

NOTES FOR CONSTRUCTION OF THE VERSA-LOK RETAINING WALL

The Owner will consider alternate equivalent retaining wall systems. Design plans sealed by a licensed Professional Engineer shall be submitted to the Owner for review. Design of an alternate system shall be based on the same lines, grades, and soil parameters indicated on this plan. Design shall be based on AASHTO or NEMA design guidelines.

GENERAL
Versa-Lok Retaining Wall Systems are designed as a gravity retaining wall utilizing a high-density polyethylene/polyester geogrid to reinforce the soil zone behind the wall. The geogrid is positively connected to the modular concrete block creating a reinforced soil mass capable of resisting lateral earth pressures and surcharged loads.

All references to the Design Engineer refer to Engineering Consulting Services, Ltd (ECS, Ltd.).

Design of the Versa-Lok Retaining Wall for this site was based on the Grading Plan, Project No. 04016, Sheet 7 of 13, dated May 2004, prepared by Engineering Concepts, Inc.

The Versa-Lok Retaining Wall design for this site addresses only the retaining wall structure and its components. Site design, including grading, erosion control, demolition, and other plans as necessary, are not the responsibility of ECS. ECS is not responsible for obtaining permits related to the installation or inspection of this wall.

The wall contractor shall arrange for periodic inspection by a testing agency/geotechnical engineer to check that installation is in compliance with these plans and specifications. The bearing capacity of the foundation materials shall be checked. The width and minimum thickness of the leveling pad shall be checked. Installation of the drainage pipe and weep holes shall be checked. The length, location, and type of geogrid installed at each level within the wall shall be checked.

The backfill material placed in the reinforced zone of the wall shall be approved by the testing agency, regarding its compliance with the parameters specified in Section 8.1, and subjected to a Standard Proctor test (ASTM D-698). Field compaction of the backfill shall be tested at the frequency and using methods specified in Note 2.5 of this sheet.

1.0 MATERIALS

1.1 The reinforced backfill shall be compacted granular fill, free of debris and consist of either of the following inorganic soil types according to the Unified Soil Classification System (USCS) designations: GP, GW, or GM, with a minimum friction angle of 38 degrees. VDOT No. 21A Stone, crusher run, or approved equivalent would be suitable for backfill in the reinforced zone.

1.2 Fill containing brush, sod, peat, roots, or other organic, perishable or deleterious matter shall be considered unsuitable and shall be removed.

1.3 Geogrid reinforcing shall be Miragrid uniaxial geogrids manufactured by TC Mirafi, Inc., Charlotte, North Carolina. The geogrid shall meet the specification requirements published by Mirafi for:

Miragrid 3XT

Geogrid shall be rejected if 10% or more of a structural rib has been cut or ripped. The Contractor shall inspect all geogrid delivered to the site and reject materials that meet this criteria. If the geogrid is damaged on the construction site, it shall be replaced at the Contractor's expense.

1.4 Wall facing shall be the Versa-Lok Retaining Wall System Standard Units manufactured in accordance with ASTM-C90 and ASTM C140. Units shall have a minimum 28-day compressive strength of 3000 psi. Units shall be interlocked with Versa-Tuff pins (2 per unit). Color of the units shall be determined by the owner.

Versa-Lok units shall be kept free of defects that would interfere with the placing or positioning of the unit or impair its strength. Minor cracks incidental to the usual method of manufacturing or minor chipping resulting from shipment and delivery are not grounds for rejection.

Batter of facing units for the entire wall shall be maintained at 7.1 degrees (1.0" setback per course).

1.5 Unit Fill and Drainage Fill shall be VDOT No. 57 stone.

1.6 Leveling Pad material shall be VDOT No. 21A Stone or VDOT No. 78 Stone.

1.7 Drainage pipe shall be 4" dia. corrugated perforated plastic pipe. All joints between pipe sections, as necessary, shall be per manufacturer's specifications.

2.0 SITE PREPARATION AND FILL PLACEMENT REQUIREMENTS

2.1 Prior to construction of the Versa-Lok Retaining Wall System, the Contractor shall clear and grub the fill zone area, removing topsoil, brush, sod organic and other deleterious materials. Any soft areas as determined by the on-site engineer shall be overexcavated and replaced prior to placing additional fill soils. The fill zone area shall be proofrolled as a minimum.

2.2 Fill shall be placed in horizontal layers not exceeding 8 inches in compacted thickness for heavy compaction equipment. For zones where compaction is accomplished with hand equipment, fill shall be placed in horizontal layers not exceeding 6 inches in uncompacted thickness. Only hand operated equipment shall be allowed within 3 feet of the wall face.

2.3 Fill materials shall be placed from the back face of the wall toward the retained fill zone to ensure further tensioning of the geogrid materials.

2.4 Fill shall be compacted to a minimum 95% of the maximum density determined in accordance with ASTM D-698 (Standard Proctor).

2.5 Fill compaction shall be verified during construction by performing at least one field density test per lift of fill placed in the reinforced zone. The density test method shall be either Sand Cone (ASTM D1556) or Nuclear Method (ASTM D2922) as appropriate for backfill material.

3.0 FOUNDATION AND LEVELING PAD INSTALLATION

3.1 The bearing capacity of the foundation soils supporting the wall shall be verified in the field. Any unsuitable soils shall be undercut and replaced as necessary to provide adequate bearing support for the wall facing.

3.2 The excavation for the leveling pad shall be cleared of loose soil, water, and any debris. Location and dimensions of the leveling pad are shown on the Typical Section-Reinforced Retaining Wall.

3.3 The top of the leveling pad shall be maintained at a depth of at least 0.5 foot below the final grade at the bottom of the wall or deeper where indicated on the wall profiles.

4.0 VERSA-LOK WALL FACING UNIT INSTALLATION

4.1 The first course of block shall be placed on top of and in full contact with the leveling pad. The unit shall be maintained at a minimum distance of 6" from the front and back of the leveling pad. Proper alignment may be achieved with the aid of a string line. Level the block in both directions. After placing connectors in each of the appropriate slots proceed to the next course of block. Each unit shall contact the units on both sides as well as above and below. Some adjustments may be required for walls with curves and a batter.

4.2 Unit Fill washed stone shall be placed in hollow cells of each block unit. All excess material shall be swept clean from the top of the block prior to installing the next course.

4.3 Drainage Fill washed stone shall be placed immediately behind the facing unit as shown in the typical wall section on this sheet. Drainage pipe shall be placed behind the first block course prior to placement of drainage fill. The drainage pipe shall have a minimum slope of 1% toward a suitable gravity outlet.

4.4 Versa-Lok Cap Units shall be glued to the top most facing unit with manufacturer recommended adhesive.

5.0 GEOGRID PLACEMENT

5.1 Geogrid shall be placed at the locations, elevations and with the proper embedment length as shown on this drawing. Embedment length is measured from the front face of the wall unit, unless otherwise noted on the drawings.

5.2 Geogrids shall be connected to the Versa-Lok facing units by placing the next course of Versa-Lok units on top of the geogrid. Insert pins through top units and into the lower units to create positive connection with the geogrid per the manufacturer's instructions.

5.3 Prior to placing fill materials in the reinforced fill area, the geogrid materials shall be placed to lay flat, pulled tight against the connector to remove any slack in the geogrids, and then anchored.

5.4 Tracked construction equipment shall not be operated directly on the geogrid materials. A minimum fill thickness of 6 inches is required for operation of tracked equipment over geogrids. The turning of tracked vehicles shall be kept to a minimum to prevent displacement of geogrids and fill.

5.5 Rubber tired vehicles may pass over the geogrids at slow speeds of less than 10 MPH. Sudden braking and sharp turning shall be avoided.

6.0 CHANGES TO GEOGRID LAYOUT OR PLACEMENT

6.1 No changes to the geogrid layout, including but not limited to, length, geogrid type, or elevation, shall be made without the explicit written consent of the Design Engineer.

7.0 DRAINAGE

7.1 Backfill shall be graded away from the wall face and rolled away at the end of each work day to prevent ponding of water on the surface or the reinforced soil mass.

7.2 Drainage and site grading shall be the responsibility of others.

8.0 DESIGN PARAMETERS

8.1 Design of the reinforced soil structure is based on the following parameters:
Reinforced fill $\Phi_{HI}' = 38^\circ$; $C' = 0$ psf $\text{GAMMA} = 145$ pcf
Retained fill $\Phi_{HI}' = 26^\circ$; $C' = 0$ psf $\text{GAMMA} = 110$ pcf
Foundation $\Phi_{HI}' = 26^\circ$; $C' = 0$ psf $\text{GAMMA} = 110$ pcf

The soil parameters above were assumed based on Engineer's experience with site soil conditions. If the soils used to support or construct the wall have weaker properties, the Engineer shall be notified immediately and the wall will be required to be redesigned.

8.2 Internal Stability:
Minimum F.S. against geogrid pullout = 1.5
Percent coverage of geogrid = 100%
Minimum F.S. for uncertainties = 1.5

8.3 External Stability:
Minimum F.S. against base sliding = 1.5
Minimum F.S. against overturning = 2.0
Minimum F.S. for global stability = 1.5

8.4 Uniform Surcharge = 250 psf (Vehicular Traffic)

8.5 Hydrostatic Loading = NONE

The Design Engineer shall be notified if any of the following should become evident during construction:
- water or wetness from or in a cut bank
- local springs, local storm drains, sewers, water lines under or behind the wall not shown on existing survey or design drawings

8.6 Seismic Loading = NONE

8.7 Required Bearing Capacity = 2,000 psf

9.0 SPECIAL PROVISIONS

9.1 The design shown herein was prepared in part based on the information obtained during the subsurface exploration prepared by ECS, Ltd. (ECS Report No. 2342 dated October 10, 2002). However, conditions may exist which were not detected in the soil borings.

9.2 The wall contractor and general contractor are responsible for having supervision of all phases of construction by a qualified testing agency/geotechnical engineer.

9.3 The wall contractor, general contractor, and general contractor's testing agency are responsible for reviewing and verifying that conditions described in Section 8.0 are accurate prior to and during construction.

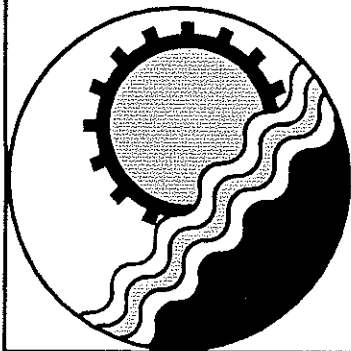
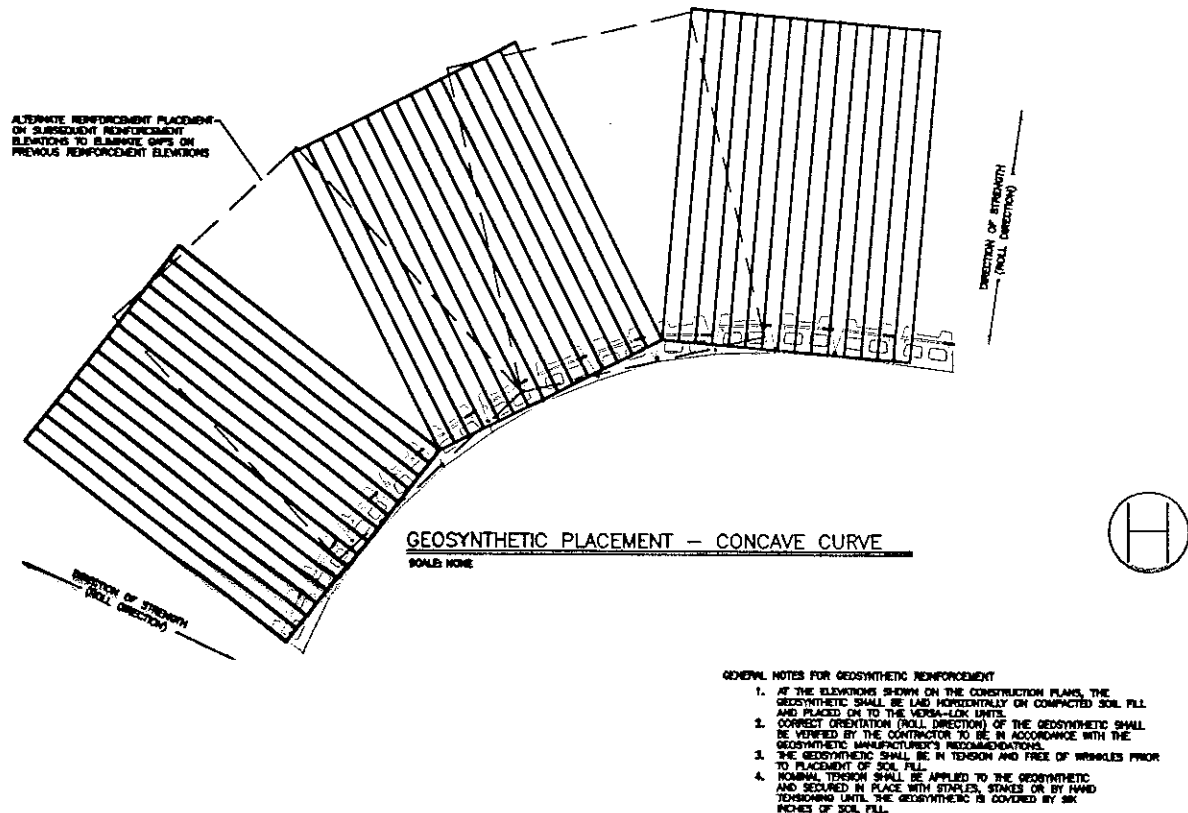
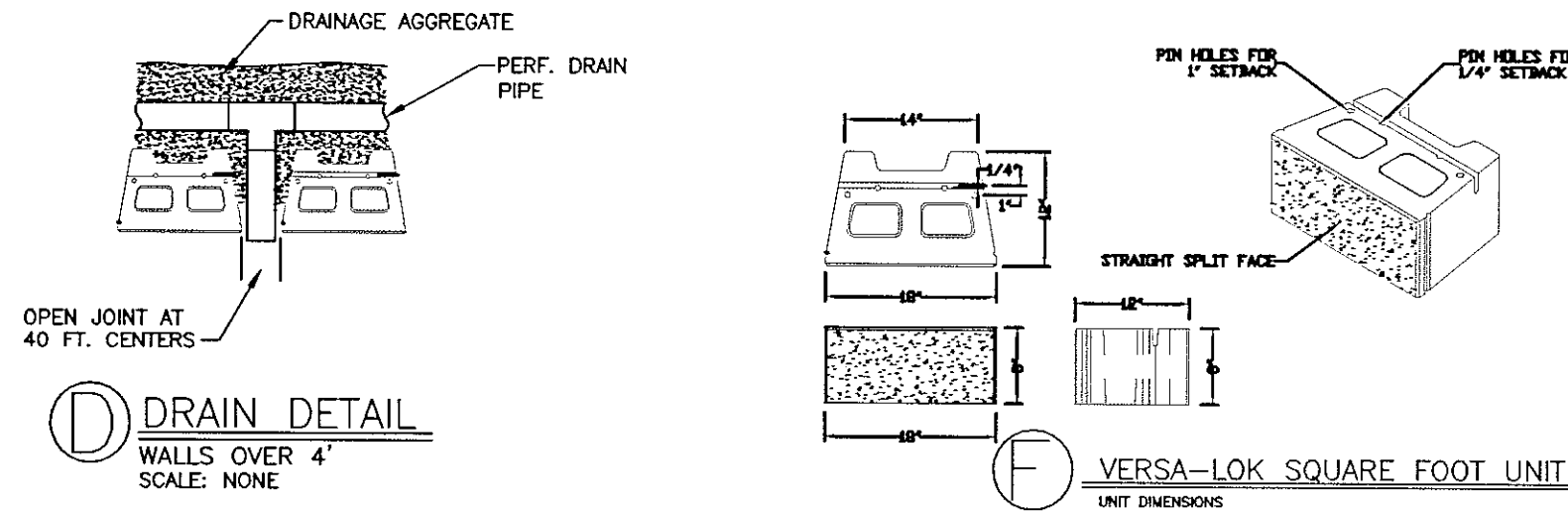
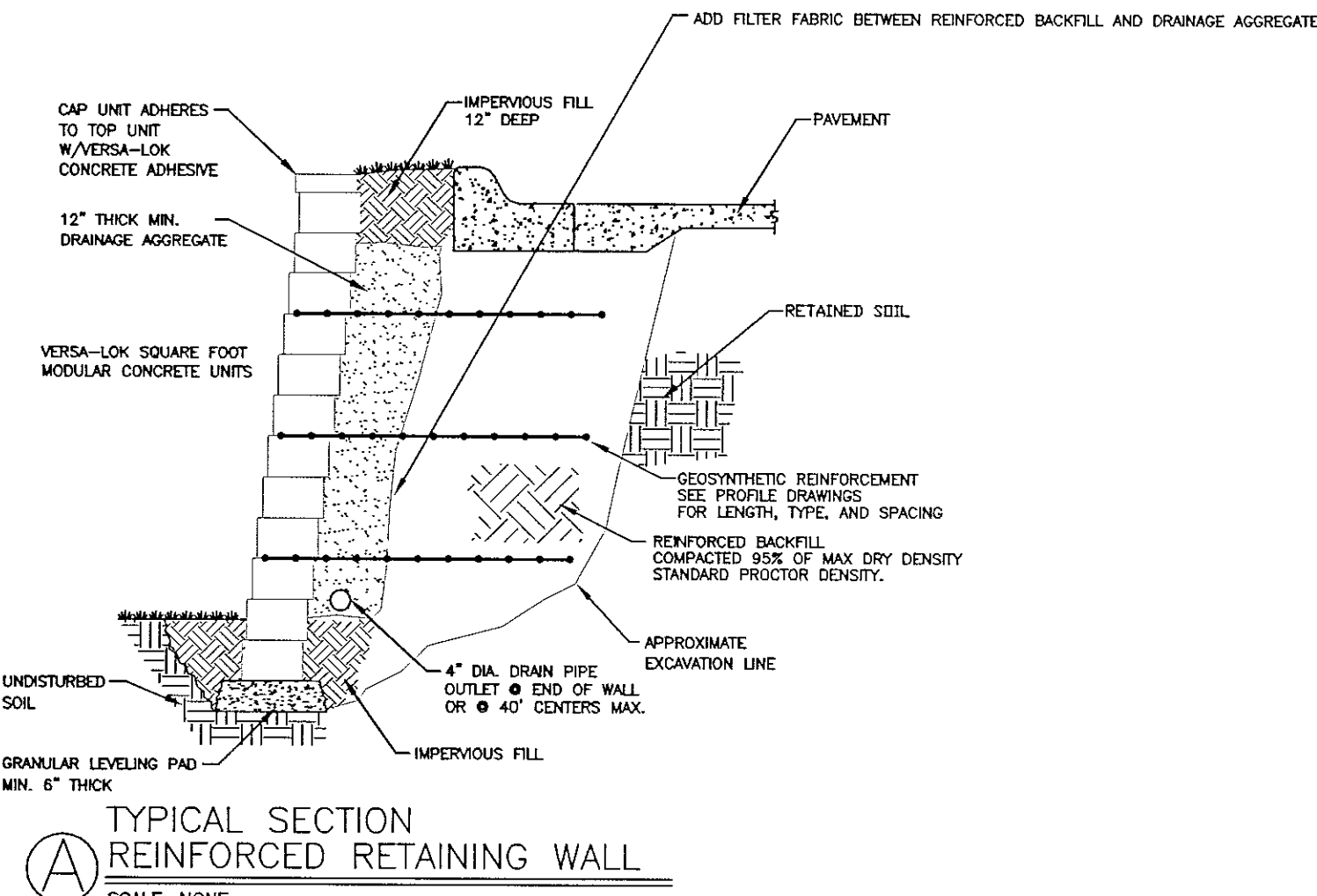
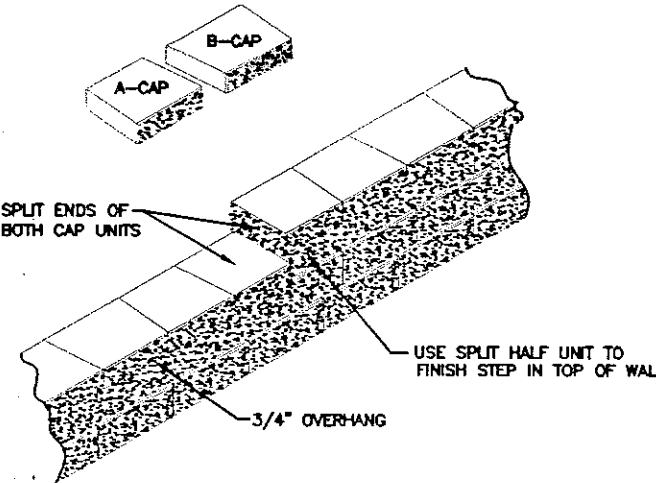
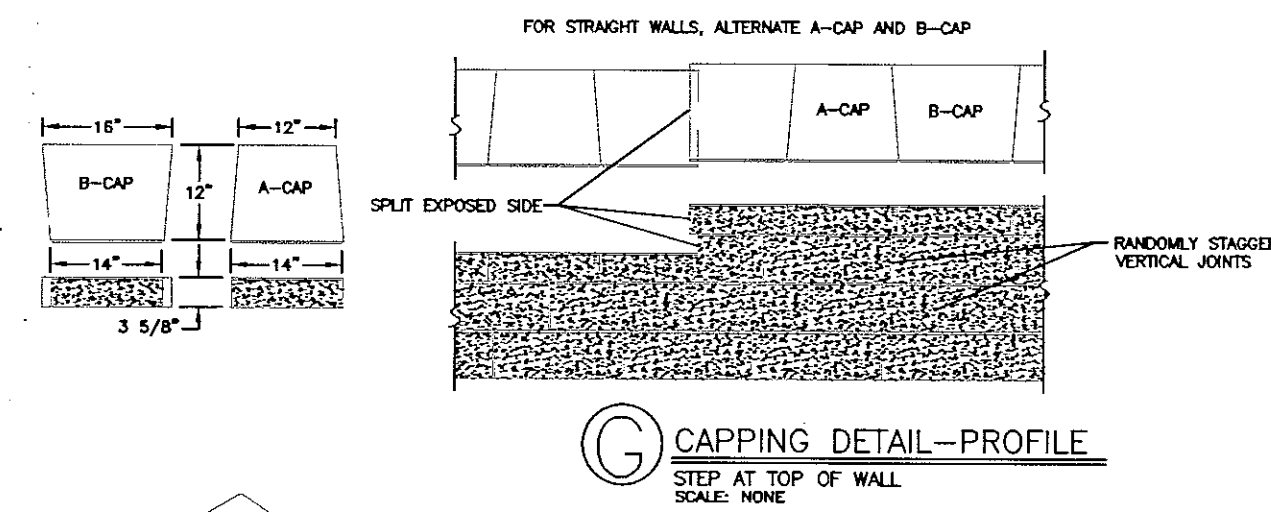
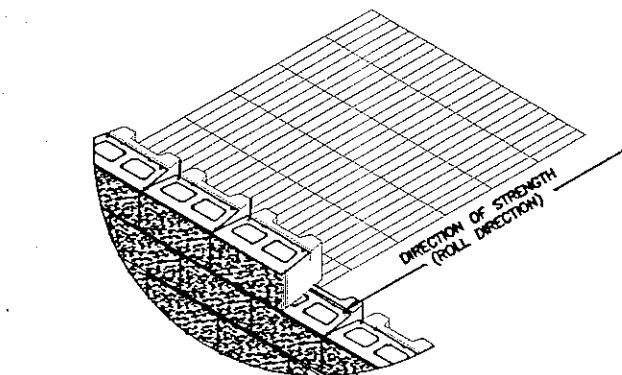
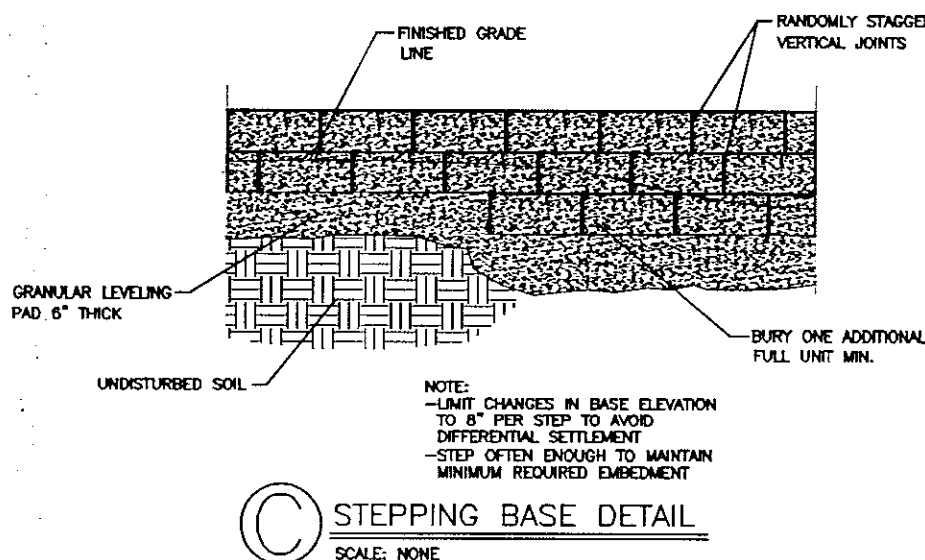
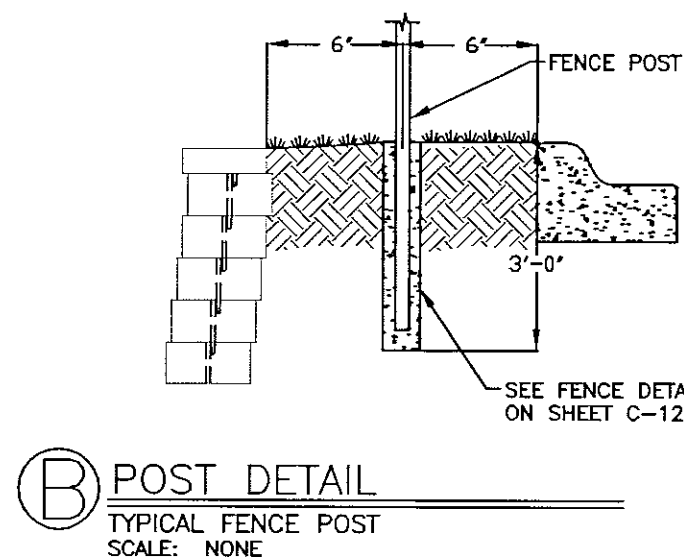
9.4 The wall contractor and general contractor are responsible for directing surface runoff away from the structure during construction.

9.5 Fences and/or guard rails above the retaining wall, where required, shall be designed (by others) to meet all local building codes and ordinances. Coordination with the retaining wall design shall be made with the approval of the retaining wall Design Engineer.

9.6 The contractor shall identify all underground utilities prior to excavation and shall avoid all utilities.

9.7 Underground utilities or other unexpected conditions encountered below the wall facing or retained fill zone should immediately be brought to the attention of the Design Engineer to evaluate their potential affect on the wall design.

9.8 Installation of storm drain pipes and other utilities shall be coordinated with wall construction to prevent damage to geogrid reinforcing for retaining wall.



ENGINEERING CONCEPTS, INC.

20 S. ROANOKE ST., PO BOX 619
FINCASTLE, VIRGINIA 24090
540.473.1253 FAX: 540.473.1254



ECS, LTD.
5320 PETERS CREEK ROAD
SUITE F
ROANOKE, VIRGINIA 24019
540-362-2000
(F) 540-362-1202

No.	Revision	By	Appd	Date	Drawn	Designed	Checked	Approved	VERIZON WIRELESS THIRLANE ROAD SWITCHING CENTER WALL DETAILS AND SPECIFICATIONS ROANOKE COUNTY, VIRGINIA	AS NOTED JUNE 11 2004 PROJECT: 04016 15 OF 15
1	COUNTY COMMENTS OF MAY 18, 2004	DRB	JDE	6-02-04	ALW	CWY	CWY	CWY		