitions, or adjacent construction. Limit track deflection to no more than 0.10 inch between bracket supports. Provide a continuous system of track sections and accessories to accommodate configuration and layout indicated for partition operation and storage.

1. Head Closure Trim: As required for acoustical performance; with factory-applied, decorative, protective finish.
2. Track shall be fabricated from single material and designed for fluid, non-binding movement of partition along track. Intermixing of materials shall not be acceptable.

- B. Carriers: Trolley system as required for configuration type, size, and weight of partition and for easy operation; with ball-bearing wheels. Non-steel tires are not acceptable.

- C. Steel Finish: Manufacturer's standard, factory-applied, corrosion-resistant, protective coating unless otherwise indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine flooring, structural support, and opening, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of operable panel partitions.

- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Comply with ASTM E 557 except as otherwise required by operable panel partition manufacturer's written installation instructions.

- B. Install operable panel partitions and accessories after other finishing operations, including painting, have been completed in area of partition installation.

- C. Install panels from marked packages in numbered sequence indicated on Shop Drawings.

- D. Broken, cracked, chipped, deformed, or unmatched panels are not acceptable.

- E. Broken, cracked, deformed, or unmatched gasketing or gasketing with gaps at butted ends is not acceptable.

3.3 ADJUSTING

- A. Adjust operable panel partitions, hardware, and other moving parts to function smoothly, and lubricate as recommended by manufacturer.

- B. Adjust storage pocket doors to operate smoothly and easily, without binding or warping.

- 1 C. Verify that safety devices are properly functioning.
- 2 3.4 DEMONSTRATION
- 3 A. Engage a factory-authorized service representative to train Owner's maintenance personnel to
- 4 adjust, operate, and maintain operable panel partitions.
- 5 END OF SECTION 10 22 26

1 SECTION 10 26 00 - WALL PROTECTION

2 PART 1 - GENERAL

3 1.1 GENERAL REQUIREMENTS

- 4 A. Drawings and Conditions of Contract, including General and Supplementary Conditions and
5 Division 1 Administration Sections, apply to this Division.

6 1.2 SUMMARY

- 7 A. This Section includes the following:

- 8 1. Wall guards.
9 2. Corner guards.

10 1.3 ACTION SUBMITTALS

- 11 A. Product Data: Include construction details, material descriptions, impact strength, dimensions
12 of individual components and profiles, and finishes for each impact-resistant wall-protection unit.

- 13 B. Shop Drawings: For each impact-resistant wall-protection unit showing locations and extent.
14 Include sections, details, and attachments to other work.

- 15 C. Samples for Initial Selection: For each type of impact-resistant wall-protection unit indicated.

- 16 1. Include similar Samples of accent strips and accessories involving color selection.

17 1.4 INFORMATIONAL SUBMITTALS

- 18 A. Qualification Data: For Installer.

- 19 B. Material Test Reports: For each impact-resistant plastic material.

- 20 C. Material Certificates: For each impact-resistant plastic material, signed by manufacturer.

21 1.5 CLOSEOUT SUBMITTALS

- 22 A. Maintenance Data: For each impact-resistant wall-protection unit to include in maintenance
23 manuals.

- 24 1. Include recommended methods and frequency of maintenance for maintaining optimum
25 condition of plastic covers under anticipated traffic and use conditions. Include
26 precautions against using cleaning materials and methods that may be detrimental to
27 plastic finishes and performance.

- 28 B. Warranty: Special warranty specified in this Section.

29 1.6 QUALITY ASSURANCE

- 30 A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

- 31 B. Testing Agency Qualifications: An independent agency qualified according to ASTM E 329 for
32 testing indicated, as documented according to ASTM E 548.

- 33 C. Source Limitations: Obtain impact-resistant wall-protection units through one source from a
34 single manufacturer.

D. Product Options: Drawings indicate size, profiles, and dimensional requirements of impact-resistant wall-protection units and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements."

1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

E. Fire-Test-Response Characteristics: Provide impact-resistant, plastic wall-protection units with surface-burning characteristics as determined by testing identical products per ASTM E 84, 2007 edition, NFPA 255, or UL 723 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

F. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store impact-resistant wall-protection units in original undamaged packages and containers inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

1. Maintain room temperature within storage area at not less than 70 deg F during the period plastic materials are stored.
2. Keep plastic sheet material out of direct sunlight.
3. Store plastic wall-protection components for a minimum of 72 hours, or until plastic material attains a minimum room temperature of 70 deg F.

- a. Store corner-guard covers in a vertical position.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install impact-resistant wall-protection units until building is enclosed and weatherproof, wet work is complete and dry, and HVAC system is operating and maintaining temperature at 70 degrees F for not less than 72 hours before beginning installation and for the remainder of the construction period.

B. Field Measurements: Verify actual locations of walls, columns, and other construction contiguous with impact-resistant wall-protection units by field measurements before fabrication and indicate measurements on Shop Drawings.

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of impact-resistant wall-protection units that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
 - a. Structural failures.
 - b. Deterioration of plastic and other materials beyond normal use.
2. Warranty Period: Five years from date of Project completion.

1.10 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Corner-Guard and Crash Rail Covers: Full-size plastic covers of maximum length equal to 2 percent of each type, color, and texture of units installed, but no fewer than two full-size units.

- B. Include mounting and accessory components. Replacement materials shall be from same production run as installed units.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 MATERIALS

- A. Extruded Rigid Plastic: ASTM D 1784, Class 1, textured, chemical- and stain-resistant, high-impact-resistant PVC or acrylic-modified vinyl plastic with integral color throughout; thickness as indicated.

1. Impact Resistance: Minimum 25.4 ft-lbf/in. of notch when tested according to ASTM D 256, Test Method A.
2. Chemical and Stain Resistance: Tested according to ASTM D 543.
3. Self-extinguishing when tested according to ASTM D 635.
4. Flame-Spread Index: 25 or less.
5. Smoke-Developed Index: 450 or less.

- B. Material: Stainless-steel sheet, Type 304.

1. Thickness: Minimum 0.0625 inch.
2. Finish: Directional satin, No. 4.

- C. Aluminum Extrusions: Alloy and temper recommended by manufacturer for type of use and finish indicated but with not less than strength and durability properties specified in ASTM B 221 for Alloy 6063-T5.

- D. Fasteners: Aluminum, nonmagnetic stainless-steel, or other noncorrosive metal screws, bolts, and other fasteners compatible with items being fastened. Use security-type fasteners in inmate areas.

2.3 WALL GUARDS (WG)

- A. Crash Rail: Heavy-duty assembly consisting of continuous extruded rubber bumper installed over concealed retainer with mechanical fasteners; designed to withstand impacts.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Pawling Corporation; EB-15 as required or comparable product by one of the following:
 - a.
2. Cover: Extruded rubber; as follows:
 - a. EB-15:
 - b. Profile: Flat.
 - 1) Dimensions: Nominal 8 inches high by 1 inch deep.
 - 2) Surface: Uniform with radiused edges.
 - 3) Color and Texture: As selected by Architect from manufacturer's full range.

3. End Caps and Corners: Prefabricated, extruded rubber; matching color and edge profile of adjacent rail.
4. Mounting: Surface mounted directly to wall.

2.4 CORNER GUARDS

- A. Surface-Mounted, Metal Corner Guards Insert drawing designation: Fabricated as one piece from formed or extruded metal with formed edges; with 90- or 135-degree turn to match wall condition.
 1. Material: Stainless-steel sheet, Type 304.
 - a. Thickness: Minimum 0.0625 inch.
 - b. Finish: Directional satin, No. 4.
 - c. Height: CG-1 – 36 inches, CG-2 – 56 inches
 2. Corner Radius: 1/8 inch.
 3. Mounting: Flat-head, countersunk security screws through factory-drilled mounting holes.

2.5 FABRICATION

- A. Fabricate impact-resistant wall-protection units to comply with requirements indicated for design, dimensions, and member sizes, including thicknesses of components.
- B. Assemble components in factory to greatest extent possible to minimize field assembly. Disassemble only as necessary for shipping and handling.
- C. Fabricate components with tight seams and joints with exposed edges rolled. Provide surfaces free of wrinkles, chips, dents, uneven coloration, and other imperfections. Fabricate members and fittings to produce flush, smooth, and rigid hairline joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and wall areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
 1. Examine walls to which impact-resistant wall protection will be attached for blocking, grounds, and other solid backing that have been installed in the locations required for secure attachment of support fasteners.
 2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Complete finishing operations, including painting, before installing impact-resistant wall-protection system components.
- B. Before installation, clean substrate to remove dust, debris, and loose particles.

3.3 INSTALLATION

- A. General: Install impact-resistant wall-protection units level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.
 1. Install impact-resistant wall-protection units in locations and at mounting heights indicated on Drawings or, if not indicated, at heights indicated below:
 - a. Corner Guards: 4" above finish floor.

- 1 b. Abar FRP.
- 2 2. Provide splices, mounting hardware, anchors, and other accessories required for a
- 3 complete installation.
- 4 a. Provide anchoring devices to withstand imposed loads.
- 5 b. Adjust top and bottom caps as required to ensure tight seams.

6 3.4 CLEANING

- 7 A. Immediately after completion of installation, clean plastic covers and accessories using a
- 8 standard, ammonia-based, household cleaning agent.
- 9 B. Remove excess adhesive using methods and materials recommended in writing by
- 10 manufacturer.

11 END OF SECTION 10 26 00
12

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1 SECTION 10 28 00 - TOILET, BATH, AND LAUNDRY ACCESSORIES

2 PART 1 - GENERAL

3 1.1 GENERAL REQUIREMENTS

- 4 A. Drawings and Conditions of Contract, including General and Supplementary Conditions and
5 Division 1 Administration Sections, apply to this Division.

6 1.2 SUMMARY

- 7 A. This Section includes the following:

- 8 1. Public-use washroom accessories.
9 2. Private-use bathroom accessories.
10 3. Healthcare accessories.
11 4. Custodial accessories.

- 12 B. Related Sections include the following:

- 13 1. Division 102813.63 Section "Detention Toilet Accessories" for accessories designed for
14 installation in detention facilities.

15 1.3 SUBMITTALS

- 16 A. Product Data: For each type of product indicated. Include the following:

- 17 1. Construction details and dimensions.
18 2. Anchoring and mounting requirements, including requirements for cutouts in other work
19 and substrate preparation.
20 3. Material and finish descriptions.
21 4. Features that will be included for Project.
22 5. Manufacturer's warranty.

- 23 B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each
24 accessory required.

- 25 1. Identify locations using room designations indicated on Drawings.
26 2. Identify products using designations indicated on Drawings.

- 27 C. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.

28 1.4 QUALITY ASSURANCE

- 29 A. Source Limitations: For products listed together in the same articles in Part 2, provide products
30 of same manufacturer unless otherwise approved by Architect.

31 1.5 COORDINATION

- 32 A. Coordinate accessory locations with other work to prevent interference with clearances required
33 for access by people with disabilities, and for proper installation, adjustment, operation,
34 cleaning, and servicing of accessories.

- 35 B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent
36 delaying the Work.

1 1.6 WARRANTY

2 A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace
3 mirrors that develop visible silver spoilage defects and that fail in materials or workmanship
4 within specified warranty period.

5 1. Warranty Period: 15 years from date of Project completion.

6 PART 2 - PRODUCTS

7 2.1 MATERIALS

8 A. Stainless Steel: ASTM A 666, Type 304, 0.0312-inch minimum nominal thickness, unless
9 otherwise indicated.

10 B. Brass: ASTM B 19 flat products; ASTM B 16, rods, shapes, forgings, and flat products with
11 finished edges; or ASTM B 30, castings.

12 C. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.0359-
13 inch minimum nominal thickness.

14 D. Galvanized Steel Sheet: ASTM A 653/A 653M, with G60 hot-dip zinc coating.

15 E. Galvanized Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.

16 F. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-
17 and-theft resistant where exposed, and of galvanized steel where concealed.

18 G. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).

19 H. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.

20 2.2 WASHROOM ACCESSORIES

21 A. Basis-of-Design Product: The design for accessories is based on products indicated in the
22 Toilet Accessory Schedule. Subject to compliance with requirements, provide the named
23 product or a comparable product by one of the following:

- 24 1. A & J Washroom Accessories, Inc.
25 2. American Specialties, Inc.
26 3. Bobrick Washroom Equipment, Inc.
27 4. General Accessory Manufacturing Co. (GAMCO).

28 B. Toilet Tissue (Roll) Dispenser:

- 29 1. Description: Double-roll dispenser.
30 2. Mounting: Surface mounted.
31 3. Operation: Noncontrol delivery with standard spindle.
32 4. Capacity: Designed for 4-1/2- or 5-inch-diameter tissue rolls.
33 5. Material and Finish: Satin-finish aluminum bracket with plastic spindle.

34 C. Paper Towel (Roll) Dispenser:

- 35 1. Mounting: Surface mounted.
36 2. Minimum Capacity: 200 C-fold or 275 multifold towels.
37 3. Material and Finish: Stainless steel, No. 4 finish (satin)

- 1 4. Lockset: Tumbler type.
- 2 5. Refill Indicators: Pierced slots at sides or front.
- 3 D. Paper Towel (Folded) Dispenser:
 - 4 1. Description: Recess-mounted and surface-mounted paper towel dispenser.
 - 5 2. Mounting: Recessed.
 - 6 a. Designed for nominal 4-inch wall depth.
 - 7 3. Minimum Towel-Dispenser Capacity: 300 C-fold or 400 multifold paper towels.
 - 8 4. Material and Finish: Stainless steel, No. 4 finish (satin).
 - 9 5. Lockset: Tumbler type for towel-dispenser compartment and waste receptacle.
- 10 E. Hand Dryer:
 - 11 1. Description: Standard-speed, warm-air hand dryer.
 - 12 2. In "Mounting" Subparagraph below, retain last option for surface-mounted units that
 - 13 project from walls by a limited dimension and that comply with the ADA-ABA. Recessed
 - 14 and semirecessed may also comply with the ADA-ABA.
 - 15 3. Mounting Surface mounted, with low-profile design].
 - 16 4. Operation: Electronic-sensor activated with timed power cut-off switch.
 - 17 a. Operation Time: 30 to 40 seconds.
 - 18 5. Cover Material and Finish: Stainless steel, No. 4 finish (satin)
 - 19 6. Electrical Requirements: [115 V, 13 A, 1500 W]
- 20 F. Grab Bar:
 - 21 1. Mounting: Flanges with exposed fasteners.
 - 22 2. Material: Stainless steel, 0.05 inch thick.
 - 23 a. Finish: Smooth, No. 4, satin finish on ends and slip-resistant texture in grip area.
 - 24 3. Outside Diameter: 1-1/2 inches.
 - 25 4. Configuration and Length: As indicated in schedule at end of section.
- 26 G. Sanitary-Napkin Disposal Unit:
 - 27 1. Mounting: Partition mounted and dual access Surface mounted.
 - 28 2. Door or Cover: Self-closing disposal-opening cover.
 - 29 3. Material and Finish: Stainless steel, No. 4 finish (satin).
- 30 H. Mirror Unit:
 - 31 1. Frame: Stainless-steel channel.
 - 32 a. Corners: Manufacturer's standard.
 - 33 2. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated
 - 34 below.
 - 35 a. One-piece, galvanized steel, wall-hanger device with spring-action locking
 - 36 mechanism to hold mirror unit in position with no exposed screws or bolts.
 - 37 b. Wall bracket of galvanized steel, equipped with concealed locking devices
 - 38 requiring a special tool to remove.
 - 39 3. Integral Shelf: 4 inches deep.
 - 40 4. Size: As indicated.
- 41 I. Baby Changing Station:
 - 42 1. Description: Recess-mounted baby changing station with stainless steel exterior finish.
 - 43 2. Mounting: Recessed.

- 1 3. Finish: Stainless steel, No. 4 (satin).
- 2 J. Waste Receptacle:
- 3 1. Description: Recessed and surface mounted waste receptacle.
- 4 2. Material and Finish: Stainless steel, No. 4 (satin).
- 5 3. Capacity: 21 gallons.
- 6 K. Combination Towel (Folded) Dispenser/Waste Receptacle:
- 7 1. Description: Combination unit for dispensing C-fold or multifold towels, with removable
- 8 waste receptacle.
- 9 2. Mounting: Recessed and surface.
- 10 a. Designed for nominal 4-inch wall depth.
- 11 3. Minimum Towel-Dispenser Capacity: 600 C-fold or 800 multifold paper towels.
- 12 4. Minimum Waste-Receptacle Capacity: 15 gallon.
- 13 5. Material and Finish: Stainless steel, No. 4 finish (satin).
- 14 6. Liner: Reusable, vinyl waste-receptacle liner.
- 15 7. Lockset: Tumbler type for towel-dispenser compartment and waste receptacle.
- 16 L. Liquid-Soap Dispenser:
- 17 1. Description: Designed for dispensing antibacterial soap in liquid or lotion form.
- 18 2. Mounting: Vertically oriented, surface mounted.
- 19 3. Capacity: 40 fluid ounces.
- 20 4. Materials: Satin finish stainless steel.
- 21 5. Lockset: Tumbler type.
- 22 6. Refill Indicator: Window type.
- 23 M. Seat-Cover Dispenser:
- 24 1. Mounting: Recessed and Surface.
- 25 2. Minimum Capacity: 500 Insert number seat covers.
- 26 3. Exposed Material and Finish: Stainless steel, No. 4 finish (satin).
- 27 4. Lockset: Tumbler type.
- 28 2.3 SHOWER ROOM ACCESSORIES
- 29 A. Basis-of-Design Product: The design for accessories is based on products indicated in the
- 30 Toilet Accessory Schedule. Subject to compliance with requirements, provide the named
- 31 product or a comparable product by one of the following:
- 32 1. A & J Washroom Accessories, Inc.
- 33 2. American Specialties, Inc.
- 34 3. Bobrick Washroom Equipment, Inc.
- 35 4. General Accessory Manufacturing Co. (GAMCO).
- 36 B. Soap Dish:
- 37 1. Description: Surface-mount heavy duty Soap Dish.
- 38 2. Mounting: Surface mounted.
- 39 3. Material and Finish: Stainless steel, No. 4 finish (satin).
- 40 C. Shower Curtain Rod:
- 41 1. Description: 1-1/4-inch OD; fabricated from nominal 0.05-inch-thick stainless steel.
- 42 2. Mounting Flanges: Stainless-steel flanges designed for exposed fasteners.

3. Finish: Stainless steel, No. 4 finish (satin).

D. Shower Curtain:

1. Size: Minimum 6 inches wider than opening by 72 inches high.
2. Material: Nylon-reinforced vinyl, minimum 10 oz. or 0.008-inch-thick vinyl, with integral antibacterial agent.
3. Color: As selected from manufacturer's full range.
4. Grommets: Corrosion resistant at minimum 6 inches on center, through top hem.
5. Shower Curtain Hooks: Chrome-plated or stainless-steel, spring wire curtain hooks with snap fasteners, sized to accommodate specified curtain rod. Provide one hook per curtain grommet.

E. Folding Shower Seat:

1. Configuration: L-shaped seat, designed for wheelchair access.
2. Seat: Solid phenolic, water resistant, ivory-colored surface; 0.5-inch minimum nominal thickness; with single-piece construction.
3. Mounting Mechanism: Stainless steel, No. 4 finish (satin).
4. Dimensions: 33 inches wide and projects 22 5/16 inch from the wall.

F. Hook:

1. Description: Single-prong unit.
2. Material and Finish: Stainless steel, No. 4 finish (satin).

2.4 HEALTHCARE ACCESSORIES

A. Basis-of-Design Product: The design for accessories is based on products indicated in the Toilet Accessory Schedule. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:

1. A & J Washroom Accessories, Inc.
2. American Specialties, Inc.
3. Bobrick Washroom Equipment, Inc.
4. General Accessory Manufacturing Co. (GAMCO).

B. Specimen Pass-Through Cabinet:

1. Description: With self-closing doors on both sides, lock that prevents doors from both being opened at the same time, and removable stainless-steel tray.
2. Nominal Wall Opening: 11 1/2 inches wide by 11 inches high.
3. Material and Finish: Type 304 stainless steel, No. 4 finish (satin).

2.5 FABRICATION

A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.

B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

B. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to method in ASTM F 446.

3.2 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.

B. Remove temporary labels and protective coatings.

C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

3.3 TOILET ACCESSORY SCHEDULE

PLAN SYMBOL	DESCRIPTION	MANUFACTURER BOBRICK (UNO)	MOUNTING HEIGHT
BCS	Baby Changing Station	Koala KB110	46 inches to top of unit
FSS	Folding Shower Seat	B-5181	17 inches to top
GB-1	Grab Bar (Toilet Back)	B-6806 Series x 36"	33 inches to centerline
GB-2	Grab Bar (Toilet Side)	B-6806 Series x 42"	33 inches to centerline
GB-3	Grab Bar (2 Side Shower)	B-6816 Series 24" x 30"	33 inches to centerline
HD	Hand Dryer	Dyson Airblade V Model AB	VIF
HK	Utility Hook	B-6707	See ARCH DWG
MR-1	Mirror	B165 Series	40 inches to bottom
MR-2	Mirror with integral shelf	B165 Series	40 inches to bottom
SPTD	Surface Paper Towel Dispenser	B-2621	40 inches to bottom
RWR	Recessed Waste Receptacle B-43944		See ARCH DWG
RWRHD	Recessed Waste Receptacle B-43944 (with HD instead of PTD)		See ARCH DWG
SWR	Surface Waste Receptacle B-277		See ARCH DWG

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CONSTRUCTION DOCUMENT
DLR GROUP
75-15208-00

1	RSCD	Seat Cover Holder	B-3013	40 inches to bottom
2				
3	SSCD	Seat Cover Holder	B-221	40 inches to bottom
4				
5	SD	Soap Dispenser	B-2111	See ARCH DWG
6				
7	SND	Sanitary Napkin Disposal	B-270	24 inches to top
8				
9	SPT	Specimen Pass Through	B-505	See ARCH DWG
10				
11	SRC	Shower Rod	B-207	See ARCH DWG
12				
13	SSD	Shower Soap Dish	Norix ISD-210	40 inches to shelf
14				
15	TTD	Toilet Tissue Dispenser	B-2740	24 inches to centerline
16				
17	END OF SECTION 10 28 00			
18				

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1 SECTION 10 2813.63 - DETENTION TOILET ACCESSORIES

2 PART 1 - GENERAL

3 1.1 GENERAL REQUIREMENTS

- 4 A. Drawings and Conditions of Contract, including General and Supplementary Conditions and
5 Division 1 Administration Sections, apply to this Division.

6 1.2 SUMMARY

7 A. Section Includes:

- 8 1. Safety hooks.
9 2. Miscellaneous toilet accessories.
10 3. Stainless-steel mirrors.
11 4. Grab bars.
12 5. Shower seats.

13 B. Related Sections:

- 14 1. Division 03 30 00 Section "Cast-in-Place Concrete" for embedding anchors into cast-in-
15 place construction.
16 2. Division 04 22 00 Section "Unit Masonry" for inserting anchors into masonry construction
17 and proprietary built-in masonry anchors.
18 3. Division 07 92 00 Section "Joint Sealants" for security sealant requirements.
19 4. Division 10 28 00 Section "Toilet, Bath, and Laundry Accessories" for non-detention toilet
20 accessories.

21 1.3 COORDINATION

- 22 A. Coordinate installation of anchorages for detention toilet accessories. Furnish setting
23 drawings, templates, and directions for installing anchorages, including sleeves, concrete
24 inserts, anchor bolts, and items with integral anchors, that are to be embedded in adjoining
25 construction. Deliver such items to Project site in time for installation.

- 26 B. Coordinate size and location of recesses in wall construction to receive recessed detention
27 toilet accessories.

28 1.4 ACTION SUBMITTALS

- 29 A. Product Data: For each type of product indicated. Include construction details, material
30 descriptions, dimensions of individual components and profiles, and finishes.

- 31 B. Samples for Verification: For each type of detention toilet accessory indicated.

- 32 1. Approved full-size Samples will be returned and may be used in the Work.

- 33 C. Product Schedule: For detention toilet accessories. Indicate types, quantities, sizes, and
34 installation locations by room of each accessory required. Use same designations indicated
35 on Drawings and in Detention Toilet Accessory Schedule.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Drawings showing location of each built-in anchor supporting detention toilet accessories, including anchors to be installed as work of other Sections, drawn to scale and coordinating anchorage with detention toilet accessories. Show the following:

1. Locations, dimensions, and profiles of wall and floor reinforcements.
2. Locations and installation details of built-in anchors.
3. Elevations of each detention toilet accessory showing dimensions of accessory, preparations for receiving anchors, and locations of anchorage.
4. Details of attachment of each detention toilet accessory to built-in anchors.

B. Examination reports documenting inspection of substrates, areas, and conditions.

C. Anchor inspection reports documenting inspections of built-in and cast-in anchors.

D. Field quality-control certification signed by Contractor and Detention Specialist.

E. Welding certificates.

F. Warranties: Sample of special warranties.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For detention toilet accessories to include in maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Security Fasteners: Furnish not less than 20 of each type and size of security fastener installed.
2. Tools: Provide two sets of tools for installing and removing security fasteners.

1.8 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of detention toilet accessory from single source from single manufacturer.

B. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.3, "Structural Welding Code - Sheet Steel."
3. AWS D1.6, "Structural Welding Code - Stainless Steel."

C. Pre-installation Conference: Conduct conference at Project site.

D. Coordination Meetings: Conduct coordination meetings at Project site to comply with requirements in Division 01 Section "Special Project Procedures for Detention Facilities."

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace detention toilet accessories that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
 - a. Structural failures including deflection exceeding 1/4 inch (6.3 mm).

- 1 b. Faulty operation of hardware.
- 2 c. Deterioration of metals, metal finishes, and other materials.
- 3 2. Warranty Period: Two years from date of Project completion.

4 PART 2 - PRODUCTS

5 2.1 MATERIALS

- 6 A. Cold-Rolled Steel Sheet: ASTM A 1008, CS (Commercial Steel), Type B.
- 7 B. Metallic-Coated Steel Sheet: ASTM A 653, CS (Commercial Steel), Type B; with G60 (Z180)
- 8 zinc (galvanized) coating designation.
- 9 C. Stainless-Steel Sheet: ASTM A 666 or ASTM A 240, austenitic stainless steel, Type 304;
- 10 Type 430 for mirrors.
- 11 D. Steel Plates, Shapes, and Bars: ASTM A 36.
- 12 E. Concealed Bolts: ASTM A 307, Grade A unless otherwise indicated.
- 13 F. Cast-in-Place Anchors in Concrete: Anchors of type indicated below, fabricated from
- 14 corrosion-resistant materials capable of sustaining, without failure, a load equal to 4 times the
- 15 load imposed, as determined by testing per ASTM E 488, conducted by a qualified
- 16 independent testing agency.
- 17 1. Threaded or wedge type; galvanized ferrous castings, either ASTM A 47 malleable iron
- 18 or ASTM A 27 cast steel. Provide bolts, washers, and shims as needed, hot-dip
- 19 galvanized per ASTM A 153.
- 20 G. Embedded Plate Anchors: Fabricated from steel shapes and plates, minimum 3/16 inch thick;
- 21 with minimum 1/2-inch-diameter headed studs welded to back of plate.
- 22 H. Welding Rods and Bare Electrodes: Select according to AWS specifications.

23 2.2 SECURITY FASTENERS

- 24 A. Fasteners that are operable only by tools produced by fastener manufacturer or other licensed
- 25 fabricator for use on specific type of fastener.
- 26 1. See Division 05 Section "Metal Fabrications."

27 2.3 DETENTION SAFETY HOOK

- 28 A. Individual or Strip, Collapsible Detention Safety Hook (DCH): 0.188-inch nominal-thickness,
- 29 stainless-steel hook held by minimum 0.109-inch thick, stainless-steel bracket punched with
- 30 not less than 4 holes for fastening with security fastener. Provide friction washer assembly,
- 31 adjustable with a non-removable security screw that maintains pressure on hook and allows
- 32 hook to pivot when load exceeds preset limit. Provide No. 4 finish.
- 33 1. Products: Subject to compliance with requirements, available products that may be
- 34 incorporated into the Work include, but are not limited to, the following:
- 35
- 36 a. A & J Washroom Accessories Inc.; Security Hook, US17.
- 37 b. American Specialties, Inc.; Surface Mounted Clothes Hook, Model No. 120.
- 38 c. Bobrick Washroom Accessories, Inc; B-983 and B-985.
- 39 d. KLN Steel Products Company; Safety Hook, Model 9217.

- e. Portland Hardware Company Inc.; Clothes Hook, Model PH765.
 - f. Peterson Detention, Inc.; Safety Clothes Hook Bolt-On.
 - g. PSI LLC.; Single Collapsible Safety Hook, Model RS-515.
2. Mounting: Front mounting with security fasteners.

2.4 MISCELLANEOUS DETENTION TOILET ACCESSORIES

- A. Recessed, Detention Toilet Tissue Dispenser (DTTD): Minimum 5-inch diameter by 4-1/2 inches; formed from minimum 0.062-inch- thick, stainless-steel sheet. Secure to wall with rear-mounting steel strap and adjustment bolts. Provide No. 4 finish.
 1. Products: Acorn Eng 1840-FA Paper Holder as basis of design or equivalent.
 - a. A & J Washroom Accessories Inc.; Security Toilet Paper Holder, US74.
 - b. American Specialties, Inc.; Security Recessed Toilet Paper Holder, Model No. 110.
 - c. GAMCO; Toilet Tissue Dispenser, MSA-1.
 - d. Maximum Security Products Corp.; Model TP 970.
 - e. PSI LLC.; Recessed Toilet Paper Holder, Model TPH-600.
 - f. Willoughby Industries, Inc.; Rear Mounted Tissue Holder, Model No. RTH-1.
 - g. Viking; Toilet Paper Holder Front Mounted
 - h. Norix; Front (ITP-110)
 2. Face: 1-inch lip around entire face.
- B. Recessed, Detention Soap Dish (DSD): Minimum inside dimensions of 5-3/4 inches wide by 4-1/2 inches high by 2-1/2 inches deep with 3/4-inch lip around entire face; formed from 0.062-inch-thick, stainless-steel sheet. Secure to wall with rear-mounting steel strap and adjustment bolts. Provide No. 4 finish.
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. A & J Washroom Accessories Inc.; Security Soap Dish, US80.
 - b. American Specialties, Inc.; Security Recessed Soap Dish, Model No. 140.
 - c. Willoughby Industries, Inc.; Recessed Soap Dish Rear Mounted, Model No. RSD-

2.5 DETENTION MIRRORS

- A. Integrally Framed Detention Mirror with Round Corners (DMR): Minimum 11 inches wide by 16 inches high; with mirror and integral frame formed from minimum 0.062-inch- thick, stainless-steel sheet; with round corners. Provide No. 8 finish for mirror, chrome plating for frame.
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. A & J Washroom Accessories Inc.; Security Mirror, US7408B.
 - b. American Specialties, Inc.; Security Framed Mirror, Model No. 107.
 - c. Norix Group, Inc.; Ironman Cell Mirror, Model No. R565-411.
 - d. Portland Hardware Company Inc.; Large One-Piece Security Mirror, Model PH721.
 - e. Willoughby Industries, Inc.; Front Access Security Mirror, Model No. MR2.
 - f. Peterson Detention, Inc.; Stainless Steel Mirror (one piece)
 2. Mounting: Front mounting with security fasteners.

2.6 DETENTION GRAB BARS

- A. Grab Bars (DSGB): 1-1/2 inches in diameter; formed from 0.042-inch thick, stainless-steel tubing, with 3-inch-diameter flanges formed from 0.125-inch- thick, stainless steel. Closure

plates for suicide prevention formed from 0.125-inch- thick, stainless steel. All-welded construction. Provide No. 4 finish.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

- a. Security Grab Bars with closure plate (DSGB)

- 1) A & J Washroom Accessories Inc.; US130 Series.
- 2) American Specialties, Inc.; 160 Series.
- 3) GAMCO; MSA-14.
- 4) Peterson Detention, Inc.; Grab Bar with Closure plate.

2. Length: As indicated in schedule.

3. Mounting: Front mounting with security fasteners.

2.7 DETENTION SHOWER SEATS

- A. Shower Seats (DSS): Stainless steel surface mounted shower seat, formed from minimum 16 gauge stainless-steel sheet. Minimum 500 lb. loading capacity. Provide No. 4 finish.

1. Products: Limited to sole product allowed by BSCC:

- a. Bradley Shower Seat, Model 9541

2.8 FABRICATION

- A. Coordinate dimensions and attachment methods of detention toilet accessories with those of adjoining construction to produce integrated assemblies with closely fitting joints and with edges and surfaces aligned unless otherwise indicated.

- B. Shear and punch metals cleanly and accurately. Remove burrs.

- C. Form edges and corners to be free of sharp edges and rough areas. Fold back exposed edges of unsupported sheet metal to form a 1/2-inch- (12.7-mm-) wide hem on the concealed side, or ease edges to a radius of approximately 1/32 inch (0.8 mm) and support with concealed stiffeners.

- D. Form metal in maximum lengths to minimize joints. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

- E. Weld corners and seams continuously to comply with referenced AWS standard and the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
5. Provide smoothly finished eased edges of 1/32" minimum at outside corners.
6. Weld before finishing components to greatest extent possible. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

- F. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to secure detention toilet accessories rigidly in place and to support expected loads. Build in straps, plates, and brackets as needed to support and anchor

fabricated items to adjoining construction. Reinforce formed-metal units as needed to attach and support other construction.

G. Cut, reinforce, drill, and tap detention toilet accessories to receive hardware, security fasteners, and similar items.

H. Form exposed work true to line and level with accurate angles and surfaces. Grind off and ease edges unless otherwise indicated.

I. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Use exposed security fasteners of type indicated or, if not indicated, flat-head (countersunk) security fasteners. Locate joints where least conspicuous.

2.9 FINISHES

A. Finish detention toilet accessories after assembly.

B. Stainless-Steel Finishes:

1. Polished Finish: Grind and polish surfaces to produce uniform finish, free of cross scratches.

a. Run grain of directional finishes with long dimension of each piece.

b. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

c. Directional Satin Finish: No. 4.

d. For mirror surfaces provide #8 non directional polished surface.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of detention toilet accessories.

1. Examine roughing-in for embedded and built-in anchors to verify actual locations of detention toilet accessory connections before detention toilet accessory installation.

2. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of detention toilet accessories.

B. Inspect built-in and cast-in anchor installations before installing detention toilet accessories to verify that anchor installations comply with requirements. Prepare inspection reports.

1. Remove and replace anchors where inspections indicate that they do not comply with specified requirements. Re-inspect after repairs or replacements are made.

2. Perform additional inspections to determine compliance of replaced or additional work. Prepare inspection reports.

C. Verify locations of detention toilet accessories.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing detention toilet accessories to in-place construction. Include threaded fasteners for concrete and masonry inserts, security fasteners, and other connectors.
- B. Provide temporary bracing or anchors in formwork for items that are to be built into concrete or masonry or similar construction.
- C. Apply security sealant around perimeter in a continuous ribbon on back of detention toilet accessories before installation.
- D. Security Fasteners: Install detention toilet accessories using security fasteners with head style appropriate for installation requirements, strength, and finish of adjacent materials. Provide stainless-steel security fasteners in stainless-steel materials.

3.3 FIELD QUALITY CONTROL

- A. Inspect installed products to verify compliance with requirements. Prepare inspection reports and indicate compliance with and deviations from the Contract Documents.
- B. Remove and replace detention work where inspections indicate that work does not comply with specified requirements.
- C. Perform additional inspections to determine compliance of replaced or additional work. Prepare inspection reports.
- D. Prepare field quality-control certification endorsed by Detention Specialist that states installed products and their installation comply with requirements in the Contract Documents.

3.4 ADJUSTING AND CLEANING

- A. Remove temporary labels and protective coatings.
- B. Adjust safety hooks to release with application of 8-lbf (35.6-N) load.
- C. Touchup Painting: Immediately after erection, clean bolted connections and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
- D. Touchup Painting: Cleaning and touchup painting of bolted connections and abraded areas of shop paint are specified in Division 09 painting Sections.

3.5 DETENTION TOILET ACCESSORY SCHEDULE

PLAN	(American Specialties Inc.)		
SYMBOL	DESCRIPTION	MODEL #	MOUNTING HEIGHT
DCH	Detention Clothes Hook	120	60 inches to centerline typical 40 inches to centerline at ADA lo- cations
DMR	Detention Mirror	107	74 inches to top of mirror 39 inches to start of refl. surface
DSD	Recessed Detention Soap Dish	140	40 inches to centerline typical (or as indicated on drawings)
DSGB-1	Security Grab Bar 42 inches long (Toilet Side)	160 Series	33 inches to centerline
DSGB-2	Security Grab Bar 36 inches long (Toilet Back)	160 Series	33 inches to centerline
DSGB-3	Security Grab Bar L shape 24 inches by 42 inches Long (H.C. Roll-in Shower Back Wall)	160 Series	33 inches to centerline
DSS	Detention Shower Seat	Bradley 9541	18 inches to seat
DTTD	Detention Toilet Tissue Dispenser	Acorn Eng 1840-FA	24 inches to centerline typical
DTTS	Detention Toilet Tissue Shelf		

END OF SECTION 10 28 13.63

1 SECTION 10 44 13 - FIRE EXTINGUISHER CABINETS

2 PART 1 - GENERAL

3 1.1 GENERAL REQUIREMENTS

- 4 A. Drawings and Conditions of Contract, including General and Supplementary Conditions and
5 Division 1 Administration Sections, apply to this Division.

6 1.2 SUMMARY

7 A. Section Includes:

- 8 1. Fire protection cabinets for the following:
9 a. Portable fire extinguishers.
10 b. Lock box

11 B. Related Sections:

- 12 1. Division 10 44 16 Section "Fire Extinguishers."

13 1.3 SUBMITTALS

- 14 A. Product Data: For each type of product indicated. Include construction details, material
15 descriptions, dimensions of individual components and profiles, and finishes for fire protection
16 cabinets.

- 17 1. Fire Protection Cabinets: Include roughing-in dimensions, details showing mounting
18 methods, relationships of box and trim to surrounding construction, door hardware,
19 cabinet type, trim style, and panel style.

- 20 B. Product Schedule: For fire protection cabinets. Coordinate final fire protection cabinet schedule
21 with fire extinguisher schedule to ensure proper fit and function. Use same designations
22 indicated on Drawings.

- 23 C. Maintenance Data: For fire protection cabinets to include in maintenance manuals.

24 1.4 QUALITY ASSURANCE

- 25 A. Fire-Rated, Fire Protection Cabinets: Listed and labeled to comply with requirements in
26 ASTM E 814, 2006 edition for fire-resistance rating of walls where they are installed.

27 1.5 COORDINATION

- 28 A. Coordinate size of fire protection cabinets to ensure that type and capacity of fire extinguishers
29 indicated are accommodated.

- 30 B. Coordinate sizes and locations of fire protection cabinets with wall depths.

31 PART 2 - PRODUCTS

32 2.1 MATERIALS

- 33 A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.

- 1 B. Tempered Float Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick,
2 Class 1 (clear).

3 2.2 FIRE PROTECTION CABINET

- 4 A. Cabinet Type: Suitable for fire extinguisher.

- 5 1. Manufacturers: Subject to compliance with requirements, provide products by one of the
6 following:
7 a. Fire End & Croker Corporation.
8 b. J. L. Industries, Inc., a division of Activar Construction Products Group.
9 c. Kidde Residential and Commercial Division, Subsidiary of Kidde plc.
10 d. Larsen's Manufacturing Company.
11 e. Modern Metal Products, Division of Technico Inc..
12 f. Moon-American.
13 g. Potter Roemer LLC.
14 h. Watrous Division, American Specialties, Inc.

- 15 B. Cabinet Construction: Nonrated.

- 16 C. Cabinet Material: Steel sheet.

- 17 1. Shelf: Same metal and finish as cabinet.

- 18 D. Recessed Cabinet (FEC-3):

- 19 1. Trimless with Concealed Flange: Surface of surrounding wall finishes flush with exterior
20 finished surface of cabinet frame and door, without overlapping trim attached to cabinet.
21 Provide recessed flange, of same material as box, attached to box to act as drywall bead.
22 2. Trimless with Hidden Flange: Flange of same metal and finish as box overlaps
23 surrounding wall finish and is concealed from view by an overlapping door.
24 3. Exposed Flat Trim: One-piece combination trim and perimeter door frame overlapping
25 surrounding wall surface with exposed trim face and wall return at outer edge
26 (backbend).

- 27 E. Semi-recessed Cabinet (FEC-2): Cabinet box partially recessed in walls of sufficient depth to
28 suit style of trim indicated; with one-piece combination trim and perimeter door frame
29 overlapping surrounding wall surface with exposed trim face and wall return at outer edge
30 (backbend). Provide where walls are of insufficient depth for recessed cabinets but are of
31 sufficient depth to accommodate semi-recessed cabinet installation.

- 32 1. Rolled-Edge Trim: 2-1/2-inch backbend depth.

- 33 F. Surface-Mounted Cabinet (FEC-1): Cabinet box fully exposed and mounted directly on wall with
34 no trim.

- 35 G. Hook-Mounted (FE – no cabinet): Hook mounted to wall with no cabinet.

- 36 H. Cabinet Trim Material: Steel sheet.

- 37 I. Door Material: Steel sheet.

- 38 J. Door Style: Fully glazed panel with frame.

- 39 K. Door Glazing: Tempered float glass (clear).

- 40 L. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet
41 type, trim style, and door material and style indicated.

1. Provide projecting door pull and friction latch.
 2. Provide manufacturer's standard hinge permitting door to open 180 degrees.
- M. Accessories:
- a. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
 2. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated.
 - a. Identify fire extinguisher in fire protection cabinet with the words "FIRE EXTINGUISHER."
 - 1) Location: Applied to cabinet glazing.
 - 2) Application Process: Decals.
 - 3) Lettering Color: Red.
 - 4) Orientation: Vertical.
- N. Finishes:
1. Manufacturer's standard baked-enamel paint for the following:
 - a. Exterior of cabinet door, and trim except for those surfaces indicated to receive another finish.
 - b. Interior of cabinet and door.
 2. Steel: Baked enamel or powder coat.
- 2.3 SECURITY FIRE PROTECTION CABINET
- A. Cabinet Type: Suitable for fire extinguisher.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. J. L. Industries, Inc., a division of Activar Construction Products Group.
 - b. Larsen's Manufacturing Company.
 - c. Potter Roemer LLC.
- B. Cabinet Construction: Nonrated.
- C. Cabinet Material: 0.0966-inch-thick steel sheet.
- D. Surface-Mounted Cabinet (DFEC): Cabinet box fully exposed and mounted directly on wall; with no trim.
- E. Cabinet Trim Material: Steel sheet.
- F. Door Material: 0.0966-inch-thick steel.
- G. Door Style: Solid opaque panel with frame.
- H. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated, and as follows:
1. Recessed door pull.
 2. Continuous Hinge: Same material and finish as trim, permitting door to open 180 degrees.
 3. Mechanical Deadlock: Lockbolt retracted and extended by five-tumbler mogul cylinder; keyed one side.
 - a. Lockbolt: 1-1/2 inches high by 3/4 inch thick; 5/8-inch throw.

I. Accessories:

1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to security fire protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
2. Keys to Door Locks: Five total, key all locks the same.

J. Finishes:

1. Manufacturer's standard baked-enamel paint for the following:
 - a. Exterior of cabinet door, and trim except for those surfaces indicated to receive another finish.
 - b. Interior of cabinet and door.
2. Steel: Baked enamel or powder coat.

2.4 FABRICATION

A. Fire Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.

1. Weld joints and grind smooth.
2. Provide factory-drilled mounting holes.
3. Prepare doors and frames to receive locks.
4. Install door locks at factory.

B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles selected.

1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch thick.
2. Fabricate door frames of one-piece construction with edges flanged.
3. Miter and weld perimeter door frames.

C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.5 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces of fire protection cabinets from damage by applying a strippable, temporary protective covering before shipping.

C. Finish fire protection cabinets after assembly.

D. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.6 STEEL FINISHES

A. Surface Preparation: Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning" or SSPC-SP 8, "Pickling". After cleaning, apply a conversion coating suited to the organic coating to be applied over it.]

B. Factory Prime Finish: Apply manufacturer's standard, fast-curing, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.

C. Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils.

1. Color and Gloss: White, semi-gloss.

2.7 LOCK BOX

A. Coordinate exact location in the field with authorities having jurisdiction and coordinate location as indicated on drawings. Provide Knox-Box 3200 Series (or lock box required by county), with recessed mounting kit.

1. Exterior Dimensions: 7H" x 7W" x 3-1/4D" flange.

2. Lock: Double action rotating tumblers and hardened steel pins accessed by a biased cut key.

3. Finish: Aluminum.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for cabinets to verify actual locations of piping connections before cabinet installation.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install fire protection cabinets in locations and at mounting heights indicated.

1. Fire Protection Cabinets: 60 inches above finished floor to top of cabinet.

B. Fire Protection Cabinets: Fasten cabinets to structure, square and plumb.

1. Fasten mounting brackets to inside surface of fire protection cabinets, square and plumb.

C. Identification: Apply decals at locations indicated.

3.3 ADJUSTING AND CLEANING

A. Remove temporary protective coverings and strippable films, if any, as fire protection cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.

B. Adjust fire protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

C. On completion of fire protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.

D. Touch up marred finishes, or replace fire protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire protection cabinet and mounting bracket manufacturers.

- 1 E. Replace fire protection cabinets that have been damaged or have deteriorated beyond
- 2 successful repair by finish touchup or similar minor repair procedures.
- 3 3.4 FIRE CABINET SCHEDULE:
- 4 A. Non Security Cabinets:
- 5 1. Hook Mounted (no cabinet) – FE
- 6 2. Surface Mounted – FEC1
- 7 3. Semi-Recess Mounted – FEC2
- 8 4. Recessed - FEC3
- 9 B. Security Cabinets:
- 10 1. Surface Mounted - DFEC.
- 11 END OF SECTION 10 44 13

1 SECTION 10 44 16 - FIRE EXTINGUISHERS

2 PART 1 - GENERAL

3 1.1 GENERAL REQUIREMENTS

- 4 A. Drawings and Conditions of Contract, including General and Supplementary Conditions and
5 Division 1 Administration Sections, apply to this Division.

6 1.2 SUMMARY

- 7 A. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire
8 extinguishers.

- 9 B. Related Sections:

- 10 1. Division 10 44 13 Section "Fire Extinguisher Cabinets."

11 1.3 SUBMITTALS

- 12 A. Product Data: For each type of product indicated. Include rating and classification, material
13 descriptions, dimensions of individual components and profiles, and finishes for fire
14 extinguisher and mounting brackets.

- 15 B. Product Schedule: For fire extinguishers. Coordinate final fire extinguisher schedule with fire
16 protection cabinet schedule to ensure proper fit and function. Use same designations indicated
17 on Drawings.

- 18 C. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.

19 1.4 QUALITY ASSURANCE

- 20 A. Title 19 Compliance: Fabricate and label fire extinguishers to comply with CCR, Title 19,
21 Division 1, Chapter 3, "Portable Fire Extinguishers."

- 22 B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent
23 testing agency acceptable to authorities having jurisdiction.

- 24 1. Provide fire extinguishers approved, listed, and labeled by FMG.

25 1.5 COORDINATION

- 26 A. Coordinate type and capacity of fire extinguishers with fire protection cabinets to ensure fit and
27 function.

28 PART 2 - PRODUCTS

29 2.1 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

- 30 A. Fire Extinguishers: Type, size, and capacity for each fire protection cabinet and mounting
31 bracket indicated.

- 32 1. Manufacturers: Subject to compliance with requirements, available manufacturers
33 offering products that may be incorporated into the Work include, but are not limited to,
34 the following:

- 1 a. Amerex Corporation.
- 2 b. Ansul Incorporated; Tyco International Ltd.
- 3 c. Badger Fire Protection; a Kidde company.
- 4 d. Buckeye Fire Equipment Company.
- 5 e. Fire End & Croker Corporation.
- 6 f. J. L. Industries, Inc.; a division of Activar Construction Products Group.
- 7 g. Kidde Residential and Commercial Division; Subsidiary of Kidde plc.
- 8 h. Larsen's Manufacturing Company.
- 9 i. Moon-American.
- 10 j. Pem All Fire Extinguisher Corp.; a division of PEM Systems, Inc.
- 11 k. Potter Roemer LLC.
- 12 l. Pyro-Chem; Tyco Safety Products.

- 13 B. Multipurpose Dry-Chemical Type (FE): UL-rated 4-A;60-B:C nominal capacity, with
- 14 monoammonium phosphate-based dry chemical in manufacturer's standard enameled
- 15 container.

16 2.2 MOUNTING BRACKETS

- 17 A. Mounting Brackets: Manufacturer's standard steel, designed to secure fire extinguisher to wall
- 18 or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated
- 19 or red baked-enamel finish.
- 20 B. Identification: Lettering complying with authorities having jurisdiction for letter style, size,
- 21 spacing, and location. Locate as indicated by Architect.
- 22 1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red
- 23 letter decals applied to mounting surface.
- 24 a. Orientation: Vertical.

25 PART 3 - EXECUTION

26 3.1 EXAMINATION

- 27 A. Examine fire extinguishers for proper charging and tagging.
- 28 1. Remove and replace damaged, defective, or undercharged fire extinguishers.
- 29 B. Proceed with installation only after unsatisfactory conditions have been corrected.

30 3.2 INSTALLATION

- 31 A. General: Install fire extinguishers in fire extinguisher cabinets and with mounting brackets in
- 32 locations indicated and in compliance with requirements of authorities having jurisdiction.
- 33 1. Mounting Brackets: 54 inches above finished floor to top of fire extinguisher.
- 34 B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations
- 35 indicated.

36 END OF SECTION 10 44 16

SECTION 10 51 13 - METAL LOCKERS

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. Drawings and Conditions of Contract, including General and Supplementary Conditions and Division 1 Administration Sections, apply to this Division.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Knocked-down, quiet metal lockers.
 - 2. Locker benches.
- B. Related Sections include the following:
 - 1. Division 06 10 00 Section "Rough Carpentry" for furring, blocking, and shims required for installing metal lockers and concealed within other construction before metal locker installation.

1.3 DEFINITIONS

- A. Uncoated Steel Sheet Thicknesses: Indicated as the minimum thicknesses.

1.4 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of metal locker and bench.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - 1. Show base, sloping tops, filler panels and other accessories.
 - 2. Include locker identification system.
- C. Samples for Initial Selection: For units with factory-applied color finishes.
- D. Qualification Data: For Installer.
- E. Maintenance Data: For adjusting, repairing, and replacing locker doors and latching mechanisms to include in maintenance manuals.
- F. Warranty: Special warranty specified in this Section.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative of metal locker manufacturer for installation and maintenance of units required for this Project.
- B. Source Limitations: Obtain metal lockers and accessories through one source from a single manufacturer.
- C. Regulatory Requirements: Where metal lockers are indicated to comply with accessibility requirements, comply with the California Building Code, the U.S. Architectural & Transportation

Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)."

1. Provide not less than 1 shelf located no higher than 48 inches above the floor for side reach at accessible locker.
2. Provide 1 shelf located at bottom of locker no lower than 15 inches above the floor for side reach at accessible locker.
3. Provide hardware that does not require tight grasping, pinching, or twisting of the wrist, and that operates with a force of not more than 5 lbf.
4. Provide decal indicating accessibility.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver metal lockers until spaces to receive them are clean, dry, and ready for metal locker installation.

1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify the following by field measurements before fabrication and indicate measurements on Shop Drawings:
 1. Concealed framing, blocking, and reinforcements that support metal lockers before they are enclosed.
 2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish recessed opening dimensions and proceed with fabricating metal lockers without field measurements. Coordinate wall and floor construction to ensure that actual recessed opening dimensions correspond to established dimensions.

1.8 COORDINATION

- A. Coordinate size and location of concrete bases for metal lockers.
- B. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that metal lockers can be supported and installed as indicated.

1.9 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal lockers that fail in materials or workmanship, excluding finish, within specified warranty period.
 1. Failures include, but are not limited to, the following:
 - a. Structural failures.
 - b. Faulty operation of latches and other door hardware.
 2. Damage from deliberate destruction and vandalism is excluded.
 3. Warranty Period for Knocked-Down Metal Lockers: Two years from date of Project completion.

1.10 EXTRA MATERIALS

- A. Furnish extra materials described below, before construction begins, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Full-size units of the following metal locker hardware items equal to 10 percent of amount installed for each type and finish installed, but no fewer than 5 units:

- a. Locks.
- b. Identification plates.
- c. Hooks.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Products: Subject to compliance with requirements, provide products by one of the specified manufacturers.

2.2 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008, Commercial Steel (CS) Type B, suitable for exposed applications.
- B. Expanded Metal: ASTM F 1267, Type II (flattened), Class I, 3/4-inch steel mesh, with at least 70 percent open area.
- C. Stainless-Steel Sheet: ASTM A 666, Type 304.
- D. Extruded Aluminum: ASTM B 221, alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated.
- E. Fasteners: Zinc- or nickel-plated steel, slotless-type exposed bolt heads, and self-locking nuts or lock washers for nuts on moving parts.
- F. Anchors: Select material, type, size, and finish required for secure anchorage to each substrate.
 - 1. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance.
 - 2. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

2.3 KNOCKED-DOWN, QUIET METAL LOCKERS

- A. Products:
 - 1. Spacesaver Corp (Basis of Design)
 - 2. Art Metal Products, Div. of Fort Knox Storage Co.
 - 3. DeBourgh Mfg. Co.
 - 4. General Storage Systems, Div. of North American Steel.
 - 5. Hadrian Inc.
 - 6. List Industries Inc.
 - 7. Lyon Workspace Products.
 - 8. Penco Products, Inc., Subsidiary of Vesper Corporation.
 - 9. Republic Storage Systems Company.
 - 10. Shanahan's Ltd.
 - 11. Tennsco Corp.
- B. Locker Arrangement: As indicated in Metal Locker Schedule located at the end of Part 3.
- C. Body: Assembled by riveting or bolting body components together. Fabricate from unperforated, cold-rolled steel sheet with thicknesses as follows:

1. Tops, Bottoms, and Intermediate Dividers: 0.0209 inch, with single bend at sides.
 2. Backs and Sides: 0.0209 inch thick, with full-height, double-flanged connections.
 3. Shelves: 0.0209 inch thick, with double bend at front and single bend at sides and back.
- D. Frames: Channel formed; fabricated from 0.0528-inch-thick, cold-rolled steel sheet; lapped and factory welded at corners; with top and bottom main frames factory welded into vertical main frames. Form continuous, integral door strike full height on vertical main frames. Retain subparagraph below if needed; cross frames between tiers are not offered by all manufacturers.
1. Cross Frames between Tiers: Channel formed and fabricated from same material as main frames; welded to vertical frame members.
 2. Frame Vents: Fabricate horizontal face frames with vents.
- E. Doors: One-piece; fabricated from 0.0528-inch-thick, cold-rolled steel sheet; formed into channel shape with double bend at vertical edges, and with right-angle single bend at horizontal edges.
1. Doors less than 12 inches wide may be fabricated from 0.0428-inch-thick, cold-rolled steel sheet.
 2. Reinforcement: Manufacturer's standard reinforcing angles, channels, or stiffeners for doors more than 15 inches wide; welded to inner face of doors.
 3. Stiffeners: Manufacturer's standard full-height stiffener fabricated from 0.0428-inch-thick, cold-rolled steel sheet; welded to inner face of doors.
 4. Sound-Dampening Panels: Manufacturer's standard, designed to stiffen doors and reduce sound levels when doors are closed, of die-formed metal with full perimeter flange and sound-dampening material; welded to inner face of doors.
 5. Door Style: Vented panel as follows:
 - a. Louvered Vents: Not less than:
 - 1) Six louver openings at top and bottom for single-tier.
 - 2) Three louver openings at top and bottom for double-tier.
 - 3) Two louver openings at top and bottom for multiple-tier lockers.
- F. Hinges: Self-closing; welded to door and attached to door frame with not less than 2 factory-installed rivets per hinge that are completely concealed and tamper resistant when door is closed; fabricated to swing 180 degrees.
1. Hinges: Manufacturer's standard, steel continuous or knuckle type.
 - a. Knuckle Hinges: Steel, full loop, 5 or 7 knuckles, tight pin; minimum 2 inches high. Provide not less than 3 hinges for each door more than 42 inches high.
- G. Recessed Door Handle and Latch: Stainless-steel cup with integral door pull, recessed so locking device does not protrude beyond face of door; pry resistant.
1. Multipoint Latching: Finger-lift latch control designed for use with built-in combination locks, built-in key locks, or padlocks; positive automatic and prelocking.
 - a. Latch Hooks: Equip doors 48 inches and higher with 3 latch hooks and doors less than 48 inches high with 2 latch hooks; fabricated from minimum 0.0966-inch-thick steel; welded or riveted to full-height door strikes; with resilient silencer on each latch hook.
 - b. Latching Mechanism: Manufacturer's standard rattle-free latching mechanism and moving components isolated with vinyl or nylon to prevent metal-to-metal contact, and incorporating a prelocking device that allows locker door to be locked while door is open and then closed without unlocking or damaging lock or latching mechanism.
- H. Combination Padlocks: Key-controlled, three-number dialing combination locks; capable of five combination changes.

- I. Equipment: Equip each metal locker with identification plate and the following, unless otherwise indicated:
 - 1. Single-Tier Units: Shelf, one double-prong ceiling hook, and two single-prong wall hooks.
 - 2. Double-Tier Units: One double-prong ceiling hook and two single-prong wall hooks.
 - 3. Multiple-Tier Units: Two single-prong wall hooks.
 - 4. Coat Rods: In lieu of ceiling hook for metal lockers 18 inches deep or greater.
- J. Accessories:
 - 1. Continuous Sloping Tops: Fabricated from cold-rolled steel sheet, manufacturer's standard thickness, but not less than 0.0329 inch thick.
 - a. Closures: Vertical-end type.
 - b. Sloped top corner fillers, mitered.
 - 2. Recess Trim: Fabricated from 0.0428-inch-thick, cold-rolled steel sheet.
 - 3. Filler Panels: Fabricated from cold-rolled steel sheet, manufacturer's standard thickness, but not less than 0.0329 inch thick.
 - 4. Finished End Panels: Fabricated from 0.0209-inch-thick, cold-rolled steel sheet.
- K. Finish: Baked enamel or powder coat.
 - 1. Color: As selected by Architect from manufacturer's full range.

2.4 LOCKER BENCHES

- A. General: Provide locker benches fabricated by same manufacturer as metal lockers.
- B. Bench Tops: Manufacturer's standard 1-piece units, of the following material, minimum 16 inches wide (20 inches at ADA bench) by 1-1/4 inches thick, with rounded corners and edges.
- C. ADA Bench tops standard 1-piece units with back 48 inch by 24 inch with 20 inch high back support. Back support shall be 2 1/2" maximum from the rear edge of the seat per CBC 11B-903.4). Height of bench seat shall be at 18 inches per CBC 11B-903.5:
 - 1. Laminated maple with one coat of clear sealer on all surfaces, and one coat of clear lacquer on top and sides.
- D. Fixed Pedestals: Manufacturer's standard supports, with predrilled fastener holes for attaching bench top and anchoring to floor, complete with fasteners and anchors, provide one of the following:
 - 1. Cast Iron: 1-1/2-inch-diameter steel tubing threaded on both ends, with standard pipe flange at top and bell-shaped cast-iron base; with baked-enamel or powder-coat finish; anchored with exposed fasteners.
 - 2. Tubular Steel: 1-1/4-inch-diameter steel tubing, with 0.1265-inch-thick steel flanges welded at top and base; with baked-enamel or powder-coat finish; anchored with exposed fasteners.
 - 3. Color: As selected by Architect from manufacturer's full range.

2.5 FABRICATION

- A. General: Fabricate metal lockers square, rigid, and without warp; with metal faces flat and free of dents or distortion. Make exposed metal edges free of sharp edges and burrs, and safe to touch.
 - 1. Form body panels, doors, shelves, and accessories from one-piece steel sheet, unless otherwise indicated.
 - 2. Provide fasteners, filler plates, supports, clips, and closures as required for a complete installation.

- B. Unit Principle: Fabricate each metal locker with an individual door and frame; individual top, bottom, and back; and common intermediate uprights separating compartments.
- C. Knocked-Down Construction: Fabricate metal lockers for nominal assembly at Project site using nuts, bolts, screws, or rivets. Factory weld frame members together to form a rigid, one-piece assembly.
- D. Hooks: Manufacturer's standard ball-pointed type, aluminum or steel; zinc plated.
- E. Coat Rods: Fabricated from 3/4-inch-diameter steel; chrome finished.
- F. Identification Plates: Manufacturer's standard etched, embossed, or stamped aluminum plates; with numbers and letters at least 3/8 inch high.
- G. Continuous Sloping Tops: Fabricated in lengths as long as practicable, without visible fasteners at splice locations; finished to match lockers.
 - 1. Sloped top corner fillers, mitered.
- H. Filler Panels: Fabricated in an unequal leg angle shape; finished to match lockers. Provide slip joint filler angle formed to receive filler panel.
- I. Finished End Panels: Designed for concealing unused penetrations and fasteners, except for perimeter fasteners, at exposed ends of non-recessed metal lockers; finished to match lockers.
 - 1. Provide one-piece panels for double-row (back-to-back) locker ends.

2.6 STEEL SHEET FINISHES

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Factory finish steel surfaces and accessories except stainless-steel and chrome-plated surfaces.
- C. Surface Preparation: Clean surfaces of dirt, oil, grease, mill scale, rust, and other contaminants that could impair paint bond. Use manufacturer's standard methods.
- D. Baked-Enamel Finish: Immediately after cleaning, pretreating, and phosphatizing, apply manufacturer's standard thermosetting baked-enamel finish. Comply with paint manufacturer's written instructions for application, baking, and minimum dry film thickness.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine walls, floors, and support bases, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
 - 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install level, plumb, and true; shim as required, using concealed shims.

1. Anchor locker runs at ends and at intervals recommended by manufacturer, but not more than 36 inches on center. Install anchors through backup reinforcing plates, channels, or blocking as required to prevent metal distortion, using concealed fasteners.
 2. Anchor single rows of metal lockers to walls near top and bottom of lockers.
 3. Anchor back-to-back metal lockers to floor.
- B. Knocked-Down Metal Lockers: Assemble knocked-down metal lockers with standard fasteners, with no exposed fasteners on door faces or face frames.
- C. Equipment and Accessories: Fit exposed connections of trim, fillers, and closures accurately together to form tight, hairline joints, with concealed fasteners and splice plates.
1. Attach hooks with at least two fasteners.
 2. Attach door locks on doors using security-type fasteners.
 3. Identification Plates:
 - a. Identify metal lockers with identification noted on shop drawing submittal.
 - b. Attach plates to each locker door, near top, centered, with at least two aluminum rivets.
 4. Attach filler panels with concealed fasteners. Locate fillers panels where indicated on Drawings.
 5. Attach sloping top units to metal lockers, with closures at exposed ends.
 6. Attach finished end panels with fasteners only at perimeter to conceal exposed ends of non-recessed metal lockers.
- D. Fixed Locker Benches: Provide not less than 2 pedestals for each bench, uniformly spaced not more than 60 inches apart. Securely fasten tops of pedestals to undersides of bench tops, and anchor bases to floor.

3.3 ADJUSTING, CLEANING, AND PROTECTION

- A. Clean, lubricate, and adjust hardware. Adjust doors and latches to operate easily without binding. Verify that integral locking devices operate properly.
- B. Protect metal lockers from damage, abuse, dust, dirt, stain, or paint. Do not permit metal locker use during construction.
- C. Touch up marred finishes, or replace metal lockers that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by metal locker manufacturer.

3.4 METAL LOCKER SCHEDULE

- A. Civilian Metal Lockers CML
1. Locker Classification: Multiple Tier.
 2. Locker Size: 15-inches wide x 15-inches deep x 60-inches high.
 - a. 3 tiers for a total of 60 inches high
 - b. Surface mounted
 - c. Sloping top
 3. Color: As selected by Architect from manufacturer's full range.
- B. Visitor Metal Locker VML:
1. Locker Classification: Multiple Tier.
 2. Locker Size: 12-inches wide x 12-inches deep x 60-inches high.
 - a. 4 tiers for a total of 60-inches high.

- b. Surface mounted
 - c. Sloping top
 - d. Removable key operation
- 3. Color: As selected by Architect from manufacturer's full range.

C. Staff Metal Locker (SML-1):

- 1. Locker Classification: Single Tier.
- 2. Locker Size: 18-inches wide x 24-inches deep x 60-inches high.
 - a. 1 tier for a total of 60-inches high.
 - b. Surface mounted
 - c. Sloping top
- 3. Color: As selected by Architect from manufacturer's full range.

D. Staff Metal Locker (SML-2):

- 1. Locker Classification: Single Tier, ACCESSIBLE.
- 2. Locker Size: 18-inches wide x 24-inches deep x 60-inches high.
 - a. 1 tier for a total of 60-inches high.
 - b. Surface mounted
 - c. Sloping top
- 3. Color: As selected by Architect from manufacturer's full range.

3.5 LOCKER BENCH SCHEDULE

A. Locker Bench 1 (LRB-1)

- 1. 16 inch deep bench.

B. Locker Bench 1 (LRB-2)

- 1. 24 inch deep bench with back support, ACCESSIBLE.

END OF SECTION 10 51 13

1 SECTION 11 13 13 - LOADING DOCK BUMPERS

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY

- 7 A. Section includes loading dock bumpers.

8 1.3 ACTION SUBMITTALS

- 9 A. Product Data: For each type of loading dock bumper.
- 10 B. Shop Drawings: For dock bumpers. Include plans, elevations, sections, details, and
11 attachments to other work.

12 PART 2 - PRODUCTS

13 2.1 DOCK BUMPERS

- 14 A. General: Surface-mounted bumpers; of type, size, and construction indicated; designed to
15 absorb kinetic energy and minimize damage to loading dock structure.

- 16 1. Basis-of-Design Product: Subject to compliance with requirements, provide Rite-Hite
17 Corporation; Laminated Dock Bumpers or a comparable product by one of the following:

- 18 a. Durable Corporation.
- 19 b. Hugger Dock Equipment Company; Columbus Foam Products, Inc.
- 20 c. Pioneer Dock Equipment.
- 21 d. Super Seal Mfg. Ltd.

- 22 B. Laminated-Tread Dock Bumper: Fabricated from multiple, uniformly thick plies cut from fabric-
23 reinforced rubber tires. Laminate plies under pressure on not less than two 3/4-inch-diameter,
24 steel supporting rods that are welded at one end to 1/4-inch-thick, structural-steel end angle and
25 secured with a nut and angle at the other end. Fabricate angles with predrilled anchor holes and
26 sized to provide not less than 1 inch of tread plies extending beyond the face of closure angles.

- 27 1. Thickness: 4 inches.
- 28 2. Horizontal Style: 12 inches high by 24 inches wide.

- 29 C. Anchorage Devices: Galvanized-steel anchor bolts, nuts, washers, bolts, sleeves, cast-in-place
30 plates, and other anchorage devices as required to fasten bumpers securely in place and to suit
31 installation type indicated. Hot-dip galvanized according to ASTM A 153/A 153M or
32 ASTM F 2329.

- 33 D. Materials: ASTM 36/A 36M for steel plates, shapes, and bars. Hot-dip galvanize according to
34 ASTM A 123/A 123M.

1 PART 3 - EXECUTION

2 3.1 EXAMINATION

3 A. Examine areas and conditions, with Installer present, for compliance with requirements for
4 installation tolerances and other conditions affecting performance of the Work.

5 B. Proceed with installation only after unsatisfactory conditions have been corrected.

6 3.2 INSTALLATION

7 A. Dock Bumpers: Attach dock bumpers to face of loading dock in a manner that complies with
8 requirements indicated for spacing, arrangement, and position relative to top of platform and
9 anchorage.

10 1. Bolted Attachment: Attach dock bumpers to preset anchor bolts embedded in concrete or
11 to cast-in-place inserts or threaded studs welded to embedded-steel plates or angles. If
12 preset anchor bolts, cast-in-place inserts, or threaded studs welded to embedded-steel
13 plates or angles are not provided, attach dock bumpers by drilling and anchoring with
14 expansion anchors and bolts.

15 3.3 ADJUSTING

16 A. After completing installation of exposed, factory-finished dock bumpers, inspect exposed
17 finishes and repair damaged finishes.

18 END OF SECTION 11 13 13

1 SECTION 11 13 19 - STATIONARY LOADING DOCK EQUIPMENT

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY

7 A. Section Includes:

- 8 1. Recessed dock levelers.

9 B. Related Requirements:

- 10 1. Section 08 33 23 "Overhead Coiling Doors" for coiling overhead doors electrically
11 interlocked to dock levelers.
12 2. Section 11 13 13 "Loading Dock Bumpers" for loading dock bumpers.

13 1.3 PREINSTALLATION MEETINGS

14 A. Preinstallation Conference: Conduct conference at Project site.

- 15 1. Inspect and discuss electrical roughing-in, equipment bases, and other preparatory work
16 specified elsewhere.
17 2. Review sequence of operation for each type of loading dock equipment.
18 3. Review coordination of interlocked equipment specified in this Section and elsewhere.
19 4. Review required testing, inspecting, and certifying procedures.

20 1.4 DEFINITIONS

21 A. Operating Range: Maximum amount of travel above and below the loading dock level.

22 B. Working Range: Recommended amount of travel above and below the loading dock level for
23 which loading and unloading operations can take place.

24 1.5 ACTION SUBMITTALS

25 A. Product Data: For each type of product.

- 26 1. Include construction details, material descriptions, dimensions of individual components
27 and profiles, and finishes for stationary loading dock equipment.
28 2. Include rated capacities, operating characteristics, electrical characteristics, and
29 furnished specialties and accessories.

30 B. Shop Drawings: For stationary loading dock equipment.

- 31 1. Include plans, elevations, sections, details, and attachments to other work.
32 2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required
33 clearances, method of field assembly, components, and location and size of anchors and
34 field connection.
35 3. Include diagrams for power, signal, and control wiring.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Welding certificates.
- C. Product Test Reports: For each dock leveler, for tests performed by manufacturer and witnessed by a qualified testing agency.
 - 1. Indicate compliance of dock levelers with requirements in MH 30.1 for determining rated capacity, which is based on comprehensive testing within last two years of current products.
 - 2. Submittal Form: According to MH 30.1.
- D. Sample Warranty: For manufacturer's special warranty.

1.7 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For stationary loading dock equipment to include in operation and maintenance manuals.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 2. AWS D1.3, "Structural Welding Code - Sheet Steel."

1.9 FIELD CONDITIONS

- A. Field Measurements: Verify actual dimensions of construction contiguous with stationary loading dock equipment, including recessed pit dimensions, slopes of driveways, and heights of loading docks, by field measurements before fabrication.

1.10 WARRANTY

- A. Manufacturer's Special Warranty: Manufacturer agrees to repair or replace dock levelers that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including cracked or broken structural support members, load-bearing welds, and front and rear hinges.
 - b. Faulty operation of operators, control system, or hardware.
 - c. Deck plate failures including cracked plate or permanent deformation in excess of 1/4 inch between deck supports.
 - d. Hydraulic system failures including failure of hydraulic seals and cylinders.
 - 2. Warranty Period for Structural Assembly: 20 years from date of Project completion.
 - 3. Warranty Period for Hydraulic System: 10 years from date of Project completion.
 - 4. Warranty shall be for unlimited usage of leveler for the specified rated capacity over the term of the warranty.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 RECESSED DOCK LEVELERS

- A. General: Recessed, hinged-lip-type dock levelers designed for permanent installation in concrete pits preformed in the edge of loading platform; of type, function, operation, capacity, size, and construction indicated; and complete with controls, safety devices, and accessories required.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Rite-Hite Corporation; Model RHH-4000 or a comparable product by one of the following:

- a. Beacon Industries, Inc.
- b. Blue Giant Equipment Corporation.
- c. Pentalift Equipment Corporation.

- B. Standard: Comply with MH 30.1.

- C. Rated Capacity: Capable of supporting total gross load of 10,000 pounds without permanent deflection or distortion.

- D. Platform: Not less than 1/4-inch-thick, nonskid steel plate.

- 1. Platform Size: As indicated on Drawings.
- 2. Frame: Manufacturer's standard.
- 3. Toe Guards: Equip open sides of dock leveler over range indicated with metal toe guards.
 - a. Toe-Guard Range: Entire upper [operating] [working] range.

- E. Hinged Lip: Not less than 1/2-inch-thick, nonskid steel plate.

- 1. Hinge: Full-width, piano-type hinge with heavy-wall hinge tube and grease fittings, with gussets on lip and ramp for support.
- 2. Safety Barrier Lip: Designed to protect material-handling equipment from an accidental fall from loading platform edge of the dock leveler when the leveler is not in use.

- F. Function: Dock levelers shall compensate for differences in height between truck bed and loading platform.

- 1. Vertical Travel: Operating range above platform level of sufficient height to enable lip to extend and clear truck bed before contact with the following minimum working range:
 - a. Above Adjoining Platform: 18 inches.
 - b. Below Adjoining Platform: 12 inches.
- 2. Automatic Vertical Compensation: Floating travel of ramp with lip extended and resting on truck bed shall compensate automatically for upward or downward movement of truck bed during loading and unloading.
- 3. Automatic Lateral Compensation: Tilting of ramp with lip extended and resting on truck bed shall compensate automatically for canted truck beds of up to 4 inches over width of ramp.
- 4. Lip Operation: Manufacturer's standard mechanism, which automatically extends and supports hinged lip on ramp edge with lip resting on truck bed over dock leveler's working

- 1 range, allows lip to yield under impact of incoming truck and automatically retracts lip
- 2 when truck departs.
- 3 a. Length of Lip Extension: 20 inches.
- 4 5. Automatic Ramp Return: Automatic return of unloaded ramp, from raised or lowered
- 5 positions to stored position, level with platform, as truck departs.
- 6 6. Interlock: Leveler does not operate while overhead door is in closed position.
- 7 G. Hydraulic Operating System: Electric control from a remote-control station; fully hydraulic
- 8 operation. Electric-powered hydraulic raising and hydraulic lowering of ramp. Equip leveler with
- 9 a packaged unit including a unitized, totally enclosed, nonventilated electric motor, pump,
- 10 manifold reservoir, and valve assembly of proper size, type, and operation for capacity of leveler
- 11 indicated. Include means for lowering ramp below platform level with lip retracted behind dock
- 12 bumpers. Provide a hydraulic velocity fuse connected to main hydraulic cylinder to limit loaded
- 13 ramp's free fall to not more than 3 inches.
- 14 1. Remote-Control Station:
- 15 a. At exterior locations, weatherproof single-button station of the constant-pressure
- 16 type, enclosed in NEMA ICS 6, Type 4 box. Ramp raises by depressing and
- 17 holding button; ramp lowers at a controlled rate by releasing button.
- 18 b. At interior locations, single-button station of the constant-pressure type, enclosed
- 19 in NEMA ICS 6, Type 12 box. Ramp raises by depressing and holding button;
- 20 ramp lowers at a controlled rate by releasing button
- 21 H. Construction: Fabricate dock-leveler frame, platform supports, and lip supports from structural-
- 22 or formed-steel shapes. Weld platform and hinged lip to supports. Fabricate entire assembly to
- 23 withstand deformation during both operating and stored phases of service. Chamfer lip edge to
- 24 minimize obstructing wheels of material-handling vehicles.
- 25 1. Cross-Traffic Support: Manufacturer's standard method of supporting ramp at platform
- 26 level in stored position with lip retracted. Provide a means to release supports to allow
- 27 ramp to descend below platform level.
- 28 2. Maintenance Strut: Integral strut to positively support ramp in up position during
- 29 maintenance of dock leveler.
- 30 I. Materials:
- 31 1. Steel Plates, Shapes, and Bars: ASTM 36/A 36M.
- 32 2. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from steel plate complying with
- 33 ASTM A 572/A 572M, Grade 55.
- 34 3. Steel Tubing: ASTM A 500/A 500M, cold formed.
- 35 4. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal
- 36 alloy welded.
- 37 J. Dock-Leveler Finish: Manufacturer's standard finish.
- 38 1. Toe Guards: Paint toe guards to comply with ANSI Z535.1.
- 39 K. Accessories:
- 40 1. Curb Angles: 3-by-3-by-1/4-inch galvanized-steel curb angles for edge of recessed
- 41 leveler pit, with 1/2-inch-diameter by 6-inch-long concrete anchors welded to angle at 6
- 42 inches o.c.
- 43 2. Self-Forming Pan: Manufacturer's standard prefabricated, self-forming steel form system
- 44 for poured-in-place construction of concrete pit.
- 45 3. Abrasive skid-resistant surface.

2.3 FINISH REQUIREMENTS

- A. Finish loading dock equipment after assembly and testing.
- B. Galvanizing: Hot-dip galvanize components to comply with the following:
 - 1. ASTM A 123/A 123M for iron and steel loading dock equipment.
 - 2. ASTM A 153/A 153M or ASTM F 2329 for iron and steel hardware for loading dock equipment.
- C. Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat in manufacturer's standard color.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for electrical systems for loading dock equipment to verify actual locations of connections before equipment installation.
- C. Examine walls and floors of pits for suitable conditions where recessed loading dock equipment is to be installed. Pits shall be plumb and square and properly sloped for drainage from back to front of loading dock.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Coordinate size and location of loading dock equipment indicated to be attached to or recessed into concrete or masonry, and furnish anchoring devices with templates, diagrams, and instructions for their installation.
- B. Set curb angles in concrete edges of dock-leveler recessed pits with tops flush with loading platform. Fit exposed connections together to form hairline joints.
- C. Set curb angles in concrete edges of truck-leveler recessed pits with tops flush with driveway. Fit exposed connections together to form hairline joints.
- D. Place self-forming pan system for recessed dock levelers in proper relation to loading platform before pouring concrete.
- E. Clean recessed pits of debris.

3.3 INSTALLATION

- A. General: Install loading dock equipment as required for a complete installation.
 - 1. Rough-in electrical connections.
- B. Recessed Dock Levelers: Attach dock levelers securely to loading dock platform, flush with adjacent loading dock surfaces and square to recessed pit.

- 1 3.4 ADJUSTING
- 2 A. Adjust loading dock equipment to function smoothly and safely, and lubricate as recommended
- 3 by manufacturer.
- 4 B. Test dock levelers for vertical travel within operating range indicated.
- 5 C. After completing installation of exposed, factory-finished loading dock equipment, inspect
- 6 exposed finishes and repair damaged finishes.
- 7 3.5 DEMONSTRATION
- 8 A. Engage a factory-authorized service representative to train Owner's maintenance personnel to
- 9 adjust, operate, and maintain loading dock equipment.
- 10 END OF SECTION 11 13 19

1 SECTION 11 19 10 - SECURITY EQUIPMENT

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General Conditions and Division 1
5 Specification Sections, apply to this Section.

6 1.2 SUMMARY

- 7 A. Provide and install detention equipment as scheduled, including but not limited to the following:

- 8 1. Transaction (Deal) Trays.
9 2. Pistol Lockers.
10 3. Weapons Clearing Traps.
11 4. Speak Through
12 5. Key Cabinet
13 6. Television Enclosure
14 7. Television Mounting Bracket

15 1.3 SUBMITTALS

- 16 A. Manufacturer's Data:

- 17 1. Submit manufacturer's product specifications and installation instructions for each type of
18 detention equipment.
19 2. Distribute one (1) copy to the installer.

- 20 B. Shop Drawings:

- 21 1. Shop drawings shall show quantities, types, and locations. Construction shall be fully
22 detailed, showing weights of materials, finish, framing, reinforcing, anchoring, and
23 method of making joints, and must indicate conformance with all specified technical
24 requirements, and shall conform with the physical configuration of the specified items.

- 25 C. Special Tools:

- 26 1. Provide Owner with 5 tamperproof fastener tools for each different type tamperproof
27 fastener at time of project completion.

28 PART 2 - PRODUCTS

29 2.1 DEAL TRAYS (DT)

- 30 A. Acceptable Products:

- 31 1. Creative Industries, Inc.; Model 1210S. (Trussbilt)
32 2. Norshield Security Products; Series 670000 deal tray.
33 3. Safeguard Security Services, Inc.; Armortex Dip Tray Model RMDT-1012.
34 4. North American Bullet Proof; Shotgard MDT 812.

- 35 B. Construction: Minimum 0.053-inch thick stainless steel deal tray with flanges for mounting in
36 countertop.

- 37 C. Mounting Depth: 1-3/4 inches.

2.2 PISTOL LOCKER (PL1, PL2)

1. Products: Subject to compliance with requirements, available manufacturers that may be incorporated into the Work include, but are not limited to, the following:
 - a. Norix Group, Inc., IPL-600 (Basis of Design).
 - b. Norment Industries, Div. of Norment Security Group.
 - c. Southern Folger:
 - d. Peterson Detention, Inc.
 - e. Viking:
2. Fabrication & Material: Cut, formed, welded and ground smooth steel.
 - a. Body Front and Sides: 7 gauge steel.
 - b. Body Back: 10 gauge steel.
 - c. Drawer Fronts: 7 gauge steel.
 - d. Drawer Sides and Backs: 10 gauge steel.
 - e. Mounting Flange: 2 x 2 x 3/16" steel.
 - f. Hinge: 14 gauge steel continuous hinge.
 - g. Compartment Size: 15 ½ inches wide by 8-1/2 inches high by 5 inches deep.
 - h. Lining: 1/8inch thick felt lining in drawers:
 - i. Lock: Individually keyed and master keyed pin tumbler snap lock. 2 keys per compartment, 2 master keys per locker.
 - j. Finish: Manufacturer's standard baked enamel or powder coat finish.
3. Sizes:
 - a. PL1: Pistol Locker, 6 compartments
 - b. PL2: Pistol Locker, 9 compartments

2.3 SPEAK THROUGH (SP)

- A. Stainless steel speak through device mounted in ballistic glazing as indicated in the documents similar to the product manufactured by the following:
 1. Argyle Precision (formerly PDI); Speaking Device #SSSD1000.
 2. Creative Industries, Inc.; No. 6-FR Talk-thru.
 3. Safeguard Security Services, Inc.; Armortex Universal Security Speaker Model SSS-7D-3.
 4. Peterson Enterprises, Inc.; Speaking Device #SSSD1000.
 5. Viking.
 6. Norix Group, Inc., ISP-100
- B. Construction: Minimum 0.093-inch thick stainless steel, nominal 6 inch diameter, with offset holes in front and back plates that allow for natural voice transmission.
 1. Cast stainless steel device
 2. Natural voice transmission
 3. Level III ballistic rating

- C. Fasteners: Security screws.

2.4 ELECTRONIC KEY CABINET (EKC)

- A. Illuminated and electronically controlled key management system based on the Morse Watchman KeyWatcher Illuminated and shall, meet the following requirements:
 1. Size: 20.5 inches wide, 18 inches high and 13 inches deep
 2. 20 key capacity

- 1 3. surface mounted
- 2 4. Illuminated system
- 3 5. Built-in keypad and up to 2,000 assignable codes with personal identification numbers
- 4 6. Coordinate alarm connections and requirements
- 5 7. Modular and expandable

6 2.5 TELEVISION ENCLOSURE (TVE1, TVE2)

7 A. Flat screen television enclose system

- 8 1. TVArmor Television Detention Enclosure
- 9 2. PC Enclosures, Sloped Top LCD Guardian (basis of design)
- 10 3. Equivalent or custom manufacturer
- 11
- 12 a. 6063-T5 black anodized aluminum 1/8 inch thick with two 1/4 inch thick aluminum
- 13 reinforcements in each corner or 9 gauge power coated steel or stainless steel
- 14 b. Surface mounted
- 15 c. Sloped top
- 16 d. Security fasteners at all exposed conditions (minimize to exposed fasteners to the
- 17 greatest extent possible)
- 18 e. Minimum 1/4 inch polycarbonate or Lexan front cover.
- 19 f. Back panel and mounting brackets (for television and enclosure)
- 20 g. Provide required internal cooling fans and ventilation holes (similar to detention
- 21 diffusers)
- 22 4. Sizes:
- 23
- 24 a. TVE-1: For TVs up to 32" diagonal screens.
- 25 b. TVE-2: For TVs up to 47" diagonal screens.

26 2.6 TELEVISION MOUNTING BRACKET (TVMB)

27 A. Flat screen television articulating wall mount bracket

- 28 1. Paramount Articulating Wall Mount, Model PA746 (basis of design)
- 29 2. Rocketfish, Model RF-TVMFM03
- 30 3. Sanus, Model BMT-B1
- 31 4. Kanto, Model PDX650
- 32 5. Peerless, IM760P
- 33 6. Equivalent manufacturer
- 34 a. Size: to be design to fit the owner specified television
- 35 b. Articulating and swing out configuration
- 36 c. Wall or ceiling mounted, depending on field condition
- 37 d. Scratch resistant, fused black epoxy finish
- 38 e. Decorative trim ring for finished look (and concealment of fasteners)
- 39 f. 200 pound weight capacity
- 40 g. 5-year manufacturer's warranty

41 PART 3 - EXECUTION

42 3.1 INSPECTION

- 43 A. Examine the areas and conditions under which detention equipment is to be installed. Notify
- 44 the Contractor in writing of conditions detrimental to the proper and timely completion of the
- 45 work. Do not proceed with the work until unsatisfactory conditions have been corrected.

- 1 3.2 INSTALLATION
- 2 A. Comply with manufacturer's printed installation instructions.
- 3 B. Touch-up painting of factory-finished or factory-primed items is the installer's responsibility.
- 4 C. Touch-up factory applied finish of stainless-steel products as required.
- 5 3.3 PROTECTION
- 6 A. Protect equipment and finishes until project completion.
- 7 B. Replace damaged equipment as directed by the Owner.
- 8 3.4 CLEANING
- 9 A. Clean equipment thoroughly prior to project completion.
- 10 END OF SECTION 11 19 10

1 SECTION 11 19 15 - RESILIENT CELL PADDING

2 PART 1 - GENERAL

3 1.1 GENERAL REQUIREMENTS

- 4 A. Drawings and Conditions of Contract, including General and Supplementary Conditions and
5 Division 1 Administration Sections, apply to this Division.

6 1.2 SUMMARY

- 7 A. This section includes resilient cell padding with all accessories as specified and shown on
8 Drawings.

- 9 1. Provide resilient cell padding where indicated on plans and finish schedule

- 10 B. Related Sections include the following:

- 11 1. Division 033000 Sections "Cast-In-Place Concrete" for concrete floor slab and "Precast
12 Structural Concrete" for wall material.
13 2. Division 042200 Section "Concrete Unit Masonry" for wall material.
14 3. Division 083463 Section "Detention Doors and Frames" for doors and frames.
15 4. Division 135000 Section "Modular Metal Detention Wall Panel System" for metal wall
16 panels.
17 5. Division 22000 Section "Plumbing" for in-floor toilet.
18 6. Division 26 Sections for electrical requirements.

19 1.3 SUBMITTALS

- 20 A. Product Data: Manufacturer's product data, literature and installation instructions.
21 B. Shop Drawings showing fabrication and installation of resilient cell padding on floors and walls.
22 Include details of installation on door and frames, around glazed openings, at floor drains and
23 around other items located on wall or floor.
24 C. Samples: Colors available.
25 D. Maintenance Information: Provide instructions for care and maintenance of surfaces.

26 1.4 QUALITY ASSURANCE

- 27 A. Fire Performance Characteristics: Provide resilient cell padding with the following surface
28 burning characteristics as determined by testing identical products per ASTM E 84, 2007 edition
29 by UL or other testing and inspecting organizations acceptable to authorities having jurisdiction.

- 30 1. Flame Spread: 20 or less.
31 2. Smoke Development: ≤ 450 .
32 3. Fuel Contribution: 10.
33 4. Class A fire rating.

- 34 B. Padding to also conform to the following:

- 35 1. Compression Deflection (ASTM D 1056): 4 psi @ 25% deflection.
36 2. Moisture Absorption: Maximum 1.05% by weight.
37 3. Fungus-Resistance (ASTM G 21-90): 0.
38 4. Temperature Stability: Unaffected between 20 to 120 degrees F.

- 39 C. Obtain approval from authority having jurisdiction to use resilient cell padding specified.

- 40 D. Installer Qualifications: Engage an experienced installer with minimum five (5) years
41 experience and approved by the manufacturer as having the necessary experience, staff and
42 training to install product.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Transport and handle resilient cell padding panels to prevent damage.
 - B. Store materials in building on platform above floor and cover with tarps. Store joint filler liquid padding material in original containers in a well ventilated area away from fire and flame.
- 1.6 PROJECT CONDITIONS
- A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication to ensure proper fitting. Show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay.
 - B. Environmental Conditions: Maintain a minimum temperature of 65 degrees F, 36 hours before installation, during installation and until materials have fully cured as mandated by manufacturer.
 - C. Ventilation: Provide adequate ventilation during installation and curing time.
 - D. Flammability: No smoking, open flames or sparking from electrical equipment shall be permitted in the area during storage and application of material.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design Product: Subject to compliance with requirements, provide "Liquid Gold Medal Resilient Cell Padding" ; Marathon Engineering Corporation, or comparable product from the following:
 - 1. "Padded Surfaces"; B&E.

2.2 MATERIALS

- A. Padding: Resilient polymeric composition containing fire-retardant additives intended for use as floor, door and wall padding and designed as a surfacing material which has no extraneous plasticizers or softening agents which are not integrally bonded in the internal chemical structure. Materials to self-adhere to subsurfaces when installed and cured on site.
 - 1. Thickness: Nominal 3/4 inch on walls, 1/2 inch on floors.
 - 2. Weight: Approximately 5 pounds per square foot at 1-inch thickness.
 - 3. Finish: Smooth texture, scuff resistant.
 - 4. Color: As selected.
- B. Accessory Materials:
 - 1. Minimum 7/16-inch fire retardant oriented strand board (OSB) or plywood panels.
 - 2. Bond Coats and Adhesives: As recommended by manufacturer of padding to insure compatibility and bond with substrates.
 - 3. Top Coating: Manufacturer's standard scuff-resistant coating.
 - 4. Repair Kit: Provide manufacturer's standard repair kit for minor damage work.
 - 5. Reinforcing Mesh: Manufacturer's standard product.

2.3 FABRICATION

- A. Padding applied to walls and doors shall be prefabricated sheets factory applied to oriented strand board panels for a nominal thickness of 1 inch or prefabricated pads nominal 3/4 inch thick.
- B. Floors shall be liquid-poured and self leveling nominal 1/2 inch thick or nominal 1/2 inch thick pads with liquid covering.

1 PART 3 - EXECUTION

2 3.1 EXAMINATION

- 3 A. Before installation of padding, examine all subsurfaces to assure surfaces are true, even, dry,
4 clean and in proper condition to start installation. Notify Architect-Engineer in writing of any
5 condition which will prevent satisfactory installation. Do not proceed with work until such defects
6 are corrected. Application of padding constitutes acceptance of surfaces and responsibility
7 thereof.

8 3.2 PREPARATION

- 9 A. Provide adequate ventilation.
10 B. Maintain minimum temperature of 65 degrees F for duration of installation and curing time.
11 C. Verify concrete has cured for a minimum of 60 days prior to application of materials. Do not use
12 curing or bonding agents on concrete in these areas.
13 D. Prepare substrates for padding by filling and leveling all grooves, cracks and other
14 imperfections prior to installation of padding.

15 3.3 INSTALLATION

- 16 A. Install resilient wall padding in accordance with approved Shop Drawings and manufacturer's
17 written installation instructions.
18 B. Remove doors to install premolded panel padding on them. Seal around glazing area as
19 specified by the manufacturer. Re-install and test to verify that door operates properly after
20 application of padding without bonding or scraping of padding, padding backer and pourable
21 material.
22 C. Apply bond coat to clean walls and adhere prefabricated wall panels from floor to ceiling with
23 minimum 1/6 inch gap between panels. Fill all gaps with padding material in liquid form and
24 sand prior to application of top coating.
25 D. Install floor in accordance with manufacturer's instruction. Take special precautions to form area
26 around floor drains, to obtain proper contours. Avoid spillage of liquid material in to drain.
27 E. Apply finish coating in accordance with manufacturer's instructions.

28 3.4 CLEANING AND PROTECTION

- 29 A. Touch-up damaged surfaces per manufacturer's instruction.
30 B. Clean work area of debris associated with installation.
31 C. Clean surfaces per manufacturer's instructions.
32 D. Allow minimum 30 day cure time before use.
33

1 END OF SECTION 11 19 15

SECTION 11 24 23 – ROOF TIE BACK SYSTEM

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: This Section specifies design, supply and installation of roof tie back systems and suspended maintenance equipment.

1.2 RELATED SECTIONS

- A. Section 05 50 00 - Metal Fabrications: davit system support brackets.
- B. Section 07 55 52 – Modified Bituminous Roofing: for flashing for davit bases.
- C. Section 01 77 00 - Closeout Procedures.

1.3 REFERENCES

- A. American Institute of Steel Construction (AISC).
1. AISC S342L, Load and Resistance Factor Design Specification for Structural Steel Buildings (including Supplement No.1).
- B. American Society of Mechanical Engineers (AMSE).
1. ASME A120.1, Safety Requirements for Powered Platforms and Traveling Ladders and Gantries for Building Maintenance.
- C. American National Standards Institute / International Window Cleaning Association (ANSI/IWCA).
1. ANSI/IWCA I-14.1, Window Cleaning Safety Standard.
- D. American Welding Society (AWS).
1. AWS D1.2/D1.2M, Structural Welding Code - Aluminum.
 2. AWS D1.1/D1.1M, Structural Welding Code—Steel.
- E. ASTM International (ASTM).
1. ASTM A123/A123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 2. ASTM A167, Specification for Stainless and Heat Resisting Chromium Nickel Steel Plate, Sheet and Strip.
 3. ASTM A276, Standard Specification for Stainless Steel Bars and Shapes.
 4. ASTM A492 Standard Specification for Stainless Steel Rope.
 5. ASTM B221, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- F. International Code Council (ICC).
1. California Building Code.(CBC)
- G. Occupational Safety and Health Administration (OSHA).
1. OSHA 1910, Subpart D, Walking and Work Surfaces.
 2. OSHA 1910, Subpart F, Appendix C, Personal Fall Arrest Systems.

3. OSHA Ruling on Window Cleaning by Bosun's Chair.
 4. OSHA 1910.66 Subpart F, Powered Platforms.
- H. National Roofing Contractor's Association (NRCA)
1. The NRCA Roofing and Waterproofing Manual, Fifth Edition.
- 1.4 ACTION SUBMITTALS
- A. General: Submit listed action submittals in accordance with Contract Conditions and Section 01 33 00 - Submittal Procedures.
- B. Shop Drawings: Indicate information on shop drawings as follows:
1. Submit shop drawings showing complete layout and configuration roof tie back system, including components and accessories.
 2. Indicate design and fabrication details, and installation details.
 3. Include installation and rigging instructions and:
 - a. Required restrictive working usage and general safety notes.
 - b. Non-restrictive working usage and general safety notes.
 4. Ensure Shop Drawings are reviewed by Engineer licensed in State of California and submit calculations and test reports to Architect.
- C. Submit product data, including manufacturer's technical data sheet, for specified products.
- 1.5 INFORMATION SUBMITTALS
- A. Quality Assurance:
1. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
 2. Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
 3. Manufacturer's installation instructions.
- B. Operating Procedures Outline Sheet (OPOS):
1. Submit an Operating Procedures Outline System (OPOS) including necessary elements in both pictorial and written form, to instruct employees in safe use of roof supported building maintenance equipment or window cleaning procedures not covered by California Labor Code orders. Ensure that OPOS contains as a minimum, elements as follows:
 - a. Isometric or plan view pictorial drawing of building's roof, including building's name, address, and date OPOS was prepared. Ensure drawing is legible and kept with building's written assurance.
 - b. Identification of drop zones, recommended drop sequences, scaffold configurations, and specific building maintenance procedures including equipment to be used.
 - c. Identification of anchorage points for personal fall arrest systems and building maintenance equipment.
 - d. Identification of personal fall protection requirements and procedures for securing equipment.
 - e. Identification of dangerous areas on roof by highlighting of "Danger Zone" on

- pictorial drawing.
- f. Description of means and methods to be used to transfer equipment from drop location or between building levels.
- g. Identification of equipment limitations, load ratings, and special use conditions.
- h. Provisions for pre-operational, operation and maintenance inspections.
- i. Identification of access and egress to work locations and storage area(s) for permanent or transportable building maintenance equipment.
- j. Indication of location and method of stabilization provided for suspended equipment.
- k. Emergency and rescue procedures, and means of communications to be used during such procedures.
- l. Method to be used to control employee exposure to falls while in "Danger Zone."

C. Manufacturer's field reports specified.

1.6 CLOSEOUT SUBMITTALS

A. Submit 1-year standard manufacturer warranty documents specified.

B. Operation and Maintenance Data: Submit Operation and Maintenance data for installed products in accordance with Section 01 77 00 - Closeout Procedures.

1. Include:

- a. Manufacturer's instructions covering maintenance requirements and parts catalog giving complete list of repair and replacement parts with cuts and identifying numbers.
- b. 1 copy of system Equipment Manual & Inspection Log Book, with "Initial Inspection - Certification for Use" and "Inspection Sign-Off" forms completed.
- c. 2 copies of reduced, "as-built shop drawing" showing equipment locations and details. Ensure drawing is posted adjacent exits to roof.

1.7 QUALITY ASSURANCE

A. Qualifications:

- 1. Installer experienced in performing work of this section who has specialized in installation of work similar to that required for this project.
- 2. Manufacturer Qualifications: Manufacturer capable of providing field service representation during construction and approving application method.

B. Regulatory Requirements.

- 1. Comply with 2013 California Building Code(s) and County of Fresno Code(s)
- 2. Comply with OSHA regulations as follows:
 - a. 1910, Subpart D, Walking and Working Surfaces.
 - b. Appendix C to 1910 Subpart F, Personal Fall Arrest Systems.
 - c. OSHA Ruling on Window Cleaning by Bosun's Chair.
 - d. 1910.66, Subpart F, Powered Platforms.
- 3. Comply with California State regulations as follows:
 - a. Code of Regulations, Title 8 - Industrial Relations, Article 5 (Window Cleaning), Article 6 (Powered Platforms for Exterior Building Maintenance), and Appendix C

to Article 6 (Personal Fall Arrest System).

- C. Pre-installation Meetings: Conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.

1.8 DELIVERY, STORAGE AND HANDLING

- A. General: Comply with 01 60 00 - Product Requirements.
- B. Ordering: Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.
- C. Delivery:
1. Deliver materials in manufacturer's original packaging with identification labels intact and in sizes to suit project.
- D. Storage and Protection:
1. Store materials protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.
- E. Transportation and Handling:
1. Ensure center of gravity of davits weighing 80 lbs or greater remains 36 inches maximum above safe surface while transporting.
 2. Ensure davits requiring 80 lbs or greater lifting effort are equipped with are equipped with mechanical means of hoisting into position.

1.9 PROJECT AMBIENT CONDITIONS

- A. Installation Location: Assemble and erect components only when temperatures are above 40 degrees F.

1.10 SEQUENCING

- A. Sequence with other Work and Comply with roof tie back equipment manufacturer's written recommendations for sequencing construction operations.

1.11 WARRANTY

- A. Project Warranty: Refer to Contract Conditions for additional project warranty provisions.
- B. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and does not limit, other rights Owner may have under Contract Documents.
- C. Warranty: Commencing on date of project completion set by Owner.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Ensure manufacturer has minimum 5 years experience in manufacturing roof tie back and

suspended maintenance system components similar to or exceeding requirements of project.

2.2 PRODUCTS AND SYSTEMS

- A. Manufacturer: Pro-Bel Group of Companies, Phone: (905) 427-0616, USA Toll Free: (800) 461- 0575, Fax: (905) 427-2545, E-mail: info@pro-belgroup.com, Internet URL: <http://www.pro-belgroup.com>

2.3 DESIGN PERFORMANCE REQUIREMENTS

- A. Locate anchorages to suit suspension equipment specified.
- B. Design anchor components for cleaning and suspended maintenance equipment to ASME A120.1.
1. Ensure compatibility with industry standard equipment.
 2. Anchorage and anchor components: Designed by Engineer qualified in design of window cleaning and suspended maintenance equipment and licensed in State of California.
- C. Design system fall arrest safety anchors and equipment supports to AISC S342L (including supplement No.1) and ANSI/IWCA I-14.1, and as follows:
1. Comply with OSHA 1910, Subpart F, Appendix C.
 2. Supports for Suspended Platforms including davits, rigging sleeves and monorail:
 - a. Safety factor against fracture or detachment: 4 to 1.
 - a. Vertical service load: 1000 lbs minimum.
 - b. Rated load against fracture: 4000 lbs minimum.
 3. Fall Arrest Safety Anchors:
 - a. Fall arresting force safety factor of 2 to 1 without permanent deformation: 1800 lbs minimum.
 - b. Fall arrest force against fracture or detachment: 5,400 lbs minimum.

2.4 ANCHORS

- A. Safety Anchor Eye Plate: Mild steel, Type 300W with 44 Ksi minimum yield strength, hot-dip galvanized to ASTM A123/A123M.
1. Plate: 0.875 inches diameter material with 2 inches eye opening.
- B. Hollow Steel Section (HSS) Piers: Mild steel, Type 300W with 50 Ksi minimum yield strength, hot dipped galvanized to ASTM A123/A123M.
1. Wall thickness to suit application.
- C. Plate and other sections: Mild steel, Type 300W with 44 Ksi minimum yield strength, hot dipped galvanized to ASTM A123/A123M.
1. Wall thickness to suit application.
- D. Seamless Spun Aluminum Flashing (for Roof Anchors): To AA ADM-1 Type 6061-T6 alloy and to ASTM B221.
1. Deck flange flashing: To NRCA Roofing and Waterproofing Manual recommendations,.
 2. Acceptable material: Pro-Bel Group, Aluminum Deck Flange Flashing.

- E. Miscellaneous Bolts, Nuts and Washers: Mild steel, Type 300W with 44 Ksi minimum yield strength, hot-dip galvanized to ASTM A123/A123M minimum yield strength.

2.5 RIGGING SLEEVES

- A. Hollow Steel Section (HSS) Sleeves: Mild steel, Type 300W with 50 Ksi minimum yield strength, hot dipped galvanized to ASTM A123/A123M.
1. Wall thickness to suit application and with 6 inch inside diameter.
 2. Wall mounted rigging sleeves: Fabricate with flip-up hinged door to accommodate push/pull outrigger.
 3. Curved rigging sleeves: Ensure bend are finished with smooth radius.
- B. Straight Suspension Bars: Hot-dip galvanized to ASTM A123/A123M, 0.75 inches minimum diameter mild steel with 35 Ksi minimum yield strength.
- C. Acceptable Material: Pro-Bel Group, Steel Rigging Sleeves.

2.6 ACCESSORIES

- A. Safety Anchor Eye Plate: Mild steel, Type 300W with 44 Ksi minimum yield strength, hot-dip galvanized to ASTM A123/A123M.
1. Plate: 0.875 inches diameter material with 2 inches eye opening.
- B. Hollow Steel Section (HSS) Piers: Mild steel, Type 300W with 50 Ksi minimum yield strength, hot dipped galvanized to ASTM A123/A123M.
1. Wall thickness to suit application.
- C. Plate and other sections: Mild steel, Type 300W with 44 Ksi minimum yield strength, hot dipped galvanized to ASTM A123/A123M.
1. Wall thickness to suit application.
- D. Seamless Spun Aluminum Flashing (for Roof Anchors): To AA ADM-1 Type 6061-T6 alloy and to ASTM B221.
1. Deck flange flashing: To NRCA Roofing and Waterproofing Manual recommendations.
 2. Acceptable material: Pro-Bel Group, Aluminum Deck Flange Flashing.
- E. Miscellaneous Bolts, Nuts and Washers: [Mild steel, Type 300W with 44 Ksi minimum yield strength, hot-dip galvanized to ASTM A123/A123M minimum yield strength.

PART 3 EXECUTION

3.1 INSTALLERS

- A. Provide experienced and qualified technicians to carry out erection, assembly and installation of roof tie back and suspended maintenance equipment system.
- B. Steel welding to AWS D1.2/D1.2M.

C. Aluminum welding to AWS D1.1/D1.1M.

3.2 MANUFACTURERS INSTRUCTIONS

A. Compliance: Comply with manufacturer's written data, including product technical bulletins, product catalog installation instructions and Pro-Bel Group technical data sheets.

3.3 EXAMINATION

A. Site Verification of Conditions:

1. Verify that substrate conditions which have been previously installed under other sections or contracts, are acceptable for product installation in accordance with manufacturer's instructions prior to installation of roof tie back equipment.
2. Inform Owner of unacceptable conditions immediately upon discovery.
3. Proceed with installation only after unacceptable conditions have been remedied.

3.4 PREPARATION

A. Ensure structure or substrate is adequate to support complete roof tie back equipment system.

B. Ensure structural steel to receive safety anchors has adequate bearing surface as indicated on shop drawings and has 100% welds between anchors and structural steel.

3.5 INSTALLATION

A. Coordinate roof tie back equipment work with work of other trades, for proper time and sequence to avoid construction delays.

B. Install roof tie back equipment plumb and level in accordance with manufacturer's written instructions.

C. Mechanically fasten anchors in accordance with manufacturer's recommendations

D. Install anchors in concrete in accordance with Section 03 30 00 - Cast-in-Place Concrete and with manufacturer's recommendations.

E. Accurately fit and align, securely fasten and install free from distortion or defects.

F. Deform threads of tail end of anchor studs after nuts have been tightened to prevent accidental removal and vandalism.

3.6 FIELD QUALITY CONTROL

A. When necessary have the manufacture assist in installation.

B. Manufacturer's Field Services: Have manufacturer's technical representative schedule site visits to review work as follows:

1. After delivery and storage of products.

2. When preparatory work for which work of this Section depends is complete, but before installation begins.
 3. 2 times during progress of work at 25% and 60% of completion.
 4. Upon completion of work, after cleaning is carried out.
- C. Testing: Test on site 100% of anchors relying upon chemical adhesive fasteners using load cell test apparatus in accordance with manufacturer's written recommendations.
- 3.7 ADJUSTMENT
- A. Complete "Initial Inspection - Certification for Use" form included in Equipment Manual and Inspection Log Book provided by manufacturer.
- 3.8 FINAL CLEANING
- A. Upon completion, remove surplus and excess materials, rubbish, tools and equipment.
- 3.9 PROTECTION
- A. Protect installed product from damage during construction.
- B. Repair or replace damage to adjacent materials caused by roof tie back equipment installation.
- 3.10 MAINTENANCE
- A. Include complete maintenance on roof tie back equipment as required by 01 78 23 Operations and Maintenance Data.
- B. Repair or replace parts of roof tie back equipment whenever required due to defect and normal wear and tear.
- C. Use only standard parts of product line of manufacturer of roof tie back equipment.
- D. Maintain locally adequate stock of parts for replacement or emergency purposes.
- E. Provide personnel to perform work under supervision and in direct employ of roof tie back equipment system manufacturer or manufacturer's licensed agent.
- F. Perform work during regular trade working hours satisfactory to Owner.
- G. Provide emergency call-back at no extra cost and ensure fulfillment of maintenance and emergency service without undue loss of time to Owner.
- H. Ensure that maintenance personnel register with designated building personnel at time of inspections and maintenance.
- END OF SECTION 11 24 23

1 SECTION 116623 - GYMNASIUM EQUIPMENT

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY

7 A. Section Includes:

- 8 1. Basketball equipment.
9 2. Volleyball equipment.
10 3. Badminton equipment.
11 4. Exercise equipment.
12 5. Safety pads.

13 B. Related Requirements:

- 14 1. Section 033000 "Cast-in-Place Concrete" for installation of floor insert sleeves to be cast
15 in concrete slabs and footings.
16 2. Section 096466 "Wood Athletic Flooring" for game lines and markers.
17 3. Section 096566 "Resilient Athletic Flooring" for game lines and markers.
18 4. Section 096766 "Fluid-Applied Athletic Flooring" for game lines and markers.
19 5. Section 116653 "Gymnasium Dividers."

20 1.3 DEFINITIONS

- 21 A. NCAA: The National Collegiate Athletic Association.

- 22 B. NFHS: National Federation of State High School Associations.

23 1.4 ACTION SUBMITTALS

24 A. Product Data: For each type of product.

- 25 1. If applicable, include assembly, disassembly, and storage instructions for removable
26 equipment.
27 2. Motors: Show nameplate data, ratings, characteristics, and mounting arrangements.

28 B. Shop Drawings: For gymnasium equipment.

- 29 1. Include plans, elevations, sections, details, and attachments to other work.
30 2. Include details of field assembly for removable equipment, connections, installation,
31 mountings, floor inserts, attachments to other work, and operational clearances.
32 3. Include transport and storage accessories for removable equipment.

1 C. Samples: For each exposed product and for each item and color specified.

2 D. Samples for Initial Selection: For each type of gymnasium equipment.

3 1.5 INFORMATIONAL SUBMITTALS

4 A. Coordination Drawings: Court layout plans, drawn to scale, and coordinated with floor inserts,
5 game lines, and markers applied to finished flooring.

6 B. Qualification Data: For Installer.

7 C. Product Certificates: For each type of gymnasium equipment.

8 D. Sample Warranty: For special warranty.

9 1.6 CLOSEOUT SUBMITTALS

10 A. Operation and Maintenance Data: For gymnasium equipment to include in emergency,
11 operation, and maintenance manuals.

12 1.7 QUALITY ASSURANCE

13 A. Installer Qualifications: Fabricator of products.

14 1.8 FIELD CONDITIONS

15 A. Environmental Limitations: Do not install gymnasium equipment until spaces are enclosed and
16 weatherproof, wet work in spaces is complete and dry, and ambient temperature and humidity
17 conditions are maintained at the levels indicated for Project when occupied for its intended use.

18 B. Field Measurements: Verify position and elevation of floor inserts and layout for gymnasium
19 equipment.

20 1.9 COORDINATION

21 A. Coordinate installation of floor inserts with structural floors and finish flooring installation and
22 with court layout and game lines and markers on finish flooring.

23 B. Coordinate layout and installation of overhead-supported gymnasium equipment and
24 suspension-system components with other construction including light fixtures, HVAC
25 equipment, fire-suppression-system components, and partition assemblies.

26 1.10 WARRANTY

27 A. Special Warranty: Manufacturer agrees to repair or replace components of gymnasium
28 equipment that fail in materials or workmanship within specified warranty period.

29 1. Warranty Period: Five years from date of Project Completion.

1 PART 2 - PRODUCTS

2 2.1 MANUFACTURERS, GENERAL

3 A. Source Limitations: Obtain gymnasium equipment from single source from single manufacturer.

4 2.2 EXERCISE EQUIPMENT

5 A. Manufacturers: Subject to compliance with requirements, provide products by one of the
6 following:

- 7 1. Arizona Courtlines, Inc.
- 8 2. Draper Inc.
- 9 3. Jaypro Sports, LLC.
- 10 4. Performance Sports Systems.
- 11 5. Porter Athletic Equipment Company.
- 12 6. TriActive America

13 B. General: Manufacturer's standard equipment floor-mounted equipment.

14 C. Pull-up and Dip Station: floor mounted.

- 15 1. TriActive America Product #PDIP, basis of design.
- 16 2. Floor mounted. Bolt device to floor as required by manufacturer. Provide security
- 17 attachment by welding and deforming any inmate accessible floor connection
- 18 3. Support Frame: Steel-angles, brackets, tubes, channels, and/or bars.

19 D. Single Sit Up Board: floor mounted.

- 20 1. TriActive America, Product #STUP1, basis of design
- 21 2. Floor mounted. Bolt device to floor as required by manufacturer. Provide security
- 22 attachment by welding and deforming any inmate accessible floor connection
- 23 3. Support Frame: Steel-angles, brackets, tubes, channels, and/or bars.

24 E. Metal Finish: Manufacturer's standard factory-applied, polyester powder-coat finish.

25 2.3 MATERIALS

26 A. Steel: Comply with the following:

- 27 1. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- 28 2. Steel Tubing: ASTM A 500/A 500M or ASTM A 513, cold formed.
- 29 3. Steel Sheet: ASTM A 1011/A 1011M.

30 B. Anchors, Fasteners, Fittings, and Hardware: Manufacturer's standard corrosion-resistant or
31 noncorrodible units; concealed; tamperproof, vandal- and theft-resistant design.

32 C. Grout: Nonshrink, nonmetallic, premixed, factory-packaged, nonstaining, noncorrosive,
33 nongaseous grout, complying with ASTM C 1107/C 1107 with minimum strength recommended
34 in writing by gymnasium equipment manufacturer.

1 PART 3 - EXECUTION

2 3.1 EXAMINATION

3 A. Examine substrates, areas, and conditions, with Installer present, for compliance with
4 requirements for play court layout, alignment of mounting substrates, installation tolerances,
5 operational clearances, and other conditions affecting performance of the Work.

6 1. Verify critical dimensions.

7 2. Examine supporting structure, subfloors, and footings below finished floor.

8 3. Examine wall assemblies, where reinforced to receive anchors and fasteners, to verify
9 that locations of concealed reinforcements are clearly marked. Locate reinforcements
10 and mark locations.

11 B. Proceed with installation only after unsatisfactory conditions have been corrected.

12 3.2 INSTALLATION, GENERAL

13 A. General: Comply with manufacturer's written installation instructions. Complete equipment field
14 assembly where required.

15 B. Unless otherwise indicated, install gymnasium equipment after other finishing operations,
16 including painting, are completed.

17 C. Permanently Placed Gymnasium Equipment and Components: Install rigid, level, plumb,
18 square, and true; anchored securely to supporting structure; positioned at locations and
19 elevations indicated; in proper relation to adjacent construction; and aligned with court layout.

20 1. Floor Insert Location: Coordinate location with application.

21 2. Floor Insert Elevation: Coordinate installed heights of floor insert with installation of finish
22 flooring and floor-plate type.

23 D. Anchoring to In-Place Construction: Use anchors and fasteners where necessary to secure
24 built-in and permanently placed gymnasium equipment to structural support and to properly
25 transfer load to in-place construction.

26 3.3 ADJUSTING

27 A. Adjust movable components of gymnasium equipment to operate safely, smoothly, easily, and
28 quietly, free from binding, warp, distortion, nonalignment, misplacement, disruption, or
29 malfunction, throughout entire operational range. Lubricate hardware and moving parts.

30 3.4 CLEANING

31 A. After completing gymnasium equipment installation, inspect components. Remove spots, dirt,
32 and debris and touch up damaged shop-applied finishes according to manufacturer's written
33 instructions.

34 B. Replace gymnasium equipment and finishes that cannot be cleaned and repaired, in a manner
35 approved by Architect, before time of Project Completion.

1 3.5 DEMONSTRATION

2 A. Train Owner's maintenance personnel to adjust, operate, and maintain gymnasium equipment.

3 END OF SECTION 11 66 23

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1 SECTION 12 21 13 - HORIZONTAL LOUVER BLINDS

2 PART 1 - GENERAL

3 1.1 GENERAL REQUIREMENTS

- 4 A. Drawings and Conditions of Contract, including General and Supplementary Conditions and
5 Division 1 Administration Sections, apply to this Division.

6 1.2 SUMMARY

- 7 A. Section Includes:

- 8 1. Horizontal louver blinds with aluminum slats.

- 9 B. Related Requirements:

- 10 1. Section 06 10 00 "Miscellaneous Rough Carpentry" for wood blocking and grounds for
11 mounting horizontal louver blinds and accessories.

12 1.3 ACTION SUBMITTALS

- 13 A. Product Data: For each type of product.

- 14 B. Shop Drawings: Show fabrication and installation details for horizontal louver blinds.

- 15 C. Samples for Initial Selection: For each type and color of horizontal louver blind.

- 16 1. Include similar Samples of accessories involving color selection.

- 17 D. Samples for Verification: For each type and color of horizontal louver blind indicated.

- 18 1. Slat: Not less than 12 inches long.

- 19 2. Tapes: Full width, not less than 6 inches long.

- 20 3. Horizontal Louver Blind: Full-size unit, not less than 16 inches wide by 24 inches long.

- 21 4. Valance: Full-size unit, not less than 12 inches wide.

- 22 E. Window-Treatment Schedule: For horizontal louver blinds. Use same designations indicated on
23 Drawings.

24 1.4 INFORMATIONAL SUBMITTALS

- 25 A. Product Certificates: For each type of horizontal louver blind.

26 1.5 CLOSEOUT SUBMITTALS

- 27 A. Maintenance Data: For horizontal louver blinds to include in maintenance manuals.

28 1.6 MAINTENANCE MATERIAL SUBMITTALS

- 29 A. Furnish extra materials, from the same product run, that match products installed and that are
30 packaged with protective covering for storage and identified with labels describing contents.

- 31 1. Horizontal Louver Blinds: Full-size units equal to 5 percent of quantity installed for each
32 size, color, texture, pattern, and gloss indicated, but no fewer than two units.

1.7 QUALITY ASSURANCE

- A. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Project completion.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver horizontal louver blinds in factory packages, marked with manufacturer, product name, and location of installation using same designations indicated on Drawings.

1.9 FIELD CONDITIONS

- A. Environmental Limitations: Do not install horizontal louver blinds until construction and wet and finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Field Measurements: Where horizontal louver blinds are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operating hardware of operable glazed units through entire operating range. Notify Architect of installation conditions that vary from Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain horizontal louver blinds from single source from single manufacturer.

2.2 HORIZONTAL LOUVER BLINDS, ALUMINUM SLATS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Hunter Douglas Contract.
 2. Levolor Contract; a Newell Rubbermaid company.
 3. Springs Window Fashions.
- B. Slats: Aluminum; alloy and temper recommended by producer for type of use and finish indicated; with crowned profile and radius corners.
1. Width: 1 inch.
 2. Thickness: Not less than 0.008 inch.
 3. Spacing: Manufacturer's standard.
 4. Finish: Ionized antistatic, dust-repellent, baked polyester finish.
 5. Features:
 - a. Lift-Cord Rout Holes: Minimum size required for lift cord and located near back (outside) edge of slat to maximize slat overlap and minimize light gaps between slats.

- 1 b. Perforated Slats: Openness factor of 6 to 7 percent.
- 2 C. Headrail: Formed steel or extruded aluminum; long edges returned or rolled. Headrails fully
- 3 enclose operating mechanisms on three sides.
- 4 1. Capacity: One blind per headrail unless otherwise indicated.
- 5 2. Ends: Manufacturer's standard
- 6 3. Manual Lift Mechanism:
- 7 a. Lift-Cord Lock: Variable; stops lift cord at user-selected position within blind full
- 8 operating range.
- 9 b. Operator: Extension of lift cord(s) through lift-cord lock mechanism to form cord
- 10 pull.
- 11 4. Manual Tilt Mechanism: Enclosed worm-gear mechanism and linkage rod that adjusts
- 12 ladders.
- 13 a. Tilt: Full.
- 14 b. Tilt: One direction, positive stop or lockout limited at an angle of 60 degrees from
- 15 horizontal, both directions.
- 16 c. Operator: Dual cord.
- 17 d. Over-Rotation Protection: Manufacturer's detachable operator or slip clutch to
- 18 prevent over rotation of gear.
- 19 D. Bottom Rail: Formed-steel or extruded-aluminum tube that secures and protects ends of ladders
- 20 and lift cords and has plastic- or metal-capped ends.
- 21 1. Type: Top contoured to match crowned shape of slat.
- 22 E. Lift Cords: Manufacturer's standard braided cord.
- 23 F. Ladders: Evenly spaced across headrail at spacing that prevents long-term slat sag.
- 24 1. Type: Braided cord.
- 25 G. Valance: Manufacturer's standard.
- 26 H. Mounting Brackets: With spacers and shims required for blind placement and alignment
- 27 indicated.
- 28 1. Type: Two piece for pocket installation
- 29 2. Intermediate Support: Provide intermediate support brackets to produce support spacing
- 30 recommended by blind manufacturer for weight and size of blind.
- 31 I. Hold-Down Brackets and Hooks or Pins: Manufacturer's standard.
- 32 J. Side Channels and Perimeter Light Gap Seals: Manufacturer's standard.
- 33 K. Colors, Textures, Patterns, and Gloss:
- 34 1. Slats: As selected by Architect from manufacturer's full range.
- 35 2. Components: Provide rails, cords, ladders, and materials exposed to view matching or
- 36 coordinating with slat color unless otherwise indicated.
- 37 2.3 HORIZONTAL LOUVER BLIND FABRICATION
- 38 A. Product Safety Standard: Fabricate horizontal louver blinds to comply with WCMA A 100.1
- 39 including requirements for corded, flexible, looped devices; lead content of components; and
- 40 warning labels.

- 1 B. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74
2 deg F:
- 3 1. Between (Inside) Jamb Installation: Width equal to jamb-to-jamb dimension of opening in
4 which blind is installed less 1/4 inch (6 mm) per side or 1/2 inch (13 mm) total, plus or
5 minus 1/8 inch (3.1 mm). Length equal to head-to-sill dimension of opening in which blind
6 is installed less 1/4 inch (6 mm), plus or minus 1/8 inch (3.1 mm).
- 7 2. Outside of Jamb Installation: Width and length as indicated, with terminations between
8 blinds of end-to-end installations at centerlines of mullion or other defined vertical
9 separations between openings.
- 10 C. Concealed Components: Noncorrodible or corrosion-resistant-coated materials.
- 11 1. Lift-and-Tilt Mechanisms: With permanently lubricated moving parts.
- 12 D. Mounting and Intermediate Brackets: Designed for removal and reinstallation of blind without
13 damaging blind and adjacent surfaces, for supporting blind components, and for bracket
14 positions and blind placement indicated.
- 15 E. Installation Fasteners: No fewer than two fasteners per bracket, fabricated from metal
16 noncorrosive to brackets and adjoining construction; type designed for securing to supporting
17 substrate; and supporting blinds and accessories under conditions of normal use.
- 18 F. Color-Coated Finish:
- 19 1. Metal: For components exposed to view, apply manufacturer's standard baked finish
20 complying with manufacturer's written instructions for surface preparation including
21 pretreatment, application, baking, and minimum dry film thickness.

22 PART 3 - EXECUTION

23 3.1 EXAMINATION

- 24 A. Examine substrates, areas, and conditions, with Installer present, for compliance with
25 requirements for installation tolerances, operational clearances, and other conditions affecting
26 performance.
- 27 1. Proceed with installation only after unsatisfactory conditions have been corrected.

28 3.2 INSTALLATION

- 29 A. Install horizontal louver blinds level and plumb, aligned and centered on openings, and aligned
30 with adjacent units according to manufacturer's written instructions.
- 31 1. Locate so exterior slat edges are not closer than 1 inch (25 mm) from interior faces of
32 glass and not closer than 1/2 inch (13 mm) from interior faces of glazing frames through
33 full operating ranges of blinds.
- 34 2. Install mounting and intermediate brackets to prevent deflection of headrails.
- 35 3. Install with clearances that prevent interference with adjacent blinds, adjacent
36 construction, and operating hardware of glazed openings, other window treatments, and
37 similar building components and furnishings.

38 3.3 ADJUSTING

- 39 A. Adjust horizontal louver blinds to operate free of binding or malfunction through full operating
40 ranges.

3.4 CLEANING AND PROTECTION

- A. Clean horizontal louver blind surfaces after installation according to manufacturer's written instructions.
- B. Provide final protection and maintain conditions in a manner acceptable to manufacturer and Installer and that ensures that horizontal louver blinds are without damage or deterioration at time of Project completion.
- C. Replace damaged horizontal louver blinds that cannot be repaired in a manner approved by Architect before time of Project completion.

END OF SECTION 12 21 13

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1 SECTION 12 35 53.13 - METAL CASEWORK

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and
5 Supplementary Conditions and Division 01 Specification Sections, apply to this
6 Section.

7 1.2 SUMMARY

8 A. Section Includes:

- 9 1. Metal casework.
10 2. Filler and closure panels.
11 3. Countertops.
12 4. Shelves.

13 B. Related Requirements:

- 14 1. Section 06 10 00 "Rough Carpentry" for wood blocking for anchoring casework.
15 2. Section 09 22 16 "Non-Structural Metal Framing" for reinforcements in metal-
16 framed partitions for anchoring casework.
17 3. Section 09 65 13 "Resilient Base and Accessories" for resilient base applied to
18 metal casework.

19 1.3 DEFINITIONS

20 A. MDF: Medium-density fiberboard.

- 21 B. Hardwood Plywood: A panel product composed of layers, or plies, of veneer, or of
22 veneers in combination with lumber core, hardboard core, MDF core, or particleboard
23 core, joined with adhesive and faced both front and back with hardwood veneers.

24 1.4 PREINSTALLATION MEETINGS

25 A. Pre-installation Conference: Conduct conference at Project site.

- 26 B. Keying Conference: Conduct conference at Project site. Incorporate keying conference
27 decisions into final keying requirements.

1.5 COORDINATION

- A. Coordinate layout and installation of framing and reinforcements for support of casework.
- B. Coordinate installation of casework with installation of other equipment.

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For casework. Include plans, elevations, sections, and attachment details.
 - 1. Indicate types and sizes of cabinets.
 - 2. Indicate locations of hardware and keying of locks.
 - 3. Indicate locations of blocking and reinforcements required for installing casework.
 - 4. Indicate locations of and clearances from adjacent walls, doors, windows, other building components, and other equipment.
 - 5. Include coordinated dimensions for equipment specified in other Sections.
- C. Keying Schedule: Include schematic keying diagram and index each key set to unique designations that are coordinated with the Contract Documents.
- D. Samples for Initial Selection: For factory-applied finishes and other materials requiring color selection.
- E. Samples for Verification: Unless otherwise directed, approved full-size Samples may become part of the completed Work, if in an undisturbed condition at time of Substantial Completion. Notify Architect of their exact locations. If acceptable full-size Samples at Project site are not incorporated into the Work, retain and remove them when directed by Architect.
 - 1. One full-size, finished base cabinet complete with hardware, doors, and drawers.
 - 2. One full-size, finished wall cabinet complete with hardware, doors, and adjustable shelves.
 - 3. One Sample each of hinged and sliding doors.
 - 4. 6-inch-square Samples for each type of countertop material.
 - 5. One of each type of hardware item specified.
- F. Delegated-Design Submittal: For casework indicated to comply with seismic performance requirements, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer.
- B. Product Test Reports for Casework: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating compliance of casework with

1 requirements of specified product standard and system structural performance
2 specified in "Performance Requirements" Article.

3 1.8 MAINTENANCE MATERIAL SUBMITTALS

4 A. Furnish complete touchup kit for each type and color of metal casework provided.
5 Include fillers, primers, paints, and other materials necessary to perform permanent
6 repairs to damaged casework finish.

7 B. Furnish extra materials that match products installed and that are packaged with
8 protective covering for storage and identified with labels describing contents.

- 9 1. Cabinet Mounting Clips and Related Hardware: Quantity equal to 5 percent of
10 amount installed, but no fewer than 20 of each type.
11 2. Modular Countertop Units: Two extra units of each length and material installed.

12 1.9 QUALITY ASSURANCE

13 A. Manufacturer Qualifications: A qualified manufacturer that produces casework of types
14 indicated for this Project that has been tested for compliance with SEFA 8 M.

15 1.10 DELIVERY, STORAGE, AND HANDLING

16 A. Protect finished surfaces during handling and installation with protective covering of
17 polyethylene film or other suitable material.

18 1.11 FIELD CONDITIONS

19 A. Environmental Limitations: Do not deliver or install casework until building is enclosed,
20 utility roughing-in and wet work are complete and dry, and temporary HVAC system is
21 operating and maintaining temperature and relative humidity at occupancy levels
22 during the remainder of the construction period.

23 B. Locate concealed framing, blocking, and reinforcements that support casework by field
24 measurements before being enclosed, and indicate measurements on Shop Drawings.

25 PART 2 - PRODUCTS

26 2.1 MANUFACTURERS

27 A. Manufacturers: Subject to compliance with requirements, provide products by one of
28 the following:

- 29 1. BMC Manufacturing.
30 2. Jamestown Metal Products.
31 3. Keur Industries, Inc.

- 1 4. Kewaunee Scientific Corporation (basis of design)
- 2 5. Mott Manufacturing Ltd.

3 B. Source Limitations: Obtain casework from single source from single manufacturer
4 unless otherwise indicated.

5 C. Product Designations: Drawings indicate sizes and configurations of casework by
6 referencing designated manufacturer's catalog numbers. Other manufacturers'
7 casework of similar sizes and similar door and drawer configurations and complying
8 with Specifications may be considered. See Section 016000 "Product Requirements."

9 2.2 PERFORMANCE REQUIREMENTS

10 A. System Structural Performance: casework and support framing system shall withstand
11 the effects of the following gravity loads and stresses without permanent deformation,
12 excessive deflection, or binding of drawers and doors:

- 13 1. Support Framing System: 600 lb/ft..
- 14 2. Suspended Base Cabinets (Internal Load): 160 lb/ft..
- 15 3. Work Surfaces (Including Tops of Suspended Base Cabinets): 160 lb/ft..
- 16 4. Wall Cabinets (Upper Cabinets): 160 lb/ft..
- 17 5. Shelves: 40 lb/sq. ft..

18 B. Delegated Design: Engage a qualified professional engineer, as defined in
19 Section 014000 "Quality Requirements," to design casework and support framing
20 system, including attachments to other work.

21 C. Seismic Performance: casework and support framing system, including attachments to
22 other work, shall withstand the effects of earthquake motions determined according to
23 ASCE/SEI 7.

- 24 1. Design earthquake spectral response acceleration, short period (Sds) for Project
25 is 3 seconds
- 26 2. Component Importance Factor: 1.5.
- 27 3. Base Cabinet Load (Including Countertop and Load on Countertop): 320 lb/ft..
- 28 4. Wall Cabinet (Upper Cabinet) Load: 160 lb/ft..

29 2.3 METAL CASEWORK (MC), GENERAL

30 A. Casework Product Standard: Comply with SEFA 8 M, " Laboratory Grade Metal
31 Casework."

32 B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in
33 CEC, by a qualified testing agency, and marked for intended location and application.

34 2.4 METAL CABINET MATERIALS

35 A. Metal: Cold-rolled, commercial steel (CS) sheet, complying with
36 ASTM A 1008/A 1008M; matte finish; suitable for exposed applications.

B. Nominal Metal Thickness:

1. Sides, Ends, Fixed Backs, Bottoms, Tops, Soffits, and Items Not Otherwise Indicated: 0.048 inch. Except for flammable liquid storage cabinets, bottoms may be 0.036 inch if reinforced.
2. Back Panels, Doors, Drawer Fronts and Bodies, and Shelves: 0.036 inch except 0.048 inch for back panels and doors of flammable liquid storage cabinets and for unreinforced shelves more than 36 inches long.
3. Intermediate Horizontal Rails, Table Aprons and Cross Rails, Center Posts, and Top Gussets: 0.060 inch.
4. Drawer Runners, Sink Supports, and Hinge Reinforcements: 0.075 inch.
5. Leveling and Corner Gussets: 0.105 inch.

2.5 COUNTERTOP MATERIALS

A. Solid-Surfacing Material (SSM): Homogeneous solid sheets of filled plastic resin complying with material and performance requirements in ANSI Z124.3, for Type 5 or Type 6, without a pre-coated finish.

1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Avonite; Avonite, Inc.
 - b. Corian; DuPont Polymers.
 - c. Surell; Formica Corporation.
 - d. Fountainhead; International Paper, Decorative Products Div.
 - e. Gibraltar; Wilsonart International.

B. Stainless-Steel Sheet: ASTM A 240, Type 304.

2.6 METAL CABINETS

A. Fabrication: Assemble and finish units at point of manufacture. Use precision dies for interchangeability of like-size drawers, doors, and similar parts. Perform assembly on precision jigs to provide units that are square. Reinforce units with angles, gussets, and channels. Except where otherwise specified, integrally frame and weld cabinet bodies to form dirt- and vermin-resistant enclosures. Where applicable, reinforce base cabinets for sink support. Maintain uniform clearance around door and drawer fronts of 1/16 to 3/32 inch.

B. Inset Doors: Outer and inner pans that nest into box formation, with full-height channel reinforcements at center of door. Fill doors with noncombustible, sound-deadening material.

C. Hinged Doors: Mortise for hinges and reinforce with angles welded inside inner pans at hinge edge.

D. Inset Drawers: Fronts made from outer and inner pans that nest into box formation, with no raw metal edges at top. Sides, back, and bottom fabricated in one piece with rolled or formed top of sides for stiffening and comfortable grasp for drawer removal. Provide drawers with rubber bumpers, polymer roller slides, and positive stops to prevent metal-to-metal contact or accidental removal.

- E. Adjustable Shelves: Front, back, and ends formed down, with edges returned horizontally at front and back to form reinforcing channels.
- F. Toe Space: Fully enclosed, 4 inches high by 3 inches deep, with no open gaps or pockets.
- G. Utilities: Provide space, cutouts, and holes for pipes, conduits, and fittings in cabinet bodies to accommodate utility services and their support-strut assemblies.
 - 1. Provide base cabinets with removable backs for access to utility space.
- H. Filler and Closure Panels: Provide where indicated and as needed to close spaces between cabinets and walls, ceilings, and indicated equipment. Fabricate from same material and with same finish as cabinets and with hemmed or flanged edges unless otherwise indicated.
 - 1. Provide knee-space panels (modesty panels) at spaces between base cabinets, where cabinets are not installed against a wall or where space is not otherwise closed. Fabricate from back-to-back panels or of hollow construction to eliminate exposed hemmed or flanged edges.
 - 2. Provide utility-space closure panels at spaces between base cabinets where utility space would otherwise be exposed, including spaces below countertops.
 - 3. Provide closure panels at ends of utility spaces where utility space would otherwise be exposed.

2.7 METAL CASEWORK SYSTEM

- A. Provide casework manufacturer's standard integrated system that includes support framing, suspended modular cabinets, filler and closure panels, countertops, and fittings needed to assemble system. System includes hardware and fasteners for securing support framing to permanent construction.
 - 1. Cabinet Construction: Metal.
 - 2. Cabinets can be removed and reinstalled without use of special tools for relocation within system.
 - 3. Base cabinets can be removed without providing temporary support for, or removing, countertops.
 - 4. Sinks are supported independent of base cabinets.
 - 5. Support framing has provision for fastening pipe supports at utility space in not more than 1-inch increments.
 - 6. System includes filler and closure panels to close spaces between support framing, cabinets, shelves, countertops, floors, and walls unless otherwise indicated. Fabricate panels from same material and with same finish as metal cabinets and with hemmed or flanged edges.
- B. Support Framing: Casework manufacturer's standard system consisting of vertical supports and connecting braces and rails as follows:

1. Cabinets, shelves, and countertops are supported from vertical supports. Vertical positioning of supported cabinets, shelves, and countertops can be varied in 1-inch increments through full height of supports.
2. Vertical supports rest on adjustable leveling bases and are secured to floor with metal clips fastened to floor.
3. Vertical supports are installed with braces and rails, connecting them to each other and to permanent building walls to create a stable, rigid structure with framed utility spaces where indicated.
4. Vertical supports are braced at floor with cantilevered horizontal leg members where indicated.

C. Countertops: Provide in modular lengths indicated, without seams.

2.8 METAL CABINET FINISH

- A. General: Prepare, treat, and finish welded assemblies after assembling. Prepare, treat, and finish components that are to be assembled with mechanical fasteners before assembling. Prepare, treat, and finish concealed surfaces same as exposed surfaces.
- B. Preparation: After assembly, clean surfaces of mill scale, rust, oil, and other contaminants. After cleaning, apply a conversion coating suited to the organic coating to be applied over it.
- C. Finish: Immediately after cleaning and pretreating, apply casework manufacturer's standard two-coat, baked-on finish (or powder coat finish) consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils.
 1. Chemical and Physical Resistance of Finish System: Finish complies with acceptance levels of cabinet surface finish tests in SEFA 8 M. Acceptance level for chemical spot test shall be no more than four Level 3 conditions.
 2. Colors for Metal Casework Finish: As selected by Architect from manufacturer's full range.

2.9 COUNTERTOPS

- A. Countertops, General: Provide units with smooth surfaces in uniform plane, free of defects. Make exposed edges and corners straight and uniformly beveled. Provide front and end overhang of 1 inch, with continuous drip groove on underside 1/2 inch from edge.
- B. Solid Surfacing Material Countertops (SSM):
 1. Quality Standard: Comply with AWS Section 11 requirements for countertops.
 2. Grade: Custom.
 3. Solid Surfacing Material Thickness: 1/2 inch.
 4. Colors, Patterns, and Finishes: Provide material and products that result in colors of solid surfacing material complying with the following requirements:
 - a. Colors:

- 1) DuPont Zodiaq – Coarse Carrara
 - b. Note: Colors above are by DuPont Zodiag but similar colors by other manufacturers listed in subparagraph 2.1.D above are acceptable upon Architect's approval.
 5. Fabricate tops in one piece with shop-applied backsplashes and edges, unless otherwise indicated. Comply with solid surfacing material manufacturer's written recommendations for adhesives, sealers, fabrication, and finishing.
 6. Drill holes in countertops for plumbing fitting in shop.
 7. Factory thermoform slope for art classroom countertops to provide 1/4 inch slope over 6 inch horizontal projection from sink on sides and to backsplash without reducing overall thickness of top as indicated in Drawings.
- C. Stainless-Steel Countertops: Refer to 12 36 16 – Metal Countertops and Tables.
- D. Stainless-Steel Shelves: Made from stainless-steel sheet, not less than 0.050-inch nominal thickness, with No. 4 satin finish. Weld shop-made joints. Fold down front edge 3/4 inch; fold up back edge 3 inches. Provide integral stiffening brackets, formed by folding up ends 3/4 inch and welding to upturned back edge. After fabricating, grind welds smooth, and polish as needed to produce uniform, directionally textured finish with no cross scratches or evidence of welds. Passivate and rinse surfaces; remove embedded foreign matter and leave surfaces clean.
- 2.10 CABINET HARDWARE AND ACCESSORIES
- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets, except for items specified in Division 08 Section "Door Hardware (Scheduled by Describing Products)."
- B. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 170 degrees of opening. (Blum Clip top 170 Hinges)
- C. Wire Pulls: Back mounted, solid metal, 4 inches long, 5/16 inch in diameter.
1. Match Hafele 116.07.224
- D. Catches: Ball friction catches, BHMA A156.9, B03013.
1. Match Hafele, 244.20.102
- E. Shelf Rests: BHMA A156.9, B04013; plastic, two-pin type with shelf hold-down clip.
1. Match Hafele, 282.47.402
- F. Door Locks: BHMA A156.11, E07121. (Olympus Lock type 777, US26D finish, with ETS1 through-bolt plate, match owner's existing keyway)
- G. Drawer Locks: BHMA A156.11, E07041. (Olympus Lock type 888, US26D finish, with ETS1 through-bolt plate, match owner's existing keyway)
- H. Grommets for Cable Passage through Countertops: 2-inch OD, black, molded-plastic grommets and matching plastic caps with slot for wire passage.
1. Product: Subject to compliance with requirements, provide "OG series" by Doug Mockett & Company, Inc. (SP Flip Top series by Mockett)

- I. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
 1. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.
- J. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances, location of reinforcements, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF CABINETS

- A. Comply with installation requirements in SEFA 2.3. Install level, plumb, and true; shim as required, using concealed shims. Where casework abuts other finished work, apply filler strips and scribe for accurate fit, with fasteners concealed where practical. Do not exceed the following tolerances:
 1. Variation of Tops of Base Cabinets from Level: 1/16 inch in 10 feet.
 2. Variation of Bottoms of Upper Cabinets from Level: 1/8 inch in 10 feet.
 3. Variation of Faces of Cabinets from a True Plane: 1/8 inch in 10 feet.
 4. Variation of Adjacent Surfaces from a True Plane (Lippage): 1/32 inch.
 5. Variation in Alignment of Adjacent Door and Drawer Edges: 1/16 inch.
- B. Base Cabinets: Fasten cabinets to utility-space framing, partition framing, wood blocking, or reinforcements in partitions, with fasteners spaced not more than 16 inches o.c. Bolt adjacent cabinets together with joints flush, tight, and uniform.
 1. Where base cabinets are installed away from walls, fasten to floor at toe space at not more than 24 inches o.c. and at sides of cabinets with not less than two fasteners per side.
- C. Wall Cabinets: Fasten to hanging strips, masonry, partition framing, blocking, or reinforcements in partitions. Fasten each cabinet through back, near top, at not less than 16 inches o.c.
- D. Install hardware uniformly and precisely. Set hinges snug and flat in mortises.
- E. Adjust casework and hardware so doors and drawers align and operate smoothly without warp or bind and contact points meet accurately. Lubricate operating hardware as recommended by manufacturer.

3.3 INSTALLATION OF COUNTERTOPS

- A. Comply with installation requirements in SEFA 2.3. Abut top and edge surfaces in one true plane with flush hairline joints and with internal supports placed to prevent deflection. Locate joints only where indicated on Shop Drawings.
- B. Field Jointing: Where possible, make in same manner as shop-made joints, using dowels, splines, fasteners, adhesives, and sealants recommended by manufacturer. Shop prepare edges for field-made joints.
 - 1. Use concealed clamping devices for field-made joints in plastic-laminate countertops. Locate clamping devices within 6 inches of front and back edges and at intervals not exceeding 24 inches. Tighten according to manufacturer's written instructions to exert a uniform heavy pressure at joints.
- C. Fastening:
 - 1. Secure countertops, except for epoxy countertops, to cabinets with Z-type fasteners or equivalent, using two or more fasteners at each cabinet front, end, and back.
 - 2. Secure epoxy countertops to cabinets with epoxy cement, applied at each corner and along perimeter edges at not more than 48 inches o.c.
 - 3. Where necessary to penetrate countertops with fasteners, countersink heads approximately 1/8 inch, and plug hole flush with material equal to countertop in chemical resistance, hardness, and appearance.
- D. Provide required holes and cutouts for service fittings.
- E. Seal unfinished edges and cutouts in plastic-laminate countertops with heavy coat of polyurethane varnish.
- F. Provide scribe moldings for closures at junctures of countertop, curb, and splash with walls as recommended by manufacturer for materials involved. Match materials and finish to adjacent casework. Use chemical-resistant, permanently elastic sealing compound where recommended by manufacturer.
- G. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

3.4 INSTALLATION OF ACCESSORIES

- A. Install accessories according to Shop Drawings, installation requirements in SEFA 2.3, and manufacturer's written instructions.
- B. Securely fasten adjustable shelving supports, and stainless-steel shelves to partition framing, wood blocking, or reinforcements in partitions.
- C. Install shelf standards plumb and at heights to align shelf brackets for level shelves. Install shelving level and straight, closely fitted to other work where indicated.

1 3.5 INSTALLATION OF SERVICE FITTINGS

- 2 A. Install fittings according to Shop Drawings, installation requirements in SEFA 2.3, and
3 manufacturer's written instructions. Set bases and flanges of sink- and countertop-
4 mounted fittings in sealant recommended by manufacturer of sink or countertop
5 material. Securely anchor fittings to casework unless otherwise indicated.

6 3.6 CLEANING AND PROTECTING

- 7 A. Clean finished surfaces, touch up as required, and remove or refinish damaged or
8 soiled areas to match original factory finish, as approved by Architect.
- 9 B. Protect countertop surfaces during construction with 6-mil plastic or other suitable
10 water-resistant covering. Tape to underside of countertop at a minimum of 48 inches
11 on center.

12 END OF SECTION 12 35 53.13
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1 SECTION 12 36 16 - METAL COUNTERTOPS AND TABLES

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY

- 7 A. Section includes stainless-steel countertops and tables.

8 1.3 ACTION SUBMITTALS

- 9 A. Product Data: For each type of product.
- 10 B. Shop Drawings: Include plans, sections, details, and attachments to other work. Detail
11 fabrication and installation, including field joints.

12 1.4 DELIVERY, STORAGE, AND HANDLING

- 13 A. Deliver metal countertops only after casework has been completed in installation areas.
- 14 B. Keep finished surfaces covered with polyethylene film or other protective covering during
15 handling and installation.

16 1.5 FIELD CONDITIONS

- 17 A. Field Measurements: Verify actual dimensions of construction to receive metal countertops by
18 field measurements before fabrication.

19 PART 2 - PRODUCTS

20 2.1 MATERIALS

- 21 A. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304.
- 22 B. Sealant for Countertops: Manufacturer's standard sealant of characteristics indicated below that
23 complies with applicable requirements in Section 079200 "Joint Sealants."
- 24 1. Mildew-Resistant Joint Sealant: Mildew resistant, single component, non-sag, neutral
25 curing, silicone.
- 26 2. Color: Clear.
- 27 3. Sealant shall have a VOC content of 250 g/L or less.

28 2.2 STAINLESS-STEEL COUNTERTOPS

- 29 A. Countertops: Fabricate from 14 gage, stainless-steel sheet. Provide smooth, clean exposed
30 tops and edges in uniform plane, free of defects. Provide front and end overhang of 1 inch over
31 the base cabinets.
- 32 1. Joints: Fabricate countertops without field-made joints to greatest extent possible.
- 33 2. Weld shop-made joints.

3. Sound deaden underside of all metal work - - - Surfaces, including sinks and similar units, with a coating of sound deadening material. Hold coating back 3 inches from sanitary edges which are open for cleaning.
4. Extend the top down to provide a 1-inch- thick edge with a 1/2-inch return flange.
5. Form the backsplash coved to and integral with top surface, with a 1/2-inch- thick top edge and 1/2-inch return flange.

2.3 STAINLESS STEEL TABLES

- A. Metal and Gages - - - Except as otherwise indicated, fabricate exposed metal work of 304 stainless steel, and fabricated the following components from the gage of metal indicated, and other components from not less than 20 gage metal.
 1. Table tops 14 gage
 2. Wall and Undershelves 16 gage
 3. Legs and crossrails 16 gage (1 5/8 inch diameter).
- B. Work Surface Fabrication - - - Fabricate metal work-surfaces by forming and welding to provide seamless construction, using welding rods matching sheet metal, grinding and polishing.
 1. Reinforce work - - - Surfaces 30 inch O.C. both ways with stainless concealed structural members. Reinforce edges which are not self-reinforced by formed edges.
 2. Sound deaden underside of all metal work - - - Surfaces, including sinks and similar units, with a coating of sound deadening material. Hold coating back 3 inches from sanitary edges which are open for cleaning.

2.4 STAINLESS-STEEL FINISH

- A. Grind and polish surfaces to produce uniform, directional satin finish matching No. 4 finish, with no evidence of welds and free of cross scratches. Run grain with long dimension of each piece. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces clean.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of metal countertops.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install metal countertops level, plumb, and true; shim as required, using concealed shims.
- B. Field Jointing: Where possible, make field jointing in the same manner as shop jointing; use fasteners recommended by manufacturer. Prepare edges to be joined in shop so Project-site processing of top and edge surfaces is not required. Locate field joints where shown on Shop Drawings.
- C. Secure tops to cabinets with Z- or L-type fasteners or equivalent; use two or more fasteners at each front, end, and back.
- D. Abut top and edge surfaces in one true plane, with internal supports placed to prevent deflection.

- 1 E. Seal junctures of tops, splashes, and walls with mildew-resistant silicone sealant or another
2 permanently elastic sealing compound recommended by countertop material manufacturer.

3 3.3 CLEANING AND PROTECTION

- 4 A. Repair or remove and replace defective work as directed on completion of installation.

- 5 B. Clean finished surfaces, touch up as required, and remove or refinish damaged or soiled areas
6 to match original factory finish, as approved by Architect.

- 7 C. Protection: Provide 6-mil plastic or other suitable water-resistant covering over the countertop
8 surfaces. Tape to underside of countertop at a minimum of 48 inches o.c. Remove protection at
9 Substantial Completion.

10 END OF SECTION 12 36 16
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1 SECTION 12 4813 - ENTRANCE FLOOR MATS AND FRAMES

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY

- 7 A. Section Includes:
8 1. Roll-up rail mats.
9 2. Recessed frames.

10 1.3 COORDINATION

- 11 A. Coordinate size and location of recesses in concrete to receive floor mats and frames.

12 1.4 ACTION SUBMITTALS

- 13 A. Product Data: For each type of product.
14 1. Include construction details, material descriptions, dimensions of individual components
15 and profiles, and finishes for floor mats and frames.
- 16 B. Shop Drawings:
17 1. Perimeter floor moldings.
- 18 C. Samples: For the following products, in manufacturer's standard sizes:
19 1. Tread Rail: Sample of each type and color.
20 2. Frame Members: Sample of each type and color.

21 1.5 CLOSEOUT SUBMITTALS

- 22 A. Maintenance Data: For floor mats and frames to include in maintenance manuals.

23 PART 2 - PRODUCTS

24 2.1 ENTRANCE FLOOR MATS AND FRAMES, GENERAL

- 25 A. Structural Performance: Provide roll-up rail mats and frames capable of withstanding the
26 following loads and stresses within limits and under conditions indicated:
27 1. Wheel load of 1000 lb per wheel.
- 28 B. Regulatory Requirements: Comply with applicable provisions in 2013 CBC, Chapter 11B.

2.2 ROLL-UP RAIL MATS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Pedimat AA with aluminum level base frame or a comparable product by one of the following:
1. Balco, Inc.
 2. JL Industries, Inc.; a division of the Activar Construction Products Group.
 3. Nystrom, Inc.
 4. Pawling Corporation.
 5. Reese Enterprises, Inc.
- B. Roll-up, Aluminum-Rail Hinged Mats: Extruded-aluminum tread rails 2 inches wide by 3/4 inch thick, sitting on continuous vinyl cushions.
1. Tread Inserts: Plain serrated aluminum treads.
 2. Rail Color: Clear.
 3. Hinges: EPDM.
 4. Mat Size: As indicated.

2.3 FRAMES

- A. Recessed Frames: Manufacturer's standard extrusion.
1. Extruded Aluminum: ASTM B 221, Alloy 6061-T6 or Alloy 6063-T5, T6, or T52.
 - a. Color: Clear.

2.4 CONCRETE FILL AND GROUT MATERIALS

- A. Provide concrete fill and grout equivalent in strength to cast-in-place concrete slabs for recessed mats and frames. Use aggregate no larger than one-third fill thickness.

2.5 FABRICATION

- A. Floor Mats: Shop fabricate units to greatest extent possible in sizes indicated. Unless otherwise indicated, provide single unit for each mat installation; do not exceed manufacturer's recommended maximum sizes for units that are removed for maintenance and cleaning. Where joints in mats are necessary, space symmetrically and away from normal traffic lanes. Miter corner joints in framing elements with hairline joints or provide prefabricated corner units without joints.
- B. Recessed Frames: As indicated, for permanent recessed installation, complete with corner pins or reinforcement and anchorage devices.
1. Fabricate edge-frame members in single lengths or, where frame dimensions exceed maximum available lengths, provide minimum number of pieces possible, with hairline joints equally spaced and pieces spliced together by straight connecting pins.
- C. Coat concealed surfaces of aluminum frames that contact cementitious material with manufacturer's standard protective coating.

2.6 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

1 PART 3 - EXECUTION

2 3.1 EXAMINATION

3 A. Examine substrates and floor conditions for compliance with requirements for location, sizes,
4 minimum recess depth, and other conditions affecting installation of floor mats and frames.

5 B. Proceed with installation only after unsatisfactory conditions have been corrected.

6 3.2 INSTALLATION

7 A. Install recessed mat frames to comply with manufacturer's written instructions. Set mat tops at
8 height recommended by manufacturer for most effective cleaning action; coordinate tops of mat
9 surfaces with bottoms of doors that swing across mats to provide clearance between door and
10 mat.

11 1. Install necessary shims, spacers, and anchorages for proper location, and secure
12 attachment of frames.

13 2. Install grout and fill around frames and, if required to set mat tops at proper elevations, in
14 recesses under mats. Finish grout and fill smooth and level.

15 3.3 PROTECTION

16 A. After completing frame installation and concrete work, provide temporary filler of plywood or
17 fiberboard in recesses and cover frames with plywood protective flooring. Maintain protection
18 until construction traffic has ended and Project is near Substantial Completion.

19 END OF SECTION 12 48 13
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SECTION 12 55 00 - DETENTION FURNITURE

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. Drawings and Conditions of Contract, including General and Supplementary Conditions and Division 1 Administration Sections, apply to this Division.

1.2 SUMMARY

- A. This Section includes the following:

1. Detention Bunks
2. Detention Desks
3. Detention Stools.
4. Detention Tables.
5. Detention Seating.
6. Video Visitation Stations.
7. Miscellaneous Detention Furniture and Accessories

- B. Related Sections include the following:

1. Division 01 35 13.16 Section "Special Project Procedures for Detention Facilities" for general requirements for detention work, including responsibilities of a single-source detention specialist.
2. Division 04 22 00 Section "Concrete Unit Masonry" for building anchors into and grouting detention furnishings installed in masonry construction.
3. Section 09 91 13 Exterior Painting
4. Section 09 91 23 Interior Painting
5. Section 12 36 16 Metal Countertops and Tables
6. Section 13 42 60 Detention Steel Wall Panels

1.3 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of detention furnishing indicated.

- B. Shop Drawings: For each type of detention furnishing. Include plans, elevations, sections, details, and attachments to other Work.

- C. Coordination Drawings: Drawings of each built-in anchor supporting detention furnishings, including those to be installed as work of other Sections, drawn to scale and coordinating anchorage with detention furnishings. Show the following:

1. Locations, dimensions, and profiles of wall and floor reinforcements.
2. Locations and installation details of built-in anchors.
3. Elevations of each detention furnishing showing dimensions of furnishing, preparations for receiving anchors, and locations of anchorage.
4. Details of attachment of each detention furnishing to built-in anchors.

- D. Samples for Initial Selection: For each type of detention furnishing with factory-applied color finishes.

- E. Product Certificates: For each type of detention furnishing, signed by product manufacturer.

- F. Welding certificates.
- G. Qualification Data: For Installer and manufacturer.
- H. Maintenance Data: For detention lockers and cabinets to include in maintenance manuals.
- I. Warranties: Sample of special warranties specified in this Section.
- J. Other Informational Submittals:
 - 1. Examination reports documenting inspections of substrates, areas, and conditions.
 - 2. Anchor inspection reports documenting inspections of built-in and cast-in anchors.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative of detention furnishing manufacturer for installation and maintenance of units required for this Project.
- B. Source Limitations: Obtain each type and variety of detention furnishing through one source from a single manufacturer, unless otherwise indicated.
- C. Welding: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1, "Structural Welding Code--Steel."
 - 2. AWS D1.3, "Structural Welding Code--Sheet Steel."
- D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.5 PROJECT CONDITIONS

- A. Field Measurements: Verify openings for recessed detention furnishings by field measurements before fabrication and indicate measurements on Shop Drawings.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the work, establish opening dimensions and proceed with fabricating detention furnishings without field measurements. Coordinate wall and floor construction to ensure that actual opening dimensions correspond to established dimensions.

1.6 COORDINATION

- A. Coordinate installation of anchorages for detention furnishings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of detention furnishings that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:
 - 1. Structural failures including deflection exceeding 1/4 inch with 400 pound point load at largest moment arm location.
 - 2. Faulty operation of hardware.
 - 3. Deterioration of metals, metal finishes, and other materials beyond normal detention use.
- B. Warranty Period: Two years from date of Project completion.

1 PART 2 - PRODUCTS

2 2.1 MANUFACTURERS

3 A. In other Part 2 articles where titles below introduce lists, the following requirements apply for
4 product selection:

5 1. Available Products: Subject to compliance with requirements, products that may be
6 incorporated into the Work include, but are not limited to, the products specified.

7 2.2 MATERIALS

8 A. Steel Plates, Shapes, and Bars: ASTM A 36.

9 B. Steel Sheet: ASTM A 569, Type B, unless otherwise indicated.

10 C. Steel Tubing: ASTM A 513, Type B, unless otherwise indicated; thickness indicated or required
11 by structural loads.

12 D. Steel Pipe: ASTM A 53, Standard Weight (Schedule 40), unless another weight is indicated or
13 required by structural loads.

14 E. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 304.

15 F. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1, made with adhesive
16 containing no urea formaldehyde.

17 G. Concealed Bolts: ASTM A 325, Grade A, unless otherwise indicated.

18 H. Cast-in-Place Anchors in Concrete: Anchors of type indicated below, fabricated from corrosion-
19 resistant materials capable of sustaining, without failure, a load equal to 4 times the load
20 imposed, as determined by testing per ASTM E 488, conducted by a qualified independent
21 testing agency.

22 1. Threaded or wedge type; galvanized ferrous castings, either ASTM A 47 (ASTM A 47M),
23 malleable iron or ASTM A 27, cast steel. Provide bolts, washers, and shims as needed,
24 hot-dip galvanized per ASTM A 153.

25 I. Embedded Plate Anchors: Fabricated from steel shapes and plates, minimum 3/16 inch thick;
26 with minimum 1/2-inch diameter, headed studs welded to back of plate.

27 J. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy
28 welded.

29 K. Adhesives, General: Do not use adhesives that contain urea formaldehyde.

30 2.3 DETENTION BUNKS

31 A. Double Wall-Mounted Cell Bed (DWCB):

32 1. Provide customized version of standard bunk. Pan to be 30" width by 80" length.

33 2. Products: Subject to compliance with requirements, available products that may be
34 incorporated into the Work include, but are not limited to, the following:

35 a. Habersham Metal Products Company, Inc.; Wall-Mounted Bunk, Model BW.

36 b. KLN Steel Products Company; Heavy Duty Single Wall Mounted Bunk, Model
37 9720.

38 c. Maximum Security Products Corp.; Model BW 200.

- d. Norix Group, Inc.; Ironman Steel Wall Mounted Bunk, Model No. B520-101.
 - e. Norment Industries, Div. of Norment Security Group; Wall Mounted Bunk, #NS704.
 - f. Peterson Detention, Inc.; Wall mounted single bunk #BKW-1000 Series.
 - g. Southern Folger Detention Equipment Co.; Wall Mounted Bunk, #535.
 - h. Viking.
3. Bunk Pan: Formed from 0.1382-inch thick solid steel sheet.
 - a. Size: Minimum 30 inches wide by 80 inches long with bunk pan flush to wall.
 - b. Turn down edges of back, sides, and front with minimum 2-inch flanges.
 - c. Holes in pan are not permitted.
 - d. All edges to be rounded and smooth with no sharp welds, splatter or edges.
 4. Combination End Panel/Mounting Plate: Formed from 3/16-inch thick steel sheet welded at connections to bunk pan, with 2-inch flange for wall mounting; provide 2 end panel/mounting plates for each bunk where free from wall at end. Where bunk is adjacent to wall at end, eliminate the end panel/mounting plate and weld pan to metal wall panel and provide angle braces.
 5. Finish: Baked enamel or primed for field painting with the cell.

2.4 DETENTION DESKS

A. Wall-Mounted Desk (DWD and DWDA):

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Viking Wall Mounted Desk DW1133 (Basis of Design)
 - b. KLN Steel Products Company
 - c. Norix Group, Inc.;
 - d. Peterson Detention, Inc.; Wall mounted desk and seat DKW-1000 Series-Modified.
 - e. Southern Folger Detention Equipment Co.; Wall-Mounted Table and Seat, #512.
 - f. Willo Products Company Inc.; #630, steel desk top and seat.
2. Desk (DWD): Formed from 0.0635-inch thick stainless-steel sheet; with minimum 1-1/2-inch flanged edges.
3. Desk (DWD) Size: Minimum 20 inches wide by 16 inches deep.
4. Accessible Desk (DWDA): Formed from 0.0635-inch thick stainless-steel sheet; with minimum 1-1/2-inch flanged edges. Comply with requirements of 2013 CBC for knee space, height, and other factors.

Accessible Desk Size: Minimum 32 inches wide by 20 inches deep.

Accessible Desk Height: 28 inches minimum and 34 inches maximum high with 27 inches knee clearance per CBC 11B-902.3
5. Finish: Stainless steel No. 4 finish.

2.5 DETENTION FIXED STOOL

A. Floor Mounted Detention Fixed Stool (DFS)

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include products manufactured by, but are not limited to, the following:
 - a. KLN Steel Products Company.
 - b. Norix Group, Inc.; Floor Mount Stool S561-120 (basis of design)
 - c. Norment Industries, Div. of Norment Security Group.
 - d. Peterson Detention, Inc.
 - e. Viking Products.

2. Description: Detention stainless steel floor mounted stool
3. Seat: 12-inch diameter, formed from 0.0785-inch-thick stainless-steel sheet; with minimum 1-1/2-inch flanged edges.
4. Pedestal Supports: Formed from 2.5-inch-diameter by 30.0785-inch-thick steel tubing welded to base and seat.
5. Floor Anchor Plate: Concealed floor anchor, minimum 0.1265 inch thick steel with tamper resistant fasteners.
6. Finish: Stainless-steel.

2.6 DETENTION SWING STOOLS

A. Detention Wall-mounted Swing Stool (DWSS):

1. Manufacturers: Subject to compliance with requirements, available manufacturers that may be incorporated into the Work include but are not limited to, the following:
 - a. KLN Steel Products Company.
 - b. Norix Group, Inc.; Max-Master.
 - c. Norment Industries, Div. of Norment Security Group.
 - d. Peterson Detention, Inc.
 - e. Viking Products (Basis of Design)
2. Design Criteria: Meet BSCC requirements for anti-ligature swing arm stools.
3. Seats: 12-inch diameter, formed from minimum 0.0781-inch-thick stainless steel sheet; with minimum 1-1/2-inch flanged edges.
4. Wall Mount and Seat Support:
 - a. Wall Plate: 10 inch by 12 inch by 1/4 inch steel plate.
 - b. Seat Reinforcement: 9 inch x by 9 inch by 10 gage reinforcement plate reinforced with triangular steel gussets and welded to swing arm.
 - c. Swing Arm: Minimum 3/8 inch by 4 inch mild steel plate formed to provide an angled swing arm at about 23 degrees from horizontal.
 - d. Pivot Pin: 3/4 inch diameter by 8-3/4" long mild steel rod.
 - e. Hinge Assembly with Swing Limiter: 3/16 inch mild steel plate with schedule 40 pipe ferrules. Limit swing so that seat does not hit the adjacent wall.
5. Finish:
 - a. Seats: #4 directional polish.
 - b. Legs and Support Framing: Manufacturer's standard baked enamel or powder coat finish.

2.7 DETENTION TABLES

A. Two-Legged Table (DT-2):

1. Products: Subject to compliance with requirements, available manufacturers that may be incorporated into the Work include, but are not limited to, the following:
 - a. KLN Steel Products Company.
 - b. Norix Group, Inc.
 - c. Norment Industries, Div. of Norment Security Group.
 - d. Peterson Detention, Inc.
 - e. Viking; 2-Person Table (Basis of Design).

2. Tabletop: Formed from 0.1793-inch- thick stainless steel sheet; reinforced with steel shapes or steel plate; with minimum 2-inch flanged edges. Requires welding or bolting to adjacent hollow metal frame as indicated.
3. Size: Minimum 30 inches wide by 24 inches by 30 inches high.
4. Seats: 12-inch diameter, formed from 0.0785-inch thick stainless steel sheet; with minimum 1-1/2-inch flanged edges.
5. Pedestal Supports: Formed from 2.5-inch-diameter by 0.0785-inch thick steel tubing welded to top.
6. Floor Anchor Plate: Concealed floor anchor, minimum 0.1793-inch thick steel with tamper resistant fasteners.
7. Top Finish: Stainless steel No. 4 finish.
8. Base Finish: Manufacturer's standard baked enamel or powder coated finish.
9. Capacity: Two persons.

B. Two-Legged Table, Accessible (DT-2A):

1. Products: Subject to compliance with requirements, available manufacturers that may be incorporated into the Work include, but are not limited to, the following:
 - a. KLN Steel Products Company.
 - b. Norix Group, Inc.
 - c. Norment Industries, Div. of Norment Security Group.
 - d. Peterson Detention, Inc..
 - e. Viking; 4-Person Table (Basis of Design).
2. Tabletop: Formed from 0.1793-inch- thick stainless steel sheet; reinforced with steel shapes or steel plate; with 2-inch flanged edges. Requires welding or bolting to adjacent hollow metal frame as indicated.
 - a. Size: Minimum 30 inches wide by 38 inches by 30 inches high with 27 inches minimum knee clearance from finish floor.
3. Seats: 12-inch diameter, formed from 0.0785-inch thick stainless steel sheet; with minimum 1-1/2-inch flanged edges.
4. Pedestal Supports: Formed from 2.5-inch-diameter by 0.0785-inch thick steel tubing welded to top.
5. Floor Anchor Plate: Concealed floor anchor, minimum 0.1793-inch thick steel with tamper resistant fasteners.
6. Top Finish: Stainless steel No. 4 finish.
7. Base Finish: Manufacturer's standard baked enamel or powder coated finish.
8. Capacity: Three persons.

C. Four-Legged Table (DT-4):

1. Products: Subject to compliance with requirements, available manufacturers that may be incorporated into the Work include, but are not limited to, the following:
 - a. KLN Steel Products Company.
 - b. Norix Group, Inc.
 - c. Norment Industries, Div. of Norment Security Group.
 - d. Peterson Detention, Inc.
 - e. Viking; 4-Person Table (Basis of Design).
2. Tabletop: Formed from 0.1793-inch- thick stainless steel sheet; reinforced with steel shapes or steel plate; with 2-inch flanged edges.
 - a. Size: Minimum 30 inches wide by 48 inches by 30 inches high.

3. Seats: 12-inch diameter, formed from 0.0785-inch thick stainless steel sheet; with minimum 1-1/2-inch flanged edges.
4. Pedestal Supports: Formed from 2.5-inch-diameter by 0.0785-inch thick steel tubing welded to top.
5. Floor Anchor Plate: Concealed floor anchor, minimum 0.1793-inch thick steel with tamper resistant fasteners.
6. Top Finish: Stainless steel No. 4 finish.
7. Base Finish: Manufacturer's standard baked enamel or powder coated finish.
8. Capacity: Four persons.

D. Four-Legged Table, Accessible (DT-4A):

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. KLN Steel Products Company.
 - b. Norix Group, Inc.
 - c. Norment Industries, Div. of Norment Security Group.
 - d. Peterson Detention, Inc.
 - e. Viking; 4-Person Table, ADA. (Basis of Design).
2. Tabletop: Formed from 0.1793-inch- thick stainless steel sheet; reinforced with steel shapes or steel plate; with 2-inch flanged edges.
 - a. Size: Minimum 30 inches wide by 62 inches by 30 inches high with 27 inches minimum knee clearance from finish floor.
3. Seats: 12-inch diameter, formed from 0.0785-inch thick stainless steel sheet; with minimum 1-1/2-inch flanged edges.
4. Pedestal Supports: Formed from 2.5-inch-diameter by 0.0785-inch- thick steel tubing welded to top.
5. Floor Anchor Plate: Concealed floor anchor, minimum 0.1793-inch- thick steel with tamper resistant fasteners.
6. Top Finish: Stainless steel No. 4 finish.
7. Base Finish: Manufacturer's standard baked enamel or powder coated finish.
8. Capacity: Five persons

2.8 DETENTION BENCH (DWB)

A. Products: Subject to compliance with requirements, Provide custom products complying with these specifications.

1. One piece continuously top flanged 1 1/2", fully welded and ground smooth. Formed gussets spaced at 3' OC evenly across the bench length. 18" wide.
 - a. Bench Gussets: 7 gauge formed mild steel construction.
 - b. Bench Top: 12 gauge stainless steel.
 - c. Bench Gusset Finish: Manufacturer's standard baked enamel or powder coat finish.
 - d. Bench Top Finish: #4 stainless steel.
 - e. Length: as indicated on the drawings

2.9 DETENTION WALL-MOUNTED VIDEO STATION (DWVS)

A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

1. Norment Industries, Div. of Norment Security Group.

1. KLN Steel Products Company.
 2. Norix Group, Inc., Intelevation Stainless Steel SEW7N (Basis of Design)
 3. Peterson Detention, Inc.
 4. Viking.
- B. Description: Stainless steel wall-mount module with enclosed cabinet designed for secure housing of video and voice communications equipment (not included). Available as a single Base unit or with indefinitely ganged Add On units. Top surface and writing surface are sloped to discourage placement of drink cups. Engineered for institutional durability. Proven suitable for continuous daily use in a correctional or institutional environment for inmates. Mount handset max. 48" AFF.
- C. Fabrication:
1. Cabinet, Divider Panels & Writing Surface: 12 gauge stainless steel. Writing surface, divider panels, cabinet top and face plate are securely connected with tamper resistant fasteners.
- D. Materials:
1. Cabinet, Divider Panels & Writing Surface: 12 gauge #4 finish stainless steel with security fasteners.
 2. Face Plate: 14 ga. #4 finish stainless steel. Monitor cut out includes 3/8" thick protective polycarbonate screen.
 3. Wall Mount Brackets: 1/4" thick powder coated steel.
 4. Wall Hanger: 10 ga. powder coated steel.
- E. Color:
1. Cabinet, Divider Panels, Writing Surface & Face Plate: #4 finish stainless steel.
- 2.10 DETENTION PUBLIC BEAM SEATING (DPBS-B and DPBS-NB)
- A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
1. Norment Industries, Div. of Norment Security Group.
 2. KLN Steel Products Company.
 3. Norix Group, Inc., Gibraltar Series Beam Seating (Basis of Design)
 4. Peterson Detention, Inc.
 5. Viking.
- B. Description: Public seating for high traffic areas. Designed and engineered specifically for intensive-use environments such as waiting rooms, lobbies, visiting and multi-purpose areas. Ergonomic seats are extra wide for optimal comfort. Available in a variety of configurations with connecting tables. Proven suitable for continuous use in a behavioral correctional environment.
1. DPBS-B. The seating is bolted and connected to the floor.
 2. DPBS-NB. The seating is not bolted or connected to the floor (and is movable).
- C. Fabrication:
1. Base Frame: Tubular steel, bent and welded to provide arm or armless in-line seating. Standard configurations for 1 to 4 people. Flat steel plate welded to the frame at each seat location to provide strength, support and a mounting platform on which the seat is securely attached.
 2. Seats: One-piece seat and back. Smooth, non-absorbent surface is easy to clean. Molded-in threaded steel inserts provide for tamper-resistant, "steel-to-steel" attachment to base frame..
- D. Materials:

1. Base Frame: 2" diameter, 14 gauge steel with 11 gauge steel seat supports.
 2. Seat: Rotationally molded, specially formulated, fire-retardant, high-impact polyethylene with ultraviolet light stabilizers (to reduce fading). Chemically resistant to blood, vinegar, urine, feces, salt solution and chlorine solution. Material is fully compounded for superior color and fire retardancy.
- E. Finishes:
1. Frame: Metallic silver powder coat.
 2. Seat: As selected by the Architect from a full line of standard and premium colors.
- 2.11 DETENTION SHELF (DS)
- A. Description: Wall mounted, custom manufactured shelf as shown on the drawings.
- B. Fabrication:
1. Fully welded.
 2. Smooth seams and welds or bent construction
- C. Materials:
1. 9 gauge steel
- D. Finishes
1. Primed finish for painting to match cell finish
- 2.12 DETENTION WALL MOUNTED SHELVES (DWSH)
- A. Description: Wall mounted, accessible designed, custom manufactured shelf as shown on the drawings.
- B. Fabrication:
1. Fully welded.
 2. Smooth seams and welds or bent construction
- C. Materials:
1. 9 gauge steel
- D. Finishes
1. Primed finish for painting to match cell finish
- E. Finishes
- 2.13 DETENTION MODESTY SCREEN (DMS)
- A. Description: Custom fabricated modesty screen attached to the wall mounted cell bunk. A 2 inch by 2 inch nominal steel tube frame with a steel perforated plate inset and secured (welded) to the frame. Modesty panel will be attached to lower and upper cell bunk and the cell wall to provide modesty screening for cell toilet fixture.
- B. Fabrication:
1. Frame: Built-up tubular type, measuring 1-3/4 inch x 1-3/4" inch, with fixed concealment plates. Open channel frame members formed of not less than 12-gauge type sheet steel with slots along the inner edges to support the perforated panel. Notched corners of the main frame for self-alignment and then robotically welded. Braces, which are similar to the frame, furnished when required.
 2. Perforated Metal Panel: Min. 3/16" thick steel perforated panel. Panel to have 3/16 inch holes at 5/16 inch centers, staggered across entire panel.

3. Perforated Metal Panel Attachment: Install perforated metal panel symmetrically into the slotted main frame. Slots shall be centered according to the perforated metal panel pattern. Perforated metal panel shall be welded at 4 inches on center with 1-1.2" inch long welds, both sides, into the slot and at the corners of the main frame. Remaining edges to be caulked with security sealant.

C. Finish:

1. Main Frame: Both face sides of the main frame shall be finished and smooth, primed for paint finish
2. Perforated Metal Panel: Mill finish
3. Steel Finish: Primed and prepared for painting to match cell and cell furnishing painting.

2.14 VIDEO VISITATION STATION (VVS AND VVSA)

- A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

1. Norment Industries, Div. of Norment Security Group.
2. KLN Steel Products Company.
3. Norix Group, Inc., CUBE36LE (Basis of Design for VVS), CUBE60LE (for VVSA)
4. Peterson Detention, Inc.
5. Viking.

- B. Description: Three-sided privacy cubicles designed for secure housing of video and voice communications equipment (not included). Use for video visitation or study carrel. Engineered for institutional durability. Free standing on adjustable glides. Suitable for continuous daily use in a correctional or institutional environment for inmates.

C. Fabrication:

1. Bolt together.
2. Sides & Writing Surface: High-pressure laminate bonded to 45 lb. density particle board.
3. T-mold vinyl edges are glued around circumference for tamper-resistance and security. Panels connect with internal barrel bolts.

D. Materials:

1. Sides & Writing Surface: Heavy-duty graffiti resistant laminate on 45 lb. density particle board.
2. Top & Face Plate: 14 gauge black powder coated steel attached with security fasteners. Monitor cut out includes 3/8" thick protective polycarbonate screen.

E. Colors:

1. Sides & Writing Surface: Wilsonart Ebony Star 4552-90 textured Crystal finish.
2. Vinyl Edge: Black.
3. Face Plate and Top Access Panel: Black powder coat.

2.15 DETENTION VIDEO VISITATION STATION – FOUR MAN (DVVT)

- A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

1. Norment Industries, Div. of Norment Security Group.
2. KLN Steel Products Company.
3. Norix Group, Inc., M413-23 Modified to receive 2 phones and 2 video visitation stations. (Basis of Design)

4. Peterson Detention, Inc.
5. Viking.

B. Description: Stainless steel floor mounted module with seats and enclosed cabinets designed for secure housing of video and voice communications equipment.

C. Fabrication:

1. X-Panel: 12 gauge stainless steel.
2. Top: Continuous Formed 10 gage 304 stainless steel.
3. Phone Face Plate: 14 gage stainless steel mounting surface for Phone and secure access panel for the telephone wiring.
4. Video Visitation Station Face Plate: 18 inch by 18 inch 14 gage stainless steel. Monitor cut out includes 3/8" thick protective polycarbonate screen.
5. Center Tube: 3 inch diameter 14 gage steel tubing at the center of the unit to conceal and protect the equipment wiring.
6. Legs and Seat Support: 10" radius curved portions of the legs support the top and for additional strength are fully welded to the vertical tubes that support the seats. The tops of the curved tubes and the tops of the seat support tubes are fully welded to 6" x 6" x 1/4" thick steel plates. The bottoms of the seat tubes are fully enclosed to conceal floor-mounting anchors.
7. Seat: Stainless Steel – 14 gauge, type 304. One piece 12 inch diameter with 1-1/2 inch drop edge. #4 finish.
8. Finishes:
 - a. Cabinet and Seat: Stainless steel #4 finish.
 - b. Legs and Seat Support: Manufacturer's standard baked enamel or powder coated finish. Color: Black.

2.16 FABRICATION

A. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Coordinate dimensions and attachment methods of detention furnishings with those of adjoining construction to produce integrated assemblies with closely fitting joints and with edges and surfaces aligned, unless otherwise indicated.

C. Shear and punch metals cleanly and accurately. Remove burrs.

D. Form edges and corners to be free of sharp edges or rough areas. Fold back and crimp exposed edges of unsupported sheet metal to form a 1/2-inch- (12.7-mm-) wide hem on the concealed side; ease edges of metal plate to a radius of approximately 1/32 inch (0.8 mm).

1. Fabricate detention furnishings with no more than 1/32-inch (0.8-mm) gap between component materials. Weld edges that cannot be crimped to meet tolerance so as to provide a seamless joint with no places for concealment of contraband.

E. Form metal in maximum lengths to minimize joints. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

- 1 F. Weld corners and seams continuously to comply with referenced AWS standard and the
2 following:
- 3 1. Use materials and methods that minimize distortion and develop strength and corrosion
4 resistance of base metals.
5 2. Obtain fusion without undercut or overlap.
6 3. Remove welding flux immediately.
7 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no
8 roughness shows after finishing and contour of welded surface matches that of adjacent
9 surface.
10 5. Provide smoothly finished eased edges of 1/32" minimum at outside corners.
11 6. Weld before finishing components to greatest extent possible. Remove weld spatter and
12 welding oxides from exposed surfaces by descaling or grinding.
- 13 G. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and
14 space anchoring devices to secure metal fabrications rigidly in place and to support expected
15 loads. Build in straps, plates, and brackets as needed to support and anchor fabricated items to
16 adjoining construction. Reinforce formed-metal units as needed to attach and support other
17 construction.
- 18 H. Cut, reinforce, drill, and tap metal fabrications to receive hardware, security fasteners, and
19 similar items.
- 20 I. Form exposed work true to line and level with accurate angles and surfaces and straight sharp
21 edges.
- 22 J. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners
23 where possible. Use exposed security fasteners of type indicated or, if not indicated, flat-head
24 (countersunk) security fasteners. Locate joints where least conspicuous.

25 2.17 FINISHES, GENERAL

- 26 A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for
27 recommendations for applying and designating finishes.
- 28 B. Finish detention furnishings after assembly.

29 2.18 STEEL FINISHES

- 30 A. Surface Preparation: Remove mill scale and rust, if present, from uncoated steel, complying
31 with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or SSPC-SP 8, "Pickling."
- 32 B. Baked-Enamel Finish: Immediately after cleaning and pretreating, apply manufacturer's
33 standard two-coat, baked-enamel finish consisting of prime coat and thermosetting topcoat.
34 Comply with paint manufacturer's written instructions for applying and baking to achieve a
35 minimum dry film thickness of 1.2 mils.
- 36 1. Color and Gloss: As selected by Architect from manufacturer's full range.
- 37 C. Primed Finish: Prime finish steel to receive paint as applied to match cell and/or other
38 surrounding finishes.
- 39 1. Color and Gloss: As selected by Architect.

2.19 STAINLESS-STEEL FINISHES

- A. General: Remove tool and die marks and stretch lines or blend into finish. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.
- B. Intermediate Polish Finish: No. 3 finish, unless otherwise indicated.
- C. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of detention furnishings.
 - 1. Examine roughing-in for embedded and built-in anchors to verify actual locations of detention furnishing connections before detention furnishing installation.
 - 2. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of detention furnishings.
- B. Inspect built-in and cast-in anchor installations before installing detention furnishings to verify that anchor installations comply with requirements. Prepare inspection reports.
 - 1. Remove and replace anchors where inspections indicate that they do not comply with specified requirements. Reinspect after repairs or replacements are made.
 - 2. Perform additional inspections to determine compliance of replaced or additional work. Prepare inspection reports.
- C. Verify locations of detention furnishings with those indicated on Coordination Drawings.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing detention furnishings to in-place construction. Include threaded fasteners for concrete and masonry inserts, security fasteners, and other connectors.
- B. Cutting, Fitting, and Placement: Obtain manufacturer's written approval for cutting, drilling, and fitting required for installing detention furnishings. Set detention furnishings accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete or masonry or similar construction.
- D. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations.
- E. Field Welding: Comply with the following requirements:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

- 1 2. Obtain fusion without undercut or overlap.
- 2 3. Remove welding flux immediately.
- 3 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no
- 4 roughness shows after finishing and contour of welded surface matches that of adjacent
- 5 surface.
- 6 5. Fillet Welds: Minimum size of 1/8 inch by 1-1/2 inches long, spaced not greater than 12
- 7 inches o. c.

- 8 F. Assemble detention furniture that requires field assembly with security fasteners, with no
- 9 exposed fasteners on exposed faces and frames.

- 10 G. Furnish and install one detention mattress for each detention bunk.

- 11 3.3 FIELD QUALITY CONTROL

- 12 A. Inspect installed products to verify compliance with requirements. Prepare inspection reports
- 13 and indicate compliance with and deviations from the Contract Documents.

- 14 B. Remove and replace detention work where inspections indicate that work does not comply with
- 15 specified requirements.

- 16 C. Perform additional inspections to determine compliance of replaced or additional work. Prepare
- 17 inspection reports.

- 18 D. Prepare field quality-control certification that states installed products and their installation
- 19 comply with requirements in the Contract Documents.

- 20 3.4 CLEANING AND PROTECTION

- 21 A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and
- 22 abraded areas of shop paint, and paint exposed areas with same material as used for shop
- 23 painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

- 24 B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and
- 25 abraded areas of shop paint are specified in Division 09 painting Sections.
- 26

3.5 DETENTION EQUIPMENT SCHEDULE

PLAN SYMBOL	DESCRIPTION	MANUFACTURER	MOUNTING HEIGHT
DFS	Detention Floor Mounted Seat		
DPBS	Detention Public Beam Seating		
DS	Detention Shelf		
DMS	Detention Modesty Screen		
DT-2	Detention Table, Two Seats		
DT-2A	Detention Table, Two Seats Accessible		
DT-4	Detention Table, Four Seats		
DT-4A	Detention Table, Four Seats Accessible		
DWB	Detention Wall-Mounted Bench		
DWCBA	Detention Wall-Mounted Cell Bunk Accessible		
DWCB	Detention Wall-Mounted Cell Bunk		
DWD	Detention Wall-Mounted Desk		
DWDA	Detention Wall-Mounted Desk Accessible		
DWSHA	Detention Wall-Mounted Shelves Accessible		
DWSSA	Detention Wall-Mounted Swing Seat Accessible		
DWVS	Detention Wall-Mounted Video Visitation without Seat		
DVVT	Detention Video Visitation Table		
VVS	Video Visitation System – without Seat		
VVSA	Video Visitation System – Accessible without Seat		

END OF SECTION 12 55 00

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1 SECTION 12 93 00 - SITE FURNISHINGS

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY

- 7 A. Section Includes:

- 8 1. Seating.
9 2. Bicycle racks.
10 3. Bicycle lockers.
11 4. Bollards.

- 12 B. Related Requirements:

- 13 1. Section 03 30 00 "Cast-in-Place Concrete" for installing pipe sleeves cast, installing
14 anchor bolts cast, and/or formed voids in concrete footings.

15 1.3 ACTION SUBMITTALS

- 16 A. Product Data: For each type of product.

- 17 B. Samples: For each exposed product and for each color and texture specified.

- 18 C. Samples for Initial Selection: For units with factory-applied finishes.

- 19 D. Samples for Verification: For each type of exposed finish, not less than 6-inch-long linear
20 components and 4-inch-square sheet components.

- 21 1. Include full-size Samples of bench and bicycle rack. Approved samples may be
22 incorporated into the Work.

- 23 E. Product Schedule: For site furnishings. Use same designations indicated on Drawings.

24 1.4 INFORMATIONAL SUBMITTALS

- 25 A. Material Certificates: For site furnishings manufactured with preservative-treated wood.

- 26 1. Indicate type of preservative used and net amount of preservative retained.

27 1.5 CLOSEOUT SUBMITTALS

- 28 A. Maintenance Data: For site furnishings to include in maintenance manuals.

1 1.6 MAINTENANCE MATERIAL SUBMITTALS

2 A. Furnish extra materials that match products installed and that are packaged with protective
3 covering for storage and identified with labels describing contents.

4 1. Bench Replacement Re-last planks: No fewer than 2, full-size units for each size
5 indicated.

6 2. Anchors: Per manufacturer

7 PART 2 - PRODUCTS

8 2.1 SEATING (BNCH) – Bid Alternate #1

9 A. Manufacturers: Subject to compliance with requirements, provide products by one of the
10 following:

11 1. Wishbone Industries, LTD, Model No. UFWM-175with UFWM-17E Seat End 2x6 Re-last
12 planks (basis of design) or equal.

13 B. Frame: Cast aluminum, powder coated.

14 C. Seat:

15 1. Material:

16 a. Aluminum Sheet: Expanded metal.

17 b. Recycled Plastic Planks: Evenly spaced, parallel.

18 2. Seat Height: As indicated.

19 3. Seat Surface Shape: Flat.

20 4. Overall Height: As indicated.

21 5. Overall Width: As indicated.

22 6. Overall Depth: As indicated.

23 7. Arms: None.

24 8. Seating Configuration: Multiple units as indicated.

25 a. Straight shape.

26 D. Aluminum Finish: Color coated.

27 1. Color: As selected by Architect from manufacturer's full range.

28 E. HDPE Color: As selected by Architect from manufacturer's full range.

29 2.2 BICYCLE RACKS (BR)

30 A. Manufacturers: Subject to compliance with requirements, provide products by one of the
31 following:

32 1. BCI Burke Company, LLC.

33 2. Bison, Inc.

34 3. Neenah Foundry Company.

- 1 4. Wausau Tile Inc.
- 2 B. Bicycle Rack Construction:
- 3 1. Frame: Steel.
- 4 a. Tubing OD: Not less than 2-3/8 inches.
- 5 2. Style: Double-side parking.
- 6 a. Overall Height: minimum 34 inches
- 7 b. Overall Width: minimum 20 inches
- 8 c. Overall Depth: As indicated].
- 9 d. Capacity: Designed to accommodate no fewer than two bicycles.
- 10 3. Security: Designed to lock wheel and frame.
- 11 4. Accessories: Base covers for each pipe and tubing anchored end.
- 12 5. Installation Method: Surface flange anchored below finished grade to substrate
- 13 indicated, cast-in concrete, or bolted to cast-in anchor bolts.
- 14 C. Steel Finish: Color coated.
- 15 1. Color: As selected by Architect from manufacturer's full range.
- 16 2.3 BICYCLE LOCKERS (BL)
- 17 A. Manufacturers: Subject to compliance with requirements, provide products by one of the
- 18 following:
- 19 1. American Bicycle Security Company.
- 20 2. Columbia Cascade Company.
- 21 3. Cora Bike Rack.
- 22 4. Creative Pipe, Inc.
- 23 5. CycleSafe.
- 24 6. Huntco Supply, LLC.
- 25 7. Madrax; Graber Manufacturing Co.
- 26 B. Bicycle Locker Construction:
- 27 1. Locker: Steel sheet, 0.053 inch thick, with perforated metal sides with welded tubular
- 28 steel frame.
- 29 2. Door: Steel sheet, 0.053 inch thick with tubular steel frame Match locker.
- 30 3. View: Perforated metal.
- 31 4. Lock: Coin/token lock.
- 32 a. Provide four keys.
- 33 5. Overall Height: minimum 48 inches
- 34 6. Overall Width: minimum 38 inches
- 35 7. Overall Depth: minimum 75 inches
- 36 8. Capacity: Designed to accommodate one bicycle(s).
- 37 9. Installation Method: Anchor with bolt through base flange to concrete slab with
- 38 expansion anchors.
- 39 10. Locker Configuration: single units as indicated, in shape indicated.

C. Steel Finish: Color coated.

1. Color: As selected by Architect from manufacturer's full range.

2.4 PRECAST CONCRETE BOLLARDS (BOL-2)

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. American Eagle Precast

B. Bollard Construction:

1. Precast Concrete: Match Precast Architectural Concrete per Section 03 45 00.

2. Style: Manufacturer's standard ??? top

3. Overall Exposed Height: 42 inches.

4. Overall Width: As indicated.

5. Installation Method: Surface flange anchored below finished grade to substrate indicated.

C. Steel Finish: Color coated.

1. Color: As selected by Architect from manufacturer's full range.

2.5 MATERIALS

A. Aluminum: Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated; free of surface blemishes and complying with the following:

1. Rolled or Cold-Finished Bars, Rods, and Wire: ASTM B 211.

2. Extruded Bars, Rods, Wire, Profiles, and Tubes: ASTM B 221.

3. Structural Pipe and Tube: ASTM B 429.

4. Sheet and Plate: ASTM B 209.

5. Castings: ASTM B 26.

B. Steel and Iron: Free of surface blemishes and complying with the following:

1. Plates, Shapes, and Bars: ASTM A 36.

2. Steel Pipe: Standard-weight steel pipe complying with ASTM A 53, or electric-resistance-welded pipe complying with ASTM A 135.

3. Tubing: Cold-formed steel tubing complying with ASTM A 500.

4. Mechanical Tubing: Cold-rolled, electric-resistance-welded carbon or alloy steel tubing complying with ASTM A 513, or steel tubing fabricated from steel complying with ASTM A 1011 and complying with dimensional tolerances in ASTM A 500; zinc coated internally and externally.

5. Sheet: Commercial steel sheet complying with ASTM A 1011.

6. Perforated Metal: From steel sheet not less than 0.075-inch nominal thickness; manufacturer's standard perforation pattern.

7. Expanded Metal: Carbon-steel sheets, deburred after expansion, and complying with ASTM F 1267.

8. Malleable-Iron Castings: ASTM A 47, grade as recommended by fabricator for type of use intended.
9. Gray-Iron Castings: ASTM A 48, Class 200.
- C. Plastic: Color impregnated, color and UV-light stabilized, and mold resistant.
 1. Polyethylene: Fabricated from virgin plastic HDPE resin.
- D. Anchors, Fasteners, Fittings, and Hardware: Manufacturer's standard, corrosion-resistant-coated or non-corrodible materials; commercial quality, tamperproof, vandal and theft resistant, concealed, recessed, and capped or plugged.
 1. Angle Anchors: For inconspicuously bolting legs of site furnishings to on-grade substrate; minimum one per leg.
 2. Antitheft Hold-Down Brackets: For securing site furnishings to substrate; two per unit.
- E. Non-shrink, Nonmetallic Grout: Premixed, factory-packaged, non-staining, non-corrosive, nongaseous grout complying with ASTM C 1107; recommended in writing by manufacturer, for exterior applications.
- F. Erosion-Resistant Anchoring Cement: Factory-packaged, non-shrink, non-staining, hydraulic-controlled expansion cement formulation for mixing with potable water at Project site to create pourable anchoring, patching, and grouting compound; resistant to erosion from water exposure without needing protection by a sealer or waterproof coating; recommended in writing by manufacturer, for exterior applications.
- G. Galvanizing: Where indicated for steel and iron components, provide the following protective zinc coating applied to components after fabrication:
 1. Zinc-Coated Tubing: External, zinc with organic overcoat, consisting of a minimum of 0.9 oz./sq. ft. of zinc after welding, a chromate conversion coating, and a clear, polymer film. Internal, same as external or consisting of 81 percent zinc pigmented coating, not less than 0.3 mil thick.
 2. Hot-Dip Galvanizing: According to ASTM A 123, ASTM A 153, or ASTM A 924.

2.6 FABRICATION

- A. Metal Components: Form to required shapes and sizes with true, consistent curves, lines, and angles. Separate metals from dissimilar materials to prevent electrolytic action.
- B. Welded Connections: Weld connections continuously. Weld solid members with full-length, full-penetration welds and hollow members with full-circumference welds. At exposed connections, finish surfaces smooth and blended, so no roughness or unevenness shows after finishing and welded surface matches contours of adjoining surfaces.
- C. Pipes and Tubes: Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of handrail and railing components.
- D. Exposed Surfaces: Polished, sanded, or otherwise finished; all surfaces smooth, free of burrs, barbs, splinters, and sharpness; all edges and ends rolled, rounded, or capped.

- E. Factory Assembly: Factory assemble components to greatest extent possible to minimize field assembly. Clearly mark units for assembly in the field.

2.7 GENERAL FINISH REQUIREMENTS

- A. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.8 STEEL AND GALVANIZED-STEEL FINISHES

- A. Powder-Coat Finish: Manufacturer's standard polyester, powder-coat finish complying with finish manufacturer's written instructions for surface preparation, including pretreatment, application, baking, and minimum dry film thickness.

- B. PVC Finish: Manufacturer's standard, UV-light stabilized, mold-resistant, slip-resistant, matte-textured, dipped or sprayed-on, PVC-plastisol finish, with flame retardant added; complying with coating manufacturer's written instructions for pretreatment, application, and minimum dry film thickness.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance of the Work.

- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's written installation instructions unless more stringent requirements are indicated. Complete field assembly of site furnishings where required.

- B. Unless otherwise indicated, install site furnishings after landscaping and paving have been completed.

- C. Install site furnishings level, plumb, true, and securely anchored at locations indicated on Drawings.

- D. Post Setting: Set cast-in support posts in concrete footing with smooth top, shaped to shed water. Protect portion of posts above footing from concrete splatter. Verify that posts are set plumb or at correct angle and are aligned and at correct height and spacing. Hold posts in position during placement and finishing operations until concrete is sufficiently cured.

- E. Posts Set into Voids in Concrete: Form or core-drill holes for installing posts in concrete to depth recommended in writing by manufacturer of site furnishings and 3/4 inch larger than OD of post. Clean holes of loose material, insert posts, and fill annular space between post and concrete with non-shrink, nonmetallic grout or anchoring cement, mixed and placed to comply

1 with anchoring material manufacturer's written instructions, with top smoothed and shaped to
2 shed water.

3 F. Pipe Sleeves: Use steel pipe sleeves preset and anchored into concrete for installing posts.
4 After posts have been inserted into sleeves, fill annular space between post and sleeve with
5 non-shrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring
6 material manufacturer's written instructions, with top smoothed and shaped to shed water.

7 END OF SECTION 12 93 00
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1 SECTION 13 07 00 - BULLET RESISTANT TRANSACTION SYSTEM

2 PART 1 GENERAL

3 1.1 SECTION INCLUDES

4

- 5 A. Total bullet resistant system including glazing, frames, doors, bullet resistant backing
6 panels and transaction trays integrated into standard wall construction and millwork
7 elements specified in other Sections as indicated.

8

9 1.2 REFERENCES

10

- 11 A. Underwriters Laboratory UL 752-Standard for Bullet Resisting Equipment
12 B. ASTM E119-98- Standard Test Methods for Fire Tests of Building Construction and
13 Materials
14 C. NIJ Standard 0108.01-(National Institute of Justice) Standard for Ballistic Resistant
15 Protective Materials
16 D. ASTM B 209/B 209M- Standard Specification for Aluminum and Aluminum Alloy
17 Sheet and Plate
18 E. ASTM A 666-Standard Specification for Annealed or Cold-Worked Austenitic
19 Stainless Steel Sheet, Strip, Plate and Flat Bar.

20

21 1.3 SUBMITTALS

22

- 23 A. The following shall be submitted by the manufacturer in accordance with Sections 13
24 07 00 and any submittal requirements for Division 01.
25 B. Submit for approval prior to fabrication: samples, product data (including preparation,
26 storage and installation methods), cuts & anchor spacing, reinforcement & location ,
27 product specifications, shop drawings, test reports (current UL Listing Verification &
28 UL 752 Test Results as provided by Underwriters Laboratories), and printed data in
29 sufficient detail to indicate compliance with the contract documents.
30
31 C. Manufacturer's Instructions for installation and cleaning of TSS Bullet Transaction
32 Window Assemblies.

33

34 1.4 DESIGN PERFORMANCE

35

- 36 A. Through the design, manufacturing techniques and material application the TSS
37 Bullet Baffle Design Bandit Barrier or equivalent.
38
39 a. The assembly shall provide multiple transaction positions utilizing the
40 "Horizontal Baffle Window" configuration.
41 b. The design shall employ Baffle windows ballistic glazing to complete the
42 "Baffle" design.
43 c. Each transaction position shall have a ricochet resistant stainless steel dip
44 tray as shown on the drawings.
45 d. Components must be manufactured in strict accordance with the
46 specifications, design and details.

- 1 e. All vision panels shall be cut to size with all exposed edges polished.
2 f. Necessary holes shall be pre drilled and tapped where required.
3 g. Stainless Steel assembly screws and acrylic spacers shall be provided.
4 h. Clear anodized angles, channels and anchoring screws shall be provided.
5
6 B. No field alterations to the construction of the assembly fabricated under the
7 acceptable standards shall be allowed unless approved by the manufacturer and the
8 architect. Standard manufacturing tolerances shall be +/- 1/16 inch.
9 C. Materials shall meet or exceed UL 752 requirements.
10
11 1.5 QUALITY ASSURANCE
12
13 A. Manufacturer shall be a Company that specializes in manufacturing products of the
14 specified type with a minimum of five years experience.
15 B. Installer shall be a Company that specializes in product type specified and Certified
16 for the installation by the manufacturer.
17 C. Manufacturer shall provide a sampling for evaluation of surface preparation and
18 application workmanship and color/finish to the Architect for approval prior to start of
19 work.
20
21 1.6 DELIVERY, STORAGE & HANDLING
22
23 A. Delivery of the materials to the project with the manufacturer's UL Listed Labels intact
24 and legible.
25 B. Handle the materials with care to prevent damage.
26 C. Store materials inside and under cover, stack flat and off floor. Project conditions
27 (temperature, humidity, and ventilation) shall be within the maximum limit
28 recommendations set by manufacturer.
29 D. Do not install products that are under conditions outside these limits.
30
31 1.7 WARRANTY
32
33 A. All materials shall be warranted against defects for a period of 1 year from date of the
34 project completion.
35 B. Certificates of manufacturer's standard warranty shall be provided at project
36 completion.
37
38 PART 2 PRODUCTS
39 2.1 ACCEPTABLE MANUFACTURERS
40 A. Products shall be based on the bullet resistant arch bandit barrier system by Total
41 Security Solutions (TSS), Inc, (www.tssbulletproof.com) as the basis of design.
42 Equivalent products will be considered.
43 2.2 BULLET RESISTANT ARCH GLAZED BARRIER (BRGB)

- 1 A. TSS Baffle Bandit Barrier:
- 2 a. The Baffle System consists of custom prefabricated bullet resistant wall
- 3 section panels with secure air passage through the baffle window transaction
- 4 point as required for voice transmission.
- 5 b. Aluminum channel, acrylic mounting clips, acrylic buttresses and accessories
- 6 for installation are included.
- 7 c. Aluminum finish will be clear anodized.
- 8 B. Glazing shall be *Bullet Resistant Level 3*, 1 1/4" LP 1250 Laminated. All acrylic
- 9 pieces shall meet or exceed UL 752 testing for ballistic integrity. All edges of acrylic
- 10 shall be filed, sanded after cutting to remove rough edges and then polished until
- 11 "water clear" transparent. All through holes for fasteners shall be 3/8" in diameter
- 12 and be drilled clean. Chipped edges at through-hole exit points are not acceptable.
- 13 All acrylic pieces shall be supported in the proper glazing channel designed for this
- 14 purpose (see aluminum, Section D).
- 15 C. Aluminum sections to be manufactured in accordance with ASTM B209, Extruded
- 16 aluminum alloy 6063 T5 Anodized
- 17 D. Glazing Channel: U-Channel specifically designed for securing transparencies tightly
- 18 in place. Angles and stops are only acceptable for top attachment. All exposed
- 19 aluminum edges shall be clean cut and have no burrs. Exposed corners shall be
- 20 rounded and sanded.
- 21
- 22 E. Mounting plates and or connecting clips shall be fabricated from 1/8" thick clear
- 23 polycarbonate.
- 24
- 25 F. Deal Trays: 18 gauge stainless steel in a brushed #4 finish with ricochet resistant
- 26 profile. All joints are welded and ground smooth and all edges are finished smooth.
- 27 Securely fasten Deal trays to the counter millwork as indicated with the fasteners
- 28 hidden and inaccessible. Trays are 8 inches from front to rear. Recessed trays are
- 29 1-1/2 inches depth are typical for new millwork construction. Deal trays shall be at
- 30 least 14" in width.

31 2.3 BULLET RESISTANT STOREFRONT SYSTEM - LEVEL 3 (BRSS)

- 32 A. Bullet Resistant Storefront System: Total Security Solutions Bullet Resistant
- 33 Aluminum TSS-BL3-DR Bullet Resistant Storefront System. All joints and
- 34 connections shall be tight, providing hairline joints and true alignment of adjacent
- 35 members. Corner joinery shall consist of heavy duty extruded and keyed aluminum
- 36 corner splines with continuous 3/8 inch diameter tie rod construction. Glazing must
- 37 not be removable from the threat side of the door. Provide to dimension heights and
- 38 widths indicated on the Drawings.
- 39 1. System shall be designed to defeat ballistic assaults from a .44 magnum
- 40 handgun in accordance with UL 752, Level 3.
- 41
- 42 a. Aluminum Doors: Top rail and stile 2-3/4" (70 mm), Bottom rail 8-1/2"
- 43 (216 mm including glass stops.
- 44 b. Aluminum Door and Sidelight Frames and Extrusions: 1 3/4" x 4",
- 45 Structural section .125" thickness
- 46 c. Glazing: LP-1250 Polycarbonate/Acrylic Laminate, 1-1/4" thick, 7.7lbs/sf.

- 1 UL 752, UL=3, 44 mag.
2 d. Hardware: Select SL-11HD continuous aluminum gear hinge, Adams
3 Rite MS1850 deadlock, with Adams Rite 4510 Series mortise thumb turn
4 and or Keyed mortise cylinder, 9" aluminum pull handle and door width
5 push bar as selected by architect. LCN 400 series heavy duty door
6 closer.

7
8 2. Door Frame Construction:

- 9
10 a. Frames shall provide equal UL protection level as door, non-ricochet
11 type, Aluminum ballistic extruded aluminum in 6061-T6 alloy, aluminum
12 finish.
13 b. Door hardware includes: HD continuous hinge, push/pull handle,
14 mortised lock, overhead closer.
15 c. Optional hardware: exit devices, electric strike plate, and custom security
16 hardware. Shipped fabricated and ready for field installation.
17 d. Style: 1 3/4" x 4" BR aluminum jamb.

18
19 3. Finish: Clear Anodized Aluminum.

20
21 2.4 OTHER ACCESSORIES

22 A. Sound Baffle:

- 23
24 a. Provide a window separation between positions as part of the system to
25 reduce sound between positions on the public side for acoustic privacy.
26 b. Sound baffle can be connected to the bullet resistant wall system.
27 c. Baffle will be of similar clear design as the bullet resistant wall system.

28 PART 3 EXECUTION

29 3.1 PREPARATION

- 30 A. Prior to installing the bullet resistive material, the contractor shall verify that all
31 supports have been installed as required by the contract documents and architectural
32 drawings, and approved shop drawings. Installer shall notify architect of any
33 unsatisfactory preparation that is responsibility of another installer which shall be
34 corrected prior to installation.
35 B. Clean and prepare all surfaces per manufacturers recommendations for achieving
36 the best results for the substrate under the project conditions.
37 C. Do not begin installation until openings have been verified and surfaces properly
38 prepared in accordance with Drawings.
39

40 3.2 INSTALLATION

- 41 A. Product shall arrive on site completely pre-fabricated to supplied field dimensions.
42 Unit shall be installed in provided opening and secured to structure.
43 B. Install in accordance with manufacturer's instructions and UL 752.
44 C. Set all equipment plumb and level.
45 D. All products shall be installed per installation instructions including adhering to

1 anchoring and finishing details in order to secure specified warranty.

2

3 3.3 POST APPLICATION

4 A. Installed in accordance with manufacturer's printed recommendations,

5 B. Inspection and Cleaning: Verify installation is complete and complies with
6 manufacturer's requirements. Clean product and accessories, removing excess
7 sealant, labels and protective covers.

8 C. Touch-up, repair or replace damaged products before Project Completion.

9 D. Product Warranty: Applicable warranty shall be issued to Owner upon final release of
10 completed project.

11

12 END OF SECTION 13 07 00

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1 SECTION 13 42 60 – MODULAR METAL DETENTION WALL PANEL SYSTEM

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General Conditions and Division 1
5 Specification Sections, apply to this Section.
- 6 B. Section 01 35 13.16 "General Requirements for Detention Work."
- 7 C. Section 03 30 00 "Cast-In-Place Concrete" for concrete floor, mezzanine floor, and concrete for
8 cell wall fill.
- 9 D. Section 05 50 00 "Metal Fabrications" for tier railing and stairs.
- 10 E. Section 05 12 00 "Structural Steel Framing" for miscellaneous structural supports for framework
11 required for detention steel wall panels.
- 12 F. Section 12 55 00 "Detention Furniture: for detention furniture and equipment attached and
13 supported by detention steel wall panels

14 1.2 SUMMARY

- 15 A. Provide and install security hollow metal panel wall system as listed in Paragraph 2.1 below.

16 1.3 SUBMITTALS

- 17 A. Manufacturer's Data:
- 18 1. Submit manufacturer's product specifications and installation instructions for each type of
19 detention equipment.
- 20 2. Distribute one (1) copy to the installer.
- 21 B. Shop Drawings: Shop drawings shall show quantities, types, and locations. Construction shall
22 be fully detailed, showing weights of materials, finish, framing, reinforcing, anchoring, and
23 method of making joints, and must indicate conformance with all specified technical
24 requirements, and shall conform with the physical configuration of the specified items. Submit
25 for review by Architect prior to submitting to State Fire Marshal.
- 26 C. Deferred Code Authority Submittal: The product under this section is an engineered system and
27 as such must be submitted to the proper Authority Having Jurisdiction (AHJ), in this case the
28 California State Fire Marshal.
- 29 1. Submit appropriate copies of approved shop drawings, calculations, test reports and
30 other data for review concurrent with A/E shop drawings submittals.
- 31 2. Submit design calculations for required welding schedule for panels, floor channels, etc.
32 and required ceiling design indicating compliance with design loads.
- 33 3. Installer Certificates: Signed by the manufacturer certifying installers comply with
34 requirements.
- 35 D. Samples:
- 36 1. Submit sample of panel 1'-0" X 1'-0" corner section showing internal construction.

- 1 a. No work represented by the samples shall be fabricated until the samples are
2 approved.
- 3 E. Test Report: Manufacturer shall submit to the architect an independent testing laboratory
4 reports certifying that products meet all test requirements set forth in Paragraph 1.5.
- 5 F. Qualifications: Manufacturer shall submit to architect his qualifications as required by Paragraph
6 1.6.
- 7 1.4 References:
- 8 A. American Society for Testing and Materials:
- 9 1. ASTM A 1008-15, Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-
10 Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
- 11 2. ASTM A 1011-14, Specification for Steel, Sheet Steel, Sheet and Strip, Hot-Rolled,
12 Carbon, Structural, High-Strength Low-Alloy and High Strength Low-Alloy with Improved
13 Formability.
- 14 3. ASTM A 653-15, Specification for Steel Sheet, Zinc-coated (Galvanized) or Zinc-Iron
15 Alloy-Coated (Galvannealed) by Hot Dipped Process, (Commercial Steel).
- 16 4. ASTM A 240-15a, Standard Specification for Chromium and Chromium-Nickel Stainless
17 Steel Plate Sheet, and Strip for Pressure Vessels and for General Applications.
- 18 5. ASTM B 117-11, Standard Practice for Operating Salt Spray (Fog) Apparatus.
- 19 6. ASTM C 143-15, Standard Test Method for Slump of Hydraulic Cement Concrete.
- 20 7. ASTM D 610-08 (2012), Standard Practice for Evaluating Degree of Rusting on Painting
21 Steel Surfaces.
- 22 8. ASTM D 714-02(2009), Standard Test Method for Evaluating Degree of Blistering of
23 Paints.
- 24 9. ASTM D 1735-14, Standard Practice for Testing Water Resistance of Coatings Using
25 Water Fog Apparatus.
- 26 10. ASTM-E119-15, Standard Methods of Fire Tests of Building Construction and Materials.
- 27 11. NFPA-251-06, Fire Tests of Building Construction and Materials.
- 28 12. ANSI A 250.10 – 2011, Standard Test Procedure and Acceptance Criteria for Prime
29 Painted Steel Surfaces for Steel Doors and Frames.
- 30 13. ASTM F 1450-12a, Standard Test Methods for hollow Metal Swinging Door Assemblies
31 for Detention and Correctional Facilities.
- 32 14. ASTM F 1592-12, Standard Test Methods for Detention Hollow Metal Vision Systems.
- 33 15. ASTM F 2322-12, Standard Test Methods for Physical Assault on Vertical Fixed Barriers
34 for Detention and Correctional Facilities.
- 35 B. NAAMM HMMA 803-08, Steel Tables.
- 36 C. HMMA 820 TN01-03, Grouting Hollow Metal Frames.
- 37 D. American National Standards Institute:
- 38
- 39 1. ANSI / NAAMM HMMA 866-12, Guide Specifications for Stainless Steel Hollow Metal
40 Doors and Frames.
- 41 2. ANSI / NFPA 80-2016, Fire Doors and Windows.
- 42 3. ANSI / NFPA 252-2012, Standard Methods of Fire Tests of Door Assemblies.
- 43 4. ANSI / NFPA 257-2012, Methods for Fire Test of Window Assemblies.
- 44 5. ANSI / UL 9-2012, Fire Test of Window Assemblies.
- 45 6. ANSI / UL 10B-2013, Fire Tests of Door Assemblies, 9th Edition.
- 46 7. ANSI / UL 10C-2009, Standard for Positive Pressure Fire Tests of Door Assemblies, 1st
47 Edition.

E. Underwriters Laboratories:

1. UL 263-2011, Fire Tests of Building Construction and Materials, 14th Edition.
2. UL 752-11, 11th Edition, Bullet Resisting Equipment.

1.5 Testing and Performance:

A. Wall Assembly Impact Test: Test in accordance with ASTM F2322-12

B. Wall De-lamination Test:

1. The test specimen shall consist of a representative sample of the wall system under investigation with a minimum size of 4'-0" X 4'-0". No end closing pieces are to be used in this test.
2. Using a steel I-beam table capable of withstanding a load of 10,000 pounds with no deflection, fix to the tabletop a steel I-beam enclosure to accommodate the sample.
3. Mount the sample in the test fixture and weld the bottom face sheet at its center to the I-beam tabletop. Weld a 3" X 3" X 1/4" thick steel plate centered on the top face sheet. Center an eyelet on the 3" X 3" X 1/4" thick steel plate. Using a hydraulic porta-power and a calibrated load cell to measure pounds force, pull on the eyelet in an upward direction. Use a dial indicator to measure the deflection at the center of the test sample.
4. The maximum allowable deflection when measure with a 3,000 pound load is 1/8".

C. Cell Furnishing Static Load Test:

1. Erect a wall or use the same wall as specified under the Wall Impact Test.
2. Attach the inmate desk by welding to the wall panel system.
3. Apply a load to the outer edge of the desk using a hydraulic porta-power and a calibrated load cell to measure pounds force. Apply a load of 1,500 pounds.
4. No permanent visible disfigurement is allowed to the wall panel system.

D. Acoustical Test:

1. Erect a wall or use the same wall as specified under Wall Impact Test.
2. Conduct these tests in accordance to: ASTM E90-09 Standard Test Classification for Determination of Sound Transmission Class (Minimum STC class rating of 45-49), and ASTM E1332-10a Standard Test Classification for Determination of Outdoor-Indoor Transmission Class (Minimum OITC class rating is 41).

1.6 QUALITY ASSURANCE

A. Single-Source Responsibility: All materials for security hollow metal panel wall system to be furnished by a single manufacturer.

B. Manufacturer Qualifications: Firm with a minimum 5 years experience in manufacturing security hollow metal panel wall systems that are similar to those indicated for this project and that have a record of successful in-service performance.

C. Mock-Up: Prior to production of wall panels and components, build a full-scale mock-up at the project site for the Architect-Engineer and Owner to review and approve.

1. Mock-up to consist of a lower cell, upper cell, and mezzanine walkway.
2. Mock-up to have a minimum one cell completely furnished and painted per this specification section and as shown on Drawings. One cell to be left unpainted and unfurnished.
3. Mezzanine to have railings installed per details.
4. Chases to have all connections and piping installed as provided by other subcontractors.
5. Mock-up to be reviewed for finishes, installation of components and other like items.

6. Approved mock-up to be used to establish quality and standard of workmanship for all component.
- a. Approval to be in the form of a letter, produced by Architect/Engineer and signed by manufacturer, Owner and Architect/Engineer.
7. Approved mock-up may be incorporated into the project and at contractor's discretion.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Packing and Marking: Mark each piece according to the approved erection drawings.
- B. Deliver all components palletized or crated to provide protection during transit and job storage.
- C. Store all components at the building site under cover. Do not store any materials directly on the ground or concrete. Provide adequate ventilation and protection to insure materials are kept dry, clean and secure. Store all materials in the manner and order as prescribed by the manufacturer.

PART 2 - PRODUCTS

2.1 SECURITY HOLLOW METAL PANEL WALL SYSTEM

- A. Security hollow metal panel system and accessories shall include, but are not necessarily limited to:
 1. Cell Walls – refer to schedule at the end of Part 3 for locations of security hollow metal panel wall systems.
 - a. Security hollow metal panel wall system No. 1: System must pass all testing criteria as listed in Part 1 paragraph 1.5.
 - b. Security hollow metal panel wall system No. 2: System must pass the following testing criteria as listed in Part 1 paragraph 1.5:
 - 1) Wall assembly impact test (ASTM F2322-12).
 - 2) Cell furnishing static load test.
 2. Mezzanine walkway, and support for railings.
 3. Security hollow metal doors, frames and chases for the cell modules only.
 4. Detention hardware, including cell door, chase door, for cell modules only, but excluding any control system elements that connect to hardware.
 5. All floor and ceiling channels and miscellaneous cell panel connection materials as required.
 6. Concrete filling of all cell wall panels.
 7. Installation of metal conduit for electrical connections as required.
 8. Supply and return grilles.
 9. Detention furnishings, including bunk, desk, stool, shelf, mirror for cell modules only.
 10. Detention lavatory commode combo units, for cell modules only.
 11. Electrical items, including cell light fixture, intercom, call button, for cell modules only.
 12. Security glazing, including cell door vision panels only.
- B. Manufacturers: Unless pre-approved prior to bidding, provide modular metal detention wall panel systems by one of the following:

1. Trussbilt, New Brighton, MN
2. MaxWall by Norment Security Group, Montgomery, AL

C. Detention Cell Accessories:

1. As identified in Section 12 55 00 "Detention Furniture."

2.2 FABRICATION

A. Methods and product quality shall meet standards set by the Hollow Metal Manufacturers Association (HMMA), a Division of the National Association of Architectural Metal Manufacturers (NAAMM).

1. Panel face sheets shall be joined at their vertical edges by a continuous rabbeted joint extending the full height of the panel.
2. Panel thickness shall be 2 inches minimum and furnished with provisions for grouting in the field. After grouting, grout holes will be concealed by a cover plate. Panels shall be neat in appearance and free from warpage or buckle. Edge bends shall be true and straight and of minimum radius for the thickness of material used.
3. Panels shall be stiffened by one of the following systems:
 - a. Continuous steel core materials, 0.015 inches minimum, having truncated triangular sections extending continuously from one panel face to the other, spot welded to each face sheet 2-3/4 inches OC horizontally and 3 inches OC vertically. Core materials shall extend full height and width of panel.
 - b. Rolled or formed 1/8 steel channels extending from top to bottom of panel and continuous from one face to the other, spaced not more than 4 inches OC and shall be spot welded to both panel faces not more than 3 inches OC vertically.
4. Security Frames, Vents:
 - a. Panels shall be provided with cutouts reinforced with steel moldings, not less than 12 gauge to secure access door frames and air venting grilles in accordance with sizes shown in Drawings. Coordinate size and location of air venting with mechanical.

B. After fabrication, all tool marks shall be filled and sanded as required to make face sheets, vertical edges, and weld joints free of irregularities with the exception of minor spot welding marks. Wholesale grinding or pressure sanding of the panel surface with resulting removal of zinc coating shall not be permitted. After appropriate metal preparation, all exposed surfaces of panels shall receive a rust inhibitive primer which meets or exceeds ASTM B117 Salt Spray for 150 hours with a rust grade of not less than 6 as defined in ASTM D610 and ASTM D1735 Water Fog Test, for organic coatings for 200 hours with any quantity of #8 blisters, but no more than "few" #6 blisters as illustrated in ASTM D714.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect floor slab for compliance with requirements for installation tolerances, embed placement and other conditions affecting installation of security hollow metal panel wall system.
- B. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 ERECTION

- A. Erection Tolerances: Install security hollow metal panel wall system level, plumb square, and true, without exceeding the tolerances and as indicated below.
1. Plan Location From Building Grid Datum: 1/4 inch.
 2. Cell Fronts: 1/8 inch.
 3. Top Elevation From Nominal Elevation: 1/4 inch.
 4. Support Elevation From Nominal Elevation:
 - a. Maximum Low: 1/4 inch.
 - b. Maximum High: 1/4 inch.
 5. Plumb in Any 10 feet of Element Height: 1/4 inch.
 6. Maximum Jog in Alignment of Matching Edges: 1/8 inch.
 7. Differential Bowing or Camber, as Erected Between Adjacent Members of the Same Design: 1/4 inch.
 8. Cell Fronts: 1/8 inch.
- B. Place floor mounting channels on floor slab and wall channels on precast wall. Anchor according to approved shop drawings.
- C. Fit panels into floor and wall channels and weld to channel and adjacent panels per manufacturer's instructions.
1. Provide 2 inch long fillet welds at 12 inches on center.
 2. Welds to be smooth with weld spatter and flue removed.
- D. Install access doorframes and security grilles into panel system and attach by welding.
- E. Fill panels with grout as specified prior to ceiling/floor installation.
- F. Install metal deck on top of panels. Weld deck to wall panels. Place concrete on deck to form floor or ceiling slab as detailed in Drawings.
- G. Install all wall hung items by welding to wall panels. Touch-up damaged primer coat as necessary.
- H. Fill vertical and horizontal joints and seams with security caulk.
- I. After installation of all accessories and fixtures, paint metal wall panels, doors, frames, ceilings, etc. as specified in Division 09 Section "High-Performance Coatings."

3.3 REPAIR AND CLEANING

- A. Repair or replace damaged panels which do not meet specifications
1. Repairs shall be approved by Architect/Engineer.
 2. Damaged panels which can not be repaired are to be removed and replaced with new panels
- B. Clean panels after erection and grouting procedures by removing excess grout and other rubbish. After all work is complete, clean all surfaces, re-caulk and repaint as required for acceptance by Architect/Engineer.

END OF SECTION 13 42 60

1 SECTION 13 90 00 – INSTITUTIONAL COVER SYSTEM

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General Conditions and Division 1
5 Specification Sections, apply to this Section.

6 1.2 SUMMARY

- 7 A. The soffit/cover system shall incorporate a concealed snap-lock connection, which, once
8 assembled, render the cover essentially irremovable with the use of ordinary tools.

9 1.3 SUBMITTALS

- 10 A. Manufacturer's Data:

- 11 1. Submit manufacturer's product specifications and installation instructions for each type of
12 detention equipment.

- 13 B. Product Data: Include construction details, material descriptions, dimensions of individual
14 components and profiles, and finishes for each type of detention enclosure indicated.

- 15 C. Shop Drawings: For each type of detention enclosure. Include plans, elevations, sections,
16 details, and attachments to other Work. Indicate type of steel for each detention enclosure
17 component.

- 18 1. Indicate requirements for cast-in anchors to be installed as work of other Sections.

- 19 D. Coordination Drawings: Drawings of each detention enclosure, drawn to scale. Show the
20 following:

- 21 1. Locations, dimensions, and profiles of detention enclosures.
22 2. Locations and installation details of detention attachments.
23 3. Elevations of each detention enclosure type showing dimensions.

- 24 E. Welding certificates.

- 25 F. Qualification Data: For Installer.

26 1.4 QUALITY ASSURANCE

- 27 A. Single-Source Responsibility: All materials for security hollow metal panel wall system to be
28 furnished by a single manufacturer.

- 29 B. Manufacturer Qualifications: Firm with a minimum 5 years experience in manufacturing security
30 hollow metal panel wall systems that are similar to those indicated for this project and that have
31 a record of successful in-service performance.

- 32 C. Coordinate installation of soffit/cover systems with all other trades.

- 33 D. Installer Qualifications: An authorized representative of detention enclosure manufacturer for
34 installation and maintenance of units required for this Project.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver all components palletized or crated to provide protection during transit and job storage.
- B. Store all components at the building site under cover. Do not store any materials directly on the ground or concrete. Provide adequate ventilation and protection to insure materials are kept dry, clean and secure. Store all materials in the manner and order as prescribed by the manufacturer.

PART 2 - PRODUCTS

2.1 MATERIAL

- A. A factory-fabricated steel cover support system with concealed surface-mounted attachment clamps, in dimensions as shown on the drawings for concealment of various system including but not limited to:
 - 1. HVAC
 - 2. Fire Sprinkler Piping
 - 3. Conduit
 - 4. Wiring
 - 5. Cable
 - 6. Piping/Plumbing Fixtures
- B. Manufacturers or Approved Sources: Unless pre-approved prior to bidding, provide modular metal detention wall panel systems by one of the following:
 - 1. JG Innovations, Inc., Janesville, WI
 - 2. In-Ex Systems, Inc., Acworth, GA
- C. Support/Attachment Devices: Spring steel shield clips of the size recommended by manufacturer, for securement of the cover. Clips shall be produced from 21 Gauge minimum zinc-plated spring steel and shall have a reverse curvature design such that the clips soundly secure the soffit from easy removal. Each clip must be demonstrated as being able to resist a force of 200 lbs. uplift at the free end. Test results shall be available upon request.
- D. Soffit/Cover:
 - 1. The soffit/cover shall be smooth in appearance and shall be made of 16 Gauge A60/G90 galvanized steel, with a paint grip finish and factory painted of a color to be specified by the owner's representative. The cover shall have a snap-lock interfacing with the clips such that once assembled, it is rendered virtually irremovable with the use of ordinary tools.
 - 2. The soffit and related fittings shall be factory painted with Sherwin Williams epoxy polyester hybrid powder coating of a color to be specified by the owner's representative. Matching touch-up paint shall be supplied to the owner by the manufacturer.
 - 3. Cover manufacturer shall be staffed with a licensed engineer having a minimum of five years experience with such systems.
 - 4. The soffit/cover shall be sized in accordance with requirements to accommodate the specific application size as specified by the project documents, specifications and blue prints, provided to the cover manufacturer prior to bid date.
 - 5. L-Shield soffit profile for sidewall installations and/or U-Shield soffit profile for sidewall and/or pendant installations respectively.
 - 6. Cover joints shall be interlocking integral joints with provision for securement utilizing stainless steel rivets. Rivet spacing shall be at no greater than 2" intervals along the joint

- and positioned at a distance no greater than 1" from the end of the overlapping section. External couplings will NOT be allowed.
7. Cover design shall include a roll-formed "groove" at the interfacing of the cover and the adjacent construction surface to facilitate the application of sealant/adhesive compounds and enhance the security of such compounds from dislodging.

E. Finishes:

1. Cold-rolled steel, 18 gauge
- a. Zinc-galvanized Paintgrip, factory treated and factory painted in colors selected by architect from manufacturers standard colors. Custom colors available upon request.

F. Accessories:

1. The system shall include tamper-resistant end caps, prefabricated corners, wall flanges, couplings, and other items, which may be necessary to complete the system, and shall be installed in accordance with manufacturer recommendations.
2. Spare Parts - The installing contractor shall supply the owner with quantities of spare parts equal to a minimum of five percent (5%) of the total quantities of each soffit part utilized in this installation

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation of system shall be in strict accordance with approved shop drawings and manufacturer's printed instructions:

1. If used to conceal fire sprinkler systems, the sprinkler contractor/engineer must determine the piping and sprinkler layout, including sprinkler head locations and pipe support locations (based on pipe manufacturer's specifications). Indicate areas on drawings where cover system is to be used.
2. Select appropriate fasteners for the substrate encountered to adequately secure the pipe and cover system.
3. To insure that the cover is linear and snug-fitting when installed, it is imperative that its support devices are anchored squarely and firmly against the structural surface in a straight line.
4. All penetrations to the soffit/cover system must be field cut to prevent misalignment with intended protrusion. The exceptions to this are that access doors will be factory furnished and installed and perforations, if required, for ventilation purposes will be factory perforated.
5. Guidelines for installation of modular soffit/cover system shall be supplied by the manufacturer of said system and the installing contractor shall adhere to the manufacturer's guidelines.
6. All field cut ends and scratches shall be "touched up" (spray or brush) with a matching paint.
7. Manufacturer shall supply on-site installation instruction, upon installer's request, by a qualified installation instructor for a minimum of one day for the project start-up (1,500 lineal feet minimum.)
8. The completed installation shall be visibly searched for voids between the interfacing of the cover and construction surface. Voids shall be sealed with a color matching siliconized caulk or urethane caulk.

- 1 B. Do not proceed with installation until unsatisfactory conditions have been corrected.
- 2 3.2 REPAIR AND CLEANING
- 3 A. Repair or replace damaged panels which do not meet specifications
- 4 1. Repairs shall be approved by Architect/Engineer.
- 5 2. Damaged panels which can not be repaired are to be removed and replaced with new
- 6 panels
- 7 B. After all work is complete, clean all surfaces, re-caulk and repaint as required for acceptance by
- 8 Architect/Engineer.
- 9 END OF SECTION 13 90 00

SECTION 14 24 00 – TRACTION AND HYDRAULIC ELEVATORS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes as follows:

1. One hydraulic service elevator, Car 1.
2. One hydraulic freight elevator, Car 2.
3. Three traction passenger elevators, Cars 3, 4, and 5.

B. Products Installed But Not Furnished Under This Section:

1. Building announcement speakers
2. Emergency Voice/Alarm Communication System Provisions
3. In car CCTV camera provisions
4. Elevator related security devices, control unit, mounting brackets, wiring materials, logic circuits, security system interface terminals, boxes and relays.
5. Car interior finishes
6. Car flooring
7. Monitoring system interface

C. Related Requirements:

1. Division 01 Section "Temporary Facilities and Controls" for temporary use of elevators for construction purposes.
2. Division 03 Section "Cast-in-Place Concrete" for setting sleeves, inserts, and anchoring devices in concrete.

1.2 ALLOWANCE

A. Elevator Car Allowances: Provide finished service and freight elevators under the elevator car allowance specified in Division 01 section "allowances." Allowance includes furnishing and installing the following:

1. Car wall finishes including trim.
2. Car floor finishes including subfloor and fastening.
3. Car ceiling finishes including lighting, wiring, and coordination of battery operated emergency lighting.
4. Car door finishes.
5. Car door sills.
6. Car light fixtures.
7. Handrails.
8. Cutouts and other provisions for installing elevator signal equipment in cars.
9. Mounting for protective pads
10. Assistance of IUEC approved installers.

B. Hoistway Door Allowances: Provide finished hoistway doors under the hoistway door allowance specified in Division 01 section "allowances." Allowance includes furnishing and installing the following:

1. Hoistway door finishes including trim.
2. Hoistway door sills.

1.3 DEFINITIONS

- A. Terms used are defined in the latest edition of the Safety Code for Elevators and Escalators, ASME A17.1.

1.4 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with ASME A17.1/CSA B44, California Building Code 2013, 11B-407.
- B. Seismic Performance: Elevator system shall withstand the effects of earthquake motions determined according to SEI/ASCE 7 and shall comply with elevator safety requirements for seismic risk Zone 2 or greater in ASME A17.1/CSA B44.
 - 1. The term "withstand" means the system will remain in place without separation of any parts when subjected to the seismic forces specified.
 - 2. Provide earthquake equipment required by ASME A17.1/CSA B44.
 - 3. Provide seismic switch required by SEI/ASCE 7.

1.5 SUBMITTALS

- A. Product Data: Include capacities, sizes, performances, operations, safety features, finishes, and similar information. Include product data for car enclosures, hoistway entrances, and operation, control, and signal systems. Include product data for signal fixtures, lights, graphics, Braille plates, and details of mounting provisions.
- B. Shop Drawings:
 - 1. Include plans, elevations, sections, and large-scale details indicating openings at each landing, machine room layout, coordination with building structure, relationships with other construction, and locations of equipment.
 - 2. Include large-scale layout of car operating panel and standby power operation control panel.
 - 3. Indicate maximum dynamic and static loads imposed on building structure at points of support and maximum and average power demands.
 - 4. Power Confirmation Information: Include motor horsepower, code letter, starting current, full-load running current, and demand factor. Provide maximum and average power consumption and heat release.
- C. Samples for Initial Selection: For finishes involving surface treatment, paint or color selection.
- D. Samples for Verification: For exposed car, hoistway door and frame, and signal equipment finishes:
 - 1. Samples of sheet materials: 3" (75 mm) square.
 - 2. Running trim members: 4" (100 mm) lengths.
- E. Operation and Maintenance Data:
 - 1. For elevators to include in emergency, operation, and maintenance manuals.
 - 2. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include diagnostic and repair information available to manufacturer's and Installer's maintenance personnel.
 - 3. Elevators 1 and 2 are standard units that are not tied in to the locking control system.
 - 4. Elevators 3, 4, and 5 are controlled from Central Control as part of the locking control system.
 - 5. The local station would control the outer vestibule doors in the basement, Floor 3, and Floor 5.

6. Central Control would receive a call from inside the vestibule, direct an elevator cab to that floor, and dispatch the elevator to destination.
 7. Cameras will be installed in Elevators 3, 4, and 5.
 8. Elevators 3, 4, and 5 will have control buttons that will be disabled with a locking control system.
- F. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted elevator use.
- G. Continuing Maintenance Proposal: Submit a continuing maintenance proposal from Installer to Owner, in the form of a standard five-year maintenance agreement, starting on date initial installation service is concluded. State services, preventative maintenance schedule, obligations, conditions, and terms for agreement period and for future renewal options.

1.6 QUALITY ASSURANCE

- A. Compliance with Regulatory Agencies: Comply with most stringent applicable provisions of following codes, laws, and/or authorities, including revisions and changes in effect:
1. Safety Code for Elevators and Escalators, ASME A17.1
 2. Guide for Inspection of Elevators, Escalators, and Moving Walks, ASME A17.2
 3. Elevator and Escalator Electrical Equipment, ASME A17.5
 4. ~~National~~ ~~California~~ Electrical Code, ~~NFPA 70~~ ~~CEC~~
 5. Americans with Disabilities Act, ADA A117.1.
 6. ~~Local~~ ~~State~~ Fire ~~Authority~~ ~~Marshal~~
 7. Requirements of most stringent provision of local authority having jurisdiction.
 8. Life Safety Code, NFPA101, and California Code of Regulations Title 19

1.7 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver material in Contractor's original unopened protective packaging.
- B. Store material in original protective packaging. Prevent soiling, physical damage, or moisture damage.
- C. Protect equipment and exposed finishes from damage and stains during transportation and construction.

1.8 WARRANTY

- A. Manufacturer's Warranty:
1. Manufacturer agrees to repair, restore, or replace elevator work that fails in materials or workmanship within specified warranty period.
 2. Failures include, but are not limited to: operation or control system failure, including excessive malfunctions; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.
 3. Warranty Period: One year from date of Substantial Completion.

1.9 MAINTENANCE

- A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include twelve months full maintenance by skilled employees of elevator Installer. Include monthly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation at rated speed

and capacity. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

1. Perform maintenance during normal working hours.
2. Perform emergency callback service during normal working hours. Include 24-hour-per-day, 7-day-per-week emergency callback service with response time of sixty minutes or less.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following manufacturers offering products that may be incorporated into the Work include the following:
1. KONE Inc.
 2. Otis Elevator Co.
 3. Schindler Elevator Corp.
 4. ThyssenKrupp Elevator
 5. Mitsubishi

2.2 ELEVATORS

- A. Elevator System, General: Manufacturer's standard elevator systems. Unless otherwise indicated, manufacturer's standard components shall be used, as included in standard elevator systems and as required for complete system.

2.3 SUMMARY – TRACTION ELEVATOR EQUIPMENT

- A. Three Low-Rise Passenger Elevators:

PASSENGER ELEVATORS 3, 4, AND 5

1. Capacity:
 - a. Elevators 3 and 5: 3,500 lbs.
 - b. Elevator 4: 5,000 lbs.
2. Class Loading: Passenger Class A
3. Contract Speed: 200 fpm
4. Roping: Per Manufacturer's standard product offering
5. Machine: Geared
6. Machine Location: Contractor standard location
7. Supervisory Control: Group automatic microprocessor-based
8. Motor Control: AC variable voltage variable frequency microprocessor-based with digital closed-loop feedback
9. Power Characteristics: 480 Volts, 3 Phase, 60 Hertz
10. Stops and Openings:
 - a. Elevators 3 and 5: 3, all front
 - b. Elevator 4: 4 front, 1 rear at Mezzanine
11. Platform Size:
 - a. Elevators 3 and 5: 7'-0" wide X 6'-2" deep
 - b. Elevator 4: 6'-0" wide X 10'-1¼" deep
12. Minimum Clear Inside Car:
 - a. Elevators 3 and 5: 6'-8" wide X 5'-5" deep

PASSENGER ELEVATORS 3, 4, AND 5

- b. Elevator 4: 5'-8" wide X 8'-6¾" deep
- 13. Entrance Size:
 - a. Elevators 3 and 5: 3'-6" wide X 7'-0" high
 - b. Elevator 4: 4'-6" wide X 9'-0" high
- 14. Door Operator: High-speed heavy-duty with minimum opening speed of 2.5 fps
- 15. Door Protection: Full screen device with differential timing, nudging, and interrupted beam
- 16. Safety: Flexible guide clamp-Type B
- 17. Guide Rails: Planed steel tees
- 18. Buffers: Spring
- 19. Car Enclosure: As specified
 - a. Steel shell as specified
 - b. Car interior finishes provided under this section
 - c. Car dropped ceiling designed for easy removal with auxiliary car lighting flush mounted in car canopy, under car crosshead. Include separate light switch in car service compartment
 - d. Car fan
 - e. Hooks and vinyl-covered pads
 - f. Battery powered emergency car lighting. Provide separate constant pressure test button in car service compartment
- 20. Signal Fixtures: LED illumination vandal resistant assembly. EPCO, Innovation, or approved equal to meet CBC.
 - a. Hall and Car Pushbutton Stations:
 - 1) Dual hall pushbutton risers
 - 2) Inconspicuous operation riser, Elevator 4
 - 3) Vandal resistant car and hall pushbuttons.
 - b. Car Position Indicators:
 - 1) Dual digital with car direction arrows
 - 2) Security control panel
 - 3) Firefighters' control panel
 - c. Hall Car Position Indicator:
 - 1) Dual digital with car direction arrows at all floors.
 - 2) Vandal resistant assembly
- 21. Communication System:
 - a. Intercom with distress signal
 - b. Self-dialing, vandal resistant, push to call, two-way communication system with recall, tracking and voiceless communication
- 22. Fixture Submittal: Submit brochure depicting contractor's proposed designs with bid
- 23. Additional Features:
 - a. Car and counterweight roller guides
 - b. Car top inspection station
 - c. Firefighters' service, Phases I and II, including alternate floor return
 - d. Standby power transfer (automatic to main floor) with manual override in firefighters' control panel
 - e. Accessibility and emergency medical services signage
 - f. Stationary car return panels arranged for surface applied car operating panels
 - g. Hoistway access switches, top and bottom floors
 - h. Platform isolation

PASSENGER ELEVATORS 3, 4, AND 5

- i. Load-weighing device
- j. Independent service feature
- k. Individual floor lock-off feature for all cars, all openings
- l. Digital video display provisions, all cars
- m. Security control panel and remote wiring
- n. Firefighters' control panel and remote wiring
- o. Machine, power conversion unit, and controller sound isolation
- p. Tamper resistant fasteners for all fastenings exposed to the public
- q. One year warranty maintenance with 24-hour call-back service
- r. Emergency paging speaker installation
- s. Seismic devices
- t. Signage engraving filled with black paint or approved etching process
- u. No visible company name or logo
- v. Wiring diagrams, operating instructions, and parts ordering information
- w. Monitoring system
- x. System diagnostic means and instructions

2.4 TRACTION CAR AND GROUP PERFORMANCE

- A. Car Speed: $\pm 3\%$ of contract speed under any loading condition.
- B. Car Capacity: Safely lower, stop and hold 125% of rated load.
- C. Car Stopping Zone: $\pm 1/4"$ under any loading condition.
- D. Door Opening Time: Seconds from start of opening to fully open:
 - 1. Elevators 3 and 5: 1.7 seconds.
 - 2. Elevator 4: 1.9 seconds.
- E. Door Closing Time: Seconds from start of closing to fully closed:
 - 1. Elevators 3 and 5: 2.4 seconds.
 - 2. Elevator 4: 3.0 seconds.
- F. Car Floor-to-Floor Performance Time: Seconds from start of doors closing until doors are 3/4 open or 1/2 open for side opening doors, and car stopped at next successive floor under any loading condition or travel direction:
 - 1. Elevators 3 and 5: 10 seconds.
 - 2. Elevator 4: 11 seconds.

2.5 SUMMARY - HYDRAULIC ELEVATOR EQUIPMENT

- A. Staff Elevator:

STAFF ELEVATOR 1

- 1. Capacity: 3,500 lbs.
- 2. Class Loading: Class A
- 3. Contract Speed: 125 fpm
- 4. Machine: Hydraulic pump
- 5. Machine Location: Adjacent
- 6. Operational Control: Selective collective microprocessor
- 7. Motor Control: Single speed AC with SCR soft start, closed transition
- 8. Power Characteristics: 480 volts, 3 phase, 60 hertz
- 9. Stops and Openings: 2, both front
- 10. Floors Served: B-1

11. Platform Size: 7'-0" wide x 6'-2" deep
12. Minimum Clear Inside Car: 6'-8" wide x 5'-5½" deep
13. Entrance Size: 3'-6" wide x 7'-0" high
14. Entrance Type: Single-speed center-opening
15. Door Operator: High-speed heavy-duty with minimum opening speed 2.5 fps
16. Door Protection: Full screen device with differential timing, nudging, and interrupted beam time
17. Hydraulic Type: Direct plunger
18. Guide Rails: Planed steel tees
19. Buffers: Spring
20. Car Enclosure: As specified
 - a. Car interior finishes provided under this section
 - b. Car dropped ceiling designed for easy removal with auxiliary car lighting flush mounted in car canopy, under car crosshead. Include separate light switch in car service compartment.
 - c. Car fan
 - d. Pad buttons and vinyl covered pads
 - e. Battery powered emergency car lighting. Provide separate constant pressure test button in car service compartment.
21. Signal Fixtures: LED illumination vandal resistant assembly. EPCO, Innovation, or approved equal to meet CBC.
 - a. Hall and Car Pushbutton Stations:
 - 1) Single hall pushbutton riser
 - 2) Vandal resistant car and hall pushbuttons
 - b. Car Position Indicators:
 - 1) Dual digital with car direction arrows
 - 2) Tie in to security control panel
 - 3) Tie in to firefighters' control panel
 - c. Hall Car Position Indicator:
 - 1) Digital type with car direction arrows at all floor
 - 2) Vandal resistant assembly
22. Communication System:
 - a. Intercom with distress signal
 - b. Self-dialing, vandal resistant, push to call, two-way communication system with recall, tracking, and voiceless communication
23. Fixture Submittal: Submit brochure depicting contractor's proposed designs with bid
24. Additional Features:
 - a. Car roller guides
 - b. Car top inspection station
 - c. Firefighters' service, Phase I and II, including alternate floor return
 - d. Battery pack standby power provision
 - e. Stationary car return panel arranged for surface applied car operating panel
 - f. Hoistway access switches top and bottom floors
 - g. Platform isolation, jack to platen connections
 - h. Independent service feature
 - i. Digital video display provisions
 - j. Security control panel and remote wiring
 - k. Firefighters' control panel and remote wiring
 - l. Hydraulic pump unit and controller sound isolation with oil cooler.
 - m. Tamper resistant fasteners for all fastenings exposed to the public
 - n. One year warranty maintenance with 24-hour call-back service

- o. Sill support angles
- p. Emergency paging speaker installation
- q. Seismic safety valve
- r. Seismic devices
- s. Jack hole, outer casing and watertight PVC inner casing with secondary containment provisions
- t. Signage engraving filled with black paint or approved etching process
- u. No visible company name or logo
- v. Wiring diagrams, operating instructions, and parts ordering information
- w. Tie in to monitoring system
- x. System diagnostic means and instructions

B. Freight Elevator:

FREIGHT ELEVATOR 2

- 1. Capacity: 6,000 lbs.
- 2. Class Loading: Freight Class C1
- 3. Contract Speed: 75 fpm
- 4. Machine: Hydraulic pump
- 5. Machine Location: Adjacent
- 6. Operational Control: Single automatic pushbutton
- 7. Motor Control: Single speed AC with SCR soft start with closed transition start
- 8. Power Characteristics: 480 volts, 3 phase, 60 hertz
- 9. Stops and Openings: 2, both front
- 10. Floors Served: B-1
- 11. Platform Size: 8'-4" wide x 9'-2¾" deep
- 12. Entrance Size: 6'-0" wide x 8'-0" high
- 13. Entrance Type: Two-speed center-opening
- 14. Hydraulic Type: Direct plunger
- 15. Guide Rails: Planed steel tees
- 16. Buffers: Spring
- 17. Car Enclosure: As specified
 - a. Steel shell as specified
 - b. Car interior finishes provided under this section
 - c. Auxiliary car lighting flush mounted in car canopy, under car crosshead. Include separate light switch in car service compartment.
 - d. Car fan
 - e. Battery powered emergency car lighting. Provide separate constant pressure test button in car service compartment.
- 18. Signal Fixtures: LED illumination contractor's standard vandal resistant assembly. EPCO, Innovation, or approved equal to meet CBC.
 - a. Hall and Car Pushbutton Stations:
 - 1) Single riser
 - 2) Single car operating panel
 - 3) Vandal resistant car and hall pushbuttons.
 - b. Car Position Indicators:
 - 1) Digital with car direction arrows
 - 2) Tie in to security control panel
 - 3) Tie in to firefighters' control panel
 - c. Hall Car Position Indicator:
 - 1) With car direction arrows at all floor
 - 2) Vandal resistant assembly

FREIGHT ELEVATOR 2

19. Communication System:

- a. Intercom with distress signal
- b. Self-dialing, vandal resistant, push to call, two-way communication system with recall, tracking and voiceless communication

20. Fixture Submittal: Submit brochure depicting contractor's proposed designs with bid

21. Additional Features:

- a. Car roller guides
- b. Car top inspection station
- c. Firefighters' service, Phase I and II, including alternate floor return
- d. Battery pack standby power provision
- e. Stationary car return panel. Arranged for surface applied car operating panel.
- f. Hoistway access switches top and bottom floors
- g. Platform isolation, jack to platen connection
- h. Independent service feature
- i. Digital video display provisions,
- j. Security control panel and remote wiring
- k. Firefighters' control panel and remote wiring
- l. Hydraulic pump unit and controller sound isolation with oil cooler
- m. Tamper resistant fasteners for all fastenings exposed to the public
- n. One year warranty maintenance with 24-hour call-back service
- o. Sill support angles
- p. Emergency paging speaker installation
- q. Seismic safety valve
- r. Jack hole, outer casing and watertight PVC inner casing with secondary containment provisions
- s. Seismic devices
- t. Signage engraving filled with black paint or approved etching process
- u. No visible company name or logo
- v. Wiring diagrams, operating instructions, and parts ordering information
- w. Monitoring system
- x. System diagnostic means and instructions

2.6 HYDRAULIC CAR PERFORMANCE

- A. Car Speed: $\pm 20\%$ of contract speed under any loading condition.
- B. Car Capacity: Safely lower, stop and hold 125% of rated load.
- C. Car Stopping Zone: $\pm 1/4"$ under any loading condition.
- D. Door Opening Time: Seconds from start of opening to fully open:
 - 1. Elevator 1: 2.1 seconds.
 - 2. Elevator 2: N/A
- E. Door Closing Time: Seconds from start of closing to fully closed:
 - 1. Elevator 1: 2.4 seconds.
 - 2. Elevator 2: N/A
- F. Car Floor-to-Floor Performance Time: Seconds from start of doors closing until doors are 3/4 open and car stopped at next successive floor under any loading condition or travel direction:
 - 1. Elevator 1: 12.5 seconds.
 - 2. Elevator 2: N/A

- G. Pressure: Fluid system components shall be designed and factory tested for 500 p.s.i. maximum operating pressure shall be 400 p.s.i.

2.7 TRACTION ELEVATOR MATERIALS

- A. Rigidized metal panel, steel diamond plate floor.
- B. Paint: Clean exposed metal parts and assemblies of oil, grease, scale, and other foreign matter and factory paint one shop coat of standard rust-resistant primer. After erection, provide one finish coat of industrial enamel paint. Galvanized metal need not be painted.
- C. Aluminum: Extrusions per ASTM B221; sheet and plate per ASTM B209.
- D. Textured: 5WL as manufactured by Rigidized Metals. Rimex Metals or approved equal with .050 inches mean pattern depth with bright directional polish (satin finish).
- E. Entrances Stainless Steel: Entrance panels will be 12 gauge formed steel plates welded into frame angels and 16 gauge metal clad wood core doors within a welded steel angle frame, Bi-parting door cover frames: hollow metal, bolted, fabricated from not less than 14 gauge material to form a one-piece unit covering steel channel sub frames complying with ASTM A167, with standard tempers and hardness required for fabrication, strength and durability. Apply mechanical finish on fabricated work in the locations shown or specified, Federal Standard and NAAMM nomenclature, with texture and reflectivity required to match Architect's sample. Protect with adhesive paper covering.

2.8 HYDRAULIC ELEVATOR MATERIALS

- A. Diamond plate aluminum floor.
- B. Paint: Clean exposed metal parts and assemblies of oil, grease, scale, and other foreign matter and factory paint one shop coat of standard rust-resistant primer. After erection, provide one finish coat of industrial enamel paint. Galvanized metal need not be painted.
- C. Aluminum: Extrusions per ASTM B221; sheet and plate per ASTM B209.
- D. Textured: 5WL as manufactured by Rigidized Metals. Rimex Metals or approved equal with .050 inches mean pattern depth with bright directional polish (satin finish).
- E. Rigidized metal panel, steel diamond plate floor.
- F. Paint: Clean exposed metal parts and assemblies of oil, grease, scale, and other foreign matter and factory paint one shop coat of standard rust-resistant primer. After erection, provide one finish coat of industrial enamel paint. Galvanized metal need not be painted.
- G. Entrances Stainless Steel: Entrance panels will be 12 gauge formed steel plates welded into frame angels and 16 gauge metal clad wood core doors within a welded steel angle frame, Bi-parting door cover frames: hollow metal, bolted, fabricated from not less than 14 gauge material to form a one- piece unit covering steel channel sub frames complying with ASTM A167, with standard tempers and hardness required for fabrication, strength and durability. Apply mechanical finish on fabricated work in the locations shown or specified, Federal Standard and NAAMM nomenclature, with texture and reflectivity required to match Architect's sample. Protect with adhesive paper covering.

2.9 ADDITIONAL APPROVED MATERIALS

- A. Steel:
 - 1. Sheet Steel (Furniture Steel for Exposed Work): Stretcher-leveled, cold-rolled, commercial quality carbon steel, complying with ASTM A366, matte finish.
 - 2. Sheet Steel (for Unexposed Work): Hot-rolled, commercial quality carbon steel, pickled and oiled, complying with ASTM A568/A568M-03.
 - 3. Structural Steel Shapes and Plates: ASTM A36.
- B. Plastic Laminate: ASTM E84 Class A and NEMA LD3.1, Fire-Rated Grade (GP-50), Type 7, 0.050" $\pm$ 0.005" thick, color and texture as follows:
 - 1. Exposed Surfaces: Color and texture selected by Architect.
 - 2. Concealed Surfaces: Contractor's standard color and finish.
- C. Fire-Retardant Treated Particle Board Panels: Minimum 3/4" thick backup for natural finished wood and plastic laminate veneered panels, edged and faced as shown, provided with suitable anti-warp backing; meet ASTM E84 Class "I" rating with a flame-spread rating of 25 or less, registered with Local Authorities for elevator finish materials.
- D. Natural Finish Wood Veneer: Standard thickness, 1/40" thoroughly dried conforming to ASME/HPMA HP-1983, Premium Grade. Place veneer, tapeless spliced with grain running in direction shown, belt, and polish sanded, book-matched. Species and finish designated and approved by Architect.
- E. Paint: Clean exposed metal parts and assemblies of oil, grease, scale, and other foreign matter and factory paint one shop coat of standard rust-resistant primer. After erection, provide one finish coat of industrial enamel paint. Galvanized metal need not be painted.
- F. Prime Finish: Clean all metal surfaces receiving a baked enamel paint finish of oil, grease, and scale. Apply one coat of rust-resistant primer followed by a filler coat over uneven surfaces. Sand smooth and apply final coat of primer.
- G. Baked Enamel Finish: Prime finish per above. Unless specified "prime finish" only, apply and bake three additional coats of enamel in the selected solid color.

2.10 CAR AND GROUP PERFORMANCE

- A. Noise and Vibration Control:
 - 1. Airborne Noise: Measured noise level of elevator equipment and its operation shall not exceed 60 dBA inside car under any condition including door operation and car ventilation exhaust blower on its highest speed. Limit noise level in the machine room relating to elevator equipment and its operation to no more than 80 dBA. All dBA readings to be taken 3'-0" off the floor and 3'-0" from the equipment using the "A" weighted scale.
 - 2. Vibration Control: All elevator equipment provided under this contract, including power unit, controller, oil supply lines, and their support shall be mechanically isolated from the building structure and electrically isolated from the building power supply and to each other to minimize the possibility of objectionable noise and vibrations being transmitted to occupied areas of the building.

2.11 OPERATION

- A. Collective Microprocessor-Based:
 - 1. Operate car without attendant from pushbuttons in car and located at each floor. When car is available, automatically start car and dispatch it to floor corresponding to

registered car or hall call. Once car starts, respond to registered calls in direction of travel and in the order the floors are reached.

2. Do not reverse car direction until all car calls have been answered, or until all hall calls ahead of car and corresponding to the direction of car travel have been answered.
3. Slow car and stop automatically at floors corresponding to registered calls, in the order in which they are approached in either direction of travel. As slowdown is initiated for a hall call, automatically cancel hall call. Cancel car calls in the same manner. Hold car at arrival floor an adjustable time interval to allow passenger transfer.
4. Answer calls corresponding to direction in which car is traveling unless call in the opposite direction is highest (or lowest) call registered.
5. Illuminate appropriate pushbutton to indicate call registration. Extinguish light when call is answered.
- 6.

2.12 INCLUDE, AS A MINIMUM, THE FOLLOWING FEATURES

A. Traction Elevators:

1. Operate cars as a group, capable of balancing service and providing continuity of group operation with one or more cars removed from the system.
2. Register service calls from pushbuttons located at each floor and in each car. Slow cars and stop automatically at floors corresponding to registered calls. Make stops at successive floors for each direction of travel irrespective of order in which calls are registered except when bypassing hall calls to balance and improve overall service; stop only one car in response to a particular hall call. Assign hall calls to specific cars and continually review and modify those assignments to improve service. Simultaneous to initiation of slowdown of a car for a hall call, cancel that call. Render hall pushbutton ineffective until car doors begin to close after passenger transfer. Cancel car calls in the same manner.
3. Operate system to meet changing traffic conditions on a service demand basis. Include provisions for handling traffic that may be heavier in either direction, intermittent, or very light. As traffic demands change, automatically and continually modify group and individual car assignment to provide the most-effective means to handle current traffic conditions. Provide means to sense long-wait hall calls and preferentially serve them. Give priority to coincidental car and hall calls in hall call assignment. Accomplish car direction reversal without closing and reopening doors.
4. Use easily reprogrammable system software. Design basic algorithm to optimize service based on equalizing system response to registered hall calls and equalizing passenger trip time to shortest possible time.
5. Serve floors below main floor in a manner that logically minimizes delay in passing or stopping at main floor in both directions of travel. Provide means to force a stop at the main floor when passing to or from lower levels.
6. Required Features:
 - a. Dispatch Protection: Backup dispatching shall function in the same manner as the primary dispatching.
 - b. Delayed Car Removal: Automatically remove delayed car from group operation.
 - c. Position Sensing: Update car position when passing or stopping at each landing.
 - d. Hall Pushbutton Failure: Provide multiple power sources and separate fusing for pushbutton risers.
 - e. Communication link: Provide serial or duplicate communication link for all group and individual car computers.
7. Load Weighing: Provide means for weighing car passenger load. Control system to provide dispatching at main floor in advance of normal intervals when car fills to capacity. Provide hall call by-pass when the car is filled to preset percentage of rated capacity and traveling in down direction. Field adjustment range: 10% to 100%.

8. Independent Service: Provide controls for operation of each car from its pushbuttons only. Close doors by constant pressure on desired destination floor button or door close button. Open doors automatically upon arrival at selected floor.
- B. Hydraulic Elevators:
1. Low Oil Control: In the event oil level is insufficient for travel to the top floor, provide controls to return elevator to the main level and park until oil is added.
 2. Load Weighing: Provide means for weighing car passenger load. Control system to provide dispatching at main floor in advance of normal intervals when car fills to capacity. Provide hall call by-pass when the car is filled to preset percentage of rated capacity and traveling in down direction. Field adjustment range: 10% to 100%.
 3. Independent Service: Provide controls for operation of each car from its pushbuttons only. Close doors by constant pressure on desired destination floor button or door close button. Open doors automatically upon arrival at selected floor.
- C. Car-to-Lobby Feature: Provide the means in the main hall pushbutton station for automatic return to the main floor. Return car nonstop after answering pre-registered car calls, and park with doors open for an adjustable time period of 60-90 seconds. Upon expiration of time period, car shall automatically revert to normal operation and close its doors until assigned as next car or until the car is placed on manual control via in-car attendant or out-of-service switch.
- D. Firefighters' Service: Provide equipment and operation in accordance with code requirements.
- E. Automatic Car Stopping Zone: Traction elevators: Stop car within 1/4" above or below the landing sill. Maintain stopping zone regardless of load in car, direction of travel, distance between landings, hoist rope slippage.
- F. Remote Monitoring and Information: Each controller and the group dispatch logic controller shall provide the following output information, including data logging, fault logs operational events, performance information including car speed, floor to floor times, and door times. The system shall be real time, capable of driving remote color LCD monitors that continually display the status of each car and call. Provide each group with a complete, interactive elevator monitoring system.
1. The system shall concurrently display all units in a group and separate units on one screen in a graphical format and record the following information for each monitored unit:
 - a. Group status:
 - 1) Group operational mode
 - 2) In/out of service
 - 3) Standby power
 - 4) Supervisory failure
 - 5) Location and direction of hall calls
 - 6) Phase I & II operation
 - b. Individual car status – expandable menus:
 - 1) Direction of travel
 - 2) Independent service
 - 3) Hall button failure
 - 4) Inspection service
 - 5) Firefighters' service
 - 6) Position of elevator
 - 7) Door status (open, opening, closing, closed)
 - 8) Door dwell time

- 9) Load by-pass
 - 10) Standby power operation/sequence
 - 11) Power on/off
 - 12) Door detector
 - 13) Safety circuit
 - 14) Door zone
 - 15) Stop switch
 - 16) Alarm button
 - 17) Registered car calls
 - 18) Out of level
 - 19) Equipment space temperature exceeds 95 degrees
 - 20) Stop counter (number of starts)
 - 21) Car speed
 - 22) Door open times
 - 23) Door close time
 - 24) Start to stop motion time
 - 25) Emergency two-way communication device
 - 26) Air conditioner/heater
 - 27) Floor lockouts (car or hall)
 - 28) Lobby recall
 - 29) VIP service
 - 30) Firefighters' service
 - 31) Up/down peak
 - c. Service Driven Outages:
 - 1) Independent service
 - 2) Car out of service
 - 3) Lobby return, cleaning
 - d. Maintenance Activity "Indicators":
 - 1) Top of car inspection
 - 2) Hoistway access
 - 3) Phase I and II
 - 4) Independent service
 - 5) Out of service
 2. Faults monitored with visual and audible alarm, triggered by combinations of any of the above status points:
 - a. Safety circuit
 - b. Alarm bell
 - c. Stop switch
 - d. Emergency two-way communication device
 - e. Door reversal device
 - f. Transmit email when any monitored faults occur.
 3. If out of service 30 minutes, initiate email to designated address. If fault continues more than eight hours, send email hourly until car returned to service.
- G. Reporting Requirements: System shall provide reports in color graphical format both on-screen and in printed form capability to conveniently switch from one report type to another and from one bank to another using minimal mouse clicks and key strokes. Reports shall be displayed after minimal waiting time. Data for all reports shall be continuously recorded and stored. Reports shall be displayed by simply selecting a date and time range, bank of equipment, and report type. Date and time range selections shall carry forward from one

report selection to the next. Reporting functions shall be sub-divided into the following categories:

1. Traffic Reports:
 - a. Number of hall calls per floor (hall call distribution on a per floor basis)
 - b. Number of hall calls per hour (24 hour time-line)
 - c. Hall call waiting times per floor (hall call waiting time distribution on a per floor basis)
 - d. Hall call waiting times per hour (24 hour time-line)
 - e. Distributed hall call response graph (24 hour time-line)
 - f. Detailed hall call response graph (% calls / n seconds)
 - g. Longest wait times including floor number, wait time, date, time, and direction
2. Fault Reports:
 - a. Ten most recent faults (most recent faults listed per bank and per car)
 - b. Fault log – displays the entire fault log for a given time period
 - c. Faults per car (fault distribution on a per car basis)
 - d. Faults per floor (fault distribution on a per floor basis)
 - e. Faults per day/week/month (fault distribution on a per unit or group basis)
3. Car Use Statistics:
 - a. Car use by hour (24 hour time-line of car calls, car starts, door cycles, delayed car, load by pass)
 - b. Car use statistics (same as above, shown for an entire bank)
4. Group Service Log:
 - a. Cars in service (24 hour time-line with text log of group availability of each car)
 - b. Group functions (24 hour time-line with text log of actuation of group functions: Up peak, down peak, fire service, emergency power, etc.)
5. Playback capability: Provide means to playback last fault events:
 - a. Provide means to store two years of data, prior to present.
 - b. Provide means to search data and display 50 faults in sequence of occurrence.
 - c. Provide means to transfer to permanent medium, CD, or approved equal.
 - d. Provide means to print out playback data.
- H. Interface to Third Party Building Management Systems: The elevator monitoring system shall be capable of interfacing and exchanging data with a variety of third party building management systems including Siemens, Landis & Staefa, Johnson Controls, SCADA. Information shall be exchanged by Modbus protocol, open protocol or other suitable methods as required.
- I. Passenger and Service Elevator: Door Operation: Automatically open doors when car arrives at main floor. At expiration of normal dwell time, close doors. Reopen doors when car is designated for loading. Provide front or rear selective door operation, Elevator 2. Provide "heavy door/variable air pressure" feature for consistent specified door operation within appropriate speed and inertia limits.
- J. Freight Elevator: Power Door Operation: Open door and gate automatically when car arrives at a floor. Control door and gate closing by using constant-pressure buttons on car or at each floor. Provide reversing safety device for car gate. Provide automatic door and gate closing feature with warning buzzer.
- K. Standby Lighting and Alarm: Car mounted battery unit with solid-state charger to operate alarm bell and car emergency lighting. Battery to be rechargeable with minimum five-year life expectancy. Include required transformer. Provide constant pressure test button in service compartment of car operating panel. Coordinate location of light fixture with Architect.

- L. Standby Power Operation: Upon loss of normal power, adequate standby power will be supplied via building electrical feeders to simultaneously start and run one car in each group and single cars at contract car speed and capacity.
 - 1. Automatically return one car at a time, in each group and single car(s), nonstop to designated floor, open doors for approximately 3.0 seconds, close doors, and park car. During return operation, car and hall call pushbuttons shall be rendered inoperative. As each car parks, system shall immediately select the next car until all cars in a group have returned to the designated floor. If a car fails to start or return within 30 seconds, system shall automatically select the next car in the group to automatically return.
 - 2. When all cars in a group have returned to the designated floor, one car in each group shall be designated for automatic operation. When a service demand exists for 30 seconds and designated car fails to start, next available car in the group shall be automatically selected for operation.
 - 3. Provide separate group selection switches in firefighters' and security control panels.
 - a. Switches shall be labeled "STANDBY POWER OVERRIDE" with positions marked "AUTO" and appropriate car numbers controlled by each respective switch. Key shall be keyed the same as the key utilized for firefighters' Phase I and II key switch. Key shall be removable in "AUTO" position only.
 - b. Switch shall override automatic return and automatic selection functions and cause the manually selected car to operate. Manual selection shall cause car to start and proceed to designated floor and open and close its doors before standby power is manually transferred to next selected car.
 - c. Provide "STANDBY POWER" indicator lights, one per car, in firefighters' control panel and security control panel. Indicator light illuminates when corresponding car is selected, automatically or manually, to operate on standby power.
 - 4. Successive Starting: When normal power is restored or there has been a power interruption, individual cars in each bank shall restart at five second intervals.
- M. Security System: Provide means to limit access to each building floor for Elevators as follows:
 - 1. Individual floor lockout means in main car operating panel and security control panel to prevent registration of car calls to any selected secure floor.
 - 2. Arrange system so that independent service overrides security system.
 - 3. Arrange system so that firefighters' service overrides security system.
 - 4. Actuate hall lantern each time car arrives at main lobby during secure mode operation.
 - 5. Provide warning light and signal in lobby indicator panel to indicate an attempt to register unauthorized destinations or to open car doors when car is moving or parked at a secured floor. Provide reset switch or button to cancel warning light and signal.

2.13 TRACTION MACHINE ROOM EQUIPMENT

- A. Arrange equipment in spaces shown on drawings.
- B. Geared Traction Hoist Machine:
 - 1. Single worm geared or helical geared traction type with AC induction or P.M.S.M. ACV³F motor, brakes, gear, drive shaft, deflector sheave, and gear case mounted in proper alignment on an isolated bedplate.
 - 2. Provide bedplate blocking to elevate secondary or deflector sheave above equipment space floor.
 - 3. Provide hoist machine mounted direct drive, digital, closed-loop velocity encoder.
 - 4. Provide hoist machine drip pans to collect lubricant seepage.

- C. Solid State Power Conversion and Regulation Unit: Provide solid-state, alternating current, variable voltage, variable frequency (ACV³F), IGBT converter/inverter Power Factor1 drive.
 - 1. Design unit to limit current, suppress noise, and prevent transient voltage feedback into building power supply. Provide internal heat sink cooling fans for the power drive portion of the converter panels. Conform to IEEE standards 519-1992 for line harmonics and switching noise.
 - 2. Mechanically isolate unit to minimize noise and vibration transmission. Incorporate isolation design shown in documents.
 - 3. Provide isolation transformers, filter networks, and choke inductors.
 - 4. Suppress solid-state converter noises, radio frequency interference, and eliminate regenerative transients induced into the mainline feeders or the building standby power generator.
 - 5. Supplemental direct-current power for the operation of hoist machine brake, door operator, dispatch processor, signal fixtures, etc., from separate static power supply.
 - 6. ACV³F Drives shall be regenerative and utilize IGBT converter/inverter and dynamic braking during overhauling condition.
- D. Encoder: Direct drive, solid-state, digital type. Update car position at each floor and automatically restore after power loss.
- E. Controller: UL/CSA labeled.
 - 1. Compartment: Securely mount all assemblies, power supplies, chassis switches, relays, etc., on a substantial, self-supporting steel frame. Completely enclose equipment with covers. Provide means to prevent overheating.
 - 2. Relay Design: Magnet operated with contacts of design and material to insure maximum conductivity, long life, and reliable operation without overheating or excessive wear. Provide wiping action and means to prevent sticking due to fusion. Contacts carrying high inductive currents shall be provided with arc deflectors or suppressors.
 - 3. Microprocessor Hardware:
 - a. Provide built-in noise suppression devices that provide a high level of noise immunity on all solid-state hardware and devices.
 - b. Provide power supplies with noise suppression devices.
 - c. Isolate inputs from external devices (such as pushbuttons) with opto-isolation modules.
 - d. Design control circuits with one leg of power supply grounded.
 - e. Safety circuits shall not be affected by accidental grounding of any part of the system.
 - f. System shall automatically restart when power is restored.
 - g. System memory shall be retained in the event of power failure or disturbance.
 - h. Equipment shall be provided with Electro Magnetic Interference (EMI) shielding within FCC guidelines.
 - 4. Wiring: CSA labeled copper for factory wiring. Neatly route all wiring interconnections and securely attach wiring connections to studs or terminals.
 - 5. Permanently mark components (relays, fuses, PC boards, etc.) with symbols shown on wiring diagrams.
- F. Auxiliary Disconnect: Provide controller or machine mounted auxiliary, lockable "open" disconnect.
- G. Sleeves and Guards: Provide 4" steel angle guards around cable or duct slots through floor slabs or grating. Provide rope and smoke guards for sheaves, cables, and cable slots in equipment space. Configure guards to minimize free area around cables.

H. Machine and Equipment Support Beams:

1. Provide structural steel beams required for direct support of and attachment to building structure of hoist machine, deflector sheaves, overhead sheaves, governor, and hoist rope dead-end hitch assemblies.
2. Provide bearing plates, anchors, shelf angles, blocking, embedment, etc., for support and fastening of machine beams or equipment to the building structure.
3. Isolate machine and overhead sheave beams to prevent noise and vibration transmission to building structure.

I. Structural Floor: Provide template for equipment layout.

J. Governor: Centrifugal-type, car and counterweight driven machine room mounted with pull-through jaws and bi-directional shutdown switches. Provide required bracketing and supports for attachment to building structure.

K. Emergency Brake: Provide means to prevent ascending car over-speed and unintended car movement.

2.14 TRACTION HOISTWAY EQUIPMENT

A. Guide Rails: Planed steel T-sections for car and counterweight of suitable size and weight for the application, including seismic reactions, including brackets for attachment to building structure. Provide rail backing and intermediate counterweight tie brackets. Provide bracketing, at top and bottom of floor beams. No additional structural points of attachment other than those shown on the Contract Documents will be provided.

B. Buffers: Spring type with blocking and support channels.

C. Sheaves: Machined grooves and sealed bearings. Provide mounting to machine beams, machine bedplate, car and counterweight structural members, or building structure.

D. Counterweight: Steel frame with metal filler weights. Provide Type "B" safety device.

E. Counterweight Guide Shoes: Spring dampened roller guide shoes

F. Counterweight Guard: Metal guard in pit. Where counterweight is located between adjacent elevators, provide runway guard next to the adjacent elevator.

G. Governor Rope and Encoder Tape Tensioning Sheaves: Mount sheaves and support frame on pit floor or guide rail. Provide frame with guides or pivot point to enable free vertical movement and proper tension of rope and tape.

H. Suspension Means:

1. 8 x 19 or 8 x 25 Seale construction, traction steel type. Fasten with staggered length, adjustable, spring isolated wedge type shackles.
2. Polyurethane coated, flat belt with imbedded steel cables.
3. Approved governor rope.

I. Terminal Stopping: Provide normal and final devices.

J. Electrical Wiring and Wiring Connections:

1. Conductors and Connections: Copper throughout with individual wires coded and connections on identified studs or terminal blocks. Use no splices or similar connections in wiring except at terminal blocks, control compartments, or junction boxes. Provide 10% spare conductors throughout. Run spare wires from car connection points to individual elevator controllers in the equipment space.

2. Conduit: Galvanized steel conduit, EMT, or duct. Flexible conduit length not to exceed 3'-0". Flexible heavy-duty service cord may be used between fixed car wiring and car door switches for door protective devices. Conduit from the closest hoistway of each elevator group or single elevator to the firefighters' control room and group control console.
3. Traveling Cables: Flame and moisture-resistant outer cover. Prevent traveling cable from rubbing or chafing against hoistway or equipment within hoistway.
 - a. Provide five pair of shielded wires of minimum 18 gauge for card reader.
 - b. Provide one RG-6/U coaxial CCTV cable and two pair of shielded 18 gauge wire within traveling cable from car controller to car top junction box, plus 3'-0" excess loop at both ends.
 - c. Provide two pair of 18 gauge wire for CCTV power.
 - d. Provide eight pair of spare shielded communication wires in addition to those required to connect specified items.
 - e. Tag spares in equipment space. Provide cables from controller to car top.
4. Auxiliary Wiring: Provide conduit, wiring and connections for fire alarm initiating devices, emergency two-way communication system, firefighters' phone jack, paging speaker, CCTV, digital video display, security system and card reader interface terminals and relays, intercom, and announcement speaker and/or background music from equipment space junction box to each car controller in equipment space.

2.15 HYDRAULIC MACHINE ROOM EQUIPMENT

- A. Hydraulic Service and Freight Elevator: Pump Unit: Assembled unit consisting of positive displacement pump, induction motor, master-type control valves combining safety features, holding, direction, bypass, stopping, manual lowering functions, shut off valve, oil reservoir with protected vent opening, oil level gauge, outlet strainer, drip pan, muffler, all mounted on isolating pads. Provide oil cooling unit and oil temperature thermostat to maintain oil at operating temperature.
- B. Landing System: Solid-state, magnetic, or optical type.
- C. Controller: UL/CSA labeled.
 1. Compartment: Securely mount all assemblies, power supplies, chassis switches, relays, etc., on a substantial, self-supporting steel frame. Completely enclose equipment with covers. Provide means to prevent overheating.
 2. Relay Design: Magnet operated with contacts of design and material to insure maximum conductivity, long life, and reliable operation without overheating or excessive wear. Provide wiping action and means to prevent sticking due to fusion. Contacts carrying high inductive currents shall be provided with arc deflectors or suppressors.
 3. Microprocessor-Related Hardware:
 - a. Provide built-in noise suppression devices which provide a high level of noise immunity on all solid-state hardware and devices.
 - a. Provide power supplies with noise suppression devices.
 - b. Isolate inputs from external devices (such as pushbuttons) with opto-isolation modules.
 - c. Design control circuits with one leg of power supply grounded.
 - d. Safety circuits shall not be affected by accidental grounding of any part of the system.
 - e. System shall automatically restart when power is restored.
 - f. System memory shall be retained in the event of power failure or disturbance.
 - g. Equipment shall be provided with Electro Magnetic Interference (EMI) shielding within FCC guidelines.
 4. Wiring: CSA labeled copper for factory wiring. Neatly route all wiring interconnections and securely attach wiring connections to studs or terminals.

5. Permanently mark components (relays, fuses, PC boards, etc.) with symbols shown on wiring diagrams.
 6. Monitoring System Interface: Provide controller with serial data link through RJ45 Ethernet connection and install all devices necessary to monitor items outlined in Section 2.13. Elevator contractor responsible to connect monitoring system interface to machine room monitoring compartment and LAN. Wiring from the LAN to the machine room monitoring compartment by others.
 7. Provide controller or machine mounted auxiliary lockable "open" disconnect if mainline disconnect is not in sight of controller and/or machine.
- D. Muffler: Provide in discharge oil line near pump unit. Design shall dampen and absorb pulsation and noise in the flow of hydraulic fluid.
- E. Piping and Oil: Provide piping, connections and oil for the system. Buried piping shall be secondarily contained with watertight Schedule 40 PVC sleeves between elevator machine room and pit. A minimum of two sound isolation couplings shall be provided between the pump unit and oil line and the oil line and jack unit. Provide isolated pipe stands or hangers as required.
- F. Shut-Off Valve: manual valve on line adjacent to pump unit. Provide second valve in pit adjacent to jack unit.

2.16 HYDRAULIC HOISTWAY EQUIPMENT

- A. Guide Rails: Planed steel T-sections for car of suitable size and weight for the application, including seismic reactions, including brackets for attachment to building structure. Provide rail backing to meet code requirements. No additional structural points of rail attachment, other than those shown on the Contract Documents, will be provided.
- B. Buffers: Spring type with blocking and support channels.
- C. Hydraulic Jack Assembly:
1. Cylinders: Seamless steel pipe. Design head to receive unit-type packing and provide means to collect oil at cylinder head and return automatically to oil reservoir. Provide secondary containment/cylinder protection.
 2. Plungers: Polished seamless steel tubing or pipe. If plunger length exceeds 24'-0", provide two or more sections not exceeding 16'-0" in length, or coordinate installation of longer unit at the jobsite. Join sections by internal threaded couplings. Multiple section jack units shall be factory polished while assembled and marked for proper future reassembly. Isolate plunger from car frames.
 3. Provide single holed application. Mount sheaves to top of plungers.
- D. Sheaves: Machined grooves and sealed bearings. Provide mounting means to top of plungers.
- E. Jack Support and Fluid Shut-Off Valves: Provide steel pit channels to support jack assembly and transmit loads to building structure. Provide intermediate stabilizers as required. Provide manual on/off valves in oil lines adjacent to pump unit and jack units in pit.
- F. Well Hole Casing:
1. Well hole is to be provided by Elevator Contractor. No additional compensation will be allowed for unforeseen conditions of any kind or spoil removal.
 2. Install steel outer casing minimum 18" diameter. Install watertight sleeve over jack assembly for secondary containment prior to insertion into the outer casing. Extend PVC sleeve through pit floor slab to underside of jack support beams and seal with non-permeable membrane. I.D. of PVC sleeve shall be capable of containing 110% of

system fluid capacity. Seal well opening at the pit floor with hydraulic quick setting cement. Provide PVC vision/access ports.

- G. Overspeed Valves: Provide a pressure sensitive, mechanically-actuated seismic safety valve, conforming to ASME A17.1, Rule 3.19.4.7. Connect valve directly to jack assembly inlet.
- H. Terminal Stopping: Provide normal and final devices.
- I. Electrical Wiring and Wiring Connections:
 - 1. Conductors and Connections: Copper throughout with individual wires coded and connections on identified studs or terminal blocks. Use no splices or similar connections in wiring except at terminal blocks, control compartments, or junction boxes. Provide 10% spare conductors throughout. Run spare wires from car connection points to individual elevator controllers in the machine room.
 - 2. Conduit: Galvanized steel conduit, EMT, or duct. Flexible conduit length not to exceed 3'-0". Flexible heavy-duty service cord may be used between fixed car wiring and car door switches for door protective devices. Conduit from the closest hoistway of each elevator group or single elevator to the firefighters' control room and group control console.
 - 3. Traveling Cables: Flame and moisture-resistant outer cover. Prevent traveling cable from rubbing or chafing against hoistway or equipment within hoistway.
 - a. Provide five pair of shielded wires of minimum 18 gauge for card reader.
 - b. Provide one RG-6/U coaxial CCTV cable and two pair of shielded 18 gauge wire within traveling cable from car controller to car top junction box, plus 3'-0" excess loop at both ends.
 - c. Provide two pair of 18 gauge wire for CCTV power.
 - d. Provide four pair of spare shielded communication wires in addition to those required to connect specified items.
 - e. Tag spares in machine room. Provide cables from controller to car top.
 - 4. Auxiliary Wiring: Provide conduit, wiring and connections for fire alarm initiating devices, emergency two-way communication system, firefighters' phone jack, paging speaker, CCTV, digital video display, security system and card reader interface terminals and relays, intercom, and announcement speaker and/or background music from the machine room junction box to each car controller in machine room.
- J. All Elevator Entrance Equipment:
 - 1. Door Hangers: Two-point hanger roller with neoprene roller surface and suspension with eccentric upthrust roller adjustment.
 - 2. Door Tracks: Bar or formed, cold-drawn removable steel tracks with smooth roller contact surface.
 - 3. Door Interlocks: Operable without retiring cam. Paint interlock box flat black.
 - 4. Door Closers: Spring, spirator, or jamb/strut mounted counterweight type. Design and adjust to insure smooth, quiet mechanical close of doors.
 - 5. Hoistway Access Switches: Mount in entrance frame side jamb at top and bottom floors. Provide switch with faceplate.
 - 6. Floor Numbers: Stencil paint 4" high floor designations in contrasting color on inside face of hoistway doors or hoistway fascia in location visible from within car.

2.17 HOISTWAY ENTRANCES

- A. Complete entrances bearing fire labels from a nationally recognized testing laboratory approved within the governing jurisdiction.
- B. Frames: 14 gauge hollow metal at all floors. Bolted and lapped. Provide Arabic floor designation/Braille plates, centered at 60" above finished floor, on both side jambs of all

- entrances. Provide plates at main egress landing with "Star" designation. For designated emergency car, provide "Star of Life" designation plates at height of 78"-84" above finished floor on both side jambs at all floors. Braille indications shall be below Arabic floor designation. Provide cast floor designation/Braille plates as manufactured by SCS, Vision Mark, or Entrada. Size clear opening of sub-frames at least 4" wider and 2" higher than clear finish opening.
- C. Transom Panels: Same construction and finish as hoistway door panels.
 - D. Door Panels: 16 gauge steel, sandwich construction without binder angles. Provide leading edges of center-opening doors with rubber astragals. Provide a minimum of two gibs per panel, one at leading and one at trailing edge with gibs in the sill groove entire length of door travel. Construct door panels with interlocking, stiffening ribs. Architectural metal cladding shall wrap around leading and trailing edge of panel and return a minimum of 1/2" on rear side of leading edge of panels.
 - E. Sight Guards: 14 gauge, same material and finish as hoistway entrance door panels. Construct without sharp edges.
 - F. Sills: Extruded aluminum
 - G. Sill Supports: Structural or formed steel designed to support door sill based upon car loading classification. Mount to eliminate need for grout under the sill
 - H. Fascia, Toe Guards, and Hanger Covers: 14 gauge furniture steel with Contractor's standard finish.
 - I. Struts and Headers: Provide for vertical support of entrances and related material. Provide door open bumpers on entrances equipped with vertical struts.
 - J. Finish of Frames and Doors: Satin finish stainless steel.
 - K. Freight Vertical Bi-Parting Freight Door Panels: 16 gauge metal clad wood core doors within a welded steel angle frame. Provide with safety astragals, vision panels, and truck-able sills.
 - L. Hoistway Access Switches: Mount in entrance frame side jamb at top and bottom floors. Provide switch with faceplate.

2.18 SEISMIC EQUIPMENT

- A. Provide dual counterweight derailment sensing wires vertically each side of counterweight the entire height of travel. The counterweight frame shall be equipped with a minimum of four derailment rings. A dual axis seismic switch shall be provided that will activate at no less than 0.15 times gravity in the vertical or horizontal directions. A minimum of one seismic switch shall be provided per single or group of elevators. Counterweight retainer plates must be bolted.

2.19 CAR EQUIPMENT

- A. Frame: Welded or bolted, rolled or formed steel channel construction to meet load classification specified.
- B. Safety Device: Type "A," instantaneous.
- C. Platform: Isolated type, constructed of steel, or steel and wood which is fireproofed on underside. Design and construct to accommodate load classification requirements. Provide Class "A" construction for passenger elevators, Class C construction for freight elevator.

- D. Guide Shoes: Roller type with three or more spring dampened, sound-deadening rollers per shoe. Maximum roller rotation speed, 350 rpm. Swivel type
- E. Finish Floor Covering:
 - 1. Elevator 1: Diamond plate aluminum floor.
 - 2. Elevators 2-5: Rigidized metal panel, steel diamond plate floor.
- F. Sills: One piece extrusion with extruded extension between car entrance columns to face of car front return. Extruded extension to match finish of sill.
- G. Door Hangers: Two-point hanger roller with neoprene roller surface and suspension with eccentric upthrust roller adjustment.
- H. Door Track: Bar or formed, cold-drawn removable steel track with smooth roller contact surface.
- I. Door Header: Construct of minimum 12 gauge steel, shape to provide stiffening flanges.
- J. Door Electrical Contact: Prohibit car operation unless car door is closed. Provide car door interlock to prevent opening of car doors outside the unlocking zone.
- K. Door Clutch: Heavy-duty clutch, linkage arms, drive blocks and pickup rollers or cams to provide positive, smooth, quiet door operation. Design clutch so car doors can be closed, while hoistway doors remain open.
- L. Restricted Opening Device: Provide car-door interlock to prevent opening of car doors outside unlocking zone.
- M. Door Operator: High-speed heavy-duty door operator capable of opening doors at no less than 2.5 fps. Accomplish reversal in no more than 2½" of door movement. Provide solid-state door control with closed loop circuitry to constantly monitor and automatically adjust door operation based upon velocity, position, and motor current. Provide a minimum of four controller-activated motion profiles, per floor, per door, to maintain consistent, smooth, and quiet door operation at all floors, regardless of door weight or varying air pressure.
 - 1. Nudging Operation: After beams of door control device are obstructed for a predetermined time interval (minimum 20.0-25.0 seconds), warning signal shall sound and doors shall attempt to close with a maximum of 2.5 foot pounds kinetic energy. Activation of the door open button shall override nudging operation and reopen doors.
 - 2. Interrupted Beam Time: When beams are interrupted during initial door opening, hold door open a minimum of 3.0 seconds. When beams are interrupted after the initial 3.0 second hold open time, reduce time doors remain open to an adjustable time of approximately 1.0-1.5 seconds after beams are reestablished.
 - 3. Differential Door Time: Provide separately adjustable timers to vary time that doors remain open after stopping in response to calls.
 - a. Car Call: Hold open time adjustable between 3.0 and 5.0 seconds.
 - a. Hall Call: Hold open time adjustable between 5.0 and 8.0 seconds. Use hall call time when car responds to coincidental calls.
- N. Infrared Reopening Device: Black, fully enclosed device with full screen infrared matrix or multiple beams extending inside or vertically along edge of each car gate guide track a height of 10'-0" above finished floor full height of opening. Obstruction of beams during gate closing shall cause immediate re-opening.
- O. Car Operating Panel:
 - 1. Elevators 1, 2, 3, and 5: One car operating panel.

2. Elevator 4: Two car operating panels, one front and one rear.
3. All car operating panels with faceplates consisting of a metal box containing the vandal resistant, EPCO, Innovation or approved equal to meet BC, operating fixtures, mounted behind the car stationary front returns.
 - a. Provide manually operated stop switch within Firefighters' Phase II compartment. Arrange switch to sound group control panel distress signal when actuated.
 - b. Provide "door open" button to stop and reopen doors or hold doors in open position.
 - c. Provide "door close" button to activate door close cycle. Cycle shall not begin until normal door dwell time for a car or hall call has expired, except firefighters' operation.
 - d. Locked panel including Phase II fire access switch and hidden floor buttons, call cancel button, door open, door close, switch, stop switch, light jewel, fire communication jack within locked panel, for fire officer use and use of car on independent service only.
4. Suitably identify floor buttons, alarm button, door open button, door close button, and emergency push-to-call button with SCS, Entrada, or equal cast tactile symbols surface mounted.
5. Configure plates per local building code accessibility standards including Braille. Locate top floor button at maximum height allowed above the car floor; no lower than 35" for emergency push-to-call button and alarm button.
4. Provide minimum 3/4" diameter raised floor pushbuttons that illuminate to indicate call registration.
5. Provide alarm button to ring bell located on car, and sound distress signal at group control panel. Illuminate button when actuated.
6. Provide Firefighters' devices and operation. Install firefighters' telephone jack with approved mounting bezel matching adjacent controls in firefighter's compartment.
7. Provide earthquake indicator light jewel and audible signal.
8. Provide lockable service compartment with recessed flush door. Door material and finish shall match car return panel or car operating panel faceplate. Inside surface of door shall contain an integral flush window for displaying the elevator operating permit. Include the following controls in lockable service cabinet with function and operating positions identified by permanent signage or engraved legend:
 - a. Inspection switch.
 - b. Light switch.
 - c. Exhaust blower switch.
 - d. Independent service switch.
 - e. Constant pressure test button for battery pack emergency lighting.
 - f. 120-volt, AC, GFCI protected electrical convenience duplex outlet.
 - g. Card reader override switch.
 - h. Switch to select either floor voice annunciation, floor passing tone, or chime.
 - i. Car lighting dimmer switch.
 - j. Attendant operation switch.
 - k. Auxiliary light switch.
 - l. Keyed stop switch.
9. Provide black paint filled (except as noted), engraved, or approved etched signage as follows with approved size and font:
 - a. Phase II firefighters' operating instructions on inside face of firefighters' compartment door. Engrave filled red firefighters' operation on outside face of compartment door.
 - b. Building identification car number on main and auxiliary car operating panel.
 - c. "No Smoking" on main car operating panel.
 - d. Car capacity in pounds on main car operating panel.
 - e. Loading classification and description on car operating panel.

- P. Car Top Control Station: Mount to provide safe access and utilization while standing in an upright position on car top.
- Q. Work Light and Duplex Plug Receptacle: GFCI protected outlet at top and bottom of car. Include on/off switch and lamp guard. Provide additional GFCI protected outlet on car top for installation of car CCTV digital video display.
- R. Communication System:
 - 1. Two-way communication instrument in car with automatic dialing, tracking, and recall features, with shielded wiring to car controller in machine room. Provide dialer with automatic rollover capability with minimum two numbers.
 - a. Actuate two-way communication via "Help" button.
 - b. Button or adjacent light jewel shall illuminate and flash when call is acknowledged.
 - c. Button shall match car operating panel pushbutton design.
 - d. Provide "Help" button tactile symbol, engraved signage, and Braille adjacent to button mounted integral with car front return panel.
 - 2. Firefighters' communication jack in car and firefighters' panel jack bezel shall match adjacent controls.
 - 3. Install remote speakers provided under Item 1.01. E.1 in car behind front return panel with drilled speaker pattern, with shielded wiring to machine room junction box.
 - 4. Provide two-way communication between car and machine room if required.

2.20 CAR ENCLOSURE

- A. Elevators 1 and 3-5: Provide complete as specified herein and detailed on architectural drawings.
 - 1. Shell: Reinforced 14 gauge furniture steel formed panels with baked enamel interior finish as selected. Apply sound-deadening mastic to exterior. Provide concealed ventilation cutouts.
 - 2. Canopy: Reinforced 12 gauge furniture steel formed panels with lockable, contacted, hinged emergency exit. Interior finish white.
 - 3. Front and Rear Return Panels: Reinforced 14 gauge furniture steel clad with minimum 16 gauge stainless steel with cutouts for applied car operating panels and other equipment.
 - 4. Transom: Reinforced 14 gauge furniture steel clad with minimum 16 gauge stainless steel full width of enclosure with cutout for car position indicator.
 - 5. Car Door Panels: Reinforced minimum 16 gauge furniture steel clad with minimum 18 gauge stainless steel. Same construction as hoistway door panels. Cladding shall wrap leading and trailing edge of panel a minimum of 1/2" on rear side.
 - 6. Interior Wall Finish: Removable panels, faced and edged, with textured finish stainless steel,
 - 7. Ventilation: Morrison Products, Inc. three-speed model exhaust blower mounted to car canopy on isolated rubber grommets. Exhaust blower shall meet noise and vibration criteria.
 - 8. Lighting: Provide LED fixtures with wiring and hookup. Coordinate with emergency lighting requirements
 - 9. Suspended Ceiling: Six-section stainless steel panels with lighting cutouts in each panel. Special design included in allowance in Item 8 above.
 - 10. Handrails: Minimum 1¼" diameter stainless steel tubular grab bar with backing plates and captive nuts across rear and side walls. Special design included in allowance in Interior Wall Finish item above. Bolt rails through car walls from back and mount on 1½" deep solid round stainless steel standoff spacers no more than 18" O.C. Return handrail/guardrail ends to car walls.

11. Cab Air Conditioner/Heater Unit: Provide self-contained cab air conditioner/heater on car top with concealed ducts, thermostat control, and evaporator. Isolate from car top to comply with noise and vibration requirements.

B. Freight Elevator 2: Provide complete as specified herein.

1. Shell: Reinforced 10 gauge furniture steel formed panels no more than 20" wide with light-proof joints. Clad panels with stainless steel textured finish as specified in Item 2.2. Reinforce and brace panels to provide rigid structure and securely fasten to car sling and platform. Provide recess in car side wall for recessed mounting of car operating panel.
2. Canopy: Reinforced 12 gauge furniture steel formed panels no more than 20" wide with light-proof joints. Interior finish white reflective baked enamel. Provide hinged emergency exit.
3. Lighting: Minimum eight recessed fixtures flush mounted in canopy with expanded metal protective diffuser and steel guard over fixtures on car top. Provide protective fluorescent tube covers.
4. Bumper Rails: Two rows of 2" x 12" oak or maple bumpers mounted on rear wall of the car. Locate bottom rail at floor level and top rail at 36" above the car floor. Bolt rails through car walls with countersunk bolt, backing plates and captive nuts on exterior of wall panel sections.

2.21 HALL CONTROL STATIONS

- A. Pushbuttons: Provide one riser per group with flush mounted faceplates. Include pushbuttons for each direction of travel that illuminate to indicate call registration. Include approved engraved message and pictorial representation prohibiting use of elevator during fire or other emergency as part of faceplate. Pushbutton design shall match car operating panel pushbuttons. Provide vandal resistant pushbutton and light assemblies. Provide LED illumination.
- B. Phase I Fire Service fixture, including keyswitch, engraved operating instructions and illuminating jewel.
- C. Provide illuminating jewel indicating standby power status.
- D. Door Control Buttons: Include vandal resistant "door open," "door close," and "stop" buttons for control of power operated vertical bi-parting doors at each landing call button fixture. Provide buttons integral with hall control station. Pushbutton design shall match car operating panel pushbuttons.

2.22 SIGNALS

- A. Dual Hall Lantern:
 1. Provide at each entrance to indicate travel direction of arriving car and floor location.
 2. Illuminate up or down LED lights and sound tone once for up and twice for down direction prior to car arrival at floor. Illuminate light until the car doors start to
 3. Sound level shall be adjustable from 20-80 dBA measured at 5'-0" in front of hall control station and 3'-0" off floor.
 4. Car direction lenses shall be arrow shaped with faceplates.
 5. Lenses shall be minimum 2½" in their smallest dimension.
 6. Provide vandal resistant lantern and light assemblies consisting of series of dots or lines for maximum visibility.
- B. Car Position Indicator: Alpha-numeric LCD screens containing floor designations and direction arrows a minimum of 1/2" high to indicate floor served and direction of car travel. Locate fixture in above car entrance and each car operating panel. When a car leaves or

passes a floor, illuminate indication representing position of car in hoistway. Illuminate proper direction arrow to indicate direction of travel. Provide multi-numeral vandal resistant indicator and light assemblies.

- C. Faceplate Material and Finish: stainless steel, all fixtures. Tamper resistant fasteners for all fastenings exposed to the public.
 - 1. Car Position Indicator
 - 2. Hall Position Indicator
 - 3. Hoistway Access Switch
 - 4. Phase I Keyswitch Faceplate
- D. Floor Passing Tone: Provide an audible tone of no less than 20 decibels and frequency of no higher than 1500 Hz, to sound as the car passes or stops at a floor served.
- E. Voice Synthesizer: Provide electronic device with easily reprogrammable message and male or female voice to announce car direction, floor, emergency exiting instructions, etc.

2.23 GROUP CONTROL AND DISPLAY PANEL

- A. Provide a control panel and color SVGA with the capability to activate, display, monitor, or control the following functions.
 - 1. On/off means to place car in or out of service. When placed in "off" position, return car(s) nonstop to designated floor and park with doors open for adjustable period of 1 to 3 minutes. At expiration of time, restore car to service.
 - 2. Car operating on normal/standby power.
 - 3. Car position and direction of travel.
 - 4. Car calls.
 - 5. Hall calls.
 - 6. Operating mode.
 - 7. Door status.
 - 8. Delayed car.
 - 9. Car to lobby feature.
 - 10. Car in/out of service.
 - 11. Seismic operation.
 - 12. Secured floor control and code entry.
 - 13. Alarm distress signal.
 - 14. Card reader override. Individual car on/off provisions.
 - 15. Fixtures and monitor shall be located as directed by Architect. Where applicable, identify all indicators and manual switches with appropriate engraving. Provide conduit and wiring to control panel. Coordinate size and location with Building Console Supplier.
- B. Firefighters' Control Panel: Locate in building fire control room. Fixture faceplate, stainless steel satin finish, including the following features:
 - 1. Car position and direction indicator (digital-readout or color SVGA display type). Identify each position indicator with car number and group identification.
 - 2. Indicator showing operating status of car.
 - 3. Manual car standby power selection switches and power status indicators.
 - 4. Two-position firefighters' emergency return switches and indicators with engraved instructions filled red.
 - 5. Firefighters' telephone jack.
 - 6. Fixtures and monitor shall be located as directed by Architect. Where applicable, identify all indicators and manual switches with appropriate engraving. Provide conduit and wiring to control panel. Coordinate size and location with Building Console Supplier.
- C. Firefighters' Key Box: Flush-mounted box with lockable hinged cover. Engrave instructions for use on cover per Local Fire Authority requirements.

- D. Machine Room Display System with Battery Backup: Provide groups of elevators with a monitoring system in the machine room and security desk with color monitor. System shall be a Windows based operating system capable of outputting to external media. As a minimum, system shall display the following functions:
1. Operational Displays:
 - a. Car operating in normal/standby power.
 - b. Car position and direction of travel.
 - c. Car and Hall calls.
 - d. Operating mode.
 - e. Door status.
 - f. Delayed car.
 - g. Load weighing and by-pass.
 - h. Car to lobby feature.
 - i. Car in/out of service.
 - j. Seismic operation.
 - k. Secured floor control and code entry.
 - l. Alarm distress signal.
 - m. Secured after hours split bank operation.
 - n. Card reader override. Individual car on/off provisions.
 2. System Performance Monitoring:
 - a. Hall call registration information: Provide memory capacity for at least the preceding five, 24-hour periods, in blocks of 5- or 15-minute segments, running hour to hour (i.e., 2:00 p.m. to 3:00 p.m.)
 - 1) Visual and printed summary of hall call registration events by floor, direction, and duration, totaled in 5- or 15-minute segments during any 60-minute block using an internal clock.
 - 2) Visual and printed summary of hall call registration duration averaged for 5- or 15-minute and hourly periods.
 - 3) Visual and printed summary of percentage of hall calls answered within 30 and 60 seconds in each 5- or 15-minute and hourly periods.
 - 4) Visual and printed summary of time periods during which individual cars are not in group operation (operating separately or out of service).
 - b. Accumulate system fault data including nature of fault, time, and day. Store and retrieval capabilities for minimum 30-day period.
 3. Provide directions and software to accomplish information retrieval.

2.24 INTERCOM AND DISTRESS SIGNAL SYSTEM

- A. General: Provide intercommunication system. Include all wiring between elevator hoistways and control panels. Include the following stations:

<u>Station Location</u>	<u>Type Station</u>	<u>Selection Buttons to Call</u>
Elevator Machine Room	Master	Control Panels, All Cars
Lobby Control Panel	Master	Machine Rooms, All Cars
Firefighters' Control Panel	Master	Machine Rooms, All Cars
All Cars	Remote	Lobby Control Panel

- B. Basic Equipment:

1. Amplifier providing static-free voice transmission with adequate volume and minimum distortion at all stations, with pre-amplifier capable of receiving voice and music inputs from building and emergency building communication system.

2. Activation of emergency building communication system overrides all other conversations and permits one-way conversation to all master stations in system.
 3. Master Stations:
 - a. Speaker-microphone combination and/or handset for two-way communication.
 - b. Selection buttons to enable communication with all master stations. Maintain continual reception of hands-free reply from station when a selected button is depressed.
 - c. Two-Position "Talk/Listen" Button: Press to talk; release to listen.
 - d. Illuminate "in use" light when any master station is being used.
 - e. Reset button to make system available for use by any master station.
 - f. Volume control knob for adjustment of incoming volume.
 - g. Button to establish communications with all stations.
 - h. Distress light in lobby panel which illuminates when "push to call" button or alarm button in car is actuated. Energize distress light and buzzer or chime until intercom selection button for that car has been depressed. Sound buzzer or chime in lobby panel simultaneously with illumination of distress light.
 4. Remote Stations:
 - a. Station in car shall be activated by "push to call," two-way communication button. "Push to call" button shall illuminate and flash when call is acknowledged. Button shall match car operating panel pushbutton design. Provide uppercase "PUSH TO CALL," "HELP ON THE WAY" engraved signage adjacent to button. Provide "push to call" button tactile symbol, engraved signage, and Braille adjacent to button.
 - b. Locate car microphone and speaker, or transceiver/speaker combination behind front return panel with drilled speaker pattern, with shielded wiring to machine room junction box.
- C. Station Housings:
1. House master station in machine room in a metal compartment with baked enamel finish. Attach to the group elevator supervisory control panel or wall mount. Provide communication handset with 25'-0" long cord.
 2. Provide control center master intercoms with stainless steel satin finish faceplates and engraved operating instructions. Coordinate faceplate size and installation of units with building Console Supplier.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Comply with applicable codes, manufacturers' instructions, shop drawings, and recommendations. Comply with ~~National~~ California Electrical Code (ASME C1 by NFPA) for electrical work required during construction.

3.2 FINAL INSPECTION AND TEST

- A. Comply with ASME A17.2-latest edition Inspectors' Manual.
- B. Install all equipment in accordance with Contractor's instructions, referenced codes, specification, and approved submittals.
- C. Install machine room equipment with clearances in accordance with referenced codes and specification.
- D. Install all equipment so it may be easily removed for maintenance and repair.

- E. Install all equipment for ease of maintenance.
- F. Install all equipment to afford maximum accessibility, safety, and continuity of operation.
- G. Remove oil, grease, scale, and other foreign matter from the following equipment and apply one coat of field-applied machinery enamel.
 - 1. All exposed equipment and metal work installed as part of this work which does not have architectural finish.
 - 2. Machine room equipment, hoistway equipment including guide rails, guide rail brackets, and pit equipment.
 - 3. Neatly touch up damaged factory-painted surfaces with original paint color. Protect machine-finish surfaces against corrosion.
- H. Clean all architectural finishes and replace or restore any surfaces damaged during construction to like new condition.

3.3 EXAMINATION

- A. Prior to beginning installation of equipment examine hoistway and machine room areas. Verify no irregularities exist, which affect execution of work specified.
- B. Do not proceed with installation until work in place conforms to project requirements.

3.4 FIELD QUALITY CONTROL

- A. Acceptance Testing: On completion of elevator installation and before permitting elevator use (either temporary or permanent), perform acceptance tests as required and recommended by ASME A17.1/CSA B44 and by governing regulations and agencies.
- B. Operating Test: Load each elevator, capacity, speed, and travel distance to rated capacity and operate continuously for 30 minutes over full travel distance, stopping at each level and proceeding immediately to the next. Record temperature rise of elevator machine during 30-minute test period. Record failure to perform as required.
- C. Advise Owner, Architect, and authorities having jurisdiction in advance of dates and times that tests are to be performed on elevators.

3.5 HYDRAULIC ADJUSTING

- A. Install hydraulic jack assembly and guide rails plumb and align vertically with tolerance of 1/16" in 100'-0". Secure guide rail joints without gaps and file any irregularities to a smooth surface.
- B. Static balance car to equalize pressure of guide shoes on guide rails.
- C. Lubricate all equipment in accordance with Contractor's instructions.
- D. Adjust motors, valves, controllers, leveling switches, limit switches, stopping switches, door operators, interlocks, and safety devices to achieve required performance levels.

3.6 TRACTION ADJUSTING

- A. Install rails plumb and align vertically with tolerance of 1/16" in 100'-0". Secure joints without gaps and file any irregularities to a smooth surface.
- B. Static balance car to equalize pressure of guide shoes on guide rails. Dynamically balance car and counterweight.

- C. Lubricate all equipment in accordance with Contractor's instructions.
- D. Adjust motors, power conversion units, brakes, controllers, leveling switches, limit switches, stopping switches, door operators, interlocks, and safety devices to achieve specified performance levels.

3.7 CLEANUP

- A. Keep work areas orderly and free from debris during progress of project. Remove packaging materials on a daily basis.
- B. Remove all loose materials and filings resulting from work.
- C. Clean machine room equipment and floor.
- D. Clean pit equipment and floor.
- E. Clean hoistways, car, car enclosure, entrances, operating, and signal fixtures.

3.8 TEST RESULTS

- A. Under any load obtain specified contract speed, performance times, stopping accuracy without re-leveling, and ride quality to satisfaction of Consultant. Tests may be conducted under no load, balanced load, and full load conditions.
- B. Consultant may test temperature rise in motor windings limited to 50° Celsius above ambient. A full-capacity one hour running test, stopping at each floor for ten seconds in up and down directions, may be required.
- C. Engage a factory-authorized service representative to train Owner's maintenance personnel to operate, adjust, and maintain elevator(s).
- D. Check operation of each elevator with Owner's personnel present before date of Substantial Completion and again not more than one month before end of warranty period. Determine that operation systems and devices are functioning properly.

3.9 PROTECTION

- A. Temporary Use: Comply with the following requirements for each elevator used for construction purposes:
 - 1. Provide car with temporary enclosure, either within finished car or in place of finished car, to protect finishes from damage.
 - 2. Provide strippable protective film on entrance and car doors and frames.
 - 3. Provide padded wood bumpers on entrance door frames covering jambs and frame faces.
 - 4. Provide other protective coverings, barriers, devices, signs, and procedures as needed to protect elevator and elevator equipment.
 - 5. Do not load elevators beyond their rated weight capacity.
 - 6. Engage elevator Installer to provide full maintenance service. Include preventive maintenance, repair, or replacement of worn or defective components, lubrication, cleanup, and adjustment as necessary for proper elevator operation at rated speed and capacity. Provide parts and supplies same as those used in the manufacture and installation of original equipment.

7. Engage Elevator Installer to restore damaged work, if any, so no evidence remains of correction. Return items which cannot be refinished in the field to the shop, make required repairs, and refinish entire unit, or provide new units as required.

END OF SECTION 14 24 00

SECTION 14420 – VERTICAL WHEELCHAIR LIFT

PART 1 GENERAL

1.1 DESCRIPTION

- A. Work Included in This Section: Provide all labor, materials, plant, appliances, tools, transportation, and equipment required to install one vertical wheelchair lift, complete as specified.
- B. Related Work Included in Other Sections:
 - 1. Supports: Provide supports to carry structural loads imposed by wheelchair lift.
 - 2. Provide appropriate sill angle as shown at top landing only.
 - 3. Patching: Patching of floors, walls, and surfaces constituting final finishes.
 - 4. Block-Outs: Provide block-outs, pockets, and chases in walls and floors as required.
 - 5. Guard Railings: At top landing only.
 - 6. Electrical Work: Power Feeders: Installation and connection to terminals of control, including fused, lockable mainline switches or circuit breakers in control area. 110 VAC, single phase.
 - 7. Painting: Field painting of prime finish items constituting final finishes.
 - 8. Phone: Provide standard dedicated phone line to controller. Do not provide VOIP or LAN type connects. Two phone lines are required if work includes Keri Systems Security Reader.

1.2 DEFINITIONS

- A. The following definitions apply to all work of this Section:
 - 1. Contractor: refers to the single point of contractual responsibility with the Owner to furnish labor and materials for the execution of work as specified herein.
 - 2. Provide: to furnish and install, complete for safe operation, unless specifically indicated otherwise.
 - 3. Install: to erect, mount and connect complete with related accessories.
 - 4. Supply: to purchase, procure, acquire and deliver complete with related accessories.
 - 5. Work: labor and materials required for proper and complete installation.
 - 6. Wiring: raceway, fittings, wire, boxes, and related items.
 - 7. Concealed: embedded in masonry or other construction, installed in furred spaces, within double partitions or hung ceilings, in trenches, in crawl spaces or in enclosures.
 - 8. Exposed: Not installed underground or concealed as defined above.
 - 9. Indicated, shown, or noted: as indicated, shown or noted on drawings or as specified.
 - 10. Similar or equal: of base bid manufacturer, equal in materials, weight, size, design, and efficiency of specified product, conforming with acceptable manufacturers.
 - 11. Reviewed, satisfactory, accepted, or directed: as reviewed, satisfactory, accepted or directed, by or to Owner.
 - 12. Where a device or a part of equipment is referred to in the singular number, it is intended that such reference shall apply to as many such devices as are required to complete the installation.

1.3 QUALITY ASSURANCE

- A. Acceptable Manufacturer:
 - 1. General: This specification is intended to cover the complete installation of a Vertical Platform Lift.
 - a. Savaria Multilift VPL

- b. No substitutions allowed
- 2. Maintenance Qualifications: Maintenance shall be performed by installing contractor of the wheelchair lift and must:
 - a. Be able to show evidence of successful experience in complete maintenance of wheelchair lifts.
 - b. Directly employ sufficient competent personnel within 50 miles of the new project to handle service.
 - c. Command local store of parts adequate for replacement on permanent or emergency basis.
 - d. Be able to respond to trouble calls within one hour.
 - e. Be able to offer the Owner agreement for continuing maintenance after expiration of maintenance period under this contract.
- B. Design Criteria:
 - 1. Performance:
 - a. Contract Speed: Speed variation under any loading condition in either direction shall be no more than five percent.
 - b. Leveling: Within 1/2" under any loading condition. Lift shall level into floor at all times, not overrun floor and level back.
 - c. Operating Qualities: Owner shall judge riding quality of lift and enforce the following requirements. The Wheelchair Lift Contractor shall make all necessary adjustments.
 - d. Transition: Starting and stopping shall be smooth and comfortable. Slowdown, stopping and leveling shall be without jars or bumps.
 - e. Full Speed: Riding shall be free from vibration and sway.
 - 2. Sound Control:
 - a. Vibration: Provide effective sound isolation materials to isolate the machine from building structure to prevent objectionable noise transmission to occupied building spaces.
 - b. Airborne Noise: Maximum acoustical output level shall not exceed 86 within a frequency range of 20 to 10,000 cycles, measured in machine area.
- C. Requirements of Regulatory Agencies:
 - 1. Codes: In accordance with the latest applicable edition requirements of the following and as specified:
 - a. ASME: American Society of Mechanical Engineers - A17.1; Safety Code for Elevators and Escalators as referenced by CCR Title 8.
 - b. ASME: American Society of Mechanical Engineers - A18.1; Safety Standard for Platform Lifts and Stairway Chairlifts.
 - c. ADA: Americans with Disabilities Act.
 - d. All local codes which govern.
 - 2. Permits: Upon completion of the vertical wheelchair lift, the Wheelchair Lift Contractor shall arrange and pay for inspections by governing authorities and obtain operating permits required.

1.4 SUBMITTALS

- A. Shop Drawings: Submit in as required by the Owner.
- B. The Owner reserves the right to require any details of any portion of the equipment.
 - 1. Layouts: Plan and section of the vertical wheelchair lift spaces include static and dynamic loads imposed on building structure. Indicate required clearances around equipment.

2. Details: Submit details of vertical wheelchair lift isolation and other details, if specifically requested.
 3. Data: Indicate on layouts or separate data sheets, machine spaces heat release and power requirements.
- C. Operating Instructions: Submit manufacturer's literature, describing system operations and special operations, as specified.
- D. Maintenance Data: After completion and acceptance, submit three sets of complete and neatly bound maintenance data specific for the vertical wheelchair lift.
- E. Final payment will not be made until following received.
1. Manuals: Describe proper use and maintenance of equipment, lubrication points, types of lubricants used, and frequency of lubricant application.
 2. Written Maintenance Control Program (MCP) specifically designed for the equipment included under this contract. Include any unique or product specific procedures or methods required to inspect or test the equipment. In addition, identify weekly, bi-weekly, monthly, quarterly, and annual maintenance procedures, including statutory and other required equipment tests.
 3. Parts Catalogs: Complete listing of all parts of equipment and components used in the installation.
 4. Wiring Diagrams: One laminated inside controller cabinet and one laminated bound set delivered to Owner. Wiring diagrams shall be as-built, specific for this installation, and reference identification on drawings shall match points identified on terminals of controllers.
 5. Telephone Programming Instructions: Laminate one set and mount as directed by Owner's Representative.
- 1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING
- A. Protect equipment during transportation, erection, and construction. Store under cover to prevent damage due to weather conditions. Replace damaged materials.
- 1.6 JOB CONDITIONS
- A. Sequencing, Scheduling: Wheelchair Lift Contractor shall schedule and be responsible for coordinating related work by other trades to avoid omissions and delays in job progress.
- 1.7 GUARANTEE
- A. All material and workmanship of the apparatus installed shall be guaranteed first-class in every respect and any defect not due to ordinary wear and tear or improper use or care which may or may not develop within two years from date of completion and acceptance of the entire installation will be made good. Final payment shall not void this guarantee.

PART 2 PRODUCTS

2.1 DESCRIPTION OF SYSTEM

- A. Vertical Wheelchair Lift:
1. Quantity: One
 2. Type: Type 2 with platform gate
 3. Capacity: 750 lbs.
 4. Speed: 9 fpm
 5. Stops and Openings: As shown on architectural drawings
 6. Travel: As shown on architectural drawings

7. Drive: 1" O.D. Acme Screw, Class 2G, 5 pitch
8. Horsepower: Minimum 3/4 HP
9. Platform Size: 39" x 51"
10. Control: Constant Pressure Type
11. Finish: Baked Enamel
12. Miscellaneous Items:
 - a. Keri Secured System
 - b. Emergency Communications
 - c. Permit Frame

2.2 MATERIALS

- A. Aluminum: Alloy and temper best suited for anodizing finish specified.
- B. Sheet Steel: ASTM A1008, uncoated, pickled, free from defects.

2.3 FINISHES

- A. Exposed-to-View Surfaces:
 1. Sheet Steel: Color as selected by Owner from manufacturer's standard colors.
 2. Aluminum: Color as selected by Owner from manufacturer's standard colors.
 3. Finish Color: Shall be electro statically applied powder coating, oven baked method of curing process.
- B. Non-Exposed-to-View Surfaces: Degrease and paint with rust inhibiting flat black, non-gloss enamel or equivalent.

2.4 OPERATION

- A. General: Provide control system to perform the functions of motion and platform operation. The entire system is to be self-contained.
- B. Provide a continuous pressure operation. Operation shall be by means of pressure type paddle switches in the car and at the landings, any one of which may be used to control the movement of the car as long as the switch is manually maintained in the activating position.

2.5 GATE OPERATION

- A. Provide 42" high self-closing and self-locking gates at the top landing level and lower landing side of the platform.
 1. Equip each gate with a tamper-proof interlock which shall prevent operation of the platform until the gates are locked in the "closed" position; and
 2. Shall prevent opening of the gate at a landing unless the platform is at rest at that landing.

2.6 EQUIPMENT

- A. General: Provide equipment which fits space and structural conditions as shown and specified.
 1. Drive: Acme screw type with secondary safety nut.
 2. Ball Safety: Ball nut provided with integral safety to prevent uncontrolled descent in the event of ball nut failure.
 3. Motor: Manufacturer's standard acceptable instant reversing type and shall be a minimum of 3/4 HP.

4. Brake: Spring actuated, electrically released type; mounted directly on ball screw shaft. Brake sets automatically upon release of control switches or loss of main power.
5. Platform: Provide a platform which is 39" by 51" with non-skid surface. Platform to be constructed of 12-gauge minimum zinc clad steel.
6. Platform Sensors: Provide with safety sensors to stop downward movement, should obstruction be encountered.
7. Limit Switches: Provide with final limit to deactivate lift in the event of control limit failure.
8. Platform and Landing Controls: Constant pressure paddle type; activation of switch operates lift in direction desired.
9. Gate Lock: Provide, at upper landings, electric or mechanical locks to prevent movement of platform should gate be in "open" position.
10. Enclosure: Provide 42" high side guard enclosure. Provide an access door, hinge and lock on the outside face (opposite side from platform) of the motor and control housing to provide easy access to that area. Housing to be constructed of 18 gauge zinc clad steel.
11. Automatic Lowering Device: Provide an emergency battery powered device which will lower the platform in the event of a system failure. Unit shall be capable of providing not less than five complete cycles while operating under battery power.
12. Wiring: Provide electrical wiring and all optional components in the vertical wheelchair lift.
13. Signage: The complete unit shall have all necessary signs, capacity plates, and data signs per Code and per Owner Construction guidelines.
14. Emergency Communications: Provide an ADA compliant device and remote signaling device (bell). Locate devices per Owner.
15. Hall Call Station: In auditorium of multi-purpose room, requirements for a Secured Lift Access System are determined on a case by case basis. Check with Owner project manager for determination.
 - a. Secured Hall Station Fixtures to provide authorized personnel access to wheelchair lifts. Furnish and install a complete and inclusive system as manufactured by Keri Systems, Inc., 1530 Old Oakland Road, San Jose, California. Furnish type and model number as specified. No product or equipment substitution will be accepted by the Owner. The use of an alternative and equivalent manufacturer or agent of the specified electrical components within this Section and other elevator related communications specialty wiring, cabling and/or electrical wiring shall not be acceptable.
 - b. Furnish and install one Keri Systems, Model #PXL-500 Tiger Controller. Provide Keri #SB-593 Satellite Boards as required by Project. Elevator contractor to provide any and all additional features and options as required by Owner.
 - 1) Provide and deliver 24 Keri Systems Model PKT-10X Proximity FOBS as selected by Owner.
 - 2) Provide one Keri Systems, Model #MS-4000 Shooting Star Vandal Resistant Proximity Reader at each elevator hall call station. See architect's drawings for desired location and signage requirements.
 - 3) Provide one Keri Systems modem, Model AOPENFM56EXV.
 - 4) Furnish and install any and all enclosures, additional electrical conduits, wiring (standard or specialty), junction boxes, etc. to provide a complete and stand-alone type system for each elevator.
 - 5) Provide all cables wiring and connections as follows:
 - a) Serial cable: Product shall be manufactured by Belden, type 9534.
 - b) Network Component Connections. Product shall be manufactured by Belden, type 9501.
 - c) Normal AC Power Supply Wiring: Product shall be manufactured by Belden, type 8481.
 - d) Connection with Elevator Hall Call Signal Fixtures: Install one Keri MS-4000 Reader at each new Hall Call Signal Fixtures location as shown on

drawings. The new surface mounted component to be connected to the Keri Tiger Controller with properly shielded electrical wiring as recommended by component manufacturer as manufactured by Belden. Furnish and install Belden, type 9536 in a home-run type path to insure a dedicated electrical run for these connections. The use of junctions, wiring splices and/or any other means which may cause the connection to be less than interrupted shall not be accepted.

- e) Output connections shall be Belden 9532.
- f) Modem cable shall be Keri Systems KDP-929.

16. Elevator Contractor shall:

- a. Provide all specified wire and cabling from machine room to all hall call signal fixture locations. See Architects drawings for final position and installation requirements.
- b. Provide and execute interfacing with elevator controls and installation in elevator machine room as directed by Architect.
- c. Final connections in machine room and testing by Elevator Contractor with assistance provided by Owner's personnel.

PART 3 EXECUTION

3.1 INSPECTION

- A. Bidding Documents: Bidders shall examine architectural, structural, electrical and mechanical plans and specifications.
- B. Any discrepancies which affect the vertical wheelchair lift work or conditions adverse to the bidder's equipment shall be brought to Owner's attention at least seven calendar days prior to the bid date.
- C. If no discrepancies are presented, changes required to plans or specifications become the responsibility of and cost to the Wheelchair Lift Contractor.

3.2 PREPARATION

- A. Field Measurements: Field verify dimensions before proceeding with the work.
- B. Construction Coordination: Coordinate any and all related work by and between other trades.

3.3 INSTALLATION

- A. Install per requirements of manufacturer, standard installation techniques and other governing authorities published standards.

3.4 SETUP PROGRAMMING OF SECURED ACCESS SYSTEM

- A. The set-up and programming of the secured access system shall only be performed by a contractor experienced with the Keri System.
- B. Contractor shall perform the following at the site: set address controller at site; and note the designated phone number for secured access system at site.
- C. Contractor shall perform the following at District Buildings and Grounds office master computer: set up Auto Config; set up access groups to name elevator doors' locations and hours of operation per District direction; and activate key fobs.
- D. Verify that the fobs work at the site after the set-up/programming.

3.5 FIELD QUALITY CONTROL

- A. Tests: Upon completion of the work, Lift Contractor shall provide instruments, weights and personnel to conduct the State permit testing and all other testing as listed. The Contractor shall submit a complete report describing the results of the tests. The following tests which shall be witnessed by a representative of the Owner.
 - 1. Performance and leveling tests, empty and fully loaded car.
 - 2. Visually verify operation of all safety features.
 - 3. Test and document for Owner all battery charge levels and actual amperage outputs. Provide a log and mount to interior of control cabinet for future maintenance requirements.
- B. Inspection: Assist Owner in making a walk-through inspection of entire installation to assure workmanship and equipment complies with contract documents.
- C. Correction: Make corrections to defects or discrepancies at no cost to Owner.

3.6 PROPER USE AND OPERATIONAL INSTRUCTION

- A. Instruct Owner's personnel in proper use of each system. Provide not less than two hours for entire project.

3.7 PREVENTIVE MAINTENANCE

- A. Provide complete continuing maintenance on vertical wheelchair lift equipment during regular working hours on regular working days for a period of two years upon Notice of Completion.
- B. Examination: Include examination of equipment on a quarterly basis.
- C. Perform any required adjustments, complete maintenance duties, and verify safe and proper operation of vertical wheelchair lift equipment.
- D. Whenever required due to failure or other day-to-day intended use, provide replacement of defective component(s) with parts or components of original manufacturer or equal as necessary for safe and proper operation.
- E. Contractor is not responsible for repairs to platform flooring resulting from normal usage or misuse, accidents and negligence for which Contractor is not responsible.
- F. Performance Standards:
 - 1. Maintain the operating qualities as set forth in this specification.
 - 2. Maintain smooth starting and stopping, smooth riding qualities and accurate leveling at all times.
- G. Call-Backs: In event of failures, provide 24 hour call-back service at no additional cost to Owner.
- H. The elevator installer will monitor the telephone 24 hours, 7 days a week during the two-year new installation maintenance period.
- I. Shutdowns:
 - 1. Should lift become or happen to be inoperative, repair within 24 hours of notification of such failure. Breakdown of components shall be acknowledged, remedied, and completed with normal service restored within 72 hours.
 - 2. Failure to comply with above, Owner may order the work done by other contractors at the Installing Contractor's expense. Any devices repaired or replaced by other than the

Installing Contractor, shall nevertheless, provide maintenance and become wholly responsible for proper operation of such devise of the contractual maintenance and construction requirements.

- J. Final Service and Inspection: Four weeks before expiration of the two-year warranty maintenance period, all equipment shall be lubricated, fully serviced, adjusted to the standards designated. A complete survey will be made by a representative of the Owner.
- K. Maintenance Data:
 - 1. After completion and prior to final acceptance, submit three sets of complete and accurate maintenance data specific for wheelchair lift.
 - 2. Final payment will not be made until received.
- L. Quotation: Base bid shall include cost of all labor, equipment, and maintenance as described above.

END OF SECTION 14 42 00



DLR Group

Architecture
Engineering
Planning
Interiors

**FRESNO COUNTY
WEST ANNEX JAIL**
Fresno, California
County Contract No. 16-S-04

**Project Manual Divisions 20-33
Volume 3 of 3**

DLR Group Project No. 75-15208-00
Back Check Review: March 28, 2017

JOHN ELLIOTT
DS FM III SP2 (RA)

CONSTRUCTION DOCUMENT

OFFICE OF THE STATE FIRE MARSHAL APPROVED FIRE AND PANIC ONLY	
Reviewed by	
DATE	4-11-17
Approval of this plan does not authorize or approve any omission or deviation from applicable regulations. Final approval is subject to field inspection. One set of approved plans shall be available on the project site at all times.	
CSFM FILE NO. 10-0031	
DIVISION OF THE STATE ARCHITECT	
APPL 02-115366	
FILE # _____	
AC _____	FLS _____
SSS _____	DATE _____
IDENTIFICATION STAMP	

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SECTION 20 01 00 – GENERAL MECHANICAL PROVISIONS

PART 1 - GENERAL

1.1 GENERAL CONDITIONS

- A. The preceding General Conditions shall form a part of this Section with the same force and effect as though repeated here. The provisions of this Section shall also apply to the following Divisions 21 through 25 of these Specifications and shall be considered a part of those Divisions.

1.2 CODES AND REGULATIONS

- A. All work and materials shall be in accordance with current rules and regulations of applicable codes. Nothing in these Drawings or Specifications is to be construed to permit work not conforming to these codes. Should the Drawings or Specifications call for material or methods of construction of a higher quality or standard than required by these codes, the Drawings and Specifications shall govern. Applicable codes and regulations include, but are not necessarily limited to, the following:

California Building Code	CCR Title 24, Part 2
California Electrical Code	CCR Title 24, Part 3
California Mechanical Code	CCR Title 24, Part 4
California Plumbing Code	CCR Title 24, Part 5
California Energy Code	CCR Title 24, Part 6
California Fire Code	CCR Title 24, Part 9
Local Codes	

1.3 DEFINITIONS

- A. Provide: The term "provide" as used in these specifications or on the drawings shall mean furnish and install.
- B. Piping: The term "piping" as used in these specifications or on the drawings shall mean all pipe, fittings, valves, hangers, insulation, etc. as may be required for a complete and functional system.
- C. Ductwork: The terms "duct" or "ductwork" as used in these specifications or on the drawings shall mean all ducts, fittings, joints, dampers, hangers, insulation, etc. as may be required for a complete and functional system.
- D. Wiring: The term "wiring" as used in these specifications or on the drawings shall mean all wiring, conduit, boxes, connections, transformers, relays, switches etc. as may be required for a complete and functional system.

1.4 PERMITS AND FEES

- A. The Contractor shall take out all permits and arrange for all tests in connection with his work as required. All charges are to be included in the work.

1.5 COORDINATION OF WORK

- A. Examination: Before starting work, thoroughly examine existing and newly completed underlying and adjoining work and conditions on which the installation of this work depends. Report to the Engineer in writing all conditions which might adversely affect this work.

- 1
2 B. Layout: Layout of materials, equipment and systems is generally diagrammatic unless
3 specifically dimensioned. Some work may be shown offset for clarity. The actual locations
4 of all materials, piping, ductwork, fixtures, equipment, supports, etc. shall be carefully
5 planned prior to installation of any work in order to avoid all interference with each other, or
6 with structural, electrical, architectural or other elements.
7
8 C. Verification: If discrepancies are discovered between drawing and specification
9 requirements, the more stringent requirement shall apply. All conflicts shall be called to the
10 attention of the Engineer prior to the installation of any work or the ordering of any
11 equipment. No work shall be prefabricated or installed prior to this coordination. No costs
12 will be allowed to the Contractor for any prefabrication or installation performed prior to this
13 coordination. Verify the proper voltage and phase of all equipment with the electrical plans.
14
15 D. Location of Utilities Prior to Trenching or Earthwork: The Contractor shall notify the
16 Owner a minimum of two business days prior to beginning trenching or earthwork. Prior
17 to this notification, the Contractor shall have marked all proposed trenches with paint and
18 shall have contacted a utility locating company and have had this company mark all
19 found underground utilities with paint. The Contractor shall then coordinate and arrange
20 for a site visit with the Owner to review the proposed trenching and/or earthwork areas.
21 Trenching and/or earthwork shall not begin until the Owner agrees. Repair and/or
22 compensation for repair of marked utilities is the responsibility of the Contractor. The
23 Owner retains the right to either self-perform the repair or require the Contractor to
24 complete the repair, as directed by the Owner. If while performing the work, the
25 Contractor discovers utilities that have not been marked, the Contractor shall immediately
26 notify the Owner verbally and in writing.
27

28 1.6 GUARANTEE
29

- 30 A. Guarantee shall be in accordance with the General Conditions. The Contractor shall repair
31 any defects due to faulty materials or workmanship and pay for any resulting damage to
32 other work which appears within the guarantee period. These Specifications may extend
33 the period of the guarantee for certain items. Where such extensions are called for, or
34 where items are normally provided with guarantee periods in excess of that called for in the
35 General Conditions, the certificate of guarantee shall be furnished to the Owner through the
36 Engineer.
37

38 1.7 QUIETNESS
39

- 40 A. Piping, ductwork and equipment shall be arranged and supported so that vibration is a
41 minimum and is not transmitted to the structure.
42

43 1.8 DAMAGES BY LEAKS
44

- 45 A. The Contractor shall be responsible for damages caused by leaks in the temporary or
46 permanent piping systems prior to completion of work and during the period of the
47 guarantee, and for damages caused by disconnected pipes or fittings, and the overflow of
48 equipment prior to completion of the work.
49

50 1.9 EXAMINATION OF SITE
51

- 52 A. The Contractor shall examine the site, compare it with Plans and Specifications, and shall
53 have satisfied himself as to the conditions under which the work is to be performed. No
54 allowance shall subsequently be made in his behalf for any extra expense to which he may
55 be put due to failure or neglect on his part to make such an examination.
56

57 1.10 COMPATIBILITY WITH EXISTING SYSTEMS

- A. Any work which is done as an addition, expansion or remodel of an existing system shall be compatible with that system.

1.11 MATERIALS AND EQUIPMENT

- A. Materials and equipment shall be new unless otherwise noted. Materials and equipment of a given type shall be by the same manufacturer. Materials and equipment shall be free of dents, scratches, marks, shipping tags and all defacing features at time of project acceptance. Materials and equipment shall be covered or otherwise protected during construction as required to maintain the material and equipment in new factory condition until project acceptance. All HVAC equipment and ductwork shall be covered, sealed and protected per CGBSC Section 5.504.3 from delivery on site until final start-up.

1.12 SUBMITTALS

- A. Shop Drawings: Within 30 days of contract award, the Contractor shall submit six copies of shop drawings for all materials, equipment, etc. proposed for use on this project. Material or equipment shall not be ordered or installed until written review is processed by the Engineer.

All shop drawings must comply with the following:

1. Shop drawings are required for all material and equipment items and shall include manufacturer's name and catalog numbers, dimensions, capacities, performance curves, and all other characteristics and accessories as listed in the specifications or on the drawings. Descriptive literature shall be current factory brochures and submittal sheets. Capacities shall be certified by the factory. FAX submittals are not acceptable.
2. All shop drawings shall be submitted at one time in a neat and orderly fashion in a suitable binder with title sheet including Project, Engineer and Contractor, table of contents, and indexed tabs dividing each group of materials or item of equipment. All items shall be identified by the specification paragraph number for which they are proposed. All equipment shall also be identified by the mark number as indicated on drawings.
3. All capacities, characteristics, and accessories called for in the specifications or on the drawings shall be high-lighted, circled or underlined on the shop drawings. Calculations and other detailed data indicating how the item was selected shall be included for items that are not scheduled. Data must be complete enough to permit detailed comparison of every significant characteristic which is specified, scheduled or detailed.

- B. Substitutions: Manufacturers and model numbers listed in the specifications or on the drawings represent the standard of quality and features desired. Proposed substitutions shall comply with the Owner's General Requirements. Calculations and other detailed data indicating how the item was selected shall be included. The Contractor shall assume full responsibility that substituted items or procedures will meet the specifications and job requirements and shall be responsible for the cost of redesign and modifications to the work caused by these items. At the Engineer's request, furnish locations where equipment similar to the substituted equipment is installed and operating along with the user's phone numbers and contact person. Satisfactory operation and service history will be considered in the acceptance or rejection of the proposed substitution.

- C. Review: Submittals will be reviewed for general conformance with the design concept, but this review does not guarantee quantity shown, nor does it supersede the responsibility of

the Contractor to provide all materials, equipment and installation in accordance with the drawings and specifications. The Contractor shall agree that shop drawing submittals processed by the Engineer are not Change Orders; that the purpose of shop drawing submittals by the Contractor is to demonstrate to the Engineer that the Contractor understands the design concept, that he demonstrates his understanding by indicating which equipment and material he intends to furnish and install and by detailing the fabrication and installation methods he intends to use. The Contractor shall agree that if deviations, discrepancies or conflicts between shop drawings and design drawings and specifications are discovered either prior to or after shop drawing submittals are processed by the Engineer, the design drawings and specifications shall control and shall be followed. If a resubmittal is required, submit a complete copy of the Engineer's review letter requiring such with the resubmittal.

1.13 MANUFACTURER'S RECOMMENDATIONS

- A. All material, equipment, devices, etc., shall be installed in accordance with the recommendations of the manufacturer of the particular item. The Contractor shall be responsible for all installations contrary to the manufacturer's recommendations. The Contractor shall make all necessary changes and revisions to achieve such compliance. Manufacturer's installation instructions shall be delivered to and maintained at the job site through the construction of the project.

1.14 SCHEDULING OF WORK

- A. All work shall be scheduled subject to the review of the Engineer and the Owner. No work shall interfere with the operation of the existing facilities on or adjacent to the site. The Contractor shall have at all times, as conditions permit, a sufficient force of workmen and quantity of materials to install the work contracted for as rapidly as possible consistent with good work, and shall cause no delay to other Contractors engaged upon this project or to the Owner. HVAC equipment and functions, whether existing or new, shall be maintained in operating condition whenever the facility is occupied, unless otherwise approved by the Owner.

1.15 DEMOLITION

- A. Existing equipment, ducts, piping, etc. noted for removal shall be removed and delivered to the Owner at a location to be determined by the Owner. Those items determined by the Owner to be of no value shall become the property of the Contractor and shall be removed from the job site by the Contractor at the Contractor's expense. Existing piping, ducts, services, etc. requiring capping shall be capped below floors, behind walls, above ceilings or above roof unless otherwise noted. Where items are removed, patch the surfaces to match the existing surfaces.

1.16 HAZARDOUS MATERIAL REMOVAL

- A. All hazardous material removal will be by the Owner. Hazardous material is to be removed before the work is started. If the Contractor discovers hazardous material which has not been removed, the Contractor shall immediately cease work in that area and promptly notify the Owner.

1.17 OPENINGS, CUTTING AND PATCHING

- A. The locations and dimensions for openings through walls, floors, ceilings, foundations, footings, etc. required to accomplish the work under this Specification Division shall be provided under this Division. Except as noted below, the actual openings and the required cutting and patching shall be provided by other Divisions. Coring through existing concrete or masonry walls, floors, ceilings, foundations, footings, etc., and saw cutting of concrete

floors or asphaltic concrete required to accomplish the work under this Specification Division shall be provided under this Division. Patching of these surfaces shall be provided by other Divisions. Cutting or coring shall not impair the strength of the structure. Any damage resulting from this work shall be repaired at the Contractor's expense to the satisfaction of the Engineer.

1.18 EXCAVATION AND BACKFILL

- A. General: Barrel of pipe shall have uniform support on sand bed. Sand shall be free from clay or organic material, suitable for the purpose intended and shall be of such size that 90 percent to 100 percent will pass a No. 4 sieve and not more than 5 percent will pass a No. 200 sieve. Unless otherwise noted, minimum earth cover above top of pipe or tubing outside building walls shall be 24", not including base and paving in paved areas.
- B. Excavation: Width of trench at top of pipe shall be minimum of 16", plus the outside diameter of the pipe. Provide all shoring required by site conditions. Where over excavation occurs, provide compacted sand backfill to pipe bottom. Where groundwater is encountered, remove to keep excavation dry, using well points and pumps as required.
- C. Backfill:
1. 6" Below, Around, and to 12" Above Pipe: Material shall be sand. Place carefully around and on top of pipe, taking care not to disturb piping, consolidate with vibrator.
 2. One Foot Above Pipe to Grade: Material shall be sandy or silty loam, free of lumps, laid in 6" layers, uniformly mixed to proper moisture and compacted to required density. If backfill is determined to be suitable and required compaction is demonstrated by laboratory test, water compaction in 6" layers may be used, subject to review by Engineer.
- D. Compaction: Compact to density of 95% within building and under walkways, driveways, traffic areas, paved areas, etc. and to 90% elsewhere. Demonstrate proper compaction by testing at top, bottom and one-half of the trench depth. Perform these tests at three locations per 100' of trench.

1.19 CONTINUITY OF SERVICES

- A. Existing services and systems shall be maintained except for short intervals when connections are made. The Contractor shall be responsible for interruptions of services and shall repair damage done to any existing service caused by the work. If utilities not indicated on the drawings are uncovered during excavation, the Contractor shall notify the Engineer immediately.

1.20 PROTECTIVE COATING FOR UNDERGROUND PIPING

- A. All ferrous pipe below grade (except cast iron) shall have a factory applied protective coating of extruded high density polyethylene, 35 to 70 mils total thickness, X-Tru-Coat, Scotchkote. All fittings and areas of damaged coating shall be covered with two layer double wrap of 10 mil polyvinyl tape to total thickness of 40 mils. John-Mansville. Protective coating shall be extended 6" above surrounding grade.

1.21 ACCESS DOORS

- A. Provide access doors as required where equipment, piping, valves, ductwork, etc. are not otherwise accessible. Access doors shall match the wall or ceiling finish and fire rating as indicated on the Architectural drawings. 16-gage steel frame and 14-gage steel door with

paintable finish, except in ceramic tile, where door shall be 16-gage stainless steel with satin finish. Continuous hinge. Deliver doors to the General Contractor for installation. Milcor. Unless otherwise noted, the minimum sizes shall be as follows:

1 valve up to 1-1/2"	12" x 12"
1 valve up to 3"	16" x 16"
Fire damper, VAV box, coil	20" x 24"

1.22 HOUSEKEEPING PAD

- A. Housekeeping pads shall be 6" high concrete, 3000 PSI strength, unless otherwise noted. Pad shall extend 6" beyond the largest dimensions of the equipment, unless otherwise noted. The top edge of the pad shall have a 3/4" chamfer. Unless otherwise noted, the pad shall have #4 reinforcing bars at 12" on center, each way, located at mid-depth of the pad. If not poured at the same time as the slab with pad rebar tied to slab rebar, the pad shall be anchored as follows: Drill 5/8" diameter, 3" deep hole in slab. Install 7" long, #4 rebar with Simpson Set epoxy system. Provide a minimum of 4 of these anchors per pad, but no more than 4 feet apart in either direction. Anchor points shall be 12" from the edge of the pad.

1.23 CONCRETE ANCHORS

- A. Steel stud with expansion wedge requiring a drilled hole – powder driven anchors are not acceptable. Minimum spacing shall be 12 diameters center to center and 10 diameters center to edge of concrete. Maximum allowable stresses for tension and shear shall be 80% of the ICC Evaluation Service Report (ESR) values. Minimum concrete embedment shall be the nominal embedment listed in the ESR table. Hilti Kwik Bolt TZ.

1.24 EQUIPMENT ANCHORING AND OTHER SUPPORTS

- A. Mechanical systems (equipment, ductwork, piping, conduit, etc.) shall be anchored in accordance with the CBC. All systems mounted on concrete shall be secured with a concrete anchor at each mounting point. All air handlers shall be mounted on spring isolators. Secure base plate as indicated above. Attachment of equipment, ductwork, piping, conduit, etc. supported on curbs or platforms shall be made to the side of curbs and platforms, where possible. Where screws or lag bolts must be installed through the top of a sheet metal cap, the installation shall be as follows. Pre-drill pilot hole. Fill pilot hole with polyurethane sealant. Install screw or lag bolt with a flat washer and an EPDM washer adjacent to the sheet metal.

1.25 SUPPORTS AND SEISMIC RESTRAINTS

- A. Any structural element required to hang or support piping, ducts or equipment provided under this Division and not shown on other drawings shall be provided under this Division.
- B. Mechanical systems (equipment, ductwork, piping, etc.) shall be provided with supports and seismic restraints in accordance with the CBC. Submit anchorage calculations and details stamped and signed by a structural engineer registered in the State of California. Submit shop drawings showing location, type and detail of restraints. Submit manufacturer's data for restraints. Restraint system shall be Mason West, Inc. (OSHDP OPM 0043-13).

1.26 PAINTING

- A. Paint all black iron supports, hangers, anchors, etc. with two coats of rust resisting primer. Also paint all uninsulated black iron piping exposed to weather with two coats of rust resisting primer.

1.27 ROOF PENETRATIONS AND PATCHING

- A. Whenever any part of the mechanical systems penetrates the roof or exterior wall, the openings shall be flashed and counter-flashed water tight with minimum 22 gauge galvanized sheet metal. Flashing shall extend not less than eight inches from the duct, pipe, or supporting member in all directions unless detailed otherwise. All roof penetrations and patching shall be in accordance with the recommendations of the National Roofing Contractor's Association and the Owner's roofing standards.

1.28 SYSTEM IDENTIFICATION

- A. Above Grade Piping: Provide markers on piping which is either exposed or concealed in accessible spaces. For piping systems, other than drain and vent lines, indicate the fluid conveyed or its abbreviation, either by pre-printed markers or stenciled marking, and include arrows to show direction of flow. Pre-printed markers shall be the type that wrap completely around the pipe, requiring no other means of fastening such as tape, adhesive, etc. Comply with ANSI A13.1 for colors. Locate markers at ends of lines, near major branches and other interruptions including equipment in the line, where lines pass through floors, walls or ceilings or otherwise pass into inaccessible spaces, and at 50' maximum intervals along exposed portions of lines. Marking of short branches and repetitive branches for equipment connections is not required.
- B. Below Grade Piping: Bury a continuous, pre-printed, bright-colored, metallic ribbon marker capable of being located with a metal detector with each underground pipe. Locate directly over buried pipe, 6" to 8" below finished grade.
- C. Equipment: All equipment shall be identified with a plastic laminated, engraved nameplate which bears the unit mark number as indicated on the drawings (e.g. AC-4). Provide 1/2" high lettering - white on black background. Nameplates shall be permanently secured to the exterior of the unit.
- D. Valves: Provide brass valve tags with brass hooks or chains on all valves of each piping system, excluding check valves, valves within equipment, faucets, stops and shut-off valves at fixtures and other repetitive terminal units. Prepare and submit a tagged-valve schedule, listing each valve by tag number, location and piping service.

1.29 CLEANING

- A. Progressively and at completion of the job, the Contractor shall thoroughly clean all of his work, removing all debris, stain and marks resulting from his work. This includes but is not limited to building surfaces, piping, equipment and ductwork, inside and out. Surfaces shall be free of dirt, grease, labels, tags, tape, rust, and all foreign material.

1.30 OPERATION AND MAINTENANCE INSTRUCTIONS

- A. Printed: Three copies of Operation and Maintenance Instructions and Wiring Diagrams for all equipment and parts list for all faucets, trim, valves, etc. shall be submitted to the Engineer. All instructions shall be clearly identified by marking them with the same designation as the equipment item to which they apply (e.g. AC-3). All Wiring Diagrams shall agree with reviewed Shop Drawings and indicate the exact field installation. All instructions shall be submitted at the same time and shall be bound in a suitable binder with tabs dividing each type of equipment (e.g. Pumps, Fans, Motors, etc.). Each binder shall be labeled indicating "Operating and Maintenance Instructions, Project Title, Contractor, Date" and shall have a Table of Contents listing all items included.
- B. Verbal: The Contractor shall verbally instruct the Owner's maintenance staff in the operation and maintenance of all equipment and systems. The controls contractor shall

present that portion of the instructions that apply to the control system. The Engineer's office shall be notified 48 hours prior to this meeting.

- C. Acknowledgment: The Contractor shall prepare a letter indicating that all operation and maintenance instructions (printed and verbal) have been given to the Owner, to the Owner's satisfaction. This letter shall be acknowledged (signed) by the Owner and submitted to the Engineer.

1.31 RECORD DRAWINGS

- A. The Contractor shall obtain one set of prints for the project, upon which a record of all construction changes shall be made. As the work progresses, the Contractor shall maintain a record of all deviations in the work from that indicated on the drawings. Final location of all underground work shall be recorded by depth from finished grade and by offset distance from permanent surface structures, i.e. building, curbs, walks. In addition, the water, gas, sewer, under floor duct, etc. within the building shall be recorded by offset distances from building walls. An electronic copy of the original drawings will be made available to the Contractor. The Contractor shall transfer the changes, notations, etc. from the marked-up prints to the electronic copy. The record drawings (marked-up prints, electronic drawings disc and a hard copy) shall be submitted to the Engineer for review.

1.32 ACCEPTANCE TESTING

- A. The Contractor shall perform, document and submit all acceptance testing as required by California Code of Regulations, Title 24, Part 6.

PART 2 - PRODUCTS (not used)

PART 3 - EXECUTION (not used)

END OF SECTION 20-01-00

SECTION 21 05 00 – FIRE SPRINKLER SYSTEM

PART 1 - GENERAL

1.1 GENERAL MECHANICAL PROVISIONS

- A. The preceding General Mechanical Provisions shall form a part of this Section with the same force and effect as though repeated here.

1.2 SCOPE

- A. General: Provide all labor, materials and services necessary for complete, lawful and operating systems as shown or noted on the drawings or as specified here. The entire facility shall be fire sprinklered. Where demolition occurs, remove all equipment, piping, braces, supports and related items no longer required.
- B. Design/Calculations: The sprinkler system shall be designed and sized by hydraulic calculations in accordance with NFPA No. 13 and fire authority requirements. Calculations shall be included in submittals.
- C. Preparation of Drawings and Material Data Sheets: Before starting work, complete shop drawings showing locations and sizes of all sprinkler heads, piping, valves, etc., shall be prepared. Shop drawings shall also include material data sheets giving manufacturer's name and catalog numbers, equipment descriptions giving dimensions, capacities, performance curves, and complete layouts. Piping shall be concealed in walls, above the ceilings or below grade unless otherwise noted. Exposed piping must be approved by the Architect and Engineer. Exposed piping shall be specifically noted on shop drawings.

1.3 WORK SPECIFIED ELSEWHERE

- A. Fire alarm system.

1.4 SUBMITTAL REVIEW PROCESS

- A. Submit shop drawings, calculations and material data sheets to the State Fire Marshal for approval.
- B. Submit approved shop drawings, calculations and material data sheets to Engineer for review.
- C. Material or equipment shall not be ordered, nor work proceed until Engineer processes written review.

PART 2 - PRODUCTS

2.1 STANDARDS

- A. All materials shall be in accordance with NFPA No.13 "Standard for the Installation of Sprinkler Systems" (2013 Edition with California Amendments) and NFPA No. 14 "Standard for the Installation of Standpipe and Hose Systems" (2013 Edition with California Amendments). Underground mains shall be in accordance with NFPA No. 24 "Standard for the Installation of Private Fire Service Mains and Their Appurtenances" (2013 Edition with California Amendments).

2.2 PIPING MATERIALS

- 1 A. General: The pressure rating of all piping, valves, flanges and other piping accessories
2 shall be in accordance with code and fire authority requirements. Pressure ratings shall
3 exceed the highest possible working pressure.
4
5 B. Piping:
6
7 1. Underground: Polyvinyl chloride, Class 200, AWWA C900, with rubber ring joints,
8 ASTM D1869. Cast or ductile iron fittings, AWWA C110 or C153, Class 250 or
9 higher, with rubber ring joints, ASTM D1869.
10
11 2. Above Grade:
12
13 a. 2" and Smaller: Threaded black steel pipe, ASTM A53, minimum wall
14 thickness per NFPA 13. 300 psi WOG black malleable iron threaded
15 fittings, UL listed.
16
17 b. 2-1/2" and Larger: Welded black steel pipe, ASTM A53, minimum wall
18 thickness per NFPA 13. Carbon steel welding fittings, ANSI B16.9. Roll
19 grooved, listed pipe couplings may be used for assembling welded
20 sections.
21
22 c. Standpipes: Shall comply with NFPA No. 14 and the State Fire Marshal.
23
24 C. Gate Valve:
25
26 1. 2" and Smaller: All bronze, rising stem. UL listed.
27
28 2. 2-1/2" and Larger: Iron body, bronze mounted, outside screw and yoke. UL listed.
29 (UL listed butterfly valves may be substituted for 4" and larger gate valves above
30 grade.)
31
32 D. Check Valve:
33
34 1. 2" and Smaller: All bronze swing check. UL listed.
35
36 2. 2-1/2" and Larger: Iron body, bronze mounted swing check. UL listed.
37
38 E. Standpipe Valves: Shall comply with NFPA No. 14 and the State Fire Marshal.
39
40 F. Air Piping: All air piping for pre-action systems shall be copper tubing with brazed (1100°F)
41 or flared joint connections.
42

43 2.3 SPRINKLER HEAD
44

- 45 A. Automatic sprinkler head - Tyco Raven head in cells, fully concealed heads in Day Rooms.
46 UL listed. Temperature ratings shall be in accordance with NFPA No. 13. Provide extra
47 heads (of each type installed) in accordance with code requirements. Heads installed with
48 deflector lower than 7'-6" above floor shall have wire guards. Heads installed in areas with
49 finished ceilings shall have metal escutcheons with same finish as head.
50

51 2.4 ALARM VALVE ASSEMBLY
52

- 53 A. Standard wet type alarm valve assembly and water motor gong complete with retarding
54 chamber and trim as required by the authority having jurisdiction. Provide flow switch for
55 connection to alarm system. Provide tamper switch. UL listed.
56

57 2.5 ALARM VALVE ASSEMBLY

- 1
2 A. UL listed alarm valve assembly designed for a pre-action system. The assembly shall be
3 single interlocked so that the valve does not open unless the detection system is activated.
4 The assembly shall have the following features.
5
6 1. Air pressure switch to supervise the pressure in the piping system and signal the
7 alarm system of a loss in air pressure.
8
9 2. Pipe mounted air compressor, 120 volt, 1 phase, ¾ horsepower.
10
11 3. Filter/dehydrator for air supply.
12
13 4. Pressure regulator to maintain air pressure in piping system.
14
15 5. Solenoid valve to allow main valve to open upon receipt of a signal from the
16 detection system.
17
18 6. Miscellaneous gages, valves, tamper switch and control devices as detailed and as
19 required by NFPA No.13 and the State Fire Marshal.
20
21 7. OS & Y valve on the discharge side of the alarm valve.
22

23 2.6 INTERIOR HOSE STATION
24

- 25 A. UL listed open hose rack with 1-1/2" valve, red enamel steel rack, 100 ft. of 1-1/2" woven
26 jacket, rubber lined hose, and a 1-1/2" adjustable nozzle.
27
28

29 PART 3 - EXECUTION
30

31 3.1 PIPING INSTALLATION
32

- 33 A. General: Piping shall be concealed in walls, above the ceilings or below grade unless
34 otherwise noted. Exposed piping must be approved by the Architect and Engineer. No
35 structural member shall be weakened by cutting, notching, boring or otherwise, unless
36 specifically allowed by structural drawings and/or specifications. Where such cutting is
37 required, reinforcement shall be provided as specified or detailed. Depth of cover in traffic
38 areas shall be 36 inches (minimum).
39
40 B. Standards: All piping shall be installed in accordance with NFPA No. 13 "Standard for the
41 Installation of Sprinkler Systems". Underground mains shall be installed in accordance with
42 NFPA No. 24 "Standard for the Installation of Private Fire Service Mains and Their
43 Appurtenances". Standpipes shall be installed in accordance with NFPA No. 14 "Standard
44 for the Installation of Standpipe and Hose Systems".
45
46 C. Miscellaneous:
47
48 1. Escutcheons: Provide chrome plated metal escutcheons where piping penetrates
49 walls, ceilings or floors in finished areas.
50
51 2. Pattern: Sprinklers shall be installed in a symmetrical pattern with lighting fixtures
52 and with ceiling pattern. Heads located in lay-in ceilings shall be centered in panel.
53
54 3. Pipe Sleeves: All piping passing through concrete shall be provided with pipe
55 sleeves. Allow 1" annular clearance between sleeve and pipe for piping 3" and
56 smaller and 2" annular clearance for piping 4" and larger. Piping through walls
57 below grade shall be sealed with Link-Seal.

4. Access: Provide access doors as required for all valves, devices, etc.
5. Pipes Passing through Fire Rated Surfaces: Pipes passing through fire rated walls, floors, ceilings, partitions, etc. shall have the annular space surrounding the pipe, or pipe insulation sealed with fire rated materials in accordance with the requirements of the fire authority having jurisdiction.
6. Concrete Thrust Blocks: Shall be constructed at all valves, tees, elbows, bends, crosses, reducers and dead ends in loose-joint pipe. Blocks shall cure a minimum of 7 days before pressure is applied. Concrete shall be 2500 psi mix.
7. Electrical Equipment: Piping shall not be run over electrical panels, motor control centers or switchboards.

3.2 IDENTIFICATION

- A. All controls, piping, valves and equipment shall be labeled for function and service in accordance with NFPA No.13 and No.14.

3.3 TESTS AND ADJUSTMENTS

- A. Unless otherwise directed, tests shall be witnessed by a representative of the Engineer and an inspector of the authority having jurisdiction. Contractor shall notify fire authority at least 48 hours prior to testing. At various stages and upon completion, the system must be tested in the presence of the enforcing agency. Work to be concealed shall not be enclosed until prescribed tests are made. Should any work be enclosed before such tests, the Contractor shall, at his expense, uncover, test and repair all work to original conditions. Leaks and defects shown by tests shall be repaired and the entire work retested. Test all systems in accordance with fire authority requirements and NFPA No.13, No. 14 and No.24.

3.4 ADDITIONAL TESTING AND DRAINING OF THE SYSTEM

- A. In addition to the above described testing, the pre-action system shall also be given a one-time test to introduce water into the mains for the purpose of determining the length of time required for water to reach the most remote area. The Contractor shall completely drain the system after this test, including draining the drop nipples to pendent heads by removing those heads. The OS & Y valve on the discharge of the alarm valve assembly is to be closed for all subsequent tests of the trip mechanism. No water shall be introduced into the piping system downstream of this OS & Y valve after the initial test. Coordinate all testing with the fire authority. The system shall be air tested after this test.

3.5 CERTIFICATION

- A. At completion of the project, a certificate of inspection from authority having jurisdiction indicating installation and testing in accordance with referenced standards shall be delivered to the Owner through the Engineer.

END OF SECTION 21 05 00

SECTION 21 05 20 – CLEAN AGENT FIRE SUPPRESSION SYSTEM

PART 1 - GENERAL

1.1 GENERAL MECHANICAL PROVISIONS

- A. The preceding General Mechanical Provisions shall form a part of this Section with the same force and effect as though repeated here.

1.2 SCOPE

- A. This specification outlines the requirements for a total flood Clean Agent Fire Suppression System with automatic detection and control. The work described in this specification includes all engineering, labor, materials, equipment and service necessary, and required, to complete and test the suppression system. Provide a Clean Agent Fire Suppression System for Room 1156, Security Electronics.

1.3 APPLICABLE STANDARDS AND PUBLICATIONS

- A. The design, equipment, installation, testing and maintenance of the Clean Agent Suppression System shall be in accordance with the applicable requirements set forth in the latest edition of the following codes and standards:
1. National Fire Protection Association (NFPA) Standards:
 - NFPA 2001 Clean Agent Fire Extinguishing Systems (2012 Edition with California Amendments)
 - 2013 California Electric Code
 - NFPA 72 National Fire Alarm Code (2013 Edition with California Amendments)
 2. Factory Mutual Systems (FM) Publications
 - Factory Mutual Approval Guide
 3. Underwriters Laboratories, Inc. (UL) Publication
 - Fire Protection Equipment Directory with quarterly supplements
 4. National Electrical Manufacturers Association (NEMA) Publication
 - Enclosures for Industrial Controls and Systems
 5. U.S. Environmental Protection Agency, Protection of Stratospheric Ozone 59 FR 13044 (SNAP)
 6. Requirements of the State Fire Marshal and State codes in force at time of award of contract.
- B. The standards listed, as well as all other applicable codes, standards, and good engineering practices, shall be used as "minimum" design standards.

1.4 EXCLUSIONS

The work listed below shall be provided by others, or under other sections of this specification:

- A. 120 VAC power supply to the system control panel
- B. Interlock wiring and conduit for shutdown of HVAC, dampers and/or electric power supplies, relays or shunt trip breakers

1.5 QUALITY ASSURANCE

- A. Manufacturer
1. The manufacturer of the suppression system hardware and detection components shall be ISO 9001 registered.

2. All devices, components, and equipment shall be the products of the same manufacturer, or supplied by the same manufacturer.
 3. All devices and equipment shall be UL listed and/or FM approved.
- B. Installer
1. The installing contractor shall be trained by the supplier to design, install, test, and maintain fire suppression systems.
 2. When possible, the installing contractor shall employ a NICET certified special hazard designer, Level II or above, who will be responsible for this project.
 3. The installing contractor shall be an experienced firm regularly engaged in the installation of automatic clean agent, or similar, fire suppression systems, in strict accordance with all applicable codes and standards.
 4. The installing contractor must have a minimum of five (5) years experience in the design, installation, and testing, of clean agent, or similar fire suppression systems. A list of systems of a similar nature and scope shall be provided on request.
 5. The installing contractor shall show evidence that his company carries a minimum \$2,000,000.00 liability and completed operations insurance policy. These limits shall supersede limits required in the general conditions of the specifications.
 6. The installing contractor shall maintain, or have access to, a clean agent recharging station. The installing contractor shall provide proof of his ability to recharge the largest clean agent system within 24 hours after a discharge.
 7. The installing contractor shall be an authorized stocking distributor of the clean agent system equipment so that immediate replacement parts are available from inventory.
 8. The installing contractor shall show proof of emergency service available on a twenty-four-hour-seven-day-a-week basis.
- C. Submittals
1. The installing contractor shall submit the following design information and drawings for approval prior to starting work on this project:
 - a) Field installation layout drawings having a scale of not less than 1/8 in. = 1 ft.- 0 in. or 1:100 detailing the location of all agent storage tanks, nozzles, pipe runs, including pipe sizes and lengths, control panel(s), detectors, manual pull stations, abort stations, audible and visual alarms, etc.
 - b) Auxiliary details and information such as maintenance panels, door holders, special sealing requirements, and equipment shutdown.
 - c) Separate layouts, or drawings, shall be provided for each level, (i.e.; room, sub floor, and above ceiling) and for mechanical and electrical work.
 - d) Electrical layout drawings shall show the location of all devices and include point-to-point conduit runs and a description of the method(s) used for detector mounting.
 - e) Provide an internal control panel wiring diagram which shall include power supply requirements and field wiring termination points.
 - f) Separate drawing providing symbol legend and identifying all symbols used.

- g) Complete hydraulic flow calculations, from a UL listed computer program, shall be provided for all engineered clean agent systems. Calculation sheet(s) must include the manufacturer's name and UL listing number for verification. The individual sections of pipe and each fitting to be used, as shown on the isometrics, must be identified and included in the calculation. Total agent discharge time must be shown and detailed by zone.
- h) Provide calculations for the battery stand-by power supply, taking into consideration the power requirements of all alarms, initiating devices, and auxiliary components under full load conditions.
- i) A complete sequence of operation shall be submitted detailing all alarm devices, shutdown functions, remote signaling, damper operation, time delay, and agent discharge for each zone or system.
2. Submit drawings, calculations and system component sheets for approval to the State Fire Marshal before starting installation. Submit approved plans.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION AND OPERATION

- A. The system shall be a Total Flood Sapphire Fire Suppression System supplied by Ansul Incorporated.
- B. The system shall provide a Novec 1230 minimum design concentration of 5.85% by volume for Class B hazards in all areas and/or protected spaces, at the minimum anticipated temperature within the protected area. System design shall not exceed 10% for normally occupied spaces, adjusted for maximum space temperature anticipated, with provisions for room evacuation before agent release.
- C. The system shall include mechanical and electrical installation, all detection and control equipment, agent storage containers, Novec 1230 agent, discharge nozzles, pipe and fittings, manual release and abort stations, audible and visual alarm devices, auxiliary devices and controls, shutdowns, alarm interface, advisory signs, functional checkout and testing, training and any other operations necessary for a functional UL listed Sapphire Clean Agent suppression system.
- D. Provide two (2) inspections during the first year of service: Inspections shall be made at 6-month intervals commencing when the system is first placed into normal service.
- E. The general contractor shall be responsible for sealing and securing the protected spaces against agent loss and/or leakage during the 10-minute "hold" period.
- F. The system(s) shall be actuated by a combination of ionization and photoelectric detectors installed for maximum area coverage of 250 sq. ft. (23.2 m) per detector. If the airflow is one air change per minute, photoelectric detectors only shall be installed for maximum area coverage of 125 sq. ft. (11.6 m) per detector.
- G. Detectors shall be cross-zoned detection requiring two detectors to be in alarm before release.
- H. Automatic operation of each protected area shall be as follows:
1. Actuation of one (1) detector, within the system, shall:
 - a) Illuminate the "ALARM" lamp on the control panel face.
 - b) Energize an alarm bell.
 - c) Transfer auxiliary contacts, which can perform auxiliary system functions such as: Operate door holder/closures on access doors; Transmit a signal to a fire alarm system; Shutdown HVAC equipment.

- d) Light an individual lamp on an optional annunciator.
2. Actuation of a 2nd detector, within the system, shall:
 - a) Illuminate the "PRE-DISCHARGE" lamp on the control panel face.
 - b) Energize a pre-discharge horn/strobe device.
 - c) Shut down the HVAC system and/or close dampers.
 - d) Start time-delay sequence (not to exceed 60 seconds).
 - e) System abort sequence is enabled at this time.
 - f) Light an individual lamp on an optional annunciator.
3. After completion of the time-delay sequence, the Sapphire Clean Agent system shall discharge and the following shall occur:
 - a) Illuminate a "SYSTEM FIRED" lamp on the control panel face.
 - b) Shutdown of all power to high-voltage equipment.
 - c) Energize a visual indicator(s) outside the hazard in which the discharge occurred.
 - d) Energize a "System Fired" audible device.
4. The system shall be capable of being actuated by manual discharge devices located at each hazard exit. Operation of a manual device shall duplicate the sequence description above except that the time delay and abort functions shall be bypassed. The manual discharge station shall be of the electrical actuation type and shall be supervised at the main control panel.

2.2 MATERIAL AND EQUIPMENT

A. GENERAL REQUIREMENTS

1. The Sapphire Clean Agent system materials and equipment shall be standard products of the supplier's latest design and suitable to perform all functions intended. When one or more pieces of equipment must perform the same function(s), they shall be duplicates produced by one manufacturer.
2. All devices and equipment shall be U.L. Listed and/or FM approved.
3. Each system shall have its own supply of clean agent.
4. The system design can be modular, central storage, or a combination of both design criteria.
5. Systems shall be designed in accordance with the manufacturer's guidelines.
6. Each supply shall be located within the hazard area, or as near as possible, to reduce the amount of pipe and fittings required to install the system.
7. The clean agent shall be stored in Sapphire Clean Agent storage tanks. Tanks shall be super-pressurized with dry nitrogen to an operating pressure of 360 psi @ 70 °F (24.8 bar at 21 °C). Tanks shall be of high-strength low alloy steel construction and conforming to NFPA 2001.
8. Tanks shall be actuated by either a resettable electric actuator or by pneumatic means from a nitrogen cartridge located in the releasing device. Explosive devices will not be permitted.
9. Each tank shall have a pressure gauge to provide visual supervision of the container pressure. The pressure gauge shall be color coded to provide an easy, visual indication of container pressure.
10. Tanks shall have a pressure relief provision that automatically operates before the internal nominal pressure exceeds 730 psi (50 bar).

11. Engineered discharge nozzles shall be provided within the manufacturer's guidelines to distribute the Novec 1230 agent throughout the protected spaces. The nozzles shall be designed to provide proper agent quantity and distribution. Nozzles shall be available in 1/2 in. through 2 in. pipe sizes. Each size shall be available in 180° and 360° distribution patterns.

12. Distribution piping and fittings shall be installed in accordance with the manufacturer's requirements, NFPA 2001, and approved piping standards and guidelines. All distribution piping shall be installed by qualified individuals using accepted practices and quality procedures. All piping shall be adequately supported and anchored at all directional changes and nozzle locations.

- a) All piping shall be reamed, blown clear and swabbed with suitable solvents to remove burrs, mill varnish and cutting oils before assembly.
- b) All pipe threads shall be sealed with Teflon tape pipe sealant applied to the male thread only.

B. AGENT

1. The fire suppression agent shall be 3M™ Novec™ 1230 Fire Protection Fluid manufactured by 3M Company, St. Paul, MN or their approved supplier.

2. Agent shall not contain any Hydrofluorocarbons (HFC).

C. CONTROL PANEL

1. The control panel shall be an Autopulse releasing panel supplied by Ansul Incorporated.

2. The detection control system and its components shall be UL listed and FM approved for use as a local fire alarm system with releasing device service.

3. The control system shall perform all functions necessary to operate the system detection, actuation, and auxiliary functions.

4. The control system shall include battery standby power to support 24 hours in standby and 5 minutes in alarm.

5. The control system shall be microprocessor based, utilizing a distributed processing concept. A single microprocessor failure shall not impact operation of additional modules in the system.

6. The control system shall be capable of supporting cross zoned detection.

7. The control system shall supply integrated 2.0 amp (minimum) power supply circuitry.

8. Each control system shall contain four (4) initiating circuits:

- a) Each circuit shall be capable of Class A (Style D) or Class B (Style A) operation.
- b) Each circuit shall be capable of operating up to fifteen (15) approved detectors or thirty (30) detectors per system.
- c) Each circuit shall be capable of monitoring contact devices configured for manual release, manual alarm, system abort, trouble input or auxiliary (non-fire) input.

9. Each control system shall contain release circuits for activation of a fire suppression system(s):

- a) Each circuit shall be capable of Class B (Style Y) operation.
- b) Each circuit shall be rated for a minimum of 1.5 amp @ 24 VDC.

10. Each control system shall contain two (2) indicating appliance circuits for annunciation:

- 1 a) Each circuit shall be capable of Class A (Style B) or Class B (Style Y)
- 2 operation.
- 3 b) Each circuit shall be rated for a minimum of 1.5 amp @ 24 VDC.
- 4 11. Each control system shall provide an auxiliary power supply rated for 2 amps @
- 5 24 VDC.
- 6 12. Each control system shall provide two (2) SPST relays: one for common alarm
- 7 and one for common trouble. Four (4) additional programmable relays can be
- 8 added to each control system by adding a relay module.

9 D. DETECTORS

- 10 1. The detectors shall be spaced and installed in accordance with the
- 11 manufacturer's specifications and the guidelines of NFPA 72.
- 12 2. The ionization detector shall be an Ansul model.
- 13 3. The photoelectric detector shall be an Ansul model.

14 E. MANUAL RELEASE (Electric)

- 15 1. The electric manual release shall be a dual action device which provides a
- 16 means of manually discharging the suppression system when used in
- 17 conjunction with the detection system.
- 18 2. The manual release shall be an Ansul model.
- 19 3. The manual release or manual pull station shall be a dual action device requiring
- 20 two distinct operations to initiate a system actuation.
- 21 4. Manual actuation shall bypass the time delay and abort functions and shall cause
- 22 all release and shutdown devices to operate in the same manner as if the system
- 23 had operated automatically.
- 24 5. Manual release shall be located at each exit from the protected hazard.

25 F. ABORT STATION

- 26 1. The abort station shall be the "Dead Man" type and shall be located next to each
- 27 manual release.
- 28 2. The abort station shall be an Ansul model.
- 29 3. The abort station shall be supervised and shall indicate a trouble condition at the
- 30 control panel, if depressed, and no alarm condition exists.
- 31 4. "Locking" or "Keyed" abort stations will not be permitted.

32 G. AUDIBLE and VISUAL ALARMS

- 33 1. Alarm audible and visual signal devices shall operate from the control panel.
- 34 2. The alarm bell, alarm horn, and horn strobe devices shall be an Ansul model.
- 35 3. The visual alarm unit shall be an Ansul strobe device.
- 36 4. A strobe device shall be placed outside, and above, each exit door from the
- 37 protected space. Provide an advisory sign at each light location.

38 H. CAUTION and ADVISORY SIGNS

39 Signs shall be provided to comply with NFPA 2001 and the recommendations of the

40 Sapphire equipment provider.

- 41 1. Entrance sign: (1) required at each entrance to a protected space.
- 42 2. Manual discharge sign: (1) required at each manual release station.

3. Flashing light sign: (1) required at each flashing light over each exit from a protected space.

I. SYSTEM and CONTROL WIRING

1. All system wiring shall be furnished and installed by the contractor.
2. All wiring shall be installed in electrical metallic tubing (EMT), or conduit, and must be installed and kept separate from all other building wiring.
3. All system components shall be securely supported independent of the wiring. Runs of conduit and wiring shall be straight, neatly arranged, properly supported, and installed parallel and perpendicular to walls and partitions.
4. The sizes of the conductors shall be those specified by the manufacturer. Color-coded wire shall be used. All wires shall be tagged at all junction points and shall be free from shorts, earth connections (unless so noted on the system drawings), and crosses between conductors. Final terminations between the control panel and the system field wiring shall be made under the direct supervision of a factory-trained representative.
5. All wiring shall be installed by qualified individuals, in a neat and workmanlike manner, to conform to the National Electrical Code, Article 725 and Article 760, except as otherwise permitted for limited energy circuits, as described in NFPA 72. Wiring installation shall meet local and state codes.
6. The complete system electrical installation and all auxiliary components shall be connected to earth ground in accordance with the National Electrical Code.

J. MONITORING NEW FIRE PANEL

1. The new fire alarm suppression panel must be monitored by the fire alarm system. All programming, design, and installation of devices attached to new suppression system for monitoring purposes must be provided by the current system manufacturers authorized dealer.
2. Any change of program of the existing fire alarm panel must be completed by a certified and trained technician (Minimum of 10 years experience) from the local authorized dealer or branch.

PART 3 - EXECUTION

3.1 SYSTEM INSPECTION and CHECKOUT

After the system installation has been completed, the entire system shall be checked out, inspected, and functionally tested by qualified, trained personnel, in accordance with the manufacturer's recommended procedures and NFPA standards.

- A. All containers and distribution piping shall be checked for proper mounting and installation.
- B. All electrical wiring shall be tested for proper connection, continuity and resistance to earth.
- C. The complete system shall be functionally tested, in the presence of the owner or his representative, and all functions, including system and equipment interlocks, must be operational at least five (5) days prior to the final acceptance tests.
- D. Each detector shall be tested in accordance with the manufacturer's recommended procedures and test values recorded.
- E. All system and equipment interlocks, such as door release devices, audible and visual devices, equipment shutdowns, local and remote alarms, etc. shall function as required and designed.

- 1 F. Each control panel circuit shall be tested for trouble by inducing a trouble condition into
2 the system.
- 3 G. During the NFPA required final test of the new suppression system and the existing fire
4 alarm system, the current manufacturer representative of the new Clean Agent system
5 shall be present.

6 3.2 TRAINING REQUIREMENTS

7 Prior to final acceptance, the installing contractor shall provide operational training to the Owner's
8 personnel. Each training session shall include control panel operation, manual and abort
9 functions, trouble procedures, supervisory procedures, auxiliary functions and emergency
10 procedures.

11 3.3 OPERATION and MAINTENANCE

12 Prior to final acceptance, the installing contractor shall provide four (4) complete operation and
13 maintenance instruction manuals to the Owner. All aspects of system operation and maintenance
14 shall be detailed, including piping isometrics, wiring diagrams of all circuits, a written description
15 of the system design, sequence of operation and drawing(s) illustrating control logic and
16 equipment used in the system. Checklists and procedures for emergency situations,
17 troubleshooting techniques, maintenance operations and procedures shall be included in the
18 manual.

19 3.4 AS-BUILT DRAWINGS

20 Upon completion of each system, the installing contractor shall provide four (4) copies of system
21 "As-Built" drawings to the Owner. The drawings shall show actual installation details including all
22 equipment locations (ie., control panel(s), agent container(s), detectors, alarms, manual pull
23 station(s) and abort switch(s), etc.), as well as piping and conduit routing details. Show all room
24 or facilities modifications, including door and/or damper installations completed. One (1) copy of
25 reproducible engineering drawings shall be provided reflecting all actual installation details.

26 3.5 ACCEPTANCE TEST

- 27 A. At the time "As-Built" drawings and maintenance/operations manuals are submitted, the
28 installing contractor shall submit a "Test Plan" describing procedures to be used to test
29 the control system(s). The Test Plan shall include a step-by-step description of all tests to
30 be performed and shall indicate the type and location of test apparatus to be employed.
31 The tests shall demonstrate that the operational and installation requirements of this
32 specification have been met. All tests shall be conducted in the presence of the Owner
33 and the State Fire Marshal and shall not be conducted until the Test Plan has been
34 approved.
- 35 B. The tests shall demonstrate that the entire control system functions as designed and
36 intended. All circuits shall be tested: automatic actuation and manual actuation, HVAC
37 and power shutdowns, audible and visual alarm devices, and manual override of abort
38 functions. Supervision of all panel circuits, including AC power and battery power
39 supplies, shall be tested and qualified.
- 40 C. A room pressurization test shall be conducted in each protected space to determine the
41 presence of openings, which would affect the agent concentration levels. The test(s) shall
42 be conducted using the Retro-Tec Corp. Door Fan system, or equivalent, with integrated
43 computer program. All testing shall be in accordance with NFPA 2001.
- 44 D. If room pressurization testing indicates that openings exist which would result in leaks
45 and/or loss of the extinguishing agent, the installing contractor shall be responsible for
46 coordinating the proper sealing of the protected space(s) by the general contractor. The
47 installing contractor shall inspect all work to ascertain that the protected space(s) have
48 been adequately and properly sealed. The suppression system installing contractor shall
49 be responsible for the success of the room pressurization tests. If the first room
50 pressurization test is not successful, in accordance with these specifications, the
51 installing contractor shall direct the general contractor to determine, and correct, the

cause of the test failure. The installing contractor shall conduct additional room pressurization tests, at no additional cost to the owner, until a successful test is obtained. Copies of successful test results shall be submitted to the owner for his record. Upon acceptance by the Owner, the completed system(s) shall be placed into service.

3.6 SYSTEM INSPECTIONS

A. During the one-year warranty period, the installing contractor shall provide two (2) inspections of each system installed under this contract. The first inspection shall be at the six-month interval, and the second inspection at the 12-month interval. Inspections shall be conducted in accordance with the manufacturer's guidelines and the recommendations of NFPA 2001.

B. Documents certifying satisfactory system(s) inspection shall be submitted to the Owner upon completion of each inspection.

3.7 WARRANTY

All Ansul system components furnished and installed under this contract shall be warranted against defects in design, materials and workmanship for the full warranty period which is standard with the manufacturer, but in no case less than one (1) year from the date of system acceptance.

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SECTION 22 04 00 - PLUMBING

PART 1 - GENERAL

1.1 GENERAL MECHANICAL PROVISIONS

- A. The preceding General Mechanical Provisions shall form a part of this Section with the same force and effect as though repeated here.

1.2 SCOPE

- A. Included: Provide all labor, materials and services necessary for complete, lawful and operating systems as shown or noted on the drawings or as specified here. The work includes, but is not necessarily limited to, the following:
1. Sanitary sewer system.
 2. Domestic water system.
 3. Storm drain system, including Rain Water Leaders, (RWL).
 4. Fuel gas system.
 5. Drain system (including condensate drain).
 6. All equipment as shown or noted on the drawings or as specified.
 7. Demolition as indicated on drawings. Where demolition is called for, remove all equipment, piping, braces, housekeeping pads, supports and related items no longer required.
- B. Work Specified Elsewhere:
1. Line voltage power wiring to equipment, motor starters in motor control centers, disconnect switches and installation of all starters are included in the Electrical Sections unless otherwise noted.
 2. Access doors.
 3. Circulating water piping for heating and air conditioning work.
 4. Concrete and reinforcing steel unless specifically called for on the drawings or specifications.
 5. Painting unless specifically called for in the drawings or specifications.
 6. Carpentry.
 7. Control of circulating pumps, etc.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Sanitary Sewer:

1. Soil, Waste and Vent Piping (Non-Pressurized):
 - a. Inside Building and Within Five Feet of Building Walls: Standard weight coated cast iron pipe and fittings. Plain end with neoprene gasket and stainless steel retaining sleeve, CISPI 301, ASTM A888. AB&I, Charlotte, Tyler. Size 2" and smaller above grade may be standard weight galvanized steel, ASTM A120/A53, with coated cast iron recessed drainage fittings, ANSI B16.12. 2" and smaller exposed to view shall be galvanized steel, ASTM A120/A53, with coated cast iron recessed drainage fittings, ANSI B16.12.

2. Soil and Waste Piping (Pressurized):
 - a. Above Grade: Standard weight galvanized steel, ASTM A120/A53, with coated cast iron recessed drainage fittings, ANSI B16.12.
 - b. Under Ground: Cast iron pressure rated pipe with mechanical joints, Class 100, with thrust blocks or restraining rods as required -or- Hard drawn Type L copper pipe with brazed joints and DWV fittings.
 - c. Valves: Same as specified for water piping.
3. Cleanouts: Comparable models of Josam, Wade or Zurn are acceptable. Floor Cleanouts: Smith 4020 with nickel bronze top in finished areas; Smith 4220 in utility areas. Wall Cleanouts: Smith 4530 with stainless steel cover and screw. Pipe Cleanouts: Iron body with threaded brass plug.
4. Cleanout Box: Precast reinforced concrete. Cast iron lid marked for service. Christy F22 in foot traffic areas; G5 in roadways.
- B. Storm Drain (Including Rain Water Leader, RWL):
 1. Piping:
 - a. Inside Building and Within Five Feet of Building Walls: Same as Soil, Waste and Vent Piping, except as otherwise noted on drawings. Where exposed to view on exterior of building, piping shall be galvanized steel with recessed drainage fittings.
- C. Perforated Drain Pipe: PVC perforated drain pipe with bell ends, ASTM D1784. Solvent weld fittings. Four rows of 0.25" holes on 3.25" centers longitudinally. Rows located at 35 degrees and 80 degrees from either side of bottom center. 35 SDR for 4"; 41 SDR for 6" and 8". Carlon.
- D. Water and Gas:
 1. Cold Water Piping:
 - a. Inside Building, Within Five Feet of Building Walls, and All Above Grade:
 - 1) Schedule 40 galvanized steel pipe, ASTM A120/A53. 150 psi galvanized malleable iron screwed fittings, ANSI B16.3.
 - or-
 - 2) Hard temper seamless copper, ASTM B88. Wrought copper fittings, ANSI B16.22. Type L with brazed joints (1100F, min.). 1-1/2" and smaller above grade may be soldered, 95-5 tin-antimony solder. All nipples shall be red brass (85% copper).
 2. Hot Water Piping:
 - a. Inside Building - Above Slab: Same as Cold Water Piping - Inside Building.
 3. Gas Piping:
 - a. Inside Building and All Above Grade: 2" and Smaller: Schedule 40 galvanized steel pipe, ASTM A120/A53. 150 psi galvanized malleable iron screwed fittings, ANSI B16.3, ANSI B31.8. Flexible connections shall be convoluted yellow brass with dielectric couplings, AGA approved. 2-1/2"

and larger: Schedule 40 black steel pipe, ASTM A120/A53. Standard weight carbon steel welding fittings, long radius ells, ANSI B16.9.

b. Inside Building - Below Grade to Five Feet Outside Building: Same as Inside Building and All Above Grade. Provide sleeves and vents acceptable to administrative authority.

c. Outside Building - Below Grade: Polyethylene pipe and fittings, ASTM D2513, where allowed by administrative authority. PolyPipe GDY 20, PE 2406/2708. Otherwise, piping shall be coated schedule 40 steel.

4. Valves and Specialties:

a. Valves:

1) General: Manufacturer's model numbers are listed to complete description. Equivalent models of Crane, Milwaukee, Nibco, Stockham or Walworth are acceptable. All valves of a particular type or for a particular service shall be by the same manufacturer. Ball valves may be substituted for 2" and smaller gate valves above grade. Butterfly valves may be substituted for 2-1/2" and larger gate valves above grade.

2) Gate Valve: 2" and Smaller: All bronze. Rising stem. Union bonnet. Wedge disk. Malleable iron handwheel. 200 psi WOG. Stockham B-105. 2-1/2" and Larger: Iron body, bronze mounted. Non-rising stem. Wedge disk. 200 psi WOG. Flanged or AWWA hub end as applicable. Stockham G-612. Underground valves shall have square operating nut. Provide one operating "T" handle for underground valves.

3) Butterfly Valve: Iron threaded lug body. Aluminum bronze disk. O-ring seals. Resilient, removable seat. 416 stainless steel shaft. 6" and smaller valves shall have multi-position lever handle. 8" and larger valves shall have gear operator. Provide 2" extension neck at insulated pipes. Demco Series NE, Stockham.

4) Check Valve: 2" and Smaller: All bronze swing check, regrinding. 200 psi WOG. Stockham B-319. Check valves for air systems shall be the spring-loaded, quick-closing type, Stockham B-322-TS. 2-1/2" and Larger: Iron body, flanged, bronze mounted, swing check. 200 psi WOG. Stockham G-931. Check valves for air systems shall be the spring-loaded, quick-closing type, Stockham WG-970.

5) Ball Valve: Full port. Bronze or brass body, cap, stem, disk and ball. Screwed connection. Lever handle. TFE seat. O-ring seals. 300 psi WOG. Valves in gas piping systems must be UL listed for gas distribution. Apollo, Jomar.

6) Plug Valve: Valves in gas piping systems must be UL listed for gas distribution. 4" and Smaller: Eccentric bronze or nickel plated semi-steel plug. Semi-steel body. Bronze bushings. Buna-N-rings. 175 psi WOG. DeZurik Series 400. 1-1/2" and smaller may be full port ball valves. Apollo, Jomar. 6" and Larger: Lubricated plug cock. Cast iron or semi-steel body and plug. 200 psi WOG. Flanged. Wrench handle. Provide one operating "T" handle for

underground valves. Resun R-1431.

- 7) Valve Box: Precast reinforced concrete. Cast iron lid marked for service. Christy F22 in foot traffic areas; G5 in roadways.

b. Instruments:

- 1) Thermometer: 3" dial. Glass window. Stainless steel case. Back or bottom connected as required. 1/2" NPT. 20F-240F, 2F divisions for hot water. 25F-125F, 2F divisions for chilled water. 2" insertion length. Allowance to be made for insulation thickness. Weksler.
- 2) Thermometer Well: Brass well. Suitable for thermometer above. Provide 2" extension at insulated pipes.
- 3) Pressure Gage: Phosphor bronze tube. Bronze bushed. 1% accuracy. Cast aluminum case. 3-1/2" white dial. Adjustable pointer. Operating pressure at midscale. 1/4" NPT brass socket. Provide brass porous core pressure snubber and gage cock. Trerice, Weksler, Winters.
- 4) Gage Cock: Lever handle brass cock. 1/4" NPT connections.
- 5) Instrument Well: Suitable for temperature sensing element. Coordinate with supplier of temperature controls.

c. Miscellaneous Specialties:

- 1) Temperature and Pressure Relief Valve: ASME rated fully automatic, reseating combination temperature and pressure relief valve sized in accordance with energy input. Sensing element immersed within 6" of tank. Watts.
- 2) Union: 2" and Smaller: AAR malleable iron, galvanized, bronze to iron ground seat. 300 psi. Size 2-1/2" and Larger: Grooved pipe, synthetic gasket, malleable iron housing. Victaulic Style 77, Type "E" gasket.
- 3) Dielectric Coupling: Insulating union or flange rated for 250 psig. EPCO.
- 4) Shock Absorber: Multiple bellows. All stainless steel construction. Designed and applied in accordance with PDI WH201. Amtrol, Smith, Wade, Zurn.
- 5) Flexible Connection: Corrugated bronze core covered with high tensile bronze tubular braid. 150 psi working pressure. 2" and smaller shall have screwed connections. 2-1/2" and larger shall have flanged connections. Flexonics, Keflex.
- 6) Water Pressure Reducing Valve: Iron body. Brass internal parts. Built-in strainer and check valve. Field adjustable range of 8-25 psi. 125 psi maximum working pressure. Bell and Gossett No. 12.
- 7) Balancing Cock: Calibrated all bronze balancing/shutoff cock. Integral pointer to indicate degree of valve opening. Taps for differential pressure gage, with check valves or shutoffs. 125 psi

working pressure. Internal seals. Preformed insulation block.
Armstrong, Bell and Gossett, Flo-set, Taco.

- E. Drain Piping (including Condensate): Same as inside building cold water piping.
- F. Flue and Vent Connector Piping: Per the recommendations of the manufacturer of the equipment item being served.
- G. Miscellaneous Piping Items:
 - 1. Pipe Support:
 - a. Pipe Hanger: Steel "J" hanger with side bolt for piping 4" and smaller; steel clevis hanger for piping 5" and larger. Load and jam nuts. Size and maximum load per manufacturer's recommendation. Felt liner for copper piping. Hanger and rod shall have galvanized finish. B-Line, Unistrut.
 - b. Isolating Shield: Galvanized steel shell and reinforcing ribs. 1/4" non-conducting hair felt pad. Pipe hanger in accordance with paragraph above. Increase hanger size per manufacturer's recommendation. B-Line, Semco, Superstrut.
 - c. Construction Channel: 12-gage, 1-5/8" x 1-5/8" galvanized steel channel. Single or multiple section. Self-locking nuts and fittings. B-Line, Unistrut.
 - 2. Flashing: Vent flashing shall be 4 lb/ft² lead, 16" sq. flange, length sufficient to be turned down 2" into vent. Oatey. Flashing for other piping through roof shall be prefabricated galvanized steel roof jacks with 16" sq. flange. Provide counter flashing clamp-on storm collar with stainless steel band, and seal water tight with mastic. For cold process built-up roof, material shall be 4 lb/ft² lead instead of galvanized steel.

2.2 PIPING INSULATION MATERIALS

- A. General: All piping insulation materials shall have fire and smoke hazard ratings as tested under ASTM E-84 and UL 723 not exceeding a flame spread of 25 and smoke developed of 50.
- B. Pre-Molded Fiberglass: Heavy density sectional pre-molded fiberglass with vapor barrier laminated all service jacket and pressure sealing vapor barrier lap. Thermal conductivity shall not exceed 0.25 Btu-in/hr-ft²-F at a mean temperature of 50F. Perm rating 0.02, ASTM E96. Puncture rating 50 Beach units, ASTM D781. Provide 3" (min.) wide tape of same material as lap for butt joints. For hot water piping, thickness shall be 1" for pipe sizes 2" and less; 1-1/2" thickness for pipe sizes 2-1/2" and larger. Certainteed, Knauf, Johns-Manville, Owens-Corning.
- C. Fiberglass Blanket: Unfaced. Thermal conductivity shall not exceed 0.25 Btu-in/hr-ft²-F at a mean temperature of 50F. 1-1/2" thickness. Knauf, Johns-Manville, Owens-Corning.
- D. PVC Jacket (for pipe, fittings and valves): Pre-molded polyvinyl chloride (PVC) jackets, 0.020" thickness. Size to match application. Provide solvent weld adhesive and PVC vapor barrier pressure sealing tape by same manufacturer. Zeston.
- E. Stretchable Glass Fabric: Reinforcing mesh. 10 X 20 continuous filament glass yarns per inch. Johns-Manville.
- F. Vapor Barrier Coating: Childers CP-30LO.

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2 G. Lagging Adhesive: Childers CP-50A.
3
4 H. Aluminum Jacketing: Aluminum pipe and fitting jacketing. 0.016" thickness for straight pipe.
5 0.024" thickness for fittings. Stucco-embossed finish. Integral moisture barrier. Provide
6 pre-fabricated aluminum strapping and seals by same manufacturer. Childers.
7
8 I. Outdoor Mastic: Childers CP-10.
9
10 J. Flexible Elastomeric: Closed cell flexible elastomeric preformed pipe insulation. Thermal
11 conductivity shall not exceed 0.27 Btu-in/hr-ft²-°F at a mean temperature of 70°F. 1/2" thick.
12 Provide #520 adhesive and Armaflex insulation pipe hangers by same manufacturer.
13 Armacell Armaflex.
14
15 K. Molded Closed Cell Vinyl (Piping Insulation Under Accessible Lavatories and Sinks): Fully
16 molded closed cell vinyl, 3/16" thick. Internal ribs on drain insulation to provide air gap.
17 Thermal conductivity shall not exceed 1.17 BTU-in/hr-ft²-F at an average temperature of
18 73°F. Weep hole in cleanout nut enclosure. Out of sight nylon fastening system. Hinged cap
19 over valve to allow access for servicing. Truebro Lav-guard.
20

21 2.3 FIXTURES
22

- 23 A. General: Provide rough-in for and install all plumbing fixtures shown on drawings. Except in
24 equipment rooms, all trim, valves and piping not concealed in wall structure, above ceiling
25 or below floors, shall be brass with polished chrome plate finish, unless noted otherwise. All
26 enameled fixtures shall be acid resisting. Standard color is white unless otherwise noted.
27
28 B. Schedule: Refer to Plumbing Fixture Schedule on the drawings for list of fixtures and trim.
29 Manufacturer's model numbers are listed to complete description.
30
31 C. Stops and P-Traps: All fixtures shall be provided with stops and P-Traps as applicable. Wall
32 mounted faucets, valves, etc. shall have integral stops or wall mounted stops.
33
34 1. Stops: All hot and cold water supplies shall be 1/2" I.P.S. inlet angle stops with
35 stuffing box, loose key lock shield, and brass riser (3/8" for 2-1/2 gpm and less,
36 otherwise 1/2"). McGuire, Speedway.
37
38 2. P-Traps: Semi-cast brass, ground joint. 17-gage. Unobstructed waterway.
39 California Tubular, McGuire.
40

41 2.4 EQUIPMENT
42

- 43 A. General Requirements:
44
45 1. Capacity: Capacities shall be in accordance with schedules shown on drawings.
46 Capacities are to be considered minimum.
47
48 2. Start-up: All equipment shall be started and tested in accordance with the
49 manufacturer's written instructions. Provide the inspector of record with factory
50 start-up literature for each mechanical equipment item. Demonstrate to inspector
51 that the start-up procedure has been completed. Start-up sheets shall be
52 completed and submitted with O&M manuals. Start-up sheets shall be signed by
53 the owner of the installing contractor, certifying that start-up has been completed
54 per manufacturer's written instructions.
55
56 3. Dimensions: Equipment must conform to space requirements and limitations as
57 indicated on drawings and as required for operation and maintenance. Equipment

will not be accepted that does not readily conform to space conditions. Prepare and submit layout drawings for all proposed equipment (different than scheduled units) showing actual job conditions, required clearances for proper operation, maintenance, etc.

4. Ratings:

a. Gas: Gas burning equipment shall be furnished with 100% safety gas shut-off, intermittent pilot ignition, and be approved by AGA.

b. Electrical: Electrical equipment shall be in accordance with NEMA standards and UL or ETL listed where applicable standards have been established.

5. Piping: Each item or assembly of items shall be furnished completely piped for connection to services. Control valves and devices shall be provided. Equipment requiring domestic water for non-potable use shall be provided with backflow preventer acceptable for intended use by local governing authorities.

6. Electrical:

a. General: Each item or assembly of items shall be furnished completely wired to individual terminal blocks for connection to single branch electrical circuit. All electrical accessories and controls required by equipment shall be furnished. Provide terminal blocks for controls and interlocks not included in equipment package. Manual and magnetic starters shall have ambient compensating running overcurrent protection in all ungrounded conductors. Magnetic starters shall be NEMA rated, manual reset, and shall have H-O-A switches and auxiliary contacts. Controllers and other devices shall be in NEMA 1 or 3R enclosures as applicable.

b. Wiring: Conductors, conduit, and wiring shall be in accordance with Electrical Specifications. Individual items within assembly shall be separately protected with dead front, fused disconnect, fuse block, or circuit breaker for each ungrounded conductor, all accessible on operating side of equipment. Switches, contacts and other devices shall be in ungrounded conductors.

c. Motors: Shall be rated, constructed and applied in accordance with NEMA and ANSI Standards without using service factor. Single-phase motor shall be of type to suit application. Three-phase motors shall be NEMA B design on pumps, NEMA C on reciprocating equipment, sealed ball bearing, three-phase induction, unless otherwise noted. Motors 1 HP and above shall be NEMA premium efficiency, Class F insulation. Motors exposed to weather shall be TEFC. Vertical motors exposed to weather shall have rain caps. Motors for use with VFD's shall be inverter ready.

d. Starters: Motor starters shall be furnished for all equipment except where starter is in a motor control center as designated on the electrical drawings. Deliver starter to Electrical Contractor for installation and wiring.

e. Control Voltage: Equipment connected to greater than 240 volts shall be provided with 120 volt control circuit from integral protected transformer if separate source is not indicated on plans. 240 volt control is acceptable if confined within control panel.

f. Submittals: Included in shop drawings shall be internal wiring diagrams

and manufacturer's recommended external wiring.

- B. Electric Drinking Fountain: Wall hung. Provide steel mounting brackets. Stainless steel basin. Removable grid drain. Chrome plated brass bubbler with automatic flow regulator and self-closing valve. Non-ferrous evaporator. Lead solder shall not be used. Hermetic compressor with automatic reset overload protection. Air cooled condenser. Adjustable thermostat. UL listed. ARI certified.
- C. Circulating Pump: In-line centrifugal. Aluminum housing. All parts exposed to fluid, stainless steel. Water lubricated ceramic shaft and bearings. Epoxy encapsulated windings. Grundfos. -Or- Bronze body, brass impeller. Mechanical seals. Bronze sleeve bearings. Integral thermal overload protection.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

A. General:

1. Piping Layout: Piping shall be concealed in walls, above the ceilings, or below grade unless otherwise noted. Exposed piping shall run parallel to room surfaces; location to be approved by the Engineer. No structural member shall be weakened by cutting, notching, boring or otherwise, unless specifically allowed by structural drawings and/or specifications. Where such cutting is required, reinforcement shall be provided as specified or detailed. All piping shall be installed in a manner to ensure unrestricted flow, eliminate air pockets, prevent any unusual noise, and permit complete drainage of the system. All piping shall be installed to permit expansion and contraction without strain on piping or equipment. Vertical lines shall be installed to allow for building settlement without damage to piping. Pipe sizes indicated on the drawings are nominal sizes unless otherwise noted. For piping connected to equipment mounted on springs, provide flex connections. Provide secondary drain piping where required.
2. Joints:
 - a. Threaded: Pipe shall be cut square and reamed to full size. Threads shall be in accordance with ANSI B2.1. Joint compound or tape suitable for conveyed fluid shall be applied to male thread only. Joints shall be made with three threads exposed.
 - b. Welded or Brazed: Filler rod shall be of suitable or the same alloy as pipe. Brazing filler metal shall have a minimum melting point of 1100F. Welding or brazing shall be performed by a Certified Welder or Brazer as certified by an organization/institution that uses standards recognized by the American Welding Society (AWS) and meets the requirements of the ASME Boiler and Pressure Vessel Code, Section 9.
 - c. Open Ends: Open ends of piping shall be capped during progress of work to preclude foreign matter.
 - d. Electrical Equipment: Piping shall not be run over electrical panels, motor control centers or switchboards.
3. Fittings and Valves:
 - a. Standard Fittings: All joints and changes in direction shall be made with

standard fittings. Close nipples shall not be used.

- b. Reducers: Pipe size reduction shall be made with bell reducer fittings. Bushings shall not be used.
- c. Unions: A union shall be installed on the leaving side of each valve, at all sides of automatic valves, at equipment connections, and elsewhere as necessary for assembly or disassembly of piping.
- d. Valves: All valves shall be full line size. Provide shut-off valve for each building and each equipment connection. Provide shut-off valve at each point of connection to existing piping. At equipment connections, valves shall be full size of upstream piping, except that gas valves within 18" of the point of connection to the equipment may be the same size as the equipment connection.
- e. Valve Accessibility: All valves shall be located so that they are easily accessible. Valves located above ceilings shall be installed within 24" of the ceiling. For situations where this is not practical or where valves are greater than 10' above the floor, chain wheel operators shall be provided. Chain shall extend down to 7' above the floor. All such installations must have prior review by the Engineer.

4. Pipe Support:

- a. General: Hangers shall be placed to support piping without strain on joints or fittings. Maximum spacing between supports shall be as specified below. Actual spacing requirements will depend on structural system. Side beam clamps shall be provided with retaining straps to secure the clamp to the opposite side of the beam. Vertical piping shall be supported with riser clamp at 20' on center (maximum). Support pipe within 12" of all changes in direction. Support individual pipes with pipe hanger. Copper piping systems which protrude through a surface for connection to a fixture stop or other outlet shall be secured with a drop ell, Grinnell No. 9788; nipple through surface shall be threaded brass.

1) Pressure Pipe:

Pipe Size (Inches)	Maximum Spacing Between Supports (ft.)*		
	Copper	Steel	Plastic
1/2	6	6	4
3/4	6	8	4
1	6	8	4
1-1/4	6	10	4
1-1/2	6	10	4
2	10	10	4
2-1/2	10	10	4
3	10	10	4
4	10	10	4
6	10	10	4
8	10	10	4
10	10	10	4

*Based on straight lengths of pipe with couplings only. Provide additional

supports for equipment, valves or other fittings. Plastic piping shall be supported per the manufacturer's recommendations. Seismic requirements may reduce maximum spacing.

2) Gravity Drain Pipe: Piping shall be supported at each length of pipe or fitting, but in no case at greater spacing than indicated above for pressure pipe.

b. Hot and Cold Water Piping: All hot and cold water piping shall have isolating shield; no portion of this piping shall touch the structure without an isolating shield except at anchor points for fixture rough-in.

c. Trapeze: Trapeze hangers of construction channel and pipe clamps may be used. Submit design to Engineer for review.

5. Miscellaneous:

a. Escutcheons: Provide chrome plated metal escutcheons where piping penetrates walls, ceilings, or floors in finished areas.

b. Pipe Sleeves: All piping passing through concrete shall be provided with pipe sleeves. Allow 1" annular clearance between sleeve and pipe for piping 3" and smaller, otherwise 2" annular clearance. Piping through walls below grade shall be sealed with Link-Seal.

c. Pipes Passing through Fire Rated Surfaces: Pipes passing through fire rated walls, floors, ceilings, partitions, etc. shall have the annular space surrounding the pipe or pipe insulation sealed with fire rated materials in accordance with the requirements of the fire authority having jurisdiction.

d. Thermometer or Pressure Gage Tap: Provide tee for instrument well. Minimum size of pipe surrounding well shall be 1-1/2".

e. Concrete Thrust Blocks: Shall be constructed at all valves, tees, elbows, bends, crosses, reducers and dead ends in loose-joint pipe. Blocks shall cure a minimum of 7 days before pressure is applied. Concrete shall be 2500 psi mix.

f. Dielectric Couplings: Dielectric couplings shall be installed wherever piping of dissimilar metals are joined, except that bronze valves may be installed in ferrous piping without dielectric couplings.

g. Exposed Pipe at Fixtures: Piping extending from finished surfaces into a finished room shall be chrome plated brass, except under kitchen sinks in commercial kitchens.

B. Sanitary Sewer Piping:

1. General: Where inverts are not indicated, sanitary sewer piping shall be installed at 1/4" per foot pitch. Piping 4" and larger may be installed at 1/8" per foot pitch where structural or other limitations prevent installation at a greater pitch. Bell and spigot piping shall be installed with barrel on sand bed; excavate hole for bell.

2. Cleanouts: Install cleanouts at ends of lines, at changes of direction greater than 45 degrees, and at not greater than 100 foot intervals. Locate interior cleanouts in accessible locations and bring flush to finished surface.

3. Vents: Vents shall terminate not less than 6" above the roof nor less than 12" from any vertical surface nor within 10' of any outside air intake. Install horizontal vent lines at 1/4" per foot pitch. Offset vents 2' minimum from gutters, parapets, ridges and roof flashing.
 - C. Storm Drain (Including Rain Water Leader, RWL): Similar to Sanitary Sewer. Piping with less than 24" of cover outside building walls shall be cast iron.
 - D. Water Piping: Connections to branches and risers shall be made from top of main. Supply header in fixture battery shall be full size to last fixture, reducing in size only on individual connections to each fixture in battery. Minimum pipe size shall be 3/4", unless otherwise noted. Exposed fixture stops and flush valves shall be installed with brass nipples for copper piping and galvanized nipples for galvanized piping. Nipples are to extend from outside of wall to fitting at header or drop behind finish wall surfaces. Pipe nipples shall be same size as stop or flush valve. Provide shut off for each building and each connection to equipment. Provide shock absorber with shut-off valve and access panel where noted on drawings and upstream of quick-closing manual valves, solenoid valves and flush valves. Only equipment mounted on vibration isolators shall be connected with flexible connections. Underground hot water and cold water piping which run parallel to each other shall be installed a minimum of 3 feet apart.
 - E. Gas Piping: Installation shall comply with CPC and NFPA 54 (National Fuel Gas Code). Shall be pitched to drain to dirt legs at low points. No unions shall be installed except at connections to equipment. Provide shutoff and dirt leg at each equipment connection. Only equipment mounted on vibration isolators shall be connected with flexible connectors. Under floor piping shall be sleeved and vented. Plastic pipe and fittings shall be joined in accordance with manufacturer's recommendations. Metal to plastic transition fittings shall be installed at all transitions. Provide 14-gage insulated tracer wire secured to pipe at 10' intervals with nylon ties. Terminate tracer 6" above grade at both ends.
 - F. Drain Piping (Including Condensate): Install with constant pitch to receptacle, 1/4" per foot where possible, otherwise 1/8" per foot minimum. Provide TEE with clean-out plug at all changes of direction. Provide trap at each air handling unit to prevent air leakage. Only equipment mounted on vibration isolators shall be connected with flexible connection.
 - G. Flue Piping: Flue piping shall be installed in accordance with its UL listing and the manufacturer's instructions.
- 3.2 PIPING INSULATION INSTALLATION:
- A. Domestic Hot Water:
 1. General: All domestic hot water piping, fittings and accessories shall be insulated.
 2. Pipe: Apply pre-molded fiberglass sections to pipe using integral pressure sealing lap adhesive in accordance with manufacturer's recommendations. Stagger longitudinal joints. Seal butt joints with factory supplied pressure sealing tape.
 3. Fittings and Valves:
 - a. Wrap all fittings and valves with pre-cut fiberglass blanket to thickness matching adjoining insulation. Cover blanket with PVC jacket in accordance with manufacturer's recommendations. Solvent weld. Seal all joints with factory supplied pressure sealing vapor barrier tape with 1-1/2" (min.) overlap on both sides of joint. Insulate valves to stem. Do not insulate unions, flanges or valves unless water temperature exceeds 140°F or the piping is exposed to weather.

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- b. For miscellaneous fittings and accessories for which PVC jackets are not available or where proximity of fittings precludes a neat-appearing installation, the Contractor may cover the fiberglass blanket with stretchable glass fabric, one coat of lagging adhesive and a final coat of vapor barrier coating. All exposed ends of insulation shall be adequately sealed.
 - 4. Equipment: Storage tanks and other equipment through which there is normally circulation, shall be insulated with materials similar to those described in Paragraph 2.2. It shall be the Contractor's responsibility to provide adequate insulation and finish, weatherproofing for equipment exposed to the weather, and a neat-appearing installation. Submit materials and method of installation to Engineer for review.
 - 5. Piping Exposed to Weather:
 - a. All piping and fittings exposed to weather shall have, in addition to the above-described insulation, an aluminum jacketing. Secure in place with factory supplied straps. Install all joints to prevent water entry. All joints shall be sealed with outdoor mastic.
 - b. For miscellaneous fittings for which aluminum jackets are not available or where proximity of fittings precludes a neat-appearing installation, the Contractor may cover the insulation with stretchable glass fabric and at least two coats of outdoor mastic.
 - 6. Additional Finish for Exposed Piping and Equipment: All piping and equipment exposed to view but protected from the weather shall be given an additional finish of PVC jackets.
 - B. Cold Water Piping-Freeze Protection: All cold water piping exposed to weather shall be insulated with flexible elastomeric. Cover valves to stem and jacket with aluminum.
 - C. Piping Insulation Under Accessible Lavatories and Sinks: Hot and cold water piping, hot and cold water stops and drain piping under accessible lavatories and sinks shall be insulated with 3/16" thick molded closed cell vinyl. Installation shall be in accordance with manufacturer's instructions.
- 3.3 FIXTURE INSTALLATION
- A. Fixture Height: Shall be as indicated on Architectural drawings.
 - B. Floor Drains or Floor Sinks: Shall be placed parallel to room surfaces, set level, flush with floor, and adjusted to proper height to drain. Cover openings during construction to keep all foreign matter out of drain line.
 - C. Wall Hung Fixtures: Shall be provided with proper backing and hanger plates secured to wall. Fixtures mounted on carriers shall bear against stop nuts, clear of wall surface. Caulk fixtures against walls with white G.E. "Sanitary 1700" silicone sealant. Caulking shall be smooth and flush with fixture surface (not concave).
 - D. Floor Mounted Fixtures: Shall be provided with proper support plates. Grout at the floor with waterproof ceramic tile grout.
 - E. Other Connections: Rough-in and connection for trim or fixtures supplied by others shall be included in this specification section.

3.4 EQUIPMENT INSTALLATION

- A. General: It shall be the responsibility of the equipment installer to insure that no work done under other specification sections shall in any way block, or otherwise hinder the equipment. All equipment shall be securely anchored in place.
- B. Connections to Equipment: Where size changes are required for connections to equipment, they shall be made immediately adjacent to the equipment and, if possible, inside the equipment cabinet.

3.5 TESTS AND ADJUSTMENTS

- A. General: Unless otherwise directed, tests shall be witnessed by a representative of the Engineer. Work to be concealed shall not be enclosed until prescribed tests are made. Should any work be enclosed before such tests, the Contractor shall, at his expense, uncover, test and repair all work to original conditions. Leaks and defects shown by tests shall be repaired and entire work retested. Tests may be made in sections, however, all connections between sections previously tested and new section shall be included in the new test.
- B. Gravity Systems:
1. Sanitary Sewer: All ends of the sanitary sewer system shall be capped and lines filled with water to the top of the highest vent, 10' above grade minimum. This test shall be made before any fixtures are installed. Test shall be maintained until all joints have been inspected, but no less than 2 hours.
 2. Drains (Including Condensate): Similar to Sanitary Sewer.
 3. Storm Drain, including Rain Water Leaders, (RWL): Similar to Sanitary Sewer.
- C. Pressure Systems:
1. General: There shall be no drop in pressure during test except that due to ambient temperature changes. All components of system not rated for test pressure shall be isolated from system before test is made.
 2. Domestic Hot and Cold Water Piping: Maintain 100 psig water pressure for 4 hours.
 3. Backflow Preventer: All backflow preventers shall be tested according to manufacturer's recommendations and the USC Cross Connection Control and Hydraulic Research Manual (8th Edition). Testing shall be performed by an AWWA Certified Backflow Prevention Assembly Tester. Contractor shall certify in writing to the Engineer the date which backflow preventers were tested and by whom test was witnessed.
 4. Gas Piping: Maintain 100 psig air pressure for 4 hours.
 5. Sanitary Sewer Piping (Pressurized): Maintain 100 psig water pressure for 4 hours.

3.6 DISINFECTION

- A. Disinfect all domestic water piping systems in accordance with AWWA Standard C651, "AWWA Standard for Disinfecting Water Mains", and in accordance with administrative authority. Disinfection process shall be performed by the Contractor and witnessed by a

1 representative of the Engineer. During procedure signs shall be posted at each water outlet
2 stating, "Chlorination - Do Not Drink". After disinfection, the Contractor shall collect water
3 samples and send them to an independent lab for bacteriological analysis. Certificate of
4 Bacteriological Purity shall be obtained and delivered to the Owner through the Engineer.
5

6 END OF SECTION 22 04 00
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8

SECTION 22 04 05 - COMMISSIONING OF PLUMBING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes Cx process requirements for the following plumbing systems, assemblies, and equipment:
 - 1. Domestic hot- and cold-water piping.
 - 2. Sanitary waste and vent piping.
 - 3. Storm drainage piping.
 - 4. Plumbing pumps.
 - 5. Plumbing equipment.
- B. Related Requirements:
 - 1. Section 018100 "General Commissioning Requirements" for general Cx process requirements and CxA responsibilities.
 - 2. For construction checklists, comply with requirements in various Division 22 Sections specifying plumbing systems, system components, equipment, and products.

1.3 DEFINITIONS

- A. Cx: Commissioning, as defined in Section 018100 "General Commissioning Requirements."
- B. CxA: Commissioning Authority, as defined in Section 018100 "General Commissioning Requirements."
- C. "Systems," "Assemblies," "Subsystems," "Equipment," and "Components": Where these terms are used together or separately, they shall mean "as-built" systems, assemblies, subsystems, equipment, and components.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For plumbing testing technician.
- B. Construction Checklists: Draft construction checklists will be created by CxA for Contractor review.
- C. Construction Checklists: Material, installation, and performance test checklists for systems, assemblies, subsystems, equipment, and components to be part of the Cx process and according to requirements in Section 018100 "General Commissioning Requirements."

1. Facility water distribution piping, including the following:
 - a. Domestic water piping, fittings, and specialties outside the building.
 - b. Pumps, motors, accessories, and controls.
 - c. Sleeves and sleeve seals.
 - d. Meters and gages.
 - e. General-duty and specialty valves.
 - f. Hangers and supports.
 - g. Vibration isolation.
 2. Domestic water piping, including the following:
 - a. Domestic cold- and hot-water piping, fittings, and specialties inside the building.
 - b. Pumps, motors, accessories, and controls.
 - c. Sleeves and sleeve seals.
 - d. Meters and gages.
 - e. General-duty and specialty valves.
 - f. Hangers and supports.
 - g. Vibration isolation.
 3. Sanitary waste and vent piping, including the following:
 - a. Gravity and forced-main sewerage piping, fittings, and specialties.
 - b. Sanitary waste interceptors.
 - c. Pumps, motors, accessories, and controls.
 - d. Drains.
 - e. Sleeves and sleeve seals.
 - f. Meters and gages.
 - g. General-duty and specialty valves.
 - h. Hangers and supports.
 - i. Vibration isolation.
 4. Storm-water piping, including the following:
 - a. Drainage piping, fittings, and specialties.
 - b. Pumps, motors, accessories, and controls.
 - c. Drains and collection basins.
 - d. Sleeves and sleeve seals.
 - e. General-duty and specialty valves.
 - f. Hangers and supports.
 - g. Vibration isolation.
 5. Plumbing fixtures, including the following:
 - a. Water closets, supports and connections, supplies, and flush valves.
 - b. Urinals, supports and connections, supplies, and flush valves.
 - c. Lavatories, supports, supplies, drain connections, and faucets.
 - d. Sinks, supports, supplies, drain connections, and faucets.
 - e. Tubs, drain connections, and faucets.
 - f. Showers, supplies, drain connections, and faucets.
 - g. Wash fountains, supplies, drain connections, and faucets.
 - h. Drinking fountains, supplies, and drainage connections.
- D. Test equipment and instrumentation list, identifying the following:

1. Equipment/instrument identification number.
2. Planned Cx application or use.
3. Manufacturer, make, model, and serial number.
4. Calibration history, including certificates from agencies that calibrate the equipment and instrumentation.
5. Equipment manufacturers' proprietary instrumentation and tools. For each instrument or tool, identify the following:
 - a. Instrument or tool identification number.
 - b. Equipment schedule designation of equipment for which the instrument or tool is required.
 - c. Manufacturer, make, model, and serial number.
 - d. Calibration history, including certificates from agencies that calibrate the instrument or tool, where appropriate.

1.5 QUALITY ASSURANCE

- A. Plumbing Testing Technician Qualifications: Technicians to perform plumbing construction checklist verification tests, construction checklist verification test demonstrations, Cx tests, and Cx test demonstrations shall have the following minimum qualifications:
 1. Journey level or equivalent skill level with knowledge of plumbing system, electrical concepts, and building operations.
 2. Minimum three years' experience installing, servicing, and operating systems manufactured by approved manufacturer.
- B. Testing Equipment and Instrumentation Quality and Calibration:
 1. Capable of testing and measuring performance within the specified acceptance criteria.
 2. Be calibrated at manufacturer's recommended intervals with current calibration tags permanently affixed to the instrument being used.
 3. Be maintained in good repair and operating condition throughout duration of use on Project.
 4. Be recalibrated/repared if dropped or damaged in any way since last calibrated.
- C. Proprietary Test Instrumentation and Tools:
 1. Equipment Manufacturer's Proprietary Instrumentation and Tools: For installed equipment included in the Cx process, test instrumentation and tools manufactured or prescribed by equipment manufacturer to service, calibrate, adjust, repair, or otherwise work on its equipment or required as a condition of equipment warranty, shall comply with the following:
 - a. Be calibrated by manufacturer with current calibration tags permanently affixed.
 - b. Include a separate list of proprietary test instrumentation and tools in operation and maintenance manuals.
 - c. Plumbing system proprietary test instrumentation and tools become property of Owner at the time of Substantial Completion.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 CONSTRUCTION CHECKLISTS

- A. Prepare detailed construction checklists for plumbing systems, assemblies, subsystems, equipment, and components.
 - 1. Domestic hot- and cold-water piping.
 - 2. Sanitary waste and vent piping.
 - 3. Storm drainage piping.
 - 4. Plumbing pumps.
 - 5. Plumbing equipment, including the following:
 - a. Water softeners.
 - b. Water filtration equipment.
 - c. Domestic water heating equipment.
 - d. Plumbing fixtures.
 - e. Water coolers.

3.2 CONSTRUCTION CHECKLIST REVIEW

- A. Review and provide written comments on draft construction checklists. CxA will create required draft construction checklists and provide them to Contractor.
- B. Return draft construction checklist review comments within 10 days of receipt.
- C. When review comments have been resolved, the CxA will provide final construction checklists, marked "Approved for Use, (date)."
- D. Use only construction checklists, marked "Approved for Use, (date)."

3.3 Cx TESTING PREPARATION

- A. Certify that plumbing systems, subsystems, and equipment have been installed, calibrated, and started and that they are operating according to the Contract Documents and approved submittals.
- B. Certify that plumbing systems instrumentation and control systems have been completed and calibrated, that they are operating according to the Contract Documents and approved submittals, and that pretest set points have been recorded.
- C. Set systems, subsystems, and equipment into operating mode to be tested according to approved test procedures (for example, normal shutdown, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).

3.4 Cx TEST CONDITIONS

- A. Perform tests using design conditions, whenever possible.
 - 1. Simulated conditions may, with approval of Architect, be imposed using an artificial load when it is impractical to test under design conditions. Before simulating conditions, calibrate testing instruments. Provide equipment to simulate loads. Set simulated conditions as directed by CxA and document simulated conditions and methods of simulation. After tests, return configurations and settings to normal operating conditions.
 - 2. Cx test procedures may direct that set points be altered when simulating conditions is impractical.
 - 3. Cx test procedures may direct that sensor values be altered with a signal generator when design or simulating conditions and altering set points are impractical.
- B. If tests cannot be completed because of a deficiency outside the scope of the plumbing system, document the deficiency and report it to Architect. After deficiencies are resolved, reschedule tests.
- C. If seasonal testing is specified, complete appropriate initial performance tests and documentation and schedule seasonal tests.

3.5 Cx TESTS COMMON TO PLUMBING

- A. Measure capacities and effectiveness of systems, assemblies, subsystems, equipment, and components, including operational and control functions, to verify compliance with acceptance criteria.
- B. Test systems, assemblies, subsystems, equipment, and components operating modes, interlocks, control responses, responses to abnormal or emergency conditions, and response according to acceptance criteria.
- C. Coordinate schedule with, and perform Cx activities at the direction of, CxA.
- D. Comply with construction checklist requirements, including material verification, installation checks, startup, and performance tests requirements specified in Division 22 Sections specifying plumbing systems and equipment.
- E. Provide technicians, instrumentation, tools, and equipment to perform and document the following:
 - 1. Construction checklist verification tests.
 - 2. Construction checklist verification test demonstrations.
 - 3. Cx tests.
 - 4. Cx test demonstrations.
- F. Supervision of Alarms in Plumbing Systems:
 - 1. Prerequisites: Acceptance of results of construction checklists for plumbing systems specified in the Sections listed below:
 - a. Section 220415 " Water Management System."
 - 2. Purpose:

- a. Verify reporting of plumbing alarm.
- 3. Conditions of the Test:
 - a. Alarm monitoring systems operating in normal, automatic mode.
- 4. Acceptance Criteria:
 - a. Activation of plumbing alarm generates alarm at control panel.

END OF SECTION 22 04 05

SECTION 22 04 15 – WATER MANAGEMENT SYSTEM

PART 1 - GENERAL

1.1 GENERAL MECHANICAL PROVISIONS

- A. The preceding General Mechanical Provisions shall form a part of this Section with the same force and effect as though repeated here.
- B. Refer to BID ALTERNATE #4.

1.2 SCOPE

- A. Provide all labor, materials and services necessary for complete, lawful and operating systems as shown or noted on the drawings or as specified here. The work includes, but is not necessarily limited to, the following:
 - 1. Provide an advanced electronic controller using a fully programmable microprocessor controller to operate and control solenoid activated valves for water closets, lavatories and showers.
 - 2. Software and programming required to control system solenoid valves activation allowing water to flow for the pre-programmed run-time.
 - 3. Activation delays, run times and lock out parameters shall be preprogrammed by the factory per Owner requirements.
 - 4. Contractor shall coordinate all termination points with each cell chase as required.

PART 2 - PRODUCTS

2.1 EQUIPMENT GENERAL REQUIREMENTS

- A. The Equipment General Requirements in Section 23 08 00 shall form a part of this Section with the same force and effect as though repeated here.

2.2 ELECTRONIC WATER MANAGEMENT SYSTEM

- A. The microprocessor control board shall have the ability to control flushing and water run times for water closet/lavatory fixtures and showers. The computer shall have the ability to activate or deactivate and modify delays, run times, and lock out periods on any fixture or group of fixtures. The computer shall have the ability to monitor individual cells, floors, pods or entire cellblocks. All control boards shall function individually if the communication network is disrupted.
- B. Provide the Acorn Master-Trol Water Management System - EVS Electronic Valve System for solenoid valves. System shall include electronic valve controllers that are microprocessor driven and powered by 24VAC 50 VA Class 2 UL/CSA listed transformers with a 3 amp fuse. An electronic valve controller shall be able to simultaneously direct up to 12 valves.

Provide a desktop server to be interfaced with 8 Versa-Links, each capable of monitoring and controlling multiple solenoid valves. Each Versa-Link can be up to 4,000 accumulated feet long. Programmed settings shall be retained in the controller regardless of power loss. Slow-closing, anti water-hammer solenoid operated valve(s) and EVS electronic flush valves shall be operated by means of vandal resistant stainless steel pushbutton and momentary air switch. Provide wiring and connectors from desktop

server to electronic valve controllers. Provide 14 feet long station cables for connecting electronic valve controller to valve assemblies. All connectors shall be quick-disconnect, plug type. All components shall be installed per National Electrical Code (NEC) and local codes.

- C. Graphic Interface: Manufacturer shall supply software with graphic-user-interface to monitor and control the control boards. The screen graphics shall display, by picture, the individual cell components (i.e. water closet, hot and cold lavatory, shower, etc.) as well as the operational state of the fixture. The computer operating system shall enable the user to track on-site fixture usage, create/modify parameters of the control boards and assign different levels of software accessibility to system users. The system and the site shall be user-definable, which includes parameter configurations for individual or groups of controllers.

PART 3 - EXECUTION

3.1 EQUIPMENT INSTALLATION

- A. The Equipment Installation Requirements in Section 23 08 00 shall form a part of this Section with the same force and effect as though repeated here.

3.2 EXAMINATION

- A. Examine equipment locations for compliance with requirements for installation and other conditions affecting performance.
- B. Examine wiring roughing-in to verify completeness before equipment installation.

3.3 INSTALLATION

- A. Wiring:
1. Install plug connectors on all wiring connecting the push-button sensors and solenoids to the microprocessor control boards.
 2. Secure modular wiring to the walls of the pipe chase and connect the modular plugs into the programmable controllers.
 3. All wiring from programmable controllers to the remote programming location (computer) shall be installed in conduit. All other wiring, not in pipe chases, shall be installed in conduit.
 4. Install transformers as required.
 5. Provide and install low voltage wiring as required.
 6. Provide and install all routers or repeaters as necessary.

3.4 MICROPROCESSOR CONTROL BOARDS

- A. The microprocessor control boards shall be programmed with the following features:
1. Lavatory- Upon activation of hot water push-button, the water will run for twenty (20) seconds and then turn off. Upon activation of the cold water push-button, the water will run for ten (10) seconds and then turn off. Immediate repeat operation is disqualified.
 2. Water closet-After push-button is activated there will be a random delay of one (1) to sixty (60) seconds before onset of flush cycle. If the fixture is flushed a second time within a five (5) minute period the system will automatically lock-out and the water closet will not flush again for a one (1) hour period. After this lock-out the

- 1 water closet will resume normal operation. Activation delays and lock-outs shall be
2 programmable to customers' specifications.
3 3. Shower-Upon activation of the push-button, the water will run for three (3) minutes.
4 Repeat operation is only possible after a delay of (5) seconds. If the push-button is
5 held in for more than five (5) seconds the water will turn off.
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8 3.5 SYSTEM ADJUSTMENTS
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- 10 A. Provide all cell numbering and nomenclature of building, floors and pods to controller
11 manufacturer for preprogramming microprocessor controllers. Review with Owner prior to
12 submittal to manufacturer.
13
14 B. Program all workstation software for complete system performance requirements as
15 confirmed by Owner.
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18 3.6 FIELD QUALITY CONTROL
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- 20 A. Testing:
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22 1. After completion of installation, test for compliance requirements.
23 2. Repair or replace malfunctioning units. Retest for required compliance.
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26 3.7 DEMONSTRATION
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- 28 A. Train Owner representatives on procedures required to make adjustments and maintain
29 proper operation of all system units.
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31 1. Include procedures and schedules for troubleshooting, servicing and maintaining
32 equipment and schedules.
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34 2. Review data in maintenance manuals.
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36 3. Schedule training with Owner.
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44 END OF SECTION 22 04 15
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SECTION 22 04 30 – WATER HEATERS

PART 1 - GENERAL

1.1 GENERAL MECHANICAL PROVISIONS

- A. The preceding General Mechanical Provisions shall form a part of this Section with the same force and effect as though repeated here.

1.2 SUBMITTALS

- A. Product Data: Include performance data, operating characteristics, furnished specialties and accessories. Prior to flue vent installation, engineered calculations and drawings must be submitted to Architect/Engineer to thoroughly demonstrate that size and configuration conform to recommended size, length and footprint for each submitted water heater.
- B. Efficiency Curves: At a minimum, submit efficiency curves for 100%, 80%, 60%, 40%, 20% and the lowest input firing rates at incoming water temperatures ranging from 70°F to 140°F. Test protocols shall conform to AERCO's AE-1 standard
- C. Pressure Drop Curve: Submit pressure drop curve for flows ranging from 0 GPM to maximum value of water heater.
- D. Shop Drawings: For water heaters, water heater trim and accessories, include:
Plans, elevations, sections, details and attachments to other work
Wiring Diagrams for power, signal and control wiring
- E. Source Quality Control Test Reports: Reports shall be included in submittals.
- F. Field Quality Control Test Reports: Reports shall be included in submittals.
- G. Operation and Maintenance Data: Data to be included in water heater emergency, operation and maintenance manuals.
- H. Warranty: Standard warranty specified in this Section.

1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices and Accessories: Condensing water heaters must be listed and labeled as defined in CEC, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Performance Compliance: Condensing water heaters must be rated in accordance with ASHRAE 118.1 testing methods and verified by UL or AHRI as capable of achieving the energy efficiency and performance ratings as tested within prescribed tolerances.
- C. ASME Compliance: Condensing water heaters must be constructed in accordance with ASME Water heater and Pressure Vessel Code, Section IV (HLW) Potable Water Heaters.

- D. ASHRAE/IESNA 90.1 Compliance: Condensing water heaters shall have minimum efficiency according to "Gas and Oil Fired water heaters - Minimum Efficiency Requirements," when tested in accordance with Section G.1 "Method of Test for Measuring Thermal Efficiency" and G.2 "Method of Test for Measuring Standby Loss" of ANSI Z21.10.3
- E. UL Compliance. Condensing water heaters must be tested for compliance with UL 795, "Commercial-Industrial Gas Heating Equipment." Condensing water heaters shall be listed and labeled by a testing agency acceptable to authorities having jurisdiction.
- F. NOx Emission Standards. When installed and operated in accordance with manufacturer's instructions, condensing water heaters shall comply with the NOx emission standards outlined in South Coast Air Quality Management District (SCAQMD), Rule 1146.2.
- G. Low Lead Compliance: Condensing water heaters must be third party classified to meet the requirements of ANSI/NSF 372, hence that the weighted average of the wetted surface area in contact with potable water must be no greater than 0.25% lead content.

1.4 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases.

1.5 WARRANTY

- A. Standard Warranty: Water heaters shall include manufacturer's standard form in which manufacturer agrees to repair or replace components of water heaters that fail in materials or workmanship within specified warranty period.
1. Warranty Period for Fire-Tube Condensing Water heaters:
The pressure vessel shall carry a 10-year from shipment, non-prorated, limited warranty against any failure due to waterside corrosion, mechanical defects, or workmanship. The heat exchanger shall carry a 10-year from shipment, prorated, limited warranty against any failure due to condensate corrosion, thermal stress, mechanical defects, or workmanship.
 2. Manufacturer labeled control panels are conditionally warranted against failure for two (2) years from shipment.
 3. All other components, with the exception of the igniter and flame detector, are conditionally guaranteed against any failure for 18 months from shipment.

PART 2 - PRODUCTS

2.1 EQUIPMENT GENERAL REQUIREMENTS

- A. The Equipment General Requirements in Section 23 08 00 shall form a part of this Section with the same force and effect as though repeated here.

2.2 CONSTRUCTION

- A. General: Each water heater shall be UL Listed; ASME Section IV (HLW) coded and stamped and shall incorporate a FM Gas train. Each unit shall operate with a minimum ASHRAE 118.1 efficiency of 96% at full fire.
- B. Description: Water heater shall be direct fired, fully condensing, fire-tube design. Power burner shall have full modulation. The minimum firing rate shall not exceed 50,000 BTU/HR input. Water heaters that have an input greater than 50,000 BTU/Hr at minimum fire will not be considered equal. The water heater shall have the capability of discharging into a positive pressure vent. Water heater thermal efficiency shall increase with decreasing load (output), while maintaining setpoint. Water heater shall have an operational setpoint capability of 50 °F to 190 °F and shall maintain the outlet temperature within an accuracy of +/- 4 °F during load changes of up to 50% rated capacity. Heater shall operate quietly, less than 55 dba. Water heater shall be factory-fabricated, factory-assembled and factory-tested, fire-tube condensing water heater with heat exchanger sealed pressure-tight, built on a steel base, including a sealed insulated sheet metal enclosure that acts as combustion-air intake plenum, flue-gas vent, water supply, return and condensate drain connections, and controls. Each water heater shall have an ASME approved temperature/pressure relief valve with a setting of 150 psig and 210 °F.
- C. Heat Exchanger: The heat exchanger shall be constructed with 316L stainless steel helical fire tubes, combustion chamber and dished tubesheet, with a two-pass combustion gas flow design. The heat exchanger shall be electroless nickel plated. The fire tubes shall be 3/4" OD, with no less than 0.035" wall thickness. The upper and lower stainless steel tubesheet shall be no less than 0.625" thick. The heat exchanger shall be welded and brazed construction. The heat exchanger shall be ASME Sect IV (HLW) stamped for a working pressure not less than 160 psig.
- D. Shell Assembly Pressure Vessel: The shell assembly pressure vessel shall have a maximum water volume of 26 gallons. The water heater water pressure drop shall not exceed 2 psig at 30 gpm. The water heater water connections shall be 2-inch NPT male connections. The shell assembly pressure vessel shall be constructed of 304 stainless steel of 0.25-inch wall thickness. The shell assembly pressure vessel shall be electroless nickel plated. Inspection openings in the pressure vessel shall be in accordance with ASME Section IV pressure vessel code. The shell assembly pressure vessel shall be ASME Sect IV (HLW) stamped for a working pressure not less than 160 psig.
- E. Modulating Air/Fuel Valve and Burner: The water heater burner shall be capable of a 18-to-1(INN800), 30-to-1(INN1350) turndown ratio of the firing rate without loss of combustion efficiency or staging of gas valves. The burner shall produce less than 20 ppm of NOx corrected to 3% excess oxygen. The unit shall be certified by the South Coast Air Quality Management District (SCAQMD) as compliant with Rule 1146.2 for water heaters and water heaters less than or equal to 2 MBTUs. The burner shall be metal-fiber mesh covering a stainless steel body with spark ignition and flame rectification. All burner material exposed to the combustion zone shall be of stainless steel construction. There shall be no moving parts within the burner itself. A modulating air/fuel valve shall meter the air and fuel input. The modulating motor must be linked to both the gas valve body and air valve body with a single linkage. The linkage shall not require any field adjustment. A variable frequency drive (VFD), controlled cast aluminum pre-mix blower shall be used to ensure the optimum mixing of air and fuel between the air/fuel valve and the burner.
- F. Minimum water heater efficiencies shall be as follows at a 70 degree delta-T:

EWT	100% Fire	80% Fire	60% Fire	40% Fire	20% Fire	<10% Fire
70 °F	96%	97%	97.5%	98%	98.5%	99%

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G. The exhaust manifold shall be of corrosion resistant cast aluminum with a 6-inch diameter flue connection. The exhaust manifold shall have a collecting reservoir and a gravity drain for the elimination of condensation.

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H. Blower. The water heater shall include a variable-speed, DC centrifugal fan to operate during the burner firing sequence and pre-purge the combustion chamber.

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I. Ignition: Ignition shall be via spark ignition with 100 percent main-valve shutoff and electronic flame supervision.

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2.3 CONTROLS

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A. The water heater control system shall be segregated into three components: "C-More" Control Panel, Power Box and Input/Output Connection Box. The entire system shall be Underwriters Laboratories recognized.

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B. The control panel shall consist of six individual circuit boards using state-of-the-art surface-mount technology in a single enclosure. These circuit boards shall include:

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A display board incorporating LED display to indicate temperature and a vacuum fluorescent display module for all message enunciation.

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A CPU board housing all control functions.

20

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An electric low-water cutoff board with test and manual reset functions.

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A power supply board.

24

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An ignition /stepper board incorporating flame safeguard control.

26

A connector board.

27

Each board shall be individually field replaceable.

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C. The combustion safeguard/flame monitoring system shall use spark ignition and a rectification-type flame sensor.

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D. The control panel hardware shall support both RS-232 and RS-485 remote communications.

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E. The controls shall annunciate water heater and sensor status and include extensive self-diagnostic capabilities that incorporate a minimum of eight separate status messages and 34 separate fault messages.

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F. The control panel shall incorporate three self-governing features designed to enhance operation in modes where it receives an external control signal by eliminating nuisance faults due to over-temperature, improper external signal or loss of external signal. These features include:

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Setpoint High Limit: Setpoint high limit allows for a selectable maximum water heater outlet temperature and acts as temperature limiting governor. Setpoint limit is based on a

PID function that automatically limits firing rate to maintain outlet temperature within a 0 to 10 degree selectable band from the desired maximum water heater outlet temperature.

Setpoint Low Limit: Setpoint low limit allows for a selectable minimum operating temperature.

Failsafe Mode: Failsafe mode allows the water heater to switch its mode to operate from an internal setpoint if its external control signal is lost, rather than shut off. This is a selectable mode, enabling the control can to shut off the unit upon loss of external signal, if so desired.

G. The water heater control system shall incorporate the following additional features for enhanced external system interface:

System start temperature feature

Pump delay timer

Auxiliary start delay timer

Auxiliary temperature sensor

Analog output feature to enable simple monitoring of temperature setpoint, outlet temperature or fire rate

Remote interlock circuit

Delayed interlock circuit

Fault relay for remote fault alarm

H. Water Heater Management: the water heater control system shall incorporate onboard multi-unit sequencing logic that would allow lead-lag functionality & sequencing between multiple water heaters operating in parallel and must have the following capabilities:

1. Efficiently sequence 2 up to 8 units on the same system to meet the load requirement.
2. Individual unit feed-forward logic will still be enabled for accurate temperature control equal to individual unit's specification.
3. Operate one motorized valve per unit as an element of the load sequencing, Valves shall close with decreased load as heaters turn off, minimum of one (quantity must be selectable) must always stay open for recirculation.
4. Automatically rotate lead/lag amongst the units on the chain and monitor run hours per unit and balance load in an effort to equalize unit run hours.
5. Automatic bump-less transfer of master function to next unit on the chain in case of designated master unit failure; master/slave status should be shown on the individual unit displays.
6. Units will default to individual control upon failure of the communications chain.
7. Night temperature setback.
8. Designated master control, used to display and adjust key system parameters.

I. Each water heater shall be supplied with a factory packaged and pre-wired motorized ball valve. This valve shall be controlled by the water heater control system as an element of the onboard water heater management.

J. Each water heater shall include an electric, single-seated combination safety shutoff valve/regulator with proof of closure switch in its gas train. Each water heater shall incorporate dual over-temperature protection with manual reset, in accordance with ASME Section IV and CSD-1.

1 2.4 ELECTRICAL POWER

- 2 A. Single-Point Field Power Connection: Factory-installed and factory-wired switches, motor
3 controllers, transformers and other electrical devices shall provide a single-point field
4 power connection to the water heater.

5 2.5 CONDENSATE

- 6 A. Low-profile condensate neutralizing tubes. Each tube shall be suitable for no less than 12
7 months continuous operation at full condensing rate. Tubes shall be refillable;

- 8 B. Condensate traps, manufactured from only non-corrosive materials. In order to guarantee
9 flue gasses cannot leak into the boiler room, the traps shall be float-type traps.

10 2.6 VENTING

- 11 A. The exhaust vent must be UL Listed for use with Category II, III and IV appliances and
12 compatible with positive pressure, condensing flue gas service. UL- listed vents of PVC,
13 CPVC, PP, or AI 29-4C stainless steel must be used with water heaters.

- 14 B. The minimum exhaust vent duct size for each water heater is six-inch diameter.

- 15 C. Combustion-Air Intake: Water heaters shall be capable of drawing combustion air from
16 the outdoors via a metal or PVC duct connected between the water heater and the
17 outdoors.

- 18 D. The minimum sealed combustion air duct size for each water heater is six-inch diameter.

- 19 E. Common Vent and Common Combustion Air must be an available option for water heater
20 installation. Consult manufacturer for common vent and combustion air sizing.

- 21 F. Follow guidelines specified in manufacturer's venting guide.

22 2.7 SOURCE QUALITY CONTROL

- 23 A. Burner and Hydrostatic Test: Factory adjust burner to eliminate excess oxygen, carbon
24 dioxide, oxides of nitrogen emissions and carbon monoxide in flue gas, and to achieve
25 combustion efficiency. Perform hydrostatic testing.

- 26 B. Test and inspect factory-assembled water heaters, before shipping, according to ASME
27 Boiler and Pressure Vessel Code.
28
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30 PART 3 - EXECUTION

31
32 3.1 EQUIPMENT INSTALLATION

- 33
34 A. The Equipment Installation Requirements in Section 23 08 00 shall form a part of this
35 Section with the same force and effect as though repeated here.
36

3.2 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies and equipment installations, including connections, and to assist in testing.

B. Tests and Inspections

1. Installation and Startup Test: Perform installation and startup checks according to manufacturer's written instructions.

2. Leak Test: Perform hydrostatic test. Repair leaks and retest until no leaks exist.

3. Operational Test: Start units to confirm proper motor rotation and unit operation. Adjust air-fuel ratio and combustion.

4. Controls and Safeties: Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

a. Check and adjust initial operating set points and high- and low-limit safety set points of fuel supply, water level and water temperature.

b. Set field-adjustable switches and circuit-breaker trip ranges as indicated.

C. Performance Tests

The water heater manufacturer is expected to provide partial load thermal efficiency curves. These thermal efficiency curves must include at least three separate curves at various BTU input levels. If these curves are not available, it is the responsibility of the water heater manufacturer to complete the following performance tests:

1. Engage a factory-authorized service representative to inspect component assemblies and equipment installations, including connections, and to conduct performance testing.

2. Water heaters shall comply with performance requirements indicated, as determined by field performance tests. Adjust, modify, or replace equipment to comply.

3. Perform field performance tests to determine capacity and efficiency of water heaters.

a. Test for full capacity.

b. Test for water heater efficiency at [low fire, 20, 40, 60, 80, 100, 80, 60, 40 and 20] percent of full capacity. Determine efficiency at each test point.

4. Repeat tests until results comply with requirements indicated.

5. Provide analysis equipment required to determine performance.

6. Provide temporary equipment and system modifications necessary to dissipate the heat produced during tests if building systems are not adequate.

END OF SECTION 22 04 30

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SECTION 22 04 40 – DOMESTIC WATER BOOSTER PUMP

PART 1 - GENERAL

1.1 GENERAL MECHANICAL PROVISIONS

- A. The preceding General Mechanical Provisions shall form a part of this Section with the same force and effect as though repeated here.

1.2 REFERENCE STANDARDS

The work in this section is subject to the requirements of applicable portions of the following standards:

Hydraulic Institute
ANSI – American National Standards Institute
ASTM – American Society for Testing and Materials
IEEE – Institute of Electrical and Electronics Engineers
NEMA – National Electrical Manufacturers Association
NEC – National Electrical Code
ISO – International Standards Organization
UL – Underwriters Laboratories, Inc.

PART 2 - PRODUCTS

2.1 EQUIPMENT GENERAL REQUIREMENTS

- A. The Equipment General Requirements in Section 23 08 00 shall form a part of this Section with the same force and effect as though repeated here.

2.2 VARIABLE SPEED PACKAGED PUMPING SYSTEM

- A. Furnish and install a pre-fabricated and tested variable speed packaged pumping system to maintain constant water delivery pressure.
- B. The packaged pump system shall be a standard product of a single pump manufacturer. The entire pump system including pumps and pump logic controller, shall be designed, built, and tested by the same manufacturer.
- C. The complete packaged water booster pump system shall be certified and listed by UL (Category QCZJ – Packaged Pumping Systems) for conformance to U.S. and Canadian Standards.
- D. The complete packaged pumping system shall be NSF61 / NSF372 Listed for drinking water and low lead requirements.
- E. The packaged pump system shall be ASHRAE 90.1 – 2010 compliant without the need of a remote mounted sensor. The control logic used to simulate a remote mounted sensor shall be proportional pressure control with squared or linear adaptation. An actual flow rate or calculated flow rate based on performance curves (5th order polynomial) loaded into the controller shall be used to adjust setpoint pressure in proportional pressure control.

2.3 PUMPS

- A. All pumps shall be ANSI NSF 61 / NSF372 Listed for drinking water and low lead requirements.
- B. The pumps shall be of the in-line vertical multi-stage design.
- C. The head-capacity curve shall have a steady rise in head from maximum to minimum flow within the preferred operating region. The shut-off head shall be a minimum of 20% higher than the head at the best efficiency point.
- D. Large In-line Vertical Multi-Stage Pumps (Nominal flows from 130 to 500 gallons per minute) shall have the following features:
- The pump impellers shall be secured directly to the smooth pump shaft by means of a split cone and nut design.
 - The suction/discharge base shall have ANSI Class 125 or Class 250 flange connections in a slip ring (rotating flange) design as indicated in the drawings or pump schedule.
 - Pump Construction.

Suction/discharge base, pump head	Ductile Iron (ASTM 65-45-12)
Shaft couplings, flange rings:	Ductile Iron (ASTM 65-45-12)
Shaft	431 Stainless Steel
Motor Stool	Cast Iron (ASTM Class 30)
Impellers, diffuser chambers, outer sleeve:	304 Stainless Steel
Impeller wear rings:	304 Stainless Steel
Intermediate Bearing Journals:	Silicon Carbide
Intermediate Chamber Bearings:	Leadless Tin Bronze
Chamber Bushings:	Graphite Filled PTFE
O-rings:	EPDM
 - The shaft seal shall be a balanced o-ring cartridge type with the following features:

Collar, Drivers, Spring:	316 Stainless Steel
Shaft Sleeve, Gland Plate:	316 Stainless Steel
Stationary Ring:	Silicon Carbide
Rotating Ring:	Silicon Carbide
O-rings:	EPDM

The Silicon Carbide shall be imbedded with graphite.
 - Shaft seal replacement shall be possible without removal of any pump components other than the coupling guard, motor couplings, motor and seal cover. The entire cartridge shaft seal shall be removable as a one piece component. Pumps with motors equal to or larger than 15 hp (fifteen horsepower) shall have adequate space within the motor stool so that shaft seal replacement is possible without motor removal.

2.4 INTEGRATED VARIABLE FREQUENCY DRIVE MOTORS

- A. Each motor shall be of the Integrated Variable Frequency Drive design consisting of a motor and a Variable Frequency Drive (VFD) built and tested as one unit by the same manufacturer.
- B. The VFD shall be of the PWM (Pulse Width Modulation) design using current IGBT (Insulated Gate Bipolar Transistor) technology.
- C. The VFD shall convert incoming fixed frequency three-phase AC power into a variable frequency and voltage for controlling the speed of motor. The motor current shall closely approximate a sine wave. Motor voltage shall be varied with frequency to maintain desired motor magnetization current suitable for centrifugal pump control and to eliminate the need for motor de-rating.
- D. The VFD shall utilize an energy optimization algorithm to minimize energy consumption. The output voltage shall be adjusted in response to the load, independent of speed.
- E. The VFD shall automatically reduce the switching frequency and/or the output voltage and frequency to the motor during periods of sustained ambient temperatures that are higher than the normal operating range. The switching frequency shall be reduced before motor speed is reduced.
- F. An integral RFI filter shall be standard in the VFD.
- G. The VFD shall have a minimum of two skip frequency bands which can be field adjustable.
- H. The VFD shall have internal solid-state overload protection designed to trip within the range of 125-150% of rated current.
- I. The integrated VFD motor shall include protection against input transients, phase imbalance, loss of AC line phase, over-voltage, under-voltage, VFD over-temperature, and motor over-temperature. Three-phase integrated VFD motors shall be capable of providing full output voltage and frequency with a voltage imbalance of up to 10%.
- J. The integrated VFD motor shall have, as a minimum, the following input/output capabilities:
 1. Speed Reference Signal: 0-10 VDC, 4-20mA
 2. Digital remote on/off
 3. Fault Signal Relay (NC or NO)
 4. Fieldbus communication port (RS485)
- K. The motor shall be Totally Enclosed Fan Cooled (TEFC) with a standard NEMA C-Face, Class F insulation with a temperature rise no higher than Class B.
- L. The cooling design of the motor and VFD shall be such that a Class B motor temperature rise is not exceeded at full rated load and speed at a minimum switching frequency of 9.0 kHz.
- M. Motor drive end bearings shall be adequately sized so that the minimum L10 bearing life is 17,500 hours at the minimum allowable continuous flow rate for the pump at full rated speed.

2.5 PUMP SYSTEM CONTROLLER

- A. The pump system controller shall be a standard product developed and supported by the pump manufacturer.

- 1
2 B. The controller shall be microprocessor based capable of having software changes and
3 updates via personal computer (notebook). The controller user interface shall have a
4 color display with a minimum screen size of 3-1/2" x 4-5/8" for easy viewing of system
5 status parameters and for field programming. The display shall have a back light with
6 contrast adjustment. Password protection of system settings shall be standard.
7
8 C. The controller shall provide internal galvanic isolation to all digital and analog inputs as
9 well as all fieldbus connections.
10
11 D. The controller shall have the ability to be connected to a battery to maintain power on
12 controller during periods of loss of supply power.
13
14 E. The controller shall have built in data logging capability. Logged vales shall be graphically
15 displayed on the controller and able to be exported. A minimum of 3600 samples per
16 logged value with the following parameters available for logging:
17
18 ▪ Estimated flow-rate
19 ▪ Speed of pumps
20 ▪ Inlet pressure
21 ▪ Process Value (usually discharge pressure of differential pressure depending on
22 application)
23 ▪ Power consumption
24 ▪ Controlling parameter (process value)
25
26 F. The controller shall display the following as status readings from a single display on the
27 controller (this display shall be the default):
28
29 • Current value of the control parameter, (typically discharge pressure)
30 • Most recent existing alarm (if any)
31 • System status with current operating mode
32 • Status of each pump with current operating mode and rotational speed as a
33 percentage (%)
34 • Estimated flow-rate, (not requiring flow meter connection)
35
36 G. The controller shall have as a minimum the following hardware inputs and outputs:
37
38 • Three analog inputs (4-20mA or 0-10VDC)
39 • Three digital inputs
40 • Two digital outputs
41 • Ethernet connection
42 • Field Service connection to PC for advanced programming and data logging
43
44 H. Pump system programming (field adjustable) shall include as a minimum the following:
45
46 • Water shortage protection (analog or digital)
47 • Sensor Settings (Suction, Discharge, Differential Pressure analog supply/range)
48 • PI Controller (Proportional gain and Integral time) settings
49 • High system pressure indication and shut-down
50 • Low system pressure indication and shut-down
51 • Low suction pressure/level shutdown (via digital contact)
52 • Low suction pressure/level warning (via analog signal)
53 • Low suction pressure/level shutdown (via analog signal)
54 • Flow meter settings (if used, analog signal)
55

- I. The system controller shall be able to accept up to seven programmable set-points via a digital input, (additional input/output module may be required).
- J. The controller shall have advanced water shortage protection. When analog sensors (level or pressure) are used for water shortage protection, there shall be two indication levels. One level is for warning indication only (indication that the water level/pressure is getting lower than expected levels) and the other level is for complete system shut-down (water or level is so low that pump damage can occur). System restart after shut-down shall be manual or automatic (user selectable).
- K. The system pressure set-point shall be capable of being automatically adjusted by using an external set-point influence. The set-point influence function enables the user to adjust the control parameter (typically pressure) by measuring an additional parameter. (Example: Lower the system pressure set-point based on a flow measurement to compensate for lower friction losses at lower flow rates).
- L. The controller shall be capable of receiving a remote analog set-point (4-20mA or 0-10 VDC) as well as a remote system on/off (digital) signal.
- M. The controller shall be able to adjust the ramp time of a change in set point on both an increase or decrease change in set point.
- N. The pump system controller shall store up to 24 warning and alarms in memory. The time, date and duration of each alarm shall be recorded. A potential-free relay shall be provided for alarm notification to the building management system. The controller shall display the following alarm conditions:
- | | |
|--|---------------------------------|
| High System Pressure | Low system pressure |
| Low suction pressure (warning and alarm) | Individual pump failure |
| VFD trip/failure | Loss of sensor signal (4-20 mA) |
| Loss of remote set-point signal (4-20mA) | System power loss |
- O. The pump system controller shall be mounted in a UL Type 3R rated enclosure. A self-certified NEMA enclosure rating shall not be considered equal. The entire control panel shall be UL 508 listed as an assembly. The control panel shall include a main disconnect, circuit breakers for each pump and the control circuit and control relays for alarm functions.
- Control panel options shall include, but not be limited to:
- | | |
|---|-----------------------------|
| Pump Run Lights | System Fault Light |
| Audible Alarm (80 db[A]) | Surge Arrestor |
| Emergency/Normal Operation Switches | Service Disconnect Switches |
| Qty (9) Configurable Digital Outputs available for monitoring | |
- P. The controller shall be capable of receiving a redundant sensor input to function as a backup to the primary sensor (typically discharge pressure).
- Q. The controller shall have a pump "Test Run" feature such that pumps are switched on during periods of inactivity (system is switched to the "off" position but with electricity supply still connected). The inoperative pumps shall be switched on for a period of two to three (3-4) seconds every 24 hours, 48 hours or once per week and at specific time of day (user selectable).
- R. The controller shall be capable of changing the number of pumps available to operate or have the ability limit the maximum power consumption by activation of a digital input for purposes of limited generator supplied power.

- 1
2 S. The controller shall be capable of displaying instantaneous power consumption (Watts or
3 kilowatts) and cumulative energy consumption (kilowatt-hours).
4
5 T. The controller shall be capable of displaying instantaneous specific energy use
6 (kW/gpm), (optional flow meter must be connected).
7
8 U. The actual pump performance curves (5th order polynomial) shall be loaded (software)
9 into the pump system controller. Pump curve data shall be used for the following:
10
11 a. Display and data logging of calculated flow rate (not requiring flow measurement)
12 b. Proportional pressure control
13 c. Pump outside of duty range protection
14 d. Pump cascade control based on pump efficiency
15
16 V. The controller shall be capable of displaying an estimated flow-rate on the default status
17 screen.
18
19 W. The controller shall have proportional pressure control to compensate for pipe friction
20 loss by decreasing pressure set-point at lower flow-rates and increasing pressure set-
21 point at higher flow-rates by using actual flow rate or calculated flow rate. Proportional
22 pressure control that uses pump speed or power consumption only shall not be
23 considered equal to proportional pressure control that uses actual or calculated flow rate.
24
25 X. The controller shall have the ability to communicate common field-bus protocols,
26 (BACnet, Modbus, Profibus, and LON), via optional communication expansion card
27 installed inside controller.
28
29 Y. The controller shall have Ethernet connection with a built in server allowing for
30 connection to a network with read/write access to controller via web browser and internet.
31
32 Z. The controller shall have a programmable Service Contact Field that can be populated
33 with service contact information including: contact name, address, phone number(s) and
34 website.
35

36 2.6 SEQUENCE OF OPERATION

- 37
38 A. The system controller shall operate equal capacity variable speed pumps to maintain a
39 constant discharge pressure or differential pressure (system set-point), depending on the
40 application. The system controller shall receive an analog signal [4-20mA] from the
41 factory installed pressure transducer on the discharge manifold, indicating the actual
42 system pressure.
43

44 Standard Cascade Control (Pumping Efficiency Based):

45 The pump system controller shall adjust pump speed as necessary to maintain system
46 set-point pressure as flow demand increases. Utilizing the pump curve information (5th
47 order polynomial), the pump system controller shall stage on additional pumps when
48 pump hydraulic efficiency will be higher with additional pumps in operation. Exception:
49 When the flow and head are outside the operating pump(s) allowable operating range the
50 controller shall switch on an additional pump thus distributing flow and allowing all
51 pump(s) to operate in allowable operating range. When the system pressure is equal to
52 the system set-point, all pumps in operation shall reach equal operating speeds. The
53 pump system controller shall have field adjustable Proportional Gain and Integral time
54 (PI) settings for system optimization.
55

- B. The system controller shall be capable of switching pumps on and off to satisfy system demand without the use of flow switches, motor current monitors or temperature measuring devices.
- C. All pumps in the system shall alternate automatically based on demand, time and fault. If flow demand is continuous (no flow shut-down does not occur), the system controller shall have the capability to alternate the pumps every 24 hours, every 48 hours or once per week. The interval and actual time of the pump change-over shall be field adjustable.
- D. The system controller shall be able to control a pressure maintenance pump, (jockey pump), in the system in pressure boosting applications. The set point of the pressure maintenance pump shall be able to be any value above or below the pump system's set point. The pressure maintenance pump shall be able to be staged on as back-up pump when capacity of pump system is exceeded.

2.7 LOW FLOW STOP FUNCTION (Constant Pressure Applications)

The system controller shall be capable of stopping pumps during periods of low-flow or zero-flow without wasting water or adding unwanted heat to the liquid. Temperature based no flow shut-down methods that have the potential to waste water and add unwanted temperature rise to the pumping fluid are not acceptable and shall not be used.

Standard Low Flow Stop and Energy Saving Mode

If a low or no flow shut-down is required (periods of low or zero demand) a bladder type diaphragm tank shall be installed with a pre-charge pressure of 70% of system set-point. The tank shall be piped to the discharge manifold or system piping downstream of the pump system. When only one pump is in operation the system controller shall be capable of detecting low flow (less than 10% of pump nominal flow) without the use of additional flow sensing devices. When a low flow is detected, the system controller shall increase pump speed until the discharge pressure reaches the stop pressure (system set-point plus 50% of programmed on/off band, adjustable). The pump shall remain off until the discharge pressure reaches the start pressure (system set-point minus 50% of programmed on/off band, adjustable). Upon low flow shut-down a pump shall be restarted in one of the following two ways:

- A. Low Flow Restart: If the low flow condition still exists, the pump shall start and the speed shall again be increased until the stop pressure is reached and the pump shall again be switched off.
- B. Normal Flow Restart: If the pump system controller determines a low flow condition no longer exists the pump shall start and the speed shall be increased until the system pressure reaches the system set-point.

2.8 SYSTEM CONSTRUCTION

- A. Suction and discharge manifold construction shall be in way that ensures minimal pressure drops, minimize potential for corrosion, and prevents bacteria growth at intersection of piping into the manifold. Manifold construction that includes sharp edge transitions or interconnecting piping protruding into manifold is not acceptable. Manifold construction shall be such that water stagnation can not exist in manifold during operation to prevent bacteria growth inside manifold.
- B. The suction and discharge manifolds material shall be 316 stainless steel. Manifold connection sizes shall be as follows:

3 inch and smaller: Male NPT threaded

- 1 4 inch through 8 inch: ANSI Class 150 rotating flanges
2 10 inch and larger: ANSI Class 150 flanges
3
4 C. Pump Isolation valves shall be provided on the suction and discharge of each pump.
5 Isolation valve sizes 2 inch and smaller shall be nickel plated brass full port ball valves.
6 Isolation valve sizes 3 inch and larger shall be a full lug style butterfly valve. The valve
7 disk shall be of stainless steel. The valve seat material shall be EPDM and the body
8 shall be cast iron, coated internally and externally with fusion-bonded epoxy.
9
10 D. A spring-loaded non-slam type check valve shall be installed on the discharge of each
11 pump. The valve shall be a wafer style type fitted between two flanges. The head loss
12 through the check valve shall not exceed 5 psi at the pump design capacity. Check
13 valves 1-1/2" and smaller shall have a POM composite body and poppet, a stainless steel
14 spring with EPDM or NBR seats. Check valves 2" and larger shall have a body material
15 of stainless steel or epoxy coated iron (fusion bonded) with an EPDM or NBR resilient
16 seat. Spring material shall be stainless steel. Disk shall be of stainless steel or leadless
17 bronze.
18
19 E. For systems that require a diaphragm tank, a connection of no smaller than 3/4" shall be
20 provided on the discharge manifold.
21
22 F. A pressure transducer shall be factory installed on the discharge manifold (or field
23 installed as specified on plans). Systems with positive inlet gauge pressure shall have a
24 factory installed pressure transducer on the suction manifold for water shortage
25 protection. Pressure transducers shall be made of 316 stainless steel. Transducer
26 accuracy shall be +/- 1.0% full scale with hysteresis and repeatability of no greater than
27 0.1% full scale. The output signal shall be 4-20 mA with a supply voltage range of 9-32
28 VDC.
29
30 G. A bourdon tube pressure gauge, 2.5 inch diameter, shall be placed on the suction and
31 discharge manifolds. The gauge shall be liquid filled and have copper alloy internal parts
32 in a stainless steel case. Gauge accuracy shall be 2 1/2 %. The gauge shall be capable
33 of a pressure of 30% above its maximum span without requiring recalibration.
34
35 H. Systems with a flooded suction inlet or suction lift configuration shall have a factory
36 installed water shortage protection device on the suction manifold.
37
38 I. The base frame shall be constructed of corrosion resistant 304 stainless steel. Rubber
39 vibration dampers shall be fitted between each pumps and baseframe to minimize
40 vibration.
41
42 J. Depending on the system size and configuration, the control panel shall be mounted in
43 one of the following ways:
44
45 On a 304 stainless steel fabricated control cabinet stand attached to the system skid.
46 On a 304 stainless steel fabricated skid, separate from the main system skid
47 On its own base (floor mounted)

48 2.9 TESTING

- 49
50 A. The entire pump station shall be factory tested for functionality. Functionality testing shall
51 include the following parameters: Dry Run Protection, Minimum Pressure and Maximum
52 Pressure alarms (where applicable), Setpoint Operation, and Motor Rotation.
53
54 B. The system shall undergo a factory hydrostatic test at the end of the production cycle.
55 The system shall be filled with water and pressurized to 1.5 times the nameplate
56 maximum pressure. Systems with 150# flange connections shall be tested at 350 psig,

and systems with 300# flange connections shall be tested at 450 psig. The pressure shall be maintained for a minimum of 15 minutes with no leakage (slight leakage around pump(s) mechanical seal is acceptable) prior to shipment.

2.10 WARRANTY

- A. The warranty period shall be a non-prorated period of 24 months from date of installation, not to exceed 30 months from date of manufacture.

PART 3 - EXECUTION

3.1 EQUIPMENT INSTALLATION

- A. The Equipment Installation Requirements in Section 23 08 00 shall form a part of this Section with the same force and effect as though repeated here.

END OF SECTION 22 04 40

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SECTION 22 04 50 – LIFT STATIONS

PART 1 - GENERAL

1.1 GENERAL MECHANICAL PROVISIONS

The preceding General Mechanical Provisions shall form a part of this Section with the same force and effect as though repeated here.

PART 2 - PRODUCTS

2.1 EQUIPMENT GENERAL REQUIREMENTS

The Equipment General Requirements in Section 23 08 00 shall form a part of this Section with the same force and effect as though repeated here.

FOR LIFT STATION SP-1

2.2 OPERATING CONDITIONS:

The submersible pump shall be capable of handling commercial sewage and grinding it to a fine slurry, enabling it to be pumped in pipelines as small as 1.25" in diameter.

2.3 CONSTRUCTION:

The pump castings shall be constructed of class 25 cast iron. The motor housing shall be oil filled to dissipate heat. All mating parts shall be machined and sealed with a Buna-N O-ring. All fasteners exposed to the liquid shall be stainless steel. The motor shall be protected on the top side with sealed cord entry plate with molded pins to conduct electricity eliminating the ability of water to enter internally through the cord. The motor shall be protected on the lower side with a dual seal arrangement. The first seal is a double lip seal molded in elastomeric rubber.

The second / main seal shall be a unitized hard face silicon carbide seal with stainless steel housings and spring.

The pump shall be furnished with stainless steel handle.

2.4 MOTORS

All motors shall be oil filled, class B insulated NEMA B design, rated for continuous duty. Air filled motors will not be considered equal. Three phase motors shall be used with an appropriate controller with integral overload protection.

2.5 BEARINGS AND SHAFT

An upper radial and lower thrust bearing shall be required. The upper bearing shall be a single ball / race type bearing. The lower bearing shall be an angular contact heavy duty ball / race type bearing, designed to handle axial grinder pump thrust loads. Both bearings shall be permanently lubricated by the oil, which fills the motor housing. The bearing system shall be

designed to enable proper cutter alignment. The motor shaft shall be made of 300 or 400 series stainless steel and have a minimum diameter of .670".

2.6 SEALS

The pump shall have a dual seal arrangement consisting of a lower and upper seal to protect the motor from the pumping liquid. The lower seal shall be a elastomeric rubber molded double lip seal, designed to exclude foreign material away from the main upper seal. The upper seal shall be a unitized silicon carbide hard face seal with stainless steel housings and spring equal to Crane Type T-6a. The motor plate / housing interface shall be sealed with a Buna-N O-ring.

2.7 IMPELLER

The impeller shall be an investment cast stainless steel impeller, with pump out vanes on the back shroud to keep debris away from the seal area. It shall be keyed and bolted to the motor shaft.

2.8 CUTTER MECHANISM

The cutter and plate shall consist of 440 stainless steel with a Rockwell C hardness of 55-60. The stationary cutter plate shall have specially designed orifices through it, which enable the slurry to flow through the pump housing at an equalized pressure and velocity. The stationary cutter plate shall consist of V shapes to maximize cutting action and arc shape exclusion slots to outwardly eject debris from under the rotary cutter. The rotary cutter shall have (4) blades and be designed with a recessed area behind the cutting edge to prevent the accumulation and binding of any material between rotary cutter and the stationary cutter plate. The cutting system shall incorporate close tolerances for optimum performance. Ring or radial cutters, or those that grind on the outside circumference will not be considered equal.

2.9 PAINT

The exterior of the casting shall be protected with Powder Coat paint.

2.10 SUPPORT

The pump shall have cast iron support legs, enabling it to be a free standing unit. The legs shall be high enough to allow solids and long stringy debris to enter the cutter assembly.

2.11 FACTORY ASSEMBLED TANK SYSTEMS WITH GUIDE RAIL AND QUICK DISCONNECT DISCHARGE

Factory mounted rail system with pump suspended by means of bolt on quick disconnect which is sealed by means of nitrite grommets. The discharge piping shall be schedule 80 PVC and furnished with a PVC shut-off ball valve. The tank shall be wound fiberglass. A cast iron inlet hub shall be provided with the fiberglass systems.

2.12 TESTING

The pump shall have a ground continuity check and the motor chamber shall be Hi-potted to test for electrical integrity, moisture content and insulation defects. The motor and volute housing shall be pressurized, and an air leak decay test shall be performed to ensure integrity of the motor housing. The pump shall be run, voltage current monitored, and tests performed for other malfunctions.

2.13 QUALITY CONTROL

The pump shall be manufactured in an ISO 9001 certified facility.

2.14 WARRANTY

Standard limited warranty shall be 3 years.

FOR LIFT STATION SP-2

2.16 OPERATING CONDITIONS:

The submersible pump shall be capable of handling 2" solids enabling pumping in pipelines as small as 2" in diameter.

2.17 CONSTRUCTION:

The castings shall be constructed of class 25 cast iron. The motor housing shall be oil filled to dissipate heat. All mating parts shall be machined and sealed with a Buna-N o-ring. All fasteners exposed to the liquid shall be stainless steel. The motor shall be protected on the top side with sealed cord entry plate with molded pins to conduct electricity eliminating the ability of water to enter internally through the cord. The motor shall be protected on the lower side with a dual seal arrangement. The first seal is a double lip seal molded in FKM fluoroelastomer or Buna N.

The second / main seal shall be a unitized hard face silicon carbide seal with stainless steel housings and spring. The upper and lower bearing shall be capable of handling all radial thrust loads. The lower bearing shall have the additional ability to handle the downward axial thrust produced by the impeller by design of angular contact roller races. The pump housing shall be of the concentric design thereby equalizing the pressure forces inside the housing which will extend the service life of the seals and bearings. The pump shall be furnished with stainless steel handle.

PART 3 - EXECUTION

3.1 EQUIPMENT INSTALLATION

The Equipment Installation Requirements in Section 23 08 00 shall form a part of this Section with the same force and effect as though repeated here.

END OF SECTION 22 04 50

SECTION 23 08 00 - HEATING, VENTILATING AND AIR CONDITIONING

PART 1 - GENERAL

1.1 GENERAL MECHANICAL PROVISIONS

- A. The preceding General Mechanical Provisions shall form a part of this Section with the same force and effect as though repeated here.

1.2 SCOPE

- A. Included: Provide all labor, materials and services necessary for complete, lawful and operating systems as shown or noted on the drawings or as specified here. The work includes, but is not necessarily limited to, the following:

1. Air distribution system.
2. All equipment as shown or noted on the drawings or as specified.
3. Circulating water system.
4. System energy balance.
5. Coordinate with Section 25 09 00 (Direct Digital Control System) regarding location and installation of system sensors, valves, actuators, etc. and to provide simultaneous start-up.
6. Refrigeration system.
7. Steam system.
8. Demolition as indicated on drawings. Where demolition is called for, remove all equipment, piping, ductwork, braces, supports, housekeeping pads, temperature controls and related items no longer required.

B. Work Specified Elsewhere:

1. Line voltage power wiring to equipment, motor starters in motor control centers, disconnect switches and installation of all starters are included in the Electrical Sections, unless otherwise noted.
2. Connection of gas, condensate drains and domestic water to equipment.
3. Access doors.
4. Concrete and reinforcing steel unless specifically called for in the drawings or specifications.
5. Painting unless specifically called for in the drawings or specifications.
6. Carpentry.
7. Direct Digital Control System.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Hot or Chilled Water Piping:

1. Above Grade:
 - a. 2" and Smaller: Schedule 40 black steel pipe, ASTM A53. 150 psi black malleable iron screwed fittings, ANSI B16.3.
 - b. 2-1/2" Through 4": Screwed pipe as above -OR- welded or grooved pipe

as below.

- c. 6" and Larger: Schedule 40 black steel pipe, ASTM A53. Standard weight carbon steel welding fittings, long radius ells, ANSI B16.9. Exposed joints may be grooved pipe unions, EPDM gaskets. Grinnell, Victaulic.

2. Below Grade Chilled Water:

- a. General: Underground chilled water piping shall be Chill-Therm, as manufactured by Thermacor Process. All straight sections, fittings and other accessories shall be factory-fabricated to job dimensions. Each system layout shall be analyzed by the piping system manufacturer to determine stress on the carrier pipe and anticipated thermal movement. Provide manufacturer's shop drawings with dimensioned piping layout and details of all expansion fittings, elbows, building entry points and all other pertinent information needed to verify that the type of materials being offered is in accordance with the specifications.

- b. Chilled Water Piping: Pre-insulated. Schedule 40 PVC core. 1" (min) foamed polyurethane insulation. HDPE jacket. Sealed ends. Fittings shall be Schedule 80 PVC, solvent welded. Field joints and fittings shall be field insulated with foamed polyurethane, applied using factory mold. Use pressure sensitive tape for closures.

3. Below Grade Hot Water Piping:

- a. General: Underground hot water piping shall be Ferro-Therm, as manufactured by Thermacor Process. All straight sections, fittings and other accessories shall be factory-fabricated to job dimensions. Each system layout shall be analyzed by the piping system manufacturer to determine stress on the carrier pipe and anticipated thermal movement. The system design shall be in conformance with ANSI B31.1. Provide manufacturer's shop drawings with dimensioned piping layout and details of all expansion fittings, elbows, building entry points and all other pertinent information needed to verify that the type of materials being offered is in accordance with the specifications.

- b. Jacket: Seamless high density polyethylene (HDPE) in accordance with ASTM D1248, Type 3, Class C. Minimum jacket thickness shall be 125 mils.

- c. Carrier Pipe: ASTM A-53, Grade B, electric-resistance welded black steel with beveled ends for field welded joints. Schedule 40. Butt welding fittings shall conform to ANSI Standard B16.9.

- d. Insulation: Polyurethane foam completely filling the annular space between the carrier pipe and the outer jacket to a minimum thickness of 1.38 inch. The in-place density shall be 2 pounds per cubic foot; the thermal conductivity factor shall be 0.15 BTU/(Hr.)(Sq. Ft.)(°F/in.); and shall have a closed cell content of 90%. Exposed insulation at unit ends shall be sealed with factory applied high temperature elastomer vapor barrier sealant.

- e. Fittings: Fittings shall be factory fabricated and preinsulated with polyurethane foam insulation. The insulation shall be protected with a 1-

piece, seamless, molded HDPE jacket of the same type, thickness and quality as that of the straight units of preinsulated pipe. Field fabrication, alteration or insulation of fittings is not permitted.

- f. Expansion Fittings and Elbows: Prefabricated expansion fittings, elbows and tees shall be furnished and installed where shown. Preinsulated fittings that must provide compensation for pipe expansion and/or contraction shall be externally insulated with flexible polyurethane foam insulation. The straight units adjoining expansion fittings shall also be insulated with flexible polyurethane foam insulation to the extent shown on the drawings. Expansion fittings and elbows shall be properly designed in accordance with stress limits indicated by ANSI B31.1 Code for Pressure Piping. The pipe manufacturer shall furnish pipe stress calculations and expansion details stamped by a registered professional engineer showing that the piping design meets this code.

4. Valves and Specialties:

a. Valves:

- 1) General: Manufacturer's model numbers are listed to complete description. Equivalent models of Crane, Milwaukee, Nibco, Stockham, Walworth or Victaulic (grooved joint systems only) are acceptable. All valves of a particular type or for a particular service shall be by the same manufacturer. Ball valves may be substituted for 2" and smaller gate valves above grade. Butterfly valves may be substituted for 2-1/2" and larger gate valves above grade; see specification below.
- 2) Gate Valve: Provide 2" extension necks at insulated pipes, where required. 2" and Smaller: All bronze. Rising stem. Union bonnet. Wedge disk. Screwed connection. Malleable iron handwheel. Class 125. Stockham B-105. 2-1/2" and Larger: Iron body, bronze mounted. Non-rising stem. Wedge disk. Class 125. Flanged or AWWA hub end as applicable. Stockham G-612. Underground valves shall have square operating nut. Provide one operating "T" handle for underground valves.
- 3) Butterfly Valve: Iron threaded lug body. Aluminum bronze disk. O-ring seals. Resilient, removable seat. 416 stainless steel shaft. 6" and smaller valves shall have multi-position lever handle. 8" and larger valves shall have gear operator. Provide 2" extension neck at insulated pipes. Demco Series NE, Stockham.
- 4) Plug Valve: 4" and Smaller: Eccentric bronze or nickel plated semi-steel plug, semi-steel body, bronze bushings, Buna-N-rings. 175 psi WOG. DeZurik Series 400. 6" and Larger: Lubricated plug cock. Cast iron or semi-steel body and plug. 200 psi WOG. Flanged connections. Wrench handle. Provide one operating "T" handle for underground valves. Resun R-1431.
- 5) Check Valve: Non-slam, lift type. Replaceable bronze seat, disk and bushings. Stainless steel helical spring. Disk guided at top and bottom. Flow area through valve shall exceed cross sectional area of pipe. 150 psi WOG. CPV, Muessco. 2" and Smaller: Shall

be screwed brass with hand lapped bronze disk. 2-1/2" and
Larger: Shall be iron body, wafer or flanged with resilient Buna-N
or TFE facing on seat.

6) Ball Valve: Full port. Bronze body, cap, stem, disk and ball.
Screwed connection. Lever handle. TFE seat. O-ring seals. 300
psi WOG. Apollo, Jomar.

7) Globe Valve: 2" and Smaller: All bronze. Renewable TFE disk.
Screwed connection. Malleable iron handwheel. Union bonnet.
Class 150. Stockham B-22. 2-1/2" and Larger: Iron body, flanged.
Bronze mounted. Class 125. Rising stem. Bolted bonnet.
Renewable seat and disk. Stockham G-512.

8) Valve Box: Pre-cast reinforced concrete. Cast iron lid marked for
services. Christy F22 in foot traffic areas; G5 in roadways.

b. Instruments:

1) Pressure Gage: Phosphor bronze tube. Bronze bushed. 1%
accuracy. Cast aluminum case. 3-1/2" white dial. Adjustable
pointer. Operating pressure at midscale. 1/4" NPT brass socket.
Provide brass porous core pressure snubber and gage cock.
Terice, Weksler, Winters.

2) Thermometer: 3" dial. Glass window. Stainless steel case. Back or
bottom connected as required. 1/2" NPT. 20-240F, 2F divisions for
hot water, 25-125F, 2F divisions for chilled water. 2" insertion
length. Allowance shall be made for insulation thickness. Weksler.

3) Thermometer Well: Brass well. Suitable for 3" dial thermometer
above. Provide 2" extension at insulated pipes.

4) Gage Cock: Lever handle brass cock. 1/4" NPT connections.
Provide 2" extension at insulated pipes.

5) Instrument Well: Suitable for temperature sensing element.
Coordinate with supplier of temperature controls.

6) Flow Switch: Paddle type. McDonnell No. FS4-3.

c. Miscellaneous Specialties:

1) Pressure Relief Valve: Bronze body. ASME rated fully automatic,
reseating pressure relief valve sized in accordance with energy
input. 75 psig rating. Bell and Gossett.

2) Union: 2" and Smaller: AAR malleable iron, bronze to iron ground
seat. 300 psi. Size 2-1/2" and Larger: Grooved pipe, synthetic
gasket, malleable iron housing. Victaulic Style 77, type "E" gasket.

3) Pressure Reducing Valve: Brass body. Diaphragm operated.
Brass internal parts. Reducing valve shall have a built-in strainer
and check valve and have a field adjustable range of 25-60 psi
and a 125 psi maximum working pressure. Bell and Gossett.

4) Balancing Cock: Calibrated all bronze balancing valve. Screwed connections. Memory stop. Position indicator. Drain connection. Taps for differential pressure gage, with check valves or shutoffs. 125 psi working pressure. Internal seals. Preformed insulation block. FlowSet by Flow Design, Inc.

5) Strainer: "Y" type, 125 psi. Machined seats. Stainless steel screens. Provide gate valve blowoff with hose threads. Bailey, Muessco.

2" and Smaller: Screwed bronze body. Perforation size 0.057".

2-1/2" and Larger: Flanged iron body, perforation size as follows:

<u>Pipe Size</u>	<u>Perforation Dia.</u>
2-1/2" - 3"	1/16"
4" - 6"	3/32"
8" and Larger	1/8"

6) Dielectric Coupling: Insulating union or flange rated for 250 psig. EPCO, Victaulic Clearflow (grooved joint system only).

7) Suction Diffuser: Cast iron angle type body with inlet vanes and combination diffuser/strainer/orifice cylinder with 3/16" openings. Provide fine mesh start-up strainer (to be removed after 30 days of operation). Strainer free area to be not less than five times the sectional area of pump connection. Adjustable support foot, drain tapping and gage tapping. Bell and Gossett, Taco, Thrush.

8) Expansion Tank: Pressurized diaphragm type. Welded steel, ASME code construction with ASME stamp and certification, 125 psi, 240F. Sealed elastomer diaphragm. Pre-charged with air to initial fill pressure of system. Base or saddle as required for mounting. Sight glass (hot water service only). Amtrol, Taco.

9) Flexible Connection: 2" and Smaller: Screwed connection. Corrugated bronze core covered with high tensile bronze tubular braid. 150 psi working pressure. Flexonics, Keflex. 2-1/2" and Larger: Contoured, molded Teflon bellows. Minimum of three convolutions. Monel reinforcing rings. Limit bolts. Flanged connection. 100 psi working pressure. Belmont, Resistoflex. -Or- Multiple laminations of 321 stainless steel. 150 psi working pressure. Limit bolts. Flanged connection. Hyspan Series 5500.

B. Condenser Water Piping:

1. 4" and Smaller: Schedule 40 galvanized steel pipe, ASTM A53. 150 psi galvanized malleable iron screwed fittings, ANSI B16.3.
2. 6" and Larger: Schedule 40 black steel pipe, ASTM A53. Standard weight carbon steel welding fittings, long radius ells, ANSI B16.9. Joints above grade may be grooved pipe unions, EPDM gaskets. Grinnell, Victaulic.

3. Valves and Specialties: Same as for chilled water piping.
- C. Flue Piping: Per the recommendations of the manufacturer of the equipment item being served.
- D. Refrigerant Piping:
 1. Piping: Hard drawn Type ACR copper, dried and capped. Wrought copper fittings, silver alloy brazed, 1100F, Silfos. Size 3/8" and smaller shall be refrigerant tube, ASTM B280.
 2. Valves and Specialties:
 - a. Line Valve: Bronze body, ball type. TFE locked in seals. Back seated valve stem. Contromatics C-11.
 - b. Filter-Drier: Replaceable core. Capacity in accordance with ARI Standard 710. Sporlan "Catch-All".
 - c. Moisture Indicator - Sight Glass: Double port. Henry, Sporlan.
 - d. Vibration Isolating Connection: Seamless flexible bronze tubing, braid covered. Suitable for system pressure. American.
 - e. Solenoid Valve: Full line size. Sporlan.
- E. Steam Piping:
 1. Steam Supply, Condensate Return, Boiler Feed and Make-Up Feed Water Piping:
 - a. 2" and Smaller Above Grade: Schedule 40 black steel pipe, ASTM A53. Low pressure fittings (less than 15 psig) shall be 125 psi cast iron screwed. High pressure fittings (15 psig and greater) shall be 250 psi cast iron screwed. All blowdown and relief piping shall be Schedule 80.
 - b. 2-1/2" and Larger Above Grade: Schedule 40 black steel pipe, ASTM A53. Standard weight carbon steel welding fittings, long radius ells, ANSI B16.9. Flanges shall be suitable for highest possible pressure. All blowdown piping shall be Schedule 80.
 - c. Steam Supply Below Grade or In Trench:
 - 1.1 Factory pre-insulated steel piping. The piping system shall be of the drainable, dryable, testable type, suitable for all ground water conditions.
 - 1.2 The pipe manufacturer shall make a complete layout of the system showing anchors, expansion provisions, and building entrance details. Means for expansion must be made in pipe off-sets or loops unless this is compensated for integrally in the system.
 - 1.3 The system shall be Class "A" STEEL as manufactured by Thermacor Process Inc.
 - 2.1 The conduit shall be 10 gauge, welded, smooth-wall black steel

conforming to A-134, A-135, and A-139. Conduit shall be tested at the factory to insure air and watertight welds prior to any fabrication or application of coating. The outside conduit surface shall be blasted to clean, bright metal. Immediately after blasting, the outer conduit surface shall be given a factory coat of NOVACOAT. Coating application shall be a minimum of 30 mils thickness.

2.2 Conduit closures shall be 10 gauge steel, furnished with the conduit at a ratio of one closure for each fabricated item or length. Closures shall be field welded over adjacent units after pipe insulation. After testing, all exposed closures shall be covered in the field with a heat shrinkable sleeve, furnished with the conduit.

2.3 Piping shall be Sch. 40, black steel, ASTM A53.

2.4 The pipe insulation shall be calcium silicate as specified elsewhere in this section.

2.5 Pre-fabricated ells and tees shall be furnished and installed where shown on plans and shall consist of pipe, insulation, and conduit conforming to the same specification as stated for straight runs. Expansion loops or expansion devices shall be designed by the manufacturer of the piping.

2.6 Terminal ends at building walls shall be equipped with end seals consisting of a 1/2" steel bulk head plate welded to the pipe and conduit. If there is no anchor within five feet of a terminal end, conduits shall be equipped with gland seals consisting of a packed stuffing box and gland follower mounted on a steel plate welded to the end of the conduit. End seals or gland seals shall be equipped with drain and vent openings. Terminate all conduits 2" beyond the inside face of building walls.

2.7 Pre-fabricated anchors shall be furnished and installed as indicated by the manufacturer and shall consist of a steel plate, welded to pipe and conduit. The steel anchor plate shall be 1/2" thick and shall be 8" larger horizontally and 8" larger vertically than nominal conduit diameter.

2.8 Wall sleeves with leak plates shall be provided at all building entries to provide an effective moisture barrier. The wall sleeve and leak plate shall be electrically isolated from building rebar. The space between the conduit and wall sleeve shall be made watertight by use of Link-Seal® pipe penetration seals or equal assemblies, which will also provide electrical isolation.

3.1 The conduit shall be air tested at 15 psi for two hours. Repair any carrier pipe leaks and retest prior to making field closure. Holiday testing of the conduit shall be the responsibility of the contractor under the directions furnished by the manufacturer. Holiday test the 30 mil Novacoat coating at 3750+/- 10%, volts. All holidays shall be recoated and retested.

d. Condensate Below Grade or In Trench: All condensate piping below grade or in a trench shall be Ferro-Therm, as specified for below grade hot water piping, except that the steel piping shall be Schedule 80.

2. Valves and Specialties: Manufacturer's model numbers are listed to complete description. Equivalent models of Crane, Grinnell, Milwaukee, Nibco, Stockham or Walworth are acceptable. All valves of a particular type or for a particular service shall be by the same manufacturer.
 - a. Low Pressure Valves (less than 15 psig):
 - 1) Gate Valve: 2" and Smaller: Rising stem, union bonnet, all bronze, wedge disk, screwed connection, malleable iron handwheel, Class 125, Stockham B-105. 2-1/2" and Larger: Iron body, bronze mounted non-rising stem, flanged, Class 125, Stockham G-612.
 - 2) Globe Valve: 2" and Smaller: Plug type. Renewable stainless steel disk and seat, with 500 BHN. Screwed connection. Malleable iron handwheel. Class 200, Stockham B-62. 2-1/2" and Larger: Iron body, flanged. Bronze mounted. Rising stem. Bolted bonnet. Renewable TFE seat and disk. Class 125. Stockham G-514T.
 - 3) Check Valve: 2" and Smaller: Screwed brass. Swing style. Class 125. Regrindable seat. Stockham B-319. 2-1/2" and Larger: Iron body, bronze mounted. Swing style. Flanged. Class 125, Stockham G-931.
 - b. Medium and High Pressure Valves (15 psig and greater):
 - 1) Gate Valve: 2" and Smaller: Rising stem, union bonnet, all bronze, wedge disk, screwed connection, malleable iron handwheel, Class 200, Stockham B-135. 2-1/2" and Larger: Iron body, bronze mounted, rising stem, OS & Y, flanged, Class 250, Stockham F-667.
 - 2) Globe Valve: 2" and Smaller: Plug type. Renewable stainless steel disk and seat, with 500 BHN. Screwed connection. Malleable iron handwheel. Class 200, Stockham B-62. 2-1/2" and Larger: Iron body. Bronze mounted. Rising stem. Bolted bonnet. Renewable seat and disk. Class 250. Stockham F-532.
 - 3) Check Valve: 2" and Smaller: Screwed brass. Swing style. Regrindable seat. Class 200, Stockham B-345. 2-1/2" and Larger: Iron body, bronze mounted. Swing style. Flanged. Class 250, Stockham F-947.
 - c. Union: AAR malleable iron, bronze to iron ground seat. Class 300.
 - d. Pressure Gage: Brass bourdon tube, cast aluminum case, rotary stainless steel and delrin movement, 3-1/2" white dials, Terice #500X. Bronze shut-off cock and siphon. Range for operating pressure at midscale. Provide plug in shutoff cocks that do not have gages.
 - e. Steam Trap: Less than 15 psig: Float and thermostatic type, 125 psig rated, with cast iron body and stainless steel trim, Sarco FT. 15 psig and greater: Inverted bucket type, 250 psig rated, with cast iron body and stainless steel trim, Sarco B.
 - f. Strainer: "Y" type with bronze strainer, gasket cover, Bailey. Locate on

steam lines preceding each trap, steam valve and elsewhere as indicated.

g. Steam Expansion Joints: Less than 250°F temperature and 3" and smaller pipe size, Flexonics Model H. 250°F temperature or greater and 4" and greater, Flexonics Controlled Flexing expansion joint.

h. Steam Pressure Reducing Valve: Pilot actuated, diaphragm operated valve. Hardened stainless steel trim. Cast semi-steel body. Removable valve head. Sarco 25 series.

F. Miscellaneous Piping Items:

1. Pipe Support:

a. Pipe Hanger: Steel "J" hanger with side bolt for piping 4" and smaller; steel clevis hanger for piping 5" and larger. Load and jam nuts. Size and maximum load per manufacturer's recommendations. Felt liner for copper piping. Hanger and rod shall have galvanized finish. B-Line, Unistrut.

b. Insulation Support: Calcium silicate insulation, 100 psi, or heavy density fiberglass, 100 psi. Insulation thickness equal to adjoining pipe insulation. Steel support shield or saddle. Provide vapor barrier for chilled water piping. Insulation and/or vapor barrier shall extend 1" beyond steel support. Pipe hanger in accordance with paragraph above. Increase hanger size per manufacturer's recommendation. B-Line, Pipe Shields, Inc., Uni-Grip.

c. Isolating Shield: Galvanized steel shell and reinforcing ribs. 1/4" non-conducting hair felt pad. Pipe hanger in accordance with paragraph above. Increase hanger size per manufacturer's recommendation. B-Line, Semco.

d. Construction Channel: 12-gage, 1-5/8" x 1-5/8" galvanized steel channel. Single or multiple section. Self-locking nuts and fittings. B-Line, Unistrut.

2. Flashing: Flashing for piping through roof shall be prefabricated galvanized steel roof jacks with 16" square flange around pipe. Provide clamp-on storm collar and seal water tight with mastic. Maintain dielectric separation between copper and galvanized materials. For cold process built-up roof, material shall be 4 lb/ft² lead instead of galvanized steel.

2.2 PIPING INSULATION MATERIALS

A. General: All piping insulation materials shall have fire and smoke hazard ratings as tested under ASTM E-84 and UL 723 not exceeding a flame spread of 25 and smoke developed of 50.

B. Pre-Molded Fiberglass: Heavy density sectional pre-molded fiberglass with vapor barrier laminated all service jacket and pressure sealing vapor barrier lap. Thermal conductivity shall not exceed 0.25 Btu-in/hr-ft²-°F at a mean temperature of 50°F. Perm rating 0.02, ASTM E96. Puncture rating 50 Beach units, ASTM D781. Provide 3" (min.) wide tape of same material as lap for butt joints. 1" thickness for chilled water piping. For hot water piping 140°F and less, thickness shall be 1" for pipe sizes less than 2-1/2", 1-1/2" thickness for pipe sizes 2-1/2" and larger. For hot water piping over 140°F, thickness shall be 1-1/2" for all pipe sizes. For low pressure steam supply, condensate return and boiler feed water piping, thickness shall be 1-1/2" for pipe sizes less than 2-1/2", 2" thickness for pipe sizes

- 1 2-1/2" and larger. CSG Insulation Corp., Knauf, Johns-Manville, Owens-Corning. See Title
2 24 for temperatures above 250°F.
3
4 C. Fiberglass Blanket: Unfaced, 1-1/2" thick. Thermal conductivity shall not exceed 0.25
5 Btu-in/hr-ft²-°F at a mean temperature of 50°F. Knauf, Johns-Manville, Owens-Corning.
6
7 D. PVC Jacket (for pipe, fittings and valves): Pre-molded polyvinyl chloride (PVC) jackets,
8 0.020" thickness. Size to match application. Provide solvent weld adhesive and PVC vapor
9 barrier pressure sealing tape by same manufacturer. Zeston.
10
11 E. Stretchable Glass Fabric: Reinforcing mesh. 10 x 20 continuous filament glass yarns per
12 inch. Johns-Manville.
13
14 F. Vapor Barrier Coating: Childers CP-30 LO.
15
16 G. Lagging Adhesive: Childers CP-50A.
17
18 H. Aluminum Jacketing: Aluminum pipe and fitting jacketing, 0.016" thickness for straight pipe.
19 0.024" thickness for fittings. Integral moisture barrier. Stucco-Embossed finish. Provide
20 pre-fabricated aluminum strapping and seals by same manufacturer. Childers.
21
22 I. Outdoor Mastic: Childers CP-10.
23
24 J. Flexible Elastomeric: Closed cell flexible elastomeric preformed pipe insulation. Thermal
25 conductivity shall not exceed 0.27 Btu-in/hr-ft²-°F at a mean temperature of 70°F. 1/2" thick.
26 Provide #520 adhesive and Armaflex insulation pipe hangers by same manufacturer.
27 Armacell Armaflex.
28

29 2.3 DUCTWORK MATERIALS
30

- 31 A. General: All ductwork materials shall have fire and smoke hazard ratings as tested under
32 ASTM E-84 and UL 723 not exceeding a flame spread of 25 and smoke developed of 50.
33 Shall comply with CMC.
34
35 B. Metal Ductwork: Metal ductwork shall be galvanized sheet steel, lock forming quality,
36 ASTM A-653, with gage and construction to match SMACNA Standard for pressure
37 required (26 gage minimum).
38
39 C. Flexible Ductwork: Insulated flexible ductwork. One pound per cubic foot glass fiber
40 insulation, 1" thick where ductwork is within the building thermal insulation envelope, 1-1/2"
41 thick where ductwork is outside the building thermal insulation envelope. Thermal
42 conductivity shall not exceed 0.25 Btu-in/hr- ft²-°F at a mean temperature of 75°F.
43 Seamless vapor barrier jacket. Duct shall comply with NFPA 90A. Continuous solid internal
44 liner bonded to galvanized steel wire helix. Duct shall be capable of continuous operation at
45 1-1/2" of water static pressure and 4,000 ft/min air velocity. Genflex, JPL.
46
47 D. Duct Joints / Duct Sealants:
48
49 1. Rectangular Ducts: Duct joint connector shall be Ductmate 25/35 factory
50 fabricated connector system with #440 gasket tape.
51
52 2. Round Ducts: All Joints Exposed to Weather: Sealant shall be G.E. "Silglaze II"
53 silicone. Joints Not Exposed to Weather (Except Spiral Wound and Greater than 2"
54 Pressure Class): Fiber tape and liquid adhesive. Hardcast DT-5300 or DT-5400
55 tape and FTA-20 adhesive, United McGill Uni-Cast. Spiral Wound Joints Not

Exposed to Weather and All Joints on Greater than 2" Pressure Class: Sealant shall be Eco-Duct Seal 44-60, or United Duct Sealer.

E. Underground Duct: Polyvinyl chloride coated galvanized steel. Connections and fittings shall also be polyvinyl chloride coated steel. All duct and fittings shall have a 4 mil coating on both sides. Fasten with stainless steel screws and fiber tape in accordance with manufacturer's instructions. PCD, United McGill.

F. Spiral Wound Metal Ductwork: Spiral wound factory fabricated, galvanized steel, gages in accordance with the CMC. Spiral lockseam shall be 6" on center, maximum, and shall comply with SMACNA spiral lockseam RL-1. All fittings shall be factory fabricated with all seams fully welded. Tees and laterals shall be conical type. Connections to plenums shall be with bell-mouth fittings. 8" and smaller ells shall be two piece die-stamped. Ells larger than 8" shall be five piece. United McGill. Shop fabricated fittings are not acceptable.

2.4 AIR TERMINALS AND DUCT FITTINGS

A. Grilles: (Grilles, Registers, Diffusers and Louvers)

1. Information on Drawings: Refer to Grille Schedule on the drawings for the list of grilles. Manufacturer's model numbers are listed to complete the description. Equivalent models of Krueger, Price, Titus or Tuttle and Bailey are acceptable. Manufacturer's facilities must include a testing lab. Refer to the floor plans for neck size, CFM, air diffusion pattern and fire damper, if required.
2. Performance: Submit complete performance data (throw, pressure drop, noise level, etc.) for all grilles proposed, other than those scheduled. Testing shall be in accordance with ANSI/ASHRAE 70. Sound level testing shall be in accordance with ARI Standard 885. If, according to the certified data of the manufacturer of the proposed units, the sizes indicated on the drawings will not perform satisfactorily, the units shall be reselected by the Contractor for the proper diffusion, spread, pressure drop, throw and noise level.
3. Frame and Accessories: All surface mounted grilles shall have a perimeter gasket and flanged edge. All grilles shall have frames suitable for mounting in the surfaces designated by the architectural drawings.
4. Finish: All ceiling and wall grilles and all louvers shall have a paintable white finish unless otherwise noted. Interior components (everything behind the face plate) shall be flat black. Floor grilles shall have an anodized aluminum finish unless otherwise noted.

B. Branch Duct Volume Damper: Volume control damper (VCD) in rectangular ducts shall be as follows: Opposed blade, 6" maximum blade width, 16-gage blade, 48" maximum length, nylon or oil impregnated bronze bearings, 1/2" diameter pin shaft, 16-gage channel frame, actuating rod and linkage out of air stream. VCD in round duct shall be as follows: Damper blade full height of branch and 1" less than branch width. All branch dampers shall have regulator with stamped steel handle, spring loaded shaft nut, cast body and serrated self-locking die cast core. Secure a 12" length of brightly colored plastic ribbon to handle for ease of location. Where rectangular or round ductwork is insulated, slit insulation to allow handle to protrude. Duro Dyne SRH-228 (with SB-112 end bearing for round ducts).

C. Extractor: Curved blade turns in adjustable position rigid frame. Tuttle and Bailey Deflectrol.

D. Turning Vanes: Double wall, hollow metal, air foil shape with trailing edge. Spacing in

- 1 accordance with manufacturer's recommendations. Aero Dyne HEP.
- 2
- 3 E. Flexible Connection: UL listed neoprene coated 30 ounce fiberglass cloth. 3" metal, 3"
- 4 fabric, 3" metal.
- 5
- 6 F. Variable Air Volume Terminal:
- 7
- 8 1. General: Pressure independent, single-duct electric powered variable volume
- 9 terminal. Scheduled pressure drop is maximum allowable at inlet static at design
- 10 conditions. Provide integral flow taps and calibration chart on each unit.
- 11 Performance testing shall be in accordance with ARI Standards. Controls and hot
- 12 water valve shall be on the same side of the unit. Enviro-Tec, Titus.
- 13
- 14 2. Casing: Welded 24-gage galvanized steel. Provide hanger holes on four corners.
- 15 Interior insulation shall be 1/2" thick, 1-1/2 lb. density glass fiber with high density
- 16 facing. Insulation shall be UL listed and in compliance with NFPA 90A. Maximum
- 17 allowable leak rate 2% at 3" WC. Provide double wall construction for applications
- 18 down stream of high efficiency filters.
- 19
- 20 3. Controls: Provide integral cross flow velocity sensor furnished and installed at the
- 21 factory.
- 22
- 23 4. Coils: Units specified with hot water coils shall have factory installed access panel
- 24 upstream of the coil and shall have coil with 1/2" O.D. seamless copper tube with
- 25 0.017" tube wall. Fin tube expanded into fin collar for permanent bond. Leak tested
- 26 at 300 psig.
- 27
- 28 5. Sound Performance Data: Discharge sound and radiated sound levels shall not
- 29 exceed the published sound levels of the terminals which were used as the basis
- 30 of design. The manufacturer shall submit discharge sound and radiated sound data
- 31 in both sound power level (ref: 10-12 watts) in octave bands and noise criteria (NC)
- 32 ratings. Testing shall be in accordance with ARI Standards.
- 33
- 34 G. Fire damper, smoke damper and Combination Fire/Smoke Damper: California State Fire
- 35 Marshal listed. UL listed. Hour rating as required by the rating of the wall, ceiling, floor, etc.
- 36 in which it is installed. All dampers shall be Leakage Class II. Include mounting sleeve and
- 37 angles. Combination fire/smoke dampers shall have normally-closed, non-stall factory
- 38 electric actuator rated for 250°F (min.). Damper position switch. Remote test and reset
- 39 switch with open/closed indicator lights. Dampers in round ducts shall be round sleeve with
- 40 round blade, two retainer plates and mounting hardware for actuator.
- 41
- 42 H. Duct Access Door: Insulated double wall door. Full piano hinge. Cam latch. Pressure rating
- 43 to match application. Minimum size 10"x10". Air Balance.
- 44
- 45 I. Relief Vent: Factory fabricated, curb mounted gravity relief vent. Galvanized steel or
- 46 aluminum. Throat area as indicated on drawings. Outlet area equal or greater than throat
- 47 area. 1/2" birdscreen. Provide backdraft damper as specified elsewhere. Cook, Penn.
- 48
- 49 J. Back Draft Damper: Aluminum interlinked blades with felt strip on mating surfaces.
- 50 Aluminum or galvanized steel frame. Bronze bearings. Adjustable counter balanced
- 51 damper. Ruskin.
- 52
- 53 K. Back Draft Damper: Fabric blades. Aluminum or galvanized steel frame. Wire mesh stop.
- 54 Ruskin NMS2.
- 55

L. Mixing Dampers: Opposed blade, 6" (max.) blade width, 16-gage blade, 48" (max.) length. Nylon or oil impregnated bronze bearings. 1/2" diameter pin shaft. 16-gage channel frame. 1% (max.) leakage at 4" WC in accordance with AMCA 500 for outside air dampers. Actuating rod and linkage out of air stream. All actuators and controllers that are a part of a smoke control system shall be UL listed for fire protection service.

M. Sound Trap:

1. General: Dimensions as shown on plans. 22-gage galvanized steel construction suitable for a differential air pressure of 8" of water. Filler material shall be in accordance with NFPA 90A. Maximum pressure drop as scheduled. Air flow measurements shall be made in accordance with applicable portions of ADC, AMCA and ASME airflow test codes. Buensod-Agitair, Environmental Elements Corp., Industrial Acoustics Company.
2. Sound Performance Data: The dynamic insertion loss and self-generated noise levels shall meet or better the published sound data of the sound traps which were used as the basis of design. Acoustic ratings shall be determined in a test facility which provides for airflow in both directions. The test set-up and procedure shall be such that all effects due to end reflection, directivity, flanking transmission, standing waves and test chamber sound absorption are eliminated. Acoustic ratings shall include dynamic insertion loss and self-generated noise levels for each octave band both for forward flow (air and noise in same direction) and reverse flow (air and noise in opposite directions) with air flow of at least 2000 fpm entering face velocity. Ratings shall be certified by an independent testing laboratory.

N. Duct Security Bars: 3/16" thick steel frame. 1/2" vertical tool steel bars, heat treated to C-61 Rockwell hardness, at 6" O.C. (max.) spacing in 2" x 1/2" retaining bars. 2" x 1/4" horizontal steel retaining bars at 15" O.C. (max.) spacing required for all horizontal opening sizes greater than 15". Provide 2" x 2" x 3/16" bolt lugs at 12" O.C. (max.) Kees.

2.5 DUCTWORK INSULATION MATERIALS

- A. General: All ductwork insulation materials shall have fire and smoke hazard ratings as tested under ASTM E-84 and UL 723 not exceeding a flame spread of 25 and smoke developed of 50.
- B. Fiberglass Blanket: Thermal conductivity shall not exceed 0.27 Btu-in/hr-ft²-°F at a mean temperature of 75°F. 3/4 lb/ft³, 1-1/2" installed thickness. Installed R-value of 4.2 where installed inside the building insulation envelope. Installed R-value of 8.0 where installed outside the building insulation envelope. Faced with glass reinforced foil laminated to Kraft paper. Certainteed, Knauf, Johns-Manville, Owens-Corning.
- C. Fiberglass Board: Thermal conductivity shall not exceed 0.25 Btu-in/hr-ft²-°F at a mean temperature of 75°F. 3 lb/ft³. 2" thick where installed outside the building insulation envelope; 1" thick where installed inside the building insulation envelope.
- D. Acoustic Lining: Glass fiber. Thermal conductivity shall not exceed 0.24 Btu-in/hr-ft²-°F at a mean temperature of 75°F. Coated to prevent fiber erosion up to 6,000 ft/min. Noise reduction coefficient of 0.70 for 1" thickness; 0.85 for 2" thickness. 2" thick where installed outside the building insulation envelope; 1" thick where installed inside the building insulation envelope. Johns-Manville Permacote Linacoustic with Superseal anti-microbial edge treatment.
- E. Bonding Adhesive: Childers CP-85.

- F. Acoustic Lining: Flexible elastomeric, closed cell. Thermal conductivity shall not exceed 0.25 Btu-in/hr-ft²-°F at a mean temperature of 75°F. Erosion resistance up to 10,000 ft/min. 1" thick. Noise reduction coefficient of 0.50. AP Armaflex. Armaflex 520 adhesive.

2.6 EQUIPMENT

A. General Requirements:

1. Start-up: All equipment shall be started and tested in accordance with the manufacturer's written instructions. Start-up procedure shall be performed by a factory trained service technician – not the installing contractor. Provide the inspector of record with factory start-up literature for each mechanical equipment item. Demonstrate to inspector that the start-up procedure has been completed. Start-up sheets shall be completed and submitted with O&M manuals. Start-up sheets shall be submitted, certifying that start-up has been completed per manufacturer's written instructions.
2. Capacity: Capacities shall be in accordance with schedules shown on drawings. Capacities are to be considered minimum.
3. Dimensions: Equipment must conform to space requirements and limitations as indicated on drawings and as required for operation and maintenance. Where Architectural screening is indicated, equipment shall not extend above or beyond screening. Equipment will not be accepted that does not readily conform to space conditions. Prepare and submit layout drawings for all proposed equipment (different than scheduled units) showing actual job conditions, required clearances for proper operation, maintenance, etc.
4. Ratings:
 - a. Gas: Gas burning equipment shall be furnished with 100% safety gas shut-off, intermittent pilot ignition, and be approved by AGA, except that boilers shall be AGA approved or UL listed.
 - b. Electrical: Electrical equipment shall be in accordance with NEMA Standards and UL or ETL listed where applicable standards have been established.
5. Piping: Each item or assembly of items shall be furnished completely piped for connection to services. Control valves and devices shall be provided. For equipment mounted on springs, provide flex connections. Equipment requiring domestic water for non-potable use shall be provided with backflow preventer acceptable for intended use by local governing authorities.
6. Electrical:
 - a. General: Each item or assembly of items shall be furnished completely wired to individual terminal blocks for connection to single branch electrical circuit. All electrical accessories required by equipment shall be furnished. Provide terminal blocks for controls and interlocks not included in equipment package. Manual and magnetic starters shall have ambient compensating running overcurrent protection in all ungrounded conductors. Magnetic starters shall be NEMA rated, manual reset, shall have H-O-A switches and auxiliary contacts. Controllers and other devices

shall be in NEMA 1 or 3R enclosures as applicable.

- b. Wiring: Conductors, conduit, and wiring shall be in accordance with Electrical Specifications. Individual items within assembly shall be separately protected with dead front, fused disconnect, fuse block, or circuit breaker for each ungrounded conductor, all accessible on operating side of equipment. Switches, contacts and other devices shall be in ungrounded conductors.
- c. Motors: Shall be rated, constructed and applied in accordance with NEMA and ANSI Standards without using service factor. Single-phase motor shall be of type to suit application. Three-phase motors shall be NEMA B design on pumps and fans, NEMA C on reciprocating equipment, sealed ball bearing, three-phase induction unless otherwise noted. Motors 1 HP and above shall be NEMA premium efficiency, Class F insulation. Motors in a fan air stream shall be TEFC or TEO. Vertical motors exposed to weather shall be TEFC and shall have rain caps. Horizontal motors exposed to weather shall be TEFC. Motors for use with VFD's shall be inverter ready.
- d. Starters: Motor starters shall be furnished for all equipment except where starter is in a motor control center as designated on the electrical drawings. Deliver starter to Electrical Contractor for installation and wiring.
- e. Control Voltage: Equipment connected to greater than 240 volts shall be provided with 120 volt control circuit from integral protected transformer if separate source is not indicated on plans. 240 volt control is acceptable if confined within control panel.
- f. Submittals: Included in shop drawings shall be internal wiring diagrams and manufacturer's recommended external wiring.

7. Fan Selection:

- a. Fan Curves: Performance curves shall be submitted for all units of 3000 CFM or greater. Operating point for forward curved fans shall be from point of maximum efficiency toward increased CFM limited by horsepower scheduled. Operating point for backward inclined fans shall be selected near point of maximum efficiency. Curves shall plot CFM versus static pressure with constant brake horsepower, RPM and efficiency lines.
- b. Static Pressure: Unless otherwise noted, pressure scheduled as external static pressure (ESP) includes all ductwork and accessory losses external to the unit housing. Unless otherwise noted, pressure scheduled as total static pressure includes all ductwork, filter, coil, cabinet, damper and other accessory losses. Unless otherwise noted, pressure scheduled as duct static pressure includes all supply and return ductwork and accessory losses external to the unit housing and plenum (as applicable). The allowance for filter losses is 0.3" WC, unless otherwise noted. Submit itemized static pressure losses for all components.

8. Filters:

- a. General: Tested and rated in accordance with ASHRAE Standard 52.2 and SFM 12-71-1, Part 12, Title 24, C.C.R. Furnish and install one

- complete change of all filters after air balance is completed and prior to acceptance. Provide pressure differential gage across all filter banks.
- b. Filter Media: 2" media. MERV 8. Clean filter resistance 0.10" water at 300 fpm. Throw-away frame. Class 2. Camfil Farr.
- c. Pressure Differential Gage: Diaphragm actuated. 4" dial. Zero adjustment. Accuracy +/- 2% of full scale. Range as required. Provide static pressure sensors, tubing and mounting brackets. Dwyer Series 2000.
- d. High Efficiency Filters:
- 1) Media: 12" deep supported media. MERV 14. Filters shall be rated at 2,000 cfm and shall have an initial resistance of not more than 0.70" WC. The above data is based on a 24" x 24" module. Class 2. Camfil Farr Riga-flo PH.
- 2) Housing and Frames: Filter housing and frames shall be a side access unit suitable for outdoor mounting, as applicable. Provide track for 2" pre-filters. Camfil Farr 3P Glidepack
9. Screens and Safety Grating: All duct or louver openings to the outside shall be covered with 1/4", 16-gage, galvanized wire mesh screen. Provide safety grating at all openings in equipment floors.
10. Mixing Dampers: Opposed blade, 16-gage. Six-inch maximum blade width, 48" maximum length. Nylon or oil impregnated bronze bearings. One-half inch diameter pin shaft. 16-gage channel frame. One percent maximum leakage at 4" WC in accordance with AMCA 500 for outside air dampers. Actuating rod out of air stream. Arrow.
11. Sound Ratings: Shall be in accordance with ASHRAE 36 - 72. Sound ratings shall not exceed scheduled values.
12. Drives: Unless noted as direct connected, drives shall be V-belt, rated at 150% of motor horsepower. Multiple drive belts shall be matched set. Drive sheaves shall be dynamically balanced, adjustable, range +/- 10%, selected at mid range. Adjustable relative movement shall be lockable to shaft. Belts shall be aligned within 1-1/2 degrees at all times. Open drives shall be provided with OSHA approved open mesh belt guards. Belt guards exposed to weather shall be weatherproof enclosure with louvered face for adequate ventilation. Driving motor shall be mounted on adjustable rails. T.B. Woods, Browning. Submit RPM range of driven machine with drive selection.
13. Vibration Isolation:
- a. General: The vibration isolation manufacturer shall be responsible for the proper selection of all isolators, support rails, and bases. Isolator selection shall be based on deflection as indicated. Lowest disturbing frequency shall be the basis for design. Isolator shall be selected for uniform deflection according to weight distribution. Shop drawings shall include a plan of equipment showing point loads, design data for each isolator including spring outside diameter, free, operating and solid heights, and ratio of horizontal to vertical stiffness, efficiency and design of support rails and bases. Consolidated Kinetics, Mason Industries, M.W. Sausse. All

isolators shall be the product of a single manufacturer.

- b. Neoprene in Shear: 2500 psi tensile strength, oil resistant neoprene. Cast-in top and base plates. Isolator shall be selected for maximum static deflection without exceeding load capacity.
- c. Springs: Laterally stable steel springs. Horizontal stiffness equal to or greater than 1.3 times vertical stiffness. Outside spring diameter shall be a minimum of 0.8 times operating height. Springs shall be selected to provide operating static deflection plus a 50% overload capacity before reaching solid height. Spring shall be housed in a welded steel assembly designed and engineered to limit movement of supported equipment without degrading the vibration isolation during normal operating conditions. Base plate shall have a 1/4" thick ribbed neoprene pad. Assembly shall have a drilled and tapped load plate and leveling bolt. Static deflection shall be 2" unless otherwise noted. Isolator shall be designed in accordance with the CBC. Submit calculations to indicate compliance.
- d. Inertia Base: Concrete slab cast into prefabricated inertia base frame. Frames shall be welded steel channels with a depth greater than 8% of the longest dimension, and shall include welded-in 1/2" steel reinforcing rods on 8" centers each way. Anchor bolts shall be housed in steel bolt sleeves to allow minor location adjustment. Isolator support brackets shall permit lowest possible mounting height. Base dimensions suitable for support of piping if required.

14. Coils:

- a. Construction: Copper tube. Copper or aluminum 0.0075" min. thickness fins hydraulically or mechanically bonded to tube. 16-gage galvanized steel rigid channel coil casing. Rated working pressure 200 psig min. All coils shall have connections at the same end. Wherever two or more coils are being controlled by a single control valve, each coil shall be installed with a separate balancing cock and a Pete's Plug at each outlet.
- b. Capacity: Ratings certified by ARI in accordance with ARI Standard 410. Cooling coil face velocity shall not exceed manufacturer's published ratings or 550 fpm. Heating coil face velocity shall not exceed 1000 fpm. Include coil selection calculations in shop drawings.
- c. Hot or Chilled Water Coils: Copper or cast iron headers, brazed or spun to tube. Tube wall minimum thickness 0.024". 10 fins/inch maximum. Two row minimum. Install hot water coils upstream of chilled water coils.
- d. Direct Expansion Coils: Copper suction header silver brazed to distributing tubes and expansion valve. Copper tubes with aluminum fins. 10 fins/inch maximum.
- e. Steam Coil (Low Pressure Duty): Extra heavy seamless copper tubing for coil and headers. Distribution baffle in supply header. Full surface mechanically bonded aluminum fins. Steel male iron pipe connections for supply and return. All joints brazed. Heavy gage die formed continuous channel frame, flanged with mounting holes. Free floating core. Pitched in

direction of return connection. Air tested to 315 psig, 200 psig steam. 10
fins/inch maximum.

B. Pumps:

1. General: Refer to Paragraph 2 06A for general requirements. Pumps shall be selected to be non overloading at any point on the pump curve. Contractor shall include all costs required to field trim or change pump impeller, if necessary, to match design conditions. All motors 1 horsepower and larger shall be the high efficiency type. Bell and Gossett.
2. Materials and Components: Enclosed stainless steel impeller hydraulically and dynamically balanced on shaft. Renewable wear rings. Mechanical seals unless otherwise noted. Stainless steel shaft or steel shaft with bronze sleeve. Gray iron casing. Suction and discharge connections shall be 125 psi flanges tapped for pressure readings.
3. End Suction Centrifugal:
 - a. Close Coupled: Single stage, single suction centrifugal pump close coupled to motor. Stainless steel impeller. Stainless steel shaft sleeve. Motor and rotating parts shall be removable without disturbing volute casing or piping. Impeller keyed and locked to shaft.
 - b. Base Mounted: Single stage, single suction centrifugal pump mounted on steel pedestal base. Regreaseable ball bearings. Pump direct connected to motor through a flexible coupling. Stainless steel impeller. Stainless steel shaft sleeve. Cal OSHA coupling guard. Bearing frame and rotating parts shall be removable without disturbing volute casing or piping. Impeller keyed and locked to shaft. Pump and motor mounted on reinforced steel base with raised lips, drain taping, and grouting holes. Pump volute shall be supported by the base. Pump and motor shall be realigned according to Hydraulic Institute Standards after grouting of base and connection of piping. Provide factory start-up.
 - c. Double Suction: Single stage, double suction, split case centrifugal pump as indicated on drawings. Welded steel base fully enclosed sides and ends, welded cross members. Impeller shaft of solid 1045 steel with 304 stainless steel sleeves. Low zinc, silicon brass impeller. Pump direct connected to motor through a heavy duty flexible coupling. Cal OSHA coupling guard. Removal of casing and bearing housings shall permit removal of the entire rotating assembly without disturbing piping. Impeller keyed to shaft. Wear rings doweled to casing. Pump and motor shall be realigned according to Hydraulic Institute Standards after grouting of base and connection of piping. Provide factory start-up.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

A. General:

1. Piping Layout: Piping shall be concealed in walls, above the ceilings, or below grade unless otherwise noted. Exposed piping shall run parallel to room surfaces;

location to be approved by Engineer. No structural member shall be weakened by cutting, notching, boring or otherwise, unless specifically allowed by structural drawings and/or specifications. Where such cutting is required, reinforcement shall be provided as specified or detailed. All piping shall be installed in a manner to ensure unrestricted flow, eliminate air pockets, prevent any unusual noise, and permit complete drainage of the system. All piping shall be installed to permit expansion and contraction without strain on piping or equipment. Vertical lines shall be installed to allow for building settlement without damage to piping. Lines shall be adequately braced against vertical and lateral movement. For piping connected to equipment mounted on springs, provide flex connections. Pipe sizes indicated on the drawings are nominal sizes unless otherwise noted. Pipe sizes shall not decrease in direction of flow, unless otherwise noted.

2. Joints:

- a. Threaded: Pipe shall be cut square, and reamed to full size. Threads shall be in accordance with ANSI B2.1. Joint compound or tape suitable for conveyed fluid shall be applied to male thread only. Joints shall be made with three threads exposed.
- b. Welded or Brazed: Welding and brazing shall conform to American Welding Society (AWS) standards. Filler rod shall be of suitable or the same alloy as pipe. Brazing filler metal shall have a minimum melting point of 1100°F. Welding or brazing shall be performed by a Certified Welder or Brazer as certified by an organization/institution that uses standards recognized by the AWS and meets the requirements of the ASME Boiler and Pressure Vessels Code, Section 9.
- c. Open Ends: Open ends of piping shall be capped during progress of work to preclude foreign matter.
- d. Electrical Equipment: Piping shall not be run over electrical panels, motor control centers or switchboards.

3. Fittings and Valves:

- a. Standard Fittings: All joints and changes in direction shall be made with standard fittings. Close nipples shall not be used.
- b. Reducers: Pipe size reduction shall be made with bell reducer fittings. Bushings shall not be used.
- c. Unions: A union shall be installed on the leaving side of each valve, at all sides of automatic valves, at equipment connections, and elsewhere as necessary for assembly or disassembly of piping.
- d. Valves: All valves shall be full line size. At equipment connections, valves shall be full size of upstream piping. Provide a shut-off valve at each point of connection to existing piping.
- e. Valve Accessibility: All valves shall be located so that they are easily accessible. Valves located above ceilings shall be installed within 24" of the ceiling. For situations where this is not practical or where valves are greater than 10' above floor, chain wheel operators shall be provided. Chain shall extend down to 7' above the floor. All such installations must

have prior review by the Engineer.

4. Pipe Support:

- a. General: Hangers shall be placed to support piping without strain on joints or fittings. Maximum spacing between supports shall be as specified below. Actual spacing requirements will depend on structural system. Refer to drawings for additional requirements and attachment to structure. Side beam clamps shall be provided with retaining straps to secure the clamp to the opposite side of the beam. Vertical piping shall be supported with riser clamp at 20' on center (maximum). Support pipe within 12" of all changes in direction.

<u>Pipe Size (In.)</u>	<u>Maximum Spacing Between Supports (Ft.)*</u>		
	Copper	Steel	Plastic
1/2	6	6	4
3/4	6	8	4
1	6	8	4
1-1/4	6	8	4
1-1/2	6	10	4
2	10	10	4
2-1/2	10	10	4
3	10	10	4
4	10	10	4
6		10	
8		10	
10		10	

*Based on straight lengths of pipe with couplings only. Provide additional supports for equipment, valves or other fittings. Plastic piping shall be supported per the manufacturer's recommendations. Seismic requirements may reduce maximum spacing.

- b. Non-Insulated Piping: Support individual pipes with pipe hanger.
- c. Hot Water Piping: Support individual pipes with insulation support and pipe hanger. Install per manufacturer's recommendations.
- d. Chilled Water Piping: Support individual pipes with insulation support and pipe hanger. Install per manufacturer's recommendations. Piping shall have complete vapor seal.
- e. Steam, Condensate and Boiler Feed Piping: Support individual pipes with insulation support and pipe hanger. Install per manufacturer's recommendations.
- f. Refrigerant Piping: Support insulated refrigerant line with construction channel and sheet metal support saddle. 5' spacing. Use isolating shield for uninsulated pipe. When using pre-charged tubing, all changes of direction shall be made with bending tools producing neat uniform bends. Free hand bends will not be accepted.

- 1 g. Trapeze: Trapeze hangers of construction channel and pipe clamps may
2 be used. Submit design to Engineer for review.
3
4 5. Miscellaneous:
5
6 a. Escutcheons: Provide chrome plated metal escutcheons where piping
7 penetrates walls, ceilings, or floors in finished areas.
8
9 b. Pipe Sleeves: All piping passing through concrete shall be provided with
10 pipe sleeves. Allow 1" (nominal) clearance between sleeve and pipe or
11 pipe insulation. Piping through walls below grade shall be sealed with
12 Link-Seal.
13
14 c. Pipes Passing through Fire Rated Surfaces: Pipes passing through fire
15 rated walls, floors, ceilings, partitions, etc. shall have the annular space
16 surrounding the pipe or pipe insulation sealed with fire rated materials in
17 accordance with the requirements of the fire authority having jurisdiction.
18
19 d. Concrete Thrust Blocks: Shall be constructed at all valves, tees, elbows,
20 bends, crosses, reducers and dead ends in pre-insulated underground
21 piping and other piping with loose joints. Solvent welded PVC piping 6"
22 and larger shall also be installed with thrust blocks. Blocks shall cure a
23 minimum of 7 days before pressure is applied. Concrete shall be 2500 psi
24 mix.
25
26 e. Dielectric Couplings: Dielectric couplings shall be installed wherever piping
27 of dissimilar metals are joined, with the following exceptions: Bronze
28 valves may be installed in ferrous piping without dielectric couplings. Do
29 not install dielectric couplings at coil connections; provide red brass union
30 in place of dielectric coupling.
31
32 B. Hot or Chilled Water Piping: Provide shut-off valve for each building and at each connection
33 to equipment. Before installing, all pipe shall be rapped along entire length to loosen sand,
34 mill scale, etc. Pipe 2" and larger shall be cleaned internally with wire brush. Before
35 connection to equipment, all piping shall be thoroughly flushed with water. All portions of
36 the system shall be piped to allow for the removal of air. All high points shall have
37 accessible air vents (e.g. highest point of all risers, circulating mains with branch
38 connections off of the bottom or side, highest point of all piping branches, etc.). Unless
39 otherwise noted all vents shall be 1/4" petcocks with 1/4" copper tube discharge. Route
40 tube to condensate pan, floor sink, etc. If a drain point is not available, terminate tube with a
41 return bend to allow water to be collected. Only equipment mounted on vibration isolators
42 shall be connected with flexible connection. The manufacturer of the underground piping
43 system shall instruct the installer regarding the manufacturer's required installation
44 procedures. The manufacturer shall also provide sufficient job-site inspection to insure that
45 the work is being accomplished in accordance with the plans, specifications and
46 manufacturer's requirements. Upon completion of the installation, a certificate shall be
47 furnished to the Engineer by the manufacturer of the system, certifying the installation was
48 made in accordance with his requirements and in compliance with the plans and
49 specifications.
50
51 C. Condenser Water Piping: Provide shut-off valve at each connection to equipment. Before
52 installing, all pipe shall be rapped along entire length to loosen sand, mill scale, etc. Pipe 2"
53 and larger shall be cleaned internally with wire brush. Before connection to equipment, all
54 piping shall be thoroughly flushed with water. Do not install strainers between tower sump
55 and pump suction. Connections to equipment mounted on vibration isolators shall be made

with flexible connection.

- D. Refrigerant Piping: Pipe shall be cut square. Joint surfaces shall be thoroughly cleaned, fitted and erected before brazing. After installation, evacuate to 29 inches of mercury, ambient temperature during evacuation shall not be less than 70°F. After evacuation, fill with dry nitrogen to 1.5 times the highest working pressure and maintain for two-hour period without additional charge. After nitrogen test, purge with refrigerant charged through dryer and maintain holding charge in system and equipment. Refrigerant piping below grade shall be run in 4" (min.) PVC conduit with long radius ells. Seal ends of conduit watertight.
- E. Flue Piping: Flue piping shall be installed in accordance with its UL listing and the manufacturer's instructions.
- F. Steam, Condensate, Boiler Feed and Make-up Water Piping: Provide shut-off valve for each connection to equipment. Before installing, all pipe shall be rapped along entire length to loosen sand, mill scale, etc. Pipe 2" and larger shall be cleaned internally with wire brush. Before connection to equipment, all piping shall be thoroughly flushed with water. Provide drip leg and steam trap at all points where condensate can collect. The manufacturer of the underground piping system shall instruct the installer regarding the manufacturer's required installation procedures. The manufacturer shall also provide sufficient job-site inspection to insure that the work is being accomplished in accordance with the plans, specifications and manufacturer's requirements. Upon completion of the installation, a certificate shall be furnished to the Architect by the manufacturer of the system, certifying the installation was made in accordance with his requirements and in compliance with the plans and specifications.

3.2 PIPING INSULATION INSTALLATION

- A. Chilled and Hot Water Supply and Return:
1. General: All chilled and hot water supply and return piping (including all fittings and accessories) and all chilled water equipment shall be insulated. Insulate a sufficient length of make-up water piping to prevent condensation.
 2. Pipe: Apply pre-molded fiberglass sections to pipe using integral pressure sealing lap adhesive in accordance with manufacturer's recommendations. Stagger longitudinal joints. Seal butt joints with factory supplied pressure sealing tape.
 3. Fittings and Valves:
 - a. Wrap all fittings and valves with pre-cut fiberglass blanket to thickness matching adjoining insulation. Cover blanket with PVC jacket, solvent welded. Seal all joints with factory supplied pressure sealing vapor barrier tape with a 1-1/2" (min.) overlap on both sides of joint. Insulate all flanges, unions and valves except stems and operators. All joints on chilled water piping shall be sealed with vapor barrier coating in addition to the vapor barrier tape.
 - b. For miscellaneous fittings and accessories for which PVC jackets are not available or where proximity of fittings precludes a neat-appearing installation, the Contractor may cover the fiberglass blanket with stretchable glass fabric, one coat of lagging adhesive, and a final coat of vapor barrier coating.

4. Vapor Barrier Continuity: All exposed ends of insulation and all gaps or voids in vapor barrier shall be sealed with stretchable glass fabric, one coat of lagging adhesive and a final coat of vapor barrier coating. Build up all horizontal areas to prevent water accumulation.
5. Pipe Hangers: Seal all joints at pipe hangers with vapor barrier tape. Joints on chilled water piping shall be sealed with vapor barrier coating in addition to the vapor barrier tape.
6. Piping Exposed to Weather:
 - a. All piping and fittings exposed to weather shall have, in addition to the above described insulation, an aluminum jacketing. Insulation at grooved pipe couplings shall be covered with aluminum flange fitting covers. Secure in place with factory supplied straps. Install all joints to prevent water entry. All joints shall be sealed with outdoor mastic.
 - b. For miscellaneous fittings for which aluminum jackets are not available or where proximity of fittings precludes a neat-appearing installation, the Contractor may cover the insulation with stretchable glass fabric and at least two coats of outdoor mastic. Plastic fitting covers shall not be used where exposed to weather.
7. Additional Finish for Exposed Piping and Equipment: All piping and equipment exposed to view but protected from the weather shall be given an additional finish of stretchable glass fabric, one coat of lagging adhesive and a final coat of vapor barrier coating. Apply finish over all service jacket. Do not apply over PVC jackets.
8. -or- Additional Finish for Exposed Piping and Equipment: All piping and equipment exposed to view but protected from the weather shall be given an additional finish of PVC jackets. Do not install this jacket where it will be subjected to a temperature of 150°F or more such as immediately adjacent to boilers. In these locations install stretchable glass fabric, one coat of lagging adhesive and a final coat of vapor barrier coating.
9. Equipment: Chilled water equipment with continuous circulation (pumps, heat exchanger, etc.), shall be insulated with materials similar to those described in Paragraph 2.2. It shall be the Contractor's responsibility to provide adequate insulation to prevent condensation, a complete vapor barrier, weatherproofing for equipment exposed to the weather, and a neat-appearing installation. Insulate hot water equipment same as above except no vapor barrier. At pumps, insulate the suction and discharge pipes and the suction diffuser the same as other piping. Use flexible elastomeric insulation at pump volutes and the access end of the suction diffuser. Submit materials and method of installation to Engineer for review.
- B. Refrigerant Piping: Cover piping with flexible elastomeric insulation in accordance with the recommendations of the refrigeration unit manufacturer. Longitudinal and end seams shall be thoroughly cemented with adhesive in accordance with manufacturer's recommendations. Cover all fittings, unions, valves and connections. Piping exposed to weather shall be covered with aluminum jacketing, seal all joints with outdoor mastic. Piping exposed to view, but not exposed to the weather shall be covered with PVC jackets.
- C. Steam and Condensate Piping: All steam and condensate piping and equipment shall be insulated the same as hot water piping except thickness shall be per Title 24 requirements.

D. Boiler Feed Piping: All boiler feed piping and equipment shall be insulated the same as steam piping.

E. Flue Piping: Insulate all single wall flue piping and boiler smoke box with 1-1/2" thick calcium silicate. Jacket with stretchable glass fabric, one coat of lagging adhesive, and a final coat of vapor barrier coating if inside or with aluminum if exposed to weather.

3.3 DUCTWORK INSTALLATION

A. General:

1. Standards: Unless otherwise noted, all ductwork shall be constructed and installed in accordance with current SMACNA Standards. Ductwork shall be built to a pressure classification equal to or greater than the maximum operating pressure at that point in the ductwork. A copy of these standards shall be maintained at the job site at all times. Duct work and accessories shall be installed in a manner to prevent vibration and rattling.
2. Access: Provide duct access doors as required to adjust equipment and dampers. Provide wall or ceiling access panels, or remote actuators as required where equipment and dampers are not otherwise accessible. Duro Dyne SRC-120 concealed remote actuator with zinc finish on cover.
3. Flexible Connections: Connection of ductwork to any vibrating equipment shall be with 3" (min.) flexible connection. Install with ample slack and uniform gap. There shall be no metal to metal contact across flexible connection. Flexible connections exposed to weather shall have a protective sheet metal cover.
4. VAV System: For all variable air volume (VAV) systems, the supply ductwork between the fan discharge and the VAV boxes shall be constructed per SMACNA standards to a pressure level equal to the maximum shut-off pressure the fan can generate. All joints in this ductwork shall be sealed with duct sealant in accordance with manufacturer's recommendations. Install VAV boxes with four diameters of straight duct on up-stream side.
5. Flanges and Escutcheon: Where ductwork penetrates walls, ceilings, or floors, furnish and install flange or escutcheon of same material as duct.
6. Ductwork Passing through Fire Rated Surfaces: Where ductwork passes through fire rated walls, floors, ceilings, partitions, etc., provide fire damper(s) or fire/smoke damper(s) in accordance with the requirements of the fire authority having jurisdiction.

B. Low Velocity-Low Pressure (up to 2,000 ft/min and up to 2.0 in water):

1. Sheet Metal Ductwork:

- a. Ells: Ells with less than standard radius and square ells shall be fitted with turning vanes.
- b. Tees: Tees in supply ductwork shall be straight tap-in with extractor or 45 degree take-off as shown on drawings. Duct mounted supply grilles shall be installed with an extractor. Grilles or branches in supply ductwork shall be a minimum of 8 duct diameters downstream of tees.

c. Duct Joints / Duct Sealants: Rectangular Ducts: Ducts shall be joined with duct joint connectors. Round Ducts: Ducts shall be joined with male-female slip joints and a minimum of three sheet metal screws. All joints and seams which are not exposed to weather shall be sealed airtight with fiber tape and liquid adhesive. Tape shall extend 1" on both sides of joints. All joints and seams exposed to weather shall be sealed air and water tight with G.E. "Silglaze II" silicone sealant. All joints on spiral wound metal ductwork not exposed to weather shall be sealed air tight with duct sealant.

d. Dampers: Install volume control damper and damper regulator in all branch ducts.

2. Flexible Glass Fiber Ductwork: The use of flexible duct is limited to the last 7 feet of each branch duct (i.e. one 7 foot section of flexible duct may be used to connect the grille to the sheet metal branch duct). No joints are permitted in this 7' length. Hangers shall be 4" wide metal straps spaced to prevent sagging, 42" spacing maximum. Insert 6" wide fiberglass pad between duct and hanging strap. Joints shall be installed with stainless steel or nylon draw bands, Duro Dyne Dyn-O-Tie. Minimum turn radius shall be in accordance with SMACNA Standards (turn radius of duct centerline not less than 1.5 times the duct diameter).

3. Spiral Wound Metal Ductwork: At side duct grilles, the grille shall be cut directly into the spiral duct. Duct to duct joints shall be made with factory joint connectors and the spiral seam rotated so that the seam forms a continuous helical pattern across the joint.

4. Underground Ductwork: Install ducts with constant slope up to grilles. All ducts and fittings shall be anchored to prevent floating as slab is poured. Any duct or fitting which is not protected with a polyvinyl chloride coating shall be encased in 3" (min.) concrete.

5. Moisture Bearing Exhaust Ductwork: Exhaust ductwork bearing moisture such as exhaust ducts from showers, dishwashers, clothes driers, etc. shall be constructed of aluminum sheets. Joints shall be sealed watertight with mastic. Unless otherwise indicated, the ducts shall slope down towards the source of moisture (grille, hood, drier, etc.). Sheet metal screws or any other device that protrudes into the duct shall not be used for clothes drier exhaust ducts.

3.4 AIR TERMINALS AND DUCT FITTINGS INSTALLATION

A. General: Unless otherwise noted, all air terminals and duct fittings shall be installed in accordance with current SMACNA Standards. Terminals and fittings shall be installed in a manner to prevent vibration and rattling. Metal surfaces exposed to view behind grilles and registers shall be painted flat black.

B. Fire and Combination Fire/Smoke Damper: Shall be installed in accordance with the manufacturer's recommendations. Provide access doors as required. The remote test and reset switch shall be located in the ceiling, the shortest possible distance from the damper. Manufacturer's instructions shall be available to the inspecting authorities. Shall be tested according to State Fire Marshal requirements.

3.5 DUCTWORK INSULATION INSTALLATION

- 1 A. General: Insulate all sheet metal supply and return ductwork except as noted below.
2 Insulation shall be continuous through walls and floors except at fire dampers.
3
4 B. Where Insulation Is Not Required: Do not insulate factory-insulated ducts or casings,
5 acoustic lined ducts, underground ductwork, supply or return ductwork exposed to view in
6 the space that it serves, or exhaust ductwork.
7
8 C. Concealed Ductwork: Wrap concealed ductwork with fiberglass blanket lapped 6"
9 minimum. Secure with staples 4" on centers maximum on straight runs and 3" maximum at
10 elbows and fittings. Insulation on bottom of ducts wider than 36" shall also be secured with
11 mechanical fasteners at 24" on center.
12
13 D. Acoustic Lining: Unless otherwise indicated, all supply and return ductwork in equipment
14 rooms including outside air intakes, all ductwork exposed to weather and other ducts as
15 indicated on drawings, shall have acoustic lining. Acoustic line all supply, return or exhaust
16 duct connections to HVAC units or fans for a minimum of 10 lineal feet upstream and
17 downstream of unit or fan, unless otherwise indicated on drawings. Do not acoustic line
18 ductwork downstream of high efficiency filters. Where acoustic lining is installed, increase
19 each sheet metal dimension to accommodate lining and maintain clear inside duct
20 dimensions shown on drawings. Apply lining with adhesive in accordance with
21 manufacturer's recommendations. For glass fiber lining, also secure with mechanical
22 fasteners in accordance with SMACNA Standards and seal exposed edges of lining with
23 anti-microbial edge treatment. Unless otherwise noted, lining shall be glass fiber. Lining
24 for evaporative cooled ductwork shall be flexible elastomeric.
25
26 E. Exposed Ductwork: All externally insulated ductwork which is exposed to view but
27 protected from the weather shall be insulated with fiberglass board. Secure with
28 mechanical fasteners at 12" on center. Reinforce all edges with corner angles and apply a
29 finish coat of canvas or stretchable glass fabric and lagging adhesive.
30
31 F. Ductwork Exposed to Weather and Externally Insulated: Ductwork which is exposed to
32 weather, but not internally insulated such as ductwork downstream of high efficiency filters
33 or ductwork on combination evaporative cooled and heated air systems shall be externally
34 insulated with fiberglass board. The fiberglass board shall then be protected with a
35 galvanized sheet metal jacket per SMACNA standards.
36

37 3.6 EQUIPMENT INSTALLATION
38

- 39 A. General: The equipment installer shall ensure that no work done under other specification
40 sections will in any way block or hinder the equipment. All equipment shall be securely
41 anchored in place. Provide factory start-up for all equipment in the Central Plant.
42
43 B. Air Handling Units: Spring isolators shall be adjusted to allow movement to maximum free
44 spring length. Piping support shall be designed so that piping weight does not bear on
45 equipment. Hot water coil shall be mounted upstream of chilled water coil.
46
47 C. Balance: Fans shall be statically and dynamically balanced in unit. Maximum allowances
48 are: 2 mils to 600 rpm; 1-1/2 mils to 900 rpm; 1 mil to 1200 rpm; 3/4 mil to 1800 rpm; and
49 1/2 mil to 2200 rpm.
50
51 D. Gage Taps: Gage taps, such as Pete's Plugs, shall be installed immediately adjacent to all
52 heat exchanger and pump connections (i.e. inlet and outlet of all pumps, boilers, chillers,
53 condensers, coils, etc.). Taps shall be installed to allow for a pressure gage or thermometer
54 to be easily inserted and read.
55

- 1 E. Connections to Equipment: Where size changes are required for connections to equipment,
2 they shall be made immediately adjacent to the equipment and, if possible, inside the
3 equipment cabinet.
4
5 F. Pumps: Install pumps with a minimum of 8 diameters of straight pipe at the pump suction
6 unless a suction diffuser is installed. Sufficient clearance to wall or other obstructions shall
7 be provided so that motor and rotating parts can be removed without disassembly of volute
8 or piping. Anchor bolt configuration shall be compatible with this method of removal.
9 Pedestal mounted pumps shall have their bases grouted. Realign pump and motor
10 according to Hydraulic Institute Standards after grouting and connection of piping.
11
12 G. Boiler: Installation shall be in accordance with California Code of Regulations, Title 8,
13 Industrial Relations. Where required, permit for system operation shall be obtained and
14 permanently posted at installation.
15
16 H. Equipment Platforms: Shall be as shown on drawings and as follows: Flashing and platform
17 cover shall be 22 gage (min.) sheet metal. All joints and seams shall be soldered with 2"
18 (min.) overlaps. Provide 3/4" gap around perimeter between roofing and drip lip to facilitate
19 re-roofing. Extend drip lip down 3" (min.). Provide 30# felt under platform cover.
20

21 3.7 TESTS AND ADJUSTMENTS
22

- 23 A. General: Unless otherwise directed, tests shall be witnessed by a representative of the
24 Engineer. Work to be concealed shall not be enclosed until prescribed tests are made.
25 Should any work be enclosed before such tests, the Contractor shall, at his expense,
26 uncover, test and repair all work to original conditions. Leaks and defects shown by tests
27 shall be repaired and entire work retested.
28
29 B. Piping Tests:
30
31 1. General: Tests may be made in sections, however, all connections between
32 sections previously tested and new section must be included in the new test. There
33 shall be no drop in pressure during test except that due to ambient temperature
34 changes. All components of system not rated for test pressure shall be isolated
35 from system before test is made.
36
37 2. Water Piping: Maintain 100 psig water pressure for 4 hours.
38
39 3. Steam, Condensate and Boiler Feed Piping: Maintain 1.5 times the operating
40 steam pressure for four hours, examining for leaks.
41

42 3.8 SYSTEM ENERGY BALANCE
43

- 44 A. Scope: Provide the services of an independent test and balance agency to test, adjust and
45 balance, retest and record performance of the system to obtain design quantities as
46 specified. The agency must prove that they have no affiliation with any equipment
47 manufacturer, design engineer, installing contractor, or any other party which might lead to
48 a conflict of interest, in order to provide an unbiased, third party system balance and report.
49
50 B. Qualifications: Prior to commencing work, the agency shall be reviewed by the Engineer
51 and shall be certified by the Associated Air Balance Council or National Environmental
52 Balancing Bureau. The agency shall provide documentation of having successfully
53 completed at least five projects of similar size and scope. The Contractor must have
54 sufficient personnel to respond to a trouble call at the site within two hours.
55

- 1 C. Instruments: All instruments shall be accurately calibrated; calibration histories shall be
2 available for examination. Application of instrumentation shall be in accordance with AABC
3 or NEBB standards.
4
- 5 D. Submittals: Include in shop drawings copies of forms to be used for testing and balancing
6 showing all data which is to be recorded. Three copies of completed balance report shall be
7 submitted for review.
8
- 9 E. Procedure - General: Procedure shall be in accordance with Associated Air Balance
10 Council's "National Standards for Field Measurements and Instrumentation - Total System
11 Balance", Volume Two, No. 12173, or equivalent NEBB standards. System shall be in full,
12 continuous operation during test. Balanced quantities shall be plus 10%, minus 0% of
13 design quantities. All nameplate data, manufacturer, model and serial numbers shall be
14 recorded for each item tested.
15
- 16 F. Extended Warranty: The test and balance agency shall include an extended warranty of 90
17 days after completion of test and balance work, during which time the Engineer, at his
18 discretion, may request a recheck or resetting of any item or items in test report. The
19 agency shall provide technicians to assist the Engineer in making any tests he may require
20 during this period of time.
21
- 22 G. Air Balance Procedure (For Each Air Handling System):
23
- 24 1. All air filters shall be clean when air balance is performed.
25
 - 26 2. Provide a sketch of the equipment showing exactly where all pressure readings
27 were taken.
28
 - 29 3. Adjust blower RPM to design requirements.
30
 - 31 4. Record motor full load amperes.
32
 - 33 5. Make pitot tube traverse of main supply and return ducts and obtain design CFM at
34 fans.
35
 - 36 6. Record system static pressures, inlet and discharge.
37
 - 38 7. Record filter quantity, size(s) and pressure drop across filter(s) at each filter bank.
39
 - 40 8. Adjust system for design CFM recirculated air.
41
 - 42 9. Adjust system for design CFM outside air.
43
 - 44 10. Adjust all main supply and return air ducts to design CFM.
45
 - 46 11. Adjust all zones to design CFM, supply and return.
47
 - 48 12. Adjust all equipment and grilles to design flow.
49
 - 50 13. Adjust CFM at all exhaust fans, make-up units, etc. (high and low speed, where
51 applicable). Record applicable data from items above.
52
 - 53 14. Each grille, diffuser and register shall be identified as to location.
54
 - 55 15. Verify proper diffusion pattern for all ceiling grilles and that all sidewall grilles are

set for 5 degrees upward deflection unless otherwise noted. Make a notation of any that are not set properly.

16. Size, type and manufacturer of diffusers, grilles, registers and all tested items shall be identified and listed. Manufacturer's ratings shall be used to make required calculations on all items.
17. Readings and tests of diffusers, grilles, and registers shall include required FPM velocity and test resultant velocity, required CFM and test resultant CFM after adjustments.
18. In cooperation with the control manufacturer's representative, set adjustments of automatically operated dampers to operate as specified. Testing agency shall check all controls for proper calibrations and list all controls requiring adjustment by control installers.
19. All diffusers, grilles and registers shall be adjusted for required air patterns and to minimize drafts.
20. As a part of the work of this contract, the air conditioning contractor shall make any changes in pulleys, belts and dampers or the addition of dampers required for correct balance as recommended by air balance agency, at no additional cost to Owner.

H. Water Balance Procedure (For Each Pumping System):

1. Set valves for maximum coil flow.
2. Remove and clean all strainers.
3. Examine water in system and determine if water has been treated and cleaned.
4. Check expansion tanks to determine that they are properly charged and that the system is completely full of water. Bleed air from system.
5. Air balance must be complete before water balance begins.
6. Adjust pumps to design flow by use of differential pressure gage calibrated in feet of water.
7. Adjust water flow through all equipment to design flow.
8. Balance all coils for design flow and mark settings on flow controllers.
9. After coils are balanced, recheck settings at all equipment and readjust if required.
10. Record pressure drop through coils, and reset to design flow. Set pressure drop across bypass valve to match coil full flow pressure drop.
11. Record the following at each coil:
 - a. Pressure drop across coil.
 - b. Pressure drop across bypass valve.
12. Record pump suction and discharge pressures at operating condition and also with

1 pump discharge valve completely closed.

2
3 13. Record running amperage of pump motor at operating condition and also with
4 pump discharge valve completely closed.

5
6 14. Record water metering device readings.

7
8 I. Additional Scope: Test and balance, in accordance with Paragraph 3.8 H, domestic hot
9 water return piping and chilled drinking water piping. Balance loops for equal temperature
10 drop.

11
12 J. Additional Scope: Test, adjust and retest water bleed rates from evaporative coolers, make-
13 up air units and cooling towers. Record all data.

14
15 K. Additional Scope: Measure, record and balance all air handling unit blowers in accordance
16 with Paragraph 3.6. Submit initial and final readings.

17
18 3.9 WATER TREATMENT

19
20 A. General: All HVAC water piping systems shall be cleaned and treated as indicated below.
21 Chemical compound identifications are from San Joaquin Chemicals, Inc. Provide
22 treatment as required to control scale, corrosion, biological fouling and foaming. Chemical
23 treatments indicated below are general in nature. Actual formations, dosages and
24 application shall be determined by analysis of the water to be treated with consideration for
25 the type of treatment equipment and operating units. Initial cleaning, preparation and
26 start-up shall be supervised by the water treatment company field service engineer.

27
28 B. Cleaning and Initial Preparations:

29
30 1. Initial Fill: As the first water is introduced, add not less than 10 gallons for each
31 1,000 gallons of contained water volume a liquid blend of alkaline detergent
32 (SANASOLV6103) comprised of the following ingredients.

- 33
34 a. Soda Ash
35 b. Sodium Silicate Pentahydrate
36 c. Sodium Tri-Polyphosphate
37 d. Wetting Agent, Non-Ionic
38

39 2. Circulation: The above detergent shall be circulated for not less than 6 hours after
40 which the system will be rapidly dumped with circulating pumps operating to
41 provide maximum practical motion, and whenever possible, simultaneously adding
42 or chasing with rinse water. In either case, the system shall be flushed until neutral
43 to phenolphthalein. After flushing, all strainers shall be removed and cleaned.
44

45 3. Initial Treatment: As soon as possible after flushing, but in no case more than 24
46 hours later, and with clean water in the systems, introduce 500 to 1,000 parts per
47 million of sodium nitrite (SANACOR 2301) and adjust Ph to 7.5-8.5. Maintain
48 treatment concentration in all closed systems using bypass feeders. Introduce
49 250-500 parts per million SANACOR 2600 series inhibitor to open recirculating
50 water systems. Allow this inhibitor to fall within control limits as recommended by
51 the water treatment representative.
52

53 C. Certification Before Start-Up: Equipment shall not be started until the water has been
54 cleaned and treated per the water treatment company's recommendations. The field
55 service engineer shall prepare a letter and submit it to the Engineer indicating that all piping

systems have been cleaned and treated and are ready to be put into operation.

D. Continuation of Supervision: Provide supervision of the water treatment program for a period of one year which shall consist of analysis of all systems treated and the submittal of a written report stating the current conditions and recommendations for maintaining optimal controls. This service shall be performed monthly.

E. Chemical Supply: Provide a 6-month supply of chemicals to maintain the following concentrations based on 10 hours operation per day, 7 days a week, at 75% capacity.

1. Chilled Closed System: Provide and maintain an excess nitrite concentration of 500-1,000 ppm by addition of SANACOR 2301.
2. Hot Water Closed System: Provide and maintain an excess nitrite concentration of 500-1,000 ppm by addition of SANACOR 2301.
3. Condenser Cooling Water: Provide and maintain between 120 and 240 ppm total treatment concentration of SANACOR 2600 series inhibitor.

F. Equipment and Accessories:

1. Bypass Feeder: Welded steel construction, rated at 175 psi working pressure. Capacity as indicated on drawings. 3"(min.) neck opening. Cast iron cap with Buna-N O-ring. 3/4" NPT fittings. 1/4" brass air vent in cap.
2. Controller: Controller shall continuously monitor the conductivity of a sample water stream via a remote sensor. As the conductivity rises above a set level, the controller shall signal a solenoid bleed valve to open and simultaneously signal a pump to introduce chemicals for treatment of the make-up water. The solenoid valve shall remain open until the conductivity drops to the set level. The conductivity level shall be adjustable from 100-6,000 micromhos. Controller shall have operating mode indicator lights, connections for chemical pump, solenoid valve and conductivity sensor, and flange for wall mounting. Cambridge Scientific Industries, Hydac, Model E.
3. Chemical Pump: Positive displacement pump with variable stroke and frequency. 0.5-24 gpd. Acrylic head. Reinforced, thermoplastic housing. Provide foot valve with strainer and polyethylene tubing. Liquid Metronics, Inc., Model A-111.
4. Solenoid Bleed Valve: Normally closed, pilot operated, diaphragm valve. One inch pipe size. Griswold Controls, Model 4160.
5. Flow Control Valve: One-inch pipe size. Dole flow control valve.
6. Chemical Storage Tank: 10-gallon polyethylene chemical container.
7. Cooling Tower Float Valve: Griswold Controls, Model 4190. One-inch pipe size.

G. Installation: Install all equipment and accessories per the piping diagrams on drawings and the manufacturer's recommendations.

END OF SECTION 23 08 00

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SECTION 23 08 05 - COMMISSIONING OF HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes Cx process requirements for the following HVAC systems, assemblies, and equipment:
 - 1. Energy supply systems.
 - 2. Heat generation systems.
 - 3. Cooling generation systems.
 - 4. Central-station air-handling systems.
 - 5. Air, steam, and hydronic distribution systems.
 - 6. Heating and cooling terminal and unitary equipment.
 - 7. HVAC controls.
 - 8. TAB verification.
 - 9. Smoke control sequences
- B. Related Requirements:
 - 1. Section 018100 "General Commissioning Requirements" for general Cx process requirements and CxA responsibilities.
 - 2. For construction checklists, comply with requirements in various Division 23 Sections specifying HVAC systems, system components, equipment, and products.

1.3 DEFINITIONS

- A. BAS: Building automation system.
- B. Cx: Commissioning, as defined in Section 018100 "General Commissioning Requirements."
- C. CxA: Commissioning Authority, as defined in Section 018100 "General Commissioning Requirements."
- D. DDC: Direct digital controls.
- E. HVAC: Heating, ventilating, and air conditioning.
- F. "Systems," "Assemblies," "Subsystems," "Equipment," and "Components": Where these terms are used together or separately, they shall mean "as-built" systems, assemblies, subsystems, equipment, and components.
- G. TAB: Testing, adjusting, and balancing.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For BAS and HVAC Testing Technician.
- B. Construction Checklists: Draft construction checklists will be created by CxA for Contractor review.
- C. Construction Checklists: Material, installation, and performance test checklists for systems, assemblies, subsystems, equipment, and components to be part of the Cx process and according to requirements in Section 018100 "General Commissioning Requirements."
 - 1. Instrumentation and control for HVAC, including the following:
 - a. Control systems equipment.
 - b. Control valves.
 - c. Control dampers.
 - d. Energy meters.
 - e. Flow instruments.
 - f. Pressure instruments.
 - g. Speed instruments.
 - h. Temperature instruments.
 - i. Sequence of operations.
 - 2. Fuel piping, including the following:
 - a. Natural gas and fuel-oil piping, fittings, and specialties.
 - b. Fuel-oil pumps and motors.
 - c. Sleeves and sleeve seals.
 - d. Meters and gages.
 - e. General-duty and specialty valves.
 - f. Hangers and supports.
 - 3. Hydronic piping, including the following:
 - a. Heating hot-water, chilled-water, and condenser-water piping, fittings, and specialties.
 - b. Hydronic pumps and motors.
 - c. Sleeves and sleeve seals.
 - d. Meters and gages.
 - e. General-duty and specialty valves.
 - f. Hangers and supports.
 - g. Vibration isolation and seismic restraints.
 - 4. Steam and condensate piping, including the following:
 - a. Steam and condensate piping, fittings, and specialties.
 - b. Steam condensate pumps, motors, controls, and accessories.
 - c. Sleeves and sleeve seals.
 - d. Meters and gages.
 - e. General-duty and specialty valves.
 - f. Hangers and supports.
 - g. Vibration isolation and seismic restraints.
 - 5. Refrigerant piping, including the following:

- a. Refrigerant piping, fittings, and specialties.
 - b. Refrigerant charge.
 - c. Sleeves and sleeve seals.
 - d. Meters and gages.
 - e. General-duty and specialty valves.
 - f. Hangers and supports.
 - g. Vibration isolation.
6. Air distribution systems, including the following:
- a. Supply, return, and exhaust systems.
 - b. Metal ducts, liners, and fittings.
 - c. Nonmetal ducts and fittings.
 - d. Hangers and supports.
 - e. Vibration isolation and seismic restraints.
 - f. Flexible ducts and fittings.
 - g. Air-duct accessories, including volume dampers, fire and smoke dampers, turning vanes, sound attenuators, and flexible connectors.
 - h. Duct-mounted access doors and panels.
7. Air-handling equipment, including the following:
- a. Fans and motors.
 - b. Indoor air-handling units with and without coils, dampers, and filters.
 - c. Motors.
 - d. Hangers and supports.
 - e. Vibration isolation and seismic restraints.
8. Computer-room air conditioners.
9. Boilers, including the following:
- a. Supports and restraints.
 - b. Trim, accessories, and factory-installed controls.
 - c. Breechings, chimneys, and stacks.
 - d. Feedwater equipment.
 - e. Deaerators.
10. Chillers, including the following:
- a. Supports and restraints.
 - b. Trim, accessories, and factory-installed controls.
 - c. Motors.
11. Cooling towers, including the following:
- a. Supports and restraints.
 - b. Trim, accessories, and factory-installed controls.
 - c. Sump pumps, motors, controls, and accessories.
 - d. Fans, motors, controls, and accessories.
12. Mechanical insulation, including the following:
- a. Duct and plenum insulation.
 - b. Plumbing, and HVAC equipment insulation.

- c. Plumbing and HVAC piping insulation.
- D. Test equipment and instrumentation list, identifying the following:
 - 1. Equipment/instrument identification number.
 - 2. Planned Cx application or use.
 - 3. Manufacturer, make, model, and serial number.
 - 4. Calibration history, including certificates from agencies that calibrate the equipment and instrumentation.
 - 5. Equipment manufacturers' proprietary instrumentation and tools. For each instrument or tool, identify the following:
 - a. Instrument or tool identification number.
 - b. Equipment schedule designation of equipment for which the instrument or tool is required.
 - c. Manufacturer, make, model, and serial number.
 - d. Calibration history, including certificates from agencies that calibrate the instrument or tool, where appropriate.

1.5 QUALITY ASSURANCE

- A. BAS Testing Technician Qualifications: Technicians to perform BAS construction checklist verification tests, construction checklist verification test demonstrations, Cx tests, and Cx test demonstrations shall have the following minimum qualifications:
 - 1. Journey level or equivalent skill level with knowledge of BAS, HVAC, electrical concepts, and building operations.
 - 2. Minimum three years' experience installing, servicing, and operating systems manufactured by approved manufacturer.
- B. HVAC Testing Technician Qualifications: Technicians to perform HVAC construction checklist verification tests, construction checklist verification test demonstrations, Cx tests, and Cx test demonstrations shall have the following minimum qualifications:
 - 1. Journey level or equivalent skill level. Vocational school four-year-program graduate or an Associate's degree in mechanical systems, air conditioning, or similar field. Degree may be offset by three years' experience in servicing mechanical systems in the HVAC industry. Generally, required knowledge includes HVAC systems, electrical concepts, building operations, and application and use of tools and instrumentation to measure performance of HVAC equipment, assemblies, and systems.
 - 2. Minimum three years' experience installing, servicing, and operating systems manufactured by approved manufacturer.
- C. Testing Equipment and Instrumentation Quality and Calibration:
 - 1. Capable of testing and measuring performance within the specified acceptance criteria.
 - 2. Be calibrated at manufacturer's recommended intervals with current calibration tags permanently affixed to the instrument being used.
 - 3. Be maintained in good repair and operating condition throughout duration of use on Project.
 - 4. Be recalibrated/repaired if dropped or damaged in any way since last calibrated.
- D. Proprietary Test Instrumentation and Tools:

1. Equipment Manufacturer's Proprietary Instrumentation and Tools: For installed equipment included in the Cx process, test instrumentation and tools manufactured or prescribed by equipment manufacturer to service, calibrate, adjust, repair, or otherwise work on its equipment or required as a condition of equipment warranty, shall comply with the following:
 - a. Be calibrated by manufacturer with current calibration tags permanently affixed.
 - b. Include a separate list of proprietary test instrumentation and tools in operation and maintenance manuals.
 - c. HVAC proprietary test instrumentation and tools become property of Owner at the time of Substantial Completion.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 CONSTRUCTION CHECKLISTS

- A. Prepare detailed construction checklists for following HVAC systems, assemblies, subsystems, equipment, and components:
 1. Energy supply systems, including the following:
 - a. Fuel-oil supply.
 - b. Fuel gas supply.
 - c. Central-plant steam supply.
 - d. Central-plant hot-water supply.
 2. Heat generation systems, including the following:
 - a. Boilers.
 - b. Furnaces.
 - c. Fuel-fired unit heaters.
 - d. Auxiliary equipment.
 3. Cooling generation systems, including the following:
 - a. Water chillers.
 - b. Cooling towers.
 - c. Direct-expansion refrigeration systems.
 4. Central-station air-handling systems.
 5. Air, steam, and hydronic distribution systems, including the following:
 - a. Supply, return, outdoor-air, and exhaust-air distribution systems.
 - b. Steam distribution systems.
 - c. Hydronic systems.
 6. Heating and cooling terminal and unitary equipment, including the following:
 - a. Fan-coil units.
 - b. Unitary heating and cooling equipment.

7. Controls and instrumentation.
8. TAB verification.
9. Smoke control system and sequences
 - a. Air handlers, fan coils, relief fans, exhaust fans, and supply fans.
 - b. Fire/smoke and smoke dampers.
 - c. Variable frequency drives.
 - d. Selected EMS controls.

3.2 CONSTRUCTION CHECKLIST REVIEW

- A. Review and provide written comments on draft construction checklists. CxA will create required draft construction checklists and provide them to Contractor.
- B. Return draft construction checklist review comments within 10 days of receipt.
- C. When review comments have been resolved, the CxA will provide final construction checklists, marked "Approved for Use, (date)."
- D. Use only construction checklists, marked "Approved for Use, (date)."

3.3 Cx TESTING PREPARATION

- A. Certify that HVAC systems, subsystems, and equipment have been installed, calibrated, and started and that they are operating according to the Contract Documents and approved submittals.
- B. Certify that HVAC instrumentation and control systems have been completed and calibrated, that they are operating according to the Contract Documents and approved submittals, and that pretest set points have been recorded.
- C. Certify that TAB procedures have been completed and that TAB reports have been submitted, discrepancies corrected, and corrective work approved.
- D. Set systems, subsystems, and equipment into operating mode to be tested according to approved test procedures (for example, normal shutdown, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).

3.4 Cx TEST CONDITIONS

- A. Perform tests using design conditions, whenever possible.
 1. Simulated conditions may, with approval of Architect, be imposed using an artificial load when it is impractical to test under design conditions. Before simulating conditions, calibrate testing instruments. Provide equipment to simulate loads. Set simulated conditions as directed by CxA and document simulated conditions and methods of simulation. After tests, return configurations and settings to normal operating conditions.
 2. Cx test procedures may direct that set points be altered when simulating conditions is impractical.
 3. Cx test procedures may direct that sensor values be altered with a signal generator when design or simulating conditions and altering set points are impractical.

- B. If tests cannot be completed because of a deficiency outside the scope of the HVAC system, document the deficiency and report it to Architect. After deficiencies are resolved, reschedule tests.
- C. If seasonal testing is specified, complete appropriate initial performance tests and documentation and schedule seasonal tests.

3.5 Cx TESTS COMMON TO HVAC SYSTEMS

- A. Measure capacities and effectiveness of systems, assemblies, subsystems, equipment, and components, including operational and control functions, to verify compliance with acceptance criteria.
- B. Test systems, assemblies, subsystems, equipment, and components operating modes, interlocks, control responses, responses to abnormal or emergency conditions, and response according to acceptance criteria.
- C. Coordinate schedule with, and perform Cx activities at the direction of, CxA.
- D. Comply with construction checklist requirements, including material verification, installation checks, startup, and performance tests requirements specified in Division 23 Sections specifying HVAC systems and equipment.
- E. Provide technicians, instrumentation, tools, and equipment to perform and document the following:
 - 1. Construction checklist verification tests.
 - 2. Construction checklist verification test demonstrations.
 - 3. Cx tests.
 - 4. Cx test demonstrations.
- F. Vibration Isolation in HVAC Systems:
 - 1. Prerequisites: Acceptance of results of construction checklists for vibration control devices.
 - 2. Components to Be Tested:
 - a. Vibration isolation control devices in HVAC systems.
 - 3. Test Purpose: Evaluate effectiveness of vibration isolation control devices.

3.6 TAB VERIFICATION

- A. Examination of requirements and correction of deficiencies of Testing, Adjusting, and Balancing in Section 23 08 00.
- B. Scope: HVAC air systems and hydronic piping systems.
- C. Purpose: Differential flow relationships intended to maintain air pressurization differentials between the various areas of Project.
- D. Conditions of the Test:

1. Systems operating in full heating mode with minimum outside air volume.
2. Systems operating in full cooling mode with minimum outside air volume.
3. For measurements at air-handling units with economizer controls; systems operating in economizer mode with 100 percent outside air.

E. Acceptance Criteria:

1. No rechecked measurement shall differ from measurements documented in the final report by more than two times the tolerances allowed.
2. Under all conditions, where the Contract Documents indicate a differential in airflow between supply and exhaust and/or return in a space, the differential relationship shall be maintained.

3.7 HEATING CONTROL SYSTEM Cx TESTS

A. Heating-Water Supply Temperature Control:

1. Prerequisites: Installation verification of the following:
 - a. Startup of boiler.
 - b. Startup of heating-water pump(s).
 - c. TAB of heating-water flow and pressure.
 - d. Input Device: Heating-water supply temperature.
 - e. Output Device: Control valve.
 - f. Display the following at the operator's workstation:
 - 1) Heating-water supply temperature.
 - 2) Heating-water supply temperature set point.
 - 3) Control-valve position.
2. Scope: Heating-water system.
3. Purpose: Control of heating-water supply temperature at input device.
4. Conditions of the Test:
 - a. Minimum heating-water flow.
 - b. Midrange Heating-Water Flow: 50 to 60 percent of maximum.
 - c. Maximum heating-water flow.
5. Acceptance Criteria: Under all conditions, heating-water supply temperature is within plus or minus 2.0 deg F of set point.

B. Control Primary Circulating Pump(s):

1. Prerequisites: Installation verification of the following:
 - a. Startup of heating-water pump(s).
 - b. Input Device: Outdoor-air temperature.
 - c. Output Device: Heating-water pump.
 - d. Display the following at the operator's workstation:
 - 1) Outdoor-air temperature.
 - 2) Operating status of primary circulating pump(s).
2. Scope: Heating-water pump(s) and associated controls.

3. Purpose: On-off control of heating-water pump(s) in response to variable outdoor-air temperature input.
4. Conditions of the Test:
 - a. High Temperature: Outdoor-air temperature above 65 deg F.
 - b. Low Temperature: Outdoor-air temperature below 65 deg F.
5. Acceptance Criteria:
 - a. High Temperature: Pump(s) are off when outside-air temperature is above 65 deg F.
 - b. Low Temperature: Pump(s) are on when outside-air temperature is below 65 deg F.

3.8 CENTRAL REFRIGERATION SYSTEM Cx TESTS

A. Start and Stop Condenser-Water Pump(s):

1. Prerequisites: Installation verification of the following:
 - a. Startup of condenser-water pump(s).
 - b. Startup of cooling tower.
 - c. Input Device: Water pressure transducer.
 - d. Input Device – DDC system outdoor air temperature.
 - e. Output Device: Hard wired through motor starter.
 - f. Display the following at the operator's workstation:
 - 1) Low-level cooling-tower sump alarm.
 - 2) Outdoor-air temperature.
 - 3) Cooling (software) demand indication.
 - 4) Time and time schedule.
 - 5) Condenser-water pump(s) on-off status.
 - 6) Condenser-water pump(s) on-off indication.
 - 7) Condenser-water flow indication.
2. Scope:
 - a. Condenser-water system, including condenser-water pump(s), cooling towers, and associated controls.
3. Purpose:
 - a. Condenser-water pump(s) lockout.
 - b. Condenser-water pump(s) start.
 - c. Condenser-water pump(s) shutdown.
 - d. Low-level cooling-tower sump alarm.
 - e. Condenser-water pump(s) time-of-day schedule.
4. Conditions of the Test:
 - a. Verify Lockout: Start with condenser-water pump enable-input devices in the "disable" state to prevent pump start. One by one, place the enable-input devices

- in the "enable" state, and then return each to the "disable" state before placing the next enable-input device to the "enable" state.
 - b. Verify Start: Start with condenser-water pump enable-input devices in the "disable" state to prevent pump start. One by one, place the enable-input devices in the "enable" state.
 - c. Verify Shutdown: Place all enable-input devices in the "enable" state to allow the pump(s) to start. One by one, place the enable-input devices in the "disable" state, and then return each to the "enable" state before placing the next enable-input device to the "disable" state.
 - d. Verify Schedule: Compare condenser-water pump start and stop schedule times with Owner-approved time-of-day schedule.
 - 5. Acceptance Criteria:
 - a. Lockout: No single enable-input device starts the pump(s) when released to the "enable" state.
 - b. Start: Condenser-water pump(s) start when, and only when, all enable-input devices are in the "enable" state.
 - c. Shutdown: Each enable-input device stops the condenser-water pump(s) when placed in the "disable" state, regardless of the state of other enable-input devices.
 - d. Schedule: Condenser-water pump start and stop schedule times agree with Owner-approved time-of-day schedule.
- B. Start and Stop Chilled-Water Pump(s):
- 1. Prerequisites: Installation verification of the following:
 - a. Startup of chilled-water pump(s).
 - b. Startup of condenser-water pump(s).
 - c. Startup of cooling tower.
 - d. Input Device: Flow switch in condenser-water circuit.
 - e. Output Device: DDC system command to starter relay.
 - f. Display of the following at the operator's workstation:
 - 1) Chilled-water flow indication.
 - 2) Condenser-water flow indication.
 - 3) Chilled-water pump(s) on-off status.
 - 4) Chilled-water pump(s) on-off indication.
 - 2. Scope: Chilled-water system, including chilled-water pump(s), associated controls, and condenser-water system controls.
 - 3. Purpose:
 - a. Chilled-water pump(s) start.
 - b. Chilled-water pump(s) shutdown.
 - 4. Conditions of the Test:
 - a. Verify Start: Start with chilled-water pump enable-input device in the "disable" state to prevent pump start. Place the enable-input device in the "enable" state.
 - b. Verify Shutdown: Start with the enable-input device in the "enable" state to allow the pump(s) to run. Then place the enable-input device in the "disable" state.
 - 5. Acceptance Criteria:

- a. Start: Chilled-water pump(s) start when, and only when, the enable-input device is in the "enable" state.
- b. Shutdown: The enable-input device stops the chilled-water pump(s) when placed in the "disable" state.

C. Start and Stop Cooling-Tower Fans(s):

- 1. Prerequisites: Installation verification of the following:
 - a. Input Device: Flow switch in condenser-water circuit.
 - b. Output Device: DDC system command to starter relay.
 - c. Display:
 - 1) Condenser-water flow indication.
 - 2) Cooling-tower fan(s) on-off indication.
- 2. Scope: Condenser-water system, including cooling tower, condenser-water pump(s), and associated controls.
- 3. Purpose:
 - a. Cooling-tower fan(s) start.
 - b. Cooling-tower fan(s) shutdown.
- 4. Conditions of the Test:
 - a. Verify Start: Start with cooling-tower fan enable-input device in the "disable" state to prevent fan(s) start. Place the enable-input device in the "enable" state.
 - b. Verify Shutdown: Start with the enable-input device in the "enable" state to allow the fan(s) to run. Then place the enable-input device in the "disable" state.
- 5. Acceptance Criteria:
 - a. Start: Chilled-water pump(s) start when, and only when, the enable-input device is in the "enable" state.
 - b. Shutdown: The enable-input device stops the chilled-water pump(s) when placed in the "disable" state.

D. Chiller(s):

- 1. Prerequisites: Installation verification of the following:
 - a. Input Device: DDC system software.
 - b. Output Device: DDC system command to chiller.
 - c. Display:
 - 1) Chiller(s) on-off indication.
 - 2) Chiller failure alarm.
- 2. Scope:
 - a. Chilled-water system and associated controls.
 - b. Condenser-water system and associated controls.
- 3. Purpose:

- a. Lead-lag rotation of chillers.
- b. Replacement of failed chiller in rotation.
- c. Replacement of failed chiller in add/drop sequence.
- d. Chiller failure alarm initiation.

4. Conditions of the Test:

- a. Lead-Lag Rotation - Chiller Start: Create a number of chilled-water system start-stop cycles equal to the number of chillers plus one.
- b. Lead-Lag Rotation - Lead Chiller Fail: Disable the lead chiller while it is running.
- c. Lead-Lag Rotation - Lag Chiller Fail: Disable a lag chiller while it is running.
- d. Lead-Lag Rotation - Chiller Start Fail: Disable a chiller while it is in standby mode. Initiate a lead-lag rotation call for the disabled chiller to start.
- e. Add/Drop Sequence - Increasing Demand: Increase chilled-water demand incrementally to observe the corresponding addition of chillers. Increase demand gradually as the load approaches the set point for adding the next chiller, to permit observation of the actual load at the time the next chiller is enabled.
- f. Add/Drop Sequence - Decreasing Demand: Decrease chilled-water demand incrementally to observe the corresponding dropping of chillers. Decrease demand gradually as the load approaches the set point for dropping the next chiller, to permit observation of the actual load at the time the next chiller is disabled.

5. Acceptance Criteria:

- a. Lead-Lag Rotation - Chiller Start: On each chilled-water system start event, the next chiller in rotation starts as the lead chiller, and the previous lead chiller is designated as the lag chiller.
- b. Lead-Lag Rotation - Lead Chiller Fail: When the lead chiller fails, the next chiller in rotation starts as the lead chiller, and a chiller failure alarm is initiated for the failed chiller.
- c. Lead-Lag Rotation - Lag Chiller Fail: When the lag chiller fails, a chiller failure alarm is initiated for the failed chiller.
- d. Lead-Lag Rotation - Chiller Start Fail: When a chiller fails to start, a chiller failure alarm is initiated for the failed chiller.

3.9 TERMINAL UNIT EQUIPMENT Cx TESTS

A. VAV Terminal Air Units with Coils:

1. Prerequisites: Installation verification of the following:

- a. Occupancy Input Device: Occupancy sensor.
- b. Occupancy Output Device: DDC system binary output.
- c. Room Temperature Input Device: Electronic temperature sensor.
- d. Room Temperature Output Device: Electronic damper actuators and control-valve operators.
- e. Display the following at the operator's workstation:
 - 1) Room/area served.
 - 2) Room occupied/unoccupied.
 - 3) Room temperature indication.
 - 4) Room temperature set point.
 - 5) Room temperature set point, occupied.
 - 6) Room temperature set point, unoccupied.

- 7) Air-damper position as percentage open.
 - 8) Control-valve position as percentage open.
- 2. Scope: VAV terminal air units with hydronic coils in supply-air systems, and associated controls.
 - 3. Purpose:
 - a. Occupancy-dependent room temperature set-point reset.
 - b. Room temperature control.
 - 4. Conditions of the Test:
 - a. Cx Test Demonstration Sampling Rate: 10 percent of each model/size unit.
 - b. Temperature Control - Occupied: Start with the room unoccupied. Occupy the room and observe the change to occupied status. Observe temperature control until room temperature is stable at occupied set point, plus or minus 1.0 deg F.
 - c. Temperature Control - Unoccupied: Start with the room occupied. Vacate the room and observe the change to unoccupied status. Observe temperature control until room temperature is stable at unoccupied set point, plus or minus 1.0 deg F.
 - 5. Acceptance Criteria:
 - a. Temperature Control - Occupied:
 - 1) Control system status changes from "occupied" to "unoccupied" after the specified time.
 - 2) Room temperature is stable at occupied set point, plus or minus 1.0 deg F within 10 minutes of occupancy. Room temperature does not overshoot or undershoot set point by more than 2.0 deg F during transition.
 - b. Temperature Control - Unoccupied:
 - 1) Control system status changes from "unoccupied" to "occupied" after five minutes of continuous occupancy.
 - 2) Room temperature is stable at unoccupied set point, plus or minus 1.0 deg F within 30 minutes of occupancy.

3.10 AIR-HANDLING SYSTEM Cx TESTS

A. Supply Fan(s) Variable-Volume Control:

- 1. Prerequisites: Installation verification of the following:
 - a. Volume Control Input Device: Static-pressure transmitter sensing supply-duct static pressure referenced to conditioned-space static pressure.
 - b. Volume Control Output Device: DDC system analog output to modulating damper actuator. Set inlet guide vanes to closed position when fan is stopped.
 - c. Volume Control Input Device: Static-pressure transmitter sensing supply-duct static pressure referenced to conditioned-space static pressure.
 - d. Volume Control Output Device: DDC system analog output to motor speed controller. Set variable-speed drive to minimum speed when fan is stopped.
 - e. High-Pressure Input Device: Static-pressure transmitter sensing supply-duct static pressure referenced to static pressure outside the duct.

- f. High-Pressure Output Device: DDC system binary output.
 - g. Display the following at the operator's workstation:
 - h. Supply-fan-discharge static-pressure set point.
 - 1) Supply-fan-discharge static-pressure indication.
 - 2)
 - 3) Supply-fan airflow rate.
 - 4) Supply-fan speed.
 - 2. Scope: VAV supply fan units and associated controls.
 - 3. Purpose:
 - a. Supply-air discharge static pressure control.
 - b. Response to excess supply-air discharge static pressure condition.
 - 4. Conditions of the Test:
 - a. Minimum supply-air flow.
 - b. Midrange Supply-Air Flow: 50 to 60 percent of maximum.
 - c. Maximum supply-air flow.
 - d. Excess supply-air discharge static pressure.
 - 5. Acceptance Criteria:
 - a. At all supply-air flow rates, and during changes in supply-air flow, discharge air static pressure is at set point plus or minus 2 percent.
 - b. Fan stops and an alarm is initiated at the operator's workstation when supply-air discharge static pressure is at the excess static pressure, plus or minus 2 percent.
- B. Air-Handler Mixed-Air Control:
- 1. Prerequisites: Installation verification of the following:
 - a. Minimum Position Input Device: DDC system time schedule.
 - b. Output Device: DDC system analog output to modulating damper actuator(s).
 - c. Heating Reset Input Device: DDC system software.
 - d. Supply Air Temperature Input Device: Electronic temperature sensor.
 - e. Cooling Reset Input Device: Outdoor- and return-air, duct-mounted electronic temperature sensor.
 - f. Display the following at the operator's workstation:
 - 1) Mixed-air-temperature indication.
 - 2) Mixed-air-temperature set point.
 - 3) Mixed-air damper position.
 - 2. Scope: Air handler with mixed-air control and associated controls.
 - 3. Purpose:
 - a. Occupied time control.
 - b. Minimum damper position control.
 - c. Heating reset control.
 - d. Mixed-air temperature control.
 - e. Cooling reset control.
 - f. Unoccupied time control.

4. Conditions of the Test:
 - a. Occupied Time Control: Start in unoccupied schedule. Advance to occupied schedule time.
 - b. Minimum Damper Position Control: Command system to mode in which minimum damper position is required.
 - c. Heating Reset Control: Create a call for heating.
 - d. Supply Air Temperature Control: Override supply-air temperature set point to a value 2.0 deg F above current supply-air temperature.
 - e. Cooling Reset Control: Override outdoor-air temperature to a value that exceeds return-air temperature.
 - f. Unoccupied Time Control: Advance to unoccupied schedule time.
 - g. Control Data Trend Log: Set up a data trend log of the following input device values and output device commands. Record data at hourly intervals. Submit trend data for 24-hour periods in which natural conditions require heating reset control, supply-air temperature control, and cooling reset control.
 - 1) Minimum position input device.
 - 2) Heating reset input device.
 - 3) Supply-air temperature input device.
 - 4) Cooling reset input device.
5. Acceptance Criteria:
 - a. Occupied Time Control: Mixed-air control is active in occupied mode.
 - b. Minimum Damper Position Control: Controller positions outdoor-air dampers to minimum position.
 - c. Heating Reset Control: Controller closes minimum outdoor-air dampers.
 - d. Supply-Air Temperature Control: Controller modulates outdoor-, return-, and relief-air dampers to maintain temporary supply-air temperature set point, plus or minus 1.0 deg F.
 - e. Cooling Reset Control: Controller sets outdoor-air dampers to minimum position when outdoor-air temperature exceeds return-air temperature.
 - f. Unoccupied Time Control: Controller positions outdoor- and relief-air dampers closed and return-air dampers open.
 - g. Control Data Trend Log: Data verify control according to sequence of control.

3.11 SMOKE CONTROL SYSTEM Cx TESTS

- A. Verify operation of the following during each of the “smoke control modes” as defined on the Mechanical Sheets.
 1. ON-OFF operation of:
 - a. Air handlers
 - b. Relief fans.
 - c. Exhaust fans.
 - d. Fan coils.
 2. OPEN-CLOSE position of:
 - a. Fire/smoke dancers.
 - b. Smoke dampers.
 - c. Air handler return air / O.A. dampers when the dampers are U.L. 555 listed.

3. Airflow testing of air handler supply fans and relief/exhaust fans.
 - a. Set up a procedure for determining the airflow of fans and the programming of VFDs to obtain precise CFMs as required for each smoke-control zone.
 - b. Provide direction to contractors performing work under Specifications Sections 230800, 250900, and 283111 to verify the sequences and document field-determined settings.
 - c. Verify and compare airflow readings of airflow monitors against airflow readings taken at grilles or traverse readings.

END OF SECTION 23 08 05

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SECTION 23 08 10 – AIR HANDLING UNITS

PART 1 - GENERAL

1.1 GENERAL MECHANICAL PROVISIONS

- A. The preceding General Mechanical Provisions shall form a part of this Section with the same force and effect as though repeated here.

1.2 QUALITY ASSURANCE

- A. Air Coils: Certify capacities, pressure drops and selection procedures in accordance with current AHRI Standard 410.
- B. Air handling units with fan sections utilizing single fans shall be rated and certified in accordance with AHRI Standard 430.
- C. Air handling units with fan sections utilizing multiple fans shall be rated in accordance with AHRI Standard 430 for airflow, static pressure, and fan speed performance.
- D. ISO 9001 Certification

1.3 REGULATORY REQUIREMENTS

A. Agency Listings/Certifications

1. Unit shall be manufactured to conform to UL 1995 and shall be listed by either UL/CUL or ETL. Units shall be provided with listing agency label affixed to the unit.
2. Certify air handling units in accordance with AHRI Standard 430. Units shall be provided with certification label affixed to the unit.
3. Certify air handling coils in accordance with AHRI Standard 410. Units shall be provided with certification label affixed to the unit.

PART 2 - PRODUCTS

2.1 EQUIPMENT GENERAL REQUIREMENTS

- A. The preceding Equipment General Requirements in Section 23 08 00 shall form a part of this Section with the same force and effect as though repeated here.

2.2 GENERAL

- A. Unit layout and configuration shall be as defined in project plans and schedule.
- B. Unit manufacturer to provide an integral base frame to support all sections of unit and raise unit for proper trapping. Contractor will be responsible for providing a

housekeeping pad when indoor air handling unit base frame is not of sufficient height to properly trap unit. Unit base frames not constructed of galvanized steel shall be chemically cleaned and coated with both a rust-inhibiting primer and finished coat of rust-inhibiting enamel.

- C. Entire indoor air handling unit shall have a full perimeter base rail for structural rigidity and condensate trapping.

2.3 UNIT CASING

- A. Unit manufacturer shall ship separate segments so unit can be broken down for ease of installation in tight spaces. The entire air handler shall be constructed of galvanized steel. Indoor air handling unit casing finish to meet ASTM B117 250-hour salt-spray test. See Section 2.26 for outdoor air handling unit requirements. The removal of access panels or access doors shall not affect the structural integrity of the unit. All removable panels shall be gasketed. All doors shall have gasketing around full perimeter to prevent air leakage. Contractor shall be responsible to provide connection flanges and all other framework that is needed to properly support the unit.

- B. Casing performance – Casing air leakage shall not exceed leak class 9 ($C_L = 9$) per ASHRAE 111 at specified casing pressure, where maximum casing leakage (cfm/100 ft² of casing surface area) = $C_L \times P^{0.65}$.

- C. Air leakage shall be determined at 1.00 times maximum casing static pressure up to 8 inches w.g. Specified air leakage shall be accomplished without the use of caulk. Total estimated air leakage shall be reported for each unit in CFM, as a percentage of supply air, and as an ASHRAE 111 Leakage Class.

- D. Under 55°F supply air temperature and design conditions on the exterior of the unit of 81°F dry bulb and 73°F wet bulb, condensation shall not form on the casing exterior. The AHU manufacturer shall provide tested casing thermal performance for the scheduled supply air temperature plotted on a psychrometric chart. The design condition on the exterior of the unit shall also be plotted on the chart. If tested casing thermal data is not available, AHU manufacturer shall provide, in writing to the Engineer and Owner, a guarantee against condensation forming on the unit exterior at the stated design conditions above. The guarantee shall note that the AHU manufacturer will cover all expenses associated with modifying units in the field should external condensate form on them. In lieu of AHU manufacturer providing a written guarantee, the installing contractor must provide additional external insulation on AHU to prevent condensation.

- E. Unit casing (wall/floor/pressure bulkhead roof panels and doors) shall be able to withstand up to 1.5 times design static pressure up to +8" w.g. in all positive pressure sections and -8" w.g. in all negative pressure sections, whichever is less, and shall not exceed 0.0042" per inch of panel span ($L/240$).

- F. Floor panels shall be double-wall construction and designed to support a 300-lb load during maintenance activities and shall deflect no more than 0.0042" per inch of panel span.

- G. Unit casing panels shall be 2" double-wall construction, with solid galvanized exterior and solid galvanized interior, to facilitate cleaning of unit interior.

- H. Unit casing panels (pressure bulkhead roof panels, walls, floor) and doors shall be provided with a minimum thermal resistance (R-value) of 13 Hr*Ft²*°F/BTU.

I . Unit casing panels (pressure bulkhead roof panels, walls, floor) and external structural frame members shall be completely insulated filling the entire panel cavity in all directions so that no voids exist. Panel insulation shall comply with NFPA 90A.

J . Structural frame must not extend from air-handling unit interior to exterior. All component and panel support structure must be internal to AHU. Casing panel inner liners must not extend to the exterior of the unit or contact the exterior frame. A mid-span, no-through-metal, internal thermal break shall be provided for all unit casing panels.

K . Access panels and/or access doors shall be provided in all sections to allow easy access to drain pan, coil(s), motor, drive components and bearings for cleaning, inspection, and maintenance.

L . Access panels and doors shall be fully removable without the use of specialized tools to allow complete access of interior surfaces.

2.4 Access Doors

A . Access doors shall be 2" double-wall construction. Interior and exterior shall be of the same construction as the interior and exterior wall panels.

B . All doors downstream of cooling coils shall be provided with a thermal break construction of door panel and door frame.

C . Gasketing shall be provided around the full perimeter of the doors to prevent air leakage.

D . Door hardware shall be surface-mounted to prevent through-cabinet penetrations that could likely weaken the casing leakage and thermal performance.

E . Handle hardware shall be designed to prevent unintended closure.

F . Access doors shall be hinged and removable without the use of specialized tools to allow.

G . Hinges shall be interchangeable with the door handle hardware to allow for alternating door swing in the field to minimize access interference due to unforeseen job site obstructions.

H . Door handle hardware shall be adjustable and visually indicate locking position of door latch external to the section.

I . All doors shall be a minimum 60" high when sufficient height is available, or the maximum height allowed by the unit height.

2.5 PRIMARY DRAIN PANS

A . All cooling coil sections shall be provided with an insulated, double-wall, galvanized drain pan.

B . The drain pan shall be designed in accordance with ASHRAE 62.1 being of sufficient size to collect all condensation produced from the coil and sloped in two planes, pitched toward drain connections, promoting positive drainage to eliminate stagnant water conditions when unit is installed level and trapped per manufacturer's requirements. See section 2.07, paragraph F through H for specifications on intermediate drain pans

- 1 between cooling coils.
- 2 C. The outlet shall be located at the lowest point of the pan and shall be sufficient diameter
- 3 to preclude drain pan overflow under any normally expected operating condition.
- 4 D. All drain pan threaded connections shall be visible external to the unit. Threaded
- 5 connections under the unit floor shall not be accepted.
- 6 E. Drain connections shall be of the same material as the primary drain pan and shall
- 7 extend a minimum 2-1/2" beyond the base to ensure adequate room for field piping of
- 8 condensate traps.
- 9 F. The installing contractor is responsible to ensure the unit is installed level, trapped in
- 10 accordance with the manufacturer's requirements, and visually inspected to ensure
- 11 proper drainage of condensate.
- 12 G. Coil support members inside the drain pan shall be of the same material as the drain pan
- 13 and coil casing.
- 14 H. Drain pans shall be provided for heating coils, access sections, and mixing sections as
- 15 indicated in the plans.
- 16 2.6 FANS
- 17 A. Fan sections shall have a minimum of one access door located on the drive side of the
- 18 unit to allow inspection and maintenance of the fan, motor, and drive components.
- 19 Construct door(s) per Section 2.04.
- 20 B. Provide fans of type and class as specified on the schedule. Fan shafts shall be solid
- 21 steel, coated with a rust-inhibiting coating, and properly designed so that fan shaft does
- 22 not pass through first critical speed as unit comes up to rated RPM. All fans shall be
- 23 statically and dynamically tested by the manufacturer for vibration and alignment as an
- 24 assembly at the operating RPM to meet design specifications. Fans controlled by variable
- 25 frequency drives shall be statically and dynamically tested for vibration and alignment at
- 26 speeds between 25% and 100% of design RPM. If fans are not factory-tested for
- 27 vibration and alignment, the contractor shall be responsible for cost and labor associated
- 28 with field balancing and certified vibration performance. Fan wheels shall be keyed to fan
- 29 shafts to prevent slipping.
- 30 C. Belt-driven fans shall be provided with grease lubricated, self-aligning, anti-friction
- 31 bearings selected for L-50 200,000-hour average life per ANSI/AFBMA Standard 9.
- 32 Lubrication lines for both bearings shall be extended to the drive side of the AHU and
- 33 rigidly attached to support bracket with zerk fittings. Lubrication lines shall be a clear,
- 34 high-pressure, polymer to aid in visual inspection. If extended lubrication lines are not
- 35 provided, manufacturer shall provide permanently lubricated bearing with engineering
- 36 calculations for proof of bearing life.
- 37 D. All fans, including direct-drive plenum fans, shall be mounted on spring isolation bases.
- 38 Internally-mounted motor shall be on the same isolation base. Fan and motor shall be
- 39 internally isolated with spring isolators. Unit sizes up to nominal 4,000 cfm shall have 1-
- 40 inch springs. Unit sizes larger than nominal 4,000 cfm shall have 2-inch spring isolators.
- 41 A flexible connection (e.g. canvas duct) shall be installed between fan and unit casing to
- 42 ensure complete isolation. Flexible connection shall comply with NFPA 90A and UL 181
- 43 requirements. If fans and motors are not internally isolated, then the entire unit shall be
- 44 externally isolated from the building, including supply and return duct work, piping, and
- 45 electrical connections. External isolation shall be furnished by the installing contractor in

order to avoid transmission of noise and vibration through the ductwork and building structure.

E. Fan sections containing multiple fans shall be provided as indicated on the schedule and drawings. Each fan shall operate in parallel to each other fan in the array. The fans shall be SWSI plenum type with high efficient AF blades. Fans shall be direct-driven. Fan wheels shall be aluminum. The Hp characteristic of the fans shall be non-overloading.

F. Fan sections containing multiple fans shall be controlled using a common control signal, such as the duct static control signal, to modulate the fan speed.

G. Belts shall be enclosed as required by OSHA standard 29 CFR 1910 to protect worker from accidental contact with the belts and sheaves.

2.7 Ultraviolet (UV-C) Lights

A. UV-C light fixtures and lamps shall be provided by the air handler manufacturer. The UV-C fixtures shall be factory-assembled and tested in the air handler. Field-installed fixtures shall not be allowed.

B. Design of the UV-C light array shall assure that the UV-C energy striking the intended coil and drain pan surfaces shall not be less than 200 microwatts per square centimeter and provide not less than 99 percent surface disinfection efficiency. The minimum intensity at any point on the surface plane of the coil must exceed 50 microwatts per square centimeter. Energy consumption at the design intensity shall be no more than 13 watts for each square foot of treated, cross sectional plane.

C. Lamps and Fixtures

1. UV-C lamps and fixtures shall be positioned to provide an equal distribution of UV-C energy and to minimize shadowed areas. The fixture assembly shall be designed and installed such that the sum of the lamp arc lengths in a row is a minimum of 90% of the irradiated surface's total width. The lamps shall not produce ozone.

2. Each lamp shall be high-output, hot cathode, T8 diameter, medium bi-pin type that produces UVGI of 254 nanometers. Lamps shall contain no more than 5.5 milligrams of mercury while producing the specified UV-C output when installed in an environment with 500 fpm air velocity and subjected to temperatures of 55-135 degrees F. Lamp life shall be 9,000 hours minimum with no more than a 20 percent loss of output after two years of continuous use.

3. The UV-C fixtures and lamps shall be coupled end-to-end and mounted on a slide-out rack to enable complete replacement and/or maintenance of the bulbs from the unit exterior.

4. Fixtures shall meet the UL drip-proof design criteria and be constructed of stainless steel to resist corrosion. Racks for fixtures shall be constructed of galvanized steel as AHU interior. Fixtures shall have been independently tested and recognized by UL/C-UL under Category Code ABQK (Accessories, Air Duct Mounted), UL Standards 153, 1598 and 1995.

D. Protection of Polymeric Materials

1. All polymeric materials that come into direct or indirect (reflected) contact with UV-C light shall be tested and certified as UV-C tolerant. Any polymeric material in direct or indirect contact with UV-C light not certified as UV-C tolerant shall be completely shielded from the UV-C light using a certified UV-C tolerant material such as metal. UV-C tolerance is defined as being capable of performing its intended duty for a minimum of 20 years.

E. Safety

1. Access doors shall be provided at the location of each UV-C light as indicated on the plans and schedule. All sections of the air handler with access doors where the UV-C lights may pose a risk for direct exposure shall have a mechanical interlock switch that disconnects power to the lights when the door is opened.
2. In addition to the mechanical interlock switch, each unit shall be equipped with an externally mounted on-off/disconnect/shut off switch that disconnects power to the UV-C lights. The switch shall be equipped with a lock-out/tag-out to prevent unwanted operation of the UV-C lights.
3. A view port with cover shall be provided in each UV section to allow viewing of the UV-C light array confirming operation. The view port and other AHU windows shall be treated to assure the UV-C energy emitted through it is below the threshold limits specified by NIOSH and ACGIH.
4. Units shall have a safety warning label applied to the exterior of each section containing UV-C lights.
5. Complete safety, maintenance and servicing instructions for the UV-C lights and fixtures shall be incorporated into the air handler manufacturer's standard installation, operating and maintenance manuals.

2.8 DISCHARGE PLENUM SECTIONS

- A. Plenums shall be provided as indicated in the schedule and plans to efficiently turn air and provide acoustical attenuation. Discharge plenum opening types and sizes shall be scaled to meet pressure drop requirements scheduled and align with duct takeoffs.
- B. Discharge plenum panels shall include an acoustical liner where indicated in the schedule and plans to meet acoustical requirements. The liner shall be fabricated from stainless steel perforated material to prevent corrosion and designed to completely encapsulate fiberglass insulation. The perforation spacing and hole size shall be such as to prevent insulation breakaway, flake off, or delamination when tested at 9000 fpm, in accordance with UL 181 or ASTM C1071. Insulation material must be resistant to fungi in accordance with ASTM C1338.

2.9 Factory Wiring of Lights

- A. All power wiring for voltages greater than 24V and traveling through multiple unit sections shall be contained in an enclosed, metal, power-wiring raceway or EMT. Sections less than 6' in length may be contained in FMC.

PART 3 - EXECUTION

3.1 EQUIPMENT INSTALLATION

- A. The preceding Equipment Installation Requirements in Section 23 08 00 shall form a part of this Section with the same force and effect as though repeated here.

3.2 INSTALLATION

- A. The Mechanical Contractor shall be responsible to coordinate ALL installation requirements with the Owner and the Owner's selected Mechanical Contractor to ensure that a complete installation for each unit is being provided. Coordination efforts shall include such items as unloading and hoisting requirements, field wiring requirements, field piping requirements, field ductwork requirements, requirements for assembly of field-bolted or -welded joints, and all other installation and assembly requirements.

- B. The Mechanical Contractor shall verify that the following items have been completed prior to scheduling the AHU manufacturer's final inspection and start up:

1. All spring-isolated components have had their shipping restraints removed and the components have been leveled.
2. On all field-joined units, that all interconnections have been completed, i.e., electrical and control wiring, piping, casing joints, bolting, welding, etc.
3. All water and steam piping connections have been completed and hydrostatically tested and all water flow rates have been set in accordance with the capacities scheduled on the Drawings.
4. All ductwork connections have been completed and all ductwork has been pressure tested for its intended service.
5. All power wiring, including motor starters and disconnects, serving the unit has been completed.
6. All automatic temperature and safety controls have been completed.
7. All dampers are fully operational.
8. All shipping materials have been removed.
9. All (clean) filter media has been installed in the units.

END OF SECTION 23 08 10

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SECTION 23 08 15 – CUSTOM AIR HANDLER AH-B3

PART 1 - GENERAL

1.1 GENERAL MECHANICAL PROVISIONS

- A. The preceding General Mechanical Provisions shall form a part of this Section with the same force and effect as though repeated here.

1.2 QUALIFICATIONS

- A. Manufacturer shall be a company specializing in manufacturing the products specified in this section issuing complete catalog data. Manufacturer shall have been in production of custom HVAC equipment for a minimum of 10 years.
- B. Each unit shall bear an ETL or UL label under UL Standard 1995 indicating unit is listed as an assembly. ETL or UL listing of individual components, or control panels only (i.e. UL 508 Electrical Enclosures) is not acceptable.

1.3 ENVIRONMENTAL REQUIREMENTS

- A. Do not operate units for any purpose, temporary or permanent, until ductwork is clean, filters are in place and fan has been test run under observation.

1.4 QUALITY ASSURANCE

- A. Conform to space and access requirements; units which do not conform to space and access requirements will not be accepted.
- B. Insulation and insulation adhesive shall comply with NFPA 90A requirements for flame spread and smoke generation.

PART 2 - PRODUCTS

2.1 EQUIPMENT GENERAL REQUIREMENTS

- A. The preceding Equipment General Requirements in Section 23 08 00 shall form a part of this Section with the same force and effect as though repeated here.

2.2 FABRICATION

- A. Unit Base: Perimeter of unit base shall be constructed from ASTM A36 structural steel 'C' channel. Internal supports shall consist of structural rectangular tubing on minimum 24" centers. All fans and coils shall be supported on minimum 1/4" thick structural tubular steel. The unit base shall be fully welded. Height and section of structural members shall take into account internal loading, unit height, length and width, and split sections so as to limit base deflection to 1/200 of span. Curb mounted units shall be provided with curb angle welded on inside of structural base.
1. Prior to welding, all structural 'C' channels shall be sandblasted to remove rust and mill scale. Wire brushing or chemical treatment is not acceptable.
 2. Heavy removable lifting lugs shall be added to the perimeter channel along the longest length of the unit. Removable type lifting lugs shall be provided with welded attachments. Provide a minimum of 4 lugs per section to ensure proper rigging. Unit floor shall be covered with 16 gauge bright galvanized sheets as

- 1 standard. The floor shall be supported by stringers and structural members on
- 2 maximum 24" centers. All seams shall be supported underneath by structural
- 3 supports. Floor shall be attached to base structure by welding from underneath
- 4 on maximum 6" centers. Floor seams shall consist of minimum 1" standing
- 5 seams, caulked and covered with cleats to ensure water and air tightness. TEK
- 6 screw attachments of floor skin to structural base frame is not acceptable.
- 7 3. Insulation under floor shall be sprayed urethane foam with a minimum thickness
- 8 of 2.5" and a R value of 15 Hr-Ft²-°F/BTU.
- 9 4. Entire structural steel base shall be primer painted with industrial grade epoxy
- 10 primer for total thickness of 4 mils minimum. Base paint system shall meet 5,000
- 11 hour performance in accordance to ASTM B117 Salt Fog Test.
- 12 5. Fan isolator support assemblies shall be attached to base structural members
- 13 with minimum 3/8" Grade 5 bolts. Welded fan isolator assembly to the floor skin
- 14 is not acceptable.
- 15 6. Coil drain pans shall be supported by structural steel members under the floor.
- 16 B. Unit Housing: The unit casing panels shall be constructed of 16 gauge galvanized steel,
- 17 and shall utilize a standing seam modular panel type construction. The panels shall be
- 18 attached to each other, to the roof, and to the floor using bolts so that all panels are
- 19 removable. All seams shall be sealed with a high strength polyurethane sealant prior to
- 20 assembling the panels. After assembly, exterior panel seams shall be filled with acrylic
- 21 latex caulk for appearance. Bolting shall be zinc plated 1/4"-20 on maximum 8" centers.
- 22 Sheet metal or 'Tek' fasteners are not acceptable for sealing pressure containing panels.
- 23 1. Fan sections shall include 20 gauge perforated galvanized interior sheet metal
- 24 liners in fan blast area.
- 25 2. Cooling coil and direct evaporative sections shall include 20 gauge 304 stainless
- 26 steel liner.
- 27 3. Insulation in sections lined with perforated sheets shall be faced with neoprene.
- 28 4. All floor openings shall have 1" minimum flange up around entire perimeter. All
- 29 floor openings shall be covered with industrial grade bar grating.
- 30 5. Roof shall be sloped at 1/4" per foot for all exterior units. Slope must be
- 31 maintained after installation.
- 32 Access doors shall be provided full height (72") where unit height permits, and
- 33 shall be 24" wide where section length permits, otherwise minimum of 18" shall
- 34 be used. Doors shall be 2" thick, double wall and insulated type. Exterior door
- 35 panels shall be painted galvanized steel with minimum 2,000 hour performance
- 36 paint in accordance to ASTM B117 Salt Fog Test; interior panels are bright
- 37 galvanized G90 steel. Door insulation shall be injected urethane foam with a
- 38 minimum R value of 13-Ft²-°F/BTU. Door frames shall be heavy aluminum
- 39 extrusion with one-piece, closed cell, replaceable santoprene gasket seal.
- 40 6. Door hinges shall be die-cast zinc with provision for adjustment without the use
- 41 of shims or special tools. Door latches and handles are to be bolted to the unit
- 42 and made with corrosion resistant materials. Bolts, nuts and shafts for door
- 43 latches, handles and hinges shall be made of zinc plated steel. Door latch and
- 44 pawl assembly shall be industrial quality and corrosion resistant with a handle on
- 45 both the inside and outside of door. Latching mechanism shall be of conical
- 46 roller design. Latch and pawl assembly shall be bolted together without the use
- 47 of set screws allowed.
- 48 7. All doors to fan sections shall be provided with latches which require a tool to
- 49 open.
- 50 8. Viewing windows shall have double thermal pane wire reinforced safety glass.

- C. Insulation: Wall and ceiling panels shall be insulated with 2"-1.5#/cu.ft. fiberglass insulation. Insulation under solid lining shall be unfaced; otherwise, insulation shall be faced with an acrylic or neoprene coating. Insulation shall be tested and rated per ASTM C 423 and NFPA-90a rated. Insulation shall have thermal conductivity K factor of .24 Btu/Hr/Sq Ft/Degree F @ 75°F mean and the following sound attenuation characteristics:

Octave Bands	125	250	500	1K	2K	4K	NRC
Absorption Coefficient	.15	.77	1.11	1.08	1.00	1.03	1.00

- D. Paint Finish: Exterior wall and roof panels shall be coated with air dry acrylic polyurethane to a minimum dry thickness of 3 mils. Finish shall have no blistering or rusting on unscrubbed areas after 2,000 hours in accordance with ASTM B-117 Salt Fog Test.

E. Fans:

1. Housed Fan Assembly: Fan housing shall be heavy gauge galvanized steel construction. Fan scroll shall be bolted to fan frame. Bearings shall be cast iron pillow block mounted self-aligning ball type. Bearings shall be rated for a minimum average life of 200,000 hours at the maximum horsepower and speed ratings for the fan class. Fan wheel and sheaves shall be keyed to the fan shaft. Each fan assembly, including sheaves and belts, shall be trim balanced at the factory in accordance with ANSI 204-96 to Balance Quality Grade G6.3. Fans shall be rated in accordance with AMCA standard 210 for air performance and AMCA 300 for sound. All fans shall carry the AMCA certification label.
2. Plenum Fan Assembly: Fan shall be SWSI arrangement 3 (Direct drive arrangement 4 is acceptable) as indicated on the schedule. Shaft shall be sized not to exceed 75% of the first critical speed at the maximum speed for the fan class. Fan frame and base shall be constructed of welded structural steel angle, and painted with 3 mils of industrial grade water-based air dry enamel. Bearings shall be cast iron pillow block mounted self-aligning ball or roller type. Bearings shall be rated for a minimum average life of 200,000 hours at the maximum horsepower and speed ratings for the fan class. Fan wheel and sheaves shall be keyed to the fan shaft. Each fan assembly, including sheaves and belts, shall be trim balanced at the factory in accordance with ANSI 204-96 to Balance Quality Grade G6.3. Fans shall be rated in accordance with AMCA Standard 210 for air performance and AMCA 300 for sound. All fans shall carry the AMCA certification label.
3. Fan Assembly Isolation Base: Fan and motor shall be mounted on an integral fully welded structural steel base. Base shall be free floating at all four corners on spring type isolators with earthquake restraints rated for Seismic Zone 4 requirements. Isolator spring deflection shall be 2" minimum or as indicated on specifications.
4. Motors and Drive: Furnish premium-efficiency open drip proof, NEMA frame, ball bearing type motors. Motor horsepower shall be in accordance with the schedule and are minimum allowable. Minimum service factor shall be 1.15 and motors shall not be selected to operate in the service factor. The motor shall be mounted on an adjustable motor base with two adjusting bolts per side. The fan motors shall be factory wired to an external junction box with flexible conduit of adequate length so that it will not have any effect on the vibration isolation. Provide V-belt type, cast-iron sheaves, and reinforced rubber belts. The belts

shall be selected for 150% of the motor nameplate horsepower. Drives shall be "Browning type QD" or equal.

F. Coil Sections:

1. Chilled water coils shall be of the plate fin extended surface type. Tubes shall be seamless copper with a 0.020" minimum wall thickness. Tubes shall be mechanically expanded into the fin collars to provide a permanent mechanical bond. Coil return bends shall be minimum one material thickness thicker than the tubes. Return bends shall be brazed. Hairpin return bends shall not be acceptable.
2. The secondary surface shall be die formed of aluminum. Fin spacing shall not exceed 12 fins per inch. Headers shall be non-ferrous material, outside the airstream and provided with brazed male pipe connections. Drain and vent fittings shall be provided for complete coil drainage. All coil connections shall be extended to the exterior of the air handling unit.
3. All coils shall have counterflow construction with connections left or right hand as shown on the drawings. The use of internal restrictive devices to obtain turbulent flow will not be accepted.
4. Cooling coil casings shall be of minimum 16 gauge 304 stainless steel. All other coil casing shall be of 16 gauge galvanized steel. Tube sheets shall have extruded tube holes. All coil assemblies shall be tested under water at 300 psi and rated for 150 psi working pressure.
5. Main drain pans are recessed 16 gauge 304 stainless steel with a double sloped IAQ design to ensure complete condensate drainage. Drain pans are insulated with 2" of urethane foam with an R value of at least 11.5. The insulation is protected by a 20 gauge galvanized steel liner. Coils are to be installed above drain pan. Coils installed with coil casings in the main condensate drain pans are not acceptable.
6. Intermediate condensate pans are to be furnished on multiple coil units and single coils greater than 48" high. The pans shall be 16 gauge 304 stainless steel. Intermediate pans shall extend at least 6" in the direction of airflow and drain to the main drain pan through copper downspouts.
7. All water coils shall be rated in accordance with ARI Standard 410.

G. Filter Sections: Filter sections shall be factory fabricated as part of the air handling unit. Filters shall be arranged for upstream, downstream or side loading into galvanized filter frames. Provide filter holding frames to accommodate scheduled filters. Filter rack shall be thoroughly caulked and sealed for minimal filter bypass.

H. Damper Sections: Dampers shall be low leakage type with airfoil blade design. All dampers shall carry the AMCA Standard 500 certification label. Air leakage through a 48" x 48" damper shall not exceed 10 CFM/ft².

1. Blade gasket shall be extruded EPDM elastomer secured in an integral slot within the aluminum extrusion. Frame seals shall be extruded TPE thermoplastic. Overlapping blade design shall compress seals to ensure tight seal on closure.
2. Damper frame shall be extruded aluminum with a thickness of not less than .080" and a depth of 4". Pivot rods shall be 7/16" hexagon extruded aluminum interlocking into blade section.
3. Bearings shall be double seal with an inner bearing fixed to the rod within a polycarbonate outer bearing inserted into the frame so that the outer bearing cannot rotate. Bearings shall be designed so that there is no metal to metal contact.

4. Linkage hardware shall be installed outside of the frame and constructed of corrosion resistant aluminum and zinc plated steel.
- I. Louvers: Louvers shall be constructed from 18 gauge A60 galvanized steel and painted with same finish as unit exterior. The louver face is lined with 1/2" galvanized mesh bird screen. Louvers shall be designed to collect and drain rainwater to outside of unit. Outside air louvers shall be sized for a maximum face velocity of 500 fpm based on gross louver area. Louvers shall have zero water penetration at 600 ft/min air velocity. Maximum louver pressure drop shall be 0.03" w.g. at 500 ft/min.
- J. Access Sections: Access sections shall be installed where indicated on the drawings and shall be as specified on the equipment schedule. Access sections shall have double-walled hinged doors.
- K. Electrical: Provide vapor tight marine lights as specified in the submittal documents, factory wired to a single weatherproof switch located on exterior of cabinet. Provide weatherproof, 15 amps, GFCI receptacle near the light switch wired to the lighting circuit. Separate 120/1/60 power to the light switch shall be provided and installed by others.
 1. All wiring shall meet N.E.C requirements.
 2. All wiring shall be run in EMT conduit, raceways are not acceptable. If the unit requires splits, junction boxes shall be furnished on each section to allow the electrical contractor to make final connections in the field. Wiring shall be clearly labeled to facilitate field connection.
- L. Testing:
 1. Factory Leak Test: Air Handling Unit manufacturer shall provide a witnessed factory leakage test at 1.5 times design static pressure up to a maximum of 12" w.g. Leakage rate at test pressure shall not exceed 0.5% of design air volume. Unit shall be tested with all openings sealed. A pressure blower with a variable frequency drive shall be used to set the test pressure. CFM shall be determined using a calibrated orifice. Unless specified otherwise, test pressures shall be positive on positively pressurized sections and negative on negatively pressurized sections of the air handler. A report of all test results shall be written and submitted to Owner's representative for approval.
 2. Factory Cabinet Deflection Test: Air handling unit manufacturer shall provide a witnessed factory Panel Deflection Test at the unit design static pressure (1.5 times design static pressure optional). Panel deflection shall not exceed L/200 of longest plane being measured the test pressure. The casing deflection shall be measured at mid point of panel and at panel seam. A report of all test results shall be written and submitted to Owner's representative for approval.
 3. Air Flow Test:
 4. Factory Sound Test: Air handling unit manufacturer shall provide factory sound test witnessed by owner's representative, mechanical engineer of record, and mechanical contractor. Tests shall be in accordance to AMCA 320 for sound and AMCA 210 for airflow performance. Noise measurements shall be measured at the Inlet, Outlet and Casing Radiated positions. Sound test must be performed with AMCA flow chamber with AMCA certified nozzles for verification of airflow and horsepower. Costs for travel and lodging to be provided by manufacturer's representatives.

PART 3 - EXECUTION

3.1 EQUIPMENT INSTALLATION

- A. The preceding Equipment Installation Requirements in Section 23 08 00 shall form a part of this Section with the same force and effect as though repeated here.

3.2 INSTALLATION

- A. Chilled water pipe connection for cooling coils and heating hot water pipe connection to heating coils shall be offset from the coil and shall not interfere with coil pull space or access doors into the air handling unit. Contractor shall coordinate exact location with air handling unit manufacturer.
- B. Air handling units shall not be operated unless the following requirements (if applicable) are met:
1. Ductwork is clean and filters are in place
 2. Bearings are lubricated.
 3. Bearing and drive setscrews to be torqued in accordance with the installation instructions.
 4. Belts aligned and fan has been test run
 5. Shipping braces removed
 6. Condensates properly trapped.
 7. Piping connections verified and leak tested.

END OF SECTION 23 08 15

SECTION 23 08 20 – MIXED FLOW INLINE FANS

PART 1 - GENERAL

1.1 GENERAL MECHANICAL PROVISIONS

- A. The preceding General Mechanical Provisions shall form a part of this Section with the same force and effect as though repeated here.

PART 2 - PRODUCTS

2.1 EQUIPMENT GENERAL REQUIREMENTS

- A. The preceding Equipment General Requirements in Section 23 08 00 shall form a part of this Section with the same force and effect as though repeated here.

2.2 GENERAL

- A. Base fan performance at standard conditions (density 0.075 Lb. /ft³).
B. Fans selected shall be capable of accommodating static pressure and flow variations of +/- 15% of scheduled values.
C. Each fan shall be belt drive in AMCA arrangement 9.
D. Fans are to be equipped with lifting lugs.
E. After fabrication all carbon steel components shall be cleaned and chemically treated by a phosphatizing process to insure proper removal of grease, oil, scale, etc. Fan shall then be coated with a minimum of 2-4 mils of Permator (Polyester Urethane), electrostatically applied and baked. Finish color shall be RAL 7023, concrete grey. Coating must exceed 1,000-hour salt spray under ASTM B117 test method.

2.3 FAN HOUSING AND OUTLET

- A. Fan housing to be aerodynamically designed with high-efficiency inlet, engineered to reduce incoming air turbulence.
B. Tubular fan housing shall be completely welded and coated with a minimum of 2-4 mils of Permator (Polyester Urethane), electrostatically applied and baked. Finish color shall be RAL 7023, concrete grey. No uncoated metal fan parts will be allowed.
C. Housing and bearing support shall be constructed of welded structural steel members to prevent vibration and rigidly support the shaft and bearings.
D. All mixed flow housings shall include welded steel vanes to straighten airflow prior to exiting the fan discharge.
E. Units up to size 27 shall incorporate a universal mounting system that allows the fan to be mounted in either vertical or horizontal configurations and field rotation of the motor position in 90 degree increments. Bearing life shall not be reduced below specified level in different configurations. Units size 30 and larger shall allow for field rotation of motor positions. Units shall accommodate base mount or ceiling hung mounting without structural modifications to the fan.
F. An access door shall be supplied for impeller inspection and service.
G. OSHA compliant belt guard or motor cover to be included to completely cover the motor pulley and belt(s).

2.4 FAN IMPELLER

- A. Fan impeller shall be mixed flow design. The impeller shall be electronically balanced both statically and dynamically to balance grade G6.3 per ANSI S2.19.
- B. Fan impeller shall be manufactured with continuously welded steel airfoils and coated with a minimum of 2-4 mils of Permatector (Polyester Urethane), electrostatically applied and baked. Finish color shall be RAL 7023, concrete grey
- C. The wheel and fan inlet shall be carefully matched and shall have precise running tolerances for maximum performance and operating efficiency.

2.5 FAN MOTORS AND DRIVE

- A. Motors shall meet or exceed EPACT (Energy Policy ACT) efficiencies. Motors to be NEMA T-frame, 1800 or 3600 RPM, Open Drip Proof (ODP) with a 1.15 service factor.
- B. Drive belts and sheaves shall be sized for 150% of the fan operating brake horsepower, and shall be readily and easily accessible for service, if required.
- C. Fan shaft to be turned and polished steel that is sized so the first critical speed is at least 25% over the maximum operating speed for each pressure class.
- D. Fan shaft bearings shall be Air Handling Quality, bearings shall be heavy-duty grease lubricated, self-aligning or roller pillow block type.
- E. Air Handling Quality bearings to be designed with low swivel torque to allow the outer race of the bearing to pivot or swivel within the cast pillow block. Bearings shall be 100% tested for noise and vibration by the manufacturer. Bearings shall be 100% tested to insure the inner race diameter is within tolerance to prevent vibration.
- F. Bearings shall be selected for a basic rating fatigue life (L-10) of 80,000 hours at maximum operating speed for each pressure class {Average Life or (L-50) of 400,000 hours Bearings shall be fixed to the fan shaft using concentric mounting locking collars, which reduce vibration, increase service life, and improve serviceability. Bearings that use set screws shall not be allowed.
- G. Bearings shall have extended lube lines with Zerk fittings to allow for lubrication.

2.6 SMOKE RATING AND FLOW MONITORING

- A. Fans shall be UL listed as "Power Ventilators for Smoke Control Systems" (by maximum temperature for a minimum number of hours of operation).
 - 1. 572°F (300°C) maximum temperature for a minimum of 2 hours of operation.
- B. The UL Power Ventilators for Smoke Control sticker shall be fixed to the fan housing.
- C. Flow Monitoring:
 - 1. Flow monitoring station shall monitor the pressure difference between the fan inlet and the smallest diameter of the inlet cone.
 - 2. Volumetric flow to be calculated from empirically derived formulas based on testing by the fan manufacturer.
 - 3. Flow monitoring station shall not use air restricting flow devices that reduce fan performance or create additional fan sound.
 - 4. Four (4) equidistantly spaced sensor orifices to be drilled in the smallest diameter of the inlet cone venturi. Flow tubes from each venturi sensor shall be extended to a termination plate mounted on the fan housing.
 - 5. High-pressure flow port(s) shall be mounted in low velocity fan inlet. Flow ports from the high-pressure sensor shall extend to a termination plate mounted on the fan housing.
 - 6. Termination plate shall include a low-pressure connection, a high-pressure connection and a listing of the empirically determined flow rate coefficient.

7. Flow monitoring station shall accurately measure the pressure differential to within +/- 3%.

8. Flow monitoring station to be installed by the fan manufacturer as part of the standard fan assembly.

9. Flow monitoring station to be supplied with electronics package that includes pressure transmitter and LCD digital readout.

PART 3 - EXECUTION

3.1 EQUIPMENT INSTALLATION

A. The preceding Equipment Installation Requirements in Section 23 08 00 shall form a part of this Section with the same force and effect as though repeated here.

END OF SECTION 23 08 20

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SECTION 23 08 22 – DIRECT DRIVE INLINE FANS

PART 1 - GENERAL

1.1 GENERAL MECHANICAL PROVISIONS

- A. The preceding General Mechanical Provisions shall form a part of this Section with the same force and effect as though repeated here.

PART 2 - PRODUCTS

2.1 EQUIPMENT GENERAL REQUIREMENTS

- A. The preceding Equipment General Requirements in Section 23 08 00 shall form a part of this Section with the same force and effect as though repeated here.

2.2 DIRECT DRIVEN BACKWARD INCLINED CENTRIFUGAL INLINE FANS

A. General Description:

1. Base fan performance at standard conditions (density 0.075 Lb/ft³)
2. Performance capabilities up to 5,000 cubic feet per minute (cfm) and static pressure to 1.75 inches of water gauge
3. Fans are available in thirteen sizes with nominal wheel diameters ranging from 8 inches through 16 inches (60 - 160 unit sizes)
4. Normal operating temperature up to 130 Fahrenheit (54.4 Celsius)
5. Applications include: intake, exhaust, return, or make-up air systems
6. Each fan shall bear a permanently affixed manufacture's engraved metal nameplate containing the model number and individual serial number

B. Wheel:

1. Non-overloading, backward inclined centrifugal wheel
2. Constructed of aluminum
3. Statically and dynamically balanced in accordance to AMCA Standard 204-05
4. The wheel cone and fan inlet will be matched and shall have precise running tolerances for maximum performance and operating efficiency
5. Single thickness blades are securely riveted or welded to a heavy gauge back plate and wheel cone.

C. Motors:

1. Electronically Commutated Motor
 - a. Motor enclosures: Open type
 - b. Motor to be a DC electronic commutation type motor (ECM) specifically designed for fan applications. AC induction type motors are not acceptable. Examples of unacceptable motors are: Shaded Pole, Permanent Split Capacitor (PSC), Split Phase, Capacitor Start and 3 phase induction type motors.
 - c. Motors are permanently lubricated, heavy duty ball bearing type to match with the fan load and pre-wired to the specific voltage and phase.
 - d. Internal motor circuitry to convert AC power supplied to the fan to DC power to operate the motor.
 - e. Motor shall be speed controllable down to 20% of full speed (80% turndown). Speed shall be controlled by either a potentiometer dial mounted at the motor or by a 0-10

- 1 VDC signal.
- 2 f. Motor shall be a minimum of 85% efficient at all speeds.
- 3 D. Housing/Cabinet Construction
- 4 1. Construction material: Galvanized
- 5 2. Square design constructed of heavy gauge galvanized steel and shall include square
- 6 duct mounting collars
- 7 3. Housing and bearing supports shall be constructed of heavy gauge bolted and welded
- 8 steel construction to prevent vibration and to rigidly support the shaft and bearing
- 9 assembly.
- 10 E. Housing Supports and Drive Frame:
- 11 1. Housing supports are constructed of structural steel with formed flanges
- 12 2. Drive frame is welded steel which supports the motor
- 13 F. Disconnect Switches:
- 14 1. NEMA 1 rated
- 15 2. Positive electrical shut-off
- 16 3. Wired from fan motor to junction box
- 17 G. Duct Collars:
- 18 1. Square design to provide a large discharge area
- 19 2. Inlet and discharge collars provide easy duct connection
- 20 H. Access Panel:
- 21 1. Two sided access panels, permit easy access to all internal components
- 22
- 23

24 PART 3 - EXECUTION

25 3.1 EQUIPMENT INSTALLATION

- 26 A. The preceding Equipment Installation Requirements in Section 23 08 00 shall form a part of
- 27 this Section with the same force and effect as though repeated here.
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33 END OF SECTION 23 08 22

SECTION 23 08 24 – CENTRIFUGAL UTILITY FANS

PART 1 - GENERAL

1.1 GENERAL MECHANICAL PROVISIONS

- A. The preceding General Mechanical Provisions shall form a part of this Section with the same force and effect as though repeated here.

PART 2 - PRODUCTS

2.1 EQUIPMENT GENERAL REQUIREMENTS

- A. The preceding Equipment General Requirements in Section 23 08 00 shall form a part of this Section with the same force and effect as though repeated here.

2.2 GENERAL

- A. Base fan performance at standard conditions (density 0.075 Lb/ft³).
B. Fans selected shall be capable of accommodating static pressure and flow variations of +/- 15% of scheduled values.
C. Each fan shall be belt driven in AMCA arrangement according to drawings.
D. Fans are to be equipped with lifting lugs.
E. After fabrication, all carbon steel components shall be cleaned and chemically treated by a phosphatizing process to insure proper removal of grease, oil, scale, etc. Fan shall then be coated with a minimum of 2-4 mils of Permatector (Polyester Urethane), electrostatically applied and baked. Finish color shall be RAL-7023, concrete grey. Coating must exceed 1,000-hour salt spray under ASTM B117 test method.

2.3 FAN HOUSING AND OUTLET

- A. Fan housing is to be aerodynamically designed with high-efficiency inlet, engineered to reduce incoming air turbulence.
B. Fan shall be of airtight PermaLock™ construction with the scroll panel material formed and embedded into the side panels. All interior and exterior surface steel shall be coated with a minimum of 2-4 mils of Permatector (Polyester Urethane), electrostatically applied and baked. Finish color shall be RAL-7023, concrete grey. No uncoated metal fan parts will be allowed.
C. Housing and bearing support shall be constructed of welded structural steel members to prevent vibration and rigidly support the shaft and bearings.
D. An OSHA compliant belt guard shall be included to completely cover the motor pulley and belt(s).

2.4 FAN WHEEL

- A. The fan wheel shall be of the non-overloading single width backward inclined centrifugal type. Wheels shall be statically and dynamically balanced to balance grade G6.3 per ANSI S2.19.
B. Fan wheel shall be manufactured of single thickness blades securely riveted to a heavy gauge back plate and wheel cone.

- C. The wheel and fan inlet shall be carefully matched and shall have precise running tolerances for maximum performance and operating efficiency.

2.5 FAN MOTORS AND DRIVE

- A. Motors shall meet or exceed EISA (Energy Independence and Security Act) efficiencies. Motors to be NEMA T-frame, Open Drip Proof (ODP) with a 1.15 service factor.
- B. Drive belts and sheaves shall be sized for 150% of the fan operating brake horsepower, and shall be readily and easily accessible for service, if required.
- C. Fan shaft to be turned and polished steel that is sized so the first critical speed is at least 25% over the maximum operating speed for each pressure class.
- D. Fan shaft bearings shall be air handling quality, bearings shall be heavy-duty grease lubricated, self-aligning or roller pillow block type.
- E. Air handling quality bearings to be designed with low swivel torque to allow the outer race of the bearing to pivot or swivel within the cast pillow block. Bearings shall be 100% tested for noise and vibration by the manufacturer. Bearings shall be 100% tested to insure the inner race diameter is within tolerance to prevent vibration.
- F. Bearings shall be selected for a basic rating fatigue life (L-10) of 80,000 hours at maximum operating speed for each pressure class {Average Life or (L-50) of 400,000 hours}.
- G. Bearings shall have Zerk fittings to allow for lubrication.

PART 3 - EXECUTION

3.1 EQUIPMENT INSTALLATION

- A. The preceding Equipment Installation Requirements in Section 23 08 00 shall form a part of this Section with the same force and effect as though repeated here.

END OF SECTION 23 08 24

SECTION 23 08 40 – COOLING TOWER

PART 1 - GENERAL

1.1 GENERAL MECHANICAL PROVISIONS

- A. The preceding General Mechanical Provisions shall form a part of this Section with the same force and effect as though repeated here.

PART 2 - PRODUCTS

2.1 EQUIPMENT GENERAL REQUIREMENTS

- A. The preceding Equipment General Requirements in Section 23 08 00 shall form a part of this Section with the same force and effect as though repeated here.

2.2 COOLING TOWER

- A. General: Furnish and install factory-assembled, induced draft, crossflow cooling tower(s) with vertical air discharge, conforming in all aspects to the specifications, schedules and as shown on the plans.
- B. Thermal Capacity: The thermal performance shall be certified by the Cooling Technology Institute in accordance with CTI Certification Standard STD-201. Lacking such certification, a field acceptance test shall be conducted within the warranty period in accordance with CTI Acceptance Test Code ATC-105, by the Cooling Technology Institute or other qualified independent third party testing agency. Manufacturers' performance guarantees or performance bonds without CTI Certification or independent field thermal performance test shall not be accepted. The cooling tower(s) shall comply with the energy efficiency requirements of ASHRAE Standard 90.1.
- C. Warranty: The entire cooling tower, including fan motor, drive system, bearings, and structure, shall be backed by a comprehensive Five-Year warranty.
- D. Quality Assurance: The cooling tower manufacturer shall have a Management System certified by an accredited registrar as complying with the requirements of ISO9001:2008 to ensure consistent quality of products and services. Manufacturers that are not ISO9001 Certified shall not be acceptable.
- E. Wind and Seismic Forces: The structure shall be designed, tested and certified in accordance with CBC 2013 regulations to meet a minimum unrestricted seismic design $S_{DS} = 1.40$ g with an Importance Factor of 1.5 and wind load of 60 psf. The unit shall be certified by the manufacturer for operation after an event, up to S_{DS} and the wind load ratings listed above, and verify that such rating is based on actual shake-table testing. Experience or calculation data is not acceptable to verify operation. Units not provided with a certificate of CBC 2013 compliance shall not be an acceptable alternative.

2.3 CONSTRUCTION DETAILS

- A. Structure: The cooling tower shall be constructed with a sturdy structural frame designed to transmit all wind, seismic and mechanical loads to the equipment anchorage. The frame shall be constructed of heavy-gauge stainless steel angles and channels.

- 1 B. Casing Panels: Casing panels shall be constructed of corrosion and UV-resistant
2 fiberglass reinforced polyester (FRP) to minimize maintenance requirements and prolong
3 equipment life. Casing panels shall not provide structural support, since the sturdy,
4 structural frame of the tower transfers all loads to the equipment anchorage.
- 5 C. Cold Water Basin: The cold water basin shall be constructed of Type 304 stainless steel.
6 All factory seams in the cold water basin shall be welded to ensure watertight
7 construction and welded seams shall be warranted against leaks for a period of five
8 years.
- 9 Standard basin accessories shall include: a corrosion resistant make-up valve with large
10 diameter polystyrene filled plastic float for easy adjustment of the operating water level,
11 removable anti-vortexing device to prevent air entrainment, and large area lift out
12 strainers with perforated openings sized smaller than the water distribution system
13 nozzles. The strainer and anti-vortexing device shall be constructed from Type 304
14 stainless steel to prevent corrosion.
- 15 D. Water Outlet: The water outlet connection shall be beveled for welding and grooved for
16 mechanical coupling or bolt hole circle designed to accept an ASME Class 150 flat face
17 flange. The outlet shall be provided with large-area lift out strainers with perforated
18 openings sized smaller than the water distribution nozzles and an anti-vortexing device to
19 prevent air entrainment. The strainer and vortex device shall be constructed of the same
20 materials as the cold water basin to prevent dissimilar metal corrosion.
- 21 E. Water Distribution System: The hot water distribution basins shall be the open and gravity
22 fed for easy cleaning, and constructed of heavy-gauge, Type 304 or 316 stainless steel.
23 The basins must be accessible from outside the unit and serviceable during tower
24 operation. Basin weirs and plastic metering orifices shall be provided to assure even
25 distribution of the water over the fill. Weir dams shall accommodate a flow range of 50%
26 to 100% of the design flow rate. Lift-off distribution covers shall be constructed of heavy-
27 gauge Type 304 stainless steel and designed to withstand a 50 psf (244 kg/m²) live load
28 or 200 pound (90.7 kg) concentrated load. Gravity flow nozzles shall be snap-in type for
29 easy removal. Should pressurized nozzles be used, they shall utilize grommets, which
30 ensure easy removal.
- 31 F. EASY CONNECT Piping Arrangement: Each tower cell shall be furnished with a single
32 water inlet connection complete with the means to automatically balance flow rates to the
33 hot water basins.
- 34 G. Flume Box: Provide flume box with positive closure plate and wing nuts.

35 2.4 MECHANICAL EQUIPMENT

- 36 A. Fan(s): Fan(s) shall be heavy-duty, axial flow with aluminum alloy blades selected to
37 provide optimum cooling tower thermal performance with minimal sound levels. Air shall
38 discharge through a fan cylinder designed for streamlined air entry and minimum tip
39 clearance for maximum fan efficiency. The top of the fan cylinder shall be equipped with
40 a conical, non-sagging removable fan guard.
- 41 B. Bearings: Fan(s) and shaft(s) shall be supported by heavy-duty, self-aligning, grease-
42 packed ball bearings with moisture proof seals and integral slinger collars, designed for a
43 minimum L₁₀ life of 80,000 hours.
- 44 C. Fan Drive: The fan(s) shall be driven by a one-piece, multi-groove, solid back V- type
45 powerband with taper lock sheaves designed for 150% of the motor nameplate

horsepower. The powerband shall be constructed of neoprene reinforced polyester cord and be specifically designed for cooling tower service.

D. Sheaves: Fan and motor sheave(s) shall be fabricated from corrosion-resistant materials to minimize maintenance and ensure maximum drive and powerband operating life.

E. Fan Motor: Fan motor(s) shall be totally enclosed air over (TEAO), reversible, squirrel cage, ball bearing type designed specifically for cooling tower service. The motor shall be furnished with special moisture protection on windings, shafts and bearings. Fan motors shall be premium efficient/inverter duty type designed per NEMA Standard MG1, Section IV Part 31.

F. Mechanical Equipment Warranty: The fan(s), fan shaft(s), sheaves, bearings, mechanical equipment support and fan motor shall be warranted against defects in materials and workmanship for a period of five (5) years from date of shipment.

2.5 FILL AND DRIFT ELIMINATORS

A. Fill and Drift Eliminators: The fill and integral drift eliminators shall be formed from self-extinguishing (per ASTM-568) polyvinyl chloride (PVC) having a flame spread rating of 5 per ASTM E84 and shall be impervious to rot, decay, fungus and biological attack. The fill shall be suitable for entering water temperatures up to and including 130°F (54.4°C). The fill shall be manufactured, tested and rated by the cooling tower manufacturer and shall be elevated above the cold water floor to facilitate cleaning.

2.6 AIR INLET LOUVERS

A. Air Inlet Louvers: Air Inlet louvers shall be separate from the fill and removable to provide easy access for inspection of the air/water interface at the louver face. Louvers shall prevent water splash out during fan cycling and be constructed of maintenance free, corrosion and UV resistant, fiberglass reinforced polyester (FRP).

2.7 ACCESS

A. Plenum Access: Two hinged access doors (per cell) shall be provided for access into the plenum section.

2.8 SOUND Refer to sound level requirement noted at cooling tower schedule.

2.9 ACCESSORIES

A. Vibration Cutout Switch: Provide a mechanical local reset vibration switch. The mechanical vibration cutout switch will be guaranteed to trip at a point so as not to cause damage to the cooling tower. To ensure this, the trip point will be set in a frequency range of 0 to 3,600 RPM and a trip point of 0.2 to 2.0 g's.

B. Basin Sweeper Piping: The cold water basin of the cooling tower shall be equipped with PVC sump sweeper piping with plastic eductor nozzles.

C. Internal Walkway: An internal stainless steel walkway shall be provided in the plenum section to provide for inspection and maintenance. All working surfaces shall be able to withstand 50 psf (244 kg/m²) live load or 200 pound (90.7 kg) concentrated load.

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PART 3 - EXECUTION

3.1 EQUIPMENT INSTALLATION

- A. The preceding Equipment Installation Requirements in Section 23 08 00 shall form a part of this Section with the same force and effect as though repeated here.

END OF SECTION 23 08 40

SECTION 23 08 42 – LIQUID-SOLIDS SEPARATION SYSTEM

PART 1 - GENERAL

1.1 GENERAL MECHANICAL PROVISIONS

- A. The preceding General Mechanical Provisions shall form a part of this Section with the same force and effect as though repeated here.

1.2 SUMMARY

- A. Primary Purpose – The system will remove unwanted solids from a cooling tower sump or remote basin using a centrifugal-action vortex separator. The liquid-solids separation system will help prevent particle fouling of the cooling system components, reduce maintenance and servicing routines, maintain optimum energy efficiency of the heat exchange process, limit blow down & chemical use practices and control harmful bacteria growth in the basin/sump. Fluid viscosity must be 100 SSU or less.
- B. Cooling Tower Basin/Remote Sump Use -- A completely assembled package shall be supplied for the isolated recirculation and particle separation/filtration of the fluid in the cooling tower basin in order to prevent troublesome accumulation of solids in the tower basin/sump. Flow through the separator package shall be continuous, without interruption for the periodic evacuation of separated solids. Placement of the separator package's inlet and outlet within the basin/sump shall be strategically determined and supplemented where necessary with specific flow enhancement/agitation devices known as Hydroboosters.

1.3 SYSTEM PERFORMANCE REQUIREMENTS

Testing Requirements – Each unit must be tested by the manufacturer prior to shipment to ensure it conforms to stated operating specifications.

- A. Independent Testing Laboratory – Performance of said products must be verified by published results from an independent and identified testing laboratory. Standard test protocol of upstream injection, downstream capture, and separator purge recovery is allowed with 50-200 mesh particles to enable effective, repeatable results. Single pass test performance must not be less than 95% removal. Model tested must be of same flow-design as specified unit.
- B. Warranty – Refer to last page.

PART 2 - PRODUCTS

2.1 EQUIPMENT GENERAL REQUIREMENTS

- A. The preceding Equipment General Requirements in Section 23 08 00 shall form a part of this Section with the same force and effect as though repeated here.

2.2 PERFORMANCE

Pressure Loss – Shall be between 3-12 psi remaining constant, varying only when the flow rate changes.

- A. Solids Removal Effectiveness
All Systems – In a single pass through the separator, given solids with a specific gravity of 2.6 and water at 1.0, performance is expected to be 98% of 74 microns and larger.

1 Additionally, particles finer in size, heavier by specific gravity and some lighter by specific
2 gravity will also be removed, resulting in an appreciable aggregate removal of particles
3 (up to 75%) as fine as 5 microns.
4

5 In Recirculating Systems -- 98% performance is predictable to as fine as 40 microns
6 (given solids with a specific gravity of 2.6), with correspondingly higher aggregate
7 performance percentages (up to 90%) of solids as fine as 5 microns.
8

- 9 B. Maximum working pressure: 150 psi.
10 Maximum operating temperature: 100° F.
11

12 2.3 CONSTRUCTION
13

- 14 A. The separator package -- Shall provide for initial pre-straining prior to pump suction
15 followed by direct pumping through a specific centrifugal-action solids-from-liquid
16 separator and immediate return of flow to the HydroBoosters (basin-cleaning
17 applications). Separated solids shall be purged periodically to desired disposal with an
18 automatic purge valve.
19

20 Strainer -- Cast-iron housing; manual-cleaning; 9/32-inch minimum mesh rating;
21 stainless steel basket.
22

- 23 B. Pump -- End-suction, single stage; TEFC motor; cast iron housing; iron impeller; bronze
24 shaft sleeve; silicon carbide mechanical shaft seal; flooded suction required.
25

- 26 C. Separator -- Centrifugal-action design, incorporating a true tangential inlet and mutually
27 tangential internal accelerating slots, employed to promote the proper velocity necessary
28 for the removal of the separable solids. The internal accelerating slots shall be spiral-cut
29 for optimum flow transfer, laminar action and particle influence into the separation barrel.
30 The separator's internal vortex shall allow this process to occur without wear to the
31 accelerating slots. Separated particle matter shall spiral downward along the perimeter of
32 the inner separation barrel, in a manner which does not promote wear of the separation
33 barrel, and into the solids collection chamber, located below the vortex deflector plate.
34 The separator shall be of unishell construction with SA-36, SA-53B or equivalent quality
35 carbon steel, minimum thickness of .25 inches (6.35 mm)
36

- 37 D. Automatic Purge Valve --An electrically-actuated valve shall be programmed at
38 appropriate intervals and duration in order to efficiently and regularly purge solids from
39 the separator's collection chamber. Valve body shall be bronze. Valve ball shall be
40 stainless steel with sealant seat.
41

- 42 E. Piping -- Schedule 40 galvanized carbon steel.
43

- 44 F. Electrical Control -- IEC starter with overload module; HOA selector switch; NEMA-4x
45 enclosure; re-set/disconnect/trip switch; 120 volt, single phase control voltage; CSA-
46 approved.
47

- 48 G. Valves -- Ball valves on purge line for isolation of solids-handling/purging equipment.
49

- 50 H. Skid Plate -- Stainless steel, 3/16-inch (5 mm) minimum thickness.
51

- 52 I. Paint Coating -- Shall be oil-based enamel
53

54 2.4 PURGING AND SOLIDS HANDLING

55 Evacuation of separated solids may be accomplished automatically, employing a motorized ball
56 valve with integrally-equipped programming for controlling the frequency and duration of solids
57 purging.

2.5 MANUFACTURERS

The separator system shall be manufactured by LAKOS Filtration systems, a division of the Claude Laval Corporation in Fresno, California, USA, or equal.

PART 3 - EXECUTION

3.1 EQUIPMENT INSTALLATION

A. The preceding Equipment Installation Requirements in Section 23 08 00 shall form a part of this Section with the same force and effect as though repeated here.

3.2 INSTALLATION

A. Coordinate with the installing contractor to ensure equipment is installed in conformance with manufacturer's recommendations and those found in the specification.

B. If deficiencies are noted by the field service representative, the contractor shall make necessary corrections and the manufacturer's field service personnel will visit the installation site and oversee any corrections or modifications required. A written report shall be filed with the Engineer at each visit.

3.3 MAINTENANCE

The separator shall feature the following access capabilities for either inspection or the removal of unusual solids/debris. A grooved coupling in the upper body to provide full access.

3.4 LIMITED WARRANTY

LAKOS Separator: 5 years. All other components: 12 months from date of installation; if installed 6 months or more after ship date, warranty shall be a maximum of 18 months from ship date.

END OF SECTION 23 08 42

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SECTION 23 08 50 – WATER CHILLER

PART 1 - GENERAL

1.1 GENERAL MECHANICAL PROVISIONS

A. The preceding General Mechanical Provisions shall form a part of this Section with the same force and effect as though repeated here.

B. Refer to BID ALTERNATE #5.

1.2 SUBMITTALS

A. Acceptable refrigerant is HCFC-123. Chiller performance must include an AHRI approved selection method.

1.3 WARRANTY

A. Chiller manufacturer shall provide a whole unit parts, labor and refrigerant warranty for a period of 10 years from start-up. The warranty must be provided by the manufacturer; third party insurance/warranty coverage is not acceptable.

PART 2 - PRODUCTS

2.1 EQUIPMENT GENERAL REQUIREMENTS

A. The preceding Equipment General Requirements in Section 23 08 00 shall form a part of this Section with the same force and effect as though repeated here.

2.2 SUMMARY

A. The contractor shall furnish and install the centrifugal water chiller as shown and scheduled in the plans and specifications. The units shall produce the specified tonnage per the scheduled data in accordance with the latest revision of AHRI 550/590. The unit shall bear the AHRI certification label as applicable.

B. The chiller shall be manufactured by Trane.

2.3 COMPRESSOR AND MOTOR

A. The compressor shall be centrifugal with multiple stages.

B. Chiller shall be able to unload to 15% of design tonnage with constant entering water temperature. The minimum unloading point shall be demonstrated at the time of the factory performance test.

C. Compressor assembly shall be vibration tested at the factory. Vibration shall not exceed 0.15 inches per second at full load design compressor speed as measured on the motor housing. The test data shall be recorded and provided to the customer for approval.

- 1 D. The motor shall be hermetic and be liquid refrigerant cooled. Hot gas motor cooling is not
2 acceptable.

3 2.4 EVAPORATOR

- 4 A. The evaporator and condenser shall be built in accordance with ANSI/ASHRAE 15-2001
5 Safety Code for Mechanical Refrigeration and ASME section VIII as applicable.

- 6 B. Evaporator tubes shall be internally and externally enhanced with a 1" outer diameter.
7 The tubes shall be securely supported at intermediate supports and physically expanded
8 into both ends of the tube sheets. The evaporator tubes must also be removable from
9 both ends to provide easy access for tube cleaning. The minimum evaporator tube wall
10 thickness, root-to-root across the entire tube length shall be 0.025". It is unacceptable to
11 provide this thickness at the intermediate supports only.

- 12 C. The evaporator waterboxes shall be standard non-marine type.

- 13 D. Hinges shall be factory supplied on the ends of the evaporator to facilitate waterbox
14 removal without external rigging.

- 15 E. Units with multi-stage compressors shall incorporate an interstage flash vessel
16 economizer.

- 17 F. The evaporator shall be furnished with an integral inlet mist or liquid eliminator to prevent
18 carryover of liquid refrigerant into the compressor.

19 2.5 CONDENSER

- 20 A. The condenser shall be built in accordance with ANSI/ASHRAE 15-2001 Safety Code for
21 Mechanical Refrigeration and ASME section VIII as applicable.

- 22 B. Condenser tubes shall be internally and externally enhanced with a 0.75" outer diameter.
23 The tubes shall be securely supported at intermediate supports and physically expanded
24 into both ends. The condenser tubes must also be removable from both ends to provide
25 easy access for tube changeouts or tube cleaning. The minimum condenser tube wall
26 thickness, root-to-root across the entire tube length shall be 0.025". It is unacceptable to
27 provide this thickness at the intermediate supports only.

- 28 C. The condenser waterboxes shall be standard non-marine type with connections per
29 schedule.

- 30 D. Hinges shall be factory supplied on the ends of the condenser to facilitate waterbox
31 removal without external rigging.

32 2.6 REFRIGERANT

- 33 A. Chillers that operate at low pressures must have a high efficiency purge system to ensure
34 that any potential non-condensable leakage into the vessel is immediately eliminated.
35 The purge run time shall be monitored by the main unit controller.

1 2.7 ELECTRICAL

2 A. Chiller shall be installed, wired, and functionally tested at the factory before being
3 shipped.

4 B. Single point power connection - A control power transformer internal to the motor
5 controller/frequency drive and of sufficient size to power all chiller mounted auxiliary
6 loads shall be supplied. No separate power connection shall be required for chiller
7 mounted equipment. The CPT shall tap from the main power connection.

8 C. Terminal blocks with numbered and color coded wiring to match the wiring diagram must
9 be included.

10 2.8 CONTROLS

11 A. The chiller shall be controlled by a unit mounted, stand-alone Direct Digital Control (DDC)
12 system. A dedicated chiller microprocessor control panel is to be supplied with each
13 chiller by the chiller manufacturer.

14 B. Enclosure shall be unit mounted NEMA 250 Type 1.

15 C. A color, touch sensitive liquid crystal display (LCD) shall be unit mounted and a minimum
16 of 12.1" diagonal. The display shall be fully adjustable in height and viewing angle.
17 Animated graphical representations of chiller subsystem operation shall be used to
18 enhance the user interface.

19 D. The chiller control panel shall provide control of chiller operation and monitoring of chiller
20 modules, sensors, actuators, relays and switches. The chiller control panel shall include
21 controls to safely and efficiently operate the chiller.

22 E. The chiller control panel shall provide password protection of all setpoints.

23 F. The controller shall have the ability to display all primary sub-system operational
24 parameters on dedicated trending graphs. The operator must be able to create up to 6
25 additional custom trend graphs, choosing up to 10 unique parameters for each graph to
26 trend log data parameters simultaneously over an adjustable period and frequency
27 polling.

28 G. The chiller control panel shall provide leaving chilled water temperature reset based upon
29 return water temperature.

30 H. Safeties - the chiller control panel shall provide the following safeties:

31 1. Low chilled water temperature.

32 2. Low evaporator refrigerant temperature or pressure.

33 3. High condenser refrigerant pressure.

- 1 4. Evaporator and condenser water flow status.
- 2 5. Low oil pressure.
- 3 6. Low oil temperature.
- 4 7. High oil temperature.
- 5 8. High motor winding temperatures.
- 6 9. High motor current.
- 7 10. Starter/AFD function faults.
- 8 11. Sensor faults.
- 9 12. Unit controls operation.
- 10 13. The chiller control panel or starter shall incorporate advanced motor protection to
11 safeguard the motor throughout the starting and running cycles from the adverse
12 effects of:
 - 13 a. Current phase loss.
 - 14 b. Current phase unbalance.
 - 15 c. Current phase reversal.
 - 16 d. Under/Over voltage.
 - 17 e. Motor current overload.
 - 18 f. Distribution fault protection with auto restart consisting of three-phase
19 current sensing devices that monitor the status of the current.
 - 20 g. Starter contactor fault protection.
 - 21 h. Starter transition failure.
- 22 I. The chiller control panel shall provide evaporator freeze protection and low limit control to
23 avoid low evaporator refrigerant temperature trip-outs during critical periods of chiller
24 operation. Whenever this control is in effect, the controller shall indicate that the chiller is
25 in adaptive mode. If the condition exists for more than 30 seconds, a limit warning alarm
26 relay shall energize.
- 27 relay shall energize.
- 28 J. The chiller control panel shall be capable of providing short cycling protection.
- 29 K. The chiller control panel shall provide hardwire connections for the following binary and
30 analog signals:

1. Compressor Running.
 2. Detection by the panel of a fault requiring manual reset.
 3. Chiller operation at maximum capacity.
 4. Chiller operation in condenser limit mode and thereby requesting condenser water temperature relief.
- L. The chiller controller must be able to communicate directly to a building automation system using BACnet protocol (MSTP-RS 485).
- 2.9 LOW VOLTAGE, UNIT MOUNTED, WYE-DELTA STARTER
1. Motor starter shall be a Wye-Delta Closed Transition and shall have a NEMA 1A gasketed enclosure. The starter shall be UL 508 approved.
 2. Motor starters shall include incoming line provisions for the number and size cables shown on the drawings. Incoming line lugs shall be copper mechanical type.
 3. Contactors shall be sized properly to the chiller full load currents.
 4. Each motor starter shall include a 4 KVA control power transformer with fused primary and secondary. Control relays shall be provided within the motor starter to interface with the control panel.
 5. If the chiller main processor does not include an advanced motor protection system, the starter shall include an advanced motor protection system incorporating electronic three phase current overloads and current transformers. This electronic motor protection system shall monitor and protect against the following conditions:
 - a. Current phase loss.
 - b. Current phase unbalance.
 - c. Current phase reversal.
 - d. Under/Over line voltage.
 - e. Motor current overload during startup and running.
 - f. Momentary power loss protection with auto restart consisting of three-phase current sensing devices that monitor the status of the current. Restart inhibit is active and looks at motor RTDs to maximize starts/hour.
 - g. Starter contactor fault protection.
 - h. Starter transition failure.

- 1 i. Distribution fault protection.
- 2 6. The starter shall be able to operate in temperatures up to 104°F.
- 3 7. All field supplied wires, bus bars, and fittings shall be copper only.
- 4 8. Circuit Breaker - Starter shall contain a circuit breaker capable of breaking
- 5 currents up to its interruption capacity of 65,000 amperes (AIC). Operating
- 6 handle and trip indicator shall be located on the door. This handle shall be
- 7 capable of being padlocked.

8 2.10 TESTING

9 A. GENERAL

- 10 1. Owner witness tests: The Owner or his representative shall be notified 14 days
- 11 in advance to witness the factory performance test. The manufacturer
- 12 representative shall assume all expenses incurred by the Owner or his
- 13 representative to witness the test.
- 14 2. One of each size chiller shall be factory performance tested with the proposed
- 15 refrigerant under full-load conditions in an AHRI certified test facility. The
- 16 manufacturer shall supply a certified test report to confirm performance as
- 17 specified. Proper AHRI certification documents for the manufacturer's test loop
- 18 shall be made available for inspection upon request.
- 19 3. The factory test instrumentation shall be per AHRI Standard 550/590, and the
- 20 calibration of all instrumentation shall be traceable to the National Institute of
- 21 Standards and Technology (NIST, formerly NBS).
- 22 4. The performance test shall be run with clean tubes in accordance with AHRI
- 23 550/590 to include the following:
 - 24 a. A downward temperature adjustment per AHRI 550/590 shall be made to
 - 25 the design leaving evaporator water temperature to adjust from the
 - 26 design fouling to the clean tube condition.
 - 27 b. An upward temperature adjustment per AHRI 550/590 shall be made to
 - 28 the design entering condenser water temperature to adjust from the
 - 29 design fouling to the clean tube condition.
 - 30 c. There shall be no exceptions to conducting the performance test with
 - 31 clean tubes and with temperature adjustments in (1) and (2). The
 - 32 manufacturer shall clean tubes, if necessary, prior to test to obtain a test
 - 33 fouling factor of 0.0000 hr·ft²·°F/Btu.

34
35 PART 3 - EXECUTION

36
37 3.1 EQUIPMENT INSTALLATION

- A. The preceding Equipment Installation Requirements in Section 23 08 00 shall form a part of this Section with the same force and effect as though repeated here.
- B. Provide for connection to electrical service.
- C. Provide for connection of electrical wiring between starter and chiller control panel, oil pump, and purge unit.
- D. Arrange piping for easy dismantling to permit tube cleaning.
- E. Provide piping from chiller relief device to outdoors. Size as recommended by manufacturer.
- F. Installation shall be in accordance with the manufacturer's recommendations.

3.2 MANUFACTURER'S FIELD SERVICES

- A. All Startup, maintenance and monitoring functions shall be performed by a manufacturer's commercial agent to confirm, (in writing), that equipment has been correctly installed and passes specification checklist prior to equipment becoming operational and covered under OEM warranty.
- B. Applied chiller manufacturers shall maintain service capabilities no more than 100 miles from the job site.

END OF SECTION 23 08 50

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SECTION 23 08 60 – HW BOILERS

PART 1 - GENERAL

1.1 GENERAL MECHANICAL PROVISIONS

- A. The preceding General Mechanical Provisions shall form a part of this Section with the same force and effect as though repeated here.
- B. Refer to BID ALTERNATE #6.

PART 2 - PRODUCTS

2.1 EQUIPMENT REQUIREMENTS

- A. The preceding Equipment General Requirements in Section 23 08 00 shall form a part of this Section with the same force and effect as though repeated here.
- B. Boiler:
 - 1. General: Firetube boiler with automatic controls. The boiler, with all piping and wiring, shall be a factory package. Boiler shall be tested and packaged for shipping. Boiler design and construction shall be in accordance with Section IV of the ASME Code for hot water heating boilers with a maximum working pressure of 125 PSIG. The boiler shall be CSA certified as an indirect or direct vent boiler and comply with ASME Section IV, ASME CSD-1 Code requirements, and California Code compliance (Title 8, Division 1, Chapter 4, Sub-Chapter 2 Boiler and Fired pressure vessel safety orders). Cleaver Brooks.
 - 2. Boiler Design:
 - a. Boiler shall be a compact, single-pass, vertical down-fired firetube type, with stainless steel tubes and tube sheets. The boiler pressure vessel shall be completely insulated with a minimum of 2" of insulation and shall be encased in an 18 gauge metal cabinet with powder coated finish.
 - b. Tubes shall be 316Ti stainless steel and shall be fitted with aluminum internal heat transfer fins creating no less than 10 square feet of heating surface per boiler horsepower.
 - c. Vessel shall be mounted on a structural steel stand with exhaust gasses collected in a polymer drain collection box complete with drain fitting. A condensate neutralizing box complete with limestone chips shall be shipped loose.
 - d. Vessel shall be fully insulated with a minimum of 2" of insulation, guaranteeing external convection and radiation heat losses shall be less than 0.5% of the rated input.
 - e. Boiler shall be built to seismic zone 3 requirements and manufacturer shall provide seismic calculations showing tie-down requirements.
 - f. Boiler shall be constructed in accordance with the A.S.M.E. Section IV Code and bear the "H" stamp and shall be manufactured within an ISO

9001 certified facility.

3. Burner Design:

- a. Forced draft burner mounted in and integral with the boiler hinged top door so when the door is opened the burner head, furnace, tubesheet, and tubes are exposed. Burner shall swing upward on hydraulic piston arms.
- b. Burner shall be of the unitized venturi, gas valve, blower, and burner head design. This pre-mix design shall utilize a variable speed fan connected to a venturi to simultaneously modulate fuel and air for a minimum of a 5:1 turndown ratio. The venturi design shall also act as a method for compensating for changes in barometric pressure, temperature and humidity.
- c. Burner head shall be constructed of a fecralloy-metal fiber for solid body radiation of the burner flame. Combustion shall take place on the surface of the burner mantle, which shall be constructed of a woven fecralloy material creating a 360 degree low temperature radiant flame.
- d. Burner shall be guaranteed to limit NOx emissions to 20 PPM or less, as certified by an independent testing lab. NOx emissions shall be at full operating conditions. Proof of such certification shall be made available to the engineer. External flue gas recirculation is not acceptable for emission control.
- e. Gas train shall meet the requirements of CSA and ASME CSD-1 and shall include:
 - 1) Low gas pressure interlock, manual reset.
 - 2) High gas pressure interlock, manual reset.
 - 3) Upstream and downstream manual test cocks.
 - 4) Ball type manual shutoff valve upstream of the main gas valve.
 - 5) Unibody double safety gas valve assembly.
 - 6) Gas pressure regulator.
 - 7) Union connection.

4. Boiler Trim:

- a. Safety valve(s) shall be ASME Section IV approved side outlet type mounted on the boiler water outlet. Size shall be in accordance with code requirements and set to open at 125 psig.
- b. Temperature and pressure gauge shall be mounted on the water outlet (shipped loose for field installation).
- c. Solid state low water cut-off probe with manual reset and test switch (shipped loose for field installation).
- d. Manual reset high limit temperature control - range not to exceed 210 F (shipped loose for field installation).
- e. Outlet water supply sensing probe for operating water limit setpoint (shipped loose for field installation).
- f. Return water-sensing probe for operating water limit setpoint (shipped

- 1 loose for field installation).
- 2
- 3 g. Solid state auxiliary low water cut-off probe with automatic reset and test
- 4 switch (shipped loose for field installation).
- 5
- 6 h. Support legs with anchorage rated for seismic zone 3.
- 7
- 8 5. Boiler Controls:
- 9
- 10 a. Integral lead-lag controller for up to 6 boilers. Boilers shall include a
- 11 computerized boiler burner control which shall be an integrated, solid
- 12 state digital micro-processing modulating device, complete with
- 13 sequence indication, fault reset, mode selection, and parameter set-point
- 14 switches. It shall be mounted at the front of the boiler panel.
- 15
- 16 b. Controller shall provide for both flame safeguard and boiler control
- 17 through separate power supplied CPU's and shall perform the following
- 18 functions:
- 19
- 20 1) Burner sequencing with safe start check, pre-purge, electronic
- 21 direct spark ignition, and post purge. Flame rod to prove
- 22 combustion.
- 23 2) Flame supervision - the control shall provide pre-purge and post-
- 24 purge and shall maintain a running history of operating hours,
- 25 number of cycles, and the most recent six faults. The control
- 26 shall be connected to a keyboard display module that will
- 27 retrieve this information.
- 28 3) Safety shutdown with display of error.
- 29 4) Modulating control of the variable speed fan for fuel/air input
- 30 relative to load requirements.
- 31 5) Gas pressure supervision, high and low.
- 32 6) Combustion air proving supervision.
- 33 7) High air pressure supervision.
- 34 8) The supply temperature and set-point temperature shall be
- 35 displayed at all times by an LED readout. Output shall be
- 36 continuous PID via 4 –20 mA current.
- 37 9) Controller shall communicate with the DDC/EMS (4-20 mA loop
- 38 temperature setpoint and remote system start/stop).
- 39
- 40 c. Provide step-up transformer as required.
- 41
- 42 6. Boiler Flue Venting: The boiler shall be CSA certified as an indirect or direct vent
- 43 boiler. Venting shall be accomplished with stainless steel, double-wall venting.
- 44 Vent piping shall be installed in accordance with applicable codes and
- 45 manufacturer's recommendations. DuraVent FasNSeal W2, category IV.
- 46
- 47 7. Manufacturer's Field Services: The boiler supplier's factory authorized service
- 48 organization shall be responsible for performance of inspections, start up and
- 49 testing of the boiler, and training of the Owner's staff.
- 50
- 51 8. Warranty Data: The pressure vessel shall be guaranteed against thermal shock
- 52 for 20 years when utilized in a closed loop hydronic heating system with a
- 53 temperature differential of 170 °F or less. The boiler pressure vessel shall be
- 54 guaranteed without a minimum flow rate or return water temperature
- 55 requirement. The boiler shall not require the use of flow switches or other devices
- 56 to ensure minimum flow. The pressure vessel, tubes and tube sheets shall be
- guaranteed against flue gas corrosion and materials/workmanship for a period of

3 years. The condensate collection box shall be guaranteed for 20 years.

PART 3 - EXECUTION

3.1 EQUIPMENT INSTALLATION

A. The preceding Equipment Installation Requirements in Section 23 08 00 shall form a part of this Section with the same force and effect as though repeated here.

B. Boiler: Installation shall be in accordance with California Code of Regulations, Title 8, Industrial Relations. Where required, permit for system operation shall be obtained and permanently posted at installation.

END OF SECTION 23 08 60

SECTION 23 08 62 – STEAM BOILERS - SB 1, 2, 3

PART 1 - GENERAL

1.1 GENERAL MECHANICAL PROVISIONS

A. The preceding General Mechanical Provisions shall form a part of this Section with the same force and effect as though repeated here.

B. Refer to BID ALTERNATE #6.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

The preceding Equipment General Requirements in Section 23 08 00 shall form a part of this Section with the same force and effect as though repeated here.

2.2 GENERAL DESCRIPTION

Each unit shall be a single pass horizontal commercial firetube design with extended tube surface area, complete with boiler fittings and automatic controls. It shall be mounted on a heavy-duty steel frame with premix forced draft burner and burner controls as a complete package fabricated and labeled by a single manufacturer. Each boiler shall be neatly finished, thoroughly tested and properly packaged for shipping. Boiler design and construction shall be in accordance with the ASME Code for steam boilers with a maximum working pressure of 15 PSIG. The boiler shall be CSA (formerly AGA/ CGA) certified as an indirect or direct vent boiler and comply with ASME CSD-1 Code requirements

Approvals - The complete package, including the burner, shall be Underwriters Laboratories, Inc. listed and the official UL/cUL label shall be affixed to the package attesting to its certification. Equipment shall be Pre-Certified in accordance with SCAQMD Rule 1146.2, and SJVUAPCD Rule 4308, with a name plate burner rating input of less than 2MMBH

As a preassembled package, the standard boiler shall be factory fire tested.

The complete package as shipped, shall be ready for connections to water, fuel, blowdown, and exhaust venting. Certain items may be shipped loose to prevent their damage such as the safety valves and gauges.

2.3 PACKAGED FIRETUBE BOILER DESIGN

Boiler shall be a compact, single-pass, firetube type, with 0.105 wall carbon steel tubes, welded into carbon steel tube sheets. The boiler pressure vessel shall be completely insulated with a minimum of 2" of insulation and shall be encased in an 18 gauge metal cabinet with powder coated finish. This jacket and insulation design shall permit field removal and reattachment if necessary for inspection, etc.

To facilitate waterside inspection, The following boiler vessel tappings/openings shall be furnished:

3 hand holes

Steam supply by NPT connection for high-pressure steam or flanged for low pressure steam.

Front and Rear Bottom blowdown connections, NPT

Feedwater make-up, NPT

Surface blowoff, NPT

Chemical Feed, NPT

High Water Level Overflow Drain to discharge water in the boiler if water level reaches an unacceptable level, NPT

Boiler shall be built to seismic zone IV requirements and manufacturer shall provide seismic calculations showing tie-down requirements for bolt diameters. Bolts and tie-down shall be by contractor.

Boiler shall be mounted on base rails suitable for transporting by fork lift. The entire boiler and base frame shall be factory painted.

Exhaust vent shall be located at the rear of the boiler and shall be a slip connection. Stack support shall be by means other than the boiler connection.

Each boiler shall be constructed in accordance with the A.S.M.E. Section IV Code and bear the "H" stamp for 15 psig MAWP and shall be manufactured within an ISO 9001 Certified facility to ensure high quality standards.

2.4 BURNER CONTROL

A. Computerized Burner Management Control, Honeywell SOLA (CB Falcon), is an integrated burner management and modulation control with a touch-screen display/operator interface. Its functions include the following.

1. Management of up to Two Heating loops (Remote sensor supplied if required); such as two heating zones (high water temp, and low water temp), or DHW.
2. Lead-Lag for up to 8 boilers (remote sensor supplied if Lead-Lag to be utilized).
3. Ability to communicate with EMS system via MODBUS or DI/DO, AI. (See equipment schedule and controls specification to determine if Protocol translator is required).
4. Burner sequencing with safe start check, pre-purge, direct spark ignition and post purge.
5. Electronic ignition.
6. Flame supervision.
7. Safety shutdown with display of error.
8. Modulating combustion fan, with fan speed proving.
9. Combustion Air proving.

B. CONTROL PANEL - A hinged NEMA 1A rated enclosure shall be furnished and located at the front of the boiler above the burner to house the following components.

1. Burner On/Off Switch.
2. Terminals for control interface wiring and connections for incoming power.
3. Solid state circuit boards for water level controls.
4. Alarm Annunciator.
5. Status indicating lights – Power on, Demand, Flame Failure, Low Water.

2.5 BURNER DESIGN

A. General: Forced draft burner mounted in, and integral with a hinged door, so when the door is opened the burner head, furnace, tubesheet, and tubes are exposed. The burner door shall utilize easy removable threaded handles. Units that do not include hinged burner access, or require blower fan removal, shall not be accepted.

B. The burner shall be of the Unitized Venturi Gas Valve with Zero Governor and 1:1 air fuel ration (requires no linkages or moving parts that require maintenance, and provides continued safe operation with Air leading fuel flow to protect against Air/fuel imbalance), Blower, and burner head design. This pre-mix design shall utilize a variable speed fan connected to a venturi to simultaneously modulate fuel and air for a minimum a 5:1 turndown ratio. The venturi design shall also act as a method for compensating for changes in pressure, temperature and humidity so the excess air levels are not adversely affected by changes in atmospheric conditions. As fan speed increases a negative pressure will be applied to the valve, allowing the valve to open further, permitting more fuel to flow into the venturi for mixing. As fan speed is reduced, fuel input shall be reduced accordingly. Air shall always lead fuel from low to high or high to low. External linkages, damper motor drives and single speed fans shall not be acceptable. On/off, staged, and linkage controlled burners are not acceptable.

C. The fan shall be driven by a variable speed motor which shall react to output demand requirements via the demand control Motor shall be a high efficiency DC Brushless type. Continuous speed synchronous motors will not be acceptable. Fan housing shall utilize non-sparking material and shall be approved for premix operation.

D. Burner head shall be constructed of a Fecralloy-metal fiber for solid body radiation of the burner flame. Combustion shall take place on the surface of the burner mantle, which shall be constructed of a woven fecralloy material creating a 360 degree low temperature radiant flame.

E. Ignition of the fuel shall be of the direct spark design; separate pilot gas train is not required. Dual ignition electrodes shall used for the spark generated from the panel mounted ignition transformer.

F. Flame Safety - Flame sensing shall be accomplished with a UV Scanner in the burner mounting plate, designed for easy removal for inspection or replacement.

G. Gas Train - As a minimum, the gas train shall meet the requirements of CSA and ASME CSD-1 and shall include:

1. Low Gas Pressure Interlock, manual reset.

2. High Gas Pressure Interlock, manual reset.
3. Upstream and downstream manual test cocks.
4. Ball Type manual shutoff valve upstream of the main gas valve.
5. Unibody double safety gas valve assembly.
6. Gas Pressure Regulator
7. Union connection to permit burner servicing.
- H. Combustion Air Proving Switch shall be furnished to ensure sufficient combustion airflow is present for burner firing.
- I. All unit sizes up to 2MMBH shall utilize flame rectification. Units greater than 2MMBH shall utilize UV scanner with Self Checking feature
- J. Air Filter - shall be fitted to the intake air venturi to filter the incoming air supply when using boiler room air. The air filter shall be designed to be easily cleaned and re-used

2.6 BOILER TRIM

A. Water Column

1. A water column shall be piped on the right hand side of the boiler [when facing the burner] complete with gauge glass and water column blowdown valve.
 - a. Feedwater Pump control - shall be integral with the water column via probe control device and electronics for on/off pump operation.
 - b. Low Water cutoff - shall be integral with the water column via probe control device and electronics.
 - c. High Water alarm - shall be integral with the water column via probe control device and electronics.
- B. An Auxiliary Low Water Cutoff shall be provided. Using an internal probe it shall be located on the top centerline of the boiler and of the manual reset design.
- C. High limit pressure control, manual reset.
- D. Operating limit pressure control, auto reset.
- E. Pressure transmitter for on/off and burner modulation.
- F. Pressure Gauge, 3" dial face with stainless movement, shall be piped onto the trim piping, including an inspectors test cock.
- G. In accordance with the A.S.M.E. Code an approved A.S.M.E. rated and stamped safety valve shall be provided and set at 15 pounds.

2.7 BOILER CONTROLS

The Boiler shall include a Computerized Boiler Burner control which shall be an integrated, solid state digital micro-processing modulating device, complete with sequence indication, fault reset, mode selection, and parameter set-point switches. It shall be mounted at the front of the boiler panel for easy access and viewing. The Display shall be a 7 inch color touch screen HMI with SD card slot, and USB

connection port. The display shall be capable of full, on-screen, diagnostics of status and history, with computer interface, and trending operating parameters with up to 30 month of trending data.

Controller shall provide for both flame safeguard and boiler control and shall perform the following functions:

Burner sequencing with safe start check, pre-purge, Electronic direct spark ignition, and post purge. UV Scanner to prove combustion.

Flame Supervision - the control shall provide pre-purge and post-purge and shall maintain a running history of operating hours, number of cycles, and the most recent faults. The control shall be connected to a touchscreen display module that will retrieve this information.

Safety Shutdown with display of error.

Modulating control of the variable speed fan for fuel/air input relative to load requirements.

High Limit temperature control.

Gas pressure supervision, high and low.

Combustion Air Proving Supervision.

High Air Pressure (back draft too high) Supervision.

Display of supply temperature and set-point temperature shall be accessible via touchscreen. Output shall be continuous PID via 4 -20 mA current.

Controller shall have an option for communication device to a laptop computer interface service and troubleshooting.

All controls shall be wired to a numbered "finger safe" din rail mount terminal strip with numbered wiring. Control panel in its entirety shall be removable from the unit.

All parameter input control set-points shall be factory downloaded with jobsite conditions programmed at the time of initial jobsite operation.

All controls to be panel mounted and so located on the boiler as to provide ease of servicing the boiler without disturbing the controls and also located to prevent possible damage by water according to CSA requirements.

Electrical power supply shall be 120 volts, 60 Hertz, single phase for the control circuit. Units greater than 2.5 MMBH shall require less than 10 amps of 208-240/3/60 power and include a fused control circuit transformer for control power 115/1/60 and Instrument power of 24vAC

Lead/Lag Header pressure transmitter to be field wired to the master boiler, for integral lead/lag staging of the boilers to maintain system pressure.

2.8 PERFORMANCE

- A. Efficiency - Fuel to Steam Efficiency shall be guaranteed at 85% for 15# steam. Efficiency rating shall account for radiation and convection losses.
- B. Radiation losses shall be less than 0.5% of the rated input at maximum firing.
- C. Noise - Sound level shall not exceed 70 dBA at high fire when measured 3 feet in front of the burner.
- D. Steam quality shall be 99.5% at maximum firing regardless of operating pressure.
- E. Noise - Sound shall not exceed 70 dBA at high fire when measured 3 feet in front of the burner.
- F. The boiler(s) burner shall be guaranteed to limit NOx emissions to 9 PPM or less with inputs greater than or equal to 2MMBH, up to 5 MMBH. For units with name plate rated inputs less than 2MMBH NOx emissions shall be less than 20 PPM, as certified by an independent testing lab. NOx emissions shall be at validated throughout the firing range (from lowest firing rate to highest firing rate). Proof of such certification shall be made available to the engineer and purchaser. External flue gas recirculation shall not be accepted for emission control. Boiler shall be pre-certified as per SCAQMD Rule 1146.2 and SJVUAPCD rule 4308 (for boilers greater than 0.4 MMBH and less than 2 MMBH). Boiler with a rated input from 2MMBH to 5 MMBH shall comply with SJVUAPCD Rule 4307 and shall require Field verification per the SJVUAPCD PEER requirements – Failure to comply shall include penalties up to and including removal and replacement of equipment at manufacturer's expense

PART 3 - EXECUTION

3.1 EQUIPMENT INSTALLATION

- A. The preceding Equipment Installation Requirements in Section 23 08 00 shall form a part of this Section with the same force and effect as though repeated here.
- B. Boiler: Installation shall be in accordance with California Code of Regulations, Title 8, Industrial Relations. Where required, permit for system operation shall be obtained and permanently posted at installation.

END OF SECTION 23 08 62

SECTION 23 08 64 – STEAM BOILERS – SB 4, 5

PART 1 - GENERAL

1.1 GENERAL MECHANICAL PROVISIONS

- A. The preceding General Mechanical Provisions shall form a part of this Section with the same force and effect as though repeated here.
- B. The preceding Equipment General Requirements in Section 23 08 00 shall form a part of this Section with the same force and effect as though repeated here.
- C. Refer to BID ALTERNATE #6.

PART 2 PRODUCTS

2.01 BOILER(S)

- A. The boilers shall be capable of firing on P.U.C. quality natural gas and shall have ventless fuel trains that is compliant with ASME CSD-1, NFPA-85 (XL-GAP), and State of California Title 8, Div1, Chapt 4, Sub-Chapt 2 – Boiler and fired pressure vessel safety orders.
- B. The boilers shall be factory assembled complete with burner, prewired burner controls, fuel train, boiler trim, refractory and insulation.
- C. The boilers shall be designed, constructed and tested in accordance with the ASME Boiler and Pressure Code, Section IV and bear the ASME stamp.
- D. Units shall be mounted on steel channels, insulated with 1-in minimum of fiberglass insulation and covered with sectional preformed sheet metal lagging.
- E. Insulation jackets, base-frame and other components shall be factory painted with hard finish enamel.
- F. Flue gas outlet shall have a steel collar with built-in damper. Damper shall be adjusted and locked in position during factory fire and combustion test.
- G. All boilers shall be provided with lugs, brackets or field supplied devices to allow the boiler to be firmly bolted to the structure. The lugs, brackets or filed supplied devices shall be sized to withstand the expected seismic loads for the area and type of application. Seismic Calculations shall be furnished by the manufacturer.

2.02 WATER TUBE BOILERS

- A. The boiler shall be a two-drum, flexible watertube design with a tangent-tube waterwall furnace mounted on a heavy steel frame. Top, bottom and sides of the furnace shall be water cooled.
- B. The boiler shall be fully assembled ready for floor or foundation mounting and connection of water, electrical, fuel, vent and drain lines. The packaged unit shall be fired tested at the factory on natural gas only, continuity test on digester gas for control
- C. The boiler pressure vessel must be constructed in accordance with ASME Boiler Code, and must receive authorized boiler inspection prior to shipment. A copy of the inspection report shall be furnished to the purchaser.

1. The boiler drums shall be furnished with handholes to facilitate boiler inspection and cleaning.
 2. Boiler tubes shall be 1.5" diameter, with 0.095" wall thickness, and shall be easy to remove and replace without expanding or welding the tube attachment to the drums.
 3. The boiler shall have a sufficiently sized downcomer to provide natural internal circulation.
 4. The burner shall be mounted on a hinged backing plate for easy access to the furnace.
- D. Observation ports for the inspection of flame conditions shall be provided at the rear of the boiler, and in the burner assembly at the front.
- E. The tangent wall tubes shall be covered with 1-1/2 inches of insulation under a gas-tight, 16-gauge inner casing. There shall be 2 inches of insulation between the inner and outer casing. The outer casing shall be 20 gauge. The boiler base frame and other components shall be factory-painted before shipment, using a hard enamel finish.
- F. Two or more eyes suitable for lifting the boiler must be located on top of the pressure vessel. Front doors on the boiler shall be hinged. Front door refractory shall be contained by a welded steel liner and guaranteed by the manufacturer for a period of not less than 10 years. Rear doors shall have no refractory. All doors are to be sealed with fiberglass rope gaskets and fastened securely using lugs and nuts threaded onto studs welded into the vessel.
- G. All heating surfaces must be fully accessible for inspection and cleaning without disturbing the burner equipment. The pressure vessel shall be furnished with appropriate handholes and manholes on boilers larger than 60-in diameter for boiler inspection and cleaning.
- H. All tubes shall be accessible from the front of the boiler. Tubes shall be rolled into the front and rear tube sheets.
- I. The exhaust gas flue connection shall contain a stack thermometer and be located on the top centerline at the rear of the boiler.
- J. Observation sight ports shall be located at each end of the boiler to facilitate inspection of flame conditions.
- K. The boiler insulation and lagging must be easily removable and readily reinstalled when necessary. Insulation shall consist of a minimum 1-1/2-in fiberglass blanket covering the entire circumference of the pressure vessel protected by preformed sheet metal lagging.
- L. Painting of the boiler, base frame and all other components shall be done prior to shipment using a hard-finish enamel.

2.03 STEAM BOILER TRIM

- A. The following items will be installed on the boiler.
1. Water Column/low Water Cutoff and Water Level Control System shall be a CB LEVEL MASTER water level control system and shall comprise a microprocessor-based electronic controller, a non-contact, non-wearing, continuously reading absolute level sensor, and pressure chamber. The control system shall be designed as follows: The electronic controller shall be mounted in the common control panel and operate in ambient temperatures from 32 degrees F to 125 degrees F. The pressure chamber shall be boiler mounted and operate to pressures of 250 PSIG and the level sensor shall operate to pressures of 250 PSIG and temperatures to 400 degrees F. The pressure-containing components shall be constructed in accordance with ASME Code. A shielded, four

conductor cables with ground shall be run in metal conduit between the level sensor and the controller. Supply power shall be 115VAC-1 phase- 60 Hz. All wiring shall be in compliance with the National Electrical Code. The pressure chamber shall have a sight glass mounted on the side. The level sensor shall have an accuracy of .01" or greater. The electronic controller shall have level and error indicating lights, alphanumeric display for messaging, reset/ menu switch and the following features:

- a. Continuous Level Indication
- b. Low Water Cutoff & Alarm
- c. High Water Alarm
- d. Low & High Water Warning
- e. Full Modulating Control of Modulating Feedwater Control Valve
- f. Continuous Monitoring of Float Operation
- g. Column Blowdown Detection and Reminder
- h. Auto or Manual Reset
- i. Real Time Clock
- j. Alarm Annunciation
- k. Alarm History Files with Time Stamp
- l. Water Column Blowdown Record
- m. Auxiliary Low Water Cutoff Check
- n. RS 232 Interface

- B. Modulating feedwater Control - The boiler modulating feedwater control and valve shall be included to automatically maintain the boiler water level within normal limits.
- C. Auxiliary Low Water Cut-off - Auxiliary low water cut-off shall be included, piped to the vessel, and wired to the burner control circuit. A manual reset device shall be used on this control.
- D. Steam Pressure Gauge - The steam pressure gauge shall be located at the front of the boiler and include cock and test connection.
- E. Safety Valve(s) - Safety valves of a type and size to comply with ASME Code requirements shall be shipped loose.
- F. Steam Pressure Controls - The steam pressure control to regulate burner operation shall be mounted near the water column. Controls shall be a high limit (manual reset), operating limit (auto reset), and firing rate control.
- G. Miscellaneous: Pressure controls, for regulation of burner operation, shall be mounted on the boiler. Temperature transmitters for the boiler water temperature, stack temperature, and burner temperature shall be mounted on the boiler and wired. Steam relief valve(s) (shipped loose) shall be of a type and size to comply with ASME Code requirements.

2.04 BURNER AND CONTROLS

- A. The burner shall be manufactured by the boiler manufacturer
- B. The complete fuel burning system shall be in full accordance with Factory Mutual (FM) requirements.
- C. Burner Description
 1. The boiler shall include a gas burner having rated capacity to burn 9 MMBtu/hr 1,000 Btu/cu-ft of natural gas at a pressure of 5 lbs/sq-in at the inlet of the burner gas control train.

- 1 2. The burner shall be forced draft type with full firing rate modulation. All combustion air shall
2 be furnished by the burner fan, which shall be an integral part of the burner. Each burner
3 motor shall not be larger than 7.5 hp, 460V / 3 phase, and shall be premium efficiency,
4 suitable for VSD operation
5
6 D. The gas burner shall burn the specified quantity of fuel without objectionable vibration, noise, or
7 pulsation, with not more than 30% excess air and less than 400 ppm (corrected to 3% O₂) CO
8 in the products of combustion. In addition, when firing gas, the burner shall be guaranteed to
9 produce less than 9 ppm (corrected to 3% O₂) NO_x emissions.
10
11 E. Primary-secondary air control shall be a design function of the combustion head. Combustion
12 heads requiring an internal adjustment shall not be acceptable.
13
14 F. The burner shall be equipped with an aluminum reverse curve fan for lower fan motor hp
15 requirements and self-cleaning characteristics.
16
17 G. A permanent observation port shall be provided in the burner to allow observation of both the
18 pilot and main flame. Both the pilot and the flame scanner shall be easily accessible without
19 opening or disassembling the burner.
20
21 H. Supply voltage available shall be 460 Volts, 3 phase, 60 Hz. All motors shall be suitable for use
22 on this voltage. All burner controls are to be for use on 120 volts, 1 phase, 60 Hz.
23
24 I. The burner shall be factory fire-tested to ensure proper operation before shipment.
25
26 2.05 PILOT GAS TRAIN FOR EACH BURNER (MOUNTED, PIPED, AND WIRED)
27
28 A. A separate pilot gas cock, gas pressure regulator, and pilot safety shutoff gas valve, shall be
29 provided for the ignition gas supply.
30
31 2.06 GAS VALVE TRAIN FOR EACH BURNER
32
33 A. Provide a pressure gauge to indicate the gas burner manifold pressure.
34
35 B. Furnish and install one manually operated, 2 or 2 1/2-inch, ball valve upstream of all valves on
36 digester gas line. Furnish and install one manually operated, 2-inch, ball valve upstream of all
37 valves on natural gas line.
38
39 C. Provide main gas pressure regulators (of tight shutoff type) with vent to outside atmosphere, in
40 accordance with local codes.
41
42 D. Provide one 2-inch for digester gas and one 2.5-inch for natural gas, automatically operated
43 motorized safety gas valve. One safety shutoff valve shall be proven closed during preignition
44 by proof of valve closure interlock switch on valve.
45
46 E. Provide a second 2-inch (digester gas), and 2.5-inch (natural gas) automatically operated gas
47 safety shutoff valve to operate simultaneously with the above gas valve.
48
49 F. A manually operated gas valve shall be located downstream of both automatic gas valves to
50 permit leakage testing of the valves.
51
52 G. Gas pressure monitoring shall be provided by approved pressure switches interlocked to
53 accomplish a non-recycling safety shutdown in the event of either high or low gas pressure.
54
55 2.07 CONTROLS
56

- A. The full modulation of the burner shall be controlled by water temperature by means of a temperature control.
- B. An additional high limit safety temperature control of the manual reset type shall be provided to control the burner.
- C. Pre- and post- operation of the burner fan shall be provided.
- D. A manual restart of the burner shall be necessary in the event of shutdown due to flame failure.
- E. All three-phase motors shall be controlled and protected by an automatic starter with thermal overload protection. The starter shall be inter-locked to prevent burner operation when over-load relays are tripped out.
- F. Supply a burner-mounted diaphragm air flow switch to prevent energizing the main fuel valves in the event of insufficient combustion air, or to provide safety shutdown in the event of combustion air interruption.
- G. Boiler Management Control System Control Panel: Boiler mounted NEMA 1 enclosure(s) with key lock; fusing, magnetic starters; step-down control transformer; flame safeguard and burner management system as indicated; annunciator lights for load demand, fuel on, low water and flame failure; selector switches, required by dry contacts, relays and terminal strips
- H. Provide four individual lights with nameplates on the control cabinet to indicate "call for heat," "main fuel valve on," "low water," and "main flame failure."
- I. CB-Hawk ICS Boiler Control System: Burner Management System. Boiler shall be factory equipped with a Boiler Control System combining a Digital Burner Management System for flame safety, and a Programmable Logic Controller for boiler modulation and operator interface functions. The factory pre-configured Boiler Control System shall integrate the Burner Management functions and the PLC based modulation and operator interface functions. The logic of the Burner Management System and the modulating controls will not be run in the same processor or powered by the same DC supply. The PLC and Operator Interface Hardware shall be as manufactured by Allen Bradley.
 1. Major system components shall include:
 - a. Programmable Logic Controller
 - b. 10" color Touch Screen HMI
 - c. One Burner Management Controller with Wiring Sub-Base
 - d. One Flame Scanner and amplifier
 2. Various Temperature and Pressure Sensors Major functions provided by the Boiler Control System shall be:
 - a. Automatic sequencing of the boiler through standby, pre-purge, pilot flame establishing period, main flame establishing period, run, flame proving and lockout and post-purge
 - b. Full modulating control of fuel and air
 - c. Utilize solid state controls and sensors to provide various control functions, such as:
 - Modulating control (algorithm shall be Proportional-Integral-Derivative (PID) type)
 - Thermal shock protection
 - High and Low limit alarms and shutdowns
 - d. Touch Screen graphical operator interface and monitoring:
 - Manual control of the boiler firing rate using control screens on the HMI to increment or decrement the firing rate
 - On screen indication of burner management controller status and diagnostics

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electric ignition and pre-ignition timer. Flame rod will not be permitted for proving pilot or main flame.

- P. All controls shall be located in a hinged metal cabinet with NEMA 12 enclosure and neoprene dust seal. Controls shall be electronic. All wiring shall be color coded, all control circuit shall be 120V, single phase grounded and shall not be obtained from a separate source. Provide control transformer.

1.Controls shall conform to FM requirements.

2.Controls shall be Honeywell, Fireye or equal.

- Q. The sequence of burner operation shall be controlled by a programming relay of the electronic type providing pre-purge and/or post-purge cycles as scheduled and with full protection against flame failure during both ignition and normal burner operating periods. Operating of the programming relay shall be governed by an excess pressure limit switch, an electronic flame failure protection device and the low water cut-off to shut-down the burner. After the safety shut-down manual reset shall be required. The burner blower controls shall be interlocked to prevent burner operation without mechanical draft. Means shall be provided for automatically delaying burner operation while allowing fan to scavenge boiler passes of combustion gases after flame or other burner stoppage.

PART 3 - EXECUTION

3.1 EQUIPMENT INSTALLATION

- A. The preceding Equipment Installation Requirements in Section 23 08 00 shall form a part of this Section with the same force and effect as though repeated here.

END OF SECTION 23 08 64

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SECTION 23 08 66 – BREECHINGS AND VENTS

PART 1 - GENERAL

1.1 GENERAL MECHANICAL PROVISIONS

- A. The preceding General Mechanical Provisions shall form a part of this Section with the same force and effect as though repeated here.
- B. The preceding Equipment General Requirements in Section 23 08 00 shall form a part of this Section with the same force and effect as though repeated here.

PART 2 - PRODUCTS

2.1 PRODUCTS

- A. Double wall metal vents.
- B. All steel, positive pressure, double wall stack:
 - 1) Manufacturers: Subject to compliance with requirements, provide all steel, positive pressure double wall vents of the following type:
 - a) Cleaver Brooks Exhaust Solutions, model CBHLA
- C. The factory built breeching system shall be made in accordance with NFPA 211. This stack system shall be designed and installed to be gas tight. It shall be UL 1738 Listed to withstand up to 15" w.c. positive pressures. This breeching system shall be designed to compensate for all flue gas induced thermal expansions. Air space insulation between inner and outer pipe shall be 1 inch thick. Clearances to combustible materials shall be per installation instructions.
- D. The joint assembly shall be a male/female slip-type jointing with flange to flange and V-band assembly. An internal sleeve serves for readily alignment as well as long term joint seal protection from condensate, water and flue gas temperature. Non-slip type joints are not acceptable.
- E. The double wall stack has an inner gas carrying pipe of 24 gauge stainless steel as per UL1738. The outer jacket shall be 24 gauge 304 stainless steel. The materials and construction of the modular sections and accessories shall be as specified by the terms of the product's UL Listing.
- F. The entire stack system from each boiler to the termination, including accessories, shall be from one manufacturer.
- G. The breeching and stack shall be warranted against functional failure due to defects in material and manufacturer's workmanship for a period of 15 years from the date of delivery.
- H. Drawings showing the actual layout and drawn to scale shall be provided by the manufacturer. The system shall be installed as designed by the manufacturer and in accordance with the terms of the manufacturer's 15 year warranty and in conjunction with sound engineering practice.

- I. The inner diameter for breeching and stack shall be verified by the manufacturer's computations. The computation shall be technically sound, shall follow ASHRAE calculation methods and incorporate the specific flow characteristics of the inner pipe.
- J. Technical services supports. The factory built modular stack system shall be furnished by a vendor organization which assures design, installation and service coordination and provides in-warranty and post warranty unified responsibility for Owner.

PART 3 - EXECUTION

3.1 EQUIPMENT INSTALLATION

- A. The preceding Equipment Installation Requirements in Section 23 08 00 shall form a part of this Section with the same force and effect as though repeated here.

END OF SECTION 23 08 66

SECTION 23 08 70 – DEAERATOR

PART 1 - GENERAL

1.1 GENERAL MECHANICAL PROVISIONS

- A. The preceding General Mechanical Provisions shall form a part of this Section with the same force and effect as though repeated here.
- B. The preceding Equipment General Requirements in Section 23 08 00 shall form a part of this Section with the same force and effect as though repeated here.

PART 2 - PRODUCTS

MANUFACTURED UNITS

Horizontal, spray/tray, Single-compartment deaerator, with spray head and spray box. The entire package shall be U.L. Labeled.

The system shall be of the single tank design and guarantee oxygen removal to not more than .005 ccs/liter in the effluent throughout all load conditions between 5 and 100%. The deaerator shall be designed for atmospheric operation suitable for use with pumped and gravity returns. Pressurized designs are not acceptable.

Material for Wetted Components: Components in contact with water that has not been deaerated shall be made of Type 316L or 304L stainless steel.

Adjustable Spray Valves: Type 316L stainless steel. Arrange spray valves for counterflow of steam and condensate and so corrosive gases being vented do not contact deaerator's head or shell.

Internal Vent Condenser: Stainless steel, with automatic and manual vent valves.

Deaerator Section:

Material: Welded 304L stainless steel steel.

Additional Corrosion Protection:

1/16" thickness allowance – total receiver shell thickness of 3/16"
Electrolytic corrosion-inhibitor anode, 1-5/16" x 18" length

Access: 12" x 16" Manhole in deaerator and storage tank for access to internal components for inspection and service.

Factory-Applied Insulation and Jacket: Minimum thickness of 2 inches for mineral-fiber pipe and tank insulation. Cover insulation with painted steel jacket.

Factory-Installed Pipe, NPS 2-1/2 and Smaller: ASTM A 53/A 53M, Grade B; or ASTM A 106, Grade B, Schedule 80; with threaded joints and fittings.

Malleable-Iron Threaded Fittings: ASME B16.3, Class 150 & 300.

Factory-Installed Pipe, NPS 3 and Larger: ASTM A 53/A 53M, Grade B; or ASTM A 106, Grade B, Schedule 40; with welded joints and carbon-steel fittings and flanges.

Wrought-Steel Fittings: ASTM A234 Grade WPB ASME B.

A direct injection steam heating assembly shall be installed in the receiver. The deaeration assembly and the sustaining assembly shall consist of a double flanged mounted stainless steel injection pipe, steam control valve, temperature regulator, wye strainer and (1) compound gauge for measuring vacuum or pressure gauge on unit. The heating assembly shall be sized for the capacities and locations as shown on the drawings.

Accessories:

Lifting eyes.

Companion flanges.

Pump suction piping with vortex breaker, isolation valve, and flexible connector. The individual pump suction piping (manifolded suction lines not acceptable) must be sized for a velocity of 2.9 ft./sec. or less and contain no suction strainers.

Pump discharge piping with check valve, isolation valve, and liquid-filled pressure gage graduated in pounds force per square inch

Pump-discharge bypass tubing and seal flush.

Pump Automatic Flow Control Valve; Griswold or Hayes Fluid Controls

Makeup Water Assembly:

Primary Field-mounted, electric, modulating valve (SIEMENS VF599) with field-mounted, differential pressure water-level controller (SIEMENS NOVA).

Factory built, three-valve bypass and inlet strainer.

Level Control Transmitter, externally mounted and piped with 3-valve isolation manifold

Steam Pressure-Reducing Valve(s): Steam operated SPENCE E2T14 with temperature and pressure pilots, and sized to reduce boiler outlet pressure to the deaerator design operating conditions

Tank Overflow Tapping: Sized to relieve full capacity of make-up valve.

Vent Condenser: Shell and tube design. The vent condenser shall be sized to preheat the incoming effluent to reduce the steam consumption of the main heating assembly.

Vents: Manual and automatic vent valves.

Vacuum breaker.

Meters and Gages:

Full-height, REDLINE water-level gage glass and stop valve set.

Bimetal dial-type thermometer with RTD retransmission, graduated in Fahrenheit mounted to measure temperature in storage and steam section of tank.

Pressure gage graduated in pounds force per square inch mounted to measure pressure in steam section of tank with stainless steel case and movement, and shall include an isolation valve, and snubber.

Chemical injection quill; stainless steel with check valve

Sampling connection with valve.

Tank drain connection with valve.

Oxygen test kit.

Support Frame: Structural-steel frame for supporting tank and pumps. Weld or bolt to tank.

Fabricate support frame with bracing adequate for seismic forces according to authorities having jurisdiction and to allow installation by anchoring deaerators to floor only.

Feedwater Pump: Vertical, Single Stage, flange-mounted, Motor Mounted (JM Frame), centrifugal pump.

Seals: Mechanical, Silicon/Carbide suitable for 300 deg F

Pump Motor: Vertical totally enclosed fan-cooled enclosure, premium efficiency, close coupled to pump.

The pump suction and discharge flange shall be an ASA design

The pump shall be fitted with a seal flush line designed to keep the seal cavity pressure at or below 50 psig.

Each boiler feed pump will have a factory installed automatic flow control valve in the discharge of each pump.

A liquid filled discharge pressure gauge with snubbers shall be provided for each pump.

The manufacturer shall furnish a certified pump performance and NPSH test.

Feedwater Pump Control Panel: Factory mounted and wired and including the following:

NEMA 250, Type 12 enclosure.

Single-point, field power connection to fused disconnect switch for each pump.

Branch power circuit to each motor and to controls with a fused disconnect switch for each pump.

NEMA Magnetic Starter for each pump.

Control Circuit transformer for 115/1/60 control power, with fused protection.

NEMA-rated motor controller, hand-off-auto switch, and overcurrent protection for each motor.

Alternating control as indicated by control sequence for each pump.

Terminal blocks with numbered and color-coded wiring to match wiring diagram.

Raceway for factory-installed wiring outside of enclosures. Make connections to motor with EMT conduit.

Removable control mounting plate.

Visual indication of pump status and alarm status.

Audible alarm and silence switch.

Visual indication of elapsed run time, graduated in hours; runtime hour meter.

Fusible, control-circuit transformer.

Programmable Logic-based single element loop controller; NOVA PD540.

4-20mA output, and separate 4-20mA retransmission

RS-485 MODBUS communications, 19200 baud

Two Relay outputs (for alarm function)

1/4 DIN with red LED display

Programmable PID loop control

DC Loop power supply/output for external transmitter

Digital Temperature indicator with 4-20mA or 0-10v retransmission.

Feedwater Pump Continuous Control Sequence:

Pump runs continuously while boiler operates to maintain header pressure set point.

Boiler water-level controller modulates feedwater control valve to maintain boiler water-level set point. Valve closes when boiler is off.

On/Off/Standby w/ push to test switch for pump control with Lead and shared lag pump for each boiler, with run time hour meter on each pump; manual alternation to equalize run time.
Visual indication of pump on and off status.
Visual indication of pump lead/lag status.

Makeup Water Control Sequence:

Electric level controller operates electric control valve to maintain tank water-level set point.
Visual and audible alarm indication of low and high tank water level.

Building Management System Interface: Factory install hardware to enable building management system to monitor and display points.

RS485 to BacNET MS/TP protocol translator.

FACTORY FINISHES

Manufacturer's standard prime-coat finish ready for field painting.

Manufacturer's standard paint in standard colors, applied to factory-assembled and -tested unit before shipping.

Do not paint aluminum, galvanized-steel, and stainless-steel surfaces.

SOURCE QUALITY CONTROL

Fabricate and label deaerator tanks according to ASME Boiler and Pressure Vessel Code: Section VIII, "Pressure Vessels," Division 1 (for pressurized Deaerator systems)

Factory test performance and certify test results on packaged deaerator units, according to ASME PTC 12.3, before shipping to Project (for pressurized Deaerator systems)

PART 3 - EXECUTION

3.1 EQUIPMENT INSTALLATION

A. The preceding Equipment Installation Requirements in Section 23 08 00 shall form a part of this Section with the same force and effect as though repeated here.

END OF SECTION 23 08 70

SECTION 23 08 71 DEAERATOR RECEIVER TANK

PART 1 - GENERAL

1.1 GENERAL MECHANICAL PROVISIONS

The preceding General Mechanical Provisions shall form a part of this Section with the same force and effect as though repeated here.

PART 2 - PRODUCTS

2.1 The preceding Equipment General Requirements in Section 23 08 00 shall form a part of this Section with the same force and effect as though repeated here.

Provide an atmospheric, horizontal deaerator receiver tank. The tank shall receive returning condensate and supplement make up water to maintain the desired operating level. Condensate and make up water mix into a blended temperature, as determined by the percentage of each. The tank shall be vented to atmosphere. The collected water is then transferred to the deaerator.

A 12 x 16 elliptical manway shall be provided for access. All nozzles shall be 3000 LB forged steel couplings. Heads shall be ASME torispherical type (flat heads are not acceptable) constructed of ASTM A516 GR 70 carbon steel with a minimum thickness of 0.25". Shell plate to be fabricated of ASTM A36 carbon steel with a minimum thickness of 0.25".

The tank shall be designed in accordance with Section VIII of the ASME Pressure Vessel Code, and be stamped accordingly. Certification shall be required. Joint efficiencies to be 70% circumferential per table UW-12, which does not require stress relieving or nondestructive examination.

The tank shall be factory-insulated and lagged with blanket insulation, pins, clips, and a durable steel jacket. Block-type insulation is not acceptable. The blanket insulation is to be fiberglass, 2" thick, 1 LB/CU-FT, and have a rating of R3.85. Pins are to be located on 18" centers and holding clips attached. The steel jacket or lagging shall have a shell thickness of 22 gauge (0.299") minimum and head thickness of 12 gauge (0.1046") minimum.

The magnesium or sacrificial anode shall provide cathodic protection against galvanic corrosion. This rod shall be 1-5/16" diameter with a 1/4" steel core to assure a good electrical contact and added strength. The design shall have a small weep hole to signal it has been consumed. Linings shall not be acceptable in this application.

The high-temperature diffuser or sparge tube shall be located beneath the normal tank water level. The tube shall be constructed of 2-1/2" pipe. This tube shall provide even distribution and blending of high-temperature condensate returns.

The chemical feed quill shall be located beneath the normal tank water level. The quill material shall be constructed of stainless steel. The tube shall provide even distribution and blending of chemical.

The basic tank shall be equipped with the following trim and accessories. Piping on packaged units shall comply with ASME Power Piping Code B31.1.

1 Make Up Valve and Controller

2
3 Electronic motorized regulating valve with steel body and threaded NPT connections. Motor shall
4 be 110V bi-directional type, with a permanently lubricated gear train, and directly coupled to the
5 valve stem. Valve shall not exceed a delta-P of 10 PSIG. This valve shall have teflon seats and
6 be suitable for temperatures up to 300 °F. This valve shall be electronically controlled by a
7 solid state control with internally mounted capacitance probes. The electronic solid state control
8 shall be able to set desired level point and acceptable deviation. The electronic solid state control
9 shall include a selection for automatic and manual operating mode. The internals shall include
10 two additional probes for high and low water alarm. The controller manufacturer shall be Cleaver-
11 Brooks, Model TW82.

12
13 The make up valve shall include a ANSI Class 125 LB three-valve bypass with inlet Y-type cast
14 iron strainer. Strainer screen to be removable and of stainless steel construction.

15
16 High Level Alarm

17 NEMA 1 This shall be an externally mounted float type switch. The switch shall make contact on
18 rise and break on fall. The float cage construction shall be cast iron.

19
20 Low Level Alarm

21 NEMA 1 This shall be an externally mounted float type switch. The switch shall make contact on
22 fall and break on rise. The float cage construction shall be cast iron.

23
24 Suction Piping

25 Suction piping for pumps shall consist of a gate valve, cast iron Y-type strainer with replaceable
26 stainless steel screen and flexible connector or hose. This piping assembly shall be 125 LB class
27 construction. The vortex breaker shall be located in the tank nozzle.

28
29 Transfer Pump and Motor Set

30 Centrifugal transfer pump and motor set. Turbine type pumps are not acceptable in this
31 application. Pump shall have materials of construction as defined by the Hydraulic Institute, and
32 have seals for a maximum water temperature of 212 °F. Pump impeller to be hydraulically
33 balanced. The pump shall be mounted on a steel baseplate and flexibly coupled with an OSHA
34 type coupling guard. Motor to be non-overloading at the rated condition without using any portion
35 of the service factor. Pump and motor set to be factory aligned prior to shipment. A stainless steel
36 recirculation orifice is to be supplied with the pump and shipped loose for field installation to
37 provide minimum bypass flow.

38
39 Support Stand

40 The stand shall elevate the surge tank to provide the net positive suction head required by the
41 pump at the rated condition to prevent cavitation. The stand shall be constructed of heavy square
42 steel tubing for the legs and 1/4" steel plate covering the floor.

43
44 Control Panel

45 Control panel shall be in a NEMA 1 enclosure and wired to the National Electric Code. The wire
46 shall be black number coded. The assembly is to contain individual motor starters with 120 Volt
47 holding coil and fuse protection. Individual green oil-tight pump run lights shall be provided. All
48 switches and lights to have nameplate identification. The assembled panel shall be given a
49 factory continuity test prior to shipment.

50
51 Electric Components

52 Audible and visual high and low water alarm function shall be provided by a bell or horn with
53 silence switch and individual red oil-tight lights. Control circuit transformer to supply 110-120
54 Volts, single-phase power supply. The transformer shall be mounted, wired and fused. Auxiliary
55 contacts shall be furnished for chemical feed pump initiation. Contacts shall be normally open.

The tank shall have a gauge glass assembly that covers the entire tank diameter. The gauge glass shall be quartz 0.625 inch diameter by 24-inch maximum length. Each length of glass shall be furnished with a bronze gauge cock set and protector rods. The tank shall be supplied with a thermometer with a 50 to 300 °F range. The tank is to be hand cleaned with a solvent to SSPC-SP-1 standards prior to painting. Prime coated to not less than 1 mil thick and finish coated with an enamel paint to not less than 1 mil thick prior to shipment. Unit is to be knocked down for shipment. Piping is to be matched marked. Warranty period to be twelve months after start-up or eighteen months after shipment, whichever comes first.

PART 3 - EXECUTION

3.1 EQUIPMENT INSTALLATION

The preceding Equipment Installation Requirements in Section 23 08 00 shall form a part of this Section with the same force and effect as though repeated here.

END OF SECTION 23 08 71

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SECTION 25 09 00 – DIRECT DIGITAL CONTROL SYSTEM

PART 1 - GENERAL

1.1 GENERAL MECHANICAL PROVISIONS

- A. The preceding General Mechanical Provisions shall form a part of this Section with the same force and effect as though repeated here.

1.2 SCOPE

- A. Included: Provide all labor, materials and services necessary for a complete, lawful and operating direct digital control (DDC) system as shown or noted on the drawings or as specified here. The work includes, but is not necessarily limited to, the following:

1. Control panels, control devices, line and low voltage wiring, conduit and related equipment as required for proper operation of all controlled systems.
2. Power wiring required for control devices such as actuators, controllers, sensors and power supplies. Power wiring for these devices shall be fed from circuits dedicated to the DDC system.

- B. Work Specified Elsewhere:

1. Line voltage dedicated power circuits for stand-alone building controllers are included in the Electrical Divisions unless otherwise noted. Power wiring required for fire/smoke dampers is included in the Electrical Divisions.

1.3 CONTRACTOR QUALIFICATIONS

- A. All controls shall be furnished and installed by a Contractor who is licensed, certified or contracted by the controls manufacturer for design, installation, start-up and service of their product. The Contractor must have factory supplied training and support. The Contractor shall have sufficient personnel to respond to a trouble call at the site within four hours. The Contractor's local manager shall have a minimum of five years experience in the design, installation, start-up and service of similar systems. The Contractor shall submit a list of at least five projects which are similar in size, scope and contract value to this project. This list shall include the Owner's contact person, phone number and controls contract value.

1.4 BASIS OF DESIGN

- A. This specification is based on the Johnson Metasys Building Systems, without substitution.

1.5 SUBMITTALS AND OPERATION AND MAINTENANCE MANUALS

- A. Submittals shall be in accordance with Section 20 01 00 and shall include the following:

1. Contractor qualifications. Manufacturer licenses, contracts or certifications for the installer shall be submitted on manufacturer's letterhead.
2. Manufacturer's data for all devices.
3. Manufacturer's data for all software.

4. Diagrams showing control schematics. Diagrams shall include all sensors, terminal strips, panels and control devices. Locations of all devices shall be indicated.
 5. Sequence of operation.
 6. Site plan showing conduit trench and pullbox locations. This plan shall also show the conduit termination points inside the buildings.
- B. Operation and Maintenance Manuals: Furnish Operation and Maintenance Manuals for all components. These manuals shall contain full documentation which shall include, without being limited to, the following:
1. General description and specifications.
 2. Installation and initial checkout procedures.
 3. Complete trouble-shooting procedures and diagrams.
 4. Complete alignment and calibration procedures for all components.
 5. Preventative maintenance requirements.
 6. Detailed schematics and assembly drawings.

1.6 SYSTEM ARCHITECTURE

- A. The direct digital control system shall employ a multi-level distributed processing architecture. A web based front end controller shall act as the host and shall communicate with both the system operator and the stand-alone controllers. The stand-alone controllers shall be microprocessor based and perform the specified data acquisition and control functions. They shall connect to and supervise multiple application specific controllers (ASC). The stand-alone controllers shall perform stand-alone control functions whether in communications with the web based front end controller or not. All independent control loops shall be processed and controlled by the stand-alone controllers. Each stand-alone controller shall store historical data for all connected points for a minimum of 24 hours. Historical data shall include total run-time for each digital point. For analog data, periodic samples shall be stored at the frequency of once per minute. The physical connection and interface with the actual field points shall be accomplished through the ASC's. The ASC's shall be located throughout the data environment, communicate with, and be controlled by the stand-alone controllers. The stand-alone controllers shall be accessible by laptop computer with proper software via cable connection. Access to the system shall also be available through connection at selected space sensors.

PART 2 - PRODUCTS

2.1 SENSORS

- A. Space Temperature Sensor: Room sensor with occupant adjustable set point and bypass button. Occupant adjustable set point shall be limited by software. Wall mounted temperature sensors shall be mounted with bottom of sensor at 48" above finish floor.
- B. Outside Air Temperature Sensor: Provide one outside air sensor per stand-alone building controller. Install on north wall of building.

- C. Duct Sensor: Averaging sensor shall be used at ducts with greater than 9 square feet of cross sectional area. Sensor shall extend across 75% of the duct. Sensor shall be housed in a NEMA 3R enclosure with proper extension at insulated ducts. Provide access door.
- D. Piping Sensor: Insertion type with separable well, extending to center of pipe. At insulated piping, sensors shall have proper extensions. Sensor shall be housed in a NEMA 3R enclosure.
- E. Photocell: Wattstopper EM-24 A 2.
- F. Status Sensor: Current sensing status sensor with sensitivity adjustment.
- G. Smoke Detector: Photoelectric type, 115 VAC. The detector shall operate at air velocities from 300 FPM to 4000 FPM. The detector head shall not require additional filters or screens. Mounted in a sheet metal housing with a removable cover. A visual indication of alarm and power shall be provided on detector front. Manual test and reset switch on front of detector. Power supervisory relay. Minimum of two sets of alarm contacts. UL listed. California State Fire Marshal listed. Air Products and Controls, SM-501Series.

2.2 SYSTEM COMPONENTS

A. Control Valves:

- 1. General: Equal percentage or linear flow characteristics. Unless otherwise noted, select for 2-4 psi pressure drop across the valve at the specified flow. 2" and smaller: Screwed connections, globe or ball valve. 2-1/2" and larger: Flanged connections, globe or butterfly valve.
- 2. Ball Valve: Chromium plated bronze ball, bronze stem, replaceable teflon seat and O-rings. 400 psi WOG. Packing shall be reinforced teflon seal washer and stuffing box ring. Stem packing gland screw shall be adjustable for wear.
- 3. Globe Valve: Contoured plug for linear control. 316 stainless steel stem, replaceable seat and adjustable operating range. Packing shall be molded BUNA-N. Valves controlling terminal units or above ceilings shall be of the packless type with bellows seal, or spring loaded teflon requiring no packing maintenance. 2" and smaller: Bronze body, 250 psi WOG. 35 psi maximum working pressure differential. 2-1/2" and larger: Cast iron body, 125 psi WOG. 25 psi maximum working pressure differential.
- 4. Butterfly Valve: Cast iron body, full lug style (with lugs drilled and tapped for isolation and removal of downstream piping), one-piece 416 stainless steel stem, aluminum bronze disc and EPDM or BUNA-N seat to match application. 175 psi WOG. Packing shall be molded BUNA-N.

B. Electric Actuators:

- 1. General: Fully modulating, UL listed. Visual position indicator, manual override, spring return. Factory weatherproof enclosure where exposed to weather. Belimo.
- 2. Valve Actuators: Provide with factory mounting brackets and linkage to the control valve. Capable of shutting off against a 50 psi differential.
- 3. Damper Actuators: Actuators shall be direct mounted onto the damper control shaft without linkage. Damper actuators shall be sized to provide a minimum of 5 inch-pounds of torque per square foot of damper face area.

- 1
2 C. Lighting Contactors: Contactor with metal enclosure. Square D. Provide low voltage
3 relays to complete the lighting control. For low voltage (120 volt) outside lighting, provide
4 status relay for lighting status. For 277 volt outside lighting, provide current sensor for
5 lighting status.
6
7 D. Web Based Front End Controller with Graphical Interface: Provide color graphics
8 accessible through the Owner's system (with security protocol) which will allow the user
9 to override on/off and temperature set points directly. Real time data shall be
10 continuously updated. The minimum graphic screens shall include the following:
11
12 1. Site lay-out locations of all equipment being controlled, control component
13 locations and spaces served. Provide multiple screens – minimum of one screen
14 per building, plus site and others as needed for clarity. By selecting the desired
15 equipment item, a flow diagram shall be displayed for the related equipment (as
16 described below). By selecting a conditioned space, a graphic display of the
17 zone conditions shall be displayed (as described below).
18
19 2. Flow diagrams shall be provided for each HVAC system, such as air-handling
20 system, chilled water system, hot water system, condenser water system,
21 package unit system with all inputs and outputs dynamically displayed.
22
23 3. Each temperature control zone shall have a screen providing set points,
24 temperatures, and related HVAC system status data.
25
26 4. Scheduling screens allowing on/off times shall be set for all the following:
27
28 a. Pre-determined individual days
29 b. Pre-determined blocks of days (from/to)
30 c. Schedules for "Routine" days
31 d. Schedules for "Special" days
32
33 E. Enclosures: Hinged, lockable front panel. The panel shall be identified with a label as
34 specified. No conduit or other penetration of any kind shall be made on top of the
35 enclosure. If any such entry is made, a plug is not acceptable; replace the enclosure.
36 Hoffman with metal back panel. NEMA 1 for indoor; NEMA 3R for outdoor, NEMA 12 for
37 hazardous locations.
38
39 F. Wiring: Sensor and communication cable shall be shielded cable, wire gage and number
40 of wires as recommended by the system manufacturer. Install per manufacturer's
41 recommendations. No splices will be allowed. Identify both ends at terminal blocks. All
42 wiring that is routed below grade shall have a PVC jacket, CL2-0552. All other wiring
43 shall be plenum-rated, CL3P-0552.
44
45 G. Conduit: Size conduit per the California Electrical Code and then increase by one size,
46 except that the minimum conduit size for low voltage shall be 1" and the minimum conduit
47 size for 120 volt power shall be ¾". For underground conduit, provide 100% spare
48 capacity by installing a second conduit (empty) along all conduit routes.
49
50 H. Labels: All labels, signs, etc. shall be engraved, laminated plastic, white on black
51 background, 1/8" high lettering, minimum.
52

53 2.3 VARIABLE SPEED DRIVE
54

- 55 A. General: The variable frequency drive (VFD) shall be a completely adjustable frequency
56 motor drive system consisting of a pulse width modulated inverter for speed control of
57 NEMA Design B induction motors. Variable frequency drives shall be manufactured by a

single source. The VFD manufacturer shall have a minimum of five years experience in VFD design. Asea Brown Boveri (ABB). Alternate manufacturers shall submit names, addresses and phone numbers of at least five installations in the immediate area. Provide factory start-up.

B. Standards: VFD shall be in accordance with the latest revisions of the following:

1. IEEE Standard 519, Guide for Harmonic Control and Reactive Compensation for Static Power Converters
2. UL Standard 508, Electrical Industrial Control Equipment
3. VFD shall be UL listed and bear the UL label.

C. Design Requirements: The VFD shall be capable of operating in the following conditions: ambient temperature 0 to 40 degrees C and relative humidity 0 to 95%, noncondensing. The power section shall allow the following faults to occur without damage to the VFD: single-phase fault, three-phase short circuit, or phase to ground short circuit. VFD shall include the following features: overcurrent protection, overspeed protection, over temperature protection, electronic thermal motor protection. NEMA 1 or 4 enclosures, as applicable. Provide line reactors, 3% impedance. Provide load filters for circuit lengths in excess of 200 feet.

D. Adjustments: VFD adjustments shall be set via menu driven selections accessible from the front panel. The VFD shall operate in the auto or manual mode and shall include the following front panel mounted switches and indicators:

1. 2 line x 14 character alphanumeric display
2. Local/ remote switch.
3. Digital indicator of frequency, current, volts, torque, HP, KW, KWhrs and run hrs.
4. Manual speed control
5. Run / stop switch.
6. Power on and run indicator
7. Fault indication including: current limit, overvoltage, undervoltage, overload or thermal motor protection.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: A dedicated ASC shall be provided for every item of new equipment and for every item of existing equipment. All electrical work shall be in accordance with the California Electrical Code and the Electrical Specification Sections. Wiring shall be concealed in walls, above the ceilings, or below grade unless otherwise noted. Exposed wiring shall run in conduit parallel to room surfaces; location shall be approved by the Engineer. Wiring in walls or in mechanical rooms, janitor rooms, or storage rooms shall be in conduit. Conduit above roofs shall be rigid conduit. Low voltage wiring in accessible attics may be run without conduit. This wiring shall be strapped to structure at 48" on center, and shall not lay on the ceiling. No structural member shall be weakened by cutting, notching, boring or otherwise. Provide power wiring for each device requiring

external power. Dedicated circuits shall be provided for devices as required by the manufacturer. Devices or wiring exposed to the weather shall be protected in NEMA 3R enclosures and weatherproof conduit. All conduit shall include a pull wire. Set, test, and adjust the system for proper operation. Provide connection to the Owner's network for web-based access to stand-alone controllers.

B. Programming: The Contractor shall be responsible for programming the system and shall coordinate the scheduling (on/off times) with the Owner. All point lists and programming blocks shall be provided by the Contractor. For upgrades or additions to existing systems, all existing programming and existing sequences of operation shall be incorporated into the new system and equipment. The project will not be considered complete until all programming and graphics have been completed and all systems are operational from the location of the web based front end controller.

C. Control Panels/Enclosures:

1. ASC's, transformers, relays, etc. shall be housed in enclosures. Enclosures shall be installed as shown on plans. Wherever practical, do not locate enclosures above ceilings. Maintain access to enclosures that are located above ceilings (e.g. at VAV boxes).
2. For all enclosures, provide a disconnect switch and an in-line fuse. All wiring shall be terminated at terminal strips – no wire nuts. Provide a plastic covered wiring diagram in each enclosure. All wiring (field and inside enclosures) shall be labeled at both ends with machine printed markers – black on white tape. At packaged equipment, locate the enclosure on the side of the unit without obstructing access or service clearance.
3. Separate 120 volt circuits from low voltage circuits horizontally. A physical barrier is not required. Enclose wiring within the enclosure in 2"x2" Panduit.

3.2 TRAINING

A. Prior to final acceptance, the Contractor shall provide operational training to the Owner's personnel. The training sessions shall include a complete demonstration of the system. Dates and times of the training sessions shall be coordinated through the Owner not less than one week prior to session. A total of 40 hours of instruction shall be provided - 20 hours initially, and 20 hours to be spread throughout the first year of operation. The Contractor shall maintain a log of training sessions including dates, times and names/titles of those attending. The Contractor shall submit a copy of this log on request.

3.3 TESTING AND ACCEPTANCE

A. The Contractor shall verify, in the presence of the Owner, the system accuracy and proper function of each controlled device and sensor. The following items shall be successfully demonstrated prior to acceptance by the Owner:

1. All system outputs including controllers, relays, and other control devices shall be addressed and start/stop functions demonstrated.
2. All inputs shall be displayed and all event-initiated functions shall be demonstrated.
3. Demonstrate program integrity and power restore sequence during and after a power failure and restoration.

4. Deliver all record drawings, wiring diagrams, equipment specifications, operation and maintenance manuals and other documentation as required to describe the system.

5. Complete operator training in the use, programming, and operation of the system.

3.4 SERVICE WORK

A. Service work shall be performed by service personnel in the direct employ of the controls contractor. The service technicians shall be factory trained and certified by the manufacturer to be competent in all aspects of the installed system. The technician shall have a working knowledge of calibration techniques, preventive maintenance, troubleshooting, software diagnostics and microprocessor repair. Precaution shall be taken to minimize disruption of facility operations by service work.

END OF SECTION 25 09 00

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SECTION 26 01 00 - GENERAL ELECTRICAL PROVISIONS

PART 1 GENERAL

1.1 RELATED DOCUMENTS:

- A. Contract Requirements: The foregoing GENERAL CONDITIONS, SPECIFIC CONDITIONS, and supplements thereto and all requirements of Division 1 of these Specifications shall form a part of this Section with the same force and effect as though repeated herein. The provisions of this Section shall apply to all of the following Sections of Division 26 of these Specifications. All applicable portions of the work under Division 26 and Division 25 (Electrical Work) shall conform fully to all provisions of all other Division 26 sections along with other Sections of these Specifications including, but not limited to the following:

GENERAL - STANDARDS, SUBMITTALS, SHOP DRAWINGS, REVIEW, INSPECTION Sections

EXCAVATING, FILLING, GRADING: DIVISION 2 - SITEWORK

CONCRETE: DIVISION 3

MECHANICAL: DIVISION 25 - MECHANICAL

- B. Codes and Regulations: All electrical equipment and material and its installation shall conform to the current requirements of the following authorities.

1. California Code of Regulations, Title 8-Industrial Safety.
2. California Code of Regulations, Title 19-Public Safety.
3. California Code of Regulations, Title 24, Part 1, Administrative Regulations.
4. California Building Code, California Code of Regulations, Title 24-Part 2, 2013 edition.
5. California Electrical Code, California Code of Regulations, Title 24-Part 3, 2013 edition.
6. California Mechanical Code, California Code of Regulations, Title 24-Part 4.
7. California Plumbing Code, California Code of Regulations, Title 24-Part 5.
8. California Fire Code (based on the National Fire Code - NFPA).
9. Regulations of the Division of the State Architect of the State of California, Office of Regulation Services.
10. Pacific Gas and Electric Service Requirements.

NOTE: Where two or more codes conflict, the most restrictive shall apply. Nothing in these Plans and Specifications shall be construed to permit work not conforming to applicable codes.

- C. Test and Standards: The tests, standards, or recommended procedures of the following agencies shall relate to all parts of these Specifications and shall be considered a minimum:

1. American National Standards Institute (ANSI).
2. Underwriters Laboratories, Inc. (UL).
3. National Electrical Manufacturers Association (NEMA).
4. Electrical Testing Laboratories (ETL).
5. National Fire Protection Association (NFPA)
6. Insulated Power Cable Engineers Association (IPCEA).

7. Institute of Electrical and Electronic Engineers (IEEE).
8. Illumination Engineering Society (IES).
9. National Electrical Testing Association, Inc. (NETA)

1.2 SUMMARY OF WORK:

The Electrical Contractor shall provide all materials, tools, equipment, labor and services necessary to furnish and install complete working electrical systems as shown on the Plans and described within these Specifications. The Electrical Contractor shall furnish all power supplies, disconnects, controls, and any other work as called for in the Division 25 specifications and plans as well as all Electrical and Electrical related work as called for in the Division 26 specifications and plans. In addition, all conduit required by Divisions 27 and 28 and the associated drawings. All systems, at project completion and before final acceptance, shall be demonstrated to have a complete and working functional operation. The work includes but is not specifically limited to items indicated below.

A. Demolition and Phasing:

1. De-energize, disconnect and remove electrical feeds to equipment being removed or relocated.
2. Remove or modify electrical installation in areas of remodel and demolition.
3. Make temporary feeds and connections to areas and equipment to allow phased construction and operation.

B. Electrical Distribution:

1. New panelboards and related equipment.
2. Conduits and feeders for electrical power and control.

C. Building and Mechanical Systems:

1. Complete lighting and power systems.
2. Electrical work associated with mechanical equipment.
3. Conduit and support system for installed telephone and computer signal systems by others.

D. Communications Distribution:

1. Conduit and support system for Video Surveillance, Security, Fire Alarm, Public Address, and Clock Systems by others.

E. Permits and fees relating to electrical work.

END OF SECTION 26 01 00

SECTION 26 05 73 - OVERCURRENT PROTECTIVE DEVICE COORDINATION AND ARC FLASH
STUDY

PART 1 GENERAL

1.1 SUMMARY

- A. This Section includes computer-based, fault-current and overcurrent protective device coordination studies. Protective devices shall be set based on results of the protective device coordination study.

1. Coordination of series-rated devices is permitted where indicated on Drawings.

1.2 REFERENCES

- A. The publications listed below form a part of this Specification to the extent referenced. The publications listed below are referenced as the latest edition published as of the date of this document. The publications are referred to within the text by the basic designation only.

B. Institute of Electrical and Electronics Engineers (IEEE)

1. IEEE 1015, Recommended Practice for Applying Low-Voltage Circuit Breakers Used in Industrial and Commercial Power Systems.
2. IEEE 242, Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems.
3. IEEE 399, Recommended Practice for Power System Analysis.
4. IEEE 620, Guide for the Presentation of Thermal Limit Curves for Squirrel Cage Induction Machines.
5. IEEE C37.13, Standard for Low-Voltage AC Power Circuit Breakers Used in Enclosures.
6. IEEE C37.46, Standard for High Voltage Expulsion and Current-Limiting Type Power Class Fuses and Fuse Disconnecting Switches.
7. IEEE C37.50, Standard for Switchgear--Low-Voltage AC Power Circuit Breakers Used in Enclosures--Test Procedures.
8. IEEE C57.12.00, Standard General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers.
9. IEEE C57.96, Guide for Loading Dry-Type Distribution and Power Transformers.

C. Insulated Cable Engineers Association (ICEA)

1. ICEA P-32-382, Short-Circuit Characteristics of Insulated Cable.
2. ICEA P-45-482, Short-Circuit Performance of Metallic Shielding and Sheaths.

D. International Electrical Testing Agency (NETA)

1. NETA ATS, Acceptance Testing Specifications for Electric Power Distribution Equipment and Systems.

E. National Electrical Manufacturers Association (NEMA)

1. NEMA MG 1, Motors and Generators.

F. National Fire Protection Association (NFPA)

1. NFPA 70, National Electrical Code.

1.3 SUBMITTALS

- A. Drawings: Power single line diagram with available short circuit currents indicated for each distribution system component.
- B. Product Data: For computer software program to be used for studies.
- C. Product Certificates: For coordination-study and fault-current-study computer software programs, certifying compliance with IEEE 399.
- D. Qualification Data: For coordination-study specialist.
- E. Other Action Submittals:
 - 1. Coordination-study input data, including completed computer program input data sheets.
 - 2. Study and Equipment Evaluation Reports.
 - 3. Coordination-Study Report.
 - 4. Setting Report.
 - 5. Arc Flash Report and Labels

1.4 QUALITY ASSURANCE

- A. Studies shall use computer programs that are distributed nationally and are in wide use. Software algorithms shall comply with requirements of standards and guides specified in this Section. Manual calculations are not acceptable. Comply with IEEE 399 for general study procedures. Comply with IEEE 242 for short-circuit and coordination time intervals. Short-circuit and coordination study shall comply with FAA Order 6950.2 and FAA Order 6950.27.
- B. Coordination-Study Specialist Qualifications: Furnish services of electrical distribution equipment manufacturer or licensed Professional Engineer, by the state of California, to make a complete system short circuit and protective device electrical coordination study on 12,470 volt primary voltage system, and 480 and 208 volt secondary system. The entity shall be experienced in the application of computer software used for studies, having performed successful studies of similar magnitude on electrical distribution systems using similar devices.
- C. Testing Agency Qualifications: Member Company of the International Electrical Testing Association.
- D. Testing Agency's Field Supervisor: Person currently certified by the International Electrical Testing Association to supervise testing specified in Part 3.

PART 2 PRODUCTS

2.1 COMPUTER SOFTWARE DEVELOPERS

- A. Subject to compliance with requirements, provide computer software programs developed by SKM System Analysis, Incorporated.

2.2 COMPUTER SOFTWARE PROGRAM REQUIREMENTS

- A. Comply with IEEE 399.
- B. Analytical features of fault-current-study computer software program shall include "mandatory," "very desirable," and "desirable" features as listed in IEEE 399.

- C. Computer software program shall be capable of plotting and diagramming time-current-characteristic curves as part of its output. Computer software program shall report device settings and ratings of all overcurrent protective devices and shall demonstrate selective coordination by computer-generated, time-current coordination plots.

1. Optional Features:

- a. Arcing faults.
- b. Simultaneous faults.
- c. Explicit negative sequence.
- d. Mutual coupling in zero sequence.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine Project overcurrent protective device submittals for compliance with electrical distribution system coordination requirements and other conditions affecting performance.

1. Submission and approval of electrical short circuit and coordination studies are required prior to submittal of Shop Drawings of electrical distribution equipment. Submittal of electrical distribution equipment made prior to approval of Electrical Studies will be returned without approval.
2. The arc flash study can be completed after relevant equipment submittals have been assembled.

3.2 SHORT CIRCUIT CURRENT STUDY

- A. Source impedance: As an infinite bus on primary side of utility transformer. Study electrical distribution system from normal power sources throughout electrical distribution system for project and use approved computer software program to calculate values. Include studies of system-switching configurations and alternate operations that could result in maximum fault conditions. Calculate momentary and interrupting duties on the basis of maximum available fault current. Use utility data where available. Calculations to verify interrupting ratings and overcurrent protection devices shall comply with the following:

1. Low-Voltage Circuit Breakers: IEEE 1015 and IEEE C37.50.
2. Low-Voltage Fuses: IEEE C37.46.
3. Circuit Breakers: IEEE C37.13.

B. Study Report:

1. Tabulation of input data including all short circuit sources and system impedances and electrical short circuit currents at each bus in system with contributions from connected busses. Comparison of interrupting and withstand ratings of electrical devices including circuit breakers, fuses, disconnect switches, transfer switches, starters and bus ducts, versus available fault current shall be included. Allowance shall be made for 20 percent growth in short circuit source contributions, for example, utility and motors.
2. Provide symmetrical three-phase bolted fault currents at 1 cycle (momentary), 5 cycles (interrupting) and steady-state (synchronous) for medium-voltage systems.
3. Provide symmetrical three-phase bolted fault currents at 1 cycle (momentary) for low-voltage systems.

4. Provide symmetrical line-to-ground bolted fault currents at 1 cycle (momentary) for solidly grounded multiple generator systems.
5. Calculations shall be completed in accordance with applicable ANSI and IEEE standards.
6. Calculations shall be completed for the worst case (maximum short circuit current) configuration of the electrical system. Wherever closed transition transfer is incorporated in the design, the contributions from both paralleled sources shall be included in the fault calculations. Tie circuit breakers shall be configured for the maximum utility and motor fault contribution.

C. Equipment Evaluation Report:

1. Prepare a report on the adequacy of overcurrent protective devices and conductors by comparing fault-current ratings of these devices with calculated fault-current momentary and interrupting duties.

3.3 COORDINATION STUDY

A. Gather and tabulate the following input data to support coordination study:

1. Product data for overcurrent protective devices specified in other Division 26 Sections and involved in overcurrent protective device coordination studies. Use equipment designation tags that are consistent with electrical distribution system diagrams, overcurrent protective device submittals, input and output data, and recommended device settings.
2. Impedance of utility service entrance.
3. Electrical distribution system diagram showing the load current that is the basis for sizing continuous ratings of circuits for cables and equipment.
4. Circuit breaker and fuse-current ratings and types.
5. Relays and associated power and current transformer ratings and ratios.
6. Transformer kilovolt amperes, primary and secondary voltages, connection type, impedance, and X/R ratios.
7. Generator kilovolt amperes, size, voltage, and source impedance.
8. Cables. Indicate conduit material, sizes of conductors, conductor insulation, and length.
9. Busway ampacity and impedance.
10. Motor horsepower and code letter designation according to NEMA MG 1.
11. Data sheets to supplement electrical distribution system diagram, cross-referenced with tag numbers on diagram:
 - a. Special load considerations, including starting inrush currents and frequent starting and stopping.
 - b. Magnetic inrush current overload capabilities of transformers.
 - c. Motor full-load current, locked rotor current, service factor, starting time, type of start, and thermal-damage curve.
 - d. Ratings, types, and settings of utility company's overcurrent protective devices.
 - e. Special overcurrent protective device settings or types stipulated by utility company.
 - f. Time-current-characteristic curves of devices indicated to be coordinated.
 - g. Manufacturer, frame size, interrupting rating in amperes rms symmetrical, ampere or current sensor rating, long-time adjustment range, short-time adjustment range, and instantaneous adjustment range for circuit breakers.
 - h. Manufacturer and type, ampere-tap adjustment range, time-delay adjustment range, instantaneous attachment adjustment range, and current transformer ratio for overcurrent relays.

- i. Panelboards, switchboards, motor-control center ampacity, and interrupting rating in amperes rms symmetrical.

Perform coordination study and prepare a written report using the results of fault-current study and approved computer software program. Comply with IEEE 399. Comply with NFPA 70 for overcurrent protection of circuit elements and devices. Comply with IEEE 242 recommendations for fault currents and time intervals

B. Transformer Primary Overcurrent Protective Devices:

1. Device shall not operate in response to the following:

- a. Self-cooled, full-load current or forced-air-cooled, full-load current, whichever is specified for that transformer.
- b. Permissible transformer overloads according to IEEE C57.96 if required by unusual loading or emergency conditions.
- c. Device shall protect transformer according to IEEE C57.12.00, for fault currents.

C. Conductor Protection:

1. Protect cables against damage from fault currents according to ICEA P-32-382, ICEA P-45-482, and conductor melting curves in IEEE 242. Verify adequacy of phase conductors at maximum 3-phase bolted fault currents, equipment grounding conductors, and grounding electrode conductors at maximum ground-fault currents.

D. Coordination-Study Report:

1. Prepare a written report indicating the following results of coordination study:

- a. Tabular format of settings selected for overcurrent protective devices:

1. Device tag.
2. Relay-current transformer ratios; and tap, time-dial, and instantaneous-pickup values.
3. Circuit breaker sensor rating; and long-time, short-time, and instantaneous settings.
4. Fuse-current rating and type.
5. Ground-fault relay-pickup and time-delay settings.

- b. Prepare coordination curves to determine settings of overcurrent protective devices to achieve selective coordination. Graphically illustrate that adequate time separation exists between series devices, including power utility company's upstream devices. No more than 3 overcurrent protective devices shall be shown on a graph. All text descriptions indicated on the graphs shall be legible. Show the following specific information:

1. Device tag.
2. Voltage and current ratio for curves.
3. Three-phase and single-phase damage points for each transformer.
4. No damage, melting, and clearing curves for fuses.
5. Cable damage curves.
6. Transformer inrush points.
7. Maximum fault-current cutoff point.
8. Calculated short circuit current at each bus as seen by the respective protective devices.
9. Selective coordination in the long time, short time and instantaneous regions of the phase and ground fault protection schemes.

- c. Completed data sheets for setting overcurrent protective devices.

3.4 ARC FLASH STUDY

- A. Perform arc-flash calculations to determine the information necessary to comply with the indicated labeling requirements in Paragraph, Arc Flash and Shock Warning Signs.
1. The study shall be based on NFPA 70E, including the guidance provided within the Annexes. Model the electrical system under normal operating conditions and with motors operating, during which normal maintenance would be undertaken. Arc flash calculations may require different short circuit system modeling then those required for the maximum available short circuit current study used to establish equipment short circuit ratings.
 2. Calculations shall be performed using the IEEE 1584 equations. Calculate the arc flash hazard using both three phase bolted fault levels and arcing fault current levels. The highest incident energy level calculated shall be utilized to determine the maximum hazard/risk category.
 3. Where equipment arc flash hazard ratings exceed Category 4 (40 cal./sq cm), the coordination study settings shall be reviewed and adjusted to reduce the arc flash hazard while still maintaining coordination. Provide recommended settings or other recommended methods in order to reduce the arc flash hazard to Category 4 or less.
 4. Provide all new electrical distribution equipment (such as switchboards, panelboards, transformers, disconnects, etc.) with arc flash equipment labels per NEC 110.16 and NFPA 70E 130.3(C) and 130.7(E)(1). Prepare and apply approved sunlight and ultra-violet resistant weatherproof tags to all equipment as applicable with all approach, minimum distance, clothing, class to be used, eye/face protection to be used and tag identification corresponding to identification number on study. All arc flash labels shall include:
 - a. The header of the label shall be the capitalized word "WARNING" in black on an orange background. The word is to be preceded by the standard alerting symbol of an exclamation point in a black triangle and followed by a black lightning bolt in a black triangle.
 - b. Listing of the hazard: "ARC FLASH" and "SHOCK HAZARD"
 - c. Flash protection: Incident Energy (Cal/cm2) at 18", flash protection boundary, and hazard/risk category number
 - d. Shock protection: voltage, and limited/restricted/prohibited approach boundaries
 - e. Equipment ID
 - f. Where equipment is fed from
 - g. Arc flash hazard calculation date
 - h. Equipment install date

3.5 OVERCURRENT PROTECTIVE DEVICE SETTING

- A. Manufacturer's Field Service:

1. Engage a factory-authorized service representative of electrical distribution equipment being set and adjusted, to set overcurrent protective devices within equipment.

- B. Testing:

1. Contractor will engage a qualified testing agency to perform device setting and to prepare test reports. After installing overcurrent protective devices and during energizing process of electrical distribution system perform the following device setting tests and prepare reports:

- 1 a. Verify that overcurrent protective devices meet parameters used in studies.
- 2 b. Adjust devices to values listed in study results.
- 3 c. Adjust devices according to recommendations in NETA ATS Inspection and Test
- 4 Procedures.

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END OF SECTION 26 05 73

SECTION 26 10 00 - BASIC ELECTRICAL REQUIREMENTS

PART 1 GENERAL

1.1 DESCRIPTION AND INSTALLATION OF SYSTEMS:

- A. The electrical drawings are diagrammatic and do not necessarily show all raceways, wiring, number or types of fittings, offsets, bends or exact locations of items required by the electrical systems. Items not shown or indicated, which are clearly necessary for proper operation or installation of systems shown, shall be provided at no increase in contract price.
- B. The exact routing of systems and location of devices and equipment shall be governed by coordination with other trades, and structural and architectural conditions. The Architect or Electrical Engineer reserves the right, at no increase in contract price, to make reasonable changes in location of electrical equipment or wiring system so as to coordinate with other systems, to group them into orderly relationships, or to increase their utility. Electrical Contractor shall verify requirements in this regard prior to roughing in.
- C. Install electrical work in cooperation with other trades, make proper provisions to avoid interferences, and coordinate with structural and architectural feature in a manner approved by the Architect or Electrical Engineer. All changes caused by neglect to make such provisions shall be at Electrical Contractor's expense. Provide offsets and special fittings, as required to facilitate installation of the work.
- D. When a particular product or type of product is specified with a manufacturer's designation, the latest published specifications, installation, and construction information of the manufacturer shall constitute the minimum acceptable standard. Any substitutions shall be made in accordance with Paragraph 1.6 SUBSTITUTIONS.

1.2 EXAMINATION OF DOCUMENTS AND SITE:

- A. Before submitting a proposal each bidder shall carefully examine the electrical, mechanical, architectural, and structural drawings and specifications. He shall also visit the sites and fully inform himself as to all existing conditions and limitations applying to the work. If, after such examination and study, it appears that any change from the drawings and specifications should be allowed, the bidder shall so state in writing together with any change in cost involved.
- B. By the act of submitting a proposal, each bidder shall be deemed to have made such examinations of the drawings and specifications and premises, and it will be assumed that he is therefore familiar with the entire scope of the project and has based his proposal upon the work described in the plans and specifications and upon all existing conditions and limitations applying to his work.

1.3 EXECUTION:

- A. Workmanship: The work shall be performed by competent licensed electrician, skilled in the particular phase of the work entailed. The work shall be first class throughout, neat, accurate and in full accordance with the intent of these specifications, and to the satisfaction of the Architect or Electrical Engineer.
- B. Safety: All standard safety procedures as set forth by OSHA, CCR, and California Division of Industrial Safety shall be strictly adhered to.

C. Coordination: The Electrical Contractor shall familiarize himself with the work of other crafts so as to be able to provide electrical service of correct size, voltage, and other requirements to any equipment to be installed. The installations shall coordinate as to location and time, and interference causing delays and non-acceptable construction shall be avoided.

1. Prior to commencing construction the Electrical Contractor shall arrange a conference with the Mechanical and Plumbing Contractors and sub-contractors as well as equipment suppliers, and shall verify types, sizes, locations, requirements, controls, and diagrams of all equipment furnished by them. Prior to roughing in, he shall inform the Architect and Electrical Engineer, in writing, that all phases of coordination of this equipment have been covered.
2. Exact equipment rough-in locations shall be verified from shop drawings.

D. Cutting and Repairing: The Electrical Contractor shall do all cutting necessary for the proper installation of his work, repair any damage done by himself or his workmen, and coordinate his work with that of others. No cutting or patching shall be done without approval of the Architect or Electrical Engineer. Round holes through concrete slabs or walls shall be core drilled with a diamond drill, rectangular openings shall be cut with a diamond saw. In no case shall any concrete beam or column be cut.

E. Sleeves and Openings: The Electrical Contractor shall be responsible for all sleeves and openings through walls and floors required by electrical work. All openings around conduits in sleeves shall be sealed with a material of equal fire rating as the surface penetrated. Openings not utilized shall be temporarily sealed in a similar manner. All required sleeves shall be furnished to and coordinated with the General Contractor.

F. Access to Equipment:

1. Access Doors: All concealed equipment, controls, etc., shall be provided with access doors as called for in the Specifications which shall be furnished by the Electrical Contractor of this section for work of this section. Installation shall be the responsibility of the trades in whose surfaces they will be installed. Access doors are not required in removable ceilings.
2. Equipment shall be installed in readily accessible locations, or means of access provided. Equipment will be deemed to be accessible only if all normal maintenance and operation can be performed with ease by an average sized person.

G. Cleaning and Painting: All exposed work shall be thoroughly cleaned upon completion of work. Panelboard enclosures, fixtures and equipment, where finish has been marred in shipment or installation, shall be completely refinished. Minor finish damage shall be rectified as indicated by the Architect or Electrical Engineer. Electrical Contractor shall remove from the site all waste and rubbish resulting from his work.

H. Permits and Fees: For work of this Specification Division, Electrical Contractor shall secure necessary permits and licenses, pay fees and deposits, and arrange for inspection, as required by applicable governmental rules, regulations, codes, and ordinances.

1.4 QUALITY CONTROL:

A. Supervision: The Electrical Contractor shall personally, or through a competent representative, constantly supervise the work from beginning to completion and final acceptance. He shall cooperate fully with the inspection authorities in the provision of information and access to the work. He shall, to the best of his ability, maintain the same job foreman throughout the life of the project unless a replacement is requested or authorized by the Architect or Electrical Engineer.

B. Inspection and Tests: The Electrical Contractor shall furnish all labor and test equipment required to fully test and adjust the equipment installed under this specification and demonstrate its proper operation, in accordance with the General Conditions, and the following:

1. Arrange for all tests and inspections and provide minimum one (1) week prior notice to the Architect or Electrical Engineer.
2. A test must demonstrate that each piece of equipment, outlet, fixture, device, and appurtenance is in sound operating condition and in proper cooperative relation to associated equipment.
3. All tests shall be conducted under supervision of the Owner or his designated representative, and any defects of any nature which are apparent as a result of such test shall be made correct to the satisfaction of the Architect or Electrical Engineer before final acceptance is made.
4. No equipment shall be tested, or operated for any other purpose, such as checking motor rotation, until it has been fully checked in accordance with the manufacturer's instructions.
5. Check and tighten nuts, bolts, lugs, and similar elements of equipment; switchboards, motor control centers, busways, panels, etc. Final torquing shall be done in the presence of the Owner's inspecting representative.
6. Submit complete test reports with maintenance manual submission.

C. Work Correction: Any portion of the work that does not perform satisfactorily or any defects that are disclosed by testing shall be corrected by Electrical Contractor at his expense before work will be accepted.

1.5 GROUNDING:

- A. The conduit system supports, cabinets, switchboards, etc., and neutral conductors must be permanently and effectively grounded by means of approved ground clamp, in accordance with the electrical safety orders of the Department of Industrial Relations of the State of California.
- B. The Electrical Contractor shall exercise every precaution to obtain good contacts at all panel boxes, pull boxes, etc. Where it is not possible to obtain good contacts, the conduit shall be bonded around the boxes with a #6 B&S gauge, rubber covered, double braided wire with ground clamps.
- C. Equipment and raceway bonding procedures shall be rigidly maintained and meet all jurisdictional requirements of codes and regulations.

1.6 SUBSTITUTIONS:

- A. Those products, or types of products, listed and specified are intended to set the standard for quality, design, and installation procedure required for the project. The Electrical Contractor shall not substitute other materials, products or systems without the written approval of the Architect or Electrical Engineer.

1. Electrical Contractor's Options:

- a. Product specified only by reference standards: Select any product meeting standards.
- b. Product specified by naming several products and/or manufacturers: Select any product and/or manufacturer named.
- c. Product specified by naming several products and/or manufacturers and reference standards: Select any product meeting standards. Product and/or manufacturer names indicate products and/or manufacturers that meet standards.

- d. Product specified by naming only product: Select product specified.
 - e. Product specified by naming one of more products and stating "or equivalent" in front of specified product: Select any product named or submit request for substitution for any product not specifically named in accordance with Paragraph 1.06.
- B. All requests for substitution shall be made in accordance with Division 1 and the General Conditions.
- C. Cost to Electrical Electrical Contractor or Bidder for review of Substitution Request:
1. Each review of a Substitution Request by the Engineer will be billed to the submitter (Electrical Contractor or Bidder) at an hourly rate of \$200.00 an hour, two hour minimum for each review, whether approved or rejected.
 - a. The Engineer may waive the review cost if in his sole opinion the submittal was complete and the time involved in the review was not substantial, and it was in the best interest of the Owner.
- D. All requests for substitution shall be in writing and shall indicate all information required thereon, including an itemized comparison of proposed substitution with specified product(s). Representative samples may be required for determination of equality.
- E. All proposed substitution shall be a standard product of the firm, under current manufacture and be a catalog item at time of bid.
- F. In making request for substitution, Electrical Contractor can attest that:
1. He personally investigated proposed product or method, and determined that it is equal or superior in all respects to that specified.
 2. He will provide the same guarantee or warranty for substitution as for product or method specified.
 3. He will coordinate installation of accepted substitution into Work, making such changes as may be required for Work to be complete in all respects.
 4. He waives all claims for additional costs related to substitution which subsequently become apparent.
- G. Submit three (3) copies of substitution request prior to submittals required in accordance with Paragraph 1.6.
- 1.7 SUBMITTALS:
- A. Make submittals for all material to be used on the project, whether as specified or substitutions, within thirty (30) days after award of Contract by the Owner, in accordance with General Conditions and the following:
1. All submittals shall be neat and bound in a suitable folder or binder, identified by Project Title and Section.
 2. Identify each item by manufacturer, brand, trade name, number, size rating, and whatever other data is necessary to properly identify and check materials and equipment. Words "as specified" are not sufficient identification.
 3. Identify each submittal item by reference to specifications section paragraph in which item is specified, or Drawing or Detail number.

4. All submittals shall be submitted in complete groups, e.g., all light fixtures at one time. No partial or incomplete submittals will be accepted.
5. Organize submittal in the same sequence as they appear in specification sections, articles, or paragraphs.
6. Provide detailed index listing for all submittals.

B. Product Data: Submit a minimum of seven (7) copies, separated in groups, as follows:

1. Basic Site Components
 - a. Conduits and raceway types required, including fittings
 - b. Concrete pull-boxes, vaults, and manholes
 - c. Electrical Identification items
 - d. Concrete coloring
2. Basic Materials
 - a. Conduits and raceway types required, including fittings
 - b. Electric wire, cable and connectors
 - c. Electrical boxes and fittings
 - d. Wiring devices
 - e. Each type of support, anchor, sleeve, and seal
 - f. Fire stopping Material
 - g. Electrical Identification items
 - h. Junction Boxes
 - i. Time Clocks
 - j. Terminal Cabinets
3. Distribution Equipment
 - a. Switchboards
 - b. Transformers
 - c. Transfer switches
 - d. Panelboards
 - e. Disconnects and Starters
 - f. Terminal Cabinets
4. Lighting
 - a. Fixtures
 - b. Lighting Controls
5. Any Additional System

C. Shop Drawings: Upon product review, submit shop drawings showing physical arrangement, wiring diagrams, construction details, finishes, materials used in fabrication, provisions for conduit entrance, access requirements for installation and maintenance, physical size, electrical characteristics, foundation and support details, weight, power sources, circuit numbers. Shop drawings shall be compatible with the Contract Drawings and Specifications.

Show wiring as actually installed, connected, and identified for this specific project. Include identification of cables and cable conductors.

Shop and instruction drawings shall cover the equipment or device to be installed and not merely the general class of such equipment or device.

Submit four prints and one reproducible as follows:

1. Panelboards
2. Special Manholes and Vaults

D. Samples: Submit single, factory boxed production run samples identical to equipment to be supplied, as follows. Samples will be retained for analysis and comparison purposes.

1. Receptacles
2. SPST and 3-way switches
3. Base cover plates

1.8 DOCUMENTATION:

A. Construction Record Drawings: The Electrical Contractor shall furnish to the Engineer, in accordance with the GENERAL REQUIREMENTS, a complete set of "as constructed" drawings which clearly indicate all deviations from the basic contract drawings, including exact dimensioned locations and depths for all stubbed conduits, location and size of spare conduits and conductors, all new and uncovered existing work outside the buildings, power feeder runs, and communications "primary" conduit runs. Corrections and changes shall be kept up-to-date at all times.

B. All submittals and shop drawings shall be resubmitted with record drawings showing all revisions and changes made, clearly marked with field termination wire so as to reflect actual construction record conditions. Revision and changes will be enumerated and new dates of drawings shown. Grouped submittals shall be combined into loose leaf binders.

C. Structural Conditions:

1. Location as indicated on the drawings show the arrangements desired for the principal apparatus, fixtures, etc., and shall be followed as closely as possible. Proper judgment shall be exercised in carrying on the work to secure a neat arrangement of the electrical systems and to overcome local difficulties and interferences of structural conditions wherever encountered.
2. Notching and boring of structural members must be held to an absolute minimum. Electrical Contractor shall lay out his work and obtain the approval of the Owner's Representative for necessary holes and notches before proceeding with the work. Where notches and holes are approved, they shall be carefully held to the minimum sizes actually required.

D. Cutting and Patching: The Electrical Contractor shall be responsible for the cutting and patching of rough or finish work required by his installation. Patching shall be of the same material, finish and workmanship as the original work, and when required by the Owner's Representative, done by mechanics of the original trade.

1.9 SEISMIC RESTRAINT AND ANCHORAGE:

A. Provide complete seismic anchorage and bracing for the lateral and vertical support of conduit and electrical equipment in accordance with latest edition CBC, Chapter 16 and Table 16A-O, and all provisions of this Section.

B. Submit calculations prepared and signed by a Structural Engineer licensed in the State of California, showing compliance with the above for all electrical equipment weighing more than 50 pounds, excepting items corresponding exactly in configuration and weight to those specified and detailed. Where anchorage details are not shown on drawings, the field installation shall be subject to the approval of the Architect and Electrical Engineer.

- C. All equipment mounted on concrete shall be secured with steel stud expansion anchors requiring a drilled hole. Power driven anchors are not acceptable. Minimum spacing shall be ten (10) diameters center to center and five (5) diameters center to edge of concrete. Maximum allowable stresses for tension and shear shall be 80% of the ICBO test report values. Hilti, Phillips.

1.10 EXISTING SUB-SURFACE STRUCTURES

The Electrical Contractor shall examine all record drawings made available by the Owner to locate existing underground systems, utilities, conduits, and pipes prior to installing the electrical distribution system. The Electrical Contractor shall also examine the site for possible locations of sprinkler pipes. Any damage done to the existing systems during the course of the electrical work, whose locations could be reasonably determined, shall be repaired to the satisfaction of the Owner and the utility or agency involved, at the expense of the Electrical Contractor.

1.11 PORTABLE OR DETACHABLE PARTS:

The Electrical Contractor shall retain in his possession and shall be responsible for, all portable and detachable parts or portions of the installation, such as fuses, keys, locks, adapters, locking clips, and inserts, until final completion of his work. These parts shall be itemized and delivered to the Owner at Project Closeout.

1.12 OPERATION AND SERVICE MANUALS:

- A. The Electrical Contractor shall prepare manuals describing the operations, service, and maintenance requirements of, and complete parts lists for all electrical equipment.
- B. Equipment: Equipment described in the manual shall include all equipment listed under "Submittals", and all other auxiliary miscellaneous systems.
- C. Information contained in the manual shall consist of 8½" x 11" size catalog data on each item, together with parts lists, description of operation, maintenance information, shop drawings, wiring and riser diagrams, and test reports as installed. Catalogs and data in the manuals shall be neat, clean copies. Drawing shall be accordion folded to letter size and installed in an envelope within the manual. An index shall be provided, which shall list all contents in an orderly manner with the respective equipment supplier's name, address and telephone number, and the manufacturer's recommended servicing instructions. Diagrams shall be complete for each system installed. Provide divider sheets with identifying tabs between each category.

1.13 INDEPENDENT TESTING AND CERTIFICATION:

- A. General: The Electrical Contractor shall provide the services of an independent testing and certification company acceptable to the Owner to inspect, test, and certify the electrical equipment and installation as indicated by Division 26 Specification Sections and as generally summarized as follows.
1. The testing firm shall provide all material, equipment, labor, and technical supervision to perform such tests and certifications.
 2. It is the purpose of these tests to assure that all tested electrical equipment is operational and within industry and manufacturer's tolerances and is installed in accordance with design specifications.
 3. The tests and shall determine suitability for energization.
- B. Qualifications of Testing Firm:

1. The testing firm shall be a corporately-and financially independent testing organization that can function as an unbiased testing authority, professionally independent of the manufacturers, suppliers, and installers of equipment or systems evaluated by the testing firm.
 2. The testing firm shall be regularly engaged in testing of electrical equipment devices, installations, and systems.
 3. The testing firm shall meet OSHA criteria for accreditation of testing laboratories, or be a Full Member Company of the International Electrical Testing Association (NETA).
 4. The lead, on-site, technical person shall be currently certified by the International Electrical Testing Association (NETA) or National Institute for Certification in Engineering Technologies (NICET) in electrical power distribution system testing.
 5. The testing firm shall utilize engineers and technicians who are regularly employed by the firm for testing services.
 6. The terms used here within, such as Testing Company, shall be construed to mean the testing firm.
- C. Methods: Testing methods and equipment utilized by the Testing Firm shall be in accordance with applicable sections of the NETA "Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems".
- D. Testing shall be performed and certification approved before energy is applied to items tested.
- E. All test equipment will be noted with factory calibration certification and date.
- F. Any item dismounted or reconnected by the Electrical Contractor after test and certification will be retested and recertified before energy is applied.
- G. Any items not meeting the Manufacturer's tolerances or performance criteria shall be corrected by the Electrical Contractor and retested and recertified before energy is applied.
- H. Tests and certification report shall be submitted in accordance with the applicable sections of these specifications. Tests shall be presented in an organized binder with subheadings for all line ups and tests performed with results therein.
- I. Items not passing Manufacturer's recommended tolerances will be enumerated on a separate set of sheets before each section.
- J. Coordination: The Electrical Contractor shall notify Architect or Engineer of testing schedule a minimum of one (1) week in advance of performance of any test.
- K. Testing Firm Test and Certification Summary:
1. Main Switchboards
 2. Solid State Circuit Breakers
 3. Ground Fault Protected (GFI) circuit breakers
 4. Isolation Panelboards
- 1.14 PENETRATIONS:
- A. Fire Rated Surfaces: Conduits or cables passing through fire rated walls, floors, ceilings, partitions, etc., of greater than one (1) hour construction shall be sleeved. Conduits shall be centered in the sleeve and the annular space around the conduit or cable shall be sealed with

fire rated materials in accordance with California State Fire Marshal requirement and approvals and as called for in the specifications.

- B. Concrete and Masonry: All conduits passing through concrete or unit masonry walls, floors, or foundations shall be sleeved to allow seismic movement of the building structure without overstressing of the conduit and its connections.

1.15 PRELIMINARY OPERATION:

The Owner reserves the right to operate portions of the electrical system on a preliminary basis without voiding the guarantee or relieving the Electrical Contractor of his responsibilities.

1.16 GUARANTEES:

All material furnished and installed under this Contract shall be new and free from all defects and shall be guaranteed for a minimum period of one (1) year from date of acceptance of the work. Should any trouble develop during this period, due to defective material or faulty workmanship, this Electrical Contractor shall furnish all necessary materials and labor to correct the trouble without any cost to the Owner. Any defective material or inferior workmanship noticed at the time of installation shall be corrected immediately to the entire satisfaction of the Owner or his representative.

1.17 DEMOLITION:

- A. Demolition: The Electrical Contractor shall modify or remove the existing electrical installation as required by the building alterations within the area of alteration work. All removed material not to be reused or retained by the Owner shall become the property of the Electrical Contractor and shall be removed from the site. Electrical Contractor shall be responsible for de-energizing electrical circuits in demolition area so as to ensure safe working conditions.

In walls, and ceilings to be removed, do circuit check to determine if areas beyond work will be affected and provide temporary feeds to them; disconnect and remove all electrical devices, fixtures and other devices. Cut off and seal all unused floor penetrations for existing wire not utilized. Remove conduit in exposed location. Abandon in place unused conduit in concealed locations after removing wire.

B. Continuity of Service:

1. The Electrical Contractor shall permanently reroute or relocate existing wiring and/or equipment which is required, while maintaining existing systems in use.
2. Utility Work Approval: The Electrical Contractor shall give required notice and obtain approval from the utility company prior to commencing work.
3. Service outages shall be kept to an absolute minimum. There shall not be any interruption of power to any building or portion of a building that is not agreed upon by the Owner and Engineer in writing. Any outages shall occur only at times convenient to the Owner, predominately between the hours of midnight and 6:00 a.m. The Electrical Contractor's necessary work associated with outages shall commence upon de-energization and shall continue uninterrupted until normal power is restored. Electrical Contractor shall maintain optimal crew size to keep outage time to a minimum.
4. Premium Pay: Any overtime work required to comply with the above paragraph shall be included as part of this contract. No additional payments will be authorized for work performed on weekends, holidays or other than normal working hours, as required to schedule outages at Owner's convenience.

1
2

END OF SECTION 26 10 00

SECTION 26 11 00 - ELECTRICAL RELATED WORK

PART 1 GENERAL

1.1 SCOPE:

- A. Provide all related work required for installation of electrical systems.
- B. Types of electrical related work specified in this section include the following:
 - 1. Excavating for Electrical Work:
 - Underground electrical wiring and service tunnels.
 - Independent (isolated) foundations.
 - Underground electrical vaults.
 - 2. Concrete for Electrical Work:
 - Equipment and pole fixture bases, conduit caps.
 - Lean concrete backfill to support electrical work.
 - Encasement of electrical work.
 - Underground structural concrete to accommodate electrical work.
 - Vaults for electrical work.
 - Electrical equipment foundations and mounting pads.
 - Rough grouting in and around electrical work.
 - Patching concrete which has been cut to accommodate electrical work.

1.2 PROJECT CONDITIONS:

- A. Existing Utilities: Locate and protect existing utilities and other underground work in manner which will ensure that no damage or service interruption will result from excavating and backfilling.
- B. Protect property from damages which might result from excavating and backfilling.
- C. Protect persons from injury at excavations by barricades, warnings, and illumination.
- D. Coordinate excavations with weather conditions to minimize possibility of washouts, settlements and other damages and hazards.
- E. Keep the work site clean and free from rubbish and debris. The Electrical Contractor shall also abate dust nuisance by cleaning, sweeping, and sprinkling with water, or other means as necessary.
- F. Materials and equipment shall be removed from the site as soon as they are no longer necessary; and, upon completion of the work and before final inspection, the entire work site shall be cleared of equipment, unused materials, and rubbish so as to present a satisfactory clean and neat appearance. All cleanup, dust control, and project site maintenance costs shall be included in the Electrical Contractor's bid.

1.3 PROTECTION AND RESTORATION OF EXISTING IMPROVEMENTS:

- A. Unless otherwise provided, the Electrical Contractor shall repair or replace all existing improvements (e.g., curbs, sidewalks, driveways, fences, signs, utilities, street surfaces, structures, etc.) damages or removed as a result of his operations. Repairs and replacements shall be at least equal to existing improvements and shall match them in finish and dimension.

- 1 B. Trees, lawns and shrubbery not designed for removal shall be protected from damage or injury.
2 If damaged or removed because of the Electrical Contractor's operations, they shall be restored
3 or replaced in as nearly the original condition and location as is reasonably possible. Lawns
4 shall be reseeded and covered with suitable mulch.

5
6 PART 2 PRODUCTS

7
8 2.1 BACKFILL ELECTRICAL WORK:

- 9
10 A. Bottom of Trench to 6" above Conduit Material: Well graded sand.
11
12 B. Backfill Material: Sandy or silty loam, free of lumps, laid in 6" layers, uniformly mixed to proper
13 moisture and compacted to required density.

14
15 2.2 CONCRETE WORK:

- 16
17 A. Equipment Bases: 2500 psi concrete and reinforcing in accordance with Division 03 concrete.
18
19 B. Pole Fixture Bases: 3000 psi concrete and reinforcing in accordance with Division 03 concrete.
20
21 C. Conduit Cap/Encasement: 2000 psi concrete slurry.

22
23 PART 3 EXECUTION

24
25 3.1 EXCAVATING FOR ELECTRICAL WORK:

- 26
27 A. General: Do not excavate for electrical work until work is ready to proceed without delay, so that
28 total elapsed time from excavation to completion of backfilling will be minimal.
29
30 B. Excavate with vertical-sided excavations to greatest extent possible, except where otherwise
31 indicated. Where necessary, provide sheeting and cross-bracing to sustain sides of
32 excavations. Remove sheeting and cross bracing during backfilling wherever such removal
33 would not endanger the work or other property. Where not removed, cut sheeting off at sufficient
34 distance below finished grade to not interfere with other work.
35
36 C. Width and Cover: Unless otherwise noted, minimum earth cover above conduit shall be 36".
37 Excavate for conduit with 6" to 9" clearance at both sides of conduit, except where otherwise
38 shown or required for proper installation of joints and fittings. Excavate for other electrical work
39 to provide minimum practical but adequate working clearances.
40
41 D. Depth for Subbase Support: Where installation of subbase material is indicated, excavate for
42 installation of subbase material in depth indicated or, if not otherwise indicated, 6" below bottom
43 of work to be supported.
44
45 E. Excavate near large trees (within drip line) by hand, and protect the root system from damage or
46 dryout to greatest extent possible. Verify trench locations with Architect or Engineer prior to
47 trenching. Maintain moist condition for root system and cover exposed roots with burlap.
48
49 F. Store excavated material (temporarily) near excavation, in manner which will not interfere with or
50 damage excavation or other work. Do not store under trees (within drip line).
51
52 1. Retain excavated material which complies with requirements for backfill material.

2. Dispose of excavated material that is either in excess of quantity needed for backfilling or does not comply with requirements for backfill material. Remove unused material from project site, and dispose of in lawful manner.

3.2 DEWATERING:

Maintain dry excavations for electrical work by removing water. Project excavations from inflow of surface water. Pump minor inflow of ground water from excavations.

3.3 BACKFILLING:

A. General: Except as otherwise indicated, backfill with properly qualified backfill material.

B. Backfill with well graded sand to 6" above conduits.

C. Condition backfill material by either drying or adding water uniformly, to whatever extent may be necessary to facilitate compaction to required densities. Do not backfill with frozen soil materials.

D. Backfill simultaneously on opposite sides of electrical work, and compact simultaneously. Do not dislocate the work from installed positions.

E. Backfill excavations in 6" high courses of backfill material uniformly compacted to the following densities (% of minimum density, ASTM D 1557), using power-driven hand-operated compaction equipment. If backfill is determined to be suitable and required compaction is demonstrated by laboratory test, water compaction in 6" layers may be used, subject to review by Engineer.

Lawn/Landscaped Areas: 85%

Paved Areas, Other Than Roadways: 90%

Roadways: 95%

F. Backfill to elevations matching adjacent grades, at time of backfilling excavations for electrical work.

G. Compaction Test: Demonstrate proper compaction by testing at one-half of the trench depth. Perform three (3) tests per 100' of trench.

H. Encase all underground conduits with concrete to 6" above conduit material before backfilling. PG&E conduits shall be capped with 3" concrete and the top the capping colored red.

3.4 BORING AND CUTTING:

A. Where trench crosses concrete walks or paved areas bore or saw cut and patch as required for conduit installation. Boring shall be by screw auger or dry ramming. Where soil conditions warrant, (water boring may be allowed on a case by case basis upon approval of the Engineer). No water jetting shall be allowed.

B. Bore and saw cut as indicated on the plans, or where not indicated; bore under concrete, paved, tiled or permanent surface 20'-0" wide or less. Saw cut permanent surfaces wider than 20'-0" with Engineer's approval.

C. Depth of saw cutting shall be no greater than ¼" below slab thickness.

3.5 PERFORMANCE AND MAINTENANCE, EXCAVATION WORK:

1 A. Subsidence: Where subsidence is measurable or observable at electrical work excavations
2 during general project warranty period, remove surface (pavement, lawn, or other finish), add
3 backfill material, compact, and replace surface treatment.

4
5 B. Restore appearance, quality and condition of the surface or finish to match adjacent work, and
6 eliminate evidence of restoration to greatest extent possible.

7
8 3.6 INSTALLATION OF CONCRETE WORK:
9

10 A. Install concrete for electrical work in accordance with Division 03 and the drawings.

11 B. Exposed fixture bases and enclosures shall be Architectural Grade Concrete in accordance with
12 Division 03.
13
14

15
16 END OF SECTION 26 11 10

SECTION 26 20 00 - BASIC MATERIALS AND METHODS

PART 1 GENERAL

1.1 SCOPE:

Furnish and install material and equipment as indicated on drawings and as specified.

1.2 MATERIALS AND EQUIPMENT:

Shall be new and of the best quality used for the purpose in good commercial practice.

1.3 UL APPROVAL:

All material and equipment within the scope of the UL reexamination service shall be approved by the Underwriters Laboratories for the purpose for which they are used and shall bear their label.

1.4 STORAGE:

All material and equipment shall be stored in a manner to prevent damage or corrosion. Equipment with components which can be damaged by moisture shall be placed in special heated storage facilities.

1.5 DRAWINGS:

Drawings for all equipment are intended to be diagrammatic only. Any location not actually dimensioned is not to be considered as necessarily final or accurate. Exact locations must be determined in the field from the requirements of the equipment that is to be installed.

1.6 COORDINATION:

Before rough-in of any utility lines, services, and feeders, or of any equipment, the Electrical Contractor must coordinate his work with that of other crafts and trades so that these services shall be installed in their proper locations and without interference to the equipment or building structure. This will require cooperation among all crafts and trades, the Inspector, and General Contractor, along with study of shop drawings and the building plans.

1.7 ELECTRICAL WORK EXPOSED TO WEATHER:

A. All electrical devices and equipment installed in exposed locations shall be protected by suitable NEMA type 3R enclosures, cast steel boxes with gasketed steel covers, or other Engineer approved methods.

B. All ferrous metal portions of electrical work exposed to weather including conduits, clamps, supports, etc. shall be hot-dipped galvanized.

1.8 SUBMITTALS:

A. Product Data: Submit manufacturer's data including specifications, installation instructions, and general recommendations for each item submitted under submittals, Section 26100, Paragraph 1.7. Submit calculations in accordance with Paragraph 1.9.

PART 2 PRODUCTS

2.1 CONDUIT MATERIALS AND COMPONENTS:

- A. Rigid Metal Conduit-Type RMC: All locations as follows excepting those specifically indicated for EMT and PVC. All exterior locations above grade, in concrete walls and slabs, or elsewhere shown on plans. Runs within, passing through or above hazardous areas shall be rigid. RMC shall be new galvanized threaded, conforming to UL 6. All couplings and connectors shall be threaded. RMC shall be specifically used on roofs or on all surfaces of corridor and walkway coverings. Threadless fittings are not allowed.
- B. Electrical Metallic Tubing-Type EMT: Interior dry locations above ground, exposed only above 60" above floor in non-finished areas where not subject to physical abuse or damage, and exterior walls and underside of eaves above 96" above grade. EMT shall be new galvanized, conforming to UL 797, furnished in 10 foot lengths. In interior locations, EMT shall be coupled with steel setscrew type connectors. In exterior locations and mechanical rooms EMT shall be coupled with steel compression type couplings requiring the tightening of a nut in all locations. Crimp type or die cast connectors are not acceptable. Connectors to have nylon insulated throats.
- C. Flexible Metal Conduit-Type FMC: Connections from junction boxes to lay-in fluorescent fixtures in accessible ceilings only, 6' maximum. FMC shall be flexible interlocking single strip zinc coated steel with an insulated copper ground wire pulled with the conductors, conforming to UL 1. Aluminum FMC shall not be used. Minimum size ½". Fittings shall be steel clamp type utilizing two (2) screws, galvanized steel with nylon insulated throat type.
- D. Liquidtight Flexible Metal Conduit-Type LFMC: Connections to machinery and equipment only. LFMC shall be flexible interlocking single strip steel conduit with liquid tight exterior cover, with all connections made using galvanized steel liquid tight connectors with "O" ring gaskets and nylon insulated throat and with copper ground wire, American Brass Sealtight or equivalent, conforming to UL 1. LFMC maximum length allowed is 36". LFMC is not to be used for connection to permanently fixed equipment.
- E. Rigid Polyvinyl chloride Conduit-Type PVC.: Underground locations and below vapor barrier of slabs. No PVC shall be installed in slab floors or in exposed locations. PVC conduit shall be schedule 40, Underwriters' Laboratories tested, furnished in 10' lengths, conforming to UL 651-77.
- F. Surface Metal Raceway: Type and locations as noted on the drawings. Provide concealed connections. Paint to match adjacent surface unless noted otherwise.

2.2 OUTLET AND SWITCH BOXES:

- A. Boxes shall be one piece die formed galvanized steel of shape and with fittings necessary to suit location and use. Boxes shall be of sufficient size to contain all wires, devices, and connection fittings required without crowding, minimum 2 gang for receptacles. Ceiling and surface mounted boxes shall be minimum 4" square by 1½" or octagonal. Plaster rings shall be provided where required. Boxes shall be used wherever possible. Where voltages are mixed in the same box (120V/277V), install welded partition barriers to separate the systems.
- B. Exposed boxes shall be cast steel provided with steel gasketed weatherproof covers and utilize only cast metal threaded hub type fittings.

2.3 WIRING DEVICES:

A. Wall Switches:

1. 120/277 Volt Switches: Quiet slow make, slow break design, toggle handle, with totally enclosed case, rated 20 ampere, heavy duty specification grade conforming to Federal Specification WS896. Provide matching two pole, 3-way, 4-way, and key switches as required. Hubbell or ArrowHart 1221 series.
2. Switch and Pilot Light: Push action type with red handle, integral long-life neon pilot light, rated at 15 ampere, 120 volts.
3. Color: Normal Lighting Circuits; provide ivory, gray, white, and brown colored switches dependent upon room wall finish; as directed by Architect. Emergency power circuits; provide red colored switches.
4. Thermal switches where designated on plans or in specifications shall be equivalent to Square D, Type "F", Class 2510. Thermal switch heater elements shall be rated for overload protection of loads controlled. Switches for special purposes, such as exhaust fans, boiler control, heaters, etc., shall be engraved with 1/8" high letters on plates. Adhesive labels are not acceptable.

B. Receptacles:

1. Duplex Receptacles: Full gang size, polarized duplex, parallel blade, U-grounding slot, specification grade conforming to Federal Specification WC596, rated at 20 amperes, 125 volts, designed for split feed service. Hubbell or ArrowHart 5352 series or equal.
2. Duplex Receptacle - Ground Fault Interrupting: Hubbell or ArrowHart #GF-5362 series or equal. Ground fault interrupting receptacles shall be required within six (6) feet of all sinks and in exterior locations.
3. Nameplates: Provide engraved or embossed plastic for receptacles other than standard duplex receptacles, indicating voltage, phase and amperes.
4. Color: Normal Power Circuits; Provide ivory, gray, white, and brown colored receptacles dependent upon room wall finish; as directed by Architect. Emergency Power Circuits, provide red colored receptacles.

2.4 WALL PLATES:

- A. Provide plate for each wiring device, or as required to protect or cover-up existing conditions left exposed due to the removal of existing devices, conduits, or equipment.
- B. Interior Flush: All locations unless noted otherwise, stainless steel (0.35") satin finish, Sierra "S" series.
- C. Weatherproof Plates: Steel, gasketed, for receptacles, provide spring loaded gasketed doors. Provide at all weatherproof locations.
- D. Where two gang boxes are required for single gang devices, provide special plates with device opening in one gang and second gang blank.
- E. Receptacle Plates: Each receptacle plate shall be identified with the panel number and the circuit number. This identification shall be with engraved phenolic labels applied to plate with permanent contact cement. Labels shall be 5/16" high, gray phenolic plastic, with 1/8" high white engraved lettering. Special receptacles shall also indicate voltage, phase, and amps.
- F. Multi-Gang Switch Plates: Where three or more switches occur at a common location, provide engraved labeling, 1/4" high (black), on the switch plate(s) indicating areas or fixtures served by each switch. Submit schedule to Engineer for approval.

G. Blank bushed or special outlet plates shall be provided for all signal systems outlets as required.

2.5 FLOOR BOXES:

A. Floor Boxes: Concrete tight fully adjustable type with round brass faceplate, deep fill type. Walker 886 series, Hubbell or Steel City equivalent.

B. Receptacle Floor Fitting: Brass, duplex flap Walker 895 series or equivalent.

C. Telephone Floor Fitting: Brass round opening, combination 2¼" x 1", Walker 866 CK-1 series or equivalent.

2.6 WIRE:

A. Low Voltage - (Under 600 Volt):

1. Feeder and Branch Circuit Wire: Copper type THWN/THHN, 600 volt, from new fresh stock, bearing UL label, delivered to site in unbroken packages; minimum size 12 AWG. All 20/1 home runs over 180 feet from panel for 277 volt circuits, and 100 feet from panel for 120 volt shall be increased to next larger size. All conductors shall be stranded copper. All control, signal, and communication wires shall be stranded. Fire alarm wire shall be solid.
2. High Temperature Wire: NEMA type AF or SFF-2 stranded, for fixture wires and circuit runs within fixtures.

2.7 TERMINAL CABINETS:

A. Telephone and Signal System Cabinets:

1. Telephone and signal system cabinets for collection of individual device or outlet homeruns, or mounting of equipment shall be 24" wide x 36" high x 6" deep unless otherwise noted. Cabinets shall be provided with ¾" fire treated plywood backboard "Dricon", conforming with CBC Section 207, one piece per cabinet, sized to maximum dimension of cabinet.
2. Cabinets shall be provided with vertical barriers as required separate conduits of different signal systems, one partitioned area per system type; i.e. fire alarm, clock, etc.
3. Cabinets located in finished areas; classrooms, corridors, storage rooms, etc. shall be flush mounted, constructed to match lighting panelboards, with concealed flush door hinges and concealed face panel trim clamps. Provide with flush lock keyed to match panelboard locks.
4. Cabinets located in electrical rooms or electrical closets may be screw cover type with continuous hinged door, surface or flush to match adjacent panels.

PART 3 EXECUTION

3.1 INSTALLATION OF CONDUIT RACEWAYS:

A. General: Install conduits in a neat manner, concealed except as noted. Mount conduits directly to building structure with clamps or two hole straps where possible. Secure straps with cadmium plated wood screws into wood, and machine screws into metal or inserts preset in concrete. Where impractical to secure directly to structure, suspended on conduit hangers. Wherever possible, group and rack multiple conduit runs.

1. Conduit Size: All branch circuit homeruns, and conduit runs containing more than two (2) circuits shall be a minimum of ¾" diameter.

- 1
2 B. Installation and Cleaning: Install free from dents, kinks and bruises. Plug ends at time of
3 installation to prevent entry of dirt or moisture. Thoroughly clean out conduits before installing
4 conductors. Thoroughly clean all exposed conduit exteriors.
5
6 C. Provide tagged pullwire in all empty conduits. Pullwire shall be 1/4" Kevlar high strength
7 measuring tape #39243 with a minimum breaking strength of 1250 pounds. Leave 36" free
8 coiled each end. Tagging all runs shall include the source and destination locations.
9
10 D. Plastic conduit shall be installed in accordance with manufacturer's recommendations and
11 accepted trade practice. Where plastic conduit runs rise above ground in exposed locations, the
12 riser bend and riser shall be of 40 Mil PVC coated galvanized rigid metal conduit installed
13 according to rigid metal portion of this specification section.
14
15 E. All plastic, flexible, feeder and receptacle branch conduits shall carry a grounding bond wire with
16 the size as shown, or where not shown, as determined by applicable codes for the ampacity of
17 the circuit being carried.
18
19 F. Protective Coating: All metallic conduits installed in contact with earth, or in concrete in contact
20 with earth, shall be coated with a minimum 40 Mil PVC coating on all conduit lengths and fittings.
21 The coating shall correspond to ATSM D638-68, D1706, D140-64, and D746-64T specifications
22 and Federal Test Standard 141, Method 615z. Coating shall be continuous without flaws
23 showing exposed metal. Coating shall extend to the device conduit is terminated to in exposed
24 locations and 12" above grade in unexposed locations. Tape wrapped conduit is not acceptable.
25
26 G. Conduits which stub-up from or through floor slabs shall be installed so that none of the curved
27 portion of the elbow is exposed. Conduits stubbed up shall be rigid type with coupling installed
28 flush floor to permit future conduit removal. Seal unused conduit with a flush threaded pipe plug.
29
30 H. Conduit Routing: Route exposed conduits parallel or perpendicular to walls or floors. Install
31 conduits in masonry walls at time of wall construction. No conduits shall be run under heavy
32 equipment, footing or other structural elements. Where runs must cross footings, install in
33 sleeves per structural details.
34
35 I. Conduit Runs in Ceiling Areas: Conduits running above accessible ceiling shall be routed
36 parallel or perpendicular to ceiling system and structural members. All conduit runs shall be
37 coordinated to avoid conflicts with mechanical and structural systems, lighting fixtures and ceiling
38 support system. Conduits shall be installed as close to the structure above as possible to avoid
39 conflict with removal of ceiling panels. It is specifically not permitted to attach or support conduit
40 from ceiling system suspension wire. Exposed cables shall be strapped to the structure above
41 the accessible ceiling.
42
43 J. Conduits Penetrating Membranes: Where conduits penetrate wall or slab membrane moisture
44 barriers, penetration shall be sealed in accordance with the requirements of applicable sections
45 of these Specifications for "Thermal and Moisture Protection."
46
47 K. Conduits Penetrating Roof: Provide flashing and counter flashing making watertight joints where
48 conduits pass through roof or waterproofing membranes.
49
50 L. Escutcheons: Conduits penetrating wall, floors, or ceiling in exposed locations shall be installed
51 with appropriate escutcheon plates.
52

- 1 M. Separations: Coordinate with all other crafts to allow minimum of 12" running and 6" crossing
2 clearance at flues, hot water pipes, steam pipes, and heat sources. Keep electrical conduits free
3 from contact with all other piping runs of other systems or of dissimilar metals.
4
- 5 N. Concrete Encased Conduits: All conduits installed underground shall be encased with 2,000 psi
6 concrete to a minimum of 6" above the conduit. The top of concrete encasements for feeds
7 greater than 600 volts shall be colored red.
8
- 9 O. Conduits Crossing Building Joints: Conduits shall not be run in concrete slab or wall
10 construction where passing through an earthquake or expansion joint. At such condition, conduit
11 shall be run exposed or in furred ceiling space with 24" length of flexible conduit crossing joints.
12
- 13 P. Conduits Penetrating Floors and Walls: Provide grouting around raceways where penetrating
14 floor slabs, concrete or masonry walls. At fire separation walls or floors, use Engineer and
15 CSFM approved expanding type intumescent foam, to maintain the fire rating of the surface
16 penetrated.
17
- 18 Q. Conduit Support: Support of conduit and tubing in steel stud walls shall be by #18 gauge steel
19 wire, secured to steel bars or straps attached to steel studs. Conduits rising vertically between
20 wall studs shall be tied to a horizontal cross support attached tightly to eliminate any movement.
21
- 22 R. Conduits Installed Below Floor Slabs: Conduits 1" diameter and smaller may be installed below
23 concrete slab vapor barriers or sand fill by shallow scraping and recovering with earth as
24 required to bury just below surface. Install to minimize disruption to engineered fill. Conduits
25 larger than 1" shall be trenched to a minimum depth of 12" below slab and backfilled and
26 compacted in accordance with Section 26110.
27
- 28 S. Conduits Installed in Area of Footings: Conduits installed in the area of footings shall be installed
29 per the applicable structural details and the electrical details for installing conduits in the vicinity
30 of footings.
31
- 32 T. Conduit Hangers:
33
- 34 1. Conduit hangers spaced at 8'-0" on center maximum with one hanger adjacent to each
35 outlet box, shall be installed wherever conduit cannot be directly attached to structure.
36 Hangers shall be secured to wood structures with steel brackets and wood screws; to steel
37 structures with appropriate clamps complete with positive attachment restraining strap or
38 hook rod to prevent slippage; and to concrete structures with preset imbedded inserts or
39 machine screws with expansion shields. Preset inserts are preferred to provide a secure
40 anchorage with greatest location flexibility. Power or velocity driven type attachments will
41 not be allowed. Complete hanger installation shall provide a safety factor of five (5) based
42 upon maximum CEC allowed conduit fill.
 - 43 2. Hangers for rigid conduit and EMT 2" and smaller in concealed spaces shall be galvanized
44 perforated type strap wrapped around raceway and bolted; then fastened to structure as
45 described above.
 - 46 3. Hangers for exposed conduit and tubing suspended below ceilings shall be steel rods ¼"
47 size for up to 2" and 3/8" for larger size conduits, with adjustable pipe ring; Steel City #C-
48 149, Fee and Mason #199 or #201, or approved equivalent.
 - 49 4. Trapeze type supports shall be used where conduits are run grouped together. Such
50 hangers shall consist of 3/8" minimum steel rods, structural steel channels, and clamps of
51 Kindorf, Unistrut, or approved equivalent manufacture.
 - 52 5. Electrical Contractor shall furnish concrete inserts to General Contractor, and coordinate
53 location.
54

3.2 INSTALLATION OF JUNCTION BOXES AND INTERIOR PULL BOXES:

Locate pull boxes and junction boxes above removable ceilings or in electrical rooms, utility rooms, or storage areas. No junction box shall be installed in an inaccessible area. Exposed boxes shall be cast with gasketed weatherproof covers.

3.3 INSTALLATION OF EXTERIOR PULL BOXES AND MANHOLES:

- A. Where pull boxes are used without bottoms, they shall be set on ¾" crushed rock of a volume equal to that of the pull box used.
- B. Where pre-cast units are used, all joints are to be tongue and groove, sealed with a suitable sealer.
- C. Where conduits enter, they shall be properly bushed and extended a minimum ½" from inside of wall into pull box.
- D. All conduits entering pull boxes and manholes shall be sealed watertight with suitable duct sealing compound.

3.4 INSTALLATION OF OUTLET AND SWITCH BOXES:

- A. Mounting: Mount outlet boxes flush in finished areas other than mechanical rooms, electrical rooms, and above removable ceilings. Boxes shall be set true and flush with all necessary and correct adapters and/or plaster rings. All boxes set deeper than code allowable shall be corrected by use of factory made extension rings such as Raco #976 or equivalent. Boxes in wood construction shall be mounted to support with wood screws.
- B. Device Locations: Locations of devices on plans are approximate only. Electrical Contractor shall study the architectural and structural plans and locate the outlets so that his work is coordinated with the work of others and the fixtures and devices present a pleasing and symmetrical appearance when installed. The location of outlets centered on any architectural feature shall be exact. Outlet locations may be moved a maximum of ten (10) feet from the location shown on the plans before roughing-in without cost to Owner. Switches in relation to door swings and cabinets must be coordinated with architectural drawings. This Electrical Contractor shall coordinate with Mechanical Contractor regarding thermostat outlets and other equipment locations.
- C. Device Height: The following dimensions for locating wall outlets represent the distance from the finished floor to the center of the outlet, unless noted otherwise.

OUTLET	INCHES
Telephone	15
Convenience receptacle	15
Lighting switch	48
Clock outlet	84
Wall mount telephone	54

Adjust outlet mounting height to agree with required location for equipment served.

- D. Boxes Located in Stud Walls: Securely mount with screws to studs or blocking so that box face is straight and true with finish wall alignment. Install backing to align box where studs are twisted

or crooked, and as required to meet dimensioned or detailed device spacings. Blocking material shall be same as wall studs and shall be attached to two adjacent studs.

E. Boxes in Counterbacks or Casework: Install in accordance with architectural details. Where not indicated in details, the Architect or Engineer shall be consulted prior to installation.

F. Boxes Above Accessible Suspended Ceilings: Mount to horizontal trapeze hangers, secured to rod attached to structure above. It is specifically not permitted to attach or support boxes from ceiling system suspension wire. Conduit and boxes shall be located a minimum of 12" above ceiling where suspended depth permits. Conduit and boxes shall not be installed prior to ceiling unless system is attached or braced to structure as to prevent horizontal movement of conduit.

G. Boxes Located in Masonry Walls: Coordinate cutting of masonry walls to achieve neat openings for boxes. Use rotary cutting equipment to cut masonry work for installation. Where furring occurs, install extension rings to bring box flush to furred surface. Where masonry is the finished surface, locate boxes uniformly for each height at either the top or bottom of a block course and install so that device plate will fit tight to block wall without extending over mortar joints.

H. Outlets in Acoustical Tile Ceilings: Locate either centered on the joint between tiles, or in the center of a tile. All such outlet locations shall be carefully planned and verified with the Architect or Engineer.

I. Exterior Wall Outlets: Conduits shall enter boxes or exterior wall mounted devices at the sides or top only. No conduit shall enter the bottom of such boxes.

J. Common Boxes and Alignment: Devices shown adjacent to each other at the same mounting location shall be gang under a common plate, except for outlets of different voltages such as telephone and duplex receptacles. Outlets mounted one over the other, or side by side, shall be in exact alignment, centered on one another.

K. Sound Control: Boxes and conduit shall be installed in a manner that minimizes sound transmission between rooms. Boxes mounted in a common wall shall be offset horizontally a minimum of 12" and mounted in different stud spaces wherever possible. No boxes shall be mounted back to back. No through boxes shall be used. Offset boxes may be connected with flexible conduit not to exceed 18" length.

L. Sealing: All unused holes or openings in boxes shall be slugged or sealed by an acceptable means.

3.5 INSTALLATION OF WIRING DEVICES:

A. Devices shall be securely fastened to outlet box with face flush with plate.

B. Mount receptacles vertically in appropriate boxes with grounding pin towards floor, except where noted for horizontal installation.

3.6 INSTALLATION OF WALL PLATES:

Install coverplates on wiring devices. Plates shall be set plumb and flush with finish wall surface. Plates located adjacent to one another shall be exactly the same height.

3.7 INSTALLATION OF WIRE:

- 1 A. Scope: Provide all wiring for complete electrical work, installed in code conforming raceway.
2 Branch circuit wiring shall be #12 AWG minimum, unless noted otherwise.
3
4 B. Home Runs: Branch circuit conductors shall home run to panelboards or motor control centers
5 in groupings shown on the drawings. Combining branch circuit home run conductors in single
6 conduits other than that shown shall not be permitted.
7
8 C. Color Coding shall be strictly adhered to and shall be as indicated in Section 26210
9 ELECTRICAL IDENTIFICATION:
10
11 1. Color coding utilized shall be noted on electrical "as constructed" drawings and shop
12 drawings.
13 2. The color coding for control circuit wires will be as noted on the plans or as agreed upon
14 with the Architect or Electrical Engineer and will be of a color other than that designated for
15 the phase wires. Where control wires are installed and various colors are used, they shall
16 be noted on them "as constructed" drawings and shop drawings turned in at the completion
17 of the job.
18
19 D. Pulling: Use approved wire pulling lubricant for pulling #4 AWG and larger wire. Oil or grease is
20 prohibited as a conductor pulling lubricant. All conductors #8 and smaller shall only be pulled by
21 hand. Pulling lubricant for conductors over 600 volt shall be approved by the conductor
22 manufacturer and the Architect or Electrical Engineer.
23
24 E. Splices & Terminations: Join the conductors securely, both mechanically and electrically using
25 crimp, compression, or Scotch Lok type connectors, except that screw-on type connectors shall
26 not be used for conductors larger than #6 AWG. Splices and terminations of conductors larger
27 than #10 AWG shall be made using an oxide inhibitor (NoAlox or equal). The splice area shall
28 be taped to provide equal or greater insulation than the original. Tape run-back over the original
29 insulation shall extend 3 to 5 overall diameters of the insulated conductor. Type of connectors
30 used shall be submitted to the Engineer for approval.
31
32 No splices in conductors over 600 volt or feeders over #6 AWG permitted.
33
34 F. Splice only in accessible junction or outlet boxes.
35
36 G. Wiring in panelboards, switchboards, cabinets, and junction boxes shall be neatly installed.
37 Wiring shall be grouped, laced or clipped, and fanned out to wiring terminals.
38
39 H. Identification and Markings: Provide identification and markings as indicated in Section 26210
40 ELECTRICAL IDENTIFICATION.
41
42 I. Cable Testing:
43
44 1. All wires under 600 volt potential, #6 or larger shall be tested as follows:
45 a. Continuity test to insure proper cable connection.
46 b. Insulation resistance test on each conductor with respect to ground and adjacent
47 conductors. Applied potential shall be 1000 Volts dc for 1 minute.
48 c. Readings shall be recorded and handed in with the record drawings at the
49 completion of the project.
50 2. Test Values: Minimum insulation resistance values shall be not less than 5 megohms.
51
52 3.8 INSTALLATION OF TERMINAL CABINETS
53
54 A. Install cabinets flush, straight and true, with top aligned with any adjacent panelboards.

- 1
2 B. Terminate conduits in cabinet with lock nut and bushing or lock nut and grounding bushing.
3 Conduits shall be located in front of plywood backboard, minimum 1" from rear of terminal
4 cabinet (measured from edge of conduit).
5
6 C. Install a minimum of two (2) ¾" and two (2) 1" conduits from each cabinet stubbed to accessible
7 attic or ceiling space for future connections.
8
9 D. Terminate wiring on terminal blocks or strips. All wiring shall be neatly cabled or fanned. Label
10 conductors and cables, including spares with plastic Panduit MP series labels, and
11 corresponding location on terminal or punch block with permanent black marker.
12
13 E. Identify all conduits terminating in terminal cabinets, new and existing, with waterproof
14 permanent black marker on conduit surfaces close to terminal cabinet; or inside terminal cabinet
15 adjacent to conduits. Electrical Contractor shall furnish a supplemental diagrammatic layout of
16 conduits inside each terminal cabinet at Project Closeout.
17
18
19

END OF SECTION 26 20 00

SECTION 26 21 00 - ELECTRICAL IDENTIFICATION

PART 1 GENERAL

1.1 SCOPE:

- A. Furnish and install identification of electrical materials, equipment, and installations, including but not limited to the following:

Buried electrical line warnings
Identification labeling for raceways, cables, and conductors.
Warning and caution signs.
Equipment labels and signs.

- B. Refer to other Division 26 sections for additional specific electrical identification associated with specific items.

1.2 SUBMITTALS:

- A. Product Data: Submit manufacturer's data for each type of product specified.

PART 2 PRODUCTS

2.1 GENERAL:

- A. Underground Line Marking Tape: Permanent, bright colored, continuous-printed, plastic tape compounded for direct-burial service not less than 4" wide by 4 mils thick. Printed legend indicative of general type of underground line below.
- B. Wire/Cable Designation Tape Markers: Vinyl, self-adhesive, wraparound, cable/conductor markers with preprinted numbers and letter.
- C. Plastic Write-on Tags: 0.015" thick, all-nylon, accepts waterproof ink labeling, Panduit MP series or Engineer approved equivalent; 3/4" x 3 1/2" for panelboard and switchboard circuits, 3/4" x 1 3/4" for signal, communication, and fire alarm circuits.
- D. Brass or Aluminum Tags: Metal tags with stamped legend, punched for fasteners. Dimensions: 2" x 4" (19 gauge).
- E. Engraved, Plastic-Laminated Labels, Signs, and Instruction Plates: Engraving stock melamine plastic laminate, 1/16" minimum thick for signs up to 20 square inches, or 8" in length; 1/8" thick for large sizes. Engraved legend and color as indicated.
- F. Baked-Enamel Warning and Caution Signs for Interior Use: Preprinted aluminum signs, punched for fasteners, with colors, legend, and size appropriate to the location.
- G. Exterior Metal-Backed Butyrate Warning and Caution Signs: Weather-resistant, nonfading, preprinted cellulose acetate butyrate signs with 20-gage, galvanized steel backing, with colors, legend, and size appropriate to the location. Provide 3/4" grommets in corners for mounting.
- H. Fasteners for Plastic-Laminated Labels and Metal Signs: Self-tapping stainless steel screws or number 10/32 stainless steel machine screws with nuts and flat and lock washers.

- I. Cable Ties: Fungus-inert, self-extinguishing, one-piece, self-locking nylon cable ties, 0.18" minimum width, 50-lb minimum tensile strength, and suitable for a temperature range from minimum 50°F to 350°F. Provide ties in specified colors when used for color coding.

PART 3 EXECUTION

3.1 GENERAL:

- A. Lettering and Graphics: Coordinate names, abbreviations, colors, and other designations used in electrical identification work with corresponding designations specified or indicated. Install numbers, lettering, and colors as approved in submittals and as required by code.
- B. Install identification devices in accordance with manufacturer's written instructions and requirements of CEC.
- C. Sequence of Work: Where identification is to be applied to surfaces that require finish, install identification after completion of finish work.

3.2 CONDUIT IDENTIFICATION:

- A. High-Voltage Feeder Conduits: Identify feeder conduits (over 600v) by words "DANGER-HIGH VOLTAGE" in black letters 2" high, stenciled at 10-foot intervals over continuous painted orange background on entire surface of exposed conduits.
- B. Underground Electrical Line Identification: During trench backfilling, for exterior underground power, signal, and communications service lines, install continuous underground plastic line marker, located directly above line at 12" below finished grade. Where multiple lines installed in a common trench or concrete envelope do not exceed an overall width of 16", install a single line marker.

3.3 CONDUCTOR COLOR CODING:

- A. Color Coding: Provide color coding for secondary service, feeder, and branch circuit conductors throughout the project secondary electrical system as follows:

<u>208/120 Volts</u>	<u>Phase</u>	<u>480/277 Volts</u>
Black	A	Brown
Red	B	Orange
Blue	C	Yellow
White	Neutral	Gray
Green	Ground	Green

B. Color:

1. Use conductors with factory-applied color for wire sizes No. 10 AWG and smaller.
2. For conductors larger than No. 10 AWG, apply colored, pressure-sensitive plastic tape in half-lapped turns for a distance of six (6) inches from terminal points and in boxes where splices or taps are made. Apply the last two laps of tape with tension to prevent possible unwinding. Use 1" wide tape in colors as specified. Do not obliterate cable identification markings by taping. Tape locations may be adjusted slightly to prevent such obliteration.
3. For conductors 10 AWG and smaller being fed from sources identified as emergency, use appropriately colored conductors with black and white tracer color for all conductors of the circuit.

3.4 CIRCUIT IDENTIFICATION:

A. Conductor Labeling: Tag or label conductors as follows:

1. Future: Identify conductors indicated to be for future connection or connection under another contract with identification indicating source and circuit number.
2. Switchboards, Panelboards, MCC's, Starters and Similar Equipment: Identify incoming feed circuit at lugs with write-on tag indicating point of origination, circuit number, phase, and voltage. Identify all distribution and branch circuit wires with write-on tags indicating circuit number, destination area or equipment, and load description; i.e., "A-13 / Room #14 / North wall plugs".
3. Junction and Wiring Boxes: Identify each wire passing through or terminating in junction or wiring boxes with write-on tag indicating panel and circuit #, voltage, and phase. Phase and voltage of branch circuit wiring may be indicated by means of coded color of conductor insulation. Three circuit, four-wire branch circuit home runs may be identified by a common tag.
4. Control Circuits: All control circuits shall be marked at each control panel termination point as to their function and where they terminate. Where control wires terminate into relays or enclosures or terminal cans remote from the main point of control the incoming wires shall be identified with write-on tags as to their function and where they originate. All associated wiring integral within a control cabinet shall be marked with the printed circular wire wrapping at each end corresponding to circuiting diagrams.

B. Raceway System Labeling: Label raceway system conduits and boxes as follows:

1. The interior of all junction and pull boxes shall be marked with permanent ink marker indicating the panel and circuit numbers of the wires passing through, originating, or terminating in the box. In attic spaces, the cover shall be marked with the same information.
2. The conduits and/or raceways entering and leaving boxes shall be marked with permanent ink marker to indicate respective points of origination and destination; i.e., "Panel A" / "Room 16".
3. All junction boxes in attic spaces terminating or serving as gathering points for emergency power or lighting circuits shall have the cover and first six (6) inches of entering and leaving conduits painted red.

1
2
3

END OF SECTION 26 21 00

SECTION 26 30 00 - SERVICE, DISTRIBUTION AND GROUNDING

PART 1 GENERAL

1.1 SCOPE:

- A. Work Included: Furnishing and installation of a complete electrical service, distribution, and grounding system. Conditions of this section apply to all other 26000 series sections included.

1.2 QUALITY ASSURANCE:

- A. Codes and Regulations, Reference Standards: See Section 26100.

1.3 SUBMITTALS:

- A. Product Data: Submit manufacturer's data on service entrance equipment switchboards, motor control centers and/or individual starters, transformers, panelboards, disconnect switches and grounding components.
- B. Trip Curves: Submit trip timing curves for all circuit interrupting devices.
- C. Nameplate Schedule: Submit nameplate schedule for approval.

1.4 COMPONENT COORDINATION:

- A. In order to maintain close control and coordinate the various components of the distribution systems, the number of manufacturers shall be kept to a minimum. Equipment manufacturer shall be General Electric, Eaton, or Square D. It shall be the manufacturer's responsibility through the Electrical Contractor to coordinate all components of the system in order to ensure systems that will provide maximum protection of equipment and reliable safe operation.

1.5 NAMEPLATES:

- A. General: Engraved plastic-laminated, color coded red for 277/480 volt equipment, black for 120/208 volt equipment, with white letters. Provide for identification of each piece of electrical equipment, switchboards, transformers, panelboards, disconnects, and enclosed breakers. A schedule of nameplates shall be included with the shop drawings for approval. Nameplates shall be secured with permanent adhesive and two (2) stainless steel self-tapping screws.
- B. Each piece of electrical equipment shall be provided with a 2" x 3½" nameplate on the front of the door or on the trim, indicating designation, voltage, and distribution panel and circuit feeding the panel.
- C. Switchboards, distribution panelboards, and all starters and disconnects shall have sub feeders and main breakers marked with 1" x 3" nameplates indicating load served.
- D. All weatherproof disconnects shall be marked with 1" x 3" nameplates indicating voltage and the panelboard or switchboard from which it is fed from.
- E. Provide identification for emergency system boxes and enclosures by labeling the boxes and enclosures and painting the conduits entering with red paint at a length of six (6) inches.

1.6 FEEDER CONNECTIONS:

- 1 A. Provide cast saddle type bolted lugs, or hydraulically set compression lugs, for all bus
2 connections. Manufacturer shall be Thomas and Betts, Burndy, O-Z Gedney or approved
3 equivalent.

4
5 1.7 MISCELLANEOUS:

- 6
7 A. Equipment Bases: Provide appropriately sized concrete housekeeping bases for all floor-
8 mounted equipment.
9
10 B. Hoisting Lifting Lugs: Provide on all heavy equipment as required to ensure safe hoisting.
11
12 C. Space for Future Protective Device: Provide as indicated on drawings, shall be completely
13 equipped for the future addition of a circuit breaker or fused switch, including all connections.
14
15 D. Keys: All equipment enclosures shall be keyed alike.

16
17 PART 2 PRODUCTS

18
19 2.1 GROUNDING:

- 20
21 A. Clamps, bonds, etc., suitable and as necessary to provide continuous ground system.
22
23 B. Ground Rods: "Copperweld" 3/4" diameter, 10' long.
24
25 C. All grounding conductors shall be copper, sizes not less than that required under CEC
26 requirements.

27
28 2.2 MOLDED CASE CIRCUIT BREAKERS:

- 29
30 A. General: Provide factory-assembled, molded case circuit breakers of frame sizes,
31 characteristics, and ratings indicated. Circuit breakers shall be UL listed and meet NEMA
32 Standards Publication AB1. Breakers covered under this specification may be applied in
33 switchboards, panelboards, motor control centers, combination motor starters, and individual
34 enclosures. Circuit breakers shall be manufactured by General Electric, Eaton, or Square D.
35
36 B. Construction: Construct with overcenter, trip-free, toggle-type operating mechanisms with quick-
37 make, quick-break action and positive handle trip indication. Construct breakers for reverse
38 connection capability, mounting and operating in any physical position, and operating in an
39 ambient temperature of 40°C. Two and three-pole breakers shall be common trip. Provide
40 breakers with mechanical screw type removable connector lugs, AL/CU rated.
41
42 C. Operation: Automatic operation of the circuit breaker shall be obtained by means of thermal and
43 magnetic tripping devices located in each pole of the breaker. The thermal device shall provide
44 time-delay tripping on overloads, and the magnetic device shall provide instantaneous tripping
45 on short circuits. The instantaneous magnetic trip shall be adjustable and accessible from the
46 front of the breaker on frame sizes above 100 amperes.
47
48 D. Lighting and Appliance Panelboard Breakers: Bolt on construction, Square D QOB, General
49 Electric, or Eaton equivalent.
50
51 1. All single pole 15 and 20 amps shall be UL listed as "Switching Breakers" and carry the
52 SWD marking.

2. Breakers indicated as "GFI" (Ground Fault Interruptive) shall provide UL Class AC 5-milliamperere sensitivity ground fault protection integral within the breaker. Single pole GFI breakers shall take no more panel space than a conventional breaker.

E. Current Limiting Breakers: Provide breakers with current limiting capability as indicated or required to meet system short circuit requirements. Square D I-Limited, General Electric, or Eaton equivalent.

1. On high level fault currents, the circuit breaker shall limit peak current and let-thru energy and provide a voltage transient-free interruption at near unity power factor. On fault currents below the threshold of limitation, the circuit breaker shall provide conventional overload and short circuit protection.

2. The unit shall not contain replaceable elements and the limiter automatically reset after circuit interruption.

F. Series Connected Ratings: Where utilized to meet short circuit requirements, combinations for series interrupting ratings shall be recognized by Underwriters Laboratories and shall appear in the Recognized Component Directory under the "Circuit Breakers - Series Connected" product category DKS2. Current limiting circuit breakers shall allow the use of branch circuit breakers with lower interrupting capacities on systems capable of delivering fault currents up to 200,000 rms symmetrical amperes at 480V, ac and 100,000 rms symmetrical amperes at 600V, ac.

G. Solid State Trip Breakers: Main and feeder breakers indicated "SS" shall be solid state trip type with ampere setting adjustment knobs for changing current carrying capability of units, and with ground-fault protection components with external neutral current transformer (CT). Construct with current carrying components isolated from the trip unit and field installed accessories, and with integral trip unit independent of any external power source. Square D ME/NE/PE/SE, GE or Eaton equivalent.

1. Provide with Long Time, Short Time, Instantaneous, and Ground Fault Pick up and delay (LSIG) unless indicated otherwise.

H. Ground Fault Protection: All 1,000 amp or greater 480 volt and "GFI" indicated service breakers shall be furnished with ground fault protection. Protection may be provided by a zero sequence/shunt trip system or solid state breaker with integral GFI. System shall be complete with all required CTs, power supplies, etc., required.

2.3 PANELBOARDS:

A. Power and Lighting Panelboards shall be Air Circuit Breaker bolted type, UL rated for 75°C. connections, with voltage, phase, breakers, and NEMA rating as specified in panelboard schedules. Panelboards shall be installed flush or surface as indicated. Panelboards shall be installed in code gauge rust proof steel cabinets with flush doors having flush lock(s), all keyed alike, and with trim cut square and true; NEMA 3R steel cabinets with gasketed doors having 3-point vault locks, all keyed alike, and two (2) spring loaded trunk catches.

120/208 Volt Panelboards: Square D type NQOD, Eaton or General Electric equivalent.

277/480 Volt Lighting Panelboards: Square D type NEHB, Eaton, or General Electric equivalent.

B. Power Distribution Panelboards shall be Molded Case Circuit Breaker type, UL rated for 75°C connections, with voltage, phase, breakers, and NEMA rating as specified in panelboard schedules. Panelboards shall be installed flush or surface as indicated. Panelboards shall be

installed in code gauge rust proof steel cabinets with flush doors having flush lock(s), all keyed alike, and with trim cut square and true; NEMA 3R steel cabinets with gasketed doors having 3-point vault locks, all keyed alike, and two (2) spring loaded trunk catches.

277/480 Volt Power Distribution Panelboards: Square D I-Line, Eaton or General Electric equivalent.

1. Spaces indicated on panelboard schedules are a minimum. Specifically sized spaces shall be provided. When schedules do not designate space frame size, the panelboard shall be supplied with spaces for one (1) three-pole breaker of the largest frame size which can be accommodated, and two (2) three-pole breakers of the next largest frame size which can be accommodated in the scheduled panelboard.

2. All spaces shall include all required circuit breaker mounting hardware. Any breaker mounting area available after allotment to scheduled or required spaces shall be filled out with all required hardware to mount three-pole breakers up to 225 amp frame size.

C. Short Circuit Rating: Panelboard and breakers shall have short circuit rating equal to or exceeding that indicated. Rating shall be for each panelboard as a complete integrated unit, tested in accordance with UL Standard UL 67. Panelboards shall be marked with their maximum short circuit current rating.

D. All interiors shall be completely factory assembled. They shall be so designed that switching and protective devices can be replaced without disturbing adjacent units and without removing the main bus connectors, so that circuits may be changed without machining, drilling, or tapping.

E. Branch circuits shall be arranged using double row construction except when narrow column panels are indicated. A nameplate shall be provided listing panel type and ratings.

F. Unless otherwise noted, full size insulated neutral bars shall be included. Bus bar taps for panels with single pole branches shall be arranged for sequence phasing of the branch circuit devices. Neutral bussing shall have a suitable lug for each outgoing feeder requiring a neutral connection. A ground bus will be included in all panels.

G. Boxes shall be at least 20" wide unless otherwise indicated and made from galvanized steel. Provide minimum gutter space in accordance with the California Electric Code. At least four (4) interior mounting studs with adjustable nuts shall be provided.

H. Door hinges shall be concealed. All locks shall be flush, stainless steel, cylinder tumbler type locks with catches and spring loaded door pulls, keyed alike. Directory frame and card having a transparent cover shall be furnished with each door.

I. All exterior and interior steel surfaces of the trim shall be properly cleaned, primed with a rust inhibiting phosphatized coating, and finished with a gray ANSI 61 paint. Trims for flush panels shall overlap the box for at least $\frac{3}{4}$ " all around. Surface trims shall have the same width and height as the box. Trims shall be mountable by a screwdriver without the need for special tools. After installation, trim clamps shall not be accessible when the panel door is closed and locked.

J. All bus bars shall be copper, sized in accordance with UL standards to limit the temperature rise on any current carrying part to a maximum of 50°C above an ambient of 40°C maximum.

2.4 SWITCHBOARDS:

A. Manufacturers: Subject to compliance with requirements, provide switchboards of one of the following:

General Electric
Eaton
Square D

B. General: Except as otherwise indicated, provide switchboards of types, sizes, characteristics, and ratings indicated, which comply with manufacturer's standard design, materials, components, and construction in accordance with published product information.

C. Auxiliary Components: Where indicated or specified, auxiliary components such as transformers, meters, contactors, controllers, etc. shall be incorporated at the factory. Miscellaneous components such as current transformers, instrument transformers, etc. shall be included as required to form complete and functional systems, whether specifically specified or not.

D. AC Dead-Front Distribution Switchboards: Provide factory assembled, dead-front, metal enclosed, self-supporting secondary power switchboards, of types, sizes and electrical ratings and characteristics indicated; consisting of panel (vertical) units, and containing circuit breakers of quantities, ratings and types indicated. Provide copper main bus and connections to switching devices of sufficient capacity to limit rated continuous operating temperature rise to 54°F and 90°F for circuit breaker branches; with main bus and tap connections silver-surfaced and tightly bolted for maximum conductivity. Brace bus for short circuit stresses up to maximum interrupting capacity. Prime and paint switchboard with manufacturer's finish and color.

E. Enclosures: Construct dead-front switchboards, suitable for floor mounting, with front cable/wire and conduit accessibility. Provide welded steel channel framework, hinge wireway front covers to permit ready access to branch circuit breaker load side terminals. Coat enclosures with manufacturer's standard corrosive resistant finish. NEMA Type 3R construction, unless otherwise noted.

F. Short Circuit Rating: Switchboards shall have integrated short circuit rating meeting the serving Utility Company available, 42,000 AIC minimum; or as indicated on plans.

G. Service Switchboards: Switchboards to be utilized as service boards shall be constructed in accordance with serving Utility Company requirements; pull section, lugs, meter provisions, etc.

1. Provide with specific grounding provisions as indicated on plans.

H. Spaces: All switchboards shall include all required circuit breaker mounting hardware for designated frame size. Any breaker mounting area available after allotment to scheduled or required spaces shall be filled out with all required hardware to mount three-pole breakers up to 225 amp frame size.

2.5 DISCONNECTS:

A. Motor and circuit disconnects shall have an Underwriters' Laboratory label.

B. Disconnect switches shall be suitable for area where they are installed, i.e., weatherproof, and shall be rated heavy duty. Use only 600 volt class with proper number of poles. Switches shall be fused unless indicated on plans. Fuses shall be dual element time delay UL Class RK5 or of type specified on plans. Weatherproof switches shall be in a NEMA 3R/12 enclosure.

C. All fuses shall be of a type to coordinate with the equipment be protected; i.e. dual element fuses for motors and HVAC compressor motors.

- 1
2 D. When the disconnect is not clearly visible from the control location, provide it with an operating
3 handle which is lockable in the open and closed positions.
4

5 2.6 AC COMBINATION STARTERS:
6

- 7 A. General: Individual motor starters shall be circuit breaker combination magnetic starters unless
8 noted otherwise. Units shall be housed with an enclosure for the area in which starter is
9 installed. Starter size, voltage, and horsepower rating shall be determined by motor being
10 served. All starters shall be rated 600 volt.
11
12 B. Combination starter shall be manufactured in accordance with the latest NEMA Standards,
13 sizes, and horsepower ratings, and shall be UL listed. Disconnect device and starter shall be
14 mounted in one enclosure. Handle shall have provisions for padlocking in the "OFF" and "ON"
15 positions with up to three padlocks.
16
17 C. Starters: Shall be gravity dropout type with double break silver alloy contacts, molded coil, and
18 melting alloy type overload relays. Thermal units shall be one-piece interchangeable. Provide
19 with 2 N.O. and 2 N.C. contact, unless noted otherwise.
20
21 D. Accessories: Provide starters with "Hand-Off-Auto" (HOA) selector switch - and red pilot light,
22 mounted in cover; unless noted otherwise.
23
24 E. Manufacturer: Combination starters shall be Square D Class 8539, General Electric, or Eaton
25 equivalent.
26

27 PART 3 EXECUTION
28

29 3.1 INSTALLATION OF GROUNDING:
30

- 31 A. Scope: Provide grounding system complying with the codes and ordinances specified.
32 Grounding system shall provide continuity through the entire electrical system including:
33
34 1. Panelboard ground buses.
35 2. All conduit or other raceways.
36 3. All motors.
37 4. All lighting fixtures.
38 5. Grounding terminals of all receptacles.
39 6. Miscellaneous grounds required by code.
40
41 B. Equipment and raceway bonding procedures shall be rigidly maintained and meet all
42 jurisdictional requirements of codes and regulations.
43
44 C. Grounding conductors shall be terminated using a bolted crimped lug connection.
45
46 D. Good, electrically continuous, metal to metal contacts shall be made wherever possible at all
47 panel boxes, pull boxes, etc. Where it is not possible to obtain good contacts, the conduit shall
48 be bonded around the boxes with a #6 B&S gauge, rubber covered, double braided wire with
49 ground clamps.
50
51 E. A separate grounding conductor shall be run in all conduit runs from distribution, lighting, and
52 power, etc., panelboards, motor control outlets, etc., back to their respective service or
53 distribution panelboards.
54

F. Flexible Conduit Grounding: Provide a separate grounding conductor in all flexible conduit runs to include watertight flexible conduit with integral grounding straps. Install ground conductors inside conduit with ungrounded conductors. Extend from nearest panel to device being connected.

G. A separate insulated (green colored) copper grounding conductor shall be run in all branch circuit conduits.

H. Ground Rods: All new service installations shall be grounded in accordance to code requirements and per plans. Isolated transformers, including mini power zones, shall be grounded on the secondary to a ground rod.

1. Check resistance to ground at all locations (new services and transformers) and other grounded locations. If resistance exceeds 25 OHMS, install additional ground rods separated at least 6'-0" until resistance is reduced to 25 OHMS or less (CEC 250-84). Submit results to Engineer.

3.2 INSTALLATION OF PANELBOARDS:

A. Provide mounting brackets, busbar drillings, and filler pieces for unused spaces.

B. Branch circuits shall be connected as shown in line diagrams and/or panelboard schedules, with wires neatly tie wrapped in panel.

C. Branch circuit panelboards shall have a plastic covered circuit directory card on the inside of each door complete with all circuit destinations neatly typed. Provide also project name and date of installation on card.

D. The Electrical Contractor shall check and tighten all factory made wire or lug connections. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturers published torque tightening values for equipment connectors. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Standard 486A.

E. Install four (4) spare $\frac{3}{4}$ " conduits from all panelboards to accessible ceiling space.

3.3 INSTALLATION OF SWITCHBOARDS:

A. Install switchboards as indicated, in accordance with manufacturer's written instruction, and with recognized industry practices to ensure that switchboards comply with requirements of NEMA and CEC standards, and applicable portions of NECA's "Standard of Installation."

B. Prior to energization of circuitry, check all accessible connections to manufacturer's torque specifications. Subsequent to wire and cable hook-ups, energize switchboards and demonstrate functioning in accordance with requirements.

C. Testing: All G.F.I. breakers shall be tested and shown to comply with CEC Section 230-95 in accordance with International Electrical Testing Association, Inc. (NETA) standards by a NETA certified independent testing company.

D. Switchboards shall have a plastic covered circuit directory card on the inside of each door with all circuit destinations neatly typed. Provide also project name and date of installation.

3.4 INSTALLATION OF DISCONNECTS:

- 1
2 A. Install disconnects for all equipment and motors of the size required and as recommended by
3 manufacturer.
4
5 B. Fuses installed for all mechanical furnished equipment shall be sized and coordinated with
6 Mechanical Contractor for specific motor or equipment requirements.
7
8 3.5 INSTALLATION OF MOTOR STARTERS:
9
10 A. In finished areas, mount motor protection switches flush and install suitable coverplates.
11
12 B. Install heaters correlated with full load current of motors provided.
13
14 C. Set overload devices to suit motors provided.
15
16
17

END OF SECTION 26 30 00

SECTION 26 30 10 - MEDIUM VOLTAGE DISTRIBUTION

PART 1 GENERAL

1.1 SCOPE:

Wire and cable, splices, connectors, and other equipment and installation required to form a complete high voltage distribution system.

1.2 COORDINATION:

Before rough-in of any utility lines, services, and feeders, or of any equipment, the Electrical Contractor must coordinate his work with that of other crafts and trades so that these services shall be installed in their proper locations and without interference to the equipment or building structure. This will require cooperation between all crafts and trades, the inspector, and General Contractor, along with study of shop drawings and the building plans.

1.3 SUBMITTALS:

Product Data: Submit manufacturer's data including specifications, installation instruction and general recommendations for all materials and equipment to be utilized.

PART 2 PRODUCTS

2.1 WIRE AND CABLE - HIGH VOLTAGE (over 600 VOLTS):

- A. All high voltage wire is to be from new fresh stock, and of the size and type as described on the plans. It shall bear the UL label with current correct marking on the outside sheath. Use only approved pulling compound for means of easing friction.
- B. High voltage cable shall be single conductor, 25 kV, EPR, 133% insulation, concentric copper shield, PVC jacketed copper, size as indicated on plans.
- C. Perform resistance leakage test (high pot) per IPCEA standards for 25 kV, EPR, 133% shielded insulation cable.
- D. Perform a corona test and other tests on the cable in accordance with IPCEA Standards. Submit certified test results prior to installation. Seal ends of cables before shipment to prevent entrance of moisture.
- E. Cable Specifications: Cable shall be Southwire Simpull 17XT-EPR or equal power cable, 25000 volts, single conductor, shielded, 133% insulation level, AEIC CS8, MV-90, sunlight resistant.
 1. Scope: This specification describes single conductor, Southwire EPR insulated, shielded power cables for use in circuits not exceeding 25,000 volts 133% insulation level at conductor temperatures of 90°C for continuous normal operation, 130°C for emergency overload conditions and 250°C for short-circuit conditions. Cables are intended for power cable applications, in wet or dry locations, including conduit, cable tray, duct, direct burial and aerial installation.
 2. Standards: The following standards shall form a part of this specification to the extent specified herein:
 - a. AEIC CS8 for Insulated Shielded Power Cables.
 - b. ICEA S-93-639.
 - c. UL Standard 1072 for Type MV-90.

3. Conductors: Class B stranded annealed uncoated copper per the ICEA Part 2, Section 2.1 and 2.5.
4. Conductor Shielding: Conductors shall be covered with a layer of extruded conducting semi-conducting thermosetting polymeric layer over the conductor, applied in tandem with and firmly bonded to the insulation.
5. Insulation: The insulation shall be EPR meeting the requirements of the referenced standard. The nominal thickness shall be 0.280".
6. Shielding: The insulation shall be covered with an extruded layer of semi-conducting thermosetting material which shall be identified as being semi-conducting. Over this layer shall be applied a helically wrapped 5 mil copper tape with 25% overlap.
7. Jacket: The cable shall be provided with a jacket of black sunlight resistant PVC conforming to the requirements specified for polyvinyl chloride in ICEA. The average thickness shall be in accordance with Table 7-3 of ICEA.
8. Identification: All cable shall be identified by means of surface ink printing indicating manufacturer, size, insulation type, insulation thickness, voltage rating, insulation level, year of manufacturer, and UL designations.
9. Tests: Qualification tests shall be conducted in accordance with the AEIC.

2.2 TERMINATIONS:

- A. Stress Relief: Provide stress relief medium voltage cable terminations, at all connections to medium voltage switchgear, switches, and similar equipment.
- B. Components: Terminations shall be 25 kV rated, one-piece rubber, conforming to IEEE Standard 48, Class 1. Terminations shall consist of a high dielectric constant stress relief tube inside a molded silicone skirted insulator, mounted on a supported core.
- C. Manufacturer: Terminations shall be 3M Brand 5600 Series Quick Term II High K silicone rubber termination, or equivalent.

2.3 SPLICES:

- A. Splice connections to medium voltage cable shall be separable cable connecting type, 25 kV rated, Elastimold 156 Series. Provide cable termination ends, spacer modules, end caps, and all other system components to suit specific cable configurations.

PART 3 EXECUTION

3.1 CABLE PULLING:

- A. Pulling tensions shall in no case exceed maximum values recommended by cable manufacturer. Pulling tensions shall be monitored during cable pulling.
- B. Use only Polywater or Ideal brand as lubricants for cable pulling.
- C. Pull rope shall be non-abrasive and non-expansive type.
- D. Cable is not to be pulled by the conductor. Cable ends are to be kept sealed and moisture proof 100% of the time.

3.2 CABLE TERMINATIONS AND SPLICES:

- A. Cable terminations and splices shall be made by certified cable splicers with a minimum of five (5) years experience in splicing cables of this type. Materials and methods used must conform to manufacturer's recommendations.
- B. Electrical Contractor shall submit evidence prior to splicing work, that Workman making such joints, or connections, have had proper training and instruction. Workmen must hold an IBEW cable splicers card or a copy of a certificate from an approved school of high voltage terminating or splicing methods.
- C. No splices shall be permitted except at system connection point.
- D. Ground the metallic cable shield at each termination.

3.3 CABLES IN MANHOLES:

- A. Provide one complete loop of cable in manhole. Support cables with fiberglass channel with porcelain insulators. See drawings for additional details.
- B. Arc Proofing: After all tests have been performed and accepted, arc proof each cable by one half-lapped layer of 3M Scotch 77 electric arc and fireproofing tape. Secure this wrap by a final wrap of glass cloth electrical tape to prevent unravelling.

3.4 HIGH VOLTAGE CABLE HIGH POTENTIAL TEST:

- A. All high voltage cables shall be given D.C. high-potential tests after installation. All tests shall be performed in the presence of the Owner and Engineer's representatives and shall be performed to their complete satisfaction. The D.C. high-potential test of cables shall be performed after all cable terminations are made, but before connections to equipment are made. A D.C. microammeter in series with the ground connection of the high voltage transformer shall be used to read the leakage current in the cable at two minute intervals during the test.
- B. If any high voltage cable fails, or tests, in opinion of the Engineer, show unacceptable cable defects, all cables in that conduit between the nearest pulling points on each side of the failure shall be withdrawn. If, in the opinion of the Engineer, other cables that may have been installed in the same duct are not damaged, they may be re-installed, but the failed cable shall be replaced with new cable without additional charge.
- C. After replacement of the faulty cable, and any other damaged cables, all cables of the circuit in that conduit shall be retested. If cable fails again, or if tests, in the opinion of the Engineer, show unacceptable cable defects, all cables shall be replaced without charge and this procedure shall be repeated until tests prove satisfactory.

3.5 IDENTIFICATION:

- A. Identify cables as to manufacturer, year, voltage, size, temperature rating and ampere capacity. If such identification is not visible on the surface the information shall be carried on an embossed plastic tape permanently secured where the cable emerges into each and all manholes or switchgear.
- B. Tagging: Immediately after installation of HV cables in manholes, pullboxes and trenches, all cables and wires, including each leg of each termination, shall be tagged with a 3" x 3" x 1/16" minimum plastic tag. Each plastic tag shall be engraved with the following information:

Installation date, voltage, phase, number of wires, circuit number as per single line diagram, source (panel, substation, etc.) wire or cable size in AWG, type of insulation, and the item it serves (building number, street lighting, etc.). Lettering shall be black on white, not less than ¼" high block type. The tag shall be attached to cable and wire by a lock-on type nylon tie. Provide the tag with a hole to pass the nylon tie for securing to the cable. Also provide cable tags on each phase in 12 kV circuit breaker compartments and oil switches or other devices where cables are accessible. Existing cables shall be tagged in the same manner due to any change of circuitry.

3.6 FIELD QUALITY CONTROL:

- A. Prior to energization, provide independent testing company test and certification of the cable and terminations in accordance with the following NETA Acceptance Testing Specifications Sections:

1. Section 7.3-2 Medium Voltage Cables

END OF SECTION 26 30 10

SECTION 26 30 20 - PAD MOUNT TRANSFORMERS

PART 1 GENERAL

1.1 SCOPE:

Furnish and install pad mounted style, oil filled transformers on concrete pad as indicated on drawings and as specified.

1.2 SUBMITTALS:

A. Product Data: Submit manufacturer's technical product data including rated KVA, frequency, primary and secondary voltages, percent taps, polarity, impedance and certifications of transformer performance efficiency at indicated loads, percentage regulation at 100% and 80% power factor, no-load and full-load losses in watts, % impedance at 50°C, hot-spot and average temperature rise above 40°C ambient, sound level in decibels, and production line test reports in accordance with ANSI C 57.12.

B. Shop Drawings: Submit manufacturer's drawings indicating dimensions and weight loadings for transformer installations showing layout, mountings and supports, spatial relationship to associated equipment, panelboards, and transformer connection to electrical equipment.

PART 2 PRODUCTS

2.1 MANUFACTURER:

Subject to compliance with the requirements, provide transformer of one of the following:

Eaton/Cooper Electric
General Electric Company
Square D

2.2 POWER/DISTRIBUTION TRANSFORMERS:

A. General: Except as otherwise indicated, provide manufacturer's standard materials and components as indicated by published product information, designed and constructed as recommended by manufacturer, and as required for complete installation.

B. Distribution Padmount Compartmental-Type Transformer: The unit shall contain the transformer, oil fused cutouts, and separate compartments in a weather resistant, tamper resistant enclosure, arranged for padlocking. Transformer shall conform to ANSI C57.12.26. High voltage and low voltage compartments shall be isolated from each other in a manner to require a separate unlatching or unbolting action to give access to the high voltage compartment.

C. Transformer: Dead-Front, three phase, two winding, 60 Hz, 55/650°C. rise, (oil insulated) self-cooled type, KVA capacity rating per plans. The high voltage shall be 12KV as designated on plans. Basic Impulse Level shall be 96 kV. Low voltage shall be 480/277, 208/120 or as designated on plans. Impedance shall be manufacturer's standard. Transformer tank shall be sealed except for bolted handhole access. Provide lifting lugs. Provide with two 2½ FCAN and two 2½ FCBN taps with external tap changing for de-energization operation only. Locate the changer control handle within the high voltage compartment and provide position indicator and method of securing the control handle against unintentional operation.

D. Tank Construction: Liquid immersed transformer shall have a sealed tank with a welded on cover.

E. Mineral Oil: ASTM D 3487, Type II tested in accordance with ASTM D 117.

F. Transformer Accessories:

1. Drain and sampling plug
2. Ground Pads
3. Provisions for lifting and jacking
4. Top liquid dial-type thermometer without alarm contacts
5. Pressure-vacuum gauge
6. Pressure-relief valve.

G. Oil Immersed Fuses: Provide Bay-O-Net type oil immersed fuses to be externally replaceable with distribution hot stick without opening the transformer tank.

H. Undercoating: Transformer and compartment bottoms shall be undercoated with a minimum 5 mil thick coal tar epoxy rust preventative coating.

I. Enclosure:

1. Enclosure shall be a minimum 12 gauge steel and shall be completely lockable, tamperproof, and weatherproof. The entire enclosure shall be degreased, primed, and finished with baked enamel.
2. The enclosure is to be provided with lifting devices and jacking pads at each corner. These are to be so designed that they can be removed after installation to render a clean appearance.
3. Appropriate OSHA approved porcelain high voltage warning signs are to be placed on the high voltage section and on outside of the transformer.

2.2 TRANSFORMER PAD:

A. Provide concrete slab foundation 8" thick, reinforced by 6" x 6" number 6 mesh placed uniformly located 4" below the top of the slab. Slab shall be placed on a well compacted gravel subbase so that the top is 4" above grade. All edges shall have a 1/2" chamfer. Pad dimensions shall allow at least 8" of free space on all sides of equipment. Cable entrance space and locations shall be as required by the equipment to be mounted.

B. Concrete for Electrical Requirements: 3000 psi concrete with 1" maximum aggregate conforming to requirements of the Concrete Section of the specifications.

PART 3 EXECUTION

3.1 INSTALLATION OF TRANSFORMERS:

A. Install transformers as indicated, complying with manufacturer's written instructions, applicable requirements of CEC, NEMA, ANSI, and IEEE standards, and in accordance with recognized industry practices to ensure that products fulfill requirements

B. Connect transformer units to electrical wiring systems; comply with requirements of other Division 26 sections.

3.2 GROUNDING:

Provide equipment grounding connections, sufficiently tight to assure permanent and effective ground, for transformers as indicated.

3.3 TESTING:

Upon completion of installation of transformers, energize primary circuit at rated voltage and frequency from normal power source and test transformers, including, but not limited to, audible sound levels, to demonstrate capability and compliance with requirements. Where possible, correct malfunctioning units at the site, then retest to demonstrate compliance; otherwise, remove and replace with new units and proceed with retesting.

1

END OF SECTION 26 30 20

SECTION 26 31 00 - DRY TYPE TRANSFORMERS

PART 1 GENERAL

1.1 SCOPE:

Furnish and install floor, shelf, or wall mounted style, dry type transformer as indicated on drawings and as specified. All dry type transformers shall comply to 2016 energy efficiency standards for transformers.

1.2 SUBMITTALS:

A. Product Data: Submit manufacturer's technical product data including rated KVA, frequency, primary and secondary voltages, percent taps, polarity, and impedance.

B. Shop Drawings: Submit manufacturer's drawings indicating dimensions, and weight loadings for transformer installations, showing layout, mountings and supports, spatial relationship to associated equipment and panelboards, and transformer connection to electrical equipment.

PART 2 PRODUCTS

2.1 MANUFACTURER:

Subject to compliance with the requirements, provide transformer of one of the following:

Square D
General Electric
Eaton

2.2 POWER/DISTRIBUTION TRANSFORMERS:

A. General: Except as otherwise indicated, provide manufacturer's standard materials and components as indicated by published product information, designed and constructed as recommended by manufacturer and as required for complete installation.

B. Transformer: Dead front, single phase or three phase, two winding, 60 Hz., 150°C. rise, self-cooled type, KVA capacity as shown on plans. Primary shall be 480 volts delta and secondary shall be 208/120 volts wye for three phase transformers and 480 volts delta primary and 240/120 volts delta secondary for single phase transformers, or as otherwise noted on plans. Impedance shall be manufacturer's standard. The maximum temperature of the top of the enclosure shall not exceed 35°C rise above a 40°C ambient. All insulating materials used to be in accordance with NEMA ST20 or NEMA TR27 standards for a 220°C. insulating system. The core of the transformer shall be visibly grounded to the enclosure by means of a flexible grounding conductor sized in accordance with applicable NEMA, IEEE, and ANSI standards.

C. Enclosure: Transformers 25 KVA and larger shall be in a heavy gauge, sheet steel, ventilated enclosure. Provide wire fabric rodent guard over ventilated openings and designed to prevent accidental access to live parts in accordance with UL, NEMA, and California Electric Code standards for ventilated enclosures. Transformers 25 KVA through 75 KVA shall be designed so they can be either floor or wall mounted. Above 75 KVA they shall be floor mounted.

D. Sound: Sound levels shall be guaranteed by the manufacturer not to exceed the following:

15 - 50 KVA 45 dB

51 - 150 KVA 50 dB
151 - 300 KVA 55 dB
301 - 500 KVA 60 dB

PART 3 EXECUTION

3.1 INSTALLATION OF TRANSFORMERS:

A. Install transformers as indicated, complying with manufacturer's written instructions, applicable requirements of CEC, NEMA, ANSI, and IEEE standards, and in accordance with recognized industry practices to ensure that products fulfill requirements.

B. Floor and roof mounted transformers shall be mounted on captive steel insert neoprene mountings, Vibrex Model F.U. vibration isolators, seismic rated or equivalent. Conduit entering transformers shall be isolated from case with oversize hole, ground wire, and rubber grommet.

3.2 GROUNDING:

Provide equipment grounding connections, sufficiently tight to assure permanent and effective ground, for transformers as indicated.

3.3 TESTING:

Upon completion of installation of transformers, energize primary circuit at rated voltage and frequency from normal power source and test transformers, including, but not limited to, audible sound levels, to demonstrate capability and compliance with requirements. Where possible, correct malfunctioning units at the site, then retest to demonstrate compliance; otherwise, remove and replace with new units and proceed with retesting.

END OF SECTION 26 31 00

SECTION 26 32 00 - MOTOR CONTROL CENTERS AND CONTROLS

PART 1 GENERAL

1.1 SCOPE:

Furnish and install the motor control center consisting of one or more enclosed vertical sections joined together to form a rigid, free standing assembly as indicated on the Drawings and as specified.

1.2 QUALITY ASSURANCE:

A. Codes and Standards: Comply with requirements set forth by Underwriters Laboratories publication, UL-845, NEMA publication No. ICS-2, the National Electric Code, and other applicable codes.

1.3 SUBMITTALS:

A. General: Voltage, phase, frequency, horizontal and vertical bus capacity, short-circuit ratings branch circuit-breaker ratings, types of motor starting types of wiring, panel boards, and transformers.

B. Shop Drawings: Submit layout drawings of motor control centers (MCC) showing accurately sealed basic equipment sections including, but not limited to, motor starters, controllers, device panels, and circuit breakers. Show spatial relationships of MCC components to proximate electrical equipment. Clearly differentiate on wiring diagrams those conductors which are factory-installed and those which are field-installed. Show all areas for conduit and wire entrances.

C. Maintenance Data: Submit maintenance data and parts list for all electrical equipment supplied, including "trouble-shooting" maintenance guide.

1.4 MANUFACTURER:

Subject to compliance with requirements, provide motor control centers of one of the following: Square D, General Electric, Furnas, Allen Bradley, Eaton, or an approved equal.

PART 2 - MATERIALS

2.1 MOTOR CONTROL CENTERS AND COMPONENTS:

A. General: Provide motor control centers and ancillary components of sizes, ratings, classes, types, and characteristics indicated; which comply with manufacturer's standard design, materials, components, and construction in accordance with published product information, as required for complete installation, and as specified herein.

B. Motor Control Centers: Provide motor control centers for operation on 480 VAC, 3-phase, 4-wire, or as shown the Drawings, 60 Hz grounded service, or otherwise indicated on the Drawings, consisting of one or more vertical sections, each with components and spaces as indicated on the Drawings. Design MCC for connection to available faults of not less than that of main service panel. Provide MCC with NEMA Class 2, Type B wiring.

- 1 C. Structures: Provide factory-assembled, deadfront, with enclosed vertical sections, as indicated on
2 the Drawings, fastened together to form rigid free-standing assembly. Unit shall be able to house
3 the horizontal and vertical busses, motor starters, panelboards, circuit breakers, control and
4 distribution transformers and other components and shall be designed to allow for easy
5 rearrangement of components by the purchaser. Construct units NEMA type 3R enclosure for
6 exterior service and NEMA 1G for indoor applications. All units to be UL labeled.
7
- 8 D. Bus System: Construct bus bars of tin-plated copper, braced to withstand fault equal to main
9 service panel; provide main horizontal bus with rating of per drawings, and vertical bus rating of
10 300 amperes; and construct vertical bus bars with protective barriers to prevent accidental contact
11 of personnel with bus. Provide tin-plated copper ground bus running full width of MCC at bottom
12 of lineup.
13
- 14 E. Starter Units: Starter units based on DIN or IEC standards are not acceptable. Starter units
15 utilizing electronic circuitry to reduce the physical area of the main contacts are not acceptable.
16 Provide magnetic motor starters with circuit breaker type disconnects and auxiliary control devices
17 as indicated on the Drawings. Motors 50 HP and over or per drawings will be provided with
18 reduced voltage starting. Enclose and isolate each unit from adjacent units. Design units so that
19 faults will be contained within compartments; and with stated rms symmetrical fault withstanding
20 ability. Equip with thermal and magnetic overload protection device for each motor, indicating
21 circuit breaker position switch, selector switch, two (2) auxiliary contacts (interchangeable NO to
22 NC), and an individual control transformer. Also refer to the Drawings for added control devices to
23 be included.
24
- 25 F. Controls: Hand/Off/Auto control must start motors in hand position regardless of other system
26 operations.
27
- 28 G. Power Metering: Motor control centers shall include metering for voltage and amperage.
29 Manufacturer to be Eaton IQ Data, Square D Powerlogic, Allen-Bradley Powermonitor, or
30 Yokogawa 2350 Multifunction meter.
31
- 32 H. Control Transformers:
33
- 34 A 480-120 V control transformer shall be supplied for each magnetic motor starter and lighting and
35 heating controller, and shall be one standard size larger than is required for the motor space
36 heater, control devices, and/or indicating lights shown on the Drawings.
37
- 38 Each control transformer shall have both primary legs fused, one secondary leg fused, and the
39 other secondary leg grounded. Connections to both secondary legs shall be provided at the
40 control terminal strip.
41
- 42 I. Disconnect Operators: Provide external operator handles for switches and circuit breakers.
43 Design handle with up-down motion and with down position indicating OFF. Construct handles
44 which permit locking hand in ON and OFF position with three padlocks.
45
- 46 J. Identification Operators: Provide equipment/system identification nameplates for each section
47 complying with Section NAMEPLATES, and in accordance with Motor Control Schedule on the
48 Drawings.
49
- 50 K. Finishes: All exterior and interior surfaces shall be properly cleaned, and primed with a rust
51 inhibiting prime coat. Provide two (2) finish coats of manufacturer's standard color baked-on
52 enamel finish.

2.2 CONTROL STATIONS AND CONTROLS:

A. Control Stations:

Push buttons, selector switches, and pilot lights shall be heavy duty, oiltight/watertight devices installed in NEMA 4X enclosures, MCCs, and control panels. Lamp devices shall use LED style lights. These devices shall be Allen-Bradley 800T/800H, Square D Company Class 9001, General Electric CR104, or equal.

Red	Alarms or trips
Green	Motor Running, valve open
Yellow	Pump Call
White	Control Power On

B. Control Relays:

- 480V service control relays shall be industrial type, 600V, with 10A contacts and contact arrangement and operating coils of the proper voltage rating as required by the control circuit sequence and the Drawings. Each relay shall have a minimum of three reversible-pole contacts. The coils shall be sealed by pressure molding. The relays shall be Allen-Bradley 700-P, Square D Company Class 8501 Type X, Eaton D26 Type M or equal.
- 120V and lower voltage miniature plug in type relays will have indicating pilot light to indicate relay is energized. The relays shall be Allen-Bradley 700-HF, Square D Company Class 8501 Type R, IDEC RR, Eaton D5 or equal.
- Timers shall be SSAC TRU3, Allen Bradley 700HX or equal. Multifunction Onboard Selectable Modes of Operation: Delay on Make, Interval, Single Shot, Recycle, Delay on Break & Retriggerable Single Shot. Six Built-in Ranges from 0.1 Seconds to 1000 Minutes. Multi-voltage Operated From 19-264VAC and 19-30VDC automatically. 10 Ampere Output Contacts- DPDT 11 pin. Onboard LED's to indicate Input and Output Status.

C. Terminal Blocks: Intermediate terminations of panel wiring shall be done using modular screw-clamp terminal blocks, rated not less than 20 amperes at 600 V. White or other light-colored marking strips, fastened by snapping numbers into molded sections at each block, shall be provided for circuit designation. Each connected terminal of each block shall have the circuit designation or wire number imprinted on the marking strip with permanent marking fluid. Terminal blocks shall be Weidmuller SAK Series mounted on assembly rail TS 32, Phoenix Series UK mounted on Series NS assembly rail, or equal.

D. Thermostat: Thermostats shall have heavy-duty controls suitable for 120/240V operation. Contacts shall be hermetically sealed and mercury wetted. Units shall include integral thermometer. Enclosures shall be indoor type. Units shall be bellows actuated and shall have removable setpoint adjust knob. Unit shall have minimum adjustable temperature range of 40°F to 60°F and double-pole single-throw switch which opens on temperature rise. Units shall be Mercoid Model 860-54-62 or approved equal.

E. Limit Switches:

Limit switches mounted on panel doors for intrusion detection or light activation shall be proximity-type and shall be self contained, side or end sensitive as required. Sentrol 100 series or equal.

Mechanical sensing limit switches for valve position sensing shall be Square D Class 9007 Type C, Allen-Bradley 802T Series, or equal.

- F. Pressure Switch: The Bourdon tube pressure switch shall be Mercoird Series DA operated by a brass Bourdon tube actuating a mercury switch. Switch shall have deadband adjustable up to a maximum of 100% of switch range. Switch shall have calibrated dial and two pointers indicating set and reset points. Switch shall have visible on/off indication. Set points shall be adjustable without removing switch cover or shutting down process. Pressure switch shall be UL listed and shall be Mercoird Series DA/DS, Model DA-31-153-7 or approved equal.

G. DC Power Supplies:

1. DC power supplies shall be supplied with proprietary equipment when part of a manufacturer's standard assembly or system.
2. Direct current supplies for bulk 24V nominal instrumentation power shall be convection-cooled switching type. Line regulation shall be 0.4 percent for line variations from 105 to 132 V, and load regulation shall be 0.4 percent for load variations from 0 to full load. Ripple and noise shall not exceed 100 mV peak-to-peak. Hold-up time at maximum load shall be not less than 16 milliseconds. Efficiency shall be better than 70 percent. Power supply shall be rated for continuous duty from 0 to 50EC at rated load. Connected load shall not exceed 50 percent of the rated load. Output shall be electronically current limited, and over voltage crowbar shutdown shall be provided. Power supplies shall be Acopian B series, Sola Silverline series, Power One International series, or equal.

PART 3 EXECUTION

3.1 INSTALLATION OF MOTOR CONTROL CENTERS:

- A. A complete functional test will be held at the shop of the panel fabricator with the MCC and all control components to verify correct functional operation. This test will be witnessed by the owner's representative and the engineer.
- B. Install motor control centers as indicated, in accordance with equipment manufacturer's written instruction, and with recognized industry practices, to ensure that motor control centers comply with requirements.
- C. Prior to energization of circuitry, check all accessible connections to meet manufacturer's torque specifications. Subsequent to wire and cable hook-ups, energize motor control center circuitry and demonstrate capability and compliance with requirements.

3.2 GROUNDING OF MOTOR CONTROL CENTERS:

Provide equipment grounding connections, sufficiently tight to assure permanent and effective ground, for motor control centers. All motor control centers will have a continuous ground bus through the entire width of the control center and any control cabinet attached to it. Where the motor control center is attached to a distribution panel or main service panel the continuous ground bus shall be tied to the bus in that equipment.

PART 4 MEASUREMENT AND PAYMENT

No separate payment will be made for Motor Control Centers. Payment for work in this section shall be included as part of the applicable Lump Sum or unit prices stated in other sections.

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END OF SECTION 26 32 00

SECTION 26 34 60 - MEDIUM-VOLTAGE METAL-CLAD SWITCHGEAR

PART 1 GENERAL

1.1 SCOPE:

The Electrical Contractor shall furnish and install the equipment as specified herein and as shown on the contract drawings.

1.2 REFERENCES:

The metal-clad switchgear and all components shall be designed, manufactured and tested in accordance with the latest applicable standards of NEMA SG-4 and SG-5, IEEE, and but not limited to, ANSI 37.20.2.

1.3 SUBMITTALS - FOR REVIEW/APPROVAL:

A. The following information shall be submitted to the Engineer:

1. Master drawing index
2. Front view elevation
3. Floor plan
4. Top view
5. Single line
6. Schematic diagram
7. Nameplate schedule
8. Component list
9. Conduit entry/exit locations
10. Assembly ratings including:
 - a. Short-circuit rating
 - b. Voltage
 - c. Continuous current
 - d. Basic impulse level for equipment over 600 volts
11. Major component ratings including:
 - a. Voltage
 - b. Continuous current
 - c. Interrupting ratings
12. Cable terminal sizes.
13. Special systems, relays and controls.

B. Where applicable the following additional information shall be submitted to the Engineer:

1. Busway connection
2. Connection details between close-coupled assemblies
3. Composite floor plan of close-coupled assemblies
4. Key interlock scheme drawing and sequence of operations.

C. Submit seven (7) copies of the above information.

1.4 SUBMITTALS - FOR INFORMATION:

A. When requested by the Engineer the following product information shall be submitted:

1. Descriptive bulletins

2. Product sheets.

1.5 SUBMITTALS - FOR CLOSEOUT:

A. The following information shall be submitted for record purposes:

1. Final as-built drawings and information for items listed in Section 1.4
2. Wiring diagrams
3. Certified production test reports
4. Installation information including equipment anchorage provisions
5. Seismic certification.
6. O & M Manuals

B. Submit seven (7) copies of the above information.

1.6 QUALIFICATIONS:

- A. The manufacturer of the assembly shall be the manufacturer of the major components within the assembly.
- B. For the equipment specified herein, the manufacturer shall be ISO 9000, 9001 or 9002 certified.
- C. The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of five (5) years. When requested by the Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.
- D. The switchgear assembly and circuit breakers shall be suitable for and certified to meet all applicable seismic requirements of Uniform Building Code (UBC) and the California Building Code (CBC) for zone 4 application. Guidelines for the installation consistent with these requirements shall be provided by the switchgear manufacturer and be based upon testing of representative equipment. The test response spectrum shall be based upon a 5% minimum damping factor, UBC: a peak of 0.75g, and a ZPA of 0.38g. The tests shall fully envelope this response spectrum for all equipment natural frequencies up to at least 35 Hz.

1.7 DELIVERY, STORAGE AND HANDLING:

- A. Equipment shall be handled and stored in accordance with manufacturer's instructions. Three (3) copies of these instructions shall be included with the equipment at time of shipment.
- B. Shipping groups shall be designed to be shipped by truck, rail, or ship. Indoor groups shall be bolted to skids. Breakers and accessories shall be packaged and shipped separately.
- C. Switchgear shall be equipped to be handled by crane. Where cranes are not available, switchgear shall be suitable for skidding in place on rollers using jacks to raise and lower the groups.
- D. Switchgear being stored prior to installation shall be stored so as to maintain the equipment in a clean and dry condition. If stored outdoors indoor gear shall be covered and heated, and outdoor gear shall be heated.

1.8 OPERATION AND MAINTENANCE MANUALS:

1 A. Seven (7) copies of the equipment operation and maintenance manuals shall be provided.

2
3 B. Operation and maintenance manuals shall include the following information:

- 4
5 1. Instruction books and/or leaflets
6 2. Recommended renewal parts list
7 3. Drawings and information required by Section 1.5.
8

9 1.9 EXTRA PRODUCTS:

10
11 Included will be a complete breaker removal system to remove breakers from stationary
12 cubicles, including a transport cart.
13

14 PART 2 PRODUCT

15 2.1 MANUFACTURERS:

16 Square D Draw out breaker to duplicate previous installation, Square D F.O. 17-14420776-
17 101
18
19

20 2.2 RATINGS:

21 A. The switchgear described in this specification shall be designed for operation on a 12 kV,
22 three-phase, 3-wire, solidly grounded, 60-hertz system.
23

24 Maximum Voltage	15kV
25 BIL Rated	95kV
26 Continuous Current	1200 Amperes
27 Short-Circuit Current	23kA
28 At Rated Maximum kV	

29 2.3 CONSTRUCTION:

30 A. The switchgear assembly shall consist of individual vertical sections housing various
31 combinations of circuit breakers and auxiliaries, bolted to form a rigid metal-clad switchgear
32 assembly. Metal side sheets shall provide grounded barriers between adjacent structures and
33 solid removable metal barriers shall isolate the major primary sections of each circuit. Hinged
34 rear doors, complete with provisions for padlocking, shall be provided.
35

36 B. The stationary primary contacts shall be silver-plated and recessed within insulating tubes. A
37 steel shutter shall automatically cover the stationary primary disconnecting contacts when the
38 breaker is in the disconnected position or out of the cell. Provide rails to allow withdrawal of
39 each 15-kV circuit breaker for inspection and maintenance without the use of a separate lifting
40 device.
41

42 2.4 BUS:

43 A. The main bus shall be copper and have fluidized bed epoxy flame-retardant and track-
44 resistant insulation. The bus supports between units shall be flame-retardant, track-resistant,
45 glass polyester for 15-kV class. The switchgear shall be constructed so that all buses, bus
46 supports and connections shall withstand stresses that would be produced by currents equal
47 to the momentary ratings of the circuit breakers. A set of 1200-ampere insulated copper main
48 bus shall be provided and have provisions for future extension. All bus joints shall be plated,
49 bolted and insulated with easily installed boots. The bus shall be braced to withstand fault
50
51
52
53
54

currents equal to the close and latch rating of the breakers. The temperature rise of the bus and connections shall be in accordance with ANSI standards and documented by design tests.

B. A copper ground bus shall extend the entire length of the switchgear.

2.5 WIRING/TERMINATIONS:

A. The switchgear manufacturer shall provide suitable terminal blocks for secondary wire terminations and a minimum of 10% spare terminal connections shall be provided. One control circuit cutout device shall be provided in each circuit breaker housing. Switchgear secondary wire shall be minimum #14 AWG, type SIS rated 600 volt, 90 degrees C, furnished with wire markers at each termination. Wires shall terminate on terminal blocks with marker strips numbered in agreement with detailed connection diagrams.

B. Incoming line and feeder cable lugs of the type and size indicated elsewhere shall be furnished.

2.6 CIRCUIT BREAKERS:

A. The circuit breakers shall be horizontal drawout type, capable of being withdrawn on rails. The breakers shall be operated by a motor-charged stored energy spring mechanism, charged normally by a universal electric motor and in an emergency by a manual handle. The primary disconnecting contacts shall be silver-plated copper.

B. Each circuit breaker shall contain three vacuum interrupters separately mounted in a self-contained, self-aligning pole unit which can be removed easily. The vacuum interrupter pole unit shall be mounted on glass polyester supports. A contact wear gap indicator for each vacuum interrupter, which requires no tools to indicate available contact life, shall be easily visible when the breaker is removed from its compartment. The current transfer from the vacuum interrupter moving stem to the breaker main conductor shall be a non-sliding design. The breaker front panel shall be removable when the breaker is withdrawn for ease of inspection and maintenance.

C. The secondary contacts shall be silver-plated and shall automatically engage in the breaker operating position, which can be manually engaged in the breaker test position.

D. Interlocks shall be provided to prevent closing of a breaker between operating and test positions, to trip breakers upon insertion or removal from housing and to discharge stored energy mechanisms upon insertion or removal from the housing. The breaker shall be secured positively in the housing between and including the operating and test positions.

E. The breakers shall be electrically operated by the following control voltages:

125-volt DC close and 125-volt DC trip.

Each breaker shall be complete with control switch and red and green indicating lights to indicate breaker contact position.

F. The control voltage shall be as indicated on the drawings.

2.7 PROTECTIVE RELAYS:

1 A. The switchgear manufacturer shall furnish and install, in the metal-clad switchgear, the
2 quantity, type and rating of protection relays as indicated on the drawings and described
3 hereafter in this specification.

4
5 B. Microprocessor Three-Phase Protective Relay

- 6
7 1. Relays for phase time over-current, instantaneous over-current and ground fault
8 protection, ANSI 50/51, 50/51G, or 50/51N, shall be incorporated into a single device and
9 shall be Cutler-Hammer type Westinghouse Digitrip-3000 having all the features and
10 functions herein specified.
11 2. The relay shall be solid-state microprocessor-based multi-functional type that operates
12 from the 5-ampere secondary output of current transformers. The relay shall provide
13 ANSI 50/51N protective functions for each of the three (3) phases, and ANSI 50/51N or
14 50/51G ground fault protection functions as shown on the plans or as determined by the
15 coordination study. The relay shall be true RMS sensing of each phase and ground.
16 Ground element shall be capable of being utilized in residual, zero sequence, or ground
17 source connection schemes, or deactivated.
18 3. The primary current transformer rating being used for phase and ground protection
19 feeding the device shall be programmable for current transformers with primary current
20 ratings from 5 through 5,000 amperes.
21 4. Both the phase and ground protection curves shall be independently field selectable and
22 programmable with or without load. Curves shall be selectable from the following:

23
24 IEEE: Moderately inverse, very inverse, extremely inverse
25 IEC: A, B, C, or D
26 Thermal: Flat, I_t , I^2t , I^4t

27
28 Thermal curves shall be similar to those on low-voltage trip units for close coordination
29 with downstream devices. Selectable short delay pick-up and short delay time settings
30 shall also be provided. The phase instantaneous over-current trip shall have field
31 programmable pick-up points from 1.0 to 25 times current transformer primary rating or
32 NONE. In addition, a field selectable (ON or OFF) discriminator circuit shall be included
33 such that when phase instantaneous over-current has been programmed to NONE, the
34 discriminator circuit shall protect against currents exceeding 11 times current transformer
35 primary rating, only when the breaker is closed.

- 36 5. The relay shall be field configurable to have either of the following function combinations
37 assigned to its' two type "a" contacts: 1) one contact assigned ANSI 51 phase and ANSI
38 51 ground and the other contact assigned ANSI 50 phase and ANSI 50 ground; 2) one
39 contact assigned ANSI 51/50 phase and the other contact assigned 51/50 ground.
40 6. The relay shall have a built-in alphanumeric display capable of displaying the following
41 information with metering accuracy of +/- one (1) percent of full scale (I_n) from $0.04 \times I_n$ to
42 $1 \times I_n$ and +/- two (2) percent of full scale (I_n) from $1 \times I_n$ to $2 \times I_n$:
43 a. Individual phase currents
44 b. Ground current
45 c. Cause of trip
46 d. Magnitude and phase of current causing trip
47 e. Peak current demand for each phase and ground since last reset
48 f. Current transformer primary rating
49 g. Programmed phase and ground set-points.
50 7. Relay shall have the following features:
51 a. Integral manual testing capability for both phase and ground
52 b. Zone selective interlocking capability for short time and ground fault protection.
53 This function shall be provided and factory wired. Where zone selective
54 interlocking is not an integral part of the protective device, a full bus differential

- 1 scheme shall be required for both phase and ground in addition to specified time
2 over-current and instantaneous over-current phase and ground fault protection.
3 Bus differential scheme shall be provided with separate differential current
4 transformers for all incoming and out-going loads, as well as appropriate
5 differential relays (ANSI 87 & 87G) as approved by the engineer.
6 c. Continuous self-testing of internal circuitry
7 d. Unit failure alarm contact for customer use
8 e. Programmable lockout/self reset after trip function
9 f. Programmable set-points for device curve selection
10 g. Programmable inputs, such as current transformer ratios
11 h. Access to program and test modes shall be via sealable hinged cover for
12 security.
- 13 8. Relay shall be suitable for operating temperatures from -30 degrees to 55 degrees C.
14 Relay shall be suitable for operating with humidity from 0 to 95% relative humidity (non-
15 condensing).
16
- 17 9. Relay shall have communication capability via local area network compatible to Cutler-
18 Hammer IMPACC system. Relay shall be capable of the following over the
19 communication network:
20 a. Ability to transmit all information contained in the relay such as currents, set-
21 points, cause of trip, magnitude of trip current, and open-close trip status
22 b. Ability to close and open the associated breaker with proper access code from
23 remote location over the communication network when the relay is dip switch
24 configured in remote close/open mode.
25 c. Information in Paragraph 2., 7., .B., 6 above.
- 26 10. Relay Alarm and/or Trip contacts shall not change state if power is lost or an Under-
27 voltage occurs. These contacts shall only cause a trip upon detection of an over-current
28 or fault condition based upon programmed settings.
- 29 11. The relay shall be suitable for operating on control power with a nominal input voltage of
30 48 to 250 volts DC or 12- to 240 volts AC (50 or 60 hertz). When AC control power
31 schemes are shown on the drawings, in addition to control power transformer or remote
32 control power shown or herein specified, a single phase uninterruptable power supply
33 shall be included to supply control power to protective devices.

34
35 2.8 AUXILIARY DEVICES:
36

- 37 A. Ring type current transformers shall be furnished as indicated on the contract drawings. The
38 thermal and mechanical ratings of the current transformers shall be coordinated with the
39 circuit breakers. Their accuracy rating shall be equal to or higher than ANSI standard
40 requirements. The standard location for the current transformers on the bus side and line side
41 of the 15-kV breaker units shall be front accessible to permit adding or changing current
42 transformers without removing high-voltage insulation connections. Shorting terminal blocks
43 shall be furnished on the secondary of all the current transformers.
44
- 45 B. Voltage and control power transformers of the quantity and ratings indicated in the detail
46 specification shall be supplied. Voltage transformers shall be mounted in drawout drawers
47 contained in an enclosed auxiliary compartment. Control power transformers up to 15 kV, 15
48 kVA, single-phase shall be mounted in drawout drawers. Rails shall be provided for each
49 drawer to permit easy inspection, testing and fuse replacement. Shutters shall isolate primary
50 bus stabs when drawers are withdrawn.
51
- 52 C. A mechanical interlock shall be provided to require the secondary breaker to be open before
53 the CPT drawer or CPT primary fuse drawer can be withdrawn.
54

2.9 NAMEPLATES:

- A. Engraved nameplates, mounted on the face of the assembly, shall be furnished for all main and feeder circuits as indicated on the drawings. Nameplates shall be laminated plastic, black characters on white background, and secured with screws. Characters shall be 3/16-inch high, minimum. Nameplates shall give item designation and circuit number as well as frame ampere size and appropriate trip rating. Furnish master nameplate giving switchgear designation, voltage ampere rating, short-circuit rating, manufacturer's name, general order number, and item number.
- B. Control components mounted within the assembly, such as fuse blocks, relays, pushbuttons, switches, etc., shall be suitably marked for identification corresponding to appropriate designations on manufacturer's wiring diagrams.

2.10 FINISH:

The finish shall consist of a coat of gray (ANSI-61), thermosetting, polyester powder paint applied electrostatically to pre-cleaned and phosphatized steel and aluminum for internal and external parts. The coating shall have corrosion resistance of 600 hours to 5% salt spray. Prior to shipment, the complete assemblies, indoor as well as outdoor, shall be given 1.5 to 2.0 mil thick exterior finish spray coat of air drying high-gloss gray enamel.

2.11 ACCESSORIES:

- A. Two - Maintenance tool for manually charging the breaker closing spring and manually opening the shutter.
- B. One - Levering crank for moving the breaker between test and connected positions.
- C. Two - Test jumper for electrically operating the breaker while out of its compartment.
- D. One - Breaker lifting yoke used for attachment to breaker for lifting breaker on or off compartment rails.
- E. Two - Sets of rail extensions and rail clamps.

2.12 BILLS OF MATERIAL:

- A. The metal-clad switchgear auxiliary section for control and instrumentation shall include the following (Applicable to each side A and B):
 - 1. Two - Line-to-line voltage transformers
 - 2. Three - Current transformers
 - 3. One - 25 kVA Single-phase control power transformer
 - 4. One - Microprocessor-based metering system
 - 5. Additional requirements as shown on the plans.
- B. Each metal-clad switchgear main circuit breaker section for control of a main circuit breaker shall include the following:
 - 1. One - Drawout power circuit breaker rated 1200 amperes
 - 2. Three - Current transformers, single secondary
 - 3. One - Circuit breaker control switch with red and green indicating lights

4. One - Microprocessor-based three-phase and ground overcurrent relay, ANSI device number 51/50/N Digitrip MV (No Substitution)
5. One - Nameplate
6. One - Microprocessor-based metering system
7. One - Set of cable lugs.
8. One - Zero sequence current transformer.

C. The metal-clad switchgear tie breaker section for control of a tie breaker shall include the following:

1. One - Drawout power circuit breaker rated 1200 amperes
2. Three - Current transformers, single secondary
3. One - Circuit breaker control switch with red and green indicating lights
4. One - Microprocessor-based three-phase and ground overcurrent relay, ANSI device number 51/50/N Digitrip MV (No Substitution)
5. One - Nameplate

D. Each metal-clad switchgear feeder breaker section for control of a feeder circuit breaker shall include the following:

1. One - Drawout power circuit breaker rated 1200 amperes
2. Three - Current transformers, single secondary
3. One - Circuit breaker control switch with red and green indicating lights
4. One - Microprocessor-based 3-phase and ground relay, ANSI device number 51/50/G, Digitrip MV (No Substitution)
5. One - Nameplate
6. One - Microprocessor-based metering system
7. One - Set of cable lugs
8. One - Zero sequence current transformer.

PART 3 EXECUTION

3.1 FACTORY TESTING:

A. The following standard factory tests shall be performed on the circuit breaker element provided under this section. All tests shall be in accordance with the latest version of ANSI standards.

1. Alignment test with master cell to verify all interfaces and interchangeability
2. Circuit breakers operated over the range of minimum to maximum control voltage
3. Factory setting of contact gap
4. One-minute dielectric test per ANSI standards
5. Final inspections and quality checks

B. The following production test shall be performed on each breaker housing:

1. Alignment test with master breaker to verify interfaces
2. One-minute dielectric test per ANSI standards on primary and secondary circuits
3. Operation of wiring, relays and other devices verified by an operational sequence test
4. Final inspection and quality check.

C. The manufacturer shall provide seven (7) certified copies of factory test reports.

3.2 INSTALLATION:

The Electrical Contractor shall install all equipment per the manufacturer's recommendations and contract drawings.

3.3 FIELD QUALITY CONTROL:

A. Provide the services of a qualified factory-trained manufacturer's representative to assist the Electrical Contractor in installation and start-up of the equipment specified under this section. The manufacturer's representative shall provide technical direction and assistance to the Electrical Contractor in general assembly of the equipment, connections and adjustments, and testing of the assembly and components contained therein.

B. The Electrical Contractor shall provide seven (7) copies of the manufacturer's field start-up report.

3.4 FIELD ADJUSTMENTS:

The relays shall be set in the field by the Electrical Contractor in accordance with settings designated by the engineer and certified by an approved testing agency.

3.5 MANUFACTURER'S CERTIFICATION/TRAINING:

A. A qualified factory-trained manufacturer's representative shall certify in writing that the equipment has been installed, adjusted and tested in accordance with the manufacturer's recommendations.

B. The Electrical Contractor shall provide seven (7) copies of the manufacturer's representative's certification.

Also provided will be field training for Owner's Personnel and recommended Preventative Maintenance Procedures and Schedule.

1

END OF SECTION 26 34 60

SECTION 26 40 00 – FIXTURES - LED

PART 1 GENERAL

1.1 SCOPE:

- A. Provide lighting fixtures of sizes, types and ratings as indicated, complete with, but not necessarily limited to, housings, reflectors, drives, boards, wiring, and mounting hardware.
- B. The Electrical Contractor shall be responsible for lighting fixture counts.

1.2 DESIGNATION:

- A. Unless otherwise shown on the plans, lighting fixture type designation for an individual fixture shall be typical for similarly indicated fixtures within the entire room or defined area.
- B. Unless otherwise shown on the plans, lighting fixtures mounted in a continuous row shall be of the same type as any individual designated fixture within the row.
- C. In the event a lighting fixture is undesignated on plans, it shall be of the same type as lighting fixtures of similar function within rooms or areas.

1.3 COORDINATION:

- A. Confirm compatibility and interface of other materials with lighting fixtures and ceiling system. Report discrepancies to the Architect or Electrical Engineer, and defer ordering until clarified.
- B. Supply plaster frames, trim rings, and back boxes to other trades.
- C. Coordinate with Division 15 to avoid conflicts between lighting fixtures, supports, fittings, and mechanical equipment.
- D. All lighting fixtures shall be coordinated with the architectural reflected ceiling plan. If any discrepancies occur, the Architect or Electrical Engineer must be notified in writing before installation is started.

1.4 SUBMITTALS:

Make product submittals per Section 26 10 00, paragraph 1.7.

- A. Product Data: Submit complete list of fixtures along with manufacturer's catalog cuts and installation instructions on each type of lighting fixture and component. Include details indicating compatibility with ceiling grid system.
- B. Shop Drawings: Submit layout drawings of all non-standard or customized fixtures. Drawings shall include mounting and feed points and methods.
- C. Samples: Submit one complete operating unit for each type of light fixture shown on the fixture schedule. Upon project completion submitted fixtures become property of the Owner.

1.5 DELIVERY, STORAGE, AND HANDLING:

- A. Deliver interior lighting fixtures in factory-fabricated containers or wrappings, which properly protect fixtures from damage.

1 B. Store interior lighting fixtures in original packaging. Store inside well-ventilated area protected
2 from weather, moisture, soiling, extreme temperatures, humidity, laid flat and blocked off
3 ground.

4
5 C. Handle interior lighting fixtures carefully to prevent damage, breaking, and scoring of finishes.
6 Do not install damaged units or components; replace with new.
7

8 1.6 SEQUENCING AND SCHEDULING:
9

10 A. Coordinate with other work including wires/cables, electrical boxes and fittings, and raceways,
11 to properly interface installation of interior lighting fixtures with other work.
12

13 B. Sequence interior lighting installation with other work to minimize possibility of damage and
14 soiling during remainder of construction.
15

16 C. Order lighting fixtures in a timely manner to allow sufficient time for manufacture and delivery of
17 long lead-time items. Make written notification with submittals of any delivery schedule
18 problems. No substitutions will be allowed for late deliveries due to Electrical Contractor's lack
19 of coordination.
20

21 PART 2 PRODUCTS
22

23 2.1 ACCEPTABLE MANUFACTURERS:
24

25 The lighting fixtures described in the Light Fixture Schedule on the drawings are to be used as
26 a standard of quality to be maintained. Substitute items of same function, performance, and
27 appearance are acceptable in conformance with Section 26 10 00.
28

29 2.2 LIGHTING FIXTURES: General
30

31 A. Provide lighting fixtures complete with all fittings, lamps, stems, hangers, and component parts
32 to make a complete installation. Lighting fixtures shall have a suitable interior means of
33 grounding the enclosure.
34

35 B. All lighting fixtures shall bear the UL label and shall be suitable for installation location.
36

37 C. All attaching devices for recessed or surface mounted fixtures mounted in the ceiling shall be of
38 formed or rolled steel and of sufficient strength to prevent movement of fixture after installation.
39

40 D. The Architect or Electrical Engineer shall have the right to reject any lighting fixture damaged
41 due to improper packaging. Any lighting fixture with broken or cracked porcelain,
42 broken or bent metal, broken lenses, or an appearance deemed not to be normal, may also be
43 rejected by the Electrical Engineer at the expense of the Electrical Contractor.
44

45 E. Trademarks or Monograms: There shall be no visible trademarks or monograms on the lighting
46 fixtures.
47

48 F. Recessed Lighting Fixture Trims: The Electrical Contractor shall use the following lighting
49 fixture trim frame designs.
50

51 1. Lay-in Frames: Lay-in frames for all exposed "T" ceiling systems in areas covered by Title
52 24.

53 2. Flanged Trims: Flanged trims for plasterboard, spline or metal lathe and plaster ceiling
54 systems. Provide plaster or mounting frames where required in areas covered by Title 24.
55

2.3 LED DRIVES:

A. Drives shall be electronic type specifically designed to save energy while maintaining full light output. Drives shall have "A" sound rating, thermal protection and guaranteed against service failure for three (3) years. Drives shall comply with FCC and MEMA limits governing electromagnetic and Radio Frequency Interference and meet all applicable ANSI, State and Federal standards. The Electrical Contractor shall indicate the installation date on each drive by inscribing the month, day and year on the drive case. Drives shall be noiseless, high power factor type and shall be ETL certified under CBM standards and UL listed.

B. LED diodes shall have the following minimum characteristics:

1. Efficacy – 90 lumens or greater per watt.
2. Color rendition index – 80 or greater
3. Standard deviation color matching for diodes shall fall within 1 MacAdam ellipse.

2.4 EXTERIOR LIGHTING FIXTURES:

A. Metal parts of exterior lighting fixtures exposed to weather conditions shall be constructed of cast or spun aluminum, cast bronze, stainless steel or other nonferrous metals available to withstand exposure.

B. Steel lighting fixtures installed in damp or wet locations shall have zinc-chromate or equal primer.

C. Provide gaskets on all trims and housings.

D. Photo Controls: All exterior lighting fixtures not on a lighting control circuit shall be furnished with integral photoelectric cell.

E. Standards: Light standards shall be as detailed on plans. Where painted standards are selected. Electrical Contractor shall provide two (2) gallons of matching paint to Owner for future touch up work.

2.5 WET LOCATIONS:

All lighting fixtures installed in wet or damp locations shall have UL approved "wet" or "damp" location labels visible in interior of fixtures.

PART 3 EXECUTION

3.1 INSTALLATION OF LIGHTING FIXTURES:

A. Lighting fixture installation shall conform to all applicable standards for installation, mounting, wiring, and quality.

B. All lighting fixtures shall be grounded and bonded in accordance with applicable codes. Where lighting fixtures are installed in rows, a #12 cu conductor shall be run continuously and a bonding screw shall be used to maintain bonding integrity from fixture to fixture.

C. All lighting fixtures, lenses, and other trim shall be aligned, clean, free of paint and blemishes before final acceptance.

D. Lighting fixtures weighing more than two pounds shall be supported by means other than the outlet box. All outlet boxes shall be able to support a minimum of eight pounds.

- 1
2 E. For lighting fixtures weighing more than two pounds, support shall be provided at all four
3 corners, plus the outlet box. Each support shall be able to carry a minimum of four times its
4 intended load.
5
6 F. No support or insert, except pendant canopies, shall be visible from the floor.
7
8 G. Where lighting fixtures are pendant suspended, the use of ball aligner and canopies at ceiling
9 and fixture, stem, and other required mounting devices shall be required for installation as
10 required to meet Title 24 requirements. A safety cable anchored to the roof structure shall be
11 installed in all pendants.
12
13 H. When lighting fixtures are stem mounted, the variation in distance from the finished floor shall
14 vary no more than ½" from the heights as specified on the plans.
15
16 I. Mounting Heights: Pendant-Mounted lighting fixtures mounting heights shall be to the bottom
17 of the fixture. Mounting heights of the wall-mounted lighting fixtures shall be to the center of
18 the outlet box unless otherwise noted.
19
20 J. Provide surface-mounted lighting fixtures with UL approval for direct mounting on the various
21 ceilings, unless specified otherwise. Spacers will not be approved.
22
23 K. Lighting Fixtures in Conflict with Ducts and Piping: Electrical Contractor shall coordinate the
24 location of lighting fixtures to the available space left between the various ducts and piping.
25 Any conflict or adverse situation shall be brought to the attention of the Architect or
26 Electrical Engineer.
27
28 L. All lighting fixtures shall be supported directly to building structural members or from bridging
29 attached to the structural members, or shall have positive attached structural angles, and/or all-
30 thread rod extensions from structure to ceiling plane. Lighting fixtures and supports shall be
31 laterally braced independently from suspended ceilings (hard or T-bar) utilizing structural angles
32 at approximate 45° angles in two planes from ceiling plane to structure above. Minimum rod
33 size shall be ½" and minimum angle size shall be 3/4" x 3/4" x 3/16" unless noted otherwise in
34 specific details. Provide all necessary blocking and hardware so that fixtures hang true, square,
35 plumb, and in proper alignment.
36
37 M. Recessed lighting fixtures in T-bar ceilings shall have #12 steel hanger wires from each fixture
38 to roof structure, in accordance with State Code Requirements, and shall be attached
39 positively to T-bar with locking T-bar clips or metal screws through T-bar into lighting fixture at
40 opposite corners in accordance with State Code Requirements. The attachment device shall
41 have a capacity of 100% of the fixture weight acting in any direction (CCR Title 24, Part 2,
42 Section 2-4701, Paragraph Section 47.1813).
43
44 N. Lighting fixtures surface mounted to T-bar ceilings shall be bolted through ceiling panel to metal
45 channel struts suspended between ceiling main runners. Install hanger wires per above from
46 struts to ceiling.
47
48 O. Install flush mounted lighting fixtures properly to eliminate light leakage between fixture frame
49 and finished surface.
50
51 P. Provide plaster frames for recessed lighting fixtures installed in other than suspended grid type
52 acoustical ceiling systems. Brace frames temporarily to prevent distortion during handling.
53
54 Q. All drives shall operate within NEMA sound ratings. Noisy or otherwise defective drives
55 shall be replaced.

R. All fixtures shall be clean and operating at time of final inspection.

S. Installation of Recessed Lighting Fixtures in Accessible-Type Suspended Ceilings: Shall be such that the fixtures will exactly suit the type of ceilings used without altering the fixture or the ceiling. Each lighting fixture shall be wired with a piece of flexible conduit sufficiently long to remove fixture enclosure from ceiling without disconnecting unit. Lighting fixture manufacturer shall prepare drawing or catalog sheets in which all details of fixture installation are carefully analyzed. Electrical Contractor to submit these shop drawings for approval. If clearance above "T" bar system is too restricted to "tip-in" lighting fixture, the Electrical Contractor shall coordinate with acoustic ceiling installer by leaving one cross "T" off until the cross "T" shall be secured into its proper place.

T. Lighting Fixtures in 1-Hour Fire Rated Ceiling: Electrical Contractor shall provide gyp board "hats" above the fixtures to maintain the integrity of the 1-hour fire ceiling.

3.2 FIELD QUALITY CONTROL:

A. Upon completion of installation of interior lighting fixtures, and after building circuitry has been energized, apply electrical energy to demonstrate capability and compliance with requirements. The Electrical Contractor shall replace at his expense all noisy ballasts, broken or cracked lenses or other defective items. Where possible, correct malfunctioning units at site, then retests to demonstrate compliance; otherwise, remove and replace with new units, and proceed with testing.

B. At the time of substantial completion, replace drives and boards in interior lighting fixtures which are observed to be noticeably dimmed after Electrical Contractor's use and testing, as judged by the Architect or Electrical Engineer.

C. Replace defective and burned out LED drives and boards for a period of five (5) years following the date of installation.

3.3 ADJUSTMENT AND CLEANING:

A. Clean interior lighting fixtures of dirt and debris.

B. Protect installed lighting fixtures from damage during remainder of construction period.

1
2

END OF SECTION

SECTION 26 43 00 - TRANSIENT VOLTAGE SURGE SUPPRESSION

PART 1 – GENERAL

1.1 SUMMARY:

- A. Transient voltage surge suppression shall be provided on all main services (Class C), all MCC's, and the secondary main bus of station step-down transformer. Minimum 240KA/PH rating for all 480 volt MCC's. TVSS installation to include fused or circuit breaker disconnect.

1.2 RELATED SECTIONS:

- A. Section 26320 Motor Control Centers

1.3 SUBMITTALS:

- A. The Electrical Contractor shall furnish submittals for all products identified in this Section.

1.4 MANUFACTURER QUALIFICATIONS:

- A. The manufacturer of transient voltage surge suppression equipment must have engaged in the design and manufacture of similar equipment for a minimum of five (5) years.

PART 2 PRODUCTS

2.1 TRANSIENT VOLTAGE SURGE SUPPRESSION:

- A. Provide transient voltage surge suppressors suitable for the circuit voltage rating, service equipment, and connected loads.

2.2 SOURCE QUALITY CONTROL:

- A. The specified system shall be tested to meet ANSI/IEEE C62.41-1991, tested per ANSI/IEEE C62.45-1992.
- B. The system shall be tested to 1,000 sequential ANSI/IEEE C62.41 Category C waveforms.

2.3 MANUFACTURER:

- A. Manufacturer shall be Eaton SPD Max, Square D EMA or equal.

PART 3 EXECUTION

3.1 INSTALLATION:

- A. Transient voltage surge suppression equipment shall be installed in accordance with manufacturer's instructions and all applicable codes and standards.

1

END OF SECTION 26 43 00

SECTION 26 49 50 - HEAVY DUTY SAFETY SWITCHES

PART 1 – GENERAL

1.1 SUMMARY:

- A. This section includes equipment used for local disconnects at motors.

1.2 RELATED SECTIONS:

- A. Division 26 Electrical

1.3 REFERENCES:

- A. National Electrical Manufacturer's Association (NEMA)
- B. National Electrical Code
- C. American National Standards Institute (ANSI)
- D. Underwriter Laboratories (UL)

1.4 SUBMITTALS:

- The Electrical Contractor shall furnish submittals for all products identified in this Section.

PART 2 PRODUCT DESCRIPTION

- A. Switches to be Heavy Duty Safety switches, 600 volt, single throw, 3 pole, fusible.
- B. Enclosure to be rated NEMA 4 dust tight, water tight, and corrosion resistant with lockable access door. All current carrying parts to be copper.
- C. Switch to be rated full load break.
- D. Short circuit withstand rating to be 200,000 RMS symmetrical amperes.
- E. Switch to be equipped with a cover viewing window showing the position of the stabs.

PART 3 EXECUTION

3.1 INSTALLATION:

- A. All safety switches shall be installed and calibrated in accordance with manufacturer's instructions.

1

END OF SECTION 26 49 50

SECTION 26 50 00 - EQUIPMENT CONNECTIONS

PART 1 GENERAL

1.1 SCOPE:

- A. Make all connections of power to all equipment along with installation of required disconnecting means.
- B. Furnish all electrical disconnects, power supplies, and controls as noted within the electrical plans for equipment, compressors, fans, etc.

PART 2 PRODUCTS

2.1 MATERIALS:

Conduits, boxes, cover plates, disconnects, etc., per applicable related sections.

PART 3 EXECUTION

3.1 INSTALLATION OF MECHANICAL EQUIPMENT WIRING:

- A. Furnish all electrical disconnects, power supplies, and controls as noted within the Division 15 and Division 26 plans for Division 15 equipment as shown on the mechanical plans.
- B. Make all connections of power to all mechanical equipment along with installation of required disconnection means. The work is generally as noted, but not specifically limited to the following:
 - 1. Air-cooled chillers
 - 2. Pumps
 - 3. Air conditioning units
 - 4. Exhaust fans
 - 5. Fan coils
 - 6. Temperature control panels
 - 7. Boilers
 - 8. Air compressors and air dryers
 - 9. Air handlers
- C. Supply all electrical junction boxes for mechanical equipment.

3.2 INSTALLATION OF OWNER-FURNISHED EQUIPMENT WIRING:

- A. Make all connections of power to all Owner-furnished equipment along with installation of required disconnection means. The work is generally as noted, and also as shown on the architectural plans, but not specifically limited to the those.
- B. Supply all electrical junction boxes for Owner-furnished equipment.

3.3 MOTOR CONNECTIONS:

- A. The Electrical Contractor shall make all line connections for each motor sized as shown on the plans. Electrical Contractor shall be responsible for proper phasing and rotation of all connected motors.

1
2 B. The Electrical Contractor shall supply those starters indicated on the plans, install these and
3 Mechanical furnished starters, and make motor-starter connections for all indicated motors.

4
5 C. The Electrical Contractor shall verify motor characteristics prior to installing wiring. Exact
6 location of motor and motor connections shall be ascertained prior to installing conduits.

7
8 D. A Liquidtight Flexible Metal (LFMC) conduit connection, in lengths not to exceed 36", shall be
9 provided at each motor. Lengths exceeding 36" are to be submitted to the Engineer for approval.

10
11 3.4 TESTING:

12
13 After all wiring to each unit is complete, the Electrical Contractor shall cooperate with Mechanical
14 or Equipment Contractors in testing equipment for proper operation and shall correct wiring as
15 required for proper operation.

16
17
18 END OF SECTION 26 50 00

SECTION 26 51 00 - EMERGENCY GENERATOR AND AUTOMATIC TRANSFER SWITCH

PART 1 GENERAL

1.1 SCOPE:

- A. The Electrical Contractor shall furnish and install an outdoor weatherproof sound attenuated emergency standby generation unit. Supplier shall verify/guarantee generator will start and run all connected loads and provide simulation data with the submittal. The generator set shall be rated per plans standby with 0.8 power factor at 60 hertz with ratings calculated at 50°C using #2 Diesel Fuel. The ratings will be with the radiator fan included, for continuous electrical service during interruption of the normal utility service. Supplier to submit verification the emergency generator meets all Regional Air Quality Board requirements and provide the required Authority to Construct/Authority to operate application with all technical data completed. The emergency generator shall meet all fire marshal requirements.
- B. The generator set shall have an output voltage of 480/277 volt, three phase, four wire.
- C. The generating unit shall be furnished ready for operation as soon as the required connections have been made to the unit's wiring. The unit is to be furnished within weatherproof enclosure for outdoor installation.

1.2 SUBMITTALS:

- A. Product Data: Submit manufacturer's data on engine-driven electric generator systems and components. Include manufacturer's product warranty statement showing single source responsibility by the engine manufacturer, for replacement of materials and equipment used in standby engine driven generator system.
- B. Shop Drawings: Submit dimensioned drawings of engine-driven generator units and accessories including, but not limited to, automatic transfer switches, fuel line piping, remote start/stop stations, and instruments, showing accurately scaled generator set layout and its spatial relationship to associated equipment, and connections to remote equipment.
- C. Other: Supplier shall verify/guarantee generator will start and run all connected loads and provide simulation data with the submittal. Supplier to submit verification the emergency generator meets all Regional Air Quality Board requirements and provide the required Authority to Construct/Authority to operate application with all technical data completed.

1.3 MATERIAL AND WORKMANSHIP:

The engine generator set shall be a factory fabricated and assembled package of new and quality grade components. Only those products currently being manufactured for the purpose of power generation will be considered. All work shall be congruent with the highest quality standards.

1.4 DESIGN:

The unit shall be designed and fabricated to meet all applicable codes and standards associated with the area and application for which it is intended. Routine maintenance and adjustments shall be able to be performed without the use of special tools or instruments.

1.5 WARRANTY:

Equipment furnished under this section shall be guaranteed by the manufacturer and administered by the selling dealer against defects in materials or workmanship for a period of five (5) years from date of acceptance. It shall cover full parts and repair labor expenses plus travel time and mileage.

PART 2 PRODUCTS

2.1 MANUFACTURER:

Subject to compliance with requirements, provide engine/generator set of one (1) of the following: Caterpillar, Cummins, or MTU.

2.2 GENERAL:

Furnish and install a complete and working packaged generator set including all engine and generator components, standard engine mounted control panel, radiator and fan, all engine oil and engine filters, and 50% Ethel glycol solution in the radiator and water cooling system. To qualify as manufacturer, the engine must be the principal item manufactured and the completed engine generator shall be supplied by that manufacturer's authorized representative.

2.3 ENGINE:

- A. Construction: The engine shall run on natural gas or #2 diesel, be fully water cooled, of four stroke cycle design, compression ignited, rated for continuous standby application. It shall produce sufficient horsepower to achieve ratings indicated while driving all accessories and parasitic loads such as fans or alternators.
- B. Governor: The engine shall be equipped with mechanical governor with a 3% speed regulation from no load to full load.
- C. Safety Devices: The generator set shall have installed and be warranted by the engine manufacturer the following alarm and shutdown features:
 - 1. Low oil pressure pre-alarm
 - 2. High water temperature pre-alarm
 - 3. Low water temperature alarm
 - 4. Low oil pressure shutdown
 - 5. High water temperature shutdown
 - 6. Overspeed set for 118% rated speed. It shall allow the unit to be tested at 75% of the actual trip point.
- D. Cooling System: The engine shall be equipped with either a gear or belt driven centrifugal water pump. The engine shall be cooled through a base mounted radiator sized to continuously maintain safe operation at full load and at 1150°F ambient air at the radiator core. A blower type fan will be furnished. The fan and all rotating members and drive belts shall be guarded and meet OSHA standards.
- E. Block Heater: A jacket water heater will be provided to maintain engine coolant temperature between 90°-120°F. in an ambient of 30°F. The heaters shall be thermostatically controlled. Voltage shall be 120 volt, single phase unless indicated otherwise on plans.

2.4 EXHAUST SYSTEM:

The engine shall have a single exhaust outlet for installation ease. A critical grade silencer and stainless steel bellows type flexible section shall be furnished complete with all gaskets and hardware. The silencer shall be mounted as a complete system to the weather protective enclosure.

2.5 FUEL SYSTEM:

Provide five (5) gallon day tank with level switch and alarm base mount fuel tank complying with NFPA 37 requirements, and UL Listed rated 48 hours of run time dual contained sub-base tank with low level and leak detector switches, 5 gallon overflow/spill basin, 2" lockable fill cap, vent caps for normal and emergency venting extended as required per local code.

2.6 MOUNTING:

The engine and generator shall be soft mounted to the base, minimizing transmission of vibration to the package.

2.7 GENERATOR AND CONTROLS:

A. Construction: The generator shall be manufactured and packaged by the engine manufacturer to insure proper performance and effect a single source of responsibility. The generator shall be rated as per drawings, and conform to NEMA standards for temperature rise and construction. Total harmonic content in the generator shall be less than 5% measured line-to-line at rated voltage on an open circuit. No single harmonic shall exceed 3%.

B. Voltage Regulator: The voltage regulator shall be solid-state, volts per hertz type. It shall be mounted in the generator providing +/-1% no load to full load regulation. Adjustable controls for voltage droop, level and gain shall be provided. Voltage level adjustment shall be -25% to +10%. The regulator shall incorporate built-in under voltage and an under frequency protection for the voltage regulator and generator. It shall have parallel capability, TIF less than 50, and EMI/RFI suppression to commercial standards.

C. Circuit Breaker: A main line circuit breaker shall be installed in a generator mounted NEMA 1 cabinet that can be easily accessed by removing one (1) of the lockable weather protective doors of the generator enclosure. The rating shall be as shown of the drawing. The circuit breaker shall be UL listed and conform to NEMA and NEC standards. Load lugs shall be provided to accept conducted size and quantity as shown on the drawings. A fully rated, isolated neutral and ground lug shall be provided.

D. Control Panel: The control panel shall be designed and built by the engine/generator set manufacturer and shall incorporate 100% solid state circuitry, microprocessor control, sealed dust tight, watertight modular components, and digital instrumentation. The panel shall be shock mounted to the generator and labeled with ISO symbols. The panel shall include the following equipment:

1. Safety Devices:

One (1) ISO red emergency stop pushbutton.

2. Generator AC Output Metering Devices:

Three (3) backlit LCD displays for volts, hertz and amperes in one (1) environmentally sealed module. Numeral height shall be 0.5% accuracy for voltage and current and 0.3% accuracy for a frequency throughout a temperature range of -40°C to +70°C.

3. Silenceable alarm horn to annunciate shutdowns for overspeed, low oil pressure, high water temperature and overcrank.

1 E. Excitation: Permanent magnet excitation.

2
3 2.8 STARTING SYSTEM:

4
5 A. Starter: The unit shall be equipped with a 24V DC starting motor, a starter relay and an
6 automatic reset circuit breaker in case of butt engagement.

7
8 B. Battery System: The starting batteries shall be the lead acid type, rubber cased with removable
9 fill caps. The batteries shall be mounted to the generator set base, and provide with seismic
10 rated anchorage. Required cables and lugs shall be furnished of the proper size.

11
12 C. Battery Charger: A solid state battery charger of current limiting design shall be provided with
13 DC voltmeter and ammeter. The charger shall maintain batteries by automatically tapering
14 output amperage as dictated by battery condition. Input shall be 120 VAC, single phase, with
15 output of 5 ampere minimum at 24 volts DC. The battery charger shall have an undervoltage
16 alarm and contacts. The input power shall be fused or circuit breaker protected. The battery
17 charger shall be mounted in the generator set enclosure.

18
19 2.9 OPERATION:

20
21 Upon power outage the transfer switch shall signal the engine-generator to start. When
22 generator output reaches approximately 90% rated voltage and speed, load shall be transferred
23 from the normal to the emergency source. Maximum time for generator on-line shall be ten (10)
24 seconds. Upon return of normal power, the transfer switch shall transfer load to the utility bus
25 and engine shall start into a cool down period. This period shall be automatically overridden in
26 the event of an additional utility failure. The cool down shall last five (5) minutes.

27
28 2.10 OPERATING SYSTEMS:

29
30 Filtering systems shall be adequate for a minimum of 200 hours of engine operation under
31 normal conditions. Furnish any special tools required for routine maintenance. Provide sufficient
32 lube oil and air cleaner elements for first change. Exposed parts which are subject to high
33 operating temperatures or which are electrically energized, and moving parts which may
34 constitute a hazard to operating personnel shall be insulated, enclosed or guarded. Provide the
35 unit with the initial fill of lubricating oil together with 50% solution of ethylene glycol antifreeze for
36 cooling system.

37
38 2.11 ENCLOSURE:

39
40 The engine/generator assembly and components shall be equipped with a weather protective
41 sound attenuated enclosure constructed of steel sheet metal. It shall be designed,
42 manufactured and assembled by the engine manufacturer and carry the same warranty as the
43 engine. It shall be properly primed and finished for extended wear. The doors shall be able to
44 be locked. The doors shall be easily removable. The enclosure shall provide a Level II 76dB(A)
45 maximum sound attenuation.

46
47 2.12 AUTOMATIC TRANSFER SWITCH:

48
49 Furnish and install freestanding automatic transfer switch, of size indicated on drawings. Switch
50 shall be enclosed in a code gauge steel housing of NEMA 1 construction. Provide transfer
51 switch that is fully compatible with Emergency Generator, as manufactured by Kohler, ASCO,
52 Russelectric, or approved equivalent.

- A. The automatic transfer switch shall consist of a power transfer module and a control module interconnected to provide complete automatic operation. The automatic transfer switch shall be mechanically held and electrically operated by a single-solenoid mechanism energized from the source to which the load is to be transferred. The switch shall be rated for continuous duty and be inherently double throw. The switch shall be mechanically interlocked to ensure only one of two possible operations - normal or emergency. The automatic transfer switch shall be suitable for use with emergency sources such as an engine or turbine generator source or another utility source.
- B. All main contacts shall be of silver composition. They shall be protected by arcing contacts in sizes 400 amperes and over. They shall be of the blow-on configuration and of segmented construction in ratings 600 amperes and over. The operating transfer time in either direction shall not exceed one-sixth (1/6) of a second.
- C. All contacts, coils, springs, and control elements shall be conveniently removable from the front of the transfer switch without major disassembly or disconnection of power conductors.
- D. The control module shall be supplied with a protective cover and be mounted separately from the transfer switch for ease of maintenance. Sensing and control logic shall be solid state and mounted on plug-in printed circuit boards. Printed circuit boards shall be keyed to prevent incorrect installation. Interfacing relays shall be industrial control grade plug-in type with dust covers.
- E. Automatic transfer switches utilizing components of molded case circuit breakers, contactors, or parts thereof which have not been intended for continuous duty or repetitive load transfer switching are not acceptable.
- F. The automatic transfer switch shall conform to the requirements of NEMA Standard ICS 2-447 and Underwriters' Laboratories UL-1008 and shall be UL listed as follows:
 1. For use in emergency systems in accordance with Articles 517 and 700 of the California Electrical Code.
 2. Rated in amperes for total system transfer including control of motors, electric-discharge lamps, electric-heating and tungsten-filament lamp loads as referred to in Paragraph 30.9 of UL 1008.
 3. Transfer switch rated 400 amperes and less shall be suitable for 100% tungsten-filament lamp load. Switches rated above 400 amperes shall be suitable for 30% or 400 amperes tungsten-filament lamp load, whichever is higher.
- G. The automatic transfer switch shall be rated to withstand the RMS symmetrical short circuit current available at the automatic transfer switch terminals with the type of overcurrent protection, voltage and X-R ratio shown on the plans.
- H. Operation:
 1. Two pole switches shall be used for single phase service and three pole switches for three phase service. Neutral conductor terminal lugs shall be provided as required for the power system.
 2. The automatic transfer switch control panel for single phase and for three phase shall utilize solid state sensing on normal and emergency for automatic, positive operation. The following shall be provided:
 - a. For single phase switches, the normal source voltage across live lines shall be monitored, and for three phase switches all phases of the normal shall be monitored line-to-line. Close differential voltage sensing shall be provided. The

- pickup voltage shall be adjustable from 85% to 100% of nominal and the dropout voltage shall be adjustable from 75% to 98% of the pickup value. The transfer of emergency will be initiated upon reduction of normal source to 85% of nominal voltage and retransfer to normal shall occur when normal source restores to 95% of nominal.
- b. A time delay to override momentary normal source outages to delay all transfer switches and engine starting signals. The time delay shall be field adjustable from 0.5 to 6 seconds and factory set at 1 second.
 - c. A time delay on retransfer to normal source. The time delay shall be automatically bypassed if the emergency source fails and normal source is available. The time delay shall be field adjustable from 0 to 30 minutes and factory set at 30 minutes.
 - d. An unloaded running time delay for emergency generator cool down. The time delay shall be field adjustable from 0 to 5 minutes and factory set at five (5) minutes.
 - e. A time delay on transfer to emergency. Initially set at zero but field adjustable up to five (5) minutes for controlling timing of load transfer to emergency, where indicated.
 - f. Independent single phase voltage and frequency sensing of the emergency source. The pickup voltage shall be adjustable from 85% to 100% of nominal. Pickup frequency shall be adjustable from 90% to 100% of nominal. Transfer to emergency upon normal source failure when emergency source voltage is 90% or more of nominal frequency is 95% or more of nominal.
 - g. A contact that closes when normal source fails for initiating engine starting, rated 10 amps, 32 VDC. Contacts to be gold plated for low voltage service.
 - h. A contact that opens when normal source fails for initiating engine starting, rated 10 amps, 32 VDC. Contacts to be gold plated for low voltage service.
 - i. A white signal light to indicate when the automatic transfer switch is connected to the normal source. A yellow signal light to indicate when the automatic transfer switch is connected to the emergency source.
 - j. One (1) auxiliary contact that is closed when automatic transfer switch is connected to normal, and one (1) auxiliary contact that is closed when automatic transfer switch is connected to emergency. Rated 10 amps, 480 volts, 60 Hz AC.
 - k. A test switch to momentarily simulate normal source failure.
 - l. Harnessing between transfer switch and control panel shall have built-in disconnect for routine maintenance.

PART 3 EXECUTION

3.1 TESTING:

- A. Manufacturer's Shop Tests: The generator set shall be tested for proper operation prior to delivery. Standard factory full load tests shall be performed. The supplier shall submit standard test reports with operation and maintenance materials.
- B. Jobsite Testing: The equipment supplier shall test the installed generator set with resistive load bank. The unit shall be tested at 50% load for one (1) hour, and 100% rated load for one-half (½) hour. All starting and shutdown systems will be demonstrated. The suppliers' standard test form shall be used with readings made and recorded every fifteen (15) minutes. A copy of the test report along with the operation guide and wiring diagrams shall be submitted within ten (10) days after performance of the job site test.
 - 1. In presence of the Engineer or Owner's Representatives, test emergency systems, by means of simulated power outage, utilizing full load sized resistive load banks, automatic

start-up by remote-automatic starting, transfer of load, and automatic shutdown. Prior to these tests, adjust transfer switch timers for proper system coordination.

3.2 ANCHORAGE:

- A. Units shall be anchored to a 12" thick concrete equipment pad with OSA approval type vibration isolators. Concrete pad shall extend a minimum of six (6) inches beyond all sides of generator skid or enclosure and shall set four (4) inches above adjacent grade.
- B. Pad shall be reinforced with 6x6/6x6 WWF set four (4) inches below top.

3.3 MOUNTING:

All components other than the automatic transfer switch will be either engine/generator mounted or mounted within the weatherproof enclosure. All batteries will be in earthquake racks.

3.4 INSTALLATION OF TRANSFER SWITCHES:

- A. Install transfer switches, including associated control devices as indicated, in accordance with equipment manufacturer's written instructions, and with recognized industry practices, to ensure that transfer switches comply with requirements. Comply with applicable requirements of NEC and NFPA pertaining to wiring practices and installation of electrical power transfer switches.
- B. Tighten electrical connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Standards 486A and B.
- C. Provide equipment grounding connections for transfer switch units as indicated. Tighten connectors to comply with tightening torques specified in UL Std 486A to assure permanent and effective grounding.

3.5 FIELD QUALITY CONTROL:

- A. Testing Company Tests: Prior to energization, provide independent testing company test and certification of the indicated components of the Generator System in accordance with the following NETA Acceptance Testing Specifications Sections:

- 1. Section 7.22.1 Visual and Mechanical Inspection
- 2. Section 7.22.2 Protective Relays
- 3. Section 7.22.4.1 Automatic Transfer Switch Visual and Mechanical Inspection

- B. Supplier Tests: Prior to energization, perform the following tests:

- 1. Furnish and install test equipment and materials and perform load bank test in accordance with the following schedule:

25% rated for 30 minutes
50% rated for 30 minutes
75% rated for 30 minutes
100% rated for 3 hours

Record voltage, frequency, load current, oil pressure, and coolant temperature at periodic intervals during test.

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2. Perform automatic transfer tests to:
 - a. Simulate loss of normal power
 - b. Return to normal power
 - c. Simulate loss of emergency power
 - d. Simulate all forms of single-phase conditions.
 3. Monitor and verify correct operation and timing of following simulations:
 - a. Normal voltage sensing relays
 - b. Engine start sequence
 - c. Time delay upon transfer
 - d. Automatic transfer operation
 - e. Interlocks and limit switch function
 - f. Time delay and retransfer upon normal power restoration.
 - g. Engine cool down and shutdown feature.

END OF SECTION 26 51 00

SECTION 26 92 40 - AC VARIABLE FREQUENCY DRIVES WITH LINE AND LOAD
REACTORS/FILTERS

PART 1 GENERAL

1.1 SCOPE

- A. This section provides specification requirements for inverter type adjustable frequency variable speed heavy duty drives or herein identified as VFD drives for use with standard inverter duty NEMA AC motors.
- B. The Electrical Contractor shall furnish, test, install and place into satisfactory operation all AC drives, with spare parts as specified.
- C. The manufacturer shall have a nationwide field service and technical support organization available 24 hours a day from an 800 telephone number. Capabilities shall include factory coordinated start-up service and on-site training of customer personnel. Replacement drives shall be stocked in a location within a 24-hour delivery time to the job site.

1.2 RELATED SECTIONS

- A. Section 26 92 00 Motor Control Center

1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's technical product data to include, but not limited to, the following: voltage, phase, amperage ratings, and short-circuit withstand rating.
- B. Shop Drawings: Submit layout drawings providing overall dimensions, mounting requirements, and location of field wiring terminations.
- C. Maintenance Data: Submit maintenance data including "trouble-shooting" maintenance guide and parts list.

1.4 MANUFACTURER'S EXPERIENCE

- A. The manufacturer shall have been specialized in the production of this type of equipment for a period of at least five (5) years. The AC drive(s), programmable logic controllers and other electrical gear herein specified, shall be supplied and manufactured by the AC drive manufacturer who shall coordinate and verify their operation.

1.5 QUALITY ASSURANCE

- A. Every VFD drive unit shall be designed, constructed and tested in accordance with NEMA, UL, NEC and IEEE recommendations. Every VFD drive and all supplied options shall be UL approved and listed according to UL 508. The controller shall have a UL listed label attached inside the enclosure as verification. The VFD will be NEMA rated and labeled for the horsepower served.
- B. The VFD type drive shall be tested with an actual motor load and temperature cycled within an environmental chamber at 122°F (50°C). The frequency output and voltage will be varied throughout the test. Documentation shall be furnished to verify successful completion at the request of the Engineer.

PART 2 PRODUCTS

2.1 MANUFACTURER

- A. Variable speed drives will be Allen Bradley, Cutler Hammer, or Square D. No others are acceptable unless approved by owner.

2.2 DESIGN

- A. The VFD drive shall convert the input VFD main power to an adjustable frequency and voltage. The output frequency and voltage of the VFD drive shall be adjustable to maintain a constant V/Hz ratio throughout the operating range. The VFD drive shall be designed to operate from 460v, three phase, 60 Hz main supply that is within +10%, -10% of nominal line voltage.

- B. Designs that incorporate silicon controlled rectifiers (SCRs) will not be allowed. The DC bus voltage shall be filtered. The rectifier shall be insensitive to the phase rotation of the AC line and shall not cause a displacement power factor of less than .95 lagging under any speed or load condition.

- C. The inverter shall change fixed DC voltage to variable frequency VFD for application to a standard inverter duty NEMA motor. Paralleling of inverter power devices to increase current rating is not acceptable.

- D. Alternate adjustable frequency control drive techniques other than pulse width modulated (PWM) technology will not be considered for motors of 500 horsepower and less.

- E. The VFD drive shall be capable of operating into an open circuit without damage in order to facilitate start-up/maintenance.

2.3 MOTOR DATA

- A. The VFD drive shall be designed to operate a standard inverter duty NEMA electrical motor with a nameplate rating of 460v, three phase power, full load amps as supplied, at 100% load factor.

1. Motors shall be designed for operation with variable frequency drives. The motor will meet NEMA standard MG1-1993, Part 31.40.4.2. This standard states that the motor should be designed for a peak voltage of 1600 volts at a minimal rise time of 0.1 microseconds for motors rated less than 600 volts.

2.4 RATINGS

- A. The VFD drive shall be capable of supplying 150% of rated full load current for one minute at maximum ambient temperature. The VFD drive unit and not just the fuses shall be rated for installation in a power system capable of delivering up to 65,000 RMS symmetrical amperes.

- B. The VFD drive shall be capable of operating within -10% to +10% of nominal input voltage rating. The minimum displacement power factor shall be 0.95 throughout the entire speed range. The VFD drive shall be capable of operating without damage with the motor disconnected.

- C. The VFD drive efficiency shall be 97% or greater at full speed.

D. The drive shall be rated to operate at 50°C ambient air temperature. The drive enclosure will be cooled by redundant cooling fans to ensure the air at the drive electronics does not exceed the 50°C rating with an ambient air temperature of 45°C. Drive mounting shall have the heat sink externally mounted from the electronics enclosure with dedicated cooling fans for the heat sink. The drive shall have a high temperature shutdown to turn off drive when maximum operating temperature is reached. Maximum temperature is the highest temperature the drive can run at without component degradation or failure.

E. The drive will be rated to withstand vibration levels of .006 inches displacement with 1G peak intensity. The drive will be rated to withstand shock of 15G peak for 11 MS duration.

F. The input drive frequency tolerance shall be from 48 to 62 hertz.

2.5 ADJUSTMENTS

A. Programmable operating parameters shall be available for all functions through a local programming and display panel.

B. A communication interface shall be provided for a PLC Ethernet Protocol.

2.6 PROTECTION

A. An adjustable instantaneous over current trip of 220 to 300% of rated output current shall be available

B. Subjecting the controller to any of the following conditions shall activate electronic protective circuits and eliminate component failure or the need for fuse replacement:

1. Short circuit at VFD drive output
2. Ground fault at VFD drive output
3. Open circuit at VFD drive output
4. AC input under voltage and over voltage
5. DC bus over voltage and under voltage
6. Power ride-thru of 15 milliseconds minimum
7. AC line switching transients up to 6000 volts peak per IEEE C62.41-1991
8. Instantaneous current limit
9. Drive over current trip
10. Over temperature/Heat sink thermistor
11. Logic control ride-thru .5 seconds minimum

2.7 CONTROL OPTIONS

A. All operator control options shall be mounted to the front panel, which is integral to the VFD drive. The VFD drive will automatically restart in either Hand or Automatic without the operator giving a manual start command. Supply with VFD:

1. Manual speed adjustment.
2. Hand-Off-Auto (HOA) switch.
3. The controller shall accept a 4-20 ma input signal from the PLC as an automatic speed reference signal when the controller is in the automatic mode of operation. The manual speed potentiometer will control the VFD drive frequency when the switch is in manual mode.

2.8 OPERATION FEATURES

- A. The VFD drive shall have the option of manual or automatic reset after faults.
- B. The VFD drive shall be capable of restarting into a motor coasting in either forward or reverse direction without component failure or tripping off line. The VFD drive shall include static reversing which shall change the output phase rotation to reverse the motor rotation.
- C. A slip compensation circuit for loads shall be included which will sense changing motor load conditions and adjust output frequency to provide speed regulation of standard NEMA motors within $\pm 0.5\%$ of maximum speed without tachometer feedback.
- D. The VFD drive shall include external fault reset capability. All the necessary logic to accept an external fault reset contact shall be included.

2.9 PILOT DEVICES

- A. All operator control options will be mounted to the dead front panel of the drive enclosure cabinet.

Front panel pilot lamps.

- 1. Power On Light.
- 2. Drive Run Power Light.
- 3. Drive Fault Pilot Light.

- B. Meters.

- 1. Digital speed meter with selectable ranges from (% of speed, rpm or Hz).
- 2. Digital output ammeter calibrated 0-150% of current.

2.10 CONTROL REQUIREMENTS

- A. Isolated follower with set point control 4-20ma dc with PI control from isolated ground signal or alternately a communication interface for control

- B. Relays

- 1. A start relay shall allow the drive to be remotely started via a 120v ac input.
- 2. A drive run relay shall provide a dry contact closure for remote monitoring.
- 3. A drive fail relay shall provide a dry contact closure for remote monitoring.

2.11 HARMONIC ANALYSIS AND POWER CONDITIONING

- A. Line reactors designed to limit harmonic distortion to less than IEE 519 requirements (5)% shall be provided, installed, and connected.
- B. If motor cable length exceeds 40 feet a load side reactor/filter will be included in the installation. This is to prevent voltage reflection and limit voltage spikes to less than cable and motor voltage ratings.

1 PART 3 EXECUTION

2 3.1 STARTUP

3 The services of a qualified technician shall supervise the installation, testing, and start-up of
4 all the VFD drives furnished under this specification.

5

1

2

END OF SECTION

SECTION 26 96 09 – ELECTRICAL COMMISSIONING AND FIELD TESTING AND NFPA 70E
REQUIREMENTS

PART 1 GENERAL

1.1 REFERENCES

A. General

1. Related Sections – 01 81 00 Project Commissioning
2. The publications listed below form a part of this specification to the extent referenced.
3. Where a date is given for reference standards, the edition of that date shall be used.
Where no date is given for reference standards, the latest edition available on the date of the Notice Inviting Bids shall be used.
4. "Engineer" and EOR (Engineer of Record) = same designation.

B. American National Standards Institute (ANSI)

C. Institute of Electrical and Electronics Engineers, Inc. (IEEE)

1. IEEE 400, Guide for Making High-Direct-Voltage Test on Power Cable Systems in the Field
2. IEEE 519, Guide for Harmonics Control in Electrical Power Systems

D. National Electrical Testing Association (NETA)

E. National Fire Protection Association (NFPA)

1. NFPA 70, National Electrical Code (NEC)

F. Electronics Industry Alliance/Telecommunications Industry Association (EIA/TIA)

1. TIA/EIA-568-B.1, B.2, B-2-1, B.3 - Commercial Building Telecommunications Cabling Standard
2. TIA/EIA-569-B - Commercial Building Standard for Telecommunications Pathways and Spaces
3. TIA/EIA 606A - Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
4. EIA/TIA 607A - Commercial Building Grounding and Bonding Requirements for Telecommunications
5. EIA -310-D - Cabinets, Racks, Panels, and Associated Equipment

G. Federal Communications Commission (FCC) part 15, part 68 and part 76

H. Rural Electrification Association (REA), Bulletin 345-63, REA Standards for Acceptance Tests and Measurements of Telephone Plant

1.2 SUBMITTALS

- A. Submit in accordance with Section 01300. Submittals will include completed test reports.
- B. Test procedures will adhere to NETA (National Electrical Testing Associations), NEMA, IEEE, other applicable industry standards, and/or specific requirements added by the EOR. It will be the contractor's responsibility to provide personnel to carry out and/or assist with these procedures and rectify issues as they are discovered. Test procedures shall include but not be limited to:
 1. Detailed procedures in sufficient detail to verify conformance with these Specifications.

2. Incorporation of the Test Record Sheets included at the end of this Section. Use of pre-formatted test forms and/or test results by manufacturers instrumentation software is not permitted unless pre-approved by the EOR.
3. Detailed comprehensive testing schedule including:
 - a. Electrical testing of each major process area.
 - b. Each major piece of electrical distribution equipment.
 - c. Each major electrical subsystem.
 - d. Duration of each test.
 - e. Milestone test completion date.
 - f. Coordination with the master construction schedule.
 - g. Date of test results submittals following completion of the tests.
 - h. Names and qualifications of the individual(s) responsible for performing the testing.
4. Submit six (6) like complete lists(s) of Procedures and Test Results. Tab in logical order per Voltage/Phase (descending), cables (identified "from and to"), panels with relays descending order), and all other miscellaneous equipment and systems. Submit in punched individual sheets in three-ring binders with spline identification and title sheet, index, references, and tabbed data.
- C. Following completion of the test submit the completed test results to the EOR for review. The results shall include a dedicated section with the "as-left" settings of all devices, relays, circuit breakers, system software, relay program software with PDF copy on thumb drive (one (1) per each of six (6) packages), etc.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 GENERAL

- A. Upon completion of various phases of the project all new electrical equipment, wiring and cabling systems shall be tested in accordance with these specifications.
- B. The Engineer reserves the right to witness all tests and shall be notified at least 5 days prior to testing.
- C. All test results shall be recorded on the attached Test Record Sheets or Contractor-equivalent that are acceptable to the Engineer (see Section 269609, 1.2 SUBMITTALS). Test records shall be submitted to the Engineer.
- D. High potential tests shall not be repeated without authorization by the Engineer.
- E. The tests shall be documented on the Test Record Sheets. The checks and tests that are required shall include, but not be limited to the following:
 1. Visually check all wire and cable connections
 2. Check all AC and DC control circuits for short circuits and extraneous grounds
 3. Functional test of power, control, and lighting circuits
 4. Functional test of electrical signal and alarm systems
 5. Continuity tests of all 600-volt power and control circuits
 6. Check grounding system
 7. Check current transformer ratios and continuity of the secondary circuits by passing current through the primary windings and taking readings of the primary current and of the current flowing through the meter, relay, and instrument coils in the secondary circuits.
 8. Checks shall be performed to determine the proper functioning of all switches, circuit breakers, relays, starters, and other items including control interlock and sequence circuits. All necessary adjustments shall be made on apparatus in accordance with the manufacturer's instructions and design requirements. Alarm systems and circuits shall

- 1 be tested by manually operating the initiating devices. Relays and control components
2 that may prove to be sluggish or otherwise unreliable shall be repaired and replaced as
3 necessary.
- 4 9. Special tests will be required on equipment if they are recommended by manufacturers.
- 5 F. All safety rules and precautions shall be followed.
- 6 3.2 TESTS ON POWER, CONTROL, INSTRUMENTATION, AND LIGHTING CIRCUITS
- 7 A. Perform continuity checks of all power, control, and instrumentation cables including each
8 conductor of multiconductor and multipair cables.
- 9 B. Verify wire numbers. Verify that actual wiring conforms to the construction drawings.
- 10 C. Conductor ends shall be clean, dry, and guarded for personnel safety during testing. Circuits
11 in the immediate vicinity that are not under test shall be grounded.
- 12 D. Perform insulation resistance tests on 600-volt power cables. Testing shall be for one minute
13 using 1,000 VDC.
- 14 E. Perform insulation resistance test on medium voltage power cable. Testing shall be 1 minute
15 using 2,500 VDC for 5 kV cables, 5,000 VDC for 15 kV cables, 7,500 VDC for 21-25 kV
16 cables.
- 17 F. Each conductor in a multiconductor or multipair cable or conduit shall be tested against
18 ground with the conduit and conductor to conductor.
- 19 G. Circuit testing shall be as follows:
- 20 1. Motor control circuits tested and verified for proper operation with control stations and
21 overcurrent devices connected.
- 22 H. Prior to performing insulation resistance tests on cables, verify that they are not connected to
23 a solid state device or any other connection not rated for test voltage.
- 24 I. The Engineer shall be consulted if minimum insulation values per IEEE and/or NEMA cannot
25 be obtained.
- 26 J. Alarm conditions shall be simulated for each alarm point, and alarm indicators shall be
27 checked for proper operation.
- 28 K. Metering and indication lights for motors and other devices shall be tested for proper
29 operation.
- 30 L. All control circuits such as bus paralleling, motor, interlock and remote shall be tested for
31 proper operation.
- 32 3.3 PROTECTIVE RELAYS INSPECTION AND TEST PROCEDURES
- 33 A. Visual and Mechanical Inspection
- 34 1. Compare equipment nameplate data with drawings and specifications.
- 35 2. Inspect relays and cases for physical damage. Remove shipping restraint material.
- 36 3. Tighten case connections. Inspect cover for correct gasket seal. Clean cover glass.
37 Inspect shorting hardware, connection paddles, and/or knife switches. Remove any
38 foreign material from the case. Verify target reset.
- 39 4. Set relays in accordance with Relay settings sheets.
- 40 B. Electrical Tests
- 41 1. Perform insulation-resistance test on each circuit-to-frame. Determine from the
42 manufacturer's instructions the allowable procedures for this test for solid-state and
43 microprocessor-based relays.

- 1 2. Inspect targets and indicators.
 - 2 a. Determine pickup and dropout of relay targets.
 - 3 b. Verify operation of all light-emitting diode indicators.
 - 4 c. Set contrast for liquid-crystal display readouts.
 - 5 d. Test and record for minimum trip on all taps and leave on tap to be used. Submit
 - 6 recorded test data to Engineer.
 - 7 e. The minimum trip accuracy for protective relays is +/-5% and the time curve
 - 8 calibration is +/-% from manufacture's rating and curves for the particular relay.
 - 9 f. Primary overall test for each phase and from each source.
- 10 C. Functional Operation
 - 11 1. 27 - Undervoltage Relay or Element in Multifunction Relays
 - 12 59 - Overvoltage
 - 13 a. Determine dropout voltage.
 - 14 b. Determine time delay.
 - 15 c. Determine the time delay at a second point on the timing curve for inverse time
 - 16 relays.
 - 17 2. 32 - Reverse Power Relay or Element in Multifunction Relays
 - 18 a. Determine minimum pickup at maximum torque angle.
 - 19 b. Determine closing zone
 - 20 c. Determine maximum torque angle
 - 21 d. Determine time delay
 - 22 e. Verify the time delay at a second point on the timing curve for inverse time delay
 - 23 3. 46 - Current Balance Relay or Element in Multifunction Relays
 - 24 a. Determine pickup of each unit.
 - 25 b. Determine percent slope.
 - 26 c. Determine time delay.
 - 27 4. 47 - Phase Sequence or Phase Balance Voltage Relay or Element in Multifunction
 - 28 Relays
 - 29 a. Determine positive sequence voltage to close the normally open contact.
 - 30 b. Determine positive sequence voltage to open the normally closed contact
 - 31 (undervoltage trip).
 - 32 c. Verify negative sequence trip.
 - 33 d. Determine time delay to close the normally open contact with sudden application of
 - 34 120 percent of pickup.
 - 35 e. Determine time delay to close the normally closed contact upon removal of voltage
 - 36 when previously set to rated system voltage.
 - 37 5. 49T - Temperature (RTD) Relay or Element in Multifunction Relays
 - 38 a. Determine trip resistance.
 - 39 b. Determine reset resistance.
 - 40 6. 50 - Instantaneous Overcurrent Relay or Element in Multifunction Relays
 - 41 a. Determine pickup.
 - 42 b. Determine dropout.
 - 43 c. Determine time delay.
 - 44 7. 51 - Time Overcurrent (51C, 51V) or Element in Multifunction Relays
 - 45 a. Determine minimum pickup.
 - 46 b. Determine time delays at two points on the time current curve.

8. 81 - Frequency Relay (Over and Under) or Element in Multifunction Relays
 - a. Determine overfrequency pickup.
 - b. Determine overfrequency time delay.
 - c. Determine underfrequency pickup.
 - d. Determine underfrequency time delay.
 9. XX – other relays or functions as noted in plans and specifications.
 - D. Control Verification
 1. Verify that each of the relay contacts performs its intended function in the control scheme including breaker trip tests, close inhibit tests, 86 lockout tests, and alarm functions.
 - E. System Tests
 1. After the equipment is initially energized, measure magnitude and phase angle of all inputs and compare to expected values.
 2. Test critical logic and controls including source transfer logic, tie breaker interlocks, generator starting and stopping, etc.
 - F. Test Values
 1. Use manufacturer's recommended tolerances when other tolerances are not specified.
 2. When critical test points are specified, the relay shall be calibrated to those points even though other test points may be out of tolerance.
- 3.4 GROUNDED SYSTEMS
- A. Relays and alarms for ground protection and system neutrals shall be tested and calibrated.
 - B. Earth resistance measurements shall be made by using "Megger" ground-tester in accordance with the manufacturer's instructions.
 - C. All ground rods and switchgear communication panels or boards, panel, motor control centers, switchboards, etc. with neutral bus disconnects.
 - D. All neutral busses with protective devices in "OFF" and ground bus disconnected.
 - E. Submit a complete NFPA 70E Flash Hazard Analysis from point of electrical connection (normal utility derived power and/or on or off site self-generated power) to end of run last device being distribution panel, motor disconnect, motor combination starter or any device where Maintenance and Operation personnel have access of any kind to energized or switching ports or devices. (Use IEEE 1584, NFPA 70E 2015 Annex D.4 as standard.)
 1. Prepare and apply approved sunlight and ultra-violet resistant weatherproof tags to all equipment as applicable with all approach, minimum distance, clothing, class to be used, eye/face protection to be used and tag identification corresponding to identification number on study.

END OF SECTION

TEST RECORD SHEETS

The test record sheets listed below shall be used to record testing of electrical equipment and of the electrical installation as required by these specifications. Sample copies of each sheet are attached.

Sheet No.	Title
1	Insulation Resistance (Power, Control Wire, and Cable) Test Record.
2	Insulation Resistance (Instrument Wire and Cable) Test Record
3	DC High Potential (Medium Voltage Cable) Test Record
4	Ground Electrode Testing Test Record
5	Neutral Grounding Resistor Test Record WHEN USED.
6	Bonding Resistance Readings (Nonelectrical Equipment/Structures) Test Record
7	Bonding Resistance Readings (Electrical Equipment) Test Record
8	Insulation Resistance (Transformer) Test Record
9	Insulation Resistance (Equipment) Test Record
10	Insulation Resistance (Rotating Equipment) Test Record
11	Equipment Absorption Ratio and Polarization Index Test Record.
12	Record Feeder Breaker Test Record
13	Breaker/Contactor Test Record
14	Motor Circuit Test Record
15	Medium Voltage Motor Circuit Test Record
16	Electric Motor Run-In Test Record with all VFD or Soft Start Programming As-left, Minimum, Mid-Range, or Maximum Amps, Volts, Power Factor, Kilowatts, Kilo-Volt Amperes, and Input Harmonic Analysis at each Range

TEST EQUIPMENT: _____ TEST VOLTAGE: _____
 TEST EQUIPMENT: _____ TEST VOLTAGE: _____
 AMBIENT TEMPERATURE: °C °F DATE: _____

- NOTES:
1. Perform Insulation Resistance Test (megger) between each conductor and all other conductors and metallic sheath for cables with nonshielded conductors. Test between each conductor and shield for multiconductor cables with shielded conductors. Record lowest reading for each cable.
 2. Use 1,000-V test set for cable rated 600 volts and 2,500-V test set for cable rated over 600 volts.
 3. Readings will vary inversely with temperature and cable length. When the use of temperature correction factors is specified, attach a second sheet with computed values. Indicate on each sheet "measured" or "temperature corrected."

[illegible]

Resistance When Cable
Connected to Equipment
(ohms)

CONTRACTOR/Date

NOTES:

1. Record only the lowest value.
2. MP - Multi-pair cable. SP - Single pair cable.
3. Megger with instruments disconnected.
4. Use 250 volt (or lower voltage, when specified) range on DC test set.
5. Readings will vary with temperature and cable length.*

[illegible]

CONTRACTOR/Date

**DC HIGH POTENTIAL (MEDIUM VOLTAGE CABLE)
TEST RECORD**

CIRCUIT NUMBER: _____ REF. DWG.: _____
CABLE SIZE: _____ (SQ.MM.) _____ (MCM) FROM: _____ TO: _____
NUMBER OF CONDUCTORS: _____ NO. OF SPLICES: _____
CABLE LENGTH: _____ MANUFACTURER: _____
INSULATION TYPE: _____ THICKNESS: _____
JACKET MATERIAL: _____
WEATHER: _____ TEMP.: _____ °C _____ °F % HUMIDITY: _____ DATE: _____
TEST EQUIPMENT USED: _____

- NOTES: 1. The test voltage shown below shall be reached in 10 equal voltage increments.
2. After each voltage increase, the leakage current shall be allowed to stabilize during a 1-minute interval. If 1-minute intervals are insufficient to stabilize the current, the cable shall be discharged, and the test repeated with new time intervals of greater, but still equal duration.
3. Record the stabilized leakage current, in microamps, at the end of each time interval.
4. Allow the voltage to remain constant at the full test voltage and record the leakage current for 5 minutes for unshielded cables and 15 minutes for shielded cables.
5. Read test equipment instruction manual prior to testing cable.
6. When the plotting of test results is specified, attach the second sheet with separate plot for each phase. Note leakage current, in microamps, on "y" axis. Note step-voltage increase on "x" axis, followed by time, in minutes, for the dielectric absorption portion of the test.
7. All other phases and shields to be grounded.

Voltage hold time
at each step
_____ sec.

_____ kV	_____ kV	_____ kV	_____ kV	_____ kV	_____ kV	_____ kV	_____ kV	_____ kV	_____ kV	_____ kV	_____ kV
ØA ⁷											
ØB ⁷											
ØC ⁷											

RECORD LEAKAGE CURRENT IN MICROAMPS

Time at _____ Kv	SEC 30	MIN 1	MIN 2	MIN 3	MIN 4	MIN 5	MIN 6	MIN 7	MIN 8	MIN 9	MIN 10	MIN 11	MIN 12	MIN 13	MIN 14	MIN 15

CABLE-RATED VOLTAGE
(kilovolts)

TEST VOLTAGE
(kilovolts)

DISTRIBUTION: _____

CONTRACTOR/Date _____

REFERENCE DRAWING: _____

- [illegible]

CONTRACTOR/Date _____

**NEUTRAL GROUNDING RESISTOR
TEST RECORD**

TEST EQUIPMENT: _____ TEST VOLTAGE: _____

TEST EQUIPMENT: _____ TEST VOLTAGE: _____

NOTES: 1. Use 1,000-volt test set for 600-volt equipment and below, 2,500-volt test set for equipment rated over 600 volts.

2. Resistor must be disconnected from ground and neutral during Insulation Resistance (megger) and DC Overpotential Tests.

3. Resistor must be disconnected from neutral during Cold Resistance Test.

4. Apply DC Overpotential Test between terminals and ground for the complete device. (The voltage applied between the terminals of each assembly and its grounded enclosure shall be twice the rated AC voltage plus 1000 V when rated 600 V or less, or 2.25 times the rated AC voltage plus 2000 V when rated over 600 V for 1 minute. This test is a Pass/Fail test based purely on withstand alone.

5. Inspect assembly for damage and missing parts.

6. Check to assure that the center tap ratio is correct, when CT is supplied with resistor.

Verify resistor reterminated.

Tag. No.	Cold Res. (ohms)	Insul. Res. (megohms)*	Overpot. (4)	CT Ratio Pri-Sec	Reterm (4)	Initials/Date

*Minimum acceptable values:

VOLTAGE CLASS
(megohms)

INSULATION RESISTANCE

DISTRIBUTION: _____

CONTRACTOR/Date _____

2. Measure resistance from ground wire tap (or anchor bolt) to tagged equipment frame or structural steel.

[illegible]

CONTRACTOR/Date

1
2

NOTES: 1. Electrical equipment bonded to the main grounding system or dedicated ground rod, as indicated on drawings listed below.

2. Measure resistance from ground wire tap to tagged equipment bus bars, tagged equipment enclosures, and any other points indicated on the drawings.

[illegible]

CONTRACTOR/Date

1
2

SUBSTATION NO.: TEST EQUIPMENT:

- 7
8
9
10
11
12
13
14
15

[illegible]

16
17
18
19
20
21

RESISTANCE (megohms)

DISTRIBUTION:

22

6
7
8
9
10
11

NOTES: 1. Use 1,000-V test set for equipment rated 600 volts and below, 2,500/5,000-V test set for equipment rated over 600 volts.

2. For equipment with solid state control circuits, consult manufacturer's literature for maximum test voltages.

[illegible]

12
13
14
15
16
17
18
19
20

RESISTANCE

DISTRIBUTION:

21

EQUIP. TEMP., IF KNOWN: _____ °C _____ °F HOW KNOWN: _____

- NOTES: 1. Use 1,000-V test set for equipment 600-volt and below, 2,500/5,000-V test set for equipment rated over 600 volts.
2. Test duration shall be 1 minute, note if otherwise: _____.
3. Isolate all motor leads from one another and from frame, test phase separately, wherever practical.
4. Document testing of low voltage and medium voltage equipment on separate sheets.
5. Readings will vary inversely with temperature. When the use of temperature correction factors is specified, attach second sheet with computed values. Indicate on each sheet "measured" or "temperature corrected."

[illegible]

RESISTANCE (megohms)

CONTRACTOR/Date

**EQUIPMENT ABSORPTION RATIO
AND POLARIZATION INDEX
TEST RECORD**

TEST EQUIPMENT: _____ TEST VOLTAGE: _____
AMBIENT TEMPERATURE: _____ °C _____ °F DATE: _____
EQUIP. TEMP., IF KNOWN: _____ °C _____ °F REL. HUMIDITY: _____

NOTES: 1. Perform test as indicated on Test Records for each individual equipment type. Reference the following sheets:

Transformers 8
Equipment 9
Motors and Generators 10

2. Absorption Ratio = $\frac{\text{1-Minute Resistance Value}}{\text{30-Second Resistance Value}}$

3. Polarization Index = $\frac{\text{10-Minute Resistance Value}}{\text{1-Minute Resistance Value}}$

OHMS TO GROUND 30-SECOND READING ØA TO GROUND	OHMS TO GROUND 1-MINUTE READING ØA TO GROUND	OHMS TO GROUND 10-MINUTE READING ØA TO GROUND	DIELECTRIC ABSORPTION RATIO	POLARIZATION INDEX
OHMS TO GROUND 30-SECOND READING ØB TO GROUND	OHMS TO GROUND 1-MINUTE READING ØB TO GROUND	OHMS TO GROUND 10-MINUTE READING ØB TO GROUND	DIELECTRIC ABSORPTION RATIO	POLARIZATION INDEX
OHMS TO GROUND 30-SECOND READING ØC TO GROUND	OHMS TO GROUND 1-MINUTE READING ØC TO GROUND	OHMS TO GROUND 10-MINUTE READING ØC TO GROUND	DIELECTRIC ABSORPTION RATIO	POLARIZATION INDEX

TESTER'S INITIALS/DATE _____

DISTRIBUTION: _____

CONTRACTOR/Date _____

Sheet 12

**FEEDER BREAKER (480 V MCC)
TEST RECORD**

EQUIPMENT DESIGNATION			
LOAD (kW/kVA)		VOLTAGE	F.L.A.
CIRCUIT BREAKER MFG.		RATING	SETTING
CONDUCTOR SIZE	POWER	GROUND	

1. Check nameplate data of breaker against approved vendor drawings. _____
2. Check breaker components for cleanliness. _____
3. Check mechanical function of breaker. _____
4. Check wiring for proper identification. _____
5. Check conduits/cables for tagging. _____
6. Check components for identification. _____
7. Check equipment for conformance of area classification. _____
8. Check installation for seals, breathers, and drains. _____
9. Verify power conductor continuity. _____
10. Check that power cable insulation resistance test (megger) is completed. _____

DISTRIBUTION:

CONTRACTOR/Date _____

**BREAKER/CONTACTOR (480 V MCC)
TEST RECORD**

EQUIPMENT DESIGNATION			
LOAD (kW/kVA)	VOLTAGE	F.L.A.	
CIRCUIT BREAKER MFG.	RATING	SETTING	
CONTACTOR MFG.	SIZE		
CONDUCTOR SIZE	POWER	CONTROL	GROUND

1. Check nameplate data of breaker, contactor fuses and relays against approved vendor drawings.
2. Check main and auxiliary contacts.
3. Check contactor/breaker components for cleanliness.
4. Check control fuses, CPT rating, and coil voltage.
5. Check mechanical function of contactor and breaker.
6. Check wiring for proper identification.
7. Check conduits/cables for tagging.
8. Check components for identification.
9. Check equipment for conformance to area classification.
10. Check installation for seals, breathers, and drains.
11. Verify continuity of all power and control leads.
12. Check that power and control cable Insulation Resistance Test (megger) is completed.
13. Complete functional operation check of the control circuit using contract drawings and approved vendor drawings. Close and open the contactor using all control devices.

DISTRIBUTION:

FRESNO COUNTY – WEST ANNEX JAIL
FRESNO, CA

CONSTRUCTION DOCUMENT
DLR GROUP
75-25208-00

CONTRACTOR/Date _____

1

**460 V MOTOR CIRCUIT (480 V MCC)
TEST RECORD**

EQUIPMENT DESIGNATION		
MOTOR TAG NO.	VOLTAGE	F.L.A.
KW/HP	RPM	S.F.
CIRCUIT BREAKER MFG.	RATING	SETTING
STARTER MFG.	SIZE	O/L HTR. SIZE
C.T. RATIO	O/L RELAY SETTING	
CONDUCTOR SIZE	POWER	GROUND

1. Check motor starter for cleanliness. _____
2. Check nameplate data and tagging of motor starter components for conformance to approved vendor drawings. _____
3. Check conduits and/or cables for correct tagging. _____
4. Check equipment and installation for conformance to area classification. _____
5. Check main and auxiliary contacts of breaker and contactors. _____
6. Manually check mechanical operation of breaker, contactor, O/L relay, and O/L reset device. _____
7. Check continuity of power and control cables. _____
8. Complete functional operation check of the motor control circuit using the contract drawings and approved vendor drawings. Close and open the starter using all control devices. _____
9. Verify proper operation of motor winding space heater unit. _____

DISTRIBUTION:

FRESNO COUNTY – WEST ANNEX JAIL
FRESNO, CA

CONSTRUCTION DOCUMENT
DLR GROUP
75-25208-00

CONTRACTOR/Date _____

1

**MEDIUM VOLTAGE MOTOR CIRCUIT
TEST RECORD**

EQUIPMENT DESIGNATION	
MOTOR DESCRIPTION TAG NO. _____ MANUFACTURER _____ KW/HP _____ FLA _____	SERIAL NUMBER. _____ SERVICE FACTOR. _____ RATED VOLTAGE. _____
STARTER DESCRIPTION MANUFACTURER _____ CONTACTOR RATING _____ RATED CURRENT _____ FUSE SIZE. _____	C.T. RATIO _____ TYPE _____ RATED VOLTAGE _____ O/L RELAY SETTING _____
CONDUCTOR SIZE	POWER CONTROL GROUND

1. Check motor starter for cleanliness. _____
2. Check nameplate data and tagging of motor starter components for conformance to approved vendor drawings. _____
3. Check conduits and/or cables for correct tagging. _____
4. Check equipment and installation for conformance to area classification. _____
5. Check installation for seals, breathers, and drains. _____
6. Check main and auxiliary contacts of breaker and contactors. _____
7. Check mechanical operation of breakers, contactors, and relay and O/L reset devices. _____
8. Check continuity of power and control cables. _____
9. Verify calibration and setting of protective relays. _____
10. Check wiring to surge arrestors, capacitors, stator RTDs and current transformers. _____
11. Complete functional operation check of the motor control circuit using the contract drawings and approved vendor drawings. Close and open the starter using all control devices. _____

GENERAL COMMENTS

DISTRIBUTION: _____

CONTRACTOR/Date _____

**ELECTRIC MOTOR RUN-IN
TEST RECORD**

TEST EQUIPMENT: _____ REFERENCE DRAWING: _____

NOTES: 1. Duration of tests to comply with specifications.

TEST	REMARKS	INITIALS/DATE
RESISTANCE: Bonding resistance measured from motor frame to main ground/earth system tap. _____ ohms		
VOLTAGE: Actual voltage measured at Motor Control Center. _____ volts		
ROTATION CHECK: Bump motor to verify rotation. Motor to be uncoupled.		
NO LOAD CURRENT: At beginning of test _____ amps At end of test _____ amps		
TEMPERATURE OF BEARING: Check bearing for high temperature: Before start: 15 minutes after start 30 minutes after start 1 hour after start 2 hours after start 3 hours after start		
VIBRATION: Make visual inspection during run-test. Record any unusual vibration in remarks column.		
NOISE: Record any unusual noise in remarks column.		

DISTRIBUTION: _____ CONTRACTOR/Date _____

SECTION 27 05 48 - VIBRATION AND SEISMIC CONTROLS FOR COMMUNICATION SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. General provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

1.2 SUMMARY

A. Section Includes

1. Anchoring and restraints.

B. Related Sections

1. Section 271500 Communication Horizontal Cabling System
2. Section 275123 Intercom System
3. Section 280500.2 Security & Communication Conduit / Raceway Systems.

1.3 REFERENCES

- A. ASTM E2265 – Standard Terminology for Anchors and Fasteners in Concrete Masonry.

1.4 SYSTEM DESCRIPTION

A. Design Requirements

1. Provide seismic components for the following systems:

- a. Communications Horizontal Cabling
- b. Intercom System

2. Provide seismic restraints for the listed materials and equipment. The attachments shall resist forces to the center of gravity of the component. Criteria shall be the operating weight of the item times 0.5g for horizontal force to be applied in any direction. Wall-mounted or suspended components shall in addition, resist a downward force of 200 pounds minimum added to the operating weight.

3. The Importance Factor (I_p) of the above systems equals 1.5.

4. From structural sheet S1.1, the applicable seismic design parameters are as follows:

- a. Site Class D
- b. Occupancy Category I3.
- c. Seismic Design Category D.
- d. Refer to sheet S1.1 to conform these values.

1.5 SUBMITTALS

- A. Provide all required submittals under provisions of Section 013300.

- B. Submit proposed system to engineer for review prior to installation.

C. Project Information:

1. Submit seismic support calculations for all electrical equipment and conduit where isolation restraints are supplied.

2. Certification of seismic restraints.

- a. Substantiated by calculations or test reports verified by a professional structural engineer or equipment manufacturer.

D. Shop Drawings

1. Submit seismic restraint installation shop drawing prior to installation.

1.6 QUALITY ASSURANCE

- A. Racks and Conduits: ASCE 7 Guidelines, Chapter 13 "Seismic Design Requirements for Nonstructural Components".

- B. Anchor Bolts: All anchor bolts shall comply with ASTM A307.

- C. Certifications: All Seismic components shall be certified as appropriate for seismic installation by the manufacturer or by a delegated design professional as specified in specification section 013300 paragraph 2.2.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Acceptable Manufacturers:

1. Seismic Control Devices:

- a. Mason Industries.
b. Vibration Eliminator Co.
c. Korfund Dynamics Corp.
d. Amber-Booth Co.
e. Consolidated Kinetics.
f. Kinetics Noise Control

- B. Provide conduit and equipment anchoring systems as indicated in the Contract Documents.

- C. Provide all mounting hardware, support wires, conduits for alignment, eyebolts, bolts, nuts and washers required for equipment mounting and seismic control. Structural blocking/backing and hardware required for installation shall be provided as indicated in the Contract Documents.

2.2 ANCHORING AND RESTRAINTS

- A. Equipment Anchors:

1. Anchor all equipment in accordance with the approved shop drawings.
2. Contractor shall be responsible for design and acquiring of approval for anchoring of equipment where required by ASCE 7.

- B. Conduit Supports:

1. Conduits shall be supported and braced in accordance with ASCE 7 Chapter 13.
2. Conduits individually supported above finished floors with an importance factor of 1.5 and greater than 2.5 inches in diameter shall be provided with seismic restraints as required by ASCE 7, Chapter 13.
3. Trapeze supported conduits with a total weight exceeding 10 lb/ft shall be provided with seismic restraints as required by ASCE 7, Chapter 13.

- 1 4. Cable trays must be listed for seismic installation in accordance with ASCE 7, Chapter
2 13. Securely attach cable to tray at intervals equal to one half the cable tray support
3 spacing.

4 C. Device Support:

- 5 1. Provide independent seismic support system for all boxes not directly anchored to
6 concrete walls or concrete ceilings for the following:
7 a. Wireless Access Points.

8 D. Floor Mounted Racks:

- 9 1. Furnish and install seismic racks and attach per manufacture's installation instructions.
10 2. Furnish and install seismic restraints for shelf mounted computers, monitors, and any
11 other component not securely attached to the frame.

12 PART 3 - EXECUTION

13 3.3 INSTALLATION

- 14 A. Install in accordance with manufacturers' written instructions in a manner to achieve full
15 capacity of support.

16 END OF SECTION 27 05 48
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SECTION 27 15 00 – VOICE, DATA & VIDEO COMMUNICATIONS CABLING SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. General provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.
- B. The ESC, as defined in Section 280500 Common Work Results for Electronic Safety and Security, shall be responsible for coordinating the conduit and raceway system furnished and installed by Division 26.
- C. Section 270548- Vibration and Seismic Controls for Security Systems.

1.2 SUMMARY

- A. Furnish and install Transient Voltage Surge Suppression on all circuits, other than fiber-optic cable, which leave the building.
- B. Furnish and install all wire, cable, fiber optic cable, punchdown blocks, patch panels, racks, wire management, and miscellaneous hardware for a complete infrastructure backbone cabling system. Coordinate with owner the installation of owner provided computers, patch cables, switches, telephone wiring, and data wiring. All labeling of new areas shall be coordinated with the owner's representative.
- C. The infrastructure backbone cabling system shall include dedicated optic fibers for the telephone and data networks. The ESC is to furnish and install 48 Strands of single-mode fiber from the main jail to Telephone/IT Distribution room 0018. The telephone and data fiber network backbone shall consist of 12 strands of single-mode fiber with Standard Connector Angled Physical Contact (SC/APC) connectors from Telephone/IT Distribution room 0018 to all IDF rack locations.
 - 1. 12 strands of single-mode fiber from Telephone/IT Distribution room 0018 to Telecommunication room 1112.
 - 2. 12 strands of single-mode fiber from Telephone/IT Distribution room 0018 to Telephone/IT Distribution room 2202.
 - 3. 12 strands of single-mode fiber from Telephone/IT Distribution room 0018 to Telephone/IT Distribution room 3202.
- D. The Copper Horizontal Cabling shall be CAT6A cable from the nearest IDF/MDF cabinet to the field devices as indicated on the plans.
- E. The dedicated security optic fiber network shall consist of:
 - 1. 24 strands of OM3 50 micrometer multimode fiber from SEC 1156 to SEC 2252
 - 2. 24 strands of OM3 50 micrometer multimode fiber from SEC 1156 to SEC 3252
- F. The infrastructure shall include conduit and cabling for from each MDF/IDF to each dayroom for the owner furnished Distributed Antenna System. Refer to Specification Section 275320.

1.3 SCOPE OF WORK

- A. This section includes the minimum requirements for the equipment and cable installations in the main telephone and data rooms as well as the telephone/data boards in the security electronics

rooms and any remote locations. A fiber optic trunk will be routed from each area's IDF and MDF equipment rooms for a facility telephone and data Local Area Network (LAN). Inside the building, furnish and install outlet boxes and Category 6A cable for each communication outlet indicated. The owner will furnish and install all telephone and data equipment.

- B. Furnish and install outlets and CAT6A wiring for telephone, data, and wireless outlets as indicated on the plans. CAT6A is to be terminated on a rack mounted patch panel furnished and installed by the ESC in the following locations:

1. Telephone/IT Distribution room 0018
2. Telecommunication room 1112
3. Telephone/IT Distribution room 1105
4. Telephone/IT Distribution room 2202
5. Telephone/IT Distribution room 3202

- C. Furnish and install data outlets and CAT6A wiring for IP based Video Visitation equipment to be furnished and installed by the owner. CAT6A is to be terminated on a rack mounted patch panel furnished and installed by the ESC in the following locations:

1. Video Equipment room 1105
2. Telephone/IT Distribution room 2202
3. Telephone/IT Distribution room 3202

- D. Included in this section are the minimum composition requirements and installation methods for the following:

1. Equipment Racks
2. Optical Fiber Patch Panels
3. Fiber Optic Cabling
4. Category 6A UTP Patch Panels
5. Vertical Cable Management System
6. Horizontal Cable Management System
7. Modular Jacks – For Category 6A Channels
8. Faceplates – Flush
9. Cable

- E. All underground fiber optic and copper cabling shall be rated for wet locations.

- F. Color scheme:

1. Telephone, wireless, data jacks, and cabling shall be YELLOW in color.
2. Video Visitation cabling and outlets shall be ORANGE in color.
3. IP Video system cabling and outlets shall be GREEN in color. (refer to specification 282300.)
4. PLC system cabling and outlets shall be WHITE in color.
5. If telephone, wireless, data cabling is 'wet location rated' and is not YELLOW in color, then where the cable leaves the conduit place a three inch piece of YELLOW shrink tubing on the outer jacket. Once the cable enters the patch panel, place another three inch piece of YELLOW shrink tubing at the end of the jacket. This will help identify which system the cable applies too. Identify all CAT 6A wet rated cable in similar fashion on this project using specific color.
6. If IP Video camera CAT 6A cable is 'wet location rated' and is not GREEN in color, then where the cable leaves the conduit place a three inch piece of GREEN shrink tubing on the outer jacket. Once the cable enters the patch panel, place another three inch piece of GREEN shrink tubing at the end of the jacket. This will help identify which system the cable applies to.

- G. The ESC is to provide fiber and fiber terminations to the Fire Alarm Control Panels. Coordinate the terminations with the Fire Alarm Contractor.
- H. The ESC is to provide fiber and fiber terminations to the PLC and Audio Systems Network components.
- I. The ESC is to provide fiber, fiber terminations for owner furnished tele/data network switches. Refer to Part 2 for additional information. Coordinate installation with owner.
- J. The ESC is to provide fiber, fiber terminations for CATV distribution system. Coordinate signal source installation with owner in Main Jail Server Room 1026. Refer to Part 2 and Specification Section 274113 for additional information.

1.4 QUALITY ASSURANCE

- A. All equipment shall be installed neatly and in accordance with manufacturers' specifications. All methods of construction that are not specifically described or indicated in the contract documents shall be subject to the control and approval of the Owner or Owner's Representative. Equipment and materials shall be of the quality and manufacture indicated.
- B. Material and work specified herein shall comply with the applicable requirements of:
1. ANSI/TIA/EIA – 568-C and addenda: "Commercial Building Telecommunications Cabling Standard"
 2. ANSI/TIA/EIA – 569-B and addenda: "Commercial Building Standard for Telecommunications Pathway and Spaces"
 3. ANSI/TIA/EIA – 606-A and addenda: "Administration Standard for the Telecommunications Infrastructure of Commercial Buildings"
 4. ANSI/TIA/EIA – 607-B and addenda: "Commercial Building Grounding and Bonding Requirements for Telecommunications"
 5. ANSI/TIA/EIA – 526-7: "Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant"
 6. ANSI/TIA/EIA – 526-14-A: "Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant"
 7. IEC/TR3 61000-5-2 Ed. 1.0 and amendments: "Electromagnetic compatibility (EMC) – Part 5: Installation and mitigation guidelines – Section 2: Earthing and cabling"
 8. ISO/IEC 11801:2000 Ed1.2 and amendments: "Information Technology – Generic cabling for customer premises"
 9. CENELEC EN 50173:2000 and amendments: "Information Technology – Generic cabling systems"
 10. NFPA 70
 11. ISO – 11801
 12. BICSI Telecommunications Distribution Methods Manual
 13. FCC 47 CFR 68
 14. NEMA – 250
 15. CEC – Articles 770 and 800
 16. Contractor must have at least one RCDD on staff responsible for the telecommunications infrastructure.

1.5 SUBMITTALS

- A. Provide product data for all proposed equipment.

- B. Provide floor plans showing outlet locations, equipment room locations, and the intended raceway routing of each cable to be installed. Clearly label each outlet shown on the plan with the proposed identification label.
- C. Provide large scale plan views of equipment rooms and equipment racks. Equipment rack layout shall be detailed to clearly define all fiber and copper terminations, termination equipment and network components.
- D. Submit a schedule of all fiber types identifying each fiber as either single mode or multimode as applicable. Identify both ends of each optic fiber with a unique label. Label should identify system and termination point at minimum.
- E. Submit the following certifications:
 - 1. Current certificate of RCDD.
 - 2. Certification in fiber installation.

PART 2 - PRODUCTS

2.1 APPROVED MANUFACTURERS

- A. Corning Cable Systems
- B. Commscope
- C. Chatsworth Products, Inc. (CPI)
- D. Belden
- E. Panduit
- F. Allen Tel

2.2 EQUIPMENT RACKS

- A. Free Standing telephone data rack shall be:
 - 1. ESC shall furnish and install a two post seismic frame rack equal to the Chatsworth Products CPI-13855-X03 44U with 19" EIA mounting rails.
 - 2. Constructed of cold rolled steel.
 - 3. 5/8" – 5/8" – 1/2" alternating hole pattern fully compatible with conventional EIA 1 1/4" – 1/2" alternating hole patterns.
 - 4. 50 pilot point #12-24 mounting screws with combination Phillips & straight heads.
 - 5. 44 Rack Mounting Units.
 - 6. Complete with seismic rated concrete anchor kit.
 - 7. U.L. listed.
 - 8. Division 26 shall provide two (2) 120VAC- 20 amp circuits from the electrical panel to each rack. Power shall be terminated at the bottom of the rack with Nema 5-20R quad receptacle or Nema 6-20R receptacle. Vertical PDUs are provided by owner. It is the ESC's responsibility to coordinate the electrical installation with Division 26.

2.3 FIBER OPTIC PATCH PANELS

- A. Provide fiber optic patch panels mounted at the top of each Tele/Data equipment enclosure as located on the plans.
- B. All fiber optic rack mount enclosures shall be equal to Corning. All adapter panels shall be Corning as required for Multi-Mode or Single Mode applications.
 - 1. Corning CCH-02HU Enclosure
 - 2. Corning CCH-01HU Enclosure
 - 3. Corning CCH-CP06-E4 Adapter Panel (MM)
- C. Fiber terminations:
 - 1. All fiber terminations for telephone and data systems shall be SC/APC type connectors using Corning Unicam rack-mount enclosures.

2.4 SINGLE MODE FIBER

- A. Single Mode fiber shall be equal to Corning FREEDM LST Single Mode (OS2) part number 004ZSF-T4101D20. Cable shall be rated for the environment it is installed in.

2.5 MUTLI MODE FIBER

- A. Multi-Mode fiber shall be equal to Corning FREEDM LST 50 um Multi-Mode (OM3) part number 006TSF-T4180D20. Cable shall be rated for the environment it is installed in.

2.6 FIBER BUNDLES

- A. Fiber bundles contain from 2, 4, 6, 12, or 24 fibers.
- B. Minimum bend radius of individual fiber bundles shall be 1.5”.
- C. The 12 fiber bundle has three bundles of four fibers each with a nylon jacket for strength. The three bundles are jacketed with expanded foam polyethylene.
- D. The 24 fiber bundle has four bundles of six fibers each with a nylon jacket for strength and a rip cord. The four bundles are jacketed with expanded foam polyethylene

2.7 CATEGORY 6A UTP PATCH PANELS

- A. Category 6A Patch Panels
 - 1. Physical Characteristics
 - a. Panels shall be made of black anodized aluminum in 48-port configurations.
 - b. Provide quantities of patch panels to accommodate the associated jacks for each area plus 25% at each equipment location.
 - c. Panels shall accommodate a minimum of 24 ports for each rack mount space (1RU = 44.5 mm [1.75 in.]).
 - d. Panels shall be available in both T568A and T568B wiring schemes, **install T568B for all jacks.**
 - e. Panels shall be equipped with 110-style termination made of fire retardant UL 94V0 rated thermoplastic and tin lead solder plated IDC.
 - f. Panel circuit boards shall be fully enclosed front and rear for physical protection.
 - g. Panels shall have port identification numbers on both the front and rear of the panel. Front port identification on the 48 port panels shall be located between the rows of jacks.
 - h. Panels shall have rear cable support bar for strain relief. Cable support bar shall attach to the rear of the patch panel itself without the use of additional fasteners or

- 1 screws. All Cat 6A cabling shall be properly strain-relieved according to
2 manufacturers' specifications.
- 3 i. Panels shall have self adhesive, clear label holders and white designation labels
4 provided with the panel for each row of 24 ports. Label all cable to match panel front.
- 5 j. Panels shall provide wiring identification & color code and maintain an in-line, paired
6 punch down sequence that does not require the splitting of conductors from individual
7 cable pairs.
- 8 k. Panels shall terminate 22-26 AWG solid conductors, maximum insulated conductor
9 outside diameter 0.050".
- 10 2. Transmission Characteristics
- 11 a. Panels shall be ANSI/TIA/EIA-568 and ISO/IEC 11801 category 6A compliant.
- 12 b. Panels shall be Cenelec EN 50173 compliant.
- 13 c. Panels shall be UL LISTED 1863 and CSA certified.
- 14 d. Panels shall be made by an ISO 9002 Certified Manufacturer.
- 15 e. Panels installed in a 4-connector channel with a category 6A modular jack, and
16 category 6A patch cords, all from the same manufacturer, and a qualified category 6A
17 cable shall meet or exceed the requirements of Draft 5 of the TIA UTP Systems Task
18 Group PN3727, Category 6A Draft Addendum to the ANSI/TIA/EIA-568 standard.
- 19 f. Design Make: Commscope 24 port patch panel: UNP-U-10G-1U-24 #760162800.
20 Commscope 48 port patch panel: UNP-U-10G-2U-48 #760162818.

21 2.8 VERTICAL CABLE MANAGEMENT CHANNELS

- 22 A. Furnish and install doubled sided, front and rear, vertical cable management system comprised
23 of a CPI-13704-X03 (or equal) on both sides of racks. Provide cable management fingers kit
24 equal to CPI-13696-002.

25 2.9 HORIZONTAL CABLE MANAGEMENT SYSTEM

- 26 A. Horizontal Cable Management System
- 27 1. Panduit High Capacity Cable Manager (part no:NM1 And NM2)
- 28 2. Horizontal cable manager to be installed above and below each Cat 6A patch panel.
- 29 3. Where there are multiple Cat 6A patch panels a horizontal cable manager is to be installed
30 between each Cat 6A patch panel and at the top and bottom of a group of Cat 6A patch
31 panels
- 32 4. Provide openings to pass cables from one side to the other.
- 33 B. Ladder rack systems
- 34 1. Ladder racking is to provide cable runway plus lateral stability for the tele-data rack
35 assemblies.
- 36 2. 12" ladder rack (CPI model: 10250-X12)
- 37 3. Wall angle bracket (CPI model: 11421-712)
- 38 4. Junction Splice Kit (CPI model: 11302-X01)
- 39 5. Butt Splice Kit (CPI model: 11301-X01)
- 40 6. Cable Runway Radius Drop (CPI model: 12101-X11)
- 41 7. Rack-to-Runway mounting plate (CPI model: 10595-X12)
- 42 8. Triangular Support Bracket (CPI model: 11312-X12)
- 43 9. Plus all necessary mounting accessories.

44 2.10 MODULAR JACKS

- 45 A. Category 6A compliant Jacks - UTP
- 46 1. Jacks shall be designed to meet TIA/EIA-568-B.2-10 Category 6A standards.

2. Jacks shall have a temperature rating of -10 °C (14°F) to 60°C (140 °F) in conformance with ANSI/TIA/EIA-568-A
3. Jacks shall have isolation to provide required ANEXT protection.
4. Jacks shall terminate 22-26 AWG stranded or solid conductors.
5. Jacks installation shall be tested and approved for CAT6A channel compliance.
6. Jacks shall be compatible with EIA/TIA 606 color code labeling and accept snap on icons for identification or designation of applications.
7. Jacks shall be marked as T568B wiring.

2.11 FLUSH FACEPLATES

- A. Faceplates shall be UL Listed and CSA Certified.
- B. Faceplates in office areas shall be constructed of high impact, 94 V-0 rated thermoplastic.
- C. Faceplates in inmate areas shall be constructed of unbreakable nylon.
- D. Faceplates shall be 2.75" W x 4.5" H (69.8 mm x 114.3 mm) for single gang and 4.5" X 4.5" (114.3 X 114.3 mm) for double gang
- E. Faceplates shall be available to mount one, two, three, four, or six jacks in a single gang, and six or eight jacks in a double gang configuration.
- F. Two, three, four and six port faceplates shall be available with port indications for voice and data or voice, data 1, data 2.
- G. Faceplates shall provide for TIA/EIA 606 compliant station labeling.
- H. Faceplates shall have plastic covers over the mounting screws that can be replaced with a clear plastic window over a printable paper insert.
- I. Faceplates shall be Ivory in color.

2.12 CABLE

- A. CommScope Uniprise cable Media 6A, 874010204/10 10G4 unshielded twisted pair (UTP) or equivalent listed to Category 6A. This shall be for all telephone and data cabling. Color as required.
- B. Cable shall consist of 4 twisted pairs.
- C. Insulated conductors and cables installed in raceways in underground installations shall be listed for use in wet locations. A wet location is defined as an installation underground or in concrete slabs or masonry in direct contact with the earth. Cat 6A Direct Burial Outdoor Rated should be equivalent to J2R cabling 10692-C6A/CMXT.
- D. CommScope Uniprise cable Media 6A, 8765704/10 unshielded twisted (UTP) or equivalent listed to Category 6A shall be used if routed above floor level and does not enter the ground. Color as required.
- E. Listing: All wiring and raceways shall be listed for the intended installation and installed in strict accordance with the NEC as required by the conditions of where it is installed. This includes

but not limited to ratings for riser, plenum or wet installations. The ESC and Division 26 must verify that all conduit is sized correctly and in accordance with the NEC.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. A certified contractor shall furnish and install all fiber optic cabling.
- B. Equipment shall be installed according to manufacturer's instructions and properly mounted to a rack, cabinet, bracket or other appropriate mounting device.
- C. Panels shall be properly labeled on front and back with the cable number and port connections for each port.
- D. Racks shall be assembled such that mounting rails are exactly perpendicular to the base.
- E. Racks shall be secured to the floor using appropriate anchors.
- F. Racks shall be grounded to the TGB or appropriate building ground using a #6 grounding wire or as indicated on drawings.
- G. Faceplates shall be labeled with the appropriate port designations as per the EIA/TIA standard.
- H. Future Wiring: All wiring shall be terminated at both ends and labeled for future use.
- I. Provide all cabling and equipment for staff phones, inmate phones, data outlets, and video visitation as indicated on the drawings.
- J. Listing: All wiring and raceways shall be listed for the intended installation and installed in strict accordance with the CEC as required by the conditions of where it is installed. This includes but not limited to ratings for riser, plenum or wet installations. The ESC must verify that all conduit is sized correctly and in accordance with the CEC.

3.2 SPARE PARTS

- A. Furnish to the owner the following spare parts:
 - 1. 10 of each type of wall outlet installed.
 - 2. One spare patch panel of each type installed.
 - 3. 2 new and unused punch down tools for cat 6A patch panels.
 - 4. All remaining screws from each tel-data rack installed.
- B. Spare parts shall be packaged in appropriate protective packing material.
- C. Box spare parts for easy storage and clearly identify the contents of each box on all four sides of each container.

3.3 TESTING

- A. Patch Panels shall be tested after fiber optic and copper cabling has been installed and terminated at both ends.

- 1 B. Panels shall be tested as part of the link or channel for Length, DC continuity, NEXT, PSNEXT,
2 Attenuation, Return Loss, ELFEXT, and PSELFEXT using a level III tester for Category 6A
3 channels.
- 4 C. Test and confirm each fiber in all fiber optic cables. Provide Test reports to engineer for review.
5 All spare and /or unused fiber shall have a connector attached and be tested as detail in this
6 section and tested.
- 7 D. Testers shall be correctly set to test the type and manufacturer of the horizontal cable used in
8 the link or channel being tested, including the correct NVP.
- 9 E. A "PASS" indication shall be obtained for all link or channel tests when tested using the
10 appropriate level tester for the appropriate category.
- 11 F. Submit copies of all test reports to the Engineer three weeks before the acceptance test.
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- 13 END OF SECTION 27 15 00
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SECTION 27 41 13 - CABLE TELEVISION SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

- A. Scope of Work: Furnish and install all components as required for a complete Cable Television Signal Distribution System. Coordinate the final signal source with the owner's representative.
- B. The ESC as defined in Section 280500 Common Work Results for Electronic Safety and Security shall be responsible for providing and coordinating this system.
- C. The base project will provide a signal distribution system for a future source to be provided by the owner.

1.2 SUBMITTALS

- A. Basic Submittals: Furnish submittals as required by Division 28 General Conditions and as required by the general contract documents.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

- A. Acceptable Manufacturers:
 - 1. Blonder Tongue, Inc
 - 2. Scientific-Atlanta, Inc
 - 3. Pico Macom, Inc
 - 4. Toner Cable Equipment, Inc

Note: Approval of manufacturers does not relieve the manufacturer from providing equipment that fully complies with the specification.

2.2 SIGNAL DISTRIBUTION EQUIPMENT:

- A. Terminating Resistor: Furnish and install terminating resistors for all unused ports in the distribution system as follows:
 - 1. 75 ohm impedance
 - 2. Rated for a frequency range from 5 MHZ to 890 MHZ
 - 3. Return loss rating of 25 dB at UHF and 30 dB across the VHF band.
- B. Broadband Distribution Amplifier: Furnish and install a wall mounted CATV amplifier equal to Blonder Tongue BIDA 550-50.
 - 1. 50 dB gain.
 - 2. Frequency range of 47 to 500 MHz.
 - 3. Attenuation control of 15 dB.
 - 4. Channel loading of 77.
- C. Fiber Receiver and Broadband Distribution Amplifier: Furnish and install a wall mounted fiber optic receiver module integrated with a broadband distribution amplifier equal to Blonder Tongue FRDA-S4A-860-FA.

1. 43 dB gain.
 2. Frequency range of 47 to 860 MHz.
 3. Attenuation control of 10 dB.
 4. Channel loading of 110.
 5. LED for optical input status.
- D. Directional Couplers: Furnish and install Blonder Tongue model SDC-4 eight (8) dB directional couplers as indicated on the plans for a complete and operational system.
- E. Splitters: Furnish and install 2-way, 3-way, 6-way, or 8-way splitters, Blonder tongue series SCVS-# with a frequency range up to 1000 MHz.
- F. Outlets: Furnish and install pass through connectors on unbreakable Nylon outlet plates for installation in dayrooms and inmate areas as indicated on the plans.
- G. Coaxial Cable: Furnish and install coaxial cable for signal distribution inside each housing unit as indicated on the plans. Coax cable shall be of 75 ohm impedance RG-59/RG-6 with a return loss of 2 dB minimum from 7 MHz to 806 MHz. Cable construction shall be copper-clad steel center conductor and cellular polyethylene dielectric. Cable shall be installed with two shields. The first shield shall consist of .002" double aluminum coated mylar or polypropylene tape with 1.8" overlap. The second shield shall be 40% coverage aluminum braid consisting of 34 AWG wire. The jacket shall be black non-contaminating low temperature polyvinyl chloride. Cable shall be equal to West Penn AQC843 for RG-59 or West Penn AQC841 for RG-6. Cable shall be wet rated if placed in conduit underground.
- H. Attenuators: Furnish and install FAF and FAM fixed attenuators in the values necessary to balance the signal distribution system. Units shall be rated for:
1. Frequency range of 5 to 890 MHz.
 2. 75 ohm impedance system.
- I. Monitors: Television monitors and mounting brackets shall be furnished and installed by others.
- J. Furnish and install two strands of single mode fiber for all signal transmission between the CATV cabinets in each Telephone IT room. Provide fiber patch cables from the fiber LIU to the fiber CATV distribution amplifier.
- 2.3 FIBER OPTIC MODULES
- A. Furnish and install all fiber optic modules required to distribute the TV signal from the source in the existing facility to each area.
- B. Fiber to be continuous through conduit to the signal source transmitter.
- C. Fiber Optic Transmitter: Furnish and install a fiber optic transmitter equal to Blonder Tongue model FIBT-S3A-812A. Unit shall provide:
1. 110 channels ranging from 45Mhz to 860 Mhz.
 2. +12 dBm Output
 3. FC/APC connector
 4. Utilize 1310 nm single mode fiber
 5. LED indication for quick assessment of RF input, Laser, and Cooler Status
 6. Status/Alarm jack on rear of panel for Monitoring 5 key parameters.

D. Fiber Optic Coupler: Furnish and install a fiber optic Coupler equal to Blonder Tongue model FOC-23-16-U series.

1. 19" Rack Mount.
2. 1 fiber input with 6 fiber outputs as required by configuration.
3. Low insertion loss with high directivity.

E. Fiber Optic Receiver: Furnish and install a fiber optic receiver equal to Blonder Tongue model FIBR-S4A-860 series. Unit shall provide:

1. Operation for 45 MHz to 860 MHz bandwidth.
2. LED for optical input status.

F. Modules to be mounted on CATV board in each area.

G. Fiber to be continuous through conduit to the signal source transmitter in the MPOE located in the existing facility.

PART 3 - EXECUTION

3.1 COORDINATION

A. Preliminary Coordination: Coordinate all required embeds, block-outs, and construction as required to install the all television devices.

B. Construction Examination: Monitor ongoing construction and coordinate all equipment.

C. Structural Examination: Examine locations to ensure the supporting structures will carry monitor mounts and devices to be installed.

3.2 INSTALLATION

A. Coordination with Other Trades: The contractor shall coordinate the work of this section with that of other Divisions as required to ensure that the entire work of this Project will be carried out in an orderly, complete and coordinated fashion.

B. Doors: All equipment terminations must be installed clear of the door's racks and cabinets to allow proper closing.

C. Listing: All wiring and raceways shall be listed for the intended installation and installed in strict accordance with the California Electric Code as required by the conditions of where it is stalled.

D. Field Wiring: The wiring shall be installed in raceways and equipment enclosures with other conductors, within limitations defined by Article 725 of the California Electric Code.

1. Installation: Dress wires and cables to provide a neat and orderly appearance within all enclosures, equipment racks, cabinets, and consoles by routing in snap-cover, plastic wiring duct. In locations where wiring duct is not feasible, organize by cable clamping, dressing and tie-wrapping.
2. Strain Relief: Relieve strain on all loose wire bundles using tie-wrap, supports fastened with machine screws or bolts. Do not use self-adhesive type supports.
3. Shrink Tubing: Neatly form cable ends and apply shrinkable tubing to shielded cables or where necessary to secure the insulation against fraying or raveling.
4. Edge Protection: Install edge protection materials on edges, holes, lips of ducts, or any other place where wires or cables cross sharp metallic edges.

5. Service Loops: Allow sufficient service loops where conductors leave cabinet or transition to door mounted electronics.
6. Splicing: Field wiring shall not be spliced. All wiring shall be continuous from the field device to the termination in the control panel.
7. Listings: Wiring shall be listed for the installation. Wire identified herein is intended to provide electrical characteristic requirements.
8. Wire Termination: All wiring shall be terminated at both ends and labeled in accordance with the equipment wiring plans. Wire not energized or connected to active devices shall be labeled for future use.

E. Seismic: The entire system shall be installed to meet the seismic requirements for the area.

3.3 FIELD QUALITY CONTROL

- A. Use attenuators as required to balance the system so that each television outlet Furnish and installs signal strength at 500 MHz between six (6) dB and nine (9) dB.
- B. Use the appropriate test equipment to measure the final signal strength at each outlet in each dayroom.
- C. Record dB readings for each outlet. Furnish copies of all readings to the owner. These test reports as well as a monitor for viewing shall be available during final testing onsite.

CATV VERIFICATION AND CHECK-OUT FORM

Job #		Job Name:		Panel #																																																																																																																						
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3.4 SPARES

- A. Furnish to the owner the following spare parts:
 1. Three television outlets.
 2. Two of each type of splitter installed.
 3. One of each type of Fiber device installed
 4. One of each value of Attenuator.
 5. Three of each type of terminating resistor installed.

- 1 B. Spare parts shall be packaged in their protective packing material.
- 2 C. Box spare parts for easy storage and clearly identify the contents of each box on all four
- 3 sides of each container.
- 4
- 5 END OF SECTION 27 41 13
- 6

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1 SECTION 27 51 23 – INTERCOM SYSTEM

2 PART 1 GENERAL

3 1.1 SUMMARY

4 A. Scope of work: Furnish and install all components to provide a complete and operational
5 digital intercom, and emergency call system as described herein. Furnish and install an
6 intercom in each cell for communication to staff. Furnish and install an intercom on both
7 sides of each controlled door (as indicated on the plans) for communication to the controlling
8 station. Furnish and install administrative intercom stations in each floor control room, lobby
9 control, and basement control (North and West Annex Jail). These stations can call and
10 communicate to other administrative intercoms stations.

11 B. The ESC as defined in Section 280500 Common Work Results for Electronic Safety and
12 Security shall be responsible for furnishing, installing, and coordinating this system.

13 1.2 SYSTEM DESCRIPTION

14 A. Intercom Control: The intercom system shall provide two-way communications from each
15 area to a master control station. Master control stations are located at Touchscreen
16 Interactive Computer (TIC). Communications shall be established between the TIC and the
17 intercom stations throughout the facility as indicated on the plans. Intercom stations are task
18 group assignable. (See Control Matrix Specification section 284600.1).

19 B. Furnish and install an intercom station (IC) as indicated on the plans, to allow inmates and
20 staff to place a call and communicate verbally to the assigned TIC. The intercom station shall
21 consist of a call button and a speaker/intercom.

22 C. Intercom Annunciation: When an intercom call is placed, the related intercom icon will flash
23 on the TIC monitoring the area until the call is answered. Once answered, the icon will
24 illuminate steady until another station is selected or the system is reset.

25 D. Intercom Answer: Activating the appropriate icon on the TIC shall connect the intercom voice
26 path from the TIC to the related intercom speaker for communication.

27 E. Inmate Monitoring: The intercom system into inmate areas shall not utilize any tone or
28 audible signal that the audio path is open.

29 F. Provide a dome lamp (DL) where indicated on the plans. Dome lamp shall be mounted above
30 each door to signal roving staff. Dome lamp shall illuminate whenever a call in the room is
31 activated.

32 G. Call buttons (C) shall be provided for calls from critical locations to staff as indicated on the
33 plans. Call buttons shall consist of a call button only. Activating a call button shall illuminate
34 the dome lamp associated with the call button.

35 H. Dome Lamp Reset button: Furnish and install a security reset button (RB) as indicated.
36 Furnish single gang plate made of 11-gauge stainless steel. Unit shall mount to a shallow
37 single gang box. It will allow the staff to turn off the dome lamp.

38 I. Furnish and install an Emergency Call station (EC) as indicated on the plans, to allow
39 inmates in cells to place a call and communicate verbally to the assigned TIC. The intercom
40 station shall consist of a call button and a speaker/intercom.

J. Paging: Activating the appropriate icon the TIC shall connect the intercom voice path to the related paging speakers for general or zoned paging. Zones shall be divided as indicated on the plans.

K. Provide a pair of non-contact communication talk through visitation units (VP), typically one on each side of a viewing window. The hands free communication assembly shall be mounted to the countertop, centered between sidewall partition, with the speakers and microphones side facing towards the viewing window.

L. Each VP station shall be provide hands free communication between visitor and inmate..

M. Locate VP controller and low voltage power supply in the intercom rack Security Electronics room 1156.

1.3 SUBMITTALS

A. Basic Submittals: Provide submittals as required by the General Conditions.

1.4 SYSTEMS INTEGRATION

A. Integration: Integrate the intercom system with the CCTV system to provide the following:

1. When an intercom call is selected by the TIC station, the camera monitoring the area will automatically be called up on the spot monitor associated with the TIC station.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Acceptable System Manufacturers:

1. Accurate Controls, Ripon, WI; 920-748-6603
2. CML Security, Erie, CO; 720-466-3650
3. Com-Tec Security, Inc., Appleton, WI; 920-749-2840
4. Cornerstone Detention, Decatur, Alabama 256-560-4207
5. Metroplex, San Antonio, TX; 210-495-5245
6. Sierra Detention Systems, Brighton, CO; 303-278-6879

B. Acceptable Equipment Manufacturers:

1. Harding
2. Quam
3. Telecor
4. Tech Works
5. Rauland

2.2 EQUIPMENT

A. All major electronic components shall be on printed circuit boards. The printed circuit boards shall utilize **push-on connectors with set screw terminal connections** (Phoenix Contact Type MSTB, screw-type, 24-12AWG, strand or solid) or equal for ease in maintenance and

- 1 replacement. Push-in wire connections will not be allowed. The major electronic componets
2 shall consist of the following:
- 3 1. A DXL administrator software package to define the software configuration of the
4 system. The DXL administrator computer shall be connected to a DCC through either
5 an RS-232 serial port or Ethernet network port.
 - 6 2. Digital Communication Controllers (DCC)
 - 7 3. Digital Communication Extenders (DCE)
 - 8 4. Talkback Expanders (TBE)
 - 9 5. Page Zone Expanders (PZE)
 - 10 6. Station Control Cards (SCC)
 - 11 7. Master Audio Interface (MAI)
 - 12 8. Intercom boards
 - 13 9. Loud-Speaker, microphone, external PTT switch and hand set interface connections
 - 14 10. Auxilliary and internal power supplies
 - 15 11. Intercom master stations
 - 16 12. Field interface cables and Quick connect boards
 - 17 13. Discrete I/O modules
- 18 B. The system shall provide for two-way conversations between a TIC and the selected
19 intercom station. The system shall allow one (1) two-way conversation to occur for each TIC.
20 Each intercom station may communicate with the TIC to which it is directly connected. A TIC
21 shall be able to connect to any intercom that is in the station's assigned task group. For TIC
22 equipment refer to Specification section 284600.
- 23 C. The intercom master station shall consist of, but not be limited to the following: a speaker,
24 gooseneck electret microphone, push-to-talk (PTT) switch, rotary knob volume control, and
25 screwdriver adjustment to set the microphone sensitivity. Provide a master intercom station
26 for each TIC and lobby control station's as indicated on the plans. The master intercom
27 station shall comply with the following:
- 28 1. Touchscreen Master Module equal the TMM-641
- 29 D. Intercom remote speakers shall connect through the CPU of the TIC. Provide an extension
30 cable to allow speakers to be placed for easy operation. Each TIC shall be provided with
31 speakers equal to Dell Model AX210 with the following features as a minimum:
- 32 1. Response bandwidth of 90 to 20,000 Hz.
 - 33 2. RMS power output of 3.6 Watts.
 - 34 3. Power on/off volume controls.
 - 35 4. Active amplification.
- 36 E. Intercom stations (IC/EC) shall be flush mounted with 11 gauge stainless steel security cover
37 plate equal to the IMC-400 series that are connected to the DXL system where shown on the
38 drawings. The intercom stations shall comply with the following specifications:
- 39 1. Speaker: 2-1/2" mylar cone
 - 40 2. Cabling: 22" gauge shielded twisted pair (2,500 ft. maximum length)
 - 41 3. Microphone Sensitivity: 10mV at 74 dB SPL
 - 42 4. Finish: Brushed stainless steel

5. Pushbutton: Single vandal resistant long life switch
 6. Dimensions: 4-1/2" L x 4-1/2" H x 1-3/4" D
 7. Backbox: Standard two-gang electrical back box equal to RACO 696. ESC to coordinate back box with electrical contractor.
 8. Mini turret (for Desk Mounted Intercom Station): Hammond Manufacturing SCEM Series (or equal)
- F. Administrative Intercom Station
1. Handset, display, and call keypad
 2. Programmable Call Routing.
 3. Station Audio Monitoring
 4. Group Call zones.
 5. Call and program switch disabling.
 6. Event response programming.
- G. Intercom Control Board:
1. Furnish and install a Digital Communications Controller (DCC) capable of operating independently as a stand-alone exchange.
 2. Furnish and install a Digital Communications Expanders (DCE) capable of increasing the capacity of the exchange load.
 3. Furnish and install Talk Back Expanders (TBE) with eight 25Vrms audio output channels capable of driving paging speakers.
 4. Furnish and install Master Control Cards (MCC) that provides an interface for up to two master stations and two-line level audio input and outputs.
 5. Provide Station Control Cards (SCC) to connect intercom stations to the exchange equal to Harding SCC-400 series.
 6. Provide screw terminals for connections from field intercoms and proper USB connections for the head in exchange.
 7. Furnish and install quantity required to operate stations indicated on plans.
- H. Paging Amplifier: Furnish and install a Biamp MCA 8050 (or equal) amplifier to power paging speakers as indicated on the plans.
1. Frequency response of 20 Hz to 20 KHz.
 2. Signal-to-Noise ratio shall be greater than 78 dB from 20 Hz to 20 KHz at line input at rated power.
 3. Balanced or single-ended 25 volt and 70 volt outputs at a screw terminal.
 4. The Mixer/Amplifier shall provide a minimum of 4 balanced input channels.
 5. Automatic and/or manual muting shall be selectable on each channel.
 6. Mixer/Amplifier shall provide an internal "pre-announcement" chime tone with level control.
 7. Amplifier shall be sized to drive 125% of the connected load.
 8. Provide zone relays as indicated.

- 1 I. Speakers: Furnish and install wall and ceiling speakers as indicated on the plans. Detention
2 and commercial grade construction shall be used in inmate areas to house speakers .
- 3 1. Detention grade speakers shall consist of the following Quam (or equal) equipment:
4 a. SE1WVP vandal proof enclosure.
5 b. 8C10PAOT Speaker
6 c. TBLU transformer
7 d. Frequency range of 80-8,000 Hz
8 e. Provide in all inmate accessible areas.
- 9 J. Pedestals: Furnish and install heavy-duty pedestals for intercom stations at vehicle sallyports
10 as indicated on the drawings. Pedestal shall be height adjustable and shall be anchored to a
11 concrete base. Provide hooded intercom stations with surface boxes. Pedestal shall be
12 constructed of round pipe allowing the housing to spin without breaking if sufficient pressure
13 is applied from the side.
- 14 K. Call Button: Furnish and install detention grade Call buttons equal to Quam CIB2 as indicated
15 on the plans. Call Button shall consist of a heavy-duty push button on a single gang plate.
16 Unit shall be constructed of 11-gauge stainless steel and designed for installation in a
17 detention facility.
- 18 L. Dome Lamp: Furnish and install security dome lamp equal to the Com-Tec CTS-3041 Series,
19 above each door as indicated. Unit shall be made of a high impact molded laminate bubble
20 attached to an 11-gauge stainless steel single gang plate. A single lamp shall be provided.
- 21 M. Dome Lamp Reset button: Furnish and install security reset button (RB) equal to Quam CIB2
22 where indicated on the plans. Furnish single gang plate made of 11-gauge stainless steel.
23 Unit shall mount to a standard single gang box.
- 24 1. Finish: Brushed stainless steel
25 2. Pushbutton: detention grade SPST normally open equal to intercom station button.
- 26 N. Talk Path: Each TIC shall have an independent talk path allowing simultaneous
27 communication from all TIC to the stations under their control. Intercom stations can
28 establish a talk path with only one master at a time.
- 29 O. Non-contact Visitation Telephone Disconnect
- 30 1. Furnish and install the necessary PLC I/O, programing, and relays to disconnect the
31 inmate visitation telephones in each dayroom and sub-dayroom. Each dayroom/sub-
32 dayroom shall be switched on or off independent of each other dayroom/sub-dayroom.
- 33 P. Non-Contact Visitation Communication (VP) Units:
- 34 1. Furnish and install full duplex two-way communication as indicated on the plans and
35 equal to Secure-Tech model JUSTTALK.
- 36 2. The talk through communicator units shall contain frequency range between 400 to
37 4000Hz +/- 3db.
- 38 3. The units shall be capable of tuning to the installed location environment to maximize
39 proper sound levels.

40
41 2.3 TRANSIENT SURGE SUPPRESSION

- 42 A. Acceptable manufacturers are as follows:
43 1. DITEK

- 1 2. Northern Technologies Incorporated
- 2 3. PolyPhaser Corporation
- 3 4. Transtector
- 4 B. Furnish and install surge protection on all intercom wiring that leaves the building equal to
- 5 Northern Technologies model PLP-S series.
- 6 C. Furnish and install surge protection for all power connections to the security systems both
- 7 inside and outside the building equal to Northern Technologies TIC-HW series.
- 8 2.4 FIBER OPTIC MODULES
- 9 A. Furnish and install all fiber optic modules required for transmitting audio between floors.
- 10 B. Certain intercoms in each area are controlled from Central Control. Refer to Specification
- 11 Section 284600.1 Control Matrix.
- 12 C. Furnish and install a fiber optic module pair to establish one audio link from each floor to
- 13 central control over fiber.
- 14 D. Modules to be located in a common module rack located next to the fiber optic patch panel
- 15 (or LIU) in each floor. Module shall be equal to AFI 89D series.
- 16 2.5 CABLING AND WIRE
- 17 A. Acceptable manufacturers:
- 18 1. Liberty Wire and Cable
- 19 2. Eastman Wire & Cable
- 20 3. West Penn Wire
- 21 4. Belden
- 22 5. Carol
- 23 6. General Cable
- 24 7. Clifford of Vermont, Inc.
- 25 B. Wire Size: Furnish and install sufficient wire gauge to limit voltage drop to 5%.
- 26 C. Intercom: Intercom wiring shall be compatible with the equipment provided.
- 27 1. For dry Locations intercom wiring as a minimum shall be equal to West Penn 357. Wet
- 28 rated cable may be run in dry locations at the contractor's option.
- 29 2. For wet locations, furnish and install cable with water-blocked tape equal to AQC357.
- 30 All locations that come in contact with the building slab are considered wet locations in
- 31 accordance with code.
- 32 D. Call Button (C): Wiring for call button shall be a two #20 AWG stranded conductors equal to a
- 33 West Penn AQC292.
- 34 E. Reset Button (RB): Wiring for reset button shall be a two #20 AWG stranded conductors
- 35 equal to a West Penn AQC292.
- 36 F. Dome Lamp (DL): Wiring for dome lamp shall be a four #20 AWG stranded conductors equal
- 37 to a West Penn AQC292.

- 1 G. Fiber Media Converter (voice path): Furnish and install one (1) OM3 fiber strand per voice
2 path.

3 2.6 EQUIPMENT ENCLOSURES

4 A. Acceptable Manufacturers:

- 5 1. AMCO Cabinets.
6 2. Hoffman.
7 3. HOME.
8 4. Lowell Manufacturing.

9 B. Cabinets: Mount intercom equipment in minimum 83" high by 27" deep by 23" wide free
10 standing cabinets as indicated on the plans equal to LSER-4427. Size cabinets to
11 accommodate all system components.

- 12 1. Cabinets shall be constructed of cold rolled steel and provide standard mounting rails for
13 19" rack mounted equipment.
14 2. Conduit shall enter from the top.
15 3. Low voltage wiring shall be separated from 120 volt wiring.
16 4. Intercom equipment may be mounted with PLC or IP Video control equipment.
17 5. Furnish and install mounting hardware as required to install all intercom security
18 electronics equipment required in the space allowed.
19 6. Furnish and install solid metal doors for access to both the front and back. Doors shall
20 be minimum 16 gauge flush mounted with air louvers and flush pulls.
21 7. Side panels shall be a minimum of 16 gauge flush mount.
22 8. Both front and rear doors shall be provide with key locks. Furnish two (2) door keys.
23 9. Furnish and install ventilation fans as required to enable proper ventilation for the
24 equipment.
25 10. Coordinate cabinet power receptacles with and Division 26.
26 11. Furnish and install blank plates by manufacturer on all unused rack sections.

27 C. Refer to Specification Section 270548 for Seismic Requirements for Equipment Enclosures
28

29 PART 3 EXECUTION

30 3.1 COORDINATION

- 31 A. Preliminary Coordination: Coordinate all required embeds, block-outs and boxes.
32 B. Control Coordination: Verify that all stations are provided with an appropriate control and an
33 annunciating icon on the TIC.

34 3.2 INSTALLATION

- 35 A. Speakers: Initially tap all speakers at the lowest tap provided. Move to higher taps in high
36 noise areas to balance the page output throughout the facility. All attenuation controls shall

- be set to the minimum practical level. All costs for balancing shall be included in the base bid. Record and submit with closeout documents listing all tap settings.
- B. Devices: Install all devices per manufacturer's recommendations. Square devices shall be installed with the bottom line parallel with the floor at designated heights.
- C. Intercom Stations: Initially tap all intercom stations at the lowest tap. Move to higher taps in high noise areas. Verify the device is installed with security screws.
- D. Call Buttons: Check wiring connection at all call buttons. Verify the device is installed with security screws.
- E. Dome Lamp: Check wiring connection at all dome lamp. Verify the device is installed with security screws.
- F. Reset Button: Check wiring connection at all reset button. Verify the device is installed with security screws.
- G. Field Wiring: The wiring shall be installed in raceways and equipment enclosures with other conductors, within limitations defined by Article 725 of the California Electric Code.
1. Installation: Dress wires and cables to provide a neat and orderly appearance within all enclosures, equipment racks, cabinets, and consoles by routing in snap-cover, plastic wiring duct. In locations where wiring duct is not feasible, organize by cable clamping, dressing and tie-wrapping.
 2. Strain Relief: Relieve strain on all loose wire bundles using tie-wrap, supports fastened with machine screws or bolts. Do not use self-adhesive type supports.
 3. Shrink Tubing: Apply shrink tubing neatly for cable ends to shielded cables or where necessary to secure the insulation against fraying or raveling.
 4. Edge Protection: Install edge protection materials on edges, holes, lips of ducts, or any other place where wires or cables cross sharp metallic edges.
 5. Service Loops: Allow sufficient service loops where conductors leave cabinet or transition to door mounted electronics.
 6. Splicing: Field wiring shall not be spliced. All wiring shall be continuous from the field device to the termination in the control panel.
 7. Listings: Wiring shall be listed for the installation. Wire identified herein is intended to provide electrical characteristic requirements.
 8. Wire Termination: All wiring shall be terminated at both ends and labeled in accordance with the equipment wiring plans. Wire not energized or connected to active devices shall be labeled for future use.

3.3 SPARE PARTS

- A. Furnish to the owner the following spare parts:
1. One (1) spare intercom amplifier
 2. Four (4) spare intercom stations
 3. Two (2) spare intercom control cards or one (1) relay board
 4. One (1) call button
 5. One (1) detention grade dome lamp
 6. One (1) Intercom master speaker and microphone of each type used

- 1 7. One (1) Intercom system Microphone and speakler assembly
- 2 B. Spare parts shall be packaged in appropriate protective packing material.
- 3 C. Box spare parts for easy storage and clearly identify the contents of each box on all four
- 4 sides of each container.
- 5 3.4 TRAINING
- 6 A. The ESC shall provide without additional cost to the owner representatives specially trained
- 7 in the operation of the Intercom and Paging systems provided. The representatives shall
- 8 train the Owner's personnel in operation, repair, and upkeep of the Intercom and Paging and
- 9 custom relay cabinets. Refer to Specification Section 280500, 3.6 for additional training
- 10 information including notification, outline, course structure, and additional post occupancy
- 11 training.
- 12 3.5 FIELD QUALITY CONTROL
- 13 A. Operation: Verify and document that intercom/paging systems operate as specified.
- 14 B. Wattage Taps: Verify and document the tap setting of each speaker and record the level
- 15 setting of each volume control station after testing is complete.
- 16 C. Intercom Operation: Verify and document that intercom calls register on the appropriate TIC
- 17 and that each intercom can be called from the TIC. Check that all integrated events occur as
- 18 specified for each intercom actuation.
- 19 D. Audio Path: Verify and document the voice path of each intercom station to the local TIC for
- 20 clarity and volume. List the final tap setting for each intercom station after testing is
- 21 complete.
- 22 E. UPS Operation: Operate the system on standby power or UPS for one hour. Place and
- 23 answer an intercom call every 60 seconds during this test. After the test is complete, record
- 24 the output levels of the UPS and batteries.
- 25 F. Test Reports: Provide written test reports documenting all of the above with either a narrative
- 26 for each point or a list of features noting "pass" or "fail". Provide copies of the tests to the
- 27 Engineer before requesting the Engineer to witness a functional test.

INTERCOM VERIFICATION AND CHECK-OUT FORM

✓ = OK
Job #
Job Name:
Panel #

FIELD TEST CODE:						REPAIR CODE:				
A - No status change						M - No call station			Software Test By: _____ Date _____	
B - No power to intercom						N - No power to CCS (NCA)			Hardware Test By: _____ Date _____	
C - No audio						O -			System Test By: _____ Date _____	
D - Poor audio						P -			Design Engineering By: _____ Date _____	
E - No CCTV call-up						Q -			Wiring By: _____ Date _____	
F - Intercom button sticks						R -			Field Test By: _____ Date _____	
G - Intercom Reversed						S -				
H - Adjust intercom amp						T -				
I - Software problem						U -				
J - Not installed						V -				
K - No power to dome lamp						W -				
L - No reset station						X -				
ON-SITE										
ICON ID#	ICON TYPE	C/U CAM. NO.	CCTV INTLK WITH	SOFT-WARE TEST	IC TEST	FIELD TEST CODE	REPAIR CODE	RE-CHECK "X"	FIELD CHECK OUT NOTES	PROBLEM RESOLVED (BY/DATE)

1

2 END OF SECTION 27 51 23

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SECTION 27 53 20 – DISTRIBUTED ANTENNA SYSTEM HEAD-END ELECTRONIC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. America National Standard ANSI/TIA/EIA Telecommunications Building Wiring Standards.
- C. California Fire Code.
- D. NFPA 1221: Standard for the Installation, Maintenance, and use of Emergency Services Communications Systems.

1.2 SUMMARY

A. Section Includes:

- 1. Head End Components
- 2. Services Supported
- 3. Coaxial Cable
- 4. Splitters / Directional Couplers
- 5. Cable Hangers
- 6. Cable Connectors
- 7. Cable Jumpers
- 8. Antennas
- 9. Miscellaneous items

- B. The purpose of the Distributed Antenna System (DAS) will be to receive donor signal(s) from an external source and distribute desired radio signals as listed below to the intended coverage area within the building. System shall be designed to amplify facility radios as well as radios for Emergency Responders
- C. The amplification system shall be approved by the Authority Having Jurisdiction before installation.
- D. Pathway survivability shall be as required. The amplification system shall be approved by the Authority Having Jurisdiction before

1.3 DEFINITIONS

- A. ATTENUATION: The reduction in signal power, expressed in decibels, as a result of coupling, heat loss, or transmission distance in a cable or in air.
- B. BDA (BI-DIRECTIONAL AMPLIFIER): An RF Amplifier that amplifies radio signals in both upstream (uplink, talk-in, reverse link) and downstream (downlink, talk-out, forward link) directions, using separate portions of a radio frequency band
- C. CABLE ASSEMBLY (JUMPER): Short length of flexible coaxial cable used to attach antennas or other components to the main coaxial cable distribution system.
- D. DAS (DISTRIBUTED ANTENNA SYSTEM): A network of service antennas connected at intervals along shielded coaxial transmission lines and all connected to head-end electronics

- 1 amplifying the signals to be distributed. Often refers to a system that includes both the passive
2 distribution system and the active amplifying electronics.
- 3 E. DIRECTIONAL COUPLER: A component which directs a small portion of downstream RF
4 energy to a port which can be connected to an antenna or another branch of distribution
5 cabling, and also serves as a combiner of upstream energy between the tap port and the
6 through connection.
- 7 F. DONOR ANTENNA: The antenna, usually mounted on the outside of a structure where a DAS
8 is installed, which picks up signals over-the-air from a donor source.
- 9 G. DONOR SOURCE: The repeater, transceiver, cell site or other radio site that produces signals
10 which a DAS will relay and distribute.
- 11 H. REFLECTED POWER: Power which is reflected back along a transmission line as a result of
12 discontinuities in line impedance caused at connectors or close proximity of metallic objects.
- 13 I. RF (RADIO FREQUENCY): Energy from electromagnetic waves, or alternating currents that
14 produce electromagnetic waves, in the spectrum of radio frequencies (30 kHz to 300GHz).
- 15 J. SPLITTER: A passive component that has a single input port and two or more output ports,
16 effectively splitting the signal equally amongst the output ports. It also serves to combine
17 upstream signals from the "output" ports into composite signals at the "input" port.
- 18 K. TERMINATION: A device that is installed on the end of a transmission line to provide a pure
19 resistive 50-ohm load.

20 1.4 QUALITY ASSURANCE

21 A. Contractor Qualifications

- 22 1. The installation contractor shall have installed similar systems in at least five locations in
23 the previous two years.
- 24 2. The installation contractor must possess test equipment known as a Frequency Domain
25 Reflectometer (FDR) and have staff trained and experienced in its use and proper testing
26 procedures.
- 27 3. The contractor must have installers qualified to accomplish in-field soldered connections
28 meeting MIL specifications for soldered connectors, if required.
- 29 4. The installation contractor shall have demonstrable experience (one project in past 2
30 years) in installing above-ceiling cabling systems within inmate spaces where inmate
31 control is required.
- 32 5. The installation contractor shall be industry trained in the installation and testing of the
33 proposed system. Technicians in the field shall demonstrate knowledge of material and
34 installation of the product line and testing. Only full-time, permanent employees/staff of
35 the company are approved to provide on-site supervision and testing.

36 1.5 CONTRACTOR

- 37 A. The selected contractor shall install, commission, and test the completed DAS section
38 according to the drawings and specification documents.

39 1.6 WARRANTY

- 1 A. The contractor shall provide a one year parts/labor warranty for the system with the option to
2 extend for up to two years at an additional cost. Any and all maintenance and/or repairs shall
3 be handled directly by the contractor during this warranty period.
- 4 B. Contractor shall accomplish all registrations and proof of purchases required to activate any
5 manufacturer's warranty.
- 6 C. Contractor shall be responsible for meeting all requirements of any manufacturer's warranty
7 during the warranty period listed in "A" above.
- 8 D. Contractor shall invoke manufacturer's warranties as necessary during the warranty period.
9 Including, but not limited to obtaining Return Merchandise Authorization, shipping defective
10 material, and receiving replacements.

11 1.7 SUBMITTALS

- 12 A. Shop Drawings:
- 13 1. Provide floor plans, showing the layout and location of antennas, couplers, splitters and
14 cabling.
- 15 2. Provide schematic drawings for the head-end and distributed electronics equipment.
- 16 3. Provide space requirements in telecommunications rooms
- 17 4. Provide power requirements in telecommunications rooms
- 18 B. Close-out documents which include:
- 19 1. As-built documentation of the installed system shall be in PDF format as well as AutoCad
20 or Revit.
- 21 2. Any test documentation shall be provided in an electronic form acceptable to the owner,
22 which is maintainable for annual or subsequent re-test and comparison.
- 23 3. Pictures of installation, showing locations of major components (BDA, Donor Antenna,
24 etc) and samples of typical components (splitter, couplers, ceiling antennas, etc).
- 25 4. Screen shots of initial system settings and status in BDA user application software (Gain
26 Levels, RSSI levels, Digital Filtering, etc).
- 27 5. Manufacturer's installation and operation manuals for all components, application
28 software and any associated cables shall be left on-site with support documentation for
29 future reference.

30 1.8 DESIGN

- 31 A. Signal Accommodation: The system shall be designed to support frequencies listed:
- 32 1. City Fire base station frequencies TX 154.190 RX 159.735
- 33 2. Fresno PD base station frequencies TX 460.050 RX 465.050
- 34 3. EMS base station frequencies TX 453.325 RX 458.325
- 35 4. Fresno Sheriff Green base station TX 160.590 RX 158.955
- 36 B. Critical Areas shall be provided with 99% coverage of the floor area as required by NFPA 1221
37 9.6.7.4. Critical areas include:
- 38 1. Fire Command Center.
- 39 2. Fire pump rooms.
- 40 3. Exit stairs.
- 41 4. Exist passage ways.

- 5. Elevator lobbies.
- 6. Standpipe cabinets.
- 7. Sprinkler sectional valve locations.
- 8. Other areas required by the Authority Having Jurisdictions.

C. General Building areas shall have 90% coverage of the floor area as required by NFPA 1221.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. All material shall be the product of a manufacturer that has been in the business of manufacturing like product and financially stable for a period of at least five years.
- B. Electronic equipment manufacturers shall have a well-defined technical support structure with 24/7 support available.

2.2 COMPONENTS

A. Bi-Directional Amplifier

- 1. Bird Signal Booster or equal.

B. Donor Antenna(s)

- 1. Sinclair SY250-SF2SNM© or equal.

C. Battery System

- 1. Battery model: Bird 6150-Battery or equal.

D. Power Supply

- 1. Power Supplies shall be the minimum necessary to allow for proper manufacturer specified operation of all equipment, including, but not limited to: fiber optic equipment, bi-directional amplifiers, battery chargers, etc.
- 2. Battery – Contractor shall provide batteries of a commonly used brand and necessary charging/miscellaneous electronics to meet the requirements below.
 - a.) Shall operate entire systems for a period of 24 hours in the event of a power failure.
 - b.) Batteries shall be of a sealed type, not requiring outside ventilation.
 - c.) Smart charging system shall be provided that prevent over charge, and alarm on abnormal charging conditions.

E. Splitters

- 1. 2-Way Splitter: Axell Wireless 05-009802 or equal.

F. Shielded Coaxial Cable

- 1. Andrew Heliax AVA5-50 (7/8" Coaxial Cable) for donor antenna run or equal.

G. Cable Hangers

- 1. Cable hangers shall be used to support the horizontal cable runs on each floor. Cable hangers shall be spaced according to cable manufacturer recommendations.
- 2. Attach cables to ceiling using methods detailed in section 270529 – Hangers and Supports for Communications Systems Cables.

H. Connectors

1. The cabling shall be connected using the connectors recommended by coaxial cable manufacturer.

I. Monitoring System

1. Electronic Equipment shall have the following alarms:
 - a.) Donor Antenna Malfunction
 - b.) Active RF emitting device failure
 - c.) Equipment - Loss of AC power
 - d.) Backup Power - DC charging failure (for battery system)
 - e.) Backup Power - 70% of battery capacity used
 - f.) System Component failure
 - g.) Failure of communication link to Fire Alarm
2. Alarms shall be connected to fire alarm panel via supervised circuits
3. Furnish and install a dedicated monitoring panel in the fire command center to annunciate items above.

J. Racks, mounting and grounding hardware

1. Provide steel racks appropriate for installed hardware
 - a.) Rack for BDA and battery enclosure
 - b.) Custom designed BDA and battery enclosure may require specialized rack. Check with manufacturer on rack mounting requirements.
2. Grounding design shall meet Motorola R56 standards and all local codes in the installation environment

K. Entrance Port

1. A rubber, watertight entrance port shall be utilized on the roof in order for the coaxial cable to transition from the roof to the interior of the structure.

L. Transient Protection at inside entrance for donor antennas (if required)

1. A bulkhead mount protector shall protect against lightning damage
2. Lightning Protection Device: Polyphaser IS-50NX-C2

M. Cable Assemblies (Jumpers)

1. Use cable assemblies (jumpers) recommended by the coaxial cabling manufacturer when connecting antennas to rigid coaxial cable. This will provide flexibility necessary to properly mount antennas without over stressing connectors.

N. Other Components

1. Any additional components needed for correct installation of this system, including but not limited to, coupler/splitter holders for cable trays, and 50 Ohm resistive loads, shall be installed according to the manufacturer guidelines and intentions.

2.3 COMPONENT SUBSTITUTION

- 1 A. Substitution of any component listed in this specification for another component must be
2 approved by the design team prior to substitution.

3 PART 3 - EXECUTION

4 3.1 COORDINATION

- 5 A. DAS contractor shall hold and coordinate meetings with owner, general contractor and the
6 design team to coordinate system installation.
- 7 B. Coordinate layout and installation of DAS pathways, cabling, conduits, and antenna placement
8 with electrical and telecom contractors and design team.
- 9 C. Coordinate installation activities with general contractor and electrical contractor.
- 10 D. Coordinate and confirm placement of antennas with owner, architect, and design team.
- 11 E. Coordinate with each licensee or system owner for all signals to be re-radiated by the DAS
12 System.
- 13 F. Officially notify licensees prior to system going on-air.
- 14 G. Procure consent to carry letter for each provider as required.
- 15 H. Coordinate power requirements for head-end equipment with electrical design team.
- 16 I. Coordinate cooling requirements for head-end equipment with mechanical design team.

17 3.2 GENERAL INSTALLATION

- 18 A. Place all terminations and antennas above 7 feet and out of reach of the general public.
- 19 B. Sleeve all terminations with appropriately sized heat shrink tubing to a point at least 6" behind
20 the connector.
- 21 C. Ground all miscellaneous metallic components, such as splitters, directional couplers, and
22 connectors.

23 3.3 CABLE INSTALLATION

- 24 A. Do not bend shielded coaxial cables to a radius that is less than the minimum manufacturer
25 specification for that cable.
- 26 B. Cables shall be run at right angles to, and remain clear of, all other trade works.
- 27 C. Attach cables to walls or ceilings using cable hangers specified in PART 2 of this section.
- 28 1. Whenever cable hangers/attachments are utilized, they shall be spaced so that the cable
29 is adequately supported according to the manufacturer specifications.
- 30 D. When using cable hangers, care shall be taken to not tighten hangers beyond what is
31 necessary to firmly hold the cable in place. This could compromise the internal integrity of the
32 cable by crimping or kinking the outer conductor or dielectric.
- 33 1. All cable shall pass a FDR test specified in PART 4.

- E. For short connections close to antenna connections (less than 2 feet), flexible coaxial cable assemblies (also known as jumpers) may be used instead of rigid coaxial cable.

3.4 SPLITTER and DIRECTIONAL COUPLER INSTALLATION

- A. Install directional couplers/splitters in such a manner so as to have minimal effect on cables.
- B. Mount each splitter/directional coupler on a bracket that provides for the structural integrity of the input and output ports of the device.
- C. Install the directional couplers in the specified orientation. Each floor or sub distribution system may receive only a percentage of the total power from the main distribution line via the coupled port of the directional coupler. The coupled port is connected to either a floor's distribution system, if branching off a riser cable, or to an antenna, if branching off of a floor's horizontal distribution cabling.

3.5 ANTENNA INSTALLATION

- A. Coordinate antenna installation with the owner to ensure correct placement.
1. Antenna placement shall be as indicated on the technology drawings. Placement of these antennas more than 5 feet from intended location must be approved by the design team prior to placement.
- B. Donor Antenna
1. Install entrance panel at entry location on roof or penthouse wall according to manufacturer instructions. Weatherproof the entry panel with manufacturer kit to ensure no water leakage through the entrance port.
2. Install lightning protector on the inside entrance of the cable entrance port near the donor antenna and exothermically ("CadWeld") connect it to the building steel (provided that steel is grounded and not floating) or some other nearby facility structural ground.
3. Ground the cable on the outside of the entry panel to a facility structural ground.
4. Install donor antenna in a location with clear visibility towards likely donor site, and coordinate with general contractor and the system owner to determine exact antenna orientation and placements. Follow manufacturer instructions for installation of the wall mount kit and antenna.

3.6 CONNECTOR INSTALLATION

- A. Install all connectors for cabling and other components in accordance with the manufacturer's recommendations.

3.7 INSTALLATION STANDARDS

- A. Install all equipment with a high degree of technical workmanship.
- B. Installation details, including but not limited to grounding, structural soundness, and power connections shall be accomplished in accordance with the latest version of Motorola Standard R56, Construction Practices for Radio System Installations.
- C. Monitoring Systems shall comply with NFPA 72.
- D. All miscellaneous connectors and cables shall be of a type meeting MIL specifications for resistance to corrosion and vibration.

- E. All miscellaneous metallic components, such as splitters, directional couplers, etc., shall be mounted on metal shelves (when installed in the head-end cabinet) or otherwise provided with a robust ground connection, and to the remainder of the system components within any room.
- F. All cabling shall be connected to walls or ceilings using the appropriate cable hangers. Cable runs shall be neat and shall not, under any circumstances, be attached to electrical conduits or metalwork associated with other building systems.
- G. Each cable between any two locations shall be tagged or marked with bands of colored tape, identically at both ends, unique to the specific cable and the radio system. Markings shall be permanent and placed where they are visible for inspection without moving other cables. Cable markings shall be noted on as-built drawings.
- H. All boxes shall be NEMA 4 water tight boxes.

PART 4 - TESTING

4.1 COMPONENT TESTING

- A. Perform and record a test of every installed cable segment using an RF FDR. (Cable segments shall be temporarily terminated at one end in a 50-ohm resistive load (termination) for these tests.)
- B. Test all cables segments (as defined below) at frequency sweeps around: 160, 460, 840, 930, and 1925 MHz. The sweep bandwidth should be reflective of common spectrum bands in that frequency range (i.e, 806-894 MHz covers the cellular and LMR band in 800 MHz).
 - 1. Test every segment of cable that has no more than a pair of connectors individually with a termination at one end.
- C. The return loss at any connector along a length of cable segment shall be greater than 20dB. Inspect the FDR trace for any locations other than connectors where return loss is below nominal value. If apparent cause is proximity to external metal devices, correct the routing of the cable and re-test. If apparent cause is stretching or tearing of cable or its materials, replace the section of cable and re-test.
- D. Provide copies of test results (both tabular and screenshots of cable tests) for all cable tests to design team two weeks prior to Punch List visit.

4.2 SYSTEM TESTING

- A. Prior to the start of testing, using electronic copies of design drawings, create as-built documents showing the exact components, locations, paths, connections, and test points used.
- B. Prior to initial activation of system for testing, contractor should notify the design team a minimum of two weeks before activation for coordination purposes.
- C. Connect distribution system to head-end electronics and perform signal coverage tests as follows for the public safety radio system:
 - 1. Divide each floor into twenty (20), approximately equal, test zones.
 - a.) Spaces with large inaccessible areas, such as those occupied by machinery, electrical equipment, etc., shall be represented by a typical personnel space.

b.) Each stairwell (with door closed) on every even numbered floor shall be a test zone. Each elevator shall be three test zones, one at the top, bottom, and midpoint with its doors closed.

2. Test zones shall be drawn on as-built floor plans. A test point shall be selected approximately in the center of the zone, and labeled in an appropriate fashion (such as Wing, Floor No. , Location No.). Test location numbers shall be entered on an Excel spreadsheet with columns indicating "Received Signal Level" and "Uplink Keying Check".

3. The testing devices shall consist of a typical portable two-way radio programmed to operate on the public safety radio system, and a spectrum analyzer or a calibrated test receiver that reads out or can be converted to true signal level in dBm using a conversion chart.

4. The portable radio shall be equipped with a typical antenna, with the radio held in the tester's hand and in a position for speaking into the built-in microphone.

5. The calibrated receiver shall be mounted on a rolling cart, using a calibrated dipole antenna at 48" above the floor.

6. The spectrum analyzer/calibrated test receiver shall be tuned to the active control channel of the public safety radio system.

7. At each test location:

a.) Read and record the downlink received level from the spectrum analyzer/calibrated test receiver and enter it on the spreadsheet opposite the location number, in the column labeled "Received Signal Level".

b.) Key the portable radio on an approved vacant talk group and listen for key-up (go-ahead) tone, and also the presence of a carrier for a few seconds after releasing the push-to-talk button.

c.) If the received signal on the spectrum analyzer/calibrated test receiver is equivalent to -80dBm or better, and the repeater system responds immediately to key-up, enter "OK" in the column of the spread sheet labeled "Uplink Keying Check".

d.) If the received signal level is equivalent to less than -80dBm, or the uplink check fails on the first attempt, then accomplish four more uplink keying attempts from the same location, and enter the number (0-4) of key-up tests that are successful. THEN move the cart in four directions from the selected test location (approximately along an "X") within the test zone. Observe the signal level behavior along the four directional lines, plot the lines on the test zone drawing, and indicate the location and values of maximum and minimum readings along those lines.

e.) Note: The -80 dBm test point value using a dipole antenna is designed to provide a 15dB margin between the actual received level and the target minimum value of 95 dBm at the terminals of a portable radio with antenna worn next to body.

8. At the conclusion of the tests, confer with owner, design team, and other interested parties to determine revisions or corrections that might be necessary to achieve desired results.

END OF SECTION 27 53 20

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SECTION 28 05 00 - COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. General provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Limits and scope of work under the Electronics Security Contractor (ESC) Section shall be defined in these specifications.
- C. Provide materials, labor, equipment and services necessary to furnish, deliver and install a completely functional integrated system.
- D. All equipment and work shall comply with all applicable codes.

1.2 SUMMARY

- A. The Electronic Security Contractor (ESC) shall provide all portions of the security systems and be responsible for integrating them into a system.

- 1. The ESC shall submit an aggregate bid for Work described in the following specification sections. The ESC shall be responsible for performing the coordination required between security electronic system and the detention equipment and metal wall cell panels as well as the Electrical work.

- a. Security Electronic Systems Work required by, but not specified in, this Section includes the following:

- 1) Division 27, Section 270548 "Vibration and Seismic Controls"
 - 2) Division 27, Section 271500 "Voice, Data, & Video Communications Cabling System"
 - 3) Division 27, Section 274113 "Cable Television System"
 - 4) Division 27, Section 275123 "Intercom System"
 - 5) Division 27, Section 275320 "Distributed Antenna System"
 - 6) Division 28, Section 280500.1 "Uninterruptible Power Source"
 - 7) Division 28, Section 280500.2 "Conduit and Raceways"

(Conduit Provided by Division 26. ESC is responsible to coordinate conduit installation.)

- 8) Division 28, Section 280548 "Vibration and Seismic Controls"
 - 9) Division 28, Section 281000 "Fiber Optic Testing"
 - 10) Division 28, Section 281300 "Access Control System"
 - 11) Division 28, Section 282300 "IP Video Surveillance"
 - 12) Division 28, Section 283111 "Digital Addressable Fire Alarm System"
 - 13) Division 28, Section 284600 "Touchscreen Interactive Computer"
 - 14) Division 28, Section 284600.1 "Security Electronics Control Matrix"
 - 15) Division 28, Section 284600.2 "Event Recording System"

16) Division 28, Section 284619 "PLC Electronic Detention Monitoring and Control Systems"

2. This project is defined as a "Design/Bid/Build" project. Approved ESC firms must base their bid on the equipment and products specified herein. Design changes or product substitutions will not be allowed. Value engineering proposals will not be considered. Substitutions on the specified software will not be approved.
3. The ESC shall have in its employ a part-time project manager and full time superintendent to supervise the work of this section. The superintendent's responsibility shall be to assist in the project management roll when the position is not on-site and to supervise and coordinate the scope of work of the ESC. The superintendent shall be at the site at all times when the work is being performed.
4. If any portion of the work listed in paragraph 1.2.A.1.a above is subcontracted, the responsibility for system coordination and integration remains with the ESC.
5. The ESC shall be fully responsible for reviewing the conduit routing for the security electronic systems and devices and notify the Architect / Engineer of any modifications required prior to any conduit installation. If the conduit is provided under another subcontractor's scope of work the ESC shall meet with that subcontractor prior to conduit installation and provide any coordination information associated with the systems and devices provided by the ESC. The ESC shall be responsible for providing a backbox schedule to the Contractor prior to conduit installation.
6. The ESC shall be fully responsible for acquiring and paying for any and all licenses and permits required to perform their Work. If licenses are required before bidding, then the ESC shall not bid any portion of the Work until the required licenses are obtained.

1.3 SCOPE AND RESPONSIBILITY

- A. The General Contractor may choose to divide the scope of work for the security electronic system. This scope of work may be done by an Electronic Security Contractor (ESC). If the decision is made by the General Contractor to divide the scope of work for the divisions 27/28 systems it will not relieve the responsibility of all parties involved to perform full coordination to insure a fully functional system as specified. During the testing, troubleshooting and inspection of this work the ESC will be required to have a knowledgeable representative present. Please note that the ESC must self perform their designated scope of work with their own work force unless approved in writing by the Architect / Consultant.
- B. The Electronics Security Contractor (ESC) is the contractor that is responsible for providing the custom fabricated equipment, programming, and systems integration for all security electronic systems specified in Divisions 27 and 28. The ESC will be responsible for furnishing all the equipment and material as specified.
- C. Electronics Security Contractor (ESC)
 1. Approved ESC firms must base their bid on the products listed herein or approved by Addendum.
 2. The ESC shall have in their employees a full time superintendent to supervise the work of Divisions 27 and 28. The superintendent's sole responsibility shall be to supervise and coordinate the work of this division. The superintendent shall be at the site at all times when the work of these divisions is being performed.
 3. The ESC may subcontract portions of the work to individuals approved in writing by the Architect/Engineer. The responsibility for system coordination and integration remains with the ESC.

4. The ESC shall be fully responsible for acquiring and paying for all licenses and permits required to perform its Work. If licenses are required before bidding, then the ESC shall not bid any portion of the Work until the required licenses are obtained.

D. Related Work Furnish and Installed by Others.

1. Furnishing and installing hardware for non-security doors.
2. Furnishing and installing hardware for detention doors.
3. Casework and Millwork.
4. Equipment grounding system.
5. All 120/208/240 VAC branch circuits including conduit, wiring and connections from power distribution panels to screw type terminal strips and/or receptacles in electronic control panels and/or at electronic system devices. All distribution and branch circuits described above shall be connected to the emergency power source.

1.4 PRE-QUALIFICATION REQUIREMENTS

- A. The following ESC firms are pre-approved to perform the work of this Section: To Be Determined. Other Contractors interested in bidding the Project as an Electronics Security Contractor (ESC) shall submit a Statement of Qualifications in section 280500, a minimum of calendar 14 days prior to bid:

1. Accurate Controls, Ripon, WI; 920-748-6603
2. CML Security, Erie, CO; 720-466-3650
3. Com-Tec Security, Inc., Appleton, WI; 920-749-2840
4. Cornerstone Detention, Decatur, Alabama 256-560-4207.
5. Metroplex, San Antonio, TX; 210-495-5245
6. Sierra Detention Systems, Brighton, CO; 303-278-6879.

Note: Approval of a firm as an ESC does not relieve the ESC from furnishing all materials from manufactures as herein specified.

1.5 SUBMITTALS

- A. Submittals shall be organized into four (4) major sections as follows:

1. General data:

- a. Table of contents.
- b. Descriptive responsibility for all parties where the ESC must interface with other trades/contractors.
- c. System theory of operations that clearly defines the operating parameters of all systems being supplied.
- d. A functional systems block diagram showing single-line interconnection of all integrated systems and the major components of each system and methods of integration.
- e. Signed certification that the controls have been coordinated with the approved detention hardware submittals.
- f. Signed certification that the emergency power requirements been coordinated with the approved electrical contractor submittals.

2. Manufacturer's data sheets organized by specification section:

- g. Table of contents.
 - h. Bill of material for each system listing the quantity and device model submitted.
 - i. Device data sheets to be organized in the same order as equipment was specified.
 - j. Provide data sheets for additional items as required at the end of each section.
 - k. The data sheets shall be annotated to clearly identify only those specific models, functions, and features that are applicable to this project.
3. Calculations and schedules organized by system:
- l. Table of contents.
 - m. Calculations as specified in each section.
 - n. Voltage drop calculations for all circuits. Where multiple runs of the same conductor are furnished, figure worse case only. Provide certification that all other runs are shorter.
 - o. Schedule of points of all electronically operated devices and their functional attributes for all systems being supplied. The schedules shall be organized by system (i.e., locking, audio, lighting, duress, etc.) and shall be formatted in alphanumeric order by architectural identification number. As a minimum for each commodity entry, the schedules shall include the following:
 - a. Associated architectural number (i.e., door 108)
 - b. Assigned operation number (i.e., D108)
 - c. Hardware group (i.e., HW-1). This is a designation given to a standard set of complete hardware being utilized. Identify all part numbers (P/N):
 - d. EX IC-1 consists of:
 - 1) 1-5" Speaker P/NXXXX
 - 2) 1-Baffle P/NXXXX
 - 3) 4-Security Screws
4. Shop Drawings
- p. Complete list of drawings.
 - q. Table listing wire and installation components to be used.
 - r. Wiring diagrams for each device.
 - s. Review and coordinate conduit drawings and confirm routing locations prior to installation. Provide wiring information for each device and conduit run to Division 26. Provide wire fill information along with interconnection for all security items.
 - t. Touchscreen Control Station drawings/artwork that depict configuration of all control maps. Include utility and administrative screens
 - u. Rack layout drawings.
 - v. Control room, security electronic equipment room and MDF T/D equipment room layout floor plans and elevations. Drawings shall include dimensions indicating clearance related requirements provided by ESC.
 - w. Provide riser diagram of each system indicating the location of each component and all interconnections for signal and power. At a minimum the submittal shall

- 1 include risers detailing all components for the following systems: PLC, IP Video
2 Surveillance, CATV, Intercom, Fire Alarm, and Access Control System.
- 3 B. Submittals not organized as specified shall be considered incomplete and will be rejected.
- 4 C. The ESC shall provide one set of a “draft” submittal to the Architect/Engineer as described in
5 “A” above. All comments and changes shall be noted on the “draft” submittal and returned to
6 the ESC at the end of the review. The ESC shall incorporate those comments and changes
7 into the “final” submittal. The ESC shall return the “draft” submittal along with the required
8 number of sets of the corrected submittal for final review.
- 9 D. Submittals for all security electronics sections shall be submitted at one time regardless of
10 which firm is providing equipment or installation.
- 11 E. Unless required otherwise in Division 1, the ESC shall submit one (1) complete sets of
12 submittal documentation for final approval. Submittals shall include items listed in “A” above.
13 Include one (1) electronic copy.
- 14 F. The ESC must include with the draft and final submittals one (1) set of submittal information
15 in PDF format available from Adobe at www.adobe.com. Provide a single file bookmarked for
16 each specification section and each data sheet for easy reference. All files shall be
17 searchable by text through Adobe Reader. The files shall be electronically transmitted
18 through the project ftp site or the contractors ftp site. Provide submittal as follows:
- 19 1. Table of Contents
- 20 a. List each major specification section.
- 21 b. Each major specification section shall be subdivided into a Bill of Material for all
22 equipment provided in that section. In each subdivision, provide a detailed list of
23 the equipment indicating manufacturer’s model number and quantity. Each model
24 number shall act as a hyperlink to the datasheet for the listed equipment.
- 25 c. The user shall be able to navigate to the correct file through the hyperlinks under
26 the table of contents, by manually selecting folders until they find the correction file,
27 or a text search.
- 28 2. Horizontal Cabling
- 29 a. Data sheets (including relays)
- 30 b. Fiber Schedule
- 31 c. Cable Schedule
- 32 3. Distributed Antenna System
- 33 d. Data sheets
- 34 e. Operational Manuals
- 35 f. Cable Schedule
- 36 4. Door Locking Control
- 37 a. Programmable Logic Controller (PLC)
- 38 i. Data sheets (including relays)
- 39 ii. Operation manual
- 40 iii. Programs
- 41 b. Touchscreen Control Station

- 1 ii. Data sheet
- 2 iii. Screen Maps
- 3 iv. Operation Manual
- 4 v. Software versions and license numbers
- 5 c. Intercom
- 6 i. Data sheets
- 7 ii. Operation manual
- 8 d. Event Recording System
- 9 i. Data sheets
- 10 ii. Operation manual
- 11 5. IP Video System
- 12 a. IP Video Stations and Monitors
- 13 i. Data sheets
- 14 ii. Operation manual
- 15 iii. Programs
- 16 b. Cameras
- 17 i. Data Sheets
- 18 ii. Operation Manual
- 19 c. Network Storage, Switches, and Servers
- 20 i. Data sheet
- 21 ii. Operation Manual
- 22 iii. Programs
- 23 6. Fire Alarm System
- 24 a. Controls and Terminal Cabinets
- 25 i. Data sheets
- 26 ii. Operation manual
- 27 iii. Programs
- 28 b. Initiating Devices and Indicating Appliances
- 29 i. Data Sheets
- 30 ii. Operation Manual
- 31 7. CATV System
- 32 a. Amplifiers and Signal Distribution
- 33 i. Data sheets
- 34 ii. Operation manual
- 35 8. Access Control System
- 36 a. Main Controller boards
- 37 i. Data sheets

- 1 ii. Operation manual
- 2 iii. Programs
- 3 b. Devices
- 4 i. Readers
- 5 ii. Door Position Switches
- 6 iii. Request to Exit Devices
- 7 c. Card Enrollment Station CAE
- 8 i. Computer Station
- 9 ii. Camera
- 10 iii. Software
- 11 9. Miscellaneous components
- 12 a. Conduit and Raceways coordination information.
- 13 b. Racks and hardware
- 14 c. Uninterruptible Power Supply
- 15 d. Wire and Cable
- 16 10. Installation and Fabrication Drawings.
- 17 G. The submittal documents shall be updated throughout the project construction and
- 18 incorporated into the Operation and Maintenance manuals.
- 19 1.6 OPERATING/MAINTENANCE MANUALS
- 20 A. ESC shall furnish three (3) copies of Operation and Maintenance Manuals for all security
- 21 electronics systems furnished under this specification. These manuals shall include:
- 22 1. Instructions for the care and operation of the systems and materials.
- 23 2. Parts list to aid the Owner with ordering replacement parts.
- 24 3. As-Built conditions, **The ESC shall have a draft copy of the as-built drawings and**
- 25 **Operating and Maintenance Manuals onsite for the final system inspection.**
- 26 4. Telephone, Fax, Address, website and instructions for contacting the appropriate
- 27 personnel during the warranty period as well as for service.
- 28 B. The owner has the right to request an interactive Operation Manual in place of the printed
- 29 hard copy manuals described above. The interactive manual will utilize the files described in
- 30 1.03, D above as a basis for an interactive document utilizing a web browser. All manuals,
- 31 files, and data sheets would be published in format compatible with Internet Browsers equal
- 32 to Microsoft Internet Explorer. Hyperlinks would link each item in a master table of contents
- 33 to individual manuals, CAD drawings, and files. The ESC shall clarify with the owner the type
- 34 of documentation required.
- 35 C. One (1) copy of the programming and source code of the applications software on a non-
- 36 volatile media (DVD/CD or Solid State) format. This copy shall have all programmer
- 37 comments, variable names, and mnemonics included.
- 38 D. Provide a disk for each panel or CPU. Provide a typed directory with all required passwords
- 39 and procedures to reload software.

E. All keys, passwords, access codes, and software required to access the programming shall be furnished to the owner as part of this project. Turn over to the owner at the end of the project.

F. Furnish a digital copy of the facility's Operation and Maintenance Manual in PDF format on the ERC.

1.7 SUBSTITUTIONS

A. No substitutions of equipment or material will be permitted where specific trade names or a manufacturer is listed, unless the architect adds them by an addendum.

B. Materials and products specified by name of manufacturer or brand trade name shall be the basis of the bids received unless changed by addendum prior to the bid dates.

C. In the event a contractor wishes to use any materials or products other than those specified, he shall make a written request to the Architect, naming the proposed substitution.

D. All additional costs resulting from the use of an approved substitution shall be borne by the contractor without additional expense to the Owner.

1.8 COORDINATION

A. Coordinate work to ensure efficient and orderly installation of each part of the work.

B. Coordinate selection of electronic products for compatibility.

C. Coordinate sequencing and scheduling of electronic work. Secure time commitments for performing critical construction activities from separate entities responsible the work.

D. Coordinate installation of anchorages and embedment's for electronic work.

E. Coordinate temporary facilities required for electronic work.

F. Coordinate protection of installed electronic work.

G. Coordinate preparation of Project Record Documents for electronic work and integrate information from entities responsible for electronic work to form one combined record.

H. Coordinate preparation of operation and maintenance manuals for electronic work and integrate information from entities responsible for electronic work to form one combined record.

I. Defective Products: Items found to be defective, either through manufacturing, damage in transit, or by field installation shall be replaced prior to final completion.

J. Coordination Meetings: Conduct coordination meetings specifically for electronic work at regular intervals.

1.9 WARRANTY

A. The ESC shall warrant the systems and equipment furnished by each under this Section to be free from defects in material and workmanship for a period of two (2) years after substantial completion.

B. The ESC must have full-time employees trained in and devoted to the maintenance and repair of systems and equipment furnished.

- C. Additional Programming: The ESC shall include all associated costs for a three (3) month post occupancy system walk through with owner and shall allow for eighty (80) hours of site specific program changes to the system.
- D. The contractor shall furnish and install all firmware upgrades and software patches released during the warranty period for all software furnished and installed as part of the Security Electronics systems. Firmware and software fixes shall be installed as they are released for both the video management system and the door locking control system.
- E. The contractor shall complete a field report after each trip and have it signed by the facility leaving a copy with the facility.
- F. Contractor shall certify in the Operation and Maintenance manual as well as in each monthly field warranty report that the firmware, software, and hardware are compatible and have been tested as a system for both the video management system and the door locking control system.

PART 2 - PRODUCTS

2.1 SECURITY SCREWS

- A. Equipment: All security equipment specified within divisions 27/28 shall have stainless steel torx-head with center-pin security screws. Such areas include but are not limited to corridors, dayrooms, cells, multipurpose rooms, medical, visitation areas, kitchens, commissary, and laundry.
- B. Alternatives: Additional means of locking or securing devices are as indicated in each section.

2.2 SECURITY COVERS

- A. Equipment: All security equipment specified within divisions 27/28 located in inmate areas within reach of inmates, which are not of detention grade because of code requirements, or application shall be protected with security covers. Provide covers sized to completely surround the device without substantially degrading the function.
- B. Alternatives: Other options for protecting devices are as indicated in each section or shown on plan details and elevations.

PART 3 - EXECUTION

3.1 FACTORY ASSESSMENT DEMONSTRATION

- A. The ESC shall provide a factory assessment test and demonstration for the security electronic system. This shall be at the ESC's fabrication shop. The ESC shall notify both the security consultant and owner four (4) weeks in advance of the test being scheduled. **The ESC shall cover all travel expenses for one architect, one engineer, and six of the owner's representatives to be present.**
1. Provide the all of the TIC stations that will be installed in Central Control and in the housing buildings. This will include the intercom microphone, video spot and sequence monitors. All control functions shall be demonstrated. At least one field device of each type installed shall be active at the time of the test.

- 1 2. At a minimum provide an intercom and duress station. Simulate locks with lamps or
2 LED's. Simulate door position switches with commercial DPS or switch.
- 3 3. Task group assignment will need to be operational. Demonstrate all utility functions and
4 emergency release. Demonstrate the transfer of task groups between stations.
- 5 4. All alarms shall be functional. Examples are the duress pushbutton, UPS, network
6 failure and door alarms.
- 7 5. Provide all IP Video monitors to be installed in the facility and connect two cameras of
8 each type in each task group. One camera shall call up when answering a door
9 intercom and the other shall be for general supervision.
- 10 6. Demonstrate the IP Camera system and recording call up. Generate at least 5 days of
11 recording on the connected cameras for use in demonstration. Demonstrate three
12 levels of recording quality.
- 13 7. Demonstrate the card access system. Provide the Card Access enrollment station.
- 14 8. Provide the intercom recording stations, and demonstrate the recording of intercoms.
- 15 9. The factory test shall include the ERC unit and printer. Demonstrate the generation of
16 reports and provide printouts for review.
- 17 10. One week before the factory demonstration, submit to the engineer a detailed schedule
18 and agenda of the test for review and comment.
- 19 11. The listed above is a minimal that can be provided. It is preferred to have the entire
20 electronic system operational as one system if possible.
- 21 B. If for any reason an additional FAT is required because the Work is incomplete or if any
22 portion of the system fails to function as designed the ESC shall be responsible for paying for
23 the time and expenses for the engineer and owner to re-schedule and re-test the Work. This
24 cost shall include time and expense for each individual of the Security Consulting firm
25 required to return for the re-test. The cost shall be a minimum of \$5000.00 per individual
26 occurrence. This cost will include travel time, inspection time and travel expenses. This
27 amount must be paid **prior** to re-scheduling the inspection.

28 3.2 INSTALLATION

- 29 A. Listing: All wiring and raceways shall be listed for the intended installation and installed in
30 strict accordance with the California Electric Code as required by the conditions of where it is
31 installed.
- 32 B. Abandoned Wire: All wiring not energized shall be terminated at both ends and labeled for
33 future use. There shall be no abandoned wire.
- 34 C. All wiring shall be fully terminated in all racks and cabinets on **screw type terminals**. All wire
35 is to be landed on screw terminal units of size, amperage rating, material, type, and class
36 suitable for service indicated.
- 37 D. All wiring/cabling shall be labeled with the system type and the device ID at each end. All
38 labeling shall be by mechanical means. The label shall be generated by a Brady I.D. Plus Pro
39 Printer or equal, and utilize a Brady part# WML-511-292 label or equal. The label used
40 should allow for the clear part of the label to overlap and protect the printed portion of the
41 label from being exposed to damage and/or being rubbed off over time. Hand written labels
42 are not permitted.
- 43 E. All wiring outside of equipment rooms is to be in conduit. Coordinate conduit routing with
44 Division 26.

- F. Seismic: The entire system shall be installed to meet the seismic requirements for the area.

3.3 INSPECTIONS AND TESTING

- A. The General Contractor and ESC shall be responsible for issuing a letter to the Owner's Representative, the Architect, and R&N Systems Design, LLC confirming that the work is complete and ready for inspection and testing. If the project is completed in phases, a letter will be submitted for each phase to be inspected. As an attachment to the letter confirming the work is "complete" and ready for inspection, the ESC must attach a self-generated "field test" report for each device which confirms in detail that the ESC has performed their own inspection and test prior to the inspection by the Architect / Consultant.

- B. The inspection shall include Systems, Subsystems, Equipment, and Components. Where these terms are used together or separately, they shall be referred to as "the system". The ESC shall be prepared to test every point for each system.

- C. If additional inspections are required because the Work is incomplete at the time of the scheduled inspection or if any portion of the system fails to function as designed the ESC shall be responsible for paying for the time and expenses for the Architect and Security Consultant to re-schedule and re-inspect the Work. This cost shall include time and expense for each individual of the Security Consulting firm required for the re-inspection. The cost shall be a minimum of \$5000.00 per individual occurrence. This cost will include travel time, inspection time and travel expenses. This amount must be paid **prior** to re-scheduling the inspection.

- D. The Superintendent and Project Manager shall be present and assist in the inspection / testing of the Work.

- E. Project completion will not be granted by the engineer until the system is installed and functioning to the Engineer's satisfaction and in accordance with the contract documents. The Engineer has the right to withhold the granting of project completion and schedule additional inspection if the system is not installed and functioning in accordance with the contract documents.

3.4 SHAKEDOWN PERIOD

- A. Coordinate with the Owner and Construction Manager/General Contractor to establish a shakedown period for the security systems. This shakedown period shall not begin until after "substantial completion" is issued. The shakedown period shall be a minimum of 15 days. If functionality or programming problems occur during the first 15 day, the shakedown period shall be extended for a minimum of two weeks after the systems are functioning dependably.

- B. ESC shall be responsible for providing a full time technician / programmer at the facility at all times during the shakedown time period to support operation of the facility by the Owner's staff.

3.5 SPARE PARTS

- A. The ESC shall deliver all spare parts at the completion of the project. The spare parts shall be clearly marked as to content and packaged for ease of handling by one (1) person without the use of forklifts or other equipment. The ESC shall obtain a signature from the owner's representative receiving the spare parts.

- B. The ESC shall furnish the parts described in each subsection of the specifications.

- C. Furnish 2 spare security covers of each type installed.

3.6 TRAINING

- A. The ESC shall provide, without additional cost to the owner, training in the operation of the security systems provided. The representatives shall train the Owner's personnel in operation, repair, and upkeep of each system.
- B. The ESC shall be responsible for notifying the Owner's Representative and the architect three (3) weeks prior to substantial completion of the total security system that training is scheduled. The ESC will coordinate the number to be trained with the owner's representative.
- C. The length of training is directly related to the size and complexity of the detention facility, but in no case shall the security electronics system training be less than three (3) days. The ESC shall be prepared to provide each training session to a minimum of 5 shifts.
- D. Course Structure
 1. The ESC shall prepare and present to the Architect a detailed course outline that specifies each major training module to be covered. The training program on the security equipment shall include the sequences and instructions for proper use and maintenance of all hardware, locking devices, control, and monitoring systems. The material shall be presented in simple layman's terminology, describe and demonstrate all step-by-step physical operations necessary for proper operation, and detail necessary equipment adjustments. At the time of training, each trainer shall present to the trainees detailed outlines of each training module to be covered and the specific skills and knowledge which the trainee is expected to master within each training module.
 2. At a minimum, the training program shall be subdivided into the following training modules:
 - a. Operation of the Security System.
 - b. Troubleshooting, General Maintenance, Equipment Adjustments, Repair and Replacement of Security System Components.
 - c. Operator Controls.
 - d. Descriptive modules organized by specification section.
- E. The ESC shall videotape each training module. The videotaping does not have to include individual student practice. The ESC in preparing the videotape shall structure it for easy reference by the facility's training officer for future use. Furnish digital copies of the facility training videos in a Windows Media file format (.wmv or equal) on the ERC. Files shall be easily viewable on the ERC's media player for training staff.
- F. Training Certification
 1. Each facility employee shall receive at the conclusion of the security systems training program a certificate certifying his attendance of the total session or portion thereof.
 2. ESC shall maintain attendance records of each class.
- G. Operation and Maintenance (O&M) manuals:
 1. Utilize the Operation and Maintenance manuals prepared for the facility for the training.
 2. Review all procedures in the Operation and Maintenance manuals.
- H. In addition to the training requirements listed above the ESC shall include all associated cost to provide additional onsite owner training following substantial completion. The additional

1 training shall occur at the three (3) months periods and shall cover topics as referenced
2 above. The additional training described above shall be provided for all division 27 and 28
3 scopes of work. Coordinate this additional training directly with the Owner's Representative.
4 Owner's representative is to provide correspondence to R&N once training has been
5 scheduled and again when training has occurred.

6 END OF SECTION 28 05 00
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**2016
Security Systems Integrator
STATEMENT OF QUALIFICATIONS**

NAME OF PROJECT: County of Fresno West Annex Jail, 2208 Merced Street, Fresno, California.

Only prequalified sub-contractors for the below specified type of work will be allowed to provide bids to General Contractors for the County of Fresno West Annex Jail project. Prequalified sub-contractors will be listed within the specifications for the below referenced project. The sub-contractor submitting for prequalification will be evaluated based on the **Qualification Criteria** section below. In order for a sub-contractor to be prequalified and be listed in the specifications, the sub-contractor shall meet or exceed the prequalification requirements indicated in the **Qualification Criteria** section. In order to establish that the sub-contractor meets the **Qualification Criteria** section, the sub-contractor must provide responses to all the **Statement of Qualifications Submittal Information** section below. The responses to this section must be complete and the required supporting documentation identified in the section must be submitted in totality. Additional prequalification opportunities for sub-contractors that do not respond to this statement of qualifications will be described in the project specifications, and may submit to become qualified during the bidding process. All information provided is subject to Public Disclosure laws.

TYPE OF WORK:

Security Systems Integrator (SSI): The SSI shall be responsible for providing the custom fabricated equipment, programming, and systems integration for all security electronic systems as specified. The SSI shall be responsible for testing and coordinating the final configurations of the system with the owner's representative and under the direction of the General Contractor. Final terminations must be made by the SSI. The Scope of Work for this contractor will be defined in the County of Fresno West Annex Jail Project drawings and specifications prepared by DLR Group and R&N Systems Design, LLC

Submission Due Date:

Fourteen (14) days prior to bid date

Submitted To:

DLR Group
700 South Flower
Street, 22nd Floor
Los Angeles, CA
90017
(213) 800-9400

Attn: Diane Castruita at dcastruita@dlrgroup.com

SSI shall submit the following information:

SUBMITTED BY:
NAME: ADDRESS:
TELEPHONE NO.: FAX
NO.: PRINCIPAL OFFICE:

Corporation	☐
Partnership	☐
Individual	☐
Joint Venture	☐
Other	☐

A. Qualification Criteria

RESPONSE MEDIUM: A single electronic PDF file, searchable for keywords. Email PDF file or mail CD to address above.

RESPONSE QUALIFICATION CRITERIA:

In order to be deemed a pre-qualified Security Systems Integrator, eligible to be retained as a subcontractor by a general contractor bidding on the County of Fresno West Annex Jail Project the SSI must meet all the terms and conditions listed below as well as provide all required responses and documentation. Additionally, any General Contractor subcontracting with a Security Systems Integrator Contractor that has been pre-qualified pursuant to this advertisement must also demonstrate that at the time of bid opening that the pre-qualified SSI contractor still meets the terms and conditions listed below and as set forth in the Bidder Supplemental Bidder Responsibility Criteria: RCW 39.04.350(2) Subcontractor Responsibility Criteria listed in the Bid Documents. The qualification information provided shall be limited exclusively to the scope of work similar to this project. Do not provide information for work performed by your company for other scopes of work.

1. Completion of Similar Projects.

1.1.1. The SSI has successfully completed or are currently under construction, at least five (5) medium security celled (or higher security) detention projects within the last five (5) years, containing **greater than 400 beds with a minimum of 100 cells each**. NOTE: If the SSI is a Joint Venture, the Joint Venture must meet the above-stated qualifications, not the individual Contractors that comprise the Joint Venture.

1.1.1.1. "Successfully completed" when specified for Contracting means that the projects SSI listed were completed with no fines levied or shutdowns instituted due to work and did not require the Surety company, the Owner or substitute SSI contractor to complete the project.

1.1.2. The Contractor's assigned Project Manager and Site Superintendent for this project must have each successfully completed at least three (3) medium security celled (or higher security) detention projects within the last ten (10) years, containing at least 400 beds with a minimum of 100 cells each. The Site Superintendent must be committed to the project on a full-time basis, on-site, while work is being performed. These assigned personnel must be employed by the SSI.

1.1.3. The SSI maintains a firm bonding capacity of at least \$5 million from an insuring company having a Best Rating of A- or better.

1.1.4. The SSI shall submit the annual amount of contracted work completed during the past five (5) years..

1.1.4.1. In evaluating the SSI the County may check references for the previous projects listed in B.3.1 and B. 3.2 and may evaluate the project owner's assessment of the SSI's performance, including but not limited to the following areas:

- 1.1.4.1.1. Quality control;
- 1.1.4.1.2. Safety record;
- 1.1.4.1.3. Timeliness of performance;
- 1.1.4.1.4. Use of skilled personnel;
- 1.1.4.1.5. Availability of and use of appropriate equipment;
- 1.1.4.1.6. Compliance with contract documents;
- 1.1.4.1.7. Management of submittals process, change orders, and close-out

- 1.2. Delinquent State Taxes
 - 1.2.1. The SSI shall not owe delinquent taxes to the Washington State Department of Revenue without a payment plan approved by the Department of Revenue.
 - 1.2.2. The SSI shall not be listed on the Washington State Department of Revenue's "Delinquent Taxpayer List" website: <http://dor.wa.gov/content/fileandpaytaxes/latefiling/dtlwest.aspx>
- 1.3. Federal Debarment
 - 1.3.1. The SSI shall not currently be debarred or suspended by the Federal government.
 - 1.3.2. The SSI shall not be listed as a current debarred or suspended SSI on the U.S. General Services Administration's "Excluded Parties List System" website: <http://www.epls.gov/>.
- 1.4. Termination for Cause
 - 1.4.1. The SSI shall not have had any contract terminated for cause on a government agency project during the five (5) year period immediately preceding the date of Bid opening, unless there are extenuating circumstances acceptable to the County.
 - 1.4.2. The SSI shall submit a written statement in a form of a certified letter attached to the SSI's Statement of Qualifications Submittal that the SSI has not had any contract terminated for cause on a government agency project during the five year period immediately preceding the date of Bid opening. The County may also use independent sources of information that may be available to demonstrate whether the SSI is in compliance with this criterion.
- 1.5. State of Washington Licensing

SSI must be licensed to do business in the State of Washington
- 1.6. State of Washington Registration Requirements
 - 1.6.1 SSI must have a current certificate of registration in compliance with chapter 18.27 RCW, which must have been in effect at the time of subcontract bid submittal;
 - 1.6.2 SSI must have a current Washington Unified Business Identifier (UBI) number;
 - 1.6.3 If applicable, have:
 - i. Industrial Insurance (workers' compensation) coverage for the subcontractor's employees working in Washington, as required by Title 51 RCW;
 - ii. A Washington Employment Security Department number, as required in Title 50 RCW;
 - iii. A Washington Department of Revenue state excise tax registration number, as required in Title 82 RCW;
 - iv. An electrical contractor license, if required by Chapter 19.28 RCW;
 - v. Not be disqualified from bidding on any public works contract under RCW 39.06.010 or 39.12.065(3).
- 1.7. SSI bidders shall provide 3 architect and/or engineer references and 3 owner references in section B.5 below.
- 1.8. SSI organization must have been incorporated and doing business in the United States as a Security Systems Integrator under its current name for at least 5 years.
- 1.9. Claims and Law Suits; the County, in its sole discretion may disqualify SSI's based on severity, quantity and date of claims or law suits.

B. Security Systems Integrator Statement of Qualifications Submittal Information

In order to establish that the SSI contractor meets the criteria above, SSI must provide responses to the following listed questions and the required supporting documentation identified to be submitted:

Where there is not sufficient space in the form for a complete answer, insert the words “Refer to attached sheet” and add a page copying the referenced question and paragraph number at the top of the page. Each page shall reference one question for clarity.

1. ORGANIZATION

1.1 How many years has your organization been in business as a Security Systems Integrator (SSI)?

1.2 How many years has your organization been in business under its present business name?

1.2.1 Under what other or former names has your organization operated?
(Attach additional details with reference to this paragraph number if required.)

<u>Year</u>	<u>Name of Organization</u>	<u>Principal Owners</u>

1.3 If your organization is a corporation, answer the following:

1.3.1 Date of incorporation:

1.3.2 State of incorporation:

1.3.3 President's name:

1.3.4 Vice-president's name(s):

1.3.5 Secretary's name:

1.3.6 Treasurer's name:

1.3.7 ESOP Companies (list Board of Directors and Trustee)

1.4 If your organization is a partnership, answer the following:

1.4.1 Date of organization:

1.4.2 Type of partnership (if applicable):

1.4.3 Name(s) of general partner(s):

1.5 If your organization is individually owned, answer the following:

1.5.1 Date of organization:

1.5.2 Name of owner:

1.6 If the form of your organization is other than those listed above, describe it and name the principals or owner:

2. LICENSING

2.1 List jurisdictions and trade categories in which your organization is legally qualified to do business, and indicate registration or license numbers, if applicable.

2.2 List license information for the State of Washington.

- a. Provide copy of current certificate of registration in compliance with chapter 18.27 RCW,
- b. Provide a current Washington Unified Business Identifier (UBI) number;
- c. If applicable, provide documentation of:
 - i. Industrial Insurance (workers' compensation) coverage for the subcontractor's employees working in Washington, as required by Title 51 RCW;
 - ii. A Washington Employment Security Department number, as required in Title 50 RCW;
 - iii. A Washington Department of Revenue state excise tax registration number, as required in Title 82 RCW;
 - iv. An electrical contractor license, if required by Chapter 19.28 RCW;
 - v. Not be disqualified from bidding on any public works contract under RCW 39.06.010 or 39.12.065(3).

2.3 List jurisdictions in which your organization's partnership or trade name is filed.

3. EXPERIENCE

Check (√) in the categories of work that your organization normally performs with its own forces.

Manufacture	Supply	Installation	SECURITY ELECTRONICS
			Access Control System
			Uninterruptable Power Supply (UPS)
			Computerized Door Control System
			Computer Control Stations
			PLC Control Systems
			Intercommunication Systems
			Lightning/Surge Protection
			Vehicle Detection
			Fiber Optic Cable Network Backbone
			IP Video System
			Video Arraignment Systems

- 3.1 List 5 construction projects for correctional facilities that have **occupancy greater than 400 beds with a minimum of 100 cells**. Projects can be either completed or actively under construction. Do not list projects completed before 2009. (Attach additional pages giving details with reference to this paragraph number.) In addition to references listed in 5.1 below, the SSI shall furnish project references for correctional facilities where the SSI scope of work was in excess of **\$1,000,000**. Provide the following:

1. Name of project.
2. Name of Owner. (Provide contact name and phone number.)
3. Name of Architect / Engineer. (Provide contact name and phone number.)
4. Name of General Contractor (If applicable) (Provide contact name and phone number.)
5. Contract Amount.
6. Occupancy.
7. List the year the project was/will be completed.
8. List the project delivery method: (Design-Bid-Build, Design-Build)

List 5 construction projects for correctional facilities that have **occupancy greater than 400 beds with a minimum of 100 cells**. A minimum of 2 must be Design-Bid-Build or CM@R delivery method the remainder maybe Design-Build

- 3.2 In addition to the projects above, list construction projects the organization currently has in progress with security electronic subcontracts for medium security celled (or higher security correctional facilities that have **occupancy greater than 400 beds with a minimum of 100 cells**. Provide the following.
1. Name of project.
 2. Name of Owner. (Provide contact name and phone number.)
 3. Name of Architect / Engineer. (Provide contact name and phone number.)
 4. Name of General Contractor (If applicable) (Provide contact name and phone number.)
 5. Contract Amount.
 6. Date of Occupancy.
 7. List the anticipated year the project will be completed.
 8. List the project delivery method: (Design-Bid-Build, Design-Build)
- 3.4 State annual dollar amount of security electronic work performed during the past five years:
- 2011:
- 2012:
- 2013:
- 2014:
- 2015:
- 3.5 State total worth of security electronic work currently under contract and in progress as of January 1, 2016.
- 3.6 Claims and Suits. List separately for each category in table listed above 3.1. (If the answer to any of the questions below is yes, please attach details with reference to the paragraph number).
- The County may disqualify any SSI that answers in the affirmative to these following items. The disqualification will be determined based on the severity, quantity and date the claim or suit occurred.
- 3.6.1 Has your organization ever failed to complete any work awarded to it?

- 3.6.2 Are there any judgments, claims, arbitration proceedings or suits pending or outstanding against your organization or its officers?
- 3.6.3 Has your organization filed any law suits or requested arbitration with regard to construction contracts within the last five years? If yes, provide explanation and circumstances.
- 3.7 Within the last five years, has any officer or principal of your organization ever been an officer or principal in another organization when it failed to complete a construction contract? (If the answer is yes, please attach details.)

4. PERSONNEL

- 4.1 Provide an Attachment “A” referencing this paragraph number, providing the following:
 - 4.1.1 Specifically designate the superintendent that will be assigned to this project. The Contractor's assigned Project Manager and Site Superintendent for this project must have each successfully completed at least three (3) medium security celled (or higher security) detention projects within the last ten (10) years, containing at least 400 beds with a minimum of 100 cells each. Provide a brief resume of this person, highlighting their experience, specifically detailing how their experience satisfies the experience requirement
- 4.2 Provide an Attachment “B”, referencing this paragraph number, providing the following:
 - 4.2.1 Specifically designate the senior project manager that will be assigned to this project. This person must have successfully completed at least three (3) medium security celled (or higher security) detention projects within the last ten (10) years, containing at least 400 beds with a minimum of 100 cells each. Provide a brief resume of this person, highlighting their experience specifically detailing how their experience satisfies the experience requirement.

5. REFERENCES

- 5.1 Architect/Engineer References (list three):
 - 5.1.1 Name:
Contact:
Address:
Telephone:
 - 5.1.2 Name:
Contact:
Address:
Telephone:

5.1.3 Name:
Contact:
Address:
Telephone:

5.2 Owner References at a reference facility knowledgeable of the installation (list three):

5.2.1 Name:
Address:
Telephone:

5.2.2 Name:
Address:
Telephone:

5.2.3 Name:
Address:
Telephone:

6. SURETY

6.1 Name of bonding company with a Best Rating of A- or better:

6.2 Name and address of bonding company agent:

6.3 Provide a letter from your bonding company that states your current bonding capacity:

7. FINANCING

7.1 Bankruptcy

7.1.1 Has your organization filed bankruptcy in the past five (5) years?

If yes, list the year in which bankruptcy was filed.

7.1.2 Has your organization under a previous name or other organization that you have acquired ever filed bankruptcy?

If yes, list the organization's name and the year in which bankruptcy was filed.

7.1.3 Have any of the key personnel managing the scope of work defined in this qualification been a member or employed by an entity that filed bankruptcy in the past five years?

If yes, list the organization's name and the year in which bankruptcy was filed.

8. NOTARIZED LETTER REQUIREMENT

The SSI shall submit a written statement in a form of a notarized letter attached to the SSI's Statement of Qualifications Submittal that the SSI has not had any contract terminated for cause on a government agency project during the five year period immediately preceding the date of Bid opening. The County may also use independent sources of information that may be available to demonstrate whether the SSI is in compliance with this criterion

9. CERTIFICATION REGARDING DEBARMENT SUSPENSION OR INELIGIBILITY

The Contractor certifies by signing this Agreement that Contractor is not presently debarred, suspended, proposed for debarment, declared ineligible or voluntarily excluded from participating in this contract by any federal department or agency. Further, Contractor agrees not to enter into any arrangements or contracts related to this contract with any party that is on the "General Service Administration List of Parties Excluded from Federal Procurement or Non-procurement Programs" at <http://epls.arnet.gov/>.

CONTRACTOR:

Authorizing Signature

Date

Federal Tax ID# _____
Contractor Lic.# _____

10. SIGNATURE

The Undersigned certifies that the information provided herein is true and sufficiently complete so as not to be misleading.

Dated this _____ day of _____ 2015.

Name of Organization:

By: _____

Title: _____

Subscribed and sworn before me this _____ day of _____ 2015

Notary Public: _____

(Seal)

My Commission Expires:

APPEAL PROCESS

If the County determines the SSI does not meet the responsibility criteria and is therefore determined not to be a qualified SSI, the County shall notify the SSI in writing with the reasons for its determination. If the SSI disagrees with this determination, it may appeal the determination within twenty four (24) hours of receipt of the County's determination by presenting additional written information to the County. The County will consider the additional information before issuing its final determination. Please note that the above-described information, materials, and documentation requested by the County for purposes of determining SSI responsibility is not necessarily exclusive, and the County expressly reserves the right to request additional information, materials, and documentation as may be determined to be necessary or desirable by the County in order to evaluate and determine SSI's compliance with the above-described SSI responsibility criteria. At all times, the County may also use other sources of information that may be available to otherwise determine whether the SSI is in compliance with the forgoing bidder responsibility criteria.

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SECTION 28 05 00.1 - UNINTERRUPTIBLE POWER SOURCE

PART 1 - GENERAL

1.1 SUMMARY

- A. Scope of Work: Provide Uninterruptible Power Supply (UPS) units to supply 120/208 volt AC power for all, intercom masters, relay boards, locking controls systems, PLC equipment, IP video equipment, access control systems, video arraignment/visitation systems, and any other security electronics not provided with batteries. All security systems components are required to have a battery backup or be supplied with UPS power.
- B. The ESC is responsible for furnishing all of the UPS system components that are required for this project. This is to include UPS units, battery cabinets, and bypass switches. Division 26 is to furnish the distribution panels, power source equipment, distribution, feeders, disconnect switch and receptacles. The ESC is to coordinate the installation of the UPS system components as well as the 120 VAC UPS power distribution panel and disconnect switch with Division 26.
- C. The ESC shall confirm that the security electronics systems are powered from an emergency power source.
- D. Refer to SE drawings for UPS location, sizing, and additional information.
- E. The ESC as defined in Section 280500 Common Work Results for Electronic Safety and Security shall be responsible for providing and coordinating this system.

1.2 SYSTEM DESCRIPTION

- A. System Capacity: Size Each UPS system appropriately so that it shall independently deliver power to the connected load for not less than **one (1) hour** in the event of failure of the normal and emergency power source.
- B. The individual UPS sizes indicated on the SE drawings are the minimum sizes allowed at each location.
- C. Growth capacity: Size units for a minimum growth capacity of 25% at each UPS.
- D. Provide UPS system components for new security equipment at the following equipment room locations:
 - 1. 15 KVA unit in SEC room 1156.
 - 2. 10 KVA unit in SEC room 2252.
 - 3. 10 KVA unit in SEC room 3252.
- E. In addition to SEC rooms, furnish and install UPS system 120 vac power receptacles for new security equipment at the following locations:
 - 1. Officer Station 0021
 - 2. Control Room 1158
 - 3. Sergeant's Office 1152
 - 4. Guard Station 2206
 - 5. Guard Station 3206
 - 6. Pole Mounted Sited Cameras

Refer to Power Risers for more information.

1.3 SUBMITTALS

- A. Basic Submittals: Provide submittals as required by the General Conditions.
- B. Special Submittal Requirements: In addition to the contract requirements for submittals, provide comprehensive UPS load calculations for each UPS.
- C. Provide a letter stating that all electrical requirements have been coordinated with the division 26 contractor.

1.4 SYSTEMS INTEGRATION

- A. Integration: Integrate the UPS system with the PLC system to annunciate and log alarms associated with the UPS in Central Control only.
 - 1. Low voltage.
 - 2. Low battery.
 - 3. High voltage.
 - 4. Inverter power on.
 - 5. Inverter power off.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Eaton Powerware Division
- B. Sola Electric
- C. American Power Conversion (APC), only for smaller units under 2200VA.

2.2 MATERIAL / EQUIPMENT

- A. UPS: Provide Powerware 9355 model UPS (or equal) sized accordingly at each location. Provide features as follows:
 - 1. Nominal Input Voltage of 208V- 4 wire-three phase.
 - 2. Operating temperature is from 0° C to 40° C with an R.H. of 5% to 95% without condensation.
 - 3. Overload capacity should be 150% surge and 125% for 10 minutes.
 - 4. Communication shall be through an RS-232 serial port (DB-9).
 - 5. Continuous, no-break power during a complete power outage or momentary power interruption.
 - 6. Hardwired connections from the primary power source to the unit. Hardwired connections from the unit to the UPS distribution panel.
 - 7. UPS and Battery cabinets shall have rollers as to ease with maintenance and to allow for access to the rear and sides of each unit. **Provide hard wired connections using rigid seal tight type conduit and compression fittings to all UPS system equipment.**
- B. Rack Mounted UPS: Provide Eaton 5P3000RT (or equal) rack mounted UPS in Secure Storage room 905.
- C. Bypass Switch: Provide an external bypass isolation switch arrangement to bypass UPS and place load on utility power for maintenance of UPS unit. Switch shall be a Make Before Break (MBB) type unit. No other function will be acceptable. Coordinate the installation of a disconnect switch between the distribution panel and UPS bypass switch. **Division 26 shall furnish and install the disconnect switch and distribution panel.**

D. Batteries: The batteries shall be standard sealed lead-acid type, especially designed for UPS use. Furnish the required number of batteries to supply power to the connected load for a period of one (1) hour. The complete system (batteries and UPS system) shall be furnished and guaranteed by the same manufacturer.

E. KVA: Size the UPS and batteries to power all the Security Electronics equipment for **one (1) hour**. The UPS sizes indicated on the plans are minimums that must be provided to allow for owner additions.

F. Surge Suppressor: Furnish and install an Eaton PTE080 surge suppressor (or equal) for monitoring input power to UPS.

PART 3 - EXECUTION

3.1 COORDINATION

A. Preliminary Examination: Coordinate all required distribution panel boards, wiring, and circuit breakers with Division 26.

B. ESC shall provide a spreadsheet listing the ESC's power requirements to the engineer and Division 26. This spreadsheet shall detail at a minimum, the quantity, size, and location of power circuits in each room where UPS power is required. The spreadsheet shall include the location where each circuit is terminated and type of outlet required.

C. Construction Examination: Examine the ongoing construction and coordinate all equipment for proper installation allowing for maintenance access to UPS batteries.

D. Structural Examination: Examine locations for UPS placement to ensure the underlying structure will support the UPS and associated battery cabinets to be installed.

3.2 INSTALLATION

A. Installation: Install all UPS units following manufacturer's recommendations and instructions in locations indicated on the plans. UPS units shall fit in the space allowed. All UPS equipment locations shall be identified clearly on the submitted drawings. Once reviewed deviations are unacceptable.

B. Connections: Connect all security/detention electronics equipment to the UPS power system. Provide sufficient electrical separation and transient suppressor to prevent lock actuation and power fluctuations from affecting any electronic control systems.

C. Listing: All wiring and raceways shall be listed for the intended installation and installed in strict accordance with the California Electric Code as required by the conditions of where it is stalled. This includes but is not limited to ratings for riser, plenum, or wet installations.

D. The ESC shall have the UPS manufacturer's representative field certify that the installation is acceptable and as per manufacturers specifications prior to requesting final inspection. Provide written documentation to include the manufacturer's field report with final testing reports. Include these documents with the project O&M manuals.

E. Seismic: The entire system shall be installed to meet the seismic requirements for the area. Refer to Specification Section 280548.

3.3 TRAINING

- A. The ESC shall provide without additional cost to the owner representatives specially trained in the operation of UPS systems provided. The representatives shall train the Owner's personnel in operation, repair, and upkeep of the UPS and custom relay cabinets. Refer to Specification Section 280500, 3.6 for additional training information including notification, outline, course structure, and additional post occupancy training.

3.4 SPARE PARTS

- A. Furnish to the owner one spare parts kit as recommended by the manufacturer for each type of UPS installed on this project.
- B. Spare parts shall be packaged in appropriate protective packing material.
- C. Box spare parts for easy storage and clearly identify the contents of each box on all four sides of each container.

3.5 FIELD QUALITY CONTROL

- A. Verify and document that each UPS is supplied with properly sized breaker. Verify and document that all alarms are annunciated both visually and audibly at each UPS, and at affected control stations.
- B. Provide written test reports documenting all of the above function and features.

UPS VERIFICATION AND CHECK-OUT FORM

✓ = OK
Job #
Job Name:
Panel #

FIELD TEST CODE:						REPAIR CODE:					
A - No status change						1-SSI			Software Test By:_____ Date_____		
B - No power UPS						2-ELECTRICIAN			Hardware Test By:_____ Date_____		
C - Verify breaker size						3-IRONWORKER			System Test By:_____ Date_____		
D - No alarm locally						4-CARPENTER			Design Engineering By:_____ Date_____		
E - No alarm CCS						5-OWNER/REP			Wiring By:_____ Date_____		
F - No emergency generator						6-ENG			Field Test By:_____ Date_____		
G - No power transfer						7 -					
H - By Pass switch failure						8 -					
I - Software problem						9 -					
J - Not installed						10 -					
K -						11 -					
L -						12 -					
ON-SITE											
ICON ID#	ICON TYPE	UPS NO.	UPS KVA	SOFT-WARE TEST	UPS TEST	FIELD TEST CODE	REPAIR CODE	RE-CHECK "X"	FIELD CHECK OUT NOTES	PROBLEM RESOLVED (BY/DATE)	

END OF SECTION 28 05 00.1

SECTION 28 05 00.2 - SECURITY & COMMUNICATION CONDUIT / RACEWAY SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. General provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.
- B. All raceway shall be supported in accordance with ASCE 7 Chapter 13.
- C. All raceways shall comply with 2013 California Electric Code (CEC).
- D. Division 26 is to furnish and install the conduit and raceway system. The ESC, as defined in Section 280500 General Conditions, shall be responsible for coordinating the conduit and raceway system with Division 26. Provide conduit and raceways for 27/28 in accordance with all special requirements of the 27/28 sections.**
- E. Provide submittals as indicated in section 280500 for all division 27/28 raceways installed.

1.2 SYSTEM DESCRIPTION

- A. Conduit: Furnish and install a complete conduit system for ESC equipment. Fully coordinate the installation of conduit system with other trades and the general contractor. All conduit installed in any pre-cast panels will be coordinated with the pre-cast contractor prior to manufacture of panel. Conduit system as shown on the drawings is for reference only. Any changes to the conduit System required to install ESC equipment as specified and APPROVED shall be the responsibility of the ESC. The ESC shall acknowledge in writing the approved conduit routing and size.
- B. Pull Boxes: Coordinate the installation of all pull boxes and junction boxes required for the installation of conductors for all ESC equipment.
- C. Outlet Boxes: Outlet boxes shall be of the physical size for the device to be mounted therein. Coordinate outlet boxes with equipment.
- D. All conduit and security electronics raceways shall be installed as described in the California Electric Code.
- E. Electrical boxes with serviceable knockouts are not allowed in accessible areas.

1.3 SUBMITTALS

- A. Provide basic submittals as required by Division 27/28 General Conditions and by the General contract requirements.
- B. Submit license of master electrician who will supervise all conduit installation.**

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Carlon

- B. Allied
- C. Hubbell
- D. Appleton
- E. Thomas and Betts
- F. Steel City
- G. Raco Steel Products
- H. Quazite

2.2 MATERIAL/EQUIPMENT

A. Conduit: The following are standards to be used when selecting the proper conduit to install.

1. All conduit shall be listed and labeled by Underwriters Laboratories for use as raceway system for electrical conductors.
2. Rigid galvanized conduit shall comply with UL Standard UL 6 and ANSI standard C-80.1.
3. Intermediate metallic conduit shall comply with UL Standard UL 1242.
4. Electric Metallic Tubing shall comply with UL Standard UL 797 and ANSI Standard C-80.3.
5. Rigid Non-metallic electrical conduit shall comply with UL standard UL 651.

B. Pull Box: The following are standards to be used when selecting the proper type of pull boxes to install.

1. Pull boxes and junction boxes shall be UL listed and labeled.
2. Dimension of pull boxes and junction boxes shall not be less than those dimensions required by the California Electrical Code, Article 314 for the number, size, and position of conduits entering the box.

C. Outlet Box: All outlet boxes shall be UL listed.

D. Enclosed Metal Wire Way:

1. Ladder-type tray shall consist of rungs spaced 9" apart with widths as indicated on the plans. Remove all burrs and sharp edges from assembled tray.
2. Bend radius shall be 12" or larger.
3. Loading depth shall be 3- inches.
4. Load rating shall be NEMA 8C – 8 foot spacing, 75 pounds per foot.
5. Furnish and install all mounting accessories and related hardware as required for a complete installation.
6. Shall meet the requirements of ASCE 7 for seismic installations.

E. In-ground hand-hole enclosure:

1. Provide security bolts to attach top, Tamper Resistant Penta-Head bolt, stainless steel.
2. Furnish and install enclosure size as required by the number of conduit entering and leaving the enclosure.
3. Enclosure shall be ANSI TIER rating at 22.
4. Lid shall be ANSI TIER rating at 22.

F. Innerduct: Smooth wall 1" ASTM D1248 Polyethylene plastic molding and extrusion material that meets ASTM D3035 dimensional requirements.

1. Innerduct shall be secured to wall with D-ring or similar strapping method.
2. Innerduct containing fiber shall terminate in LIU, trough, cabinet, or wire tray.

PART 3 - EXECUTION

3.1 **CONDUIT INSTALLATION: CONDUITS SHALL BE LISTED FOR THE INTENDED INSTALLATION.** IN ADDITION TO LOCAL, STATE AND FEDERAL CODES, ALL 27/28 SYSTEMS CONDUIT AND RACEWAYS SHALL BE INSTALLED ACCORDING TO THE SPECIAL REQUIREMENTS LISTED HEREIN.

A. Concrete: Conduits installed within concrete wall panels which are in direct contact with grade or exposed where inmates have direct access shall be galvanized rigid steel (GRS) or intermediate metal conduit (IMC).

B. Security electronic and communication conduit shall NOT be installed within the concrete floor slab. All security electronic and communication conduit shall be installed under the concrete floor slab.

C. Roof: Conduits which penetrate the roof structure shall be galvanized rigid steel (GRS) or intermediate metal conduit (IMC). Seal all penetrations.

D. Earth: Conduits installed in direct contact with the earth shall be Schedule 40, heavy wall PVC.

E. The use of ENT is not acceptable.

F. EMT: All other conduit, unless excluded herein, not permitted by the California Electrical Code, or otherwise indicated on the drawings, shall be electrical metallic tubing (EMT). All raceways shall be terminated to wire ways, back boxes, equipment racks and system devices using individual steel compression connectors. Provide a plastic busing on each connector (3/4" or larger) prior to installation of fiber, wire and/or cable.

1. All EMT fittings are to be steel compression type.

2. DO NOT use EMT set screw fittings.

G. Different Conduit Types: Conduit types shall not be mixed indiscriminately with other types in the same run, unless specified herein or required by the CEC.

H. Flexible Conduit: Use flexible conduit when required for connections to extension arm mounted adjustable cameras or to the UPS cabinet.

1. Flexible conduit used when required for connection of fixed cameras shall not exceed 18 inches in length. Cameras in inmate housings shall not be connected with flexible conduit.

2. Maintain ground continuity through flexible conduit with green equipment grounding conductor. Do not use conduit for ground continuity.

3. Liquid tight conduit shall be used to connect equipment in the kitchen area, laundry area, exterior installations, connecting the UPS cabinet, and other equipment.

4. All conduits installed exposed from the finished floor to a minimum height of ten feet above the floor shall be galvanized rigid steel (GRS), unless in an equipment or an electrical room. **Exposed conduit below 10 feet in inmate areas is not allowed.**

I. Below Grade Raceway Installations: In addition to meeting the requirements above, conduits, under grade shall also conform to the following:

1. Direct Burial Conduit

a. Install top of conduit 24 inches minimum below finished grade.

b. Install top of conduit six inches minimum below bottom of building slab.

c. Install top of conduit 30 inches minimum below grade, below roads and any other paved surfaces.

d. Where transition is made from below grade PVC installation to a metallic conduit system above grade or slab, make transition with rigid galvanized elbow and extend through slab or above grade with galvanized rigid steel conduit. For corrosion

protection, where the elbow penetrates surface, wrap with vinyl all-weather electrical tape or coat with bituminous asphaltic compound, for 6 inches above and below concrete surface.

e. Install conduit marker tape 6" above all buried conduit.

f. The use of ENT is not acceptable below grade or within concrete slabs.

J. Raceway Installations In Concrete: In addition to meeting the requirements above, conduits in concrete shall also conform to the following:

1. Conduit shall be run following the most direct route between two points.
2. Conduit shall not be installed in concrete wall panels which is less than three inches thick or where the outside conduit diameter is larger than 1/3 of the concrete thickness.
3. Conduits shall not be installed within shear walls unless specifically indicated on the drawings. Conduits shall not be run directly below and parallel with load bearing walls.
4. Protect each metallic conduit installed 1.5 inch and smaller passing through a concrete slab against corrosion where conduit enters and leaves concrete by wrapping conduit with vinyl all-weather electrical tape or coat with bituminous asphaltic compound.
5. The maximum projection of conduit stub-up and bushing above slab shall be three inches.
6. Protect all conduits entering and leaving concrete floor slabs from physical damage during construction.
7. Provide expansion fittings for all conduits runs exceeding 200 feet or for conduits passing through building expansion joints.
8. Seal all penetrations through fire and smoke barriers in such a way as to maintain the fire and smoke ratings.
9. Install pull string in all raceways in concrete as each conduit run is completed.

K. Concealed, above Ceilings, surface mounted and exposed Installations:

1. Conduit shall be run parallel or at right angles to existing walls, ceilings, and structural members.
2. Support conduits at intervals not exceeding ten (10) feet and within three (3) feet of each outlet, junction box, cabinet or fitting for all ceiling and installations above ten (10) feet.
3. Attach individual conduits to structural steel members with beam conduit clamps and to non-metallic structural members with one-hole conduit straps. Exposed conduits suspended from structural members shall be installed with hanger rods and conduit clamp assemblies. Multiple conduits in the same run shall be supported by trapeze type supports suspended from the structure. Do not attach conduits to ceiling suspension system channels or suspension wires. All installations must meet project seismic requirements.
4. Attach feeder conduits larger than one (1) inch diameter to the building structure on intervals not to exceed ten (10) feet. Attach conduit with conduit beam clamps, one (1) hole conduit straps or trapeze type support in accordance with support systems described for branch circuit conduits.
5. Conduit support fastening devices.
 - a. Anchors for solid masonry and concrete shall be self-drilling expansion shields, insert type expansion shield, or lead shields with machine bolts.
 - b. Fasten support device to wood with wood screws. Nails are not acceptable.
 - c. Fasten support device to hollow masonry with toggle bolts.
 - d. Fasten support device to steel with machine screws with bolts and beam clamps.
6. Exposed conduits shall be painted, see painting section of the specifications.
7. Where conduits must pass through structural members, obtain approval of location and size of hole prior to drilling from Architect.
8. Install conduit sleeves in slabs where conduits 2.0 inch and larger pass through. Sleeves shall extend one (1) inch minimum above finished slab. Seal all spare sleeves and between conduits within sleeves to maintain fire rating, to make watertight, and to make smoke-tight.

- 1 9. Install all conduits or sleeves penetrating rated fire walls or fire floors to maintain fire rating
2 of wall or floor.
3 10. Conduits rigidly secured to building structure on opposite sides of a building expansion
4 joint shall be provided with an expansion and deflection coupling. In lieu of an expansion
5 coupling, conduits 2-1/2 inches and smaller may be provided with junction boxes on both
6 sides of the expansion joint connected by 15 inches of slack flexible conduit with bonding
7 jumper.

8 **L. Exposed Raceway at inmate accessible areas mounted below ten (10) feet is not**
9 **allowed.**

10 M. All conduits shall be supported in accordance with ASCE 7 Chapter 13.

11 N. Furnish and install a listed expansion/deflection fitting or other approved means where a
12 raceway crosses a structural joint intended for expansion, contraction, or deflection, used in
13 buildings or other structures as required by the Electric Code in 300.4-H. Furnish and install
14 electrical continuity by bonding jumpers or other means as required by 250.98 of the Electric
15 Code."

16 O. Seal all penetrations through fire and smoke barriers in such a way as to maintain the fire and
17 smoke ratings. Division 26 shall seal all penetrations through interior non-rated walls using fire
18 caulk.

19 **3.2 SEPERATION**

20 A. Cabling and conduit shall be installed in strict compliance with the California Electric Code and
21 TIA 569.

22 B. Communication, Class 2, and Class 3 wires and cables shall be separated by at least 2 inches
23 from conductors of any electric light, electric power, Class 1, non-power-limited fire alarm, or
24 medium power network-powered broadband communications circuits.

25 1. Separation can be less if communication, Class 2, and Class 3 circuits are completely
26 enclosed in metallic pathways that are properly grounded and bonded per ANSI/TIA-607-
27 B. Walls of the pathway must have a minimum thickness of .04 inches if made of steel or
28 .06 inches if made of aluminum.

29 2. Separation can be less if any electric light, electric power, Class 1, non-power-limited fire
30 alarm, or medium power network-powered broadband communications circuits are
31 completely enclosed in metallic pathways that are properly grounded and bonded per
32 ANSI/TIA-607-B. Walls of the pathway must have a minimum thickness of .04 inches if
33 made of steel or .06 inches if made of aluminum.

34 **3.3 PULL BOX INSTALLATION**

35 A. Pull boxes and junction boxes installed in finished spaces shall be flush mounted cabinets
36 provided with trim, hinged door, and flush latch and lock to match panel trim for flush mounted
37 electrical panel board.

38 B. Pull boxes and junction boxes installed in unfinished spaces shall be galvanized boxes with
39 covers held by screws.

40 C. Junction boxes installed exposed to the weather shall be watertight NEMA IV.

41 D. Pull boxes shall be provided where indicated on the drawings and where required to facilitate
42 the installation of conductors. Pull boxes shall be installed exposed only in unfinished spaces,
43 unless otherwise indicated on the drawings, and shall be installed to be fully accessible as
44 required by the California Electrical Code.

E. Splices are not permitted in pull boxes except when approved in writing by the Architect or where shown on the drawings. Pull all wires in a single continuous run between devices and terminating screws.

F. All boxes shall be supported in accordance with ASCE 7 Chapter 13.

3.4 OUTLET BOX INSTALLATION

A. Ceiling: Flush mounted outlet boxes for devices mounted on the ceiling shall be 4" square boxes 1-1/2" deep. Where installed in concrete, outlet box shall be provided with an extension ring and sealed for installation in concrete.

B. Wall: Flush mounted outlet boxes for devices mounted in walls shall be 4" square boxes, 1-1/2" deep with square edge tile type cover.

C. Alternate: Where only one conduit enters box, 3-1/2" deep single gang switch box may be used.

D. Outlet boxes for devices surface mounted on walls or concrete ceiling shall be FS boxes with matching device plate.

E. Where a special purpose device requires a larger outlet box than specified herein, provide outlet box suitable for specific device. These outlet boxes shall be of the same type as specified herein for the installation required.

F. Where a low voltage device is installed in a common box with a line voltage device, provide metal barrier within outlet box to establish two separate compartments.

G. Review architectural drawings for areas where outlets occur within specific architectural or structural features and install outlets as shown on architectural drawings. If not shown, accurately center and align boxes within the architectural feature or detail.

H. Outlet boxes for flush mounted devices shall be set to within 1/8" of finished wall.

I. All boxes shall be supported in accordance with ASCE 7 Chapter 13.

3.5 FIELD QUALITY CONTROL

A. Licensed Electrician: All conduit and raceway for low voltage systems shall be installed by a Master Licensed Electrician.

B. Debris: All conduits, pull boxes, junction boxes, and outlet boxes shall be installed free of concrete, dirt or other debris.

C. Future conductors: All conductors not energized for this project shall be terminated on both ends and labeled for "Future".

D. Alignment: All conduits shall be installed parallel to walls and ceilings.

E. Bends: All conduit shall be installed to minimize bends and offsets.

F. Inmate areas: Do not install pull boxes, conduits, or junction boxes in space normally accessible to inmates.

G. Seismic: All raceway shall be supported in accordance with ASCE 7 Chapter 13.

1 H. All raceways shall be terminated at wire ways, back boxes, equipment racks and system
2 devices using individual steel compression connectors. Provide a plastic busing on each
3 connector (3/4" or larger) prior to installation of fiber, wire and/or cable.
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5 END OF SECTION 28 05 00.2

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SECTION 28 05 48 - VIBRATION AND SEISMIC CONTROLS FOR COMMUNICATION SYSTEMS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. General provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

A. Section Includes

- 1. Anchoring and restraints.

B. Related Sections

- 1. Section 280500.2 - Security & Communication Conduit / Raceway Systems.
- 2. Section 284619 – PLC.

1.3 REFERENCES

- A. ASTM E2265 - Standard Terminology for Anchors and Fasteners in Concrete and Masonry.

1.4 SYSTEM DESCRIPTION

C. Design Requirements

- 1. Provide seismic components for the following systems:

- a. 280500.1 UPS system
- b. 282300 IP Video Surveillance
- c. 283111 Digital Addressable Fire Alarm
- d. 284600 Touchscreen Control Station
- e. 284619 PLC

- 2. Provide seismic restraints for the listed materials and equipment. The attachments shall resist forces to the center of gravity of the component. Criteria shall be the operating weight of the item times 0.5g for horizontal force to be applied in any direction. Wall-mounted or suspended components shall in addition, resist a downward force of 200 pounds minimum added to the operating weight.

- 3. The Importance Factor (I_p) of the above systems equals 1.5.

- 4. From structural sheet S1.1, the applicable seismic design parameters are as follows:

- a. Site Class D.
- b. Occupancy Category I-3.
- c. Seismic Design Category D
- d. Refer to S1.1 to confirm these parameters.

1.5 SUBMITTALS

- D. Provide all required submittals under provisions of Section 013300.

- E. Submit proposed system to engineer for review prior to installation.

- F. Project Information:

- 1. Submit seismic support calculations for all electrical equipment and conduit where isolation restraints are supplied.
- 2. Certification of seismic restraints.

- a. Substantiated by calculations or test reports verified by a professional structural engineer or equipment manufacturer.

G. Shop Drawings

1. Submit seismic restraint installation shop drawing prior to installation.

1.6 QUALITY ASSURANCE

- H. Racks and Conduits: ASCE 7 Guidelines, Chapter 13 "Seismic Design Requirements for Nonstructural Components".

- I. Anchor Bolts: All anchor bolts shall comply with ASTM A307.

- J. Certifications: All Seismic components shall be certified as appropriate for seismic installation by the manufacturer or by a delegated design professional as specified in specification section 013300 paragraph 2.3.

PART 2 -PRODUCTS

2.1 GENERAL

A. Acceptable Manufacturers:

1. Seismic Control Devices:

- a. Mason Industries.
- b. Vibration Eliminator Co.
- c. Korfund Dynamics Corp.
- d. Amber-Booth Co.
- e. Consolidated Kinetics.
- f. Kinetics Noise Control

- B. Furnish and install racks equivalent to Lowell LER-4432 23" wide by 32" deep by 84" high.

- C. Provide conduit and equipment anchoring systems as indicated in the Contract Documents.

- D. Provide all mounting hardware, support wires, conduits for alignment, eyebolts, bolts, nuts and washers required for equipment mounting and seismic control. Structural blocking/backing and hardware required for installation shall be provided as indicated in the Contract Documents.

2.2 ANCHORING AND RESTRAINTS

A. Equipment Anchors:

1. Anchor all equipment in accordance with the approved shop drawings.
2. Contractor shall be responsible for design and acquiring of approval for anchoring of equipment where required by ASCE 7.

B. Conduit Supports:

1. Conduits shall be supported and braced in accordance with ASCE 7 Chapter 13.
2. Conduits individually supported above finished floors with an importance factor of 1.5 and greater than 2.5 inches in diameter shall be provided with seismic restraints as required by ASCE 7, Chapter 13.
3. Trapeze supported conduits with a total weight exceeding 10 lb/ft shall be provided with seismic restraints as required by ASCE 7, Chapter 13.

4. Cable trays must be listed for seismic installation in accordance with ASCE 7, Chapter 13. Securely attach cable to tray at intervals equal to one half the cable tray support spacing.

C. Device Support:

1. Provide independent seismic support system for all boxes not directly anchored to concrete walls or concrete ceilings for the following:
- a. Wireless Access Points.
 - b. Cameras.

D. Floor Mounted Racks:

1. Furnish and install seismic racks and attach per manufacture's installation instructions.
2. Furnish and install seismic restraints for shelf mounted computers, monitors, and any other component not securely attached to the frame.

PART 3 -EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturers' written instructions in a manner to achieve full capacity of support.

END OF SECTION 28 05 48

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SECTION 28 10 00 – FIBER OPTIC TESTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. General provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

- A. Perform and document testing of all optic fiber installed for CCTV, PLC, and security systems. This specification does not apply to infrastructure furnished under Division 27. Refer to specification section 271500 for all Division 27 testing requirements.
- B. All testing is to be performed by a certified experienced tester of a nationally recognized certification organization. (Fiber Optic Association)
- C. The test result shall be a graphic representation of the relative power versus the fiber length called a "signature trace".

1.3 SCOPE OF WORK

- A. This section includes the minimum requirements for Tier 2 of TSB-140 testing of the optic fiber installed for all security systems networks.
- B. Test multimode optic fibers at both 850 nm and 1300 nm wavelengths.
- C. Test single-mode optic fibers at both 1310 nm and 1550 nm wavelengths.
- D. Test for continuity and quality of all installed optic fibers. Any deficiencies found shall be corrected by the optic fiber installer and the corrected optic fiber retested and documented.
- E. The final fiber signature traces for each optic fiber as corrected shall be included in the O&M Manuals turned over to the owner.

1.4 QUALITY ASSURANCE

- A. All equipment shall be installed neatly and in accordance with manufacturers' specifications. All methods of construction that are not specifically described or indicated in the contract documents shall be subject to the control and approval of the Owner or Owner's Representative. Equipment and materials shall be of the quality and manufacture indicated.
- B. Material and work specified herein shall comply with the applicable requirements of:
1. ANSI/TIA/EIA – 568-B.1: "Commercial Building Telecommunications Cabling Standard"
 2. ANSI/TIA/EIA – 526-7: "Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant"
 3. ANSI/TIA/EIA – 526-14A: "Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant"
 4. CEC
 5. BICSI Telecommunications Distribution Methods Manual

- 1 6. Contractor must have at least one Registered Communications Distribution Designer
2 RCDD® on staff.

3 1.5 SUBMITTALS

- 4 A. Submit testing plan for facility optic fiber with submittals.

- 5 B. Submit the following certifications:

- 6 1. Current certificate of RCDD®.
7 2. Certification in optic fiber testing.

8 PART 2 - PRODUCTS

9 2.1 OPTICAL TIME DOMAIN REFLECTOMETER (OTDR)

- 10 A. Utilize a high-resolution OTDR to characterize the power loss and power reflected along
11 optical fibers.
12 B. The OTDR must operate within the range of 850 ± 30 nm or 1300 ± 20 nm for multimode
13 testing in accordance with ANSI/TIA/EIA-526-14-A.
14 C. The OTDR must operate within the range of 1300 ± 10 nm or 1550 ± 20 nm for single-mode
15 testing in accordance with ANSI/TIA/EIA-526-7.

16 PART 3 - EXECUTION

17 3.1 TESTING

- 18 A. For multimode optical fiber, perform optical fiber end-to-end attenuation tests in accordance
19 with EIA TIA/EIS-568-B.3 and EIA TIA/EIA-526-14A using an Optical Time Domain
20 Reflectometer (OTDR) to generate a fiber "trace".
21 B. For single-mode optical fiber, perform optical fiber end-to-end attenuation tests in accordance
22 with EIA TIA/EIS-568-B.3 and EIA TIA/EIA-526-7 using an OTDR.
23 C. All testing shall be performed with launch cables of proper length for accurate readings.
24 D. All testing shall be performed with "receive fiber" length of proper length for accurate
25 readings.
26 E. Attenuation losses shall not exceed those specified by the fiber manufacturer.

27 3.2 PROBLEMS

- 28 A. All problem or error conditions shall be corrected and retested to provide clean traces of all
29 fibers.
30 B. Problems requiring correction and retesting include but are not limited to the following:
31 1. Fiber Splice – fibers are not to have any splices. They terminate on equipment or patch
32 panels only.
33 2. Negative loss reading.
34 3. DB Gainer.

4. Reflective events other than the cable ends.
5. Excessive Tailing.
6. Hook on the falling edge of the trace.

3.3 REPORT

A. Compile all corrected signature traces into a report that shall be submitted to the Architect and Owner.

1. The Contractor shall compile and submit one organized test notebook, in hard copy format, as well as a single electronic copy in Portable Document Format (PDF) that includes all required test results summary tables, and OTDR traces and power meter results of each fiber by each cable tested.
2. The test notebook and electronic copy shall at a minimum, include the following:
 - a. Identification number and name of each fiber.
 - b. A summary sheet that clearly illustrates length and measured loss versus budgeted loss for each fiber or connected fiber string.
 - c. Calculations and notations for each fiber and wavelength that include total loss, measured dB/km loss and any anomalies over 0.1dB.

B. Organize the signature traces by system as follows:

1. Furnish the following separation tabs:
 - a. Fire Alarm
 - b. County/Owner Tele/Data
 - c. CCTV
 - d. PLC
 - e. Intercom/audio
 - f. CATV
2. At the beginning of each tabbed section, verbally described the testing procedures used including length of launch and reference fiber cables. The verbal description shall include the manufacturer and exact model number of the OTDR used for the testing. List all OTDR tester and related software settings and defaults.
3. The electronic copy of the traces shall be organized with a folder for each tab and all files stored in the appropriate folder.

C. Under each system, identify the point of origination and the point of termination as well as the optic fiber number.

END OF SECTION 28 10 00

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1 SECTION 2813 00 - ACCESS CONTROL SYSTEM

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

4 A. General provisions of the Contract, including General and Supplementary Conditions and
5 Division 1 Specification Sections, apply to this section.

6 B. The ESC as defined in Section 280500 Common Work Results for Electronic Safety and
7 Security shall be responsible for providing and coordinating this system.

8 C. The ESC shall coordinate all door hardware and power requirements with section 087100.

9 1.2 SUMMARY

10 A. Scope of Work: Provide all components to incorporate locks, readers, and request to exit
11 devices to provide a complete Card access system as indicated on the plans and described
12 herein.

13 B. Card access is to be provided for access to Administration areas. It will connect to a County
14 system.

15 1.3 SYSTEM DESCRIPTION

16 A. Access Control: The readers shall provide access by operating the door strike and/or electric
17 lock when a valid card is presented during a valid timer period.

18 B. Card Access Controller: Provide one PLC output per designated card access controller room
19 for emergency release function.

20 1.4 SUBMITTALS

21 A. Basic Submittals: Provide submittals as required by 280500 Common Work Results for
22 Electronic Safety and Security and as required by the general contract documents.

23 B. Hardware: Provide wiring diagrams as coordinated with hardware supplier. Provide letter
24 indicating coordination has occurred with both commercial and detention hardware and frame
25 provider.

26 C. Point lists: Provide a point list of each door and all monitored points.

27 D. Provide documentation from the manufacturer that the ESC is certified to install the Card
28 Access System.

29 PART 2 - PRODUCTS

30 2.1 ACCEPTABLE MANUFACTURERS:

31 **A. Hirsch (no substitutions)**

32 2.2 DOOR HARDWARE:

33 A. Coordinate all connections with hardware provided by others. Provide power to device from
34 security electronics room UPS.

2.3 TERMINAL CONTROLLER (CA):

- A. Furnish and install terminal controllers equivalent to Hirsch Part# Controller, in wall cabinets as indicated on the drawings. Monitor cabinet tamper switch.
- B. Terminal controllers shall provide the following as a minimum:
 - 1. Scalable to 64 doors.
 - 2. Minimum 50,000 card holders.
 - 3. UL listed 294.
- C. Furnish and install a dual door module equal to the Hirsch Part# for the number of readers indicated on the plans plus at least two spare. Door modules are to be mounted in wall cabinets and connected to headend controller by RS-485 or similar communication cabling methods.
- D. The card access system shall operate on an independent dedicated network. The network shall consist of CAT6A cable inside buildings, and RS-485 (or similar) cable between controller boards. ESC shall furnish and install all components of this network. (excluding conduit provided by Division 26)
- E. Provide hardware for the number of readers and watch tours indicated on the plans plus at least two spare.
- F. Enclosures shall be Hoffman or Unity Manufacturing (or equal).
- G. Provide an Altronix AL1024ULX Power Supply/Charger (or equal) where indicated on the plans.
- H. Provide Altronix ACM8 Access Power controller (or equal) where indicated on the plans.
- I. Provide Altronix PD8 Power distribution devices (or equal) where indicated on the plans.
- J. The cabinet tamper switch shall be G.E. Security 3010 series recessed pin plunger model 3012-N (or equal).

2.4 CARD READER (RDR):

- A. Proximity Card Reader: Furnish and install 125 kHz proximity card readers equal to ProxPro series. As a minimum, the unit shall have the following features:
 - 1. Sealed in a rugged weatherized polycarbonate UL 94 material.
 - 2. Card Readers shall be UL 294 listed.
- B. Mini Proximity Card Reader: Furnish and install 125 kHz proximity card readers equal to MiniProx 5365. As a minimum, the unit shall have the following features:
 - 1. Sealed in a rugged weatherized polycarbonate UL 94 material.
 - 2. Card Readers shall be UL 294 listed.

2.5 REQUEST TO EXIT (REX):

A. Furnish and install a request to exit device where indicated on the plans.

1. Request to exit device with an "M" is a motion detector mounted above the door. Device shall be equal to the Dortronics 6612 Motion Sensor. Install the detection range such that the door is unlocked only when a person approached the door to leave.
2. Request to exit device noted with a "B" is a push button mounted next to the door equal to the Camden CM-400.
3. Request to exit device noted with an "H" is a function of the door hardware.

2.6 DOOR POSITION SWITCH:

- A. If a detention DPS is not present, ESC to furnish and install GE door position switches wired to the card access system to indicate that the door is closed.

2.7 CARD ENROLLMENT STATION (CAE):

- A. Provided by the County.

2.8 PROXIMITY CARDS:

- A. Provided by the County

2.9 CABLING AND WIRE:

A. Acceptable manufacturers:

1. Liberty Wire and Cable
2. Eastman Wire & Cable
3. West Penn Wire
4. Belden
5. Carol
6. General Cable
7. Clifford of Vermont, Inc.
8. Alpha

- B. Wire Size: Furnish and install sufficient wire gauge to limit voltage drop to 5%.

- C. Listings: Wiring shall be listed for the installation.

- D. Access Terminal Controller Wiring: Furnish and install a two conductor #20 AWG stranded with overall shielded cable or Ethernet Category 6A.

- E. Card Reader Wiring: Furnish and install a five conductor #20 AWG stranded with overall shielded cable to each card reader.

- F. Request to Exit Wiring: Furnish and install a two conductor #20 AWG cable to each request to exit wall switch.

- G. Door Position Switch Wiring: Furnish and install a two conductor #20 AWG cable to each door position switch.

- H. Conductors shall be grouped and laced with nylon tie straps.
- I. All power conductors shall be a minimum 14 AWG THWN, 600 volt rated and shall be installed in raceways and equipment enclosures with other conductors within limitations defined by Article 300 of the California Electric Code.
- J. Class 2 Circuit Wiring that extends from the electronic control relay terminal trips to the low voltage devices shall be Class 2 as defined by article 725 of the California Electric Code. All control conductors shall be a minimum of 20 AWG, jacketed, control cable. All control cable insulation shall be 600 volt rated.
- K. All wiring systems shall be labeled and color-coded with labeling and coding shown on shop drawings.
- L. All conductors within junction boxes pull boxes, and equipment enclosures shall be grouped and laced with nylon tie traps.
- M. Control system conductors shall not be spliced.

PART 3 - EXECUTION

3.1 COORDINATION

- A. Preliminary Coordination: Coordinate all required embeds, block-outs, and construction as required to install the devices as indicated on the plans.
- B. Hardware: Coordinate connections to hardware provided by others.

3.2 INSTALLATION

- A. Coordination: Fully coordinate the card access equipment with all other trades for a complete and operational system.
- B. Listing: All wiring and raceways shall be listed for the intended installation and installed in strict accordance with the California Electric Code as required by the conditions of where it is stalled.
- C. Seismic: The entire system shall be installed to meet the seismic requirements for the area.

3.3 FIELD QUALITY CONTROL

- A. Tests: Test that all readers respond correctly to all alarm events as well as unlocking the door on a valid card read.
- B. Test Reports: Provide written test reports documenting all of the above with either a narrative for each point or a list of features noting "pass" or "fail".

3.4 TRAINING

- A. The ESC shall provide without additional cost to the owner representatives specially trained in the operation of Access Control system provided. The representatives shall train the Owner's personnel in operation, repair, and upkeep of this system. Refer to Specification Section 280500, 3.6 for additional training information including notification, outline, course structure, and additional post occupancy training.

3.5 SPARES

A. Furnish spare parts.

1. One spare reader.

2. One spare of each type door board installed on the project.

3. One spare of each power supply installed on the project.

B. Spare parts shall be packaged with appropriate protective packing material.

C. Box spare parts for easy storage and clearly identify the contents of each box on four sides of each box.

ACCESS CONTROL VERIFICATION AND CHECK-OUT FORM

✓ = OK
Job #
Job Name:
Panel #

FIELD TEST CODE: A - No status change M - Reversed B - No power card reader N - No event recording C - No power to door O - No power to printer D - Door won't open P - E - Door won't close Q - F - Wrong door opens R - G - Adjust door S - H - Doors emergency release SCCT - I - Adjust DPS U - J - Motion detection failure V - K - Software problem W - L - Not installed X -						REPAIR CODE: 1-SSI 2-ELECTRICIAN 3-IRONWORKER 4-CARPENTER 5-OWNER/REP 6-ENG 7 - 8 - 9 - 10 - 11 - 12 -		Software Test By: _____ Date _____ Hardware Test By: _____ Date _____ System Test By: _____ Date _____ Design Engineering By: _____ Date _____ Wiring By: _____ Date _____ Field Test By: _____ Date _____			
						ON-SITE					
ICON ID#	ICON TYPE	STA CALL NO.	CA INTLK WITH		SOFT-WARE TEST	CA TEST	FIELD TEST CODE	REPAIR CODE	RE-CHECK "X"	FIELD CHECK OUT NOTES	PROBLEM RESOLVED (BY/DATE)

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SECTION 28 23 00 – IP VIDEO SURVEILLANCE

PART 1 - GENERAL

1.1 SUMMARY

- A. Scope of Work: Furnish and install all components to provide a complete, integrated, and fully functional Internet Protocol (IP) camera system as indicated on the plans and described herein.
- B. The ESC as defined in Section 280500 Common Work Results for Electronic Safety and Security shall be responsible for providing and coordinating this system.
- C. The ESC shall provide all local video switches, video servers, video management software, camera licenses, and programming of cameras and network equipment required for a fully functional system.
- D. Provide recording of all cameras for a period of 12 months. Video storage array shall be a minimum of 760 Terabytes in size. Refer to camera schedule for recording parameters of each camera.
- E. The video system shall be interfaced with the PLC/TIC system for intercom, systems alarms, and individual camera call up functions.

1.2 SYSTEM DESCRIPTION

- A. System Capacity: Furnish and install a color IP camera system with the network capacity indicated plus 25% spare. (25% spare does not include additional video storage.)
- B. Video Management System (VMS): a Video Management System on a central server will be provided by the ESC to control all IP cameras.
- C. Multiplex Monitor Station: Furnish and install color monitors and CPU's to view up to 16 camera views simultaneously or as selected by the operator.
- D. Spot Monitor Station: Furnish and install color monitors and CPU's to display a camera activated by alarm, intercom call up, or manual activation.
- E. Camera Identification: Uniquely identify each camera by a 16 character, alphanumeric label incorporated into the video signal.
- F. IP Camera: Furnish and install all cameras and camera cabling. The IP camera shall provide at least two individually configured simultaneous video streams.
- G. Continuous Operation: All cameras, computers, and system components shall be rated for continuous operation.
- H. Standards: All cameras and components shall be compliant with a single standard, either ONVIF or PSIA.
- I. Fully integrate the IP video system with the Door Locking Control, PLC and Intercom systems.
- J. Video Storage: ESC shall furnish and install a video storage array sized to provide 366 days of video storage for all of the IP video cameras.**

1.3 SUBMITTALS

A. Basic Submittals: Provide submittals as required by Section 280500 Common Work Results for Electronic Safety and Security and as required by the general contract documents.

B. Submit camera pole finishes for approval.

1.4 SYSTEMS INTEGRATION

A. Alarm Call-up: Cameras covering a duress button shall automatically display live video on the controlling spot monitor whenever the duress button is activated.

B. Intercom Call-up: Cameras covering an intercom station shall automatically display live video on the controlling spot monitor whenever the intercom is selected by the controlling Touchscreen Interactive Computer (TIC).

PART 2 - PRODUCTS

2.1 ACCEPTABLE IP VIDEO MANUFACTURERS

A. Acceptable hardware manufactures IP Video equipment:

1. Bosch
2. Vicon
3. Pelco

B. Bosch is used as a basis of design. Comparable equipment from other manufacturers may be used as long as all specified requirements are incorporated.

2.2 SYSTEM PARAMETERS

A. Manufacturing Standards: All components shall be manufactured to a single standard, either ONVIF or PSIA.

B. All components shall incorporate the following:

1. UL listed for the intended purpose.
2. Vandal resistant housing.

C. Network Features: All components operate over Ethernet switches, Cat 6A cabling and optic fiber. All components shall incorporate the following:

1. Compatible with Internet Protocol Version 4 (IPv4) and Version 6 (IPv6).
2. Support both fixed and dynamically assigned IP addresses.
3. Shall have the ability to limit maximum bandwidth to a selected value.

2.3 IP VIDEO CAMERAS

A. Furnish and install where indicated in the camera schedule interior IP cameras equal to Bosch Flexidome HD model NIN-63013-A3 series with cast aluminum housings and polycarbonate dome and 1280x720 resolution.

1. Vandal resistant construction IK10 impact resistant.

- 1 B. Furnish and install where indicated in the camera schedule interior IP cameras equal to
2 Bosch HD model NIN-63023-A3 series with cast aluminum housing and polycarbonate dome
3 and 1920x1080 resolution.
- 4 1. Vandal resistant construction IK10 impact resistant.
5 2. Powered over Ethernet.
6 3. Pendant mounted cameras below duct work and lighting in dayrooms to provide an
7 unobstructed view. Mount cameras a minimum of 8' (horizontally) from mezzanine level.
- 8 C. Corner mounted cameras in cells shall be equal to Bosch NCN-90022-F1 corner mount unit.
- 9 1. Vandal resistant construction.
10 2. Powered over Ethernet.
11 3. No grip, anchor free design.
- 12 D. Furnish and install where indicated in the camera schedule exterior PTZ camera equivalent to
13 VG5-7130EPC4 with 1280x720 resolution.
- 14 1. Vandal resistant construction IK10 impact resistant.
15 2. Powered over Ethernet.
16 3. Bosch arm mount.
- 17 E. Furnish and install where indicated in the camera schedule a 360-degree camera equal to
18 Bosch NUC-52051-F0 panoramic camera.
- 19 1. Vandal resistant construction IK10 impact resistant.
20 2. Powered over Ethernet.
- 21
22
- 23 F. Furnish and install where indicated in the camera schedule a 180-degree camera equal to
24 Bosch NIN-70122-F1 panoramic camera with surface mount box equal to Bosch VDA-70112-
25 SMB.
- 26
27 1. Vandal resistant construction IK10 impact resistant.
28 2. Powered over Ethernet.
29
- 30 G. Exterior units shall be rated IP66 against weather for outdoor mounting.
- 31 H. Camera Pole: Furnish and install camera poles with mounting heights as indicated on the
32 plans. Poles shall be Lithonia model RSS 18 4-5B (or equal), round steel and be a minimum
33 of 4" diameter at the top. Color to be dark bronze or as approved by owner/engineer. Pole
34 shall provide a hand hole to access cabling running up the inside of the pole. Pole shall have
35 a weatherproof cap on the top.

36 2.4 IP VIDEO MONITOR WORKSTATIONS

- 37 A. Workstation Computer: At a minimum, furnish and install a Bosch MHW-WZ4R4-HEUS (or
38 equal) computer with all required hardware and software as indicated on the plans.
- 39 B. Workstation and Spot Monitors: Furnish and install a 22 inch monitor equal to the Bosch
40 UML-223-90 where indicated on the plans.

C. Multiplexed Monitors: Furnish and install a 32 inch monitor equal to the Bosch UML-323-90 where indicated on the plans.

D. Furnish and install a computers and monitors for each video workstation and each video review location.

2.5 IP VIDEO CONTROLS

A. Furnish and install an IP Video Storage Array equal to Bosch E2700 DSA E-Series with a minimum of three (3) 60 bay expansions. Video storage array shall be a minimum of 760TB in size. Record camera video according to the parameters listed in the camera schedule. Video shall be stored for 12 months. In addition, provide the following features:

1. Provide RAID 6 storage configuration

2. System shall be scalable. Provide expansion units equal to Bosch high density 60 bay expansion units with 4 TB hard drives.

3. Provide active storage for all of the cameras installed in the project.

4. Provide space for future expansion.

5. The system shall provide "watermarks" to ensure the video has not been modified.

6. Video recording manager equal to Bosch BVRM 3.60.

B. Furnish and install a Software IP Video Management System equal to Bosch BVMS 7.0, with all components required for a fully functional system.

C. Furnish and install local Ethernet switches for the video system in each control room camera rack and the main server rack as required for the final number of cameras to be installed. The Ethernet switch shall be equal to HP 2620-24-PoE+ 24 port Gigabit Switch with 382 Watts of Power over Ethernet. Each unit shall have the redundant power supply. PoE shall be available on all ports.

D. Furnish and install an aggregating switch equal to HP E5400zl in main SEC room 1156. Furnish and install optic fiber SFP ports for connections to remote edge switches. Furnish and install all power supplies, hardware, and software required for a fully functional system.

E. Furnish and install a video server equal to Bosch model MHW-S380R9-SCUS.

F. Furnish and install a Lantronix UDS1100 Media Converter (or equal) for the ASCII interface between the PLC and IP video network.

G. Provide a Louroe IF-PX audio interface for the microphone and camera in Contact Visitation 1160 and Interview room 1144. Mount the Louroe audio interface in a 10" x 10" enclosure above the ceiling in Contact Visitation 1160 and Interview room 1144.

H. The Audio Recording Microphone shall be equal to Louroe Verifact D Omni- directional, low impedance, Electret Condenser microphones with built-in preamp. Provide features as follows:

1. Frequency response of 40 Hz to 15 kHz +/- 1dB.

2. Sensitivity (microphone & preamp): 80dB SPL input provides 0.25V RMS.

3. Output: Line level (0 dB @1K Ohms).

4. Supply Voltage: 12 Vdc.

5. Output impedance: 600 Ohms unbalanced.

- 1 6. Faceplate Dimensions: 2 ¾" W x 4 ½" H
- 2 7. Backbox: Single gang electrical box.
- 3 8. Wiring: Cable shall be equal to West Penn 452

4 I. Provide a Bosch Divar IP 3000 (or equal) with 2 x 2TB storage capacity for recording the
5 camera and microphone in Contact Visitation 1160 and Interview room 1144.

6 J. Ground-Loop Isolation transformers: Furnish and install a power isolation transformer for each
7 camera that uses an external power source.

8 2.6 TRANSIENT SURGE SUPPRESSION

9 A. Acceptable manufacturers are as follows:

- 10 1. Northern Technologies Incorporated
- 11 2. DITEK
- 12 3. PolyPhaser Corporation
- 13 4. Transtector

14 B. Furnish and install surge suppression on all power connections to exterior cameras equal to
15 Northern Technologies TCS-HWR.

16 2.7 FIBER OPTIC MODULES

17 A. Furnish and install dedicated multimode optic fiber between Video Ethernet switches and
18 remote exterior cameras. Fiber shall be equal to Corning FREEDM 002T8F-31180-29.
19 Furnish and install quantity of optic fibers required plus 25% spare.

20 B. Furnish and install a Comnet Ethernet 2 port media converter CNGE2MC or equal for each
21 pole mounted camera. The unit shall be located in the security electronics equipment rack
22 (VID). If two channels is necessary use CNGE22MC.

23 C. Furnish and install a Comnet Ethernet 2 port media with PoE converter CNGE2MCPOEM or
24 equal for each pole mounted camera. The unit shall be located in the camera pole power
25 cabinet.

26 2.8 CABLING AND WIRE

27 A. Acceptable manufacturers:

- 28 1. Commscope Uniprise Cat 6 cable.
- 29 2. Commscope Uniprise Cat 6 cable jumpers.
- 30 3. "Wet Rated" shall be equal to CommScope Uniprise 6NF4-i cable.
- 31 4. "Non Wet Rated" shall be CommScope Uniprise 65N4+ cable.

32 B. Wire Size: Furnish and install sufficient wire gauge to limit voltage drop to 5%.

33 C. Camera Power Wiring: Interior cameras will be Powered over Ethernet (PoE). Furnish and
34 install 120 VAC UPS power for cameras connected by optic fiber. Coordinate the location and
35 installation of 120 VAC UPS power with Division 26.

36 D. IP Camera Wiring: Furnish and install category 6A cabling from each IP video device to the
37 nearest switch.

E. Category 6A cable for all cameras shall be GREEN in color.

F. All factory patch cords shall be GREEN in color.

2.9 EQUIPMENT ENCLOSURES

A. The IP Video system equipment shall be mounted in seismic rated rack. Furnish and install racks equal to CPI Seismic Frame series Cabinet.

B. Each workstation computer shall be provided with low profile metal cabinet to house the computer. Furnish each CPU with a model CPU-1 or CPU-2 cabinet as manufactured by Computer Security Products. Furnish and install the following as a minimum:

1. Fully vented steel doors.

2. Welded side panels with handles.

3. Lockable cabinet.

4. Equipment rack noted here is not required if millwork is fabricated with ventilated and lockable storage area for CPU's.

2.10 FABRICATION

A. Assemble all components in a neat and orderly fashion.

B. Identify camera with text approved by the owner.

2.11 CAMERA POLE

A. Furnish and install a camera pole and base at each pole mounted camera shown on the site plan. The camera signal shall be over optic fiber to the pole enclosure. Furnish and install a ground rod at each camera pole.

B. Furnish and install a hand hole and Full Base Cover for the pole.

C. Camera pole to be equal to Lithonia model RSS Round Straight Steel pole with anchor base and round cap. Pole to be 18' tall and 4" in diameter. All fasteners to be stainless steel unless otherwise noted.

1. Top part of anchor bolts shall be galvanized per ASTM A-153 and made of steel rod having a minimum yield strength of 55,000 psi. Submit finish to the architect for approval.

D. Furnish and install all hardware required to mount the equipment enclosure and camera as indicated in the plans and details.

E. Assemble all components in a neat and orderly fashion.

PART 3 - EXECUTION

3.1 COORDINATION

A. Preliminary Coordination: Coordinate all required embeds and block-outs as required to install the cameras as indicated on the plans.

B. Construction Examination: Monitor ongoing construction and coordinate with other trades so that a clear line of site of the area to be viewed is maintained for each camera.

C. Structural Examination: Examine locations for camera mounts and poles to ensure the supporting structures will carry camera mounts and devices to be installed.

3.2 INSTALLATION

- A. Conduit: All conduits are to be concealed.
- B. Cable: All connecting cables to cameras shall be concealed in the mount or installed with flexible conduit. Flexible conduit not allowed in inmate housing areas.
- C. Anchoring: All mounts shall be anchored to the walls or structures as indicated in the installation manuals.
- D. Special Boxes: Furnish and install special back boxes in a timely manner for field installation while adequate access is available.
- E. Titles: Program camera identifications and intercom call up titles as approved by the Owner.
- F. Field Wiring: The wiring that extends from the electronic control relay terminal strips to the locks, lights, etc. shall be class 1, 2, or 3 as defined by Article 725 of the California Electric Code.

3.3 FIELD QUALITY CONTROL

- A. Testing: All cameras shall be tested and viewed from each scheduled monitor after installation is complete.
- B. Integration Testing: Check that all integrated events call up the appropriate camera.
- C. Test Reports: Furnish written test reports to the engineer prior to final inspection documenting all of the above. See example form below.

VIDEO SURVEILLANCE VERIFICATION AND CHECK-OUT FORM

✓ = OK
Job #
Job Name:
Panel #

FIELD TEST CODE: A - No status change M - B - Won't call up with alarm N - C - Poor video O - D - No video P - E - Out of focus Q - F - PTZ does not function R - G - No power to camera S - H - Reversed CCTV Camera call- T - I - Software problem U - J - Monitor failure V - K - Multiplex/Quad failure W - L - Not installed X -							REPAIR CODE: 1-SSI 2-ELECTRICIAN 3-IRONWORKER 4-CARPENTER 5-OWNER/REP 6-ENG 7 - 8 - 9 - 10 - 11 - 12 -			Software Test By: _____ Date _____ Hardware Test By: _____ Date _____ System Test By: _____ Date _____ Design Engineering By: _____ Date _____ Wiring By: _____ Date _____ Field Test By: _____ Date _____		
ON-SITE												
ICON ID#	ICON TYPE	C/U CAM. NO.	CCTV INTLK. WITH	CELL CCTV VIDEO	SOFT-WARE TEST	HARD-WARE TEST	FIELD TEST CODE	REPAIR CODE	RE-CHECK "X"	FIELD CHECK OUT NOTES	PROBLEM RESOLVED (BY/DATE)	

- D. Program camera identifications and intercom call up titles as approved by the owner.

3.4 SOFTWARE

- A. Furnish a single Adobe Acrobat PDF file detailing all passwords for each IP Video system.

- B. Furnish documents listed in 3.4 A at project completion.

3.5 ADJUSTING AND CLEANING

- A. Coordinate final views: Final adjustments shall be reviewed and approved by the owner.

- B. View Adjustment: Use a portable monitor to adjust the cameras for the best possible camera coverage. Final adjustments shall be reviewed and approved by the owner.

- C. Fully coordinate the final location of all cameras to prevent camera views being blocked by light fixtures, HVAC fixtures, and all other obstructions.

3.6 TRAINING

- A. The ESC shall provide without additional cost to the owner representatives specially trained in the operation of Video Surveillance systems provided. The representatives shall train the Owner's personnel in operation, repair, and upkeep of the Video Surveillance and custom recording settings. Refer to Specification Section 280500, 3.6 for additional training information including notification, outline, course structure, and additional post occupancy training.

3.7 SPARES

- A. Cameras: Furnish (2) spare cameras of each type installed on the project.

- B. PTZ Camera: Furnish (1) spare camera of each type installed on the project.

- C. Corner Mounted Camera: Furnish (1) spare camera of each type installed on the project.

- D. Workstation: Furnish one spare workstation with monitor.

- E. Spare parts shall be packaged with appropriate protective packing material.

- F. Box spare parts for easy storage and clearly identify the contents of each box on all four sides of each box.

END OF SECTION 28 23 00

1 SECTION 28 31 11 - DIGITAL ADDRESSABLE FIRE ALARM SYSTEM

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

4 A. General provisions of the Contract, including General and Supplementary Conditions and
5 Division 1 Specification Sections, apply to this section.

6 B. All Fire Alarm wiring shall be in conduit. Conduit is provided by division 26. Refer to
7 280500.2 for conduit and cable requirements. ESC is responsible for coordinating conduit
8 with Division 26.

9 C. Fire alarm installer shall furnish and install all cabling, wiring, and conduit from fire alarm
10 control panels to addressable devices. Fire alarm installer shall furnish and install all cabling,
11 wiring, and conduit from addressable I/O modules to monitored and controlled devices.

12 D. Refer to Specification 230993 for Sequence of Operations for HVAC controls

13 1.2 SCOPE OF WORK

14 A. Furnish and install a complete, and ready for operation, automatic fire detection and alarm
15 system. System shall include control panel, detectors, annunciators, manual stations, alarm
16 devices, wiring, components, relays, accessories, and all wiring and connections to devices
17 furnished by others. Coordination with divisions 23 and 26 is required to assure that system
18 operates correctly.

19 B. Miscellaneous points shall be monitored or controlled by an addressable module located
20 within three feet of the device controlled as required by NFPA 72 21.2.4. Program the device
21 into the nearest Fire Alarm Control Panel. Wiring that leaves the building shall be provided
22 with a transient voltage surge suppressor at the exit point. Furnish and install a ground wire
23 to the facility ground.

24 C. All Fire Alarm Network Communications between control panels shall be over copper line
25 networks. The ESC is to provide copper and copper terminations to the Fire Alarm control
26 panels in conduit provided by Division 26.

27 D. Furnish and install addressable output modules to open and close all smoke/fire dampers.

28 E. Each address shall have a unique label indicating the building, dayroom, and device type. All
29 labels shall be coordinated with the facility signage and approved by the owner and the
30 Authority Having Jurisdiction.

31 F. The system shall provide all required points for monitoring, from an on and off site, Central
32 Station including Alarm, System Trouble, Water Flow, and System Supervisory. Provide and
33 install all required components to accomplish this monitoring.

34 G. Coordinate with Division 23 the shutdown of the HVAC units when their respective duct
35 smoke detectors have been activated. Provide the necessary number of relays to perform
36 this function.

37 H. Provide supervised monitoring of radio contact outputs as follows:

1. Antenna Malfunction
2. Signal Booster failure
3. Power Supply Supervisory alarm to include:
 - a. Loss of normal AC power.
 - b. Failure of backup battery charger.
 - c. Low-battery capacity alarm at 70% capacity.

1.3 CODE REFERENCES

- A. Applicable Publications: The Fire Alarm system shall be furnished and installed in accordance with the following:
 1. California Building Code 2013
 2. California Electric Code.
 3. National Fire Protection Association (NFPA) Standard 72, 2013 Ed. with California Amendments.
 - a. Proprietary Supervising Station System.
 4. California Fire Code 2013.
 5. Approved Fire Protection Plan.
- B. All equipment shall be UL listed for the intended purpose.
- C. All equipment shall be CSFM listed for the intended purpose by the California State Fire Marshall's Office. CSFM listing: the system shall be listed as a system. Plans and calculations to be approved by the State Fire Marshal.

1.4 SYSTEM DESCRIPTION

- A. The automatic fire detection and alarm system shall consist of a microprocessor based main control panel, printer, remote annunciator, detection devices, manual stations and alarm indicating appliance and as specified herein.
- B. System operation shall be provided with three (3) levels of password protection.
- C. The system shall be capable of performing time base control functions and shall contain the ability to be programmed for a holiday schedule.
- D. The system shall be capable of operating both intelligent/analog and non-addressable devices.
- E. The system shall have a point capacity of 2500 points.
- F. The system shall function as follows when an area detector, duct detector, manual station or water-flow switch operates:
 1. Activate audible and visual notification devices in the area of alarm.
 2. Annunciate audibly and visually on Fire Alarm Control Panels (FACP) and Fire Alarm Annunciators (FAA) in the area of alarm as well as Central Control Room 1158.
 3. Display individual detector and/or zone number on alphanumeric display with user defined message on Fire Alarm Control Panels and Fire Annunciators in the area of alarm as well as Central Control Room 1158.
 4. Printed record on FACP printer in Fire Command Center Room 1172.
 5. Transmit an alarm signal to the Central Station monitoring the facility.
 6. Graphics of actual annunciator and FACP to be approved by State Fire Marshal.
- G. Duct detectors shall shut down their respective unit when they sense smoke in the unit.

- H. System shall monitor and annunciate positive confirmation of fan activation and presence of power as defined by the CBC and these documents.

1.5 SMOKE CONTROL

- A. Provide sequence of operation as specified in Mechanical Division 23. Control relays shall be mounted within three feet for the controlled appliance as required by NFPA 72 21.2.4.
- B. Provide a fully functional UUKL listed Smoke Control Panel (SCP) where indicated.
- C. The AC units feeding the security electronics room, the electrical rooms and the control center rooms will not be shut down in any smoke control sequence.
- D. Smoke dampers should be closed by the relay that shuts down the air handling system they are a part of.
- E. Upon smoke detection of fire, all HVAC systems should shut down except the smoke control equipment serving an active smoke zone of fire origin. Refer to mechanical drawings for responsibilities, sequence of operation and coordination requirements.
- F. Where smoke dampers are provided on units less than 2000 CFM, furnish and install an addressable module to shut the unit down. Coordinate fully with all trades.
- G. System shall monitor and annunciate positive confirmation of fan activation and presence of power as defined by the CBC.
- H. Furnish and install a switch for each smoke zone at the area Fire Alarm Control Panel to bypass the smoke control system.
- I. Furnish and install a separate smoke control panel for each housing unit. Locate all smoke control panels in the Fire Command Center or as indicated.
- J. Where load exceeds the contact of the addressable modules required amount, the fire alarm contractor shall provide additional contacts to handle the load.

1.6 AUXILIARY FUNCTION

- A. Furnish and install an addressable monitor device to monitor a dry contact on the area Stand-by Emergency Generator Automatic Transfer Switch.
- B. Furnish and install an addressable control relay at each AC unit to drop the condenser coil in addition to any modules required for smoke control.
- C. When normal electrical power is lost and the building is transferred to emergency power, turn off all AC condensers in the affected area. Fully coordinate with all other trades.
- D. Provide addressable relay output modules to control smoke exhaust fans.
- E. Provide input modules to monitor pressure switches associated with the smoke exhaust fans. If the switch is not indicating air flow within 10 seconds after an alarm is initiated the system should register a trouble on the local fire alarm panel.
- F. The AC units feeding the security electronics room, the electrical rooms and the control center rooms will not be shut down while the building is on the emergency generator.
- G. Furnish and install individual switches on FAA in central control room to shut down sprinkler water in the controlled zones.
- H. Furnish and install a red alarm bell and red flashing light suitable for exterior mounting for each sprinkler riser at each area.

- I. Furnish and install a graphic map at each FACP and annunciator panel. Map to show “you are here” and show layout of building and name of areas.

1.7 SUBMITTALS

- A. Basic Submittals: Provide submittals as required by Section 280500 Common Work Results for Electronic Safety and Security and division 1.
- B. Special Submittal Requirements: In addition to the contract requirements for submittals provide the following:
1. Riser diagram indicating integration with other systems. Identify all major components, interconnections, and subsystems.
 2. Identify spare capacity of each circuit either by schedule, device identification, or notation.
 3. Battery calculations for each panel.
 4. Voltage drop calculations for each signal circuit using the following model:
 - a. All device loads will be treated as if at the end of the circuit.
 - b. No circuit shall have a voltage drop of more than 10%.
 - c. Identify circuit current, voltage drop, wire size, and percentage drop.
- C. Approvals and comments from the State Fire Marshal.
- D. Furnish a copy of the license for the master electrician who will supervise the installation of the fire alarm system.
- E. Furnish a copy of the UUKL listing for the smoke control equipment.
- F. The Fire Alarm contractor shall program a weekly test of all smoke control equipment as required by CBC 909.12.1. During the deferred submittal, to the Fire Marshall, the contractor shall submit to allow the facility to disconnect the fans during the weekly test as this will interfere with the normal building operation.

1.8 SYSTEM INTEGRATION

- A. Printer: Provide a printer dedicated to generate hard-copy configuration reports form addressable systems and the voice-alarm control panel for records/reporting in the Fire Command Center room 1172.
- B. HVAC: Integrate the fire alarm with the HVAC system by means of dry contacts and addressable devices.
- C. Sprinkler System: Monitor Fire Sprinkler Flow and Supervisory devices provided by and installed by others.

PART 2 - PRODUCTS

2.2 FIRE ALARM SYSTEM

A. ACCEPTABLE MANUFACTURERS

1. Siemens
2. EST
3. Notifier

2.3 FIRE ALARM CONTROL PANEL

- A. The main control panel shall be equal to the FireFinder XLSV as manufactured by Siemens. The completed system shall have space provided for a minimum of 25% spare slots. The system shall provide the following:
1. The control panel shall be capable of supporting non-addressable as well as addressable detection devices.

2. The control panel shall be capable of supporting digital emergency, voice-alarm and a communication system designed to be used with the Siemens Fire Safety FireFinder XLS panel.
 3. The panel annunciator shall be an 80 character back lit alphanumeric display, which shall provide a 32-character user definable message associated with each detection device or zone.
 4. System shall be capable of a minimum 2500 points.
 5. System shall include battery standby power to support 24 hours in standby and 5 minutes in alarm.
- B. Supervision: Dynamic supervision of system electronics, wiring, detection devices, and software shall be provided by the control system. System failures shall be indicated on the alphanumeric annunciator. Software and processor operation shall be monitored by an independent hardware watchdog circuit, which will indicate their failure.
1. The module shall be capable of indicating power status, communication, internal operations, ground fault, and troubled conditions for all circuits.
- C. Ground fault: Ground fault detection shall be provided for all circuits. A single ground condition shall result in the annunciation of a trouble signal.
- D. Power: The control panel shall operate from a two wire 120 VAC supply with internal 24 VDC backup battery. All panel power connections whether AC or DC shall be separately fused within the control. The Fire Alarm Control Panel shall furnish low voltage power to all remote fire control relays. Power supplies shall be sized with 25% spare capacity.
- E. Analog Operation: The control panel shall measure and adjust within UL guidelines the sensitivity of analog smoke detectors. An alphanumeric display shall be provided for custom operator messages and for reading detector sensitivity. Each device on an intelligent/analog detecting circuit shall be checked continuously.
- F. Supervision: The control shall report the failure of a device's transmitting component(s), open or shorted, on an intelligent/analog detection circuit. The device shall be recognized and identified by location within the circuit to the specific device, and all other devices on the circuit shall continue to function properly.
- G. Device number: The controls shall report, by specific device number, any device removed from an intelligent/analog detection circuit and all other devices shall continue to function.
- H. Printed record: The network fire alarm panel shall have a 24 VDC build-in printer system capable of generating hard copy records of all alarms, troubles, and supervisory events. Printer shall be CSFM listed for the intended purpose by the California State Fire Marshall's Office. Furnish and install a printer equivalent to Siemens Supervised Parallel Printer.
- I. New Alarms: New unacknowledged alarms and troubles shall be distinctively displayed visually differentiated from previous alarms and troubles.
- J. System Reset: It shall not be possible to reset the system until all off normal indications have been acknowledged.
- K. Logic: Control functions shall be assigned on the basis of system initiation patterns of detection devices such as "anding" zones, counting zones, counting devices, "anding" groups, and "anding" types of detection devices.
- L. Addressing: Sprinkler water flow switches, air duct smoke detectors, tamper switches, OS & Y valves, manual stations, and thermal detectors shall be equipped with a unique address.
- M. Signal Circuits: Provide notification appliance circuits capable of providing 1.5 amp at 24 VDC per circuit as required to power evacuation signals. All notification appliance circuits shall be

capable of Class A operation. Circuit visual alarms separately from audible signals. Provide switches to allow the audible signals to be silenced while the visuals continue to flash.

1. Furnish and install a Zone Indicating Card equivalent to Siemens ZIC-4A.

N. The addressable Signaling Line Circuit Pathways shall be so constructed that all devices shall continue to communicate even past a single open fault, and the single open fault shall result in the annunciation of a trouble signal. Conditions that affect the intended operation of the path are annunciated as trouble signal. (Class A operation). The facility fire alarm system shall meet the requirements for a Proprietary Fire Alarm System as defined by NFPA.

1. Furnish and install all redundant and backup components as required.

O. Provide automatic detectors with built in relays where indicated on the plans or required. Remote relays located on detector bases or double gang outlets throughout the building shall be controlled in the same manner as panel mounted relays.

P. Provide amplifier for the XLS panel capable of amplifying eight (8) digital-audio channels. The audio amplifier shall have a 40-Watt plug-in and audio levels of 25/70VRMS.

1. Furnish and install a Zone Amplifier equal to Siemens Model ZAC-40.

Q. Provide signaling line circuits for communication with addressable devices as required by the number of devices.

1. Upon activation of any intelligent/analog device installed on the circuit, the system shall automatically report the status of the device and initiate the sequence of operations specified for that device. Alarms shall have priority over troubles.

2. All intelligent/analog initiating devices on all circuits may be in alarm at the same time and perform the sequences of operation prescribed by the system configuration. If there are more than 127 alarms, the message "more than 127 alarms" will appear and any alarms after 127 will still have all of their required functions performed.

3. The circuits shall detect a line break and provide information to the control panel allowing the user to determine between which two (2) devices the break has occurred.

4. Furnish and install a Device Loop Card equivalent to Siemens DLC.

R. Additional circuits for operation of DC audible devices, leased line, or city tie, shall be provided by a Signal Module. This module shall be system interconnected by a card edge connector, and shall be operable by the control unit.

1. Upon command by the control unit, the output circuits will respond as configured. The output current shall be at least 1.5 amps per circuit. Each circuit shall be fused separately and supervised.

2. Open circuits shall report trouble only and respond with circuit identification. A shorted circuit shall respond in a similar manner.

3. The module shall contain two programmable open collector outputs capable of sourcing 250 mA at 40 VDC for relay or LED activation.

S. Provide a controllable relay output module for control of air handling units and other building life safety functions.

1. The module shall be system interconnected by a card edge connector and shall be operable by the control unit or manually controlled.

2. It shall contain two (2) independent relays, fitted with form "C" contacts, rated at 4 Amp 30VDC/120 VAC Resistive.

3. Furnish and install relay module equivalent to Siemens Model CRC-6 and components as required.

- 1 T. Cabinet: Provide a NEMA 1 cabinet to house all controls, power supplies, motherboards,
2 relays, and accessories. Cabinet shall fit in space designated on the plans.
- 3 U. Network: Furnish and install network cards for communication between Fire Alarm Panels.
4 The network shall be so constructed that all devices shall continue to communicate even with
5 isolated copper faults occur. (Class A operation)
6 1. Cards shall be located in the fire alarm panel in each area.
7 2. Furnish and install Network Cards equivalent to Siemens Model NRC.
- 8 V. Programmer Tester: Furnish to the owner a programmer/tester equal to the FPI-32
9 SensorLINK Programmer and Tester with carrying case. Furnish an operations manual for
10 the programmer.
- 11 W. Furnish and install a Switch Control Module that is capable of providing manual control of the
12 Emergency Voice Evacuation System or manual fire control system equivalent to Siemens
13 Model SCM-8.
- 14 X. Furnish and install a microphone to give firefighters the ability to voice messages to specified
15 audio zones and indicates that selected zones are ready to be paged. Provide a local page
16 board to properly connect the microphone and convert two (2) analog input signals into the
17 internal digital format.
18 1. Furnish and install a Live Voice Module equal to Siemens LVM and components where
19 required.

20 2.4 FIRE ALARM ANNUNCIATOR

- 21 A. Furnish and install Fire Alarm Annunciators (FAA) equal to the Siemens RCC-3 series panel
22 where indicated on the plans.
23 1. Full command keyboard.
24 2. 6" LCD display up to 8 events and system status.
25 3. 12 programmable function keys.
26 a. One key shall be programmed to **ACTIVATE** the fire sprinkler shut-off valve in the
27 controlled zones of the basement & first level to prevent water from flowing for
28 maintenance.
29 b. One key shall **DEACTIVATE** the fire sprinkler shut-off valve in the controlled zones of
30 the basement & first floor to allow water to flow.
31 c. One key shall be programmed to **ACTIVATE** the supply and relief fan VDF's when
32 smoke is detected basement.
33 d. One key shall be programmed to **ACTIVATE** the fire/smoke dampers (FSD's) to allow
34 the purge supply and exhaust system to function in the basement.
35 e. One key shall be programmed to **CLOSE** the FSD's to stop circulation to other
36 areas of the basement.
37 f. One key shall be programmed to **CLOSE** the RA damper associated with the AHU
38 ductwork being used for exhaust.
39 g. One key shall be programmed to **CLOSE** the dampers associated with the RA duct
40 serving the sleeping cells in the zone of fire origin.
41 h. One key shall be programmed to **OPEN** the Exhaust Air Damper associated with the
42 Smoke Exhaust Fan.
43 i. One key shall be programmed to **ACTIVATE** Smoke Exhaust Fans serving the zones
44 of fire origin.
45 j. One key shall be programmed to **CLOSE** dampers associated Return/Exhaust Air
46 Ductwork in order to isolate the Smoke Control zones that are **NOT** in alarm (such
47 that exhaust fans will **ONLY** be **exhausting air** from the housing units of fire
48 origin).

- k. One key shall be programmed to **SHUT DOWN** the AHU and normal HVAC system on the floor of origin.

B. Each annunciator shall have the functions listed below:

1. LCD display with four (4) lines of forty characters each.
2. Duplicate of command keys on the Fire Alarm panel to include:
 - a. Acknowledge
 - b. Silence
 - c. Reset
 - d. Change detector sensitivity.
 - e. Disarm devices for maintenance.

C. Provide an FAA at the following locations at a minimum:

1. Central Control Room 1156.
2. Guard Station Room 2206.
3. Guard Station Room 3206.

D. Provide a Fire Alarm Annunciator at the Fire Command Center in room 1172. The annunciator shall have the functions listed below:

1. LCD display with four (4) lines of forty characters each.
2. Duplicate of command keys on the Fire Alarm panel to include:
 - a. Acknowledge
 - b. Silence
 - c. Reset
 - d. Change detector sensitivity
 - e. Disarm devices for maintenance

2.5 ALARM INITIATING DEVICES

A. All intelligent/analog smoke and thermal detectors shall contain an integral alarm LED. All intelligent/analog detectors shall be individually identifiable from the control panel.

B. The intelligent/analog smoke detector shall be a plug-in, twist/lock unit which shall be capable of removal from or installation into its base with one hand.

1. The detector shall contain two ionization chambers and solid state indicator lamp. The reference chamber shall compensate against sensitivity changes due to changes in environmental temperature, humidity and barometric pressure. The sensing chamber shall be open to the outside elements through a protective cover which will permit products of combustion to enter, while preventing foreign matter from entering and causing unwanted alarms.
2. The intelligent/analog detector sensitivity shall be individually adjustable from the control panel. It shall also be possible to accurately measure the intelligent/analog detector's sensitivity from the control panel. Relative sensitivity measurements, providing no readout of discrete sensitivity, will not be considered as being equivalent.
3. The intelligent/analog ionization detector shall be dynamically supervised, indicating a trouble condition at the control panel when the detector is unable to sense a fire condition due to both internal and external operating conditions or malfunctions.

C. Furnish and install protective guards on ceiling or wall spot smoke detectors located in inmate accessible areas. Unit shall be the Shaw-Perkins Protection Steel Smoke Detector Guard model #SDG or equal, be UL listed and constructed of heavy-duty double wall 16 gauge

- 1 steel. Holes shall be staggered between the double walls. Guard shall be secured with pin-
2 torx style security fasteners.
- 3 D. Furnish and install wall spot smoke detectors equivalent to Siemens Model FDOT421.
- 4 E. The intelligent thermal detectors shall be of the rate compensated fixed temperature type.
5 The intelligent thermal detectors shall be individually annunciated on the control panel. The
6 intelligent thermal detectors shall contain an integral alarm lamp. The intelligent detector's
7 address shall be set by electronic means only, no mechanical means such as programming
8 pins, dipswitches or rotary dials shall be used.
9 1. Furnish and install heat detectors equivalent to Siemens Model FDT421.
- 10 F. The intelligent interface module shall incorporate a custom microprocessor based, integrated
11 circuit which shall provide communication with the XLS/XLSV control panel. The interface
12 module shall supervise and monitor normally open or normally closed dry contacts. The
13 interface module shall report the contact's status to the control panel. The intelligent interface
14 module shall be dynamically supervised and uniquely identifiable by the control panel. The
15 intelligent interface module's address shall be set by electronic means only, no mechanical
16 means such as programming pins, dipswitches or rotary dials shall be used. The intelligent
17 interface module shall be used to uniquely identify all water-flow switches, tamper switches
18 and OS and Y valves.
- 19 G. The intelligent manual fire station shall be non-coded and shall operate on any addressable
20 detection circuit. The intelligent manual fire station shall be individually annunciated on the
21 control panel. Provide key activation option in inmate areas. Operation of station requires
22 the use of a special key. All manual fire alarm stations shall be identified with both English
23 and Spanish verbiage.
24 1. Furnish and install manual pull stations equivalent to Siemens HMS-S.
25 2. Furnish and install manual pull stations with key activation equivalent to Siemens MSM-
26 INST.
- 27 H. The non-addressable thermal detectors shall be either fixed temperature or rate
28 compensated rating and type as indicated on the drawings. Non-addressable thermal
29 detectors shall contain an integral alarm lamp.
- 30 I. The air duct detector shall operate on a cross-sectional air sampling principle to overcome
31 stratification and the skin effect. The air duct detector shall consist of a standard
32 intelligent/analog ionization detector mounted in an air duct sampling assembly and sampling
33 tube that protrudes across the duct of the ventilating system. The air duct detector shall
34 retain the features of the intelligent/analog or non-addressable ionization detector, and be
35 installed in the ventilating duct as indicated in the manufacturer's instructions. Provide an air
36 duct detector for all HVAC units with indicated as 2000CFM or larger.
37 1. Furnish and install duct detector equivalent to Siemens FDBZ492-HR.
- 38 J. Addressable Modules: Furnish and install addressable modules as required. Addressable
39 modules shall be equal to the following:
40 1. HTRI-S, which provides a single addressable input to the fire alarm system.
41 2. HTRI-R, which provides a single addressable input to the fire alarm system and a single
42 output on the same address.
43 3. HTRI-D, which provides two addressable inputs to the fire alarm system and requires two
44 addresses.
45 4. FDCIO422, which provides four addressable inputs and four addressable outputs.
- 46 K. Miscellaneous relays: Where fire alarm contacts are not large enough to handle the control
47 current, provide larger relays and contactors mounted in NEMA 1 boxes.

2.6 ALARM INDICATING DEVICES

A. The alarm speaker shall be design for a field-selectable input of either 25 or 70VRMS. The speaker shall incorporate a sealed-back construction designed for indoor surface or flush mounting. The speaker shall incorporate a speaker mounting plate with a grille cover which is secured with two screws for a level, finish and shall mount to standard electrical hardware requiring no additional trim plate or adapter. All speaker inputs shall employ terminals that range from #12 to #18 AWG wire sizes and power taps shall not exceed one (1) watt. The alarm speakers shall be UL Listed under Standard 1480 for Fire Protective Service and ADA/NFPA compliant.

1. Furnish and install alarm speaker equivalent to Siemens Series SEF Speakers.

B. Alarm visual strobes shall be clear with a flash rate not to exceed two (2) flashes per second, nor less than 1 flash per second throughout the voltage range of the appliance. Source intensity not to exceed 1000 candela. Strobe appliances shall be ADA approved and listed under U.L. 1971.

C. The visual alarm speaker strobe shall be design for a field-selectable input of either 25 or 70VRMS. The speaker strobe shall incorporate a sealed-back construction designed for indoor surface or flush mounting. The speaker strobe shall incorporate a speaker mounting plate with a grille cover which is secured with two screws for a level, finish and shall mount to standard electrical hardware requiring no additional trim plate or adapter. The speaker strobe shall be clear with a flash rate not to exceed two (2) flashes per second, nor less than 1 flash per second throughout the voltage range of the appliance. Source intensity not to exceed 1000 candela. Strobe appliances shall be ADA approved and listed under U.L. Standard 1971.

1. Furnish and install speaker strobe equivalent to Siemens Series SEF Speakers Strobes.

D. All strobe appliances shall be synchronized so that all strobes visible at a single point flash simultaneously.

E. Furnish and install a protective cover for each strobe or audio visual device located in inmate areas. Unit shall be equal to STI model STI-1210C. Unit shall be UL listed and constructed of UV-stabilized polycarbonate.

F. All strobe devices shall be identified with either English and Spanish verbiage or have no marking at all.

2.7 TRANSIENT SURGE SUPPRESSION

A. Acceptable manufacturers are as follows:

1. Northern Technologies Incorporated
1. DITEK
2. PolyPhaser Corporation
3. Transtector

B. Suppression: Provide surge protection for wiring that leaves the building. Provide Northern Technologies series PLP-s units matched to the voltage of the circuit suppressed. The suppressors shall have a peak pulse power dissipation rating of 10 joules each mode, minimum.

C. System Power: Provide surge protection for 120 power connections both inside and outside the building. Devices shall be equal to Northern Technologies TCS-HWR series rated for the

power of the circuit suppressed. The suppressors shall have a peak pulse power dissipation rating of 300 joules L-N, minimum. Units shall provide a dry contact monitored by the security system and identified by electrical panel circuit number

2.8 FIRE DOOR HOLDERS

- A. Furnish and install magnetic door holders equal to Siemens SDH-2 where indicated on the plans. Coordinate installation with all trades.

2.9 CABLING AND WIRE

- A. Acceptable manufacturers:

1. Liberty Wire and Cable
1. Eastman Wire & Cable
2. West Penn Wire
3. Belden
4. Carol
5. General Cable
6. Clifford of Vermont, Inc.

- B. Wire Size: Furnish and install sufficient wire gauge to limit voltage drop to 5%.

- C. Initiating device wiring: Furnish and install data grade fire alarm cabling to all addressable devices equal to West Penn D975 #18 twisted shielded pair. AQ224 for wet rated use.

- D. Alarm Indicating Appliance Circuits: Wiring for signal circuits, power, and miscellaneous controls shall be a minimum of #14 THWN.

- E. Cable shall be wet rated when placed in conduit buried under ground.

2.10 FABRICATION

- A. Assemble and Test: Assemble all smoke detectors and annunciating devices so that they are addressed according to the prints

- B. Device Identification: Identify smoke detectors and annunciating devices with the loop address assigned according to the prints. Label should be visible after detector has been placed into the base.

PART 3 - EXECUTION

3.2 COORDINATION

- A. Preliminary Coordination: Coordinate all required embeds, block-outs, and construction as required by the plans.

- B. Coordination with the State Fire Marshal (SFM): Contractor shall submit plans and pay for all Fire Alarm permits. Contractor to notify the General Contractor and Architect immediately if the SFM requires something more than what is shown on the contract documents. This notice is to be written and include any SFM written comments as well as a price for additional fire alarm material.

3.3 INSTALLATION

- A. The cost of any required changes required by compliance with codes shall be covered by the contractor.
- B. Wire: Install all wire according to be the following:
1. In strict compliance with manufacturer's specification.
 2. In full compliance with 2013 CEC, 2013 NFPA 72 requirements.
 3. Transposing or changing color coding of wires shall not be permitted.
 4. All conductors in conduit containing more than one wire shall be labeled on each end with "E-Z markers" or equivalent.
 5. Conductors in cabinets shall be carefully formed and harnessed so that each drops off directly opposite to its terminal.
 6. Cabinet terminals shall be numbered and coded. All controls and function switches shall be clearly labeled on all equipment panels.
 7. Wire Termination: All wiring shall be terminated at both ends and uniquely labeled in accordance with the equipment wiring plans. Wire not energized or connected to active devices shall be labeled for future use.
- C. Panels: Control and other panels shall be mounted with sufficient clearance for observation, service, and testing. All fire alarm control panels must be clearly marked for easy identification.
- D. Junction Boxes: All fire alarm junction boxes must be clearly marked for easy identification.
- E. Flexible Connectors: Flexible connectors shall be used for all devices mounted in suspended lay-in ceiling panels. Flexible connections shall be securely supported by the building structure and limited to a maximum of three feet.
- F. Continuous Grounding: All conduit, mounting boxes, junction boxes and panels shall be securely hung and fastened with appropriate fittings to insure positive grounding throughout the entire system.
- G. Shared Raceway: No wiring other than that directly associated with fire alarm detection, alarm or auxiliary fire protection functions shall be permitted in fire alarm conduits.
- H. Splices: Wiring splices are not acceptable between devices. Electrical boxes provided are to be used as pull points, not junction points.
- I. Wire Quality: All wiring shall be checked and tested to insure that there are no grounds, opens or shorts.
- J. Listing: All wiring and raceways shall be listed for the intended installation and installed in strict accordance with the California Electric Code as required by the conditions of where it is stalled. This includes but is not limited to ratings for riser, plenum, or wet installations.
- K. Licensed Electrician: All fire alarm systems shall be installed under the supervision of a C-10 License.
- L. Coordination: Fully coordinate all equipment installation with division 23 and division 26 contractors.
- M. Manual Pull Stations: Install per code and at a minimum as follows:

1. Public Areas: Install within 5 feet of the door at each means of egress with no further than 100' travel distance.
2. Inmate Housing Units: Locate manual stations at the Office Control stations and not at the means of egress where inmates can tamper with the stations.
3. Inmate areas: Where indicated provide manual stations with key activation equal to Siemens MSM-INST.
4. Bilingual stations are required.

N. Spot Smoke detectors: Install per code and at a minimum as follows:

1. Where a single detector is shown on the wall, locate top of the detector 12" from ceiling in accordance with NFPA 72. Fully coordinate with all other trades. Locate no closer than 3' to any HVAC exhaust registers.
2. Where a single detector is provided on the ceiling, locate in the center of the room. Fully coordinate with all other trades. Locate no closer than 3' to any HVAC exhaust registers.
3. Locate one spot detector in the air flow at the top of the plumbing chase between cells. Coordinate access panel with division 23.

O. Seismic: The entire system shall be installed to meet the seismic requirements for the area.

P. Locate spot detectors above each cell in the return air flow return as indicated on the drawings. Provide one spot detector for every two cells when there is a mezzanine level.

3.4 SOFTWARE

A. For each Fire Alarm Control Panel, furnish to the owner uniquely identified:

1. One (1) copy of the programming and source code of the application software on a CD or DVD. This copy shall have all programmer comments, variable names, and mnemonics included.
2. One (1) separate back-up CD or DVD for each FACP with the ladder logic file (programmer's notated file) and the source code. Each disk will be labeled with the project name, programs, FACP, programmer, and revision date.

B. Furnish a single Adobe Acrobat PDF file detailing all passwords for each FACP. This file shall also identify the following by system and panel:

1. The file name of each program required for restoration of each failed FACP.
2. The passwords required for each FACP as well as required programs.
3. The name of the programmers for each custom program.
4. The date of the last program change.
5. Furnish documents listed in 3.4 A-B at project completion. Furnish a new set with all revisions after the completion of 280500, 1.9-C.

3.5 SPARES

A. Turn over the owner all programmer/testers for system maintenance including programmers for addressable devices and beam detector test equipment.

B. Turn over to the owner devices in their original shipping boxes with the part number and description of each device contained. Turn over to the owner spares as follows:

1. 10 Spot smoke detector heads.
2. 10 Audio-Visual units.
3. 10 Visual-Only units.
4. 2 Duct smoke detector heads.
5. 2 Addressable input modules.
6. 2 Addressable output modules.
7. 2 Addressable pull stations. (one keyed and one unkeyed)

8. 10 keys for key operated stations.
9. 20 spot smoke detector dust covers for use by the owner when they are performing cleaning tasks that are known to cause nuisance alarms.

3.6 TRAINING

- A. The ESC shall provide without additional cost to the owner representatives specially trained in the operation of Fire Alarm systems provided. The representatives shall train the Owner's personnel in operation, repair, and upkeep of the Fire Alarm and custom relay cabinets. Refer to Specification Section 280500, 3.6 for additional training information including notification, outline, course structure, and additional post occupancy training.

3.7 FIELD QUALITY CONTROL

- A. Test and Certification: The Fire alarm contractor shall test and certify the entire installation as required by NFPA 72. Each of the following shall be tested and any deficiencies corrected before calling for a review by the State Fire Marshal or the engineer.

1. Test all spot detectors by introducing a controlled amount of smoke as required by NFPA.
2. Test all duct detectors by introducing a controlled amount of smoke as required by NFPA.
3. Activate each manual station.
4. Activate each fire sprinkler flow switch and each tamper switch.
5. Confirm the system operates on battery for the required time period.
6. Confirm all functions are activated as required and specified.
7. Confirm evacuation device illumination coverage and audible levels.

- B. The Fire alarm contractor shall participate in tests to confirm smoke purge operation as required by the Fire Marshall.

- C. Record of Completion: After all testing is complete and all problems corrected, fill out completely the Record of Completion in NFPA 72.

- D. Local Requirements: Furnish all required documentation to the State Fire Marshal.

- E. Final Test: Final tests and inspection shall be held in the presence of architect's representatives and to their satisfaction. The contractor shall supply personnel and required auxiliary equipment for this test without additional cost. Final test to be witnessed and approved by the State Fire Marshal.

END OF SECTION 28 31 11

SECTION 28 46 00 – TOUCHSCREEN INTERACTIVE COMPUTER

PART 1 - GENERAL

SUMMARY

A. Scope of work: Furnish and install all components for a Touchscreen Interactive Computer (TIC) integrated with security systems as indicated on the plans and described herein. The Touchscreen Interactive Computer shall be the primary operator interface.

B. The ESC as defined in Section 280500 Common Work Results for Electronic Safety and Security shall be responsible for providing and coordinating this system.

SYSTEM DESCRIPTION

A. Touchscreen Interactive Computer (TIC): The Touchscreen Interactive Computer shall be a computer terminal with the appropriate cards and programming incorporated into an integrated unit to serve as an operator interface. Refer to Specification section 284600.1 for the operations controlled by each TIC station.

B. Basic Operation: All areas of the building will be graphically represented displaying all monitored and controlled icons as required for proper operation. The graphics for the TIC shall fit the screen size, configuration and icon functions as described below. **The orientation/direction of each map must match the orientation as related to the operator at each TIC station location.**

C. Task Groups: Control and monitoring functions shall be assigned to a TIC through task groups. A task group is a logical association of points assigned to a particular TIC where multiple TIC units are provided in a single control room. Assigning a task group to a particular TIC will prevent that point from being controlled by another TIC.

D. Graphic Plans: The TIC uses graphic representations of various facility areas to describe events as they occur. Each graphic is to be a 1/8" scaled depiction of each area. Graphics are to be sized for proper operation of control icons and useful building representations. All graphic screens shall be labeled as detailed in this section.

1. Key Plan: A facility key plan will be available on all graphic screens. Selecting an area of the key plan will call up a graphic of the area providing control icons and more detailed building information. Icons as described below will be located on the plan to graphically locate where in the facility the controlled item is installed. The area plans are the second level of graphic zoom.
2. Detail Window: Detail plan windows shall be provided for any section of the graphic plan where there is a high concentration of controls making it impossible to properly indicate all icons. This shall be the third and last level of graphical zoom.

E. Provide the following:

1. TIC.1C in Officer Station 0021
2. TIC.1A and TIC.1B in Central Control 1158
3. TIC.2A and TIC.2B in Guard Station 2206
4. TIC.3A and TIC.3B in Guard Station 3206

GLOBAL FUNCTION OPERATIONS

A. All electrically controlled hardware and security subsystems end-of-line devices as indicated herein shall provide status and control by use of symbolic icons and status indicators. All

control icons (switch functions) that are used shall be of a size that will facilitate a positive selection point; the minimum size of 0.5 inches square shall be required. All status indicators shall be a minimum of three-sixteenths inch in diameter or a large, square or rectangle symbol may be used at an equal size. All symbols shall provide status by its color and/or associated text, both the control icons and its associated status indicators. Global function icons shall be located on the bottom of each graphic screen. These icons, if active, shall control global functions for the associated graphically displayed area.

B. Log-on: Selecting this icon shall cause a pop-up window to appear. Located within this window there shall be a text prompt requesting the operator to enter their password and user name. The system shall confirm the password and username. If they match the stored list of usernames and passwords, the system site screen shall be displayed and a valid log on event shall be recorded on the event recorder and data log. The operator will then have access to those functions assigned to entered username and password. If the username and password do not match the stored list of usernames and passwords, the system shall display a text window with "Log On Failed" and return to the main log on screen. The failure will be stored as an event on the event recorder and data log.

C. Log-off: Selecting this icon shall cause a pop-up verification window to appear on top of the graphically displayed area. Located within this window there shall be a text prompt requesting the correction officer if they wish to proceed with the Log Off function. Also located within the window shall be two icons. One shall have the text "YES" and one shall have the text "NO". Selecting the icon with the text "NO" shall cause the verification window to be removed from the screen and the system shall return to normal operation. Selecting the icon with the text "YES" shall cause the verification window to be removed from the screen and shall cause the current operator to be logged out of the TIC. The display shall return to the primary log-on screen awaiting a new operator to log-in on this console.

D. Identifying Graphic Screen labels TIC graphics screens shall have labels for the following critical areas at a minimum:

1. Cells
2. Control rooms
3. Electrical/Security Electronics rooms
4. Communication rooms (IDF/MDF)
5. Mechanical rooms
6. Dayrooms
7. Intake
8. Medical
9. Vehicle sallyport
10. Admin. areas

E. TIC graphics and labels shall be provided for all devices including:

1. Controlled doors
2. Monitored Doors
3. Intercoms
4. Site gates
5. Cameras
6. Duress stations
7. Loop Detectors

F. TIC system screens shall include the following features:

1. Each identifying label shall have a fixed value that may be used for programming and cannot be changed by the operator.

2. Each identifying label shall have an alternate value provided by the owner. This field shall be up to 10 alphanumeric characters long, cannot be used for programming purposes and can be changed by the owner with the proper password.
3. Provide a toggle on the utilities screen to toggle between the two label sets.
4. The initial alternate labels shall be programmed by the contractor as approved by the owner.
5. The selected label shall be a part of the point identifier when listed on the screen or logged for reporting.
6. The utility screen shall allow the operator to print a list of points with both labels.

SYSTEM UTILITIES

- A. Selecting this icon shall cause the system to switch to the System Management Screen. The functions located on this screen will be based upon the access level that the current operator has obtained. Specialized functions will be disabled and grayed out if the access level is not acceptable. The Systems Management Screen shall consist of, but are not limited to these functions:
 1. Configure Users
 2. Change Password
 3. TIC Calibration
 4. Set Date and Time
- B. The system utilities operation shall be menu driven with an instructive help-menu.

SITE PLAN

- A. Selecting this icon shall cause the system to display a graphic screen, which displays the entire site plan.

AREA MAPS

- A. Selecting this icon shall cause the system to display a graphic screen, which displays the entire area in which the system is viewing at that time. This is to allow the operator a quick method to access another detail section within that area.
- B. Task group assignment shall be accomplished through the area maps. Task group assignment shall be activated by enter the correct password on any central control TIC.

TIC SCREEN COMPONENTS

- A. Active Graphic Screen: The Active Graphic Screen shall display the active part of the building with the appropriate icons and status indicators. This shall be where most of the operator to system interface occurs. Maximize this area for each screen.
- B. System Alarm Control: There shall be an area of the Active Graphic Screen that displays the highest priority system alarms. Display a minimum of four events simultaneously. The operator shall be able to scroll through all active alarms. There shall not be any limitation on the number of active alarms that a TIC can display. As each alarm is processed, corrected, or reset, it shall be removed from the System Alarm Line.
- C. Intercom Control: Intercom calls shall be displayed on a separate area from alarms. Display a minimum of four calls with the ability to scroll through all active calls. Refer to the intercom section of this specification for additional information. There shall not be any limitation on the number of active intercom calls that a TIC can handle. As each call is processed or rest, it shall be removed from the Intercom Control area.

D. Pop-up Window: A pop-up window is a graphic that is displayed when a particular event occurs. Refer to the description and function for each item for additional information.

E. Icon: An Icon is a graphic that is displayed whenever the appropriate screen is called. Refer to the description and function for each item for additional information.

LOCKING OPERATIONS

A. Door Position Status Icon (Monitored Only):

1. Description: The Icon shall consist of a **circular** figure with a door graphic that indicates that the door is secured via a color change. This icon shall be visible whenever the screen is selected.
2. Function: The Door Position Status Icon background shall illuminate red when the door is unsecured and shall be gray when the door is secured. In addition, graphically depict that the door is closed when secured and open when unsecured.
3. Distribution: Provide an icon for each monitored only door on each screen.
4. Alarm: Since these are used for security electronics rooms, pharmacy, and records rooms, the opening of this door shall register an alarm on the TIC alarm line of the active screen.

B. Interlock Group Status:

1. Description: A yellow circle with a yellow line to each door that is part of the interlock group. In the center of the circle shall be a number. The number shall be "0" when not in interlock override. This icon shall be visible whenever the screen is selected.
2. Function: When the interlock override is active, the counter will count down from 10 to 0 seconds. Anytime during this timer period, doors in the interlock group may be unlocked.
3. Distribution: Provide an interlock group status for each set of interlocked doors shown on the screen.

C. Interlock Override Icon:

1. Description: A pop-up verification window with the text prompt, "YOU ARE ABOUT TO OVERRIDE A SECURITY INTERLOCK GROUP, ARE YOU SURE". Also located within this window there shall be two icons, one shall have the text "YES" and one shall have the text "NO". This Icon shall be visible only when called for under 'Function'.
2. Function: A pop-up verification window shall appear whenever a door in an interlock group is unlocked and a second door is selected. Selecting the icon with the text "NO" shall cause the verification window to be removed from the screen and the system shall return to normal operation. Selecting the icon with the text "YES" shall cause the verification window to be removed from the screen and shall cause the indicator within the Interlock Override Function icon to change to count down from 10 to 0. When the override time limit is reached, the system shall return to normal.
3. Distribution: Provide Interlock override icons for each interlock group on the screen.

D. Swing Door Icon:

1. Description: The Swing Door Icon shall consist of a square button with a swing door graphic that indicates that the door is secured by both graphic change and color change. The button shall appear raised and appear to depress when clicked to unlock the door. Unlocking a swing door shall be a **single button** command **except at the Segregation dayroom**. This shall have a two step unlock function. Provide a pop-up verifying that you are about to unlock this door. This icon shall be visible whenever the screen is selected.

2. This swing door icon shall be visible whenever the screen containing the swing door is selected.
3. Function: Selecting the icon will depress the button and apply power to unlock the related door. The Swing Door Icon background shall illuminate red when the door is unsecured and shall be gray when the door is secured. In addition, graphically depict that the door is closed when secured and open when unsecured.
4. Distribution: Provide an icon for each controlled swing door on the each screen. Provide a monitoring icon for any controlled doors that is not controlled from the screen.

E. Cell Door Icon:

1. Description: The Cell Door Icon shall consist of a square button with a swing door graphic that indicates that the door is secured by both graphic change and color change similar to the Swing Door Icon. The button shall appear raised and appear to depress when clicked to unlock the door. Refer to specification 284600.1, "Control Matrix".
2. Typical Cell door (Keyed Only): Local and central control stations will have monitoring status indication. If cell door control is disabled, no cell door shall be controlled from any control station.
 - 1)Local Control Station: Monitoring indication only (cell and circulation).
 - 2)Central Control Station: Cell door control is a control function that is password protected only. If the correct password is entered, the cell door control function will be activated.
 - 3)On a utility screen, provide an icon stating "CELL DOOR CONTROL". Selecting this icon will activate a pop-up window to enter the password. When the correct password is entered, controls will be enabled or disabled. The password shall be alphanumeric and have at least one upper case alphanumeric letter, one lower case alphanumeric letter, and one number. The password shall be at least 8 characters long.
3. Segregation/Maximum Cell Door: Provide Two step unlock function with the cell door number within the pop-up. Provide a pop-up verifying that you are about to unlock this door. This icon shall be visible whenever the screen is selected. Provide the Segregation cell door number in the pop-up window for each individual cell door when door icon is activated.
4. Function: Selecting the icon will depress the button and apply power to unlock the related door. The Swing Door Icon background shall illuminate red when the door is unsecured and shall be gray when the door is secured. In addition, graphically depict that the door is closed when secured and open when unsecured.
5. Distribution: Provide an unlock icon for each controlled swing door as indicated in the Control Matrix. Provide a monitoring status icon for any controlled doors that are not controlled from the screen. Refer to specification 284600.1, "Control Matrix".

F. Vehicle Gate Icon:

1. Description: The Vehicle Gate Icon shall consist of three **square** buttons for each gate. The buttons shall be labeled "OPEN' STOP" and "CLOSED" in black text on a gray background and perform the indicated function. The button shall appear raised and appear to depress when clicked to open the gate. There shall be a separate icon that indicates the Vehicle Gate is secured by both graphic change and color change. This icon shall be visible whenever the screen is selected.
2. Function: Selecting the "OPEN" icon will depress the button and apply power to open the gate. Selecting the "STOP" icon will depress the button and remove all power from the gate. Selecting the "CLOSE" icon will depress the button and apply power to close the gate. The Slider Icon background shall illuminate red when the door is unsecured and shall be gray when the door is secured. In addition, graphically depict the slider

- gate as closed when secured and open when unsecured. Clicking the button a second time shall apply power to the close function of the slider.
3. Distribution: Provide a vehicle gate icon for each controlled vehicle gate on the screen. Provide a monitoring icon for any controlled doors that is not controlled from this screen.

G. EMERGENCY RELEASE:

1. Description: Provide a separate screen for the EMERGENCY RELEASE functions for the facility. Provide an icon for each area with "EMERGENCY RELEASE" in black text on gray background. This icon shall be visible on the TIC only when the screen is selected. When active, the background will change from gray to red and flash.
2. Function: Selecting this icon shall cause a pop-up verification window to appear on top of the graphically displayed area. Located within this window there shall be a text prompt requesting that the operator confirm the request before proceeding with the text "You have requested to unlock ALL doors in this area, ARE YOUR SURE?" Also located within this window there shall be two icons, one shall have the text "RELEASE" and one shall have the text "CANCEL". Selecting the icon with the text "CANCEL" shall cause the verification window to be removed from the screen and the system shall return to normal operation. Selecting the icon with the text "RELEASE" shall cause the verification window to be removed from the screen and shall hold all locks in the area open, other than enclosed control rooms. Control rooms are not to be released upon selection of emergency release. The emergency release button shall flash and an audible and visual indication shall be displayed on the TIC in the area released. If the verification window is not confirmed after 5 seconds, the function shall automatically cancel and the system shall return to normal. To reset the emergency release, select the flashing "Emergency Release" icon and select "CANCEL" on the verification window. The Emergency Release function shall override all group assignments, interlocks, and other programming features that would exclude a door from opening under normal operations. Emergency release is a staggered function in that doors are released in groups of three, not all doors simultaneously. **The emergency release function in a selected smoke zone releases all controlled doors except a control room door within 60 seconds.** If the emergency release is canceled before the staggered cycle completes, the system shall discontinue unlocking doors and shall relock the doors previously unlocked.
3. Distribution: There shall be one emergency release icon for each area at a minimum and for dayroom with in each inmate housing area.
4. ESC to include in their bid the cost to modify the Emergency Release programing following the final testing, as directed by the owner/engineer.

H. High Security Risk:

1. Description: A pop-up window to appear on top of the graphically displayed area with the text "HIGH SECURITY RISK". Located within this window there shall be a text prompt "You have requested to unlock an EXTERIOR door in this area. ARE YOUR SURE?" Also located within this window there shall be two icons in the, one shall have the text "RELEASE" and the other shall have the text "CANCEL". This Icon shall be visible only when called for under 'Function'.
2. Function: Selecting an unlock icon to unlock an exterior door shall cause a pop-up verification window as described above to appear. Selecting the icon with the text "CANCEL" shall cause the verification window to be removed from the screen and the system shall return to normal operation. Selecting the icon with the text "RELEASE" shall cause the verification window to be removed from the screen and unlock the selected door. If the verification window is not confirmed after 5 seconds, the function shall automatically cancel and the system shall return to normal.
3. Distribution: Provide at each exterior door of all areas.

I. DOOR OPEN TOO LONG Icon:

1. Description: A pop-up window with black text on a red back ground with a leader line to the appropriate door. Multiple leader lines can identify multiple doors or a separate pop-up can be programmed for each depending on program simplicity. This Icon shall be visible only when called for under 'Function'.
2. Function: The status icon, which will illuminate and flash red with an audible tone to indicate a security door, is opened too long. Selecting the silence icon shall silence the audible tone and illuminate the status icon a steady red. The status icon shall disappear when the security door returns to normal operation.
3. When a circulating door is opened, a timer will start on the PLC. If the door is not secured before the timer expires, then a 'Door Open Too Long' alarm will sound at central control and register on the alarm line.
4. The alarm event will be recorded with Door ID Time and Date.
5. Securing the door will automatically reset the timer. If the alarm has already been activated, then securing the door will clear the alarm and no other operator action is required.
6. Central control can acknowledge the alarm and allow it to continue as allowed by Operations policy and procedures. If the 'Door Open Too Long' alarm is acknowledged and allowed to continue unsecured, then the alarm will resound at central control in 15 minutes.
7. Each circulating door shall have its own unique timer.
8. The 'Door Open Too Long' alarm function will be suspended during Emergency Release since doors are supposed to be held open until Emergency Release is canceled. Once canceled, door open timers will start for all doors not secured.
9. The timer alarm function shall not apply to cell doors.
10. Doors that are provided with a door position switch and only monitored, but not controlled will also be provided with 'Door Open Too Long' timers.
11. All information above will be stored as part of the SQL database.
12. Distribution: Provide a status icon on the computer control station screen to indicate that security doors used for circulation or monitored only are opened and have not been secured within a preset time value ranging from 0 to 999 seconds.
13. Alarm: This condition shall register an alarm on the TIC alarm line of the active screen.

J. CHANGING THE TIMER VALUES

1. The TIC will provide a utility screen to enter all timer values for all doors described in the form of a graphic map. The graphic map will be the same map used for door control and annunciation with the timer value displayed at each door.
2. Only the Administration access level password can change the timer values.
3. Operator level users cannot change the timer values.
4. The timer value will range from 0 to 999 seconds.
5. The utility screen will keep a running average of the length of time each door remains open to aid in door timer management.
6. The utility screen will provide a 'Copy to All' function to copy a timer setting to all timers currently displayed on the screen.

K. DOOR KEYED 'ALARM'

1. Exterior and circulating doors are not to be keyed open. There shall be an alarm generated in central control when a circulating door is opened by any means other than a command from the PLC. This Icon shall be visible only when called for under 'Function'.
2. Provide a status icon on the computer control station to indicate security doors used for circulation or monitored doors that have been opened by a door key. Selecting the

silence icon shall silence the audible tone and illuminate the status icon a steady red.
The status icon shall disappear when the security door returns to normal operation.

L. ELECTRIC KEY (K)

1. Description of doors with Electric Key (K) function; a control door with the 'K' next to the symbol in the drawings represents that the door can be unlocked at the door via the mogul key cylinder by turning the key a certain direction. A switch within the lock is activated and this will send a signal to the PLC control system which will unlock the door. If the key cylinder is turned in the other direction the lock will unlock manually and an alarm (Unauthorized Access) shall be displayed at the TCS station in CCR. Provide a PLC input point for each door. Some doors will have (2K) next to the symbol which means there is a key cylinder on both sides of the door. Only a single point to the PLC is required for this operation.

INTERCOM OPERATIONS

- A. Intercom Control Area: There shall be a group of control icons used to select, answer and reset audio communications between a calling staff station and the TIC. This group shall be as follows:

1. Description: Provide a call list that identifies as a minimum the last four calls with the call time for each. Provide controls to scroll up of down through the list. Provide a "CONNECT" icon, a "GO TO NEXT" icon and a "DISCONNECT" icon as a minimum.
2. Function: All active calls at the TIC shall be displayable in groups of four. There shall be no limit to the number of calls allowed in the system on a TIC.
3. Distribution: Provide an intercom control group of icons on each TIC.

B. Cell Emergency Call

1. Description: Provide a speaker symbol on a button.
2. Function: Operator selection of a staff station: Selecting a Cell Emergency Station icon shall open a talk path between the TIC and the associated Cell Emergency Station. The associated status icon shall illuminate yellow. The TIC operator can listen to the cell. The TIC operator can activate the press-to-talk switch on the microphone to speak to the cell. Selecting the staff station icon a second time shall close the talk path and the status icon shall extinguish.
3. Function: Station Call-in: Pressing the cell call station call button shall annunciate at the controlling TIC by flashing the call station icon in alternating colors with an audible voice annunciation stating "Intercom call". Selecting the flashing call station icon on the TIC shall cause the flashing icon to illuminate steady and open a talk path between the TIC and the associated cell call station. The TIC operator can listen to the cell. The TIC operator can activate the press-to-talk switch on the microphone to speak to the cell. Selecting the call station icon a second time shall close the talk path, reset the call, and the status icon shall return to normal.
4. Distribution: Provide an icon for each cell call station.

C. Intercom Station Call:

1. Description: Provide a speaker symbol on a button.
2. Function: Operator selection of an intercom station: Selecting an intercom station icon shall open a talk path between the operator and the associated staff station. The associated status icon shall illuminate yellow. The TIC operator can listen to the station. The TIC operator can activate the press-to-talk switch on the microphone to speak to the station. Selecting the intercom station icon a second time shall close the talk path and the status icon shall extinguish.

3. Function: Station Call-in: Pressing the call station button shall annunciate at the controlling TIC by flashing the staff station icon in alternating colors. Selecting an intercom station icon shall open a talk path between the operator and the associated intercom station. The associated status icon shall illuminate yellow. The TIC operator can listen to the cell. The TIC operator can activate the press-to-talk switch on the microphone to speak to the cell. Selecting an intercom station icon a second time shall close the talk path and the status icon shall extinguish.
4. Distribution: Provide an icon for each staff call station.

D. Control Room to Control Room Communications: Same as intercom station to TIC operation described above.

E. Rollover: Once an intercom call button has been pressed, the PLC will start a timer. If after 10 minutes an intercom has not been answered by the local station assigned the intercom task group, Central Control will be alerted that the intercom has been unanswered.

F. Call Button:

1. Description: Provide a round icon for each call button. Icon shall be gray under normal operation. When call button is pressed the icon shall turn YELLOW in color and remain yellow until the reset button has been activated as to clear the call.
2. All call buttons shall be logged on the ERC system.
3. Distribution: Provide round icon on TIC station.

AUXILIARY OPERATIONS

A. General Alarm Condition: There shall be a status icon, which will illuminate and flash red with an audible tone to indicate a device initiated alarm condition. Selecting the silence icon shall silence the audible tone and illuminate the status icon a steady red. The status icon shall disappear when the device returns to normal operation. The following conditions are able to initiate general alarm conditions.

1. Emergency Power Status
2. Staff Duress Status
3. Controller Fault

B. Synchronized Digital Clock System: Provide a digital clock on all TIC's. The digital clock shall be a minimum of 0.5 inches high by 1.25 inches long. The digital clock shall have the capability of displaying both twenty-four (24) hour (military time) and twelve hour formats. Mode and time settings will be through the system utilities function. Accuracy of the synchronized digital clock system shall be within +/- one (1) minute within a thirty (30) day period. Synchronize digital clock with the PLC Master clock.

C. Roof Hatch Monitor: Provide an audible alarm and "pop-up window" graphically illustrating the open and unsecured position of all roof hatches in every area.

D. Staff Duress System: Activation of a duress station will cause:

1. Annunciation on the central control TIC.
2. A red icon to appear and an audible tone will sound.
3. If there is a local TIC with door controls of that area, the TIC will be shut down.
4. Central control will have to reactivate the local TIC once the station has been reset.
5. Each activation will be logged on the central control event recording system (ERC).
6. Camera associated shall automatically call up.
7. Provide a duress icon on each local TIC. This should be located at the top right hand side of the screen. This will function the same as a duress station mounted on the wall.

E. Enable/Disable Function:

1. Provide an icon on the Central Control TIC to enable/disable any local TIC if door controls are present. This should be located in each control room or location of the TIC on the map. This will log on the ERC each time this function is activated.

F. Door Alarm Shunt Icon:

1. Description: Provide a gray button with "Door Alarm Shunt" in black text. The button shall appear to be raised.
2. Function: Clicking on the "Door Alarm Shunt" shall cause the button to momentarily depress and silence the audible "Door Open to Long" or "Door Keyed Open" alarm. The visual indicator shall remain.
3. Distribution: Provide one Door Alarm shunt for each door on an Administrator password protected screen.

G. Watch Tour Start Icon: Selecting the watch tour start icon activates an action verification popup window.

1. Once confirmed, watch tour is started for the facility. The tour remains active until the watch tour finished icon is selected.
2. If the request is canceled, the pop up window closes and the function resets to normal.
3. Activating watch tour is logged to the hard drive into the history log for future review. Each tour station activation is logged, also with station, time, and date.

H. Telephone Disconnect:

1. Description: Provide a black outline of a telephone on a gray button that appears raised. When activated, the back ground shall change to yellow.
2. Function: Clicking on the telephone icon shall depress the button and change the background to yellow and disconnect the inmate telephones as well as placing a red slash through a circle over the telephone symbol. Clicking it a second time will cause it to return to normal and activate the inmate telephones.
3. Distribution: Provide a telephone disconnect icon on the ground level of each dayroom.

I. Fixed Camera Call-Up:

1. Description: Provide a black outline of a camera on a gray button. When activated, the background shall change to blue. The camera should graphically match the orientation of fixed cameras.
2. Function: Clicking on the camera icon shall, change the background to blue, and display the camera video on the spot monitor associated with the TIC displaying the camera.
3. Distribution: Provide a Fixed Camera Icon for each camera controlled from the TIC.

J. Pan-Tilt-Zoom Camera Call-Up:

1. Description: Provide a black outline of a camera on a gray button. Provide icons to select preset positions 1 through 8 around the camera icon. When activated, the background shall change to blue. The presets should match the views from the camera as close as practical.
2. Function: Clicking on the camera icon shall, change the background to blue, and display the camera video on the spot monitor associated with the TIC displaying the preset view #1 camera. Selecting other presets will display those presets accordingly. Program a position for each of the 8 preset icons.
3. Distribution: Provide a Pan-Tilt-Zoom Camera Icon for each Pan-Tilt-Zoom camera controlled from the TIC.

1 K. Silence Icon:

- 2 1. Description: Provide a gray button with "SILENCE" in black text. The button shall
- 3 appear to be raised.
- 4 2. Function: Clicking on the silence icon shall cause the button to momentarily depress
- 5 and silence the audible tone. The visual indicator shall remain. Alarms from duress
- 6 stations cannot be silenced until they are reset at the device.
- 7 3. Distribution: Provide one silence icon on each screen.

8 L. Reset Switch:

- 9 1. Description: Provide a gray button with "RESET" in black text. The button shall appear
- 10 to be raised. .
- 11 2. Function: Clicking on the reset icon shall cause the button to momentarily depress.
- 12 Silenced alarms shall be cleared from the system. Duress station alarms cannot be
- 13 reset until they are reset at the station alarming device.
- 14 3. Distribution: Provide one reset icon on each screen.

15 M. System Utilities

- 16 1. Selecting this icon shall cause the system to switch to the System Management Screen.
- 17 2. Provide controls to set the time and date.

18 N. Priority levels:

- 19 1. The system shall provide 25 levels of alarm priorities. Alarms and events shall be
- 20 displayed by priority.
- 21 2. All alarm points shall be logged to the Alarm Log with the following minimum
- 22 information:
- 23 a. Time and date of alarm activation
- 24 b. Alarm point name (Owner configured)
- 25 c. Time and date of acknowledgment
- 26 d. Time and date of reset
- 27 e. Operator handling alarm

28 O. UPS System Alarms:

- 29 1. UPS alarm shall be a pop-up window generated in central control TIC, display in the
- 30 alarm queue and will have an audible tone to indicate a device initiated alarm condition
- 31 (refer to Specification Section 280500.1). Provide the UPS initiated alarm conditions as
- 32 listed below:
- 33 a. UPS Active or 120 VAC Power Failure
- 34 b. Low Battery.
- 35 c. Low Voltage.
- 36 d. Inverter Power.
- 37 e. Trouble.
- 38 2. Selecting the silence icon shall silence the audible tone. The status shall disappear
- 39 when the device returns to normal operation.
- 40 3. This will log on the ERC each time this function is activated.

41 P. PLC Network Communication Alarms:

- 42 1. PLC network alarm shall be a pop-up window generated in central control TIC, display in
- 43 the alarm queue and will have an audible tone to indicate a device initiated alarm
- 44 condition (refer to Specification Section 284619). Provide the PLC network initiated
- 45 alarm conditions as listed below:

- a. Communication Failure.
- b. Communication Power Failure.
2. Selecting the silence icon shall silence the audible tone. The status shall disappear when the device returns to normal operation.
3. This will log on the ERC each time this function is activated.

Q. TVSS Alarms:

1. TVSS alarm shall be a pop-up window generated in central control TIC, display in the alarm queue and will have an audible tone to initiate a device initiated alarm condition (refer to Specification Section 284619, 2.5). Provide the TVSS initiated alarm conditions as listed below:
 - a. 120 VAC TVSS (Failure).
 - b. 208 VAC TVSS (Failure).
2. Selecting the silence icon shall silence the audible tone. The status shall disappear when the device return to normal operation.
3. This will log on the ERC each time this function is activated.

R. Temperature Alarms:

1. Temperature alarm shall be a pop-up window generated in central control TIC, display in the alarm queue and will have an audible tone to initiate a device initiated alarm condition (refer to Specification Section 284619, 2.12). Provide the Temperature initiated alarm conditions as listed below:
 - c. Low Temperature (Below 60 degrees).
 - d. High temperature (Above 85 degrees).
2. Selecting the silence icon shall silence the audible tone. The status shall disappear when the device return to normal operation.
3. This will log on the ERC each time this function is activated.

TASK GROUP

- A. Definition: A task group is a logical grouping of points that can be assigned to multiple TIC stations. Refer to Specification Section 284600.1 Control Matrix for Task Groups.
- B. Task Groups: Provide at a minimum the following Task Groups.
 1. Site, Vehicle and Pedestrian Sallyport gates
 2. Housing Units
 3. Administration Area
 4. Support Spaces

IP VIDEO OPERATION

- A. All cameras shall be displayed on the Central Control TIC stations only. These shall be by room location and camera number.
- B. Activating the associated icon will call up the appropriate camera on the spot monitor for viewing by the operator.
- C. Camera monitoring intercom stations shall automatically display on the spot monitor when the intercom station is selected at the related TIC.

- 1 D. Owner to provide camera titling prior to final programming of the camera and monitor system.
2 The system provider shall provide the required programming service and time as required to
3 revise the camera titling accordingly.

4 VOICE ANNOUNCE

- 5 A. The TIC shall provide a voice announcement of the following events. The announcement is
6 by event type not by point as follows:
- 7 1. Intercom calls to the TIC shall be preceded by a voice announcement "Intercom Call."
 - 8 2. Duress Stations shall be preceded by a voice announcement "Duress."
 - 9 3. Call button shall be preceded by a voice announcement "Incoming Call."
 - 10 4. Emergency release caution windows shall be annunciated by "Warning! You are
11 attempting to open all the doors in the area. Escape is possible. Please confirm."
 - 12 5. Interlock override caution windows shall be annunciated by "Warning! You are
13 attempting to override a security sally port. Escape is possible. Please confirm."

14
15 SUBMITTALS

- 16 A. Provide basic submittals as required by Section 280500 Common Work Results for Electronic
17 Safety and Security and by the General Contract requirements.
- 18 B. In addition, submit color prints of all graphic screens for approval.
- 19 C. Also submit a list of all reportable alarm points.
- 20 D. Submit a flow chart or site map showing the relationship of all proposed screens.

21 SYSTEMS INTEGRATION

- 22 A. Integrated Systems:
- 23 1. IP Video System.
 - 24 2. Door locking control system.
 - 25 3. Intercom system.
 - 26 4. The PLC system.
 - 27 5. UPS system.
 - 28 6. Card Access systems
- 29 B. Event Priority Level: The operator shall always have control and can manually activate any
30 icon displayed at any time. The following priority applies only to the automatic call up of
31 events for the system and the "Select" icon described above under Interactive Alarm/Audio
32 Handling and Operation. Events shall be given the following priority:
- 33 1. Staff Duress Alarms
 - 34 2. Intercom Calls
 - 35 3. Door alarms
 - 36 4. Perimeter system alarms
 - 37 5. Communication failure alarms
 - 38 6. Transient Voltage Surge Suppression Troubles

39 TIC CONTROL AND MONITORING SYSTEM:

- 40 A. Provide and program all necessary TIC selection zones and required graphic lay-out displays
41 on the different monitors to control specified devices as follows:
- 42 1. The system shall be capable of changing to a called screen within one second.

2. The system must generate a command from the TIC to the remote PLC within 500 milliseconds of receiving the selection on the screen.
3. The TIC shall be updated with point status from the PLC every 500 milliseconds.
4. Failure of a TIC shall not disturb PLC communications with other control consoles.
5. The TIC system shall have a means to prevent image burn-in on the CRT when the system control panel has been inactive for more than 2 minutes. Any movement of the trackball should return to the last active screen.
6. Access to the TIC system shall be password protected and all operators shall log into the system. The system shall allow for a minimum of 16 different access levels. Users can log in from a keyboard or directly on the screen.
7. Data Logging: All alarms and critical actions are recorded to the hard drive.
 - a. Critical actions initiated at any station are reported to the data logging system. Such reports shall consist of a time and date tag, activity description, station tag and the operator logged on to the system. Special alarms and conditions shall be reported in a similar manner. Critical actions are defined as follows:
 - 1)Duress alarm activation.
 - 2)Watch tour station activation.
 - 3)Transient Voltage Suppressor failure on protected 120 VAC security circuits.
 - 4)Emergency Release activation.
 - 5)Refer to specification section 284600.2 for other actions to be logged.
 - b. The data logging system shall maintain and store files from which reports may be generated. The Data Logger shall purge old files after a preset time.
 - c. The log files will be stored on the hard drive and kept for a predetermined amount of time. The owner shall have the option to archive data files to CDs.

PART 2 - PRODUCTS

ACCEPTABLE MANUFACTURERS

A. Acceptable Manufacturers

1. Accurate Controls, Ripon, WI; 920-748-6603.
2. CML Security, Erie, CO; 720-466-3650
3. Cornerstone Detention, Decatur, Alabama 256-560-4207.
4. Com-Tec Security, Inc., Appleton, WI; 920-749-2840.
5. Metroplex, San Antonio, TX; 210-495-5245.
6. Sierra Detention Systems, Brighton, CO; 303-278-6879.

EQUIPMENT

- A. Furnish and install a complete, locking and control system with annunciation and control of all security subsystems utilizing touchscreen graphic controls with integrated Programmable Logic Controls. Provide all labor, equipment, materials, software, and supervision to install, calibrate, adjust, document and test the total system.
- B. The locking control system shall control all electrically controlled hardware, motorized gates and other security subsystem devices. The system shall monitor and annunciate the status condition of all electrically equipped hardware, doors, gates and security subsystem control conditions, security conditions, call-in signals and other functions as described herein. The system shall interface with other security subsystems for control and annunciation as indicated.

1 SYSTEM CONFIGURATION

- 2 A. The Interactive TIC Station consists of a Touchscreen monitor and a computer, which shall
3 be connected to the Programmable Logic Controller (PLC) via a local area network. The PLC
4 shall communicate with the TIC Station on an independent, closed network.

- 5 1. Touchscreen Interactive Computer Consoles (TIC): The TIC shall serve as the graphic
6 based operator interface between the corrections officer and the facility's locking controls
7 system and the security subsystems as specified herein.
8 2. Programmable Logic Control System (PLC): The PLC shall provide all necessary logic
9 transactions required to implement the functions and features of the locking control
10 system and the security subsystem as specified herein. The PLC shall be distributive in
11 nature and a standard product of one manufacture.

12 SYSTEM PERFORMANCE GUIDELINES

- 13 A. The interaction time lag between selecting the control icon, i.e., key icon, at any given TIC
14 and the controlled point activation, (i.e., the lock), shall be no greater than one second (1
15 sec).
16 B. The interaction time lag between a controlled point activating and any given TIC 's response
17 either by activation of an audible alarm and/or the associated icon changing state (color) shall
18 be no greater than one second (1 sec).
19 C. The interaction time lag between recalling any floor plan at any given TIC shall be no greater
20 than one second (1 sec).

21 MINIMUM HARDWARE REQUIREMENTS

- 22 A. Each TIC shall consist of the following:
23 1. An IBM™ compatible computer with an Intel™ Xeon class E5 microprocessor chip set or
24 equivalent. The operating speed shall be a minimum of 3.5 GHz, 16GB DDR4 SDRAM
25 and a minimum of 8MB of Cache shall be provided.
26 2. The latest Operating System version from Microsoft. The Operating System shall be
27 compatible with all software and approved during the submittal process.
28 3. One primary 500GB SATA 3.0Gb/s Hard Drive.
29 4. All necessary boards for integration to local area network, PLC's, sound system, etc.,
30 shall be provided.
31 5. Minimum 16X DVD-ROM Read/Write CD/DVD drive.
32 6. Gigabyte Network Interface Card.
33 7. TIC stations TIC.1A, TIC.1B, TIC.1C, TIC.2A, TIC.2B, TIC.3A, and TIC.3B, shall have an
34 ELO "24" model 2401LM Touch monitor or equal. Unit shall provide the following
35 features:
36 a. 100 Watts or less power consumption.
37 b. Operating temperature range of 41 to 95 degrees Fahrenheit.
38 B. Each TIC shall be provided with an optical mouse. Features shall be as follows:
39 1. Two customizable buttons.
40 2. IBM PC compatible.
41 3. USB or PS/2 port connection.
42 4. Scroll wheel.
43 C. Each TIC shall be provided with desk paging microphone equal to Astatic model 878HL with
44 the following features as a minimum:
45 1. Frequency response of 40 to 20,000 Hz.
46 2. Omnidirectional microphone.

3. Push to talk momentary switch.
 4. Drivers and interface boards required for control of intercom system.
- D. Each TIC shall be provided with multimedia speakers equal to Sony model SRS-A212 with the following features as a minimum:
1. Response bandwidth of 90-20000 Hz.
 2. 3.6 Watt RMS power output.
 3. Power on/off and volume controls.
 4. Active amplification.
 5. Hardware as required for intercom audio and TIC voice audibles.
- E. The combination of the microphone in 2.5 C and the speakers in 2.5 D above, shall provide the intercom M.I.S. as defined in section 275123.
- F. Each TIC shall be provided with low profile metal cabinet to house the computer. Furnish each TIC CPU with a model CPU-1 or CPU-2 cabinet as manufactured by Computer Security Products. Furnish and install the following as a minimum:
1. Fully vented steel doors.
 2. Welded side panels with handles.
 3. Lockable cabinet.
 4. Equipment rack noted here is not required if millwork is fabricated with ventilated and lockable storage area for CPU's.

FIBER OPTIC MODULES

- A. Furnish and install all fiber optic modules required for proper system operation.
- B. Modules to be located in a common module rack located next to the fiber optic distribution panel in each security electronics room.

MINIMUM SOFTWARE BASE REQUIREMENTS

- A. The software will be an *Off-the-Shelf* package available through a distributor network. The *Off-the-Shelf* software will be programmed and tailored to the specified functions and features described herein and shown on the drawings. **Approved manufacturer of software is Wonderware or InduSoft.** All I/O server software packages shall standard in nature and be from one of the two approved software manufacturers listed below. If an I/O package (i.e. KepWare, TopServer.....) is used other than from the approved list, it shall be sent to the engineer for approval prior to being used to develop any programming. **Custom or Proprietary software code will not be approved.** The software will convey an accurate floor plan of all areas, which require display on the monitor. The software will utilize the maximum resolution and colors of the monitor to enhance and simplify the displayed control and status information. Fast orientation and ergonomics will be the goal of all graphic displays.
- B. The software will provide log-on security password protection for all TIC's. There shall be a minimum of sixteen (16) levels of access, expandable. The software will provide a database for users. This database shall support a minimum of two hundred fifty six (256) users, expandable.
- C. The software shall provide on-line utilities, accessed through the System Utilities function icon. These utilities shall provide the operator with the ability to edit and update required databases, system operating variables, report configuration and generation, alarm tags and point descriptions, etc. These utilities shall be protected by security levels and password requirements.

- 1 D. The software will automatically align and adjust the monitor display during the boot-up
2 sequence of the TIC without interaction of the correction officer.
- 3 E. All software licenses shall be transferred to the Owner at completion of the project. This shall
4 include, but not be limited to all original installation disks, software manuals, equipment
5 manuals, etc., all project specific application software shall be transferred at the end of
6 warranty period. The use of removable software licenses is prohibited.
- 7 F. The software license utilized shall be loaded directly onto each station. The use of a
8 removable or "hard key" style license is not acceptable.
- 9 G. All application programming interfaces (APIS), Middleware, device drivers, dynamic-link
10 libraries (DLL, GNU, etc. files), firmware, executable files, and all other software used as a
11 part of the software/firmware/hardware framework shall be open source and non-proprietary.
12 The contractor is to provide in the submittal a software architectural model detailing the HMI-
13 PLC-DEVICE software architecture.
- 14 H. Contractor can expect to be provided with a Revit model and PDF files of the floor plan for
15 use as a base for the TIC screens.

16 SPARE PARTS

- 17 A. Furnish one spare computer and monitor to match what is provided for a typical TIC station.

18 PART 3 - EXECUTION

19 INSTALLATION

- 20 A. Coordination With Other Trades: The contractor shall coordinate the work of this section with
21 that of other Divisions as required to ensure that the entire work of this project will be carried out
22 in an orderly, complete and coordinated fashion.
- 23 B. Millwork: Completely coordinate cable and raceway access with millwork provider at each TIC
24 location.
- 25 C. Field Wiring: The wiring that extends from the electronic control relay screw terminal strips to
26 the locks, lights, etc. shall be class 1, 2, or 3 as defined by Article 725 of the California Electric
27 Code. All conductors shall be 14 gauge or larger THHN or THWN, 600 volt rated, and shall be
28 installed in raceways and equipment enclosures with other conductors, within limitations defined
29 by Article 725 of the California Electric Code.
- 30 1. Installation: Dress wires and cables to provide a neat and orderly appearance within all
31 enclosures, equipment racks, cabinets, and consoles by routing in snap-cover, plastic
32 wiring duct. In locations where wiring duct is not feasible, organize by cable clamping,
33 dressing and tie-wrapping.
- 34 2. Strain Relief: Relieve strain on all loose wire bundles using tie-wrap, supports fastened
35 with machine screws or bolts. Do not use self-adhesive type supports.
- 36 3. Shrink Tubing: Neatly form cable ends and apply shrinkable tubing to shielded cables or
37 where necessary to secure the insulation against fraying or raveling.
- 38 4. Edge Protection: Install edge protection materials on edges, holes, lips of ducts, or any
39 other place where wires or cables cross sharp metallic edges.
- 40 5. Service Loops: Allow sufficient service loops where conductors leave cabinet or transition
41 to door mounted electronics.
- 42 6. Splicing: Field wiring shall not be spliced. All wiring shall be continuous from the field
43 device to the termination in the control panel.

7. Future Wiring: All wiring not utilized in the current configuration shall be terminated at both ends and labeled for "Future" use.

D. Ground System: Connection to grounds for Transient Voltage Surge Suppressors shall be 1 ohms or less. All grounds shall be installed as required by the CEC.

E. Ground Wire: Furnish and install a ground wire sized as required by the CEC in all conduits containing conductors carrying voltages above 30 volts rms.

F. Listing: All wiring and raceways shall be listed for the intended installation and installed in strict accordance with the California Electric Code as required by the conditions of where it is stalled. This includes but is not limited to ratings for risers, plenum, or wet installations.

PROGRAMMING

G. Library: The TIC programming shall utilize a library of reusable, programmed modules. Programming a function will consist of submitting a point list to the appropriate program module and acting on the results.

H. Testing: All programming will be completely tested and debugged in the factory before being sent to the site for installation. Each response for each point shall be tested by an actual device or by software manipulation.

I. Personnel: All programmers developing software for the TIC systems shall be experienced programmers completely trained in the operation of the computers involved. The software shall be tested by competent programmers other than the developers.

FABRICATION

A. All cables between PLC and TIC shall be provided with quick disconnect connectors for ease of trouble-shooting and service.

B. All field wiring shall be landed on appropriately labeled terminal strips.

C. All wiring shall be cabled or neatly bundled and secured to the housing with wire ties and internal wire ducts.

TRAINING

A. The ESC shall provide without additional cost to the owner representatives specially trained in the operation of the Touchscreen systems provided. The representatives shall train the Owner's personnel in operation, repair, and upkeep of the system. Refer to Specification Section 280500, 3.6 for additional training information including notification, outline, course structure, and additional post occupancy training.

FIELD QUALITY CONTROL

A. All functions specified shall be individually activated and the result documented. .

B. All functions shall be demonstrated for the Owner and Consultant's representative.

CCS VERIFICATION AND CHECK-OUT FORM

✓ = OK
Job #
Job Name:
Panel #

FIELD TEST CODE:		REPAIR CODE:									
A - No status change	M - Poor audio	1-SSI	Software Test By: _____ Date _____								
B - Won't show secure	N - No audio	2-ELECTRICIAN	Hardware Test By: _____ Date _____								
C - No power to door	O - Out of focus	3-IRONWORKER	System Test By: _____ Date _____								
D - Door won't open	P - No picture	4-CARPENTER	Design Engineering By: _____ Date _____								
E - Door won't close	Q - Call button sticks	5-OWNER/REP	Wiring By: _____ Date _____								
F - Door needs alignment	R - Reversed	6-ENG	Field Test By: _____ Date _____								
G - Wrong door opens	S - Software problem	7 -									
H - Adjust DPS	T - Not installed	8 -									
I - Adjust roller bolt	U -	9 -									
J - File strike plate	V -	10 -									
K - Adjust lock	W -	11 -									
L - No latch back	X -	12 -									
ON-SITE											
ICON ID#	ICON TYPE	C/U CAM. NO.	DOOR INTLK WITH REL.	CELL GRP. REL.	SOFT-WARE TEST	HARD-WARE TEST	FIELD TEST CODE	REPAIR CODE	RE-CHECK "X"	FIELD CHECK OUT NOTES	PROBLEM RESOLVED (BY/DATE)

SOFTWARE

- A. For each TIC, furnish to the owner uniquely identified:
 1. One (1) copy of the programming and source code of the application software on a CD or DVD. This copy shall have all programmer comments, variable names, and mnemonics included.
 2. Complete and accurate set of programming work sheets filled out with the final configuration for each system.
 3. One (1) back-up CD or DVD with programmer's notes and source code. Each disk will be labeled with the project name, programs, programmer, and revision date.
- B. Furnish a single Adobe Acrobat PDF file detailing all passwords for each TIC. This file shall also identify the following by system and panel:
 1. The file name of each program required for restoration of each failed TIC.
 2. The passwords required for each TIC as well as required programs.
 3. The name of the programmers for each custom program.
 4. The date of the last program change.
- C. Furnish documents listed in 3.4 A-B at project completion. Furnish a new set with all revisions after the completion of the three month reprogram specified in 280500, 1.8-C.
- D. Provide a job specific demonstration software program for staff training purposes. Software shall be on an electronic medium so that it can be easily loaded on a standard computer. Training software duplicate TIC appearance and functions without operational capabilities. The ESC is to demonstrate how to load the software on a PC as a part of the system training.

END OF SECTION 28 46 00

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SECTION 28 46 00.1 - SECURITY ELECTRONICS CONTROL MATRIX

The Control Matrix is a tool to aid in the programming of the Locking Control System for the Fresno County West Annex Jail. Each device that is a part of the locking control system is listed in the first column below.

The Interlock Groups in the second column define the sally ports in the facility. If doors are interlocked in a group, only one door can be open in the group at a time without the TIC operator completing extra steps.

The third column shows the Emergency Release groups. There are currently six emergency release groups. They are:

- a.) Basement Level or **BSM**
- b.) Level 1 or **LV1**
- c.) Level 2A or **L2A**
- d.) Level 2B or **L2B**
- e.) Level 3A or **L3A**
- f.) Level 3B or **L3B**

The activation of an emergency release group will open all of the doors associated with the group and hold the locks open. Emergency Release can only be activated from Central Control room 1158 on the first level.

The Camera Call-Up column defines which camera will appear on the TIC station's video spot monitor when an intercom or duress is activated.

The next six columns are used to define Task Groups. Task Groups are a logical group of devices that can be transferred from one Touchscreen Interactive Computer (TIC) to another. There are seven control stations at the Fresno County West Annex Jail. The primary control stations are TIC.1A and TIC.1B, located in Central Control in room 1156. TIC.1A and TIC.1B utilize task groups to divide up and control the facility. These Task Groups are interchangeable. Neither station would be able to control the same task group at the same time. The six task groups would be transferred between these two stations. The Task Groups at the Fresno County West Annex Jail are:

- a.) Task Group 1 (**ELEVATOR**).
- b.) Task Group 2 (**STAIRWAY**).
- c.) Task Group 3 (**BASEMENT**).
- d.) Task Group 4 (Level 1 or **LV1**).
- e.) Task Group 5 (Level 2 including Mezz, or **LV2**).
- f.) Task Group 6 (Level 3 including Mezz, or **LV3**).

The next five columns represent the individual TIC stations away from Central Control. The numbers in these columns show how a device is displayed or controlled by the respective station. The five stations outside of Central Control are:

- a.) TIC.1C
- b.) TIC.2A
- c.) TIC.2B
- d.) TIC.3A
- e.) TIC.3B

Central Control has the ability to take over the operation of these five stations. If a station is disabled, the station's task group would transfer to Central Control.

The Card Access Column distinguishes devices that are a part of the card access system. Some devices are integrated into both the card access and locking control system.

The remaining column is for additional notes that might distinguish a device from a similar device. The notes are as follows:

CONTROL MATRIX KEYED NOTES

- 1 Task Group (or Control Station) has primary control and monitoring.
- 2 Task Group (or Control Station) has monitoring only.
- 3 A trouble alarm will register on the TIC that is assigned this task group.

- 4 When a local Duress is activated, the local TIC is disabled. Central Control station must re-activate the local TIC.
- 5 When the call station is pressed, it will activate the call icon and illuminate the corridor dome light. Call icon on the TIC will be flashing yellow and dome light will flash. The call can be reset from either the TIC station or the local reset button.
- 6 Watchtours are activated on the TIC in Central control that has control of the Task Group.
- 7 Activation of this device shall be recorded on the Event Recording Computer.
- 8 This device is controlled from the card access system and the locking control system. The ESC shall coordinate all door hardware and power requirements with hardware provider.
- 9 This door is controlled by the card access system and the Receptionist Panel (RP) mounted at Reception Desk 1120.
- 10 HIGH SECURITY RISK pop up window to appear when this door is signaled to be open.
- 11 DOOR OPEN TOO LONG pop up window will appear when this door is opened to long.
- 12 DOOR KEYED OPEN alarm to register when this door is opened by means other than the TIC station.
- 13 Door lock will include a one-sided (13.1) or two-sided (13.2) internal key function (CKS) to be disabled in case of emergency. **(13.1)** to indicate the controlled door to **ONLY** be keyed from the Dayroom side. **(13.2)** to indicate the controlled door to be keyed from **BOTH** sides of the door.

Devices	Interlock	Emergency	Camera Call Up	Elevator	Stairway	Basement	LVL 1	LVL 2	LVL 3	TIC.1C	TIC.2A	TIC.2B	TIC.3A	TIC.3B	Card Access	Notes
Basement Level																
Intercom Stations																
0019A.1 (Dr. 0019A)			004			1										7
0019A.2			005			1										7
0019B.1 (Dr. 0019B)			005			1										7
0019B.2			007			1										7
0020.1 (Dr. 0020)			008			1										7
0020.2			007			1										7
0023A.1 (Dr. 0023A)			024							1						7
0023A.2			009							1						7
0024B.1 (Dr. 0024B)			022							1						7
0024B.2			009							1						7
0025.1 (Dr. 0025)			009							1						7
0025.2			021							1						7
0030.1 (Dr.0030)			012							1						7
0030.2			032							1						7
0035.1 (Dr. 0035)			002		1											7
0035.2			003		1											7
0039A.1 (Dr. 0039A)			012			1										7
0039A.2			014			1										7
0039C.1 (Dr. 0039C)			016			1										7
0039C.2			014			1										7
0040.1 (Dr. 0040)			015			1										7
0040.2			014			1										7

Devices	Interlock	Emergency	Camera Call Up	Elevator	Stairway	Basement	LVL 1	LVL 2	LVL 3	TIC.1C	TIC.2A	TIC.2B	TIC.3A	TIC.3B	Card Access	Notes
0042.1 (Dr. 0042)			003			1										7
0042.2						1										7
0048A.1 (Dr. 0048A)			006			1										7
0048A.2			019			1										7
0054.1 (Dr. 0054)			010							1						7
0054.2			029							1						7
0055.1 (Dr. 0055)			010							1						7
0055.2			030							1						7
0056.1 (Dr. 0056)			010							1						7
0056.2			031							1						7
0057A.1 (Dr. 0057A)			010			1										7
0057A.2						1										7
EL-03.2A			029	1												7
EL-04.2A			030	1												7
EL-05.2A			031	1												7
ST-03A.1 (Dr. ST-03A)			001		1											7
ST-03A.2			002		1											7
Emergency Call Station																
0036			026							1						7
0037			027							1						7
0038			028							1						7
Individual Door Control																
0019A	A1	BSM				1				2						7, 10,11, 12
0019B	A1	BSM				1				2						7, 10, 11, 12
0020		BSM				1				2						7, 10, 11, 12
0023A		BSM								1						7, 11, 12
0023B		BSM								1						7, 11, 12
0024A		BSM								1						7, 11, 12
0024B		BSM								1						7, 11, 12
0025		BSM								1						7, 11, 12
0030		BSM								1						7, 11, 12
0035	A3	BSM			1					2						7, 11, 12
0039A (sliding door)	A2	BSM				1				2						7, 11, 12
0039C (sliding door)	A2	BSM				1										7, 11, 12
0040 (sliding door)	A2	BSM				1										7, 10,11,

Devices	Interlock	Emergency	Camera Call Up	Elevator	Stairway	Basement	LVL 1	LVL 2	LVL 3	TIC.1C	TIC.2A	TIC.2B	TIC.3A	TIC.3B	Card Access	Notes
																12
0042		BSM				1				2						7, 11, 12
0048A		BSM				1				2						7, 11, 12
0054		BSM				2				1						7, 11, 12
0055		BSM				2				1						7, 11, 12
0056		BSM				2				1						7, 11, 12
0057A	A4	BSM				1				2						7, 11, 12
ST-03A	A3	BSM			1											7, 10,11, 12
Monitored Doors																
0025										2						7, 11
0026										2						7, 11
0030										2						7, 11
0031										2						7, 11
0032										2						7, 11
0032										2						7, 11
0057B	A4					2										7, 11
Holding Cell Door Control																
Accessible Cell 0036		BSM								2						7
Cell 0037		BSM								2						7
Cell 0038		BSM								2						7
Duress Station																
0023			025							2						7
0024			022							2						7
0033			021							2						7
0050			018							2						7
TIC.1C			011			2				4						7
Power Control																
Holding Cell Lights										1						7
Program Room Lights										1						7
Corridor Lights										1						7
Television Receptacles																
0012										1						7
0013										1						7

Devices	Interlock	Emergency	Camera Call Up	Elevator	Stairway	Basement	LVL 1	LVL 2	LVL 3	TIC.1C	TIC.2A	TIC.2B	TIC.3A	TIC.3B	Card Access	Notes
0023										1						7
0024										1						7
0044										1						7
LEVEL 1																
Pedestal Intercom Station																
L01.1			134				1									7
Intercom Stations																
1101.1 (Dr. 1101)			103				1									7
1137A.1 (Dr. 1137A)			110				1									7
1137A.2			112				1									7
1137B.1 (Dr. 1137B)			111				1									7
1137B.2			113				1									7
1140.1 (Dr. 1140)			113				1									7
1140.2			119				1									7
1141.1 (Dr. 1141)			113				1									7
1141.2			121				1									7
1142.1 (Dr. 1142)			113				1									7
1142.2			123				1									7
1146.1 (Dr. 1146)			136				1									7
1146.2			137				1									7
1153.1 (Dr. 1153)			115				1									7
1153.2			124				1									7
1155A.1 (Dr. 1155A)			133				1									7
1155A.2			124				1									7
1155B.1 (Dr. 1155B)			133				1									7
1157.1 (Dr. 1157)			133				1									7
1157.2			133				1									7
1160A.1 (Dr. 1160A)			130				1									7
1160A.2			115				1									7
1161D.1 (Dr. 1161D)			116				1									7
1161D.2			117				1									7
1162A.1 (Dr. 1162A)			116				1									7
1162A.2			114				1									7
1162B.1 (Dr. 1162B)			102				1									7
1162B.2			117				1									7
1166.1 (Dr. 1166)			106		1											7
1166.2			107		1											7

Devices	Interlock	Emergency	Camera Call Up	Elevator	Stairway	Basement	LVL 1	LVL 2	LVL 3	TIC.1C	TIC.2A	TIC.2B	TIC.3A	TIC.3B	Card Access	Notes
EL-03.1			118	1			2									7
EL-03.2			119	1			2									7
EL-04.1			120	1			2									7
EL-04.2			121	1			2									7
EL-05.1			122	1			2									7
EL-05.2			123	1			2									7
ST-03B.1 (Dr. ST-03B)			105		1											7
ST-03B.2			106		1											7
Loop Detectors																
L01			134				2									7
L02			134				2									7
Gate Control																
G1A (Card Access)		LV1					2								8	7, 11, 12
G1B		LV1					2									7, 11, 12
G2A (Card Access)		LV1					2								8	7, 11, 12
G2B		LV1					2									7,11, 12
Individual Door Control																
1101.1 (Card Access)		LV1					1								8	7
1101.2 (Card Access)		LV1					1								8	7
1117A (Card Access)		LV1			2										8	7
1117B (Card Access)		LV1			2										8	7
1120A (Card Access)		LV1					2								8	7,9
1120B (Card Access)		LV1					2								8	7,9
1122 (Card Access)		LV1					2								8	7
1124 (Card Access)		LV1					2								8	7
1128 (Card Access)		LV1					2								8	7
1137A	B2	LV1					1									7, 11, 12
1137B	B2	LV1					1									7, 11, 12
1140		LV1					1									7, 11, 12
1141		LV1					1									7, 11, 12
1142		LV1					1									7, 11, 12
1143 (Card Access)		LV1					1								8	7
1146		LV1					1									7, 11, 12
1153		LV1					1								8	7, 11, 12
1155A	B3	LV1					1									7, 11, 12

Devices	Interlock	Emergency	Camera Call Up	Elevator	Stairway	Basement	LVL 1	LVL 2	LVL 3	TIC.1C	TIC.2A	TIC.2B	TIC.3A	TIC.3B	Card Access	Notes
1155B	B3						1									7, 11, 12
1157		LV1					1									7, 11, 12
1160A		LV1					1									7, 11, 12
1160B		LV1					1									7, 11, 12
1161D	B1	LV1					1									7, 10, 11, 12
1162A	B1	LV1					1									7, 11, 12
1162B	B1	LV1					1									7, 10, 11, 12
1163 (Card Access)		LV1					2								8	7
1166	B4	LV1			1		2									7, 11, 12
ST-03B	B4	LV1			1		2									7, 10, 11, 12
Non-Contact Visitation Door Control																
1103A		LV1					2									7
1103B		LV1					2									7
1103C		LV1					2									7
1103D		LV1					2									7
1103E		LV1					2									7
1103F		LV1					2									7
1103G		LV1					2									7
1103H		LV1					2									7
1103J		LV1					2									7
Monitored Doors																
1156							2									7, 11
1161C							2									7, 11
1170.1, double doors							2									7, 11
1170.2, double doors							2									7, 11
1171B							2									7, 11
1172							2									7, 11
ST-01					2											7, 11
ST-03					2											7, 11
ST-04					2											7, 11
Elevator Doors																
EL-03				1			2									7
EL-04				1			2									7

Devices	Interlock	Emergency	Camera Call Up	Elevator	Stairway	Basement	LVL 1	LVL 2	LVL 3	TIC.1C	TIC.2A	TIC.2B	TIC.3A	TIC.3B	Card Access	Notes
EL-05				1			2									7
Duress Station																
1109			129				2									7
1114			109				2									7
1120			110				2									7
1122			110				2									7
1123			110				2									7
1126			110				2									7
1127			110				2									7
1129			110				2									7
1144			125				2									7
1146A			137				2									7
TIC.1A			133				2				4					7
TIC.1B			133				2					4				7
Power Control																
Corridor Lights							1									7
Visitation Room Lights							1									7
Video Visitation Stations							1									7
Television Receptacles																
1114							1									7
1133							1									7
1148							1									7
1168							1									7
Alarm Functions Security Electronics 1156																
PLC Communication (Failure)							2									7
UPS Active/Power (Failure)							2									7
UPS Low Battery							2									7
UPS Low Voltage							2									7
UPS Inverted Power							2									7
UPS Trouble							2									7
120 VAC TVSS (Failure)							2									7
24 VDC TVSS (Failure)							2									7
Temp Sensor							2									7

Devices	Interlock	Emergency	Camera Call Up	Elevator	Stairway	Basement	LVL 1	LVL 2	LVL 3	TIC.1C	TIC.2A	TIC.2B	TIC.3A	TIC.3B	Card Access	Notes
LEVEL 2																
Intercom Stations																
2001.1 (Dr. 2001)			203		1											7
2001.2			206		1											7
2003A.1 (Dr. 2003A)			213									1				7
2003A.2			206									1				7
2011B.1 (Dr. 2011B)			211								1					7
2011B.2			204								1					7
2012.1 (Dr. 2012)			202		1											7
2012.2			204		1											7
2015.1 (Dr. 2015)			204								1					7
2015.2			220								1					7
2016.1 (Dr. 2016)			220								1					7
2016.2			221								1					7
2024A.1 (Dr. 2024A)			216								1					7
2024A.2			205								1					7
2024B.1 (Dr. 2024B)			216									1				7
2024B.2			207									1				7
2033.1 (Dr. 2033)			206									1				7
2033.2			225									1				7
2034.1 (Dr. 2034)			225									1				7
2034.2			226									1				7
2039.1 (Dr. 2039)			242									1				7
2039.2			208									1				7
2040.1 (Dr. 2040)			242									1				7
2040.2			209									1				7
2041.1 (Dr. 2041)			242									1				7
2041.2			210									1				7
2050B.2 (Dr. 2050B)			249								1					7
2050C.1 (Dr. 2050C)			251								1					7
2050C.2			243								1					7
2068.1 (Dr. 2068)			277								1					7
2068.2			243								1					7
2070.2 (Dr. 2070)			255								1					7
2071A.1 (Dr. 2071A)			234								1					7
2071A.2			244								1					7
2071B.1 (Dr. 2071B)			256								1					7
2071B.2			234								1					7
2071C.1 (Dr. 2071C)			232		1											7

Devices	Interlock	Emergency	Camera Call Up	Elevator	Stairway	Basement	LVL 1	LVL 2	LVL 3	TIC.1C	TIC.2A	TIC.2B	TIC.3A	TIC.3B	Card Access	Notes
2071C.2			235		1											7
2079.1 (Dr. 2079)			232		1											7
2079.2			277		1											7
2090.2 (Dr. 2090)			263								1					7
2091A.1 (Dr. 2091A)			232		1											7
2091A.2			238		1											7
2091B.1 (Dr. 2091B)			264								1					7
2091B.2			239								1					7
2091C.1 (Dr. 2091C)			239								1					7
2091C.2			246								1					7
2108.1 (Dr. 2108)			279								1					7
2108.2			245								1					7
2110.2 (Dr. 2110)			267								1					7
2111A.1 (Dr. 2111A)			233		1											7
2111A.2			240		1											7
2111B.1 (Dr. 2111B)			268								1					7
2111B.2			241								1					7
2111C.1 (Dr. 2111C)			241								1					7
2111C.2			245								1					7
2118.1 (Dr. 2118)			233		1											7
2118.2			276		1											7
2130.2 (Dr. 2130)			259									1				7
2131A.1 (Dr. 2131A)			236									1				7
2131A.2			248									1				7
2131B.1 (Dr. 2131B)			260									1				7
2131B.2			236									1				7
2131C.1 (Dr. 2131C)			233		1											7
2131C.2			337		1											7
2149.1 (Dr. 2149)			275									1				7
2149.2			247									1				7
2150B.2 (Dr. 2150B)			252									1				7
2150C.1 (Dr. 2150C)			254									1				7
2150C.2			247									1				7
2250.1 (Dr. 2250)			242					1								7
2250.2			242					1								7
2254.1 (Dr. 2254)			242								1					7
2254.2			278								1					7
2255.1 (Dr. 2255)			276									1				7
2255.2			279									1				7
2256.1 (Dr. 2256)			242										1			7

Devices	Interlock	Emergency	Camera Call Up	Elevator	Stairway	Basement	LVL 1	LVL 2	LVL 3	TIC.1C	TIC.2A	TIC.2B	TIC.3A	TIC.3B	Card Access	Notes
2256.2			275										1			7
EL-03.2B			208	1												7
EL-04.2B			209	1												7
EL-05.2B			210	1												7
ST-01C.1 (Dr. ST-01C)			203		1											7
ST-01C.2			203		1											7
ST-02C.1 (Dr. ST-02C)			201		1											7
ST-02C.2			202		1											7
ST-03C.1 (Dr. ST-03C)			230		1											7
ST-03C.2			230		1											7
ST-04C.1 (Dr. ST-04C)			231		1											7
ST-04C.2			231		1											7
2081.1 (Dr. 2081)			256								1					7
2081.2			257								1					7
2089A.1 (Dr. 2089A)			271								1					7
2089A.2			258								1					7
2089B.1 (Dr. 2089B)			271								1					7
2089B.2			265								1					7
2101.1 (Dr. 2101)			264								1					7
2101.2			266								1					7
2121.1 (Dr. 2121)			268									1				7
2121.2			270									1				7
2128A.1 (Dr. 2128A)			272									1				7
2128A.2			269									1				7
2128B.1 (Dr. 2128B)			272									1				7
2128B.2			262									1				7
2141.1 (Dr. 2141)			260									1				7
2141.2			261									1				7
2201.1 (Dr. 2201)				1												7
2201.2			273	1												7
2203.1 (Dr. 2203)			274	1												7
2203.2			273	1												7
EL-04.2D			274	1												7
ST-03D.1 (Dr. ST-03D)											1					7
ST-03D.2			271								1					7
ST-04D.1 (Dr. ST-04D)												1				7
ST-04D.2			272									1				7
Emergency Call Stations																
Safety Cell 2025			217									1				7

Devices	Interlock	Emergency	Camera Call Up	Elevator	Stairway	Basement	LVL 1	LVL 2	LVL 3	TIC.1C	TIC.2A	TIC.2B	TIC.3A	TIC.3B	Card Access	Notes
Observation Cell 2027			218								1					7
Holding Cell 2044			242									1				7
Holding Cell 2046			242								1					7
Cell 2018			222								1					7
Cell 2019			223								1					7
Cell 2020			224								1					7
Cell 2036			229									1				7
Cell 2037			228									1				7
Cell 2038			227									1				7
Cells 2051 through 2057			250								1					7
Cells 2073 through 2078			234-235								1					7
Cells 2092 through 2096			238-239								1					7
Cells 2113 through 2117			240-241								1					7
Cells 2132 through 2137			236-237									1				7
Cells 2152 through 2158			253									1				7
Cells 2059 through 2065			250								1					7
Cells 2083 through 2088			257-258								1					7
Cells 2102 through 2106			265-266								1					7
Cells 2123 through 2127			269-270								1					7
Cells 2142 through 2147			261-262									1				7
Cells 2163 through 2169			253									1				7
Call Station-Dome Light-Reset Button																
2022			205								5					7
2023			205								5					7
2031			207									5				7
2032			207									5				7
Monitored Doors																
2171								2								7, 11
2173								2								7, 11
2174								2								7, 11
2175								2								7, 11

Devices	Interlock	Emergency	Camera Call Up	Elevator	Stairway	Basement	LVL 1	LVL 2	LVL 3	TIC.1C	TIC.2A	TIC.2B	TIC.3A	TIC.3B	Card Access	Notes
2176								2								7, 11
2178								2								7, 11
2252								2								7, 11
2200A								2								7, 11
2200B								2								7, 11
ST-01D								2								7, 11
ST-02D								2								7, 11
Individual Door Control																
2001	C5	L2B			1			2				2				7, 10, 11, 12
2003A		L2B						2				1				7, 10
2003B	C5	L2B			1			2				2				7, 10, 11, 12
2004 (magnetic hold-open)		L2B						2				1			8	7
2009A		L2A						2			1				8	7
2009C		L2A						2			1				8	7
2011A		L2A						2			1					7
2011B		L2A						2			1					7
2012	C4	L2A			1			2			2					7, 10, 11, 12
2015		L2A						2			1					7,11,13.2
2016		L2A						2			1					7,13.1
2022		L2A						2			1					7
2023		L2A						2			1					7
2024A	C3	L2B						2				1				7, 11, 12
2024B	C3	L2B						2				1				7, 11, 12
2031		L2B						2				1				7
2032		L2B						2				1				7
2033		L2B						2				1				7, 11,13.2
2034		L2B						2				1				7,13.1
2039		L2A		2							1					7, 11, 13.1
2040		L2A		2							1					7, 11, 13.1
2041		L2A		2							1					7, 11, 13.1
2050A		L2A						2			1					7, 11, 12
2050B		L2A						2			1					7, 13.2
2050C		L2A						2			1					7, 11

Devices	Interlock	Emergency	Camera Call Up	Elevator	Stairway	Basement	LVL 1	LVL 2	LVL 3	TIC.1C	TIC.2A	TIC.2B	TIC.3A	TIC.3B	Card Access	Notes
2068		L2A						2			1					7, 13.2
2070		L2A						2			1					7, 13.2
2071A		L2A						2			1					7, 11
2071B		L2A						2			1					7, 11, 13.2
2071C	C2	L2A			1			2			2					7, 10, 11, 12
2079	C2	L2A			1			2			2					7, 10, 11, 12
2081		L2A						2			1					7, 13.2
2089A	C7	L2A			1			2			2					7, 10, 11, 12
2089B	C7	L2A			1			2			2					7, 10, 11, 12
2090		L2A						2			1					7, 13.2
2091A	C2	L2A			1			2			2					7, 10, 11, 12
2091B		L2A						2			1					7, 13.2
2091C		L2A						2			1					7, 11
2101		L2A						2			1					7, 13.2
2108		L2A						2			1					7, 11, 13.2
2110		L2B						2			1					7, 11, 13.2
2111A	C6	L2B			1			2			2					7, 10, 11, 12
2111B		L2B						2				1				7, 11, 13.2
2111C		L2B						2				1				7, 10, 11
2118	C6	L2B			1			2				2				7, 10, 11, 12
2121		L2A						2			1					7, 11, 13.2
2128A	C8	L2A						2			1					7, 10, 11
2128B	C8	L2B						2				1				7, 10, 11
2130		L2B						2				1				7, 11, 13.2
2131A		L2B						2				1				7, 11, 12
2131B		L2B						2				1				7, 11, 13.2
2131C	C6	L2B			1			2				2				7, 10, 11, 12
2141		L2B						2				1				7, 10, 11, 13.2

Devices	Interlock	Emergency	Camera Call Up	Elevator	Stairway	Basement	LVL 1	LVL 2	LVL 3	TIC.1C	TIC.2A	TIC.2B	TIC.3A	TIC.3B	Card Access	Notes
2149		L2B						2				1				7, 11, 13.2
2150A		L2B						2				1				7, 10, 11, 12
2150B		L2B						2				1				7, 11, 13.2
2150C		L2B						2				1				7, 10, 11, 12
2250		L2A						1								7, 10, 11, 12
2254		L2A						2			1					7, 10, 11, 12
2255		L2B						2				1				7, 11
2256		L2A						1			2					7, 10, 11, 12
ST-01C	C5	L2B			1			2								7, 10, 11, 12
ST-02C	C4	L2A			1			2								7, 10, 11, 12
ST-03C	C2	L2A			1			2								7, 10, 11, 12
ST-03D	C7	L2A			1			2								7, 10, 11, 12
ST-04C	C6	L2B			1			2								7, 10, 11, 12
ST-04D	C8	L2B			1			2								7, 10, 11, 12
Cell Door Control																
Safety Cell 2025		L2B										1				7
2017		L2A									1					7
2058		L2A									1					7
2072		L2A									1					7
2097		L2A									1					7
2112		L2A									1					7
2035		L2B										1				7
2138		L2B										1				7
2151		L2B										1				7
2026		L2B										1				7
Holding Cell 2044		L2B										1				7
Holding Cell 2046		L2A									1					7
Cell 2053		L2A									1					7, 13.1
Cell 2078		L2A									1					7, 13.1

Devices	Interlock	Emergency	Camera Call Up	Elevator	Stairway	Basement	LVL 1	LVL 2	LVL 3	TIC.1C	TIC.2A	TIC.2B	TIC.3A	TIC.3B	Card Access	Notes
Cell 2092		L2A									1					7, 13.1
Cell 2117		L2B										1				7, 13.1
Cell 2132		L2B										1				7, 13.1
Cell 2156		L2B										1				7, 13.1
Cell 2027		L2A										1				7
Cell 2018		L2A									1					7, 13.1
Cell 2036		L2B										1				7, 13.1
Cell 2019		L2A									1					7, 13.1
Cell 2020		L2A									1					7, 13.1
Cell 2037		L2B										1				7, 13.1
Cell 2038		L2B										1				7, 13.1
Cell 2051		L2A									1					7, 13.1
Cell 2052		L2A									1					7, 13.1
Cell 2157		L2B										1				7, 13.1
Cell 2158		L2B										1				7, 13.1
Cells 2054 through 2057		L2A									1					7, 13.1
Cells 2073 through 2077		L2A									1					7, 13.1
Cells 2093 through 2096		L2A									1					7, 13.1
Cells 2113 through 2116		L2B										1				7, 13.1
Cells 2133 through 2137		L2B										1				7, 13.1
Cells 2152 through 2155		L2B										1				7, 13.1
Cells 2059 through 2065		L2A									1					7, 13.1
Cells 2083 through 2087		L2A									1					7, 13.1
Cells 2103 through 2106		L2A									1					7, 13.1
Cells 2123 through 2126		L2B										1				7, 13.1
Cells 2143 through 2147		L2B										1				7, 13.1
Cells 2163 through 2169		L2B										1				7, 13.1
Cell 2088		L2A									1					7, 13.1
Cell 2102		L2A									1					7, 13.1
Cell 2127		L2B										1				7, 13.1
Cell 2142		L2B										1				7, 13.1
Duress Station																
2003A			214									2				7
2005			215									2				7
2006			215									2				7
2007			215									2				7
2009			205								2					7
2011A			211								2					7
2022			205								2					7

Devices	Interlock	Emergency	Camera Call Up	Elevator	Stairway	Basement	LVL 1	LVL 2	LVL 3	TIC.1C	TIC.2A	TIC.2B	TIC.3A	TIC.3B	Card Access	Notes
2023			205								2					7
2031			207									2				7
2032			207									2				7
TIC.2A			242					2			4					7
TIC.2B			242					2				4				7
Television Receptacles																
2003												1				7
2011A											1					7
2015											1					7
2033												1				7
2050											1					7
2070, 2071, and 2081											1					7
2090, 2091, and 2101											1					7
2110, 2111, and 2121											1					7
2130, 2131, and 2141												1				7
2150												1				7
CPAP Receptacles																
Medical Cells																
Cell 2018											1					7
Cell 2027												1				7
Cell 2036												1				7
Cell 2053											1					7
Cell 2078											1					7
Cell 2092											1					7
Cell 2117											1					7
Cell 2132												1				7
Cell 2156												1				7
Maintenance Outlets																
2050 North Side 1 (LV2A)											1					7
2071 North Side 1 (LV2A)											1					7
2079 North Side 1 (LV2A)											1					7
2091 North Side 1 (LV2A)											1					7
2255 North Side 1 (LV2A)											1					7
2050 North Side 2 (LV2A)											1					7
2070 North Side 2 (LV2A)											1					7
2071 North Side 2 (LV2A)											1					7

Devices	Interlock	Emergency	Camera Call Up	Elevator	Stairway	Basement	LVL 1	LVL 2	LVL 3	TIC.1C	TIC.2A	TIC.2B	TIC.3A	TIC.3B	Card Access	Notes
2090 North Side 2 (LV2A)											1					7
2091 North Side 2 (LV2A)											1					7
St#3-2 North Side 2 (LV2A)											1					7
2111 South Side 2 (LV2B)												1				7
2130 South Side 2 (LV2B)												1				7
2131 South Side 2 (LV2B)												1				7
2150 South Side 2 (LV2B)												1				7
ST#4-2 South Side 2(LV2B)												1				7
2110 South Side 2 (LV2B)												1				7
2118 South Side 2 (LV2B)												1				7
2130 South Side 2 (LV2B)												1				7
2131 South Side 2 (LV2B)												1				7
2150 South Side 2 (LV2B)												1				7
Receptacles																
2016											1					7
2034												1				7
2068											1					7
2081											1					7
2101											1					7
2108											1					7
2121											1					7
2141												1				7
2149												1				7
Lighting Control																
Cell 2046											1					7
Cells 2051-2066											1					7
Walkway/Corridor 2067											1					7
Dayroom 2050											1					7
Cells 2072-2078											1					7
Cells 2082-2088											1					7
Walkway 2071 and 2081											1					7
Dayroom 2070											1					7
Cells 2092-2097											1					7
Cells 2082-2088											1					7
Walkway 2091 and 2101											1					7
Dayroom 2090											1					7
Cells 2112-2117											1					7

Devices	Interlock	Emergency	Camera Call Up	Elevator	Stairway	Basement	LVL 1	LVL 2	LVL 3	TIC.1C	TIC.2A	TIC.2B	TIC.3A	TIC.3B	Card Access	Notes
Cells 2122-2127											1					7
Walkway 2110 and 2121											1					7
Dayroom 2110											1					7
Cells 2132-2138												1				7
Cells 2142-2148												1				7
Walkway 2131 and 2141												1				7
Dayroom 2130												1				7
Cells 2151-2158												1				7
Cells 2162-2169												1				7
Corridor/Walkway 2170												1				7
Dayroom 2150												1				7
Cell 2044												1				7
Cells 2035-2038												1				7
Dayroom 2033												1				7
Cells 2017-2020											1					7
Dayroom 2015											1					7
Exercise Area 2068											1					7
Exercise Area 2108											1					7
Exercise Area 2149												1				7
Exercise Area 2034												1				7
Exercise Area 2016											1					7
Corridor 2002, 2118, and 2030												1				7
Corridor 2010 and 2021											1					7
Vestibule 2039-2041											1					7
Corridor 2079, 2045, 2254-2256											1					7
Safety Cell 2025-2027												1				7
Safety Cell Vestibule 2024												1				7
Power Control																
2050 Dayroom											1					7
2070 Dayroom											1					7
2090 Dayroom											1					7
2110 Dayroom											1					7
2130 Dayroom												1				7
2150 Dayroom												1				7
2015 Dayroom											1					7
2033 Dayroom												1				7

Devices	Interlock	Emergency	Camera Call Up	Elevator	Stairway	Basement	LVL 1	LVL 2	LVL 3	TIC.1C	TIC.2A	TIC.2B	TIC.3A	TIC.3B	Card Access	Notes
2071 Sub Dayroom											1					7
2081 Sub Dayroom											1					7
2091 Sub Dayroom											1					7
2101 Sub Dayroom											1					7
2111 Sub Dayroom											1					7
2121 Sub Dayroom											1					7
2031 Sub Dayroom											1					7
2141 Sub Dayroom												1				7
Water Control Pods																
2015											1					7
2026												1				7
2033												1				7
2050											1					7
2070											1					7
2090											1					7
2110											1					7
2130												1				7
2150												1				7
2024												1				7
Hot Water Control Pods																
2015											1					7
2026												1				7
2033												1				7
2050											1					7
2070											1					7
2090											1					7
2110											1					7
2130												1				7
2150												1				7
Inmate Telephones Dayrooms																
2015											1					7
2033												1				7
2050											1					7
2070											1					7
2090											1					7
2110												1				7

Devices	Interlock	Emergency	Camera Call Up	Elevator	Stairway	Basement	LVL 1	LVL 2	LVL 3	TIC.1C	TIC.2A	TIC.2B	TIC.3A	TIC.3B	Card Access	Notes
2130												1				7
2150												1				7
2071											1					7
2091											1					7
2111												1				7
2131												1				7
2018											1					7
2019											1					7
2020											1					7
2036												1				7
2037												1				7
2038												1				7
Watchtour Stations Dayrooms																
2015.1-2015.2								6								7
2024.1-2024.2								6								7
2033.1-2033.2								6								7
2050.1 through 2050.6								6								7
2071.1-2071.2								6								7
2081.1-2081.2								6								7
2091.1-2091.2								6								7
2101.1-2101.2								6								7
2111.1-2111.2								6								7
2121.1-2121.2								6								7
2131.1-2131.2								6								7
2141.1-2141.2								6								7
2150.1 through 2150.6								6								7
Paging Zones by Dayroom																
Zone 2A											1					7
Zone 2B											1					7
Zone 2C											1					7
Zone 2D											1					7
Zone 2E											1					7
Zone 2F											1					7
Zone 2G												1				7
Zone 2H												1				7
Zone 2I												1				7

Devices	Interlock	Emergency	Camera Call Up	Elevator	Stairway	Basement	LVL 1	LVL 2	LVL 3	TIC.1C	TIC.2A	TIC.2B	TIC.3A	TIC.3B	Card Access	Notes
Alarm Functions Security Electronics 2252																
PLC Communication (Failure)								2								7
UPS Active/Power (Failure)								2								7
UPS Low Battery								2								7
UPS Low Voltage								2								7
UPS Inverted Power								2								7
UPS Trouble								2								7
120 VAC TVSS (Failure)								2								7
24 VDC TVSS (Failure)								2								7
Temp Sensor								2								7
LEVEL 3																
Intercom Stations																
3001.1 (Dr. 3001)			303		1											7
3001.2			306		1											7
3003A.1 (Dr. 3003A)			313											1		7
3003A.2			306											1		7
3011B.1 (Dr. 3011B)			311										1			7
3011B.2			304										1			7
3012.1 (Dr. 3012)			302		1											7
3012.2			304		1											7
3015.1 (Dr. 3015)			304										1			7
3015.2			320										1			7
3016.1 (Dr. 3016)			320										1			7
3016.2			321										1			7
3024A.1 (Dr. 2024A)			316										1			7
3024A.2			305										1			7
3024B.1 (Dr. 3024B)			316											1		7
3024B.2			307											1		7
3033.1 (Dr. 3033)			306											1		7
3033.2			325											1		7
3034.1 (Dr. 3034)			325											1		7
3034.2			326											1		7
3039.1 (Dr. 3039)			342											1		7
3039.2			308											1		7
3040.1 (Dr. 3040)			342											1		7
3040.2			309											1		7
3041.1 (Dr. 3041)			342											1		7

Devices	Interlock	Emergency	Camera Call Up	Elevator	Stairway	Basement	LVL 1	LVL 2	LVL 3	TIC.1C	TIC.2A	TIC.2B	TIC.3A	TIC.3B	Card Access	Notes
3041.2			310											1		7
3050B.2 (Dr. 3050B)			349										1			7
3050C.1 (Dr. 3050C)			351										1			7
3050C.2			343										1			7
3068.1 (Dr. 3068)			377										1			7
3068.2			343										1			7
3070.2 (Dr. 3070)			355										1			7
3071A.1 (Dr. 3071A)			334										1			7
3071A.2			344										1			7
3071B.1 (Dr. 3071B)			356										1			7
3071B.2			334										1			7
3071C.1 (Dr. 3071C)			332		1											7
3071C.2			335		1											7
3079.1 (Dr. 3079)			332		1											7
3079.2			377		1											7
3090.2 (Dr. 3090)			363										1			7
3091A.1 (Dr. 3091A)			332		1											7
3091A.2			338		1											7
3091B.1 (Dr. 3091B)			364										1			7
3091B.2			339										1			7
3091C.1 (Dr. 3091C)			339										1			7
3091C.2			346										1			7
3108.1 (Dr. 3108)			379										1			7
3108.2			345										1			7
3110.2 (Dr. 3110)			367										1			7
3111A.1 (Dr. 3111A)			333		1											7
3111A.2			340		1											7
3111B.1 (Dr. 3111B)			268										1			7
3111B.2			341										1			7
3111C.1 (Dr. 3111C)			341										1			7
3111C.2			345										1			7
3118.1 (Dr. 3118)			333		1											7
3118.2			375		1											7
3130.2 (Dr. 3130)			359											1		7
3131A.1 (Dr. 3131A)			336											1		7
3131A.2			348											1		7
3131B.1 (Dr. 3131B)			360											1		7
3131B.2			336											1		7
3131C.1 (Dr. 3131C)			333		1											7
3131C.2			337		1											7

Devices	Interlock	Emergency	Camera Call Up	Elevator	Stairway	Basement	LVL 1	LVL 2	LVL 3	TIC.1C	TIC.2A	TIC.2B	TIC.3A	TIC.3B	Card Access	Notes
3149.1 (Dr. 3149)			375											1		7
3149.2			347											1		7
3150B.2 (Dr. 3150B)			352											1		7
3150C.1 (Dr. 3150C)			354											1		7
3150C.2			347											1		7
3250.1 (Dr. 3250)			342					1								7
3250.2			342					1								7
3254.1 (Dr. 3254)			342										1			7
3254.2			378										1			7
3255.1 (Dr. 3255)			376											1		7
3255.2			379											1		7
3256.1 (Dr. 3256)			342										1			7
3256.2			375										1			7
EL-03.2C			308	1												7
EL-04.2C			309	1												7
EL-05.2C			310	1												7
ST-01E.1 (Dr. ST-01E)			303		1											7
ST-01E.2			303		1											7
ST-02E.1 (Dr. ST-02E)			301		1											7
ST-02E.2			302		1											7
ST-03E.1 (Dr. ST-03E)			330		1											7
ST-03E.2			330		1											7
ST-04E.1 (Dr. ST-04E)			331		1											7
ST-04E.2			331		1											7
3081.1 (Dr. 3081)			356										1			7
3081.2			357										1			7
3089A.1 (Dr. 3089A)			371										1			7
3089A.2			358										1			7
3089B.1 (Dr. 3089B)			371										1			7
3089B.2			365										1			7
3101.1 (Dr. 3101)			364										1			7
3101.2			366										1			7
3121.1 (Dr. 3121)			368											1		7
3121.2			370											1		7
3128A.1 (Dr. 3128A)			372											1		7
3128A.2			369											1		7
3128B.1 (Dr. 3128B)			372											1		7
3128B.2			362											1		7
3141.1 (Dr. 3141)			260											1		7
3141.2			261											1		7

Devices	Interlock	Emergency	Camera Call Up	Elevator	Stairway	Basement	LVL 1	LVL 2	LVL 3	TIC.1C	TIC.2A	TIC.2B	TIC.3A	TIC.3B	Card Access	Notes
3201.1 (Dr. 3201)				1												7
3201.2			373	1												7
3203.1 (Dr. 3203)			374	1												7
3203.2			373	1												7
EL-04.2E			374	1												7
ST-03F.1 (Dr. ST-03F)													1			7
ST-03F.2			371										1			7
ST-04F.1 (Dr. ST-04F)														1		7
ST-04F.2			372											1		7
Emergency Call Stations																
Safety Cell 3025			317											1		7
Accessible Cell 3027			318										1			7
Holding Cell 3044			342											1		7
Holding Cell 3046			342										1			7
Cell 3018			322										1			7
Cell 3019			323										1			7
Cell 3020			324										1			7
Cell 3036			329											1		7
Cell 3037			328											1		7
Cell 3038			327											1		7
Cells 3051 through 3057			350										1			7
Cells 3073 through 3078			334- 335										1			7
Cells 3092 through 3096			338- 339										1			7
Cells 3113 through 3117			340- 341										1			7
Cells 3132 through 3137			336- 337											1		7
Cells 3152 through 3158			353											1		7
Cells 3059 through 3065			350										1			7
Cells 3083 through 3088			357- 358										1			7
Cells 3102 through 3106			365- 366										1			7
Cells 3123 through 3127			369- 370										1			7
Cells 3142 through 3147			361- 362											1		7
Cells 3163 through 3169			353											1		7

Devices	Interlock	Emergency	Camera Call Up	Elevator	Stairway	Basement	LVL 1	LVL 2	LVL 3	TIC.1C	TIC.2A	TIC.2B	TIC.3A	TIC.3B	Card Access	Notes
Call Station-Dome Light-Reset Button																
3022			305										5			7
3023			305										5			7
3031			307											5		7
3032			307											5		7
Monitored Doors																
3171									2							7, 11
3173									2							7, 11
3174									2							7, 11
3175									2							7, 11
3176									2							7, 11
3178									2							7, 11
3252									2							7, 11
3200A									2							7, 11
3200B									2							7, 11
ST-01F									2							7, 11
ST-02F									2							7, 11
Individual Door Control																
3001	D5	L3B			1				2							7, 10, 11, 12
3003A		L3B							2					1		7, 10
3003B	D5	L3B			1				2							7, 10, 11, 12
3004 (magnetic hold-open)		L3B							2					1	8	7
3009A		L3A							2				1		8	7
3009C		L3A							2				1		8	7
3011A		L3A							2				1			7
3011B		L3A							2				1			7
3012	D4	L3A			1				2							7, 10, 11, 12
3015		L3A							2				1			7, 11, 13.2
3016		L3A							2				1			7, 13.1
3022		L3A							2				1			7
3023		L3A							2				1			7
3024A	D3	L3A							1				2			7, 11, 12
3024B	D3	L3A							1				2			7, 11, 12
3031		L3B							2					1		7

Devices	Interlock	Emergency	Camera Call Up	Elevator	Stairway	Basement	LVL 1	LVL 2	LVL 3	TIC.1C	TIC.2A	TIC.2B	TIC.3A	TIC.3B	Card Access	Notes
3032		L3B							2					1		7
3033		L3B							2					1		7, 11, 13.2
3034		L3B							2					1		7, 13.1
3039		L3A		2									1			7, 11, 13.1
3040		L3A		2									1			7, 11, 13.1
3041		L3A		2									1			7, 11, 13.1
3050A		L3A							2				1			7, 10, 11
3050B		L3A							2				1			7, 13.2
3050C		L3A							2				1			7, 11
3068		L3A							2				1			7, 13.2
3070		L3A							2				1			7, 13.2
3071A		L3A							2				1			7, 11
3071B		L3A							2				1			7, 11, 13.2
3071C	D2	L3A			1				2				2			7, 10, 11, 12
3079	D2	L3A			1				2				2			7, 10, 11, 12
3081		L3A							2				1			7, 13.2
3089A	D7	L3A			1				2				2			7, 10, 11, 12
3089B	D7	L3A			1				2				2			7, 10, 11, 12
3090		L3A							2				1			7, 13.2
3091A	D2	L3A			1				2				2			7, 10, 11, 12
3091B		L3A							2				1			7, 13.2
3091C		L3A							2				1			7, 11
3101		L2A							2				1			7, 13.2
3108		L3A							2				1			7, 11, 13.2
3110		L3B							2					1		7, 11, 13.2
3111A	D6	L3B			1				2				2			7, 10, 11, 12
3111B		L3B							2					1		7, 10, 11, 13.2
3111C		L3B							2					1		7, 10, 11
3118	D6	L3B			1				2					2		7, 10, 11, 12

Devices	Interlock	Emergency	Camera Call Up	Elevator	Stairway	Basement	LVL 1	LVL 2	LVL 3	TIC.1C	TIC.2A	TIC.2B	TIC.3A	TIC.3B	Card Access	Notes
3121		L3A							2				1			7, 11, 13.2
3128A	D8	L3A							2				1			7, 10, 11
3128B	D8	L3B							2					1		7, 10, 11
3130		L3B							2					1		7, 11, 13.2
3131A		L3B							2					1		7, 11, 12
3131B		L3B							2					1		7, 11, 13.2
3131C	D6	L3B			1				2					2		7, 10, 11, 12
3141		L3B							2					1		7, 11, 13.2
3149		L3B							2					1		7, 11, 13.2
3150A		L3B							2					1		7, 10, 11, 12
3150B		L3B							2					1		7, 11, 13.2
3150C		L3B							2					1		7, 10, 11, 12
3250		L3A							1				2			7, 10, 11, 12
3254		L3A							2				1			7, 10, 11, 12
3255		L3B							2				2	1		7, 11
3256		L3A							1				2			7, 10, 11, 12
ST-01C	D5	L3B			1				2							7, 10, 11, 12
ST-02C	D4	L3A			1				2							7, 10, 11, 12
ST-03E	D2	L3A			1				2							7, 10, 11, 12
ST-03F	D7	L3A			1				2							7, 10, 11, 12
ST-04E	D6	L3B			1				2							7, 10, 11, 12
ST-04F	D8	L3B			1				2							7, 10, 11, 12
Cell Door Control																
Safety Cell 3025		L3A											1			7
3017		L3A											1			7

Devices	Interlock	Emergency	Camera Call Up	Elevator	Stairway	Basement	LVL 1	LVL 2	LVL 3	TIC.1C	TIC.2A	TIC.2B	TIC.3A	TIC.3B	Card Access	Notes
3058		L3A											1			7
3072		L3A											1			7
3097		L3A											1			7
3112		L3A											1			7
3035		L3B												1		7
3138		L3B												1		7
3151		L3B												1		7
3026		L3B												1		7
Holding Cell 3044		L3B												1		7
Holding Cell 2046		L3A											1			7
Cell 3053		L3A											1			7, 13.1
Cell 3078		L3A											1			7, 13.1
Cell 3092		L3A											1			7, 13.1
Cell 3117		L3B												1		7, 13.1
Cell 3132		L3B												1		7, 13.1
Cell 3156		L3B												1		7, 13.1
Cell 3027		L3A											1			7
Cell 3018		L3A											1			7, 13.1
Cell 3036		L3B												1		7, 13.1
Cell 3019		L3A											1			7, 13.1
Cell 3020		L3A											1			7, 13.1
Cell 3037		L3B												1		7, 13.1
Cell 3038		L3B												1		7, 13.1
Cell 3051		L3A											1			7, 13.1
Cell 3052		L3A											1			7, 13.1
Cell 3157		L3B												1		7, 13.1
Cell 3158		L3B												1		7, 13.1
Cells 3054 through 3057		L3A											1			7, 13.1
Cells 3073 through 3077		L3A											1			7, 13.1
Cells 3093 through 3096		L3A											1			7, 13.1
Cells 3113 through 3116		L3B												1		7, 13.1
Cells 3133 through 3137		L3B												1		7, 13.1
Cells 3152 through 3155		L3B												1		7, 13.1
Cells 3059 through 3065		L3A											1			7, 13.1
Cells 3083 through 3087		L3A											1			7, 13.1
Cells 3103 through 3106		L3A											1			7, 13.1
Cells 3123 through 3126		L3B												1		7, 13.1
Cells 3143 through 3147		L3B												1		7, 13.1
Cells 3163 through 3169		L3B												1		7, 13.1
Cell 3088		L3A											1			7, 13.1

Devices	Interlock	Emergency	Camera Call Up	Elevator	Stairway	Basement	LVL 1	LVL 2	LVL 3	TIC.1C	TIC.2A	TIC.2B	TIC.3A	TIC.3B	Card Access	Notes
Cell 3102		L3A											1			7, 13.1
Cell 3127		L3B												1		7, 13.1
Cell 3142		L3B												1		7, 13.1
Duress Station																
3003A			314											2		7
3005			315											2		7
3006			315											2		7
3007			315											2		7
3009			305										2			7
3011A			311										2			7
3022			305										2			7
3023			305										2			7
3031			307											2		7
3032			307											2		7
TIC.3A			342						2				4			7
TIC.3B			342						2					4		7
Television Receptacles																
3003														1		7
3011A													1			7
3015													1			7
3033														1		7
3050													1			7
3070, 3071, and 3081													1			7
3090, 3091, and 3101													1			7
3110, 3111, and 3121													1			7
3130, 3131, and 3141														1		7
3150														1		7
CPAP Receptacle Medical Cells																
Cell 3018													1			7
Cell 3036														1		7
Cell 3053													1			7
Cell 3078													1			7
Cell 3092													1			7
Cell 3117													1			7
Cell 3132														1		7

Devices	Interlock	Emergency	Camera Call Up	Elevator	Stairway	Basement	LVL 1	LVL 2	LVL 3	TIC.1C	TIC.2A	TIC.2B	TIC.3A	TIC.3B	Card Access	Notes
Cell 3156														1		7
Maintenance Outlets																
3050 North Side 1 (LV3A)													1			7
3071 North Side 1 (LV3A)													1			7
3079 North Side 1 (LV3A)													1			7
3091 North Side 1 (LV3A)													1			7
3255 North Side 1 (LV3A)													1			7
3050 North Side 2 (LV3A)													1			7
3070 North Side 2 (LV3A)													1			7
3071 North Side 2 (LV3A)													1			7
3090 North Side 2 (LV3A)													1			7
3091 North Side 2 (LV3A)													1			7
St#3-3 North Side 2 (LV3A)													1			7
3111 South Side 2 (LV3B)														1		7
3130 South Side 2 (LV3B)														1		7
3131 South Side 2 (LV3B)														1		7
3150 South Side 2 (LV3B)														1		7
ST#4-3 South Side 2(LV3B)														1		7
3110 South Side 2 (LV3B)														1		7
3118 South Side 2 (LV3B)														1		7
3130 South Side 2 (LV3B)														1		7
3131 South Side 2 (LV3B)														1		7
3150 South Side 2 (LV3B)														1		7
Receptacles																
3016													1			7
3034														1		7
3068													1			7
3081													1			7
3101													1			7
3108													1			7
3121													1			7
3141														1		7
3149														1		7
Lighting Control																
Cell 3046													1			7
Cells 3051-3066													1			7

Devices	Interlock	Emergency	Camera Call Up	Elevator	Stairway	Basement	LVL 1	LVL 2	LVL 3	TIC.1C	TIC.2A	TIC.2B	TIC.3A	TIC.3B	Card Access	Notes
Walkway/Corridor 3067													1			7
Dayroom 3050													1			7
Cells 3072-3078													1			7
Cells 3082-3088													1			7
Walkway 3071 and 3081													1			7
Dayroom 3070													1			7
Cells 3092-3097													1			7
Cells 3082-3088													1			7
Walkway 3091 and 3101													1			7
Dayroom 3090													1			7
Cells 3112-3117													1			7
Cells 3122-3127													1			7
Walkway 3110 and 3121													1			7
Dayroom 3110													1			7
Cells 3132-3138														1		7
Cells 3142-3148														1		7
Walkway 3131 and 3141														1		7
Dayroom 3130														1		7
Cells 3151-3158														1		7
Cells 3162-3169														1		7
Corridor/Walkway 3170														1		7
Dayroom 3150														1		7
Cell 3044														1		7
Cells 3035-3038														1		7
Dayroom 3033														1		7
Cells 3017-3020													1			7
Dayroom 3015													1			7
Exercise Area 3068													1			7
Exercise Area 3108													1			7
Exercise Area 3149														1		7
Exercise Area 3034														1		7
Exercise Area 3016													1			7
Corridor 3002, 3118, and 3030														1		7
Corridor 3010 and 3021													1			7
Vestibule 3039-3041													1			7
Corridor 3079, 3045, 3254-3256													1			7
Safety Cell 3025-3027														1		7
Safety Cell Vestibule 3024														1		7

Devices	Interlock	Emergency	Camera Call Up	Elevator	Stairway	Basement	LVL 1	LVL 2	LVL 3	TIC.1C	TIC.2A	TIC.2B	TIC.3A	TIC.3B	Card Access	Notes
Power Control																
3050 Dayroom													1			7
3070 Dayroom													1			7
3090 Dayroom													1			7
3110 Dayroom													1			7
3130 Dayroom														1		7
3150 Dayroom														1		7
3015 Dayroom													1			7
3033 Dayroom														1		7
3071 Sub Dayroom													1			7
3081 Sub Dayroom													1			7
3091 Sub Dayroom													1			7
3101 Sub Dayroom													1			7
3111 Sub Dayroom													1			7
3121 Sub Dayroom													1			7
3031 Sub Dayroom													1			7
3141 Sub Dayroom														1		7
Water Control Pods																
3015													1			7
3027														1		7
3033														1		7
3050													1			7
3070													1			7
3090													1			7
3110													1			7
3130														1		7
3150														1		7
3024														1		7
Hot Water Control																
3050													1			7
3027														1		7
3070													1			7
3090													1			7
3110													1			7
3130														1		7
3150														1		7

Devices	Interlock	Emergency	Camera Call Up	Elevator	Stairway	Basement	LVL 1	LVL 2	LVL 3	TIC.1C	TIC.2A	TIC.2B	TIC.3A	TIC.3B	Card Access	Notes
Inmate Telephones Dayrooms																
3015													1			7
3033														1		7
3050													1			7
3070													1			7
3090													1			7
3110														1		7
3130														1		7
3150														1		7
3071													1			7
3091													1			7
3111														1		7
3131														1		7
3018													1			7
3019													1			7
3020													1			7
3036														1		7
3037														1		7
3038														1		7
Watchtour Stations Dayrooms																
3015.1-3015.2									6							7
3024.1-3024.2									6							7
3033.1-3033.2									6							7
3050.1 through 3050.6									6							7
3071.1-3071.2									6							7
3081.1-3081.2									6							7
3091.1-3091.2									6							7
3101.1-3101.2									6							7
3111.1-3111.2									6							7
3121.1-3121.2									6							7
3131.1-3131.2									6							7
3141.1-3141.2									6							7
3150.1 through 3150.6									6							7
Paging Zones by Dayroom																
Zone 3A													1			7
Zone 3B													1			7

Devices	Interlock	Emergency	Camera Call Up	Elevator	Stairway	Basement	LVL 1	LVL 2	LVL 3	TIC.1C	TIC.2A	TIC.2B	TIC.3A	TIC.3B	Card Access	Notes
Zone 3C													1			7
Zone 3D													1			7
Zone 3E													1			7
Zone 3F													1			7
Zone 3G														1		7
Zone 3H														1		7
Zone 3I														1		7
Alarm Functions Security Electronics 3252																
PLC Communication (Failure)									2							7
UPS Active/Power (Failure)									2							7
UPS Low Battery									2							7
UPS Low Voltage									2							7
UPS Inverted Power									2							7
UPS Trouble									2							7
120 VAC TVSS (Failure)									2							7
24 VDC TVSS (Failure)									2							7
Temp Sensor									2							7

END OF SECTION 28 46 00.1

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SECTION 28 46 00.2 - EVENT RECORDING SYSTEM

PART 1 - GENERAL

1.01 SUMMARY

A. Scope of work: Furnish and install all components for an Event Recording System integrated with the security systems as indicated on the plans and described herein.

B. The ESC as defined in Section 280500 Common Work Results for Electronic Safety and Security shall be responsible for providing and coordinating this system.

1.02 SYSTEM DESCRIPTION

A. Event Recording Computer: The Event Recording Computer (ERC) shall be a computer terminal with the appropriate cards and programming incorporated into it to form an integrated unit to serve as an operator interface for the PLC system.

B. The ERC shall be located in Central Control Room 1158.

C. Basic Operation: All critical events monitored and controlled by the PLC will be recorded with Operator Identification, event, time and date on the ERC's hard drive.

D. Graphic Plans: The ERC shall provide graphic representations of each area to aid in defining points recorded. Each graphic is to be a 1/8" scaled depiction of each area. Graphics are to be sized for proper operation of control icons and useful building representations.

1. Key Plan: A facility key plan will be available on all graphic screens. Touching an area of the key plan will call up a graphic of the area providing control icons and more detailed building information. Icons as described below will be located on the plan to graphically locate where in the facility the controlled item is installed. The area plans are the second level of graphic zoom.

2. Detail Window: Detail plan windows shall be provided for any section of the graphic plan where there is a high concentration of controls making it impossible to properly indicate all icons. This shall be the second and last level of graphical zoom.

3. The Graphic Plans are to be identical to the plans used on the TIC stations with the same label identifiers.

1.03 REPORT FUNCTIONS

A. System Historical Journal:

1. The system shall maintain a history file on the hard disk. The history data shall be organized into a logically circular file such that the most recent 500,000 (minimum) transactions are accessible directly from the hard disk without having to resort to archival media. Points to be recorded are as follows:

- a. Staff duress activation.
- b. Staff duress reset.
- c. Unlock commands from Touchscreen Interactive Computer (TIC) units.
- d. Intercom call placed.
- e. Intercom call answered by TIC.
- f. Intercom call reset.
- g. Call button placed.
- h. Call button reset.
- i. TIC controlled doors opened by means other than the TIC.
- j. Monitored door activation.
- k. Vehicle loop activation.
- l. Watch tour start and finish.
- m. Individual watch tour station activation.

- n. 120 VAC TVSS failure.
 - o. Loss of power.
 - p. Interlock override activation.
 - q. Alarm reset.
 - r. Signal Silence.
 - s. TIC operator log in and log out.
2. All information shall be stored in an SQL database.
 3. Each history entry in the journal shall be marked with the date and time of its occurrence, the name of the operator logged on (if applicable), and the terminal from which the event was initiated (if applicable).
 4. The system shall provide a method by which incremental sections of the historical journal may be backed up to magnetic tape media, compact disk, or flash memory for storage and later recall. The system journal archive method shall be sufficient to assure that no events are lost in the transfer from hard disk to the archive media.
 5. In addition, the journal archive method shall preserve the contents of all data in the on-line portion of the historical journal until the disk space occupied by data must be reclaimed for use in an oldest-first order.
 6. Data shall be stored on the ERC hard drive and be available for a minimum of 366 days. At the end of the 366th day, the day 1 data shall automatically be deleted from the data base. Each day following this point, the oldest days data shall be automatically deleted from the hard drive as the new day's data is preserved.
- B. Operator Comments:
1. The system shall allow operator comments to be entered from the TIC for any duress alarm condition.
 - a. When the alarm is active, allow the operator to select an icon and enter up to 1000 characters of information for the event.
 - b. Store the operator comment tagged to the event for as long as the event is stored.
 - c. When the tagged event is deleted or overwritten, delete the comment.
 2. Provide memory for 10,000 operator comments.
 3. Provide the operator the ability to search operator comments for a particular word or character string.
- C. Historical Reports:
1. The system shall be capable of producing the following reports of historical events over a specified time range, both individually and in any combination from the historical journals.
 2. Report of alarms or group of alarms. As a minimum, provide reporting of the following alarms:
 - a. Staff Duress Activation
 - b. Staff Duress Clear
 - c. TVSS Fault
 - d. Power/UPS Fault
 - e. PLC Fault
 3. Report of event activation for a selected event or group of events. As a minimum, provide reporting of the following events:
 - a. Watch Tour Start
 - b. Watch Tour Finish
 - c. Watch Tour Station Activation
 - d. Emergency Release Activation
 - e. Interlock Override

- 1 f. Group Release
- 2 g. Controlled Door / Gate Lock Activation
- 3 h. Controlled Door Gate Slider Operation
- 4 4. Report of operator comments.
- 5 5. Each TIC activation shall be recorded with time, date, event, and operator identification
- 6 number. Non TIC events shall be recorded with time, date, and event.
- 7 6. Report of manual operator overrides actions (acknowledge, reset, manual door unlocks,
- 8 etc.).
- 9 7. Report of automatic system actions (automatic door unlocks).
- 10 8. The system shall be capable of generating these reports in a format that is user defined.
- 11 Search and sort capacity shall include sorts by the field parameters defined by the user,
- 12 sorts alphabetically and sorts numerically.
- 13 9. The ESC shall set create a list of pre-defined reports. The pre-defined report shall only
- 14 require that the date and time be determined before generating the report. At a minimum
- 15 provide the following pre-defined report options:
- 16 a. Watch Tour System Activities
- 17 b. Emergency Release Activation
- 18 c. Interlock Override Activations
- 19 d. Door alarms
- 20 e. Duress Alarms
- 21 f. Trouble Alarms
- 22 D. Preventive Maintenance Reports
- 23 1. The system shall be capable of keeping running totals and summations.
- 24 2. The system shall be capable of producing reports identifying the number of lock
- 25 activations by device to identify locks requiring maintenance.
- 26 1.04 NETWORKING
- 27 A. The Event Recording System shall be part of the Security Systems local area network to
- 28 include the UPS, TIC, and PLC systems. All events from these systems will be recorded to
- 29 the ERC computer. The ERC computer will not be accessible to the owner's LAN.
- 30 B. The Security and PLC systems will not be accessible from the owner's LAN over the ERC
- 31 computer network connection.
- 32 1.05 SUBMITTALS
- 33 A. Provide basic submittals as required by Section 280500 Common Work Results for Electronic
- 34 Safety and Security and by the General Contract requirements.
- 35 B. In addition, submit color prints of all graphic screens for approval.
- 36 C. Also submit a list of all reportable alarm points.
- 37 D. Submit a flow chart of all proposed screens.
- 38 1.06 SYSTEMS INTEGRATION
- 39 A. Integrated Systems: The Event Recording System shall be integrated with the other systems
- 40 including, but not limited to:
- 41 1. The TIC.
- 42 2. The Door Locking Control system.
- 43 3. PLC system.
- 44 4. Intercom System.
- 45 5. IP video system

6. UPS system.
- B. The ERC CPU shall not be used as an "application server" to the locking control/PLC control system. The ERC is for data storage and shall function as a database server.
- 1.07 SOFTWARE BACKUP
- A. This unit shall provide backup and storage for all custom programs in a program folder entitled BACKUP.
- B. Backup program folder shall contain a copy of the backup software for each TIC so that the programming can be recreated if the backup CD is lost or damaged.

PART 2 - PRODUCTS

2.01 MINIMUM HARDWARE REQUIREMENTS:

- A. The ERC machine shall be equal to the Dell PowerEdge T430 Tower Server which consists of the following:
 1. An IBM™ compatible computer with an Intel™ Xeon class E5 microprocessor chip set or equivalent. The operating speed shall be a minimum of 2.4 GHz, 16GB DDR4 SDRAM and a minimum of 20MB of Cache shall be provided.
 2. Windows Server 2012R2 Standard Edition.
 3. Two primary 2GB SATA 6.0 Gb/s Hard Drive.
 4. All necessary boards for integration to local area network, PLC's, sound system, etc., shall be provided.
 5. Minimum 16X DVD-ROM Read/Write CD/DVD drive.
 6. Gigabyte Network Interface Card.
 7. A nineteen-inch (19") LCD flat screen monitor equal to NEC AccuSync ASLCD92V.
 8. All necessary boards for integration to local area network, PLC's shall be provided.

2.02 MINIMUM SOFTWARE BASE REQUIREMENTS

- A. The software will be an *Off-the-Shelf* package available through a distributor network. The Off-the-Self software will be programmed and tailored to the specified functions and features described herein and shown on the drawings. The database shall be programmed in SQL.
- B. The software will provide common database functions, templates, and forms.
- C. All software licenses shall be transferred to the Owner at completion of the project. This shall include, but not be limited to all original installation disks, software manuals, equipment manuals, etc., all project specific application software shall be transferred at the end of warranty period.

2.03 SYSTEM PRINTER:

- A. Acceptable Manufacturers:
 1. Hewlett Packard
 2. Epson
 3. Cannon
- B. Connection: Furnish and install a system printer. The system printer shall be connected to the server ERC for report printing. All printing shall be by operator request. The system shall not automatically print events.
- C. Type: Furnish and install a HP 200 LaserJet pro color printer (or equal).
 1. Print up to 14 pages per minute monochrome.
 2. Print up to 14 pages per minute color.
 3. On-screen ink level indicator and print cancel button.
 4. Recommended monthly page volume of 1,500 pages.

- D. Up to 3600 optimized dpi.
E. Unit shall not print alarms as they occur.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Coordination with Other Trades: The contractor shall coordinate the work of this section with that of other divisions as required to ensure that the entire work of this project will be carried out in an orderly, complete and coordinated fashion.
- B. Software: All source code, programming keys, and printouts of the operating program shall be furnished to the Owner at the end of the project.
- C. The ERC CPU shall reside in a lockable ventilated cabinet as manufactured by CSP, model number CPU1, CPU2 or equal. Unit shall have a ventilation fan. ESC shall verify that all racks are sized for the electronics scheduled for each area. Verify that appropriate space is provided in cabinets for ERC and the required accessories.
- D. UPS: Furnish and install a UPS power to all ERC components. This shall be in addition to providing emergency power. Refer to Power Risers on SE3.2 Power Risers for additional information.
- E. Listing: All wiring and raceways shall be listed for the intended installation and installed in strict accordance with the California Electric Code as required by the conditions of where it is installed. This includes but is not limited to ratings for riser, plenum, or wet installations.

3.02 FIELD QUALITY CONTROL

- A. All functions specified above shall be individually activated and the result documented. Test reports shall be printed lists. Note each function as "pass" or "fail". The completed test reports shall be copied and submitted to the engineer prior to final inspection.
- B. All functions shall be demonstrated for the Owner's, Architect's, and Consultant's representative.

EVENT RECORDING VERIFICATION AND CHECK-OUT FORM

✓ = OK
Job #
Job Name:
Panel #

FIELD TEST CODE:						REPAIR CODE:					
A - No status change M -						1-SSI				Software Test By: _____ Date _____	
B- No power to ERC N -						2-ELECTRICIAN				Hardware Test By: _____ Date _____	
C -Software problem O -						3-IRONWORKER				System Test By: _____ Date _____	
D -Not installed P -						4-CARPENTER				Design Engineering By: _____ Date _____	
E - Q -						5-OWNER/REP				Wiring By: _____ Date _____	
F - R -						6 -ENG				Field Test By: _____ Date _____	
G - S -						7 -					
H - T -						8 -					
I - U -						9 -					
J - V -						10 -					
K - W -						11 -					
L - X -						12 -					
ON-SITE											
ICON ID#	ICON TYPE				SOFT-WARE TEST	ERC TEST	FIELD TEST CODE	REPAIR CODE	RE-CHECK "X"	FIELD CHECK OUT NOTES	PROBLEM RESOLVED (BY/DATE)

3.03 SOFTWARE:

A. For the ERC, furnish to the owner uniquely identified:

1. One (1) separate back-up CD or Disc for the ERC program. Label the disk with the project name, programs, programmer, and revision date.

B. Furnish a single Microsoft Word file detailing all passwords for each system. This file shall also identify the following by system and panel:

1. The file name of each program required for restoration of each failed system.
2. The passwords required for each system and software.
3. The name of the programmers for each custom software program.
4. The date of the last program change.

C. Furnish a digital copy of the facility's Operation and Maintenance Manual in PDF format on the ERC. Refer to Specification section 280500.

D. Furnish a digital copy of the As-Built documents in PDF format on the ERC. Refer to Specification section 280500.

E. Furnish digital copies of the facility training videos in a Windows Media file format (.wmv or equal) on the ERC. Files shall be easily viewable on the ERC's media player for training staff. Refer to Specification section 280500.

3.04 SPARE PARTS:

A. Spare parts shall be packaged in protective packing material. Box spare parts for easy storage and clearly identify the contents of each box on all four sides of each container.

B. Furnish the following:

1. 25 Blank Read Write CD's
2. One (1) ream (500 sheets) of 8-1/2" x 11" printer paper.

END OF SECTION 28 46 00.2

SECTION 28 46 19 – PLC ELECTRONIC DETENTION MONITORING AND CONTROL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Scope of work: Furnish and install all components for a complete and integrated Programmable Logic Controller (PLC) integrated with the security subsystems as indicated and described herein.
- B. The ESC as defined in Section 280500 Common Work Results for Electronic Safety and Security shall be responsible for providing and coordinating this system.
- C. Provide new Touchscreen Interactive Computer (TIC) and Event Recording Computer (ERC) stations as indicated on the plans. These stations shall function as the human-machine interface for the PLC system. Refer to Specification sections 284600 and 284600.2 for additional information.
- D. Integrate all new PLC's, TIC, ERC, and IP Video system into a single control system enabling the staff to control and monitor all locations.
- E. Provide a separate and dedicated fiber optic network for PLC communication.
- F. Related section: 280548 Vibration and Seismic Controls for Security Systems.

1.2 SYSTEM DESCRIPTION

- A. PLC: The PLC network shall control all of the logic functions of the TIC for control and annunciation of locking control and security systems.
- B. PLC CPU: The PLC CPU shall provide the necessary logic and timing functions, memory, software variables, and communication capabilities required to meet the functions described in the specifications. Each PLC location shall be provided with a CPU to allow independent degraded operations in the event of loss of network communications.
- C. Master Clock: Furnish and install programming to automatically update the PLC clock for daylight savings time across all PLC's, TIC, ERC, and maintenance computers. The current time shall be transmitted to all PLC CPU's in the system. All system clocks shall be updated within 2 seconds of a change being entered at the main PLC master clock.
- D. The PLC system shall be industrial general purpose in nature, not custom designed and built for this isolated application. The PLC shall be generally non location specific in its construction. The controller shall be operationally customized and made location specific by installing the applicable software, and making the I/O interface board's system specific. All components shall be manufacturer's standard modules.
- E. The PLC shall accomplish emergency release and group releases by staggering all unlock commands to minimize surges. Up to three motorized locks may be grouped together and released simultaneously. Solenoid locks shall be released individually.
- F. In a single emergency release grouping, all doors shall unlock within sixty (60) seconds of the command being initiated.
- G. Furnish and install a complete PLC in each PLC rack noted on the plans.

- H. Removable Media: Each PLC CPU shall have a slot for a removable memory card, which allows the PLC program to be offloaded for storage.

1.3 SYSTEMS INTEGRATION

- A. The PLC units shall be integrated with the other systems including:
1. Intercom System
 2. UPS System
 3. Access Control System.
 4. IP Video System
 5. Touchscreen.
 6. Event Recording System.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Acceptable System Manufacturers:
1. Accurate Controls
 2. CML Security
 3. Com-Tec, Inc.
 4. Cornerstone Security Electronics
 5. Metroplex Control Systems
 6. Sierra Detention Systems

Note: Approval as an acceptable system manufacturer does not relieve the manufacturer from furnishing all materials as herein specified.

- B. Except as otherwise specified herein, the equipment and materials of this section shall be products of a single manufacturer engaged in the production of logic control systems for industrial applications for a minimum of ten (10) years. Controllers manufactured by the following are acceptable:

1. Omron Electronics
2. Schnieder Electric Modicon
3. GE Fanuc
4. Allen Bradley

- C. PLC shall be equal to the Omron CS1 series or Modicon 340 series.

- D. Industrial Grade Network Switch: Provide a din-rail industrial grade managed Hirschmann RSB20 10/100 Mbps Fast Ethernet switch or equivalent from an approved manufacturer. The switch shall provide a redundant network/ring topology (looping) for the PLC security communications. Furnish and install Hirschmann components to provide a self-healing Ethernet ring. Hirschmann Ethernet components shall be powered by the security UPS. The switch shall have a minimum of 4 (2 pairs) SC MM optic fiber connections and a minimum of six (6) CAT 6A ports dedicated to the PLC network system. Each fiber port and RJ45 port shall be monitored at the PLC/TIC for any failure. Any communication failure shall be monitored on the PLC/ TIC as "Comm Failure". The power to the switch shall be monitored on the PLC for failure as "Comm Power Failure". Approved manufacturers:

1. Hirschmann RSB20 series is the base design.
2. Comnet
3. Phoenix Contact.

2.2 GENERAL

- A. Programmable logic control system shall control all input/output functions of the TIC station.
- B. The programmable logic control system shall be designed so that each PLC operates totally independent of one another. Failure or loss of any controller shall not hamper the operation of any other controller.
- C. The programmable controller and I/O modules shall be of modular construction and be capable of being rack mounted.
- D. All modules must be key coded to ensure proper slot placement and polarity. All identical function modules shall be coded alike.
- E. The controller shall be constructed to withstand as a minimum, the following climatic conditions without the need for special enclosures or additional environmental control equipment such as fans or air conditioning.
 - 1. Temperature: 0 to 60 C (operating), -20 to 70 C (storage)
 - 2. Humidity: 10 to 90% r. h. (non-condensing)
- F. Controller shall be capable of operating over a voltage range of 88-132V with a frequency of 45-63 Hz.
- G. Controller and I/O racks shall be capable of being front or rear mounted.
- H. Where more than one controller is used, all controllers shall be of one single manufacturer and if different size controllers are used, these must be fully compatible.
- I. All controllers shall share the same control language and I/O structure.
- J. All controller and I/O structures of a single manufacturer shall be capable of being mounted on the same size fixing centers to allow for larger capacity controllers to be installed in the future should the facility require an expansion beyond the limits specified in the original contract documents.
- K. Programmable controller manufacturers must guarantee the availability of replacement/spare parts for a minimum of ten (10) years.
- L. All input/output modules and housings must be of a standard type and be fully interchangeable with all size controllers.
- M. All controllers shall have built-in comprehensive self-test and self-diagnostic capabilities to ensure reliable operation.
- N. All controllers shall have built-in status indication of power supply voltages and controller healthy signal to show proper operation.
- O. All I/O cards shall be 24V DC and each card shall have as minimum, sixteen (16) discrete circuits. These circuits shall be rated such that they have a minimum of 50% more current capacity than required by the respective I/O devices connected to them.
- P. All PLC I/O modules shall be 24V DC and each module shall have as minimum, sixteen (16) discrete circuits. Output modules for all **locks** shall be **SOURCING type** only. No **sinking** type output modules will be acceptable. These circuits shall be rated such that they have a

minimum of 50% more current capacity than required by the respective I/O devices connected to them. Controllers must be capable of driving local I/O racks, where local is defined as up to one hundred (100) feet from the control unit, without the need for further intelligent interface modules or additional power supplies.

Q. When required, the system must be capable of controlling remote I/O up to a distance of ten kilometers (10km) from the controller, using high-speed links with a minimum data rate of 1.5 millimeters baud. Communications over this link shall be accomplished using twisted pair wires with an overall shield.

R. Fiber Optic Modules:

1. Furnish and install all fiber optic modules required for proper system operation.
2. Modules to be located in PLC CPU rack with continuous fiber through to the next node.
3. The PLC fiber optic communication link shall be installed in a two fiber self-healing "loop" configuration thus eliminating any "single" point of failure from taking down the entire PLC system.

S. In each security electronics room, furnish and install an industrial Ethernet switching hub. Provide sufficient Category 6A ports to connect to each security UPS, each PLC, each TIC, and the ERC.

2.3 FUNCTIONAL REQUIREMENTS

A. The system application program and operating software and fixed database shall be stored in EEPROM.

B. Memory battery backup for general purpose ram shall be for a minimum period of twenty-four (24) months in the event of a power failure.

C. The controllers shall provide all necessary logic functions, timing functions, input points, output points, memory, communication capabilities, and software for the operating features shown in the contract documents.

D. Functions shall include but not be limited to the following which can be implemented in bit logic, word logic, or a mixture of both. The combination of said logic in sufficient levels, variations, and quantities must provide the operating features shown in the contrast documents.

1. Logical AND, OR, XOR and INVERT
2. On/Off Delay
3. Counters
4. Timers
5. Sequencers
6. Four Function Math (Add, Subtract, Multiply, Divide)
7. VCD Input and Output
8. Contacts
9. Coils
10. Block Instructions (conditional jumps)
11. Group Logic Functions
12. Array Math Functions

E. Communications capability shall be provided in logic controllers to allow serial communication between distributed controllers, and ASCII serial devices. Serial communications shall be RS232, RS422, or 20 mA and shall operate at selectable speeds from 300 to 19,200 baud.

- 1 F. The logic controllers shall be capable of communication (if required) to other controller via
2 industry standard Ethernet LAN network utilizing non-proprietary protocols.
- 3 G. The following modes of operation of the CPU must be selectable via a key operated switch or
4 programming software commands:
- 5 1. PROGRAM – Processor is not scanning program in memory and all outputs are held
6 OFF.
7 2. MONITOR – Processor is executing program and changes in user memory and data
8 memory are allowed.
9 3. RUN – Processor is executing program in memory and outputs are controlling to the
10 program. No editing of the data registers are allowed.
- 11 H. The above settings shall require either a key, or programming console with a key, or
12 programming software loaded on a computer to change the operating mode of the CPU.
- 13 I. The processor shall incorporate extensive self-diagnostic features that will not half the
14 processor. In addition, separate visual indicators will annunciate at the following conditions.
- 15 1. POWER – Logic Power is applied to the CPU and I/O rack from the power supply.
16 2. RUN – Processor is executing the program in memory and outputs are being controlled
17 according to the program.
18 3. OUTPUT INHIBIT – Processor is executing program in memory according to input status,
19 but outputs are being held in the OFF state.
20 4. ALARM – A non-fatal error (such as a low memory battery condition) has occurred in the
21 PLC hardware or program software. The PLC is still running and the outputs are being
22 controlled according to the program.
23 5. ERROR – A fatal error (such as a memory parity error) has occurred, the CPU is not
24 scanning the program and the outputs are held in the OFF state.
- 25 J. In addition to visual self-diagnostic indicators (LED's), the processor shall have a specifically
26 designated block of at least 100 WOR of internal diagnostic words and bits. These shall
27 provide more detailed system status and fault diagnostic information accessible by
28 programming equipment or intelligent peripherals.
- 29 K. The processor must contain an error log area. This area must be able to log what error
30 occurred and when the error happened, giving exact time and date. This area must be able
31 to store a minimum of 1000 records.
- 32 L. At a minimum, the internal diagnostic registers shall provide the type of digital (input or
33 output) or intelligent (analog, ASCII, etc.) I/O unit inserted in console or programming
34 software.
- 35 M. The program storage medium shall be Battery Backed Random Access Memory (RAM). The
36 memory shall be housed in the same enclosure as the processor.
- 37 N. Each Network Interface unit for each PLC shall not consume more than one I/O slot in the
38 main PLC rack.
- 39 O. The Network Interface units on each of the PLC's shall be powered directly by the terminals
40 located on the rack across the backplane like the other I/O units on that rack. In addition, the
41 Network Interface units shall have auxiliary power supply terminals located on the rack, so
42 that it can be powered separately from some uninterruptable source in the event of a CPU
43 power supply failure.

- 1 P. The data rate of the network shall not be less than 2 million B.P.S. This data rate will remain
2 the same regardless of the number of nodes on the network loop.
- 3 Q. The network shall accommodate at least 62 nodes on any network loop.
- 4 R. The transmitted data packets from any node must be capable of carrying not less than 512
5 bytes of data.
- 6 S. The PLC and network system shall be designed so that each PLC system will accept at least
7 four Network Interface Units operating simultaneously on their racks.
- 8 T. Any node on the network must be able to send data to every other node on the network
9 simultaneously.
- 10 U. Using a single command, a network node can communicate with other nodes on three
11 network levels: Nodes on the local network, nodes on the network connected directly via a
12 gateway/bridge, and nodes on networks separated by one other network (i.e., connected via
13 two network gateways/bridges).
- 14 V. The logic control system installed I/O shall be no greater than 80% of the controller's
15 capacity.
- 16 W. The logic control system shall be supplied with 20% spare memory capacity available after
17 completion of system software required by the contract documents for future system
18 expansion.
- 19 X. Standard PLC communication protocols confirmed by a third party are acceptable for lower
20 level controls. Protocols shall provide a means of supervision to annunciate loss of
21 communication.

22 2.4 ELECTRONIC CONTROL RELAY SYSTEM

- 23 A. The electronic control relay system will perform actual switching of power to locks, intercom,
24 paging, etc. as required and shall be capable of interfacing with other systems. All relays
25 shall be mounted in suitable enclosures with the capability of key lockable doors and
26 removable steel mounting plates if required. The cabinets shall be sized as required to
27 adequately accommodate the equipment housed therein and shall conform to the space
28 requirements indicated on the plans. The cabinets shall be installed as shown on contract
29 drawings.
- 30 B. Acceptable Manufactures:
- 31 1. Accurate Controls, Ripon, WI; 920-748-6603.
32 2. CMLRW Security, Erie, CO: 720-466-3650
33 3. Com-Tec, Inc., Greenville, WI; 920-749-2840.
34 4. Cornerstone Security Electronics, Decatur. AL; 256-560-4207
35 5. Metroplex Control Systems, San Antonio TX; 210-495-5245.
36 6. Sierra Detention Systems, Brighton, CO; 303-278-6879.
- 37 C. Class 1 Circuit control Relays: The control relays shall be electro-mechanical type that are
38 rated for at least 50% more current capacity than required for any given steady state control
39 function, but in no case less than 10 amps for power control functions. The relays shall be
40 capable of operating on an input signal of 24 VDC and the output shall be capable of
41 switching the required voltage and current for the intended applications. The unit shall have
42 a minimum of 2500 VAC isolation between the input and output.

- 1 D. Class 2 Circuit Control Relays: The control relays shall be electro-mechanical type that are
2 rated for at least 50% more current capacity than required for any given steady state control
3 function, but in no case less than 2 amps for power control functions. The relays shall be
4 capable of operating on an input signal of 24 VDC and the output shall be capable of
5 switching the required voltage and current for the intended applications. The unit shall have
6 a minimum of 2500 VAC isolation between the input and output.
- 7 E. Each relay for locking control shall be individually fused to meet California Electric Code
8 distribution requirements and to protect the relay and other circuitry from a short circuit failure
9 at the lock.
- 10 F. Each relay rated at 4 amps or higher shall be socket mounted to facilitate field replacement.
- 11 G. Provide individual relays for each 120VAC man gate. Locate these relays separately from all
12 other door lock control relays within the equipment rack. Individually fuse each 120VAC
13 current carrying door lock wire with a minimum 4 amp fuse.
- 14 H. Indicators on relay base sockets must be rated for the appropriate load. LED indicators on
15 120VAC relay base sockets are required to function without external resistors, diodes, or
16 other means of draining excess voltage.
- 17 I. All relays and terminations are to be clearly labeled to show all field connections.

18 2.5 TRANSIENT SURGE SUPPRESSION

- 19 A. Acceptable manufacturers are as follows:
- 20 1. DITEK
21 2. Northern Technologies Incorporated
22 3. PolyPhaser Corporation
23 4. Transtector
- 24 B. Miscellaneous Controls: Provide surge protection as indicated on the plans for miscellaneous
25 control circuits that leave the building. Provide surge protectors equal to Northern
26 Technologies series PLP-s units matched to the voltage of the circuit suppressed. The
27 suppressors shall have a peak pulse power dissipation rating of 10 joules each mode,
28 minimum.
- 29 C. Security System Power: Provide surge protection for all 120 volt emergency power
30 connections powering logic and control equipment. Device shall be equal to Northern
31 Technologies TIC -HWR series rated for the power of the circuit suppressed. The
32 suppressors shall have a peak pulse power dissipation rating of 300 joules L-N, minimum.
33 Units shall provide a dry contact monitored by the security system and identified by electrical
34 panel circuit number.
- 35 D. Clearly identify at each rack location all 120VAC power sources.

36 2.6 EQUIPMENT ENCLOSURES

- 37 A. Acceptable Manufacturers:
- 38 1. Cabtron Systems
39 2. Atlas-Soundolier
40 3. Hoffman Engineering Co.
41 4. Hammond Co.
42 5. CMP Enclosures

6. House of Metal Enclosures, Inc. (HOME)
- B. Cabinets: Mount equipment in minimum 83" high by 27" deep by 23" wide free standing cabinets as indicated on the plans equal to the Lowell LSER-4427.
1. All racks shall be rated for the seismic requirements of the project, refer to Specification section 280548. Racks shall be constructed of cold rolled steel and provide standard mounting rails for 19" rack mounted equipment.
 2. Conduit shall enter from the top.
 3. Low voltage wiring shall be separated from 120 volt wiring.
 4. PLC equipment may be mounted with intercom or IP video control equipment.
 5. Furnish and install solid metal doors for access to both the front and back. Doors shall be minimum 16 gauge flush mounted with air louvers and flush pulls.
 6. Side panels shall be a minimum of 16 gauge flush mount.
 7. Both front and rear doors shall be provide with key locks.
 8. Furnish and install ventilation fans as required to enable proper ventilation for the equipment.
 9. Coordinate cabinet power with and Division 26.
 10. Furnish and install blank plates by manufacturer to provide closure on all unused rack sections.
 11. Furnish and install al seismic supports for computers, monitors, etc.
- 2.7 DURESS STATION
- A. Button: Furnish and install a red mushroom button mounted on a single gang wall plate. Mushroom button shall latch when depressed and require a key reset. Mount at 4 feet above finished floor unless indicated otherwise on plans. If millwork is provided, locate the switch where it is easily accessible by the intended user, but hidden from public view.
- B. Switch shall be as follows:
1. Mushroom head key released latching push button equal to IDEC model HW1B-X4F10-R with plastic bezel and one normally CLOSED contact.
 2. Mushroom guard shall be equal to IDEC model HW9Z-KG2-TK2120. Furnish and install where indicated on the plans.
 3. Faceplate shall be 11 gauge stainless steel attached to box with security screws.
- C. Keys: Furnish four duress reset keys for project.
- 2.8 DOOR MONITOR
- A. Where a door is to be monitored, but no detention door position switch is provided, furnish and install a door contact equal to Sentrol 2707A-L hermetically sealed reed switch. Mount to side opposite of the corridor where possible.
- B. Unit shall provide a three-foot flexible stainless steel cable. Surface mount sealed switch on the secure side of the door and monitor position.
- C. Reed switch shall provide a form C contact and handle up to .25 amps at 30 volts.
- D. Reed switch shall function properly with an installed gap of up to three inches.
- 2.9 VEHICLE LOOP DETECTOR
- A. Acceptable Manufactures:
1. Preferred Security Components Inc.
 2. Peek Traffic, Inc. (www.peekglobal.com)

3. National Loop Co.
- B. Equipment.
 1. Saw-Cut Style Preformed Vehicle Detection Loop: Provide vehicle detection loops as indicated on the plans, National Loop Company SawCut Style Preformed Vehicle Detection Loop, when pavement is already installed. Provide features as follows:
 - a. One continuous length of 18 GA XLP or 18GA PVC Insulated, 19 strand wire through loop turns and lead-in.
 - b. Machine twisted lead-in with a minimum of 12 turns per foot.
 - c. Ease of 45° or even 90° turns in frigid weather.
 - d. Loop wires are securely held together with a polypropylene back tape.
 - e. Minimum number of turns: 3.0.
 2. Pave-Over Style Preformed Vehicle Detection Loop: Provide vehicle detection loops as indicated on the plans, National Loop Company PaveOver Style Preformed Vehicle Detection Loop, when pavement has not been installed. Provide features as follows:
 - a. Ribbed non-metallic, ½" flexible conduit covering.
 - b. Standard Schedule 40 ½" PVC Type "T" fitting watertight seal.
 - c. Accepts standard ½" non-metallic conduit for lead-in protection.
 3. Detector Loop Sealant: Provide vehicle detection loop sealant as needed equal to National Loop Company Q-Seal 290. Provide features as follows:
 - a. For use in both asphalt and concrete pavements.
 - b. Cures in approximately 3 hours at 77°F and 50% R.H.
 - c. Chemical resistance to de-icing salts, gasoline, hydraulic brake fluid, motor oil and Calcium Chloride (5%).
 4. Single Loop Controller: Provide vehicle loop controllers as indicated on the plans, Peek model 625X Detector. Provide features as follows:
 - a. Failsafe or fail-secure outputs.
 - b. Six selectable sensitivities.
 - c. Second relay output mode selectable.
 - d. 24 or 120 VAC input.
 - e. Inductance range of 18 to 1800 micro-henries, automatically tuned.
 - f. Consistent presence time.
 - g. Operating temperature of -40°C to 80°C.
 - h. Frequency range of 10 to 97 KHz.
 5. Installation: Coordinate installation with all other trades. Coordinate with pavement installation. Furnish and install wire as required by manufacturer.

2.10 CABLING AND WIRE

- A. Acceptable manufacturers:
 1. Belden.
 2. Carol.
 3. Clifford of Vermont, Inc.
 4. Eastman Wire & Cable.
 5. General Cable.
 6. Liberty Wire and Cable.
 7. West Penn Wire.
- B. Wire Size: Furnish and install sufficient wire gauge to limit voltage drop to 5%.

- 1 C. Listings: Wiring shall be listed for the installation. Wire indicated below is intended to provide
2 electrical characteristic requirements.
- 3 D. Graphic Panel Wiring: Furnish and install a four conductor #20 AWG cable for the control
4 panel at the Receptionist Desk Room 1120.
- 5 E. Watch Tour Station Wiring: Furnish and install a four conductor #20 AWG cable to each
6 watch tour station.
- 7 F. Duress Station Wiring: Furnish and install a two conductor #22 cable to each duress station.
8 Cable shall be equal to West Penn 220 or AQC290.
- 9 H. Door Monitor Device Wiring: Furnish and install a two conductor #20 AWG cable to each
10 device. Cable shall be equal to West Penn 222 or AQC292. Cable must be 'wet location
11 rated' if routed under the floor slab.
- 12 I. Control Wiring: All control wiring within the relay cabinets shall be installed using good
13 workmanship and standard shop wiring and control practices. Conductors shall be grouped
14 and laced with nylon tie straps. Straps will be placed on each side of all bundle breakouts.
15 Wiring will be supported at intervals not exceeding four inches and labeled at both ends.
16 Each relay shall be labeled with its circuit number.
- 17 J. Line Voltage Wiring: Line Voltage Wiring that extends from electronic control relay screw
18 terminal strips to the 120 VAC locks; receptacles, etc. shall meet Article 300 of the California
19 Electric Code. All power conductors shall be a minimum 14 AWG THWN, 600 volt rated and
20 shall be installed in raceways and equipment enclosures with other conductors within
21 limitations defined by Article 300 of the California Electric Code.
- 22 K. Class 2 Circuit Wiring that extends from the electronic control relay screw terminal strips to
23 the low voltage devices shall be Class 2 as defined by article 725 of the California Electric
24 Code. All control conductors shall be a minimum of 20 AWG, jacketed, control cable. All
25 control cable insulation shall be 600 volt rated.
- 26 L. All control wiring shall use stranded copper conductors. All terminations shall be made on
27 screw terminal strips correctly sized and applied to conductor provided.
- 28 M. All terminations at devices shall be made with crimp type lugs correctly sized and applied to
29 conductor with crimping tool intended for use with the lug or connector used.
- 30 N. All wiring systems shall be labeled and color-coded with labeling and coding shown on shop
31 drawings. White conductors shall be used only for neutral conductors, green only for
32 grounding conductors with exceptions of low voltage control wiring that meet the
33 requirements of Article 725 of the California Electric Code.
- 34 O. All conductors within junction boxes pull boxes, and equipment enclosures shall be grouped
35 and laced with nylon tie straps. Attach identification tabs in individual sets serving individual
36 locks or groups. Conductor groups shall be identified on the tab with respect to room or area
37 served.
- 38 P. Control system conductors shall not be spliced. All conductors shall be continuous between
39 the control termination point and the controlled device.
- 40

2.11 NON-CONTACT VISITATION TELEPHONE

- A. Furnish and install the necessary PLC I/O, programing, and relays to disconnect the inmate telephones in each dayroom and sub-dayroom. Each dayroom/sub-dayroom shall be switched on or off independent of each other dayroom/sub-dayroom.

2.12 SECURITY ELECTRONICS ROOM TEMPERATURE MONITORING

- A. Furnish and install the necessary PLC I/O, programing, and high/low temperature limit sensor to monitor the temperature in each security electronics room. When the temperature is outside of the desired temperature range, an alarm shall register in accordance with Specification Sections 284600 and 284600.1. Temperature sensor shall be equal to the TempAlert TA-1 manufactured by Winland Electronics.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Coordination with Other Trades: The ESC shall coordinate the work of this section with that of other Divisions as required to ensure that the entire work of this Project will be carried out in an orderly, complete and coordinated fashion.
- B. Field Wiring: The wiring that extends from the electronic control relay screw terminal strips to the locks, lights, etc. shall be class 1, 2, or 3 as defined by Article 725 of the California Electric Code. All conductors shall be 14 gauge or larger THHN or THWN; 600 volt rated, and shall be installed in raceways and equipment enclosures with other conductors, within limitations defined by Article 725 of the California Electric Code.
1. Installation: Dress wires and cables to provide a neat and orderly appearance within all enclosures, equipment racks, cabinets, and consoles by routing in a plastic snap-cover wiring duct. In locations where wiring duct is not feasible, organize by cable clamping, dressing and tie-wrapping.
 2. Strain Relief: Relieve strain on all loose wire bundles using tie-wrap supports fastened with machine screws or bolts. Do not use self-adhesive type supports.
 3. Shrink Tubing: Neatly form cable ends and apply shrinkable tubing to shielded cables or where necessary to secure the insulation against fraying or raveling.
 4. Edge Protection: Install edge protection materials on edges, holes, lips of ducts, or any other place where wires or cables cross sharp metallic edges.
 5. Service Loops: Allow sufficient service loops where conductors leave cabinet or transition to door mounted electronics.
 6. Splicing: Field wiring shall not be spliced. All wiring shall be continuous from the field device to the termination in the control panel.
 7. Wire Termination: All wiring shall be terminated at both ends and labeled in accordance with the equipment wiring plans. Wire not energized or connected to active devices shall be labeled for future use.
- C. Ground System: Connection to grounds for Transient Voltage Surge Suppressors shall be 1 ohms or less. All grounds shall be installed as required by the CEC.
- D. Ground Wire: Furnish and install a ground wire sized as required by the CEC in all conduits containing conductors carrying voltages above 30 volts rms.
- E. Listing: All wiring and raceways shall be listed for the intended installation and installed in strict accordance with the California Electric Code as required by the conditions of where it is stalled. This includes but is not limited to ratings for riser, plenum, or wet installations.

1. All wiring/cabling shall be labeled with the system type and the device ID at each end. The label shall be generated by a Brady I.D. Plus Pro Printer or equal and utilize a Brady part# WML-511-292 label or equal. The label used should allow for the clear part of the label to overlap and protect the printed portion of the label from being exposed to damage and/or being rubbed off over time. Hand written labels are not acceptable. Provide one sample of the labeling to be used on the intercom system, and lock wiring for approval. The numbering system used should match the equipment wiring plans and be similar to the following:
 - a. C### camera Cat6.
 - b. CA### card access
 - c. IC### intercom.
 - d. L### locking device. .

- F. Vehicle sensor: Completely coordinate the installation of the vehicle sensors with all trades and the owner's representative.

3.2 FABRICATION

- A. All cables between racks for PLC inputs and outputs shall be provided with quick release connectors for ease of trouble-shooting and service.
- B. Install rack mounted components so they are accessed from the front and/or rear of the cabinet. Do not mount items on the sides of the equipment rack.
- C. All field wiring shall be landed on appropriately labeled screw terminal strips.
- D. All wiring shall be cabled or neatly bundled and secured to the housing with wire ties and internal wire ducts.
- E. Wire nuts, crimp caps and other similar style wire connectors are not acceptable within the equipment racks. All connections within these racks must be done with screw style terminal connections.

3.3 SEPARATION

- A. Cabling and conduit shall be installed in strict compliance with the California Electric Code and TIA 569.
- B. Communication, Class 2, and Class 3 wires and cables shall be separated by at least 2 inches from conductors of any electric light, electric power, Class 1, non-power-limited fire alarm, or medium power network-powered broadband communications circuits.
 1. Separation can be less if communication, Class 2, and Class 3 circuits are completely enclosed in metallic pathways that are properly grounded and bonded per ANSI/TIA-607-B. Walls of the pathway must have a minimum thickness of .04 inches if made of steel or .06 inches if made of aluminum.
 2. Separation can be less if any electric light, electric power, Class 1, non-power-limited fire alarm, or medium power network-powered broadband communications circuits are completely enclosed in metallic pathways that are properly grounded and bonded per ANSI/TIA-607-B. Walls of the pathway must have a minimum thickness of .04 inches if made of steel or .06 inches if made of aluminum.

3.4 FIELD QUALITY CONTROL

- A. All functions specified shall be individually activated and the result documented. Utilize preprinted test sheets with space for comments and indicate "pass" or "fail" for each. These test reports shall be copied and submitted to the engineer prior to requesting the Engineer to witness the final functional test.

- 1 B. All functions shall be demonstrated for the owner and Architects representative.

PLC VERIFICATION AND CHECK-OUT FORM

✓ = OK
Job #
Job Name:
Panel #

FIELD TEST CODE:							REPAIR CODE:				
A - No status change							1-SSI			Software Test By: _____ Date _____	
B - Won't show secure							2-ELECTRICIAN			Hardware Test By: _____ Date _____	
C - No power to door							3-IRONWORKER			System Test By: _____ Date _____	
D - Door won't open							4-CARPENTER			Design Engineering By: _____ Date _____	
E - Door won't close							5-OWNER/REP			Wiring By: _____ Date _____	
F - Door needs alignment							6 -ENG			Field Test By: _____ Date _____	
G - Wrong door opens							7 -				
H - Adjust DPS							8 -				
I - Adjust roller bolt							9 -				
J - File strike plate							10 -				
K - Adjust lock							11 -				
L - No latch back							12 -				
M - Poor audio											
N - No audio											
O - Out of focus											
P - No picture											
Q - Call button sticks											
R - No reset station											
S - No power to nurse call											
T - No dome light											
U - No nurse call station											
V - Reversed											
W - Software problem											
X - Not installed											
ON-SITE											
ICON ID#	ICON TYPE	C/U CAM. NO.	DOOR INTLK. WITH	CELL GRP. REL.	SOFT-WARE TEST	HARD-WARE TEST	FIELD TEST CODE	REPAIR CODE	RE-CHECK "X"	FIELD CHECK OUT NOTES	PROBLEM RESOLVED (BY/DATE)

2

3 3.5 SOFTWARE

- 4 A. For each PLC, furnish to the owner uniquely identified:

- 5 1. One (1) separate back-up CD or flash memory device for each PLC with the ladder logic
6 file (programmer's notated file) and the source code. Each disk will be labeled with the
7 project name, programs, PLC, programmer, and revision date.
8 2. One (1) copy of the source code of the application software on CD and/or other digital
9 media.

- 10 B. Furnish a single Microsoft Word file detailing all passwords for each PLC. This file shall also
11 identify the following by system and panel:

- 12 1. The file name of each program required for restoration of each failed PLC.
13 2. The passwords required for each PLC as well as required programs.
14 3. The name of the programmers for each custom program.
15 4. The date of the last program change.

- 16 C. Furnish documents listed in 3.5 A-B at project completion. Furnish a new set with all
17 revisions after the completion of the three month walkthrough outlined in Specification section
18 280500.

19 3.6 TRAINING

- 20 A. The ESC shall provide without additional cost to the owner representatives specially trained
21 in the operation of PLC systems provided. The representatives shall train the Owner's
22 personnel in operation, repair, and upkeep of the PLC and custom relay cabinets. Refer to
23 Specification Section 280500, 3.6 for additional training information including notification,
24 outline, course structure, and additional post occupancy training.

3.7 SPARES

A. The contractor shall turn over to the Owner, the following program documentation and materials:

1. One electronic copy of the source code of the applications software including full instruction documentation and comments on a CD or portable hard drive.
2. All keys, passwords, and access codes for access to the programming software.
3. Furnish one (1) PLC central processor of each type installed.
4. Furnish one (1) Network Ethernet switch for each type installed.
5. Furnish one (1) power supply of each type installed.
6. Furnish one (1) group of programmed memory media for each program installed.
7. Furnish one (1) spare input card of each type installed in the facility.
8. Furnish one (1) spare output card of each type installed in the facility.
9. Furnish two (2) completely assembled watch tour stations.
10. Furnish two (2) completely assembled duress station.
11. Furnish two (2) completely assembled dome light stations.
12. Furnish two (2) completely assembled reset buttons.
13. Furnish no less than five (5) of each style of relay used, including relay base.
14. Furnish no less than ten (10) of every size replaceable fuse used.
15. Furnish one (1) Sentrol monitor switch of each type installed on project.
16. Furnish one CPU memory card for each PLC CPU plus 10%.
17. Spare parts shall be packaged in appropriate protective packing material.
18. Box spare parts for easy storage and clearly identify the contents of each box on four sides of each container.

END OF SECTION 28 46 19

1 SECTION 31 11 00 - SITE CLEARING

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY:

- 7 A. This Section includes the following:

- 8 1. Provide all material, labor, equipment and services necessary to completely clear and
9 demolish all materials, accessories and other related items necessary to complete the
10 Project as indicated by the Contract Documents.

- 11 B. This Section does not include building demolition.

12 1.3 RELATED SECTIONS:

- 13 A. Contract General Conditions and Division 1, General Requirements

- 14 B. Section 312000 – Earthwork: Excavation, Filling, and Grading

- 15 C. Section 312222 – Soil Materials

- 16 D. Section 312333 – Trench Excavation and Backfill

- 17 E. Section 320190 – Existing Landscape Protection

18 1.4 SUBMITTALS

19 (NOT APPLICABLE)

20 1.5 QUALITY ASSURANCE

- 21 A. Regulatory Requirements:

- 22 1. In accordance with Specification Section REGULATORY REQUIREMENTS, and the
23 following:

- 24 a. Materials and equipment used for this project shall comply with the current
25 applicable regulations of the California Air Resources Board [CARB] and the
26 Environmental Protection Agency [EPA].

- 27 B. Meetings:

- 28 1. Minimum agenda shall be to discuss coordination of upcoming work, review the work
29 progress, discuss field observations, identification of any potential problems which may

1 impede planned progress; corrective measures to regain projected schedule; and
2 maintenance of quality and work standards.

3 2. Meetings shall include Pre-Clearing and Demolition Meetings.

4 3. Participants (or designated representative of) invited to attend each of the above
5 meetings shall be as follows:

6 a. Contractor.

7 b. Owner.

8 c. Architect.

9 d. Testing Laboratory.

10 e. Local Governing Authorities as applicable.

11 f. Utility Representatives as applicable.

12 g. Owner's Inspector.

13 h. Clearing and Demolition Subcontractor.

14 i. Other subcontractors, as appropriate (including any accessory subcontractors).

15 1.6 PROJECT CONDITIONS OR SITE CONDITIONS

16 A. Dust Control

17 1. Contractor shall comply with all requirements of the San Joaquin Valley Air Pollution
18 Control District (SJVAPCD) for construction activity related to this project.

19 2. A Dust Control Plan, as required by the SJVAPCD, may be required for this project.
20 Contractor shall be responsible for preparing said Dust Control Plan, submitting to the
21 SJVAPCD for review and approval, and paying all SJVAPCD review and permitting fees
22 related to the Dust Control Plan.

23 3. No construction activity related to this project may begin until Contractor has secured an
24 approved Dust Control Plan, if one is required.

25 4. Contractor shall be solely responsible to implement all requirements of the Dust Control
26 Plan throughout the life of this contract.

27 5. Should fines or fees be levied against the Project for violations of the Dust Control Plan
28 and/or related SJVAPCD regulations, Contractor shall be responsible to pay all said fines
29 or fees and to implement all mitigation measures required by SJVAPCD in order to bring
30 the construction activity into compliance with SJVAPCD regulations. The costs for any
31 such fines or fees shall be included in the lump sum price bid for work under this contract
32 and no additional payment will be made therefor.

33 B. Existing Conditions:

1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
2. Conduct work so as not to interfere unnecessarily with adjacent roads, streets, drives, walks or occupied facilities.
 - a. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and Authorities having jurisdiction.
 - b. Provide alternate routes around closed or obstructed traffic ways if required by Authorities having jurisdiction.
3. Locate and identify utilities.
 - a. Call a Local Utility Locator Service (USA – “Underground Service Alert” – [800] 227-2600) for the task of locating any applicable utilities in the area where the Project is located.
4. Carefully remove items indicated to be salvaged and store on Owner’s premises at the Owner’s direction.

PART 2 - PRODUCTS

(NOT APPLICABLE)

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordination:

1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.

B. Protection:

1. Protect and maintain all benchmarks and survey control points from disturbance during clearing and demolition operations.
2. Provide erosion-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties.
3. Furnish and install temporary protection/barrier fencing surrounding the limits of demolition.
4. Protect trees, plant growth, and features not specifically designated for removal. Locate and clearly flag trees and vegetation to remain or to be relocated.

5. Protect existing improvements designated to remain from damage during construction.

a. Restore damaged improvements to their original condition, as acceptable to the Owner.

3.2 CONSTRUCTION

A. Shrub and Weed Removal:

1. Remove weeds and rooted topsoil to a minimum four (4) inch depth and temporarily stockpile as needed for re-use in finished grading of landscape areas. Remove excess material from the site.

2. Where existing vegetation is to be replaced by new materials, remove contaminated or excess soil from the site and legally dispose of off-site.

B. Existing Site Improvements Removal:

1. Remove existing above and below grade improvements as necessary to facilitate new construction.

a. Remove concrete slabs, sidewalk, curbs, mow strips, gutters, and fence post footings.

1) Neatly saw-cut length of existing pavement to remain before removing existing pavement unless existing full-depth joints coincide with line of demolition. Saw-cut faces vertically.

b. Remove indicated utility improvements within the limits of construction.

1) Excavate for and disconnect utilities designated to be removed. Seal or cap off underground.

2) Coordinate removal and/or relocation of utilities with the appropriate utility agencies.

c. Where existing underground utilities, irrigation pipes, wells, leach fields, or underground tanks are encountered, they must be removed or moved to a point at least 5 feet horizontally outside the proposed building and 3 feet horizontally outside the concrete flatwork or pavement construction areas. All resultant cavities must be backfilled with engineered fill.

C. Existing Utilities to Remain or be Relocated:

1. Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

a. Notify Architect and the Owner not less than seven (7) days in advance of proposed utility interruptions.

b. Arrange to shut off indicated utilities with utility companies and Owner.

2 1. Legally dispose of all debris (surplus soil materials, unsuitable topsoil, obstructions,
3 demolished materials, waste materials, trash, etc.) resulting from clearing, grubbing,
4 demolition and from construction. Disposal of all materials shall be at a location secured
5 by the Contractor off of the Owner's property.

END OF SECTION

1 SECTION 31 20 00 - EARTHWORK: EXCAVATION, FILLING AND GRADING

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY:

- 7 A. Excavating soil and other material for surface improvements.
8 B. Placing fill.
9 C. Compaction of existing ground and fill.
10 D. Preparation of subgrade for other improvements.
11 E. Grading of soil.

12 1.3 RELATED SECTIONS

- 13 A. Contract General Conditions and Division 1, General Requirements.
14 B. Section 311100 – Site Clearing.
15 C. Section 312222 – Soil Materials.
16 D. Section 312333 – Trench Excavation and Backfill.

17 1.4 REFERENCES

- 18 A. ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil Aggregate
19 Mixtures Using 10 lb (4.54 Kg) Rammer and 18 inch (457 mm) Drop.

20 1.5 DEFINITIONS

- 21 A. Utility: Any buried or above ground pipe, conduit, cable, associate device or appurtenances, or
22 substructure pertaining thereto.

23 1.6 SUBMITTALS

- 24 A. Submit in accordance with Specification Section SUBMITTAL PROCEDURES:

25 1. Product Data:

- 26 a. Information indicating the source of all import material, the fill material type and
27 where it is to be used, and approval of the District's Inspector of Record for
28 incorporation of import material into the Work.

29 2. Quality Assurance/Control:

- 30 a. Material Test Reports:

- EARTHWORK
31 20 00-2

- 59 C. Certificates:
- 60 1. Installer's certification that all Earthwork installation meets or exceeds the requirements
- 61 of this specification.
- 62 2. Contractor's certification (on Contractor's letterhead paper) that the Earthwork materials
- 63 and installation meets or exceeds the requirements of this specification.
- 64 D. Meetings:
- 65 1. Pre-Installation: Schedule prior to the start of work.
- 66 a. Coordinate the work with other work being performed.
- 67 b. Identify any potential problems, which may impede planned progress and proper
- 68 installation of work regarding quality of installation and warranty requirements.
- 69 2. Progress: Scheduled by the Contractor during the performance of the work.
- 70 a. Review for proper installation of work progress.
- 71 b. Identify any installation problems and acceptable corrective measures.
- 72 c. Identify any measures to maintain or regain project schedule if necessary.
- 73 3. Completion: Scheduled by the Contractor upon proper completion of the work.
- 74 a. Inspect and identify any problems which may impede issuance of warranties or
- 75 guaranties.
- 76 b. Maintain installed work until the Notice of Substantial Completion has been filed.
- 77 1.8 COORDINATION
- 78 A. Coordinate work with Owner's personnel.
- 79 B. Provide required notification to the Geotechnical Engineer so that a representative from the
- 80 Owner's Geotechnical Engineering consultant can be present for all excavation, filling and
- 81 grading operations to test and observe earthwork construction.
- 82 C. Verify that the location of existing utilities have been indicated at work site by utility authorities,
- 83 by Owner, and as specified on the Plans.
- 84 1.9 EXISTING CONDITIONS
- 85 A. Existing Conditions:
- 86 1. Examine the site and verify conditions with the Drawings and Specifications. Contractor
- 87 shall familiarize himself with existing site conditions and any changes that have occurred
- 88 at the site since the preparation of the contract documents, and shall be responsible to
- 89 account for any such changes in the price bid for this work.
- 90 2. Thoroughly investigate and verify conditions under which the Work is to be performed.

- 91 3. Locate and identify utilities:
- 92 a. Call a Local Utility Locator Service (USA - "Underground Service Alert" – [800]
93 227-2600) for the task of locating any applicable off-site and on-site utilities in the
94 area where the Project is located.
- 95 4. No allowance for Extra Work will be granted resulting from negligence or failure to meet
96 requirements of this Section.
- 97 B. Where subsurface work involves more than the normal depth of excavation required for the
98 removal and/or construction of surface improvements (surface improvements such as concrete
99 flatwork, paving, landscaping, signs, etc.), the Engineer will have made a diligent attempt to
100 indicate on the plans the location of all main and trunk line utility facilities which may affect the
101 Work. In many cases, however, the only available information relative to the existing location of
102 said facilities may have been small scale undimensioned plats. The locations of said facilities,
103 therefore, shall be considered approximate only, until exposed by the Contractor.
- 104 C. Under similar circumstance, service laterals and appurtenances will have also been shown
105 where information was available as to their location. In many cases, however, the only
106 available information relative to the existing location of said facilities may have been small scale
107 undimensioned plats. The locations of said facilities, therefore, shall be considered
108 approximate only, until exposed by the Contractor.
- 109 D. Determine exact location of existing buried utilities by:
- 110 1. Marking on ground or pavement surface the alignment and extent of the facilities and the
111 probable location of existing utilities using construction plans and existing surface
112 features.
- 113 2. Requesting Underground Service Alert (USA) to indicate location of existing buried
114 facilities (phone 1-800-227-2600). Provide USA a minimum of two (2) working days
115 notice of request for locations, and notify Owner of said request concurrently.
- 116 3. Confirm exact location of existing utilities by hand methods of excavation, or by use of
117 vacuum equipment.
- 118 E. At proposed work location, expose by hand methods (or vacuum equipment) all existing utilities
119 along the route of the proposed work prior to using any mechanical equipment. If mechanical
120 equipment is allowed at a particular location, it may only be used after the completion by the
121 Contractor of a successful exhaustive search by hand (or vacuum equipment) methods to locate
122 all existing facilities as indicated on the plans, and/or as indicated on the ground by USA or
123 Owner's personnel.
- 124 F. Provide Field Engineering to record the location of all utilities encountered. Where locational
125 conflicts exist between existing utilities and the planned location of facilities to be constructed
126 under this Contract, submit detailed information to the Engineer for review and direction.
- 127 G. Maintain all existing utility mains and service lines in constant service during construction of the
128 Work.
- 129 H. Where service disruptions are allowed, minimize the length of such disruptions by proper
130 scheduling and diligent pursuit of the work, and coordinate the timing of any such disruptions in
131 advance with the District.

132 1.10 ENVIRONMENTAL REQUIREMENTS

133 A. Dust control: Perform work in a manner as to minimize the spread of dust and flying particles.
134 Thoroughly moisten all surfaces as required to prevent dust from being a nuisance to the public,
135 neighbors and concurrent performance of other on-site work.

136 1. All disturbed areas, including storage piles, which are not being actively utilized for
137 construction purposes, shall be effectively stabilized of dust emissions using water,
138 chemical stabilizer/suppressant, or vegetative ground cover.

139 2. All land clearing, demolition, grubbing, scraping, excavation, land leveling, grading, and
140 cut and fill activities shall be effectively controlled of fugitive dust emissions utilizing
141 application of water or by pre-soaking.

142 3. When materials are transported off-site, all material shall be covered, effectively wetted to
143 limit visible dust emissions or at least six inches of freeboard space from the top of the
144 container shall be maintained.

145 4. All operations shall limit or expeditiously remove the accumulation of mud or dirt from
146 adjacent public streets at least once every 24 hours when operations are occurring. The
147 use of dry rotary brushes is expressly prohibited except where preceded or accompanied
148 by sufficient wetting to limit the visible dust emissions. The use of blower devices is
149 expressly forbidden.

150 5. Following the addition of materials to, or the removal of materials from, the surface of
151 outdoor storage piles, said piles shall be effectively stabilized of fugitive dust emissions
152 utilizing sufficient water or chemical stabilizer/ suppressant.

153 a. Contractor shall comply with all requirements of the San Joaquin Valley Air
154 Pollution Control District (SJVAPCD) for construction activity related to this project.

155 b. A Dust Control Plan, as required by the SJVAPCD, may be required for this
156 project. If required, Contractor shall be responsible for preparing said Dust Control
157 Plan, submitting to the SJVAPCD for review and approval, and paying all
158 SJVAPCD review and permitting fees related to the Dust Control Plan.

159 c. If a dust control plan is required, no construction activity related to this project may
160 begin until Contractor has secured an approved Dust Control Plan.

161 d. Contractor shall be solely responsible to implement all requirements of the Dust
162 Control Plan throughout the life of this contract.

163 e. Should fines or fees be levied against the Project for violations of the Dust Control
164 Plan and/or related SJVAPCD regulations, Contractor shall be responsible to pay
165 all said fines or fees and to implement all mitigation measures required by
166 SJVAPCD in order to bring the construction activity into compliance with
167 SJVAPCD regulations. The costs for any such fines or fees shall be included in
168 the lump sum price bid for work under this contract and no additional payment will
169 be made therefore

170 B. Burning: No burning will be allowed on-site.

171 C. Rain: Work under this section shall not be started or maintained under threat of rain, unless the
172 work is not affected by the rain.

- 173 D. Do not place fill during weather conditions which will alter moisture content of fill materials
174 sufficiently to make compaction to the specified densities difficult or impossible.
- 175 E. When reference is made to SWPPP (Storm Water Pollution Prevention Plan), if any within this
176 Project Manual, then comply with all environmental protection requirements included therein.
- 177 F. In accordance with EPA, CARB and CF.
- 178 G. Protection:
- 179 1. Protect cut and fill areas to prevent water running into excavation. Maintain areas free of
180 water. Remove seeping water immediately by pumps. Provide dewatering as necessary.
- 181 2. Protect cut slopes from erosion due to precipitation and other sources of runoff.
- 182 3. Protect utilities to remain within the construction area and special construction. If utility
183 lines are uncovered (water, electric, sewer, etc.) not shown on the drawings during
184 excavation of site, notify the Architect promptly for its review and action.
- 185 4. Do not permit access to undeveloped portions of the site, nor to areas that are outside of
186 the limits of grading.

187 1.11 PROJECT RECORD DOCUMENTS

- 188 A. Submit under provisions of GENERAL CONDITIONS and DIVISION 1, GENERAL
189 REQUIREMENTS.
- 190 B. Accurately record actual locations of utilities encountered including depth and horizontal
191 location, as measured from permanent site features.

192 PART 2 - PRODUCTS

193 2.1 MATERIALS

- 194 A. Fill in Turf or Other Planting Areas: Type S2 or S3 per Division 31 Specification Section SOIL
195 MATERIALS.
- 196 B. Fill in Non-planting Areas: Type S1, S2 or S4 per Division 31 Specification Section SOIL
197 MATERIALS.
- 198 C. Imported material: Type S3, S4 or S5 per Division 31 Specification Section SOIL MATERIALS.

199 PART 3 - EXECUTION

200 3.1 EXAMINATION

- 201 A. Verify site conditions.

202 3.2 PREPARATION

- 203 A. Layout of Work:

- 204 1. Contractor shall be responsible for all lines and grades. Layout shall be provided by a

- 205 California registered Land Surveyor or Civil Engineer, at Contractor's expense.
- 206 2. Check all bench marks, monuments and property lines and verify locations.
- 207 3. Locate and maintain all grade stakes.
- 208 4. Monuments moved or displaced during grading operation are to be replaced by a
209 California Registered Civil Engineer or Surveyor, at Contractor's expense.
- 210 B. Locate, identify, and protect existing above and below grade utilities from damage.
- 211 C. Protect plant life, lawns, trees, shrubs, and other features not authorized for removal.
- 212 D. Protect existing structures, fences, curbs, sidewalks, paving and other improvements to remain
213 from damage from excavation equipment and vehicular traffic.
- 214 E. Employ equipment and methods appropriate to the work site.
- 215 F. Protect excavated areas from drainage inflow, and provide for drainage of all excavated areas.
- 216 G. Comply with all provisions of the Construction Safety Orders and General Safety Orders of the
217 California Division of Industrial Safety, as well as all other applicable regulations as they pertain
218 to the protection of workers from the hazard of caving ground in excavations.
- 219 3.3 SITE STRIPPING:
- 220 A. Reference is made to Division 31 Specification Section SITE CLEARING.
- 221 B. Within the areas of planned surface improvements and structures, the near surface soils
222 containing vegetation, roots, organics, or other objectionable material must be stripped and
223 removed from the site. Upon approval of the Geotechnical Engineer, suitable materials stripped
224 from the site may stockpiled and incorporated into the finish fill for planting areas.
- 225 C. All areas to receive surface improvements shall be stripped to remove turf, shrubs, trees and
226 other vegetation, along with associated root systems, concrete, wood, metal, rubbish and other
227 unsuitable debris, and any loose, saturated or unconsolidated soil material. Minimum stripping
228 depth is expected to be 4-inches below existing site grades. Stripping shall continue to the
229 depth required to expose acceptable basement soils that are free from deleterious which are not
230 suitable for Engineered Fill, as required by the Geotechnical Engineer.
- 231 3.4 EXCAVATION
- 232 A. Following clearing and stripping operations, excavate planned construction areas as specified in
233 this Section.
- 234 B. Provide additional excavation as required to conform to the lines, grades and cross-sections
235 shown on the plans.
- 236 C. When excavating through tree roots, perform work by hand and cut roots, where authorized,
237 with a saw. Remove all roots 1/4" in diameter and greater.
- 238 D. Remove excess soil not to be used as fill in the Work from the site. Unless requested by Owner
239 to be deposited at a site designated by Owner on the property, obtain a disposal site and legally
240 dispose of said excess material, all at no additional cost to the Owner.

- 241 E. Areas disturbed by demolition must be excavated to expose undisturbed soils.
- 242 F. Excavated soils free of deleterious substances (organic matter, demolition debris, tree roots,
243 etc.) and with less than 3% organic content by weight, may be returned to the excavations as
244 Engineered Fill.
- 245 3.5 FILLING AND COMPACTING
- 246 A. Once clearing, stripping and over-excavation operations are complete, scarify the surface to
247 receive fill material or improvements to a depth of 8-inches, moisture condition to at least 2%
248 above optimum moisture content, and compact to a minimum of 90% of maximum dry density
249 based on ASTM Test Method 1557.
- 250 B. Place and compact soil to finish subgrade of improvements to be placed thereon, or to finished
251 surface grade where no improvements are to be placed thereon.
- 252 C. All fill required shall be placed as Engineered Fill.
- 253 D. Imported fill shall be approved by the Geotechnical Engineer prior to placement
- 254 E. On-site soils are suitable for re-use as Engineered Fill, providing they are cleansed of excessive
255 organics (less than 3 percent by weight, ASTM D2974), debris, and fragments larger than three
256 (3) inches in maximum dimension and meet the requirements of soil Type S4, Division 31
257 Specification Section SOIL MATERIALS.
- 258 F. Engineered Fill shall be moisture conditioned to within 2% of optimum moisture, placed in
259 uncompacted layers not exceeding eight (8) inches in thickness, and compacted as specified,
260 based on ASTM Test Method D1557.
- 261 1. Non-vegetative surface improvement areas (structures, pavement and site concrete
262 improvements) - To a minimum of 90% of maximum dry density.
- 263 2. Vegetative surface improvement areas (turf and planters) - Below top twelve (12) inches -
264 to a minimum of 90% of maximum dry density. Top twelve (12) inches - 85% of maximum
265 dry density.
- 266 G. Maintain optimum moisture content of fill materials to attain required compaction density.
- 267 H. Additional lifts shall not be placed if the previous lift did not meet the required dry density, or if
268 soil conditions are not stable.
- 269 I. Conform fill to the lines, grades and cross-sections shown on the plans.
- 270 J. Fill materials to conform to Division 31 Specification Section SOIL MATERIALS.
- 271 K. Provide, at no additional cost to Owner, imported soil material conforming to the requirements of
272 Division 31 Specification Section SOIL MATERIALS, as needed to attain finished grades of
273 Work.
- 274 L. Utilize equipment which will not disturb or damage existing utilities and other improvements.
- 275 3.6 PREPARATION OF SUBGRADE FOR SURFACE IMPROVEMENTS

- 276 A. Where concrete, asphalt-concrete, aggregate base, or other non-vegetative surface
277 improvements, or a layer of said surface improvements, are to be constructed on the soil
278 surface, prepare the subgrade for said improvements in accordance with this section.
- 279 B. Scarify the soil as specified and remove and dispose of (off the project site) all rocks, hardpan
280 chunks or otherwise unsuitable material over 2.5 inches in size.
- 281 C. Thoroughly moisture condition and compact as described above.
- 282 D. Prior to commencing construction of surface improvements, pass a test roller of size and weight
283 as approved by the Owner over the subgrade to establish the extent of soft or spongy areas
284 requiring repairs.
- 285 E. Conform finished subgrade surface to the lines, grades and cross-sections shown on the plans.
- 286 3.7 FINE GRADING
- 287 A. Fine grade all finished surfaces to the lines, grades and cross-sections shown on the plans, and
288 to blend to hard surface improvements.
- 289 B. Rake and smooth all finished surfaces not to receive hard surface improvements.
- 290 C. Use suitable stockpiled or imported topsoil for the top 12-inches of areas to receive landscape
291 improvements.
- 292 D. Import topsoil meeting the requirements of Division 31 Specification Section SOIL MATERIALS,
293 as required to complete finish grading.
- 294 E. Topsoil may not be used in areas requiring Engineered Fill.
- 295 3.8 TOLERANCES
- 296 A. Top surface of Subgrade for Non-Vegetative Surface Improvements or Layers thereof: Plus or
297 minus 0.02 foot from planned elevation.
- 298 B. Top surface of Subgrade for Vegetative Surface Improvements or for Bare Ground - Plus or
299 minus 0.05 foot of planned elevation, or as required for finish surface to match adjacent
300 improvements or ground.
- 301 3.9 FIELD QUALITY CONTROL
- 302 A. Field inspection and testing will be performed under provisions of GENERAL CONDITIONS
303 and/or DIVISION 1, GENERAL REQUIREMENTS.
- 304 B. Compaction testing will be performed in accordance with ANSI/ASTM D1557.
- 305 C. If tests indicate work does not meet specified requirements, recompact, or remove and replace,
306 and retest.
- 307 D. All retesting required as a result of failure of initial test will be performed by Owner's testing
308 agency, at the expense of the Contractor.
- 309 3.10 PROTECTION

- 310 A. Protect graded areas from traffic, freezing, erosion, and all other sources of damage. Keep free
311 of debris and trash.
- 312 B. Repair and re-establish grades to specified tolerances where completed or partially completed
313 work becomes eroded, rutted, settled, or where it is damaged by subsequent construction
314 operations or weather.
- 315 C. Where settlement occurs prior to acceptance of the work, remove and replace surface
316 improvements, excavate, replace, and re-compact in accordance with these specifications, and
317 restore the surface improvements.
- 318 3.11 CLEANING
- 319 A. Remove all surplus or unsatisfactory soil material, trash, and debris, and legally dispose of off of
320 the Owner's property.
- 321 END OF SECTION

1 SECTION 312222 - SOIL MATERIALS

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and Division 01 Specification Sections, apply to this Section.

6 1.2 SECTION INCLUDES

- 7 A. Excavated (and re-used) materials and imported materials.

8 1.3 RELATED SECTIONS:

- 9 A. Section 312000 - Earthwork: Excavation, Filling and Grading.
10 B. Section 312333 - Trench Excavation and Backfill.

11 1.4 SUBMITTALS

- 12 A. Samples: Submit, in air-tight containers, 10 lb. sample of Type S3, S4 and S5 fill to inspector.
13 B. Soil Analysis: Submit for Type S3, S4 and S5 soils to be imported.
14 C. Materials Source: Submit location of imported materials source. Provide materials from same
15 source throughout the work. Change of source requires approval.
16 D. For imported soil, obtain Geotechnical Engineer and DTSC approval prior to importing.

17 PART 2 - PRODUCTS

18 2.1 SOIL MATERIALS

- 19 A. Soil Type S1: Excavated and re-used material, graded; free of lumps larger than 3 inches,
20 rocks larger than 2 inches, and debris.
21 B. Soil Type S2: Excavated and reused material, graded; free of roots, lumps greater than one
22 inch, rocks larger than 1/2 inch, debris, weeds and foreign matter.
23 C. Soil Type S3: Imported topsoil, friable loam; reasonably free of roots, rocks larger than 1/2 inch,
24 debris, weeds, and foreign matter.
25 D. Soil Type S4: Imported borrow, suitable for purposes intended, meeting the following
26 characteristics:
27 1. Maximum Particle Size: 4"
28 2. Plasticity Index: <10
29 3. Expansion Index: <15

- 1 E. Soil Type S5: Imported sand. Natural river or bank sand (sand equivalent greater than 30),
2 washed; free of silt, clay, loam, friable or soluble materials, and organic matter.

3 2.2 SOURCE QUALITY CONTROL

- 4 A. Inspection of imported soil will be performed by the Geotechnical Engineer, at source of import
5 and prior to being delivered to the site.

6 PART 3 - EXECUTION

7 3.1 STOCKPILING

- 8 A. Stockpile excavated or imported material onsite at location designated by project inspector.

- 9 B. Stockpile excavated or imported material in sufficient quantities to meet project schedule and
10 requirements.

11 3.2 STOCKPILE CLEANUP

- 12 A. Remove stockpile, leave area in a clean and neat condition. Grade site surface to prevent free
13 standing surface water.

- 14 B. Dispose of excess material off-site.

15 END OF SECTION

1 SECTION 31 23 33 - TRENCH EXCAVATION AND BACKFILL

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and Division 01 Specification Sections, apply to this Section.

6 1.2 SECTION INCLUDES

- 7 A. Excavating trenches, holes and pits for constructing the Work.
8 B. Backfill and compaction.
9 C. Providing suitable bedding and backfill material, as specified herein.

10 1.3 RELATED SECTIONS

- 11 A. Contract General Conditions and Division 1, General Requirements.
12 B. Section 311100 - Site Clearing
13 C. Section 312000 - Earthwork: Excavation, Filling and Grading
14 D. Section 312222 - Soil Materials
15 E. Section 331200 - Water Utilities
16 F. Section 333000 - Site Sewer Systems
17 G. Section 334000 - Storm Drainage

18 1.4 REFERENCES

- 19 A. ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate
20 Mixtures Using 10 lb (4.54 Kg) Rammer and 18 inch (457 mm) Drop.

21 1.5 DEFINITIONS

- 22 A. Utility: Any buried or above ground pipe, conduit, cable, associate devices or appurtenances, or
23 substructure pertaining hereto.

24

1.6 QUALITY ASSURANCE

A. Qualifications

1. Installer:

- a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this project within the past 5 years.

B. Regulatory Requirements:

1. In accordance with Specification Section REGULATORY REQUIREMENTS and the following:

- a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board [CARB] and the Environmental Protection Agency [EPA].
- b. CF County of Fresno, Codes and Ordinances
- c. EPA Environmental Protection Agency.
- d. CAL/OSHA Comply with all provisions of the Construction Safety Orders and the General Safety Orders of the California Division of Occupational Safety and Health, as well as all other applicable regulations as they pertain to the protection of workers from the hazard of caving ground excavations.

C. Certificates:

1. Installer's certification that all trench backfill installation meets or exceeds the requirements of this specification.
2. Contractor's certification (on Contractor's letterhead paper) that the trench backfill materials and installation meets or exceeds the requirements of this specification.

D. Meetings:

1. Pre-Installation: Schedule prior to the start of work.
- a. Coordinate the work with other work being performed.
- b. Identify any potential problems, which may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
2. Progress: Scheduled by the Contractor during the performance of the work.
- a. Review for proper installation of work progress.
- b. Identify any installation problems and acceptable corrective measures.

- 1 c. Identify any measures to maintain or regain project schedule if necessary.
- 2 3. Completion: Scheduled by the Contractor upon proper completion of the work.
- 3 a. Inspect and identify any problems which may impede issuance of warranties or
- 4 guaranties.
- 5 4. Maintain installed work until the Notice of Substantial Completion has been filed.

6 1.7 COORDINATION

- 7 A. Coordinate work with Owner's personnel.
- 8 B. Verify that the location of existing utilities have been indicated at work site by utility authorities.

9 1.8 EXISTING UTILITIES

- 10 A. Where subsurface work involves more than the normal depth of excavation required for the
- 11 removal and/or construction of surface improvements (surface improvements such as concrete
- 12 work, paving, landscaping, signs, etc.), the Engineer will have made a diligent attempt to
- 13 indicate on the plans the location of all main and trunkline utility facilities which may affect the
- 14 Work. In many cases, however, the only available information relative to the existing location of
- 15 said facilities may have been small scale undimensioned plats. The locations of said facilities,
- 16 therefore, shall be considered approximate only, until exposed by the Contractor.
- 17 B. Under circumstance similar to 312333/1.8A, service laterals and appurtenances will have also
- 18 been shown where information was available as to their location. In many cases, however, the
- 19 only available information relative to the existing location of said facilities may have been small
- 20 scale undimensioned plats. The locations of said facilities, therefore, shall be considered
- 21 approximate only, until exposed by the Contractor.
- 22 C. Determine exact location of existing buried utilities by:
 - 23 1. Marking on ground or pavement surface the alignment and extent of the proposed
 - 24 facilities and the probable location of existing utilities using construction plans and
 - 25 existing surface features.
 - 26 2. Requesting Underground Service Alert (USA) to indicate location of existing buried
 - 27 facilities (phone 1-800-227-2600). Provide USA a minimum of two (2) working days
 - 28 notice of request for locations, and notify Owner of said request concurrently.
 - 29 3. Locate exact location of existing utilities by hand methods of excavation, or by use of
 - 30 vacuum equipment.
- 31 D. At proposed work location, expose by hand methods (or vacuum equipment) all existing utilities
- 32 along the route of the proposed work prior to using any mechanical equipment. If mechanical
- 33 equipment is allowed at a particular location, it may only be used after the completion by the
- 34 Contractor of a successful exhaustive search by hand (or vacuum equipment) methods to locate
- 35 all existing facilities as indicated on the plans, and/or as indicated on the ground by USA or
- 36 Owner's personnel.
- 37 E. Provide Field Engineering per Contract General Conditions and Division 1 to record the location
- 38 of all utilities encountered. Where locational conflicts exist between existing utilities and the
- 39 planned location of facilities to be constructed under the Contract, submit detailed information to

1 the Owner's Inspector and Engineer for review and direction.

2 F. Maintain all existing utility mains and service lines in constant service during construction of the
3 Work.

4 G. Where service disruptions are allowed, minimize the length of such disruptions by proper
5 scheduling and diligent pursuit of the work.

6 PART 2 - PRODUCTS

7 2.1 FILL MATERIALS

8 A. Fill Type S1, S2, S4 and S5, as specified in Division 31 Specification Section SOIL
9 MATERIALS.

10 PART 3 - EXECUTION

11 3.1 PREPARATION

12 A. Protect plant life, lawns, trees, shrubs, and other features not authorized for removal.

13 B. Protect existing structures, fences, sidewalks, curbs, and other improvements from excavation
14 equipment and vehicular traffic.

15 C. Maintain and protect above and below grade utilities which are to remain.

16 D. Comply with all provisions of the Construction Safety Orders and General Safety Orders of the
17 California Division of Industrial Safety, as well as all other applicable regulations as they pertain
18 to the protection of workers from the hazard of caving ground in excavations.

19 3.2 EXCAVATION

20 A. Excavate soil required to locate existing utilities and install the work.

21 B. Use hand methods of excavation to locate existing utilities, and to excavate trenches, pits and
22 holes in congested areas.

23 C. Employ equipment and methods appropriate to the work site. Small mechanical excavators
24 may be used only in areas where there is sufficient space so as not to damage adjacent
25 improvements, and where the locations of all existing utilities have been determined by hand
26 methods of excavating.

27 D. Cut trenches just wide enough to enable installation and proper bedding and backfill, and to
28 allow inspection.

29 E. Do not interfere with 45 degree bearing splay of foundations.

30 F. Hand trim excavation. Hand trim for bell and spigot pipe joints. Remove loose material.

31 G. Excavate trenches, pits or holes bottoming in hardpan to a minimum of 6 inches below the
32 grade for the bottom of the pipe and any couplings, and then backfill to the pipe grade with Type
33 S2, S4 or S5 material, thoroughly compacted. No additional payment will be made for such
34 over-excavation and refill.

H. In all trenches or excavation sites where a firm foundation is not encountered, such as soft, spongy, or otherwise unsuitable material, remove the material to a minimum of 12 inches, or to a depth determined by the Engineer, below the bottom of the proposed pipe or structure, and backfill the space with Type S2, S4 or S5 material containing sufficient moisture to allow compaction to 90% relative compaction. No additional payment will be made for such additional excavation or backfill.

I. Excavate trenches to provide the design grade of the facility, or as directed by the Engineer.

J. Stockpile excavated material to be returned to trench adjacent thereto in location which will not be detrimental to existing improvements, or pedestrian or vehicular traffic. Remove from site all unsuitable or excess material not to be used.

K. When excavating through tree roots, perform work by hand and cut roots, where authorized, with a saw.

L. Remove excess soil not used as backfill from the work site. Obtain a disposal site off of the Owner's property and legally dispose of said excess material, all at no additional cost to the Owner.

M. If water is encountered during excavations, provide all dewatering measures necessary to construct improvements shown.

N. Contractor shall make all provisions necessary, including but not limited to, shoring or sloping back trench walls as required to address sandy soils. The cost of these provisions shall be included in the lump sum amount bid for this work and no separate payment will be made therefore.

3.3 PROTECTION OF EXCAVATIONS

A. Provide all shoring and bracing as required and those codified in local, state and federal safety regulations.

B. Prevent water, caving or sloughing ground from entering excavations.

C. Maintain excavations free of water.

3.4 BACKFILLING

A. Provide type S2 or S5 pipe bedding as required by Plans and compact to 90% of the maximum dry density.

B. After installation of pipes and appurtenances and placement of pipe bedding material, backfill trenches and excavations to finished grade, or subgrade in areas to receive surface improvements

C. Backfill trenches above pipe bedding material and to within 24 inches of finish subgrade with Type S1, S2, S4 or S5 soils, except that that top 12 inches shall be type S2, S3, S4 or S5 soils.

D. Employ a placement method that does not disturb or damage existing or proposed pipes or other Utilities or Improvements.

E. Place and compact all soil backfill in continuous layers not exceeding 8 inches in uncompacted thickness.

- 1 F. Maintain optimum moisture content of fill materials to attain required compaction density.
- 2 G. Backfill final 12-inch thickness to finish subgrade in areas to receive concrete, asphalt-concrete,
3 aggregate base, or other non-vegetative surface improvement, with Type S2, S4 or S5 soils.
- 4 H. Backfill final 12-inch thickness to finish subgrade in areas to receive sod, other vegetation, or
5 bare soil, with Type S2 or S3 soils.
- 6 I. Compact backfill below the top 12-inches to 90% relative compaction.
- 7 J. In areas to receive buildings, structures, or concrete flatwork, compact the top 12-inches to 92%
8 relative compaction.
- 9 K. In areas to receive asphalt concrete pavements, compact the top 12-inches to 92% relative
10 compaction.
- 11 L. In planting areas, compact the top 12-inches to 85% relative compaction.
- 12 3.5 TOLERANCES
- 13 A. Top Surface of Backfill under Paved or Concrete Areas: Plus or minus 0.02 feet from required
14 elevations.
- 15 B. Top Surface of General Backfilling: As required for finish surface to match adjacent
16 improvements or ground.
- 17 3.6 FIELD QUALITY CONTROL
- 18 A. Field inspection and testing will be performed under provisions of General Conditions and/or
19 Division 1.
- 20 B. Compaction testing will be performed in accordance with ANSI/ASTM D1557.
- 21 C. If tests indicate work does not meet specified requirements, recompact, and retest. Retests
22 required due to failure of initial tests shall be paid for by the Contractor.
- 23 3.7 PROGRESS AND PROSECUTION
- 24 A. Backfill any excavation opened in any day on that same day.
- 25 END OF SECTION

1 SECTION 31 31 00 - SOIL STERILIZATION

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY:

- 7 A. This Section includes the following:

- 8 1. Provide all material, labor, equipment and services necessary to provide soil sterilization
9 under all new asphaltic-concrete pavement.

10 1.3 RELATED SECTIONS:

- 11 A. All Division 00 Specification Sections
12 B. All Division 01 Specification Sections
13 C. Section 312000 – Earthwork: Excavation, Filling, and Grading
14 D. Section 312333 – Trench Excavation and Backfill
15 E. Section 321126 – Aggregate Base Course
16 F. Section 321216 – Asphalt Paving

17 1.4 REFERENCES

- 18 A. In accordance with the following:

19 CBC California Building Code, California Code of Regulations,
20 Title 24, Part 2, CCR-T24.
21 USDA United States Department of Agriculture.
22 EPA Environmental Protection Agency.
23 All applicable Environmental Regulations and Standards.

24 1.5 QUALITY ASSURANCE

- 25 A. Provide licensed operator to apply soil sterilant.
26 B. All products shall comply with the current EPA regulations at time of application.
27 C. Should the products listed become unavailable because of changes in the law, submit
28 substitute products for review by the Owner.

29

SUBMITTALS

A. Submit in accordance with Specification Section SUBMITTAL PROCEDURES.

1. Product data for each type of product specified.

- a. Include the EPA Registered Label showing active ingredients and their percentages.

2. Quality Assurance/Control Submittals:

a. Certificates:

- 1) Indicating compliance with applicable regulations for all products, signed by product manufacturer.

- 2) Installer's qualifications for product specified.

b. Manufacturer's instructions for each type of product specified.

1.8 COORDINATION

A. Coordinate with other work, including subgrade preparation and asphalt-concrete paving.

PART 2 - PRODUCTS

1.1 MATERIALS

A. Soil Sterilant: Treflan, weed and grass preventer, or approved equivalent.

PART 3 - EXECUTION

1.1 EXAMINATION

A. Verify that site is ready for application.

1.2 PREPARATION

A. Identify installation locations.

B. Employ equipment and methods appropriate to the work site.

C. Provide vehicular and traffic controls as required until after paving has been completed.

1.3 APPLICATION

A. Thoroughly water soak surface to be treated. Avoid excessive water runoff.

B. Apply sterilant solution over surface to receive pavement or surfacing prior to the start of pavement or surfacing installation.

C. Apply in spray form, at rate as allowable by State of California.

D. Take all precautions to limit soil sterilant solution to areas immediately under proposed pavement or surfacing. Use shields as necessary, and do not apply under windy conditions.

1.4 FIELD QUALITY CONTROL

A. Perform application under the supervision of the Owner's inspector..

END OF SECTION

1 SECTION 32 11 26 - AGGREGATE BASE COURSE

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY:

- 7 A. This Section includes the following:

- 8 1. Provide all material, labor, equipment and services necessary to install aggregate base
9 surfacing as indicated by the Contract Documents.

10 1.3 RELATED SECTIONS

- 11 A. All Division 00 Specification Sections
12 B. All Division 01 Specification Sections
13 C. Section 312000 – Earthwork: Excavation, Filling, and Grading.
14 D. Section 312333 – Trench Excavation and Backfill.
15 E. Section 313100 – Soil Sterilization.
16 F. Section 321216 – Asphalt Paving.

17 1.4 REFERENCES

- 18 A. All Division 00 Specification Sections
19 B. All Division 01 Specification Sections
20 C. Section 311100 - Site Clearing and Demolition
21 D. Section 312000 – Earthwork: Excavation, Filling and Grading
22 E. Section 312222 – Soils Materials
23 F. Section 312333 - Trench Excavation and Backfill
24 G. SSCDOT - Standard Specifications, Department of Transportation, State of California
25 (Caltrans), latest edition, except for references to method of payment, and references to any
26 state furnished materials.

27 1.5 QUALITY ASSURANCE

- 28 A. Provide and install in accordance with SSCDOT.

29 1.6 SUBMITTALS

- 30 A. Submit data sheets from supplier to document compliance with SSCDOT requirements.
31 B. Certificates of compliance for material.
32 C. Load tags for delivered material.

33 1.7 COORDINATION

- 34 A. Coordinate with other work, including subgrade preparation and soil sterilization.
35 B. Coordinate installation schedule with Owner's use of the premises and with other contractors
36 working at the site.

PART 2 - PRODUCTS

1.1 MATERIALS

- A. Aggregate Base: Unless specified otherwise on Plans, Class 2, 3/4 Inch Maximum per Section 26 of SSCDOT.

PART 3 - EXECUTION

1.1 EXAMINATION

- A. Verify quantities required.
B. Verify that subgrade has been placed and compacted per Contract Documents
C. Verify gradients and elevations of subgrade are correct.

1.2 INSTALLATION OF AGGREGATE BASE COURSE

- A. Install in conformance with SSCDOT Section 26, Aggregate Bases.
B. Thickness - As shown on construction drawings.
C. Spreading and Compacting - In accordance with Section 26, SSCDOT. The relative compaction of each layer of compacted base material shall be not less than 95 percent.
D. The completed surface shall be thoroughly compacted, free from ruts, depressions, and irregularities, true to grade and cross-section.
E. Lines and grades for the installation of aggregate base shall be set by a California licensed Land Surveyor or Civil Engineer, at Contractor's expense.

1.3 TOLERANCES

- A. Compacted thickness of aggregate base: Not less than the thickness specified on the Plans.
B. Finished Surface: Within 0.02 foot of planned grade per Section 26, SSCDOT. No more than 50% of the finish surface shall be above or below the specified grade for aggregate base.

1.4 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed by the Owner's inspector, under provisions of Division 01.

1.5 PROTECTION

- A. Immediately after placement and compaction, protect surface from mechanical injury.
B. Protect completed surface until surfacing layers are in place.

END OF SECTION

1 SECTION 32 12 16 - ASPHALT PAVING

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and Division 01 Specification Sections, apply to this Section.

6 1.2 SUMMARY

- 7 A. This Section includes the following:

- 8 1. Provide all material, labor, equipment and services necessary to completely install all
9 pavement materials, accessories and other related items as required by the Contract
10 Documents.

11 1.3 RELATED SECTIONS:

- 12 A. All Division 00 Specification Sections
13 B. All Division 01 Specification Sections
14 C. Section 312200 - Earthwork: Excavation, Filling, and Grading
15 D. Section 312333 - Trench Excavation and Backfill
16 E. Section 313100 - Soil Sterilization.
17 F. Section 321126 - Aggregate Base Course.

18 1.4 REFERENCES

- 19 A. SSCDOT - Standard Specifications, Department of Transportation, State of California
20 (Caltrans), latest edition, except for references to method of payment, and references to any
21 state furnished materials.

22 1.5 QUALITY ASSURANCE

- 23 A. Perform work in accordance with SSCDOT.
24 B. Mixing Plant: Conform to SSCDOT.
25 C. Installation Criteria: Asphalt concrete shall show no evidence of cracking, uneven settlement,
26 improper drainage, or untoward junctions with adjoining or existing surfaces. Work displaying
27 such conditions shall be corrected under the Contractor's guarantee of all work.

28 1.6 SUBMITTALS

- 29 A. Submit under provisions of Division 01.
30 B. Mix design
31 C. Certificates of compliance for material.
32 D. Load tags for delivered material.

33 1.7 COORDINATION

- 34 A. Coordinate with other work, including subgrade preparation, aggregate base placement and
35 soil sterilization.

36 1.8 ENVIRONMENTAL REQUIREMENTS

- 37 A. Do not place asphalt-concrete when atmosphere temperature is less than 50 degrees F, or
38 surface is wet or frozen.
39

PART 2 - PRODUCTS

1.1 MATERIALS

- A. Paint Binder: In accordance with SSCDOT Section 94, Asphaltic Emulsions.
- B. Asphalt-Concrete: Type B in accordance with Section 39, SSCDOT, ½ inch or ¾ inch maximum aggregate (medium) as indicated on the Plans. The asphaltic concrete shall be compacted to an average relative compaction of 97 percent, with no single test value being below a relative compaction of 95 percent based on a 50 blow Marshall maximum density. Use asphalt binder performance grade PG 64-10.
- C. Seal Coat: Asphalt based seal coat shall be "Guardtop" as manufactured by Industrial Asphalt, Irwindale, California, or approved equivalent.

PART 3 - EXECUTION

1.1 EXAMINATION

- A. Verify quantities required. New asphalt-concrete paving is required at all locations shown on the plans, and where existing asphalt-concrete paving to remain is removed or damaged by the Project excavation or related work.
- B. Verify that subgrade or base material has been compacted to required relative compaction and is dry.
- C. Verify gradients and elevations of base are correct.
- D. Verify that subgrade or base material has been sterilized per Section 313100 SOIL STERILIZATION.

1.2 AGGREGATE BASE

- A. Where shown on the construction plans, place and compact aggregate base course per Section 321126 AGGREGATE BASE COURSE.
- B. Where shown on the construction plans, place asphalt on compacted earth subgrade per Section 312000 EARTHWORK: EXCAVATION, FILLING AND GRADING and Section 312300 TRENCH EXCAVATION AND BACKFILL.
- C. A soil sterilant shall be applied over the entire area which is to be paved in accordance with Section 313100 SOIL STERILIZATION

1.3 PREPARATION – PAINT BINDER

- A. Apply paint binder to existing asphalt-concrete or concrete surfaces which will be in contact with asphalt-concrete surfacing.
- B. Rate of application for all surfaces against which asphalt concrete is to be placed shall be no less than 0.02 and no more than 0.05 gallons per square yard. All vertical concrete surfaces which will be in contact with asphalt concrete surfacing and all areas now in place which will be covered with new surfacing materials and feathering operations shall be coated with a paint binder applied at the rate of 0.05 gallons per square yard.

1.4 INSTALLATION OF ASPHALTIC-CONCRETE

- A. Install in conformance with SSCDOT Section 39, Asphalt-Concrete.
- B. Thickness - As shown on construction plans. Where thickness exceeds 3 inches, place in no less than 2 layers with top layer no thicker than one inch. Asphaltic concrete shall be laid to the thickness designated on the Plans. The plan thickness is to be considered as a minimum thickness. The Contractor shall lay the asphaltic concrete to a depth required to insure that, after compaction, the in place compacted thickness is equal to or greater than the specified plan thickness.

C. The Contractor shall provide to the Engineer the truck delivery weight tags for the asphaltic concrete material. The quantity delivered shall be equal to or greater than the calculated in place quantity based on the specified thickness and area to be paved as designated on the construction plans and based on a unit density of the asphaltic concrete of 141 pounds per cubic feet.

D. Asphalt type: PG 64-10

E. Compaction Equipment - In accordance with Section 39, SSCDOT. At small difficult areas, equipment may be altered as approved by Engineer.

F. The completed surface shall be thoroughly compacted, free from ruts, depressions, and irregularities and to be true to grade and cross-section.

1.5 TOLERANCES –GENERAL

A. Finished Surface: within 0.02 foot of planned grade.

B. Flatness: Maximum variation of 1/4 inch measured with 10-foot straight edge.

C. Scheduled Compacted Thickness: Not less than specified.

1.6 INSTALLATION OF SEAL COAT

A. Immediately prior to applying the sealer, the surface shall be cleaned of all loose material which might adversely affect bonding of the sealer. Any standard cleaning method such as power sweepers and blowers may be employed.

B. Where cracks in pre-existing pavement exceed 1/2 inch in depth or 1/4 inch in width, or both, they shall be thoroughly cleaned and repaired with asphalt crack filler material before placing the sealer. All cracks between 1/8" and 1/4" in width shall be filled with "Guardtop Crackfiller", as manufactured by Industrial Asphalt, or approved equivalent, in accordance with the manufacturer's recommendations.

C. Whether or not specifically indicated on the plans, all potholes and badly distorted or depressed areas, except those lying within areas designated for pavement removal and replacement, shall be properly cleaned and repaired by applying a binder coat and hot mix asphalt concrete patch conforming to the requirements of Section 39, SSCDOT, before placing the seal coat. Any vegetation such as soil sterilant approved by the Engineer shall be applied to the area and any required pavement patching shall then be completed.

D. A prime coat of SS-1 asphalt emulsion diluted with water, to 5 parts water to 1 part asphaltic emulsion, shall be applied to all existing (not new) pavement surfaces at a rate of application of 0.05 to 0.10 gallon of diluted primer per square yard.

E. Following the prime coat, two coats of asphalt based seal coat shall be applied. The first coat shall have added to it a silica sand mineral filler which has passed a 50-mesh screen. Apply at a rate of 2 to 3 pounds per 1 gallon of concentrated sealer. When the first coat is dry enough to walk on without picking the material up, a second coat shall be applied without mineral filler. If the manufacturer indicates that the product may be diluted, it may be diluted with no more than 20 percent by volume clean fresh water with the prior approval of the Engineer. The total application rate shall be a minimum of 35 to 45 gallons of undiluted product per 1,000 square feet, as directed by the Engineer. The finished surface shall be smooth and uniform in appearance. If existing depressions are such that aggregate still protrudes after the second coat of asphalt based sealer has been applied, the Contractor shall apply a third coat when so directed by the Engineer.

1. Seal Coat (for new pavement) - a minimum of 20 gallons of undiluted product per 1,000 square feet, as directed by the Engineer.

2. Seal Coat (for existing pavement) - 35 to 40 gallons of undiluted product per 1,000 square feet, as directed by the Engineer.

F. Allow asphalt-concrete to cure 21 days minimum prior to sealing, or as otherwise recommended by the manufacturer.

G. Broom clean asphalt-concrete prior to sealing.

H. Protect sealed surface until it is cured.

1.7 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Division 01.

B. Pavement shall comply with the following:

1. Water shall not be able to accumulate at any point and the surface shall be free to drain to drainage inlets or gutters.

2. The paving contractor shall water flood the surface with the use of a water truck. If, after 30 minutes on a 70 degree F day, "bird baths" are evident in a depth more than 0.01 foot, the paving contractor and the Owner's representative will determine the best method of correction.

3. A 10 foot straightedge shall be used to check for high spots and ridges. High spots and ridges out of compliance shall be reduced by a remedy determined by the paving contractor and the Owner's representative.

C. Should a section of the work be not acceptable on the basis of inadequate compaction and/or the mixture becomes loose and broken, mixed with dirt, out of tolerance, or in any other way defective, it shall be repaired or removed and replaced with fresh mixture and immediately compacted to conform to the surrounding area to the satisfaction of the Owner.

1.8 PROTECTION

A. Immediately after placement, protect pavement from mechanical injury.

B. Protect sealed surface until it is cured.

END OF SECTION

SECTION 32 13 13 - SITE CONCRETE IMPROVEMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES

- A. Provide all material, labor, equipment and services necessary to completely install exterior Portland cement flatwork, cast-in-place concrete, and architectural flatwork concrete, accessories and other related items, slabs, ramps and sidewalks and walkways, curb and gutter, mowstrips, and other miscellaneous concrete items of the form and dimensions shown on the plans and necessary to complete the project, and in accordance with the requirements of the Standard Specifications as modified and supplemented by these Special Provisions
- B. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specifications sections, apply to the work of this section.

1.3 RELATED SECTIONS:

- A. Section 312000 - Earthwork: Excavation, Filling, and Grading

1.4 REFERENCES

- A. SSCDOT - Standard Specifications, Department of Transportation, State of California (Caltrans), latest edition, except for references to method of payment, and references to any state furnished materials.
- B. ACI standards, including but not limited to #304, 305, 306, 308, 309 and 347.
- C. ASTM standards, including but not limited to #C-33, C-39, C-94, C-136, C-143, C-150, and C-309.

1.5 QUALITY ASSURANCE

- A. Furnish concrete materials conforming with SSCDOT.
- B. Perform work in accordance with SSCDOT, unless noted otherwise herein.

1.6 SUBMITTALS

- A. Submit under provisions of Specification Section SUBMITTALS.
1. Certificates of compliance for materials and mix designs.
 2. Load tags for delivered material.
 3. Strength testing as required by the approving agency.
 4. Integral color sample, where applicable.
 5. Application instructions for the architectural finish materials.
 6. Accessories and manufacturer's installation specifications.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Concrete shall be 6-sack conforming to the requirements of Section 90 of the Standard Specifications, and shall have a minimum compressive strength of 3,500 psi at 28 days.

Portland cement shall be Type II Modified and aggregate gradation shall conform to the requirements of Subsection 90-3.4 for 1-inch maximum grading.

- B. Reinforcement shall comply with relevant portions of Division 31 Specification Section CONCRETE REINFORCEMENT.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Subgrade shall conform to the requirements of Division 31 Specification Section EARTHWORK: EXCAVATION, FILLING AND GRADING. The District may elect to verify compacted subgrade elevations by measurement made from adjacent existing improvements or by a template supported by forms.

3.2 GENERAL CONCRETE

- A. Concrete placement shall conform to the applicable requirements of Standard Specification Sections 51 and 90. Concrete shall not be placed when the air temperature in the shade at the project site exceeds 95° F or is below 45° F, or when the temperature of the concrete exceeds 85° F.
- B. After the concrete has been placed, it shall be struck off to proper section and compacted with a grid of parallel metal bars until a layer of mortar not less than 3/8 inch thick has been brought to the surface. All exposed concrete surfaces shall receive a medium broom finish applied transversely to the line of pedestrian traffic or to the longest dimension of the concrete, as applicable.
- C. General concrete surfaces shall be cured by the curing compound method and shall be protected in accordance with the provisions of Subsections 90-7 and 90-8 of the Standard Specifications.

3.3 PROTECTION OF CONCRETE

- A. The Contractor shall be responsible for the condition of all concrete work until such time as all work has been completed and is accepted by the District. The Contractor shall limit vehicular travel across concrete until such time as the concrete has achieved strength sufficient that it can support traffic without damage. In no case, however, will vehicles be allowed to travel across new concrete improvements until seven calendar days have passed since the concrete was placed.

3.4 CONCRETE JOINTS

- A. Expansion joints and weakened plane joints shall be constructed at the locations shown on the plans or as directed by the Engineer. Where joint locations are not specified on the plans, expansion joints shall be constructed at maximum intervals of 45 feet, and weakened plane joints shall be constructed at maximum intervals of 15 feet.
- B. Expansion joints shall be considered as weakened plane joints for the purpose of spacing weakened plane joints. Expansion joints shall be tooled with a ½ inch maximum radius edger, and shall be filled with ½ inch pre-formed expansion joint filler.

3.5 CONCRETE FINISHES

- A. Where concrete is being installed adjacent to or near existing concrete improvements, match the finish of similar concrete surfaces, i.e. new sidewalks shall match existing sidewalks, new curbs shall match existing curbs, etc.
- B. Sidewalks and Mowstrips: Medium sweat finish or medium broom finish as required to match existing finishes.
- C. Curbs: Trowel smooth and finish with a light brush.

D. Gutters: Medium broom finish

E. Drive approaches and wheelchair ramps: Broom Finish, perpendicular to the direction of travel

3.6 INSTALLATION OF ACCESSORIES

A. Strictly comply with manufacturer's instructions and recommendations and approved details.
Securely anchor work to substrate.

3.7 REPAIR AND CLEAN-UP

A. Contractor shall legally remove all trash, debris, containers and excess materials from the site on a periodic basis, and shall keep the work broom clean until Owner's acceptance.

B. The Contractor shall be held responsible for the repair and/or replacement of new or existing improvements damaged as a result of this work to the satisfaction of the Owner.

C. The Contractor shall provide roll-off bins for wash-out of ready mix concrete trucks and pumbers. Do not allow concrete debris or cement water onto soils scheduled for landscape planting.

END OF SECTION

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1 SECTION 321315 - CONCRETE REINFORCEMENT

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and Division 01 Specification Sections, apply to this Section.

6 1.2 RELATED SECTIONS

- 7 A. Section 321313 - Site Concrete Improvements.

8 1.3 SUBMITTALS

- 9 A. Submit in accordance with Specification Section SUBMITTALS and the Contract General
10 Conditions.

- 11 1. Mill test certificates identifying chemical and physical analysis of each load of reinforcing
12 steel delivered. If mill test reports are not available and the quantity of steel for a
13 structure exceeds 5 tons, provide a laboratory test to prove yield strength and bending.

- 14 2. Drawings and placing diagrams for each grade slab including dowels and corner bars.

- 15 3. On the placing diagrams, show all openings for pipelines and architectural features.
16 Include additional reinforcing at openings and corner bar arrangements at intersecting
17 beams, walls, and footings.

- 18 4. Coordinate placing diagrams with the concrete placing schedule.

19 1.4 PRODUCT DELIVERY

- 20 A. Deliver reinforcement to project site in bundles marked with tags indicating bar size and length.

- 21 B. Store on wooden supports above ground surface.

22 PART 2 - PRODUCTS

23 2.1 BARS

- 24 A. Bars shall be deformed billet steel conforming to ASTM A 615, Grade 40. Mixing of steel
25 grades will not be allowed.

26 2.2 BAR SUPPORTS

- 27 A. Bar support shall be concrete or metal chairs, spacers or hangers. Reinforcing bars shall not be
28 supported by forms.

29 2.3 TIE WIRE

- 30 A. Tie wire shall be annealed steel wire of not less than 16-gauge.

31 PART 3 - EXECUTION

32 3.1 PLACEMENT

- 33 A. Position reinforcement in accordance with the drawings, secure with wire ties or suitable clips at
34 all intersections, and support by an adequate number of concrete or metal chairs, spacers, or
35 metal hangers such that reinforcing bars do not sag more than one quarter of an inch (1/4")
36 between supports. Do not place reinforcement or supports in contact with the forms. Bend tie
37 wires away from the forms in order to provide the specified concrete coverage. To secure
38 reinforcement in position, the Contractor may elect to locate bars additional to those shown on
39 the drawings, but at no additional cost to the Owner.

- 11
- END OF SECTION

SECTION 323310 - TACTILE/DETECTABLE WARNING SURFACE TILE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section

1.2 SECTION INCLUDES

- A. Surface Applied tactile tile modules where indicated.

1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's literature describing products, installation procedures and routine maintenance.
- B. Samples for Verification Purposes: Submit two tile samples minimum, 6 inch by 8 inch of kind proposed for use.
- C. Shop drawings are required for products specified showing fabrication details; composite structural system; plans of tile placement including joints, and material to be used as well as outlining installation materials and procedure.
- D. Material Test Reports: Submit test reports from qualified independent testing laboratory indicating that materials proposed for use are in compliance with requirements and meet the properties indicated. All test reports shall be conducted on Surface Applied tactile tile system as certified by a qualified independent testing laboratory.
- E. Maintenance Instructions: Submit copies of manufacturer's specified maintenance practices for each type of tactile tile and accessory as required.

1.4 QUALITY ASSURANCE

- A. Provide Surface Applied tactile tiles and accessories as produced by a single manufacturer.
- B. Installer's Qualifications: Engage an experienced Installer certified in writing by tactile manufacturer as qualified for installation, who has successfully completed tile installations similar in material, design, and extent to that indicated for Project.
- C. Americans with Disabilities Act (ADA): Provide tactile warning surfaces that comply with detectable warnings on walking surfaces section of Americans with Disabilities Act (Title 49 CFR TRANSPORTATION, Part 37.9 STANDARDS FOR ACCESSIBLE TRANSPORTATION FACILITIES, Appendix A, Section 4.29.2 DETECTABLE WARNINGS ON WALKING SURFACES.
- D. California Code of Regulations (CCR): Provide only approved DSAAC detectable warning products as provided in the California Code of Regulations (CCR). Title 24, Part 1, Articles 2, 3 and 4 and Part 2, Section 205 definition of "Detectable Warning". Section 11B-406 for "Curb ramps, blended transitions and islands" and Section 11B-705 for "Detectable warnings and detectable directional texture".
- E. Detectable Warning Texture: Division of the State Architect (DSA Access Compliance) approved products shall be used, compliance with CBC Section 11B-705.2, IRs 11B-2, 11B-3 and 11B-4 and the California Accessibility Reference Manual.
1. Truncated Domes: provide raised Detectable Warnings with diameter of 0.9 inch at base tapering to 0.45 inch at top, height of 0.2 inch, with center-to-center spacing of 2.35 inches and corner domes spaced at 0.896 inch from the corner edges of tile. Provide raised truncated domes in a square grid (in-line) pattern.

- a. Truncated Dome: shall contrast visually with adjoining surfaces, light-on-dark or dark-on-light. Material used to provide contrast shall be integral part of walking surface. Warning surface shall differ from adjoining surface in resiliency or sound to cane contact.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Tiles shall be suitably packaged or crated to prevent damage in shipment or handling. Finished surfaces shall be protected by sturdy wrappings and tile type shall be identified by part number.
- B. Tiles shall be delivered to location at building site for storage prior to installation.

1.6 SITE CONDITIONS

- A. Environmental Conditions and Protection: Maintain minimum temperature of 40°F in spaces to receive tactile tiles for at least 48 hours prior to installations, during installation, and for not less than 48 hours after installation. Store tactile tile material in spaces where they will be installed for at least 48 hours before beginning installation. Subsequently, maintain minimum temperature of 40°F in areas where work is completed.
- B. The use of water for work, cleaning or dust control, etc. shall be contained and controlled and shall not be allowed to come into contact with the passengers or public. Provide barricades or screens to protect passengers or public.
- C. Disposal of any liquids or other materials of possible contamination shall be made in accordance with federal state and local laws and ordinances.
- D. Cleaning materials shall have code acceptable low VOC solvent content and low flammability if used on the site.

1.7 EXTRA STOCK

- A. Deliver extra stock to storage area designated by engineer. Furnish new materials from same manufactured lot as materials installed and enclose in protective packaging with appropriate identification for Surface Applied tactile tiles. Furnish not less than two (2) percent of the supplied materials for each type, color and pattern installed.

1.8 WARRANTY (DETECTABLE WARNINGS AND DIRECTIONAL TEXTURE)

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of detectable warnings and directional surface products that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
 - a. Shape, color fastness, confirmation, sound-on-cane acoustic quality, resilience, and attachment will not degrade significantly.
 - b. Degrade significantly means that product maintains at least 90 percent of its approved design characteristics, as determined by the authority having jurisdiction.
 2. Warranty Period: Five years from date of Final Completion.
 3. Authority: California Building Code Sections 11B-406 and 11B-407, Division of the State Architect Interpretation of Regulations (IR) 11 B-2, 11B-3 11B-4.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
1. Engineered Plastics Inc., Armor Tile.
 2. ADA Solutions, Inc., North Billerica, MA.
- B. Detectable Warning Texture: Division of the State Architect (DSA/Access Compliance) approved products shall be used, compliance with CBC Section 11B-705.2, IRs 11B-2, 11B-3 and 11B-4 and the California Accessibility Reference Manual.
1. Truncated Domes: provide raised Detectable Warnings with diameter of 0.9 inch at base tapering to 0.45 inch at top, height of 0.2 inch, with center-to-center spacing of 2.35 inches and corner domes spaced at 0.896 inch from the corner edges of tile; Provide raised truncated domes in a square grid (in-line) pattern.
 - a. Truncated Dome: shall contrast visually with adjoining surfaces, light-on- dark or dark-on-light. Material used to provide contrast shall be integral part of walking surface. Warning surface shall differ from adjoining surface in resiliency or sound to cane contact.
 2. Detectable Warning Texture (Truncated Domes): Plastics/Composites: Armor Tile, ADA Tactile Systems by Engineered Plastics Inc., North Billerica, or equal.
- C. The Vitrified Polymer Composite (VPC) Surface Applied Tactile Tile specified is based on Armor-Tile manufactured by Engineered Plastics Inc. Existing engineered and field tested products which are subject to compliance with requirements, may be incorporated in the work and shall meet or exceed the specified test criteria and characteristics.
- D. Color: Yellow conforming to Federal Color No. 33538. Color shall be homogeneous throughout the tile.

2.2 MATERIALS

- A. Fasteners: Color matched, corrosion resistant, flat head drive anchor: W diameter x 1 3/4" long, or manufacturer's recommended fasteners.
- B. Adhesive and Sealant: Manufacturer's standard.

PART 1 - EXECUTION

3.1 INSTALLATION

- A. During all surface preparation and tile installation procedures, ensure adequate safety guidelines are in place and that they are in accordance with the applicable industry and government standards.
- B. The application of all tile, adhesives, mechanical fasteners, and caulking shall be in strict accordance with the guidelines set by their respective manufacturers.
- C. Ensure that surfaces being prepared and fabricated to receive the tiles are constructed correctly and adequately for tile installation. Review design drawings with the Contractor prior to the construction and refer any and all discrepancies to Engineer.
- D. Set the tile true and square to the curb ramp area as detailed in the design drawings, so that its location can be marked on the concrete surface. Use thin permanent marker. Remove tile when done marking its location.
- E. The surface to receive the detectable warning surface tile (not recommended for asphalt) is to be mechanically cleaned with diamond cup grinder or shot blaster to remove any dirt or foreign material. This cleaning and roughening of the concrete surface should include at least 4 inches around the perimeter of the area to receive the tile, and also along the cross

- 1 pattern established by the corresponding areas on the backside of the tile. Those same
2 areas should then be cleaned with a rag soaked in Acetone.
- 3 F. Immediately prior to installing the detectable warning surface tile, the concrete surfaces
4 must be inspected to ensure that they are clean, dry, free of voids, curing compounds,
5 projections, loose material, dust, oil, grease, sealers and determined to be structurally
6 sound and cured for minimum of 30 days.
- 7 G. Using Acetone, wipe the backside of the tile around the perimeter and along the internal
8 cross pattern, to remove any dirt or dust particles from the area to receive the adhesive.
- 9 H. Apply the adhesive on the backside of the tile, following the perimeter and internal cross
10 pattern established by the tile manufacturer. Sufficient adhesive must be placed on the
11 prescribed areas to have full coverage across the 2" width of the adhesive locator. A 3 x 4
12 foot tile will typically require an entire tube of adhesive.
- 13 I. Set the tile true and square to the curb ramp area as detailed in the design drawings.
- 14 J. Standing with both feet applying pressure around the molded recess provided in the tile,
15 drill a hole true and straight to a depth of 3W using the recommended diameter bit. Drill
16 through the tile without hammer option until the tile has been successfully penetrated, and
17 then with hammer option to drill into the concrete.
- 18 K. Immediately after drilling each hole, and while still applying foot pressure, vacuum, brush or
19 blow away dust and set the mechanical fastener as described below, before moving on to
20 the next hole.
- 21 L. Mechanically fasten tiles to the concrete substrate using a hammer to set the fasteners.
22 Ensure the fastener has been placed to full depth in the dome, straight, and flush to the top
23 of dome. Drive the pin of the fastener with the hammer, taking care to avoid any inadvertent
24 blows to the truncated dome or tile surface. A plastic deadblow or leather hammer is
25 recommended.
- 26 M. Working in a sequence that will prevent buckles in the tile, proceed to drill and install all
27 fasteners in the tile's molded recesses.
- 28 N. Following the installation of the tiles, the perimeter caulking sealant should be applied.
29 Follow the perimeter caulking sealant manufacturer's recommendations when applying.
30 Tape all perimeter edges of the tile and also tape the adjacent concrete back 1/2" from the
31 tile's perimeter edge. Tool the perimeter caulking with a plastic applicator or spatula to
32 create a straight edge in a cove profile between the tile and adjacent concrete. Remove
33 tape immediately after tooling perimeter caulking sealant.
- 34 O. Do not allow foot traffic on installed tiles until the perimeter caulking sealant has cured
35 sufficiently to avoid tracking.
- 36 P. If installing adjacent tiles, note the orientation of each tile. Careful attention will reveal that
37 one of the long edges of the tile is different than the other, in regard to the tiny dotted
38 texture. You may also note a larger perimeter margin before the tiny dotted texture pattern
39 begins. Consistent orientation of each Tile is required in order that the truncated domes on
40 adjacent tiles line up with each other.
- 41 Q. In order to maintain proper spacing between truncated domes on adjacent tiles, the tapered
42 edge should be trimmed off using a continuous rim diamond blade in a circular saw or mini-
43 grinder. The use of a straightedge to guide the cut is advisable. All cuts should be made
44 prior to installation of the tiles.
- 45 R. If installing adjacent tiles, care should be taken to leave a 1/8 inch gap between each. If
46 tiles are custom cut to size, and if pre-molded recesses (to receive fasteners) are removed
47 by the cut, then any truncated dome can be center-drilled with a 5 inch through hole, and
48 countersunk with a suitable bit, to receive mechanical fasteners. New holes should be

created no closer to the edge of the tile than any of the other perimeter fastener pre-molded recesses. Care should be taken to not countersink too deeply. Fasteners should be flush with the top of the truncated dome when countersunk properly.

S. Adhesive or caulking on the surface of the Tile can be removed with Acetone.

3.2 CLEANING AND PROTECTING

A. Protect tiles against damage during construction period to comply with tactile tile manufacturer's specification.

B. Protect tiles against damage from rolling loads following installation by covering with plywood or hardwood.

C. Clean tactile tiles not more than four days prior to project completion. Clean tactile tile by methods recommended by manufacturer.

END OF SECTION

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1 SECTION 32 84 00 - IRRIGATION SYSTEM

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary Conditions
5 and Division 01 Specification Sections, apply to this Section.

6 1.2 SCOPE OF WORK

- 7 A. Provide all materials, labor, equipment and services necessary to furnish, install and maintain the
8 Irrigation System, accessories and other related items necessary to complete the Project as
9 indicated by the Contract Documents unless specifically excluded.

10 B. Related Work Specified Elsewhere

- 11 1. Drawings and general provisions of the Contract, including General and Supplemental
12 Conditions and Division 1 Specification Sections, apply to work of this section.
13 2. Section 312000 – Earthwork: Excavation, Filling, and Grading
14 3. Section 312333 – Trench Excavation and Backfilling
15 4. Section 329000 – Landscape Planting
16 5. Section 260000 – General Electrical

17 1.3 CODES AND REGULATIONS

- 18 A. All work and materials shall be in full accordance with the following codes adopted and amended
19 by the authority having jurisdiction. Nothing in these drawings or specifications is to be construed
20 to permit work not conforming to these codes. The work described in these specifications shall
21 govern in the event that the drawings or specifications call for material or methods of construction
22 of higher quality or standard than required by these codes.

- 23 1. California Plumbing Code
24 2. California Code of Regulations
25 a. Title 8, Industrial Relations
26 b. Title 19, Public Safety
27 3. California Electrical Code
28 4. Standards and Regulations of other agencies, water utility provider, or organizations as
29 listed in this specification relating to products or procedures, e.g. American Society for Testing
30 and Materials.

31 1.4 DEFINITIONS

- 32 A. Piping: All pipe fittings, valves, and accessories as required for a complete piping system.

- 33 B. PVC: Polyvinyl Chloride.

- 34 C. Agencies and Organizations:

- 35 1. ASTM- American Society for Testing and Materials
36 2. AWWA- American Water Works Association
37 3. IAPMO- International Association of Plumbing and Mechanical Officials
38 4. NEC - National Electrical Code.

- 1 5. UL - Underwriter's Laboratories
- 2 6. SSPWC – Standard Specifications for Public Works Construction, by the American Public
- 3 Works Assoc./Associated General Contractors of California.
- 4 D. Owner: An authorized representative of the Owner or the Owner's authorized consultant.
- 5 1.5 QUALITY ASSURANCE
- 6 A. The work of this section shall be performed by a single firm experienced in irrigation work and
- 7 holding a current California Contractor's A or C27 License.
- 8 B. Qualifications of Workers
- 9 1. The Contractor shall employ skilled workers who are thoroughly trained and experienced in
- 10 irrigation system installation and who are completely familiar with the specified requirements
- 11 and methods needed for proper performance of this work.
- 12 2. The Contractor shall provide adequate supervision by a qualified foreman fluent in English that
- 13 will be continuously onsite during the performance of this work.
- 14 1.6 SUBMITTALS
- 15 A. The Contractor shall submit complete lists of proposed materials and equipment per the Division
- 16 01 Submittal Section, including manufacturer's name and model numbers. Only provide additional
- 17 product data and/or catalog cut sheets if a substitute material or equipment is proposed. No
- 18 substitution will be allowed without prior written approval by the Owner.
- 19 B. Shop drawings shall be provided for the layout and description of all equipment assemblies,
- 20 including dimensions, capacities, and other characteristics as listed in product specifications.
- 21 Materials and equipment shall not be ordered until given written approval by the Owner.
- 22 Equipment or materials installed or furnished without prior approval of the Owner may be rejected
- 23 and the Contractor shall be required to remove such materials from the site at his own expense.
- 24 C. When specific name brands of equipment and materials are used, they are intended as preferred
- 25 standards only. This does not imply any right upon the part of the Contractor to furnish other
- 26 materials unless specifically approved in writing as equal in quality and performance by the
- 27 Owner. Decisions by the Owner shall govern as to what name brands of equipment and materials
- 28 are equal to those specified on the plans and his decisions shall be final. It shall be the
- 29 responsibility of the Contractor to furnish proof as to equality of any proposed equipment or
- 30 material.
- 31 D. Approval of any item, alternate or substitute indicates only that the products apparently meet the
- 32 requirements of the drawings and specifications on the basis of the information or samples
- 33 submitted. Manufacturer's warranties shall not relieve the Contractor of his liability under the
- 34 guarantee. Such warranties shall only supplement the guarantee.
- 35 E. Acceptance of any submittals, deliverables, or other work product of the Contractor shall not be
- 36 construed as assent that the Contractor has complied with, nor in any way relieved the Contractor
- 37 of compliance with (i) the applicable standard of care, and/or (ii) applicable statutes, regulations,
- 38 rules, guidelines, and contract requirements.
- 39 F. Irrigation Equipment: When the Contractor desires to transfer irrigation equipment and/or parts to
- 40 the Owner, he must submit along with the equipment an itemized list. The Contractor is solely
- 41 responsible to obtain a written confirmation by the Owner that all materials received by the Owner
- 42 matches his material list. The transfer of materials will not be considered executed without written
- 43 confirmation of same.
- 44 1.7 EXPLANATION OF DRAWINGS
- 45 A. The intent of the drawings and specifications is to indicate and specify a complete and efficient
- 46 sprinkler irrigation system ready for use in accordance with the manufacturer's recommendations,

- 1 and all applicable local codes and ordinances. Interpretation of irrigation plans and specifications
2 shall be the responsibility of the Landscape Architect or Owner.
- 3 B. All existing systems and improvements are shown in their approximate locations. Before
4 proceeding with any work, the Contractor shall carefully check and verify all dimensions and shall
5 report any variations to the Owner.
- 6 C. Due to the scale of the drawings, it is not possible to indicate all offsets, fittings, etc., which may
7 be required. The Contractor shall carefully investigate the structural and finished conditions
8 affecting all his work, and plan his work accordingly, furnishing such fittings, etc., as may be
9 required to meet such conditions. Drawings are generally diagrammatic and indicative of the work
10 to be installed in the most direct and workmanlike manner, so that conflicts between sprinkler
11 systems, planting, utilities, and architectural features will be avoided. Locate pipe, valves and
12 other equipment in planting areas unless specifically noted otherwise.
- 13 D. All work called for on the drawings by notes shall be furnished and installed whether or not
14 specifically mentioned in the specifications.
- 15 1.8 EXISTING CONDITIONS
- 16 A. The Contractor shall not install the irrigation system as indicated on the Drawings when it is
17 obvious in the field that obstructions or differences in existing conditions and/or systems are
18 present. Such obstructions or differences should be immediately brought to the attention of the
19 Owner. Failure to provide notification prior to the start of this work shall make the Contractor liable
20 for any and all repairs and/or corrections necessary for proper functioning and coverage of the
21 system without any additional cost to the Owner.
- 22 B. The Contractor shall examine carefully the site of work contemplated and the proposal, plans,
23 specifications, and all other contract documents. It will be assumed that the Contractor has
24 investigated and is satisfied as to the conditions to be encountered, as to the character, quality,
25 and quantity of work to be performed and materials to be furnished, and as to the requirements of
26 the specifications. The Contractor shall take necessary precautions to protect existing site
27 conditions that are to remain. Should damage be incurred, the Contractor shall make the
28 necessary repair or replacement to bring it back to its original condition at his own expense.
- 29 C. Prior to cutting into the soil, the Contractor shall coordinate with the Owner to locate all cables,
30 conduits, sewers, septic tanks, and other such underground utilities as are commonly encountered
31 and he shall take proper precaution not to damage or disturb such improvements. If a conflict
32 exists between such obstacles, notify the Owner who will consider realignment of the proposed
33 work. The Contractor will proceed in the same manner if a rock layer or any other condition
34 encountered underground makes change advisable. Should utilities not shown on the plans be
35 found during excavations, Contractor shall promptly notify the Owner for instructions as to further
36 action. Failure to do so will make Contractor liable for any and all damage thereto arising from his
37 operations subsequent to discovery of such utilities not shown in plans.
- 38 D. The Contractor shall verify the correctness of all finish grades within the work area in order to
39 insure the proper soil coverage (as specified) of the sprinkler system pipes. The Contractor shall
40 verify and be familiar with location and size of the proposed water supply (P.O.C.). He shall make
41 approved type connection and install new work.
- 42 E. The Contractor shall be responsible for notifying the Owner prior to installation that equipment or
43 methods indicated on the drawings or in the specifications conflict with local codes, are
44 incompatible or an error is apparent. In the event the Contractor neglects to do this, he will accept
45 full responsibility for any revisions necessary.
- 46 F. If the project includes an existing irrigation system, the Contractor and the Owner shall verify the
47 operational condition of that portion of the existing irrigation system pertaining to the proposed
48 planting areas prior to the start of the proposed work. The Contractor shall notify the Owner of any
49 repairs and/or corrections necessary for proper functioning and coverage in the area of work. The

repairs and/or corrections shall be completed before any plant material is planted. Failure to verify the existing system's operational status and to provide notification prior to the start of this work shall make the Contractor liable for any and all repairs and/or corrections necessary for proper functioning and coverage of the system, as well as any required plant replacement, without any additional cost to the Owner.

- G. If the project includes an existing irrigation system, the Contractor shall ensure that the irrigation system for the existing landscape planting scheduled to remain that is impacted by the work shall remain continuously operational, or approved alternative irrigation methods are provided, except for brief periods not more than four (4) hours where the Contractor is making connections or modification to the existing system. Notify the Owner at least 48 hours in advance of any scheduled shut off.

1.9 MODIFICATIONS AND REPAIRS TO EXISTING SYSTEM

- A. All modifications and repairs to the existing system shall be made using new materials and components equal to the materials and components used in the new work.
- B. Modifications such as removing valves and repairs to existing main lines shall be made using epoxy coated ductile iron couplings, Smith-Blair model 411 or equal, with a minimum 3 foot length of new main line pipe matching the existing size and type.
- C. Modifications and repairs to existing lateral lines shall be made using solvent weld PVC Sch 40 couplings with a minimum 3 foot length of new pipe matching the existing size.

1.10 PERMITS

- A. The Contractor shall obtain and pay required fees to any governmental or public agency. Any permits for the installation or construction of any of the work included under this contract, which are required by any of the legally constituted authorities having jurisdiction, shall be obtained and paid for by the Contractor, each at the proper time. He shall also arrange for and pay all costs in connection with any inspections and examination required by these authorities.

1.11 TESTING

- A. General: Unless otherwise directed, tests shall be witnessed by the Owner. Work to be concealed shall not be covered until prescribed tests are made. Should any work be covered before such tests, the Contractor shall, at his expense, uncover, test and repair his work and that of other contractors to original conditions. Leaks and defects shown by tests shall be repaired and entire work re-tested. Tests may be made in sections, however, all connections between sections previously tested and new section must be included in the test.
- B. Main Line Piping: Maintain 125 psi water or air pressure in new main line piping for a duration of twenty-four (24) hours. There shall be no drop in pressure during test except that due to ambient temperature changes (+/- 5psi).
- C. After being installed at the project site, any newly installed Backflow Prevention unit must be tested and approved as functioning properly per the local water agency requirements. Approval of the backflow prevention unit must precede any final inspection of the irrigation system. All costs for testing shall be the responsibility of the Contractor.

1.12 OBSERVATION

- A. General:
1. Installation and operations must be approved by the Owner.
 2. In no event shall the Contractor cover up or otherwise remove from view any work under this contract without prior approval of the Owner. Any work covered prior to inspection shall be opened to view by the Contractor at his expense.

3. In all cases, where inspection of the irrigation system work is required and/or where portions of the work are specified to be performed under the direction and/or inspection of the Owner the Contractor shall notify the Owner, at least 48 hours in advance of the time when such inspection and/or direction is required. Any necessary re-excavation or alterations to the system needed because of failure of the Contractor to have the required inspection, shall be performed at the Contractor's own expense.
- B. Periodic observations shall be required for basic operations and installations during progression of the project. The Owner's Representative, Owner or Landscape Architect shall perform the observations and shall record the observation on the Irrigation System Observation Log form on the As Built Record Drawings. Such observations will include but not necessarily be limited to the following items as included in the scope of work:
1. Layout and flagging of sprinkler heads.
 2. Trenching.
 3. Wire placement.
 4. Partial fill compaction of trenches.
 5. Control valve installation.
 6. Sprinkler coverage and system operation.
- C. Coverage & Operations Review:
1. When the irrigation system is operational and prior to soil conditioning operations, the Contractor in the presence of the Owner shall perform a coverage test of the irrigation system. The Contractor shall furnish all materials and labor required to perform the coverage test and to correct any minor inadequacies of coverage disclosed. The Contractor shall inform the Owner and Owner of any deviation from the plan required due to wind, planting, soil, or site conditions that bear on proper coverage. If such notification of necessary corrections or additions to the irrigation system is not provided prior to or during the coverage test, the Contractor shall make all subsequent adjustments and corrections needed for proper coverage without any extra cost to the Owner.
 2. Prior to the start of the maintenance period, the irrigation system shall be reviewed by the Owner for proper operations, and a review of and training on equipment and associated controls performed. Any corrections and/or adjustment shall be made as a condition for the start of the maintenance period and subsequent Final Acceptance.
- D. Final Acceptance: The work will be accepted in writing when the entire project improvements have been completed to the satisfaction of the Owner. In judging the work, no allowance for deviation from the original plans and specifications will be made unless already approved in writing at proper time. Should it become necessary for the Owner to occupy any portion of the work area before the contract is fully completed, such occupancy shall not constitute acceptance. The Contractor will not be responsible for any damage caused by the Owner's separate work forces.
- 1.13 REJECTION OF NON-CONFORMING MATERIAL OR WORK
- A. The Owner reserves the right to reject any material or work which does not conform to the contract documents. The rejected material or work shall be removed or corrected by the Contractor at no additional cost to the Owner.
- 1.14 OPERATIONS AND MAINTENANCE INSTRUCTIONS & RECORD DOCUMENTS
- A. The Contractor shall prepare and deliver to the Owner's Representative within ten (10) calendar days prior to completion of the construction and as a prerequisite to the start of the maintenance period, all required and necessary descriptive material in complete detail and sufficient quantity, properly prepared in two individually bound sets of Operating and Maintenance Manuals. These

- 1 manuals shall describe the material installed and shall be in sufficient depth to permit operating
2 personnel to understand, operate and maintain all equipment. Spare part lists and related
3 manufacturer identification shall be included for each installed equipment item. Each complete,
4 bound manual shall contain the following information:
- 5 1. Cover sheet stating Contractor's address and telephone number, duration of guarantee
6 period, and a list of equipment, with names and addresses of local manufacturer representatives
7 and warranty periods.
 - 8 2. The Contractor to issue a "CERTIFICATE OF CONSTRUCTION COMPLIANCE" which
9 indicates that all work done, materials and equipment used and installed are in compliance with
10 the approved plans, specifications and all authorized revisions and that the system functions
11 properly.
 - 12 3. Complete operating and maintenance instructions and warranties on all major equipment.
 - 13 4. Complete set of manufacturer's literature and specifications of material installed, including
14 parts list.
 - 15 5. A list of the controller station number for each control valve if different than the control valve
16 number shown on the drawings.
 - 17 6. Initial electrical data on each control valve:
 - 18 a. Ohms reading for each valve taken at the controller (circuit is OFF).
 - 19 b. Voltage reading for each valve taken both at the controller and at the valve (circuit is ON).
- 20 B. The contractor shall furnish one set of As-Built full-scale drawings on bond, and one set of digital
21 PDF files on compact disk after all As-Built record information has been included in the drawings.
- 22 1. Label first page of each document, or set of documents, "PROJECT RECORD" in neat large
23 printed letters on lower right hand corner. Record information concurrently with construction
24 progress. Prints for this purpose may be obtained from the Owner. This set of drawings shall be
25 kept on the site and shall be used only as a record set. Do not conceal any work until required
26 information is recorded. These drawings shall also serve as work in progress sheets, and the
27 Contractor shall make **neat and legible** annotations thereon daily as the work progresses,
28 showing the work as actually installed. These drawings shall be available at all times for inspection
29 and shall be kept in a location designated by the Owner.
 - 30 2. Drawings: Legibly mark to record actual construction:
 - 31 a. Horizontal and vertical locations of underground utilities and appurtenances, referenced to
32 permanent surface improvements. Give sufficient horizontal and vertical dimensions to
33 accurately trace route and depth of each concealed line or item. Accurately locate each
34 capped, plugged or stubbed line.
 - 35 b. Field changes of dimension and detail.
 - 36 c. Changes made by Field Order, by Addenda, or by Change Order.
 - 37 d. Details not on original Contract Drawings.
 - 38 e. Show the controller station number for each control valve if different than the control valve
39 number shown on the drawings.
 - 40 3. Deliver all Record Documents (As-Built) to the Owner. Accompany submittal with transmittal
41 letter in duplicate, containing:
 - 42 a. Date.
 - 43 b. Project title.
 - 44 c. Contractor's name and address.

- d. Title and number of each Record Document (As-Built).
- e. Signature of Contractor or his authorized representative.
- C. The Contractor shall provide controller chart(s) as follows:
 1. The Contractor shall provide two controller charts for each controller's area of work.
 2. The chart shall show the area of work controlled by the automatic controller and shall be the maximum size that the controller door will allow.
 3. Show the controller station number for each control valve if different than the control valve number shown on the drawings.
 4. The chart may be a reduced drawing of the actual as-built system. However, in the event the valve numbering is not legible when the drawing is reduced, it shall be enlarged to a size that will be readable when reduced.
 5. The chart shall be colored with a different permanent color for each station.
 6. The chart shall be enclosed in a waterproof envelope or laminated.
- 1.15 SPARE PARTS AND EQUIPMENT
 - A. Prior to the conclusion of the maintenance period, furnish the Owner with the following spare parts and equipment:
 1. Ten spare nozzles for each different sprinkler head arc and/or radius nozzle installed.
- 1.16 WORK AREA AND SAFETY
 - A. The Contractor shall furnish, erect, and maintain all temporary facilities; perform all temporary work during the period of construction, including those herein specified. All facilities shall be maintained in proper and safe operating and sanitary conditions at all times.
 - B. The Contractor shall comply with the provisions of the Construction Safety Orders, and General Safety Orders issued by the State Division of Industrial Safety, as well as all other applicable laws, ordinances and regulations.
 - C. The project site shall be maintained in a neat and safe condition at all times. Cleanup shall be accomplished as the work progresses and upon completion of the work. The Contractor shall provide adequate safety measures to protect workers and the public from injury.
- 1.17 GUARANTEE
 - A. Irrigation system consisting of materials, equipment and workmanship shall be guaranteed for proper operation a minimum of one year from date of Final Acceptance of the Work or the Notice of Substantial Completion of the Project, whichever is later. Manufacturer's warranty periods may be longer, and shall be noted in the close-out documents.
 - B. The Contractor shall be held responsible for repair and/or replacement of damages to new or existing improvements resulting from the defects of materials, equipment or workmanship one year from the date of project completion.
 - C. The Owner reserves the right to make temporary repairs as necessary to keep the irrigation system equipment in operating condition. The exercise of this right by the Owner shall not relieve the Contractor of his responsibilities under the terms of the Guarantee as herein specified.
 - D. The Booster Pump Assembly shall have a minimum 60 month warranty with no-cost annual service checks over the Warranty Period. See the Booster Pump Assembly and Controls execution section for additional requirements.

PART 2 - PRODUCTS

2.1 PIPE AND FITTINGS

- 1 A. Schedule rated white rigid PVC Pipe shall be made from NSF approved Type 1, Grade I, PVC
2 compound conforming to ASTM D-1785.
- 3 B. Class rated (Standard Dimension Ratio) white rigid PVC Pipe shall be made from NSF approved
4 Type 1, Grade I, PVC compound conforming to ASTM D-1784.
- 5 C. PVC pipe shall be of the Class or Schedule as follows:
 - 6 1. PVC pipe shall meet ASTM D-2241 for solvent weld, plain end, ASTM D-2672 for solvent
7 weld, bell end, and ASTM D-3139 for gasketed bell end. Pipe shall be of the Schedule and/or
8 Class as shown on the Drawings.
 - 9 2. Pipe sleeves under paving shall be PVC Schedule 40 for 3-inch and smaller or SDR 35 for 4-
10 inch and larger pipes.
 - 11 3. Riser and/or manifold pipe connecting valves to main line fittings shall be Schedule 80 PVC.
- 12 D. All pipes shall be continuously and permanently marked and conform with the following
13 information: manufacturer's name or trademark, nominal pipe size, Schedule or Class of pipe,
14 pressure rating in PSI, ASTM designation and (NSF) seal of approval.
- 15 E. White rigid polyvinyl chloride (PVC) Fittings:
 - 16 1. Schedule 40 type I and II grade 1, solvent weld socket fittings ASTM D-2466 for all lateral
17 lines.
 - 18 2. Schedule 80 type I and II grade 1 solvent weld socket fittings ASTM D-2464 for all main line
19 less than 4 inches diameter.
 - 20 3. All fittings shall bear the manufacturer's name or trademark, material designation, size,
21 applicable (IPS) schedule, and (NSF) seal of approval.
 - 22 4. All plastic fittings and connectors shall be injection molded of an improved polyvinyl chloride
23 compound featuring high tensile strength, high chemical resistance and high impact strength
24 in terms of current ASTM standards for such fittings. Where threads are required in plastic
25 fittings, these shall be injection molded also.
- 26 F. PVC Solvent Weld Adhesive: All socket and bell type connections shall be joined with primer and
27 PVC solvent cement which shall meet the requirements of ASTM F656 for primer and ASTM
28 D2564, "Standard Specification for Solvent Cements for Polyvinyl Chloride (PVC) Plastic Pipe and
29 Fittings." Solvent cement joints for plastic pipe and fittings will be made as prescribed by
30 manufacturer. The high chemical resistance of the pipe and fitting compounds specified in the
31 foregoing sections makes it mandatory that an aggressive colored primer, which is a true solvent
32 for PVC be used in conjunction with a solvent cement designed for the fit of pipe and fittings of
33 each size range specified. A medium bodied solvent cement shall be used on pipe joints with
34 interference fits up to 3 inch. A heavy bodied solvent cement can be used for all classes and
35 schedules of pipe and fittings.
- 36 G. PVC Pipe Thread Sealant: A non-hardening all purpose sealant and lubricant similar to Permatex
37 #51 or Lasco blue pipe thread sealant which is certified by the manufacturer to be harmless to
38 PVC pipe and fittings. Apply sealant to clean male threads, brushing into grooves and to the first
39 three threads of the female threads. A good quality grade of teflon tape recommended by the
40 manufacturer for use with plastics may be used in lieu of sealant. Minimum width of tape to be
41 used is 3/4". A minimum of two wraps and a maximum of three wraps to be used.
- 42 H. PVC Swing Joints: Connections to sprinkler heads from lateral lines shall be made with swing
43 joints as detailed. Pre-assembled swing joints from Hunter, King Brothers or Spears are
44 acceptable.
 - 45 1. Use 6" length nipples for 1/2 inch inlet heads.
 - 46 2. Use 12" length nipples for 3/4 or 1 inch inlet heads.

I. Coated Ductile Iron pipe and fittings:

1. Ductile Iron pipe shall be centrifugally cast pipe conforming to ANSI/AWWA C150/A21.50 and ANSI/AWWA C151/A21.51, thickness Class 50, with cement - mortar lining and seal coating per ANSI/AWWA C104/A21.4.

2. Ductile Iron flanged pipe shall conform to ANSI/AWWA C115/21.15.

3. Joints shall comply with the following standards:

a. Rubber gasketed/mechanical joints: ANSI/AWWA C111/A21.11.

b. Flanged joints: ANSI/AWWA C110/A21.10, B16.1, B16.2.

J. Coated ductile iron push-on mechanical fittings meeting ANSI/AWWA C110 or C153/A21.10 shall be used for:

1. Main line connections for pipe 4 inches and greater in diameter.

2. New main line service tee at valve connections.

3. Self-restrained fittings shall be used for bell x flange or bell x threaded fittings.

K. Coated ductile iron service saddles with stainless steel double straps, Romac Industries 202S or equal, shall be used for electric control/quick coupler valve service connections on existing main lines 4 inch or greater.

L. Galvanized pipe and fittings:

1. Galvanized Pipe shall be hot dip galvanized continuous welded, seamless steel SCH 40 pipe conforming to current ASTM A53 standards.

2. Galvanized Fittings shall be galvanized, threaded malleable iron SCH 40 conforming to current ASTM A865 standards.

2.2 BACKFLOW PREVENTION ASSEMBLY

A. Backflow prevention assembly is existing and shall be protected in place.

2.3 VALVES

A. Electric Control Valves:

1. Globe valves operated by low-power solenoid, normally closed, manual flow adjustment. Sizes and types as shown on drawings.

2. Provide a pressure regulating module on all control valves operating spray head or low volume head zones when there is a irrigation booster pump as part of the system.

B. Control Valve Marking: Christy's valve identification tag (or equal), yellow color with text designating controller and valve station number, e.g. "A12", or equivalent.

C. Isolation Valves:

1. Cast bronze gate valve with resilient wedge, non-rising stem and operating nut. Match size of mainline.

2. Cast bronze, two piece ball valve with insulated handle (NS) for manual control at skinned infields.

D. Quick Coupling Valve: Two piece quick coupling valve as shown on the Drawings.

2.4 VALVE BOXES

A. Control Valve boxes:

1. Shrub/Ground Cover areas: Carson 1419 with lockable tan plastic cover, or equivalent.

2. Turfgrass or hardscape areas: Carson 1419 with lockable green plastic cover, or equivalent.
 3. Hardscape areas: Christy B16 concrete box (11.75" x 22.25") with Fibrelyte FL16D lid, or equivalent.
 - B. Quick Coupler Valve boxes:
 1. Shrub/Ground Cover areas: Carson 910 with lockable tan plastic cover, or equivalent.
 2. Turfgrass or skinned ballfield areas: Christy F08 round concrete valve box (8" ID) with Fibrelyte FL08D lid, or equivalent.
 - C. Isolation Valve boxes:
 1. Gate Valve box in vehicular pavement: Christy G05 round concrete valve box (10.375" ID) with cast iron G05C lid, or equivalent.
 2. Gate Valve box in pedestrian areas: Christy F08 round concrete valve box (8" ID) with Fibrelyte FL08D lid, or equivalent. Use F14 ADS adapter and extension for sizes 2.5 inches and larger.
 3. Ball Valve box: Christy B16 concrete valve box (11.75" x 22.25") with Fibrelyte FL16D lid, or equivalent.
 - D. Control Valve box marking: Plastic and concrete lids shall have an embossed, exterior grade plastic label permanently attached to the top of lid with 2" high letters showing controller letter and station number.
- 2.5 CONTROLLER
- A. An existing controller is in place and shall remain operational. Verify valve stations and related programming impacted by the scope of work. Verify spare stations and control wire as necessary.
- 2.7 CONTROL AND TRACER WIRE
- A. Connections between the automatic controllers and the electric control valves, and tracer wire shall be made with direct burial AWG – UF 600 volt copper wire manufactured for irrigation system use.
 - B. Hot control wires shall be red. Common ground wire shall be white, with a different color stripe when multiple controllers are installed. Spare control wires shall be black and spare common wire blue. Tracer wire shall be green.
 - C. Install in accordance with valve manufacturer's specifications and wire chart. In no case shall wire size be less than #14. Common wire shall be a minimum #12 size.
 - D. All control wire splices shall be made with waterproof wire connectors, Spears Model No. DS-500 Dri-Splice, King Safety Products King 6 Blue, or approved equal. Use one splice per connector sealing pack. Apply wire Ld labels at both sides of all splices, at the control valve and at the controller terminal board.
- 2.8 IRRIGATION HEADS
- A. Spray/Bubbler Head: Molded plastic body with plastic nozzles. Refer to schedule on drawings. Manufacturer's numbers are listed with description.
 - B. Rotor Head: Molded plastic and stainless steel construction, Gear driven with memory arc, balanced nozzle sets. Refer to schedule on drawings. Manufacturer's numbers are listed with description.
- 2.10 CONCRETE
- A. Cast-in-place Portland cement concrete used for pipe encasement, cover, thrust blocks, pipe support or other below-grade use shall at minimum comply with 2,800 psi 28 day strength.

1.3 OTHER MATERIALS

- A. Materials not specifically indicated but necessary for the proper execution of this work shall be of first quality as selected by the Contractor subject to the acceptance of the Owner.
- B. All materials appearing in the legend and details of the irrigation drawings are to be furnished and installed by the Contractor unless specifically noted to the contrary. Contractor is responsible for installation according to plans and details. The system shall efficiently and uniformly irrigate all areas and perform as required by these plans and specifications.
- C. Granular bedding material shall be clean natural occurring sand, free from clay, salt, sea shells or organic material, suitable for the purpose intended, and shall be of such size that 90 percent to 100 percent will pass a No. 4 sieve and not more than 5 percent will pass a No. 200 sieve.

PART 3 - EXECUTION

3.1 SYSTEM DESIGN AND VERIFICATION

- A. Contractor shall verify existing pressure and any existing irrigation equipment, and shall inform the Owner of any discrepancies between the existing systems' make and model of equipment, such as sprinkler heads, control valves, etc., and those indicated in the Drawings in writing prior to the start of irrigation system installation. Failure to inform the Owner of any discrepancy within seven working days prior to beginning of system installation will place the responsibility of any and all corrective action on the Contractor at no expense to the Owner.

3.2 DEMOLITION OF EXISTING SYSTEM

- A. Where existing valves are removed from, or repair of an existing main line greater than 2 inch size, remove the saddle or tee fitting and/or replace the main line with a minimum 3 foot section of new main line pipe of the same diameter and type as the existing. Use bolted, epoxy coated ductile iron couplings at the joints, Smith-Blair 461, Romac Industries 501 or equal.
- B. Modifications and/or repairs to existing lateral lines shall be made using a solvent weld PVC Sch 40 fitting and repair coupling with a minimum 3 foot length of new pipe matching the existing size.

3.3 PIPING INSTALLATION

A. General:

- 1. Any equipment installed by the Contractor and deemed to be for the use of the Owner in various situations (i.e., control valves, control panels, etc.) shall be so installed to be readily accessible and quickly operable. Equipment deemed by the Owner to be inoperable for its intended purpose shall be reinstalled by the Contractor in an operable position before approval will be given. Any changes made by the Contractor shall be done without any additional cost to the Owner.
- 2. The Contractor shall be responsible for layout of proposed facilities and any minor adjustments required due to differences between existing conditions and the Drawings. Any such deviations in layout shall be within the intent of the original drawings, and without additional costs to the Owner. The Owner will indicate the proposed precise location of the control panels. Head spacing on drawings is diagrammatic. Head spacing and patterns shall be adjusted to provide complete and adequate coverage with a minimum spray on non-planted areas. Where head spacing is not specifically noted, Contractor shall install sprinkler heads evenly along the irrigation area's perimeter. Flush all lines prior to installation of heads.
- 3. Support piping without strain on joints or fittings and allow for piping expansion and contraction. "Snake" pipe into trench in accordance to manufacturer's recommendations to allow for expansion. Lay on solid sub-base, at uniform depth.

- B. The Contractor shall examine all other portions of working drawings and plan trenching and pipe layout so that no conflict will arise between irrigation and any other work. Any corrective action will be the Contractors responsibility at no further expense to the Owner.

C. Excavations:

1. Excavations through the canopy drip line of existing trees is restricted. See Section 320119 for requirements.
2. Excavations shall be open vertical construction, sufficiently wide to provide clear working space around the work installed and to provide ample space for backfilling and tamping.
3. The use of a vibratory plow or methods other than open vertical trenching will not be allowed without the written approval of the Owner. To obtain such approval, a field test must be performed, at the proposed site, with the equipment to be used in the presence of the Owner and Owner. The field test is to indicate if the proposed site is favorable to the plowing method. Approval for plowing at one location does not allow the use of plowing at another location. Approval for plowing must be obtained for each location where the use of plowing is proposed. If, at previously approved plowing locations, conditions for plowing become unfavorable as determined by the Owner, plowing shall be terminated.
4. Trenches for pipe and equipment shall be cut to required grade lines, and compacted to provide an accurate grade and uniform bearing for the full length of the line.
5. Unless written approval for using native soils as bedding material is given by the Owner, main line pipe shall be placed on a minimum 4 inch depth of granular bedding material.
6. When two pipes are to be placed in the same trench, it is required to maintain a minimum four inch (4") horizontal separation between pipes.
7. Depth of trenches shall be sufficient to provide a minimum cover above the top of the pipe as follows:
 - a. 24-inch minimum over main lines.
 - b. 18-inch minimum over non-pressure (rotary pop-up) lateral lines.
 - c. 12-inch minimum over non-pressure (pop-up spray head) lateral lines.
 - d. 24-inch minimum over any lines located out in road surface area of paved streets.
 - e. Maximum cover above the top of the pipe shall not exceed twelve inches (12") greater than the required minimum cover.
 - f. 12-inch minimum cover over drip line non-pressure lateral lines.
 - g. 4-inch minimum cover over in-line emitter or main distribution tubing.

D. Assemblies:

1. Routing of pressure supply lines as indicated on drawings is diagrammatic. Install lines (and various assemblies) in such a manner as to conform with details on plans.
2. Install all assemblies specified herein according to the respective detail drawings or specifications pertaining to specific items required to complete the work. Perform work according to best standard practice.
3. Install no multiple assemblies on plastic lines. Provide each assembly with its own outlet.
4. All threaded pipe and fittings shall be assembled using an approved teflon tape, or equivalent, applied to the male threads only. A minimum of two (2) wraps and a maximum of three (3) wraps of an approved teflon tape will be required.
5. No main line elbows, branch tees or isolation valves are to be located closer than five (5) feet to each other without prior approval of the Owner.

E. Line Clearance: All lines shall have a minimum clearance of four inches (4") from each other, and six inches (6") from lines of other trades. Parallel lines shall not be installed directly over one another.

F. Plastic to Steel Connections:

1. At all plastic (PVC) pipe connections, the Contractor shall work the steel connections first. Connections shall always be plastic into steel, never steel into plastic. An approved teflon tape shall be used on all threaded (PVC) to steel, never steel into plastic. An approved teflon tape shall be used on all thread (PVC) to steel pipe joints applied to the male threads only, and light wrench pressure is to be applied. A minimum of two (2) wraps and a maximum of three (3) wraps of an approved 3/4" wide teflon tape will be required.
2. A non-hardening sealant and lubricant similar to Permatex #51 or LASCO blue pipe sealant may be used in lieu of teflon tape. Apply sealant to clean male threads brushing into grooves and to the first three threads of the female threads.

G. Plastic Pipe:

1. The Contractor shall exercise care in handling, loading, unloading, and storing plastic pipe and fittings. All plastic pipe and fittings shall be stored under a weatherproof roofed structure before using and shall be transported in a vehicle with a bed long enough to allow the length of pipe to lie flat so as not to be subject to undue bending or concentrated external load at any point.
 - a. All lumber, rubbish, rubble, concrete and rocks shall be removed from the trenches by the Contractor. Pipe shall have a firm uniform bearing for the entire length of each pipe line to prevent uneven settlement. Wedging or blocking under riser tees shall be done only if specified on the plans. Pad trenches with soil as necessary to provide uniform bearing surfaces.
 - b. Where extensive lengths of pipe are installed, snake pipe in trench from side to side to allow for expansion and contraction. One additional foot per one hundred (100) feet of pipe is the minimum allowance for snaking. Never lay pipe when there is water in the trench or when the temperature is 32 degrees F or below.
 - c. All changes in direction of pipe shall be made with fittings, not by bending. No main line fittings for changes in direction shall be greater than 45 degrees. Provide a minimum five (5) feet between changes in direction elbows.
 - d. Safely handle primers and cements per ASTM F-402. Make solvent weld joints per ASTM D-2855 with a non-synthetic bristle brush in the following sequence:
 - 1) Make sure pipe is cut square and all rough edges and burrs are removed. All connecting surfaces are properly cleaned and dry prior to application of pipe primer.
 - 2) Apply an even coat of colored primer to pipe and fitting prior to application of solvent.
 - 3) Apply an even coat of solvent to the outside of the pipe, making sure that the coated area is equal to the depth of the fitting socket.
 - 4) Apply an even light coat of solvent to the inside of the fitting.
 - 5) Apply a second coat of solvent to the pipe.
 - 6) Insert the pipe quickly into the fitting and turn pipe approximately one-eighth to one-quarter turn to distribute the solvent and remove air bubbles. Hold the joint for approximately fifteen seconds so the fittings do not push off the pipe.
 - 7) Using a clean rag, make sure to wipe off all excess solvent to prevent weakening at joint.

- 8) Exercise care in going to the next joint so that pipe is not twisted, thereby disturbing the last completed joint.
 - 9) Allow at least fifteen minutes setup time for each welded joint before moving.
 - 10) Repairing plastic pipe when damaged shall be done by replacing the damaged portion of pipe.
- H. Concrete Thrust Blocks: Concrete anchors or thrust blocks shall be provided on pressure main pipelines 3 inches or greater in diameter at abrupt changes in pipeline grade, changes in horizontal alignment (bends, tees and crosses), reduction in pipe size (reducers, reducing tees or crosses), end-line caps or plugs, and/or in-line isolation valve to absorb any axial thrust of the pipeline. The pipe manufacturer's recommendation for thrust control shall be followed. Thrust blocks must be formed against solid unexcavated earth (undisturbed). Do not enclose entire joint in concrete. Provide a minimum of two cubic feet of concrete for each thrust block.
- I. Concrete thrust blocks may be eliminated if the main line piping system uses self-restrained fittings and bell joint restraints throughout.

3.4 PIPE DEPTH AND BACKFILL

- A. Backfill shall not be placed until the installed system has been inspected, pressure tested and approved by the Owner.
- B. Backfill for first 4 inches around and above main line pipe and control wires shall be granular bedding material, unless the Owner approves in writing that native soil may be used for initial backfill in lieu of granular bedding material. Backfill material for the upper portion of the trench shall be approved soil. Unsuitable material, such as pipe remnants and wire including clods and rocks over two inches (2") in size, shall be removed from the premises and disposed of legally at no cost to the Owner.
- C. Backfilling for all pipe shall be carried out in two basic stages.
1. Stage One Backfilling: This shall be accomplished as soon as possible after the pipe is laid. A bedding of uniform depth with no voids must be provided along the entire length of the pipe. The bedding material should be placed in the trench and tamped into the areas under the pipe, using a suitable tool. Joints should be left exposed until hydrostatic tests are completed. Cover only those portions of the pipe necessary to prevent movement or damage.
 2. Stage Two Backfilling: This shall be completed after all hydrostatic tests are completed and the piping system has been thoroughly checked for leaks or other defects. Continue to add backfill material in four inch (4") layers and hand tamp to achieve density similar to adjacent soil. After twelve inches (12") in main line trenches and eight inches (8") in lateral line trenches of hand tamped soil is in place over the pipe and fittings, backfilling can be continued, using light machinery to place dirt in the trenches in six inch (6") layers and to compact the dirt to conform to adjacent soil. Extreme care should be taken to avoid damage to the pipe from machinery that is too heavy. All trenches shall then be water jetted to assure uniform settling and compaction. Backfilling operations will not be considered complete until the top surface has been graded to conform to the adjacent soil. All rocks uncovered and not used as backfill must be collected and removed from the site.
- D. All backfilling shall be done carefully and shall be properly tamped. All soil shall be tamped and puddled to eliminate any voids.
- E. Surplus earth remaining after backfilling shall be disposed of as directed by the Owner.
- F. PVC piping and fittings shall not be backfilled during periods of extreme heat or when a sudden lowering of temperature of the pipe may cause separation of joints or fittings.

G. Contractor shall fill with properly amended topsoil any irrigation trench that subsides during the warranty period. Contractor shall assume all cost associated with the trench repair, including but not limited to plant replacement of a size of plant disturbed at the time of the repair.

3.5 BACKFLOW PREVENTION ASSEMBLY

A. Verify it is operating properly without leaks or blockages.

3.6 CONTROL AND TRACER WIRE

A. Protect wire by running alongside of mainline piping. Bundle wires together and tape at intervals of ten (10) feet. Do not tape wire together when encased in sleeve. Minimum cover shall be 24 inches. Crimp wires together at valve manifold with Scotchlok connector. Seal splice with 3M DBY splice kit. Tag all control wire at splices and new wire at control valves and controllers with approved control wire markers.

B. Wire size shall be determined by the number of valves operating on a given wire and the distance from the controller to the farthest valve, as specified by the charts furnished by the remote control valve manufacturer. Splices are not encouraged but allowed. All splice connections must be provided in a valve box.

C. Install tracer wire along the top of pipe at the following locations:

1. All pipe sleeves.
2. Main line pipe without adjacent control wire.

3.7 VALVES

A. The Contractor shall make all necessary connections for operation, and shall be connected and aligned to provide the most efficient flow of water to the irrigation heads. Where pressure regulating electric control valves are specified, the Contractor shall adjust the valve so a uniform distribution of water is applied by the heads, and that the most remote heads operate at the pressure recommended by the head manufacturer.

B. Each valve is to be enclosed in a separate valve box. The valve box shall be secured on firm soil clear of valves and wiring connections. Valve boxes and lids shall be set to finished grade or as indicated on the Drawings. Use valve box extensions of the same material as the box to the proper depth below the pipeline. Backfill carefully and properly compact in order to prevent settlement and subsequent damage.

C. When existing valve and/or splice boxes are within the area of work, replace in kind any damaged boxes and/or lids, unless noted otherwise. Adjust the elevation of all existing boxes within the area of work to final grade per the drawings.

D. Locate valve boxes in ground cover/shrub planting areas instead of turfgrass areas whenever possible. Locate valve boxes 18" from and perpendicular to adjacent paving. When grouped together, provide equal spacing of at least 36" between boxes.

E. Permanently attach the plastic valve identification tag to the remote control valve body and locate so it's clearly visible in an open valve box.

F. Permanently secure the control valve identification label to the top of the valve box lid with non-corrosive connectors.

3.8 AUTOMATIC CONTROLS

A. Connect operational control wires to the controller, and program valve schedules appropriately for the new planting.

B. Install automatic controller chart in laminated or watertight plastic envelope inside controller cover showing which valves are connected to which stations on controller in the work area.

3.9 SPRINKLER HEAD INSTALLATION

- A. Head spacing on drawings is diagrammatic. Head spacing and patterns shall be adjusted to provide complete and adequate coverage with a minimum spray on non-planted areas. Flush all lines prior to installation of heads.
- B. Sprinkler heads shall be installed as detailed, set adjacent to the edge of hardscape elements (6 inches for spray heads, 12 inches for rotary heads) and perpendicular to the finish grade. Sprinkler heads shall be a minimum 2 feet, and preferably 3 feet (if planting layout permits) from building walls.
- C. Upon completion of the installation, the Contractor shall adjust or change sprinkler head nozzles to uniformly distribute water without overspray and shall place entire irrigation system in first-class operating condition without any additional cost to the Owner.
- D. Sprinkler heads shall be adjusted in order by fully opening the sprinkler furthest from the control valve and working back toward the control valve. Adjust sprinkler heads which spray toward buildings or adjacent hardscape so that water spray does not contact the side of buildings or significantly over-spray onto hardscape .

3.10 CONCRETE

- A. Concrete shall be installed in accordance with the relevant portions of the Site Concrete specification section.

3.11 COMPLETION AND MAINTENANCE

- A. After the system has been completed but prior to the start of maintenance, the Contractor shall operate the automated system with the Owner, shall instruct the Owner in the operations and maintenance of the system and controls, and shall program the controller for each station. If site central control system equipment is installed, the authorized central control distributor/installer shall program the central base station to communicate with the site control system, and shall verify that proper communication protocols are operational.
- B. The irrigation system shall be maintained and adjusted as required to provide proper coverage throughout the maintenance period or until Final Acceptance of the project, whichever is greater. Irrigation system maintenance shall commence upon an acceptable review following the completion of irrigation installation, planting operations and general clean-up.
- C. The maintenance period shall not terminate until the close-out documents and as-builts record drawings have been submitted and accepted.

3.12 REPAIR AND CLEAN-UP

- A. All areas shall be maintained in a neat and orderly condition at all times. All reasonable precautions shall be taken to avoid damage to existing planting and structures. Disturbed areas shall be restored to their original condition to the satisfaction of the Owner.
- B. Where trenching or other work disturbs existing turfgrass or planting, the Contractor shall reinstall the existing sod if viable, or install a full width of new turfgrass sod or planting to match the existing turfgrass/planting species/variety and size, after first conditioning the top 6 inches of soil per the Landscape Planting specification. Adjust finish grades to account for the new turfgrass sod's soil mat so that the new sod is flush to the adjacent turfgrass.
- C. After the irrigation operations are completed, the Contractor shall remove all trash, excess materials, empty containers or any other debris accumulated by the work from the site. All damage caused by the work shall be repaired or material replaced at the Contractor's expense. The site shall be left in a neat and orderly condition to the satisfaction of the Owner.

END OF SECTION

1 SECTION 32 90 00 - LANDSCAPE PLANTING

2 PART 1 - GENERAL

3

4 1.1 RELATED DOCUMENTS

- 5 A. Drawings and general provisions of the Contract, including General and Supplementary
6 Conditions and Division 01 Specification Sections, apply to this Section.

7 1.2 SCOPE OF WORK

- 8 A. The Contractor shall furnish all material, labor and equipment necessary to install all
9 landscape work as indicated in the plans and specifications.

- 10 B. The landscape work includes but is not necessarily limited to the following:

- 11 1. Soil preparation including cross ripping of all planting soil.
12 2. Weed control including an application of a pre-emergent herbicide.
13 3. Providing import planting topsoil at raised grade planters and/or at planting areas
14 needing fill.
15 4. Fine grading, conditioning and amending planting topsoil.
16 5. Planting new trees, plants and ground covers.
17 6. Tree drainage sump boring and testing.
18 7. Root Barriers.
19 8. Sixty (60) day maintenance.

20 C. Related Work Specified Elsewhere

- 21 1. Contract Drawings, Addenda, general provisions of the Contract, including General
22 and Supplemental Conditions, and Division 1 Sections apply to work of this section.
23 2. Section 312222 - Soil Materials
24 3. Section 328400 - Irrigation System

25 1.3 DEFINITIONS

- 26 A. Unless noted otherwise, the term "approved" shall mean by the Owner in writing.

27 B. Agencies and Organizations:

- 28 1. ASTM- American Society for Testing and Materials
29 2. ANSI – American National Standards Institute
30 3. ISA – International Society of Arborists

4. SSPWC – Standard Specifications for Public Works Construction, by the American Public Works Assoc./Associated General Contractors of California.

5. TPI – Turfgrass Producers International

C. Owner: The Owner's authorized representative or authorized consultant.

1.4 QUALITY ASSURANCE

A. The work of this Section shall be performed by a single firm experienced in landscape planting and holding a current California Contractor's A or C27 License.

B. Plant quality and sizes shall conform to the current edition of "American Standard for Nursery Stock" for Number One nursery stock as adopted by the American Nursery & Landscape Association (ANSI Z60.1). Plants shall be of uniform, standard size for their listed container size, neither overgrown and root bound or encircling, nor so recently transplanted that the root system is not thoroughly well established throughout the container so that the roots reach the sides of the container and maintain a firm root ball. Pruning shall not be done prior to delivery except by prior approval.

C. Botanical names shall take precedence over common names. Provide plants that are true to name. Tag one representative plant of each species and size with the botanical name and size.

D. Inspection:

1. All landscape work and materials shall comply with applicable Federal, State, County and City regulations.

2. All plant material shall be reviewed onsite by the Owner's Representative and/or Landscape Architect prior to positioning and planting. Review shall not limit the right of rejection during any stage of the work until Final Acceptance for any reason including condition of the foliage or root ball, size, variety, form, appearance, latent defects or injuries. Rejected plants shall be removed from the site and replaced immediately by the Contractor at no additional cost to the Owner.

E. Qualifications of Workmen

1. Employ skilled workmen who are thoroughly trained experienced in landscape planting and who are completely familiar with specified requirements and methods needed for proper performance of the work in this section.

2. Provide adequate supervision by a qualified foreman fluent in English that will be continuously onsite during the performance of this work.

F. Any pruning of existing trees specified as part of this Work shall be performed under the direct supervision of an ISA Certified Arborist and in compliance with ANSI A300-Part 1 Standard Practices (Pruning).

1.5 SUBMITTALS

A. Materials List: Within sixty (60) days after the project's Notice to Proceed submit:

1. A complete materials list of all items proposed to be furnished including estimated quantities.
 2. Laboratory analyses of soil conditioning materials shall have been performed within one year of the submittal date.
 3. Quality Certificates and/or Certificates of Inspection required by government agencies (providing duplicate copies for the Owner's Representative).
 4. Registration Certificates and Material Safety Data Sheets for all chemicals, pesticides/herbicides proposed for use.
 5. Submit photos with a scale marker of all boxed trees proposed for use from the nursery source. Photos shall clearly show the individual tree form without background greenery.
- B. Soil amendments: Submit one (1) pint sample and an analysis of organic compost and mulch.
- C. Other Samples: When requested by the Landscape Architect and/or Owner's Representative.
- D. Soil Fertility Analysis and Recommendations:
1. The Contractor shall provide and pay for a fertility analysis of the existing topsoil and any proposed import planting topsoil. After mass grading operations are completed, native soil samples shall be collected for the fertility analysis by collecting a minimum of 5 representative samples of the soil per acre throughout the area of work. Separate samples shall be produced for cut and fill areas, and for any other area composed of soils not similar to the existing soils. Each sample shall be a minimum of one pint each, and shall be thoroughly mixed together to prepare a homogenous sample. A one quart representative sample for cut, fill and any other special conditions shall be submitted to the soil testing laboratory as a representative sample for fertility analysis. The fertility analysis shall at a minimum provide the following data:
 - a. soil texture class and percent sands, silts and clays per ASTM D422
 - b. estimated soil infiltration and percolation rates
 - c. pH
 - d. organic matter (%)
 - e. total soluble salts (ECe)
 - f. Cation Exchange Capacity (CEC) and Percent Cation Saturation for K, Mg, Ca and Na
 - g. major and minor nutrients (ppm).
 2. The soil analysis and recommendations shall be performed by of the following laboratories capable of providing the above analyses by a licensed soil scientist:
 - a. D&D Agricultural Laboratory. Contact Darrin Peters at 559-348-1818.

- LANDSCAPE PLANTING
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1.6 AVAILABILITY

- A. The Contractor shall confirm availability of plants, supplies, and materials prior to submitting his landscape bid. Plant variety substitutions are not desired.
- B. If a plant is found not to be suitable or available, the Contractor is to notify Landscape Architect before bidding. The Landscape Architect is then required to select a reasonable alternate and to inform all those bidding of the availability of the original plant. If a substitute is selected it must be of the same size, value and quality as the original plant. Failure to inform the Landscape Architect of unavailable plants prior to bidding will require that all plants specified shall be provided by the Contractor at time of installation.
- C. Plant container size listed on construction documents are minimum acceptable size. If plant material specified is not substituted prior to award of the contract the minimum container size specified shall be provided by the Contractor. If the Contractor can not provide the minimum specified size plant material at the time of installation, the Contractor shall be required to install a larger size container of the plant specified at no additional cost to the Owner.

1.7 EXISTING CONDITIONS

- A. The Contractor is to visit the job site to verify existing conditions including soils, vegetative growth, subsurface conditions, existing grade and drainage, irrigation system etc. making allowances in his bid for any required work to provide the landscape installation as specified in the construction documents.
- B. The Contractor shall notify the Owner to locate underground lines prior to hole boring or trenching. Do not permit heavy equipment such as trucks, rollers, or tractors to damage utilities. Hand excavate as required to minimize possibility of damage to underground utilities. Maintain grade stakes set by others until removal is mutually agreed upon by all parties concerned. Prevent damage to temporary risers of underground irrigation system and similar obstructing work located in the landscape areas.
- C. If there is a conflict with existing utilities, improvements and/or planting and the proposed planting, Contractor shall promptly notify the Owner's Representative for instructions as to further action. Failure to do so will make Contractor liable for any and all damage or corrective actions arising from his operations.
- D. Prior to the start of this work, the Contractor and the Owner's Representative shall verify the operational condition of that portion of the existing irrigation system pertaining to the proposed planting area. The Contractor shall notify the Owner's Representative of any repairs and/or corrections necessary for proper functioning and coverage. The repairs and/or corrections shall be completed before any plant material is planted. Failure to perform system verification and provide notification prior to the start of this work will make the Contractor liable for any and all repairs and/or corrections necessary for proper functioning and coverage, as well as any required plant replacement, without any additional cost to the Owner.
- E. No plants shall be planted in situations that show poor drainage infiltration or low areas that result in standing water. Such situations shall be corrected by the Contractor as directed by the Landscape Architect. Any corrections of finish grades shall be provided by the Contractor at no additional cost to the Owner.

1.8 PROTECTION

A. The Contractor shall guarantee repair of damage to any part of the premises resulting from but not limited to leaks, defects in materials or workmanship, operation of equipment, storage of materials and/or equipment, installation of underground or overhead utilities. The Contractor shall be liable for any and all accidents resulting from his work, including open holes and trenches during construction.

B. Protect new and existing landscape areas in the area of work from theft, loss, damage and deterioration during storage, installation and maintenance. Protect from unauthorized persons (trespassers) as well as from operations by other contractors and tradesmen, and landscape operations. Protect all planted turf and shrub areas from persons as well as operations of other contractors and the Owner. Cost of protection shall be born by the Contractor with means of protection such as temporary fencing as approved by Owner. Cost for protection shall be included in the Contractor's bid for the work.

C. Contractor shall repair or replace damaged work and/or damage to existing improvements/landscape as identified by the Owner's Representative to a condition acceptable to the Owner's Representative. No additional payment will be made to the Contractor for repair or replacement of damaged work and/or existing improvements/landscape.

1.9 OBSERVATIONS

A. The Owner's Representative, Project Inspector or Landscape Architect shall perform periodic observations and shall record the observation on the Landscape Planting Observation Log form on the As Built Record Drawings. Such observations shall include but are not necessarily be limited to:

1. Weed control operations prior to other portions of work.
2. Ripping and soil conditioning of the planting area.
3. Layout of the plant material and trees at the site prior to planting in order to avoid conflicts and to meet the design intent.
4. Condition and quality of plant material prior to planting.
5. Auguring, digging and preparation of plant pits and drainage sumps for trees and shrubs.
6. Planting and staking of trees.
7. Planting of shrubs, ground cover and turfgrass.

B. Any corrective action called for shall be immediately performed by the Contractor.

C. Failure by the Contractor to obtain the above observations shall place the responsibility on the Contractor for any relocation and/or replacement of planted trees or shrubs.

1.10 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Plant label shall identify each species and variety. A label shall be attached to each individual plant or block of identical plants grouped together.

B. Adequately protect plants from sun and wind prior to planting. Do not allow stored plant material to dry out at any time.

- C. Deliver packaged materials in containers showing weight, analysis, and name of manufacturer. Protect materials from deterioration during delivery and while stored at the site. Store materials and equipment in a location as directed by the Owner's Representative.

1.11 PESTICIDE NOTIFICATION

- A. A written notification of any and all pesticide/herbicide products scheduled for use by the Contractor or their representative on the Owner's property must be submitted to the Owner's Representative at least seven days prior to the scheduled application. Notification shall include the product name, manufacturer's name, the pesticide active ingredient, the U.S. EPA and CalDPR registration numbers, the scheduled date and application areas, and the reason (target species) for the application.

PART 2 - PRODUCTS

2.1 TOPSOIL

- A. Topsoil used in planting areas shall be a clean, friable soil with no noxious weeds, clods or stones larger than 0.5 inch in diameter, subsoil, hardpan, wood, debris, fine organic material greater than 5%, undesirable insects, plant disease or any other natural or extraneous objects detrimental to normal plant growth to a minimum depth of 18 inches from finish grade.
- B. The Contractor shall provide a particle size analysis, fertility testing and amendment recommendations of proposed native and/or import topsoil, and the Landscape Architect reserves the right to reject topsoil not conforming to the minimum specifications. Stockpiled onsite topsoil may be used if analysis and testing determines compliance with these requirements prior to placement. Failure to meet minimum specifications shall result in the removal of any unauthorized placed topsoil at the Contractors expense.
- C. Particle size distribution for topsoil shall meet the following per ASTM D422:
1. 100% passing a 12.2 mm (1/2") screen.
 2. Minimum 95% passing a 9.5 mm (3/8") screen.
 3. Minimum 75% passing a 2.36 mm (No. 8) screen.
 4. Maximum 45% passing a No. 200 screen.
 5. Silt content shall be a maximum 35%.
 6. Clay content shall be a maximum 25%.
 7. Silt to Clay ratio shall be less than 2 and greater than 0.5.
- D. Other characteristics shall conform to the following:
1. Permeability rate shall be not less than one (1.0) inch per hour or more than 20 inches per hour.
 2. The sodium absorption ratio (SAR) shall not exceed 3.0 and the electrical conductivity (ECe) shall not exceed 2.5 milliohms per centimeter at 25 degrees

centigrade.

3. Soluble boron shall be no greater than 1.0 part per million (mg/l).
4. Soil pH range shall be 6.5 – 7.9.
5. Maximum concentration of soluble chloride shall be 150 parts per million.
6. Maximum concentration of heavy metals shall not exceed the following when the pH is between 6 and 7:
 - a. Arsenic: 0.5 ppm
 - b. Cadmium: 0.5 ppm
 - c. Chromium: 5 ppm
 - d. Cobalt: 1 ppm
 - e. Lead: 15 ppm
 - f. Mercury: 0.5 ppm
 - g. Nickel: 2.5 ppm
 - h. Selenium: 1.5 ppm
 - i. Silver: 0.25 ppm
 - j. Vanadium: 1.5 ppm
7. Petroleum hydrocarbons shall not exceed 100 mg/kg dry soil.
8. Aromatic volatile organic hydrocarbons shall not exceed 2 mg/kg dry soil.

2.2 SOIL AMENDMENTS

- A. Organic Compost: "Agri-Yield" as supplied by Harvest Power (559) 435-1114; "WonderGrow Compost" by Grover, Inc. (866) 764-5765, or equivalent and conforming to the following minimums:
 1. Certified as "Mature" or better per the California Compost Quality Council Maturity Index.
 2. Pass EPA Class A standards for pathogens and heavy metals.
 3. Particle size: 1/8" maximum.
 4. pH: 6.5-8.5.
 5. Macro-nutrients: Minimum of 1.0% Nitrogen, 0.5% Phosphorus, 0.5% Potassium.
 6. AgIndex ratio greater than 2.
 7. Organic matter content greater than 25% dry weight.

- 1 8. Carbon/Nitrogen ratio: less than or equal to 25.
- 2 9. Salinity (ECe): less than 5.0 dS/m.
- 3 B. Gypsum shall be mined agricultural grade gypsum composed of no less than 100% $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ hydrated calcium sulfate in a pelletized form. Elemental Sulfur shall be a minimum
- 4 95% pure agricultural grade.
- 5
- 6 C. Dry Humate organic soil conditioner comprised of 70% humic acid from Leonardite.
- 7 D. Endo 120 Mycorrhizae containing a minimum 60,000 living propagules per pound of glomus
- 8 intraradices.
- 9 E. Amendment material types and application rates may be subject to change based on the
- 10 findings and recommendations of the horticultural soil testing lab, and as such may result in
- 11 an increase or decrease in the Contract Amount.
- 12 2.3 FERTILIZER
- 13 A. Trees and Shrubs: Fertilizer for all trees and shrubs to be BEST PAKS (20-10-5) controlled
- 14 release fertilizer in a biodegradable 10 oz. packet. The BEST PAKS shall be applied at the
- 15 following rates:
- 16 1. 1 Gallon Can: 1 Best-Pak
- 17 2. 2 Gallon Can: 2 Best-Paks
- 18 3. 5 Gallon Can: 5 Best-Paks
- 19 4. 15 Gallon Can: 10 Best-Paks
- 20 5. Boxed sizes: 4 Best-Paks per 1/2" of trunk caliper
- 21 B. The pre-plant fertilizer shall be a commercial homogeneous, granular pellet:
- 22 1. Pre-plant fertilizer for turfgrass shall be:
- 23 a. Best 6-24-24-5S XB+ with Avail
- 24 2. Pre-plant fertilizer for mixed plantings shall be:
- 25 a. Best Landscape Color 14-14-14 (14-6-11.6-3S and micronutrients) with 9.9%
- 26 slow release N, or equal.
- 27 C. The maintenance fertilizer shall be a commercial homogeneous, granular pellet:
- 28 1. Maintenance fertilizer for turfgrass shall be one or more of the following:
- 29 a. Urea 46-0-0
- 30 b. Ammonia Sulfate 21-0-0-24S, standard grade
- 31 c. Best Nitra King 19-4-4-11.5S-2.2Fe, or equal.

1 d. Best Nitex 19-3-5-7S-3.4Fe, or equal.

2 2. Maintenance fertilizer for mixed plantings shall be the pre-planting fertilizer.

3 D. Fertilizer material types and analysis may be subject to change based on the findings and
4 recommendations from the horticultural soil testing lab, and as such may result in an
5 increase or decrease in the Contract Amount.

6 2.4 MULCH

7 A. Walk-on type of chipped and aged greenwaste woody material without leaves, green wood,
8 sticks, dirt, stones, dust and other non-organic debris as accepted by the Landscape
9 Architect. Particle size ½" to 1" in general size.

10 2.5 STAKING & GUYING MATERIALS

11 A. Stakes: 2" Diameter lodgepole pine, pressure treated and pointed one end.

12 B. Ties: V.I.T. Cinch Tie, 32 inches long, V.I.T. Products, Inc. (619) 673-1760, or equivalent.

13 2.6 PLANTS

14 A. Plants shall be typical of their species and variety, shall have normal growth habits, well
15 developed branches and be densely foliated, and shall have fibrous root systems. No
16 substitutions will be allowed unless approved in writing by the Landscape Architect.

17 B. Plants shall be free from defects and injuries including disease, insects, insect eggs and
18 larvae and girdled or matted roots.

19 C. Quality and size of plants, spread or roots, and size of balls shall be in accordance with
20 ANSI Z60.1-2004, "American Standard for Nursery Stock" as described in Quality
21 Assurance.

22 D. Plants shall not be pruned before planting.

23 E. Plant material must be selected from nurseries that have been inspected by State or
24 Federal Agencies.

25 F. Plants shall be nursery grown and shall have been transplanted or root pruned at least
26 once in the past three (3) years. Plants shall have been grown under climatic conditions
27 similar to those in the locality of the project.

28 G. Each bundle of plants shall be properly identified by weatherproof labels securely attached
29 thereto before delivery to the project site. Label shall identify plant by name.

30 H. Nomenclature shall be in accordance with Sunset Western Garden Book, current edition.

31 I. No plants shall be removed from their container until a review has been made in the field or
32 at the nursery, or except when specifically authorized in writing by the Owner.

33 J. Collected plant material may be used only when approved. Approval shall not limit the right
34 of rejection during work progress for conditions of the root ball, latent defects or injuries.

35 K. Where shown a "MULTI" provide trees with a minimum of three trunks.

- L. Plant sizes listed on the planting plan are minimum acceptable sizes. The quantities listed are the Landscape Architect's estimate only. The Contractor is responsible for the quantities of plant symbols shown on the plan, and/or the quantities in hatched planting areas at the specified triangular spacing.

2.7 TURFGRASS SOD

- A. Sod shall be produced from certified or approved seed/stolons, fresh and labeled in accordance with U. S. Department of Agriculture Rules and Regulations. Sod quality shall be Premium or Standard Grade per TPI specifications.
- B. Sod shall be neatly mowed and be mature enough that when grasped at one end it can be picked up and handled without damage, delivered to the project site, adequately protected and installation commenced within 24 hours of harvesting.
- C. Turfgrass shall be a species and variety as specified in the Contract Drawings. If a warm-season grass is specified and the installation is to be performed between the months of October and April, a species with an established perennial ryegrass overseeding shall be installed. Submit the overseeded product information for approval prior to the installation.

2.8 ROOT BARRIER

- A. A ribbed polyethylene panel of minimum 0.080" thickness equal to Deep Root Partners #UB 24-2 PANEL, (800) 458-7668..

2.9 TREE TRUNK PROTECTOR

- A. ArborGard+ polyethylene tree guard by Dimex (800) 334-3776, or equal.

2.10 HERBICIDES

- A. Herbicide products for removal of unwanted grass and broad-leafed weeds shall be registered and approved for use by the U.S. EPA and CalDPR, and shall comply with the Owner's Standards and with the "Healthy Schools Act with current amendments".
- B. Provide pre-emergent and post-emergent, selective herbicide formulations for use on turfgrass areas and/or ornamental shrub/ground cover areas that are not injurious to the proposed plantings and turfgrasses.
- C. Provide a non-selective contact herbicide formulation for use on existing established weeds.

2.11 OTHER MATERIALS

- D. Materials not specifically indicated, but necessary for proper execution of the work, shall be of first quality as selected by the Contractor subject to approval of the Landscape Architect.

PART 3 - EXECUTION

3.1 EXAMINATION & PREPARATION

- A. General: Verify that existing site conditions are as specified and indicated before beginning this work.
- B. Damaged Earth: Verify that earth rendered unfit to receive planting due to concrete water, mortar, limewater, hydrocarbons or any other contaminant dumped on it has been removed and replaced with clean earth from a source approved by the Owner's Representative.
- C. Examine the area and conditions under which the work in this section is to be performed. Verify that any existing irrigation system within the limit of work is in proper working order with full coverage. Correct conditions detrimental to the timely and proper completion of the work. Do not proceed until unsatisfactory conditions have been corrected. Commencement of the work signifies acceptance of the existing conditions.
- D. Protection:
1. Locate sewer, water, irrigation, gas, electric, phone and other pipelines or conduits and equipment within the area of work prior to commencing work.
 2. Mark existing irrigation heads, valves, valve boxes and other below grade equipment or components that are scheduled to remain. Protect in place.
- E. Runoff and Erosion Control: Furnish equipment, materials and labor necessary to control the flow, drainage, and accumulation of excess water running off the work area and prevent soil erosion, blowing soil and accumulation of wind-deposited material on the site per the approved SWPPP.

3.2 ROUGH GRADING, SOIL PREPARATION, PLANTER BACKFILL

- A. Rough Grading shall be performed by other subcontractors to the extent of establishing rough pads, slopes and drainage patterns. The Contractor is responsible for placement of topsoil and grading required to ensure positive drainage in all turfgrass and planting areas. All planting areas shall have a minimum topsoil depth of 18 inches from on-site native and/or approved import sources. Rough grading shall be completed prior to weed control, cross ripping or rock removal operations.
- B. After the completion and acceptance of the weed control operations outlined below, and unless directed otherwise by the Landscape Architect or noted on the Drawings, and except for the area under the canopy of existing trees, the Contractor shall cross rip and till (break up large clumps and clods in excess of 1 inch diameter) the soil within all planting areas outside the canopy drip line of existing trees until the soil is loose and friable. Ripping shall be to a minimum depth of twelve inches (12") in turfgrass areas and eighteen inches (18") in shrub/ground cover areas, with ripping tines a maximum 18" apart performed in a minimum of four passes each in different directions (perpendicular and diagonal). The Contractor shall review the completed ripping operation with the Owner's Representative and Landscape Architect to determine compliance. The first 6 inches of any new topsoil fill shall be tilled into the existing soil to a minimum depth of 6 inches prior to placing any further topsoil fill. The Contractor shall provide any additional work as directed by the Owner's Representative after the review to obtain compliance. Do not proceed with the addition of topsoil and/or amendments, or commence rock picking or fine grading until the completed ripping operation is accepted in writing by the Owner's Representative.

- C. Planting area soil under the canopy drip line of existing trees, or in planting beds not accessible by motorized equipment, shall be ripped to a minimum depth of 12 inches using manual spading shovels, forks and/or broadforks and working around major tree roots and/or utilities. In areas receiving new mulch, rip to a minimum depth of 6 inches while protecting any existing plants and their root system. Break up and/or remove rocks and clods as indicated below.
- D. Do not work soil when moisture content is so great that excessive compaction will occur, or when it is so dry that dust will form in air or clods will not break up readily, or when a full ripping depth cannot be achieved. Apply water, if necessary, to bring soil to an optimum moisture content for tilling and dust control. Maintain within 2 percent above or below optimum moisture content for the existing soil type at all times during the work.
- E. After soil ripping and preliminary finish grading is completed, the topsoil shall be cleared of all concrete, wire, sticks, roots, debris and foreign materials. Remove rocks and clods as follows:
1. In shrub/ground cover areas, remove stones and clods greater than one (1.0) inches in diameter from the top 4 inches of finish grade.
 2. In general, non-traffic turfgrass areas, remove stones and clods greater than three-quarter (0.75) inch in diameter from the top 4 inches of finish grade.
 3. In designated play or sports field turfgrass areas, remove stones and clods greater than one-half (0.50) inch in diameter from the top 4 inches of finish grade using a mobile tractor pulled, PTO powered, hydraulic controlled rock picker, Cherrington Model 4500 or similar.
- F. Add clean planting topsoil where needed to bring grade to elevation to promote positive drainage. Spread approved planting topsoil over ripped subgrade prior to incorporating amendments.
- G. Backfill all raised grade planters with a minimum depth of 12 inches of imported clean sandy loam planting topsoil conforming to Subsection 2.02 and approved prior to import and/or placement. Failure to obtain import approval prior to backfilling raised grade planters shall result in the removal of any planting and non-approved backfill, and the reinstallation of the work with approved materials.

3.3 WEED CONTROL

- A. The Contractor shall treat any weeds in proposed new turfgrass and planting areas with a post-emergent contact weed killer at manufacturer's approved rates prior to any commencement of work at the site including any irrigation work, ripping of soils or fine grading. Areas planned for turfgrass seed/stolon planting shall in addition receive "grow and kill" weed removal as outlined below.
- B. Weed eradication shall be ongoing throughout the course of the landscape installation. The Contractor shall apply a pre-emergent herbicide after shrub/ground cover planting and prior to mulch installation. Manually remove weed seed heads. At no time will weeds be allowed to become established. Contractor shall provide all weed control operations as directed by the Owner's Representative.
- C. All weed control operations using pesticides/herbicides shall comply with the CalDPR and Owner Standards as well as AB2260 "Healthy Schools Act". The Contractor shall comply with the notification and posting requirements of the "Healthy Schools Act".

1. The Contractor shall notify the Owner per Subsection 1.11, A.
 2. The Contractor shall post highly visible signs around the treatment area in conformance with the "Healthy Schools Act" warning of a scheduled pesticide/herbicide application a minimum of 24 hours before to 72 hours after a pesticide application.
 - D. After the shrub/ground cover planting is complete and prior to mulch installation, apply an approved pre-emergent herbicide per the manufacturer's recommended rates.
- 3.4 SOIL CONDITIONING
- A. Before commencement of any soil conditioning, weed and rock removal shall be completed as outlined above.
 - B. Uniformly amend the entire area of topsoil in turfgrass and mixed planting areas per the following bid rates and per the approved modifications as a result of the soils analysis recommendations:
 1. Turf and Non-Sloped (less than 4h:1v) Planting Area Soil Conditioning (per 1,000 square feet).
 - a. Compost at a rate of four and one half (4.5) cubic yards (a 1.5 inch thick layer).
 - b. Gypsum at a rate of 100 pounds, or Sulfur at 19 pounds, or an equivalent combination.
 - c. Humate soil conditioner at a rate of thirty-five (35) pounds.
 - d. A pre-planting fertilizer to turfgrass areas at a rate of 1.5 pounds of actual P and K.
 - e. A pre-planting fertilizer to mixed planting areas at a rate of 1 pound of actual N.
 - f. Endo 120 per Subsection 3.06, Mycorrhizae Application.
 - C. Till soil amendments into all planting soil to a minimum depth of six (6) inches. Perform the cultivation in at least two passes, one in each perpendicular directions to the first, so that the amendments are homogeneously incorporated into the topsoil. All cultivation inside the dripline of existing trees shall be preformed manually with minimal disturbance to the root system.
 - D. Planting backfill for trees and shrubs shall be a mix of four-fifth native soil and one-fifth Compost by volume. Add Humate and Endo 120 Mycorrhizae at 5 pounds each per cubic yard of backfill.
 - E. Amendment material types and application rates may be subject to change based on the findings and recommendations of the horticultural soil testing lab, and as such may result in an increase or decrease in the Contract Amount.

3.5 FINE GRADING

- A. Upon completion of soil preparation, fine grade all planting and turfgrass areas to a smooth

and even slope conforming to and reestablishing drainage patterns. Grading shall eliminate all humps and hollows and promote positive drainage in all planting and turfgrass areas.

B. Tolerance of grade differential for planting and general turfgrass areas shall be plus or minus 0.04 foot. If requested, the Contractor shall water test all turf and planting areas after the grading operations are completed in the presence of the Owner's Representative and Landscape Architect. The water test shall consist of applying water to the turf and planting areas to the point where water begins to run over the soil to show the drainage pattern. Make all corrections to the finish grading as required by the Owner's Representative to re-established positive drainage patterns. Acceptance of the finish grading shall be obtained in writing from the Owner's Representative and Landscape Architect prior to proceeding with soil conditioning and planting operations.

C. Turfgrass sports fields shall be fine graded using a laser controlled machine capable of producing final grades within 0.02 foot plus or minus from the proposed elevations.

D. After the finish grading process, relative compaction of the soil in turf and planting areas shall range between 82% and 85% relative density. Compaction/moisture levels are generally acceptable if an Oakfield probe is able to penetrate a minimum of six inches into the cultivated planting topsoil with moderate pressure. The Owner reserves the right to require the Contractor to test for over compaction. If the compaction is within the acceptable range, the test will be paid for by the Owner. All testing due to non-compliance will be paid for by the Contractor.

E. Remove all rocks produced as a result of the soil conditioning and finish grading operations per the requirements of Subsection 3.02.

F. Finish grades shall be one-half inch (1/2") to three-quarter inch (3/4") for turfgrass sod areas, flush (0.0") for turfgrass seed/stolon areas and two inches (2") for shrub/ground cover planting areas below the finish surface of all adjacent walks, curbs, mowstrips and utility/valve boxes or collars. Transition any grade modification in existing planted areas a minimum 24 inches for turfgrass and 12 inches for mulched areas, unless shown otherwise on the grading plan.

3.6 MYCORRHIZAE APPLICATION

A. In turfgrass planting areas, after fine grading is completed broadcast Endo 120 Mycorrhizae at a rate of one and one half (1.5) pounds per 1,000 square feet (65 lbs. per acre). Lightly rake into the top one inch (1") of topsoil immediately prior to turfgrass installation.

B. In shrub and/or ground cover planting areas, the Mycorrhizae inoculant shall be incorporated into the soil with the other soil amendments at three (3.0) pounds per 1,000 square feet (130 lbs. per acre) per Subsection 3.04, Soil Conditioning. Inoculant shall also be incorporated into the planting backfill per Subsection 3.04, E.

3.7 PLANTING

A. General Requirements

1. Obtain written approval from the Landscape Architect or Owner's Representative to begin planting operations. The irrigation system shall be fully automated and operational, all weeding, soil conditioning and finish grading completed, and the tree and plant layout approved.

2. Planting shall be performed by workmen familiar with planting procedures and under

the supervision of a qualified foreman. The planting foreman shall be on the job site at all times when planting is in progress.

3. Planting operations shall not occur under unfavorable weather conditions.

4. Boxed trees shall be planted first. Shrub planting shall be completed before groundcover is planted.

5. Proceed and complete the landscape work as rapidly as portions of the site become available, working within the seasonal limitations for each kind of planting required.

6. Cooperate with other contractors and trades working in and adjacent to the planting work areas. Examine drawings which show the development of the entire site and become familiar with the scope of other work required.

B. Planting Preparation and Operations

1. Planting material shall be provided with adequate protection of root system and balls from drying winds and sun. Do not bend or bind trees or shrubs in such a manner as to damage bark, break or destroy natural shape. Provide protective covering during delivery.

2. Deliver trees and shrubs after preparations for planting have been completed, and plant immediately. If planting is delayed more than six (6) hours after deliver, set trees and shrubs in shade, protect from weather and mechanical damage and keep roots moist. Do not remove container grown stock from containers until planting time.

3. All planting areas shall be smooth and even. Finish grades shall be done prior to any placement of plants.

4. Place all trees and shrubs in locations shown on the planting plan and obtain written field approval of the Landscape Architect before planting or digging planting pits. Inform the Landscape Architect seven (7) days prior to placing the plants. Maintain a minimum 15 foot clearance from trees to any light pole, unless specifically noted otherwise.

5. Carefully remove all canned stock from containers with tin snips or approved cutter. Cut away and remove any girdled or matted roots.

6. Excavate holes of circular outline with vertical sides for all plants 15 gallon or less. Boxed trees shall have square planting holes. The vertical sides and bottom of the holes shall be thoroughly scarified to promote union of backfill with existing soils. All trees shall have two drainage sump holes drilled with a twelve inch (12") diameter auger penetrating hardpan layers to a minimum one (1) foot into a sand/gravel layer or to a minimum depth of ten (10) feet below the planting pit bottom. Precautions shall be exercised to avoid smooth sides on the holes. Offset augured holes a minimum of eighteen inches (18") from planned tree location to avoid settling of tree after planting.

7. After cleaning out the sump holes, the Contractor shall test the sumps for drainage by flooding with water. If the water does not drain out within twenty-four (24) hours, auger down as required to achieve such drainage by breaking through the hardpan layer, or by extending the drainage sumps to a minimum depth of 15 feet below the bottom of the planting pit. After obtaining approval of the sump holes, fill the augured

drainage sump holes with coarse concrete sand.

8. Tree and shrub planting pits shall be at least two and one half (2.5) times the width of the plant container, but a minimum of 36" wide for trees and 18" wide for container shrubs. Planting pits shall be as deep as the soil depth in the container or box, less the additional height of the crown above the finish grade.

9. Set each plant in the center of the pit, plumb and straight. Set the crown of the plant at one inch (1") for shrubs, two inches (2") for trees above finish grade. When 1/2 of the backfill mix has been placed, tamp-in, insert fertilizer (BEST PAKS as per Section 2.1B1) and allow no air pockets as remainder of backfill is added.

10. Compact soil around the rootball of all plants and thoroughly water in the entire backfill depth.

11. Excess soil from plant holes shall be cultivated and raked to a smooth outline.

12. Shrubs and groundcovers shall be installed in relation to walks and paving to allow for future growth without obstructing traffic with clearance as shown on the drawings.

13. All plants shall be set in watering basin which shall be as wide as the planting pit, but at least four feet (4') in diameter and four inches (4") deep for trees and two feet (2') in diameter and three inches (3") deep for shrubs and vines.

14. Ground cover plants shall be planted at the spacing noted on the drawings. Not more than fifteen minutes shall elapse from the time any groundcover plant is planted until it is watered.

C. Pruning: Prune plants in accordance with established horticultural practice. Shearing of any plants will not be acceptable. Tree pruning shall only be performed with the written approval of the Landscape Architect and under the direction of a certified arborist, and shall comply with ISA Pruning Standards (ANSI 300).

3.8 MULCH

A. Where mulch is to be installed in an existing planting area, breakup/till the existing soil to a minimum 6" depth per section 3.02, and adjust finish grade adjacent to hardscape elements per section 3.05 prior to mulch installation.

B. Install a minimum 3" layer of mulch in all planting areas, except for slopes greater than 3h:1v and seeded areas. Install a minimum 2" layer of mulch in all areas receiving flatted plants, and in the watering basin next to trunks of trees and shrubs.

C. Install a minimum 3" layer of wood mulch at a minimum 3' radius from the tree trunk of existing trees located in turfgrass areas. Provide a smooth finish grade transition to where the mulch meets the turfgrass, so that the top elevation of the mulch is flush to the turfgrass soil. For new trees in turfgrass areas, remove the watering berm just prior to the turfgrass planting but maintain the mulched area within the planting pit.

3.9 STAKING & GUYING

A. Trees shall be supported by two (2) tree stakes as shown on the drawings. Cut off the top of stakes damaged by installation or where the stake conflicts with canopy branches.

B. Stakes shall be set firmly in the ground outside the rootball and where possible set stakes

1 perpendicular to the prevailing northwest wind.

2 C. Trees shall be tied to upright stakes loosely with tree ties (see planting detail). Remove the
3 nursery stake.

4 D. Multi-trunked trees shall be guyed, or individual branches may be staked and loosely tied
5 as shown on the Drawings.

6 3.10 ROOT BARRIER

7 A. Install root barrier, if required, per planting details and manufacturers recommendations.

8 3.11 ARBOR GUARD

9 A. Install ArborGard+ on all newly planted tree trunks in turfgrass areas per manufacturer's
10 recommendations.

11 3.12 TURFGRASS SOD

12 A. The area to be planted shall be finish graded to present a smooth and even surface free of
13 humps and hollows and conforming to the finish grading plans. Where new sod is abutting
14 existing turfgrass, fine grade to allow for the thickness of the new sod soil so that the new
15 and existing sod grades are flush. Immediately prior to planting, the surface of the area to
16 be planted shall be sufficiently loose and friable, with adequate moisture to receive the sod.
17 Avoid laying sod on hot or dry soil.

18 B. Lay first strip of sod slabs along a straight line (use a string in irregular areas). Butt joints
19 tightly. Do not overlap edges. On second strip, stagger head joints (similar to a running
20 bond brick pattern). Use a sharp knife to cut sod in order to fit curves, edges, and sprinkler
21 heads.

22 C. Install with turf-tired machinery full width sections sod as delivered and flush to adjacent
23 surfaces. Terminating sod edges shall be straight and at right angles to hardscape
24 elements whenever possible.

25 D. As the sod is being installed, water the sod lightly to prevent drying out. Continue to lay sod
26 and lightly water until installation is complete.

27 E. After laying sod, roll to eliminate irregularities and to form good contact between sod and
28 soil. Avoid a too heavy roller or excessive initial watering which may cause roller marks. Fill
29 all visible joint gaps less than 0.5 inch with washed concrete sand. Fill any joint gaps of 0.5
30 inch or greater width with a minimum two foot long replacement sod section in order to
31 achieve a tight joint.

32 F. Water the completed lawn surface thoroughly. Topsoil should be constantly moist for a
33 minimum two inches deep. Repeat irrigating at regular intervals to keep sod moist until
34 rooted. The areas shall not be watered to the extent of saturating the soil and causing
35 "flotation" or "flowing" of the top surface of the soil. After water has once been applied, no
36 portion of the planted areas shall be allowed to dry out during the entire maintenance
37 period. After sod roots are established, decrease frequency and increase amount of water
38 per application as necessary to maintain good soil moisture to a minimum 6" depth without
39 standing water or excess runoff. The Contractor shall be responsible to monitor the site and
40 alter the watering times and frequencies to meet site and climatic conditions.

G. Fertilize turfgrass sod with maintenance fertilizer material and rates within seven days of installation.

H. Replace dead or distressed sod with equivalent material as directed by the Landscape Architect.

I. Do not install turfgrass inside the watering basin of new trees planted in turf areas, or within a 3' radius of existing tree trunks located in turf areas.

3.13 CLEAN-UP AND REPAIR

A. All areas shall be maintained in a neat and orderly condition at all times. All reasonable precautions shall be taken to avoid damage to existing planting and structures. Disturbed and/or damaged areas, whether a part of this work or from the work of other trades, shall be restored to their original condition.

B. Plants and/or turfgrass shown to remain and damaged or removed by construction operations and/or utility/electrical/drainage lines shall be replaced with plants that match as closely as possible to the existing plant species, variety and size. The replacement turfgrass sod variety shall be the same as shown in the Planting Legend if for new work, or shall match the existing turfgrass variety where the turfgrass is existing. Adjust the finish grade so that the new turfgrass sod abuts flush to the existing turfgrass or to hardscape. The replacement plants and/or turfgrass sod shall be maintained as part of the original scope of work.

C. After the planting operations are completed, the Contractor shall remove all trash, excess soil, empty containers or any other debris accumulated by the work from the site. All damage caused by the work shall be repaired at the Contractor's expense and the site shall be left in a neat and orderly condition to the satisfaction of the Owner.

3.14 PRE-MAINTENANCE REVIEW

A. A general review will be held prior to the start of the maintenance period upon conclusion of the planting operations, irrigation system installation and after clean-up has occurred. The Owner's Representative shall be informed in writing a minimum of seven (7) working days prior to the time the work is ready for review in order to arrange a suitable time and date for such review.

B. At the time of review, Contractor shall have all planting areas free of weeds and neatly cultivated and fine graded. All plant basins shall be in good repair. All trees shall be properly staked and tied. All turfgrass areas shall be fully established and have a healthy, uniform and dense stand of grass without weeds or bare spots.

C. Work requiring corrective action or replacement in the judgment of the Owner's Representative shall be performed within five (5) days after the inspection. Corrective work and materials replacement shall be in accordance with the drawings and specifications and shall be made by the Contractor at no cost to the Owner. A subsequent review shall then be arranged.

D. If after the review, the Landscape Architect is of the opinion that all the work has been performed as per the Contract Documents, and a uniform stand of healthy dense turfgrass has been established without weeds or bare spots, the Contractor will be given written notice that the maintenance period may begin.

3.15 MAINTENANCE - GENERAL

- A. After all work indicated on the drawings or herein specified has been completed, reviewed, and approved, the Contractor shall commence a sixty (60) calendar day maintenance period in which the Contractor shall continuously maintain all areas included in the contract during the progress of the work and throughout the maintenance period, or until Final Acceptance of the project, whichever is greater.
- B. Maintenance work includes monitoring the site to control all watering, replanting, fertilizing, mulching, weeding, cultivating and mowing necessary to bring the planted areas to a healthy and vigorous growing condition, and any additional work needed to keep the areas neat, edged, weed and trash free, and attractive.
- C. All trees, shrubs, ground cover shall be kept at optimum growing condition by watering, weeding, replanting, fertilizing, cultivating, tree stake repair, spraying for diseases and insects, replace dead or dying materials, pruning as directed, maintaining proper grades of plants, and providing any other reasonable operations of maintenance and protection required for successful completion of the project.
- D. Any date when the Contractor fails to adequately water, replace unsuitable planted areas and other work determined to be necessary by the Owner, will **NOT** be credited as part of the establishment/maintenance period.
- E. The establishment of turfgrass sod is herein defined as being all work necessary to develop sod without weeds or distressed areas with a minimum rooting depth of 2 inches into site soil.
- F. No additional payment will be made for additional time necessary for turfgrass establishment. The maintenance period shall not start until all contract work has been completed and all close-out documents and materials have been submitted. Turfgrass will be considered weed-free if there is a maximum of one percent undesirable turfgrass species, and nine weeds or less per 50 square yards (one per 50 square feet).
- G. During the progress of the maintenance period, the Contractor and the Owner's Representative shall conduct reviews at no less than 21 day intervals to determine that ongoing maintenance activities have been conducted by the Contractor. If in the opinion of the Owner, ongoing maintenance has not been conducted by the Contractor in a satisfactory manner the maintenance period shall be suspended. The Contractor shall provide remedial work as directed by the Owner's Representative to correct the found deficiencies and schedule another review. If after the subsequent review the work is deemed acceptable, the maintenance period shall resume.

3.16 MAINTENANCE – MOWING

- A. For new sod, mow when 1.4 inch tall and cut down to 1.0 inch.
- B. Turfgrass areas shall be mowed during the growing season a minimum of twice a week for warm-season varieties and a minimum of once a week for cool-season varieties, or at any time the grass reaches 1.4 times its mowing height. Turfgrass shall be edged weekly. The Contractor shall coordinate his watering and weed control schedules to accommodate his mowing schedule. If the Contractor is unable to mow the turf areas on the required day, he has until 5:00 pm of the next day to do the work. After that time, the Owner reserves the right to secure the services of an alternate mowing entity to perform the work. The cost for the alternate mowing will be deducted from monies owed to the Contractor. The Contractor

will remain responsible to perform all scheduled mowings and maintenance of the site. The turfgrass shall be mowed and edged, and all trash and debris removed prior to Final Acceptance.

3.17 MAINTENANCE - FERTILIZATION

A. During the establishment and maintenance period, the Contractor shall fertilize the warm-season turfgrass (Bermudagrass) every twenty-eight (28) days from installation with the turfgrass maintenance fertilizer at a rate of 0.75 lb. of actual N /1,000 s.f. and as modified by the soil fertility recommendations and approved by the Landscape Architect. The Contractor shall continue the fertilizer applications until Final Acceptance, or upon written direction by the Landscape Architect.

B. The Contractor shall fertilize the non-turf planted areas during the last week of the maintenance period with the mixed pre-planting fertilizer (14-6-11.6) at a rate of six (6.0) lbs./1,000 s.f. and as modified by the soil fertility recommendations and approved by the Landscape Architect.

3.18 MAINTENANCE – REPAIR AND WEEDING

A. Between the fourteenth (14) and twenty-first (21) day after turfgrass planting, the Contractor shall perform the following: replant all spots or areas where normal germination or growth is not evident; remove all rocks or other debris that would constitute a hindrance to mowing or cultivating; repair all damage done by his operations. Where poorly compacted trench backfill shows settlement, remove turfgrass or plants, fill all depressions and eroded channels with sufficient conditioned topsoil to raise to proper grade, compact lightly and replant the filled areas.

B. Visible weeds shall be removed at least weekly during the maintenance period. At the end of the maintenance period, all planting areas shall be without weeds. If weeds are present, the Contractor shall manually remove the weeds and shall then apply a granular, selective pre-emergent herbicide at manufacturer's approved rates. Coordinate application with the Owner's Representative and provide certificates of application to Owner's Representative. The turfgrass will be considered weed-free if there are 9 weeds or less per 50 square yards (one per 50 square feet).

3.19 FINAL REVIEW

A. A Final Review will be made before the end of the Maintenance Period or upon the pending Final Acceptance of the work, whichever is earlier, provided all deficiencies revealed during the maintenance period have been corrected. If these deficiencies have not been corrected by the end of the stated maintenance period, the Contractor shall continue to fully maintain the project at his own expense. After all deficiencies have been corrected, a Final Review will be held with the Landscape Architect, Owner's Representative, and Contractor.

B. If after the Final Review, the Landscape Architect and Owner's Representative are of the opinion that the work is acceptable and complete, the Contractor's maintenance responsibility shall terminate on an agreed upon date.

3.20 WARRANTY AND REPLACEMENT

A. All trees and plants provided under this Contract shall be guaranteed to be in good, healthy, disease/pest free and in a flourishing condition one growing year from the date of Final Acceptance of the work, provided the Owner maintains the plants properly and in accordance with accepted horticultural practices. Species and size of any tree and/or plant

1 replacements, either prior to or after Final Acceptance, shall be equal to that of the same
2 adjacent trees and/or plants at the time of replacement as determined by the Landscape
3 Architect.

4 B. The Contractor shall be responsible to replace all lost plants due to theft, vandalism or any
5 other preventable causes till Final Acceptance of the work by the Owner. Replacement
6 trees and plants shall be planted as originally specified and detailed. Replacement trees
7 and plants shall be guaranteed as specified above from the date of replacement. The
8 maintenance period may be extended for a duration of not more than the original
9 maintenance period duration for the establishment of replacement plants.

10 C. The Contractor shall be held responsible for repair and/or replacement of damages to new
11 or existing improvements resulting from the defects or actions of trees, plants, materials,
12 equipment or workmanship one year from the date of Final Acceptance or the Notice of
13 Completion, whichever is later.

14 END OF SECTION

1 SECTION 33 12 00 - SITE WATER DISTRIBUTION

2 PART 1 - GENERAL

3 1.1 RELATED DOCUMENTS

- 4 A. Drawings and general provisions of the Contract, including General and Supplementary
5 Conditions and Division 01 Specification Sections, apply to this Section.

6 1.2 SECTION INCLUDES

- 7 A. Pipe and fittings for water piping.

- 8 B. Valves and valve boxes.

- 9 C. Accessories.

10 1.3 RELATED SECTIONS:

- 11 A. Drawings and general provisions of the Contract, including General and Supplementary
12 Conditions and Division 00 and 01 Sections, apply to this work.

- 13 B. Section 312300 – Trench Excavation and Backfilling

- 14 C. Section 321313 – Site Concrete Improvements

15 1.4 REFERENCES

- 16 A. ASTM D-1557.

- 17 B. ANSI/ASTM D2466 - Polyvinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 40.

- 18 C. ANSI/AWWA C110 - Ductile Iron and Grey-Iron Fittings, 3 inch through 48 inch, for Water
19 and Other Liquids.

- 20 D. ANSI/AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined
21 Molds, for Water or Other Liquids.

- 22 E. ANSI/AWWA C500 - Gate Valves, 3 through 48 in NPS, for Water and Sewage Systems.

- 23 F. ANSI/AWWA C900 - Standard for Polyvinyl Chloride (PVC) Pressure Pipe, 4 inch through
24 12 inch, for Water.

- 25 G. ASTM D1785 - Polyvinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80, and Class 200.

- 26 H. ASTM D2855 - Making Solvent-Cemented Joints with Polyvinyl Chloride (PVC) Pipe and
27 Fittings.

- 28 I. ASTM D3139 - Joints for Plastic Pressure Pipes using Flexible Elastomeric Seals.

29 1.5 SUBMITTALS

- 30 A. Submit under provisions of Division 01.

- 31 B. Product Data: Provide data on pipe materials, pipe fittings, valves and accessories.

- 32 C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

33 1.6 PROJECT RECORD DOCUMENTS

- 34 A. Submit under provisions of Division 01.

- 35 B. Accurately record actual locations of piping mains, valves, connections, and
36 appurtenances.

- 37 C. Identify and describe discovery of uncharted utilities, or utilities found at locations
38 different than indicated on plans.

39 1.7 QUALITY ASSURANCE

A. Perform work in accordance with product manufacturer's recommendations and these Contract Documents.

B. Valves: Manufacturer's name and pressure rating marked on valve body.

1.8 Provide an approved protective wrap or coating for all metallic pipe, fittings, and appurtenances in contact with soil.

1.9 Delivery, Storage, and Handling

A. Deliver, store, protect and handle all products required.

PART 2 - PRODUCTS

1.1 WATER PIPE

A. PVC Pipe (4" and larger, underground): ANSI/AWWA C900 Class 200.

1. Fittings: ANSI/AWWA C111, ductile iron.

2. Joints: ASTM D2855, solvent weld.

B. PVC Pipe (3" and smaller, underground): ANSI/AWWA Schedule 40.

1. Fittings: ANSI/AWWA Schedule 80.

1.2 GATE VALVES - Up to 2 Inches (50 mm)

A. Use full port ball valves for 2" and smaller and gate valves for 2-1/2" and larger size.

B. Brass or Bronze body, non-rising stem, inside screw, single wedge or disc, IPS ends.

1.3 GATE VALVES - 2-1/2 Inches (63 mm) and Over

A. ANSI/AWWA C500, Iron body, bronze trim, non-rising stem with square nut or control handle wheel, single wedge, threaded or flanged.

1.4 ACCESSORIES

A. Concrete for Thrust Blocks and Valve Box Surface Collars: Concrete type specified in Section 321313.

B. Valve Boxes and Covers: Christy No. G5 traffic box, or approved equal. Cover marking shall read "Water". A one piece PVC riser extension shall be provided as necessary to allow unobstructed access to valve operating nut.

C. Solvent Cement and Primer for PVC Pipe and Fittings: Per ASTM F656 and ASTM D2564.

D. Locator Tape: Tape shall be an inert material such as polyethylene plastic with a metallic core, and highly resistant to alkalis, acids, or other chemical components likely to be encountered in soils. The tape shall be bright colors for contrast with the soils with identifying print in black letters. The tape shall be six inches wide and be printed "CAUTION - WATER LINE BELOW".

1.5 VALVES, PIPES AND FITTINGS

A. All valves, pipes and fittings for the fire line must meet the requirements of NFPA 24, 3-1-1, 4-1-1 and 7-1-1, and NFPA 13, 3-4-1.

PART 3 - EXECUTION

1.1 Examination

A. Verify existing conditions. All plot dimensions are approximate. Before proceeding with any work, carefully check and verify all dimensions and report any variations to the Engineer.

B. Due to the scale of the drawings, it is not possible to indicate all offsets, fittings, etc., which may be required. Carefully investigate the structural and finished conditions affecting all work, and plan work accordingly, furnishing such fittings, etc., as may be required to meet such conditions. Drawings are generally diagrammatic and indicative of the work to be installed in the most direct and workmanlike manner, so that conflicts between water systems, planting, and architectural features will be minimized.

C. Do not install the facilities as indicated on the drawings when it is obvious in the field that unknown obstructions might not have been considered in the engineering. Such obstructions or differences should be brought to the attention of the Engineer before proceeding.

1.2 PREPARATION

A. Prepare for pipe installation by assembling all needed materials.

B. Cover all PVC pipe during storage.

1.3 BEDDING

A. Excavate trench, pit or hole in accordance with Section 312333 for work of this Section.

B. Where trench or pit has been overexcavated, place bedding material at bottom of excavations, level soil materials in continuous layers not exceeding 6 inches uncompacted depth.

C. Backfill around sides and to a level six inches above the top of pipe with bedding sand, tamped in place.

D. Maintain optimum moisture content of bedding material to attain required compaction density.

1.4 INSTALLATION – PIPE AND FITTINGS

A. Install pipe at locations and depths indicated on plans.

B. Install pipe, fittings, and associated materials in accordance with manufacturer's recommendations.

C. Route pipe in straight line, whenever possible. All changes in direction of pipes shall be made with fittings, not by bending.

D. Install pipe to allow for expansion and contraction without stressing pipe or joints.

E. Form and place concrete for thrust blocks at each elbow, tee, angle or other significant change of direction in loose-joint pipe, per detail on plans.

F. Establish elevations of buried piping to ensure not less than 30 inches of cover, except at connections to existing lines, which may be shallower or deeper, or where shown otherwise on plans.

G. When two water pipes are to be installed in same trench, maintain 4 inch horizontal clearance between pipes.

H. Backfill trench or other excavation in accordance with Section 312333.

1.5 INSTALLATION – VALVES

A. Set valves on solid bearing.

B. Where valves are installed below finish surface grade, center and plumb valve box and any necessary extensions over valve. Set box cover flush with finished grade.

C. Pour concrete collar around top of valve box per detail on plans.

D. Furnish and install valves and valve boxes in addition to those shown on plans as required for isolation of lines for construction and disinfection, while minimizing disruption of service to buildings, at no additional cost to Owner.

1.6 INSTALLATION – THREADED CONNECTIONS

- A. Assemble all plastic and galvanized steel threaded pipe and fittings using an approved teflon tape applied to the male threads only. A minimum of two (2) wraps and a maximum of three (3) wraps of an approved teflon tape will be required.
- B. At all plastic (PVC) pipe connections, work the ductile iron connections first. Connections shall always be plastic into steel, never steel into plastic.
- C. A non-hardening sealant and lubricant similar to Permatex #51 or LASCO blue pipe sealant may be used in lieu of teflon tape. Apply sealant to clean male threads, brushing into grooves, and to the first three threads of the female threads.

1.7 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Disinfect all domestic water piping systems in accordance with AWWA Standard C601, "AWWA Standard for Disinfecting Water Mains", and in accordance with administrative authority. Disinfection process shall be performed in cooperation with health department having jurisdiction and witnessed by the Owner's Inspector. During procedure, signs shall be posted at each water outlet stating, "Chlorination - Do Not Drink". After disinfection, water samples shall be collected for bacteriological analysis. Certificate of Bacteriological Purity shall be obtained and delivered to the Owner by the Owner's Inspector.

1.8 SALVAGE OF MATERIALS

- A. Salvage and deliver to location specified by Owner all materials desired by Owner. Dispose of all materials not desired by Owner.

1.9 FIELD QUALITY CONTROL

- A. Compaction testing will be performed in accordance with ASTM D-1557.
- B. If compaction tests indicate, work does not meet specified requirements, recompact and retest at no additional cost to Owner.
- C. If tests indicate that work does not meet specified requirements, remove work, replace and retest at no additional cost to Owner.

END OF SECTION

SECTION 33 30 00 - SITE SEWER SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:

- 1. Provide all materials, labor, equipment and services necessary to provide, install and/or modify sanitary sewer facilities as indicated in the Contract Documents

1.3 RELATED SECTIONS:

- A. All Division 00 Specification Sections
- B. All Division 01 Specification Sections
- C. Section 3111 00 – Site Clearing and Demolition
- D. Section 3122 22 – Soil Materials
- E. Section 3123 00 – Trench Excavation and Backfill

1.4 QUALITY ASSURANCE

- A. Requirements of Regulatory Agencies

- 1. Safety Regulations: Work shall comply with all Federal, State and Municipal regulations regarding safety, including the requirements of the following:
 - a. William-Steiger Occupational Safety & Health Act of 1970.
 - b. State of California, California Code of Regulations, Title 8 Industrial Relations, Chapter 4, Subchapter 4, "Construction of Safety Orders" and other State and local agencies having jurisdiction.
 - c. All trenching work shall conform to Trench Construction Safety Orders of California State Industrial Accident Commission.

1.5 REFERENCES

- A. American Water Works Association (AWWA).
- B. American National Standards Institute/American Society for Testing and Materials (ANSI/ASTM)
- C. California Plumbing Code, 2013 Edition (CPC).
- D. Madera County Health Department Standards.

1.6 SUBMITTALS

- A. Submit under provisions of Division 01.
- B. Submit manufacturer's data and/or fabrication drawings for Sanitary Sewer Pipelines and Sewer Fittings, installed under this Section. No items shall be incorporated into the work until submittals are approved by the Engineer.
- C. Manufacturer's installation instructions.
 - 1. Indicate special procedures required to install products supplied.

1.7 COORDINATION

- 1 A. Verify that locations of existing utilities have been indicated at the site by utility authorities or
2 Owner's personnel.
- 3 B. Coordinate work with Owner's use of the premises, and with other contractors working at the site.
- 4 C. Coordinate with the Owner for the shutdown of the existing sewer system to make new sewer
5 connection. Install sewer pipelines before making tie-in to the existing sewer pipeline.
- 6 1.8 EXISTING UTILITIES
- 7 A. Reference is made to Part 1.7 of Section 312333 TRENCH EXCAVATION AND BACKFILL.
- 8 1.9 PROJECT RECORD DOCUMENTS
- 9 A. Submit under the requirements of Division 01
- 10 B. Accurately record the locations of existing utilities encountered, referenced to permanent surface
11 features
- 12 C. Provide As-Built drawings of new sewer facilities, including surveyed position (horizontal and
13 vertical) at all manholes and other junction structures.
- 14 1. Record all deviations from the locations and elevations indicated on the Plans.
- 15 D. Quality Assurance
- 16 1. Qualifications of Installer
- 17 a. Through the progress of installation of the Work of this Section, provide at least one
18 person who shall be thoroughly familiar with the specified requirements, completely
19 trained and experienced in the necessary skills, and who shall be present at the site
20 and shall direct all Work performed under this Section.
- 21 b. During installation of the Work of this Section, use an adequate number of skilled
22 workmen to ensure installation in strict accordance with the Contract Documents.
- 23 c. In acceptance or rejection the Work performed under this Section, the Engineer will
24 make no allowance for lack of skill on the part of the workmen.
- 25 1.10 PRODUCT HANDLING
- 26 A. Use all means necessary to protect the materials of this Section before, during and after the
27 installation, and to protect the work from other trades.
- 28 1.11 REPLACEMENTS
- 29 A. In the event of damage, immediately make all necessary repairs and replacements necessary to
30 the satisfaction of the Engineer, at no additional cost to the Owner.
- 31 PART 2 - PRODUCTS
- 32 1.1 MATERIALS
- 33 A. PVC Pipe and Fittings, 3-inches in Diameter and Smaller: Schedule 40 PVC pipe, per ASTM
34 D1785, 1120 high impact
- 35 B. PVC Pipe and Fittings, 4-inches through 15-inches in Diameter: Per ANSI/ASTM D3034, with
36 gasketed joints. Minimum wall thickness shall conform to SDR 35. PVC compound additives and
37 fillers, including but not limited to stabilizers, antioxidants, lubricants, colorants, etc., shall not
38 exceed 10 parts by weight per 100 of PVC resin in the compound.
- 39 C. Precast Reinforced Concrete Manhole Sections: Per ANSI/ASTM C478. Elliptical single line
40 reinforcement is not allowed.
- 41 D. Cast-in-Place Concrete: Per Section 321313.

- E. Forms: Per Section 321313.
- F. Mortar: Composed of one part, by weight, Portland Cement (Type II low alkali per ASTM C150), 2 parts, by weight, sand, and water.
- G. Manhole Frames, Covers and Grates: Cast Iron per ASTM A48, Class 25.
- H. Imported sand for PVC Pipe Bedding Envelope: imported sand material per Section 19, SSCDOT, or on-site granular material having a sand equivalent of at least 30.
- I. Cleanout Boxes shall be precast reinforced concrete with cast iron lid marked for sewer service, Christy G5 or approved equal.
- J. Locator Tape: Tape shall be an inert material such as polyethylene plastic with a metallic core, and highly resistant to alkalis, acids, or other chemical components likely to be encountered in soils. The tape shall be bright colors for contrast with the soils with identifying print in black letters. The tape shall be six inches wide and be printed "CAUTION - SEWER LINE BELOW".

PART 3 - EXECUTION

1.1 EXAMINATION

- A. Verify site conditions.

1.2 PREPARATION

- A. Identify location of proposed sanitary sewer facilities to be constructed. Expose connection points to existing system and pothole other existing utilities which could conflict with proposed grade of sewer. Verify design grades versus actual elevation of existing utilities. Notify Engineer immediately of any conflicts.
- B. Locate, identify, field survey and protect existing above and below grade utilities from damage.
- C. Protect plant life, lawns, trees, shrubs, and other features not authorized for removal.
- D. Protect existing structures and other improvements from damage from excavation equipment and vehicular traffic.
- E. Employ equipment and methods appropriate to the work site.
- F. Comply with all provisions of the Construction Safety Orders and General Safety Orders of the California Division of Industrial Safety, as well as all other applicable regulations as they pertain to the protection of workers from the hazard of caving ground in excavations.

1.3 SOIL MATERIALS

- A. Excavated materials and imported materials shall be in accordance with Section 31 22 22 - SOIL MATERIALS.

1.4 PIPE INSTALLATION

- A. Pipe Laying: Alignment and elevation stakes shall be set at intervals with offsets and cut to the invert of the pipe.
 - 1. After the trench for the pipe has been brought to the proper line and grade, the Contractor shall furnish and use, for grade and alignment control, a laser beam system which complies with OSHA requirements. The laser system shall have good visibility when used with suitable target material. The laser system must be of the self-leveling type so that the laser beam is automatically compensated for minute grade disturbances.
 - 2. The laser system must also have an early warning system that instantly warns the pipe layer when the laser is off grade. The laser system is to be provided by the Contractor and shall have a minimum accuracy of ± 0.01 foot per one hundred feet (100') on line; and a minimum visible range of one thousand feet (1000'). When conditions are such that this

- method is impractical, such as on short pipe runs, the Contractor shall have an Engineer on the ground to set grade of each joint of pipe by means of an Engineer's level.
3. The grade line shown on the plans indicates the flow line or invert of the pipe and all cuts, unless otherwise indicated, refer to this line.
4. Pipe laying shall proceed upgrade with the bell ends of bell and spigot pipe placed upstream. Each section of pipe shall be laid to line and grade as herein specified and in such a manner as to form a watertight, concentric joint with the adjoining pipe. The interior of the pipe shall be cleared of all dirt and debris and excess joint sealing material as the work progresses. Pipe shall not be laid when the condition of the trench or weather is unsuitable. All open ends of pipe and fittings shall be adequately and securely closed whenever the work is discontinued for more than one-half hour.
5. All joint surfaces shall be cleaned before joints are made.
6. Place and compact bedding and backfill material per Section 312333 TRENCH EXCAVATION AND BACKFILL.
- 1.5 INSTALLATION OF SANITARY SEWER STRUCTURES AND APPURTENANCES
- A. Install sanitary sewer structures as indicated on the construction plans, in accordance with the manufacturer's recommendations, and as specified herein.
- B. Bases: Manhole bases shall be constructed on undisturbed native soil. Manhole bases may be precast or cast-in-place. If precast, they shall be placed on a minimum of 12 inches of crushed rock of 3/4 inch maximum size. Elevation differentials of inlets and outlets must conform to the construction plans. Stubs or couplings provided in precast bases shall be of the same material as the pipe to which they connect unless otherwise approved by the Engineer. Connection may be made using a resilient connector conforming to ASTM Standard C923 such as Kor-N-Seal, A-LOK or equal.
- C. Temporary Sewer Systems Plugs: Temporary plugs of brick or mortar shall be installed on all sewer projects at points of connection to existing facilities. These plugs shall remain in place until completion of the bailing and flushing operation. The plugs, intended to prevent water from the bailing and flushing operation, drainage, or any other condition from entering the existing system, shall be installed or removed in the presence of and under the direct supervision of the Engineer. Until the system has been pumped clear of accumulated water, the plugs shall not be removed. This water must not be allowed to enter adjacent sewer or drainage systems.
- D. Where new sewer system plugs are to be installed, install approved factory prefabricated plugs.
- E. Construct cast-in-place concrete per Section 321313.
- F. Key top of poured-in-place concrete bases for manholes to receive the tongue of precast riser sections.
- G. Joint precast manhole riser sections are to be installed with a watertight joint using a minimum thickness of 1/2 inch of mortar per Section 51, SSCDOT, ConSeal CS-101 Butyl Sealant, or approved equal. Neatly point the inside and outside of the joint. Set sections plumb.
- H. For pipe sizes less than 12 inches in diameter, install cleanouts at end of lines, at changes of direction greater than 45 degrees, and at spacing not greater than of 100 foot intervals. Locate cleanouts in accessible locations and bring flush to finished surface.
- I. Construct all sanitary sewer appurtenances as shown on the Plans.
- 1.6 TOLERANCES
- A. Pipe Laying Tolerances:
1. Above grade: Not to exceed 1/4-inch above planned grade.
2. Below grade: Not to exceed 1/2-inch below planned grade.

3. Alignment: Not to exceed 2 inches from planned alignment, if gradual and regular over a distance of 20 feet.

B. Structure finish grade tolerance: Within 1/4-inch of planned grade, but must match adjacent improvements.

C. PVC Pipe Deflection:

1. Up to and including 12-inch diameter: 5% maximum.

2. The maximum average inside diameter of the pipe shall be equal to the average outside diameter per applicable ASTM Standard minus two minimum wall thicknesses per applicable ASTM Standards. Manufacturing and other tolerances shall not be considered for determining maximum allowable deflections.

1.7 FIELD QUALITY CONTROL

A. Internal Inspection: Upon completion of construction and prior to final inspection, the Contractor shall clean the entire new pipeline of all dirt and debris. Any dirt or debris in previously existing pipes or ditches in the area, which in the opinion of the Engineer resulted from the new installation, shall also be removed by the Contractor. Sewer pipes shall be cleaned by the controlled balling method. Temporary plugs shall be installed and maintained during cleaning operations at points of connection to existing facilities to prevent water, dirt, and debris from entering the existing facility. Temporary plugs for sewer systems shall also conform to Subsection 5.C above. Water from the drainage system operations shall be routed through a suitable trap to collect any dirt and debris prior to discharging into any downstream facility. The Contractor shall notify the Engineer immediately after completion of the pipe cleaning operations.

B. As soon as possible after the completion of the pipe cleaning, and prior to final acceptance, the Engineer may make a visual internal inspection of the new pipeline either manually or with television equipment.

C. After cleaning per Subsection 7.A above, each section of sewer constructed shall be tested in accordance with ASTM F1417-92(2005) Standard Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air.

D. Prior to final surface restoration after 30 days following completion of installation, pull an Engineer approved steel mandrel through installed and backfilled PVC pipe by hand to prove deflection tolerance has not been exceeded. Remove any over-deflected pipe, and if the pipe is not damaged, reinstall it and retest it. If the pipe has been damaged, install new pipe and retest. Continue procedure until required tolerance is met. The mandrel shall:

1. Be a rigid, nonadjustable, odd-numbering-leg (9 legs minimum) mandrel having an effective length not less than its nominal diameter.
2. Have a minimum diameter at any point along the full length of the nominal pipe as follows:

Pipe Material	Nominal Size (Inches)	Minimum Mandrel Diameter (Inches)
PVC - ASTM D 3034 (SDR 35)	6	5.619
	8	7.524
	10	9.405
	12	11.191
	15	13.849

1 1.8 CLEAN UP

- 2 A. Remove from the site all rubbish, debris, etc. in a lawful manner, resulting from Work in this
3 Section. The clean-up shall include the replacement and repair of any damaged or disturbed
4 property.

5 END OF SECTION

6

SECTION 33 30 10 – SEWAGE GRINDER PUMP

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SCOPE OF WORK

- A. The Contractor shall furnish, install, place into satisfactory operation, and warrant the 30004T - 1206 for shredding municipal wastewater solids, as shown on the Plans and described by the Specifications.

- B. All items detailed in this section shall be provided by the same manufacturer.

1.3 REFERENCE STANDARDS

- A. Equipment shall, as applicable, meet the requirements of the following industry standards:

1. American National Standards Institute (ANSI) B16.42-1979 Class 150 Flanges
2. American Society for Testing and Materials (ASTM) A36 Carbon Steel Plate
3. American Society for Testing and Materials (ASTM) A536-84 Ductile Iron Castings
4. American Iron and Steel Institute (AISI) 4130 Heat Treated Alloy Steel
5. American Iron and Steel Institute (AISI) 4140 Heat Treated Alloy Steel
6. American Iron and Steel Institute (AISI) 8620 Heat Treated Alloy Steel
7. American Iron and Steel Institute (AISI) 303 Stainless Steel
8. American Iron and Steel Institute (AISI) 304 Stainless Steel
9. American Iron and Steel Institute (AISI) 316 Stainless Steel
10. American Society for Testing and Materials (ASTM) Grade 630 (UNS S17400) Stainless Steel
11. Society of Automotive Engineers (SAE) 660 Bearing Bronze

- B. Controllers shall, as applicable, meet the requirements of the following Regulatory Agencies:

1. National Electrical Manufacturer's Association (NEMA) Standards
2. California Electrical Code (CEC)
3. Underwriters Laboratory (UL and cUL)
4. International Electrotechnical Commission (IEC)

1.4 QUALITY ASSURANCE

A. Identification

1. Equipment shall be identified with a corrosion-resistant nameplate affixed in a conspicuous location.
2. Nameplate information shall include manufacturer's name and address, equipment model number, and serial number.

B. Manufacturer

1. Supplier shall be ISO9001 certified and have a minimum 40 years experience as a manufacturer of municipal waste water equipment and a minimum 10000 prior installations of similar equipment.

2. Supplier shall, at request, provide a list of reference sites of similar equipment for verification by the Engineer or Owner's representative.
3. Supplier shall conduct factory testing and verification of equipment prior to shipment.
4. Supplier shall have factory-owned bi-coastal service centers in USA.
5. Supplier shall have a replacement exchange service program.

1.5 SUBMITTALS

A. Approval Documents

Supplier shall submit approval documents in .pdf format. Submittals shall include equipment descriptions, functional descriptions, dimensional and assembly drawings, catalog data, job specific drawings, manufacturer's instructions.

B. Operation and Maintenance Manuals

The supplier shall submit one (1) copy of a suitable operation & maintenance manual. An electronic version shall be supplied to create additional copies. The manuals shall include equipment descriptions, operating instructions, drawings, troubleshooting techniques, a recommended maintenance schedule, recommended lubricants, and recommended spares.

C. Warranty Documentation

The supplier shall submit a warranty statement clearly identifying the scope and term of the warranty.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packaging and Shipment

1. Equipment shall be packaged in containers or on skids suitable for normal shipping, handling, and storage.
2. Equipment shall be protected from rain, snow, impact and abrasion while in the possession of the carrier.

B. Delivery and Acceptance Requirements

Contractor shall review the contents of the shipment at time of delivery and promptly notify the carrier and supplier of any discrepancies.

C. Storage and Handling Requirements

1. Equipment shall remain in the packaging provided by the supplier until it is installed.
2. Equipment shall be stored in a dry environment between 40° F (4.5° C) and 100° F (37.8° C).

D. Packaging Waste Management

1. Contractor shall be responsible for discarding all packaging materials in an environmentally-friendly manner and in accordance with local regulations.

1.7 WARRANTY

Manufacturer's standard 12-month limited warranty shall be provided with the equipment.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- ##### A. Equipment shall be in accordance with these plans and specifications and shall be supplied by one of the following manufacturers:

1. JWC Environmental, LLC, 290 Paularino Ave., Costa Mesa, CA 92626; Tel: 800-331-2277

Muffin Monster Grinder Model 30004T

Motor Controller Model PC2200

2. Approved equal.

B. Manufacturers requesting to be selected as an approved equal shall satisfy the requirements of the following section "Pre-Approval of Alternate Equipment."

2.2 PRE-APPROVAL OF ALTERNATE EQUIPMENT

A. Manufacturers requesting to be selected as an approved equal shall either: (i) perform a pilot test at the facility, or; (ii) coordinate a site visit to allow the Engineer and owner the opportunity to witness the performance of the proposed equipment. This task shall be completed a minimum of 10 days prior to the bid. All expenses associated with (i) or (ii) above shall be paid for by the submitting manufacturer.

B. Manufacturers requesting to be selected as an approved equal shall also submit certified documentation showing compliance with these specifications a minimum of ten (10) days prior to bid opening. Selected equipment manufacturers shall be added to the list of approved manufacturers at engineer's discretion.

2.3 PERFORMANCE REQUIREMENTS

A. General

Grinder shall reduce or shred influent solids for protection of downstream equipment.

B. Design Summary

1. Number of grinders	1
2. Number of motor controllers	1
3. Environment rating for grinders	Non-hazardous
4. Environment rating for motor controllers	Non-hazardous
5. Supply power characteristics	460 volt / 3 phase / 60 Hertz
Equipment	
6. Housing flange size	6" ANSI Class 150 bolt pattern
7. Nominal stack height	8' +/-
8. Minimum liquid handling capacity per grinder	700 GPM
9. Maximum head drop across cutter stack	34" at minimum capacity
10. Cutter type	11-tooth
11. Spacer type	Smooth
12. Shaft seal type	Mechanical, Tungsten Carbide
13. Seal maximum pressure	90 psi
14. Speed reducer type and ratio	Cycloidal, 29:1
15. Installed horsepower	3 hp (2.2 kW)
16. Motor type	TEFC
17. Motor service factor	1.15
18. Minimum motor efficiency (at full load)	84.0%
19. Minimum motor power factor (at full load)	82.0%

20. Minimum peak shaft torque 4,756 lb-in/hp
21. Minimum peak force at cutter tip 2,020 lb_f/hp

2.4 GRINDER

A. General

Grinder shall be two-shafted design consisting of individual cutters and spacers. The cutters shall actively grab and pull material into the stack for shredding. Grinder shall have a single piece main body housing with integral pipe flanges and inspection ports. Cutter cartridge shall be removable with the main body housing remaining in situ. Cutter cartridge shall have an upper and lower end housings to retain shaft support bearings and seals. Grinder shall have motor and speed reducer for cutter drive. The equipment shall operate at low speed with a maximum cutter shaft speed of 60 rpm.

B. Components

1. Cutters and Spacers

- a. Cutting stack shall be of nominal height listed in Performance Requirements.
- b. Cutters shall have 11 teeth and be 0.310" (7.87 mm) nominal thickness.
- c. Spacers shall be 0.319" (8.1 mm) nominal thickness.
- d. Cutters and spacers shall be individual disks constructed of heat treated alloy steel.
- e. Cutter tooth height shall be not greater than ½-inch (13 mm) above the root diameter of the cutter.
- f. Cutter outside diameter shall not exceed a maximum 4.71" (120 mm).
- g. Cutter thickness tolerance shall be +.000/-.001" (+.000/-.025 mm). Spacer thickness tolerance shall be +.001/-.000" (+.025/-.000 mm).
- h. Cutters shall be heat treated to 45-53 HRc.
- i. Spacers shall be heat treated to 34-53 HRc.
- j. Spacers shall have a smooth outside diameter.
- k. Cutter to cutter clearance shall be a maximum of 0.011" (0.28 mm).

2. Shafts

- a. Shafts shall be hexagonal, 2" (50.8 mm) across flats.
- b. Shafts shall be of heat treated 4140 alloy steel with a minimum tensile strength of 149,000 psi (1,027 kPa).
- c. Shaft hardness shall be 38-48 Rockwell C.

3. Intermediate Shaft Yokes (as applicable)

- a. Intermediate shaft yokes shall provide radial support to the shafts during severe grinding demands.
- b. Intermediate shaft yokes shall be constructed of 304 stainless steel, 660 bronze, and 17-4PH Stainless steel.
- c. Intermediate shaft yokes shall be factory lubricated with high temperature marine grade grease.
- d. Grease fittings shall be provided on intermediate shaft yokes for periodic maintenance.
- e. Intermediate shaft yokes shall only be supplied on 24-inch (610 mm) cutter stacks.

4. Shaft Bearings and Seals

- a. Radial and axial loads shall be borne by sealed, oversized, deep-groove ball bearings.
- b. Shaft seal type shall be mechanical.
- c. Each bearing and seal arrangement shall be incorporated into a cartridge-style housing.
- d. Cutter shafts shall be supported on both ends. Cantilever-style arrangements shall not be permitted.
- e. Dynamic and rotating seal faces shall be Tungsten Carbide with 6% Nickel binder.
- f. Seal cartridges shall be rated to a maximum pressure of 90 psi (620 kPa).
- g. O-rings shall be of BUNA-N.
- h. Seal cartridges shall not require flushing.
- i. Seals shall be rated to operate wet or dry.

5. Housings and Covers

- a. Housings and covers shall be of ASTM A536 ductile iron.
- b. Main body housing shall have integral inlet and outlet flanges.
- c. Flange bolt pattern shall be as listed in Performance Requirements.
- d. Main body housing shall have integral side wall deflectors to direct solids into cutters.
- e. Inspection port covers shall be on both inlet and outlet sides of main body housing.
- f. End housings shall have integral bushing deflectors to guide solids away from seal cartridges.
- g. Housings shall not contain grit or debris traps requiring periodic cleaning.

6. Transfer Gears

- a. Transfer gears shall be of involute profile and fabricated from heat treated alloy steel.
- b. Transfer gear tooth design, thickness and hardness shall be suitable to transfer torque between shafts up to the rated breakdown torque of the motor.
- c. The interface between transfer gears shall be factory lubricated with grease to minimize wear.
- d. The transfer gear ratio shall be such that the ratio of cutter tip speed of the low speed shaft to cutter tip speed of the high speed shaft shall be greater than 0.90 and less than 1.00 to promote tearing of material as it passes through the cutter stack and at the same time facilitate cleanout of material from between the cutters.

7. Low Speed Coupling

- a. Low speed coupling shall be a 3-jaw type.
- b. The 3-jaw halves shall be of hardened 4140 alloy steel.
- c. Each low speed coupling half shall be encapsulated on its mating shaft to facilitate proper engagement of coupling lobes (1/16" – 1/8").
- d. The interface between low speed coupling halves shall be factory lubricated with grease to minimize wear.

8. Speed Reducer

- a. Speed reducer shall be manufactured by Sumitomo Machinery Corporation of America.

- 1 b. Speed reducer shall be a cycloidal type.
- 2 c. Gear motor speed reduction ratio shall be 29:1.
- 3 d. Speed reducer shall be grease lubricated.
- 4 9. Motor
- 5 a. Motor shall be manufactured by Baldor Electric Company.
- 6 b. Shall have the characteristics as listed in Performance Requirements.
- 7 10. High Speed Coupling
- 8 a. High speed coupling shall be a 3-jaw type with elastomer spider.
- 9 b. The 3-jaw halves shall be of sintered iron.
- 10 c. The spider shall be of BUNA-N.
- 11 11. Lifting Brackets
- 12 a. Grinder shall be fitted with two (2) fabricated lifting rings.
- 13 2.5 MOTOR CONTROLLER
- 14 A. Description
- 15 Controller shall provide programmable operation of the grinder system. Controller shall have
- 16 switches, indicator lights, and other control devices.
- 17 Controller shall be designed to suit the supply power and motor characteristics listed in
- 18 Performance Requirements.
- 19 B. Components
- 20 1. Enclosure
- 21 a. Enclosure shall be fiberglass reinforced plastic, NEMA 4X.
- 22 b. Enclosure shall house motor starter, PLC, and control devices.
- 23 2. Selector switches
- 24 a. Selector switches shall be 22 mm, rated equal to or better than the enclosure.
- 25 b. Grinder selector switch shall be three-position and indicate On-Off/Reset-Remote.
- 26 3. Pilot Lights
- 27 a. Lights shall be 22 mm, LED (pilot lamp), rated equal or better than the enclosure.
- 28 b. Lights shall indicate POWER ON, grinder RUN, grinder JAMMED and MOTOR FAULT.
- 29 4. Motor Starter
- 30 a. Starter shall be IEC, full voltage, reversing.
- 31 b. Contactors shall have 120-volt operating coils.
- 32 c. Overload relays shall be adjustable and sized to full load amperes (FLA) of the motor.
- 33 5. Control Power Transformer
- 34 a. Control power transformer shall produce 120-volt AC power from the supply power.
- 35 Transformer shall be sized and fused in accordance with code to accommodate the
- 36 control power requirements.
- 37 6. Programmable Logic Controller
- 38 a. PLC shall be a Panasonic FPX.

7. Current Transducer
 - a. Current transducer shall be a discrete output type.
 - b. Current transducer shall have adjustable set point from 1-135A with 200 ms or faster response time.
 - C. Operation
 1. Grinder control shall be in accordance with the setting of the On-Off/Reset-Remote selector switch.
 - a. In the OFF/RESET position the grinder shall not run. Motor controller faults shall be cleared.
 - b. In the ON position, the grinder shall run forward.
 - c. In the REMOTE position, the grinder shall operate as controlled by a remote start/stop dry contact.
 2. When an obstruction jams the grinder, the controller shall stop the grinder and reverse the rotation to clear the obstruction. If the obstruction is cleared, the controller shall return the grinder to normal operation. If three (3) reverses occur within a 30 second interval, the controller shall stop the grinder motor and activate the grinder FAIL indicator and relay.
 3. When a motor overload or motor over-temperature condition occurs, the motor shall be de-energized, the MOTOR FAULT indicator lamp shall be illuminated and the FAIL contact shall be closed.
 4. When a power failure occurs while the system is operating, the system shall return to normal operation when power is restored.
 5. When a power failure occurs while the grinder is in a fail condition, the system shall return to a fail state when power is restored. The fail state shall not be cleared until reset.
 6. Reset of the grinder shall be accomplished from the controller only.
- 2.6 FINISHES
- A. Paint Coatings (Ferrous Materials)

Ferrous metal surfaces shall be prepared to SSPC-SP6 (Commercial Blast Cleaning) and coated with minimum 6-8 mils TDFT (total dry film thickness) paint of type and color listed in Performance Requirements.
 - B. Paint Coatings (Previously-Coated Components)

Previously-coated components (motors, speed reducers, etc.) shall be prepared to SSPC-SP1 (Solvent Cleaning) and SSPC-SP2 (Hand Tool Cleaning) and coated with minimum 6-8 mils TDFT (total dry film thickness) paint of type and color listed in Performance Requirements.
- PART 3- EXECUTION
- 3.1 INSTALLATION
- The Contractor shall coordinate installation of the equipment in accordance with the manufacturer's installation instructions, drawings and related specification sections, and in accordance with all OSHA, local, state, and federal codes and regulations.
- 3.2 SYSTEM START-UP
- The equipment supplier shall provide the services of a factory or manufacturer's representative for a minimum of one (1) day to inspect the equipment for proper installation, apply power for the first time and check for proper motor rotation, oversee the initial introduction of material into the system and

1 confirm the equipment operates as intended. Representative shall also provide services as detailed
2 in Training below.

3 3.3 TRAINING

4 Field training shall be provided for operations, maintenance and supervisory staff members. Field
5 instruction shall cover key components of the equipment, operating and maintenance requirements
6 and troubleshooting techniques.

7 END OF SECTION

SECTION 33 40 00 - STORM DRAINAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY:

- A. This section includes the following:
 - 1. Provide all materials, labor, equipment and services necessary to furnish and install Storm Drainage System, accessories and other related items necessary to complete the Project as indicated by the Contract Documents unless specifically excluded.

1.3 RELATED SECTIONS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Divisions 00 and 01 sections, apply to this work.
- B. Section 312222 – Soil Materials
- C. Section 312333 – Trench Excavation and Backfilling.
- D. Section 321313 – Site Concrete Improvements.

1.4 REFERENCES

- A. ANSI/ASTM C76 - Reinforced Concrete Culvert, Storm Drain and Sewer Pipe.
- B. ANSI/ASTM C443 - Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
- C. ANSI/ASTM C478 - Precast Reinforced Concrete Manhole Sections.
- D. ASTM D1557.

1.5 DEFINITIONS

- A. Bedding: Fill placed under, around, beside and directly over pipe, prior to subsequent backfill operations.
- B. Utility: Any buried or above ground pipe, conduit, cable, associate device or appurtenances, or substructure pertaining thereto.

1.6 SUBMITTALS

- A. Submit under provisions of Division 01.
- B. Certificates of compliance for material.
- C. Product Data: Provide data indicating pipe, accessories, and associated equipment to be furnished.
- D. Submit manufacturer's data and/or fabrication drawings for all pipes, and appurtenances installed under this Section. No items shall be incorporated into the work until submittals are approved by the Architect/Engineer.

1.7 COORDINATION

- A. Coordinate work with Owner's personnel.
- B. Verify that the location of existing utilities have been indicated at work site by utility authorities and Owner's personnel.
- C. Coordinate work with other project work.

1.8 EXISTING UTILITIES

- A. The Engineer has made a diligent attempt to indicate on the plans the location of all main and trunkline utility facilities which may affect the Work. In most cases, however, the only available information relative to the existing location of said facilities was small scale undimensioned plats. The location of said facilities, therefore, shall be considered approximate only, until exposed by the Contractor.
- B. Service laterals and appurtenances have also been shown where information was available as to their location. In most cases, however, the only available information relative to the existing location of said facilities was small scale undimensioned plats. The location of said facilities, therefore, shall be considered approximate only, until exposed by the Contractor.
- C. At new work location, expose by hand methods all existing utilities along the route of the new work prior to using any mechanical equipment. If mechanical equipment is allowed at a particular location, it may only be used after the completion by the Contractor of a successful exhaustive search by hand methods to locate all existing facilities as indicated on the plans, and as indicated at the work site by Owner's personnel.
- D. Maintain all existing utility mains and service lines in constant service during construction of the Work.

1.9 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Division 01.
- B. Accurately record actual locations of utilities encountered.

PART 2 - PRODUCTS

1.1 MATERIALS

- A. Reinforced Concrete Pipe for pipe larger than fifteen (15) inches or larger: ANSI/ASTM C76, Class 3, with rubber gasket joints per ANSI/ASTM C443.
- B. Storm drainage sewer pipeline shall be polyvinyl chloride (PVC) pipe for storm sewer conforming to ASTM designation 3034, SDR 35 for pipe twelve (12) inches or less.
- C. Storm drainage pipeline shall be polyvinyl chloride (PVC) pipe for storm sewer conforming to ANSI/AWWA Schedule 40 for pipe three (3) inches or less.
- D. Poured in Place Concrete: Per Section 321313 – Site Concrete Improvements.
- E. Mortar: Composed of one part, by weight, portland cement (Type II low alkali per ASTM C150), 2 parts, by weight, sand, and water.
- F. Manhole Frames, Covers and Grates: Cast Iron per ASTM A48, Class 25.
- G. Soil Fill for Concrete Pipe Bedding Envelope: Backfill or Sandfill per Section 312222 and Section 312300.
- H. Concrete collar shall be constructed as per detailed drawing.
- I. Cleanout shall be constructed as per detail drawing.
- J. All metallic pipe, fittings and appurtenances in contact with soil shall be coated or wrapped with an approved material, as required to protect it from corrosive soil.
- K. Locator Tape: Tape shall be an inert material such as polyethylene plastic with a metallic core, and highly resistant to alkalis, acids, or other chemical components likely to be encountered in soils. The tape shall be bright colors for contrast with the soils with identifying print in black letters. The tape shall be six inches wide and be printed "CAUTION – STORM SEWER LINE BELOW".

PART 3 - EXECUTION

1.1 EXAMINATION

- A. Verify site conditions.

1.2 PREPARATION

- A. Identify location of proposed storm drainage facilities to be constructed. Expose connection points to existing system.
- B. Locate, identify, and protect existing above and below grade utilities from damage.
- C. Protect plant life, lawns, trees, shrubs, and other features not authorized for removal.
- D. Protect existing structures and other improvements to remain from damage from excavation equipment and vehicular traffic.
- E. Employ equipment and methods appropriate to the work site.
- F. Protect excavated areas from drainage inflow, and provide drainage to all excavated areas. Dewater existing drainage basins and existing drainage pipeline systems as necessary to accomplish the work.
- G. Comply with safety requirements as they pertain to excavations, per Section 312300.
- H. Remove all interfering surface and subsurface improvements authorized for removal.

1.2 EXCAVATION

- A. Excavate soil required to locate existing utilities and install the work.
- B. Excavate trenches and pits per Section 312333.
- C. Excavate trenches and pits to allow installation and construction of the storm drainage facilities to the alignment, grades, depths and cross-sections as indicated on the construction plans.
- D. Excavate trench to depth which is 4-inches below the outside bottom of the pipe barrel to be placed therein.
- E. Cut trenches just wide enough to allow the installation of the pipe and pipe bedding as indicated on the plans. Minimize trench width above the pipe.
- F. Provide protection to public per Division 01.

1.3 INSTALLATION AND BEDDING OF STORM DRAIN PIPE

- A. Install the pipe and fittings to the lines and grades shown on the construction plans.
- B. Install pipe and fittings in accordance with the manufacturer's recommendations, and these specifications.
- C. Unless otherwise approved by the Engineer, lay all pipe upgrade from structure to structure, with bell or socket ends of pipe upgrade.
- D. Excavate suitable bell (or socket) holes in the bedding material, so that the bells do not bear on the subgrade or bedding. Provide uniform bearing of pipe barrel on bedding material.
- E. Ensure that all joints are properly "homed" and are watertight.
- F. Bed concrete pipe in backfill or sandfill soil envelope, and compact to a minimum of 90% relative compaction. Place and compact the bedding material under, around and over the pipe, filling the trench cavity and extending from the bottom of the trench (4-inches below the outside bottom of the pipe barrel) to a level 6-inches above the outside top of the pipe barrel.

1.4 INSTALLATION OF STORM DRAINAGE STRUCTURES AND APPURTANCANCES

- A. Install storm drainage structures as indicated on the construction plans, in accordance with the manufacturer's recommendations, and as specified herein.
- B. Construct poured-in-place concrete per Section 321313.
- C. Key top of poured-in-place concrete bases for structures to receive the tongue of precast riser sections.
- D. Construct cleanout, outfall structure per detail drawing.

1.5 BACKFILLING TO FINISHED GRADE AND FINISHED GRADING

- A. Place and compact backfill per Section 312333/3.4.
- B. Conform finished surface to the lines, grades and cross-sections shown on the plans, or as otherwise directed by the Inspector.
- C. In areas to receive paving or a significant thickness of sealing material, temporarily set manhole frame and cover below finish grade, then return after final surfacing and/or pavement sealing and bring manhole frame and cover to final grade, as shown on the plans.
- D. Fine grade all finished soil surfaces disturbed to the lines, grades and cross-sections shown on the plans.
- E. Rake and smooth all finished dirt surfaces.

1.6 TOLERANCES

- A. Pipe laying tolerances:
 - 1. Above grade: Not to exceed 1/4-inch above planned grade.
 - 2. Below grade: Not to exceed 1/2-inch below planned grade.
 - 3. Alignment: Not to exceed 2-inches from planned alignment, if gradual and regular over a distance of 20-feet.
- B. Structure finish grade tolerance: Within 1/4-inch of planned grade, but must match adjacent improvements.

1.7 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Division 01.
- B. Compaction testing of bedding and backfill will be performed in accordance with ASTM D 1557.
- C. If tests indicate work does not meet specified requirements, recompact, or remove and replace, and retest at no additional cost to Owner.

END OF SECTION

BIDDER: Bernards Bros. Inc.

Contract No.: 16-S-04	
Project: Fresno County West Annex Jail	
Lump Sum Price Written In Words	
Base Bid - Base bid work includes, but is not limited to: General Conditions, Supplemental General Conditions, Demolition, Extension of existing on-site utilities, Grading, Site Work, Irrigation, Concrete, Masonry, Metals, Architectural Wood Work, Thermal and Moisture Protection, Doors and Windows, Hardware, Finishes, Equipment, Specialties, Mechanical, Plumbing, Fire Suppression, Fire Alarm, Vandal Alarm, CCTV Surveillance, Electrical, Telecommunications, Audio-Visual, and Energy Management Electronics. <u>EIGHTY MILLION SIX HUNDRED AND FIFTY EIGHT THOUSAND</u> Dollars	\$ <u>80,658,000</u>
Additive Bid 1 - Added planters/seat walls as indicated on Sheets C3.0A, L1.0A, L2.0A, A14.0, A14.1 and A14.2. <u>ONE HUNDRED & THREE THOUSAND</u> Dollars	\$ <u>103,000</u>
Additive Bid 2 - Prime Coat painting of all inmate cells in lieu of base specification per Section "09 96 03 - Special Coatings". <u>FOUR HUNDRED & THIRTY THOUSAND</u> Dollars	\$ <u>430,000</u>
Additive Bid 3 - Bullet resistive glazing at Lobby Reception as shown on Sheet A14.3 and per Section "13 07 00 - Bullet Resistant Transaction Barriers" in lieu of tempered glass and aluminum base bid as indicated. <u>SEVENTY - THREE THOUSAND</u> Dollars	\$ <u>73,000</u>

CONTRACT NO. 16-S-04

PROPOSAL
00 42 13-3

WEST ANNEX JAIL

BIDDER: Bernards Bros. Inc.

Additive Bid 4 – Added water management system at all inmate cells and inmate showers per Section "22 04 15 – Water Management System".	
<u>ONE HUNDRED & NINETY THOUSAND</u> Dollars	\$ <u>190,000</u>
Additive Bid 5 – Trane Chiller (County Preferred Vendor). Note: if base "low" bid is Trane, this cost would be reflected as \$0.	
<u>ONE THOUSAND</u> Dollars	\$ <u>1,000</u>
Additive Bid 6 – Cleaver Brooks Boilers (County Preferred Vendor). Note: if base "low" bid is Cleaver Brooks, this cost would be reflected as \$0.	
<u>ONE THOUSAND</u> Dollars	\$ <u>1,000</u>
Allowance - CCTV System (Reference Section 01 21 00)	
Three hundred thousand Dollars	\$ <u>300,000</u>
6) Total Bid (Base Bid + Additive Bids #1 + #2 + #3 + #4 + #5+ #6 + Allowance)	
<u>EIGHTY-ONE MILLION SEVEN HUNDRED & FIFTY-SIX</u> ^{THOUSAND} Dollars	\$ <u>81,756,000</u>

Acknowledgement of Addendum:

Addendum No. <u>1</u>	Dated: <u>08/31/2017</u>
Addendum No. <u>2</u>	Dated: <u>09/19/2017</u>
Addendum No. <u>3</u>	Dated: <u>10/12/2017</u>
Addendum No. <u>4</u>	Dated: <u>10/16/2017</u>
Addendum No. _____	Dated: _____
Addendum No. _____	Dated: _____
Addendum No. _____	Dated: _____
Addendum No. _____	Dated: _____



Document A310™ – 2010

Conforms with The American Institute of Architects AIA Document 310

Bid Bond

CONTRACTOR:

(Name, legal status and address)

Bernards Bros. Inc.
555 First Street
San Fernando, CA 91340

OWNER:

(Name, legal status and address)

County of Fresno
2220 Tulare Street, 6th Floor
Fresno, CA 93721

BOND AMOUNT: Ten Percent of Amount Bid 10%

PROJECT:

(Name, location or address, and Project number, if any)

Fresno County West Annex Jail - County Contract No. 16-S-04

SURETY:

(Name, legal status and principal place of business)

Liberty Mutual Insurance Company
790 The City Drive South, Suite 200
Orange, CA 92868

Mailing Address for Notices

790 The City Drive South, Suite 200
Orange, CA 92868

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

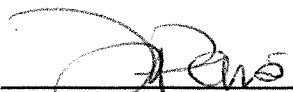
The Contractor and Surety are bound to the Owner in the amount set forth above, for the payment of which the Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, as provided herein. The conditions of this Bond are such that if the Owner accepts the bid of the Contractor within the time specified in the bid documents, or within such time period as may be agreed to by the Owner and Contractor, and the Contractor either (1) enters into a contract with the Owner in accordance with the terms of such bid, and gives such bond or bonds as may be specified in the bidding or Contract Documents, with a surety admitted in the jurisdiction of the Project and otherwise acceptable to the Owner, for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof; or (2) pays to the Owner the difference, not to exceed the amount of this Bond, between the amount specified in said bid and such larger amount for which the Owner may in good faith contract with another party to perform the work covered by said bid, then this obligation shall be null and void, otherwise to remain in full force and effect. The Surety hereby waives any notice of an agreement between the Owner and Contractor to extend the time in which the Owner may accept the bid. Waiver of notice by the Surety shall not apply to any extension exceeding sixty (60) days in the aggregate beyond the time for acceptance of bids specified in the bid documents, and the Owner and Contractor shall obtain the Surety's consent for an extension beyond sixty (60) days.

If this Bond is issued in connection with a subcontractor's bid to a Contractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

When this Bond has been furnished to comply with a statutory or other legal requirement in the location of the Project, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

Signed and sealed this 26th day of September, 2017.


(Witness) TAMAR TAWILIAN


(Witness) Maria Pena

Bernards Bros. Inc.

(Principal)

(Seal)

By:

(Title) JERRY HIGGINS, VICE PRESIDENT

Liberty Mutual Insurance Company

(Surety)

By:

(Title) Lisa L. Thornton, Attorney-in-Fact

CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT**CIVIL CODE § 1189**

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

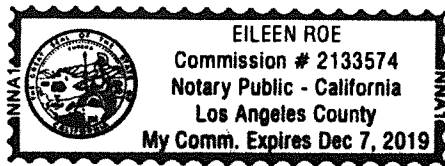
State of California)
County of Los Angeles)

On October 20, 2017 before me, Eileen Roe, Notary Public,
Date Here Insert Name and Title of the Officer
personally appeared Jerry Higgins
Name(s) of Signer(s)

who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.



Signature

Eileen Roe
Signature of Notary Public

Place Notary Seal Above

OPTIONAL

Though this section is optional, completing this information can deter alteration of the document or fraudulent reattachment of this form to an unintended document.

Description of Attached Document

Title or Type of Document: Bid Bond Document Date: Sep. 26, 2017
Number of Pages: 1 Signer(s) Other Than Named Above: Lisa L. Thornton

Capacity(ies) Claimed by Signer(s)

Signer's Name: Jerry Higgins
☒ Corporate Officer — Title(s): Vice President
☐ Partner — ☐ Limited ☐ General
☐ Individual ☐ Attorney in Fact
☐ Trustee ☐ Guardian or Conservator
☐ Other: _____
Signer Is Representing: Bernards Bros. Inc.

Signer's Name: _____
☐ Corporate Officer — Title(s): _____
☐ Partner — ☐ Limited ☐ General
☐ Individual ☐ Attorney in Fact
☐ Trustee ☐ Guardian or Conservator
☐ Other: _____
Signer Is Representing: _____

Civil Code § 1189

State of California)
) ss
County of Los Angeles)

e: Natalie K. Trofimoff
Natalie K. Trofimoff, Notary Public

THIS POWER OF ATTORNEY IS NOT VALID UNLESS IT IS PRINTED ON RED BACKGROUND.

This Power of Attorney limits the acts of those named herein, and they have no authority to bind the Company except in the manner and to the extent herein stated.

Certificate No. 7828704

Liberty Mutual Insurance Company
The Ohio Casualty Insurance Company West American Insurance Company

POWER OF ATTORNEY

KNOWN ALL PERSONS BY THESE PRESENTS: That The Ohio Casualty Insurance Company is a corporation duly organized under the laws of the State of New Hampshire, that Liberty Mutual Insurance Company is a corporation duly organized under the laws of the State of Massachusetts, and West American Insurance Company is a corporation duly organized under the laws of the State of Indiana (herein collectively called the "Companies"), pursuant to and by authority herein set forth, does hereby name, constitute and appoint, C. K. Nakamura; E. S. Albrecht, Jr.; Jeffrey Strassner; Jessica L. Rosser; Lisa L. Thornton; Maria Pena; Natalie K. Trofimoff; Noemi Quiroz; Patricia S. Arana; Tim M. Tomko

all of the city of Los Angeles, state of CA each individually if there be more than one named, its true and lawful attorney-in-fact to make, execute, seal, acknowledge and deliver, for and on its behalf as surety and as its act and deed, any and all undertakings, bonds, recognizances and other surety obligations, in pursuance of these presents and shall be as binding upon the Companies as if they have been duly signed by the president and attested by the secretary of the Companies in their own proper persons.

IN WITNESS WHEREOF, this Power of Attorney has been subscribed by an authorized officer or official of the Companies and the corporate seals of the Companies have been affixed thereto this 7th day of July, 2017.



The Ohio Casualty Insurance Company
Liberty Mutual Insurance Company
West American Insurance Company

By: David M. Carey
David M. Carey, Assistant Secretary

STATE OF PENNSYLVANIA ss
COUNTY OF MONTGOMERY

On this 7th day of July, 2017, before me personally appeared David M. Carey, who acknowledged himself to be the Assistant Secretary of Liberty Mutual Insurance Company, The Ohio Casualty Company, and West American Insurance Company, and that he, as such, being authorized so to do, execute the foregoing instrument for the purposes therein contained by signing on behalf of the corporations by himself as a duly authorized officer.

IN WITNESS WHEREOF, I have hereunto subscribed my name and affixed my notarial seal at King of Prussia, Pennsylvania, on the day and year first above written.



COMMONWEALTH OF PENNSYLVANIA
Notarial Seal
Teresa Pastella, Notary Public
Upper Merion Twp., Montgomery County
My Commission Expires March 28, 2021
Member, Pennsylvania Association of Notaries

By: Teresa Pastella
Teresa Pastella, Notary Public

This Power of Attorney is made and executed pursuant to and by authority of the following By-laws and Authorizations of The Ohio Casualty Insurance Company, Liberty Mutual Insurance Company, and West American Insurance Company which resolutions are now in full force and effect reading as follows:

ARTICLE IV – OFFICERS – Section 12. Power of Attorney. Any officer or other official of the Corporation authorized for that purpose in writing by the Chairman or the President, and subject to such limitation as the Chairman or the President may prescribe, shall appoint such attorneys-in-fact, as may be necessary to act in behalf of the Corporation to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations. Such attorneys-in-fact, subject to the limitations set forth in their respective powers of attorney, shall have full power to bind the Corporation by their signature and execution of any such instruments and to attach thereto the seal of the Corporation. When so executed, such instruments shall be as binding as if signed by the President and attested to by the Secretary. Any power or authority granted to any representative or attorney-in-fact under the provisions of this article may be revoked at any time by the Board, the Chairman, the President or by the officer or officers granting such power or authority.

ARTICLE XIII – Execution of Contracts – SECTION 5. Surety Bonds and Undertakings. Any officer of the Company authorized for that purpose in writing by the chairman or the president, and subject to such limitations as the chairman or the president may prescribe, shall appoint such attorneys-in-fact, as may be necessary to act in behalf of the Company to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations. Such attorneys-in-fact subject to the limitations set forth in their respective powers of attorney, shall have full power to bind the Company by their signature and execution of any such instruments and to attach thereto the seal of the Company. When so executed such instruments shall be as binding as if signed by the president and attested by the secretary.

Certificate of Designation – The President of the Company, acting pursuant to the Bylaws of the Company, authorizes David M. Carey, Assistant Secretary to appoint such attorneys-in-fact as may be necessary to act on behalf of the Company to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations.

Authorization – By unanimous consent of the Company's Board of Directors, the Company consents that facsimile or mechanically reproduced signature of any assistant secretary of the Company, wherever appearing upon a certified copy of any power of attorney issued by the Company in connection with surety bonds, shall be valid and binding upon the Company with the same force and effect as though manually affixed.

I, Renee C. Llewellyn, the undersigned, Assistant Secretary, The Ohio Casualty Insurance Company, Liberty Mutual Insurance Company, and West American Insurance Company do hereby certify that the original power of attorney of which the foregoing is a full, true and correct copy of the Power of Attorney executed by said Companies, is in full force and effect and has not been revoked.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed the seals of said Companies this SEP 26 2017 day of SEP 26 2017, 2017.



By: Renee C. Llewellyn
Renee C. Llewellyn, Assistant Secretary

To confirm the validity of this Power of Attorney call
1-610-832-8240 between 9:00 am and 4:30 pm EST on any business day.

Not valid for mortgage, note, loan, letter of credit,
currency rate, interest rate or residual value guarantees.

PROJECT: FRESNO COUNTY WEST ANNEX JAIL

CONTRACT: 16-S-04

BIDDER: Bernards Bros. Inc.

SUBCONTRACTORS

The following named subcontractor(s) will perform work or labor, or otherwise render service to the general contractor in or about the construction of the work or improvement, in an amount in excess of **one-half of one percent** of the total bid presented herewith. Please fill out as completely as possible when submitting your bid. Use subcontractor's business name style as registered with the License Board. Each listed subcontractor's name, location of business and description of work, and both their contractor's license number and public works contractor registration number are REQUIRED, by Section 4104 of the California Public Contract Code, to be submitted prior to bid opening. (The "location of business" must specify the city in which the subcontractor's business is located, and the state if other than California.) All other requested information shall be submitted, either with the bid or within 24 hours after bid opening.

FAILURE TO LIST SUBCONTRACTORS AS DIRECTED MAY RENDER THE BID NON-RESPONSIVE, OR MAY RESULT IN ASSESSMENT OF A PENALTY AGAINST THE BIDDER IN ACCORDANCE WITH SECTION 4110 OF THE CALIFORNIA PUBLIC CONTRACT CODE."

SUBCONTRACTOR: _____

Business Address: _____

Class _____ License No. _____ DIR Registration No. _____

Item No. or Description of Work _____ **DEMOLITION** JH

Dollar Amount or Percentage of Total Bid _____

Email Address _____

SUBCONTRACTOR: MASS EX

Business Address: FRESNO, CA

Class A License No. 902334 DIR Registration No. 1000005550

Item No. or Description of Work _____ **EARTHWORK**

Dollar Amount or Percentage of Total Bid _____

Email Address _____

SUBCONTRACTOR: Malcolm Drilling

Business Address: SAN FRANCISCO, CA

Class C57, C61, D4 License No. 259543 DIR Registration No. 1000000389

Item No. or Description of Work _____ **SHORING**

Dollar Amount or Percentage of Total Bid _____

Email Address _____

PROJECT: FRESNO COUNTY WEST ANNEX JAIL

CONTRACT: 16-S-04

BIDDER: Bernards Bros. Inc.

- 4 1 **SUBCONTRACTOR:** _____
- 2 Business Address: _____
- 3 Class _____ License No. _____ DIR Registration No. _____
- 4 Item No. or Description of Work _____ **SITE CONCRETE** JH
- 5 Dollar Amount or Percentage of Total Bid _____
- 6 Email Address _____
- 7
- 5 8 **SUBCONTRACTOR:** _____
- 9 Business Address: _____
- 10 Class _____ License No. _____ DIR Registration No. _____
- 11 Item No. or Description of Work _____ **LANDSCAPING** JH
- 12 Dollar Amount or Percentage of Total Bid _____
- 13 Email Address _____
- 14
- 6 15 **SUBCONTRACTOR:** CMC
- 16 Business Address: Fresno CA
- 17 Class C50 License No. 778010 DIR Registration No. 1000000 298
- 18 Item No. or Description of Work _____ **REBAR**
- 19 Dollar Amount or Percentage of Total Bid _____
- 20 Email Address _____
- 21
- 7 22 **SUBCONTRACTOR:** McGuire
- 23 Business Address: Fowler CA
- 24 Class C8 License No. 818119 DIR Registration No. 100000 6002
- 25 Item No. or Description of Work _____ **STRUCTURAL CONCRETE**
- 26 Dollar Amount or Percentage of Total Bid _____
- 27 Email Address _____
- 28
- 8 29 **SUBCONTRACTOR:** Structure Cast
- 30 Business Address: Bakersfield CA
- 31 Class C8, C13, B License No. 774870 DIR Registration No. 1000000 308
- 32 Item No. or Description of Work _____ **PRE-CAST CONCRETE**
- 33 Dollar Amount or Percentage of Total Bid _____
- 34 Email Address _____
- 35
- 36
- 37
- 38
- 39

PROJECT: FRESNO COUNTY WEST ANNEX JAIL

CONTRACT: 16-S-04

BIDDER: Bernards Bros. Inc.

- 9 1 **SUBCONTRACTOR:** Barton
2 Business Address: Fresno, CA
3 Class C29 License No. 274525 DIR Registration No. 1000005266
4 Item No. or Description of Work MASONRY & BRICK VENEER
5 Dollar Amount or Percentage of Total Bid _____
6 Email Address _____
7
- 10 8 **SUBCONTRACTOR:** _____
9 Business Address: _____
10 Class _____ License No. _____ DIR Registration No. _____
11 Item No. or Description of Work FENCING ~~IT~~
12 Dollar Amount or Percentage of Total Bid _____
13 Email Address _____
14
- 11 15 **SUBCONTRACTOR:** Rasco Fab
16 Business Address: Fresno, CA.
17 Class C50, C51 License No. 433448 DIR Registration No. 1000006155 ~~IT~~ } H
18 Item No. or Description of Work STRUCTURAL STEEL & MISC. METALS
19 Dollar Amount or Percentage of Total Bid _____
20 Email Address _____
21
- 12 22 **SUBCONTRACTOR:** NUNO Iron
23 Business Address: KIRBY CITY, CA
24 Class C50, C51 License No. 757760 DIR Registration No. 1000007597
25 Item No. or Description of Work Structural Steel ~~IT~~ METAL DECKING ~~IT~~
26 Dollar Amount or Percentage of Total Bid _____
27 Email Address _____
28
- 13 29 **SUBCONTRACTOR:** 4E Four C
30 Business Address: Fresno, CA
31 Class C43 License No. 908294 DIR Registration No. 1000002824
32 Item No. or Description of Work Sheet Metal ~~IT~~ SHEET METAL ~~IT~~
33 Dollar Amount or Percentage of Total Bid _____
34 Email Address _____
35
36
37
38
39

PROJECT: FRESNO COUNTY WEST ANNEX JAIL

CONTRACT: 16-S-04

BIDDER: Bernards Bros. Inc.

14 1 **SUBCONTRACTOR:** _____
2 Business Address: _____
3 Class _____ License No. _____ DIR Registration No. _____
4 Item No. or Description of Work DOORS / FRAMES / HARDWARE JH
5 Dollar Amount or Percentage of Total Bid _____
6 Email Address _____

15 8 **SUBCONTRACTOR:** _____
9 Business Address: _____
10 Class _____ License No. _____ DIR Registration No. _____
11 Item No. or Description of Work GLAZING JH
12 Dollar Amount or Percentage of Total Bid _____
13 Email Address _____

14 C9 C33, C35
16 15 **SUBCONTRACTOR:** Toelton & Sons
16 Business Address: Fresno, CA
17 Class B, C, 2 License No. 342341 DIR Registration No. 1000004368
18 Item No. or Description of Work METAL STUD FRAMING / DRYWALL
19 Dollar Amount or Percentage of Total Bid _____
20 Email Address _____

21
17 22 **SUBCONTRACTOR:** CML Security
23 Business Address: ERIE, CO.
24 Class B - C10 License No. 1015730 DIR Registration No. 1000040451
25 Item No. or Description of Work DETENTION EQUIPMENT
26 Dollar Amount or Percentage of Total Bid _____
27 Email Address _____

28
18 29 **SUBCONTRACTOR:** CML Security
30 Business Address: ERIE, CO.
31 Class B - C10 License No. 1015730 DIR Registration No. 1000040451
32 Item No. or Description of Work SECURITY ELECTRONICS (DIV 28)
33 Dollar Amount or Percentage of Total Bid _____
34 Email Address _____

35
36
37
38
39

PROJECT: FRESNO COUNTY WEST ANNEX JAIL

CONTRACT: 16-S-04

BIDDER: Bernards Bros. Inc.

19 1 **SUBCONTRACTOR:** _____
2 Business Address: _____
3 Class _____ License No. _____ DIR Registration No. _____
4 Item No. or Description of Work SITE UTILITIES *SH*
5 Dollar Amount or Percentage of Total Bid _____
6 Email Address _____

20 8 **SUBCONTRACTOR:** NEW ENGLAND Sheet Metal
9 Business Address: FRESNO, CA
10 Class C20, C36 License No. 433674 DIR Registration No. 100000 1449
11 Item No. or Description of Work PLUMBING
12 Dollar Amount or Percentage of Total Bid _____
13 Email Address _____

21 15 **SUBCONTRACTOR:** NEW ENGLAND Sheet Metal
16 Business Address: FRESNO, CA
17 Class C20, C36 License No. 433674 DIR Registration No. 100000 1449
18 Item No. or Description of Work HVAC
19 Dollar Amount or Percentage of Total Bid _____
20 Email Address _____

22 22 **SUBCONTRACTOR:** Sebastian
23 Business Address: FRESNO, CA
24 Class C10 License No. 630669 DIR Registration No. 100000 1876
25 Item No. or Description of Work ELECTRICAL
26 Dollar Amount or Percentage of Total Bid _____
27 Email Address _____

23 29 **SUBCONTRACTOR:** ABG Caulking
30 Business Address: Good Lettsville, TN.
31 Class C33 License No. 526169 DIR Registration No. 10000 16206
32 Item No. or Description of Work JOINT Sealants
33 Dollar Amount or Percentage of Total Bid _____
34 Email Address _____

PROJECT: FRESNO COUNTY WEST ANNEX JAIL

CONTRACT: 16-S-04

BIDDER: Bernards Bros. Inc.

- 24 1 **SUBCONTRACTOR:** T.S.V.
2 Business Address: Sacramento, CA
3 Class C33 License No. 392444 DIR Registration No. 1000001903
4 Item No. or Description of Work Painting **EKH**
5 Dollar Amount or Percentage of Total Bid _____
6 Email Address _____
7
- 25 8 **SUBCONTRACTOR:** Kone
9 Business Address: Sacramento, CA
10 Class C11 License No. 179166 DIR Registration No. 1000003806
11 Item No. or Description of Work Elevators
12 Dollar Amount or Percentage of Total Bid _____
13 Email Address _____
14
- 26 15 **SUBCONTRACTOR:** Jenco
16 Business Address: Fresno, CA
17 Class C16 License No. 548570 DIR Registration No. 1000000984
18 Item No. or Description of Work Fire sprinklers
19 Dollar Amount or Percentage of Total Bid _____
20 Email Address _____
21
- 27 22 **SUBCONTRACTOR:** Pecoraro
23 Business Address: San Diego, CA
24 Class C33 License No. 868925 DIR Registration No. 1000053195
25 Item No. or Description of Work Painting
26 Dollar Amount or Percentage of Total Bid _____
27 Email Address _____
28
- 28 29 **SUBCONTRACTOR:** _____
30 Business Address: _____
31 Class _____ License No. _____ DIR Registration No. _____
32 Item No. or Description of Work _____
33 Dollar Amount or Percentage of Total Bid _____
34 Email Address _____
35
36
37
38
39

PROJECT: FRESNO COUNTY WEST ANNEX JAIL

CONTRACT: 16-S-04

BIDDER: Bernards Bros. Inc.

- 29 1 **SUBCONTRACTOR:** Prime Coat Coating Systems
2 Business Address: 405 Oakwood Ave., Waukegan, IL 60085
3 Class C33 License No. 952144 DIR Registration No. 1000038784
4 Item No. or Description of Work 99602 Cell Coatings ALTERNATE #2 ONLY
5 Dollar Amount or Percentage of Total Bid \$622,145
6 Email Address chrispullos@yahoo.com
7
- 30 8 **SUBCONTRACTOR:** _____
9 Business Address: _____
10 Class _____ License No. _____ DIR Registration No. _____
11 Item No. or Description of Work _____
12 Dollar Amount or Percentage of Total Bid _____
13 Email Address _____
14
- 31 15 **SUBCONTRACTOR:** _____
16 Business Address: _____
17 Class _____ License No. _____ DIR Registration No. _____
18 Item No. or Description of Work _____
19 Dollar Amount or Percentage of Total Bid _____
20 Email Address _____
21
- 32 22 **SUBCONTRACTOR:** _____
23 Business Address: _____
24 Class _____ License No. _____ DIR Registration No. _____
25 Item No. or Description of Work _____
26 Dollar Amount or Percentage of Total Bid _____
27 Email Address _____
28
- 33 29 **SUBCONTRACTOR:** _____
30 Business Address: _____
31 Class _____ License No. _____ DIR Registration No. _____
32 Item No. or Description of Work _____
33 Dollar Amount or Percentage of Total Bid _____
34 Email Address _____
35
36
37
38 End of Section 00 43 36

1 **PROJECT:** FRESNO COUNTY WEST ANNEX JAIL

2
3 **CONTRACT:** 16-S-04

4
5 To the Board of Supervisors, County of Fresno:

6
7 **NONCOLLUSION AFFIDAVIT**

8
9 TO BE EXECUTED BY BIDDER AND SUBMITTED WITH BID *

10
11 Jerry Higgins

12
13 (Printed or Typed Name)

14
15 being first duly sworn, deposes and says that he or she is

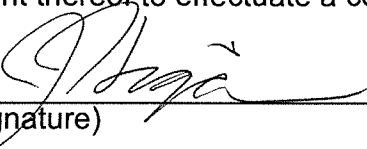
16
17 Vice President

18
19 (Owner, Partner, Corporate Officer (list title), Co-Venturer)

20
21 of Bernards Bros. Inc.

22
23 (Bidding Entity)

24 the party making the foregoing bid that the bid is not made in the interest of, or on
25 behalf of, any undisclosed person, partnership, company, association, organization, or
26 corporation; that the bid is genuine and not collusive or sham; that the bidder has not
27 directly or indirectly induced or solicited any other bidder to put in a false or sham bid,
28 and has not directly or indirectly colluded, conspired, connived, or agreed with any
29 bidder or anyone else to put in a sham bid, or that anyone shall refrain from bidding;
30 that the bidder has not in any manner, directly or indirectly, sought by agreement,
31 communication, or conference with anyone to fix the bid price of the bidder or any other
32 bidder, or to fix any overhead, profit, or cost element of the bid price, or of that of any
33 other bidder, or to secure any advantage against the public body awarding the contract
34 of anyone interested in the proposed contract; that all statements contained in the bid
35 are true; and, further, that the bidder has not, directly or indirectly, submitted his or her
36 bid price or any breakdown thereof, or the contents thereof, or divulged information or
37 data relative thereto, or paid, and will not pay, any fee to any corporation, partnership,
38 company association, thereto, or paid, and will not pay, any fee to any corporation,
39 partnership, company association, organization, bid depository, or to any member or
40 agent thereof to effectuate a collusive or sham bid.

41
42 
43 (Signature)

10/20/2017

(Dated)

44
45 (Title 23 United States Code Section 112)

46
47 (Calif Public Contract Code Section 7106; Stats.1988, c. 1548, Section 1.)

48
49 * NOTE: Completing, signing, and returning the Noncollusion Affidavit is a required part
50 of the Proposal. Bidders are cautioned that making a false certification may subject the
51 certifier to criminal prosecution.

52
53 End Section 00 45 19

PROJECT: FRESNO COUNTY WEST ANNEX JAIL

CONTRACT NO: 16-S-04

(This guaranty shall be executed by the successful bidder in accordance with Article 2.32 of the General Conditions. The bidder shall execute the guaranty on this page at the time of submitting his bid.)

GUARANTY

To the Owner: County of Fresno

The undersigned guarantees the construction and installation of the following work included in this project:

ALL WORK

Should any of the materials or equipment prove defective or should the work as a whole prove defective, due to faulty workmanship, material furnished or methods of installation, or should the work or any part thereof fail to operate properly as originally intended and in accordance with the plans and specifications, due to any of the above causes, all within twelve (12) months unless noted otherwise in contract documents after the date on which this contract is accepted by the Owner, the undersigned agrees to reimburse the Owner, upon demand, for its expenses incurred in restoring said work to the condition contemplated in said project, including the cost of any such equipment or materials replaced and the cost of removing and replacing any other work necessary to make such replacement or repairs, or, upon demand by the Owner, to replace any such material and to repair said work completely without cost to the Owner so that said work will function successfully as originally contemplated.

The Owner shall have the unqualified option to make any needed replacement or repairs itself or to have such replacements or repairs done by the undersigned. In the event the Owner elects to have said work performed by the undersigned, the undersigned agrees that the repairs shall be made and such materials as are necessary shall be furnished and installed within a reasonable time after the receipt of demand from the Owner. If the undersigned shall fail or refuse to comply with his obligations under this guaranty, the Owner shall be entitled to all costs and expenses reasonably incurred by reason of said failure or refusal.

Bernards Bros. Inc.

(Company)

By:

Jerry Higgins

Vice President

(Title)

Date: 10/20/2017

1 PROJECT: FRESNO COUNTY WEST ANNEX JAIL

2
3 OWNER: COUNTY OF FRESNO

4
5 CONTRACT: 16-S-04

6
7 To the Board of Supervisors, County of Fresno

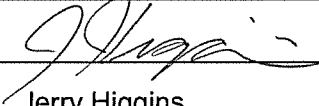
8
9 **HAZARDOUS MATERIALS CERTIFICATION**

10
11 TO BE EXECUTED BY CONTRACTOR AND SUBMITTED WITH THE SIGNED AGREEMENTS

- 12
13 1. The Contractor hereby certifies that no Asbestos, Asbestos-Containing Materials, poly-chlorinated biphenyl ("PCB")
14 products, or any material listed, as of the date of Award of Construction by the Board of Supervisors, County of Fresno,
15 by any Federal and/or State Environmental Protection Agency; and/or any Federal and/or State health agencies as a
16 hazardous material, or any other material defined as being hazardous under Federal and/or State laws, rules or
17 regulation ("Hazardous Material"), shall be furnished, installed or incorporated in any way into the Project, or in any
18 tools, devices, clothing or equipment used to perform any portion of the Work on the Project.
19
20 2. The Contractor further certifies that it has provided notice to and instructed its employees, subcontractors and
21 suppliers with respect to the requirements included in paragraph 1, above, and its employees, subcontractors and
22 suppliers have agreed to comply.
23
24 3. Asbestos and Asbestos-Containing material shall be defined as all items containing, but not limited to, chrysotile,
25 crocidolite, amosite, anthophyllite, tremolite and actinolite. Asbestos-Containing material shall be defined as any
26 material containing more than one-tenth of one percent (0.1%) asbestos, using recognized and accepted standardized
27 test methods.
28
29 4. Anytime a material is suspected of meeting the definition of Hazardous Material and conclusive data does not exist to
30 resolve the concern, the county shall engage an independent, certified, third party to sample and test the material
31 using recognized and accepted standardized test methods. If the material is determined to be Hazardous Material, the
32 costs of any such sampling, testing and related activities shall be borne by the Contractor.
33
34 5. All Work and/or materials found to be Hazardous Material, or Work installed with equipment containing Hazardous
35 Material, shall be immediately rejected, removed and replaced at the Contractor's expense and at no cost to the
36 County.
37
38 6. The Contractor has read, understands and shall comply with all the provisions contained herein.

39
40 DATE: October 20, 2017

41
42 CONTRACTOR NAME: Bernards Bros. Inc.

43
44 SIGNATURE: 

45
46 PRINT NAME: Jerry Higgins

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48 TITLE: Vice President

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50
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END OF DOCUMENT



County of Fresno

DEPARTMENT OF PUBLIC WORKS AND PLANNING
STEVEN E. WHITE, DIRECTOR

January 17, 2018

Mr. Falco DiGiallonardo, Vice President
Bernards Bros. Inc.
7045 N. Chestnut Ave., Suite 103
Fresno, CA 93720

Subject: Correction to Notice of Approval, Contract No. 16-S-04, Fresno County West Annex Jail

Dear Mr. DiGiallonardo:

The Department of Industrial Relations (DIR) Project ID 224495 is assigned to this contract, 16-S-04. The original Notice of Approval dated January 12, 2018 stated that it was assigned to a different contract number.

If you have any questions, contact Mitch Araki at maraki@co.fresno.ca.us or (559) 600-4501.

Sincerely,

Mohammad Alimi, PhD, P.E.
Design Engineer

Erin Haagenson
Senior Staff Analyst

Enclosures

cc: Board of Supervisors, Auditor - Controller, Financial Services, Construction Management,
Design Division – Design Services

CONFIRMATION OF COVERAGE

Subcontractor Default Insurance

Issue Date: December 22, 2017

THIS CONFIRMATION OF COVERAGE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE PARTY TO WHICH IT IS ISSUED. THIS DOCUMENT DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW.

PRODUCER

Alliant Insurance Services, Inc.
333 S. Hope St., Suite 3750
Los Angeles, CA 90071

COMPANY AFFORDING COVERAGE

Cove Program Underwriting Ltd
34 Lime Street
London EC3M 7AT

INSURED

Bernards Bros. Inc.
555 First Street
San Fernando CA 91340

POLICY NUMBER

CC1700399

POLICY PERIOD

09/01/2017 to
09/01/2019

POLICY LIMITS

\$80,000,000 (USD) Aggregate limit of liability
\$20,000,000 (USD) Subcontractor limit of liability

COVERAGES

This is to confirm that a Subcontractor Default Insurance Policy has been issued to the insured named above and applies to the project indicated below. This Policy is in effect for all Subcontracts entered into which are enrolled under the project and the program. Coverage will remain in effect until fulfillment of all terms, conditions, and specifications of covered Subcontracts, including any related warranty periods, subject to all terms, conditions, exclusions, and conditions of the Policy.

PROJECT INFORMATION

Name: West Annex Jail
Owner: County of Fresno
Description: The Fresno County West Annex Jail is located on an approximately 2.7 acre site of County owned land located in the main downtown area of the City of Fresno, California. The project is a new Type II Detention Facility consisting of 300 new beds. This building is a five story cast in place structure with a full basement. Includes housing units with tiered design. Exterior skin consists of cast in place concrete, CMU and precast concrete. The new building will be located on the corner of Merced and L streets, adjacent to the existing North Annex Jail building in an existing parking lot to be demoed. The West Annex Jail will be attached to the existing North Annex Jail via underground tunnel. Vertical access / egress by combination of stairs and 5 elevators. Level 2 and level 3 housing will include combination cell / dayrooms, exercise area, program spaces, medical / mental health support and general staff support functions. This facility includes support functions for medical, behavior / mental health, laundry, loading dock / receiving, non-secure public areas including entry / lobby area, video-visitation, non-contact visitation, day reporting, administration and program space.
Location: 2208 Merced Street, Fresno CA 93721
Effective Date of Coverage: January 8, 2018
Estimated Value of Covered Subcontracts: \$70,000,000.00



OTHER INFORMATION:

Confirmation of Coverage Issued to:

County of Fresno
2220 Tulare Street, 8th Floor
Fresno CA 93721



CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

12/21/2017

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER Alliant Insurance Services, Inc. 333 South Hope Street, Suite 3750 Los Angeles CA 90071	CONTACT NAME: Elizabeth Perison	
	PHONE (A/C, No, Ext): 213-270-0995	FAX (A/C, No):
	E-MAIL ADDRESS: Eperison@alliant.com	
	INSURER(S) AFFORDING COVERAGE	NAIC #
	INSURER A: Illinois Union Insurance Company	27960
	INSURER B: Ironshore Specialty Insurance Co	25445
	INSURER C: ACE Property & Casualty Ins Co	20699
	INSURER D: Starr Indemnity and Liability Company	38318
	INSURER E: Federal Insurance Company	20281
	INSURER F:	

INSURED Bernards Bros. Inc. 555 First St San Fernando, CA 91340	BERNBRO-01

COVERAGES**CERTIFICATE NUMBER:** 884878670**REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDITIONAL SUBROGATION WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS
B	☒ COMMERCIAL GENERAL LIABILITY ☐ CLAIMS-MADE ☒ OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: ☐ POLICY ☒ PROJECT ☐ LOC OTHER:		AGS0074103	7/1/2017	7/1/2018	EACH OCCURRENCE \$ 1,000,000 DAMAGE TO RENTED PREMISES (Ea occurrence) \$ 100,000 MED EXP (Any one person) \$ 5,000 PERSONAL & ADV INJURY \$ 1,000,000 GENERAL AGGREGATE \$ 2,000,000 PRODUCTS - COMP/OP AGG \$ 2,000,000 \$
E	☒ AUTOMOBILE LIABILITY ☐ ANY AUTO ☐ ALL OWNED AUTOS ☐ HIRED AUTOS ☐ SCHEDULED AUTOS ☐ NON-OWNED AUTOS		54309468	7/1/2017	7/1/2018	COMBINED SINGLE LIMIT (Ea accident) \$ 1,000,000 BODILY INJURY (Per person) \$ BODILY INJURY (Per accident) \$ PROPERTY DAMAGE (Per accident) \$ \$
D C	☒ UMBRELLA LIAB ☒ OCCUR ☐ EXCESS LIAB ☐ CLAIMS-MADE DED ☐ RETENTION \$		100023810 XCQ G28135695 002	7/1/2017 7/1/2017	7/1/2018 7/1/2018	EACH OCCURRENCE \$ 25,000,000 AGGREGATE \$ 25,000,000 \$
E	☒ WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	☐ Y ☒ N ☐ N/A	54309469	7/1/2017	7/1/2018	PER STATUTE ☐ OTH-ER ☐ E.L. EACH ACCIDENT \$ 1,000,000 E.L. DISEASE - EA EMPLOYEE \$ 1,000,000 E.L. DISEASE - POLICY LIMIT \$ 1,000,000
A	Professional/Pollution Liability		GOOG27055187005	10/1/2017	10/1/2018	Per Occurrence \$10,000,000 Aggregate \$10,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

Re: Fresno Jail project

The County of Fresno, its officers, officials, employees, agents, Consulting Engineers, and volunteers, individually and collectively, and the State Public Works Board of the State of California (SWPB) and the Board of State and Community Corrections (BSCC) and their respective officers, agents, and employees, individually and collectively are included as Additional Insured as respects Liability arising out of work performed by the Named Insured. The insurance provided shall be primary and any other insurance maintained by the Additional Insured is excess and non-contributory. Waiver of Subrogation applies as required by contract. Thirty (30) Days Notice of Cancellation / Non-Renewal - Ten (10) Days Notice For Non-Payment of Premium. Umbrella Liability is follow form.

CERTIFICATE HOLDER**CANCELLATION**

The Board of State and Community Corrections (BSCC)
2590 Venture Oaks Way, Suite 200
Attention: Executive Director
Sacramento CA 95833

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

© 1988-2014 ACORD CORPORATION. All rights reserved.

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

**ADDITIONAL INSURED – OWNERS, LESSEES OR
CONTRACTORS – SCHEDULED PERSON OR
ORGANIZATION**

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART

SCHEDULE

Name Of Additional Insured Person(s) Or Organization(s)	Location(s) Of Covered Operations
As required by written contract. If required by your agreement with such Additional Insured.	
The inclusion of one or more Insured(s) under the terms of this endorsement does not increase our limits of liability.	
All other terms and conditions remain unchanged.	
Information required to complete this Schedule, if not shown above, will be shown in the Declarations.	

A. Section II – Who Is An Insured is amended to include as an additional insured the person(s) or organization(s) shown in the Schedule, but only with respect to liability for "bodily injury", "property damage" or "personal and advertising injury" caused, in whole or in part, by:

1. Your acts or omissions; or
2. The acts or omissions of those acting on your behalf;

in the performance of your ongoing operations for the additional insured(s) at the location(s) designated above.

However:

1. The insurance afforded to such additional insured only applies to the extent permitted by law; and

2. If coverage provided to the additional insured is required by a contract or agreement, the insurance afforded to such additional insured will not be broader than that which you are required by the contract or agreement to provide for such additional insured.

B. With respect to the insurance afforded to these additional insureds, the following additional exclusions apply:

This insurance does not apply to "bodily injury" or "property damage" occurring after:

1. All work, including materials, parts or equipment furnished in connection with such work, on the project (other than service, maintenance or repairs) to be performed by or on behalf of the additional insured(s) at the location of the covered operations has been completed; or
2. That portion of "your work" out of which the injury or damage arises has been put to its intended use by any person or organization other than another contractor or subcontractor engaged in performing operations for a principal as a part of the same project.

C. With respect to the insurance afforded to these additional insureds, the following is added to **Section III – Limits Of Insurance:**

If coverage provided to the additional insured is required by a contract or agreement, the most we will pay on behalf of the additional insured is the amount of insurance:

1. Required by the contract or agreement; or

2. Available under the applicable Limits of Insurance shown in the Declarations;

whichever is less.

This endorsement shall not increase the applicable Limits of Insurance shown in the Declarations.

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.**ADDITIONAL INSURED – OWNERS, LESSEES OR
CONTRACTORS – COMPLETED OPERATIONS**

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART
PRODUCTS/COMPLETED OPERATIONS LIABILITY COVERAGE PART**SCHEDULE**

Name Of Additional Insured Person(s) Or Organization(s)	Location And Description Of Completed Operations
As required by written contract.	The insurance afforded by this policy for the benefit of the additional insured does not apply to 'property damage' to any building, structure or appurtenant structure intended to be occupied as a 'private residence'. The term "private residence" includes single family homes or residences, multi-family homes or residences. Apartments are not considered "private residences."
The inclusion of one or more Insured(s) under the terms of this endorsement does not increase our limits of liability.	
All other terms and conditions remain unchanged.	
Information required to complete this Schedule, if not shown above, will be shown in the Declarations.	

A. Section II – Who Is An Insured is amended to include as an additional insured the person(s) or organization(s) shown in the Schedule, but only with respect to liability for "bodily injury" or "property damage" caused, in whole or in part, by "your work" at the location designated and described in the Schedule of this endorsement performed for that additional insured and included in the "products-completed operations hazard".

However:

1. The insurance afforded to such additional insured only applies to the extent permitted by law; and

2. If coverage provided to the additional insured is required by a contract or agreement, the insurance afforded to such additional insured will not be broader than that which you are required by the contract or agreement to provide for such additional insured.

B. With respect to the insurance afforded to these additional insureds, the following is added to Section III – Limits Of Insurance:

If coverage provided to the additional insured is required by a contract or agreement, the most we will pay on behalf of the additional insured is the amount of insurance:

1. Required by the contract or agreement; or
2. Available under the applicable Limits of Insurance shown in the Declarations;
whichever is less.

This endorsement shall not increase the applicable Limits of Insurance shown in the Declarations.

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

**PRIMARY AND NONCONTRIBUTORY –
OTHER INSURANCE CONDITION**

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART
PRODUCTS/COMPLETED OPERATIONS LIABILITY COVERAGE PART

The following is added to the **Other Insurance** Condition and supersedes any provision to the contrary:

Primary And Noncontributory Insurance

This insurance is primary to and will not seek contribution from any other insurance available to an additional insured under your policy provided that:

- (1) The additional insured is a Named Insured under such other insurance; and

- (2) You have agreed in writing in a contract or agreement that this insurance would be primary and would not seek contribution from any other insurance available to the additional insured.

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

WAIVER OF TRANSFER OF RIGHTS OF RECOVERY AGAINST OTHERS TO US

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART
PRODUCTS/COMPLETED OPERATIONS LIABILITY COVERAGE PART

SCHEDULE

Name Of Person Or Organization:

As Required by Written Contract

Information required to complete the Schedule, if not shown above, will be shown in the Declarations.

The following is added to Paragraph **8. Transfer Of Rights Of Recovery Against Others To Us** of **Section IV – Conditions:**

We waive any right of recovery we may have against the person or organization shown in the Schedule above because of payments we make for injury or damage arising out of your ongoing operations or "your work" done under a contract with that person or organization and included in the "products-completed operations hazard". This waiver applies only to the person or organization shown in the Schedule above.

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.**DESIGNATED INSURED**

This endorsement modifies insurance provided under the following:

BUSINESS AUTO COVERAGE FORM
GARAGE COVERAGE FORM
MOTOR CARRIER COVERAGE FORM
TRUCKERS COVERAGE FORM

With respect to coverage provided by this endorsement, the provisions of the Coverage Form apply unless modified by this endorsement.

This endorsement identifies person(s) or organization(s) who are "insureds" under the Who Is An Insured Provision of the Coverage Form. This endorsement does not alter coverage provided in the Coverage Form.

This endorsement changes the policy effective on the inception date of the policy unless another date is indicated below.

Endorsement Effective: 7/1/2017	Countersigned By: (Authorized Representative)
Named Insured: Bernards Bros. Inc.	

SCHEDULE

Name of Person(s) or Organization(s): WHERE REQUIRED BY WRITTEN CONTRACT.

(If no entry appears above, information required to complete this endorsement will be shown in the Declarations as applicable to the endorsement.)

Each person or organization shown in the Schedule is an "insured" for Liability Coverage, but only to the extent that person or organization qualifies as an "insured" under the Who Is An Insured Provision contained in **Section II** of the Coverage Form.

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

WAIVER OF TRANSFER OF RIGHTS OF RECOVERY AGAINST OTHERS TO US (WAIVER OF SUBROGATION)

This endorsement modifies insurance provided under the following:

AUTO DEALERS COVERAGE FORM
BUSINESS AUTO COVERAGE FORM
MOTOR CARRIER COVERAGE FORM

With respect to coverage provided by this endorsement, the provisions of the Coverage Form apply unless modified by the endorsement.

This endorsement changes the policy effective on the inception date of the policy unless another date is indicated below.

Named Insured: Bernards Bros. Inc.

Endorsement Effective Date: 7/1/2017

SCHEDULE

Name(s) Of Person(s) Or Organization(s):

WHERE REQUIRED BY WRITTEN CONTRACT.

Information required to complete this Schedule, if not shown above, will be shown in the Declarations.

The **Transfer Of Rights Of Recovery Against Others To Us** condition does not apply to the person(s) or organization(s) shown in the Schedule, but only to the extent that subrogation is waived prior to the "accident" or the "loss" under a contract with that person or organization.

WORKERS' COMPENSATION AND EMPLOYERS' LIABILITY INSURANCE POLICY

WC 99 03 04 (Ed. 7- 08)

WAIVER OF OUR RIGHT TO RECOVER FROM OTHERS ENDORSEMENT— CALIFORNIA

This endorsement changes the policy to which it is attached effective on the inception date of the policy unless a different date is indicated below.

(The following "attaching clause" need to be completed only when this endorsement is issued subsequent to preparation of the policy.)

This endorsement, effective on 7/1/2017 at 12:01 A. M. standard time, forms a part of
(DATE)

Policy No. 54309469 of the Federal Insurance Company
(NAME OF INSURANCE COMPANY)

issued to Bernards Bros. Inc.

Endorsement No.

Authorized Representative

We have the right to recover our payments from anyone liable for an injury covered by this policy. We will not enforce our right against the person or organization named in the Schedule. The additional premium for the blanket waiver offered by this endorsement shall be 0.00 % of total California premium.

Schedule

Person or Organization

Job Description

WHERE REQUIRED BY WRITTEN CONTRACT.



CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

12/21/2017

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER Alliant Insurance Services, Inc. 333 South Hope Street, Suite 3750 Los Angeles CA 90071	CONTACT NAME: Elizabeth Perison	
	PHONE (A/C, No. Ext): 213-270-0995	FAX (A/C, No):
	E-MAIL ADDRESS: Eperison@alliant.com	
	INSURER(S) AFFORDING COVERAGE	NAIC #
INSURED Bernards Bros. Inc. 555 First St San Fernando, CA 91340	INSURER A: Illinois Union Insurance Company	27960
	INSURER B: Ironshore Specialty Insurance Co	25445
	INSURER C: ACE Property & Casualty Ins Co	20699
	INSURER D: Starr Indemnity and Liability Company	38318
	INSURER E: Federal Insurance Company	20281
	INSURER F:	

COVERAGES**CERTIFICATE NUMBER:** 1490808650**REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS
B	☒ COMMERCIAL GENERAL LIABILITY ☐ CLAIMS-MADE ☒ OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: ☐ POLICY ☒ PROJECT ☐ LOC OTHER:			AGS0074103	7/1/2017	7/1/2018	EACH OCCURRENCE \$ 1,000,000 DAMAGE TO RENTED PREMISES (Ea occurrence) \$ 100,000 MED EXP (Any one person) \$ 5,000 PERSONAL & ADV INJURY \$ 1,000,000 GENERAL AGGREGATE \$ 2,000,000 PRODUCTS - COMP/OP AGG \$ 2,000,000 \$
E	☒ AUTOMOBILE LIABILITY ☒ ANY AUTO ☐ ALL OWNED AUTOS ☐ HIRED AUTOS ☐ SCHEDULED AUTOS ☐ NON-OWNED AUTOS			54309468	7/1/2017	7/1/2018	COMBINED SINGLE LIMIT (Ea accident) \$ 1,000,000 BODILY INJURY (Per person) \$ BODILY INJURY (Per accident) \$ PROPERTY DAMAGE (Per accident) \$ \$
D C	☒ UMBRELLA LIAB ☒ OCCUR ☐ EXCESS LIAB ☐ CLAIMS-MADE DED RETENTION \$			100023810 XCQ G28135695 002	7/1/2017 7/1/2017	7/1/2018 7/1/2018	EACH OCCURRENCE \$ 25,000,000 AGGREGATE \$ 25,000,000 \$
E	☒ WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	Y / N ☐ N / A		54309469	7/1/2017	7/1/2018	PER STATUTE ☐ OTH-ER ☐ E.L. EACH ACCIDENT \$ 1,000,000 E.L. DISEASE - EA EMPLOYEE \$ 1,000,000 E.L. DISEASE - POLICY LIMIT \$ 1,000,000
A	Professional/Pollution Liability			GOOG27055187005	10/1/2017	10/1/2018	Per Occurrence \$10,000,000 Aggregate \$10,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

Re: Fresno Jail project

The County of Fresno, its officers, officials, employees, agents, Consulting Engineers, and volunteers, individually and collectively, and the State Public Works Board of the State of California (SWPB) and the Board of State and Community Corrections (BSCC) and their respective officers, agents, and employees, individually and collectively are included as Additional Insured as respects Liability arising out of work performed by the Named Insured. The insurance provided shall be primary and any other insurance maintained by the Additional Insured is excess and non-contributory. Waiver of Subrogation applies as required by contract. Thirty (30) Days Notice of Cancellation / Non-Renewal - Ten (10) Days Notice For Non-Payment of Premium. Umbrella Liability is follow form.

CERTIFICATE HOLDER**CANCELLATION**

The State Public Works Board of the State of California (SWPB)
915 L. St. 9th Floor
Attention: Executive Director
Sacramento CA 95814

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

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**ADDITIONAL INSURED – OWNERS, LESSEES OR
CONTRACTORS – SCHEDULED PERSON OR
ORGANIZATION**

COMMERCIAL GENERAL LIABILITY COVERAGE PART

Name Of Additional Insured Person(s) Or Organization(s)	Location(s) Of Covered Operations
As required by written contract. If required by your agreement with such Additional Insured. The inclusion of one or more Insured(s) under the terms of this endorsement does not increase our limits of liability. All other terms and conditions remain unchanged.	
Information required to complete this Schedule, if not shown above, will be shown in the Declarations.	

1. The insurance afforded to such additional insured only applies to the extent permitted by law; and

2. If coverage provided to the additional insured is required by a contract or agreement, the insurance afforded to such additional insured will not be broader than that which you are required by the contract or agreement to provide for such additional insured.

B. With respect to the insurance afforded to these additional insureds, the following additional exclusions apply:

This insurance does not apply to "bodily injury" or "property damage" occurring after:

1. All work, including materials, parts or equipment furnished in connection with such work, on the project (other than service, maintenance or repairs) to be performed by or on behalf of the additional insured(s) at the location of the covered operations has been completed; or
2. That portion of "your work" out of which the injury or damage arises has been put to its intended use by any person or organization other than another contractor or subcontractor engaged in performing operations for a principal as a part of the same project.

C. With respect to the insurance afforded to these additional insureds, the following is added to **Section III – Limits Of Insurance:**

If coverage provided to the additional insured is required by a contract or agreement, the most we will pay on behalf of the additional insured is the amount of insurance:

1. Required by the contract or agreement; or

2. Available under the applicable Limits of Insurance shown in the Declarations; whichever is less.

This endorsement shall not increase the applicable Limits of Insurance shown in the Declarations.

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.**ADDITIONAL INSURED – OWNERS, LESSEES OR
CONTRACTORS – COMPLETED OPERATIONS**

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART
PRODUCTS/COMPLETED OPERATIONS LIABILITY COVERAGE PART**SCHEDULE**

Name Of Additional Insured Person(s) Or Organization(s)	Location And Description Of Completed Operations
As required by written contract.	The insurance afforded by this policy for the benefit of the additional insured does not apply to 'property damage' to any building, structure or appurtenant structure intended to be occupied as a 'private residence'. The term "private residence" includes single family homes or residences, multi-family homes or residences. Apartments are not considered "private residences."
The inclusion of one or more Insured(s) under the terms of this endorsement does not increase our limits of liability.	
All other terms and conditions remain unchanged.	
Information required to complete this Schedule, if not shown above, will be shown in the Declarations.	

A. Section II – Who Is An Insured is amended to include as an additional insured the person(s) or organization(s) shown in the Schedule, but only with respect to liability for "bodily injury" or "property damage" caused, in whole or in part, by "your work" at the location designated and described in the Schedule of this endorsement performed for that additional insured and included in the "products-completed operations hazard".

However:

1. The insurance afforded to such additional insured only applies to the extent permitted by law; and

2. If coverage provided to the additional insured is required by a contract or agreement, the insurance afforded to such additional insured will not be broader than that which you are required by the contract or agreement to provide for such additional insured.

B. With respect to the insurance afforded to these additional insureds, the following is added to Section III – Limits Of Insurance:

If coverage provided to the additional insured is required by a contract or agreement, the most we will pay on behalf of the additional insured is the amount of insurance:

1. Required by the contract or agreement; or
2. Available under the applicable Limits of Insurance shown in the Declarations;
whichever is less.

This endorsement shall not increase the applicable Limits of Insurance shown in the Declarations.

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

**PRIMARY AND NONCONTRIBUTORY –
OTHER INSURANCE CONDITION**

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART
PRODUCTS/COMPLETED OPERATIONS LIABILITY COVERAGE PART

The following is added to the **Other Insurance** Condition and supersedes any provision to the contrary:

Primary And Noncontributory Insurance

This insurance is primary to and will not seek contribution from any other insurance available to an additional insured under your policy provided that:

- (1) The additional insured is a Named Insured under such other insurance; and

- (2) You have agreed in writing in a contract or agreement that this insurance would be primary and would not seek contribution from any other insurance available to the additional insured.

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

WAIVER OF TRANSFER OF RIGHTS OF RECOVERY AGAINST OTHERS TO US

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART
PRODUCTS/COMPLETED OPERATIONS LIABILITY COVERAGE PART

SCHEDULE

Name Of Person Or Organization:

As Required by Written Contract

Information required to complete the Schedule, if not shown above, will be shown in the Declarations.

The following is added to Paragraph 8. **Transfer Of Rights Of Recovery Against Others To Us** of **Section IV – Conditions:**

We waive any right of recovery we may have against the person or organization shown in the Schedule above because of payments we make for injury or damage arising out of your ongoing operations or "your work" done under a contract with that person or organization and included in the "products-completed operations hazard". This waiver applies only to the person or organization shown in the Schedule above.

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

DESIGNATED INSURED

This endorsement modifies insurance provided under the following:

BUSINESS AUTO COVERAGE FORM
GARAGE COVERAGE FORM
MOTOR CARRIER COVERAGE FORM
TRUCKERS COVERAGE FORM

With respect to coverage provided by this endorsement, the provisions of the Coverage Form apply unless modified by this endorsement.

This endorsement identifies person(s) or organization(s) who are "insureds" under the Who Is An Insured Provision of the Coverage Form. This endorsement does not alter coverage provided in the Coverage Form.

This endorsement changes the policy effective on the inception date of the policy unless another date is indicated below.

Endorsement Effective: 7/1/2017	Countersigned By: (Authorized Representative)
Named Insured: Bernards Bros. Inc.	

SCHEDULE

Name of Person(s) or Organization(s): WHERE REQUIRED BY WRITTEN CONTRACT.

(If no entry appears above, information required to complete this endorsement will be shown in the Declarations as applicable to the endorsement.)

Each person or organization shown in the Schedule is an "insured" for Liability Coverage, but only to the extent that person or organization qualifies as an "insured" under the Who Is An Insured Provision contained in **Section II** of the Coverage Form.

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

WAIVER OF TRANSFER OF RIGHTS OF RECOVERY AGAINST OTHERS TO US (WAIVER OF SUBROGATION)

This endorsement modifies insurance provided under the following:

AUTO DEALERS COVERAGE FORM
BUSINESS AUTO COVERAGE FORM
MOTOR CARRIER COVERAGE FORM

With respect to coverage provided by this endorsement, the provisions of the Coverage Form apply unless modified by the endorsement.

This endorsement changes the policy effective on the inception date of the policy unless another date is indicated below.

Named Insured: Bernards Bros. Inc.

Endorsement Effective Date: 7/1/2017

SCHEDULE

Name(s) Of Person(s) Or Organization(s):

WHERE REQUIRED BY WRITTEN CONTRACT.

Information required to complete this Schedule, if not shown above, will be shown in the Declarations.

The **Transfer Of Rights Of Recovery Against Others To Us** condition does not apply to the person(s) or organization(s) shown in the Schedule, but only to the extent that subrogation is waived prior to the "accident" or the "loss" under a contract with that person or organization.

WORKERS' COMPENSATION AND EMPLOYERS' LIABILITY INSURANCE POLICY

WC 99 03 04 (Ed. 7- 08)

WAIVER OF OUR RIGHT TO RECOVER FROM OTHERS ENDORSEMENT— CALIFORNIA

This endorsement changes the policy to which it is attached effective on the inception date of the policy unless a different date is indicated below.

(The following "attaching clause" need to be completed only when this endorsement is issued subsequent to preparation of the policy.)

This endorsement, effective on 7/1/2017 at 12:01 A. M. standard time, forms a part of
(DATE)

Policy No. 54309469 of the Federal Insurance Company
(NAME OF INSURANCE COMPANY)

issued to Bernards Bros. Inc.

Endorsement No.

Authorized Representative

We have the right to recover our payments from anyone liable for an injury covered by this policy. We will not enforce our right against the person or organization named in the Schedule. The additional premium for the blanket waiver offered by this endorsement shall be 0.00 % of total California premium.

Schedule

Person or Organization

Job Description

WHERE REQUIRED BY WRITTEN CONTRACT.



EVIDENCE OF PROPERTY INSURANCE

DATE (MM/DD/YYYY)
12/27/2017

THIS EVIDENCE OF PROPERTY INSURANCE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE ADDITIONAL INTEREST NAMED BELOW. THIS EVIDENCE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS EVIDENCE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE ADDITIONAL INTEREST.

AGENCY Alliant Insurance Services, Inc. 333 South Hope Street, Suite 3750 Los Angeles, CA 90071		PHONE (A/C, No, Ext): 213-270-0995	COMPANY See Attached	
FAX (A/C, No):	E-MAIL ADDRESS: Eperison@alliant.com			
CODE:	SUB CODE:			
AGENCY CUSTOMER ID #:				
INSURED Bernards Bros. Inc. 555 First St San Fernando, CA 91340			LOAN NUMBER	POLICY NUMBER See Attached
			EFFECTIVE DATE 12/27/2017	EXPIRATION DATE 06/16/2020
			☐ CONTINUED UNTIL TERMINATED IF CHECKED	
THIS REPLACES PRIOR EVIDENCE DATED:				

PROPERTY INFORMATION

LOCATION/DESCRIPTION
2208 Merced St., Fresno, CA 93721

THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS EVIDENCE OF PROPERTY INSURANCE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

COVERAGE INFORMATION

COVERAGE / PERILS / FORMS	AMOUNT OF INSURANCE
Earthquake excluding Flood, EQSL	\$81,756,000

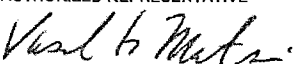
REMARKS (Including Special Conditions)

Empire Indemnity Insurance Company, Policy #BPP1151804, Limits: \$21,317,000;
Everest Indemnity Insurance Company, Policy #8400005717-171, Limits: \$40,000,000;
General Security Indemnity Company of Arizona, Policy #TR0001486-04357-17, Limits: \$20,439,000.
See attached.
Re: Project: Fresno County West Annex Jail, Building No. 606, Address: 2208 Merced St., Fresno, CA
County of Fresno, its officers, officials, employees, agents, Consulting Engineers, and volunteers, individually and collectively, and the State Public Works Board of the State of California (SWPB) and the Board of State and Community Corrections (BSCC) and their respective officers, agents, and employees, individually and collectively, as Loss Payee, but only insofar as the operations under this Agreement are concerned.

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

ADDITIONAL INTEREST

NAME AND ADDRESS Board of State and Community Corrections Attention: Executive Director 2590 Venture Oaks Way, Suite 200 Sacramento CA 95833	☐	MORTGAGEE	☐	ADDITIONAL INSURED
	☒	LOSS PAYEE		
	LOAN #			
	AUTHORIZED REPRESENTATIVE 			

Fresno County West Annex Jail
Difference in Conditions Coverage
Earthquake excluding Flood, EQSL
Effective December 27, 2017 to June 16, 2020

Carrier	Policy Number	Share	Limits of Liability
Empire Indemnity Insurance Company	BPP1151804	26.07%	\$ 21,317,000
Everest Indemnity Insurance Company	8400005717-171	48.93%	\$ 40,000,000
General Security Indemnity Company of Arizona	TR0001486-04357-17	25.00%	<u>\$ 20,439,000</u>
			\$ 81,756,000



EVIDENCE OF PROPERTY INSURANCE

DATE (MM/DD/YYYY)

12/27/2017

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AGENCY Alliant Insurance Services, Inc. 333 South Hope Street, Suite 3750 Los Angeles, CA 90071		PHONE (A/C, No, Ext): 213-270-0995		COMPANY See Attached	
FAX (A/C, No):		E-MAIL ADDRESS: Eperison@alliant.com			
CODE:		SUB CODE:			
AGENCY CUSTOMER ID #:		LOAN NUMBER		POLICY NUMBER See Attached	
INSURED Bernards Bros. Inc. 555 First St San Fernando, CA 91340		EFFECTIVE DATE 12/27/2017		EXPIRATION DATE 06/16/2020	
				☐ CONTINUED UNTIL TERMINATED IF CHECKED	
THIS REPLACES PRIOR EVIDENCE DATED:					

PROPERTY INFORMATION

LOCATION/DESCRIPTION
2208 Merced St., Fresno, CA 93721

THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS EVIDENCE OF PROPERTY INSURANCE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

COVERAGE INFORMATION

COVERAGE / PERILS / FORMS	AMOUNT OF INSURANCE
Earthquake excluding Flood, EQSL	\$81,756,000

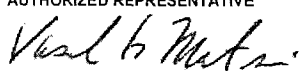
REMARKS (Including Special Conditions)

Empire Indemnity Insurance Company, Policy #BPP1151804, Limits: \$21,317,000;
Everest Indemnity Insurance Company, Policy #8400005717-171, Limits: \$40,000,000;
General Security Indemnity Company of Arizona, Policy #TR0001486-04357-17, Limits: \$20,439,000.
See attached.
Re: Project: Fresno County West Annex Jail, Building No. 606, Address: 2208 Merced St., Fresno, CA
County of Fresno, its officers, officials, employees, agents, Consulting Engineers, and volunteers, individually and collectively, and the State Public Works Board of the State of California (SWPB) and the Board of State and Community Corrections (BSCC) and their respective officers, agents, and employees, individually and collectively, as Loss Payee, but only insofar as the operations under this Agreement are concerned.

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

ADDITIONAL INTEREST

NAME AND ADDRESS State Public Works Board Attention: Executive Director 915 L. Street 9th Floor Sacramento CA 95814	☐	MORTGAGEE	☐	ADDITIONAL INSURED
	☒	LOSS PAYEE		
	LOAN #			
	AUTHORIZED REPRESENTATIVE 			

Fresno County West Annex Jail
Difference in Conditions Coverage
Earthquake excluding Flood, EQSL
Effective December 27, 2017 to June 16, 2020

Carrier	Policy Number	Share	Limits of Liability
Empire Indemnity Insurance Company	BPP1151804	26.07%	\$ 21,317,000
Everest Indemnity Insurance Company	8400005717-171	48.93%	\$ 40,000,000
General Security Indemnity Company of Arizona	TR0001486-04357-17	25.00%	\$ 20,439,000
			\$ 81,756,000

Ag 3

Ag 3

PROJECT West Annex Jail

Contract No. 16-S-04

Contractor Bernards Bros. Inc.

Contact Person Falco DiGiallonardo **Phone No.** 559 420-7505

SURETY COMPANY (Exact Name Style, Home Office Address)

Liberty Mutual Insurance Company

175 Berkeley Street, Boston, MA 02116

AGENT / BROKER

Attorney-in-fact Lisa L. Thornton **Phone No.** 213 443-2440

Firm Alliant Insurance Services, Inc.

Mail Address 333 South Hope Street

City, State, ZIP Los Angeles, CA 90071

CA Dept of Insurance License No. 0C36861 Expires / /
(or attach copy of License)

Owner's use only

Received _____ / _____ / _____ By _____

Surety admitted _____ / _____ / _____

Surety Best's Class _____ Rating _____

Comments



CONTRACT BOND - CALIFORNIA

Bond 024231832

Initial premium charged for this bond is
\$523,736.00 subject to
adjustment upon completion of contract
at applicable rate on final contract price.

KNOW ALL BY THESE PRESENTS, That Bernards Bros. Inc.

of 555 First Street, San Fernando, CA 91340 _____ as Principal,
and the Liberty Mutual Insurance Company _____, a corporation organized and existing
under the laws of the State of MA _____ and authorized to transact surety business in the State of California, as
Surety, are held and firmly bound unto County of Fresno _____

in the sum of Eighty-one Million Seven Hundred Fifty-six Thousand Dollars And Zero Cents
_____ Dollars (\$81,756,000.00),

for the payment whereof, well and truly to be made, said Principal and Surety bind themselves, their heirs, administrators, successors and
assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THE FOREGOING OBLIGATION IS SUCH, That WHEREAS, the above-bounden Principal has entered into a
Contract, dated _____, 2017, with the County of Fresno _____

to do and perform the following work, to-wit:
West Annex Jail, Contract No. 16-S-04

NOW, THEREFORE, if the above-bounden Principal shall faithfully perform all the provisions of said Contract, then this obligation shall
be void; otherwise to remain in full force and effect.

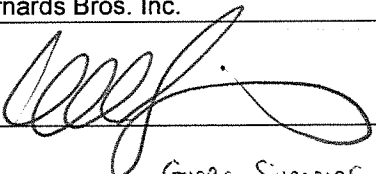
PROVIDED FURTHER THAT, Any suit under this bond must be instituted before the expiration of two (2) years from the date of
substantial completion of the work to be performed under the Contract.

Signed and sealed this 21st day of December, 2017.

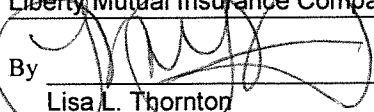


Bernards Bros. Inc.

Principal


Greg Simons, President

Liberty Mutual Insurance Company

By 
Lisa L. Thornton Attorney-in-Fact

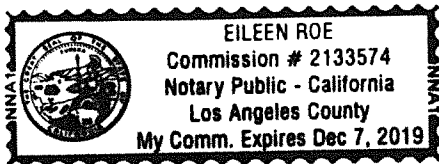
CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT**CIVIL CODE § 1189**

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

State of California)

County of Los Angeles)On 12/27/2017 before me, Eileen Roe, Notary Public,*Date**Here Insert Name and Title of the Officer*personally appeared Greg Simons*Name(s) of Signer(s)*

who proved to me on the basis of satisfactory evidence to be the person~~(s)~~ whose name~~(s)~~ is/~~are~~ subscribed to the within instrument and acknowledged to me that he/~~she/they~~ executed the same in his/~~her/their~~ authorized capacity~~(ies)~~, and that by his/~~her/their~~ signature~~(s)~~ on the instrument the person~~(s)~~, or the entity upon behalf of which the person~~(s)~~ acted, executed the instrument.



I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature

A handwritten signature in cursive script that reads "Eileen Roe".

Signature of Notary Public

Civil Code § 1189

State of California)
) ss
County of Los Angeles)

Patricia Arana, Notary Public



Bond 024231832

CONTRACT BOND - CALIFORNIA

KNOW ALL BY THESE PRESENTS, That we, Bernards Bros. Inc.

and the Liberty Mutual Insurance Company, a corporation organized and existing under the laws of the State of Massachusetts and authorized to transact surety business in the State of California, as Surety, are held and firmly bound unto County of Fresno

, as Oblige, in the sum of Eighty-one Million Seven Hundred Fifty-six Thousand Dollars And Zero Cents Dollars (\$81,756,000.00),

for the payment whereof, well and truly to be made, said Principal and Surety bind themselves, their heirs, administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THE FOREGOING OBLIGATION IS SUCH, That WHEREAS, the above-bounden Principal has entered into a contract, dated _____ day of _____, _____, with the Oblige to do and perform the following work, to-wit: West Annex Jail, Contract No. 16-S-04

NOW, THEREFORE, if the above-bounden Principal or his/her subcontractors fail to pay any of the persons named in Section 9100 of the Civil Code of the State of California, or amounts due under the Unemployment Insurance Code with respect to work or labor performed under the Contract, Surety will pay for the same, in an amount not exceeding the amount specified in this bond, and also, in case suit is brought upon this bond, a reasonable attorney's fee, to be fixed by the court.

This bond shall inure to the benefit of any and all persons, companies or corporations entitled to file claims under Section 9100 of the Civil Code of the State of California, so as to give a right of action to them or their assigns in any suit brought upon this bond.

Signed, sealed and dated this 21st day of December, 2017.

No premium is charged for this bond. It is executed in connection with a bond for the performance of the contract.

Bernards Bros. Inc.

Principal

Greg Simons, President



Liberty Mutual Insurance Company

By

Lisa L. Thornton

Attorney-in-Fact

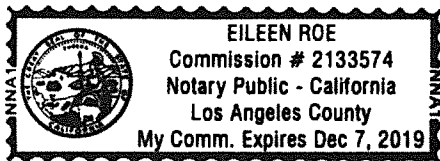
CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT**CIVIL CODE § 1189**

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State of California)

County of Los Angeles)On 12/27/2017 before me, Eileen Roe, Notary Public,*Date**Here Insert Name and Title of the Officer*personally appeared Greg Simons*Name(s) of Signer(s)*

who proved to me on the basis of satisfactory evidence to be the person~~(s)~~ whose name~~(s)~~ is/~~are~~ subscribed to the within instrument and acknowledged to me that he/~~she/they~~ executed the same in his/~~her/their~~ authorized capacity~~(ies)~~, and that by his/~~her/their~~ signature~~(s)~~ on the instrument the person~~(s)~~, or the entity upon behalf of which the person~~(s)~~ acted, executed the instrument.



I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature

A handwritten signature in cursive script that reads 'Eileen Roe'.

Signature of Notary Public

Civil Code § 1189

State of California)
) ss
County of Los Angeles)

Patricia Arana, Notary Public

(Seal)



Interchange Corporate Center
450 Plymouth Road, Suite 400
Plymouth Meeting, PA. 19462-1644
Ph. (610) 832-8240

MAINTENANCE BOND

Bond Number: 024231832

KNOW ALL MEN BY THESE PRESENTS, that we Bernards Bros. Inc.

Bernards Bros. Inc., as principal (the "Principal"),
and Liberty Mutual Insurance Company, a Massachusetts stock insurance company, as surety (the "Surety"), are
held and firmly bound unto County of Fresno

Bernards Bros. Inc., as obligee (the "Obligee"),
in the penal sum of Eight Million One Hundred Seventy Five Thousand Six Hundred and No/100ths
_____ Dollars (\$ 8,175,600.00),
for the payment of which sum well and truly to be made, the Principal and the Surety, bind ourselves, our heirs,
executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has by written agreement dated _____, entered into a contract (the
"Contract") with the Obligor for _____
West Annex Jail, Contract No. 16-S-04
which contract is by reference made a part hereof.

NOW, THEREFORE, the condition of this obligation is such that if the Principal shall remedy without cost to the
Obligee any defect which may develop during a period of one (1) year(s) from the date of completion and
acceptance of the work performed under the Contract, provided such defects are caused by defective or inferior
materials or workmanship, then this obligation shall be null and void; otherwise, it shall be and remain in full force and
effect.

PROVIDED AND SUBJECT TO THE CONDITIONS PRECEDENT:

1. Obligor shall provide both Principal and Surety with written notice of the discovery (Notice of Discovery) of
any item of defective or inferior materials or workmanship during the covered period (a "Covered Item").
Should Principal improperly fail to remedy the Covered Item, then Obligor shall make a written demand
upon the Surety ("Demand") within ninety (90) days of the Obligor's issuance of the Notice of Discovery of
the Covered Item.
2. The Notice of Discovery and the Demand shall be in writing and via certified mail to the Principal and to
the Surety. Notice to the Surety shall be delivered to the attention of the Surety Law Department at the above
address.
3. No suit or action may be commenced by the Obligor against the Surety after the expiration of one (1) year (or
such lesser time period as otherwise permitted by relevant law) from the date of Obligor's discovery of
a Covered Item. If the provision of this paragraph is void or prohibited by law, the minimum period of
limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

DATED as of this 21st day of December, 2017.

WITNESS / ATTEST

Bernards Bros. Inc.

(Principal)

By: _____

Name: Greg Simons

Title: President

(Seal)

LIBERTY MUTUAL INSURANCE COMPANY

(Surety)

By: _____

Lisa L. Thornton Attorney-in-Fact

(Seal)

CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT

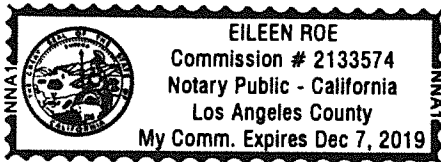
CIVIL CODE § 1189

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

State of California)
County of Los Angeles)

On 12/27/2017 before me, Eileen Roe, Notary Public,
Date Here Insert Name and Title of the Officer
personally appeared Greg Simons
Name(s) of Signer(s)

who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/~~she/they~~ executed the same in his/~~her/their~~ authorized capacity(ies), and that by his/~~her/their~~ signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.



I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature Eileen Roe
Signature of Notary Public

Civil Code § 1189

State of California)
) ss
County of Los Angeles)

Signature:

Patricia Arana, Notary Public

THIS POWER OF ATTORNEY IS NOT VALID UNLESS IT IS PRINTED ON RED BACKGROUND.

This Power of Attorney limits the acts of those named herein, and they have no authority to bind the Company except in the manner and to the extent herein stated.

Certificate No. 7911013

Liberty Mutual Insurance Company
The Ohio Casualty Insurance Company West American Insurance Company

POWER OF ATTORNEY

KNOWN ALL PERSONS BY THESE PRESENTS: That The Ohio Casualty Insurance Company is a corporation duly organized under the laws of the State of New Hampshire, that Liberty Mutual Insurance Company is a corporation duly organized under the laws of the State of Massachusetts, and West American Insurance Company is a corporation duly organized under the laws of the State of Indiana (herein collectively called the "Companies"), pursuant to and by authority herein set forth, does hereby name, constitute and appoint, Noemi Quiroz; E. S. Albrecht, Jr.; Patricia S. Arana; C. K. Nakamura; Maria Pena; Jessica L. Rosser; Jeffrey Strassner; Lisa L. Thornton; Tim M. Tomko; Natalie K. Trofimoff

all of the city of Los Angeles, state of CA each individually if there be more than one named, its true and lawful attorney-in-fact to make, execute, seal, acknowledge and deliver, for and on its behalf as surety and as its act and deed, any and all undertakings, bonds, recognizances and other surety obligations, in pursuance of these presents and shall be as binding upon the Companies as if they have been duly signed by the president and attested by the secretary of the Companies in their own proper persons.

IN WITNESS WHEREOF, this Power of Attorney has been subscribed by an authorized officer or official of the Companies and the corporate seals of the Companies have been affixed thereto this 10th day of October, 2017.



The Ohio Casualty Insurance Company
Liberty Mutual Insurance Company
West American Insurance Company

By: David M. Carey
David M. Carey, Assistant Secretary

STATE OF PENNSYLVANIA ss
COUNTY OF MONTGOMERY

On this 10th day of October, 2017, before me personally appeared David M. Carey, who acknowledged himself to be the Assistant Secretary of Liberty Mutual Insurance Company, The Ohio Casualty Company, and West American Insurance Company, and that he, as such, being authorized so to do, execute the foregoing instrument for the purposes therein contained by signing on behalf of the corporations by himself as a duly authorized officer.

IN WITNESS WHEREOF, I have hereunto subscribed my name and affixed my notarial seal at King of Prussia, Pennsylvania, on the day and year first above written.



COMMONWEALTH OF PENNSYLVANIA
Notarial Seal
Teresa Pastella, Notary Public
Upper Merion Twp., Montgomery County
My Commission Expires March 28, 2021
Member, Pennsylvania Association of Notaries

By: Teresa Pastella
Teresa Pastella, Notary Public

This Power of Attorney is made and executed pursuant to and by authority of the following By-laws and Authorizations of The Ohio Casualty Insurance Company, Liberty Mutual Insurance Company, and West American Insurance Company which resolutions are now in full force and effect reading as follows:

ARTICLE IV – OFFICERS – Section 12. Power of Attorney. Any officer or other official of the Corporation authorized for that purpose in writing by the Chairman or the President, and subject to such limitation as the Chairman or the President may prescribe, shall appoint such attorneys-in-fact, as may be necessary to act in behalf of the Corporation to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations. Such attorneys-in-fact, subject to the limitations set forth in their respective powers of attorney, shall have full power to bind the Corporation by their signature and execution of any such instruments and to attach thereto the seal of the Corporation. When so executed, such instruments shall be as binding as if signed by the President and attested to by the Secretary. Any power or authority granted to any representative or attorney-in-fact under the provisions of this article may be revoked at any time by the Board, the Chairman, the President or by the officer or officers granting such power or authority.

ARTICLE XIII – Execution of Contracts – SECTION 5. Surety Bonds and Undertakings. Any officer of the Company authorized for that purpose in writing by the chairman or the president, and subject to such limitations as the chairman or the president may prescribe, shall appoint such attorneys-in-fact, as may be necessary to act in behalf of the Company to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations. Such attorneys-in-fact subject to the limitations set forth in their respective powers of attorney, shall have full power to bind the Company by their signature and execution of any such instruments and to attach thereto the seal of the Company. When so executed such instruments shall be as binding as if signed by the president and attested by the secretary.

Certificate of Designation – The President of the Company, acting pursuant to the Bylaws of the Company, authorizes David M. Carey, Assistant Secretary to appoint such attorneys-in-fact as may be necessary to act on behalf of the Company to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations.

Authorization – By unanimous consent of the Company's Board of Directors, the Company consents that facsimile or mechanically reproduced signature of any assistant secretary of the Company, wherever appearing upon a certified copy of any power of attorney issued by the Company in connection with surety bonds, shall be valid and binding upon the Company with the same force and effect as though manually affixed.

I, Renee C. Llewellyn, the undersigned, Assistant Secretary, The Ohio Casualty Insurance Company, Liberty Mutual Insurance Company, and West American Insurance Company do hereby certify that the original power of attorney of which the foregoing is a full, true and correct copy of the Power of Attorney executed by said Companies, is in full force and effect and has not been revoked.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed the seals of said Companies this _____ day of _____, 20____.



By: Renee C. Llewellyn
Renee C. Llewellyn, Assistant Secretary

Not valid for mortgage, note, loan, letter of credit, currency rate, interest rate or residual value guarantees.

To confirm the validity of this Power of Attorney call 1-610-832-8240 between 9:00 am and 4:30 pm EST on any business day.



CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

1/11/2018

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER Alliant Insurance Services, Inc. 333 South Hope Street, Suite 3750 Los Angeles CA 90071	CONTACT NAME: Elizabeth Perison PHONE (A/C, No, Ext): 213-270-0995 E-MAIL ADDRESS: Eperison@alliant.com FAX (A/C, No):												
INSURED Bernards Bros. Inc. 555 First St San Fernando, CA 91340	INSURER(S) AFFORDING COVERAGE <table><tr><td>INSURER A: Illinois Union Insurance Company</td><td>NAIC # 27960</td></tr><tr><td>INSURER B: Ironshore Specialty Insurance Co</td><td>25445</td></tr><tr><td>INSURER C: ACE Property & Casualty Ins Co</td><td>20699</td></tr><tr><td>INSURER D: Starr Indemnity and Liability Company</td><td>38318</td></tr><tr><td>INSURER E: Federal Insurance Company</td><td>20281</td></tr><tr><td>INSURER F:</td><td></td></tr></table>	INSURER A: Illinois Union Insurance Company	NAIC # 27960	INSURER B: Ironshore Specialty Insurance Co	25445	INSURER C: ACE Property & Casualty Ins Co	20699	INSURER D: Starr Indemnity and Liability Company	38318	INSURER E: Federal Insurance Company	20281	INSURER F:	
INSURER A: Illinois Union Insurance Company	NAIC # 27960												
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INSURER C: ACE Property & Casualty Ins Co	20699												
INSURER D: Starr Indemnity and Liability Company	38318												
INSURER E: Federal Insurance Company	20281												
INSURER F:													

COVERAGES**CERTIFICATE NUMBER:** 2075747953**REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS
B	☒ COMMERCIAL GENERAL LIABILITY ☐ CLAIMS-MADE ☒ OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: ☐ POLICY ☒ PRO-JECT ☐ LOC OTHER:			AGS0074103	7/1/2017	7/1/2018	EACH OCCURRENCE \$1,000,000 DAMAGE TO RENTED PREMISES (Ea occurrence) \$100,000 MED EXP (Any one person) \$5,000 PERSONAL & ADV INJURY \$1,000,000 GENERAL AGGREGATE \$2,000,000 PRODUCTS - COMP/OP AGG \$2,000,000 \$
E	☒ AUTOMOBILE LIABILITY ☐ ANY AUTO ☐ ALL OWNED AUTOS ☐ HIRED AUTOS ☐ SCHEDULED AUTOS ☐ NON-OWNED AUTOS			54309468	7/1/2017	7/1/2018	COMBINED SINGLE LIMIT (Ea accident) \$1,000,000 BODILY INJURY (Per person) \$ BODILY INJURY (Per accident) \$ PROPERTY DAMAGE (Per accident) \$ \$
D C	☒ UMBRELLA LIAB ☒ EXCESS LIAB DED ☐ RETENTION \$			100023810 XCQ G28135695 002	7/1/2017 7/1/2017	7/1/2018 7/1/2018	EACH OCCURRENCE \$25,000,000 AGGREGATE \$25,000,000 \$
E	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	Y/N ☐	N/A	54309469	7/1/2017	7/1/2018	PER STATUTE E.L. EACH ACCIDENT \$1,000,000 E.L. DISEASE - EA EMPLOYEE \$1,000,000 E.L. DISEASE - POLICY LIMIT \$1,000,000
A	Professional/Pollution Liability			GOOG27055187005	10/1/2017	10/1/2018	Per Occurrence \$10,000,000 Aggregate \$10,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

Re: Fresno Jail project

The County of Fresno, its officers, officials, employees, agents, Consulting Engineers, and volunteers, individually and collectively, and the State Public Works Board of the State of California (SWPB) and the Board of State and Community Corrections (BSCC) and their respective officers, agents, and employees, individually and collectively are included as Additional Insured as respects Liability arising out of work performed by the Named Insured. The insurance provided shall be primary and any other insurance maintained by the Additional Insured is excess and non-contributory. Waiver of Subrogation applies as required by contract. Thirty (30) Days Notice of Cancellation / Non-Renewal - Ten (10) Days Notice For Non-Payment of Premium. Umbrella Liability is follow form.

CERTIFICATE HOLDER**CANCELLATION**

The County of Fresno
2220 Tulare Street, 7th Floor
Fresno CA 93721

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

© 1988-2014 ACORD CORPORATION. All rights reserved.

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

**ADDITIONAL INSURED – OWNERS, LESSEES OR
CONTRACTORS – SCHEDULED PERSON OR
ORGANIZATION**

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART

SCHEDULE

Name Of Additional Insured Person(s) Or Organization(s)	Location(s) Of Covered Operations
As required by written contract. If required by your agreement with such Additional Insured.	
The inclusion of one or more Insured(s) under the terms of this endorsement does not increase our limits of liability.	
All other terms and conditions remain unchanged.	
Information required to complete this Schedule, if not shown above, will be shown in the Declarations.	

- A. Section II – Who Is An Insured** is amended to include as an additional insured the person(s) or organization(s) shown in the Schedule, but only with respect to liability for "bodily injury", "property damage" or "personal and advertising injury" caused, in whole or in part, by:
1. Your acts or omissions; or
 2. The acts or omissions of those acting on your behalf;

in the performance of your ongoing operations for the additional insured(s) at the location(s) designated above.

However:

1. The insurance afforded to such additional insured only applies to the extent permitted by law; and

2. If coverage provided to the additional insured is required by a contract or agreement, the insurance afforded to such additional insured will not be broader than that which you are required by the contract or agreement to provide for such additional insured.

B. With respect to the insurance afforded to these additional insureds, the following additional exclusions apply:

This insurance does not apply to "bodily injury" or "property damage" occurring after:

1. All work, including materials, parts or equipment furnished in connection with such work, on the project (other than service, maintenance or repairs) to be performed by or on behalf of the additional insured(s) at the location of the covered operations has been completed; or
2. That portion of "your work" out of which the injury or damage arises has been put to its intended use by any person or organization other than another contractor or subcontractor engaged in performing operations for a principal as a part of the same project.

C. With respect to the insurance afforded to these additional insureds, the following is added to **Section III – Limits Of Insurance:**

If coverage provided to the additional insured is required by a contract or agreement, the most we will pay on behalf of the additional insured is the amount of insurance:

1. Required by the contract or agreement; or

2. Available under the applicable Limits of Insurance shown in the Declarations; whichever is less.

This endorsement shall not increase the applicable Limits of Insurance shown in the Declarations.

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

ADDITIONAL INSURED – OWNERS, LESSEES OR CONTRACTORS – COMPLETED OPERATIONS

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART
PRODUCTS/COMPLETED OPERATIONS LIABILITY COVERAGE PART

SCHEDULE

Name Of Additional Insured Person(s) Or Organization(s)	Location And Description Of Completed Operations
As required by written contract.	The insurance afforded by this policy for the benefit of the additional insured does not apply to 'property damage' to any building, structure or appurtenant structure intended to be occupied as a 'private residence'. The term "private residence" includes single family homes or residences, multi-family homes or residences. Apartments are not considered "private residences."
The inclusion of one or more Insured(s) under the terms of this endorsement does not increase our limits of liability.	
All other terms and conditions remain unchanged.	
Information required to complete this Schedule, if not shown above, will be shown in the Declarations.	

A. Section II – Who Is An Insured is amended to include as an additional insured the person(s) or organization(s) shown in the Schedule, but only with respect to liability for "bodily injury" or "property damage" caused, in whole or in part, by "your work" at the location designated and described in the Schedule of this endorsement performed for that additional insured and included in the "products-completed operations hazard".

However:

1. The insurance afforded to such additional insured only applies to the extent permitted by law; and

2. If coverage provided to the additional insured is required by a contract or agreement, the insurance afforded to such additional insured will not be broader than that which you are required by the contract or agreement to provide for such additional insured.

B. With respect to the insurance afforded to these additional insureds, the following is added to **Section III – Limits Of Insurance:**

If coverage provided to the additional insured is required by a contract or agreement, the most we will pay on behalf of the additional insured is the amount of insurance:

1. Required by the contract or agreement; or
2. Available under the applicable Limits of Insurance shown in the Declarations;
whichever is less.

This endorsement shall not increase the applicable Limits of Insurance shown in the Declarations.

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

PRIMARY AND NONCONTRIBUTORY – OTHER INSURANCE CONDITION

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART
PRODUCTS/COMPLETED OPERATIONS LIABILITY COVERAGE PART

The following is added to the **Other Insurance** Condition and supersedes any provision to the contrary:

Primary And Noncontributory Insurance

This insurance is primary to and will not seek contribution from any other insurance available to an additional insured under your policy provided that:

(1) The additional insured is a Named Insured under such other insurance; and

(2) You have agreed in writing in a contract or agreement that this insurance would be primary and would not seek contribution from any other insurance available to the additional insured.

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

WAIVER OF TRANSFER OF RIGHTS OF RECOVERY AGAINST OTHERS TO US

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART
PRODUCTS/COMPLETED OPERATIONS LIABILITY COVERAGE PART

SCHEDULE

Name Of Person Or Organization:

As Required by Written Contract

Information required to complete the Schedule, if not shown above, will be shown in the Declarations.

The following is added to Paragraph 8. **Transfer
Of Rights Of Recovery Against Others To Us** of
Section IV – Conditions:

We waive any right of recovery we may have against the person or organization shown in the Schedule above because of payments we make for injury or damage arising out of your ongoing operations or "your work" done under a contract with that person or organization and included in the "products-completed operations hazard". This waiver applies only to the person or organization shown in the Schedule above.

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

DESIGNATED INSURED

This endorsement modifies insurance provided under the following:

BUSINESS AUTO COVERAGE FORM
GARAGE COVERAGE FORM
MOTOR CARRIER COVERAGE FORM
TRUCKERS COVERAGE FORM

With respect to coverage provided by this endorsement, the provisions of the Coverage Form apply unless modified by this endorsement.

This endorsement identifies person(s) or organization(s) who are "insureds" under the Who Is An Insured Provision of the Coverage Form. This endorsement does not alter coverage provided in the Coverage Form.

This endorsement changes the policy effective on the inception date of the policy unless another date is indicated below.

Endorsement Effective: 7/1/2017	Countersigned By: (Authorized Representative)
Named Insured: Bernards Bros. Inc.	

SCHEDULE

Name of Person(s) or Organization(s): WHERE REQUIRED BY WRITTEN CONTRACT.

(If no entry appears above, information required to complete this endorsement will be shown in the Declarations as applicable to the endorsement.)

Each person or organization shown in the Schedule is an "insured" for Liability Coverage, but only to the extent that person or organization qualifies as an "insured" under the Who Is An Insured Provision contained in **Section II** of the Coverage Form.

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

WAIVER OF TRANSFER OF RIGHTS OF RECOVERY AGAINST OTHERS TO US (WAIVER OF SUBROGATION)

This endorsement modifies insurance provided under the following:

AUTO DEALERS COVERAGE FORM
BUSINESS AUTO COVERAGE FORM
MOTOR CARRIER COVERAGE FORM

With respect to coverage provided by this endorsement, the provisions of the Coverage Form apply unless modified by the endorsement.

This endorsement changes the policy effective on the inception date of the policy unless another date is indicated below.

Named Insured: Bernards Bros. Inc.

Endorsement Effective Date: 7/1/2017

SCHEDULE

Name(s) Of Person(s) Or Organization(s):

WHERE REQUIRED BY WRITTEN CONTRACT.

Information required to complete this Schedule, if not shown above, will be shown in the Declarations.

The **Transfer Of Rights Of Recovery Against Others To Us** condition does not apply to the person(s) or organization(s) shown in the Schedule, but only to the extent that subrogation is waived prior to the "accident" or the "loss" under a contract with that person or organization.

WORKERS' COMPENSATION AND EMPLOYERS' LIABILITY INSURANCE POLICY

WC 99 03 04 (Ed. 7- 08)

WAIVER OF OUR RIGHT TO RECOVER FROM OTHERS ENDORSEMENT— CALIFORNIA

This endorsement changes the policy to which it is attached effective on the inception date of the policy unless a different date is indicated below.

(The following "attaching clause" need to be completed only when this endorsement is issued subsequent to preparation of the policy.)

This endorsement, effective on 7/1/2017 at 12:01 A. M. standard time, forms a part of
(DATE)
Policy No. 54309469 of the Federal Insurance Company
(NAME OF INSURANCE COMPANY)

issued to Bernards Bros. Inc.

Endorsement No. _____

Authorized Representative

We have the right to recover our payments from anyone liable for an injury covered by this policy. We will not enforce our right against the person or organization named in the Schedule. The additional premium for the blanket waiver offered by this endorsement shall be 0.00 % of total California premium.

Schedule

Person or Organization

Job Description

WHERE REQUIRED BY WRITTEN CONTRACT.



CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

1/8/2018

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER Los Angeles-Alliant Insurance Services, Inc. 333 S Hope St Ste 3750 Los Angeles CA 90071	CONTACT NAME: Elizabeth Perison PHONE (A/C, No, Ext): E-MAIL ADDRESS: Eperison@alliant.com	FAX (A/C, No):
INSURER(S) AFFORDING COVERAGE		NAIC #
INSURER A : Int'l Ins Co. of Hannover U.K.		
INSURER B : Underwriters At Lloyds London		15792
INSURER C : ALLIED WORLD ASSUR CO US INC		54
INSURER D : Fireman's Fund Insurance Company		21873
INSURER E : Swiss Re International SE		25364
INSURER F : ACE Property & Casualty Ins Co		20699

COVERAGES

CERTIFICATE NUMBER: 2133330946

REVISION NUMBER:

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS
A B	☒ COMMERCIAL GENERAL LIABILITY ☐ CLAIMS-MADE ☒ OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: ☐ POLICY ☒ PRO-JECT ☐ LOC ☐ OTHER:			CC1700389 CC1700389	1/8/2018 1/8/2018	6/15/2020 6/15/2020	EACH OCCURRENCE \$ 2,000,000 DAMAGE TO RENTED PREMISES (Ea occurrence) \$ 100,000 MED EXP (Any one person) \$ EXCLUDED PERSONAL & ADV INJURY \$ 4,000,000 GENERAL AGGREGATE \$ 4,000,000 PRODUCTS - COMP/OP AGG \$ 4,000,000 \$
	AUTOMOBILE LIABILITY ☐ ANY AUTO ☐ ALL OWNED AUTOS ☐ SCHEDULED AUTOS ☐ HIRED AUTOS ☐ NON-OWNED AUTOS						COMBINED SINGLE LIMIT (Ea accident) \$ BODILY INJURY (Per person) \$ BODILY INJURY (Per accident) \$ PROPERTY DAMAGE (Per accident) \$ \$
T I M E	UMBRELLA LIAB ☒ OCCUR EXCESS LIAB ☐ CLAIMS-MADE DED ☐ RETENTION \$			0311-1398 SHX 00024661092 MH 97333.1 XCQ G46855838 001	1/8/2018 1/8/2018 1/8/2018	6/15/2020 6/15/2020 6/15/2020	EACH OCCURRENCE \$ 48,000,000 AGGREGATE \$ 48,000,000 \$
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	Y / N ☐ N / A					PER STATUTE ☐ OTH-ER ☐ E.L. EACH ACCIDENT \$ E.L. DISEASE - EA EMPLOYEE \$ E.L. DISEASE - POLICY LIMIT \$

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

RE: Project Name: West Annex Jail . Project Site: 2208 Merced Street, Fresno, CA 93721.
County of Fresno, its officers, officials, employees, agents, Consulting Engineers, and volunteers, individually and collectively, and the State Public Works Board of the State of California (SWPB) and the Board of State and Community Corrections (BSCC) and their respective officers, agents, employees, individually and collectively are included as Named Insureds. Insurance provided is Primary and any other insurance is secondary and non-contributory. Coverage is non-cancellable, except for 10 days NOC for non-payment of premium and 30 days NOC for fraud or material misrepresentation, or failure to comply with loss control/safety/claims.

CERTIFICATE HOLDER**CANCELLATION**

County of Fresno
2220 Tulare Street
Fresno CA 93721

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

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EVIDENCE OF PROPERTY INSURANCE

DATE (MM/DD/YYYY)

1/11/2018

THIS EVIDENCE OF PROPERTY INSURANCE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE ADDITIONAL INTEREST NAMED BELOW. THIS EVIDENCE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS EVIDENCE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE ADDITIONAL INTEREST.

AGENCY Alliant Insurance Services, Inc. 333 South Hope Street, Suite 3750 Los Angeles, CA 90071		PHONE (A/C, No, Ext): 213-270-0995		COMPANY See Attached	
FAX (A/C, No):		E-MAIL ADDRESS: Eperison@alliant.com			
CODE:		SUB CODE:			
AGENCY CUSTOMER ID #:					
INSURED Bernards Bros. Inc. 555 First St San Fernando, CA 91340		LOAN NUMBER		POLICY NUMBER See Attached	
		EFFECTIVE DATE 12/27/2017		EXPIRATION DATE 06/16/2020	
				☐ CONTINUED UNTIL TERMINATED IF CHECKED	
THIS REPLACES PRIOR EVIDENCE DATED:					

PROPERTY INFORMATION

LOCATION/DESCRIPTION
2208 Merced St., Fresno, CA 93721

THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS EVIDENCE OF PROPERTY INSURANCE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

COVERAGE INFORMATION

COVERAGE / PERILS / FORMS	AMOUNT OF INSURANCE	DEDUCTIBLE
Earthquake excluding Flood, EQSL	\$81,756,000	5%

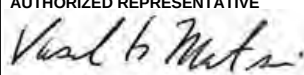
REMARKS (Including Special Conditions)

Empire Indemnity Insurance Company, Policy #BPP1151804, Limits: \$21,317,000;
Everest Indemnity Insurance Company, Policy #8400005717-171, Limits: \$40,000,000;
General Security Indemnity Company of Arizona, Policy #TR0001486-04357-17, Limits: \$20,439,000.
See attached.
Re: Project: Fresno County West Annex Jail, Building No. 606, Address: 2208 Merced St., Fresno, CA
County of Fresno, its officers, officials, employees, agents, Consulting Engineers, and volunteers, individually and collectively, and the State Public Works Board of the State of California (SWPB) and the Board of State and Community Corrections (BSCC) and their respective officers, agents, and employees, individually and collectively, as Loss Payee, but only insofar as the operations under this Agreement are concerned.

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

ADDITIONAL INTEREST

NAME AND ADDRESS The County of Fresno 2220 Tulare Street, 7th Floor Fresno CA 93721	MORTGAGEE	ADDITIONAL INSURED
	X LOSS PAYEE	
	LOAN #	
AUTHORIZED REPRESENTATIVE 		

Fresno County West Annex Jail
Difference in Conditions Coverage
Earthquake excluding Flood, EQSL
Effective December 27, 2017 to June 16, 2020

Carrier	Policy Number	Share	Limits of Liability
Empire Indemnity Insurance Company	BPP1151804	26.07%	\$ 21,317,000
Everest Indemnity Insurance Company	8400005717-171	48.93%	\$ 40,000,000
General Security Indemnity Company of Arizona	TR0001486-04357-17	25.00%	<u>\$ 20,439,000</u>
			\$ 81,756,000

SURETY VERIFICATION

(Complete and return with Performance, Payment and Warranty Bonds)

PROJECT West Annex Jail

Contract No. 16-S-04

Contractor Bernards Bros. Inc.

Contact Person Falco DiGiallonardo

Phone No. 559 420-7505

SURETY COMPANY (Exact Name Style, Home Office Address)

Liberty Mutual Insurance Company

175 Berkeley Street, Boston, MA 02116

AGENT / BROKER

Attorney-in-fact Lisa L. Thornton

Phone No. 213 443-2440

Firm Alliant Insurance Services, Inc.

Mail Address 333 South Hope Street

City, State, ZIP Los Angeles, CA 90071

CA Dept of Insurance License No. 0C36861

Expires / /

(or attach copy of License)

Owner's use only

Received 01 / 04 / 2018 By Muxa

Surety admitted 08 / 30 / 1929

Surety Best's Class XV Rating A

Comments