

ADDENDUM 1

to

**MATERIAL TESTING AND GEOTECHNICAL SERVICES FOR
GLENN COUNTY LANDFILL CLOSURE**

**Glenn County Landfill
5700 County Road 33
Artois, CA 95913**

Proposal Due Date: March 28, 2019

March 12, 2019

To All Proposers:

The following is Addendum 1 to the Contract Documents for the Material Testing and Geotechnical Services for the Glenn County Landfill Closure project. Please acknowledge receipt of this addendum in your proposal. The following text summarizes the changes to the Contract Documents.

FEE SCHEDULE

1. Quantity change to Geomembrane Direct Shear Verification.

SPECIFICATIONS

In the attached specifications, deleted Text is shown in strikethrough (~~example~~). Inserted text is shown in underline and red (example). The significant changes include the following:

1. Revised version of Section 02750 – HDPE & LLDPE GEOMEMBRANE, pages 7, 10, and 20 attached. This specification has been modified to clarify several items, including:
 - 2.01(A) Direct Shear Requirements: clarification for a single sampling frequency for each of the sideslope and cap top deck direct shear testing, as indicated in the revised specification (two tests total).
 - 2.01(E) Extrusion resin/typical extrudate: modified to reflect same “formulation and resin type” and delete “batch lot material”.
 - 2.01(F) HDPE or LLDPE shrink wrap: deleted.
 - 3.10(E)7 Deleted line, non-applicable.

2. Revised version of Section 02752 – GEOTEXTILES AND GEOCOMPOSITES, full section attached. This specification has been modified to clarify several items, including:
 - 1.02 Related Sections: Updated to include Section 02750 – HPDE and LLDPE Geomembrane, and the CQA Plan.
 - 1.03 References: Updated to replace ASTM D3776 with D5261, and delete ASTM D4833 and replace with ASTM D6241 Test Method for Static Puncture Strength of Geotextiles.
 - 1.05 Submittals: Added new item (C) for sample of direct shear testing.
 - General edit to 1.05(D) and (E), to ADD and clarify certain submittals to be provided at least 14 calendar days prior to installation.
 - Added titles to Tables.
 - Table 02752-1 updated based on CBR Puncture Test, and updated values in the table based on geotextile requirements.
 - Moved the Geocomposite material description and Table 02752-3, prior to the Quality Control and Labeling sections, with the intent that the latter sections apply to all materials indicated prior.

CQA PLAN

1. Table 6 updated to reflect the changes noted in Table 02752-1 above. Single sheet of the revision attached.

**MATERIALS TESTING FEE SCHEDULE
GLENN COUNTY LANDFILL CLOSURE PROJECT**

Item No.	Description	CQA Plan Section	Specification	Unit	Quantity	Unit Price	Total Price
1	Administration – include coordination, data review, submittal of test results, and preparation of field reports	-	-	Each	1	\$	\$
2	Attend Preconstruction Meeting	-	-	Each	1	\$	\$
3	Field Technician – 8 hours on site, include travel time, sample collection, and nuclear density testing	Table 1	02210	Day	40	\$	\$
4	Soil Analysis – USCS Soil Classification Manual Method	Table 1	02210	Each	22	\$	\$
5	Soil Analysis – Proctor Curve	Table 1	02210	Each	22	\$	\$
6	HDPE or LLDPE Geomembrane Sample Analysis	Tables 2 & 3	02750	Each	35	\$	\$
7	HDPE or LLDPE Geomembrane Seam Sample Test	-	02750	Each	300	\$	\$
8	HDPE or LLDPE Geomembrane Direct Shear Verification	-	02750	Each	2 300	\$	\$
9	Geocomposite Sample Analysis	Table 5	02752	Each	7	\$	\$

GRAND TOTAL	\$
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Section 02750 - Geomembrane
Addendum #1 Revisions

PART 2 - PRODUCTS

2.01 MATERIALS

A. Direct Shear Requirements:

1. The Contractor will be required to submit the materials to be used for construction to an ELAP certified lab for direct shear testing under ASTM D 6232-98 / D 5321-92 with a 12-inch by 12-inch effective test area. For consistency, the liner layers will be saturated for 48-hours before testing, drained, tested at a strain rate of 0.4 inches per minute, 3 inches of displacement, and tested at normal stresses, 144, 288, and 566 psf. The following layers will be tested in a single sampling frequency (2 tests total), provided the test results are acceptable to the CQA Monitor:

Sideslope (bottom to top):

- Native soil, remolded to 92% of maximum dry density at 3 to 6% above optimum moisture content.
- White 40-mil single sided textured HDPE or LLDPE (textured side facing GCL) the white color shall be on the smooth side, facing up (against native soil)
- Nonwoven geosynthetic fabric, see Section 02752.
- Geocomposite, see Section 02752.
- Native soil, remolded to 92% of maximum dry density at 3 to 6% above optimum moisture content.

Cap Top Deck (bottom to top):

- Native soil, remolded to 90% of maximum dry density at 3 to 6% above optimum moisture content.
 - 40-mil HDPE or LLDPE double sided textured.
 - Nonwoven geosynthetic fabric, see Section 02752.
 - Native soil, remolded to 85 to 90% of maximum dry density at 3 to 6% above optimum moisture content and then flooded during test.
 - The test for the cap top deck shall be tested flooded and undrained
2. The minimum strength parameters shall be a cohesion of 212 and a phi angle of 21 or equivalent secant angle the sideslope where a geocomposite drainage layer is used and a cohesion of 0 and a phi angle of 31.9 degrees for the top deck (less than 19 % slope).
 3. If the sideslope is less than the above limits, notify the CQA Monitor immediately. In this case, the Engineer may reevaluate stability.

HDPE and LLDPE Geomembrane Requirements

Property	Test Method	Units	Textured	Textured
Material	NA	NA	LLDPE	HDPE
Thickness (nominal)	ASTM D 5199 D 5994 (textured)	mils	40 (min)	40
Thickness (minimum)		mils	36	36
Density	ASTM D 1505	g/cm ³	0.940	0.940
Carbon Black Content	ASTM D 4218, or D 1603	%	2-3	2-3
Carbon Black Dispersion (min.)	ASTM D 5596	rating	Note 2	Note 2
Tensile Properties:	ASTM D 6693:			
Tensile Strength at Yield (min.)		ppi	NA	84
Tensile Strength at Break (min.)		ppi	60	60
Elongation at Yield (min.) (1.3)		%	NA	12
Elongation at Break (min.) (2.0)		%	250	100
Tear Resistance (min.)	ASTM D 1004	lbs.	28	28
Stress Crack Resistance (min.)	ASTM D 5397-App.	hrs.	NA	300 ⁴
Asperity (min)	ASTM D 7466	mil	18	18

Notes: 1: Maximum Value

2: Carbon black dispersion (only near spherical agglomerates) for 10 different views:
9 in Categories 1 or 2 and 1 in Category 3.

3. P-NCTL test should be conducted on smooth edges of textured rolls or on smooth sheets made from the same formulation as being used for the textured sheet materials.

E. Extrusion resin/typical extrudate: Extrusion resin/typical extrudate used for extrusion welding of the geomembrane shall be HDPE or LLDPE produced from the same ~~formulation and resin type batch lot material~~ as the sheet resin. Physical properties shall be the same as the geomembrane sheet. The extrudate's additives shall be thoroughly dispersed throughout the rod or bead. The extrudate shall be free of contamination by moisture and foreign matter and shall be recommended for use with the associated sheet material.

F. ~~HDPE or LLDPE shrink wrap: HDPE or LLDPE shrink wrap shall be heat-shrinkable Thermofit Wraparound Pipe Sleeves, Type WPC 60, as manufactured by Raychem or equal.~~

1. Test bonded-seam strength (ASTM D6693).
2. Test peel adhesion (ASTM D6392).
3. Test at least 5 specimens for each test method. Select specimens alternately by test from the samples (i.e., peel, shear, peel, shear...). For double-wedge-welded samples, test both sides in peel.
4. A sample passes if 4 of the 5 specimens for each test method meet the following requirements:
 - (a) The break is a film tearing bond.
 - (b) The break is ductile.
 - (c) No more than 25% partial peel per GM-17.
 - (d) The peel and shear tests must meet or surpass the values in the following tables:

Minimum Weld Values for HDPE Geomembranes

Property	Test Method	30	40	60	80	100	120
Peel Strength (fusion), ppi	ASTM D 6392	49	65	98	130	162	196
Peel Strength (extrusion), ppi	ASTM D 6392	39	52	78	104	130	157
Shear Strength (fusion & ext.), ppi	ASTM D 6392	61	81	121	162	203	242

Minimum Weld Values for LLDPE Geomembranes

Property	Test Method	30	40	60	80	100
Peel Strength (extrusion), ppi	ASTM D 6392	36	48	72	96	120
Peel Strength (fusion), ppi	ASTM D 6392	38	50	75	100	125
Shear Strength (fusion & ext.), ppi	ASTM D 6392	45	60	90	120	150

5. Provide test results no more than forty-eight hours after receiving samples.
6. The construction quality assurance laboratory shall forward a 12-inch x 12-inch sample to the geosynthetic quality-assurance laboratory for confirmation testing (in accordance with this Specification). Sample frequency shall be 1 for every 20 destructive samples taken.

~~7. Destructive seam testing will not be required on the 30-mil "preferential pathway".~~

F. Failed-seam procedures:

1. Follow these procedures when there is a destructive test failure. Procedures apply when test failure is conducted by the construction quality assurance laboratory, the fabricators laboratory, or by field tensiometer. Follow 1 of the following 2 options:
 - (a) First option: Recap the seam between any 2 passed-test locations.
 - (b) Second option:
 - (1) Trace the seam to a location at least 10 feet in both directions from the failed test location, or to where the welded seam ends.
 - (2) Obtain a small sample at both locations for an additional field test.

Section 02752 – Geotextiles and Geocomposites

Addendum #1 Revisions

SECTION 02752

GEOTEXTILES AND GEOCOMPOSITES

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. General: The work described in this Section shall consist of providing all operations pertaining to the furnishing, installing, and testing, of the geotextile and geocomposite drainage layer in accordance with the Specifications and in conformity with the lines and grades shown on the Drawings and as directed by these Specifications.
- B. Non-woven geotextiles will be used as a cushion layer on top of the geomembrane for filter fabric between the rock and vegetative layer soil in various locations.
- C. Woven geotextiles will be used beneath rocked roads for this project.
- D. Geocomposite (geogrid sandwiched between non-woven geotextiles) will be used as drainage layer between the LLDPE or HDPE geomembrane and the soil vegetative layer for the landfill cap. It will also act as a cushion layer between the LLDPE or HDPE geomembrane, rock lining for V ditches, and as a landfill gas venting layer contingency.

1.02 RELATED SECTIONS

- A. Section 01300 – Submittals.
- B. Section 02271 – Erosion and Water Pollution Control.
- C. Section 02272 – Rock Lined Channel Protection and Riprap.
- D. Section 02207 – Aggregate Materials.
- E. Section 02610 – HDPE Pipe.
- F. Section 02750 – HPDE and LLDPE Geomembrane.
- E-G. Construction Quality-Assurance Plan (CQA Plan).

1.03 REFERENCES

- A. ASTM D1777 Method for Measuring Thickness of Textile Materials.
- B. ASTM D~~3526~~1776 Test Methods for Mass Per Unit Area (Weight) of Woven

Fabric.

- C. ASTM D3786 Test Method for Hydraulic Bursting Strength of Non-woven Fabrics.
- D. ASTM D4355 Test Method for Deterioration of Geotextiles from Exposure to Ultraviolet Light and Water.
- E. ASTM D4491 Test Method for Water Permeability of Geotextiles by Permittivity.
- F. ASTM D4533 Test Method for Trapezoidal Tearing Strength of Geotextiles.
- G. ASTM D4595 Test Method for Tensile Properties of Geotextiles by the Wide Width Strip Method.
- H. ASTM D4632 Test Method for Grab Breaking Load Elongation of Geotextiles.
- I. ASTM D~~6241~~~~4833~~ Test Method for ~~Static-Index~~ Puncture ~~Strength~~~~Resistance~~ of Geotextiles.

1.04 SUPPLIER QUALIFICATIONS

- A. Manufacturer Qualifications: The following are pre-qualified. Substitutions will be considered.
 - 1. Scapps Industries, distributed by California Paving Fabrics, Anderson, California (530) 365-0108.
 - 2. GSE, Inc., 19103 Gundle Road, Houston, Texas 77073, (800) 435-2008.
 - 3. Poly-Flex, Inc., 2000 W. Marshall Dr., Grand Prairie, TX 75051, 888-765-9359
 - 4. Agru America, Inc. 700 Rockmead, Suite 150, Kingwood, Texas 77339, (281) 358-4741.
 - 5. Tenax Corporation, Geosynthetics Division, 4800 East Monument Street, Baltimore, MD, 21205, (800) 365-8945.

1.05 SUBMITTALS

- A. Submittals shall be turned in during mobilization. Submit 4 copies of Specification sheet for geotextiles.
- B. Product Data and Factory Test Results:
 - 1. Published product properties.
 - 2. Specifications and seaming techniques.

3. Factory test results of materials, certified by the geotextile manufacturer shall be submitted showing conformance with the requirements of these Specifications, specifically Table 02752-1.
4. The manufacturer's certification stating that the material proposed is similar to and of the same formulation as that for which test results are submitted, and by which actual usage has been demonstrated to be satisfactory for the intended application.

C. Sample for Direct Shear Testing: Within 5 days after initial approval of the Manufacture's test results by the CQA Manager, the Geosynthetics Contractor shall coordinate manufacturer submittal of 4-foot wide by 6-foot long representative samples. Refer to the 02750 - Geomembrane specification, Section 2.01(A) for Direct Shear testing requirements for each of the sideslope and closure cap top deck (2 tests total).

DC. Quality Control:

1. Copies of the manufacturer's recommendations for quality control addressing each item in the material Specification and address procedures for quality control, at least 14 calendar days prior to installation.

ED. Delivery, Storage and Handling Instructions:

1. The manufacturer's recommendations for delivery, storage, and handling shall be submitted to the Engineer for review at least 14 calendar days prior to installation.

PART 2 - PRODUCTS

2.01 MATERIALS

A. The materials supplied under these Specifications shall have the following characteristics:

1. New, first-quality products, designed and manufactured specifically for the purpose of this work, which shall have been satisfactorily demonstrated, by prior use, to be suitable and durable for such purposes.
2. The geotextile in contact with the LLDPE or HDPE geomembrane shall be a polypropylene, staple fiber (short sections), needle punched, non-woven fabric.
3. The geotextile shall be continuously monitored with electronic metal detection during the manufacturing process to ensure that the fabric is needle-free.
4. GSE or equivalent with sides non-burnished.

B. Geotextile Properties: The Geotextile properties shall meet the requirements of Table 02752-1 and Table 02752-2 on the following page:

Table 02752-1
Non-Woven Geotextile Requirements

Property Geotextile	Test Method	Units	Min. Geotextile Value			
Weight	ASTM D 3776 5261	oz/yd ²	6	8	12	16
Thickness (min.) ¹	ASTM D 1777	mils	85	90	130	195
Grab Tensile (min.)	ASTM D 4632	lbs.	160	20 50	275	350
Grab Elongation (min.)	ASTM D 4632	%	50	50	50	50
Puncture Resistance (min.)	ASTM D 4833	lbs.	NL	130	185	220
<u>CBR Puncture Test</u>	<u>ASTM D 6241</u>	<u>lbs.</u>	<u>400</u>	<u>500</u>	<u>NA</u>	<u>NA</u>
<u>Burst Strength (min.)</u>	<u>ASTM D 3786</u>	<u>psi</u>	<u>400</u>	<u>450</u>	<u>650</u>	<u>920</u>
Trapezoidal Tear (min.)	ASTM D 4533	lbs.	60	80	115	130
Permittivity (min.)	ASTM D 4491	sec ⁻¹	1. 45	1. 15	0.9	0.7
<u>Flow Rate</u>	<u>ASTM D 4491</u>	<u>gpm/sf</u>	<u>110</u>	<u>90</u>	<u>NA</u>	<u>NA</u>
<u>Apparent Opening Size</u>	<u>ASTM D 4751</u>	<u>Sieve</u>	<u>70</u>	<u>80</u>	<u>NA</u>	<u>NA</u>

Note: 1: Nominal value, not intended as an acceptance criterion. NL: Not Listed

Table 02752-2
Woven Geotextile Requirements

Property Geotextile	Test Method	Units	Min. Geotextile Value		
Weight	ASTM D 3776	oz/yd ²	4	6	8
Thickness (min.) ¹	ASTM D 1777	mils	NA	NA	NA
Grab Tensile (min.)	ASTM D 4632	lbs.	190	300	300
Grab Elongation (min.)	ASTM D 4632	%	<20	<20	<20
Puncture Resistance (min.)	ASTM D 4833	lbs.	85	120	120
Burst Strength (min.)	ASTM D 3786	psi	350	500	500
Trapezoidal Tear (min.)	ASTM D 4533	lbs.	70	95	110
Permittivity (min.)	ASTM D 4491	sec ⁻¹	NA	NA	NA

Note: 1: Nominal value, not intended as an acceptance criterion

C. Geocomposites

1. A geocomposite consists of a high-density polyethylene (HDPE) geogrid sandwiched between two layers of geotextile.
2. The Geocomposite shall have the following minimum properties listed on Table 02752-3 on the following page:

**Table 02752-3
Geocomposite with 8-oz. Geotextile - Properties**

<u>Property</u>	<u>Test Method</u>	<u>Units</u>	<u>Min Value</u>	<u>Qualifier</u>
<u>Geonet</u>				
<u>Thickness</u>	<u>ASTM D 5199</u>	<u>mil</u>	<u>270±15³</u>	<u>Range</u>
<u>Carbon Black</u>	<u>ASTM D 4218</u>	<u>%</u>	<u>2 to 3</u>	<u>Range</u>
<u>Tensile Strength</u>	<u>ASTM D 5035</u>	<u>lb/in</u>	<u>50</u>	<u>Minimum</u>
<u>Melt Flow</u>	<u>ASTM D 12383</u>	<u>g/10 min</u>	<u>1</u>	<u>Maximum</u>
<u>Density</u>	<u>ASTM D 1505</u>	<u>g/cm³</u>	<u>0.94</u>	<u>Minimum</u>
<u>Transmissivity¹</u>	<u>ASTM D 4716</u>	<u>m²/sec</u>	<u>2.5x10⁻³</u>	<u>MARV²</u>
<u>Geocomposite</u>				
<u>Ply Adhesion (min)</u>	<u>ASTM D 7005</u>	<u>lb/in</u>	<u>1</u>	<u>MARV</u>
<u>Transmissivity¹</u>	<u>ASTM D 4716</u>	<u>m²/sec</u>	<u>=>5 x10⁻⁴</u>	<u>MARV</u>
<u>Geotextile</u>				
<u>Weight</u>	<u>ASTM D 3776</u>	<u>oz/yd²</u>	<u>8</u>	<u>MARV</u>
<u>Thickness (min.)³</u>	<u>ASTM D 1777</u>	<u>mils</u>	<u>90</u>	<u>MARV</u>
<u>Grab Tensile (min.)</u>	<u>ASTM D 4632</u>	<u>lbs.</u>	<u>200</u>	<u>MARV</u>
<u>Grab Elongation (min.)</u>	<u>ASTM D 4632</u>	<u>%</u>	<u>50</u>	<u>MARV</u>
<u>Puncture Resistance (min.)</u>	<u>ASTM D 4833</u>	<u>lbs.</u>	<u>130</u>	<u>MARV</u>
<u>Burst Strength (min.)</u>	<u>ASTM D 3786</u>	<u>psi</u>	<u>450</u>	<u>MARV</u>
<u>Trapezoidal Tear (min.)</u>	<u>ASTM D 4533</u>	<u>lbs.</u>	<u>80</u>	<u>MARV</u>
<u>Permittivity (min.)</u>	<u>ASTM D 4491</u>	<u>sec⁻¹</u>	<u>1.5</u>	<u>MARV</u>
<u>AOS</u>	<u>ASTM D 4751</u>	<u>US Sieve</u>	<u>80</u>	<u>MARV</u>

1. Transmissivity measured using water at 21 ± 2°C (70 ± 4°F) with a gradient of 0.1 and a confining pressure of no less than 500 psf between steel plates after 15 minutes. Values may vary between individual labs. Geonet transmissivity may vary significantly as long as the geocomposite transmissivity is met.
2. MARV is statistically defined as mean minus two standard deviations and it is the value which is exceeded by 97.5% of all the test data.
3. Thickness may vary significantly as long as the geocomposite transmissivity

—DC. Manufacturer source quality control (non-woven geotextile only):

1. Test the **geotextile** at a minimum of once for every 100,000 square feet produced or each lot provided, whichever is the least square footage, to evaluate the pertinent characteristics for quality control.
2. If testing does not meet the Specifications, the Engineer shall reject the applicable rolls.

3. At the manufacturer's discretion and expense, additional testing of individual rolls may be performed to more closely identify the non-complying rolls and/or to qualify individual rolls.
4. Certify the quality of the rolls of geotextiles.
5. Provide quality control certificates for each lot and each shift's production in accordance with this section. Include the following:
 - (a) Roll numbers and identification.
 - (b) Sampling procedures.
 - (c) Results of quality control tests, including a description of test methods used.

E. ~~D.~~ Labeling:

1. Supply in rolls wrapped in impermeable and opaque protective covers.
2. Prominently and indelibly mark or tag with the following information:
 - (a) Roll numbers and identification.
 - (b) Sampling procedures.
 - (c) Results of quality control tests, including a description of test methods used.
3. If any special handling is required, mark special handling requirements on the geotextile itself, e.g., 'This side up', or 'This side against geomembrane'.
4. The rolls of geotextile shall be identified such that the roll numbers, lot numbers, and product identification allow each roll to be traceable.

~~E.~~ Geocomposites

- ~~1. A geocomposite consists of a high density polyethylene (HDPE) geogrid sandwiched between two layers of geotextile.~~
- ~~2. The Geocomposite shall have the following minimum properties:~~

Geocomposite with 8-oz. Geotextile -- Properties

Property	Test Method	Units	Min Value	Qualifier
Geonet				
Thickness	ASTM D-5199	mil	270±15 ³	Range
Carbon Black	ASTM D-4218	%	2 to 3	Range
Tensile Strength	ASTM D-5035	lb/in	50	Minimum
Melt Flow	ASTM D-12383	g/10 min	+	Maximum
Density	ASTM D-1505	g/cm ³	0.94	Minimum
Transmissivity [†]	ASTM D-4716	m ² /sec	2.5x10 ⁻³	MARV ²
Geocomposite				
Ply Adhesion (min)	ASTM D-7005	lb/in	+	MARV
Transmissivity [†]	ASTM D-4716	m ² /sec	=>5 x10 ⁻⁴	MARV

Geotextile				
Weight	ASTM D 3776	oz/yd ²	8	MARV
Thickness (min.) [†]	ASTM D 1777	mils	90	MARV
Grab Tensile (min.)	ASTM D 4632	lbs.	200	MARV
Grab Elongation (min.)	ASTM D 4632	%	50	MARV
Puncture Resistance (min.)	ASTM D 4833	lbs.	130	MARV
Burst Strength (min.)	ASTM D 3786	psi	450	MARV
Trapezoidal Tear (min.)	ASTM D 4533	lbs.	80	MARV
Permittivity (min.)	ASTM D 4491	sec ⁻¹	1.5	MARV
AOS	ASTM D4751	US Sieve	80	MARV

1. ~~Transmissivity measured using water at 21 ± 2°C (70 ± 4°F) with a gradient of 0.1 and a confining pressure of 10000 psf between steel plates after 15 minutes. Values may vary between individual labs. Geonet transmissivity may vary significantly as long as the geocomposite transmissivity is met.~~
2. ~~MARV is statistically defined as mean minus two standard deviations and it is the value which is exceeded by 97.5% of all the test data.~~
3. ~~Thickness may vary significantly as long as the Geocomposite transmissivity~~

PART 3 - EXECUTION

3.01 PANEL MARKING, PACKAGING, DELIVERY, STORAGE, AND HANDLING

- A. General: The geotextile shall be delivered, stored, and handled in strict accordance with the manufacturer's recommendations.
- B. Packaging: Each factory roll shall be individually packaged and protected to prevent damage to it during shipment. It shall be prominently identified in the same fashion as the roll within, and show the date of shipment.
- C. Delivery:
 1. Materials shall be delivered to the site only after the Engineer reviews and takes no exception to the materials and manufacturer submitted by Contractor.
 2. Separate damaged or rejected rolls from undamaged or acceptable rolls and store at locations designated by the Engineer until proper disposition of material is determined by the Engineer.
 3. The Contractor shall identify damaged rolls.
- D. Storage:
 1. The geotextile storage area at the construction site shall be prepared, and reviewed for acceptability prior to the arrival of any material.

2. The area shall be secured from the following:
 - (a) Man or Animal: The storage area shall not be near or adjacent to areas frequented by the general public, unless a security fence is provided.
 - (b) Puncture, Dirt, Dust, Grease or Water: Store geotextile rolls to protect from puncture, dirt, grease, water, moisture, water, mud, mechanical abrasions or other damage. Do not store where bonding may occur.
 - (c) Extreme Heat: The geotextile shall be protected from direct sunlight and extreme heat.
3. The geotextile shall be stacked no more than three (3) rolls high.

E. Handling:

1. Use appropriate handling equipment recommended by the manufacturer to load, move, and deploy geotextile rolls.
2. Appropriate handling equipment may include but not be limited to cloth chokers, spreader bar, and roll bars for deployment.
3. Dragging panels or rolls on ground surface will not be permitted.
4. Contractor is responsible for off-loading, storage, and transporting material from storage area to installation site.

3.02 GEOTEXTILE INSTALLATION

- A. For woven and non-woven geotextile that will not be sewn, orient overlaps and seams no less than 2 feet and secure seams to ensure that they do not fold back during placement of backfill.
- B. Ensure that no soil cover material is inadvertently inserted beneath the geotextile at the overlaps.
- C. For nonwoven geotextile used beneath the vegetative layer, the seams must be sewn.
- D. All geocomposite seams shall be sewn or heat welded to prevent intrusion of soil during placement of the vegetative layer or during the postclosure period.

3.03 COVER MATERIAL PLACEMENT

- A. Placement of cover material shall not be performed until the installation in that particular area is certified by the Contractor/installer/manufacturer's representative to have been installed in accordance with the Drawings, Specifications and manufacturer's recommendations and approved by the CQA Monitor.
- B. All geotextiles should be covered within ten (10) days. If the geotextile will be left exposed for more than ten (10) days, the manufacturer (prior to shipping) shall provide field LTV test data and written recommendations for the maximum time of

UV exposure. Geotextiles which will be left exposed for more than four (4) weeks shall be routinely sampled every four (4) weeks, and tested for tensile strength. Samples should be taken from the exposed geotextile, and these areas properly repaired. If within the time frame of recommended exposure, the tensile strength of the geotextile falls below 80 percent of the original values, the manufacturer shall replace the defective material assuming all cost for removal of the defective material and installation of the replacement material.

- C. Temporary geotextile or geocomposite terminations that have been left exposed during winter shall be trimmed, and the subsequent newer material used to replace it. Alternatively, the contractor may cover temporary edges with a method that provides a clean edge for subsequent heat bonding, or as recommended by the Geosynthetic Installer and approved by the Project Engineer.

3.04 FIELD QUALITY CONTROL

Conformance Testing: The Factory shall provide samples of the same lot that will be delivered to the site to the Engineer for inspection and/or testing. The samples shall be labeled with the lot or roll number. The Rolls that are delivered to the site shall have the same lot or roll number or additional tests will be performed at the Contractors expense. No extra contract time will be allowed for retests that are caused by the Contractor.

3.05 REPAIR

- A. Repair holes and tears as follows:
 - 1. Patch using the same geotextile seamed in place with a minimum of 24 inches overlap in all directions.
 - 2. Remove any soil or other material which may have penetrated the torn geotextile.

3.06 GEOTEXTILES ACCEPTANCE

- A. The Contractor retains all ownership and responsibility for the geotextile until acceptance by the Owner. Owner will provide written notification of acceptance to the Contractor.
- B. The geotextile will be accepted by the Owner after:
 - 1. The installation is finished.
 - 2. All documentation of installations is completed.
 - 3. Verification of the adequacy of all overlaps and repairs, including associated testing is complete.

3.07 CONTINGENCY FOR EXCESSIVE GAS PRESSURE

- A. While the cap is designed with gas-relief strips, there is the potential that isolated areas could produce localized LFG flow. If incipient liner bulging is encountered

during geosynthetic placement as described in Section 02750 – HDPE and LLDPE Geomembrane, the Contractor shall contact the engineer to provide the limits of a sub-geosynthetic venting strips consisting of a 10-foot wide geocomposite strip (including lap to a shallow trench) and vented by a 3-inch diameter HDPE pipe in a shallow trench, with 5-foot tall 3-inch diameter HDPE riser spaced every 200 feet with a 90 degree turn in the top or other rain cap.

PART 4 - MEASUREMENT AND PAYMENT

- 4.1 General: The price for geotextiles shall include all materials, shipping, sales tax, waste, overlap, sewing materials, labor, equipment, superintendence, and incidentals to install the work complete in-place.
- 4.2 MEASUREMENT AND PAYMENT: Measurement and payment shall be included in the unit prices listed in the Bid Schedule as follows:
 - A. Non-woven Geotextile: Payment for non-woven geotextile shall be included in the per-square-foot cushion layer as described in the Bid Schedule under “8-oz. non-woven geotextile cushion layer.”
 - B. Woven Geotextiles shall be included in the unit price of graveled roads, ditches and other similar applications.
 - C. Geocomposite: Payment for Geocomposite shall be included in the per square-foot price of the “Geocomposite drainage layer” and included in the per-linear-foot price of “Gas Venting Strips” as described in the Bid Schedule. The surface area will be calculated by slope surface area installed. The linear feet will be based on the linear feet installed. The owner will not pay for waste or unused material.
 - D. Gas Venting Strips: Payment for gas venting strips will be on a price per linear-foot basis as described in the Bid Schedule under “Gas Venting Strips.”
 - E. General: The Contractor shall include lap, scrap, and waste in their unit price.

END OF SECTION

Construction Quality Assurance (CQA) Plan
Addendum #1 Revisions

Seams for the geotextile shall be sewn or heat lystered so that it provides a continuous filter with no perforations.

Table 6
Non-Woven Geotextile Requirements

Property Geotextile	Test Method	Units	Min. Geotextile Value		
Nominal Weight	ASTM D 3776	oz/yd ²	8	12	16
Thickness (min.)	ASTM D 1777	mil	90	130	145
Grab Tensile (min.)	ASTM D 4632	lbs	200	275	350
Grab Elongation (min.)	ASTM D 4632	%	50	50	50
Puncture Resistance (min.) CBR Puncture Test	ASTM D 6241 4833	lbs	500 130	185	220
Burst Strength (min.)	ASTM D 3786	psi	450	600	700
Trapezoidal Tear (min.)	ASTM D 4533	lbs	80	115	130
Permittivity (min.)	ASTM D 4491	sec ⁻¹	1.15	0.7	0.7

Note: The values in the above table are intended to convey the general quality requirements for the cushion layer. Permittivity is not a minimum value for the cushion layer.

12.8.2

Check Manufacturer's Data Against Requirements

Check the following information:

1. Published product properties.
2. Technical Specifications and seaming techniques.
3. The manufacturer's certification stating that the material proposed is similar to and of the same formulation as that for which test results are submitted, and by which actual usage has been demonstrated to be satisfactory for the intended application.

12.8.3
Obtain samples for confirmation analysis:

1. No tests required.

Monitor Installation

The following monitoring duties will be performed:

1. Confirm overlaps and seams on the sides of the panels are oriented parallel to the line of maximum slope, (i.e., down, not across slope).
2. Confirm that horizontal overlaps or seams at the ends of the rolls (overlaps or seams running perpendicular to the slope) are at least 5 feet away from toe or crest of slope.