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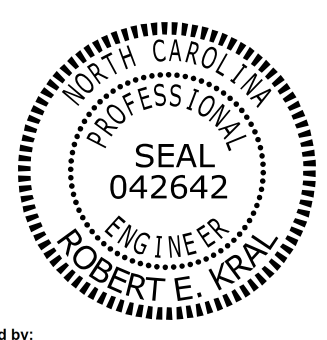
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# RETAINING WALL NO. 1

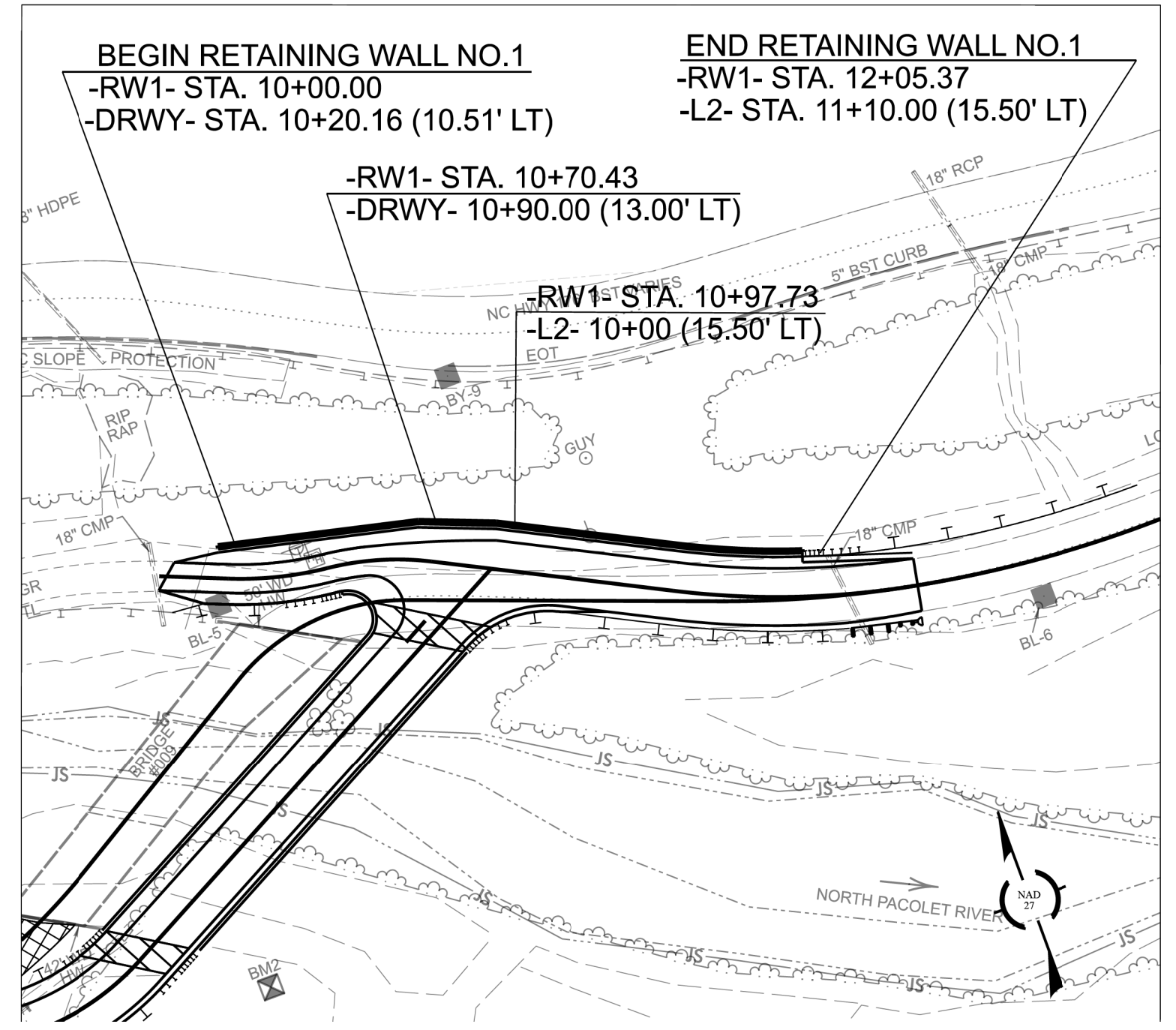
GEOTECHNICAL ENGINEER

ENGINEER



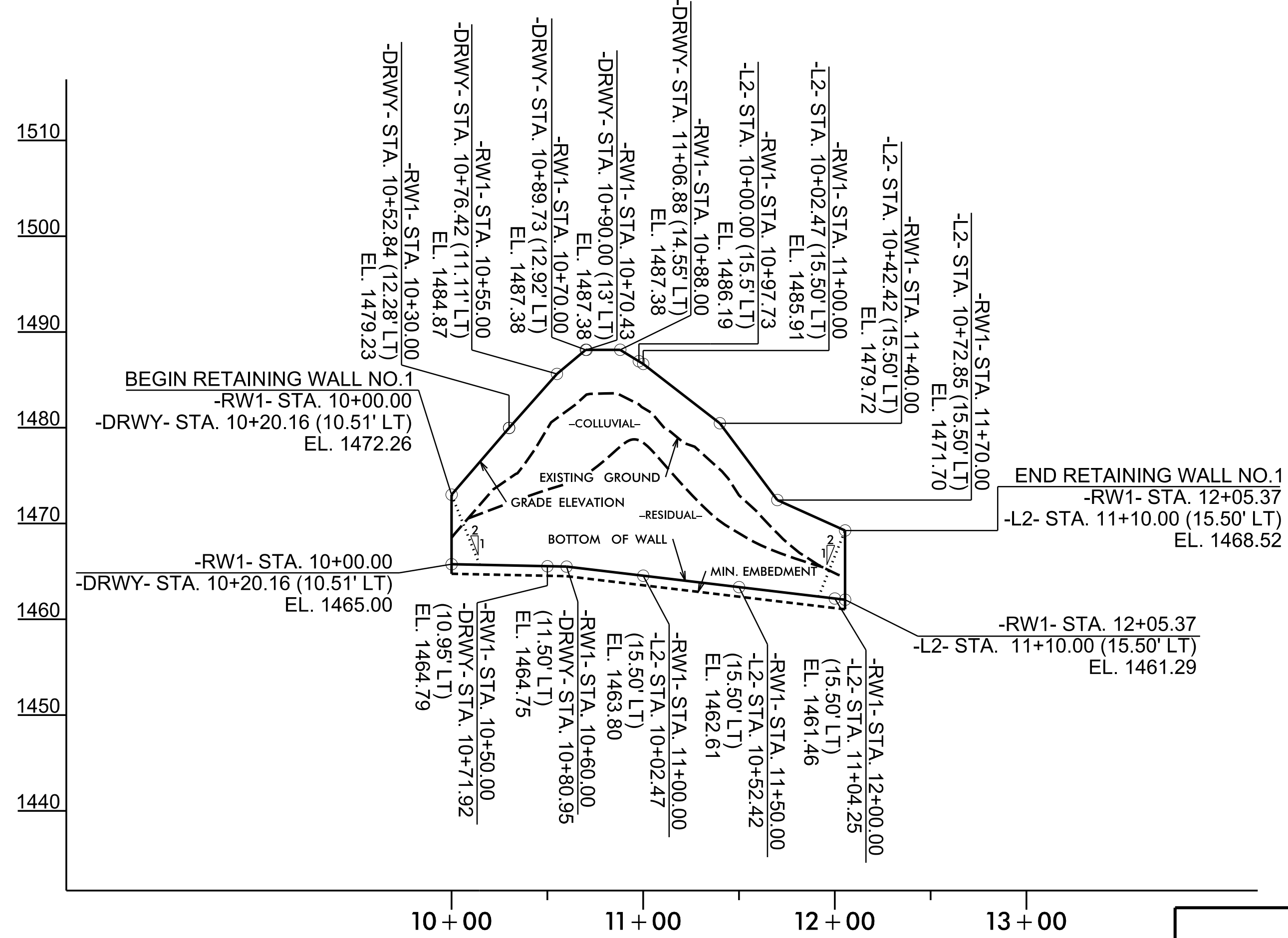
Signed by: Robert E. Kral  
 DATE: 11/21/2025  
 SIGNATURE: \_\_\_\_\_ DATE: \_\_\_\_\_

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



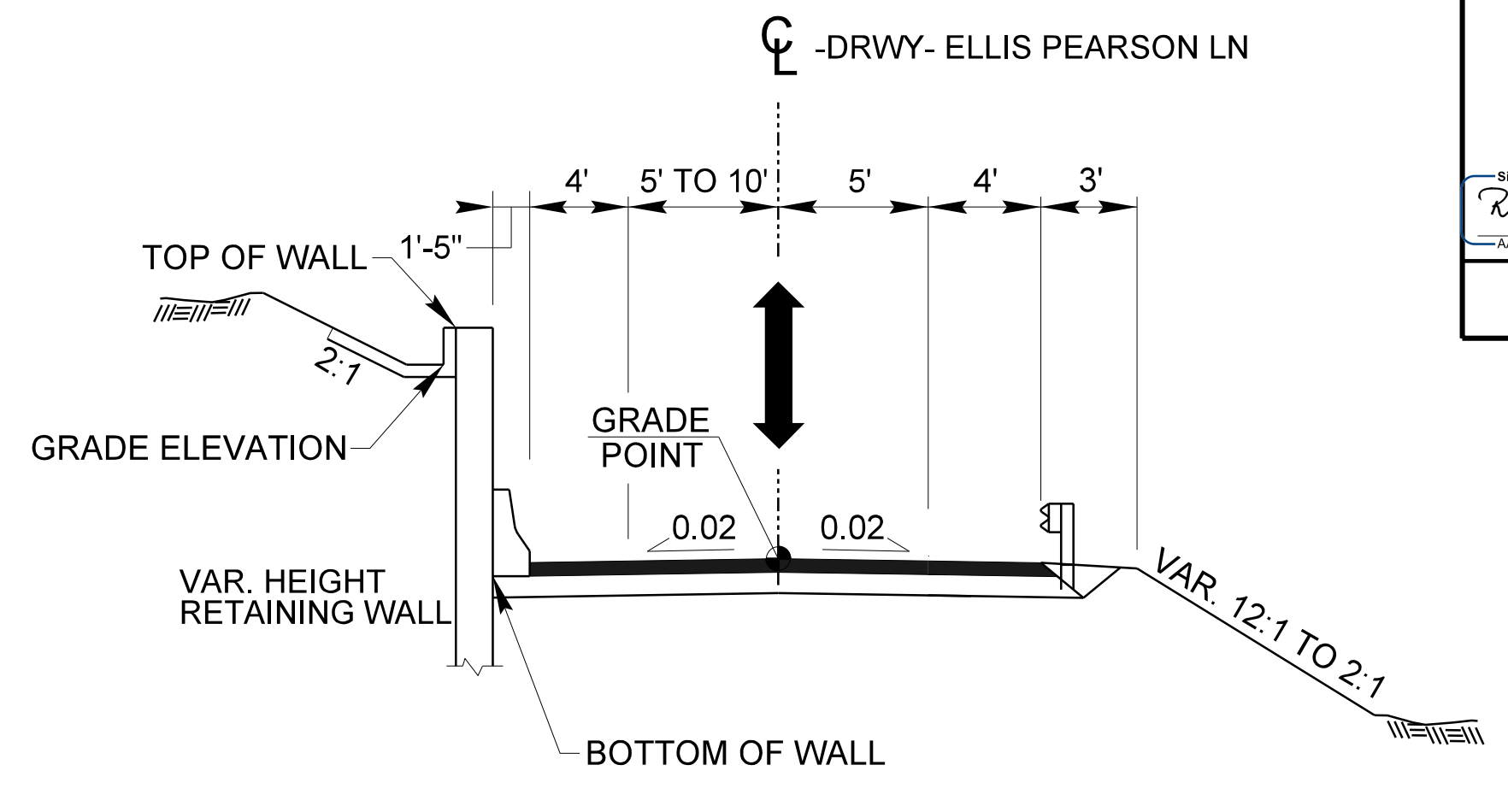
**RETAINING WALL NO. 1 - PLAN**

NOT TO SCALE



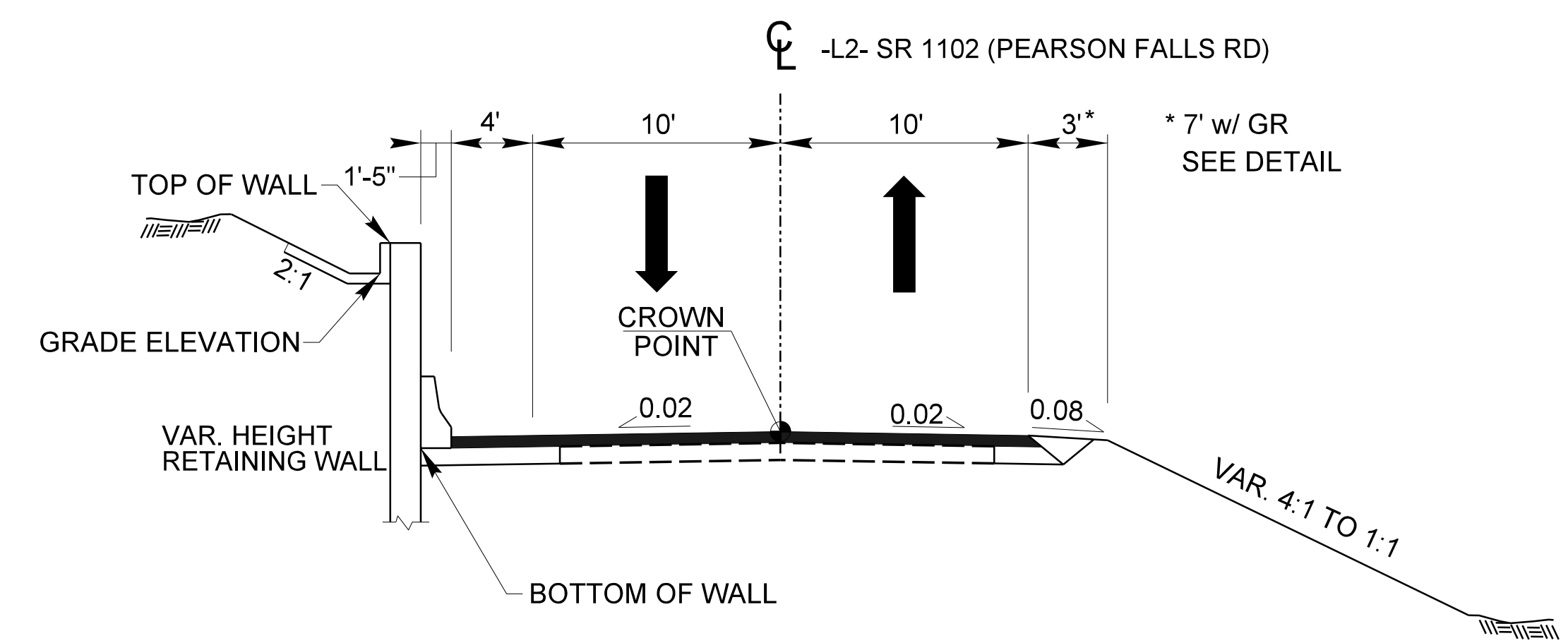
**RETAINING WALL NO. 1 - PROFILE**

NOT TO SCALE  
(LOOKING AT FACE OF WALL)



**PARTIAL TYPICAL SECTION RETAINING WALL NO. 1**

-RW1- STA. 10+00.00 TO 10+97.73  
 -DRWY- STA. 10+20.00 TO 11+16.46



**PARTIAL TYPICAL SECTION RETAINING WALL NO. 1**

-RW1- STA. 10+97.73 TO 12+05.37  
 -L2- STA. 10+00.00 TO 11+10.00

STATION	GRADE ELEVATION (FT)	BOTTOM OF WALL ELEVATION (FT)	MIN. EMBEDMENT (FT)	TOP OF LEVELING PAD ELEVATION (FT)	WALL DESIGN HEIGHT, "H" (FT)
-DRWY- 10+20.16, LT	1472.26	1465.00	1.00	1464.00	8.26
-DRWY- 10+71.92, LT	1483.74	1464.79	1.00	1463.79	19.95
-L2- 10+02.47, LT	1485.91	1463.80	1.00	1462.80	23.11
-L2- 10+52.42, LT	1477.05	1462.61	1.00	1461.61	15.44
-L2- 11+04.25, LT	1469.00	1461.46	1.00	1460.46	8.54
-L2- 11+10.00, LT	1468.52	1461.29	1.00	1460.29	8.23

PROJECT NO.: BP14.R038

POLK COUNTY

STATION: -RW1- STA. 10+00.00 TO 12+05.37

SHEET 1 OF 2

PREPARED BY: KND  
 REVIEWED BY: REK

DATE: 11/25  
 DATE: 11/25

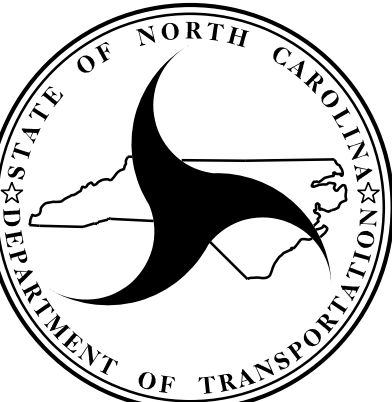
RETAINING WALL NO. 1 ENVELOPE AND WALL LAYOUT PROVIDED BY VHB 06/1/25.

Prepared in the Office of:



**CAROLINAS GEOTECHNICAL GROUP**

1805 SARDIS ROAD NORTH  
 SUITE 100  
 CHARLOTTE, NC 28270  
 (980) 339-8684



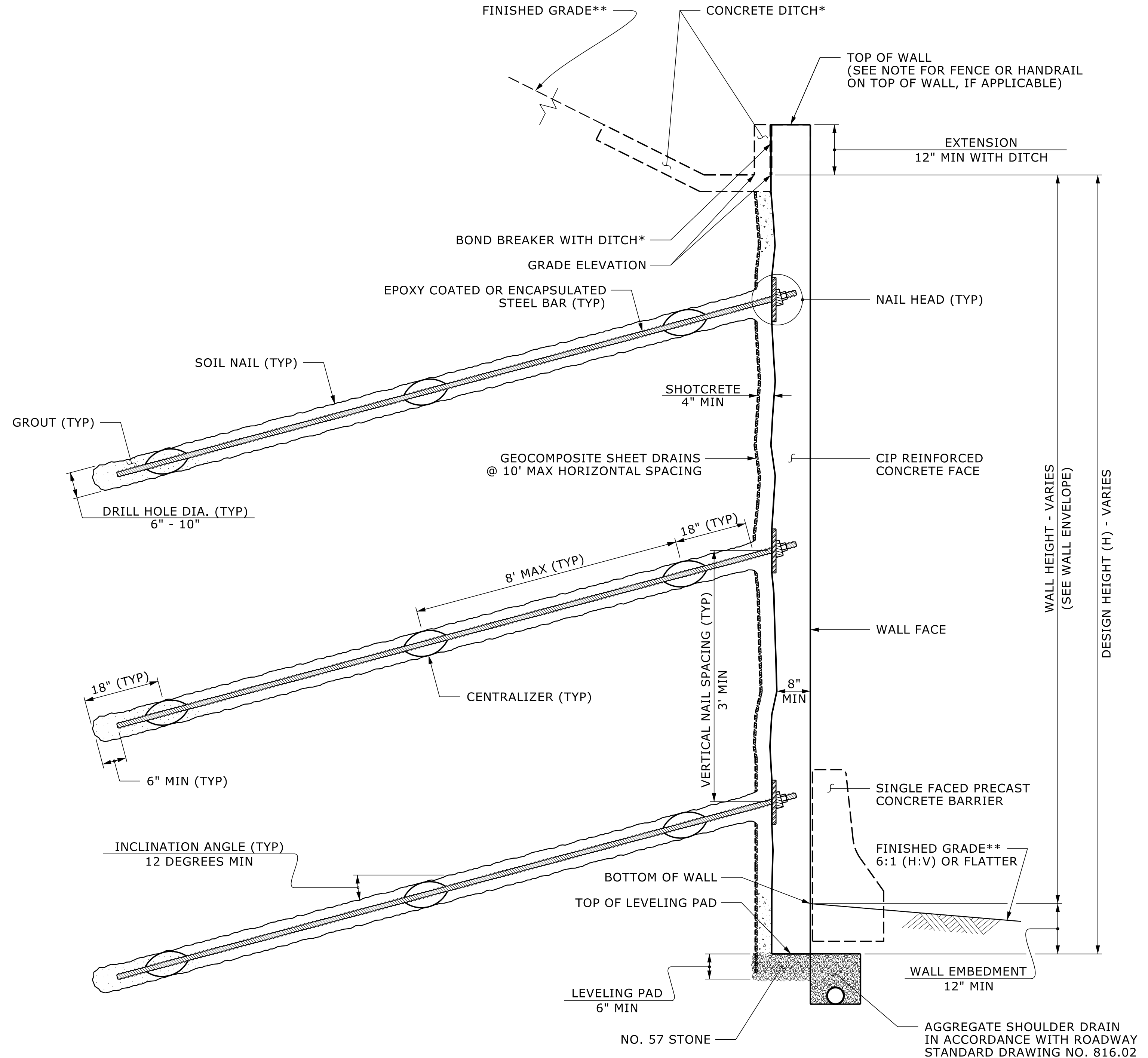
NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 DIVISION OF HIGHWAYS

**GEOTECHNICAL ENGINEERING UNIT**

SOIL NAIL RETAINING WALL NO. 1  
 PLAN AND PROFILE

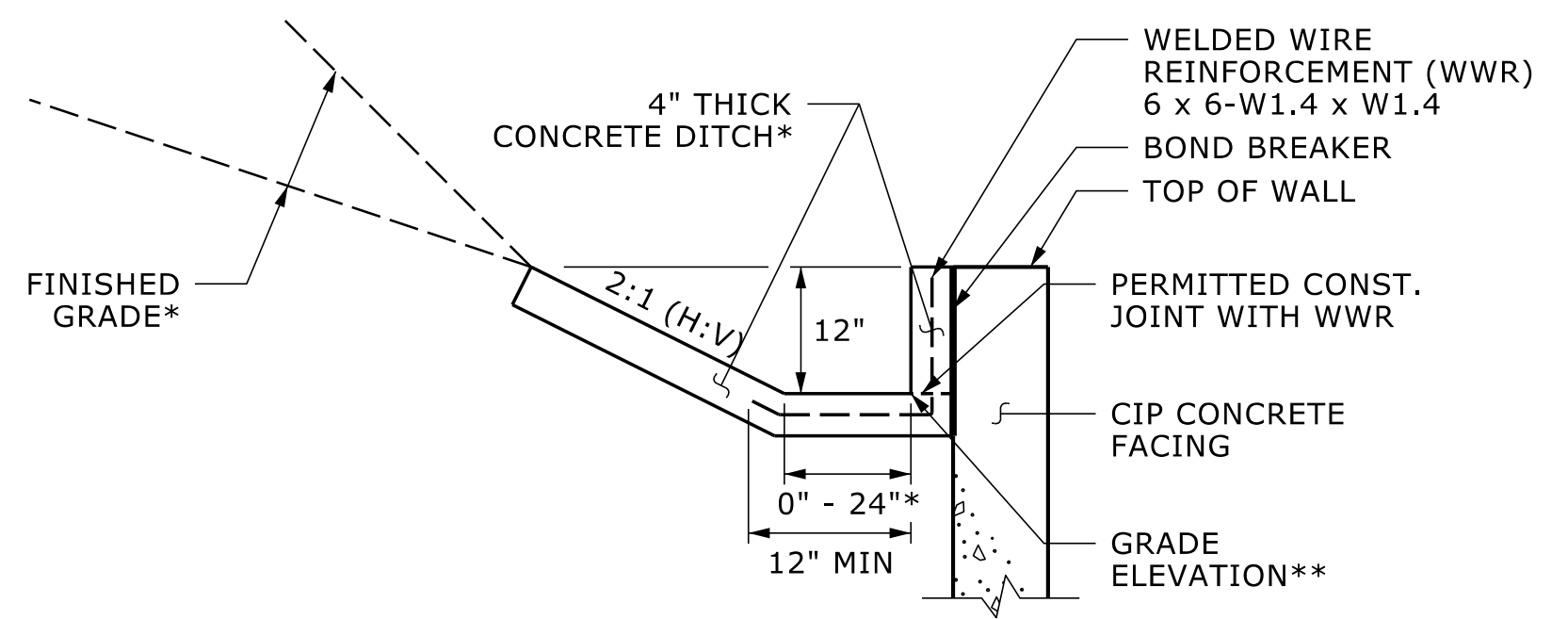
REVISIONS					
NO.	BY	DATE	NO.	BY	DATE
1			3		
2			4		

SHEET NO. W-1



**SOIL NAIL WALL - TYPICAL SECTION**

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



**CONCRETE DITCH BEHIND WALL WITH CONCRETE FACING**

\*SEE ROADWAY PLANS FOR CONCRETE DITCH AND FINISHED GRADE DETAILS.  
\*\*SEE WALL ENVELOPE FOR GRADE ELEVATIONS.

**NOTES:**

- FOR SOIL NAIL RETAINING WALLS, SEE SOIL NAIL RETAINING WALLS PROVISION.
- FOR SINGLE FACED PRECAST CONCRETE BARRIER, SEE ROADWAY PLANS AND SECTION 857 OF THE STANDARD SPECIFICATIONS.
- BEFORE BEGINNING SOIL NAIL WALL DESIGN FOR RETAINING WALL NO. 1, 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) DESIGN HEIGHT (H) = WALL HEIGHT + WALL EMBEDMENT
  - 2) DESIGN LIFE = 75 YEARS
  - 3) MINIMUM WALL EMBEDMENT DEPTH = 1 FT
  - 4) MINIMUM NAIL LENGTH = 1.2H OR 10 FEET, WHICHEVER IS LONGER
  - 5) IN-SITU ASSUMED MATERIAL PARAMETERS:
    - IN COLLUVIAL:
      - UNIT WEIGHT,  $\gamma = 110$  PCF
      - FRICTION ANGLE,  $\phi = 26$  DEGREES
      - COHESION,  $c = 0$  PSF
    - IN RESIDUAL:
      - UNIT WEIGHT,  $\gamma = 120$  PCF
      - FRICTION ANGLE,  $\phi = 32$  DEGREES
      - COHESION,  $c = 0$  PSF
    - IN WEATHERED ROCK:
      - UNIT WEIGHT,  $\gamma = 135$  PCF
      - FRICTION ANGLE,  $\phi = 32$  DEGREES
      - COHESION,  $c = 500$  PSF
    - IN CRYSTALLINE ROCK:
      - UNIT WEIGHT,  $\gamma = 170$  PCF
      - FRICTION ANGLE,  $\phi = 34$  DEGREES
      - COHESION,  $c = 1,000$  PSF

SOIL NAIL WALL CONSTRUCTION WILL REQUIRE GROUND TO BE CREATED TO REACH TOP OF WALL AT SOME LOCATIONS WITHIN THE WALL ENVELOPE. CONSTRUCTION OF THE CREATED GROUND SHOULD BE ACCOUNTED FOR IN THE SOIL NAIL WALL DESIGN.

ESTIMATED SOIL NAIL WALL QUANTITIES			
RETAINING WALL NO.	SOIL NAIL RETAINING WALLS (SQUARE FEET)	SOIL NAIL VERIFICATION TESTS	SOIL NAIL PROOF TESTS
1	3,450	2 EA	7 EA

PREPARED BY: KND	DATE: 11/25
REVIEWED BY: REK	DATE: 11/25

Prepared in the Office of:  
**CAROLINAS GEOTECHNICAL GROUP**

1805 SARDIS ROAD NORTH  
SUITE 100  
CHARLOTTE, NC 28270  
(980) 339-8684

NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS

**GEOTECHNICAL ENGINEERING UNIT**

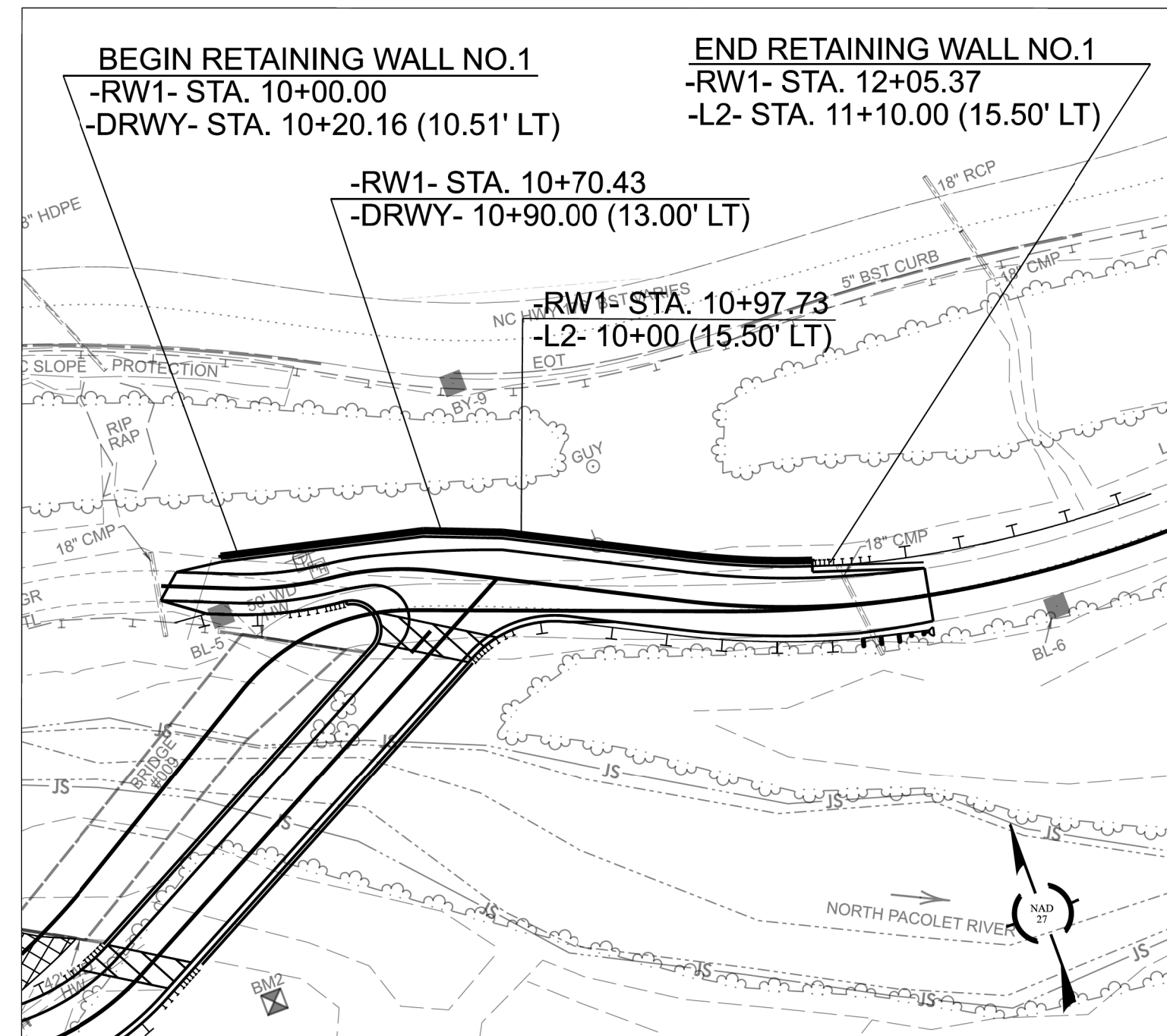
PROJECT NO.: BP14.R038  
POLK COUNTY  
STATION: -RW1- STA. 10+00.00 TO 12+05.37  
SHEET 2 OF 2

REVISIONS					
NO.	BY	DATE	NO.	BY	DATE
1			3		
2			4		

SOIL NAIL RETAINING WALL NO. 1  
NOTES AND DETAILS

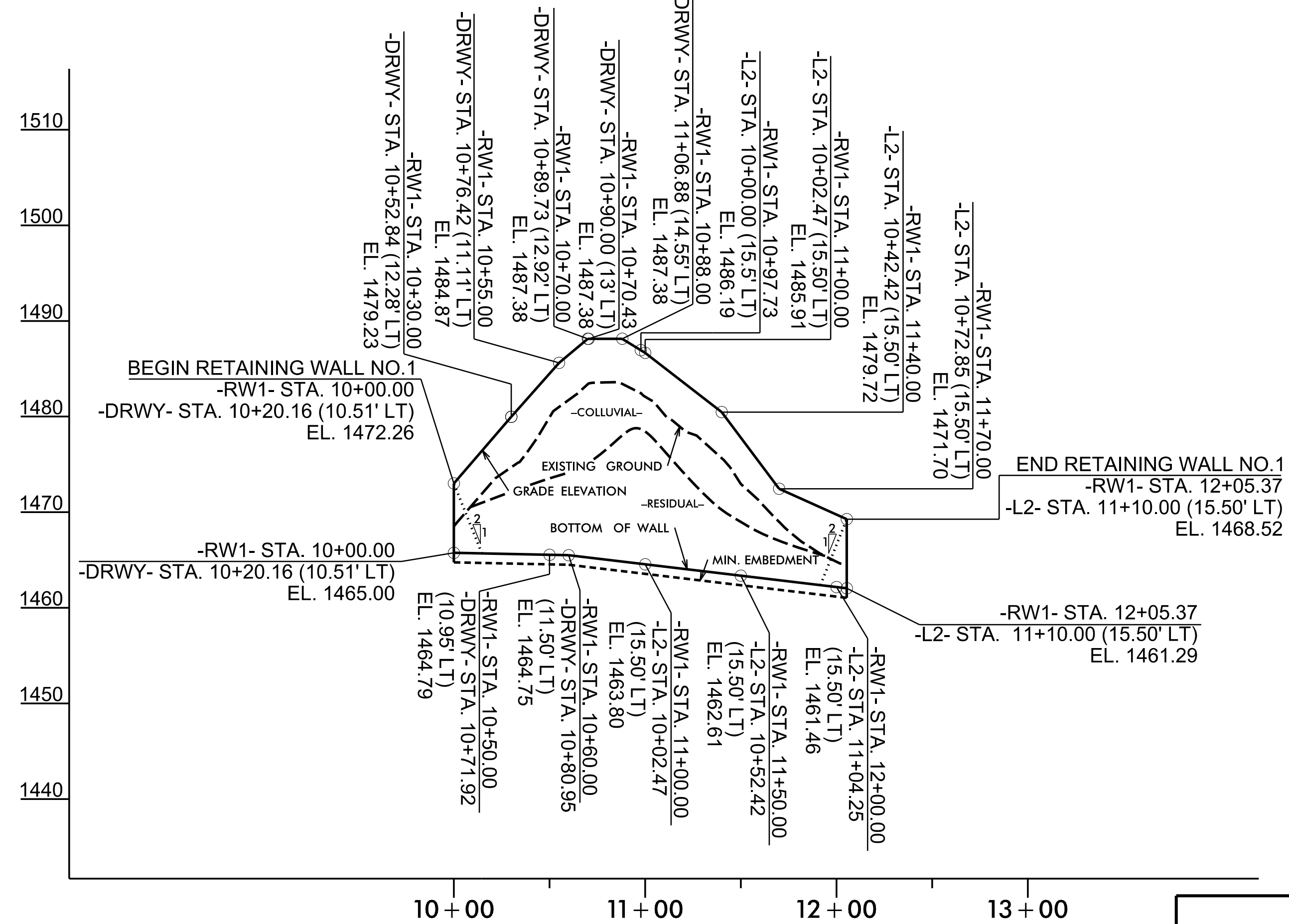
W-2

# RETAINING WALL NO. 1



**RETAINING WALL NO. 1 – PLAN**

NOT TO SCALE



**RETAINING WALL NO. 1 – PROFILE**

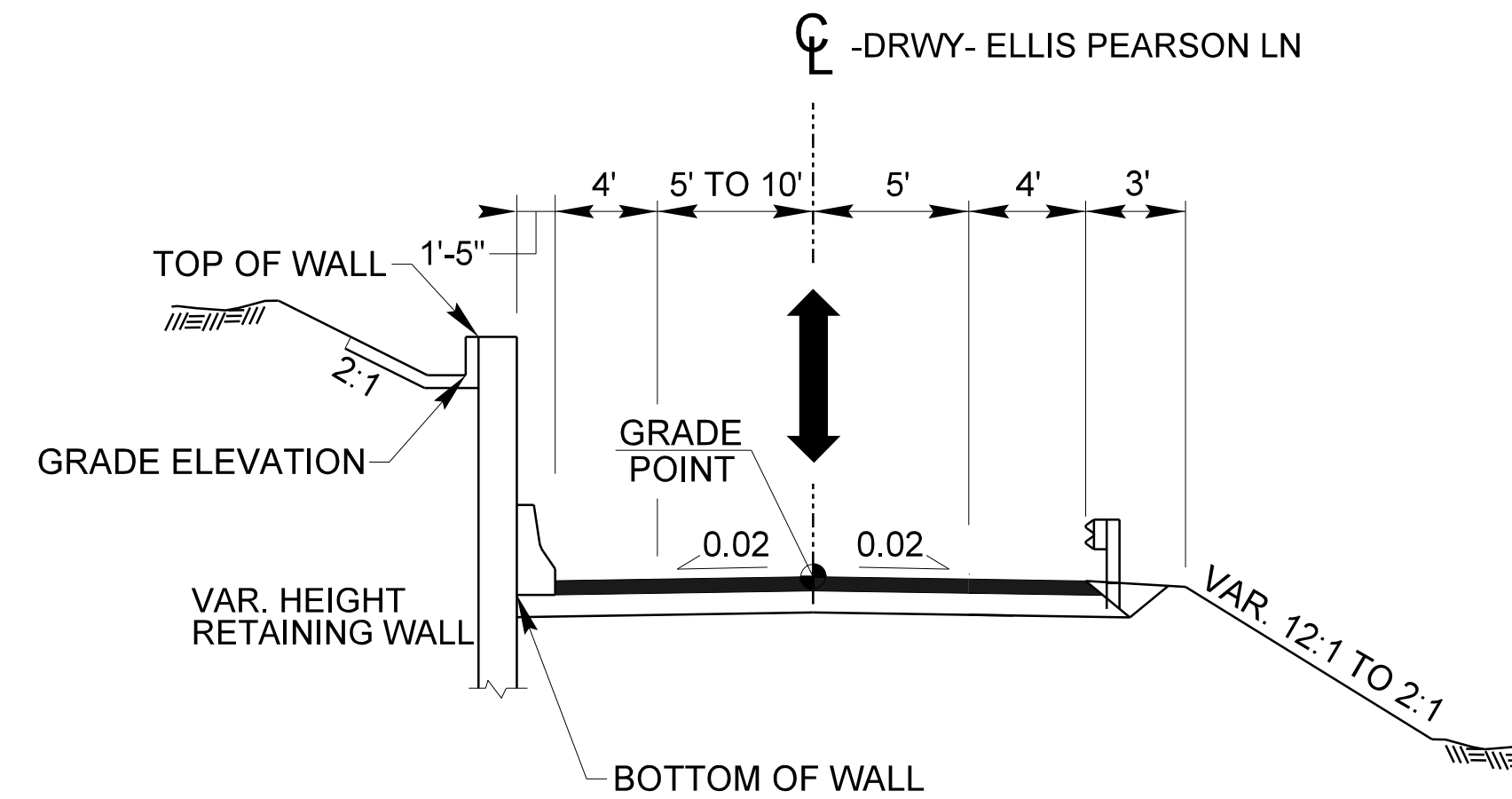
NOT TO SCALE  
(LOOKING AT FACE OF WALL)

PREPARED BY: KND DATE: 07/25  
REVIEWED BY: REK DATE: 07/25  
RETAINING WALL NO. 1 ENVELOPE AND WALL LAYOUT PROVIDED BY VHB 06/1/25.

GEOTECHNICAL ENGINEER ENGINEER

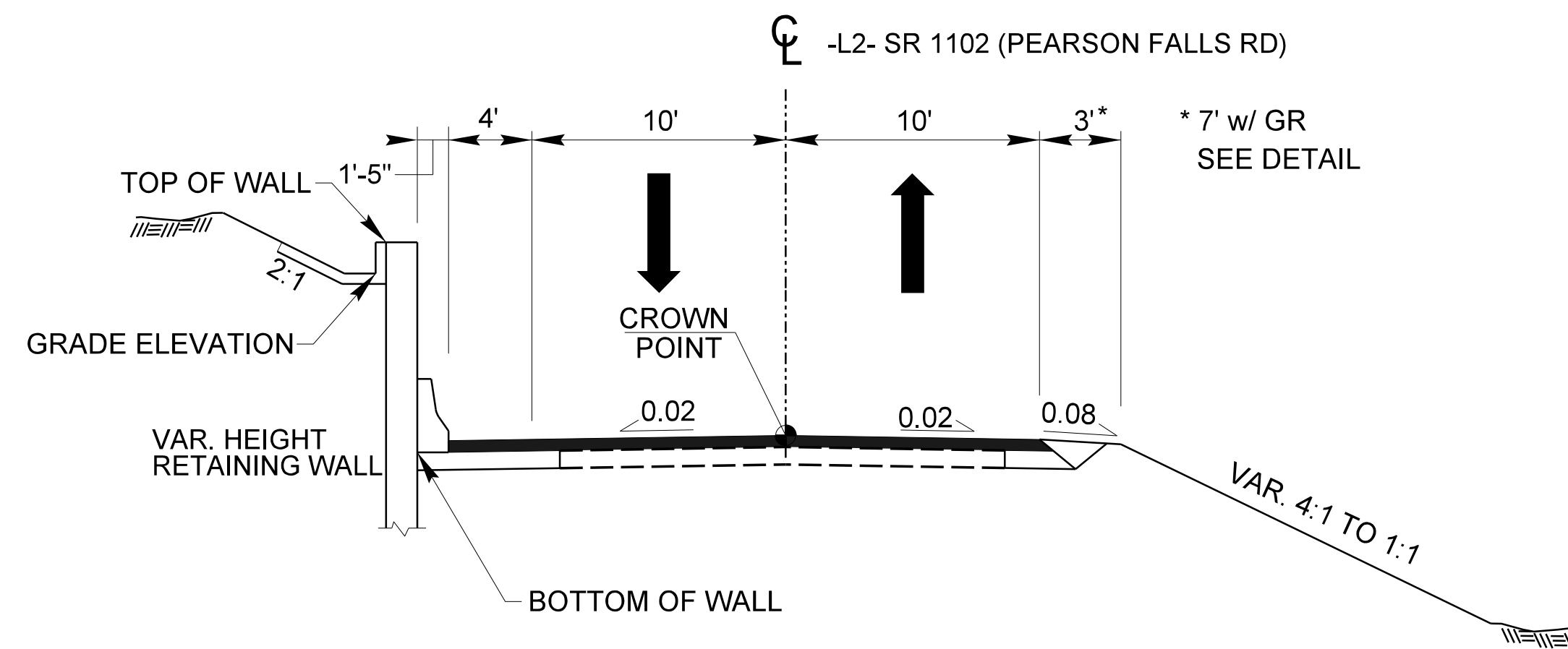
**ROBERT E. KRAL**  
NORTH CAROLINA PROFESSIONAL ENGINEER  
SEAL 042642  
Signed by: Robert Kral 07/31/2025  
AAFB8E73C5E4B1  
SIGNATURE DATE SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



**PARTIAL TYPICAL SECTION RETAINING WALL NO. 1**

-RW1- STA. 10+00.00 TO 10+97.73  
-DRWY- STA. 10+20.00 TO 11+16.46



**PARTIAL TYPICAL SECTION RETAINING WALL NO. 1**

-RW1- STA. 10+97.73 TO 12+05.37  
-L2- STA. 10+00.00 TO 11+10.00

STATION	GRADE ELEVATION (FT)	BOTTOM OF WALL ELEVATION (FT)	MIN. EMBEDMENT (FT)	TOP OF LEVELING PAD ELEVATION (FT)	WALL DESIGN HEIGHT, "H" (FT)
-DRWY- 10+20.16, LT	1472.26	1465.00	1.00	1464.00	8.26
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PROJECT NO.: BP14.R038

POLK COUNTY

STATION: -RW1- STA. 10+00.00 TO 12+05.37

SHEET 1 OF 2

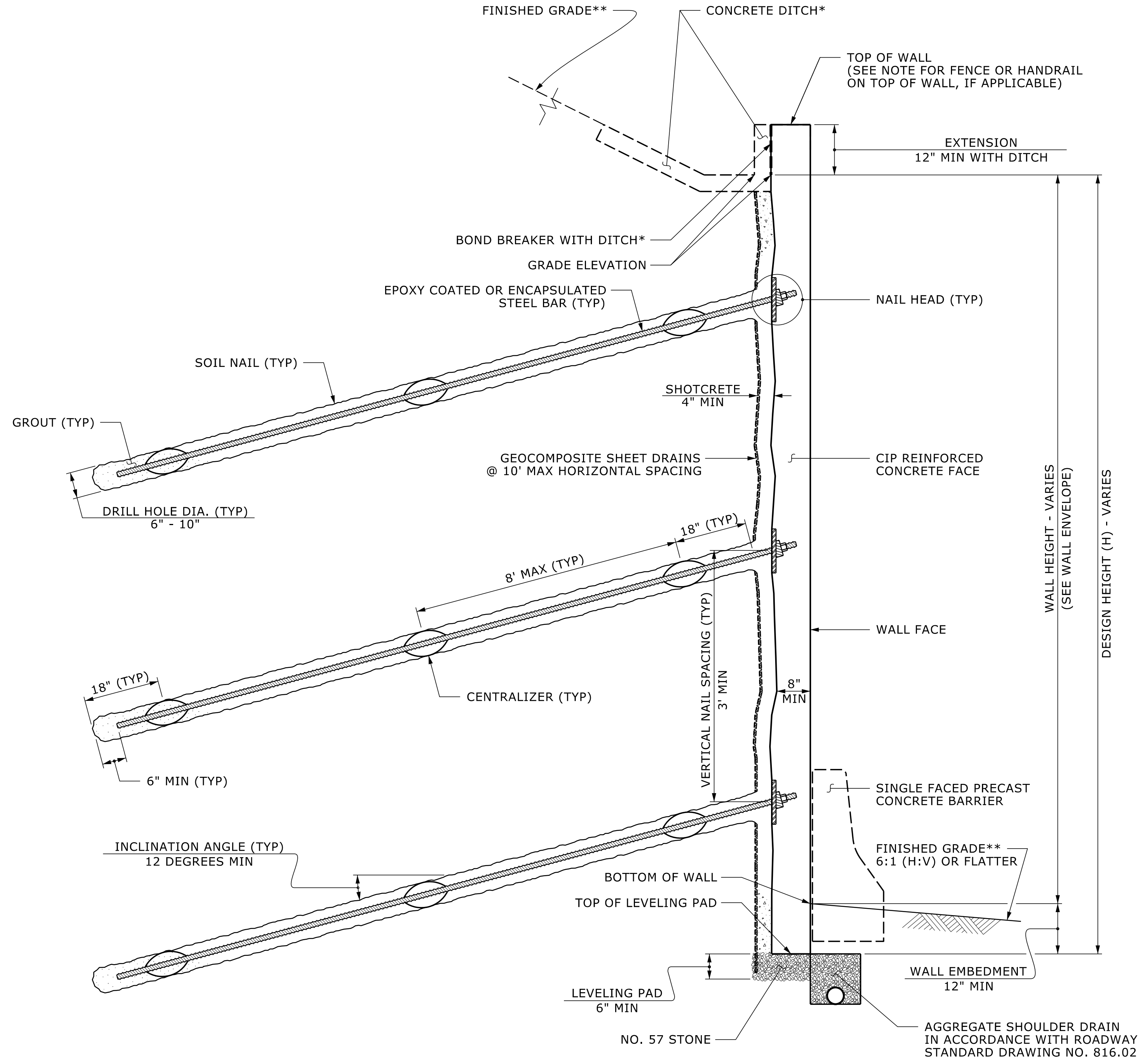
Prepared in the Office of:  
**CAROLINAS GEOTECHNICAL GROUP**  
1805 SARDIS ROAD NORTH SUITE 100  
CHARLOTTE, NC 28270  
(980) 339-8684

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS  
**GEOTECHNICAL ENGINEERING UNIT**

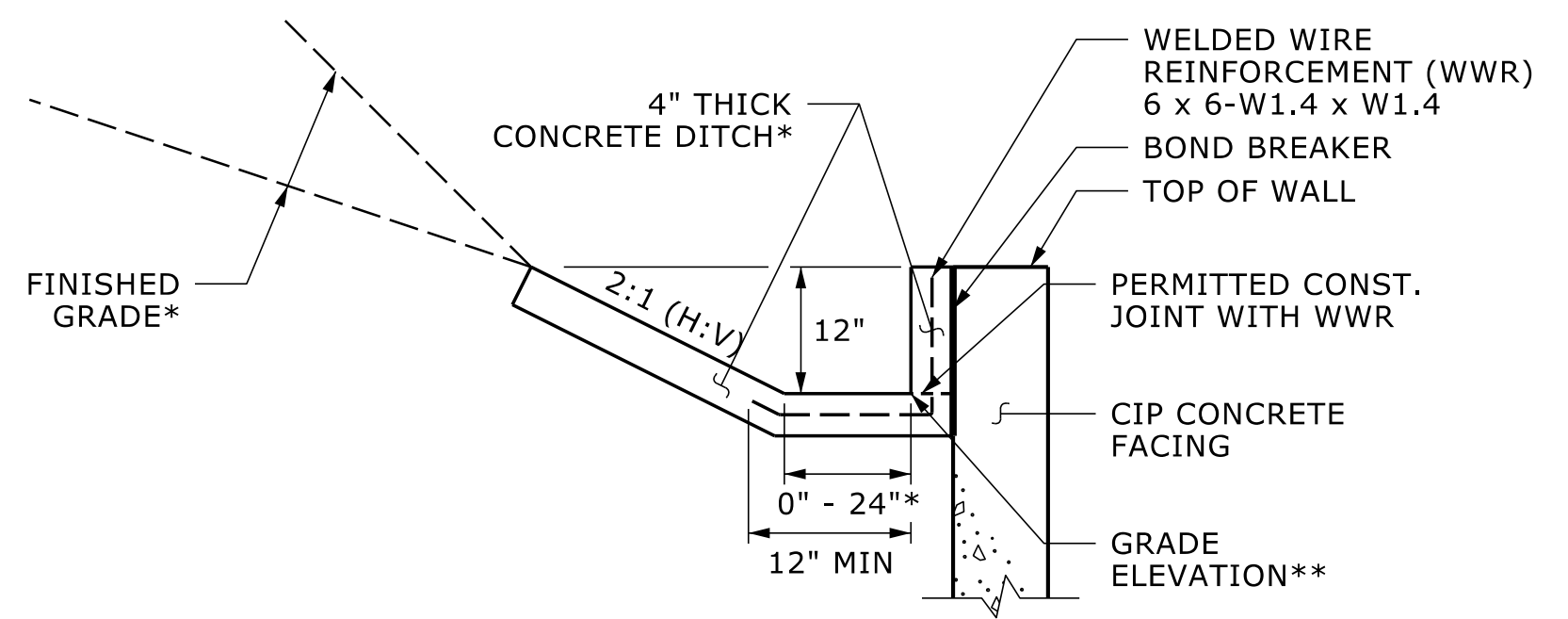
SOIL NAIL RETAINING WALL NO. 1  
PLAN AND PROFILE

REVISIONS					
NO.	BY	DATE	NO.	BY	DATE
1			3		
2			4		

SHEET NO. W-1



**SOIL NAIL WALL - TYPICAL SECTION**  
 \*SEE CONCRETE DITCH BEHIND WALL DETAILS.  
 \*\*SEE PLANS FOR FINISHED GRADE OR END BENT SLOPE DETAILS.



**CONCRETE DITCH BEHIND WALL WITH CONCRETE FACING**  
 \*SEE ROADWAY PLANS FOR CONCRETE DITCH AND FINISHED GRADE DETAILS.  
 \*\*SEE WALL ENVELOPE FOR GRADE ELEVATIONS.

**NOTES:**

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 COHESION,  $c = 0$  PSF  
 IN RESIDUAL:  
 UNIT WEIGHT,  $\gamma = 120$  PCF  
 FRICTION ANGLE,  $\phi = 32$  DEGREES  
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 UNIT WEIGHT,  $\gamma = 170$  PCF  
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ESTIMATED SOIL NAIL WALL QUANTITIES			
RETAINING WALL NO.	SOIL NAIL RETAINING WALLS (SQ. FEET)	SOIL NAIL VERIFICATION TESTS	SOIL NAIL PROOF TESTS
1	3,450	2 EA	7 EA

PREPARED BY: KND DATE: 07/25  
 REVIEWED BY: REK DATE: 07/25

Prepared in the Office of:  
**CGE CAROLINAS GEOTECHNICAL GROUP**  
 1805 SARDIS ROAD NORTH SUITE 100  
 CHARLOTTE, NC 28270  
 (980) 339-8684

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS  
**GEOTECHNICAL ENGINEERING UNIT**

PROJECT NO.: BP14.R038  
 POLK COUNTY  
 STATION: -RW1- STA. 10+00.00 TO 12+05.37  
 SHEET 2 OF 2

SOIL NAIL RETAINING WALL NO. 1 NOTES AND DETAILS					
REVISIONS					
NO.	BY	DATE	NO.	BY	DATE
1			3		
2			4		

SHEET NO. W-2