SP-150394
(New)

SPECIAL PROVISIONS
FOR
GEOCOMPOSITE WALL DRAIN

Polk County
IMX-080-3(209)133--02-77

Effective Date
May 21, 2019

THE STANDARD SPECIFICATIONS, SERIES 2015, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

150394.01 DESCRIPTION.

This work shall consist of furnishing and installing geocomposite wall drain on the soil side of abutment walls and wing walls.

150394.02 MATERIAL.

A. Geocomposite wall drain shall be a flexible geocomposite consisting of a supporting structure or core, the soil side of which is bonded to an approved geotextile weighing not less than 3.5 ounces per square yard. The drainage core shall provide support to and be bonded to the geotextile at intervals not exceeding 1 1/8 inches in any direction and shall permit unobstructed flow through not less than 75% of the geotextile.

B. The flow rate of the core shall not be less than 10 gallons per minute per foot at a hydraulic gradient of 1.0 when subjected to a normal pressure on the soil side face of 6000 pounds per square foot. When tested in a sand box according to the method described below at 6000 pounds per square foot, the core deflection shall not exceed 20%.

C. Load-Deflection Test for Geocomposite Wall Drains (Sand Box Method).

1. Scope.
The purpose of this procedure is to evaluate geocomposite drains for use on the soil side of abutment walls and wing walls.

2. Reference Documents.
- **a.** ASTM E 4
- **b.** ASTM C 109
- **c.** ASTM C 778

d. ASTM D 3350

3. Test Equipment.

a. A compression testing machine with a constant-rate-of crosshead-movement calibrated to ASTM E 4.

b. Four dial indicators with clamp on bases which are capable of reading to the nearest 0.001 inches.

c. A winged tower type loading plate measuring 12 inches by 12 inches by 1 inch, and a steel sand box. (Figure 1a and 1b)

d. A large quantity of graded standard sand (Ottawa Sand ASTM C 109) that meets the gradation requirement for ASTM C 778.

4. Procedure.

a. The Contractor shall evaluate the effectiveness of geocomposite drains and submit the results to the Office of Construction and Materials for approval.

b. The manufacturer shall provide a sample measuring 3.3 feet by 3.3 feet to be considered for approval.

1) Sample Preparation.

a) For the purpose of testing, cut one 12 inch by 12 inch representative specimen of the geocomposite drain.

b) Unless otherwise specified, conduct the test in the Standard Laboratory Atmosphere of 73.4°F ± 3.6°F and 50% ± 5% relative humidity. Condition the specimens in the laboratory environment for at least 48 hours prior to testing.

c) Measure and record the thickness of the drain to the nearest 0.001 inch. This is accomplished by measuring the material under a dial indicator with a leveling plate. Several readings shall be taken over the area of the mat, and the average of those measurements less the thickness of the plate will be used for the overall thickness. (Figure 2)

2) Sample Testing.

a) Geocomposite drains shall be a flexible geocomposite consisting of a supporting structure of core bonded to an approved geotextile fabric. The geotextile shall not weigh less than 3.5 ounces per square yard. The core shall be fabricated of polyethylene with a minimum cell classification of PE 112110 in accordance with ASTM D 3350 or other approved polymeric material.

b) The drain should be tested with the filter fabric side-up, and the edges prepared (taped) to prevent sand infiltration. (Figure 3)

c) The drain shall be covered with a level 3 1/2 inch layer of graded standard sand, and the loading plate is set on top on the sand. (Figure 4)

d) The sand box assembly will be placed into the compressing testing machine, and the dial indicators are to be clamped to the wings of the loading plate 1 1/2 inches from each edge. These gauges are used to measure the average load-deflection. (Figures 5 and 6)

e) An initial preload of 50 pounds is used to seat the loading plate on the bed of sand and the gauges are then adjusted to zero. (Figure 7)

f) A load of 6000 pounds shall be applied to the plate at a rate of 0.05 inches per minute.

g) To obtain the total deflection of the geocomposite drain, average the four readings from the indicators. The readings shall be taken upon reaching the 6000 pounds load.

h) Calculate the deflection by the following formula. The deflection of the drain shall not exceed 20% of the drain thickness.

$$\% \text{ Deflection} = (\Delta / T)\ 100$$

Where:

Δ = Average deflection reading of the four dial indicators.
T = Original thickness measurement.

3) Sample Acceptance.

a) Contract acceptance samples shall pass the first test. If the material fails, two additional retests shall be performed with both samples passing.

b) For new product/producer evaluation the number of test required will be based on the performance of the specimen relative to specification requirements.

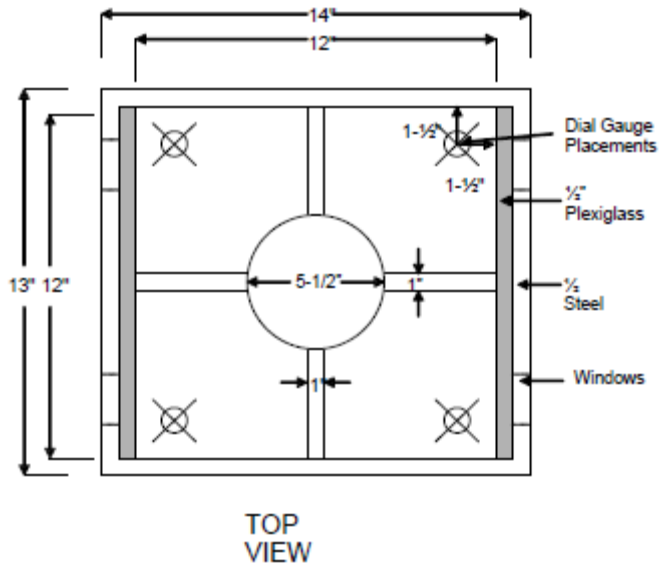

Figure 1a. Top View - Sand box with the compression plate installed.

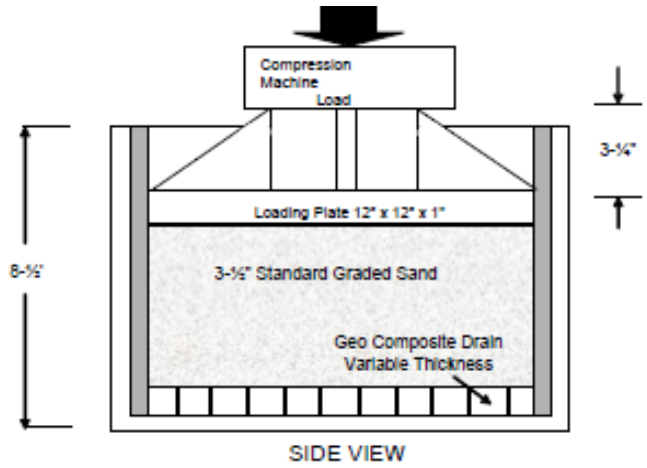

Figure 1b. Side View - Sand box with the drainage mat and sand installed.

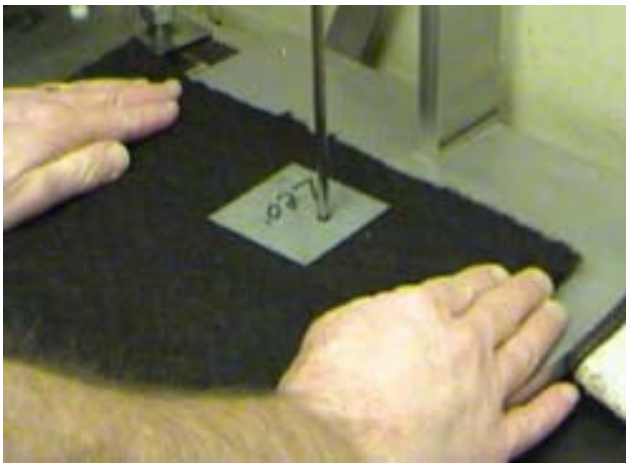

Figure 2. Measuring the thickness of the drainage mat using a dial indicator gauge.

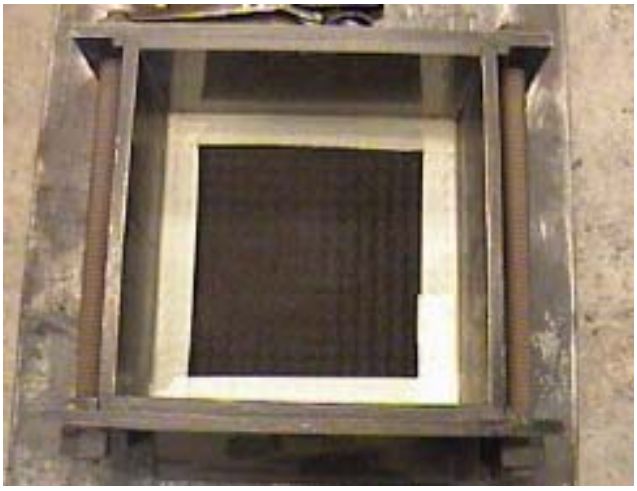

Figure 3. Drainage mat with edges sealed with 2 1/2 inch masking tape to prevent sand infiltration.

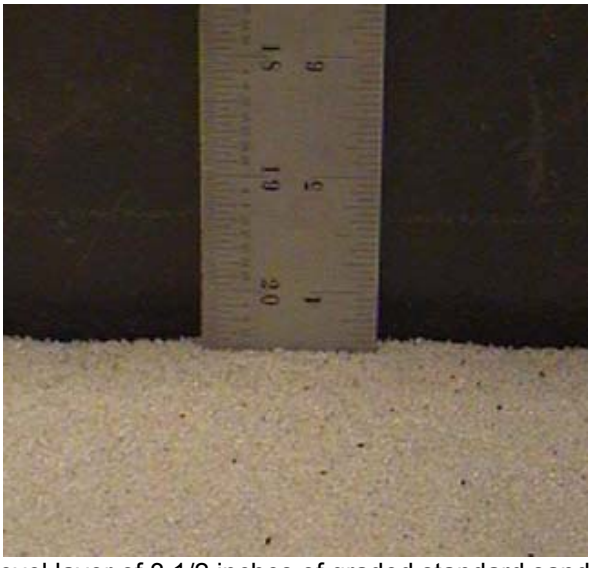

Figure 4. A level layer of 3 1/2 inches of graded standard sand (ASTM C 109) placed on the mat.

Figure 5. Loading plate placed on top of the sand and ready to be placed into the compression machine.

Figure 6. Loading assembly in the compression machine with indicator gauges installed.

Figure 7. Initial preload applied, and the gauges are adjusted to zero.

D. The core shall be fabricated of polyethylene with a minimum cell classification of PE 112110 according to ASTM D 3350 or other approved material.

E. The wall drain shall be furnished with: 1) approved fittings to connect with outlet pipes and weep holes; 2) suitable approved splices; 3) end, top, and bottom caps to prevent the intrusion of backfill material into the core; and 4) approved fastening systems to secure the wall drain to the wall.

F. Products listed below are similar but have not yet been approved by Iowa DOT:

Manufacturer	Product Name
JDR Enterprise	J Drain 400
American Wick Drain	Site Drain 180
US Fabrics	US 400

150394.03 CONSTRUCTION.

A. Geocomposite wall drain shall be constructed in horizontal courses with the first course resting on the top of the footing. The geocomposite shall be in direct contact with the wall and secured with concrete nails not less than 2 inches long with approved washers not less than 9 square inches in area. The spacing of the concrete nails shall be as directed by the Engineer but shall not be more than 3 feet, both horizontally and vertically. There shall be at least one horizontal row of nails in each course.

B. Horizontal seams shall be formed by a 4 inch flap of geotextile extending from the upper course and lapping over the top of the lower course or by a 12 inch wide continuous strip of geotextile

centered over the seam and securely fastened to the upper course with continuous 3 inch wide plastic tape. The overlapping flap or strip shall be fastened to the lower course intermittently as directed by the Engineer, but the spacing shall not exceed 2 feet. Vertical splices shall be formed by a 4 inch flap of geotextile extending from one or the other abutting pieces or by a 12 inch wide continuous strip of geotextile centered over the splice. Vertical splice flaps or strips shall be continuously fastened to the geocomposite with continuous applications of contact adhesive or 3 inch wide plastic tape.

C. The bottom, side, and top edges of the geocomposite shall be covered with a suitable cap formed by folding a 6 inch flap or a 12 inch wide strip of geotextile over the edge and securing it in place with a continuous application of contact adhesive or 3 inch wide plastic tape. All seams, splices, bottom caps, top caps, and end caps shall be constructed so that backfill material cannot enter the geocomposite during or after construction.

D. Connection to pipe outlet systems shall be as shown on the plans. Outlet fittings shall be fastened to the wall drains as directed by the manufacturer and so that backfill materials cannot enter the system during or after construction. If necessary, to facilitate the rapid and complete flow of water from the wall drain into the pipe outlet, a portion of the wall drain core equal to the cross section at the outlet shall be removed. Weep holes shall be accommodated by cutting a matching hole through the wall drain. An approved weep hole cover extending at least 4 inches from the edge(s) of the hole shall be securely fastened to the soil side of the wall drain by 3 inch wide plastic tape or contact adhesive applied continuously around its periphery.

150394.04 METHOD OF MEASUREMENT.

No separate measurement.

150394.05 BASIS OF PAYMENT.

No separate payment will be made for the work of furnishing and installing geocomposite wall drain, including testing. The cost all material and labor associated with this item shall be included in the payment for Structural Concrete (Bridge).