
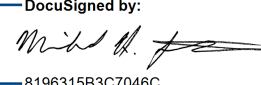
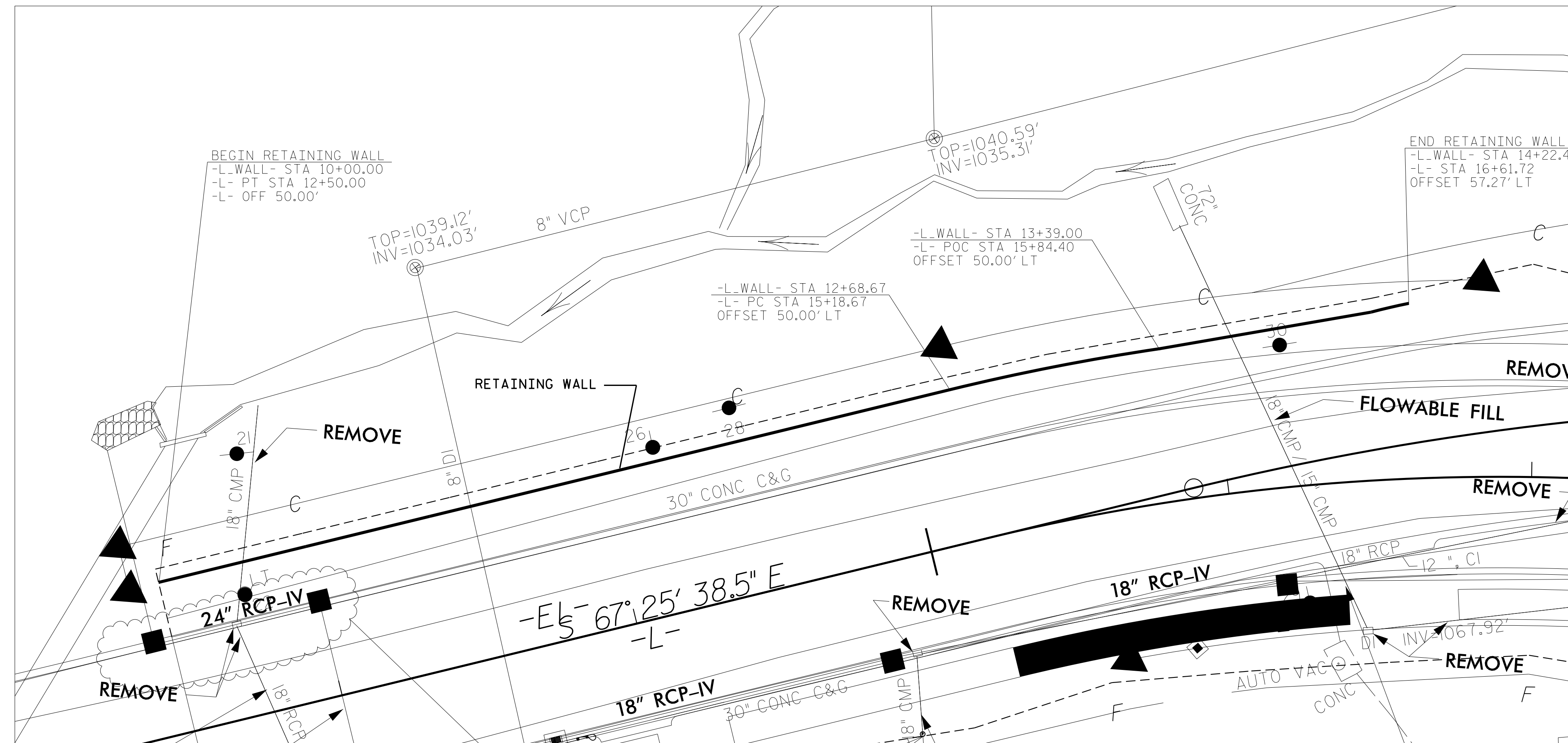


<b>PROJECT REFERENCE NO.</b> B-5869 (48063.1.FR1)		<b>SHEET NO.</b> W-1	
GEOTECHNICAL ENGINEER  SEAL 028893 MICHAEL H. STEPHENS ENGINEER		ENGINEER	
DocuSigned by:  12/20/2022		DATE SIGNATURE DATE	
<b>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</b>			

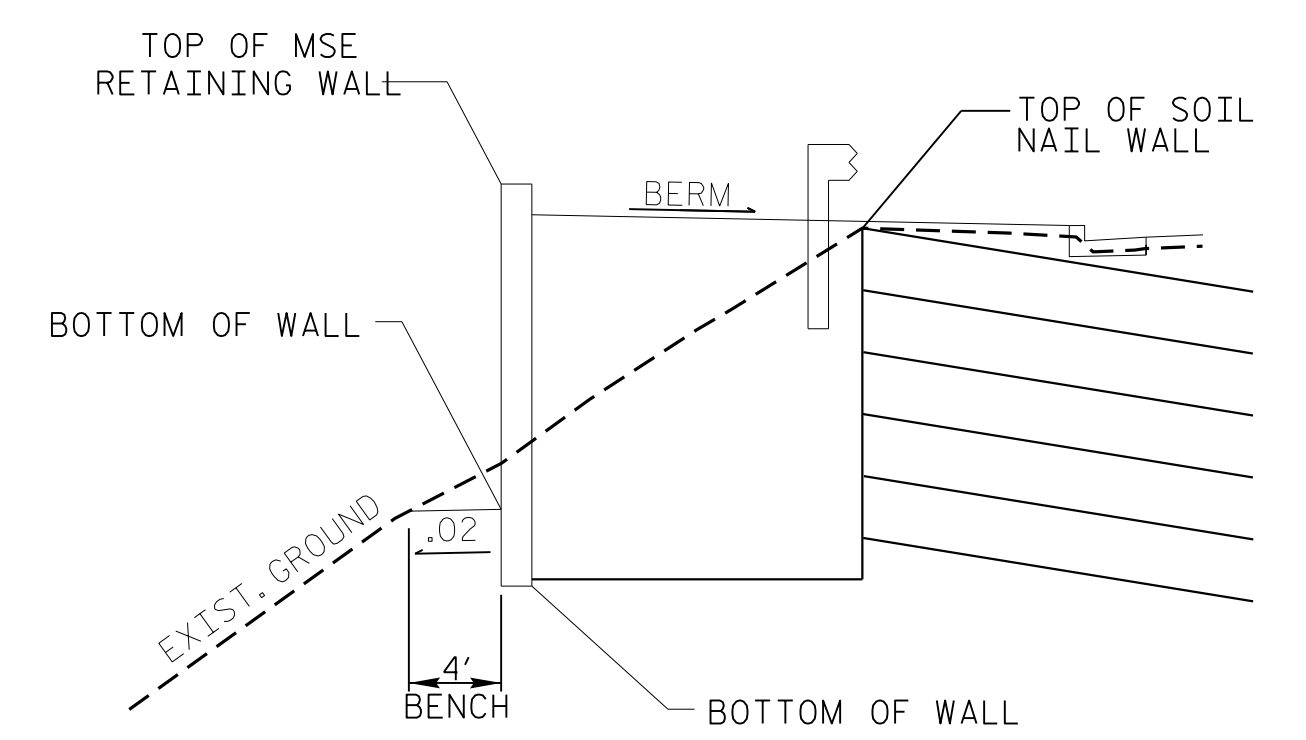


RETAINING WALL NO. 1 - PLAN VIEW  
N.T.S.

**FRONT SLOPE WALL EMBEDMENT**

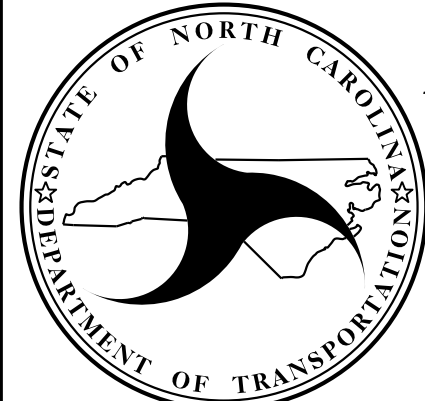
SLOPE IN FRONT OF STRUCTURES	MINIMUM EMBEDMENT DEPTH	
	FOR WALLS	FOR ABUTMENTS
HORIZONTAL	FOR WALLS	H/20
3.0H:1.0V	WALLS	H/10
2.5H:1.0V	WALLS	H/8.5
2.0H:1.0V	WALLS	H/7
1.5H:1.0V	WALLS	H/5
1.25H:1.0V	WALLS	H/4
1.0H:1.0V	WALLS	H/3

NOTE:  
 1) MAINTAIN A MINIMUM BENCH WIDTH OF 4.0 IN FRONT OF THE WALL FOR ITS ENTIRE LENGTH.  
 2) MINIMUM EMBEDMENT DEPTH OF 2 FT, UNLESS LARGER DEPTHS DICTATED BY THE ABOVE TABLE.  
 3) MAXIMUM SLOPE OF 1H:1V WILL BE MAINTAINED ON FRONT SLOPES FOR THE ENTIRE LENGTH OF THE WALL.  
 4) SUBMIT WITH THE WALL DESIGN INTERNAL, EXTERNAL, AND GLOBAL STABILITY ANALYSES.



SMSE RETAINING WALL TYPICAL SECTION

PREPARED BY: MHS      DATE: 12/20/22  
 REVIEWED BY: SCC      DATE: 12/20/22


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

**RETAINING WALL NO. 1**  
**REPLACE BRIDGE 99 ON**  
**US 64/US70 OVER SOUTHERN**  
**RAILROAD**

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

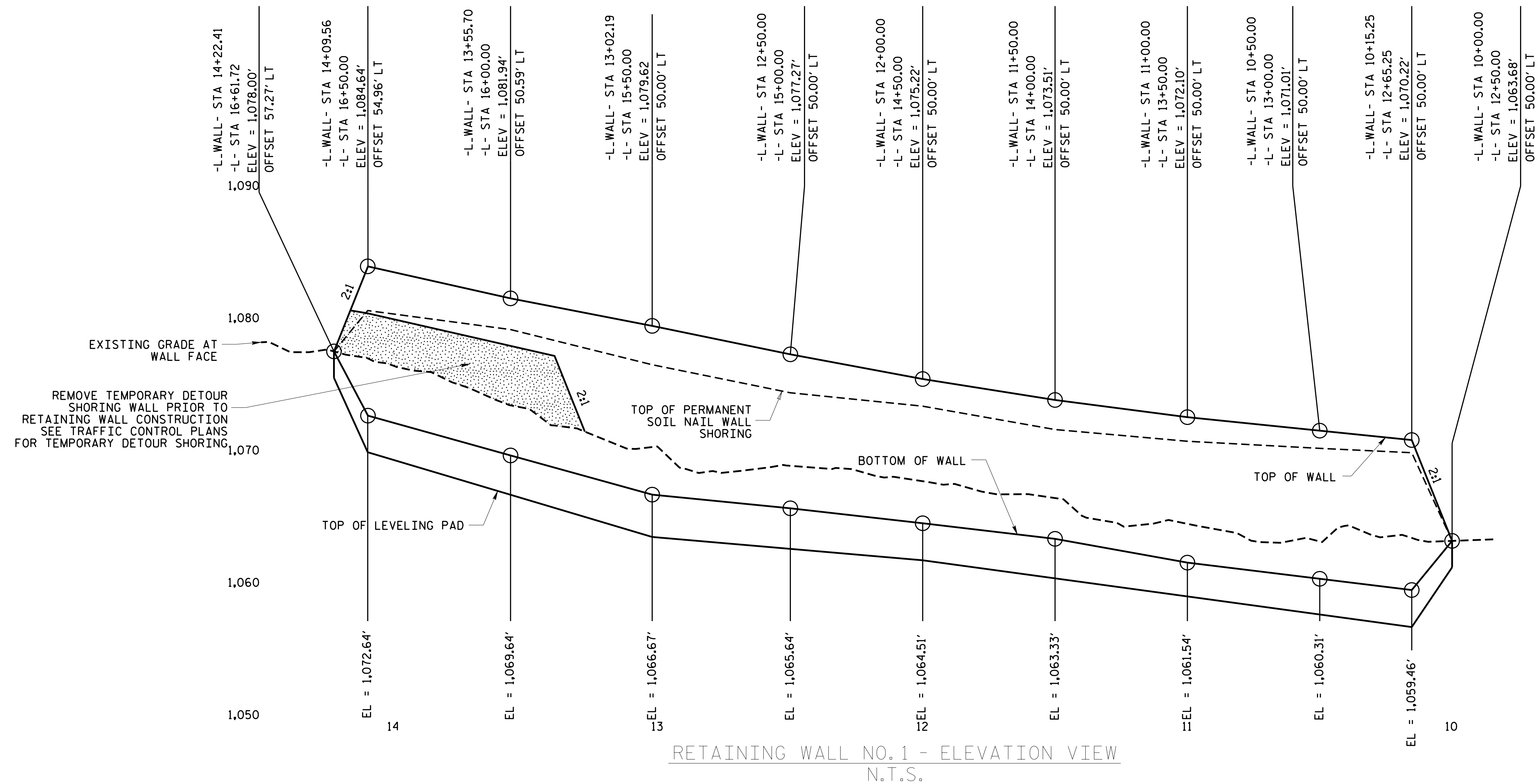
GEOTECHNICAL ENGINEER

ENGINEER



Documented by: *M.H.S.* 12/20/2022

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

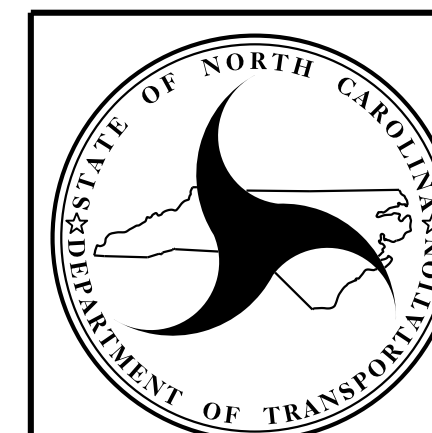


SMSE RETAINING WALL SCHEDULE								
-L- STATION	OFFSET FROM $\phi$ (LEFT) (FT)	FINISHED GRADE ELEVATION	TOP OF WALL ELEVATION	TOP OF LEVELING PAD ELEVATION	ESTIMATED SMSE WALL EMBEDMENT (FT)	DESIGN SMSE WALL HEIGHT "H" (FT)	TOP OF SOIL NAIL WALL	SOIL NAIL WALL HEIGHT (FT)
12+50.00	50.00	1063.18	1063.68	1061.18	2.00	2.50	1063.18	2.00
12+65.25	50.00	1069.72	1070.22	1056.63	2.83	13.59	1069.40	12.77
13+00.00	50.00	1070.51	1071.01	1057.51	2.80	13.50	1069.66	12.15
13+50.00	50.00	1071.60	1072.10	1058.79	2.75	13.31	1070.51	11.72
14+00.00	50.00	1073.01	1073.51	1060.71	2.62	12.80	1071.96	11.25
14+50.00	50.00	1074.72	1075.22	1061.79	2.72	13.43	1073.44	11.65
15+00.00	50.00	1076.77	1077.27	1062.74	2.90	14.53	1074.54	11.80
15+50.00	50.00	1079.12	1079.62	1063.48	3.19	16.14	1076.50	13.02
16+00.00	50.59	1081.44	1081.94	1066.67	2.97	15.27	1079.16	12.49
16+50.00	54.96	1084.14	1084.64	1069.82	2.82	14.82	1080.53	10.71
16+61.72	57.27	1077.50	1078.00	1075.50	2.00	2.50	1077.50	2.00

ESTIMATED SMSE WALL QUANTITIES (SQUARE FEET)	
SMSE RETAINING WALL NO. 1	11,740 SF
*SOIL NAIL WALL	** 9,880 SF

\* SOIL NAIL WALL QUANTITIES ARE BASED ON SMSE WALL REINFORCEMENT LENGTH OF 0.5H  
\*\* NO PAYMENT WILL BE MADE FOR THE SOIL NAIL WALL PART OF THE SMSE WALL.

PREPARED BY: MHS DATE: 12/20/22  
REVIEWED BY: SCC DATE: 12/20/22



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS


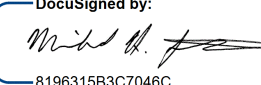
GEOTECHNICAL ENGINEERING UNIT

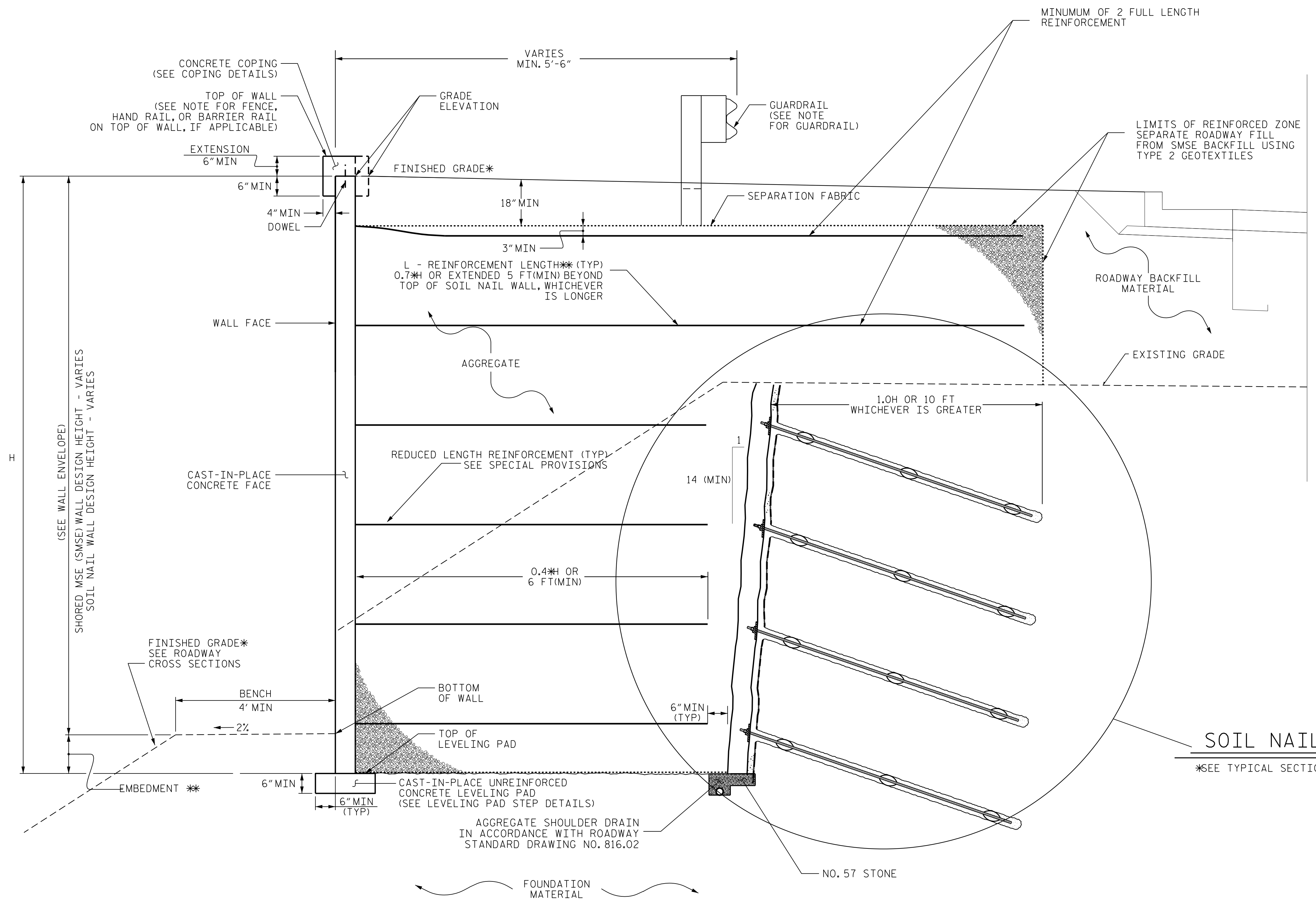
RETAINING WALL NO. 1 REPLACE BRIDGE 99 ON US 64/US70 OVER SOUTHERN RAILROAD

REVISIONS

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



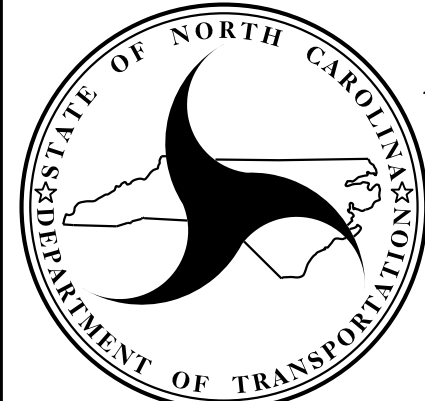
<b>PROJECT REFERENCE NO.</b> B-5869 (48063.1.FR1)		<b>SHEET NO.</b> W-3	
GEOTECHNICAL ENGINEER  DocuSigned by:  12/20/2022 <small>6190315837040C</small>		ENGINEER SIGNATURE _____ DATE _____	
<b>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</b>			



**SMSE WALL WITH PRECAST PANELS TYPICAL SECTION**


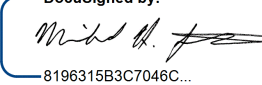
\*SEE ROADWAY PLANS FOR FINISHED GRADE DETAILS.  
\*\*SEE SMSE RETAINING WALLS PROVISION FOR EMBEDMENT REQUIREMENTS.

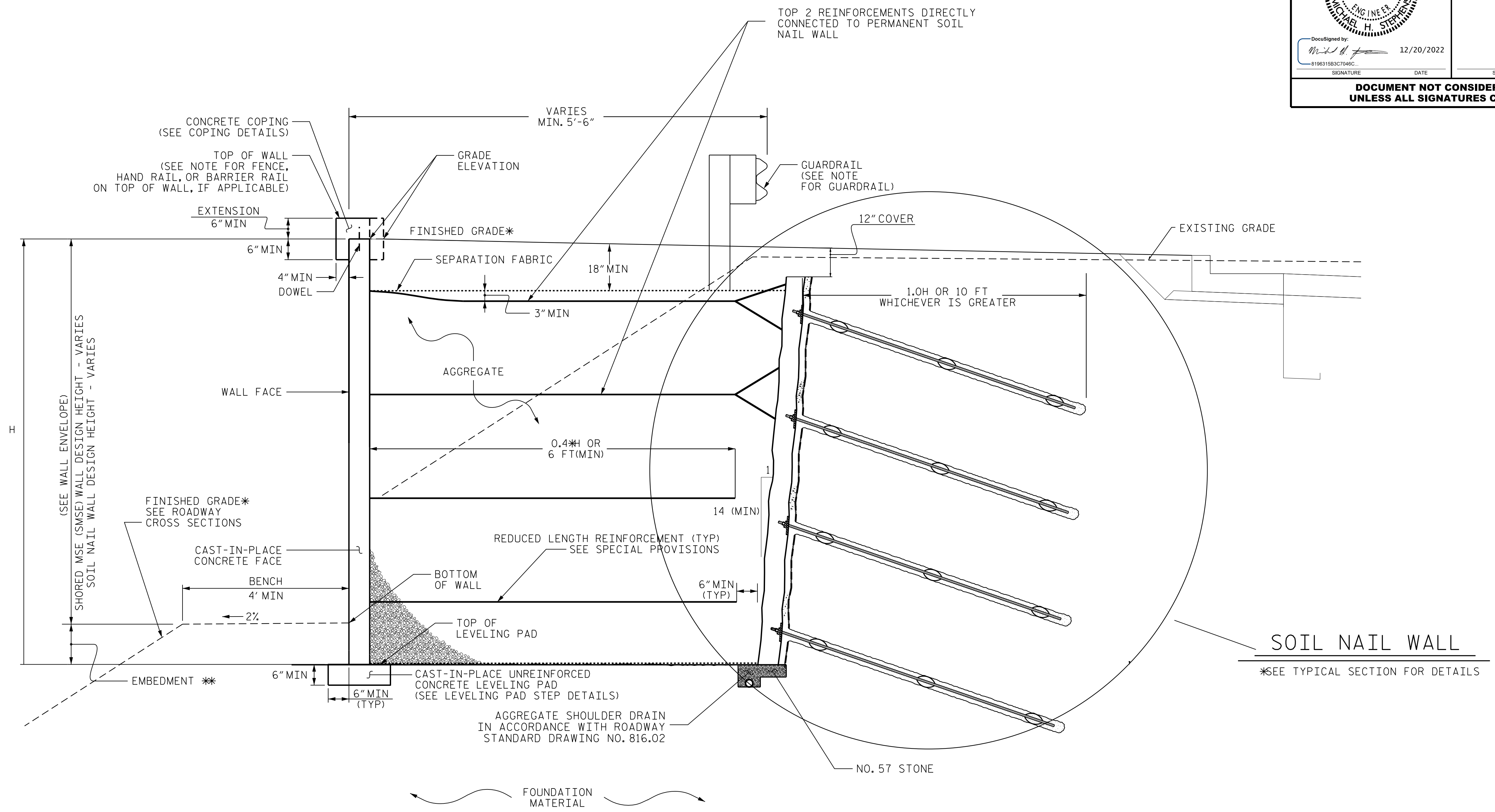
PREPARED BY: MHS      DATE: 12/20/22  
 REVIEWED BY: SCC      DATE: 12/20/22

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

**RETAINING WALL NO. 1  
SMSE WALL W/ PRECAST PANEL  
TYPICAL SECTION**

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

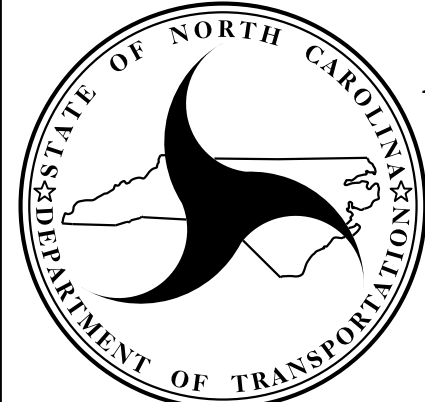
<b>PROJECT REFERENCE NO.</b> B-5869 (48063.1.FR1)	<b>SHEET NO.</b> W-4
GEOTECHNICAL ENGINEER  DocuSigned by:  12/20/2022 SIGNATURE DATE	ENGINEER SIGNATURE DATE
<b>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</b>	



**SMSE WALL WITH PRECAST PANELS TYPICAL SECTION (OPTIONAL)**

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

PREPARED BY: MHS	DATE: 12/20/22
REVIEWED BY: SCC	DATE: 12/20/22




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

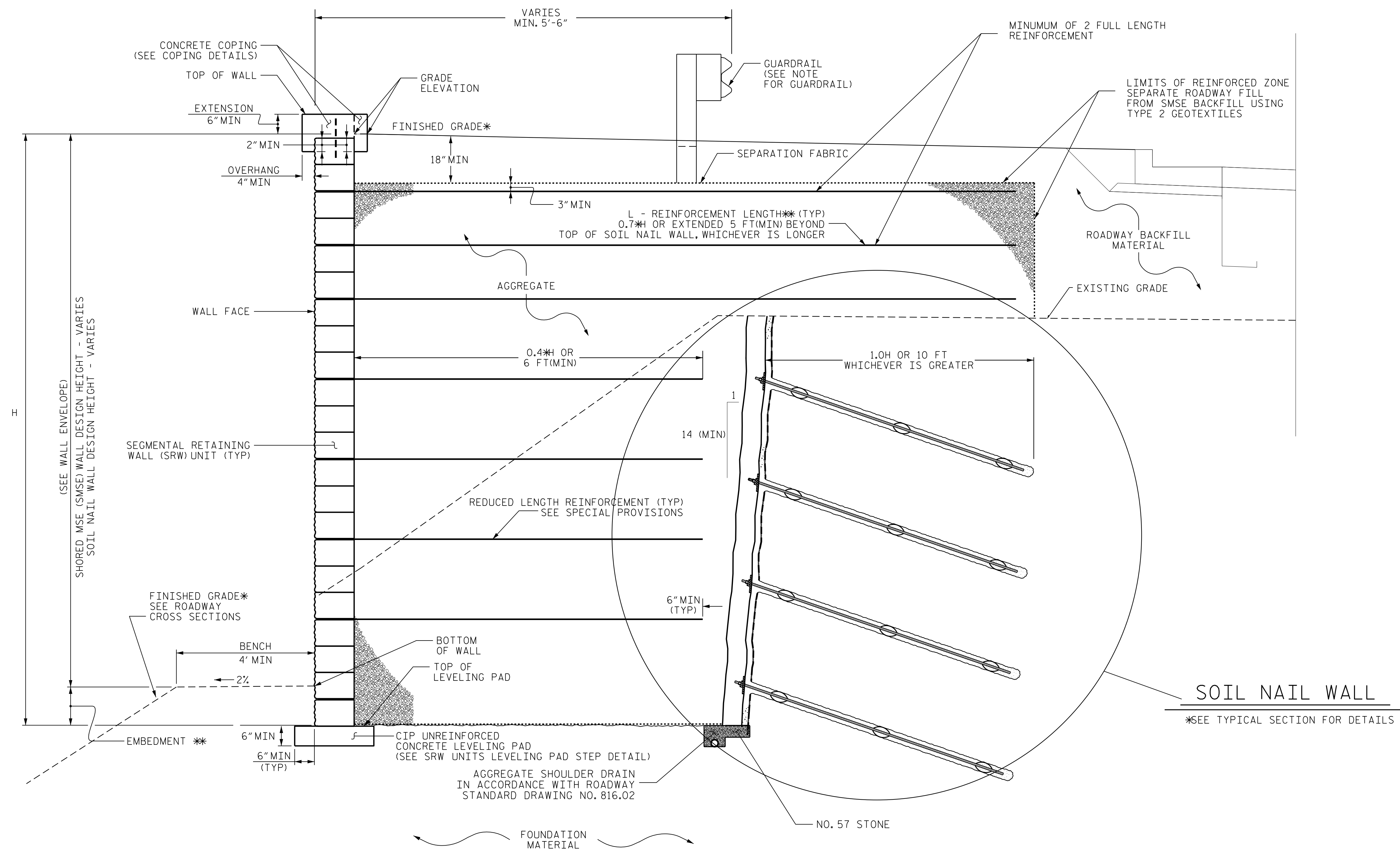
**GEOTECHNICAL  
ENGINEERING UNIT**

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

**RETAINING WALL NO. 1  
SMSE WALL W/ PRECAST PANEL  
TYPICAL SECTION (OPTIONAL)**



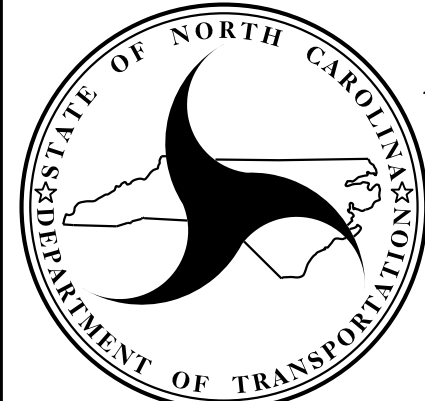
<b>PROJECT REFERENCE NO.</b> B-5869 (48063.1.FR1)	<b>SHEET NO.</b> W-5
GEOTECHNICAL ENGINEER  DocuSigned by: <i>Michael H. Stephens</i> 12/20/2022 SIGNATURE DATE	ENGINEER SIGNATURE DATE
<b>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</b>	



**SMSE WALL WITH SRW UNITS TYPICAL SECTION**


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

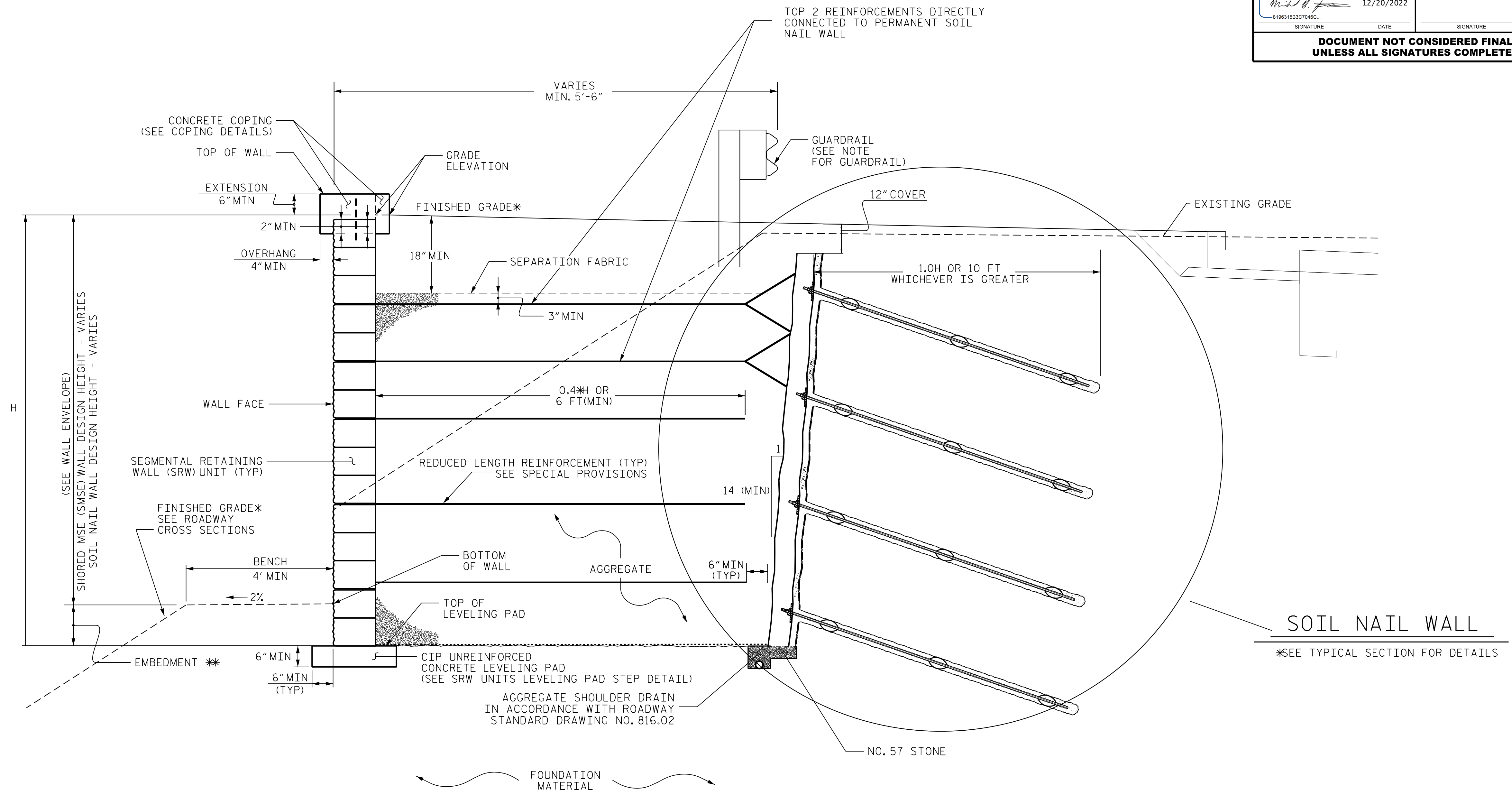
PREPARED BY: MHS	DATE: 12/20/22
REVIEWED BY: SCC	DATE: 12/20/22

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

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

**RETAINING WALL NO. 1  
SMSE WALL W/ SRW UNITS  
TYPICAL SECTION**

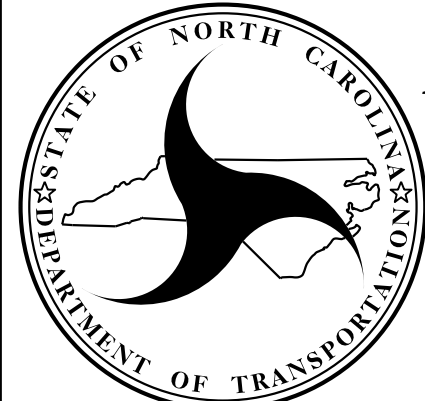
<b>PROJECT REFERENCE NO.</b> B-5869 (48063.1.FR1)		<b>SHEET NO.</b> W-6	
GEOTECHNICAL ENGINEER  DocuSigned by: <i>Michael H. Stephens</i> 12/20/2022 SIGNATURE DATE		ENGINEER SIGNATURE DATE	
<b>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</b>			



**SMSE WALL WITH SRW UNITS TYPICAL SECTION (OPTIONAL)**

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

PREPARED BY: MHS	DATE: 12/20/22
REVIEWED BY: SCC	DATE: 12/20/22




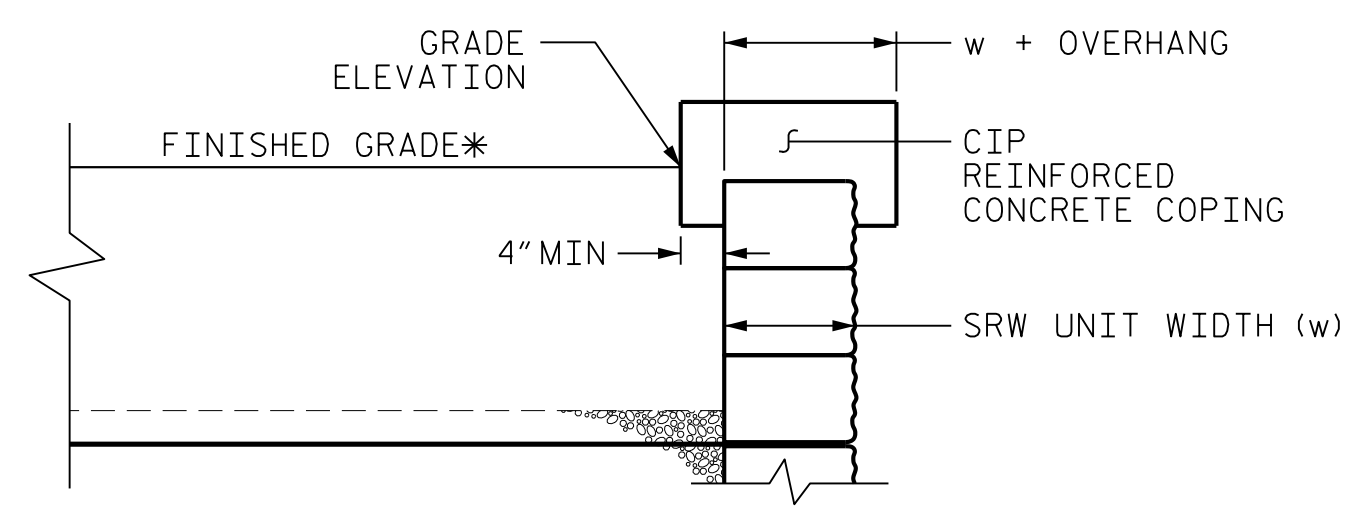
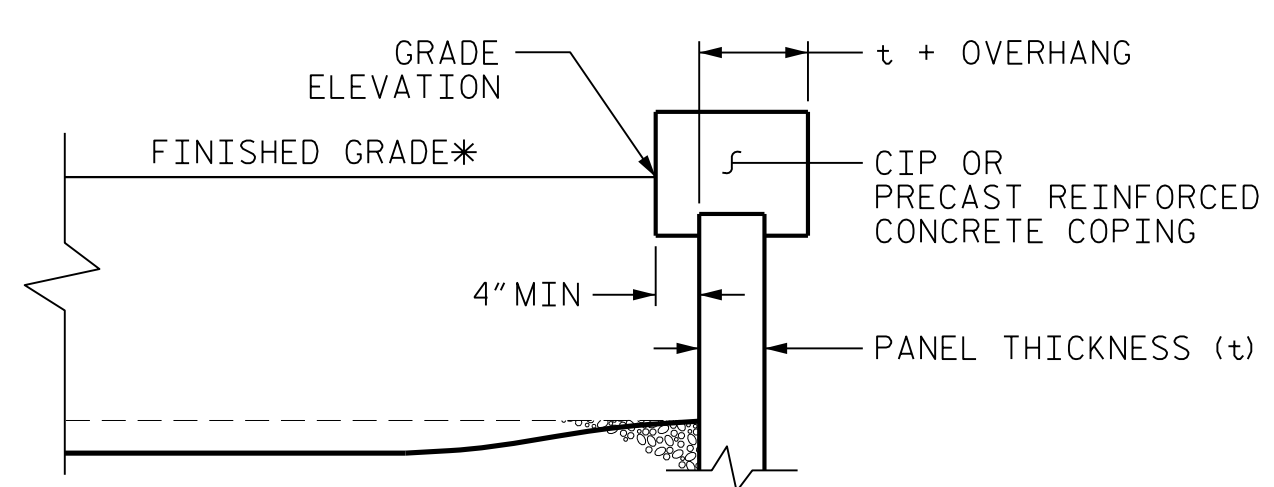
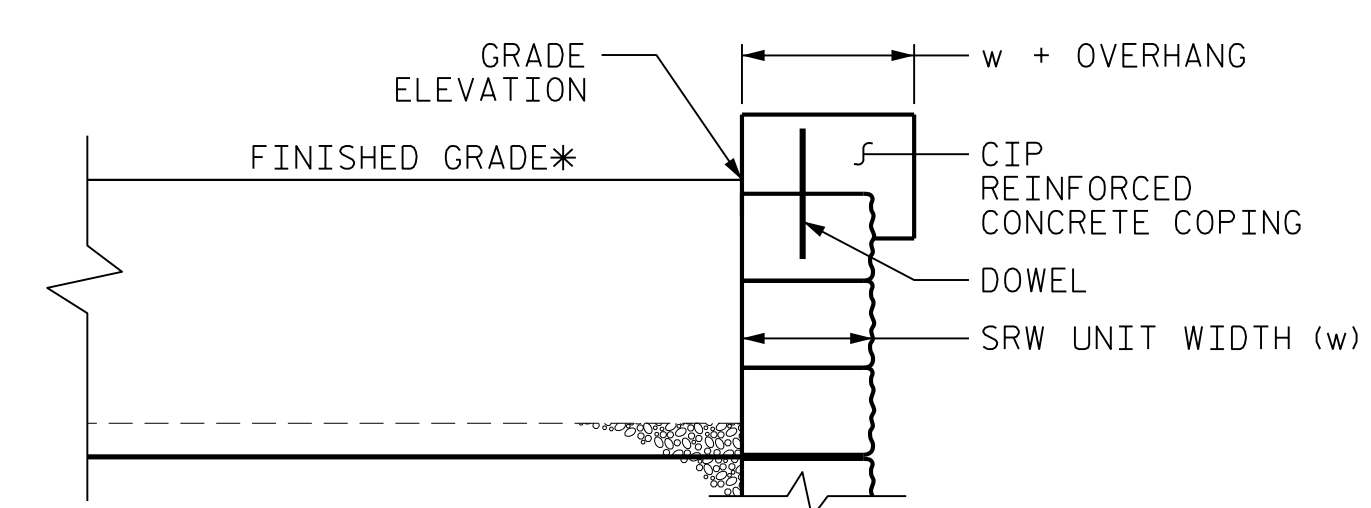
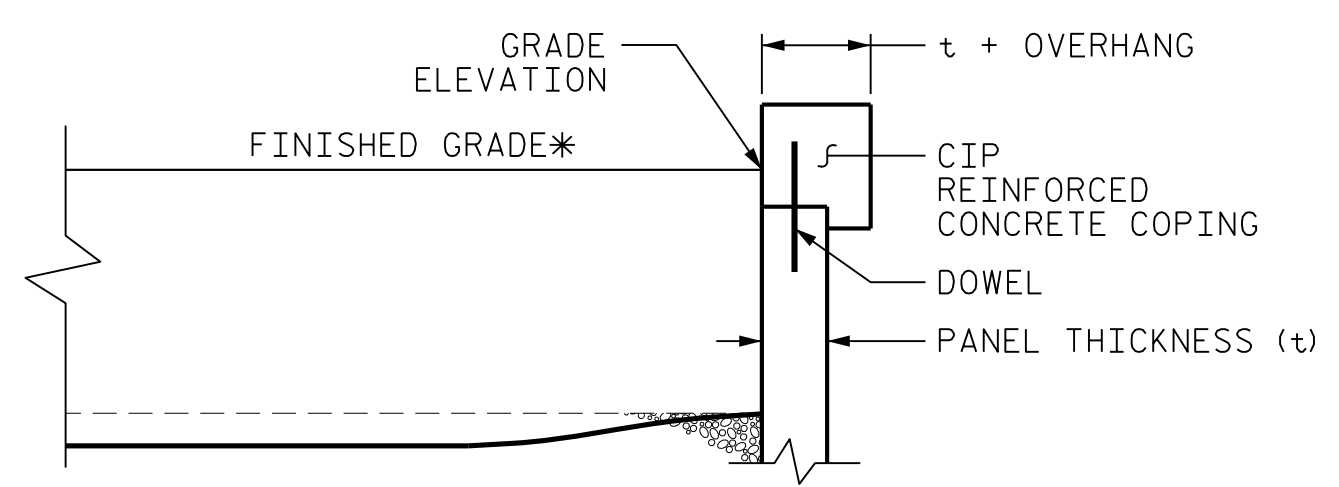
**NORTH CAROLINA**  
**DEPARTMENT OF TRANSPORTATION**  
**DIVISION OF HIGHWAYS**  
  
**GEOTECHNICAL**  
**ENGINEERING UNIT**

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

**RETAINING WALL NO. 1**  
**SMSE WALL W/ SRW UNITS**  
**TYPICAL SECTION (OPTIONAL)**



<b>PROJECT REFERENCE NO.</b> B-5869 (48063.1.FR1)		<b>SHEET NO.</b> W-7	
GEOTECHNICAL ENGINEER  SEAL 028893 MICHAEL H. STEPHENS ENGINEER		ENGINEER	
DocuSigned by: <i>Michael H. Stephens</i> #196315837046C		12/20/2022	
SIGNATURE		DATE	
<b>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</b>			

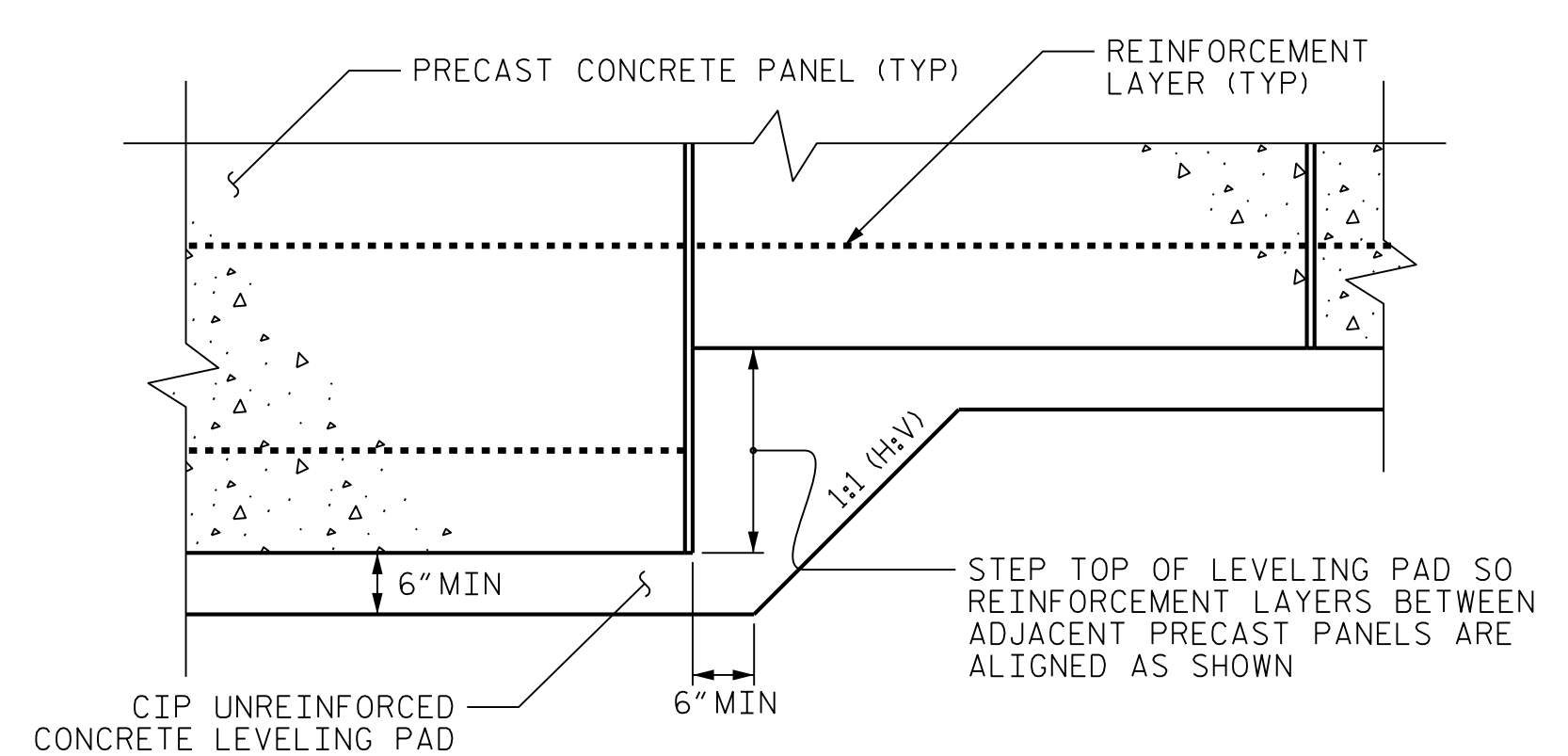


**PRECAST PANEL COPING DETAILS**

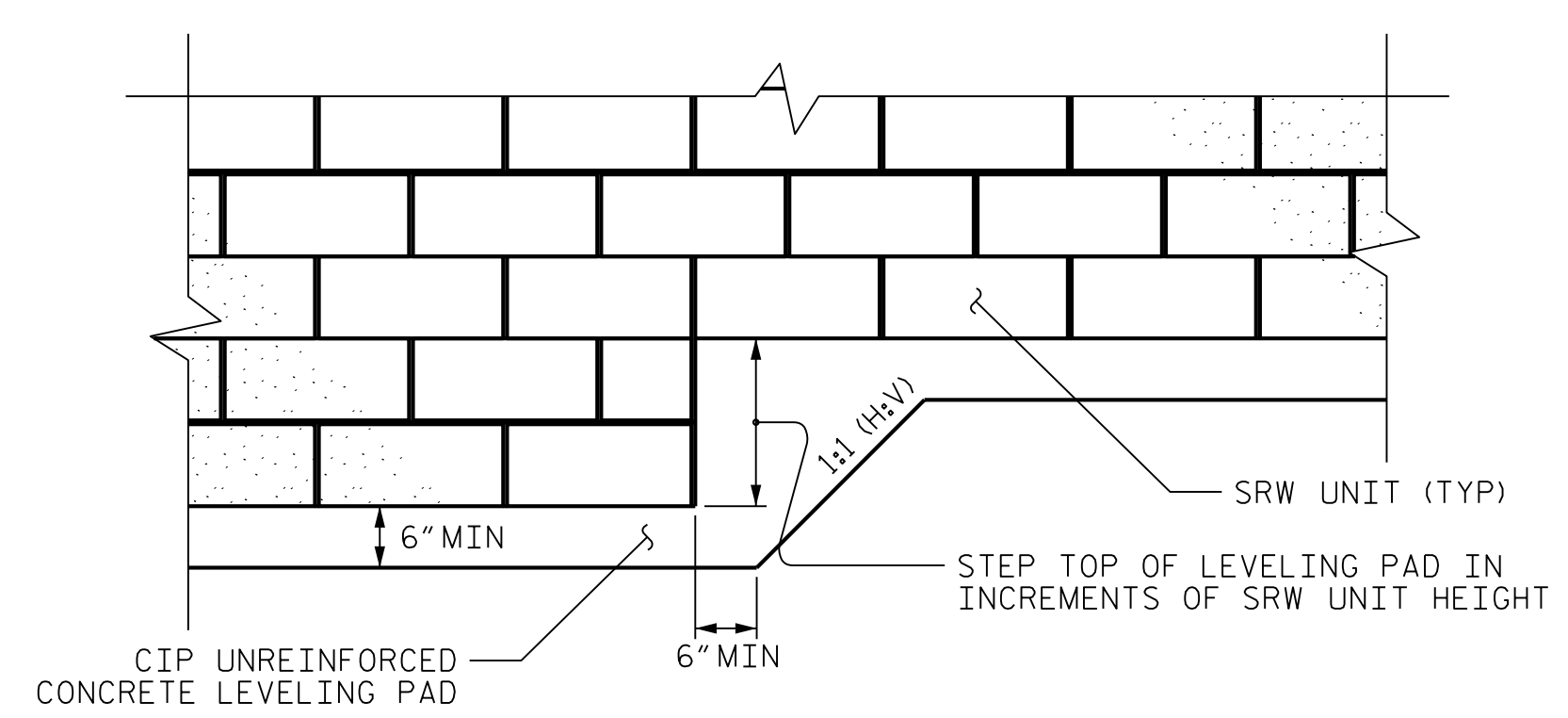
AT THE CONTRACTOR'S OPTION, CONNECT COPING TO PANELS WITH DOWELS OR EXTEND COPING DOWN BACK OF PANELS.  
\*SEE ROADWAY PLANS FOR FINISHED GRADE DETAILS.

**MSE WALL WITH SRW UNITS - 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.



**PRECAST PANELS LEVELING PAD STEP DETAIL**



**SRW UNITS LEVELING PAD STEP DETAIL**

**NOTES:**

FOR SHORED MECHANICALLY STABILIZED EARTH (SMSE) RETAINING WALLS, SEE SHORED MECHANICALLY STABILIZED EARTH RETAINING WALLS SPECIAL PROVISION.

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

AT THE CONTRACTOR'S OPTION, USE AN SMSE WALL SYSTEM WITH SEGMENTAL RETAINING WALL (SRW) UNITS THAT MEET ARTICLE 1040-4 OF THE STANDARD SPECIFICATIONS FOR RETAINING WALL NO. 1.

WHEN USING AN SMSE WALL SYSTEM WITH SRW UNITS FOR RETAINING WALL NO. 1, 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 WALL NO. 1.

A SEPARATION GEOTEXTILE IS NOT 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 THE FOLLOWING:
- 1) DESIGN HEIGHT (H) = WALL HEIGHT + WALL EMBEDMENT
  - 2) DESIGN LIFE = 100 YEARS
  - 3) MAXIMUM FACTORED VERTICAL PRESSURE ON FOUNDATION MATERIAL = 3,200 PSF
  - 4) MINIMUM REINFORCEMENT LENGTH (L) = 1.4H OR 11.5 FT, WHICHEVER IS LONGER
  - 5) MINIMUM EMBEDMENT ELEVATION = SEE SMSE WALL SCHEDULE AND EMBEDMENT TABLE
  - 6) REINFORCED ZONE AGGREGATE PARAMETERS:

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

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

7) IN-SITU ASSUMED MATERIAL PARAMETERS:

MATERIAL TYPE	UNIT WEIGHT (g) PCF	FRICTION ANGLE (f) DEGREES	COHESION (c) PSF
RETAINED	30	120	0
FOUNDATION	30	120	0

DESIGN RETAINING WALL NO.1 FOR A LIVE LOAD (TRAFFIC) SURCHARGE.

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

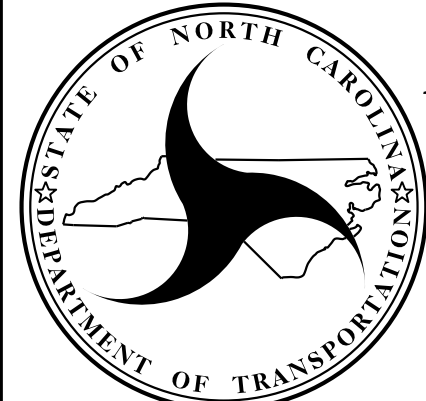
FOR FENCES OR HANDRAILS ON TOP OF WALLS, SEE ROADWAY PLANS FOR FENCE OR HANDRAIL ATTACHMENT DETAILS.

THE PERMANENT SHORING HEIGHT IS AN ESTIMATE ONLY, HEIGHT IS BASED THE DIFFERENCE BETWEEN THE SLOPE HINGE POINT AND TOP OF SMSE WALL LEVELING PAD.

THE SOIL NAIL WALL DESIGNER IS RESPONSIBLE FOR DETERMINING GLOBAL STABILITY BASED ON THE FULLY EXCAVATED CUT AND THE SMSE WALL. SUBMIT THESE RESULTS WITH THE WALL DESIGN PACKAGE.

SUBMIT SMSE WALL AND SOIL NAIL WALL DESIGNS AT THE SAME TIME.

PREPARED BY: MHS      DATE: 12/20/22  
REVIEWED BY: SCC      DATE: 12/20/22




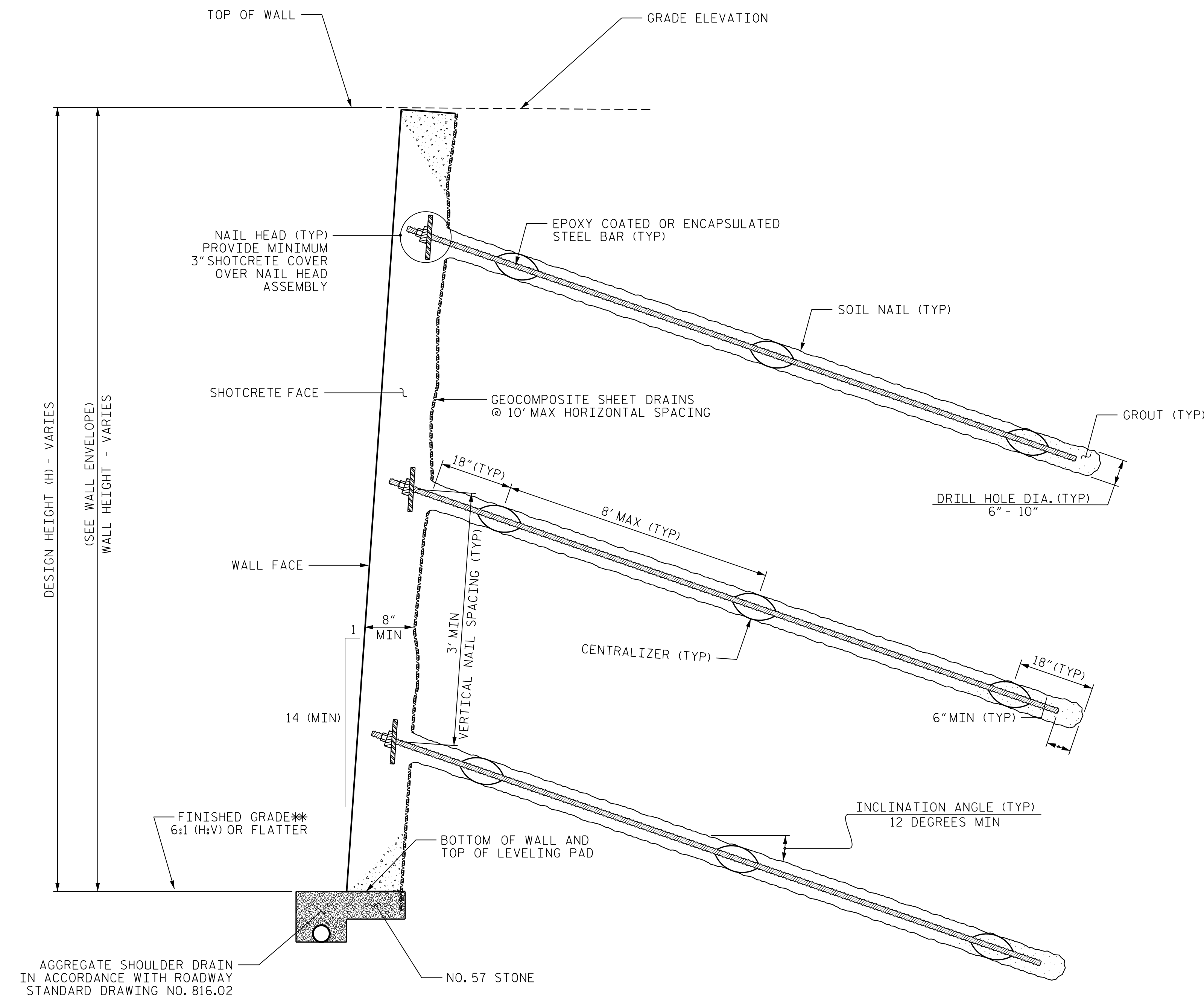
**NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS**

**GEOTECHNICAL  
ENGINEERING UNIT**

**RETAINING WALL NO. 1  
NOTES AND DETAILS**

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

<b>PROJECT REFERENCE NO.</b> B-5869 (48063.1.FR1)	<b>SHEET NO.</b> W-8
GEOTECHNICAL ENGINEER  DocuSigned by: <i>Michael H. Stephens</i> 12/20/2022 <small>DATE SIGNATURE DATE</small>	ENGINEER
<b>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</b>	



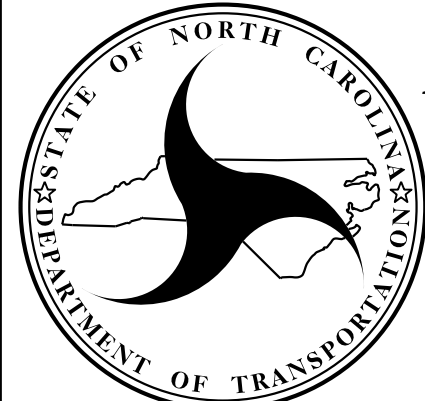
**SOIL NAIL WALL - TYPICAL SECTION**

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

**NOTES:**

- FOR SOIL NAIL RETAINING WALL, SEE SMSE SPECIAL PROVISION.
- FOR STEEL BEAM GUARDRAIL, SEE ROADWAY PLANS AND SECTION 862 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 SOIL NAIL RETAINING WALL NO. 1 FOR THE FOLLOWING:
  - 1) SOIL NAIL WALL DESIGN HEIGHT (H) = SMSE WALL DESIGN HEIGHT
  - 2) DESIGN LIFE = 100 YEARS
  - 3) MINIMUM WALL EMBEDMENT ELEVATION = 0 FT
  - 4) IN-SITU ASSUMED MATERIAL PARAMETERS:
    - UNIT WEIGHT,  $\gamma = 120$  PCF
    - FRICTION ANGLE,  $\phi = 30$  DEGREES
    - COHESION,  $c = 0$  PSF
- 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 SOIL NAILS FOR RETAINING WALL NO. 1.
- "TOP OF SOIL NAIL WALL" AS SHOWN IN WALL ENVELOPES REPRESENTS THE APPROXIMATE SLOPE HINGE POINT ELEVATION.
- THE ESTIMATED SOIL NAIL WALL QUANTITY IS BASED ON DIFFERENCE BETWEEN THE SLOPE HINGE POINT AND THE SMSE TOP OF LEVELING PAD. 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 FULLY EXCAVATED CUT AND THE SMSE WALL. SUBMIT THESE RESULTS WITH THE WALL DESIGN PACKAGE.

PREPARED BY: MHS	DATE: 12/20/22
REVIEWED BY: SCC	DATE: 12/20/22



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

**GEOTECHNICAL  
ENGINEERING UNIT**

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

**RETAINING WALL NO. 1  
SOIL NAIL WALL  
TYPICAL SECTION AND NOTES**