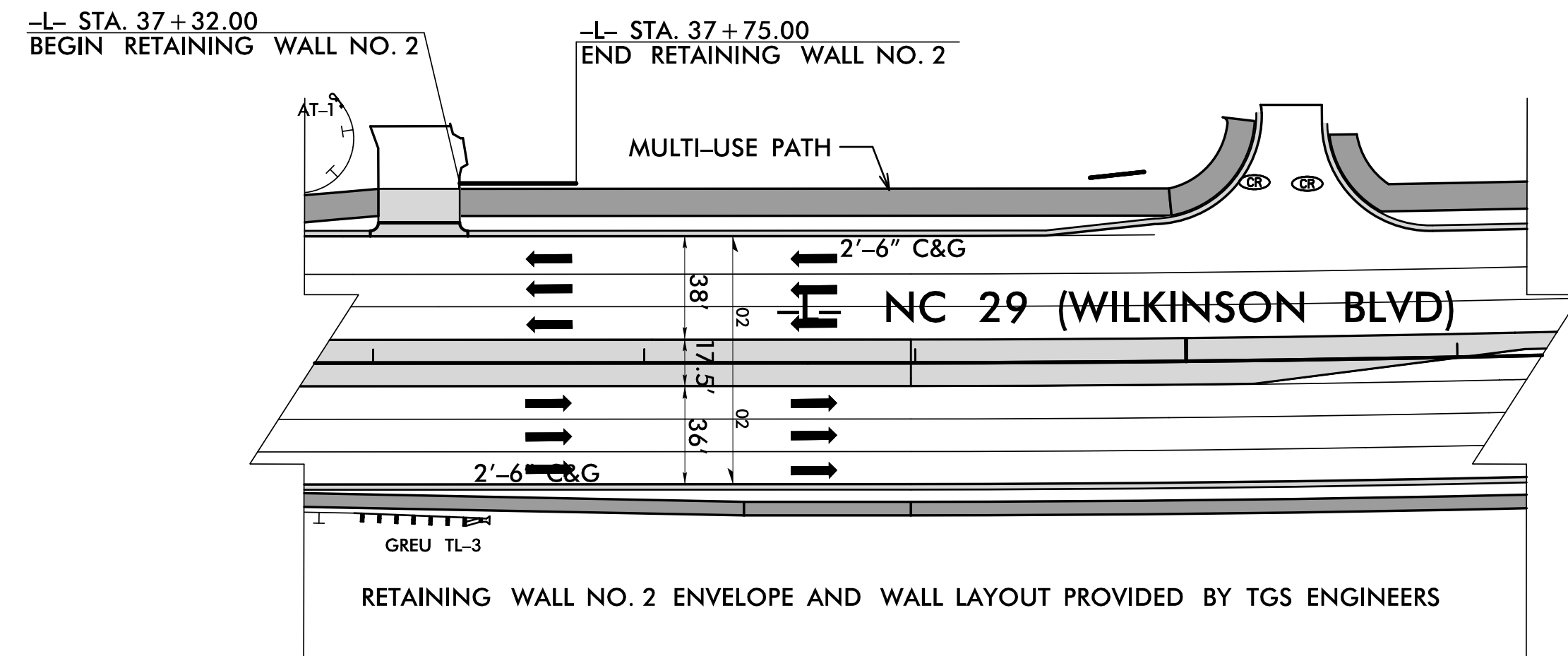
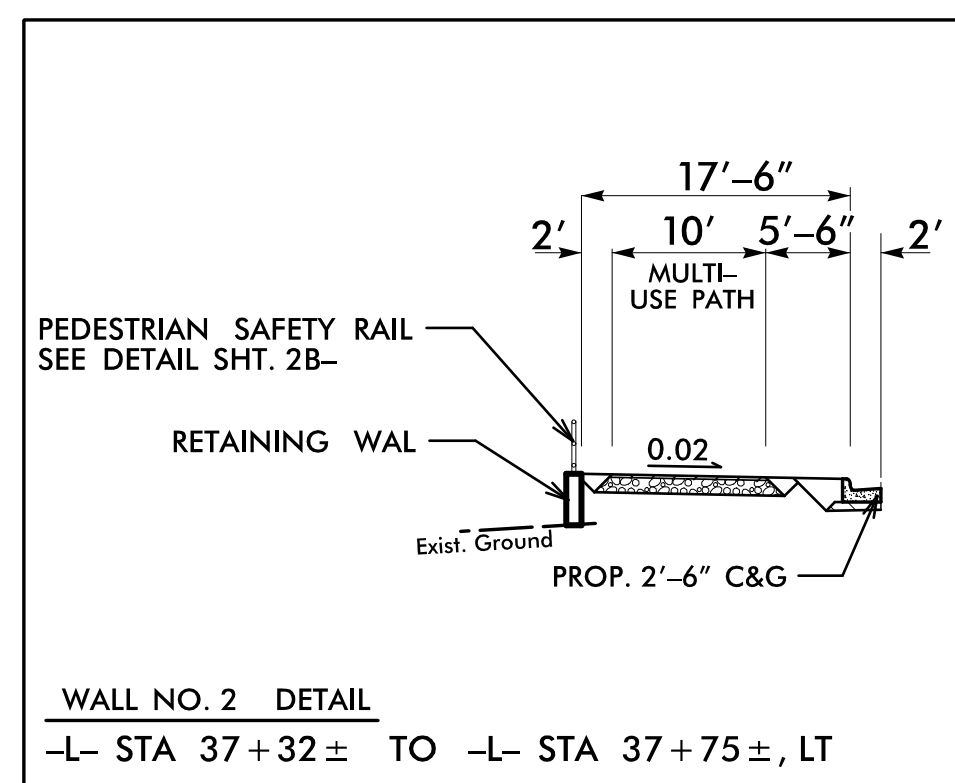


RETAINING WALL NO. 2:



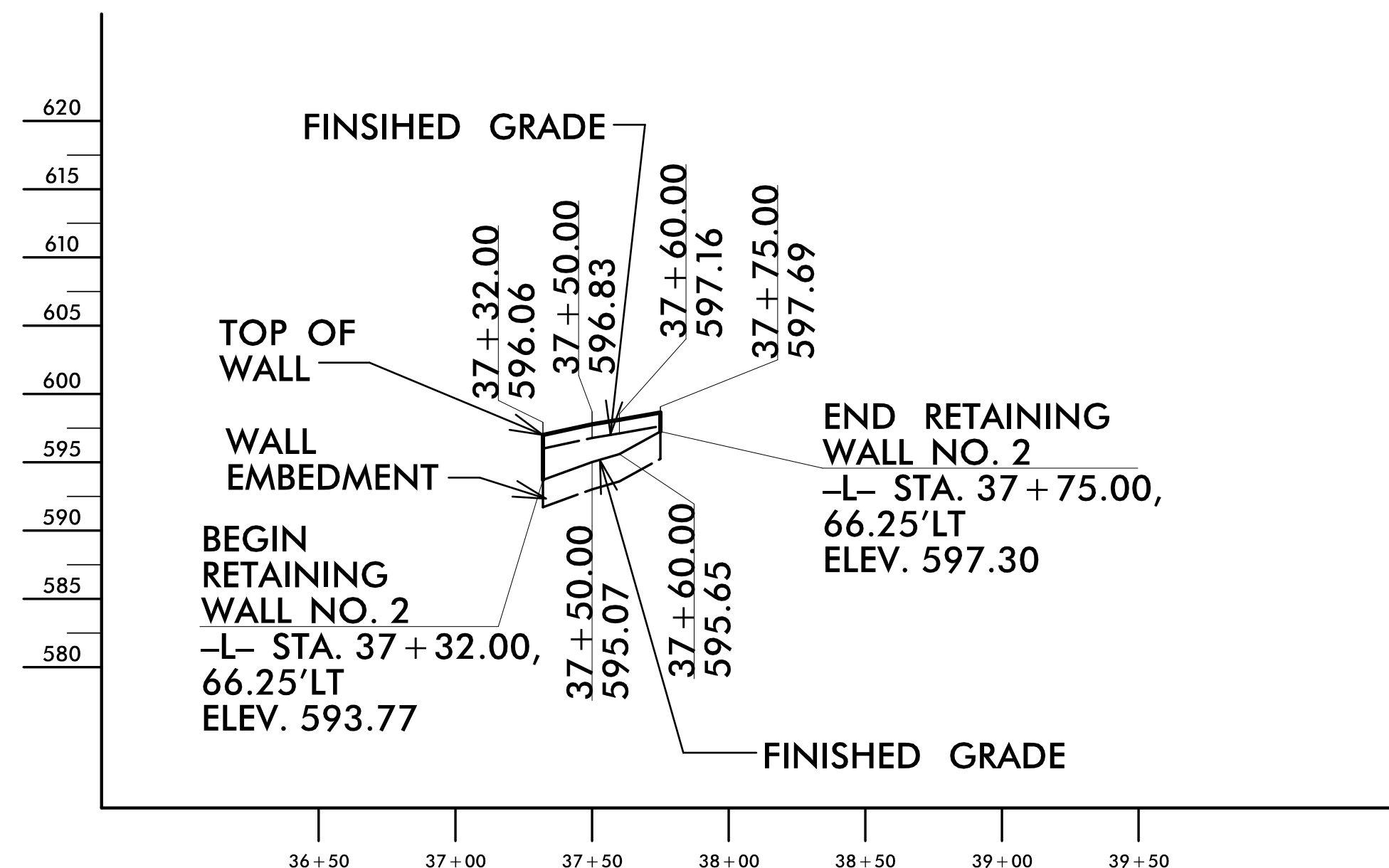
ESTIMATED RETAINING WALL QUANTITY (SQUARE FEET)	
CAST-IN-PLACE (CIP) GRAVITY RETAINING WALL NO. 2	145 SF

*WALL AREA ESTIMATE IS THE DIFFERENCE BETWEEN TOP OF WALL
AND TOP OF FOOTING



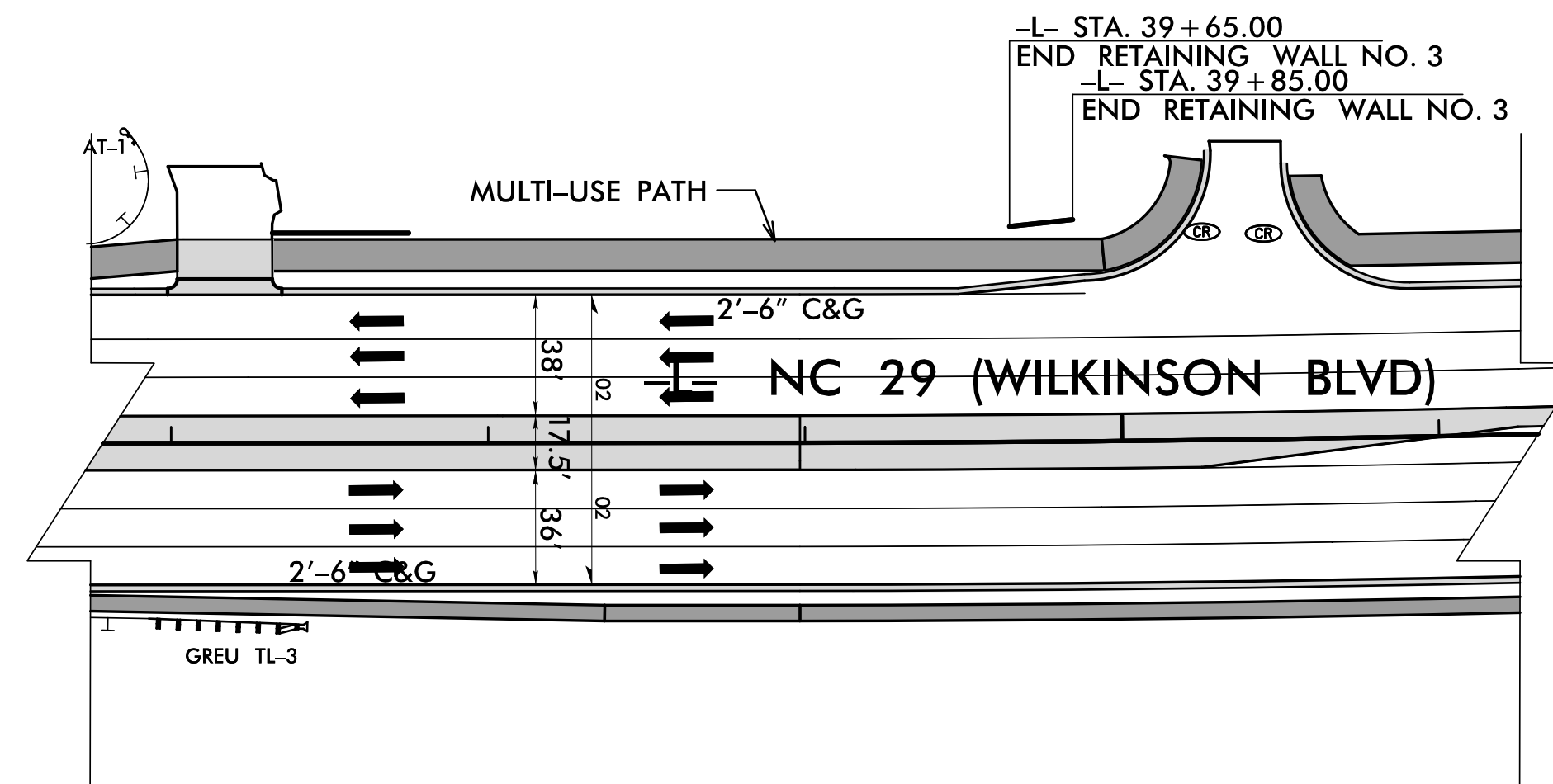
RETAINING WALL NO. 2:

NOT TO SCALE



PREPARED BY: DMB	DATE: 10/24/23
REVIEWED BY: REK	DATE: 10/24/23

RETAINING WALL NO. 3:

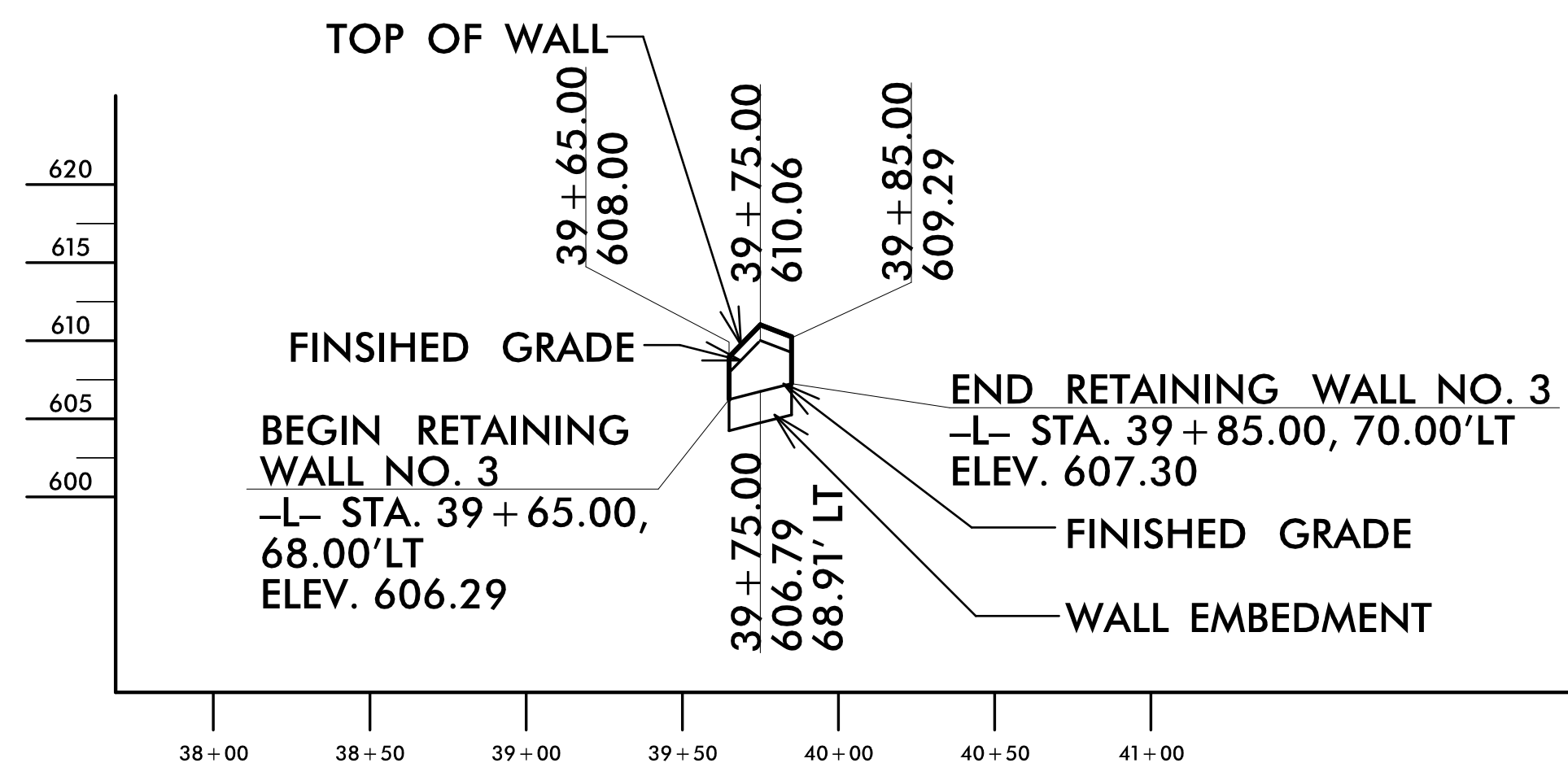


ESTIMATED RETAINING WALL QUANTITY (SQUARE FEET)	
CAST-IN-PLACE (CIP) GRAVITY RETAINING WALL NO. 3	85 SF

* WALL AREA ESTIMATE IS THE DIFFERENCE BETWEEN TOP OF WALL
AND TOP OF FOOTING

RETAINING WALL NO. 3:

NOT TO SCALE



THE WALL ENVELOPE DOES NOT ACCURATELY
DEPICT THE ACTUAL FACE OF THE WALL
AT THE FOLLOWING LOCATION:
-L- STA. 39+65.00 TO 39+85.00, LT

TYPICAL WALL SECTION

NOT TO SCALE

PROJECT NO.: U-6146/B-5857

GASTON COUNTY

RETAINING WALL NO. 2: -L- 37+32, 66' LT TO 37+75, 66' LT

RETAINING WALL NO. 3: -L- 39+65, 68' LT to 39+85, 70' LT

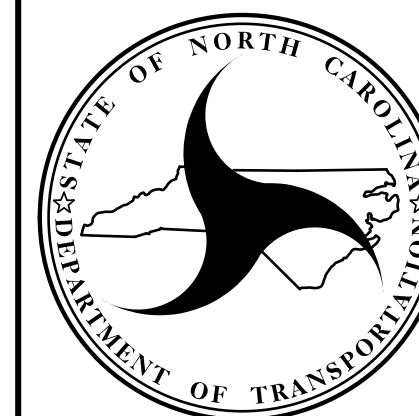
SHEET 1 OF 3

WALL ID: RW-2_3_7-1

Prepared in the Office of:

 **CARLINUS
GEOTECHNICAL
GROUP**

**2400 CROWNPOINT EXECUTIVE DRIVE
SUITE 800
CHARLOTTE, NC 28227
(980) 339-8684**



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

**GEOTECHNICAL
ENGINEERING UNIT**

RETAINING WALL NO. 2 AND NO. 3 STANDARD CAST-IN-PLACE (CIP) GRAVITY RETAINING WALL

REVISIONS						SHEET NO. W-1
NO.	BY	DATE	NO.	BY	DATE	
1			3			
2			4			

GEOTECHNICAL
ENGINEER



DocuSigned by:
D. Matthew Brewer
386128C9A4E04843

SIGNATURE

ENGINEER

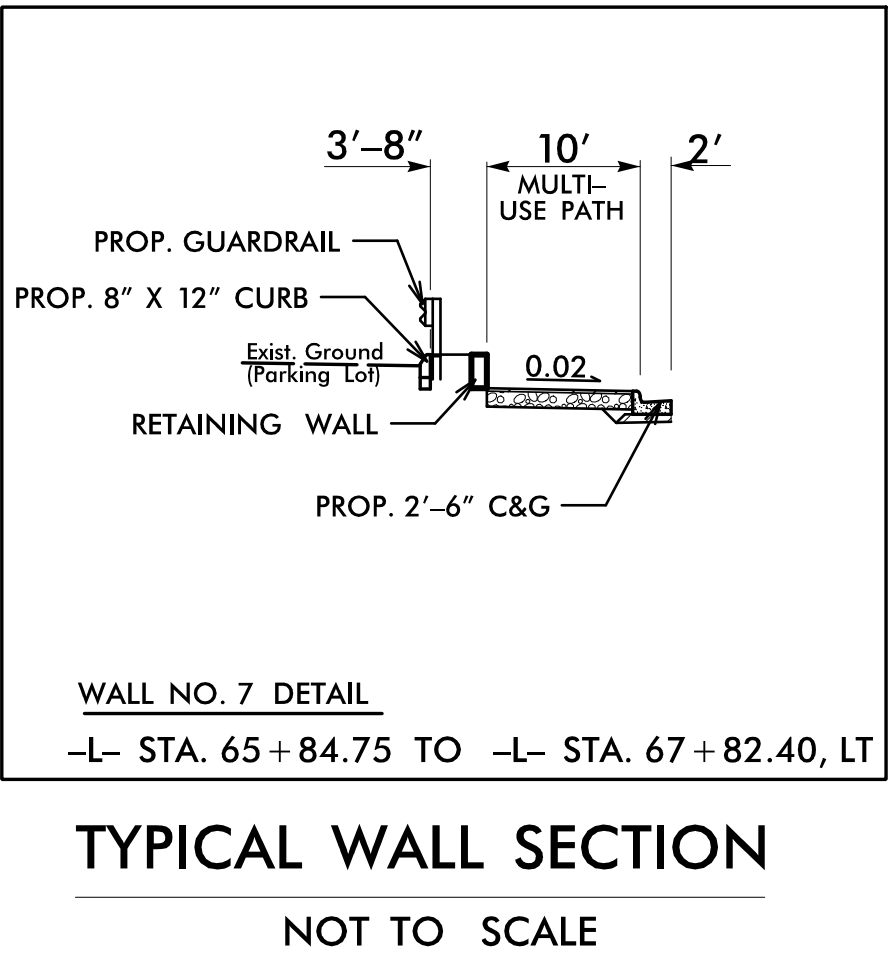
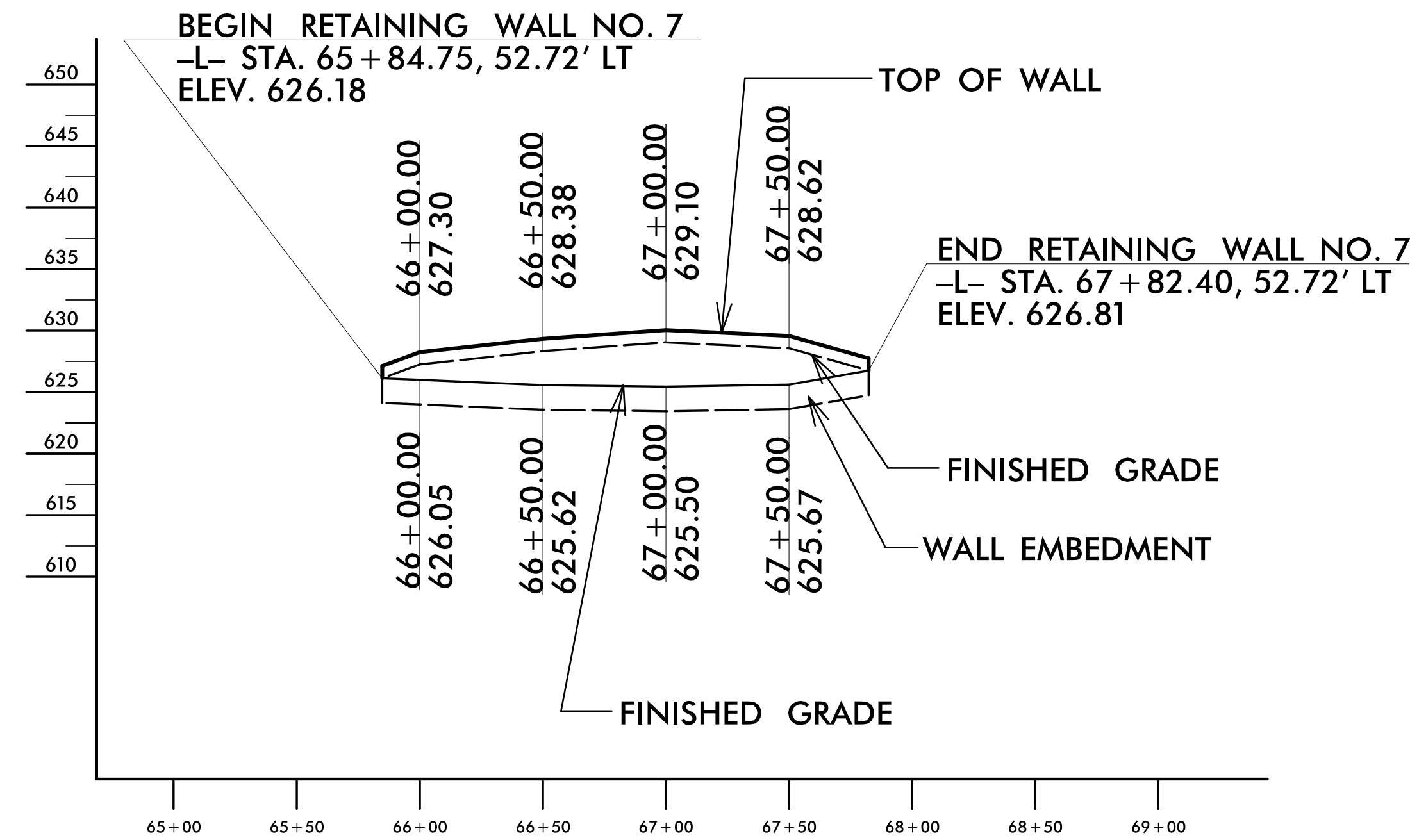
10/26/23
DATE

SIGNATURE

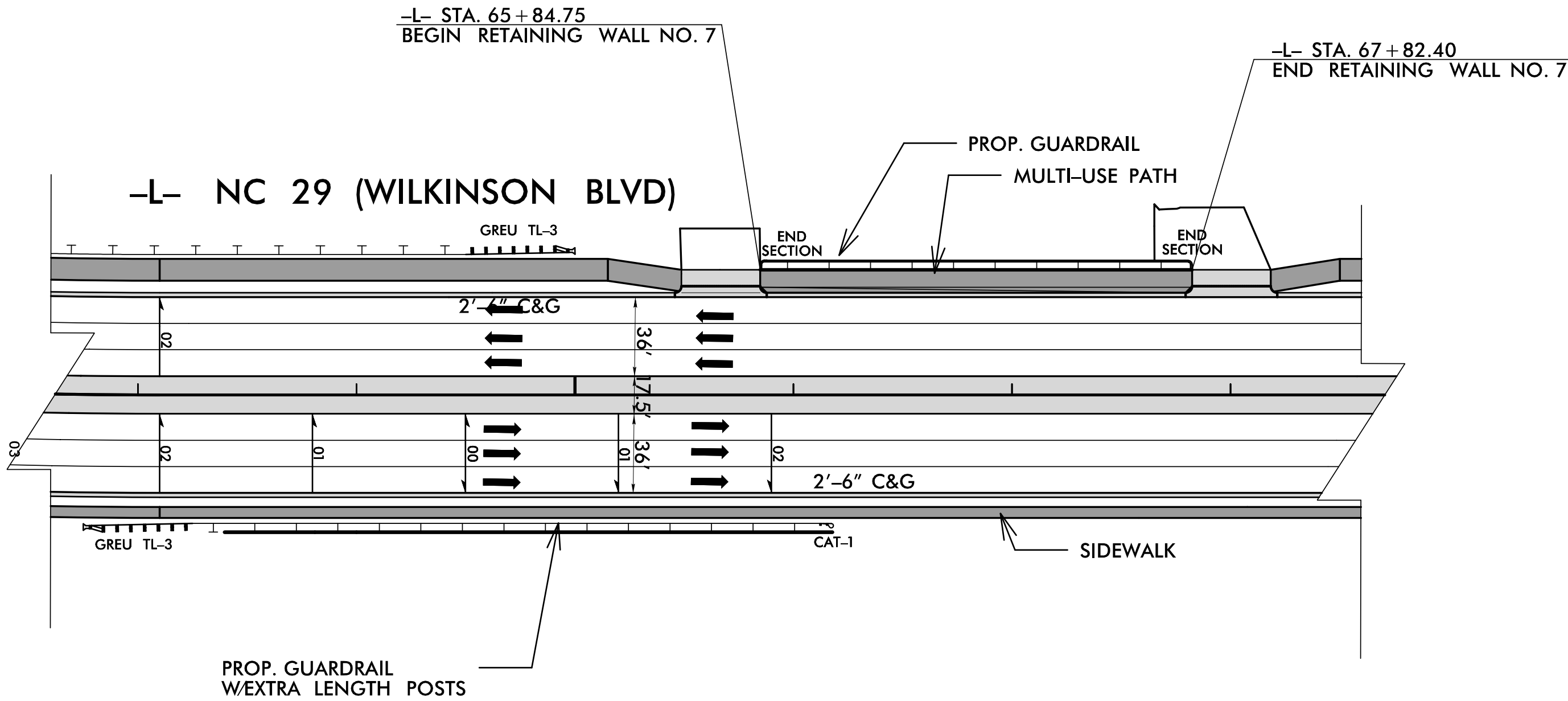
DATE

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

RETAINING WALL NO. 7:



ESTIMATED RETAINING WALL QUANTITY (SQUARE FEET)	
CAST-IN-PLACE (CIP) GRAVITY RETAINING WALL NO. 7	830 SF
* WALL AREA ESTIMATE IS THE DIFFERENCE BETWEEN TOP OF WALL AND TOP OF FOOTING	



RETAINING WALL NO. 7 ENVELOPE AND WALL LAYOUT PROVIDED BY TGS ENGINEERS

PROJECT NO.: U-6146/B-5857

GASTON COUNTY

RETAINING WALL NO. 7: -L- 65+84, 52' LT to 67+82, 52' LT

SHEET 2 OF 3

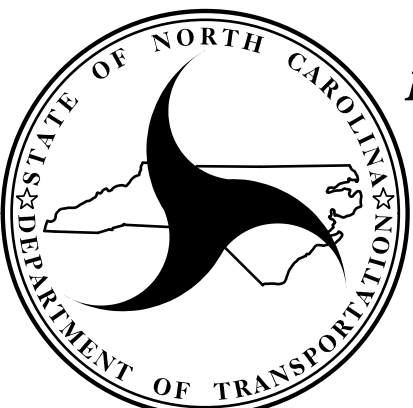
WALL ID: RW-2_3_7-2

PREPARED BY: DMB	DATE: 10/24/23
REVIEWED BY: DMB	DATE: 10/24/23

Prepared in the Office of:



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

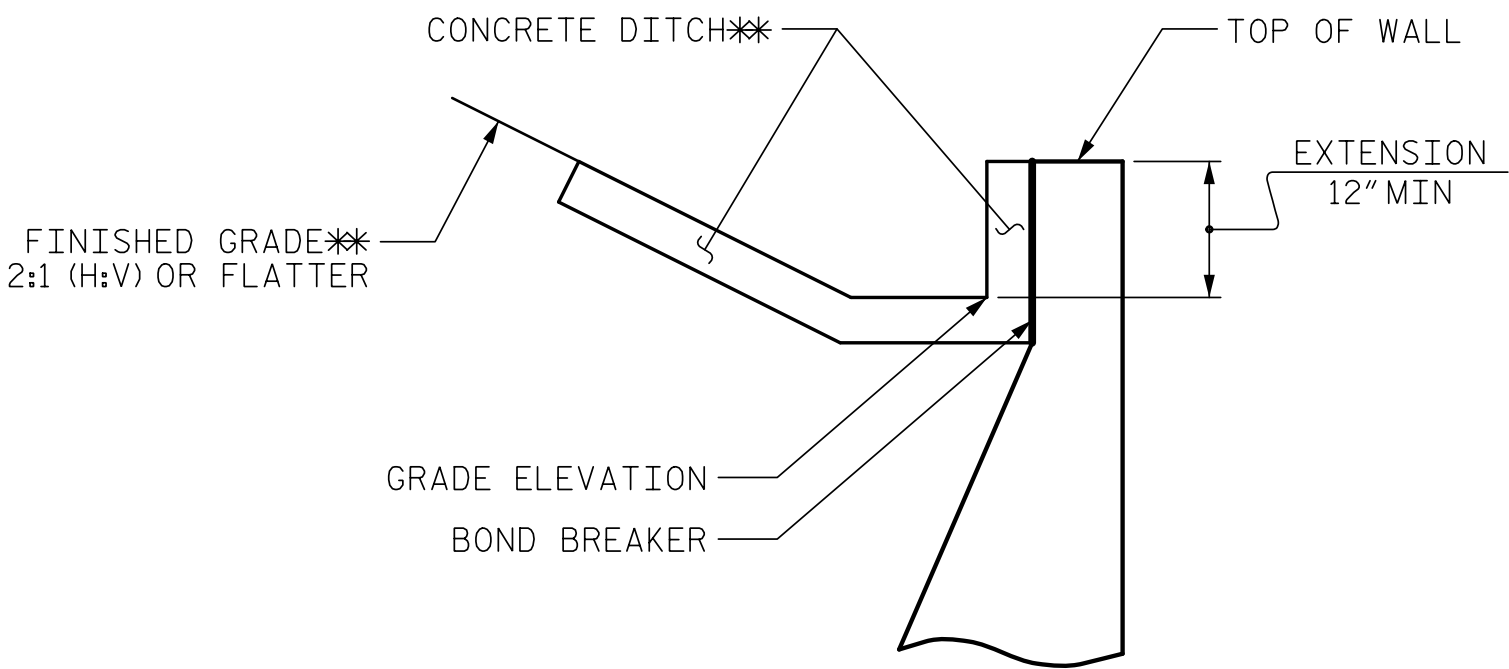


NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

GEOTECHNICAL
ENGINEERING UNIT

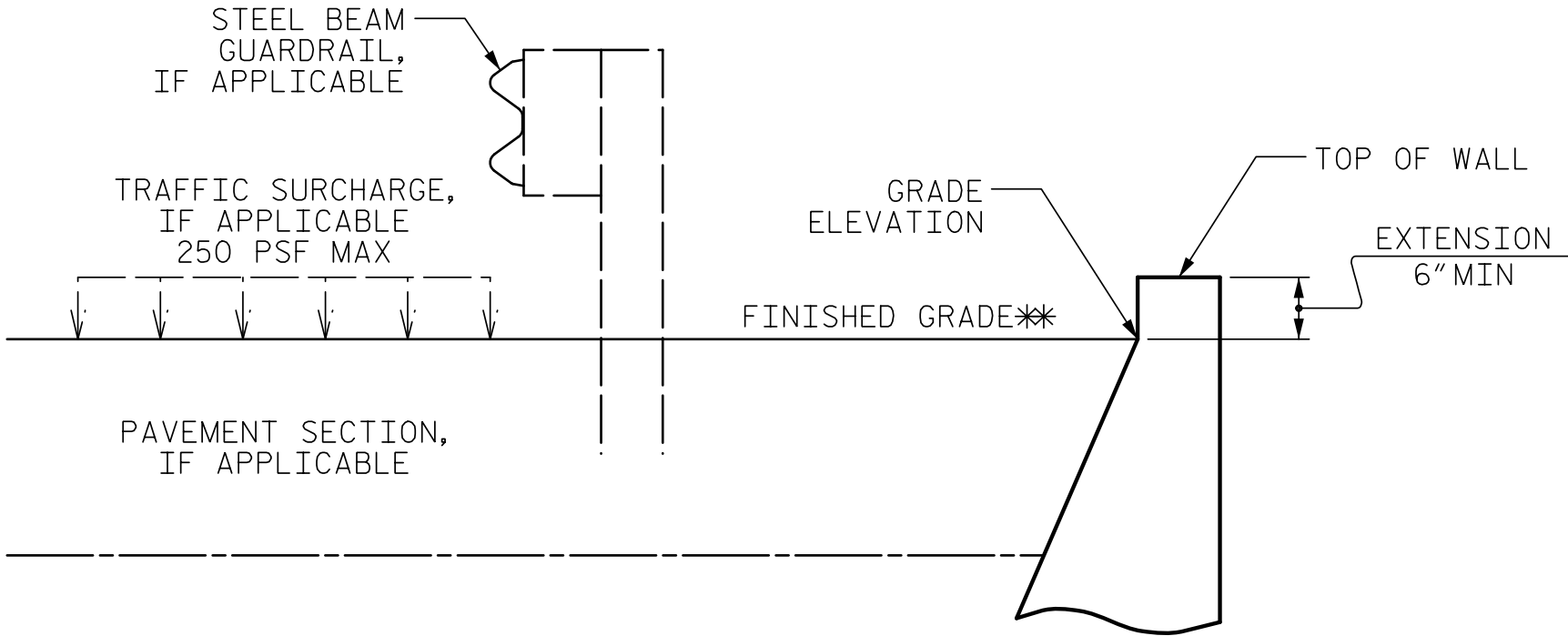
RETAINING WALL NO. 7
STANDARD CAST-IN-PLACE (CIP)
GRAVITY RETAINING WALL

REVISIONS						SHEET NO. W-2
NO.	BY	DATE	NO.	BY	DATE	
1			3			
2			4			



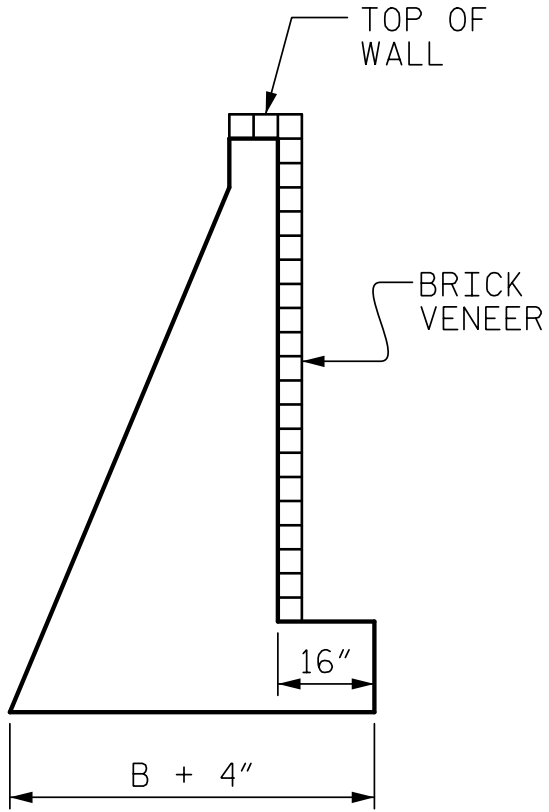
SLOPE CASE

**SEE ROADWAY PLANS FOR CONCRETE DITCH AND FINISHED GRADE DETAILS.



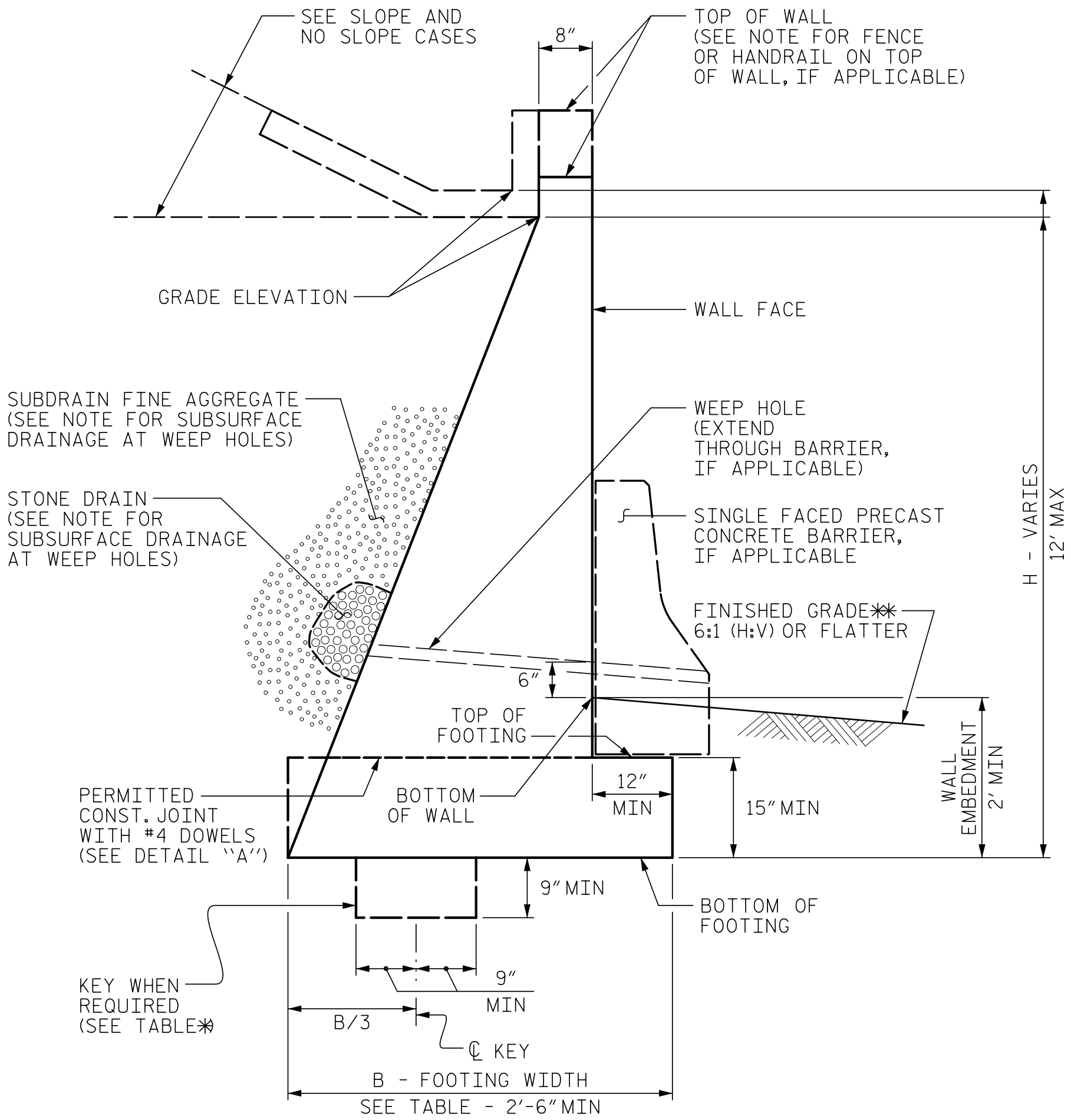
NO SLOPE CASE

**SEE ROADWAY PLANS FOR FINISHED GRADE DETAILS.



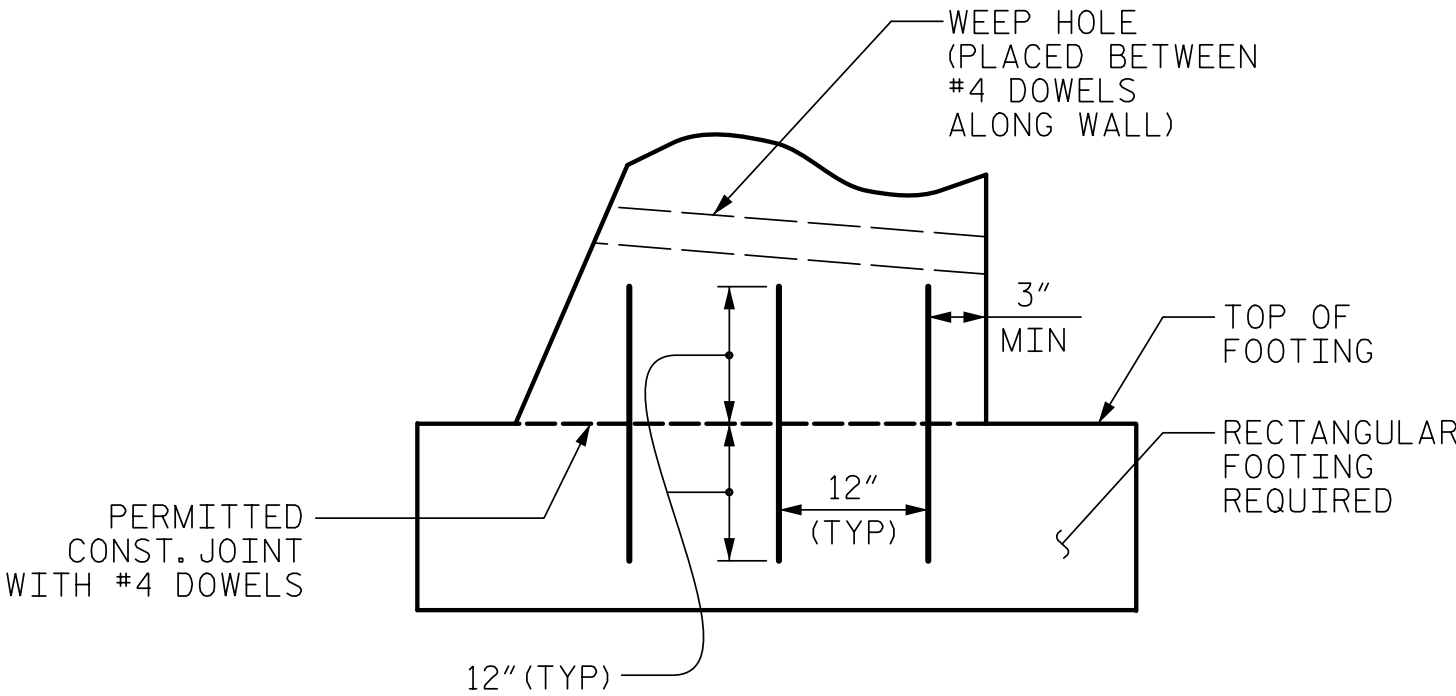
BRICK VENEER DETAIL

(WHEN APPLICABLE)



STANDARD CIP GRAVITY WALL

**SEE ROADWAY PLANS FOR FINISHED GRADE DETAILS.



DETAIL "A"

H (FT)	3 - < 6	6 - 9	> 9 - 12
SLOPE CASE	.66	.70*	.75*
NO SLOPE CASE WITH TRAFFIC SURCHARGE	.80	.75*	.70*
NO SLOPE CASE WITHOUT TRAFFIC SURCHARGE	.60	.60	.60

B/H RATIO (B = 2'-6" MIN)

*KEY IS REQUIRED FOR "SLOPE CASE" OR "NO SLOPE CASE WITH TRAFFIC SURCHARGE" WHEN H IS 6' OR GREATER.

NOTES:

FOR STANDARD CIP GRAVITY RETAINING WALLS, SEE SECTION 453 OF THE STANDARD SPECIFICATIONS.

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

FOR SINGLE FACED PRECAST CONCRETE BARRIER, SEE ROADWAY PLANS AND SECTION 857 OF THE STANDARD SPECIFICATIONS.

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

FOR SUBSURFACE DRAINAGE AT WEEP HOLES, SEE ARTICLE 414-8 OF THE STANDARD SPECIFICATIONS.

STANDARD CIP GRAVITY WALLS ARE BASED ON THE FOLLOWING IN-SITU ASSUMED SOIL PARAMETERS:
UNIT WEIGHT, γ = 120 PCF
FRICTION ANGLE, ϕ = 35 DEGREES (GROUNDWATER WITHIN 7' OF BOTTOM OF FOOTING)
FRICTION ANGLE, ϕ = 30 DEGREES (GROUNDWATER MORE THAN 7' BELOW BOTTOM OF FOOTING)
COHESION, c = 0 PSF

DO NOT USE STANDARD CIP GRAVITY WALLS IF ASSUMED SOIL PARAMETERS ARE NOT APPLICABLE OR GROUNDWATER IS ABOVE BOTTOM OF FOOTING.

DO NOT USE STANDARD CIP GRAVITY WALLS WHEN VERY LOOSE OR SOFT SOIL OR MUCK IS BELOW WALLS.

BEFORE BEGINNING STANDARD CIP GRAVITY WALL CONSTRUCTION, SURVEY WALL LOCATIONS AND SUBMIT WALL PROFILE VIEWS (WALL ENVELOPES) FOR REVIEW. FOR WALL ENVELOPES, INCLUDE BOTTOM OF WALL, EXISTING GROUND AND GRADE ELEVATIONS AND OTHER ELEVATIONS AS NEEDED AT INTERVALS OF 25' OR LESS ALONG WALLS. DO NOT START WALL CONSTRUCTION UNTIL WALL ENVELOPES ARE ACCEPTED.

FOR BRICK VENEERS, SUBMIT BRICK SAMPLES FOR APPROVAL BEFORE BEGINNING STANDARD CIP GRAVITY WALL CONSTRUCTION.

DO NOT PLACE CONCRETE FOR FOOTINGS UNTIL EXCAVATION DIMENSIONS AND FOUNDATION MATERIAL ARE APPROVED.

WHEN CONSTRUCTING STANDARD CIP GRAVITY WALLS WITH A CONSTRUCTION JOINT AS SHOWN IN DETAIL "A", PROVIDE A MINIMUM OF 3 EQUALLY SPACED #4 DOWELS AT INTERVALS OF 1'-6" ALONG WALLS.

PROJECT NO.: U-6146/B-5857

GASTON COUNTY

RETAINING WALL NO. 2: -L- 37+32, 66' LT to 37+75, 66' LT

RETAINING WALL NO. 3: -L- 39+65, 68' LT to 39+85, 70' LT

RETAINING WALL NO. 7: -L- 65+84, 52' LT to 67+82, 52' LT

SHEET 3 OF 3

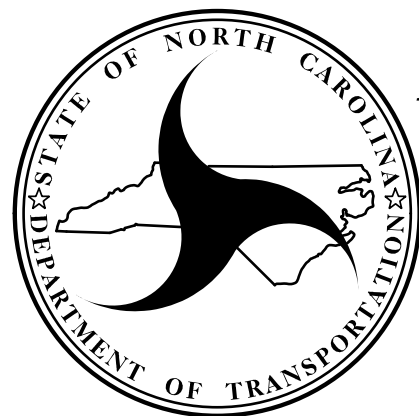
WALL ID: RW-2_3_7-3

STANDARD DETAIL NO. 453.01

STANDARD
CAST-IN-PLACE (CIP)
GRAVITY RETAINING WALL

SHEET
NO.
W-3

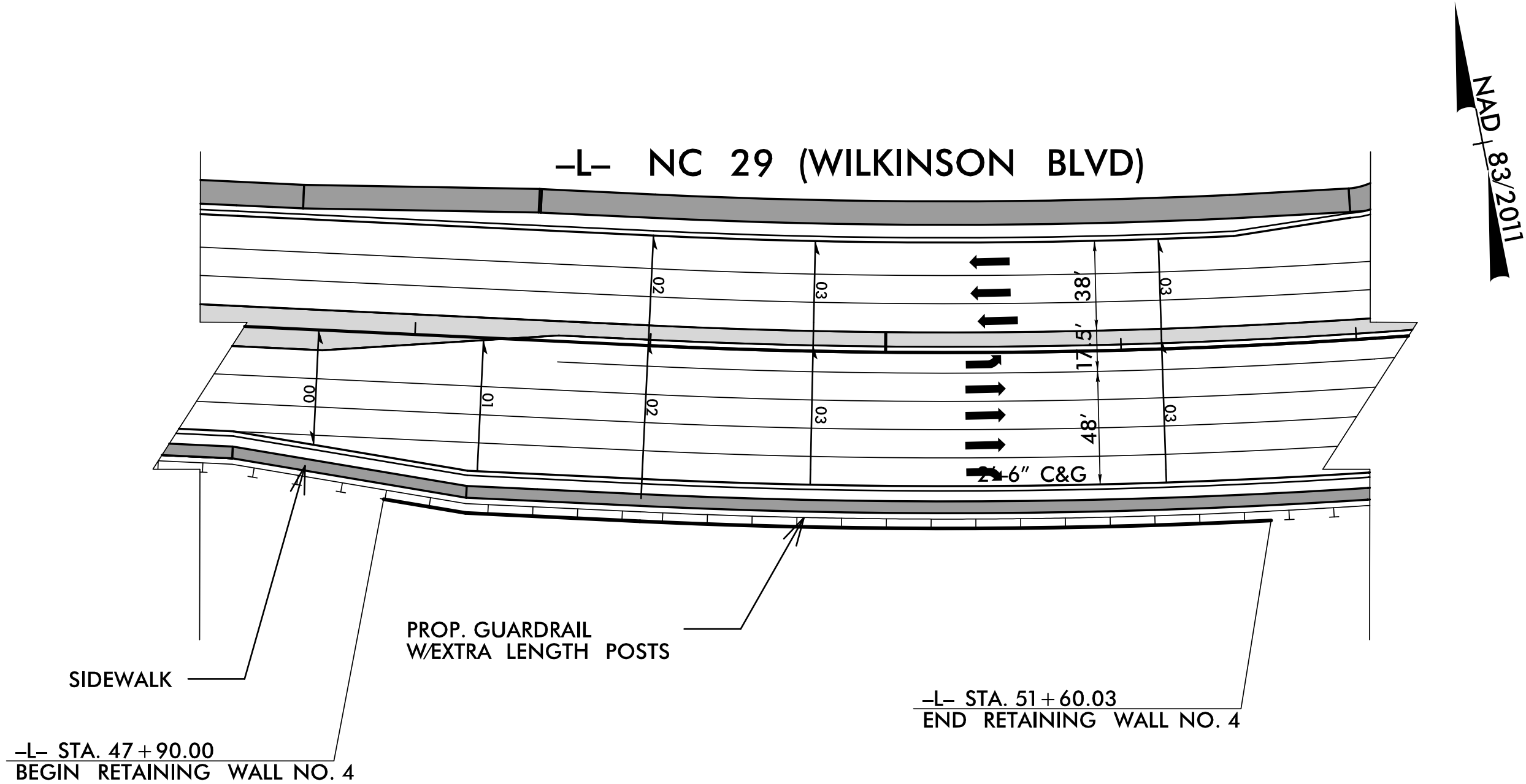
DATE: 10-19-21



NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

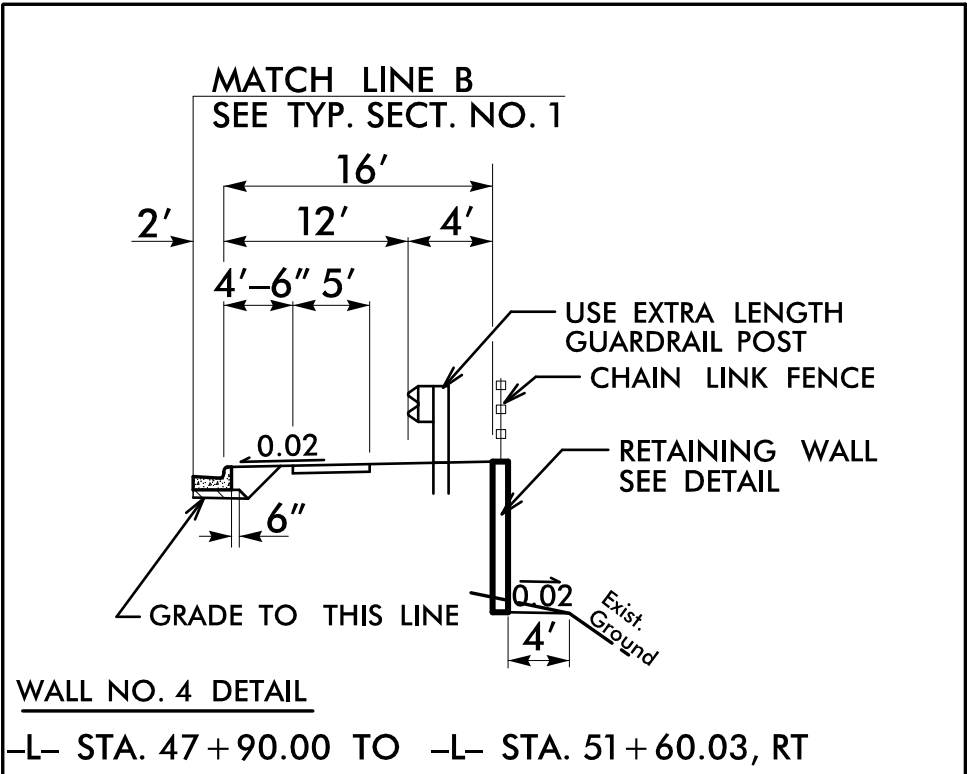
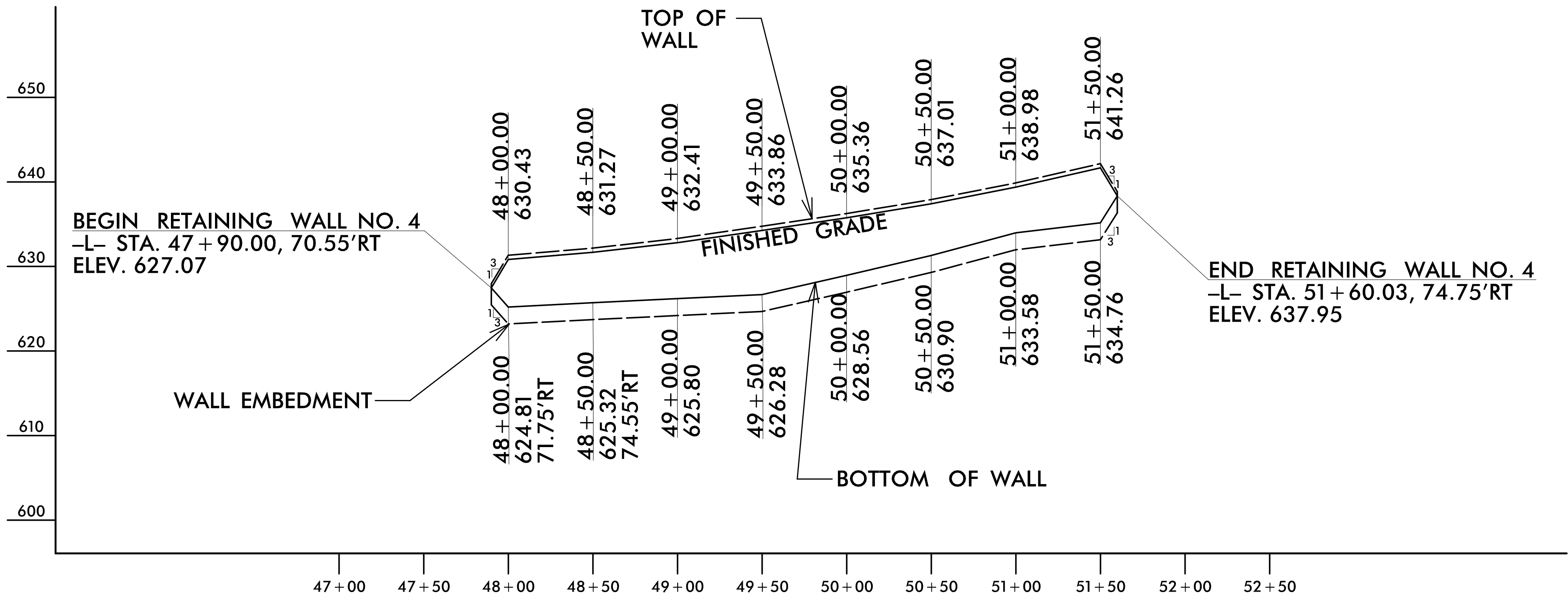
GEOTECHNICAL
ENGINEERING UNIT

RETAINING WALL NO. 4:



RETAINING WALL NO. 4:

NOT TO SCALE



TYPICAL WALL SECTION

NOT TO SCALE

ESTIMATED MSE WALL QUANTITY (SQUARE FEET)	
MSE RETAINING WALL NO. 4	3,220 SF*
*INCLUDES EMBEDMENT AND COPING EXTENSION	

PROJECT NO.: U-6146/B-5857

GASTON COUNTY

STATION: -L- 47+90, 70' RT TO 51+60, 74' RT

SHEET 1 OF 3

WALL ID RW-4-1

THE WALL ENVELOPE DOES NOT ACCURATELY DEPICT THE ACTUAL FACE OF THE WALL AT THE FOLLOWING LOCATION:
-L- STA. 47 + 90.00 TO 48 + 50.00, RT

PREPARED BY: DMB	DATE: 10/24/23
REVIEWED BY: REK	DATE: 10/24/23

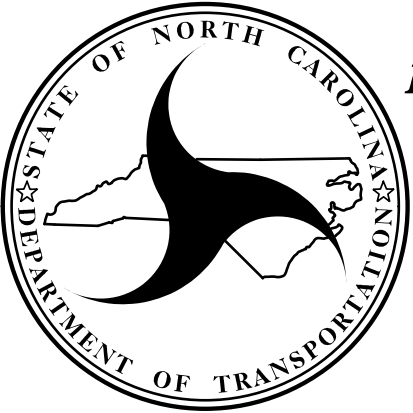
Prepared in the Office of:



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

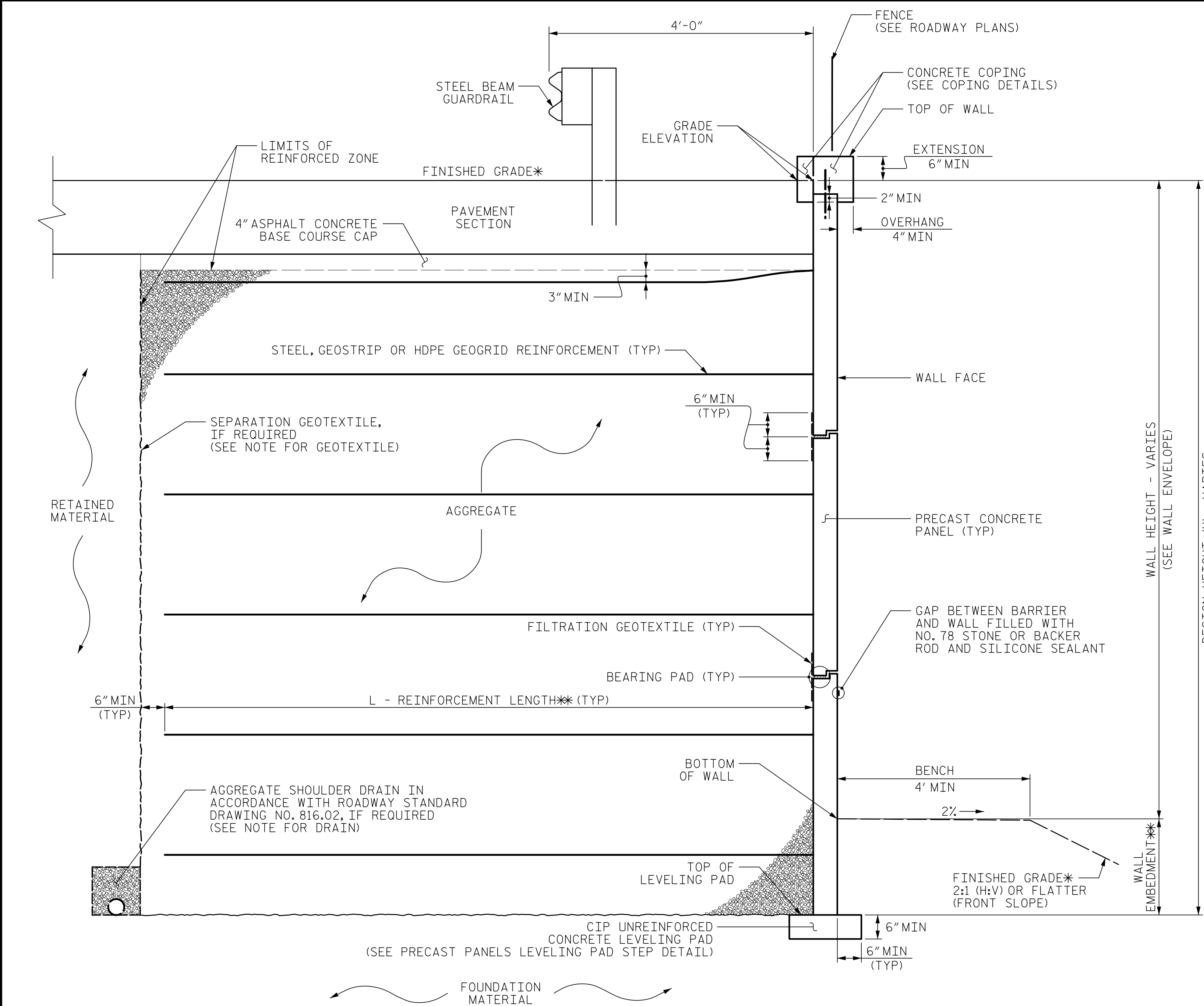
**NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

**GEOTECHNICAL
ENGINEERING UNIT**



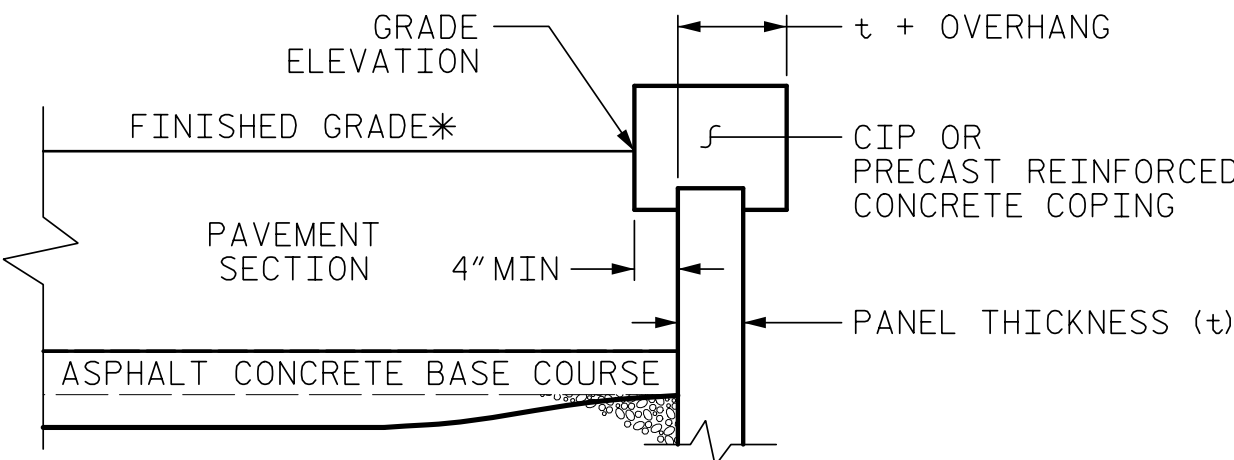
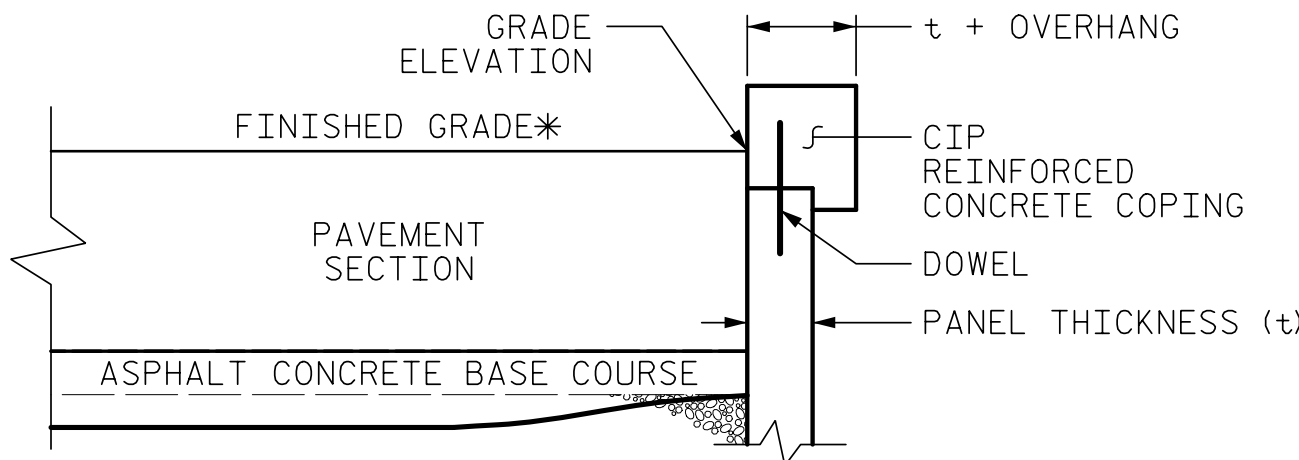
MECHANICALLY STABILIZED
EARTH (MSE)
RETAINING WALL NO. 4

REVISIONS						SHEET NO. W-4
NO.	BY	DATE	NO.	BY	DATE	
1			3			
2			4			



MSE WALL WITH PRECAST PANELS - TYPICAL SECTION

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



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

DocuSigned by:
D. Matthew Brown
386128C0A4C1462
SIGNATURE

ENGINEER

10/26/23

SIGNATURE

DATE

SIGNATURE

DATE

MSE RETAINING WALL NO. 4						
STA. -L-	OFFSET FROM L (RT) FT	FINISHED GRADE* (FT)	BOTTOM OF WALL (FT)	TOP OF LEVELING PAD (FT)	ESTIMATED MSE WALL EMBEDMENT (FT)	DESIGN MSE WALL HEIGHT "H" (FT)
47+90.00	70.55	627.07	627.07	625.07	2.00	2.00
48+00.00	71.75	630.43	624.81	622.81	2.00	7.62
48+50.00	74.55	631.27	625.32	623.32	2.00	7.95
49+00.00	74.55	632.41	625.80	623.80	2.00	8.61
49+50.00	74.55	633.86	626.28	624.28	2.00	9.58
50+00.00	74.55	635.36	628.56	626.56	2.00	8.80
50+50.00	74.55	637.01	630.90	628.90	2.00	8.11
51+00.00	74.55	638.98	633.58	631.58	2.00	7.40
51+50.00	74.55	641.26	634.76	632.76	2.00	8.50
51+60.03	74.75	637.95	637.95	635.95	2.00	2.00

*FINISHED GRADE ELEVATION ADJACENT TO COPING EXTENSION, SEE TYPICAL DETAIL

FRONT SLOPE WALL EMBEDMENT		
SLOPE IN FRONT OF STRUCTURES		MINIMUM EMBEDMENT DEPTH
HORIZONTAL	FOR WALLS	H/20
	FOR ABUTMENTS	H/10
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 FT IN FRONT OF THE WALL.
2) MINIMUM EMBEDMENT DEPTH OF 2 FT, UNLESS LARGER DEPTHS DICTATED BY 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 AND EXTERNAL ANALYSES.
REFERENCE MSE WALL PROVISION.

PROJECT NO.: U-6146/B-5857
GASTON COUNTY
STATION: -L- 47+90, 70' RT TO 51+60, 74' RT
SHEET 2 OF 3 WALL ID RW-4-2

PREPARED BY: DMB	DATE: 10/24/23
REVIEWED BY: REK	DATE: 10/24/23

Prepared in the Office of:

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

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

GEOTECHNICAL
ENGINEERING UNIT

MECHANICALLY STABILIZED EARTH (MSE) RETAINING WALL NO. 4					
REVISIONS					
NO.	BY	DATE	NO.	BY	DATE
1			3		
2			4		

SHEET NO.
W-5

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.
FOR FENCES OR HANDRAILS ON THE TOP OF THE RETAINING WALL, SEE ROADWAY PLANS FOR FENCE OR HANDRAIL ATTACHMENT DETAILS.
AT THE CONTRACTOR'S OPTION, USE FINE AGGREGATE IN THE REINFORCED ZONE OF RETAINING WALL NO. 4.
A SMOOTH FINISH IS REQUIRED FOR PRECAST CONCRETE PANELS FOR RETAINING WALL NO. 4.
A SEPARATION GEOTEXTILE IS REQUIRED AT THE BACK OF THE REINFORCED ZONE FOR RETAINING WALL NO. 4.
A DRAIN IS REQUIRED FOR RETAINING WALL NO. 4.

BEFORE BEGINNING MSE 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. 4 FOR THE FOLLOWING:
1) H = DESIGN HEIGHT + EMBEDMENT
2) DESIGN LIFE = 100 YEARS
3) MAXIMUM FACTORED VERTICAL PRESSURE ON FOUNDATION MATERIAL = 3,100 PSF
4) MINIMUM REINFORCEMENT LENGTH (L) = 0.75xH OR 6 FT, WHICHEVER IS LONGER
5) MINIMUM EMBEDMENT DEPTH = 2.0 FT
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	30	0

DESIGN RETAINING WALL NO. 4 FOR A LIVE LOAD (TRAFFIC) SURCHARGE.

FOUNDATIONS FOR SIGNS, LIGHTING OR SIGNALS MAY BE LOCATED BEHIND RETAINING WALL NO. 4 AND MAY INTERFERE WITH REINFORCEMENT. BEFORE BEGINNING MSE WALL CONSTRUCTION, SUBMIT PROPOSED CONSTRUCTION METHODS FOR THESE FOUNDATIONS FOR APPROVAL.

EXISTING OR FUTURE OBSTRUCTIONS SUCH AS FOUNDATIONS, GUARDRAIL, FENCE OR HANDRAIL POSTS, PAVEMENTS, PIPES, INLETS OR UTILITIES MAY INTERFERE WITH REINFORCEMENT FOR RETAINING WALL NO. 4.

DO NOT PLACE LEVELING PAD CONCRETE, AGGREGATE OR REINFORCEMENT FOR RETAINING WALL NO. 4 UNTIL EXCAVATION DIMENSIONS AND FOUNDATION MATERIAL ARE APPROVED.

"TEMPORARY SHORING" MAY BE REQUIRED FOR RETAINING WALL NO. 4 IN ACCORDANCE WITH THE TEMPORARY SHORING PROVISION. SEE ROADWAY PLANS.

SPECIAL NOTES:

UNDERCUTTING SOFT AND/OR WET SOILS IN THE VICINITY OF THE REINFORCED ZONE AND LEVELING PAD MAY BE REQUIRED TO IMPROVE BEARING RESISTANCE. IF REQUIRED BY THE ENGINEER, USE UNDERCUT EXCAVATION TO REMOVE SOFT SOILS AS DIRECTED BY THE ENGINEER. UNDERCUT TO SUITABLE FOUNDATION SOILS OR TO A DEPTH NO GREATER THAN 3 FEET BELOW THE TOP OF LEVELING PAD ELEVATION, WHICHEVER OCCURS FIRST. PLACE GEOTEXTILE FOR SOIL STABILIZATION IN THE BOTTOM OF THE EXCAVATION AND BACKFILL WITH SELECT GRANULAR MATERIAL. FOR UNDERCUT EXCAVATION AND SELECT GRANULAR MATERIAL SEE STANDARD SPECIFICATIONS. UNDERCUT EXCAVATION, SELECT GRANULAR MATERIAL, AND GEOTEXTILE FOR SOIL STABILIZATION WILL BE PAID AS SEPARATE ADDITIONAL QUANTITIES.

AN ACTIVE WATERLINE IS LOCATED IN CLOSE PROXIMITY TO THE BACK OF THE REINFORCED ZONE.

GEOTECHNICAL
ENGINEER



DocuSigned by:
D. Matthew Brewer
30012900461625

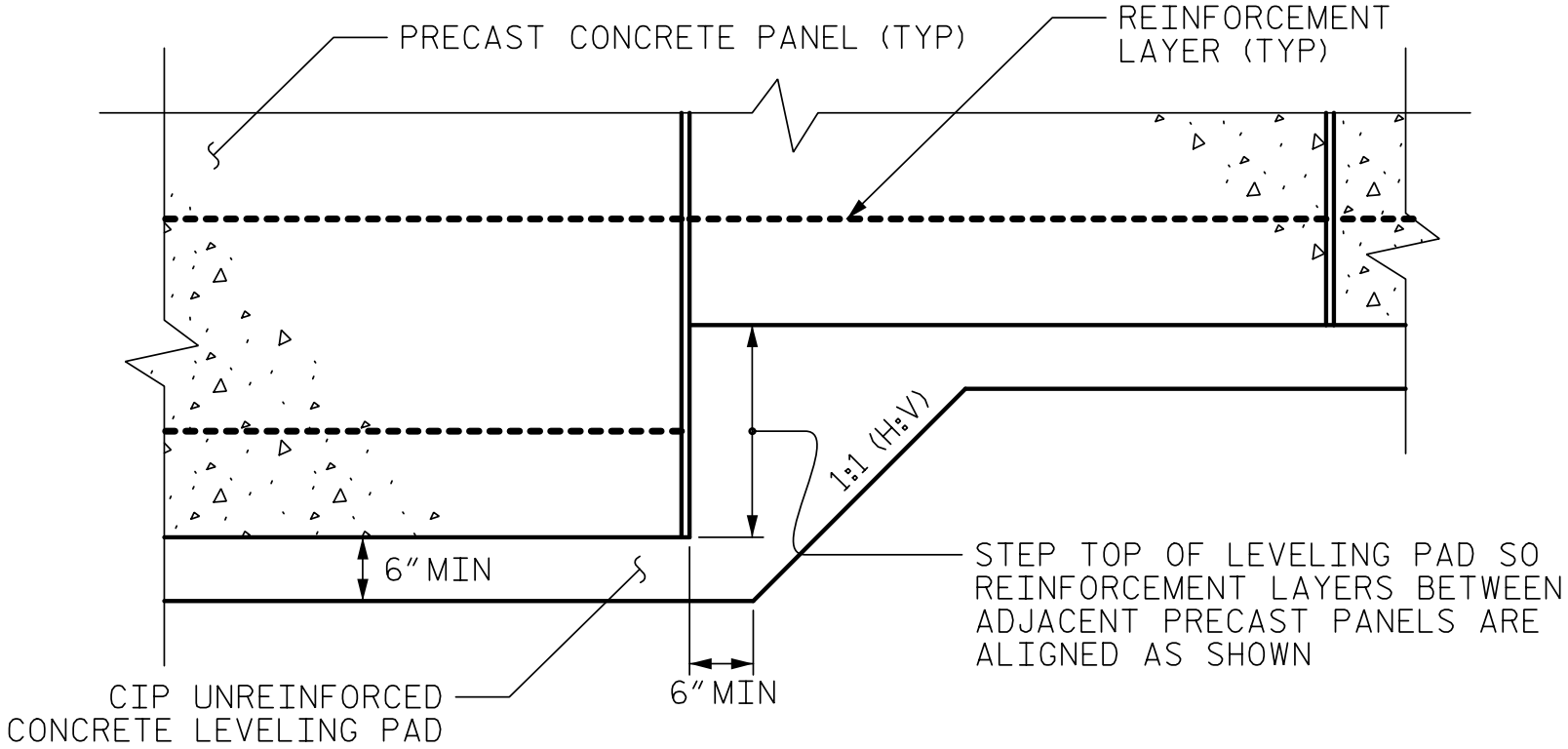
ENGINEER

SIGNATURE

DATE

SIGNATURE

DATE



PRECAST PANELS
LEVELING PAD STEP DETAIL

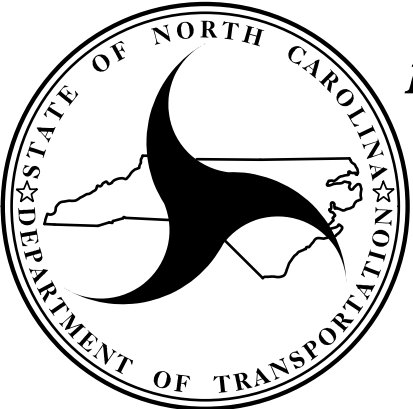
PROJECT NO.: U-6146/B-5857
GASTON COUNTY
STATION: -L- 47+90, 70' RT TO 51+60, 74' RT
SHEET 3 OF 3 WALL ID RW-4-3

PREPARED BY: DMB	DATE: 10/24/23
REVIEWED BY: REK	DATE: 10/24/23

Prepared in the Office of:



CAROLINAS
GEOTECHNICAL
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2400 CROWNPOINT EXECUTIVE DRIVE
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CHARLOTTE, NC 28227
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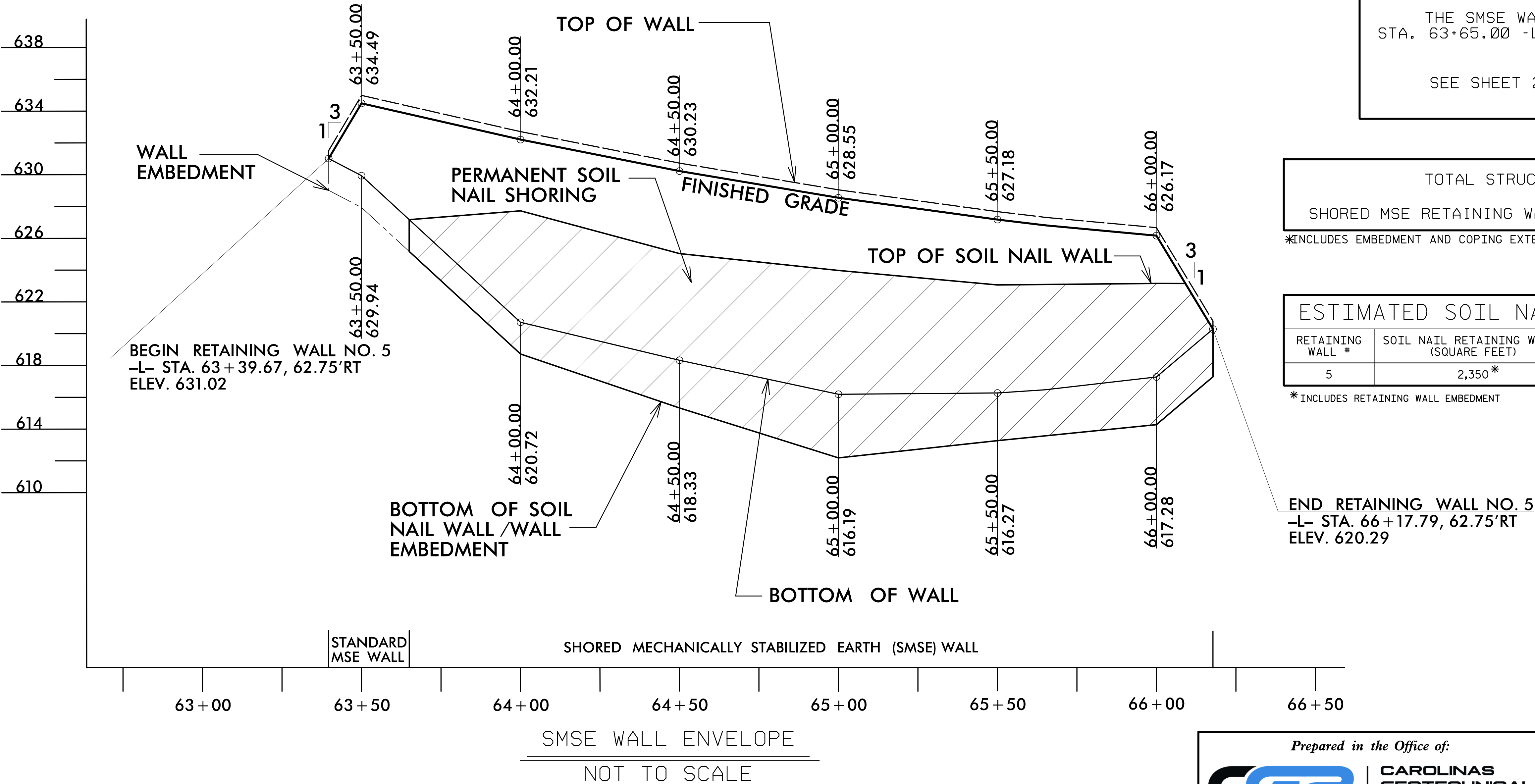
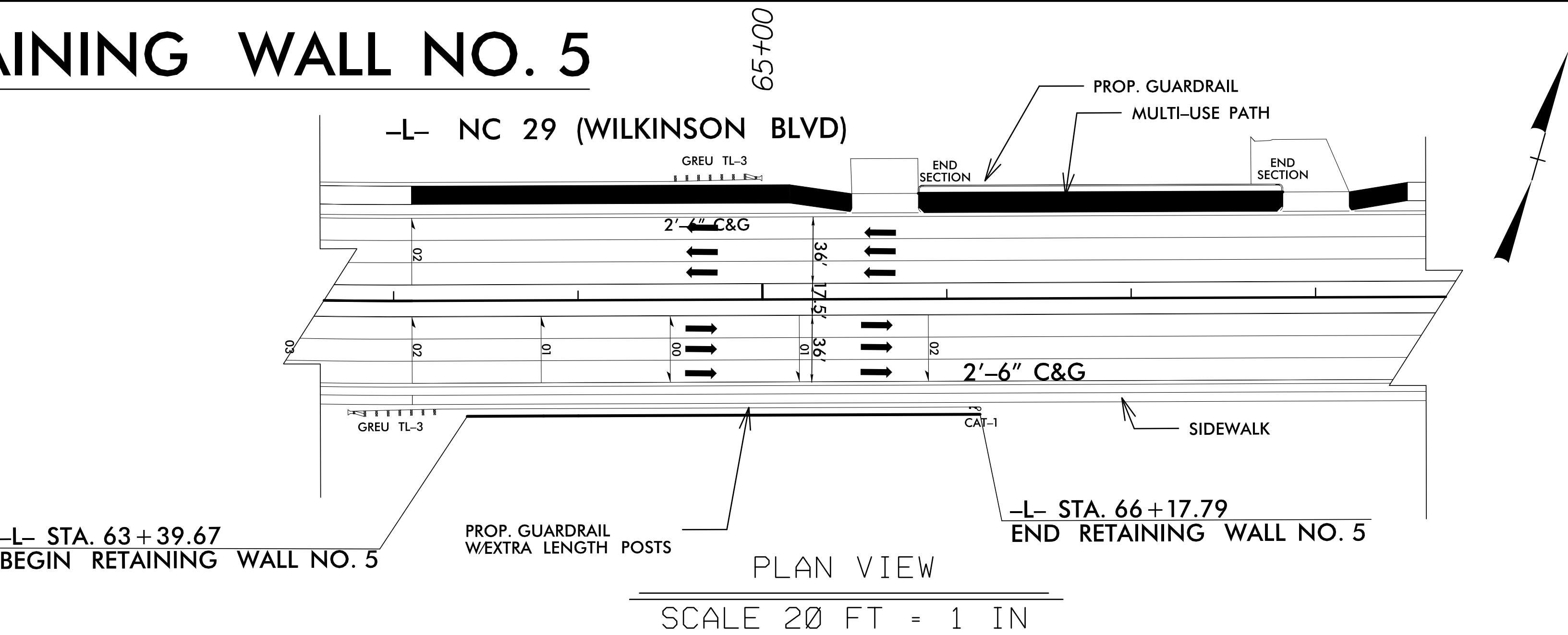


NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

GEOTECHNICAL
ENGINEERING UNIT

MECHANICALLY STABILIZED EARTH (MSE) RETAINING WALL NO. 4						
REVISIONS						
NO.	BY	DATE	NO.	BY	DATE	SHEET NO. W-6
1			3			
2			4			

RETAINING WALL NO. 5



GEOTECHNICAL
ENGINEER

DocuSigned by:
D. Matthew Brewer
398129C95C5E573E

ENGINEER

10/26/23

SIGNATURE

DATE

SIGNATURE

DATE

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

NOTE:

THE MSE WALL (ONLY) LIMITS ARE FROM STA. 63+39.67 -L- TO STA. 63+65.00 -L-.

THE SOIL NAIL WALL LIMITS ARE FROM STA. 63+65.00 -L- TO STA. 66+17.79 -L-.

THE SMSE WALL LIMITS ARE FROM STA. 63+65.00 -L- TO STA. 66+17.79 -L-.

SEE SHEET 2 OF 6 FOR DETAILS

TOTAL STRUCTURE QUANTITIES	
SHORED MSE RETAINING WALL NO. 5	3,710 SQ. FT.
*INCLUDES EMBEDMENT AND COPING EXTENSION	

ESTIMATED SOIL NAIL WALL QUANTITIES			
RETAINING WALL #	SOIL NAIL RETAINING WALLS (SQUARE FEET)	SOIL NAIL VERIFICATION TESTS	SOIL NAIL PROOF TESTS
5	2,350*	3	8
*INCLUDES RETAINING WALL EMBEDMENT			

PROJECT NO.: U-6146/B-5857

GASTON COUNTY

STATION: -L- 63+39, 62' RT TO 66+17, 62' RT

SHEET 1 OF 6 WALL ID RW-5-1

PREPARED BY: DMB	DATE: 10/24/23
REVIEWED BY: REK	DATE: 10/24/23

Prepared in the Office of:

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

SHORED MECHANICALLY STABILIZED EARTH (SMSE) RETAINING WALL NO. 5						
REVISIONS						
NO.	BY	DATE	NO.	BY	DATE	SHEET NO.
1			3			W-7
2			4			

NOTE:

THE MSE WALL (ONLY) LIMITS ARE FROM STA. 63+39.67 -L- TO STA. 63+65.00 -L-.

THE SOIL NAIL WALL LIMITS ARE FROM STA. 63+65.00 -L- TO STA. 66+17.79 -L-.

THE SMSE WALL LIMITS ARE FROM STA. 63+65.00 -L- TO STA. 66+17.79-L-.

-L- STA. 63+39.67
BEGIN RETAINING WALL NO. 5

-L- STA. 66+17.79
END RETAINING WALL NO. 5

WALL LIMITS SKETCH

NOT TO SCALE

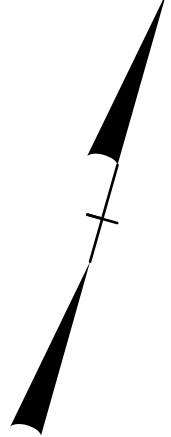
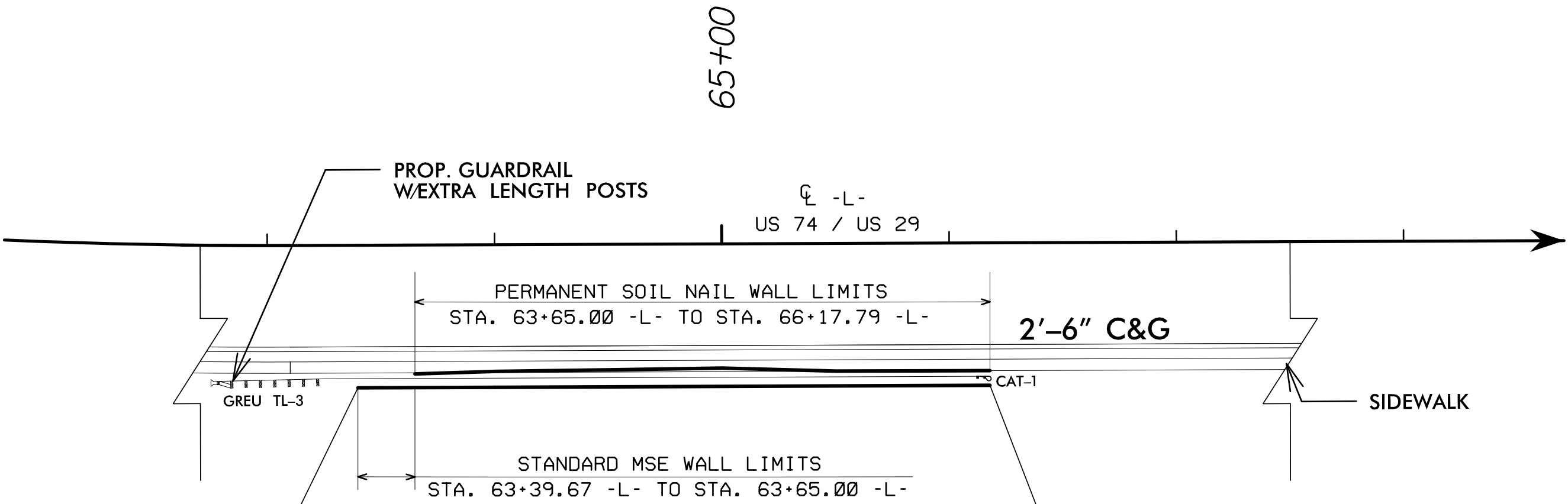
SMSE RETAINING WALL INFORMATION									
STA. -L-	OFFSET RT FROM CL TO WALL FACE	PROPOSED FINISHED GRADE	BOTTOM OF WALL	MINIMUM TOP OF LEVELING PAD	ESTIMATED MINIMUM SMSE WALL EMBEDMENT	* DESIGN SMSE WALL HEIGHT "H"	TOP OF SOIL NAIL WALL	SOIL NAIL WALL HEIGHT	WALL REINFORCEMENT LENGTH 'L'
63+39.67	62.75	631.02	631.02	629.02	2.00	2.00	—	—	Ø.7XH OR 6 FT (MIN)
63+50.00	62.75	634.49	629.94	627.94	2.00	6.55	—	—	Ø.7XH OR 6 FT (MIN)
63+65.00	62.75	633.82	627.17	625.17	2.00	8.65	627.17	2.00	LOWER: Ø.7XH OR 6 FT (MIN) UPPER: Ø.7XH OR 10 FT (MIN)
64+00.00	62.75	632.21	620.72	618.72	2.00	13.49	627.70	8.98	LOWER: Ø.7XH OR 6 FT (MIN) UPPER: Ø.7XH OR 10 FT (MIN)
64+50.00	62.75	630.23	618.33	615.33	3.00	14.90	625.04	9.71	LOWER: Ø.5XH OR 6 FT (MIN) UPPER: Ø.7XH OR 10 FT (MIN)
65+00.00	62.75	628.55	616.19	612.19	4.00	16.36	623.98	11.79	LOWER: Ø.5XH OR 6 FT (MIN) UPPER: Ø.7XH OR 10 FT (MIN)
65+50.00	62.75	627.18	616.27	613.27	3.00	13.91	623.07	9.80	LOWER: Ø.5XH OR 6 FT (MIN) UPPER: Ø.7XH OR 10 FT (MIN)
66+00.00	62.75	626.17	617.28	614.28	3.00	11.90	623.16	8.89	LOWER: Ø.5XH OR 6 FT (MIN) UPPER: Ø.7XH OR 10 FT (MIN)
66+17.79	62.75	620.29	620.29	618.29	2.00	3.00	620.29	2.00	LOWER: Ø.5XH OR 6 FT (MIN) UPPER: Ø.7XH OR 10 FT (MIN)

*FOR DESIGN WALL HEIGHT "H" AND ADDITIONAL CONSTRUCTION DETAILS, SEE SHEETS 3 THRU 6
ALL TABLE DIMENSIONS ARE GIVEN IN FEET

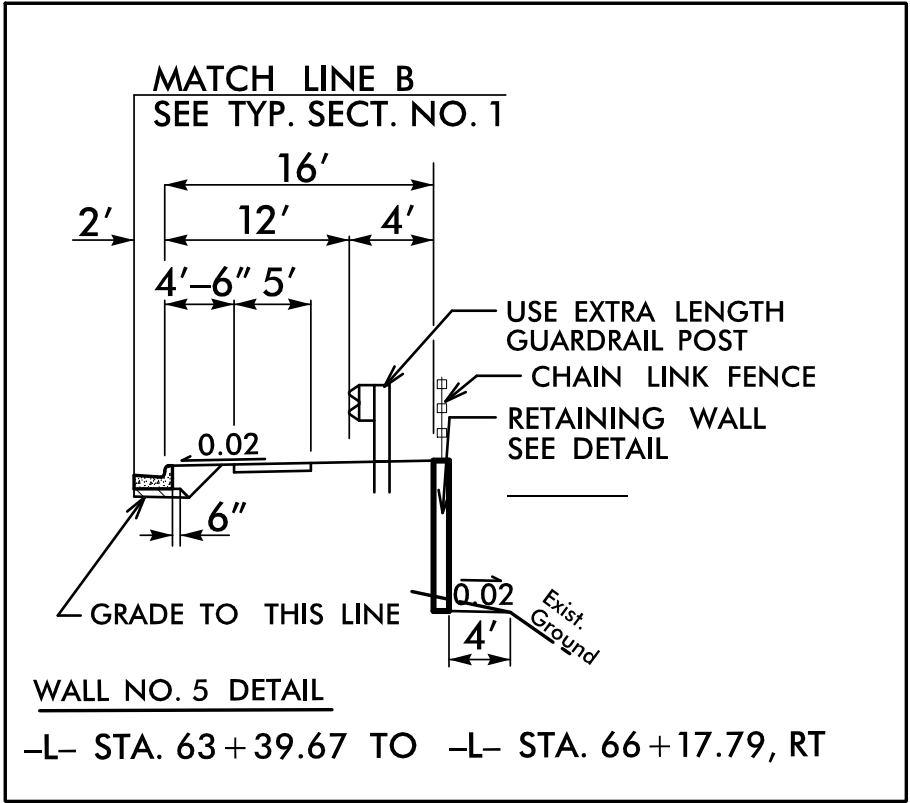
FRONT SLOPE WALL EMBEDMENT		
SLOPE IN FRONT OF STRUCTURES		MINIMUM EMBEDMENT DEPTH
HORIZONTAL	FOR WALLS	H/20
	FOR ABUTMENTS	H/10
3.0H:1.0V	WALLS	H/10
2.5H:1.0V	WALLS	H/8.5
2.0H:1.0V	WALLS	H/7
1.5H:1.0V	WALLS	H/5
1.25H:1.0V	WALLS	H/4
1.0H:1.0V	WALLS	H/3

NOTE:

- 1) MAINTAIN A MINIMUM BENCH WIDTH OF 4.0 FT IN FRONT OF THE WALL FOR ITS ENTIRE LENGTH.
 - 2) MINIMUM EMBEDMENT DEPTH OF 2 FT, UNLESS LARGER DEPTHS DICTATED BY 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 ANALYSESIS.
- REFERENCE SPECIAL PROVISION GT-3



GEOTECHNICAL ENGINEER	ENGINEER
	
DocuSigned by: <i>D. Matthew Brewer</i> 3001290046205	10/26/23
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SIGNATURE	DATE



TYPICAL WALL SECTION

NOT TO SCALE

PROJECT NO.: U-6146/B-5857

GASTON COUNTY

STATION: -L- 63+39, 62' RT TO 66+17, 62' RT

SHEET 2 OF 6

WALL ID RW-5-2

PREPARED BY: DMB	DATE: 10/24/23
REVIEWED BY: REK	DATE: 10/24/23

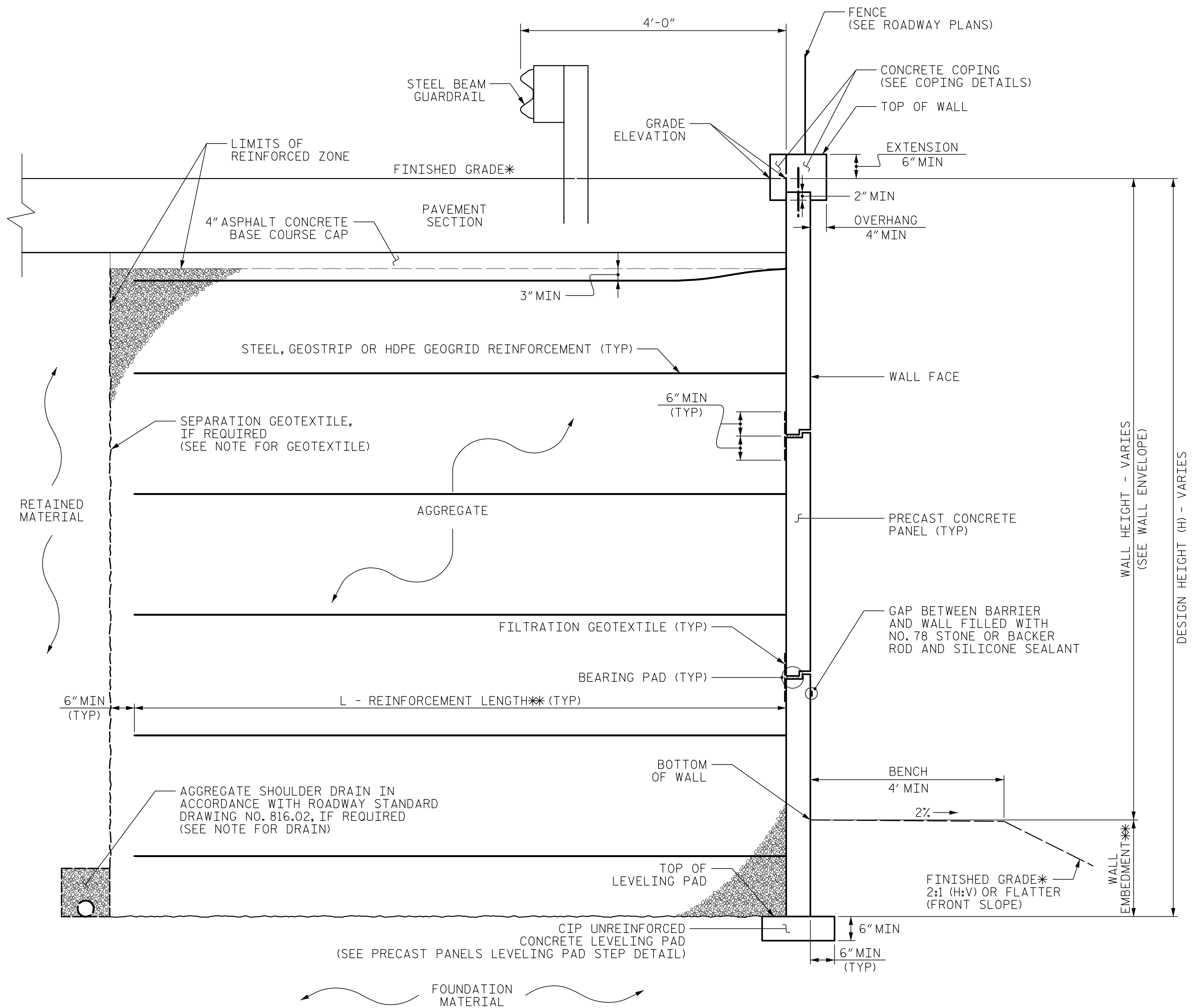
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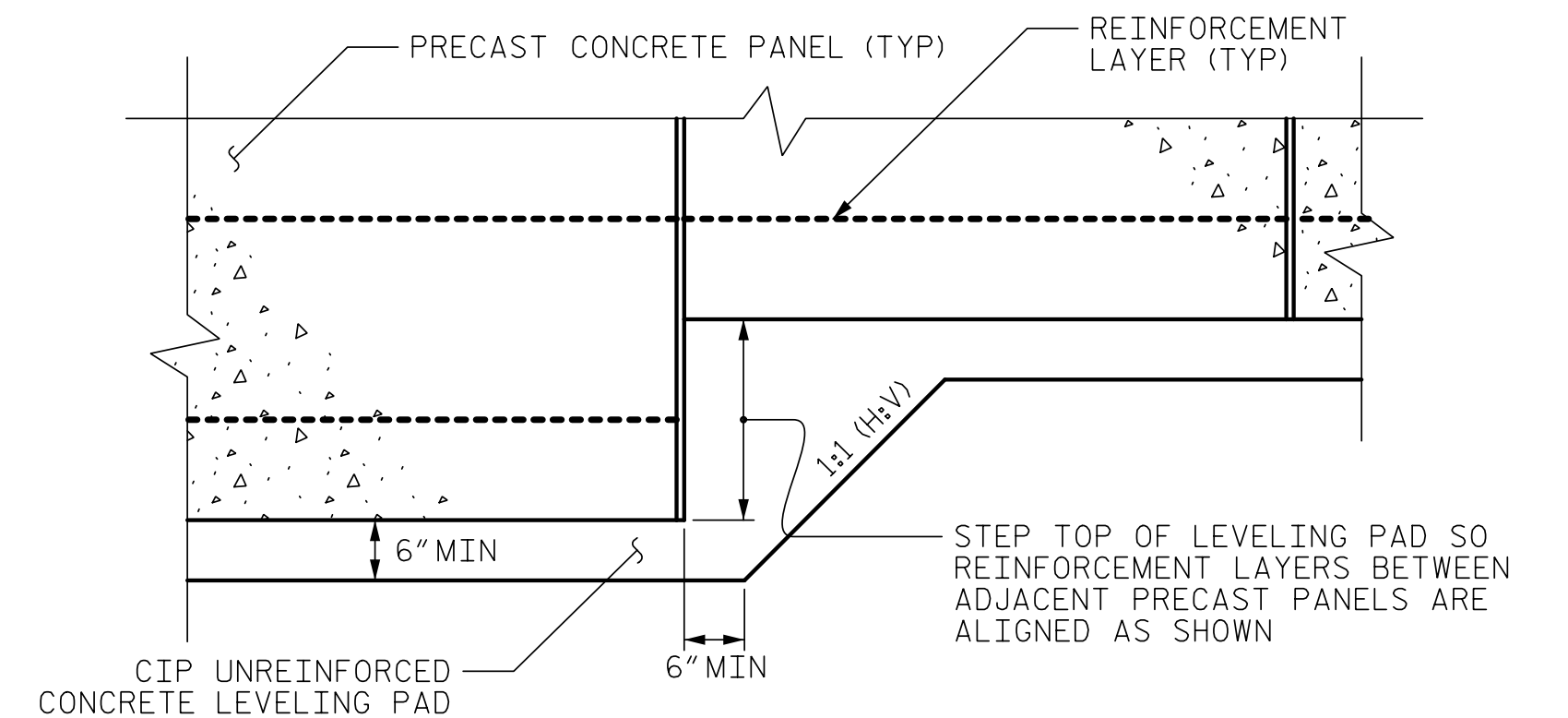
SHORED MECHANICALLY
STABILIZED EARTH (SMSE)
RETAINING WALL NO. 5

REVISIONS						SHEET NO. W-8
NO.	BY	DATE	NO.	BY	DATE	
1			3			
2			4			



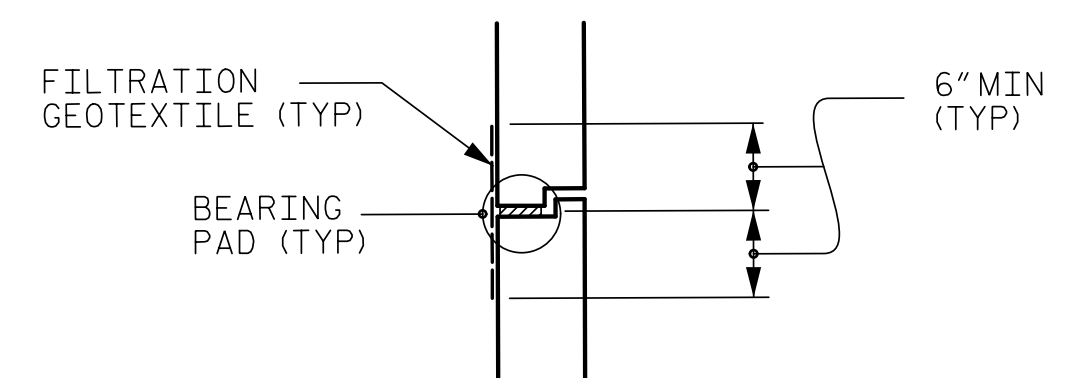
MSE WALL WITH PRECAST PANELS - TYPICAL SECTION

*SEE SMSE RETAINING WALLS SPECIAL PROVISION AND IF APPLICABLE, SMSE WALL NOTES REINFORCEMENT LENGTH REQUIREMENTS.



PRECAST PANELS LEVELING PAD STEP DETAIL

NOT TO SCALE



PRECAST PANEL JOINT DETAILS

NOT TO SCALE

SHEET 3 OF 6 WALL ID RW-5-3

MECHANICALLY STABILIZED EARTH (MSE) RETAINING WALL NO. 5

REVISIONS						SHEET NO. W-9
NO.	BY	DATE	NO.	BY	DATE	
1			3			
2			4			

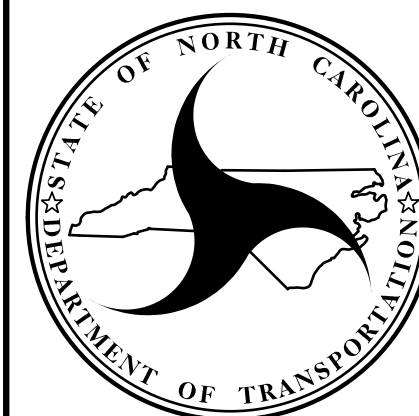
SHEET
NO.
M-9

PREPARED BY: DMB	DATE: 10/24/23
REVIEWED BY: REK	DATE: 10/24/23

Prepared in the Office of:

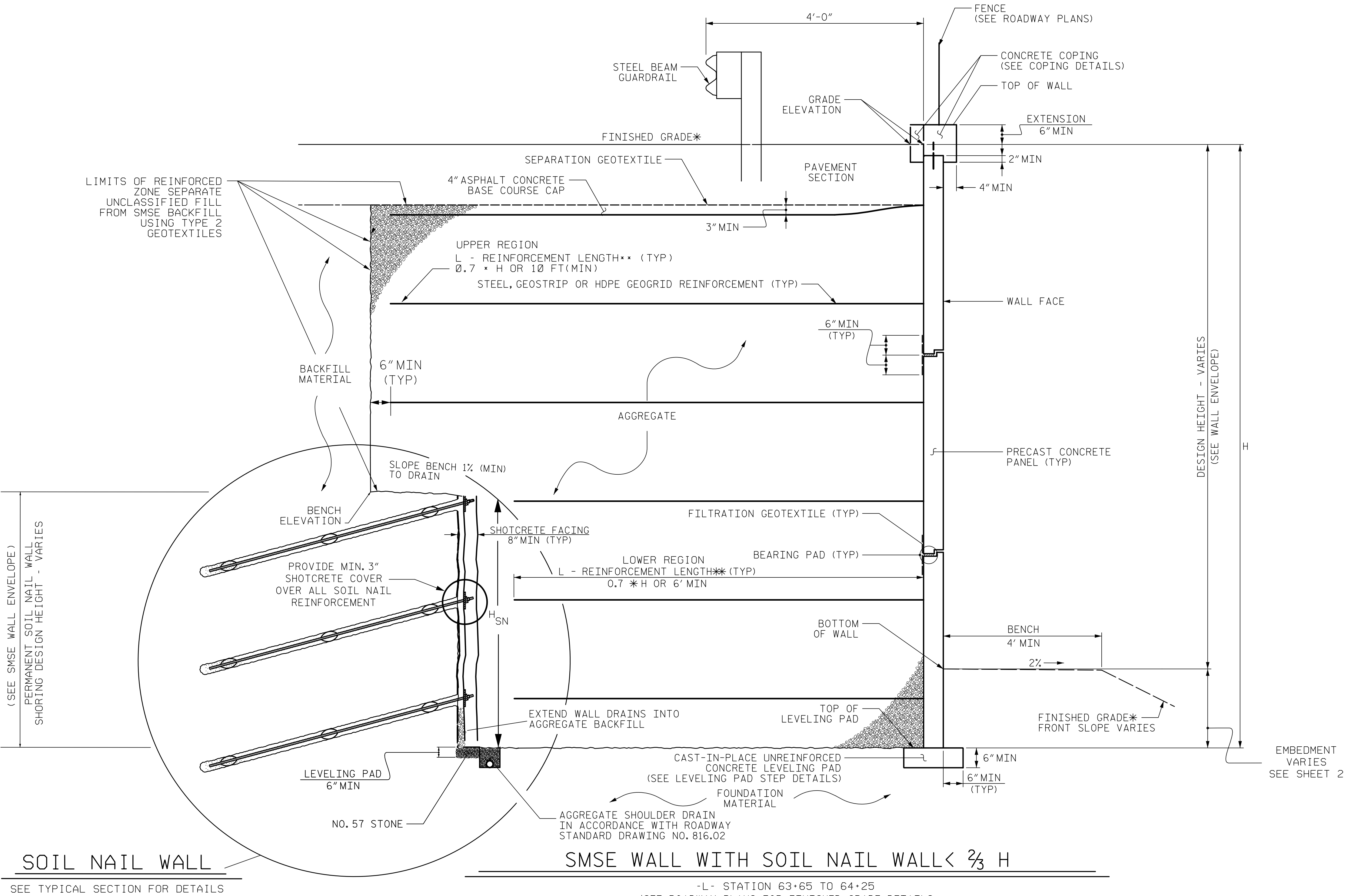
 **CAROLINAS
GEOTECHNICAL
GROUP**

**2400 CROWNPOINT EXECUTIVE DRIVE
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CHARLOTTE, NC 28227
(980) 339-8684**



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

**GEOTECHNICAL
ENGINEERING UNIT**



GEOTECHNICAL ENGINEER



DocuSigned by:
D. Matthew Brewer
386128C0A4C1462

ENGINEER

SIGNATURE

DATE

10/26/23

SIGNATURE

DATE

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PROJECT NO.: U-6146/B-5857

GASTON COUNTY

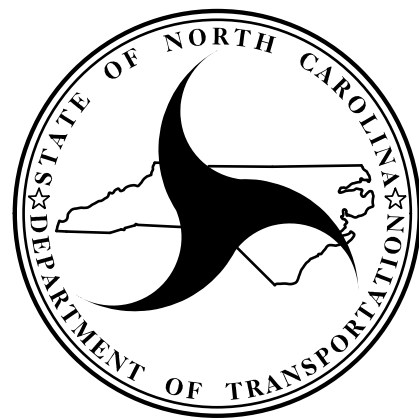
STATION: -L- 63+39, 62' RT TO 66+17, 62' RT

SHEET 4 OF 6 WALL ID RW-5-4

PREPARED BY: DMB	DATE: 10/24/23
REVIEWED BY: REK	DATE: 10/24/23

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DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

**GEOTECHNICAL
ENGINEERING UNIT**

REVISIONS						SHEET NO. W-10
NO.	BY	DATE	NO.	BY	DATE	
1			3			
2			4			

SHORED MECHANICALLY STABILIZED EARTH (SMSE) RETAINING WALL NO. 5

NOTES:

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

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

FOR LOCATIONS WHERE A SMSE RETAINING WALL IS NOT USED, USE FULL LENGTH REINFORCEMENT AS SHOWN IN THE MSE TYPICAL SECTION.

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

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

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.

AT THE CONTRACTOR'S OPTION, USE FINE AGGREGATE IN THE REINFORCED ZONE OF RETAINING WALL NO. 5.

A SMOOTH ARCHITECTURAL FINISH IS REQUIRED FOR PRECAST CONCRETE PANELS FOR RETAINING WALL NO. 5.

A SEPARATION GEOTEXTILE IS REQUIRED AT THE BACK OF THE REINFORCED ZONE FOR RETAINING WALL NO. 5.

A DRAIN IS REQUIRED FOR RETAINING WALL NO. 5.

BEFORE BEGINNING SMSE WALL DESIGN FOR RETAINING WALL NO. 5, 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. 5 FOR WALL HEIGHTS EQUAL TO THE DESIGN HEIGHT (DIFFERENCE BETWEEN FINISHED 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. 5 FOR THE FOLLOWING:

- 1) H = DESIGN HEIGHT + EMBEDMENT
- 2) DESIGN LIFE = 75 YEARS
- 3) MAXIMUM FACTORED VERTICAL PRESSURE ON FOUNDATION MATERIAL = 3,100 PSF
- 4) MINIMUM REINFORCEMENT LENGTH (L) = VARIES, SEE TABLE ON SHEET W5-2
- 5) MINIMUM SOIL NAIL REINFORCEMENT LENGTH (L_{SN}) = H_{SN} X 0.70 OR 10 FT, WHICHEVER IS GREATER. (SEE SPECIAL PROVISION)
- 6) MINIMUM SOIL NAIL REINFORCEMENT LENGTHS ARE BASED ON GLOBAL STABILITY.
- 7) MINIMUM EMBEDMENT DEPTH = 2 FT (MIN), SEE TABLE ON SHEET W5-2
- 8) 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	30	0
FOUNDATION	120	29	0

DESIGN RETAINING WALL NO. 5 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. 5.

DO NOT PLACE LEVELING PAD CONCRETE, AGGREGATE OR REINFORCEMENT FOR MSE WALL PORTION OF RETAINING WALL NO. 5 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. 5. SEE MSE RETAINING WALLS PROVISION FOR TEMPORARY SHORING FOR WALL CONSTRUCTION.

FOR SOIL NAIL RETAINING WALLS, SEE SMSE RETAINING WALL SPECIAL PROVISION.

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.

THE PERMANENT SOIL NAIL WALL HEIGHT IS AN ESTIMATE ONLY, THAT IS BASED ON THE ANTICIPATED EXCAVATION PLUS THE MINIMUM EMBEDMENT LISTED.

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.

DESIGN SOIL NAIL WALL FOR HEIGHTS (H_{SN}) EQUAL TO THE DESIGN HEIGHT (DIFFERENCE BETWEEN GRADE ELEVATION AND THE TOP OF LEVELING PAD).

"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 0.5 TIMES "H" (SMSE DESIGN HEIGHT) INCLUDING THE MINIMUM EMBEDMENT LISTED IN THE DESIGN TABLE ON SHEET W4-2. 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 STABILTIY 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.

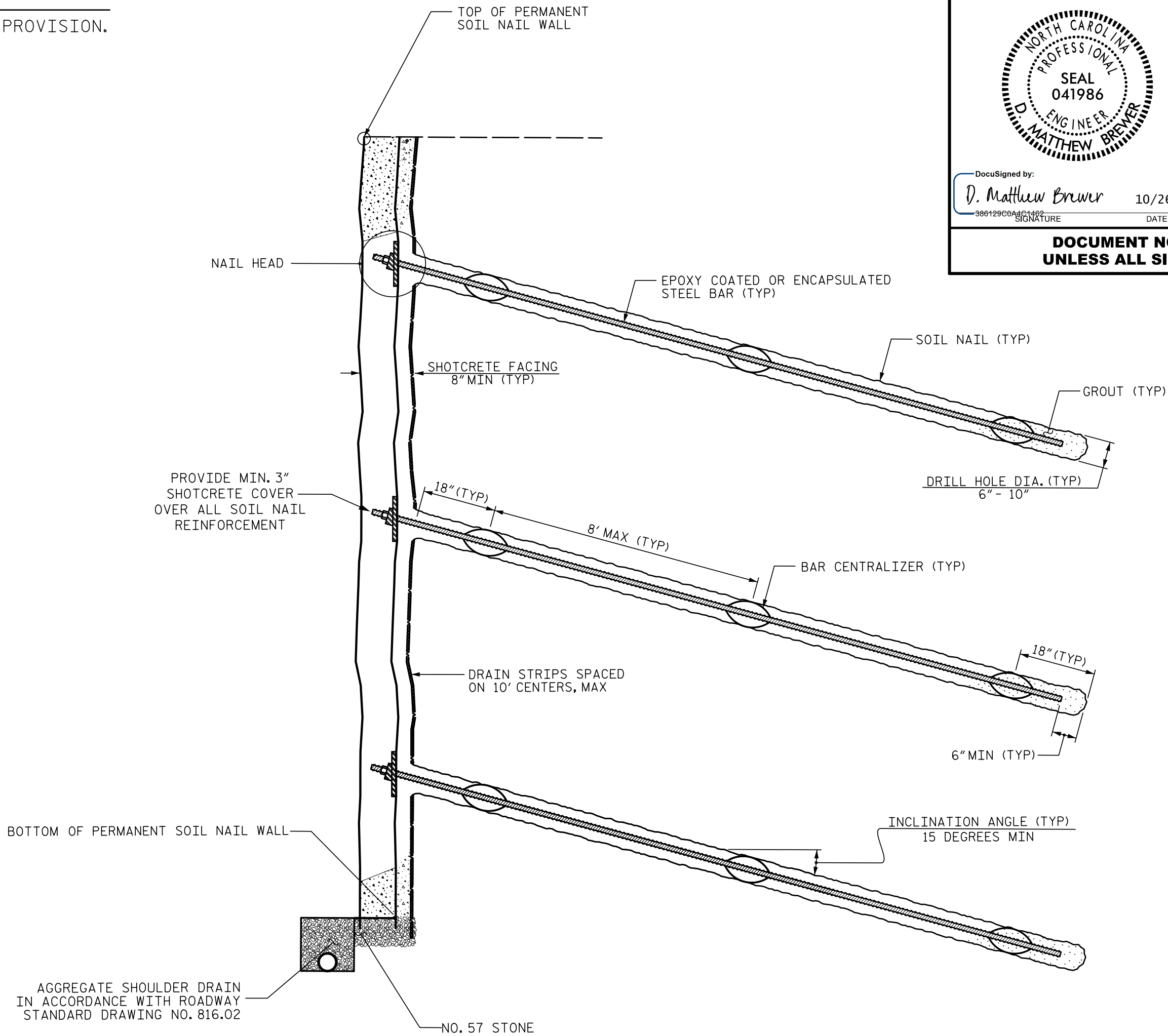
CONTRACTOR SHALL DAYLIGHT AGGREGATE SHOULDER DRAINS OUTSIDE THE LIMITS OF THE WALL.

SPECIAL NOTES:

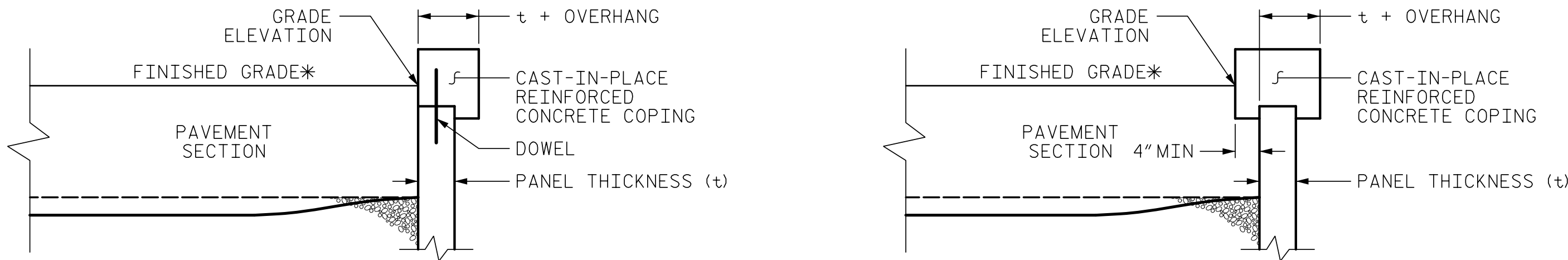
UNDERCUTTING SOFT AND/OR WET SOILS IN THE VICINITY OF THE REINFORCED ZONE AND LEVELING PAD MAY BE REQUIRED. IF REQUIRED BY THE ENGINEER, USE UNDERCUT EXCAVATION TO REMOVE SOFT SOILS AS DIRECTED BY THE ENGINEER. UNDERCUT TO SUITABLE FOUNDATION SOILS OR TO A DEPTH NO GREATER THAN 3 FEET BELOW THE TOP OF LEVELING PAD ELEVATION, WHICHEVER OCCURS FIRST. PLACE GEOTEXTILE FOR SOIL STABILIZATION IN THE BOTTOM OF THE EXCAVATION AND BACKFILL WITH SELECT GRANULAR MATERIAL. FOR UNDERCUT EXCAVATION AND SELECT GRANULAR MATERIAL SEE STANDARD SPECIFICATIONS. UNDERCUT EXCAVATION, SELECT GRANULAR MATERIAL, AND GEOTEXTILE FOR SOIL STABILIZATION WILL BE PAID AS SEPARATE ADDITIONAL QUANTITIES.

EXTEND SOIL NAIL WALL TO BOTTOM OF EXCAVATION AS REQUIRED. ADDITIONAL SOIL NAIL WALL DUE TO UNDERCUT EXCAVATION WILL BE PAID AS ADDITIONAL WORK IN ACCORDANCE WITH THE SHORED MECHANICALLY STABILIZED EARTH RETAINING WALLS SPECIAL PROVISION.

AN ACTIVE WATERLINE IS LOCATED IN CLOSE PROXIMITY TO THE BACK OF THE REINFORCED ZONE.



SOIL NAIL WALL - TYPICAL SECTION



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.

PROJECT NO.: U-6146/B-5857

GASTON COUNTY

STATION: -L- 63+39, 62' RT TO 66+17, 62' RT

SHEET 6 OF 6

WALL ID RW-5-5

SHORED MECHANICALLY STABILIZED EARTH (SMSE) RETAINING WALL NO. 5

REVISIONS

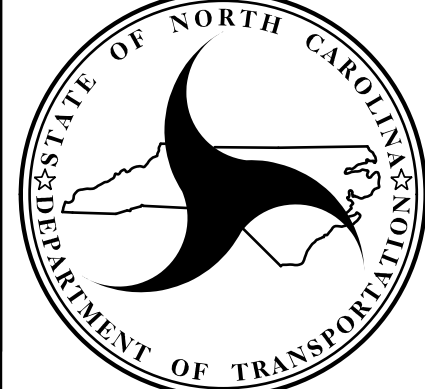
NO.	BY	DATE	NO.	BY	DATE
1			3		
2			4		

SHEET NO.
W-12

Prepared in the Office of:

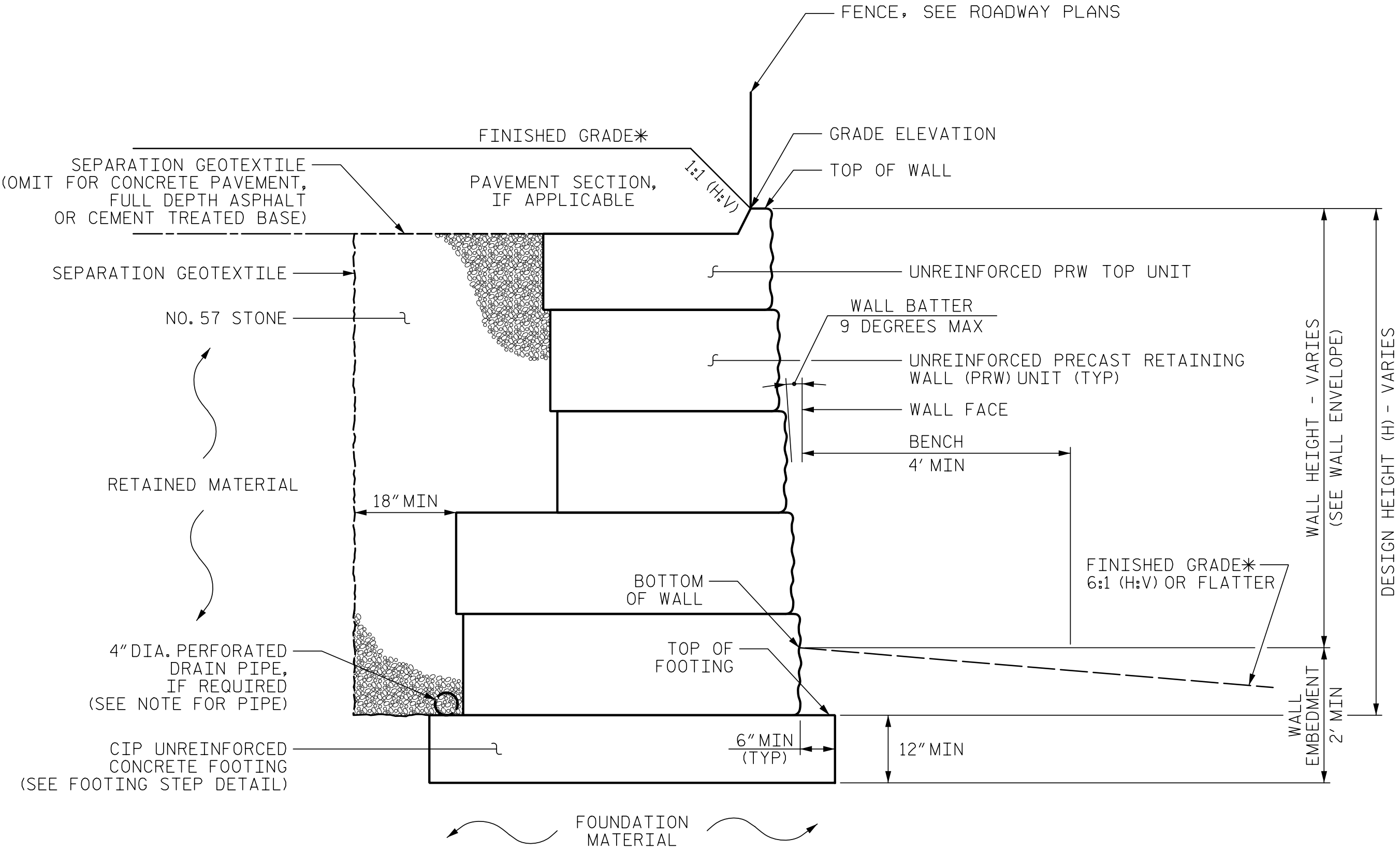


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PRECAST GRAVITY WALL WITH
TOP PRW UNIT - TYPICAL SECTION

*SEE ROADWAY PLANS FOR FINISHED GRADE DETAILS.

NOTES:

FOR PRECAST GRAVITY RETAINING WALLS, SEE SECTION 455 OF THE STANDARD SPECIFICATIONS.

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

A DRAIN PIPE IS REQUIRED FOR RETAINING WALL NO. 6.

BEFORE BEGINNING PRECAST GRAVITY WALL DESIGN FOR RETAINING WALL NO. 6, 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.

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

DESIGN RETAINING WALL NO. 6 FOR WALL HEIGHTS EQUAL TO THE DESIGN HEIGHT PLUS DEPTH TO TOP OF FOOTING (DIFFERENCE BETWEEN GRADE ELEVATION AND TOP OF FOOTING ELEVATION).

DESIGN RETAINING WALL NO. 6 FOR THE FOLLOWING:

1) MAXIMUM FACTORED VERTICAL PRESSURE ON FOUNDATION MATERIAL = 2,900 PSF

3) MINIMUM EMBEDMENT DEPTH = 2.0 FT

4) IN-SITU ASSUMED MATERIAL PARAMETERS:

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

DESIGN RETAINING WALL NO. 6 FOR A LIVE LOAD (TRAFFIC) SURCHARGE.

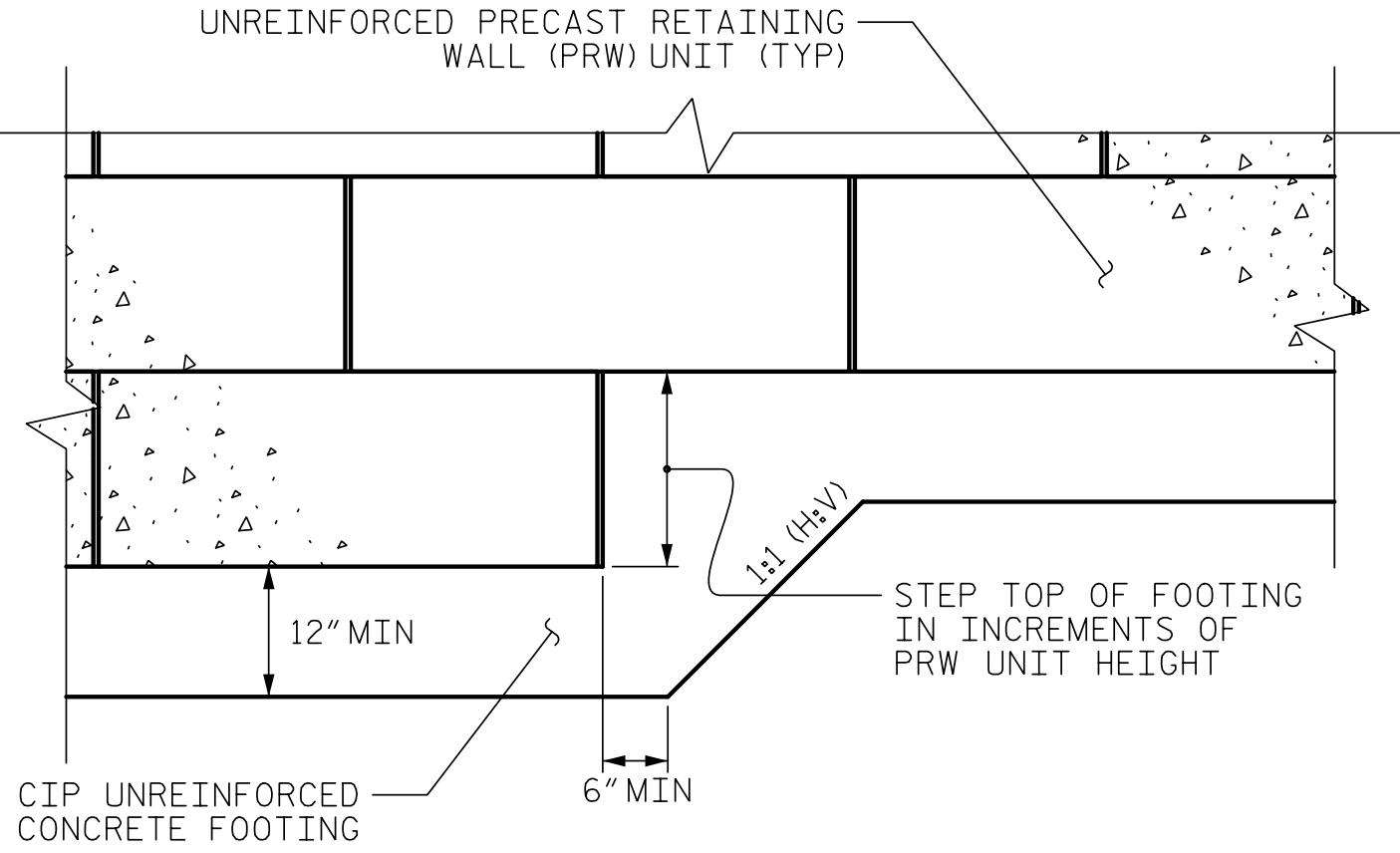
DO NOT PLACE CONCRETE FOR FOOTINGS FOR RETAINING WALL NO. 6 UNTIL EXCAVATION DIMENSIONS AND FOUNDATION MATERIAL ARE APPROVED.

AT THE CONTRACTOR'S OPTION, "TEMPORARY SHORING FOR WALL CONSTRUCTION" MAY BE USED TO CONSTRUCT RETAINING WALL NO. 6. SEE PRECAST GRAVITY RETAINING WALLS PROVISION FOR TEMPORARY SHORING FOR WALL CONSTRUCTION.

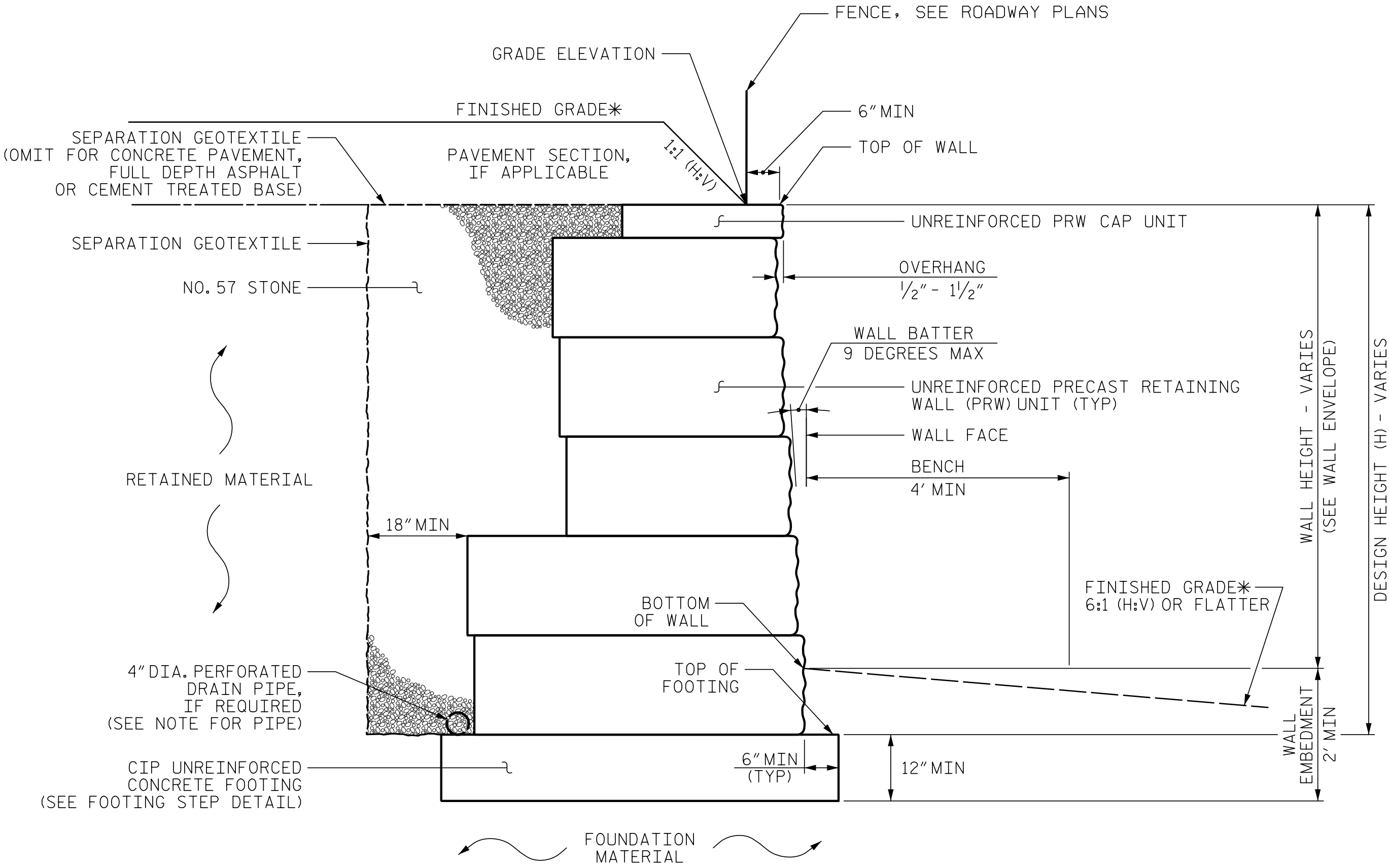
SPECIAL NOTES:

PORTIONS OF THE WALL MAY SUPPORT AN AREA THAT CONTAINS A NEARBY SEPTIC DRAIN FIELD.

OVERHEAD UTILITIES ARE PRESENT IN THE VICINITY OF THE PROPOSED WALL LOCATION.



FOOTING STEP DETAIL



PRECAST GRAVITY WALL WITH
CAP PRW UNIT - TYPICAL SECTION

*SEE ROADWAY PLANS FOR FINISHED GRADE DETAILS.

GEOTECHNICAL
ENGINEER

DocuSigned by:
D. Matthew Brewer
10/26/23

ENGINEER

SIGNATURE

DATE

SIGNATURE

DATE

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PROJECT NO.: U-6146/B-5857

GASTON COUNTY

RETAINING WALL NO. 6: -L- 37+32, 66' LT TO 37+75, 66' LT

SHEET 2 OF 2

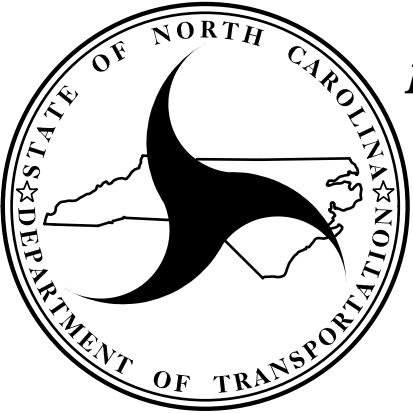
WALL ID RW-6-2

PREPARED BY: DMB	DATE: 10/24/23
REVIEWED BY: REK	DATE: 10/24/23

Prepared in the Office of:

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RETAINING WALL NO. 6
PRECAST GRAVITY
RETAINING WALL

REVISIONS						SHEET NO. W-14
NO.	BY	DATE	NO.	BY	DATE	
1			3			
2			4			