

# RETAINING WALL NO. 1

THE WALL ENVELOPE DOES NOT ACCURATELY DEPICT THE ACTUAL FACE OF THE WALL AT THE FOLLOWING LOCATION:  
 -L- STA. 28+75.00 TO -L- STA. 29+00.00, LT  
 -L- STA. 31+40.00 TO -L- STA. 31+50.00, LT

GEOTECHNICAL ENGINEER

ENGINEER

SEAL 041986

D. Matthew Brewer

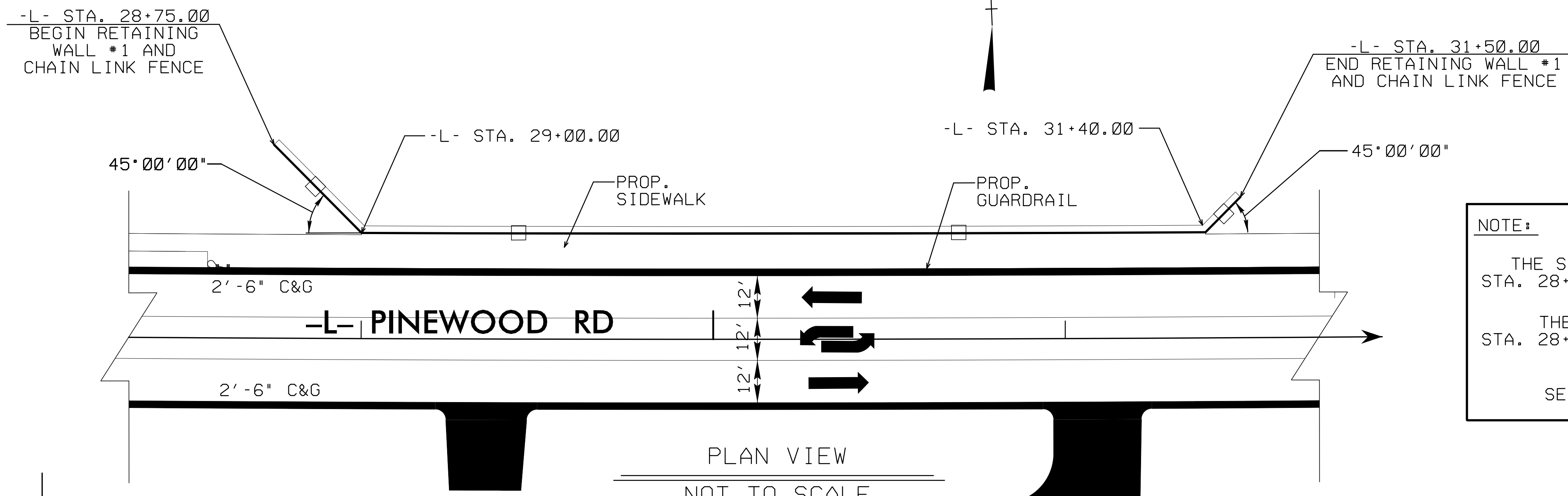
11/21/23

DATE

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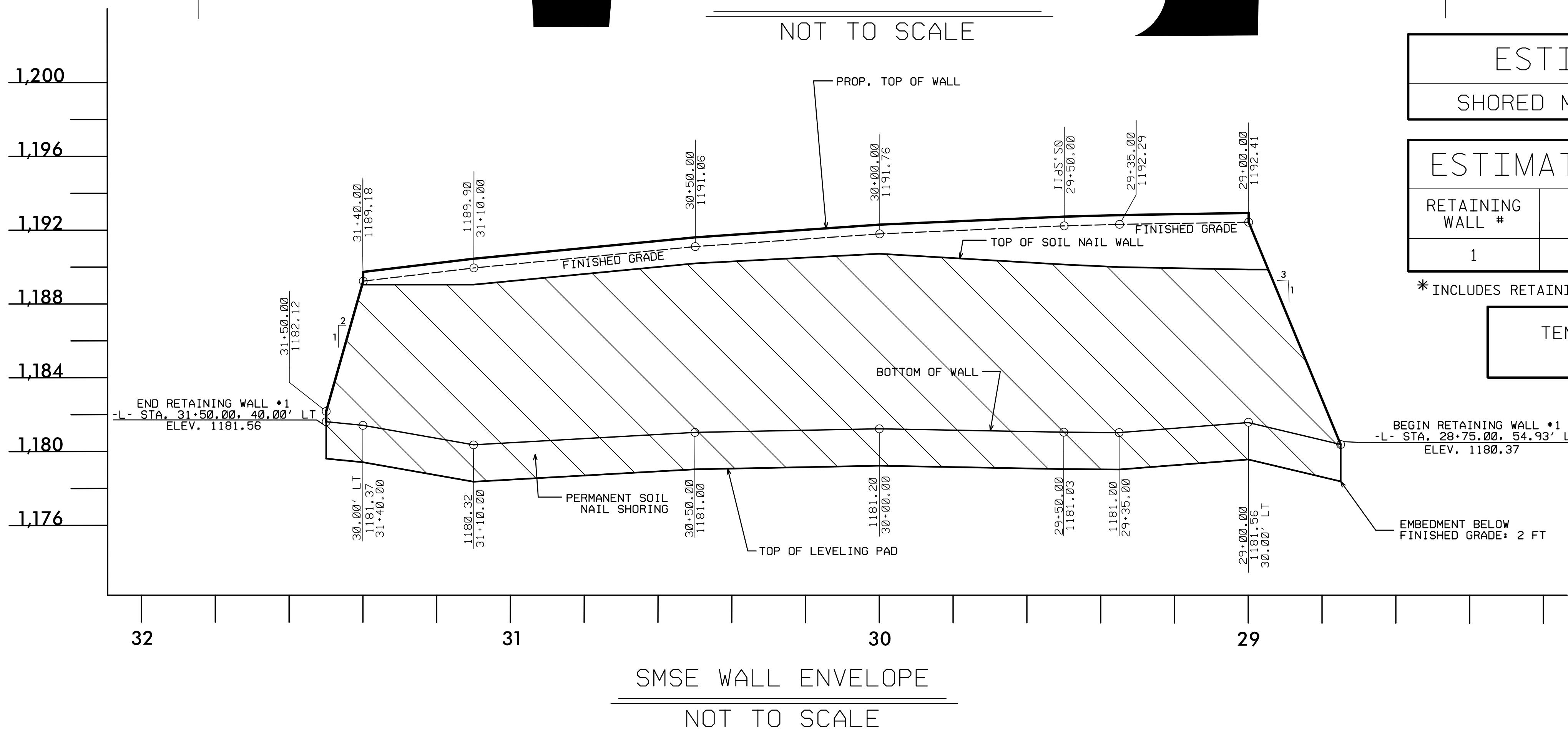


NOTE:

THE SOIL NAIL WALL LIMITS ARE FROM STA. 28+75.00 -L- TO STA. 31+50.00 -L-.

THE SMSE WALL LIMITS ARE FROM STA. 28+75.00 -L- TO STA. 31+50.00 -L-.

SEE SHEET 2 OF 5 FOR DETAILS



ESTIMATED SMSE WALL QUANTITIES	
SHORED MSE RETAINING WALL NO. 1	3,320 SQ. FT.

ESTIMATED SOIL NAIL WALL QUANTITIES			
RETAINING WALL #	PERMANENT SOIL NAIL RETAINING WALLS (SQUARE FEET)	SOIL NAIL VERIFICATION TESTS	SOIL NAIL PROOF TESTS
1	2,900*	2	8

\*INCLUDES RETAINING WALL EMBEDMENT

TEMPORARY SOIL NAIL SHORING 825 SQ. FT. (IF REQUIRED)

PROJECT NO.: U-6036  
 CALDWELL COUNTY  
 RETAINING WALL NO. 1 STATION: -L-28+75, LT TO 31+50, LT  
 SHEET 1 OF 5

Prepared in the Office of:

**CGE** CAROLINAS GEOTECHNICAL GROUP  
 2400 CROWNPPOINT EXECUTIVE DRIVE  
 SUITE 800  
 CHARLOTTE, NC 28227  
 (980) 339-8684

SHORED MECHANICALLY STABILIZED EARTH (SMSE) RETAINING WALL

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

SHEET NO. W-1

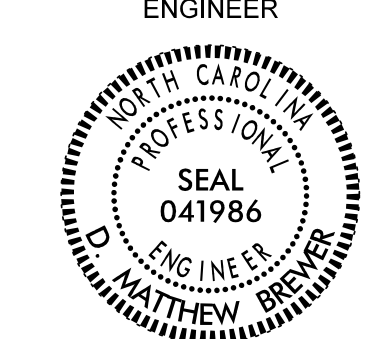
PREPARED BY: DMB DATE: 11/21/23  
 REVIEWED BY: REK DATE: 11/21/23

### SMSE RETAINING WALL #32 INFORMATION

STA. -Y2-	OFFSET FROM CL TO WALL FACE	FINISHED GRADE BEHIND WALL	BOTTOM OF WALL	MINIMUM TOP OF LEVELING PAD	ESTIMATED MINIMUM SMSE WALL EMBEDMENT	* DESIGN SMSE WALL HEIGHT "H"	TOP OF SOIL NAIL WALL	APPROX. SOIL NAIL WALL HEIGHT	WALL REINFORCEMENT (MSE STRAP) LENGTH 'L'
28+75.00	54.93	1180.37	1180.37	1178.37	2.00	2.00	—	0.00	LOWER: 0.5XH OR 6 FT (MIN) UPPER: 0.7XH OR 10 FT (MIN)
29+00.00	32.00	1192.41	1181.56	1179.56	2.00	12.85	1189.87	10.31	LOWER: 0.5XH OR 6 FT (MIN) UPPER: 0.7XH OR 10 FT (MIN)
29+35.00	32.00	1192.29	1181.00	1179.00	2.00	13.29	1190.00	11.00	LOWER: 0.5XH OR 6 FT (MIN) UPPER: 0.7XH OR 10 FT (MIN)
29+50.00	32.00	1192.20	1181.03	1179.03	2.00	13.17	1190.14	11.11	LOWER: 0.5XH OR 6 FT (MIN) UPPER: 0.7XH OR 10 FT (MIN)
30+00.00	32.00	1191.76	1181.20	1179.20	2.00	12.56	1190.72	11.52	LOWER: 0.5XH OR 6 FT (MIN) UPPER: 0.7XH OR 10 FT (MIN)
30+50.00	32.00	1191.06	1181.00	1179.00	2.00	12.06	1190.20	11.20	LOWER: 0.5XH OR 6 FT (MIN) UPPER: 0.7XH OR 10 FT (MIN)
31+10.00	32.00	1189.90	1180.32	1178.32	2.00	11.58	1189.05	10.73	LOWER: 0.5XH OR 6 FT (MIN) UPPER: 0.7XH OR 10 FT (MIN)
31+40.00	32.00	1189.18	1181.37	1179.37	2.00	9.81	1189.05	9.68	LOWER: 0.5XH OR 6 FT (MIN) UPPER: 0.7XH OR 10 FT (MIN)
31+50.00	40.00	1182.12	1181.56	1179.56	2.00	2.56	—	0.00	LOWER: 0.5XH OR 6 FT (MIN) UPPER: 0.7XH OR 10 FT (MIN)

\* FOR DESIGN WALL HEIGHT "H" AND ADDITIONAL CONSTRUCTION DETAILS, SEE SHEETS 3 AND 4  
ALL TABLE DIMENSIONS ARE GIVEN IN FEET

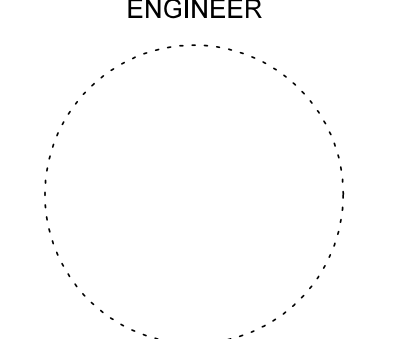
GEOTECHNICAL ENGINEER



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**D. Matthew Brewer**  
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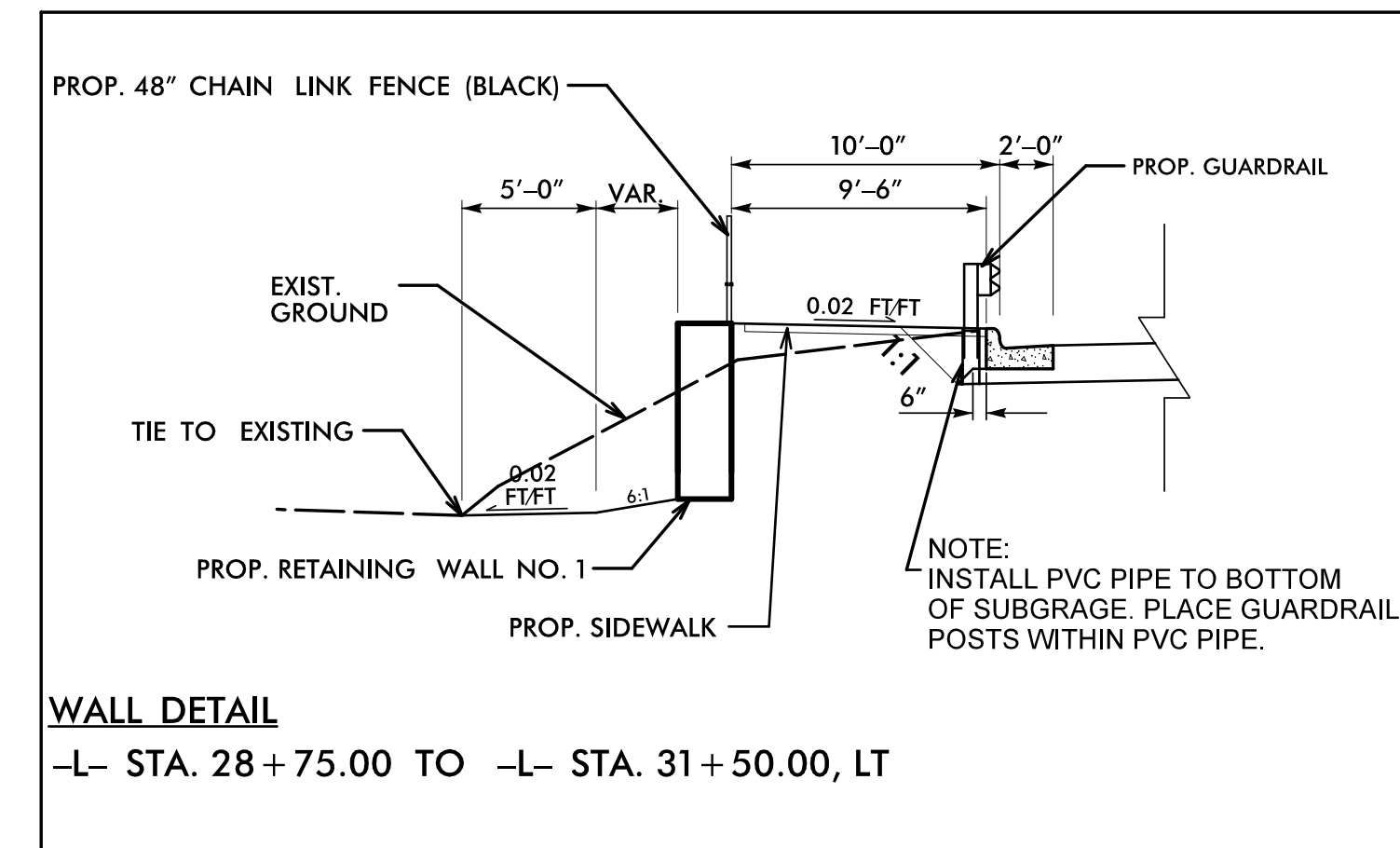
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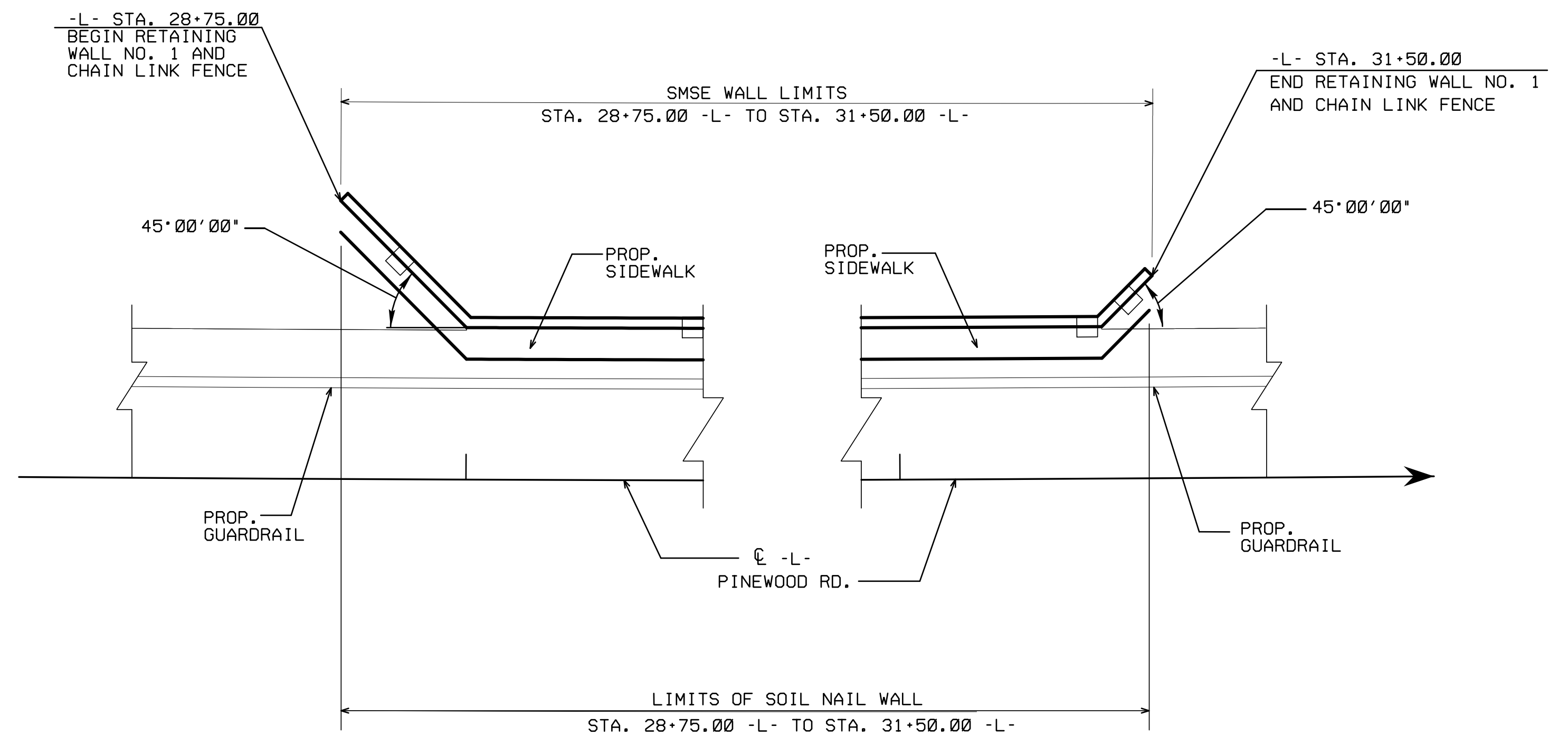


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TYPICAL WALL SECTION  
NOT TO SCALE



WALL LIMITS SKETCH  
NOT TO SCALE

**NOTE:**

THE SOIL NAIL WALL LIMITS ARE FROM STA. 28+75.00 -L- TO STA. 31+50.00 -L-.

THE MSE WALL LIMITS ARE FROM STA. 28+75.00 -L- TO STA. 31+50.00 -L-.

PROJECT NO.: U-6036  
CALDWELL COUNTY  
RETAINING WALL NO. 1 STATION: -L-28+75, LT TO 31+50, LT  
SHEET 2 OF 5

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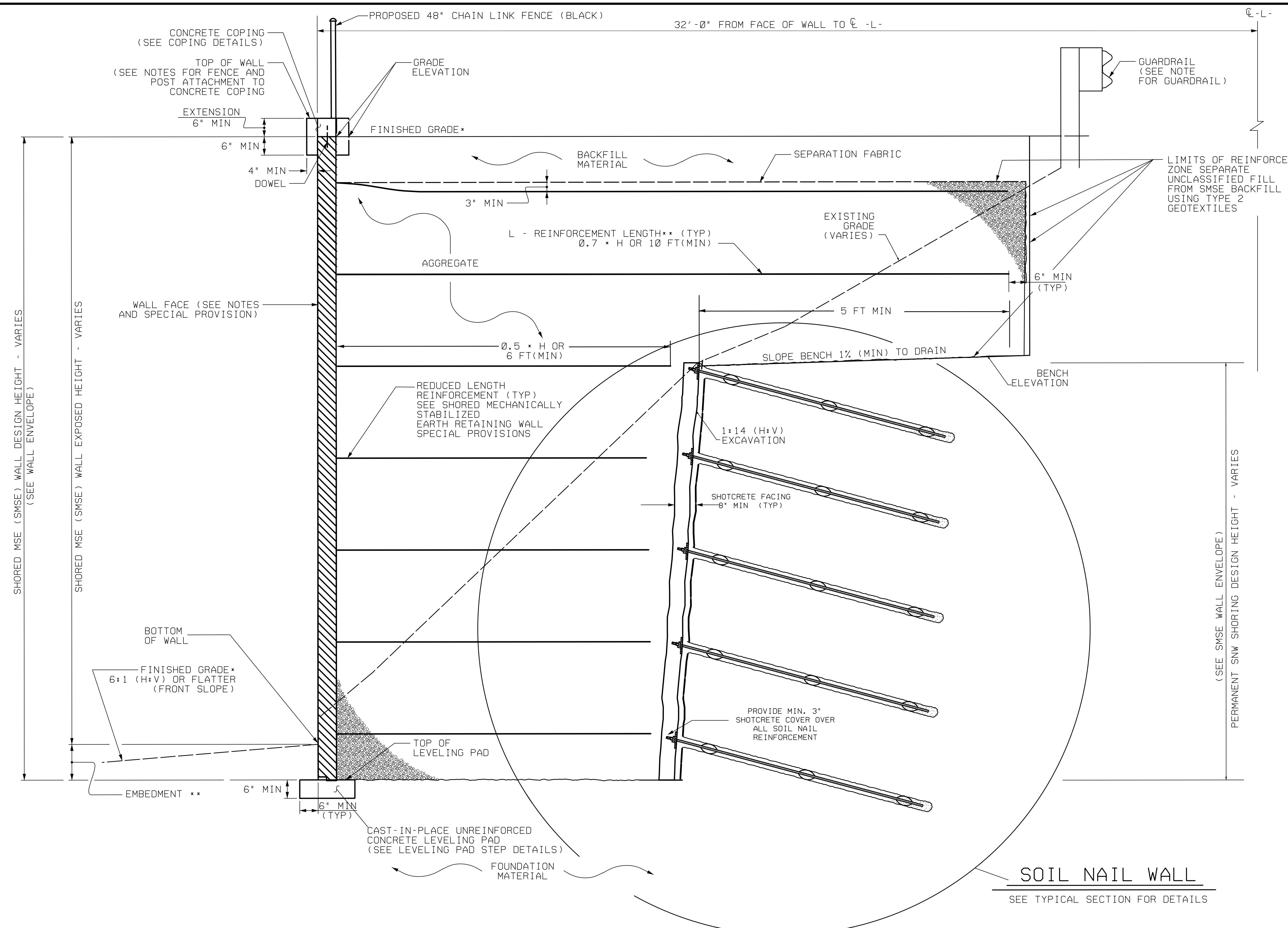


**CAROLINAS GEOTECHNICAL GROUP**  
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SHORED MECHANICALLY STABILIZED EARTH (SMSE) RETAINING WALL					
REVISIONS					
NO.	BY	DATE	NO.	BY	DATE
1			3		
2			4		

SHEET NO. W-2

PREPARED BY: DMB	DATE: 11/21/23
REVIEWED BY: REK	DATE: 11/21/23



**SMSE WALL TYPICAL SECTION**

\*SEE ROADWAY PLANS FOR FINISHED GRADE DETAILS.  
 \*\*SEE SMSE RETAINING WALLS PROVISION FOR EMBEDMENT AND REINFORCEMENT LENGTH REQUIREMENTS.

GEOTECHNICAL ENGINEER  D. Matthew Brewer 11/21/23 SIGNATURE DATE	ENGINEER  SIGNATURE DATE
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 RETAINING WALL NO. 1 STATION: -L-28+75, LT TO 31+50, LT  
 SHEET 3 OF 5

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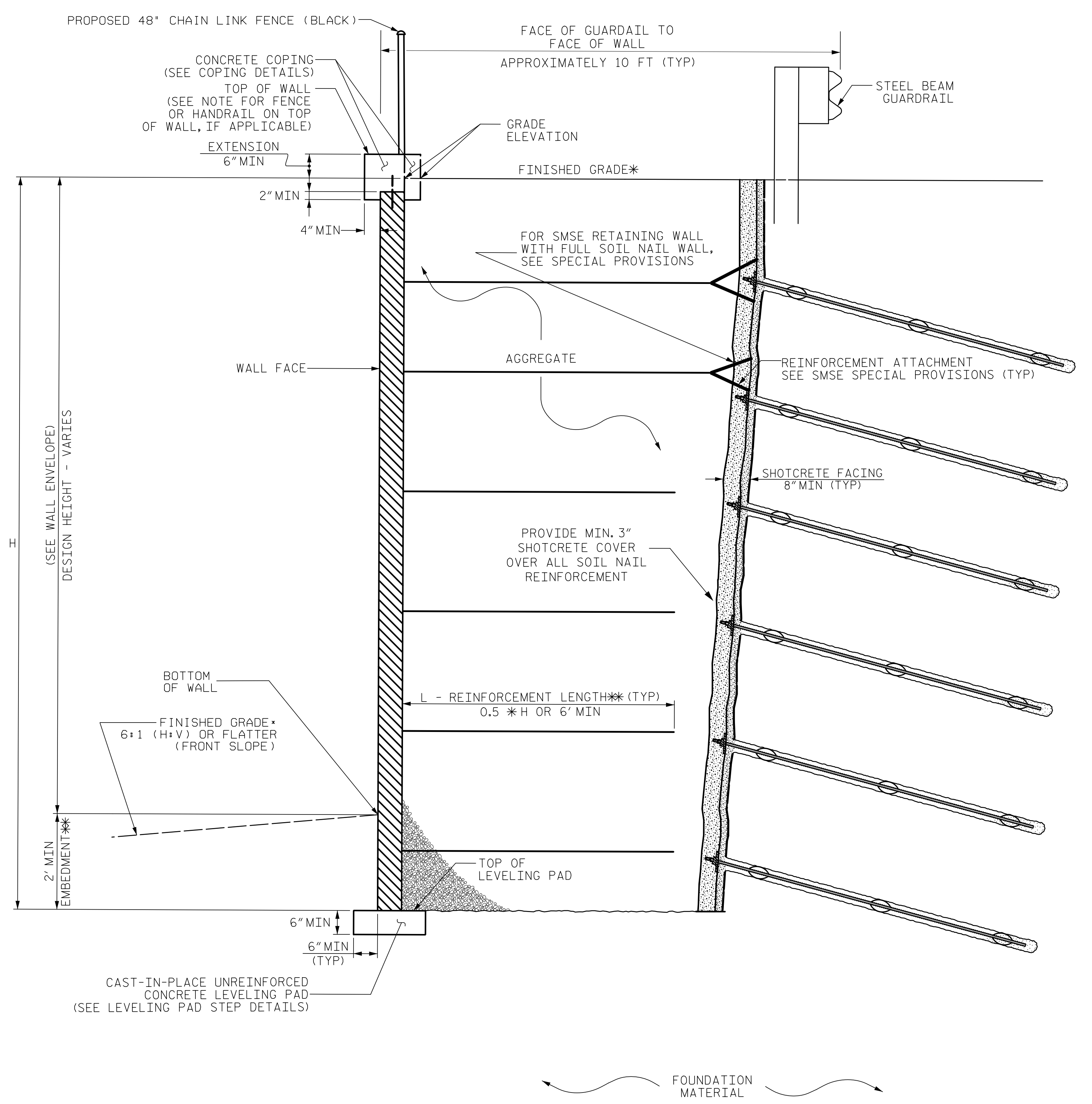
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**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS**

**GEOTECHNICAL ENGINEERING UNIT**


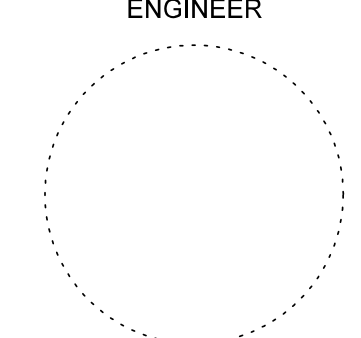
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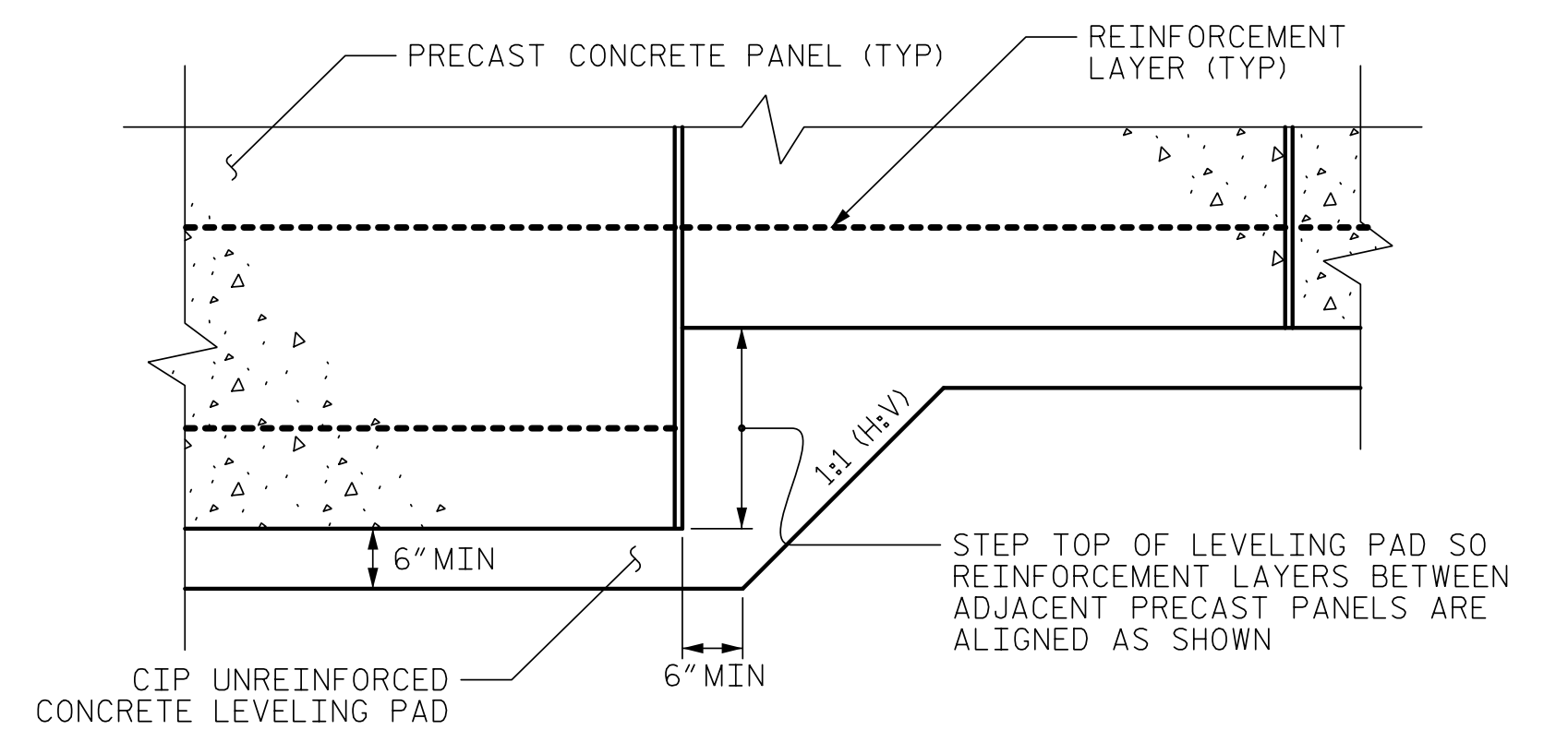
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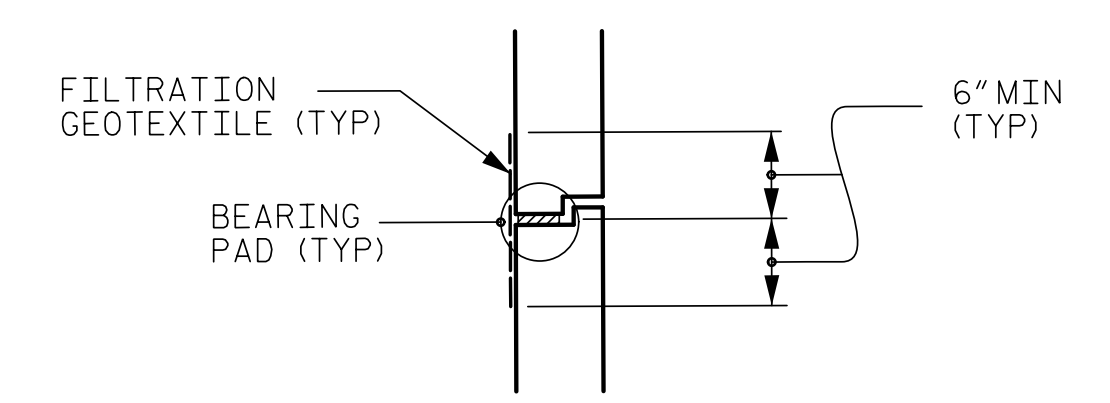
**SMSE WALL WITH FULL HEIGHT SOIL NAIL WALL**

\* SEE ROADWAY PLANS FOR FINISHED GRADE DETAILS.  
 \*\* SEE SMSE RETAINING WALLS PROVISION FOR EMBEDMENT AND REINFORCEMENT LENGTH REQUIREMENTS.

GEOTECHNICAL ENGINEER  SEAL 041986 ENGINEER M. MATTHEW BREWER	ENGINEER 
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**PRECAST PANELS LEVELING PAD STEP DETAIL**



**PRECAST PANEL JOINT DETAILS**

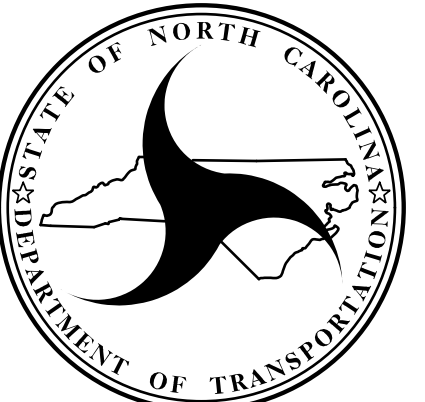
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CALDWELL COUNTY  
 RETAINING WALL NO. 1 STATION: -L-28+75, LT TO 31+50, LT  
 SHEET 4 OF 5

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1			3		
2			4		

SHEET NO. W-4

**NOTES:**

FOR SHORED MECHANICALLY STABILIZED EARTH (SMSE) WALL RETAINING WALLS, SEE SHORED MECHANICALLY STABILIZED EARTH RETAINING WALLS SPECIAL PROVISION.  
 FOR LOCATIONS WHERE A SMSE RETAINING WALL IS NOT USED, USE FULL LENGTH REINFORCEMENT AS SHOWN IN THE SMSE TYPICAL SECTION.  
 FOR STEEL BEAM GUARDRAIL, SEE ROADWAY PLANS AND SECTION 862 OF THE STANDARD SPECIFICATIONS.  
 USE AN SMSE WALL SYSTEM WITH PRECAST PANELS OR CAST-IN-PLACE FACING FOR THIS RETAINING WALL. DO NOT USE SEGMENTAL RETAINING WALL (SRW) UNITS.  
 DO NOT USE FINE AGGREGATE IN THE REINFORCED ZONE OF RETAINING WALL NO. 1.  
 CIP REINFORCED CONCRETE COPING IS REQUIRED FOR RETAINING WALL NO. 1.  
 A SMOOTH ARCHITECTURAL FINISH IS REQUIRED FOR PRECAST CONCRETE PANELS FOR RETAINING WALL NO. 1.  
 A SEPARATION GEOTEXTILE IS REQUIRED AT THE BACK OF THE REINFORCED ZONE FOR RETAINING WALL NO. 1.  
 A DRAIN IS REQUIRED FOR RETAINING WALL NO. 1.

BEFORE BEGINNING SMSE 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 WALL HEIGHTS EQUAL TO THE DESIGN HEIGHT (DIFFERENCE BETWEEN GRADE ELEVATION AND BOTTOM OF WALL ELEVATION) PLUS EMBEDMENT (DIFFERENCE BETWEEN BOTTOM OF WALL ELEVATION AND TOP OF LEVELING PAD ELEVATION).

- 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 = 2,500 PSF  
 4) MINIMUM REINFORCEMENT LENGTH (L) = VARIES, SEE TABLE ON SHEET W-2.  
 5) MINIMUM SOIL NAIL REINFORCEMENT LENGTH ARE BASED ON SNAIL.  
 6) MINIMUM EMBEDMENT DEPTH = 2.0 FT  
 7) 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.

9) IN-SITU ASSUMED MATERIAL PARAMETERS:

MATERIAL TYPE	UNIT WEIGHT (γ) PCF	FRICTION ANGLE (φ) DEGREES	COHESION (C) PSF
BACKFILL	120	28	0
FOUNDATION	120	32	0

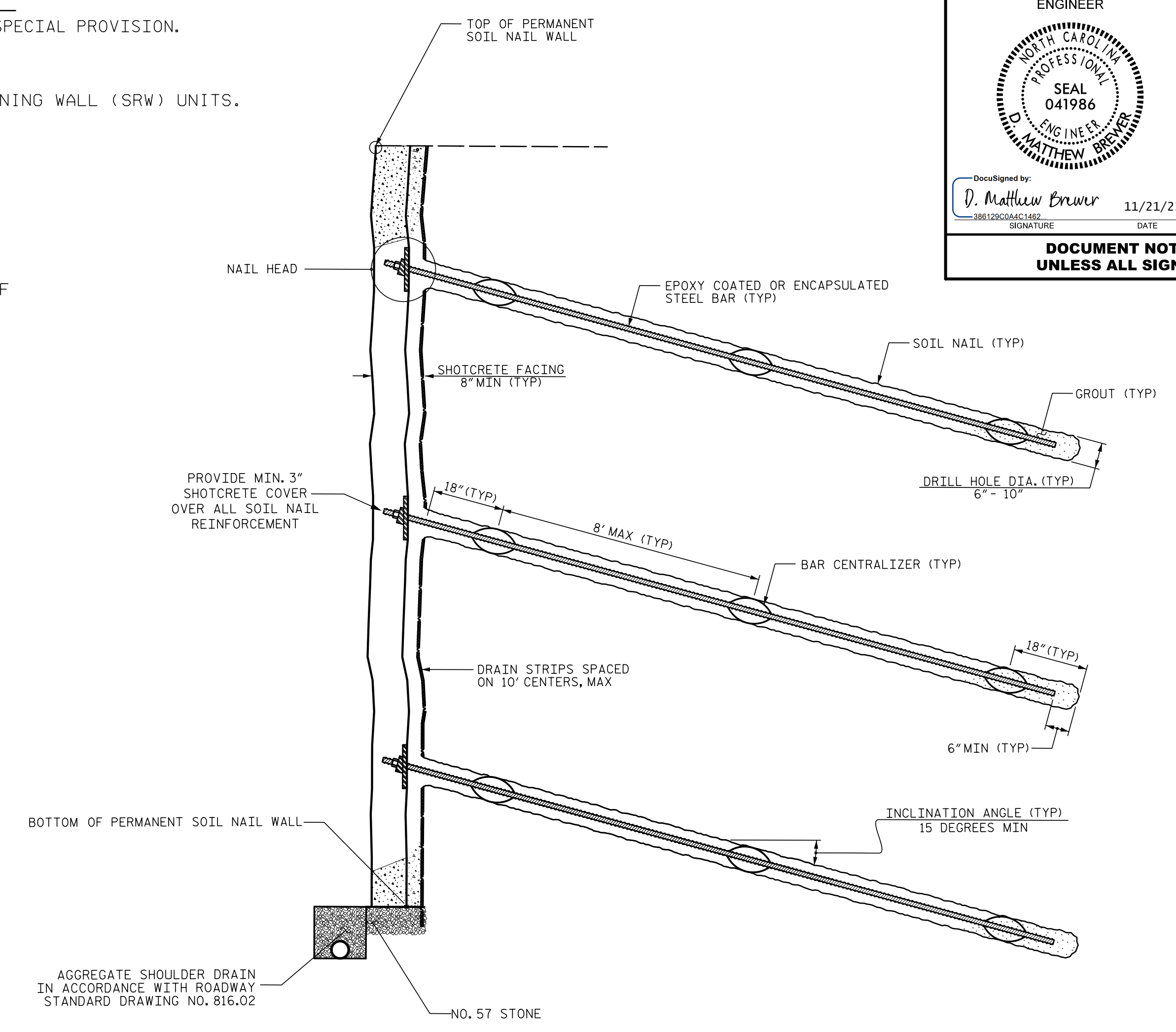
DESIGN RETAINING WALL NO. 1 FOR A LIVE LOAD (TRAFFIC) SURCHARGE.  
 EXISTING OR FUTURE OBSTRUCTIONS SUCH AS FOUNDATIONS, GUARDRAIL, FENCE OR HANDRAIL POSTS, PAVEMENTS, PIPES, INLETS OR UTILITIES WILL INTERFERE WITH MSE AND SOIL NAIL REINFORCEMENT FOR RETAINING WALL NO. 1.  
 DO NOT PLACE LEVELING PAD CONCRETE, AGGREGATE OR REINFORCEMENT FOR MSE WALL PORTION OF RETAINING WALL NO. 1 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. 1. SEE MSE RETAINING WALLS PROVISION FOR TEMPORARY SHORING FOR WALL CONSTRUCTION.  
 FOR FENCES OR HANDRAILS ON THE TOP OF THE RETAINING WALL, SEE ROADWAY PLANS FOR FENCE OR HANDRAIL ATTACHMENT DETAILS.

THE SMSE WALL DESIGNER SHALL CONSULT WITH THE SOIL NAIL WALL DESIGNER TO VERIFY LOCATIONS WHERE "TEMPORARY SHORING" MAY BE REQUIRED FOR THE RETAINING WALL IN ACCORDANCE WITH THE TEMPORARY SHORING PROVISION. SEE TRAFFIC CONTROL PLANS. IN LOCATIONS WHERE "PERMANENT SOIL NAIL WALL" IS USED, PAYMENT WILL NOT BE MADE FOR "TEMPORARY SHORING" FOR TRAFFIC CONTROL.  
 CONTRACTOR SHALL DAYLIGHT AGGREGATE SHOULDER DRAINS OUTSIDE THE LIMITS OF THE WALL.  
 FOR SOIL NAIL RETAINING WALLS, SEE SMSE RETAINING WALL SPECIAL PROVISION.

THE PERMANENT SOIL NAIL WALL HEIGHT IS AN ESTIMATE ONLY, THAT IS BASED ON THE ANTICIPATED EXCAVATION PLUS THE MINIMUM EMBEDMENT LISTED.  
 DESIGN SOIL NAIL WALL FOR A LIVE LOAD (TRAFFIC) SURCHARGE.  
 DESIGN SOIL NAIL WALL FOR HEIGHTS (H<sub>SN</sub>) EQUAL TO THE DESIGN HEIGHT (DIFFERENCE BETWEEN GRADE ELEVATION AND THE TOP OF LEVELING PAD).

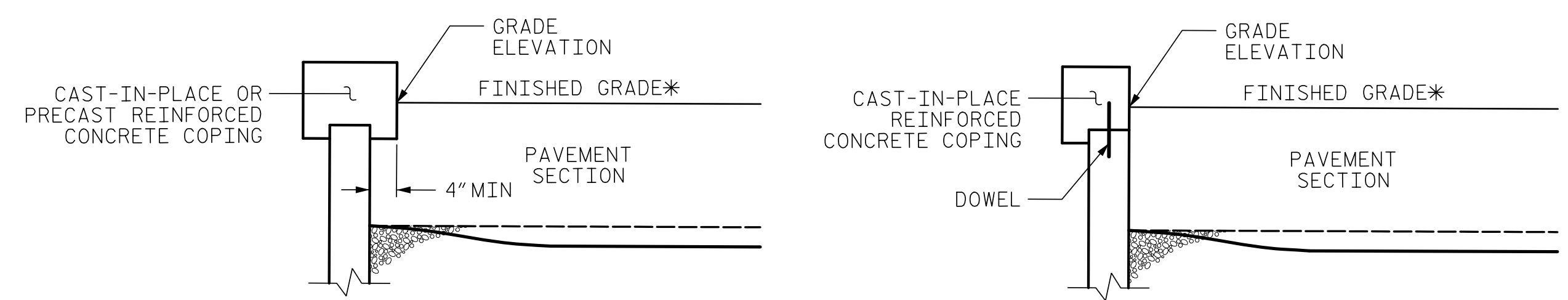
WHERE APPLICABLE, DESIGN SOIL NAIL WALL REINFORCEMENT INCLINATION TO ACCOUNT FOR EXISTING OR FUTURE UTILITY CONFLICTS BEHIND THE SOIL NAIL WALL. VERIFY UTILITY LOCATION AND ELEVATION BEFORE BEGINNING SOIL NAIL WALL DESIGN OR CONSTRUCTION.  
 \*TOP OF SOIL NAIL WALL\* AS SHOWN IN THE WALL ENVELOPE REPRESENTS THE APPROXIMATE GRADE ELEVATION AT A DISTANCE OF 0.5 TIMES THE PROPOSED WALL HEIGHT ("H") AT THAT STATION.  
 THE ESTIMATED SOIL NAIL WALL QUANTITY IS BASED ON THE 0.5 TIMES "H" OFFSET PLUS THE MINIMUM EMBEDMENT LISTED IN THE DESIGN TABLE. THESE VALUES ARE PROVIDED AS AN ESTIMATE ONLY AND MAY VARY DUE TO SITE CONDITIONS.  
 THE SOIL NAIL WALL DESIGNER IS RESPONSIBLE FOR DETERMINING GLOBAL STABILITY BASED ON THE FINISHED SMSE WALL. A MINIMUM FACTOR OF SAFETY OF 1.35 IS REQUIRED FOR GLOBAL STABILITY. SUBMIT THESE RESULTS WITH THE WALL DESIGN PACKAGE. VERIFY UTILITY LOCATIONS AND ELEVATIONS BEFORE BEGINNING MSE WALL DESIGN OR CONSTRUCTION.

**SPECIAL NOTES:**  
 UNDERCUTTING SOFT OR WET SOILS BELOW THE SMSE WALL MAY BE REQUIRED. USE UNDERCUT EXCAVATION TO REMOVE SOILS AS DIRECTED BY THE ENGINEER. PLACE GEOTEXTILE FOR SOIL STABILIZATION WHEN NEEDED IN THE BOTTOM OF THE EXCAVATION AND BACKFILL WITH SUITABLE EMBANKMENT MATERIAL. FOR UNDERCUT EXCAVATION SEE STANDARD SPECIFICATIONS. UNDERCUT EXCAVATION AND GEOTEXTILE FOR SOIL STABILIZATION WILL BE PAID AS SEPARATE ADDITIONAL QUANTITIES.  
 IF REQUIRED, EXTEND SOIL NAIL SHORING TO BOTTOM OF UNDERCUT EXCAVATION. DESIGN SOIL NAIL SHORING FOR THE HEIGHT EQUAL TO THE DIFFERENCE BETWEEN THE EXISTING ROADWAY GRADE AND THE BOTTOM OF THE UNDERCUT EXCAVATION. SOIL NAIL SHORING FOR ADDITIONAL UNDERCUT EXCAVATION WILL BE PAID IN ACCORDANCE WITH THE TEMPORARY SOIL NAIL SHORING SPECIAL PROVISION.  
 IF REQUIRED, CONTROL GROUNDWATER DURING AND AT THE BOTTOM OF UNDERCUT EXCAVATION USING DITCHING, SUMPS, AND PERMANENT SHOULDER DRAINS AS DIRECTED BY THE ENGINEER.  
 AN ACTIVE WATERLINE IS LOCATED IN CLOSE PROXIMITY TO THE BACK OF THE REINFORCED ZONE.



**PERMANENT SOIL NAIL WALL - TYPICAL SECTION**

NOT TO SCALE



**COPING DETAILS**

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

GEOTECHNICAL ENGINEER  SEAL 041986 ENGINEER M. MATTHEW BREWER	ENGINEER 
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CALDWELL COUNTY  
 RETAINING WALL NO. 1 STATION: -L-28+75, LT TO 31+50, LT  
 SHEET 5 OF 5

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SHEET NO. W-5