

8/17/99

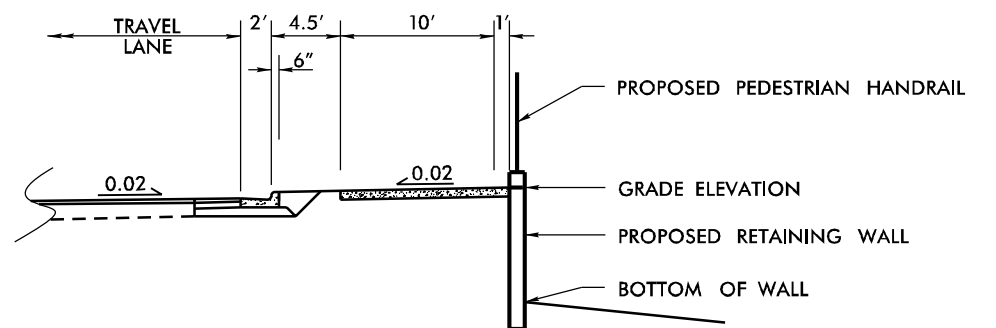
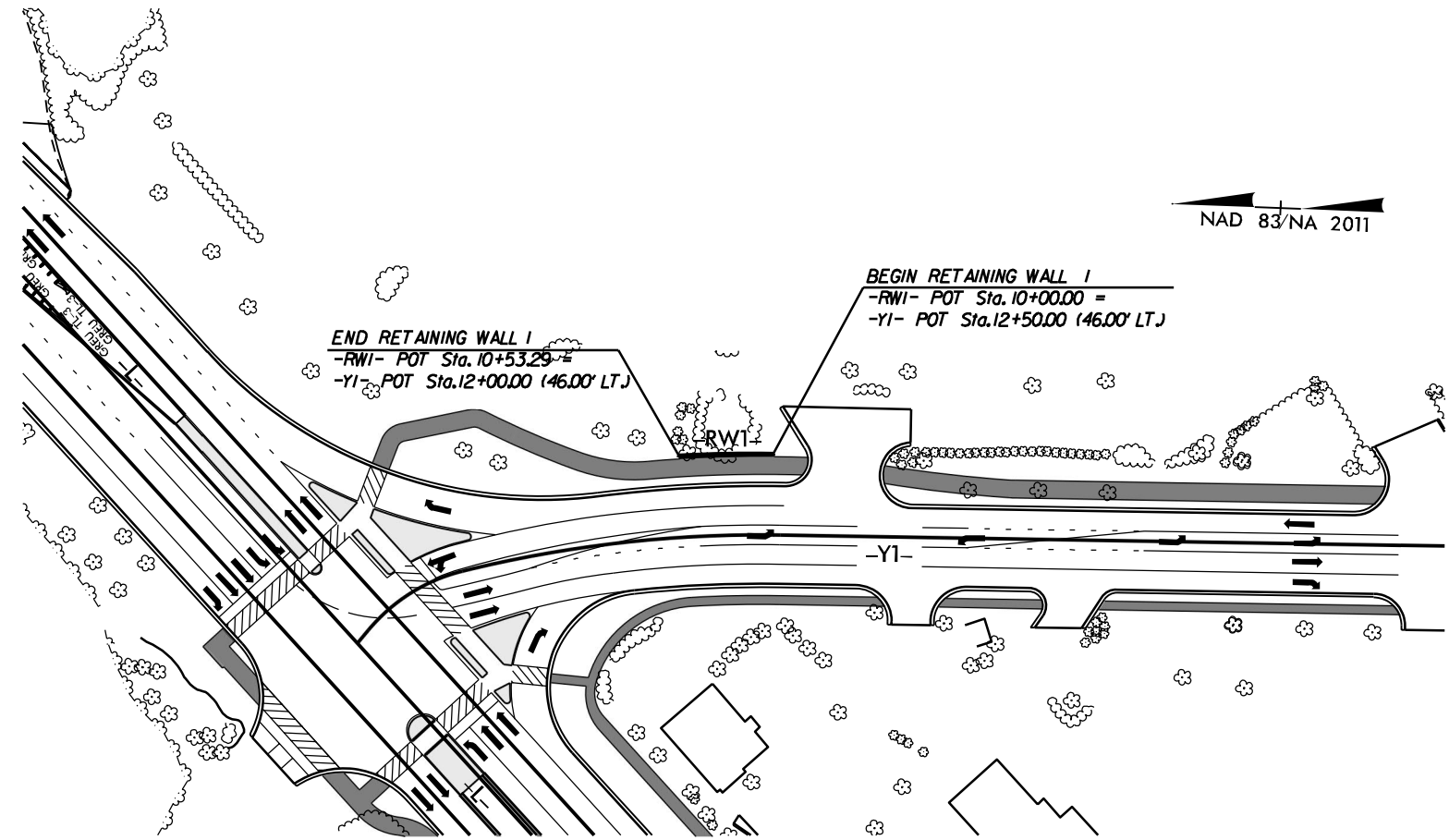
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RETAINING WALL 1 PLAN

ROADWAY DESIGN ENGINEER

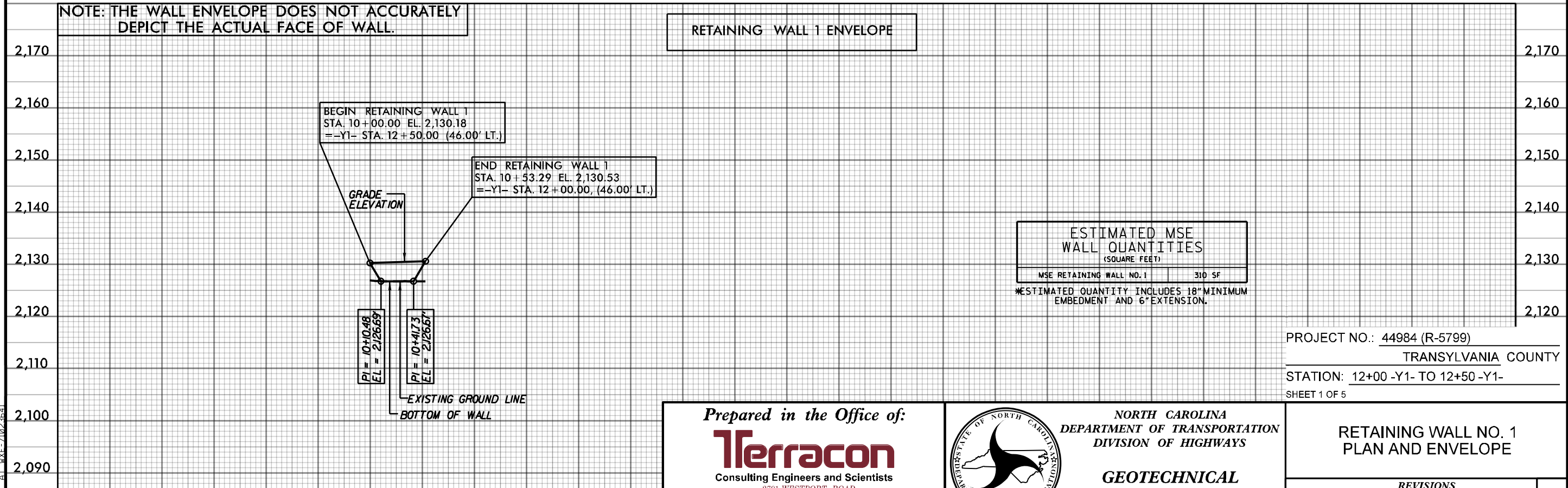
GEOTECHNICAL ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



SECTION THROUGH RETAINING WALL
-RW1- STA. 10+00.00 TO -RW1- STA. 10+53.29

NOTE: THE WALL ENVELOPE DOES NOT ACCURATELY DEPICT THE ACTUAL FACE OF WALL.



ESTIMATED MSE WALL QUANTITIES (SQUARE FEET)	
MSE RETAINING WALL NO. 1	310 SF

*ESTIMATED QUANTITY INCLUDES 18" MINIMUM EMBEDMENT AND 6" EXTENSION.

PROJECT NO.: 44984 (R-5799)

TRANSYLVANIA COUNTY

STATION: 12+00 -Y1- TO 12+50 -Y1-

SHEET 1 OF 5

PREPARED BY: G. F. THILL DATE: 10/28/19

REVIEWED BY: M. J. ALEXANDER DATE: 10/28/19

10 11

Prepared in the Office of:

Consulting Engineers and Scientists

2701 WESTPORT ROAD
CHARLOTTE, NORTH CAROLINA 28208
NC REGISTERED ENGINEERING FIRM: F-08869
NC REGISTERED GEOLOGIC FIRM: C-367

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

GEOTECHNICAL
ENGINEERING UNIT

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	
1	JPM/GFT	6/15/20	3			W-1
2			4			

8/17/99

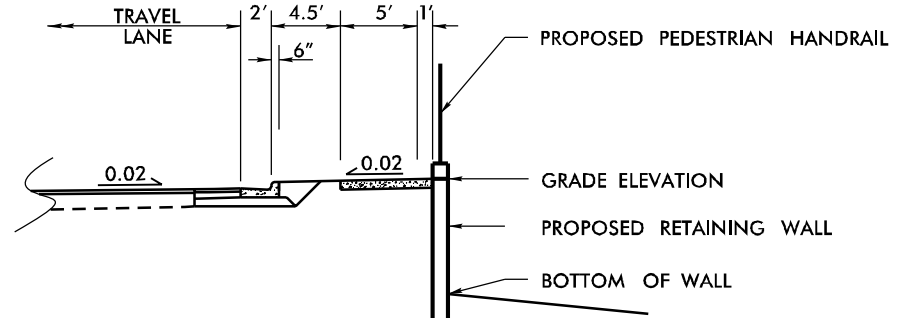
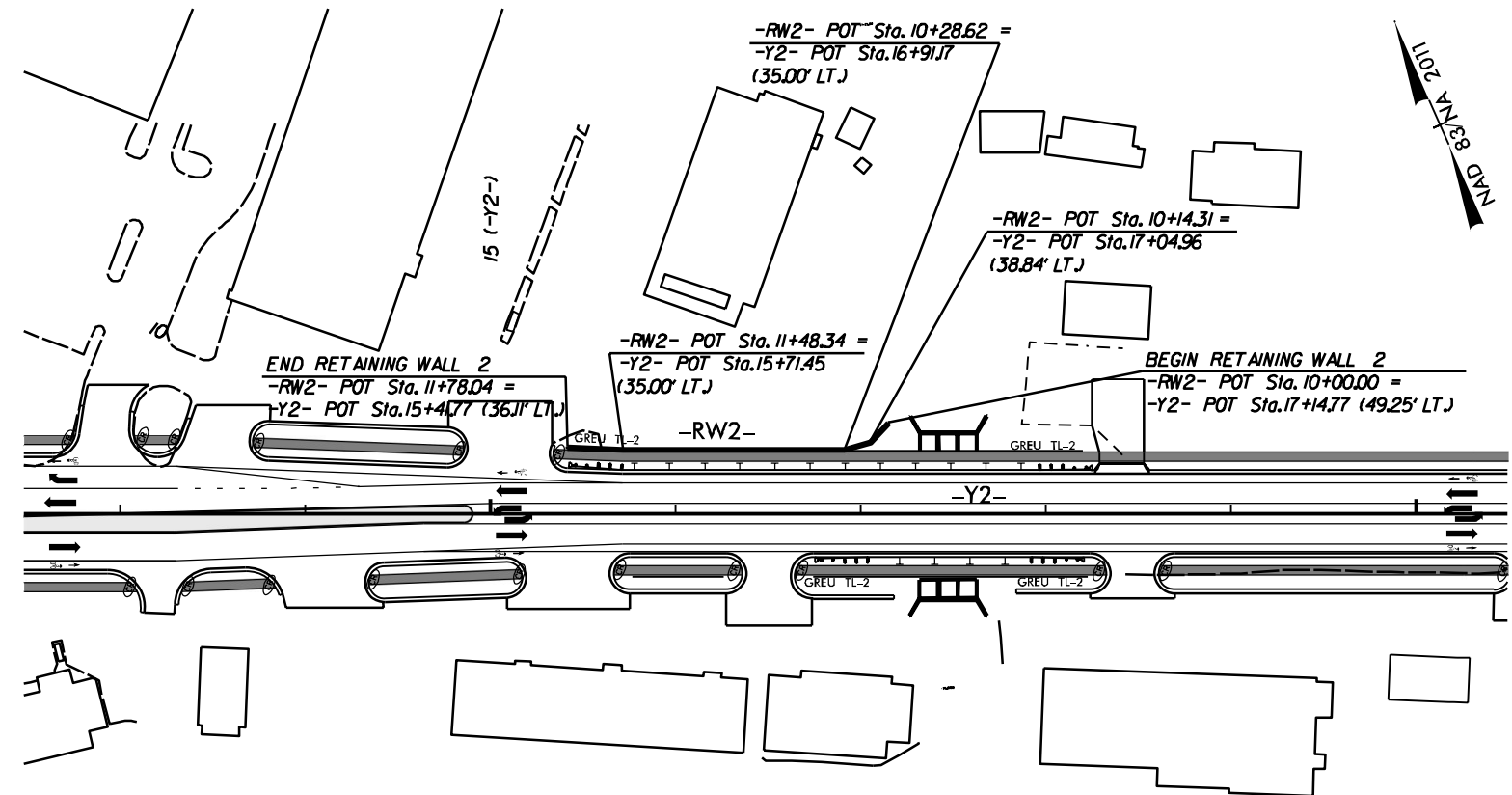
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RETAINING WALL 2 PLAN

ROADWAY DESIGN ENGINEER

GEOTECHNICAL ENGINEER

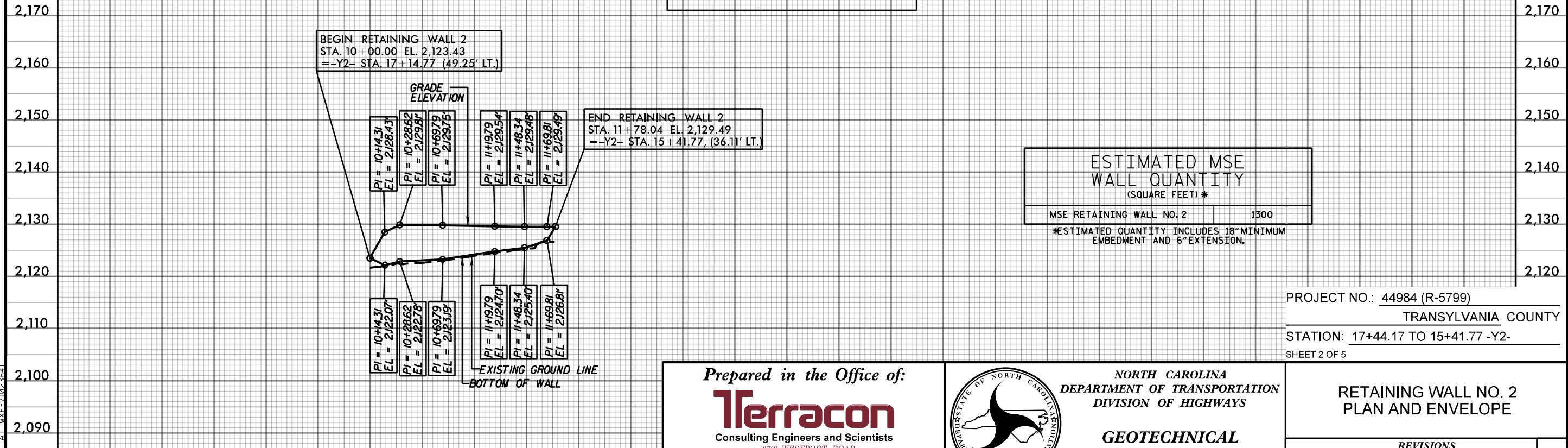
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SECTION THROUGH RETAINING WALL
-RW2- STA. 10+00.00 TO -RW2- STA. 11+78.04

NOTE: THE WALL ENVELOPE DOES NOT ACCURATELY DEPICT THE ACTUAL FACE OF WALL.

RETAINING WALL 2 ENVELOPE



PROJECT NO.: 44984 (R-5799)
 TRANSYLVANIA COUNTY
 STATION: 17+44.17 TO 15+41.77 -Y2-
 SHEET 2 OF 5

Prepared in the Office of:

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 2701 WESTPORT ROAD
 CHARLOTTE, NORTH CAROLINA 28208
 NC REGISTERED ENGINEERING FIRM: F-0869
 NC REGISTERED GEOLOGIC FIRM: C-367

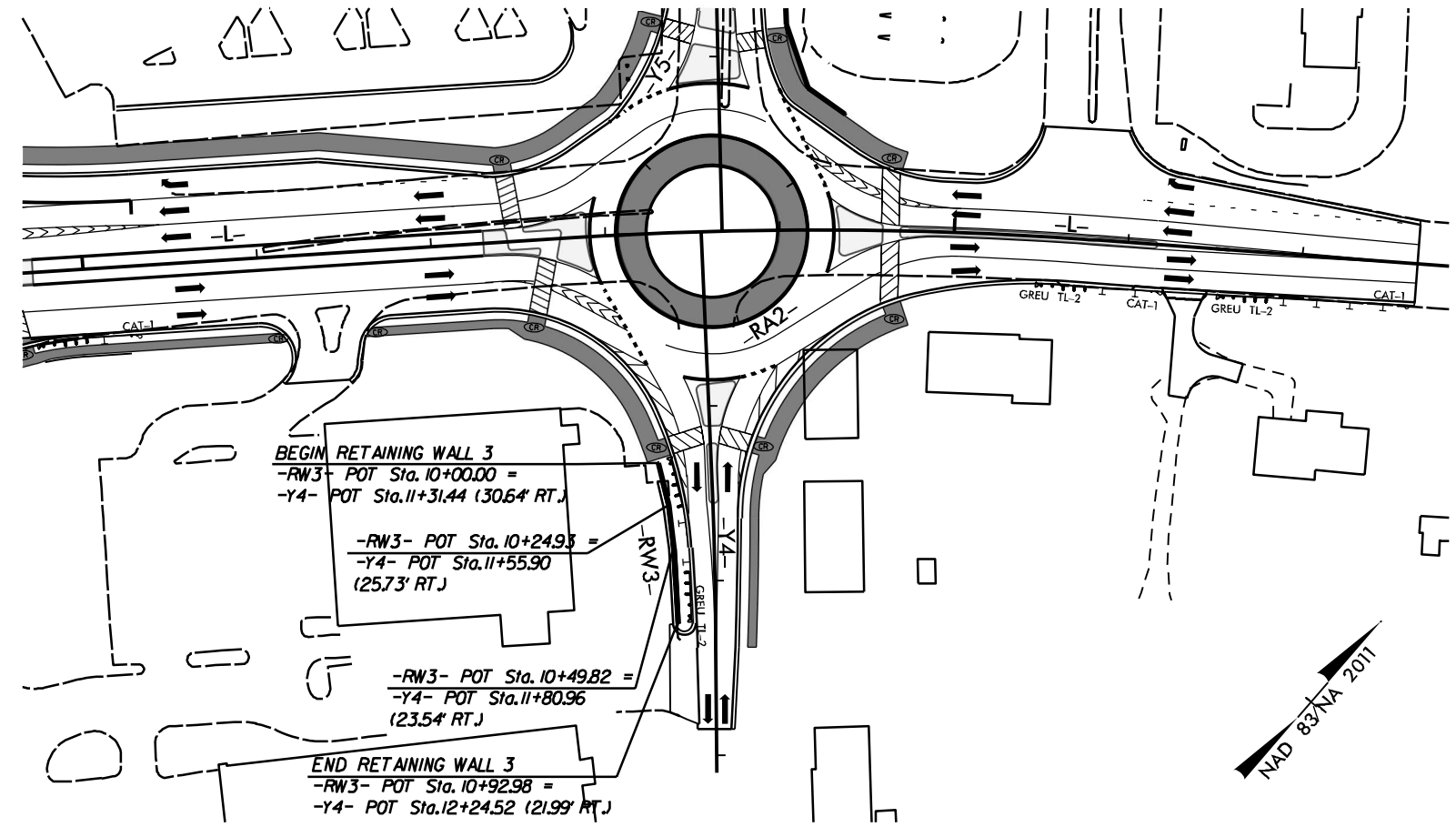
NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 DIVISION OF HIGHWAYS

GEOTECHNICAL
 ENGINEERING UNIT

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	
1	JPM/GFT	6/15/20	3			W-2
2			4			

PREPARED BY: G. F. THILL DATE: 10/28/19
 REVIEWED BY: M. J. ALEXANDER DATE: 10/28/19

8/17/99
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 2019/06/15 10:23:41
 10/28/19



BEGIN RETAINING WALL 3
 -RW3- POT Sta. 10+00.00 =
 -Y4- POT Sta. 11+31.44 (30.64' RT.)

 -RW3- POT Sta. 10+24.93 =
 -Y4- POT Sta. 11+55.90 (25.73' RT.)

 -RW3- POT Sta. 10+49.82 =
 -Y4- POT Sta. 11+80.96 (23.54' RT.)

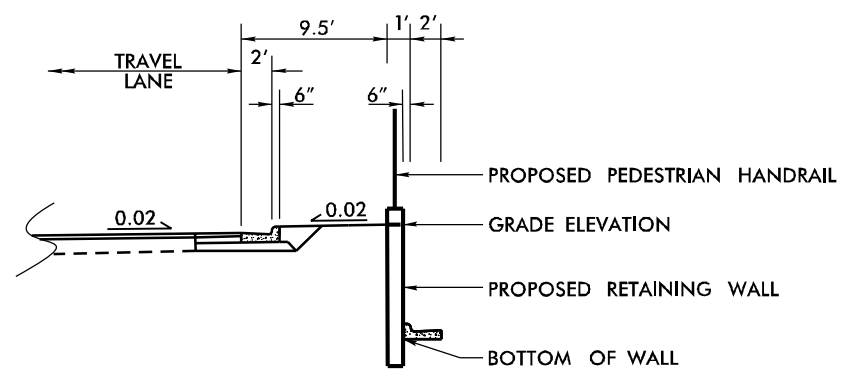
END RETAINING WALL 3
 -RW3- POT Sta. 10+92.98 =
 -Y4- POT Sta. 12+24.52 (21.99' RT.)

RETAINING WALL 3 PLAN

ROADWAY DESIGN ENGINEER

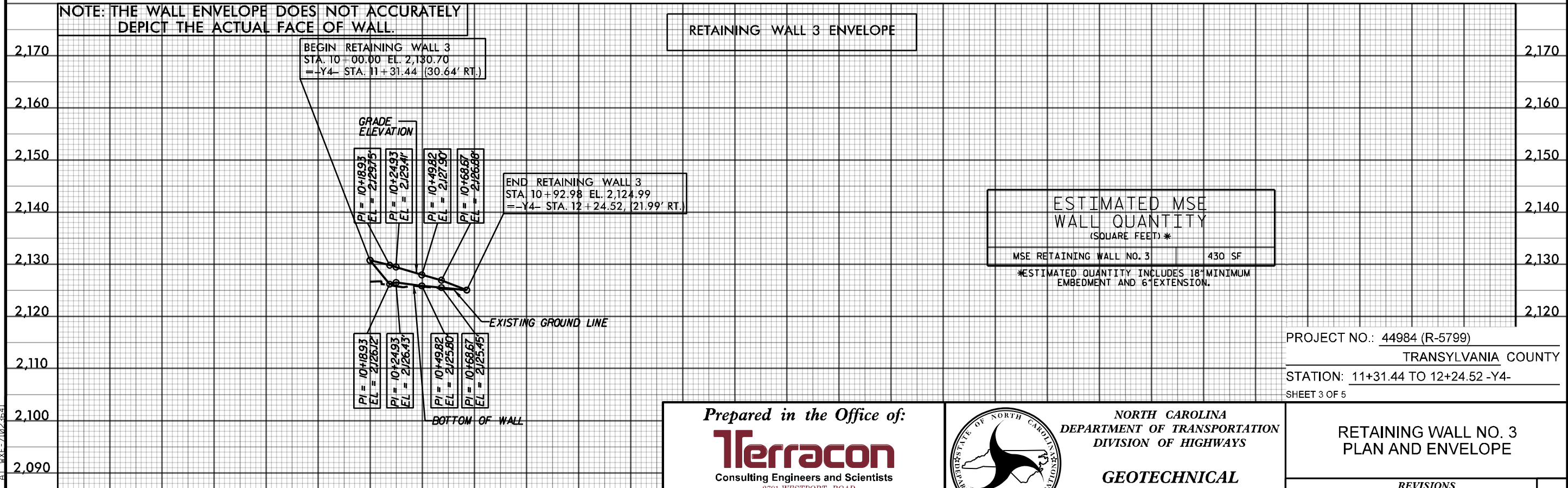
GEOTECHNICAL ENGINEER

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SECTION THROUGH RETAINING WALL
-RW3- STA. 10+00.00 TO -RW3- STA. 10+92.98

NOTE: THE WALL ENVELOPE DOES NOT ACCURATELY DEPICT THE ACTUAL FACE OF WALL.



ESTIMATED MSE WALL QUANTITY (SQUARE FEET)*

MSE RETAINING WALL NO. 3	430 SF
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*ESTIMATED QUANTITY INCLUDES 18" MINIMUM EMBEDMENT AND 6" EXTENSION.

PROJECT NO.: 44984 (R-5799)
 TRANSYLVANIA COUNTY
 STATION: 11+31.44 TO 12+24.52 -Y4-
 SHEET 3 OF 5

PREPARED BY: G. F. THILL DATE: 10/28/19
 REVIEWED BY: M. J. ALEXANDER DATE: 10/28/19

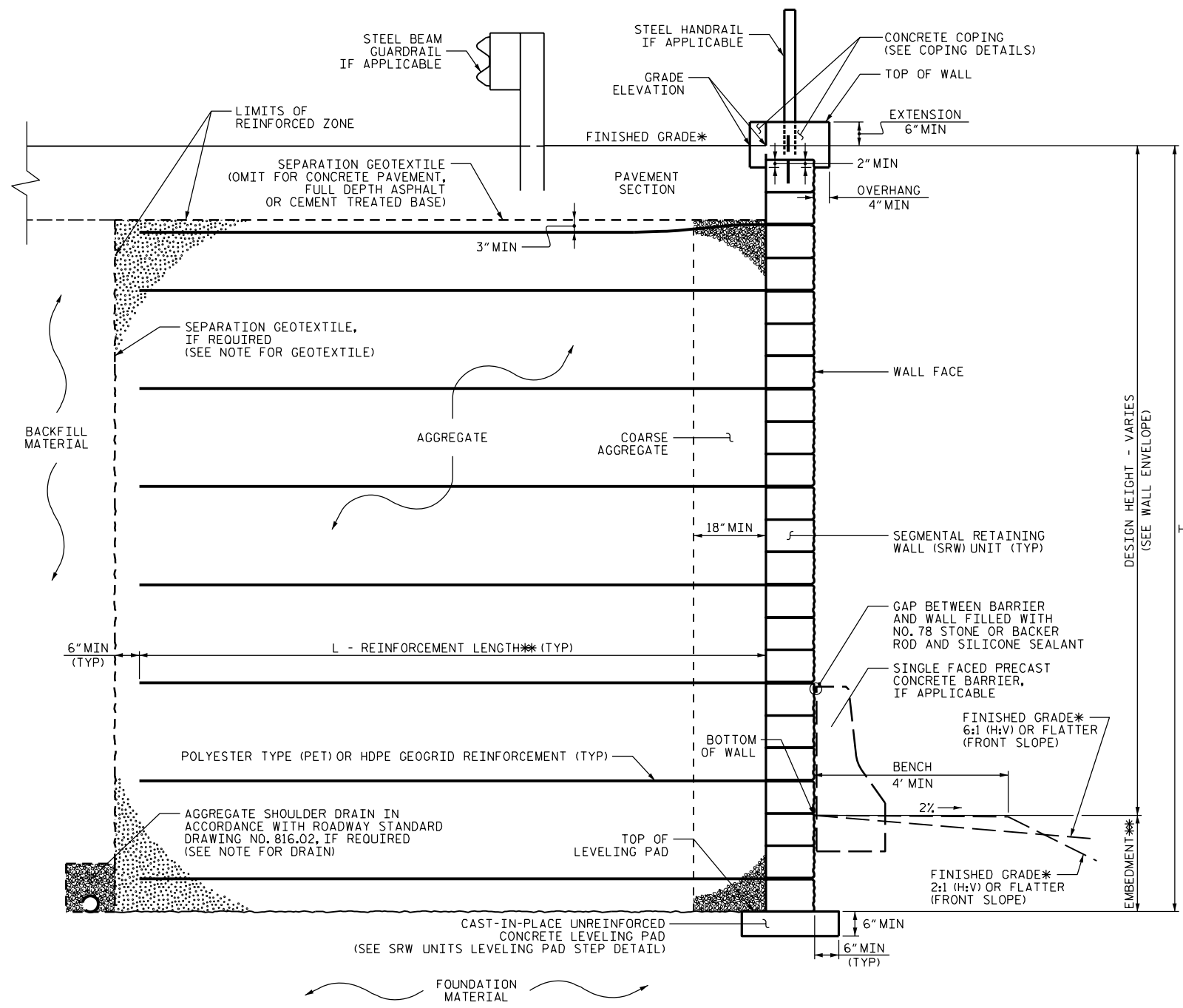
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 2701 WESTPORT ROAD
 CHARLOTTE, NORTH CAROLINA 28208
 NC REGISTERED ENGINEERING FIRM: F-0869
 NC REGISTERED GEOLOGIC FIRM: C-367

NORTH CAROLINA
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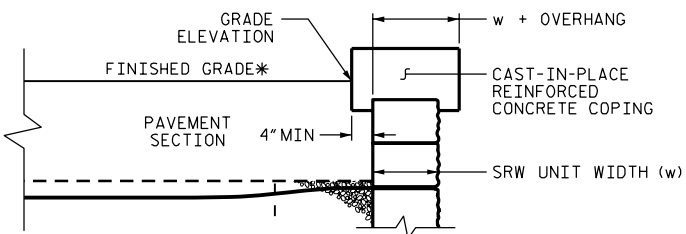
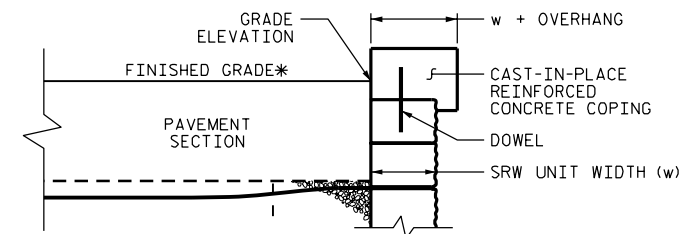
GEOTECHNICAL
 ENGINEERING UNIT

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	
1	JPM/GFT	6/15/20	3			W-3
2			4			



MSE WALL WITH SRW UNITS - TYPICAL SECTION

*SEE ROADWAY PLANS FOR FINISHED GRADE DETAILS.
 *SEE MSE RETAINING WALLS PROVISION AND IF APPLICABLE, MSE WALL NOTES FOR EMBEDMENT AND REINFORCEMENT LENGTH REQUIREMENTS.



COPING DETAILS

AT THE CONTRACTOR'S OPTION, CONNECT COPING TO SRW UNITS WITH DOWELS OR EXTEND COPING DOWN BACK OF SRW UNITS.
 *SEE ROADWAY PLANS FOR FINISHED GRADE DETAILS.

PROJECT NO.: 44984 (R-5799)
 TRANSYLVANIA COUNTY
 STATION: WALL 1: 12+00 TO 12+50 -Y1-
 WALL 2: 17+44.17 TO 15+41.77 -Y2-
 WALL 3: 11+31.44 TO 12+24.52 -Y4-
 SHEET 4 OF 5

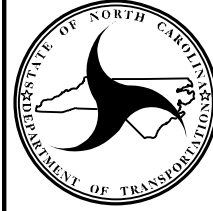
MSE WALL WITH - SRW UNITS AND BARRIER - TYPICAL

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	
1	JPM/GFT	8/15/20	3			W-4
2			4			

PREPARED BY: G. F. THILL	DATE: 10/28/19
REVIEWED BY: M. J. ALEXANDER	DATE: 10/28/19

Prepared in the Office of:
Terracon
 Consulting Engineers and Scientists
 2701 WESTPORT ROAD
 CHARLOTTE, NORTH CAROLINA 28208
 NC REGISTERED ENGINEERING FIRM: E-0869
 NC REGISTERED GEOLOGIC FIRM: C-367

NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
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GEOTECHNICAL ENGINEERING UNIT



NOTES:

FOR MECHANICALLY STABILIZED EARTH (MSE) RETAINING WALLS, SEE MECHANICALLY STABILIZED EARTH RETAINING WALLS PROVISION.

FOR STEEL BEAM GUARDRAIL, SEE ROADWAY PLANS AND SECTION 862 OF THE STANDARD SPECIFICATIONS, IF APPLICABLE.

USE AN MSE WALL SYSTEM WITH SEGMENTAL RETAINING WALL UNITS (SRW) UNITS THAT MEET ARTICLE 1040-4 OF THE STANDARD SPECIFICATIONS FOR RETAINING WALLS NO. 1,2&3.

WHEN USING AN MSE WALL SYSTEM WITH SRW UNITS FOR RETAINING WALLS NO. 1,2&3, FREEZE-THAW DURABLE SRW UNITS THAT MEET ARTICLE 1040-4 OF THE STANDARD SPECIFICATIONS ARE REQUIRED.

AT THE CONTRACTOR'S OPTION, USE FINE AGGREGATE IN THE REINFORCED ZONE OF RETAINING WALLS NO. 1,2&3.

USE SRW UNITS WITH A CONCRETE GRAY COLOR FOR RETAINING WALLS NO. 1,2&3.

USE SRW UNITS WITH A VERTICAL STRAIGHT FACE FOR RETAINING WALLS NO. 1,2&3.

A SEPARATION GEOTEXTILE IS NOT REQUIRED AT THE BACK OF THE REINFORCED ZONE FOR RETAINING WALLS NO. 1,2&3.

A DRAIN IS REQUIRED FOR RETAINING WALLS NO. 1,2&3.

BEFORE BEGINNING MSE WALL DESIGN FOR RETAINING WALLS NO. 1,2&3, SURVEY WALL LOCATION AND SUBMIT A REVISED WALL PROFILE VIEW (WALL ENVELOPE) FOR REVIEW. DO NOT START WALL DESIGN OR CONSTRUCTION UNTIL THE REVISED WALL ENVELOPE IS ACCEPTED.

DESIGN RETAINING WALL NO. 1 FOR THE FOLLOWING:

- 1) H = DESIGN HEIGHT + EMBEDMENT
- 2) DESIGN LIFE = 75 YEARS
- 3) MAXIMUM FACTORED VERTICAL PRESSURE ON FOUNDATION MATERIAL = 812 PSF
- 4) MINIMUM REINFORCEMENT LENGTH (L) = 0.7 H OR 6 FT, WHICHEVER IS LONGER
- 5) MINIMUM EMBEDMENT DEPTH = 1.5 FEET
- 6) REINFORCED ZONE AGGREGATE PARAMETERS:

AGGREGATE TYPE*	UNIT WEIGHT (γ) PCF	FRICTION ANGLE (φ) DEGREES	COHESION (c) PSF
COARSE	110	38	0
FINE	115	34	0

*SEE MSE RETAINING WALLS PROVISION FOR COARSE AND FINE AGGREGATE MATERIAL REQUIREMENTS.

7) IN-SITU ASSUMED MATERIAL PARAMETERS:

MATERIAL TYPE	UNIT WEIGHT (γ) PCF	FRICTION ANGLE (φ) DEGREES	COHESION (c) PSF
BACKFILL	120	30	0
FOUNDATION	120	26	0

DESIGN RETAINING WALL NO. 2 FOR THE FOLLOWING:

- 1) H = DESIGN HEIGHT + EMBEDMENT
- 2) DESIGN LIFE = 75 YEARS
- 3) MAXIMUM FACTORED VERTICAL PRESSURE ON FOUNDATION MATERIAL = 1535 PSF
- 4) MINIMUM REINFORCEMENT LENGTH (L) = 0.7 H OR 6 FT, WHICHEVER IS LONGER
- 5) MINIMUM EMBEDMENT DEPTH = 1.5 FEET
- 6) REINFORCED ZONE AGGREGATE PARAMETERS:

AGGREGATE TYPE*	UNIT WEIGHT (γ) PCF	FRICTION ANGLE (φ) DEGREES	COHESION (c) PSF
COARSE	110	38	0
FINE	115	34	0

*SEE MSE RETAINING WALLS PROVISION FOR COARSE AND FINE AGGREGATE MATERIAL REQUIREMENTS.

7) IN-SITU ASSUMED MATERIAL PARAMETERS:

MATERIAL TYPE	UNIT WEIGHT (γ) PCF	FRICTION ANGLE (φ) DEGREES	COHESION (c) PSF
BACKFILL	120	30	0
FOUNDATION	120	26	0

DESIGN RETAINING WALL NO. 3 FOR THE FOLLOWING:

- 1) H = DESIGN HEIGHT + EMBEDMENT
- 2) DESIGN LIFE = 75 YEARS
- 3) MAXIMUM FACTORED VERTICAL PRESSURE ON FOUNDATION MATERIAL = 1020 PSF
- 4) MINIMUM REINFORCEMENT LENGTH (L) = 0.7 H OR 6 FT, WHICHEVER IS LONGER
- 5) MINIMUM EMBEDMENT DEPTH = 1.5 FEET
- 6) REINFORCED ZONE AGGREGATE PARAMETERS:

AGGREGATE TYPE*	UNIT WEIGHT (γ) PCF	FRICTION ANGLE (φ) DEGREES	COHESION (c) PSF
COARSE	110	38	0
FINE	115	34	0

*SEE MSE RETAINING WALLS PROVISION FOR COARSE AND FINE AGGREGATE MATERIAL REQUIREMENTS.

7) IN-SITU ASSUMED MATERIAL PARAMETERS:

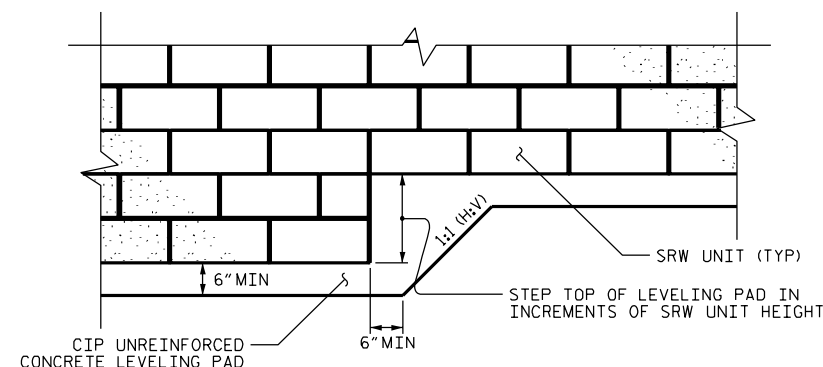
MATERIAL TYPE	UNIT WEIGHT (γ) PCF	FRICTION ANGLE (φ) DEGREES	COHESION (c) PSF
BACKFILL	120	30	0
FOUNDATION	120	28	0

DESIGN RETAINING WALLS NO. 1,2&3 FOR A PEDESTRIAN LIVE LOAD SURCHARGE.

DO NOT PLACE LEVELING PAD CONCRETE, AGGREGATE OR REINFORCEMENT FOR RETAINING WALLS NO. 1,2&3 UNTIL EXCAVATION DIMENSIONS AND FOUNDATION MATERIAL ARE APPROVED.

AT THE CONTRACTOR'S OPTION, "TEMPORARY SHORING FOR WALL CONSTRUCTION" MAY BE USED TO CONSTRUCT RETAINING WALL NO. 2. SEE MSE RETAINING WALLS PROVISION FOR TEMPORARY SHORING FOR WALL CONSTRUCTION.

FUTURE HANDRAIL POSTS WILL INTERFERE WITH REINFORCEMENT FOR RETAINING WALLS 1,2,&3.



SRW UNITS LEVELING PAD STEP DETAIL

GEOTECHNICAL
ENGINEER

SIGNATURE _____ DATE _____

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UNLESS ALL SIGNATURES COMPLETED

PROJECT NO.: 44984 (R-5799)
 TRANSYLVANIA COUNTY
 STATION: WALL 1: 12+00 TO 12+50 -Y1-
 WALL 2: 17+44.17 TO 15+41.77 -Y2-
 WALL 3: 11+31.44 TO 12+24.52 -Y4-
 SHEET 5 OF 5

PREPARED BY: G. F. THILL	DATE: 10/28/19
REVIEWED BY: M. J. ALEXANDER	DATE: 10/28/19

Prepared in the Office of:

Terracon
 Consulting Engineers and Scientists
 2701 WESTPORT ROAD
 CHARLOTTE, NORTH CAROLINA 28208
 NC REGISTERED ENGINEERING FIRM: E-0869
 NC REGISTERED GEOLOGIC FIRM: C-367

NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 DIVISION OF HIGHWAYS

**GEOTECHNICAL
 ENGINEERING UNIT**

**MSE WALL -
 NOTES & SRW UNITS
 LEVELING PAD STEP DETAIL**

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	
1	JPM/GFT	8/15/20	3			W-5
2			4			

8/17/99

ROADWAY DESIGN ENGINEER

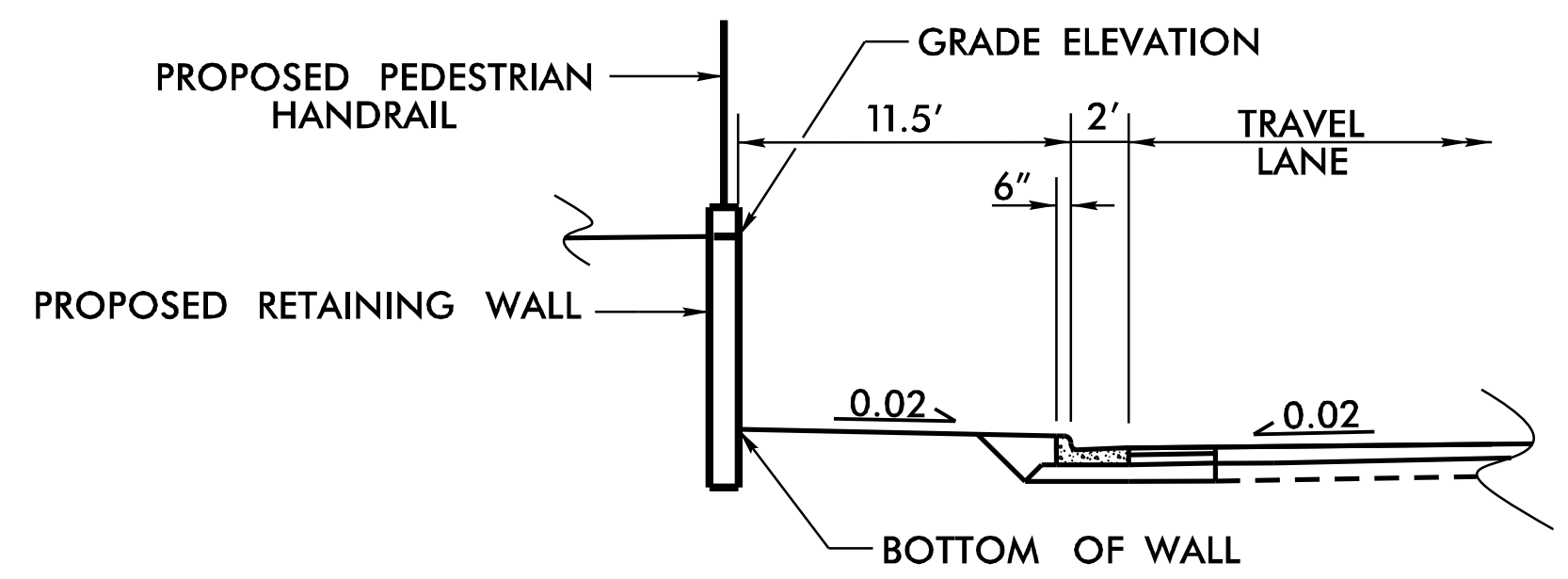
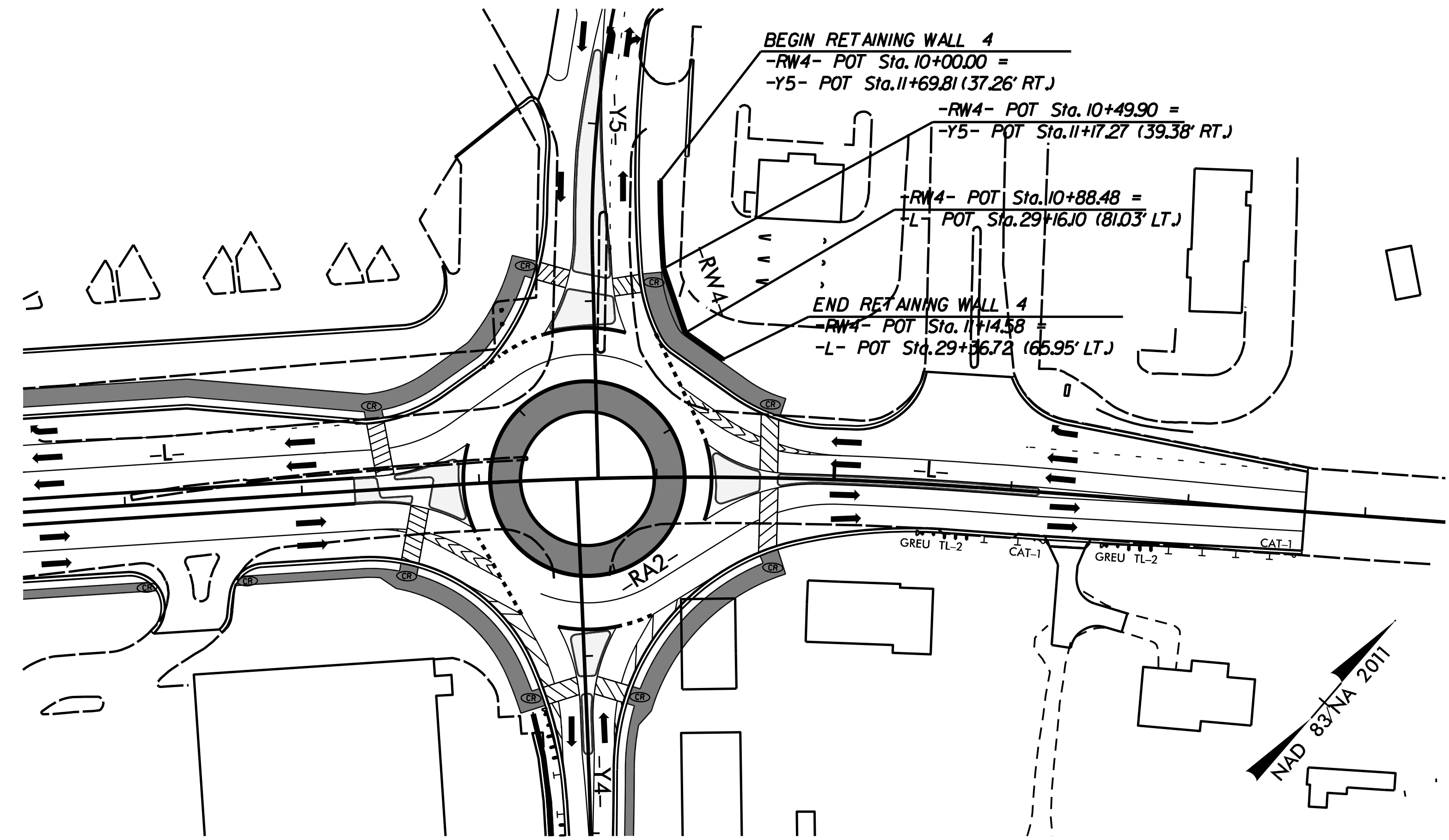
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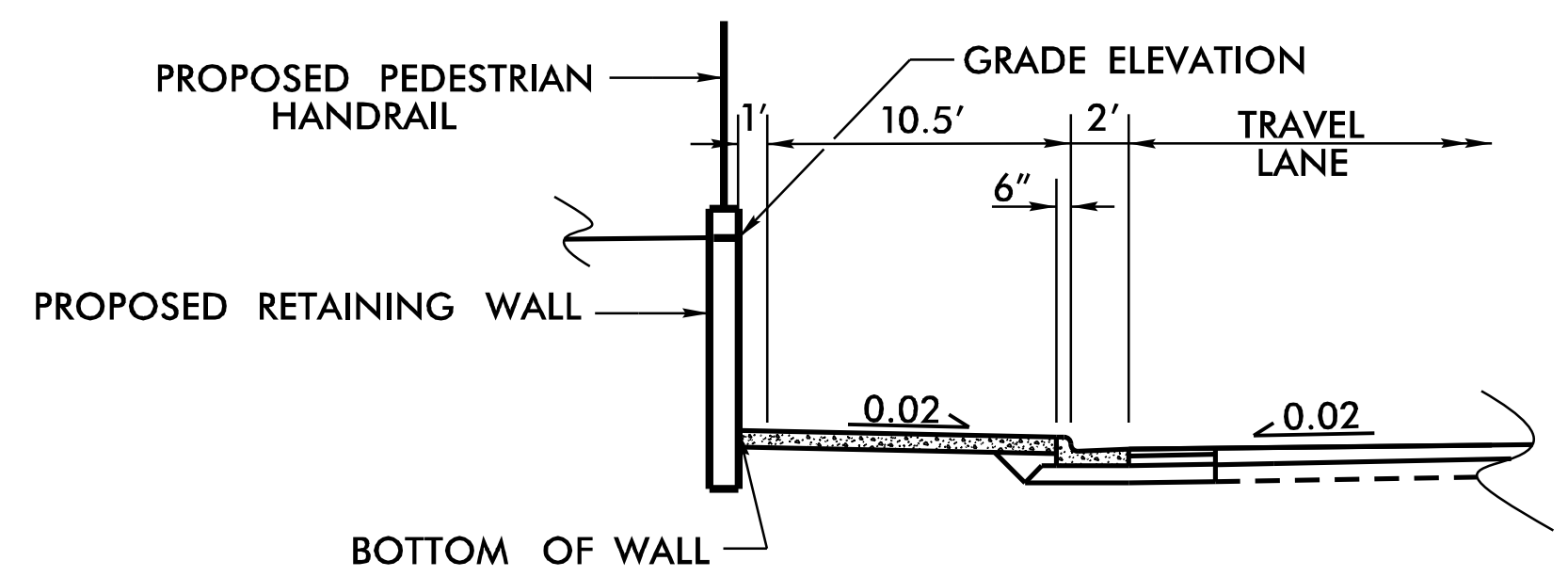
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RETAINING WALL 4 PLAN



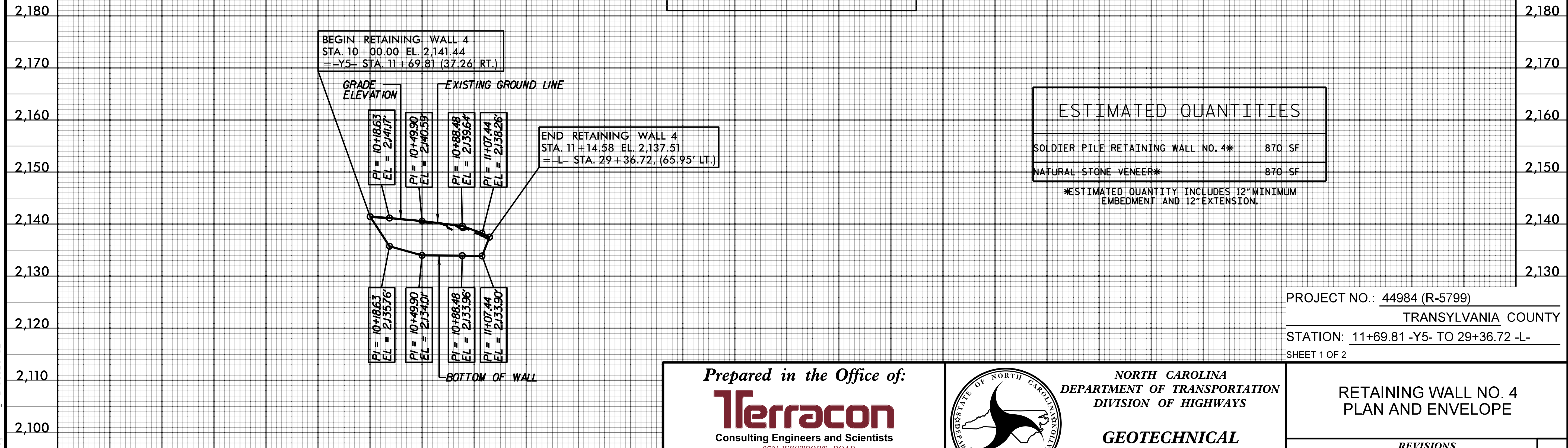
SECTION THROUGH RETAINING WALL
-RW4- STA. 10+00.00 TO -RW4- STA. 10+51.49



SECTION THROUGH RETAINING WALL
-RW4- STA. 10+51.49 TO -RW4- STA. 11+14.58

NOTE: THE WALL ENVELOPE DOES NOT ACCURATELY DEPICT THE ACTUAL FACE OF WALL.

RETAINING WALL 4 ENVELOPE



ESTIMATED QUANTITIES	
SOLDIER PILE RETAINING WALL NO. 4*	870 SF
NATURAL STONE VENEER*	870 SF

*ESTIMATED QUANTITY INCLUDES 12" MINIMUM EMBEDMENT AND 12" EXTENSION.

PROJECT NO.: 44984 (R-5799)

TRANSYLVANIA COUNTY

STATION: 11+69.81 -Y5- TO 29+36.72 -L-

SHEET 1 OF 2

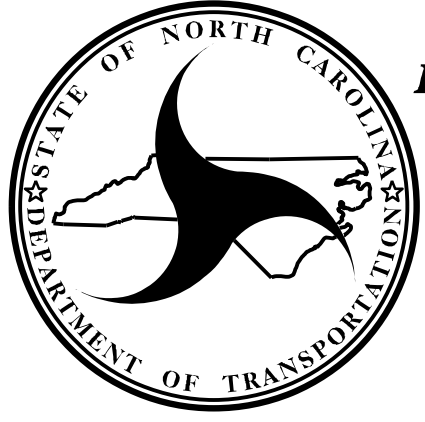
PREPARED BY: G. F. THILL DATE: 10/28/19

REVIEWED BY: M. J. ALEXANDER DATE: 10/28/19

Prepared in the Office of:

Consulting Engineers and Scientists

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CHARLOTTE, NORTH CAROLINA 28208
NC REGISTERED ENGINEERING FIRM: F-0869
NC REGISTERED GEOLOGIC FIRM: C-367



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NO.	BY	DATE	NO.	BY	DATE
1	JPM/GFT	6/15/20	3		
2	SWG/EJK	7/14/23	4		

SHEET NO. W-6

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GEOTECHNICAL
ENGINEER

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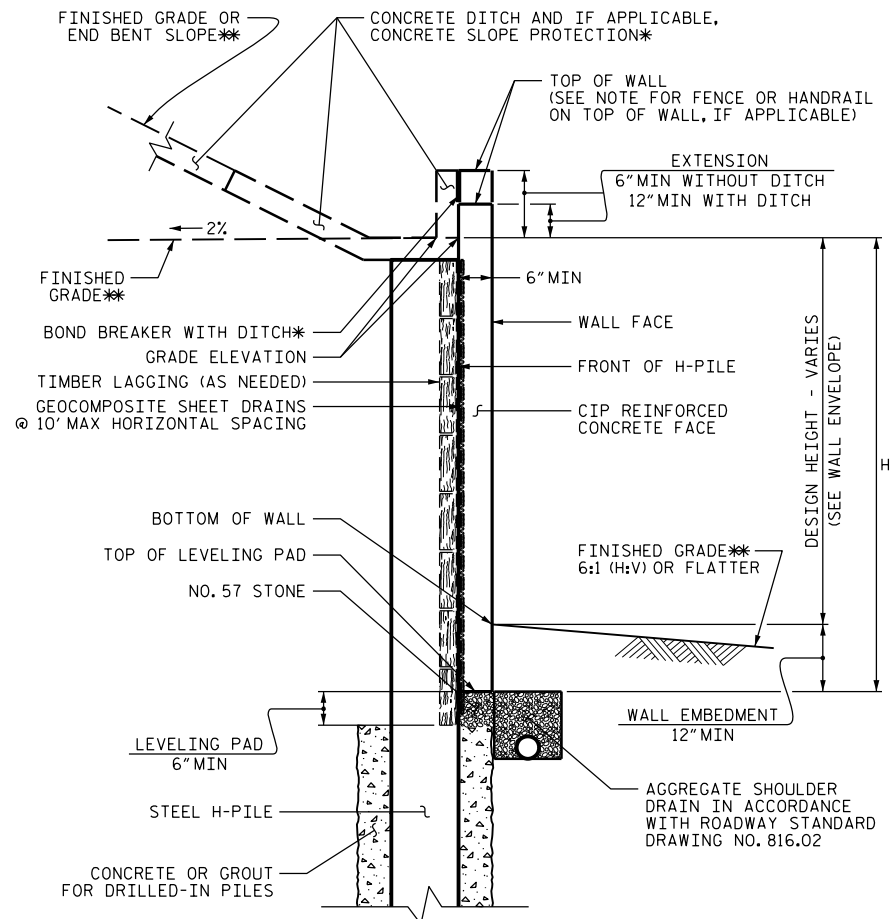
Scott Gutowski

040555
6429 DE 96582C493
P.E.
SCOTT GUTOWSKI

7/11/2023

SIGNATURE DATE

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**SOLDIER PILE WALL WITH
CIP FACE - TYPICAL SECTION**

*SEE CONCRETE DITCH BEHIND WALL DETAILS.
*SEE PLANS FOR FINISHED GRADE OR END BENT SLOPE DETAILS.

NOTES:

- FOR SOLDIER PILE RETAINING WALLS, SEE SOLDIER PILE RETAINING WALLS PROVISION.
- A FENCE OR HANDRAIL IS REQUIRED ON TOP OF RETAINING WALL NO. 4. SEE ROADWAY PLANS FOR FENCE OR HANDRAIL ATTACHMENT DETAILS.
- USE A SOLDIER PILE RETAINING WALL WITH A CIP REINFORCED CONCRETE FACE FOR RETAINING WALL NO. 4.
- A ROCK FACADE ARCHITECTURAL FINISH IS REQUIRED FOR THE CIP REINFORCED CONCRETE FACE FOR RETAINING WALL NO. 4.
- FOR THE ROCK FACADE ARCHITECTURAL FINISH, SEE THE ROCK WALL FACADE SPECIAL PROVISION.
- BEFORE BEGINNING SOLDIER PILE WALL DESIGN FOR RETAINING WALL NO. 4, SURVEY WALL LOCATION AND SUBMIT A REVISED WALL PROFILE VIEW (WALL ENVELOPE) FOR REVIEW. DO NOT START WALL DESIGN OR CONSTRUCTION UNTIL THE REVISED WALL ENVELOPE IS ACCEPTED.

- DESIGN RETAINING WALL NO. FOR THE FOLLOWING:
- 1) H = DESIGN HEIGHT + WALL EMBEDMENT
 - 2) DESIGN LIFE = 100 YEARS
 - 3) MINIMUM WALL EMBEDMENT ELEVATION = 1 FT
 - 4) MINIMUM PILE PENETRATION INTO DENSE RESIDUAL SOIL = 2 FT
 - 5) IN-SITU ASSUMED MATERIAL PARAMETERS ABOVE ELEVATION 2126 FT:
 - UNIT WEIGHT, γ = 120 PCF
 - FRICTION ANGLE, ϕ = 28 DEGREES
 - COHESION, c = 0 PSF
 - 6) IN-SITU ASSUMED MATERIAL PARAMETERS BELOW ELEVATION 2126 FT:
 - UNIT WEIGHT, γ = 105 PCF
 - FRICTION ANGLE, ϕ = 0 DEGREES
 - COHESION, c = 400 PSF
 - 7) IN-SITU ASSUMED MATERIAL PARAMETERS BELOW ELEVATION 2118 FT:
 - UNIT WEIGHT, γ = 125 PCF
 - FRICTION ANGLE, ϕ = 32 DEGREES
 - COHESION, c = 0 PSF

PROJECT NO.: 44984 (R-5799)
 TRANSYLVANIA COUNTY
 STATION: 11+69.81 -Y5- TO 29+36.72 -L-
 SHEET 2 OF 2

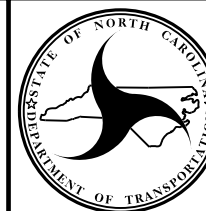
PREPARED BY: G. F. THILL	DATE: 10/28/19
REVIEWED BY: A. F. RIGGS	DATE: 10/28/19

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NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 DIVISION OF HIGHWAYS

GEOTECHNICAL
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**SOLDIER PILE WALL
 TYPICAL SECTION AND NOTES**

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	
1	JPM/GFT	6/15/20	3			W-7
2	SWG/EJK	7/10/23	4			