

## Appendix F. Design Specifications

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**SECTION 00 01 15**  
**LIST OF DRAWINGS**

**PART 1 GENERAL**

**1.1 SUMMARY**

This section lists the design drawings for the project.

**1.2 CONTRACT DRAWINGS**

Contract Drawings are as follows:

<b>Drawing No.</b>	<b>Revision No.</b>	<b>Title</b>
1	0	Title Sheet
2	0	Work Area Location Map
3	0	Well Abandonment Plan and Details
4	0	Waste Removal Area Plan and Sections A and B
5	0	Waste Consolidation Plan and Sections C and D
6	0	Final Grading Plan and Sections E and F
7	0	Landfill Cover Design Details
8	0	Surface Water Control System Plan and Details
9	0	Landfill Gas Collection System Plan and Details
10	0	Perimeter Gas Monitoring Network Plan and Details
11	0	French Drain Layout Plan and Details

**PART 2 PRODUCTS**

Not used.

**PART 3 EXECUTION**

Not used.

**END OF SECTION**

**SECTION 01 11 00**  
**SUMMARY OF WORK**

**PART 1 GENERAL**

**1.1 PROJECT DESCRIPTION**

The work includes preparation of a remedial action work plan (RAWP), site preparation, excavation of waste above the sewer line, excavation of the top layer of the existing cover, waste consolidation, placement and compaction of a foundation layer, installation of a geomembrane liner, excavation and placement of native soil in a drainage layer, installation of a geocomposite layer, excavation and placement of native soil in a vegetative layer, final grading and construction of stormwater drainage and infiltration systems, installation of a French drain, installation of gas vents and protective structures, installation of a perimeter landfill gas monitoring network, revegetation of the final cover, and incidental related work.

The work is being performed under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

This contract implements the selected remedial action documented in the Record of Decision (ROD) issued by the U.S. Department of Agriculture Forest Service (Forest Service) in November 2007.

**1.2 LOCATION**

The work will be located at Meyers Landfill, El Dorado County, California, as shown on the drawings.

**1.3 SUBMITTALS**

**1.3.1 SD-01 Preconstruction Submittals**

Submit the RAWP; G

- a. Site history, project scope, key personnel, remedial activities and work requirements.
- b. Detailed Construction Schedule, including sequence of construction
- c. Site Health and Safety Plan
- d. Stormwater Pollution Prevention Plan
- e. Air Pollution Prevention Plan
- f. Traffic Control Plan
- g. Decontamination Plan
- h. Noise Control Plan
- i. Spill Control Plan

- j. Waste Management Plan
- k. Contaminant Prevention Plan
- l. Resource Protection Plan
- m. Contingency Plan
- n. Quality Control (QC) Plan
- o. Winterization Plan
- p. Sewer Line Damage Contingency Plan
- q. Excavation Protection Plan
- r. Dewatering Plan

1.3.2 SD-11 Closeout Submittals

Submit the After Action Report; G

- a. As-built drawings
- b. As-built Operations Monitoring and Maintenance Plan

1.4 CONTRACTOR ACCESS AND USE OF PREMISES

1.4.1 Working Hours

Regular working hours shall consist of a period established by the Forest Service between 6:00 a.m. and 6:00 p.m., Monday through Saturday.

1.4.2 Work Outside Regular Hours

Work outside regular working hours requires Government approval. During periods of darkness, work shall be lighted in a manner approved by the Government.

1.4.3 Unauthorized Access

Ensure that unauthorized personnel do not have access to the area during the construction period.

1.5 UNDERGROUND FACILITIES

Contact Underground Service Alert 48-hours prior to performing any excavation work. Through a private utility locating service, verify the locations of all utilities that may be present. Scan the construction site boundaries with electromagnetic or sonic equipment and determine where utilities enter areas of proposed construction. Mark the surface of the ground where existing underground utilities are discovered. Verify the location and elevation of existing piping, utilities, and other types of underground obstructions not indicated but discovered during scanning. Protect all utilities encountered during construction.

1.6 SCHEDULE

Contractor shall anticipate suspending all construction activities between approximately October 15 and April 15 due to wet weather conditions.

1.7 DELAYS

Notify the Client of delays or changes in construction schedule within 48 hours. Cessation of construction activities resulting from delays shall not constitute the release of Contractor's responsibility to maintain a tidy, secured, and protected site. In such cases, Contractor shall protect all surfaces from erosion and all materials from degradation. When construction activities resume, Contractor shall return grades and installed items to their condition before construction ceased.

1.8 REMEDIAL ACTION WORK PLAN

Contractor shall prepare a RAWP describing the proposed implementation of construction in accordance with the requirements contained in the Remedial Design and include the items listed in paragraph 1.3.1.

1.9 AFTER ACTION REPORT

Contractor shall prepare an After Action Report, including as-built drawings, construction QC documentation, and an as-built Operations Monitoring and Maintenance Plan.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

**SECTION 01 33 00**  
**SUBMITTAL PROCEDURES****PART 1 GENERAL****1.1 DEFINITIONS****1.1.1 Submittal**

Shop Drawings, product data, samples, and administrative submittals presented for review and approval. Contract Clauses “FAR 52.236-5, Material and Workmanship,” paragraph (b) and “FAR 52.236-21, Specifications and Drawings for Construction,” paragraphs (d), (e), and (f) apply to all “submittals.”

**1.1.2 Types of Submittals**

All submittals are classified as indicated in paragraph 1.2, Schedule of Submittal Descriptions. The submittals also are grouped as follows:

- a. Shop Drawings: As used in this section, Drawings, schedules, diagrams, and other data prepared specifically for this Contract, by the Contractor, or through the Contractor by way of a subcontractor, manufacturer, supplier, distributor, or other lower-tier contractor, to illustrate a portion of the work.
- b. Product data: Preprinted material such as illustrations, standard schedules, performance charts, instructions, brochures, diagrams, manufacturer’s descriptive literature, catalog data, and other data to illustrate a portion of the work, but not prepared exclusively for this Contract.
- c. Samples: Physical examples of products, materials, equipment, assemblies, or workmanship that are physically identical to a portion of the work illustrate a portion of the work, or establish standards for evaluating the appearance of the finished work or both.
- d. Administrative submittals: Data presented for review and approval to ensure that the administrative requirements of the project are adequately met but not to ensure directly that the work is in accordance with the design concept and in compliance with the Contract documents.

**1.2 SCHEDULE OF SUBMITTAL DESCRIPTIONS (SD)****1.2.1 SD-01, Preconstruction Submittals**

- a. Certificates of insurance
- b. Surety bonds
- c. List of proposed products
- e. RAWP, including the following:

1. Work Plan
2. Health and Safety Plan
3. Site Health and Safety Plan
4. Stormwater Pollution Protection Plan
5. Air Pollution Prevention Plan
6. Traffic Control Plan
7. Decontamination Plan
8. Noise Control Plan
9. Spill Control Plan
10. Waste Management Plan
11. Contaminant Prevention Plan
12. Resource Protection Plan
13. Contingency Plan
14. Quality Control (QC) Plan
15. Winterization Plan
16. Sewer Line Damage Contingency Plan
17. Excavation Protection Plan
18. Dewatering Plan

#### 1.2.2 SD-02, Shop Drawings

Drawings, diagrams, and schedules specifically prepared to illustrate some portion of the work.

Diagrams and instructions from a manufacturer or fabricator for use in producing the product and as aids to the contractor for integrating the product or system into the project.

Drawings prepared by or for the contractor to show how multiple systems and interdisciplinary work will be coordinated.

#### 1.2.3 SD-03, Product Data

Catalog cuts, illustrations, schedules, diagrams, performance charts, instructions, and brochures illustrating size, physical appearance, and other characteristics of materials or equipment for some portion of the work.

Samples of warranty language when the contract requires extended product warranties.



#### 1.2.4 SD-04, Samples

Physical examples of materials, equipment, or workmanship that illustrate functional and aesthetic characteristics of a material or product and establish standards that can be used to judge the work.

#### 1.2.5 SD-05, Design Data

Calculations, mix designs, analyses, or other data pertaining to a part of the work.

#### 1.2.6 SD-06, Test Reports

Report signed by authorized official of testing laboratory that a material, product, or system identical to the material, product, or system to be provided has been tested in accord with specified requirements. (Testing must have occurred within 3 years of the date of contract award for the project.)

Report that includes findings of a test required to be performed by the Contractor on an actual portion of the work or prototype prepared for the project before shipment to the job site.

Report that includes finding of a test made at the job site or on a sample taken from the job site, on a portion of work during or after installation.

- Investigation reports
- Daily checklists

#### 1.2.7 SD-07, Certificates

Statements signed by responsible officials of the manufacturer of the product, system, or material attesting that the product, system, or material meets the specification requirements. Must be dated after award of the project contract and clearly name the project.

Document required of the Contractor, or of a supplier, installer, or subcontractor through the Contractor, the purpose of which is to further the quality of orderly progression of a portion of the work by documenting procedures, acceptability of methods, or personnel qualifications.

Confined space entry permits.

#### 1.2.8 SD-08, Manufacturer's Instructions

Preprinted material describing the installation of a product, system, or material, including special notices and Material Safety Data Sheets concerning impedances, hazards, and safety precautions.

1.2.9 SD-09, Manufacturer’s Field Reports

Documentation of the testing and verification of actions taken by the manufacturer’s representative to confirm compliance with the manufacturer’s standards or instructions.

Factory test reports.

1.2.10 SD-10, Operation and Maintenance Data

Data intended to be incorporated in operations and maintenance manuals.

1.2.11 SD-11, Closeout Submittals

Documentation to record compliance with technical or administrative requirements or to establish an administrative mechanism.

- a. As-built After Action Report, including As-built drawings and As-built Operations, Maintenance and Monitoring Plan

1.2.12 Approving Authority

The person authorized to approve a submittal.

1.2.13 Work

As used in this section, on- and off-site construction required by the Contract documents, including labor necessary to produce the construction and materials, products, equipment, and systems incorporated or to be incorporated in such construction.

1.3 SUBMITTALS

Submit the following in accordance with the requirements of this section.

1.3.1 SD-11, Closeout Submittals

- a. Submittal register

1.4 USE OF SUBMITTAL REGISTER

Prepare and maintain a submittal register as work progresses. Use the submittal register provided at the end of the specification section or in any other format.

1.4.1 Submittal Register

Submit with the quality control plan and the project schedule required by [Section 01 45 00 Quality Control](#). Verify that all submittals required for the project are listed and add missing submittals.

## 1.5 PROCEDURES FOR SUBMITTALS

### 1.5.1 Reviewing, Certifying, Approving Authority

The QC Manager, in accordance with [Section 01 45 00 Quality Control](#), shall be responsible for reviewing and certifying that submittals are in compliance with contract requirements. The approving authority on submittals is the QC Manager unless otherwise specified for the specific submittal. At each “Submittal” paragraph in the individual specification sections, the notation “G” following a submittal item indicates that the Government is the approving authority.

### 1.5.2 Scheduling

- a. Coordinate scheduling, sequencing, preparing, and processing of submittals with performance of the work so that work will not be delayed by submittal processing. Allow for potential requirements to resubmit.
- b. Except as specified otherwise, allow a review period, beginning with receipt by the approving authority, that includes at least 15 working days for submittals for QC Manager approval and 20 working days for submittals for Government approval. The period of review for submittals with Government approval begins when the Government receives the submittal from the QC Manager. The period of review for each resubmittal is the same as for the initial submittal.

### 1.5.3 Variations

Variations from contract requirements require Government approval pursuant to Contract Clause “FAR 52.236-21, Specifications and Drawings for Construction,” and will be considered where advantageous to the Government.

When proposing a variation, submit a written request, with documentation of the nature and features of the variation and an explanation why the variation is desirable and beneficial to the Government. If lower cost is a benefit, also include an estimate of the cost saving. Identify the proposed variation separately and include documentation for the proposed variation along with the required submittal for the item.

### 1.5.4 Contractor’s Responsibilities

- a. Determine and verify field measurements, materials, field construction criteria; review each submittal; and check and coordinate each submittal with requirements of the work and Contract documents.
- b. Transmit submittals to the QC Manager in orderly sequence; in accordance with the approved submittal register; and to prevent delays in the work, delays to the Government, or delays to separate contractors.
- c. Advise the Government of variations, as required by paragraph 1.5.3, Variations.

- d. Correct and resubmit submittal as directed by the approving authority. When resubmitting disapproved transmittals or transmittals noted for resubmittal, the Contractor shall provide a copy of the transmittal submitted previously, including all reviewer comments, for use by the approving authority. Direct specific attention, in writing or on resubmitted submittal, to revisions not requested by the approving authority on previous submissions.
- e. Complete work that must be accomplished as a basis of a submittal in time to allow the submittal to occur as scheduled.
- f. Ensure no work has begun until submittals for that work have been returned as “approved,” or “approved as noted” or “approved except as noted; resubmission not required,” except to the extent that a portion of the work must be accomplished as a basis for the submittal.

## 1.6 FORMAT OF SUBMITTALS

### 1.6.1 Transmittal Form

Each submittal must be accompanied by a transmittal form that includes signed certifications by the QC Manager confirming that the submittal meets project drawings and specifications and whether it is approved for use or rejected.

### 1.6.2 Identifying Submittals

Identify submittals, except sample panel and sample installation, with the following information permanently adhered to or noted on each separate component of each submittal and noted on the transmittal form. Mark each copy of each submittal identically, with the following:

- a. Project title and location.
- b. Construction Contract number.
- c. The section number of the specification section by which the submittal is required.
- d. The name, address, and telephone number of the subcontractor, supplier, manufacturer, and any other second-tier contractor associated with the submittal.
- e. Product identification and location in project.

## PART 2 PRODUCTS

Not used.

## PART 3 EXECUTION

Not used.

**SUBMITTAL REGISTER (PART A)**

CONTRACT NO: \_\_\_\_\_ PROJECT TITLE: Meyers Landfill Operable Unit 1

<b>SPEC SECTION NO. (a)</b>	<b>SD NO &amp; TYPE OF SUBMITTAL-MATL OR PRODUCT (b)</b>	<b>SPEC PARAGRAPH (c)</b>	<b>APPROVAL REQUIRED (d)</b>
01 11 00	SD-01, PRECONSTRUCTION SUBMITTAL a. Remedial Action Work Plan (RAWP)	1.8	G
01 11 00	SD-11, CLOSEOUT SUBMITTALS a. After Action Report	1.9	G
01 33 00	SD-11, CLOSEOUT SUBMITTALS a. Submittal register	1.4.1	
01 35 29	SD-01, PRECONSTRUCTION SUBMITTALS a. Site Health and Safety Plan (included in RAWP)	1.7	
01 35 29	SD-06 REPORTS a. Accident Reports	1.12.1	
01 35 29	SD-07 CERTIFICATES a. Hot work permit	1.12.2	
01 45 00	SD-01, PRECONSTRUCTION SUBMITTAL a. Quality Control (QC) Plan (included in RAWP)	1.6	G
01 45 00	SD-07, CERTIFICATES a. Resume of the QC Manager (included in QC Plan)	1.5.1	G
01 45 00	SD-07, CERTIFICATES b. Completion Certification (signed by QC Manager)	1.11.2	G
01 50 00	SD-01, PRECONSTRUCTION SUBMITTAL a. Traffic Control Plan (included in RAWP)	1.3	G
01 50 00	SD-02, DRAWINGS a. Construction site plan (included in RAWP)	1.4	G
01 57 19	SD-01, PRECONSTRUCTION SUBMITTALS a. Stormwater Pollution Prevention Plan (included in RAWP)	1.6	G
01 77 00	SD-03, PRODUCT DATA a. Warranty Data	1.4.1	
01 77 00	SD-03, PRODUCT DATA b. Spare Parts Data	1.3	
01 77 00	SD-10, OPERATIONS AND MAINTENANCE DATA a. Operation and Maintenance Manuals	1.5	G
01 77 00	SD-11, CLOSEOUT SUBMITTALS a. As built drawings (included in After Action Report)	1.2.1	G
01 77 00	SD-11, CLOSEOUT SUBMITTALS b. As built operations, maintenance, and monitoring plan (included in After Action Report)	1.2.2	G

<b>SPEC SECTION NO. (a)</b>	<b>SD NO &amp; TYPE OF SUBMITTAL-MATL OR PRODUCT (b)</b>	<b>SPEC PARAGRAPH (c)</b>	<b>APPROVAL REQUIRED (d)</b>
01 77 00	SD-11, CLOSEOUT SUBMITTALS c. As built record of materials and equipment	1.2.3	
01 77 00	SD-11, CLOSEOUT SUBMITTALS d. Warranty list	1.4.1	
02 56 13	SD-02, DRAWINGS a. Installation layout drawings	1.3.1	
02 56 13	SD-03 PRODUCT DATA a. Material warranties	1.3.2	
02 56 13	SD-03 PRODUCT DATA b. Recycled polymer statement	1.3.2	
02 56 13	SD-03 PRODUCT DATA c. Installer's geosynthetic field installation quality assurance plan	1.3.2	
02 56 13	SD-07 CERTIFICATES a. Installer's qualifications statement	1.3.3	
02 56 13	SD-11 CLOSEOUT SUBMITTALS a. As built drawings for geomembrane placement	1.3.4	
02 56 13	SD-11 CLOSEOUT SUBMITTALS b. Geomembrane installation certificate (signed by installer and QC Manager)	1.3.4	
02 61 13	SD-01, PRECONSTRUCTION SUBMITTAL a. Remedial Action Work Plan (RAWP)	1.2.1	G
02 61 13	SD-06, TEST REPORTS a. Confirmation sampling and analysis	3.4	
02 61 13	SD-11, CLOSEOUT SUBMITTALS a. After Action Report	3.10	
03 37 13	SD-06, TEST REPORTS a. Mixture proportions	1.4	G
03 37 13	SD-06, TEST REPORTS b. Aggregates	2.1.2, 3.7.2	G
03 37 13	SD-06, TEST REPORTS c. Strength tests	1.51, 3.72	G
03 37 13	SD-07, CERTIFICATES a. Synthetic (Polypropylene) Fiber Reinforcement	2.1.6.1	G
31 00 00	SD-06, FIELD TEST REPORTS a. Soil cover and foundation layer material tests	3.14	
31 00 00	SD-09, MANUFACTURER'S TEST REPORT a. Top soil analysis	3.12.2.1	G
31 00 00	SD-11, CLOSEOUT SUBMITTALS a. Final soil cover survey with As-Built Drawings	3.1.5.1	

<b>SPEC SECTION NO. (a)</b>	<b>SD NO &amp; TYPE OF SUBMITTAL-MATL OR PRODUCT (b)</b>	<b>SPEC PARAGRAPH (c)</b>	<b>APPROVAL REQUIRED (d)</b>
31 00 00	SD-11, CLOSEOUT SUBMITTALS b. Survey information on permanent local site monuments	3.1.5.2	
31 05 20	SD-03, PRODUCT DATA a. Geocomposite drainage layer properties	2.1	
31 05 20	SD-03, PRODUCT DATA b. Manufacturer's quality control manual	1.2.1	
31 05 20	SD-06, TEST REPORTS a. Manufacturing QC test results	2.2.1	
31 05 20	SD-07, CERTIFICATES a. Geocomposite certification	1.2.3, 2.1	
31 05 21	SD-02, SHOP DRAWINGS a. Installation drawings and instructions	3.1	
31 05 21	SD-02, SHOP DRAWINGS b. Sequencing and construction procedures	3.1, 3.2	
32 31 00	SD-02, DRAWINGS a. Warning sign b. Site Closure sign	2.1	G
32 31 13	SD-02, SHOP DRAWINGS a. Shop drawings for all chain link fence	1.2.1	
32 31 13	SD-03, PRODUCT DATA a. Manufactures catalog data for fence and gate hardware and accessories	2.0	
32 92 00	SD-01, PRECONSTRUCTION SUBMITTAL a. Vegetation Establishment Plan	1.2.1	
32 92 00	SD-07, CERTIFICATES a. Seed	2.1	G
32 92 00	SD-07, CERTIFICATES b. Mulch	2.2	G
32 92 00	SD-07, CERTIFICATES c. Binder	2.3	G
32 92 00	SD-07, CERTIFICATES d. Fertilizer	2.7.1	G
33 23 00	SD-03, MANUFACTURER'S CATALOGUE DATA a. Pipe	2.1, 2.2, 2.3	
33 23 00	SD-03, PRODUCT DATA b. Fittings	2.1, 2.2, 2.3	
33 23 00	SD-03, PRODUCT DATA c. Filter-pack	2.4	
33 23 00	SD-06, FIELD TEST REPORTS a. Post construction methane tests	3.6	
33 40 00	SD-03, PRODUCT DATA a. Manufacturer's product data and installation instructions for pipe and geotextile	2.1, 2.2, 2.5	

SPEC SECTION NO. (a)	SD NO & TYPE OF SUBMITTAL-MATL OR PRODUCT (b)	SPEC PARAGRAPH (c)	APPROVAL REQUIRED (d)
33 40 00	SD-06, TEST REPORTS a. Soil density tests	3.4.4, 3.4.5	
33 40 00	SD-07, CERTIFICATES a. Resin Certification	2.1.1	
33 40 01	SD-03, PRODUCT DATA a. Silt Fence Filter Fabric	2.1	
33 40 01	SD-03, PRODUCT DATA b. Erosion Control Wattles	2.2	
33 40 01	SD-07, Certificates a. Erosion Control Wattles	2.2	

G – Government Approval Required

END OF SECTION



**SECTION 01 35 29**  
**SAFETY AND OCCUPATIONAL HEALTH REQUIREMENTS**

**PART 1 GENERAL**

**1.1 REFERENCES**

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

**NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)**

NFPA 10 (2002) Portable Fire Extinguishers

NFPA 51B (2003) Fire Prevention during Welding, Cutting, and Other Hot Work

**U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)**

29 CFR 1910 Occupational Safety and Health Standards

29 CFR 1926 Safety and Health Regulations for Construction

**1.2 SUBMITTALS**

**1.2.1 SD-01 Preconstruction Submittals**

Site Health and Safety Plan (HASP shall be included as part of the RAWP submittal; also see [Section 01 11 00 Summary of Work](#)).

**1.2.2 SD-06 Reports**

a. Accident Reports

**1.2.3 SD-07 Certificates**

a. Hot work permit

**1.3 DEFINITIONS**

**High Visibility Accident:** Any mishap which may generate publicity and/or high visibility.

**Medical Treatment:** Treatment administered by a physician or by registered professional personnel under the standing orders of a physician. Medical treatment does not include first aid treatment even through provided by a physician or registered personnel.

**Recordable Injuries or Illnesses:** Any work-related injury or illness that results in:

1. Death, regardless of the time between the injury and death, or the length of the illness;
2. Days away from work (any time lost after day of injury/illness onset);
3. Restricted work;
4. Transfer to another job;
5. Medical treatment beyond first aid;
6. Loss of consciousness; or
7. A significant injury or illness diagnosed by a physician or other licensed health care professional, even if it did not result in 1 through 6 above.

#### 1.4 REGULATORY REQUIREMENTS

In addition to the detailed requirements included in the provisions of this contract, work performed shall comply with the federal, state, and local laws, ordinances, criteria, rules and regulations. Submit matters of interpretation of standards to the appropriate administrative agency for resolution before starting work. Where the requirements of this specification, applicable laws, criteria, ordinances, regulations, and referenced documents vary, the most stringent requirements shall apply.

#### 1.5 SITE QUALIFICATIONS, DUTIES AND MEETINGS

##### 1.5.1 Personnel Qualifications

Site Safety and Health Officer (SSHO) shall be provided at the work site at all times to perform safety and occupational health management, surveillance, inspections, and safety enforcement for the Contractor. The SSHO shall have a minimum of 3 years safety work and at least 5 years of experience on similar projects.

##### 1.5.2 Site Safety and Health Officer (SSHO)

- a. Conduct daily safety and health inspections and maintain a written log which includes area/operation inspected, date of inspection, identified hazards, recommended corrective actions, estimated and actual dates of corrections.
- b. Conduct mishap investigations and complete required reports. Maintain the OSHA Form 300 and Daily Production reports for prime and sub-contractors.
- c. Maintain applicable safety reference material on the job site.
- d. Attend periodic in-progress meetings.
- e. Maintain a safety and health deficiency tracking system that monitors outstanding deficiencies until resolution. A list of unresolved safety and health deficiencies shall be posted in the job trailer.

- f. Ensure compliance with safety and health requirements.
- g. Failure to perform the above duties will result in dismissal of the superintendent and SSHO, and a project work stoppage. The project work stoppage will remain in effect pending approval of a suitable replacement.

### 1.5.3 Safety Meetings

Minutes showing contract title, signatures of attendees and a list of topics discussed shall be attached to the Contractors' daily quality control report.

### 1.6 SITE SPECIFIC HEALTH AND SAFETY PLAN (HASP)

The Contractor shall use a qualified person to prepare the written site-specific HASP. Contractors are responsible for informing their subcontractors of the safety provisions under the terms of the contract and the penalties for noncompliance, coordinating the work to prevent one craft from interfering with or creating hazardous working conditions for other crafts, and inspecting subcontractor operations to ensure that accident prevention responsibilities are being carried out.

Once work begins, changes to the accepted HASP shall be made with the knowledge and concurrence of the Government, project superintendent, SSHO and quality control manager. Should any hazard become evident, stop work in the area, secure the area, and develop a plan to remove the hazard. Notify the Government within 24 hours of discovery. Eliminate and remove the hazard. In the interim, all necessary action shall be taken to restore and maintain safe working conditions in order to safeguard onsite personnel, visitors, the public (as defined by ANSI/ASSE A10.34,) and the environment.

The HASP shall be continuously reviewed and amended, as necessary, throughout the life of the project. Unusual or high-hazard activities not identified in the original HASP shall be incorporated in the plan as they are discovered.

The following shall be included in the HASP:

- a. Names and qualifications of all site safety and health personnel designated to perform work on this project to include the designated site safety and health officer and other competent and qualified personnel to be used. The duties of each position shall be specified.
- b. Qualifications of excavation competent persons.

### 1.7 ACTIVITY HAZARD ANALYSIS (AHA)

The analysis should be used during daily inspections to ensure the implementation and effectiveness of the activity's safety and health controls.

The AHA list will be reviewed monthly at the Contractor supervisory safety meeting and updated as necessary when procedures, scheduling, or hazards change.

The activity hazard analyses shall be developed using the project schedule as the basis for the activities performed. Any activities listed on the project schedule will require an AHA. The AHAs will be developed by the Contractor, supplier or subcontractor and provided to the prime contractor for inclusion in the HASP.

## 1.8 SITE SAFETY REFERENCE MATERIALS

Maintain safety-related references applicable to the project, including those listed in the article “References.” Maintain applicable equipment manufacturer’s manuals.

## 1.9 EMERGENCY MEDICAL TREATMENT

Contractors will arrange for their own emergency medical treatment. Government has no responsibility to provide emergency medical treatment.

## 1.10 REPORTS

### 1.10.1 Accident Reports and Notification

For recordable injuries and illnesses, and property damage accidents resulting in at least \$2,000 in damages, the Contractor shall conduct an accident investigation to establish the root cause(s) of the accident and complete an accident report within 5 calendar day(s) of the accident.

Notify the Government as soon as practical, but not later than four hours, after any accident meeting the definition of Recordable Injuries or Illnesses or High Visibility Accidents, property damage equal to or greater than \$2,000, or any weight handling equipment accident. Information shall include contractor name; contract title; type of contract; name of activity, installation or location where accident occurred; date and time of accident; names of personnel injured; extent of property damage, if any; extent of injury, if known, and brief description of accident (to include type of construction equipment used, PPE used, etc

### 1.10.2 Hot Work

Prior to performing any “Hot Work” (welding, cutting, etc.) or operating other flame-producing and spark-producing devices, a written permit shall be requested from the South Lake Tahoe Fire Department. **CONTRACTORS ARE REQUIRED TO MEET ALL CRITERIA BEFORE A PERMIT IS ISSUED.** The Contractor will provide at least two (2) twenty (20) pound 4A:20 BC rated extinguishers for normal “Hot Work”. All extinguishers shall be current inspection tagged, approved safety pin and tamper resistant seal. It is also mandatory to have a designated FIRE WATCH for any “Hot Work” done at this activity. The Fire Watch shall be trained in accordance with NFPA 51B and remain on-site for a minimum of 30 minutes after completion of the task or as specified on the hot work permit.

When starting work at the site, Contractors shall require their personnel to place in memory the emergency Fire Department phone number. ANY FIRE, NO MATTER HOW SMALL, SHALL BE REPORTED TO THE RESPONSIBLE SOUTH LAKE TAHOE FIRE DEPARTMENT AND TO THE GOVERNMENT IMMEDIATELY.

1.11 Air Monitoring

California Clean Air Act (Title 17 CCR, El Dorado County Air Quality Management District Rule 223.1) specifies that grading and earthmoving activities shall not cause or allow the emissions of fugitive dust such that the presence of such dust remains visible in the atmosphere beyond the property line of the emission source and shall not cause or allow PM10 levels to exceed 50 micrograms per cubic meter when determined, by simultaneous sampling, as the difference between upwind and downwind samples. The Contractor will conduct upwind and downwind air monitoring throughout construction measure fugitive dust. If the regulatory standard is exceeded, the contractor must implement additional dust control measures prior to continuing work.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 CONSTRUCTION AND/OR OTHER WORK

The Contractor shall comply with the Forest Service Fire Plan, NFPA 241, the HASP, the AHA, Federal and State OSHA regulations, and other related submittals and activity fire and safety regulations. The most stringent standard shall prevail.

END OF SECTION

**SECTION 01 45 00  
QUALITY CONTROL****PART 1 GENERAL****1.1 REFERENCES**

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

**ASTM INTERNATIONAL (ASTM)**

- ASTM D 3740 (2001) Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
- ASTM E 329 (2000) Agencies Engaged in the Testing and/or Inspection of Materials used on Construction

**1.2 SUBMITTALS**

Submit the following in accordance with [Section 01 33 00 Submittal Procedures](#).

**1.2.1 SD-01, Preconstruction Submittal**

- a. Quality Control (QC) plan (QC Plan shall be included as part of the RAWP submittal; also see [Section 01 11 00 Summary of Work](#)); G

**1.2.2 SD-07, Certificates**

- a. Resume of the QC Manager (to be included in the QC plan); G
- b. Certificate to the Government attesting that “the work has been completed, inspected, tested, and is in compliance with the Contract” (to be signed by the QC Manager)

**1.3 INFORMATION FOR THE GOVERNMENT**

Deliver the following to the Government:

- a. Contractor Quality Control Report for each day that work is performed;
- b. Field Test Reports: within 2 working days after the test is performed;
- c. Monthly Summary Report of Tests;
- d. QC Certifications: As required by the paragraph titled “QC Certifications.”

## 1.4 QC PROGRAM REQUIREMENTS

Establish and maintain a QC program as described in this section. The QC program consists of a QC Organization, QC Plan, QC Meeting, and QC certifications and documentation necessary to provide materials, equipment, workmanship, fabrication, construction and operations that comply with the requirements of the remedial design (RD).

### 1.4.1 Acceptance of the Construction QC Plan

Acceptance of the QC Plan is required prior to the start of construction. The Government reserves the right to require changes in the QC Plan and operations as necessary, including removal of personnel, to ensure the specified quality of work. The Government reserves the right to interview any member of the QC organization at any time in order to verify the submitted qualifications. All QC organization personnel are subject to acceptance by the Government. The Government may require the removal of any individual for noncompliance with quality requirements specified in the Contract

### 1.4.2 Preliminary Construction Work Authorized Prior to Acceptance

The only construction work that is authorized to proceed prior to the acceptance of the QC Plan is mobilization of storage and office trailers, temporary utilities, and surveying.

## 1.5 QC ORGANIZATION

### 1.5.1 QC Manager

#### 1.5.1.1 Duties

Contractor shall provide a QC Manager at the work site to implement and manage the QC program. In addition to implementing and managing the QC program, the QC Manager may perform the duties of project superintendent.

The QC Manager is required to conduct the QC meetings, perform submittal review, perform submittal approval, ensure testing is performed, and provide QC certifications and documentation required in this Contract. The QC Manager is responsible for managing and coordinating the documentation performed by Testing Laboratory personnel and any other inspection and testing personnel required by this contract.

#### 1.5.1.2 Qualifications

An individual with a minimum of 3 years experience as a superintendent, inspector, QC Manager, project manager, or construction manager on similar size and type construction contract. The QC Manager shall be a registered engineer or geologist, or work under the direct supervision of one.

## 1.6 QUALITY CONTROL PLAN

### 1.6.1 Requirements

Provide for approval by the Government, a QC plan prepared by a registered professional engineer or certified engineering geologist. For the final landfill cover, the QC plan shall be in conformance with the requirements of the California Integrated Waste Management Board (CIWMB) for landfill covers (27 CCR § 20324).

- a. QC ORGANIZATION: A chart showing the QC organizational structure
- b. NAMES AND QUALIFICATIONS: Names and qualifications, in resume format, for each person in the QC organization.
- c. DUTIES, RESPONSIBILITY AND AUTHORITY OF QC PERSONNEL: Duties, responsibilities, and authorities of each person in the QC organization
- d. OUTSIDE ORGANIZATIONS: A listing of outside organizations, such as architectural and consulting engineering firms, that will be employed by the Contractor and a description of the services these firms will provide
- e. SUBMITTAL PROCEDURES AND INITIAL SUBMITTAL REGISTER: Procedures for reviewing, approving, and managing submittals. Provide the name(s) of the person(s) in the QC organization authorized to review and certify submittals prior to approval. Provide the initial submittal of the Submittal Register as specified in [Section 01 33 00 Submittal Procedures](#).
- g. TESTING LABORATORY INFORMATION: Testing laboratory information required by the paragraphs entitled “Accreditation Requirements”, as applicable
- i. PROCEDURES TO COMPLETE REWORK ITEMS: Procedures to identify, record, track, and complete rework items

### 1.7 QC MEETINGS

After the start of construction, the QC Manager shall conduct weekly QC meetings at the work site with the project superintendent. The QC Manager shall prepare the minutes of the meeting within 2 working days after the meeting. The Government may attend these meetings. As a minimum, the following shall be accomplished at each meeting:

- a. Review the minutes of the previous meeting
- b. Review the schedule and the status of work:
  1. Work or testing accomplished since last meeting;
  2. Rework items identified since last meeting;
  3. Rework items completed since last meeting;



- c. Review the status of submittals:
  - 1. Submittals reviewed and approved since last meeting;
  - 2. Submittals required in the near future;
- d. Review the work to be accomplished in the next 2 weeks and the documentation required:
  - 1. Establish completion dates for rework items
  - 2. Discuss construction methods and the approach that will be used to provide quality construction by planning ahead and identifying potential problems for each feature of work
  - 3. Discuss status of off-site work or testing
  - 4. Documentation required;
- e. Resolve QC and production problems; and
- f. Address items that may require revising the QC plan:
  - 1. Changes in QC organization personnel
  - 2. Changes in procedures.

## 1.8 SUBMITTAL REVIEW AND APPROVAL

Procedures for submission, review, and approval of submittals are described in [Section 01 33 00 Submittal Procedures](#).

## 1.9 MATERIALS TESTING

Perform all required sampling and testing.

### 1.9.1 Materials Testing Laboratory Requirements

Provide an independent, appropriately certified testing laboratory qualified to perform sampling and tests required.

### 1.9.2 Materials Testing Laboratories Capability Check

The Government retains the right to check laboratory equipment in the proposed laboratory and the laboratory technician's testing procedures, techniques, and other items pertinent to testing, for compliance with the standards set forth in this specification.

### 1.9.3 Materials Testing Laboratories Test Results

Cite applicable Contract requirements, tests, or analytical procedures used. Provide actual results and include a statement that the item tested or analyzed conforms or fails

to conform to specified requirements. If item fails to conform, notify the Government immediately. Test results shall be signed by a testing laboratory representative authorized to sign certified test reports. Furnish the signed reports, certifications, and other documentation to the Government via the QC Manager. Furnish a summary report of field tests at the end of each month. Attach a copy of the summary report to the last daily Contractor QC Report of each month.

#### 1.9.4 Material Testing Laboratories Test Reports and Monthly Summary Report of Tests

The QC Manager shall furnish the signed reports, certifications, and a field tests summary report at the end of each month to the Government. Attach a copy of the summary report to the last daily Contractor QC Report of each month.

#### 1.10 ANALYTICAL LABORATORY

Soil samples submitted for chemical analysis to verify clean source materials shall be analyzed using EPA SW-846 methods. Analytical laboratory testing shall be performed by state of California-certified analytical laboratories.

#### 1.11 QC CERTIFICATIONS

##### 1.11.1 Contractor Quality Control Report Certification

Each Contractor QC Report shall contain the following statement: “On behalf of the Contractor, I certify that this report is complete and correct and equipment and material used and work performed during this reporting period is in compliance with the contract Drawings and specifications to the best of my knowledge, except as noted in this report.”

##### 1.11.2 Completion Certification

Upon completion of work under this Contract, the QC Manager shall furnish a certificate to the Government attesting that “the work has been completed, inspected, tested, and is in compliance with the Contract.”

#### 1.12 DOCUMENTATION

Maintain current and complete records of on-site and off-site QC program operations and activities.

##### 1.12.1 Contractor Production Report

Reports are required for each day that work is performed and shall accompany the submission of the Contractor Quality Control Report prepared for the same day. Account for each calendar day throughout the life of the Contract. The reporting of work shall be identified by terminology consistent with the construction schedule. Contractor Production Reports are to be prepared, signed, and dated by the project superintendent and shall contain the following information:

- a. Date of report, report number, name of contractor, title and location of project, and superintendent present.
- b. Weather conditions in the morning and in the afternoon.
- c. A list of Contractor and subcontractor personnel on the work site, their trades, employer, work location, description of work performed, and hours worked.
- d. A list of job safety actions taken and safety inspections conducted. Indicate that safety requirements have been met including the results on the following:
  1. Attach a copy of the meeting minutes from the daily job safety meeting.
  2. Were there any lost time accidents? (If YES, attach a copy of the completed Occupational Safety and Health Administration report.)
  3. Was crane/trenching/scaffold/high voltage electrical/high work done? (If YES, attach a statement or checklist showing inspection performed.)
  4. Was hazardous material/waste released into the environment? (If YES, attach a description of meetings held and accidents that happened.)
- e. A list of equipment/material received each day that is incorporated into the job.
- f. A list of construction and plant equipment on the work site including the number of hours used, idle, and down for repair.
- g. Include a “remarks” section in this report which will contain pertinent information including directions received, problems encountered during construction, work progress and delays, conflicts or errors in the Drawings or specifications, field changes, safety hazards encountered, instructions given and corrective actions taken, delays encountered, and a record of visitors to the work site.

#### 1.12.2 Contractor Quality Control Report

Reports are required for each day that work is performed and for every 7 consecutive calendar days of no work and on the last day of a no-work period. Account for each calendar day throughout the life of the Contract. The reporting of work shall be identified by terminology consistent with the construction schedule. Contractor Quality Control Reports are to be prepared, signed, and dated by the QC Manager, and shall contain the following information:

- a. List of QC tests performed.
- b. List the rework items identified, but not corrected, by close of business.
- c. List the rework items corrected from the rework items list along with the corrective action taken.

- d. Include a “remarks” section in this report that will contain pertinent information including directions received, quality control problem areas, deviations from the QC plan, construction deficiencies encountered, QC meetings held, acknowledgment that as-built Drawings have been updated, corrective direction given by the QC Organization, and corrective action taken by the Contractor.
- e. Contractor Quality Control Report certification.

#### 1.12.3 Testing Plan and Log

As tests are performed, the QC Manager shall record on the “Testing Plan and Log” the date the test was conducted, the date the test results were forwarded to the Government, remarks, and acknowledgment that an accredited or Government-approved testing laboratory was used. Attach a copy of the updated “Testing Plan and Log” to the last daily Contractor QC Report of each month.

#### 1.12.4 Rework Items List

The QC Manager shall maintain a list of work that does not comply with the Contract, identifying what items need to be reworked, the date the item was originally discovered, and the date the item was corrected. There is no requirement to report a rework item that is corrected the same day it is discovered. Attach a copy of the “Contractor Rework Items List” to the last daily Contractor QC Report of each month. The Contractor shall be responsible for including on this list items needing rework, including those identified by the Government.

#### 1.12.5 As-Built Drawings

The QC Manager is required to review the as-built Drawings to ensure that as-built Drawings are kept current on a daily basis and marked to show deviations that have been made from the Contract Drawings. The QC Manager shall initial each deviation and each revision. Upon completion of work, the QC Manager shall furnish a certificate attesting to the accuracy of the as-built Drawings.

#### 1.12.6 Report Forms

The following forms, which are attached at the end of this section, are acceptable for providing the information required by the paragraph titled “Documentation.” While use of these specific formats is not required, any other format used shall contain the same information:

- a. Combined Contractor Production Report
- b. Contractor Quality Control Report
- c. Testing Plan and Log
- d. Rework Items List

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

**SECTION 01 50 00**  
**TEMPORARY FACILITIES AND CONTROLS**

**PART 1 GENERAL**

**1.1 REFERENCES**

**FEDERAL HIGHWAY ADMINISTRATION (FHWA)**

FHWA MUTCD Manual on Uniform Traffic Control Devices (1988)

**1.2 SUBMITTALS**

Submit the following in accordance with [Section 01 33 00 Submittal Procedures](#).

**1.2.1 SD-01 Preconstruction Submittals**

a. Traffic control plan (to be included in the RAWP); G

**1.2.2 SD-02 Drawings**

a. Construction site plan (to be included in the RAWP); G

**1.3 TRAFFIC CONTROL PLAN**

Prior to the start of work, submit a traffic control plan describing traffic control procedures, access and haul routes, avenues of ingress and egress to the work area, and vehicle parking and staging areas.

**1.4 CONSTRUCTION SITE PLAN**

Prior to the start of work, submit a site plan showing the locations and dimensions of temporary facilities, including layouts and details, equipment and material storage area (on site and off site), and access and haul routes, avenues of ingress and egress to the fenced area and details of the fence installation. Identify any areas which may have to be graveled to prevent the tracking of mud. Indicate if the use of a supplemental or other staging area is desired. Show locations of safety and construction fences, site trailers, construction entrances, trash dumpsters, temporary sanitary facilities, and worker parking areas.

**PART 2 PRODUCTS**

**2.1 TEMPORARY BUILDINGS AND CONSTRUCTION EQUIPMENT**

Locations of the Contractor staging area shall be approved by the Government. The trailers or storage buildings shall be suitably painted and kept in a good state of repair. A sign not smaller than 24 inches by 24 inches shall be conspicuously placed on the trailer depicting the company name, business phone number, and emergency phone number.

## PART 3 EXECUTION

### 3.1 TEMPORARY UTILITIES

The Contractor shall coordinate any utility hookups that may be needed for the project, including water, electricity, and telephone services.

### 3.2 TEMPORARY SANITARY FACILITIES

Provide adequate sanitary conveniences of a type approved for the use of persons employed on the work, properly secluded from public observation, and maintained in such a manner as required or approved by the Government. Maintain these conveniences at all times without nuisance. Upon completion of the work, remove the conveniences from the premises, leaving the premises clean and free from nuisance.

### 3.3 UNAUTHORIZED ACCESS

Ensure that the public and other unauthorized personnel do not have access to the area during the construction period.

END OF SECTION

**SECTION 01 57 19**  
**TEMPORARY ENVIRONMENTAL CONTROLS**

**PART 1 GENERAL**

**1.1 REFERENCES**

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

**CODE OF FEDERAL REGULATIONS (CFR)**

29 CFR 1910	Occupational Safety and Health Administration Standards
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Generators of Hazardous Waste
40 CFR 263	Transporters of Hazardous Waste
40 CFR 264	Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 265	Interim Status Standard for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 300	National Oil and Hazardous Substances Pollution Contingency Plan
49 CFR 171	General Information, Regulations, and Definitions
49 CFR 172	Hazardous Materials, Tables, and Hazardous Materials Communications Regulations

**CALIFORNIA CODE OF REGULATIONS (CCR)**

CCR Title 22, Division 4.5, Chapter 11, Identification and Listing of Hazardous Waste

**1.2 CONTRACTOR LIABILITIES FOR ENVIRONMENTAL PROTECTION**

Contractors shall complete and provide documentation of environmental training for training required by Federal, State, and local regulations.

**1.3 DEFINITIONS**

**Sediment:** Soil and other debris that has eroded and has been transported by runoff water or wind.

**Solid Waste:** Rubbish, debris, garbage, and other discarded solid materials, except hazardous waste as defined below.



**Sanitary Wastes:** Wastes characterized as domestic sanitary sewage.

**Rubbish:** Combustible and noncombustible wastes such as paper, boxes, glass, crockery, metal, lumber, cans, and bones.

**Debris:** Combustible and noncombustible wastes such as ashes and waste materials resulting from construction or maintenance and repair work, leaves, and tree trimmings.

**Garbage:** Refuse and scraps resulting from preparation, cooking, dispensing, and consumption of food.

**Hazardous Waste:** Hazardous substances as defined in 40 CFR 261 or as defined by CCR Title 22.

**Hazardous Materials:** Hazardous materials as defined in 49 CFR 171 and listed in 49 CFR 172 and listed CCR Title 22.

**Oily Waste:** Petroleum products and bituminous materials.

#### 1.4 SUBMITTALS

Submit the following in accordance with [Section 01 33 00 Submittal Procedures](#).

##### 1.4.1 SD-01, Preconstruction Submittals

- a. Stormwater Pollution Prevention Plan (SWPP shall be included as part of the RAWP submittal; see [Section 01 11 00](#)); G

#### 1.5 ENVIRONMENTAL PROTECTION REGULATORY REQUIREMENTS

Provide and maintain, during the life of the contract, environmental protection as defined in this Section. Plan for and provide environmental protective measures to control pollution that develops during normal construction practice. Plan for and provide environmental protective measures required to correct conditions that develop during the construction of permanent or temporary environmental features associated with the project. Comply with Federal, State, and local regulations pertaining to the environment, including but not limited to water, air, solid waste, and noise pollution.

#### 1.6 STORMWATER POLLUTION PREVENTION PLAN

The contractor shall prepare and implement a SWPPP.

The SWPPP shall include: (1) an outline of the areas of vegetative soil cover or native vegetation on site that will remain undisturbed during the construction project; (2) an outline of all areas of soil disturbance, including cut or fill areas, that will be stabilized during the rainy season by temporary or permanent erosion control measures, such as seeding, mulch, or blankets, etc.; (3) an outline of the areas of soil disturbance, cut, or fill that will be left exposed during any part of the rainy season, representing areas of

potential soil erosion where sediment control BMPs are required to be used during construction; and (4) a proposed schedule for the implementation of erosion control measures.

The SWPPP shall also include a description of the BMPs and control practices to be used for both temporary and permanent erosion control measures. BMPs will include, but not be limited to, silt fence, straw wattle, and temporary sediment retention ponds, as needed. The SWPPP shall also include a list of native species appropriate for revegetation and will reference the decontamination plan to ensure that noxious weeds or non-native invasive species (NNIS) are not introduced or spread during construction activities.

## PART 2 PRODUCTS

Not Used

## PART 3 EXECUTION

### 3.1 PROTECTION OF NATURAL RESOURCES

Preserve the natural resources outside the limits of permanent work. Confine construction activities to within the limits of the work indicated or specified. Do not disturb any wetland area.

#### 3.1.1 Water Resources

Prevent oily or other hazardous substances from entering the ground, drainage areas, wetlands or local bodies of water. Surround all temporary fuel oil or petroleum storage tanks with a temporary earthen berm of sufficient size and strength to contain the contents of the tanks in the event of leakage or spillage.

#### 3.1.2 Fish and Wildlife Resources

Do not unnecessarily disturb fish or wildlife. Do not alter water flows or otherwise disturb the native habitat adjacent to the project, except as indicated or specified.

### 3.2 HISTORICAL AND ARCHAEOLOGICAL RESOURCES

Carefully protect in-place and report immediately to the Government historical and archaeological items or human skeletal remains discovered in the course of work. Stop work in the immediate area of the discovery until directed by the Government to resume work. The Government retains ownership and control over historical and archaeological resources.

### 3.3 NOISE

Make the maximum use of low-noise emission products, as certified by the U.S. Environmental Protection Agency (EPA). Blasting or use of explosives will not be permitted without written permission from the Government, and then only during designated times.

### 3.4 EROSION AND SEDIMENT CONTROL MEASURES

#### 3.4.1 Burnoff

Burnoff of the ground cover is not permitted.

#### 3.4.2 Protection of Erodible Soils

Plan and conduct earthwork to minimize the duration of exposure of unprotected soils in accordance with the approved Stormwater Pollution Prevention Plan (SWPP).

#### 3.4.3 Temporary Protection of Erodible Soils

Mechanically retard and control the rate of runoff in areas where erosion is observed during construction. Controls include construction of diversion ditches, benches, berms, and use of silt fences, straw wattle, and straw bales to retard and divert runoff to protected drainage courses.

### 3.5 CONTROL AND DISPOSAL OF CONTRACTOR-GENERATED SOLID WASTES

Pick up solid wastes and place them in covered containers that are regularly emptied. Do not prepare or cook food on the project site. Prevent contamination of the site or other areas when handling and disposing of wastes. At project completion, leave the areas clean.

#### 3.5.1 Disposal of Rubbish and Debris

Dispose of rubbish and debris in accordance with the requirements specified below:

##### 3.5.1.1 Removal from Government Property

Remove and dispose of rubbish and debris from Government property.

#### 3.5.2 Garbage Disposal

Place garbage in approved containers, and move to a pickup point or disposal area, where directed.

### 3.6 CONTROL AND DISPOSAL OF HAZARDOUS WASTE

#### 3.6.1 Hazardous Waste Generation

Handle generated hazardous waste in accordance with 40 CFR 262.

### 3.6.2 Hazardous Waste Disposal

Dispose of hazardous waste in accordance with Federal, State, and local regulations, especially 40 CFR 263, 40 CFR 264, 40 CFR 265, and CCR Title 22, Division 4.5, Chapter 11. Removal of hazardous waste from Government property shall not occur without prior notification and coordination with the Government. Transport hazardous waste by a permitted, licensed, or registered hazardous waste transporter to a treatment, storage, and disposal (TSD) facility. Hazardous waste shall be properly identified, packaged, and labeled in accordance with 49 CFR 172. Provide completed manifests for hazardous waste disposed of off-site to the Government within 7 days of disposal. Hazardous waste shall not be brought onto the base.

### 3.6.3 Hazardous Waste Storage

Store hazardous waste in containers in accordance with 49 CFR 178. Identify hazardous waste in accordance with 40 CFR 261 and 40 CFR 262. Identify hazardous waste generated within the confines of the station by the station's EPA generator identification number.

### 3.6.4 Spills of Oil and Hazardous Materials

Take precautions to prevent spills of oil and hazardous material. In the event of a spill, immediately notify the Government. Spill response shall be in accordance with 40 CFR 300 and applicable State regulations.

### 3.6.5 Petroleum Products

Protect against spills and evaporation during fueling and lubrication of equipment and motor vehicles. Properly dispose of lubricants and excess oil.

### 3.7 DUST CONTROL

Control dust at all times, including during nonworking periods. Sprinkle or treat, with approved dust suppressants, the soil at the site, haul roads, and other areas disturbed by operations.

### 3.8 METHANE GAS

Take precautions to avoid all ignition sources on the site during construction due to potentially explosive concentrations of methane gas.

### 3.9 WATER GENERATED DURING CONSTRUCTION

Water generated by dewatering areas below the ground surface or any other water that may have contacted waste or contaminated soil shall not be discharged from the site. This water will be collected, stored and used for moisture conditioning of the foundation layer or for dust control within the footprint of the landfill, prior to installation of the geosynthetic layers. This water shall not be used for moisture

conditioning of any fill layers above the geosynthetic layers. Water that is not used for dust control or moisture conditioning shall be containerized, analyzed for chemical constituents, and subsequently disposed at an appropriate facility based on chemical characterization.

END OF SECTION

**SECTION 01 77 00  
CLOSEOUT PROCEDURES**

**PART 1 GENERAL**

**1.1 SUBMITTALS**

Submit the following in accordance with [Section 01 33 00 Submittal Procedures](#).

**1.1.1 SD-03 Product Data**

- a. Warranty Data: Copies of warranty documents associated with products installed at the site.
- b. Spare Parts Data: Copies of list that indicates manufacturer’s name, part number, nomenclature, and stock level recommended for maintenance and repair. List those items that may be standard to the normal maintenance of the system.

**1.1.2 SD-10 Operation and Maintenance Data**

Submit Operation and Maintenance Manuals in accordance with paragraph entitled, “Operation and Maintenance,” of this section; G

**1.1.3 SD-11 Closeout Submittals**

- a. As-built drawings (included in the After Action Report); G
- b. As-built Operations Maintenance and Monitoring Plan (included in the After Action Report); G
- c. As-built record of materials and equipment
- d. Warranty list

**1.2 PROJECT RECORD DOCUMENTS**

**1.2.1 As-Built Drawings**

This paragraph covers record drawings complete, as a requirement of the contract. The terms “drawings,” “contract drawings,” “drawing files,” “working record drawings” and “final record drawings” refer to contract drawings which are revised to be used for final record drawings showing as-built conditions.

Show on the as-built drawings, but not limited to, the following information:

- a. The actual location, kinds and sizes of all subsurface utility lines. Also record the average depth below the surface of each run.

- b. Correct grade, elevations, cross section, or alignment of roads, earthwork, structures or utilities, noting any changes were made from contract plans.
- c. Changes in details of design or additional information obtained from working drawings specified to be prepared and/or furnished by the Contractor; including but not limited to fabrication, erection, installation plans and placing details, pipe sizes, dimensions, etc.
- d. The topography, invert elevations and grades of drainage installed or affected as part of the project construction.
- e. Furnish a contour map of the area elevations.

1.2.2 As-Built Operations Maintenance and Monitoring Plan

The draft OM&M plan will be updated by the contractor upon completion of construction to produce the As-Built OM&M plan.

1.2.3 As-Built Record of Materials and Equipment

Furnish one copy of preliminary record of equipment and materials used on the project prior to final inspection. This preliminary submittal will be reviewed and returned after final inspection with Government comments. Submit final record of equipment and materials 10 days after final inspection and receipt of Government comments. Key the designations to the related area depicted on the contract drawings. List the following data:

**TABLE 1. RECORD OF DESIGNATED EQUIPMENT AND MATERIALS DATA**

Description	Specification Section	Manufacturer and Catalog Model, and Serial Number	Composition and Size	Where Used

1.3 SPARE PARTS DATA

Indicate manufacturer’s name, part number, nomenclature, and stock level required for maintenance and repair. List those items that may be standard to the normal maintenance of the system.

1.4 WARRANTY MANAGEMENT

1.4.1 Equipment/Product Warranty Data and Warranty List

Assemble approved information in a binder and turn over to the Government upon acceptance of the work. The construction warranty period will begin on the date of

project acceptance and continue for the full product warranty period. Include within the warranty list, but not limited to, the following:

- a. Listing and status of delivery of all Certificates of Warranty for extended warranty items.
- b. A list for each warranted equipment, item, feature of construction, or system indicating:
  1. Name of item.
  2. Model and serial numbers.
  3. Location where installed.
  4. Name and phone numbers of manufacturers or suppliers and sources of spare parts.
  5. Terms of warranty.
  7. Cross-reference to warranty certificates as applicable.
  8. Starting point and duration of warranty period.
  9. Summary of maintenance procedures required to continue the warranty in force.
  10. Organization, names and phone numbers of persons to call for warranty service.

## 1.5 OPERATION AND MAINTENANCE MANUALS

Operation and Maintenance Manuals must be consistent with the manufacturer's standard brochures, schematics, printed instructions, general operating procedures, and safety precautions. Bind information in manual format and grouped by technical sections. Test data must be legible and of good quality. Light-sensitive reproduction techniques are acceptable provided finished pages are clear, legible, and not subject to fading. Caution and warning indications must be clearly labeled.

## 1.6 CLEANUP

Leave premises "broom clean." Clean debris from drainage systems. Sweep paved areas and rake clean landscaped areas. Remove waste and surplus materials, rubbish and construction facilities from the site. Promptly and legally transport and dispose of any trash. Do not burn, bury, or otherwise dispose of trash on the project site.

## PART 2 PRODUCTS

Not used



PART 3 EXECUTION

Not used

END OF SECTION

**SECTION 02 41 00  
SITE DEMOLITION**

**PART 1 GENERAL**

**1.1 GENERAL REQUIREMENTS**

Remove rubbish and debris resulting from construction activities from the project site; do not allow accumulations. Existing fill materials at the site are to be incorporated into the foundation grading shown in the Drawings. Oversize material or highly compressible material shall be removed from the site for off-site disposal or shall be pulverized, chipped or shredded as necessary for proper disposal.

**1.2 SUBMITTALS**

None Required

**1.3 DUST AND DEBRIS CONTROL**

Prevent the spread of dust and debris and avoid the creation of a nuisance or hazard in the surrounding area. Do not use water if it results in hazardous or objectionable conditions such as, but not limited to flooding or pollution.

**1.4 PROTECTION**

Protect existing features that are to remain in place. Repair items that are to remain and that are damaged during performance of the work to their original condition, or replace with new.

**1.5 BURNING**

Burning will not be permitted.

**PART 2 PRODUCTS**

Not used.

**PART 3 EXECUTION**

**3.1 REFUSE DISPOSAL**

All refuse generated by construction will be controlled such that it is not carried off site by wind or water and does not constitute a hazard to worker safety or construction equipment. Refuse may be collected in construction dumpsters contracted through a local municipal waste hauler.

Remove and transport refuse in a manner that will prevent spillage on pavements, streets, or adjacent areas. Clean up spillage from pavements, streets, and adjacent areas to prevent potential damage by foreign objects.

### 3.2 CLEARING AND GRUBBING

Clear and grub surface vegetation and roots prior to grading per [Section 31 11 00, Clearing and Grubbing](#).

END OF SECTION

**SECTION 02 56 13**  
**POLYETHYLENE GEOMEMBRANE LINER**

## PART 1 GENERAL

## 1.1 REFERENCES

## ASTM INTERNATIONAL (ASTM)

ASTM D 1004	Test Method for Initial Tear Resistance of Plastic Film and Sheeting
ASTM D 1238	Standard Test Method for Flow Rates of Thermoplastics by Extrusion Plastometer
ASTM D 1505	Test Method for Density of Plastics by the Density-Gradient Technique
ASTM D 1603	Test Method for Carbon Black in Olefin Plastics
ASTM D 3895	Standard Test Method for Oxidative-Induction Time of Polyolefins by Differential Scanning Calorimetry
ASTM D 4833	Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products
ASTM D 5199	Standard Test Method for Measuring Nominal Thickness of Geotextiles and Geomembranes
ASTM D 5321	Standard Test Method for Determining the Coefficient of Soil and Geosynthetic or Geosynthetic and Geosynthetic Friction by the Direct Shear Method
ASTM D 5397	Standard Test Method for Evaluation of Stress Crack Resistance of Polyolefin Geomembranes Using Notched Constant Tensile Load Test
ASTM D 5596	Standard Test Method for Microscopic Evaluation of the Dispersion of Carbon Black in Polyolefin Geosynthetics
ASTM D 5994	Standard Test Method for Measuring Core Thickness of Textured Geomembranes
ASTM D 6392	Standard Test Method for Determining the Integrity of Nonreinforced Geomembrane Seams Produced Using Thermo-Fusion Methods
ASTM D 6693	Standard Test Method for Determining Tensile Properties of Nonreinforced Polyethylene and Nonreinforced Flexible Polypropylene Geomembranes

## GEOSYNTHETIC RESEARCH INSTITUTE (GRI)

GRI GM 14            Selecting Variable Intervals for Taking Geomembrane Destructive Seam Samples Using the Method of Attributes

## 1.2        DEFINITIONS

**Lot:** A quantity of resin (usually the capacity of one rail car) used in the manufacture of geomembranes. Finished roll will be identified by a roll number traceable to the resin lot used.

**Manufacturer:** The party responsible for manufacturing the geomembrane rolls.

**Laboratory:** Party, independent from the Contractor and Manufacturer, responsible for conducting laboratory tests on samples of geosynthetics obtained at the site or during manufacturing.

**Panel:** Unit area of a geomembrane that will be seamed in the field that is larger than 100 ft<sup>2</sup>.

**Patch:** Unit area of a geomembrane that will be seamed in the field that is equal to or less than 100 ft<sup>2</sup>.

**Subgrade:** Soil layer surface which immediately underlies the geosynthetic material(s).

## 1.3        SUBMITTALS

## 1.3.1      SD-02 Shop Drawings:

- a.    Installation layout drawings illustrating proposed panel layout, including field seams and details. Approved shop drawings will be for concept only and actual panel placement will be determined by site conditions.

## 1.3.2      SD-03 Product Data:

- a.    Material warranties
- b.    Product data indicating that no recycled polymer and no more than 10 percent rework of the same type of material (recycled product run) is added to the resin
- c.    Installer's Geosynthetic Field Installation QC Plan

## 1.3.3      SD-07 Certificates:

- a.    Installer's qualification statement including resumes of key personnel involved in the project

1.3.4 SD-11 Closeout submittals.

- a. As-built drawings showing actual geomembrane placement and seams, including typical anchor trench detail.
- b. Certificate stating the geomembrane has been installed in accordance with the Contract Documents.

1.4 QUALITY ASSURANCE

The Contractor's QC Officer will assure compliance with the project specifications.

1.5 QUALIFICATIONS

1.5.1. MANUFACTURER

- a. Geomembrane shall be Ultraflex 60-mil double-sided textured linear low-density polyethylene (LLDPE) manufactured by GSE Lining Technology, Inc., or equivalent.

1.5.2. INSTALLER

- a. The Contractor's installation shall be performed by a specialty subcontractor experienced in the installation and seam welding of 60-mil LLDPE geomembranes. The subcontractor's installation experience shall be recent (within the last 2 years).
- b. The subcontractor's supervisor shall have worked in a similar capacity on projects similar in size and complexity to the project described in these Contract Documents.
- c. The subcontractor shall provide a minimum of one Master Seamer for work on the project. The Master Seamer must have completed a minimum of 1,000,000 square feet of geomembrane seaming work using the type of seaming apparatus proposed for the use on this Project.
- d. Subcontractor qualifications shall be submitted to QC Manager for approval

PART 2 PRODUCTS

2.1 MATERIAL LABELING, DELIVERY, STORAGE AND HANDLING

- a. Labeling - Each roll of geomembrane delivered to the site shall be labeled by the manufacturer. The label shall identify the manufacturer's name, product identification, and product thickness
- b. Delivery - Rolls of liner will be prepared to ship by appropriate means to prevent damage to the material and to facilitate off-loading.

- c. Storage - The on-site storage location for geomembrane material, provided by the Contractor to protect the geomembrane from punctures, abrasions and excessive dirt, and moisture. The storage location shall be level (no wooden pallets), smooth, dry, protected from theft and vandalism, and be adjacent to the area being lined
- d. Handling - Materials are to be handled so as to prevent damage.

## 2.2 GEOMEMBRANE

- a. Material shall be textured polyethylene geomembrane as shown on the Drawings.
- b. Resin shall be new, first quality, compounded and manufactured specifically for producing geomembrane. Natural resin (without carbon black) shall meet the minimum requirements presented in Table 1.

**TABLE 1. MINIMUM VALUES FOR NATURAL RESINS**

Property	Test Method	Minimum Required Value
Density	ASTM D 5199	0.915 g/cm <sup>2</sup>
Melt Flow Index	ASTM D 1238	< 1.0 g/10 min
Oxidative Induction Time	ASTM D 3895	100 minutes

- c. Geomembrane Rolls
  - 1. Do not exceed a combined maximum total of 1 percent by weight of additives other than carbon black.
  - 2. Geomembrane shall be free of holes, pinholes as verified by visual inspection for bubbles, blisters, excessive contamination by foreign matter, and nicks and cuts on roll edges.
  - 3. All liner sheets produced at the factory shall be inspected prior to shipment for compliance with the physical property requirements listed in this specification section and be tested by an acceptable method of inspecting for pinholes. If pinholes are located, identified and indicated during manufacturing, these pinholes may be corrected during installation.
  - 4. The geomembrane manufacturer shall sample and test the geomembrane, at a minimum, once every 50,000 square feet to demonstrate that its properties conform to the values specified in Table 2.

**TABLE 2: MINIMUM VALUES FOR TEXTURED BLACK-SURFACED LLDPE GEOMEMBRANES**

Property	Test Method <sup>(1)</sup>	Units	Minimum Value
Thickness: Minimum Average	ASTM D 5199	mil (mm)	54 (1.40)
Thickness : Lowest Individual Reading for 8 out of 10 Values	ASTM D 5199	mil (mm)	51 (1.30)
Density	ASTM D 1505	g/cm <sup>3</sup>	0.92
Carbon Black Content	ASTM D 1603, mod.	percent	2.0
Carbon Black Dispersion	ASTM D 5596		Note 2
Tensile Properties: Strength at Break (each direction)	ASTM D 6693	lb/in (kN/m)	90 (16)
Tensile Properties: Elongation at Break(each direction) <sup>3</sup>	ASTM D 6693	percent	250
Tear Resistance	ASTM D 1004	lb (N)	33 (147)
Puncture Resistance	ASTM D 4833	lb (N)	66 (300)
Oxidative Induction Time	ASTM D 3895	min	100

## Notes:

1. Some test procedures have been modified for application to geosynthetics. All procedures and values are subject to change without prior notification.
2. Only near spherical agglomerates are considered. 9 of 10 views shall be Category 1 or 2. No more than one view Category 3.
3. For 2.0" gauge length.

## d. Extrudate Rod or Bead

1. Extrudate material shall be made from same type resin as the geomembrane.
2. Additives shall be thoroughly dispersed.
3. Materials shall be free of contamination by moisture or foreign matter.

## PART 3 EXECUTION

## 3.1 EQUIPMENT

- a. Welding equipment and accessories shall meet the following requirements:
  1. Gauges showing temperatures in apparatus (extrusion welder) or wedge (wedge welder) shall be present.
  2. An adequate number of welding apparatus shall be available to avoid delaying work.
  3. Power source must be capable of providing constant voltage under combined line load.



### 3.2 CONFORMANCE TESTING

- a. Samples of the geomembrane will be removed and sent to a geosynthetics QA laboratory for testing to ensure conformance with the requirements of Table 2. The appropriate test methods are summarized in Table 2. The Contractor shall account for this testing in the installation schedule. Only material, which meets the requirements of Paragraph 2.2 shall be installed.
- b. Samples of the geomembrane will be removed and sent to a geosynthetics QA laboratory for three-point direct shear testing to ensure conformance with the requirements of Table 3. A minimum of one test per project or material type will be performed.
- b. Samples will be selected by the QA Representative in accordance with this Section and with the procedures outlined in the CQA Plan.
- c. Samples will be taken at a minimum frequency of one sample per 100,000 square feet with a minimum of one sample per lot.
- d. The QA Representative may increase the frequency of sampling in the event that test results do not comply with the requirements of Paragraph 2.2. The additional testing shall be performed at the expense of the Geomembrane Manufacturer.
- e. Any geomembranes that conformance testing indicates do not comply with Paragraph 2.2, will be rejected by the QA Representative. The Geomembrane Manufacturer shall replace the rejected material with new material.

**TABLE 3: MINIMUM WELD VALUES FOR LLDPE GEOMEMBRANES**

Materials	Test Method	Frequency	Minimum Value
Geomembrane against Geocomposite	ASTM D 5321	One 3-point direct shear, vertical stress no more than 1,000 psf	Friction angle <u>greater than</u> 20 degrees
Geomembrane against Drainage Sand (90% compaction and 2% over opt. moisture content)	ASTM D 5321	One 3-point direct shear, vertical stress no more than 1,000 psf	Friction angle <u>greater than</u> 30 degrees

### 3.3 DEPLOYMENT

- a. Assign each panel a simple and logical identifying code. The coding system shall be subject to approval and shall be determined at the job site.
- b. Visually inspect the geomembrane during deployment for imperfections and mark faulty or suspect areas.

- c. Deployment of geomembrane panels shall be performed in a manner that will comply with the following guidelines:
  - 1. Unroll geomembrane using methods that will not damage geomembrane and will protect underlying surface from damage (spreader bar, protected equipment bucket).
  - 2. Place ballast (commonly sandbags) on geomembrane which will not damage geomembrane to prevent wind uplift.
  - 3. Personnel walking on geomembrane shall not engage in activities or wear shoes that could damage it. Smoking will not be permitted on the geomembrane.
  - 4. Do not allow heavy vehicular traffic directly on geomembrane. Rubber-tired ATV's and trucks are acceptable if wheel contact is less than 6 psi.
  - 5. Protect geomembrane in areas of heavy traffic by placing protective cover over the geomembrane.
- d. Sufficient material (slack) shall be provided to allow for thermal expansion and contraction of the material.

### 3.4 FIELD SEAMING

- a. Seams shall meet the following requirements:
  - 1. To the maximum extent possible, orient seams parallel to line of slope, i.e., down and not across slope.
  - 2. Minimize number of field seams in corners, odd-shaped geometric locations and outside corners.
  - 3. Slope seams (panels) shall extend a minimum of 5 feet beyond the grade break into the flat area.
  - 4. Use a sequential seam numbering system compatible with panel numbering system.
  - 5. Align seam overlaps consistent with the requirements of the welding equipment being used. A 6-inch overlap is commonly suggested.
- b. During Welding Operations
  - 1. Provide at least one Master Seamer who shall provide direct supervision over other welders as necessary.
- c. Extrusion Welding
  - 1. Hot-air tack adjacent pieces together using procedures that do not damage the geomembrane.

2. Clean geomembrane surfaces by disc grinder or equivalent.
  3. Purge welding apparatus of heat-degraded extrudate before welding.
- d. Hot Wedge Welding
1. Welding apparatus shall be a self-propelled device equipped with an electronic controller which displays applicable temperatures.
  2. Clean seam area of dust, mud, moisture and debris immediately ahead of hot wedge welder.
  3. Protect against moisture build-up between sheets.
- e. Trial Welds
1. Perform trial welds on geomembrane samples to verify welding equipment is operating properly.
  2. Make trial welds under the same surface and environmental conditions as the production welds, i.e., in contact with subgrade and similar ambient temperature.
  3. Minimum of two trial welds per day, per welding apparatus, one made prior to the start of work and one completed at mid shift.
  4. Cut four, 1-inch-wide by 6-inch-long test strips from the trial weld.
  5. Quantitatively test specimens for peel adhesion, and then for shear strength.
  6. Trial weld specimens shall pass when the results shown in Table 4 are achieved in both peel and shear test.
    - a. The break, when peel testing, occurs in the liner material itself, not through peel separation (FTB).
    - b. The break is ductile.
  7. Repeat the trial weld, in its entirety, when any of the trial weld samples fail in either peel or shear.
  8. No welding equipment or welder shall be allowed to perform production welds until equipment and welders have successfully completed trial weld.

**TABLE 4: MINIMUM WELD VALUES FOR LLDPE GEOMEMBRANES**

Property	Test Method	Units	Minimum Value
Peel Strength (extrusion)	ASTM D 6392	ppi (kN/m)	72 (12.6)
Peel Strength (fusion)	ASTM D 6392	ppi (kN/m)	75 (13.1)
Shear Strength (fusion & ext.)	ASTM D 6392	ppi (kN/m)	90 (15.8)

- f. Seaming shall not proceed when ambient air temperature or adverse weather conditions jeopardize the integrity of the liner installation. Contractor shall demonstrate that acceptable seaming can be performed by completing acceptable trial welds.
- g. Defects and Repairs
  - 1. Examine all seams and non-seam areas of the geomembrane for defects, holes, blisters, undispersed raw materials, and any sign of contamination by foreign matter.
  - 2. Repair and nondestructively test each suspect location in both seam and nonseam areas. Do not cover geomembrane at locations that have been repaired until test results with passing values are available.

### 3.5 FIELD QUALITY ASSURANCE

#### 3.5.1 Nondestructive Field Testing

Nondestructive testing may be carried out as the seaming progresses or at completion of all field seaming.

##### 3.5.1.1. Vacuum Testing

- a. The equipment shall comprise the following:
  - 1. A vacuum box assembly consisting of a stiff housing, a transparent viewing window, a soft neoprene gasket attached to the bottom, port hole or valve assembly, and a vacuum gauge.
  - 2. A system for applying 5 psi (34 kPa) gauge to the box.
  - 3. A bucket of soapy solution and applicator.
- b. The following procedure shall be followed:
  - 1. Energize the vacuum pump and reduce the tank pressure to approximately 5 psi (34 kPa) gauge.
  - 2. Wet an area of the geomembrane seam larger than the vacuum box with the soapy solution.
  - 3. Place the box over the wetted area.
  - 4. Close the bleed valve and open the vacuum valve.
  - 5. Ensure that a leak tight seal is created.
  - 6. Examine the geomembrane through the viewing window for the presence of soap bubbles for not less than 30 seconds.

7. In no bubbles appear after 30 seconds, close the vacuum valve and open the bleed valve, move the box over the next adjoining area with a minimum 3 inches overlap, and repeat the process.
8. All areas where soap bubbles appear shall be marked with a marker that will not damage the geomembrane and be repaired in accordance with Paragraph 3.4.

#### 3.5.1.2. Air Pressure Testing (For Double Fusion Seams Only).

- a. The following procedures are applicable to those processes which produce a double seam with an enclosed space.
- b. The equipment shall comprise the following:
  1. An air pump (manual or motor driven) or air reservoir, equipped with a pressure gauge, capable of generating and sustaining a minimum pressure of 30 psi, mounted on a cushion to protect the geomembrane.
  2. A rubber hose with fittings and connections.
  3. A hollow needle, or other approved pressure feed device.
- c. The following procedures shall be followed:
  1. Seal both ends of the seam to be tested.
  2. Insert needle, or other approved pressure feed device, into the tunnel created by the fusion weld.
  3. Insert a protective cushion between the air pump and the geomembrane.
  4. Energize the air pump to a minimum pressure of 30 psi, close the valve, and sustain the pressure for not less than 5 minutes.
  5. If loss of pressure exceeds 3 psi, or does not stabilize, locate faulty area and repair in accordance with Paragraph 3.4.
  6. Cut opposite end of air channel from the pressure gauge and observe release of pressure to ensure air channel is not blocked.
  7. Remove needle, or other approve pressure feed device, and seal repair in accordance with Paragraph 3.4.

#### 3.5.2 Destructive Field Testing

- a. Location and Frequency of Testing
  1. Collect destructive test samples at a frequency of one per every 1,500 lineal feet of seam length.
  2. Test locations will be determined after seaming.

3. Exercise Method of Attributes as described by GRI GM-14 (Geosynthetic Research Institute, <http://www.geosynthetic-institute.org>) to minimize test samples taken.
- b. Sampling Procedures are performed as follows:
1. Contractor shall cut samples as the seaming progresses in order to obtain field laboratory test results before the geomembrane is covered.
  2. Contractor shall number each sample, and the location will be noted on the installation as-built.
  3. Samples shall be twelve (12) inches wide by minimal length with the seam centered lengthwise.
  4. Cut a 2-inch wide strip from each end of the sample for field-testing.
  5. Destructive testing shall be performed in accordance with ASTM D 6392, “Standard Test Method for Determining the Integrity of Non-Reinforced Geomembrane Seams Produced Using Thermo-Fusion Methods.”
  6. Contractor shall repair all holes in the geomembrane resulting from destructive sampling.
  7. Repair and test the continuity of the repair in accordance with these Specifications.

### 3.5.3 Failed Seam Procedures

- a. If the seam fails, Contractor shall follow one of two options:
  1. Reconstruct the seam between any two passed test locations.
  2. Trace the weld to intermediate location at least 10 feet minimum or where the seam ends in both directions from the location of the failed test.
- b. The next seam welded using the same welding device is required to obtain an additional sample, i.e., if one side of the seam is less than 10 feet long.
- c. If sample passes, then the seam shall be reconstructed or capped between the test sample locations.
- d. If any sample fails, the process shall be repeated to establish the zone in which the seam shall be reconstructed.

### 3.6 REPAIR PROCEDURES

- a. Remove damaged geomembrane and replace with acceptable geomembrane materials if damage cannot be satisfactorily repaired.

- b. Repair any portion of unsatisfactory geomembrane or seam area failing a destructive or nondestructive test.
- c. Contractor shall be responsible for repair of defective areas.
- d. Agreement upon the appropriate repair method shall be decided between Contractor and the Government by using one of the following repair methods:
  - 1. Patching - Used to repair large holes, tears, undispersed raw materials and contamination by foreign matter.
  - 2. Abrading and Rewelding - Used to repair short section of a seam.
  - 3. Spot Welding - Used to repair pinholes or other minor, localized flaws or where geomembrane thickness has been reduced.
  - 4. Capping - Used to repair long lengths of failed seams.
  - 5. Flap Welding - Used to extrusion weld the flap (excess outer portion) of a fusion weld instead of a full cap.
  - 6. Remove the unacceptable seam and replace with new material.
- e. The following procedures shall be observed when a repair method is used:
  - 1. All geomembrane surfaces shall be clean and dry at the time of repair.
  - 2. Surfaces of the polyethylene that are to be repaired by extrusion welds shall be lightly abraded to assure cleanliness.
  - 3. Extend patches or caps at least 6 inches for extrusion welds and 4 inches for wedge welds beyond the edge of the defect, and around all corners of patch material.
- f. Repair Verification
  - 1. Number and log each patch repair.
  - 2. Nondestructively test each repair using methods specified in this Specification.

END OF SECTION

**SECTION 02 61 13**  
**EXCAVATION AND HANDLING OF CONTAMINATED MATERIAL****PART 1 GENERAL****1.1 REFERENCES**

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

**ASTM INTERNATIONAL (ASTM)**

- ASTM D 1557 (2007) Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup>) (2700 kN-m/m<sup>3</sup>)
- ASTM D 2487 (2006) Soils for Engineering Purposes (Unified Soil Classification System)
- ASTM D 422 (1963; R 2007) Particle-Size Analysis of Soils
- ASTM D 6938 (2007a) Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

**U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)**

- 29 CFR 1926 Safety and Health Regulations for Construction
- 40 CFR 302 Designation, Reportable Quantities, and Notification

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY (EPA)**

- EPA 6010B Metals by Inductively Coupled Plasma-Atomic Emission Spectrometry
- EPA 8015 Nonhalogenated Organics Using GC/FID
- EPA 8081A Organochlorine pesticides by Gas Chromatography
- EPA 8260B Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry
- EPA 8270C Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)
- EPA 8290 Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by High-Resolution Gas Chromatography/High-Resolution Mass Spectrometry (HRGC/HRMS)



## 1.2 SUBMITTALS

The following shall be submitted in accordance with [Section 01 33 00 Submittal Procedures](#).

### 1.2.1 SD-01 Preconstruction Submittals

Remedial Action Work Plan (RAWP); G

The RAWP shall be submitted within 30 calendar days of receiving notice to proceed. No work at the site, with the exception of site inspections and surveys, shall be performed until the RAWP is approved by the government. At a minimum, the RAWP shall include:

- a. Site history, project scope, key personnel, remedial activities and work requirements.
- b. Detailed Construction Schedule, including sequence of construction
- c. Site Health and Safety Plan
- d. Stormwater Pollution Prevention Plan
- e. Air Pollution Prevention Plan
- f. Traffic Control Plan
- g. Decontamination Plan
- h. Noise Control Plan
- i. Spill Control Plan
- j. Waste Management Plan
- k. Contaminant Prevention Plan
- l. Resource Protection Plan
- m. Contingency Plan
- n. Quality Control (QC) Plan
- o. Winterization Plan
- p. Sewer Line Damage Contingency Plan
- q. Excavation Protection Plan
- r. Dewatering Plan

### 1.2.2 SD-06 Test Reports

- a. Confirmation Sampling and Analysis Reports

### 1.2.3 SD-11 Closeout Submittals

- a. After Action Report (within 30 calendar days of work completion at the site).

## 1.3 SURVEYS

Surveys shall be performed immediately prior to and after excavation of contaminated material to determine the volume of contaminated material removed. Surveys shall also be performed immediately after completion of waste placement. Locations of confirmation samples shall be shown on the drawings.

## 1.4 REGULATORY REQUIREMENTS

### 1.4.1 Permits and Licenses

The Contractor shall obtain any required federal, state, and local permits for excavation.

### 1.4.2 Air Emissions

Air emissions shall be monitored and controlled in accordance with all applicable local, state, and federal regulations.

## 1.5 DESCRIPTION OF WORK

The work shall consist of excavation and temporary stockpiling of the top 2 feet of clean cover soil and the excavation and placement of contaminated material (municipal waste). Approximate locations of contaminated material are shown on the RD drawings. The Contractor shall submit a RAWP as specified in the Submittals paragraph. The Government shall be notified within 24 hours, and before excavation, if contaminated material is discovered that has not been previously identified or if other discrepancies between data provided and actual field conditions are discovered. To ensure protection of the STPUD sewer line, a contingency plan will be in place prior to the start of work. All waste relocation in the vicinity of the sewer line will be coordinated with the STPUD well in advance of construction to ensure that an on-site STPUD representative can be present for the work. Groundwater is approximately 60 feet below pre-excavation ground surface and is estimated at approximately 6,320 feet above mean sea level.

## 1.6 SCHEDULING

The Contractor shall be responsible for contacting appropriate government and regulatory agencies in accordance with the applicable reporting requirements.

## PART 2 PRODUCTS

### 2.1 SPILL RESPONSE MATERIALS

The Contractor shall provide appropriate spill response materials including, but not limited to the following: containers, adsorbents, shovels, and personal protective equipment. Spill response materials shall be available at all times when contaminated materials/wastes are being handled or transported. Spill response materials shall be compatible with the type of materials and contaminants being handled.

## PART 3 EXECUTION

### 3.1 EXISTING STRUCTURES AND UTILITIES

No excavation shall be performed until site utilities have been field located. The Contractor shall take the necessary precautions to ensure no damage occurs to existing structures and utilities. Damage to existing structures and utilities resulting from the Contractor's operations shall be repaired. Utilities encountered that were not previously shown or otherwise located shall not be disturbed without approval from the Government.

### 3.2 CLEARING

Clearing shall be performed to the limits shown on the drawings in accordance with [Section 31 11 00 Clearing and Grubbing](#).

### 3.3 CONTAMINATED MATERIAL REMOVAL

#### 3.3.1 Excavation

Areas of contamination shall be excavated to the depth and extent shown on the drawings and not more than 0.5 feet beyond the depth and extent shown on the drawings unless directed by the Government. Excavation shall be performed in a manner that will limit spills and the potential for contaminated material to be mixed with uncontaminated material. An excavation log describing visible signs of contamination encountered shall be maintained for each area of excavation.

Inspect waste to ensure that it does not contain oversized materials (such as appliances, automobiles, large rocks, concrete, etc.) or materials that cannot be disposed of on site (such as batteries, hazardous chemicals, tires, etc.). Any unsuitable materials will be segregated, characterized, profiled, transported, and disposed of at an appropriately permitted recycling or disposal facility.

#### 3.3.2 Shoring

If workers must enter the excavation, it shall be evaluated, shored, sloped or braced as required by 29 CFR 1926 § 650.

### 3.3.3 Dewatering

Surface water shall be diverted to prevent entry into the excavation. Dewatering shall be limited to that necessary to assure adequate access, a safe excavation, prevent the spread of contamination, and to ensure that compaction requirements can be met.

### 3.4 CONFIRMATION SAMPLING AND ANALYSIS

After all material suspected of being contaminated has been removed, the excavation shall be examined for evidence of contamination. If the excavation appears to be free of contamination, field analysis shall be used to determine the presence of volatile organic compounds (VOCs) contamination using a real time vapor monitoring instrument. Field analysis of metals may be conducted using a hand-held x-ray fluorescence (XRF) spectrometer. Excavation of additional material shall be as directed by the Government. After all suspected contaminated material is removed, confirmation samples shall be collected and analyzed for the following contaminants:

- CAM 17 metals, by EPA Methods 6010B and 7470A/7471A
- VOCs, by EPA Method 8260B
- Polycyclic aromatic hydrocarbons (PAHs), by EPA Method 8270C
- Organochlorine pesticides, by EPA Method 8081A
- Dioxins and furans by EPA Method 8290
- Total petroleum hydrocarbons (TPH) quantified as gasoline, by EPA Method 8260B
- Extractable TPH quantified as diesel, by EPA Method 8015 with silica gel cleanup

Confirmation sample results will be compared with the lower of EPA regional screening levels (RSLs) for industrial reuse, California human health screening levels, unless background levels exceed these screening levels, in which case background levels will be used. During evaluation of confirmation samples, leachability testing may also be conducted, if appropriate.

Samples shall be collected at a frequency of at least one per 1,000 square feet. Based on test results, the Contractor shall propose any additional excavation which may be required to remove material which is contaminated above screening levels. Additional excavation shall be subject to approval by the Government. Locations of samples shall be marked in the field and documented on the as-built drawings.

### 3.5 PLACEMENT OF WASTE

#### 3.5.1 Compaction

Excavated waste shall be placed in lifts with a maximum loose thickness of 12 inches. Waste material shall be mechanically compacted with specialized construction equipment for the compaction of landfill waste.

### 3.6 AFTER ACTION REPORT

An After Action Report shall be prepared and submitted within 30 calendar days of completing work at the site. The report shall be labeled with the contract number, project name, location, date, name of Contractor. The After Action Report shall include the following information as a minimum:

- a. A cover letter signed by a Professional Engineer registered in the State of California certifying that all services involved have been performed in accordance with the terms and conditions of the contract documents and regulatory requirements.
- b. A narrative report including, but not limited to, the following:
  1. site conditions, groundwater elevation, and cleanup criteria
  2. excavation logs
  3. field screening readings
  4. quantity of materials removed from each area of contamination
  5. sampling locations and sampling methods
  6. sample collection data such as time of collection and method of preservation
  7. sample chain-of-custody forms
- c. Copies of all chemical and physical test results.
- d. Scale drawings showing limits of each excavation, limits of contamination, known underground utilities within 15 m (50 feet) of excavation, sample locations, and sample identification numbers. On-site stockpile, storage, treatment, loading, and disposal areas shall also be shown on the drawings.
- e. Progress Photographs. Color photographs shall be used to document progress of the work and shall include:
  1. Soil removal and sampling.
  2. Unanticipated events such as spills and the discovery of additional contaminated material.
  3. Contaminated material, handling, and transport.
  4. Waste placement and grading.

END OF SECTION

**SECTION 03 37 13**  
**FIBER REINFORCED CONCRETE****PART 1 GENERAL****1.1 REFERENCES**

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM A 820/A 820M	Standard Specification for Steel Fibers for Fiber-Reinforced Concrete
ASTM C 1077	Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
ASTM C 1116/C 1116M	Standard Specification for Fiber-Reinforced Concrete
ASTM C 136	Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C 150	Standard Specification for Portland Cement
ASTM C 171	Standard Specification for Sheet Materials for Curing Concrete
ASTM C 143	Standard Test Method for Slump of Hydraulic Cement Concrete
ASTM C 172	Standard Practice for Sampling Freshly Mixed Concrete
ASTM C 231	Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure method
ASTM C 309	Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C 33	Standard Specification for Concrete Aggregates
ASTM C 31	Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C 618	Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM C 685/C 685M	Concrete Made by Volumetric Batching and Continuous Mixing

ASTM C 881/C 881M	Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete
ASTM C 94/C 94M	Standard Specification for Ready-Mixed Concrete
COE CRD-C 400	(1963) Requirements for Water for Use in Mixing or Curing Concrete

## 1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. The following shall be submitted in accordance with [Section 01 33 00 Submittal Procedures](#).

### 1.2.1 SD-06 Test Reports

#### a. Mixture Proportions; G

The recommended mixture proportions, sources of materials, and all test results shall be submitted for approval.

#### b. Aggregates; G

Supplier's test reports for aggregates showing the materials meet the requirements of this specification.

#### c. Strength Tests

Contractor shall provide mix tests exhibiting the 28-day compressive strength of 3,000 psi per the specifications herein.

### 1.2.2 SD-07 Certificates

#### a. Synthetic (Polypropylene) Fiber Reinforcement

Fiber reinforcement shall be certified for compliance with ASTM A 820/A 820M.

## 1.3 QUALITY ASSURANCE

The Contractor shall provide facilities and labor as may be necessary for obtaining and testing representative test samples.

## 1.4 MIXTURE PROPORTIONS

Mixture proportions and test data from prior experience within 3 years, if available, may be submitted for approval. If test data from experience are not available or accepted, specimens shall be made and tested from mixtures having three or more different proportions. The recommended mixture proportions, sources of materials, and all test results shall be submitted for acceptance.

## 1.5 EVALUATION AND ACCEPTANCE

### 1.5.1 Strength

Final acceptance of the fiber reinforced concrete will be based on conformance to ASTM A 820/A 820M. Contractor shall provide mix exhibiting the 28-day compressive strength of 3,000 psi.

## PART 2 PRODUCTS

### 2.1 MATERIALS

#### 2.1.1 Cementitious Materials

Cementitious materials shall be Portland cement or Portland cement in combination with pozzolan, and shall conform to appropriate specifications listed below.

##### 2.1.1.1 Portland Cement

Portland cement shall meet the requirements of ASTM C 150 Type I, II, III, V with tricalcium aluminate limited to 5 percent if Type III is used.

##### 2.1.1.2 Pozzolan Other Than Silica Fume

Pozzolans shall conform to ASTM C 618, Class C, with the optional requirements for available alkalis from Table 1A multiple factor, drying shrinkage, and uniformity of Table 2A.

#### 2.1.2 Reinforcing Materials

Cementitious materials shall be Portland cement or Portland cement, in combination with pozzolan, and shall conform to appropriate specifications listed below.

#### 2.1.3 Aggregates

Aggregates shall conform to ASTM C 33 with the combined grading of coarse and fine aggregates conforming to the grading shown below.

SIEVE SIZE	PERCENT BY MASS PASSING INDIVIDUAL SIEVES		
	GRADING NO. 1	GRADING NO. 2	GRADING NO. 3*
19.0 mm (3/4 in.)	--	--	100
12.5 mm (1/2 in.)	--	100	80-95
9.5 mm (3/8 in.)	100	90-100	70-90
4.75 mm (No. 4)	95-100	75-85	50-70
2.36 mm (No. 8)	80-100	50-70	35-55
1.18 mm (No. 16)	50-85	35-55	20-40
600 μm (No. 30)	25-60	20-35	10-30
300 μm (No. 50)	10-30	10-30	5-17
150 μm (No. 100)	2-10	2-10	2-10

\* Fine and coarse aggregates shall be batched separately to avoid segregation.



#### 2.1.4 Water

Fresh, clean, potable mixing water or nonpotable water which meets the requirements of COE CRD-C 400 shall be used.

#### 2.1.5 Admixtures

Admixtures shall be dissolved in water before introduction into the concrete mixture.

#### 2.1.6 Curing Materials

Curing materials shall meet the following requirements.

##### 2.1.6.1 Impervious Sheet Materials

ASTM C 171, type optional except polyethylene film, if used, shall be white opaque.

##### 2.1.6.2 Membrane-Forming Curing Compound

ASTM C 309, Type 1-D or Type 2.

#### 2.1.7 Reinforcement

##### 2.1.7.1 Synthetic (Polypropylene) Fiber Reinforcement

Synthetic (polypropylene) fiber reinforcement shall meet the requirements of ASTM C 1116/C 1116M.

### PART 3 EXECUTION

#### 3.1 PRODUCTION OF FIBER REINFORCED CONCRETE

The fiber reinforced concrete shall be produced by wet-mix process.

##### 3.1.1 Wet Mix Process

###### 3.1.1.1 Batching and Mixing

Batching and mixing shall be accomplished in accordance with the applicable provisions of ASTM C 94/C 94M. If volumetric batching and mixing are used, the materials shall be batched and mixed in accordance with the applicable provisions of ASTM C 685/C 685M. The mixing equipment shall be capable of thoroughly mixing the specified materials in sufficient quantity to maintain continuous placing. Ready-mix concrete complying with ASTM C 94/C 94M may be used.

### 3.1.1.2 Delivery Equipment

The equipment shall be capable of delivering the premixed materials accurately, uniformly, and continuously through the delivery hose.

Recommendations of the equipment manufacturer shall be followed for cleaning, inspection, and maintenance of the equipment.

### 3.1.1.3 Air Content

Air-entraining admixture shall be used in such proportion that the air content of the concrete prior to pouring shall be 6 plus or minus ( $\pm$ ) 1.0 percent as determined by ASTM C 231.

## 3.2 PREPARATION OF SURFACES

Earth shall be compacted and trimmed to line and graded before placement of concrete. Surfaces to receive concrete shall be dampened.

## 3.3 PLACEMENT OF CONCRETE

Concrete shall be placed using suitable delivery equipment and procedures. The area to which concrete is to be applied shall be clean and free of debris.

## 3.4 REPAIR OF DEFECTS

### 3.4.1 Defects

Defective areas larger than 48 square inches or 2 inches deep shall be removed and replaced with fresh concrete. These defects include honeycombing, lamination, dry patches, voids, or sand pockets.

#### 3.4.1.1 Repairs

All repairs shall be made within 1 week of the time the deficiency is discovered. All unacceptable materials shall be removed and repaired by the procedures described in the following two paragraphs.

#### 3.4.1.2 Minor Patching

Minor patching may be accomplished with a dry-pack mixture. Patches that exceed 0.1 cubic foot in volume shall receive a brush coat of approved epoxy resin meeting ASTM C 881/C 881M, Type II, as a prime coat. Care shall be taken not to spill epoxy or overcoat the repair surface so that the epoxy runs or is squeezed out onto the surface which will remain exposed to view. Epoxy resin shall be used in strict conformance with manufacturer's recommendations with special attention paid to pot life, safety, and thin film tack time.

### 3.5 QC TESTING

#### 3.5.1 Strength Testing

- a. Take concrete samples during placement in accordance with ASTM C 172. All concrete shall have a maximum slump of 4 in. as measured in accordance with ASTM C 143. Perform slump tests at commencement of concrete placement, and as a minimum, each batch and every 10 cubic yards of concrete, whichever is greater.
- b. Make three (3) test cylinders for each set of tests in accordance with ASTM C 31. Precautions shall be taken to prevent evaporation and loss of water from the specimen. Test one cylinder at 7 days and two cylinders at 28 days. Samples for strength tests shall be taken at the commencement of concrete placement and not less than once for each 100 cubic yards of concrete. For the entire project, take no less than one set of samples and perform strength tests. Each strength test result shall be the average of two cylinders from the same concrete sample tested at 28 days.

#### 3.5.2 Grading

The grading of the coarse and fine aggregate shall be determined in accordance with ASTM C 136. The fine and coarse aggregate grading shall be determined prior to batching the concrete and at least once during a shift in which concrete is being batched. The Contracting Officer will have the option to require one additional sieve analysis test for aggregate type.

END OF SECTION

**SECTION 31 00 00  
EARTHWORK**

**PART 1 GENERAL**

**1.1 REFERENCES**

The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

**ASTM INTERNATIONAL**

- ASTM D 422 (1963; R 2007) Particle-Size Analysis of Soils
- ASTM D 1557 (2000) Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup>)
- ASTM D 2216 (1998) Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
- ASTM D 2487 (2000) Classification of Soils for Engineering Purposes (Unified Soil Classification System)
- ASTM D 2488 (2000) Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)
- ASTM D 6938 (2008) Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

**Public Works Standards, Inc.**

- Greenbook (2006) Standard Specifications for Public Works Construction

**SOIL SCIENCE SOCIETY OF AMERICA (SSSA)**

- SSSA and ASA A. Klute, editor. Number 5 in the Soil Science Society of America Book Series. "Methods of Soil Analysis: Part 1-Physical and Mineralogical Methods." 1986.

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY (EPA)**

- SW 846 (May 1997) Test Methods for Evaluating Solid Waste

**1.2 DEFINITIONS**

**Solid Waste:** Rubbish, debris, garbage, and other discarded solid non-inert materials resulting from industrial, commercial, and agricultural operations and from community activities.

**Foundation Layer:** The foundation layer consists of a 2-foot-thick layer of compacted soil. The foundation layer supports the geosynthetic layers indicated on the project plans. The foundation layer consists predominantly of existing cover materials with the addition of native material as needed.

**Low Permeability Geomembrane:** The low permeability geomembrane is a 60-mil double-sided textured linear low-density polyethylene (LLDPE) liner that forms a hydraulic barrier in the landfill cap. The LLDPE liner is constructed on the foundation layer. The geomembrane liner is specified in [Section 02 56 13, Polyethylene Geomembrane Liner](#).

**Drainage Layer:** The drainage layer consists of a one-foot thick layer of sand with a medium to high permeability to promote drainage off the geomembrane on steep cover slopes.

**Geocomposite Layer:** The geocomposite layer lies above the low-permeability geomembrane. Except on steep slopes, where overlies the drainage layer. The geocomposite drainage layer is specified in [Section 31 05 20, Geocomposite Drainage Layer](#).

**Cover Layer:** The cover layer consists of a 2-foot thick layer of compacted soil. The cover layer is constructed using native material from the borrow area,

**Geogrid Layers:** Two layers of geogrid are placed within the cap at 6 and 12 inches below final ground surface within the vegetative layer. The geogrid is specified in [Section 31 05 21, Geogrid Soil Reinforcement](#).

**Vegetative Layer:** The top layer of the cover (vegetative layer) shall consist of soil that is capable of supporting plant growth. The top soil cover shall have a minimum compacted thickness of 12 inches.

**Access Road:** The access road shall consist of native material and shall follow the alignment specified on the design drawings.

**Drainage Channel:** The drainage channel shall consist of compacted native material and shall follow the alignments specified on the design drawings.

### 1.3 SUBMITTALS

Submit the following in accordance with [Section 01 33 00 Submittal Procedures](#).

#### 1.3.1 SD-06 Field Test Reports

- a. Soil cover, foundation layer, and access road material tests

See Table 3 for testing frequency and type. Submit raw data as available.

## 1.3.2 SD-09 Manufacturer's Test Reports

## a. Top soil analysis; G

The results of the top soil analysis and laboratory's recommendations for plant growth shall be supplied to the Government for approval prior to revegetation with approved seed mix.

## 1.3.3 SD-11 Closeout Submittals

## a. Final soil cover survey with As-Built Drawings

## b. Survey information for permanent local site monuments

## 1.4 DELIVERY, STORAGE, AND HANDLING

Perform in a manner to prevent contamination or segregation of materials.

## PART 2 PRODUCTS

## 2.1 FOUNDATION LAYER MATERIAL

Foundation layer material shall consist of onsite native soil.

## 2.2 DRAINAGE LAYER MATERIAL

Drainage layer material (for steep cover slopes) shall consist of natural or manufactured granular material, or a combination thereof, free of soil particles larger than 0.5-inch diameter, brush, weeds, toxic substances, and other deleterious material. Drainage layer materials will conform to the gradation presented in Table 1.

**TABLE 1. DRAINAGE LAYER SAND GRADATION**

Sieve Size	Percentage Passing Sieve
12.7 mm (1/2 in)	100
4.75 mm (No.4)	95-100
2.36 mm (No.8)	75-95
600 µm (No.30)	30-50
300 µm (No.50)	10-25
150 µm (No.100)	2-10
75 µm (No.200)	0-8

### 2.3 COVER LAYER

Cover material shall consist of natural, clean, well-drained soils capable of being compacted to at least 90 percent of the maximum dry density. General fill shall be free of sub-soil, stumps, rock larger than 6-inch diameter, brush, weeds, toxic substances, and other harmful material.

### 2.4 VEGETATIVE LAYER

Natural, clean, friable soil representative of productive, well-drained soils. Vegetative soils shall be free of sub-soil, stumps, rock larger than 2-inch diameter, brush, weeds, toxic substances, and other material detrimental to plant growth.

### 2.5 ACCESS ROAD

Native material.

### 2.5 DRAINAGE CHANNEL

**Base Material:** Native material.

**Rock protection:** 8-15-inch diameter rock

**Concrete:** Fiber-reinforced 3,000 psi concrete as described in [Section 03 37 13](#).

## PART 3 EXECUTION

### 3.1 SCHEDULE

Contractor shall schedule earthwork such that hydroseeding occurs in the months specified (see [Section 32 92 00 Landscaping](#), Part 3.1.1). Contractor is responsible for maintaining completed work and environmental controls (see [Section 01 57 19 Temporary Environmental Controls](#)) at all times, including gaps in construction activity.

All mass grading at the site shall be conducted exclusively during the dry season from April 15 to October 15. If unavoidable delays require earthwork following the dry season, an erosion and sedimentation control program plan shall be prepared and submitted prior to the start of work in October. The erosion and sedimentation control plan shall detail erosion control measures to minimize erosion during the rainy season and shall be made available for review and comment by the Lahontan Regional Water Quality Control Board in advance of rainy season work.

### 3.2 STORMWATER BEST MANAGEMENT PRACTICES

During initial site preparation and throughout construction, maintain stormwater best management practices specified in approved SWPPP. Perform stormwater discharge monitoring. Stormwater management and erosion control must conform to the requirements of local, county, and state regulatory requirements, including:

- State Water Resources Control Board Order No. R6T-2005-0007 (Updated Waste Discharge Requirements And National Pollutant Discharge Elimination System General Permit No. CAG616002-Discharges of Storm Water Runoff Associated With Construction Activity Involving Land Disturbance In The Lake Tahoe Hydrologic Unit, El Dorado, Placer, And Alpine Counties)
- State Water Resources Control Board Order No. 97-03-DWQ (Waste Discharge Requirements for Discharges of Storm Water Associated with Industrial Activities Excluding Construction Activities)

### 3.3 PROTECTION

#### 3.3.1 Drainage and Dewatering

Provide for the collection and reuse or disposal of potentially contaminated surface and subsurface water encountered during construction.

##### 3.3.1.1 Drainage

So that construction operations progress successfully, drain the site during periods of construction to keep soil materials sufficiently dry. The Contractor shall establish storm drainage features at the earliest stages of site development. Throughout construction, grade the construction area to provide positive surface water runoff away from the construction activity or provide temporary ditches, swales, and other drainage features and equipment as required to maintain dry soils. When unsuitable working platforms for equipment operation and unsuitable soil support for subsequent construction features develop, remove unsuitable material and provide new soil material as specified herein. The Contractor is responsible for assessing the conditions of soil and groundwater presented by the design and to employ necessary measures to permit construction to proceed.

##### 3.3.1.2 Dewatering

Water generated by dewatering areas adjacent to the landfill or any other water that may have contacted waste or contaminated soil shall not be discharged from the site. This water will be collected, stored and used for moisture conditioning of the foundation layer or for dust control within the footprint of the landfill, prior to installation of the geosynthetic layers. This water shall not be used for moisture conditioning of any layer located above the geosynthetic layers. Water that is not used for dust control or moisture conditioning shall be containerized, analyzed for chemical constituents, and subsequently disposed at an appropriate facility based on chemical characterization.

### 3.4 EXCAVATION OF EXISTING CAP

The top two feet of the existing cap shall be excavated from both the waste removal and waste consolidation areas. Excavated cap soils shall be stockpiled and reused as foundation soil.



### 3.5 WASTE EXCAVATION AND CONSOLIDATION

Waste shall be excavated and regraded on the north and east portions of the landfill footprint in accordance with the RD. Waste located above the sewer line shall be excavated in a manner that minimizes the risk of damage to the sewer line.

Excavated waste shall be direct loaded and hauled to the waste consolidation area. Prior to placement, waste shall be visually inspected to ensure that only acceptable wastes are consolidated on site. Any oversized or non-compactable waste (such as household appliances, automobiles, etc.) or materials that cannot be disposed of on site (such as car batteries, tires, etc.) shall be segregated, characterized, profiled, transported, and disposed of at an appropriately permitted recycling or disposal facility. The waste shall be placed in 12-inch-thick loose lifts and mechanically compacted using specialized construction equipment for compaction of landfill waste.

### 3.6 FOUNDATION LAYER

The stockpiled existing cap material shall be used to construct the 2-foot-thick foundation layer. If additional material is required, native material from the borrow area shall be used to complete the layer. The foundation layer shall be constructed in 8-inch loose lifts and compacted to an average of 90 percent of the maximum dry density, but no less than 85 percent at any location. The foundation layer will be inspected immediately prior to placing the geosynthetic layers to ensure that there are no sharp objects or rocks larger than 0.5 inch protruding at the surface that may damage the liner.

### 3.7 GEOMEMBRANE LAYER

The foundation layer will be covered with a LLDPE geomembrane. The geomembrane will be covered with a drainage layer. The placement of these layers is also illustrated on the project drawings.

### 3.8 DRAINAGE LAYER

A 1-foot-thick drainage layer shall be placed above the geomembrane. The drainage layer shall be placed in 12-inch lifts compacted to 85 percent of the maximum dry density.

### 3.9 GEOCOMPOSITE LAYER

The drainage layer will be covered with a geocomposite to further promote drainage off the geomembrane. The geocomposite will be covered with cover material. The placement of these layers is also illustrated on the project drawings.

### 3.10 COVER AND VEGETATIVE LAYERS

The 24-inch-thick cover layer shall be placed in 12-inch lifts and compacted to 85 percent of the maximum dry density in the first lift where the cover soil is in contact

with the geocomposite and 90 percent in the subsequent lifts. The first lift may not contain sharp objects or rocks larger than 0.5 inch protruding that may damage the liner. The material required to construct the cover layer shall be acquired from the on-site borrow area.

The 12-inch-thick vegetative layer shall consist of the native material amended with a high-organic content topsoil to promote vegetative growth. The vegetative layer shall be placed in a single 12-inch lift and compacted to 85 to 90 percent of maximum density. Over the 12-inch corrugated drainage pipe, the road thickness shall be increased to 24 inches for a span of 5 feet on either side of the pipe. The road shall gradually transition from one thickness to another in this area.

3.11 GEOCOMPOSITE LAYER

The drainage layer will be covered with a geocomposite to further promote drainage off the geomembrane. The geocomposite will be covered with cover material. The placement of these layers is also illustrated on the project drawings.

3.12 FINISHING OPERATIONS

3.12.1 Grading

Finish grades as indicated within plus or minus one tenth of one foot (0.1 feet). Grade smooth existing surfaces that are to remain but have been disturbed by the Contractor’s operations.

3.12.2 Vegetative Layer

The vegetative layer shall be graded to the slopes shown on the Drawings.

3.12.2.1 Topsoil Test

A soil test shall be performed for every acre of applied vegetative material. The soil test shall be performed to assess the suitability of soil to support the native plant species approved by the Government for use in revegetation and shall identify type and quantity of soil amendments. The soil test laboratory shall be located in California and shall analyze soils according to University of California soil testing procedures, American Society of Agronomy chemical and microbiological analyses, or the equivalent.

Soils shall be tested for the following constituents:

Nitrate-Nitrogen	Calcium	Sodium Adsorption Ratio
Phosphorus	Magnesium	Boron
Potassium	Sodium	Chloride
Sulfate	Zinc	Manganese
Iron	Copper	Cation Exchange Capacity
Percent Base Saturation	Limestone	pH
Salinity	Organic Matter	Gypsum Requirement

The soil test laboratory shall recommend type and application rate of soil amendments based on soil test results. Top soil testing shall be performed using the analytical methods presented in Table 2.

**TABLE 2. ANALYTICAL METHODS FOR DETERMINING TOP SOIL PROPERTIES**

Analysis Package	Analyte	Method
Complete Agronomic	pH (saturated paste)	SSSA 1986, Method 10.3.1
	Organic matter %	SSSA 1986Method 29-3.5.2
	Nitrate-nitrogen	SSSA 1986Method 33-8.1
	Available phosphorus (Olsen or Bray)	SSSA 1986Method 24-5.4 SSSA 1986Method 24-5.1
	Potassium (ammonium acetate extractable)	SSSA 1986Method 13-3.5
	Sodium	SSSA 1986Method 13-4
	Sulfate	SSSA 1986Method 10-3.7
	Lime requirement	SSSA 1986Method 12-3
	Electrical conductivity	SSSA 1986Method 10-3.3
	Texture	SSSA 1986 Method 15-5

Note:

SSSA SOIL SCIENCE SOCIETY OF AMERICA A. Klute, editor. Number 5 in the Soil Science Society of America Book Series. "Methods of Soil Analysis: Part 1-Physical and Mineralogical Methods." 1986.

### 3.12.3 Hydroseed

Provide as specified by the Government (see [Section 32 92 00 Landscaping](#)).

### 3.12.4 Access Road

Access road shall comprise 12 inches of native material compacted to 95 percent of the maximum density.

### 3.12.5 Access Road

Drainage channel base material shall comprise native material compacted to 90 percent of the maximum density.

### 3.12.6 Protection of Surfaces

Protect newly graded areas from erosion (see [Section 01 57 19 Temporary Environmental Controls](#)), and settlement that may occur. Repair or reestablish damaged grades, elevations, or slopes.

## 3.13 DISPOSAL OF SURPLUS MATERIAL

Contractor shall minimize the generation of waste, inorganic trash, or debris whenever possible, recycle as much material as possible, and utilize local waste recovery sites available in the area.

## 3.14 FIELD QUALITY CONTROL

## 3.14.1 Sampling

Collect the number and size of samples required to perform the specified tests of source materials.

## 3.14.2 Source Testing

Determine laboratory compaction characteristics and soil classification for soil materials used. See Table 3.

**TABLE 3. FOUNDATION LAYER AND SOIL COVER TESTING REQUIREMENTS AND FREQUENCY**

Material	Test	ASTM Method	Frequency	Required Minimum Criteria
All Foundation and Cover Soils	Density and Moisture	Nuclear gauge D 6938	One per 10,000 s.f. per lift of compacted fill	See Table 4
All Foundation and Cover Soils	Oven Moisture Content	ASTM D 2216	As necessary to check nuclear method	n/a
All Foundation and Cover Soils	Compaction Curves	Mod. Proctor D 1557	Every 5,000 CY	n/a
All Foundation and Cover Soils	Identification of Soils (Unified Soil Classification System)	D 2487	Every 5,000 CY or one per change in material, whichever occurs first	n/a
All Foundation and Cover Soils	Description and Identification of Soils (Visual-Manual Procedure)	D 2488	As needed to identify change in material	n/a
Top Lift of Foundation Soil	Sieve Analysis	ASTM D 422	One per 5,000 CY	1) No particle larger than ½"
Sand Drainage Layer	Sieve Analysis	ASTM D 422	One per 5,000 CY	1) No particle larger than ½" 2) No more than 8% passing #200
First Lift of Cover Soil	Sieve Analysis	ASTM D 422	One per 5,000 CY	1) No particle larger than ½" 2) No more than 15% passing #200
Access Road	Density and Moisture	Nuclear gauge D 6938	One per 500 LF. per lift of compacted material	See Table 4

### 3.14.3 Field Density Tests

See Tables 3 and 4. If a test location fails, the surrounding area shall be reworked up to at least half the distance to all nearby test locations that passed. Then, a new location within 10 feet of the previous test location shall be retested. Repeat until test location area passes.

**TABLE 4. FOUNDATION LAYER AND SOIL COVER COMPACTION REQUIREMENTS**

Fill Type	Maximum Loose Lift Thickness	Moisture Content	Minimum Density	Method of Test
Foundation Layer	8 inches	± 3% of optimum	average of 90 % but no less than 85 percent	ASTM D 1557
Drainage Layer	12 inches	± 3% of optimum	85% min	ASTM D 1557
First Lift of Cover Layer	12 inches	± 3% of optimum	85% min	ASTM D 1557
Subsequent Lifts of Cover Layer	12 inches	± 3% of optimum	90% min	ASTM D 1557
Vegetative Layer	8 inches	± 3% of optimum	85% to 90%max	ASTM D 1557
Access Road	6 inches	± 3% of optimum	95% min	ASTM D 1557

## 3.15 SURVEY

### 3.15.1 Final Cover Survey

Perform a final cover survey of the cover once construction is complete. Include the final survey information with the As-Built Drawings.

### 3.15.2 Permanent Local Monuments

Install two permanent monuments (settlement markers) on the final cover. Monuments shall be installed by a licensed Land Surveyor, from which the location and elevation of wastes, containment structures, and monitoring facilities can be determined throughout the post-closure maintenance period.

END OF SECTION

**SECTION 31 05 20**  
**GEOCOMPOSITE DRAINAGE LAYER**

**PART 1 GENERAL**

**1.1 REFERENCES**

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D 1505	(2003) Density of Plastics by the Density-Gradient Technique
ASTM D 1603	(2006) Carbon Black Content in Olefin Plastics
ASTM D 4218	(1996; R 2001) Determination of Carbon Black Content in Polyethylene Compounds by the Muffle-Furnace Technique
ASTM D 4355	(2007) Deterioration of Geotextiles from Exposure to Light, Moisture and Heat in a Xenon-Arc Type Apparatus
ASTM D 4491	(1999a; R 2004e1) Water Permeability of Geotextiles by Permittivity
ASTM D 4533	(2004) Trapezoid Tearing Strength of Geotextiles
ASTM D 4632	(1991; R 2003) Grab Breaking Load and Elongation of Geotextiles
ASTM D 4716	(2007) Determining the (In-Plane) Flow Rate Per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head
ASTM D 4751	(2004) Determining Apparent Opening Size of a Geotextile
ASTM D 4833	(2007) Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products
ASTM D 5035	(2006) Breaking Force and Elongation of Textile Fabrics (Strip Method)
ASTM D 5199	(2001; R 2006) Measuring Nominal Thickness of Geosynthetics
ASTM D 5261	(1992; R 2003) Measuring Mass Per Unit Area of Geotextiles

GEOSYNTHETIC INSTITUTE (GSI)

GSI GRI GC7	(1997) Determination of Adhesion and Bond Strength of Geocomposites
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## 1.2 SUBMITTALS

Submit the following in accordance with [Section 01 33 00 Submittal Procedures](#).

### 1.2.1 SD-03 Product Data

- a. Geocomposite drainage layer properties
- b. Manufacturer's QC manual

### 1.2.2 SD-06 Test Reports

- a. Manufacturing QC test results

### 1.2.3 SD-07 Certificates

Written certification or manufacturers quality control data which displays that the geocomposite meets or exceeds minimum average roll values (MARV) specified herein.

## 1.3 DELIVERY, STORAGE, AND HANDLING

The QC inspector shall be present during delivery and unloading of the geosynthetic drainage layer. Ensure the drainage layer material has not been damaged during shipping, storage, or handling. Any drainage layer material found to be damaged shall be repaired or replaced. Accept delivery of material only after the required submittals have been approved. Each roll shall be labeled with the manufacturer's name, product identification, lot number, roll number, and roll dimensions. Rolls that have attached geotextiles shall be individually wrapped in plastic. Store the rolls in a level and dry area.

## PART 2 PRODUCTS

### 2.1 GEOCOMPOSITE DRAINAGE LAYER

The geocomposite shall be GSE PermaNet UL double-sided 6 oz/yd<sup>2</sup> geocomposite, or equivalent. The polymer used to manufacture the geonet component of the geocomposite drainage layer shall be polyethylene which is clean and free of any foreign contaminants. Re grind material which consists of edge trimmings and other scraps may be used to manufacture the geonet; however, post-consumer recycled materials shall not be used. Conform the geocomposite drainage layer to the property requirements listed in Table 1. Component criteria for the geonet alone and geotextile alone are also listed in Table 1. The manufacturer shall sample and test the geocomposite, at a minimum, once every 100,000 square feet to demonstrate that its properties conform to the values specified in Table 1. The geonet shall be covered on both sides with nonwoven geotextile. Create geocomposite by heat bonding geotextile to the geonet. The geotextile shall not be bonded to the drainage net within 6 inches of the edges of the rolls. Where applicable, Table 1 property values represent MARVs. The value for AOS represents the maximum average roll value (MaxARV).

**TABLE 1 - GEOCOMPOSITE DRAINAGE LAYER PROPERTIES**

Property	Test Method	Units	Minimum Required Value
<b>GEONET</b>			
Thickness <sup>1</sup>	ASTM D 5199	mil (mm)	300 (7.6)
Polymer Density, minimum average	ASTM D 1505	g/cm <sup>3</sup>	0.940
Tensile Strength minimum average (machine direction) <sup>2</sup>	ASTM D 5035	lb/in (N/mm)	100 (17)
Carbon Black Content	ASTM D 1603/ ASTM D 4218	percent	2.0
<b>NONWOVEN GEOTEXTILE</b>			
Mass/Unit Area, MARV	ASTM D 5261	oz/yd <sup>2</sup>	6.0
Grab Tensile Strength, MARV	ASTM D 4632	lbs	170
Puncture Strength, MARV	ASTM D 4833	lbs	90
Permittivity, MARV	ASTM D 4491	sec <sup>-1</sup>	1.5
AOS(O95), MaxARV	ASTM D 4751	US sieve (mm)	70 (0.21)
UV Stability, percent retained (500 hrs) <sup>3</sup>	ASTM D 4355	percent	70
<b>GEOCOMPOSITE</b>			
Transmissivity, minimum, including attached geotextiles <sup>4</sup>	ASTM D 4716	gal/min-foot (m <sup>2</sup> /sec)	4.8 (1x10 <sup>-3</sup> )
Geonet/Geotextile Adhesion, minimum average <sup>5</sup>	GSI GRI GC7	lb/in (g/cm)	1.0 (178)

Note 1: The diameter of the presser foot shall be 2.22 inches and the pressure shall be 2.9 psi. For other thickness options, see manufacturer's literature.

Note 2: This is the average peak value for five equally spaced machine direction tests across the roll width.

Note 3: Use manufacturer's historical data. Does not need to be tested 1 every 100,000 ft<sup>2</sup>.

Note 4: Measure manufacturing quality control transmissivity tests using a gradient of 0.1 under a normal pressure of 25,000 psf. Use a minimum seating period of 15 minutes. Perform the test between rigid end platens.

Note 5: Average of five tests across the roll width. Discounting the outer 305 mm of each side of the roll, collect samples at the 10, 30, 50, 70, and 90 percent positions across the roll width. Test both sides for double sided geocomposites.)

## 2.2 SAMPLING AND TESTING

### 2.2.1 Manufacturing Quality Control Testing

Manufacturing quality control test methods shall be in accordance with Table 1 and shall be performed at a minimum, 1 per every 100,000 square feet, unless otherwise approved.



## PART 3 EXECUTION

### 3.1 INSTALLATION

#### 3.1.1 Surface Preparation

Prior to placement of the geosynthetic drainage layer, the subgrade shall be smooth and free of all materials which could damage the drainage layer.

#### 3.1.2 Placement

The geosynthetic drainage layer shall not be damaged during placement. Unroll the drainage layer in the direction of maximum slope, keeping the net flat against the subgrade to minimize wrinkles and folds. The drainage layer shall not be dragged across textured geomembrane if a geotextile is attached to the surface facing the geomembrane. Place adequate ballast (e.g. sandbags) to prevent uplift by wind prior to covering.

#### 3.1.3 Seams and Overlaps

- a. The components of the geocomposite (e.g., geonet-geotextile) are not bonded together at the ends and edges of the rolls. Each component will be secured or seamed to the like component at overlaps.
- b. Geonet Components:
  1. The geonet components shall be overlapped by at least 4 inches. These overlaps shall be secured by tying.
  2. Tying shall be achieved by nylon cable ties. Tying devices shall be white or yellow for easy inspection. Metallic devices shall not be used.
  3. Tying shall be at a minimum of every 5 feet along the slope, every 1 foot across the slope, every 6 inches in any anchor trench and every 10 feet on horizontal surfaces.
- c. Geotextile Component:
  1. The bottom layers of geotextile shall be overlapped. The top layers of geotextiles shall be continuously sewn (spot sewing is not allowed). Geotextiles shall be overlapped a minimum of 6 inches prior to sewing.
  2. Polymeric thread, with chemical resistance properties equal to or exceeding those of the geotextile component, shall be used for all sewing. The seams shall be sewn using Stitch Type 401. The seam type shall be Federal Standard Type Ssa-1.
  3. Horizontal seams on slopes steeper than 100 horizontal to 1 vertical shall be sewn twice as specified above.

## 3.2 REPAIRS

### 3.2.1 Geonet Damage

Make repairs by placing a patch of the geosynthetic drainage layer over the damaged area. Extend the patch a minimum of 2 feet beyond the edge of the damage. Use approved fasteners, spaced every 6 inches around the patch, to hold the patch in place. If more than 25 percent of the roll width is damaged, approval must be obtained to repair or replace the damaged roll.

### 3.2.2 Geotextile Damage

Repair damaged geotextile by placing a patch of geotextile over the damaged area with a minimum of 12 inches of overlap in all directions. The geotextile patch shall be thermally bonded in place.

## 3.3 PROTECTION AND BACKFILLING

Cover the geosynthetic drainage layer with the specified materials within 14 days of acceptance. Place cover soil from the bottom of the slope upward and shall not be dropped directly onto the drainage layer from a height greater than 3 feet. The cover soil shall be pushed out over the geosynthetic drainage layer in an upward tumbling motion so that wrinkles in the drainage layer do not fold over. No equipment shall be operated on the top surface of the geosynthetic drainage layer without permission from the Government. The initial loose soil lift thickness shall be 8 inches. Use equipment with ground pressures no greater than 5 psi to place the first lift of soil. A minimum of 12 inches of soil shall be maintained between construction equipment with a ground pressure greater than 5 psi and the drainage layer.

END OF SECTION

**SECTION 31 05 21  
GEOGRID SOIL REINFORCEMENT****PART 1 GENERAL****1.1 REFERENCES**

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

**ASTM INTERNATIONAL (ASTM)**

ASTM D 4355	(2007) Deterioration of Geotextiles from Exposure to Light, Moisture and Heat in a Xenon-Arc Type Apparatus
ASTM D 4595	(2005) Tensile Properties of Geotextiles by the Wide-Width Strip Method
ASTM D 4873	(2002) Identification, Storage, and Handling of Geosynthetic Rolls and Samples
ASTM D 5262	(2007) Evaluating the Unconfined Tension Creep Behavior of Geosynthetics
ASTM D 5321	(2002) Determining the Coefficient of Soil and Geosynthetic or Geosynthetic and Geosynthetic Friction by the Direct Shear Method

**1.2 SUBMITTALS**

Submit the following in accordance with [Section 01 33 00 Submittal Procedures](#):

**SD-02 Shop Drawings**

- a. Installation Drawings and Instructions, including geogrid layout plan along with anchorage and joint details.
- b. Sequencing and construction procedures.

**1.3 DELIVERY, STORAGE, AND HANDLING**

Check products upon delivery to ensure that the proper material has been received and is dry and undamaged. Protect the materials from damage and exposure following the guidelines presented in ASTM D 4873.

**1.3.1 Labeling**

Label each roll with the manufacturer's name, product identification, roll dimensions, lot number, and date manufactured.

### 1.3.2 Handling

Handle and unload geogrid rolls by hand, or with load carrying straps, a fork lift with a stinger bar, or an axial bar assembly. Geosynthetic rolls shall not be dragged, lifted by one end, lifted by cables or chains, or dropped to the ground.

### 1.3.3 Storage

Protect geogrid from deleterious materials, chemicals, sparks and flames, temperatures in excess of 160 °F, and any other environmental condition that may degrade the physical properties. If stored outdoors, the rolls shall be elevated from the ground surface. Protect geogrids, except for extruded grids, with an opaque waterproof cover.

## PART 2 PRODUCTS

### 2.1 GEOGRID REINFORCEMENT

Provide two layers of Mirafi® BXG11 geogrid (or equivalent) to reinforce the cover slopes against seismic deformation. The geogrid is a geosynthetic manufactured for reinforcement applications and a regular network of integrally connected polymer tensile elements with aperture geometry sufficient to permit significant mechanical interlock with the surrounding soil, aggregate, or other fill materials. The geogrid structure shall be dimensionally stable and able to retain its geometry under manufacture, transport and installation. The geogrid shall be manufactured with 100 percent virgin resin consisting of polyethylene, polypropylene, polyester, or other approved material and with a maximum of 5 percent in-plant regrind material. Polyester resin shall have a minimum molecular weight of 25,000 and a carboxyl end group number less than 30. Polyethylene and polypropylene shall be stabilized with long term antioxidants. Submit Certificates of Compliance for the materials provided as specified in the Submittals paragraph.

#### 2.1.1 Geogrid Reinforcement Properties

The reinforcement shown on the contract drawings shall meet the property requirements listed in Table 1. Reinforcement strength requirements represent minimum average roll values in the machine direction.

**TABLE 1 GEOGRID PROPERTY REQUIREMENTS:**

Property	Test Method	Required Value	
		Machine Direction	Cross Machine Direction
Tensile Strength @ 1% Strain	ASTM D 6637	300 lb/ft	300 lb/ft
Tensile Strength @ 2% Strain	ASTM D 6637	500 lb/ft	500 lb/ft
Tensile Strength @ 5% Strain	ASTM D 6637	920 lb/ft	920 lb/ft
Tensile Modulus @ 5% Strain	ASTM D 6637	30,000 lb/ft	30,000 lb/ft
Ultimate Tensile Strength	ASTM D 6637	2,000 lb/ft	2,000 lb/ft

## PART 3 EXECUTION

### 3.1 INSTALLATION

#### 3.1.1 Subgrade Preparation

Immediately prior to placement of the geogrid, the surface on which the geogrid will be placed shall be free of rock and other material that could damage the geogrid or the underlying geosynthetics.

#### 3.1.2 Placement

Install the geogrid in accordance with the Manufacturer's recommendations. Unroll the geogrid in the direction of reinforcement. After a layer of geogrid has been placed, use suitable means that do not damage the underlying geosynthetics to hold the geogrid flat and in place until cover soil can be placed. Geogrid damaged during placement and covering shall be removed and replaced.

#### 3.1.3 Overlaps and Fasteners

Adjacent rolls of geogrid shall be positioned edge-to-edge and loosely fastened to maintain alignment during fill placement. Adjacent rolls shall not be overlapped. Use fastener type and spacing as recommended by the manufacturer. Metallic fasteners will not be allowed.

#### 3.1.4 Penetrations

For small penetrations through geogrids, only transverse members of the geogrid shall be cut. The load-carrying longitudinal (machine direction) members shall be spread around the penetration. For larger penetrations, additional geogrid shall be placed on each side of the penetration and spliced to the adjacent geogrid to compensate for any longitudinal tensile members that must be cut.

### 3.2 COVER SOIL PLACEMENT

Cover geogrid with soil within 5 calendar days of acceptance. Keep the geogrid smooth and taut during placement of cover materials. Cover soil shall not be dropped onto the geogrid from a height greater than 3 feet. The soil shall be pushed out over the geogrid in an upward tumbling motion. Place soil from the bottom of the slope upward. The initial loose soil lift thickness shall be 8 inches). Use equipment with ground pressures less than 5 psi to place the first lift over the geogrid. A minimum of 6 inches of soil shall be maintained between construction equipment with ground pressures greater than 5 psi and the geogrid. Equipment placing cover soil shall not stop abruptly, make sharp turns, spin their wheels, or travel at speeds exceeding 5 mph). Additional cover soil material and placement requirements are described in [Section 31 00 00 Earthwork](#).

### 3.3 OVERSIGHT

Keep a QC Representative present at all times during geogrid installation.

END OF SECTION

## **SECTION 31 11 00 CLEARING AND GRUBBING**

### **PART 1 GENERAL**

#### **1.1 DELIVERY, STORAGE, AND HANDLING**

Deliver materials to store at the site, and handle in a manner which will maintain the materials in their original manufactured or fabricated condition until ready for use.

### **PART 2 PRODUCTS**

Not used.

### **PART 3 EXECUTION**

#### **3.1 PROTECTION**

##### **3.1.1 Roads and Walks**

Keep roads and walks free of dirt and debris at all times.

##### **3.1.2 Trees, Shrubs, and Existing Facilities**

Trees and vegetation to be left standing shall be protected from damage incident to clearing, grubbing, and construction operations by the erection of barriers or by such other means as the circumstances require.

##### **3.1.3 Utility Lines**

Protect existing utility lines that are indicated to remain from damage. The Contractor shall be responsible for the repairs or damage to existing utility lines that are indicated or made known to the Contractor prior to start of clearing and grubbing operations.

#### **3.2 CLEARING**

Clearing shall consist of the felling, trimming, and cutting of trees into sections and the satisfactory disposal of the trees and other vegetation designated for removal, including downed timber, snags, brush, and rubbish occurring within the areas to be cleared. Trees, stumps, roots, brush, and other vegetation in areas to be cleared shall be cut off flush with or below the original ground surface, except such trees and vegetation as may be indicated or directed to be left standing.

### 3.3 GRUBBING

Grubbing shall consist of the removal and disposal of stumps, roots larger than 3 inches in diameter, and matted roots from the designated grubbing areas.

### 3.4 DISPOSAL OF MATERIALS

Logs, stumps, roots, brush, rotten wood, and other refuse from the clearing and grubbing operations, shall be disposed of outside the limits of Government-controlled land at the Contractor's responsibility except when otherwise directed in writing. Such directive will state the conditions covering the disposal of such products and will also state the areas in which they may be placed.

END OF SECTION



**SECTION 32 31 00**  
**SIGNS**

**PART 1 GENERAL**

**1.1 REFERENCES**

The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by basic designation only.

**AMERICAN NATIONAL STANDARD (ANS)**

ANS 253.1 (1967) Fundamental Specification of Safety Colors

**ASTM INTERNATIONAL (ASTM)**

ASTM B 209 (2000) Specification for Aluminum and Aluminum-Alloy Sheet and Plate

**1.2 SUBMITTALS**

Submit the following in accordance with [Section 01 33 00 Submittal Procedures](#).

**1.2.1 SD-02, Drawings**

- a. Warning sign; G
- b. Closure sign; G

**PART 2 PRODUCTS**

**2.1 SIGNS**

**2.1.1 Substrate**

Conform to ASTM B 209 for aluminum sheet plate requirements. Provide caution or warning signs from aluminum plate with the thickness of at least 1.3 mm. Appropriate sign mounting hardware shall be fastened to back of substrate by rivets or welding to allow mounting of sign on post.

**2.1.2 Paint**

Use the opaque glossy sample colors as specified in Table 1 of Fundamental Specification of Safety Colors for Commercial Item Description, Standard Source “C” ANS 253.1-1967. Unless directed by the Government, standard color of the background shall be yellow with black letters.

### 2.1.3 Posts

Signposts shall be of the U-channel type, 3 lbs/ft nominal, fabricated of hot rolled carbon steel bars. Finish shall be galvanized. Posts shall have a uniform hole pattern.

The post shall consist of two parts, a signpost and a base post. The base post shall be identical to the signpost except having a pointed and sharpened-edge end for post driving. Holes between the base post and signpost shall be of identical pattern.

### 2.1.4 Signs

Signage will be required to meet the following requirements:

- b. Lettering shall be legible from a distance of at least 25 feet
- c. Signs shall contain contact information for US Forest Service personnel responsible for long-term landfill oversight
- d. Signs shall be visible from surrounding areas and at potential routes of entry
- e. Signs shall be of a material able to withstand the elements
- f. Language for the warning signs will be:

***“Former Meyers Landfill***

***Digging is Prohibited***

***Disturbance of Soil May be a Hazard***

***Call (530) 543-2600 for more information”***

- g. Language for the closure signs will be:

***“Site Closed  
No Trespassing”***

## PART 3 EXECUTION

### 3.1 SIGN INSTALLATION

Place signs at regular intervals along the perimeter of the area requiring land use controls (see Land Use Control Remedial Design, included as an appendix to the RD). Embedded metals shall be given a primer coat of the required paint on all surfaces prior to installation. Install posts to dimensions as designated on the Drawings. Do not damage coating before or during installation.

END OF SECTION

**SECTION 32 31 13**  
**CHAIN LINK FENCES AND GATES****PART 1 GENERAL****1.1 REFERENCES**

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

**ASTM INTERNATIONAL (ASTM)**

ASTM A 116	(2005) Standard Specification for Metallic-Coated, Steel Woven Wire Fence Fabric
ASTM A 702	(1989; R 2006) Standard Specification for Steel Fence Posts and Assemblies, Hot Wrought
ASTM C 94/C 94M	(2007) Standard Specification for Ready-Mixed Concrete
ASTM F 626	(1996a; R 2003) Standard Specification for Fence Fittings

**1.2 SUBMITTALS**

Submit the following in accordance with [Section 01 33 00 Submittal Procedures](#).

**1.2.1 SD-02 Shop Drawings**

- a. Submit shop drawings for all chain link fence installations specified in the RD drawings.

**1.2.2 SD-03 Product Data**

- a. Submit Manufacturer's catalog data for all fence and gate hardware and accessories, per the requirements specified in Part 2.

**1.3 DELIVERY, STORAGE, AND HANDLING**

Deliver materials to site in an undamaged condition. Store materials off the ground to provide protection against oxidation caused by ground contact.

**PART 2 PRODUCTS****2.1 GENERAL**

Provide fencing materials that conform to the requirements of ASTM A 116, ASTM A 702, ASTM F 626, and as specified.

## 2.2 ZINC COATING

Ferrous-metal components and accessories, except as otherwise specified, must be hot-dip galvanized after fabrication, but before installation.

## 2.3 FABRIC

Fabric must consist of galvanized No. 9-gage wires woven into a 2-inch diamond mesh.

## 2.4 TENSION WIRE

Wire must be galvanized, No. 7-gage, coiled spring wire, provided at the bottom of the fabric only.

## 2.5 STRETCHER BARS

Provide bars that have one-piece lengths equal to the full height of the fabric.

## 2.6 POST TOPS

Provide tops that are steel, wrought iron, or malleable iron designed as a weathertight closure cap. Provide one cap for each post, unless equal protection is provided by a combination post-cap and barbed-wire supporting arm. Caps must have an opening to permit through passage of the top rail.

## 2.7 GATES

Gates shall be single swing. Shape and size of gate frame, as indicated on Remedial Design drawings. Framing and bracing members, round of steel alloy. Gate fabric, as specified for fencing fabric. Coating for steel latches, stops, hinges, keepers, and accessories, galvanized. Gate latches, forktype. Attach gate fabric to gate frame in accordance with manufacturer's standards, except that welding is not permitted. Arrange padlocking latches to be accessible from both sides of gate, regardless of latching arrangement.

Provide gate frame assembly that is welded or assembled with special malleable or pressed-steel fittings and rivets to provide rigid connections. Install fabric with stretcher bars at vertical edges; stretcher bars may also be used at top and bottom edges. Attach stretcher bars and fabric to gate frames on all sides at intervals not exceeding 15 inches. Attach hardware with rivets or by other means which provides equal security against breakage or removal.

## 2.8 GATE HARDWARE AND ACCESSORIES

Provide latch that permits operation from either side of the gate, with a padlock eye provided as an integral part of the latch.

## 2.9 WIRE TIES

Wires for tying fabric to line posts must be 16-gage galvanized steel wire spaced 12 inches on center. For tying fabric to rails and braces, wire ties must be spaced 24 inches on center. For tying fabric to tension wire, 0.105-inch hog rings must be spaced 24 inches on center.

Manufacturer's standard procedure will be accepted if of equal strength and durability.

Provide wire ties constructed of the same material as the fencing fabric.

## 2.10 CONCRETE

Provide concrete conforming to ASTM C 94/C 94M. Concrete mix must obtain a minimum 28-day compressive strength of 3,000 psi, unless otherwise approved by the Government.

## PART 3 EXECUTION

### 3.1 GENERAL

Final grading and established elevations must be complete prior to commencing fence installation.

### 3.2 EXCAVATION

Excavations for post footings must be drilled holes in compacted soil, of minimum sizes as indicated.

Bottoms of the holes must be approximately 3 inches below the bottoms of the posts. Set bottom of each post not less than 36 inches below finished grade.

### 3.3 SETTING POSTS

Remove loose and foreign materials from holes and the soil moistened prior to placing concrete.

Provide tops of footings that are trowel finished and sloped or domed to shed water away from posts. Set hold-open devices, sleeves, and other accessories in concrete.

Keep exposed concrete moist for at least 7 calendar days after placement.

### 3.4 CONCRETE STRENGTH

Concrete must attain at least 75 percent of its minimum 28-day compressive strength before rails, tension wire, or fabric are installed. Fabric and wires must not be stretched or gates hung until the concrete has attained its full design strength.

Samples and test concrete must be taken to determine strength as specified.

### 3.5 TOP RAILS

Provide top rails that run continuously through post caps or extension arms, bending to radius for curved runs. Provide expansion couplings as recommended by the fencing manufacturer.

### 3.6 CENTER RAILS

Center rails must be one piece between posts set flush with posts on the fabric side, using special offset fittings where necessary.

### 3.7 BRACE ASSEMBLY

Contractor must provide bracing assemblies at end and gate posts and at both sides of corner and pull posts, with the horizontal brace located at mid-height of the fabric.

Install brace assemblies so posts are plumb when the diagonal rod is under proper tension.

Provide two complete brace assemblies at corner and pull posts where required for stiffness and as indicated.

### 3.8 TENSION WIRE INSTALLATION

Install tension wire by weaving them through the fabric and tying them to each post with not less than 7-gauge galvanized wire or by securing the wire to the fabric with 10-gage ties or clips spaced 24 inches on center.

### 3.9 FABRIC INSTALLATION

Provide fabric in single lengths between stretch bars with bottom barbs placed approximately 1.5 inches above the ground line. Pull fabric taut and tied to posts, rails, and tension wire with wire ties and bands.

Install fabric on the security side of fence, unless otherwise directed.

Fabric must remain under tension after the pulling force is released.

### 3.10 STRETCHER BAR INSTALLATION

Thread stretcher bars through or clamped to fabric 4 inches on center and secured to posts with metal bands spaced 15 inches on center.

### 3.11 GATE INSTALLATION

Install gates plumb, level, and secure, with full opening without interference. Install ground set items in concrete for anchorage as recommended by the fence manufacturer. Adjust hardware for smooth operation and lubricated where necessary.

### 3.12 TIE WIRES

Provide tie wires that are U-shaped to the pipe diameters to which attached. Twist ends of tie wires not less than two full turns and bent so as not to present a hazard.

### 3.13 FASTENERS

Install nuts for tension bands and hardware on the side of the fence opposite the fabric side. Peen ends of bolts to prevent removal of nuts.

### 3.14 ZINC-COATING REPAIR

Clean and repair galvanized surfaces damaged by abrasion, and cut ends of fabric, or other cut sections with specified galvanizing repair material applied in strict conformance with the manufacturer's printed instructions.

### 3.15 TOLERANCES

Provide posts that are straight and plumb within a vertical tolerance of 0.25 inch after the fabric has been stretched. Provide fencing and gates that are true to line with no more than 0.5-inch deviation from the established centerline between line posts. Repair defects as directed.

### 3.16 FENCE INSTALLATION

Install fence on prepared surfaces to line and grade indicated. Install fence in accordance with fence manufacturer's written installation instructions.

### 3.17 ACCESSORIES INSTALLATION

#### 3.17.1 Post Caps

Install post caps as recommended by the manufacturer.

### 3.18 CLEANUP

Remove waste fencing materials and other debris from the work site.

END OF SECTION

**SECTION 32 92 00  
LANDSCAPING**

**PART 1 GENERAL**

**1.1 REFERENCES**

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

**ASTM INTERNATIONAL (ASTM)**

ASTM C 602 (1995) Specification for Agricultural Liming Materials

**CALIFORNIA STATUTES FOOD AND AGRICULTURE CODE**

Division 18, Chapter 2 California Seed Law

**COMMERCIAL ITEM DESCRIPTIONS (CID)**

CID A-A (1909) Fertilizer

**U. S. CODE OF FEDERAL REGULATIONS (CFR)**

7 CFR 201.12a Labeling Agricultural Seeds - Lawn and Turf Seed Mixtures

**1.2 SUBMITTALS**

The following shall be submitted in accordance with [Section 01 33 00 Submittal Procedures](#).

**1.2.1 SD-01, Preconstruction Submittal**

**a. Vegetation Establishment Plan**

Written calendar period for the vegetation establishment period. When there is more than one vegetation establishment period, describe the boundaries of the vegetated area covered for each period.

**1.2.2 SD-07, Certificates**

Prior to the delivery of materials, certificates of compliance certifying that materials meet the requirements specified. Certified copies of the reports for the following materials shall be included.

**a. Seed; G**

Mixture, percent pure live seed, minimum percent germination and hard seed, maximum percent weed seed content, date tested, and state certification.



- b. Mulch; G  
Composition
- c. Binder; G  
U.S. Department of Agriculture (USDA) auxiliary soil chemical
- d. Fertilizer; G  
Chemical analysis, composition percent if used.

### 1.3 DELIVERY, INSPECTION, STORAGE, AND HANDLING

#### 1.3.1 Delivery of Soil Amendments

Soil amendments shall be delivered to the site in the original, unopened containers bearing the manufacturer's chemical analysis. In lieu of containers, soil amendments may be furnished in bulk. A chemical analysis shall be provided for bulk deliveries.

#### 1.3.2 Inspection

Inspect all materials upon arrival at the job site for conformity to specifications.

#### 1.3.3 Storage

Seed and fertilizer shall be stored in cool, dry locations away from contaminants.

#### 1.3.4 Handling

Except for bulk deliveries, materials shall not be dropped or dumped from vehicles.

## PART 2 PRODUCTS

### 2.1 SEED

#### 2.1.1 Seed Mixtures

- a. Seed mixture shall be as specified by the Government, prior to application. A preliminary list of approved native species for potential inclusion in the seed mix is presented in the Operations, Maintenance and Monitoring Plan, included as an appendix to the RD.
- b. All seed shall be furnished in bags or containers clearly labeled to show the name and address of the supplier, the seed name, the lot number, net weight, the percent of weed seed content and the guaranteed percentage of purity and germination. All brands furnished shall be free from all noxious seeds or non-native invasive species (see Operations, Maintenance and Monitoring Plan included as an appendix to the RD). Seed that has become wet, moldy, or otherwise damaged in transit or in storage will not be acceptable.

- c. Seed shall not exceed 0.5 percent weed content by weight. If seed available on the market does not meet the minimum purity and germination percentages specified, the Contractor must compensate for a lesser percentage of purity or germination by furnishing sufficient additional seed to equal the specified product. Product comparison shall be made on the basis of pure live seed in pounds. The formula used for determining the quantity of pure live seed shall be: Pounds of seed x (Purity x Germination) = pounds of Pure Live Seed. Samples may be drawn by the Engineer for testing.
- d. Final cover seed mixture shall be as determined by the Forest Service biologist

## 2.2 MULCH

Mulch shall be fibrous, cellulose mulch, containing no growth or germination inhibiting substances and shall be manufactured in such a manner that, when thoroughly mixed with seed, fertilizer, organic stabilizer, and water, it will form a homogeneous slurry that is capable of being sprayed to form a porous mat. If possible, the mulch shall be green in color to allow metering during application. Biosolids may be used as part of the mulch material. Mulch shall be applied at a rate of 2,000 lbs/acre, or as specified by the Government.

## 2.3 BINDER

Binder shall be of organic origin and registered with the U.S. Department of Agriculture as an auxiliary soil chemical. Binder shall not be asphalt based. Binder shall be nontoxic to plant or animal life. Binder shall be applied at a rate of 120 lbs/acre, or as specified by the Government.

## 2.4 PREMIXED MULCH/BINDER COMBINATIONS

Where premixed combinations meet or exceed other requirements of this Specification, they may be used.

## 2.5 WATER

Shall not contain a total dissolved solids level of greater than that in base potable supply or exceed the salt tolerance of the plant species for any growth regime, irrigation practice used, and local climate. Water shall be applied at rate such that hydroseeding machinery operates smoothly, but that minimizes surface runoff and leaching once applied.

## 2.6 HYDRAULIC EQUIPMENT

Contractor shall use a commercial type mulcher for the application of slurry. Equipment shall have a built-in agitation system with an operation capacity sufficient to agitate, suspend and homogeneously mix slurry. Distribution lines shall be large enough to prevent stoppage and to provide even distribution of the slurry over the ground. The pump must be capable of exerting up to 150 psi at the nozzle. The slurry

tank shall have a minimum capacity of 1,000 gallons and shall be mounted on a traveling unit that will place the slurry tank and spray nozzles within sufficient proximity to the areas to be seeded so as to provide uniform distribution without waste.

## 2.7 SOIL AMENDMENTS

Soil amendments shall consist of fertilizer, organic soil amendments, and soil conditioners, if appropriate. Soils used in the vegetative layer shall be amended as recommended by soil test in [Section 31 00 00, Earthwork](#).

### 2.7.1 Fertilizer

Fertilizer shall be commercial grade, free flowing, uniform in composition, conforming to CID A-A-1909, and meet requirements as recommended from the results of the soil test. Application rate shall be determined from the soil test.

## PART 3 EXECUTION

### 3.1 SEEDING, TIMES AND CONDITIONS

#### 3.1.1 Seeding Time

Seed shall be sown according to supplier instructions. If feasible, seeding shall take place as soon as final grade has been achieved and heavy equipment has been retired from the project.

#### 3.1.2 Planting Conditions

Not used.

### 3.2 SITE PREPARATION

#### 3.2.1 Finish Grading

##### 3.2.1.1 Preparation

Drainage patterns shall be maintained as indicated on Drawings. Areas designated for hydroseed that have been compacted by construction operations shall be scarified to a depth of 1 to 2 inches. Soil used for repair of erosion or grade deficiencies shall conform to topsoil requirements specified in [Section 31 00 00, Earthwork](#).

### 3.3 HYDROSEEDING

#### 3.3.1 General

Seeding operations shall not take place when the wind velocity will prevent uniform seed distribution. All slurry preparation shall take place on the job site. Operators of hydroseeding equipment shall be thoroughly experienced in this type of application.

### 3.3.2 Mixing

Water, mulch and binder shall be added to the mixing tank first. Fertilizer and seed shall be added at the last practical moment. The slurry must be completely homogeneous before application.

### 3.3.3 Application

Apply specified slurry mix in a sweeping motion to form a uniform mat at the specified rate. Limit hydroseeding to designated areas and prevent contact with other items. Slurry mixture that has not been applied within 2 hours of mixing shall be removed from the site. Total time from the addition of seed to seed discharge shall be less than 1 hour, if more than 1 hour, the remainder of the load shall be recharged with seed.

## 3.4 RESTORATION AND CLEANUP

### 3.4.1 Restoration

Existing vegetated areas, pavements, and facilities that have been damaged from the hydroseeding operation shall be restored to their original condition.

### 3.4.2 Cleanup

Excess and waste material shall be removed from the planting operation and shall be disposed of off the site.

## 3.5 PROTECTION OF SEEDED AREAS

Once hydroseeding has taken place, care shall be taken to avoid damage to the surface until soil is firm and more than 80 percent of plants have germinated. Avoid vehicular traffic, especially that which creates depressions or ruts. Keep foot traffic to a minimum and, in all cases, avoid repeat traffic over the same area.

## 3.6 VEGETATION ESTABLISHMENT PERIOD

### 3.6.1 Commencement

The Vegetation Establishment Period for establishing healthy vegetation shall begin on the first day of seeding operation or planting under this contract and shall end 6 months after the last day of seeding or planting operations required by this contract.

### 3.6.2 Satisfactory Stand of Vegetation

A satisfactory stand of vegetation from the seeding or planting operation is defined as a minimum of 10 plants per square foot. Cover at the end of the Establishment Period shall be 35 percent.

### 3.6.3 Maintenance During Establishment Period

#### 3.6.3.1 General

Maintenance of the seeded areas shall include controlling insects, weeds, and diseases below levels that are detrimental to plant health. In addition, the Contractor shall protect embankments and ditches from erosion, maintain erosion control materials and mulch, protect vegetated areas from traffic, and water and fertilize as needed.

#### 3.6.3.2 Watering

Watering shall be at intervals to obtain a moist soil condition to a minimum depth of 1 inch for hydroseeded areas or groundcover. Frequency of watering and quantity of water shall be adjusted in accordance with the growth of the vegetation. Runoff, runoff, puddling, and wilting shall be prevented.

#### 3.6.3.3 Post-Fertilization

Nitrogen carrier fertilizer shall be applied at the rate of no more than 0.5 pounds per 1,000 square feet for hydroseeded areas or groundcover after the first month and again prior to the final acceptance. The application shall be timed prior to the advent of winter dormancy and shall avoid excessively high nitrogen levels.

#### 3.6.3.4 Repair

The Contractor shall reestablish, as specified herein, eroded, damaged, or barren areas or plants, including seed and topsoil.

### 3.7 FINAL ACCEPTANCE OF VEGETATION

#### 3.7.1 Preliminary Inspection

Not less than 21 days prior to the completion of the Vegetation Establishment Period, a preliminary inspection will be held by the Government. Date and time for the inspection will be established in writing and will be communicated to the Contractor 14 days prior to the inspection date. The acceptability of the vegetation in accordance with the Vegetation Establishment Period shall be determined. An unacceptable stand of vegetation shall be repaired as soon as conditions permit.

#### 3.7.2 Final Inspection

Within 7 days of the end of the Vegetation Establishment Period, a final inspection will be held by the Government to determine that deficiencies noted in the preliminary inspection have been corrected. Date and time for the inspection will be established in writing and communicated to the Contractor 14 days prior to the inspection date.

END OF SECTION

**SECTION 33 23 00**  
**PASSIVE GAS VENTS AND PERIMETER GAS MONITORING POINTS**

**PART 1 GENERAL**

**1.1 REFERENCES**

The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D 1785	(1999) Polyvinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80, and 120
ASTM D 2564	(1996) Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems
ASTM D 2855	(1996) Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings
ASTM D 5088	(1990) Standard Practice for Decontamination of Field Equipment Used at Nonradioactive Waste Sites
ASTM F 810	(1999) Specification for Smoothwall Polyethylene (PE) Pipe for Use in Drainage and Waste Disposal Absorption Fields
ASTM F 480	(2000) Standard Specification for Thermoplastic Probe Casing Pipe and Couplings Made in Standard Dimension Ratios (SDR), SCH 40 and SCH 80

**1.2 SUBMITTALS**

The following shall be submitted in accordance with Section 01 33 00 Submittal Procedures.

**1.2.1 SD-03, Manufacturers Catalogue Data**

- a. Pipe
- b. Fittings
- c. Filter-pack

**1.2.2 SD-06, Field Test Reports**

- a. Post Construction Methane Tests: Submit test results of post construction methane sampling.

## PART 2 PRODUCTS

### 2.1 GAS VENT AND GAS MONITORING CASINGS

**Gas Vent Pipe:** 8-inch, solvent-welded nominal diameter, schedule 80 PVC, dimensions and lengths as indicated on Drawings, manufactured to meet the requirements of ASTM F 480. Solvent cement to meet the requirements of ASTM D 2564.

**Perimeter Gas Monitoring Point Pipe:** 3/4-inch, nominal diameter schedule 40 PVC, dimensions and lengths as indicated on Drawings, manufactured to meet the requirements of ASTM F 480. Pipe fittings shall be flush-joint threaded with O-ring seals, equipped with sampling ports.

### 2.2 GAS VENT HORIZONTAL COLLECTION PIPE

**Gas Vent Horizontal Collection Pipe:** 8-inch, solvent-welded nominal diameter, schedule 80 PVC, dimensions and lengths as indicated on Drawings, manufactured to meet the requirements of ASTM F 480. Solvent cement to meet the requirements of ASTM D 2564.

### 2.3 GAS VENT AND GAS MONITORING SCREEN

**Gas Vent Screen:** 8-inch, solvent welded nominal diameter, schedule 80 PVC, dimensions and lengths as indicated on Drawings, machine slotted 0.020 inches, manufactured to meet the requirements of ASTM F 480. Provide solvent welded PVC bottom end cap.

**Perimeter Gas Monitoring Point Screen:** 3/4-inch, nominal diameter, flush-joint threaded schedule 40 PVC, dimensions and lengths as indicated on Drawings, machine slotted 0.020 inches, manufactured to meet the requirements of ASTM F 480. Provide solvent welded PVC bottom end cap.

### 2.4 FILTER PACK

**Gas Vent:** Nominal 0.75–inch drain rock.

**Perimeter Gas Monitoring Point:** Appropriately sized gravel filter pack (#3 Monterey Sand, or equivalent)

## PART 3 EXECUTION

### 3.1 GAS VENT BOREHOLE DRILLING

- a. Drill all boreholes through foundation layer and waste to the approximate depths shown in the Drawings.

- b. Drilling augers shall be nominal 24-inch outside diameter to meet the dimensions of the minimum borehole size shown on the drawing.
- c. The Contractor's field geologist will be responsible for completing a log of the borehole lithology.
- d. No drilling fluids shall be added to the borehole.
- e. No lubricants shall be used on down-hole drilling equipment other than vegetable-based lubricants on auger flight and drill rod joints.
- f. Drill cuttings shall be containerized and properly disposed of.

### 3.2 PERIMETER GAS MONITORING POINT BOREHOLE DRILLING

- a. Drill all boreholes through native materials to the approximate depths shown in the Drawings.
- b. Drilling augers shall be nominal 12-inch outside diameter to meet the dimensions of the minimum borehole size shown on the drawing.
- c. The Contractor's field geologist will be responsible for completing a log of the borehole lithology.
- d. No drilling fluids shall be added to the borehole.
- e. No lubricants shall be used on down-hole drilling equipment other than vegetable-based lubricants on auger flight and drill rod joints.
- f. Drill cuttings shall be containerized and properly disposed of.

### 3.3 GAS VENT AND PERIMETER GAS MONITORING POINT INSTALLATION

- a. All annular materials shall be installed to the approximate depths shown on the Drawings. Construct gas vents using PVC solvent welding according to ASTM D 2855. Construct perimeter gas monitoring points using flush-joint threaded pipe with O-ring seals. The Contractor's field geologist may request minor modifications to the installation depths as necessary. Depths to the top of filter pack and cement seal materials shall be directly measured using a weighted tape measure to confirm installation to appropriate depths. Screen and blank casing lengths shall be measured to the nearest 0.01 foot.
- b. The drain rock filter pack shall be added by gravity fall from the surface.
- c. Gas vents shall be manifolded together as shown on the Drawings. Construct gas vents using PVC solvent welding according to ASTM D 2855.



- d. Protective casings shall be installed on gas probes to protect the monitoring points. Compact cap soil to eliminate voids and finish to a slope as specified in the Drawings to divert water runoff away from the vent casing. Gas vent pipe shall be painted above grade.

### 3.4 DECONTAMINATION

- a. Decontamination procedures shall conform to ASTM D 5088.
- b. All drill rods, drill bits, augers, and other associated equipment shall be cleaned with a portable, high-pressure steam cleaner prior to drilling at each vent or probe location. Provide equipment to capture and containerize all decontamination fluids.

### 3.5 WASTE DISPOSAL

The Contractor will be responsible for arranging and completing appropriate final disposition of all containerized drill cuttings and decontamination water.

### 3.6 SURVEYING

- a. Provide a California-licensed surveyor or registered Civil Engineer to survey horizontal and vertical coordinates for location (northing and easting), the top of casing (TOC) elevation, and adjacent ground surface elevation for each gas vent and gas monitoring probe constructed.
- b. All northing and easting coordinates shall be based on established control points. Horizontal coordinates shall be measured within 0.1-foot accuracy.
- c. All elevation measurements shall be measured within 0.01-foot accuracy. The TOC elevation shall be measured by placing the surveying rod directly on top of the north side of the probe casing. The TOC elevation measuring point shall be marked with a 1/8-inch deep sawcut, but do not puncture PVC casing.

### 3.7 POST-CONSTRUCTION GAS VENT TESTING

The Contractor shall collect post-construction samples from each gas vent to confirm that vent system is operational.

END OF SECTION

## **SECTION 33 40 00 DRAINAGE UTILITIES**

### PART 1 GENERAL

#### 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION  
OFFICIALS (AASHTO)

AASHTO M 294 (2007) Standard Specification for Corrugated Polyethylene Pipe,  
300- to 1200-mm Diameter

ASTM INTERNATIONAL (ASTM)

ASTM D 1171 (1999; R 2007) Rubber Deterioration - Surface Ozone Cracking  
Outdoors or Chamber (Triangular Specimens)

ASTM D 1557 (2007) Standard Test Methods for Laboratory Compaction  
Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup>)  
(2700 kN-m/m<sup>3</sup>)

ASTM D 2488 Standard Practice for Description and Identification of Soils  
(Visual-Manual Procedure)

ASTM D 3212 (2007) Standard Specification for Joints for Drain and Sewer  
Plastic Pipes Using Flexible Elastomeric Seals

ASTM D 3350 (2006) Polyethylene Plastics Pipe and Fittings Materials

ASTM D 4491 (1999, Rev A) Standard Test Methods for Water Permeability of  
Geotextiles by Permittivity

ASTM D 4533 (2004) Standard Test Method for Trapezoid Tearing Strength of  
Geotextiles

ASTM D 4632 (2008) Standard Test Method for Grab Breaking Load and  
Elongation of Geotextiles

ASTM D 4751 (2004) Standard Test Method for Determining Apparent Opening  
Size of a Geotextile

ASTM D 4833 (2000) Standard Test Method for Index Puncture Resistance of  
Geotextiles, Geomembranes, and Related Products

ASTM D 5261 (1992) Standard Test Method for Measuring Mass per Unit Area of  
Geotextiles

ASTM D 6938 (2007a) Standard Test Method for In-Place Density and Water  
Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow  
Depth)

ASTM F 1417 (1992; R 2005) Standard Test Method for Installation Acceptance  
of Plastic Gravity Sewer Lines Using Low Pressure Air

ASTM F 477 (2007) Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe

ASTM F 714 (2008) Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter

## 1.2 SUBMITTALS

Submit the following in accordance with [Section 01 33 00 Submittal Procedures](#).

### 1.2.1 SD-03 Product Data

Pipe and geotextile: Printed copies of the manufacturer's product data and installation procedures.

### 1.2.2 SD-06 Field Test Reports

a. Soil density tests

### 1.2.3 SD-07 Certificates

a. Resin Certification

## 1.3 DELIVERY, STORAGE, AND HANDLING

### 1.3.1 Delivery and Storage

Materials delivered to site shall be inspected for damage, unloaded, and stored with a minimum of handling. Materials shall not be stored directly on the ground. The inside of pipes and fittings shall be kept free of dirt and debris. Before, during, and after installation, plastic pipe and fittings shall be protected from any environment that would result in damage or deterioration to the material. Keep a copy of the manufacturer's instructions available at the construction site at all times and follow these instructions unless directed otherwise by the Government. Solvents, solvent compounds, lubricants, elastomeric gaskets, and any similar materials required to install plastic pipe shall be stored in accordance with the manufacturer's recommendations and shall be discarded if the storage period exceeds the recommended shelf life. Solvents in use shall be discarded when the recommended pot life is exceeded.

### 1.3.2 Handling

Materials shall be handled in a manner that ensures delivery to the trench in sound, undamaged condition. Pipe shall be carried to the trench, not dragged.

## PART 2 PRODUCTS

### 2.1 PIPE FOR CULVERTS AND STORM DRAINS

Pipe for culverts and storm drains shall be of the sizes indicated on design drawings and shall conform to the requirements specified.

#### 2.1.1 HDPE Pipe

The pipe manufacturer's resin certification indicating the cell classification of PE used to manufacture the pipe shall be submitted prior to installation of the pipe. The minimum cell classification for polyethylene plastic shall apply to each of the seven primary properties of the cell classification limits in accordance with ASTM D 3350.

##### 2.1.1.1 Smooth Wall HDPE Pipe (Solid and Perforated)

ASTM F 714, maximum DR of 21 for pipes 80 to 600 mm (3 to 24 inches) in diameter and maximum DR of 26 for pipes 650 to 1,200 mm (26 to 48 inches) in diameter. Pipe shall be produced from PE certified by the resin producer as meeting the requirements of ASTM D 3350, minimum cell class 335434C.

##### 2.1.1.2 Corrugated HDPE Pipe

AASHTO M 294, Type S or D, for pipes 12 to 48 inches produced from PE certified by the resin producer as meeting the requirements of ASTM D 3350, minimum cell class in accordance with AASHTO M 294. Pipe walls shall have the following properties.

Nominal Size (inch)	Minimum Wall Area (square inch/feet)	Minimum Moment of Inertia of Wall Section (into the 4th/inch)
12	1.50	0.024
15	1.91	0.053
18	2.34	0.062
24	3.14	0.116
30	3.92	0.163
36	4.50	0.222
42	4.69	0.543
48	5.15	0.543

## 2.2 MISCELLANEOUS MATERIALS

### 2.2.1 Joints

#### 2.2.1.1 Smooth Wall HDPE Plastic Pipe

Pipe shall be joined using bell ends or butt fusion method as recommended by the pipe manufacturer.

#### 2.2.1.2 Corrugated HDPE Plastic Pipe

Water tight joints shall be made using a PE coupling and rubber gaskets as recommended by the pipe manufacturer. Rubber gaskets shall conform to ASTM F 477. Soil tight joints shall conform to the requirements in AASHTO HB-17, Division II, Section 26.4.2.4. (e) for soil tightness and shall be as recommended by the pipe manufacturer.

## 2.3 EROSION CONTROL RIPRAP

Provide nonerodible rock not exceeding 15 inches in its greatest dimension with a minimum diameter of 8 inches and choked with sufficient small rocks to provide a dense mass.

## 2.4 ROCK OUTFALL TO DRAINAGE DITCH

Provide 3/4-inch rock (gravel), angular (per ASTM D 2488) for drainage channels.

## 2.5 ROCK-LINED DITCH

Provide non-erodible rock not exceeding 15 inches in its greatest dimension, with a minimum diameter of 8 inches for rock-lined ditches.

## 2.6 GEOTEXTILE

For lining drainage channels and separating soil from rock, provide an 8 oz. nonwoven polypropylene geotextile with an ultimate grab tensile strength of at least 200 pounds.

## PART 3 EXECUTION

### 3.1 EXCAVATION FOR PIPE CULVERTS, STORM DRAINS, AND DRAINAGE STRUCTURES

Excavation of trenches, and for appurtenances and backfilling for culverts and storm drains, shall be in accordance with the applicable portions of Section 31 00 00 Earthwork and the requirements specified below.

### 3.2 BEDDING

The bedding surface for the pipe shall provide a firm foundation of uniform density throughout the entire length of the pipe.

### 3.3 PLACING PIPE

Each pipe shall be thoroughly examined before being laid; defective or damaged pipe shall not be used. Plastic pipe shall be protected from exposure to direct sunlight prior to laying, if necessary to maintain adequate pipe stiffness and meet installation deflection requirements. Pipelines shall be laid to the grades and alignment indicated. Proper facilities shall be provided for lowering sections of pipe into trenches. Lifting lugs in vertically elongated metal pipe shall be placed in the same vertical plane as the major axis of the pipe. Pipe shall not be laid in water, and pipe shall not be laid when trench conditions or weather are unsuitable for such work. Diversion of drainage or dewatering of trenches during construction shall be provided as necessary.

#### 3.3.1 Smooth HDPE Pipe

If bell-end pipe is used, laying shall proceed upgrade with spigot ends of bell-and-spigot pipe and tongue ends of tongue-and-groove pipe pointing in the direction of the flow.

#### 3.3.2 Corrugated HDPE Pipe

Laying shall be with the separate sections joined firmly on a bed shaped to line and grade and shall follow manufacturer's recommendations.

### 3.4 BACKFILLING

#### 3.4.1 Backfilling Pipe in Trenches

After the pipe has been properly bedded, selected material from excavation or borrow, at a moisture content that will facilitate compaction, shall be placed along both sides of pipe in layers not exceeding 6 inches in compacted depth. The backfill shall be brought up evenly on both sides of pipe for the full length of pipe. The fill shall be thoroughly compacted under the haunches of the pipe. Each layer shall be thoroughly compacted with mechanical tampers or rammers. This method of filling and compacting shall continue until the fill has reached an elevation of at least 12 inches above the top of the pipe. The remainder of the trench shall be backfilled and compacted by spreading and rolling or compacted by mechanical rammers or tampers in layers not exceeding 8 inches. Tests for density shall be made as necessary to ensure conformance to the compaction requirements specified below.

#### 3.4.2 Backfilling Pipe in Fill Sections

For pipe placed in fill sections, backfill material and the placement and compaction procedures shall be as specified below. The fill material shall be uniformly spread in

layers longitudinally on both sides of the pipe, not exceeding 6 inches in compacted depth, and shall be compacted by rolling parallel with pipe or by mechanical tamping or ramming. Prior to commencing normal filling operations, the crown width of the fill at a height of 12 inches above the top of the pipe shall extend a distance of not less than twice the outside pipe diameter on each side of the pipe or 12 feet, whichever is less. After the backfill has reached at least 12 inches above the top of the pipe, the remainder of the fill shall be placed and thoroughly compacted in layers not exceeding 8 inches.

### 3.4.3 Backfilling Pipe in Drainage Channels

For pipe placed in drainage channels, backfill material and placement and compaction procedures shall be as specified below. The fill material shall be uniformly spread in layers longitudinally on both sides of the pipe with care, not exceeding 6 inches in compacted depth. Prior to commencing normal filling operations, the crown width of the fill at a height of 12 inches above the top of the pipe shall extend a distance of not less than twice the outside pipe diameter on each side of the pipe or 12 feet, whichever is less. After the backfill has reached at least 12 inches above the top of the pipe, the remainder of the fill shall be placed.

### 3.4.4 Movement of Construction Machinery

When compacting by rolling or operating heavy equipment parallel with the pipe, displacement of or injury to the pipe shall be avoided. Movement of construction machinery over a culvert or storm drain at any stage of construction shall be at the Contractor's risk. Any damaged pipe shall be repaired or replaced by the Contractor.

### 3.4.5 Compaction

#### 3.4.5.1 Minimum Density

Backfill over and around the pipe and backfill around and adjacent to drainage structures shall be compacted at the approved moisture content to the following applicable minimum density, which will be determined as specified below.

- a. Under unpaved or turfed traffic areas, density shall not be less than 90 percent of maximum density as determined by ASTM D1557 for cohesive material and 95 percent of maximum density as determined by ASTM D1557 for cohesionless material.
- b. Under nontraffic areas, density shall be not less than that of the surrounding material.

### 3.4.6 Determination of Density

Testing is the responsibility of the Contractor. Testing shall be performed by an approved commercial testing laboratory or by the Contractor subject to approval. Tests shall be performed in sufficient number to ensure that specified density is being obtained. Laboratory tests for moisture-density relations shall be made in accordance

with ASTM D 1557 except that mechanical tampers may be used provided the results are correlated with those obtained with the specified hand tamper. Field density tests shall be determined in accordance with ASTM D 6938. Test results shall be furnished the Government.

#### 3.4.7 Geotextile Installation and Testing

During installation and seaming of the geotextile, the material will be inspected for defects and damage. Depending on the extent of the defect or damage, the panel may be repaired or rejected. Repairs shall be made in accordance with manufacturer's recommended procedures. Testing is the responsibility of the Contractor. Perform a geotextile conformance test samples for every 100,000 square feet and a minimum of one per batch or lot of material delivered to the site. Conformance tests include:

- Grab strength (ASTM D 4632)
- Mass per unit area (ASTM D 5261)
- Puncture resistance (ASTM D 4833)
- Trapezoidal tear strength (ASTM D 4533)
- Permittivity (ASTM D 4491)
- Apparent opening size (ASTM D4751)

END OF SECTION



**SECTION 33 40 01**  
**CONSTRUCTION DRAINAGE AND EROSION CONTROLS**

**PART 1 GENERAL**

**1.1 REFERENCES**

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

**ASTM INTERNATIONAL (ASTM)**

ASTM D 6461 Standard Specification for Silt Fence Materials

ASTM D 6462 Standard Practice for Silt Fence Installation

**1.2 SUBMITTALS**

Submit the following in accordance with [Section 01 33 00 Submittal Procedures](#).

**1.2.1 SD-03, Product Data**

- a. Silt Fence Filter Fabric
- b. Erosion Control Wattles

**1.2.2 SD-07, Certificates**

- a. Certification that Erosion Control Wattles 100 percent organic fiber and weed free.

**1.3 DELIVERY, STORAGE, AND HANDLING**

**1.3.1 Delivery and Storage**

Inspect materials delivered to site for damage; store with minimum of handling. Do not store materials directly on the ground.

**1.3.2 Handling**

Handle materials in a manner to ensure delivery to the point of installation in sound undamaged condition.

## PART 2 PRODUCTS

### 2.1 SILT FENCE

The silt fence materials used during construction shall conform to ASTM D 6461.

### 2.2 EROSION CONTROL WATTLES

The erosion control wattles used during construction are designed to filter overland runoff and capture sediment. Wattles shall be manufactured from 100 percent organic fiber and certified weed free and shall be from 8 to 12 inch in diameter and about 25 feet in length.

## PART 3 EXECUTION

### 3.1 SEDIMENT CONTROL SYSTEM

All sediment control system components shall be placed in accordance with manufacturer's instructions. Installation of the silt fence shall conform to ASTM D 6462-99.

#### 3.1.1 Silt Fence Installation

Extend silt fences a minimum of 16 inches above the ground surface without exceeding 34 inches above the ground surface. Provide filter fabric from a continuous roll cut to the length of the barrier to avoid the use of joints. When joints are unavoidable, splice together filter fabric at a support post, with a minimum 6-inch overlap, and securely sealed. Excavate trench approximately 4 inches wide and 4 inches deep on the upslope side of the location of the silt fence. The 4-by-4-inch trench shall be backfilled and the soil compacted over the filter fabric.

#### 3.1.1 Erosion Control Wattle Installation

A small trench, 2 to 3 inches deep, shall be excavated on the slope contour and perpendicular to water flow. Wattles shall be installed in the trench, insuring that no gaps exist between the soil and the bottom of the wattle. The ends of adjacent Wattles shall be tightly abutted so that no opening exists for water or sediment to pass through. Alternately, wattles may be lapped, 6 inches minimum to prevent sediment passing through the field joint. Wooden stakes shall be used to fasten the wattles to the soil. Wooden stakes shall be placed 6 inches from the wattle end and spaced at 4 feet leaving less than 1 to 2 inches of stake exposed above the wattle.

END OF SECTION