ICC-ES Evaluation Report

Reissued July 2023

ESR-3073

This report is subject to renewal July 2024.

DIVISION: 32 00 00—EXTERIOR IMPROVEMENTS
Section: 32 32 00—Retaining Walls
Section: 32 32 23—Segmental Retaining Walls

REPORT HOLDER:

SOIL RETENTION PRODUCTS, INC.

EVALUATION SUBJECT:

VERDURA RETAINING WALL SYSTEMS

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2015, 2012 and 2009 *International Building Code*® (IBC)
- 2013 *Abu Dhabi International Building Code* (ADIBC)†

†The ADIBC is based on the 2009 IBC. 2009 IBC code sections referenced in this report are the same sections in the ADIBC.

Properties evaluated:

Physical properties

2.0 USES

The Verdura Retaining Wall Systems consist of modular concrete units used in the construction of segmental landscaping and retaining walls, with or without a mass of reinforced soil, stabilized by horizontal layers of geosynthetic reinforcement materials.

3.0 DESCRIPTION

3.1 General:

The Verdura Retaining Wall Systems consist of modular concrete units assembled in running bond without mortar or grout and with or without horizontal layers of geosynthetic reinforcement materials in the backfilled soil mass. Where geosynthetic reinforcement materials are used, a positive mechanical connection between the concrete block units and the geosynthetic reinforcement materials is established as described in Section 4.1.3.2.

3.2 Materials:

3.2.1 Verdura Concrete Block Units: Verdura concrete block units are trough-shaped and vary in dimension and weight. Verdura concrete block units have a scallop lip which controls maximum batter when successive courses are abutted and provides shear strength to resist lateral loading. The type, weight and design batter of the Verdura concrete block units are given in Table 1. Schematics of the Verdura concrete block units are shown in Figures 1 and 2.

Verdura concrete block units are made with normal-weight aggregates and comply with ASTM C1372, including having a minimum 28-day compressive strength of 5,000 psi (345 MPa) on the net area and a maximum water absorption of 8 pounds per cubic feet (128 kg/m^3).

3.2.2 Geosynthetic Reinforcement Materials: The geosynthetic reinforcement materials as described in Sections 3.2.2.1 and 3.2.2.2 are used to increase the height of the Verdura Wall System above the height at which the wall is stable under its self-weight as a gravity system. See Tables 2 and 3 for geosynthetic reinforcement materials used with the Geosyntheticcally Reinforced Verdura Retaining Wall Systems.

3.2.2.1 Geogrids: The geogrids consist of polyester yarns with polymeric coating, formed into a grid shape. The geogrids (identified as Miragrid in Tables 2 and 3) are used specifically with the Verdura 40 wall system and manufactured by Tencate Geosynthetics.

3.2.2.2 Geosynthetic Fabric: Posi-Dura fabric identified as Mirafi HS667 is a woven polyester geosynthetic fabric, and is used specifically with the Verdura 30 wall system. Posi-Dura fabric is manufactured by Tencate Geosynthetics and is supplied with pre-fabricated sewn sleeves at a regular interval and a minimum of 7 inches (178 mm) in width.

3.2.3 Positive Mechanical Connection Pipe: The positive mechanical connection pipe used for both Verdura 30 and Verdura 40 connection systems must be of 1-inch-diameter (25.4 mm) Schedule 80 PVC pipe conforming to ASTM D1785.

3.2.4 Backfill Material: Backfill material placed behind the Verdura concrete block units as a reinforced soil mass must consist of approved suitable fine grain or coarse gain materials as specified by the registered design professional per recognized design procedures.

3.2.5 Unit Infill: The unit infill material placed within the block cell and between the blocks shall be the backfill material in accordance with Section 3.2.4. The unit infill material can be modified by the registered design professional for purposes of facilitating vegetation growth.

4.0 DESIGN AND INSTALLATION

4.1 Design:

4.1.1 General: Structural calculations must be submitted to the code official for each wall system installation. The design of Verdura segmental retaining walls (SRWs) must be based on accepted engineering principles for gravity and soil-reinforced structures. The system must be designed as a gravity or reinforced-soil retaining wall that depends on the weight and geometry of the concrete units and soil to resist lateral earth pressures and other lateral forces. Lateral earth pressures are determined using either Coulomb or Rankine earth pressure theory. The design must include evaluation of both external and internal stability of the structure and include consideration of external loads such as surcharges and seismic forces, as applicable.

External stability analysis must be similar to that required for conventional retaining walls, and must consider base (lateral) sliding, overturning, bearing capacity (and excessive settlement), and overall (deep-seated) slope stability. Internal stability analysis of SRWs without reinforced soil must consider movement between courses. Internal stability analysis of the SRWs with reinforced soil must consider the maximum allowable reinforcement tension, pull-out resistance of reinforcement behind the active failure zone (excessive movement of geosynthetic through the reinforced soil zone, if applicable), the connection strength of geosynthetic reinforcement material to the SRW concrete units or blocks, and movement between courses.

Minimum safety factors used in design (for external stability check) for SRWs, with and without a geosynthetically-reinforced soil mass, must be 1.5 for deep-seated (global) stability and 2.0 for bearing capacity. The minimum safety factors must be 1.5 for lateral sliding and 2.0 for overturning for SRWs with a geosynthetically-reinforced soil mass. The minimum safety factors against lateral sliding and overturning must be 1.5 in accordance with IBC Section 1807.2.3 for SRWs without a reinforced soil mass. Minimum safety factors used in design (for internal stability) must be 1.5 for peak shear connection strength between the geosynthetic material and SRW units, and for shear strength between SRW units with or without geosynthetic material. The minimum safety factors for tensile rupture and pullout of the geosynthetic reinforcement must be determined by the registered design professional for wall design such that the minimum safety factors prescribed in this section for other failure modes are maintained. Seismic safety factors for all limit states related to SRW design may be 75 percent of the corresponding minimum allowable static safety factors.

A site-specific soils investigation report in accordance with IBC Section 1803 is required. The soils investigation report must provide a global slope stability analysis that considers the influence of site geometry, subsoil properties, groundwater conditions, and existing (or proposed) slopes above and below the proposed retaining wall. The soils investigation report must also specify the soil parameters so the registered design professional for wall design can determine soil-reinforcement and interaction coefficients, including the coefficient of interaction for pullout and coefficient of direct sliding; and include derivation of the ultimate tensile strength of the geosynthetic reinforcement material (according to ASTM D4595), and the applicable safety factors for deriving the ultimate strength, long-term design strength and allowable tensile strength of the geosynthetic reinforcement. Where the wall is assigned to Seismic Design Category (SDC) C, D, E or F, the site-specific soils report must include the information as required by IBC Section 1803.5.11. Where the wall is assigned to Seismic Design Category D, E or F, the site-specific soils report must include the information as required by IBC Section 1803.5.12.

4.1.2 Gravity Retaining Walls: The gravity wall system relies on the weight and geometry of the Verdura Retaining Wall concrete block units to resist lateral earth pressures. Gravity wall design is based on standard engineering principles for segmental concrete retaining walls. Figure 6 shows a typical cross section of a Verdura gravity retaining wall, and Table 2 lists the inter-unit shear capacity equations.

4.1.3 Geosyntheticcally Reinforced Retaining Walls:

4.1.3.1 General: The geosynthetically-reinforced-soil wall system relies on the weight and geometry of the Verdura Retaining Wall units, a positive geosynthetic reinforcement-to-block mechanical connection, and the geosynthetically-reinforced soil mass acting as a coherent gravity mass to resist lateral earth pressures. The design of a reinforced soil structure must be specific to the Verdura Retaining Wall units, geosynthetic reinforcement material strength and soil interaction, soil strength properties, and structure geometry. Figure 6 shows typical cross sections of Verdura geosynthetically-reinforced retaining wall systems.

4.1.3.2 Positive Geosynthetic-reinforcement-material-to-Block Connections: The Verdura Retaining Wall Systems employ two proprietary positive geosynthetic reinforcement material-to-block connections as described in Sections 4.1.3.2.1 and 4.1.3.2.2:

4.1.3.2.1 Geogrid-to-Verdura 40 Block Connection: The positive mechanical geogrid-to-block connection is made by wrapping geogrid around a 1-inch-diameter (25.4 mm) Schedule 80 PVC pipe conforming to ASTM D1785 and depressing the PVC pipe into the notches of the Verdura 40 concrete block unit rails in the field. The PVC pipe pushes the geogrid downward into the block to engage it with the block unit. The shorter loose-end section of geogrid is pulled back over the PVC pipe to a minimum of 12 inches (254 mm) beyond the back of the block (minimum 18 inches [381 mm] from the point of connection) and is set with the backfill soil behind the block. Subsequent lifts of Verdura 40 concrete block units and soil fill layers secure the system in place. The geogrid-to-block connection requires a notch atop the rail of the Verdura 40 concrete block unit. See Figure 5 for details of the positive geogrid-to-Verdura 40 block connection. The associated geogrid-to-block connection strengths are listed in Table 3.

4.1.3.2.2 Posi-Dura Fabric-to-Verdura 30 Block Connection: The Posi-Dura fabric-to-block connection consists of a 1-inch-diameter (25.4 mm) Schedule 80 PVC pipe conforming to ASTM D1785, which is cut to fit into the inside of the Verdura 30 concrete block unit rails. The PVC pipe is inserted through the pre-fabricated Posi-Dura fabric sleeve. Both components are then inserted into the inner gusset walls of the Verdura 30 concrete block units and are embedded with the appropriate unit infill material. The PVC pipe must be a minimum of $11^1/_4$ inches (286 mm) in length to fit within the inner width of each Verdura 30 concrete block unit, and provide a minimum $1^1/_4$-inch (32 mm) extension beyond the edge of the gusset at both ends. See Figure 4 for details of the Posi-Dura fabric-to-block connection system. This connection system does not require a notch atop the rail of the Verdura 30 concrete block unit. The associated Posi-Dura-to-block connection strength is listed in Table 3.

4.1.3.3 Structural Analysis: Structural analysis must be based on accepted engineering principles and the IBC. The analysis must, at a minimum, include all requirements noted in Sections 4.1.3.3.1 and 4.1.3.3.2 of this report. All contact surfaces of the units must be maintained in compression.

4.1.3.3.1 External Stability Analysis:

1. The minimum length of the geosynthetically-reinforced mass is 0.6 times the height of the wall (as measured from the bottom of the lowest block to the top of the wall) or as required to satisfy a safety factor of 1.5 on sliding at the base, whichever is greater.
2. The minimum safety factor for overturning the geosynthetically-reinforced mass is 2.0, considering the mass as a rigid body rotating about the toe of the wall.
3. Global stability analysis must be provided by a registered design professional for walls with slopes above and/or below the wall, walls on soft foundations, and walls that will be designed for submerged conditions, or tiered walls.
4. After completion of the external stability analysis and determination of the geosynthetic reinforcement layout, investigation is necessary with regard to total and differential settlement of the SRW and soils, which may have varying soil strengths along the length and width of the segmental retaining wall with geogrid-reinforced soil.

4.1.3.3.2 Internal Stability Analysis:

1. Geosynthetic reinforcement spacing must be based on local stability of the Verdura wall units during construction. Maximum vertical spacing between geosynthetic reinforcement is limited to two times the depth of the block unit.
2. Tension calculations for each respective layer of geosynthetic reinforcement must be provided. Tension is based on the earth pressure and surcharge load calculated from halfway to the layer below to halfway to the layer above. Calculated tension load must not exceed the allowable geosynthectic reinforcement strength.
3. Connection capacity must be checked for each connection of geosynthetic reinforcement to Verdura concrete block units (see Table 3). The allowable connection capacity must be equal to or greater than the calculated tension for each layer.
4. A calculation check must be made on pullout of the upper layers of geosynthetic reinforcement from the soil zone beyond the theoretical Coulomb or Rankine failure plane. The allowable pullout capacity must be equal to or greater than the calculated tension after the applicable geosynthetic reinforcement interaction and sliding coefficient adjustment factors are applied.
5. After determination of a geosynthetic reinforcement layout, sliding along each respective geosynthetic reinforcement layer must be checked, including shearing through the wall face.

4.2 Installation:

Verdura concrete block units are assembled in a running bond pattern with an optional 9-inch (229 mm) spacing between adjacent blocks for planting of the wall. The wall system units are stacked and aligned at the minimum design batter using the vertical lip of the lower block as a brace. The minimum design batter is 14 degrees from vertical for the Verdura 40 retaining wall system and 18 degrees from vertical for the Verdura 30 retaining wall system (see Table 1). The Verdura Retaining Wall Systems may include horizontal layers of structural geosynthetic reinforcement material in the backfill soil mass. Requirements for installation of the Verdura Retaining Wall Systems are as follows:

1. Excavate for Verdura Retaining Wall System, including block and reinforced soil zone, if geosynthetic reinforcement material is to be used.
2. Inspect excavations for adequate bearing capacity of foundation soils and observation of groundwater conditions by a qualified geotechnical engineer.
3. Install the first course of Verdura concrete block units on firm and unyielding subgrade, ensuring that units are level from front to back with the desired spacing between adjacent blocks in the same course. Units may be installed level or tilted on the side up to a 15 percent grade with respect to horizontal for both Verdura 40 and Verdura 30 retaining wall systems, as shown in Figure 3. With spacing between the blocks, the Verdura Retaining Wall System may be placed with concave or convex curves formed at front of the wall. To conform to intended wall curvature, block unit spacing is to be adjusted at the front or the back of the block unit to maintain a 9-inch (229 mm) spacing measured between any two adjacent blocks and to maintain four point supports for each block from the blocks below.
4. Infill the block units and the area between the block units (if spaced) with the unit infill material complying with Section 3.2.5. Compaction of unit infill materials shall be in accordance with the registered design professional.
5. Place and compact approved backfill material behind the blocks as each block course is placed and prior to the placement of an additional block course.
6. Clean the top surface of the units to remove loose aggregate material and provide a level base for the next course of block units. A nominally 0.25-inch (6.4 mm) layer of backfill material may remain atop the block rail through rod-boarding.
7. At designated elevations per the wall design, install geosynthetic reinforcement material per Section 4.1.3.2 as shown on the approved plans. The positive mechanical geogrid-to-block connection system in accordance with Section 4.1.3.2.1 is constructed after unit fill, rod boarding and notch clearing. The Posi-Dura fabric-to-block connection per Section 4.1.3.2.2 is constructed prior to unit fill.
8. Check to ensure that the proper orientation of the geosynthetic reinforcement material is used so the strong direction is perpendicular to the wall face direction. Adjacent geogrid rolls are placed side-by-side; no overlap is required, while Posi-Dura fabrics are spaced 27 inches (686 mm) on-center, as measured at the block.

9. Geosynthetic reinforcements are pulled taut to remove slack and wrinkles before backfill is placed.
10. Repeat placement of block units, block infill, backfill and reinforcements (if any), as shown on the approved plans, to the finished grade.
11. Backfill used in the reinforced fill mass must consist of approved fine-grain or coarse-grain materials complying with Section 3.2.4 of this report, and must be placed in lifts compacted to a minimum of 90 percent of the maximum dry density as determined by ASTM D1557 (or 95 percent per ASTM D698).
12. Install a subsurface drainage system as specified by the registered design professional with the intent of keeping both the unreinforced and reinforced soil mass dry from water intrusion or seepage from behind the reinforced soil mass.
13. The reinforced backfill must be placed and compacted no lower than the top unit elevation above which geosynthetic reinforcement placement is required.
14. The completed wall is built with alignment tolerances of 1.5 inches (40 mm) in 10 feet (3.05 m) in both the horizontal and vertical directions. Wall batter must be within 2 degrees of the design batter.

4.3 Special Inspection: Special inspection during installation must be provided in accordance with the 2015 and 2012 IBC Sections 1705.1.1, 1705.4 and 1705.6 (2009 IBC Sections 1704.15, 1704.5 and 1704.7). At a minimum, but are not limited to, the inspector's responsibilities include verifying the following:

1. Block type and unit dimensions.
2. Verification of block unit for compliance with ASTM C1372, including compressive strength and water absorption, as described in Section 3.2.1 of this report.
3. Product identification, including evaluation report number (ESR-3073).
4. Foundation preparation.
5. Verdura block unit placement, including proper alignment and inclination within design tolerances.
6. PVC pipe connections, including installation locations, proper fit within the blocks, and installation sequence with respect to the geosystnthetic reinforcement placement.
7. Geosynthetic reinforcement material type (see Tables 2 and 3), location and placement.
8. Placement of approved backfill including unit infills noted in Section 4.2, item 4, and compaction.
9. Drainage provisions.

5.0 CONDITIONS OF USE

The Verdura Retaining Wall Systems described in this report comply with, or are a suitable alternative to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

5.1 The systems are designed and installed in accordance with this evaluation report, the manufacturer's published installation instructions, and accepted engineering principles. If there is a conflict between this report and the manufacturer's published installation instructions, the more stringent requirement governs.

5.2 The wall design calculations are submitted to, and approved by, the code official. The calculations must be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.

5.3 A site-specific soils investigation, in accordance with IBC Section 1803 as noted in Section 4.1.1 of this report, must be provided for each project site.

5.4 In areas where repeated freezing and thawing under saturated conditions occur, evidence of compliance with freeze-thaw durability requirements of ASTM C1372 must be furnished to the code official for approval prior to construction.

5.5 Special inspection must be provided for backfill material, placement, and compaction; geosynthetic reinforcement placement (when applicable); and block installation, in accordance with Section 4.3 of this report.

5.6 Details in this report are limited to areas outside of groundwater. For applications where free-flowing groundwater is encountered, or where wall systems are submerged, the installation and design of systems must comply with the recommendations of the soils engineer and the appropriate sections of the NCMA Design Manual for Segmental Retaining Walls, and must be approved by the code official.

5.7 Under the 2015 IBC, project specifications for soil and water conditions that include sulfate concentrations identified in ACI 318-14 Table 19.3.1.1 as severe (S2) or very severe (S3), must include mix designs for the concrete, masonry and grout that comply with the intent of ACI 318-14 Table 19.3.1.1. See 2015 IBC Section 1904.

5.8 Under the 2012 IBC, project specifications for soil and water conditions that include sulfate concentrations identified in ACI 318-11 Table 4.2.1 as severe (S2) or very severe (S3), must include mix designs for the concrete, masonry and grout that comply with the intent of ACI 318-11 Table 4.3.1. See 2012 IBC Section 1904.

5.9 Under the 2009 IBC, project specifications for soil and water conditions that include sulfate concentrations identified in ACI 318-08 Table 4.2.1 as severe (S2) or very severe (S3), must include mix designs for the concrete, masonry and grout that comply with the intent of ACI 318-08 Table 4.3.1. See 2009 IBC Section 1904.

5.10 As regards to the geosynthetic reinforcement material, this report covers only the connection strength of the material when attached to the concrete block units. Physical properties of the geosynthetic reinforcement material or its interaction with the soil have not been evaluated.

6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Segmental Retaining Walls (AC276), dated October 2004 (editorially revised May 2014).

7.0 IDENTIFICATION

7.1 Each pallet of concrete units is identified with the manufacturer's name (Soil Retention Products, Inc.) and address, the name of the product, the unit type (Verdura 40 or Verdura 30), and the evaluation report number (ESR-3073).

7.2 The report holder's contact information is the following:

SOIL RETENTION PRODUCTS, INC.
2501 STATE STREET
CARLSBAD, CALIFORNIA 92008
(760) 966-6090
www.soilretention.com
info@soilretention.com

TABLE 1—VERDURA WALL BLOCK UNIT NOMINAL WEIGHT AND MINIMUM DESIGN BATTER

BLOCK TYPE	NOMINAL WEIGHT (pounds per unit)[1]	MINIMUM DESIGN BATTER[2] (degrees from vertical)
Verdura 30	68	1H : 3V (18)
Verdura 40	89	1H : 4V (14)

For SI: 1 lbf = 4.448 N.
[1]The unit weight has a ±5 percent tolerance.
[2]See Figure 6 for the design batter.

TABLE 2—INTER-UNIT SHEAR RESISTANCE[1]

BLOCK AND GEOSYNTHETIC REINFORCEMENT TYPE		PEAK SHEAR STRENGTH (lbs/ft)		SERVICEABILITY SHEAR STRENGTH[2] (lbs/ft)	
		Equation	Maximum	Equation	Maximum
Verdura 30	With and Without Posi-Dura Fabric	S = 2,213 + 0.22*N	2,719	S = 534 +0.37*N	1,496
Verdura 40	Without Geogrid	S = 2,275 + 0.32*N	3,883	S = 1,071 + 0.34*N	2,849
	Miragrid 5XT	S = 2,018 + 0.28*N	3,077	S = 656 + 0.58*N	2,706
	Miragrid 8XT	S = 1,451 + 0.40*N	2,693	S = 178 + 0.60*N	1,853
	Miragrid 10XT	S = 1,953 + 0.39*N	4,743	S = 806 + 0.41*N	4,247
	Miragrid 20XT	S = 1,841 + 0.30*N	3,101	S = 691 + 0.50*N	2,793
	Miragrid 22XT	S = 1599 +0.45*N	6,373	S = 1,769 + 0.32*N	4.753

For SI: 1 lbf/ft. = 14.6 N/m. N = superimposed normal (applied) load (lbf/ft. of wall length).
[1]The inter-unit shear resistance, S, of the Verdura block units at any depth is a function of the superimposed normal (applied) load.
[2]The serviceability shear strength is based on a prescribed deformation criterion of 0.13 inch (3.3 mm) for Verdura 30 and 0.16 inch (4 mm) for Verdura 40, respectively, which is a value equal to 2 percent of the block unit height.

TABLE 3—GEOSYNTHETIC REINFORCEMENT-TO-BLOCK PULLOUT RESISTANCE

BLOCK AND GEOSYNTHETIC REINFORCEMENT TYPE		PEAK CONNECTION STRENGTH (lbs/ft)		SERVICEABILITY CONNNECTION STRENGTH[1] (lbs/ft)	
		Equation	Maximum	Equation	Maximum
Verdura 30	Posi-Dura Fabric	S = 799 + 0.01*N	866	S = 396 + 0.00*N	431
Verdura 40	Miragrid 5XT	S = 2,093 + 0.45*N	3,532	S = 637 + 0.37*N	1,665
	Miragrid 8XT	S = 2,525 + 0.55*N	4,514	S = 1,188 + 0.26*N	2,168
	Miragrid 10XT	S = 3,928 + 0.27*N	6,077	S = 1,471 + 0.25*N	3,203
	Miragrid 20XT	S = 4,319 + 0.45*N	8,254	S = 1,212 + 0.33*N	4,530
	Miragrid 22XT	S = 4,280 + 0.73*N	11,786	S = 1,514 + 0.43*N	4,999

For SI: 1 lbf/ft. = 14.6 N/m. N = superimposed normal (applied) load (lb/foot of wall length).
[1]The serviceability shear strength is based on a prescribed deformation criterion of 0.75 inch (19 mm), which is the geosynthetic reinforcement material displacement.

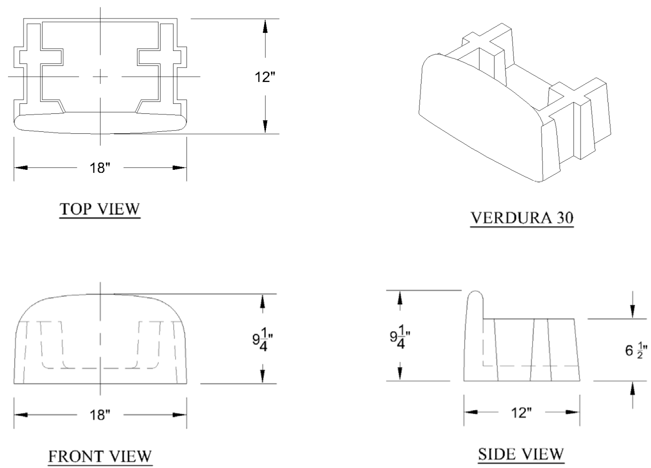


FIGURE 1 - VERDURA 30

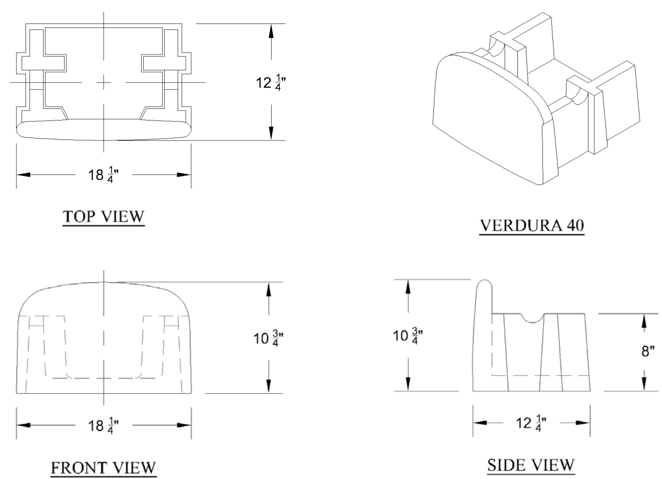


FIGURE 2 - VERDURA 40

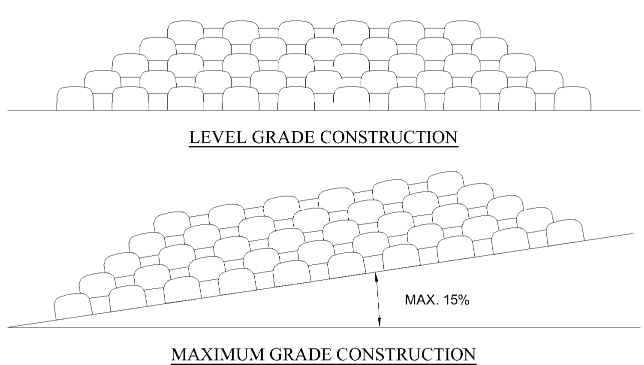
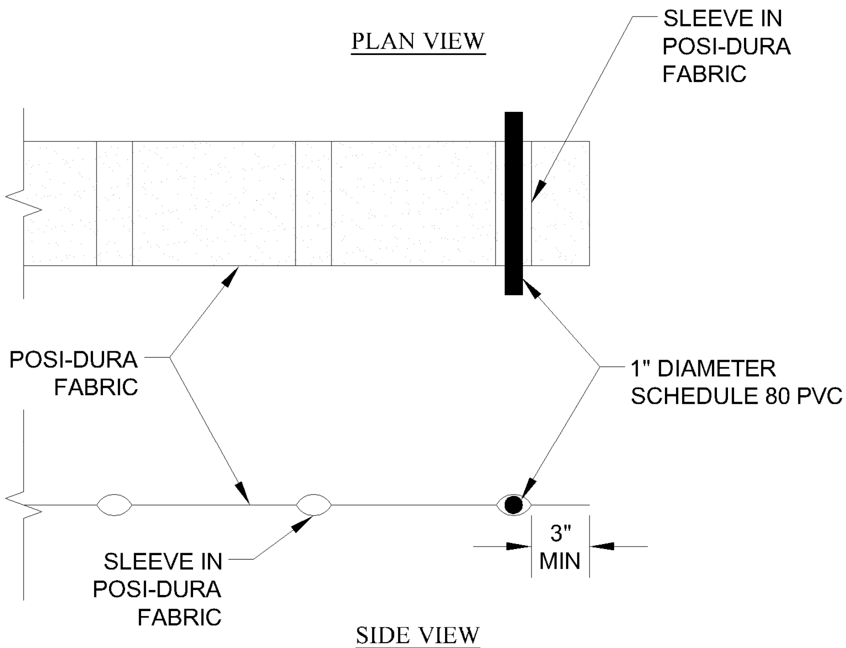


FIGURE 3 - TYPICAL GRADE CONSTRUCTION



POSI-DURA PIPE THROUGH POSI-DURA FABRIC CONNECTION

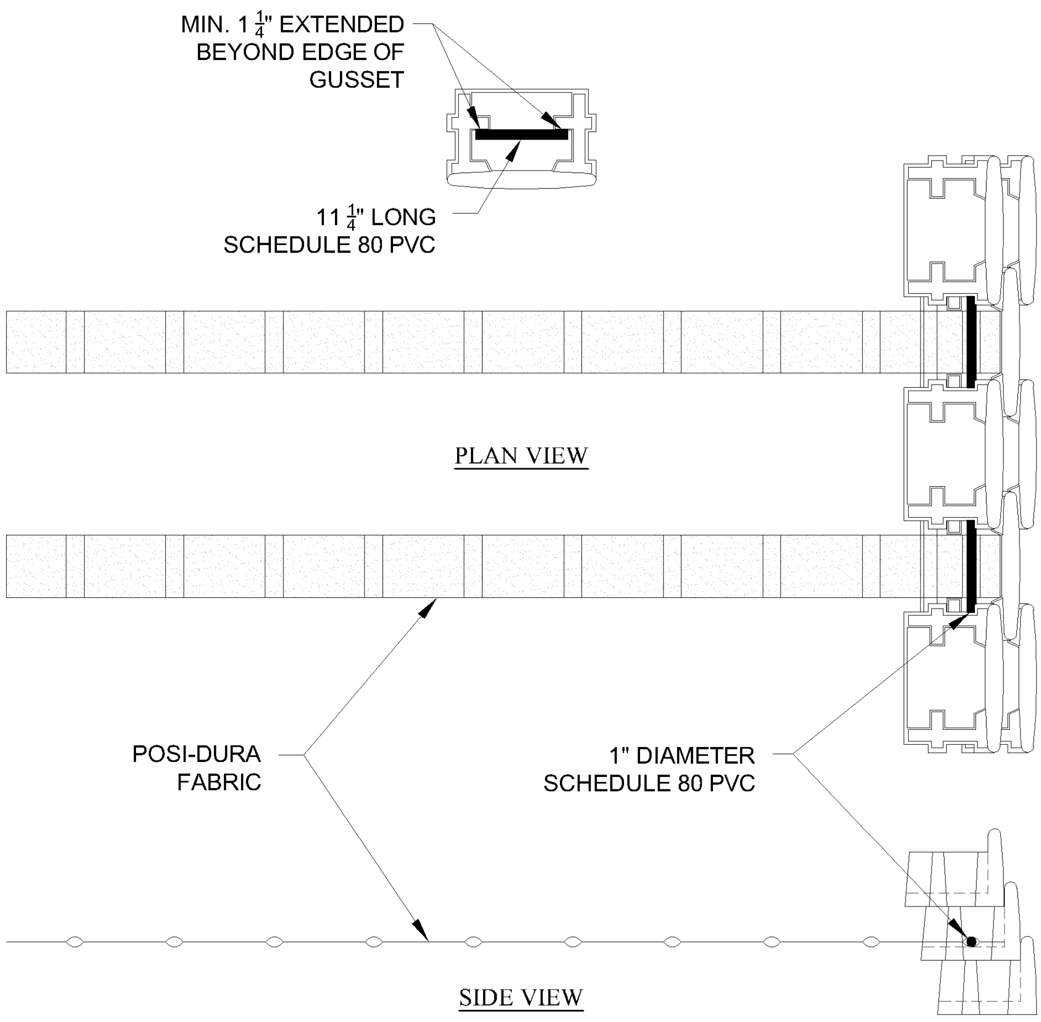


FIGURE 4 - POSI-DURA REINFORCEMENT CONNECTION

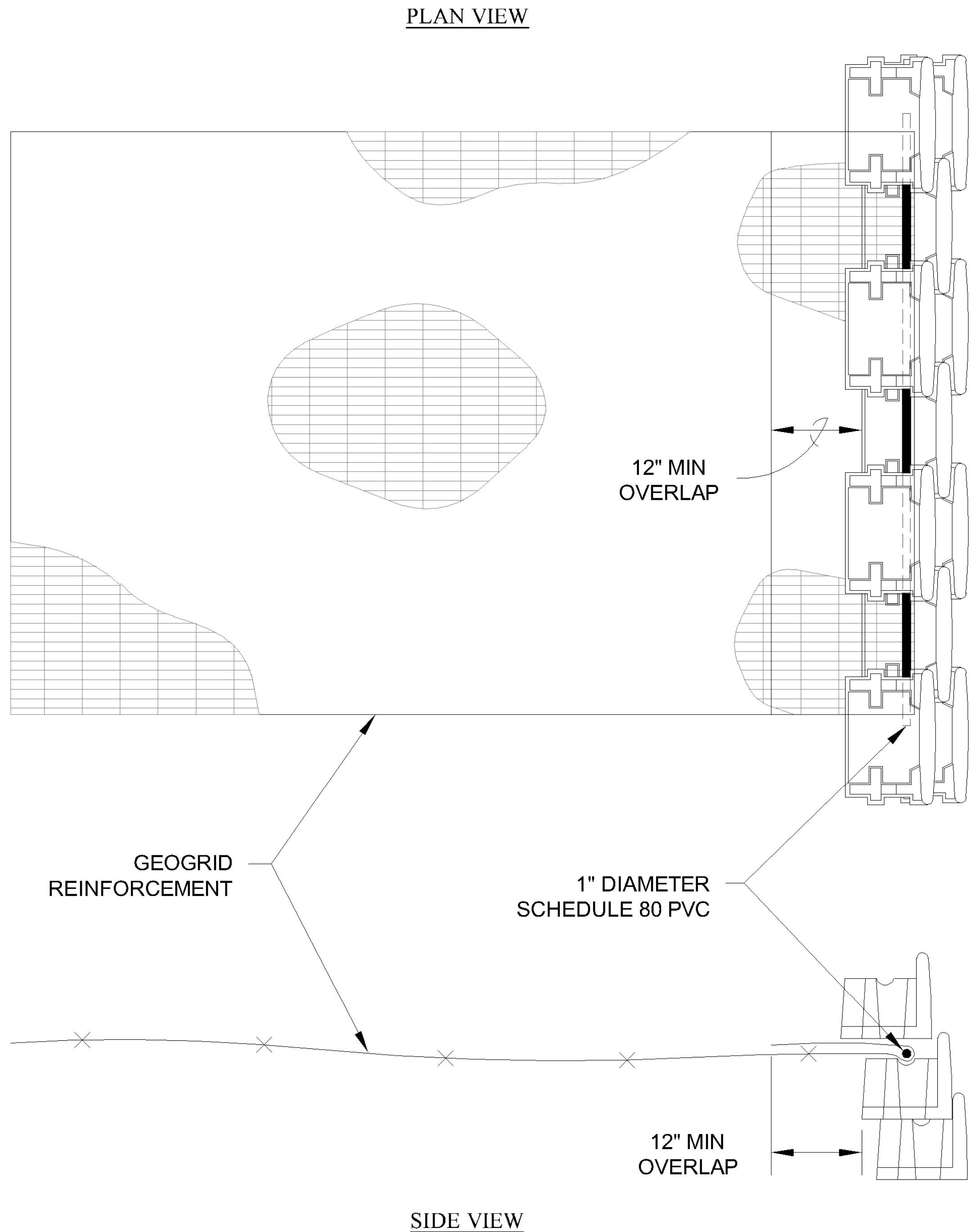
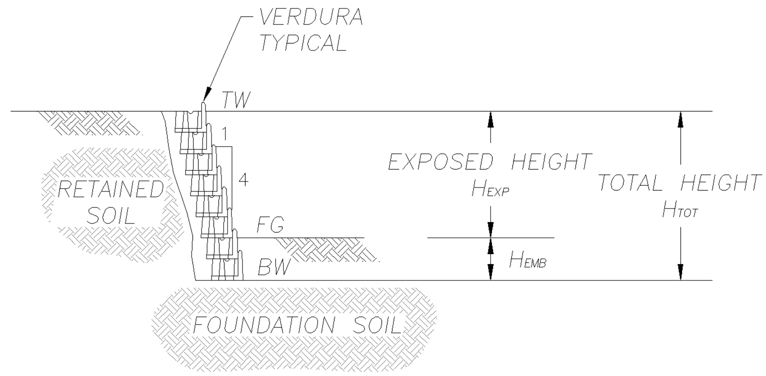
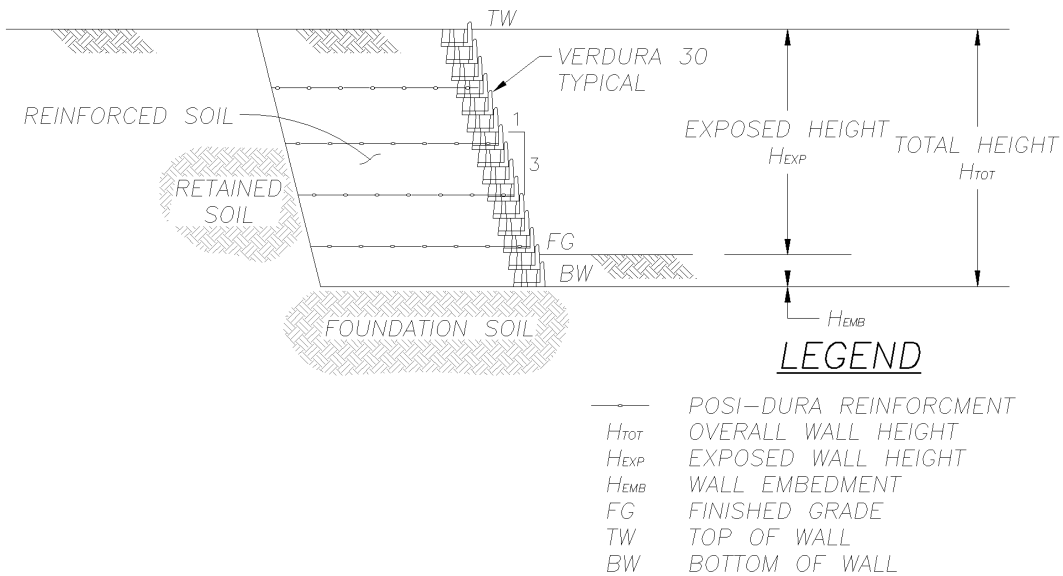


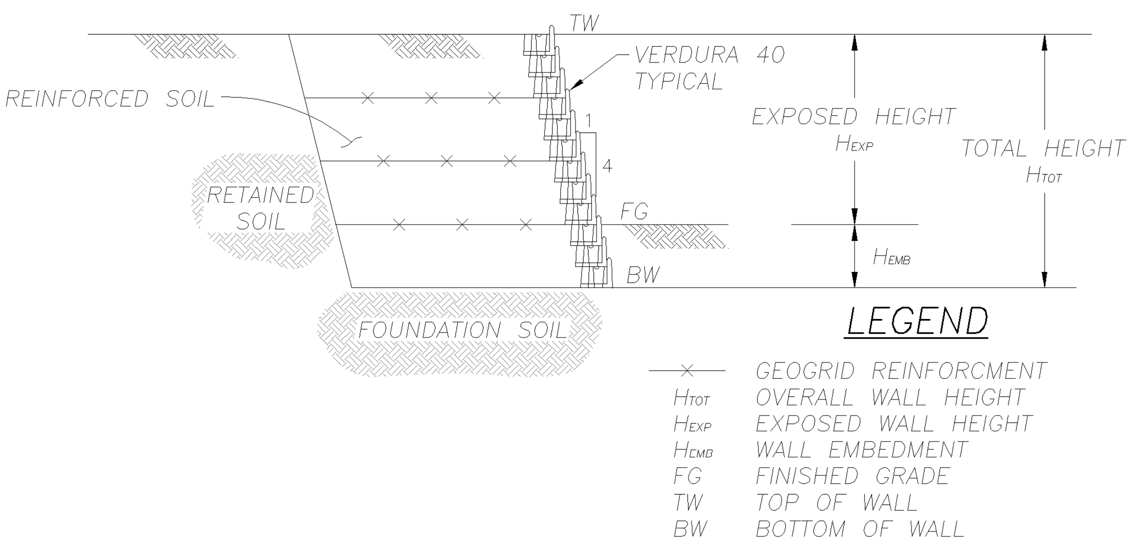
FIGURE 5 - POSITIVE GEOGRID-TO-BLOCK CONNECTION SYSTEM



VERDURA GRAVITY RETAINING WALL



VERDURA RETAINING WALL WITH POSI-DURA REINFORCEMENT



VERDURA RETAINING WALL WITH GEOGRID REINFORCMENT

FIGURE 6 - TYPICAL WALL SECTIONS

ICC-ES Evaluation Report

ESR-3073 CBC Supplement

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1.0 REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that the Verdura Retaining Wall System, described in ICC-ES evaluation report ESR-3073, has also been evaluated for compliance with Chapters 18 and 18A of the code edition noted below.

Applicable code edition:

2013 *California Building Code®* (CBC)

2.0 CONCLUSIONS

The Verdura Retaining Wall System, described in Sections 2.0 through 7.0 of the evaluation report ESR-3073, complies with CBC Chapters 18 and 18A, provided the design and installation are in accordance with the *International Building Code®* provisions noted in the evaluation report and the additional requirements of CBC Chapters 18 and 18A, as applicable.

This supplement expires concurrently with the evaluation report, reissued July 2023.