

**SPECIAL NOTE FOR
TREATMENT OF END BENT OR ABUTMENT BACKFILLS USING GEOTEXTILE
REINFORCEMENT AND ELASTIC INCLUSION**

May 21, 2013

I. DESCRIPTION

Geotextile Reinforced Backfill and Elastic Inclusion work shall consist of installation of an elasticized Expanded Polystyrene (EPS) and geotextile separation fabric between the back of concrete surfaces and backfill material, in accordance with these specifications and in conformity with manufacturer's recommendations, the lines shown on the plans or as established by the Engineer. It also includes placing Geotextile reinforcement within the granular backfill. Construction shall be in accordance with Special Provision No. 69, Embankment at End Bent Structures, Standard Drawing RGX-100 (Sepia), and Standard Drawing RGX-105(Sepia) except where the requirement of this note direct otherwise.

II. MATERIALS

- (a) **Geotextile Reinforcement:** The Geotextile Reinforcement utilized in the backfill shall be a woven fabric meeting the requirements Fabric – Geotextile Class 1A of Section 843 of the Standard Specifications except that the Geotextile Reinforcement shall have a minimum Ultimate Strength of 1350 lb/ft and a minimum Strength at 2% strain of 380 lb/ft when tested by ASTM D 4595.
- (b) **Elasticized Expanded Polystyrene (EPS):** The EPS shall have a size tolerance of 1/8 inch for each dimension and conform to the following:

Physical Property	ASTM Test Method	Requirements
Compressive strength	D-1621	720 psf +/-60 psf @10% strain
Water absorption	C-272	Max. 3% by volume
Insect Resistance	D-3345-74	Resistance to ants, termites, etc.

The EPS shall be elasticized, with a linear-elastic stress-strain behavior up to 10 percent strain and linear proportional stress-strain behavior up to 30 percent strain.

The EPS shall contain no chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), hydrofluorocarbons (HFCs) or formaldehyde. It shall be chemically and biologically inert when in contact with acidic and alkaline soils. It shall be treated to prevent insect attack.

Materials shall withstand temperature variations from 0°F to 140°F without deforming and shall maintain their original dimensions and placement without chipping, spalling, or cracking. Material shall not deteriorate because of contact with sodium chloride, calcium chloride, mild alkalis and acids, or other ice control materials.

The EPS shall contain a flame retardant additive.

- (c) **Spill Protection Layer:** The exposed top and side surfaces of the blocks shall be protected against chemical spill, particularly petroleum products, using a geomembrane liner. The geomembrane shall be resistant to petroleum products such as gasoline and diesel fuel. The geomembrane shall be manufactured from a tripolymer consisting of polyvinyl chloride, ethylene interpolymers, and polyurethane, or a similar combination. The geomembrane shall have a minimum thickness of 0.7 mm. Seaming, if required, shall be by thermal or solvent methods. The geomembrane shall extend a minimum of twelve inches beyond the EPS surface and overlap with adjacent concrete surfaces. The geomembrane shall be stored and installed according to the manufacturer's recommendations or as directed by the Engineer.

- (d) **Geotextile Separation Fabric:** Fabric-Geotextile Class 2 meeting the requirements of Section 843 of the Standard Specifications shall be placed between the geomembrane wrapped EPS and the backfill material. Fabric joints shall have a minimum overlap of twelve inches. Fabric shall extend a minimum of twelve inches beyond the EPS surface and overlap with adjacent concrete or geomembrane surfaces. Geotextile separation fabric for subsurface installation shall not be exposed to direct sunlight for more than 24 hours during installation.
- (e) **Adhesive:** Adhesive shall be used to bond the EPS to concrete surfaces, the geomembrane to the EPS and concrete, and the separation fabric to the geomembrane wrapped EPS or concrete. It shall be applied in accordance with the EPS, geomembrane, and separation fabric manufacturer's recommendations.
- (f) **Granular Backfill:** Granular Backfill material shall be crushed stone meeting the requirements of Section 805 of the Standard Specifications and conform to the following gradation:

Sieve Size	Percent Passing
1-1/2 inch	100%
No. 4	0 – 25%
No. 8	0 – 5%

III. PROCEDURES

- (a) **Preparation of Concrete Surface:** Before placement of EPS, concrete surfaces shall be abrasive blast cleaned with a positive contact sandblaster or adhesives manufacturer's recommendation and approved by the Engineer to remove all non-adherent laitance, oil, grease or other foreign or deleterious matter.
- (b) **Installation of EPS Material and Geotextile Separation Fabric:** The EPS shall be attached to the back of the concrete surfaces with an adhesive compatible with the material.

The concrete surface must be thoroughly dry and clean for adhesive for the application of the EPS. Adhesive shall be applied in accordance with the adhesive manufacturer's recommendation or approval.

The geomembrane and separation fabric may be installed after the EPS has been installed or it may be pre-attached to the EPS. The geomembrane shall cover all exposed surfaces of the EPS. The separation fabric shall cover all exposed surfaces of the geomembrane.

EPS, geomembrane, and separation fabric shall be installed in accordance with the manufacturer's recommendations.

- (c) **Installation of Wrapped Geotextile Reinforcement and Backfill:** Place Fabric – Geotextile Class 2 in accordance with Section 214 of the Standard Specifications where the Granular Backfill material will come in contact with embankment material. The Granular Backfill material shall be completely wrapped with Fabric – Geotextile Class 2.

Place two 4-inch perforated underdrain pipes wrapped with Geotextile fabric in the bottom of the backfill trench at the base of the end bent/abutment as shown on the attached drawing. Place Granular Backfill in the bottom of the trench and compact as noted below. A minimum of 1 foot but no more than 2 feet of Granular Backfill should be placed in the bottom of the trench, and the actual depth should be determined in the field such that the 1 foot lifts of Geotextile Reinforcement and Granular Backfill will result in the required final grade.

Place Geotextile Reinforcement and Granular Backfill as shown in the attached drawing in lifts not to exceed 1 foot. The Geotextile Reinforcement shall be placed so that the strongest direction is perpendicular to the end bent/abutment and shall be laid so that it is taut and free of wrinkles prior to

backfilling. If needed the Geotextile fabric may be overlapped or mechanically connected (sewn) in accordance with the manufacturer's specifications except that overlaps may not be used within 4 feet of the back wall of the end bent/abutment. Vehicles shall not be allowed to operate directly on the fabric. The Geotextile Reinforcement shall wrap around to enclose the backfill material on three sides (at the end bent and side slopes).

Granular Backfill material shall be placed and spread starting at the back of the End Bent/Abutment and moving perpendicularly away from the End Bent/Abutment so that the Geotextile Reinforcement does not become wrinkled or develop slack. Each lift of the backfill material shall be compacted using a suitable compactor until there is no visible sign of further compression. A minimum of four passes shall be applied per lift. Hand operated compaction equipment such as lightweight mechanical tampers, vibratory plates, or rollers are required within 3 feet of the back of the end bent/abutment.

IV. TESTING

Elasticized EPS shall be tested by an independent commercial laboratory, to verify the material requirements specified herein. The Contractor shall provide written documentation of all tests specified. Documentation shall include style, lot, roll numbers, and actual results of each test. In addition, the name, address, phone number of the testing laboratory, and date of testing shall be provided.

Geotextile Reinforcement and geomembranes shall be tested by an independent commercial laboratory, to verify the material requirements specified herein. The Contractor shall provide written documentation of all tests specified. Documentation shall include style, lot, roll numbers, and actual results of each test. In addition, the name, address, phone number of the testing laboratory, and date of testing shall be provided.

After the EPS has been installed and before the work has been accepted, the Contractor and Inspector shall perform a visual inspection of EPS coverage and adhesion to the concrete surface. Any area deemed unacceptable and questionable as to remaining in position during the placement of the backfill material shall be replaced or repaired, as required.

V. REPAIR OF FAILED AREA OF EPS

Unacceptable portion of the EPS shall be removed and the concrete surface shall be prepared and the EPS installed in accordance with this special provision. New EPS in the repair areas shall be visually inspected after curing. The cost of all additional work for repairing or replacing of the defective joint material shall be borne by the Contractor.

VI. MEASUREMENT AND PAYMENT

Elasticized EPS will be measured in square yards along the back of backwall surface area, complete-in-place, and will be paid for at the contract unit price per square yard. Such price shall be full compensation for cleaning surface, for furnishing and installing the EPS material in accordance with these Specifications and the manufacturer's recommendations, testing, and for all material, labor, tools, equipment and incidentals necessary to complete the work. The department will not measure for payment the geomembrane and will consider it incidental to the Elasticized EPS.

Granular Backfill will be measured in cubic yards using the plan quantity, increased or decreased by authorized adjustments as specified in Section 204 of the Standard Specifications. The Department will not measure for payment any Granular Backfill not called for in the plans. The Department will not measure for payment the 4-inch perforated underdrain pipe or the Fabric - Geotextile Class 2 and will consider it incidental to the Granular Backfill.

Fabric – Geotextile Class 1A will be measured as specified in Section 214 of the Standard Specifications. See detail sheet in the Plans.

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Payment will be made under:

Pay Item	Pay Unit
Elasticized EPS (Thickness)	Square Yard
Fabric – Geotextile Class 1A	Square Yard
Granular Backfill	Cubic Yard

On August 3, 2021 the following items in this special note were edited:

- Section II(a) - Type V High Strength Geotextile Fabric changed to Fabric – Geotextile Class 1A
- Section II(d) - Geotextile Fabric Type IV changed to Fabric – Geotextile Class 2
- Section III (c) - Geotextile Fabric Type IV changed to Fabric – Geotextile Class 2
- Section VI - Geotextile Fabric Type IV changed to Fabric – Geotextile Class 2
- Section VI – High Strength Geotextile Fabric changed to Fabric – Geotextile Class 1A
- Pay Item - High Strength Geotextile Fabric changed to Fabric – Geotextile Class 1A