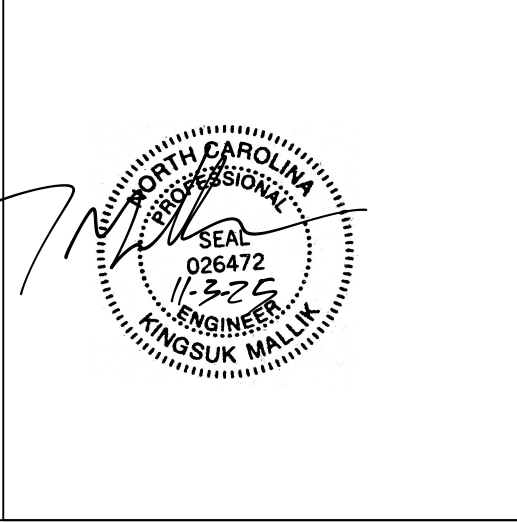


MSE RETAINING WALL
CONSTRUCTION PLANS
FOR
SERENITY AMENITY
HARNETT COUNTY, NORTH CAROLINA



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RETAINING WALL PROFILES	SHT 1
WALL DETAILS	SHT 2
SPECIFICATIONS	SHT 3
RETAINING WALL LABELS PLAN (FOR PLAN VIEW REFERENCE)	C4.02

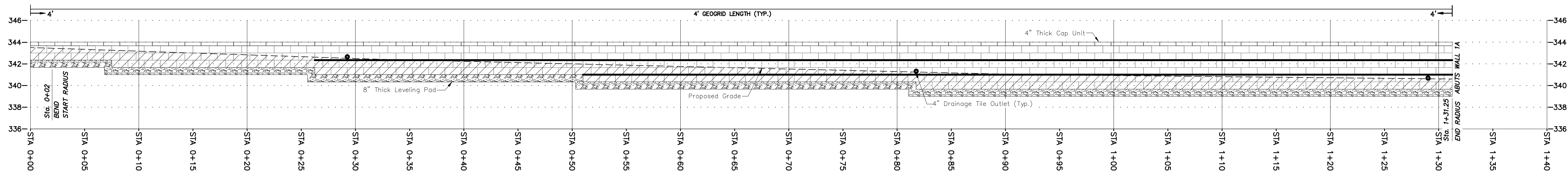


NO.	REVISIONS

TM Engineering, Inc.
103 Howatha Court
CARY, NC 27513
(919) 468-2545
Company #NC-3201

SERENITY AMENITY
HARNETT COUNTY, NC

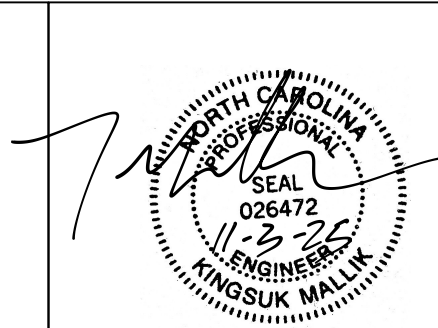
DATE 11-3-25



WALL PROFILE

NOTE: FILL MATERIALS IN THE REINFORCED ZONE SHOULD CONSIST OF A GRANULAR MATERIAL SUCH AS QUARRY SCREENINGS, ABC STONE, WASHED #57 OR #67 STONE, OR A SIMILAR APPROVED MATERIAL. SUBMIT SAMPLES OF ALL PROPOSED REINFORCED BACKFILL MATERIAL TO OWNERS GEOTECHNICAL REPRESENTATIVE FOR REVIEW AND APPROVAL PRIOR TO START OF CONSTRUCTION.

- SCALE: 1"=5'
- Miragrid 3XT
 - Leveling Pad
 - Embedded Blocks



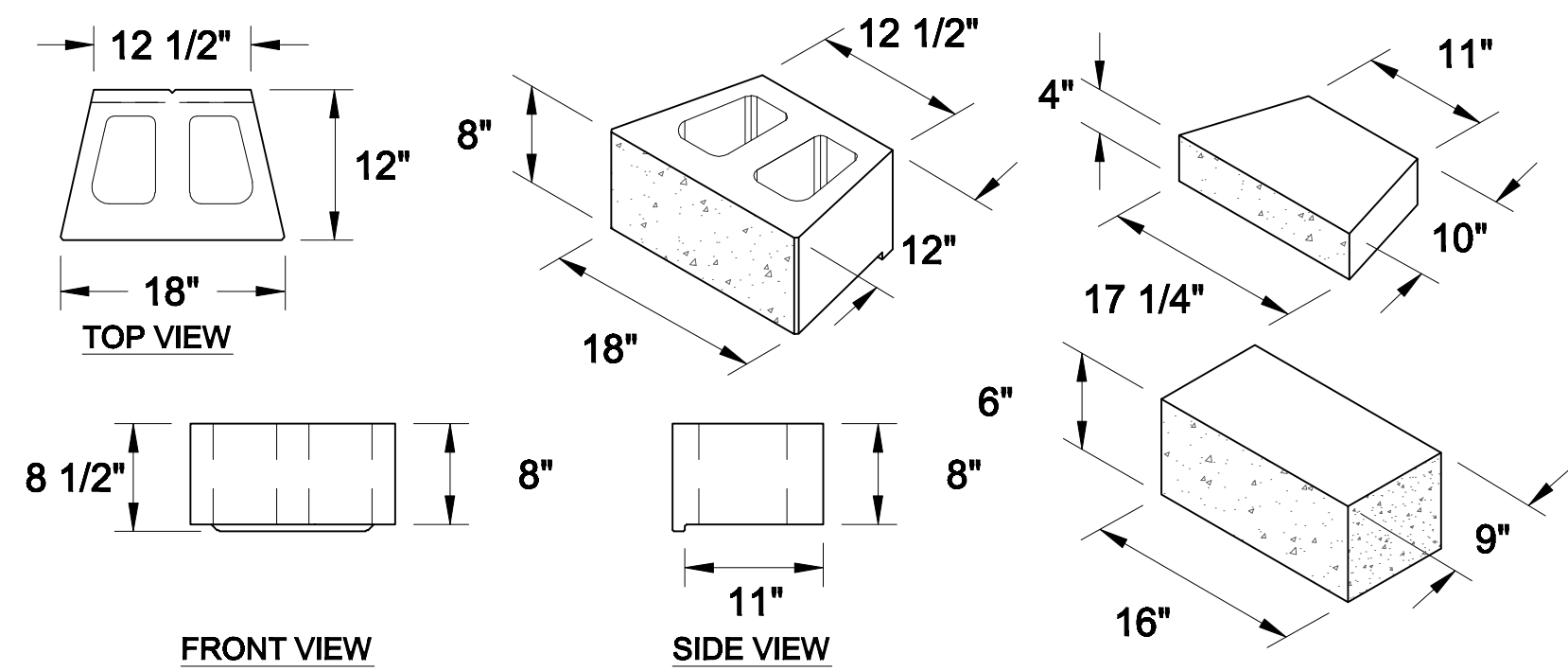
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103 Howatha Court
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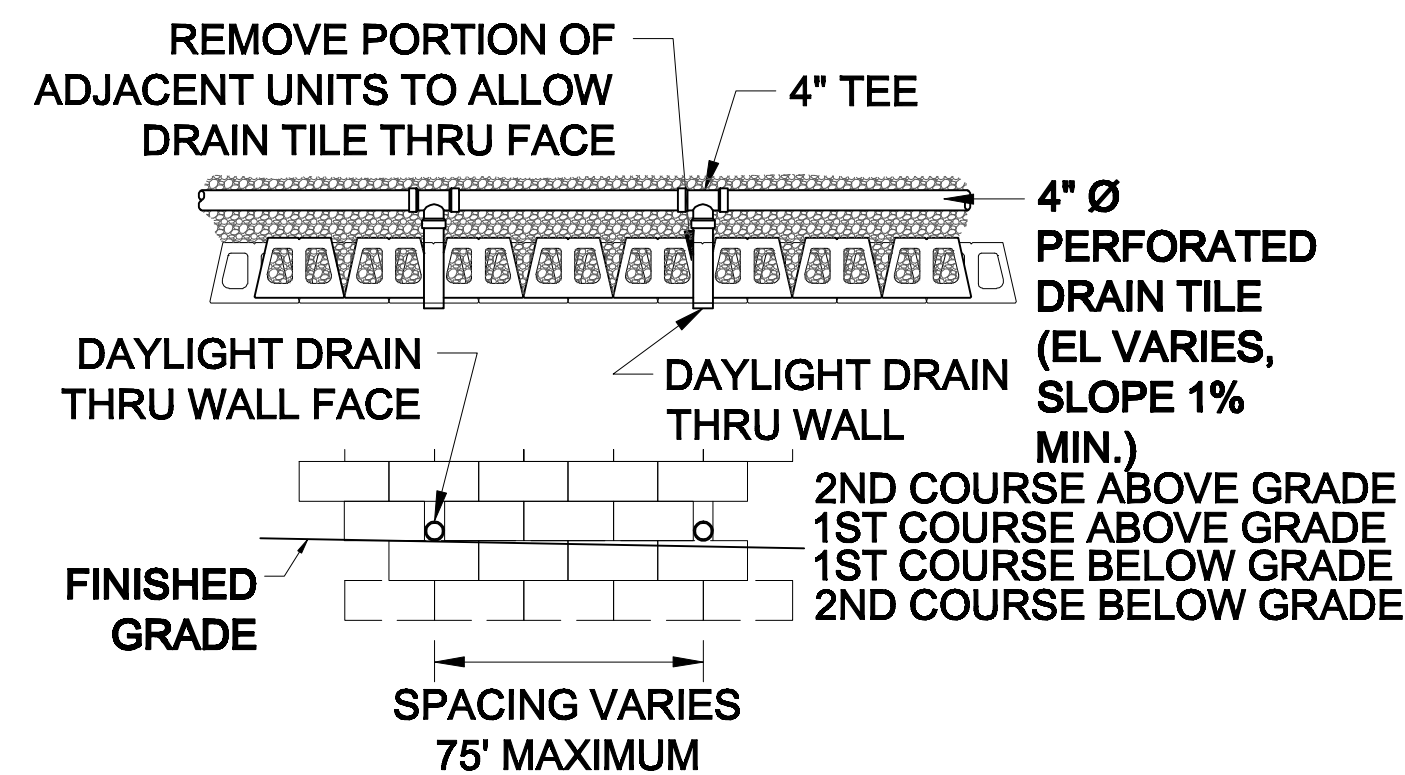
Company #NC-3201

SERENITY AMENITY
HARNETT COUNTY, NC

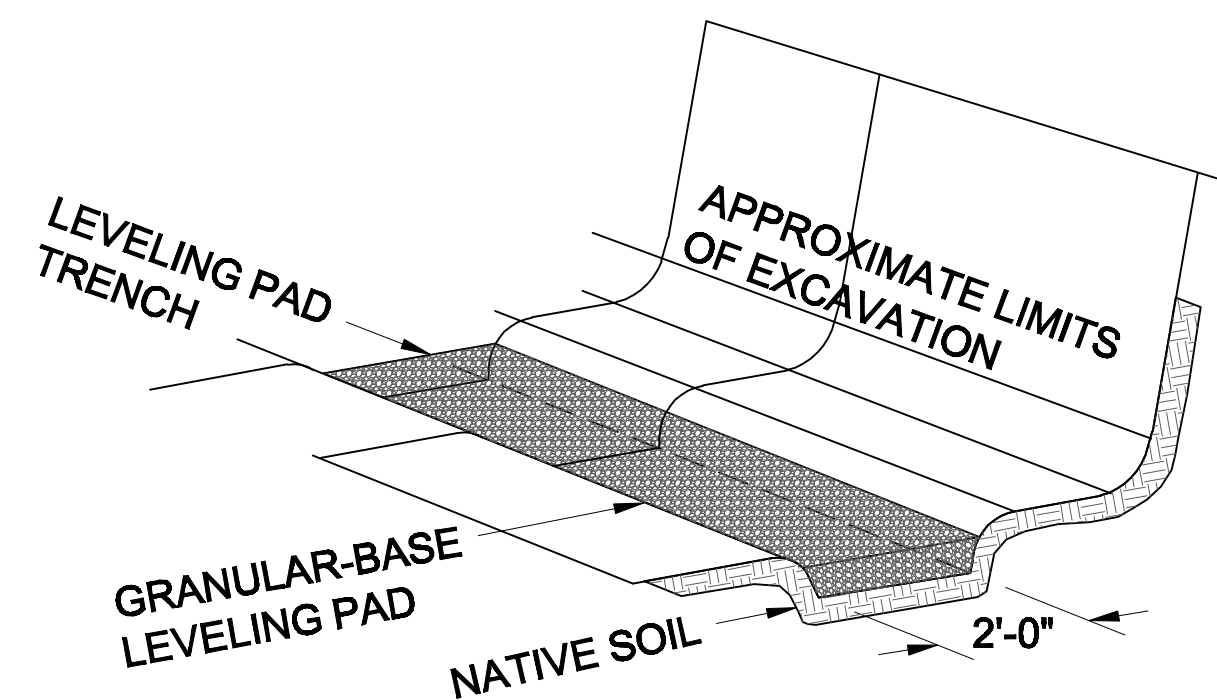
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SHEET 1 OF 3



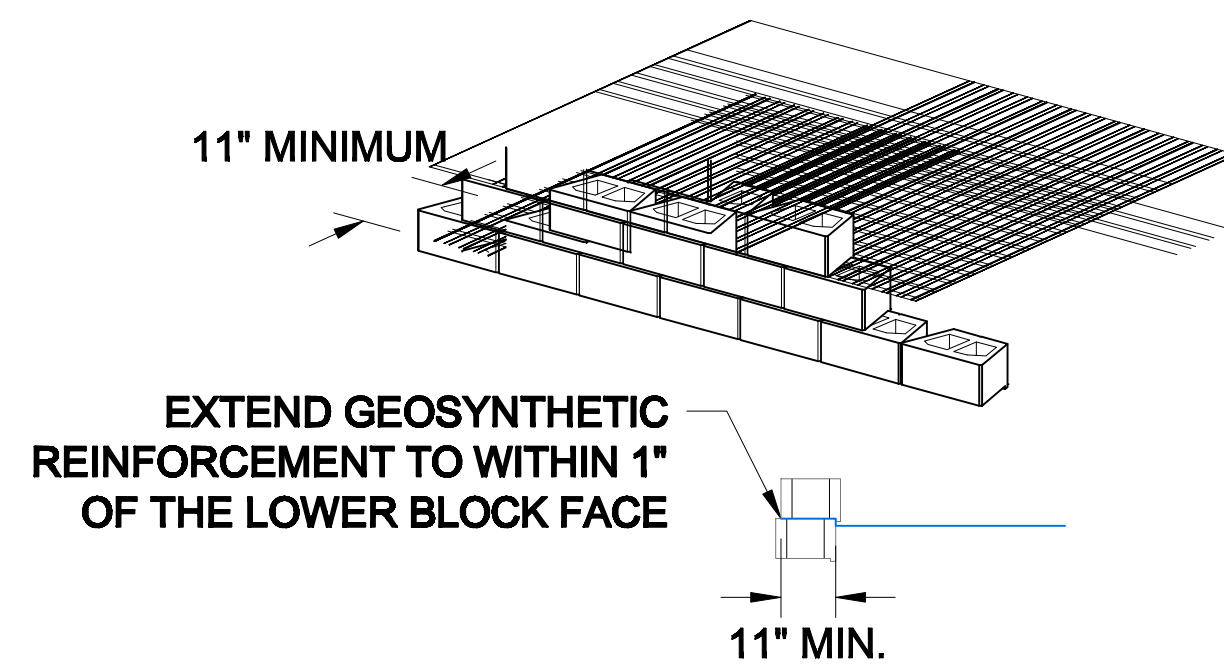
ANCHOR DIAMOND PRO BLOCK DETAILS



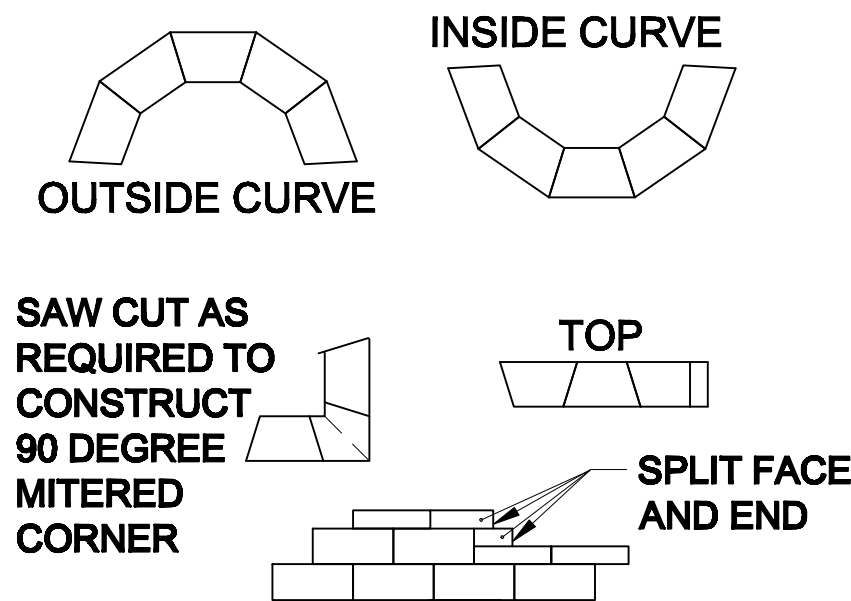
DRAIN PIPE THROUGH WALL FACE



TYPICAL BASE PREPARATION

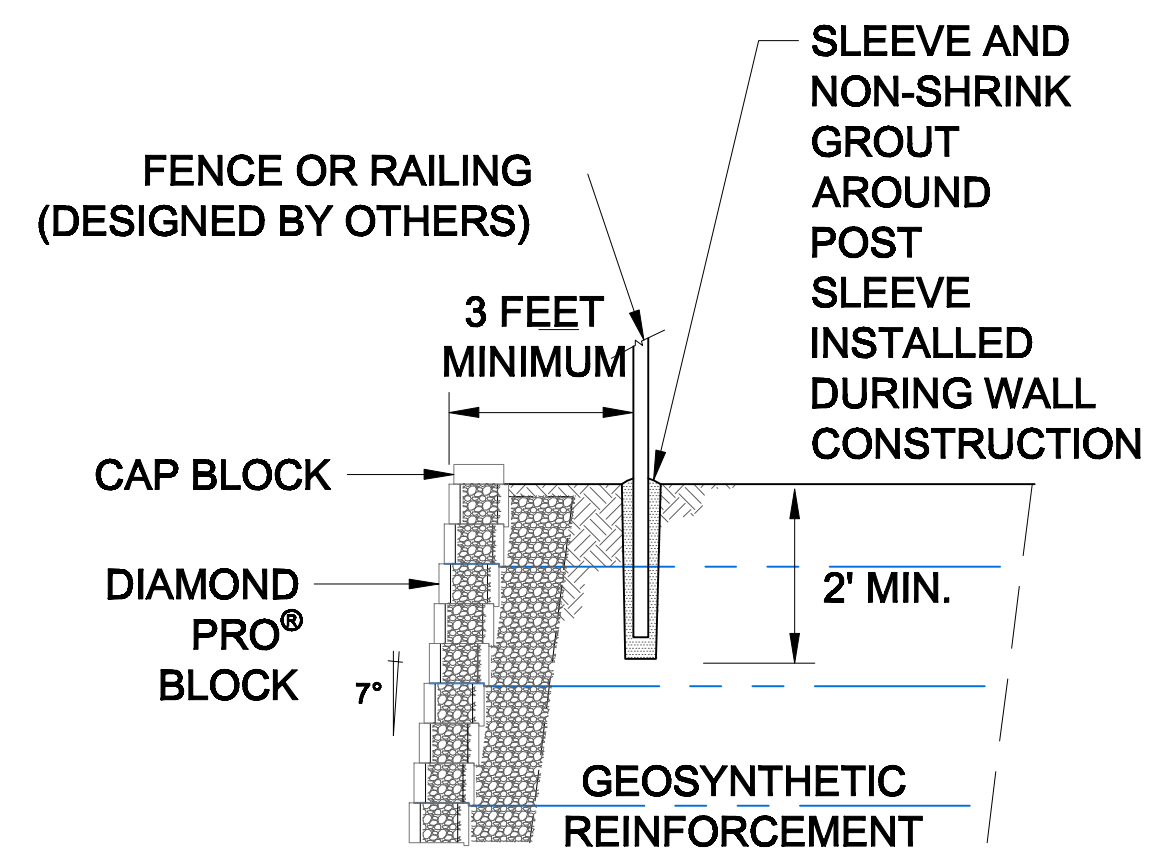


REINFORCEMENT CONNECTION DETAIL

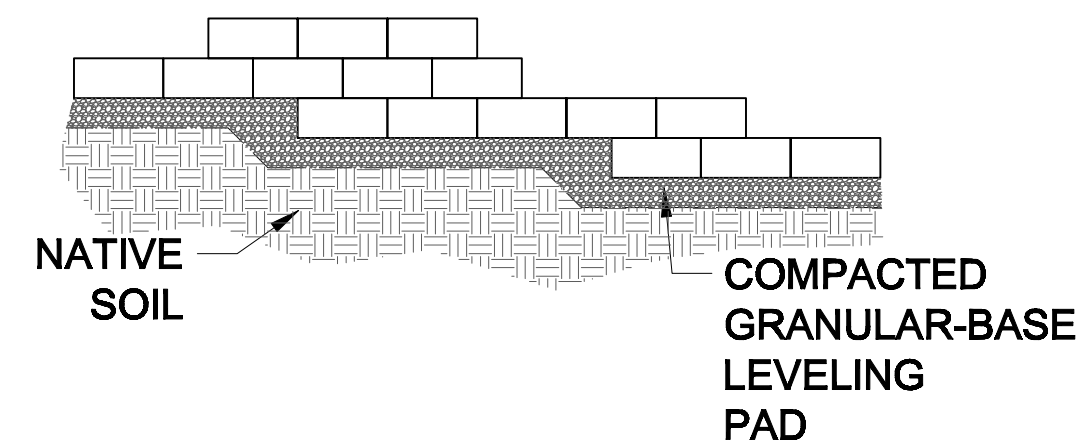


1. ALWAYS START CAPPING WALL FROM THE LOWEST ELEVATION.
2. LAYOUT CAPS PRIOR TO USING ADHESIVE.
3. CUT CAPS TO FIT. VARIOUS COMBINATIONS OF LONG AND SHORT CAP FACES WILL BE NECESSARY FOR RADII GREATER THAN THE MINIMUM.
4. ALTERNATE SHORT AND LONG CAP FACES EVERY OTHER CAP TO ACHIEVE A STRAIGHT ROW OF CAPS.
5. USE EXTERIOR-GRADE CONSTRUCTION ADHESIVE TO SECURE CAPS.

CAPPING DETAILS



TYPICAL FENCE CROSS SECTION

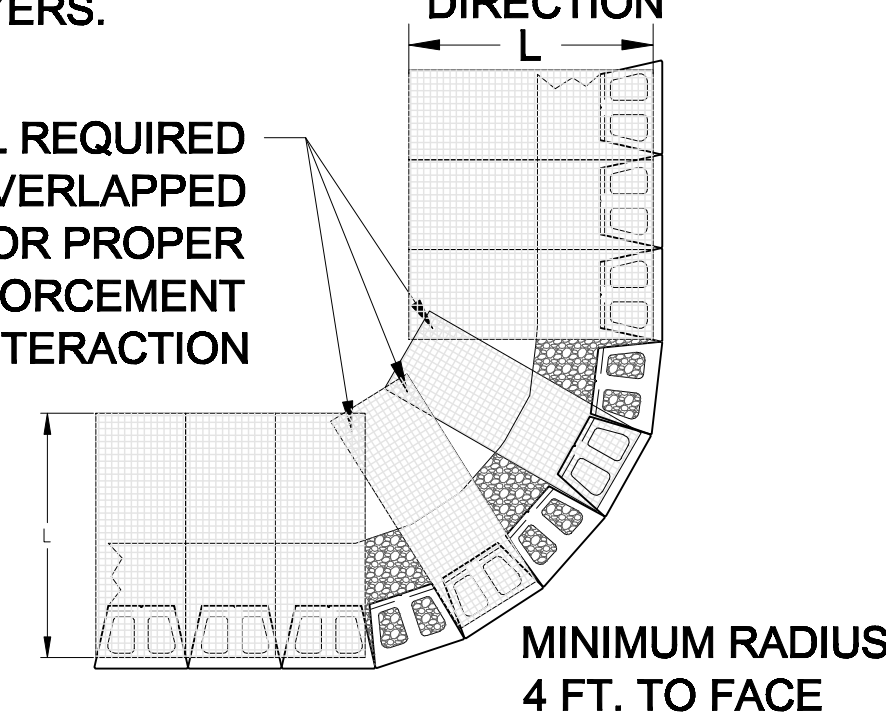


TYPICAL BASE STEP-UP

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

2"-3" OF SOIL FILL REQUIRED BETWEEN OVERLAPPED REINFORCEMENT FOR PROPER SOIL AND REINFORCEMENT INTERACTION

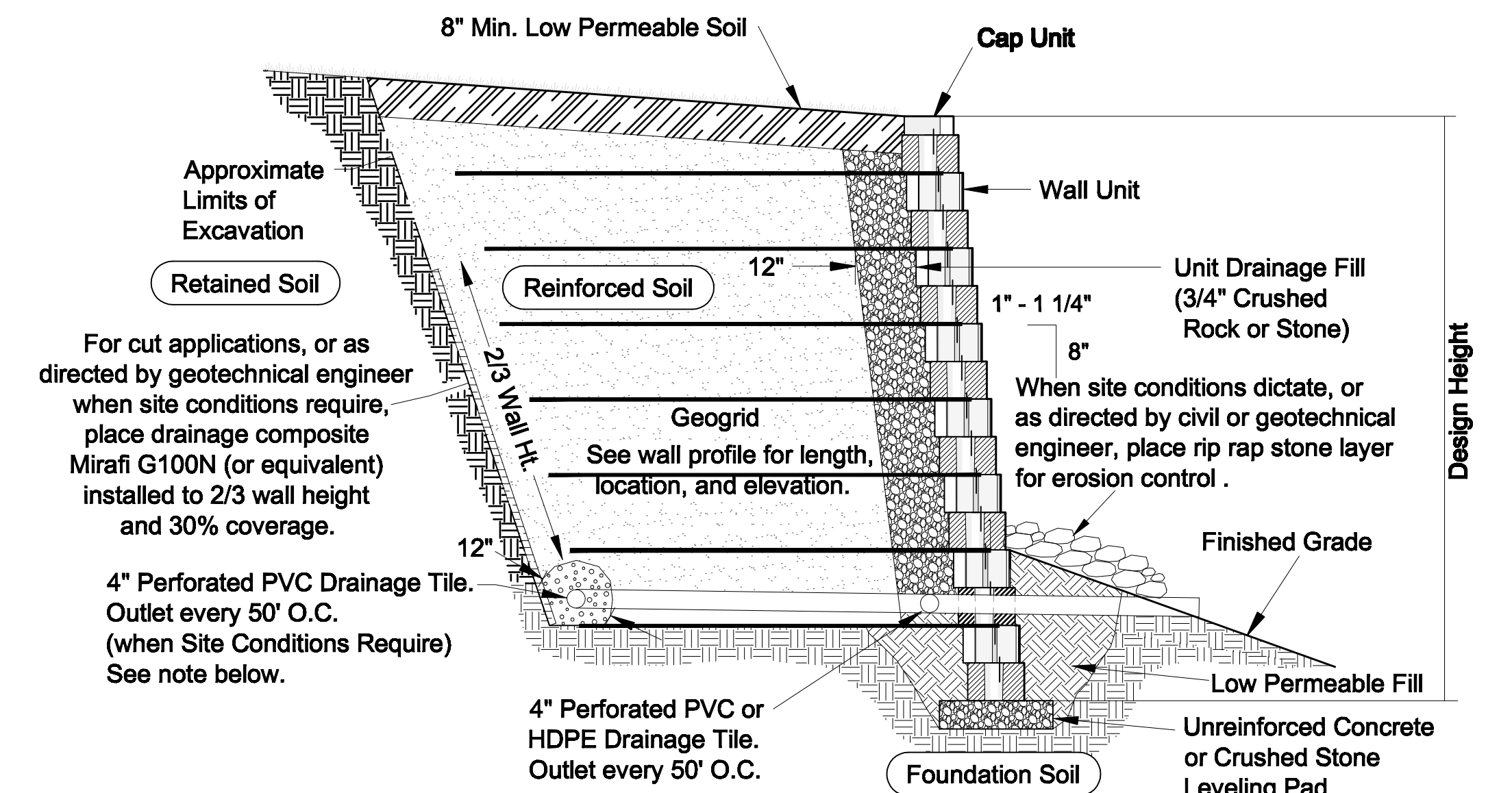
PRINCIPLE REINFORCEMENT DIRECTION



STEP 2: LAY THE NEXT COURSE OF BLOCK. MAKE A MARK ON THE BACK OF THE BLOCKS IN THE AREAS THAT ARE NOT REINFORCED. BACKFILL AND COMPACT THAT COURSE.

STEP 3: PLACE REINFORCEMENT IN THE AREAS WHERE THE MARKS SHOW GAPS IN THE LOWER REINFORCEMENT PATTERN. CONTINUE NORMAL WALL CONSTRUCTION, REPEATING THESE STEPS AS NEEDED.

OUTSIDE CURVES



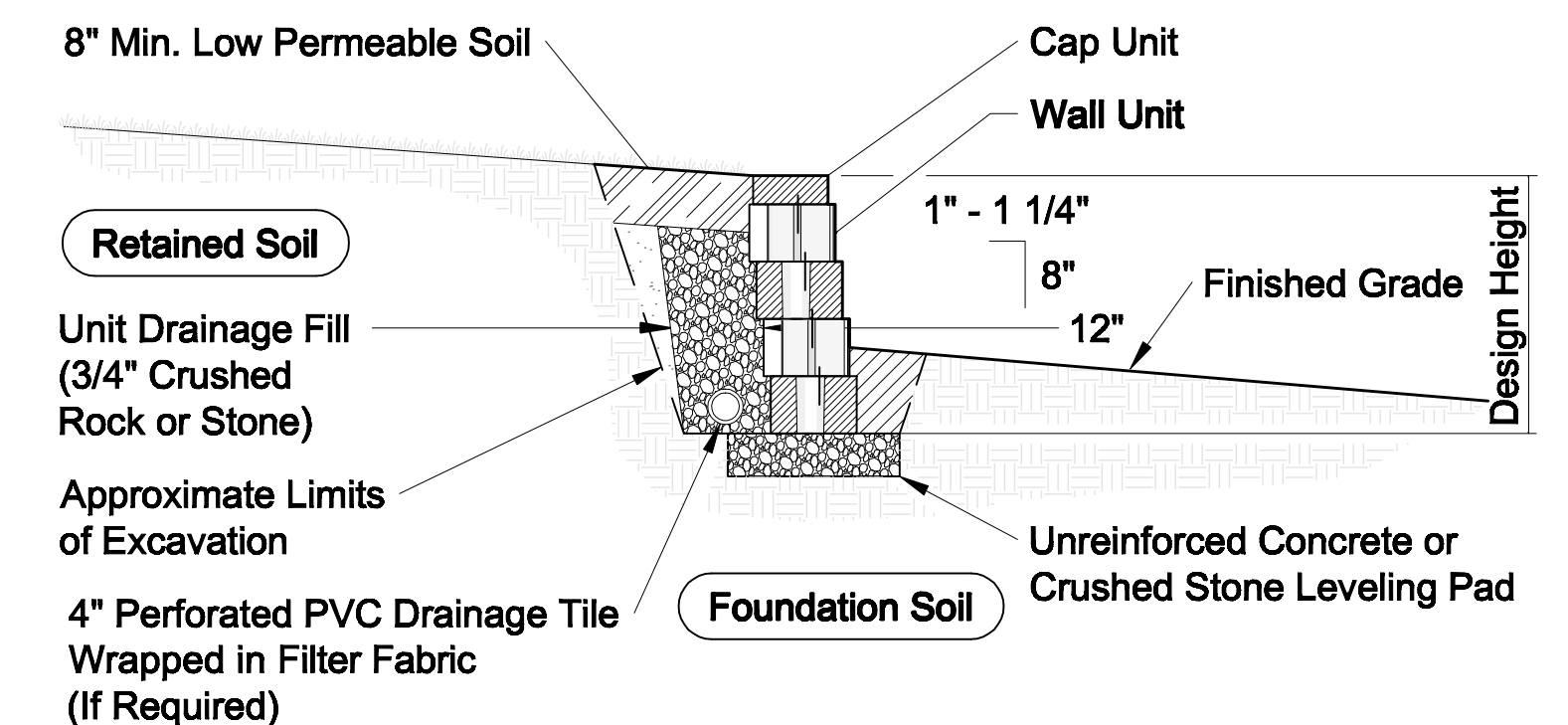
Note:

As directed by engineer when site conditions require, wrap drainage tile in #57 or #67 washed stone and nonwoven filter fabric and place with drainage composite or aggregate back drain system.

Note:

SOIL BEARING CAPACITY OF 3,000 PSF IS ASSUMED

TYPICAL REINFORCED CROSS SECTION



TYPICAL GRAVITY CROSS SECTION

RETAINING WALL DETAILS

NO SCALE THIS SHEET

NO.	REVISIONS	

TM Engineering, Inc. 103 Hiawatha Court CARY, NC 27513 (919) 468-2545 Company #NC-3201	
SERENITY AMENITY HARNETT COUNTY, NC	
DATE 11-3-25	
SHEET 2 OF 3	

Retaining Wall Specifications:

1.1 General

Modular Block Retaining Wall Systems are designed as a gravity retaining wall utilizing a high density 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 Engineer refer to TM Engineering Inc.

1.2 Backfill Materials

The soil material associated with the retaining wall in the reinforced zone, the retained zone, or the foundation bedding shall have the following properties:

- A) Foundation Soils: Ø=28 degrees, unit weight= 120 lbs./cu.ft (moist weight)
B) Retained Soils: Ø=28 degrees, unit weight= 120 lbs./cu.ft (moist weight)
C) Reinforced Backfill Soils: Ø=30 degrees, unit weight= 100 lbs./cu.ft (moist weight)

- D) Unit fill shall consist of clean 1” minus crushed stone or crushed gravel meeting the following gradation:
- | sieve size | %passing |
|------------|----------|
| 2” | 100 |
| ¾” | 75–100 |
| No. 4 | 0–10 |
| No. 50 | 0–5 |

- E) Reinforced backfill soils shall be free of debris or organic material meeting the following gradation:
- | sieve size | %passing |
|------------|----------|
| 2” | 100 |
| ¾” | 75–100 |
| No. 40 | 0–10 |
| No. 200 | 0–30 |

- F) The soil characteristics above were assumed for this design and should be verified to be as or equivalent by the geotechnical engineer for the project. If this information does not represent the actual soil to be used, the Engineer shall be notified immediately, the new soil parameters shall be submitted to the Engineer, and the wall will be reviewed for potential revision. Design revisions will be performed for an additional expense. Global stability analysis if required is the responsibility of the site geotechnical engineer.
G) The maximum aggregate size shall be limited to 2” unless field tests have been performed to evaluate potential strength reduction to installation.
H) Material can be excavated material when the above requirements are met. Unsuitable soils for backfill (high plastic clays or organic materials) shall not be used in the reinforced soil mass. If on site materials consisting of predominately silts and clays are used, some internal movements will occur increasing the potential for failure.
I) Contractor shall submit reinforced fill sample and test results to the engineer for approval prior to construction.

1.3 Foundation Loads

The maximum applied foundation load for this wall is 2,000 PSF.

1.4 Concrete Masonry Wall Units

Concrete Wall Units shall be manufactured in accordance with ASTM–C90 and ASTM C140 and shall have a minimum 28 day compressive strength of 3000 psi.

1.5 Geogrid Reinforcement

The geogrid reinforcing material shall be a high density polyester manufactured by Tencate and shall meet the specification requirements published by Tencate for:

Miragrid 3XT

1.6 Wall Batter

Batter for the entire wall shall be maintained at 6 degrees minimum.

2.0 Foundation Requirements

The foundation bearing capacity that was assumed for design shall be verified in the field, and copies of the test data filed with the Engineer. The footing shall be cleared of loose soil. A minimum of 12” of washed stone shall be placed at the back of each block as indicated on the details.

2.1 Leveling Pad

Material shall consist of compacted sand, gravel, crushed rock, or unreinforced concrete. The pad shall be 6” thick when concrete and 8” thick otherwise. Sand or gravel material shall be compacted to 95% Standard Proctor and at ±3% materials optimum moisture content. Aggregate material shall receive a minimum of one pass of the compaction equipment. The top of the leveling pad shall typically be maintained at a minimum depth of 8”. Refer to Engineer’s design plans for leveling pad depth, for minimum depth may increase due to site conditions.

2.2 Unit Fill

The void within each unit shall be filled with a washed stone having 100% of the aggregate passing the 1.5” sieve. A minimum of 3/8” washed stone size is required. (No more than 5% passing the #200 sieve.) Place this material behind the block as well. All excess shall be swept clean from the top of the block prior to installing the next course. Each course of block shall be completely filled before proceeding to the next course.

2.3 First Block Course

The first course of block shall be placed on top of and in full contact with the leveling pad. The units shall maintain a distance of a minimum 6” from the front and back of the leveling pad. Proper alignment may be achieved with the aid of a string line. Place stone below the first block and the leveling pad and level the block in both directions. After placing stone in each of the appropriate holes 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.

2.4 Caps

Apply a construction adhesive to the cap units to prevent their removal.

3.0 Geogrid Installation

The geogrid reinforcement shall be laid horizontally on compacted backfill and installed to the face of the block. Geogrid shall be pulled taut removing all slack from the material and anchored by suitable contractor determined methods before adding fill. Geogrid shall be installed at the elevations and lengths required as shown on the plans. (Refer to details for the appropriate orientation.) Soil surface shall be smooth and level and have been compacted to 95% Standard Proctor before installing the grid.

3.1 Fill Placement

Backfill material shall be placed on a maximum 8” lift compacted to 95% Standard Proctor and ±3% of the materials optimum moisture content. Only hand operated equipment shall be allowed within 3 feet of the concrete block units. Backfill should be placed from the wall rearward to insure tautness of the geogrid. Construction equipment shall not be operated directly on the geogrid.

3.2 Unsuitable Materials

Soils containing roots, brush, sod or other organic material shall not be allowed. Frozen soils, snow, ice, heavy clays, or wet soils shall not be allowed. Material passing the #40 sieve shall not have a liquid limit of greater than 30 and a plastic limit of greater than 15, unless written consent is obtained from the Engineer prior to placement.

4.0 Soil Testing

Compaction testing shall be performed for every lift. Tests shall be performed for every 100 linear feet of wall face. Compaction tests as well as a verified friction angle shall be filed with the Engineers’ office.

5.0 Hydrostatic Pressure Potential

The Engineer shall be notified if any of the following should become evident:
–water or wetness from or in a cut bank
–local springs, local storm drains, sewers, water lines under or behind the wall

6.0 Acceptable Block

Concrete block units shall be used and 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.

7.0 Acceptable Geogrid

The Contractor shall inspect all geogrid delivered to the site to ensure it is undamaged. If significant damage occurs during construction it shall be replaced at the Contractors expense.

8.0 Drainage Composite – (Applies to cut wall applications only)

For cut wall applications, Drainage composite shall be installed to cover 30% of the cut surface behind the geogrid layers. Drainage composite shall be installed on 15 ft. centers and 2/3 the wall height.

9.0 Special Provisions

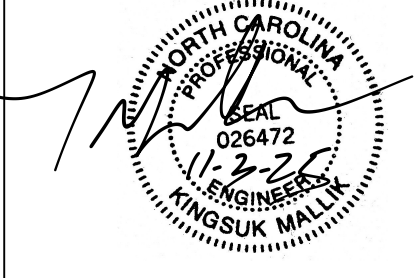
- A) General or Site contractor shall coordinate geogrid and wall installation with paving installation as well as grading operations.
B) Maintain the direction of drainage away from the wall face at all times during construction of the wall and finish grading as shown on plans.
C) Placement of geogrid shall be as per plans reference to length and elevations.
D) The Engineer shall be notified by the installing contractor should the embedment depth vary from that indicated on the wall profiles.

10.0 Qualification of Design









- A) Stability of any temporary slopes required by the installation of a segmental retaining wall shall be addressed by a qualified Geotechnical Engineer. The slopes shall meet all OSHA standards of maximum slope steepness.
B) Handrail/guardrail requirements shall be determined by the Architect or General Contractor.

General Retaining Wall Design Notes:

- A. Wall profiles were designed by TM Engineering Inc. per existing and proposed grades shown on plans provided. All grades shall be field verified prior to construction. Notify TM Engineering Inc. prior to modifying design if topography does not match conditions outlined in the retaining wall profile.
- B. Construction verification of the wall installation by an engineer is required by most local municipalities, and must be provided by a knowledgeable geotechnical engineer. The owner shall be required to engage inspection and testing services, including independent testing laboratories, to provide quality assurance and testing services on a full time basis throughout the construction of retaining walls. Testing and inspection services shall only be performed by qualified and experienced technicians. As a minimum, quality assurance testing should include foundation soil inspection, soil and backfill testing, verification of design parameters, and observation of construction for general compliance with design drawings and specifications.
- C. Soil installed in slopes both above and below the reinforced structure shall be compacted to minimum 95% density as determined by the standard proctor test (ASTM D–698).
- D. Prior to retaining wall construction, all building footings/elevations behind and/or abutting up to the retaining wall need confirmed by project architect and structural engineer, to ensure that no dead loading from a building affects the proposed retaining wall. The retaining wall design does not take into any account any structural loading from a building.
- E. Identification of all utilities shall be the responsibility of the contractor prior to any construction. Any conflicts shall be reported to the Engineer of record prior to construction.
- F. Excavation through the geosynthetic reinforcement for the purpose of planting trees or installation of utilities or fencing should not occur without approval by the Engineer of record.
- G. Waterlines including irrigation systems must be water tight within 100 feet of the reinforced zone. Leakage behind a retaining wall will increase the horizontal pressure against the wall leading to wall failure. For this reason, subsurface waterlines and irrigation systems should not be installed above the reinforced zones of the retaining wall, or within 5 feet behind the reinforced zones.
- H. All construction activity shall conform to the minimum requirements per O.S.H.A. standards.
- I. This design is based upon specific properties of materials which are proprietary. Any substitution of the specified products or change in structure geometry will invalidate this design. This drawing is being furnished for use on the specific project only. Any party accepting this document does so in confidence and agrees that it shall not be duplicated, in whole or in part, nor disclosed to others without the consent of TM Engineering, Inc. This drawing, design notes, and associated calculations have been prepared by TM Engineering, Inc. from information provided by others.
- J. Discovery of subsurface groundwater shall be reported immediately to the Project Geotechnical Engineer and TM Engineering, Inc. for additional drainage consideration.
- K. Storm drain systems are prone to leaking. Therefore, if a joint in a storm water pipe is located within 100 feet of the retaining wall the storm water pipe must be water tight.
- L. Construction activities, which occur on the site after completion of a retaining wall, should be monitored by the owner’s representative to insure that they do not result in excavation through Geosynthetic reinforcement or in the vicinity of the wall foundation. Heavy construction equipment should not be permitted or operate within 3.0 feet behind a wall face.
- M. Prior to retaining wall construction, wall construction plans shall be reviewed by project civil engineer or architect with respect to final location of the entire structure (top and bottom of structure) as a result of proposed structure batter and its effect on overall site feasibility. Possible encroachment of final earth structure location in relation to property lines, easements, buffers, utilities, and sensitive structures, shall be reviewed for possible negative impact on site feasibility.
- N. Final earth structure location in relation to property lines, watershed easements, utility easements or any other type of easement or buffer are the responsibility of the owner or the site Civil Engineer. TM Engineering, Inc. assumes no liability for the final location of the earth structure. Survey control must be performed using the civil site designer’s location information and account for all structure face batter. Deviation from the civil site design layout must be reported to and approved by the civil engineer prior to the earth structure’s construction.
- O. All roof drains and road drain outlets must be piped to storm drain system. Roof drains shall not be emptied into dry wells or pop up dissipaters within 20 ft. of the reinforced zone. Both permanent and temporary grading should be performed to prevent channelized stormwater runoff from being directed over retaining wall.
- P. Walls that incorporate outside bends and radii include stresses that are trying to move in different directions in those locations. This creates increased stresses that can result in unit cracking or gapping in these areas. Use of high quality granular backfill that meets the previous outlined specifications will greatly reduce (although not eliminate) the potential for unit cracking and/or gapping. If the wall has been constructed per specifications minor unit cracking and gapping is not an indication of structural instability.
- Q. Per UDO Sec 7.2.8.D.Retaining walls that are located within 30 feet of a public sidewalk shall be required to adhere to the following:
a. A retaining wall may not exceed a continuous, uninterrupted height of 15 feet. Additional height may be permitted, provided the wall contains a 2–foot step back for each 15 feet of wall height. This regulation shall not apply to walls associated with culverts or stream crossings or to transportation improvements, such as bridge overpass structures for street or railroads.

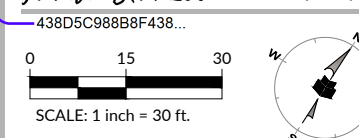
	NO.	REVISIONS	<div><div>TM Engineering, Inc.</div><div>103 Hawatha Court CARY, NC 27513 (919) 468-2545</div><div>Company #NC–3201</div></div> <div>SERENITY AMENITY HARNETT COUNTY, NC</div> <table><tr><td>DATE</td><td>11–3–25</td><td></td></tr><tr><td>SHEET</td><td>3</td><td>OF 3</td></tr></table>	DATE	11–3–25		SHEET	3	OF 3
	DATE	11–3–25							
	SHEET	3		OF 3					



SYMBOL	DESCRIPTION
	EXISTING MAJOR CONTOUR
	EXISTING MINOR CONTOUR
	PROPOSED MAJOR CONTOUR
	PROPOSED MINOR CONTOUR
	STORM PIPE
	CATCH BASIN (CB)
	JUNCTION BOX (JB)
	YARD INLET (YI)/DROPPED INLET (DI)



Signed by: David Starkel 5/27/2025



INITIAL PLAN DATE: 05/23/2025
REVISIONS:

WR JOB NUMBER	23-1177
DRN: WR	DGN: WR CKD: WR

RETAINING WALL LABELS

C4.02



1.0 PAVEMENTS, CURBS, CURB RAMPS

- | | |
|------|---------------------------|
| 1.0 | HD CONCRETE |
| 1.1 | LD CONCRETE TYPE 1 |
| 1.2 | LD CONCRETE TYPE 2 |
| 1.3 | HD ASPHALT PAVEMENT |
| 1.4 | CHAPEL HILL GRIT |
| 1.5 | LD CONCRETE PAVER TYPE 1 |
| 1.6 | LD CONCRETE PAVER TYPE 2 |
| 1.7 | HD CONCRETE PAVER TYPE 1 |
| 1.8 | HD CONCRETE PAVER TYPE 2 |
| 1.9 | SYNTHETIC TURF TYPE 1 |
| 1.10 | SYNTHETIC TURF TYPE 2 |
| 1.11 | CONCRETE CURB & GUTTER |
| 1.12 | CONCRETE FLUSH CURB |
| 1.13 | CONCRETE CURB RAMP TYPE 1 |
| 1.14 | CONCRETE CURB RAMP TYPE 2 |

- ## 2.0 JOINTING

- 2.0 CONTROL JOINT
- 2.1 EXPANSION JOINT

3.0 STEPS / RAMPS

- 3.0 STAIRS TYPE 1 (CONCRETE)
- 3.1 STAIRS TYPE 2 (PAVER)
- 3.2 CONCRETE ACCESSIBLE RAMP

4.0 SITE WALLS / EMBANKMENTS

- 4.2 STONE VENEER RETAINING WALL
- 4.4 SEGMENTAL BLOCK WALL

5.0 RAILINGS, BARRIERS, FENCING / GATES

- 5.0 HANDRAIL
- 5.1 BLACK ALUM. POOL FENCING
- 5.2 48" CHAIN LINK FENCING
- 5.3 42" BLACK CHAIN LINK FENCING
- 5.4 GATE
- 5.5 CONCRETE FILLED BOLLARD
- 5.6 DECORATIVE BOLLARD

6.0 SITE FURNISHINGS

- 6.0 BENCH
- 6.1 WASTE RECEPT
- 6.2 BIKE RACK
- 6.3 POOL LOUNGE C

7.0 SITE LIGHTING

- 7.0 VEHICULAR AREA LIGHT POLE
- 7.1 PED. LIGHT POLE TYPE 1

8.0 DRAINAGE

- ## 8.0 TRENCH DRAIN

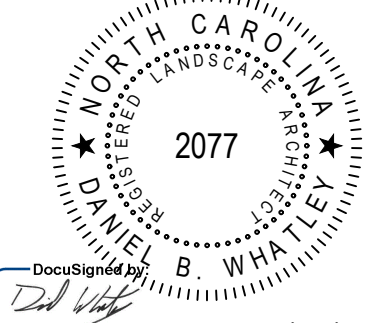
CONSTRUCTION PLANS

CONSTRUCTION PLANS

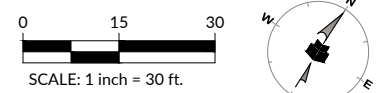
TRI POINTE HOMES

SERENITY AMENITY

STREAMSIDE TERRACE | HARNETT COUNTY, NORTH CAROLINA



5/27/2025



INITIAL PLAN DATE: 05/23/2025
REVISIONS:

WR JOB NUMBER	23-117
DRN: WR	DGN: WR CKD: WR

SITE PLAN

C2.00



EST. 1983

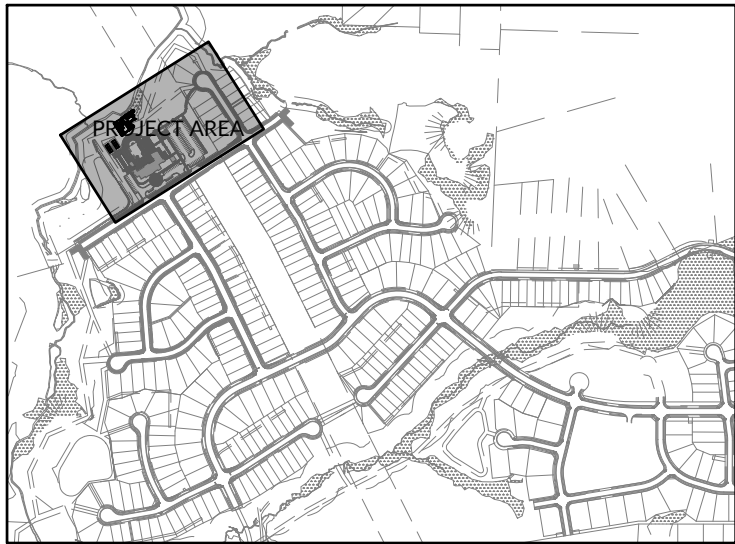
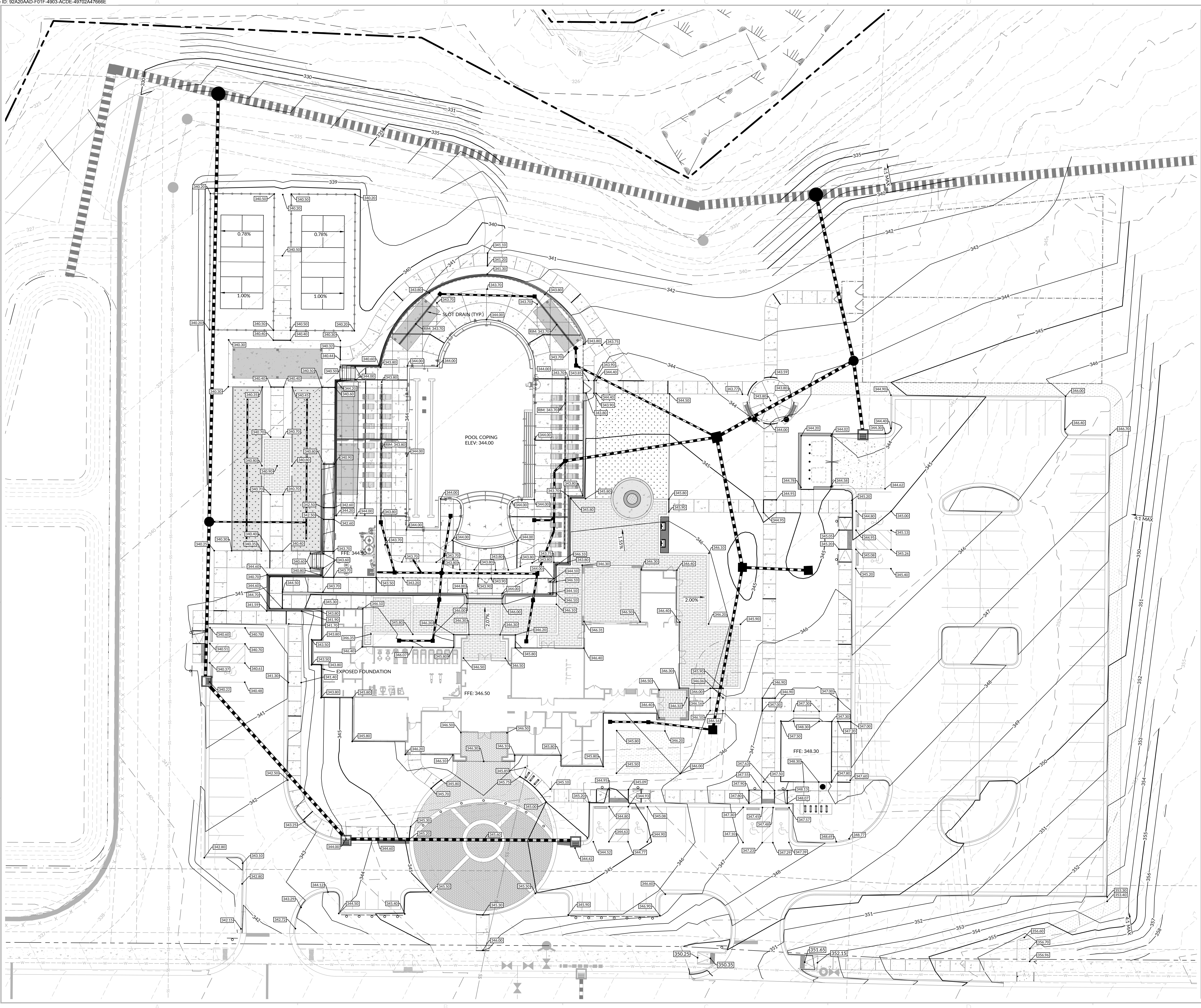
Tri Pointe Homes
440 Wade Park Blvd Suite 400

Raleigh, NC 27607

Raleigh, NC 27607

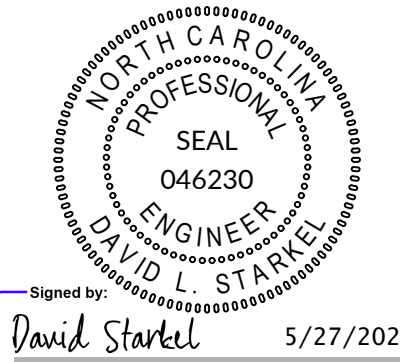
our people • your success

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GRADING AND DRAINAGE LEGEND	
SYMBOL	DESCRIPTION
	EXISTING MAJOR CONTOUR
	EXISTING MINOR CONTOUR
	PROPOSED MAJOR CONTOUR
	PROPOSED MINOR CONTOUR
	STORM PIPE
	CATCH BASIN (CB)
	JUNCTION BOX (JB)
	YARD INLET (YI)/DROP INLET (DI)

CONSTRUCTION PLANS
**TRI POINTE HOMES
SERENITY AMENITY**
STREAMSIDE TERRACE | HARNETT COUNTY, NORTH CAROLINA



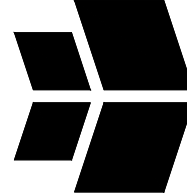
INITIAL PLAN DATE: 05/23/2025
REVISIONS:

WR JOB NUMBER 23-1177
DRN: WR DGN: WR CKD: WR

GRADING PLAN

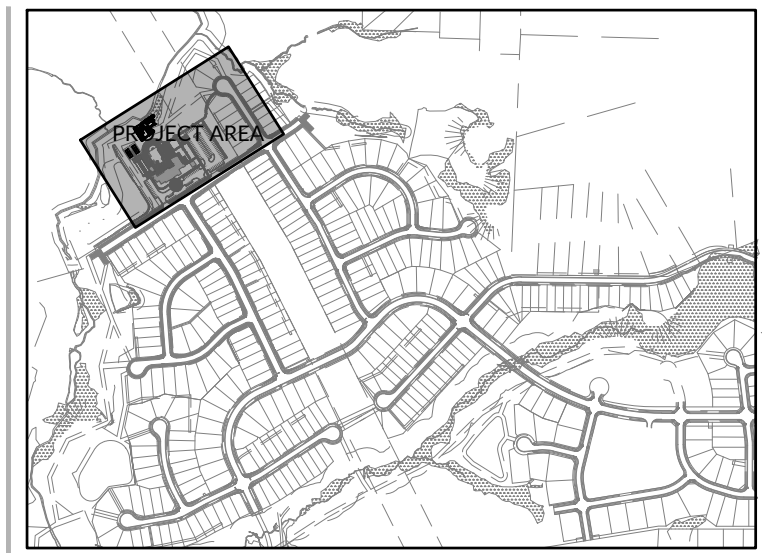
C4.00









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Tri Pointe Homes
5440 Wade Park Blvd Suite 400
Raleigh, NC 27607

our people • your success



GRADING AND DRAINAGE LEGEND	
SYMBOL	DESCRIPTION
	EXISTING MAJOR CONTOUR
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