

Sam Page
County Executive

Saint Louis
COUNTY
TRANSPORTATION
PUBLIC WORKS

Daniel W. Dreisewerd, P.E., PTOE
Acting Director

Stephanie Leon Streeter, P.E.
Deputy Director

June 26, 2019

Mr. Michael Yount, PE
Engineering Solutions, P.C.
5393 Old Baumgartner Road
Saint Louis, MO 63129

Re: Permit Application #19BLD-01787: **Residential Master Plans** for
Building Products, Inc., using the **Anchor Highland 6"**
Block Retaining Wall System

Dear Mr. Yount:

I am pleased to inform you that the plans submitted for review of the **Anchor Highland 6"** Retaining Walls are **approved** and the new master plan numbers are as follows:

Single Tier, 6' high max, 3:1 Max Slope, Compacted Rock Backfill, No Surcharge	707-19-100
Single Tier, 6' high max, No Slope, Compacted Rock Backfill, No Surcharge	707-19-101
Single Tier, 6' high max, No Slope, Compacted Rock Backfill, 120psf LL Surcharge	707-19-102
Double Tier, 4' high max (each tier), 3:1 Max Slope, Compacted Rock Backfill, No Surcharge	707-19-103
Double Tier, 4' high max (each tier), No Slope, Compacted Rock Backfill, No Surcharge	707-19-104
Double Tier, 4' high max (each tier), No Slope, Compacted Rock Backfill, 120psf LL Surcharge	707-19-105

Please inform your customers of the following **procedures they need to follow** when applying for a residential retaining wall permit with Saint Louis County:

1. Submit a **completed permit application** form that includes the **selected master plan number**.
2. Submit **four (4) site plans** showing the location and length of the wall, drawn to scale, with the top-of-wall and bottom-of-wall elevations noted at the ends and midpoint of each wall, at a minimum. Dimension the wall(s) distance from any structures, parking lots, easements and property lines. Show with arrows the existing and proposed direction of site drainage at and around the proposed wall area.
3. Submit **four (4) copy sets** of the approved master plan (13 pages total).
4. Your customers should be made aware that a **Saint Louis County Pre-grading Inspection may be required** to assess any potential major changes on the site grading and drainage when a retaining wall is proposed closer than 10-feet to a property line. Conditions on the site plans submitted may also indicate a Saint Louis County Pre-grading Inspection is needed.

Please call me at 314-615-7149 or e-mail at rdelbert@stlouisco.com if you have any questions.

Sincerely,

Ryan Delbert
Building Code Review Section
Division of Code Enforcement

St. Louis County Masterplan Construction Drawings

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Sheet 2 Specifications
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Sheet 4 Specifications (cont.)

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Sheet 9 Level Backslope, No Surcharge
Sheet 10 Level Backslope, 120 psf Live Load Surcharge (Residential Driveway)
Sheet 11 2 - Terrace 3:1 Slope Above Wall, No Surcharge
Sheet 12 2 - Terrace Level Backslope, No Surcharge
Sheet 13 2 - Terrace Level Backslope, 120 psf Live Load Surcharge (Residential Driveway)



Highland 6"

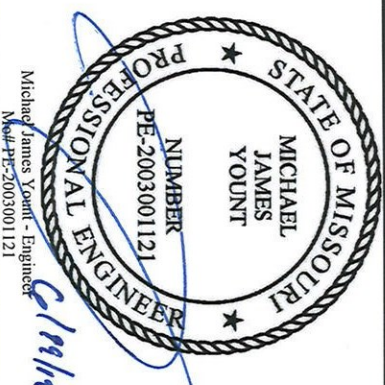
Masterplan, St. Louis County, Mo.



950 Freeburg Ave
Belleville, IL 62220
800-427-6282

**Engineering
Solutions, P.C.**

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St. Louis, Mo. 63129
Phone (314) 842-8200
Mo. State Certificate of Authority #P00565746



Michael James Yount - Engineer
No. PE-2003001121

Title & Index

Sheet 1 of 13

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General

This masterplan is for Anchor Highland 6" retaining walls on one or two family residential properties only. These plans shall specify the structural requirements of single tier walls up to six feet in height for the specific applications shown. Retaining walls that support a house or other structure or that apply a surcharge to a house or other structure (including swimming pools and other retaining walls) and walls in contact with water such as lakes, rivers, ponds or creeks or any application outside of these specific design sections and/or soil parameters shown herein, are excluded. The user of this masterplan is responsible for confirming its applicability. Retaining walls not meeting these parameters should be individually engineered. This plan must be used in its entirety. The contractor shall locate & protect all existing utilities, and shall be responsible for all worker and public safety at the retaining wall site. The contractor shall be responsible for compliance with all OSHA regulations. All installation shall be per the retaining wall manufacturer's construction recommendations and/or as noted herein.

Site Plan

All walls requiring a St. Louis County permit shall be shown on a site plan drawn to scale showing the locations of the wall relative to property lines, easements & existing or proposed structures. This site plan shall show elevations along the top and bottom of the wall relative to a on site benchmark. The site plan shall show the ground surface inclinations above and below the wall for a lateral distance of at least 25'. The site plan shall clearly define drainage in the wall area.

Drainage

A drainage design is not part of this masterplan. However drainage is an important component of the complete wall design. When feasible, it is recommended that surface water be diverted to not drain over the top of the wall. A swale or drainage boxes/structures can be used to divert surface water. Any drain piping should be watertight piping to an acceptable outfall below the wall & should not be connected to the perforated drain tile used for internal wall drainage. If it is necessary to direct the water over the top of the wall concentration to one point should be avoided. The owner should expect some periodic maintenance of the soil cap & the soil cover at the toe of the wall being required. Water should not be allowed to pond above the wall.

Guard Rails/Fencing

Non-Wind Loading guard rails/fencing shall be installed installed above the wall where required per code in accordance with Anchor Retaining Walls specifications. Wind loaded fences or vehicular guard rails can affect the retaining wall and should be designed by a qualified engineer.

Materials

The Leveling Pad shall be constructed 1" minus crushed limestone compacted to at least 90% modified proctor with minimum dimensions of 6" thick and 24" wide.

Retaining Wall Units shall be Anchor Highland 6" as manufactured by Building Products.

The **reinforced wall backfill** material shall be 1" clean crushed limestone. Material shall be placed in lifts, 8" max each, and compacted by multiple passes of a vibratory plate compactor.



ANCHORTM

Highland 6"

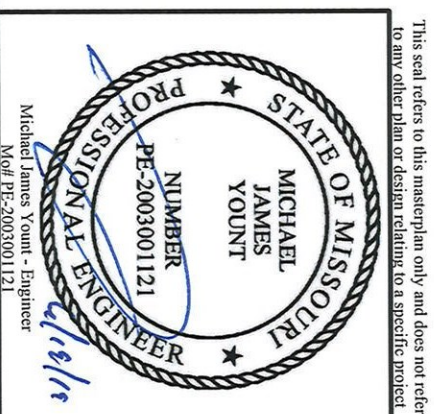
Masterplan, St. Louis County, Mo.



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Specifications

Sheet 2 of 13



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Materials (cont.)

Geogrid shall be Geostar Optima HP 200, Carthage Mills GX150, Miragrid 3XT, Startagrid SG150 as indicated on the plan, or approved equivalent.

Filter Fabric shall be Carthage Mills FX40 or Mirafi 140N or approved equivalent.

Drain Tile shall be 4" HDPE perforated wrapped in fabric (sock) & extended to daylight at the wall low point.

The Soil Cap shall consist of compacted low plastic impervious soil above the structural backfill in areas not to be paved.

Wall Foundation Excavation

Foundation soil shall be excavated as required for the leveling pads and the structural backfill zone. All excavations shall comply with OSHA safety requirements. The exposed foundation material & retained materials shall be observed prior to placing the leveling pad rock to confirm the soil parameters comply with the design assumptions. The retained material shall be low plastic with an internal angle of friction of at least 26 degrees. Foundation soil shall be low plastic and have a minimum bearing capacity of 1,500 psf and an effective internal angle of friction of 26 degrees. Any soils that are soft, plastic ($LL > 50\%$), frozen, or wet and untested fills shall be removed and recompacted to 90% modified Proctor under the direction of the geotechnical engineer. Care should be taken to identify any utility trenches in the area. The contractor shall identify if the backfill in these trenches has been properly placed & compacted. See sewer & utility backfill section to follow.

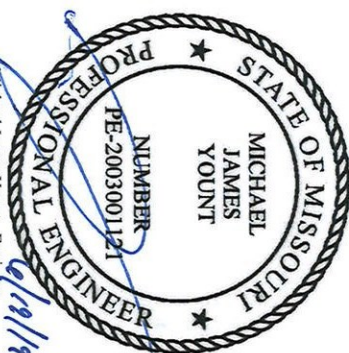
Geogrid Reinforcing

The geogrids shall be cut to the design lengths "L" and placed between the blocks at the elevations shown on the plans. The geogrid's primary strength direction shall be perpendicular to the wall face (into the fill). The geogrid shall be placed horizontally and laid flat on the reinforcing fill material. The geogrid shall be placed so that a minimum of 10" of grid is between the block layers. Slack in the geogrid shall be removed prior to placing backfill.

Wall Construction

Provide a minimum 6" thick x 24" wide crushed limestone leveling pad centered beneath the base block compacted to at least 90% modified proctor. Install the first course of blocks on the leveling pad, units must be level in all directions & be in complete contact with the leveling pad. Install the next course in a running bond stack. Adjust for setback per course. Continue stacking subsequent courses until the level of the first layer of geogrid is reached. Install drain tile & daylight prior to backfilling. Backfill material shall be placed in maximum 8" lifts and compacted by multiple passes with a vibratory plate compactor. Backfill shall be placed, spread and compacted in such a manner that minimizes wrinkles and movement of the geogrid. During backfill placement only hand operated equipment shall be used in the 4' zone directly behind the wall. The front of the wall shall be backfilled and compacted to finished grade. Filter fabric shall separate the granular backfill from the retained soil and the soil cap. Filter fabric shall not cover the foundation materials. The geogrids shall be cut to the lengths shown and placed in accordance with the tables shown on the design sections. The geogrid shall be orientated so that the direction of maximum strength is perpendicular to the face of the wall. There shall be at least 10" of geogrid between the block layers. The geogrids must be kept taut & level. All geogrid installation shall be in accordance with the manufacturers specifications. Install the soil cap, compact & finish grade for proper drainage per the approved site plan.

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Michael James Yount - Engineer
Mo# PE-2003001121

Specifications
(cont.)

Sheet 3 of 13

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Highland 6"

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Sewer & Utility Trench Backfill

Any excavation to be backfilled within a distance of (2) times the wall height from the wall face must be compacted to at least 90% modified proctor. Any excavations made below the wall should be backfilled with 1" or 2" minus compacted to 90% modified proctor, or as directed by a geotechnical engineer.

Protection of Work

The surfaces surrounding the wall shall be graded at the end of each day to provide positive drainage away from the wall. Grading shall include proper contouring of fills in adjacent areas to prevent the flow of excessive surface water toward the wall. Finish grading should be completed in accordance with the approved site development plan.

The stability of temporary excavation during wall construction is beyond the scope of this design and is the responsibility of the contractor.

The Owner or Owner's Representative is responsible for ensuring that construction by others adjacent to the wall does not disturb the wall or place temporary construction loads on the wall that exceed design loads, including loads such as water pressure, temporary grades, or equipment loading. Heavy paving or grading equipment shall be kept a minimum of 3 feet behind the back of the wall face. Equipment with wheel loads in excess of 150 psf live load shall not be operated within 10 feet of the face of the retaining wall during construction adjacent to the wall. Care should be taken by the Owner or Owner's Representative to ensure water runoff is directed away from the wall structure until final grading and surface drainage collection systems are completed.

Design Parameters

This design is based on design parameters that must be field verified. This verification should include both existing soils & the new fill material. If actual conditions are of lesser strength or quality than the design parameters redesign or remediation may be required. A pre-construction soils investigation may reduce the risk of discovering poor materials & increasing the overall cost of the project during construction. Global stability and settlement are outside of the scope of this design.

	Friction Angle	Unit Weight	Cohesion
REINFORCING ZONE FILL (1" Clean)	38°	100 PCF	0 PSF
RETAINED BACKFILL (Low plastic silty clay)	26°	120 PCF	0 PSF
FOUNDATION SOIL (Low plastic silty clay)	26°	120 PCF	50 PSF

No changes shall be made to these plans without written approval of Engineering Solutions, P.C.

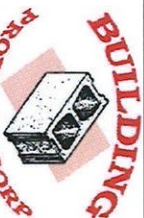
MINIMUM FACTORS OF SAFETY

EXTERNAL SLIDING = 1.5
INTERNAL SLIDING = 1.5
OVERTURNING = 1.5
BEARING CAPACITY = 1,500 PSF



Highland 6"

Masterplan, St. Louis County, Mo.



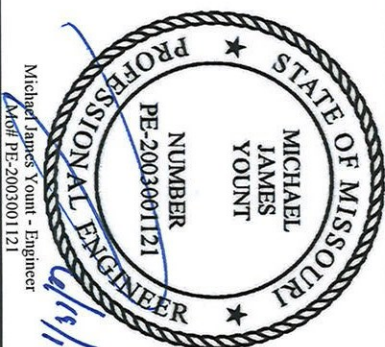
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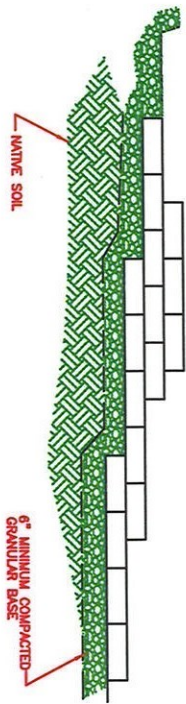
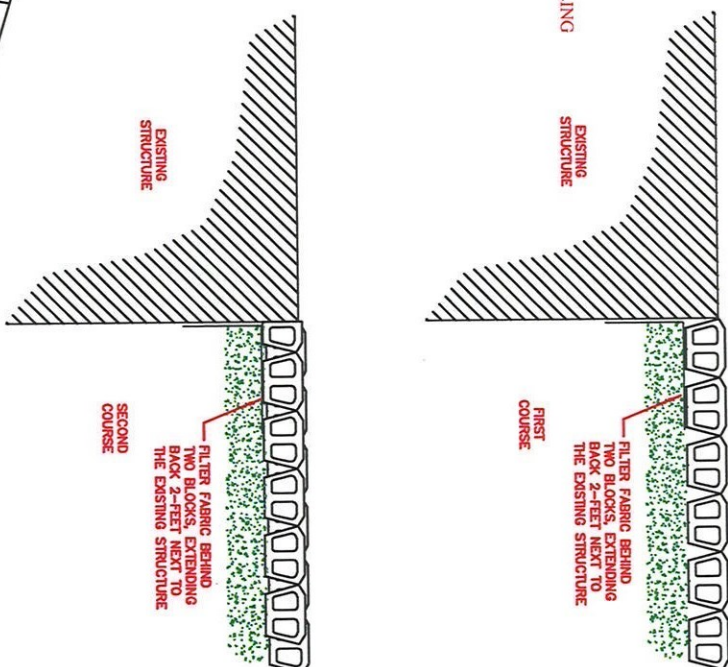
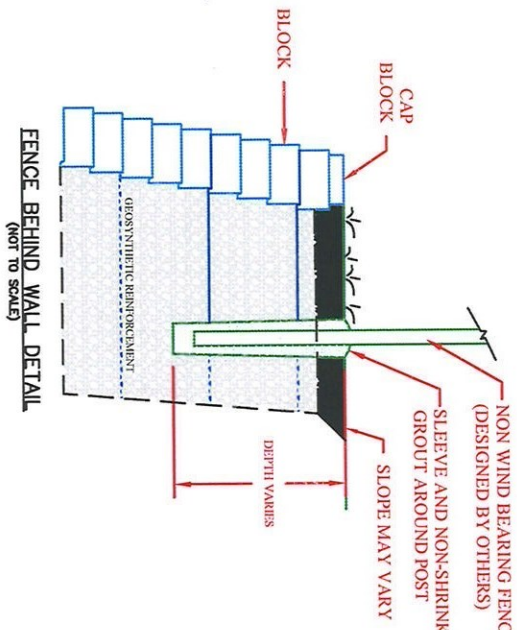
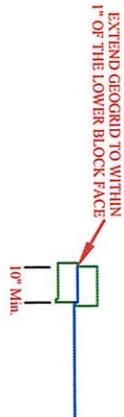
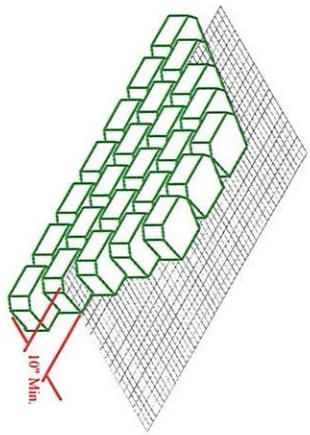
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Specifications
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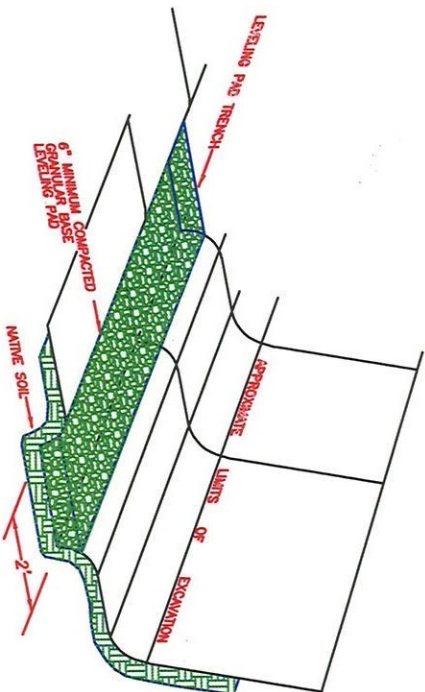
Sheet 4 of 13



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TYPICAL STEP-UP DETAIL
(NOT TO SCALE)



TYPICAL BASE PREPARATION
(NOT TO SCALE)



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Highland 6"

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Typical Details

Sheet 5 of 13



Michael James Yount - Engineer
Mo/IL PE-2003001121

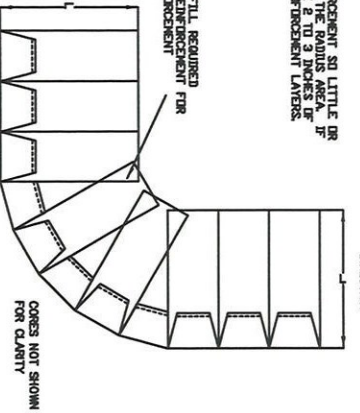
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WALL ABUTTING EXISTING STRUCTURE
(NOT TO SCALE)

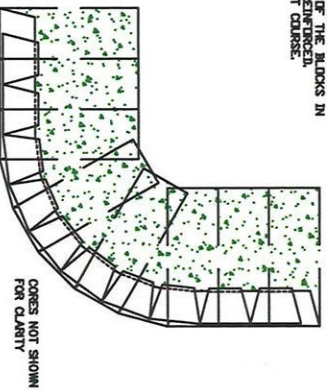
PRINCIPLE
REINFORCEMENT
DIRECTION

STEP 1 - PLACE REINFORCEMENT SO LITTLE OR NO OVERLAP OCCURS IN THE RADIAL AREA. IF OVERLAP OCCURS, PLACE 2 TO 3 INCHES OF SAND BETWEEN THE REINFORCEMENT LAYERS.

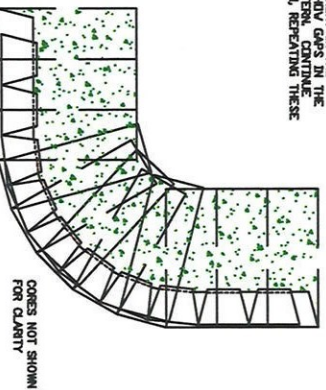
2" TO 3" OF GRANULAR FILL REQUIRED BETWEEN OVERLAPPED REINFORCEMENT FOR PLACEMENT AND REINFORCEMENT INTERACTION



STEP 2 - LAY THE NEXT COURSE OF BLOCKS AND MARK ON THE BLOCKS THE RADIAL AREAS THAT ARE NOT REINFORCED. BACKFILL AND COMPACT THAT COURSE.

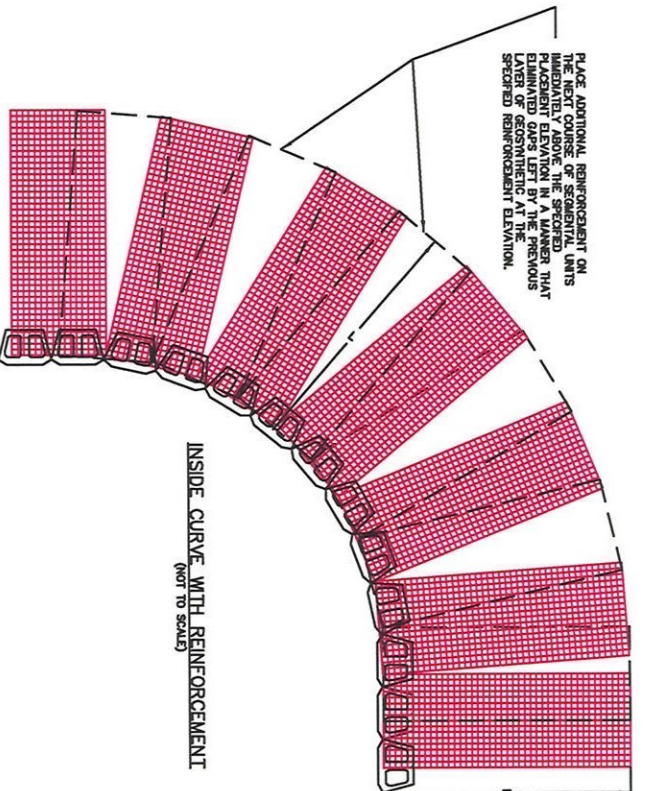


STEP 3 - PLACE REINFORCEMENT IN THE AREAS WHERE THE MARKS SHOW GAPS IN THE LAYER REINFORCEMENT PATTERN. CONTINUE REINFORCEMENT PATTERN AND REINFORCEMENT INTERACTION, REPEATING THESE STEPS AS NEEDED.



OUTSIDE CURVE WITH REINFORCEMENT
(NOT TO SCALE)

PLACE ADDITIONAL REINFORCEMENT ON THE NEXT COURSE OF GEOMETRIC UNITS. ELIMINATE GAPS LEFT BY THE PREVIOUS LAYER OF GEOMETRIC UNITS AT THE SPECIFIED REINFORCEMENT ELEVATION.



INSIDE CURVE WITH REINFORCEMENT
(NOT TO SCALE)

PRINCIPLE
REINFORCEMENT
DIRECTION



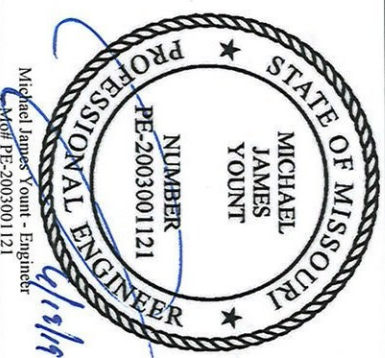
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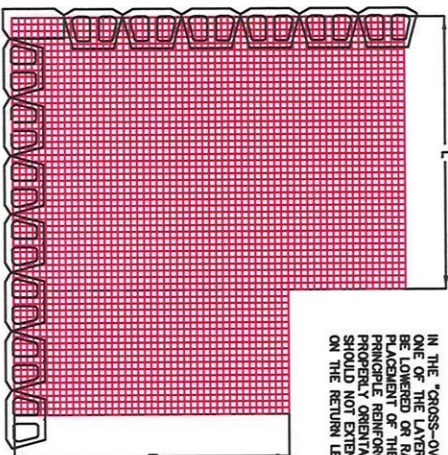
Typical Details
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Sheet 6 of 13



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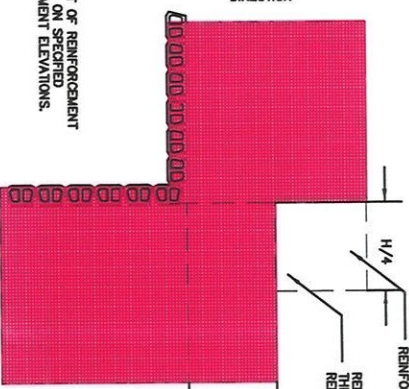
PRINCIPLE
REINFORCEMENT
DIRECTION



PRINCIPLE
REINFORCEMENT
DIRECTION

IN THE "CROSS-OVER AREA" OF REINFORCEMENT, ONE OF THE LAYERS OF REINFORCEMENT SHOULD BE LOWERED OR RAISED ONE COURSE TO ALLOW PLACEMENT OF THE REINFORCEMENT WITH THE PRINCIPLE REINFORCEMENT DIRECTION. THE REINFORCEMENT SHOULD NOT EXTEND INTO THE SEGMENTAL UNITS ON THE RETURN LEG OF THE 90 DEGREE CORNER.

PRINCIPLE
REINFORCEMENT
DIRECTION



PRINCIPLE
REINFORCEMENT
DIRECTION

NOTES:
1. PLACEMENT OF REINFORCEMENT
EXTENSION ON SPECIFIED
REINFORCEMENT ELEVATIONS.

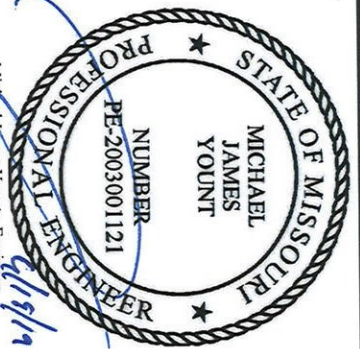
H/4

REINFORCEMENT NOT SHOWN FOR CLARITY
REINFORCEMENT H/4 BEYOND
THE CORNER AT THE SPECIFIED
REINFORCEMENT ELEVATIONS

H/4 EXTENSION
BEYOND
BLOCK

ANCHOR DIAMOND PRO BLOCK
90 DEGREE INSIDE CORNER WITH REINFORCEMENT
(NOT TO SCALE)

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Michael James Yount - Engineer
Mo# PE-2003001121



Highland 6"

Masterplan, St. Louis County, Mo.



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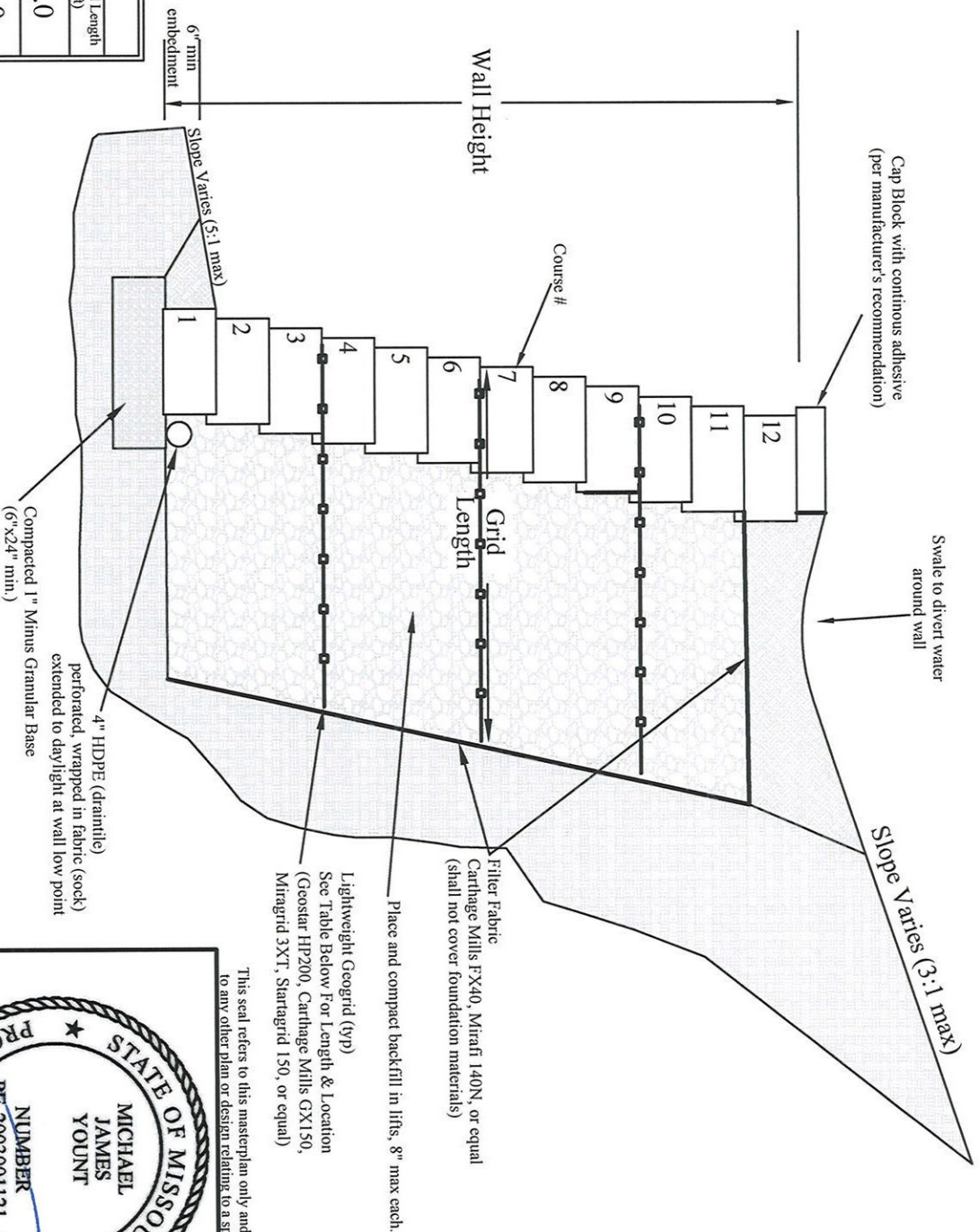
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Typical Details
(cont.)

Sheet 7 of 13

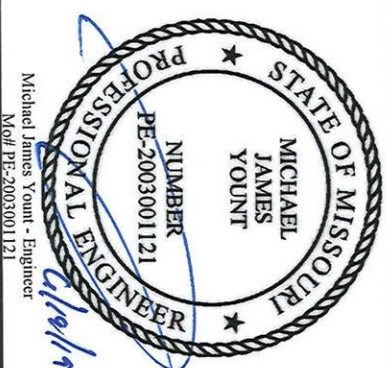
Backfill Table - 3:1 (max) Slope Above Wall

Wall Height (feet) (without cap)	# of Geogrid Layers	Geogrid Location (on top of course #)	Geogrid Length (ft)
3.0	1	3	4.0
4.0	1	4	4.0
5.0	2	3,7	4.5
6.0	3	3,6,9	5.0



Refer to Specifications Sheets 2-4 &
Construction Details Sheets 5-7 for
Additional Requirements

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Highland 6"

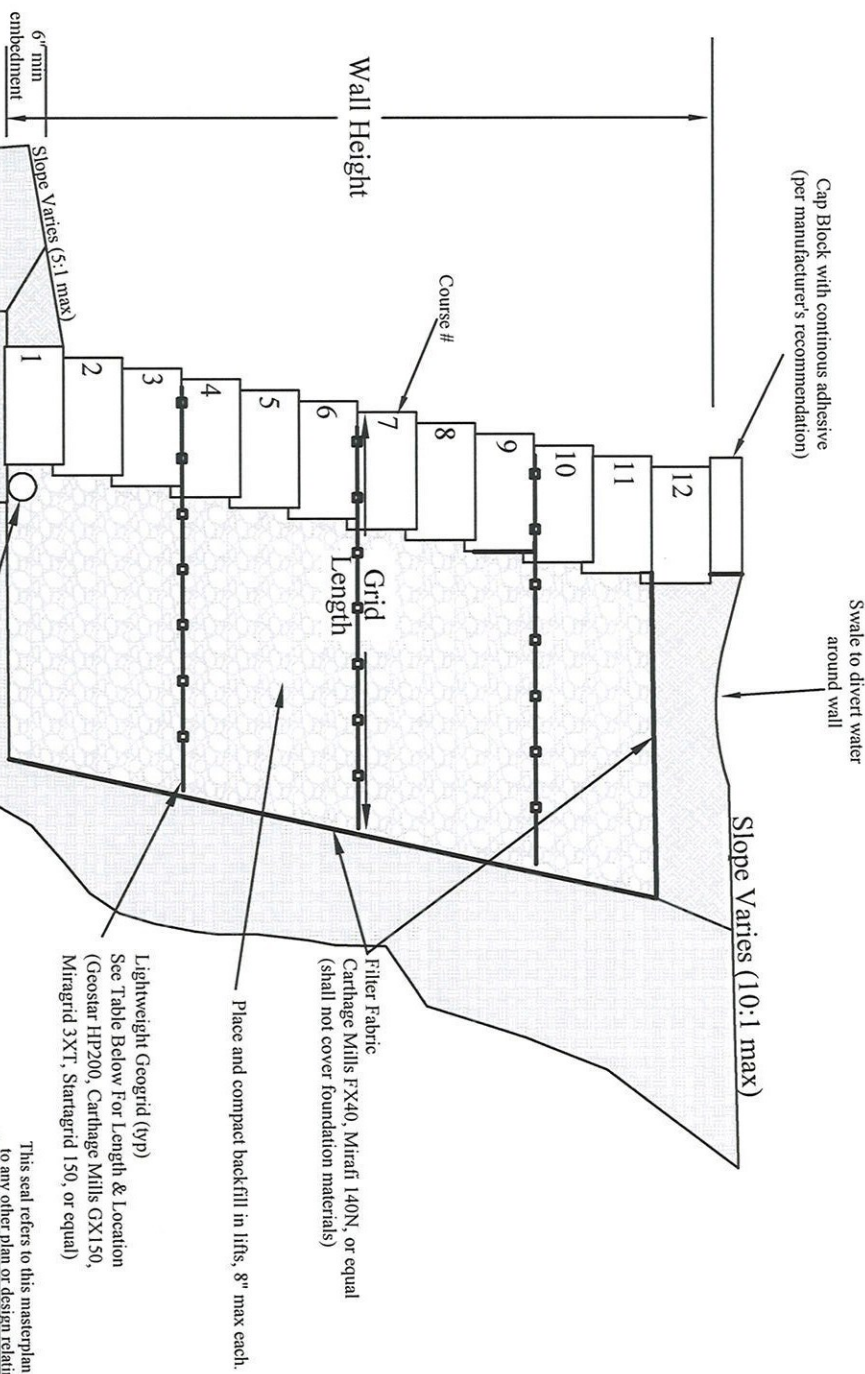
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Typical Cross Section
3:1 Slope, No Surcharge

Sheet 8 of 13

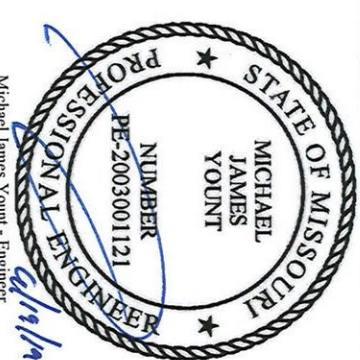


Backfill Table - No Slope Above Wall (10:1 max)

Wall Height (feet) (without cap)	# of Geogrid Layers	Geogrid Location (on top of course #)	Geogrid Length (ft)
3.0	1	3	4.0
4.0	1	4	4.0
5.0	2	3,7	4.0
6.0	3	3,6,9	4.5

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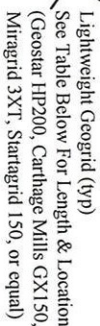


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Typical Cross Section
Level Backslope, No Surcharge



Wall Height (feet) (without cap)	# of Geogrid Layers	Geogrid Location (on top of course #)	Geogrid Length (ft)
	3.0	1	3
4.0	1	4	4.0
5.0	2	3,7	4.0
6.0	3	3,6,9	4.5

Michael James Yount - Engineer
Mof PE-2003001121



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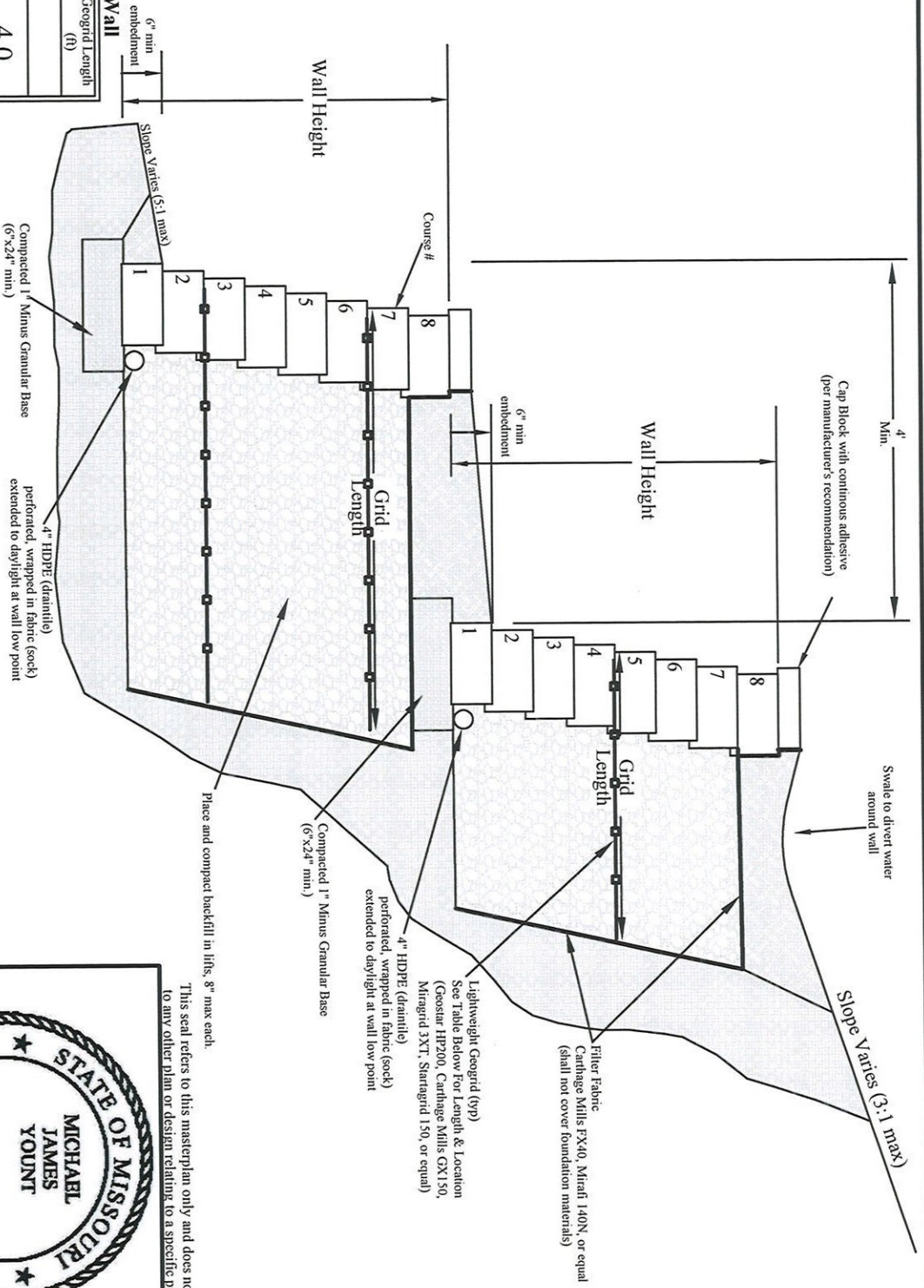
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Masterplan, St. Louis County, Mo.

Typical Cross Section
Level Backslope, 120 psf Surcharge
(Residential Driveway)

Sheet 10 of 13

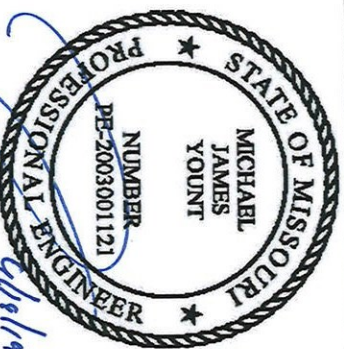


Backfill Table - 3:1 (max) Slope Above Wall

Wall Height (feet) (without cap)	# of Geogrid Layers	Geogrid Location (on top of course #)	Geogrid Length (ft)
3.0	1	Upper Terrace	4.0
4.0	1	4	4.0
		Lower Terrace	
3.0	2	2,4	5.0
4.0	2	2,6	5.5

Refer to Specifications Sheets 2-4 & Construction Details Sheets 5-7 for Additional Requirements

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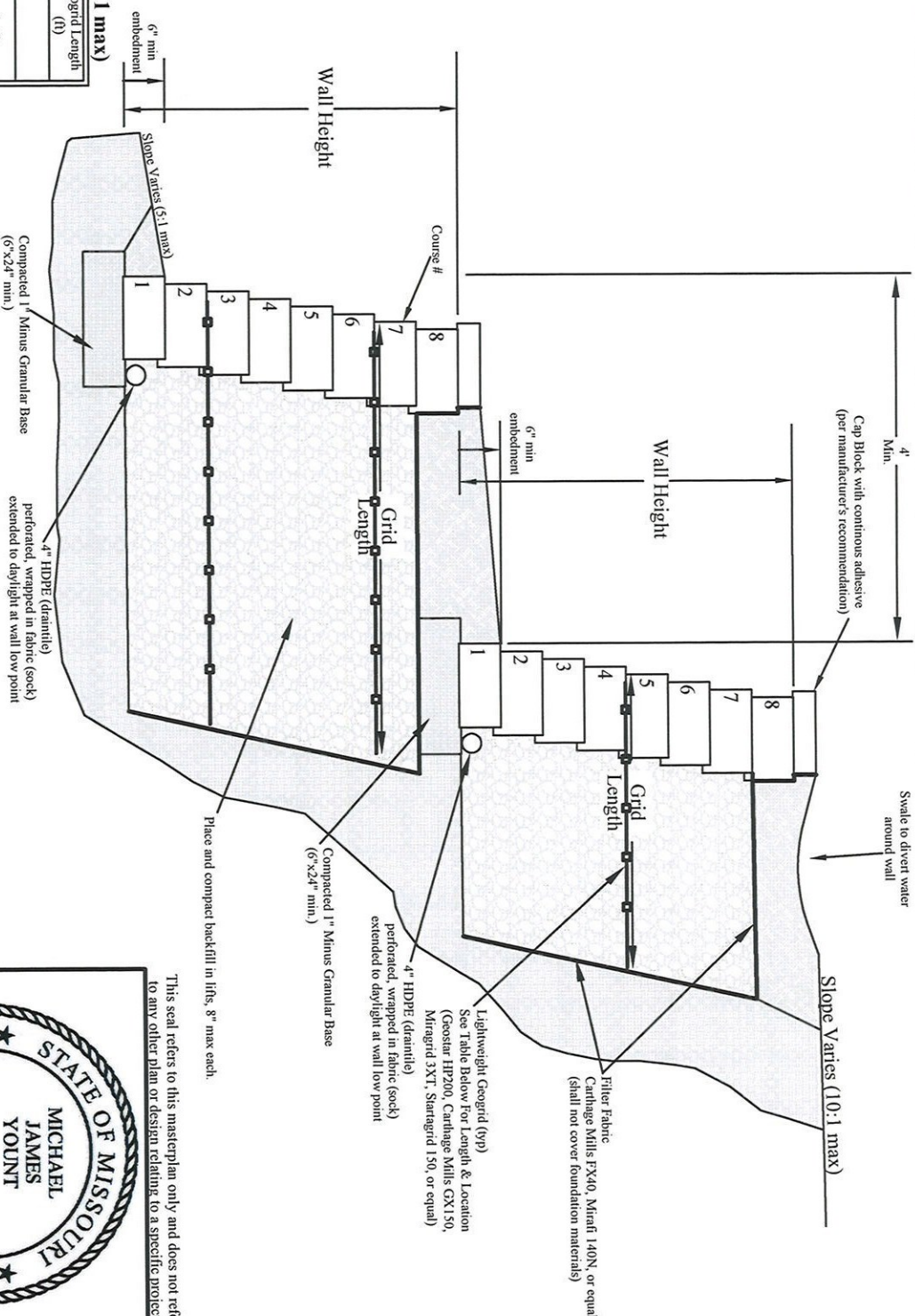
ANCHORTM
Highland 6"

Masterplan, St. Louis County, Mo.

BUILDING PRODUCTS CORP.
950 Freeburg Ave
Belleville, IL. 62220
800-427-6382

Engineering Solutions, P.C.
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Typical Cross Section
2 - Terrace
3:1 Slope, No Surcharge
Sheet 11 of 13



Backfill Table - No Slope Above Wall (10:1 max)

Wall Height (feet) (without cap)	# of Geogrid Layers	Geogrid Location (on top of course #)	Geogrid Length (ft)
3.0	1	3	4.0
4.0	1	4	4.0
	Lower Terrace		
3.0	2	2,4	5.0
4.0	2	2,6	5.5



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Highland 6"

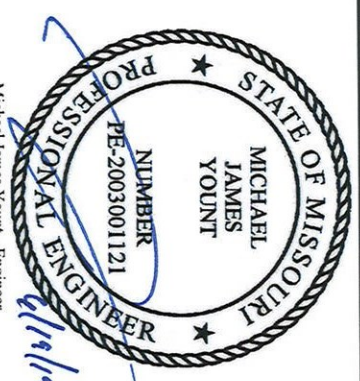
Masterplan, St. Louis County, Mo.



950 Freeburg Ave
Belleville, IL 62220
800-427-6282

Engineering Solutions, P.C.
5393 Old Baumgartner Rd
St. Louis, Mo. 63129
Phone (314) 842-8200
Mo. State Certificate of Authority #P00065746

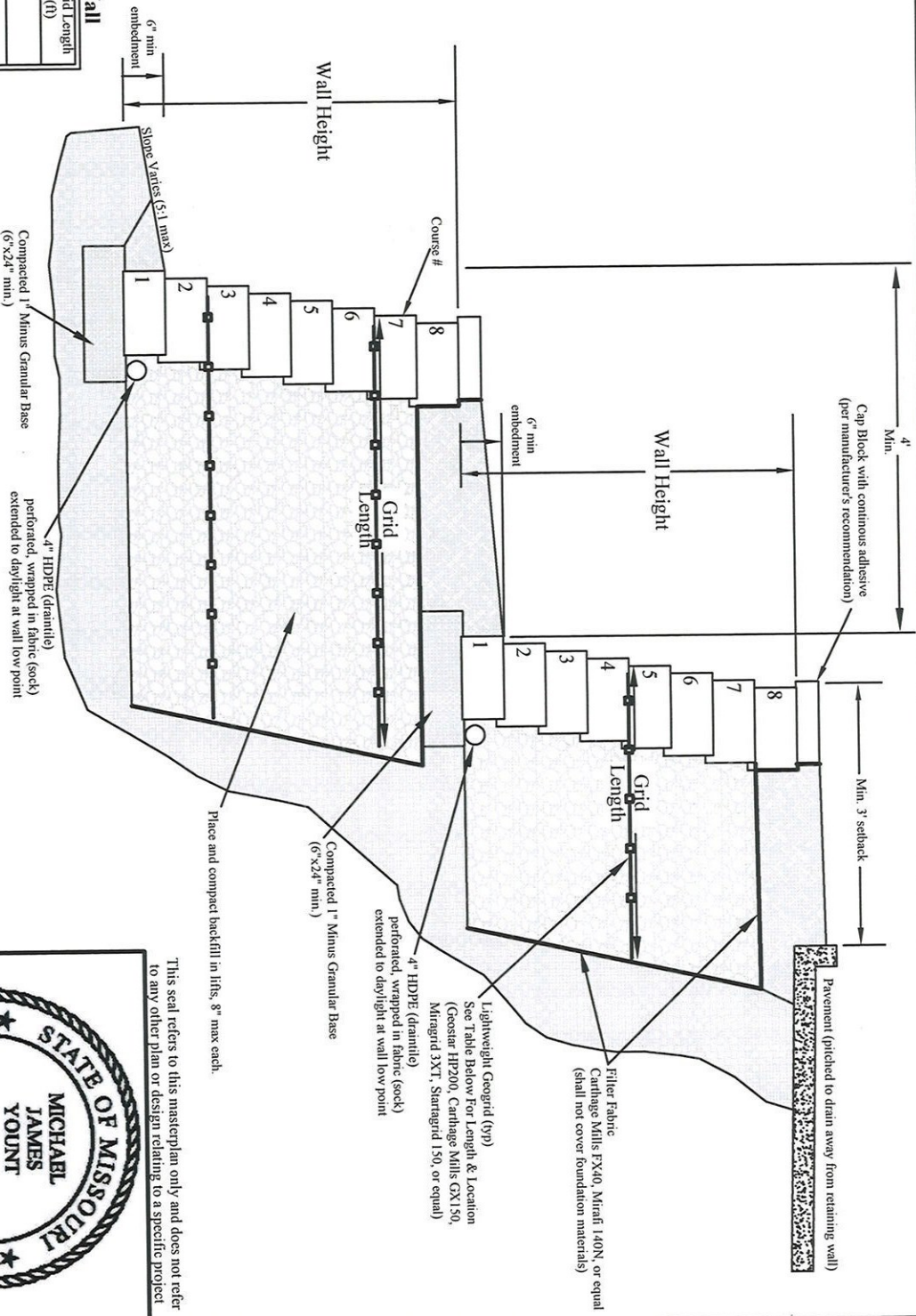
Refer to Specifications Sheets 2-4 & Construction Details Sheets 5-7 for Additional Requirements



This seal refers to this masterplan only and does not refer to any other plan or design relating to a specific project.

Typical Cross Section
2 - Terrace
Level Backslope, No Surcharge

Sheet 12 of 13

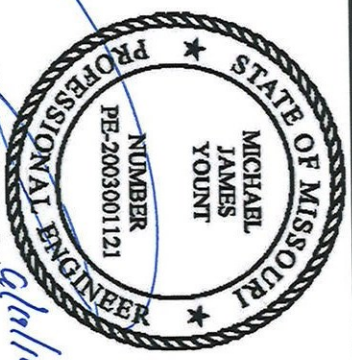


Backfill Table - 120 psf Live Load Above Wall

Wall Height (feet) (without cap)	# of Geogrid Layers (on top of course #)	Geogrid Location (on top of course #)	Geogrid Length (ft)
3.0	1	Upper Terrace	4.0
4.0	1	4	4.0
		Lower Terrace	
3.0	2	2,4	5.0
4.0	2	2,6	5.5

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ANCHOR
Highland 6'™

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Typical Cross Section

2 - Terrace
Level Backslope, 120 psf Surcharge
(Residential Driveway)

Sheet 13 of 13