WORLDWIDE WWE INC ENGINEERING

SEGMENTAL RETAINING WALLS

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NORTH CAROLINA PROFESSIONAL SEAL 19258 ENGINEER MICHAEL KISER

Michael Kiser 5/22/2024

NO.	REVISIONS	DRN	DATE	CHK	DATE
	DESIGNER: MICHAEL KISER PE				

COVER

Fairway Pointe at Anderson Creek
RETAINING WALLS
Harnett County, NC

DESIGN MLK 5/22/24
DRAW PJR 5/22/24
SCALE

SEGMENTAL RETAINING WALL

LEGEND

- TEMPORARY DISSIPATOR PAD
- TD — TEMPORARY DIVERSION DITCH
- TEMPORARY INLET PROTECTION
- LIMITS OF DISTURBANCE
- x — x — TEMPORARY SILT FENCE
- SKIMMER BASIN DRAINAGE AREA

SKIMMER BASINS	TOP WIDTH	TOP LENGTH	BASIN DEPTH	BASIN CAPACITY (CF)	ORIFICE DIA. (IN)	WEIR WIDTH
SKB-1	40'	80'	1.50'	4104	1.4"	10'

TD #	BOTTOM WIDTH	LINING HEIGHT (MIN.)	Q10 (CFS)	LINING TYPE
1	1 FT.	3 FT.	5.24	DOUBLE STRAW NET
2	1 FT.	3 FT.	4.54	DOUBLE STRAW NET

TEMPORARY DIVERSION DITCH

SEVEN DAY GROUND COVER REQUIRED.

THE CONTRACTOR SHALL INSTALL THE REQUIRED LINING MATERIAL ON THE TEMPORARY DIVERSION SWALES WITHIN SEVEN DAYS OF FIRST DISTURBANCE.

STREAM DATA:

SOUTH PRONG ANDERSON CREEK 18-23-32-2
STREAM CLASS: C
RIVER BASIN: CAPE FEAR
SITE IS NOT IN A FEMA FLOOD PLAIN PER PANEL MAP NO. 3720050400J – DATE: 10/3/2006

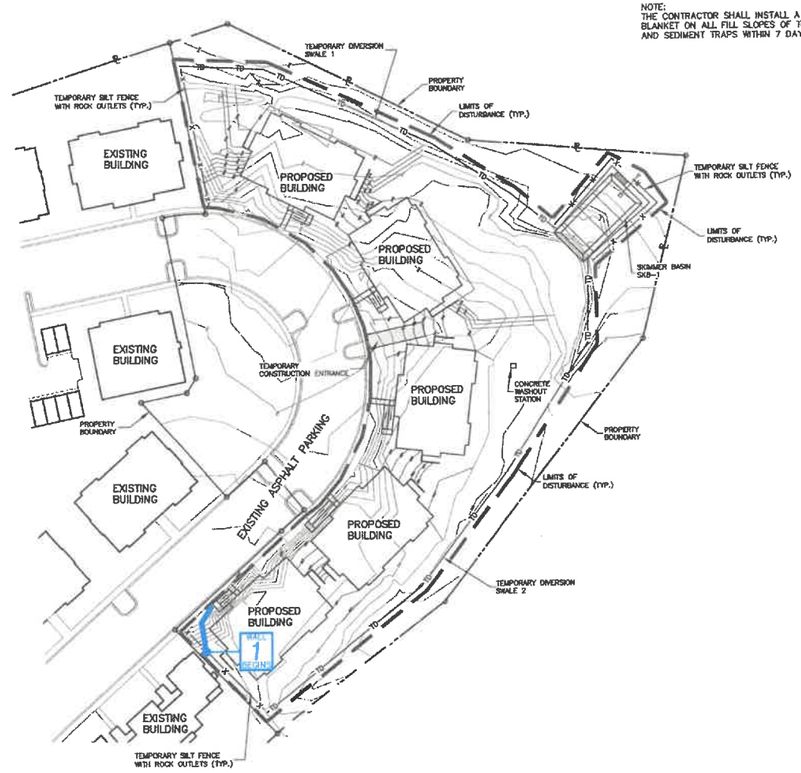
DISTURBED AREA = 2.06 ACRES

SOIL DATA

TAKE FROM NATIONAL COOPERATIVE SOIL SURVEY
SOIL CLASSIFICATION:
BnB BLANEY LOAMY SAND, 2 TO 8%
CaB CANDOR SAND, 0 TO 8%

NOTE:
THE CONTRACTOR SHALL INSTALL A DOUBLE STRAW NET BLANKET ON ALL FILL SLOPES OF THE SKIMMER BASINS AND SEDIMENT TRAPS WITHIN 7 DAYS OF CONSTRUCTION.

NC GRID NAD 1983 NORTH



ALL TEMPORARY DIVERSION SWALES REQUIRE LINING MATERIAL BE INSTALLED WITHIN SEVEN DAYS OF FIRST DISTURBANCE.

LIMITS OF DISTURBANCE SHALL BE AS PER THE LIMITS OF DISTURBANCE LINE ON THIS PAGE.

811 Know what's below. Call before you dig. Dial 811

SCALE: 1" = 100'
100' 0 50' 100' 200'

File: P:\D.2230 Anderson Creek Fairway Pointe\DRAWINGS 2022\02-Erosion Control Plan.dwg, Layout: Layout1, By: Lee, Phillip, Tue Jan 17, 2023 at 10:00am, 22X34's Used: 00 SHEET BORDER (1)00 SHEET BORDER.dwg
Data: for Erosion Control (\Data for Erosion Control.dwg)

REVISIONS		
SYM.	DESCRIPTION	DATE

D&L Engineering, PLLC
150 S. Page Street • Southern Pines, NC 28387• (910) 684-8646 • Cert. No. P-2587

NORTH CAROLINA PROFESSIONAL SEAL ENGINEER DAVID T. UPCHURCH 1-17-23

FAIRWAY POINTE
AT ANDERSON CREEK
HARNETT COUNTY, NORTH CAROLINA

EROSION CONTROL PLAN

FINAL DRAWINGS
RELEASED FOR CONSTRUCTION

JANUARY 2023
DATE

EC-1
SHEET NO.

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NOT TO SCALE

NOTES:
- THIS SHEET IS NOT A CERTIFIED DOCUMENT OF WORLDWIDE ENGINEERING GEO. DIV. INC.. GRADING PLAN IS THE PROPERTY OF THE CIVIL ENGINEER OF RECORD AND IS SHOWN FOR REFERENCE TO VIEW WALLS. LOCATE WALLS USING CIVIL ENGINEER'S DOCUMENTS ONLY.
- 2021 IBC CODE REQUIRES SEGMENTAL RETAINING WALLS TO BE CERTIFIED AT THE END OF CONSTRUCTION. THE CERTIFYING FIRM SHALL BE UNDER CONTRACT AND ONSITE AT THE BEGINNING OF CONSTRUCTION.

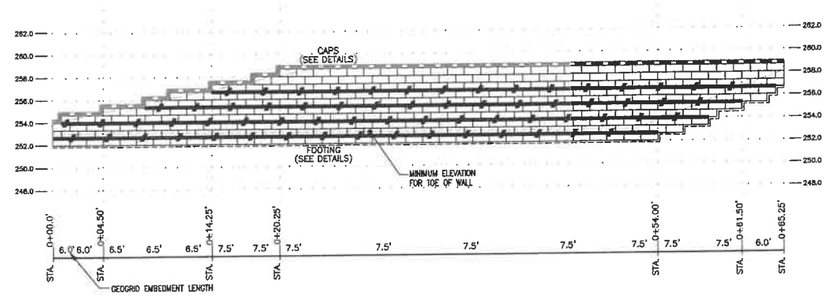
DESIGNER: MICHAEL KISER PE

NO.	REVISIONS	DRN	DATE	CHK	DATE

PLAN VIEW
Fairway Pointe at Anderson Creek
RETAINING WALLS
Harnett County, NC

DESIGN MLK DATE 5/22/24 SP. DATE
DRAW PJR DATE 5/22/24 SP. DATE
SCALE SEGMENTAL RETAINING WALL

WALL PROFILE #1



NOTES:

1. THE REINFORCED BACKFILL SHALL BE A CLEAN SAND AND IS RESTRICTED TO HAVING A MAXIMUM FINE CONTENT OF 50% PASSING THE #200 SIEVE, A MAXIMUM LIQUID LIMIT OF 30 AND A MAXIMUM PI OF 10.
2. THE CLEAN SAND IN THE REINFORCED BACKFILL SHALL BE SEPARATED FROM THE WASHED STONE FILL WITH A 4 OUNCE GEOTEXTILE FABRIC.
3. THE CONTRACTOR WRAP THE LEVELING PAD WITH A 4 OUNCE GEOTEXTILE FABRIC.

LEGEND

MIRAFI 3XT

0 3' 6' 12'
HORIZONTAL SCALE 1" = 6'

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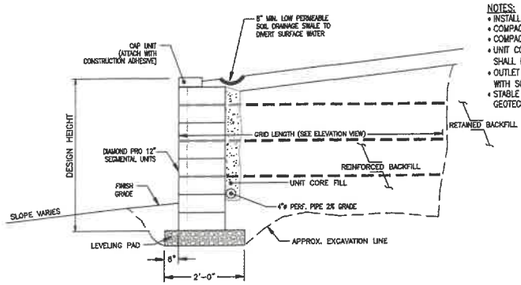
ELEVATION VIEW

Fairway Pointe at Anderson Creek
RETAINING WALLS
Harnett County, NC

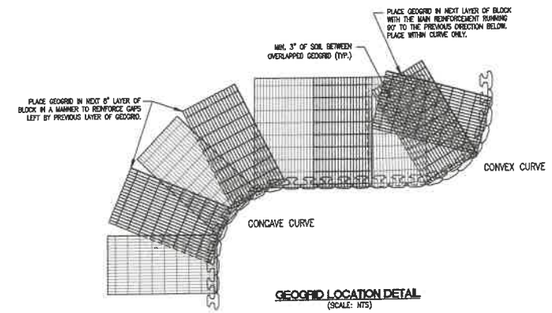
DESIGN MLK 5/22/24 REV.
DRAWN PJR 5/22/24 REV.

SEGMENTAL RETAINING WALL

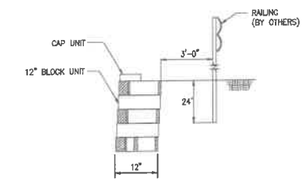


NOTES:
- INSTALL GEOGRID IN TENSION
- COMPACT SOILS TO 95% STANDARD PROCTOR
- COMPACT SOILS IN FRONT OF WALL
- UNIT CORE FILL INSTALLED TO 12" BEHIND UNIT SHALL BE 3/4" MINUS STONE.
- OUTLET DRAIN LINES THROUGH WALL AT 100' O.C. WITH SCHEDULE 40 PVC 4" DIA. PIPE.
- STABLE FOUNDATION SHALL BE APPROVED BY A GEOTECHNICAL ENGINEER.

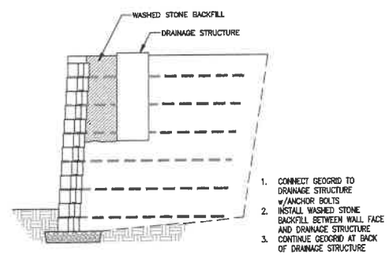
TYPICAL CROSS-SECTION: SEGMENTAL RETAINING WALL
12" DIAMOND PRO UNITS
(SCALE: NTS)



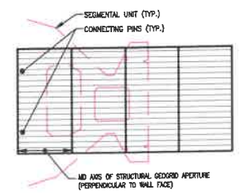
GEOGRID LOCATION DETAIL
(SCALE: NTS)



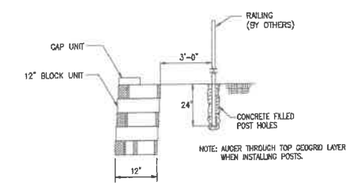
TYPICAL ROADWAY GUARD RAIL LOCATION DETAIL
N.T.S.



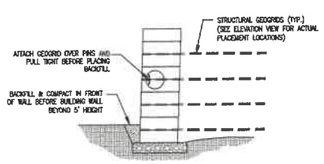
DRAINAGE STRUCTURE DETAIL
(SCALE: NTS)



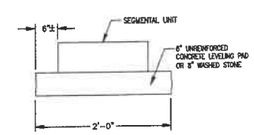
GEOGRID ORIENTATION
(SCALE: NTS)



TYPICAL HANDRAIL LOCATION DETAIL
N.T.S.



GEOGRID ATTACHMENT DETAIL
(SCALE: NTS)



LEVELING PAD DETAIL
(SCALE: NTS)

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Michael Kiser 5/22/24

NO.	REVISIONS	DRN	DATE	CHK	DATE

DESIGNER: MICHAEL KISER PE

DETAILS
Fairway Pointe at Anderson Creek
RETAINING WALLS
Harnett County, NC

DRAWN MLK 5/22/24 APP. ____ DWG ____
DATE PJR 11/22/24 APP. ____ DWG ____

SEGMENTAL RETAINING WALL

Diamond Pro Retaining Walls

1.1 General

Segmental Retaining Wall Systems are designed as a gravity retaining wall utilizing a high tenacity 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 Worldwide Engineering.

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=30°, cohesion=0 psf, unit weight=120 lbs./cu.ft (moist weight)
B) Retained Soils: Ø=30°, cohesion=0 psf, unit weight=120 lbs./cu.ft (moist weight)
C) Reinforced Soils: Ø=30°, cohesion=0 psf, unit weight=120 lbs./cu.ft (moist weight)

The soil characteristics above were assumed based on information supplied to the Engineer. 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 required to be redesigned. Payment for all designs is the responsibility of the Owner and/or General Contractor.

1.3 Foundation Loads

The maximum applied foundation load for this wall is 2 KIPS/sq.ft.

1.4 Concrete Masonry Wall Units

Concrete Wall Units shall be segmental units 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 polyethylene or polyester meeting a minimum Long–Term Design Strength (LTDS) published by the manufacturer of:

MIRAFI 3XT

1.6 Wall Batter

Batter for the entire wall shall be maintained at 8 degrees (1" setback per course).

2.0 Foundation Requirements

The foundation bearing capacity that was assumed for design shall be verified in the 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 pad is concrete and 8" thick otherwise. Sand or gravel material shall be compacted to 95% Standard Proctor. Aggregate material shall receive a minimum of one pass of the compaction equipment. The top of the leveling pad shall be maintained at a depth of 1.5 feet when the exposed height of the wall exceeds 7 feet.

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 material 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 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" compacted to 95% Standard Proctor. Only hand operated equipment shall be allowed within 3 feet of the Segmental Block units. Backfill shall 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 PI of greater than 10, unless written consent is obtained from the Engineer prior to placement.

3.3 Soil Properties

Minimum internal angle of friction shall equal or be greater than 30° with 0 psf cohesion. Verification shall be filed with the Engineer that the soil will meet this criteria. If soils are greater than 35% fines, then the top two (2) geogrid layers shall be increased by 25% for the entire length of the wall.

4.0 Soil Testing

Compaction testing shall be performed for every lift elevation requiring geogrid or every 3rd lift as a minimum 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 Engineer's 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

Segmental 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

Geogrid shall be rejected if 20% 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 meets this criteria. If the geogrid is damaged on the construction site, it shall be replaced at the Contractors expense.

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

Drainage Composite shall be installed to cover 30% of the cut behind the geogrid layers. It (6 ft. wide sections) provides 30% coverage when installed on 15 ft. centers and 2/3 the wall height.

9.0 Special Provisions

A) General contractor shall coordinate upper geogrid layers installation with paving installation.
B) No splices shall be made within 6 feet of each other or the modular unit.
C) 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.
D) Placement of geogrid shall be as per plans reference to length and elevations.
E) The Engineer shall be notified by the installing contractor should the embedment depth of the block be less than 6" for walls less than 7', and less than 9" for walls greater than 7' in height.
F) The reinforced soil is assumed to be a sandy type material (pure silts and clay are not acceptable).

10.0 Qualification of Design

A. Stability of any temporary slopes required by the installation of segmental retaining wall shall be addressed by a qualified Geotechnical Engineer. Responsibility of these temporary slopes rests with the Owner and/or Architect of this project and the slopes shall meet all OSHA standards of maximum slope steepness = 1.5H:1V.
B. Handrail/guardrail requirements shall be determined by the Architect or General Contractor.
C. The top of wall elevation for this design has been established by the retaining wall engineer at his discretion. The flexibility of this design allows for the top of wall to be adjusted higher of lower by 12 vertical inches and still meet acceptable factors of safety. Any adjustments to the wall height must include maintaining a maximum geogrid spacing of 24 inches and must be supplied to the retaining wall engineer in writing.
D. The general contractor is responsible for integrating the retaining wall installation into the project. The general contractor is responsible for verifying that the wall configuration illustrated on these plans can be installed according to the site information provided on the civil engineer's grading plan without conflicts associated with curb and gutter, pavement sections, building foundations, utilities, or any other component to be installed in close proximity to this retaining wall system.
E. All conflicts or discrepancies must be presented to the retaining wall engineer at a project meeting on site before construction begins on the retaining wall. An allowable time for revision to be made and provided by the retaining wall engineer shall be established at the same meeting before construction begins.

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NOTES
Fairway Pointe at Anderson Creek
RETAINING WALLS
Harnett County, NC

DESIGN MLK 5/22/24 APP. ____ DATE ____
DRAWN PJR 5/22/24 APP. ____ DATE ____

SEGMENTAL RETAINING WALL