SPECIFICATIONS

AMERICAN AVENUE DISPOSAL SITE

MODULES 7 & 8 EXCAVATION AND LINER SYSTEM CONSTRUCTION

BUDGET / ACCOUNT: 9026 / 8150

Department of Public Works and Planning

CONTRACT NO. 16-22-SW

County of Fresno

DEPARTMENT OF PUBLIC WORKS AND PLANNING
STEVEN E. WHITE, DIRECTOR

March 6, 2017

ADDENDUM NO. 2 to the Bidding and Contract Documents for Contract No. 16-22-SW American Avenue Disposal Site (AADS) Modules 7 & 8 Excavation and Liner System Construction, American Avenue Disposal Site Modules 7 & 8 Excavation and Liner System Construction, revising the Bidding and Contract Documents as follows:

SPECIAL PROVISIONS

ADD THE FOLLOWING PARAGRAPH TO SECTION 10-1.02 CONSTRUCTION SITE MANAGEMENT UNDER SUBMITTALS:

4. Within 10 days after contract approval, the Contractor shall submit one hard copy and one electronic copy of a project specific Water Pollution Control Plan, addressing the requirements of the construction site management section of these Specifications.

ADD THE FOLLOWING PARAGRAPH TO SECTION 10-1.02 CONSTRUCTION SITE MANAGEMENT UNDER PAYMENT:

The preparation of the water pollution control plan is included in the contract lump sum price paid for construction site management, which includes full compensation for furnishing all labor, materials, tools, equipment and incidentals and for doing all the work involved in preparing, obtaining approval of from the County, any amendments to the water pollution control plan, and inspecting water pollution control practices as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

END OF ADDENDUM NO. 2

Attachments:
Supplemental Information

Please attach this Addendum to the inside cover of the Specifications booklet. If you have given the Bidding and Contract Documents to someone else, please forward this Addendum.

REGISTERED PROFESSIONAL ENGINEER
DALE A. SIEMER
No. 59670
Exp. 12-31-17
CIVIL
STATE OF CALIFORNIA

3/6/17
Date Signed

Supervising Engineer: _____
Dale Siemer, PE C59670
Lic. Expiration: 12/31/17

FRESNO COUNTY
Department of Public Works and Planning
m/a 2220 Tulare Street, Suite 720
Fresno, CA 93721-2106

SUPPLEMENTAL INFORMATION – Not Part of the Contract Documents

The following list is comprised of paraphrased questions submitted by potential bidders or sub-bidders in writing via facsimile, email, or letter. These paraphrased questions and associated responses are not part of the contract documents and shall have no bearing whatsoever on the interpretation of the Standard Specifications, the Standard Plans, the Special Provisions, or the Plans. Nor shall they have any bearing whatsoever on the interpretation of other publications referenced therein.

1. **Question**: Will the contractor be required to develop their own SWPPP plan and acquire a separate permit through the County? Or is it acceptable that the Contractor performing the work could work under the landfills current SWPPP permit?

   Response:
   A SWPPP is not necessary. However, Section 05-1.13 "Relations with California Regional Water control Board" states that the Contractor will be required to identify and implement best management practices in accordance with the provisions and requirements of Section 10-1.02 "Construction Site Management." A water pollution control plan is required per Section 10-1.02.

County of Fresno

DEPARTMENT OF PUBLIC WORKS AND PLANNING
STEVEN E. WHITE, DIRECTOR

February 24, 2017

ADDENDUM NO. 1 to the Bidding and Contract Documents for Contract No. 16-22-SW, American Avenue Disposal Site Modules 7 & 8 Excavation and Liner System Construction, revising the Bidding and Contract Documents as follows:

PROPOSAL

DELETE: PROPOSAL 2.0

REPLACE WITH: PROPOSAL 2.1

END OF ADDENDUM NO. 1

Attachments:
Proposal 2.1
Supplemental Information

Please attach this Addendum to the inside cover of the Specifications booklet. If you have given the Bidding and Contract Documents to someone else, please forward this Addendum.

REGISTERED PROFESSIONAL ENGINEER
DALE A. SIEMER
No. 59670
Exp. 12-31-17
CIVIL
STATE OF CALIFORNIA

2/24/17
Date Signed

Supervising Engineer: _____
Dale Siemer, PE C59670
Lic. Expiration: 12/31/17

FRESNO COUNTY
Department of Public Works and Planning
m/a 2220 Tulare Street, Suite 720
Fresno, CA 93721-2106

SUPPLEMENTAL INFORMATION – Not Part of the Contract Documents

The following list is comprised of paraphrased questions submitted by potential bidders or sub-bidders in writing via facsimile, email, or letter. These paraphrased questions and associated responses are not part of the contract documents and shall have no bearing whatsoever on the interpretation of the Standard Specifications, the Standard Plans, the Special Provisions, or the Plans. Nor shall they have any bearing whatsoever on the interpretation of other publications referenced therein.

1. **Question**: After digitizing the .tiff file provided on 2/21/2017, we have found 1,250,000 cubic yards of excavation in Modules 7 & 8. Please confirm that the final pay quantity for bid item 9(F) will be only 1,150,000 cubic yards.

   Response:
   See Addendum No. 1.

COUNTY OF FRESNO
DEPARTMENT OF PUBLIC WORKS AND PLANNING
PROJECT: AMERICAN AVENUE DISPOSAL SITE
PHASE III - MODULES 7 & 8 EXCAVATION AND LINER CONSTRUCTION

CONTRACT NO: 16-22-SW

ITEM No.	QUANTITY	F/S	UNIT OF MEASURE	ITEM	ITEM PRICE	TOTAL PRICE
1	220,000		$	SUPPLEMENTAL WORK	$1.00	$220,000.00
2	20,000		$	SUPPLEMENTAL WORK (SPECIAL STOCKPILING)	$1.00	$20,000.00
3	70,000		$	SUPPLEMENTAL WORK (SPECIAL TRAFFIC HANDLING AND OPERATIONS)	$1.00	$70,000.00
4	10,000		$	SUPPLEMENTAL WORK (SPECIAL COORDINATION)	$1.00	$10,000.00
5	1		LS	CONSTRUCTION SITE MANAGEMENT		
6	1		LS	TRAFFIC CONTROL SYSTEM		
7	1		LS	CLEARING AND GRUBBING		
8	17,000		SY	UNSUITABLE MATERIAL		
9	1,238,000	F	CY	MODULE EXCAVATION		
10	170,000	F	SY	SUBGRADE PREPARATION		
11	1		LS	FINISH PROJECT SITE		
12	2,500		LF	PERFORATED HDPE PIPE, 6"		
13	140		LF	PERFORATED HDPE PIPE, 10"		
14	1,100		LF	NON-PERFORATED HDPE PIPE, 6"		
15	1,000		LF	NON-PERFORATED HDPE PIPE, 10"		
16	1,540,000	F	SF	GEOSYNTHETIC CLAY LINER		
17	1,560,000	F	SF	HDPE GEOMEMBRANE		
18	1,540,000	F	SF	GEONET		
19	1,540,000	F	SF	GEOTEXTILE (10 OZ)		
20	170		EA	PROTECTIVE PLYWOOD COVER		
21	115,000	F	CY	OPERATIONS LAYER		
22	1		LS	LEACHATE METERING PIPE & FITTINGS		
23	24		EA	STEEL PIPE BOLLARD		
24	6	F	CY	CLASS 3 CONCRETE (SLAB)		
25	2		EA	FURNISH AND INSTALL SUMP CONTROL PANEL BACKBOARD AND HARDWARE		
26	1,600	F	CY	PERMEABLE MATERIAL		
27	1	S	LS	GEOELECTRIC LEAK DETECTION		
28	1		LS	MOBILIZATION		
TOTAL BID (ITEMS 1 - 28)						

F - Final Pay Item
S - Specialty Item

AMERICAN AVENUE DISPOSAL SITE PHASE III
MODULES 7 & 8 EXCAVATION AND LINER SYSTEM CONSTRUCTION

Adopted by the Fresno County Board of Supervisors, February 7, 2017

Brian Pacheco, Chairman	1st District
Sal Quintero, Vice Chairman	3rd District
Andreas Borgeas	2nd District
Ernest Buddy Mendes	4th District
Nathan Magsig	5th District

Jean Rousseau, County Administrative Officer

Steven E. White, Director
Department of Public Works and Planning

REGISTERED PROFESSIONAL ENGINEER
DALE A. SIEMER
No. 59670
Exp. 12-31-17
CIVIL
STATE OF CALIFORNIA

Date Signed: 2/3/17

Supervising Engineer: _____

Dale Siemer PE C59670
Lic. Expiration: 12/31/17

FRESNO COUNTY
Department of Public Works and Planning
m/a 2220 Tulare Street, Suite 720
Fresno, CA 93721-2106

Contract Number 16-22-SW

T A B L E O F C O N T E N T S

BOARD OF SUPERVISORS COUNTY OF FRESNO STATE OF CALIFORNIA

N O T I C E T O B I D D E R S

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

2:00 P.M. (1400 hours and 00 seconds)
Thursday, March 9, 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 project specifications therefor, to which special reference is made as follows:

AMERICAN AVENUE DISPOSAL SITE PHASE III

MODULES 7 & 8 EXCAVATION AND LINER SYSTEM CONSTRUCTION

CONTRACT NUMBER: 16-22-SW

The work to be done consists, in general, of the excavation of Modules 7 & 8, installation of a composite liner system consisting of geosynthestics over a geosynthetic clay liner, and the performance of a geoelectric leak detection survey. It also includes but is not limited to the installation of Modules 7 & 8 sump liner system, riser pipes, clean out pipes, leachate meter runs and all miscellaneous work associated with the installation of these items. Clearing and grubbing is to be performed and the project site is to be finished. Other items or details not mentioned herein that are required by the plans, Standard Specifications or these special provisions shall be performed, constructed, furnished or installed.

A mandatory pre-bid meeting is scheduled for 10:00 a.m., on February 22, 2017, at the project site (18950 W American Ave, Kerman, CA 93630). A discussion of the project will be held and the project site will be open for examination. This meeting will inform bidders of project requirements and subcontractors of subcontracting and material supply opportunities. Any bid submitted by a prime contractor who does not attend this meeting will be considered non-responsive.

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 Section 7 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, Department of Social Services, Employment Resource Center. For questions regarding the incentive program, contact the Employment Resource Center at (559) 600-5370.

Planholder and exchange/publication names may be obtained from the Fresno County website at **http://www.co.fresno.ca.us/planholders**.

Electronic copies, in ".pdf" file format, of the official project plans and specifications, and such additional supplemental project information as may be provided, are available to view, download, and print at **http://www.co.fresno.ca.us/planholders**.

Bid books, which contain bid proposal sheets necessary to submit a bid, may be obtained at no charge by sending a request to DesignServices@co.fresno.ca.us. Upon receipt of the request, a bid book will be mailed to the requestor via First Class United States Mail and the requestor will then be listed as a planholder for the project.

Project plans and specifications will not be sold to prospective bidders in hardcopy format except upon special written request to DesignServices@co.fresno.ca.us. Payment therefor will be **$40** for each set of full size plans and **$40** for each set of specifications.

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

All questions regarding this project shall be in writing and shall be received by the Department of Public Works and Planning, Design Division, no later than 2:00 P.M. on the seventh (7th) calendar day before bid opening. Any questions received after this deadline will not receive a response unless the Department of Public Works and Planning elects to issue an addendum to revise the bid opening date. In the event that the bid opening date is revised, the deadline for questions will be extended to no later than 2:00 P.M. on the seventh (7th) calendar day before the revised bid opening date. Questions shall be submitted on the "CONTRACTOR REQUEST FOR CLARIFICATION" form provided in the "Project Details" section of these project specifications. Fax questions to (559) 455-4609; e-mail to DesignServices@co.fresno.ca.us or mail to:

County of Fresno
Department of Public Works and Planning
2220 Tulare Street, Sixth Floor
Fresno, Ca. 93721-2104

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

Any oral explanation or interpretations given to this project are not binding.

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

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

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

Pursuant to Section 1773 of the Labor Code, the general prevailing wage rates in the county, or counties, in which the work is to be done have been determined by the Director of

the California Department of Industrial Relations. These wages are set forth in the General Prevailing Wage Rates for this project, available at County of Fresno, Department of Public Works and Planning, 2220 Tulare Street, Sixth Floor, Fresno CA 93721-2104 and available from the California Department of Industrial Relations' Internet web site at http://www.dir.ca.gov/DLSR/PWD. Future effective general prevailing wage rates, which have been predetermined and are on file with the California Department of Industrial Relations are referenced but not printed in the general prevailing wage rates.

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

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

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

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

Bids are required for the entire work described herein. Bids will be compared on the basis of the total of bid items.

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. Each bond specified in this Notice (bid bond, faithful performance bond and payment bond) shall meet the requirements of all applicable statutes, including but not limited to those specified in Public Contract Code section 20129 and Civil Code section 3248.

Each bond specified in this Notice shall be issued by a surety company designated as an admitted surety insurer in good standing with and authorized to transact business in this state by the California Department of Insurance, and acceptable to the County of Fresno. Bidders are cautioned that representations made by surety companies will be verified with the California 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 **A** and 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.

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

Board of Supervisors, County of Fresno

Jean Rousseau, County Administrative Officer

Approved by Board of Supervisors: February 7, 2017 By: Bernice E. Seidel, Clerk to the Board

Issue Date: February 7, 2017

Board of Supervisors County of Fresno State of California

S P E C I A L P R O V I S I O N S

AMERICAN AVENUE DISPOSAL SITE PHASE III
MODULES 7 & 8 EXCAVATION AND LINER SYSTEM CONSTRUCTION

CONTRACT NO. 16-22-SW

SECTION 1 – SPECIFICATIONS AND PLANS

The work embraced herein shall be done in accordance with the Standard Specifications dated May 2006 and with the Standard Plans dated May 2006, of the State of California, Department of Transportation insofar as the same may apply and in accordance with the following special provisions.

Amendments to the Standard Specifications shall not apply except to the extent, if any, set forth as “Amendments to the State of California, Department of Transportation May 2006 Standard Specifications” in the “Project Details” Section of these special provisions or as otherwise set forth elsewhere in these special provisions.

Amendments to the Standard Specifications set forth in these special provisions shall be considered as part of the Standard Specifications for the purposes set forth in Section 5-1.04, "Coordination and Interpretation of Plans, Standard Specifications and Special Provisions," of the Standard Specifications. Whenever either the term "Standard Specifications is amended" or the term "Standard Specifications are amended" is used in the special provisions, the indented text or table following the term shall be considered an amendment to the Standard Specifications.

In case of conflict between the Standard Specifications and these special provisions, the special provisions shall take precedence over and be used in lieu of such conflicting portions.

For the purpose of this contract, the following terms or pronouns in place of them, used throughout the Standard Specifications and defined in Section I, “Definitions and Terms,” of the Standard Specifications, shall be as follows:

TERM	INTERPRETATION
(A) State	County of Fresno.
(B) Department	The Fresno County Board of Supervisors.
(C) Director	Chairman of the Board of the Fresno County Board of Supervisors.
(D) Engineer	Director of the Department of Public Works and Planning of Fresno County, acting either directly or through properly authorized agents, such agents acting within the scope of the particular duties entrusted to them.

(E) Department of Transportation	Fresno County Department of Public Works and Planning.
(F) Contractor	The person or persons, co-partnership or corporation, private or municipal, who have entered into a contract with Fresno County as party or parties of the second part, or his or her legal representatives.
(G) County's material testing laboratory	The person or persons, co-partnership or corporation, private or municipal, who have entered into a contract with Fresno County to perform materials testing services.

SECTION 2 – PROPOSAL REQUIREMENTS AND CONDITIONS

02-1.01 GENERAL

The bidder's attention is directed to the provisions in Section 2, "Proposal Requirements and Conditions," of the Standard Specifications and these special provisions for the requirements and conditions which the bidder must observe in the preparation of and the submission of the bid.

The bidder's bond shall be properly filled out and executed.

In conformance with Public Contract Code Section 7106, a Noncollusion Affidavit is included in the Proposal forms.

A firm that has provided architectural or engineering services to the County of Fresno for this contract before bid submittal for this contract is prohibited from any of the following:

1. Submit a bid
2. Subcontract for a part of the work
3. Supply materials

02-1.02 WITHDRAWAL OF PROPOSALS - Requests to withdraw proposals shall be in accordance with the provisions in Section 2-1.08, "Withdrawal of Proposals," of the Standard Specifications and these special provisions. The written request to withdraw the proposal, executed by the bidder or the bidder's duly authorized representative, shall include the name of the individual authorized to receive the withdrawn proposal, and said individual shall be required to present photo identification prior to withdrawing the proposal.

02-1.03 DISCLOSURE OF SELF-DEALING TRANSACTIONS - This provision is only applicable if the contractor is operating as a corporation (a for-profit or non-profit corporation) or if during the term of this agreement, the contractor changes its status to operate as a corporation.

Members of the contractor's Board of Directors shall disclose any self-dealing transactions that they are a party to while contractor is providing goods or performing services under this agreement. A self-dealing transaction shall mean a transaction to which the contractor is a party and in which one or more of its

directors has a material financial interest. Members of the Board of Directors shall disclose any self-dealing transactions that they are a party to by completing and signing a Self-Dealing Transaction Disclosure Form which is included in the “Project Details” Section of these special provisions.

In the event that the Contractor (to whom the project is awarded) is operating as a corporation or incorporates during the course of the construction contract, and any member of its board of directors is engaged or intends to become engaged in self-dealing transaction(s), each member of its board of directors who is engaged or intends to become engaged in a self-dealing transaction or transactions must complete and submit to the County a completed Self-Dealing Transaction Disclosure Form (in Project Details) for each such transaction prior to engaging therein or immediately thereafter.

SECTION 3 – AWARD AND EXECUTION OF CONTRACT

The bidder's attention is directed to the provisions in Section 3, "Award and Execution of Contract," of the Standard Specifications for the requirements and conditions concerning award and execution of the contract. Award shall be made to the lowest responsible bidder within 54 days after opening of proposals, subject to extension for such further period as may be agreed upon between the Fresno County Board of Supervisors and the bidder concerned.

SECTION 4 – BEGINNING OF WORK, TIME OF COMPLETION, LIQUIDATED DAMAGES

Attention is directed to the Provisions in Section 8-1.03 "Beginning of Work," to Section 8-1.06 "Time of Completion," and to Section 8-1.07 "Liquidated Damages," of the Standard Specifications and these special provisions.

Time is of the essence in constructing this project. Be prepared to begin work at the project site no later than the 20th business day after award of the Contract by the Department.

The Engineer may issue a notice to proceed as soon as the Contracts, including bonds and insurance certificates, have been approved.

Start work on the day shown in the notice to proceed, unless an early start has been approved.

The Engineer may issue a notice of commencement of contract time if you fail to provide Contracts, including bonds and insurance certificates or other required documents timely.

A notice of commencement of contract time does not authorize you to start work on the project site, but contract time begins to elapse on the date shown in the notice of commencement of contract time.

Complete work before the expiration of

ONE HUNDRED AND FORTY (140) WORKING DAYS

from the date shown in said Notice to Proceed, or in the Notice of Commencement of Contract Time, whichever comes first.

Complete all work, including corrective work and punch list work, prior to the expiration of the allotted working days. Working days continue to accrue until corrective work and punch list work is completed and accepted.

The Contractor shall pay to the County of Fresno the sum of

FIVE THOUSAND DOLLARS ($5000.00)

per day for each and every calendar day's delay in finishing the work in excess of the number of working days prescribed above.

The Contractor shall not be assessed liquidated damages for delay in completion of the project, when such delay was caused by the failure of the County of Fresno or the Owner of the utility to provide for removal or relocation of the existing utility facilities.

SECTION 5 – GENERAL PROVISIONS

SECTION 5-1. MISCELLANEOUS

05-1.01 PREVAILING WAGE - Attention is directed to Section 7-1.01A(2), "Prevailing Wage," of the Standard Specifications.

The general prevailing wage rates determined by the Director of Industrial Relations, for the county or counties in which the work is to be done, are available at the County of Fresno, Department of Public Works and Planning, 2220 Tulare Street, Sixth Floor, Fresno CA 93721-2104 or on the State of California Department of Industrial Relations Website at:

http://www.dir.ca.gov/dirdatabases.html

These wage rates are not included in the special provisions for the project. Changes, if any, to the general prevailing wage rates will be available at the same location.

05-1.02 PUBLIC SAFETY - The Contractor shall provide for the safety of traffic and the public in conformance with the provisions in Section 7-1.09, "Public Safety," of the Standard Specifications and these special provisions.

When traffic cones or delineators are used to delineate a temporary edge of a traffic lane, the line of cones or delineators shall be considered to be the edge of the traffic lane, however, the Contractor shall not reduce the width of an existing lane to less than 12 feet without written approval from the Engineer.

When work is not in progress on a trench or other excavation that required closure of an adjacent lane, the traffic cones or portable delineators used for the lane closure shall be placed off of and adjacent to the edge of the traveled way. The spacing of the cones or delineators shall be not more than the spacing used for the lane closure.

Suspended loads or equipment shall not be moved nor positioned over public traffic or pedestrians.

Full compensation for conforming to the provisions in this section "Public Safety," including furnishing and installing temporary railing (Type K) and temporary crash

cushion modules if necessary, shall be considered as included in the contract prices paid for the various items of work involved and no additional compensation will be allowed therefor.

05-1.03 REMOVAL OF ASBESTOS AND HAZARDOUS SUBSTANCES - When the presence of asbestos or hazardous substances are not shown on the plans or indicated in the specifications and the Contractor encounters materials which the Contractor reasonably believes to be asbestos or a hazardous substance as defined in Section 25914.1 of the Health and Safety Code, and the asbestos or hazardous substance has not been rendered harmless, the Contractor may continue work in unaffected areas reasonably believed to be safe. The Contractor shall immediately cease work in the affected area and report the condition to the Engineer in writing.

In conformance with Section 25914.1 of the Health and Safety Code, removal of asbestos or hazardous substances including exploratory work to identify and determine the extent of the asbestos or hazardous substance will be performed by separate contract.

If delay of work in the area delays the current controlling operation, the delay will be considered a right of way delay and the Contractor will be compensated for the delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

05-1.04 SUBCONTRACTING - No subcontract releases the Contractor from the contract or relieves the Contractor of their responsibility for a subcontractor's work.

If the Contractor violates Public Contract Code § 4100 et seq., the County of Fresno may exercise the remedies provided under Public Contract Code § 4110. The County of Fresno may refer the violation to the Contractors State License Board as provided under Public Contract Code § 4111.

The Contractor shall perform work equaling at least 30 percent of the value of the original total bid with the Contractor’s own employees and equipment, owned or rented, with or without operators.

Each subcontract must comply with the contract.

Each subcontractor must have an active and valid State contractor's license with a classification appropriate for the work to be performed (Bus & Prof Code, § 7000 et seq.).

Submit copies of subcontracts upon request by the Engineer.

Before subcontracted work starts, submit a Subcontracting Request form.

Do not use a debarred contractor; a current list of debarred contractors is available at the Department of Industrial Relations' Web site.

Upon request by the Engineer, immediately remove and not again use a subcontractor who fails to prosecute the work satisfactorily.

05-1.05 PROMPT PROGRESS PAYMENT TO SUBCONTRACTORS - A prime contractor or subcontractor shall pay any subcontractor not later than 10 days of receipt of each progress payment in accordance with the provision in Section 7108.5 of the California Business and Professions Code concerning prompt payment to subcontractors. The 10 days is applicable unless a longer period is agreed to in writing. Any delay or postponement of payment over 30 days may take place only

for good cause and with the County's prior written approval. Any violation of Section 7108.5 shall subject the violating contractor or subcontractor to the penalties, sanction and other remedies of that section. This requirement shall not be construed to limit or impair any contractual, administrative, or judicial remedies otherwise available to the contractor or subcontractor in the event of a dispute involving late payment or nonpayment by the prime contractor, deficient subcontract performance, or noncompliance by a subcontractor.

05-1.06 PROMPT PAYMENT OF FUNDS WITHHELD TO SUBCONTRACTORS - The County shall hold retainage from the prime contractor and shall make prompt and regular incremental acceptances of portions, as determined by the County, of the contract work, and pay retainage to the prime contractor based on these acceptances. The prime contractor, or subcontractor, shall return all monies withheld in retention from a subcontractor within 30 days after receiving payment for work satisfactorily completed and accepted including incremental acceptances of portions of the contract work by the County. Federal law (49CFR26.29) requires that any delay or postponement of payment over 30 days may take place only for good cause and with the County's prior written approval. Any violation of this provision shall subject the violating prime contractor or subcontractor to the penalties, sanctions and other remedies specified in Section 7108.5 of the Business and Professions Code. These requirements shall not be construed to limit or impair any contractual, administrative, or judicial remedies otherwise available to the prime contractor or subcontractor in the event of a dispute involving late payment or nonpayment by the prime contractor, deficient subcontract performance, or noncompliance by a subcontractor.

05-1.07 PAYMENTS - Attention is directed to Section 9-1.07, "Progress Payments," and 9-1.08, "Payment After Contract Acceptance," of the Standard Specifications and these special provisions; provided, however that the provision in Section 9-1.07F, "Retentions," shall not apply.

The Department, once in each month, shall cause an estimate in writing to be made by the Engineer. The estimate shall include the total amount of work done and acceptable materials furnished, provided the acceptable materials are listed as eligible for partial payment as materials in the special provisions and are furnished and delivered by the Contractor on the ground and not used or are furnished and stored for use on the contract, if the storage is within the State of California and the Contractor furnishes evidence satisfactory to the Engineer that the materials are stored subject to or under the control of the Department, to the time of the estimate, and the value thereof. The estimate shall also include any amounts payable for mobilization. Daily extra work reports furnished by the Contractor less than 5 calendar days, not including Saturdays, Sundays and legal holidays, before the preparation of the monthly progress estimate shall not be eligible for payment until the following month's estimate.

The amount of any material to be considered in making an estimate will in no case exceed the amount thereof which has been reported by the Contractor to the Engineer on State-furnished forms properly filled out and executed, including accompanying documentation as therein required, less the amount of the material incorporated in the work to the time of the estimate. Only materials to be incorporated in the work will be considered. The estimated value of the material established by the Engineer will in no case exceed the contract price for the item of work for which the material is furnished.

The Department shall retain 5 percent of the estimated value of the work done and 5 percent of the value of materials so estimated to have been furnished and delivered and unused or furnished and stored as aforesaid as part security for the fulfillment of the contract by the Contractor.

The Department shall pay monthly to the Contractor, while carrying on the work, the balance not retained, as aforesaid, after deducting therefrom all previous payments and all sums to be kept or retained under the provisions of the contract. No monthly estimate or payment shall be required to be made when, in the judgment of the Engineer, the work is not proceeding in accordance with the provisions of the contract.

No monthly estimate or payment shall be construed to be an acceptance of any defective work or improper materials.

Attention is directed to the prohibitions and penalties pertaining to unlicensed contractors as provided in Business and Professions Code Sections 7028.15(a) and 7031.

In determining the partial payments to be made to the Contractor, only the following listed materials will be considered for inclusion in the payment as materials furnished but not incorporated in the work:

1. Geosynthetic Clay Liner (GCL)
2. Geomembrane
3. Geonet
4. Geotextile

The provisions in Section 9-1.07F of the Standard Specifications shall not apply.

05-1.08 WORK DAY - All work shall be performed during the regular work week (Monday through Friday). The contractor shall plan his work such that all construction operations performed each day, including cleanup of the project site, establishment of appropriate traffic control, and any other work necessary for the safety of the public shall not commence prior to 7:00 A.M. and shall conclude no later than 5:00 P.M.

The County of Fresno anticipates that the Geo-Electric Leak Detection Survey will be performed after 5 PM. The Contractor will be required to give a 5-working day notice to the Engineer for the Geo Electric Leak Detection Survey to be performed after 5 PM. Measures must be taken for anticipation of inspection of the leak location survey, including but not limited to bringing out lighting equipment capable of lighting up the area the leak location survey is taking place.

In the event that the contractor fails to complete his work during these hours the Engineer shall have the authority to stop all work upon the onset of nighttime and order the contractor to perform any and all work as the Engineer deems necessary for the safety of the public during the nighttime hours. The contractor shall not be entitled to any additional compensation or extension of the contract time as a result of the Engineer stopping the work due to the onset of nighttime.

05-1.09 LAWS TO BE OBSERVED - In addition to the provisions of Section 7-1.01, “Laws to be Observed,” of the Standard Specifications, the Contractor shall observe and comply with the provisions of the Charter of the County of Fresno.

A retention in the amount of $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 $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 County to be both complete and acceptable as to form.

05-1.10 PLANS AND SPECIFICATIONS - The awarded Contractor may receive a maximum of fifteen (15) sets of plans and specifications at no charge. The 15 plan sets shall include not less than five full-sized plan sets and not less that five reduced size plan sets, and the size of the remaining five plan sets shall be at the discretion of the County depending upon availability. Should the Contractor require additional copies, the Contractor may make such additional copies, at the Contractor’s expense, using the sets of Plans and Specifications provided the Contractor. Alternatively, the Contractor may request and purchase from the County additional documents for the price named in the notice to Notice to Bidders. Prepayment therefor and a 2–working day notice shall be required if the contractor requests that additional sets be printed.

05-1.11 APPRENTICES - Attention is directed to the provisions in Section 7-1.01A(5), “Apprentices,” of the Standard Specifications.

Information relative to apprenticeship standards, wage schedules, and other requirements may be obtained from the Director of Industrial Relations, Ex Officio The Administrator of Apprenticeship, San Francisco, CA, or from the Division of Apprenticeship Standards, 2550 Mariposa St., Fresno, CA 93721, (559) 445-5431.

05-1.12 PERMITS AND LICENSES - Attention is directed to Section 7-1.04, "Permits and Licenses," of the Standard Specifications and these special provisions.

- Relations With California Regional Water Quality Control Board
- Relations With the San Joaquin Valley Air Pollution Control District

05-1.13 RELATIONS WITH CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD

All stormwater runoff generated on site is retained on site. Consequently, an individual NOI was not required for this project; however, the contractor will be required to identify and implement best management practices in accordance with the provision in section “10-1.02 Construction Site Management”, elsewhere in these special provisions.

05-1.14 RELATIONS WITH SAN JOAQUIN VALLEY AIR POLLUTION CONTROL DISTRICT (SJVAPCD)

The Contractor shall be responsible for compliance with all applicable SJVAPCD regulations and requirements. This section is provided for the Contractor's information, and nothing herein or elsewhere within these special provisions shall be construed as limiting the Contractor's responsibility for complying with all applicable rules and regulations.

It has been determined that the provisions of SJCAPCD RULE 9510 INDIRECT SOURCE REVIEW (ISR) do not apply to this project.

Attention is directed to Sections 7-1.01, "Laws to be Observed," 7-1.12, "Indemnification and Insurance," and Section 10, "Dust Control," of the Standard Specifications.

In accordance with SJVAPCD Regulation VIII – Fugitive PM10 Prohibitions: Rule 8021, implementation of an SJVAPCD-approved dust control plan is required prior to commencement of any dust generating activities. The Contractor will file a dust control plan with the SJVAPCD and the County will pay the $350 application fee. A copy of the dust control plan required by the Contractor is included in "Project Details" of these special provisions.

The Contractor is hereby informed that the Contractor will be required to prepare and submit to the Engineer proposed modifications to the dust control plan to provide any information which is identified as "to be determined" on the dust control plan filed by the County and to modify the dust control plan to the extent necessary to accurately reflect the Contractor's proposed operations. The Engineer will complete the review within two working days after receipt thereof from the Contractor. In the event that the Contractor's submittal is incomplete or inadequate, the Contractor shall submit a corrected plan to the Engineer and the Engineer shall complete review of any re-submittal within two working days after receipt thereof.

Upon approval by the Engineer, the Contractor shall submit the proposed modified dust control plan to the SJVAPCD. The Contractor shall be responsible for payment of any fees to the SJVAPCD which may be required for any modifications of the dust control plan. The Contractor shall be solely responsible for prompt preparation and submittal to the Engineer, and immediately upon approval by the Engineer, submittal to the SJVAPCD of all proposed modifications to the dust control plan.

The Contractor shall not commence work until the SJVAPCD has approved or conditionally approved the dust control plan and shall not commence work until so authorized in writing by the Engineer. When a modification to an approved dust control plan is under consideration by the Engineer or by the SJVAPCD, no work shall be performed which is inconsistent with the approved dust control plan prior to receiving written approval from the Engineer.

Compensation for delays associated with review and approval of dust control plans shall only be considered in the event that: 1) the Engineer fails to review any modified dust control plan submitted by the Contractor within two working days after submittal thereof by the Contractor; or 2) the SJVAPCD fails to review and to either approve or disapprove a modified dust control plan within 30 calendar days after their receipt thereof. Disapproval of a proposed modification to the dust control plan by the Engineer or by the SJVAPCD shall not be considered as a basis for an extension of contract time nor as the basis for any additional compensation. Only in the event that it is determined by the Engineer that the Contractor was unreasonably delayed, through no fault of the Contractor, will compensation for delays be considered in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

The Contractor shall be fully informed of the requirements of the Dust Control Plan and all rules, regulations, plans and conditions that may govern the Contractor's operations and shall conduct the work accordingly. Modifications to the Dust Control Plan approved by the SJVAPCD and accepted by the Engineer shall be fully binding on the Contractor. The provisions of this section and SJVAPCD-approved modifications to the Dust Control Plan shall be made a part of every subcontract executed pursuant to this contract.

Full compensation for conforming to the provisions in this section of these special provisions shall be considered as included in the prices paid for the various contract items of work and no separate payment will be made therefor.

05-1.15 FIRE PLAN - The Contractor shall cooperate with local fire prevention authorities in eliminating hazardous fire conditions and shall implement the following fire plan under the direction of the Engineer:

A. The Contractor shall be responsible for:
   1. obtaining the phone number of the nearest fire suppression agency and providing this phone number to the Engineer as a first order of work,
   2. immediately reporting to the nearest fire suppression agency fires occurring within the limits of the project,
   3. preventing project personnel from setting open fires,
   4. preventing the escape of fires caused directly or indirectly as a result of project operations and extinguishing these fires.

B. Except for motor trucks, truck tractors, buses and passenger vehicles, the Contractor shall equip all hydro-carbon fueled engines, both stationary and mobile, including motorcycles, with spark arresters that meet United States Forest Service Standards as specified in the Forest Service Spark Arrester Guide and shall maintain the spark arresters in good operating condition. Spark arresters are not required by the State Department of Forestry or the United States Forest Service on equipment powered by properly maintained exhaust-driven turbo-charged engines or when equipped with scrubbers with properly maintained water levels. The Forest Service Spark Arrester Guide is available at the District Offices of the Department of Transportation.

C. Toilets shall have a metal receptacle, at least 6 inches in diameter by 8 inches deep, half-filled with sand for ashes and discarded smokes, and within easy reach of anyone utilizing the facility.

D. Equipment service areas, parking areas and gas and oil storage areas shall be located so that there is no flammable material within a radius of at least 50 feet of these areas. Small mobile or stationary engine sites shall be cleared of flammable material for a radius of at least 15 feet from the engine.

E. The areas to be cleared and grubbed shall be cleared, and kept clear of, flammable material such as dry grass, weeds, brush, downed trees, oily rags and waste, paper, cartons, and plastic waste.

F. The Contractor shall furnish each piece of equipment with the following:
   1. one shovel and one fully charged fire extinguisher UL rated at 4 B:C or more on each truck, personnel vehicle tractor,
   2. one shovel and one back-pack 5-gallon water-filled tank with pump for each welder,

3. one shovel or one chemical pressurized fire extinguisher, fully charged, for each gasoline-powered tool, including but not limited to chain saws, soil augers, rock drills, etc. The required fire tools shall, at no time, be farther than 25 feet from the point of operation of the power tool. Fire extinguishers shall be of the type and size required by the California Public Resource Code, Section 4431, and the California Administrative Code, Title 14, Section 1234,
4. shovels shall be size "O" or larger and shall be not less than 46 inches in length.

G. The Contractor shall furnish a pickup truck and driver that will be available for fire control during working hours and as specified herein.

H. The Contractor's operations shall also conform to the following:

1. during welding operations, the fire control pickup and associated fire tools shall be located as close as practicable to the welding operation, and shall remain there until welding is discontinued,
2. during welding operations, a spotter, other than the welder, shall be assigned to observe welding to ensure that any stray sparks are extinguished immediately,
3. during blasting operations, the fire control pickup and associated fire tools shall be located as close as practicable to the blasting operation, and shall remain there until blasting is discontinued.

The Engineer may order that construction operations be temporarily suspended in the event that, in the opinion of the Engineer, an extreme fire hazard exists.

If the project is shut down or partially shut down on account of hazardous fire conditions, working days during such period will be determined in the same manner as provided in Section 8-1.06, "Time of Completion," of the Standard Specifications for shutdowns due to weather.

Full compensation for conforming to the provisions herein shall be considered as included in the prices paid for the various contract items of work and no separate payment will be made therefor.

05-1.16 STOCKPILING MATERIALS / EQUIPMENT STORAGE - Before any materials are stockpiled or equipment parked / stored within the American Avenue Landfill limits, the Contractor shall first obtain written authorization from the property owner whose property the materials are to be stockpiled or equipment parked/stored. That written authorization shall be in the form of the Notice to Proceed from the County of Fresno. The Contractor shall file with the Engineer said authority or a certified copy thereof together with a written release absolving the County of Fresno from any and all responsibility in connection with the stockpiling of materials or parking/storage of equipment on said Storage Area. Before any material is stockpiled or equipment parked/stored, the Contractor shall obtain written permission from the Engineer to stockpile materials or park/store equipment at the location designated in said authorization. **Failure by the Contractor to provide written authorization shall result in the withholding of all funds due to the Contractor until said authorization is received by the County.**

The Contractor is required to obtain all permits required by all applicable regulatory agencies and to comply with all applicable codes, regulations and zoning ordinances prior to establishing a storage yard for materials and/or

equipment. The Contractor shall provide copies of all permits acquired to the Engineer.

05-1.17 DAMAGE BY STORM, FLOOD, TSUNAMI OR EARTHQUAKE - The provisions in Section 7-1.165 of the Standard Specifications shall not apply.

05-1.18 INCREASED OR DECREASED QUANTITIES - Attention is directed to the provisions in Section 4-1.03B, “Increased or Decreased Quantities,” of the Standard Specifications and these special provisions.

All written requests for adjustment shall be made no later than five working days after notification by the Engineer that the item of work is complete.

05-1.19 FINAL PAY ITEMS - Attention is directed to the provisions in Section 9-1.01C, “Final Pay Items,” of the Standard Specifications and these special provisions.

05-1.20 ARBITRATION - The provisions in Section 9-1.10, “Arbitration,” of the Standard Specifications shall not apply.

05-1.21 RESOLUTION OF CONTRACT CLAIMS - Public works contract claims of three hundred seventy-five thousand dollars ($375,000) or less which arise between a Contractor and a local public agency shall be resolved in accordance with the provisions of Article 1.5 (Sections 20104-20104.6, inclusive) of Chapter 1 of Part 3 of Division 2 of the Public Contract Code. Article 1.5 requires that its provisions or a summary thereof be set forth in the plans and specifications for any work which may give rise to a claim thereunder. Accordingly, this contract incorporates all of the terms and conditions of Article 1.5, as follows:

Article 1.5 Resolution of Contract Claims

20104.(a)(1) This article applies to all public works claims of three hundred seventy-five thousand dollars ($375,000) or less which arise between a Contractor and a local agency.

(2) This article shall not apply to any claims resulting from a contract between a Contractor and a public agency when the public agency has elected to resolve any disputes pursuant to Article 7.1 (commencing with Section 10240) of Chapter 1 of Part 2.

(b)(1) "Public work" has the same meaning as in Sections 3100 and 3106 of the Civil Code, except that "public work" does not include any work or improvement contracted for by the state or the Regents of the University of California.

(2) "Claim" means a separate demand by the Contractor for (A) a time extension, (B) payment of money or damages arising from work done by or on behalf of the Contractor pursuant to the contract for a public work and payment of which is not otherwise expressly provided for or the claimant is not otherwise entitled to, or (C) an amount the payment of which is disputed by the local agency.

(c) The provisions of this article or a summary thereof shall be set forth in the plans or specifications for any work which may give rise to a claim under this article.

(d) This article applies only to contracts entered into on or after January 1, 1991.

20104.2 For any claim subject to this article, following requirements apply:

(a) the claim shall be in writing and include the documents necessary to substantiate the claim. Claims must be filed on or before the date of final payment. Nothing in this subdivision is intended to extend the time limit or supersede notice requirements otherwise provided by contract for the filing of claims.

(b)(1) For claims of less than fifty thousand dollars ($50,000), the local agency shall respond in writing to any written claim within 45 days of receipt of the claim, or may request, in writing, within 30 days of receipt of the claim, any additional documentation supporting the claim or relating to defenses or claims the local agency may have against the claimant.

(2) If additional information is thereafter required, it shall be requested and provided pursuant to this subdivision, upon mutual agreement of the local agency and the claimant.

(3) The local agency's written response to the claim as further documented, shall be submitted to the claimant within 15 days after receipt of the further documentation or within a period of time no greater than that taken by the claimant in producing the additional information, whichever is greater.

(c)(1) For claims of over fifty thousand dollars ($50,000) and less than or equal to three hundred seventy-five thousand dollars ($375,000), the local agency shall respond in writing to all written claims within 60 days of receipt of the claim, or may request, in writing, within 30 days of receipt of the claim, any additional documentation supporting the claim or relating to defenses or claims the local agency may have against the claimant.

(2) If additional information is thereafter required, it shall be requested and provided pursuant to this subdivision, upon mutual agreement of the local agency and the claimant.

(3) The local agency's written response to the claim, as further documented, shall be submitted to the claimant within 30 days after receipt of the further documentation, or within a period of time no greater than that taken by the claimant in producing the additional information or requested documentation, whichever is greater.

(d) If the claimant disputes the local agency's written response, or the local agency fails to respond within the time prescribed, the claimant may so notify the local agency in writing, either within 15 days of receipt of the local agency's response or within 15 days of the local agency's failure to respond within the time prescribed, respectively, and demand an informal conference to meet and confer for settlement of the issues in dispute. Upon a demand, the local agency shall schedule a meet and confer conference within 30 days for settlement of the dispute.

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

20104.4 The following procedures are established for all civil actions filed to resolve claims subject to this article:

(a) Within 60 days, but no earlier than 30 days, following the filing or responsive pleadings, the court shall submit the matter to nonbinding mediation unless waived by the mutual stipulation of both parties. The mediation process shall provide for the

selection within 15 days by both parties of disinterested third person as mediator, shall be commenced within 30 days of the submittal, and shall be concluded within 15 days from the commencement of the mediation unless a time requirement is extended upon a good cause showing to the court or by stipulation of both parties. If the parties fail to select a mediator within the 15-day period, any party may petition the court to appoint the mediator.

(b)(1) If the matter remains in dispute, the case shall be submitted to the judicial arbitration pursuant to Chapter 2.5 (commencing with Section 1141.10) of Title 3 of Part 3 of the Code of Civil Procedure, notwithstanding Section 1141.11 of that code.

The Civil Discovery Act of 1986 (Article 3 (commencing with Section 2016) of Chapter 3 of Title 3 of Part 4 of Civil Procedure) shall apply to any proceeding brought under this subdivision consistent with the rule pertaining to judicial arbitration.

(2) Notwithstanding any other provision of law, upon stipulation of the parties, arbitrators appointed for purposes of this article shall be experienced in construction law, and, upon stipulation of the parties, mediators and arbitrators shall be paid necessary and reasonable hourly rates of pay not to exceed their customary rate, and such fees and expenses shall be paid equally by the parties, except in the case of arbitration where the arbitrator, for good cause, determines a different division. In no event shall these fees or expenses be paid by state or county funds.

(3) In addition to Chapter 2.5 (commencing with Section 1141.10) of Title 3 of Part 3 of the Code of Civil Procedure, any party who after receiving an arbitration award requests a trial de novo but does not obtain a more favorable judgment shall, in addition to payment of costs and fees under that chapter, pay the attorney's fees of the other party arising out of the trial de novo.

(c) The court may, upon request by any party, order any witnesses to participate in the mediation or arbitration process. Arbitrators shall be experienced in construction law.

20104.6 (a) No local agency shall fail to pay money as to any portion of a claim which is undisputed except as otherwise provided in the contract.

(b) In any suit filed under Section 20104.4, the local agency shall pay interest at the legal rate on any arbitration award or judgment. The interest shall begin to accrue on the date the suit is filed in a court of law.

05-1.22 JOB SAFETY - The Contractor's attention is directed to Section 5-1.02A, "Excavation Safety Plans," of the Standard Specifications. Attention is directed to the provisions of the Construction Safety Orders, Tunnel Safety Orders and General Safety Orders of the California Department of Industrial Relations, Labor Code Section 6705 and all other applicable laws and regulations.

Where the plans call for trenching and pipeline installations, and boring or jacking of pipe, the Contractor will be required to obtain permits from the California Department of Industrial Relations, Division of Industrial Safety.

The Contractor shall be responsible for obtaining such permits and shall provide evidence of their permit to the Engineer before beginning trenching, boring or jacking operations.

05-1.23 TRENCHING AND EXCAVATION SHORING - In accordance with Section 7104 of the California Public Contract Code, the following provisions shall

apply to any contract involving digging of trenches or other excavations that extend deeper than 4 feet below the surface:

1) The Contractor shall promptly, and before the following conditions are disturbed, notify the Owner, in writing, of any:
   a) Material that the Contractor believes may be material that is hazardous waste, as defined in Section 25117 of the Health and Safety Code, that is required to be removed to a Class I, Class II, or Class III disposal site in accordance with provisions of existing law.
   b) Subsurface or latent physical conditions at the site differing from those indicated.
   c) Unknown physical conditions at the site of any unusual nature, different materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the contract.
2) The Owner shall promptly investigate the conditions, and if it finds that the conditions do materially so differ, or do involve hazardous waste, and cause a decrease or increase in the Contractor's cost of, or the time required for, performance of any part of the work, shall issue a change order in accordance with Section 9-1.06, “Work Character Changes,“ of the Standard Specifications.
3) In the event that a dispute arises between the Owner and the Contractor whether the conditions materially differ, or involve hazardous waste, or cause a decrease or increase in the Contractor's cost of, or time required for, performance of any part of the work, the Contractor shall not be excused from any scheduled completion date provided for by the contract, but shall proceed with all work to be performed under the contract. The Contractor shall retain any and all rights provided either by contract or by law which pertain to the resolution of disputes and protests between the contracting parties.

Attention is directed to Section 5-1.02A, "Excavation Safety Plans," and Section 7-1.01E. "Trench Safety," of the Standard Specifications.

Excavation for structures shall be considered "open excavations."

The requirements as set forth by the State Division of Industrial Safety for the provision of worker protection from the hazard of caving ground are minimum requirements. In addition, the Contractor shall provide, for the life of the Contract, the same protection for any person, including the Engineer or any of his/her representatives, subcontractors, or any other person required to be exposed to such hazard in the performance of the work, inspection of the work, or any other reason.

Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in excavation shoring, complete in place, including the design of the shoring system, preparation of the safety plan, removal and disposal of shoring materials, excavation and replacement of sloped sides of excavations, as shown on the Plans, as specified in the Standard Specifications and these special provisions and as directed by the Engineer will be considered as included in the contract price or prices paid for the items of work involved and no additional compensation will be allowed therefor.

05-1.24 GUARANTY AND BONDS - A material guaranty for a period of 12 months from the date of acceptance for the following items of work as designated in the proposal will be required and shall conform to the provisions in Section 2-1.12, "Material Guaranty," of the Standard Specifications. A guaranty form for this purpose is included in the proposal.

ALL WORK

The terms of the guarantee shall be clearly stated and shall be approved by the Engineer prior to the acceptance of the contract.

The two contract bonds required by Section 3-1.02, "Contract Bonds." of the Standard Specifications may be reduced as provided in said Section 2-1.12.

Full compensation for furnishing the guaranty and bonds will be considered as included in the contract price or prices paid for the items of work involved and no additional compensation will be allowed therefor.

05-1.25 COOPERATION - Attention is directed to Section 7-1.14, “Cooperation,” of the Standard Specifications.

The Contractor shall cooperate with other Contractors or forces which may be working at the American Avenue Disposal Site.

During the progress of the work under this Contract, the American Avenue Disposal Site will be operating. Coordination with owner forces will be necessary to avoid interfering with normal business to the greatest possible extent.

Work for the **AADS – Landfill Gas and Leachate Collection System Expansion – SCADA Integration** may be in progress at or near the job site of this contract.

Full compensation for conforming to the requirements of this section shall be considered as included in the prices paid for the various items of work and no separate payment will be made therefor.

05-1.26 PAYMENT OF WITHHELD FUNDS - Substitution of securities for any moneys withheld by the Owner to ensure performance under a contract shall be permitted, provided that substitution of securities provisions shall not apply to contracts in which there will be financing provided by the Rural Development Administration of the United States Department of Agriculture pursuant to the Consolidated Farm and Rural Development Act (7 U.S.C. Sec. 1921 et seq.), and where federal regulations or policies, or both, do not allow the substitution of securities.

At the request and expense of the Contractor and in compliance with Public Contract Code Section 22300, securities equivalent to the amount withheld pursuant to these specifications shall be deposited by the Contractor with the Owner, or with a state or federally chartered bank as the escrow agent, who shall then pay such withheld amounts to the Contractor upon written authorization of the Owner.

Securities eligible for investment under this section shall include those listed in Section 16430 of the Government Code, bank or savings and loans certificates of deposit, interest bearing demand deposit accounts, standby letters of credit, or any other security mutually agreed to by the Contractor and the Owner.

Securities to be placed in escrow shall be of a value at least equivalent to the amounts of retention to be paid to the Contractor.

The Contractor shall be beneficial owner of any securities substituted for moneys withheld and shall receive any interest thereon.

The Contractor shall enter into an escrow agreement satisfactory to the Owner, which agreement shall substantially comply with Public Contract Code Section 22300.

The Contractor shall obtain the written consent of the surety to such escrow agreement.

05-1.27 FINAL PAYMENT - Final payment for the work will be made in accordance with the standard County of Fresno procedures.

05-1.28 ASSIGNMENT - No third-party agreement relieves you or your surety of your responsibility to complete the work. Do not sell, transfer, or otherwise dispose of any contract part without prior written consent from the Department.

If you wish to assign the right to receive contract payments, the Department may accept the assignment upon the Engineer's receipt of a notice, provided that such request is approved by the Fresno County Auditor. A pending request for assignment does not excuse you from compliance with any part of the contract, including the requirement that all signed contracts, bonds, and insurance certificates be provided timely in accordance with the contract requirements. Assigned payments remain subject to deductions and withholdings as described in the contract. The Department may use withheld payments for work completion whether payments are assigned or not.

05-1.29 SURFACE MINING AND RECLAMATION ACT - Attention is directed to the Surface Mining and Reclamation Act of 1975, commencing in Public Resources Code, Mining and Geology, Section 2710, which establishes regulations pertinent to surface mining operations.

Material from mining operations furnished for this project shall only come from permitted sites in compliance with the Surface Mining and Reclamation Act of 1975.

The requirements of this section shall apply to all materials furnished for the project, except for acquisition of materials in conformance with Section 4-1.05, “Use of Materials Found on the Work,” of the Standard Specifications.

05-1.30 LINES AND GRADES - Attention is directed to Section 5-1.07, "Lines. and Grades," of the Standard Specifications.

Stakes or marks will be set by the Engineer in conformance with the requirements in Chapter 12, "Construction Surveys," of the California Department of Transportation’s Surveys Manual.

The Contractor shall provide the Engineer 48 hours notice prior to performance by the County of any Contractor survey requests, staking requests, or grade verifications.

05-1.31 ARCHAEOLOGICAL DISCOVERIES - The Contractor shall leave archaeological materials, including human skeletal material and disarticulated human bone, undisturbed in accordance with the following codes and these special provisions:

A. California Public Resources Code, Chapter 1.7, Section 5097.5;

B. California Administrative Code, Title 14, Section 4308;

C. California Penal Code, Title 14, Part 1, Section 622-1/2;

D. California Health and Human Safety Code 7050.5; and

E. California Public Resources Code, Sections 5097.98 and 5097.99.

Archaeological materials are defined as the physical remains of past human activity, and include historic-period archaeological materials and prehistoric Native American archaeological materials. Nonhuman fossils are not considered to be archaeological except when showing direct evidence of human use or alteration, or when they are found in direct physical association with archaeological materials as described in these special provisions.

Historic-period archaeological materials include cultural remains beginning with initial European contact in California, but at least 50 years old. Historical archaeological materials may include:

A. trash deposits or clearly-defined disposal pits containing tin cans, bottles, ceramic dishes, or other refuse indicating previous occupation or use of the site;

B. structural remains of stone, brick, concrete, wood, or other building material found above or below ground; or

C. human skeletal remains from the historic period, with or without coffins or caskets, including any associated grave goods.

Prehistoric Native American archaeological materials may include:

A. human skeletal remains or associated burial goods such as beads or ornaments;

B. evidence of tool making or hunting such as arrowheads and associated chipping debris of fine-grained materials such as obsidian, chert, or basalt;

C. evidence of plant processing such as pestles, grinding slabs, or stone bowls;

D. evidence of habitation such as cooking pits, stone hearths, packed or burnt earth floors; or

E. remains from food processing such as concentrations of discarded or burnt animal bone, shellfish remains, or burnt rocks used in cooking.

Full compensation for leaving archaeological materials undisturbed will be considered as included in the various items of work and no additional compensation will be allowed therefor.

05-1.32 RESPONSIBILITY TO OTHER ENTITIES - The Contractor shall be responsible for any liability imposed by law and for injuries to or death of any person including, but not limited to, workers and the public or damage to property, and shall indemnify and save harmless any county, city or district, its officers and employees connected with the work, within the limits of which county, city or district the work is being performed, all in the same manner and to the same extent conforming to the provisions in Section 7-1.12, "Indemnification and Insurance," of the Standard Specifications, for the protection of the State of California and all officers and employees thereof connected with the work.

SECTION 6 – NOT USED

SECTION 7 – FORCE ACCOUNT PAYMENT

07-1.01 LABOR SURCHARGE - Attention is directed to the provisions in Section 9-1.03B, "Labor," of the Standard Specifications. The labor surcharge to be added to the actual wages paid shall be **12** percent of the actual wages, except as provided for the premium portion of dump truck operation wages as provided in the Equipment Rental Rates referred to in Section "Equipment Rental Rates" of these special provisions and except as provided for below:

07-1.02 RECORDS - The Contractor shall furnish to the Engineer completed daily extra work reports, on forms furnished by the Engineer or on computerized facsimiles of the County of Fresno's forms acceptable to the Engineer, for each day's extra work to be paid for on a force account basis. The daily extra work reports shall itemize the materials used, and shall cover the direct cost of labor and the charges for equipment rental, whether furnished by the Contractor, subcontractor or other forces, except for charges described in Section 9-1.04, "Extra Work Performed by Specialists." The daily extra work reports shall provide names or identifications and classifications of workers, the hourly rate of pay and hours worked, and also the size, type and identification number of equipment, and hours operated. These reports are to be furnished no later than the second working day following the work for labor and equipment involved and no later than the fifth working day for material invoices and specialized forces.

Unless otherwise permitted by the Engineer, no payment will be made for extra work on a force account basis if not reported within the time and in the manner specified.

07-1.03 EQUIPMENT RENTAL RATES - Attention is directed to the provisions of Section 9-1.03D, "Equipment Rental," of the Standard Specifications. The equipment rental rates to be paid are listed in a table entitled "State of California, Department of Transportation, Labor Surcharge and Equipment Rental Rates" on file with the Clerk of the Board of Supervisors, Room 301, Hall of Records, Fresno, California, and are incorporated herein by reference.

Copies of the equipment rental rates may be obtained from the County of Fresno, Department of Public Works and Planning, Design Services Section, Seventh Floor, Fresno County Plaza Building, 2220 Tulare Street, Fresno, CA 93721. Phone 559/600-4528.

The rates to be applied to this project are the latest rates dated on or before the date of approval of this contract for advertising. The date of approval for advertising appears on the last page of the Notice To Bidders for this project.

07-1.04a SUPPLEMENTAL WORK - The Supplemental Work bid item which is not associated with any specified activity is provided to compensate the Contractor for new and unforeseen work necessary to construct the project as designed and intended. Supplemental Work is not for design changes.

Supplemental Work will be classed as extra work in accordance with the provisions of Section 4-1.03D, "Extra Work," of the Standard Specifications. The dollar amount shown in the Proposal is an estimate only, and shall be included in each bidder's proposal. Except to the extent, if any, otherwise expressly specified in the following

sections related to supplemental work associated with particular activities, the provisions of this section, 07-1.04a, shall apply to all supplemental work bid items.

Supplemental work shall be performed only upon direct written authorization from the Engineer and daily extra work reports shall be submitted to and approved by the Engineer. The Contractor shall maintain separate records for extra work performed in accordance with the provisions of Section 5-1.015," Records," of the Standard Specifications and these special provisions.

The following portion of Section 5-1.015E, "Extra Work Bills," shall not apply:

> "Submit extra work bills using the Department's Internet extra work billing system.
>
> The Contractor submitting and the Engineer approving an extra work bill using the Internet force account work billing system is the same as each party signing the report.

The Department provides billing system:

1. Training within 30 days of your written request
2. Accounts and user identification to your assigned representatives after a representative has received training

Each representative must maintain a unique password."

Payment for any Supplemental Work item will be based on the total amount of such Supplemental Work actually performed (with the determination of the amount of work actually performed subject to such limitations as are identified in the following sections regarding supplemental work), and will not be subject to the provisions of Section 4-1.03B, "Increased or Decreased Quantities" of the Standard Specifications.

07-1.04b SUPPLEMENTAL WORK (SPECIAL STOCKPILING) – It is anticipated that the existing areas for Modules 7 and 8 will contain all material specified to be placed therein. In the event that unforeseen circumstances not caused by the Contractor require the Contractor to use an alternative location for a portion of the permanent stockpiling operation, this item will be used to compensate the Contractor therefor. Compensation for this item, if any, will be limited to the difference between the Contractor's cost to utilize Permanent Stockpile Areas 1 and 2 to stockpile the amount of material that cannot be accommodated by said stockpile area and the Contractor's cost to perform such Special Stockpiling, as demonstrated by the Contractor to the satisfaction of the Engineer.

In the event that the need to perform Special Stockpiling is precipitated by the Contractor's failure to place material in Permanent Stockpile Areas 1 and 2 in accordance with the requirements pertaining thereto elsewhere in these Special Provisions, or is otherwise caused by the Contractor's failure to perform the work in accordance with all requirements pertaining to the Project, Special Stockpiling shall be performed at the Contractor's expense and no additional compensation will be allowed therefor.

07-1.04c SUPPLEMENTAL WORK (SPECIAL TRAFFIC HANDLING AND OPERATIONS) – Public landfill traffic, including commercial waste haulers, will utilize the landfill entrance road and scale house on a continuous basis in large numbers; however, it is anticipated that the vast majority of waste delivered will be placed in the existing phase III fill area. If such circumstances have a substantial and

quantifiable adverse impact on the Contractor's operations and/or require additional traffic control which would not otherwise be required, this item will be used to compensate the Contractor therefor.

Compensation for this item, if any, will be limited to the difference between the Contractor's cost to perform the work absent such adverse impact and the Contractor's cost to perform the work under the changed adverse conditions.

07-1.04d SUPPLEMENTAL WORK (SPECIAL COORDINATION) – An expansion of the existing landfill gas collection system will take place via separate contract during construction of this project; however the commencement and duration of construction has not been firmly established.

Generally, the gas collection work to be performed under separate contract will involve the installation of at grade and below grade gas transmission and collection pipes, and will not involve extensive earthwork operations. A preliminary plan showing the general route for such pipes is provided on the County's website for the Contractor's information only. Such plan shall be deemed as having no relevance nor purpose whatsoever with respect to this Module Construction Project except to depict the pipe route in general terms. The preliminary pipe route crosses an access road which is used for disposal operations, and during construction, this access road may be unavailable for the Contractor's use for a period of up to ten working days.

The Contractor shall plan for a reasonable effort to coordinate with such gas collection contractor based the information provided in these Special Provisions. It is anticipated that any additional traffic control required due to the gas collection system contractor's operations will be provide by such contractor.

In the event that such work by the gas collection contractor has substantial and quantifiable adverse impact on the Contractor's operations that could not reasonably have been anticipated based on the information provided herein and on the preliminary drawing that is being posted, and/or requires additional traffic control which would not otherwise be required, this item will be used to compensate the Contractor therefor.

Compensation for this item, if any, will be limited to the difference between the Contractor's cost to perform the work absent such adverse impact and the Contractor's cost to perform the work under the changed adverse conditions.

SECTION 8 – MATERIALS

SECTION 8-1 MISCELLANEOUS

08-1.01 GENERAL - Attention is directed to Section 6, "Control of Materials," of the Standard Specifications and these special provisions.

All materials required to complete the work under this contract shall be furnished by the Contractor.

A certificate of compliance may be required for materials used on this contract as directed by the Engineer.

When requested by the Engineer, the supplier or Contractor shall furnish, without charge, samples of all materials entering into the work, and no material shall be used prior to approval by the Engineer. Samples of the material from local sources shall be taken by or in the presence of the Engineer, otherwise the samples will not be considered for testing.

Unless otherwise specified elsewhere in these special provisions, salvaged material shall be carefully removed and stockpiled near the project site at a location designated by the Engineer. County forces or other forces will remove salvaged materials from the project site.

08-1.02 TESTING - Whenever a specified test as described in the CQA Plan is required and the material or portion thereof so tested fails to meet or exceed the required testing parameters specified, any tests beyond the amounts shown in the Table 8-1 **"MATERIAL TESTING RATE SCHEDULE**" shall be charged at the per unit rate shown in the table. The charge for each additional test beyond the amounts shown shall be deducted from the monies due or that may become due the Contractor under the contract plus an additional $100 administrative fee per re-test.

The Contractor shall provide the Engineer 24 hours notice prior to performance by the County of any compaction testing.

TABLE 8-1

MATERIAL TESTING RATE SCHEDULE

Description	ASTM Method	Unit Rate	# of tests included
Geosynthetic Clay Liner			
Peel Strength	D-6496	$51	12
Mass per Unit Area	D-5993	$58	12
Moisture Content (bentonite)	D-5993	$58	12
Index Flux	D-5887	$305	2
Free Swell	D-5890	$58	12
Tensile Strength	D-6768	$51	12
Permeability	D-5887	$305	2
Fluid Loss	D-5887	$58	12
Shear Strength (GCL/subgrade)	D-6243	$350	3
Geomembrane			
Thickness	D-5994	$23	12
Asperity Height	D-7466	$32	12
Tensile Properties	D-6693	$64	12
Puncture Resistance	D-4833	$51	12
Tear Resistance	D-1004	$51	12
Specific Gravity	D-1505	$36	12
Direct Shear	D-6243	$350	3
Seam Strength/Peel Adhesion (Geomemebrane/GCL)	D-4437	$34	175
Geonet			
Tensile Strength	D-7179	$64	8
Compressive Strength	D-1621	$84	8
Carbon Black	D-1603 or D-4218	$46	8
Thickness (geonet)	D-5199	$23	8

Transmissivity	D-4716	$325	8
Direct Shear (Geonet/Geomembrane)	D-5321	$350	3
Geotextile			
Grab Strength & Elongation	D-4632	$51	12
CBR Puncture Resistance	D-6241	$51	12
Permittivity	D-4491	$107	12
Apparent Opening Size	D-4751	$117	12
Mass per Unit Area	D-5261	$24	12
Soil and Rock Evaluation			
Subgrade			
Compaction Characteristics	D-1557	$311	9
Particle Size (soil)	D-422	$109	9
Classification	D-2487	$90	9
Visual Description	D-2488	$12	9
Permeable Material			
Permeability	D-2434	$318	3
Classification	D-2487	$90	3
Sieve Analysis (rock)	C-136	$109	3
Visual Description	D-2488	$12	3
Operations Layer			
Particle Size	D-422	$109	13
Classification	D-2487	$90	13
Unsuitable Material/General Cut/Fill			
Compaction Characteristics	D-1557	$311	3
Particle Size	D-422	$109	3
Classification	D-2487	$90	3
Visual Description	D-2488	$12	3
Soil and Rock Construction Testing			
Subgrade			
Sand Cone/Drive Tube	D-1556/D-2937	$35	2
Moisture Content	D-2216	$15	2
Classification	D-2487	$90	9
Permeable Material			
Classification	D-2487	$90	3

Unsuitable Material/General Cut/Fill			
Sand Cone/Drive Tube	D-1556/D-2937	$35	2
Moisture Content	D-2216	$15	2
Classification	D-2487	$90	8

08-1.03 MEASUREMENT OF MATERIALS - Attention is directed to Section 9-1.01 "Measurement of Quantities" of the Standard Specifications and these special provisions.

08-1.04 TRADE NAMES AND ALTERNATIVES - Unless substitution of a particular product is expressly disallowed in the special provisions, whenever an article, or any class of materials, is specified by trade name or by the name of any particular patentee, manufacturer or dealer, or by reference to the catalog of any such manufacturer or dealer, it shall be taken as intending to mean and specify the article or material described or any other equal thereto in quality, finish and durability, and equally as serviceable for the purpose for which it is or they are intended. The intent of the plans and specifications is to specify high grade standard equipment, and it is not the intent of these plans and specifications to exclude or omit the products of any responsible manufacturer, if such products are equal in every respect to those mentioned herein.

All requests for substitution (after bid opening), along with all supporting information necessary for the County's review, shall be submitted no later than fifteen (15) days from the date of the Notice to Proceed.

The County does not guarantee that alternative articles, components, materials or equipment other than the item specified by trade name or other specific identification, will fit within the design parameters of the project without alteration of the project design by the contractor.

The County has the right to reject any proposed alternative material which requires alteration of the project design which impacts the safety of the public or the user of the completed facility. If the proposed alternative material requires alteration of the design of the project and said alterations are acceptable to the County, the contractor shall be responsible for performing said alterations at no additional cost to the County.

08-1.05 SUBMITTALS - Unless otherwise specified in these special provisions, submittals shall be provided via email in .pdf format.

The time allocated for the Engineer’s review of submittals and for re-review of previously rejected submittals shall be as specified elsewhere in these special provisions; provided, however, that the time allocated for each such review or each such re-review shall not exceed fifteen working days notwithstanding anything to the contrary elsewhere in these special provisions. In the event that the time allocated for the Engineer’s review of particular submittals and for re-review of previously rejected submittals is not specified elsewhere in these special provisions, then the Engineer’s review time shall be 15 working days.

08-1.06 PREQUALIFIED AND TESTED SIGNING AND DELINEATION MATERIALS - The California Department of Transportation maintains a list of Prequalified and Tested Signing and Delineation Materials. The Engineer shall not be precluded from sampling and testing products on the list of Prequalified and Tested Signing and Delineation Materials.

The manufacturer of products on the list of Prequalified and Tested Signing and Delineation Materials shall furnish the Engineer a Certificate of Compliance in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications for each type of traffic product supplied.

For those categories of materials included on the list of Prequalified and Tested Signing and Delineation Materials, only those products shown within the listing may be used in the work. Other categories of products, not included on the list of Prequalified and Tested Signing and Delineation Materials, may be used in the work provided they conform to the requirements of the Standard Specifications.

The "Prequalified and Tested Signing and Delineation Materials," list is available at:

http://www.dot.ca.gov/hq/esc/oe/specifications/SSPs/2006-SSPs/Sec_08_Mtls/08-1_Misc/S8-M03_E_A12-03-09.doc

08-1.07 VALUE ENGINEERING CHANGE PROPOSALS (VECP) – You may submit a VECP to reduce any of the following:

1. Total cost of construction
2. Construction activity duration
3. Traffic congestion

Before preparing a VECP, meet with the Engineer to discuss:

1. Proposal concept
2. Permit issues
3. Impact on other projects
4. Project impacts, including traffic, schedule, and later stages
5. Peer reviews
6. Overall proposal merits
7. Review times required by the Department and other agencies

The VECP must not impair the project's essential functions or characteristics, such as:

1. Service life
2. Operation economy
3. Maintenance ease
4. Desired appearance
5. Design and safety

The VECP must include:

1. Description of the contract specifications and drawing details for performing the work and the proposed changes.

2. Itemization of contract specifications and drawing details that would be changed.

3. Detailed cost estimate for performing the work under the existing contract and under the proposed change.

Determine the estimates under Section 9-1.03, "Force Account Payment."

4. Deadline for the Engineer to decide on the changes.

5. Bid items affected and resulting quantity changes.

The Department is not required to consider a VECP. If a VECP is similar to a change in the plans or specifications being considered by the Department at the time the proposal is submitted or if the proposal is based on or similar to drawings or specifications adopted by the Department before Contract award, the Department does not accept the VECP and may make these changes without VECP payments.

Until the Department approves a change order incorporating the VECP or parts of it, continue to perform the work under the contract. If the Department does not approve a change order before the deadline stated in the VECP or other date you subsequently stated in writing, the VECP is rejected. The Department does not adjust time or payment for a rejected VECP.

The Department decides whether to accept a VECP and the estimated net construction-cost savings from adopting the VECP or parts of it.

The Department may require you to accept a share of the investigation cost as a condition of reviewing a VECP.

After written acceptance, the Department considers the VECP and deducts the agreed cost.

If the Department accepts the VECP or parts of it, the Department issues a change order that:

1. Incorporates changes in the contract necessary to implement the VECP or the parts adopted

2. Includes the Department's acceptance conditions

3. States the estimated net construction-cost savings resulting from the VECP

4. Obligates the Department to pay you 50 percent of the estimated net savings

In determining the estimated net construction-cost savings, the Department excludes your VECP preparation cost and the Department's VECP investigation cost, including parts paid by you.

If a VECP providing for a reduction in working days is accepted by the Department, 50 percent of the reduction is deducted from contract time.

If a VECP providing for a reduction in traffic congestion or avoiding traffic congestion is accepted by the Department, the Department pays 60 percent of the estimated net savings in construction costs attributable to the VECP. Submit detailed traffic handling comparisons between the existing contract and the proposed change, including estimates of the traffic volumes and congestion.

The Department may apply an accepted VECP for general use on other contracts.

If an accepted VECP is adopted for general use, the Department pays only the contractor who first submitted the VECP and only to the contracts awarded to that contractor before the submission of the accepted VECP.

If the Department does not adopt a general-use VECP, an identical or similar submitted proposal is eligible for acceptance.

The Contractor's attention is directed to the fact that the use of separate geotextile and geonet components, as well as all other components to be incorporated in the work, has been expressly approved by the Regional Water Quality Control Board, and that the use of single-sided geocomposite, or substitution of any other specified components, would require approval of both the Engineer and the RWQCB. The Contractor may submit a VECP proposal for such substitution only in strict conformance with the requirements in said Section 4-1.035B and these special provisions, and any such proposal shall provide for a substantial net reduction in cost to the County or will not be considered. Furthermore, the determination to consider or not consider any VECP shall, irrespective of proposed cost reductions and/or reductions in working days allotted for completion of the contract shall be at the Engineer's sole discretion.

Other VECPs which may be submitted by the Contractor must provide for a substantial reduction in net cost to the County and/or in working days allotted for completion of the contract.

The provisions of section 4-1.035C, "Value Analysis Workshop," of the 2006 Amendments shall not apply to this contract.

SECTION 8-2 CONCRETE

08-2.01 PORTLAND CEMENT CONCRETE - Portland cement concrete shall conform to the provisions in Section 90, "Portland Cement Concrete," of the Standard Specifications and these special provisions.

The Contractor is hereby informed that all requirements associated with Portland Cement Concrete, including requirements pertaining to the qualities of mineral admixtures, will be strictly enforced, except where expressly noted in these special provisions. Mix designs not conforming to all requirements shall be rejected, and the Contractor shall not be granted any extension of contract time nor any additional compensation therefor.

The California Department of Transportation maintains a list of sources of fine and coarse aggregate that have been approved for use with a reduced amount of supplementary cementitious material in the total amount of cementitious material to be used.

If the aggregates used in the concrete are on the Department of Transportation's list, the minimum amount of supplementary cementitious material shall conform to the following:

1. If fly ash or natural pozzolan conforming to the provisions in Section 90-2.01C, "Required Use of Supplementary Cementitious Materials," of the Standard Specifications is used, the minimum amount of supplementary cementitious material shall be 15 percent by weight of the total cementitious material; or
2. If silica fume conforming to the provisions in Section 90-2.01C, "Required Use of Supplementary Cementitious Materials," of the Standard Specifications is used, the minimum amount of supplementary cementitious material shall be 7 percent by weight of the total cementitious material.

The limitation on tricalcium silicate (C_3S) content in Type II cement specified in Section 90-2.01A, "Cement," of the Standard Specifications shall not apply.

SECTION 9 - DESCRIPTION OF WORK

Description of work: The work to be done consists, in general, of the excavation of Modules 7 & 8, installation of a composite liner system consisting of geosynthestics over a geosynthetic clay liner, and the performance of a geoelectric leak detection survey. It also includes but not limited to the installation of Modules 7 & 8 sump liner system, riser pipes, clean out pipes and all miscellaneous work associated with the installation of these items.

Clearing and grubbing is to be performed and the project site is to be finished.

Other items or details not mentioned herein that are required by the plans, Standard Specifications or these special provisions shall be performed, constructed, furnished or installed.

SECTION 10 - CONSTRUCTION DETAILS

10-1.01 ORDER OF WORK - Order of work shall conform to the provisions in Section 5-1.05, "Order of Work," of the Standard Specifications and these Special Provisions.

The Contractor is herby informed that construction operations shall not commence prior to 7:00 A.M. and shall conclude no later than 5:00 P.M.

The exception to the work performed between 7 AM and 5 PM is the leak location survey. It is anticipated that the leak location survey will be performed after 5 PM, if necessary, and all coordination will be per these Special Provisions, the Standard Specifications, and the Engineer.

Unless otherwise permitted in writing by the Engineer, the Contractor shall construct the work as set forth herein.

10-1.02 CONSTRUCTION SITE MANAGEMENT

GENERAL

Summary

This work includes controlling potential sources of water pollution before they come in contact with storm water systems or watercourses.

Control material pollution and manage waste and non-stormwater at the job site by implementing effective handling, storage, use, and disposal practices.

For information on documents specified in these special provisions, refer to the Department's Preparation Manual, Dewatering Guide, and BMP Manual.

Preparation Manual, Dewatering Guide, and BMP Manual are available from the Department's Construction Storm Water and Water Pollution Control web site at:

http://www.dot.ca.gov/hq/construc/stormwater/stormwater1.htm

Definitions and Abbreviations

Active and inactive areas: (1) Active areas have soil disturbing work activities occurring at least once within 14 days, and (2) Inactive areas are areas that have not been disturbed for at least 15 days.

BMP Manual: The Department's Construction Site Best Management Practices (BMP) Manual.

CDPH: California Department of Public Health

Dewatering Guide: The Department's Field Guide to Construction Site Dewatering.

ELAP: Environmental Laboratory Accreditation Program

Minor spills: Small quantities of oil, gasoline, paint, or other material that are small enough to be controlled by a first responder upon discovery of the spill.

MSDS: Material Safety Data Sheet

Preparation Manual: The Department's Storm Water Pollution Prevention Plan (SWPPP) and Water Pollution Control Program (WPCP) Preparation Manual.

Semi-significant spills: Spills that can be controlled by a first responder with help from other personnel.

Significant or hazardous spills: Spills that cannot be controlled by construction personnel.

WPC: Water Pollution Control

WPC Manager: Water Pollution Control Manager as defined under "Water Pollution Control" of these special provisions.

Submittals

Submit the following:

1. MSDS at least 5 days before material is used or stored
2. Monthly inventory records for material used or stored
3. Copy of written approval to discharge into a sanitary sewer system at least 5 days before beginning discharge activities

Quality Control and Assurance

Not Used

MATERIALS

Not Used

CONSTRUCTION

Spill Prevention and Control

Implement spill and leak prevention procedures for chemicals and hazardous substances stored at the job site. If you spill or leak chemicals or hazardous substances at the job site, you are responsible for all associated cleanup costs and related liability.

As soon as it is safe, contain and clean up spills of petroleum products, sanitary and septic waste substances listed under CFR Title 40, Parts 110, 117, and 302.

Minor Spills

Clean up minor spills using the following procedures:

1. Contain the spread of the spill
2. Recover the spilled material by absorption
3. Clean the contaminated area
4. Dispose of the contaminated material promptly and properly

Semi-significant Spills

Clean up semi-significant spills immediately by the following procedures:

1. Contain the spread of the spill

2. Recover the spilled material using absorption whenever a spill occurs on a paved surface or an impermeable surface
3. Contain the spill with an earthen dike and dig up the contaminated soil for disposal whenever a spill occurs on soil
4. If the spill occurs during precipitation, cover the spill with plastic or other material to prevent contaminated runoff
5. Dispose of the contaminated material promptly and properly

Significant or Hazardous Spills

Immediately notify qualified personnel of significant or hazardous spills. Do not let construction personnel attempt to clean up the spill until qualified staff have arrived. Do the following:

1. Notify the Engineer and follow up with a written report
2. Obtain the services of a spills contractor or hazardous material team immediately
3. Notify the local emergency response team by dialing 911 and county officials at the emergency phone numbers kept at the job site
4. Notify the Governor's Office of Emergency Services Warning Center at (805) 852-7550
5. Notify the National Response Center at (800) 424-8802 regarding spills of Federal reportable quantities under CFR Title 40, Parts 110, 119, and 302
6. Notify other agencies as appropriate, including:
   - 6.1. Fire Department
   - 6.2. Public Works Department
   - 6.3. Coast Guard
   - 6.4. Highway Patrol
   - 6.5. City Police or County Sheriff Department
   - 6.6. Department of Toxic Substances
   - 6.7. California Division of Oil and Gas
   - 6.8. Cal OSHA
   - 6.9. Regional Water Resources Control Board

Report minor, semi-significant, and significant spills to the WPC Manager. The WPC Manager must notify the Engineer immediately. The WPC Manager must oversee and enforce proper spill prevention and control measures.

Prevent spills from entering storm water runoff before and during cleanup. Do not bury spills or wash spills with water.

Keep material or waste storage areas clean, well organized, and equipped with enough cleanup supplies for the material being stored.

Material Management

General

Material must be delivered, used, and stored for this job in a way that minimizes or eliminates discharge of material into the air, storm drain systems, and watercourses.

Implement the practices described under "Material Management" of these special provisions while taking delivery of, using, or storing any of the following materials:

1. Hazardous chemicals including acids, lime, glues, adhesives, paints, solvents, and curing compounds
2. Soil stabilizers and binders
3. Fertilizers
4. Detergents
5. Plaster
6. Petroleum materials including fuel, oil, and grease
7. Asphalt components and concrete components
8. Pesticides and herbicides

Employees trained in emergency spill cleanup procedures must be present during the unloading of hazardous materials or chemicals.

If practicable, use less hazardous materials.

Material Storage

Use the following material storage procedures:

1. Store liquids, petroleum materials, and substances listed in CFR Title 40, Parts 110, 117, and 302 as specified by the Department, and place them in secondary containment facilities.
2. Secondary containment facilities must be impervious to the materials stored there for a minimum contact time of 72 hours.
3. Cover secondary containment facilities during non-working days and when precipitation is predicted. Secondary containment facilities must be adequately ventilated.
4. Keep secondary containment facility free of accumulated rainwater or spills. After precipitation, or in the event of spills or leaks, collect accumulated liquid and place into drums within 24 hours. Handle these liquids as hazardous waste under "Hazardous Waste" of these special provisions unless testing determines them to be nonhazardous.
5. Do not store incompatible materials, such as chlorine and ammonia, in the same secondary containment facility.
6. Store materials in the original containers with the original material labels maintained in legible condition. Replace damaged or illegible labels immediately.
7. Secondary containment facilities must have the capacity to contain precipitation from a 24-hour-long, 25-year storm, and 10 percent of the

aggregate volume of all containers, or entire volume of the largest container within the facility, whichever is greater.

8. Store bagged or boxed material on pallets. Protect bagged or boxed material from wind and rain during non-working days and while precipitation is predicted.
9. Provide sufficient separation between stored containers to allow for spill cleanup or emergency response access. Storage areas must be kept clean, well organized, and equipped with cleanup supplies appropriate for the materials being stored.
10. Repair or replace perimeter controls, containment structures, covers, and liners as necessary. Inspect storage areas before and after precipitation, and at least weekly during other times.

Stockpile Management

Use the following stockpile management procedures:

1. Reduce or eliminate potential water pollution from stockpiled material including soil, paving material, and pressure treated wood.
2. Locate stockpiles:

   2.1. If within the floodplain, at least 100 feet from concentrated flows of storm water, drainage courses, and inlets unless approved

   2.2. If outside the floodplain, at least 50 feet from concentrated flows of storm water, drainage courses, and inlets unless approved

Install WPC practices within 15 days or before predicted precipitation, whichever occurs first.

Active and inactive soil stockpiles must be:

1. Covered with soil stabilization measures, plastic sheeting, or geosynthetic fabric
2. Surrounded with a linear sediment barrier

Control wind erosion year round under Section 10, "Dust Control" of the Standard Specifications.

Repair or replace linear sediment barriers and covers as needed to keep them functioning properly. If sediment accumulates to 1/3 of the linear sediment barrier height, remove the sediment.

Waste Management

Solid Waste

Do not allow litter or debris to accumulate anywhere at the job site, including storm drain grates, trash racks, and ditch lines. Pick up and remove trash and debris from the job site at least once a week. The WPC Manager must monitor solid waste storage and disposal procedures at the job site.

If practicable, recycle nonhazardous job site waste and excess material. If recycling is not practicable, disposal must comply with Section 7-1.13, "Disposal of Material

Outside the Highway Right of Way" of the Standard Specifications. Highway Right of Way shall include American Avenue Disposal Site boundaries.

Disposal of solid waste generated during the Phase III Module 4, 5 and 6 project will be the sole responsibility of the contractor. All waste disposed of at AADS shall be at the published rates. Only waste permitted by various regulatory agencies to be disposed of at the site can be accepted for disposal.

Furnish enough closed-lid dumpsters of sufficient size to contain any solid waste generated by work activities. When the refuse reaches the fill line, empty the dumpsters. Dumpsters must be watertight. Do not wash out dumpsters at the job site. Furnish additional containers and pick up dumpsters more frequent during the demolition phase of construction.

Solid waste includes:

1. Brick
2. Mortar
3. Timber
4. Metal scraps
5. Sawdust
6. Pipe
7. Electrical cuttings
8. Non-hazardous equipment parts
9. Styrofoam and other packaging materials
10. Vegetative material and plant containers from highway planting
11. Litter and smoking material, including litter generated randomly by the public
12. Other trash and debris

Furnish and use trash receptacles at the job site yard, field trailers, and locations where workers gather for lunch and breaks.

Any and all waste accumulated from Construction activities must be disposed of properly, which includes paying the fees associated with construction-related debris if disposed of at the American Avenue Disposal Site facilities.

Hazardous Waste

Use hazardous waste management practices if waste is generated at the job site from the following substances:

1. Petroleum products
2. Asphalt products
3. Concrete curing compound
4. Pesticides
5. Acids
6. Paints
7. Stains

8. Solvents
9. Wood preservatives and treated posts
10. Roofing tar
11. Road flares
12. Lime
13. Glues and adhesives
14. Materials classified as hazardous by California Code of Regulations, Title 22, Division 4.5; or listed in CFR Title 40, Parts 110, 117, 261, or 302

The WPC Manager must oversee and enforce hazardous waste management practices. Minimize the production of hazardous materials and hazardous waste at the job site. If damaged, repair or replace perimeter controls, containment structures, and covers.

If hazardous material levels are unknown, use a laboratory certified by ELAP under CDPH to sample and test waste to determine safe methods for storage and disposal.

Separate potentially hazardous waste from nonhazardous waste at the job site. Hazardous waste must be handled, stored, and disposed of under California Code of Regulations, Title 22, Division 4.5, Section 66262.34; and in CFR Title 49, Parts 261, 262, and 263.

Store hazardous waste in sealed containers constructed and labeled with the contents and date accumulated under California Code of Regulations, Title 22, Division 4.5; and in CFR Title 49, Parts 172, 173, 178, and 179. Keep hazardous waste containers in temporary containment facilities under "Material Storage" of these special provisions.

Furnish containers with adequate storage volume at convenient locations for hazardous waste collection. Do not overfill hazardous waste containers. Do not mix hazardous wastes. Do not allow potentially hazardous waste to accumulate on the ground. Store containers of dry waste that are not watertight on pallets. Store hazardous waste away from storm drains, watercourses, moving vehicles, and equipment.

Dispose of hazardous waste within 90 days of being generated. Use a licensed hazardous waste transporter to take hazardous waste to a Class I Disposal Site. Submit a copy of uniform hazardous waste manifest forms within 24 hours of transporting hazardous waste.

The WPC Manager must inspect the following daily:

1. Storage areas for hazardous materials and wastes
2. Hazardous waste disposal and transporting activities
3. Hazardous material delivery and storage activities

Contaminated Soil

Identify contaminated soil from spills or leaks by noticing discoloration, odors, or differences in soil properties. Soil with evidence of contamination must be sampled and tested by a laboratory certified by ELAP.

If levels of contamination are found to be hazardous, handle and dispose of the soil as hazardous waste.

Prevent the flow of water, including ground water, from mixing with contaminated soil by using one or a combination of the following measures:

1. Berms
2. Cofferdams
3. Grout curtains
4. Freeze walls
5. Concrete seal course

If water mixes with contaminated soil and becomes contaminated, sample and test the water using a laboratory certified by ELAP. If levels of contamination are found to be hazardous, handle and dispose of the water as hazardous waste.

Sanitary and Septic Waste

Do not bury or discharge wastewater from sanitary or septic systems within American Avenue Disposal Site. The WPC Manager must inspect sanitary or septic waste storage and monitor disposal procedures at least weekly. Sanitary facilities that discharge to the sanitary sewer system must be properly connected and free from leaks. Place sanitary facilities at least 50 feet away from storm drains, watercourses, and flow lines.

Obtain written approval from the local health agency, city, county, and sewer district before discharging from a sanitary or septic system directly into a sanitary sewer system, and submit a copy to the Engineer. Comply with local health agency provisions while using an on-site disposal system.

Liquid Waste

Use practices that will prevent job site liquid waste from entering storm drain systems or watercourses. Liquid wastes include the following:

1. Drilling slurries or fluids
2. Grease-free or oil-free wastewater or rinse water
3. Dredgings, including liquid waste from drainage system cleaning
4. Liquid waste running off a surface including wash or rinse water
5. Other non-stormwater liquids not covered by separate permits

Hold liquid waste in structurally sound, leak proof containers such as:

1. Roll-off bins
2. Portable tanks

Liquid waste containers must be of sufficient quantity and volume to prevent overflow, spills and leaks.

Store containers:

1. At least 50 feet from moving vehicles and equipment
2. If within the floodplain, at least 100 feet from concentrated flows of storm water, drainage courses, watercourses, and storm drain inlets unless approved

3. If outside the floodplain, at least 50 feet from concentrated flows of storm water, drainage courses, watercourses, and storm drain inlets unless approved

Liquid waste may require testing to determine hazardous material content before disposal.

If an approved location is available within the job site, fluids and residue exempt under California Code of Regulations, Title 23, Section 2511(g) may be dried by evaporation in a leak proof container. Dispose of remaining solid waste under "Solid Waste" of these special provisions.

Non-Storm Water Management

Water Control and Conservation

Manage water used for work activities to prevent erosion or discharge of pollutants into storm drain systems or watercourses. Obtain approval before washing anything at the job site with water that could discharge into a storm drain system or watercourse. Report discharges immediately.

If water is used at the job site, implement water conservation practices. Inspect irrigation areas. Adjust watering schedules to prevent erosion, excess watering, or runoff. Shut off water source to broken lines, sprinklers, or valves, and repair breaks within 24 hours. If possible, reuse water from waterline flushing for landscape irrigation. Sweep and vacuum paved areas; do not wash them with water.

Direct job site water runoff, including water from water line repair, to areas where it can infiltrate into the ground and not enter storm drain systems or watercourses. Do not allow spilled water to escape water truck filling areas. If possible, direct water from off-site sources around the job site. Minimize the contact of off-site water with job site water.

Illegal Connection and Discharge Detection and Reporting

Inspect the job site and the site perimeter before starting work for evidence of illegal connections, discharges, or dumping. After starting work, inspect the job site and perimeter on a daily schedule.

Whenever illegal connections, discharges, or dumping are discovered, notify the Engineer immediately. Take no further action unless ordered by the Engineer. Assume unlabeled or unidentifiable material is hazardous.

Look for the following evidence of illegal connections, discharges, or dumping:

1. Debris or trash piles
2. Staining or discoloration on pavement or soils
3. Pungent odors coming from drainage systems
4. Discoloration or oily sheen on water
5. Stains or residue in ditches, channels or drain boxes
6. Abnormal water flow during dry weather
7. Excessive sediment deposits
8. Nonstandard drainage junction structures
9. Broken concrete or other disturbances near junction structures

Vehicle and Equipment Cleaning

Limit vehicle and equipment cleaning or washing at the job site except what is necessary to control vehicle tracking or hazardous waste. Notify the Engineer before cleaning vehicles and equipment at the job site with soap, solvents, or steam. Contain and recycle or dispose of resulting waste under "Liquid Waste" or "Hazardous Waste" of these special provisions, whichever is applicable. Do not use diesel to clean vehicles or equipment, and minimize the use of solvents.

Clean or wash vehicles and equipment in a structure equipped with disposal facilities. If using a structure is not possible, clean or wash vehicles and equipment in an outside area. The outside area must be:

1. Paved with AC, HMA, or concrete paving
2. Surrounded by a containment berm
3. Equipped with a sump to collect and dispose of wash water
4. If within the floodplain, located at least 100 feet from concentrated flows of storm water, drainage courses, watercourses, and storm drain inlets unless approved
5. If outside the floodplain, located at least 50 feet from concentrated flows of storm water, drainage courses, watercourses, and storm drain inlets unless approved

When washing vehicles or equipment with water, use as little water as possible. Hoses must be equipped with a positive shutoff valve.

Discharge liquid from wash racks to a recycle system or to another approved system. Remove liquids and sediment as necessary.

The WPC Manager must inspect vehicle and equipment cleaning facilities:

1. Daily if vehicle and equipment cleaning occurs daily
2. Weekly if vehicle and equipment cleaning does not occur daily

Vehicle and Equipment Fueling and Maintenance

If practicable, perform maintenance on vehicles and equipment off the job site.

If fueling or maintenance must be done at the job site, designate a site, or sites, and obtain approval before using. Minimize mobile fueling or maintenance.

If vehicle and equipment fueling and maintenance must be done at the job site, areas for the following activities must be:

1. On level ground
2. Protected from storm water run-on
3. If within the floodplain, located at least 100 feet from concentrated flows of storm water, drainage courses, watercourses, and storm drain inlets unless approved
4. If outside the floodplain, located at least 50 feet from concentrated flows of storm water, drainage courses, watercourses, and storm drain inlets unless approved

Use containment berms or dikes around the fueling and maintenance area. Keep adequate quantities of absorbent spill cleanup material and spill kits in the fueling

and maintenance area and on fueling trucks. Dispose of spill cleanup material and kits immediately after use. Use drip pans or absorbent pads during fueling or maintenance.

Fueling or maintenance activities must not be left unattended. Fueling nozzles must be equipped with an automatic shutoff control. Vapor recovery fueling nozzles must be used where required by the San Joaquin Valley Air Pollution Control District. When not in use, nozzles must be secured upright. Do not top-off fuel tanks.

Recycle or properly dispose of used batteries and tires.

The WPC Manager must inspect vehicle and equipment maintenance and fueling areas:

1. Daily when vehicle and equipment maintenance and fueling occurs daily
2. Weekly when vehicle and equipment maintenance and fueling does not occur daily

The WPC Manager must inspect vehicles and equipment at the job site for leaks and spills on a daily schedule. Operators must inspect vehicles and equipment each day of use.

If leaks cannot be repaired immediately, remove the vehicle or equipment from the job site.

Dewatering

Dewatering consists of discharging accumulated storm water, ground water, or surface water from excavations or temporary containment facilities.

If dewatering and discharging activities are specified under a work item such as "Temporary Active Treatment System" or "Dewatering and Discharge," perform dewatering work as specified in the section involved.

If dewatering and discharging activities are not specified under a work item and you will be performing dewatering activities, you must:

1. Submit a Dewatering and Discharge Plan under Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications and "Water Pollution Control" of these special provisions at least 10 days before starting dewatering activities. The Dewatering and Discharge Plan must include:
   - 1.1. Title sheet and table of contents
   - 1.2. Description of dewatering and discharge activities detailing locations, quantity of water, equipment, and discharge points
   - 1.3. Estimated schedule for dewatering and discharge (start and end dates, intermittent or continuous)
   - 1.4. Discharge alternatives such as dust control or percolation
   - 1.5. Visual monitoring procedures with inspection log
2. Conduct dewatering activities under the Departments' s "Field Guide for Construction Dewatering."
3. Ensure that any dewatering discharge does not cause erosion, scour, or sedimentary deposits that could impact natural bedding materials.
4. Discharge the water within the project limits. Dispose of the water in the same way as specified for material in Section 7-1.13 "Disposal of Material

Outside the Highway Right of Way" of the Standard Specification if it cannot be discharged within project limits due to site constraints.

5. Do not discharge storm water or non-stormwater that has an odor, discoloration other than sediment, an oily sheen, or foam on the surface. Notify the Engineer immediately upon discovering any such condition.

The WPC manager must inspect dewatering activities:

1. Daily when dewatering work occurs daily
2. Weekly when dewatering work does not occur daily

PAYMENT

The contract lump sum price paid for construction site management includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in spill prevention and control, material management, waste management, non-stormwater management, and dewatering and identifying, sampling, testing, handling, and disposing of hazardous waste resulting from your activities, as specified in the Standard Specifications and these special provisions, and as ordered by the Engineer.

10-1.03 COOPERATION - Attention is directed to Section 7-1.14, "Cooperation," and Section 8-1.10, "Utility and Non-Highway Facilities," of the Standard Specifications and these special provisions.

10-1.04 PROGRESS SCHEDULE - A progress schedule shall be submitted to the Engineer no less than five (5) working days before commencing work. The Contractor shall include time for Construction Quality Assurance (CQA) activities, e.g., geologic mapping and geoelectric liner leak detection survey in the progress schedule.

The Contractor shall schedule and coordinate the work of all Subcontractors using the critical path method of scheduling. The Contractor shall keep the Subcontractors informed of the progress schedule to enable the Contractor to plan and perform the work properly.

The Contractor shall notify the Engineer in writing **at least two (2) working days** prior to making any changes to the progress schedule. Changes in the progress schedule must be approved by the Engineer prior to being implemented by the Contractor.

Failure of the Contractor to provide an initial progress schedule prior to the start of work, or an updated progress schedule when requested by the Engineer, shall result in the suspension of all work on the contract until said progress schedule has been submitted. Any period of time during which work on the contract has been suspended, pending submittal of the progress schedule, shall be included in the contract as specified in Section 4 of these Special Provisions and no extension of time will be granted.

Any work performed by the Contractor after he has been notified that all work on the contract is suspended, pending submittal of a progress schedule, shall be considered as unauthorized and shall be subject to being rejected.

Failure of the Contractor to submit an initial or updated progress schedule shall result in no progress payments being made for any work until a satisfactory progress schedule has been submitted and approved by the Engineer.

The Contractor shall deliver copies of daily job logs to the Engineer on a weekly basis. At a minimum, the Contractor's daily job log shall include the Subcontractors 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.

10-1.05 DUST CONTROL - Dust control shall conform to the provisions in Section 10, "Dust Control," of the Standard Specifications and these Special provisions.

No separate payment will be made for any water used for dust control resulting from public traffic. The provisions in the last paragraph of Section 10-1.04 "Payment" of the Standard Specifications shall not apply.

The Contractor shall be responsible for the alleviation or prevention of dust nuisance caused by construction-related traffic.

In the event the Contractor does not apply water for dust control when the road conditions require it and it becomes necessary for the Engineer to notify the Contractor of his duty to apply water for dust control, the Contractor shall pay **$200.00 per 15-minute period or portion thereof** to the County for all the time required for the alleviation or prevention of such dust.

Such payment shall commence at the time when notice of the dust condition is given to the Contractor or his authorized representative by the Engineer and shall terminate when the condition is corrected. Such payment will be deducted from the Contractor's payment.

In addition thereto, when it is necessary for the Engineer to perform the work, the Contractor shall pay the actual cost for the performance thereof. Such amount will be deducted from the Contractor's payment.

10-1.06 MAINTAINING TRAFFIC - Attention is directed to Sections 7-1.08, "Public Convenience," 7-1.09, "Public Safety," and 12, "Construction Area Traffic Control Devices," of the Standard Specifications and to the Section entitled "Traffic Control System" elsewhere in these Special Provisions, and these Special Provisions.

Nothing in these Special Provisions shall be construed as relieving the Contractor from responsibility provided in said Section 7-1.09.

The type and location of signs, lights, flags, flagmen, and other traffic control and safety devices shall be in accordance with the current edition of the California Manual on Uniform Traffic Control Devices (MUTCD) issued by the State of California, Department of Transportation (Caltrans). This document may be accessed via the following website:

www.dot.ca.gov/hq/traffops/signtech/mutcdsupp/pdf/camutcd/CaliforniaMUTCD.pdf

Landfill traffic shall be permitted to pass through construction at all times unless otherwise specified in these Special Provisions.

That portion of the twenty-second paragraph of Section 7-1.08, "Public Convenience", of the Standard Specifications relieving the Contractor of responsibility for damage to the work caused by public traffic shall not apply.

When directed by the Engineer, traffic shall be routed through the work under one-way control.

Access to all driveways within or adjacent to the project site shall be maintained at all times.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in maintaining traffic shall be considered as included in the contract lump sum paid for Traffic Control System and no additional compensation will be allowed therefor.

10-1.07 MOBILIZATION - Mobilization shall conform to the provisions in Section 11, "Mobilization," of the Standard Specifications.

10-1.08 TRAFFIC CONTROL SYSTEM - The provisions in the first paragraph of Section 12-2.02 of the Standard Specifications, relating to the division of costs for furnishing flagmen, transporting flagmen, and to provide passage through the work, including pilot car costs, shall be revised as follows:

The Contractor shall bear all traffic control costs for work performed during the allotted working days for the contract. Payment will be as per lump sum item for Traffic Control System included in the contract. If a contract change order changes the character of the Traffic Control System plan or allocates additional working days, the provisions of Section 12-2.02 shall apply to the changes in traffic control necessary because of the contract change order. Flagging costs shall be borne by the County for the additional working days.

The Contractor shall prepare and submit to the Engineer, for review and approval, a traffic control plan identifying and describing the means and methods he will employ to institute and maintain traffic control for all phases of the work within the project. The traffic control plan, as a minimum, shall include provisions for traffic control during the operations for spreading emulsion, placing pavement fabric, paving, and all other major operations of the project. **The traffic control plan shall be submitted to the County Construction Engineer <u>a minimum of five (5) working days prior to the pre-construction conference.</u>**

The Contractor shall obtain written approval of the traffic control plan from the Engineer prior to the start of work.

Late submittal of the traffic control plan or revisions thereafter required, due to inadequacy of the plan, shall not be accepted as justification for the delay in start of the working days for the project.

The Contractor shall not perform any work within the Project Site until said traffic control plan has been approved by the Engineer.

If the Contractor's haul route crosses the existing entrance road or operation roads of the disposal site, then the Contractor shall provide a flagman at each point of crossing during hauling operations. Said flagman may stop traffic entering or exiting the disposal site or site of active garbage dumping only as necessary to allow construction vehicles to pass. Disposal site traffic shall not be stopped such that said vehicles are backed up beyond the front entrance gate to the site or to such an extent as to create a hazardous situation as determined by the Engineer.

The Contractor is responsible for placing appropriate traffic control signs as directed by the Engineer at the point of crossing and in advance of the location. Said signing shall be placed on American Avenue if necessary to warn traffic entering the Disposal Site.

If the Contractor does not provide the traffic control and it becomes necessary for the Engineer to notify the Contractor of the Contractor's duties according to the Standard Specifications and these Special Provisions, the Contractor shall pay $200 per 15-minute period or portion thereof to the County for all the time required to acquire the traffic control, including pilot car. If the Contractor does not take immediate measures to correct the traffic control deficiency, then the Engineer may terminate all crossing of construction equipment over the existing disposal site roads. Construction equipment shall not cross active roads until required flagmen and traffic control signs have been provided.

Such payment for failure to provide traffic control shall commence at the time notice of the improper traffic control condition is given to the Contractor or the Contractor's authorized representative by the Engineer and shall terminate when the condition is corrected. Such payment will be deducted from the Contractor's payment.

In addition thereto, when it is necessary for the Engineer to perform the work, the Contractor shall pay the actual cost for the performance thereof. This reimbursement will be in addition to any other penalties imposed in this section of the Special Provisions. Such amount will be deducted from the Contractor's payment.

The provisions in this section will not relieve the Contractor from the Contractor's responsibility to provide such additional devices or take such measures as may be necessary to comply with the provisions in Section 7-1.09, "Public Safety," of the Standard Specifications.

Traffic will be controlled by flagmen by eyesight, radio (walkie-talkie), or baton. In the event these methods do not work satisfactorily, as determined by the Engineer, a pilot car will be required.

The Engineer may require a pilot car to be used during any operation when the Contractor's operations cover an area beyond the line of sight, or beyond the range of radios or when the baton method does not function satisfactorily.

Full compensation for furnishing and operating the pilot car (including driver, radios, and any other equipment and labor required) shall be considered as included in the contract lump sum price paid for Traffic Control System and no separate payment will be made therefor.

If any component in the traffic control system is displaced, or ceases to operate or function as specified, from any cause, during the progress of the work, the Contractor shall immediately repair said component to its original condition or replace said component and shall restore the component to its original location.

Construction area signs and all advisory signs located beyond the limits of construction shall be furnished, installed, maintained, and removed when no longer required in accordance with the provisions of Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications and these Special Provisions.

All work specified in Section 7-1.08 of Standard Specifications shall be performed by the Contractor. The provisions as stated in the fifteenth paragraph (beginning with "After the surface...) of Section 7-1.08 of the Standard Specifications shall remain unchanged. All other provisions required by Section 7-1.08 of the Standard Specifications shall be paid for and included in the contract lump sum price paid for Traffic Control System and no further compensation shall be made therefor.

Full compensation for furnishing all labor, tools, materials, equipment, and incidentals and for doing all the work involved in Traffic Control System as specified in these Special Provisions, the Standard Specifications and as directed by the Engineer, shall be considered as included in the contract lump sum price paid for

Traffic Control System and no further compensation will be made therefor.

Full compensation for furnishing all labor, tools, equipment and incidentals and for doing all the work involved in providing flagmen and traffic control signs as directed by the Engineer shall be considered as included in the contract lump sum price paid for Traffic Control System and no further compensation will be made therefor.

10-1.09 OBSTRUCTIONS - Attention is directed to Sections 8-1.10, "Utility and Non-Highway Facilities," and 15, "Existing Highway Facilities," of the Standard Specifications and these special provisions.

10-1.10 EXISTING FACILITIES - The Contractor shall protect all existing facilities, including, but not limited to groundwater monitoring wells, production wells, landscaping, the perimeter chain link fence, perimeter berm, existing underground electrical conduits and facilities, the existing gas collection system, the existing leachate collection facility risers, the existing perimeter leachate collection system and vadose zone monitoring equipment from damage by the Contractor’s equipment and operations during construction.

All existing groundwater monitoring wells are necessary for continued groundwater monitoring and are to remain functional. The well locations are shown on the Plans and any within the Contractor’s work area or adjacent to the Contractor’s haul routes shall be field-located by the Contractor before beginning work on the site and marked with flagging, or other appropriate methods, to ensure that the wells are visible to all equipment operators.

Existing production wells, irrigation systems and landscaping are to be protected from damage by the Contractor.

All existing gas collection facilities and pipelines are to be protected from damage by the Contractor.

The existing leachate collection facility risers and the vadose zone monitoring stations are necessary for continued operation of the landfill and shall be marked by the Contractor to ensure that they are visible to all equipment operators.

The Engineer will inspect the, production wells, monitoring wells, perimeter chain link fence, perimeter berm, leachate collection facility risers, perimeter leachate collection system and the vadose zone monitoring equipment upon completion of the grading activities. If any of these facilities are damaged or destroyed by the Contractor's forces during the construction activities, the Contractor shall satisfactorily complete the necessary repairs or replacement as directed by the Engineer.

Full compensation for marking and protecting the monitoring wells, leachate collection facility risers and perimeter collection system, chain link fence, and the vadose zone monitoring equipment shall be included in the various items of work and no additional compensation will be allowed therefor.

The full cost of repairing or replacing any damaged facilities shall be borne by the Contractor and no additional compensation will be allowed therefor.

10-1.11 CLEARING AND GRUBBING - Clearing and grubbing shall conform to the provisions in Section 16, "Clearing and Grubbing," of the Standard Specifications and these Special Provisions.

The limits of clearing and grubbing shall be the limits of excavation and embankment construction. All existing vegetation, outside the areas to be cleared and grubbed, shall be protected from injury or damage resulting from the Contractor's operations.

In areas where excavation is to occur, existing vegetation does not need to be cleared prior to beginning excavation. Excavated soil which contains vegetation shall be placed in the Permanent Stockpile Areas as directed by the Engineer. Excavated soil which does not contain vegetation, as determined by the Engineer, shall be incorporated in embankment in accordance with the requirements in Section 10-1.14, “Earthwork,” of these Special Provisions or shall be placed in the Permanent Stockpile Areas as directed by the Engineer. Soil containing vegetation shall not be used for the construction of the operations layer.

Nothing herein shall be construed as relieving the Contractor of the Contractor’s responsibility for final cleanup of the project site as provided in Section 4-1.02, "Final Cleaning Up," of the Standard Specifications.

10-1.12 WATERING - Watering shall conform to the provisions in Section 17, "Watering," of the Standard Specifications and these Special Provisions.

Water necessary for dust control and compaction shall be applied by the Contractor.

There is a water tank and well located at the “Existing Pond…” shown on the Plans. The Contractor may use the pond to obtain water required for dust control, soil compaction, and for hydro-seeding operations. If the Contractor uses the pond, the Contractor shall provide a pump and any other appurtenances necessary to draw water from the pond. The Contractor shall <u>not</u> use the existing water supply equipment to obtain water.

Any modification of existing facilities or installation or construction of tanks or other facilities for storing or pumping water shall be approved by the Engineer before the Contractor may begin such modification, installation or construction.

County landfill operators will also be using the well and/or ponding basin during construction. The Contractor is required to coordinate with County landfill operators so that normal landfill operations are not impeded by the Contractor’s operations.

When water is not needed for dust control or proper prosecution of the work, watering equipment may be removed from the project.

10-1.13 CQA PLAN AND MONITORING - The Project Details section of these special provisions includes the Construction Quality Assurance (CQA) Plan and it is the contractor’s responsibility to be familiar therewith. The contractor is to conduct its operations required to facilitate the efforts of the CQA monitor and may be required to actively assist the CQA monitor using the Contractor’s forces and equipment.

Full compensation for performing all work required to facilitate the efforts of the CQA monitor shall be considered to be included in the various items of work, and no additional compensation will be allowed therefor.

10-1.14 EARTHWORK - Earthwork shall conform to the provisions in Section 19 of the Standard Specifications and these Special Provisions.

Except where a different relative compaction is specified in these Special Provisions, all embankment for the project shall be compacted in lifts to 90% relative compaction in accordance with the requirements in Section 19-5, “Compaction,” of the Standard

Specifications.

The County will perform construction staking for this project.

A. SURPLUS MATERIAL – All surplus excavated soil which is not used in the construction of the operations layer, embankment, or backfill, shall be transported to and distributed within the Permanent Stockpile Areas as shown on the Plans, as specified in these Special Provisions and as directed by the Engineer.

B. MODULE EXCAVATION - Excavation and embankment construction for Modules 7 & 8 shall conform to the Plans and these Special Provisions. Modules 7 & 8 shall be excavated and embankment shall be constructed to the lines and grades shown on the Plans and as directed by the Engineer.

Excavation from Modules 7 & 8 shall be used for embankment construction where necessary at the top of the module slopes to obtain the desired Geosynthetic Clay Liner (GCL) subgrade elevations as shown on the Plans. The embankment within the Modules 7 & 8 area shall be compacted to 95% relative compaction as specified in Section 10-1.13C, “Modules 7 & 8 Subgrade Preparation,” of these Special Provisions.

Requirements for embankment construction beyond the limits of the GCL are included in Section 10-1.13C, “Modules 7 & 8 Subgrade Preparation,” of these Special Provisions.

Full compensation for providing all labor, material, equipment and incidentals and for doing all the work involved in constructing module embankment to achieve the grades as shown on the Plans, specified in these Special Provisions and as directed by the Engineer shall be included in the unit price per cubic yard for Module Excavation and no additional compensation will be allowed therefor.

The contract unit price paid per cubic yard for module excavation shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in excavating the sump area and the leachate collection drain and pan lysimeter trench along with the remainder of Modules 7 & 8, including loading, hauling, and depositing the excavation, as shown on the Plans, as specified in these Special Provisions and the Standard Specifications and as directed by the Engineer.

C. MODULES 7 & 8 SUBGRADE PREPARATION - This section shall be used along with Section 11-1.03.1, “Preparation of Subgrade”, of these Special Provisions. The term subgrade as used in this section (Section 10-1.13C) shall refer to the surface directly beneath the GCL unless otherwise noted in the Plans or these Special Provisions. Modules 7 & 8 subgrade preparation shall only be performed where the Geosynthetic Clay Liner (GCL) is to be placed. Subgrade preparation for areas outside the area defined by the limits of the placement of GCL shall be performed in accordance with the requirements in the appropriate section of these Special Provisions and in accordance with the applicable requirements in the Standard Specifications for the type of construction in question.

The subgrade surface, prior to placement of the GCL, shall be graded to the lines and grades shown on the Plans. The uppermost eight (8) inches shall be scarified, brought to moisture content within two (2) percent of optimum

conditions and compacted to 95% of maximum dry density, as determined by ASTM methods.

Where embankment will be beneath the GCL, the embankment shall be compacted in lifts to 95% relative compaction and the uppermost eight (8) inches of embankment shall be scarified and re-compacted in accordance with the requirements in the preceding paragraph. Compaction will be achieved by means of available earthwork equipment suitable for achieving with consistency the requirements stated in these Special Provisions.

Where embankment is to be constructed beyond the limits of the GCL, the existing ground surface shall be cleared of all vegetation and deleterious materials, shall be scarified to a depth of 0.5-foot, watered, and compacted to 90% relative compaction. The embankment shall then be placed and compacted in lifts to 90% relative compaction. Compaction shall be achieved by means of available earthwork equipment suitable for achieving with consistency the requirements stated in these Special Provisions.

Following compaction, the prepared subgrade surface shall be "proof-rolled". The proof-rolling shall be performed with at least one pass of a roller type compactor weighing at least **8 tons**. Soft areas and areas exhibiting "pumping" shall be excavated, moisture conditioned, and re-compacted to the requirements of these Special Provisions. In the event unsuitable material is encountered below the subgrade elevations as determined by the Engineer, said unsuitable material shall be excavated, disposed of, and replaced as specified in Section 10-1.14D, “Unsuitable Material” and as directed by the Engineer.

The finished subgrade surface shall be graded to within one-tenth of one foot of the grades shown on the Plans. The surface shall be free of surface irregularities, runs, loose soil, rocks, stones, sticks, roots, sharp objects, voids, cracks, and ruts.

At such time that the Contractor believes that a portion of the subgrade has been prepared and conforms to the requirements in these Special Provisions, and at the grades shown on the plans, the Contractor shall, in writing, inform the Engineer that the subgrade or portion thereof is ready for verification by the CQA Monitor. The Contractor shall provide such written notice no less than three working days in advance of the day upon which a particular verification is being requested.

For purposes of subgrade verification, the subgrade shall be prepared in no more than four segments, and the Contractor may request up to four verification surveys for the entire site as the preparation of a given segment is completed.

The CQA Monitor will notify the Chief of Surveys of the County of Fresno that the subgrade is ready for a verification survey.
The subgrade surface will be surveyed on a 50’ x 50’ grid by the County of Fresno to ensure proper grades prior to placement of the GCL.

The County of Fresno’s licensed surveyor shall provide the CQA Monitor with point over point subgrade survey in AutoCAD format for comparison with each of the design grades. The Contractor shall not place GCL until the grades of the entire site have been checked and determined to be within the design tolerance required by the Specifications at each point. If it is determined the grades are not in compliance with the design grades, the Contractor shall rework the subgrade areas not in compliance with the design grades to achieve the design grades. At such time that the Contractor believes that the reworked subgrade area is in compliance with the design grades and conforms to the requirements in these Special Provisions, the Contractor shall, in writing, inform the Engineer

that the subgrade or portion thereof is ready for verification by the CQA Monitor. The Contractor shall provide such written notice no less than three working days in advance of the day upon which a particular verification is being requested.

In the event that the Contractor requests more than four verification surveys for the entire site or in the event that the subgrade surface, or a portion thereof, is found not to be in compliance with the requirements in these Special Provisions, the Contractor shall pay to the County the actual cost incurred by the County to perform verification surveys in excess of the number allowed found to be not in compliance with the requirements in these Special Provisions.

The Contractor is hereby notified that the cost of a County of Fresno survey to verify one (1) module is $1,600.00, or $3,200 for the entire site. The cost incurred by the County to perform the verification survey in excess of the number allowed shall be proportional to the area being re-verified to the area of one module but in no case less than $500. Such payments will be deducted from payments made to the Contractor.

The subgrade surface shall be maintained at a moisture content, as directed by the Engineer, sufficient to prevent excessive drying and cracking of the prepared surface. GCL shall not be placed until the subgrade surface has been has been inspected and accepted by the Installer and CQA Monitor in accordance with the requirements in Section 11-1.03.1.F of these Special Provisions.

The construction of the subgrade shall be strictly controlled and documented in compliance with these specifications. The Engineer may perform random grade checks and/or may perform additional testing of the subgrade surface to verify conformance with these Special Provisions at any time.

During construction, the CQA Monitor will perform the following testing of the Modules 7 and 8 subgrade:

1. Standard Classification of Soils for Engineering Purposes (ASTM D2487). One test per 22,500 Square Yards. (Approximately 14 tests). A passing result shall indicate that the subgrade soil is well-graded and amenable to compaction.
2. Laboratory Moisture of Subgrade materials (ASTM D2216). One Test Minimum Per every 10 nuclear gauge tests (Approximately 14 tests).
3. In-Situ Moisture and Dry Density Determinations (ASTM D6938). One Test Minimum Per 22,500 Square Yards (Approximately 116 tests).
4. Sand Cone (ASTM D1556) or Drive Tube (ASTM D2937). One for every 10 nuclear gauge tests (Approximately 6 tests).

For the gradation of the subgrade to be deemed acceptable, the results of the ASTM D422 test must indicate that 100% of the test sample passes a 0.5 inch sieve and that no less than 30% passes a #200 sieve. In the event that a sample or samples fail to meet this criteria, the CQA Monitor may perform additional ASTM D422 tests to determine the extent of the unsuitable material. Unsuitable material will be removed and replaced as directed by the Engineer in accordance with Section 10-1.14D, “Unsuitable Material”.

In the event that any of the preceding tests indicate failing results, the Contractor shall perform corrective measures to the subgrade area represented by the failing test result. The area of the subgrade represented by a test result will be determined by the Engineer.

If the failing result is due to a deficiency in the existing subgrade material, as determined by the Engineer, such corrective measures shall involve the

replacement of the material in accordance with the requirements in Section 10-1.14D, "Unsuitable Material," of these Special Provisions.

If the failing result is due to a deficiency in the Contractor's subgrade preparation operations, as determined by the Engineer, the Contractor shall perform corrective measures to the area represented by the failing test result as directed by the Engineer, and no additional compensation will be allowed therefor. After such corrective measures have been performed, retests shall be performed by the CQA Monitor for all tests which failed previously.

In the event that the total number of tests and retests exceeds the number of tests allowed in Table 8-1 shown in Section 8-1.02, then the Contractor shall pay to the County the penalty for each test performed in excess of the number of allowed per that table, plus a $100 administrative fee per re-test.

Such payments will be deducted from payments made to the Contractor.

The Contractor shall coordinate with the Engineer and shall schedule construction operations to facilitate establishment of the grid and the performance of subgrade materials testing by the CQA Monitor. Full compensation for coordinating with the Engineer and scheduling construction operations accordingly shall be considered to be included in the various items of work and no additional compensation will be allowed therefor.

The Contractor shall grade areas to drain where shown on the Plans.

All existing drainage ditches and drainage pipes to remain.

Full compensation for furnishing all labor, tools, equipment and incidentals, and for doing all of the work involved in grading areas to drain where shown on the Plans and as directed by the Engineer shall be considered as included in the contract prices paid for the various items of work and no separate payment will be made therefor.

Full compensation for providing all labor, material, equipment and incidentals and for doing all the work involved in subgrade preparation as shown on the Plans, as specified in these Special Provisions and as directed by the Engineer, shall be included in the unit price per square yard for Subgrade Preparation, and no additional compensation will be allowed therefor.

D. UNSUITABLE MATERIAL - In the event unsuitable material is encountered below the subgrade elevations as determined by the Engineer, said unsuitable material shall be excavated to a depth of 2 feet, disposed of, and replaced as shown on the Plans with suitable material, as specified in these Special Provisions, and as directed by the Engineer.

When unsuitable material is removed and disposed of, the resulting space shall be filled with material obtained from other areas of the excavation which is suitable for the planned use. Such suitable material shall be placed and compacted in layers as specified in these Special Provisions and in Section 19 of the Standard Specifications for constructing embankments.

If the unsuitable material to be replaced is within the Modules 7 & 8 area, suitable materials shall be prepared as specified in accordance with the requirements for module subgrade preparation.

If the unsuitable material to be replaced is not within the Modules 7 & 8 area, suitable materials shall be prepared as specified in accordance with the requirements for embankment which is beyond the limits of the GCL in Section 10-1.14C, "Modules 7 & 8 Subgrade Preparation" of these Special Provisions.

Disposal of unsuitable material shall involve loading, hauling, and depositing the unsuitable material at the stockpile locations as shown on the Plans, as directed by the Engineer, and as specified in these Special Provisions.

The quantity of unsuitable material to be removed, disposed of and replaced with suitable materials shall be determined from lines as established by the Engineer. Excavation and replacement of materials beyond the lines as determined by the Engineer will not be paid for.

The Contractor shall be responsible for excavating unsuitable material to a depth of 2 feet and for selecting the material obtained from other areas of the excavation to be used for replacement.

The quantity of unsuitable material to be paid for shall be the actual cubic yard quantity as calculated based on the lines as determined by the Engineer. No compensation will be allowed for quantities of unsuitable material in excess of that allowed by the Engineer.

The exact quantity of unsuitable material which may be encountered is unknown. For bidding purposes, a quantity has been estimated for unsuitable material. No adjustment of contract unit price will be made for any increase or decrease in the quantity of unsuitable material regardless of the reason for such increase or decrease. The provisions in Section 4-1.03B, “Increased or Decreased Quantities,” of the Standard Specifications shall not apply to the unsuitable material item.

The contract unit price paid per square yard for unsuitable material shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in excavating hauling, and depositing unsuitable material and loading, hauling placing, and compacting suitable material from the excavation to replace removed unsuitable material as shown on the Plans, as specified in these Special Provisions and the Standard Specifications and as directed by the Engineer.

E. EXCAVATED MATERIAL HAUL ROUTES – The Contractor shall submit proposed haul routes used to transport the excess excavated material to the stockpile locations to the Engineer for approval five (5) working days prior to the start of any work.

The Contractor’s equipment and materials shall not remain within 50 feet of any disposal site operations or entry road when not in use.

Upon approval of the Engineer, existing drainage ditches may be partially backfilled as needed to provide a haul road. A portion of the drainage ditch shall be maintained to provide for drainage of storm water. The drainage ditch shall be reconstructed to its original cross section upon completion of the excavation of Modules 7 & 8.

Full compensation for providing all labor, material, equipment and incidentals and for doing all the work involved in proposing and constructing haul routes and backfilling and restoring drainage ditches as shown on the Plans, specified in these Special Provisions and as directed by the Engineer shall be included in the unit prices paid for the various items of work and no additional compensation will be allowed therefor.

10-1.15 PERMANENT STOCKPILE AREAS 1 AND 2 – The Contractor shall utilize the area designated on the Plans as Permanent Stockpile Area 1 and Permanent

Stockpile Area 2 in accordance with these Special Provisions and as directed by the Engineer.

Permanent Stockpile Areas 1 and 2 shall be used by the Contractor to place excavated earthen material which is not used for the construction of the operations layer, embankment, or backfill. Material shall be placed in Permanent Stockpile Areas 1 and 2 as follows:

- As the stockpile areas are filled by the Contractor, the Contractor shall deposit material such that an ingress ramp is created commencing in the vicinity of the southeast corners of Permanent Stockpile Areas 1 and 2.
- As the stockpile areas are filled by the Contractor, the Contractor shall deposit material such that an egress ramp is created commencing in the vicinity of the southwest corners of Permanent Stockpile Areas 1 and 2.
- Such ramps shall each be 30 feet wide.
- Such ramps shall have a longitudinal grade of no more than 7%.
- Area 1 must be filled to a minimum grade of the original ground, as determined by the Engineer.
- Plan to deliver up to 4000 CY of excavated earthen material delivered to the tipping area as directed by the Engineer.
- The side slopes of the stockpiles shall be 2:1.
- One 15 foot wide bench shall be constructed approximately 50 feet above original ground.
- The height of the stockpile shall not exceed an elevation of 280 feet.
- Material shall be deposited such that, on an ongoing basis, the uppermost surface of the stockpile shall be planar and shall drain at a slope of 2% to the east. If material is placed in a manner which will cause ponding of water or drainage in an improper direction, the Contractor shall be required to grade the stockpile area as directed by the Engineer.
- No minimum compaction requirements are associated with the stockpile area; however, the Contractor shall be solely responsible for placing and maintaining the stockpile in the configuration as required herein. In the event that the Contractor has to repair slides, slip outs or other deviations from the required stockpile configuration, no additional compensation will be allowed therefor.

The owner will continue to use material from Permanent Stockpile Area 2 for daily operations, and it is anticipated that the average elevation of Permanent Stockpile Area 2 will be lower when construction begins, and no additional compensation will be allowed for such variation in elevation.

Contractors are advised that the Owner's equipment will be operating in the area designated as Permanent Stockpile Area 2 during construction. The Owner operates up to three scrapers to pick up soil for daily cover operations, and the Contractor's equipment is required to be operated such that the Owner's operations are not impeded. The frequency of the Owner's operations in Permanent Stockpile Area 2 is variable.

For the Contractor's information only, the Owner's scrapers (one 33 cubic yard capacity and two 23 cubic yard capacity) operate continuously up to six to eight hours each working day, making up to seven round-trips to Permanent Stockpile Area 2 each hour.

Selected sandy soil from the excavation to be used for the construction of the operations layer shall be stockpiled in the Permanent Stockpile Areas 1 or 2. Excavated material to be used in the construction of embankment shall also be placed in Permanent Stockpile Areas 1 and/or 2.

No stockpiling or Contractor traffic of any kind will be allowed on completed landfill modules, except for disposal of waste in accordance with the requirements in these Special Provisions.

Excavated material placed in the Permanent Stockpile Areas 1 and 2 shall be deposited in such a manner that the area will drain in the proper direction. If material is placed in a manner which will cause ponding of water or drainage in an improper direction, the Contractor shall grade the area as directed by the Engineer.

Full compensation for providing all labor, material, equipment and incidentals and for doing all the work involved in placing material in the Permanent Stockpile Areas 1 and 2 and transporting and placing excess material in the Permanent Stockpile Areas 1 and 2, as shown on the Plans, specified in these Special Provisions and as directed by the Engineer, shall be included in the unit prices paid for the various items of work and no additional compensation will be allowed therefor.

Full compensation for providing all labor, material, equipment and incidentals and for doing all the work involved in transporting and placing material in the Permanent Stockpile Areas 1 and 2 without impeding the Owner's operations and grading these areas, as shown on the Plans, specified in these Special Provisions and as directed by the Engineer shall be included in the unit prices paid for the various items of work and no additional compensation will be allowed therefor.

10-1.16 STAGING AREA – The Contractor shall utilize the area designated on the Plans as the Staging Area in accordance with these Special Provisions and as directed by the Engineer.

The Contractor may park construction equipment and may stage construction materials within the area designated on the Plans as the Staging Area.

The Contractor is hereby informed that, although the perimeter of the landfill site is fenced, the Staging Area is not separately fenced or otherwise secured. The Contractor may elect to install temporary fences to secure the Staging Area in accordance with these Special Provisions. The Contractor will be solely responsible for any costs incurred from damage to or loss of equipment or materials due to theft or vandalism, and no additional compensation will be allowed therefor.

The Contractor shall, prior to project completion, restore the Staging Area to its original configuration as directed by the Engineer. Any damage to any existing facilities which was caused by the Contractor or the Contractor's subcontractors shall be repaired by the Contractor at the Contractor's expense.

Full compensation for providing all labor, material, equipment, and incidentals and for doing all the work involved in staging equipment or materials in the designated Staging Area, restoring the area to its original configuration, repairing any damage caused by the Contractor or the Contractor's subcontractors, and any other work necessary, as shown on the Plans, specified in these Special Provisions and as directed by the Engineer shall be included in the unit prices paid for the various items of work and no additional compensation will be allowed therefor.

10-1.17 SELECTED MATERIAL STOCKPILE AREA – The Contractor shall designate an area within Permanent Stockpile Area 1 or Permanent Stockpile Area 2

as the Selected Material Stockpile Area in accordance with these Special Provisions and as directed by the Engineer. The designated area for the Selected Material Stockpile Area must be shown on a layout plan submittal. The location of the designated area for the Selected Material Stockpile Area must be approved by the Engineer prior to the start of construction.

The Selected Material Stockpile Area is not labeled on the plans, but is bounded to the west of Fill Area III as shown on the plans and must be within the limits of Permanent Stockpile Areas 1 or 2. Selected sandy soil from the excavation to be used for the construction of the operations layer shall be stockpiled in the Contractor's designated area of either Permanent Stockpile Areas 1 or 2. Additionally, at the Contractor's option and expense, additional selected sandy soil materials in excess of those needed for construction of the operations layer generated from excavation may be placed therein.

No materials other than those expressly approved by the Engineer as selected sandy soil shall be placed within the designated area. In the event the Contractor places materials therein without the approval of the Engineer, such materials shall be removed therefrom and transported to and placed in a non-designated area within the limits of Permanent Stockpile Areas 1 or 2 at the Contractor's expense.

Full compensation for providing all labor, material, equipment and incidentals and for doing all the work involved in transporting and placing selected material in the designated Selected Material Stockpile Area, removing and transporting such material for use in construction of the operations layer, removing any materials placed therein without the express approval of the Engineer and transporting and placing such materials in Permanent Stockpile Areas 1 or 2, as shown on the Plans, specified in these Special Provisions, as directed by the Engineer and without interfering with the Owner's ongoing operations, shall be included in the unit prices paid for the various items of work and no additional compensation will be allowed therefor.

10-1.18 FINISH PROJECT SITE - Finishing project site shall conform to the provisions in Section 22 of the Standard Specifications.

10-1.19 TEMPORARY FENCES – The Contractor shall furnish, construct and install temporary fences in accordance with these Special Provisions and as directed by the Engineer.

Temporary fences may be furnished, constructed and maintained by the Contractor in the event that the Contractor wishes to secure the equipment and/or materials staging areas.

If the Contractor elects to install temporary fences to secure the equipment and/or materials staging area, the Contractor shall submit a layout plan to the Engineer, and shall not commence with installation of temporary fences until said plan has been approved by the Engineer.

Temporary fences shall be removed from the site when they are no longer needed by the Contractor, and shall remain the property of the Contractor.

Except as otherwise specified in this section, temporary fences shall conform to the plan details and the specifications for permanent fences of similar character as provided in Section 80, "Fences," of the Standard Specifications.

Used materials may be utilized providing such materials are good, sound, and are suitable for the purpose intended.

Concrete footings for metal or wood posts will not be required for temporary fences.

Temporary fences that are damaged from any cause during the progress of the work shall be repaired or replaced by the Contractor at the Contractor's expense.

When no longer required for the work as determined by the Engineer, temporary fences shall be removed. Removed facilities shall become the property of the Contractor and shall be removed from the site of the work, except as otherwise provided in this section.

Removed temporary fence materials that are not damaged may be reused in the permanent work providing such materials conform to all of the requirements specified for the permanent work and such materials are new when used for the temporary fences.

Holes caused by the removal of temporary fences shall be backfilled in accordance with the provisions in the second paragraph of Section 15-1.02, "Preservation of Property," of the Standard Specifications.

Full compensation for installing, maintaining, removing, and disposing of temporary fences, shall be considered as included in contract prices paid for the various items of work and no additional compensation will be allowed therefor.

10-1.20 PERMEABLE MATERIAL - Permeable material shall be clean, washed, water worn gravel conforming to the provisions in Section 68-1.025 of the Standard Specifications and these Special Provisions, and shall have a minimum permeability of 1 cm/sec.

Permeability shall be tested by the County's material testing laboratory at a frequency of one test per 1,000 cubic yards. Any material not passing the permeability test or otherwise not in conformance with the requirements of these Special Provisions shall be rejected and shall be replaced by the Contractor at no additional cost to Owner.

The permeable material shall be Class 1, Type A. No crushed rock will be allowed. Permeable material shall be placed using equipment and methods that will not damage the Geomembrane. Trucks, tractors or other equipment traveling on the permeable material shall not exceed the maximum allowable equipment ground pressures listed in the chart below.

The methods to be used in placing the permeable material shall be approved in writing by the liner material installer and the Engineer prior to placement of the permeable material. The Contractor shall submit a written plan for the placement of the permeable material for approval at least 10 days in advance of the Contractor's proposed starting date. The Contractor shall comply with the maximum allowable equipment ground pressures listed in the following table:

Maximum Allowable Equipment Ground Pressure (psi)	Thickness of Permeable Material Over Geosynthetics (feet)
5	1.0
10	1.5
15	2.0
>20	3.0

It is necessary for the permeable material to contain some moisture to facilitate the geoelectric leak detection survey. The Contractor shall be responsible for ensuring that sufficient moisture is present in the permeable material to perform the geoelectric leak detection survey.

For the entire duration of the contract, the Contractor shall, as often as necessary as directed by the Engineer, remove and dispose of any excess water which has collected in the sump or elsewhere within Modules 7 & 8. The Contractor shall be responsible for maintaining the sump and Modules 7 & 8 and for pumping out any water which collects in the sump or elsewhere within Modules 7 & 8, regardless of the source of said water.

After the permeable material has been placed, the Contractor shall maintain it free of ruts, depressions, and damage resulting from the hauling and handling of any material, equipment, tools, etc. until such time as the overlying materials are placed.

The Contractor shall use all means necessary to protect all prior work, including all materials and completed work of other sections.

In the event of damage, the Contractor shall immediately make all repairs and replacements necessary, to the approval of the Engineer and at no additional cost to the Owner.

The quantity of permeable material shall be measured and paid for by the cubic yard of permeable material complete in place as calculated from lines and grades shown on the Plans.

The contract unit price paid per cubic yard for permeable material shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in installing the permeable material, including testing, removing and disposing of water, and maintaining the permeable material for the duration of the project, as shown on the Plans and as specified in these Special Provisions and as directed by the Engineer.

The contract lump sum price paid for Geoelectric Leak Detection shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in performing the work for the Geoelectric Leak Detection surveys as referenced in Section 11-2.03.6 of these Special Provisions and as directed by the Engineer.

10-1.21 LEACHATE METERING PIPE & FITTINGS

PVC Plastic Pipe and Fittings shall be furnished and installed including but not limited to all labor, materials, tools, supervision, transportation, equipment and incidentals necessary to install PVC plastic pipe and fittings as shown on the Plans, as specified in these Special Provisions, and as directed by the Engineer.

All PVC piping used in the Work shall be Schedule 80, unless noted otherwise. PVC piping used in the Work shall meet the standardized dimensional requirements of ASTM D-1785 for Schedule 40, 80, and 120 PVC pipe.

PVC fittings used in the Work shall meet the requirements of ASTM D-2464, ASTM D-2466, and ASTM D-2467 for PVC fittings.

PVC pipe made in accordance with ASTM D-1785, Schedule 40, 80, and 120, shall have an ASTM D-1784 Cell Classification of 12454.

PVC Pipe shall meet Dimensions and Tolerances (IPS Schedule 40 Series), Pipe Flattening, and Impact Strength requirements of ASTM F-891.

The following information shall be clearly marked on the fittings and pipe, at regular

intervals:

A. Name and/or trademark of the pipe manufacturer.

B. Nominal pipe size.

C. Pipe Schedule.

D. Material designation (e.g. PE 3408).

E. Production code for which date and place of manufacture can be determined.

All PVC fittings used in the work shall be Schedule 80, unless noted otherwise. Fitting components that use socket type solvent welded connections shall have socket diameters, lengths, and wall thickness as required by ASTM D-2466 for SCH 40 or ASTM D-2467 for SCH 80.

Schedule 80 components using taper pipe thread connections shall have thread lengths, diameters, and configurations in conformance with ASTM D-2464 and ANSI B 1.20.1.

Fittings shall be industrial, heavy duty, hub style.

Unions shall be O-Ring seal type having interchangeable components with true union valves for maximum system versatility. Unions intended for joining dissimilar materials shall be the transition type, which utilize components of the two dissimilar materials, joined with an O-Ring or flex hose to absorb the thermal expansion differential.

Socket fittings shall be pressure rated the same as the corresponding size pipe prescribed by ASTM D-1785. Threaded fittings shall be pressure rated at 50% of the rating for socket fittings.

Valves, unions, and flanges shall be pressure rated at 150 psi for water service at 73 F, non-shock and have a minimum burst requirement 3.3 times the rated pressure, unless otherwise noted in these special provisions.

If necessary, provide 150-pound, flat-face, socket-type Schedule 80 PVC flanges. Diameter and drilling of flanges shall comply with ANSI B16.5 for Class 150. Provide full-face, neoprene flange gaskets, 1/16-inch thick with "A" scale hardness of 45 to 60 durometer. Provide correct number and sizes of hexagon bolts, washers, and hexagon nuts, electrogalvanized with zinc or cadmium.

PVC Solvent Primer: Provide solvent primer as recommended by PVC product supplier and complying with ASTM F 656.

PVC Solvent Cement: Provide medium-bodied solvent cement as recommended by PVC product supplier and complying with ASTM D 2564.

The Contractor shall handle pipe, fittings, valves and accessories in a manner that will ensure installation in sound, undamaged condition; equipment, tools, and methods used in unloading, reloading, hauling and laying pipe and fittings shall be such that the materials are not damaged and in a manner as to avoid shock. Pipe and fittings shall not be dropped or dumped.

The Contractor shall provide adequate storage for all materials and equipment delivered to the job site. Pipe, fittings and appurtenances shall be stored in a flat, horizontal position and/or per Manufacturer’s instructions, until ready for installation. Protect from direct sunlight for extended periods of time.

Joining, laying, suspending, and pulling of pipe shall be accomplished by personnel experienced in working with the specified pipe. Installation shall be as specified by the manufacturer's recommended installation procedures. The pipe couplings and fittings shall be cleaned of all foreign material such as dirt, grease, oil, or moisture prior to placement. The pipe shall be laid and suspended in a manner that does not damage pipe.

Adaptors for HDPE pipe to PVC shall be HDPE SDR 11 to 316 stainless steel threaded end as shown on the plans and specified in these Special Provisions.

Adjoining sections of PVC pipe shall be solvent cement welded. Solvent cemented joints shall be prepared in accordance with ASTM D-2855. All contraction of solvent weld pipe and fittings shall be performed in accordance with ASTM F-402.

Pipe supports shall be 12-gauge double-strut posts at locations shown on the Drawings. Post and fittings shall be hot-dipped galvanized and conform to ASTM A36. All nuts, bolts, and washers shall be hot-dipped galvanized mild steel. Supports shall be Uni-Strut, or approved equal.

Ball valves shall have Type 316 stainless steel body and ball with glass-filled PTFE seats and PTFE seals. Valves shall be rated for 1,000 psi at 200° F maximum pressure, 28.95 inches Hg vacuum, and a temperature range of 0 to 450° F. Ball valves shall be McMaster-Carr or approved equal.

Check valves shall be swing check type with PVC body, flanged ends, ethylene propylene diene monomer (EPDM) seals, and spring-assist closure, rated at 150 psi, by Asahi, or equal. Any metal components shall be Type 316 stainless steel.

Valve connections shall be NPT female at the sizes shown on the Project Drawings.

Valves shall have an oval handle.

The contract price paid for lump sum for leachate metering pipe & fittings shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in providing and installing PVC pipe and fittings, valves, adaptors, pipe supports as shown on the Plans, as specified in these Special Provisions and the Standard Specifications and as directed by the Engineer.

10-1.22 SUMP CONTROL PANEL BACKBOARDS AND HARDWARE – Sump control panel plywood backboards and hardware shall be manufactured, installed, and painted as shown on the Plans, as specified in these Special Provisions, and as directed by the Engineer.

Painting of the plywood backboards shall be per Specification Section 59-4, Painting Timber.

Plywood used for the backboards shall not be treated wood.

Wood primer shall be the color white painted in two coats on each side. The primer can be placed prior to the erection of the backboards.

The finish coats of paint shall be two (2) coats of oil-based epoxy paint in the color white and shall be used and placed in two coats on each side of the plywood backboard. Paint the plywood per the manufacturer’s recommendations.

Painting shall be done in a neat and workmanlike manner. Unless otherwise specified, paint shall be applied by brush, or spray, or roller, or any combination of these methods. Gun extensions shall not be used.

No separate payment will be made for preparing surfaces and for painting plywood

backboards. Full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in preparing surfaces and painting plywood backboards as shown on the plans, and as specified in these specifications and the special provisions, and as directed by the Engineer will be considered as included in the per each price paid for Furnish and Install Sump Control Panel Backboard and Hardware.

Channels and hardware to erect the backboards shall be 12-gauge solid hot-dip galvanized adhering to ASTM A 36. Channels shall be Uni-Strut P1000 or approved equal.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing, installing and erecting plywood backboards, channels and necessary hardware as shown on the plans, and as specified in the specifications and the special provisions, and as directed by the Engineer will be considered as included in the per each price paid for Furnish and Install Sump Control Panel Backboard and Hardware.

10-1.23 STEEL PIPE BOLLARD – Bollards shall be manufactured, installed, cleaned and powder coated as shown on the Plans, as specified in these Special Provisions, and as directed by the Engineer.

All pipe used in the construction of Bollards shall be ASTM A53 Type E or S, Grade B steel pipe (extra strong), schedule 80 with a nominal 6-inch diameter.

Individual bollards shall be constructed of a single length of pipe. Welding together of individual lengths of pipe to construct bollards shall not be allowed.

All bollards shall be placed in portland cement concrete footings with a minimum diameter of 15-inches. Said footings shall extend along the length of each bollard for a minimum distance of 18 inches above the bottom of the steel pipe, and shall extend at least 6-inches below the bottom of the steel pipe.

The steel pipe shall be filled with portland cement concrete and said concrete shall be struck off level with the top of each bollard.

Portland cement concrete shall be minor concrete and shall conform to the requirements for portland cement concrete contained in these Special Provisions.

The length of steel pipe bollards for “Sump and Lysimeter Riser” and for “Cleanout and Inspection Riser” shall be as shown on the Plans.

All exposed metal surfaces of bollards shall be cleaned and powder coated in conformance with these Special Provisions.

The Contractor shall remove all sharp corners prior to powder coating by creating a small chamfer with a grinder.

The Contractor shall remove heavy oil or grease with a scraper from surfaces to be powder coated with solvent vapor, alkali, emulsion (detergent), or steam. Only solvents that do not leave a residue may be used. The Contractor shall then remove any remaining foreign matter by brushing with stiff fiber or wire brushes, abrading, or cleaning with solutions of appropriate cleaners. The use of any cleaning solutions shall be followed by a fresh water rinse and the pipe shall then be wiped dry.

After cleaning, the steel pipe shall be blast-cleaned to remove all dirt, dust, mill scale, rust, corrosion products, oxides, paint, and other foreign matter.

When blast-cleaning is being performed near machinery, all journals, bearings, motors and moving parts shall be sealed against entry of abrasive dust before blast-cleaning begins.

Blast-cleaned surfaces shall be inspected for surface preparation. Surface imperfections, such as slivers, scabs, burrs, weld spatter, and gouges, shall be removed by hand filing or grinding.

Blast-cleaned surfaces shall be protected from high humidity, rainfall, or surface moisture. No surface shall be allowed to flash rust before coating. If cleaned surfaces rust or are contaminated with foreign material before coating is accomplished, the surfaces shall be re-cleaned and, if required by the Engineer, re-blasted at the Contractor's expense.

The Contractor shall submit proposed powder coating product data and manufacturer's recommended application procedures for the Engineer's approval prior to ordering said materials. All coatings shall be applied in conformance with the coating manufacturer's recommended procedures.

The finish color is to be "CAT YELLOW" or approved equivalent.

The Engineer may reject the surface preparation and/or the coated pipe if the surface condition or application of the coating does not comply with the requirements of these Special Provisions. Bollards rejected because of inadequate cleaning or coating shall be re-cleaned and re-coated at the Contractor's expense.

A minimum of two orange reflective tape bands, each not less than 3-inches wide, shall be mounted at least 1 1/2 inches apart and at a height on the post so that one orange reflective tape band will be between 2.5-feet and 3-feet above the finished grade ground surface.

The contract unit price paid for each Steel Pipe Bollard shall include full compensation for furnishing all labor, materials, equipment and incidentals, and for doing all work involved in providing and installing bollards complete in place, including concrete footings, cleaning, blasting, coating, and reflective bands as shown on the Plans, as specified in these Special Provisions and the Standard Specifications, and as directed by the Engineer, and no additional compensation will be allowed therefor.

10-1.24 CONCRETE SLAB - Concrete Slab shall conform to the provisions of Section 51 "Concrete Structures" of the Standard Specifications and these Special Provisions.

Concrete slabs shall be constructed of Class 3 concrete containing not less than 506 pounds of cement per cubic yard, to the dimensions shown on the Plans, as Specified in these Special Provisions, and as directed by the Engineer. Concrete placed below or outside of the limits shown or specified for the slabs shall not be paid for.

Class 3 concrete shall conform to the requirements for portland cement concrete contained in these Special Provisions.

The contract unit price paid per cubic yard for Concrete Slab shall include full compensation for furnishing all labor, materials, equipment and incidentals, and for doing all work involved in installing concrete slabs complete in place, and excavation and backfill, as shown on the Plans, as specified in these Special Provisions and the Standard Specifications, and as directed by the Engineer, and no additional compensation will be allowed therefor.

10-1.25 MINOR CONCRETE - Concrete shall conform to the provisions of Section 90-10 "Minor Concrete", of the Standard Specifications.

When concrete is designated by class, the Contractor shall determine the mix proportions.

Concrete construction shall be cured in accordance with any of the methods described in Section 90-7.01, “Methods of Curing”, of the Standard Specifications; except the curing compound, if used, shall be clear and non-pigmented.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing minor concrete for the bollards, including any necessary excavation, disposal of removed materials clearing and grubbing, saw cutting, and backfill, Portland cement concrete, and water, complete in place as shown in the Project Details, Standard Specifications and as directed by the Engineer shall be considered to be included in the unit price per each Steel Pipe Bollard and no additional compensation will be allowed therefor.

SECTION 11 - LINER SYSTEM

11-1 GEOSYNTHETIC CLAY LINER

11-1.01 GENERAL

The Geosynthetic Clay Liner (GCL) to be furnished and installed under this contract shall conform to the requirements outlined herein along with the accompanying geosynthetics quality assurance plan.

The Contractor shall notify the Engineer 14 calendar days in advance of starting the GCL installation.

11-1.01.1 SUMMARY

A. Section includes furnishing and installing geosynthetic clay liner.

B. Related Sections:

1. Section 10-1.14 - Earthwork
2. Section 11-2 - High Density Polyethylene Geomembrane
3. Section 11-3 - Geonet
4. Section 11-4 - Geotextile
5. Section 11-5 - Operations Layer
6. Section 11-6 - Protective Plywood Cover

11-1.01.2 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. ASTM D 422 - Method for Particle-size Analysis of Soil.
2. ASTM D 638 - Standard Test Method for Tensile Properties of Plastics.
3. ASTM D 751 - Method of Testing Coated Fabrics
4. ASTM D 1004 - Test Method for Initial Tear Resistance of Plastic Film and Sheeting.

5. ASTM D 1557 - Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort.
6. ASTM D 2216 - Test Method for Laboratory Determination
7. Water (Moisture) Content of Soil, Rock, and Soil-aggregate Mixtures.
8. ASTM D 4354 - Standard Practice for Sampling of Geosynthetics for Testing.
9. ASTM D 4632 - Standard Test Method for Breaking Load and Elongation of Geotextiles (Grab Method).
10. ASTM D 4643 - Standard Test Method for Determination of Water (Moisture) Content of Soil by the Microwave Oven Method.
11. ASTM D 4759 - Standard Practice for Determining the Specification Conformance of Geosynthetics.
12. ASTM D 4873 - Identification, Storage, and Handling of Geosynthetics.
13. ASTM D 5084 - Standard Test Method of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter.
14. ASTM D 5261 – Standard Test Method for Measuring Mass per Unit Area of Geotextiles.
15. ASTM D 5321 - Standard Test Method for Determining the Shear Strength of Soil-Geosynthetic and Geosynthetic-Geosynthetic Interfaces by Direct Shear.
16. ASTM D 5993 - Standard Test Method for Measuring Mass Per Unit Area of Geotextiles.
17. ASTM D 6243 - Standard Test Method for Determining the Internal and Interface Shear Strength of Geosynthetic Clay Liner by the Direct Shear Method.
18. ASTM D6768 – Standard Test Method for Tensile Strength of Geosynthetic Clay Liners
19. ASTM D 5887 - Standard Test Method for Measurement of Index Flux Through Saturated Geosynthetic Clay Liner Specimens Using a Flexible Wall Permeameter.
20. ASTM D 5890 - Standard Method for Swell Index of Clay Mineral Component of Geosynthetic Clay Liner.
21. ASTM D 5891 – Standard Method for Determining Bentonite Fluid Loss.
22. ASTM D 6496 – Test Method for Determining Average Bonding Peel Strength Between the Top and Bottom Layers of Needle-Punched Geosynthetic Clay Liners.
23. ASTM D6768 – Standard Test Method for Tensile Strength of Geosynthetic Clay Liners.

B. Geosynthetics Construction Quality Assurance (CQA) Plan For The American Avenue Disposal Site Phase III – Modules 7 & 8.

11-1.01.3 DEFINITIONS

A. Bentonite: Clay soil, comprised primarily of sodium montmorillonite, characterized by high swelling potential and low hydraulic conductivity.

B. Construction Quality Assurance (CQA) Consultant: The monitoring firm responsible for implementation of the CQA activities.

C. Construction Quality Assurance (CQA) Laboratory: A laboratory selected by the CQA Consultant independent from the Engineer, Contractor, Manufacturer, Fabricator and Installer, responsible for conducting laboratory tests on samples of materials obtained at the site. Also referred to as the Geosynthetics Laboratory.

D. Construction Quality Assurance (CQA) Officer: The professional representative of the CQA Consultant responsible for implementation of the CQA plan. Also, referred to as the CQA Engineer.

E. Construction Quality Assurance (CQA) Monitor: Site representative of the CQA Consultant responsible for documenting field observations and tests.

F. Engineer: Director of the Department of Public Works and Planning of Fresno County, acting either directly or through properly authorized agents, such agents acting within the scope of the particular duties entrusted to them.

G. Geomembrane: An essentially impermeable geosynthetic composed of one or more synthetic sheets. Synonymous term for flexible membrane liner (FML).

H. Geosynthetic Clay Liner (GCL): A manufactured hydraulic barrier consisting of clay bonded to a layer or layers of geosynthetic materials.

I. Geosynthetic Installer (Installer): The person or persons, firm, partnership, corporation, or any combination, private, municipal, or public, which, as an independent contractor or subcontractor to the Contractor, has entered into a contract to install Geosynthetics. Also called the Installer.

J. Leak Location Contractor: A firm specializing in leak location testing of synthetic liner materials, independent from the Engineer, Manufacturer, Fabricator, and Installer, responsible for performing the geoelectric liner leak detection survey of the installed Geomembrane.

K. Lot: A unit of production, or a group of other units or packages, taken for sampling or statistical examination, having one or more common properties and being readily separable from other similar units.

L. GCL Manufacturer (Manufacturer): The party responsible for the production and quality of the GCL.

M. Minimum Average Roll Value (MARV): For geosynthetics, a manufacturing quality control tool used to allow manufacturers to establish published values such that the user/ purchaser will have a 97.7 % confidence level that the property in question will meet published values. For normally distributed data, “MARV” is calculated as the typical value minus two standard deviations from documented quality control test results for a defined population from one specific test method associated with one specific property.

N. Owner: County of Fresno

O. Textile Backing (textile or Geotextile): Geosynthetic support material consisting of woven slit film, needle-punched nonwoven, or spunlaced polymer fabric, used for supporting bentonite in a GCL.

11-1.01.4 SUBMITTALS

A. Qualifications (Manufacturer): The Contractor shall submit information necessary to evaluate the Manufacturer's qualifications in accordance with Section 11-1.01.5 of these Special Provisions at least 21 calendar days prior to ordering the material. Material shall not be ordered by the Contractor until the Manufacturer's qualifications have been reviewed and approved in writing by the Engineer.

B. Qualifications (Installer): The Contractor shall submit information necessary to evaluate the Installer's qualifications in accordance with Section 11-1.01.5 of these Special Provisions at least 21 calendar days prior to installation of the material. The submittal shall include the name of Installer and the names and resumes of the installation supervisor/field design engineer.

C. Quality Control Plan and Installation Procedures (Manufacturer) - The Contractor shall submit the following 21 calendar days prior to installation:

1. A copy of Manufacturer's quality control plan including a list of quality control tests performed and typical testing frequencies.
2. Manufacturer's recommended installation procedures.

D. Schedules and Drawings - the Contractor shall submit the following 14 calendar days prior to installation of the material:

1. An installation schedule which includes hours to be worked per day for each shift and which indicates all weather delay built into schedule.
2. Installation layout drawings showing the panel layout indicating laplines or matchlines and details not conforming to the Plans. Upon acceptance by Engineer, these drawings shall be the basis for installation of the GCL.

E. Product Data (Manufacturer) - the Contractor shall submit the following 14 calendar days prior to shipping material to the site:

1. Geotextile Backing Data:
   a. Certification stating that the Geotextile meets the product requirements (Table 11-1A).
   b. Copy of quality control certificates issued by Geotextile supplier (if different from GCL Manufacturer).
   c. Copy of quality control tests performed by GCL Manufacturer.
2. Bentonite Data:
   a. Certification stating that the bentonite meets the product requirements (Table 11-1A).
   b. Copy of quality control tests performed by bentonite supplier if different from GCL Manufacturer).
3. GCL Data:

a. Certification stating that the GCL meets the product requirements (Table 11-1A).

b. Copy of quality control tests performed by GCL Manufacturer.

c. Permeability testing on typical product by independent laboratory.

d. The Manufacturer's product warranty.

e. Roll sample.

f. Roll length and width.

F. Field Quality Control Documents – the Contractor shall:

1. Submit prior to the start of installation, subgrade acceptance certificate signed by the Installer's installation supervisor for each area to be covered by the GCL.

2. Submit quality control documentation prepared during installation before demobilizing.

G. The Contractor shall submit the following upon completion of the installation:

1. A certification stating that the GCL has been installed in accordance with the Plans and Special Provisions.

2. The Contractor's installation warranty.

3. Reproducible as-built drawings showing the location of panels. The Contractor shall prepare as-built drawing on D-size sheets to a scale approved by the Engineer. The medium upon which the drawings are printed shall be approved by the Engineer. The drawings shall include a title block, project name, name of Installer, name and signature of the person preparing the drawings, and the date of drawing preparation. The drawings shall also be furnished in AutoCAD format on a CD.

11-1.01.5 QUALIFICATIONS

A. The manufacturer of the GCL shall manufacture the material in the United States or in Canada and shall have previously demonstrated the ability to produce this GCL by having successfully manufactured a minimum of ten million square feet of similar material for landfill lining installations. A list of similar projects completed in which the manufactured material has been successfully used shall be submitted.

B. The Installer of the lining material shall have previously demonstrated the ability to install this GCL by having successfully installed a minimum of five million square feet of similar liner material for landfill lining installations. A list of projects completed by the Installer in which similar product has been successfully installed shall be submitted.

11-1.01.6 QUALITY ASSURANCE

A. The Owner will engage and pay for the services of (1) Construction Quality Assurance (CQA) Consultant, and (2) Construction Quality Assurance (CQA) Laboratory for monitoring the quality and installation of the GCL unless otherwise specified.

B. The GCL Manufacturer shall allow the Engineer and Construction Quality Assurance Monitor (CQA Monitor) to visit the manufacturing plant prior to the manufacturing of the GCL for this project if such a visit is considered by the Engineer to be necessary to assure the quality of the liner material and its manufacturing. The manufacturing plant visit will be documented by the CQA Monitor. The purpose of the visit will be to:

1. Observe the manufacturing process for the GCL.
2. Review plant quality assurance laboratory and establish protocols for conformance testing with the third party laboratory.
3. Observe conformance testing and establish specific conformance values.

C. Neither the Contractor nor the Manufacturer will charge any time, material, or other expenses to the Owner related to a plant visit by the Engineer, the CQA Monitor or designated representative.

D. The Contractor shall render assistance as necessary for the CQA Monitor to collect product samples and perform testing in accordance with the CQA Plan. The Contractor shall aid the CQA Monitor in product sampling by providing personnel and equipment necessary to move, cut, and protect GCL rolls.

E. GCL shall not be shipped to the site until all required conformance testing has been completed and the test results are determined to comply with the specifications. If GCL is shipped before all required conformance testing has been completed and the test results are determined to comply with the specifications, it will be at the Contractor's risk and the Contractor assumes all responsibility for the handling of GCL that is determined to not comply with the specifications.

F. Should the Contractor choose to have GCL shipped to the site before required conformance testing has been completed and the test results are determined to NOT comply with the specifications, those GCL rolls not meeting specification requirements shall be stored separate from GCL that has been determined to comply with the specifications. Those rolls not meeting specification requirements should be readily marked with spray paint indicating the rolls do not meet specification requirements and taped on either side of the rolls with a minimum of 3 feet X 2 inch wide red tape and preferably placed in an enclosed fenced area (k-rail or equivalent) to prevent accidental use in the project.

G. Conformance test results will be reviewed consistent with ASTM D 4759-Procedure B. If a test result is in non-conformance with the specifications, all material from that individual lot sampling unit represented by the failed conformance test shall be catalogued as “failed” or non-conforming. Any individual lot sampling unit which fails initial testing shall be retested for all the methods which did not meet the acceptable specification values. If the average of both tests for any initially non-conforming methods, confirm that the individual lot sampling unit is non-conforming, then the individual lot sampling unit failing the acceptable specification value need to be rejected. Individual lot sampling units before and after the failed individual lot sampling unit or units in the lot will be resampled and retested for all applicable testing methods ("blocking tests"). Finally, the sequence of non-conforming individual lot sampling units in the lot shall be bounded/delineated by passing individual lot sampling units ("blocking tests"). Additional tests and replaced material will be provided at no additional cost to the Owner.

11-1.01.7 DELIVERY, STORAGE, AND HANDLING

A. General: The Contractor shall conform to the Manufacturer's requirements and ASTM D-4873 unless otherwise specified.

B. Delivery – the Contractor shall:

1. Notify the Engineer in writing 48 hours in advance of delivery. Material deliveries will not be allowed on site unless and until submittals pertaining thereto which are required prior to delivery have been reviewed and accepted and advance written notice of delivery has been provided to the Engineer in accordance with these Special Provisions.
2. Deliver material to the site only after the CQA Monitor accepts required submittals.
3. Unload all material in the presence of the CQA Monitor.
4. Cover material with a waterproof, tightly-fitting, plastic covering resistant to ultraviolet degradation.
5. Ship material less than one month prior to scheduled installation.
6. Mark each roll with the following information:
   a. Manufacturer's name
   b. Product identification
   c. Lot and roll numbers
   d. Roll dimensions and weight

C. Storage – the Contractor shall:

1. Store rolls in space allocated by the Owner. Space shall be at high ground level or elevated above ground surface.
2. Stack no more than 3 rolls high.
3. Protect rolls from precipitation, mud, dirt, dust, puncture, cutting or any other damaging or deleterious conditions.

4. Preserve integrity and readability of roll labels.
5. Any non-conforming rolls shipped to the site will be placed in an enclosed fenced area (k-rail or equivalent) to prevent accidental used in the project.

D. Handling – the Contractor shall:

1. Use appropriate handling equipment to load, move, or deploy GCL rolls. Appropriate handling equipment includes cloth chokers and spreader bar for loading, spreader and roll bars for deployment. Dragging panels on ground surface will not be permitted.
2. Handle rolls in a competent manner so that damage does not occur to the product or to its protective wrapping and follow handling procedures outlined in ASTM D 4873.
3. Immediately repair any damage to protective covering and perform repairs such that the GCL roll is protected from moisture and other deleterious conditions.
4. Maintain control of and responsibility for off-loading, storing, and transporting material from storage area to installation site.

11-1.01.8 WARRANTY

A. The Contractor shall provide a Manufacturer's Warranty for GCL material in compliance with the requirements of these Special Provisions. The Manufacturer’s Warranty shall:

1. Provide a minimum 20-year warranty for the material against deterioration due to exposure to buried elements.
2. Cover the costs of material replacement and installation; assuming the area is in a clean, dry, unencumbered condition. In the event the area cannot be rendered as such, compensation for defective material will be provided to the Owner on a pro rata basis for the estimated cost to the Owner at that time of supplying and installing material to a clean, dry, and unencumbered condition by a third-party installer.

B. The Contractor shall provide an installation warranty for GCL material in compliance with the requirements of these Special Provisions. The installation warranty shall provide a minimum of 2 year non-prorated warranty for the installation against defects.

11-1.02 PRODUCTS

11-1.02.1 MANUFACTURERS

Material shall be provided by a Manufacturer meeting the qualification requirements in Section 11-1.01.5 or by a distributor approved by a qualified Manufacturer.

11-1.02.2 BENTONITE

A. Shall be supplied in granular form.

B. Shall meet the requirements of Table 11-1A.

11-1.02.3 GEOTEXTILE BACKING

A. Shall be needle-punched nonwoven.

B. Shall meet the requirements of Table 11-1A.

11-1.02.4 GCL

A. Shall be produced in the United States or Canada. Material from other sources may be used only with prior written approval by the Engineer.

B. Shall consist of bentonite encapsulated by Geotextiles.

C. Shall have continuous water-proof laplines and matchlines printed directly on the Geotextile-type GCL at 6 and 9 inches from the edges of the rolls respectively.

D. Shall be wrapped around structurally-sound cores that can support weight of GCL without excessive bending or buckling. The core shall be accessible to stingers or rods placed full-length within the core.

E. Shall meet the requirements of Table 11-1A.

F. Geotextiles shall be needle-punched or lock-stitched together through the bentonite layer to form a stable composite. Adhesives may be used in addition to, but not in lieu of, needle-punching or lock-stitching.

G. Shall be continuously inspected for presence of needles and certified in writing to be “needle-free”.

H. Both sides of the GCL shall be nonwoven Geotextiles.

11-1.02.5 MANUFACTURER SOURCE QUALITY CONTROL

A. The Manufacturer shall perform quality control tests listed in Table 11-1A at the frequencies indicated in Table 11-1B.

B. The Contractor shall supply copies of test results to CQA Officer.

Table 11-1A

Properties for Geosynthetic Clay Liner

Test	Test Designation(1)	Requirement(2)
Bentonite (as received)		
Swell Index	ASTM D 5890	24 cc/2g min. avg.
Fluid Loss	ASTM D 5891	18 ml at 0% moisture content max. avg.
Geotextile (as received)		
Mass Per Unit Area	ASTM D 5261	5.9 oz/yd^2 min. avg.
GCL (as manufactured)		
Mass Per Unit Area(3)	ASTM D 5993	0.82 pounds/sf(4) min. avg.
Mass of Bentonite(3)	ASTM D 5993	0.75 lb/sf min. avg.
Moisture Content	ASTM D 5993	35% max. avg.
Tensile Strength(4)	ASTM D 6768	23 lb/in min. avg.
Permeability	ASTM D 5887	5.0 x 10^{-9} cm/sec(5) max. avg.
Flux	ASTM D 5887	1 x 10^{-6} cm^3/sec-cm^2 max. avg.
Peel Strength	ASTM D 6496	2.1 pounds per inch min. avg.
Residual Shear Strength	ASTM D 6243	See Table 11-2C

Notes:

(1) Alternate tests are allowed only with prior written approval of Engineer.

(2) The average of the test results should be calculated per the particular standard cited and compared to the minimum (maximum) value listed in this table; hence the values listed are the minimum average values and are designated as “min. avg.” When the property is a maximum value, the designation is “max. avg.”

(3) Mass of the GCL and bentonite is measured after oven drying per the cited test method.

(4) Measured in the machine direction.

(5) Measured under 5 psi confining pressure and 2 psi head pressure.

Table 11-1B

Manufacturer's Testing for Geosynthetic Clay Liner

Test	Test Designation	Frequency [1]
Bentonite [2] (as received)		
Swell Index	ASTM D 5890	1 per 100 tons
Fluid Loss	ASTM D 5891	1 per 100 tons
Geotextile (as received)		
Mass Per Unit Area	ASTM D 5261	1 per 25,000 square yards
GCL (as manufactured)		
Mass Per Unit Area	ASTM D 5993	1 per 5,000 square yards
Mass of Bentonite	ASTM D 5993	1 per 5,000 square yards
Moisture Content	ASTM D 5993	1 per 5,000 square yards
Tensile Strength	ASTM D 6768	1 per 25,000 square yards
Permeability	ASTM D 5887	1 per 30,000 square yards [3]
Flux	ASTM D 5887	1 per 30,000 square yards[3]
Peel Strength	ASTM D 6496	1 per 5,000 square yards
Residual Shear Strength	ASTM D 6243	1 series for each interface See Table 11-2C

[1] One test per quantity indicated, minimum one test per lot.

[2] Frequencies based on material with ten percent moisture content.

[3] Minimum of 2 tests for permeability and 2 tests for flux.

11-1.03 EXECUTION

11-1.03.1 PREPARATION OF SUBGRADE

A. The Contractor shall prepare subgrade in accordance with the requirements of Section 10-1.14 Earthwork, of these Special Provisions.

B. The Contractor shall ensure that the subgrade has been compacted and smoothed to be free of surface irregularities, runs, loose soil, rocks, stones, sticks, roots, sharp objects, and any other protrusions that could damage the GCL.

C. The Contractor shall ensure that all voids and cracks in the subgrade have been filled.

D. The Contractor shall compact the subgrade to 95 percent maximum dry density (ASTM D-1557).

E. The Contractor shall prepare the subgrade so that it provides a firm, unyielding foundation for the GCL with no sudden, sharp, or abrupt changes of break in grade. No standing water shall be allowed.

F. The Installer shall not install GCL until the underlying subgrade has been inspected and approved by the Installer and CQA Monitor.

G. The Installer shall certify in writing on the subgrade acceptance form that the surface on which the GCL is to be installed is acceptable.

H. The Contractor shall maintain the subgrade until the liner has been installed and accepted.

I. Any rough areas or damage caused by the GCL installation shall be repaired by the Contractor.

J. The Contractor shall round all grade breaks, including the leading edge of the anchor trench to a 6-inch radius to avoid a sharp bend in the GCL.

11-1.03.2 DEPLOYMENT

A. The Installer shall deploy the material only after underlying subgrade is accepted by Installer and CQA Monitor.

B. The GCL shall be deployed in the field in the same configuration as tested for interface strength. For example: the geotextile side of the GCL in contact with the geomembrane in the field shall be the same as the side used to perform the interface strength test.

C. The Installer shall not allow foot traffic on the GCL if the material is at a moisture content of 35 percent or greater.

D. The Installer shall deploy the GCL manually or by use of spreader bar attached to loader or backhoe without damaging the subgrade.

E. The Installer shall ensure that objects or moisture are not entrapped beneath the GCL.

11-1.03.3 JOINING

A. Overlaps:

1. For Geotextile-type GCLs, using the lapline and matchline as guides, the Installer shall overlap the material a minimum of 9 inches along length and heat-bonded (“lystered”).

2. The Installer shall overlap the material a minimum of 24 inches at ends of rolls, in sump areas, and in anchor trench areas.

3. Overlaps or seams are not allowed perpendicular to slopes greater than 10 percent provided the length of the slope is less than the maximum available roll length. In these areas the Installer shall place GCL in one piece along the entire slope, unless otherwise approved in writing by the Engineer.

4. In cases where the slope is greater than 10 percent, and the slope length is greater than the maximum manufactured GCL roll length, the following procedures shall be used:

   a. Install a maximum of one horizontal seam, at a minimum distance of 10 feet from the edge of the eastern slope of the perimeter

leachate and lysimeter collection drains, within the lower 25 percent of the larger eastern side slope of the module.

b. The lower GCL panel starting on the lower 25 percent of the larger eastern side slope shall be on continuous panel through the perimeter leachate and lysimeter collection drains.

c. Horizontal seams from one panel to the adjacent panel shall be staggered a minimum of 5 feet.

d. Seams shall be shingled such that the down slope edge of the upper GCL panel overlays the up slope edge of the lower GCL panel. Overlap for the seams shall be 4 feet minimum.

e. Granular bentonite application shall be applied in accordance with Section B below.

B. Seams:

1. All GCL shall be overlapped in accordance with these Special Provisions and heat-bonded ("lystered"). Adding additional Bentonite along overlaps at 4 ounces per lineal foot is not required if Manufacturer can document that the permeability at the overlaps is no greater than the permeability of the GCL material. Approval to forego the use of additional bentonite along seams must be received in writing from the Engineer before installation begins.

2. The Installer shall use a lime spreader if powdered bentonite is used to reduce wind-blown particles.

3. The Installer shall not sew or use mechanical connections (except for repairs).

11-1.03.4 RESTRAINING AND PROTECTING

A. The Installer shall restrain GCL against wind using sandbags filled with fine-grained material.

B. The Installer shall maintain sandbags in place until GCL is covered.

C. The Installer shall cover the GCL with Geomembrane or temporary protective cover during the same working day that the GCL is installed. If overlying Geomembrane is not seamed the same day, the CQA Monitor may request Geomembrane edges to be pulled back by the Contractor to allow the CQA Monitor to inspect the GCL at no additional cost to Owner. Torn, punctured, or hydrated material shall be removed and replaced in accordance with Section 11-1.03.5 at no additional cost to Owner.

D. Any bentonite material in the GCL that becomes hydrated to a moisture content greater than 40 percent before being covered by Geomembrane will be rejected. Rejected material shall be removed and replaced by the Contractor at no cost to the Owner.

E. Installer shall be responsible for staging the Work so that no construction equipment needs to be driven over already deployed GCL panels while deploying subsequent GCL panels or subsequent geosynthetics.

F. Equipment used for placing soils shall not be driven directly over geosynthetics. A minimum thickness of 1 foot (300 mm) of material is required between a low ground pressure (LGP) dozer and underlying geosynthetics. A minimum thickness of 3 feet of material is required

between rubber-tired vehicles and underlying geosynthetics. In areas of heavy vehicle traffic, such as access ramps, the material thickness should be at least 3 feet. In any case, the following table shall be complied with during construction:

G.

Maximum Allowable Equipment Ground Pressure (psi)	Initial Lift Thickness Over Geosynthetics (feet)
5	1.0
10	1.5
15	2.0
>20	>3.0

11-1.03.5 REPAIR PROCEDURES

A. The Installer shall remove punctured, torn, or hydrated material.

B. The Installer shall cover damaged areas with same type of GCL material with same side up.

C. The Installer shall overlap defective areas by a minimum of 12 inches in all directions.

D. The Installer may use adhesion tape or heat-bond ("lyster") to keep patches in place.

E. The Installer shall apply loose bentonite to repairs as with normal overlaps at 4 ounces per linear foot.

11-1.03.6 FIELD QUALITY CONTROL AND QUALITY ASSURANCE

A. General:

1. Field quality control is the responsibility of the Installer who must document that the installation proceeds in accordance with this specification.
2. Field quality assurance is the responsibility of the CQA Officer who is assisted by the CQA Monitor and the Installer.

B. The Installer and CQA Monitor shall inspect:

1. The underlying surface for entrapped particles that may impact the GCL.
2. The surface of the GCL for needles, punctures, tears, thinning, or other evidence that the material may not meet specification requirements.
3. The GCL for evidence of premature hydration such as wet areas or swelling. Hydrated areas shall be removed and replaced with new GCL material.

4. Overlaps using the laplines and matchlines as a guide. The CQA Monitor shall periodically measure the distance of the laplines and matchlines from the edge of the GCL.
5. The bentonite seam to check the location of the seams over the overlap and the amount of bentonite (if used) or the GCL heat-bonding being used at all seams.
6. The Contractor shall not cover a section of GCL until the CQA Monitor has approved that section of the GCL.

C. The Installer shall aid the CQA Monitor in collecting samples for testing in accordance with the following:

1. The CQA Monitor shall reject any roll that cannot be identified.
2. Samples shall be taken at a minimum frequency at a frequency of one per lot or one per 150,000 square feet of material supplied, whichever results in greatest number of tests.
3. Samples shall be a minimum of two feet long and run the entire width of the roll.
4. Samples shall not be taken from the first two feet of a roll.
5. The CQA Monitor shall mark the roll number, machine direction, and the date on which the sample was taken on each sample.

D. Field Testing:

1. The CQA Monitor shall conduct moisture content tests in the field.
2. Reported values shall be the average of 5 specimens taken from the same sample.
3. If a sample passes the field moisture content testing (meets the requirements of Table 11-1A), the remaining portion of the sample shall be sent to the CQA testing laboratory described in Paragraph E below.

E. Laboratory Testing:

1. The following laboratory tests shall be conducted by the CQA laboratory according to the test methods in Table 11-1A, on samples passing field testing:
   a. Mass per Unit Area: ASTM D 5993
   b. Mass of Bentonite: ASTM D 5993
   c. Moisture Content (bentonite): ASTM D 5993
   d. Tensile Strength: ASTM D 6768
   e. Permeability (1 sample only): ASTM D 5887
   f. Flux (1 sample only) ASTM D 5887
   g. Peel Strength: ASTM D 6496
   h. Swell Index (bentonite): ASTM D 5890
   i. Residual Shear Strength (1 sample only): ASTM D 6243
2. The test results shall be evaluated according to ASTM D-4759.

11-1.03.7 ACCEPTANCE

A. Contractor shall retain ownership of and responsibility for GCL until acceptance by the Owner.

B. Owner will accept GCL installation when:

1. All required documentation from the Manufacturer and Installer has been received and accepted.
2. Test reports verifying material properties have been received and accepted.
3. The CQA Monitor has completed final inspection and any noted defects have been repaired.
4. Geomembrane is installed and covered.
5. The Engineer has approved the Contractor's as-built drawings required by Section 11-1.01.4.
6. The Operations Layer has been installed, the Leak Location Contractor has completed the geoelectric leak location survey, and any defects in the Geomembrane have been repaired by the Installer and repairs have been approved by the CQA Monitor.

11-1.04 MEASUREMENT AND PAYMENT

11-1.04.1 MEASUREMENT

A. The quantity of GCL will be calculated by measurements made along the plane of installation and shall include GCL installed in the anchor trenches to the dimensions shown on the Plans.

B. GCL required for seam overlap and GCL required to repair or replace damaged material will not be measured.

11-1.04.2 PAYMENT

A. The quantity of GCL is a final pay quantity. Payment for furnishing and installing GCL will be by the unit price per square foot quoted therefor in Bid Schedule.

B. The contract unit price paid per square foot for GCL shall include full compensation for furnishing all labor, materials, equipment, accessories, and incidentals, and for performing all work specified including, but not limited to: quality control testing of material prior to delivery; installing; seaming; testing; repairing; providing, placing and removing sandbags; anchor trench excavation and backfill; and providing all Contractor CQA documentation required to complete the work in accordance with these Special Provisions, the Plans, and as directed by the Engineer.

C. GCL required for seam overlap and GCL required to repair or replace damaged material will not be paid for. All costs in connection therewith shall be considered to be included in the various items of work and no additional compensation will be made therefor.

11-2 HIGH DENSITY POLYETHYLENE GEOMEMBRANE

11-2.01 GENERAL

The high density polyethylene (HDPE) Geomembrane liner to be furnished and installed under this contract shall conform to the requirements outlined herein along with the accompanying geosynthetics quality assurance plan. The Geomembrane liner shall be manufactured in the largest widths and lengths possible to minimize the number of field seams.

The HDPE Geomembrane liner shall be textured on one side and smooth on the other. The Geomembrane **liner shall be placed with the textured side down against the GCL and the smooth side up.**

11-2.01.1 SUMMARY

A. This section includes furnishing and installing 60-mil textured high density polyethylene (HDPE) Geomembrane

B. Related Sections:

1. Section 10-1.14 - Earthwork
2. Section 11-1 - Geosynthetic Clay Liner
3. Section 11-3 - Geonet
4. Section 11-4 - Geotextile
5. Section 11-5 - Operations Layer
6. Section 11-6 - Protective Plywood Cover

11-2.01.2 REFERENCES

A. American Society for Testing and Materials (ASTM):

B. American Society for Testing and Materials (ASTM):

1. ASTM D 1004 - Standard Test Method for Tear Resistance (Graves Tear) of Plastic Film and Sheeting.
2. ASTM D 1238 - Standard Test Method for Flow Rates of Thermoplastics by Extrusion Plastometer.
3. ASTM D 1505 – Standard Test Method for Density of Plastics by the Density-Gradient Technique.
4. ASTM D 1603 – Standard Test Method for Carbon Black in Olefin Plastics
5. ASTM D 3895 – Standard Test Method for Oxidative Induction Time of Polyolefins by Thermal Analysis
6. ASTM D 4218 - Standard Test Method for Determination of Carbon Black Content in Polyethylene Compounds by the Muffle-Furnace Technique
7. ASTM D 4437 – Standard Practice for Non-destructive Testing (NDT) for Determining the Integrity of Seams Used in Joining Flexible Polymeric Sheet Geomembranes.
8. ASTM D 4759 - Standard Practice for Determining the Specification Conformance of Geosynthetics.

9. ASTM D 4833 - Standard Test Method for Index Puncture Resistance of Geomembranes and Related Products.
10. ASTM D 5321 – Standard Test Method for Determining the Shear Strength of Soil-Geosynthetic and Geosynthetic-Geosynthetic Interfaces by Direct Shear.
11. ASTM D 5397 - Evaluation of Stress Crack Resistance of Polyethylene Geomembranes Using Notched Constant Tensile Load Test.
12. ASTM D 5596 – Standard Test Method for Microscopic Evaluation of the Dispersion of Carbon Black Polyolefin Geosynthetics.
13. ASTM D 5617 - Standard Method for Multi-Axial Tension Test for Geosynthetics.
14. ASTM D 5721 – Standard Practice for Air-Oven Aging of Polyolefln Geomembranes.
15. ASTM D 5885 – Standard Test Method for Oxidative Induction Time of Polyolefin Geosynthetics by High Pressure Differential Scanning Calirometry.
16. ASTM D 5994 - Test Method for Measuring the Core Thickness of Textured Geomembranes
17. ASTM D 6243 - Standard Test Method for Determining the Internal and Interface Shear Strength of Geosynthetic Clay Liner by the Direct Shear Method.
18. ASTM D 6392 - Standard Test Method for Determining the Integrity of Nonreinforced Geomembrane Seams Produced Using Thermo-Fusion Methods.
19. ASTM D 6693 – Standard Test Method for Determining Tensile Properties of Nonreinforced Polyethylene and Nonreinforced Flexible Polypropylene Geomembranes.
20. ASTM D 6747 – Standard Guide for Selection of Techniques for Electrical Leak Location of Leaks in Geomembranes.
21. ASTM D 7002 – Standard Practice for Electric Leak Location on Exposed Geomembrane Using the Water Puddle Method.
22. ASTM D 7007 – Standard Practices for Electrical Methods for Locating Leaks in Geomembranes Covered with Water or Earthen Materials.
23. ASTM D 7466 – Standard Test Method for Measuring Asperity Height of Textured Geomembrane.
24. ASTM D 7909 – Standard Guide for Placement of Blind Actual Holes during Electrical Leak Location Surveys of Geomembranes.

B. Geosynthetics Construction Quality Assurance (CQA) Plan For The American Avenue Disposal Site Phase III Expansion.

11-2.01.3 DEFINITIONS

A. Batch: A quantity of resin, usually the capacity of one railcar, used in the fabrication of high density polyethylene (HDPE) Geomembrane sheet. The finished sheet will be identified by a roll number corresponding to the particular quantity of resin used.

B. Bridging: The condition when Geomembrane becomes suspended over its subgrade due to contraction of the material or poor installation.

C. Construction Quality Assurance (CQA) Consultant: The monitoring firm responsible for implementation of the CQA activities.

D. Construction Quality Assurance (CQA) Laboratory: A laboratory selected by the CQA Consultant independent from the Engineer, Contractor, Manufacturer, Fabricator and Installer, responsible for conducting laboratory tests on samples of materials obtained at the site. Also referred to as the Geosynthetics Laboratory.

E. Construction Quality Assurance (CQA) Officer: The professional representative of the CQA Consultant responsible for implementation of the CQA plan. Also, referred to as the CQA Engineer.

F. Construction Quality Assurance (CQA) Monitor: Site representative of the CQA Consultant responsible for documenting field observations and tests.

G. Engineer: Director of the Department of Public Works and Planning of Fresno County, acting either directly or through properly authorized agents, such agents acting within the scope of the particular duties entrusted to them.

H. Extrudate: The molten polymer which is emitted from an extruder during seaming using either extrusion fillet or extrusion flat methods. The polymer is initially in the form of a ribbon, rod, bead, or pellets.

I. Fabricator: The party responsible for the fabrication of Geomembrane panels constructed from rolls received from the manufacturer.

J. Fishmouth: An opening resulting from the uneven mating of two Geomembranes where the upper sheet has excessive length that prevents it from being bonded flat to the lower sheet.

K. Geomembrane Manufacturer (Manufacturer): The party responsible for the production of the Geomembrane rolls from resin and for the quality of the resin.

L. Geomembrane: An essentially impermeable synthetic membrane used as a solid or liquid barrier. Synonymous term for flexible membrane liner (FML).

M. Geomembrane Subgrade: The soil or geosynthetic surface on which the Geomembrane lies.

N. Installer: The party responsible for field handling, transporting, storing, deploying, seaming, temporary restraining (against wind), and installation of the Geomembrane.

O. Leak Location Contractor: A firm specializing in leak location testing of synthetic liner materials, independent from the Engineer, Manufacturer, Fabricator, and Installer, responsible for performing the geoelectric liner leak detection survey of the installed Geomembrane.

P. Panel: The unit area of Geomembrane that will be seamed in the field. If the Geomembrane is not fabricated into panels in a factory, a panel is identified as a roll or portion of a roll without any seams.

Q. Owner: County of Fresno

11-2.01.4 SUBMITTALS

A. Qualifications (Manufacturer): The Contractor shall submit information necessary to evaluate the Manufacturer's qualifications in accordance with Section 11-2.01.5 of these Special Provisions at least 21 calendar days prior to ordering the material. Material shall not be ordered by the Contractor until the Manufacturer's qualifications have been reviewed and approved in writing by the Engineer.

B. Qualifications (Installer): The Contractor shall submit information necessary to evaluate the Installer's qualifications in accordance with Section 11-2.01.5 of these Special Provisions at least 21 calendar days prior to installation of the material. The submittal shall include the name of Installer and the names and resumes of the installation supervisor/field design engineer and the master seamer to be assigned to the project.

C. Qualifications (Leak Location Contractor): The Contractor shall submit information necessary to evaluate the Leak Location Contractor's qualifications in accordance with Section 11-2.01.5 of these Special Provisions at least 21 calendar days prior to installation of the Geomembrane. The submittal shall include:

1. Name of Leak Location Contractor.
2. Number of years the Leak Location Contractor has performed the proposed survey process.
3. Resumes of on-site supervisor and survey technicians.
4. List of projects demonstrating the qualifications and experience of the proposed Leak Location Contractor, including site name, location, and contact; dates survey was performed; area and type of material surveyed; type of survey conducted; general results of the survey; names of supervisor and technicians performing the survey.
5. Sample final report prepared by Leak Location Contractor.

D. Equipment and Personnel – The Installer shall submit the following 14 calendar days prior to installation:

1. Equipment list stating quantity and types to be used.
2. List of personnel to perform field seaming operations.
3. Sample warranties for installation and material for the Engineer and the Owner to review.

E. Schedules and Drawings - The Installer shall submit the following 14 calendar days prior to installation of the Geomembrane:

1. An installation schedule which Includes hours to be worked per day, week and per shift, approximate starting time for each shift and when work will proceed at night (if applicable) and which indicates all weather delay built into schedule.
2. Installation layout drawings which show the panel layout and which indicate both fabricated (if applicable) and field seams, and details not conforming to the Plans. Upon acceptance by Engineer, the Installer shall use these drawings as the basis for installation of Geomembrane.

F. Product Data (Manufacturer): The Contractor shall submit the following 7 calendar days prior to shipping material to the site:

1. Resin Data:

a. Certification stating that the resin meets the product requirements (Section 11-2.02.2).

b. Copy of quality control certificates issued by Manufacturer. The data submitted on the resin shall include production dates and the results of conformance tests described in Section 11-2.02.2. The submittals for the resin shall also include a statement that no reclaimed polymer was used and that all resin is from the same supplier.

2. Geomembrane Roll:

a. An instruction manual which includes the proper storage, handling, deployment, and seaming of the Geomembrane. This manual shall be in compliance with these Special Provisions, the quality assurance plan, and any conditions of warranty.

b. Laboratory test results and certification stating that the Geomembrane meets the product requirements (Section 11-2.02.3).

c. Copy of quality control certificates issued by Manufacturer. The quality control certificates shall include the production date and the laboratory results from the supplier demonstrating compliance with the Geomembrane specifications described in Section 11-2.02.3. Certification shall also be provided which states that the liner rolls are from the same supplier and that no reclaimed polymer was added.

d. Sample warranties for review.

e. Roll length and width.

3. Extrudate Beads and/or Rod.

a. Laboratory certification stating that the extrudate meets the product requirements (Section 11-2.02.4).

b. Copy of quality control certificates issued by Manufacturer.

c. Certification stating that the extrudate bead or rod resin is the same type, from the same manufacturer and compatible with the resin used to manufacture the Geomembrane supplied for this project.

G. Field Quality Control Documents (Installer).

1. The Installer shall submit, prior to the start of installation, a subgrade acceptance certificate signed by the installation supervisor for each area to be covered by the Geomembrane.

2. The Installer shall submit quality control documentation prepared during installation before demobilizing.

H. The Installer shall submit the following upon completion of the installation:

1. A certification stating that the Geomembrane has been installed in accordance with the Plans and the Special Provisions.

2. The Manufacturer's product warranty.

3. The Contractor’s installation warranty.

4. Reproducible as-built drawings showing the location of panels, seams, repairs, patches, and destructive samples, including

measurements. The Installer shall prepare as-built drawing on D-size sheets to a scale approved by the Engineer. The medium upon which the drawings are printed shall be approved by the Engineer. The drawings shall include a title block, project name, name of Installer, name and signature of the person preparing the drawings, and the date of drawing preparation. The drawings shall also be furnished in AutoCAD format on a CD.

5. Seam test results.

I. Field Quality Assurance Documents (Leak Location Contractor):

1. The Leak Location Contractor shall submit a leak location survey plan to the Engineer for approval prior to commencement of the leak location survey. The leak location survey plan shall include:

   a. Description of the proposed method and procedures.

   b. Required site preparations.

   c. Duration of survey.

   d. Quality control and field calibration procedures.

2. The Leak Location Contractor shall provide the CQA Monitor with field notes at the end of each survey day describing the area surveyed and the results.

3. Within 2 weeks after completion of the leak location survey, the Leak Location Contractor shall submit a written report to the Engineer describing

   a. Principles of survey method and procedures.

   b. Site activities.

   c. Map of leak locations.

   d. Description of leaks, if known.

   e. Certification that the entire Geomembrane was surveyed.

11-2.01.5 QUALIFICATIONS

A. The Manufacturer of the Geomembrane material shall manufacture the material in the United States or in Canada and shall have previously demonstrated the ability to produce this Geomembrane by having successfully manufactured a minimum of ten million square feet of similar Geomembrane material for landfill lining installations. A list of similar projects completed in which the manufactured material has been successfully used shall be submitted.

B. The Installer of the lining material shall have previously demonstrated the ability to install this Geomembrane by having successfully installed a minimum of five million square feet of similar Geomembrane material for landfill lining installations. The Installer shall be capable of providing at least one seaming supervisor, present on the site at all times when seaming operations are being conducted, whose experience includes a minimum of 5 million square feet of liner installation using the seaming device used at the site. A list of projects completed by the Installer in which similar product has been successfully installed shall be submitted.

C. The Leak Location Contractor shall have previously demonstrated the ability to perform a geoelectric liner leak survey by having successfully conducted the proposed survey method and procedures and having surveyed a minimum of 15,000,000 square feet of Geomembrane liner within the previous three years. The Leak Location Contractor's supervisor shall have a minimum of three years and 3,000,000 square feet of Geomembrane liner testing experience using the proposed survey methods and procedures. The Leak Location Contractor supervisor must be on site while the geoelectric liner leak location survey is being conducted.

11-2.01.6 QUALITY ASSURANCE

A. The Contractor shall engage and pay for the services of a Leak Location Contractor for conducting a geoelectric liner leak location survey of Geomembrane material being installed.

B. The Owner will engage and pay for the services of a CQA Consultant and a CQA Laboratory for monitoring the quality and installation of Geomembrane material being installed unless otherwise specified.

C. The Manufacturer shall allow the Engineer and Construction Quality Assurance Monitor (CQA Monitor) to visit the Geomembrane manufacturing plant prior to the manufacturing of the Geomembrane for this project, if such a visit is considered by the Engineer to be necessary to assure the quality of the liner material and its manufacturing. The manufacturing plant visit will be documented by the CQA Monitor. The purpose of the visit will be to:

1. Observe the manufacturing process for the Geomembrane.
2. Review plant quality assurance laboratory and establish protocols for conformance testing with the third party laboratory.
3. Observe conformance testing and establish specific conformance values.

C. Neither the Contractor nor the Manufacturer will charge any time, material, or other expenses to the Owner related to a plant visit by the Engineer, the CQA Monitor or designated representative.

D. The Contractor shall render assistance as necessary for the CQA Monitor to collect product samples and perform testing in accordance with the CQA Plan.

E. Geomembrane shall not be shipped to the site until conformance testing has been completed and the test results are determined to comply with the specifications. If geomembrane is shipped prior conformance testing has been completed and the test results are determined to not comply with the specifications, it will be at the Contractor's risk and the Contractor assumes all responsibility for the handling of geomembrane that is determined to ultimately not comply with the specifications.

F. Should the Contractor choose to have geomembrane shipped to the site before conformance testing has been completed and the test results are determined to not comply with the specifications, the geomembrane shall be stored separate from geomembrane that has been determined to comply with the specifications.

G. Conformance test results will be reviewed consistent with ASTM D 4759-Procedure B. If a test result is in non-conformance with the specifications, all material from that individual lot sampling unit represented by the failed conformance test shall be catalogued as “failed” or non-conforming. Any individual lot sampling unit which fails initial testing shall be retested for all the methods which did not meet the acceptable specification values. If the average of both tests for any initially non-conforming methods, confirm that the individual lot sampling unit is non-conforming, then the individual lot sampling unit failing the acceptable specification value need to be rejected. Individual lot sampling units before and after the failed individual lot sampling unit or units in the lot will be resampled and retested for all applicable testing methods ("blocking tests"). Finally, the sequence of non-conforming individual lot sampling units in the lot shall be bounded/delineated by passing individual lot sampling units ("blocking tests"). Additional tests and replaced material will be provided at no additional cost to the Owner.

11-2.01.7 DELIVERY, STORAGE, AND HANDLING

A. General: The Contractor shall be responsible for transporting, unloading, and storing the Geomembrane and shall conform to the Manufacturer's requirements and these Special Provisions. Folding of Geomembrane material is not permitted; folded material will be rejected.

B. Delivery (Manufacturer and Installer).

1. The Contractor shall deliver Geomembrane to the site only after the Engineer accepts required submittals.
2. The Contractor shall notify the Engineer in writing 48 hours in advance of delivery of the Geomembrane. Material deliveries will not be allowed on-site unless and until submittals pertaining thereto which are required prior to delivery have been reviewed and accepted and advance written notice of delivery has been provided to the Engineer in accordance with these Special Provisions.
3. The Installer shall separate damaged rolls from undamaged rolls and store at locations designated by the Engineer until proper disposition of material is determined by Engineer.
4. The Contractor shall deliver the material in rolls and shall not fold the material.

C. Storage on Site - The Installer shall:

1. Store rolls in the space allocated by the Engineer.
2. Store rolls to protect from puncture, dirt, grease, water, moisture, mud, mechanical abrasions, excessive heat or other damage.
3. Store rolls on prepared surface (not on wooden pallets).
4. Stack no more than three rolls high.

D. Handling on Site - The Installer shall:

1. Use appropriate handling equipment to load, move, or deploy Geomembrane rolls. Appropriate handling equipment includes cloth chokers and spreader bar for loading, spreader and roll bars for deployment. Dragging panels on ground surface will not be permitted.

2. Folding of Geomembrane material is not permitted; folded material will be rejected.
3. Off load and store material at the storage area.
4. Transport material from the storage area to the installation site upon commencement of installation.

E. Damaged Geomembrane

1. Damaged Geomembrane will be documented by the CQA Monitor and the Installer.
2. The Installer shall repair damaged Geomembrane, if repair in lieu of rejection of the material is approved by the Engineer, in accordance with these Specifications.
3. If material is rejected by the Engineer, the material shall be replaced by the Contractor at no cost to the Owner.

11-2.01.8 WARRANTY

A. The Contractor shall provide a Manufacturer's Warranty for Geomembrane material in compliance with the requirements of these Special Provisions. The Manufacturer’s Warranty shall:

1. Provide a minimum 20-year warranty for the Geomembrane material against deterioration due to buried exposure.
2. Cover the costs of Geomembrane material replacement and installation; assuming the area is in a clean, dry, unencumbered condition. In the event the area cannot be rendered as such, compensation for defective material will be provided to the Owner on a pro rata basis for the estimated cost to the Owner at that time of supplying and installing material to a clean, dry, and unencumbered condition by a third-party installer.

B. The Contractor shall provide an installation warranty for Geomembrane material in compliance with the requirements of these Special Provisions. The installation warranty shall provide a minimum of 2 year non-prorated warranty for the installation against defects.

11-2.02 PRODUCTS

The materials described under this section include Geomembrane resin, Geomembrane rolls, and the extrudate rod or beads used in the extrusion welding process. The Contractor shall provide the appropriate submittals as described in Section 11-2.03, Submittal of Engineering Data of these Special Provisions.

11-2.02.1 MANUFACTURERS

Material shall be provided by a Manufacturer meeting the qualification requirements in Section 11-2.01.5 or by a distributor approved by a qualified Manufacturer.

11-2.02.2 GEOMEMBRANE RESIN

The resin supplied for the Geomembrane shall conform to the following requirements:

A. Resin shall be High Density Polyethylene (HDPE), first quality, compounded, and manufactured specifically for producing polyethylene Geomembrane.

B. Resin types shall not be mixed during manufacturing.

C. Resin shall not be manufactured with recycled materials.

D. Resin shall be compatible with existing in-place Geomembrane resin as determined by destructive seam tests (if applicable).

E. Resin shall conform with the requirements in Table 11-2A.

Table 11-2A

Properties of HDPE Resin

Test	Test Designation	HDPE
Specific Gravity	ASTM D 1505	0.932 g/cc(1) min. avg.
Melt Index	ASTM D 1238	1 g per 10 min. max avg
1. Measure on pure resin without additives.		

11-2.02.3 GEOMEMBRANE ROLLS

The Geomembrane shall be composed of new, first quality HDPE manufactured and designed specifically for the purpose of liquid containment and shall conform to the following requirements:

A. Shall be produced in the United States or Canada. Material from other sources may be used only with prior written approval by the Engineer.

B. The combined total weight of all additives other than carbon black or pigment shall not exceed 1.5 percent of the weight of the finished Geomembrane.

C. The quantity of processing aids, antioxidants, and other additives as a percentage of the weight of the finished Geomembrane shall be documented and included on the quality control certificates.

D. The combined total weight of all additives including carbon black and pigment shall not exceed 4.0 percent of the weight of the finished Geomembrane.

E. All additives for UV protection, thermal stability, color, texturing, or processing agents shall be evenly dispersed within the material and shall not "bloom" to the surface over time or inhibit welding.

F. The finished product shall be free from blemishes, holes, pin holes, bubbles, blisters, excessive gels, undispersed resins or undispersed carbon black, contamination by foreign matter, and nicks or cuts on edges.

G. Each roll shall be identified with labels indicating roll number, thickness, length, width, and Manufacturer.

H. Geomembrane shall be textured on one side and smooth on the other side.

I. The geomembrane shall be manufactured with a minimum 15-foot seamless width. There shall be no factory seams.

J. Geomembrane shall conform with the requirements in Table 11-2B and in Table 11-2C.

Table 11-2B

Properties for High Density Polyethylene Geomembrane

Test	Test Designation	Requirement (1)
Sheet Thickness	ASTM D 5994	60-mils (2)
Asperity Height	ASTM D 7466	16 mil min. avg.
Specific Gravity	ASTM D 1505	0.940 g/cc min. avg.
Tensile Properties(3)	ASTM D 6693, Type IV	
• Tensile Strength at Yield		126 lb/in min. avg.
• Tensile Strength at Break		90 lb/in min. avg.
• Elongation at Yield (3)		13% min. avg.
• Elongation at Break (3)		100% min. avg.
Tear Resistance	ASTM D 1004, Die C	42 lb min. avg.
Puncture Resistance	ASTM D 4833	90 lb min. avg.
Oxidation Induction Time	ASTM D 3895 or D 5885	See Notes (4)
Stress Crack Resistance (5)	ASTM D 5397	500 hours @ 30% of yield stress min. avg.
Carbon Black Content	ASTM D 4218	2% to 3%
Carbon Black Dispersion	ASTM D 5596	See Notes (6)
Oven Aging at 85°C	ASTM D 5721	See Notes (7)
UV Resistance	ASTM D 5885	50% (8) min. avg.
Direct Shear	ASTM D 6243 (9)	See Table 11-2C
	ASTM D 5321 (10)	See Table 11-2C

Table 11-2B

Properties for High Density Polyethylene Geomembrane

Continued

	Notes:
(1)	Determine conformance according to ASTM D 4759. The values listed in the table above are to be interpreted according to the designated test method. In this respect, they are neither minimum average roll values nor maximum average roll values.
(2)	Nominal thickness. Thickness measurement does not include texturing. Lowest individual value for 8 out of 10 values shall be 54 mils. Lowest individual value for any of the 10 values shall be 51 mils.
(3)	Machine direction (MD) and cross machine direction (XMD) average values should be on the basis of 5 test specimens in each direction. Yield elongation shall be calculated using a gage length of 1.3 inches. Break elongation shall be calculated using a gage length of 2.0 inches.
(4)	Minimum average of 100 minutes using ASTM D 3895 or minimum average of 400 minutes using ASTM D 5885.
(5)	P-NCTL test is not appropriate for testing geomembrane with textured or irregular rough surfaces. Test should be performed on smooth edges of textured rolls or on smooth sheets made from the same formulations as being used for the textured sheet materials. The yield stress used to calculate the applied load for the SP-NCTL test should be the Manufacturer's mean value determined from Manufacturer's quality control testing.
(6)	Carbon black dispersion (only near spherical agglomerates) for 10 different views: 9 in Categories 1 or 2, and 1 in Category 3.
(7)	Minimum average retention of 55% after 90 days if using ASTM D 3895 or 80% after 90 days if using ASTM D 5885.
(8)	The condition of the test should be 20 hours UV cycle at 75°C followed by 4 hours condensation at 60°C.
(9)	Requirements for shear strength of Geomembrane and GCL interface and internal shear strength of GCL. Further requirements are listed in Table 11-2C.
(10)	Requirements for shear strength of Geonet and 60 mil HDPE Geomembrane interface. Further requirements are listed in Table 11-2C.

Table 11-2C

Interface Strength Requirements for Liner System

Test	Test Designation	Normal Load (psf)	Minimum Residual Shear Strength (psf)(1)
Residual Shear Strength	ASTM D 6243 (2)	2,500 5,200 7,500	500 1,000 1,000
	ASTM D 5321 (3)	2,500 5,200 7,500	500 1,000 1,000

1 Residual shear strength is the lowest measured value between displacement at the peak shear stress and at 3 inches.

2 Requirement applies to (1) 60-mil HDPE Geomembrane/GCL interface, and (2) GCL/Soil subgrade. Multiple interfaces can be tested at the same time. The soil samples to be used for shear strength testing shall be fabricated from on-site soil with a minimum relative compaction of 95 percent of the D-1557 test maximum dry density (unit weight) and with a moisture content of 2 percent above the D-1557 test optimum moisture content. The actual moisture content may be revised on the basis of the D-1557 test results for each material. The direct shear strength tests will be performed by saturating the GCL and soil under a normal load of 125 psf for a minimum period of 48 hours, applying a normal load, and shearing the specimen at the normal loads shown. Incrementally load the test specimen at 1,000 psf per minute until specified normal load is reached. The sample shall be sheared using a constant strain rate of 0.04 inches per minute. The residual shear strength shall be measured at 3.0 inches of displacement.

Applies to Geonet / 60 mil HDPE Geomembrane interface. The test specimen shall be sheared at a constant rate of 0.2 inch per minute.

11-2.02.4 EXTRUDATE ROD OR BEAD

Extrudate rod or bead shall:

A. Meet the Geomembrane Manufacturer requirements.
B. Be made from same resin as the Geomembrane.
C. Be from the same supplier as the Geomembrane.
D. Thoroughly disperse additives throughout rod or bead.
E. Contain 2 to 3 percent carbon black.
F. Be free of contamination by moisture or foreign matter.

11-2.02.5 WELDING EQUIPMENT

The Installer shall:

A. Utilize welding equipment which is equipped with gages showing temperatures both in the apparatus and the nozzle (extrusion welder) or at one wedge (wedge welder).

B. Maintain sufficient operational seaming apparatus to continue work without delay.

C. Use a power source for welding equipment which is capable of providing constant voltage under combined line load.

D. Do not locate electric generators on the lining unless approved in writing by the Engineer.

E. Provide tensiometers capable of measuring seam strength, calibrated and accurate within 2 pounds.

F. Provide dies for cutting seam samples.

11-2.02.6 PIPE BOOTS

A. Pipe boots shall be manufactured from material with the same sheet density and nominal thickness as the Geomembrane to which they are being welded.

B. Pipe boots shall be shop fabricated of non-textured Geomembrane material. The Contractor shall provide a Manufacturer's statement of hydraulic or pneumatic testing of the fabricated boots prior to acceptance.

C. The Installer shall minimize liner penetrations to areas where they are absolutely necessary to boot around existing pipes.

D. The Installer shall thoroughly and securely seal penetrations though the Geomembrane. The seal between the Geomembrane and pipe shall be without detectable leakage.

E. Where clamps, fasteners, gaskets, seals or sealants are used, the Installer shall use only materials which are compatible with the Geomembrane and the pipe.

11-2.02.6 MANUFACTURER SOURCE QUALITY CONTROL

The manufacturer shall perform the following quality control tests at the manufacturing plant or Contractor laboratory on Geomembrane products.

Table 11-2D

Testing Frequencies

Test	Test Designation	Frequency (see Notes)
Sheet Thickness	ASTM D 5594	A
Asperity Height	ASTM D7466	E
Specific Gravity	ASTM D 1505	B
Tensile Strength at Yield	ASTM D 6693	C
Tensile Strength at Break	ASTM D 6693	C
Elongation at Yield	ASTM D 6693	C
Elongation at Break	ASTM D 6693	C
Tear Resistance	ASTM D 1004, Die C	D
Puncture Resistance	ASTM D 4833	D
Oxidation Induction Time	ASTM D 3895	B
Stress Crack Resistance	ASTM D 5397	B
Carbon Black Content	ASTM D 1603	C
Carbon Black Dispersion	ASTM D 5596	C
Oven Aging At 85°C	ASTM D 5721	F
UV Resistance	ASTM 5885	F
Direct Shear	ASTM D 6243	G
	ASTM D 5321	G

Notes:

A. Ten tests per roll.

B. One per 600,000 square feet of sheet produced or one per resin batch, whichever results in the greater number of tests.

C. One per 60,000 square feet of sheet produced or one per resin batch, whichever results in the greatest number of tests.

D. One per 120,000 square feet of sheet produced or one per resin batch, whichever results in the greatest number of tests.

E. One per every second roll.

F. One per formulation

G. One test performed for the interfaces and test conditions presented in Table 11-2C (a) and (b) in minimum 12-inch x 12-inch direct shear box. Representative samples will be determined by CQA Officer. The CQA Officer will interpret test results.

11-2.03 EXECUTION

11-2.03.1 EXAMINATION OF SUBGRADE

A. The Installer shall inspect the subgrade (GCL) and submit a written acceptance of subgrade to the CQA Monitor prior to beginning deployment.

B. The Installer shall notify the CQA Monitor in writing if the surface on which the Geomembrane will be installed is not acceptable.

C. In the event that the Installer begins deployment without providing written acceptance of the subgrade (GCL), said commencement of deployment shall be considered to constitute the Installer's acceptance of the subgrade condition.

D. All grade changes shall be rounded to a minimum 6-inch radius.

11-2.03.2 PREPARATION

The Contractor shall:

A. Repair damage caused to underlying subgrade during geosynthetics deployment.

B. Round edges of anchor trenches or cushion with Geotextile.

C. Perform trial seam welds in accordance with the following:

1. Trial seam welds shall be performed on samples of Geomembrane to verify the performance of welding equipment, seaming methods, and conditions.

2. No seaming equipment or welder will be allowed to perform production welds until equipment and welders have successfully completed trial welds.

3. Frequency of trial welds:

a. At the start of the seaming period.

b. Once every four hours of seaming.

c. When directed by the CQA Monitor.

d. Every 2 hours when using a wedge weld to weld across seams.

e. Minimum one trial weld per person per shift.

f. Minimum one trial weld per seaming device per shift.

g. When ambient temperature changes more than 18°F (10°C) since previous trial weld.

4. Make trial welds in the same surroundings and environmental conditions as the production welds.

5. Make trial weld sample at least 2 feet long for welding methods other than double wedge welding. Make trial weld sample 3 feet long for double wedge welding machines.

6. Cut 2, 1-inch wide test strips from opposite ends of the trial weld (4 strips total).

7. Quantitatively test specimens, first for peel adhesion, and then for bonded seam strength (shear) (ASTM D 4437).

a. A specimen is considered passing when the following results are achieved.

1) The break is a film tearing bond (FTB).
2) The break is ductile.
3) The peel strength is 70 percent minimum of the specified sheet yield strength peel test for wedge welded or flat welded seams.
4) There is no more than 10 percent separation of the weld. For wedge welds the width of the weld must be equal to the width of the hip roller.
5) The shear strength is 100 percent of the specified sheet yield strength for shear test for all weld types. When testing set grips back 2 inches from the edge of the weld. Minimum elongation between the grips must be 2 inches.

b. A trial weld sample is considered passing when both specimens pass peel and shear tests. For double-wedge welding, both welds must pass in peel.

8. Repeat the trial weld in its entirety when any of the trial weld samples fail in either peel or shear.
9. If repeated test welds fail, the welding technician or apparatus shall not be used until the reasons for the failing values are identified and corrected and two consecutive successful trail welds are achieved.

11-2.03.3 INSTALLATION

Installation of the Geomembrane shall be performed by an Installer meeting the qualification requirements of these Special Provisions.

11-2.03.4 PLACEMENT OF THE GEOMEMBRANE

The Geomembrane shall be placed by the Installer in accordance with the panel layout drawing submitted by the Installer and in conformance with the following requirements:

A. Deployment

1. **Geomembrane shall be placed with the textured side down against the GCL and the smooth side up.**
2. The Installer shall give careful consideration to the timing and temperature during deployment. The CQA Monitor will focus on verifying that (a) there is no bridging or stresses in the Geomembrane and (b) there are no wrinkles in the Geomembrane that will fold over when covering with soil material. Ideally, deployment, welding, and covering would all occur at the same temperature. The Installer shall strive to perform these activities within as narrow a temperature range as practical, and shall avoid performing these activities during peak hot or cold conditions.
3. The Installer shall place liner panels continuously down the slopes. Transverse joints between panels shall be made at the base of the slopes and shall be located a minimum of six feet from the toe of the slope and a minimum of five feet from the nearest edge of the leachate collection trench.

4. The Installer shall label each panel with a unique identification number or code consistent with the Installer's submitted panel layout drawing. The coding is subject to approval by the CQA Monitor.
5. The Installer shall not deploy more panels in one shift than can be welded or secured during that same day.
6. The Installer shall not deploy in the presence of excessive moisture, precipitation, ponded water, or high winds.
7. The Installer shall ensure that the Geomembrane is not damaged by handling, trafficking, leakage of hydrocarbons, or any other means.
8. The Installer shall place the liner using methods and equipment that do not damage it, the GCL, or the subgrade. Personnel working on the liner shall not smoke, nor wear shoes that potentially could damage the Geomembrane, nor engage in other potentially damaging activities. No vehicles shall be allowed to directly drive over exposed GCL and exposed Geomembrane.
9. Installer shall be responsible for staging the Work so that no construction equipment needs to be driven over already deployed GCL panels while deploying subsequent geomembrane panel or subsequent geosynthetics (geonet).
10. Equipment used for placing soils shall not be driven directly over geosynthetics. A minimum thickness of 1 ft (300 mm) of material is required between a low ground pressure (LGP) dozer and underlying geosynthetics. A minimum thickness of 3 ft of material is required between rubber-tired vehicles and underlying geosynthetics. In areas of heavy vehicle traffic, such as access ramps, the material thickness should be at least 3 ft. In any case, the following table shall be complied with during construction:
11.

Maximum Allowable Equipment Ground Pressure (psi)	Initial Lift Thickness Over Geosynthetics (feet)
5	1.0
10	1.5
15	2.0
>20	>3.0

12. The Installer shall unroll Geomembrane panels using methods that will not damage, stretch or crimp Geomembrane, and shall protect the underlying surface from damage.
13. The Installer may use a sacrificial Geomembrane slip plane between the Geomembrane and GCL if deploying Geomembrane over GCL becomes difficult due to the Geomembrane adhering to the GCL. The Installer shall remove any sacrificial slip plane immediately after deployment is completed.
14. The Installer shall use methods that minimize wrinkles and differential wrinkles between adjacent panels, and shall allow panels to come to the same approximate temperature before seaming.

15. The Installer shall Secure Geomembrane during deployment by placing sandbags as ballast.
16. The Installer shall fill sandbags with the same material as that which is used for the Operations Layer.
17. The Installer shall maintain ballast in place until the Geomembrane is covered.
18. The Installer shall protect Geomembrane in areas of heavy traffic by placing protective cover which is compatible with and will not cause damage to the Geomembrane.
19. The Installer shall remove protective cover prior to the performance of geoelectric leak location survey by the Leak Location Contractor.
20. The Installer shall repair damage to subgrade or other underlying materials prior to completing deployment of Geomembrane.
21. The Installer shall remove heavily wrinkled or folded material.
22. The Installer shall visually inspect the liner material as it is deployed and shall mark any defects for repair. If a significant number of defects are identified as determined by the CQA Monitor, the material shall be removed and replaced by the Contractor at no expense to the Owner.
23. The Installer shall install material to account for shrinkage and contraction to avoid wrinkles.
24. The Installer shall install material in an unstressed configuration with no bridging.
25. Before wrinkles fold over, the Installer shall attempt to push them out. In the event that wrinkles cannot be pushed out, the Installer shall remove wrinkles by cutting and subsequent repair as directed by the CQA Monitor.

B. Seam Layout – the Installer shall:

1. Orient seams parallel to line of a maximum slope, i.e., orient down not across slope.
2. Minimize the number of field seams in corners and in irregularly-shaped geometric locations.
3. Use a seam numbering system which is compatible with the panel number system.
4. Overlap the Geomembrane panels a minimum of three inches for extrusion welding and four inches for fusion welding.

11-2.03.5 SEAMING OF THE GEOMEMBRANE

A. Seam Welding Personnel – the Installer shall:

1. Provide at least one welder (master welder) who has experience welding over 5 million square feet of Geomembrane using the same type of welding apparatus to be used at the site. The master welder will provide direct supervision over other welders.
2. Provide experienced personnel to perform welding operations who have successfully passed field welding tests performed on site.

3. Do not begin seaming operations until each welding technician and apparatus used in the field has passed a test welds in accordance with these Special Provisions.
4. Provide a minimum of two welders including the master welder.

B. Seam Welding Equipment:

1. The Contractor shall provide and use a power source capable of providing constant voltage under combined line load to power the seam welding equipment.
2. Extrusion welders shall be equipped with gauges showing temperatures in extruder apparatus and at nozzle. The temperature at nozzle may be measured by external temperature gauges.
3. Hot wedge welders shall be self-propelled variable speed machines equipped with devices to measure and adjust wedge temperature. Pressure shall be controlled by springs, pneumatics, or other systems that allow for variations in sheet thickness. Rigid frame fixed position equipment shall not be used.
4. The Installer shall provide and maintain welding apparatus of sufficient quality to perform work on schedule.

C. Test welding procedures – the Installer shall follow test welding procedures described in Section 11-2.03.2

D. General welding procedures – the Installer shall:

1. Cut fishmouths or wrinkles along the ridge of the wrinkle in order to achieve a flat overlap. Extrusion weld the cut fishmouths or wrinkles where the overlap is more than 3 inches. When there is less than 3 inches overlap, patch with an oval or round patch extending a minimum of 6 inches beyond the cut in all directions.
2. Not commence welding with welding equipment or operators until a trial weld test sample, made by that equipment and operator, passes test.
3. Ensure that all welds extend for the full extent of the Geomembrane including that portion placed in the anchor trench.
4. Prior to welding, prepare the seams by cleaning the seam surface of any moisture, grease, dust, dirt, debris, or other foreign material and removing surface oxidation not more than a half hour before welding. The grinder shall be held parallel to the liner edge and any area where grinding removes more than 4 mils shall be patched.
5. Clean surface overlap panels a minimum 3 inches for extrusion and 4 inches for hot wedge welding.
6. Not use solvents or adhesives unless product is approved in writing by the Engineer.
7. Provide adequate material on weld to allow peel testing of both sides of double wedge weld.
8. Extend welding to the outside edge of all panels.
9. Provide a firm substrata for welding by using a flat board, a conveyor belt, or similar hard surface directly under the weld overlap.

10. Provide adequate illumination if welding operations are carried out at night.
11. Record the following information every two hours:
    a. Temperature directly on the Geomembrane surface being welded.
    b. Extrudate temperatures in barrel and at nozzle (extrusion welder).
    c. Operating temperature of hot wedge (hot wedge welder) and any pressure adjustments made.
    d. Preheat temperature.
    e. Speed of hot wedge welder in feet per minute.
12. Weld only when temperature measured on the Geomembrane is between 32°F (0°C) and 130°F (55°C). All seaming operations must cease when the Geomembrane temperature is outside this range. When the temperature is below 50 degrees Fahrenheit, provide preheating of the weld by a hot air device. Any seaming done below 40˚ F or above 120˚ F shall be allowed only after verification by the CQA Monitor that the material can be seamed according to the Special Provisions.
13. Discontinue operations temporarily as directed by the CQA Monitor if temperatures below 130°F result in excessive wrinkling in unseamed panels.

E. Defects and Repairs – the Installer shall:
    1. Examine all welds and non-weld areas of the Geomembrane for defects, holes, blister, undispersed raw materials, and any sign of contamination by foreign matter. Ensure that the surface of the Geomembrane is clean at the time of the examination.
    2. Repair and non-destructively test each suspect location both in weld and non-weld areas and shall not cover Geomembrane at locations which have been repaired until test results with passing values are available.

F. Extrusion Type of Welding – the Installer shall:
    1. Use procedures to tack bond adjacent panels together that do not damage Geomembrane and which allow CQA tests to be performed.
    2. Purge welding apparatus of heat-degraded extrudate before welding and after any work stoppages of more than three minutes.
    3. Bevel top edges of Geomembrane a minimum of 45° for the full thickness of Geomembrane before extrusion welding.
    4. Clean seam welding surfaces of oxidation by disc grinder with 80 grit sandpaper not more than 30 minutes before extruding weld. Change grinding discs frequently and shall not use clogged discs.
    5. Not remove more than 4 mils of material when grinding.
    6. Grind across, not parallel to, welds.
    7. Cover entire width of grind area with extrudate.
    8. Grind ends of all welds that are more than 5 minutes old when restarting welding.

9. Ensure that grind marks do not extend more than a quarter inch beyond the weld head.

G. Interface Extrudate Welding – the Installer shall:

1. Mount components necessary to weld on mobile unit.
2. Include the following accessories on mobile unit:
   a. Variable speed control.
   b. Wheels with non-skid surface.
   c. Directional control.
   d. Automatic hot air system for preheating welding surfaces.
   e. Extruder system with appropriate die.
   f. Adjustable contact pressure rollers.
3. Test and set hot air system using scrap material each day prior to commencing welding.
4. Adjust hot air velocity to negate wind effects.
5. Adjust contact pressure rollers to prevent surface ripples in panels.
6. Protect against moisture build-up between panels.

H. Hot Wedge Welding. – the Installer shall:

1. Place smooth insulating plate or fabric beneath hot welding apparatus after usage.
2. Protect against moisture build-up between panels.
3. Conduct field test welds at least every two hours if welding across cross seams, otherwise, once prior to start of work and once at mid-day.
4. Bevel edges of top and bottom panels on cross seams prior to welding .
5. Extrusion-weld a patch over all seam intersections.
6. Use the extrusion or single wedge fusion welding method if the double hot wedge welding process produces areas where air pressure testing of the seams can not be conducted with a vacuum box.

11-2.03.6 FIELD QUALITY CONTROL

A. General

1. The Manufacturer, Fabricator, and Installer shall participate in and conform with all terms and requirements of the Owner's quality assurance program. The Contractor is responsible for this participation.
2. The Installer shall designate a technician that is responsible for supervising and/or conducting the Installer's field quality control program.

B. Conformance Testing (Performed by CQA Laboratory).

1. The Installer shall allow 5 working days for conformance testing following the date material is available to the CQA Consultant.
2. The CQA Monitor shall have the following tests performed by the CQA Laboratory at a frequency of one per batch or one per 150,000 square feet of material supplied, whichever results in the greatest number of tests, to determine Geomembrane conformance with the requirements of these Special Provisions:
   a. Sheet Thickness (ASTM D 5994)
   b. Asperity Height (ASTM D 7466)
   c. Specific Gravity (ASTM D 1505)
   d. Tensile Properties (ASTM D6993)
   e. Tear Resistance (ASTM D 1004)
   f. Puncture Resistance (ASTM D 4833)
3. Where optional procedures are noted in the test method, the requirements of these Special Provisions shall prevail.
4. Additional tests may be performed at the discretion of the CQA Monitor.
5. The Installer shall provide equipment and personnel to assist the CQA Monitor in obtaining samples in accordance with the following:
   a. The Installer shall sample across the entire width of the roll as directed by the CQA Monitor.
   b. The Installer shall cut samples 3 feet long by width of roll as directed by the CQA Monitor.
   c. The CQA Monitor shall mark the roll number, machine direction, and the date on which the sample was taken on each sample.
   d. Samples shall be taken at a rate of one per batch or one per 150,000 square feet of material supplied, whichever results in greatest number.

C. Conformance Testing (Performed by Leak Location Contractor).

1. The Leak Location Contractor shall perform a geoelectric liner leak location survey. The survey will be performed in two phases. The first phase (ASTM D 7002) will be a “water puddle” survey performed on the installed Geomembrane before placing Geonet, Geotextile, and Operations Layer soil. The “water puddle” survey is typically conducted at night when the Geomembrane is taut. The first phase will be performed after all samples of Geomembrane required for destructive testing are obtained and the sample locations repaired. The second phase (ASTM D 7007) will be performed after placing the Geonet, Geotextile, and Operations Layer soil.
2. As directed by the CQA Monitor, blind actual holes will be placed in the Geomembrane in accordance with ASTM D 7909 before conducting the survey as a quality control/quality assurance measure to ensure that leaks through the Geomembrane are detectable.
3. The Contractor shall perform calibration testing with the blind actual hole on the Geomembrane. If a blind actual hole is not detected

during the calibration testing, the hole will be repaired, and the Geomembrane resurveyed since the previous calibration test was inadequate.

4. The Contractor shall provide electrical isolation surrounding the area which will be geoelectric liner leak location surveyed prior to completion of phase two of the geoelectric survey. This typically includes foregoing the placement of Operations Layer Soils surrounding the entire area that will be surveyed at a minimum of 2 ft wide and have the geosynthetics still visible. The Leak Location Contractor shall perform the geoelectric liner leak detection survey in accordance with either ASTM D 7002 or ASTM D 7007, as applicable. The Leak Location Contractor shall conduct the first phase of the geoelectric liner leak detection survey such that any holes in the Geomembrane with a diameter of 0.2 inches or greater and any holes with an overall area of 0.03 square inches or greater are detected.
5. The Installer shall coordinate Geomembrane, Geonet, Geotextile, and Operations Layer placement with the Leak Location Contractor and the CQA Monitor. No Geomembrane shall be covered with any material before the “water puddle” liner leak location survey is performed. If the Installer wants to temporarily cover the Geomembrane before the liner leak detection survey is performed, approval from the CQA Monitor shall be obtained before doing so.
6. The Contractor and Installer shall assist the Leak Location Contractor by providing equipment and personnel to assist the Leak Location Contractor in performing the liner leak location survey.
7. The Contractor shall install, at the direction of the Leak Location Contractor, at least two permanent electrodes in the soil liner or GCL located beneath the Geomembrane. The permanent electrodes must be installed before the installation of the Geomembrane. The permanent electrodes will be provided by the Leak Location Contractor.
8. The Contractor shall provide an adequate power supply (110V, 5 A) for the liner leak location survey.
9. The Contractor shall provide two supervised laborers, or as requested by the Leak Location Contractor, with equipment to assist in laying out survey string lines and applying water to the Geomembrane.
10. The liner leak location survey is expected to take up to 5 working days per phase to complete. The Contractor shall allow for all time necessary to complete the liner leak location survey, including repairs to the Geomembrane.
11. The Installer shall repair all damage, holes, or defects in the Geomembrane identified by the Leak Location Contractor in accordance with these Special Provisions.
12. Placement of Geonet, Geotextile, and Operations Layer can proceed after successful completion of the liner leak location survey and repair of all damage, holes, and defects in the Geomembrane.
13. Full compensation for performing the first and second phases required for the Geo-Electric Leak Detection Surveys as described in

the Specifications and throughout these Special Provisions and as directed by the Engineer, shall be paid for in the lump sum item for Geoelectric Leak Detection, and no additional compensation will be allowed therefor.

D. Field Testing:

1. General: The Installer shall non-destructively test all field seams over their full length using a vacuum test unit, air pressure (for double fusion seams only), spark testing, or other approved methods. The Installer shall perform testing as the seaming progresses and not at the completion of all the field seaming. The Installer shall complete all required repairs in accordance with this specification.

2. Vacuum Testing

   a. Equipment for vacuum testing shall be comprised of the following:

      1) A vacuum box assembly consisting of a rigid housing, a transparent viewing window, a soft neoprene gasket attached to the bottom, port hole, or valve assembly, and a vacuum gauge. Box dimensions shall be small enough so that testing can be accomplished over odd-shaped surfaces.

      2) A vacuum pump assembly equipped with a pressure control.

      3) A rubber pressure/vacuum hose with fittings and connections.

      4) A soapy solution and an applicator.

   b. Vacuum test procedures – the Installer shall:

      1) Wet the weld to be tested with a soapy solution prior to using the vacuum box.

      2) Place the box over the wetted seam area.

      3) Ensure that a leak-tight seal is created.

      4) Energize the vacuum pump and reduce the vacuum box pressure to approximately 10 inches of mercury, i.e., 5 psi gauge.

      5) Examine the Geomembrane through the viewing window for the presence of soap bubbles for a period of not less than fifteen seconds.

      6) Test the next section of seam, if no bubbles appear, with a minimum of three inches of overlap with the previous section.

      7) Mark and repair all areas where soap bubbles appear in accordance with repair procedures described in this specification.

3. Air pressure testing for seaming processes producing a double seam with an enclosed channel. If the double hot wedge welding system is used, air pressure testing shall be conducted instead of vacuum testing.

   a. Equipment for air pressure testing shall be comprised of the following:

      1) An air pump (manual or motor driven) capable of generating and sustaining a pressure over 30 psi and mounted on a cushion to protect the Geomembrane.

2) A rubber hose with fittings and connections.

3) A sharp hollow needle, or other approved pressure feed device.

4) A pressure gauge with an accuracy of one psi.

b. Air pressure test procedures – the Installer shall:

1) Seal both ends of the welded seam to be tested.

2) Insert needle or other approved pressure feed device into the tunnel created by the weld.

3) Energize the air pump to a minimum pressure of 1/2 psi per mil of liner thickness, close valve and sustain pressure for at least five minutes.

4) If loss of pressure exceeds two psi (ten mm mercury), or does not stabilize, locate faulty area and repair in accordance with repair procedures described in these Special Provisions.

5) Puncture opposite end of seam to release air. If blockage is present (air is not released), locate and test seam on both sides of blockage.

6) Remove needle or other approved pressure feed device and seal the penetration holes.

4. Spark Testing for penetrations or other difficult areas not accessible for vacuum testing.

a. Equipment for spark testing shall be comprised of the following:

1) 24 gauge copper wire.

2) Low-amperage electric detector, 20,000 to 30,000 volt, with brush-type electrode capable of causing visible arc up to 3/4 inch from copper wire.

b. Spark testing procedures – the Installer shall:

1) Place copper wire in the seam within 1/4 inch of the edge of extrusion seam or clamp seal.

2) Pass electrode over seam or clamp area and observe for spark. If a spark is detected perform a repair.

5. Destructive Testing (performed by CQA Monitor and the Installer).

a. Location and Frequency of Testing.

1) The Installer shall collect destructive test samples as the installation progresses.

2) The Installer shall repair any suspicious looking welds before release of a seam for destructive sampling.

3) The Installer shall assist the CQA Monitor by collecting destructive test samples at a minimum frequency of one test location per 500 feet of seam length.

4) The Installer shall assist the CQA Monitor by collecting destructive test samples at a minimum frequency of one test location per 200 feet of seam length for seams between

previously installed (more than 6 months previously) and new Geomembrane (if applicable).

5) The CQA Monitor will determine test locations during welding. The selection of test locations may be prompted by excess crystallinity or by suspicion of contamination, offset welds, or other defect. The CQA Monitor will not notify the Installer in advance of selecting locations where weld samples will be taken.

6) If the number of failed samples exceed 5 percent of the tested samples, the CQA Monitor may increase the test frequency. Samples taken as the result of failed tests do not count toward the total number of required tests.

b. Sampling Procedures.

1) The Installer shall cut samples at locations designated by the CQA Monitor. Destructive samples shall be cut as the installation progresses and not at the completion of the project. The Contractor shall verify that laboratory test results have been obtained before the Geomembrane is covered by another material.

2) The CQA Monitor will number each sample with consecutive numbers along with the seam number and will mark sample number and location in compliance with the CQA plan.

3) The Installer shall cut initial samples a minimum of 12 inches wide by 46 inches long with the seam centered lengthwise. The Installer shall then cut two one-inch wide strips from each end of the sample and test these for (shear and peel) in the field and shall cut the remaining sample into three parts for distribution as follows:

a. One portion for the Installer: 12 inches by 12 inches.

b. One portion for CQA Laboratory: 12 inches by 18 inches.

c. One portion to the OWNER for archive storage: minimum 12 inches by 12 inches.

4) The Installer shall repair all holes in the Geomembrane resulting from destructive test sampling the same day samples are taken in accordance with repair procedures described in this section and shall test the continuity of the repair in accordance with this section.

6. Field Testing

a. The CQA Monitor shall test the four, one-inch wide strips specified above by tensiometer for peel (2 strips, 1 from each end) and shear (2 strips, 1 from each end), respectively.

b. The CQA Monitor shall ensure that the test strips meet peel and shear requirements for welded seams specified in Section 11-2.03.2.

c. If any field test sample fails, the Installer shall follow failed weld procedures outlined in this section.

D. Laboratory seam testing performed by the CQA Laboratory.

1. The Installer shall provide samples to the CQA Monitor as described elsewhere in these Special Provisions.
2. The CQA Monitor shall send samples to the CQA Laboratory for "seam strength" and "peel adhesion" (ASTM D 6392) tests.
3. Minimum acceptable values to be obtained for these tests are specified in Section 11-2.03.2.
4. The CQA Laboratory shall:
   a. Test five specimens for each test method. Four of five specimens must meet minimum requirements. All peel specimens must peel less than 25 percent, or the entire sample will be considered as failing.
   b. Select specimens alternately by test from the samples (i.e., peel, shear, peel, shear, etc.).
   c. Provide verbal test results no more than one working day after receiving samples.
   d. Provide written test results within one week after receiving samples.
   e. Test both sides of the sample in peel for double wedge welded samples.

E. The Contractor shall not cover any seams which have not been tested.

F. The Installer shall keep a seaming log with the date, time, location, seaming technician, apparatus, temperature, and pass or fail criteria for each seam.

G. Acceptable Welded Seams:
   1. Acceptable welded seams shall be bracketed by two locations from which samples have passed destructive tests.
   2. For reconstructed seams exceeding 100 feet in length, a sample taken from within the reconstructed weld must pass destructive testing and the reconstructed seam must be approved by the CQA Monitor to be deemed acceptable.
   3. The CQA Monitor may require additional testing for seams that were welded by the same welder or welding apparatus, or which were welded during the same shift as a weld which failed testing.

H. Seams That Cannot Be Non-Destructively Tested – for seams that cannot be non-destructively tested, the Installer shall:
   1. Test the weld non-destructively prior to final installation if it is accessible to testing equipment. Seaming and testing in these areas shall be observed by the CQA Monitor.
   2. Cap strip the weld if it cannot be tested prior to final installation. The welding and cap-stripping operations must be observed by the CQA Monitor and Installer for uniformity and completeness.

I. Failed Weld Procedures - when a destructive test failure is determined by the CQA Laboratory or by field tensiometer, the Installer shall follow one of the following two options:
   1. First Option: reconstruct the seam between any two passing test locations.

2. Second Option:
   a. Trace the weld at least 10 feet minimum in both directions from the location of the failed test, or to the end of the weld.
   b. Obtain a small sample at both locations.
   c. Give samples to the CQA Monitor for testing using a field tensiometer.
   d. If these additional test samples pass field tests, then take laboratory samples.
   e. If the laboratory samples pass, then reconstruct the weld or cap between the two test sample locations that bracket the failed test location. The final pass or fail criteria for a seam will be based on the results from the third party laboratory.
   f. If any sample fails, then repeat the process to establish the zone in which the weld must be reconstructed.

11-2.03.7 REPAIRS

The Installer shall perform repair or replacement of Geomembrane in accordance with these Special Provisions.

A. For areas that have large defects, folds, or large wrinkles, the Installer shall remove and replace the material. The CQA Monitor shall determine areas that require removal.

B. Prior to covering, the Installer shall repair areas where bridging or trampolining of the Geomembrane occurs.

C. Repair, removal, and replacement is at Contractor's expense if the damage results from the Manufacturer’s, Contractor's, or the Contractor's subcontractor activities.

D. The Installer shall repair any portion of the Geomembrane exhibiting a flaw, leak, or failing a destructive or non-destructive test. Agreement upon the appropriate repair method will be determined between the Engineer, the CQA Consultant and the Installer. The Installer shall not commence welding on liner until a trial weld test sample, made by that equipment and operator, passes trial test. Repair procedures shall conform with the following requirements:
   1. Patching shall be used to repair all destructive sample holes, tears, large holes (1/4-inch diameter or larger), tears with lengths of 2 inches or more, areas with blisters or undispersed raw materials, and areas contaminated by foreign matter.
   2. Abrading and re-welding shall be used to repair small sections of seams.
   3. Spot welding or seaming shall be used to repair small tears (less than 2 inches long), pin holes or other minor, localized flaws. The Installer may repair holes smaller than 1/4 inch by using an extrusion weld. The surface oxidation surrounding the hole shall be removed a minimum of one inch around the hole and then immediately welded. After the hole has been welded, it shall be vacuum tested for leaks. The result of the test, the name of the tester, and the date shall be recorded on the liner near the repair.

4. Capping shall be used to repair large lengths of failed seams.
5. Long lengths of defective seams shall be repaired by removing the seam and replacing with a strip of new material as directed by the CQA Monitor.

E. Additionally, repairs shall be performed in accordance with the following requirements:

1. The Installer shall abrade Geomembrane surfaces to be repaired via the use of extrusion welds no more than one (1) hour prior to the repair.
2. The Installer shall clean and dry all surfaces at the time of repair.
3. The Installer shall not commence with a repair until the repair procedures, materials, and techniques have been accepted by the CQA Monitor and the Engineer for the specific repair in question.
4. Patches shall be round or oval in shape, extend at least six inches beyond the defect, and be made of the same material as the Geomembrane. The edge of the patch shall be beveled and welded to the liner in accordance with the procedures outlined for extrusion welding. All patches shall be vacuum tested and the results recorded on the liner.
5. Unless otherwise instructed by the Engineer, the Installer shall cut Geomembrane below large caps to avoid water or gas collection between the sheets.

F. Verification of repair – the Installer shall:

1. Number and log each patch repair.
2. Non-destructively test each repair using methods specified in these Special Provisions.
3. Perform additional destructive tests at the discretion of the CQA Monitor.
4. Reconstruct repairs until tests indicate passing results.

11-2.03.8 ACCEPTANCE OF THE GEOMEMBRANE

A. The Contractor shall be responsible for maintaining the Geomembrane and shall retain ownership thereof until final acceptance by the Engineer.

B. The Engineer will accept Geomembrane installation when:

1. All required documentation from the Manufacturer, Fabricator, and Installer has been received and accepted.
2. The installation is finished.
3. Test reports verifying completion of all field seams and repairs, including associated testing, have been received and approved.
4. Written certification documents and drawings have been received by the Owner from the CQA Consultant.
5. The Engineer has approved the Contractor's as-built drawings required by Section 11-2.01.4.

6. The Operations Layer has been installed, the Leak Location Contractor has completed the geoelectric liner leak location survey, and any damage, holes or defects have been repaired by the Installer and repairs have been approved by the CQA Monitor.

11-2.04 MEASUREMENT AND PAYMENT

11-2.04.1 MEASUREMENT

A. The quantity of Geomembrane will be calculated by measurements made along the plane of installation and shall include Geomembrane installed in the anchor trenches to the dimensions shown on the Plans.

B. Geomembrane required for seam overlap and Geomembrane required to repair or replace damaged material will not be measured.

11-2.04.2 PAYMENT

A. The quantity of Geomembrane is a final pay quantity. Payment for furnishing and installing Geomembrane will be by the unit price per square foot quoted therefor in Bid Schedule.

B. The contract unit price paid per square foot for Geomembrane shall include full compensation for furnishing all labor, materials, equipment, accessories, and incidentals, and for performing all work specified including, but not limited to: quality control testing of material prior to delivery; installing; seaming; testing; repairing; providing, placing and removing sandbags; and repairing any defects in the liner system identified by the leak location survey thereby; and providing all Contractor Geomembrane documentation required to complete the work in accordance with the Plans, these Special Provisions, and as directed by the Engineer.

C. Geomembrane required for seam overlap and Geomembrane required to repair or replace damaged material will not be paid for. All costs in connection therewith shall be considered to be included in the various items of work and no additional compensation will be made therefor.

D. For each laboratory destructive test failure in excess of 5 percent of the total number of destructive weld tests performed by the CQA Consultant, the Owner will deduct $1,000 from final payment to the Contractor.

11-3 GEONET

11-3.01 GENERAL

The Geonet is to be installed as a drainage media over the Geomembrane to ensure leachate is transmitted to the leachate collection and removal system.

11-3.01.1 SUMMARY

A. Section includes furnishing and installing Geonet.

B. Related Sections:

1. Section 10-1.14 - Earthwork
2. Section 11-1 - Geosynthetic Clay Liner
3. Section 11-2 - High Density Polyethylene Geomembrane
4. Section 11-4 – Geotextile
5. Section 11-5 - Operations Layer
6. Section 11-6 - Protective Plywood Cover
7. Section 12 – High Density Polyethylene Pipe

11-3.01.2 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. ASTM D 1238 – Standard Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer.
2. ASTM D 1505 - Standard Test Method for Density of Plastics by the Density - Gradient Technique.
3. ASTM D 1603 – Standard Test Method for Carbon Black in Olefin Plastics.
4. ASTM D 1621 - Test Method for Compressive Properties of Rigid Cellular Plastics.
5. ASTM D 4218 - Standard Test Method for Determination of Carbon Black Content in Polyethylene Compounds by the Muffle-Furnace Technique.
6. ASTM D 4716 - Test Method for Determining the (In-Plane) Flow Rate per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head.
7. ASTM D 5199 - Standard Test Method for Measuring Nominal Thickness of Geotextiles and Geomembranes.
8. ASTM D 7179 – Standard Test Method for Determining Geonet Breaking Force.

B. Geosynthetics Construction Quality Assurance (CQA) Plan For The American Avenue Disposal Site Phase III Expansion.

11-3.01.3 DEFINITIONS

A. Construction Quality Assurance (CQA) Consultant: The monitoring firm responsible for implementation of the CQA activities.

B. Construction Quality Assurance (CQA) Laboratory: A laboratory selected by the CQA Consultant, independent from the Owner, Manufacturer, Fabricator, and Installer, responsible for conducting laboratory tests on samples of geosynthetics obtained at the site. Also referred to as the Geosynthetics Laboratory.

C. Construction Quality Assurance (CQA) Officer: The professional representative of the CQA Consultant responsible for implementation of the CQA plan. Also, referred to as the CQA Engineer.

D. Construction Quality Assurance (CQA) Monitor: Site representative of the CQA Consultant responsible for documenting field observations and tests.

E. Engineer: Director of the Department of Public Works and Planning of Fresno County, acting either directly or through properly authorized agents, such agents acting within the scope of the particular duties entrusted to them.

F. Fabricator: The party responsible for the fabrication of Geonet panels constructed from rolls received from the manufacturer.

G. Geonet: A geosynthetic consisting of intergrally connected parallel sets of ribs overlying similar sets at various angles.

H. Geonet Manufacturer (Manufacturer): The party responsible for the production and quality of the Geonet.

I. Installer: The party responsible for field handling, deploying, seaming, temporary restraining (against wind), and installing the Geonet.

J. Leak Location Contractor: A firm specializing in leak location testing of synthetic liner materials, independent from the Engineer, Manufacturer, Fabricator, and Installer, responsible for performing the geoelectric liner leak detection survey of the installed Geomembrane.

K. Owner: County of Fresno

L. Panel: The unit area of Geonet, a roll or a portion of a roll, that will be seamed or overlapped in the field.

11-3.01.4 SUBMITTALS

A. Qualifications (Manufacturer): The Contractor shall submit information necessary to evaluate the Manufacturer's qualifications in accordance with Section 11-3.01.5 of these Special Provisions at least 21 calendar days prior to ordering the material. Material shall not be ordered by the Contractor until the Manufacturer's qualifications have been reviewed and approved in writing by the Engineer.

B. Qualifications (Installer): The Contractor shall submit information necessary to evaluate the Installer's qualifications in accordance with Section 11-3.01.5 of these Special Provisions at least 21 calendar days prior to installation of the material. The submittal shall include the name of Installer and the names and resumes of the installation supervisor/field design engineer.

C. The Contractor shall furnish the following engineering data to the Engineer no less than 14 calendar days prior to shipping:

1. An instruction manual which includes the proper storage, handling, deployment, and joining of the Geonet.

2. Quality control certificates on the Geonet. The quality control certificates shall include the production date and the laboratory results from the supplier demonstrating compliance with the Geonet specifications described in Section 11-3.03.

3. Samples and a complete description of the Geonet proposed for use. The Geonet shall meet or exceed requirements of this section.

4. Written instructions for storage and handling of the Geonet material prior to shipment to the site.
5. Roll length and width.
6. Sample warranties for review.

D. The Contractor shall submit the following upon completion of the installation:

1. A certification stating that the Geonet has been installed in accordance with the Plans and Special Provisions.
2. The Manufacturer's product warranty.
3. The Contractor's installation warranty.

11-3.01.5 QUALIFICATIONS

A. The manufacturer of the Geonet shall manufacture the material in the United States or in Canada and shall have previously demonstrated the ability to produce this Geonet by having successfully manufactured a minimum of ten million square feet of similar Geonet material for landfill installations. A list of similar projects completed in which the manufactured material has been successfully used shall be submitted.

B. The Installer of the Geonet shall have previously demonstrated the ability to install this Geonet by having successfully installed a minimum of five million square feet of similar Geonet material for landfill installations. A list of projects completed by the Installer in which similar product has been successfully installed shall be submitted.

11-3.01.6 QUALITY ASSURANCE

A. The Owner will engage and pay for the services of a CQA Consultant, and a CQA Laboratory for monitoring the quality and installation of Geonet material being installed unless otherwise specified.

B. The Contractor shall render assistance as necessary for CQA Monitor to collect product samples in accordance with the CQA Plan.

C. Geonet shall not be shipped to the site until conformance testing has been completed and the test results are determined to comply with the specifications. If geonet is shipped before conformance testing has been completed and the test results are determined to comply with the specifications, it will be at the Contractor's risk and the Contractor assumes all responsibility for the handling of geonet that is determined to not comply with the specifications.

D. Should the Contractor choose to have geonet shipped to the site before conformance testing has been completed and the test results are determined to comply with the specifications, the geonet shall be stored separate from geonet that has been determined to comply with the specifications.

E. Conformance test results will be reviewed consistent with ASTM D 4759. If a test result is in non-conformance with the specifications, all material from that production lot represented by the failed conformance test shall be rejected. Rejected material may be minimized by bounding the non-conforming material with additional passing tests conducted by the CQA

laboratory. Additional tests and replaced material will be provided at no additional cost to the Owner.

11-3.01.7 DELIVERY, STORAGE, AND HANDLING

The Contractor shall be responsible for transporting, unloading, and storing the Geonet. The Contractor shall:

A. Protect material from ultraviolet light exposure, precipitation, inundation, mud, dirt, dust, puncture, cutting, and other damaging or deleterious conditions.

B. Follow the Manufacturer's written instruction for shipping, storage, and handling unless otherwise approved in writing by the Engineer.

C. Ship the Geonet such that it is not damaged in transport.

D. Unload Geonet in the presence of the CQA Monitor.

E. Notify the Engineer in writing 48 hours in advance of delivery of the Geonet. Material deliveries will not be allowed on-site unless and until submittals pertaining thereto which are required prior to delivery have been reviewed and accepted and advance written notice of delivery has been provided to the Engineer in accordance with these Special Provisions.

F. Stack Geonet rolls on a prepared surface. The surface shall be prepared such that the net is not subjected to rocks or sharp objects, water, oil, or other deleterious conditions.

G. Immediately restore damaged protective covering.

H. Facilitate the CQA Monitor’s inspection of material during the off-loading process so that damaged material may be documented by the CQA Monitor.

I. Separate damaged rolls from undamaged rolls and store at locations designated by the Engineer until proper disposition of material is determined by Engineer.

J. Replace any Geonet determined by the Engineer to be unacceptable.

11-3.01.8 WARRANTY

A. The Contractor shall provide a Manufacturer's Warranty for Geonet material in compliance with the requirements of these Special Provisions. The Manufacturer’s Warranty shall:

   1. Provide a minimum 20-year warranty for the material against deterioration due to exposure to buried elements.

   2. Cover the costs of material replacement and installation; assuming the area is in a clean, dry, unencumbered condition. In the event the area cannot be rendered as such, compensation for defective material will be provided to the Owner on a pro rata basis for the estimated cost to the Owner at that time of supplying and installing material to a clean, dry, and unencumbered condition by a third-party installer.

B. The Contractor shall provide an installation warranty for Geonet material in compliance with the requirements of these Special Provisions. The installation warranty shall provide a minimum of 2 year non-prorated warranty for the installation against defects.

11-3.02 PRODUCTS

11-3.02.1 MANUFACTURERS

Material shall be provided by a Manufacturer meeting the qualification requirements in Section 11-3.01.5 or by a distributor approved by a qualified Manufacturer.

11-3.02.2 MATERIAL

The Geonet supplied for use as drainage material shall come in non-deformed nets constructed of extruded and/or formed high density polyethylene rods. The Geonet material shall meet or exceed the following specifications:

11-3.02.3 GEONET

Geonet shall:

A. Be produced in the United States or Canada. Material from other sources may be used only with prior written approval by the Engineer.

B. Be made from new, first quality resin that is UV stabilized with carbon black.

C. Be comprised of a high-density polyethylene bi-planar drainage structure consisting of thick supporting ribs with diagonally placed top and bottom ribs.

D. Be capable of providing high flow rates in a soil environment under high and normal loads.

E. Be furnished in rolls wrapped in impermeable, opaque protective coverings.

F. Be marked with Manufacturer’s name, product designation, lot number, and roll number.

G. Meet the Geonet/Geomembrane interface shear strength requirements specified in Tables 11-2C.

H. Meet the requirements in Table 11-3A.

Table 11-3A
Properties for Geonet

Test	Method	Requirement
Resin Density	ASTM D 1505	0.935 g/cm^3 min. avg.
Resin Melt Index	ASTM D 1238	1.0 g/10 min. max. avg.
Carbon Black Content	ASTM D 1603 or D 4218	2.0 % - 3.0 %
Thickness	ASTM D 5199	0.220 inch min. avg.
Tensile Strength	ASTM D 7179	60 lbs/inch min. avg.
Compression Behavior	ASTM D 1621	75 % (1)
Transmissivity (2)	ASTM D 4716	7.0 gal/min/ft min. avg.
Interface Shear Strength	See Table 11-2C	

1. Percent retained at 10,000 psf
2. In plane flow rate based on hydraulic gradient, i = 0.10 and normal load of 15,000 psf.

11-3.02.4 MANUFACTURER SOURCE QUALITY CONTROL

A. The Manufacturer shall perform quality control tests shown in Table 11-3B at the manufacturing plant at the frequency shown.

Table 11-3B
Quality Control Tests (1)

Test	Test Designation	Frequency (2)
Resin Density	ASTM D 1505	50,000 sf
Resin Melt Index	ASTM D 1238	50,000 sf
Carbon Black Content	ASTM D 1603 or D 4218	50,000 sf
Thickness	ASTM D 5199	50,000 sf
Tensile Strength	ASTM D 7179	50,0000 sf
Compression Behavior	ASTM D 1621	50,000 sf
Transmissivity	ASTM D 4716	500,000 sf

1. Quality control tests must meet minimum values shown on Table 11-3A.
2. One test per area or one test per lot, whichever is greater.

B. The Contractor shall provide the CQA Monitor with quality control certificates from the Manufacturer for each lot and each shift's production of Geonet. The quality control certificates shall include:

1. Roll numbers and identification.
2. Sampling procedures.

3. Results of quality control tests, including a description of test methods used.

11-3.02.5 LABELING

The Manufacturer shall mark or tag Geonet rolls with the following:

A. Manufacturer's name.

B. Product identification.

C. Lot number.

D. Roll number.

E. Roll dimensions.

11-3.02.6 EQUIPMENT

Equipment shall:

A. Be adequately maintained in order to avoid delaying work.

B. Be supplied by a power source capable of providing constant voltage under a combined-line load.

C. Be provided with a protective lining and splash pad large enough to catch spilled fuel under electric generator, if used on geosynthetics.

11-3.03 EXECUTION

11-3.03.1 DEPLOYMENT

The Installer shall:

A. Not commence with installation of the Geonet until the first phase of geoelectric leak location survey has been performed and the Installer has repaired any damage, holes, or defects in accordance with Section 11-2 of these Special Provisions.

B. Install product in accordance with the Manufacturer's recommendations.

C. Place Geonet over the Geomembrane only after approval by the Engineer.

D. Installer shall be responsible for staging the Work so that no construction equipment needs to be driven over already deployed geomembrane panels while deploying subsequent geonet or subsequent Operations Soil Layer.

Equipment used for placing soils shall not be driven directly over geosynthetics. A minimum thickness of 1 ft (300 mm) of material is required between a low ground pressure (LGP) dozer and underlying geosynthetics. A minimum thickness of 3 ft of material is required between rubber-tired vehicles and underlying geosynthetics. In areas of heavy vehicle traffic, such as access ramps, the material thickness should be at least 3 ft. In any case, the following table shall be complied with during construction:

E.

Maximum Allowable Equipment Ground Pressure (psi)	Initial Lift Thickness Over Geosynthetics (feet)
5	1.0
10	1.5
15	2.0
>20	>3.0

F. Follow Manufacturer's recommendations, standards, and guidelines unless otherwise stated in these Special Provisions or directed by the Engineer.

G. Secure Geonet during deployment by placing sandbags as ballast.

H. Fill sandbags with the same material as that which is used for the Operations Layer.

I. Maintain ballast in place until the Geonet is covered.

J. Maintain the Geonet until it has been approved and covered.

K. Use appropriate equipment to transport the Geonet from the storage area and deploy it on top of the Geomembrane liner. This equipment shall not damage the underlying Geomembrane or GCL.

L. Repair or replace any damaged material as directed by the Engineer.

K. Ensure that dust, stones, moisture, or other deleterious materials are not trapped in the Geonet or in underlying geosynthetics.

L. Clean the surface of the Geomembrane of dirt and loose materials prior to placement of the Geonet.

M. Examine Geonet over its entire surface to ensure that no potentially harmful foreign objects such as needles, are present and remove foreign objects if encountered.

N. Cover Geonet within 72 hours unless otherwise approved in writing by the Engineer.

O. Ensure that workers do not smoke or vape or engage in other activities that could damage the Geonet or underlying Geomembrane.

P. Maintain the Geomembrane free from holes or damage during installation of the Geonet.

Q. Repair any holes or damaged areas in the Geomembrane in accordance with Section 11-2.09, “Repairs” of these Special Provisions.

11-3.03.2 SEAMS AND OVERLAPS

The Installer shall:

A. Overlap the Geonet by at least 6 inches.

B. Secure overlaps by tying with white or yellow nylon cable ties.

C. Do not use metallic devices for tying.

D. Perform tying at a minimum of every 5 feet along slopes, every 1 foot (.03 m) across slopes, every 6 inches in any anchor trench and every 10 feet on floor areas.

11-3.03.3 FIELD QUALITY ASSURANCE

A. General

1. The Manufacturer, Fabricator, and Installer shall participate in and conform with all terms and requirements of the Owner's quality assurance program. The Contractor is responsible for this participation.
2. The Installer shall designate a technician that is responsible for supervising and/or conducting the Installer's field quality control program.

B. Conformance Testing (Performed by CQA Laboratory).

1. The CQA Monitor shall obtain conformance testing samples of the Geonet delivered to the site and forward the samples to the CQA Laboratory.
2. The Installer shall allow 5 working days for conformance testing following the date material is available to the CQA Consultant.
3. The CQA Monitor shall have the following tests performed by the CQA Laboratory at a frequency of one per batch or one per 250,000 square feet of material supplied, whichever results in greatest number of tests, to determine Geonet conformance with the requirements of these Special Provisions.
   a. Thickness: ASTM D 5199
   b. Tensile Strength and Elongation: ASTM D 7179
   c. Compression Behavior: ASTM D 1621
   d. Carbon Black Content: ASTM D 1603 or D 4218.
   e. Transmissivity: ASTM D 4716.
4. Where optional procedures are noted in the test method, the requirements of these Special Provisions shall prevail.
5. Additional tests may be performed at the discretion of the CQA Monitor.
6. The Contractor shall provide equipment and personnel to assist the CQA Monitor in obtaining samples in accordance with the following:
   a. The Installer shall sample across the entire width of the roll as directed by the CQA Monitor.
   b. Samples shall not be taken from the first 2 feet of a roll.
   c. The Installer shall cut samples 3 feet long by width of roll as directed by the CQA Monitor.
   d. The CQA Monitor shall mark the roll number, machine direction, and the date on which the sample was taken on each sample.

e. Samples shall be taken at a rate of one per batch or one per 250,000 square feet of material supplied, whichever results in the greatest number of samples.

11-3.03.4 REPAIR – The Installer shall repair Geonet in accordance with the following:

A. Any holes or tears in the Geonet shall be repaired by placing a patch extending 2 feet beyond the edges of the hole or tear. The patch shall be secured by installing approved tying devices through the Geonet every 6 inches in a grid pattern across the entire surface of the patch.

B. Any method of underpatching shall require approval from the Engineer. If the hole or tear width across the roll is more than 50 percent of the width of the roll, the damaged area will be cut out and the two portions of the Geonet will be joined in accordance with Section 11-3.03.2 above.

11-3.03.5 PROTECTION

When placing Geotextile or soil materials over the Geonet the Contractor shall:

A. Ensure that there is no damage to Geonet.

B. Ensure that there is no slippage of Geonet over underlying layers.

C. Ensure that no excessive tensile stresses are applied to the Geonet.

11-3.03.6 ACCEPTANCE OF THE GEONET

A. The Contractor shall be responsible for maintaining the Geonet and shall retain ownership thereof until final acceptance by the Engineer.

B. The Engineer will accept Geonet installation when:

1. All required documentation from the Manufacturer, Fabricator, and Installer has been received and accepted.

2. The installation is finished.

3. Written certification documents and drawings have been received by the Owner from the CQA Consultant.

5. The Operations Layer has been installed, the Leak Location Contractor has completed the geoelectric liner leak location survey, and any damage, holes, or defects have been repaired by the Installer and repairs have been approved by the CQA Monitor.

11-3.04 MEASUREMENT AND PAYMENT

11-3.04.1 MEASUREMENT

A. The quantity of Geonet will be calculated by measurements made along the plane of installation and shall include Geonet installed in the anchor trenches to the dimensions shown on the Plans.

B. Geonet required for seam overlap and Geonet required to repair or replace damaged material will not be measured.

11-3.04.2 PAYMENT

A. The quantity of Geonet is a final pay quantity. Payment for furnishing and installing Geonet will be by the unit price per square foot quoted therefor in Bid Schedule.

B. The contract unit price paid per square foot for Geonet shall include full compensation for furnishing all labor, materials, equipment, accessories, and incidentals, and for performing all work specified including, but not limited to: quality control testing of material prior to delivery; installing; seaming; testing; repairing; providing, placing and removing sandbags; anchor trench excavation and backfill; and providing all Contractor CQA documentation required to complete the work in accordance with these Special Provisions, the Plans, and as directed by the Engineer.

C. Geonet required for seam overlap and Geonet required to repair or replace damaged material will not be paid for. All costs in connection therewith shall be considered to be included in the various items of work and no additional compensation will be made therefor.

11-4 GEOTEXTILE

11-4.01 GENERAL

The Geotextile to be furnished and installed under this contract shall conform to the requirements outlined herein along with the accompanying geosynthetics quality assurance plan.

The Contractor shall notify the Engineer 14 calendar days in advance of starting the Geotextile installation.

11-4.01.1 SUMMARY

A. Section includes furnishing and installing Geotextile over the Geonet and around the leachate pipe collection trenches.

B. Related Sections:

1. Section 10-1.14 - Earthwork
2. Section 11-1 - Geosynthetic Clay Liner
3. Section 11-2 - High Density Polyethylene Geomembrane
4. Section 11-3 - Geonet
5. Section 11-5 - Operations Layer
6. Section 11-6 - Protective Plywood Cover
7. Section 12 – High Density Polyethylene Pipe

11-4.01.2 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. ASTM D 3786 – Standard Test Method for Hydraulic Bursting Strength of Textile Fabrics – Diaphragm Bursting Strength Tester Method

2. ASTM D 4491 — Test Methods for Water Permeability of Geotextiles by Permittivity.
3. ASTM D 4533 — Test Method for Trapezoid Tearing Strength of Geotextiles.
4. ASTM D 4632 — Test Method for Grab Breaking Load and Elongation of Geotextiles.
5. ASTM D 4751 — Test Method for Determining Apparent Opening Size of a Geotextile.
6. ASTM D 5261 — Standard Test Method for Measuring Mass per Unit Area of Geotextiles.
7. ASTM D 6241 – Standard Test Method for Static Puncture Strength of Geotextiles and Geotextile Related Product Using a 50-mm Probe

B. Geosynthetics Construction Quality Assurance (CQA) Plan For The American Avenue Disposal Site Phase III Expansion.

11-4.01.3 DEFINITIONS

A. Construction Quality Assurance (CQA) Consultant: The monitoring firm responsible for implementation of the CQA activities.

B. Construction Quality Assurance (CQA) Laboratory: A laboratory selected by the CQA Consultant independent from the Engineer, Contractor, Manufacturer, Fabricator and Installer, responsible for conducting laboratory tests on samples of materials obtained at the site. Also referred to as the Geosynthetics Laboratory.

C. Construction Quality Assurance (CQA) Officer: The professional representative of the CQA Consultant responsible for implementation of the CQA plan. Also, referred to as the CQA Engineer.

D. Construction Quality Assurance (CQA) Monitor: Site representative of the CQA Consultant responsible for documenting field observations and tests.

E. Engineer: Director of the Department of Public Works and Planning of Fresno County, acting either directly or through properly authorized agents, such agents acting within the scope of the particular duties entrusted to them.

F. Geotextile: A permeable geosynthetic comprised solely of textiles.

G. Installer: The party responsible for field handling, deploying, seaming temporary restraining (against wind), and installing the Geotextile.

H. Leak Location Contractor: A firm specializing in leak location testing of synthetic liner materials, independent from the Engineer, Manufacturer, Fabricator, and Installer, responsible for performing the geoelectric liner leak detection survey of the installed Geomembrane.

I. Manufacturer: The party responsible for the production and quality of the Geotextile.

K. Owner: County of Fresno

L. Panel: The unit area of Geotextile, a roll or a portion of a roll, that will be seamed or overlapped in the field.

11-4.01.4 SUBMITTALS

A. Qualifications (Manufacturer): The Contractor shall submit information necessary to evaluate the Manufacturer's qualifications in accordance with Section 11-4.01.5 of these Special Provisions at least 21 calendar days prior to ordering the material. Material shall not be ordered by the Contractor until the Manufacturer's qualifications have been reviewed and approved in writing by the Engineer.

B. Qualifications (Installer): The Contractor shall submit information necessary to evaluate the Installer's qualifications in accordance with Section 11-4.01.5 of these Special Provisions at least 21 calendar days prior to installation of the material. The submittal shall include the name of Installer and the names and resumes of the installation supervisor/field design engineer.

C. The Contractor shall submit the following 14 calendar days prior to Geotextile shipment to the site:

1. Samples and complete description of Geotextile fabric proposed for use, that meet or exceed requirements of these Special Provisions.
2. Manufacturer's certificates of compliance with specified product requirements prior to shipment. This submittal shall include Manufacturer's Quality Control (MQC) testing.
3. An instruction manual which includes the proper storage, handling, deployment, and sewing of the Geotextile. This manual shall be in compliance with these Special Provisions, the quality assurance plan, and any conditions of warranty.
4. Quality control certificates on the Geotextile. The data submitted with the Geotextile shall include the production date and the laboratory results from the supplier demonstrating compliance with the specifications described in Section 11-4.04, Material of these Special Provisions.
5. Roll length and width.
6. Specifications and manufacturer's certification on the thread used to sew the Geotextile. The thread shall be a polymeric material with chemical resistance and strength characteristics that are equal to or exceed those of the Geotextile.
7. Sample warranties for review.

D. The Contractor shall submit the following upon completion of the installation:

1. A certification stating that the Geotextile has been installed in accordance with the Plans and Special Provisions.
2. The Manufacturer's product warranty.
3. The Contractor's installation warranty.

11-4.01.5 QUALIFICATIONS

A. The manufacturer of the Geotextile shall manufacture the material in the United States or in Canada and shall have previously demonstrated the ability to produce this Geotextile by having successfully manufactured a minimum of ten million square feet of similar Geotextile material for landfill installations. A list of similar projects completed in which the manufactured material has been successfully used shall be submitted.

B. The Installer of the Geotextile shall have previously demonstrated the ability to install this Geotextile by having successfully installed a minimum of five million square feet of similar Geotextile material for landfill installations. A list of projects completed by the Installer in which similar product has been successfully installed shall be submitted.

11-4.01.6 QUALITY ASSURANCE

A. The Owner will engage and pay for the services of a Construction Quality Assurance (CQA) Consultant, and a Construction Quality Assurance (CQA) Laboratory for monitoring the quality and installation of the Geotextile material being installed unless otherwise specified.

B. The Contractor shall aid the CQA Monitor in product sampling by providing personnel and equipment necessary to move, cut, and protect Geotextile rolls.

C. Geotextile shall not be shipped to the site until conformance testing has been completed and the test results are determined to comply with the specifications. If geotextile is shipped before conformance testing has been completed and the test results are determined to not comply with the specifications, it will be at the Contractor's risk and the Contractor assumes all responsibility for the handling of geotextile that is determined to not comply with the specifications.

D. Should the Contractor choose to have geotextile shipped to the site before conformance testing has been completed and the test results are determined to not comply with the specifications, the geotextile shall be stored separate from geotextile that has been determined to comply with the specifications.

E. Conformance test results will be reviewed consistent with ASTM D 4759-Procedure B. If a test result is in non-conformance with the specifications, all material from that individual lot sampling unit represented by the failed conformance test shall be catalogued as "failed" or non-conforming. Any individual lot sampling unit which fails initial testing shall be retested for all the methods which did not meet the acceptable specification values. If the average of both tests for any initially non-conforming methods, confirm that the individual lot sampling unit is non-conforming, then the individual lot sampling unit failing the acceptable specification value need to be rejected. Individual lot sampling units before and after the failed individual lot sampling unit or units in the lot will be resampled and retested for all applicable testing methods ("blocking tests"). Finally, the sequence of non-conforming individual lot sampling units in the lot shall be bounded/delineated by passing individual lot sampling units ("blocking tests"). Additional tests and replaced material will be provided at no additional cost to the Owner.

11-4.01.7 DELIVERY, STORAGE, AND HANDLING

The Contractor shall:

A. Protect Geotextile from ultraviolet light exposure, precipitation, inundation, mud, dirt, dust, puncture, cutting, and other damaging or deleterious conditions.

B. Follow the Manufacturer's written instructions for shipping, storage, and handling unless otherwise approved in writing by the Engineer.

C. Ship Geotextile in closed trailers.

D. Separate damaged rolls from undamaged rolls and store at locations designated by the Engineer until proper disposition of material is determined by Engineer.

E. Ship Geotextile such that it is not damaged in transport.

F. Unload Geotextile in the presence of the CQA Monitor.

G. Notify the Engineer in writing 48 hours in advance of delivery. Material deliveries will not be allowed on-site unless and until submittals pertaining thereto which are required prior to delivery have been reviewed and accepted and advance written notice of delivery has been provided to the Engineer in accordance with these Special Provisions.

H. Facilitate the CQA Monitor's inspection of material during the off-loading process so that damaged material may be documented by the CQA Monitor.

I. Separate damaged rolls from undamaged material.

J. Defer to the Engineer's direction regarding the final disposition of damaged rolls.

K. Replace any Geotextile determined to be unacceptable at no cost to Owner.

L. Stack Geotextile rolls on a prepared surface. The surface shall be prepared such that the material is not subjected to rocks or sharp objects, water, oil, or other deleterious conditions.

M. Ship and store the Geotextile rolls in opaque and water tight protective covers.

N. Use appropriate equipment to transport the Geotextile from the storage area and deploy it on top of the Geonet without driving over placed geosynthetics.

O. Installer shall be responsible for staging the Work so that no construction equipment needs to be driven over already deployed geonet panels while deploying subsequent geotextile or subsequent Operations Soil Layer.

P. Equipment used for placing soils shall not be driven directly over geosynthetics. A minimum thickness of 1 ft (300 mm) of material is required between a low ground pressure (LGP) dozer and underlying geosynthetics. A minimum thickness of 3 ft of material is required between rubber-tired vehicles and underlying geosynthetics. In areas of heavy vehicle traffic, such as access ramps, the material thickness should be at least 3 ft. In any case, the following table shall be complied with during construction:

Maximum Allowable Equipment Ground Pressure (psi)	Initial Lift Thickness Over Geosynthetics (feet)
5	1.0
10	1.5
15	2.0
>20	>3.0

Q. Repair any damage caused to the Geonet or underlying liners to the satisfaction of the CQA Monitor at no cost to the Owner.

R. Follow delivery, storage, and handling procedures outlined in ASTM D 4873.

11-4.01.8 WARRANTY

A. The Contractor shall provide a Manufacturer's Warranty for Geotextile material in compliance with the requirements of these Special Provisions. The Manufacturer's Warranty shall:

1. Provide a minimum 20-year warranty for the material against deterioration due to exposure to buried elements.
2. Cover the costs of material replacement and installation; assuming the area is in a clean, dry, unencumbered condition. In the event the area cannot be rendered as such, compensation for defective material will be provided to the Owner on a pro rata basis for the estimated cost to the Owner at that time of supplying and installing material to a clean, dry, and unencumbered condition by a third-party Installer.

B. The Contractor shall provide an installation warranty for Geotextile material in compliance with the requirements of these Special Provisions. The installation warranty shall provide a minimum of 2 year non-prorated warranty for the installation against defects.

11-4.02 PRODUCTS

11-4.02.1 MANUFACTURERS

Material shall be provided by a Manufacturer meeting the qualification requirements in Section 11-4.01.5 or by a distributor approved by a qualified Manufacturer.

11-4.02.2 GEOTEXTILE

Geotextile shall conform to the following requirements:

A. Shall be produced in the United States or Canada. Material from other sources may be used only with prior written approval by the Engineer.

B. Geotextile shall be comprised of non-woven, continuous-filament needle-punched polypropylene or polyester fabric which is oriented into a stable network that maintains its structure during handling, placement, and long-term service.

C. If polypropylene is used in Geotextile, it shall be UV stabilized.

D. Geotextile shall not be heat burnished except as a finishing process.

E. Geotextile shall be resistant to soil chemicals.

F. Geotextile shall be new product made from virgin materials.

G. Geotextile shall be furnished in rolls wrapped in impermeable, opaque coverings.

H. Geotextile rolls shall be marked with Manufacturer's name, product designation, lot number, and roll number.

I. Geotextile shall meet the requirements in the following table:

Table 11-4A

Properties for Geotextile

Test	Test Designation	Unit	Requirement
Mass per Unit Area	ASTM D 5261	oz/yd^2	9.5 min. avg.
Grab Tensile Strength (1)	ASTM D 4632	lbs	250 min. avg.
Grab Tensile Elongation (2)	ASTM D 4632	%	50 min. avg.
CBR Puncture Strength	ASTM D 6241	lbs	700 min. avg.
Trapezoidal Tear	ASTM D 4533	lbs	100 min. avg.
Permittivity	ASTM D 4491	sec^{-1}	1.0 min. avg.
Apparent Opening Size	ASTM D 4751	US sieve	100 max. avg.

1. Measured in weakest direction.
2. Measured in direction of lower elongation.

11-4.02.3 MANUFACTURER SOURCE QUALITY CONTROL

The Geotextile Manufacturer shall:

A. Perform the following quality control tests of Geotextile at the manufacturing plant:

Table 11-4B

Testing Frequency

Test	Test Designation	Unit	Frequency
Mass per Unit Area	ASTM D 5261	oz/yd^2	A
Grab Tensile Strength	ASTM D 4632	lbs	B
Grab Tensile Elongation	ASTM D 4632	%	B
CBR Puncture Strength	ASTM D 6241	lbs	B
Trapezoidal Tear	ASTM D 4533	lbs	B
Permittivity	ASTM D 4491	sec^{-1}	C
Apparent Opening Size	ASTM D 4751	US sieve	C

A. Two tests per roll.

B. One test per 100,000 square feet or one per lot, whichever results in the greater number of tests.

C. One test per 500,000 square feet or one per lot, whichever results in the greater number of tests.

B. Reject rolls for which quality control requirements are not met.

C. Provide the CQA Monitor quality control certificates for each lot and each shift's production. The quality control certificates shall include:

1. Roll numbers and identification
2. Sampling procedures
3. Results of quality control tests, including a description of test methods used.

11-4.02.4 LABELING

The Geotextile Manufacturer shall:

A. Mark or tag Geotextile rolls with the following information:

1. Manufacturer's name
2. Product identification
3. Lot number
4. Roll number
5. Roll dimensions

B. Mark special handling requirements on rolls.

11-4.02.5 EQUIPMENT

The Contractor’s equipment shall:

A. Be adequately maintained and be sufficient in numbers in order to avoid delaying work.

B. Be supplied by a power source capable of providing constant voltage under a combined-line load.

C. Be provided with a protective lining and splash pad large enough to catch spilled fuel under an electric generator, if used, on geosynthetics.

11-4.03 EXECUTION

11-4.03.1 EXAMINATION

Prior to installation of Geotextile, the Contractor, Installer, and the CQA Monitor shall:

A. Examine the underlying construction for conformance with the Special Provisions.

B. Verify that the underlying installations are complete and have been installed as designed.

C. Ensure that as-built information has been obtained.

11-4.03.2 DEPLOYMENT

The Installer shall:

A. Follow Manufacturer's recommendations, standards, and guidelines unless otherwise stated in these Special Provisions or directed by the Engineer.

B. Place Geotextile over the Geonet only after Geonet installation has been approved by the Engineer.

C. Cut Geotextile using approved cutter only.

D. Protect other in-place geosynthetic materials when cutting Geotextile.

E. Repair or replace, at the Engineer’s discretion, landfill components damaged during Geotextile installation at no cost to Owner.

F. Secure Geotextile during deployment by placing sandbags as ballast.

G. Fill sandbags with the same material as that which is used for the Operations Layer.

H. Maintain ballast in place until the Geotextile is covered.

I. Maintain the Geotextile until it has been approved and covered.

J. Ensure that dust, stones, moisture, or other deleterious materials are not trapped in the Geotextile or in underlying geosynthetics.

K. Examine Geotextile over entire completed surface to ensure that no potentially harmful foreign objects, such as needles, are present. Remove any foreign objects.

L. Either seam, or overlap a minimum of two feet in lieu of seaming, Geotextile used as cushion or wrap around gravel fill.

M. Cover Geotextile within 72 hours unless otherwise approved by the Engineer.

N. Ensure that workers do not smoke, vape or engage in other activities that could damage the Geotextile, Geonet or underlying Geomembrane.

O. Maintain the Geomembrane and the Geonet free from holes or damage during installation of the Geotextile. Any holes or damaged areas shall be repaired in accordance with these Special Provisions.

11-4.03.3 SEAMS AND OVERLAPS

Except where otherwise specified, the Geotextile is to be seamed by sewing. Other seaming methods, such as hot wedge seaming, may be used with prior approval of the Engineer if the minimum strength requirement can be obtained.

Seams in Geotextile placed in trenches may be formed by overlapping a minimum of 2 feet instead of sewing. Seaming is not required for Geotextile wrapped around gravel fill, or placed under pipes if the minimum 2-foot overlap is maintained.

The Installer shall:

A. Not seam horizontally on slopes greater than 10 horizontal to 1 vertical (i.e., seam up and down, not across slopes).

B. Seam Geotextile by sewing unless alternative method is approved by the Engineer.

C. Overlap Geotextile 6 inches prior to sewing or other seaming.

D. Ensure that no soil materials are present within the seams.

E. Sew using polymeric thread with chemical resistance properties equal to or exceeding those of the Geotextile unless alternative method is approved by the Engineer.

F. Seam Geotextile by sewing with 401 two-thread chain stitch unless alternative method is approved by the Engineer.

G. Ensure that seams have a strength equal to at least 50 percent of the Geotextile strength as measured in a wide-strip tensile test.

11-4.03.4 FIELD QUALITY ASSURANCE

A. General

1. The Manufacturer, Fabricator, and Installer shall participate in and conform with all terms and requirements of the Owner's quality assurance program. The Installer is responsible for this participation.

2. The Installer shall designate a technician that is responsible for supervising and/or conducting the Installer's field quality control program.

B. Conformance Testing (Performed by CQA Laboratory).

1. The CQA Monitor shall obtain conformance testing samples of the Geonet delivered to the site and forward the samples to the CQA Laboratory.

2. The Installer shall allow 5 working days for conformance testing following the date material is available to the CQA Consultant.

3. The CQA Monitor shall have the following tests performed by the CQA Laboratory at a frequency of one per batch or one per 150,000 square

feet of material supplied, whichever results in greatest number of tests, to determine Geotextile conformance with the requirements of these Special Provisions:

a. Mass per Unit Area: ASTM D 5261.

b. Grab Tensile Strength: ASTM D 4632.

c. CBR Puncture Strength: ASTM D 6241.

d. Apparent Opening Size: ASTM D 4751.

e. Permittivity: ASTM D 4491.

4. Where optional procedures are noted in the test method, the requirements of these Special Provisions shall prevail.

5. Additional tests may be performed at the discretion of the CQA Monitor.

6. The Contractor shall provide equipment and personnel to assist the CQA Monitor in obtaining samples in accordance with the following:

a. The Installer shall sample across the entire width of the roll as directed by the CQA Monitor.

b. Samples shall not be taken from the first 3 feet of a roll.

c. The Installer shall cut samples 3 feet long by width of roll as directed by the CQA Monitor.

d. The CQA Monitor shall mark the roll number, machine direction, and the date on which the sample was taken on each sample.

e. Samples shall be taken at a rate of one per batch or one per 150,000 square feet of material supplied, whichever results in the greatest number of samples.

11-4.03.5 REPAIR PROCEDURES

A. The Installer shall repair holes or tears in Geotextile as follows:

1. On 10 horizontal to 1 vertical (10:1) or steeper slopes: Patch from the same Geotextile material and continuously sew in place.

2. On slopes flatter than 10:1: Patch from the same Geotextile material, sew in place with a minimum overlap of 24 inches in all directions.

3. Remove all sheets with tears exceeding 10 percent of the roll width and replace with new material.

4. On the side slopes holes or tears shall be repaired with fabric patches sewn into place no closer than 1 inch from any edge.

B. The Contractor shall remove soil and other material, which may have penetrated through the torn Geotextile before repairing.

11-4.03.6 PROTECTION

When placing soil materials over Geotextile, the Contractor shall ensure that:

A. The Geotextile is not damaged.

B. The Geotextile does not slip over underlying layers.

C. The placement of soil does not induce excessive tensile stresses in Geotextile.

11-4.03.7 ACCEPTANCE

A. The Contractor shall retain ownership and responsibility for Geotextile until acceptance by the Owner.

B. The Owner will accept the Geotextile installation when:

1. The installation is finished.
2. All required documentation from the Manufacturer and Installer has been received and approved.
3. Verification of the adequacy of all field seams and repair, including associated testing, is complete.
4. Written certification documents have been received by the Owner from the CQA Consultant.
5. The Operations Layer has been installed, the Leak Location Contractor has completed the geoelectric liner leak location survey, and any damage, holes, or defects have been repaired by the Installer and repairs have been approved by the CQA Monitor.

11-4.04 MEASUREMENT AND PAYMENT

11-4.04.1 MEASUREMENT

A. The quantity of Geotextile will be calculated by measurements made along the plane of installation and shall include Geotextile installed in the anchor trenches to the dimensions shown on the Plans.

B. Geotextile required for seam overlap and Geotextile required to repair or replace damaged material will not be measured.

C. Geotextile fabric required to wrap gravel fill for leachate pipe collection trenches will not be measured.

D. Geotextile fabric used as cushion for the side slope HDPE Geomembrane and for ultraviolet light protection will not be measured.

11-4.04.2 PAYMENT

A. The quantity of Geotextile is a final pay quantity. Payment for furnishing and installing Geotextile will be by the unit price per square foot quoted therefor in Bid Schedule.

B. The contract unit price paid per square foot for Geotextile shall include full compensation for furnishing all labor, materials, equipment, accessories, and incidentals, and for performing all work specified including, but not limited to: quality control testing of material prior to delivery; installing; seaming; testing; repairing; providing, placing and removing sandbags; anchor trench excavation and backfill; and providing all Contractor CQA documentation required to complete the work in accordance with these Special Provisions, the Plans, and as directed by the Engineer.

C. Geotextile required for seam overlap and Geotextile required to repair or replace damaged material will not be paid for. All costs in connection therewith shall be considered to be included in the various items of work and no additional compensation will be made therefor.

D. Geotextile fabric used as cushion for the side slope HDPE Geomembrane and for ultraviolet light protection will not be paid for. All costs in connection therewith shall be considered to be included in the various items of work and no additional compensation will be made therefor.

11-5 OPERATIONS LAYER

11-5.01 GENERAL - The Operations Layer shall consist of selected native materials that shall be placed over the Geotextile in accordance with methods prescribed by the liner system Installer, these Special Provisions and as directed by the Engineer.

11-5.01.1 SUMMARY

A. Section includes placement of on-site soils as Operations Layer.

B. Related Sections:

1. Section 10-1.14 - Earthwork
2. Section 11-1 - Geosynthetic Clay Liner
3. Section 11-2 - High Density Polyethylene Geomembrane
4. Section 11-3 - Geonet
5. Section 11-6 - Protective Plywood Cover
6. Section 12 – High Density Polyethylene Pipe

11-5.01.2 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. ASTM D 422 – Standard Test Method for Particle-Size Analysis of Soils
2. ASTM D 1140 – Standard Test Method for Amount of Material in Soil Finer than the No. 200 (75 mm) Sieve.
3. ASTM D 2487 – Standard Test Method for Classification of Soils for Engineering Purposes.

4. ASTM D 2488 – Standard Practice for Description and Identification of Soils (Visual-Manual Procedure).
5. ASTM D 7002 – Standard Practice for Electric Leak Location on Exposed Geomembrane Using the Water Puddle Method.
6. ASTM D 7007 – Standard Practices for Electrical Methods for Locating Leaks in Geomembranes Covered with Water or Earthen Materials.
7. ASTM D 7909 – Standard Guide for Placement of Blind Actual Holes during Electrical Leak Location Surveys of Geomembranes.

11-5.01.3 DEFINITIONS

A. Construction Quality Assurance (CQA) Consultant: The monitoring firm responsible for implementation of the CQA activities.

B. Construction Quality Assurance (CQA) Laboratory: A laboratory selected by the CQA Consultant independent from the Engineer, Contractor, Manufacturer, Fabricator and Installer, responsible for conducting laboratory tests on samples of materials obtained at the site. Also referred to as the Geosynthetics Laboratory.

C. Construction Quality Assurance (CQA) Officer: The professional representative of the CQA Consultant responsible for implementation of the CQA plan. Also, referred to as the CQA Engineer.

D. Construction Quality Assurance (CQA) Monitor: Site representative of the CQA Consultant responsible for documenting field observations and tests.

E. Engineer: Director of the Department of Public Works and Planning of Fresno County, acting either directly or through properly authorized agents, such agents acting within the scope of the particular duties entrusted to them.

F. Leak Location Contractor: A firm specializing in leak location testing of synthetic liner materials, independent from the Engineer, Manufacturer, Fabricator, and Installer, responsible for performing the geoelectric liner leak detection survey of the installed Geomembrane.

G. Operations Layer: Soil placed over the liner system to protect the liner system and to provide a working surface for the placement of waste.

H. Owner: County of Fresno

11-5.02 MATERIAL - Selected material, as identified by the Engineer, from the excavation of Modules 7 & 8, shall be used to construct the Operations Layer. The material shall be free of rocks, roots, or any other material or objects that could damage the underlying synthetic liner materials. The maximum particle size shall be ¾-inch when in contact with geosynthetic materials, unless otherwise approved by the Engineer.

During construction the Owner shall conduct Particle Size Gradation (ASTM D 422) and Classification (ASTM D 2487) tests at a frequency of one test per 10,000 cubic yards.

11-5.03 PLACEMENT - The methods to be used in placing the Operations Layer shall be approved in writing by the liner material Installer and the Engineer before

placement of the Operations Layer may begin. The Contractor shall submit a written plan for the Operations Layer placement for approval at least 10 calendar days in advance of the Contractor's proposed starting date.

All synthetic liner materials underlying the Operations Layer shall be inspected and approved by the Engineer prior to placing the Operations Layer.

The Operations Layer shall be placed in a manner that will not damage or displace the synthetic liner materials. Wrinkles in the liner material shall not be allowed to develop to a height that will fold over when the Operations Layer is placed.

The Operations Layer shall be placed in layers with a minimum thickness of one foot unless otherwise allowed by the Engineer.

The Operations Layer shall be compacted by track walking with a minimum of one pass with a D-7 or approved equivalent dozer.

The surface of the Operations Layer shall be graded and rolled to provide a smooth uniform surface and shall not vary more than 0.1 foot from the grade established by the Engineer at any point.

11-5.04 CONFORMANCE TESTING (PERFORMED BY LEAK LOCATION CONTRACTOR)

A. The Leak Location Contractor shall perform the geoelectric liner leak location survey. The survey will be performed in two phases. The first phase (ASTM D 7002) will be a “water puddle” survey performed on the installed Geomembrane before placing Geonet, Geotextile, and Operations Layer soil. The “water puddle” survey is typically conducted at night when the Geomembrane is taut. The first phase will be performed after all samples of Geomembrane required for destructive testing are obtained and the sample locations repaired. The second phase (ASTM D 7007) will be performed after placing the Geonet, Geotextile, and Operations Layer soil. Except as otherwise specified in paragraph “E” below, the second phase shall not be performed until the Operations Layer Soil has been placed in its entirety, compacted, rolled, and verified to conform to the grade tolerances specified elsewhere in these Special Provisions.

B. As directed by the CQA Monitor, blind actual holes will be placed in the Geomembrane in accordance with ASTM D 7909 before conducting the survey as a quality control/quality assurance measure to ensure that leaks in the Geomembrane are detectable.

C. The Contractor shall perform calibration testing with the blind actual hole on the Geomembrane. If a blind actual hole is not detected during the calibration testing, the hole will be repaired and the Geomembrane resurveyed since the previous calibration test was inadequate.

D. The Installer shall coordinate Geomembrane, Geonet, Geotextile, and Operations Layer placement with the Leak Location Contractor and the CQA Monitor.

E. The Contractor shall leave a minimum of 1 foot and a maximum of 3 feet of Geomembrane continuously exposed around the edge of Modules 7 & 8, including the sideslopes, or as directed by the Leak Location Contractor.

F. The Contractor shall assist the Leak Location Contractor by providing equipment and personnel to assist the Leak Location Contractor in performing the liner leak location survey.

G. The Contractor shall install, at the direction of the Leak Location Contractor, at least two permanent electrodes in the soil liner or GCL located beneath the Geomembrane. The permanent electrodes must be installed before the installation of the Geomembrane. The permanent electrodes will be provided by the Leak Location Contractor.

H. The Contractor shall provide an adequate power supply (110V, 5 A) for the liner leak location survey.

I. The Contractor shall provide two supervised laborers, or as requested by the Leak Location Contractor, with equipment to assist in laying out survey string lines and applying water to the Geomembrane.

J. The liner leak location survey is expected to take up to 5 working days per phase to complete. It is anticipated that the leak location survey will be performed after 5 PM. Lighting must be provided for inspection and safety of workers. The Contractor shall allow for all time necessary to complete the liner leak location survey, including repairs to the Geomembrane.

K. If the geoelectric liner leak location survey identifies damage, holes, or defects in the Geomembrane, the Contractor shall expose the Geomembrane. The Installer shall repair all damage, holes, or defects in the Geomembrane identified by the Leak Location Contractor in accordance with these Special Provisions.

L. Placement of Operations Layer on the exposed edges shall proceed after successful completion of the liner leak location survey and repair of all damage, holes, and defects in the Geomembrane.

11-5.05 MEASUREMENT AND PAYMENT - Operations Layer is a final pay quantity.

The contract unit price paid per cubic yard for Operations Layer shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in excavating, transporting, installing, and compacting the Operations Layer, and repairing any defects in the liner system identified by the leak location survey thereby, as shown on the Plans, as specified in these Special Provisions and as directed by the Engineer and no additional compensation will be provided therefor.

11-6 PROTECTIVE PLYWOOD COVER

11-6.01 GENERAL - The protective plywood cover provides protection to the perimeter of the geosynthetic liner system for future construction activities.

11-6.02 MATERIALS - The protective plywood cover shall consist of 4 ft. x 8 ft. x 1/2 inch CDX plywood. Mill rejected material is allowed.

11-6.03 PLACEMENT - The Contractor shall place protective plywood cover over the geosynthetic liner continually along the extent of the west edges of Modules 7 and 8 as shown on the Plans. The Contractor shall overlap ends of plywood sheets a minimum of three (3) inches.

11-6.04 MEASUREMENT AND PAYMENT - The quantity of protective plywood cover shall be measured by the 4 ft. x 8 ft. sheet, complete in place as shown in Section 11-6.03, "Placement", of these Special Provisions.

The contract price paid per sheet for protective plywood cover shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in furnishing, installing, removing and disposing of the protective plywood cover as shown on the Plans, as specified in these Special Provisions and as directed by the Engineer.

SECTION 12 - HIGH DENSITY POLYETHYLENE PIPE

12-1.01 GENERAL - The Contractor shall furnish all labor, tools, materials, equipment and incidentals for installing the perforated and plain wall High Density Polyethylene (HDPE) pipe of various sizes as shown on the plans and as specified in these Special Provisions.

12-1.02 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. ASTM D 638 – Standard Test Method for Tensile Properties of Plastics.
2. ASTM D 790 – Standard Test Method for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
3. ASTM D 1238 – Standard Test Method for Flow Rates of Thermoplastics by Extrusion Plastometer.
4. ASTM D 1505 – Standard Test Method for Density of Plastics by the Density-Gradient Technique.
5. ASTM D 1603 – Standard Test Method for Carbon Black in Olefin Plastics.
6. ASTM D 1693 – Standard Test Method for Environmental Stress-Cracking of Ethylene Plastics.
7. ASTM D 3035 – Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Controlled Outside Diameter.
8. ASTM D 3350 – Specification for Polyethylene Plastic Pipe and Fittings Materials.
9. ASTM F 714 – Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter.

12-1.03 DELIVERY STORAGE AND HANDLING OF THE HDPE PIPE - The Contractor shall be responsible for loading, transporting, unloading and storing the HDPE pipe. Care shall be taken to prevent damage by abrasion and/or puncturing.

Once the HDPE pipe has been unloaded, it shall be stacked on a prepared surface no more than eight layers high. The surface shall be prepared such that the pipe is not subjected to rocks or sharp objects, water, oil, or other deleterious conditions.

The Contractor shall use appropriate equipment to transport the pipe from the storage area to its point of placement in the Modules. The Contractor shall repair or

replace any damaged pipe to the satisfaction of the Engineer.

12-1.04 MATERIALS - The HDPE pipe and fittings shall be manufactured from new, first quality high density polyethylene resin that is UV stabilized with carbon black and shall meet the following specifications:

PROPERTY	TEST METHOD	UNIT	REQUIRED VALUES
Density	ASTM D-1505	gm/cm^3	0.947 gm/cm^3 min. avg.
Melt Index	ASTM D-1238	gm/10 min	0.15 gm/min max. avg.
Flexural Modulus	ASTM D-790	psi	120,000 psi min. avg.
Tensile Strength	ASTM D-638	psi	3,000 psi min. avg.
Environmental Stress Crack	ASTM D-1693 Test Condition C	Failure %, hrs	5,000 hours failure min. avg.
Carbon Black	ASTM D-1603		2% to 3%

The Contractor shall provide manufacturer's certification for all pipe which lists the property tested, the test method, and the results of the manufacturer's testing. Any type of pipe for which a manufacturer's certification is not provided and any pipe not meeting the requirements of these Special Provisions shall be rejected by the Engineer and replaced by the Contractor at the Contractor's expense.

The pipe shall be homogeneous throughout, uniform in color, and free of cracks, holes (except where specified) foreign materials, blisters or deleterious faults.

Pipe shall be marked at 10-foot intervals or less with a coded number which identifies the manufacturer, SDI size, material, machine, date an shift on which the pipe was extruded.

Polyethylene resin shall meet or exceed the requirements of ASTM D 3350 for PE 4710 material with a Cell Classification of 445464C, or better.

Pipe shall be SDR 13.5 and shall conform to ASTM D 3035 and ASTM F 714.

Pipe perforations shall be slots arranged in three (3) rows evenly spaced around the circumference of the pipe. The slots shall have a maximum width of 0.125 inches. The slots shall be uniformly spaced along the length of the pipe and shall provide a minimum inlet area of 2.5 inches per foot of pipe. **The exterior and interior of the pipes shall be free of burrs and cuttings from the slots.**

Fittings and couplings shall be marked with the manufacturer's name or logo, size and material from which they were molded.

All fittings and couplings shall be manufactured using the same resin and additives and shall be from the same manufacturer as the pipe.

Caps shall be Slip on conforming to the requirements for HDPE fittings.

12-1.05 STAINLESS STEEL PULL ROPE - The stainless steel pull ropes to be placed in the leachate collection pipe shall be 1/4-inch diameter P.V.C. coated stainless steel pull rope with a minimum tensile strength of 1,000 lbs. Nylon pull ropes shall have a minimum tensile strength of 400 lbs. The Contractor shall submit

a sample of the nylon pull rope to the Engineer. Nylon pull rope shall not be installed until the submitted sample has been approved by the Engineer.

12-1.06 INSTALLATION - The HDPE pipe shall be installed to the lines and grades as shown on the plans, specified in these Special Provisions and as directed by the Engineer.

Permeable material conforming with the requirements elsewhere in these Special Provisions and as shown on the plans shall be provided under the pipe.

Perforated pipe shall be placed with 2 rows of perforations at the top. All loose material shall be removed from within the pipe.

Pipe connections on solid HDPE pipes shall be permanently joined by fusion welding or a mechanical joining system approved by the Engineer. Electro-fusion fittings will be allowed.

HDPE pipe shall be wrapped with fiberglass or other suitable material to prevent bonding and allow for thermal expansion wherever Portland cement concrete is poured around HDPE pipe.

The existing leachate collection pipe which terminates at the southern boundary of Module 6 includes a 1200-foot long stainless steel pull rope. The Contractor shall connect the existing pipe to the pipe for the cleanout and inspection riser (to be constructed by the Contractor) which terminates along the east edge of Module 7 at N11481.27. The Contractor shall install the existing stainless steel pull rope in the cleanout and inspection riser pipe while the pipe is being installed. Upon completion, the stainless steel pull rope shall extend through the existing cleanout and inspection riser pipe located along the north edge of Module 6, through the existing leachate collection pipe in Module 6, and shall terminate at the top of the cleanout and inspection riser pipe located along the east edge of Module 7 at N11481.27. The stainless steel pull rope shall be securely anchored in the end caps at the top of the riser pipes.

The existing Module 6 cleanout and inspection riser pipe, which terminates at the southern boundary of Module 6, includes a nylon pull rope. The Contractor shall connect this existing pipe to the Module 7 leachate collection pipe to be installed by the Contractor. The Contractor shall use the nylon pull rope to install a stainless steel pull rope with a length of 1200 feet. The stainless steel pull rope shall extend from the top of the southernmost Module 6 cleanout and inspection riser, through the Module 7 leachate collection pipe, and shall terminate at the top of the cleanout and inspection riser pipe located along the east edge of Module 8 at N10889.59. The stainless steel pull rope shall be securely anchored in the end caps at the top of the riser pipes. The excess stainless steel pull rope shall be coiled and stored at the top of the cleanout and inspection riser located at N10889.59.

The Contractor shall install a stainless steel pull rope with a length of 1100 feet in the cleanout and inspection riser pipe which terminates along the east edge of Module 7 at N10989.94. Upon completion, the stainless steel pull rope shall extend through the Module 8 leachate collection pipe, and shall terminate at the top of the cleanout and inspection riser pipe located along the south edge of Module 8 at N10224.20. The stainless steel pull rope shall be securely anchored in the end cap at the top of the riser pipes excess stainless steel pull rope shall be coiled and stored at the top of the cleanout and inspection riser located at N10889.94.

The Contractor shall furnish closed circuit television equipment for an interior inspection of the newly installed cleanout and inspection 6-inch HDPE and perforated HDPE pipes. The Contractor shall perform television inspection of the

pipes after complete installation of the pipes and placement of the permeable material.

If the video inspection indicates that any pipes are damaged or improperly installed, as determined by the Engineer, the Contractor shall repair or replace damaged pipe as directed by the Engineer. Repair or replacement of damaged or improperly installed pipes shall be performed by the Contractor at the Contractor's expense and no additional compensation will be allowed therefor.

In the event that any pipes require repair or replacement, the Contractor shall re-perform the video inspection on all pipes that have been repaired or replaced. Re-inspection of pipes which have been repaired or replaced shall be performed by the Contractor at the Contractor's expense and no additional compensation will be allowed therefor.

The Contractor shall provide the County two DVD's and an external thumb drive showing the distance (footage) from the cleanouts.

12-1.06 MEASUREMENT AND PAYMENT - The quantity of pipe shall be determined from actual measurements of the various types and sizes of pipe complete in place including fittings as shown on the plans and as directed by the Engineer.

The contract unit price paid per linear foot for 6-inch and 10-inch HDPE Pipe shall include full compensation for furnishing all labor, materials, fittings, caps, tools, equipment and incidentals, and for doing all the work involved in transporting, storing, placing, joining and bedding the plain wall leachate collection pipe and riser pipe as shown on the plans and, as specified in these Special Provisions and as directed by the Engineer.

The contract unit price paid per linear foot for 6-inch and 10-inch Perforated HDPE Pipe shall include full compensation for furnishing all labor, materials, fittings, caps, tools, equipment and incidentals, and for doing all the work involved in transporting, storing, placing, joining and bedding the perforated leachate collection pipe as shown on the plans and, as specified in these Special Provisions and as directed by the Engineer.

The contract unit price paid per linear foot for 6-inch and 10-inch HDPE Pipe and 6-inch and 10-inch Perforated HDPE Pipe shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in installing the stainless steel pull ropes as shown on the plans and, as specified in these Special Provisions and as directed by the Engineer.

The contract unit price paid per linear foot for 6-inch HDPE Pipe and 6-inch Perforated HDPE Pipe shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in installing nylon pull ropes as shown on the plans and as specified in these Special Provisions and as directed by the Engineer.

The contract unit price paid per linear foot for 6-inch HDPE Pipe and 6-inch Perforated HDPE Pipe shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in television inspection and preparing the video tapes.

PROJECT DETAILS

CONSTRUCTION QUALITY ASSURANCE PLAN

CONSTRUCTION QUALITY ASSURANCE PLAN

Phase III – Modules 7 & 8
Contract No. 16-22-SW
American Avenue Disposal Site
Fresno County, California

Submitted To: County of Fresno
Department of Public Works and Planning
2220 Tulare Street, 6th Floor
Fresno, California 93721

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January 2017

Golder Project No. 1653453

Table of Contents

List of Tables

List of Appendices

1.0 INTRODUCTION

1.1 Purpose

The purpose of this plan is to describe the quality assurance procedures to be used during construction of the Phase III, Modules 7 & 8 Excavation and Liner System Construction at the American Avenue Disposal Site (AADS) in Fresno County, California. The primary goals of the quality assurance program are to:

- Determine if proper construction techniques, materials, and procedures are used
- Determine if the intent of the construction documents and project design reports are met
- Identify construction problems and provide a mechanism for resolution

Upon completion of construction, information generated through the quality assurance program will be used to prepare a project construction report.

The AADS Phase III, Modules 7 & 8 liner system includes the following containment system components:

- Subgrade layer recompacted to 95 percent of maximum dry density with minimum 30 percent passing the #200 sieve
- Geosynthetic clay liner (GCL)
- 60-mil thick high density polyethylene (HDPE) single-sided textured geomembrane (textured side down)
- Geonet drainage layer
- Nonwoven filter geotextile
- 2-foot thick soil operations layer

The leachate collection and removal system (LCRS) includes 6-inch diameter perforated SDR 13.5 HDPE pipes in trenches and encapsulated with permeable material. The LCRS sumps include 10-inch diameter perforated SDR 13.5 HDPE pipes with permeable material. The unsaturated zone monitoring system is present below the LCRS sump and the LCRS trenches and includes 6-inch and 10-inch HDPE pipes in the unsaturated zone monitoring trenches and sump, respectively and permeable material.

1.2 Document Format

The Construction Quality Assurance (CQA) Plan is presented in five sections. Section 1 is the introduction and presents the document format and definitions and terms used throughout the document. Section 2 presents general requirements of the quality assurance program and organization. Sections 3 and 4 present special requirements for specific work items of the construction, including procedures such as materials verification, test standards, testing frequencies,

conformance and construction testing, sample numbering and processing, and monitoring for each work item. Section 5 presents methods of documentation and record- keeping.

All parties involved in the construction should be thoroughly familiar with this document, the project Construction Drawings, and the Specifications.

1.3 Definitions

Whenever the terms listed below are used, the intent and meaning will be interpreted as indicated.

ASTM	American Society for Testing and Materials
CTM	Caltrans Test Method
Caltrans	California Department of Transportation
Construction Quality Assurance (CQA)	A planned series of observations and tests to support that quality control functions have been performed adequately and determine compliance with plans and specifications. CQA activities will be performed by the CQA Consultant.
Construction Quality Assurance Consultant	The monitoring firm responsible for implementation of the CQA activities
Construction Quality Assurance Laboratory	A laboratory selected by the CQA Consultant independent from the Engineer, Contractor, Manufacturer, Fabricator and Installer, responsible for conducting laboratory tests on samples of materials obtained at the site. Also referred to as the Geosynthetics Laboratory.
Construction Quality Assurance Monitor	Site representative of the CQA Consultant responsible for documenting field observations and tests
Construction Quality Assurance Officer	The professional representative of the CQA Consultant responsible for implementation of the CQA plan. Also, referred to as the CQA Engineer.
Construction Quality Assurance Soil Testing Laboratory	A laboratory selected by the CQA Consultant independent from the Engineer, Contractor, Manufacturer, Fabricator and Installer, responsible for conducting laboratory tests on samples of soil material obtained at the site.
Conformance Testing	Testing by the CQA Laboratory of geosynthetic samples of materials produced for this specific project. Conformance testing may be completed before or after the material has been delivered to the project site.
Contract Documents	The official set of documents issued by the Engineer that includes bidding requirements,

	contract forms, contract conditions, specifications, construction drawings, addenda, and contract modifications.
Construction Drawings	The official plans, profiles, typical cross sections, elevations, and details, as well as their amendments and supplemental drawings, that show the locations, character, dimensions, and details of the work to be performed. Construction Drawings are also referred to as the “plans.”
Construction Manager	The individual or firm retained by the Engineer for the purpose of achieving project objectives including the management of quality, cost, time, and scope.
Construction Specifications	The qualitative requirements for products, materials, and workmanship upon which the construction is based. Also referred to as Specifications.
Contractor	The person or persons, firm, partnership, corporation, or any combination, which, as an independent contractor, has entered into a contract with the Engineer for construction.
Drainage Layer	Permeable material or geosynthetic material placed above a geomembrane or low-permeability layer to convey leachate or moisture.
Earthwork	A construction activity involving the use of soil materials as defined in the construction specifications and Section 4 of this plan.
Engineer	Director of the Department of Public Works and Planning of Fresno County, acting either directly or through properly authorized agents, such agents acting within the scope of the particular duties entrusted to them.
Extrudate	The molten polymer which is emitted from an extruder during seaming using either extrusion fillet or extrusion flat methods. The polymer is initially in the form of a ribbon, rod, bead, or pellets.
Fishmouth	An opening resulting from the uneven mating of two geomembranes where the upper sheet has excessive length that prevents it from being bonded flat to the lower sheet.
Geomembrane	An essentially impermeable synthetic membrane used as solid or liquid barrier. Synonymous term for flexible membrane liner (FML).
Geomembrane Manufacturer	The party responsible for the production of the Geomembrane rolls from resin and for the quality of the resin.
Geonet	A geosynthetic consisting of intergrally connected parallel sets of ribs overlying similar sets at

	various angles.
Geosynthetics	A planar product manufactured from polymeric material used with soil, rock, earth, or other geotechnical engineering related material as an integral part of a man-made project, structure, or system.
Geosynthetic Clay Liner (GCL)	A manufactured hydraulic barrier consisting of clay bonded to a layer or layers of geosynthetic materials.
GCL Manufacturer	The party responsible for the production and quality of the GCL.
Geosynthetics Installer	The person or persons, firm, partnership, corporation, or any combination, private, municipal, or public, which, as an independent contractor or subcontractor to the Contractor, has entered into a contract to install Geosynthetics. Also called the Installer.
Geotechnical Consultant	Individual or firm responsible for the geotechnical analysis report.
Geotextile	A permeable geosynthetic comprised solely of textiles.
Geosynthetic Installer	The party responsible for field handling, transporting, storing, deploying, seaming, and temporary restraining (against wind) of the Geosynthetic material in question.
LCRS	Leachate collection and removal system.
Leak Location Contractor	A firm specializing in leak location testing of synthetic liner materials, independent from the Engineer, Manufacturer, Fabricator, and Installer, responsible for performing the geoelectric liner leak detection survey of the installed Geomembrane.
Low-Permeability Layer	A layer comprised of soil or geosynthetic material in a liner system or final cover that acts as a barrier to liquids to minimize downward movement of leachate or surface water.
Lot	A unit of production, or a group of other units or packages, taken for sampling or statistical examination, having one or more common properties and being readily separable from other similar units.
Minimum Average Roll Value (MARV)	For geosynthetics, a manufacturing quality control tool used to allow manufacturers to establish published values such that the user/ purchaser will have a 97.7% confidence that the property in question will meet published values. For normally distributed data, “MARV” is calculated as the typical value minus two (2) standard deviations from

	documented quality control test results for a defined population from one specific test method associated with one specific property.
Nonconformance	A deficiency in characteristic, documentation, or procedure that renders the quality of an item or activity unacceptable or indeterminate. Examples of nonconformances include, but are not limited to, physical defects, test failures, and inadequate documentation.
Operations Layer	Soil placed over the liner system to protect the liner system and to provide a working surface for the placement of waste.
Owner	County of Fresno, Department of Public Works and Planning.
Panel	The unit area of geosynthetics, a roll or a portion of a roll that will be seamed or overlapped in the field.
Permeable Material	Granular, free-draining material used for backfilling leachate collection and removal system (LCRS) collection pipes, lysimeter and conforming to the technical specifications.
Procedure	A document that specifies or describes how an activity is to be performed.
Project Construction Drawings and Special Provisions	All project drawings (Plans) and specifications (Special Provisions) used for installation of the geosynthetic liner system and leachate collection and removal system.
Project Documents	Contractor submittals, construction drawings, record drawings, specifications, shop drawings, construction quality control and quality assurance plans, safety plan, and project schedule.
Quality Assurance	All those planned or systematic actions necessary to provide adequate confidence that a material, product, system, or service will satisfy given needs. Quality assurance will be performed by the independent Construction Quality Assurance Consultant selected by the Engineer.
Quality Control	The operational techniques and the activities which sustain a quality of material, product, system, or service that will satisfy given needs; also the use of such techniques and activities. Quality control will be performed by the Contractor, manufacturers, suppliers, and subcontractors.
Record Drawings	Drawings recording the constructed dimensions, details, and coordinates of the project (also referred to as “As-Builts”).
Subgrade	The soil or geosynthetic surface on which the

	Geosynthetics lie.
Surveyor	Firm or individual responsible for providing construction staking and preparing as-built survey Record Drawings. Surveying shall be performed under the direction of a California State Licensed Land Surveyor.
Testing	Verification that an item meets specified requirements by subjecting that item to a set of physical, chemical, environmental, or operating conditions.
Testing Laboratory	A certified laboratory capable of conducting the tests required by this CQA Plan and the specifications. Sometimes referred to as the third-party laboratory.
Textile Backing (textile or Geotextile)	Geosynthetic support material consisting of woven slit film, needle-punched nonwoven, or spunlaced polymer fabric, used for supporting bentonite in a GCL.

2.0 GENERAL REQUIREMENTS

This section of the CQA Plan describes general requirements of the CQA consultant as they relate to the overall project. It includes general requirements for meetings, responsibilities of the project team, control of project records, and documentation and control of nonconforming work.

2.1 Meetings

To facilitate construction, and to clearly define construction goals and activities, close coordination between the Engineer, CQA personnel, and Contractor is essential. To meet this objective, preconstruction and progress meetings will be held.

2.1.1 Preconstruction Meeting

A preconstruction meeting shall be held at the site and be attended by the Engineer, Contractor, CQA Officer, CQA Monitor, Geosynthetics Installer, Surveyor and others designated by the Engineer. The purpose will be to:

- Identify key personnel, define lines of communication and authority
- Review the Construction Drawings, Specifications, CQA plan, work area security, safety procedures, and related issues
- Provide all parties with relevant project documents
- Review responsibilities and qualifications of each party
- Define lines of communication and authority
- Establish reporting and documentation procedures
- Review testing equipment and procedures
- Establish testing protocols and procedures for correcting and documenting construction or nonconformances
- Conduct a site inspection to discuss work areas, stockpile areas, staging areas, access roads, haul roads, and related items
- Review the project schedule

The meeting will be documented by the CQA Officer or his representative. Copies of the minutes and relevant documents will be prepared and provided to all parties.

2.1.2 Progress Meetings

An informal progress meeting shall be held on a daily basis before the start of work. At a minimum, this meeting will be attended by the CQA Monitor, Contractor and Engineer. The CQA Monitor will document the meeting with the Daily Progress Meeting form attached in Appendix A. The purpose of this meeting is to:

- Discuss problems and resolutions
- Review test data

- Discuss the Contractor's personnel and equipment assignments for the day
- Review the previous day's activities and accomplishments
- Resolve any outstanding problems or disputes

2.1.3 Weekly Meeting

Weekly scheduled meetings will be held. The Engineer, CQA Officer or representative, Contractor, and CQA Monitor will be present. The meetings will be held to discuss progress, problems, construction schedule, changes, test data, and any other issues necessary. The meetings will be documented by the CQA Monitor.

2.1.4 Other Meetings

As required, special meetings will be held to discuss problems or nonconformances. At a minimum, this meeting will be attended by the Engineer, CQA Officer or representative, CQA Monitors, and Contractor. If the problem requires a design modification and subsequent change order the Engineer should also be present. The meeting will be documented by completing the Construction Problem and Solution Data Sheet by the CQA Monitor.

2.2 Communications between Construction Personnel

2.2.1 Communications with the Contractor

Only the individuals assigned to this project, as defined in this plan, communicate with the Contractor. When written communications are required, they must be documented on the appropriate forms. Formal letters to the Contractor should normally be signed by the CQA Officer, reviewed and signed by the Engineer.

2.2.2 Communications with the Engineer

Only those individuals assigned to this project, as defined in this plan, communicate with the Engineer. All communications must be through proper channels as defined in the project organization chart. Communications of an official nature must be written using the appropriate form included in Appendix A.

2.3 Responsibilities of Construction Personnel

2.3.1 Responsibilities of the Engineer

The Engineer defines the overall project scope and has the authority to make changes to that scope, if needed (with proper regulatory coordination). The Engineer (or designee) is also the key point for regulatory contact. The Engineer (or designee) will be responsible for contract administration, budget and coordination between parties during the project.

2.3.2 Responsibilities of the CQA Officer

The CQA Officer will be responsible for documenting the construction and preparing the final construction report. The final construction report will include a statement by the CQA Officer that the construction was performed in general conformance with the Construction Drawings and Specifications, compliance with the CQA Plan and design intent. The CQA Officer acts as an auditor to verify and document the proper and complete implementation of the quality assurance program. The CQA Officer, in cooperation with the Engineer, must approve all design changes and clarifications to design questions.

2.3.3 Responsibilities of the CQA Monitors

CQA Monitors represent the Engineer by administering the construction quality assurance program, monitoring and testing the Contractor's work activities. The CQA Monitors observe and document the activities of the Contractor in sufficient detail and with continuity to provide a high level of confidence that the work product is fully compatible with the intent of the construction documents. The CQA Monitors also perform tests, when appropriate, to provide a high level of confidence that the characteristics of the work meet the requirements of the construction documents.

Whenever monitors perform visual observation or perform tests, they are responsible for timely preparation and processing of all required documentation and reports. Accurate and concise reports must be prepared for all monitoring activities and for each test performed. Section 5 of this document describes documentation requirements.

2.4 Control of Documents, Records, and Forms/Logs

2.4.1 Project Control of Construction Documents

Construction documents, including specifications, drawings, and change orders, are controlled by the Engineer. The CQA Officer maintains one or more copies of the most current set of construction documents for use by the monitors. Upon issuance of new copies or revisions, it is the responsibility of the Engineer to notify the Contractor and CQA staff of the revisions, provide revised construction documents, and order the recall of all unrevised copies of the Contract Documents.

2.4.2 Project Control of As-Built Information

As-built information is controlled by the CQA Monitors and Surveyor. During the progress of the work, the CQA Officer and Engineer obtain as-built information provided by the Contractor, CQA Monitors, or Surveyor. At the completion of the project, this information is presented to the Engineer for use in preparing record drawings of the construction. Final as-built drawings are included with the construction report.

2.4.3 Project Control of Forms/Logs

Daily report forms/logs, test report forms/logs, and other project forms/logs are controlled by the CQA Officer, who maintains a master of each form for copies. Upon issuance of a new form, the CQA Officer must recall and remove all superseded copies along with the master, notify the CQA Monitors, and provide new copies for their use.

2.4.4 Processing Daily Reports

Each CQA Monitor writes a daily record of work progress. The daily report is reviewed by the CQA Officer for legibility, clarity, traceability, and completeness. The review must be evidenced by a signature, who maintains a complete file of daily reports. A summary monthly report is prepared by the CQA Officer and coordinator and forwarded to the Engineer.

2.4.5 Processing Test Reports

A test report must be completed by the CQA Monitor whenever testing is performed. The test reports must be peer-reviewed, or reviewed by the CQA Officer. The review includes a check for mathematical accuracy, conformance to test requirements, conformance to specifications, and a check for clarity, legibility, traceability, and completeness. The review must be evidenced by the signature of the reviewer. Copies of all test reports are transmitted weekly to the CQA Officer, and the original maintained by the CQA Monitor.

2.4.6 Processing Project Records

Project records are completed as needed. Use of the project records is limited to the scope for which they are intended. The record must be completed by filling in all the blanks provided on the form, followed by the signature of the individual completing the form. All project records must be maintained by the CQA Monitor.

2.5 Documentation and Control of Nonconformance

2.5.1 Observation of Nonconformance

Whenever a nonconformance is discovered or observed in the construction process, product, job- related materials, documentation, or elsewhere, the CQA Monitor must notify the Contractor and CQA Officer as soon as possible.

2.5.2 Determining Extent of Nonconformance

Whenever a nonconformance is discovered or observed in the construction process, product, job- related materials, documentation, or elsewhere, the CQA Monitor will determine the extent of the nonconformance. The extent of the deficiency may be determined by additional sampling, testing, observations, review of records, or any other means deemed appropriate.

2.5.3 Documenting Nonconformance

All nonconformances must be documented in writing on the daily records, logs, and elsewhere, as appropriate. The documentation must occur immediately upon determining the extent of the nonconformance. For those nonconformances that are considered serious or complex in nature, the corrective measures of which may require approval from regulatory agencies or that require an engineering evaluation; a nonconformance report will be initiated and issued to the Engineer, CQA Officer, and Contractor.

2.5.4 Corrective Measures

For a simple or routine nonconformance, corrective measures will be determined by specification direction, or if none exists, the CQA Monitor, CQA Officer, and Contractor will discuss standard construction methods to correct the deficiency. For those nonconformances requiring a nonconformance report, the Engineer must determine corrective measures. A copy of the nonconformance report, with the corrective measure determination and corresponding regulatory approval (if required), is forwarded to the CQA Monitor and Contractor for implementation of the corrective action.

2.5.5 Verification of Corrective Measures

Upon notification to the CQA Monitor by the Contractor that corrective measures are complete, the CQA Monitor verifies its completion. The verification must be accomplished by observations or retesting and photographs. Written documentation of the corrective measures must be made by the CQA Monitor on daily reports, logs and forms, and the nonconformance report. Verification of corrective measures is reviewed by the CQA Officer.

2.6 Equipment Control

2.6.1 Equipment List

Before the start of construction, the CQA Monitor will complete a list of all measuring, sampling, and testing equipment being used at the site. As new equipment becomes available during the course of the project, it must be added to the list. When more than one of any type of equipment is available, a unique number will be affixed to each piece to maintain identify. The equipment list is maintained in the project files and contains the following information:

- Type of equipment
- Serial or identification number
- Date entered into service
- Use of equipment

2.6.2 Calibration

Before placing a piece of testing equipment into service its accuracy must be established and calibration performed and/or verified by the CQA Monitor. Types of equipment requiring calibration include nuclear moisture/density gauges, sand cone devices, sand used in the sand cone devices, and scales. The calibration procedures and frequencies must be per manufacturer's instructions or ASTM standards. Equipment producing questionable results must be removed from service immediately and recalibrated.

3.0 CONSTRUCTION QUALITY CONTROL FOR GEOSYNTHETICS

3.1 Introduction

This section describes CQA procedures for the installation of the geosynthetic components in the liner or final cover at the American Avenue Disposal Site.

The base and side slope liner will consist of a minimum 60-mil thick HDPE geomembrane overlying a low-permeability layer, consisting of a geosynthetic clay liner (GCL) with a nonwoven geotextile backing on both sides. A geonet drainage net will serve as the drainage layer in the base of each module and will be overlain by a filter geotextile that will also be installed over permeable material in the LCRS and unsaturated zone sumps. Perforated and solid HDPE pipe will be installed as part of the leachate collection and removal system.

This CQA Plan stresses careful documentation during the quality assurance process, from the verification of materials selected for use on this project through the geosynthetic installation.

The overall goal of the geosynthetics quality assurance program is to assure that proper construction techniques and procedures are used and that the project is built in accord with the project Construction Drawings and Specifications. Another function of the quality assurance program is to identify problems that may occur during construction and to verify that these problems are avoided or corrected before construction is complete. The program includes: (1) a review of the Contractor's quality control submittals, (2) material evaluation (conformance testing), (3) construction testing, and (4) construction observation. Conformance testing refers to material testing that takes place before material installation. A summary of conformance testing frequencies for the geosynthetic materials is listed in Table 1. Construction testing includes activities that occur during installation. Activities will be conducted in accord with this plan, and the approved project Construction Drawings and Specifications.

The types of geosynthetics used in the liner system construction include geomembrane, geocomposite drainage layer, geosynthetic clay liner, and HDPE pipe and fittings. These geosynthetics are defined in the Project Specifications. Prior to and during construction, these geosynthetics shall be sampled and tested to determine if they conform to Project Specifications. All geosynthetic conformance testing shall be the responsibility of the CQA Consultant.

3.2 Review Quality Control Submittals

Prior to geosynthetic installation, the CQA Officer shall review the Geosynthetic Installation Contractor's Quality Control submittals to confirm that materials meet Project Specifications. The CQA Officer shall review the following submittals for each geosynthetic material specified for the Project:

- Geosynthetic material samples, name of Manufacturer, and minimum material specifications that shall include the Manufacturer's minimum physical properties of the material, test methods (ASTM Standards) used, and factory and site seaming methods.
- Manufacturer's Quality Control Plan followed during the manufacturing process.
- The origin (supplier's name and production plant), identification (brand name and number) and material properties of the resin used to manufacture the product.
- Geosynthetics Installers Contractor's Quality Control Plan, for the installation and testing of the geosynthetic.
- Resume of the Installation Superintendent, Master Seamer, and Seamers to be assigned to this project (geomembrane only).
- Certification that both the Installation Superintendent and the Master Seamer have reviewed this Construction Quality Assurance Plan and the Construction Drawings and Specifications.
- A copy of each of the Quality Control Certificates on each lot of resin issued by the resin Supplier for the specific material for this project. Geomembrane submittals shall include certification of the resin for extrusion welding rod.
- The result of quality control testing conducted on the resin used in manufacturing the specific material for this project.
- A listing that correlates the resin to the individual geosynthetic rolls and extruded materials.
- A copy of the geosynthetic roll Quality Control Certificates that shall be supplied at a frequency required in the Specifications.
- A panel layout drawing for geomembrane showing the proposed installation layout identifying field seams as well as any variance or additional details that deviate from the Construction Drawings.
- A detailed installation schedule for the project.
- Certification that the extrusion welding rod to be used is comprised of the same resin type as the geomembrane to be used (geomembrane only).

3.3 Conformance Testing

Prior to geosynthetic installation, the CQA Consultant shall obtain samples of the geosynthetics for conformance testing to evaluate or confirm that these materials meet the Specifications. The conformance testing frequency shall be at a rate of 1 per 150,000 square feet, or one sample per lot, whichever results in the greater number of conformance tests. Conformance test frequencies for Index Flux and Direct Shear tests shall be as indicated in Table 1. Details for the required Direct Shear tests are provided in Section 3.3 of this CQA Plan. Geosynthetic samples will be taken either at the manufacturing plant before rolls are shipped, or at the site by the CQA Monitor after rolls are shipped. In either case, the sampling procedures are the same. Specimens should be taken across the entire roll width and should not include the first 3 feet. Five 1-foot by 1-foot specimens should be taken from the roll. Specimen locations should be evenly spaced across the roll width and be limited to the first 5 feet of geomembrane (i.e., taken near the end of the roll). The five specimens constitute one sample. The

sampler should mark the roll identification number and machine direction. The five specimens from any one sample should be taped together or otherwise packaged so that they do not become separated before arriving at the Geosynthetics Laboratory. A test request sheet should be included with each shipment. The CQA Consultant shall arrange for the samples to be shipped so that they arrive at the Geosynthetics Laboratory within 24 hours after sampling. In addition, a minimum 1-foot by 5-foot specimen from each sample should be retained by the Geosynthetics Laboratory at least until the project is completed.

All conformance tests shall be performed in accordance with the Specifications and Table 1 of this CQA Plan. The CQA Officer shall review the test results and shall report any nonconformance to the CQA Monitor and the Installation Contractor.

3.4 Direct Shear Testing

For each separately run Lot of HDPE Geomembrane manufactured for this project, the Contractor shall allow the CQA Consultant to provide for direct shear testing for interface strength in accordance with ASTM D 5321 "Standard Test Method for Determining the Shear Strength of Soil-Geosynthetic and Geosynthetic-Geosynthetic Interfaces by Direct Shear" and in the case of GCL, conduct interface direct shear testing in accordance with ASTM D 6243 "Standard Test Method for Determining the Internal and Interface Shear Strength of Geosynthetic Clay Liner by the Direct Shear Method." Issues and procedures related to soil preparation shall be governed by ASTM D 3080 "Standard Method for Direct Shear Test of Soils Under Consolidated Drained Conditions."

The laboratory testing equipment shall be capable of providing:

- Total strain of at least 3 inches
- Constant rate of strain
- Minimum test sample size of 12-inches by 12-inches
- Means of producing and maintaining "saturated" conditions

The CQA Consultant shall arrange for the sampling and documentation of samples of geosynthetic materials approved for the project, arrange for appropriate soil samples (subgrade preparation layer and operations layer), and shall arrange for shipment of the samples to an independent Geosynthetics Institute (GI)-approved Geosynthetics Laboratory for direct shear testing. Procedures presented in Section 7.5.2 of ASTM D 3080 shall be used to prepare soil test specimens at ninety (95) percent of the maximum dry density as established by ASTM D 1557. The samples shall be maintained at a moisture content of 2 percent above optimum content (ASTM D1557) for direct placement in the shear box. Shearing shall take place once the sample is fully consolidated.

The geomembrane shall meet the interface shear strength requirements of Table 2 and be tested at a frequency of two tests per test configuration (three samples under different normal stress increments as specified). Testing at each of the normal stresses shall be undertaken on individual samples, i.e. multi-stage testing of the sample will not be allowed.

A detailed laboratory test report consistent with ASTM D6243 procedures shall be submitted and, at a minimum, shall include:

- Initial and final moisture content and density
- Any deviations or peculiarities in test
- Vertical displacement (i.e. displacement in the plane perpendicular to the shear direction) vs. time during submergence, compression/consolidation and shearing
- Shear stress versus shear strain
- Interpreted strength values

The laboratory test report shall also describe the observed condition of the geomembrane specimens after testing. This shall include:

- Clamping method and any deformation that occurred during testing
- Abrasion of geomembrane
- Elongation of geomembrane
- Other physical changes in material such as wrinkling
- Differential movement between specimen and contact surfaces
- Tilting

These samples, along with the laboratory test report, shall constitute a submittal that must demonstrate the minimum interface friction strength of the composite section. This adequacy shall be determined during a review completed by the CQA Officer.

All costs associated with direct shear interface testing shall be borne by the CQA Consultant.

3.5 Protection of Geosynthetics

Installer shall be responsible for staging the Work so that no construction equipment needs to be driven over already deployed geosynthetics.

Equipment used for placing soils shall not be driven directly over geosynthetics. A minimum thickness of 1 foot of soil is required between a low ground pressure (LGP) dozer and underlying geosynthetics. A minimum thickness of 3 feet of soil is required between rubber-tired vehicles and underlying geosynthetics. In areas of heavy vehicle traffic, such as access ramps, the soil thickness should be at least 3 feet. In any case, the following table shall be complied with during construction:

Maximum Allowable Equipment Ground Pressure (psi)	Soil Thickness Over Geosynthetics (feet)
5	1.0
10	1.5
15	2.0
>20	>3.0

3.6 Geosynthetic Clay Liner

3.6.1 Delivery

The CQA Monitor and the Installer's representative will verify the following:

- Equipment used to unload the rolls will not damage the GCL.
- Care is used in unloading and stacking the rolls.
- All documentation required by the specifications has been received.

At the CQA Officer's or Engineer's discretion, damaged rolls may be rejected. Rejected rolls will be removed from the site or stored at a location designated by the Engineer, separate from accepted rolls. All rolls that do not have proper manufacturer's documentation will also be stored at a set location until all documentation has been received and approved.

Surface Preparation. Before GCL installation, the CQA Monitor will verify that:

- All lines and grades have been verified by a qualified Surveyor.
- The GCL subgrade has been prepared consistent with the earthwork specifications.
- The GCL subgrade has been compacted and smoothed to be free of surface irregularities, runs, loose soil, and protrusions consistent with the specifications.
- There are no excessively soft areas that could results in GCL damage (see earthwork specification for remedial measures).
- The GCL subgrade moisture content does not exceed the specified value (see earthwork specifications).
- All voids and cracks in the subgrade have been filled and there are no ruts in the subgrade greater than 1 inch deep.
- Construction stakes and hubs have been removed.
- The Installer has certified, in writing, that the surface on which the GCL will be installed is acceptable by completing Acceptance of Subgrade Surface condition form attached in Appendix A.

GCL Panel Placement. During GCL panel placement, the CQA Monitor will:

- Observe the underlying surface for entrapped particles that may impact the GCL.

- Observe the surface of the GCL for needles, punctures, tearing, thinning, or other evidence that the material may not meet specification requirements.
- Inspect the GCL for evidence of premature hydration, such as wet areas or swelling. Hydrated areas will be removed and replaced with dry material in accordance with the specifications.
- Verify that equipment used in deployment does not damage the GCL.
- Verify that GCL panels are deployed down, not across, slopes.
- Verify that GCL panels deployed are covered the same day. GCL must be inspected and approved by CQA Monitor before covering.
- Verify that the GCL is placed with the correct sides facing up and down per manufacturer's recommendations.
- Verify that adequate anchor trenches are constructed on the slopes.

The CQA Monitor will inform the Installer and the CQA Officer if the above conditions are not met.

Field Seaming. The CQA Monitor will verify that:

- The panel overlaps of the geotextile-backed GCL are made in accordance with the specifications
- Bentonite is applied at the specified rate for the seams (if required)

Repairs. Any portion of the GCL with a flaw will be repaired consistent with the specifications. The CQA Monitor will verify that:

- All punctured, torn, or hydrated material is removed
- The GCL "patch" is placed with the same side up as the originally placed material
- The patch overlaps the repair area at least 12 inches in all directions
- The patch is secured in place using adhesive tape, if necessary
- Bentonite is applied at the specified rate (if required)

3.6.2 Deficiencies

When deficiencies (items that do not meet specified values) are discovered, the CQA Monitor will immediately determine the nature and extent of the problem, notify the CQA Officer and Installer, and complete required documentation. In all cases, the CQA Monitor will notify the Installer within 1/2 hour after discovering the deficiency, or on the next working day if discovered at the end of a shift. If the deficiency will cause construction delays of more than 8 hours or will necessitate substantial rework, the CQA Monitor will also notify the Engineer.

The Installer will correct the deficiency to the satisfaction of the CQA Monitor. If the Installer is unable to correct the problem, the CQA Monitor will develop and present to the Engineer suggested solutions for his approval. If the solution requires a design modification, the Engineer will also be contacted.

The corrected deficiency will be retested before additional work is performed. All retests and the steps taken to correct the problem will be documented by the CQA Monitor.

3.7 Geomembrane

3.7.1 Delivery

Upon delivery of the geomembrane, the CQA Monitor will verify that:

- The geomembrane is delivered in rolls and not folded. Folded geomembrane is not acceptable because the highly crystalline structure of HDPE geomembrane will be damaged if it is folded. Any evidence of folding or other shipping damage is cause for rejection of the material.
- Equipment used to unload and store the rolls does not damage the geomembrane.
- The geomembrane is stored in an acceptable location and in accord with the specifications. The geomembrane is protected from puncture, dirt, grease, mud, mechanical abrasions, excessive heat, or other damage.
- All manufacturing documentation required by the specifications has been received.
- Each roll is marked or tagged with the following information: manufacturer's name, project identification, lot number, roll number, and roll dimensions. Log this information on the geosynthetics received log.
- The geosynthetics received log is completed.
- Geomembrane that does not have proper manufacturer's documentation must be stored at a separate location until all documentation has been received, reviewed, and accepted.

Any damaged rolls must be rejected and removed from the site or stored at a location, separate from accepted rolls, designated by the Engineer. All rolls that do not have proper manufacturer's documentation must also be stored at a separate location, until all documentation has been received and approved.

3.7.2 Panel Placement

Before installation of the geomembrane, the Contractor or Installer must submit drawings showing the panel layout, indicating the panel identification number, both fabricated (if applicable) and field seams, as well as details not conforming to the drawings. This submittal is used to guide the orientation of panel placement during construction.

During placement, the CQA Monitor must maintain up-to-date logs documenting panel and roll numbers, seam numbers, test locations and results, repair locations and results, and nondestructive testing information. The CQA Monitor will review the Contractor prepared as- built (record) drawings, using the logs as reference.

During panel placement, the CQA Monitor shall:

- Verify that the geomembrane is placed in the configuration as shown on the Construction Drawings, with the textured side down against the GCL and the smooth side up.
- Verify that equipment installing the geomembrane does not directly drive over the deployed GCL.
- Record panel numbers and dimensions on a panel/seam log.
- Observe the geomembrane surface as it is deployed and record all panel defects and repair of the defects. All repairs must be made in accord with the specifications.
- Verify that equipment used does not damage the geomembrane during handling or equipment transit, by contact with hydrocarbons, or by other means.
- Verify that the GCL beneath the geomembrane has not been damaged or hydrated since previous acceptance.
- Verify there are no stones, construction debris, or other items beneath the geomembrane that could cause damage to the geomembrane.
- Verify that the geomembrane is not dragged across an unprotected surface. If the geomembrane is dragged across an unprotected surface, the geomembrane must be inspected for scratches and repaired or rejected, if necessary.
- Record weather conditions, including temperature, wind, and humidity. The geomembrane must not be deployed in the presence of excess moisture (fog, dew, mist, etc.). In addition, geomembrane should not be seamed when the air temperature is less than 32°F, or when standing water or frost is on the ground.
- Seaming below 32°F may be allowed at the discretion of the CQA Consultant if means are taken to protect the geomembrane seam area from adverse temperatures and additional trial welds pass. The geomembrane should not be deployed during excessive winds that can lift and move the geomembrane panels.
- Verify that people working on the geomembrane do not smoke, wear shoes that could damage the liner, or engage in activities that could damage the liner.
- Verify that the method used to deploy the sheet minimizes wrinkles and that the sheets are anchored and ballasted to prevent movement by the wind. (The Contractor is responsible for any damage resulting to or from windblown geomembrane.)
- Verify that no more panels are deployed than can be seamed on the same day. This is particularly important if seaming problems are occurring.

The CQA Monitor must inform both the Contractor and the CQA Officer if the above conditions are not met.

3.7.3 Field Seaming

The Contractor or Installer must provide the CQA Officer and Construction Monitor with a seam and panel layout drawing and update this drawing daily as the job proceeds. No panels should be seamed until the panel layout drawing has been accepted by the CQA Monitor. A seam numbering system must be agreed to by the CQA Monitor and Installer before the start of seaming operations. One procedure is to identify the seam by adjacent panels.

Before geomembrane welding, each welder and welding apparatus (both wedge and extrusion welders) must be tested a minimum of twice a day in accordance with the specifications to determine whether the equipment is functioning properly. One trial weld should be taken before the start of work and one at mid-shift. A third trial seam at the end of the day should be considered if seam quality is in question or temperatures fall below 32°F. The trial weld sample must be at least 3 feet long and 12 inches wide, with the seam centered lengthwise. The CQA Monitor must observe all welding operations, quantitatively test each trial weld for peel and shear, and record the results. It is very important that the trial weld be completed under conditions similar to those under which the panels will be welded. The trial weld must meet specified requirements for peel and shear and the break must be ductile or a film tearing bond (FTB) for a wedge weld. If at any time the CQA Monitor believes that an operator or welding apparatus is not functioning properly, a weld test must be performed. If there are wide changes in temperature (20°F), humidity, or wind speed, the test weld should be repeated. The test weld must be allowed to cool to ambient temperature before testing.

During geomembrane welding operations, the CQA Monitor must verify the following:

- The Contractor has the number of welding apparatuses and spare parts necessary to perform the work.
- Equipment used for welding will not damage the geomembrane.
- The extrusion welder is purged before beginning a weld until all the heat-degraded extrudate is removed (extrusion welding only).
- Seam grinding has been completed less than 1 hour before seam welding, and the upper sheet is beveled (extrusion welding only).
- Grind marks do not extend more than 1/4 inch from the edge of the weld.
- The geomembrane surface temperature is between 32 and 130°F.
- The ends of old welds, more than 5 minutes old, are ground to expose new material before restarting a weld (extrusion welding only).
- The contact surfaces of the sheets are clean, free of dust, grease, dirt, debris, and moisture before welding.
- The weld is free of dust, rocks, and other debris.
- For cross seams, the seam is ground to a smooth incline before welding (extrusion welding only).
- The seams are overlapped a minimum of 3 inches for extrusion and 4 inches for hot wedge welding, or in accord with manufacturer's recommendations, whichever is more stringent.
- No solvents or adhesives are present in the seam area.
- The procedure used to temporarily hold the panels together does not damage the panels and does not preclude CQA testing.
- If necessary, a strip of geomembrane, wide enough and long enough to protect the hot wedge welder from running on the subgrade, is placed below the geomembrane. This piece may be as long as the seam itself or shorter and moved along with the seaming

equipment. If necessary, a firm substratum such as a flat board or similar hard surface is placed directly under the weld overlap to achieve firm support.

- The panels are welded in accord with the plans and specifications.
- There is no free moisture in the weld area.

For extrusion welding, the CQA Monitor shall observe that the welding device is purged of heat-degraded extrudate for at least 30 seconds before welding following all work stoppages longer than 3 minutes. All purged extrudate shall be disposed of off the liner. Each extruder shoe shall be inspected daily for wear to assure that its offset is the equal to the liner thickness. All worn or damaged shoes or other parts shall be repaired by the Contractor. No equipment shall be allowed to begin welding until the test weld, made by that equipment, passes the weld test. All test welds shall be observed by the CQA Monitor.

3.7.4 Construction Testing

Construction testing is performed on seams welded at the construction site. These tests include quality control testing performed by the Contractor, and quality assurance testing.

3.7.4.1 Nondestructive Seam Testing

The purpose of nondestructive testing is to detect discontinuities or holes in the seam, and it indicates whether a seam is continuous and nonleaking. Nondestructive tests for geomembrane include vacuum testing and air-pressure testing. Nondestructive testing must be performed over the entire length of the seams constructed on site.

Nondestructive testing is performed entirely by the Installer. The CQA Monitor's responsibility is to observe performance of the testing in compliance with the specifications, locate seam defects, and document their repairs. Nondestructive testing procedures are described below.

For welds tested by vacuum method, the weld is placed under suction using a vacuum box made of rigid housing, with a transparent viewing window, a soft neoprene rubber gasket attached to the open bottom perimeter, a vacuum gauge on the inside, and a valve assembly attached to the vacuum hose connection. The box is placed over a seam section that has been thoroughly saturated with a soapy water solution (1 ounce of soap to 1 gallon of water). The rubber gasket on the bottom perimeter of the box must fit snugly against the soaped seam section of the liner, to ensure a leak-tight seal. The vacuum pump is energized and the vacuum box pressure reduced to approximately 5 pounds per square inch (psi) gauge. Any pinholes, porosity, or non- bonded areas are detected by the appearance of soap bubbles in the vicinity of the defect. Dwell time must not be less than 10 seconds.

Pressure testing is used to test double seams that have an enclosed air space between them. Both ends of the air channel should be sealed. The pressure feed device, usually a needle equipped with a

pressure gauge, is inserted into the channel. Air is then pumped into the channel to a minimum pressure of 30 psi. A 2-minute relaxing period is allowed for the pressure to stabilize. The air chamber must sustain the pressure for 5 minutes without losing more than 2 psi. After a passed pressure test, the opposite end of the tested seam must be punctured to release the air. The pressure gauge must return to zero; if not, a blockage is most likely present in the seam channel. Locate the blockage and test the seam on both sides of the blockage. The penetration holes must be sealed after testing, by capping.

During nondestructive testing, the CQA Monitor should perform the following:

- Review technical specifications regarding test procedures.
- Verify that equipment operators are fully trained and qualified to perform their work.
- Verify that test equipment meets project specifications.
- Verify that the entire length of each seam is tested in accord with the specifications.
- Observe all continuity testing and record results.
- Verify that all testing is completed in accord with the project specifications.
- Identify the failed areas by marking them with a waterproof marker compatible with the geomembrane and inform the Contractor of any required actions.
- Verify that all repairs are completed and tested in accord with the project specifications.
- Record all completed and tested repairs.

3.7.4.2 Destructive Seam Testing

Destructive seam tests will be performed independently by the Installer and CQA Consultant at intervals of at least one test per 500 lineal feet,or less, of welded geomembrane seam per welder used. However, the CQA Monitor must perform additional tests if there is suspicion that a seam does not meet specification requirements. Reasons for performing additional tests may include, but are not limited to:

- Wrinkling in seam area
- Excess crystallinity
- Suspect seaming equipment or techniques
- Weld contamination Insufficient overlap
- Adverse weather conditions
- Possibility of moisture, dust, dirt, debris, and other foreign material in the seam
- Failing tests

There are two types of destructive testing required for the geomembrane installation: peel adhesion (peel) and bonded seam strength (shear). The purpose of peel and shear tests is to evaluate seam strength and long-term performance. Shear strength measures the continuity of tensile strength through the seam and into the parent material. Peel strength determines weld quality. Test welds must be

allowed to cool naturally to ambient temperature before testing. Destructive testing must be performed concurrently with seaming operations, not at the completion of the entire installation.

The CQA Monitor selects locations where seam samples will be cut for laboratory testing. Select locations as follows:

- A minimum of one test per 500 feet of welded seam length per welder used. This is an average frequency for the entire installation; individual samples may be taken at greater or lesser intervals per welder used.
- A maximum frequency must be agreed to by the Contractor and CQA Monitor at the preconstruction meeting. However, if the number of failed samples exceeds 5 percent of the tested samples, this frequency may be increased at the discretion of the CQA Monitor. Samples taken as the result of failed tests do not count toward the total number of required tests.
- Test locations are at the discretion of the CQA Monitor and may be selected on the basis of liner distortion, weld contamination, or other potential areas of poor seaming.

The CQA Monitor will not inform the Contractor in advance of selecting the destructive sample locations.

3.7.4.3 Destructive Test Sampling Procedures

The Installer will remove samples at locations identified by the CQA Monitor. The CQA Monitor must:

- Observe sample cutting.
- Mark the top of each sample with an identifying number.
- Log the seam number, destructive test number, welder, date, and time on the Geomembrane Seam Log.
- Record the sample location, weather conditions, and reason sample was taken (random sample, visual appearance, result of a previous failure, etc.).

Two types of samples must be taken at each test location. First, obtain two sets of seam specimens 42 inches apart with the weld centered across the samples' length. Each set consists of two specimens that are 1 inch wide by 12 inches long. The Installer must test each set in the field using a tensiometer capable of quantitatively measuring shear and peel strengths. For double- wedge welding, test both welds. The CQA Monitor must observe the tests. A geomembrane seam sample passes when the break is a ductile, FTB. An FTB means the test strip must break at the edge or the outside of the seam, but not in the seam. In addition, the seam strength must meet the specified values.

If one or more of the 1-inch specimens fails in either peel or shear, the Installer can, at his discretion, (1) reconstruct the entire seam between previous passing test locations, or (2) take another test sample 10 feet from the point of the failed test and repeat this, procedure. If the second test passes, the Installer can either reconstruct or cap-strip the seam between the two passed test locations. If subsequent tests fail, the sampling and testing procedure is repeated, until the length of the poor-quality

seam is established. Repeated failures indicate that either the seaming equipment or the operator is not performing properly, and appropriate corrective action must be taken immediately.

When a wedge-welder is used and (1) there is at least a 1-inch-wide strip outside the wedge weld, (2) there is no evidence of overheating of the weld, and (3) the wedge-weld passes the shear test, the Installer may extrusion-weld the flap left from the wedge-weld, thus creating a new seam. This procedure can take the place of reconstruction. The new seam must be tested.

Once the field test specimens have passed, a sample must be recovered between the passing field specimen locations for laboratory testing. The sample must be 42 inches long by 12 inches wide, with the weld centered along the length. Divide the recovered sample into three parts: one 12-inch by 12-inch section for the Installer, one 12-inch by 18-inch section for the testing laboratory to test, and one 12-inch by 12-inch section for the Engineer to archive. Record the results of laboratory testing.

If the laboratory test fails in either peel or shear, the Contractor must either reconstruct the entire seam, or recover additional samples at least 10 feet on either side of the failed sample for retesting. Sample size and disposition must be as described in the preceding paragraph. This process is repeated until passed tests bracket the failed seam section. All seams must be bounded by locations from which passing laboratory tests have been taken. Laboratory testing governs seam acceptance. In no case can field testing of repaired seams be used for final acceptance.

3.7.4.4 Testing Laboratory Destruction Testing

All CQA destructive samples must be shipped to the geosynthetic testing laboratory to verify seam quality. Testing includes bonded seam strength and peel adhesion. Test at least five specimens from each sample in each method used. Minimum test values are presented in the specifications. The testing laboratory must provide test results within 24 hours, in writing or via telephone, to the CQA Monitor. Certified test results are to be provided within 5 days. The CQA Monitor must immediately notify the Contractor in the event of a failed test result. The geomembrane may not be covered, except as necessary to provide wind protection, until passing results are received from the Testing Laboratory.

3.7.5 Repairs

Any portion of the geomembrane that is flawed or fails a nondestructive or destructive test, or portions where destructive tests were cut or nondestructive tests left cuts or holes, must be repaired in accord with the specifications. The CQA Monitor must locate and record all repairs. Repair techniques include the following:

- Patching – used to repair large holes, tears, large panel defects, undispersed raw materials, contamination by foreign matter, and destructive sample locations.

- Capping – used to repair failed welds or to cover seams where welds or bonded sections cannot be nondestructively tested (also used to cap tee-seams where wedge-welding is used).
- Removal – used to replace areas with large defects where the preceding methods are not appropriate. Also used to remove excess material (wrinkles, fishmouths, intersections, etc.) from the installed geomembrane. Areas of removal must be patched or capped.

Repair procedures included the following:

- Abrade geomembrane surfaces to be repaired (extrusion welds only) no more than 30 minutes before the repair.
- Clean and dry all surfaces at the time of repair.
- Verify acceptance of the repair procedures, materials, and techniques by the CQA Monitor in advance of the specific repair.
- Extend patches or caps at least 6 inches beyond the edge of the defect, and round all comers of material to be patched and the patches to a radius of at least 3 inches. Bevel the top edges of patches before extrusion welding.

3.7.6 Wrinkles

During placement of drainage layer permeable material over the geomembrane, temperature changes or creep may cause wrinkles to develop in the geomembrane. Any wrinkles that can fold over must be repaired either by cutting out excess material or, if possible, by allowing the liner to contract by temperature reduction. In no case can material be placed over the geomembrane, which could result in the geomembrane folding. Panels that are being seamed together should be at approximately the same temperature and have approximately the same amount of wrinkling. The CQA Monitor must observe the geomembrane for wrinkles and notify the Contractor if wrinkles are being covered with soil. The CQA Monitor is responsible for documenting corrective action to remove the wrinkles.

3.7.7 Geomembrane Anchor Trench

The geomembrane should be placed in the anchor trench to the dimensions shown on the Construction Drawings. Excess material must be removed before the anchor trench is backfilled. The geomembrane anchor trench is left open until panels are seamed together. Expansion and contraction of the geomembrane should be accounted for in the liner placement. The anchor trench should be filled at sundown or in the morning when temperatures are coolest to reduce bridging of the geomembrane.

3.7.8 Geomembrane Acceptance

The Contractor retains all ownership and responsibility for the geomembrane until acceptance by the Engineer. The Contractor is responsible for placing materials over the geomembrane, the Contractor retains all ownership and responsibility for the geomembrane until all required documentation is complete and the cover material is placed. After panels are placed, seamed, tested successfully, and repairs made, the completed installation is walked by the Engineer's and Contractor's representatives.

Any damage or defect found during this inspection is repaired properly by the Installer. The installation is not accepted until it meets the requirements of both representatives. In addition, the geomembrane is accepted by the CQA Officer only when the following has been completed:

- The installation is finished.
- All seams have been inspected and verified to be acceptable.
- All required laboratory and field tests have been completed and reviewed.
- All required Contractor-supplied documentation has been received and reviewed.
- All Record Drawings have been received and reviewed by the CQA Monitor. The record drawings show the true panel dimensions, and the locations of seams, trenches, pipes, appurtenances, and repairs.
- The operations layer has been installed.
- The Leak Location Contractor has completed the geoelectric liner leak location survey and any defects discovered have been repaired.

3.8 Geonet

Geonet is utilized on this project as the drainage layer for the LCRS. Proper installation of the geonet is essential to ensure that the containment system operates as intended.

3.8.1 Delivery

During delivery, the CQA Monitor will verify that:

- Equipment used to unload the rolls will not damage the geotextile.
- Rolls are wrapped in impermeable, opaque protection covers.
- Care is used to unload the rolls.
- All documentation required by the specifications has been received.
- Each roll is marked or tagged with the following information: manufacturer's name, project identification, lot number, roll number, and roll dimensions. Log this information on the Log of Geonet Received.
- The Log of Geonet Received is completed.
- Materials are stored in a location that will protect the rolls from ultraviolet light exposure, precipitation, mud, dirt, dust, puncture, cutting, or any other damaging or deleterious conditions.

Any damaged rolls must be rejected and removed from the site or stored at a location, separate from accepted rolls, designated by the Engineer. All rolls that do not have proper manufacturer's documentation must also be stored at a separate location, until all documentation has been received and approved.

3.8.2 Geonet Installation

Surface Preparation. Before geonet installation, the CQA Monitor must verify the following:

- All underlying layers (e.g., GCL, geomembrane) have been approved

- The geomembrane is clean and free of excess dirt and debris

Geonet Placement. During geonet placement, the CQA Monitor must:

- Observe the geonet as it is deployed and record all defects and disposition of the defects (panel rejected, patch installed, etc.). All repairs are to be made in accord with the specifications.
- Verify that equipment used does not damage the geonet by handling, equipment transit, leakage of hydrocarbons, or other means.
- Verify that people working on the geonet do not smoke or vape, wear shoes that could damage the geonet, or engage in activities that could damage the geonet.
- Ensure that the geonet is securely anchored in an anchor trench, if shown on the Construction Drawings.
- Verify that the geonet are anchored to prevent movement by the wind.
- Verify that the panels overlap a minimum of 4 inches along edges and 12 inches at roll ends. Rolls should be shingled in the direction of the slope.
- Examine the geonet after installation to ensure that no potentially harmful foreign objects are present.
- Verify that geonet is covered within 14 days. If geonet is exposed for more than 14 days, ultraviolet exposure conditions will be reviewed. If the tensile strength of the geotextile is less than the specified tensile strength, the geonet will be removed and replaced.
- Verify that equipment placing cover do not drive directly on the geonet. The cover material shall be placed and spread using low-ground pressure equipment. Cover material shall be placed from the bottom of the slope and spread up-slope in a manner that prevents instability of the cover material and damage to the geonet.
- Verify that compaction of the cover material does not damage the geonet.

The CQA Monitor must inform both the Contractor and the CQA Officer if the above conditions are not met.

3.8.3 Repairs

Repair procedures include:

- Patching – used to repair large holes, tears, large defects, and destructive sample locations.
- Removal – used to replace areas with large defects where the preceding method is not appropriate.

Holes, tears, and defects must be repaired in the following manner. Soil or other material that may have penetrated the defect must be removed completely before repair. Should any tear, hole, or defect exceed 50 percent of the width of the roll, the roll must be removed and replaced. If the defect is not located on a slope, the patch must be made using the same type of material placed with a minimum 12-inch overlap in all directions. The patch should be secured to the original geonet by tying every 6 inches with approved tying devices.

3.9 Geotextiles

Nonwoven geotextile is utilized on this project as a separator over the permeable material and on top of the geonet. Proper installation of geotextile is essential to ensure that the system operates as intended.

3.9.1 Delivery

During delivery, the CQA Monitor will verify that:

- Equipment used to unload the rolls will not damage the geotextile.
- Rolls are wrapped in impermeable, opaque protection covers.
- Care is used to unload the rolls.
- All documentation required by the specifications has been received.
- Each roll is marked or tagged with the following information: manufacturer's name, project identification, lot number, roll number, and roll dimensions. Log this information on the Log of Geotextile Received.
- The Log of Geotextile Received is completed.
- Materials are stored in a location that will protect the rolls from ultraviolet light exposure, precipitation, mud, dirt, dust, puncture, cutting, or any other damaging or deleterious conditions.

Any damaged rolls must be rejected and removed from the site or stored at a location, separate from accepted rolls, designated by the Engineer. All rolls that do not have proper manufacturer's documentation must also be stored at a separate location, until all documentation has been received and approved.

3.9.2 Geotextile Installation

Surface Preparation. Before geotextile installation, the CQA Monitor must verify the following:

- All lines and grades have been verified by the Contractor.
- The subgrade has been prepared in accordance with the earthwork specification, and the geomembrane and geonet installations, including all required documentation, have been completed.
- The supporting surface does not contain stones larger than 1-inch that could damage the geotextile.
- There are no excessively soft areas that could result in damage to the geotextile.
- All construction stakes and hubs have been removed.

Geotextile Placement. During geotextile placement, the CQA Monitor shall:

- Observe the geotextile as it is deployed and record all defects and disposition of the defects (panel rejected, patch installed, etc.). All repairs are to be made in accord with the specifications.
- Verify that equipment used does not damage the geotextile by handling, equipment transit, leakage of hydrocarbons, or other means.

- Verify that people working on the geotextile do not smoke, wear shoes that could damage the geotextile, or engage in activities that could damage the geotextile.
- On slopes greater than 20 percent, ensure that the geotextile is securely anchored in an anchor trench.
- Verify that the geotextiles are anchored to prevent movement by the wind.
- Verify that the panels overlap per Section 11-4 of the Construction Specifications.
- Verify that the geotextile was not exposed to direct sunlight for more than 5 days except for the geotextile over the sideslope geonet.
- Examine the geotextile after installation to ensure that no potentially harmful foreign objects are present.

Geotextile Final Evaluation. Upon geotextile final placement, the CQA Monitor must:

- Inform the Engineer of readiness for a walk through when installation is finished.
- Execute walk through with Contractor and Installer.
- Visually inspect seams, panel surface and repairs during walk through.
- Distinctively mark defects, suspicious looking seams, permanent wrinkles, and bridging, for repair.
- Document findings and corrective actions.
- Arrange for final walk through after corrective actions.
- Document the result of the final walk through in a Field Construction Inspection Report.

3.9.3 Repairs

Repair procedures include:

- Patching – used to repair large holes, tears, large defects, and destructive sample locations.
- Removal – used to replace areas with large defects where the preceding method is not appropriate.

Holes, tears, and defects must be repaired in the following manner. Soil or other material that may have penetrated the defect must be removed completely before repair. Should any tear, hole, or defect exceed 20 percent of the width of the roll, the roll must be removed and replaced. If the defect is not located on a slope, the patch must be made using the same type of material placed with a minimum 24-inch overlap in all directions.

3.10 HDPE Pipe

HDPE pipe is used on this project as part of the leachate collection and removal and drainage system. Proper installation of pipe is essential to ensure that the systems operate as intended.

3.10.1 Delivery

During delivery, the CQA Monitor must verify the following:

- Equipment used to unload the pipe does not damage the pipe.
- The pipe is stacked consistent with the manufacturer's recommendations.
- Pipe is proper size and dimension.
- Perforated pipe has holes in locations and dimensions specified in the contract documents.
- All documentation required by the specifications has been received.
- Each section is marked according to specification requirements, including pipe manufacturer, SDR size, ASTM designation, and date of manufacturer.

Any damaged pipe must be rejected and removed from the site or stored at a location, separate from the accepted pipe designated by the Engineer. All pipe that does not have proper manufacturer's documentation must also be stored at a separate location, until all documentation has been received and approved.

3.10.2 Installation

The CQA Monitor shall verify:

- Pipe is installed to the lines and grades shown on the Construction Drawings by reviewing the as-built surveys.
- Pipe segments are joined consistent with the manufacturer's recommended procedure. Pipe installation is performed with minimum amount of lifting and moving.
- Fittings are not used as the point of attachment for lifting.
- Loose material (shavings, soil, stones, etc.) are removed from the pipe.

3.11 Electric Leak Location Survey

An electrical leak location survey (ELLS) shall be completed by the third party Leak Location Contractor being retained by the General Contractor in Phase III, Modules 7 & 8 base liner areas as described in the approved Specifications. Two electric leak location surveys will be completed. One of the tests will be performed following installation of the 60 mil HDPE geomembrane liner in accordance with ASTM D 7002. This test is typically conducted at night when the geomembrane is taut. The other test will be completed following the placement of the overlying operations layer soil in accordance with ASTM D 7007. Additionally, blind actual holes will be placed in the geomembrane before conducting the ELLS in accordance with ASTM D 7909 as a quality control/quality assurance measure to ensure that leaks through the geomembrane are detectable.

The CQA Officer/Monitor shall ensure that the liner is properly prepared for the ELLS and shall verify that adequate moisture is added to the permeable material or geonet and operations layer prior to conducting the test. All edges of the liner must be "electrically isolated" prior to completing the tests.

The CQA Officer/Monitor shall:

- Review the qualifications of the Leak Location Contractor to assess conformance with the qualification requirements stated in this CQA Plan and in the project Special Provisions.
- Review the Geoelectric Liner Leak Detection Work Plan to assess conformance with the requirements of the CQA Plan and project Special Provisions.
- Identify any discrepancies in the Geoelectric Liner Leak Detection Work Plan and ensure that they are corrected prior to commencement of the leak location survey.
- Verify that the site has been inspected by the Leak Location Contractor prior to commencing the leak location survey.
- Verify that the first phase of the leak location survey, conducted on the bare geomembrane, is in conformance with the ASTM standards or procedures prescribed in the work plan.
- Verify that calibration testing has been performed periodically with a blind actual hole (per ASTM D 7909) on the geomembrane for proper equipment operation. If a blind actual hole is not detected during the calibration testing, the hole will be repaired, and the geomembrane area resurveyed since the previous calibration test was inadequate.
- Prepare documentation that the first phase of the leak location survey is completed, all defects have been repaired, and the surveyed area is turned over to the Contractor and/or Installer for subsequent installation of geosynthetics and soil cover over the geomembrane.
- Observe proper placement of additional geo synthetic layers and operations soil over the geomembrane liner.
- Verify that the second phase of the leak location survey, conducted on the soil operation layer, is in conformance with the ASTM standards or procedures prescribed in the work plan.
- Verify that a calibration test with a blind actual hole is performed for the second phase of the leak location survey. The hole shall be placed in the geomembrane with the geonet and geotextile placed over the geomembrane, and then covered with the operations layer soil. Leak detection survey measurements must be demonstrated with the blind actual hole located midway between data measurement locations.
- Verify and observe leak survey measurement above the calibration hole to determine detection sensitivity and maximum grid spacing.
- Verify the locations of all identified or indicated leaks with flags, spray paints, or written coordinates prepared by the Leak Location Contractor.
- Review the Leak Location Contractor's written report of the surveys and confirm that it accurately represents the surveys. In the event that discrepancies are identified, ensure that they are corrected by the Leak Location Contractor.

In the event the ELLS identifies anomalies that are indicative of a defect in the liner system, the CQA Monitor shall document the location of the suspect area, and then observe and document the exposure of the liner system and any subsequent repairs that may be necessary. The CQA Monitor will photograph the area after it is exposed and after any repairs are completed.

The Leak Location Contractor shall submit a report detailing the procedures used and the results of their survey within 2 weeks of completion outlining:

- Principles of technique
- Site activities
- Map of defect locations
- Description of defects, if known
- Certification that any defective areas were successfully repaired
- Certification that the entire geomembrane area was surveyed

3.11.1 Deficiencies

When deficiencies (items that do not meet specified values) are discovered, the CQA Monitor shall immediately determine the nature and extent of the problem, notify the Contractor of the problem, and complete required documentation. In all cases, the CQA Monitor shall notify the Contractor within 1/2 hour after discovering the deficiency, or on the next working day if discovered at the end of a shift. If the deficiency will cause construction delays of more than 2 hours or will necessitate substantial rework, the CQA Monitor shall also notify the Engineer. The Contractor shall correct the deficiency to the satisfaction of the CQA Monitor. If the Contractor is unable to correct the problem, the CQA Monitor will develop and present to the Engineer suggested solutions for his approval. If the solution requires a design modification, the Engineer shall also be contacted and any necessary regulatory approvals obtained prior to implementation of solution.

The corrected deficiency shall be retested before additional work is performed. All retests and the steps taken to correct the problem shall be documented.

4.0 CONSTRUCTION QUALITY ASSURANCE FOR EARTHWORK

4.1 Introduction

This section describes the monitoring and testing that will be performed to assure that the earthwork construction meets the specified requirements.

The scope of earthwork construction for this project includes the following:

- Excavation from on-site soil stockpiles or borrow areas
- General fill placement
- Subgrade preparation layer placement
- Permeable material fill placement
- Operations layer placement

The overall goal of the earthwork quality assurance program is to assure that proper construction techniques and procedures are used and that the project is built in accord with the project Construction Drawings and Specifications. Another function of the quality assurance program is to identify problems that may occur during construction and to verify that these problems are avoided or corrected before construction is completed.

Construction must be conducted consistent with the project Construction Drawings and Specifications. To monitor conformance, a quality assurance testing program will be implemented that includes: (1) material evaluation, (2) construction testing, and (3) construction observation.

Activities will be conducted in accord with this plan, and the project Construction Drawings and Specifications.

4.2 Material Evaluation

Material sources will be identified and samples tested to determine whether the material meets specifications for specific work elements. Material evaluation testing is conducted before construction begins. Definitions and requirements of the materials are provided in the Specifications. Test samples are obtained in accordance with standard operating procedures and applicable ASTM International standards. Archive samples and test results are maintained and stored at the project site. Material sources requiring quality verification include:

- General fill
- Subgrade preparation layer
- Permeable material fill
- Operations layer

Before the start of construction, sources will be identified for each material and samples tested to determine whether the materials meet project specifications. Borrow sources will be determined by the Engineer. Samples will be obtained in accord with applicable ASTM standards. Record samples and test results of the test samples will be maintained and stored at the project site. Table 3 establishes the test frequencies for earthwork material evaluation.

4.3 Construction Testing

4.3.1 Test Procedures

The CQA Monitors must perform the various field and laboratory tests in accordance with the applicable standard, as specified in the construction documents or this plan. In most instances, the applicable procedure is an ASTM standard. Construction testing is conducted during construction activities.

During progress of the work, additional procedures may be needed for other testing or sampling. If such procedures do not exist, or if they exist and need to be modified, written procedures must be developed by the CQA Officer. Where called for in this plan or in the construction documents, the following test standards apply:

Test	Test Description
ASTM C 117	Standard Test Method for Materials Finer than the # 200 Sieve in Mineral Aggregates by Washing
ASTM C 136	Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM D 422	Standard Test Method for Particle Size Analysis of Soils
ASTM D 1140	Standard Test Methods for Determining the Amount of Material Finer than the # 200 Sieve in Soils by Washing
ASTM D 1556	Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 1557	Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Method
ASTM D 2216	Standard Test Method of Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 2434	Standard Test Method for Permeability of Granular Soils (Constant Head)
ASTM D 2487	Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)

ASTM D 2488	Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)
ASTM D 2937	Standard Test Method for Density of Soil by the Drive Cylinder Method
ASTM D 4318	Standard Test Method for Liquid limit, Plastic Limit, and Plasticity Index of Soils
ASTM D 4643	Standard Test Method for Determination of Water (Moisture) Content of Soil by Microwave Oven Heating
ASTM D 6938	Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

4.3.2 Test Frequencies

Table 4 establishes the test frequencies for earthwork construction quality assurance. The test frequencies listed establish a minimum number of required tests. Extra testing must be conducted whenever work or materials are suspect, marginal, or of poor quality. Extra testing may also be performed to provide additional data for engineering evaluation. Any retests performed as a result of a failing test do not contribute to the total number of tests performed in satisfying the minimum test frequency. Examples of conditions that may warrant additional tests include the following:

- Compactors slip while compacting
- Excessive pumping or cracking of fill
- Lift thickness greater than specified
- Dirt-clogged rollers used to compact the fill
- Improperly ballasted compactor
- Adverse weather
- Equipment breakdown
- Work conducted in difficult areas
- High frequency of failed tests

4.3.3 Soil Sample and Test Numbering

The CQA Monitor maintains soil sample numbers on the Master Log for Test Samples. No sample or test number shall be repeated. Retests of failing samples and tests shall be given the original sample or test number and a letter suffix (e.g. a retest of 12 would be 12A, 12B, etc.). Each sample will be labeled with a unique identification number.

4.3.4 Sample Location Repair

All perforations made by a nuclear density device probe, sand-cone test and grab sample holes in the subgrade preparation layer shall be repaired. Perforations shall be repaired by backfilling with a soil mixture and tamping in place with a tamping rod, modified Proctor hammer, or mechanical tamper depending on the perforation size.

4.3.5 Test Locations

The intent of the CQA program is to provide confidence that the construction materials conform to specifications. Density and moisture content tests should be uniformly dispersed throughout the fill. Density test locations must be chosen without bias; however, additional testing can be performed in any areas that are suspect, marginal, or appear to be of poor quality.

4.4 Protection of Geosynthetics

Installer shall be responsible for staging the Work so that no construction equipment needs to be driven over already deployed geosynthetics.

Equipment used for placing soils shall not be driven directly over geosynthetics. A minimum thickness of 1 foot of soil is required between a low ground pressure (LGP) dozer and underlying geosynthetics. A minimum thickness of 3 feet of soil is required between rubber-tired vehicles and underlying geosynthetics. In areas of heavy vehicle traffic, such as access ramps, the soil thickness should be at least 3 feet. In any case, the following table shall be complied with during construction:

Maximum Allowable Equipment Ground Pressure (psi)	Soil Thickness Over Geosynthetics (feet)
5	1.0
10	1.5
15	2.0
>20	>3.0

4.5 Monitoring Requirements

Each earthwork component has specific construction requirements that must be monitored by the CQA Officer/Monitor. The following paragraphs list monitoring requirements for each type of earthwork.

4.5.1 General Fill and Subgrade Preparation Layer Placement

- Verify vegetation and other organic material is removed from within areas of fill placement.
- Visually observe stripped areas for soft or excessively wet areas, and unstable slopes.

- Monitor and confirm that the surface of the subgrade is free of soft, organic, and otherwise deleterious materials, and that the surface is firm and unyielding.
- Verify that grade control is established.
- Verify removal and stockpiling of oversized material.
- Verify that source of material is suitable for engineering fill.
- Verify lift thickness.
- Test compaction and moisture content at required frequencies.
- Sample and perform classification testing at required frequencies.
- Promptly notify the Contractor of test results that affect the work.
- Verify that completed grades meet slope requirements.
- Verify that final grading meets tolerance requirements.
- Verify that the survey has been completed and that the Record Drawing furnished by the Surveyor indicates compliance with the lines, grades, elevations, and tolerances as indicated by the Construction Drawings and Specifications.

4.5.2 Permeable Material Placement

Obtain samples of permeable material fill and perform material evaluation testing at the frequencies established in this plan.

- Verify that underlying geosynthetic installations are complete before material installation.
- Verify that grade control is established. Observation and monitoring of hauling equipment and spreading equipment to verify that the minimum thickness is maintained for spreading and hauling equipment above the underlying geosynthetics.
- Visually observe the permeable materials as delivered to the site to observe for any variability in the aggregate, taking care to observe for variation in gradation, excess fines, excess angular material, or any deleterious material present in the aggregate.
- Verify thickness of material placed, by direct field measurements of in-place material and by reviewing as-built surveys.
- Monitor placement of material, and mark any geosynthetics damaged during material installation.
- Verify that damage is repaired. Monitor placement of material over piping, and verify that pipe is not damaged.
- Verify that damaged pipe is replaced. Perform sampling and construction testing of material during installation, at the frequencies established in this plan to verify material quality.
- Verify that the CQA Survey has been completed and that the Record Drawings furnished by the Surveyor indicate compliance with the lines, grades, elevations, and tolerances as indicated by the Construction Drawings and Specifications.

4.5.3 Operations Layer Placement

- Obtain samples of operation layer material and perform material evaluation testing at the frequencies established in this plan.

- Verify that underlying materials are installed correctly.
- Verify that grade control is established.
- Obtain samples and perform material evaluation testing at the frequencies established in this plan (Table 3).
- Verify that thickness requirement and final grading requirements are met by direct field measurements of in-place soil and by reviewing as-built surveys.
- Verify that the thickness of operations layer required by the Construction Drawings and Specifications is achieved; and verify soil operations materials are placed to the limits indicated in the Construction Drawings.

4.6 Construction Surveys

Construction staking shall be performed by the Surveyor. The Contractor shall request staking through the Construction Manager.

The Surveyor shall furnish “As-built Survey Record Drawings” (also referred to as “as-built” drawings) for review by the CQA Officer. The CQA Officer shall provide confirmation that surveyed materials are constructed to the lines and grades identified in the Construction Drawings and Specifications. The CQA Officer shall review and approve the drawings prior to placement of a new system component over the work. Required Record Drawings shall be as specified in the Specifications. All CQA surveying shall be performed under the direction of a Surveyor licensed to perform such work in the State of California. All Record Drawings shall be signed and sealed by the licensed Surveyor who directed the CQA record survey work. Record Drawings shall be at a scale not smaller than 1 inch = 100 feet. The accuracy of the surveying shall be sufficient to determine if the measurements are within the tolerances specified in the Construction Drawings and Specifications.

The required surveying of the liner system elevations shall be carried out on a 50-foot square grid. The grid points for each successive earthworks layer shall have the same horizontal locations for comparison of layer thickness. Additional survey locations shall be recorded to define the following features in the liner system: toe of slope, hinge of slope, grade breaks, sumps, anchor trench, drainage system piping, and perimeter drainage ditch. The thicknesses of the geosynthetic liner system components on the Construction Drawings shall be interpreted as negligible.

5.0 DOCUMENTATION

The quality assurance program depends on thorough monitoring and documentation of all construction activities. Therefore, the CQA Officer and Monitors will document that all quality assurance requirements are addressed and satisfied. Documentation consists of daily record- keeping, testing and installation reports, nonconformance reports (if necessary), progress reports, design and specification revisions, and a construction report. Report/log forms are presented in Appendix A.

5.1 Daily Record-Keeping

At a minimum, daily records consist of construction progress, daily construction report, observation and test data sheets, and, as needed, nonconformance/corrective measure reports. All forms are copied to the CQA Officer for review.

5.1.1 Daily Record of Construction Progress

The Daily Progress Meeting form and the Field Construction Inspection Report will summarize ongoing construction and discussions with the Contractor, and will be prepared by the CQA Monitor. At a minimum, the form and report will include the following:

- Date, project name, project number, and location.
- A unique number for cross-referencing and document control.
- Weather data.
- A description of all ongoing construction for the day in the area of the monitor's responsibility.
- An inventory of equipment used by the Contractor.
- Items of discussion and names of parties involved in discussions. A brief description of tests and observations, identified as passing or failing, or, in the event of failure, a retest.
- Areas of nonconformance/corrective actions, if any, (nonconformance/corrective action form to be attached).
- Summary of materials received and quality documentation.
- Follow-up information on previously reported problems or deficiencies.
- Record of any site visitors.
- Signature of monitor.

5.1.2 Observation and Test Data Sheets

Observation and test data sheets should include the following information as appropriate for the form being used:

- Date, project name, and location
- A unique number for cross-referencing and document control
- Weather data, as applicable

- A reduced-scale site plan showing sample and test locations
- Test equipment calibrations, if applicable
- A summary of test results identified as passing, failing, or, in the event of a failed test, retest
- Completed calculations
- Signature of the monitor
- Signature of the peer reviewer

Sample test report forms and installation documentation forms are appended.

5.1.3 Nonconformance Reports

In the event of a nonconformance event, a nonconformance verification report form is included with the daily report. Procedures for implementing and resolving any nonconformances to the specification are outlined in Section 2.6 of the CQA Plan.

5.2 Progress Reports

The CQA Officer prepares monthly progress reports summarizing construction and quality assurance activities. The reports contain, at a minimum, the following information:

- The date, project name, and location
- A summary of work activities
- A summary of deficiencies or defects and resolutions
- Ongoing summary of changes or change orders to the work
- Third-party laboratory test results, test locations, and data sheets
- The signature of the CQA Monitor
- Copies are forwarded to the Engineer

5.3 Photographs

Construction activities are photographed. Photographs include any significant problems encountered and corrective actions, and document construction progress. The photographs are identified by number, location, time, date, and photographer. The photographer should document the subject of the photograph in a photograph log. Electronic copies of the photographs are given to the Engineer.

5.4 Design and Specification Changes

Design and Specification changes may be required during construction. Design and Specification changes are only made with written agreement of the Engineer and Contractor. These changes are made by change order to the contract. The regulatory agencies are notified by the Owner via CQA Officer of any signification changes and necessary regulatory approval gained prior to implementation of the change. When change orders are issued, they are prepared by the Owner with technical input from the Engineer

and CQA Officer. The Engineer distributes change orders to the required parties for signature and execution.

5.5 Construction Report

At the completion of the project, the CQA Officer submits a final construction report. This report documents that construction is in compliance with the Construction Drawings and Specifications. At a minimum, the report contains:

- A summary of major construction activities
- A summary of laboratory and field test results
- Sampling and testing location drawings
- A description of significant construction problems and the resolution of these problems
- A list of changes from the Construction Drawings and Specifications and the justification for these changes
- Any regulatory approvals of design changes, or statement that regulatory approval was not required
- As-built records, ARCH D size
- A statement of compliance with the construction documents and design intent, signed and stamped by the CQA Officer

The as-built Record Drawings accurately locate the constructed location of all work items. All surveying and base maps required for the development of the Record Drawings are prepared by the project Surveyor. The Engineer, CQA Officer, CQA Monitor, and Contractor must review and verify that as-builts are correct. As-builts are included in the final construction report.

6.0 REFERENCES

Daniel, David E. and Robert M. Koerner (2007) *Waste Containment Facilities, Guidance for Construction Quality Assurance and Construction Quality Control of Liner and Cover Systems*, ASCE Press, 2nd Edition.

TABLES

Table 1
Geosynthetics Conformance Testing Frequencies [1]
Module Preparation and Liner Construction

Test [2]	Test Method [3]	GCL (sf)	Geomembrane (sf)	Geotextile (sf)	Geonet (sf)
Mass per Unit Area	D 5993	150,000			
Mass of Bentonite	D 5993	150,000			
Moisture Content (bentonite)	D 5993	150,000			
Tensile Strength	D 6768	150,000			
Permeability	D 5887	1 test			
Peel Strength	D 6496	150,000			
Fluid Loss	D 5891	150,000			
Free Swell	D 5890	150,000			
Thickness	D 5994		150,000		
Asperity Height	D 7466		150,000		
Specific Gravity	D 1505		150,000		
Tensile Properties	D 6693		150,000		
Tear Resistance	D 1004		150,000		
Puncture Resistance	D 4833		150,000		
Mass per Unit Area	D 5261			150,000	
Grab Tensile Strength	D 4632			150,000	
CBR Puncture Strength	D 6241			150,000	
Apparent Opening Size	D 4751			150,000	
Permittivity	D 4491			150,000	
Thickness	D 5199				250,000
Tensile Strength and Elongation	D 7179				250,000
Compression Behavior	D 1621				250,000
Transmissivity [4]	D 4716				250,000
Shear Strength [5]	D 6243 / D 5321	2 tests	2 tests	2 tests	2 tests

[1] Evaluate all tests per ASTM D 4759.

[2] Minimum one test per quantity shown or one test per lot, whichever results in the greater number of tests. CQA Officer may require more frequent testing based on test results and/or field conditions.

[3] Test methods are ASTM unless otherwise indicated.

[4] See Specifications for Geonet transmissivity testing requirements. Design and routine testing required.

[5] Two tests per configuration. See Table 2 for required configurations.

Table 2
Minimum Acceptable Large Displacement Interface Shear Strength Values

Test Configuration	Test	Test Condition	Hydration Time Prior to Shearing	Strain Rate (inch/min)	Min. Shear Displacement (in)	Normal Load (psf)	Residual Shear Strength (psf)[1]
Upper Suface of GCL / Textured Lower Surface of Geomembrane [2]	ASTM D 6243	Submerged	48 hours under corresponding normal load	0.04	3.0	2,500 5,200 7,500	500 1,000 1,000
Smooth Upper Surface of Geomembrane / Lower Surface of Geonet [3]	ASTM D 5321	Submerged	None	0.2	3.0	2,500 5,200 7,500	500 1,000 1,000
Lower Surface of GCL / Subgrade [2]	ASTM D 6243	Submerged	48 hours under corresponding normal load	0.04	3.0	2,500 5,200 7,500	500 1,000 1,000

(1) The normal load shall be applied in a single increment.

(2) Subgrade to be compacted to 95% of the maximum dry density at a moisture content of 2% above optimum moisture content based on ASTM D 1557. The internal shear strength of the GCL should be tested simultaneously by placing in a floating configuration.

(3) The internal shear strength of the geonet/geotextile should be tested simultaneously by placing in a floating configuration.

(4) Vertical displacements shall be monitored. Hydration is complete when the specimen reaches equilibrium.

Table 3
Soil and Rock Evaluation Testing Frequencies
Module Preparation and Liner Construction

Test [1]	Test Method [2]	General Cut/Fill (cy) [3]	Subgrade (sy) [4]	Permeable Material (cy)	Operations Layer (cy)
Compaction Characteristics	D 1557	5,000	22,500		
Particle Size	D 422 / D 1140	5,000	22,500		10,000
Permeability	D 2434			1,000	
Classification	D2487	5,000	22,500	1,000	10,000
Sieve Analysis	C 136 / C 117			1,000	
Visual Description	D 2488	5,000	22,500	1,000	

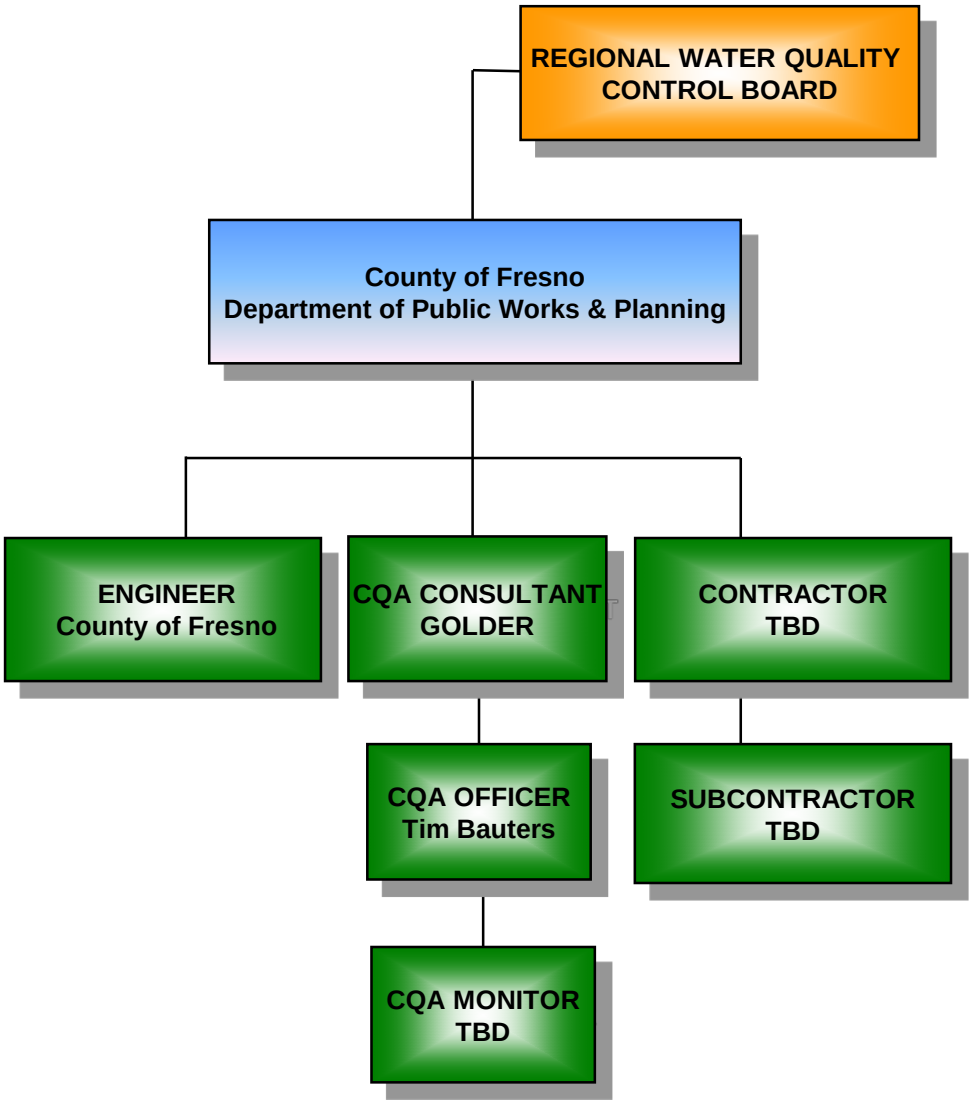
[1] Minimum one test for each quantity shown or material type, whichever results in a greater number of tests.
[2] Test methods are ASTM designations unless otherwise indicated.
[3] cy = cubic yards
[4] sy = square yard

Table 4
Soil and Rock Construction Field Testing[1] Frequencies
Module Preparation and Liner Construction

Test [2]	Test Method [3]	General Cut/Fill (cy) [4]	Subgrade (sy) [5]	Permeable Material (cy)	Operations Layer (cy)
In-Place Nuclear Density	D 6938	5,000	22,500		
Sand Cone or Drive Tube	D 1556 D 2937	1 per every 20 Nuclear Gauge tests	1 per every 20 Nuclear Gauge tests		
Moisture Content	D 2216 / D 4643	1 per every 10 Nuclear Guage tests	1 per every 10 Nuclear Guage tests		
Particle Size	D 422				10,000
Classification	D 2487	5,000	22,500	1,000	10.000

(1) Field Testing includes testing performed in a laboratory.
(2) Minimum of one test per quantity shown or material type, whichever results in a greater number of tests.
(3) Test methods are ASTM designations unless otherwise indicated.
(4) cy = cubic yards
(5) sy = square yards

FIGURE 1
AMERICAN AVENUE DISPOSAL SITE
MODULES 7 & 8
ORGANIZATION AND COMMUNICATION CHART



Appendix A

CQA Documentation Forms / Log List

Earthwork	Geosynthetics	Form / Log
X	X	Weekly Project Meeting
X	X	Weekly Meeting Sign-In Sheet
X	X	Daily Progress Meeting
X	X	Submittal Log
X	X	Correspondence Log
X	X	Conversation Summary
X	X	Memorandum of Record
X	X	Contractor Request for Clarification
X	X	Field Construction Inspection Report
X	X	Construction Problem and Solution Data Sheet
X		Master Log for Test Samples
X		Laboratory Test Request
X		Nuclear Gauge Moisture Density Test Log
X		Sand Cone Moisture Density Test Log
X		Moisture Content Test Report
X		Sieve Analysis
	X	Acceptance of Subgrade Surface Condition
	X	Log of GCL Received
	X	Log of Geomembrane Received
	X	Log of Geonet Received
	X	Log of Geotextile Received
	X	Geomembrane Start-Up Trail Weld Log
	X	Geomembrane Installer’s Field Quality Control Log
	X	Geomembrane Seam Log
	X	GCL Panel Deployment Log
	X	Geomembrane Panel Deployment Log
	X	Panel and Seam Acceptance Form
	X	Destructive Seam Test Results (Field Results)

WEEKLY MEETING AGENDA

CONSTRUCTION MEETING #____
AMERICAN AVENUE DISPOSAL SITE
PHASE III - MODULES 7 AND 8
EXCAVATION AND LINER SYSTEM CONSTRUCTION
FRESNO COUNTY, CALIFORNIA

[Date]

Attendees:

Name	Company

1. Potential Change Orders:

No.	Change Order	Cost
1.		
	Est. Total Additional Cost	

2. Site Health & Safety
   -
   -
3. Work Progress & Issues
   -
   -
   -
4. Schedule
   -

-

5. Submittal Status

-
-

6. Other Discussion Items

-
-

WEEKLY MEETING SIGN-IN SHEET

CONSTRUCTION MEETING #____
AMERICAN AVENUE DISPOSAL SITE
PHASE III - MODULES 7 AND 8
EXCAVATION AND LINER SYSTEM CONSTRUCTION
FRESNO COUNTY, CALIFORNIA

[Date]

Name	Company	Phone	Email

COUNTY OF FRESNO
Department of Public Works and Planning
American Avenue Disposal Site

Job No: _____
Date: _____

DAILY PROGRESS MEETING

Project: American Avenue Disposal Site Phase III, Modules 7 & 8

Meeting Location: _____

Weather Conditions: _____

Meeting Attendees: _____

Scheduled Work Activities: _____

Items Discussed: _____

_____
CQA Monitor Signature

SUBMITTAL LOG

PROJECT: American Avenue Disposal Site Phase III, Modules 7 & 8

OWNER: Fresno County Department of Public Works and Planning PROJECT NO.: _____ TASK NO.: _____

DESCRIPTION: Single-Composite Liner System YEAR: _____

CONTRACTOR: _____

SUBMITTAL NO.	DESCRIPTION	RECEIVED FROM (month/day)	CONTRACTOR SUBMITTAL NO.	SUBMITTED TO (month/day)	RECEIVED FROM (month/day)	RETURNED TO (month/day)	STATUS*	COMMENTS

* NET - No Exception Taken
CAS - Corrected as Noted
RR - Revise and Resubmit
R - Rejected
SSI - Submit Specified Item(s)

Sheet No. _____ of _____

CORRESPONDANCE LOG

AMERICAN AVENUE DISPOSAL SITE PHASE III, MODULES 7 & 8

No.:	Date Sent:	Date Received:	Correspondance To/From:	Correspondance Summary:

Conversation Summary

Project Number: _____ **Date:** _____

Project Name: _____ **Attendees:** _____

Summary of Conversation

Prepared By: _____ **Reviewed By:** _____

Distribution: _____

Memorandum of Record

Project Number: _____ **Date:** _____

Project Name: _____ **Attendees:** _____

Memorandum

Prepared By: _____ **Reviewed By:** _____

Distribution: _____

COUNTY OF FRESNO

Department of Public Works and Planning

American Avenue Disposal Site

Page _____of _____

Report No._____

Job No._____

Date: _____

FIELD CONSTRUCTION INSPECTION REPORT

Project: American Avenue Disposal Site Phase III, Modules **7 & 8**

Location: _____

Total Hours: _____

Equipment In Use: _____

_____

_____

Description of Work: _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

CQA Monitor Signature

Master Log for Test Samples

Project Number: _____ **Sheet** _____ **of** _____

Project Name: _____

Sample Number	Test(s) To Be Performed	Date Sampled	Sampled By	Location Sampled Area, Soil Segment, Cord., Elev.	Tests to be Performed at:		Date Sent to Lab.	Date Results Received	Test Results and Remarks
					Site	Lab.			

LABORATORY TEST REQUEST FORM

AMERICAN AVENUE DISPOSAL SITE, PHASE III - MODULES 7 AND 8, EXCAVATION AND LINER SYSTEM CONSTRUCTION

Date In:	Due Date:	Contact Email:
Contact Name:	Contact Number:	
Results To:		

Material Type	Sample No.	Sample Type	Depth (ft)	Test	Instructions

Test	Test #		
Moisture (MC)	1		
MD, 2-2.5" diameter	2		
MD 3" diameter	3		
PI Dry (CTL default)	4		
PI Wet Prep	5		
Sieve (SA)-3/4" / +3/4"	6		
Sieve + Hydrometer	7		
-#200Wash	8		
Specific Gravity(-#4)	9		
Specific Gravity(+#4)	10		
% Organics	11		
Total Porosity	12		
Effective Porosity	13		
UC-Soil	14		
UC-Soil-Cement-Precast	15		
UC-Lime Precast	16		
Direct Shear - CU	17		
Direct Shear - CD	18		
TX-UU	19		
TX-ICU	20		
TX-ICU- Staged	21		
TX-ICU-PP	22		
TX-ICU-PP- Staged	23		
Torsional peak or res	24		
Torsional peak and res	25		
Incremental - Consol	26		
SS/+Expansion-Pressure	27		
Shrink Swell (SS)	28		
Expansion Pressure	29		
Expansion Index, ASTM	30		
Expansion Index, UBC	31		
Collapse	32		
Permeability 2-3" dia.	33		
PERM on drain rock	34		
Modified Proctor 4"/ 6"	35		
Max Index Density .1 / .5ft^3	36		
Min. Index Density .1 / .5ft^3	37		
R-Value	38		
R-value-batch/admix	39		
CBR	40		
Sand Equivalent (SE)	41		
Class II AB Spec	42		
Durability Index, Fi / Co	43		
LA Abrasion	44		
Sulfate Soundness	45		
Rapid Chlor. Perm	46		
UC Lime (Cal 373)	47		
Free Swell (Bentonite)	48		
Mass Per Unit Area	49		D5261 or D5993
Grab Tensile Strength	50		
Peel Strength	51		
Index Flux	52		
Direct Shear Strength	53		D5321 or D6243
Sheet Thickness	54		
Tensile Properties	55		
Tear resistance	56		
Puncture Resistance	57		D6241 or D4833
Grab Tensile Strength & Elongation	58		
Permittivity	59		
Apparent Opening Size (AOS)	60		
Trapezoidal Tear	61		
Thickness (Geonet Core)	62		
Tensile Strenght & Elongation	63		Geonet
Compressive Behavior	64		
Transmissivity	65		Routine or Design

Special Instructions:

Nuclear Gauge Moisture Density Test Log

Project Number: _____ **Tested By** _____

Project Name: _____ **Reviewed By:** _____

Project Location: _____ **Date:** _____

Soil Characterization Engineering Materiel Properties

Compaction Curve No.	Compaction: Soil Description	Max. Dry Density (pcf) Y	Opt. Moist. Content (%) w	Sketch

Nuclear Gauge Moisture and Density Test Data (ASTM D3017 & D2922)

Test Number						
Northing/Station						
Easting/Offset						
Elevation/Lift						
Probe Depth						
Compaction Curve Number						
a	Wet Density (pcf)					
b	Weight of Water (pcf)					
w	Moisture Content					
d=a/(1+(w/100))	Dry Density (pcf)					
r=(d/Y)*100	Relative Compaction					

Laboratory Moisture Test Data (ASTM D2216 & 4643)

Test Method		Mic.	Oven	Mic.	Oven	Mic.	Oven	Mic.	Oven	Mic.	Oven
Tare Number											
A	Wet soil + tare (gr.)										
B	Dry Soil + Tare (gr.)										
C=A-B	Water (gr.)										
D	Tare (gr.)										
E=B-D	Dry Soil										
W=C/E)*100	Moisture Content (%)										

Combined Nuclear and Laboratory Test Data

F=a/(1+(W/100))	Dry Density (pcf)										
R=(F/Y)*100	Rel. Compaction (%)										
Required Relative Compaction (%)											
Required Moisture Range (%)											

Note: For test location use estimated Northing and Easting, Station and Offset, or show on a sketch (Attach sheet if necessary)

Sand Cone Moisture Density Test Log

Project Number: _____ **Tested By:** _____

Project Name: _____ **Reviewed By:** _____

Project Location: _____ **Date:** _____

Laboratory Soil Data					Sand Cone Data
	Comp. Curve Number				Cone No.
	ASTM Number				Plate No.
Y	Max. Dry Density (pcf)				(L) Cone + Plate Vol.
Z	Opt. Moist. Cont.(%)				(J) Sand Density

Nuclear Gauge Moisture and Density Test Data (ASTM D3017 & D2922)

Test Number						
Northing/ Station						
Easting/Offset						
Elevation/Lift						
Probe Depth						
Compaction Curve Number						
a	Wet Density (pcf)					
b	Weight of Water (pcf)					
w	Moisture Content					
d=a/(1+(w/100))	Dry Density (pcf)					
r=(d/Y)*100	Relative Compaction					

Laboratory Moisture Test Data (ASTM D2216 & 4643)

Test Method		Mic.	Oven	Mic.	Oven	Mic.	Oven	Mic.	Oven	Mic.	Oven
Tare Number											
A	Wet soil + Tare (gr.)										
B	Dry Soil + Tare (gr.)										
C=A-B	Water (gr.)										
D	Tare (gr.)										
E=B-D	Dry Soil										
W=C/E)*100	Moisture Content (%)										

Test Hole Volume and Soil Density

G	Initial Sand and Jar					
H	Final Sand and Jar					
I=G-H	Sand In Hole					
J	Sand Unit Weight					
K=I/J	Total Sand Volume					
L	Cone Volume					
M=K-L	Soil Hole Volume					
N	Wet + Soil and Tare					
O	Tare Weight					
P	Wet Soil Weight					
Q=P/M	Wet Soil Density					
S=Q/(1+(F/100))	Dry Soil Density					
R=(S/Y)*100	Rel. Compaction					

THE COUNTY OF FRESNO 1856

Moisture Content Test Report

Project Number: ____________________ **Tested By:** ____________________

Project Name: ____________________ **Sampled By:** ____________________

Project Location: ____________________ **Reviewed By:** ____________________

Sample Number							
Date							
Tare No.							
Wet Wt. + Tare							
Dry Wt. + Tare							
Weight of Water							
Weight of Tare							
Weight of Dry Soil							
Percent Moisture							
Sample Number							
Date							
Tare No.							
Wet Wt. + Tare							
Dry Wt. + Tare							
Weight of Water							
Weight of Tare							
Weight of Dry Soil							
Percent Moisture							
Sample Number							
Date							
Tare No.							
Wet Wt. + Tare							
Dry Wt. + Tare							
Weight of Water							
Weight of Tare							
Weight of Dry Soil							
Percent Moisture							
Sample Number							
Date							
Tare No.							
Wet Wt. + Tare							
Dry Wt. + Tare							
Weight of Water							
Weight of Tare							
Weight of Dry Soil							
Percent Moisture							

Sieve Analysis

Project: Number: _____ **Tested By:** _____
Project Name: _____ **Date Tested:** _____
Project Location: _____ **Reviewed By:** _____
Sample Description _____

Moisture Content

	Tare No.	
a	Wet Wt. + Tare (gm)	_____
b	Dry Wt. + Tare (gm)	_____
c=a-b	Weight Water (gm)	_____
d	Weight Tare (gm)	_____
e=b-d	Weight Dry Soil (gm)	_____
w=c/e*100	Moisture Content (%)	_____

Sample Reduction

	Reduction Sieve Size	_____
f	Total Sample Weight	_____
g	Reduced Sample Weight	_____
h=g/f*100	Percent of Total Sample	_____

Sieve Analysis

Standard Sieve Size	Accumulative Weight Retained			Accum. Percent Retained (r=n/t*100)	Accum. Percent Passing (p=100-r)	Percent of Total (s=p*h/100)	Remarks
	Gross (l)	Tare (m)	Net (n)				
Total (t)							

Remarks

COUNTY OF FRESNO
Department of Public Works and Planning
American Avenue Disposal Site

Job No: _____
Date: _____

CONSTRUCTION PROBLEM AND SOLUTION DATA SHEET

Project: American Avenue Disposal Site Phase III, Modules 7 & 8

Meeting Location: _____

Weather Conditions: _____

Description of Problem: _____

Location of Problem: _____

Cause of Problem: _____

How Was the Problem Identified: _____

How Was Problem Solved: _____

_____
CQA Monitor Signature

COUNTY OF FRESNO
Department of Public Works and Planning
American Avenue Disposal Site

Job No: _____
Date: _____

ACCEPTANCE OF SUBGRADE SURFACE CONDITION

Project: American Avenue Disposal Site Phase III, Modules 7 & 8

Installer Firm Name: _____

Description of Area to be Accepted: _____

_____

_____

_____

_____

I, the undersigned, dully authorized representative of the installer, do herby accept the subgrade surface condition and shall be responsible for maintaining the integrity and suitability of said surface in accordance with the Special Provisions for this project, from this date to completion if this installation. I do not accept any responsibility for the condition or characteristics of the subsurface soils.

_____
Name (Print)
Accepted By:
Installer's Representative

_____
Signature

_____
Title

_____
Date

_____
Name (Print)
Acknowledged By:

_____
Signature

_____
Title

_____
Date

COUNTY OF FRESNO
Department of Public Works and Planning
American Avenue Disposal Site

LOG OF GLC RECEIVED

Project: AADS Phase III, Modules 7 & 8 Job No: _____ Location: _____

Date Received In Site	Roll #	Lot	Batch	Length (feet)	Width (feet)	Area (square Feet)	Date Received Factory Q/C	Pass or Fail (P or F)	QC Lab

Manufacturer: _____ Total This Page: _____ square feet

Material Type; _____ Cumulative Total: _____ square feet

Reviewed By: _____

COUNTY OF FRESNO
Department of Public Works and Planning
American Avenue Disposal Site

LOG OF GEOMEMBRANE RECEIVED

Project: AADS Phase III, Modules 7 & 8 Job No: _____ Location: _____

Date Received In Site	Roll #	Lot	Batch	Length (feet)	Width (feet)	Area (square Feet)	Date Received Factory Q/C	Pass or Fail (P or F)	QC Lab

Manufacturer: _____ Total This Page: _____ square feet

Material Type; _____ Cumulative Total: _____ square feet

Reviewed By: _____

COUNTY OF FRESNO
Department of Public Works and Planning
American Avenue Disposal Site

LOG OF GEONET RECEIVED

Project: AADS Phase III, Modules 7 & 8 Job No: _____ Location: _____

Date Received In Site	Roll #	Lot	Batch	Length (feet)	Width (feet)	Area (square Feet)	Date Received Factory Q/C	Pass or Fail (P or F)	QC Lab

Manufacturer: _____ Total This Page: _____ square feet

Material Type; _____ Cumulative Total: _____ square feet

Reviewed By: _____

COUNTY OF FRESNO
Department of Public Works and Planning
American Avenue Disposal Site

LOG OF GEOTEXTILE RECEIVED

Project: AADS Phase III, Modules 7 & 8 Job No: _____ Location: _____

Date Received In Site	Roll #	Lot	Batch	Length (feet)	Width (feet)	Area (square Feet)	Date Received Factory Q/C	Pass or Fail (P or F)	QC Lab

Manufacturer: _____ Total This Page: _____ square feet

Material Type; _____ Cumulative Total: _____ square feet

Reviewed By: _____

COUNTY OF FRESNO
Department of Public Works and Planning
American Avenue Disposal Site

GEOMEMBRANE START-UP TRIAL WELD LOG

Project: AADS Phase III, Modules 7 & 8 Job No: _____ Location: _____

Date	Time	Sample No.	Ambient Temp.	Temperature		Machine	Technician	Shear	P/F	Peel	P/F	Material	Thickness (Mils)	QC Technician
				Wedge	Extruder									

P- Pass Reviewed By: _____

F- Fail Comments: _____

COUNTY OF FRESNO
Department of Public Works and Planning
American Avenue Disposal Site

GEOMEMBRANE INSTALLER'S FIELD QUALITY CONTROL LOG

Project: AADS Phase III, Modules 7 & 8 Job No: _____ Location:_____

Seam Number	Date	Technician	Test Type	Number of Repairs	Location of Repairs	Repair Date	Retest Date	P/F	Observed By

P- Pass Reviewed By: _____

F- Fail Comments: _____

GEOMEMBRANE SEAM LOG

PROJECT: _____ PROJECT TITLE: AADS PHASE III, MODULES 7 & 8

OWNER: COUNTY OF FRESNO CONTRACTOR: _____

LOCATION: AMERICAN AVENUE DISPOSAL SITE

☐ FUSION

☐ EXTRUSION

MACHINE # _____

PASSING TRIAL SEAMS NO.	TIME	TECH ID

DESTRUCTIVE LENGTH CARRY-OVER FROM PREVIOUS LOG _____

DATE: _____

SHEET NUMBER: _____

	SEAM NUMBER	SEAM SECTION START POINT	SEAM SECTION FINISH POINT	APPROX. START TIME	AMB. AIR TEMP	WELD TECH	PREHEAT OR MACH. SPEED	MACHINE TEMPERATURES DIGITAL SET WEDGE OR BARREL NOZZLE	MACHINE TEMPERATURES INDICATOR WEDGE OR BARREL NOZZLE	APPROX. LENGTH WELDED	LENGTH FROM PREVIOUS DESTR.	DESTR. NUMBER	MON.	REMARKS	** NON-DESTRUCTIVE TEST DATE	** NON-DESTRUCTIVE MON.
1	/	-						-	-							
2	/	-						-	-							
3	/	-						-	-							
4	/	-						-	-							
5	/	-						-	-							
6	/	-						-	-							
7	/	-						-	-							
8	/	-						-	-							
9	/	-						-	-							
10	/	-						-	-							
11	/	-						-	-							
12	/	-						-	-							
13	/	-						-	-							
14	/	-						-	-							
15	/	-						-	-							
16	/	-						-	-							
17	/	-						-	-							

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS), A REPAIR NUMBER, OR A POINT LOCATION ON THE SEAM.

DAILY TOTAL DESTRUCTIVE LENGTH CARRY-OVER

** COLUMNS TO BE USED BY THE DATA REVIEWER ONLY

REVIEWED BY: _____ DATE: _____

GAI FORM : G13
(JUNE 2003)

COUNTY OF FRESNO
Department of Public Works and Planning
American Avenue Disposal Site

GCL PANEL DEPLOYMENT LOG

Project: AADS Phase III, Modules 7 & 8 Job No: _____ Location: _____

Date	Time	Temperature	Wind	Panel No.	Roll No.	Micrometer Reading	Location	Remarks

Reviewed By: _____

COUNTY OF FRESNO
Department of Public Works and Planning
American Avenue Disposal Site

GEOMEMBRANE PANEL DEPLOYMENT LOG

Project: AADS Phase III, Modules 7 & 8 Job No: _____ Location: _____

Date	Time	Temperature	Wind	Panel No.	Roll No.	Micrometer Reading	Location	Remarks

Reviewed By: _____

COUNTY OF FRESNO
Department of Public Works and Planning
American Avenue Disposal Site

PANEL AND SEAM ACCEPTANCE FORM

Project: American Avenue Disposal Site Phase III, Modules 7 & 8

Job No: _____

Installer: _____

Panel/Seam No.	Date Accepted	Name of Q/A Rep.	Panel/Seam No.	Date Accepted	Name of QA Rep.

I, the undersigned, duly authorize representative of _____ do herby acknowledge that the Geomembrane Liner panels and seams noted above have been installed, inspected, and tested in accordance with the project Plans and Special Provisions.

Name: _____ Title: _____

Signature: _____ Date: _____

THE COUNTY OF FRESNO 1856

Destructive Seam Test Results

(Field Results)

Project Number: ________________

Project Name: ________________ **Sheet No.:** ________

Sample No.: ________ Seam No.: ________ Date Seamed: ________ Equip. No.: ________
Operator: ________ Date Tested: ________ Monitor: ________

Shear (ppi) ________ Inside Peel (ppi) ________ Outside Peel (ppi) ________
Shear (ppi) ________ Inside Peel (ppi) ________ Outside Peel (ppi) ________
Pass/Fail ________ Pass/Fail ________ Pass/Fail ________

Sample No.: ________ Seam No.: ________ Date Seamed: ________ Equip. No.: ________
Operator: ________ Date Tested: ________ Monitor: ________

Shear (ppi) ________ Inside Peel (ppi) ________ Outside Peel (ppi) ________
Shear (ppi) ________ Inside Peel (ppi) ________ Outside Peel (ppi) ________
Pass/Fail ________ Pass/Fail ________ Pass/Fail ________

Sample No.: ________ Seam No.: ________ Date Seamed: ________ Equip. No.: ________
Operator: ________ Date Tested: ________ Monitor: ________

Shear (ppi) ________ Inside Peel (ppi) ________ Outside Peel (ppi) ________
Shear (ppi) ________ Inside Peel (ppi) ________ Outside Peel (ppi) ________
Pass/Fail ________ Pass/Fail ________ Pass/Fail ________

Sample No.: ________ Seam No.: ________ Date Seamed: ________ Equip. No.: ________
Operator: ________ Date Tested: ________ Monitor: ________

Shear (ppi) ________ Inside Peel (ppi) ________ Outside Peel (ppi) ________
Shear (ppi) ________ Inside Peel (ppi) ________ Outside Peel (ppi) ________
Pass/Fail ________ Pass/Fail ________ Pass/Fail ________

Sample No.: ________ Seam No.: ________ Date Seamed: ________ Equip. No.: ________
Operator: ________ Date Tested: ________ Monitor: ________

Shear (ppi) ________ Inside Peel (ppi) ________ Outside Peel (ppi) ________
Shear (ppi) ________ Inside Peel (ppi) ________ Outside Peel (ppi) ________
Pass/Fail ________ Pass/Fail ________ Pass/Fail ________

Sample No.: ________ Seam No.: ________ Date Seamed: ________ Equip. No.: ________
Operator: ________ Date Tested: ________ Monitor: ________

Shear (ppi) ________ Inside Peel (ppi) ________ Outside Peel (ppi) ________
Shear (ppi) ________ Inside Peel (ppi) ________ Outside Peel (ppi) ________
Pass/Fail ________ Pass/Fail ________ Pass/Fail ________

Sample No.: ________ Seam No.: ________ Date Seamed: ________ Equip. No.: ________
Operator: ________ Date Tested: ________ Monitor: ________

Shear (ppi) ________ Inside Peel (ppi) ________ Outside Peel (ppi) ________
Shear (ppi) ________ Inside Peel (ppi) ________ Outside Peel (ppi) ________
Pass/Fail ________ Pass/Fail ________ Pass/Fail ________

Health Safety And Environment Plan

COUNTY OF FRESNO

PHASE III – MODULES 7 & 8 EXCAVATION AND LINER SYSTEM CONSTRUCTION

Site Address American Avenue Disposal Site
18950 W American Avenue, Kerman, CA 93630

Submitted By

Golder Associates Inc.
425 Lakeside Drive
Sunnyvale, CA 94085

Revision 1

January 2017 **Project No.1653435**

A world of capabilities delivered locally

1.0 CONTACTS LIST SUMMARY

1.1 Emergency Contacts

Contact	Number
First aid radio channel	n/a
First aid Phone number	+1 559 600-6988 (Jesus Apodaca, Disposal Site Supervisor)
Ambulance	911
Fire	911
Police	911
Crisis Response Hotline (US and Canada)	(866) 599-7198
Golder National Health, Safety, Security, and Environment Advisor - Renee Weaver	(336) 707-3869
WorkCare	(888) 449-7787

Hospital name	Address	Phone	Level of Care Available
Community Regional Medical Center	2823 Fresno Street, Fresno, California 93701	(559) 459-6000	Level 1 Trauma Center

1.2 Golder Contacts

	Name	Office Name	Office	Cell
Project Manager	Richard Haughey	Sunnyvale	+1 (408) 220-9223 x62240	+1 415 971-7633
Project Director	Ken Haskell	Sacramento	+1 (916) 786-2424 x39376	+1 916 257 3673
	Tom Vercoutere	Sunnyvale	+1 (408) 220-9223 x62249	+1 650 464-3036
	Tim Bauters	Sunnyvale	+1 (408) 220-9223 x62236	+1 650 515-0393
	Brian Gulewich	Sacramento	+1 (916) 786-2424 x39369	+1 906 369-1110
Client	County of Fresno			

1.3 Missed Check-in Contacts

	Name	Phone	Cell
Project Manager	Richard Haughey	+1 (408) 220-9223 x62240	+1 415 971-7633
Project Director	Ken Haskell	+1 (916) 786-2424 x39376	+1 916 257 3673

1.4 Client and Site Contacts

	Number
Nearest Golder office	USA - Sunnyvale
Phone	+1 408 220 9223
Fax	+1 408 220 9224
Email	

Role	Name	Number
Contact person on site	Jesus Apodaca (Disposal Site Supervisor)	+1 559 600-6988
Client safety contact	Landfill Operations Manager	+1 559 351-9546
Company Golder reports to	County of Fresno	
Company reporting to Golder	(PENDING)	
Golder overall site supervisor:	Richard Haughey	Office: +1 (408) 220-9223 x62240 Cell: +1 415 971-7633

1.5 Subcontractor Contacts

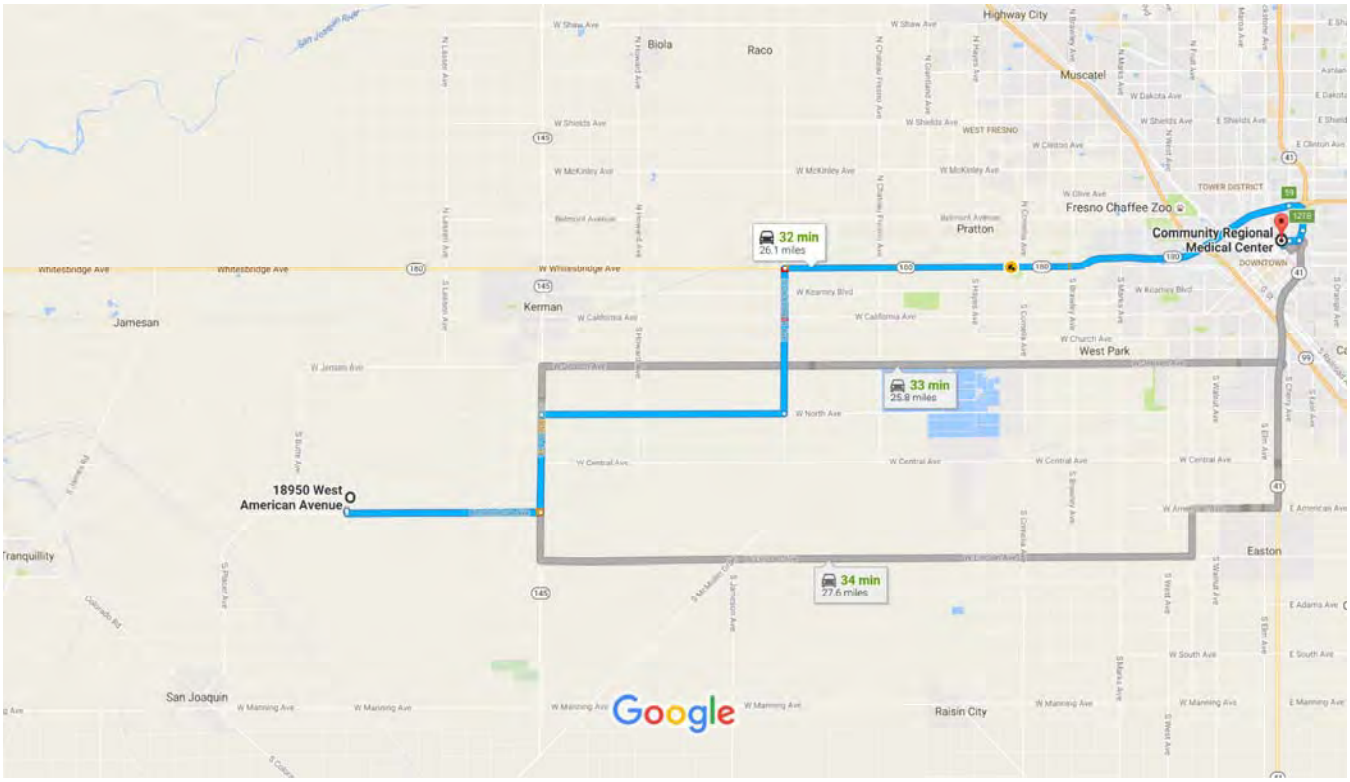
Name	Subcontractor key staff	Phone
(PENDING)		

You have the right to refuse any work you feel is unsafe, or that you are not trained to do. Choose to work safely and in compliance with all HSE requirements.

Google Maps

18950 West American Avenue to Community Regional Medical Center

Drive 26.1 miles, 32 min



Map data ©2016 Google 2 mi

18950 West American Avenue

Kerman, CA 93630

1. Head south toward W American Ave

14 s (272 ft)

Continue on W American Ave to W North Ave

7 min (6.0 mi)

2. Turn left onto W American Ave

4.0 mi

3. Turn left onto CA-145 N

2.0 mi

4. Turn right onto W North Ave

6 min (5.0 mi)

Follow S Dickenson Ave and CA-180 E to Fresno St in Fresno

19 min (15.1 mi)

5. Turn left onto S Dickenson Ave

3.0 mi

6. Turn right onto CA-180 E

10.7 mi

7. Use the right 2 lanes to take exit 59 to merge onto CA-41 S toward Paso Robles

0.7 mi

8. Use the right lane to take exit 127B for Divisadero St/Tulare St

0.2 mi

9. Turn right onto E Divisadero St

0.2 mi

10. Use the left 2 lanes to turn left onto Fresno St

0.2 mi

Community Regional Medical Center

2823 Fresno Street, Fresno, CA 93721

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

It is company policy to complete a HaSEP form including a task-based Health, Safety and Environment (HSE) risk assessment for every project that includes site work, working alone or international travel.
To get an updated table of contents, please right-click the table of contents below and choose 'Update Field'

Table of Contents

List of Appendices

2.0 PROJECT PROPOSAL DETAILS

Project/Proposal Number	1653435	**Start Date**	Oct 12, 2016	**End Date**	Dec 5, 2017
Project Title	County of Fresno/Phase III - Modules 7 & 8 Excavation and Liner System Construction				
Client Name	County of Fresno				

Brief description of project and scope of works (include any hazardous activities, if known)

Provide construction quality assurance monitoring services for Modules 7 & 8 liner construction at the American Avenue Disposal Site in Kerman, California.

3.0 GOLDER TEAM

Name	Office	Contact number (cell phone)	Office Phone	Role
Tom Vercoutere	Sunnyvale	+1 650 464-3036	+1 (408) 220-9223 x62249	
Tim Bauters	Sunnyvale	+1 650 515-0393	+1 (408) 220-9223 x62236	
Brian Gulewich	Sacramento	+1 906 369-1110	+1 (916) 786-2424 x39369	

Project Manager (PM)

- Appoint a competent site supervisor and alternate. For sites with multiple Golder projects/disciplines at work, coordinate with the overall site supervisor
- Oversee/develop hazard controls including work instructions and
- Assign only adequately trained and competent employees to the project

Site Supervisor

- The site supervisor is responsible for the safety of all Golder employees, subcontractors, visitors and public on the parts of the site under Golder control.
- Communicate all site hazards to affected parties, in real time, as hazards, conditions and employees change.
- Ensure that work is undertaken in accordance with the hazard controls included in this HaSEP.

Contractor

- All plant and equipment is maintained in a safe working condition
- All plant and equipment are to be registered/licensed and electrical equipment tagged and tested
- Potential hazards are to be controlled (e.g., cage over rotating parts)
- You will report any identified hazards to the Golder Associates field staff member

Field Staff

- Inspect your worksite and equipment before starting work
- Apply the controls outlined in this HaSEP
- Look out for the safety of yourself and others
- Report unsafe acts, conditions and incidents to the site supervisor

4.0 CLIENT/SITE LOCATION DETAILS

4.1 Client/Site Location Details

4.1.1 *Site Description*

If the project is near another Golder Office, has the local Office been notified of the work? ☐Yes ☒No

Site Name	American Avenue Disposal Site			
Address	18950 W American Avenue, Kerman, CA 93630			
Coordinates	36.66794, -120.13232			
Description	Active Landfill			
Access info	Access is from W. American Avenue			
Previous land uses	Agriculture			
Site Receptors that maybe impacted by the proposed work	None			
Additional Info				
HSE Induction / orientation provider	☐Golder	☐Client	☒Contractor	
Site Contact Numbers	**Field cell phone**		**Satellite phone**	
	Other			
Nearest Golder office	USA - Sunnyvale	**Address**	425 Lakeside Drive Sunnyvale, California, USA 94085	
Opening days and hours		**Email**		
Phone	+1 408 220 9223	**Fax**	+1 408 220 9224	
Google Maps				

5.0 SUBCONTRACTOR DETAILS

Has Golder been assigned the role of Principal Contractor? * ☒Yes ☐No

Name	Subcontractor key staff	Phone	Subcontractor activities	Risk Assessment Supplied	Method Statement Supplied	Approved Golder subcontractor?
(PENDING)				☐	☐	☐

6.0 CHECK-IN SYSTEM

6.1 Check-in contacts

	Primary	Secondary
Name	Breanna Lara	Tim Bauters
Phone/Email	Office: +1 408 220-9257 Cell: +1 408 482-8417 Email: Breanna_Lara@golder.com	Office: +1 (408) 220-9223 x62236 Cell: +1 650 515-0393 Email: Tim_Bauters@golder.com
Check-in frequency*	Daily	Daily
By phone	☒	☒
By email	☒	☒
By SMS	☒	☒
On site	☐	☐

6.2 Missed Check-in Procedure

Within 2 hours of missed check-in time:

1. Attempt to contact employee
2. Contact accommodation or other project personnel to determine last contact with employee
3. Notify Project Manager.
4. Project manager to determine timing of further action, based on project details.

Within 4 hours of scheduled call-in time:

1. Contact client and request assistance to locate employee.
2. Notify Project Director, Office Manager, and local authorities (as appropriate)
3. Initiate Crisis Response Plan (as appropriate)

☐Does missed check-in procedure for this project deviate from the standard procedure?

7.0 RISK REGISTER

7.1 Risk Definition

Health & Safety Consequence or Impact Description:

Catastrophic	5	Death, toxic release off-site with detrimental effect, very high financial loss
Major	4	Extensive injuries, loss of production capability, off-site release with no detrimental effects, major financial loss
Moderate	3	Medical treatment required, on-site release contained with outside assistance, high financial loss
Minor	2	First aid treatment, on-site release immediately contained, limited financial loss
Insignificant	1	No injuries, low financial loss

Environmental Consequence or Impact Description:

Catastrophic	5	Release to air, water or land with life threatening impacts on or off site. e.g.: human death(s); destruction of endangered species; habitat destruction; human water supply or food destruction; localized extinction of a species; Protracted or extensive clean up requiring external resources.
Major	4	Release to air, water or land with destructive impacts on or off site. e.g.: destruction of animal / fish life; habitat damage; making air, water or land unfit for use by living things; destruction of known or unknown indigenous people's / heritage sites ; irreversible alteration of the natural environment or its aesthetics; dust or noise affecting a region; large volumes of contaminated or hazardous waste. Requires clean up using external resources.
Significant	3	Release to air, water or land with impacts requiring long term recovery. e.g.: habitat disturbance; damage to indigenous people's/heritage sites; alteration of the natural environment or its aesthetics; generation of contaminated or hazardous waste, or large volumes of solid waste; dust or noise affecting the immediate area. Clean-up can be managed by internal resources.
Minor	2	Release to air, water or land with resulting in localised damage to worksite requiring short term recovery. e.g.: readily repairable impacts (physical or aesthetic) to the natural environment, indigenous people's/heritage items, property, or business operations; public nuisance (noise, dust, odours); generation of small quantities of waste. Clean up can be completed by internal resources.
Insignificant	1	Release to or disturbance of air, water or land resulting in no impact or localised (i.e. isolated to worksite) impacts within authorized limits. Short term impact with complete recovery. Clean up can be completed by person(s) involved.

Likelihood Description:

Almost certain	5	Incident will occur in every circumstance (e.g. every time).
Likely	4	Incident will probably occur (e.g. 1 in 10 times).
Possible	3	Incident may occur at sometime (e.g. 1 in 100 times).
Unlikely	2	Incident not expected to occur, but conceivable (e.g. 1 in 1, 000 times).
Rare	1	Incident would only occur in exceptional circumstances (e.g. 1 in 10,000 times).

Risk Analysis Matrix:

Likelihood:		**Consequence:**				
		Catastrophic	Major	Moderate	Minor	Insignificant
		5	**4**	**3**	**2**	**1**
Almost certain	**5**	**25 (VH)**	**20**	**15**	**10**	**5**
Likely	**4**	**20**	**16 (H)**	**12**	**8**	**4**
Possible	**3**	**15**	**12**	**9 (M)**	**6**	**3**
Unlikely	**2**	**10**	**8**	**6**	**4 (L)**	**2**
Rare	**1**	**5**	**4**	**3**	**2**	**1 (VL)**

0-3 (VL) Very Low Risk	No additional controls necessary. Continue to monitor risk.
4-6 (L) Low Risk	Consider additional controls to further reduce risk.
8-12 (M) Moderate Risk	Controls must be implemented to reduce risk.
15-16 (H) High Risk	Risk Unacceptable, do not proceed without controls, minimum of 'engineering controls'.
20-25 (VH) Very High Risk	Risk Unacceptable, do not proceed without controls, elimination or substitution controls required.

7.2 Risk Register

Header key:

- PA: Persons Affected
- IC: Initial Consequence
- IL: Initial Likelihood
- IR: Initial Risk
- RC: Residual Consequence
- RL: Residual Likelihood
- RR: Residual Risk
- AC: Additional controls

Risk Group	Initial Risk	Hazard	PA	IC	IL	IR	Controls	RC	RL	RR	AC
General	Driving Vehicle (Rental/Fleet)	Driving Vehicle	Golder Employee	4	2	8	Follow Motor Vehicles and Driving on Company Business SWP24). If unfamiliar with the vehicle, allow sufficient time to familiarize oneself with the controls of vehicle. Verify the vehicle is in roadworthy condition, suited for the intended purpose, and equipped with the appropriate tires (including a spare). Ensure any signs, stickers, or labels are affixed in such a manner that they do not obstruct the driver's vision or impede the driver's use of any controls. Drivers will have a current driving license and be fit to drive. Adhere to all roadway regulations and follow speed limits. Do not drive in adverse weather or when fatigued. Equip vehicle used for on-site work with fire extinguisher and first aid kit. If any safety concerns are identified, the vehicle must not be used. For Golder fleet vehicles, report vehicle deficiencies to the Operations Manager as soon as they are noticed. The Operations Manager, or his/her delegate, will arrange for maintenance of the vehicle.	2	2	4	

Risk Group	Initial Risk	Hazard	PA	IC	IL	IR	Controls	RC	RL	RR	AC
General	Operating a Vehicle Around Heavy Equipment	Traffic and Road Conditions (e.g., Heavy Equipment Traffic)	Golder Employee	5	3	15	Seat belts shall be worn by all drivers and passengers in vehicles on company business. The vehicle should have a clean windshield unobstructed by rain, debris, fog, or cracks to the shield. Headlights, tail lights, brake lights, and the car's horn should be fully functional to help alert equipment operators to their presence. When reversing onsite, must have a clear rear view, reverse signal alarm, or an observer who can signal instructions to the driver while reversing. Verify the rules of the road (speed limit, type of vehicles, rules on passing, signage, method of communication with other vehicles) and follow any site-specific traffic control.	4	1	4	
General	Operating a Vehicle	Operating a Vehicle	Golder Employee	4	3	12	Comply with the Fitness for Duty and Fatigue SWP27. Employees will not operate a vehicle or mobile equipment if fatigued. Employees shall not drive if the work period has exceeded 14 hours. Travel to and from the work site may be considered part of the working hours. Arrange for accommodation close to the work location to limit travel time.	3	2	6	

Risk Group	Initial Risk	Hazard	PA	IC	IL	IR	Controls	RC	RL	RR	AC
General	High Noise Environments	Noise	Golder Employee	4	4	16	Follow the Hearing Protection SWP21. Evaluate the noise level. If it is difficult to maintain a normal conversation at a distance of 3 feet, institute controls to manage the hazard. Install insulation or other noise damping techniques where possible. Establish task rotation to decrease exposure times to hazardous noise. Wear hearing protection with a sufficient protection factor to mitigate the noise hazard. This could be properly fitted ear plugs or a combination of both ear plugs and ear muffs. Consider using a dosimeter to test noise levels.	2	2	4	
General	Damaged Equipment	Exposure to Radiation	Golder Employee	4	3	12	In the event of physical damage to the gauge, a 15 foot radius area will be secured by means of rope, stakes and signs to secure the area around the gauge. If a vehicle is involved with the gauge damage, vehicles are to remain stopped until the extent of contamination hazard (if any) is determined. Contact the Radiation Safety Officer IMMEDIATELY and request further instruction.	4	2	8	
General	Employee Exposure Monitoring	Exposure to Radiation	Golder Employee	3	2	6	Always wear your assigned thermoluminescent dosimeter (TLD) or film badge when using, cleaning, or performing basic maintenance on the gauge. Never store your TLD or film badge near the gauge. Submit your TLD or film badge quarterly for analysis. Keep individuals without a dosimeter at a safe and secure distance from any gauge that is in use.	2	2	4	

Risk Group	Initial Risk	Hazard	PA	IC	IL	IR	Controls	RC	RL	RR	AC
General	Shipping a Nuclear Gauge	Exposure to Radiation	Golder Employee/Public	3	3	9	Only Golder employees who have received DOT General Awareness, Function Specific, Safety, and Security for Class 7 and Radiation Protection Training material are authorized to ship or accept a shipment of a gauge. When receiving a gauge the receiver must inspect the gauge transportation case for damage. Office RSO should prepare the travel packages and transportation notebook for each user/gauge with all of the proper documents. All shipping records must be retained for two years.	3	2	6	
General	Transportation and Storage of a Nuclear Gauge	Exposure to Radiation	Golder Employee	3	3	9	Each portable nuclear gauge shall have a handle lock and outer locked container designed to prevent unauthorized or accidental removal of the sealed source from its shielded position. The gauge or its container must be locked when in transport, storage or when not under the direct surveillance of an authorized user. Only Golder employees who have received DOT General Awareness, Function Specific, Safety, and Security for Class 7 and Radiation Protection Training material are authorized to transport a gauge. Office RSO should prepare the travel packages for each user. License and emergency response documents must accompany the gauge. Store the gauge as far as possible from the occupied area of the vehicle.	3	2	6	

Risk Group	Initial Risk	Hazard	PA	IC	IL	IR	Controls	RC	RL	RR	AC
General	Using a Nuclear Gauge	Exposure to Radiation	Golder Employee	3	2	6	Nuclear gauges will only be used by properly trained employees. Radiation monitoring dosimeters or film badges must be worn at all times when using a nuclear gauge. Before each use inspect the box and gauge. If visual examination of the instrument and source indicate damage contact the Radiation Safety Officer IMMEDIATELY and request further instruction. Check that the gauge has been calibrated and maintained annually in accordance with the local license. Conduct a field calibration standard check before using. While the test is in progress, stand back far enough to maintain "care and control", while providing as much distance as is practical to minimize exposure. Wash hands after using the gauge. Never leave the gauge unattended while it's in operation or when it's not secured in the gauge box or when not secured at its storage location.	2	2	4	
Tasks	Managing the excavated area	Managing the excavated area	Golder Employee	4	4	16	Any excavation greater than 4 ft deep must comply with regulatory requirements and may require a protective structure prior to entry, as determined by the competent person on the project. Keep traffic, equipment, and the edge of temporary spoil piles at least 2 feet from the edge of the excavation. Permanent spoil piles should be placed further from the excavation. Complete the Trenching/Excavation Daily Inspection Checklist (Appendix A, SWP 16). People working in an excavation should not work in isolation. Another person should be present in the immediate area to manage nearby hazards and provide assistance if needed.	3	3	9	

Risk Group	Initial Risk	Hazard	PA	IC	IL	IR	Controls	RC	RL	RR	AC
Tasks	Monitoring Excavation Conditions	Monitoring Excavation Conditions	Golder Employee	4	2	8	Golder personnel should observe conditions in excavations or trenches from the 'short' edge (opposite end to the excavator) as the potential for instability is generally lower here. Monitor the excavation for signs of instability such as slumping of side walls, tension cracks, and water ingress. Observations are particularly important for sandy soils, poorly compacted soils, uncontrolled fills or wet fissured clays. If slumping occurs or any changes are observed indicating possible unstable conditions, move out of the work area and contact the project manager.	3	2	6	
Tasks	Stability of excavator	Stability of excavator	Golder Employee	3	2	6	Choose a site that allows for safe access for the excavator. Determine the experience level of the excavator operator, years of experience, type of equipment and the type of sites worked on. Request that the excavator operator verifies the equipment is stable. Slope stability should also be considered particularly when working in close proximity to crests or at the base of steep slopes where rock falls are possible. Keep traffic, equipment, and the edge of temporary spoil piles at least 2 feet from the edge of the excavation. Permanent spoil piles should be placed further from the excavation.	2	2	4	

Risk Group	Initial Risk	Hazard	PA	IC	IL	IR	Controls	RC	RL	RR	AC
Tasks	Trenching, Shoring, and Excavations - General	Trenching, Shoring, and Excavations - General	Golder Employee	5	4	20	Whenever Golder employees are working on or near sites with trenches, shoring or excavations, procedures outlined in SWP 16 must be followed. Do not enter any excavations or trenches deeper than 4 feet unless it is adequately shored or the sidewalls are cutback with a suitable angle of repose for the soil type (as determined by a competent person). If in doubt about the excavation stability or shoring, do NOT enter. Ladders used for access must be positioned inside trench boxes or shored areas.	3	3	9	
Tasks	Working Around Heavy Equipment (SWP 18)	Working around heavy equipment	Golder employee	4	3	12	Heavy equipment activity may change daily or hourly, with differing potential hazards that need to be identified and addressed. Never approach an operational piece of heavy equipment until the operator is aware of your presence, your desire to approach, and signals the OK – where possible use radio contact. Stand in a safe location. Never work or pass directly under a lifted or suspended load. Whenever a Golder employee works on a project site where heavy equipment is operated, the Working Around Heavy Equipment SWP 18 must be followed.	4	2	8	

Risk Group	Initial Risk	Hazard	PA	IC	IL	IR	Controls	RC	RL	RR	AC
Work Environment	Explosion, Fire, Spill, Leak, Exposure	Explosion, Fire, Spill, Leak, Exposure		5	4	20	Measure for LEL with a combustible gas meter. At levels <10% LEL continue with the work. At levels between 10% and 25% LEL continue onsite monitoring with extreme caution as higher levels may be encountered. At levels >25% LEL there is an explosion hazard. Withdraw from area immediately. Evacuate at least 30 feet upwind of the source of methane. Contact the Project Manager. If methane is found at any detectable concentration, do not allow ignition sources (smoking, sparks, cell phones, hot work such as cutting or welding) within 25 feet of structures, vaults, manholes, blower-flare facility or other low lying areas where methane may collect. Use only intrinsically safe equipment within 15 feet of the sampling point. When possible, work from a position upwind of activities.	5	1	5	
General	Undertaking Work Without Adequate Rest	Undertaking Work Without Adequate Rest	Golder Employee	4	3	12	Identify hours of work and comply with the Fitness for Duty and Fatigue SWP27. There should be a minimum of one 30 minute break in each 8 hour work period or part thereof. If a period of 12 hours has been worked, an employee is required to ensure that a break away from work of at least 8 hours is taken prior to returning to work. Non-work activities must allow for sufficient rest.	3	2	6	

Risk Group	Initial Risk	Hazard	PA	IC	IL	IR	Controls	RC	RL	RR	AC
General	Working Abnormal Shifts	Working Without Adequate Rest	Golder Employee	4	3	12	Comply with the Fitness for Duty and Fatigue SWP27. Conduct a fatigue assessment prior to starting the project. Schedule work during daylight hours, if possible. If the project requires night work, modify the task to give people the opportunity for adequate rest between night shifts and time to acclimate. Avoid switching shifts during your rotation (i.e., stay on night shift or day shift) to allow your body to adjust to the working hours.	3	2	6	
General	Working Long Hours	Working Without Adequate Rest	Golder Employee	5	3	15	Identify hours of work to comply with the Fitness for Duty and Fatigue Management SWP27. All activities should be designed to fit into the standard work day/work shift of 12 hours (including travel time). If work exceeds the maximum, a fatigue risk assessment must be conducted and permission sought by PM or OM. Employees shall not drive if the work period has exceeded 14 hours - find alternative methods of transportation.	3	2	6	

Risk Group	Initial Risk	Hazard	PA	IC	IL	IR	Controls	RC	RL	RR	AC
General	Heat (SWP 04)	Heat stroke, heat stress, sunburn	Golder employee	4	3	12	Check daily weather reports. Wherever possible, reduce temperature and humidity through air cooling and increased air movement. Assess physical demands of the work and provide equipment that will reduce the physical demands. Work in shaded areas, or provide barrier to give shelter from the sun. Schedule work to allow workers to acclimatize. Schedule work to cooler times of the day. Increase the frequency and lengths of break periods. Provide a cool, shady place to take breaks. Assign extra workers or slow down the pace. Drink plenty of fluids. Make water and sports drinks available. Use a buddy system; check each other frequently for signs of heat stress (e.g. disorientation, lack of sweat, fatigue). Assess each worker for factors that may contribute to early onset of heat stress. Wear hats and light colored loose clothing. Cooling vests may be required. Consider the additional stress load caused by PPE such as Tyvek coveralls. If someone is suffering from heat-related illness:- Move the person to a cool area, maybe the air-conditioned vehicle. - Give the person small amounts of cool (not cold) water.- DO NOT leave the person unattended.- Immediately seek qualified medical assistance if the person does not recover or their condition worsens.	3	2	6	
General	Sun (SWP 04)	Sunburn	Golder employee	4	3	12	Sunburn can occur even when the weather is not hot. It is possible to get sunburn in the winter time or on water. Check UV rating, wear sunscreen, look for shade, protect eyes with shaded glasses.	2	3	6	

Risk Group	Initial Risk	Hazard	PA	IC	IL	IR	Controls	RC	RL	RR	AC
Work Environment	Dust (or airborne particles) - On-site	Exposure to dust	Golder Employee	3	4	12	There are many types of hazardous dust that could be encountered on a project site. Exposure to dust can irritate eyes, nose, throat and the upper respiratory system. Some dusts are also skin irritants. Determine the type of dust(s) present at the project site. Dusts to consider when assessing this hazard include silica, cement, diesel particulates, Bentonite, asbestos, and heavy metals. It may be necessary to conduct an industrial hygiene survey of the site to determine if dust concentrations are above nuisance levels. Develop a control plan to minimize exposures. Determine the source of the dust and if possible institute engineering controls to reduce levels. Controls could include, applying water or dust suppression liquids, ventilation system with dust capture and working upwind of the source. Use respiratory protection and eye protection, if required.	2	3	6	

8.0 PERSONAL PROTECTIVE EQUIPMENT

Item	Required	Provided by Golder	Provided by Client	Specific Requirement
Gloves				
Mechanical hazard	☒	☒	☐	as needed
Head Protection				
Hard Hat	☒	☒	☐	
Hearing Protection				
Disposable foam ear plugs	☒	☒	☐	as needed
High Visibility Clothing				
Yellow	☒	☒	☐	or orange
Eye Protection				
Impact resistant safety goggles or glasses	☒	☒	☐	as needed
General Protection				
Sun cream or block	☒	☒	☐	
Other				
First aid supplies	☒	☒	☐	carry in vehicle
Fire extinguisher	☒	☒	☐	carry in vehicle
Drinking water	☒	☒	☐	stay hydrated
Nuclear guage	☒	☒	☐	dosimeter
Air quality monitor	☒	☒	☐	4-gas or H2S meter

9.0 TRAINING

It is up to the Project Manager to arrange for the following training e.g. Confined Spaces.

Course Name	Employee Name or Role
Golder Health & Safety Orientation	Golder field staff
OSHA 10-hour Construction Safety	Golder field staff
First aid/CPR/BBP	Golder field staff
Nuclear Density Gauge Use & Transport	As needed

10.0 INCIDENT AND EMERGENCY MANAGEMENT

10.1 First Aid Arrangements

Method of communication	**Phone**	+1 559 600-6988 (Jesus Apodaca, Disposal Site Supervisor)
	Radio channel	n/a
Location of first aid kit	Golder vehicle	
First Aider(s)	On-site personnel	

10.2 Site Emergency

☒Site emergency procedures available
☒Site owner will provide emergency procedures induction/site induction

11.0 HSE PLAN CONTROL

It is the responsibility of the Project Manager to ensure that this HaSEP is prepared and the contents communicated at the pre-start / toolbox meeting to all project staff, Golder or subcontractor, with a copy held on site. The HaSEP has been reviewed or prepared by the Project Manager.
If the project site is remote from the home office, this HaSEP is to be reviewed and approved by the local Golder office whether in another country, province or city.

Role	Name (printed)	Date	Signature
Prepared by	Brian Lim		
Reviewed by	Richard Haughey		
Approved by	Ken Haskell		
Other			

11.1 Golder Sign-off

Signing below indicates you have read and agree to comply with the information contained in this document.

Date	Name	Company	Signature

12.0 OTHER DOCUMENTATION

When reading this HaSEP please refer to the following documentation from clients etc., as required:

Document	Link to Document
Radiation Protection Plan (HSE207)	Appendix B

13.0 ONSITE CHANGES AND REVIEW

Date	Change or modification	How was it communicated?

14.0 INSPECTIONS AND SITE VISITS

14.1 Inspections

Nature	Frequency	Person Responsible
On-site HaSEP verification with call to PM	Before work begins	Site Supervisor

14.2 Inspections and Site Visits

Date	Area	Name

15.0 REVISION HISTORY

Version	Author	Date	Amendments, hazards associated with amendments & controls	Reviewed and communicated to all parties	Approved by
V1	Brian Lim	1/20/2017	Update client on-site and emergency contacts.		

APPENDIX A - WRITTEN WORK PROCEDURES

- HSE_200.014_SWP_Slips_Trips_and_Falls.pdf
- HSE_200.018_SWP_Working_Around_Heavy_Equipment.pdf
- HSE_200.021_SWP_Hearing_Protection.pdf
- HSE_200.004_SWP_Heat_Stress.pdf
- HSE_200.009_SWP Landfill_Construction_Quality_Assurance.pdf
- HSE_200.037_SWP_Traffic_Safety.pdf
- HSE_200.027_SWP_Fitness_For_Duty.pdf
- HSE_200.024_SWP_Motor_Vehicles_and_Driving.pdf
- HSE_200.016_SWP_Trenching_Shoring_and_Excavation.pdf
- HSE_200.036_SWP_FA_CPR_AED_BBP.pdf
- HSE_200.008_SWP_Gas_Hazards_and_Exposure.pdf

Approved by	Jane Mills	Issue Date	August 2012
Revision by	Brian Tuccillo	Revision Date	August 2013

1.0 SCOPE

This Standard Work Procedure (SWP) applies to all Golder Associates Inc. (Golder) staff. The majority of falls occur on slippery, uneven, defective, cluttered or obstructed walking surfaces. A significant number of debilitating falls are the result of a person falling out of his or her own chair, typically while in the process of sitting down, or leaning back. Falls from elevations while reaching for an overhead object are also common, and frequently cause severe injuries.

2.0 SLIPS, TRIPS, AND FALLS

Slips are primarily caused by a slippery surface and compounded by wearing the wrong footwear.

Providing dry walking and working surfaces and slip-resistant footwear can minimize slips and their resultant falls and injuries. Shoes with rubber-cleated, soft soles and heels are recommended for most field work.

In work areas where the walking and working surface is likely to be slippery, non-skid strips, mats, or floor coatings should be used.

As little as a 3/8" rise in a walkway can cause a “stubbed” toe resulting in a trip and fall. The same thing can happen when going up a flight of stairs: Only a slight difference in the height of subsequent steps could cause a person to trip and fall. Be aware of uneven surfaces.

3.0 TYPES OF FALLS

Falls are of two basic types: elevated falls and same-level falls. Same-level falls are most frequent, but elevated falls are more severe.

- Same-Level Falls: high frequency--low severity.
- Elevated Falls: lower frequency--high severity.

Same-level falls are generally slips or trips. Injury results when the individual hits a walking or working surface or strikes some other object during the fall. Over 60 percent of elevated falls are from less than 10 feet.

4.0 CONTRIBUTING FACTORS

Proper housekeeping in work and walking areas can contribute to safety and the prevention of falls. It is important to maintain a safe working environment and walking surface. Work areas must remain free of obstacles that might cause slips and trips. One action which promotes good housekeeping in work

environments is the painting of yellow lines to identify working and walking areas. Working and walking areas should never be obstructed by objects of any kind.

Adequate lighting can improve visibility in an area and is an important factor in the prevention of slips and falls. Moving from light to dark areas, or vice versa, can cause temporary vision problems, that might be just enough to cause a person to slip on an oil spill, or trip over a misplaced object.

Carrying an oversized object can also obstruct one's vision and result in a slip or a trip. This is a particularly serious problem on stairs.

If a material spills on the floor, promptly clean it up and post the necessary precautionary signs until it is dry and free of slip hazards.

In addition to wearing the wrong footwear, there are specific behaviors which can lead to slips, trips, and falls. Walking too fast or running can cause major problems. Rapid changes in direction or walking backwards can create a similar problem.

Other problems that can lead to slips, trips and falls are: distractions; not watching where one is going; carrying materials which obstruct view; wearing sunglasses in low-light areas; and failure to use handrails. These and other behaviors, caused by lack of knowledge, impatience, or bad habits developed from past experiences, can lead to falls, injuries, or even death.

5.0 RELATED GOLDER DOCUMENTS

- GAI HSE 200.022 SWP Housekeeping.

Approved by	Jane Mills	Issue Date	August 31, 2012
Revision by	Brian Tuccillo	Revision Date	December 2013

1.0 SCOPE

This Standard Work Practice (SWP) applies to all Golder Associates Inc. (Golder) staff that will be operating and/or working around heavy or mobile equipment such as drill rigs, cranes, dozers, excavators, compactors, front end loaders, graders, tractors, flatbeds, trucks (dump and haul), aerial lifts, vacuum trucks, etc. Such sites include surface and underground mines, remediation areas, and construction sites. Heavy equipment activity may change daily or hourly, with differing potential hazards that need to be identified and addressed. The purpose of this SWP to provide employees with the basic information needed to safely work on or around mobile equipment.

2.0 DEFINITIONS

Competent Person A competent person is one who is capable of identifying existing and possible hazards in the workplace. A competent person must also have authority to take any corrective action necessary to safely complete the task.

Mobile Equipment Equipment propelled/powered by gasoline, propane, natural gas, diesel or electricity that is used to haul, transport, excavate, move, maneuver, drill, or hoist materials, equipment, products or personnel.

PPE Personal protective equipment.

ROPS Rollover protective structures.

Shall or must Means mandatory.

Should or may Means recommended.

Qualified Person A qualified person is one who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience in a technical or engineering has successfully demonstrated his ability to solve or resolve problems relating to the operation, maintenance, and/or the safety controls of the equipment, the work, and/or the project.

3.0 MOBILE EQUIPMENT SAFETY

Only authorized and qualified personnel shall be allowed to operate mobile or electrical equipment. All mobile equipment operators must supply proof of training or show evidence of experience (work history) prior to initially operating equipment.

One of the most important points to remember about working around any piece of heavy equipment is that the operator has a limited field of vision. Always make eye contact with the operator of the equipment prior to moving into swing/operating radius.

3.1 Reviewing Safety Information

Prior to the start of work activities, employees shall review the site-specific Health, Safety, and Environment Plan (HASEP) and/or task-specific Job Safety Analysis (JSA). Employees must acknowledge having read and understood the information presented within the HASEP and/or JSA by signing the job safety briefing form located in the HASEP.

Prior to the work activities and/or in the event of any site or scope of work changes, employees and subcontractors shall conduct a safety meeting (i.e. toolbox meeting). Traffic control procedures regarding the equipment shall be included within that meeting where relevant.

3.2 Daily Inspections/Maintenance

The mobile equipment operator will complete a daily inspection of the equipment that they will be working on prior to its use. The inspections should be documented, and documentation should be maintained with the equipment being inspected and/or to meet any other additional site/client specific requirements.

- If any of the safety equipment (i.e. rollover protective structures, back up alarms functioning and audible above surrounding noise levels, shut off switches, lights, etc.) is not in proper working order and/or in the event of any defects or equipment failures (tires, braking, hydraulic, steering, or other critical systems), the equipment shall be removed from service and locked/tagged out until it can be fixed by a person qualified to make the repairs.
- Preventive maintenance procedures recommended by the manufacturer must be followed.
- Repairs shall not be made unless the equipment is turned off and properly blocked off from movement, such as choking off the wheels. In the event that an adjustment is necessary for the repair the equipment can be moved or turn on temporary.
- Use of any machinery or equipment found to be defective or potentially unsafe is prohibited until unsafe conditions have been corrected.
- In the event of change in shift or operator, the new operator is required to perform their own equipment inspection prior to operating the machine.
- Perform a walk around the equipment to identify any nearby hazards.

3.3 General Operation

- Machinery and mechanized equipment may be operated only by qualified, designated personnel.
- Do not solely rely on your mirrors when turning, swiveling, or backing up the equipment. Turn your head to look around the surrounding area. If necessary, get out of the vehicle to perform a check of the blind spots. Operators shall inform any people working around

the equipment of the potential blind spots and equipment swing radii so they can avoid those areas.

- Operators are to obey the signalers who are assisting with the loading or unloading of equipment from a transportation vehicle, performing traffic control duties, and/or otherwise assisting the operator in moving the equipment. Signalers are to maintain a clear line of site with the operator at all times. Signalers and operators shall have a radio for additional and/or emergency communications.
- Workers around the mobile equipment shall make periodic eye contact with the operator. Remember if you cannot see them then they cannot see you.
- Be alert at all times, the working area and equipment are constantly moving and changing. Listen and identify any back up alarms, periodically scan the area for moving equipment, and never stand next to operating equipment unless the operator has indicated for you to approach the equipment.
- Maintain high visibility when working around mobile equipment. Do not work around or operate equipment in dense fog or other inclement weather that reduces visibility around the immediate work area.
- Never lay on the ground.
- Wear high visibility PPE or clothing.
- Stay out of the blind spots of the equipment operator.

3.4 Roadways

- All pieces of haulage equipment and large mobile equipment will have the right-of-way on all roadways. All other equipment will give way and will keep a safe distance until the roadway is cleared.
- In areas of traffic congestion and narrow travel-ways, the smallest vehicle shall always yield to larger vehicles.
- When following heavy equipment, a safe travelling distance should be maintained at all times. The driver's side mirror should always be visible to you, and hence you to the operator.
- On the majority of operating surface mines, all traffic travels on the left-hand side of the road. However practices may vary between sites. Check with the site superintendent/foreman before travelling on site roadways.
- Overtaking hauling and dump trucks should be done only when the truck operator tells you to do so. Visual and/or radio contact must be made with the operator.
- Road or ground surfaces must be able to support the weight of the load. During slippery, icy, or muddy conditions the operator shall slow down to maintain control of the equipment. If ground conditions cannot be made safe through maintenance or reduced speeds, operations shall cease until such time as the conditions improve to allow safe operation of equipment.
- Mobile equipment operators shall obey all traffic signs and signals, and keep the equipment under control.
- Equipment operators shall maintain a minimum safe distance behind another piece of equipment. At a minimum you should follow behind 10 foot per 10 mph increasing distance with increased speed.
- Machinery or equipment must not be operated in a manner that will endanger persons or property. Do not exceed safe operating speeds and loads.

3.5 Approaching Mobile Equipment

- Never approach an operational piece of heavy equipment until the operator is aware of your presence, your desire to approach, and signals the OK – where possible use radio contact.
- Stand in a safe location well outside the maximum extended reach of the shovel, dragline, or excavator arm, and out of the way of other mobile equipment. With an excavator, the optimum location is within the quadrant of the operator's visual coverage.
- When contact is made either by radio or visual contact, advise the operator of your wish to approach the equipment. The operator may want to complete a task prior to shutting down. If so, remain at the same location until the operator signals the OK to advance. Usually this will involve lowering the bucket to the ground; however practices may vary between sites. It is advisable to check with the site superintendent/foreman before entering areas where heavy equipment is in operation.
- Advise the operator of your task and requirements. Complete your task, advise the operator that you have completed your work, and depart the work area.

3.6 Overhead Hazards

When elevating or lifting equipment near energized overhead lines, the following safety precautions shall be followed (see Overhead Hazards SWP):

- The operator of the lifting equipment shall post and maintain in plain view of the operator and driver on each crane, derrick, power shovel, drilling rig, hay loader, hay stacker, pile driver, or similar apparatus, a durable warning sign legible at 12 feet. The sign shall read "Unlawful To Operate This Equipment Within 10 Feet of High-Voltage Lines of 50,000 Volts or Less." **This is only required by California Occupational Safety and Health Administration (OSHA).**

4.0 CONTROL OR OPERATING MEASURES

- Mobile equipment operators shall give an audible warning prior to starting up the equipment.
- No personnel shall ride on or in the mobile equipment unless it is designed to seat passengers.
  - Employees are to keep all parts of their bodies within the protective confines of the equipment while the equipment is in motion.
  - Equipment shall not travel on the highway or other public roads unless it is specifically designed and licensed to do so.
- All personnel shall wear a seat belt while the equipment is in operation. Prior to the start of the equipment the seat belt(s) shall be fastened and properly adjusted. Unless the equipment is designed for the operator to be unrestrained/standing, no Golder personnel shall operate equipment that is not outfitted with functioning seatbelts.
- Modification to the equipment is not permitted unless the manufacturer approves of any modifications. The equipment shall be used in the manner it was designed and intended to be used.
- Operators shall not exceed the manufacturer's recommended equipment rating capacity found within the operations and maintenance (O&M) manual.
- All mobile equipment shall be equipped with a functioning back up alarm system.

- Rollover Protective Structures (ROPS) shall be in use on all mobile equipment unless specifically not required in 29 CFR 1926 Subpart O.
- Windshields or protective side glass/windows shall be free of cracks, damage, or any debris which could impair the vision of the operator. Windshields must be equipped with powered wipers, unless specifically designed otherwise. Vehicles that operate under conditions that cause fogging or frosting of windshields must be equipped with operable defogging or defrosting devices
- Loads for transportation shall be properly secured in a manner that will not allow the load to shift, slide, or fall. Loads should be properly centered to provide balance for the transportation vehicle.
  - Mobile loading and haulage equipment shall be inspected by a competent person prior to operation.
- Equipment shall only be fitted with counterweights approved by the equipment manufacturer and shall be installed and used in accordance with the information found within the O&M manual of the machine, Excess counter weighting is not permitted.
- Lift trucks, stackers, etc., must have the rated capacity posted on the vehicle so as to be clearly visible to the operator. When auxiliary removable counterweights are provided by the manufacturer, corresponding alternate rated capacities will also be clearly shown on the vehicle. The ratings are not to be exceeded.
- Unstable loads shall be restacked and secured until they are stable.
- Operators shall not use cell phones, eat, drink, read, or any other activity that would distract their attention from the proper operation of the equipment.
- During fueling activities the equipment shall be turned off, the filler nozzle in contact with the tank, an appropriately sized spill kit nearby, and no smoking within the immediate area of the equipment and fuel source.
- Preventative maintenance activities (fluid changes) shall be conducted in location that will minimize the impacts of any spills and appropriate spill response equipment shall be made available during these activities.
- In the event the equipment is parked on an incline, the wheels shall be properly chocked off to prevent unintended movement.
- Operator(s) and passengers shall use pre-designated access/egress points for the machine.

5.0 ADDITIONAL SPECIFIC REQUIREMENTS

5.1 Underground Mining Requirements

Employees that may be working in underground mining operations and working with the specific equipment outlined below shall follow these additional procedures:

- Before underground mobile equipment is trammed (box-shaped wagon or iron car run on tracks), the operator shall make sure all personnel in the area are clear and in a safe location away from harm. All employees shall notify the operator prior to approaching the equipment.
- When mobile trolley or battery equipment is not in use and unattended (out of sight), the trolley pole shall be removed from the wire or the battery breaker switches must be in the off position. The driveline directional controller must be in the neutral or centered position.

5.2 Suspended Loads

Employees that may be working under suspended loads shall follow these additional procedures:

- During the lifting or hoisting of equipment and materials, employees are to stay clear of the area during the lift and should never position themselves directly under a lifted or suspended load.
- Employees shall not work or pass under the buckets or booms of loaders in operation.
- Dippers, buckets, loading booms, or heavy suspended loads shall not be swung over the cabs of haulage vehicles until the drivers are out of the cabs and out of the area, unless the trucks are designed specifically to protect the drivers from falling material.

5.3 Aerial Lifts

Employees that may be using this type of equipment shall refer to the Aerial Lift SWP (GAI HSE 200.042) for use.

6.0 TRAINING

Any employee or subcontractor that will be operating mobile equipment shall be trained and certified to operate that specific piece of equipment by a qualified person. Training at a minimum should cover, but not limited to the operation procedures, equipment controls, safety work instructions, safety controls, and be conducted by a competent person. The training shall be evaluated through observation of practical operating skills, training and certification by an approved vendor, or documented work history. The training records shall be maintained in employee files, and at a minimum contain the name of the employee, date of training, the name of the trainer (i.e. competent person). Re-certification and/or re-evaluation of the training shall be conducted as required (new machines, change in process, near miss/accident, etc.).

7.0 PERSONAL PROTECTIVE EQUIPMENT (PPE)

The following PPE may be required for work on or around mobile equipment. Additional PPE may be necessary depending on project site conditions and client requirements.

- Hard hat (except within enclosed cab).
- Steel toe boots.
- High visibility safety vest.
- Safety glasses (except within an enclosed cab).
- Work gloves, as needed.
- Hearing protection, as needed.

8.0 APPLICABLE REGULATORY REFERENCES

- 29 CFR 1910 Subpart F Powered Platforms, Manlifts, and Vehicle Mounted Platforms.

- 29 CFR 1910 Subpart N Materials Handling (section related to powered industrial trucks).
- 29 CFR 1926 Subpart O Motorized Vehicles.
- 29 CFR 1926 Subpart N Cranes.
- 29 CFR 1926 Subpart L Scaffolds (sections related to mobile scaffolds and aerial lifts).

9.0 RELATED GOLDER DOCUMENTS

- GAI HSE 200.001 SWP Drilling.
- GAI HSE 200.011 SWP Overhead Hazards.
- GAI HSE 200.037 SWP Traffic Safety.
- GAI HSE 205 Forklift Safety.
- GAI HSE 206 Crane and Rigging Safety.

Approved by	Jane Mills	Issue Date	August 2012
Revision by	Jane Mills	Revision Date	August 2013

1.0 SCOPE

This Standard Work Procedures (SWP) applies to all Golder Associates Inc. (Golder) staff working in high noise environments.

2.0 DEFINITION

Noise induced hearing loss is an insidious, debilitating disease. Employees are advised of the potentially harmful effects of excessive noise and should make every effort to limit their exposure both at work and at home. Although noise-induced hearing loss is one of the most common occupational illnesses, it is often ignored because there are no visible effects, it usually develops over a long period of time, and, except in very rare cases, there is no pain. What does occur is a progressive loss of communication, socialization, and responsiveness to the environment.

Work-related hearing loss continues to be a critical workplace safety and health issue. Noise-induced hearing loss is preventable, but once acquired, hearing loss is permanent and irreversible. Prevention measures must be taken by employers and workers to maintain the protection of workers' hearing. The following table below is the Occupational Safety and Health Administrations (OSHA) permissible sound exposure limits found in 29 Code of Federal Regulations (CFR) 1910.95 Table G-16.

Duration per day (hours of exposure)	Sound level (dBA, slow response)
8	90
6	92
4	95
3	97
2	100
1-1/2	102
1	105
1/2	110
1/4 or less	115

3.0 HAZARDS

Golder shall administer a hearing conservation program when employees are exposed to sounds equal or greater than 85 dB(A) on an 8 hour Time-Weighted Average (TWA) bases. Golder will provide earplugs and/or earmuffs to all employees who work where peak noise levels may equal or exceed 85 dB(A) at no

cost to the employee. Unless specific noise readings are available to demonstrate otherwise, noise levels near heavy equipment, drill rigs, pile drivers, concrete coring devices, etc. should be assumed to equal or exceed 85 dB(A). Employees shall use the issued hearing protection devices when in any of the following situations:

- When work area safety requirements include hearing protection.
- When working in an area of steady state (continuous) noise that interferes with normal speech between individuals who are standing at a distance of three feet apart.
- When working in an area of any impact noise (such as driving casing or piles) where the noise is loud enough to cause discomfort.
- When in areas where signs are posted requiring hearing protection.
- When noise levels measured with a properly calibrated sound level meter equal or exceed 85 dB(A).
- At sound levels at or above 105dB dual hearing protection must be implemented.
- At no time shall employees be exposed to sounds either protected or unprotected above 115dB continuously or 140dB with impact/impulsive pressure.

4.0 POSSIBLE CONSEQUENCES

Permanent hearing loss or impairment can result from prolonged exposure to noise at levels above 85 dB(A) on an 8 hour TWA basis. Hearing loss or impairment can also result from shorter exposures at higher sound levels.

5.0 TRAINING

Employees required to work in areas where peak noise levels may equal or exceed 85 dB(A) will be provided with appropriate training regarding hearing conservation before commencing work in these areas. Training will include addressing ambient conditions, as well as changed conditions. Refresher training will be provided as conditions change, or, at a minimum, on an annual basis. Records of training will be maintained in the employee's personnel file, as required in 29 CFR 1910.95 and 1910.120.

6.0 MEDICAL MONITORING

All Golder technical employees participate in the company's medical monitoring program which includes annual or biennial physicals. The medical monitoring program consists of regular, annual, biennial, or periodic physical examinations including audiometric testing in accordance with 29 CFR 1910.95 and 29 CFR 1910.120(f). Prior to beginning employment with Golder, all new employees complete a pre-employment physical examination at no cost to the prospective employee that, among other items, includes a baseline audiogram for the employee. Prior to the baseline audiogram the employee must not be exposed to workplace noise by at least 14 hours. In the event that a standard threshold shift is determined during a regular, periodic audiogram, the employee will be notified within 21 days of the

determination. In addition, employee work habits, Personal Protective Equipment (PPE) and site situations will be evaluated to determine what alternative hearing conservation methods would be appropriate. This evaluation will be conducted in consultation with a qualified medical professional.

Medical monitoring results (including audiograms) are provided to the employee after completion of the physical examination and evaluation of the data by Golder's occupational medical physician or other licensed physician. Audiogram results are retained by Golder with the employee's medical monitoring records for a period of time in accordance with the provisions of 29 CFR 1910.95(m) and 1910.1020(d).

7.0 CONTROL MEASURES

- Where reasonable and practicable, Golder will reduce the worker's exposure to high noise situations through the use of engineering, and administrative controls. Should these controls not be sufficient or effective, PPE will be used to protect the worker.
- Employees shall complete a hazard assessment prior to starting work in an area of high noise, to make sure all hazards are accounted for, and the appropriate PPE is utilized. Employees shall comply with all ear plugs/muffs manufacturer's guidelines, and government standards regarding ear protection.
- Noise levels will be monitored at regular intervals throughout the work period to maintain worker safety. If the noise monitoring confirms excessive noise at a worksite, sound level measurements will be used to evaluate the efficacy of the planned PPE. In the event that planned PPE will not provide sufficient hearing protection, the site safety contact will consult with the office or regional Health and Safety Coordinator to develop an alternative approach to protect worker hearing.
- Hearing protection PPE will be inspected prior to the start of work each day to make sure the PPE is functioning as designed, and if the PPE is in anyway compromised, it is replaced. Hearing PPE will be provided by Golder at no cost to the employee.

8.0 PERSONAL PROTECTIVE EQUIPMENT

Employees shall have the opportunity to select their hearing protection in order to ensure a proper fit for the individual.

9.0 JOB STEPS & PRECAUTIONS

- Workers shall read and understand the SWPs regarding Hearing Protection and PPE.
- A site specific Health, Safety and Environment Plan (HASEP) will contain a hazard assessment that will be completed prior to work commencing to determine the hazards as well as the required PPE.
- PPE will be inspected daily to make sure it is in good working order.

10.0 APPLICABLE REGULATORY REFERENCES

- 29 CFR 1910.95 “Occupational Noise Exposure”.
- 29 CFR 1910.120 “Hazardous Waste Operations and Emergency Response”.
- 29 CFR 1910.1020 “Access to Employee Exposure and Medical Records”.
- Ear plugs (Compliant with American National Standards Institute (ANSI) S3.19-1974.)
- Ear muffs (Compliant with ANSI S3.19-1974.)

Approved by	Jane Mills	Issue Date	August 2012
Revision by	Brian Tuccillo	Revision Date	August 2013
Revision by	Angela Kinderis	Revision Date	July 2015

1.0 SCOPE

This Standard Work Procedure (SWP) applies to all Golder Associates Inc. (Golder) employees who work in the field and in locations where there is potential for heat-stress conditions to develop.

2.0 HEAT STRESS

Heat stress is a condition that can develop when the body is unable to adequately cool itself through responses such as sweating and blood circulation. Employees may experience heat stress due to a combination of environmental factors such as temperature; humidity; radiant heat (i.e., from the sun or another heat source); air velocity; and the concurrent use of personal protective equipment (PPE).

All Project Managers will be trained in the elements of this SWP prior to supervising employees where heat-stress conditions may be present. Project Managers should consider the need to monitor heat stress during the project planning stage based on the site location, type of work, and time of year. Whenever ambient temperatures are forecast to exceed 95ºF, the Site Safety Officer (SSO) and/or field employees will follow high-heat procedures (Section 5.0).

3.0 HEAT-RELATED ILLNESSES

Heat rashes, sunburns, and heat cramps can be painful and uncomfortable, but they are generally not life threatening. Field personnel should be aware that heat rashes or cramps can progress into more serious, potentially life-threatening conditions such as heat exhaustion and heat stroke. Project Managers will be trained in the signs, symptoms, and response measures necessary in the event that emergency conditions develop with any employee under their supervision. Information about these heat-related illnesses is presented below:

Heat Rash Caused by continuous exposure to heat and humid air, and aggravated by chafing clothes. Symptoms: Red cluster of pimples or small blisters often occurring on the neck, upper chest, in the groin, under the breasts, and in elbow creases. First Aid: Keep affected areas dry. Apply dusting powders to increase comfort.

Sunburns Caused by too much exposure of the skin from the sun (i.e., ultraviolet [UV] radiation). Symptoms: Red or painful skin that can blister or peal. Wear protective clothing such as long pants and shirts, or hats and sunglasses. First Aid: Wear water-resistant sunscreen lotion of greater than SPF 30. Work in the shade or under cover.

Fainting Caused when standing in one place in heat, which may cause the blood to pool in the lower areas of the body (due to enlarged blood vessels), leaving the brain without adequate replenishment. Symptoms: Light headedness, dizziness, weak pulse, or cool moist skin. First Aid: Sit down and place your head between your legs or lie down. Once the dizziness subsides, get up and walk around to prevent any further pooling of the blood. Note: Fainting can indicate a serious medical condition. It may be necessary to call 911. Fainting or loss of consciousness, if work related, is an OSHA recordable injury. Contact the Golder Project Manager as soon as time permits.

Heat Cramps Caused by profuse perspiration with inadequate fluid intake and chemical replacement. Signs: Muscle spasms and pain in the extremities and abdomen. If heat cramps are suspected – stop work, move to a cool place, and drink clear juice or a sports drink. Seek medical attention if the employee has a history of heart problems or cramps do not subside within 1 hour.

Heat Exhaustion Caused by increased stress on various organs to meet increased demands to cool the body. Symptoms: Heavy sweating, extreme fatigue or weakness, dizziness, confusion, shallow breathing, nausea, pale, and clammy moist skin. First Aid: If symptoms occur, the employee should leave the work area and proceed to the nearest cool, shaded or air-conditioned location, and drink plenty of water or other cool, non-alcoholic beverages; if possible, take a cool shower or bath and rest until the symptoms pass. Contact the Golder Project Manager immediately.

Heat Stroke The most severe type of heat-related illness. Heat stroke is a medical emergency that may rapidly result in death or permanent disability. It occurs when the body is unable to control its body temperature; the body's temperature rises rapidly, the sweating mechanism fails, and the body is unable to cool down. When this occurs, the body temperature can rise to 106°F in 10 to 15 minutes. Symptoms: Red, hot, dry skin or profuse sweating, hallucinations, chills, throbbing headache, high body temperature, confusion/dizziness, and slurred speech. First Aid: Call 911 and seek medical help immediately. If heat stroke is suspected, implement Emergency Response Plan. Move the employee to a cool shaded area, remove excess clothing and cool the person by spraying, sponging, or showering the employee with cool or lukewarm water. Fan their body. Drink water (sip do not gulp, if conscious). Do not give an unconscious person anything to eat or drink. Never place ice on the person. Contact the Golder Project Manager as soon as time permits.

4.0 HEAT-RELATED ILLNESS PREVENTION PLAN

4.1 Monitoring the Heat Index

Employees who are exposed to extreme heat or work in hot environments may be at risk for a heat-related illness. If hot conditions are expected, site-specific training should include heat stress recognition, control, and first aid for heat stress-induced illnesses.

The National Weather Service, which is part of the National Oceanic and Atmospheric Administration (NOAA), published the following Heat Index to evaluate the likelihood of heat-related illness when

temperature and humidity are factored together. Note: values were devised for shady conditions with a light wind. Exposure to full sunshine can increase the Heat Index by up to 15°F. Using the Heat Index, employees can evaluate how hot it really feels when humidity is factored into the actual air temperature. Local weather conditions must be monitored daily or more frequently if conditions warrant.

NOAA's National Weather Service

Heat Index

Temperature (°F)

Relative Humidity (%)	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	128	136					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

Caution | Extreme Caution | Danger | Extreme Danger

Source: NOAA

4.2 Identifying Risk Factors

Several personal factors can affect how an employee responds to high-heat conditions. It is important to recognize these characteristics when scheduling work and when monitoring field employees for signs of over-exposure. Project Managers must take the following fitness for duty factors into consideration prior to assigning any employee work in an area where heat-related illness may be a factor. Characteristics that can adversely affect a body's reaction to temperature include:

- Fitness level
- Existing medical conditions such as heart disease, diabetes, or high blood pressure
- Pregnancy
- Age (65+)
- Medications (e.g., antihistamines)
- Previous heat-related illness events
- Low fluid consumption (including from the previous day)

Additional increased risk factors that must be considered when preparing to work in hot environments include:

- Exposure to direct sunlight
- Limited or no air flow
- Level of physical exertion required
- Heavy or non-breathable PPE
- Length of the shift

4.3 Heat-Related Illness Prevention

The following steps will help prevent heat-related injuries and illnesses:

- As part of project planning, this SWP will be made readily available to affected Golder employees through the HaSEP document required for the work. This document will be included as part of the mandatory appendices, and all project employees will acknowledge their understanding of the elements contained therein by signing the HaSEP.
- Project Managers, the SSO, and employees will be trained to the content of this SWP to prevent heat-related illnesses prior to managing/supervising and/or conducting work in a hot environment. Training will also include emergency response procedures to follow when an employee exhibits symptoms consistent with possible heat-related illness. See Section 8.0 of this SWP for training requirements.
- Whenever possible, schedule work for cooler times of the day. Attempt to reschedule your work hours or restrict certain work activities so that you are not working in the hottest time of the day, which is typically between 10 a.m. and 2 p.m.
- Project Managers will take steps to help employees become acclimatized (gradually build up exposure to heat, usually 4 to 14 days), especially those employees who are new to working in the heat or have been away from work for a week or more. Gradually increase workloads and allow more frequent breaks during the first 2 weeks of work.
- Employees must be allowed and encouraged to take preventive cool-down breaks in the shade when they feel the need to do so to protect them from overheating. Access to shade shall be permitted at all times. An individual employee who takes a preventive cool-down break (A) shall be monitored and asked if he or she is experiencing symptoms of heat-related illness; (B) shall be encouraged to remain in the shade; and (C) shall not be ordered back to work until any signs or symptoms of heat-related illness have abated, but in no event less than 5 minutes in addition to the time needed to access the shade. If an employee exhibits signs or reports symptoms of heat-related illness while taking a preventive cool-down break or during a preventive cool-down rest period, the Project Manager shall provide appropriate first aid or emergency response.
- The location of adequate medical services must be identified in the project HaSEP.
- All employees must have access to sufficient quantities of fresh, suitably cool, potable water and/or alternative fluids containing electrolytes intended to replace the salt and minerals lost due to sweating. These fluids must be free of charge to the employees. These fluids shall be located as close as practicable to the areas where employees are working.

- Employees should begin drinking extra fluids before starting any work activities. As a general rule of thumb if you are thirsty, your body is already dehydrated.
- If sweating heavily, employees should drink 1 to 2 cups of water (i.e., 16 fluid ounces or 0.24 liters) every 15 to 20 minutes or at each rest break for a total of 17 to 34 cups (i.e., 135 to 270 ounces or 4 to 8 liters) per day.
- Shade shall be present when the temperature exceeds 80°F. Employees shall have access to a cool, shaded, preferably air-conditioned area for rest breaks and meal breaks when the outdoor work area temperature exceeds 80°F. The amount of shade shall be at least enough to accommodate the number of employees on a rest break, so they may sit in a normal posture fully in the shade without having to be in physical contact with each other and shall be located as close as practicable to the areas where employees are working.
- Employees should not consume beverages that contain alcohol, caffeine, or large amounts of sugar to rehydrate. These substances do not help the body to rehydrate and alcohol can cause additional adverse effects. Employees should refrain from drinking alcohol at night and from drinking coffee during working hours.
- Employees should be familiar with the signs of the different heat-related illnesses and should monitor for signs of heat stress for themselves and for those around them (i.e., use the buddy system). Closely monitor employees who have increased risk factors for heat-related illnesses.

5.0 HIGH-HEAT PROCEDURES

All Project Managers shall implement high-heat procedures when the temperature equals or exceeds 95°F. These procedures shall include the following to the extent practicable:

- Ensuring that effective communication by voice, observation, or electronic means is maintained so that employees at the work site can contact their supervisor when necessary. An electronic device, such as a cell phone or text messaging device, may be used for this purpose only if reception in the area is reliable.
- Designating one or more employees on each worksite as authorized to call for emergency medical services, and allowing other employees to call for emergency services when no designated employee is available.
- Holding pre-shift meetings before the commencement of work to review the high-heat procedures, encourage employees to drink plenty of water, and remind employees of their right to take a cool-down rest when necessary.
- Observing employees for alertness and signs or symptoms of heat-related illness. The Project Manager shall ensure effective employee observation/monitoring by implementing one or more of the following:
  - Supervisor or designee observation of 20 or fewer employees, or
  - Mandatory buddy system, or
  - Regular communication with sole employee such as by radio or cellular phone, or
  - Other effective means of observation.
- Reminding employees throughout the work shift to drink plenty of water.

5.1 Emergency Response Procedures

The Project Director, Project Manager, supervisor, or designee shall implement effective emergency response procedures, including:

- Responding to signs and symptoms of possible heat-related illness, including but not limited to first aid measures and how emergency medical services will be provided.
  - If a supervisor or designee observes, or any employee reports, any signs or symptoms of heat-related illness in any employee, the supervisor or designee shall take immediate action commensurate with the severity of the illness.
  - If the signs or symptoms are indicators of severe heat-related illness (such as, but not limited to, decreased level of consciousness, staggering, vomiting, disorientation, irrational behavior, or convulsions), emergency response procedures must be implemented.
  - An employee exhibiting signs or symptoms of heat-related illness shall be monitored and shall not be left alone or sent home without being offered on-site first aid and/or being provided with emergency medical services.
- Contacting emergency medical services and, if necessary, transporting employees to a place where they can be reached by an emergency medical provider.
- In the event of an emergency, ensuring clear and precise directions to the work site can and will be provided as needed to emergency responders.

6.0 ACCLIMATIZATION

All employees shall be closely observed by a supervisor or designee during a heat wave. For purposes of this section only, “heat wave” means any day in which the predicted high temperature for the day will be at least 80°F and at least 10°F higher than the average high daily temperature in the preceding 5 days.

- An employee who has been newly assigned to a high heat area shall be closely observed by a supervisor or designee for the first 14 days of the employee's assignment.

7.0 PERSONAL PROTECTIVE EQUIPMENT FOR SUN PROTECTION

- Select PPE that will take into account both the need to block out UV radiation and the need to reduce the effects of heat.
- It is recommended that Golder employees wear tight-woven clothing that has a minimum ultraviolet protection factor (UPF) of at least 30 (i.e., allows 1/30th of the UV radiation falling on the surface of the clothing to pass through it). Clothing should be lightweight, light colored, loose-fitting, and have a collar to assist with keeping cool.
- Hats should be made of close-weave material and have a wide brim or be legionnaire-style. In circumstances where the wearing of a broad-brimmed hat causes difficulties due to their size, sunscreen and other protective measures should be used instead.
- Sunscreen does not offer complete protection and should always be used in conjunction with other protection such as protective clothing. Broad-spectrum and water-resistant sunscreen with an SPF of 30+ should be used.

- Employees using sunscreen should check the “use by date” of the sunscreen to verify if its effectiveness has expired per the manufacturer’s recommendations.
- Sunscreen will be placed in an easily accessible location, and employees instructed in correct application and use. Sunscreen should be generously applied to all areas of exposed skin at least 20 minutes before going outside and should be reapplied at least every 2 hours, as directed by the manufacturer’s instructions, or as changing conditions warrant.

8.0 TRAINING

8.1 Employee Training

Effective training in the following topics shall be provided to each supervisory and non-supervisory employee before the employee begins work that should reasonably be anticipated to result in exposure to the risk of heat-related illness:

- The environmental and personal risk factors for heat-related illness, as well as the added burden of heat load on the body caused by exertion, clothing, and PPE.
- Golder’s procedures for complying with the requirements of this standard, including Golder’s responsibility to provide water, shade, cool-down rests, and access to first aid as well as the employees’ right to exercise their rights under this standard without retaliation.
- The importance of frequent consumption of water, up to 4 cups per hour, when the work environment is hot and employees are likely to be sweating more than usual in the performance of their duties.
- The concept, importance, and methods of acclimatization.
- The different types of heat-related illness, the common signs and symptoms of heat-related illness, appropriate first aid and/or emergency responses to the different types of heat-related illness, and that heat-related illness may progress quickly from mild symptoms and signs to a serious and life-threatening illness.
- The importance to employees of immediately reporting to the Project Manager, directly or through the employee's supervisor, symptoms or signs of heat-related illness in themselves or in co-workers.
- Golder’s procedures for responding to signs or symptoms of possible heat-related illness, including how emergency medical services will be provided should they become necessary.
- Golder’s documentation in the HaSEP for contacting emergency medical services, and if necessary, for transporting employees to a point where they can be reached by an emergency medical service provider.
- Golder’s documentation in the HaSEP of directions to the work site that can be provided to emergency responders.

8.2 Supervisor Training

Training on the following topics shall be provided to the supervisor prior to supervising employees performing work that should reasonably be anticipated to result in exposure to the risk of heat-related illness:

- The information required for employees above.
- The procedures the supervisor is to follow to implement the applicable provisions in this section.
- The procedures the supervisor is to follow when an employee exhibits signs or reports symptoms consistent with possible heat-related illness, including emergency response procedures.
- How to monitor weather reports and how to respond to hot weather advisories.

9.0 REFERENCES

- Cal/OSHA T8 CCR 3395
- Center for Disease Control (CDC) Preventing Heat-related Illness or Death of Outdoor Workers
- NIOSH: Criteria for a Recommended Standard: Occupational Exposure to Hot Environments (Revised Criteria 1986)
- OSHA: Using the Heat Index: A Guide for Employers

Approved by	Jane Mills	Issue Date	August 31, 2012
Revision by	Jane Mills	Revision Date	None

1.0 SCOPE

This Standard Work Practice (SWP) applies to all Golder Associates Inc. (Golder) staff providing landfill Construction Quality Assurance (CQA) services; including cap placement, leachate collection systems, control and electrical panel services and density testing.

2.0 DEFINITIONS

Geosynthetic membrane A specialized liner product utilized to prevent movement of leachate vertically or horizontally in soil, typically at landfills.

3.0 HAZARDS

- Slip, trip, fall conditions (see Slips, Trips and Falls SWP).
- Heat or cold stress (see Inclement Weather SWP).
- Lightning and high winds.
- Radiation.
- Rolls of geosynthetic membrane.
- Excavation (see Trenching and Shoring SWP).
- Airborne dust.
- Hazardous Flora and Fauna (see Biological Exposure Risks SWP).

4.0 POSSIBLE CONSEQUENCES

- Wind (liner control problems)
- Struck-by or fall trauma
- Irritation or disease from dust, radiation or biological hazard exposure.
- Electrocution
- Heat stroke or frost bite from exposure
- Engulfment or asphyxiation related to excavation or confined space.
- Falling down steep slopes
- Crushing injuries
- Lightning

5.0 TRAINING

- On-site training with qualified personnel
- Golder and site specific instruction
- Emergency and First Aid/CPR Course

- 10-hour OSHA Construction Training
- Confined Space Training (if the excavation meets confined space criteria)
- 40-hour OSHA training (as required by the Site work)
- Radiation safety (use of density gauges), if applicable

6.0 CONTROL MEASURES

The nature of earthwork construction often results in uneven surfaces. Appropriate shoes are steel toed boots for earthworks, and tennis shoes for geomembrane. If the project includes constructed slopes in excess of 2.5 horizontal to 1 vertical, Golder personnel will not attempt to walk on the slope without appropriate fall protection equipment such as safety harnesses. Prior approval must be obtained from the Golder Project Manager for such activities. For site work, the following safe work practices should be observed:

- Wear proper footwear including steel toes for earthwork, and rubber soled shoes for geomembrane.
- Clean boots and testing equipment, since slips may result from mud on a hard surface.
- Avoid jumping across obstacles (e.g.: anchor trenches).
- Exercise caution while walking on improvised plank bridges across ditches or anchor trenches.

When working on geomembrane, slippery conditions may be present. Employees should never run on a geomembrane. Always observe and use caution when on a geomembrane. Some items which may present slip hazards include:

- Muddy shoes on geomembrane.
- Unsecured pieces of material.
- Dust or oil spots on the geomembrane.
- Soapy film on the geomembrane after vacuum testing.
- Grade changes.
- Electric cables and sand bags.

Observe site traffic rules and right-of-way practices at all times. Heavy equipment and trucks have the right-of-way. Generally, the following rules apply to determining the right-of-way:

- The heavier piece of equipment has the right-of-way.
- Loaded trucks and equipment have precedence over unloaded ones.
- Equipment moving down slope has precedence over equipment moving upslope.

Other general site vehicle operation rules include:

- Observe posted speed limits on site (usually do not exceed 15 miles per hour).
- Do not follow another vehicle closely; material may fall off the vehicle or be thrown by the tires when in motion.
- Large equipment may have a significant “blind spot” on the right side of the vehicle. Avoid passing heavy equipment unless specifically instructed to do so by the operator of that equipment. Assume the equipment operator does not know you are present in an area and maneuver accordingly.
- Listen for and heed back-up alarms from heavy equipment.
- Make eye contact with equipment operators.
- Park the company vehicle near the work location to mark your presence in the area (check your tires). Wear high visibility clothing (reflective vests) to aid the operator in noticing your presence. Use extreme caution when operating in dusty conditions. Drive with your headlights on to increase your visibility. If conditions become dusty and significantly reduce visibility across the site, leave the area and wait for conditions to improve and contact the Golder Project Manager.
- Do not ride on the contractor’s equipment, and do not attempt to operate any such equipment.
- Do not ride on anything that does not have a seat designed for human occupancy.
- Wear your seatbelt at all times.

NEVER stand below a roll of geomembrane. Rolls of geosynthetics typically weigh between 3,000 to 5,000 lbs. Handling mechanism failure during deployment could result in an unexpected movement of the roll and may cause injury or death to nearby employees. Stay clear of the working radius of the geomembrane deployment crew and stand off to the side. Never stand in the anchor trench when rolls of geosynthetics are being handled nearby.

Landfill CQA may involve the entry of excavations, confined spaces and potential exposure to ionizing radiation through use of density gauges. See appropriate SWPs for these specialized activities and obtain additional training as required.

7.0 PERSONAL PROTECTIVE EQUIPMENT (PPE)

- Hard hat
- Safety Glasses
- High visibility vest

- Safety boots and/or rubber soled shoes
- Multi-gas meter
- PID or FID
- Dust mask or respirator if required
- Gloves

8.0 RELATED GOLDER DOCUMENTS

- GAI HSE 200.003 SWP Biological Exposure Risks.
- GAI HSE 200.014 SWP Slips Trips and Falls
- GAI HSE 200.018 SWP Working Around Heavy Equipment.
- GAI HSE 200.016 SWP Trenching Shoring and Excavation.
- GAI HSE 200.048 SWP Gas Hazards.

Approved by	Jane Mills	Issue Date	March 12, 2013
Revision by	Brian Tuccillo	Revision Date	None

1.0 SCOPE

This Standard Work Practice (SWP) applies to all Golder Associates Inc. (Golder) staff working on projects with active uncontrolled traffic conditions (e.g., in street/highway right-of-ways).

2.0 TRAFFIC SAFETY

Traffic control is required whenever the uncontrolled movement of vehicle traffic could be hazardous to workers. Working on projects with active uncontrolled traffic conditions (e.g., in street/highway right-of-ways) can be very dangerous or even life threatening without the proper safety controls, awareness, and signage. Golder's project manager and site safety officer should develop a traffic control plan that will meet local, state, and federal regulations to make sure Golder personnel are safe.

3.0 TRAFFIC CONTROLS

3.1 Precautions

- Inspections or determinations of road conditions and structures must be made in advance to assure that clearances and load capacities are safe for the passing or placing of any machinery or equipment. Check with local authorities for appropriate regulations and site-specific hazards.
- Adequate barricades, channelization cones, flashing lights, flagmen, and warning signs shall be provided at all project sites adjacent to or in public traffic lanes (based on any regulations and/or the site specific hazard assessment).
- Adequate safety precautions must be observed when parking vehicles. Whenever a vehicle or heavy equipment is parked, the parking brake must be set. Equipment parked on inclines must have the wheels chocked or track mechanism blocked and the parking brake set.
- At a minimum hard hats and reflective clothing must be worn by all employees and subcontractors at all times while working on a public right-of-way or in the vicinity of vehicular traffic.

3.2 Non-Lane Closure

These traffic controls or actions are intended to protect Golder personnel without using lane closures or restricting traffic flow. Examples of non-lane closure activities include working at commercial properties (e.g., retail petroleum stations) or observing rock slopes in a right-of-way. Best management traffic control procedures include one or more of the following practices:

- Performing work within traffic areas at off-peak hours, if possible.
- Placing orange reflective cones and caution tape around the designated work area.
- Placing high-visibility signs to warn drivers of designated work areas.

- Placing your vehicle between you and oncoming traffic.
- Wearing high-visibility safety apparel, including high visibility vest intended to provide visibility during both daytime and nighttime (Note: must meet the Performance Class 2 or 3 requirements of the ANSI/ ISEA 107–2004).
- Wearing safety glasses to prevent dust or other debris from entering your eyes.
- Parking your vehicle behind the Jersey barrier or guardrail and exiting your vehicle on the opposite side of traffic.
- Turning on your vehicle's flasher lights and/or roof-mounted flashing amber light.
- Always face traffic if possible.
- Be prepared for inclement weather and know how this may impact your work area (e.g., rain may create slippery driving conditions).
- When not engaged in the work (e.g., taking notes, talking on your cell phone, breaks) stand in a safe area behind the guard rails or Jersey barriers.
- Reducing and/or eliminating the number of times you cross the road.

3.3 Lane Closure

The *Manual on Uniform Traffic Control Devices* (**MUTCD**) defines the standards used by road managers nationwide to install and maintain traffic control devices on streets and highways. This resource should only be used as a reference.

Federal Highway Administration (FHWA) publishes MUTCD under 23 Code of Federal Regulations (CFR), Part 655, Subpart F. This resource should only be used as a reference.

Golder personnel should implement the following guidelines on projects where the fieldwork must be performed within traffic closures or lane restrictions. (The guidelines described herein have been prepared under the assumption that the set-up and control of the traffic closure is provided by an appropriately trained person or traffic control subcontractor. Traffic control procedures must meet the requirements of the local Department of Transportation (DOT) and/or local Police Department.). Golder personnel should also follow the best management traffic control procedures listed above during lane closures and/or lane restrictions.

- Make sure a Golder representative has in their possession a copy of all local, state, and federal permits to perform the lane closure and/or lane restriction.
- Field staff participating in the project must attend an orientation meeting with the person or representative of the traffic control company in charge of the lane closure or restriction (e.g., altering the traffic pattern) to discuss the particulars of each traffic closure/restriction set-up and safety requirements. Traffic closure or restrictions should only be set up by suitably trained and qualified individuals. Traffic controls must meet the requirements of the local DOT and/or Police Department requirements.
- Any work vehicle within the traffic closure or entering the work zone shall have its four-way flashers on or be equipped with a roof-mounted flashing amber light.

- Until all traffic control safety measures are in place, only the members of the field staff involved in the lane closure set–up will be allowed on-site. In the case where an outside firm is providing the lane closure, no staff shall be allowed within the closure until the closure is complete.
- Workers within the closure area must be within communicating range of each other.
- Two-way radios should be used when the workers are not within talking range of each other.
- In cases where equipment, noise and/or obstructions limit a worker's audible or visual cues to danger from traffic, a lookout person shall be stationed in these work areas to monitor traffic and signal the workers if a potential dangerous conditions arises.
- Be aware of construction equipment operating within the lane closure area.
- If working at night, understand the bright lights from the construction area may decrease, confuse, or blind the oncoming drivers; Use extreme caution when exiting and entering a lane closure (i.e., getting within the “safe” zone of the traffic closure). Allow enough time to safely accelerate your vehicle to match traffic speeds and provide enough warning and distance to drivers behind you to safely decelerate your vehicle to enter the lane closure area.
- The worker should face the on-coming traffic and position themselves away from traffic to the extent possible.

3.4 Public Access

These traffic controls or actions are intended to protect the public when working in areas where public access is permitted. Examples of areas of public access are parks, streets, public parking lots, and etc. The best management practices for protecting the public from areas of work are as follows:

- A barrier should be set up around the work area that not only physically inhibits the public, but visually provides a partition such as reflective orange devices or yellow caution tape.
- When heavy machinery is required such as drill rigs, the diameter of the area partitioned will be equal to approximately two times the height of the machinery used to protect the public in the event of toppling.
- A member of the project field team will be responsible for maintaining the barrier or partition and assuring no member of the public will enter the workspace.
- When machinery enters or leaves the workspace “spotters” will be utilized to divert the public from the path of the machinery.
- The barrier or partition will not be removed until all work has been completed in the work space.

4.0 MINE TRAFFIC SAFETY

Golder personnel working at active mines must follow the Site-specific Health, Safety and Environment Plan (HASEP) prepared in accordance with Mine Safety & Health Association (MSHA) regulations.

5.0 APPLICABLE REGULATORY REFERENCES

- American National Standard for High-Visibility Safety Apparel and Headwear", ANSI/ISEA 107-2004.
- Manual on Uniform Traffic Control Devices (MUTCD), Federal highway Administration (FHWA), 23 CFR Part 655, Subpart F.

6.0 RELATED GOLDER DOCUMENTS

- GAI HSE 200.018 SWP Working Around Heavy Equipment.

Approved by	Jane Mills	Issue Date	December 10, 2009
Revision by	Brian Tuccillo	Revision Date	April 4, 2014

1.0 INTRODUCTION

This Standard Work Procedure (SWP) applies to all Golder Associates Inc. (Golder) employees and contractors to evaluate if they are fit for duty. This SWP follows the minimum standards set forth in Golder's Global Procedure 6 (GP 6) Management of Health and Safety.

2.0 DEFINITIONS

Company-Related Business – Any act performed by a Golder employee within the scope of the employee's duties. Generally, operating one's personal vehicle from home to work and/or from work to home does not constitute company-related business. However, this travel time is included in the calculation of working hours for fatigue management purposes.

Downtime - Work Break – Non-work periods within a work day allowing time for eating, drinking and relaxation. Rest Period – Non-work periods outside of the 12 hour work day.

Emergency Situation – Where life and/or property are in danger of immediate harm.

Fit for Duty/Fitness for Duty – Physically, mentally and emotionally able to perform all assigned duties and in a manner which does not compromise or threaten the safety and health of themselves or others while preserving the integrity of property and the environment. An individual may be unfit for duty for a variety of reasons, including the adverse effects of fatigue, alcohol or drug use, or a range of physical, psychological or emotional limitations.

Fatigue – Physical, mental or emotional exhaustion resulting from a number of causes including, but not limited to, work, physical, mental or emotional exertion, lack of sleep, various stressors, or a combination of these factors.

Fatigue Leave – Time off to be taken immediately after completing 14 consecutive 12 hour days or at the end of the scheduled shift rotation if longer.

Golder's Contractor – A third-party retained by Golder to perform services at any location where Golder employees are engaged in company-related business. The term contractor includes all sub-consultants and subcontractors and their employees. A contractor representative is the person responsible for directing, controlling and/or supervising the contractors who perform or provide contractor services.

Standard Working Day/Shift – Working up to 12 hours including travel time, for fatigue management purposes.

Sufficient Rest – Rest period is the time away from work when an employee has the opportunity to eat, relax and sleep. Sufficient rest period is typically a period of between 8 and 10 hours between the time work is ceased and returning to work. In some instances travel can be considered as a rest period, providing the employee can ensure effective sleep during the time of travel.

Supervisor – For the purposes of this SWP, a Supervisor is the person who reviews an employee's weekly time record and has the authority to direct their work schedule, among other responsibilities.

Work Hours – Work Hours - A maximum of 12 hours worked per day. Shift Rotation - A maximum of 14 consecutive 12 hour days without two days off of fatigue leave.

3.0 GOLDER'S RESPONSIBILITIES UNDER THIS SWP

Golder is responsible for implementing and enforcing this SWP. The responsibilities for Golder employees in their different roles are detailed below:

3.1 Operations Manager

It is the responsibility of the **Operations Manager** to:

- Communicate the fitness for duty SWP to employees and refresh with annual training as appropriate to ensure that all employees are familiar with the SWP and with their duties and responsibilities under the SWP.
- Inform Golder employees of situations that might affect their fitness for duty through education sessions and during project planning.
- Provide training to supervisors who review timesheets in appropriate response measures for employees with excessive weekly hours.
- Determine who is fit for duty under this SWP, and respond as appropriate to employees who are unfit for duty.
- Conduct a risk assessment with affected employees for office work when required by this SWP.
- Review and, when appropriate, approve task-specific risk assessments for office assignments.
- Discipline violations of this SWP in accordance with Section 9 of this SWP.

3.2 Supervisor

It is the responsibility of the **Supervisor** to:

- Review employee weekly timecards and evaluate compliance with this SWP.
- If deviations from the SWP (relative to hours worked) are noted, contact the employee to discuss the deviations, and make immediate corrections, as necessary, involving the Project Director (when applicable).

3.3 Project Director

It is the responsibility of the **Project Director** to:

- Consider the requirements of this SWP when determining work shifts.
- Review and, if appropriate, approve task-specific risk assessments for field assignments.

3.4 Project Manager

It is the responsibility of the **Project Manager** to:

- Advise employees and contractors of situations that may impact their safety at their worksite through hazard analysis conducted during project planning (HASEP).
- Inform Golder employees of situations that may affect their fitness for duty through education sessions and during project planning.
- Provide a copy of this SWP to the contractor representatives.
- Conduct a risk assessment with affected employees for field work when required by this SWP.
- Respond as appropriate to employees who are unfit for duty.
- Provide a copy of this SWP to the contractor representatives.

3.5 Human Resources Representative

It is the responsibility of the **Human Resources Representative (HRR)** to:

- Respond to confidential fitness for duty inquiries from employees.
- Communicate, as necessary, with Project Managers or Supervisors on behalf of the employee.
- Understand federal, state and/or local laws as they may relate to work hours.

4.0 EMPLOYEE RESPONSIBILITY UNDER THIS SWP

- Arrive at work each day fit for duty.
- Comply at all times with Golder's Code of Conduct, employee handbook, all Golder policies, procedures, and safe work practices.
- Notify your HRR, your supervisor, or any designated company representative immediately if:
  - You have any doubts or concerns about your fitness for duty, or about your ability to safely perform your assigned responsibilities.
  - For any reason, you become unfit for duty during the course of the workday.
  - You observe another employee or Golder contractor who might appear to be unfit for duty.
  - You observe another employee or Golder contractor engaging in unsafe behavior.
  - You believe the work you are assigned to perform is unsafe, or if you feel you are not adequately trained to safely perform any of your assigned responsibilities.
  - You are using drugs, alcohol, and other substances that might impair your fitness for duty.

- Schedule sufficient rest (as defined in Section 8.3) before arriving at work.
- Ensure non-work activities allow for sufficient rest.
- Ensure illnesses that might affect your fitness for duty are managed.
- Refrain from using drugs, alcohol, and other substances that might impair your fitness for duty.

5.0 FACTORS THAT CAN AFFECT AN INDIVIDUAL'S FITNESS FOR DUTY

A number of factors can affect an individual's fitness for duty. Among the most common factors are fatigue, temporary physical or psychological conditions, alcohol consumption, and the use of prescription medication and illegal drugs and substances. Many symptoms are commonly associated with fatigue. Because these symptoms might not be recognized by the fatigued employee, it is important for all employees to watch for symptoms of fatigue in each other during long work shifts.

6.0 KEY HAZARDS

Employees who are unfit for duty have a significantly higher risk than others do of suffering a serious injury or death, causing serious injury or death to others, and committing mistakes in performing their job responsibilities. Individuals who are unfit for duty:

- Tend to overestimate their ability to perform tasks safely, underestimate potential hazards in the workplace, and often disregard the use of appropriate personal protective equipment.
- Tend to be less efficient, less productive, and more prone to making technical errors.

7.0 WORK HOURS

Golder acknowledges flexible working hours might be required to ensure business continuity and delivery of client service. Golder has established the following work hour limits that all employees must adhere to, and all employees must follow when establishing work schedules:

All activities at Golder should be designed to fit into the standard working day of 12 hours (including travel time). In addition, all activities at Golder should be designed and managed so that no employee works more than fourteen consecutive 12-hour days without experiencing two days of fatigue leave.

The standard working-day guidelines rely on each employee to monitor their own fitness for duty in preparation for work periods of up to 12 hours in duration.

If under extreme or unforeseen circumstances a project or office activity requires an extended working day (greater than 12 hours), a project-specific or activity-specific fatigue risk assessment (Section 8) must be conducted and permission must be obtained from either the Project Director or Operations Manager. If

permission to work in excess of 12 hours is granted, the following minimum control measures must be implemented:

- A "buddy" system so the employees are not working the extended work day alone. Work at home or in a hotel room after the extended work day represents a lower safety risk, because driving while fatigued is eliminated.
- The Project Director (for field work) or Supervisor (for office work) and the affected employees shall identify factors that might impact the employees' ability to work safely beyond the standard working day. During this consultation, the employees must notify the Project Manager and supervisor of any personal or other matters that might affect their fitness for duty or their ability to safely work the extended hours.

If international or remote site work requires employees to be onsite for greater than the two-week period, a project-specific or activity-specific risk assessment must be conducted, and permission for the extended (>14 days) rotation is required from either the Project Director (for field work) or the Operations Manager (for office work). If permission is granted, the following minimum control measures must be implemented:

- All effort must be made to ensure breaks are taken during the work period so that 14 consecutive 12-hour days in a row are not exceeded.
- The working plan must allow for flexibility in work hours such as half-day breaks for rest.
- During downtime in operation (such as equipment breakdowns), employees must be given the opportunity to rest.

A modified standard working day might be established based on environmental factors and the specific nature of the work to be performed. These factors include, for example, extreme weather conditions, remoteness, and degree of the physical exertion required.

Work schedules for projects involving employees from multiple operating companies must be defined in advance of employee deployment to the site. GAI employees will only be deployed to a project site where compliance with this SWP is assured. A GAI employee working for another Golder operating company would still need to follow GAI's Fitness For Duty SWP (this document), if the other Golder operating company's Fitness For Duty requirements are less stringent.

7.1 Compliance With Federal, State and Local Laws Governing Working Hours

Certain federal, state and/or local laws or client requirements can impose specific requirements with respect to the maximum number of hours an employee is permitted to work at any one time. Golder will comply with applicable laws governing working hours (MSHA and DOT, where applicable) or client requirements. Any questions regarding these laws or client requirements should be directed to your HRR or Project Manager as appropriate.

8.0 FATIGUE RISK ASSESSMENT

If operational requirements necessitate staff exceeding the work-hour guidelines, a risk assessment shall be conducted that can demonstrate all risks are adequately controlled. The risk assessment process is detailed in the toolkit associated with this SWP.

8.1 Fatigue Risk Assessments for Field Work

The risk assessment must be conducted by the employee and the Project Manager for work outside of the office. The risk assessment must be documented on the form provided in the toolkit associated with this SWP. Work cannot proceed until this risk assessment has been reviewed and authorized by the Project Director or Operations Manager. Work schedules/activities to minimize risks associated with fatigue will be incorporated into the project HASEP as identified through the risk assessment process.

8.2 Fatigue Risk Assessments for Office Work

The risk assessment must be conducted by the employee and the employee's supervisor for office work whether conducted at the office or at a remote location like a hotel. This assessment can take the form of a conversation that includes the elements defined in the toolkit associated with this SWP.

8.3 Breaks

Breaks are an important part of managing fatigue. Time spent away from work allows individuals to recover from mental and physical fatigue and improve safety, work performance, efficiency. Factors such as the physical demands of the task or weather conditions must be considered.

Consistent with applicable federal, state or local laws, breaks during a standard working day should be adequate and regular. Rest during your lunch break. At other times this could be as simple as taking a break while demobilizing from a project site. There should be a minimum of one 30-minute break in each 8-hour work period.

As a guide, the amount of sleep required in the previous 48-hours needs to be no less than the length of the next intended work period. For example, if you plan to work 12 hours in any given day, you need to have had at least 12 hours sleep over the previous 48-hours.

For extended working days/shifts:

- If an employee has worked at least 12 hours (excluding breaks), the employee must rest for at least 8 hours before returning to work.
- On rare occasions when an employee has worked more than 12 hours, the employee is required to rest for at least 10 hours before returning to work.

8.4 Travel/Transport

- When an employee has worked consecutively for 14 hours or more in a single day they shall not operate a vehicle. Arrangements must be made, not at the employee's expense, for alternative transportation or accommodations. In unforeseen situations, an employee may complete their journey without being in violation of the provisions of this procedure, provided the planned journey could reasonably have been completed within the provisions of this procedure in the absence of the unforeseen situation.

9.0 COMPLIANCE

All individuals are required to comply with this SWP. For employees, failure to comply with this SWP will result in disciplinary action up to, and including termination of employment. Contractors who fail to comply with this SWP can be removed from the worksite or prohibited from engaging in any further Company-Related Business. Supervisors, Project Managers or Project Directors who chronically fail to ensure their staff follow the SWP are subject to disciplinary action up to, and including termination of employment.

10.0 GOLDER RELATED DOCUMENTS

- GP-6 Management of Health and Safety
- Golder's Code of Conduct
- Golder's Employee Handbook

SWP Motor Vehicles and Driving on Company Business – GAI HSE 200.024

Approved by	Jane Mills	Issue Date	August 2012
Revision by	Brian Tuccillo	Revision Date	April 2014

1.0 SCOPE

This Standard Work Procedure (SWP) applies to all Golder Associates Inc. (Golder) company drivers who operate motor vehicles (company owned, leased, private, or hired) on company business. All employees must comply with Golder's Motor Vehicle Policy, contained within the Employee Handbook. Definitions of the terms in this SWP are the same as the terms in that Policy. In the event of conflict, Golder's Motor Vehicle Policy takes precedence over this SWP.

2.0 MOTOR VEHICLES AND DRIVING ON COMPANY-RELATED BUSINESS

Preventing work-related roadway crashes requires strategies that combine traffic safety principles and sound safety management practices. Although Golder cannot control roadway conditions, the company can provide safety information to employees and set and enforce driver safety policies to promote safe driving behavior.

3.0 GENERAL GUIDELINES

- Company drivers are authorized to operate a motor vehicle (company owned, leased, private, or hired) while on company business.
- Seat belts shall be worn by all drivers and passengers in vehicles on company business.
- Employees must carry legally required insurance if using private vehicles for work purposes.
- For restrictions relating to the use of portable electronic devices reference Golder's Motor Vehicle Policy and the HSE 200.023 SWP Cellular Telephone.
  - While operating a vehicle on company related business, employees shall not use any electronic devices, with the exception of Global Positioning System (GPS) devices. If the employee needs to operate an electronic device, they shall first park the vehicle in a designated and safe parking location.
  - Employees are strongly discouraged from performing other activities that result in taking away meaningful attention to operating a vehicle safely.
- Only operate vehicles for the designed intended purpose.
- Do not drive when fatigued, and follow the driving limitations of Golder's Fitness for Duty and Fatigue policy. Follow applicable hours-of-service regulations.
- Develop work schedules that allow employees to obey speed limits.
- Observe all the rules and regulations pertaining to the use of public land. Always ask permission before crossing pastoral land. Leave gates in the same position as they were found. Keep to constructed vehicle tracks. Avoid areas that are easily damaged, such as swamps, alpine snow plains and vegetated sand dunes. Exercise caution when operating a motor vehicle in a railroad right-of-way.

- Do not operate any vehicle while under the influence of alcohol, illegal drugs, or medications (prescription or over the counter) that might impair the ability to safely operate the vehicle.
- Consider fire safety when parking vehicles in areas with dried grasses, leaves, or other plant material. Hot engine fluids, catalytic converters or other vehicle equipment could ignite dry plant material, and cause a fire. Observe all fire restrictions.

4.0 VEHICLE MAINTENANCE AND FLEET MANAGEMENT

- To keep the vehicle in a safe working order, follow the maintenance requirements prescribed in Golder's fleet management program for company owned or leased vehicles.
- Maintain a Vehicle Condition Check-out/Check-in list for company owned or leased vehicles.
- Test the brakes, wipers, tires (including pressure, this information can be found on the inside of the driver's side door frame), lights, and turn signals, and verify that the vehicle has an inflated spare tire and jack prior to use (in company, private, or rented vehicles). Address any notes or oral warnings concerning vehicle deficiencies. If any safety concerns are identified, the vehicle must not be used.
- Report vehicle deficiencies to the Operations Manager as soon as they are noticed. The Operations Manager, or his/her delegate, will arrange for maintenance of the vehicle.
- Equip company-owned, leased, rented, or private vehicles used for on-site work with fire extinguishers and first aid kits, when appropriate for the work. For example, a journey to a client's office in a populated area would not necessitate a fire extinguisher or first aid kit in the vehicle (unless client requires this equipment).
- Make sure rented or client-provided vehicles are in a roadworthy condition.

5.0 SAFETY TRAINING PROGRAMS

- Teach employees strategies for recognizing and managing driver fatigue and in-vehicle distractions via the Learning Management System (LMS) at least annually.
- Provide appropriate training to employees operating specialized motor vehicles or equipment.
- Emphasize the need to follow safe driving practices on and off the job, through annual training programs.

6.0 DRIVER PERFORMANCE EVALUATION

- Employees must report any traffic violations and/or vehicle accidents or damage that occurred when driving on company related business to the Project Manager or the Human Resource Representative.
- Human Resources Representatives are responsible to make sure each driver of a vehicle being used on company business (company owned, leased, private, or hired) possesses a valid driver's license. The Project Manager is required to verify that the license is appropriate for the type of vehicle to be driven.
- Human Resources will check driving records of prospective employees, and perform periodic rechecks after hiring.
- Human Resources will maintain complete and accurate records of employees' driving performance.

7.0 SECURING LOADS

Unsecured and poorly secured items inside or outside of a vehicle can be extremely dangerous if they are loose or become airborne. They can harm the vehicle driver and passenger, and/or occupants in following vehicles. The following recommendations should be followed:

- Use tie-down straps that are in good condition and rated for the load that the vehicle will carry. Ratcheting tie downs are preferred over bungee cords. Bungee cords have caused numerous serious injuries and even fatalities when over-stretching has resulted in the hook opening or losing grip on the strap resulting in the strap springing back and contacting the user's face. If bungee cords must be used, seek cords with non-metal hook ends to reduce the risk of eye injuries.
- Install mounts to secure loads that are hauled frequently in the same vehicle or trailer.
- Secure tarps covering loads so they are snug and do not flap.
- Check all loads after driving for 30 minutes to make sure that they have not shifted and remain properly secured.
- Loads shall not exceed the manufactures specifications and legal limits for the vehicle.

8.0 VEHICLE SAFETY EQUIPMENT AND EMERGENCY PREPARATION

Be prepared for a driving emergency by ensuring that the vehicle is equipped with roadside emergency supplies. Consider carrying items such as the following, and know how to use them properly:

- Flashlight
- Reflective safety vest
- Light sticks
- Fire extinguisher
- Tire inflator or sealant
- Reflective triangles or flares
- Spill response kit (for company owned or leased vehicles and rentals >30 days) appropriate for the cargo carried in your vehicle.

9.0 SAFE DRIVING TECHNIQUES FOR 4-WHEEL DRIVING

9.1 Driving In Heavy Vegetation

- Check road conditions before proceeding if the ground conditions are unknown or if there is mud or water.
- Do not change transmission gears in the middle of a hazardous area. If in doubt, always choose the lower gear.
- Setting the correct tire pressure when driving off-road is important. Lowering tire pressures helps in soft ground areas. For soft tracks, 140-180 kPa or 20-26 pounds per square inch (psi) is a good tire pressure. The vehicle must be operated at a lower speed when the tires are at lower pressure. Remember to re-inflate the tires as soon as the vehicle is back on hard ground.

- Cross small ridges 'square on' and cross ditches at a slight angle.
- Turn the steering wheel from side to side to maintain traction and move forward if the vehicle begins to lose traction going uphill, along a rutted track, or in mud.

9.2 Driving On Steep Hills

- Use low second or third gear for going uphill and low first gear for going downhill.
- Use the footbrake sparingly and with caution.
- Avoid turning the vehicle sideways on a hill. If the vehicle begins to slide sideways, very slightly accelerate and steer into the slide. This will usually straighten the vehicle's descent.
- Allow sufficient stopping distance between vehicles.
- Do not touch the clutch or accelerator if the vehicle stalls going uphill.

9.3 Sand Driving

- Speed and flotation are important for successful driving on sand. High transmission gear ratio is best, if possible.
- Lower the tire pressure to 20 psi to increase the surface area of tire on the road. When a lower tire pressure is used, the vehicle must be operated at a lower speed. Remember to re-inflate the vehicle tires as soon as the vehicle is back on hard ground.
- Drive in existing wheel tracks if they are present, because the sand in those locations may be more compacted.
- Avoid sudden changes in direction or acceleration. Coast to a stop if possible.
- Approach dunes head on.
- Avoid braking when descending a dune. Point the front of the vehicle downhill. Do not go fast, but also do not go so slow that the wheels stop rolling, or the vehicle begins to slide sideways. A touch on the throttle will keep the wheels moving and the vehicle pointing in the right direction. Be aware that anti-locking braking systems (ABS) may engage which could cause the vehicle to continue to slide down a hill or slope.
- Try to rock the vehicle backwards or forwards, building up a small stretch of hardpack sand from which the vehicle can accelerate if it gets stuck. Do not spin the wheels.
- Be sure that recovery gear is always in the vehicle in these driving conditions.

9.4 Snow, Rain, and Ice Driving

- Carry chains and install them on the tires when required.
- Prepare the vehicle with appropriate safety gear (see section 8 for a preliminary list).
- Travel only on roads and tracks that are open to traffic.
- Do not travel when visibility is poor.
- Vehicles travelling uphill in snow and ice conditions have right of way.
- Park only where directed and as close to the bank as possible. When parking, leave the vehicle in gear. Do not use the handbrake - it could freeze in the "on" position.
- Lift the wiper blades off the windshield when leaving the vehicle parked.

- Watch for other travelers and animals and drive slowly in areas where they may be present. In the event that an animal is encountered on a road where driving conditions are poor due to the presence of snow, ice, or rain, do not over steer to avoid hitting the animal. The act of over steering may cause the vehicle to slide or roll. Most of the time the animal will move out of the road before the vehicle reaches it.
- Consider increasing the load or weight on the rear axle of front-wheel drive vehicles to improve traction when driving in snow, ice, or rain.

9.5 Driving in Mud

- Good tires with deep tread are helpful when driving in muddy conditions.
- Low second or third gears are the best gears for vehicle operation.
- Where appropriate, move the steering wheel rapidly from side to side to improve traction.
- Keep a steady pace.
- Stay out of ruts if possible.
- Rock the vehicle backwards or forwards by alternating between first and reverse if it becomes stuck.

9.6 Driving in Fog/Limited Visibility

- Drive with low beam lights on.
- Drive slowly and carefully.
- If visibility is poor, pull over to a safe location until weather improves if the vehicles in front or behind cannot be seen.

10.0 RELATED GOLDER DOCUMENTS

- Golder Motor Vehicle Policy
- HSE 200.023 SWP Cellular Telephone
- SWP 200.012. SWP Remote Work-Working Alone
- HSE 200.028 SWP All-Terrain Vehicles
- HSE 200.049 SWP Mine General Safety
- HSE 200.043 SWP Snowmobile Safety
- Golder Associates Inc. DOT Driver and Vehicle Program

Approved by	Jane Mills	Issue Date	August 31, 2012
Revision by	Amanda Cote	Revision Date	January 2, 2015

1.0 SCOPE

This Standard Work Procedure (SWP) applies to all Golder Associates Inc. (Golder) employees working on project sites where trenching, excavations and/or shoring may be present or identified as an activity for the project in the work plan.

2.0 TRENCHING, SHORING AND EXCAVATION SUMMARY

The Occupational Safety and Health Administration (OSHA) reports that two workers are killed every month in trench collapses. Cave-ins pose the greatest risk to workers and cause the highest number of excavation-related fatalities. Other potentially fatal hazards related to excavations include falling loads, exposure to hazardous atmospheres, and incidents involving mobile equipment. Working near underground utilities poses electrocution and/or explosion hazards and must be properly managed to prevent contact.

Some excavations and trenches may meet the OSHA definition for a "confined-spaces". The OSHA definition of a confined space and procedures for working within them is provided in Golder's Confined Space SWP (GAI HSE 200.006).

The following risk control measures must be addressed (in addition to any confined space requirements) prior to commencing any trenching, shoring or excavation work.

- Complete the Trenching/Excavation Daily Inspection Checklist (Appendix A).
- Conduct an underground utility locate prior to initiating any ground disturbance activities as required by applicable regulations and Golder's SWP (GAI HSE 200.017). Underground utilities may include natural gas, water, sewer, stormwater, communication, and electric services.
- No excavation shall be entered without an inspection by a competent person to determine the stability of the excavation walls.
- Any excavation, including test pits, greater than (4 feet) deep must comply with applicable state and federal requirements for acceptable angle of repose and/or shoring before entry. A competent person must evaluate soil conditions to determine the acceptable angle of repose and to designate the need for any required protective systems or structures prior to entry. Excavations need to be properly sloped or benched to prevent cave-ins. Additional precautionary measures may include the use of a trench shield or engineered shoring system.
- Equipment and excavated material must be kept at a minimum of (2 feet) from edge of the trench.
- Employees must <u>always</u> wear a hard hat while in an excavation.

Standing or walking on braces or stringers has a high risk of accident. This practice is strongly discouraged. Employees must assess the hazard for each specific situation.

3.0 DEFINITIONS (EXCERPTED FROM 29 CFR 1926 SUBPART P)

Aluminum Hydraulic Shoring A pre-engineered shoring system comprised of aluminum hydraulic cylinders (cross braces) used in conjunction with vertical rails (uprights) or horizontal rails (wales). Such system is designed specifically to support the sidewalls of an excavation and prevent cave-ins.

Benching/ Benching System Benching system means a method of protecting employees from cave-ins by excavating the sides of an excavation to form one or a series of horizontal levels or steps, usually with vertical or near-vertical surfaces between levels.

Cave-In The separation of a mass of soil or rock material from the side of an excavation, or the loss of soil from under a trench shield or support system, and its sudden movement into the excavation, either by falling or sliding, in sufficient quantity so that it could entrap, bury, or otherwise injure and immobilize a person.

Competent Person A competent person is capable of identifying existing and predictable hazards in the surroundings, or working conditions that are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them. A competent person should have and be able to demonstrate the following:

- Training, experience, and knowledge of soil analysis, use of protective systems, and requirements of 29 Code of Federal Regulations (CFR) 1926 Subpart P.
- Conditions that could result in cave-ins, failures in protective systems, hazardous atmospheres, and other hazards including those associated with confined spaces.
- Authority to take prompt corrective measures to eliminate existing and predictable hazards and to stop work when required.

Excavation Any man-made cut, cavity, trench, or depression in an earth surface, formed by earth removal and is usually deeper than it is wide.

Failure The breakage, displacement, or permanent deformation of a structure of component of a structure used as a protective system.

Hazardous Atmosphere An atmosphere that is immediately dangerous to human safety or health. Hazardous atmospheres can include explosive, flammable, toxic, corrosive, oxidizing, and, oxygen deficient or rich environments.

Protective System A method of protecting people in a trench or excavation by preventing cave-ins. Protective systems can include benching, sloping, and shield systems, or any type of structural controls used to prevent a cave-in. Protective systems by be designed by a registered professional engineer.

Registered Professional Engineer A registered professional engineer is a person who is registered as a professional engineer in the state where the work is to be performed. However, a professional engineer, registered in any state is deemed to be a "registered professional engineer" within the meaning of this standard when approving designs for "manufactured protective systems" or "tabulated data" to be used in interstate commerce.

Shield (shield system) A structure that is able to withstand the forces imposed on it by a cave-in and thereby protects employees within the structure. Shields can be permanent structures or can be designed to be portable and moved along as work progresses. Additionally, shields can be either pre-manufactured or job-built in accordance with 29 CFR 1926.652(c)(3) or (c)(4). Shields used in trenches are usually referred to as "trench boxes" or "trench shields."

Shoring (shoring system) A structure such as a metal hydraulic, mechanical or timber shoring system that supports the sides of an excavation and which is designed to prevent cave-ins.

Sloping (sloping system) A method of protecting employees from cave-ins by excavating to form sides of an excavation that are inclined away from the excavation so as to prevent cave-ins. The angle of incline varies with differences in such factors as the soil type, environmental conditions of exposure, and application of surcharge loads.

Stable Rock A solid mineral material that will remain intact after an excavation. Un-stable rock can be considered stable after the sides are secured against caving-in or movement by use of rock bolts or another protective system.

Tabulated Data Are tables and charts used to design and construct a protective system. Tabulated date must be approved by a registered professional engineer.

Trench (trench excavation) A narrow excavation (in relation to its length) made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench is not greater than 15 feet. If forms or other structures are installed or constructed in an excavation as to reduce the dimension measured from the forms or structure to the side of the excavation to 15 feet or less, the excavation is also considered to be a trench.

Uprights The vertical structures in a trench shoring system. These structures must be placed within contact of the sides of the trench and do not contact each other.

Wales The horizontal structures in a trench shoring system and are parallel to the sides of the trench and uprights.

4.0 GENERAL REQUIREMENTS

All excavations shall be made in accordance with the rules, regulations, requirements, and guidelines set forth in the OSHA standard on Excavations, 29 CFR 1926.650, .651, and .652, except where otherwise noted below. The following requirements relate to trenching, shoring and excavation project work.

4.1 Competent Person Responsibility

The competent person is responsible for all personnel in the trench at all times. At no time shall a person enter a trench without the authorization of the competent person. If an order to evacuate or not enter is given by the competent person is given, it shall be obeyed immediately. The competent person shall:

- Perform any trenching/excavation daily inspection checklist (appendix A) is completed prior to each day's activities and prior to any personnel entry.
- Conduct at least one manual and one visual test is completed prior to any entry (if tests are not completed, soil must be classified as Type "C").
- Verify that underground utilities have been located and that the marks are current and understood by everyone working in the area.
- Verify that any shielding or shoring that is used is adequate and that the tabulated data sheet is on site and matches the trench being used.
- Verify that all structures, buried utilities, and/or other surface encumbrances (e.g., sidewalks, trees, fences etc.) are properly supported at all times and do not pose a risk to employees in the trench.
- The competent person shall conduct and document inspections:
  - Daily and before the start of each shift.
  - As dictated by the work being done in the trench.
  - After every rain storm or other water intrusion event.
  - After other events that could increase hazards, such as a snowstorm, windstorm, thaw, earthquake, dramatic change in weather, etc.
  - When fissures, tension cracks, sloughing, undercutting, water seepage, bulging at the bottom, or other similar conditions occur.
  - When there is a change in the size, location, or placement of the spoil pile.
  - When there is any indication of change or movement in adjacent structures.
  - For excavations 4 feet or greater in depth, a trench inspection form shall be filled out for each inspection.

4.2 Utility Locates

State law requires any person or company involved in subsurface work to contact the call center that dispatches locate requests to utilities (e.g., Call Before You Dig, One-Call, Dig-Safe) prior to commencing subsurface activities. The approximate location of subsurface installations, such as sewer, telephone, fuel, electric, water lines, or any other subsurface installations that reasonably may be expected to be encountered during excavation work, shall be determined by the locator prior to opening an excavation.

- Utilities will be called in for additional locates every 30 days (or more frequently as required by local regulations) or if any of the conditions below exist. Utility locates are expired from previous ticket.
- Utility locate marks are gone or no longer legible even though ticket dates are still within the 30 day boundary.

- Utility locates are called in by a different company/firm.
- Belief that there are additional utilities in the area other than those marked.
- Excavation boundary is approaching edge of locate area or work area has been changed or enlarged.

5.0 SOIL TYPES AND TESTING METHODS

The competent person in charge of the excavation shall be responsible for determining whether the soil is Type B or C. If the competent person wants to classify the soil as Type C, no testing is needed. However, tests must be conducted to determine if the soil can be classified as Type B. To do this, the competent person shall use a visual test coupled with one or more manual tests.

5.1 Soil Types

Type A (most stable) - Clay, silty clay, and hardpan (resists penetration). No soil is Type A if it is fissured, is subject to vibration of any type, has previously been disturbed, or has seeping water.

Type B (medium stability) - Silt, sandy loam, medium clay and unstable dry rock; previously disturbed soils unless otherwise classified as Type C; soils that meet the requirements of Type A soil, but are fissured or subject to vibration.

Type C (least stable) - Gravel, loamy sand, soft clay, submerged soil or dense, heavy unstable rock, and soil from which water is freely seeping.

Layered geological strata **(where soils are configured in layers)** - The soil must be classified on the basis of the soil classification of the weakest soil layer. Each layer may be classified individually if a more stable layer lies below a less stable layer, i.e., where a Type C soil rests on top of stable rock.

Because most excavations will be conducted in order to repair / replace existing pipelines or equipment (i.e., the soil has been previously disturbed), **excavations shall be made to meet the requirements for Type B or Type C soils only**, as appropriate.

5.2 Visual Soil Test

In addition to checking the items on the trench inspection form, the competent person should perform a **visual test** to evaluate the conditions around the site. In a visual test, the entire excavation site is observed, including the soil adjacent to the site and the soil being excavated. The competent person also checks for any signs of vibration.

During the visual test, the competent person should check for crack-line openings along the failure zone that would indicate tension cracks, look for existing utilities that indicate that the soil has been previously

disturbed, and if so, what sort of backfill was used and observe the open side of the excavation for indications of layered geologic structuring.

This person should also look for signs of bulging, boiling, or sloughing, as well as for signs of surface water seeping from the sides of the excavation or from the water table.

In addition, the area adjacent to the excavation should be checked for signs of foundations or other intrusions into the failure zone, and the evaluator should check for surcharging and the spoil distance from the edge of the excavation. Excavated soils and other materials must be kept a minimum of 2 feet from trench or excavation edges.

5.3 Manual Soil Test

5.3.1 *Thumb Penetration Test*

Attempt to press the thumb firmly into the soil in question. If the thumb penetrates no further than the length of the nail, it is probably Type B soil. If the thumb penetrates the full length of the thumb, it is Type C. It should be noted that the thumb penetration test is the least accurate testing method.

5.3.2 *Dry Strength Test*

Take a sample of dry soil. If it crumbles freely or with moderate pressure into individual grains, it is considered granular (Type C). Dry soil that falls into clumps that subsequently break into smaller clumps (and the smaller clumps can only be broken with difficulty), it is probably clay in combination with gravel, sand, or silt (Type B).

5.3.3 *Plasticity or Wet Thread Test*

Take a moist sample of the soil. Mold it into a ball and then attempt to roll it into a thin thread approximately 1/8 inch in diameter by two inches in length. If the soil sample does not break when held by one end, it may be considered Type B.

A pocket penetrometer, shear vane, or torvane may also be used to determine the unconfined compression strength of soils. The data readings and comparative soil types are found on the daily trench inspection log sheet.

6.0 SPOIL

Soils that have been removed from the ground are referred to as spoil. Temporary spoil shall be placed no closer than 2 feet from the surface edge of the excavation, measured from the nearest base of the spoil to the cut. This distance should not be measured from the crown of the spoil deposit. This distance

requirement help maintain that any loose rock or soil from the temporary spoil will not fall on workers in the trench and minimizes the risk to the excavation walls posed by the weight of the spoil pile. Scaling or installation of protective barriers may be required to stop or contain falling materials.

- Spoils should be placed so that it channels rainwater and other run-off water away from the excavation. Spoils should be placed so that it cannot accidentally run, slide, or fall back into the excavation.
- That the weight of the spoil does not cause the side of the excavation to give way.
- Permanent spoil should be placed some distance from the excavation.

7.0 SURFACE CROSSING OF TRENCHES

Surface crossing of trenches should not be made unless absolutely necessary. However, if necessary, they are only permitted under the following conditions:

- Vehicle crossings must be designed by and installed under the supervision of a registered professional engineer.
- Walkways or bridges must:
  - have a minimum clear width of 20 inches,
  - be fitted with standard rails,
  - be maintained free of obstacles, materials, tools, or trash, and
  - extend a minimum of 24 inches past the surface edge of the trench.

8.0 INGRESS AND EGRESS

- Trenches 4 feet or more in depth shall be provided with a fixed means of ingress/egress.
- Spacing between ladders or other means of ingress/egress must be such that a worker will not have to travel more than 25 feet laterally to the nearest means of ingress/egress.
- Ladders must be secured and extend a minimum of 36 inches above the landing.
- Metal ladders should not be used when electric utilities are present.
- Benches are not considered ingress/egress.

9.0 EXPOSURE TO VEHICLES

Workers exposed to vehicular traffic shall be provided with and required to wear reflective vests or other suitable garments marked with or made of reflectorized or high-visibility materials.

The following steps should be taken to prevent vehicles from accidentally falling into the trench:

- Trained flag persons, signs, signals, and barricades shall be used to prevent a vehicle from falling into the trench, getting within 2 feet of the edges, and to protect persons working near the surface of the trench.

- Barricades must be installed where necessary.
- Hand or mechanical signals must be used as required.
- Trenches left open overnight shall be fenced and barricaded.

10.0 EXPOSURE TO FALLING LOADS

- All workers working in an excavation or trench must wear hard hats.
- Workers are not allowed to work under suspended or raised loads and materials.
- Workers are not allowed to work under loads being lifted or moved by heavy equipment used for digging or lifting.
- Workers are required to stand away from equipment that is being loaded or unloaded to avoid being struck by falling materials or spillage.
- Equipment operators or truck drivers may remain in their equipment during loading and unloading if the equipment is properly equipped with a cab shield or adequate canopy to provide protection.
- Adequate protection will be in place to prevent injury to falling objects/loads including spoil piles, tools, pipes, or other objects from being at least 2 feet away from the edge of the trench.

11.0 WARNING SYSTEMS FOR MOBILE EQUIPMENT

When mobile equipment is operated adjacent to an excavation, or when such equipment is required to approach the edge of an excavation, and the operator does not have a clear and direct view of the edge of the excavation, a warning system shall be utilized such as barricades, hand or mechanical signals, or stop logs. If possible, the direction of the ground surface gradient should be away from the excavation.

12.0 HAZARDOUS ATMOSPHERES AND CONFINED SPACES

Employees shall not work in hazardous and/or contaminated atmospheres unless conditions have been assessed by a qualified person and appropriate controls have been established. Testing and controls shall be put in place to prevent exposure to harmful levels of atmospheric contaminants and to assure acceptable atmospheric conditions. Contaminated atmospheres include those with:

- Less than 19.5% oxygen or greater than 23.5%oxygen.
- A combustible gas concentration greater than 10% of the Lower Explosive Limit (LEL) or Lower Flammable Limit (LFL).
- Concentrations of hazardous substances that exceed established limit values such as permissible exposure limits (PELs) and Threshold Limit Values (TLVs) for airborne contaminants established by the American Conference of Industrial Hygienists (ACGIH).
- All operations involving such atmospheres must be conducted in accordance with OSHA requirements for occupational health and environmental controls for personal protective equipment and for lifesaving equipment. Engineering controls (such as ventilation) and respiratory equipment may be required.

Emergency rescue equipment, such as breathing apparatus, a safety harness and line, or a basket stretcher, shall be readily available where hazardous atmospheric conditions exist or may reasonably be expected to develop during work in an excavation. This equipment shall be attended when in use.

13.0 TESTING FOR ATMOSPHERIC CONTAMINANTS

If there is any possibility that the trench or excavation could contain a hazardous atmosphere, atmospheric testing must be conducted prior to entry. Conditions that might warrant atmospheric testing would be if the excavation was made in a landfill area or if the excavation was crossed by, was adjacent to, or contained pipelines containing a hazardous material (for example, natural gas lines).

- Testing should be conducted before workers enter the trench and should be done regularly to monitor that the trench remains safe. The frequency of testing should be increased if equipment is operating in the trench.
- Testing frequency should also be increased if welding, cutting, or burning is done in the trench or if internal combustion engine-driven equipment is operated in or near the trench or excavation.
- Workers required to wear respiratory protection must be trained, fit-tested, and enrolled in a respiratory protection program.
- Some trenches qualify as confined spaces. When this occurs, compliance with Golder's Confined Space Program is also required. (GAI HSE 200.006)

When testing for air quality OSHA requires the following testing to be performed within the following order (from top to bottom):

- Oxygen Content. The oxygen meter shall be calibrated in ambient air to 20.9 percent oxygen. Supplied air will be required if the reading are less than less than 19.5 or greater than 23.5 percent oxygen.
- Flammability. Flammable gases and vapors must not be in excess of 10 percent of the chemical LEL.
- Toxicity. The toxicity of the air is determined by the Permissible Exposure Limit (PEL) set by OSHA. Any air toxicity that does not have an OSHA PEL will use the Threshold Limit Value (TLV) set by the ACGIH.

14.0 STANDING WATER AND WATER ACCUMULATION

Employees shall not work in excavations in which there is accumulated water, or in excavations in which water is accumulating, unless adequate precautions have been taken to protect employees against the hazards posed by water accumulation. Methods for controlling standing water and water accumulation must be provided and should consist of the following if employees must work in the excavation:

- Use of special support or shield systems approved by a registered professional engineer.
- Water removal equipment, such as pumps, used and monitored by a competent person.

- Workers removed from the trench during rainstorms.
- Trenches carefully inspected by a competent person after each rain, water intrusion event and before workers are permitted to re-enter the trench.

15.0 BENCHING, SLOPING, SHORING AND SHIELDING

All excavations or trenches 4 feet or greater in depth shall be appropriately benched, shored, or sloped according to the procedures and requirements set forth in the OSHA Excavation standard, 29 CFR 1926.650, .651, and .652.

- Trenches 5 feet deep or greater require a protective system unless the excavation is made entirely of stable rock. If less than 5 feet deep, a competent person may determine that a protective system is not required.
- Excavations or trenches 20 feet deep or greater must have a protective system designed by a registered professional engineer.
- Where the stability of adjoining buildings, walls, or other structures is endangered by excavation operations, support systems such as shoring, bracing, or underpinning shall be designed by a registered professional engineer and installed to ensure the stability of such structures for the protection of employees.
- Sidewalks and pavement shall not be undermined unless a support system or another method of protection is provided to protect employees from their possible collapse.
- Employees must not work on the faces of sloped or benched excavation at levels above other workers except when employees at the lower levels are adequately protected from the hazards of falling, rolling or sliding materials or equipment.

15.1 Benching

There are two basic types of benching: single and multiple, which can be used in conjunction with sloping.

- In Type B soil, the vertical height of the benches must not exceed 4 feet. Benches must be below the maximum allowable slope for that soil type. In other words, a 10-foot deep trench in Type B soil must be benched back 10 feet in each direction, with the maximum of a 45-degree angle.
- *Benching is not allowed in Type C soil.*

15.2 Sloping

Maximum allowable slopes for excavations less than 20 feet based on soil type and angle to the horizontal are as follows:

Soil Type	Height/depth ratio	Slope angle
Type B	1:1	45 degrees
Type C	1 1/2:1	34 degrees

A 10-foot-deep trench in Type B soil would have to be sloped to a 45-degree angle, or sloped 10 feet back in both directions. Total distance across a 10-foot-deep trench would be 20 feet, plus the width of the bottom of the trench itself. In Type C soil, the trench would be sloped at a 34-degree angle, or 15 feet back in both directions for at least 30 feet across, plus the width of the bottom of the trench itself.

15.3 Shoring

Shoring or shielding is used when the location or depth of the cut makes sloping back to the maximum allowable slope impractical. There are two basic types of shoring: timber and aluminum hydraulic.

- All shoring shall be installed from the top down and removed from the bottom up.
- Hydraulic shoring shall be checked at least once per shift for leaking hoses and/or cylinders, broken connections, cracked nipples, bent bases, and any other damaged or defective parts.
- The top cylinder of hydraulic shoring shall be no more than 18 inches below the top of the excavation. The bottom of the cylinder shall be no higher than four feet from the bottom of the excavation. (Two feet of trench wall may be exposed beneath the bottom of the rail or plywood sheeting, if used.)
- Three vertical shores, evenly spaced, must be used to form a system. Wales are installed no more than two feet from the top, no more than four feet from the bottom, and no more than four feet apart, vertically.
- Hydraulic shores must be installed in accordance with 29 CFR 1926 Subpart P App D “Aluminum Hydraulic Shoring for Trenches”.
- Hydraulic shores must be installed with sheeting in accordance with 29 CFR 1926 Subpart P App D “Aluminum Hydraulic Shoring for Trenches”.

15.4 Shielding

Trench boxes are different from shoring because, instead of shoring up or otherwise supporting type trench face, they are intended primarily to protect workers from cave-ins and similar incidents. Trench boxes are also known as trench shields.

- The excavated area between the outside of the trench box and the face of the trench should be as small as possible. **The space between the trench box and the excavation side must be backfilled to prevent lateral movement of the box.** Shields may not be subjected to loads exceeding those which the system was designed to withstand.
- Trench boxes are generally used in open areas, but they also may be used in combination with sloping and benching.
- The box must extend at least 18 inches above the surrounding area if there is sloping toward the excavation. This can be accomplished by providing a benched area adjacent to the box.
- Any modifications to the shields must be approved by the manufacturer.

- Shields may ride two feet above the bottom of an excavation, provided they are calculated to support the full depth of the excavation and there is no caving under or behind the shield.
- Workers must enter and leave the shield in a protected manner, such as by a ladder or ramp.
- Workers may not remain in the shield while it is being installed, removed or moved.
- Standing or walking on braces or stringers is strictly prohibited.

Note: All shoring and shielding equipment will be inspected by the competent person prior to use, while in use, and upon removal. This inspection will include a thorough review of all components, parts, and any other section(s) of the device to verify that it will not fail during use. Any defective equipment will be removed from service immediately and tagged out or destroyed to prevent reuse. All repairs will be completed and approved by a professional engineer licensed in the state to which repairs are made.

16.0 PERSONAL PROTECTIVE EQUIPMENT

Employees entering bell-bottom pier holes, or other similar deep and confined footing excavations, shall wear a harness with a lifeline securely attached to it. The lifeline shall be separate from any line used to handle materials, and shall be individually attended at all times while the employee wearing the lifeline is in the excavation.

17.0 TRAINING

Employees who are involved in the excavation operation and exposed to excavation operation hazards shall be trained in the excavator notification and excavation practices.

18.0 APPLICABLE REGULATORY REFERENCES

- 29 CFR 1926.650 “Scope, Application, and definitions applicable to this subpart”.
- 29 CFR 1926.651 “Specific Excavation Requirements”.
- 29 CFR 1926.652 “Requirements for Protective Systems”.

19.0 29 CFR 1926 SUBPART P APPENDICES A-FRELATED GOLDER DOCUMENTS

- GAI HSE 200.006 SWP Confined Space
- GAI HSE 200.014 SWP Slips Trips and Falls
- GAI HSE 200.017 SWP Underground Utilities

APPENDIX A
TRENCHING/EXCAVATION INSPECTION FORM

Golder Associates

TRENCHING/EXCAVATION INSPECTION

LOCATION:		COMPETENT PERSON:
PROJECT #:	DATE:	WEATHER CONDITIONS:

DIMENSIONS

DEPTH:	TOP L:	TOP W:	BOTTOM L:	BOTTOM W:

UTILITIES	Y	N	N/A
Location(s) marked (public/private)	☐	☐	☐
Date of last locate:			

HAZARDOUS CONDITIONS	Y	N	N/A
Saturated soil / standing or seeping Water	☐	☐	☐
Cracked or fissured wall(s)	☐	☐	☐
Bulging wall(s)	☐	☐	☐
Floor heaving	☐	☐	☐
Frozen soil(s)	☐	☐	☐
Vibration	☐	☐	☐
Other:	☐	☐	☐

WATER	Y	N	N/A
Water Control	☐	☐	☐
Rain/Snow since last inspection	☐	☐	☐
Surface water diverted/protected against	☐	☐	☐
Employee(s) protected from water accumulation	☐	☐	☐
Pumping equipment inspected & functioning	☐	☐	☐

OTHER	Y	N	N/A
Spoils Pile >2ft away from edge	☐	☐	☐
Surface encumbrances protected/supported	☐	☐	☐
Equipment warning(s) in place	☐	☐	☐
Correct PPE	☐	☐	☐

LADDER(S)	Y	N	N/A
Within 25ft of employee(s)	☐	☐	☐
Secured	☐	☐	☐
Extends 3ft above the landing	☐	☐	☐

PROTECTION SYSTEM	Y	N	N/A
Hydraulic Shores	☐	☐	☐
Shielding	☐	☐	☐
Horizontal Whalers	☐	☐	☐
Timber Shores	☐	☐	☐
Benching	☐	☐	☐
TDS on site for shoring/shielding	☐	☐	☐
Does trench match TDS	☐	☐	☐
Slope (Circle H:V)	½:1	¾:1	1:1	1½:1

ATMOSHPERE	Y	N	N/A
Risk of hazardous atmosphere*	☐	☐	☐
Air monitoring in place	☐	☐	☐
Air ventilation in place	☐	☐	☐

OTHER	Y	N	N/A
Trench crossing >6ft have handrails	☐	☐	☐
Isolated open trenches protected	☐	☐	☐
Overnight open trenches protected	☐	☐	☐
Correct traffic control	☐	☐	☐

***If there is a risk of hazardous atmospheres, the confined space SWP must be followed and a confined space permit must be completed and accompany this form.**

SOIL CONDITION / SOIL TYPE (Circle method used and result obtained below)

DATE AND TIME INSPECTED:	SOIL TYPE IDENTIFIED:

Manual Tests

Testing Device/Method	Class C Soil	Class B Soil	Class A Soil
Torvane Shear	0-0.5 tsf	0.5-1.5 tsf	1.5< tsf
Penetrometer	0-0.5 tsf	0.5-1.5 tsf	1.5< tsf
Thumb test	Easy to Penetrate	Effort to Penetrate	Difficult to Penetrate
Roll test (2" long, 1/8" diameter)	Does Not Hold	Will Hold Without Tearing	N/A

Visual Tests

	Y	N	N/A	Advice
Are there visual cracks/spalling/sloughing	☐	☐	☐	If yes then conditions are unsafe/use adequate protection
Are there large clumps in the spoils pile	☐	☐	☐	Indication of Type B soil, further testing needed
Is there water in the trench	☐	☐	☐	Immediately classify as type C soil
Potential vibration risks	☐	☐	☐	Downgrade rating and increase shielding/shoring/slope

TRENCHING/EXCAVATION INSPECTION

Sketch of excavation and describe any changing conditions, plans or shoring equipment damage:

NOTE		TO BE FILLED OUT BY COMPETENT PERSONNEL **Excavation Entry Authorized By:**
	All unsafe conditions must be corrected prior to trench entry. If any hazardous conditions are observed, the trench must be immediately evacuated and no one allowed to re-enter until corrective actions have been taken. A new trench permit shall be issued.	**Person in Charge at Site (sign and print name)** **Date**

Approved by	Jane Mills	Issue Date	June 20, 2014
Revision by	Amanda Cote	Revision Date	January 12, 2015

1.0 SCOPE

This Standard Work Procedure (SWP) applies to all Golder Associates Inc. (Golder) employees working in areas where an injury that requires first-aid care may occur or where emergency medical services may be slow to respond or not available. This SWP is intended to represent minimum standards and does not supersede requirements of local agencies or jurisdictions.

2.0 FIRST-AID/CPR/AED

Golder recognizes the value of training our employees to respond to emergency situations, including those situations involving an injury. Golder employees are not required to provide first-aid as a routine part of their job duties. In the event of a life threatening emergency, Golder employees are trained to contact professionally trained Emergency Medical Technicians (EMTs) through the local 911 system or other site-specific emergency contact numbers listed in the site-specific Health, Safety, and Environment Plan (HASEP).

In accordance with OSHA General Industry and Construction standards, at least one Golder employee on every field project site shall be designated as a first-aid provider if EMT services are not readily available (less than 10 minute response). Field personnel are trained in First-Aid/CPR/AED to provide on-site first-aid in the absence of EMTs. This training is required for field personnel because many client work sites do not have an infirmary, clinic, or hospital in near proximity to the workplace that is used for the treatment of injured employees. Additionally, adequate first-aid supplies are provided to field employees, to respond to reasonably anticipated injuries.

3.0 FIRST-AID FACILITIES

3.1 Classification of First-Aid Kits

Under the American National Standards Institute (ANSI) standard, Z308.1-2009, first-aid kits are divided into four different categories or classifications:

- **Type I:** Intended for use in stationary, indoor applications where kit contents have minimal potential for damage. These kits are not intended to be portable and should have a means for mounting in a fixed position. Some applications for Type I first-aid kits are general indoor use, office use, or in a light manufacturing facility. First-aid cabinets would fall in this classification.
- **Type II:** Intended for use in portable indoor applications. Kit contents should have minimal potential for damage. These kits should be equipped with a carrying handle. Some applications for Type II first-aid kits are general indoor use, office, or manufacturing environments.

- **Type III:** Intended for portable use in mobile industries and/or outdoor applications. Kits should be moisture resistant, equipped with a carrying handle, have the means for being mounted in a fixed position, and should also be corrosion resistant. Transportation industry or construction jobs present typical applications for Type III first-aid kits.
- **Type IV:** Intended for portable use in the mobile and/or outdoor applications where the potential for damage to the kit contents due to environmental factors and rough handling is significant.

3.2 Basic Fill Contents for Type I, II, III, and IV First-Aid Kits

All first-aid kits meeting the first-aid standard of ANSI Z308.1-2009 should contain the first-aid items listed in Section 6.1, Table 1 of the standard and included in Appendix A of this SWP. The quantity and size specifications of these components are the minimum necessary to comply.

In addition to the minimum contents listed in the standard, a kit should have recommended items added based upon specific workplace hazards. Additional supplies may include oral analgesics, antibiotic treatments, compress bandages, Cardiopulmonary Resuscitation (CPR) barriers, burn dressings, cold packs, eye covers, eyewash, and a roller bandage.

3.3 Providing and Inspecting First-Aid Supplies

The contents of the first-aid kits shall be checked before being sent out to each job site by the HSC, Project Manager, or the Site Safety Officer (SSO)/Site Supervisor, and should contain at least Type III or Type IV contents. For long-term projects, weekly on-site inspections shall be conducted by the SSO to make sure the first-aid supplies are intact and/or that any expended/expired items are replaced. First-aid supplies should be stored in a weather-proof container (if being brought into the field) with individually sealed packages of each item.

First-aid stations are required when there are 50-200 persons working at a field worksite, in each permanent Golder office location, in each temporary project trailer that Golder may rent/lease, and in each Golder laboratory location. The stations must be located as close as practicable to the highest concentration of personnel. First-aid stations must be well marked and available to personnel during all working hours. One first-aid kit may be a permanent wall-mounted kit, but in all cases the station shall be equipped with at least one portable first-aid kit (kits within field vehicles may be used to meet this requirement).

- Maintenance of first-aid kits stationed within the office is the responsibility of the HSC or their designee.
- Maintenance of first-aid kits in the laboratory is the responsibility of the lab manager.
- Maintenance of first-aid kits in field vehicles, or otherwise established first-aid stations, where required, is the responsibility of the Project Manager or Site Supervisor or their designee for the project.

3.4 Emergency Eyewash and Shower Equipment

Where the eyes or body of any employee may be exposed to injurious corrosive materials, emergency eye wash provisions (eyewash station or portable kits) for quick drenching or flushing of the eyes and body must be provided. Depending on the potential hazard, facilities or bottled eyewash shall be capable of providing copious amount (15 minutes) of potable water at a suitable temperature, generally between 60 degrees F and 105 degrees F. Facilities must be provided for immediate emergency use in the laboratory and near the work area or office trailer for field-related activities. Facilities shall meet and be inspected following ANSI Z358.1-2009.

4.0 AUTOMATED EXTERNAL DEFIBRILLATORS

4.1 Definitions

Automated External Defibrillator (AED): An external defibrillator is capable of cardiac rhythm analysis and will charge and deliver a shock if needed to restore normal heart rhythm.

Cardiopulmonary Resuscitation (CPR): An emergency live-saving procedure employed when someone's breathing or heartbeat has stopped. Through CPR the heart and lungs are made to work by manually compressing the chest overlying the heart and forcing air into the lungs. CPR is used to maintain circulation when the heart stops functioning.

4.2 Using an AED

Golder's offices with more than one employee are expected to have an AED available for use, either in the office or in the building where Golder is a tenant. AEDs should be stored in locations that are easily accessed and clearly labeled. When an AED is acquired, the applicable local emergency communication center or dispatch center (such as 911) should be notified about the existence, the storage location, and type of AED(s). In some locations, written notification or registry with a state agency may be required.

Golder's AEDs will be maintained, tested, and inspected according to the manufacturer's operational guidelines. Inspections will be conducted at least every 30 days. Written inspection records will be maintained in every office with an AED.

Anyone who may use an AED must receive CPR/AED training from the American Red Cross, American Heart Association, or equivalent with a demonstrated proficiency. Where local regulations require, use of the AED will be limited to people who have received the appropriate training. Training records will be maintained for each office location.

When an AED is used to provide emergency assistance to someone experiencing cardiac arrest, the local emergency medical services must also be notified as soon as possible. A written report documenting the

incident will be prepared and submitted to Golder's supervising physician for review. If required by state regulations, a physician will review these AED procedures and recommend modifications as necessary to comply with applicable regulations.

5.0 EMERGENCY ACTION PLANS

The HASEP or office Emergency Action Plan shall identify the emergency action plan for transporting an injured person to a physician or hospital. In the event that the work area is not served by emergency services (i.e., "911"), a list of the telephone numbers and addresses of doctors, hospitals, and ambulance services shall be posted at each first-aid station or within the field vehicle(s). For field operations, the list shall also include the physical address of the worksite.

For work in remote locations or where medical care may be sub-standard, please reference GAI HSE 200.012 SWP Remote Work-Working Alone.

6.0 OSHA'S BLOODBORNE PATHOGENS REQUIREMENTS

The Occupational Safety and Health Administration (OSHA) promulgated regulations (29 CFR 1910.1030 Bloodborne Pathogens [BBP]) to protect employees who may be occupationally exposed to blood and other potentially infectious materials. The primary concerns include protection from exposure to the Human Immunodeficiency Virus (HIV) and Hepatitis B virus (HBV), which may be present in infected individuals' body fluids. For the purposes of the BBP Standard, occupational exposure means "reasonably anticipated skin, eye, mucous membrane, or parenteral contact with blood or other potentially infectious materials that may result from the performance of the employee's duties."

7.0 BBP EXPOSURE CONTROL PLAN

This SWP will serve as Golder's Exposure Control Plan. Where applicable, the Exposure Control Plan will be documented within the site-specific HASEP and within the corporate Health and Safety Orientation Manual and Injury and Illness Prevention Program. The Plan will also be maintained on the company intranet and will be available to any employee upon request. All employees will have access to a copy of the Exposure Control Plan in accordance with 29 CFR 1910.1020(e).

OSHA's BBP regulations require that employees "treat all human blood and other potentially infectious materials **as if they were infectious (i.e., universal precautions)**." In the event that an employee does administer CPR or render first-aid involving the presence of blood or other potentially infectious materials, occupational exposure as defined above is presumed. While there is some risk associated with any contact with another human being's body fluids, the risk associated with providing emergency first-aid is low and the measures set out below are intended to reduce the risk even further. The direct life-saving benefits of immediate emergency assistance (e.g., administering CPR to a heart attack victim or

controlling severe bleeding in traumatic injury cases), far outweigh the risks associated with properly administered assistance. First-aid providers shall take reasonable and universal precautions to limit contact with the victim's body fluids.

After providing first-aid care, do not eat anything, use tobacco products, or touch your eyes until you thoroughly wash your hands with, at a minimum, soap and water.

8.0 BBP WORK PRACTICE CONTROLS

The following work practice controls shall be used to eliminate or minimize employee exposure:

- Personal Protective Equipment (PPE) (including nitrile, neoprene, and/or latex gloves, CPR mask) will be provided at no cost to the employee. PPE will be made available within the appropriate sizes and shall be replaced as needed.
- Employees who choose to assist in a medical emergency shall wear the appropriate PPE for the treatments in which they are engaged. If an employee does not use the PPE provided, appropriate disciplinary action may be taken.
- The use of a "biohazard' bag for BBP-impacted waste is required when the waste meets the definition of "regulated waste." Regulated waste means liquid or semi-liquid blood or other potentially infectious materials, contaminated items that would release blood or other potentially infectious materials in a liquid or semi-liquid state if compressed, items that are caked with dried blood or other potentially infectious materials and are capable of releasing these materials during handling, contaminated sharps, and pathological and microbiological wastes containing blood or other potentially infectious materials.
- Do not eat, drink, use tobacco products, or touch your eyes and mouth until you have thoroughly washed your hands. Hand washing facilities and/or antiseptic solutions/towelettes will be made available at all work locations for use.
- All equipment or environmental surfaces shall be cleaned and decontaminated (using disinfectant solutions or cleaners) after contact with blood or other infectious materials, and all cleaning materials shall be properly disposed of. Due to a lack of laundering facilities, contaminated clothing will be disposed of and replaced as needed. Contaminated clothing must be promptly removed and placed in the "biohazard bags" for disposal. You should also wash your skin under where the clothing was contaminated.
- Equipment and engineering controls will be evaluated and updated based on current regulations and standard medical practices. Evaluations will be performed by Golder's National Leader Health, Safety, and Environment (NLHSE) and/or their designee. Equipment or materials shall be replaced based upon use or expiration date, and medical kits will be taken out of service until necessary replacement items can be procured.

9.0 PROCEDURES FOR BBP EXPOSURE INCIDENT

Golder is required to prepare an Exposure Determination Plan for employees with occupational exposure. In the event that an Exposure Determination Plan is needed, exposure determinations shall be made without regards to the use of PPE.

9.1 BBP Exposure Incident

In the event of a BBP exposure incident, immediately report the incident to your office Human Resources Representative (HRR). Also, Golder employees should immediately report any non-life threatening work-related injury or exposure incident to WorkCare at 888-449-7787. WorkCare will communicate with the Corporate Human Resources Manager for injury or exposure reporting.

If necessary, WorkCare will request testing of the "source individual's" blood for potential BBPs. The results of the source individual's blood test will be made available to Golder's occupational physician as soon as possible through the injured person's attending physician.

If a post-exposure medical evaluation is conducted, it will include a review of the exposure incident, a review of your medical history including HBV vaccination status, a review of the source individual's blood test results if available, a baseline sample of your blood, and possibly (if appropriate in the opinion of the attending physician) a Hepatitis B vaccination or booster.

Following the post-exposure evaluation, the attending physician will provide a written opinion regarding medical clearance to the HRR. This opinion shall be limited to a statement that the employee has been informed of the results of the evaluation and told of the need, if any, for any further evaluation or treatment. Golder is required to provide the affected employees with a copy of the physician's opinion within 15 days. The physician's written opinion shall be the only information provided to Golder's HRR regarding the exposure incident; all other medical findings and records will remain confidential.

10.0 TRAINING

Field employees are required to maintain current first-aid, CPR, and AED training. The first-aid, CPR, and AED training must occur every two years and be conducted by a certified program sanctioned by the American Red Cross, American Heart Association, National Safety Council, or equivalent.

Employees who attend first-aid, CPR, and AED training will automatically be enrolled in BBP training. BBP training is required annually for employees with occupational exposure as defined in the Standard, and must be given at the time of initial assignment to tasks where occupational exposure may take place. Employees who do not attend the annual refresher shall not be authorized to provide medical care of any kind until refresher training is complete.

Training will be re-evaluated based on changes in regulations, near misses, exposures, accidents, or any other time as deemed necessary by the NLHSE or HSC.

Participation in training courses will be documented. Evidence of training will be maintained at the employee's local office. It is the responsibility of the employee to maintain adequate training records and to make sure training is kept current.

11.0 HEPATITIS B VACCINATION

All medical evaluations and procedures including the Hepatitis B vaccine and vaccination series and post-exposure evaluation and follow-up, including prophylaxis, are made available at no cost to the employee; made available to the employee at a reasonable time and place; and performed by or under the supervision of a licensed physician or by or under the supervision of another licensed healthcare professional.

Golder employees do not render medical assistance as a primary job duty and therefore will not be routinely offered the pre-exposure Hepatitis B vaccination. Employees who primarily provide first aid or emergency response duties must be vaccinated. The Bloodborne Pathogen Standard excludes employees who perform unanticipated "Good Samaritan acts" from coverage by the Standard since such an action does not constitute "occupational exposure."

In the event that a Golder employee renders first aid or performs emergency response duties involving the presence of blood or other potentially infectious materials, the Hepatitis B vaccine will be made available to that employee, unless the employee has previously received the complete Hepatitis B vaccination series, antibody testing has revealed that the employee is immune, or the vaccine is contraindicated for medical reasons.

If an employee renders first aid or performs emergency response duties involving the presence of blood or other potentially infectious materials and declines to accept the Hepatitis B vaccination offered by Golder, the employee must sign a form, which states:

> *I understand that due to my occupational exposure to blood or other potentially infectious materials I may be at risk of acquiring hepatitis B virus (HBV) infection. I have been given the opportunity to be vaccinated with hepatitis B vaccine, at no charge to myself. However, I decline hepatitis B vaccination at this time. I understand that by declining this vaccine, I continue to be at risk of acquiring hepatitis B, a serious disease. If in the future I continue to have occupational exposure to blood or other potentially infectious materials and I want to be vaccinated with hepatitis B vaccine, I can receive the vaccination series at no charge to me.*

12.0 RECORDKEEPING

Training records shall be maintained for a minimum of 3 years from the date on which the training occurred. Medical records will be maintained during the period of employment plus 30 years.

According to 29 CFR 1910.1020(h), records are available to employees, to employee representatives, and to OSHA. Employees have the right to request, transfer, or release training and exposure medical records. This process requires written authorization from the employee in question. Records can be picked up in person or mailed via certified mail to make sure they are delivered properly. All record transmittals will be compliant with the Bloodborne Pathogens Standard.

13.0 APPLICABLE REGULATIONS AND STANDARDS

- 29 CFR 1926.50 Medical Services and First Aid
- 29 CFR 1910.151 Medical Services and First Aid
- 29 CFR 1910.1030 Bloodborne Pathogens
- ANSI Standard Z308.1-2009 Minimum Requirements for Workplace First Aid Kits and Supplies
- ANSI Z358.1-2009 Emergency Eyewashes and Shower Equipment
- 29 CFR 1910.1020 “Access to Employee Exposure and Medical Records”.

14.0 RELATED GOLDER DOCUMENTS

- GAI HSE 200.012 SWP Remote Work-Working Alone

APPENDIX A

FIRST-AID KIT CHECKLIST

List of Minimum Required First-Aid Kit Equipment per ANSI Z308.1-2009

ANSI/ISEA Z308.1-2009 Type I, II, III, or IV			
Required Minimum Fill		**Recommended Supplies**	
	1 First Aid Guide		Analgesic (Oral)
	1 Absorbent Compress 4 x 8 in. min.		Bandage Compress 2 x 36 in. min.
	16 Adhesive Bandages 1 x 3 in.		Breathing Barrier, single use
	1 Adhesive Tape 2.5 yd.		Burn Dressing 12 sq. in. min.
	10 Antiseptic Treatment Applications 0.5 gm. Each		Cold Pack 4 x 5 in. min.
	6 Burn Treatment Applications 0.9 gm. Each		Eye Covering 1/4 in. thick min.
	4 Sterile Pads 3 x 3 in. min.		Eye/Face Wash, sterile 4 fl. oz. min
	2 Pair Medical Exam Gloves		Roller Bandage 2 in. x 4 yd. min.
	1 Triangular Bandage 40 x 40 x 56 in. min.		Hand Sanitizer, 0.9 gm. min
	6 Antibiotic Treatment Applications 0.5 gm. Each		Tweezers
			Surgical Scissors
			Bloodborne Pathogens Exposure Prevention Kit
The described kit may be suitable for some businesses. However, the adequacy of the contents for hazards of each work environment should always be evaluated by competent personnel. For a variety of operations, employers may find that additional first-aid supplies and kits are needed.			

Note: This kit meets ANSI Z308.1–2009 only when the minimum is maintained with first-aid products marked “ANSI Z308.1–2009.”

Approved by	Jane Mills	Issue Date	August 31, 2012
Revision by	Richard P. Lovett	Revision Date	October 10, 2015

1.0 SCOPE

This Standard Work Procedure (SWP) applies to all Golder Associates Inc. (Golder) employees working in areas where there is potential for harmful exposure to benzene, carbon dioxide (CO_2), carbon monoxide (CO), hydrogen sulfide (H_2S), methane (CH_4), nitrogen (N), and 1,3-Butadiene (butadiene**)**. For the purposes of this SWP, gas refers to these six gases only, unless otherwise specified. This SWP replaces Golder's SWP #8 (Landfill Gas Sampling and Monitoring) and #48 (Gas Hazards).

Work areas where potential hazardous gas exposures could be anticipated include, but are not limited to, landfill gas (LFG) extraction wells, monitoring well, gas probes, blower/flare stations, gas-to-energy plants, petroleum refining sites, refinery operations (including tanks, production pipelines), and petroleum field maintenance locations. The presence of the varying concentrations of gases encountered while working on/around remediation and monitoring sites (primarily LFG sites) may expose Golder employees to hazardous situations.

2.0 HEALTH EFFECTS AND EXPOSURE LIMITS

Commonly encountered hazardous gases on Golder project sites includes benzene, CO_2, CO, H_2S, CH_4, N, and butadiene. Health effects and exposures limits for each of these gasses are presented below.

Benzene

Benzene is a colorless to light-yellow liquid with an aromatic odor. As a gas it is typically a lighter than air gas. The affects to the employee can include irritation eyes, skin, nose, respiratory system; dizziness; headache, nausea, staggered gait; anorexia, lassitude (weakness, exhaustion); dermatitis; bone marrow depression. Upon exposure, the gas targets the eyes, skin, respiratory system, blood, central nervous system, bone marrow (potential carcinogen – Leukemia).

- Permissible Exposure Limit (PEL) – 1 ppm or 3.19 mg/m^3 with a STEL of 5 ppm (15.95 mg/m^3) for a 15-minute TWA exposure (OSHA - construction and maritime).
- Recommended Exposure Limit (REL) – 0.1 ppm (0.319 mg/m^3) with a STEL of 1 ppm (3.19 mg/m^3) for a 15-minute TWA exposure. *(NIOSH)*
- Immediately Dangerous to Life and Health (IDLH) – 500 ppm (1,595 mg/m^3) for a single event. *(NIOSH)*

Golder has adopted the following LEL and UEL for H_2S:

- Lower Explosive Limit (LEL) – 1.2% (12,000 ppm).
- Upper Explosive Limit (UEL) – 7.8% (78,000 ppm).

CO_2

CO_2 displaces oxygen and can become an asphyxiant. It can affect the cardiovascular system, lungs, blood, and central nervous system resulting in headaches, dizziness, restlessness, paresthesia (tingling, pricking, or numbness of the skin), shortness of breath, sweating, increased heart rate, elevated blood pressure or pulse, coma, convulsions, and possible death.

- PEL) 5,000 ppm (9000 mg/m^3) Time Weighted Average (TWA) *(OSHA: General, Construction, and Maritime Industry)*
- REL) 5,000 ppm (9,000 mg/m^3) TWA. *(NIOSH)*
- Ceiling – 30,000 ppm (54,000 mg/m^3) for a 10 minute period. *(NIOSH)*
- IDLH – 40,000 ppm (72,000 mg/m3). (NIOSH)
- There is no LEL or UEL for CO2.

CO

CO displaces oxygen, inhibits the blood's ability to carry oxygen, and is considered an asphyxiant. It can affect the respiratory system and cardiovascular system. At low concentrations, symptoms include shortness of breath, mild nausea, dizziness, and mild headaches. As the concentration increases the exposure symptoms include headaches, dizziness, nausea, rapid breathing or pulse, and light-headedness, vision problems, convulsions, seizures, loss of consciousness followed by death within minutes.

- PEL – 50 ppm (55 mg/m^3) TWA. *(OSHA: General, Construction, and Maritime Industry)*
- REL – 35 ppm (40 mg/m^3) TWA. *(NIOSH)*
- Ceiling – 200 ppm (229 mg/m^3). *(NIOSH)*
- IDLH – 1,200 ppm (single event). *(NIOSH)*

Golder has adopted the following LEL and UEL for CO:

- LEL – 12.5% (125,000 ppm). With an action level is 10% of LEL or 12,500 ppm.
- UEL – 74.0% (740,000 ppm).

H_2S

H_2S displaces oxygen, inhibits the blood's ability to carry oxygen, and is considered an asphyxiant. It is a colorless and flammable hazardous gas, associated with a "rotten egg" smell, and is soluble in water. H_2S occurs naturally in crude petroleum and natural gas, and is also produced by the breakdown of organic matter and human/animal waste. H_2S is heavier than air (i.e. collecting in low-lying and enclosed areas such as basements, manholes, sewer lines, underground vaults, etc.). At low concentrations one can exhibit shortness of breath, mild nausea, dizziness, and mild headaches and the concentration increases the symptoms can include headaches, dizziness, nausea, rapid breathing or pulse, and light-headedness, vision problems, convulsions, seizures, loss of consciousness followed by death within minutes.

- PEL – 10 ppm (14 mg/m^3) TWA (OSHA - construction and maritime).
- Ceiling – 50 ppm (70 mg/m^3) for a 10 minute period. *(NIOSH)*

- REL – 10 ppm (15 mg/m^3) for a 10 minute period. *(NIOSH)*
- IDLH – 100 ppm (140 mg/m^3) (single event). *(NIOSH)*

Golder has adopted the following LEL and UEL for H_2S:

- LEL – 4.0% (40,000 ppm) with and action level is 10% of LEL or 4,000 ppm.
- UEL – 44.0% (440,000 ppm).

CH_4

CH_4 displaces oxygen and categorized as a simple asphyxiant. CH_4 can increased breathing rate or pulse, fatigue, difficulty breathing, dizziness, headaches, nausea, and vomiting. At high concentrations (i.e. low concentrations of oxygen) symptoms include a loss of consciousness and death.

- TLV: 1,000 ppm as TLV by American Conference of Governmental Industrial Hygienists (ACGIH).

Golder has adopted the following (LEL and UEL for CH_4:

- LEL 5% (21,000 ppm).
- UEL 15% (95,000 ppm).

N_2

Nitrogen is a simple asphyxiant that is without other significant physiologic effects. Nitrogen can cause the following acute symptoms (short term) such as nausea, drowsiness, and blue coloration of the skin and lips. At high concentrations (i.e., low concentrations of oxygen) symptoms include a loss of consciousness and death.

- PEL – 5 ppm (9 mg/m^3) OSHA?
- REL – 1 ppm (1.8 mg/m^3) NIOSH?
- IDLH – 20 ppm

There is no LEL or UEL for N_2.

Butadiene[1]

Butadiene can cause irritation to the eyes, throat, nose, and lungs following acute low concentration exposures. High concentration exposures to butadiene may result in damage to the central nervous system or cause symptoms such as distorted blurred vision, vertigo, general tiredness, decreased blood pressure, headache, nausea, decreased pulse rate, and fainting. There are no recorded cases of accidental exposures at high concentration that have caused death in humans. The effects of chronic exposure to butadiene are inconclusive but can possibly include increased chances for cardiovascular diseases and cancer.

[1] Sources of 1,3-butadiene released into the air include motor vehicle exhaust, manufacturing and processing facilities, forest fires or other combustion, and cigarette smoke. Higher levels of 1,3-butadiene may be found in highly industrialized cities or near oil refineries, chemical manufacturing plants, and plastic and rubber factories

- PEL – 1 ppm TWA. *(OSHA - construction and maritime)*
- STEL – 5 ppm for a 15 minute period. *(OSHA - construction and maritime)*
- IDLH – 2,000 ppm (10% LEL). *(NIOSH)*

Golder has adopted the following LEL and UEL for Butadiene:

- LEL – 2.0% (20,000 ppm) with an action level is 10% of LEL or 2,000 ppm.
- UEL – 12.0% (120,000 ppm).

Other LFGs

Other hazardous gases typically encountered on landfills (e.g., ammonia and other non-methane organic compounds) can pose an explosion hazard. These gases are unlikely to be present at concentrations above their LELs and rarely pose an explosion hazard as individual gases. The primary gas hazard occurs at landfills when gases displace oxygen and create an oxygen-deficit atmosphere in an enclosed space.

3.0 CONTROL MEASURES INCLUDING PERSONEL PROTECTIVE EQUIPMENT (PPE)

At sites where hazardous gases are known or suspected to exist, Golder employees will conduct air monitoring to determine if employees are exposed hazardous gases at levels in excess of the PEL. Awareness of the hazards is best way to make sure appropriate controls are in place to manage safe gas levels.

During the planning and upon commencement of field activities where a hazardous gas atmosphere could exist the following procedures will be evaluated and implemented.

Project planning and preparation:

- Site Specific Health, Safety and Environment Plan (HaSEP) is required at all Golder work sites. At sites where there is known or potential hazardous gas exposure above the Action Level or PEL, the HaSEP will contain detailed information regarding respiratory protection, PPE as well as emergency action plans, etc and incorporate any components of the clients contingency plans. The plan will provide a site specific compliance program to reduce exposures to or below regulatory limits. This plan will address mechanical and administrative controls along with necessary respirator and PPE and air monitoring requirements. The plan will be reviewed by each employee before conducting field related activities and the plan will reviewed and revised to reflect the most recent exposure monitoring data.
- Engineering and work practice controls should be utilized (when feasible) to reduce exposure to the levels below the PEL. If the controls are not feasible, Golder shall use engineering/work controls to reduce employee exposure to the lowest levels achievable, and shall supplement the controls with appropriate PPE (respiratory protection).
- Employees shall complete a hazard assessment prior to starting work in an area to make sure all hazards are being accounted for, and the appropriate PPE is being utilized properly. Employees shall comply with all PPE manufacturer's guidelines, and government standards regarding personal protection.

Once onsite:

- PPE will be inspected prior to the start of work each day to make sure proper maintenance is being completed, and if the PPE is not up to standard that it is being replaced. The need for additional PPE (respirators, hard hat, gloves, coveralls, vented goggles, footwear, etc.) should be determined during the hazard assessment and made available before beginning the work begins. The PPE shall be provided and worn when appropriate to prevent eye contact and limit dermal exposure. Golder will provide this PPE at no cost to the employee.
- Before the start of any work activities all employees working on the job site must review the Emergency Action Plan (EAP) located within the site specific Health, HaSEP. The EAP and HaSEP identify the procedures, muster points, list required PPE, and emergency contact information in the event that gas levels are detected at or above appropriate action levels.
  - Employees shall familiarize themselves with any client or site specific EAP plans, if required.
  - Employees may be required to participate in client or site specific safety training, evacuation drills, and/or rescue procedures. Unless employees are specifically trained to perform rescue procedures as part of their job duties, they should follow the evacuation plan in the EAP.
- All air monitoring equipment and gas alarms shall be calibrated by the manufacture and have a certificate, sticker, or some other recognition that the equipment has been calibrated and in proper working order.
  - Prior to the start of any work activities and prior to any shift changes the air monitoring equipment shall be calibrated in the field per the manufacturer's recommendations. The calibrations must be documented with information including the date, time, and person performing the calibration.
  - Employees should test the alarms ("bump test") on the air monitoring equipment prior to the start of the work activities and before each shift to make sure the equipment is in proper working order. The alarms should be set at the appropriate action levels outlined in the section 2.0 of this document.
- In the event that a personal or fixed air gas monitors alarms, employees must vacate the area immediately. Precautions should be taken at all times to make sure exits are well marked and unobstructed.
- Personal portable gas detector shall be used in high gas hazard areas.
- In the event that planned PPE will not provide sufficient exposure protection, the site safety contact will consult with the HSC to develop an alternative approach to protect employees.
- Fire extinguishers should be readily available in areas where flammable gases are present such as butadiene, methane, H_2S, etc.
- Smoking is prohibited in areas where flammable gases are present or suspected of being present. Employees shall only smoking in designated areas.

Each of these gases can be monitored by selecting the proper monitoring device (e.g. FID, PID, multi-gas monitor, Draeger tubes); however, the key to the selection process relies on the knowledge of each of the gas and how they react in the work environment. Please consult your health and safety coordinator or a CIH before selecting the monitoring devices.

3.1 Personal Protective Equipment (PPE)

Where reasonably practicable, Golder will reduce the employee exposure through the use of engineering, and administrative controls. Each project site, where the potential for hazardous gas exposure is present, will be evaluated for best application of engineering and administrative controls. PPE will be used to protect the employee when engineering and administrative controls are not applicable or do not improve the conditions to allow work at levels below the PEL. Golder provides respiratory protection, PPE and medical monitoring for all employees who are exposed to hazardous gases, at no cost to the employee. The PPE should include, but is not limited to:

- Hard hat
- Safety glasses
- High visibility vest
- Safety boots
- Dust mask or respirator (if required)
- Rubber gloves
- Flame resistant clothing (FRC)

3.2 Medical surveillance

A medical surveillance program is available for employees who are or may be exposed to hazardous gases at or above the action level 30 or more days per year or may be exposed to above the PELs 10 or more days per year for employees.

3.3 Respiratory Protection

In the event that employees are required to use respiratory protection, they shall be trained in accordance with 29 CFR 1910.134 “Respiratory Protection”. For additional information regarding respiratory protection see Golder’s Respiratory Protection SWP.

Employee(s) who have been properly trained and fit tested for respiratory protection shall use NIOSH approved respirators and shall inspect their equipment prior to each use for possible defects. Employees must use the Assigned Protection Factors (APF) from 29 CFR 1910.134 when evaluating the proper respiratory equipment. Appendix A includes information of the selections of the appropriate respirator type that meets or exceeds the required level of employee protection based on a particular gas.

4.0 TRAINING

Employees who may be exposed to hazardous gases shall receive awareness level training on this SWP prior to any work activities and also have annual refresher classes, as required. The training shall be documented with the employee name and date of training. A copy of the training should be kept within the employee’s personnel file. In addition employees shall review any applicable Safety Data Sheet (SDS) prior

to the start of any work activities and receive awareness training on the Hazardous Communication Program. Training should include the following elements:

- Identification of the characteristics, sources, and hazards of hazardous gases.
- The proper use and handling requirements for the chemical, if applicable.
- Proper positioning of portable and fixed base monitors.
- Proper use and locations of the gas detection methods and monitoring systems (portable and fixed base monitors).
- The recognition of gas hazard warnings (oxygen deficiency, oxygen enrichment, carbon monoxide and H2S) and the proper responses.
- Recognition of symptoms of the gas hazards to which employees are exposed.
- Proper first-aid and evacuation procedures to be used in gas exposure.
- Proper use and maintenance of the PPE.
- Rescue procedures (if job duties require it).
- Wind direction awareness and routes of egress.
- Any client/plant specific training.

The training listed below is the typically required training. This training will be determined based on the type of site and the anticipated tasks to be performed. Specialized or supplemental training such as confined space, lockout/tag out, mine safety, HAZWOPER may also be required.

- On-site training with qualified personnel.
- Golder and site specific instruction.
- Emergency and First Aid/CPR Course.
- 10-hour OSHA Construction Training.
- Confined Space Training (if the excavation meets confined space criteria).
- 40-hour HAZWOPER training (as required by the Site work).
- MSHA Part 46/48 training.

5.0 SPECIAL SITUATIONS

In the event that an employee will be working on a mineral or coal mine facility additional training, air monitoring equipment, PPE, etc. will be required. The Mine Safety and Health Administration (MSHA) requires that all employees working on a surface or underground mine sites receive the appropriate level of mine safety training and compliance with additional regulations.

6.0 RELATED GOLDER DOCUMENTS

- GAI HSE 208 FRC Program
- GAI HSE 200.013 SWP Respiratory Protection

- GAI HSE 200.049 SWP Mining General Safety

7.0 APPLICABLE REGULATORY REFERENCES

- 29 CFR 1910.134 “Respiratory Protection”
- 29 CFR 1910.1000, Table Z-2 “Air Contaminants”
- 29 CFR 1910.1200 “Hazard Communication”
- 29 CFR 1926.55 “Gases, vapors, fumes, dusts, and mists”
- 29 CFR 1910.1051 Appendix A
- NIOSH "Pocket Guide to Chemical Hazards" (latest edition)
- MSHA 30 CFR 75.1714

Appendix A

To determine the assigned protection factor (APF) for various types of respirators please refer to Golders Respirator Protection Program (Section 6.4). The APF requirements (as provided by NIOSH) for the gases discussed in the SWP are as follows:

Benzene

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:

- (APF = 10,000) Any self-contained breathing apparatus that has a full face piece and is operated in a pressure-demand or other positive-pressure mode.
- (APF = 10,000) Any supplied-air respirator that has a full face piece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus.

Escape:

- (APF = 50) Any air-purifying, full-face piece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister.
- Any appropriate escape-type, self-contained breathing apparatus.

Carbon Dioxide

Up to 40000 ppm:

- (APF = 10) Any supplied-air respirator.
- (APF = 50) Any self-contained breathing apparatus with a full face piece.

Emergency or planned entry into unknown concentrations or IDLH conditions:

- (APF = 10,000) Any self-contained breathing apparatus that has a full face piece and is operated in a pressure-demand or other positive-pressure mode.
- (APF = 10,000) Any supplied-air respirator that has a full face piece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus.

Escape:

- Any appropriate escape-type, self-contained breathing apparatus.

Carbon Monoxide

Up to 350 ppm:

- (APF = 10) Any supplied-air respirator.

Up to 875 ppm:

- (APF = 25) Any supplied-air respirator operated in a continuous-flow mode.

Up to 1200 ppm:

- (APF = 50) Any air-purifying, full-face piece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern.
- (APF = 50) Any self-contained breathing apparatus with a full face piece.
- (APF = 50) Any supplied-air respirator with a full face piece.

Emergency or planned entry into unknown concentrations or IDLH conditions:

- (APF = 10,000) Any self-contained breathing apparatus that has a full face piece and is operated in a pressure-demand or other positive-pressure mode.
- (APF = 10,000) Any supplied-air respirator that has a full face piece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus.

Escape:

- (APF = 50) Any air-purifying, full-face piece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern. Any appropriate escape-type, self-contained breathing apparatus.

Hydrogen Sulfide

Up to 100 ppm:

- (APF = 25) Any powered, air-purifying respirator with cartridge(s) providing protection against the compound of concern.
- (APF = 50) Any air-purifying, full-face piece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern.
- (APF = 10) Any supplied-air respirator.
- (APF = 50) Any self-contained breathing apparatus with a full face piece.

Emergency or planned entry into unknown concentrations or IDLH conditions:

- (APF = 10,000) Any self-contained breathing apparatus that has a full face piece and is operated in a pressure-demand or other positive-pressure mode.
- (APF = 10,000) Any supplied-air respirator that has a full face piece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus.

Escape:

- (APF = 50) Any air-purifying, full-face piece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern Any appropriate escape-type, self-contained breathing apparatus.
- Atmospheres with IDLH of 100 ppm or greater must use Self-Contained Breathing Apparatus (SCBA) or an airline respirator with an escape SCBA.
- If H_2S levels are below 100 ppm <u>and</u> no oxygen deficient atmosphere exists, an air-purifying full-face piece respirator may be used, assuming the filter cartridge/canister is appropriate for hydrogen sulfide. A full face piece respirator will prevent eye irritation.

Butadiene

1 ppm to 5 ppm:

- (APF = 10 to 50) Air-purifying half-mask or full-face piece respirator equipped with approved butadiene or organic vapor cartridges or canisters. Cartridges or canisters shall be replaced every 4 hours.

5 ppm to 10 ppm:

- (APF = 10 to 50) Air-purifying half-mask or full-face piece respirator equipped with approved butadiene or organic vapor cartridges or canisters. Cartridges or canisters shall be replaced every 3 hours.

10 ppm to 25 ppm:

- (APF = 10 to 50) Air-purifying half-mask or full-face piece respirator equipped with approved butadiene or organic vapor cartridges or canisters. Cartridges or canisters shall be replaced every 2 hours.

25 ppm to 50 ppm:

- (APF = 50) Air-purifying full-face piece respirator equipped with approved butadiene or organic vapor cartridges or canisters. Cartridges or canisters shall be replaced every 1 hour; or Powered air-purifying respirator (PAPR) equipped with a tight-fitting face piece and approved butadiene or organic vapor cartridges. PAPR cartridges shall be replaced every 1 hour.

50 ppm and up:

- (APF = 10,000) Supplied-air respirator equipped with a half-mask or full face piece and operated in a pressure-demand or other positive-pressure mode.

Escape:

- (APF = 10,000) Any positive-pressure self-contained breathing apparatus with an appropriate service life; or any air-purifying full-face piece respirator equipped with a front- or back-mounted butadiene or organic vapor canister.

APPENDIX B – RADIATION PROTECTION PLAN (HSE207)

Radiation Protection Plan

GOLDER ASSOCIATES INC.

Radiation Protection Plan

For Portable Nuclear Density Gauges

Approved by	Jane P. Mills	Issue Date	September 2012
Revision by	Jane Mills	Revision Date	August 2013
			September 2013

A world of capabilities delivered locally

Golder Associates

HEALTH AND SAFETY STATEMENT

Golder in the USA (Golder) is committed to providing the time and resources necessary to enable our employees to perform their work in a safe and healthy manner. An effective radiation protection plan (RPP) and training program is essential to protecting the health, safety, security and environment and is a part of Golder's comprehensive health and safety program. Portable nuclear density gauges are an integral tool used in the construction quality assurance monitoring and field testing of compacted soils and asphalt. They contain radioactive sources regulated by the NRC or appropriate State agency. Owners of such devices are required to obtain and maintain a radioactive materials license from the NRC or appropriate State agency. One of the responsibilities of a licensee is to develop a Radiation Protection Plan. This RPP has been developed to identify program responsibilities, training requirements, and present a consistent approach to safe working procedures of the operation, storage and maintenance of portable nuclear density gauges across the United States.

Table of Contents

List of Tables

List of Appendices

1.0 PURPOSE AND SCOPE

This Radiation Protection Plan (RPP) is intended to provide guidance on working safely with ionizing radiation sources (e.g. portable nuclear gauges) in accordance to the Nuclear Regulatory Commission (NRC) requirements. All Golder Associates Inc. (Golder) employees using ionizing radiation sourced instruments will follow this plan and its associated work instructions. This Plan is not intended to conflict with or supersede federal or state regulations.

All references to “Golder” are intended to mean Golder Associates Inc. (Golder) and subsidiaries affiliated with Golder Associates Inc.

This RPP recognizes that the regulations governing ionizing radiation sourced instruments (portable nuclear density gauges) are as stringent as or more stringent than the NRC regulations in many of the jurisdictions where Golder operates. Therefore this RPP is designed to detail the fundamental or base requirements for Golder in all U.S. locations. Additional requirements beyond this RPP are detailed in license-specific RPP programs.

This RPP will be incorporated by reference in all of Golder’s license-specific RPP programs.

2.0 DEFINITIONS AND ABBREVIATIONS

Agreement State:	A State that has signed an agreement with the NRC authorizing the State to regulate certain uses of radioactive materials within the State. A Non-Agreement State follows the NRC regulations.
ALARA:	As low as reasonably achievable. (See further definition in Section 5.0)
Allowable dose:	Dose or radiation dose is a generic term that means absorbed dose, dose equivalent, effective dose equivalent, committed dose equivalent, committed effective dose equivalent, or total effective dose equivalent.
Authorized User:	New or experienced, but current on their training
Declared Pregnant Woman:	Declared pregnant woman means a woman who has voluntarily informed the licensee, in writing, of her pregnancy and the estimated date of conception. The declaration remains in effect until the declared pregnant woman withdraws the declaration in writing or is no longer pregnant (as defined in 10 CFR 20.1003.)
Dosimeter:	Measures radiation exposure (usually to external gamma radiation). Dosimeters are used to monitor the cumulative radiation exposure over long periods of time. Dosimeters are usually named after the technology used, for example: Thermoluminescent Dosimeter (TLD) and Optical Stimulated Light Dosimeter (OSL).
DOT	United States Department of Transportation
Experienced User:	A Golder employee who uses an ionizing radiation source instrument (e.g., portable nuclear density gauge). A gauge user who has completed initial radiation safety training and has field gauge use experience.
Golder:	Golder Associates Inc. (GAI) and companies affiliated with

	Golder Associates Inc.
Gauge:	Portable Nuclear Density Gauge
IAEA:	International Atomic Energy Agency
IATA:	International Air Transport Association
Licensee:	Golder
Movement:	When a gauge is removed from the office or storage location by an employee of Golder, and does not leave the control of Golder.
Movement Log:	The form that the user must sign and log each movement of the gauge. It is a part of the required transportation documents.
New User:	A Golder employee who uses an ionizing radiation source instrument (e.g., portable nuclear density gauge). No previous training or gauge experience at Golder. Initial radiation safety training complete.
NRC:	Nuclear Regulatory Commission
Permanent Storage Site:	The Golder office or location where gauges are normally stored
RPP:	Radiation Protection Plan
Office Specific RPP:	Radiation Protection Manual or Program relevant to a specific office's operation, license condition, and/or equipment inventory
REM	Abbreviation for *roentgen equivalent man,* a dose of ionizing radiation that produces in humans the same effect as one roentgen of x-radiation or gamma radiation. 1 rem is the equivalent of 10 milliSieverts (mSv).

RSO:	Radiation Safety Officer
Shipment:	The shipment of a gauge is when an external shipping company is hired to ship the gauge from one location to the next or an employee of Golder delivers the gauge to a non-Golder licensed company (example taking the gauge to Troxler for repair)
Permanent Storage Location:	A facility or work site where Golder stores a nuclear density gauge for more than 90 days.
Temporary Storage Site:	A facility or work site where Golder stores a nuclear density gauge. The duration for this storage activity may be defined in state-specific licensing requirements.
TDG:	Transportation of Dangerous Goods.
TEDE:	Total effective dose equivalent.
TLD:	Thermoluminescence Device, also known as a dosimeter badge.
Transport:	See “Movement”
Transportation Package	The group of documents that are prepared and taken with the gauge each time the gauge is moved or shipped.

3.0 PROGRAM RESPONSIBILITIES

See the organizational chart in Appendix A for current program structure.

3.1 Radiation Safety Program Manager

- Review the results of internal audits of this radiation protection plan and state-specific plans as may exist in many Golder offices;
- Support Regional RSOs;
- Verify copies of all incidences, internal and external audits are maintained, Also, verify Office RSO is correcting deficiencies and responding within the designated time frame;
- Evaluate and organize training program for users and RSOs.
- Based on feedback from employees, internal audits, and NRC or appropriate State agency inspections the Radiation Safety Program Manager shall review and revise (if necessary) the RPP annually. If practicable, employees exposed to ionized radiation shall be involved in the development and implementation of the safe work procedures and Radiation Protection Plan;
- Appoint Regional RSOs in consultation with Regional Management.

3.2 Regional RSO

- Liaise with Radiation Safety Program Manager;
- Complete the required training, per Section 4.0 of this RPP
- Review license renewals and changes/amendments;
- Conduct internal audits of this radiation protection plan and state-specific plans as may exist in many Golder offices;
- Perform gauge audits/inspections per Section 6.8.,
- Support Office RSOs, by answering inquires and providing information and resources as necessary;
- Obtain copies of all incidences, internal and external audits for the Region;
- Ensure Office RSO has corrected any identified deficiencies and responded to the NRC or appropriate State agency or internal auditors within the designated time frame;
- Ensure copies of records relating to the use of Golder's portable nuclear density gauges and other licensed activities including but not limited to: inspections, training, dosimeter readings, gauge purchase, transfer, disposal, leak tests and maintenance are kept as per NRC or appropriate State agency or for 3 years beyond the expiry of the last license. Final license closure records are not to be disposed without notifying the NRC or appropriate State agency, and;
- Understand the applicable regulations and remain up to date on changes.

3.3 Office Manager

- Appoint an Office RSO;
- Ensure Office RSO is maintaining compliance with applicable regulations;

- Support Office RSO with time and resources needed to meet compliance;
- Ensure that deficiencies noted in internal and external audits are corrected in the designated time frame;
- Budget for expenses and training related to maintaining compliance with NRC or appropriate State agency regulations, and;
- Assist RSO in the development of a Security Plan specific for the location where Golder nuclear density gauges are stored.

3.4 Office RSO

- Complete the required training, per Section 4.0 of this RPP
- License administration; apply for license renewal and changes when required;
- Correspond with the NRC or appropriate State agency;
- Understand the applicable NRC or appropriate State agency regulations and license conditions and remain up to date on changes;
- Facilitate and/or conduct ongoing Radiation Safety Training for users to include on-site instruction to new users, refresher training on the safe operation of a gauge and radiation safety and security, and basic training for those who work in the vicinity of the gauge storage areas
- Confirm user competence and post the names of the authorized users;
- Ensure gauges are maintained in good working order following manufacturers recommendations;
- Perform audits/inspections per Section 6.8, including a monthly survey of all permanent storage locations under your supervision;
- Conduct emergency response training, as related to gauge safety and security;
- Report all incidents involving gauges, audit results, and changes of users to regional RSOs;
- If required, Notify NRC or appropriate State agency, and Regional RSO of additional storage locations that will be in use for more than 90 days, changes of location and changes of RSO;
- Administer dosimetry program to users;
- Ensure leak test and calibrations are completed as per NRC or State agency requirements;
- Ensure NRC or appropriate State agency inspectors are provided information requested;
- Correct deficiencies noted in internal and external audits and respond to auditors within the designated time frame;
- Ensure office storage and all temporary storage locations meet the NRC or appropriate State agency requirements;
- Maintain records for all of the above;
- Ensure copies of records relating to the use of Golder's portable nuclear density gauges and other licensed activities including but not limited to: inspections, training, dosimeter readings, gauge purchase, transfer, disposal, leak tests and maintenance are kept as per NRC or appropriate State agency or for 3 years

beyond the expiry of the last license. Records are not to be disposed without notifying the NRC or appropriate State agency;

- Develop and keep a security plan for the gauges up to date for the storage location;
- Develop and keep current a license specific RPP, and;
- Inform the local Fire Department of the quantity of portable gauges held in the storage facility, as necessary.

3.5 Nuclear Gauge Users

- Complete the required training, per Section 4.0 of this RPP
- Clearly understand the allowable methods of transportation based on your level of training;
- Know, understand, and follow Golder's Radiation Protection Plan and office specific RPP;
- Follow office procedures for transportation, use, maintenance, inventory, and reporting incidents involving gauges;
- Do not perform any activity relating to radiation safety that you feel is unsafe;
- Know where to find the Emergency Procedures;
- Report incidents or unsafe conditions relating to radiation safety to the Office RSO immediately;
- Use dosimeter and other safety and personal protective equipment as required;
- Understand the NRC or appropriate State agency Act and Regulation and remain up to date on changes; and,
- Based on daily activities provide the Office RSO with direction for revisions to the RPP annually. If practicable, employees exposed to ionized radiation shall be involved in the development and implementation of the safe work procedures and Radiation Protection Plan.
- Understand the distinction between nuclear gauge users and authorized nuclear gauge user.

4.0 TRAINING REQUIREMENTS

4.1 Radiation Safety Program Manager

The Radiation Safety Program Manager will facilitate training programs for RSOs and users. A database of training records and certificates will be maintained by the Radiation Safety Program Manager or designate.

4.2 Regional RSO

All Regional RSOs will complete the following training:

- Certified RSO training;
- Transporting Portable Gauges by Road;
- Radiation Protection, and
- DOT (ground) and IATA (air) Training (shipping)

4.3 Office RSO

All Office RSOs will complete the following training:

- Certified RSO training;
- Transporting Portable Gauges by Road;
- Radiation Protection, and
- DOT (ground) and IATA (air) Training (shipping)

The Office RSO will ensure that the following is carried out and records are maintained:

- Training certificates issued by a qualified training provider (e.g., Troxler) on completion of the 3-year DOT/Safety/Security update course are maintained in the training files. To transport or ship a nuclear gauge by ground, DOT general awareness, function specific, safety, and security training must be current (every 3-years). To ship by air, IATA training must be current (every 2 years).
- Before an employee operates a gauge alone, they must receive on-site instruction and supervision by the Office RSO or designated gauge user in the transportation, use, and maintenance of the gauges. The number of hours of instruction will vary based on the user's previous experience and ability. A target of 15 hours is a good guide for most new users.
- The Office RSO will determine when the user is sufficiently experienced in the use of the gauge and his or her understanding of Golder's Radiation Protection Plan and the office specific RPP;
- A brief description of the RSO's rationale for deeming a user to be sufficiently experienced should be included in the training records. This is typically based on hours of training and visual observation of hands on experience;

- Competency in gauge use will be evaluated at the conclusion of all training sessions. The Office RSO will maintain records of the competency.
- Refresher training on the safe operation of a gauge and radiation safety and security will be delivered at least every 12 months to all users;
- The Office RSO will train employees who work in the vicinity of the gauge storage area on the basics of radiation safety. Records of these general knowledge employees should be maintained.
- Emergency response training which relate to the gauges should be carried out at least annually, or at the beginning of the construction season.

4.4 New User

All new users must complete training that includes the following topics:

- Procedures for use, handling and transportation of a portable nuclear gauge before they operate, perform maintenance on, or transport a gauge (annual refresher).
- DOT general awareness, function specific (ground transportation/shipment), security and safety training. Shipping by Air is prohibited without additional training. (3-yr refresher).

Before an employee operates a gauge alone, they will receive on-site instruction/supervision by the Office RSO or designated gauge user on the transportation, use, and maintenance of portable nuclear gauges for a minimum of three days.

The Office RSO will determine when a user is sufficiently experienced to operate a portable nuclear gauge without supervision.

Each new user must also be a participant in a dosimetry program.

4.5 Experienced User

All experienced users must complete an approved refresher course that covers:

- Procedures for use, handling and transportation of a portable nuclear gauge before they operate, perform maintenance on, or transport a gauge (annual refresher).
- DOT general awareness, function specific (ground transportation/shipment), security and safety training. Shipping by Air is prohibited without additional training. (3-yr refresher).All experienced users must be a participant in a dosimetry program.

4.6 Female Users

In addition to the technical training appropriate to their specific duties, radiation safety training for female employees should include detailed information on the risks posed to an embryo or fetus

by exposure to radiation as defined in 10 CFR 20. They should also be advised that a user who becomes aware that she is pregnant may voluntarily inform Golder of the pregnancy in writing.

Golder shall ensure that the dose equivalent to the embryo/fetus during the entire pregnancy, due to the occupational exposure of a declared pregnant woman, does not exceed 0.5 rem (5 mSv). Recordkeeping requirements are defined in 10 CFR 20.2106.

Dosimetry for all declared pregnant women who continue to be nuclear density gauge users during the pregnancy will be modified. Declared pregnant women dosimeters will be collected and analyzed on a monthly basis, to ensure that current short-term exposures are documented and evaluated monthly, instead of quarterly for all others users.

Golder shall make efforts to avoid substantial variation above a uniform monthly exposure rate to a declared pregnant woman so as to satisfy the limit in 10 CFR 20.2106 (a).

The dose equivalent to the embryo/fetus is the sum of:

- (1) The deep-dose equivalent to the declared pregnant woman; and
- (2) The dose equivalent to the embryo/fetus resulting from radionuclides in the embryo/fetus and radionuclides in the declared pregnant woman.

If the dose equivalent to the embryo/fetus is found to have exceeded 0.5 rem (5 mSv), or is within 0.05 rem (0.5 mSv) of this dose, by the time the woman declares the pregnancy to the licensee, the licensee shall be deemed to be in compliance with 10 CFR 20.2106 (a) if the additional dose equivalent to the embryo/fetus does not exceed 0.05 rem (0.5 mSv) during the remainder of the pregnancy.

5.0 ACTIONS TO ACHIEVE EXPOSURE AS LOW AS REASONABLY ACHIEVABLE (ALARA)

ALARA (acronym for "as low as is reasonably achievable") means making every reasonable effort to maintain exposures to radiation as far below the dose limits as is practical, consistent with the purpose for which the licensed activity is undertaken, taking into account the state of technology, the economics of improvements in relation to the state of technology, the economics of improvements in relation to benefits to the public health and safety, and other societal and socioeconomic considerations, and in relation to utilization of nuclear energy and licensed materials in the public interest.

Since any exposure to ionizing radiation can, in principle, increase the risk of an employee someday contracting a radiation induced cancer, it is important that all employee radiation exposures are minimized.

Control strategies for exposure to radiation start at the project planning stage. If exposure is likely it should be limited through good work practices and by careful monitoring.

Protection from external gamma radiation is achieved through:

- Time – limiting exposure time which limits the dose received
- Distance – radiation intensity decreases as the inverse square with distance from a point source
- Shielding – barriers of lead, concrete and water provide effective protection against gamma rays and neutrons. Some plastic shields will stop beta particles.

Protection from internal exposure is achieved through:

- Time – limiting exposure time which limits the dose received.
- Personal Protective Equipment – PPE can be used to provide a barrier against the uptake of radioactive material by inhalation or absorption through the skin.
- Contamination control – cleaning equipment and removing outer covering clothing, showering will remove radioactive material from employees' clothing and bodies.
- Personal Hygiene – careful attention to personal hygiene is required after working with radioactive material or in an area where contamination is present. Radioactive material may be transferred to hands and feet and subsequently ingested. Contaminated clothing and equipment should be left at the work site. There should be provision for employees to wash and shower if they become contaminated with radioactive material.
- Consuming food/ beverages – set up approved areas for eating and drinking, after the decontamination area. Chewing gum and smoking is not permitted in a contaminated area.

6.0 PORTABLE NUCLEAR GAUGE USE AND HANDLING

6.1 Gauge Use and Handling

6.1.1 Regulatory Reference

Regulations: 10 CFR 30.34(e), 10 CFR 20.1101, 10 CFR 20.1801, 10 CFR 20.1802, 10 CFR 20.2201-2203, 10 CFR 30.50.

6.1.2 Use and Handling Responsibilities

6.1.2.1 Office RSO and User

The Office RSO must develop, implement, and maintain operating and emergency procedures containing the following elements:

- Instructions for using the portable gauge and performing routine maintenance, according to the manufacturer's recommendations and instructions;
- Instructions for maintaining security during storage and transportation;
- Instructions to keep the gauge under control and immediate surveillance during use;
- Steps to take to keep radiation exposures ALARA;
- Steps to maintain accountability during use;
- Steps to control access to a damaged gauge; and
- Steps to take, and whom to contact, when a gauge has been damaged.

When personnel dosimetry is provided:

- Always wear your assigned thermoluminescent dosimeter (TLD) or film badge when using, cleaning, or performing basic maintenance on the gauge;
- Never wear another person's TLD or film badge;
- Never store your TLD or film badge near the gauge.

Before removing the gauge from its place of storage, ensure that, where applicable, each gauge source is in the fully shielded position and that in gauges with a movable rod containing a sealed source, the source rod is locked (e.g., keyed lock, padlock, mechanical control) in the shielded position. Place the gauge in the transport case and lock the case.

Sign out the gauge in the utilization/transfer log (that remains at the storage location) including the date(s) of use, name(s) of the authorized users who will be responsible for the gauge, and the temporary job site(s) where the gauge will be used.

Block and brace the gauge to prevent movement during transport and lock the gauge in or to the vehicle. Follow all applicable DOT requirements when transporting the gauge. See section 6.11 for more information on transportation of gauges.

Use the gauge according to the manufacturer's instructions and recommendations.

Do not touch the unshielded source rod with your fingers, hands, or any part of your body.

Do not place hands, fingers, feet, or other body parts in the radiation field from an unshielded source.

Unless absolutely necessary, do not look under the gauge when the source rod is being lowered into the ground. If you must look under the gauge to align the source rod with the hole, follow the manufacturer's procedures to minimize radiation exposure.

After completing each measurement in which the source is unshielded, immediately return the source to the shielded position.

Always maintain constant surveillance and immediate control of the gauge when it is not in storage. At job sites, do not walk away from the gauge when it is left on the ground. Take action necessary to protect the gauge and yourself from danger of moving heavy equipment.

Always keep unauthorized persons away from the gauge.

Perform routine cleaning and maintenance according to the manufacturer's instructions and recommendations.

Before transporting the gauge, ensure that, where applicable, each gauge source is in the fully shielded position. Ensure that in gauges with a movable source rod, the source rod is locked in the shielded position (e.g., keyed lock, padlock, mechanical control). Place the gauge in the transport case and lock the case. Block and brace the case to prevent movement during transportation. Lock the case in or to the vehicle, preferably in a closed compartment.

Return the gauge to its proper locked storage location at the end of the work shift.

Log the gauge into the utilization/transfer log when it is returned to storage.

After making changes affecting the gauge storage area (e.g., changing the location of gauges within the storage area, removing shielding, adding gauges, changing the occupancy of adjacent

areas, moving the storage area to a new location), reevaluate compliance with public dose limits and ensure proper security of gauges.

- Portable nuclear gauges will be stored in a locked area accessible to authorized users only.
- Employees who may work in the proximity of the gauge storage area must be informed by the Office RSO or the User of the risks associated with radioactivity. This should include the principles of hazard control by time, distance and shielding; the dose control measures that are in place; and the security procedures that must be followed.

6.2 Portable Nuclear Gauge Labeling

6.2.1 Regulatory Reference

Regulations: 10 CFR 71.5, 49 CFR Parts 171-178, 10 CFR 20.1101.

6.2.2 Gauge Labeling Responsibilities

Labeling of the nuclear gauges for public transport or shipping of radioactive material must comply with NRC, DOT and state-specific regulations. Excerpted from NUREG 1556Vol 1, Rev. 1, Section 8.10.10, Appendix K titled, “Major DOT Regulations” addresses the requirements for transport and shipping of portable gauges. This appendix comprises Appendix B for this RPP.

6.3 Portable Nuclear Gauge Storage

6.3.1 Regulatory Reference

Regulations: 10 CFR 20.1301, 10 CFR 20.1302, 10 CFR 20.1003, 10 CFR 20.1801, 10 CFR 20.1802, and 10 CFR 20.2107.

6.3.2 Storage Responsibilities

Each portable nuclear gauge shall have a lock or outer locked container designed to prevent unauthorized or accidental removal of the sealed source from its shielded position. The gauge or its container must be locked when in transport, storage or when not under the direct surveillance of an authorized user.

6.3.2.1 Office RSO

The Office RSO is responsible for the following actions:

- Ensure that licensed gauges will be used, transported, and stored in such a way that members of the public will not receive more than 100 mrem (1 mSv) in one year, and the dose in any unrestricted area will not exceed 2 mrem (0.02mSv) in any one hour, from licensed operations.
- Control and maintain constant surveillance over gauges that are not in storage and secure stored gauges from unauthorized removal or use.

- Perform a visual survey of all storage locations under their supervision every 6 months.
- Maintain an active inventory list of nuclear gauges.
- Notify the Regional RSO of additional storage locations that will be in use for more than 90 days (license condition), changes to gauge inventory, and changes of permanent and temporary locations.
- Ensure gauges are stored in a locked and secure storage area that includes the posting of required signage and documentation. See section 6.3.3 for posting requirements.
- Post emergency information at storage facilities and provides a copy of this information with each device when shipped.

6.3.3 Storage When Overnighting in a Hotel

Most licenses or regulations stipulate that the gauge not be stored within a specified distance from a living quarters or permanent work station. Hotel rooms, more often than not, cannot meet requirements of distance requirements (same reason why we cannot bring gauges home for storage). There are also security concerns storing in a hotel room.

For proper security the gauge should not be stored in a vehicle overnight. Where permitted, and absolutely necessary, you may use the vehicle as a temporary storage area.

The best practice, where a gauge must be used away from the permanent storage location, is to setup a temporary storage location at the job site with the proper distance and security controls established.

6.3.4 Storage Signage and Documentation

The signage and documentation required to be posted as close as possible to the entrance to the storage location include:

- Radiation warning sign on door of storage location.
- A current copy of the relevant Golder radiation license for that location.
- Authorized gauge user list.
- Emergency Procedures. These procedures will include the names and phone numbers of the current office emergency contacts.
- Sign out sheets for each portable gauge.

6.3.5 Radiation Surveys for Storage Areas

Certain radioactive materials licenses may require monthly surveys of the normally occupied areas in proximity to the gauge storage area are conducted using a radiation survey meter to verify dose rates are less than 0.25 mrem/h (2.5 μSv/h).

If the dose rate exceeds 2.5 µSv/h, inform the Regional RSO and implement controls immediately to reduce the dose rate to less than 2.5 µSv/h.

6.4 Radiation Survey Meter Calibration

6.4.1 Regulatory Reference

Regulations: 10 CFR 20.2103

6.4.2 Calibration - General

The radiation survey meter will be calibrated by the manufacturer or a qualified service-provider in accordance with NRC or appropriate State agency expectations. Radiation survey meter calibration records will be maintained by the Office RSO.

Each Office RSO must have access (within 24-hours) to an instrument meeting the following criteria:

- Capable of detecting gamma radiation;
- Capable of measuring from 1 to 50 mrem/hr (0.01 to 0.5 mSv/hr);
- Calibrated In accordance with manufacturers specifications;
- Calibrated at a minimum of 2 points, each located at approximately one-third and two-thirds of each scale; readings within ±20 percent are acceptable;
- Calibrated by the manufacturer or qualified service provider;
- Checked for functionality prior to use (e.g., with the gauge or a check source).

Records of instrument calibration must be maintained in the permanent equipment file. The service file must be maintained for 3 years after an instrument is permanently taken out of service.

6.5 Portable Nuclear Gauge Maintenance

6.5.1 Regulatory Reference

Regulations: 10 CFR 20.1101, 10 CFR 30.34(e).

6.5.2 Maintenance - General

Users must routinely clean and maintain gauges according to the manufacturer's recommendations and instructions. For gauges with a source rod, radiation safety procedures for routine cleaning and lubrication of the source rod and shutter mechanism (e.g., to remove caked dirt, mud, asphalt, or residues from the source rod; lubricate the shutter mechanism) must consider the possibility of receiving exposures to the whole body, as well as to the hands, from

handling the source rod. Users should keep such exposures ALARA and ensure that the gauge functions as designed and source integrity is not compromised.

Non-routine maintenance or repair (beyond routine cleaning and lubrication) that involves detaching the source or source rod from the device, and any other activities during which personnel could receive radiation doses exceeding NRC limits, must be performed by the gauge manufacturer or a person specifically authorized by NRC or an Agreement State. Requests for specific authorization to perform non-routine maintenance or repair must demonstrate that personnel performing the work:

- Have adequate training and experience;
- Use equipment and procedures that ensure compliance with regulatory requirements, and consider ALARA; and
- Ensure that the gauge functions as designed and that source integrity is not compromised.

Portable nuclear gauges may be cleaned and lubricated by Golder in accordance with the manufacturer's operating manual and in compliance with NRC or appropriate State agency's directions relating to the dismantling of radiation devices.

All employees shall wear a dosimeter while performing maintenance on portable nuclear gauges, and must wash their hands with soap and water when finished.

6.5.3 Maintenance Responsibilities

6.5.3.1 Office RSO

The Office RSO has the following responsibilities as they relate to maintenance of all gauges under the office license.

- Portable nuclear density gauges and radiation survey meters must be maintained according to manufacturer's instructions.
- A maintenance schedule must be developed, documented and followed for each piece of equipment.
- All gauges are calibrated annually by the equipment manufacturer or other company following a written method using NIST traceable standards in compliance with ASTM testing procedures (there are two D2950 and D6938).

6.5.3.2 User

Each gauge user has the following responsibilities as they relate to maintenance of all gauges under the office license.

- The user will inspect the gauge prior to each use.

- Shutter on gauges must be checked for retained soil after each day's use, with a more thorough cleaning scheduled with the Office RSO or delegate. Maintenance outside of this should not be undertaken.
- Only charge gauge under manufacture instructions e.g. rechargeable batteries have memory – overcharging will damage battery life.
- The gauge must be kept warm and dry. If the gauge becomes wet, open the face plate and let it dry overnight in a secure location.
- Ensure all documentation and accessories are with the gauge at all times.

6.6 Portable Nuclear Gauge Leak Testing

6.6.1 Regulatory Reference

Regulation: 10 CFR 30.53.

6.6.2 Leak Testing - General

Gauges will be leak tested in accordance with the governing license. Where applicable, a gauge cannot be moved without a leak test that has been performed with in the last 6 months.

Gauge users shall wear a dosimeter while performing leak tests on portable nuclear gauges, and must wash their hands with soap and water when finished.

The NRC requires testing to determine whether there is any radioactive leakage from the source in the device. Testing must be conducted by an organization approved by NRC or an Agreement State or according to procedures approved by NRC or an Agreement State. Records of test results must be maintained as long as the gauge is owned by Golder.

When issued, a license will require performance of leak tests at intervals approved by NRC or an Agreement State. The measurement of the leak test sample is a quantitative analysis requiring that instrumentation used to analyze the sample be capable of detecting 185 Bqs (0.005 microcurie) of radioactivity.

Manufacturers, consultants, and other organizations may be authorized by NRC or an Agreement State to either perform the entire leak test sequence for other licensees or provide leak test kits to licensees. In the latter case, the Office RSO is expected to take the leak test sample according to the gauge manufacturer's and the kit supplier's instructions and return it to the kit supplier for evaluation and reporting results. Leak test samples should be collected at the most accessible area where contamination would accumulate if the sealed source were leaking.

6.7 Portable Nuclear Gauge Security

6.7.1 Regulatory Reference

Regulations: 10 CFR 30.34(e), 10 CFR 30.41, 10 CFR 30.51.

6.7.2 Gauge Security - General

The Office RSO must do the following:

- Maintain records of receipt, transfer, source certificate, and disposal of gauges; and
- Conduct physical inventories at intervals not to exceed 6 months (or some other interval justified by the Office RSO) to account for all sealed sources.

A Radiation Security Plan must be maintained for every permanent storage location and includes the following information:

- Radiation source description
- Facility description
- Objectives of the plan
- Technical measures in use
- Administrative controls
- Determination of trustworthiness of personnel
- Information security
- Access authorization
- Emergency planning, and
- Training of employees authorized to operate, maintain or transport a gauge.

6.8 Portable Nuclear Audits and Inspections

6.8.1 Regulatory Reference

Regulations: 10 CFR 20.1101, 10 CFR 20.2102.

6.8.2 Audits and Inspections - General

Licensees must review the content and implementation of their radiation protection programs annually to ensure the following:

- Compliance with NRC, Agreement State Agencies, and DOT regulations, and the terms and conditions of the license;
- Occupational doses and doses to members of the public are as low as reasonably achievable (ALARA) (10 CFR 20.1101); and
- Records of audits and other reviews of program content are maintained for 3 years.

The following audits and inspections will be conducted to ensure compliance with this Radiation Protection Plan and local license requirements.

Table 6.1 – Audits and Inspections

Audit	Audited by	Frequency	Purpose of the Audit	Checklist
Storage (office locations)	Regional RSO	Annual	Compliance with the RPP and local license requirements.	Internal Radiation Safety Audit

Type of Inspection	Inspected by	Frequency	Purpose of the Inspection	Checklist
Storage / Temporary Storage	Office RSO	Every 6 months	• Storage location is secure	Storage / Temporary Storage
If a gauge storage location is in a remote area, the Office RSO may designate an alternate to conduct the inspection.				
Site (location gauge is used)	Office RSO	Annually *	• Portable gauges are used in safe, secure manner (principles of ALARA) • Verify training • Transport, license and emergency response documentation is available and complete	Portable Gauge Jobsite Inspection Form
	Regional RSO	Ad hoc		
User compliance (each user must undergo an inspection)	Regional RSO	Minimum annually per user	• Users are able to describe the steps to take to respond to an emergency involving a portable gauge. • Verify users are wearing their dosimeter	

Note: The Office RSO or a designate will conduct at least one site inspection during the portable gauge working season. The frequency should be increased dependent on the competency and experience of the gauge user and to cover locations with multiple gauges.

6.8.3 Inspection and Audit Responsibilities

6.8.3.1 Radiation Safety Program Manager

- The Radiation Safety Program Manager will ensure that an audit of each office's implementation of the current radiation protection plan is performed least annually by the Regional RSOs.
- When corrective actions have been identified for deficiencies found during inspections, the Radiation Safety Program Manager should ensure that all offices receive a summary of the findings.

- All new procedures and forms and up-to-date revision of the Radiation Protection Plan (RPP) will be posted by the Radiation Safety Program Manager to the Collaborative website located on the US HSE CWS – Radiation Safety.

6.8.3.2 Regional RSO

- The Regional RSO will conduct an audit of each office in their region at least annually utilizing the forms in this document. The audit will include an examination of records, an inspection of gauge storage facilities, interview of users, and observations of work practices in the field, when possible. Close attention should be paid to the transportation documents that are carried with the user.

6.8.3.3 Office RSO

- The Office RSO or a designate will conduct an inspection of the portable nuclear gauge storage area at least once every 6 months to verify that containers, gauges, and storage areas are properly labeled, signed and secure. This inspection will include a survey of all relevant areas, utilizing the forms in this document.
- The Office RSO or a designate will conduct a site inspection at least once per year during the portable gauge working season to verify that portable nuclear gauges are being used according to Golder's procedures, the Nuclear Safety and Control Act and Regulations, and the license governing the gauge. The frequency of inspections should be increased dependent on the competency and experience of the gauge user and to cover gauge use in multiple locations.
- The Office RSO or a designate will conduct an inspection of all temporary storage locations at least once every 6 months to verify that temporary storage location is following Golder's procedures, the Nuclear Safety and Control Act and Regulations, and Golder's License. This inspection will follow the "Portable Gauge Inspection Report" in this document.
- The Office RSO will keep a record of all internal inspection results for 3 years.
- The Office RSO is responsible for ensuring that the deficiencies noted in an audit are resolved within the allotted time frame.

6.8.3.4 User

- Each user should inspect the gauge to ensure it is in proper working order prior to leaving the office and again when returning the gauge to the storage area. Any problems should be reported to the Office RSO or designated equipment managers immediately.
- The NRC or appropriate State agency will conduct periodic inspections of storage locations and may conduct an audit of Golder's overall radiation safety program including interviewing users. Golder employees will give NRC or appropriate State agency inspectors their full cooperation.

6.9 Occupational Dosimetry

6.9.1 Regulatory Reference

Regulations: 10 CFR 20.1502, 10 CFR 20.1201, 10 CFR 20.1207, 10 CFR 20.1208.

6.9.2 Occupational Dosimetry - Applicability

The NRC allows Golder to do either of the following:

- Maintain, for inspection by NRC, documentation demonstrating that unmonitored individuals are not likely to receive, in one year, a radiation dose in excess of 10 percent (10%) of the allowable limits as shown in Table 6.2 (below);

OR

- Provide dosimetry processed and evaluated by a National Voluntary Laboratory Accreditation Program (NVLAP)-approved processor that is exchanged at a frequency recommended by the processor.

If gauge users are likely to receive, in one year from sources external to the body, a dose in excess of 10 percent of the allowable effective dose (5 rem (0.05 Sv)), or if declared pregnant women are likely to receive during the entire pregnancy, from radiation sources external to the body, a deep dose equivalent in excess of 0.1 rem (1 mSv); then Golder shall monitor the occupational intake of radioactive material.

Golder will require all employees who perform the following activities to wear a dose monitoring device (dosimeter) to determine their amount of radiation exposure to the known radiation hazards:

- Operate a portable nuclear gauge;
- Work in the immediate vicinity of a portable nuclear gauge;
- Work in the immediate vicinity of any storage facility;
- Transport a portable nuclear gauge; or
- Conduct maintenance on a portable nuclear gauge that contains a radioactive source,

The dosimeter provides a cumulative dose, not an instantaneous indication. Golder will provide dosimetry processed and evaluated by an NVLAP-approved processor that is exchanged at a quarterly (every 3 months) rate.

6.9.3 Dosimetry Frequency and Exposure Levels

When personnel monitoring is needed, most licensees use either film badges or thermoluminescent dosimeters (TLDs) that are supplied by an NVLAP-approved processor. The exchange frequency for film badges is usually monthly because of technical concerns about film fading. The exchange frequency for TLDs is usually quarterly. The Office RSO should verify that the processor is NVLAP-approved.

Table 6.2 Annual Dose Limits for Occupationally Exposed Adults (Type of Adult)

DOSE LIMITS		
Type of Worker	**Period**	**Effective Dose**
User	Quarterly dosimetry period	
User	One-year dosimetry period	5 rem (0.05 Sv)
Declared Pregnant User	Balance of pregnancy	0.5 rem (5 mSv) for balance of pregnancy
Non-User (member of the public)	One calendar year	0.1 rem (1 mSv)

Table 6.3 Annual Dose Limits for Occupationally Exposed Adults (Body Part)

Organ or Tissue	Type of Worker	Period	Effective Dose
Whole body (TEDE)	User	One-year dosimetry period	5 rem (0.05 Sv)
Lens of an eye	User	One-year dosimetry period	15 rem (0.15 Sv)
Skin	User	One-year dosimetry period	50 rem (0.5 Sv)
Hands and Feet	User	One-year dosimetry period	50 rem (500 mSv)
Knees to feet	User	One-year dosimetry period	50 rem (0.5 Sv)
Elbows and hands	User	One-year dosimetry period	50 rem (0.5 Sv)
Internal Organs	User	One-year dosimetry period	50 rem (0.5 Sv)

Note: Total effective dose equivalent TEDE = Deep dose from external exposure + dose from internal deposited radionuclides.

In this document, dose or radiation dose is used as defined in 10 CFR 20.1003, i.e., a generic term that means absorbed dose, dose equivalent, effective dose equivalent, committed dose equivalent, committed effective dose equivalent, or total effective dose equivalent. These latter terms are also defined in 10 CFR Part 20.

6.9.4 Dosimetry - General

6.9.4.1 Choosing a dosimeter

When exposure to external radiation is possible, each gauge user will wear a personal dosimeter during the exposure period to determine the dose they receive. The dosimeter provides a cumulative dose, not an instantaneous indication. The type of dosimeter used is determined by the type of radiation hazard present. The Office RSO, in conjunction with the dosimeter provider,

will be consulted to determine the optimum dosimeter badge for the project. Dosimeter service providers must be certified by the NVLAP.

6.9.4.2 Using a dosimeter

Dosimeter badges are issued to individual users and cannot be shared. The Office RSO is responsible to ensure dosimeter readings are attributed to the assigned wearer.

Dosimeter badges should be worn on the user's torso.

All employees wearing a dosimeter should understand the hazards and associated risks, know the acceptable levels of exposure to occupational radiation, and understand the exposure levels at which action is taken.

6.9.4.3 Results of dosimetry

Each dosimeter must be sent to a licensed dosimetry provider for readout. This may be done on a quarterly basis or more frequently in special cases. Dosimeters that are shipped for analysis will be shipped in packaging marked "DO NOT X-RAY", so as to avoid devices from being irradiated.

Personnel will be notified of their exposure upon request, or in cases of overexposure". Personnel will be notified of their exposure results in private. Correspondence must be kept confidential. A record of the exposure results are to be kept on file while employee is active. *(Final lifetime accumulation readings to be transferred to employee's human resources file)*.

Any exposure reaching the annual limits will be reported to the Regional RSO (as described in the structure of the RPP) and the Project Manager will conduct an investigation. The affected user will assist the Project Manager in determining the cause of the high exposure result.

The Regional RSO shall notify NRC within 21 days of receiving the exposure notification. All affected user's will co-operate fully with any NRC investigation into the over exposure.

Any user who exceeds the yearly dose levels will be assigned other duties until the investigation has determined the cause of the overexposure. If the investigation determines that the actual employee exposure is less than the limit, the employer may, with the permission of the NRC, return the user to regular work.

6.9.5 Occupational Dosimetry Responsibilities

6.9.5.1 Radiation Safety Program Manager

Radiation Safety Program Manager is responsible to ensure that dose monitoring is conducted in conformance with national and state-specific requirements.

The Radiation Safety Program Manager and Regional RSOs will assist the Office RSO in conducting an investigation to determine the magnitude of any overexposure and to establish the causes of the exposure.

6.9.5.2 Regional RSO

Regional RSOs will support the Office RSOs in the implementation of dose monitoring programs that are conducted in conformance with national and state-specific requirements.

Regional RSOs will assist the Office RSOs in conducting an investigation to determine the magnitude of any overexposure and to establish the causes of the exposure.

Any areas of improvement that are identified during an investigation or audit that are required to prevent the occurrence of an event, will be communicated to all RSOs.

6.9.5.3 Office RSO

The Office RSO will issue dosimeters to all users who operate a portable nuclear gauge. Spare dosimeters will be available to issue to new employees.

The office RSO shall be responsible to distribute and collect all dosimeters as each wearing period begins and ends and shall ensure they are promptly returned to the monitoring authority for measurement of radiation exposure. The wearing period is three months.

The Office RSO will make available reports of dose monitoring to monitored employees upon request. Personnel will be notified of their exposure results in private. Correspondence must be kept confidential. Dose reports are not to be posted in public view to maintain employee privacy.

When a dose of radiation received by an employee exceeds the allowable dose, the Office RSO will notify the employee, Regional RSO, Radiation Safety Program Manager and the NRC or appropriate State agency of the over-exposure. The Office RSO must ensure the employee stops any work that is likely to add to the dose until authorized by the NRC or appropriate State agency to return to that work.

The Office RSO, with the assistance of the Regional RSOs and Radiation Safety Program Manager, will conduct an investigation to determine the causes of the over-exposure. Actions and areas of improvement will be identified to avoid a reoccurrence.

6.9.5.4 User

All employees operating a portable nuclear gauge for 30 or more days per year will be designated as a gauge user (based on established exposure assumptions that each shot is equivalent to 0.0012 mSv, if a user takes more than 833 shots per year they should be designated as a gauge user).

All gauge users will be informed, in writing by the Office RSO, the risks of exposure to radiation.

- All users will wear a dosimeter when working around a gauge.
- Gauge users must store their dosimeter at least 30 feet from the nearest portable nuclear gauge when they are not working with or near, a gauge. This will prevent false exposure readings by the dosimeter.
- In the event of a dose that exceeds the allowable dose (over-exposure), the employee will stop any work that is likely to add to the dose until authorized by the NRC or appropriate State agency to return to that work.
- The employee will be involved in the investigation of any over-exposure to ensure that over-exposure does not reoccur.

6.10 Dose Limits for the Public

6.10.1 Regulatory Reference

Regulations: 10 CFR 20.1301, 10 CFR 20.1302, 10 CFR 20.1003, 10 CFR 20.1801, 10 CFR 20.1802, and 10 CFR 20.2107.

6.10.2 Requirements

Golder must ensure that licensed gauges will be used, transported, and stored in such a way that members of the public will not receive more than 100 mrem (1 mSv) in one year, and the dose in any unrestricted area will not exceed 2 mrem (0.02 mSv) in any one hour, from licensed operations.

Users must control and maintain constant surveillance over gauges that are not in storage and secure stored gauges from unauthorized removal or use.

6.11 Transportation of Nuclear Gauges

6.11.1 Regulatory Reference

Regulations: 10 CFR 71.5, 49 CFR Parts 171-178, 10 CFR 20.1101.

6.11.2 Gauge Transportation - General

Each Office RSO must develop, implement, and maintain safety programs for public transport of radioactive material to ensure compliance with DOT regulations.

The labeling of the transport container must be maintained in a legible condition. With regard to blocking and bracing, the licensee must assure that the transport container does not shift during transport. During an inspection, NRC uses the provisions of 10 CFR 71.5 to examine and enforce transportation requirements applicable to portable gauge licensees. Appendix B lists major DOT regulations and provides a sample shipping paper.

Note: The shipment of a gauge requires different paperwork and signage than the movement of a gauge.

6.11.3 Transportation Responsibilities

6.11.3.1 Office RSO

Only Golder employees who have received DOT General Awareness, Function Specific, Safety, and Security for Class 7 and Radiation Protection Training material are authorized to ship, transport or accept a shipment of a gauge.

When receiving a gauge the receiver must inspect the gauge transportation case for damage. If a case has sustained visible damage, the procedure in Section 6.13 “Incidents Involving (Damage to or Loss of) a Portable Nuclear Gauge” will be followed.

Office RSO should prepare the travel packages for each user to ensure all the proper documents are included. All transportation records must be retained.

6.11.3.2 Users

Only Golder employees who have received DOT General Awareness, Function Specific, Safety, and Security for Class 7 and Radiation Protection training are authorized to ship, transport or accept a shipment that includes a portable gauge.

Each user is responsible to ensure that all NRC or appropriate State agency regulations are followed for each shipment or movement of a gauge.

- The handle/trigger of a portable nuclear gauge must be locked in the fully retracted position and the gauge must be placed in an approved shipping case.
- The transport case must be locked, and secured using a 3 lock method at minimum. The 3 lock method refers to three distinct locks/security measures (i.e. gauge locked in its case, locked to the body of the truck with a separate lock, and

locked in a canopy or some variation of this combination). The handle lock is not considered one of the 3 locks.

- If the transport case is transported in an open vehicle, such as a pickup truck, the case must be chained and locked to the vehicle.
- Users who transport a gauge in a road vehicle must ensure the gauge is positioned as far away from the passenger area as possible.

When receiving a gauge the receiver will inspect the gauge transport container for damage as well as labels on gauge and shipping case. If a container has sustained visible damage, the procedure in Section 6.13 will be followed.

Users must follow the Golder Motor Vehicle Policy when transporting a gauge.

6.12 Portable Nuclear Gauge Inventory

6.12.1 Regulatory Reference

Regulations: 10 CFR 30.34(e), 10 CFR 30.41, 10 CFR 30.51.

6.12.2 Inventory Responsibilities

6.12.2.1 Office RSO

Office RSOs must do the following:

- Maintain records of receipt, transfer, and disposal of gauges; and
- Conduct physical inventories at intervals not to exceed 6 months to account for all sealed sources.

A utilization/transfer log will be posted outside the portable nuclear gauge storage area for users to record their daily removal and return of gauges to the storage area.

If an office needs to acquire any other make and model, a request to the NRC or appropriate State agency for a revision to our license must be made by the Radiation Safety Program Manager, 30 days prior to the acquisition. There may be a requirement for correspondence with the NRC or appropriate State agency for a revision to an existing license.

Depending on the status of the license, the NRC or appropriate State agency may need to be notified of change in inventory (purchase/disposal) of gauges.

The NRC or appropriate State agency may need to be notified of any movement of a gauge to a temporary location (more than 90 days) or permanently to another licensed location.

6.13 Incidents Involving (Damage to or Loss of) a Portable Nuclear Gauge

If the source fails to return to the shielded position (e.g., as a result of being damaged, source becomes stuck below the surface), or if any other emergency or unusual situation arises (e.g., the gauge is struck by a moving vehicle, is dropped, or is in a vehicle involved in an accident):

- Immediately secure the area and keep people at least 15 feet away from the gauge until the situation is assessed and radiation levels are known. However, perform first aid for any injured individuals and remove them from the area only when medically safe to do so.
- If any heavy equipment is involved, detain the equipment and operator until it is determined there is no contamination present.
- Gauge users and other potentially contaminated individuals should not leave the scene until emergency assistance arrives.

6.13.1 Incident Responsibilities

6.13.1.1 Regional RSO

- Make necessary notifications to local authorities as well as to NRC as required. (Even if it is not required, you may report *any* incident to NRC by calling NRC's Emergency Operations Center at (301) 816-5100, which is staffed 24 hours a day and accepts collect calls.). NRC notification is required when gauges containing licensed material are lost or stolen, when gauges are damaged or involved in incidents that result in doses in excess of 10 CFR 20.2203 limits, and when it becomes apparent that attempts to recover a source stuck below the surface will be unsuccessful.
- Reports to NRC must be made within the reporting time frames specified by the regulations. Reporting requirements are found in 10 CFR 20.2201-2203 and 10 CFR 30.50.

6.13.1.2 Office RSO

- If a case has sustained visible damage, the case will be placed in a secure area accessible only to employees familiar with responding to incidents involving radioactive material.
- In the case of fire, do not use the gauge until the damage has been assessed. A leak test must be performed after any incident that may have resulted in source damage.
- In the case of a radiation leak, the initial procedures to be followed are in Section 6.13, and then follow your local office-specific protocol.
- All incidents involving a portable nuclear gauge or if damage to a gauge is detected, will be reported immediately to the Regional RSO who will assist in the emergency response.
- The Office RSO will inform the Radiation Safety Program Manager and Regional RSO of all incidents involving a gauge and, if necessary, will notify the NRC or appropriate State agency duty officer.
- Emergency response training will be conducted at least annually or prior to the each construction season (annually). The Regional RSO will provide scenarios,

desktop exercises, and/or tailgate examples to run and provide feedback on the user response capabilities.

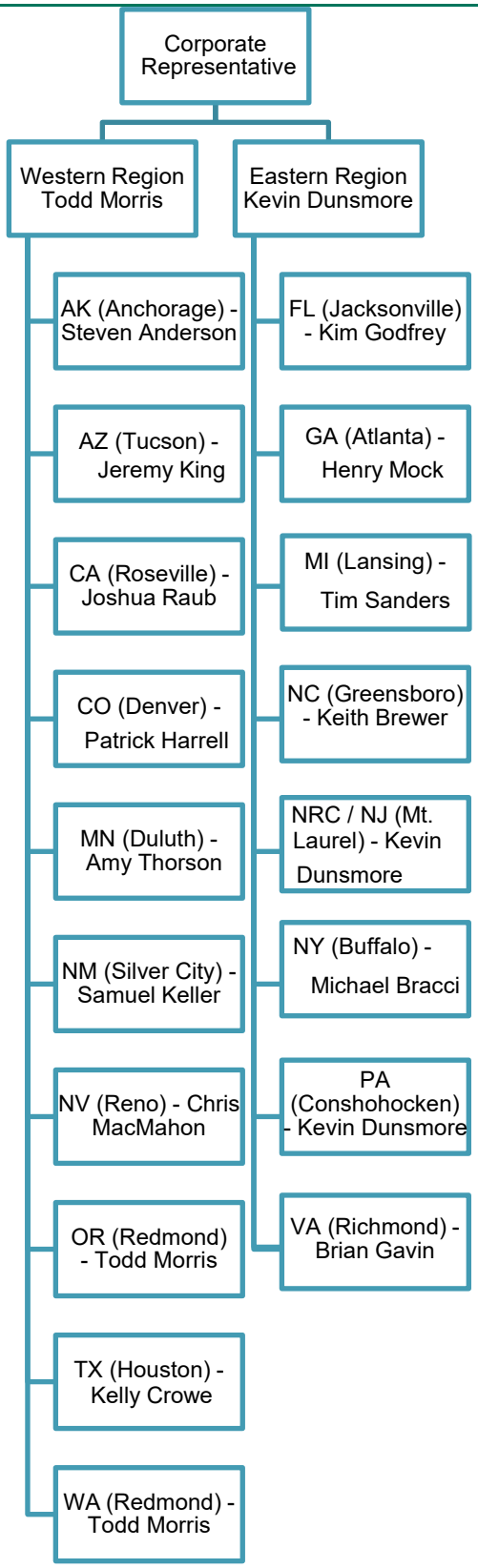
- Arrange for a radiation survey to be conducted as soon as possible by a knowledgeable person using appropriate radiation detection instrumentation. This person could be an experienced user using a survey meter located at the job site or a consultant. To accurately assess the radiation danger, it is essential that the person performing the survey be sufficiently experienced in the use of the survey meter.
- If gauges are used for measurements with the unshielded source extended more than 3 feet below the surface, contact persons listed on the emergency procedures need to know the steps to be followed to retrieve a stuck source and to convey those steps to the staff on site.

6.13.1.3 User

- All incidents involving a portable nuclear gauge or if damage is detected, must be reported immediately to the Office RSO or designee.
- In the case of fire, do not use the gauge until the damage has been assessed. A leak test must be performed after any incident that may have resulted in source damage.
- In the case of a radiation leak, the initial procedures to be followed are in Section 6.13, and then follow your local office-specific protocol.

APPENDIX A:
RADIATION SAFETY ORG. CHART

Radiation Safety Officer Organizational Chart



APPENDIX B:
NUREG 1556 VOL1, REV. 1, SECTION 8.10.80, APPENDIX K TITLED, "MAJOR DOT REGULATIONS".

Appendix K

Major DOT Regulations; Sample Bill of Lading

The major areas in the DOT regulations that are most relevant for transportation of typical portable gauges that are shipped as Type A quantities are as follows:

- Table of Hazardous Materials and Special Provisions 49 CFR 172.101, and App. A, Table 2: Hazardous materials table, list of hazardous substances and reportable quantities;
- Shipping Papers 49 CFR 172.200-204: General entries, description, additional description requirements, shipper's certification;
- Package Markings 49 CFR 172.300, 49 CFR 172.301, 49 CFR 172.303, 49 CFR 172.304, 49 CFR 172.310, 49 CFR 172.324: General marking requirements for non-bulk packagings, prohibited marking, marking requirements, radioactive material, hazardous substances in non-bulk packaging;
- Package Labeling 49 CFR 172.400, 49 CFR 172.401, 49 CFR 172.403, 49 CFR 172.406, 49 CFR 172.407, 49 CFR 172.436, 49 CFR 172.438, 49 CFR 172.440: General labeling requirements, prohibited labeling, radioactive materials, placement of labels, specifications for radioactive labels;
- Placarding of Vehicles 49 CFR 172.500, 49 CFR 172.502, 49 CFR 172.504, 49 CFR 172.506, 49 CFR 172.516, 49 CFR 172.519, 49 CFR 172.556: Applicability, prohibited and permissive placarding, general placarding requirements, providing and affixing placards, highway, visibility and display of placards, RADIOACTIVE placard;
- Emergency Response Information, Subpart G, 49 CFR 172.600, 49 CFR 172.602, 49 CFR 172.604: Applicability and general requirements, emergency response information, emergency response telephone number;
- Training, Subpart H, 49 CFR 172.702, 49 CFR 172.704: Applicability and responsibility for training and testing, training requirements;
- Radiation Protection Program for Shippers and Carriers, Subpart I, 49 CFR 172.800, etc.;
- Shippers - General Requirements for Shipments and Packaging, Subpart I, 49 CFR 173.403, 49 CFR 173.410, 49 CFR 173.412, 49 CFR 173.415, 49 CFR 173.433, 49 CFR 173.435, 49 CFR 173.441, 49 CFR 173.475, 49 CFR 173.476: Definitions, general design requirements, additional design requirements for Type A packages, authorized Type A packages, requirement for determining A1 and A2, table of A1 and A2 values for radionuclides, radiation level limit, quality control requirements prior to each shipment, approval of special form radioactive materials;
- Carriage by Public Highway 49 CFR 177.816, 49 CFR 177.817, 49 CFR 177.834(a), 49 CFR 177.842: Driver training, shipping paper, general requirements (secured against movement), Class 7 (radioactive) material.

Minimum Required Packaging For Class 7 (Radioactive) Materials

This table must not be used as a substitute for the DOT and NRC regulations on the transportation of radioactive materials

Quantity:	< 70 Bq/g (< 0.002 µCi/g)	Limited Quantity (§173.421)	A_1/A_2 value (§173.435)	1 rem/hr at 3 m, un-shielded (§173.427)
Non-LSA/SCO:	**Excepted**	**Type A**	**Type B [3]**	
Domestic or International LSA/SCO: • LSA-I solid, (liquid)[1] • SCO-I	**Excepted**	**IP-I**		**Type B [3]**
• LSA-I Liquid • LSA-II Solid, (liquid or gas)[1] • (LSA-III)[1] • SCO-II		**IP-II**		**Type B [3]**
• LSA-II Liquid or Gas • LSA-III		**IP-III**		**Type B [3]**
Domestic (only) LSA/SCO: • LSA-I, II, III; SCO-I, II	**Excepted**	**Strong-tight [2]**	**DOT Spec. 7A Type A**	**Type B [3]** **NRC Type A LSA [3,4]**

1. For entries in parentheses, exclusive use is required for shipment in an IP (e.g., shipment of LSA-I liquid in an IP-I packaging would require exclusive-use consignment)
2. Exclusive use required for strong-tight container shipments made pursuant to §173.427(b)(2)
3. Subject to conditions in Certificate, if NRC package
4. Exclusive use required, see §173.427(b)(4). Use of these packages expires on 4/1/99 (10 CFR 71.52)

Package and Vehicle Radiation Level Limits (49 CFR 173.441) [A]

This table must not be used as a substitute for the DOT and NRC regulations on the transportation of radioactive materials

Transport Vehicle Use:	**Non-Exclusive**	**Exclusive**		
Transport Vehicle Type:	Open or Closed	Open (flat-bed)	Open w/Enclosure [B]	Closed
Package (or freight container) **Limits:**				
External Surface	2 mSv/hr **(200 mrem/hr)**	2 mSv/hr **(200 mrem/hr)**	10 mSv/hr **(1000 mrem/hr)**	10 mSv/hr **(1000 mrem/hr)**
Transport Index (TI) [C]	10	no limit		
Roadway or Railway Vehicle (or freight container) **Limits:**				
Any point on the outer surface	N/A	N/A	N/A	2 mSv/hr **(200 mrem/hr)**
Vertical planes projected from outer edges		2 mSv/hr **(200 mrem/hr)**	2 mSv/hr **(200 mrem/hr)**	N/A
Top of . . .		load: **(200 mrem/hr)**	enclosure: 2 mSv/hr **(200 mrem/hr)**	vehicle: 2 mSv/hr **(200 mrem/hr)**
2 meters from. . .		vertical planes: 0.1 mSv/hr **(10 mrem/hr)**	vertical planes: 0.1 mSv/hr **(10 mrem/hr)**	outer lateral surfaces: 0.1 mSv/hr **(10 mrem/hr)**
Underside		2 mSv/hr **(200 mrem/hr)**		
Occupied position	N/A [D]	0.02 mSv/hr **(2 mrem/hr)** [E]		
Sum of package TI's	50	no limit [F]		

A. The limits in this table do not apply to excepted packages - see 49 CFR 173.421-426.
B. Securely attached (to vehicle), access-limiting enclosure; package personnel barriers are considered as enclosures.
C. For nonfissile radioactive materials packages, the dimensionless number equivalent to maximum radiation level at 1 m (3.3 feet) from the exterior package surface, in millirem/hour.
D. No dose limit is specified, but separation distances apply to Radioactive Yellow-II or Radioactive Yellow-III labeled packages.
E. This does not apply to private carrier wearing dosimetry if under radiation protection program satisfying 10 CFR 20 or 49 CFR 172 Subpart I.
F. Some fissile shipments may have combined conveyance TI limit of 100 - see 10 CFR 71.59 and 49 CFR 173.457.

Hazard Communications for Class 7 (Radioactive) Materials

DOT Shipping Papers (49 CFR 172.200-205)

NOTE: IAEA, ICAO, and IMO may require additional hazard communication information for international shipments
This table must not be used as a substitute for the DOT and NRC regulations on the transportation of radioactive materials

Entries Always Required Unless Excepted	Additional Entries Sometimes Required	Optional Entries
• The basic description, In sequence: **Proper Shipping Name**, **Hazard Class (7),** **U.N. Identification Number** • 24 hour **emergency response telephone number** • Name of **shipper** • Proper page numbering (Page 1 of 4) • Except for empty and bulk packages, the **total quantity** (mass, or volume for liquid), in appropriate units (lbs, mL....) • If not special form, **chemical and physical form** • The **name of each radionuclide** (95 percent rule) and total package activity. The activity must be in SI units (e.g., Bq, TBq), or both SI units and customary units (e.g., Ci, mCi). However, for domestic shipments, the activity *may* be expressed in terms of customary units only, until 4/1/97. • For each labeled package: - The **category of label** used; - The **transport index** of each package with a Yellow-II or Yellow-III label - Shipper's **certification** (not required of private carriers)	Materials-Based Requirements • If hazardous substance, "RQ" as part of the basic description • The LSA or SCO group (e.g., LSA-II) • "Highway Route Controlled Quantity" as part of the basic description , if HRCQ • Fissile material information (e.g., "Fissile Exempt," controlled shipment statement [see §172.203(d)(7)]) • If the material is considered hazardous waste and the word waste does not appear in the shipping name, then "waste" must precede the shipping name (e.g., Waste Radioactive Material, nos, UN2982) • "Radioactive Material" if not in proper shipping name **Package-Based Requirements** • Package identification for DOT Type B or NRC certified packages • IAEA CoC ID number for export shipments or shipments using foreign-made packaging (see §173.473) **Administrative-Based Requirements** • "Exclusive Use-Shipment" • Instructions for maintenance of exclusive use-shipment controls for LSA/SCO strong-tight or NRC certified LSA (§ 173.427) • If a DOT exemption is being used, "DOT-E" followed by the exemption number	• The type of packaging (e.g., Type A, Type B, IP-1, ...) • The technical/chemical name may be in included (if listed in §172.203(k), in parentheses between the proper shipping name and hazard class; otherwise inserted in parenthesis after the basic description) • Other information is permitted (e.g., functional description of the product), provided it does not confuse or detract from the proper shipping name or other required information • For fissile radionuclides, except Pu-238, Pu-239, and Pu-241, the weight in grams or kilograms may be used *in place of* activity units. For Pu-238, Pu-239, and Pu-241, the weight in grams or kilograms may optionally be entered *in addition to* activity units [see §172.203(d)(4)] • Emergency response hazards and guidance information (§§172.600-604) may be entered on the shipping papers, or may be carried with the shipping papers [§172.602(b)]

Some Special Considerations/Exceptions for Shipping Paper Requirements

- Shipments of Radioactive Material, excepted packages, under UN2910 (e.g., Limited Quantity, Empty packages, and Radioactive Instrument and Article), are excepted from shipping papers. For limited quantities (§173.421), this is only true if the limited quantity is not a hazardous substance (RQ) or hazardous waste (40 CFR 262).
- Shipping papers must be in the pocket on the left door, or readily visible to a person entering the driver's compartment and within arm's reach of the driver.
- For shipments of multiple cargo types, any HAZMAT entries must appear as the first entries on the shipping papers, be designated by an "X" (or "RQ") in the hazardous material column, ***or*** be highlighted in a contrasting color.

NRC Contacts: John Cook, (301) 415-8521 Earl Easton, (301) 415-8520

Hazard Communications for Class 7 (Radioactive) Materials

Marking Packages (49 CFR 172.300-338)

NOTE: IAEA, ICAO, and IMO may require additional hazard communication information for international shipments
This table must not be used as a substitute for the DOT and NRC regulations on the transportation of radioactive materials

Markings Always Required Unless Excepted	Additional Markings Sometimes Required	Optional Markings
Non-Bulk Packages ● Proper shipping name ● U.N. identification number ● Name and address of consignor or consignee, *unless*: 1. highway only and no motor carrier transfers; *or* part of carload or truckload lot or freight container load, and entire contents of railcar, truck, or freight container are shipped from one consignor to one consignee [see §172.301(d)]	**Materials-Based Requirements** ● If in excess of 110 lbs (50 kg), Gross Weight ● If non-bulk *liquid* package, underlined double arrows indicating upright orientation (two opposite sides) [ISO Std 780-1985 marking]  ● If a Hazardous substance in non-bulk package, the letters "RQ" in association with the proper shipping name **Package-Based Requirements** ● The package type if Type A or Type B (½" or greater letters) ● The specification-required markings [e.g., for Spec. 7A packages: "DOT 7A Type A" and "Radioactive Material" (see §178.350-353)] ● For approved packages, the certificate ID number (e.g., USA/9166/B(U), USA/9150/B(U)-85, ...) ● If Type B, the trefoil (radiation) symbol per Part 172 App. B [*size*: outer radius ≥ 20 mm (0.8 in)] ● For NRC certified packages, the model number, gross weight, and package ID number (10 CFR 71.85) **Administrative-Based Requirements** ● If a DOT exemption is being used, "DOT-E" followed by the exemption number ● If an export shipment, "USA" in conjunction with the specification markings or certificate markings	● "IP-1," "IP-2," or "IP-3" on industrial packaging is recommended ● Both the name and address of consignor and consignee are recommended ● Other markings (e.g., advertising) are permitted, but must be sufficiently away from required markings and labeling
Bulk Packages (i.e., net capacity greater than 119 gallons as a receptacle for liquid, or 119 gallons and 882 pounds as a receptacle for solid, or water capacity greater than 1000 lbs, with no consideration of intermediate forms of containment) ● U.N. identification number, on orange, rectangular panel (see §172.332) - some exceptions exist		

Some Special Considerations/Exceptions for Marking Requirements

- Marking is required to be: (1) durable, (2) printed on a package, label, tag, or sign, (3) unobscured by labels or attachments, (4) isolated from other marks, and (5) be representative of the hazmat contents of the package.
- Limited Quantity (§173.421) packages and Articles Containing Natural Uranium and Thorium (§173.426) must bear the marking "radioactive" on the outside of the inner package or the outer package itself, and are excepted from other marking. The excepted packages shipped under UN 2910 must also have the accompanying statement that is required by §173.422.
- Empty (§173.428) and Radioactive Instrument and Article (§173.424) packages are excepted from marking.
- Shipment of LSA or SCO required by §173.427 to be consigned as exclusive use are excepted from marking except that the exterior of each nonbulk package must be marked "**Radioactive-LSA**" or "**Radioactive-SCO**," as appropriate. Examples of this category are domestic, strong-tight containers with less than an A_2 quantity, and domestic NRC certified LSA/SCO packages using 10 CFR 71.52.
- For bulk packages, marking may be required on more than one side of the package (see 49 CFR 172.302(a)).

Hazard Communications for Class 7 (Radioactive) Materials

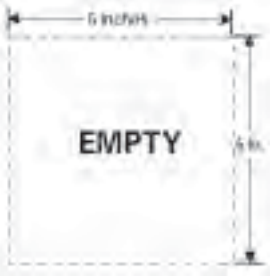
Labeling Packages (49 CFR 172.400-450)

NOTE: IAEA, ICAO, and IMO may require additional hazard communication information for international shipments
This table must not be used as a substitute for the DOT and NRC regulations on the transportation of radioactive materials

Placement of Radioactive Labels

- Labeling is required to be: (1) placed near the required marking of the proper shipping name, (2) printed or affixed to the package surface (not the bottom), (3) in contrast with its background, (4) unobscured by markings or attachments, (5) within color, design, and size tolerance, and (6) representative of the HAZMAT contents of the package.
- For labeling of radioactive materials packages, two labels are required on opposite sides excluding the bottom.

Determination of Required Label

Size: *Sides:* ≥ 100 mm (3.9 in.) *Border:* 5-6.3 mm (0.2-0.25 in.)	 49 CFR 172.436	 49 CFR 172.438	 49 CFR 172.440	 49 CFR 172.450
Label	**WHITE-I**	**YELLOW-II**	**YELLOW-III**	**EMPTY LABEL**
Required when:	Surface radiation level < 0.005 mSv/hr (0.5 mrem/hr)	0.005 mSv/hr (0.5 mrem/hr) < surface radiation level ≤ 0.5 mSv/hr (50 mrem/hr)	0.5 mSv/hr (50 mrem/hr) < surface radiation level ≤ 2 mSv/hr (200 mrem/h) [Note: 10 mSv/hr (1000 mrem/hr) for exclusive-use closed vehicle (§173.441(b)]	The EMPTY label is required for shipments of empty Class 7 (radioactive) packages made pursuant to **§173.428**. It must cover any previous labels, or they must be removed or obliterated.
Or:	TI = 0 [1 meter dose rate < 0.0005 mSv/hr (0.05 mrem/hr)]	TI ≤ 1 [1 meter dose rate < 0.01 mSv/hr (1 mrem/hr)]	TI ≤ 10 [1 meter dose rate < 0.1 mSv/hr (10 mrem/hr)] [Note: There is no *package* TI limit for exclusive-use]	
Notes:	• Any package containing a Highway Route Controlled Quantity (HRCQ) **must bear YELLOW-III label** • Although radiation level transport indices (TIs) are shown above, for fissile material, the TI is typically determined on the basis of criticality control			

Content on Radioactive Labels

2. RADIOACTIVE Label must contain (entered using a durable, weather-resistant means):
   (1) The radionuclides in the package (with consideration of available space). Symbols (e.g., Co-60) are acceptable.
   (2) The activity in SI units (e.g., Bq, TBq), or both SI units with customary units (e.g., Ci, mCi) in parenthesis. However, for domestic shipments, the activity *may* be expressed in terms of customary units only, until 4/1/97.
   (3) The Transport Index (TI) in the supplied box. The TI is entered *only* on YELLOW-II and YELLOW-III labels.

Some Special Considerations/Exceptions for Labeling Requirements
• For materials meeting the definition of another hazard class, labels for each secondary hazard class need to be affixed to the package. The subsidiary label *may* not be required on opposite sides, and must not display the hazard class number. • Radioactive Material, excepted packages, under UN2910 (e.g., Limited Quantity, Empty packages, and Radioactive Instrument and Article), are excepted from labeling. However, if the excepted quantity meets the definition for another hazard class, it is re-classed for that hazard. Hazard communication requirements for the other class are required. • Labeling exceptions exist for shipment of LSA or SCO required by § 173.427 to be consigned as exclusive use. • The “Cargo Aircraft Only” label is typically required for radioactive materials packages shipped by air [§ 172.402(c)].

Hazard Communications for Class 7 (Radioactive) Materials

Placarding Vehicles (49 CFR 172.500-560)

NOTE: IAEA, ICAO, and IMO may require additional hazard communication information for international shipments
This table must not be used as a substitute for the DOT and NRC regulations on the transportation of radioactive materials.

Visibility and Display of Radioactive Placard

- Placards are required to be displayed:
  - On four sides of the vehicle;
  - Visible from the direction they face, (for the front side of trucks, tractor-front, trailer, or both are authorized);
  - Clear of appurtenances and devices (e.g., ladders, pipes, tarpaulins);
  - At least 3 inches from any markings (such as advertisements) which may reduce placard's effectiveness;
  - Upright and on-point such that the words read horizontally;
  - In contrast with the background, or have a lined-border which contrasts with the background;
  - Such that dirt or water from the transport vehicle's wheels will not strike them;
  - Securely attached or affixed to the vehicle, or in a holder.
- Placard must be maintained by carrier to keep color, legibility, and visibility.

Conditions Requiring Placarding

- Placards are required for any vehicle containing a package with a RADIOACTIVE Yellow-III label.
- Placards are required for shipment of LSA or SCO required by §173.427 to be consigned as exclusive use. Examples of this category are domestic, strong-tight containers with less than an A_2 quantity, and domestic NRC certified LSA/SCO packages using 10 CFR 71.52. Also, for bulk packages of these materials, the orange panel marking with the UN Identification number is not required.
- Placards are required for any vehicle containing a package with a Highway Route Controlled Quantity (HRCQ). In this case, the placard must be placed in a square background as shown below (see §173.507(a)).

Radioactive Placard

Size Specs: *Sides:* ≥ 273 mm (10.8 in.) *Solid line Inner border:* About 12.7 mm (0.5 in.) from edges *Lettering:* ≥ 41 mm (1.6 in.) *Square for HRCQ:* 387mm (15.25 in.) outside length by 25.4 mm (1 in.) thick	 49 CFR 172.556 **RADIOACTIVE PLACARD (Domestic)** *Base of yellow solid area:* 29 ± 5 mm (1.1 ± 0.2 in.) above horizontal centerline	 IAEA SS 6 (1985) paras. 443-444 **RADIOACTIVE PLACARD (International)**	 See 49 CFR 172.527 AND 556 **RADIOACTIVE PLACARD FOR HIGHWAY ROUTE CONTROLLED QUANTITY** (either domestic or international placard could be in middle)

Some Special Considerations/Exceptions for Placarding Requirements

- Domestically, substitution of the UN ID number for the word “RADIOACTIVE” on the placard is prohibited for Class 7 materials. However, some import shipments may have this substitution in accordance with international regulations.
- Bulk packages require the orange, rectangular panel marking containing the UN ID number, which must be placed adjacent to the placard (see §172.332) [NOTE: except for LSA/ SCO exclusive use under §173.427, as above].
- If placarding for more than one hazard class, subsidiary placards must not display the hazard class number. Uranium Hexaflouride (UF_6) shipments $\geq$ 454 kg (1001 lbs) require both RADIOACTIVE and CORROSIVE (Class 8) placarding.
- For shipments of radiography cameras in convenience overpacks, if the overpack does not require a RADIOACTIVE – YELLOW III label, vehicle placarding is not required (regardless of the label which must be placed on the camera).

Package and Vehicle Contamination Limits (49 CFR 173.443)

This table must not be used as a substitute for the DOT and NRC regulations on the transportation of radioactive materials

NOTE: All values for contamination in DOT rules are to be averaged over each 300 cm^2
Sufficient measurements must be taken in the appropriate locations to yield representative assessments

$\beta\gamma$ means the sum of beta emitters, gamma emitters, and low-toxicity alpha emitters
" means the sum of all other alpha emitters (i.e., other than low-toxicity alpha emitters)

The Basic Contamination Limits for All Packages: 49 CFR 173.443(a), Table 11	General Requirement: Non-fixed (removable) contamination must be kept as low as reasonably achievable (ALARA)
	$\beta\gamma$: 0.4 Bq/cm^2 = 40 Bq/100 cm^2 = 1x10^{-5} µCi/cm^2 = 2200 dpm/100 cm^2
	α: 0.04 Bq/cm^2 = 4 Bq/100 cm^2 = 1x10^{-6} µCi/cm^2 = 220 dpm/100 cm^2

The following exceptions and deviations from the above basic limits exist:

Deviation from Basic Limits	**Regulation 49 CFR §§**	**Applicable Location and Conditions Which must Be Met:**
10 times the basic limits	173.443(b) and 173.443(c) Also see 177.843 (highway)	On any external surface of a package in an exclusive use shipment, during transport including end of transport. Conditions include: • Contamination levels at beginning of transport must be below the basic limits. • Vehicle must not be returned to service until radiation level is shown to be ≤ 0.005 mSv/hr (0.5 mrem/hr) at any accessible surface, and there is no significant removable (non-fixed) contamination.
10 times the basic limits	173.443(d) Also see 177.843 (highway)	On any external surface of a package, at the beginning or end of transport, if a closed transport vehicle is used, solely for transporting radioactive materials packages. Conditions include: • A survey of the interior surfaces of the empty vehicle must show that the radiation level at any point does not exceed 0.1 mSv/hr (10 mrem/hr) at the surface, or 0.02 mSv/hr (2 mrem/hr) at 1 meter (3.3 ft). • Exterior of vehicle must be conspicuously stenciled, "For Radioactive Materials Use Only" in letters at least 76 mm (3 inches) high, on both sides. • Vehicle must be kept closed except when loading and unloading.
100 times the basic limits	173.428	**Internal** contamination limit for excepted package-empty packaging, Class 7 (Radioactive) Material, shipped in accordance with 49 CFR 173.428. Conditions include: (1) The basic contamination limits (above) apply to **external** surfaces of package. (2) Radiation level must be ≤ 0.005 mSv/hr (0.5 mrem/hr) at any external surface. (3) Notice in §173.422(a)(4) must accompany shipment. (4) Package is in unimpaired condition & securely closed to prevent leakage. (5)Labels are removed, obliterated, or covered, and the "empty" label (§172.450) is affixed to the package.

In addition, after any incident involving spillage, breakage, or suspected contamination, the modal-specific DOT regulations (§177.861(a), highway; §174.750(a), railway; and §175.700(b), air) specify that vehicles, buildings, areas, or equipment have "no significant removable surface contamination" before being returned to service or routinely occupied. The carrier must also notify offeror at the earliest practicable moment after incident.

APPENDIX C:
RECORDKEEPING REFERENCE TABLE

Recordkeeping Requirements Summary Table

Document Type	**Responsibility**	**Minimum Retention Time**[1]	**Where Kept?**
Radioactive Materials License	Office RSO	Until current license is terminated (then archived)	Office RSO files & at entrance to gauge storage area
Radioactive Materials License Application	Office RSO	Until current license is terminated (then archived)	Office RSO files
Radioactive Materials License Reciprocity Agreements	Office RSO	Until reciprocity agreement is terminated (then archived)	Office RSO Files
Nuclear Gauge User Training Records/Competency Verification	Office RSO	3 years from end of employment	Office RSO Files
Nuclear Gauge User Dosimeter Readings[2]	Office RSO	While employee is active. *(Final lifetime accumulation readings to be transferred to employee's final H&S file)*.	Office RSO Files (private)
Unmonitored Individuals Exception[3]	Office RSO	While license is active	Office RSO Files
Deep-Dose Equivalent to Declared Pregnant Woman and Dose Equivalent to Embryo/Fetus	Office RSO	While employee is active. *(Final lifetime accumulation readings to be transferred to employee's final H&S file)*.	Office RSO Files (private)
Declaration of Pregnancy	Office RSO	While employee is active.	HR Files (private)
Leak Testing	Office RSO	As long as Golder owns the gauge	Office RSO Files
Survey Meter (portable radiation gauge) Calibration	Office RSO	3 years after the meter is permanently taken out of service	Office RSO Files
Nuclear Gauge Calibration	Office RSO	3 years after the gauge is permanently taken out of service	Office RSO Files
Maintenance Records	Office RSO	3 years after the gauge is permanently taken out of service	Office RSO Files
Nuclear Gauge Inspection (*at jobsite*)	Office RSO	3 years from the date of the inspection	Office RSO Files
Nuclear Gauge Inspection (*storage areas*, *every 6 months*)	Office RSO	3 years from the date of the inspection	Office RSO Files
Internal Audits	Office RSO	3 years from date of Audit	Office RSO Files
External Audits	Office RSO	3 years from date of Audit	Office RSO Files
Annual Radiation Protection Program Review	RSPM	3 years from date of review	Office RSPM Files
Annual License-Specific RPP Program Review	Office RSO	3 years from date of review	Office RSO Files
Gauge purchase/receipt, transfer, and disposal documentation	Office RSO	3 Years beyond license expiration	Office RSO Files

Document Type	Responsibility	Minimum Retention Time[1]	Where Kept?
Gauge Incident Reports	Office RSO	3 years from date of report	Office RSO Files
NRC/State Correspondence	Office RSO	3 years from date of correspondence (*or longer pending significance of correspondence*)	Office RSO Files
Nuclear Gauge Authorized Users List	Office RSO	3 Years beyond license expiration, updated regularly as needed.	At entrance to gauge storage area & Office RSO Files
Emergency Contact Information/Procedures	Office RSO	Until license/reciprocity agreement is terminated	At entrance to gauge storage area, with gauge when shipped, & Office RSO Files
Nuclear Gauge inventory	Office RSO	Until license/reciprocity agreement is terminated	Office RSO Files
Nuclear Gauge utilization/transfer log	Office RSO	Until license/reciprocity agreement is terminated	Active log maintained at entrance to gauge storage area (inactive logs archived in Office RSO files)
Shipping Documents	Office RSO	3 years from date of shipment	Office RSO files & during shipment of the gauge (but separately from the gauge container)
Source Certificate	Office RSO	3 years after the gauge is permanently taken out of service	Office RSO files & during transport of the gauge (but separately from the gauge container)
NRC/State Required Health Posting	Office RSO	Until license/reciprocity agreement is terminated	At entrance to gauge storage area
Office-specific Radiation Security Plan	Office RSO	3 years after license/reciprocity agreement is terminated	Office RSO files

[1]or appropriate time stated by NRC or State regulations, whichever is longer. Final license closure records are not to be disposed without notifying the NRC or appropriate State agency.
[2]Records of inadvertent exposure of the dosimeter while not being worn by the assigned individual must also be maintained.
[3] Maintain, for inspection by NRC, documentation demonstrating that unmonitored individuals are not likely to receive, in one year, a radiation dose in excess of 10 percent (10%) of the allowable limits as shown in Table 1 of the Radiation Protection Plan.

NRC-Nuclear Regulatory Commission
RSO-Radiation Safety Officer
RSPM-Radiation Safety Program Manager

APPENDIX D:
RADIATION SAFETY AUDIT FORMS

Annual Radiation Safety Audit

Licensee:				Report Number:	
License Number:				Inspection Date:	
Address:				Inspector Name:	
City:		State:		Zip:	Gauge Model and Serial Numbers:
Person Seen:					

This Radiation Safety Audit an announced visit by 0 . The purpose was to audit the above facility portable gauge management against the Golder RPP and the appropriate local regulations.

(Inspector)

This inspection was in line with the specified inspection/audit program from the Golder Radiation Protection Plan (RPP).

Response to this report demonstrating compliance is due to 0 by .

(Inspector) (Date)

Risk Rating		Audit Ratings	
L=Likelihood		A= Exceeds requirement	D= Significantly below requirements
C=Consequence		B= Meets Requirements	E= Unacceptable
		C= Below Requirements	N/A = Not Applicable
			N/C = Not Checked

#	Description	Compliance Expectations	Regulatory Reference (Local/Federal)	Risk Rating L	Risk Rating C	Risk Rating Overall	Audit Rating	Comments
1	License Review	License is current and all applicable details are accurate.						
2	Inventory	A complete nuclear substance and radiation device inventory is available.						
3	Records Retained	Records of transfer, receipt, disposal and abandonment are available. Records of inspection, measurement, test and servicing are available. Records are retained for the entire active life of the instrument.						
4	License details	License activities are conducted in accordance with the license.						
5	Change Notified	Changes to the RSO responsible for management and control of licensed activity have been reported to the licensing authority.						
6	Device certification	(1) All radiation devices in use have a current calibration by an authorized external provider. (2) All radiation devices have a current leak test with analysis provided by an authorized provider.						
7	Transfer Documents	A copy of the most recent leak test result is provided for all transfers of radiation devices as well as instructions to follow in the event of an accident.						
8	Authorized transfer	All transfers of radiation devices have been to users operating under authorized licenses.						

Work Doc:– Records								
9	Leak Test	Leak testing is performed at the required frequency following acceptable procedures.						
10	Leak Test Event	Leak testing was performed immediately after any event that may have damaged the sealed source(s).						
11	Failed Leak Test	Appropriate actions were taken upon detection of a leaking source.						
12	Device accidents	Any radiation device involved in an accident or incident has been tested/inspected and confirmed to be functioning properly prior to return to use.						
13	Reportable events	Incidents and unplanned events have been immediately reported to the appropriate licensing authority and a detailed written report was submitted to the regional RSO within 30 days.						
14	Reporting dangerous occurrence	Licensee provided an immediate report to Regional RSO and if necessary a report to the appropriate licensing authority when becoming aware of any of the following situations: ▪ vehicle accident while transporting Class 7; ▪ package damage or tampering during transport or shipping; ▪ radioactive material lost, stolen or loss of control; ▪ failure to comply with the governing regulations (pertaining to packaging and transport).						
15	Training and sufficient workers	There are a sufficient number of trained and qualified workers to carry on licensed activity.						
16	Worker records retained	(1) (a) The name of each worker who handles nuclear radiation devices is recorded (users list). (b) Initial radiation safety training records for all workers who handle radiation devices are available (2) Worker training records are kept on file for three years after termination						
17	TDG training certificate on file	A current copy of the three year DOT/Safety/Security training requirements for each active gauge user is available.						
18	List of Nuclear Energy Worker	A current list of active Gauge Users is available.						
19	Ascertainment and recording of doses	(1) Personal doses are ascertained and recorded. (2) Doses are determined by personal dosimeter badges and are analyzed by an authorized third party vendor.						
20	Dose limits/body	Dose limits not exceeded.						
21	Licensed dosimetry	A licensed dosimetry service is used for all active Gauge Users.						
22	Shipping doc kept 2 years	Shipping documents kept on file for two years.						
23	Competent Authority Certificates	Special form certificates are available for all applicable sources.						
24	Type A package certification	Type A package design, test results and packaging instructions kept on file for two years after last shipment.						
25	Record Requirements (>90 days at sites)	Records and operational procedures are available at storage/use locations (greater than ninety days).						
26	Regulations available	A copy of the appropriate governing regulations (paper copy, electronic copy) are readily available to all workers.						

Work Doc: - Operation/Storage								
27	Posting of Signs	A radiation warning symbol is posted: (a) at the boundary of and at every point of access where there is a device permanent storage location; or (b) where the radiation dose rate could exceed 25 µSV/h.						
28	Contact details posted	The name or job title, an emergency response telephone number and any required documents by the local licensing authority are posted in a readily visible location where the nuclear device is stored.						
29	Radiation Warning Sign	An appropriate radiation warning symbol is displayed when required.						
30	Frivolous posting of signs	Radiation warning signs are not posted where there is no nuclear substance or radiation device, or where there are no plans to have a nuclear substance or radiation device present.						
31	Storage	(a) Access to storage areas containing nuclear radiation devices is restricted to authorized personnel. (b) Dose rates at occupied areas outside storage areas do not exceed 2.0mRem/h. (c) Dose limits are not exceeded as a result of radiation devices in storage						
32	Security indicators	Provisions are in place to ensure the security of nuclear substances and radiation devices and the health and safety of persons. This may be achieved through restricted access (for example locks, alarms and security systems) and reporting of incidents including loss, theft and sabotage.						
33	Post license	(1) A copy of the license or an appropriate notice is posted at the site of the licensed activity. (2) The license is available at field locations.						
34	Use of equipment & procedures	Licensee ensures appropriate equipment, clothing and procedures are used at the work site.						
35	Maintenance limitations	Maintenance is limited to cleaning basic repairs and lubrication in accordance with the manufacturer's instructions.						
36	Device provided & maintained	Required devices are available and have been maintained according to the manufacturer's specifications.						
37	Location notification	The appropriate licensing authority was informed in writing of sites where licensed activities were conducted for more than 90 days, when required by regulations. Discontinuance of such sites was also reported when required by regulations.						
38	Inaccuracies Notification	Changes to licensing documents have been reported to the appropriate licensing authority.						
39	Worker's obligations	Every worker: (a) uses equipment, devices, facilities and clothing in accordance with the local licensing restrictions. (b) complies with procedures and measures established by the licensee; (c) informs the licensee or supervisor of any situation where there may be: (i) an increase in the risk to the environment or the health and safety of persons; (ii) a threat to security; (iii) a failure to comply with regulatory requirements; (iv) sabotage, theft, loss or illegal use or possession of prescribed equipment, or (v) a release into the environment not authorized by the license; (d) observes and obeys all notices and warning signs; and (e) takes all reasonable precautions to ensure the safety and security of individuals, the environment and the nuclear radiation device or facility.						
40	ALARA/RP program	The licensee has implemented a radiation protection program that keeps doses ALARA and includes: (i) management control over work practices; (ii) personnel qualification and training; (iii) control of occupational and public exposure to radiation; and (iv) planning for unusual situations						

Work Doc:– Packaging and Transport								
41	Type A package requirements	A Type A package must be prepared and labeled in accordance DOT and IATA/ICAO requirements. Package requirements are as follows:						
		▪ name of consignor or consignee package;						
		▪ shipping name;						
		▪ UN number;						
		▪ "Type A" marking;						
		▪ Type A package certification on file;						
		▪ Two (I-White, II-Yellow or III-Yellow) labels;						
		▪ identify the radionuclide on labels;						
		▪ Maximum activity on labels;						
		▪ Transport Index on labels for II-Y and III-Y						
		Note - package integrity must not be compromised						
42	Excepted packages content/activity	Excepted packages meet the following criteria:						
		▪ dose rate below 0.5 mRem/h;						
		▪ consignor or consignee I.D.;						
		▪ UN number on package;						
		▪ "RADIOACTIVE" visible inside package upon opening for UN 2908 (Empty Packages);						
		▪ Excepted package labeling requirements used ;						
		Note - package integrity must not be compromised.						
43	Transport document requirement	The consignor of radioactive material provides a shipping document that includes the following:						
		▪ consignor name and address;						
		▪ 24 hour contact number;						
		▪ number of packages;						
		▪ shipping name;						
		▪ Class #7;						
		▪ UN number;						
		▪ radionuclide identification;						
		▪ form;						
		▪ maximum activity;						
		▪ category of package;						
		▪ transport index;						
		▪ source certificate;						
		▪ competent authority certificate number(s);						
		▪ shipper's declaration signed and dated by the consignor						
44	Transport document location	Shipping document is located within driver's reach or in a door pocket on the driver's side.						
45	Package secured in vehicle	Consignments are segregated, securely stowed and locked in accordance with local licensing requirements.						
		Category II-Yellow and III-Yellow packages are not carried in compartments occupied by						
47	Training certificate	The employer is responsible for:						
		(1) ensuring only trained workers who hold a valid TDG certificate handle Class 7 dangerous goods.						
		(2) issuing training certificates that include:						
		▪ the company providing the training;						
		▪ the employee's name;						
		▪ the expiry date of the certificate;						
		▪ aspects of handling and transporting; and						
		▪ employer authorization signatures or authorization statement.						

Annual Radiation Safety Audit

Local Audits

48	Storage Location Audit	Audits are performed in accordance with the RPP. Retention of storage location audits.						
49	Site Audits	Is there a schedule for conducting Site audits? Audits are performed in accordance with the RPP. Retention of site visit records.						

Findings - Please complete for each audit rating lower than B.

#	Area	Non-Compliance or observation	Risk level	Responsibility	Action taken	Date Corrected	Corrected by

Inspector:		Division Manager:		Corporate Program Manager:	
Date		Date:		Date	
Signature:		Signature:		Signature:	

Established in 1960, Golder Associates is a global, employee-owned organization that helps clients find sustainable solutions to the challenges of finite resources, energy and water supply and management, waste management, urbanization, and climate change. We provide a wide range of independent consulting, design, and construction services in our specialist areas of earth, environment, and energy. By building strong relationships and meeting the needs of clients, our people have created one of the most trusted professional services organizations in the world.

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Golder Associates

Engineering Earth's Development, Preserving Earth's Integrity

San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

HEALTHY AIR LIVING™

RECEIVED
JUN 30 2016
FRESNO COUNTY
DEPT. OF
PUBLIC WORKS & PLANNING

JUN 29 2016

Mr. Curtis Larkin
American Ave Landfill
Public Works & Planning, Fresno County
2220 Tulare St, 6th Floor
Fresno, CA 93721

Re: Notice of Final Action - Title V Permit Renewal
District Facility # C-3115
Project # C-1150035

Dear Mr. Larkin:

The District has issued the Final Renewed Title V Permit for American Ave Landfill. The preliminary decision for this project was made on April 18, 2016. No comments were received subsequent to the District preliminary decision.

The public notice for issuance of the Final Title V Permit will be published approximately three days from the date of this letter.

Thank you for your cooperation in this matter. If you have any questions, please contact Mr. Errol Villegas, Permit Services Manager, at (559) 230-5900.

Sincerely,

for Arnaud Marjollet
Director of Permit Services

Enclosures

cc: Tung Le, CARB (w/enclosure) via email
cc: Gerardo C. Rios, EPA (w/enclosure) via email

San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

HEALTHY AIR LIVING™

Facility # C-3115
AMERICAN AVENUE LANDFILL
2220 TULARE ST, 6TH FLOOR
ATTN: RESOURCES MANAGER
FRESNO, CA 93721

Notice of Permit Issuance

The enclosed permit unit requirements authorize the operation of the equipment as described. These permit unit requirements supersede any and all previous permits for the specified equipment.* Please insert these documents into the Facility Permit to Operate, and post copies on or near the equipment as required by District Rule 2010.

Please contact any of our Small Business Assistance (SBA) staff at the numbers below if you have any questions:

Modesto:	(209) 557-6446
Fresno:	(559) 230-5888
Bakersfield:	(661) 392-5665

*Failure to comply with the permit unit requirements may result in enforcement action.

Seyed Sadredin
Executive Director/Air Pollution Control Officer

Northern Region
4800 Enterprise Way
Modesto, CA 95356-8718
Tel: (209) 557-6400 FAX: (209) 557-6475

Central Region (Main Office)
1990 E. Gettysburg Avenue
Fresno, CA 93726-0244
Tel: (559) 230-6000 FAX: (559) 230-6061

Southern Region
34946 Flyover Court
Bakersfield, CA 93308-9725
Tel: 661-392-5500 FAX: 661-392-5585

www.valleyair.org www.healthyairliving.com

San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

HEALTHY AIR LIVING

Permit to Operate

FACILITY: C-3115

EXPIRATION DATE: 07/31/2021

LEGAL OWNER OR OPERATOR:	AMERICAN AVENUE LANDFILL
MAILING ADDRESS:	2220 TULARE ST, 6TH FLOOR ATTN: RESOURCES MANAGER FRESNO, CA 93721
FACILITY LOCATION:	18950 W AMERICAN AVE KERMAN, CA
FACILITY DESCRIPTION:	LANDFILL (EG SOURCE)

The Facility's Permit to Operate may include Facility-wide Requirements as well as requirements that apply to specific permit units.

This Permit to Operate remains valid through the permit expiration date listed above, subject to payment of annual permit fees and compliance with permit conditions and all applicable local, state, and federal regulations. This permit is valid only at the location specified above, and becomes void upon any transfer of ownership or location. Any modification of the equipment or operation, as defined in District Rule 2201, will require prior District approval. This permit shall be posted as prescribed in District Rule 2010.

Seyed Sadredin
Executive Director / APCO

Arnaud Marjollet
Director of Permit Services

Jun 23 2016 10 41AM – LOWELES

San Joaquin Valley
Air Pollution Control District

FACILITY: C-3115-0-3 **EXPIRATION DATE:** 07/31/2021

FACILITY-WIDE REQUIREMENTS

1. The owner or operator shall notify the District of any breakdown condition as soon as reasonably possible, but no later than one hour after its detection, unless the owner or operator demonstrates to the District's satisfaction that the longer reporting period was necessary. [District Rule 1100] Federally Enforceable Through Title V Permit
2. The District shall be notified in writing within ten days following the correction of any breakdown condition.. The breakdown notification shall include a description of the equipment malfunction or failure, the date and cause of the initial failure, the estimated emissions in excess of those allowed, and the methods utilized to restore normal operations. [District Rule 1100] Federally Enforceable Through Title V Permit
3. The owner or operator of any stationary source operation that emits more than 25 tons per year of nitrogen oxides or reactive organic compounds, shall provide the District annually with a written statement in such form and at such time as the District prescribes, showing actual emissions of nitrogen oxides and reactive organic compounds from that source. [District Rule 1160] Federally Enforceable Through Title V Permit
4. Any person building, altering or replacing any operation, article, machine, equipment, or other contrivance, the use of which may cause the issuance of air contaminants or the use of which may eliminate, reduce, or control the issuance of air contaminants, shall first obtain an Authority to Construct (ATC) from the District unless exempted by District Rule 2020 (12/20/07). [District Rules 2010 and 2020] Federally Enforceable Through Title V Permit
5. The permittee must comply with all conditions of the permit including permit revisions originated by the District. All terms and conditions of a permit that are required pursuant to the Clean Air Act (CAA), including provisions to limit potential to emit, are enforceable by the EPA and Citizens under the CAA. Any permit noncompliance constitutes a violation of the CAA and the District Rules and Regulations, and is grounds for enforcement action, for permit termination, revocation, reopening and reissuance, or modification; or for denial of a permit renewal application. [District Rules 2070, 2080 and 2520] Federally Enforceable Through Title V Permit
6. A Permit to Operate or an Authority to Construct shall not be transferred unless a new application is filed with and approved by the District. [District Rule 2031] Federally Enforceable Through Title V Permit
7. Every application for a permit required under Rule 2010 (12/17/92) (Permits Required) shall be filed in a manner and form prescribed by the District. [District Rule 2040] Federally Enforceable Through Title V Permit
8. The operator shall maintain records of required monitoring that include: 1) the date, place, and time of sampling or measurement; 2) the date(s) analyses were performed; 3) the company or entity that performed the analysis; 4) the analytical techniques or methods used; 5) the results of such analysis; and 6) the operating conditions at the time of sampling or measurement. [District Rule 2520] Federally Enforceable Through Title V Permit
9. The operator shall retain records of all required monitoring data and support information for a period of at least 5 years from the date of the monitoring sample, measurement, or report. Support information includes copies of all reports required by the permit and, for continuous monitoring instrumentation, all calibration and maintenance records and all original strip-chart recordings. [District Rule 2520] Federally Enforceable Through Title V Permit
10. The operator shall submit reports of any required monitoring at least every six months unless a different frequency is required by an applicable requirement. All instances of deviations from permit requirements must be clearly identified in such reports. [District Rule 2520] Federally Enforceable Through Title V Permit

FACILITY-WIDE REQUIREMENTS CONTINUE ON NEXT PAGE

11. Deviations from permit conditions must be promptly reported, including deviations attributable to upset conditions, as defined in the permit. For the purpose of this condition, promptly means as soon as reasonably possible, but no later than 10 days after detection. The report shall include the probable cause of such deviations, and any corrective actions or preventive measures taken. All required reports must be certified by a responsible official consistent with section 10.0 of District Rule 2520(6/21/01). [District Rules 2520 and 1100] Federally Enforceable Through Title V Permit

12. If for any reason a permit requirement or condition is being challenged for its constitutionality or validity by a court of competent jurisdiction, the outcome of such challenge shall not affect or invalidate the remainder of the conditions or requirements in that permit. [District Rule 2520] Federally Enforceable Through Title V Permit

13. It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of the permit. [District Rule 2520] Federally Enforceable Through Title V Permit

14. The permit may be modified, revoked, reopened and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition. [District Rule 2520] Federally Enforceable Through Title V Permit

15. The permit does not convey any property rights of any sort, or any exclusive privilege. [District Rule 2520] Federally Enforceable Through Title V Permit

16. The Permittee shall furnish to the District, within a reasonable time, any information that the District may request in writing to determine whether cause exists for modifying, revoking and reissuing, or terminating the permit or to determine compliance with the permit. Upon request, the permittee shall also furnish to the District copies of records required to be kept by the permit or, for information claimed to be confidential, the permittee may furnish such records directly to EPA along with a claim of confidentiality. [District Rule 2520] Federally Enforceable Through Title V Permit

17. The permittee shall pay annual permit fees and other applicable fees as prescribed in Regulation III of the District Rules and Regulations. [District Rule 2520] Federally Enforceable Through Title V Permit

18. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 2520] Federally Enforceable Through Title V Permit

19. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 2520] Federally Enforceable Through Title V Permit

20. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to inspect at reasonable times any facilities, equipment, practices, or operations regulated or required under the permit. [District Rule 2520] Federally Enforceable Through Title V Permit

21. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to sample or monitor, at reasonable times, substances or parameters for the purpose of assuring compliance with the permit or applicable requirements. [District Rule 2520] Federally Enforceable Through Title V Permit

22. No air contaminants shall be discharged into the atmosphere from any source operation (as defined in District Rule 1020) for a period or periods aggregating more than 3 minutes in any one hour which is as dark or darker than Ringelmann #1 or equivalent to 20% opacity and greater, unless specifically exempted by District Rule 4101 (2/17/05), by using EPA method 9. If the equipment or operation is subject to a more stringent visible emission standard as prescribed in a permit condition, the more stringent visible emission limit shall supersede this condition. [District Rule 4101] Federally Enforceable Through Title V Permit

FACILITY-WIDE REQUIREMENTS CONTINUE ON NEXT PAGE

23. No person shall supply, sell, solicit or apply any architectural coating, except specialty coatings, that contains more than 250 grams of VOC per liter of coating (less water and exempt compounds, and excluding any colorant added to tint bases), or manufacture, blend, or repackage such coating with more than 250 grams of VOC per liter (less water and exempt compounds, and excluding any colorant added to tint bases) for use within the District, unless exempted under section 4.0 of District Rule 4601 (Amended 12/17/09). [District Rule 4601] Federally Enforceable Through Title V Permit

24. No person shall apply, sell, solicit, or offer for sale any specialty architectural coating listed in the Table of Standards (District Rule 4601, Table 1 (12/17/09)), nor manufacture, blend, or repackage such coating for use within the District, which contains VOCs (less water and exempt compounds, excluding any colorant added to tint bases) in excess of the specified limits listed in Table 1 of Rule 4601 (12/17/09), unless exempted under section 4.0 of District Rule 4601 (Amended 12/17/09). [District Rule 4601] Federally Enforceable Through Title V Permit

25. All VOC-containing materials shall be stored in closed containers when not in use. In use includes, but is not limited to: being accessed, filled, emptied, maintained or repaired, unless exempted under section 4.0 of District Rule 4601 (Amended 12/17/09). [District Rule 4601] Federally Enforceable Through Title V Permit

26. A person shall not use VOCs for the cleanup of spray equipment unless equipment for collection of the cleaning compounds and minimizing its evaporation to the atmosphere is used, unless exempted under section 4.0 of District Rule 4601 (Amended 12/17/09). [District Rule 4601] Federally Enforceable Through Title V Permit

27. The permittee shall comply with all the Labeling and Test Methods requirements outlined in Rule 4601 sections 6.1 and 6.2 (12/17/09), unless exempted under section 4.0 of District Rule 4601 (Amended 12/17/09). [District Rule 4601] Federally Enforceable Through Title V Permit

28. With each report or document submitted under a permit requirement or a request for information by the District or EPA, the permittee shall include a certification of truth, accuracy, and completeness by a responsible official. [District Rule 2520] Federally Enforceable Through Title V Permit

29. If the permittee performs maintenance on, or services, repairs, or disposes of appliances, the permittee shall comply with the standards for Recycling and Emissions Reduction pursuant to 40 CFR Part 82, Subpart F. [40 CFR 82 Subpart F] Federally Enforceable Through Title V Permit

30. If the permittee performs service on motor vehicles when this service involves the ozone-depleting refrigerant in the motor vehicle air conditioner (MVAC), the permittee shall comply with the standards for Servicing of Motor Vehicle Air Conditioners pursuant to all the applicable requirements as specified in 40 CFR Part 82, Subpart B. [40 CFR Part 82, Subpart B] Federally Enforceable Through Title V Permit

31. Disturbances of soil related to any construction, demolition, excavation, extraction, or other earthmoving activities shall comply with the requirements for fugitive dust control in District Rule 8021 unless specifically exempted under Section 4.0 of Rule 8021 (8/19/04) or Rule 8011 (8/19/04). [District Rule 8021 and 8011] Federally Enforceable Through Title V Permit

32. Outdoor handling, storage and transport of any bulk material which emits dust shall comply with the requirements of District Rule 8031, unless specifically exempted under Section 4.0 of Rule 8031 (8/19/04) or Rule 8011 (8/19/04). [District Rule 8031 and 8011] Federally Enforceable Through Title V Permit

33. An owner/operator shall prevent or cleanup any carryout or trackout in accordance with the requirements of District Rule 8041 Section 5.0, unless specifically exempted under Section 4.0 of Rule 8041 (8/19/04) or Rule 8011 (8/19/04). [District Rule 8041 and 8011] Federally Enforceable Through Title V Permit

34. Whenever open areas are disturbed or vehicles are used in open areas, the facility shall comply with the requirements of Section 5.0 of District Rule 8051, unless specifically exempted under Section 4.0 of Rule 8051 (8/19/04) or Rule 8011 (8/19/04) [District Rule 8051 and 8011] Federally Enforceable Through Title V Permit

35. Any paved road or unpaved road shall comply with the requirements of District Rule 8061 unless specifically exempted under Section 4.0 of Rule 8061 (8/19/04) or Rule 8011 (8/19/04). [District Rule 8061 and 8011] Federally Enforceable Through Title V Permit

FACILITY-WIDE REQUIREMENTS CONTINUE ON NEXT PAGE

36. Any unpaved vehicle/equipment area that anticipates more than 75 vehicle trips per day shall comply with the requirements of Section 5.1.1 of District Rule 8071. Any unpaved vehicle/equipment area that anticipates more than 100 vehicle trips per day shall comply with the requirements of Section 5.1.2 of District Rule 8071. All sources shall comply with the requirements of Section 5.0 of District Rule 8071 unless specifically exempted under Section 4.0 of Rule 8071 (9/16/04) or Rule 8011 (8/19/04). [District Rule 8071 and 8011] Federally Enforceable Through Title V Permit

37. Any owner or operator of a demolition or renovation activity, as defined in 40 CFR 61.141, shall comply with the applicable inspection, notification, removal, and disposal procedures for asbestos containing materials as specified in 40 CFR 61.145 (Standard for Demolition and Renovation). [40 CFR 61 Subpart M] Federally Enforceable Through Title V Permit

38. The permittee shall submit certifications of compliance with the terms and standards contained in Title V permits, including emission limits, standards and work practices, to the District and the EPA annually (or more frequently as specified in an applicable requirement or as specified by the District). The certification shall include the identification of each permit term or condition, the compliance status, whether compliance was continuous or intermittent, the methods used for determining the compliance status, and any other facts required by the District to determine the compliance status of the source. [District Rule 2520] Federally Enforceable Through Title V Permit

39. Any Title V permittee shall submit an application permit renewal to the District at least six months, but not greater than 18 months, prior to the Title V permit expiration date. [District Rule 2520] Federally Enforceable Through Title V Permit

40. When a term is not defined in a Title V permit condition, the definition in the rule cited as the origin and authority for the condition in a Title V permit shall apply. [District Rule 2520] Federally Enforceable Through Title V Permit

41. The reporting periods for the Report of Required Monitoring and the Compliance Certification Report begin July 1 of every year, unless alternative dates are approved by the District Compliance Division. These reports are due within 30 days after the end of the reporting period. [District Rule 2520] Federally Enforceable Through Title V Permit

42. No air contaminant shall be released into the atmosphere which causes a public nuisance. [District Rule 4102]

San Joaquin Valley
Air Pollution Control District

PERMIT UNIT: C-3115-2-14 **EXPIRATION DATE:** 07/31/2021

EQUIPMENT DESCRIPTION:
44.4 MILLION CUBIC YARD CAPACITY (367 ACRES) MUNICIPAL SOLID WASTE LANDFILL WITH A LANDFILL GAS COLLECTION AND CONTROL SYSTEM, INCLUDING COLLECTION WELLS, PIPING, VACUUM PUMP/BLOWER, CONDENSATE TRAPS AND A 3,150 GALLON CONDENSATE STORAGE TANK, CONTROLLED BY ONE 51 MMBTU/HR AND ONE 99 MMBTU/HR ENCLOSED GROUND FLARE USING AN LPG PILOT

PERMIT UNIT REQUIREMENTS

1. Annual amount of soil used for covering shall not exceed 5,920,933 cubic yards of soil, and PM10 emissions shall not exceed 0.008 lb PM10/ton of soil (using a soil density of 3,240 lbs/cubic yard of soil). Permittee shall keep annual records of the amount of soil used for covering. [District Rule 2201] Federally Enforceable Through Title V Permit
2. All equipment shall be maintained in good operating condition and shall be operated in a manner to minimize emissions of air contaminants into the atmosphere. [District Rule 2201 and 40 CFR Part 60.752(b)(2)(iii)(B)(2) and (b)(2)(iv), and 62.14353(b)] Federally Enforceable Through Title V Permit
3. All equipment shall be constructed, calibrated, maintained and operated according to the specifications and plans contained in the permit application except as otherwise specified herein. [District Rule 2201 and 40 CFR 60.755(d), 60.756(b), 62.14354(b) and 40 CFR part 64] Federally Enforceable Through Title V Permit
4. No air contaminant shall be discharged from the flare into the atmosphere for a period or periods aggregating more than five minutes in any two hours which is as dark as, or darker than, Ringelmann 1/4 or 5% opacity. [40 CFR 60.18(c)(1)] Federally Enforceable Through Title V Permit
5. Particulate matter emissions from any combustion source shall not exceed 0.1 grains/dscf (calculated to 12% carbon dioxide). [District Rule 4301] Federally Enforceable Through Title V Permit
6. Landfill gas condensate can be injected into the enclosed flares. [District Rule 2201] Federally Enforceable Through Title V Permit
7. The enclosed flares shall be equipped with automatic dampers, an automatic shutdown device, and a flame arrester. [District Rule 2201 and 17 CCR 95464] Federally Enforceable Through Title V Permit
8. VOC emissions from this landfill operation controlled with the 51 MMBtu/hr and 99 MMBtu/hr enclosed flares shall not exceed 804.3 lb/day (includes landfill fugitive, flare landfill gas, flare pilot, and flare condensate emissions). [District Rule 2201] Federally Enforceable Through Title V Permit
9. The enclosed flares shall either reduce VOC by 98 weight percent or reduce the outlet VOC concentration to less than 20 parts per million by volume, dry basis as methane at 3 percent oxygen. [District Rules 2201 and 4102, and 40 CFR 60.752(b)(2)(iii)(B) and 62.14353(b)] Federally Enforceable Through Title V Permit
10. The methane destruction efficiency for the enclosed flares shall be at least 99% by weight. [17 CCR 95464]
11. The landfill gas consumption rate for the 51 MMBtu/hr enclosed flare shall not exceed 51 MMBtu/hr. Heat input shall be calculated daily using landfill gas flow into the flare (cubic feet per minute) and the annually tested landfill gas heat content (Btu/cubic foot). [District Rule 2201] Federally Enforceable Through Title V Permit

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

12. The landfill gas consumption rate for the 99 MMBtu/hr enclosed flare shall not exceed 99 MMBtu/hr. Heat input shall be calculated daily using landfill gas flow into the flare (cubic feet per minute) and the annually tested landfill gas heat content (Btu/cubic foot). [District Rule 2201] Federally Enforceable Through Title V Permit

13. Emissions from the 51 MMBtu/hr enclosed flare shall not exceed any of the following limits: 0.05 lb-NOx/MMBtu; 0.0178 lb-SOx/MMBtu (46.9 ppmv of H2S in fuel); 0.2 lb-CO/MMBtu; or 0.008 lb-PM10/MMBtu. [District Rule 2201] Federally Enforceable Through Title V Permit

14. Emissions from the 99 MMBtu/hr enclosed flare shall not exceed any of the following limits: 0.057 lb-NOx/MMBtu; 0.0178 lb-SOx/MMBtu (46.9 ppmv of H2S in fuel); 0.110 lb-CO/MMBtu; or 0.008 lb-PM10/MMBtu. [District Rule 2201] Federally Enforceable Through Title V Permit

15. Landfill design capacity shall not exceed 44.4 million cubic yards, or 367 acres, of solid waste. Annual amount of refuse received shall not exceed 1,300,000 ton/year. [District Rule 2201] Federally Enforceable Through Title V Permit

16. The enclosed flares shall be equipped with an LPG fired pilot. [40 CFR 60.18(c)(2) and (f)(2)] Federally Enforceable Through Title V Permit

17. Emissions from the flare LPG-fired pilot shall not exceed any of the following limits: 0.15 lb-NOx/MMBtu, 0.0164 lb-SOx/MMBtu, 0.0044 lb-PM10/MMBtu, 0.021 lb-CO/MMBtu, or 0.0055 lb-VOC/MMBtu. [District Rule 2201] Federally Enforceable Through Title V Permit

18. Source sampling to determine the compliance status of an emissions source shall be witnessed or authorized by District personnel. [District Rule 1081] Federally Enforceable Through Title V Permit

19. The District must be notified 30 days prior to any compliance source test, and a source test plan must be submitted for approval 15 days prior to testing. The results of each source test shall be submitted to the District within 60 days after testing. [District Rule 1081] Federally Enforceable Through Title V Permit

20. Source testing to demonstrate compliance with VOC, NOx, and CO emission limits and VOC control efficiency requirements shall be conducted at least once every 12 months for each flare. [District Rule 2201] Federally Enforceable Through Title V Permit

21. Source testing for NOx shall be conducted using EPA Test Method 7E or CARB Method 100. [District Rule 1081] Federally Enforceable Through Title V Permit

22. Source testing for CO shall be conducted using EPA Test Method 10 or 10B, CARB Methods 1-5 with 10 or CARB Test Method 100. [District Rule 1081] Federally Enforceable Through Title V Permit

23. Gas combusted in the flares shall be tested for H2S content on a quarterly basis using Draeger tubes. If compliance is shown for two consecutive quarters, the testing frequency may be changed to annual. Quarterly testing shall resume if any annual test shows noncompliance. [District Rule 1081] Federally Enforceable Through Title V Permit

24. VOC emissions shall be measured by USEPA Test Method 18, 25, 25A, or 25C. [District Rule 1081 and 40 CFR 60.754(d) and 62.14354(b)] Federally Enforceable Through Title V Permit

25. The enclosed flares shall be equipped with a temperature indicator and recorder which measures and records the operating temperature. The temperature indicator and recorder must operate continuously. [40 CFR 60.756(b)(1) and 62.14354(b)] Federally Enforceable Through Title V Permit

26. The enclosed flare control devices shall be operated within the parameter ranges established during the initial or most recent performance test. [40 CFR 60.752(b)(2)(iii)(B)(2) and 62.14353(b) and 17 CCR 95464] Federally Enforceable Through Title V Permit

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

27. Except during periods of startup, shutdown, and malfunction, the permittee shall continuously monitor and record combustion chamber temperature. The enclosed flare average combustion temperature, for all 3-hour periods of operation, shall not drop more than 28 degrees C below the average combustion temperature, during the most recent performance test at which compliance with 60.752(b)(2)(iii)(B)(2) was determined. Upon detecting any temperature excursion lower than 28 degree C (50 degree F) below the source test average combustion temperature, averaged over a 3-hour period, the permittee shall investigate the excursion and take corrective action to minimize excessive emissions and prevent recurrence of the excursion as expeditiously as practicable. Duration of startup, shutdown, or malfunction shall not exceed 5 days for collection systems and shall not exceed 1 hour for control devices where free venting of landfill gas occurs. [40 CFR 60.758(c)(1)(i), 60.755(e), 62.14354(b), and 40 CFR part 64] Federally Enforceable Through Title V Permit

28. The owner or operator shall measure the gauge pressure in the gas collection header at each individual interior well on a monthly basis as provided in 60.755(a)(3). If a positive pressure exists, action shall be initiated to correct the exceedance within 5 calendar days. If negative pressure cannot be achieved without excess air infiltration within 15 calendar days of the first measurement, the gas collection system shall be expanded to correct the exceedance within 120 days of the initial measurement of positive pressure. Any attempted corrective measure shall not cause exceedances of other operational or performance standards. An alternative timeline for correcting the exceedance may be submitted to the Administrator for approval. [40 CFR 60.755(a)(3), 60.756(a)(1), and 62.14354(b)] Federally Enforceable Through Title V Permit

29. The owner or operator shall monitor each interior well monthly for temperature and oxygen as provided in 60.753(c). If a well exceeds one of these operating parameters, action shall be initiated to correct the exceedance within 5 calendar days. If correction of the exceedance cannot be achieved within 15 calendar days of the first measurement, the gas collection system shall be expanded to correct the exceedance within 120 days of the initial exceedance. Any attempted corrective measure shall not cause exceedances of other operational or performance standards. An alternative timeline for correcting the exceedance may be submitted to the Administrator for approval. [40 CFR 60.753(c), 60.755(a)(3) and (a)(5), 60.756(a)(2) and (a)(3), and 62.14354(b)] Federally Enforceable Through Title V Permit

30. The operator shall record quarterly the surface emission tests including test time, weather conditions, precipitation records, areas sampled, calibration records, and test results. Corrective action shall be taken if required in accordance to 40 CFR 60.755(c). [District Rule 2201, 40 CFR 60.755(c), 60.756(f), and 62.14354(b)] Federally Enforceable Through Title V Permit

31. Permittee shall maintain continuous records of flare combustion temperature and volumetric gas flow rate. Permittee shall record and test the net heating value of landfill gas being combusted at least annually using ASTM D 1826 or D 1945 in conjunction with ASTM D 3588 for gaseous fuels. [District Rule 2201 and 40 CFR 60.756(b), 60.758(b)(2)(i), (c)(2) and (b)(2)(i), and 62.14354(b)] Federally Enforceable Through Title V Permit

32. Permittee shall keep, for the life of the collection system, an up-to-date, readily accessible plot map showing each existing and planned collector in the system and providing a unique identification location label for each collector. [40 CFR 60.758(d) and 60.34(c)] Federally Enforceable Through Title V Permit

33. The operator shall record emission control device source tests including VOC destruction/treatment efficiency and emissions of CO, NOx, and SOx, in pounds per MMBtu heat input. [District Rule 1081] Federally Enforceable Through Title V Permit

34. Records of the weight of materials received (tons) of Class II/III waste material shall be maintained. [District Rule 2201] Federally Enforceable Through Title V Permit

35. This operating permit may be cancelled upon District approval when the landfill is closed, is not otherwise subject to the requirements of 40 CFR part 70 or part 71, and if the landfill meets the conditions for control system removal specified in 40 CFR 60.752(b)(2)(v). [40 CFR 62.14352(f)] Federally Enforceable Through Title V Permit

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

36. An active collection system shall be designed to handle the maximum expected gas flow rate from the entire area of the landfill that warrants control over the intended use period of the gas control or treatment system equipment, collect gas from each area, cell, or group of cells in the landfill in which the initial solid waste has been placed for a period of 5 years or more if active; or 2 years or more if closed or at final grade, collect gas at a sufficient extraction rate, and be designed to minimize off-site migration of subsurface gas. [40 CFR 60.752(b)(2)(ii)(A) and 62.14353(b)] Federally Enforceable Through Title V Permit

37. If the landfill is permanently closed, a closure notification shall be submitted to the APCO within 30 days of waste disposal cessation. A permanent closure must take place in accordance with 40 CFR 258.60. If a closure report has been submitted, no additional waste may be placed in the landfill without filing a notification of modification to the APCO, pursuant to 40 CFR 60.7(a)(4). [40 CFR 60.752(b)(1)(ii)(B), 60.757(d), and 62.14354(b)] Federally Enforceable Through Title V Permit

38. For approval of collection and control systems that include any alternatives to the operational standards, test methods, procedures, compliance measures, monitoring, recordkeeping or reporting provisions, owner or operator must follow the procedures in 40 CFR 60.752(b)(2). If alternatives have already been approved under 40 CFR Part 62 subpart GGG, these alternatives can be used to comply with 40 CFR 63 subpart AAAA, except that all affected sources must comply with the startup, shutdown, and malfunction (SSM) requirements in subpart A of 40 CFR 63 as specified in Table 1 of 40 CFR 63 subpart AAAA and all affected sources must submit compliance reports every 6 months as specified in 40 CFR 63.1980(a) and (b), including information on all deviations that occurred during the 6 month reporting period. Deviations for continuous emission monitors or numerical continuous parameter monitors must be determined using a 3 hour monitoring block average. [40 CFR 60.752(b)(2) and 63.1955(c)] Federally Enforceable Through Title V Permit

39. Permittee shall operate the landfill gas collection system with negative pressure at each wellhead except under the following conditions: (1) A fire or increased well temperature. The owner or operator shall record instances when positive pressure occurs in efforts to avoid a fire. These records shall be submitted with the annual reports ass provided in 60.757(f)(1); (2) At a wellhead within the immediate vicinity of filling; (3) Use of a geomembrane or synthetic cover. The owner or operator shall develop acceptable pressure limits in the design plan; (4) A decommissioned well. A well may experience a static positive pressure after shut down to accommodate for declining flows. All design changes shall be approved by the APCO. [40 CFR 60.753(b) and 62.14354(b) and 17 CCR 95464, !& CCR 95468] Federally Enforceable Through Title V Permit

40. Permittee shall operate the collection system so that the methane concentration is less than 500 parts per million above background at the surface of the landfill. To determine if this level is exceeded, the owner or operator shall conduct surface testing around the perimeter of the collection area and along a pattern that traverses the landfill at 30 meter intervals and where visual observations indicate elevated concentrations of landfill gas, such as distressed vegetation and cracks or seeps in the cover. The owner or operator may establish an alternative traversing pattern that ensures equivalent coverage. A surface monitoring design plan shall be developed that includes a topographical map with the monitoring route and the rationale for any site-specific deviations from the 30 meter intervals. Areas with steep slopes or other dangerous areas may be excluded from the surface testing. [40 CFR 60.753(d), 60.755(c)(1) and 62.14354(b)] Federally Enforceable Through Title V Permit

41. Compliance with the surface methane operational standard shall be demonstrated using the procedures outlined in 40 CFR 60.755(c) within 180 days of installation and startup of the collection and control system and quarterly thereafter. [40 CFR 60.753(d), 60.755(c), 62.14354(b), and 60.8] Federally Enforceable Through Title V Permit

42. Permittee shall operate the enclosed flares at all times when the collected gas is routed to it. [40 CFR 60.753(f) and 62.14354(b)] Federally Enforceable Through Title V Permit

43. Permittee shall operate the landfill gas collection system such that gas is collected from each area, cell, or group of cells in the MSW landfill in which solid waste has been in place for: (1) five years or more if active; or (2) two years or more if closed or at final grade. [40 CFR 60.753(a) and 62.14354(b)] Federally Enforceable Through Title V Permit

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

44. Permittee shall operate each interior wellhead in the collection system with a landfill gas temperature less than 55 C and with oxygen level less than 5 percent except under the following conditions: (1) A fire or increased well temperature; or (2) at a wellhead within the immediate vicinity of filling. The owner or operator may establish a higher operating temperature or oxygen value at a particular well. A higher operating value demonstration shall show supporting data that the elevated parameter does not cause fires or significantly inhibit anaerobic decompositions by killing methanogens. [40 CFR 60.753(c) and 62.14354(b)] Federally Enforceable Through Title V Permit

45. The collection system shall be operated so that the methane concentration is less than 500 parts per million above background at the surface of the landfill, and such that all collected gases are sent to a control system designed and operated in compliance with 60.752(b)(2)(iii). In the event the collection or control system is inoperable, the gas mover system shall be shut down and all valves in the collection and control system contributing to venting of the gas to the atmosphere shall be closed within 1 hour. [40 CFR 60.753(d), (e), 60.755(c), and 62.14354(b)] Federally Enforceable Through Title V Permit

46. If monitoring demonstrates that the operational requirements are not met, corrective action shall be taken as specified in 40 CFR 60.755(a)(3 - 5) or (c). [40 CFR 60.753(g) and 62.14354(b)] Federally Enforceable Through Title V Permit

47. For each interior wellhead, unless an alternative test method is established as allowed by 60.752(b)(2)(i) of this subpart, the oxygen shall be determined by a Landtec GEM gas meter or equal, in accordance with the equipment requirements set forth in 40 CFR 60.753 for field measurement of temperature and oxygen or an oxygen meter using Method 3A or 3C except that: (i) The span shall be set so that the regulatory limit is between 20 and 50 percent of the span; (ii) A data recorder is not required; (iii) Only two calibration gases are required, a zero and span, and ambient air may be used as the span; (iv) A calibration error check is not required; (v) The allowable sample bias, zero drift, and calibration drift are +-10 percent. [40 CFR 60.753(c)(2) and 62.14354(b)] Federally Enforceable Through Title V Permit

48. Surface emission monitoring shall be performed in accordance with section 4.3.1 of Method 21 of appendix A, except that the probe inlet shall be placed within 5 to 10 centimeters of the ground. Monitoring shall be performed during typical meteorological conditions. Any reading of 500 parts per million or more above background at any location shall be recorded as a monitored exceedance and the actions specified in 40 CFR 60.755(c)(4)(i-v) shall be taken. As long as the specified actions are taken, the exceedance is not a violation of the operational requirements of 60.753(d). [40 CFR 60.755(c)(3), (4) and 62.14354(b)] Federally Enforceable Through Title V Permit

49. Permittee shall calculate the NMOC emission rate for purposes of determining when the collection and control system can be removed as provided in 40 CFR 60.752(b)(2)(v) by using the equation found in 40 CFR 60.754(b). [40 CFR 60.754(b) and 62.14354(b)] Federally Enforceable Through Title V Permit

50. For the performance test required in 60.752(b)(2)(iii)(B), Method 25, 25C, or Method 18 of Appendix A must be used to determine compliance with the 98 weight percent efficiency or the 20 ppmv outlet concentration level, unless another method to demonstrate compliance has been approved by the APCO as provided by 60.752(b)(2)(i)(B). Method 3 or 3A shall be used to determine oxygen for correcting the NMOC concentration as hexane to 3 percent. In cases where the outlet concentration is less than 50 ppm NMOC as carbon (8 ppm NMOC as hexane), Method 25A should be used in place of Method 25. If using Method 18 of appendix A, the minimum list of compounds to be tested shall be those published in the most recent Compilation of Air Pollutant Emission Factors (AP-42). The following equation shall be used to calculate efficiency: (NMOCin - NMOCout)/NMOCin. The District must be notified at least 30 days prior to any compliance source test, and a source test plan must be submitted for approval at least 15 days prior to testing. [District Rule 1081 and 40 CFR 60.754(d) and 62.14354(b)] Federally Enforceable Through Title V Permit

51. Each owner or operator shall place each well or design component as specified in the approved design plan as provided in 40 CFR 60.752(b)(2)(i). Each well shall be installed no later than 60 days after the date on which the initial solid waste has been in place for a period of: 1) 5 years or more if active or 2) 2 years or more if closed or at final grade. [40 CFR 60.755(b) and 62.14354(b)] Federally Enforceable Through Title V Permit

52. For the purposes of calculating the maximum expected gas generation flow rate from the landfill to determine compliance with 60.752(b)(2)(ii)(A)(1), one of the equations in Section 60.755(a)(1)(i) or (ii) or (iii) shall be used. [40 CFR 60.755(a)(1) and 62.14354(b)] Federally Enforceable Through Title V Permit

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

53. For the purposes of determining sufficient density of gas collectors for compliance with 60.752(b)(2)(ii)(A)(2), the owner or operator shall design a system of vertical wells, horizontal collectors, or other collection devices, satisfactory to the APCO, capable of controlling and extracting gas from all portions of the landfill sufficient to meet all operational and performance standards. [40 CFR 60.755(a)(2) and 62.14354(b)] Federally Enforceable Through Title V Permit

54. Owners or operators are not required to expand the system as required in paragraph 60.755(a)(3) during the first 180 days after gas collection system startup. [40 CFR 60.755(a)(4) and 62.14354(b)] Federally Enforceable Through Title V Permit

55. The provisions of this subpart apply at all times, except during periods of start-up, shutdown, or malfunction, provided that the duration of start-up, shutdown, or malfunction shall not exceed 5 days for collection systems and shall not exceed 1 hour for treatment or control devices. [40 CFR 60.755(e) and 62.14354(b)] Federally Enforceable Through Title V Permit

56. Surface monitoring shall be performed on a quarterly basis using an organic vapor analyzer, flame ionization detector, or other portable monitor meeting the specifications provided in 40 CFR 60.755(d). [40 CFR 60.755(c)(1) and 62.14354(b)] Federally Enforceable Through Title V Permit

57. When performing surface monitoring, the background concentration shall be determined by moving the probe inlet upwind and downwind outside the boundary of the landfill at a distance of at least 30 meters from the perimeter wells. [40 CFR 60.755(c)(2) and 62.14354(b)] Federally Enforceable Through Title V Permit

58. Permittee shall implement a program to monitor for cover integrity and implement cover repairs as necessary on a monthly basis. [40 CFR 60.755(c)(5) and 40 CFR 62.14354(b)] Federally Enforceable Through Title V Permit

59. The portable analyzer shall meet the instrument specifications of Method 21, section 3 (except that "methane" shall replace all references to VOC). The calibration gas shall be methane, diluted to a nominal concentration of 500 parts per million in air. To meet the performance evaluation requirements of Method 21, section 3.1.3, the instrument evaluation procedures of Method 21, section 4.4 shall be used. The calibration procedures provided in Method 21, section 4.2 shall be followed immediately before commencing a surface monitoring survey. The provisions of this condition apply at all times, except during periods of start-up, shutdown, or malfunction which shall not exceed 5 days for collections systems and shall not exceed 1 hour for treatment or control devices. [40 CFR 60.755(d), (e) and 62.14354(b)] Federally Enforceable Through Title V Permit

60. Each wellhead shall have a sampling port and a thermometer, other temperature-measuring device, or an access port for temperature measurements. [40 CFR 60.756(a)] Federally Enforceable Through Title V Permit

61. The enclosed flares shall be equipped with a temperature monitoring device equipped with a continuous recorder and having a minimum accuracy of +-1 percent of the temperature being measured expressed in degrees Celsius or +- 0.5 degrees Celsius, whichever is greater. The temperature indicator and recorder must operate continuously. [District Rule 2201 and 40 CFR 60.756(b)(1) and 62.14354(b) and 40 CFR part 64] Federally Enforceable Through Title V Permit

62. The owner/operator shall install, calibrate, maintain, and operate a meter with a continuous recording device that measures and records the landfill gas flow rate into the flare at least once every 15 minutes. This meter shall also be capable of measuring the landfill gas flow rate that might bypass the flare in the event of equipment malfunction or maintenance. [40 CFR 60.754(b)(1), 60.756(b)(2) and 62.14354(b)] Federally Enforceable Through Title V Permit

63. When performing surface monitoring, any closed landfill that has no monitored exceedances of the operational standard in three consecutive quarterly monitoring periods may skip to annual monitoring. Any methane reading of 500 ppm or more above background detected during the annual monitoring returns the frequency for that landfill to quarterly monitoring. [40 CFR 60.756(f) and 62.14354(b)] Federally Enforceable Through Title V Permit

64. The operator shall monitor and record maintenance-related and other control system downtimes and individual well shutdowns. Exceedances defined under 60.758(c) shall be reported once every 180 days. [District Rule 4102 and 40 CFR 60.757(f), (g)(4) and 60.758(c) and (e), and 62.14354(b)] Federally Enforceable Through Title V Permit

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

65. Except as provided in 60.752(b)(2)(i)(B), each owner or operator of a controlled landfill shall keep up-to-date, readily accessible records for the life of the control equipment of the data listed in paragraphs 60.758(b)(1) through (b)(4) as measured during the initial performance test or compliance determination. Records of subsequent tests or monitoring shall be maintained for a minimum of 5 years. Records of the control device vendor specifications shall be maintained until removal. [40 CFR 60.758(b) and 62.14354(b)] Federally Enforceable Through Title V Permit

66. Permittee shall keep the following records: (1)(i) the maximum expected gas generation flow rate as calculated in 60.755(a)(1). The owner or operator may use another method to determine the maximum gas generation flow rate, if the method has been approved by the APCO; (ii) the density of wells, horizontal collectors, surface collectors, or other gas extraction devices determined using the procedures specified in 60.759(a)(1); (2)(i) the average combustion temperature measured at least every 15 minutes and averaged over the same time period of the performance test; (ii) the percent reduction of NMOC determined as specified in 60.752(b)(2)(iii)(B) achieved by the control device. [40 CFR 60.758(b)(1) and (2) and 62.14354(b)] Federally Enforceable Through Title V Permit

67. Except as provided in 60.752(b)(2)(i)(B), permittee shall keep, for the life of the collection system, an up-to-date, readily accessible plot map showing each existing and planned collector in the system and providing a unique identification location label for each collector. If applicable, permittee shall keep readily accessible documentation of the nature, date of deposition, amount, and location of asbestos-containing or nondegradable waste excluded from collection as well as any nonproductive areas excluded from collection. [40 CFR 60.758(d), 62.14354(b), and 60.34(c)] Federally Enforceable Through Title V Permit

68. Except as provided in 60.752(b)(2)(i)(B), permittee shall keep for at least 5 years up-to-date, readily accessible records of all collection and control system exceedances of the operational standards in 60.753, the reading in the subsequent month whether or not the second reading is an exceedance, and the location of each exceedance. [40 CFR 60.758(e)] Federally Enforceable Through Title V Permit

69. The landfill is no longer required to comply with the requirements of 40 CFR Part 63 Subpart AAAA when it is no longer required to apply controls as specified in the Federal plan or EPA approved and effective State plan or tribal plan that implements 40 CFR part 60, subpart Cc. [40 CFR 63.1950] Federally Enforceable Through Title V Permit

70. The permittee shall comply with the general provisions specified in Table 1 of 40 CFR Part 63 Subpart AAAA and 63.1960 through 63.1985 starting on the date required to install the gas collection and control system. [40 CFR 63.1955(b)] Federally Enforceable Through Title V Permit

71. The permittee shall maintain a copy of the SSM plan written according to the provisions in 40 CFR 63.6(e)(3). Failure to maintain a copy of the SSM plan is a deviation from the requirements of this subpart. [40 CFR 63.1960] Federally Enforceable Through Title V Permit

72. The permittee shall keep records and reports as specified in the Federal plan, EPA approved State plan or tribal plan that implements 40 CFR part 60, subpart Cc. The annual report described in 40 CFR 60.757(f) must be submitted every 6 months. [40 CFR 63.1980(a)] Federally Enforceable Through Title V Permit

73. The permittee shall maintain records as specified in the general provisions of 40 CFR part 60 and this part as shown in Table 1 of this subpart. Applicable records in the general provisions include items such as SSM plans and the SSM plan reports. [40 CFR 63.1980(b)] Federally Enforceable Through Title V Permit

74. The enclosed flare burner and its associated components and the vapor collection system shall be inspected on an annual basis. The records of inspection shall at least contain date and time of inspection, identification of the person performing an inspection, parts replacement and repairs, and all maintenance actions taken. The records shall be kept and maintained for compliance inspection upon request. [40 CFR part 64] Federally Enforceable Through Title V Permit

75. The permittee shall comply with the compliance assurance monitoring operation and maintenance requirements of 40 CFR part 64.7. [40 CFR part 64] Federally Enforceable Through Title V Permit

76. The permittee shall comply with the recordkeeping and reporting requirements of 40 CFR part 64.9. [40 CFR part 64] Federally Enforceable Through Title V Permit

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

77. If the District or EPA determine that a Quality Improvement Plan is required under 40 CFR 64.7(d)(2), the permittee shall develop and implement the Quality Improvement Plan in accordance with 40 CFR part 64.8. [40 CFR part 64] Federally Enforceable Through Title V Permit

78. All records shall be retained for a minimum of 5 years, and shall be made available for District inspection upon request. [District Rule 1070 and 40 CFR 60.758(a) and (b) and 62.14354(b)] Federally Enforceable Through Title V Permit

79. Permittee may use actual landfill gas generation values in future expansion designs of the gas collection and control system(GCCS). All records and recovery data shall be submitted with GCCS plans. [17 CCR 95468]

80. Landfill collection and control system must be operated such that methane emission from the landfill do not exceed instantaneous or integrated limit requirements. [17 CCR 95464]

81. Landfill gas collection system components downstream of blower have a leak limit of 500 ppmv as methane. Components must be checked quarterly. If compliance with the methane limit has been demonstrated for 4 consecutive quarters, then the component checking frequency shall be annually. If an annual test fails to show compliance, quarterly testing shall resume. [17 CCR 95464]

82. Landfill collection and control system must be operated such that landfill surface methane emissions shall not exceed instantaneous surface emission limit of 500 ppmv as methane or integrated surface emission limit of 25 ppmv as methane. [17 CCR 95464, 17 CCR 95465]

83. Instantaneous and integrated landfill surface emissions measurements shall be done quarterly. The landfill may monitor annually provided they comply with requirements of 17 CCR 95469 (a)(1). [17 CCR 95469]

84. Permittee shall keep records of all gas collection system downtime exceeding five days, including individual well shutdown and disconnection times and the reason for downtime. [17 CCR 95470]

85. Permittee shall keep records of all gas control system downtime in excess of one hour, the reason for the downtime and the length of time the gas control system was shutdown. [17 CCR 95470]

86. Permittee shall keep records of the expected gas generation flow rate calculated pursuant to section 95471(e). [17 CCR 95470]

87. Permittee shall keep records of all instantaneous surface readings of 200 ppmv or greater; all exceedances of the limits in sections 95464(b)(1)(B) or 95465, including the location of the leak (or affected grid), leak concentration in ppmv, date and time of measurement, the action taken to repair the leak, date of repair, any required re-monitoring and the re-monitored concentration in ppmv, and wind speed during surface sampling; and the installation date and location of each well installed as part of a gas collection system expansion. [17 CCR 95470]

88. Permittee shall keep records of any positive wellhead gauge pressure measurements, the date of the measurements, the well identification number, and the corrective action taken. [17 CCR 95470]

89. Permittee shall conduct surface emission monitoring using either the procedures specified in section 95471 or the Los Angeles County Sanitation District monitoring procedure. Permittee shall keep records of which procedure was used. [17 CCR 95468]

90. Permittee shall keep records of delays encountered during repair of leaks or repair of positive wellhead readings. Documentation of delays shall be submitted with the annual report. [17 CCR 95468]

91. Permittee shall keep records of alternate landfill gas collection system modifications being implemented to correct an exceedance in the landfill gas surface emissions or wellhead pressure. Any alternative to installing a new well shall be documented and submitted with the annual report. [17 CCR 95468]

92. Permittee shall identify areas which are dangerous and unable to be inspected. Areas shall be clearly identified on a map of the facility. A copy of the map shall be kept onsite as well as submitted with the annual report. [17 CCR 95468]

93. Permittee shall conduct monitoring of the landfill surface within 3 inches of the surface. The facility may monitor surface emissions with the probe tip at the height of the vegetation if there is vegetation and it is impractical to monitor at 3 inches from the landfill surface. [17 CCR 95468]

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

94. Permittee shall terminate surface emission testing when the measured average wind speed is over 15 mph or the instantaneous wind speed is over 30 mph. [17 CCR 95468, 17 CCR 95471]

95. Permittee shall only conduct surface emission testing when precipitation has met the following requirements. It has been 24 hours since measured precipitation of 0.01 to 0.15 inches. It has been 48 hours since measured precipitation of 0.16 to 0.24 inches. It has been 72 hours since measured precipitation of 0.25 or more inches. [17 CCR 95468]

96. Permittee shall keep records of the annual solid waste acceptance rate and the current amount of waste-in-place. [17 CCR 95470]

97. Permittee shall keep records of the nature, location, amount , and date of deposition of non-degradable waste for any landfill areas excluded from the collection system. [17 CCR 95470]

98. Permittee shall keep records of any source tests conducted pursuant to section 95464(b)(4). [17 CCR 95470]

99. Permittee shall keep records describing the mitigation measures taken to prevent the release of methane or other emissions into the atmosphere during the following activities: 1. When solid waste was brought to the surface during the installation or preparation of wells, piping, or other equipment; 2. During repairs or the temporary shutdown of gas collection system components; or, 3. When solid waste was excavated and moved. [17 CCR 95470]

100. Permittee shall keep records of any construction activities pursuant to section 95466. The records must contain the following information: 1. A description of the actions being taken, the areas of the MSW landfill that will be affected by these actions, the reason the actions are required, and any landfill gas collection system components that will be affected by these actions. 2. Construction start and finish dates, projected equipment installation dates, and projected shut down times for individual gas collection system components. 3. A description of the mitigation measures taken to minimize methane emissions and other potential air quality impacts. [17 CCR 95470]

101. Permittee shall keep records of the equipment operating parameters specified to be monitored under section 95469(b)(1) as well as records for periods of operation during which the parameter boundaries established during the most recent source test are exceeded. The records must include the following information: 1. For enclosed flares, all 3-hour periods of operation during which the average temperature difference was more than 28 degrees Celsius (or 50 degrees Fahrenheit) below the average combustion temperature during the most recent source test at which compliance with sections 95464(b)(2) was determined and a gas flow rate device which must record the flow to the control device at least every 15 minutes. [17 CCR 95470]

102. Permittee shall submit the following reports as required in section 95470(b): Closure notification, Equipment removal report and Annual report. All reports must be accompanied by a certification of truth, accuracy, and completeness signed by a responsible official. [17 CCR 95470]

103. Permittee may comply with the CARB regulation for landfill methane control measures by using approved alternative compliance options. The permittee shall obtain written District approval for the use of any alternative compliance options not approved by this permit. Changes to the approved alternate compliance options must be made and approved in writing. Documentation of approved alternative compliance options shall be available for inspection upon request. [17 CCR 95468]

San Joaquin Valley
Air Pollution Control District

PERMIT UNIT: C-3115-3-2 **EXPIRATION DATE:** 07/31/2021

EQUIPMENT DESCRIPTION:
755 BHP CUMMINS MODEL QSX15-69 DIESEL-FIRED EMERGENCY IC ENGINE POWERING AN ELECTRICAL GENERATOR

PERMIT UNIT REQUIREMENTS

1. This engine shall be equipped with either a positive crankcase ventilation (PCV) system that recirculates crankcase emissions into the air intake system for combustion, or a crankcase emissions control device of at least 90% control efficiency. [District Rule 2201] Federally Enforceable Through Title V Permit
2. The exhaust stack shall vent vertically upward. The vertical exhaust flow shall not be impeded by a rain cap (flapper ok), roof overhang, or any other obstruction. [District Rule 4102]
3. Only CARB certified diesel fuel containing not more than 0.0015% sulfur by weight is to be used. [District Rules 2201 and 4801 and 17 CCR 93115] Federally Enforceable Through Title V Permit
4. This engine shall be equipped with a non-resettable hour meter with a minimum display capability of 9,999 hours, unless the District determines that a non-resettable hour meter with a different minimum display capability is appropriate in consideration of the historical use of the engine and the owner or operator's compliance history. [District Rule 4702, 17 CCR 93115, and 40 CFR 63 Subpart ZZZZ] Federally Enforceable Through Title V Permit
5. An emergency situation is an unscheduled electrical power outage caused by sudden and reasonably unforeseen natural disasters or sudden and reasonably unforeseen events beyond the control of the permittee. [District Rule 4702] Federally Enforceable Through Title V Permit
6. This engine shall not be used to produce power for the electrical distribution system, as part of a voluntary utility demand reduction program, or for an interruptible power contract. [District Rule 4702] Federally Enforceable Through Title V Permit
7. This engine shall be operated and maintained in proper operating condition as recommended by the engine manufacturer or emissions control system supplier. [District Rule 4702] Federally Enforceable Through Title V Permit
8. During periods of operation for maintenance, testing, and required regulatory purposes, the permittee shall monitor the operational characteristics of the engine as recommended by the manufacturer or emission control system supplier (for example: check engine fluid levels, battery, cables and connections; change engine oil and filters; replace engine coolant; and/or other operational characteristics as recommended by the manufacturer or supplier). [District Rule 4702 and 40 CFR 63 Subpart ZZZZ] Federally Enforceable Through Title V Permit
9. This engine shall be operated only for testing and maintenance of the engine, required regulatory purposes, and during emergency situations. Operation of the engine for maintenance, testing, and required regulatory purposes shall not exceed 50 hours per calendar year. [District Rule 4702, 17 CCR 93115, and 40 CFR 63 Subpart ZZZZ] Federally Enforceable Through Title V Permit
10. Operation of this engine for all purposes combined shall not exceed 10 hours per day. [District Rule 2201] Federally Enforceable Through Title V Permit
11. The permittee must minimize the engine's time spent at idle during startup and minimize the engine's startup time to a period needed for appropriate and safe loading of the engine, not to exceed 30 minutes. [40 CFR 63 Subpart ZZZZ] Federally Enforceable Through Title V Permit

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

12. Particulate matter emissions shall not exceed 0.1 grains/dscf in concentration. [District Rule 4201] Federally Enforceable Through Title V Permit
13. Emissions from this engine shall not exceed any of the following limits: 5.7 g-NOx/hp-hr, 0.4 g-CO/hp/hr or 0.14 g-VOC/hp-hr. [District Rule 2201] Federally Enforceable Through Title V Permit
14. The PM10 emissions rate shall not exceed 0.08 g/hp-hr based on US EPA certification using ISO 8178 test procedure. [District Rule 2201] Federally Enforceable Through Title V Permit
15. The permittee shall maintain monthly records of the type of fuel purchased, the amount of fuel purchased, date when the fuel was purchased, signature of the permittee who received the fuel, and signature of the fuel supplier indicating that the fuel was delivered. [17 CCR 93115]
16. The permittee shall maintain monthly records of emergency and non-emergency operation. Records shall include the number of hours of emergency operation, the date and number of hours of all testing and maintenance operations, the purpose of the operation (for example: load testing, weekly testing, rolling blackout, general area power outage, etc.) and records of operational characteristics monitoring. For units with automated testing systems, the operator may, as an alternative to keeping records of actual operation for testing purposes, maintain a readily accessible written record of the automated testing schedule. [District Rule 4702 and 17 CCR 93115] Federally Enforceable Through Title V Permit
17. All records shall be maintained and retained on-site for a minimum of five (5) years, and shall be made available for District inspection upon request. For units at unstaffed sites or operated remotely, records may be maintained and retained at a District-approved off-site location. [District Rule 4702, 17 CCR 93115, and 40 CFR 63 Subpart ZZZZ] Federally Enforceable Through Title V Permit
18. The engine's oil and filter shall be changed every 500 hours of operation or every 12 months, whichever comes first. [40 CFR Subpart ZZZZ] Federally Enforceable Through Title V Permit
19. The permittee has the option of utilizing an oil analysis program in order to extend the specified oil change requirement in Tables 2c and 2d of Subpart ZZZZ. The oil analysis must be performed at the same frequency specified for changing the oil in Table 2c or 2d to this subpart. The analysis program must at a minimum analyze the following three parameters: Total Base Number, viscosity, and percent water content. The condemning limits for these parameters are as follows: Total Base Number is less than 30 percent of the Total Base Number of the oil when new; viscosity of the oil has changed by more than 20 percent from the viscosity of the oil when new; or percent water content (by volume) is greater than 0.5. If all of these condemning limits are not exceeded, the engine owner or operator is not required to change the oil. If any of the limits are exceeded, the engine owner or operator must change the oil within 2 days of receiving the results of the analysis; if the engine is not in operation when the results of the analysis are received, the engine owner or operator must change the oil within 2 days or before commencing operation, whichever is later. The owner or operator must keep records of the parameters that are analyzed as part of the program, the results of the analysis, and the oil changes for the engine. The analysis program must be part of the maintenance plan for the engine. [40 CFR 63 Subpart ZZZZ] Federally Enforceable Through Title V Permit
20. The engine's air filter shall be inspected every 1,000 hours of operation or every 12 months, whichever comes first, and replaced as necessary. [40 CFR 63 Subpart ZZZZ] Federally Enforceable Through Title V Permit
21. The engine's hoses and belts shall be inspected every 500 hours of operation or every 12 months, whichever comes first, and replaced as necessary. [40 CFR 63 Subpart ZZZZ] Federally Enforceable Through Title V Permit
22. The permittee shall maintain monthly records of the occurrence and duration of each malfunction of operation (i.e., process equipment) or the air pollution control and monitoring equipment. The permittee shall also maintain monthly records of action taken during periods of malfunction to minimize emissions in accordance with §63.6605(b), including corrective actions to restore malfunctioning process and air pollution control and monitoring equipment to its normal or usual manner of operation. [40 CFR 63 Subpart ZZZZ] Federally Enforceable Through Title V Permit
23. The engine shall be in full compliance with 40 CFR Part 63, Subpart ZZZZ (National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines). [40 CFR 63 Subpart ZZZZ] Federally Enforceable Through Title V Permit

San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

San Joaquin Valley Air Pollution Control District
Regulation VIII – Fugitive PM10 Prohibitions
Dust Control Plan

Rule 8021 – ***Construction, Demolition, Excavation, Extraction, and Other Earthmoving Activities*** requires the owner or operator of a construction project to submit a Dust Control Plan to the District if at anytime the project involves:

- Residential developments of ten or more acres of disturbed surface area,
- Non-residential developments of five or more acres of disturbed surface area, or
- Moving, depositing, or relocating of more than 2,500 cubic yards per day of bulk materials on at least three days of the project.

A Dust Control Plan identifies the fugitive dust sources at the construction site and describes all of the dust control measures to be implemented before, during, and after any dust generating activity for the duration of the project. The District will review and approve, conditionally approve, or disapprove the Dust Control Plan within 30 days of submittal. **Construction activities shall not commence until the Dust Control Plan has been approved or conditionally approved.** An owner or operator must also provide written notification to the District via fax or mail within 10 days prior to the commencement of earthmoving activities. A copy of the approved Dust Control Plan must be retained at the project site and made available upon request by a District inspector.

Pursuant to Rule 3135 -- ***Dust Control Plan Fee***, payment must accompany each Dust Control Plan submitted to the District. A separate fee is charged for any major modification made to an approved plan, such as modifying the size and scope of the project or making significant changes to the types of control or preventative measures. No fees are charged for administrative changes to an approved plan.

At least one key individual representing the owner or operator, or any person who prepares a Dust Control Plan must complete a Dust Control Training Course presented by the District. Please contact the District to find out when courses are being offered.

Regardless of whether a District-approved Dust Control Plan is in place or not, the owner or operator is required to comply with all requirements of the applicable rules under Regulation VIII and the District's Rules and Regulations at all times.

Submit the Dust Control Plan to the District's Compliance Division at the office listed below:

For San Joaquin, Stanislaus, and Merced Counties:	**Northern Region Office** 4800 Enterprise Way Modesto, CA 95356 (209) 557-6400 FAX (209) 557-6475
For Madera, Fresno, and Kings Counties:	**Central Region Office** 1990 East Gettysburg Avenue Fresno, CA 93726 (559) 230-5950 FAX (559) 230-6062
For Tulare County and the valley portion of Kern County	**Southern Region Office** 34946 Flyover Court Bakersfield, CA 93308 (661) 392-5500 FAX (661) 392-5585

Dust Control Plan
Section 1 – General Information – Page 1

1-A Project Name and Location

Project Name: American Avenue Disposal Site (AADS) – Phase III Modules 7 & 8 Excavation & Liner Construction

Project Address: 18950 W. American Avenue, Kerman, CA 93630

Major X-Streets: American Avenue and Madera Avenue

City: Kerman County: Fresno

Section(s): 35 Township: 9S Range: 16E

Expected Construction Start Date: June 5, 2017 End Date: December 29, 2017

1-B Contacts

Report the names, addresses, and phone numbers of persons and owners or operators responsible for the preparation, submittal, and implementation of the Dust Control Plan and responsible for the dust generating operation and dust control applications. (Rule 8021 Sec. 6.3.6.1)

Property Owner: **County of Fresno**

Address: **2220 Tulare Avenue, 6th Floor**

City / State / Zip: **Fresno, CA 93721**

Phone: **(559) 600-4078** Fax: **(559) 600-4399**

Developer:

Address:

City / State / Zip:

Contact Person:

Phone: Fax:

General Contractor:

Address:

City / State / Zip:

Contact Person:

Phone: Fax:

This Dust Control Plan was prepared by:

Name: D'Andra Buchanan Title: Project Engineer

Company Name: **County of Fresno**

Address: **2220 Tulare Avenue, 7th Floor**

City / State / Zip: **Fresno, CA 93721**

Phone: (559) 600-4326 Fax: (559) 600-4399

Date training completed: June 23, 2010 ☒ Attach a copy of the course certificate

☐ I would like additional information about opportunities to reduce water usage on the project site.

Section 1 – General Information – Page 2

Project Name: AADS – Phase III Modules 7 & 8 Excavation & Liner Construction

1-C Contractors

Provide the names, addresses, and phone numbers of the contractors involved in dust generating activities or performing dust control as part of this project (Rule 8021 Sec. 6.3.6.1). A supplemental list may be attached.

1. _____
2. _____
3. _____
4. _____

1-D Who will have the primary responsibility for implementing this Dust Control Plan? (Rule 8021 Sec 6.3.6.1)

☐ **Property Owner** ☐ **Developer** ☒ **General / Prime Contractor**

☐ **Sub-Contractor(s)** ☐ **Other:** _____

Primary Project Contact: _____

Title: _____

Company Name: _____

Address: _____

City / State / Zip: _____

On-Site Phone: _____ Fax: _____

Mobile Phone: _____ Pager: _____

Date training completed: _____ ☐ Attach a copy of the course certificate

1-E Indirect Source Review (ISR) (Rule 9510)

An Air Impact Assessment application was submitted to the District on: _____

Discretionary Approval: Received on: _____ ☐ Approval is pending.

☒ Exempt from ISR. Explain: **Rule 9510 (ISR), Section 4.4.3.11**

1-F Provide a brief description of the project's operations.

The work to be done consists, in general of the excavation of Modules 7 & 8, installation of a composite liner system consisting of geosynthetics over a geosynthetic clay liner, and the installation of sump liner systems, riser pipes, clean out pipes and all misc. work associated with the installation of these items.

Dust Control Plan
Section 2 – Plot Plan – Page 1

Project Name: AADS – Phase III Modules 7 & 8 Excavation & Liner Construction

2-A Plot Plan

A plot plan identifies the type and location of each project. Attach appropriately sized maps with the project boundaries outlined or use the space in sections 2-B or 2-C to draw a plot plan. Attached maps may include tract maps, site maps, and topographic maps. Use the checklist below to make sure all areas have been identified on the plot plan. (Rule 8021 Sec. 6.3.6.2 & 6.3.6.5)

Identify the relative locations of actual and potential sources of fugitive dust emissions.

- ☐ Bulk material handling and storage areas.
- ☒ Paved and unpaved access roads, haul roads, traffic areas, and equipment storage yards.
- ☐ Exit points where carryout and trackout onto paved public roads may occur.
- ☐ Water supply locations if water application will be used for controlling visible dust emissions.

Identify the relative locations of sensitive receptors within ¼ mile of the project. (Rule 4102 Sec. 4.1)

- ☒ No sensitive receptors within ¼ mile of the project.
- ☐ Residential areas, schools, day care, churches, hospitals, nursing facilities, commercial, retail, etc.
- ☐ Freeways, roads, or traffic areas that may be affected by the dust generating activities.
- ☐ Other: _____

2-B Draw Plot Plan (if one is not attached)

May use the back of this form
Include a North Arrow

☒ Plot plan is attached (Skip to 3-A).

Section 2 – Plot Plan – Page 2

Project Name: AADS – Phase III Modules 7 & 8 Excavation & Liner Construction

2-C Draw Plot Plan (if one is not attached) Include a North Arrow

Dust Control Plan
Section 3 – Fugitive PM10 Sources – Page 1

Project Name: AADS – Phase III Modules 7 & 8 Excavation & Liner Construction

3-A Disturbed Surface Area

Report the total area of land surface to be disturbed, the daily throughput volume of earthmoving in cubic yards, and the total area in acres of the entire project site. (Rule 8021 Sec. 6.3.6.3)

Total area of land surface to be disturbed:	35	Acres
Daily maximum throughput volume of earthmoving:		Cubic Yards
Daily average throughput volume of earthmoving:		Cubic Yards
Total area of entire project site:	240	Acres
Total disturbed areas that will be left inactive for more than seven days:	0	Acres

3-B Dust Generating Activity Dates

The expected start and completion dates of **dust generating activities and soil disturbance activities** to be performed on site. For phased projects, it may be necessary to report expected start and completion dates separately. (Rule 8021 Sec. 6.3.6.4)

Expected start date:	June 5, 2017	**Completion Date:**	December 29, 2017
Phase Project Start – A:		Completion – A:	
Phase Project Start – B:		Completion – B:	
Phase Project Start – C:		Completion – C:	

3-C Other Locations

Identify whether any other locations should be included with this plan that are involved with this project. An example may include listing any site where materials will be imported from or exported to. (Rule 8021 Sec. 6.3.2)

☒ No other locations are included with this project. (Skip to 3-D)

Location 1: _____

☐ No Dust Control Plan Required ☐ Included with this plan ☐ Included with another plan

Location 2: _____

☐ No Dust Control Plan Required ☐ Included with this plan ☐ Included with another plan

Location 3: _____

☐ No Dust Control Plan Required ☐ Included with this plan ☐ Included with another plan

Section 3 – Fugitive PM10 Sources – Page 2

Project Name: AADS – Phase III Modules 7 & 8 Excavation & Liner Construction

3-D Sources of Fugitive Dust

This section describes the minimum requirements for limiting visible dust emissions from activities that cause fugitive dust emissions. (Rule 8021 Sec. 6.3.6.5) **Check at least one box under each category.**

Structural Demolition. (Rule 8021 Sec. 5.1, 6.3.3, & 6.3.6.5)

- ☒ No demolitions are planned for this project.
- ☐ Asbestos NESHAP notification and fees have been submitted to the District. (Rule 3050 and Rule 4002).
- ☐ Water will be applied to the following areas for the duration of the demolition activities:
  - Building exterior surfaces;
  - Unpaved surface areas where equipment will operate;
  - Razed building materials; and
  - Water or dust suppressants will be applied to unpaved surface areas within 100 feet of structure during demolition.

Pre-Activity. (Rule 8021 Sec. 5.2)

- ☐ Not applicable for this project (Please explain why in Section 3-F).
- ☒ The site will be pre-watered and work will be phased to reduce the amount of disturbed surface area at any one time (Complete Section 4-A).

Active Operations. (Rule 8021 Sec. 5.2)

- ☒ Water will be applied to dry areas during leveling, grading, trenching, and earthmoving activities (Complete Section 4-A).
- ☐ Wind barriers will be constructed and maintained, and water or dust suppressants will be applied to the disturbed surface areas (Complete Sections 4-A or 4-B, and 4-C).

Inactive Operations, including after work hours, weekends, and holidays. (Rule 8021 Sec. 5.2)

- ☐ Not applicable for this project (Please explain why in Section 3-F).
- ☒ Water or dust suppressants will be applied on disturbed surface areas to form a visible crust, and vehicle access will be restricted to maintain the visible crust. (Complete Section 4-A or 4-B, and 4-C)

Temporary stabilization of areas that remain unused for seven or more days. (Rule 8021 Sec. 5.2)

- ☐ Not applicable for this project (Please explain why in Section 3-F)
- ☒ Vehicular access will be restricted and water or dust suppressants will be applied and maintained at all un-vegetated areas (Complete Section 4-A or 4-B, and 4-C).
- ☐ Vegetation will be established on all previously disturbed areas (Complete Section 4-C).
- ☐ Gravel will be applied and maintained at all previously disturbed areas (Complete Section 4-C).
- ☐ Previously disturbed areas will be paved (Complete Section 4-C).

Unpaved Access and Haul Roads, Traffic and Equipment Storage Areas. (Rule 8021 Sec. 5.2 and 5.3)

- ☐ Not applicable for this project (Please explain why in Section 3-F)
- ☒ Apply water or dust suppressants to unpaved haul and access roads (Complete Section 4-A or 4-B)
- ☐ Post speed limit signs of not more than 15 miles per hour at each entrance, and again every 500 feet. (Complete Section 4-C)
- ☐ Water or dust suppressants will be applied to vehicle traffic and equipment storage areas (Complete Section 4-A or 4-B).

Wind Events. (Rule 8021 Sec. 5.4)

- ☒ Water application equipment will apply water to control fugitive dust during wind events, unless unsafe to do so. Outdoor construction activities that disturb the soil will cease whenever visible dust emissions cannot be effectively controlled.

3-E Bulk Materials (Rule 8021 Sec. 6.3.6.6 and Rule 8031)

Outdoor Handling of Bulk Materials. (Rule 8031 Sec. 5.0 A)

- ☐ No bulk materials will be handled during this project.
- ☒ Water or dust suppressants will be applied when handling bulk materials.
- ☐ Wind barriers with less than 50 percent porosity will be installed and maintained, and water or dust suppressants will be applied.

Outdoor Storage of Bulk Materials. (Rule 8031 Sec. 5.0 B)

- ☐ No bulk materials will be stored during this project.
- ☒ Water or dust suppressants will be applied to storage piles.
- ☐ Storage piles will be covered with tarps, plastic, or other suitable material and anchored in such a manner that prevents the cover from being removed by wind action.
- ☐ Wind barriers with less than 50 percent porosity will be installed and maintained around the storage piles, and water or dust suppressants will be applied.
- ☐ A three-sided structure (< 50% porosity) will be used that is at least as high as the storage piles.

On-Site Transporting of Bulk Materials. (Rule 8031 Sec. 5.0 C)

- ☐ No bulk materials will be transported on the project site.
- ☐ Vehicle speed will be limited on the work site.
- ☒ All haul trucks will be loaded such that the freeboard is not less than six inches when transported across any paved public access road.
- ☐ A sufficient amount of water will be applied to the top of the load to limit visible dust emissions.
- ☐ Haul trucks will be covered with a tarp or other suitable cover.

Off-Site Transporting of Bulk Materials. (Rule 8031 Sec. 5.0 D)

- ☒ No bulk materials will be transported to or from the project site.
- ☐ The following practices will be performed: (complete Section 5-B)
  - The interior of emptied truck cargo compartments will be cleaned or covered before leaving the site.
  - Spillage or loss of bulk materials from holes or other openings in the cargo compartment's floor, sides, and tailgates will be prevented.
  - Haul trucks will be covered with a tarp or other suitable cover or will be loaded such that the freeboard is not less than six inches when transported on any paved public access road to or from the project site and a sufficient amount of water will be applied to the top of the load to limit visible dust emissions.

Outdoor Transport using a Chute or Conveyor. (Rule 8031 Sec. 5.0 E)

- ☒ No chutes or conveyors will be used.
- ☐ Chute or conveyor will be fully enclosed.
- ☐ Water spray equipment will be used to sufficiently wet the materials.
- ☐ Transported materials will be washed or screened to remove fines (PM10 or smaller).

3-F Comments

Dust Control Plan
Section 4 – Dust Control Methods – Page 1

Project Name: AADS – Phase III Modules 7 & 8 Excavation & Liner Construction

4-A Water Application

Complete this section if water application will be used as a control method for limiting visible dust emissions and stabilizing surface areas. Check and answer everything that applies to this project.
(Rule 8021 Sec. 6.3.6.6)

Water Application Equipment:

☐ Sprinklers: Describe the activities that will utilize sprinklers:

Minimum treated area: _____ ☐ Square Feet ☐ Acres

Maximum treated area: _____ ☐ Square Feet ☐ Acres

Minimum water flow rate: _____ Gallons/minute Duration: _____

☒ Water Truck, ☐ Water Trailer, ☐ Water Wagon, ☐ Other: _____

Describe the activities that will utilize this equipment:

Number of application equipment available: _____

Application equipment capacity: _____

Application frequency: _____

Application rate: TBD Gallons per acre per application

Hours of operation: 7 AM to 5 PM

Water application equipment is available to operate after normal working hours, on weekends, and holidays.

After-hours contact: _____ Phone No.: _____

After-hours contact: _____ Phone No.: _____

Water Supply: *Include the relative locations of these sources on the plot plan in Section 2.*

☐ Fire hydrants

Number of hydrants available On-Site: _____ Off-Site: _____

Approval granted by the owner or public agency to use their fire hydrants for this project.

Owner or Agency: _____

Contact: _____ Phone No.: _____

☐ Storage tanks Number and capacity: _____

☐ Wells Number and flow rate: _____

☒ Canal, River, Pond, Lake, etc. Describe: On-site pond for Contractor's use of water

Approval granted by the owner or public agency to use their water source for this project.

Owner or Agency: County of Fresno

Contact: Landfill Operations Manager Phone No.: (559) 600-4259

☐ Other: _____

Section 4 – Dust Control Methods – Page 2

Project Name: AADS – Phase III Modules 7 & 8 Excavation & Liner Construction

4-B Dust Suppressant Products

Complete this section if a dust suppressant product will be used. These materials include, but are not limited to: hygroscopic suppressants (road salts), adhesives, petroleum emulsions, polymer emulsions, and bituminous materials (road oils). (Rule 8021 Sec. 6.3.6.6)

Copy this page if more than one dust suppressant product will be used.

☒ **Not Applicable.** Only water application will be the control method used. **Skip to 4-C.**

Application Area: _____

Product Name: _____

Contractor's Name: _____ Phone No: _____

Application Rate: _____ Gallons of undiluted material per ☐ mile or ☐ acre treated.

Application Frequency: _____ Applications per ☐ week, ☐ month, ☐ year

Application Equipment: _____

Number of Application Equipment Available: _____

Application Equipment Capacity: _____

Attach each of the following information that fully describes this product. Use the checklist below to make sure all information is submitted with this plan.

- ☐ Product Specifications (MSDS, Product Safety Data Sheet, etc.)
- ☐ Manufacturer's Usage Instructions (method, frequency, and intensity of application)
- ☐ Environmental impacts and approvals or certifications related to the appropriate and safe use for ground application.

Section 4 – Dust Control Methods – Page 3

Project Name: AADS – Phase III Modules 7 & 8 Excavation & Liner Construction

4-C Other Dust Control Methods

Check below the other types of dust control methods that will be employed at the construction site. (Rule 8021 Sec. 5.2)

☐ Physical barriers for restricting unauthorized vehicle access:
- ☐ Fences ☐ Gates ☐ Posts ☐ Berms ☐ Concrete Barriers
- ☐ Other: _____

☐ Wind barriers Describe: _____

☐ Posted speed limit signs meet State and Federal Department of Transportation standards. (Rule 8021 Sec. 5.3)
- ☐ Posted at 15 miles per hour, ☐ Posted at _____ miles per hour (less than 15 MPH)

☐ Re-establish vegetation for temporarily stabilizing previously disturbed surfaces.
- Explain: _____

☐ Apply and maintain gravel:
- ☐ On haul roads ☐ On access roads ☐ At equipment storage yards
- ☐ At vehicle traffic areas ☐ For temporarily stabilizing previously disturbed areas.
- Explain: _____

☐ Apply pavement:
- Explain: _____

☒ Other: _____

4-D Contingencies

Contingencies to be implemented if application equipment becomes inoperable, more equipment is needed to effectively control fugitive dust emissions during active and inactive periods, accessibility limitations occur at the water sources, or staff is not available to operate the application equipment. Describe the contingencies that will be in place and when they will be implemented. Attach any additional information if needed. (Rule 4102 and Rule 8021 Sec. 6.3.6.6)

Contingencies are to be determined after Contract Award. They generally involve suspending operations if weather conditions or equipment failure necessitates.

4-E Record keeping (Rule 8011 Sec. 6.2)

Records and any other supporting documents for demonstrating compliance must be maintained, but only for those days when a control measure is implemented. The District has developed record keeping forms that may be used for complying with this requirement. Check one or both below:

☒ Records will be maintained using the forms developed by the District.

☐ Records will be maintained using documents or forms developed by the owner or operator.

Explain and include copies: _____

Dust Control Plan
Section 5 – Carryout and Trackout – Page 1

Project Name: AADS – Phase III Modules 7 & 8 Excavation & Liner Construction

5-A Treatments for Preventing Trackout

Select the control devices that will be used for preventing trackout from occurring onto paved public roads. Trackout is any material that adheres to vehicle tires and is deposited onto a paved public road or the paved shoulder of a paved public road. Check one or a combination that will apply to this project.

☐ **Grizzly:** Rails, pipes, or grates used to dislodge debris off of vehicles before exiting the site. Extends from the intersection with the paved public road surface for the full width of the unpaved exit surface for a distance of at least 25 feet. (Rule 8041 Sec. 5.9.1)

Describe: _____

☐ **Gravel Pad:** A layer of washed gravel at least one (1) inch or larger in diameter, three (3) inches deep, and extends from the intersection with the public paved road surface for the full width of the unpaved exit surface for a distance of at least 50 feet. (Rule 8041 Sec. 5.9.2)

Gravel Size: _____ Inches

Pad Width: _____ Feet Length: _____ Feet Depth: _____ Inches

☐ **Paved Surface:** Extends from the intersection with the paved public road surface for the full width of the unpaved access road for at least 100 feet to allow mud and dirt to drop off of vehicles before exiting the site. (Rule 8041 Sec. 5.9.3)

Width: _____ Feet Length: _____ Feet

Mud and dirt deposits accumulating on paved interior roads will be removed with sufficient frequency, but not less frequently than once per workday. Cleanup will commence within ½ hour of generating any carryout and trackout. (Rule 8041 Sec. 5.8.2 and 5.9.3)

Clean-up Frequency: _____

☐ **Wheel Washer:** Uses water to dislodge debris from tires and vehicle undercarriage. (Rule 8011 Sec. 3.73)

Describe: _____

☒ **Other:** (Rule 8041 Sec. 5.8.1.2) _____

5-B Treatments for Preventing Carryout

Report the required treatments that will be used for preventing carryout from occurring on paved public roads. Carryout occurs when materials from emptied or loaded haul trucks, vehicles, or trailers falls onto a paved public road or paved shoulder of a paved public road.

☒ No haul trucks will be routinely entering or leaving the project site.

Emptied Haul Trucks: (Rule 8031 Sec 5.0)

☐ Interior cargo compartments will be cleaned before leaving the project site.

☐ Cargo compartment will be covered with a tarp or suitable cover before leaving the project site.

Loaded Haul Trucks: Spillage or loss of materials from holes or other opening in the cargo compartment will be prevented when material is transported onto any paved public access road. (Rule 8031 Sec 5.0)

Select one or both of the required applications:

☐ Haul trucks will be loaded such that the freeboard is not less than six inches with water applied to the top of the load before leaving the project site.

☐ Cargo compartment and load will be covered with a tarp or suitable cover before leaving the project site.

☐ **Other:** _____

Section 5 – Carryout and Trackout – Page 2

Project Name: AADS – Phase III Modules 7 & 8 Excavation & Liner Construction

5-C Cleaning up Carryout and Trackout

Check and report below the methods and frequency for cleaning up carryout and trackout from the surface and paved shoulders of paved public roads.

The use of blower devices, or dry rotary brushers or brooms, for removal of carryout and trackout from paved public roads is prohibited. (Rule 8041 Sec. 5.0).

In the event the control device becomes ineffective due to an accumulation of mud and dirt, material must be removed within ½ hour of the generation of carryout and trackout. (Rule 8041 Sec. 5.8.2.)

The project is located in:

☐ An **Urban Area,** within an incorporated city boundary or an unincorporated area surrounded by a city.
Minimum cleanup frequency will be at the end of the workday and removed immediately if carryout and trackout extends beyond 50 feet. (Rule 8041 Sec. 5.4)

☒ A **Rural Area,** located within an unincorporated area and not surrounded by an incorporated city.

- ☐ The construction project is less than 10 acres in size: minimum cleanup frequency is at the end of the workday. (Rule 8041 Sec. 5.1)
- ☒ Construction projects 10 or more acres in size: minimum cleanup frequency is end of the workday and immediately if carryout and trackout extends beyond 50 feet. (Rule 8041 Sec. 5.5)

Clean up Method: Check the method below that will be used for cleaning carryout and trackout.

☐ Manually sweeping and picking up. (Rule 8041 Sec. 5.7.1)

☐ Mechanical sweeping with a rotary brush or broom accompanied or preceded by water. (Rule 8041 Sec. 5.7.2)
Describe the types of equipment that will used:

_____

☐ Operating a PM10-efficient street sweeper. (Rule 8041 Sec. 5.7.3)

Make and Model: _____

☐ Flushing with water: allowed if: (Rule 8041 Sec. 5.7.4)

- No curbs or gutters are present.
- Using water will not result as a source of trackout and carryout.
- Using water will not result in adverse impacts on storm water drainage systems.
- Using water will not violate any National Pollutant Discharge Elimination System permit program.

5-D Record keeping for Cleanup of Carryout and Trackout (Rule 8011 Sec. 6.2)

Records and any other supporting documents for demonstrating compliance must be maintained. The District has developed a record keeping form specific for cleaning carryout and trackout from paved public roads and may be used for complying with this requirement. Check one or both below:

☒ Records will be maintained using the form developed by the District.

☐ Records will be maintained using documents or forms developed by the owner or operator.

Explain and include copies: _____

Dust Control Plan
Section 6 – Certification

Project Name: AADS – Phase III Modules 7 & 8 Excavation & Liner Construction

6-A Certification

The owner, principle operator, or the individual implementing must certify the plan (Rule 8021 Sec 6.3). For Title V sources, the responsible official must provide the certification (Rule 2520 Sec. 3.28 and 10.0).

I certify that all information contained herein and information submitted in the attachments to this documents are true and correct.

Dale Siemer, PE	Supervising Engineer
Print Name	Title
	2/2/17
Signature	Date

(559) 600-4327	(559) 600-4399	
Phone Number	Fax Number	Cell Number

SAN JOAQUIN VALLEY
AIR POLLUTION CONTROL DISTRICT
COMPLIANCE DIVISION

Presents this
Certificate of Completion
to

D'Andra Buchanan

On June 23, 2010, at Fresno, CA for

REGULATION VIII — DUST CONTROL TRAINING

San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

Signature _____ Date 1-18-17

SELF-DEALING TRANSACTION DISCLOSURE FORM

(1) Company Board Member Information:

Name: _____ Date: _____

Job Title: _____

(2) Company/Agency Name and Address:

_____

_____

_____

_____

(3) Disclosure (Please describe the nature of the self-dealing transaction you are a party to)

_____

_____

_____

_____

(4) Explain why this self-dealing transaction is consistent with the requirements of Corporations Code 5233 (a)

_____

_____

_____

_____

_____

_____

_____

(5) Authorized Signature

Signature: _____ Date: _____

SELF-DEALING TRANSACTION DISCLOSURE FORM INSTRUCTIONS

In order to conduct business with the County of Fresno (hereinafter referred to as "County"), members of a contractor's board of directors (hereinafter referred to as "County Contractor"), must disclose any self-dealing transactions that they are a party to while providing goods, performing services, or both for the County. A self-dealing transaction is defined below:

"A self-dealing transaction means a transaction to which the corporation is a party and which one or more of its directors has a material financial interest"

The definition above will be utilized for purposes of completing the disclosure form.

(1) Enter board member's name, job title (if applicable), and date this disclosure is being made.

(2) Enter the board member's company/agency name and address.

(3) Describe in detail the nature of the self-dealing transaction that is being disclosed to the County. At a minimum, include a description of the following:

   a. The name of the agency/company with which the corporation has the transaction; and

   b. The nature of the material financial interest in the Corporation's transaction that the board member has.

(4) Describe in detail why the self-dealing transaction is appropriate based on applicable provisions of the Corporations Codes.

(5) Form must be signed by the board member that is involved in the self-dealing transaction described in Sections (3) and (4).

COUNTY OF FRESNO

REQUEST FOR CONSTRUCTION STAKING

PROJECT _____ CONTRACT NO. _____

TYPE OF STAKING (Slope Stakes, Curb, FG EP, Wing Wall, Pipe, R/W, etc.)	STAKES ARE		LOCATION AND DESCRIPTION (Line, from station to station, offset, side, structure, etc.)	DATE STAKES WILL BE USED	DATE STAKES WERE SET
	ORIG.	RESET			

CONTRACTOR	COUNTY OF FRESNO
REQUESTED BY _____ DATE _____ (Contractor's Rep.)	RECEIVED BY _____ DATE _____ (Resident Engineer)
	COMPLETED BY _____ DATE _____ (Party Chief)

COMMENTS

_____

_____

_____

_____

CONTRACTOR REQUEST FOR CLARIFICATION

AMERICAN AVENUE DISPOSAL SITE PHASE III
MODULES 7 & 8 EXCAVATION AND LINER SYSTEM CONSTRUCTION

CONTRACT NO. 16-22-SW

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:

Fax form to (559) 600-4399 or e-mail to DesignServices@co.fresno.ca.us

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.

BID BOOK

AMERICAN AVENUE DISPOSAL SITE

MODULES 7 & 8 EXCAVATION AND LINER SYSTEM CONSTRUCTION

BUDGET / ACCOUNT: 9026 / 8150

Department of Public Works and Planning

CONTRACT NO. 16-22-SW

CONTRACT NO. 16-22-SW COPY NUMBER:

BID BOOK TABLE OF CONTENTS

INSTRUCTIONS FOR COMPLETING THE BID BOOK

General

Complete forms in the *Bid* book.

Submit your bid:

1. Under sealed cover

2. Marked as a bid

3. Identifying the contract number and the bid opening date

Certain bid forms must be submitted with the bid and properly executed.

Certain other forms and information must be submitted either with the bid or within the prescribed period after bid opening as specified elsewhere in these special provisions.

Failure to submit the forms and information as specified results in a nonresponsive bid.

If an agent other than the authorized corporation officer or a partnership member signs the bid, file a Power of Attorney with the Department either before opening bids or with the bid. Otherwise, the bid may be nonresponsive.

Bid Item List and Bid Comparison

Submit a bid based on the bid item quantities the Department shows on the Bid Proposal Sheet (Proposal 2). Bids will be evaluated and the low bidder determined as indicated in the *Notice to Bidders.*

Bid Document Completion

Proposal sheets are identified by title and by the letter “P” followed by the number assigned to the proposal sheet in question. Proposal sheets are included in the *Bid Book.*

Proposal 1 - Proposal to the Board of Supervisors of Fresno County

Provided for information.

Proposal 2 - Bid Proposal Sheet

One or more sheet(s) upon which the bidder completes the bid.

Fill out completely including a unit price and total for each unit price-based item and a total for each lump sum item.

Do not make any additions such as “plus tax”, “plus freight”, or conditions such as “less 2% if paid by 15th”.

Use ink or typewriter.

Proposal 3 - Evaluation of Bid Proposal Sheet

Describes how inconsistences and irregularities are evaluated and corrected when Design Services reviews the Bid Sheet.

Proposal 4 - Bid Security and Signature

Submit one of the following forms of bidder's security equal to at least 10 percent of the bid:

- Cash
- Cashier's check
- Certified check
- Signed bidder's bond by an admitted surety insurer

Indicate type of bid security provided.

- Cash – Acceptable but 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. This type of security is held until the bid is no longer under consideration. If submitted by a potential awardee, they will be returned when the contract is fully executed by the bidder and bonds and insurance have been approved.
- Bid Bonds - Must be signed by the bidder and by the attorney-in-fact for the bonding company. Provide notarized signature of attorney-in-fact accompanied by bonding company's affidavit authorizing attorney-in-fact to execute bonds. An unsigned bid bond will be cause for rejection.

Acknowledge Addenda

Provide contractor's license information.

State business name and if business is a:

- Corporation - list officers
- Partnership - list partners
- Joint Venture - list members; if members are corporations or partnerships, list their officers or partners.
- Individual - list Owner's name and firm name style

Signature of Bidder - the following lists types of companies and corresponding authorized signers.

- Corporation - by an officer
- Partnership - by a partner
- Joint Venture - by a member
- Individual - by the Owner

If signature is by a Branch Manager, Estimator, Agent, etc., the bid must be accompanied by a power of attorney authorizing the individual to sign the bid in question or to sign bids more generally, otherwise the bid may be rejected.

- Business Address - Firm's Street Address
- Mailing Address - P.O. Box or Street Address
- Complete, sign, and return with bid.

Proposal 5 - Noncollusion Affidavit

Must be completed, signed, and returned with bid.

Proposal 6 - Public Contract Code Section 10285.1 Statement

Check “has” or “has not” in accordance with instructions on form, return with completed for with bid. Note that signing the bid constitutes signing this statement.

Proposal 7 - Public Contract Code Section 10162 Questionnaire And Public Contract Code 10232 Statement

Check: ”yes” or “no” accordance with instructions on form, include explanation if “yes” is checked. Return completed form with bid. Note that signing the bid constitutes signing this questionnaire and statement.

Proposal 8(a) through Proposal 8(d) - Subcontractors

Sheet(s) upon which bidders list subcontractors. List each subcontractor to perform work in an amount in excess of 1/2 of 1 percent of the total bid (Pub Cont Code § 4100 et seq.).

The *Subcontractor List* submitted with the bid must show the name, location of business, work portions to be performed, and the contractor’s license number for each subcontractor listed.

- Use subcontractor's business name style as registered with the License Board.
- Specify the city in which the subcontractor’s business is located and the state if other than California.
- Description of the work to be performed by the subcontractor. Indicate with work descriptions similar to those on bid sheet.
- List license number for each subcontractror.

Upon request from Design Services, provide the following additional information within 24 hours of bid opening if not included on the *Subcontractor List* submitted with the bid:

- Complete physical address for each subcontractor listed.
- Percentage of the total bid or dollar amount associated with each subcontractor listed.
- Department of Industrial Relations registration number.

Proposal 9 - Proposal 15 – Not Used

Proposal 16 - *Guaranty*

Does not need to be signed with the bid. Part of the contract which must be signed by the contractor when contract is executed.

PROPOSAL TO THE BOARD OF SUPERVISORS OF THE COUNTY OF FRESNO

_____
hereinafter called the Owner

AMERICAN AVENUE DISPOSAL SITE PHASE III
MODULES 7 & 8 EXCAVATION AND LINER SYSTEM CONSTRUCTION

CONTRACT NO. 16-22-SW

The work to be done and referred to herein is in Fresno County, State of California, and extends over existing rights of way at Lost Lake Park Campground.

The work embraced herein shall be done in accordance with the Standard Specifications dated May 2006 and with the Standard Plans dated May 2006, of the State of California, Department of Transportation insofar as the same may apply and in accordance with these special provisions.

Amendments to the Standard Specifications shall not apply except to the extent, if any, set forth as “Amendments to the State of California, Department of Transportation May 2006 Standard Specifications” in the “Project Details” Section of these special provisions or as otherwise set forth elsewhere in these special provisions.

The work to be done is shown on a set of Plans, Department File No. *11265*, entitled: "American Avenue Disposal Site; Phase III - Module 7 & 8.”

The undersigned, as bidder, declares that the only persons, or parties interested in this proposal as principals are those named herein, that this proposal is made without 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 plans therein referred to; and he proposes and agrees if this proposal is accepted, that he will contract with the Owner 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 unit prices, to-wit:

COUNTY OF FRESNO
DEPARTMENT OF PUBLIC WORKS AND PLANNING
PROJECT: AMERICAN AVENUE DISPOSAL SITE
PHASE III - MODULES 7 & 8 EXCAVATION AND LINER CONSTRUCTION

CONTRACT NO: 16-22-SW

Wood Bros
#1 Low bidder

ITEM No.	QUANTITY	F/S	UNIT OF MEASURE	ITEM	ITEM PRICE	TOTAL PRICE
1	220,000		$	SUPPLEMENTAL WORK	$1.00	$220,000.00
2	20,000		$	SUPPLEMENTAL WORK (SPECIAL STOCKPILING)	$1.00	$20,000.00
3	70,000		$	SUPPLEMENTAL WORK (SPECIAL TRAFFIC HANDLING AND OPERATIONS)	$1.00	$70,000.00
4	10,000		$	SUPPLEMENTAL WORK (SPECIAL COORDINATION)	$1.00	$10,000.00
5	1		LS	CONSTRUCTION SITE MANAGEMENT	28,000.00	28,000.00
6	1		LS	TRAFFIC CONTROL SYSTEM	8,175.00	8,175.00
7	1		LS	CLEARING AND GRUBBING	53,347.00	53,347.00
8	17,000		SY	UNSUITABLE MATERIAL	3.94	66,980.00
9	1,238,000	F	CY	MODULE EXCAVATION	1.41	1,745,580
10	170,000	F	SY	SUBGRADE PREPARATION	0.63	107,100.00
11	1		LS	FINISH PROJECT SITE	16,800.00	16,800.00
12	2,500		LF	PERFORATED HDPE PIPE, 6"	17.20	43,000.00
13	140		LF	PERFORATED HDPE PIPE, 10"	85.60	11,984.00
14	1,100		LF	NON-PERFORATED HDPE PIPE, 6"	15.40	16,940.00
15	1,000		LF	NON-PERFORATED HDPE PIPE, 10"	31.00	31,000.00
16	1,540,000	F	SF	GEOSYNTHETIC CLAY LINER	.51	785,400
17	1,560,000	F	SF	HDPE GEOMEMBRANE	.53	826,800
18	1,540,000	F	SF	GEONET	.34	523,600
19	1,540,000	F	SF	GEOTEXTILE (10 OZ)	.20	308,000
20	170		EA	PROTECTIVE PLYWOOD COVER	35.00	5,950.00
21	115,000	F	CY	OPERATIONS LAYER	3.02	347,300.00
22	1		LS	LEACHATE METERING PIPE & FITTINGS	8,937.00	8,937.00
23	24		EA	STEEL PIPE BOLLARD	730.00	17,520.00
24	6	F	CY	CLASS 3 CONCRETE (SLAB)	885.00	5,310.00
25	2		EA	FURNISH AND INSTALL SUMP CONTROL PANEL BACKBOARD AND HARDWARE	3,050.00	6,100.00
26	1,600	F	CY	PERMEABLE MATERIAL	71.80	114,880.00
27	1	S	LS	GEOELECTRIC LEAK DETECTION	41,472.00	41,472.00
28	1		LS	MOBILIZATION	246,365	246,365
TOTAL BID (ITEMS 1 - 28)					5,686,540.00	

F - Final Pay Item
S - Specialty Item

COUNTY OF FRESNO
DEPARTMENT OF PUBLIC WORKS AND PLANNING
PROJECT: AMERICAN AVENUE DISPOSAL SITE
PHASE III - MODULES 7 & 8 EXCAVATION AND LINER CONSTRUCTION

CONTRACT NO: 16-22-SW

ITEM No.	QUANTITY	F/S	UNIT OF MEASURE	ITEM	ITEM PRICE	TOTAL PRICE
1	220,000		$	SUPPLEMENTAL WORK	$1.00	$220,000.00
2	20,000		$	SUPPLEMENTAL WORK (SPECIAL STOCKPILING)	$1.00	$20,000.00
3	70,000		$	SUPPLEMENTAL WORK (SPECIAL TRAFFIC HANDLING AND OPERATIONS)	$1.00	$70,000.00
4	10,000		$	SUPPLEMENTAL WORK (SPECIAL COORDINATION)	$1.00	$10,000.00
5	1		LS	CONSTRUCTION SITE MANAGEMENT		
6	1		LS	TRAFFIC CONTROL SYSTEM		
7	1		LS	CLEARING AND GRUBBING		
8	17,000		SY	UNSUITABLE MATERIAL		
9	1,150,000	F	CY	MODULE EXCAVATION		
10	170,000	F	SY	SUBGRADE PREPARATION		
11	1		LS	FINISH PROJECT SITE		
12	2,500		LF	PERFORATED HDPE PIPE, 6"		
13	140		LF	PERFORATED HDPE PIPE, 10"		
14	1,100		LF	NON-PERFORATED HDPE PIPE, 6"		
15	1,000		LF	NON-PERFORATED HDPE PIPE, 10"		
16	1,540,000	F	SF	GEOSYNTHETIC CLAY LINER		
17	1,560,000	F	SF	HDPE GEOMEMBRANE		
18	1,540,000	F	SF	GEONET		
19	1,540,000	F	SF	GEOTEXTILE (10 OZ)		
20	170		EA	PROTECTIVE PLYWOOD COVER		
21	115,000	F	CY	OPERATIONS LAYER		
22	1		LS	LEACHATE METERING PIPE & FITTINGS		
23	24		EA	STEEL PIPE BOLLARD		
24	6	F	CY	CLASS 3 CONCRETE (SLAB)		
25	2		EA	FURNISH AND INSTALL SUMP CONTROL PANEL BACKBOARD AND HARDWARE		
26	1,600	F	CY	PERMEABLE MATERIAL		
27	1	S	LS	GEOELECTRIC LEAK DETECTION		
28	1		LS	MOBILIZATION		
TOTAL BID (ITEMS 1 - 28)						

F - Final Pay Item
S - Specialty Item

Rebid Bid #1

ABBREVIATIONS USED IN ENGINEER'S ESTIMATE AND PROPOSAL SHEETS

CF - Cubic Foot
CY - Cubic Yard
EA - Each
LB(S) - Pounds
LF - Linear Foot
LS - Lump Sum
(F) - Final Pay Quantity
(S-F) - Specialty Item and Final Pay Quantity
SACK – Sack
STAYD - Station Yard
SF - Square Foot
SY - Square Yard
TON - Ton
(S) - Specialty Item

EVALUATION OF BID PROPOSAL SHEETS

Abbreviations used in the bid proposal sheet are identified in the instructions for completing the bid book.

Bids are required for the entire work. Bids will be compared on the basis indicated in the Notice to Bidders. The bidder shall set forth for each unit basis item of work a unit price and a total for the item, and for each lump sum item a total for the item, all in clearly legible figures in the respective spaces provided for that purpose. In the case of unit basis items, the amount set forth under the "Item Total" column shall be the product of the unit price bid and the estimated quantity for the item.

In case of discrepancy between the unit price and the total set forth for a unit basis item, the unit price shall prevail, except as provided in (a) or (b), as follows:

(a) If the amount set forth as a unit price is unreadable or otherwise unclear, or is omitted, or is the same as the amount as the entry in the item total column, then the amount set forth in the item total column for the item shall prevail and shall be divided by the estimated quantity for the item and the price thus obtained shall be the unit price;

(b) (Decimal Errors) If the product of the entered unit price and the estimated quantity is exactly off by a factor of ten, one hundred, etc., or one-tenth, or one-hundredth, etc. from the entered total, the discrepancy will be resolved by using the entered unit price or item total, whichever most closely approximates percentage-wise the unit price or item total in the Owner's Final Estimate of cost.

If both the unit price and the item total are unreadable or otherwise unclear, or are omitted, the bid may be deemed irregular. Likewise if the item total for a lump sum item is unreadable or otherwise unclear, or is omitted, the bid may be deemed irregular unless the project being bid has only a single item and a clear, readable total bid is provided.

Symbols such as commas and dollar signs will be ignored and have no mathematical significance in establishing any unit price or item total or lump sums. Written unit prices, item totals and lump sums will be interpreted according to the number of digits and, if applicable, decimal placement. Cents symbols also have no significance in establishing any unit price or item total since all figures are assumed to be expressed in dollars and/or decimal fractions of a dollar. Bids on lump sum items shall be item totals only; if any unit price for a lump sum item is included in a bid and it differs from the item total, the items total shall prevail.

The foregoing provisions for the resolution of specific irregularities cannot be so comprehensive as to cover every omission, inconsistency, error or other irregularity which may occur in a bid. Any situation not specifically provided for will be determined in the discretion of the Owner , and that discretion will be exercised in the manner deemed by the Owner to best protect the public interest in the prompt and economical completion of the work. The decision of the Owner respecting the amount of a bid, or the existence or treatment of an irregularity in a bid, shall be final.

If this proposal shall be accepted and the undersigned shall fail to contract, as aforesaid, and to give the two bonds in the sums to be determined as aforesaid, with surety satisfactory to the Owner, within eight (8) days not including Saturdays, Sundays and legal holidays, after the bidder has received notice of award of the contract, the Owner, at its option, may determine that the bidder has abandoned the contract, and thereupon this proposal and the acceptance thereof shall be null and void, and the forfeiture of such security accompanying this proposal shall operate and the same shall be the property of the Owner.

AMERICAN AVENUE DISPOSAL SITE PHASE III **CONTRACT NO. 16-22-SW**
MODULES 7 & 8 EXCAVATION AND LINER SYSTEM CONSTRUCTION

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

Bid Bond (✓); Certified Check ( ); Cashier's Check ( ); Cash ($)

Bidder has and acknowledges the following addenda: 1, 2

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

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

FIRM NAME Wood Bros Inc.
William S. Wood, President
Donald T. Wood, Secretary

Licensed in accordance with an act providing for the registration of Contractors,
Class 558251 License No. A Expires 2-28-19

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

Signature of Bidder

3-8-17
Dated

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

BUSINESS ADDRESS: PO Box 216, Lemoore CA 93245
Zip Code

MAILING ADDRESS: PO Box 216, Lemoore CA 93245
Zip Code

BUSINESS PHONE: (559) 924-7715 FAX NUMBER: (559) 924-4595

EMAIL ADDRESS don@woodbrosinc.com

AMERICAN AVENUE DISPOSAL SITE PHASE III CONTRACT NO. 16-22-SW
MODULES 7 & 8 EXCAVATION AND LINER SYSTEM CONSTRUCTION

To the Board of Supervisors, County of Fresno:

NONCOLLUSION AFFIDAVIT

TO BE EXECUTED BY BIDDER AND SUBMITTED WITH BID *

Donald T. Wood
(Printed or Typed Name)

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

Secretary
(Owner, Partner, Corporate Officer (list title), Co-Venturer)

of Wood Bros Inc.
(Bidding Entity)

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

(Signature) 3·8·17 (Dated)

(Title 23 United States Code Section 112)

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

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

PUBLIC CONTRACT CODE

Public Contract Code Section 10285.1 Statement

In conformance with Public Contract Code Section 10285.1 (Chapter 376, Stats. 1985), the bidder hereby declares under penalty of perjury under the laws of the State of California that the bidder has ___ , has not ✓ been convicted within the preceding three years of any offenses referred to in that section, including any charge of fraud, bribery, collusion, conspiracy, or any other act in violation of any state or Federal antitrust law in connection with the bidding upon, award of, or performance of, any public works contract, as defined in Public Contract Code Section 1101, with any public entity, as defined in Public Contract Code Section 1100, including the Regents of the University of California or the Trustees of the California State University. The term "bidder" is understood to include any partner, member, officer, director, responsible managing officer, or responsible managing employee thereof, as referred to in Section 10285.1.

Note: The bidder must place a check mark after "has" or "has not" in one of the blank spaces provided. The above Statement is part of the Bid. Signing this Bid on the signature portion thereof shall also constitute signature of this Statement. Bidders are cautioned that making a false certification may subject the certifier to criminal prosecution.

Public Contract Code Section 10162 Questionnaire

In conformance with Public Contract Code Section 10162, the Bidder shall complete, under penalty of perjury, the following questionnaire:

Has the bidder, any officer of the bidder, or any employee of the bidder who has a proprietary interest in the bidder, ever been disqualified, removed, or otherwise prevented from bidding on, or completing a federal, state, or local government project because of a violation of law or a safety regulation?

Yes _____ No ✓

If the answer is yes, explain the circumstances in the following space.

Public Contract Code 10232 Statement

In conformance with Public Contract Code Section 10232, the Contractor, hereby states under penalty of perjury, that no more than one final unappealable finding of contempt of court by a federal court has been issued against the Contractor within the immediately preceding two year period because of the Contractor's failure to comply with an order of a federal court which orders the Contractor to comply with an order of the National Labor Relations Board.

Note: The above Statement and Questionnaire are part of the Bid. Signing this Bid on the signature portion thereof shall also constitute signature of this Statement and Questionnaire.

Bidders are cautioned that making a false certification may subject the certifier to criminal prosecution.

AMERICAN AVENUE DISPOSAL SITE PHASE III **CONTRACT NO. 16-22-SW**
MODULES 7 & 8 EXCAVATION AND LINER SYSTEM CONSTRUCTION

BIDDER: Wood Bros Inc.

SUBCONTRACTORS:

The following named subcontractor(s) will perform with labor, or otherwise render services 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. Submission of subcontractor's name, location of business and description of work, and their contractor's license number is 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.

Please fill out as completely as possible when submitting your bid. Use subcontractor's business name style as registered with the License Board.

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: Geo-Logic

Business Address: 16055 Caputo Dr. Morgan Hill, CA.

Class _____ License No. _____ DIR Registration No. _____

Description of Work: Leak Location

Dollar Amount or Percentage of Total Bid .5%

Email Address _____

SUBCONTRACTOR: International Lining

Business Address: 850 Maestro Drive Reno Nev.

Class C-61 License No. 811377 DIR Registration No. 1000003265

Description of Work: Liner

Dollar Amount or Percentage of Total Bid 35%

Email Address _____

BIDDER: ____

SUBCONTRACTOR: ____

Business Address: ____

Class ____________ License No. ________________ DIR Registration No. ____________

Description of Work: ____

Dollar Amount or Percentage of Total Bid ______________________________

Email Address ____

SUBCONTRACTOR: ____

Business Address: ____

Class ____________ License No. ________________ DIR Registration No. ____________

Description of Work: ____

Dollar Amount or Percentage of Total Bid ______________________________

Email Address ____

SUBCONTRACTOR: ____

Business Address: ____

Class ____________ License No. ________________ DIR Registration No. ____________

Description of Work: ____

Dollar Amount or Percentage of Total Bid ______________________________

Email Address ____

SUBCONTRACTOR: ____

Business Address: ____

Class ____________ License No. ________________ DIR Registration No. ____________

Description of Work: ____

Dollar Amount or Percentage of Total Bid ______________________________

Email Address ____

BIDDER: ______________________________

SUBCONTRACTOR: ______________________________

Business Address: ______________________________

Class ____________License No. ________________DIR Registration No.____________

Description of Work: ______________________________

Dollar Amount or Percentage of Total Bid ______________________________

Email Address______________________________

SUBCONTRACTOR: ______________________________

Business Address: ______________________________

Class ____________License No. ________________DIR Registration No.____________

Description of Work: ______________________________

Dollar Amount or Percentage of Total Bid ______________________________

Email Address______________________________

SUBCONTRACTOR: ______________________________

Business Address: ______________________________

Class ____________License No. ________________DIR Registration No.____________

Description of Work: ______________________________

Dollar Amount or Percentage of Total Bid ______________________________

Email Address______________________________

SUBCONTRACTOR: ______________________________

Business Address: ______________________________

Class ____________License No. ________________DIR Registration No.____________

Description of Work: ______________________________

Dollar Amount or Percentage of Total Bid ______________________________
Email Address______________________________

BIDDER: ____

SUBCONTRACTOR: ____

Business Address: ____

Class ____________License No. __________________DIR Registration No.____________

Description of Work: ____

Dollar Amount or Percentage of Total Bid ____

Email Address____

SUBCONTRACTOR: ____

Business Address: ____

Class ____________License No. __________________DIR Registration No.____________

Description of Work: ____

Dollar Amount or Percentage of Total Bid ____

Email Address____

SUBCONTRACTOR: ____

Business Address: ____

Class ____________License No. __________________DIR Registration No.____________

Description of Work: ____

Dollar Amount or Percentage of Total Bid ____

Email Address____

SUBCONTRACTOR: ____

Business Address: ____

Class ____________License No. __________________DIR Registration No.____________

Description of Work: ____

Dollar Amount or Percentage of Total Bid ____

Email Address____

BIDDER: ____

SUBCONTRACTOR: ____

Business Address: ____

Class ____________ License No. ________________ DIR Registration No. ____________

Description of Work: ____

Dollar Amount or Percentage of Total Bid ______________________________

Email Address____

SUBCONTRACTOR: ____

Business Address: ____

Class ____________ License No. ________________ DIR Registration No. ____________

Description of Work: ____

Dollar Amount or Percentage of Total Bid ______________________________

Email Address____

SUBCONTRACTOR: ____

Business Address: ____

Class ____________ License No. ________________ DIR Registration No. ____________

Description of Work: ____

Dollar Amount or Percentage of Total Bid ______________________________

Email Address____

SUBCONTRACTOR: ____

Business Address: ____

Class ____________ License No. ________________ DIR Registration No. ____________

Description of Work: ____

Dollar Amount or Percentage of Total Bid ______________________________
Email Address____

BIDDER: ____

SUBCONTRACTOR: ____

Business Address: ____

Class ____________License No. __________________DIR Registration No.____________

Description of Work: ____

Dollar Amount or Percentage of Total Bid ____

Email Address____

SUBCONTRACTOR: ____

Business Address: ____

Class ____________License No. __________________DIR Registration No.____________

Description of Work: ____

Dollar Amount or Percentage of Total Bid ____

Email Address____

SUBCONTRACTOR: ____

Business Address: ____

Class ____________License No. __________________DIR Registration No.____________

Description of Work: ____

Dollar Amount or Percentage of Total Bid ____

Email Address____

SUBCONTRACTOR: ____

Business Address: ____

Class ____________License No. __________________DIR Registration No.____________

Description of Work: ____

Dollar Amount or Percentage of Total Bid ____

Email Address____

(This guaranty shall be executed by the successful bidder in accordance with instructions in the special provisions. The bidder may 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 after 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.

Donald T. Wood
Secretary

Date: 3.8.17 Contractor: Wood Bros Inc.

AMERICAN AVENUE DISPOSAL SITE PHASE III CONTRACT NO. 16-22-SW
MODULES 7 & 8 EXCAVATION AND LINER SYSTEM CONSTRUCTION

A G R E E M E N T

THIS AGREEMENT made at Fresno, in Fresno County, California, by and between Wood 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, but excluding such materials as are mentioned in the specifications to be furnished by the Owner, and to perform all the work in a good and workmanlike manner, free from any and all liens and claims of mechanics, materialmen, teamsters, subcontractors, artisans, machinists, and laborers required for:

AMERICAN AVENUE DISPOSAL SITE PHASE III
MODULES 7 & 8 EXCAVATION AND LINER SYSTEM CONSTRUCTION

CONTRACT NO. 16-22-SW

All in strict compliance with the plans, drawings and specifications therefor prepared by the Owner, and other contract documents relating thereto.

ARTICLE II. The Contractor and the Owner agree that the Notice to Bidders and Special Provisions, the Wage Scale (Prevailing Wages), the, the Plans and Drawings, Addenda and Bulletins thereto, and the Proposal (the Bid Book) hereto attached, together with this Agreement, form the contract, and they are as fully a part of the contract as if hereto attached or herein repeated.

All portions of the Standard Specifications of the State of California, Department of Transportation, dated 2010, which are not in conflict with this contract shall be deemed a part of the specifications as though fully therein set forth; provided, however, that revisions to the said Standard Specifications shall apply only to the extent, if any, included in the Project Details of these specifications or as otherwise incorporated directly herein. No part of said specifications which is in conflict with any portion of this agreement, or which is not actually descriptive of the work to be done thereunder, or of the manner in which said work is to be executed, shall be considered as any part of this agreement, but shall be utterly null and void.

ARTICLE III. The Owner agrees to pay the Contractor in current funds for the performance of the contract the sum of **FIVE MILLION SIX HUNDRED EIGHTY-SIX THOUSAND FIVE HUNDRED FORTY DOLLARS AND 00/100 ($5,686,540.00)** it being understood that said price is based upon the estimated quantities of materials to be used as set forth in the Proposal, except where provisions are made in the contract documents whereby the estimated quantities shall constitute the final quantity; that upon completion of the project the final contract prices shall be revised by change order, if necessary, to reflect the true quantities used at the stated unit price thereof as contained in the Contractor's Proposal hereto attached. Payments on account thereof will be made as set forth in the special provisions.

ARTICLE IV. If the Contractor should be adjudged a bankrupt, or if he should make a general assignment for the benefit of his creditors, or if a receiver should be appointed on account of his insolvency, or if he or any of his subcontractors should persistently violate any of the provisions of the contract, or if he should persistently or repeatedly refuse or should fail,

except in cases for which extension of time is provided, to supply enough properly skilled workmen or proper materials, or if he should fail to make prompt payment to subcontractors or for material or labor, or persistently disregard laws, ordinances or the instructions of the Engineer, then the Owner may, upon certificate of the Engineer when sufficient cause exists to justify such action, serve written notice upon the Contractor and his surety of its intention to terminate the contract, and unless within five days after the serving of such notice, such violations shall cease and satisfactory arrangements for correction thereof be made, the contract shall, upon the expiration of said five days, cease and terminate.

In the event of any such termination, the Owner shall immediately serve written notice thereof upon the surety and the Contractor, and the surety shall have the right to take over and perform the contract, provided, however, that if the surety within ten (10) days after the serving upon it of notice of termination does not give the Owner written notice of its intention to take over and perform the contract or does not commence performance thereof within the ten (10) days stated above from the date of the serving of such notice, the Owner may take over the work and prosecute the same to completion by contract or by any other method it may deem advisable, for the account and at the expense of the Contractor, and the Contractor and his surety shall be liable to the Owner for any excess cost occasioned the Owner thereby, and in such event the Owner may without liability for so doing, take possession of and utilize in completing the work such materials, appliances, plant and other property belonging to the Contractor as may be on the site of the work and necessary therefor. In such case the Contractor shall not be entitled to receive any further payment until the work is finished. If the unpaid balance of the contract price shall exceed the expenses of finishing the work, including compensation for additional managerial and administrative services, such excess shall be paid to the Contractor. If such expense shall exceed such unpaid balance, the Contractor shall pay the difference to the Owner. The expense incurred by the Owner, as herein provided and damage incurred through the Contractor's default, shall be certified by the Engineer.

ARTICLE V. With respect to any work required to be done under this contract, the Contractor will indemnify and hold harmless the COUNTY OF FRESNO, CONSULTANTS and all other participating public agencies, whether or not said agencies are named herein, who have jurisdiction within the areas in which the work is to be performed, and all officers and employees of the Owner, the County, the State, the United States and said other participating agencies, from any and all costs and expenses, attorney fees and court costs, damages, liabilities, claims and losses occurring or resulting to COUNTY 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 COUNTY for Federal, State of California and/or local audit exceptions resulting from non-compliance herein on the part of CONTRACTOR.

CONTRACTOR agrees to indemnify, save, hold harmless, and at COUNTY'S request, defend the COUNTY, its officers, agents, and employees from any and all costs and expenses, damages, liabilities, claims, and losses occurring or resulting to COUNTY 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, 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 the event CONTRACTOR fails to keep in effect at all times insurance coverage as herein provided, the COUNTY may, in addition to other remedies it may have, suspend or terminate this Agreement upon the occurrence of such event.

All policies shall be with admitted insurers licensed to do business in the State of California. Insurance purchased shall be purchased from companies possessing a current A.M. Best, Inc. rating of A and FSC VIII or better.

The Certificate of Insurance shall be issued in duplicate, to the COUNTY OF FRESNO and all other participating agencies, whether or not said agencies are named herein, 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.

In the event CONTRACTOR fails to keep in effect at all times insurance coverage as herein provided, the COUNTY may, in addition to other remedies it may have, suspend or terminate this Agreement upon the occurrence of such event.

All policies shall be with admitted insurers licensed to do business in the State of California. Insurance purchased shall be purchased from companies possessing a current A.M Best Company rating of A FSC VII or better.

Without limiting the COUNTY'S right to obtain indemnification from CONTRACTOR or any third parties, CONTRACTOR, at its sole expense, shall maintain in full force and effect, the following insurance policies or a program of self-insurance, including but not limited to, an insurance pooling arrangement or Joint Powers Agreement (JPA) throughout the term of the Agreement:

A. Commercial General Liability

Commercial General Liability Insurance with limits not less than those shown in the following table:

Liability Insurance Requirements

Total bid	For each occurrence[a]	Aggregate for products/completed operation	General aggregate[b]	Umbrella or excess liability[c]
≤ $1,000,000	$1,000,000	$2,000,000	$2,000,000	$5,000,000
> $1,000,000 ≤ $10,000,000	$1,000,000	$2,000,000	$2,000,000	$10,000,000
> $10,000,000 ≤ $25,000,000	$2,000,000	$2,000,000	$4,000,000	$15,000,000
> $25,000,000	$2,000,000	$2,000,000	$4,000,000	$25,000,000

[a]*Combined single limit for bodily injury and property damage.*
[b]*This limit must apply separately to your work under this Contract.*
[c]*The umbrella or excess policy must contain a clause stating that it takes effect (drops down) in the event the primary limits are impaired or exhausted.*

This policy shall be issued on a per occurrence basis. COUNTY may require specific coverages including completed operations, products liability, contractual liability, Explosion-Collapse-Underground, fire legal liability, or any other liability insurance deemed necessary because of the of the nature of this contract.

Such Commercial General Liability insurance shall name the County of Fresno, its officers, agents, and employees, individually and collectively, as additional insured, but only insofar as the operations under this Agreement are concerned. Such coverage for additional insured shall apply as primary insurance and any other insurance, or self-insurance, maintained by COUNTY, its officers, agents and employees shall be excess only and not contributing with insurance provided under CONTRACTOR's policies herein. This insurance shall not be cancelled or changed without a minimum of thirty (30) days advance written notice given to COUNTY. CONTRACTOR shall obtain endorsements to the Commercial General Liability insurance policy naming COUNTY as an additional insured and providing for a thirty (30) day prior written notice of cancellation or change in terms or coverage.

Within eight (8) days from date CONTRACTOR executes this Agreement, CONTRACTOR shall provide certificates of insurance and endorsement as stated above for all of the foregoing policies, as required herein, to the County of Fresno, stating that such insurance coverages have been obtained and are in full force; that the County of Fresno, its officers, agents and employees will not be responsible for an premiums on the policies; that such Commercial General Liability insurance names the County of Fresno, its officers, agents, and employees, individually and collectively, as additional insured, but only insofar as the operations under this Agreement are concerned; that such coverage for additional insured shall apply as primary insurance an any other insurance, or self- insurance shall not be cancelled or changed without a minimum of thirty (30) days advance, written notice given to COUNTY.

CONTRACTOR shall obtain endorsements to the Commercial General Liability insurance naming the County of Fresno, its officers, agents, and employees, individually and collectively, as additional insured, but only insofar as the operations under this Agreement are concerned. Such coverage for additional insured shall apply as primary insurance and any other insurance, or self-insurance, maintained by COUNTY, its officers, agents, and employees shall be excess only and not contributing with insurance provided under CONTRACTOR'S policies herein. This insurance shall not be cancelled or changed without a minimum or thirty (30) days advance written notice given to COUNTY.

B. Automobile Liability

Comprehensive Automobile Liability Insurance with limits of not less than One Million Dollars ($1,000,000) per accident for bodily injury and property damage. Coverage should include owned and non-owned vehicles used in connection with this Agreement and all applicable endorsements.

C. Professional Liability

If CONTRACTOR is a licensed professional or employs professional staff, (e.g., Architect, Engineer, Surveyor, etc.) in providing services, Professional Liability Insurance with limits of not less than One Million Dollars ($1,000,000.00) per occurrence, Three Million Dollars ($3,000,000.00) annual aggregate with a provision for 3 year tail coverage.

AMERICAN AVENUE DISPOSAL SITE PHASE III CONTRACT NO. 16-22-SW
MODULES 7 & 8 EXCAVATION AND LINER SYSTEM CONSTRUCTION

D. Worker's Compensation

A policy of Worker's Compensation insurance as may be required by the California Labor Code.

ARTICLE VI. Contractor represents that he has secured the payment of Worker's Compensation in compliance with the provisions of the Labor Code of the State of California and during the performance of the work contemplated herein will continue so to comply with said provisions of said Code. Contractor shall supply the Owner with certificates of insurance, in duplicate, evidencing that Worker's Compensation Insurance is in effect and providing that the Owner will receive ten days notice of cancellation. If Contractor self-insures Worker's Compensation, Certificate of Consent to Self-insure should be provided the Owner.

ARTICLE VII. The Contractor shall forthwith furnish in duplicate, a faithful performance bond in an amount equal to 100% of the contract price and a payment bond in an amount equal to 100% of the contract price, both bonds to be written by a surety company acceptable to the Owner and in the form prescribed by law.

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

ARTICLE VIII. Governing Law – Venue for any action arising out of or relating to this Agreement shall be in Fresno County, California. This Agreement shall be governed by the laws of the State of California

This Contract, **16-22-SW.** was awarded by the Board of Supervisors on April 25, 2017. It has been reviewed by the Department of Public Works and Planning and is in proper order for signature of the Chairman of the Board of Supervisors.

Director of the Department of Public Works and Planning

IN WITNESS WHEREOF, they have executed this Agreement this 24th day of May, 2017

COUNTY OF FRESNO
(OWNER)

By
Chairman, Board of Supervisors

Wood Bros Inc
(CONTRACTOR)

77-0201050
(Taxpayer Federal I.D. No.)

By
Title Donald T. Wood Secretary

Contract Number 16-22-SW **Agreement – 5**

ATTEST:
BERNICE E. SEIDEL, Clerk
Board of Supervisors
By
Deputy

Fresno County Department of Public Works and Planning
Project: General Building Job Order Contract Class-B
Contract No.: 17-J-01, 17-J-02 & 17-J-03

Bidders

1 **Haus Construction**
2 **Durham Construction Co., Inc.**
3 **Exbon Development, Inc**
4 **Puma Construction-Non-Responsive**

		Haus Construction 17-J-01		Durham Constr Co., Inc. 17-J-02		Exbon Development, Inc. 17-J-03		Puma Constr-Non-Responsive	
ITEM NO.	ITEM DESCRIPTION								
1	County/State-Normal Working Hours	0.9055		0.8600		0.9450		1.1500	
2	Multiply Line 1 by 50%		0.4528		0.4300		0.4725		0.5750
3	County/State-Other Than Normal Working Hours	0.9575		0.8600		0.9451		1.2000	
4	Multiply Line 3 by 15%		0.1436		0.1290		0.1418		0.1800
5	Federal-Normal Working Hours	0.9055		0.7500		0.8000		1.1600	
6	Multiply Line 5 by 5%		0.0453		0.0375		0.0400		0.0580
7	Federal-Other Than Normal Working Hours	0.9575		0.7500		0.8001		1.2100	
8	Multiply Line 7 by 5%		0.0479		0.0375		0.0400		0.0605
9	County/State-in Secure Facilities-Normal Working Hours	0.9055		1.2300		1.1000		1.1600	
10	Multiply Line 9 by 15%		0.1358		0.1845		0.1650		0.1740
11	County/State-in Secure Facilities-Other Than Normal Working Hours	0.9575		1.2300		1.1001		1.2100	
12	Multiply Line 11 by 10%		0.0958		0.1230		0.1100		0.1210
	Add Lines 2, 4, 6, 8, 10, & 12. This is the Award Criteria Figure		**0.9211**		**0.9415**		**0.9693**		**1.1685**

Fresno County Department of Public Works and Planning
Project: General Building Job Order Contract Class-B
Contract No.: 17-J-01, 17-J-02 & 17-J-03

Bidders

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2 **Durham Construction Co., Inc.**
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		Haus Construction 17-J-01		Durham Constr Co., Inc. 17-J-02		Exbon Development, Inc. 17-J-03		Puma Constr-Non-Responsive	
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4	Multiply Line 3 by 15%		0.1436		0.1290		0.1418		0.1800
5	Federal-Normal Working Hours	0.9055		0.7500		0.8000		1.1600	
6	Multiply Line 5 by 5%		0.0453		0.0375		0.0400		0.0580
7	Federal-Other Than Normal Working Hours	0.9575		0.7500		0.8001		1.2100	
8	Multiply Line 7 by 5%		0.0479		0.0375		0.0400		0.0605
9	County/State-in Secure Facilities-Normal Working Hours	0.9055		1.2300		1.1000		1.1600	
10	Multiply Line 9 by 15%		0.1358		0.1845		0.1650		0.1740
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12	Multiply Line 11 by 10%		0.0958		0.1230		0.1100		0.1210
	Add Lines 2, 4, 6, 8, 10, & 12. This is the Award Criteria Figure		**0.9211**		**0.9415**		**0.9693**		**1.1685**

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): 9/8/2017

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

BW Insurance Services, member of Kinney & Company
524 S. Rosemead Blvd
Pasadena CA 91107

CONTACT NAME:
PHONE (A/C, No, Ext): 213-820-5863 FAX (A/C, No):
E-MAIL ADDRESS: bwinsurance7@gmail.com

INSURER(S) AFFORDING COVERAGE	NAIC #
INSURER A: Mt. Hawley Insurance Company	37974
INSURER B: Liberty Mutual Insurance Company	23043
INSURER C: Federal Insurance Company	20281
INSURER D:	
INSURER E:	
INSURER F:	

INSURED

Exbon Development, Inc
13831 Newhope Street
Garden Grove SC 92843

COVERAGES **CERTIFICATE NUMBER:** **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	X COMMERCIAL GENERAL LIABILITY CLAIMS-MADE X OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: POLICY PRO-JECT LOC X OTHER:	Y		MGL0186102	4/25/2017	4/25/2018	EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG	$ 1,000,000 $ 50,000 $ 5,0002 $ 1,000,000 $ 2,000,000 $ 2,000,000 $
B	AUTOMOBILE LIABILITY X ANY AUTO ALL OWNED AUTOS X HIRED AUTOS SCHEDULED AUTOS X NON-OWNED AUTOS	Y		58012810MLN1Q1	6/12/2017	6/12/2018	COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident) Deductible	$ 1,000,000 $ 1,000,000 $ 1,000,000 $ 1,000,000 $ 1,000
A	X UMBRELLA LIAB X OCCUR X EXCESS LIAB CLAIMS-MADE DED X RETENTION $ 0	Y		MXL0425256	4/25/2017	4/25/2018	EACH OCCURRENCE AGGREGATE Deductible	$ 9,000,000 $ 9,000,000 $ 0
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? Y / N (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	N / A					PER STATUTE OTH-ER E.L. EACH ACCIDENT E.L. DISEASE - EA EMPLOYEE E.L. DISEASE - POLICY LIMIT	 $ $ $
C	Contractors' Equipment	Y		45470286	9/6/2017	9/6/2018	$310,000	

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

The owner, its officers, officials, employees, agents including Consulting Engineers while performing contract administration services, and volunteers are Addition
**30 days of notice of cancellation for non-payment of premium.
Project: General Building Job Order Contract, Contract No. 17-J-03

CERTIFICATE HOLDER

County of Fresno
Department of Public Works and Planning
2220 Tulare St. 6th Floor
Fresno CA 93721

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.

AUTHORIZED REPRESENTATIVE

Billy Woo

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

WAIVER OF TRANSFER OF RIGHTS OF RECOVERY AGAINST OTHERS

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART.
OWNERS AND CONTRACTORS PROTECTIVE LIABILITY COVERAGE PART

SCHEDULE

Name of Person or Organization:
The owner, its officers, officials, employees, agents including Consulting Engineers while performing contract administration services, and volunteers

Project: General Building Job Order Contract, Contract No. 17-J-03

(If no entry appears above, information required to complete this endorsement will be shown in the Declarations as applicable to this endorsement.)

We waive any right of recovery we may have against the person or organization shown in the Schedule because of payments we make for injury or damage arising out of "your work" done under a contract with that person or organization. The waiver applies only to the person or organization shown in the Schedule.

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

ADDITIONAL INSURED - OWNERS, LESSEES OR CONTRACTORS - AUTOMATIC STATUS FOR OTHER PARTIES WHEN REQUIRED IN WRITTEN CONSTRUCTION AGREEMENT

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART

A. Section II – Who Is An Insured is amended to include as an additional insured:

1. Any person or organization for whom you are performing operations when you and such person or organization have agreed in writing in a contract or agreement that such person or organization be added as an additional insured on your policy; and
2. Any other person or organization you are required to add as an additional insured under the contract or agreement described in Paragraph **1.** above.

Such person(s) or organization(s) is an additional insured only with respect to liability for "bodily injury", "property damage" or "personal and advertising injury" caused, in whole or in part, by:

a. Your acts or omissions; or
b. The acts or omissions of those acting on your behalf;

in the performance of your ongoing operations for the additional insured.

However, the insurance afforded to such additional insured described above:

a. Only applies to the extent permitted by law; and
b. Will not be broader than that which you are required by the contract or agreement to provide for such additional insured.

A person's or organization's status as an additional insured under this endorsement ends when your operations for the person or organization described in Paragraph **1.** above are completed.

B. With respect to the insurance afforded to these additional insureds, the following additional exclusions apply:

This insurance does not apply to:

1. "Bodily injury", "property damage" or "personal and advertising injury" arising out of the rendering of, or the failure to render, any professional architectural, engineering or surveying services, including:
   a. The preparing, approving, or failing to prepare or approve, maps, shop drawings, opinions, reports, surveys, field orders, change orders or drawings and specifications; or
   b. Supervisory, inspection, architectural or engineering activities.

   This exclusion applies even if the claims against any insured allege negligence or other wrongdoing in the supervision, hiring, employment, training or monitoring of others by that insured, if the "occurrence" which caused the "bodily injury" or "property damage", or the offense which caused the "personal and advertising injury", involved the rendering of, or the failure to render, any professional architectural, engineering or surveying services.
2. "Bodily injury" or "property damage" occurring after:
   a. 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

b. 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:**

The most we will pay on behalf of the additional insured is the amount of insurance:

1. Required by the contract or agreement described in Paragraph **A.1.**; 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 – 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
The Owner, its officers, officials, employees, agents, including Consulting Engineers while performing contract administration services, and volunteers	General Building Job Order Contract, Contract No. 17-J-03
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.

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.

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

SCHEDULE

Name Of Additional Insured Person(s) Or Organization(s):	Location And Description Of Completed Operations
The Owner, its officers, officials, employees, agents, including Consulting Engineers while performing contract administration services, and volunteers	General Building Job Order Contract, Contract No, 17-J-03
Information required to complete this Schedule, if not shown above, will be shown in the Declarations.	

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".

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

BLANKET WAIVER OF SUBROGATION WHEN REQUIRED IN A WRITTEN CONTRACT OR AGREEMENT

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART

The TRANSFER OF RIGHTS OF RECOVERY AGAINST OTHERS TO US Condition (Section IV – COMMERCIAL GENERAL LIABILITY CONDITIONS) is deleted and replaced by the following:

We waive any right of recovery we may have against any person or organization against whom you have agreed to waive such right of recovery in a written contract or agreement 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 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.

ADDITIONAL INSURED ENDORSEMENT

This endorsement modifies insurance provided under the following:

BUSINESS AUTO COVERAGE FORM

SCHEDULE

Name Of Person Or Organization:
The owner, its officers, officials, employees, agents including Consulting Engineers while performing contract administration services, and volunteers. Project: Geneeral Building Job Order Contract, Contract No. 17-J-03
Information required to complete this Schedule, if not shown above, will be shown in the Declarations.

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. The inclusion of additional interest or interests will not operate to increase the limit of our liability.

An additional premium of $ is fully earned at the time of issue.

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): 09/08/2017

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 have ADDITIONAL INSURED provisions or 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

Charmjoun Ins & Financial Services
7699 9th St., Ste 202
Buena Park, CA 90621
Phone (562) 475-0110 Fax (562) 475-0113

CONTACT NAME:
PHONE (A/C, No, Ext): (562) 475-0110 **FAX (A/C, No):** (562) 475-0113
E-MAIL ADDRESS: info@charmjoun.com

INSURER(S) AFFORDING COVERAGE		NAIC #
INSURER A :	Granite State Insurance Co	23809
INSURER B :	Hartford Fire Insurance Co	19682
INSURER C :		
INSURER D :		
INSURER E :		
INSURER F :		

INSURED

Exbon Development, Inc.
13831 Newhope Street
Garden Grove CA 92843

COVERAGES **CERTIFICATE NUMBER:** **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 INSR	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
	☐ COMMERCIAL GENERAL LIABILITY ☐ CLAIMS-MADE ☐ OCCUR ☐ ☐ GEN'L AGGREGATE LIMIT APPLIES PER: ☐ POLICY ☐ PRO-JECT ☐ LOC ☐ OTHER						EACH OCCURRENCE	$
							DAMAGE TO RENTED PREMISES (Ea occurrence)	$
							MED EXP (Any one person	$
							PERSONAL & ADV INJURY	$
							GENERAL AGGREGATE	$
							PRODUCTS - COMP/OP AGG	$
								$
	AUTOMOBILE LIABILITY ☐ ANY AUTO ☐ OWNED AUTOS ONLY ☐ SCHEDULED AUTOS ☐ HIRED AUTOS ONLY ☐ NON-OWNED AUTOS ONLY ☐ ☐						COMBINED SINGLE LIMIT (Ea accident)	$
							BODILY INJURY (Per person)	$
							BODILY INJURY (Per accident)	$
							PROPERTY DAMAGE (Per accident)	$
								$
	☐ UMBRELLA LIAB ☐ OCCUR ☐ EXCESS LIAB ☐ CLAIMS-MADE ☐ DED ☐ RETENTION $						EACH OCCURRENCE	$
							AGGREGATE	$
								$
A	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY Y / N ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) Y If yes, describe under DESCRIPTION OF OPERATIONS below	N / A		005564246	10/01/2016	10/01/2017	☑ PER STATUTE ☐ OTH-ER	
							E.L. EACH ACCIDENT	$ 1,000,000
							E.L. DISEASE - EA EMPLOYE	$ 1,000,000
							E.L. DISEASE - POLICY LIMIT	$ 1,000,000
B	Contractor's Equipment	Y		72MSNK3226	09/06/2017	09/06/2018	Ded:$1,000	$270,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (Attach ACORD 101, Additional Remarks Schedule, if more space is required)

Project Name- General Building Job Order Contract, Contract No. 17-J-03. The Owner, its officers, officials, employees and volunteers are named as additional insured. **30 days of notice of cancellation for non-payment of premium.**

CERTIFICATE HOLDER

County of Fresno
Department of Public Works and Planning
2220 Tulare St. 6th Floor
Fresno, CA 93721

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.

AUTHORIZED REPRESENTATIVE

POLICY NUMBER: 005564246 EFFECTIVE: 10/01/2016 – 10/01/2017

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

WAIVER OF SUBROGATION
WORKERS COMPENSATION POLICY

This endorsement modifies insurance provided under the following:

WAIVER OF SUBROGATION ON WORKERS' COMPENSATION POLICY

We have a right to recover our payments from anyone liable for an injury covered by this policy. We will not enforce our right against any person or organization with whom you have a written contract that requires you to obtain this agreement from us, as regards any work you perform for such person or organization.

Name of Person or Organization:

County of Fresno, the Owner, its officers, officials, employees and volunteers

Project: General Building Job Order Contract, Contract No. 17-J-03

(If no entry appears above, information required to complete this endorsement will be shown in the Declaration as applicable to this endorsement).

Authorized Representative

EXECUTED IN 2 ORIGINAL COUNTERPARTS

PERFORMANCE BOND – PUBLIC WORK

Bond No. 0730086
$ 12,115.00 premium is for contract term and is subject to adjustment based on final Contract Price.

KNOW ALL MEN BY THESE PRESENTS: That we,

EXBON DEVELOPMENT, INC.

As Principal, and INTERNATIONAL FIDELITY INSURANCE COMPANY, a corporation duly authorized under the laws of the State of NEW JERSEY to become surety on bonds and undertakings, as Surety, are held and firmly bound unto

COUNTY OF FRESNO

As Obligee in the full and just sum of

ONE MILLION FIVE HUNDRED THOUSAND & 00/100

Dollars, ($ 1,500,000.00), lawful money of the United States of America, to be paid to the said Obligee, successors or assigns; for which payment, well and truly to be made, we bind ourselves, our heirs, executors, successors, administrators 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 AUGUST 28TH, 2017 (YEAR), with the Obligee to do and perform the following work, to-wit:

GENERAL BUILDING JOB ORDER CONTRACT - CONTRACT # 17-J-03

as is more specifically set forth in said contract, to which contract reference is hereby made;

Now therefore, if the said Principal shall well and truly perform the work contracted to be performed under said contract in accordance with the plans and specifications, then the above obligation to be void, otherwise to remain in full force and virtue.

No right of action shall accrue under this bond to or for the use of any person other than the Obligee named herein.

Sealed with our seals and dated this 7TH day of SEPTEMBER, 2017 (YEAR).

EXBON DEVELOPMENT, INC.
Principal

Dongwook Seo / Vice President

INTERNATIONAL FIDELITY INSURANCE COMPANY

By
KEVIN E. VEGA, Attorney-in-Fact

ID-1219 (CA) (REV. 2/01)

Tel (973) 624-7200

POWER OF ATTORNEY

INTERNATIONAL FIDELITY INSURANCE COMPANY
ALLEGHENY CASUALTY COMPANY

ONE NEWARK CENTER, 20TH FLOOR NEWARK, NEW JERSEY 07102-5207

KNOW ALL MEN BY THESE PRESENTS: That INTERNATIONAL FIDELITY INSURANCE COMPANY, a corporation organized and existing under the laws of the State of New Jersey, and ALLEGHENY CASUALTY COMPANY a corporation organized and existing under the laws of the State of Pennsylvania, having their principal office in the City of Newark, New Jersey, do hereby constitute and appoint

KEVIN E. VEGA, BRITTON CHRISTIANSEN, PHILIP E. VEGA, MYRNA SMITH

Covina, CA.

their true and lawful attorney(s)-in-fact to execute, seal and deliver for and on its behalf as surety, any and all bonds and undertakings, contracts of indemnity and other writings obligatory in the nature thereof, which are or may be allowed, required or permitted by law, statute, rule, regulation, contract or otherwise, and the execution of such instrument(s) in pursuance of these presents, shall be as binding upon the said INTERNATIONAL FIDELITY INSURANCE COMPANY and ALLEGHENY CASUALTY COMPANY, as fully and amply, to all intents and purposes, as if the same had been duly executed and acknowledged by their regularly elected officers at their principal offices.

This Power of Attorney is executed, and may be revoked, pursuant to and by authority of the By-Laws of INTERNATIONAL FIDELITY INSURANCE COMPANY and ALLEGHENY CASUALTY COMPANY and is granted under and by authority of the following resolution adopted by the Board of Directors of INTERNATIONAL FIDELITY INSURANCE COMPANY at a meeting duly held on the 20th day of July, 2010 and by the Board of Directors of ALLEGHENY CASUALTY COMPANY at a meeting duly held on the 15th day of August, 2000:

"RESOLVED, that (1) the President, Vice President, Executive Vice President or Secretary of the Corporation shall have the power to appoint, and to revoke the appointments of, Attorneys-in-Fact or agents with power and authority as defined or limited in their respective powers of attorney, and to execute on behalf of the Corporation and affix the Corporation's seal thereto, bonds, undertakings, recognizances, contracts of indemnity and other written obligations in the nature thereof or related thereto; and (2) any such Officers of the Corporation may appoint and revoke the appointments of joint-control custodians, agents for acceptance of process, and Attorneys-in-fact with authority to execute waivers and consents on behalf of the Corporation; and (3) the signature of any such Officer of the Corporation and the Corporation's seal may be affixed by facsimile to any power of attorney or certification given for the execution of any bond, undertaking, recognizance, contract of indemnity or other written obligation in the nature thereof or related thereto, such signature and seals when so used whether heretofore or hereafter, being hereby adopted by the Corporation as the original signature of such officer and the original seal of the Corporation, to be valid and binding upon the Corporation with the same force and effect as though manually affixed."

IN WITNESS WHEREOF, INTERNATIONAL FIDELITY INSURANCE COMPANY and ALLEGHENY CASUALTY COMPANY have each executed and attested these presents on this 22nd day of July, 2014.

INTERNATIONAL FIDELITY INSURANCE COMPANY CORPORATE SEAL 1904 NEW JERSEY

STATE OF NEW JERSEY
County of Essex

ROBERT W. MINSTER
Executive Vice President/Chief Operating Officer
(International Fidelity Insurance Company)
and President (Allegheny Casualty Company)

ALLEGHENY CASUALTY COMPANY 1936 PENNSYLVANIA

On this 22nd day of July 2014, before me came the individual who executed the preceding instrument, to me personally known, and, being by me duly sworn, said he is the therein described and authorized officer of INTERNATIONAL FIDELITY INSURANCE COMPANY and ALLEGHENY CASUALTY COMPANY; that the seals affixed to said instrument are the Corporate Seals of said Companies; that the said Corporate Seals and his signature were duly affixed by order of the Boards of Directors of said Companies.

IN TESTIMONY WHEREOF, I have hereunto set my hand affixed my Official Seal, at the City of Newark, New Jersey the day and year first above written.

CATHY VAZQUEZ NOTARY PUBLIC STATE OF NEW JERSEY

A NOTARY PUBLIC OF NEW JERSEY
My Commission Expires April 16, 2019

CERTIFICATION

I, the undersigned officer of INTERNATIONAL FIDELITY INSURANCE COMPANY and ALLEGHENY CASUALTY COMPANY do hereby certify that I have compared the foregoing copy of the Power of Attorney and affidavit, and the copy of the Sections of the By-Laws of said Companies as set forth in said Power of Attorney, with the originals on file in the home office of said companies, and that the same are correct transcripts thereof, and of the whole of the said originals, and that the said Power of Attorney has not been revoked and is now in full force and effect.

IN TESTIMONY WHEREOF, I have hereunto set my hand this 7TH day of SEPTEMBER, 2017

MARIA BRANCO, Assistant Secretary

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 09/07/2017 before me, PHILIP VEGA, NOTARY PUBLIC,
Date *Here Insert Name and Title of the Officer*

personally appeared KEVIN E. VEGA
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.

PHILIP VEGA
COMM. # 2152121
NOTARY PUBLIC - CALIFORNIA
LOS ANGELES COUNTY
MY COMM. EXP. MAY 31, 2020

Signature _____
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: _____ Document Date: _____

Number of Pages: _____ Signer(s) Other Than Named Above: _____

Capacity(ies) Claimed by Signer(s)

Signer's Name: _____
☐ Corporate Officer — Title(s): _____
☐ Partner — ☐ Limited ☐ General
☐ Individual ☐ Attorney in Fact
☐ Trustee ☐ Guardian or Conservator
☐ Other: _____
Signer Is Representing: _____

Signer's Name: _____
☐ Corporate Officer — Title(s): _____
☐ Partner — ☐ Limited ☐ General
☐ Individual ☐ Attorney in Fact
☐ Trustee ☐ Guardian or Conservator
☐ Other: _____
Signer Is Representing: _____

California All-Purpose Certificate of Acknowledgment

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 Orange } s.s.

On 09/11/17 before me, Jinjoo Choi, Notary Public,
Name of Notary Public, Title

personally appeared Dongwook Seo
Name of Signer(s)

_____
Name 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 of Notary Public

NRO1 JINJOO CHOI COMM. #2194448 Notary Public - California Orange County My Comm. Expires Apr. 28, 2021 NRO1

OPTIONAL INFORMATION

Although the information in this section is not required by law, it could prevent fraudulent removal and reattachment of this acknowledgment to an unauthorized document and may prove useful to persons relying on the attached document.

Description of Attached Document

The preceding Certificate of Acknowledgment is attached to a document titled/for the purpose of _____,

containing _____ pages, and dated _____.

The signer(s) capacity or authority is/are as:

- ☐ Individual(s)
- ☐ Attorney-in-fact
- ☐ Corporate Officer(s) _____
  Title(s)
- ☐ Guardian/Conservator
- ☐ Partner - Limited/General
- ☐ Trustee(s)
- ☐ Other: _____

representing: _____
Name of Person(s) or Entity(ies)

_____

Additional Information

Method of Signer Identification

Proved to me on the basis of satisfactory evidence:

☐ form(s) of identification ☐ credible witness(es)

Notarial event is detailed in notary journal on:

Page # _____ Entry # _____

Notary contact: _____

Other

☐ Additional Signer ☐ Signer(s) Thumbprints(s)

☐ _____

EXECUTED IN 2 ORIGINAL COUNTERPARTS

PAYMENT BOND – PUBLIC WORK

Bond No. 0730086
Premium included in Performance bond

KNOW ALL MEN BY THESE PRESENTS, That
EXBON DEVELOPMENT, INC.

, as Principal,
and INTERNATIONAL FIDELITY INSURANCE COMPANY, a corporation authorized to transact a general surety business in the State of California, as Surety, are held and firmly bound unto

COUNTY OF FRESNO

, as Obligee in the sum of

ONE MILLION FIVE HUNDRED THOUSAND & 00/100

Dollars ($ 1,500,000.00) for the payment whereof, in lawful money of the United States, 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 AUGUST 28TH, 2017 (YEAR), with the obligee to do the following work, to wit:

GENERAL BUILDING JOB ORDER CONTRACT - CONTRACT # 17-J-03

Now, therefore, if the above bounded Principal, contractor, person, company or corporation, or his or its sub-contractor, fails to pay any claimant named in Section 3181 of the Civil Code of the State of California, or amounts due under the Unemployment Insurance Code, with respect to work or labor performed by any such claimant, that the Surety on this bond will pay the same, in an amount not exceeding the aggregate sum specified in this bond, and also, in case suit is brought upon this bond, a reasonable attorney's fee, which shall be awarded by the court to the prevailing party in said suit, and attorney's fees to be taxed as costs in said suit.

This bond shall inure to the benefit of any person named in Section 3181 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.

This bond is executed and filed to comply with the provisions of the act of Legislature of the State of California as designated in Civil Code, Sections 3247-3252 inclusive, and all amendments thereto.

Signed and Sealed this 7TH day of SEPTEMBER, 2017 (YEAR).

EXBON DEVELOPMENT, INC.
Principal

Dongwook Seo / Vice President

INTERNATIONAL FIDELITY INSURANCE COMPANY
Surety

By
KEVIN E. VEGA, Attorney-in-Fact

ID-1210 (CA) (REV. 1/01)

Tel (973) 624-7200

POWER OF ATTORNEY

INTERNATIONAL FIDELITY INSURANCE COMPANY
ALLEGHENY CASUALTY COMPANY

ONE NEWARK CENTER, 20TH FLOOR NEWARK, NEW JERSEY 07102-5207

KNOW ALL MEN BY THESE PRESENTS: That INTERNATIONAL FIDELITY INSURANCE COMPANY, a corporation organized and existing under the laws of the State of New Jersey, and ALLEGHENY CASUALTY COMPANY a corporation organized and existing under the laws of the State of Pennsylvania, having their principal office in the City of Newark, New Jersey, do hereby constitute and appoint

KEVIN E. VEGA, BRITTON CHRISTIANSEN, PHILIP E. VEGA, MYRNA SMITH

Covina, CA.

their true and lawful attorney(s)-in-fact to execute, seal and deliver for and on its behalf as surety, any and all bonds and undertakings, contracts of indemnity and other writings obligatory in the nature thereof, which are or may be allowed, required or permitted by law, statute, rule, regulation, contract or otherwise, and the execution of such instrument(s) in pursuance of these presents, shall be as binding upon the said INTERNATIONAL FIDELITY INSURANCE COMPANY and ALLEGHENY CASUALTY COMPANY, as fully and amply, to all intents and purposes, as if the same had been duly executed and acknowledged by their regularly elected officers at their principal offices.

This Power of Attorney is executed, and may be revoked, pursuant to and by authority of the By-Laws of INTERNATIONAL FIDELITY INSURANCE COMPANY and ALLEGHENY CASUALTY COMPANY and is granted under and by authority of the following resolution adopted by the Board of Directors of INTERNATIONAL FIDELITY INSURANCE COMPANY at a meeting duly held on the 20th day of July, 2010 and by the Board of Directors of ALLEGHENY CASUALTY COMPANY at a meeting duly held on the 15th day of August, 2000:

"RESOLVED, that (1) the President, Vice President, Executive Vice President or Secretary of the Corporation shall have the power to appoint, and to revoke the appointments of, Attorneys-in-Fact or agents with power and authority as defined or limited in their respective powers of attorney, and to execute on behalf of the Corporation and affix the Corporation's seal thereto, bonds, undertakings, recognizances, contracts of indemnity and other written obligations in the nature thereof or related thereto; and (2) any such Officers of the Corporation may appoint and revoke the appointments of joint-control custodians, agents for acceptance of process, and Attorneys-in-fact with authority to execute waivers and consents on behalf of the Corporation; and (3) the signature of any such Officer of the Corporation and the Corporation's seal may be affixed by facsimile to any power of attorney or certification given for the execution of any bond, undertaking, recognizance, contract of indemnity or other written obligation in the nature thereof or related thereto, such signature and seals when so used whether heretofore or hereafter, being hereby adopted by the Corporation as the original signature of such officer and the original seal of the Corporation, to be valid and binding upon the Corporation with the same force and effect as though manually affixed."

IN WITNESS WHEREOF, INTERNATIONAL FIDELITY INSURANCE COMPANY and ALLEGHENY CASUALTY COMPANY have each executed and attested these presents on this 22nd day of July, 2014.

INTERNATIONAL FIDELITY INSURANCE COMPANY CORPORATE SEAL 1904 NEW JERSEY

STATE OF NEW JERSEY
County of Essex

ROBERT W. MINSTER
Executive Vice President/Chief Operating Officer
(International Fidelity Insurance Company)
and President (Allegheny Casualty Company)

ALLEGHENY CASUALTY COMPANY 1936 PENNSYLVANIA

On this 22nd day of July 2014, before me came the individual who executed the preceding instrument, to me personally known, and, being by me duly sworn, said he is the therein described and authorized officer of INTERNATIONAL FIDELITY INSURANCE COMPANY and ALLEGHENY CASUALTY COMPANY; that the seals affixed to said instrument are the Corporate Seals of said Companies; that the said Corporate Seals and his signature were duly affixed by order of the Boards of Directors of said Companies.

IN TESTIMONY WHEREOF, I have hereunto set my hand affixed my Official Seal, at the City of Newark, New Jersey the day and year first above written.

CATHY VAZQUEZ NOTARY PUBLIC STATE OF NEW JERSEY

A NOTARY PUBLIC OF NEW JERSEY
My Commission Expires April 16, 2019

CERTIFICATION

I, the undersigned officer of INTERNATIONAL FIDELITY INSURANCE COMPANY and ALLEGHENY CASUALTY COMPANY do hereby certify that I have compared the foregoing copy of the Power of Attorney and affidavit, and the copy of the Sections of the By-Laws of said Companies as set forth in said Power of Attorney, with the originals on file in the home office of said companies, and that the same are correct transcripts thereof, and of the whole of the said originals, and that the said Power of Attorney has not been revoked and is now in full force and effect.

IN TESTIMONY WHEREOF, I have hereunto set my hand this 7TH day of SEPTEMBER, 2017

MARIA BRANCO, Assistant Secretary

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 09/07/2017 before me, PHILIP VEGA, NOTARY PUBLIC,
Date *Here Insert Name and Title of the Officer*

personally appeared KEVIN E. VEGA
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.

PHILIP VEGA
COMM. # 2152121
NOTARY PUBLIC - CALIFORNIA
LOS ANGELES COUNTY
MY COMM. EXP. MAY 31, 2020

Signature _____
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: _____ Document Date: _____

Number of Pages: _____ Signer(s) Other Than Named Above: _____

Capacity(ies) Claimed by Signer(s)

Signer's Name: _____
☐ Corporate Officer — Title(s): _____
☐ Partner — ☐ Limited ☐ General
☐ Individual ☐ Attorney in Fact
☐ Trustee ☐ Guardian or Conservator
☐ Other: _____
Signer Is Representing: _____

Signer's Name: _____
☐ Corporate Officer — Title(s): _____
☐ Partner — ☐ Limited ☐ General
☐ Individual ☐ Attorney in Fact
☐ Trustee ☐ Guardian or Conservator
☐ Other: _____
Signer Is Representing: _____

California All-Purpose Certificate of Acknowledgment

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 Orange } s.s.

On 09/11/17 before me, Jinjoo Choi, Notary Public,
Name of Notary Public, Title

personally appeared Dongwook Seo
Name of Signer (1)

Name of Signer (2)

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 of Notary Public

NRO1 JINJOO CHOI COMM. #2194448 Notary Public - California Orange County My Comm. Expires Apr. 28, 2021 NRO1

OPTIONAL INFORMATION

Although the information in this section is not required by law, it could prevent fraudulent removal and reattachment of this acknowledgment to an unauthorized document and may prove useful to persons relying on the attached document.

Description of Attached Document

The preceding Certificate of Acknowledgment is attached to a document titled/for the purpose of _____,

containing _____ pages, and dated _____.

The signer(s) capacity or authority is/are as:

- ☐ Individual(s)
- ☐ Attorney-in-fact
- ☐ Corporate Officer(s) _____
  Title(s)
- ☐ Guardian/Conservator
- ☐ Partner - Limited/General
- ☐ Trustee(s)
- ☐ Other: _____

representing. _____
Name(s) of Person(s) or Entity(ies)

Additional Information

Method of Signer Identification

Proved to me on the basis of satisfactory evidence:

☐ form(s) of identification ☐ credible witness(es)

Notarial event is detailed in notary journal on:

Page # _____ Entry # _____

Notary contact: _____

Other

☐ Additional Signer ☐ Signer(s) Thumbprints(s)

☐ _____

SURETY VERIFICATION

(Complete and return with Performance and Payment Bonds)

PROJECT GENERAL BUILDING JOB ORDER CONTRACT

Contract No. 17-J-03

Contractor EXBON DEVELOPMENT, INC.

Contact Person DON SEO Phone No. 714-539-2222

SURETY COMPANY (Exact Name Style, Home Office Address)

INTERNATIONAL FIDELITY INSURANCE COMPANY

ONE NEWARK CENTER

NEWARK, NJ 07102

AGENT / BROKER

Attorney-in-fact KEVIN E. VEGA Phone No. 626-859-1000

Firm C&D BONDING & INSURANCE SERVICES

Mail Address 534 E. BADILLO ST.

City, State, ZIP COVINA, CA 91723

CA Dept of Insurance License No. OF92118 Expires 12 / 31 / 2017
(or attach copy of License)

- -

Owner's use only

Received 9 / 26 / 17 By [illegible]

Surety admitted 2 / 9 / 1996

Surety Best's Class A- Rating VII

Comments

\dsform\PW180G

EXECUTED IN 2 ORIGINAL COUNTERPARTS

WARRANTY BOND

Bond No. 0730086
Effective Date: SEPTEMBER 7TH, 2017

KNOW ALL PERSONS BY THESE PRESENTS:

THAT we, EXBON DEVELOPMENT, INC., as Principal, and INTERNATIONAL FIDELITY INSURANCE COMPANY, a corporation organized and doing business under and by virtue of the laws of the State of NEW JERSEY and duly licensed to conduct surety business in the State of CALIFORNIA, as Surety, are held and firmly bound unto

COUNTY OF FRESNO

as Obligee, in the sum of ONE HUNDRED FIFTY THOUSAND & 00/100

($ 150,000.00) Dollars, for which payment, well and truly to be made, we bind ourselves, our heirs, executors and successors, jointly and severally firmly by these presents.

THE CONDITION OF THE OBLIGATION IS SUCH THAT:

WHEREAS, the above named Principal entered into an agreement or agreements with said Obligee to:

GENERAL BUILDING JOC 17-J-03

WHEREAS, said agreement provided that Principal shall guarantee replacement and repair of improvements as described therein for a period of ONE (1) year(s);

NOW, THEREFORE, if the above Principal shall indemnify the Obligee for all loss that Obligee may sustain by reason of any defective materials or workmanship which become apparent during the period of ONE (1) year(s) from the effective date of this bond, then this obligation shall be void; otherwise to remain in full force and effect.

IN WITNESS WHEREOF, the seal and signature of said Principal is hereto affixed and the corporate seal and the name of the said Surety is hereto affixed and attested by its duly authorized Attorney-in-Fact

this 7TH day of SEPTEMBER, 2017
Year

EXBON DEVELOPMENT, INC.
(Principal)

Dongwook Seo / vice president

INTERNATIONAL FIDELITY INSURANCE COMPANY
(Surety)

BY: KEVIN E. VEGA, Attorney-in-Fact

ID-1799 (Warranty-No Performance) (5/10)

Tel (973) 624-7200

POWER OF ATTORNEY

INTERNATIONAL FIDELITY INSURANCE COMPANY
ALLEGHENY CASUALTY COMPANY

ONE NEWARK CENTER, 20TH FLOOR NEWARK, NEW JERSEY 07102-5207

KNOW ALL MEN BY THESE PRESENTS: That INTERNATIONAL FIDELITY INSURANCE COMPANY, a corporation organized and existing under the laws of the State of New Jersey, and ALLEGHENY CASUALTY COMPANY a corporation organized and existing under the laws of the State of Pennsylvania, having their principal office in the City of Newark, New Jersey, do hereby constitute and appoint

KEVIN E. VEGA, BRITTON CHRISTIANSEN, PHILIP E. VEGA, MYRNA SMITH

Covina, CA.

their true and lawful attorney(s)-in-fact to execute, seal and deliver for and on its behalf as surety, any and all bonds and undertakings, contracts of indemnity and other writings obligatory in the nature thereof, which are or may be allowed, required or permitted by law, statute, rule, regulation, contract or otherwise, and the execution of such instrument(s) in pursuance of these presents, shall be as binding upon the said INTERNATIONAL FIDELITY INSURANCE COMPANY and ALLEGHENY CASUALTY COMPANY, as fully and amply, to all intents and purposes, as if the same had been duly executed and acknowledged by their regularly elected officers at their principal offices.

This Power of Attorney is executed, and may be revoked, pursuant to and by authority of the By-Laws of INTERNATIONAL FIDELITY INSURANCE COMPANY and ALLEGHENY CASUALTY COMPANY and is granted under and by authority of the following resolution adopted by the Board of Directors of INTERNATIONAL FIDELITY INSURANCE COMPANY at a meeting duly held on the 20th day of July, 2010 and by the Board of Directors of ALLEGHENY CASUALTY COMPANY at a meeting duly held on the 15th day of August, 2000:

"RESOLVED, that (1) the President, Vice President, Executive Vice President or Secretary of the Corporation shall have the power to appoint, and to revoke the appointments of, Attorneys-in-Fact or agents with power and authority as defined or limited in their respective powers of attorney, and to execute on behalf of the Corporation and affix the Corporation's seal thereto, bonds, undertakings, recognizances, contracts of indemnity and other written obligations in the nature thereof or related thereto; and (2) any such Officers of the Corporation may appoint and revoke the appointments of joint-control custodians, agents for acceptance of process, and Attorneys-in-fact with authority to execute waivers and consents on behalf of the Corporation; and (3) the signature of any such Officer of the Corporation and the Corporation's seal may be affixed by facsimile to any power of attorney or certification given for the execution of any bond, undertaking, recognizance, contract of indemnity or other written obligation in the nature thereof or related thereto, such signature and seals when so used whether heretofore or hereafter, being hereby adopted by the Corporation as the original signature of such officer and the original seal of the Corporation, to be valid and binding upon the Corporation with the same force and effect as though manually affixed."

IN WITNESS WHEREOF, INTERNATIONAL FIDELITY INSURANCE COMPANY and ALLEGHENY CASUALTY COMPANY have each executed and attested these presents on this 22nd day of July, 2014.

INTERNATIONAL FIDELITY INSURANCE COMPANY CORPORATE SEAL 1904 NEW JERSEY

STATE OF NEW JERSEY
County of Essex

ROBERT W. MINSTER
Executive Vice President/Chief Operating Officer
(International Fidelity Insurance Company)
and President (Allegheny Casualty Company)

ALLEGHENY CASUALTY COMPANY 1936 PENNSYLVANIA

On this 22nd day of July 2014, before me came the individual who executed the preceding instrument, to me personally known, and, being by me duly sworn, said he is the therein described and authorized officer of INTERNATIONAL FIDELITY INSURANCE COMPANY and ALLEGHENY CASUALTY COMPANY; that the seals affixed to said instrument are the Corporate Seals of said Companies; that the said Corporate Seals and his signature were duly affixed by order of the Boards of Directors of said Companies.

IN TESTIMONY WHEREOF, I have hereunto set my hand affixed my Official Seal, at the City of Newark, New Jersey the day and year first above written.

CATHY VAZQUEZ NOTARY PUBLIC STATE OF NEW JERSEY

A NOTARY PUBLIC OF NEW JERSEY
My Commission Expires April 16, 2019

CERTIFICATION

I, the undersigned officer of INTERNATIONAL FIDELITY INSURANCE COMPANY and ALLEGHENY CASUALTY COMPANY do hereby certify that I have compared the foregoing copy of the Power of Attorney and affidavit, and the copy of the Sections of the By-Laws of said Companies as set forth in said Power of Attorney, with the originals on file in the home office of said companies, and that the same are correct transcripts thereof, and of the whole of the said originals, and that the said Power of Attorney has not been revoked and is now in full force and effect.

IN TESTIMONY WHEREOF, I have hereunto set my hand this 7TH day of SEPTEMBER, 2017

MARIA BRANCO, Assistant Secretary

California All-Purpose Certificate of Acknowledgment

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 Orange } s.s.

On 09/18/17 before me, Jinjoo Choi, Notary Public,
Name of Notary Public, Title

personally appeared Dongwook Seo
Name of Signer (1)

_____
Name of Signer (2)

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.

_____ Seal
Signature of Notary Public

OPTIONAL INFORMATION

Although the information in this section is not required by law, it could prevent fraudulent removal and reattachment of this acknowledgment to an unauthorized document and may prove useful to persons relying on the attached document.

Description of Attached Document

The preceding Certificate of Acknowledgment is attached to a document titled/for the purpose of _____,

containing _____ pages, and dated _____.

The signer(s) capacity or authority is/are as:

- ☐ Individual(s)
- ☐ Attorney-in-fact
- ☐ Corporate Officer(s) _____
  Title(s)
- ☐ Guardian/Conservator
- ☐ Partner - Limited/General
- ☐ Trustee(s)
- ☐ Other: _____

representing: _____
Name(s) of Person(s) or Entity(ies)

Additional Information

Method of Signer Identification

Proved to me on the basis of satisfactory evidence:

☐ form(s) of identification ☐ credible witness(es)

Notarial event is detailed in notary journal on:

Page # _____ Entry # _____

Notary contact: _____

Other

☐ Additional Signer ☐ Signer(s) Thumbprints(s)

☐ _____

Haus Construction, Inc
Low Bidder #1
17-J-01

BIDDER: _____

1. **County/State-funded Projects – Normal Working Hours** (7:00am to 5:00pm Monday through Friday)

Zero point nine zero five five
(Written in Words)

0	■	9	0	5	5

(Specify to four (4) decimal places)

2. **County/State-funded Projects – Other Than Normal Working Hours** (5:00pm to 7:00am Monday through Friday, and all day Saturday, Sunday, and Holidays)

Zero point nine five seven five
(Written in Words)

0	■	9	5	7	5

(Specify to four (4) decimal places)

3. **Federally-funded Projects – Normal Working Hours** (7:00am to 5:00pm Monday through Friday)

Zero point nine zero five five
(Written in Words)

0	■	9	0	5	5

(Specify to four (4) decimal places)

4. **Federally-funded Projects – Other Than Normal Working Hours** (5:00pm to 7:00am Monday through Friday, and all day Saturday, Sunday, and Holidays)

Zero point nine five seven five
(Written in Words)

0	■	9	5	7	5

(Specify to four (4) decimal places)

5. **County/State-funded Projects in Secure Facilities – Normal Working Hours** (7:00am to 5:00pm Monday through Friday)

Zero point nine zero five five
(Written in Words)

0	■	9	0	5	5

(Specify to four (4) decimal places)

6. **County/State-funded Projects in Secure Facilities – Other Than Normal Working Hours** (5:00pm to 7:00am Monday through Friday, and all day Saturday, Sunday, and Holidays)

Zero point nine five seven five
(Written in Words)

0	■	9	5	7	5

(Specify to four (4) decimal places)

Acknowledgement of Addendum:			
Addendum No._____	Dated _____	Addendum No._____	Dated _____
Addendum No._____	Dated _____	Addendum No._____	Dated _____

Award Criteria Figure

Instructions To Bidder: Specify lines 1 through 13 to four (4) decimal places. Use conventional rounding methodology (i.e., if the number in the 5th decimal place is 0-4, the number in the 4th decimal remains unchanged; if the number in the 5th decimal place is 5-9, the number in the 4th decimal is rounded upward).

Line 1.	**County/State-funded Projects – Normal Working Hours**	1. 0.9055	
Line 2.	Multiply Line 1 by 50%		2. 0.4528
Line 3.	**County/State-funded Projects – Other Than Normal Working Hours**	3. 0.9575	
Line 4.	Multiply Line 3 by 15%		4. 0.1436
Line 5.	**Federally-funded Projects – Normal Working Hours**	5. 0.9055	
Line 6.	Multiply Line 5 by 5%		6. 0.0453
Line 7.	**Federally-funded Projects – Other Than Normal Working Hours**	7. 0.9575	
Line 8.	Multiply Line 7 by 5%		8. 0.0479
Line 9.	**County/State-funded Projects in Secure Facilities – Normal Working Hours**	9. 0.9055	
Line 10.	Multiply Line 9 by 15%		10. 0.1358
Line 11.	**County/State-funded Projects in Secure Facilities – Other Than Normal Working Hours**	11. .9575	
Line 12.	Multiply Line 11 by 10%		12. 0.0958
Line 13.	Add Lines 2, 4, 6, 8, 10 and 12 This is the Award Criteria Figure:		0.9212

Transfer the number on Line 13 to the space provided below constituting the Bidder's Award Criteria Figure. Transfer the number and write the words.

Award Criteria Figure

Zero point nine two one two	0 . 9 2 1 2
(Written in Words)	(Specify to four (4) decimal places)

The weights in lines 2, 4, 6, 8, 10, and 12 above are for the purpose of calculating the Award Criteria Figure only. No assurances are made by the Owner that Work will be ordered under the Contract in a distribution consistent with the weighted percentages above. The Award Criteria Figure is only used for the purpose of determining the lowest Bidder. When submitting Work Order Price Proposals related to specific Work Orders, the Contractor shall utilize one or more of the Adjustment Factors applicable to the Work being performed provided in items in 1, 3, 5, 7, 9, and 11 on the Schedule of Adjustment Factors above, as applicable.

The Owner Reserves The Right To Revise All Arithmetic Errors In the Calculation of the Award Criteria Figure For Correctness.

END OF PROPOSAL FORM

END OF SECTION

BID SECURITY FORM

CONTRACT: JOB ORDER CONTRACTS

CONTRACT: #17-J-01, 17-J-02, 17J-03, Class B

Accompanying this proposal is security (check one only) in amount equal to $25,000.00:

Bid Bond (x); Certified Check ( ); Cashier's Check ( ); Cash ($_____)

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

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

FIRM NAME Haus Construction, Inc. 1401 Fulton Street, Suite 611, Fresno, CA 93721

Marc Kerkochian, CEO/President/Secretary/Treasurer

State of California

Licensed in accordance with an act providing for the registration of Contractors,

Class B License No. 1012660 Expires 4/30/2018

Department of Industrial Relations Registration No: 1000040312

Signature of Bidder

July 27, 2017
Dated

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

BUSINESS ADDRESS: 1401 Fulton Street, Fresno, CA 93721
Zip Code

MAILING ADDRESS: P O Box 6139, Fresno, CA 93703
Zip Code

BUSINESS PHONE: (559) 233-2225 FAX NUMBER: (559) 233-2850

EMAIL: marc@hausconstructioninc.co

END OF SECTION

CONTRACT: JOB ORDER CONTRACTS

CONTRACT: 17-J-01, 17-J-02, 17-J-03, Class B

To the Board of Supervisors, County of Fresno:

N O N C O L L U S I O N A F F I D A V I T

TO BE EXECUTED BY BIDDER AND **SUBMITTED WITH EACH BID** *

Marc Kerkochian
(Printed or Typed Name)

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

CEO/President
(Owner, Partner, Corporate Officer (list title), Co-Venturer)

of Haus Construction, Inc.
(Bidding Entity)

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

(Signature) July 27, 2017
(Dated)

(Title 23 United States Code Section 112)

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

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

END OF SECTION

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CONTRACT: JOB ORDER CONTRACT

CONTRACT NO: #17-J-01, 17-J-02, 17-J-03, Class B

(This guaranty shall be executed by the successful bidder in accordance with Section 2.32 of the General Conditions. The bidder may execute the guaranty on this page at the time of submitting the 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 each individual Work Order Detailed Scope of Work and specifications, due to any of the above causes, all within twelve (12) months after the date on which the Work Order under 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.

Haus Construction, Inc.
(Company)

By: _____

Marc Kerkochian CEO/President
(Title)

Date: July 27, 2017

END OF SECTION

North American Specialty Insurance Company

Manchester, New Hampshire 03101

BID BOND

KNOW ALL MEN BY THESE PRESENTS, That We, HAUS CONSTRUCTION, INC.

of PO Box 6139, Fresno, CA 93703, as Principal, and North American Specialty Insurance Company, of Manchester, New Hampshire, as Surety, a New Hampshire corporation duly licensed to do business in the State of California are held and firmly bound unto COUNTY OF FRESNO, DEPARTMENT OF PUBLIC WORKS AND PLANNING, as Obligee, in the penal sum of **TEN PERCENT (10%) OF AMOUNT BID** Dollars ($ **10%**), for the payment of which the Principal and the Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, That, whereas the Principal has submitted, or is about to submit, a proposal or a bid to the Obligee on a contract for

Job Order Contract

Contract #'s 17-J-01, Class B 17-J-02 17-J-03

NOW, THEREFORE, if the aforesaid principal shall be awarded the contract, the said principal will within the period specified therefore, or, if no period be specified, within ten (10) days after the notice of such award into a contract and give bond for the faithful performance of the contract, then this obligation shall be null and void, otherwise the principal and the surety will pay unto the obligee the difference in money between the amount of the bid of said principal and the amount for which the obligee may legally contract with another party to perform the work if the latter amount be in excess of the former; in no event shall the liability hereunder exceed the penal sum hereof.

PROVIDED AND SUBJECT OF THE CONDITION PRECEDENT, that any suits at law or proceedings in equity brought or to be brought against the Surety to recover any claim hereunder must be instituted and serviced upon the Surety within ninety (90) days after the acceptance of said bid of the Principal by the Obligee.

Any person who, with the intent to defraud or knowing that he is facilitating a fraud against an insurer, submits an application or files a claim containing a false or deceptive statement is guilty of insurance fraud.

SIGNED , SEALED AND DATED this 10th day of July, 2017

ADDRESS ALL CORRESPONDENCE TO:

North American Specialty Ins. Co.
701 S. Parker St. Suite 3800
Orange, CA 92868

HAUS CONSTRUCTION, INC.
Principal

By:

North American Specialty Insurance Company

By:
Karen Amin, Attorney-in-Fact

BND 140 S REV (05/95)

ACKNOWLEDGMENT

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 San Joaquin)

On July 10, 2017 before me, Jennifer Loper, Notary Public
(insert name and title of the officer)

personally appeared Karen Amin,
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 Jennifer Loper (Seal)

TCB2 JENNIFER LOPER TCB2
COMM. #2177989
NOTARY PUBLIC - CALIFORNIA
SAN JOAQUIN COUNTY
My Comm. Expires JAN 27, 2021

NAS SURETY GROUP

NORTH AMERICAN SPECIALTY INSURANCE COMPANY
WASHINGTON INTERNATIONAL INSURANCE COMPANY

GENERAL POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS, THAT North American Specialty Insurance Company, a corporation duly organized and existing under laws of the State of New Hampshire, and having its principal office in the City of Manchester, New Hampshire, and Washington International Insurance Company, a corporation organized and existing under the laws of the State of New Hampshire and having its principal office in the City of Schaumburg, Illinois, each does hereby make, constitute and appoint:

DANIEL M. CONNOLLY, DAVID SCHNAPP, KAREN AMIN,
and JENNIFER LOPER
JOINTLY OR SEVERALLY

Its true and lawful Attorney(s)-in-Fact, to make, execute, seal and deliver, for and on its behalf and as its act and deed, bonds or other writings obligatory in the nature of a bond on behalf of each of said Companies, as surety, on contracts of suretyship as are or may be required or permitted by law, regulation, contract or otherwise, provided that no bond or undertaking or contract or suretyship executed under this authority shall exceed the amount of:

FIFTY MILLION ($50,000,000.00) DOLLARS

This Power of Attorney is granted and is signed by facsimile under and by the authority of the following Resolutions adopted by the Boards of Directors of both North American Specialty Insurance Company and Washington International Insurance Company at meetings duly called and held on the 9th of May, 2012:

"RESOLVED, that any two of the Presidents, any Managing Director, any Senior Vice President, any Vice President, any Assistant Vice President, the Secretary or any Assistant Secretary be, and each or any of them hereby is authorized to execute a Power of Attorney qualifying the attorney named in the given Power of Attorney to execute on behalf of the Company bonds, undertakings and all contracts of surety, and that each or any of them hereby is authorized to attest to the execution of any such Power of Attorney and to attach therein the seal of the Company; and it is

FURTHER RESOLVED, that the signature of such officers and the seal of the Company may be affixed to any such Power of Attorney or to any certificate relating thereto by facsimile, and any such Power of Attorney or certificate bearing such facsimile signatures or facsimile seal shall be binding upon the Company when so affixed and in the future with regard to any bond, undertaking or contract of surety to which it is attached."

NORTH AMERICAN SPECIALTY INSURANCE COMPANY CORPORATE SEAL 1973 NEW HAMPSHIRE

By _____
Steven P. Anderson, Senior Vice President of Washington International Insurance Company
& Senior Vice President of North American Specialty Insurance Company

By _____
Michael A. Ito, Senior Vice President of Washington International Insurance Company
& Senior Vice President of North American Specialty Insurance Company

WASHINGTON INTERNATIONAL INSURANCE COMPANY CORPORATE SEAL NEW HAMPSHIRE

IN WITNESS WHEREOF, North American Specialty Insurance Company and Washington International Insurance Company have caused their official seals to be hereunto affixed, and these presents to be signed by their authorized officers this 24th day of June, 2015.

North American Specialty Insurance Company
Washington International Insurance Company

State of Illinois
County of Cook ss:

On this 24th day of June, 2015, before me, a Notary Public personally appeared Steven P. Anderson, Senior Vice President of Washington International Insurance Company and Senior Vice President of North American Specialty Insurance Company and Michael A. Ito, Senior Vice President of Washington International Insurance Company and Senior Vice President of North American Specialty Insurance Company, personally known to me, who being by me duly sworn, acknowledged that they signed the above Power of Attorney as officers of and acknowledged said instrument to be the voluntary act and deed of their respective companies.

OFFICIAL SEAL
M KENNY
NOTARY PUBLIC, STATE OF ILLINOIS
MY COMMISSION EXPIRES 12/04/2017

M. Kenny, Notary Public

I, Jeffrey Goldberg, the duly elected Assistant Secretary of North American Specialty Insurance Company and Washington International Insurance Company, do hereby certify that the above and foregoing is a true and correct copy of a Power of Attorney given by said North American Specialty Insurance Company and Washington International Insurance Company, which is still in full force and effect.

IN WITNESS WHEREOF, I have set my hand and affixed the seals of the Companies this 10th day of July, 2017.

Jeffrey Goldberg, Vice President & Assistant Secretary of
Washington International Insurance Company & North American Specialty Insurance Company

STATE OF CALIFORNIA
dca
DEPARTMENT OF CONSUMER AFFAIRS

CONTRACTORS
STATE LICENSE BOARD
ACTIVE LICENSE

License Number **1012660** Entity CORP

Business Name HAUS CONSTRUCTION INC

Classification(s) B

Expiration Date 04/30/2018 www.cslb.ca.gov