

Scale: 1"=10'

SURVEY INFORMATION
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NOTIFICATION OF TESTING
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PROTECTION OF WORK
 Contractor shall slope the backfill surface away from the wall at the end of each day of work such that surface runoff is directed away from the face of the wall. Contractor shall not allow runoff from adjacent areas to enter the wall construction area.

REVISIONS	
NO.	DATE



Midwest Testing
 Geotechnical - Environmental - Materials
 8606 Page Avenue
 St. Louis, Missouri 63114
 314-739-2727 Fax 314-739-5429



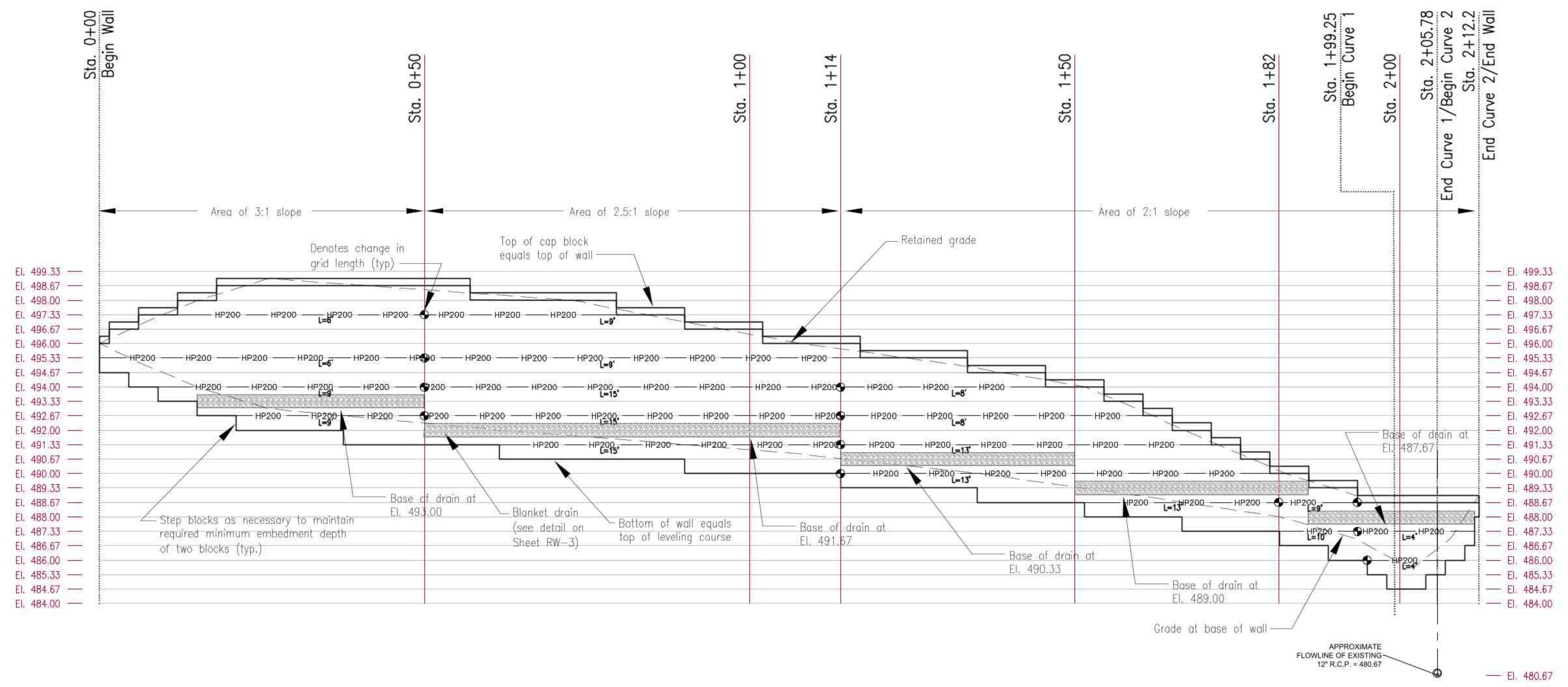
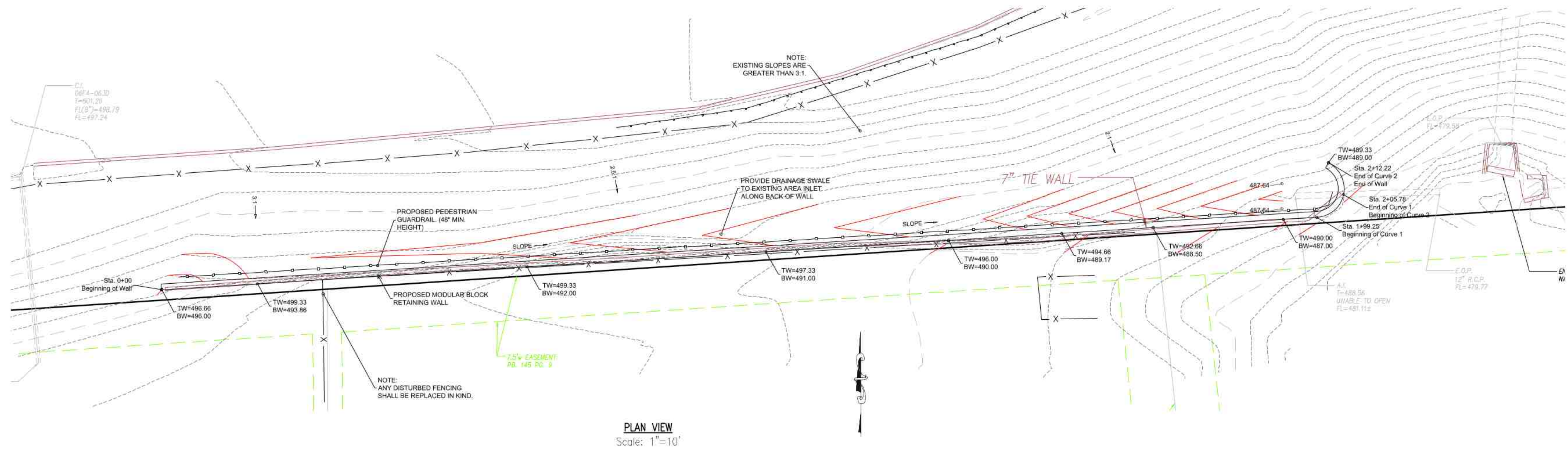
SITE PLAN
 Unit Block Retaining Wall
 Jamestown Mall
 Florissant, Missouri

JOB NO.	15277
DRAWN BY	KILL
DESIGNED BY	KILL
REVIEWED BY	DJB
DATE	7/29/22

RW-1

CURVE 1 DATA
 R = 5.00'
 Δ = 75°
 L = 6.53'

CURVE 2 DATA
 R = 5.00'
 Δ = 75°
 L = 6.44'



ELEVATION VIEW
 Scales: 1"=10' Horizontal
 1"=3' Vertical

LEGEND

— HP200 — Geostar HP200 Geogrid

NOTES:

- 1) Secondary geogrid reinforcement for fence and/or guard rail not shown, but required. See details and specifications this plan set, and civil plans for information.
- 2) Length of geogrid shown measured from back of block. Add for embedment between blocks.
- 3) Wall stationing is along the base of the wall.

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DISCLAIMER OF RESPONSIBILITY

I hereby specify that the documents intended to be authenticated by my seal are limited to this sheet. Copies have been retained by the professional engineer. I hereby disclaim any responsibility to subsequent changes to this drawing and all other drawings, specifications, estimates, reports, or other documents or instruments relating to or intending to be used for any part of the architectural or engineering project or survey unless the changes are made by me or with my written permission.

PROTECTION OF WORK

Contractor shall slope the backfill surface away from the wall at the end of each day of work such that surface runoff is directed away from the face of the wall. Contractor shall not allow runoff from adjacent areas to enter the wall construction area.

REVISIONS	
NO.	DESCRIPTION



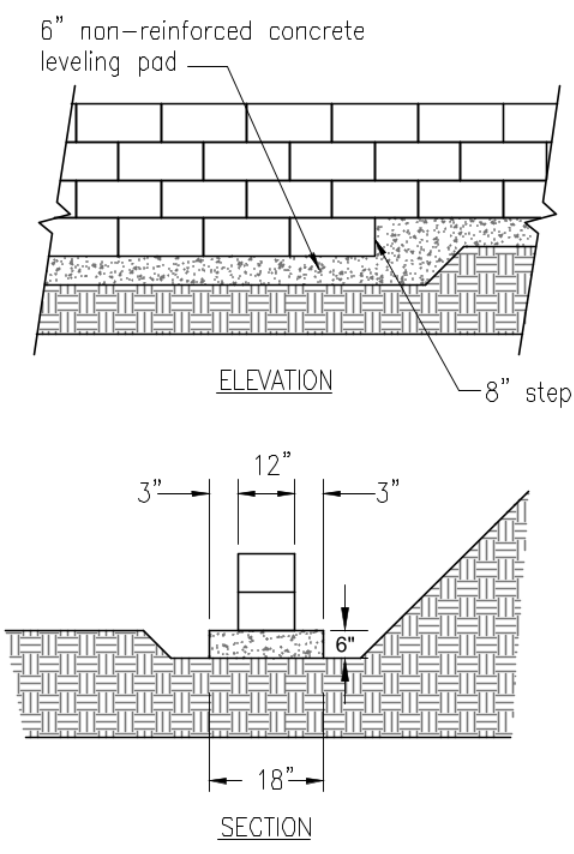
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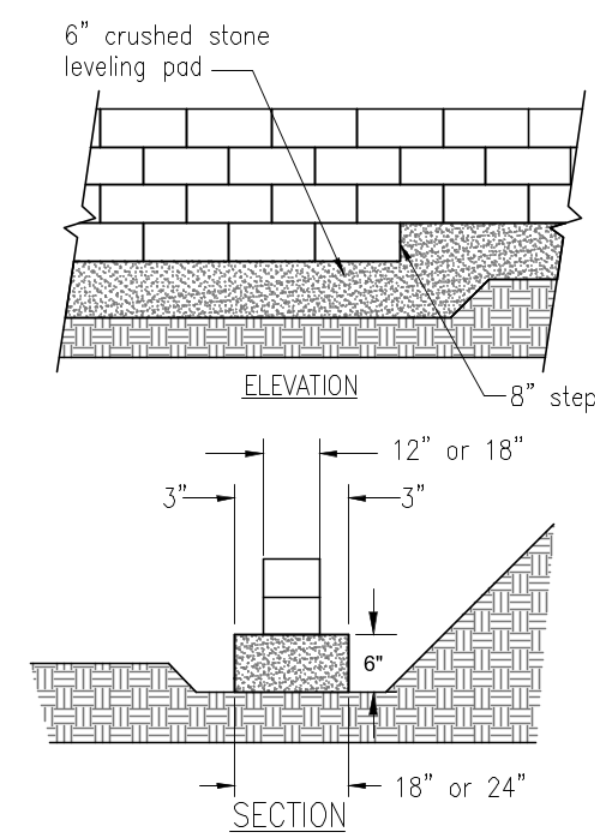
PLAN & ELEVATION VIEWS
 Unit Block Retaining Wall
 Jamestown Mall
 Florissant, Missouri

JOB NO.	15277
DRAWN BY	KILL
DESIGNED BY	KILL
REVIEWED BY	DJB
DATE	7/29/22

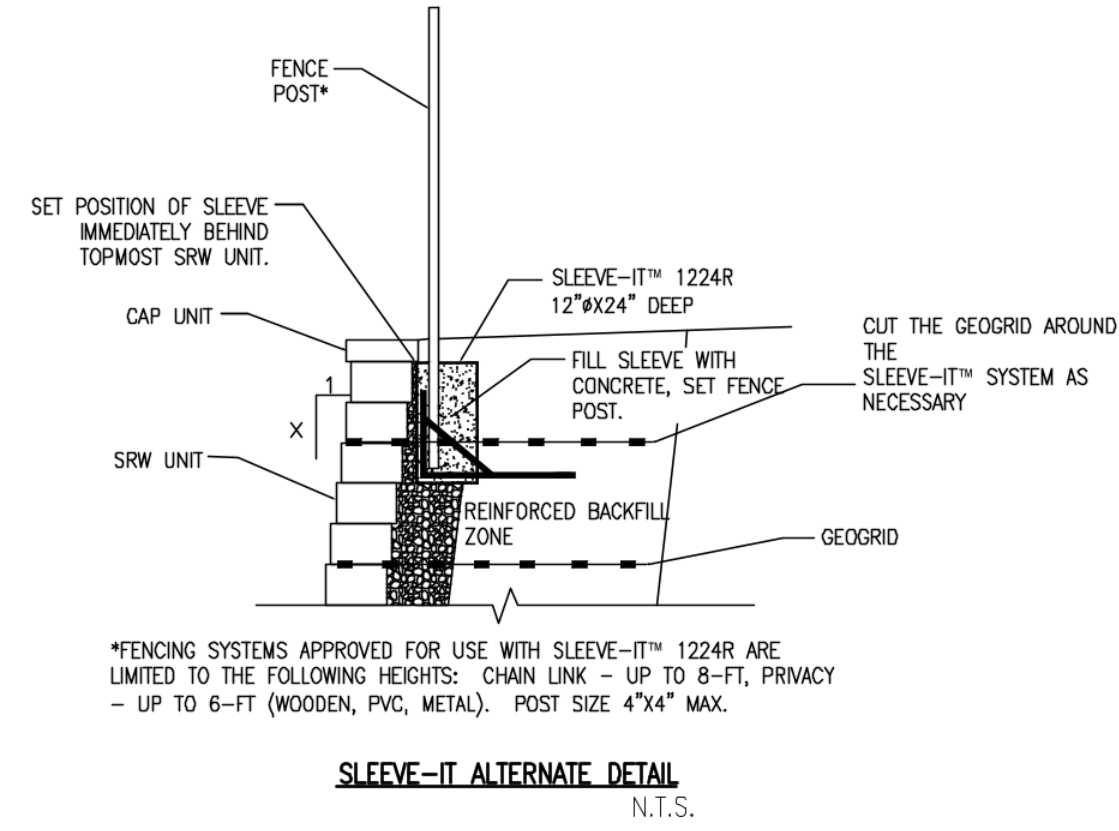
RW-2



LEVELING PAD DETAIL – NON-REINFORCED CONCRETE
N.T.S.

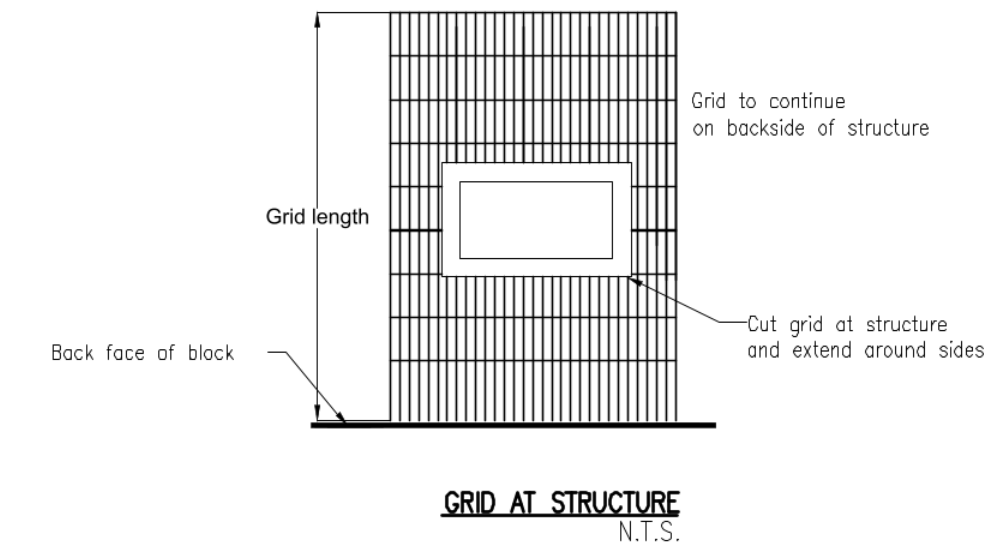


LEVELING PAD DETAIL – CRUSHED STONE

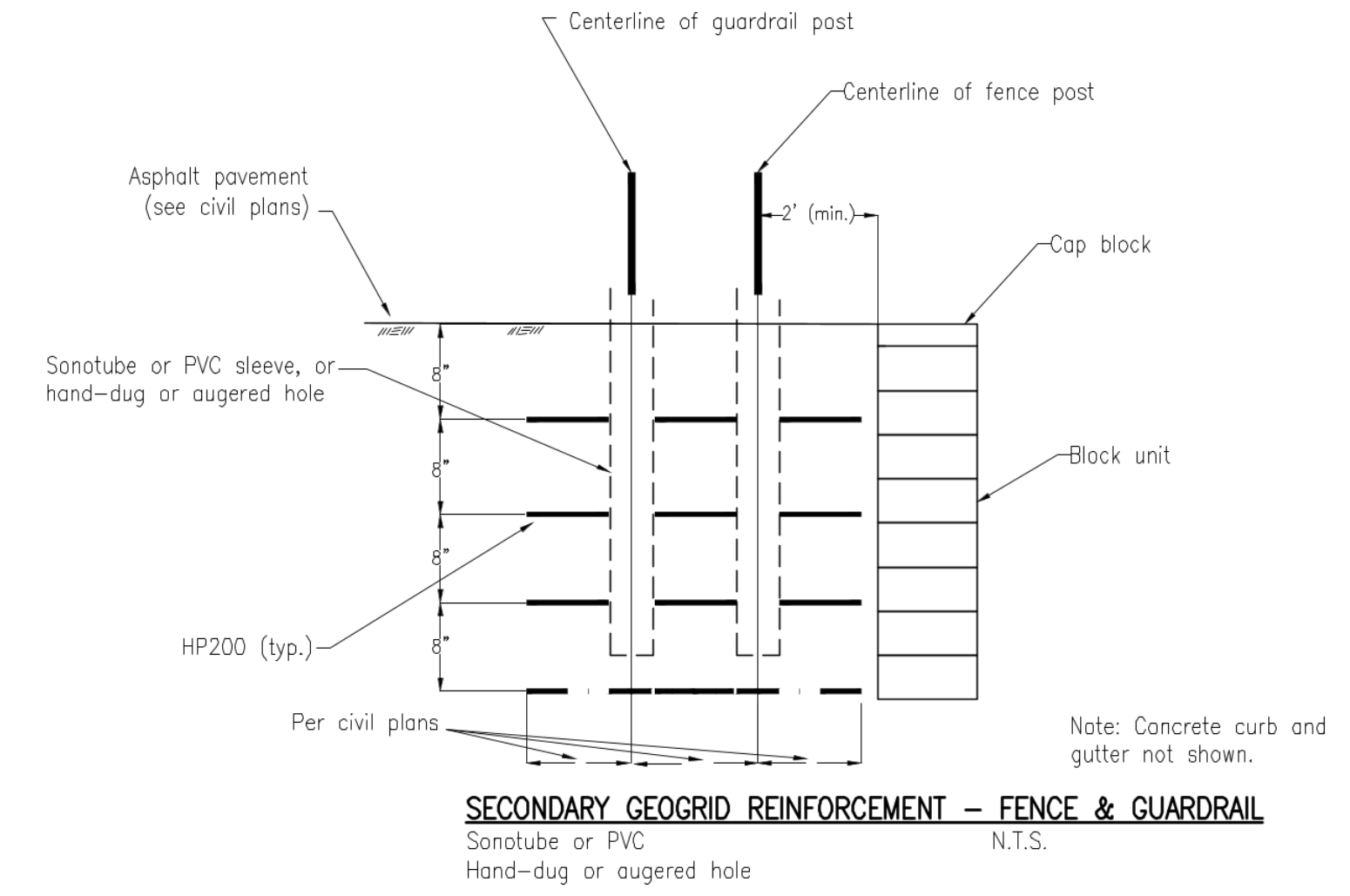


*FENCING SYSTEMS APPROVED FOR USE WITH SLEEVE-IT™ 1224R ARE LIMITED TO THE FOLLOWING HEIGHTS: CHAIN LINK – UP TO 8-FT, PRIVACY – UP TO 6-FT (WOODEN, PVC, METAL). POST SIZE 4"x4" MAX.

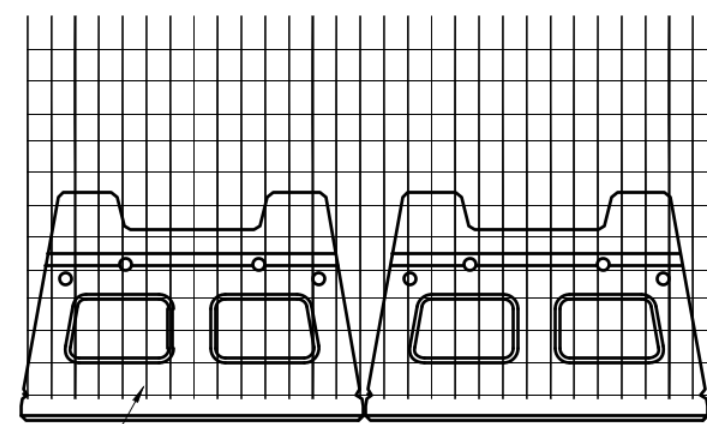
SLEEVE-IT ALTERNATE DETAIL
N.T.S.



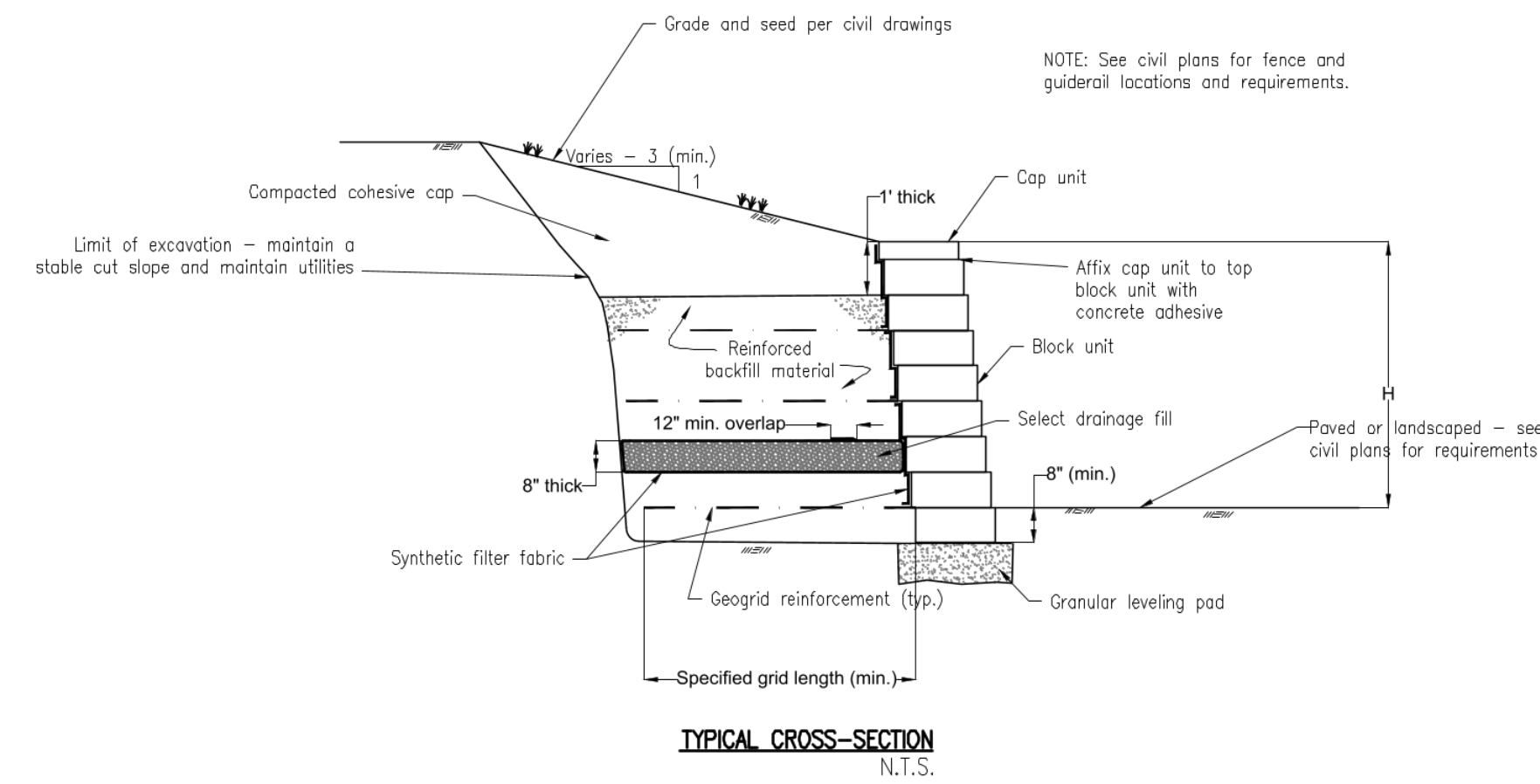
GRID AT STRUCTURE
N.T.S.



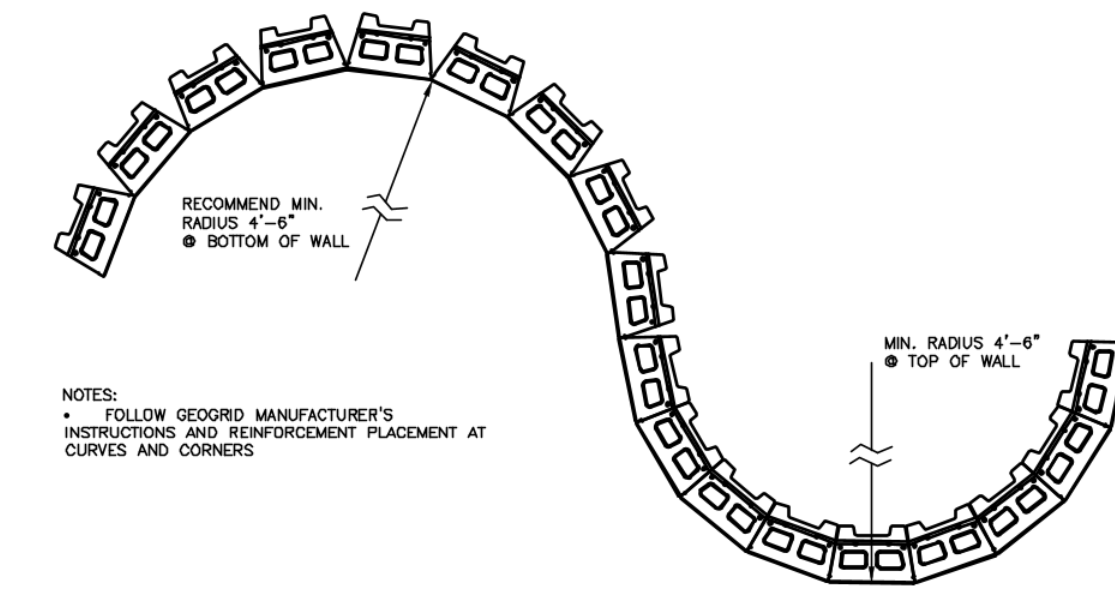
SECONDARY GEOGRID REINFORCEMENT – FENCE & GUARDRAIL
N.T.S.



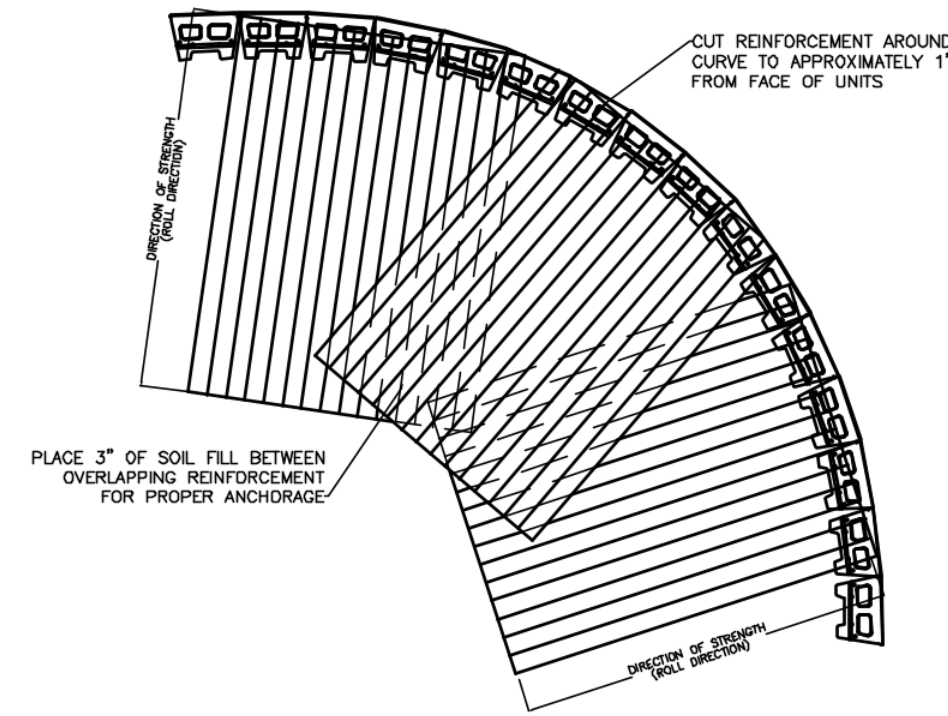
GRID & PIN CONNECTION
N.T.S.



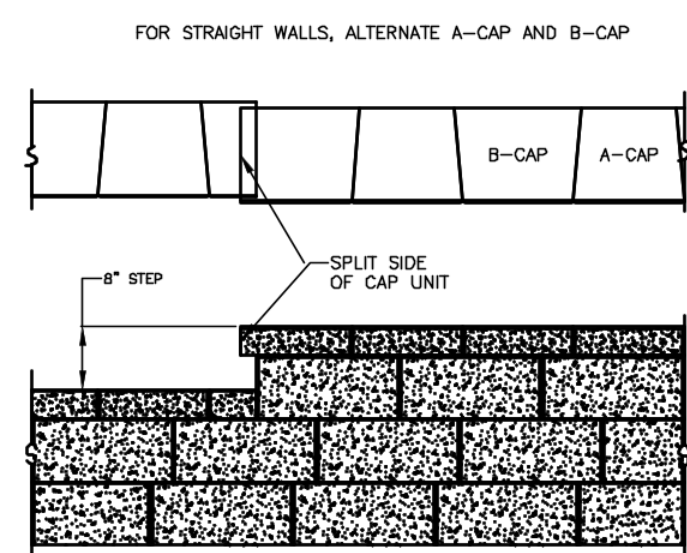
TYPICAL CROSS-SECTION
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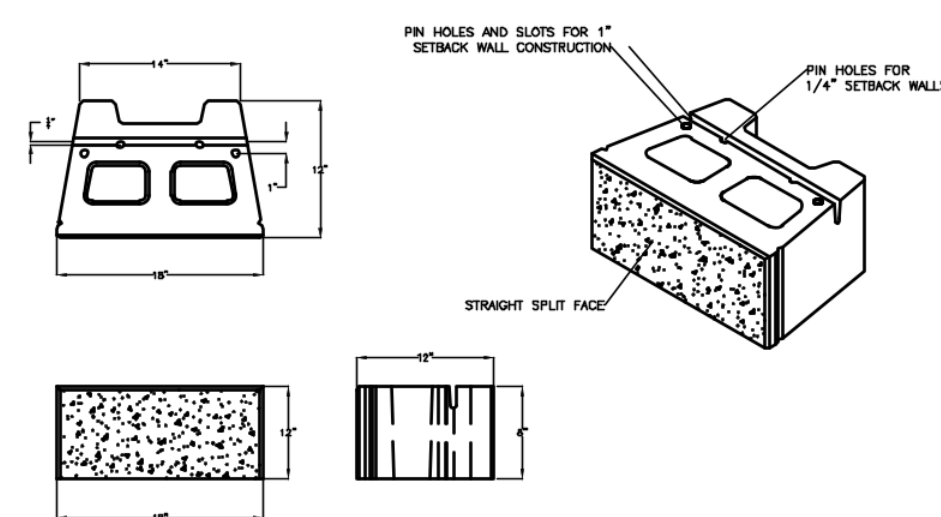
SQUARE FOOT UNIT – CURVE DETAILS
N.T.S.



GRID PLACEMENT ON CURVES
N.T.S.



CAPPING DETAIL – PROFILE
N.T.S.



VERSA-LOK SQUARE FOOT BLOCK DETAILS
N.T.S.

REVISIONS

NO.	DATE	DESCRIPTION



Midwest Testing
Geotechnical • Environmental • Materials
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St. Louis, Missouri 63114
314-739-2727 • Fax 314-739-5429



DETAILS
Unit Block Retaining Wall
Jamestown Mall
Florissant, Missouri

JOB NO.	15277
DRAWN BY	KLL
DESIGNED BY	KLL
REVIEWED BY	DJB
DATE	7/29/22

RW-3

REFERENCES

The following references are applicable to the work:

- ACI 304 Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete
ACI 306R Cold Weather Concreting
ASTM C 33 Concrete Aggregates
ASTM C 94 Ready-mixed Concrete
ASTM C 150 Portland Cement
ASTM C 260 Air Entraining Admixtures for Concrete
ASTM C 494 Chemical Admixtures for Concrete

PRODUCTS

Retaining wall units shall be Versa-Lok 8-inch-high Square Foot units. Cap units shall be Versa-Lok 4-inch-high Cap Units for Square Foot blocks. All wall and cap units shall be by Versa-Lok Retaining Wall Systems (www.versa-lok.com).

Square Foot units are 8 inches high by 18 inches wide by 12 inches deep and weigh approximately 85 pounds each. Block color and finish shall be as specified by Owner. The units shall conform to ASTM C 145 with a minimum unit weight of 125 pounds per cubic foot. Pins shall be Versa-Tuff pins as supplied with Versa-Lok units. Material shall be protected at the job site and kept free from damage prior to installation.

The foundation leveling course material shall conform to the requirements of Missouri Type 5 Aggregate crushed stone as set forth in Section 1007 of Missouri Standard Specifications for Highway Construction. MoDOT Class B concrete can be used as a leveling course alternative.

The reinforced wall backfill shall be 1-inch minus crushed stone.

The select drainage fill and block core fill shall be Missouri Grade 4 Drainage Aggregate. Material locally referred to as 3/4- or 1-inch clean crushed stone shall be acceptable, provided it contains less than 5 percent by weight passing the No. 200 sieve.

The cohesive soil cap shall consist of cohesive soil with a liquid limit not to exceed 45 and a plasticity index (PI) less than 20. The material shall be free of rubble, boulders, cobbles, and gravels, and not contain more than 5 percent by weight organic matter.

The synthetic filter fabric shall be an 8-ounce nonwoven fabric such as Mirafi 140N or equivalent

Adhesive cement shall be Versa-Lok Concrete Adhesive or equivalent.

Geogrid reinforcement shall be GeoStar HP200, manufactured by U.S. Fabrics, and as shown on the drawings.

Fences and guard rails shall be as specified on the civil drawings or by Owner.

Equivalent products will be considered only upon written request to the Engineer prior to bidding, including submittal of product specifications and test data satisfactory to the Engineer.

WALL ERECTION

Site Preparation. Vegetation and topsoil shall be removed from all retaining wall construction areas.

Bench into existing overburden as needed to permit the placement of the specified geogrid reinforcement length.

Should durable rock be encountered above proposed reinforcement elevations, the Geotechnical Engineer shall be notified immediately.

If soft soils or loose fills are encountered, these materials shall be removed to expose a suitable bearing material approved by the Geotechnical Engineer.

Open excavations shall be observed by the Engineer prior to starting wall construction to verify that the desired bearing stratum is exposed and the base of the excavation is free of loose soil, uncompacted fill, water, frozen material, and deleterious matter. Undercut areas shall be filled with compacted material in accordance with compaction requirements set forth elsewhere in these specifications.

Contractor shall maintain stable cut slopes and excavations at all times, including compliance with applicable codes and regulations. The installation of temporary shoring (if needed) is the responsibility of the Contractor. The Contractor shall protect existing utility poles against movement until the wall construction is completed.

Filling and Compaction

Compaction of grade-raise fills and backfill shall achieve at least 95% of the material's standard Proctor (ASTM D 698) maximum dry density at a moisture content conducive to achieving compaction and maintaining a stable fill surface.

Block Placement

Leveling pad material shall be placed with a minimum thickness of 6" and extend laterally a minimum of 3" in front and behind the modular wall unit. Leveling course shall be compacted to at least 95% of standard Proctor. As an alternate, concrete can be used to construct the leveling pad. Leveling pad shall be prepared to ensure full contact to the base surface of the wall units.

The minimum embedment depth is 8" below grade (one block course). Block units shall be stepped as required to remain at least the minimum embedment depth below grade at all locations.

Install first course of wall units at the minimum embedment depth on the prepared leveling course. Alignment and level shall be checked in all directions and all units shall be in full contact with the base and properly seated. To ensure that the units are properly aligned, a thin veneer of fine- to medium-grained sand not to exceed 1 inch in thickness may be spread over the prepared footing to aid in leveling and provide full contact with the prepared footing.

Sweep all excess material from top of units and install next course in running bond pattern. Install two pins per unit, ensuring that the pin protrudes fully into the lower course. See specifications elsewhere on this sheet for geogrid installation procedures. Maximum stacked vertical height of wall units, prior to block core fill and backfill placement and compaction, shall not exceed three courses.

The setback of successive courses shall be 'zero' with the blocks installed in the near-vertical position, resulting in a very slight wall batter of 0.9 degrees. Layout of curves and corners shall be in accordance with manufacturer's recommendations, as shown on the detail drawings.

The walls shall be fitted with 4-inch-high cap units. Cap units shall be affixed with the adhesive cement applied at the manufacturer's recommended rate. All elevations shown are finished grade and shall be within 0.1 feet of those shown on the grading plan.

If cutting is necessary, use brick chisel and split unit in half or use half-blocks as provided by the manufacturer. Pieces less than one-half of the original unit size shall not be used.

Geogrid Reinforcement

Refer to the construction drawings for required length and elevation of geogrids. Geogrids can have a minimum tolerance of the specified length minus 3 inches. Lengths shorter than this minimum will be rejected. Additional geogrid length must be added for embedment between block courses.

The placement of the geogrids is shown on the construction drawings. Monitoring of the fill will be necessary to ensure that the geogrids are placed at the specified elevation. Geogrids placed outside of a plus or minus 4-inch zone of the geogrid design elevation will not be accepted. Removal of unacceptably placed geogrids will be required so that proper elevations can be obtained for the placement of the geogrids.

Geogrid is to be laid horizontally on compacted backfill and oriented with the highest strength axis perpendicular to the wall alignment. The geogrid must be connected to the wall units by embedding the geogrid between the block courses and installing the block pins through the openings in the geogrid. The geogrid must be anchored and pulled taut before the backfill is placed over the geogrid.

Geogrid reinforcements shall be continuous throughout their embedment lengths and placed side-by-side to provide 100% coverage at each level. Spliced connections between shorter pieces of geogrid or gaps between adjacent pieces of geogrid are not permitted. Adjacent geogrid layers must overlap at curves and corners.

Slack in the geogrid at the wall unit connections shall be removed in the manner and degree established by the Engineer during construction of the wall. It is recommended that a tensioning device or metal forks be used to provide uniform tensioning of all grids throughout the height of the wall.

Slack in the geogrids will result in undesirable movements of the wall which will require repair by the Contractor at no expense to the Owner.

See specifications elsewhere on this sheet for secondary geogrid at fence and guardrail locations.

Wall Backfill

Place reinforced wall backfill material in maximum 8" thick loose lifts and compact to at least 95% of the material's maximum dry density, as determined by the standard Proctor (ASTM D 698) method. The moisture content of the backfill material must be within the range conducive for achieving the required compaction, which may require aeration or the addition of water depending on the moisture conditions prevailing at the time of construction.

Backfill shall be placed, spread, and compacted in such a manner that minimizes wrinkles and movement of the geogrid. Backfill shall be placed from the wall outward to ensure that the geogrid remains taut during the backfilling operation.

Field density testing shall be conducted by a qualified soils technician to verify that at least the minimum degree of compaction is being obtained during the backfill placement. All soils tests shall be conducted by the Geotechnical Engineer concurrent with the grading and backfilling operations.

Wall Drainage

Install the blanket drains for the length of the walls as shown on the wall elevation views and detail drawings. At least a portion of the blanket drain shall be installed above the grade at the base of the wall. Install synthetic filter fabric (around the 8" thick layer of select drainage fill and along the back face of the wall as shown on the plans) as construction proceeds to prevent the migration of soil fines into the drainage material and through the block joints.

Positive contact between the drainage blanket and the back face of the wall blocks shall be established. A minimum of 3" of reinforced backfill shall be present between the fabric-wrapped blanket drain and any geogrid layer.

Finished grading shall be performed such that surface water will sheet-flow along the back of the wall, as shown on the drawings. Grade and seed or sod per civil drawings. Re-grade and dress any eroded areas within the work area.

Utility Installation

All utilities must be installed such that they do not interfere with or damage the wall reinforcement. Utilities located within the reinforced backfill zone of the retaining walls shall be installed concurrently with the reinforced fill.

Reinforcing material at any elevation conflicting with a utility line shall be installed at the required elevation and extend the required distance from the face of the wall. However, if the reinforcing material is displaced less than 6" in the vertical direction at the point of conflict only, the reinforcing material shall travel over or under the utility line without being cut. Install a minimum of 3" of compacted fill between the utility line and the reinforcing layer. If the vertical displacement required to install the reinforcing material is greater than 6", an opening shall be cut in the reinforcing material to allow the utility to pass through. The opening shall be a maximum of 2" larger than the utility that passes through.

It is recommended that all excavations above the reinforced zone be performed using a smooth-bottom bucket to minimize the damage to the reinforcing materials.

Should concrete flumes or storm water pipes penetrating the face of the wall be proposed in the future, it is recommended that the Geotechnical Engineer shall be contacted to review these changes to assess their impact on the retaining walls.

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PROTECTION OF WORK

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As-built Construction Tolerances

Vertical alignment: ± 1 1/2" over any 10' distance.

Horizontal alignment: ± 1 1/2" over any 10' distance.

Wall Batter: 0.9° ± 1'

Corners and bends: ± 1' to theoretical location.

Maximum horizontal gap between erected units shall be 1/2".

Subsequent Protection of Wall

The design of the wall is based on conditions and loads imposed on the wall upon completion of the project. Prior to project completion, the wall is vulnerable to damages caused by construction activity adjacent to the wall. Of particular concern is the use of grading equipment on the retained fill at the top of the wall.

Only equipment with a weight not exceeding 1 ton can be used in the 3' zone immediately behind the back face of the wall blocks. Equipment exceeding this weight limit, including, but not limited to, compaction equipment, scrapers, high-lifts, dozers, skid-steers, backhoes, motor graders, dump trucks, and pavers, must be kept a minimum of 3' from the back face of the wall blocks to avoid overstressing the geogrids and pushing the wall out of alignment. This restriction may require the use of hand labor to complete the wall.

Do not allow traffic and equipment to operate at an angle to the wall. Traffic and equipment which do not travel parallel to the wall can impart dynamic forces to the wall which can move the wall out of proper alignment. Any damage to the wall caused by the Contractor shall be repaired by the Contractor at no cost to the Owner.

The surface of the wall backfill shall be graded at the end of each day of work to provide positive surface drainage away from the wall. Grading shall include proper contouring of fills in adjacent areas to prevent the flow of surface water into the select backfill work area.

Uncontrolled infiltration from heavy rains during construction can cause severe erosion and undermining of unit block walls, requiring their removal and reconstruction in some instances. Care must be exercised during construction to prevent the infiltration of surface water into the work area behind the wall. The Contractor shall control surface water during wall construction and make all necessary repairs caused by surface water at no additional expense to the Owner.

Fence Installation

Secondary reinforcement is to be installed continuously along the length of the fences and guardrails as shown on the detail drawings. Secondary reinforcement consists of four layers of GeoStar HP200, 4 feet wide, spaced at 8-inch vertical intervals.

As an alternate for fence and guardrail post installation, post locations can be fitted with Sonotubes, PVC sleeves, or the 12" diameter Sleeve-It 1224R system. As an alternate for guardrail installation, the Sleeve-It 1632R system can be installed at guardrail post locations. If selected, these alternates must be installed concurrent with geogrid installation and backfill placement.

Fences and guardrails shall be installed per the manufacturer's guidelines.

GENERAL NOTES

- 1) Identifying and protecting underground utility locations shall be the responsibility of the Contractor. Underground utilities, if present, shall be located prior to excavation, grading, and wall construction.
2) Notify the Engineer immediately if running water is encountered. Do not proceed with work until method of dealing with rock or running water is approved.
3) The Contractor shall obtain and pay for all permits which may be required for this project.
4) It shall be the responsibility of the Contractor to provide and preserve all survey stakes during construction.
5) Care shall be taken to prevent damage to edges of existing pavement, curbs, and structures. Damaged pavement, curbs, and structures shall be repaired or replaced as directed by the Owner.
6) Fill where necessary to establish the required grades for the wall construction. All fills shall be placed in maximum 8-inch-thick loose lifts and mechanically compacted as specified herein, at a moisture content conducive to achieving the required compaction criterion.
7) All disturbed areas shall be finish-graded, raked, and vegetated, or paved to prevent soil erosion of exposed ground surfaces.
8) Provide siltation control, and keep streets and adjacent properties clean and free of dirt, mud, and debris in accordance with applicable regulations.
9) The surface of the wall backfill shall be graded at the end of each day of work to provide positive surface drainage away from the walls. Grading shall include proper contouring of fills in adjacent areas to prevent the flow of surface water into the select backfill work area. Uncontrolled infiltration from heavy rains during construction can cause severe erosion and undermining of unit block walls, requiring their removal and reconstruction in some instances. Care must be exercised during construction to prevent the infiltration of surface water into the work area behind the walls.
10) Changes to any aspect of the design depicted on the plans, including, but not limited to, the length, elevation, and type of geogrid, backfill material, and block face units, shall not be made without the written permission of Midwest Testing.
11) Drawings will not be to scale if reduced or enlarged. Use dimensions and elevations.
12) Maintain stable cut slopes and protect existing utilities during construction.
13) The existing locations, elevations, grades, and alignments are based on drawings produced by Cochran.
14) Block course, geogrid, and blanket drain elevations and dimensions as shown in the drawings are based on construction using 8-inch-high block units.

RETAINING WALL DESIGN

The following parameters and requirements were used in the development of the designs depicted hereon

Table with 4 columns: Component, Total Unit Weight, pcf, Cohesion, psf, Friction Angle (degrees). Rows include Reinforced compacted wall fill, Retained fill, Foundation Soil, Internal Stability of Wall, and External Stability of Wall.

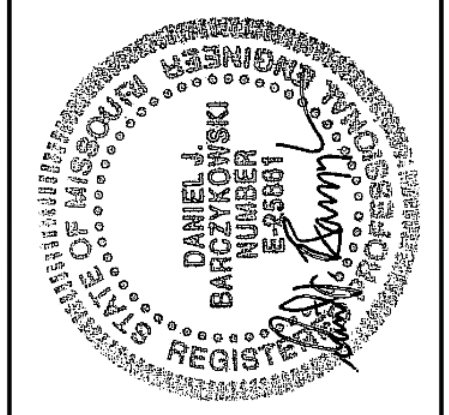
Table with 2 columns: External Loading, Factor of safety for direct sliding, Factor of safety for overturning, Maximum eccentricity (e/L ratio).

External Loading
Surcharge load = 150 psf for paved areas; 100 psf for landscaped areas

Bearing Conditions
All walls shall bear on natural undisturbed soil. The design of the walls includes a factor of safety of at least 2 against a general bearing capacity failure.

Global Stability
These walls have been designed with a static factor of safety of at least 1.5 for global stability.

REVISIONS table with columns: NO., DATE, DESCRIPTION



Midwest Testing Geotechnical/Environmental Materials 8606 Page Avenue St. Louis, Missouri 63114 314-739-2727 Fax 314-739-5429

SPECIFICATIONS Unit Block Retaining Wall Jamestown Mall Florissant, Missouri

Table with 4 columns: JOB NO., DRAWN BY, DESIGNED BY, REVIEWED BY, DATE

RW-4