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GEOTECHNICAL ENGINEER

ENGINEER

DocuSigned by:
 8/21/2019

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STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS HIGHWAY BUILDING PO BOX 25201 RALEIGH, NORTH CAROLINA 27611	<h2 style="margin: 0;">RETAINING WALL SUMMARY</h2>	SUBJECT: I-4400C - I-26 from US 25 Business (Exit 44) to NC 280 (Exit 40)
		PREPARED BY: MHS PROJECT: 34232.1.FS4 DATE: -- TIP: I-4400C CHECKED BY: -- COUNTY: Buncombe

Retaining Wall No.	Begin Alignment	Begin Station	Offset (LT / RT)	End Alignment	End Station	Offset (LT / RT)	Length (ft)	Excavation Type (Cut or Fill)	Exposed Wall Area (sft)	Minimum Embedment (ft)	Installed Area (sft)*	Avg. Height (ft)	Max. Design Height (ft)	Back Slope (Yes or No)	Wall Type								
RW99	-L-	661+35.2	68.3' (RT)	-L-	664+49.2	76.3' (RT)	314	Fill	6539	2.0	8367	9.2	14.3	No	MSE w/ MS								
	-Y10RPC-	10+00.	27.3' (RT)	-Y10RPC-	16+00.	27.3' (RT)	600																
							Total									914							
RW100	-L-	660+13.4	68.3' (LT)	-L-	663+21.2	76.3' (LT)	307.8	Fill	8199	2.0	9815	12.1	13.8	No	MSE w/ MS								
	-Y10RPB-	10+00.	27.3' (LT)	-Y10RPB-	15+00.	27.3' (LT)	500																
							Total									807.8							
RW101	-L-	676+00.	64.5' (RT)	-L-	678+50.	64.5' (RT)	250	Cut	881	1.0	1131	4.5	7.0	Yes	SNW								
RW102	-Y10RPA-	20+00.	30.3' (RT)	-Y10RPA-	27+38.4	43.3' (RT)	738.4																
	Spur RT	10+00.	27.3' (LT)	Spur RT	11+61.1	31.3' (RT)	161.1									Total	899.5						
RW103	-L-	707+00.	92.5' (RT)	-L-	708+50.	92.5' (RT)	150	Cut	1591	1.0	1741	11.6	17.0	No	SNW								
RW104	-L-	707+50.	92.5' (LT)	-L-	709+25.	92.5' (LT)	175																
RW105	-L-	812+50.	92.5' (RT)	-L-	817+00.	92.5' (RT)	450																
RW106	-L-	814+65.	92.5' (LT)	-L-	816+00.	92.5' (LT)	135																
RW107	-Y12-	26+85.	22.5' (LT)	-Y12-	28+50.	22.5' (LT)	165									Fill	1071	2.0	1401	8.5	2.0	No	MSE
RW108	-Y23-	14+10.	37.5' (LT)	-Y23-	15+24.	62.0' (LT)	114																

* Beginning with the 2018 Standard Specifications, retaining walls are paid for on a per square foot of installed facing, which now includes the embedded portion. For estimating purposes, we have included an embedded quantity based on the slopes in the provided cross sections. The minimum embedment listed was determined from a global stability analysis. It is the Contractor and Designer's responsibility to evaluate site conditions and adjust embedment as required while maintaining the minimum values, or deeper if warranted, along the length of the wall.

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 FOR MSE WALLS AND 1 FT FOR SOIL NAIL WALLS, UNLESS LARGER DEPTHS DICTATED BY THE ABOVE TABLE.
 3) MAXIMUM FRONT SLOPES WILL NOT EXCEED A SLOPE OF 1H:1V
 4) SUBMIT WITH THE WALL DESIGN INTERNAL, EXTERNAL, AND GLOBAL STABILITY ANALYSES.
 5) REV01 INCLUDES THE ADDITION OF RW108.

RETAINING WALL NO.	SOIL NAIL RETAINING WALLS (SQUARE FEET)	ARCHITECTURAL CONCRETE SURFACE TREATMENT (SQUARE FEET)	SOIL NAIL VERIFICATION TESTS	SOIL NAIL PROOF TESTS
101	881	881	2	6
103	1,591	1,591	2	5
104	2,035	2,035	2	6
105	4,043	4,043	3	14
106	1,397	1,397	2	5
TOTAL QUANTITIES	9,947 SF	9,947 SF	11	36

RETAINING WALL NO.	SOIL NAIL RETAINING WALLS (SQUARE FEET)	ARCHITECTURAL CONCRETE SURFACE TREATMENT (SQUARE FEET)
MSE RETAINING WALL NO. 99	8,367	8,367
MSE RETAINING WALL NO. 100	9,815	9,815
MSE RETAINING WALL NO. 102	10,419	10,419
MSE RETAINING WALL NO. 107	1,401	1,401
MSE RETAINING WALL NO. 108	1,048	1,048
TOTAL QUANTITIES	31,050 SF	31,050 SF

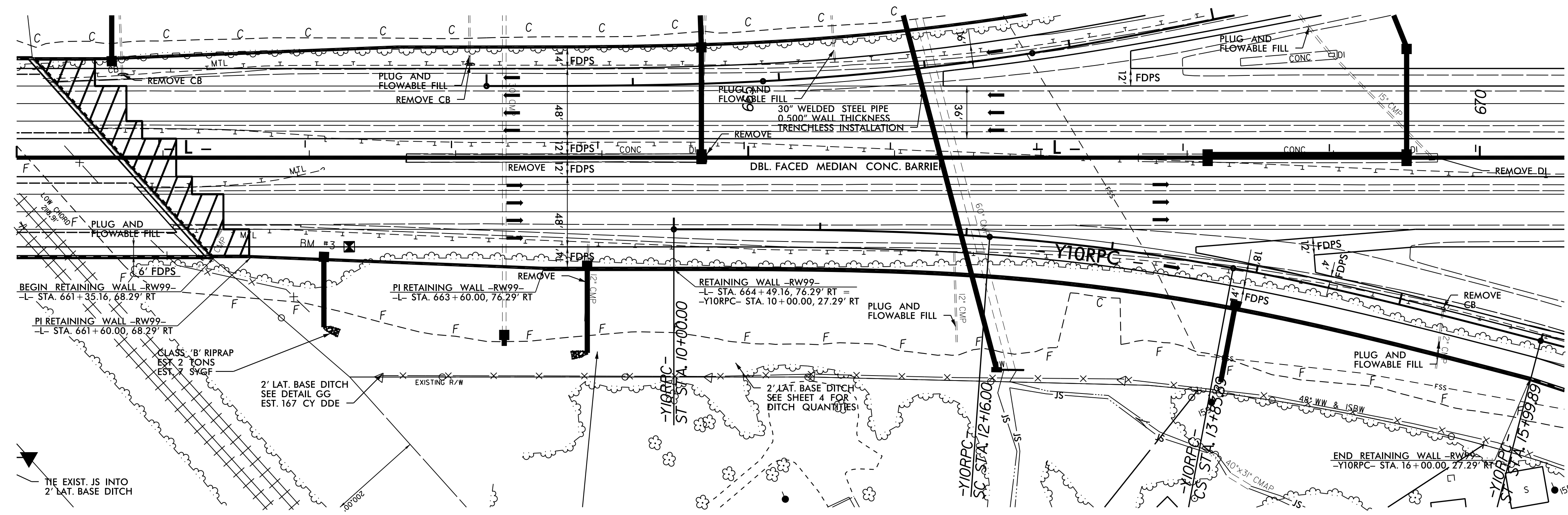
PROJECT NO.: 34232.1.FS4 (I-4400C)
 BUNCOMBE COUNTY
 STATION:
 (SHEET 1 OF 15)

PREPARED BY: MHS DATE: 6/27/19
 REVIEWED BY: SCC DATE: 6/27/19

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

GEOTECHNICAL
ENGINEERING UNIT

REVISIONS					SHEET NO.
NO.	BY	DATE	NO.	BY	
1	MHS	8/21/19	3		W-1
2			4		



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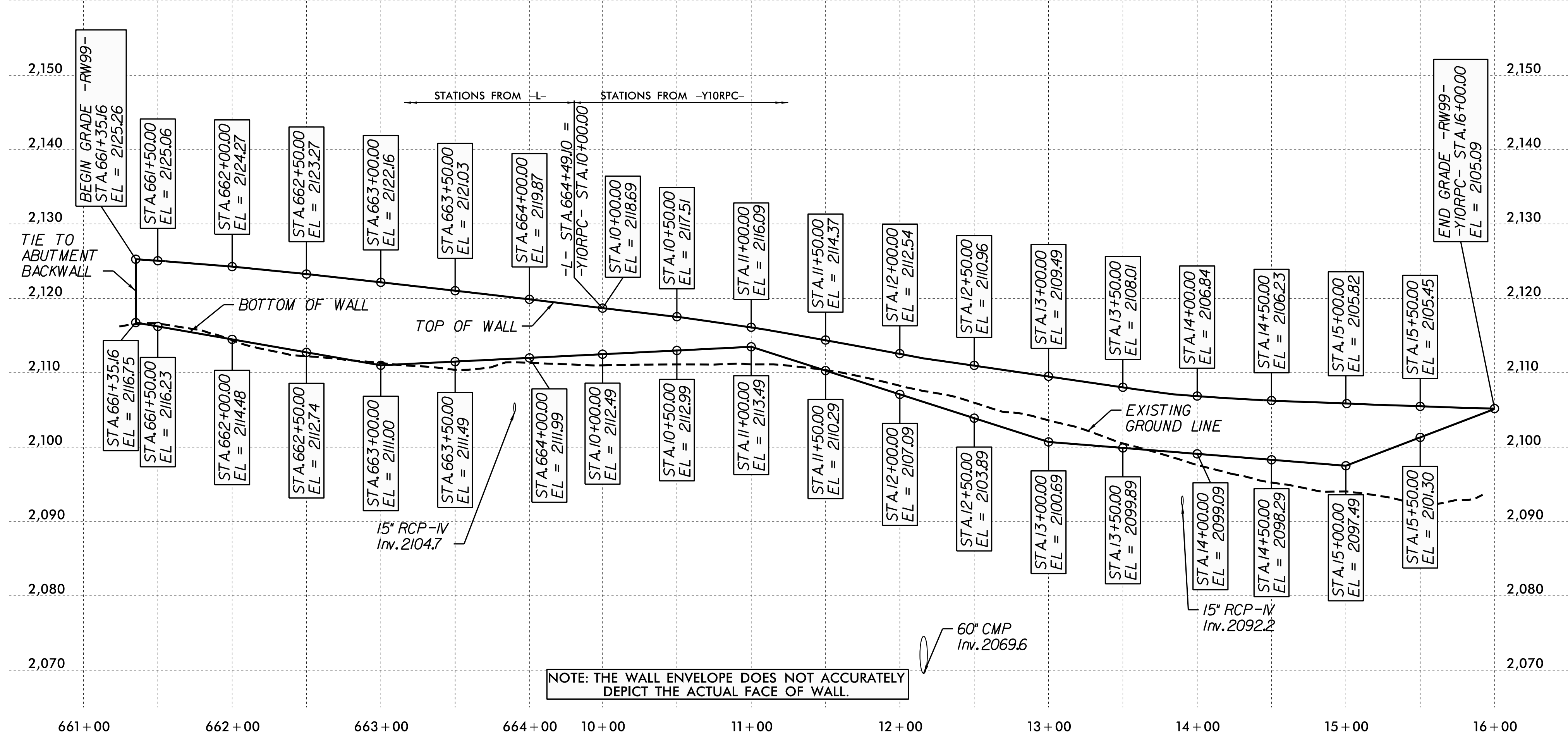
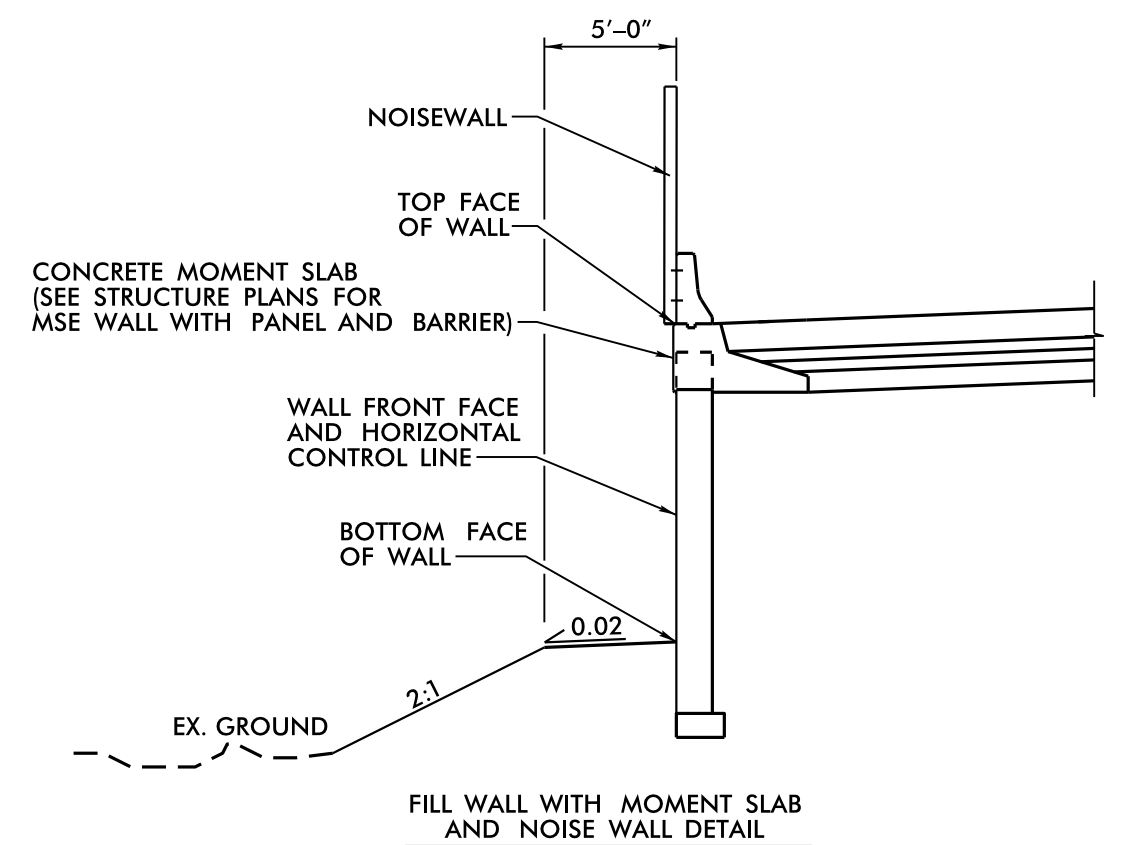
PROFESSIONAL ENGINEER

MICHAEL H. STEPHENS

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DATE SIGNATURE DATE

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DESIGN RETAINING WALL (NO. RW99) FOR THE FOLLOWING:

- 1) H = DESIGN HEIGHT + EMBEDMENT
- 2) DESIGN LIFE = 100 YEARS
- 3) MAXIMUM FACTORED VERTICAL PRESSURE ON FOUNDATION MATERIAL = 3,500 LB/SF
- 4) MINIMUM REINFORCEMENT LENGTH (L) = 0.8 H OR 6 FT, WHICHEVER IS LONGER
- 5) MINIMUM EMBEDMENT DEPTH = H/7 OR 2 FT, WHICHEVER IS DEEPER
- 6) REINFORCED ZONE AGGREGATE PARAMETERS:

AGGREGATE TYPE*	UNIT WEIGHT (γ) LB/CF	FRICTION ANGLE (φ) DEGREES	COHESION (c) LB/SF
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) LB/CF	FRICTION ANGLE (φ) DEGREES	COHESION (c) LB/SF
BACKFILL	120	30	0
FOUNDATION	120	30	0

NOTES:

- 1) THE WALL ENVELOPE SHOWN AND AREA DOES NOT INCLUDE THE WALL EMBEDMENT. SEE SUMMARY TABLE FOR TOTAL INSTALLED WALL AREA.

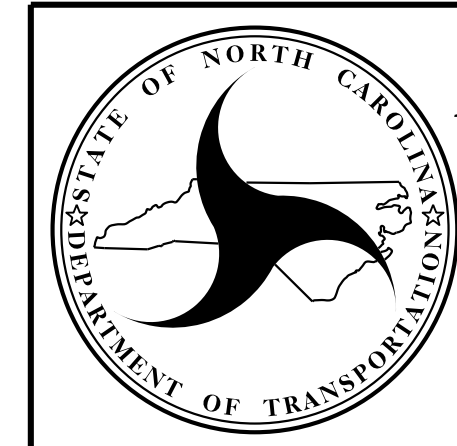
PROJECT NO.: 34232.1.FS4 (I-4400C)

BUNCOMBE COUNTY

STATION: STA 661+35 -L-

(SHEET 2 OF 15)

RETAINING WALL -RW99-



NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

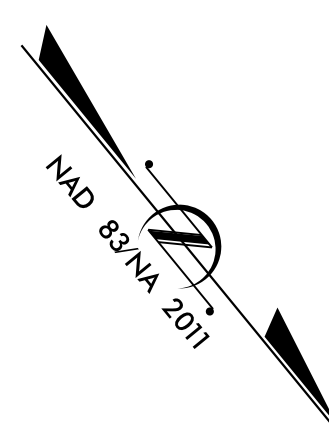
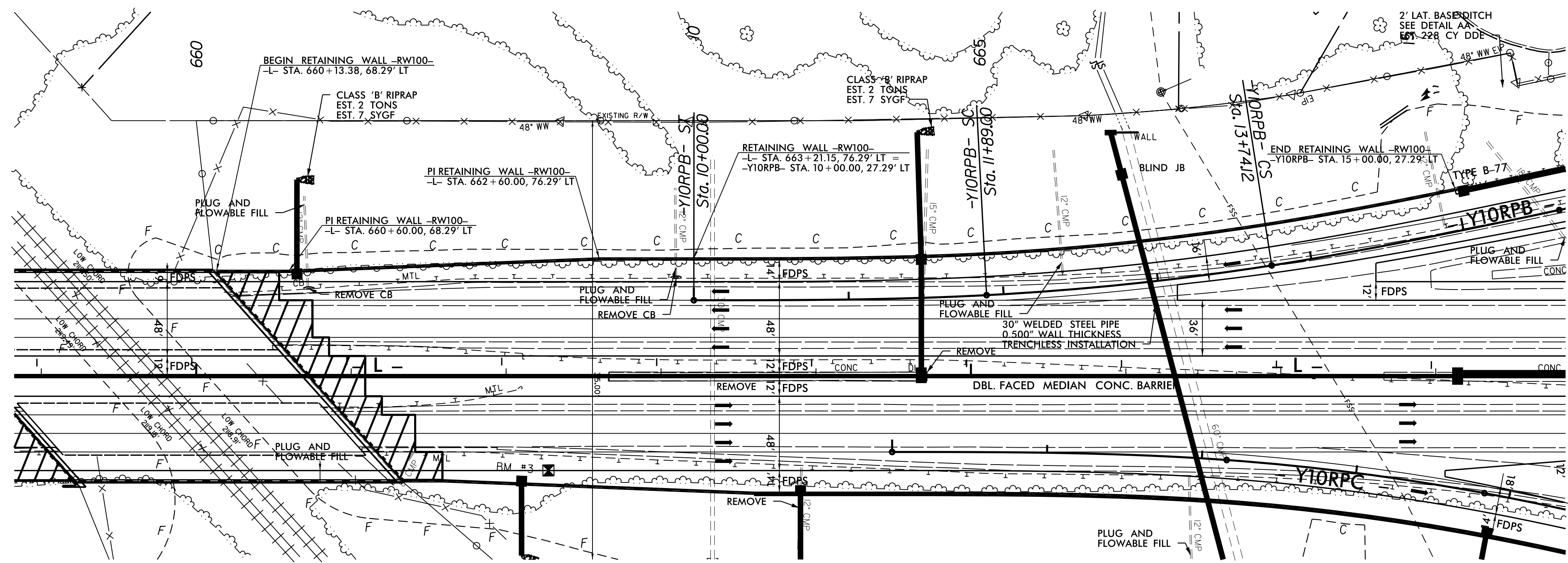
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RETAINING WALL NO. RW99
MSE RETAINING WALL
WITH MOMENT SLAB

REVISIONS					SHEET NO.
NO.	BY	DATE	NO.	DATE	
1	MHS	8/21/19	3		W-2
2			4		

PREPARED BY: MHS DATE: 6/27/19

REVIEWED BY: SCC DATE: 6/27/19



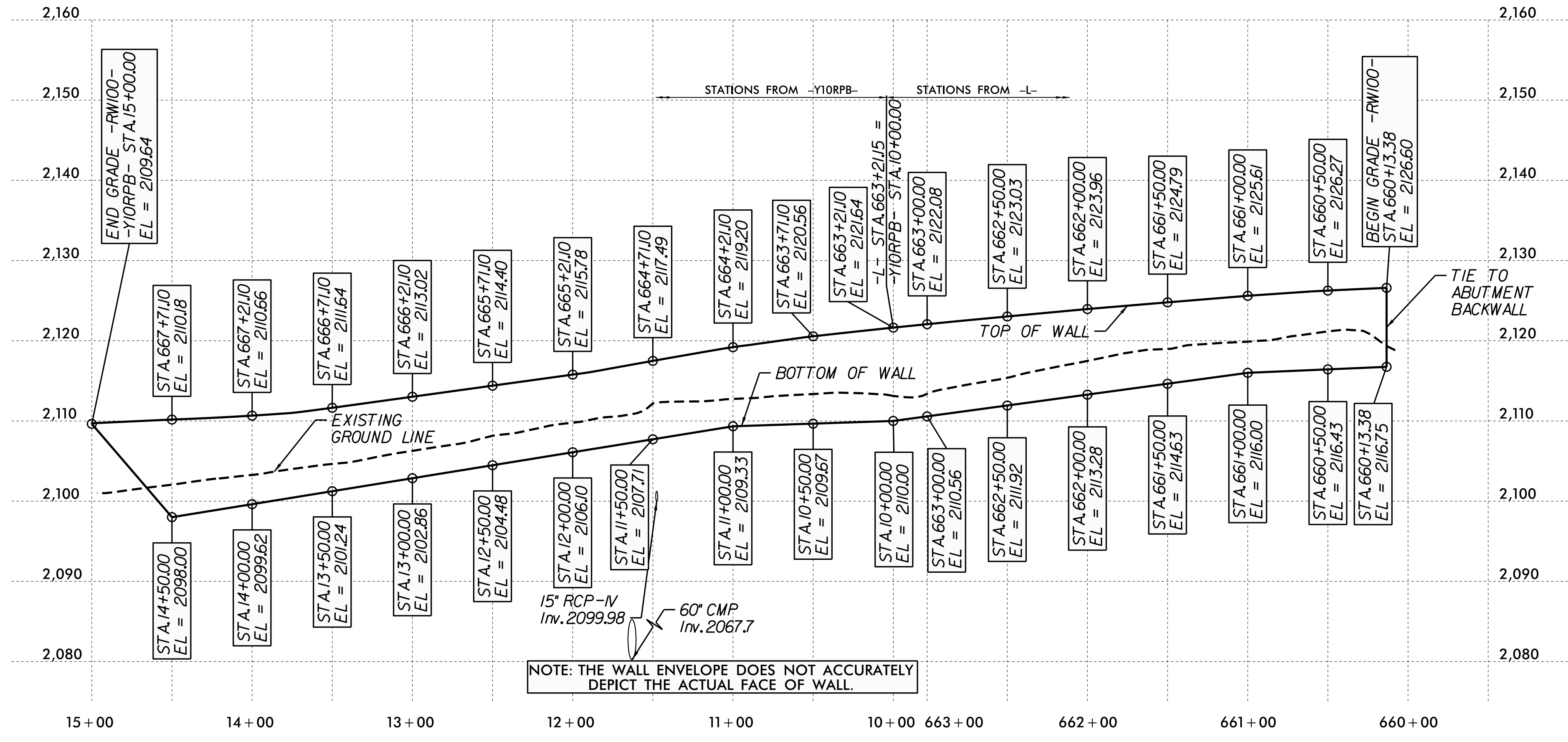
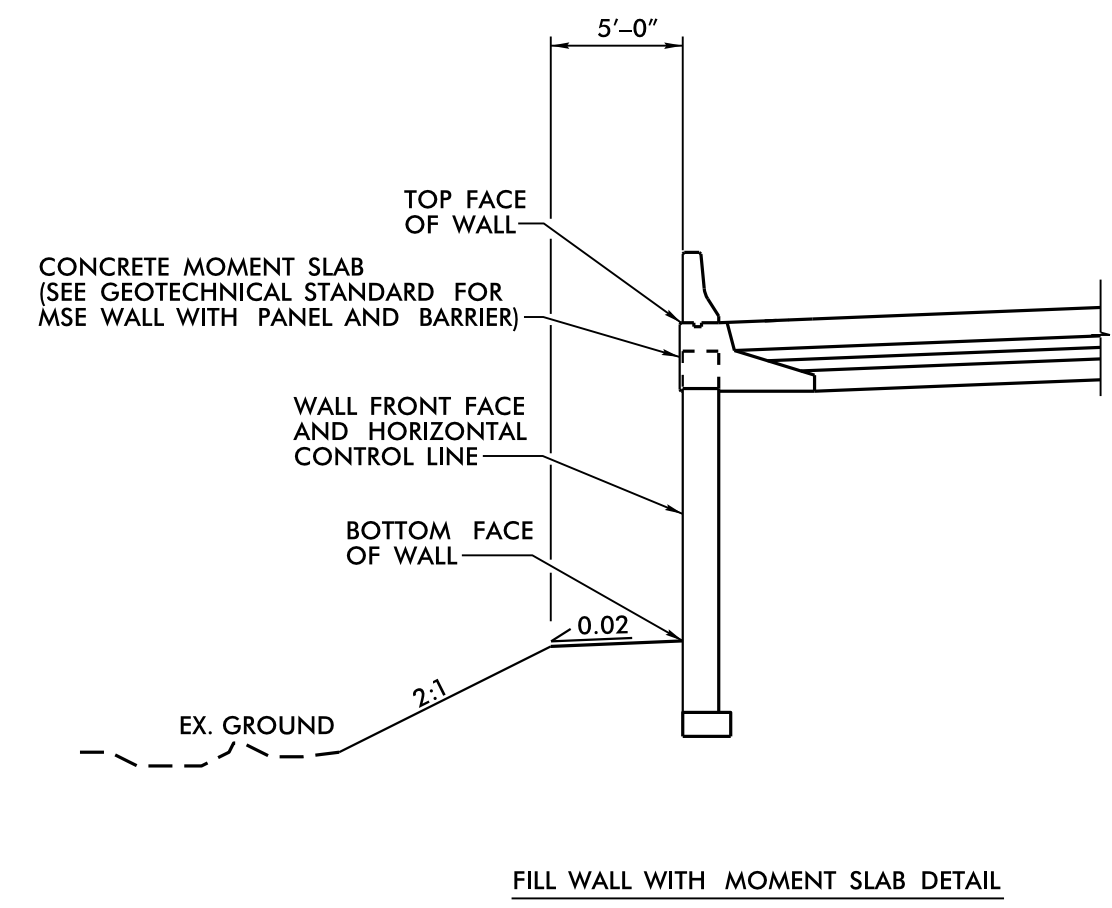
GEOTECHNICAL ENGINEER

ENGINEER

SEAL 028893

8/21/2019

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RETAINING WALL -RW100-

- DESIGN RETAINING WALL (NO. RW100) FOR THE FOLLOWING:
- 1) H = DESIGN HEIGHT + EMBEDMENT
 - 2) DESIGN LIFE = 100 YEARS
 - 3) MAXIMUM FACTORED VERTICAL PRESSURE ON FOUNDATION MATERIAL = 3,850 LB/SF
 - 4) MINIMUM REINFORCEMENT LENGTH (L) = 0.7 H OR 6 FT, WHICHEVER IS LONGER
 - 5) MINIMUM EMBEDMENT DEPTH = H/7 OR 2 FT, WHICHEVER IS DEEPER
 - 6) REINFORCED ZONE AGGREGATE PARAMETERS:

AGGREGATE TYPE*	UNIT WEIGHT (γ) LB/CF	FRICTION ANGLE (φ) DEGREES	COHESION (c) LB/SF
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) LB/CF	FRICTION ANGLE (φ) DEGREES	COHESION (c) LB/SF
BACKFILL	120	30	0
FOUNDATION	120	30	0

NOTES:
 1) THE WALL ENVELOPE SHOWN AND AREA DOES NOT INCLUDE THE WALL EMBEDMENT. SEE SUMMARY TABLE FOR TOTAL INSTALLED WALL AREA.

PROJECT NO.: 34232.1.FS4 (I-4400C)
 BUNCOMBE COUNTY
 STATION: STA 660+13 -L-
 (SHEET 3 OF 15)

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

RETAINING WALL NO. RW100 MSE RETAINING WALL WITH MOMENT SLAB

REVISIONS					SHEET NO.
NO.	BY	DATE	NO.	DATE	
1	MHS	8/21/19	3		W-3
2			4		

PREPARED BY: MHS DATE: 6/27/19
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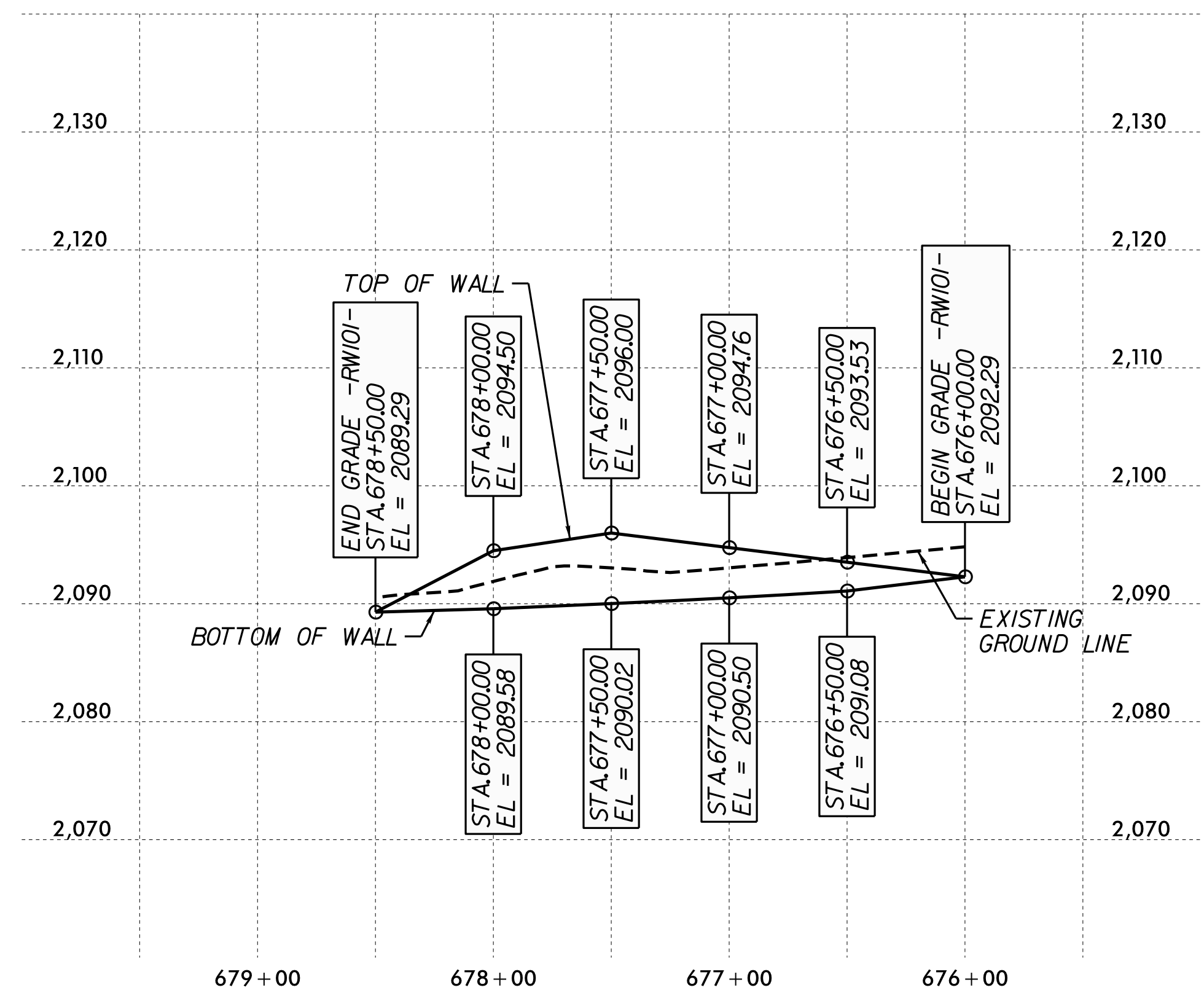
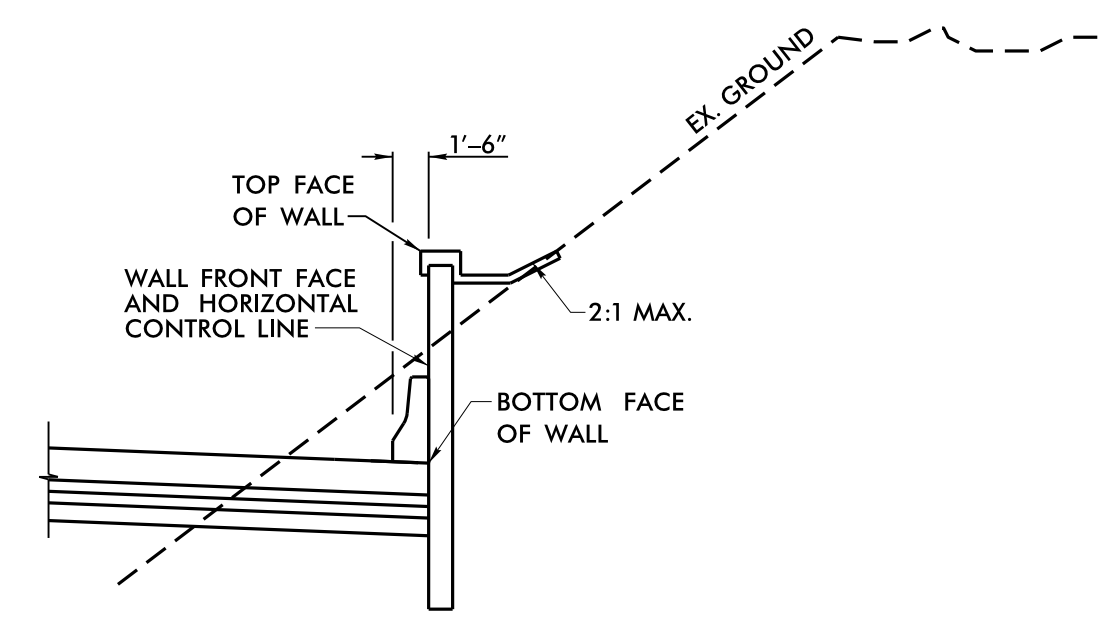
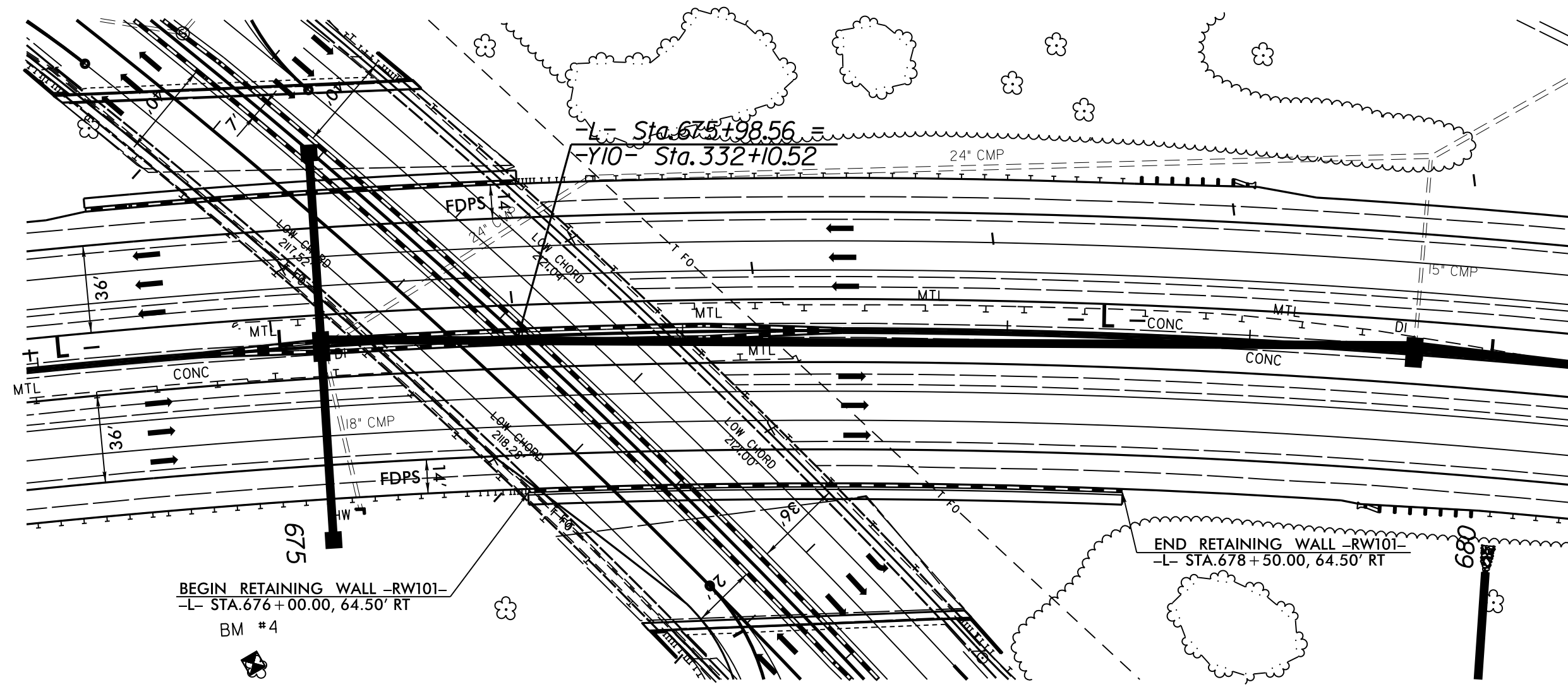
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IN-SITU ASSUMED MATERIAL PARAMETERS:

MATERIAL TYPE	UNIT WEIGHT, γ (LB/CF)	FRICTION ANGLE, ϕ DEGREES	COHESION, c (LB/SF)
EMBANKMENT FILL	115	29	0
RESIDUAL	120	30	0

NOTES:
 1) A FENCE MAYBE REQUIRED ON TOP OF THE RETAINING WALLS. SEE ROADWAY PLANS FOR FENCE OR HANDRAIL ATTACHMENT DETAILS.
 2) THE WALL ENVELOPE SHOWN AND AREA DOES NOT INCLUDE THE WALL EMBEDMENT. SEE SUMMARY TABLE FOR TOTAL INSTALLED WALL AREA.

RETAINING WALL -RW101-

PROJECT NO.: 34232.1.FS4 (I-4400C)
 BUNCOMBE COUNTY
 STATION: STA 676+00 -L-
 (SHEET 4 OF 15)

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

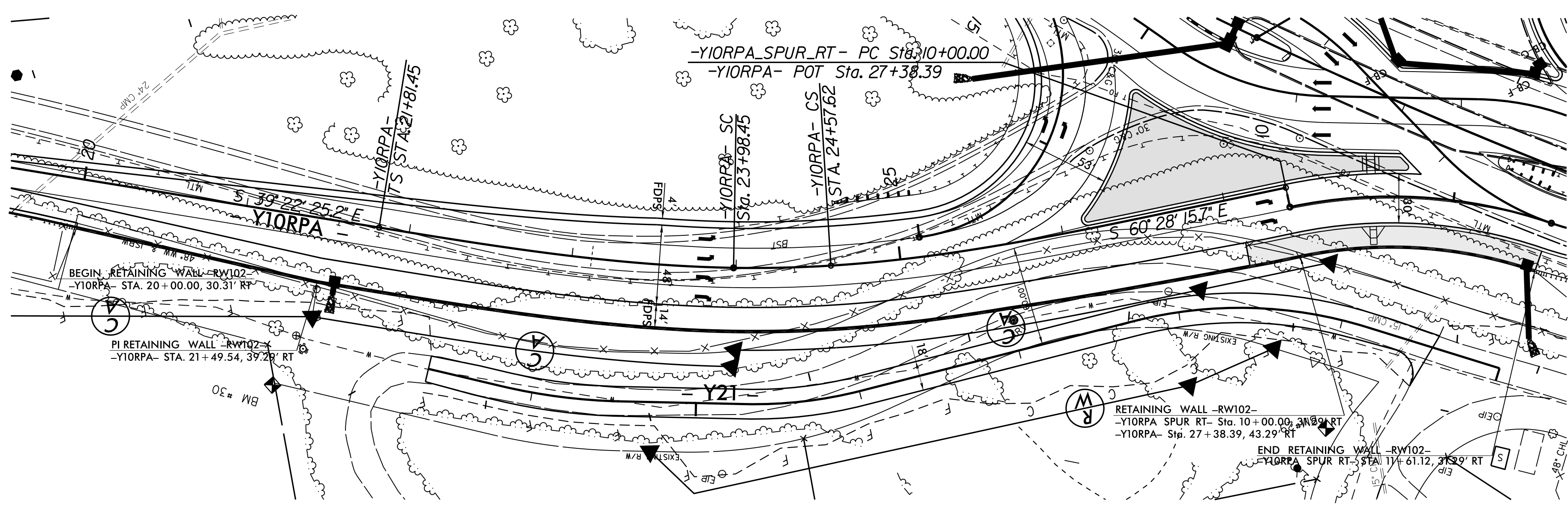
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ENGINEERING UNIT**

**RETAINING WALL NO. RW101
SOIL NAIL RETAINING WALL**

REVISIONS					
NO.	BY	DATE	NO.	BY	DATE
1	MHS	8/21/19	3		
2			4		

SHEET NO. W-4

PREPARED BY: MHS DATE: 6/27/19
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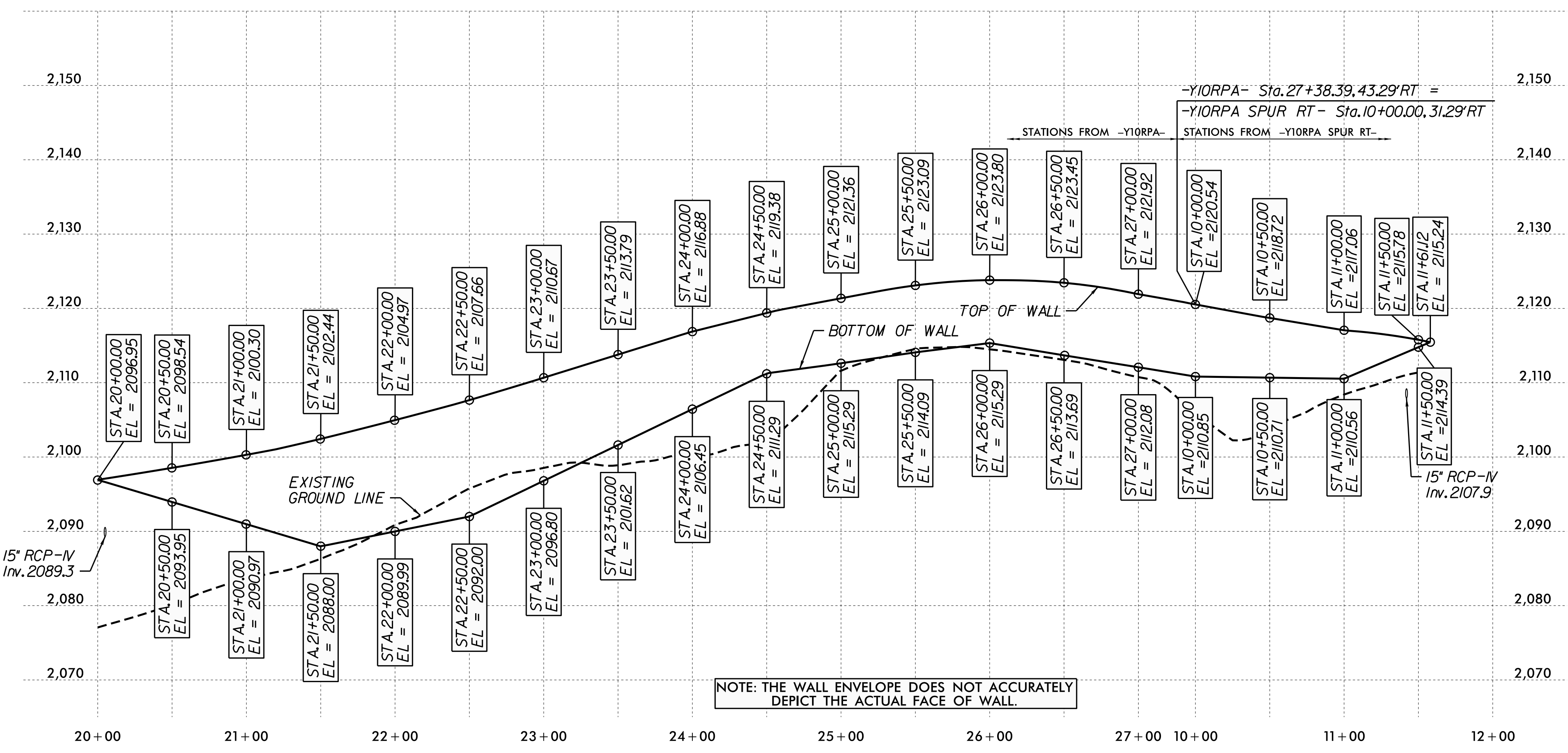
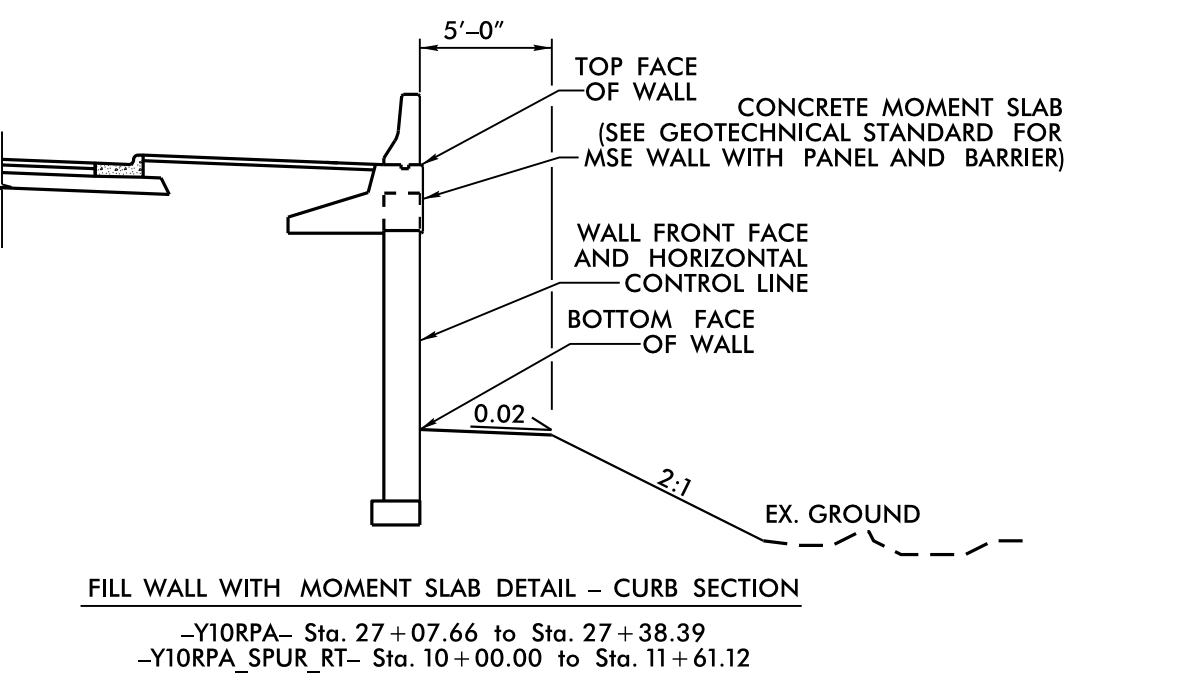
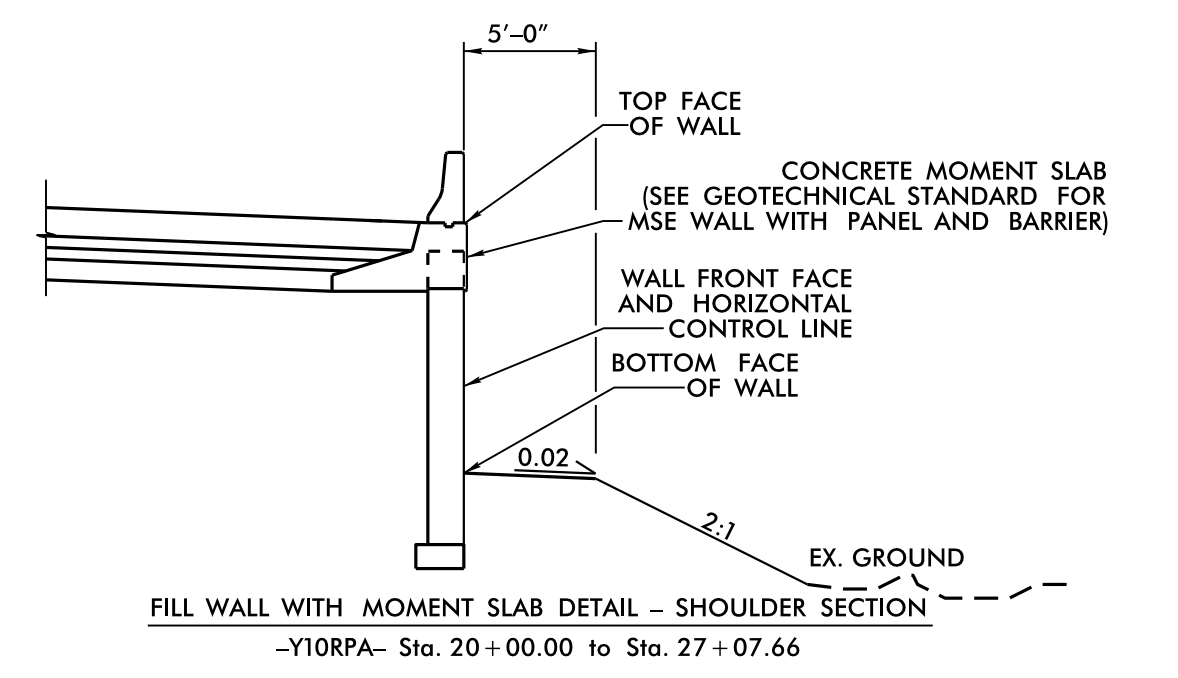
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RETAINING WALL -RW102-

- DESIGN RETAINING WALL (NO. RW102) FOR THE FOLLOWING:
- 1) H = DESIGN HEIGHT + EMBEDMENT
 - 2) DESIGN LIFE = 100 YEARS
 - 3) MAXIMUM FACTORED VERTICAL PRESSURE ON FOUNDATION MATERIAL = 4,000 LB/SF
 - 4) MINIMUM REINFORCEMENT LENGTH (L) = 0.8 H OR 6 FT, WHICHEVER IS LONGER
 - 5) MINIMUM EMBEDMENT DEPTH = H/10 OR 2 FT, WHICHEVER IS DEEPER
 - 6) REINFORCED ZONE AGGREGATE PARAMETERS:

AGGREGATE TYPE*	UNIT WEIGHT (γ) LB/CF	FRICTION ANGLE (φ) DEGREES	COHESION (c) LB/SF
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) LB/CF	FRICTION ANGLE (φ) DEGREES	COHESION (c) LB/SF
BACKFILL	120	30	0
FOUNDATION	120	30	0

NOTES:
 1) THE WALL ENVELOPE SHOWN AND AREA DOES NOT INCLUDE THE WALL EMBEDMENT. SEE SUMMARY TABLE FOR TOTAL INSTALLED WALL AREA.

PROJECT NO.: 34232.1.FS4 (I-4400C)
 BUNCOMBE COUNTY
 STATION: STA 20+00 -Y10RPA-
 (SHEET 5 OF 15)

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

RETAINING WALL NO. RW102
 MSE RETAINING WALL WITH MOMENT SLAB

REVISIONS				
NO.	BY	DATE	NO.	DATE
1	MHS	8/21/19	3	
2			4	

SHEET NO. W-5

PREPARED BY: MHS DATE: 6/27/19
 REVIEWED BY: SCC DATE: 6/27/19

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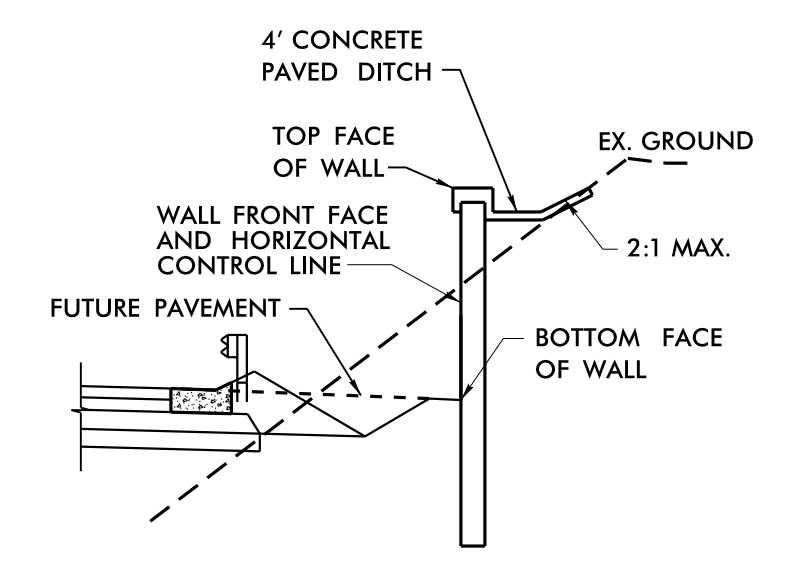
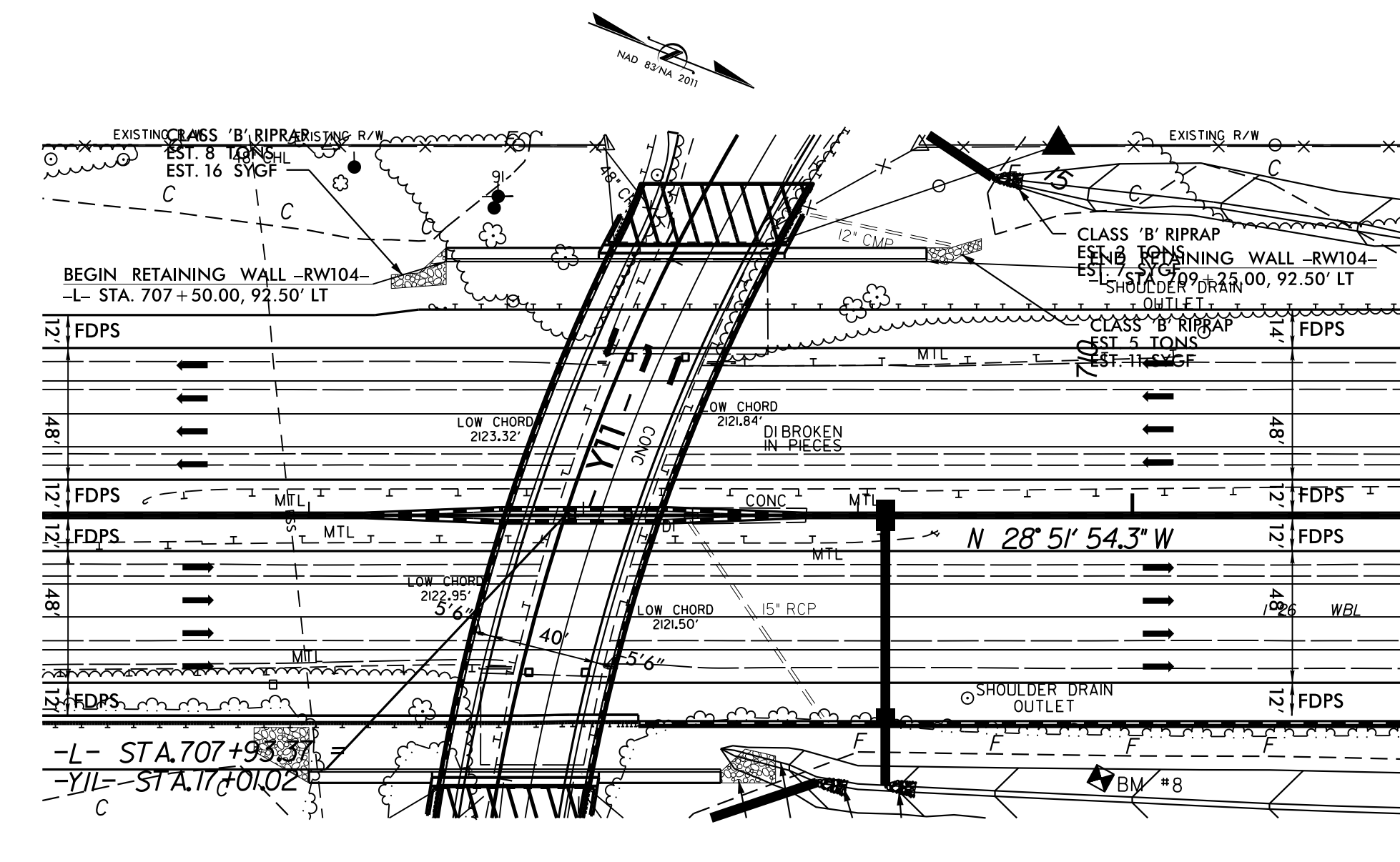
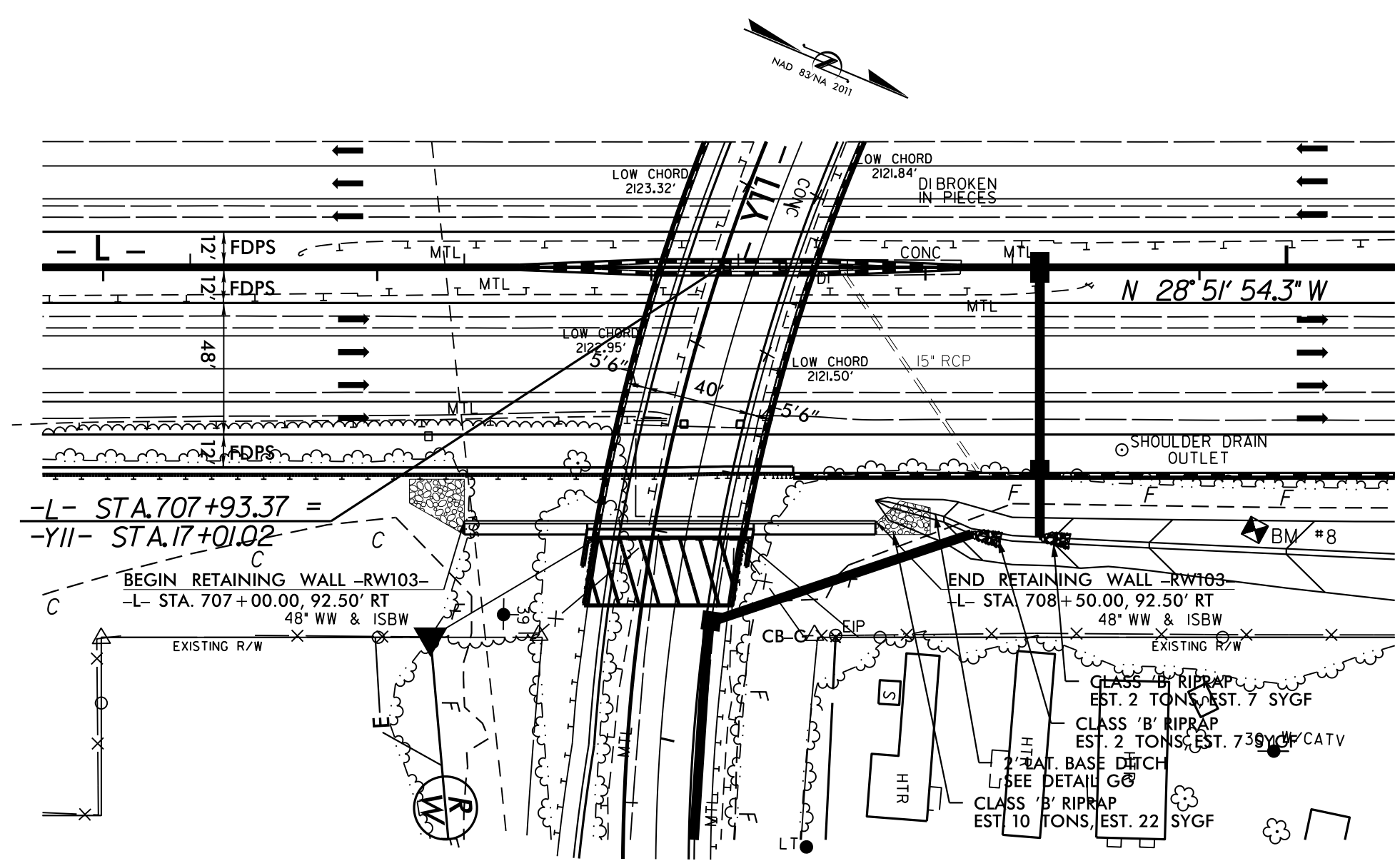
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Discussed by: *MHS* 8/21/2019

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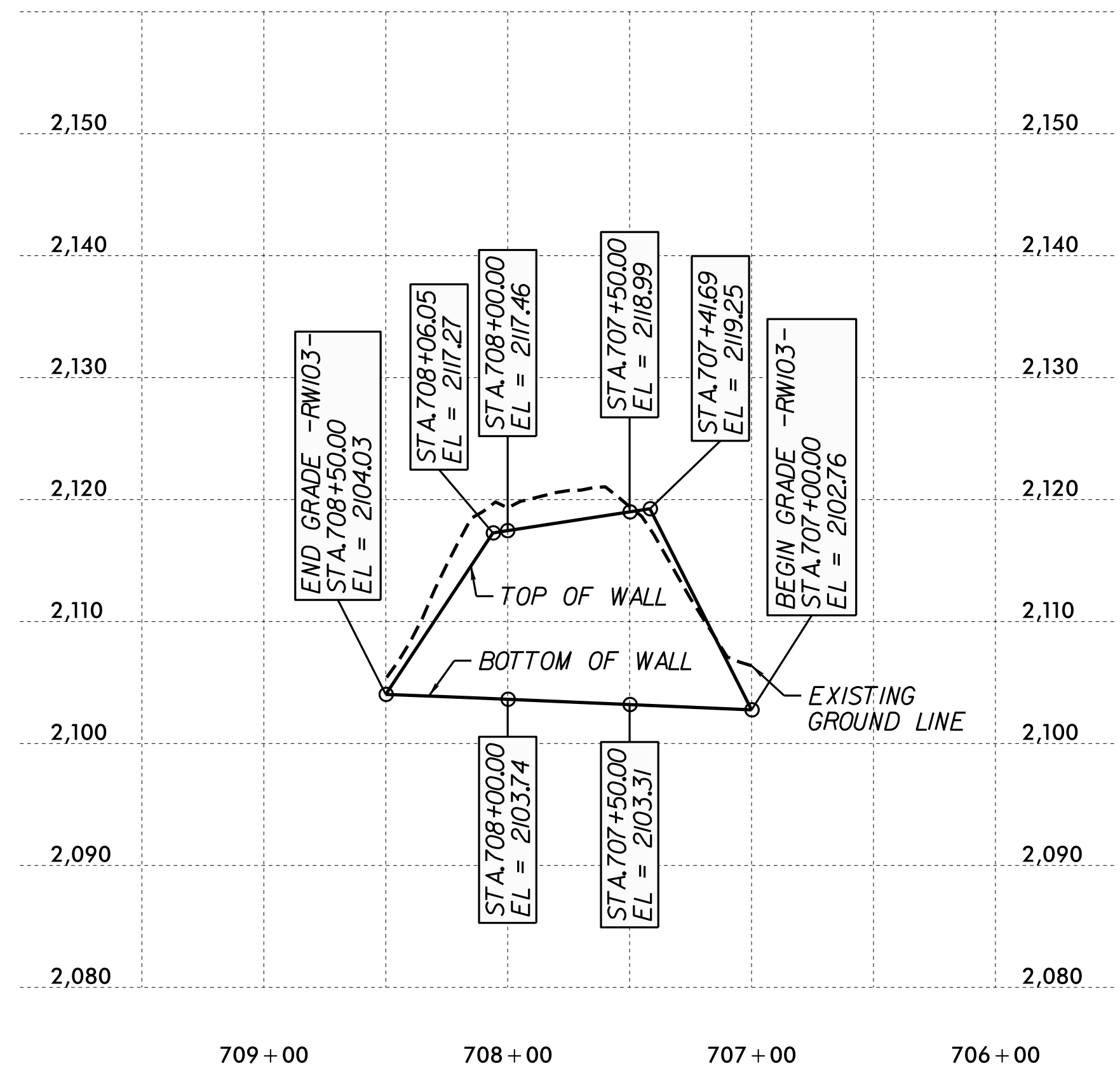


OFFSET CUT WALL DETAIL

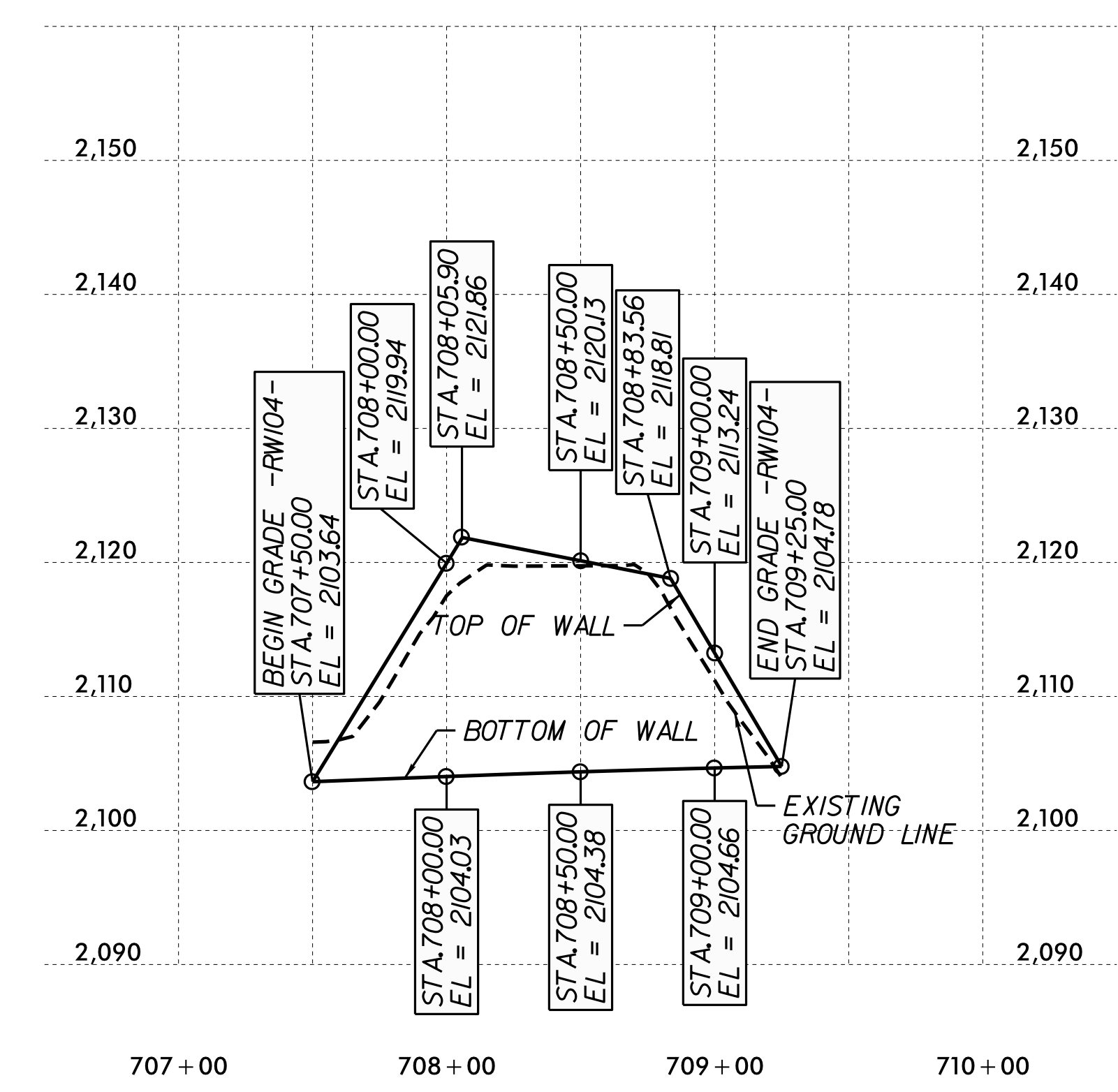
-L- STA 707+00.00 TO STA 707+41.69
 -L- STA 708+06.05 TO STA 708+20.00
 -L- STA 708+20.00 TO STA 708+50.00**

-L- STA 707+50.00 TO STA 708+05.90
 -L- STA 708+83.56 TO STA 709+25.00

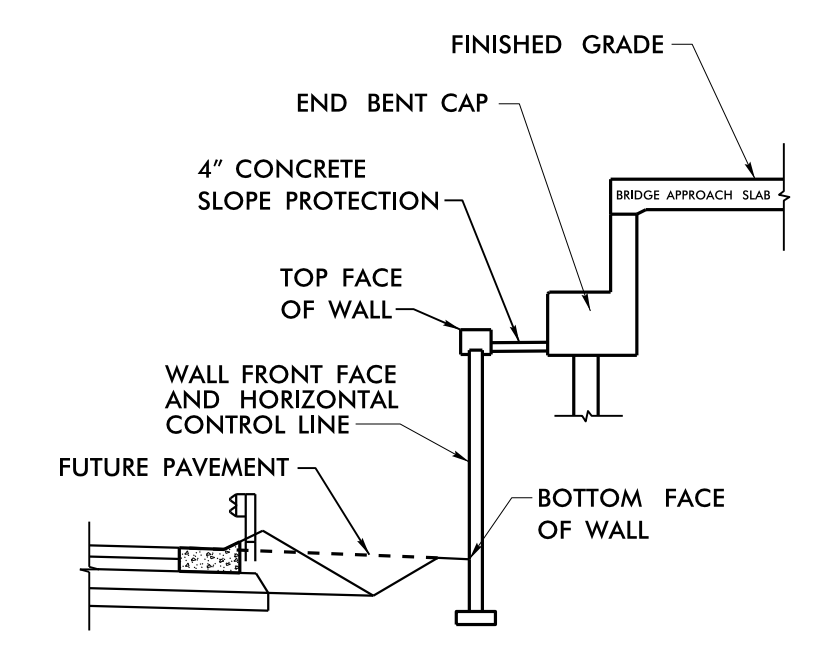
**NOTE: NOISEWALL INSTEAD OF SHOULDER BERM GUTTER ALONG FDPS



RETAINING WALL -RW103-



RETAINING WALL -RW104-



OFFSET ABUTMENT WALL DETAIL

-L- STA 707+41.69 TO STA 708+06.05
 -L- STA 708+05.90 TO STA 708+83.56

IN-SITU ASSUMED MATERIAL PARAMETERS:

MATERIAL TYPE	UNIT WEIGHT, γ (LB/CF)	FRICTION ANGLE, ϕ DEGREES	COHESION, c (LB/SF)
EMBANKMENT FILL	115	28	0
RESIDUAL	115	28	0

NOTES:
 1) A FENCE MAYBE REQUIRED ON TOP OF THE RETAINING WALLS. SEE ROADWAY PLANS FOR FENCE OR HANDRAIL ATTACHMENT DETAILS.
 2) THE WALL ENVELOPE SHOWN AND AREA DOES NOT INCLUDE THE WALL EMBEDMENT. SEE SUMMARY TABLE FOR TOTAL INSTALLED WALL AREA.

PROJECT NO.: 34232.1.FS4 (I-4400C)
 BUNCOMBE COUNTY
 STATION: STA 707+00 -L- AND STA 707+50 -L-
 (SHEET 6 OF 15)

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

RETAINING WALL NOS. RW103 AND RW104 SOIL NAIL RETAINING WALL

REVISIONS					SHEET NO.
NO.	BY	DATE	NO.	BY	
1	MHS	8/21/19	3		W-6
2			4		

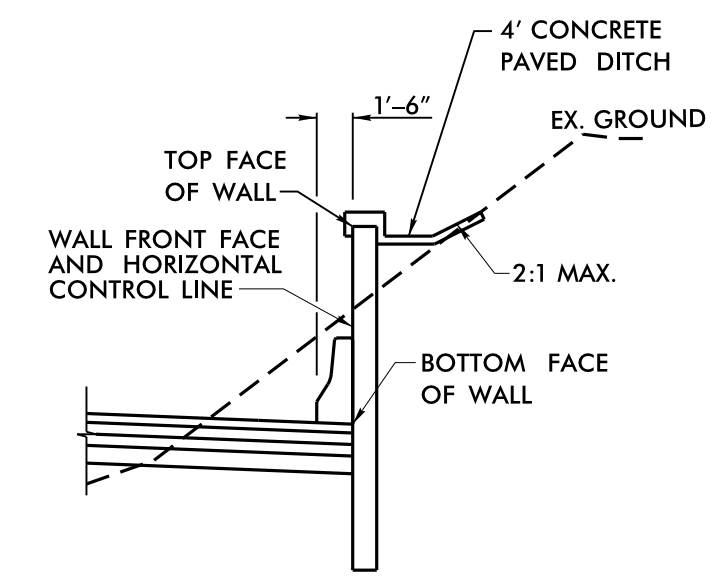
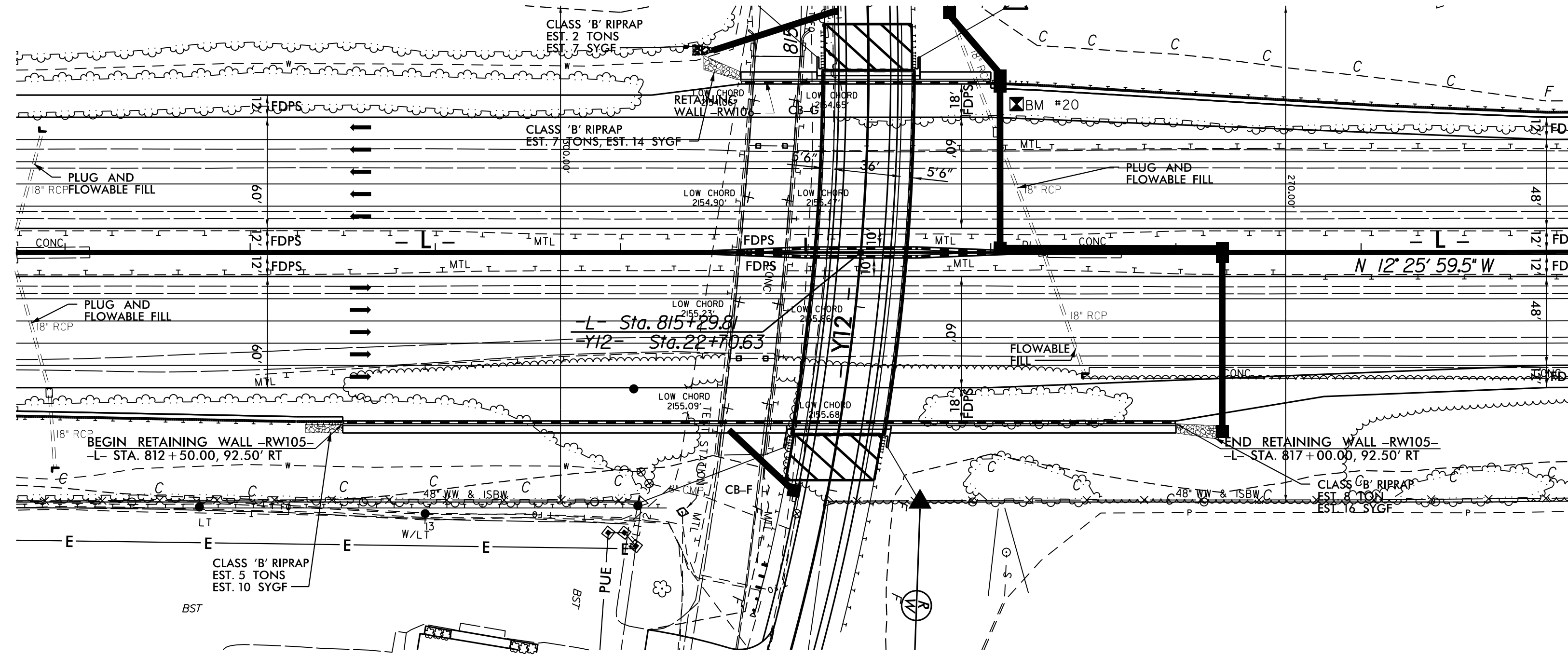
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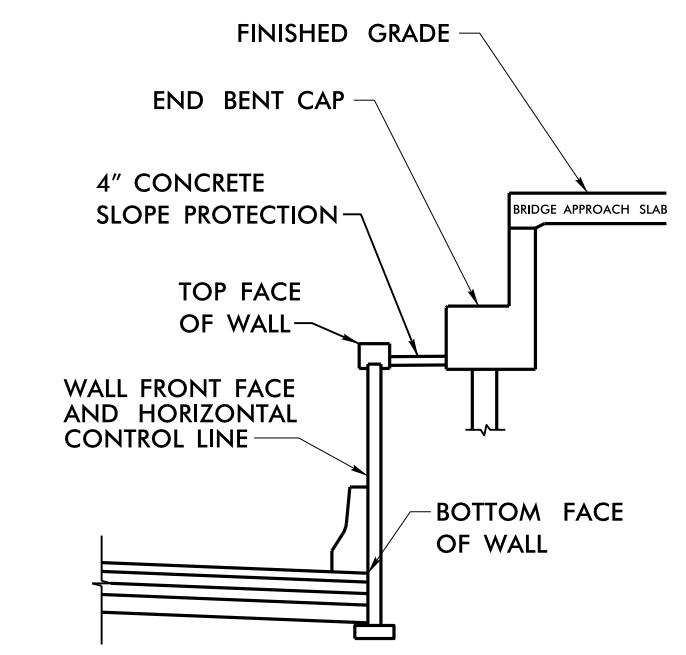
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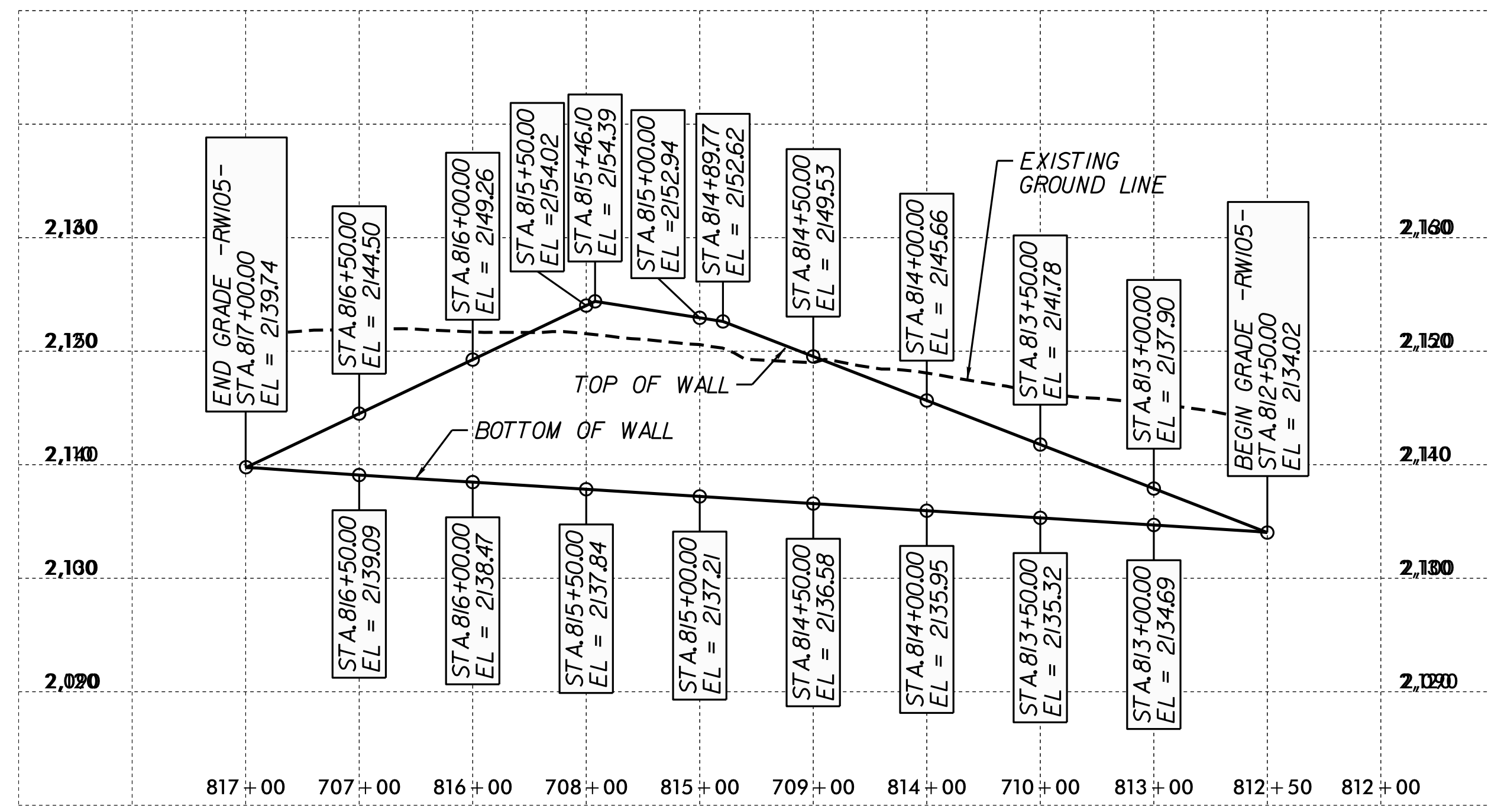
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CUT WALL DETAIL
 -L- STA 812+50.00 TO STA 814+89.77
 -L- STA 815+46.10 TO STA 817+00.00



ABUTMENT WALL DETAIL
 -L- STA 814+89.77 TO STA 815+46.10



IN-SITU ASSUMED MATERIAL PARAMETERS:

MATERIAL TYPE	UNIT WEIGHT, γ (LB/CF)	FRICTION ANGLE, φ DEGREES	COHESION, c (LB/SF)
RESIDUAL	125	32	0
WEATHERED ROCK	135	36	0

NOTES:
 1) A FENCE MAYBE REQUIRED ON TOP OF THE RETAINING WALLS. SEE ROADWAY PLANS FOR FENCE OR HANDRAIL ATTACHMENT DETAILS.
 2) THE WALL ENVELOPE SHOWN AND AREA DOES NOT INCLUDE THE WALL EMBEDMENT. SEE SUMMARY TABLE FOR TOTAL INSTALLED WALL AREA.

RETAINING WALL -RW105-

PROJECT NO.: 34232.1.FS4 (I-4400C)
 BUNCOMBE COUNTY
 STATION: STA 812+50 -L-
 (SHEET 7 OF 15)

PREPARED BY: MHS DATE: 6/27/19
 REVIEWED BY: SCC DATE: 6/27/19

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

**GEOTECHNICAL
 ENGINEERING UNIT**

**RETAINING WALL NO. RW105
 SOIL NAIL RETAINING WALL**

REVISIONS					SHEET NO.
NO.	BY	DATE	NO.	DATE	
1	MHS	8/21/19	3		W-7
2			4		

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ENGINEER

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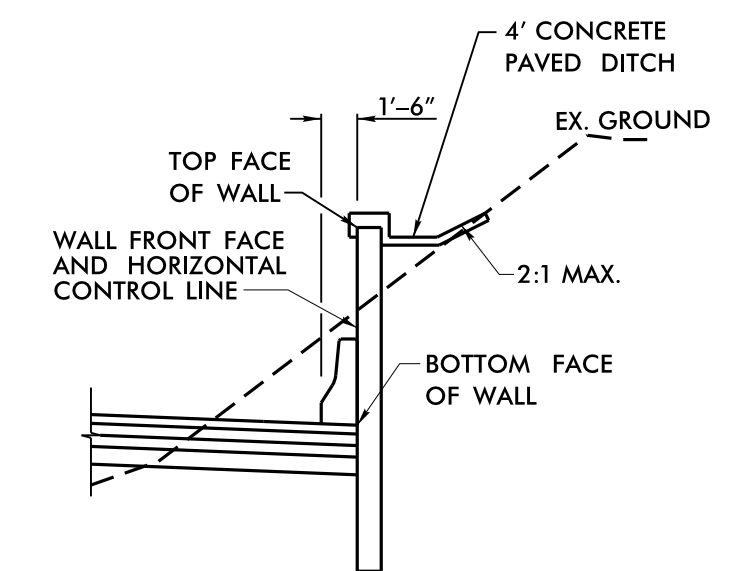
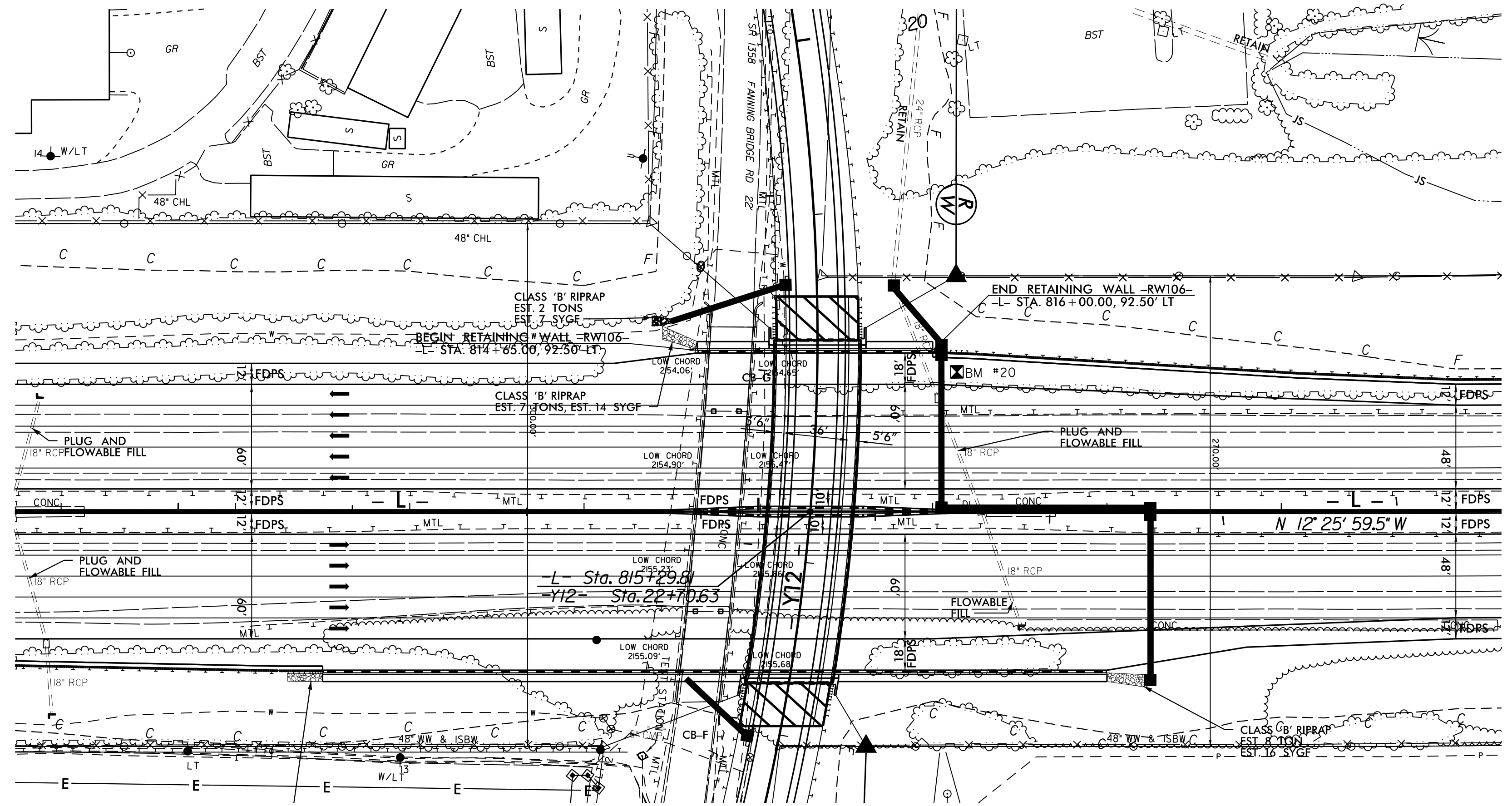
MICHAEL H. STEPHENS

DocuSigned by: *MHS* 8/21/2019

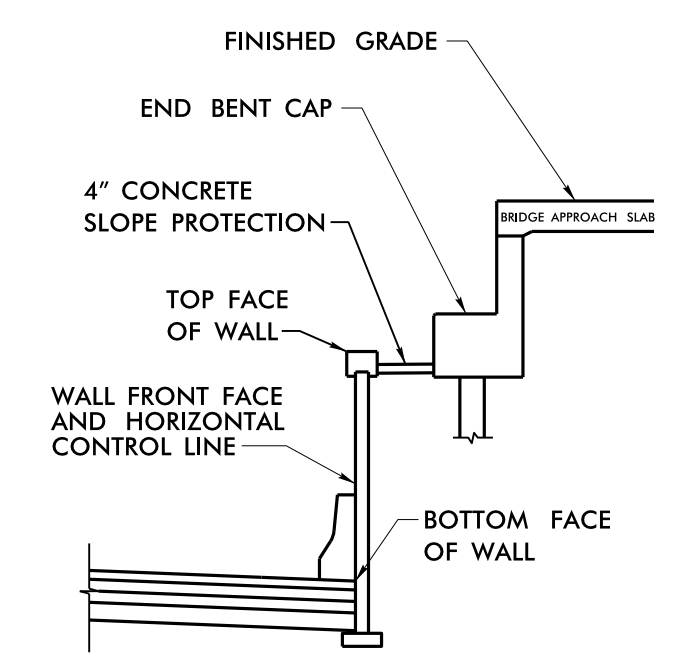
DATE 8/21/2019

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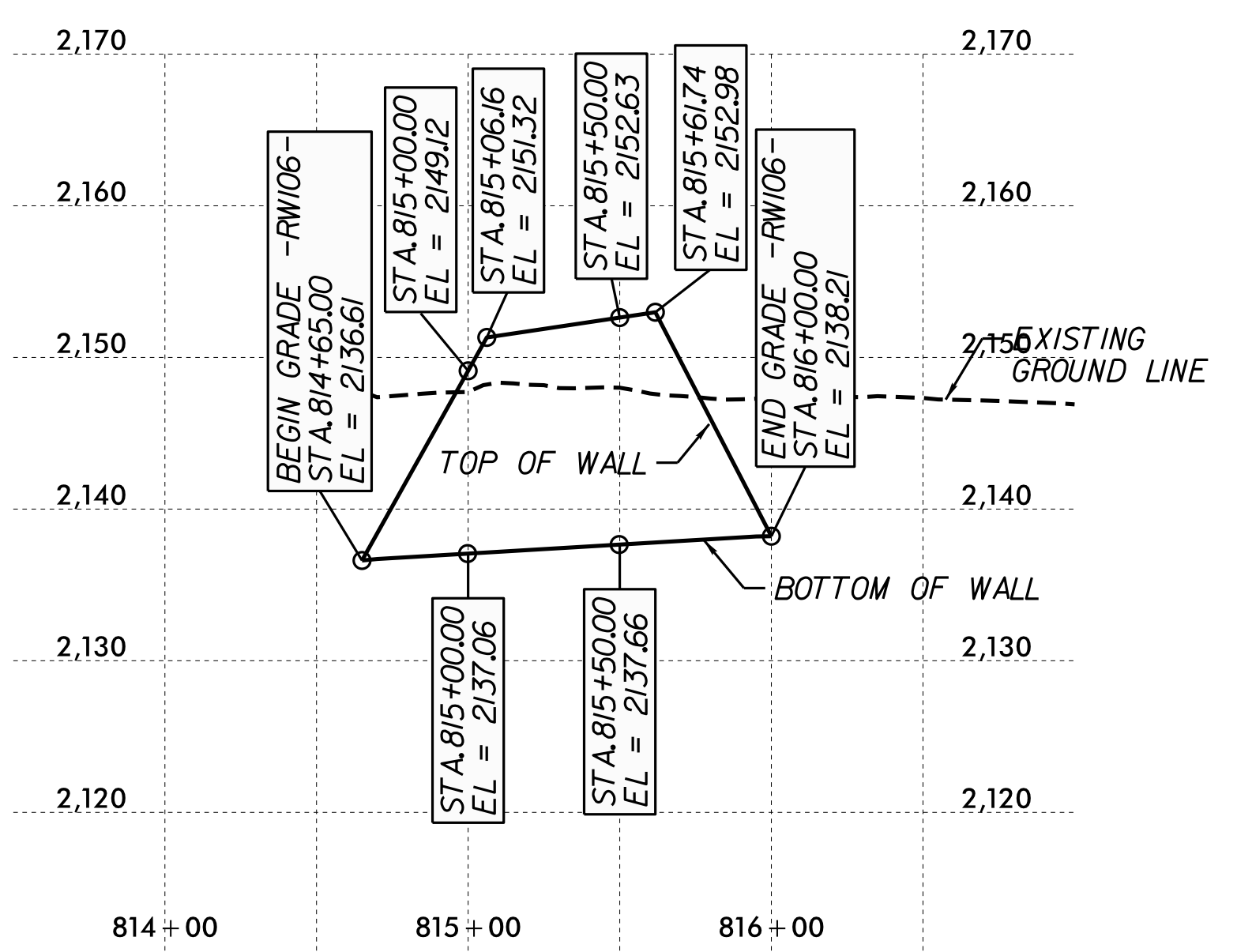


CUT WALL DETAIL
 -L- STA 814+65.00 TO STA 815+06.016
 -L- STA 815+61.74 TO STA 816+00.00



ABUTMENT WALL DETAIL
 -L- STA 815+06.16 TO STA 815+61.74

RETAINING WALL -RW106-



IN-SITU ASSUMED MATERIAL PARAMETERS:

MATERIAL TYPE	UNIT WEIGHT, γ (LB/CF)	FRICTION ANGLE, ϕ DEGREES	COHESION, c (LB/SF)
RESIDUAL	120	30	0
WEATHERED ROCK	135	36	0

NOTES:
 1) A FENCE MAYBE REQUIRED ON TOP OF THE RETAINING WALLS. SEE ROADWAY PLANS FOR FENCE OR HANDRAIL ATTACHMENT DETAILS.
 2) THE WALL ENVELOPE SHOWN AND AREA DOES NOT INCLUDE THE WALL EMBEDMENT. SEE SUMMARY TABLE FOR TOTAL INSTALLED WALL AREA.

PROJECT NO.: 34232.1.FS4 (I-4400C)
 BUNCOMBE COUNTY
 STATION: STA 814+65 -L-
 (SHEET 8 OF 15)

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS

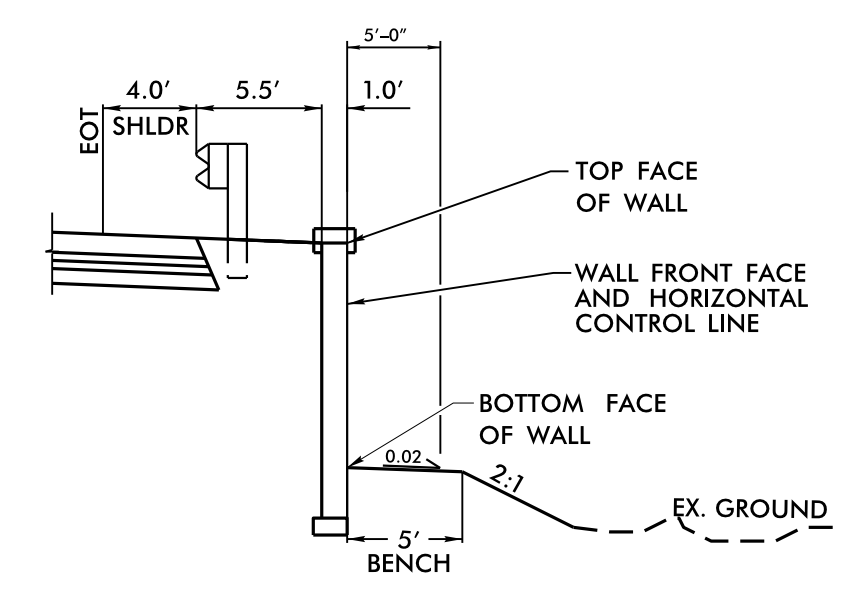
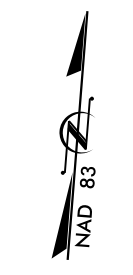
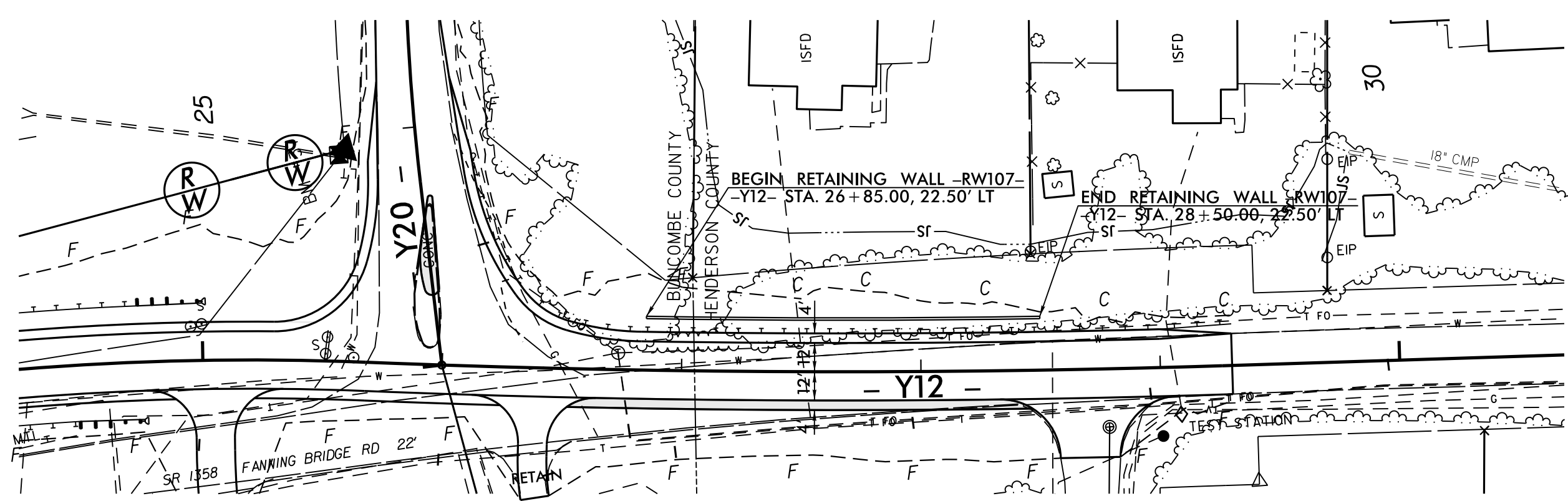
GEOTECHNICAL ENGINEERING UNIT

RETAINING WALL NO. RW106 SOIL NAIL RETAINING WALL

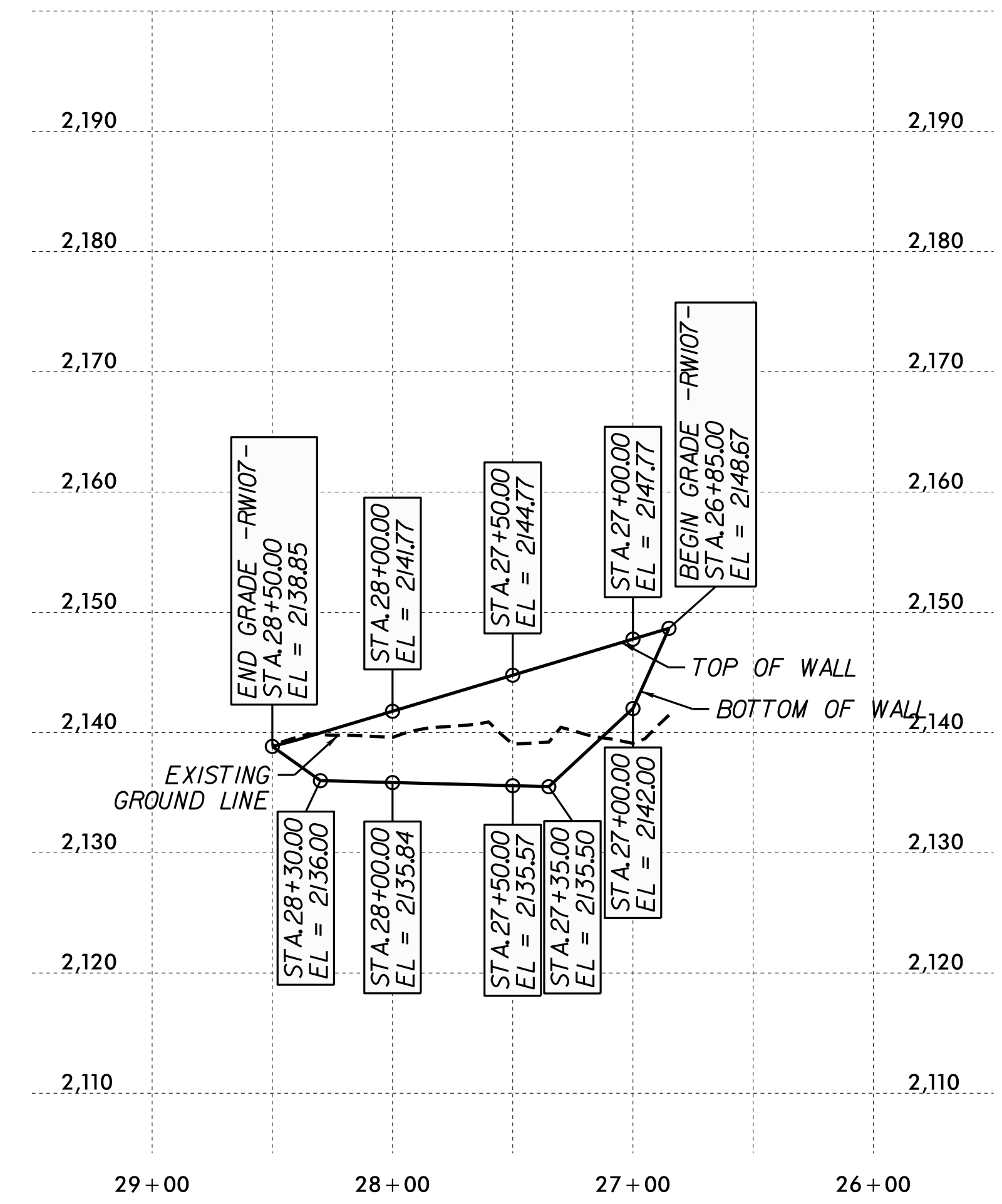
REVISIONS					
NO.	BY	DATE	NO.	BY	DATE
1	MHS	8/21/19	3		
2			4		

SHEET NO. W-8

PREPARED BY: MHS DATE: 6/27/19
 REVIEWED BY: SCC DATE: 6/27/19



FILL WALL WITH GUARD RAIL DETAIL



RETAINING WALL -RW107-

- DESIGN RETAINING WALL (NO. RW107) FOR THE FOLLOWING:
- 1) H = DESIGN HEIGHT + EMBEDEDMENT
 - 2) DESIGN LIFE = 100 YEARS
 - 3) MAXIMUM FACTORED VERTICAL PRESSURE ON FOUNDATION MATERIAL = 3,000 LB/SF
 - 4) MINIMUM REINFORCEMENT LENGTH (L) = 1.0 H OR 6 FT, WHICHEVER IS LONGER
 - 5) MINIMUM EMBEDMENT DEPTH = H/7 OR 2 FT, WHICHEVER IS DEEPER
 - 6) REINFORCED ZONE AGGREGATE PARAMETERS:

AGGREGATE TYPE*	UNIT WEIGHT (γ) LB/CF	FRICTION ANGLE (φ) DEGREES	COHESION (c) LB/SF
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) LB/CF	FRICTION ANGLE (φ) DEGREES	COHESION (c) LB/SF
BACKFILL	115	28	0
FOUNDATION	115	28	0

NOTES:
 1) THE WALL ENVELOPE SHOWN AND AREA DOES NOT INCLUDE THE WALL EMBEDMENT. SEE SUMMARY TABLE FOR TOTAL INSTALLED WALL AREA.

GEOTECHNICAL ENGINEER

ENGINEER

SEAL 028893

DocuSigned by: *M. H. Stephens* 8/21/2019

DATE: 8/21/2019

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PROJECT NO.: 34232.1.FS4 (I-4400C)

BUNCOMBE COUNTY

STATION: STA. 26+85 -Y12-

(SHEET 9 OF 15)

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

RETAINING WALL NO. RW107 MSE RETAINING WALL

REVISIONS					SHEET NO.
NO.	BY	DATE	NO.	DATE	
1	MHS	8/21/19	3		W-9
2			4		

PREPARED BY: MHS	DATE: 6/27/19
REVIEWED BY: SCC	DATE: 6/27/19

GEOTECHNICAL ENGINEER

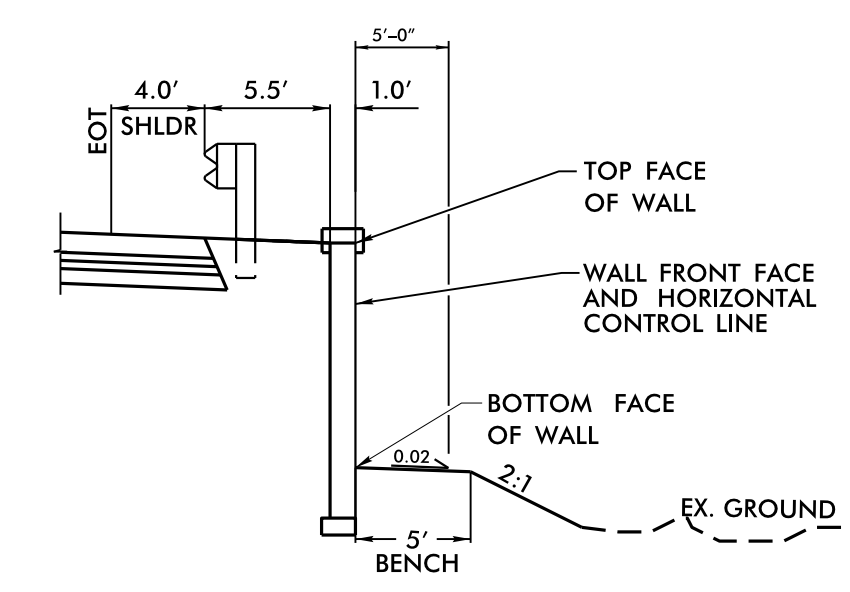
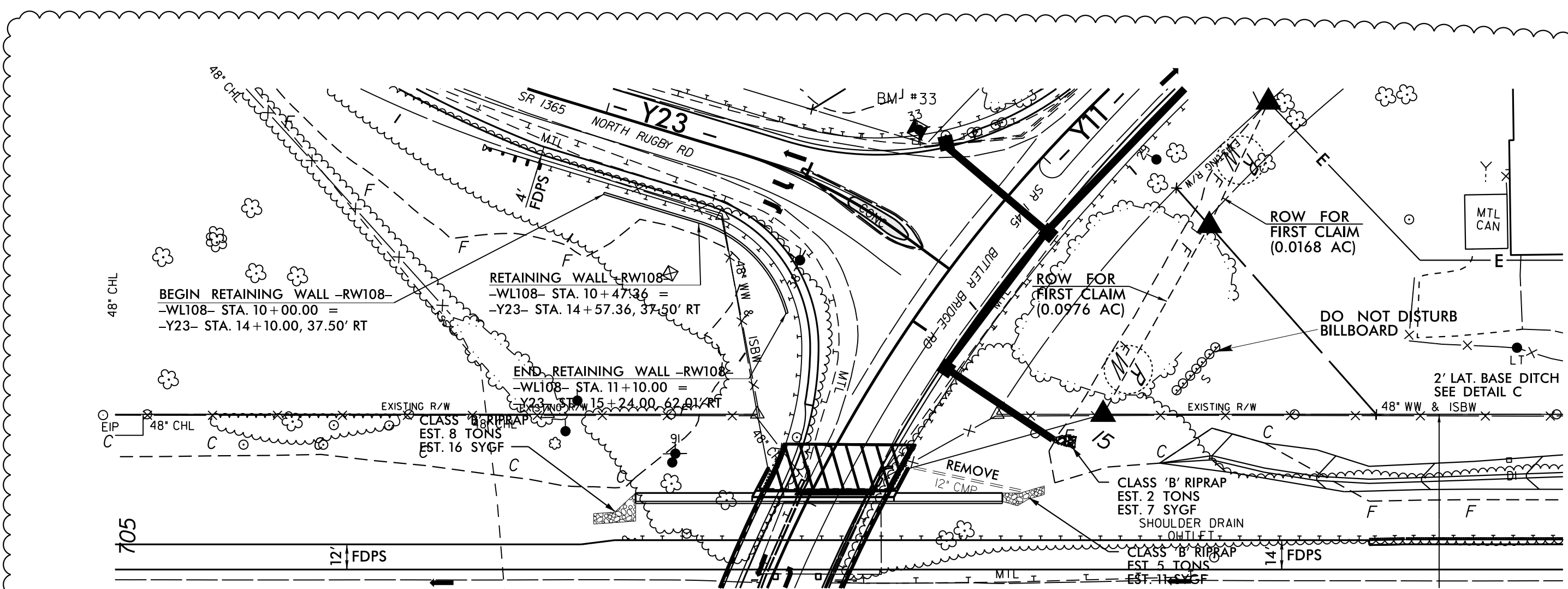
SEAL 028893
MICHAEL H. STEPHENS

ENGINEER

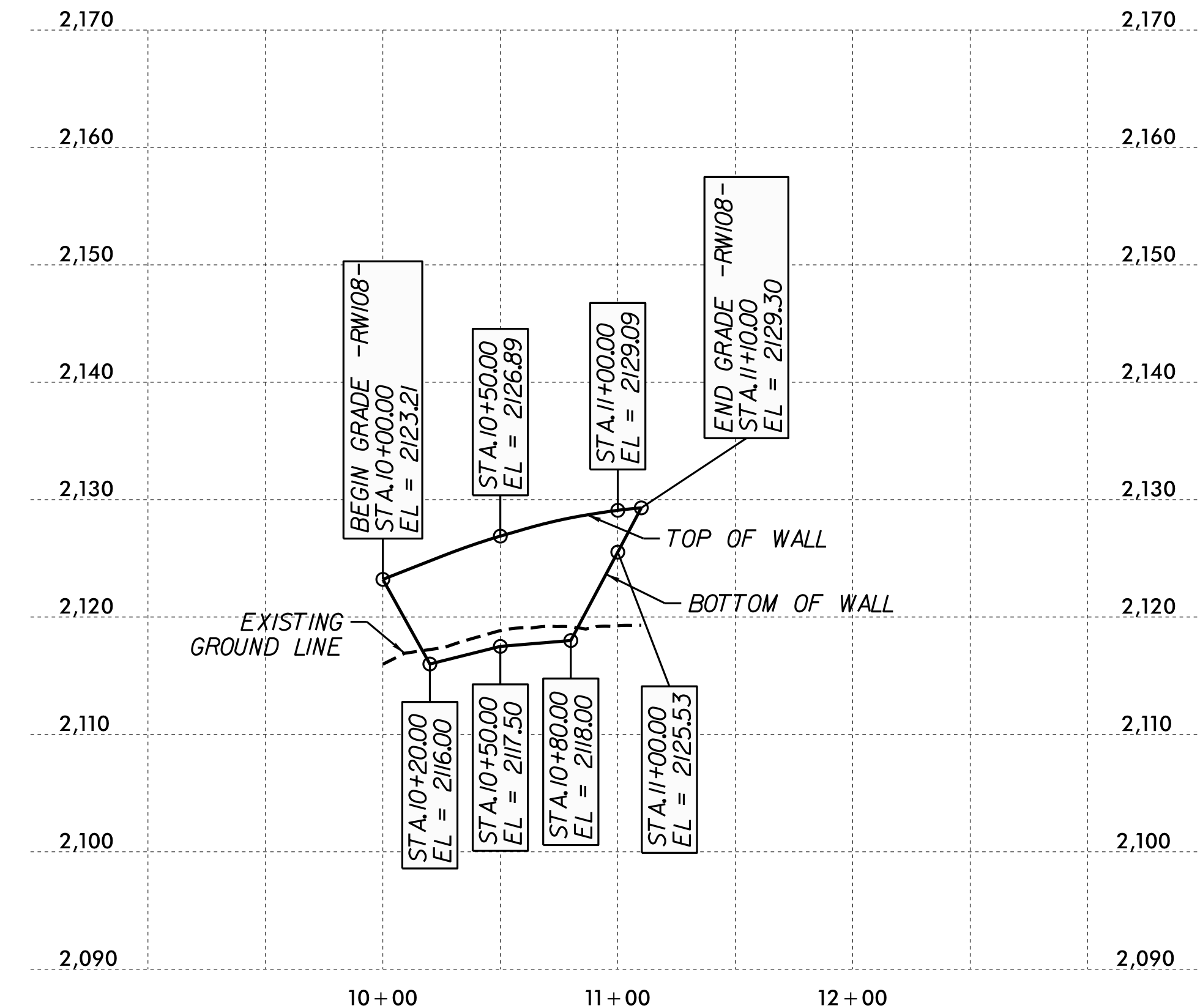
DocuSigned by: *M. H. Stephens* 8/21/2019

DATE: 8/21/2019

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FILL WALL WITH GUARD RAIL DETAIL



RETAINING WALL -RW108-

- DESIGN RETAINING WALL NO. RW108 FOR THE FOLLOWING:
- 1) H = DESIGN HEIGHT + EMBEDMENT
 - 2) DESIGN LIFE = 100 YEARS
 - 3) MAXIMUM FACTORED VERTICAL PRESSURE ON FOUNDATION MATERIAL = 3,000 LB/SF
 - 4) MINIMUM REINFORCEMENT LENGTH (L) = 1.0 H OR 6 FT, WHICHEVER IS LONGER
 - 5) MINIMUM EMBEDMENT DEPTH = H/7 OR 2 FT, WHICHEVER IS DEEPER
 - 6) REINFORCED ZONE AGGREGATE PARAMETERS:

AGGREGATE TYPE*	UNIT WEIGHT (γ) LB/CF	FRICTION ANGLE (φ) DEGREES	COHESION (c) LB/SF
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) LB/CF	FRICTION ANGLE (φ) DEGREES	COHESION (c) LB/SF
BACKFILL	115	28	0
FOUNDATION	115	28	0

- NOTES:
- 1) THE WALL ENVELOPE SHOWN AND AREA DOES NOT INCLUDE THE WALL EMBEDMENT. SEE SUMMARY TABLE FOR TOTAL INSTALLED WALL AREA.
 - 2) REVISION INCLUDES THE ADDITION OF RW108.
 - 3) SUBSURFACE INVENTORY FOR WALL RW108 IS NOT AVAILABLE. SEE ROADWAY INVENTORY FOR ANY AVAILABLE SUBSURFACE INFORMATION.

PROJECT NO.: 34232.1.FS4 (I-4400C)
 BUNCOMBE COUNTY
 STATION: STA. 14+10 TO 15+24 -Y23-
 SHEET 10 OF 15

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

**GEOTECHNICAL
ENGINEERING UNIT**

REVISIONS						SHEET NO. W-10
NO.	BY	DATE	NO.	BY	DATE	
1	MHS	8/21/19	3			
2			4			

PREPARED BY: MHS	DATE: 8/21/19
REVIEWED BY: SCC	DATE: 8/21/19

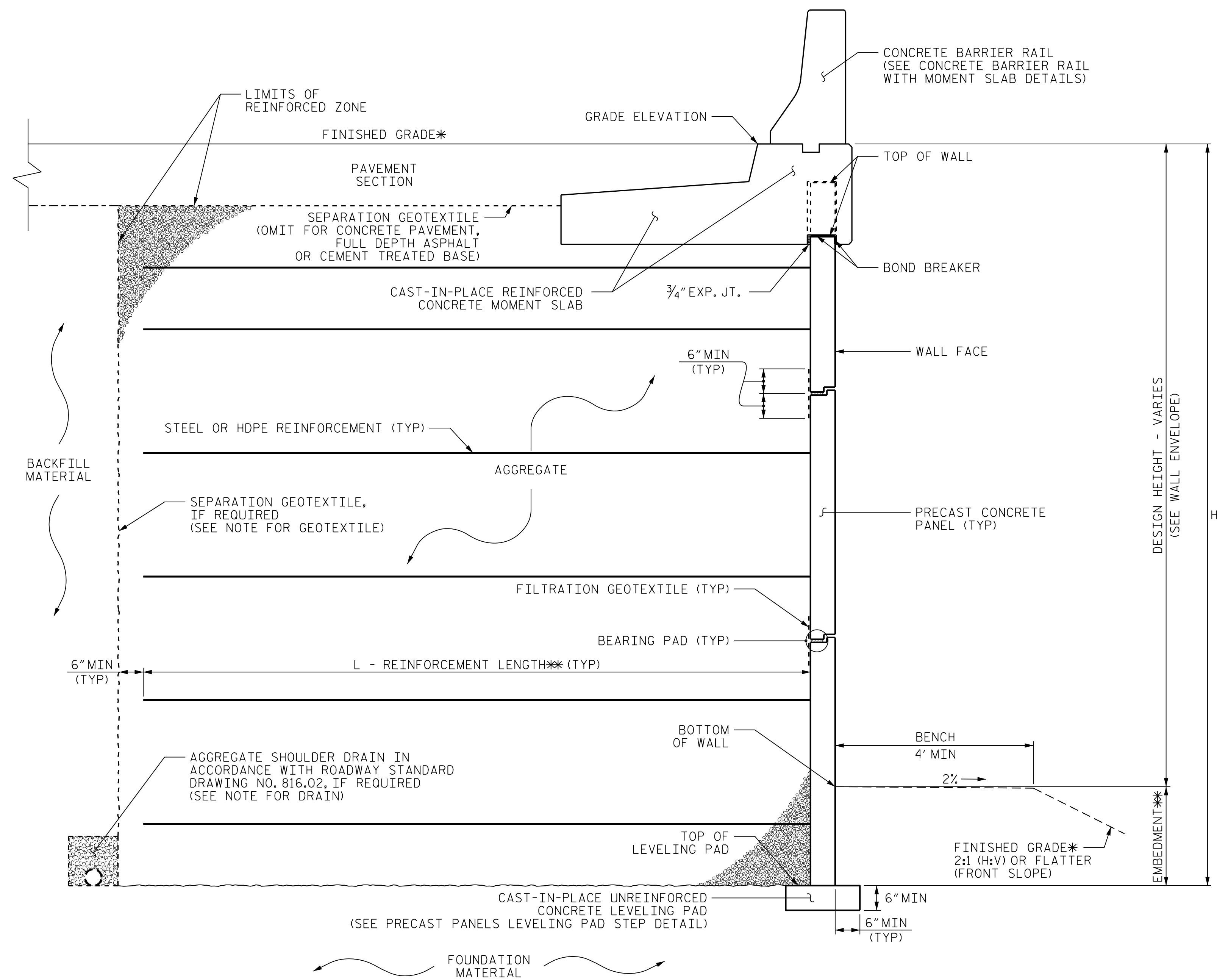
GEOTECHNICAL ENGINEER

DocuSigned by:
Michael H. Stephens
8/21/2019

ENGINEER

DATE: _____ SIGNATURE: _____ DATE: _____

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

PROJECT NO.: 34232.1.FS4 (I-4400C)
 BUNCOMBE COUNTY
 STATION: VARIES
 SHEET 11 OF 15

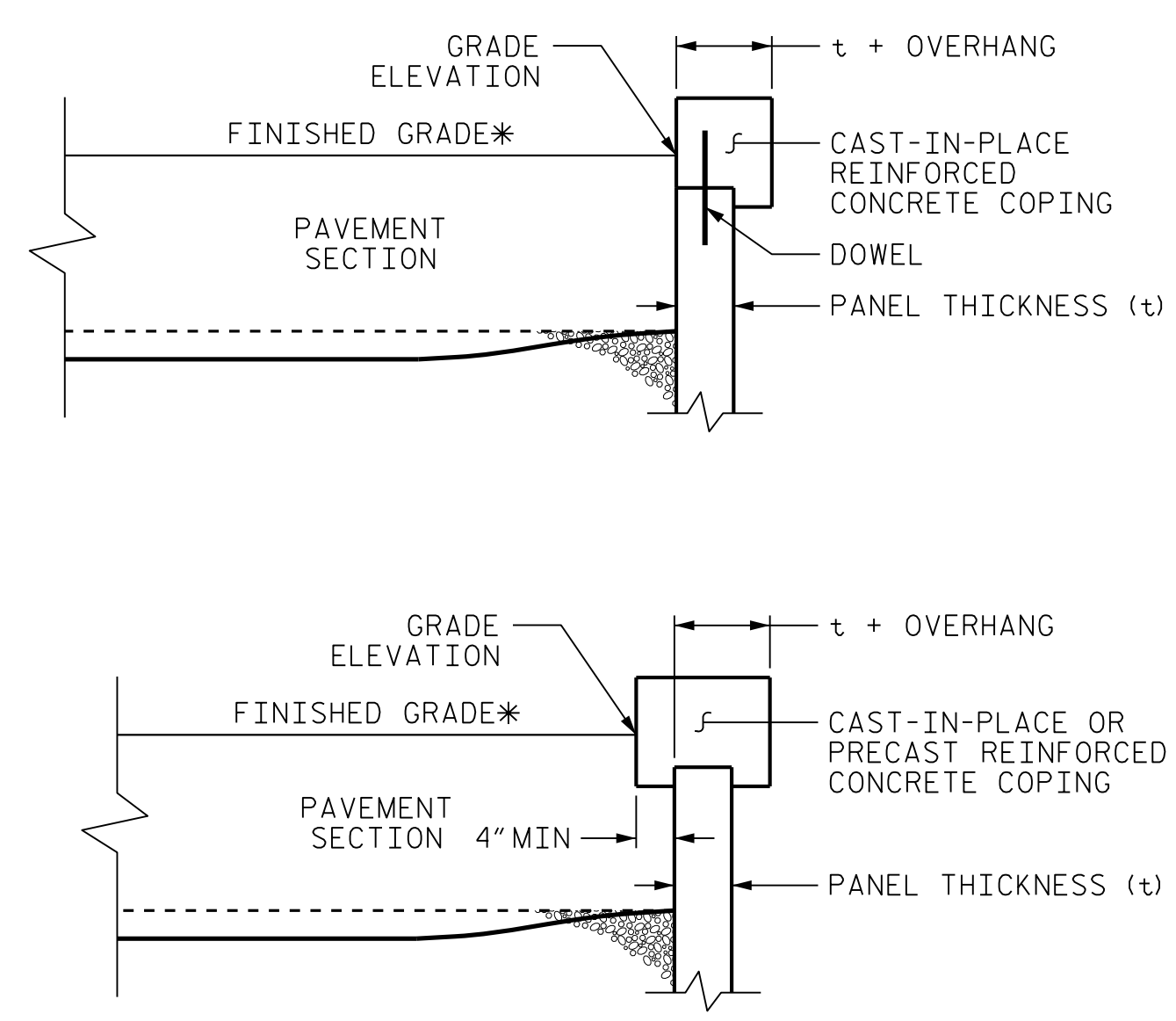
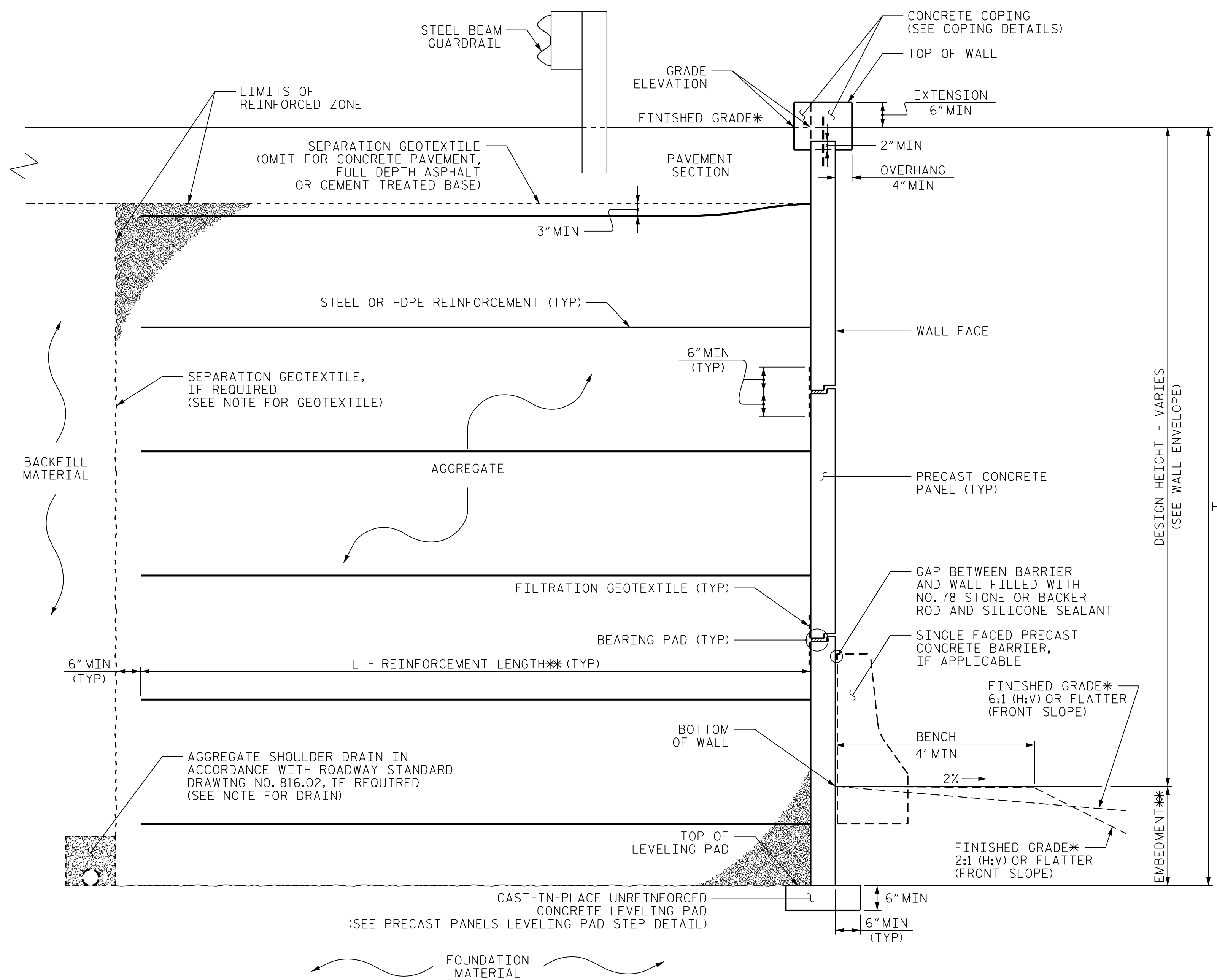
**NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 DIVISION OF HIGHWAYS**

**GEOTECHNICAL
 ENGINEERING UNIT**

REVISIONS					
NO.	BY	DATE	NO.	BY	DATE
1	MHS	8/21/19	3		
2			4		

PREPARED BY: MHS	DATE: 6/27/19
REVIEWED BY: SCC	DATE: 6/27/19

SHEET NO.
W-11



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 PRECAST PANELS - 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.


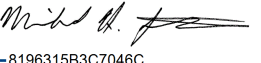
PROJECT NO.: **34232.1.FS4 (I-4400C)**
BUNCOMBE COUNTY
 STATION: VARIES
 SHEET 12 OF 15

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

**GEOTECHNICAL
ENGINEERING UNIT**

MSE WALL WITH GUARD RAIL DETAIL RETAINING WALL NOS. RW107 AND RW108					
REVISIONS					
NO.	BY	DATE	NO.	BY	DATE
1	MHS	8/21/19	3		
2			4		

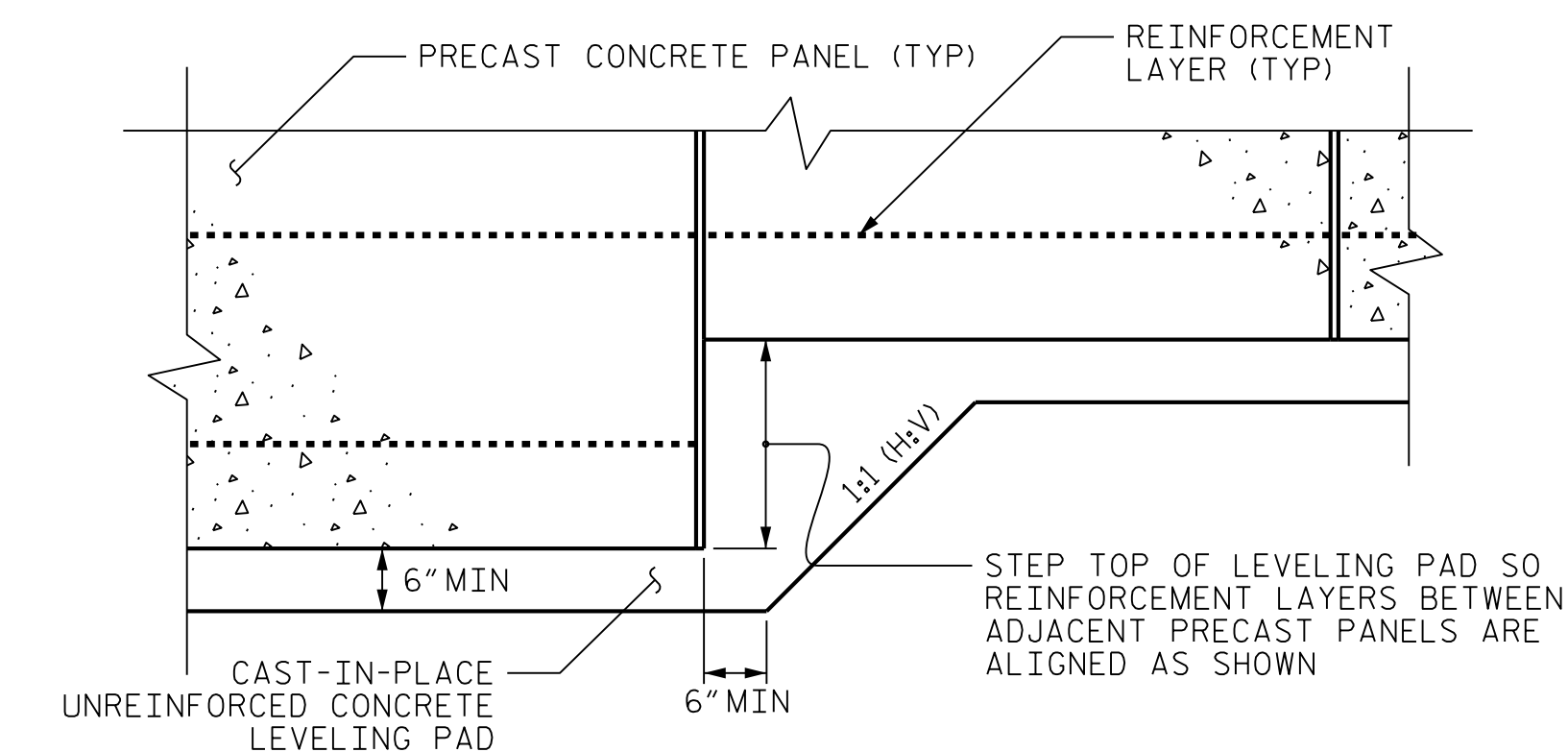
PREPARED BY: MHS	DATE: 6/27/19
REVIEWED BY: SCC	DATE: 6/27/19

GEOTECHNICAL ENGINEER  SEAL 028893 ENGINEER MICHAEL H. STEPHENS	ENGINEER
DocuSigned by: 	8/21/2019
SIGNATURE	DATE

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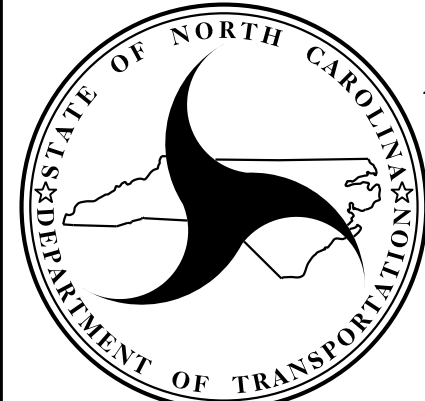
- FOR MECHANICALLY STABILIZED EARTH (MSE) RETAINING WALLS, SEE MECHANICALLY STABILIZED EARTH RETAINING WALLS PROVISION (PAY ITEMS UPDATED WITH 2018 EDITION).
- THE FOLLOWING NOTES ARE FOR RETAINING WALL NOS. RW99, RW100, RW102, AND RW107, AND (RW108) UNLESS OTHERWISE INDICATED.
- FOR STEEL BEAM GUARDRAIL, 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.
- A CONCRETE BARRIER RAIL WITH MOMENT SLAB IS REQUIRED ABOVE RETAINING WALL NOS. RW99, RW100, AND RW103. SEE STRUCTURE PLANS FOR CONCRETE BARRIER RAIL WITH MOMENT SLAB DETAILS AND QUANTITIES.
- AT THE CONTRACTOR'S OPTION, USE FINE AGGREGATE IN THE REINFORCED ZONE OF THE RETAINING WALLS.
- CAST-IN-PLACE REINFORCED CONCRETE COPING IS REQUIRED FOR THE RETAINING WALLS.
- A SIMULATED STONE FORM LINER ARCHITECTURAL FINISH IS REQUIRED FOR PRECAST CONCRETE PANELS FOR THE RETAINING WALLS. SEE ARCHITECTURAL CONCRETE SURFACE TREATMENT FINISH SPECIAL PROVISION.
- A SEPARATION GEOTEXTILE IS REQUIRED AT THE BACK OF THE REINFORCED ZONE FOR RETAINING WALLS CONSTRUCTED WITH COARSE AGGREGATE.
- A DRAIN IS REQUIRED FOR THE RETAINING WALLS.
- BEFORE BEGINNING MSE WALL DESIGN FOR THE RETAINING WALLS, 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 THE RETAINING WALLS FOR A LIVE LOAD (TRAFFIC) SURCHARGE.
- EXISTING AND FUTURE DRAINAGE PIPES AND DRAINAGE STRUCTURES MAY BE LOCATED BENEATH AND BEHIND RETAINING WALLS, VERIFY ALL LOCATIONS PRIOR TO DESIGN AND SUBMIT ANY CONFLICTS FOR REVIEW. SEE ROADWAY AND HYDRAULIC PLANS FOR UTILITY LOCATIONS.
- EXISTING OR FUTURE OBSTRUCTIONS SUCH AS FOUNDATIONS, GUARDRAIL, FENCE OR HANDRAIL POSTS, PAVEMENTS, PIPES, INLETS OR UTILITIES MAY INTERFERE WITH REINFORCEMENT FOR THE RETAINING WALLS.
- DO NOT PLACE LEVELING PAD CONCRETE, AGGREGATE OR REINFORCEMENT FOR THE RETAINING WALLS UNTIL EXCAVATION DIMENSIONS AND FOUNDATION MATERIAL ARE APPROVED.
- "TEMPORARY SHORING" MAY BE REQUIRED FOR SOME OF THE RETAINING WALLS IN ACCORDANCE WITH THE TEMPORARY SHORING PROVISION. SEE ROADWAY, STRUCTURE AND TRAFFIC CONTROL PLANS. TEMPORARY THAT IS REQUIRED FOR THE CONSTRUCTION OF THE MSE WALLS WILL BE INSIDENTAIL TO THE RETAINING WALLS.
- AT THE CONTRACTOR'S OPTION, "TEMPORARY SHORING FOR WALL CONSTRUCTION" MAY BE USED TO CONSTRUCT THE RETAINING WALLS. SEE MSE RETAINING WALLS PROVISION FOR TEMPORARY SHORING FOR WALL CONSTRUCTION.



**PRECAST PANELS
LEVELING PAD STEP DETAIL**

PROJECT NO.: **34232.1.FS4 (I-4400C)**
 BUNCOMBE COUNTY
 STATION: VARIES
 SHEET 13 OF 15

PREPARED BY: MHS	DATE: 6/27/19
REVIEWED BY: SCC	DATE: 6/27/19



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

**GEOTECHNICAL
ENGINEERING UNIT**

REVISIONS					
NO.	BY	DATE	NO.	BY	DATE
1	MHS	8/21/19	3		
2			4		

MSE WALL NOTES

SHEET NO. W-13

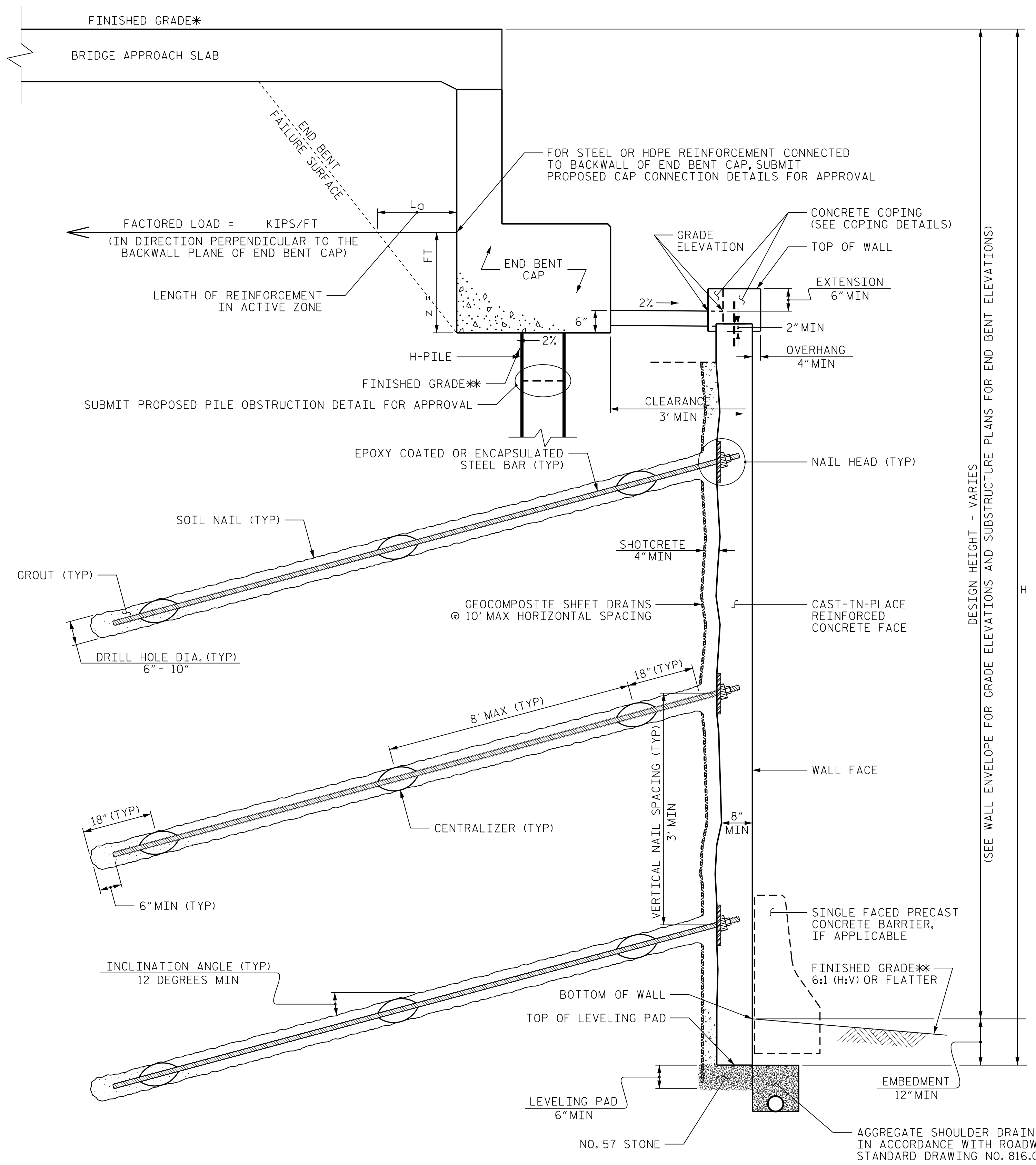
GEOTECHNICAL ENGINEER

ENGINEER

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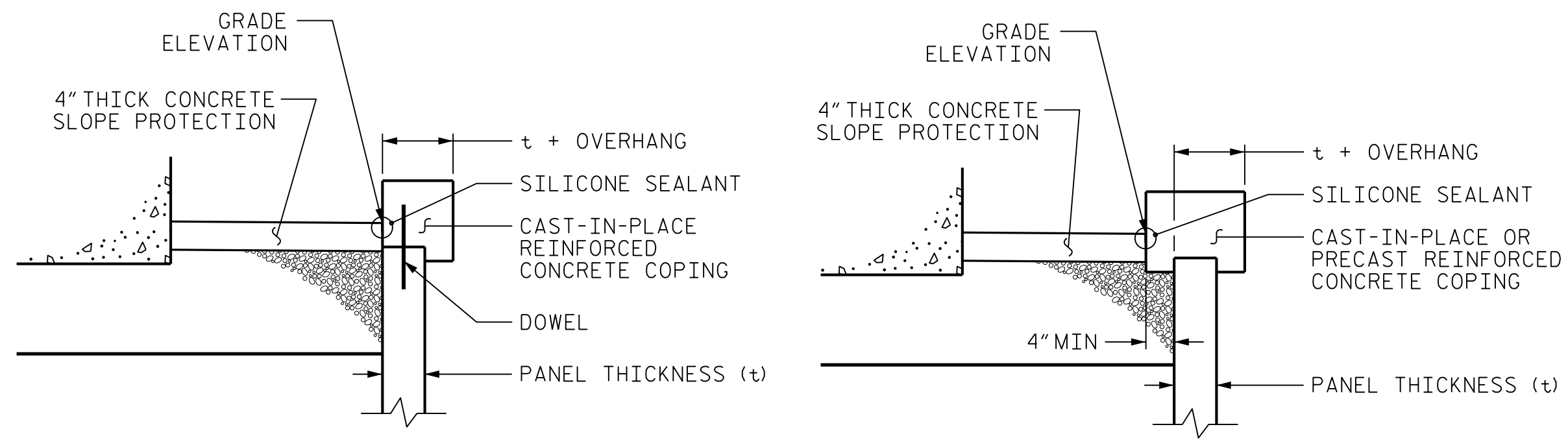
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NOTES:

- FOR SOIL NAIL RETAINING WALLS, SEE SOIL NAIL RETAINING WALLS PROVISION.
- THE FOLLOWING NOTES ARE FOR RETAINING WALL NOS. RW103, RW104, RW105, AND RW106, UNLESS OTHERWISE INDICATED.
- FOR SINGLE FACED PRECAST CONCRETE BARRIER, SEE ROADWAY PLANS AND SECTION 857 OF THE STANDARD SPECIFICATIONS.
- A FENCE OR HANDRAIL MAYBE REQUIRED ON TOP OF THE RETAINING WALLS. SEE ROADWAY PLANS FOR FENCE OR HANDRAIL ATTACHMENT DETAILS.
- A SIMULATED STONE FORM LINER ARCHITECTURAL FINISH IS REQUIRED FOR PRECAST CONCRETE PANELS FOR THE RETAINING WALLS. SEE ARCHITECTURAL CONCRETE SURFACE TREATMENT FINISH SPECIAL PROVISION.
- CAST-IN-PLACE REINFORCED CONCRETE COPING IS REQUIRED FOR THE RETAINING WALLS.
- BEFORE BEGINNING SOIL NAIL WALL DESIGN FOR THE RETAINING WALLS, 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 THE RETAINING WALLS FOR THE FOLLOWING:
 - 1) H = DESIGN HEIGHT + EMBEDMENT
 - 2) DESIGN LIFE = 100 YEARS
 - 3) MINIMUM EMBEDMENT DEPTH = 1 FT
 - 4) IN-SITU ASSUMED MATERIAL PARAMETERS, SEE PLAN SHEETS
- DESIGN RETAINING WALLS FOR A LIVE LOAD (TRAFFIC) SURCHARGE.
- DESIGN REINFORCEMENT CONNECTED TO END BENT CAPS FOR FACTORED LOAD AND LENGTH OF REINFORCEMENT IN ACTIVE ZONE (L_a) SHOWN. CAST REINFORCEMENT OR CONNECTORS INTO CAP BACKWALL FOR END BENTS NO. 1 AND 2 AT BRIDGES 232 (-Y11-, BUTLER BRIDGE ROAD) AND 8 (-Y12-, FANNING BRIDGE ROAD). MAINTAIN A CLEARANCE OF AT LEAST 3" BETWEEN REINFORCEMENT OR CONNECTORS AND REINFORCING STEEL IN CAP.
- EXISTING OR FUTURE OBSTRUCTIONS SUCH AS FOUNDATIONS, GUARDRAIL, FENCE OR HANDRAIL POSTS, PAVEMENTS, PIPES, INLETS OR UTILITIES MAY INTERFERE WITH THE SOIL NAIL WALLS.
- FOUNDATIONS FOR END BENT NOS 1 AND 2 AT BRIDGES 232 (-Y11-, BUTLER BRIDGE ROAD) AND 8 (-Y12-, FANNING BRIDGE ROAD), WILL INTERFERE WITH SOIL NAILS FOR RETAINING WALL NO. RW103, RW104, RW105, AND RW106. SEE "FOUNDATION LAYOUT" SHEET FOR FOUNDATION LOCATIONS.



COPING DETAILS

AT THE CONTRACTOR'S OPTION, CONNECT COPING TO PANELS WITH DOWELS OR EXTEND COPING DOWN BACK OF PANELS.

SOIL NAIL WALL - TYPICAL SECTION

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

PROJECT NO.: 34232.1.FS4 (I-4400C)
 BUNCOMBE COUNTY
 STATION: -Y14- 12+50 AND -Y14- 12+90
 SHEET 15 OF 15

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

REVISIONS					
NO.	BY	DATE	NO.	BY	DATE
1	MHS	8/21/19	3		
2			4		

SHEET NO. W-15

PREPARED BY: MHS	DATE: 6/27/19
REVIEWED BY: SCC	DATE: 6/27/19

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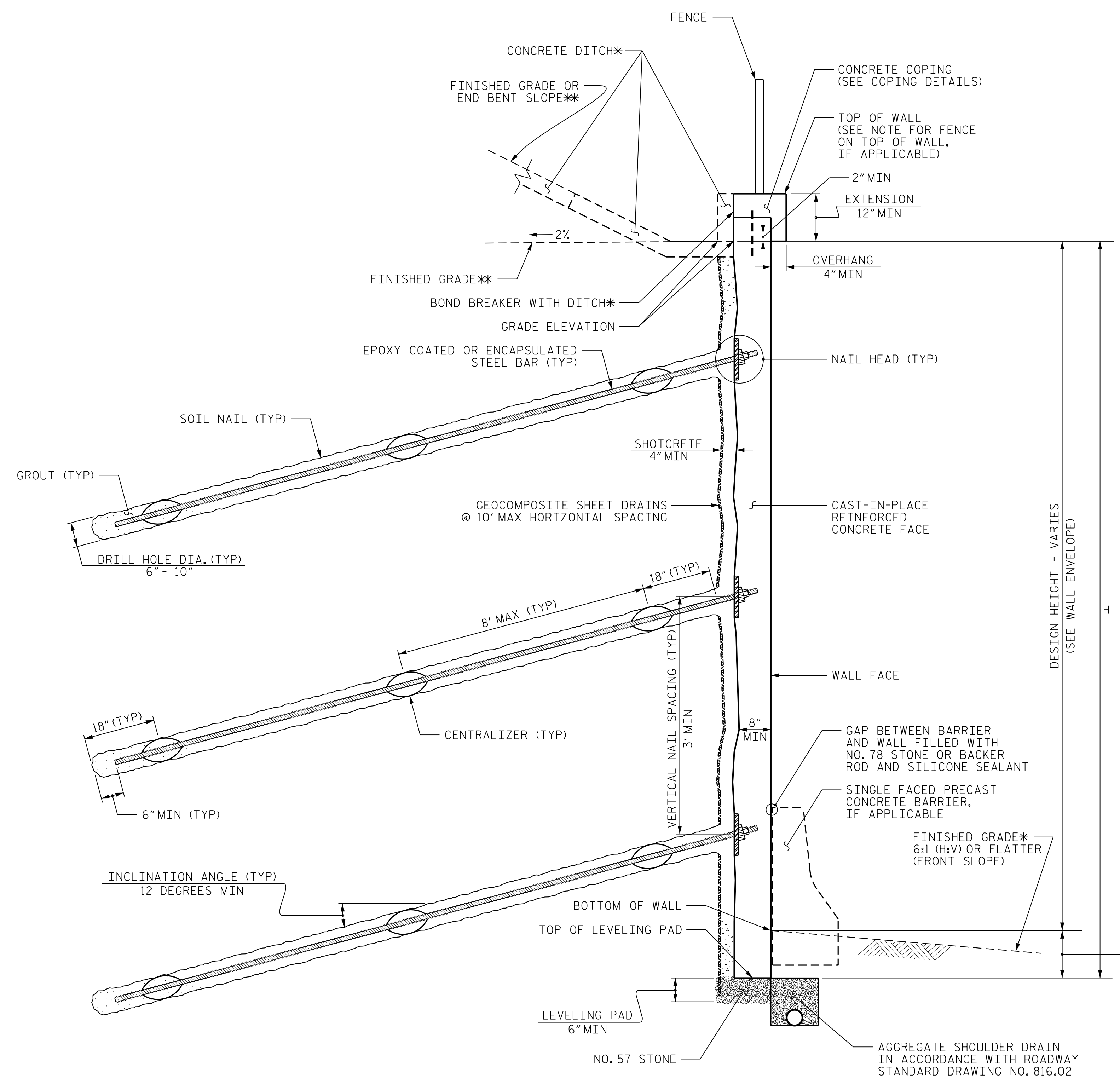
ENGINEER

SEAL
028893
ENGINEER
MICHAEL H. STEPHENS

DocuSigned by: *Michael H. Stephens* 8/21/2019

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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 WALLS, SEE SOIL NAIL RETAINING WALLS PROVISION (PAY ITEMS UPDATED WITH 2018 EDITION).
- THE FOLLOWING NOTES ARE FOR RETAINING WALL NOS. RW101, RW103, RW104, RW105, AND RW106, UNLESS OTHERWISE INDICATED.
- 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.
- A FENCE MAYBE REQUIRED ON TOP OF THE RETAINING WALLS. SEE ROADWAY PLANS FOR FENCE OR HANDRAIL ATTACHMENT DETAILS.
- A SIMULATED STONE FORM LINER ARCHITECTURAL FINISH IS REQUIRED FOR PRECAST CONCRETE PANELS FOR THE RETAINING WALLS. SEE ARCHITECTURAL CONCRETE SURFACE TREATMENT FINISH SPECIAL PROVISION.
- CAST-IN-PLACE REINFORCED CONCRETE COPING IS REQUIRED FOR THE RETAINING WALLS.
- BEFORE BEGINNING SOIL NAIL WALL DESIGN FOR THE RETAINING WALLS, 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 THE RETAINING WALLS FOR THE FOLLOWING:
 - 1) H = DESIGN HEIGHT + EMBEDMENT
 - 2) DESIGN LIFE = 100 YEARS
 - 3) MINIMUM EMBEDMENT DEPTH = 1 FT
 - 4) IN-SITU ASSUMED MATERIAL PARAMETERS, SEE PLAN SHEETS
- AS NEEDED, DESIGN RETAINING WALLS NO. RW8, RW17 AND RW21 FOR A PIPE AND DRAINAGE BOX EXTENDING BEHIND AND THROUGH THE WALL AS SHOWN. VERIFY PIPE AND DRAINAGE BOX LOCATIONS AND ELEVATION BEFORE BEGINNING SOIL NAIL WALL DESIGN OR CONSTRUCTION.
- EXISTING OR FUTURE OBSTRUCTIONS SUCH AS FOUNDATIONS, GUARDRAIL, FENCE OR HANDRAIL POSTS, PAVEMENTS, PIPES, INLETS OR UTILITIES MAY INTERFERE WITH SOIL NAILS FOR THE RETAINING WALLS.

PREPARED BY: MHS	DATE: 6/27/19
REVIEWED BY: SCC	DATE: 6/27/19

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

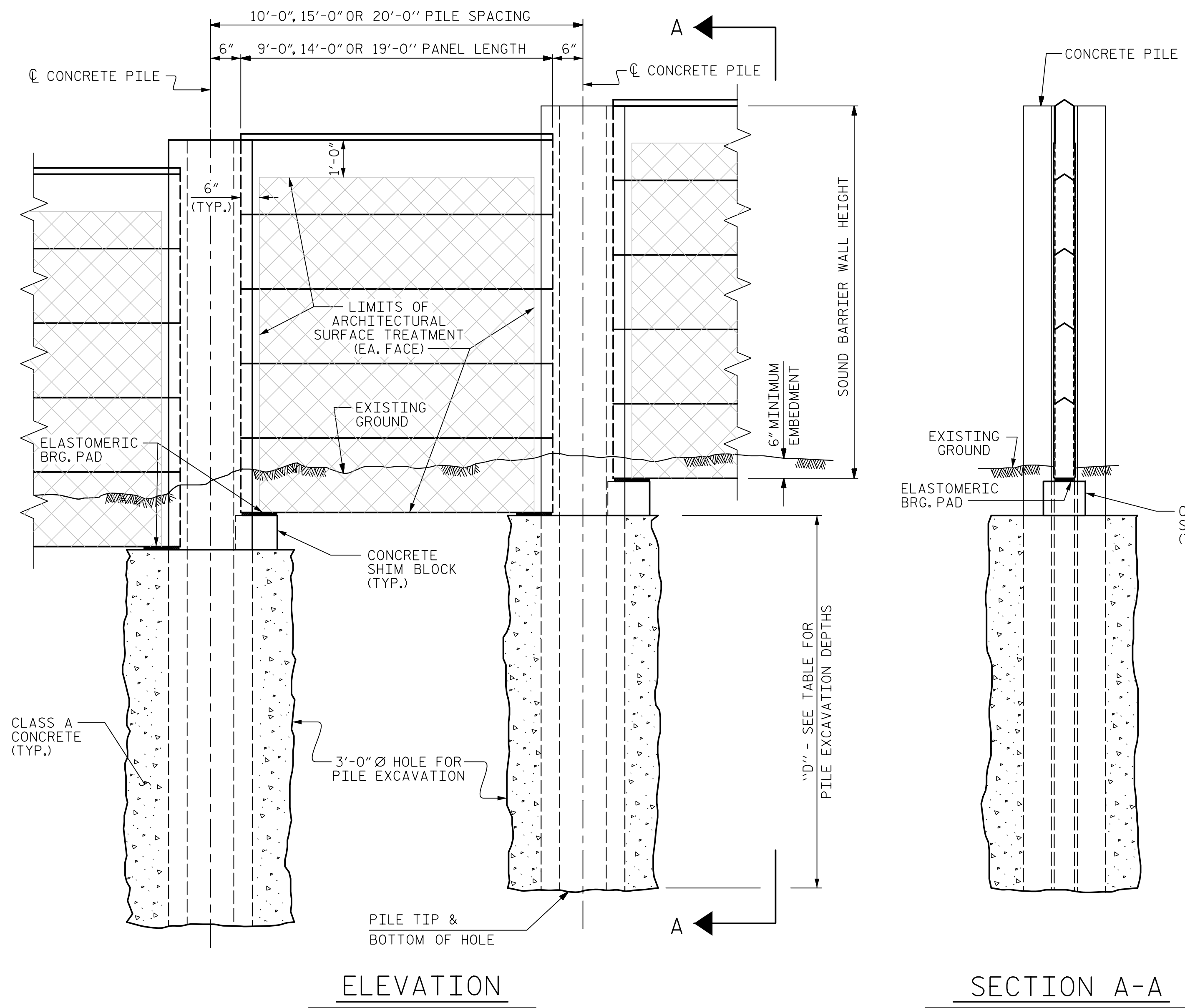
**GEOTECHNICAL
ENGINEERING UNIT**

PROJECT NO.: 34232.1.FS4 (I-4400C)
BUNCOMBE COUNTY

STATION: VARIES
SHEET 14 OF 15

SOIL NAIL WALL DETAIL					
REVISIONS					
NO.	BY	DATE	NO.	BY	DATE
1	MHS	8/21/19	3		
2			4		

SHEET NO. W-14



PILE EXCAVATION DEPTHS "D"				
WALL -NW4.6-		FROM : STA. 18+10.00 TO : STA. 20+80.00		
3'-0" Ø HOLE	PILE SPACING	WALL HEIGHT		
		H ≤ 15'	15' < H ≤ 20'	20' < H ≤ 25'
	10'-0"	10'	12'	13'
	15'-0"	11'	13'	16'
20'-0"	12'	15'	18'	

BILL OF MATERIAL	
SOUND BARRIER WALL	5,369 S.F.
ARCHITECTURAL SURFACE TREATMENT	9,505 S.F.
QUANTITIES PROVIDED ARE APPROXIMATE AND ARE FOR BID PURPOSES ONLY.	
ARCHITECTURAL SURFACE TREATMENT	
TEXTURE OPTION:	DRY STACK STONE
STAIN OPTION:	GRAY (FS36173)

NOTES

FOR SOUND BARRIER WALL, SEE SPECIAL PROVISIONS.

CONSTRUCT SOUND BARRIER WALL TO LINES AND GRADES SHOWN ON THE ROADWAY PLANS.

PROVIDE PANELS WITH A FLAT BOTTOM.

VERIFY THE LOCATION OF UNDERGROUND UTILITIES BEFORE DRILLING HOLES TO ENSURE SUFFICIENT CLEARANCE IS AVAILABLE.

ADJUST PILE EXCAVATION ELEVATIONS TO MAINTAIN 6" MINIMUM EMBEDMENT OF THE BOTTOM PANEL.

USE CLASS AA FOR PANELS AND CLASS A CONCRETE PILE EXCAVATION BACKFILL, IN ACCORDANCE WITH ARTICLE 1000-4 OF THE STANDARD SPECIFICATIONS.

AT THE CONTRACTOR'S OPTION, USE 10'-0", 15'-0", OR 20'-0" PILE SPACINGS. STANDARD PRECAST CONCRETE PANELS MAY BE USED WITH THE 10'-0" AND 15'-0" PILE SPACING. FOR 20'-0" PILE SPACING, PANELS DESIGNED AND MANUFACTURED BY A THIRD PARTY VENDOR SHALL BE USED.

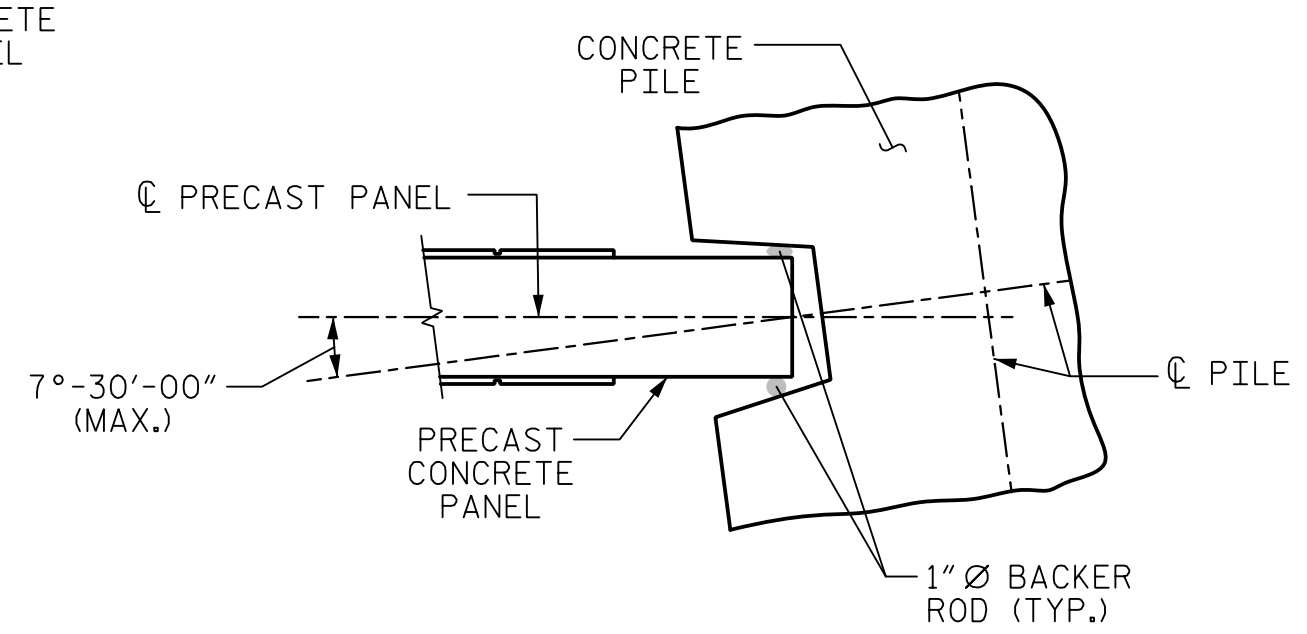
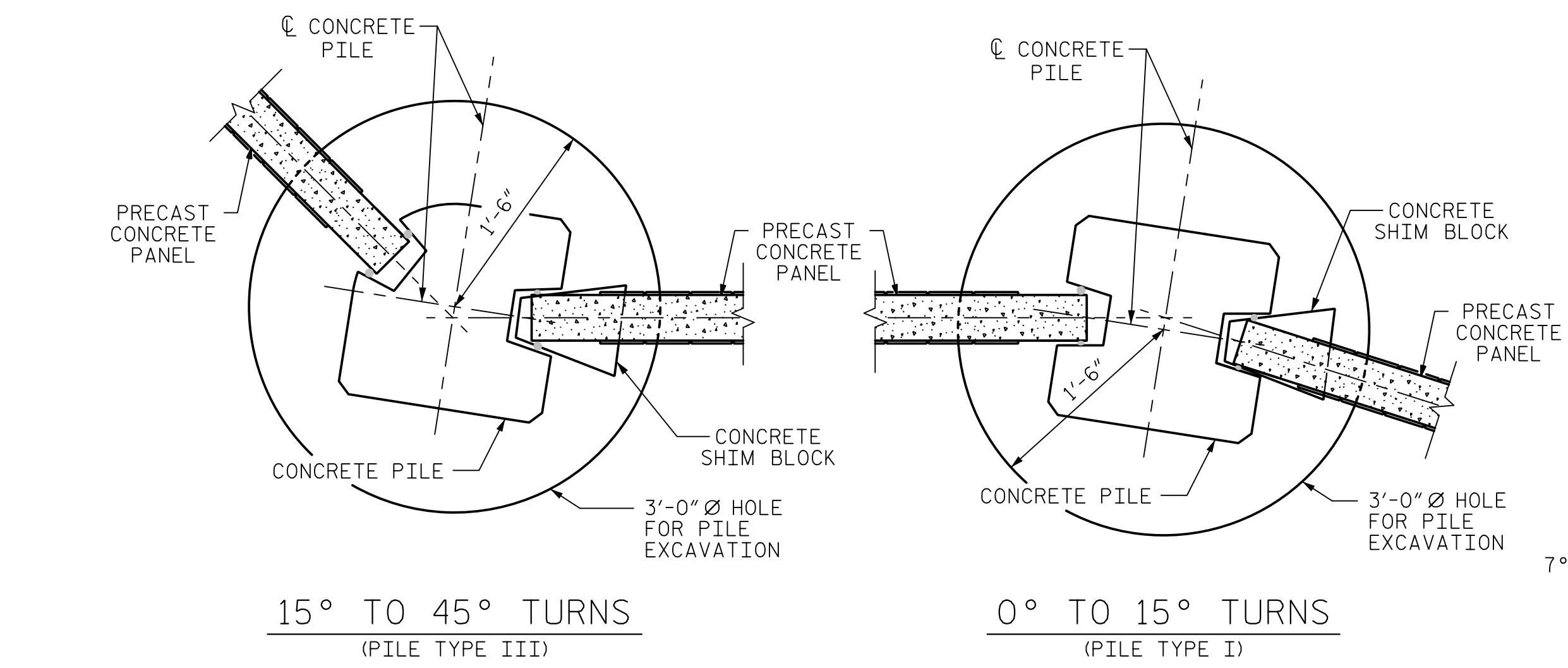
FOR SOUND BARRIER WALL STATIONS, OFFSETS, AND WALL ENVELOPE, SEE ROADWAY PLANS.

PLACE 1" Ø BACKER RODS FULL HEIGHT ON EACH SIDE OF THE PRECAST PANELS. SET AND SEAL THE BACKER ROD IN PLACE WITH SEALANT THAT CONFORMS WITH ARTICLE 1028-3 OF THE STANDARD SPECIFICATIONS.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

PILE REINFORCING STEEL DESIGN WIND PRESSURE = 40 PSF							
PILE TYPE I				PILE TYPE III			
PILE SPACING	MAXIMUM WALL HEIGHT (H)	VERTICAL REINFORCING STEEL	TIES	PILE SPACING	MAXIMUM WALL HEIGHT (H)	VERTICAL REINFORCING STEEL	TIES
10'-0"	H ≤ 25'	4 - #8 EA. FACE	#3 @ 1'-4" CTS.	10'-0"	H ≤ 25'	3 - #9 SHORT FACE 4 - #9 LONG FACE	#3 @ 1'-4" CTS.
	20' < H ≤ 25'	4 - #10 EA. FACE	#3 @ 1'-4" CTS.		15'-0"	H ≤ 20'	3 - #9 SHORT FACE 4 - #9 LONG FACE
15'-0"	H ≤ 20'	4 - #8 EA. FACE	#3 @ 1'-4" CTS.	15'-0"		20' < H ≤ 25'	3 - #11 SHORT FACE 4 - #11 LONG FACE
	20' < H ≤ 25'	4 - #9 EA. FACE	#3 @ 1'-4" CTS.		20'-0"	H ≤ 20'	3 - #10 SHORT FACE 4 - #10 LONG FACE
20'-0"	H ≤ 20'	4 - #9 EA. FACE	#3 @ 1'-4" CTS.	20'-0"		H ≤ 20'	3 - #10 SHORT FACE 4 - #10 LONG FACE
	20' < H ≤ 25'	4 - #11 EA. FACE	#3 @ 1'-4" CTS.				
PILE TYPE II				PILE TYPE III ALT.			
PILE SPACING	MAXIMUM WALL HEIGHT (H)	VERTICAL REINFORCING STEEL	TIES	PILE SPACING	MAXIMUM WALL HEIGHT (H)	VERTICAL REINFORCING STEEL	TIES
10'-0"	H ≤ 25'	4 - #6 EA. FACE	#3 @ 1'-4" CTS.	10'-0"	H ≤ 25'	3 - #9 SHORT FACE 4 - #9 LONG FACE	#3 @ 1'-4" CTS.
	20' < H ≤ 25'	4 - #7 EA. FACE	#3 @ 1'-4" CTS.		15'-0"	H ≤ 20'	3 - #9 SHORT FACE 4 - #9 LONG FACE
15'-0"	H ≤ 20'	4 - #6 EA. FACE	#3 @ 1'-4" CTS.	15'-0"		20' < H ≤ 25'	3 - #11 SHORT FACE 4 - #11 LONG FACE
	20' < H ≤ 25'	4 - #8 EA. FACE	#3 @ 1'-4" CTS.		20'-0"	H ≤ 20'	3 - #10 SHORT FACE 4 - #10 LONG FACE
20'-0"	H ≤ 20'	4 - #6 EA. FACE	#3 @ 1'-4" CTS.	20'-0"		H ≤ 20'	3 - #10 SHORT FACE 4 - #10 LONG FACE
	20' < H ≤ 25'	4 - #8 EA. FACE	#3 @ 1'-4" CTS.				



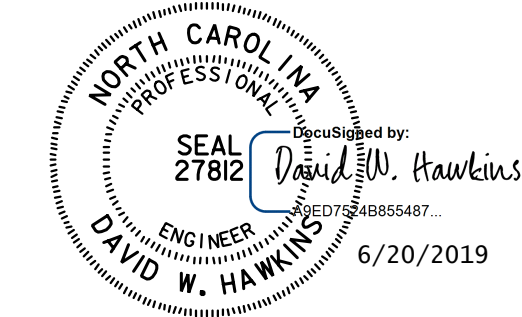
ASSEMBLED BY : M. WRIGHT	DATE : 6/19
CHECKED BY : N. HART	DATE : 6/19
DRAWN BY : MAA 6/11	REV. 9/26/14 MAA/TMG
CHECKED BY : GM 6/11	REV. 10/17 MAA/THC
	REV. 5/18 MAA/THC

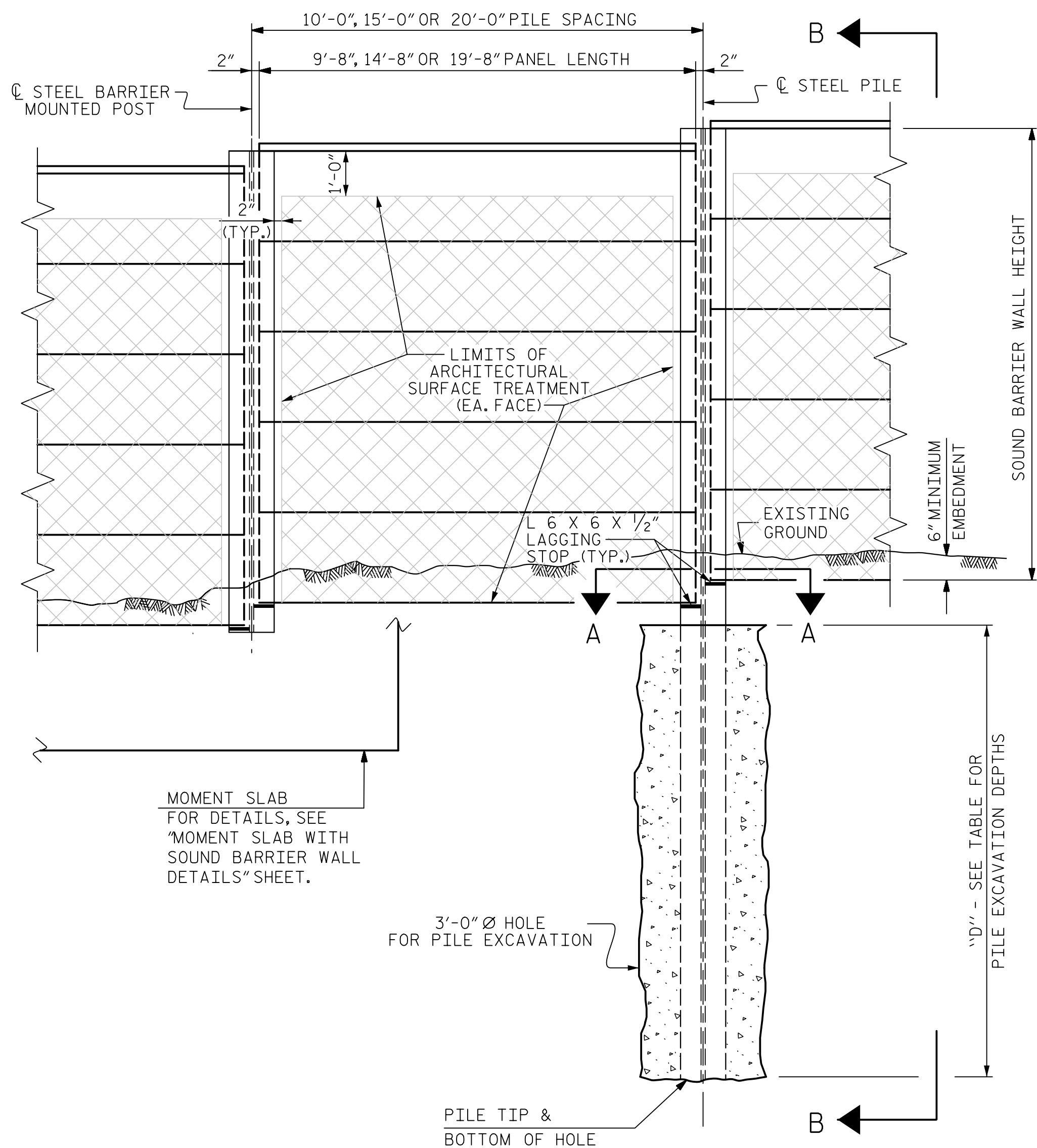
PILE ROTATION LIMIT FOR WALL TURN
(ROTATE THE CONCRETE PILE ±7°-30'-00" TO ACCOMMODATE WALL TURN.)

HNTB		HNTB NORTH CAROLINA, P.C. NC License No. C-1554 343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609	
DRAWN BY : M. WRIGHT	DATE : 6/19	DWG. NO. : 1	
CHECKED BY : N. HART	DATE : 6/19		
DESIGN ENGINEER OF RECORD : D. HAWKINS	DATE : 6/19		

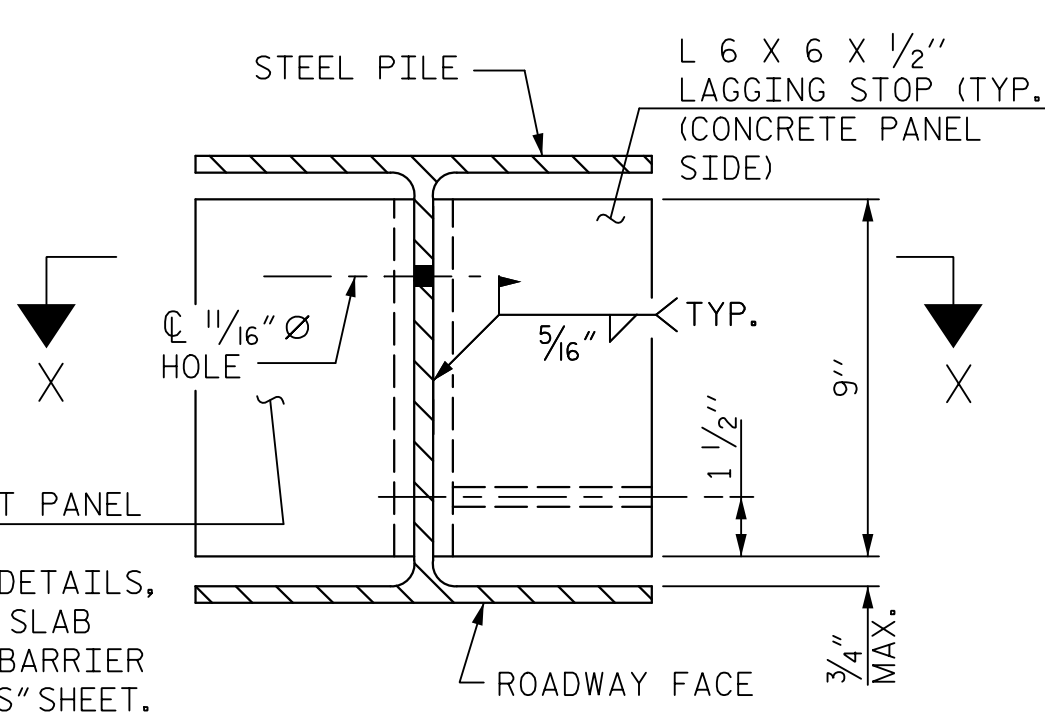
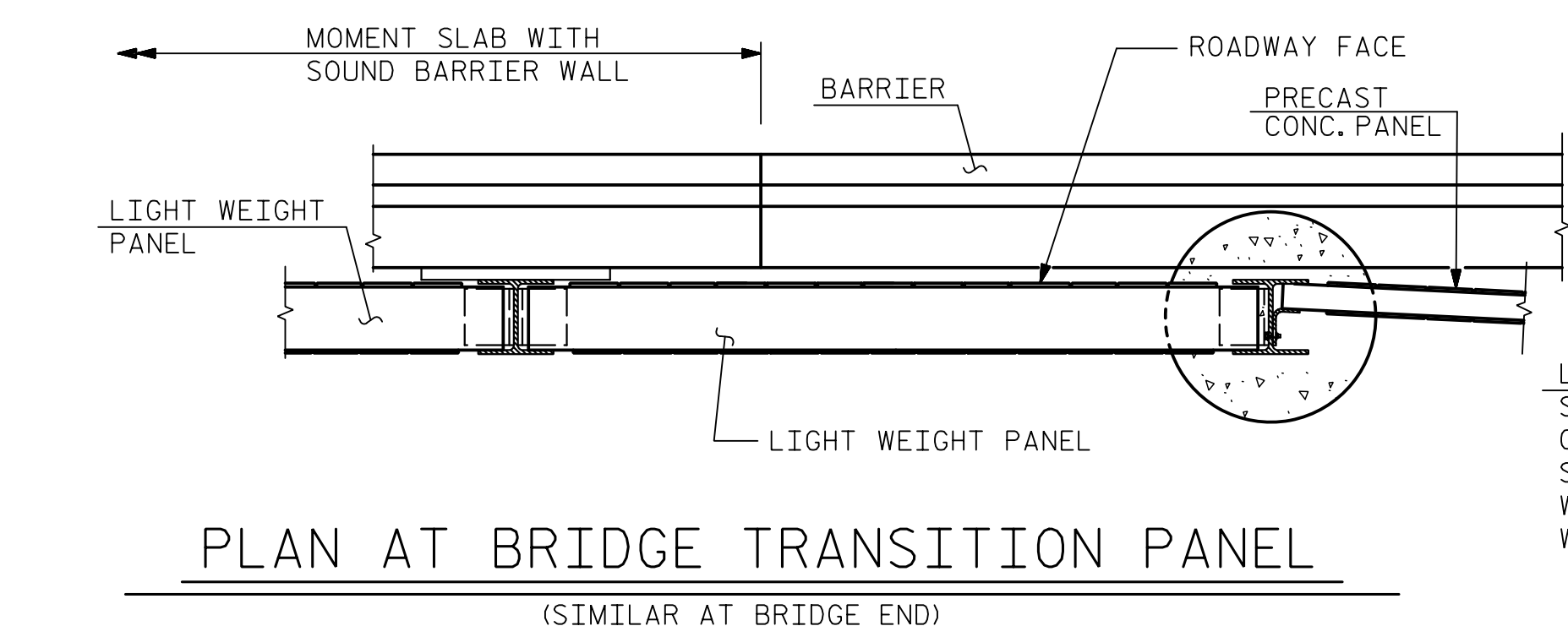
PROJECT NO. I-4400C
HENDERSON COUNTY
 STATION: 662+34.64 -L- =
10+00.00 -NW4.6-

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					SHEET NO. SW-1
STANDARD					TOTAL SHEETS 7
SOUND BARRIER WALL No. -NW4.6-					
REVISIONS					
NO.	BY	DATE	NO.	BY	DATE
1			3		
2			4		

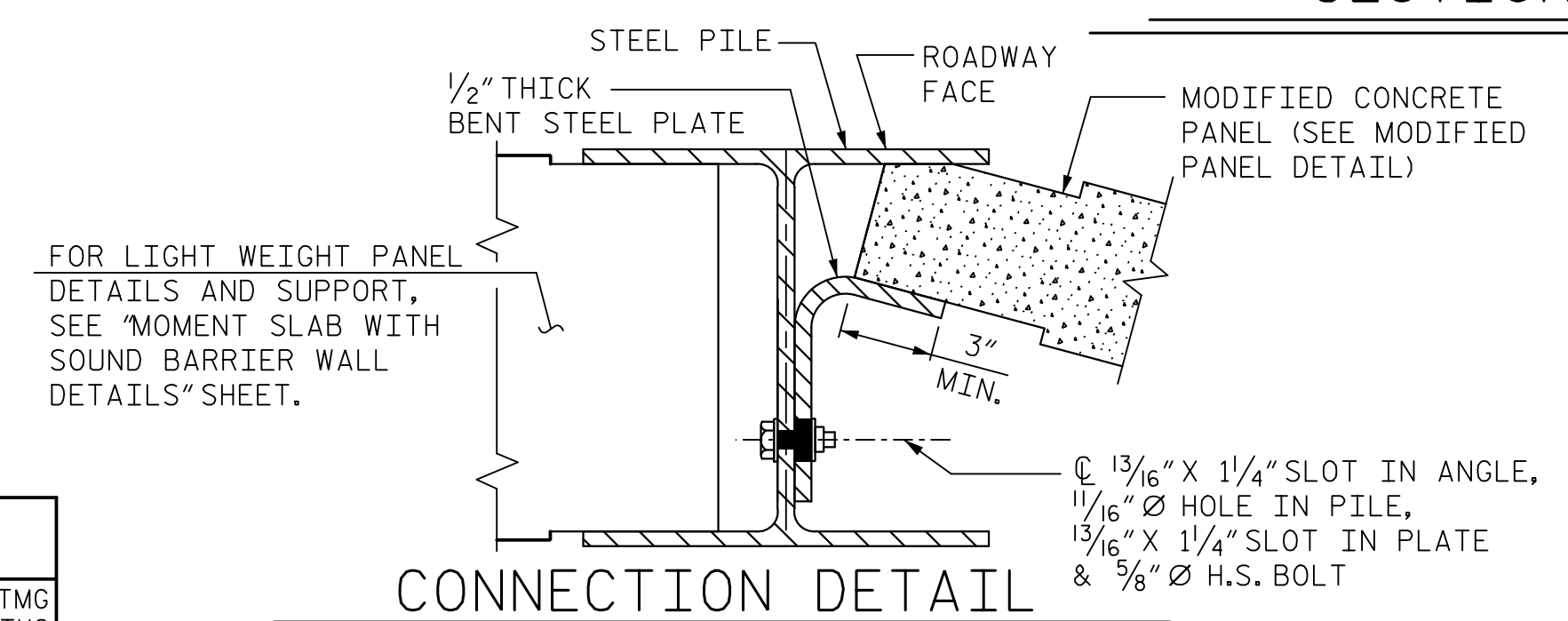




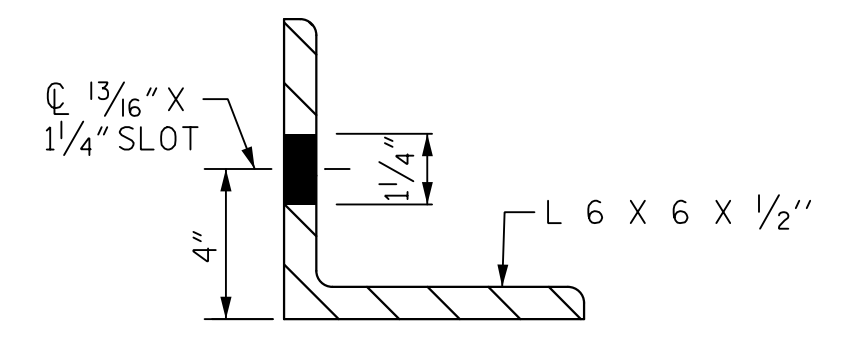
ELEVATION



SECTION A-A

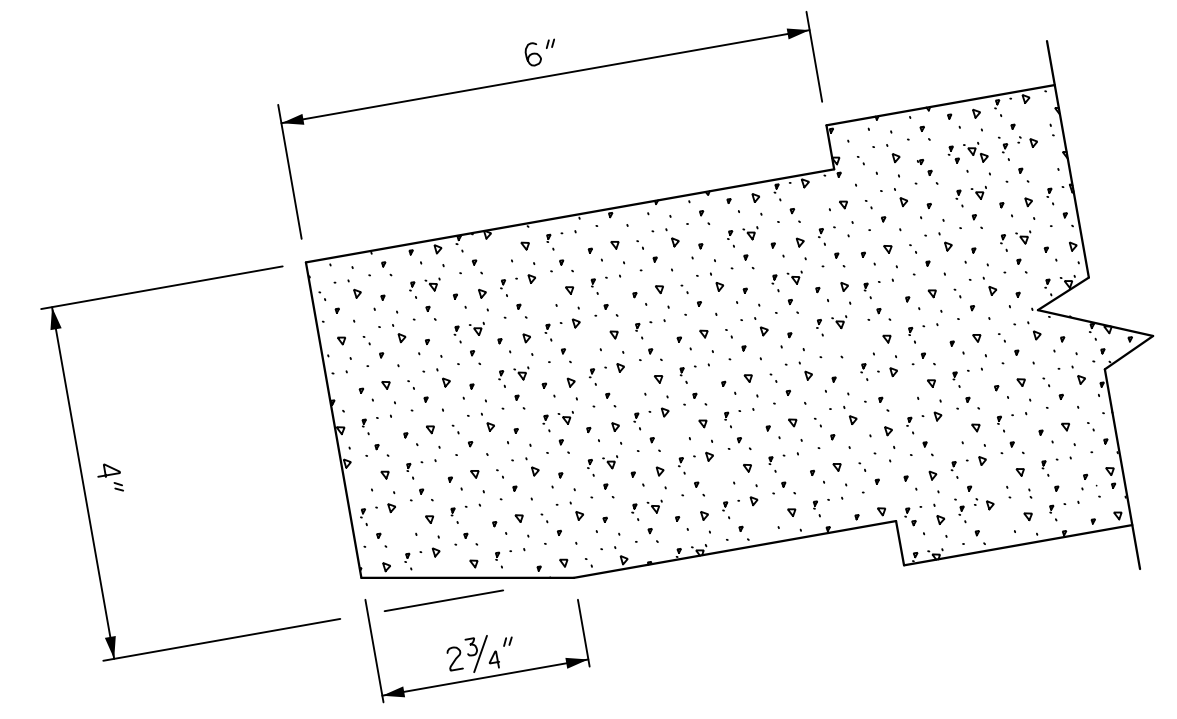


CONNECTION DETAIL



ANGLE DETAIL

PILE EXCAVATION DEPTH "D"					
WALL -NW4.6-		AT: STA. 18+10.00			
3'-0" Ø HOLE	PILE SPACING	WALL HEIGHT			
			H ≤ 15'	15' < H ≤ 20'	20' < H ≤ 25'
		10'-0"	10'	12'	13'
15'-0"	11'	13'	16'		
20'-0"	12'	15'	18'		

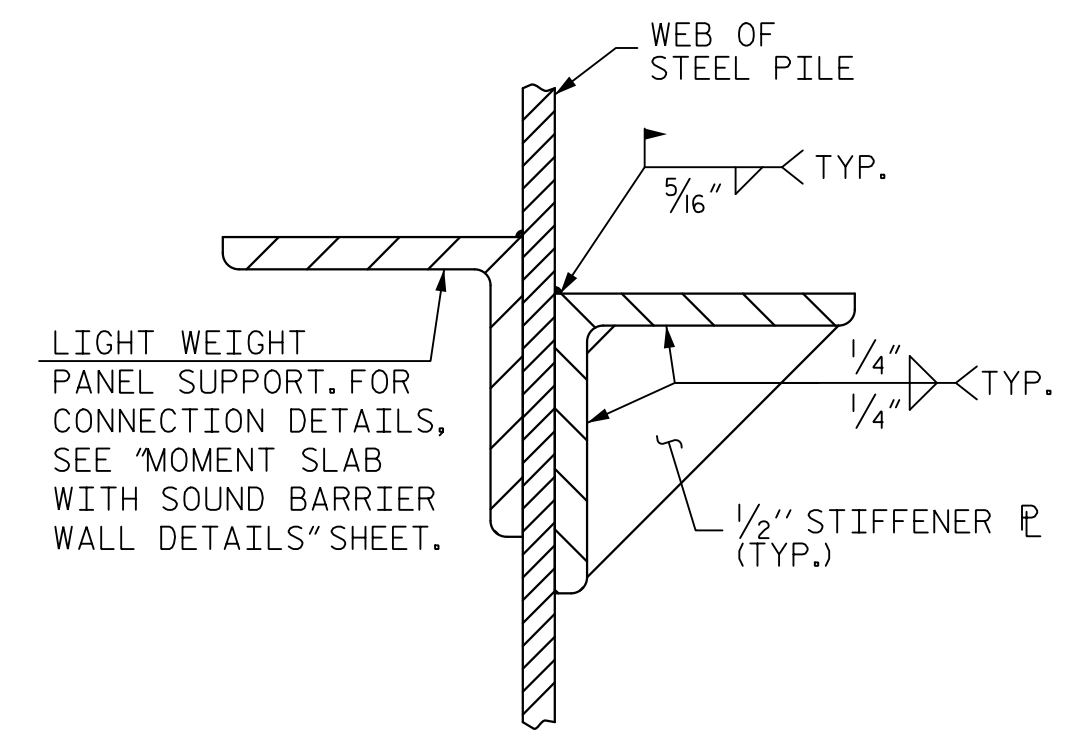


MODIFIED PANEL DETAIL

STEEL PILES DESIGN WIND PRESSURE = 40 PSF			
PILE SPACING	MAXIMUM WALL HEIGHT (H)	MINIMUM W SIZE STEEL PILES	MINIMUM HP SIZE STEEL PILES
10'-0"	H ≤ 15'	W 12 X 40 W 14 X 48	HP 12 X 53 HP 14 X 73
	15' < H ≤ 20'	W 12 X 45 W 14 X 48	HP 12 X 53 HP 14 X 73
	20' < H ≤ 25'	W 12 X 65 W 14 X 61	HP 12 X 53 HP 14 X 73
	25' < H ≤ 29'	W 12 X 87 W 14 X 90	HP 14 X 73
15'-0"	H ≤ 15'	W 12 X 40 W 14 X 48	HP 12 X 53 HP 14 X 73
	15' < H ≤ 20'	W 12 X 53 W 14 X 61	HP 12 X 53 HP 14 X 73
	20' < H ≤ 25'	W 12 X 72 W 14 X 90	HP 12 X 74 HP 14 X 73
20'-0"	25' < H ≤ 29'	W 12 X 120 W 14 X 90	HP 14 X 89
	H ≤ 15'	W 12 X 40 W 14 X 48	HP 12 X 53 HP 14 X 73
	15' < H ≤ 20'	W 12 X 58 W 14 X 61	HP 12 X 63 HP 14 X 73
	20' < H ≤ 25'	W 12 X 96 W 14 X 90	HP 14 X 89
25' < H ≤ 29'		W 12 X 152 W 14 X 109	HP 14 X 117

NOTES

- FOR SOUND BARRIER WALL, SEE SPECIAL PROVISIONS.
- CONSTRUCT SOUND BARRIER WALL TO LINES AND GRADES SHOWN ON THE ROADWAY PLANS.
- PROVIDE PANELS WITH A FLAT BOTTOM.
- USE STEEL PILES, ANGLES, AND LAGGING STOPS MEETING THE REQUIREMENTS OF AASHTO M270, GRADE 50. GALVANIZE ALL STEEL COMPONENTS INCLUDING PILES, ANGLES, LAGGING STOPS, BOLTS, NUTS, AND WASHERS IN ACCORDANCE WITH SECTION 1076 OF THE STANDARD SPECIFICATIONS. REPAIR ANY DAMAGED GALVANIZATION IN ACCORDANCE WITH ARTICLE 1076-7 OF THE STANDARD SPECIFICATIONS.
- VERIFY THE LOCATION OF UNDERGROUND UTILITIES BEFORE DRILLING HOLES TO ENSURE SUFFICIENT CLEARANCE IS AVAILABLE.
- AT THE CONTRACTOR'S OPTION, USE AN APPROVED NON-SHRINK NON-METALLIC GROUT BETWEEN THE FLANGES OF THE STEEL PILES TO SUPPORT THE BOTTOM PANEL IN LIEU OF LAGGING STOPS.
- ADJUST PILE EXCAVATION ELEVATIONS TO MAINTAIN 6" MINIMUM EMBEDMENT OF THE BOTTOM PANEL.
- USE CLASS AA FOR PANELS AND CLASS A CONCRETE PILE EXCAVATION BACKFILL, IN ACCORDANCE WITH ARTICLE 1000-4 OF THE STANDARD SPECIFICATIONS.
- PROVIDE PLATES AND ANGLES TO SECURE PANELS 6" LONG AS MEASURED ALONG THE STEEL PILE.
- AT THE CONTRACTOR'S OPTION, USE EITHER 'W' OR 'HP' PILES THAT SATISFY THE MINIMUM PILE SIZE REQUIRED IN THE "STEEL PILES" TABLE. PILES SMALLER THAN W12 OR HP12 ARE NOT PERMITTED. AT TURNS WITH A 3'-0" DIAMETER HOLE FOR PILE EXCAVATION, USE ONLY W12 OR HP12 PILES, AS SHOWN.
- AT THE CONTRACTOR'S OPTION, USE 10'-0", 15'-0", OR 20'-0" PILE SPACINGS, AND EITHER 2'-6" OR 3'-0" DIAMETER HOLES FOR PILE EXCAVATION. STANDARD PRECAST CONCRETE PANELS MAY BE USED WITH THE 10'-0" AND 15'-0" PILE SPACING. FOR 20'-0" PILE SPACING, PANELS DESIGNED AND MANUFACTURED BY A THIRD PARTY VENDOR SHALL BE USED.
- DO NOT SPLICE STEEL PILES.
- FOR SOUND BARRIER WALL STATIONS, OFFSETS, AND WALL ENVELOPE, SEE ROADWAY PLANS.
- FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.
- FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.
- FOR MOMENT SLAB WITH SOUND BARRIER WALL, SEE SPECIAL PROVISIONS.

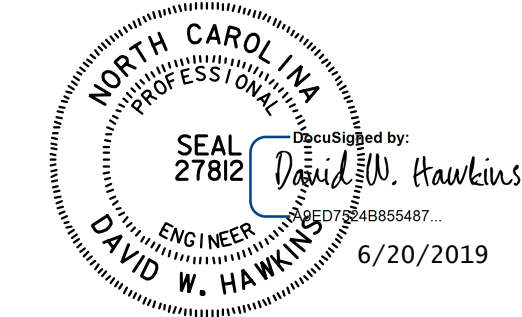


SECTION X-X

PROJECT NO. I-4400C
 HENDERSON COUNTY
 STATION: 662+34.64 -L- = 10+00.00 -NW4.6-

SHEET 2 OF 7

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 STANDARD
 SOUND BARRIER WALL
 (STEEL PILES)
 No. -NW4.6-

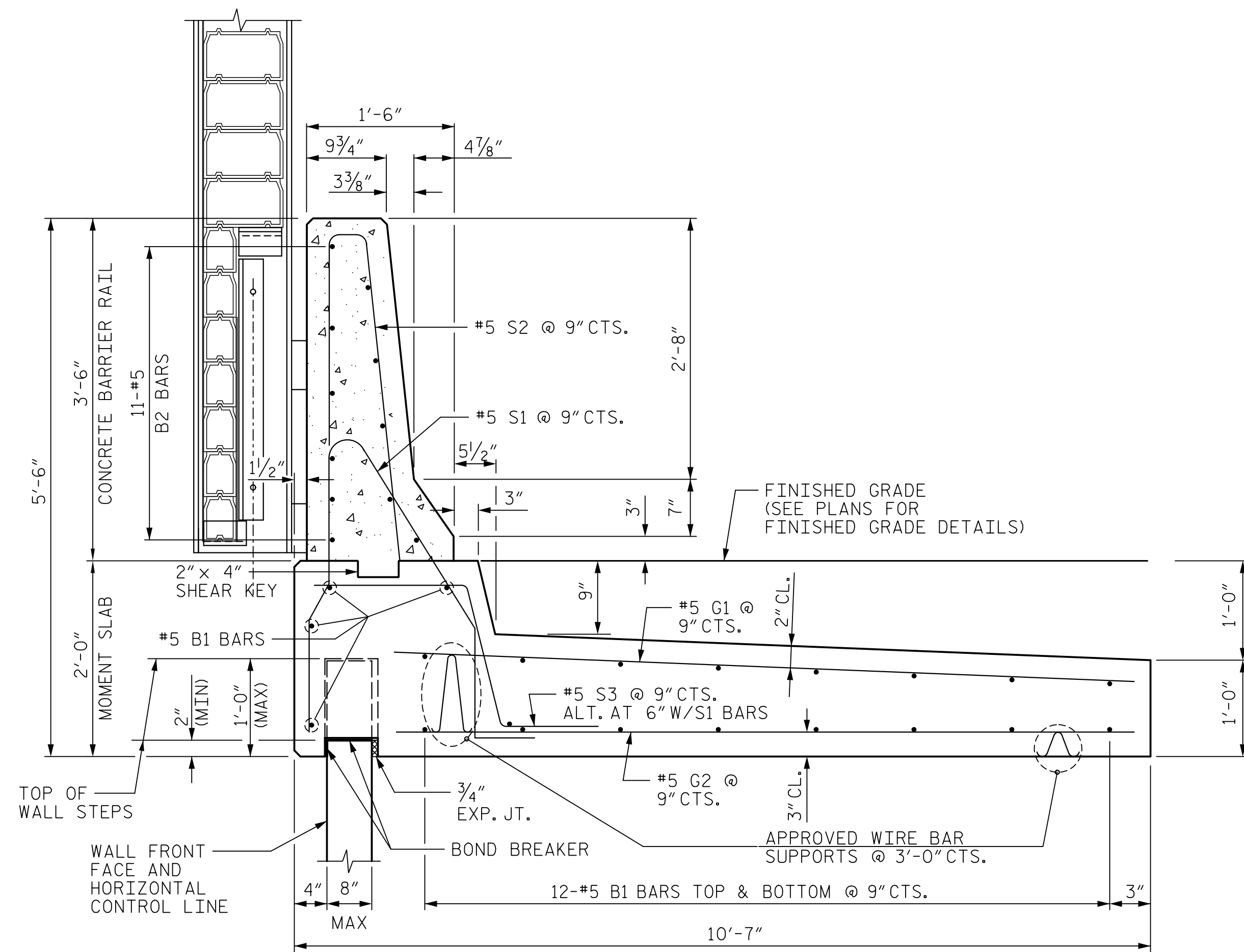


ASSEMBLED BY : M. WRIGHT	DATE : 6/19
CHECKED BY : N. HART	DATE : 6/19
DRAWN BY : JAD 5/01	REV. 9/26/14 MAA/THC
CHECKED BY : RDR 5/01	REV. 10/17 MAA/THC
	REV. 5/18 MAA/THC

HNTB		HNTB NORTH CAROLINA, P.C. NC License No. C-1554 343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609	
DRAWN BY : M. WRIGHT	DATE : 6/19	DWG. NO. 2	
CHECKED BY : N. HART	DATE : 6/19		
DESIGN ENGINEER OF RECORD : D. HAWKINS	DATE : 6/19		

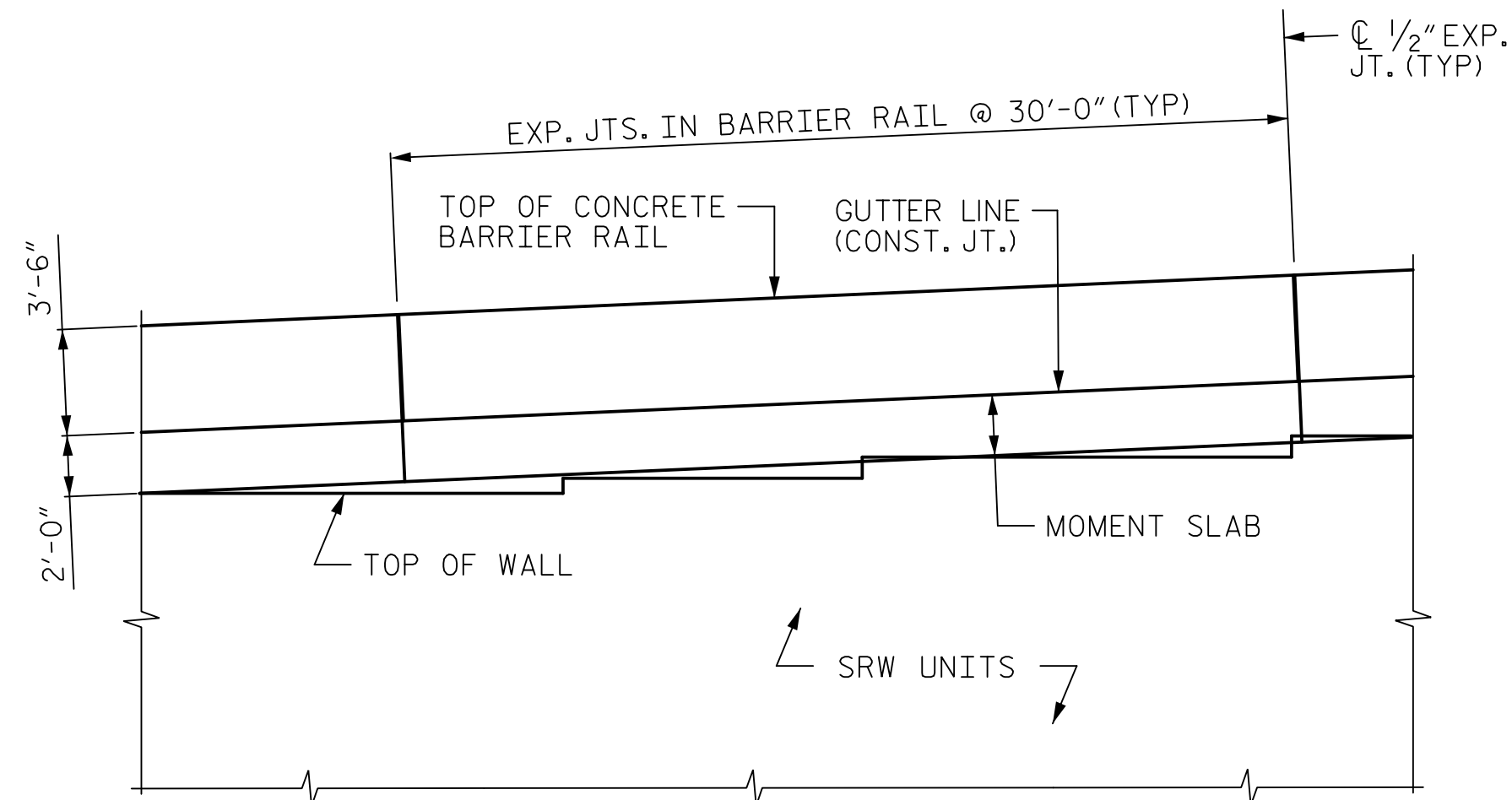
REVISIONS					SHEET NO. SW-2
NO.	BY	DATE	NO.	DATE	
1			3		TOTAL SHEETS 7
2			4		

DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED



CONCRETE BARRIER RAIL WITH MOMENT SLAB

NOTE: SOUND WALL TO BARRIER RAIL BOLTS NOT SHOWN FOR CLARITY.



CONCRETE BARRIER RAIL WITH MOMENT SLAB - PARTIAL ELEVATION

MOMENT SLAB WITH SOUND BARRIER WALL FROM STA. 10+00.00 TO STA. 18+10.00
LENGTH = 810' LIN. FT.

NOTES:

THE MOMENT SLAB WITH SOUND BARRIER WALL SHALL BE PAID AS A LUMP SUM PAY ITEM, SEE SPECIAL PROVISIONS.

CONCRETE BARRIER RAIL WITH MOMENT SLAB SHALL BE A MINIMUM OF 15' IN LENGTH.

EXPANSION JOINTS SHALL BE PLACED IN THE BARRIER RAIL AND MOMENT SLAB AT A MAXIMUM SPACING OF 30'.

GROOVED CONTRACTION JOINTS, 1/2" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED SURFACES OF THE BARRIER RAIL AND IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. A CONTRACTION JOINT SHALL BE LOCATED AT EACH THIRD POINT BETWEEN BARRIER RAIL EXPANSION JOINTS. ONLY ONE CONTRACTION JOINT IS REQUIRED AT MID-POINT OF BARRIER RAIL SEGMENTS LESS THAN 20' IN LENGTH.

THE BARRIER RAIL SHALL NOT BE CAST UNTIL THE MOMENT SLAB HAS ATTAINED AN AGE OF THREE CURING DAYS OR A MINIMUM COMPRESSIVE STRENGTH OF 2,000 PSI. IN ADDITION, NO FILL MATERIAL, ASPHALT, OR CONSTRUCTION EQUIPMENT IS ALLOWED ON THE MOMENT SLAB PRIOR TO SATISFYING THE MINIMUM CONCRETE CURING AND STRENGTH REQUIREMENTS.

ALL REINFORCING STEEL IN THE BARRIER RAIL SHALL BE EPOXY COATED.

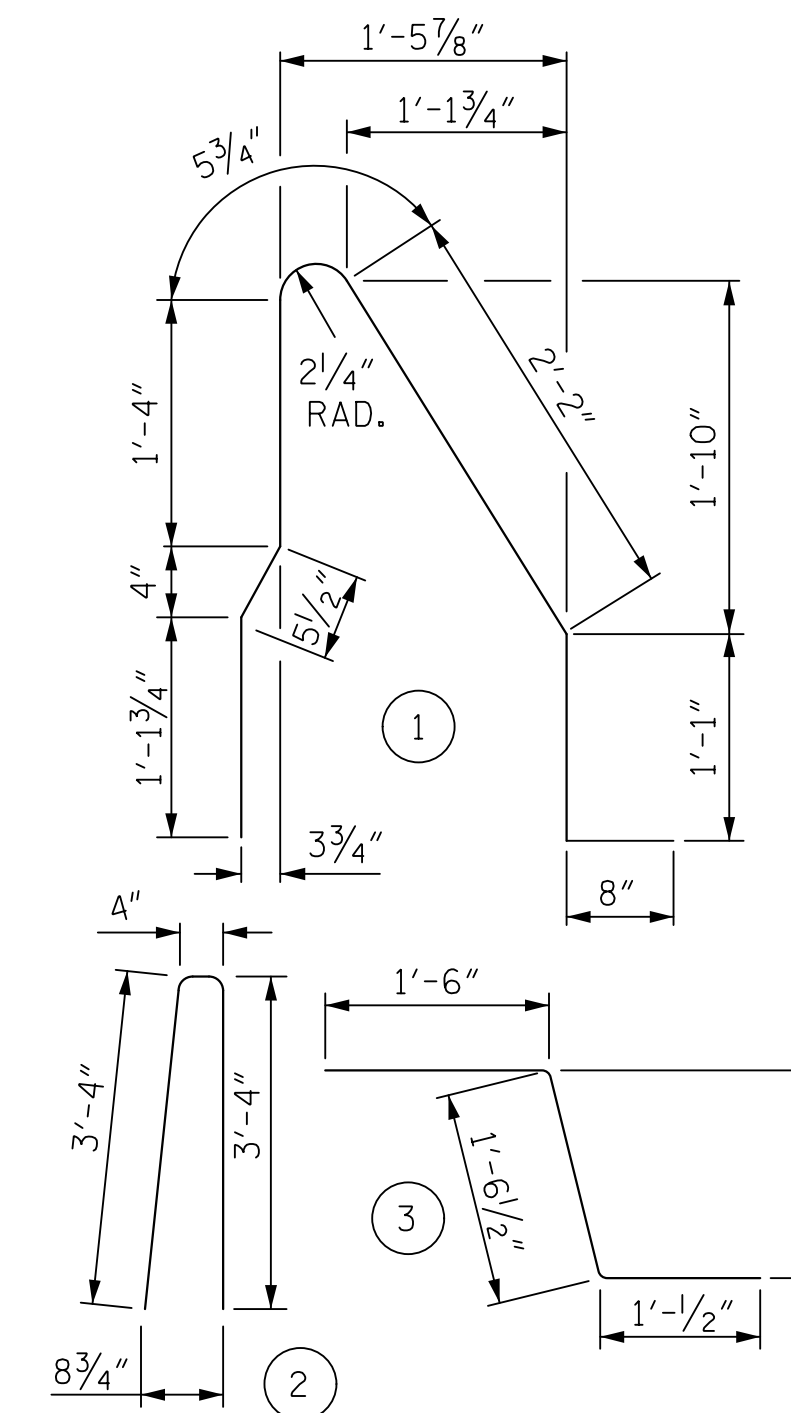
IF STEPS ARE REQUIRED AT TOP OF WALL, DETAILS SHOWING INTERFACE BETWEEN BOTTOM OF MOMENT SLAB AND STEPS SHALL BE SUBMITTED FOR APPROVAL.

IF EXISTING OR FUTURE OBSTRUCTIONS SUCH AS FOUNDATIONS, BARRIERS, PIPES, INLETS OR UTILITIES WILL INTERFERE WITH CONCRETE BARRIER RAIL WITH MOMENT SLAB, CONCRETE BARRIER RAIL WITH MOMENT SLAB DETAILS SHALL BE REVISED AND SUBMITTED FOR APPROVAL.

FOR MOMENT SLAB SECTIONS LESS THAN 30' IN LENGTH, CONTRACTOR MUST SUBMIT BILL OF MATERIAL FOR APPROVAL.

MOMENT SLAB WITH SOUND BARRIER WALL BEGINS AT STA. 662+34.64 -L- AND ENDS AT STA. 16+00.00 -Y10RPC-.

BAR TYPES

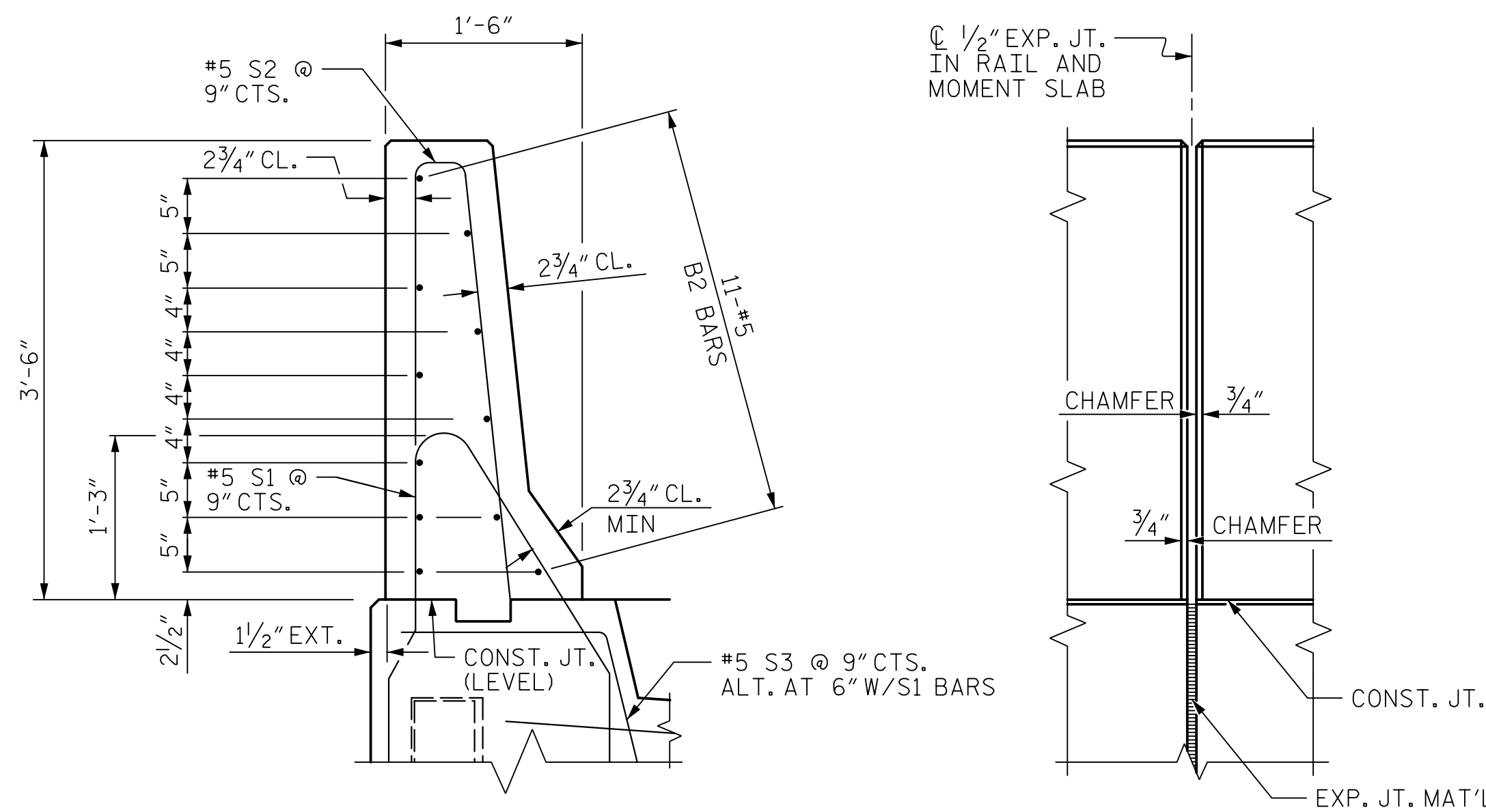


ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

FOR ONE 30'-0" SECTION OF CONCRETE BARRIER RAIL WITH MOMENT SLAB

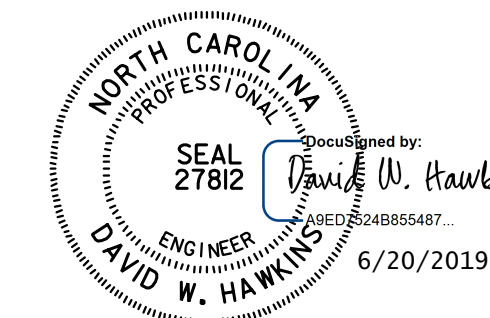
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	28	5	STR	29'-7"	864
* B2	11	5	STR	29'-7"	339
G1	41	5	STR	9'-2"	392
G2	41	5	STR	9'-2"	392
* S1	41	5	1	7'-4"	314
* S2	41	5	2	7'-0"	299
S3	40	5	3	4'-1"	170
REINFORCING STEEL					1,818 LB
* EPOXY COATED REINFORCING STEEL					952 LB
CLASS AA CONCRETE BARRIER RAIL					4.1 CY
CLASS A CONCRETE MOMENT SLAB					15.0 CY
CONCRETE BARRIER RAIL WITH MOMENT SLAB					30 LIN FT



SECTION THRU RAIL

ELEV. @ EXP. JOINTS

BARRIER RAIL DETAILS



PROJECT NO. I-4400C
HENDERSON COUNTY
STATION: 662+34.64 -L- =
10+00.00 -NW4.6-

SHEET 3 OF 7

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

MOMENT SLAB WITH SOUND BARRIER WALL
No. -NW4.6-

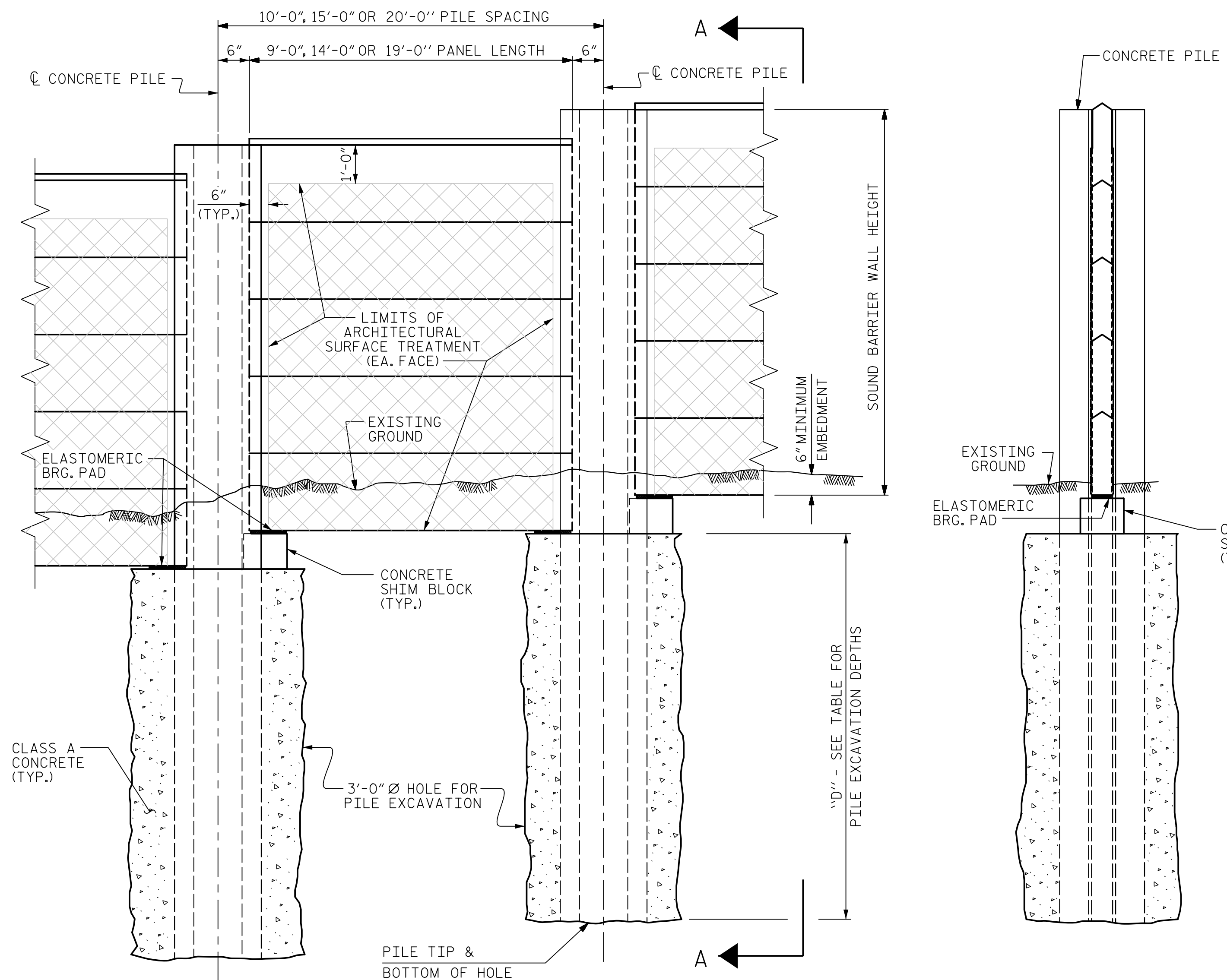
HNTB HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY: M. WRIGHT DATE: 4/19
CHECKED BY: N. HART DATE: 4/19
DESIGN ENGINEER OF RECORD: D. HAWKINS DATE: 6/19
DWG. NO. 3

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UNLESS ALL SIGNATURES COMPLETED

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

TOTAL SHEETS: 7



ELEVATION

SECTION A-A

PILE EXCAVATION DEPTHS "D"				
WALL -NW5.3-		FROM : STA. 10+00.00 TO : STA. 25+60.00		
3'-0" Ø HOLE	PILE SPACING	WALL HEIGHT		
		H ≤ 15'	15' < H ≤ 20'	20' < H ≤ 25'
	10'-0"	10'	12'	13'
	15'-0"	11'	13'	16'
20'-0"	12'	15'	18'	

BILL OF MATERIAL	
SOUND BARRIER WALL	21,574 S.F.
ARCHITECTURAL SURFACE TREATMENT	37,362 S.F.
QUANTITIES PROVIDED ARE APPROXIMATE AND ARE FOR BID PURPOSES ONLY.	
ARCHITECTURAL SURFACE TREATMENT	
TEXTURE OPTION:	DRY STACK STONE
STAIN OPTION:	GRAY (FS36173)

NOTES

FOR SOUND BARRIER WALL, SEE SPECIAL PROVISIONS.

CONSTRUCT SOUND BARRIER WALL TO LINES AND GRADES SHOWN ON THE ROADWAY PLANS.

PROVIDE PANELS WITH A FLAT BOTTOM.

VERIFY THE LOCATION OF UNDERGROUND UTILITIES BEFORE DRILLING HOLES TO ENSURE SUFFICIENT CLEARANCE IS AVAILABLE.

ADJUST PILE EXCAVATION ELEVATIONS TO MAINTAIN 6" MINIMUM EMBEDMENT OF THE BOTTOM PANEL.

USE CLASS AA FOR PANELS AND CLASS A CONCRETE PILE EXCAVATION BACKFILL, IN ACCORDANCE WITH ARTICLE 1000-4 OF THE STANDARD SPECIFICATIONS.

AT THE CONTRACTOR'S OPTION, USE 10'-0", 15'-0", OR 20'-0" PILE SPACINGS. STANDARD PRECAST CONCRETE PANELS MAY BE USED WITH THE 10'-0" AND 15'-0" PILE SPACING. FOR 20'-0" PILE SPACING, PANELS DESIGNED AND MANUFACTURED BY A THIRD PARTY VENDOR SHALL BE USED.

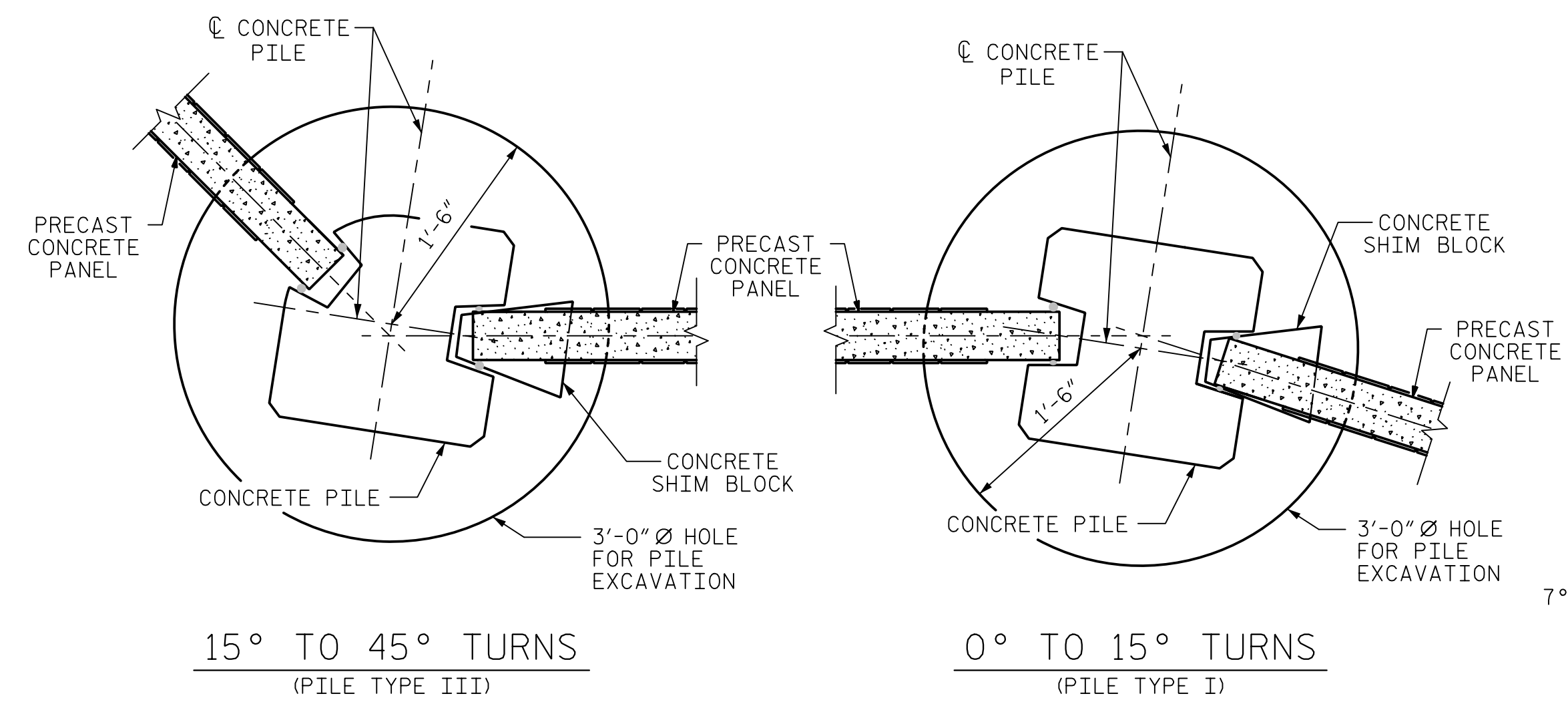
FOR SOUND BARRIER WALL STATIONS, OFFSETS, AND WALL ENVELOPE, SEE ROADWAY PLANS.

PLACE 1" Ø BACKER RODS FULL HEIGHT ON EACH SIDE OF THE PRECAST PANELS. SET AND SEAL THE BACKER ROD IN PLACE WITH SEALANT THAT CONFORMS WITH ARTICLE 1028-3 OF THE STANDARD SPECIFICATIONS.

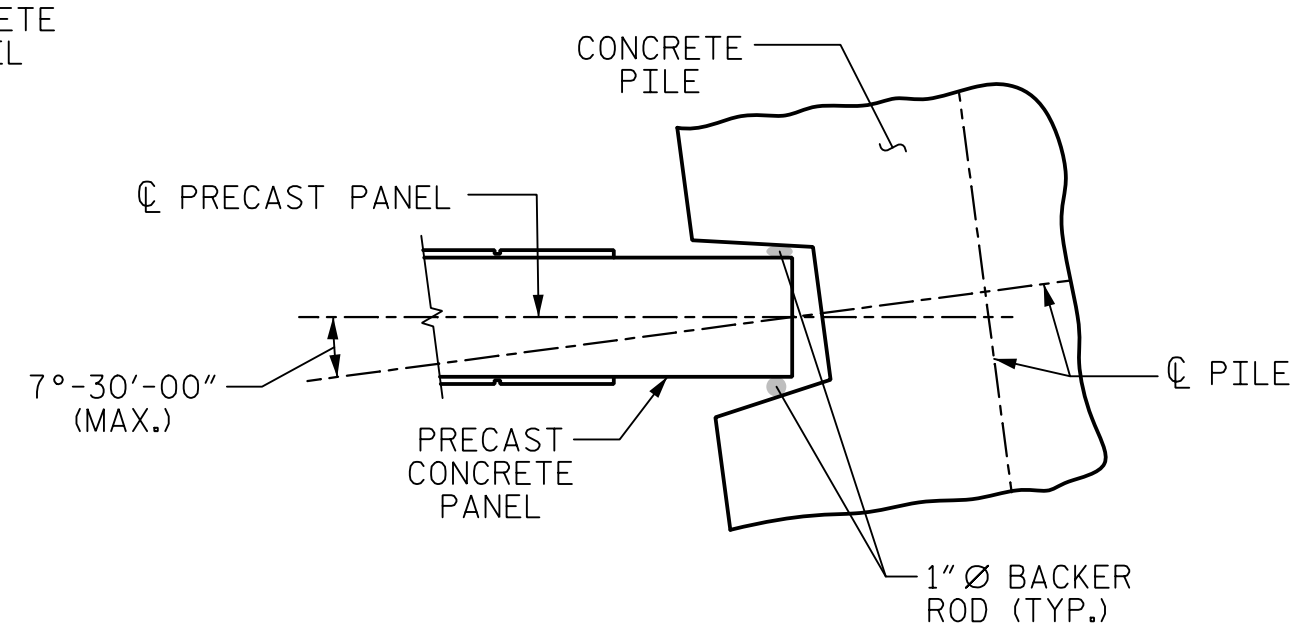
FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

PILE REINFORCING STEEL DESIGN WIND PRESSURE = 40 PSF							
PILE TYPE I				PILE TYPE III			
PILE SPACING	MAXIMUM WALL HEIGHT (H)	VERTICAL REINFORCING STEEL	TIES	PILE SPACING	MAXIMUM WALL HEIGHT (H)	VERTICAL REINFORCING STEEL	TIES
10'-0"	H ≤ 25'	4 - #8 EA. FACE	#3 @ 1'-4" CTS.	10'-0"	H ≤ 25'	3 - #9 SHORT FACE 4 - #9 LONG FACE	#3 @ 1'-4" CTS.
	20' < H ≤ 25'	4 - #10 EA. FACE	#3 @ 1'-4" CTS.		15'-0"	H ≤ 20'	3 - #9 SHORT FACE 4 - #9 LONG FACE
15'-0"	H ≤ 20'	4 - #8 EA. FACE	#3 @ 1'-4" CTS.	15'-0"		20' < H ≤ 25'	3 - #11 SHORT FACE 4 - #11 LONG FACE
	20' < H ≤ 25'	4 - #9 EA. FACE	#3 @ 1'-4" CTS.		20'-0"	H ≤ 20'	3 - #10 SHORT FACE 4 - #10 LONG FACE
20'-0"	H ≤ 20'	4 - #9 EA. FACE	#3 @ 1'-4" CTS.	20'-0"		H ≤ 20'	3 - #10 SHORT FACE 4 - #10 LONG FACE
	20' < H ≤ 25'	4 - #11 EA. FACE	#3 @ 1'-4" CTS.				
PILE TYPE II				PILE TYPE III ALT.			
PILE SPACING	MAXIMUM WALL HEIGHT (H)	VERTICAL REINFORCING STEEL	TIES	PILE SPACING	MAXIMUM WALL HEIGHT (H)	VERTICAL REINFORCING STEEL	TIES
10'-0"	H ≤ 25'	4 - #6 EA. FACE	#3 @ 1'-4" CTS.	10'-0"	H ≤ 25'	3 - #9 SHORT FACE 4 - #9 LONG FACE	#3 @ 1'-4" CTS.
	20' < H ≤ 25'	4 - #7 EA. FACE	#3 @ 1'-4" CTS.		15'-0"	H ≤ 20'	3 - #9 SHORT FACE 4 - #9 LONG FACE
15'-0"	H ≤ 20'	4 - #6 EA. FACE	#3 @ 1'-4" CTS.	15'-0"		20' < H ≤ 25'	3 - #11 SHORT FACE 4 - #11 LONG FACE
	20' < H ≤ 25'	4 - #8 EA. FACE	#3 @ 1'-4" CTS.		20'-0"	H ≤ 20'	3 - #10 SHORT FACE 4 - #10 LONG FACE
20'-0"	H ≤ 20'	4 - #6 EA. FACE	#3 @ 1'-4" CTS.	20'-0"		H ≤ 20'	3 - #10 SHORT FACE 4 - #10 LONG FACE
	20' < H ≤ 25'	4 - #8 EA. FACE	#3 @ 1'-4" CTS.				



TYPICAL WALL TURN DETAILS



PILE ROTATION LIMIT FOR WALL TURN

(ROTATE THE CONCRETE PILE ±7°-30'-00" TO ACCOMMODATE WALL TURN.)

ASSEMBLED BY : M. WRIGHT	DATE : 6/19
CHECKED BY : N. HART	DATE : 6/19
DRAWN BY : MAA 6/11	REV. 9/26/14 MAA/TMG
CHECKED BY : GM 6/11	REV. 10/17 MAA/THC
	REV. 5/18 MAA/THC

HNTB		HNTB NORTH CAROLINA, P.C. NC License No. C-1554 343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609	
DRAWN BY : M. WRIGHT	DATE : 6/19	DWG. NO. : 4	
CHECKED BY : N. HART	DATE : 6/19		
DESIGN ENGINEER OF RECORD : D. HAWKINS	DATE : 6/19		

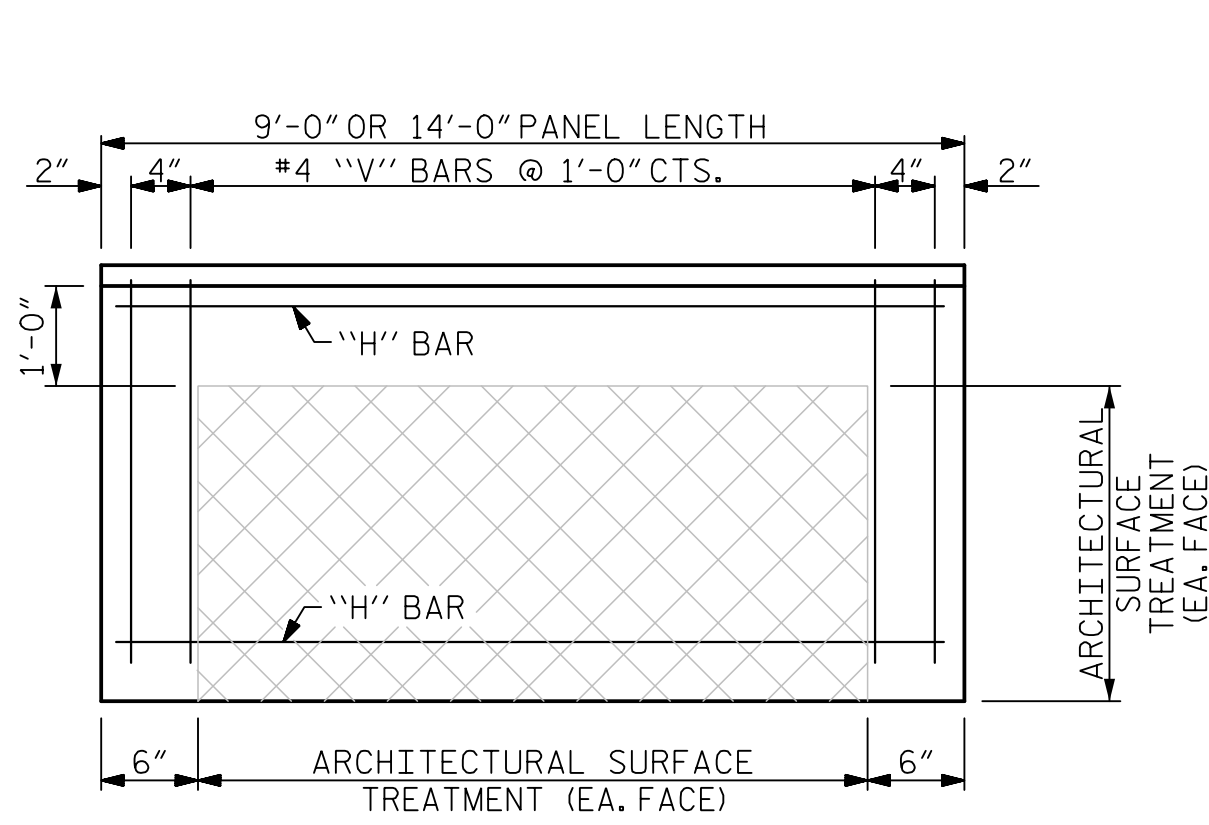
PROJECT NO. I-4400C
HENDERSON COUNTY
 STATION: 708+19.96 -L- =
10+00.00 -NW5.3-

SHEET 4 OF 7

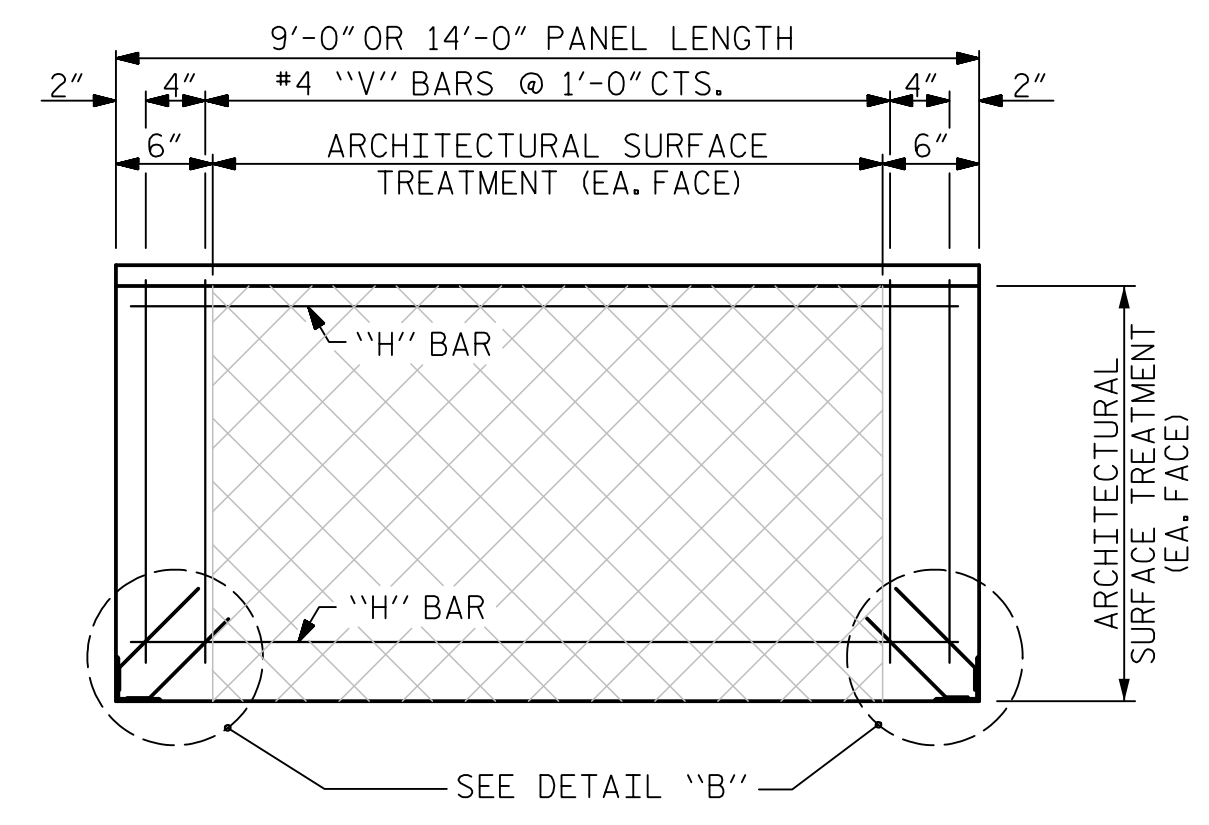
STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 STANDARD
 SOUND BARRIER WALL
 No. -NW5.3-

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

TOTAL SHEETS: 7



FRONT ELEVATION OF UPPER PRECAST PANEL



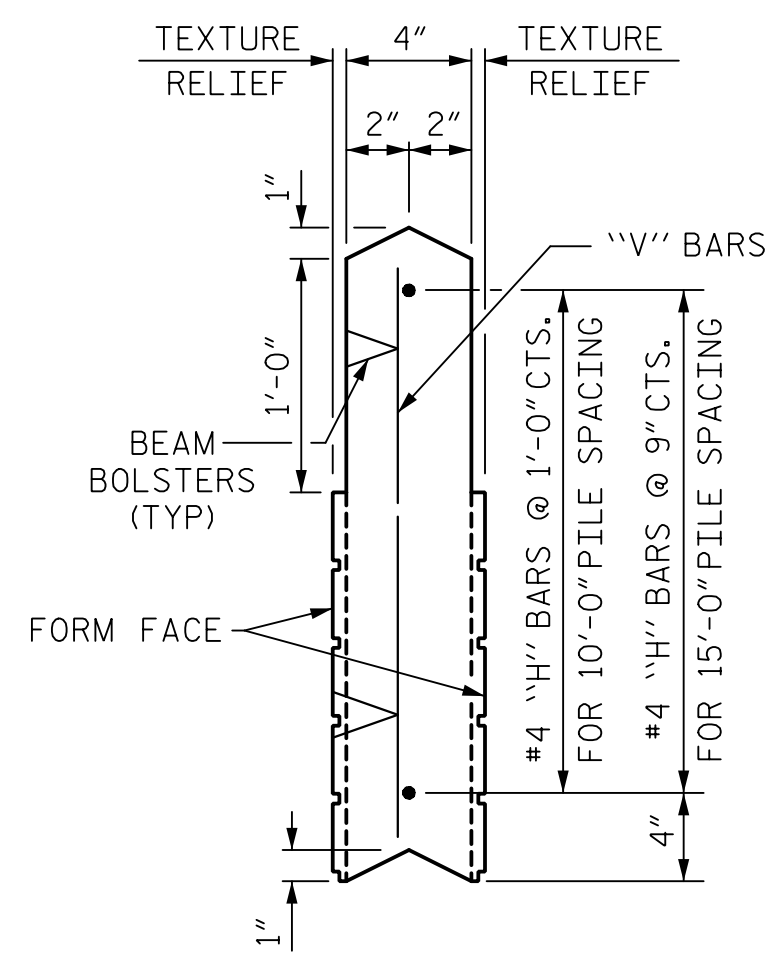
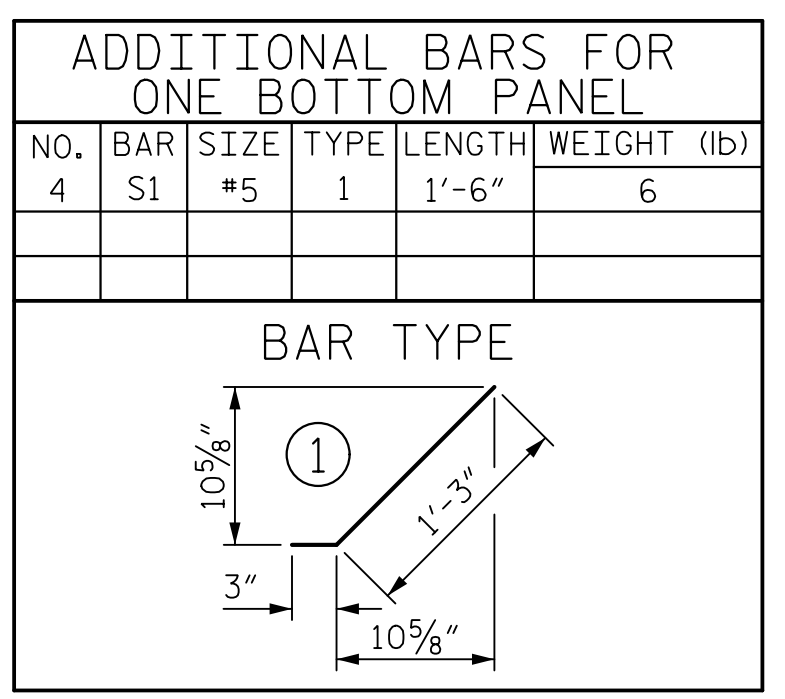
FRONT ELEVATION OF BOTTOM PRECAST PANEL

QUANTITIES FOR ONE PRECAST PANEL (FOR 10'-0" PILE SPACING)

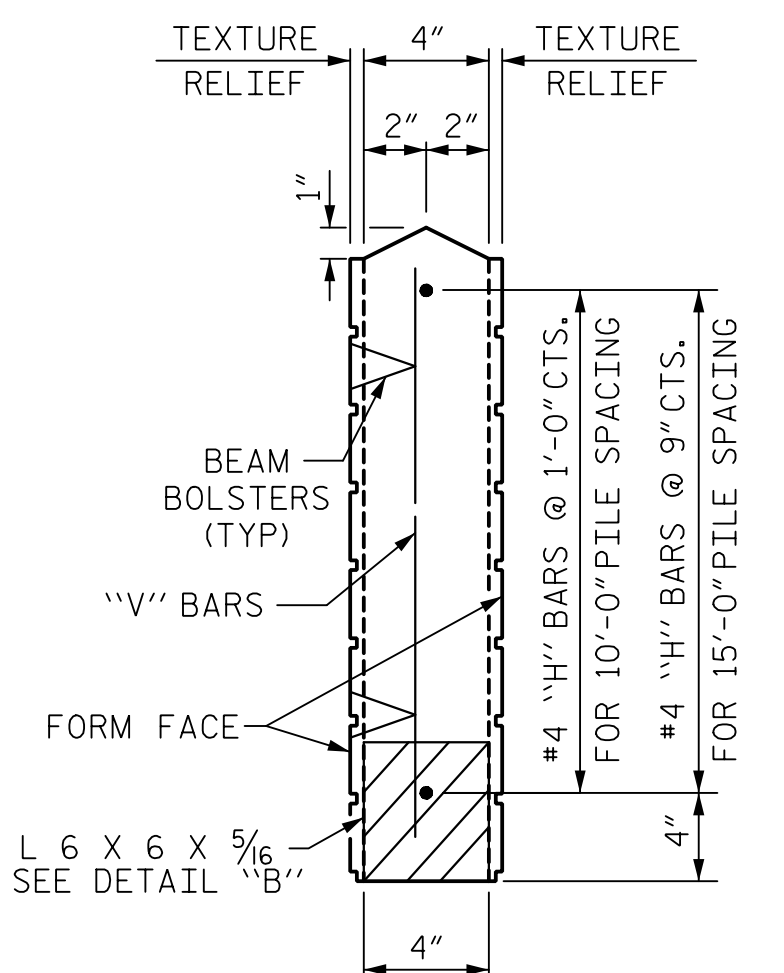
PANEL HEIGHT	CLASS AA CONCRETE C.Y.	BAR TYPES											
		HORIZONTAL					VERTICAL						
		NO.	BAR SIZE	TYPE	LENGTH	WEIGHT (lb)	NO.	BAR SIZE	TYPE	LENGTH	WEIGHT (lb)		
2'-0"	0.22	3	H1	#4	STR	8'-8"	17	11	V1	#4	STR	1'-8"	12
3'-0"	0.33	4	H2	#4	STR	8'-8"	23	11	V2	#4	STR	2'-8"	20
4'-0"	0.44	5	H3	#4	STR	8'-8"	29	11	V3	#4	STR	3'-8"	27

QUANTITIES FOR ONE PRECAST PANEL (FOR 15'-0" PILE SPACING)

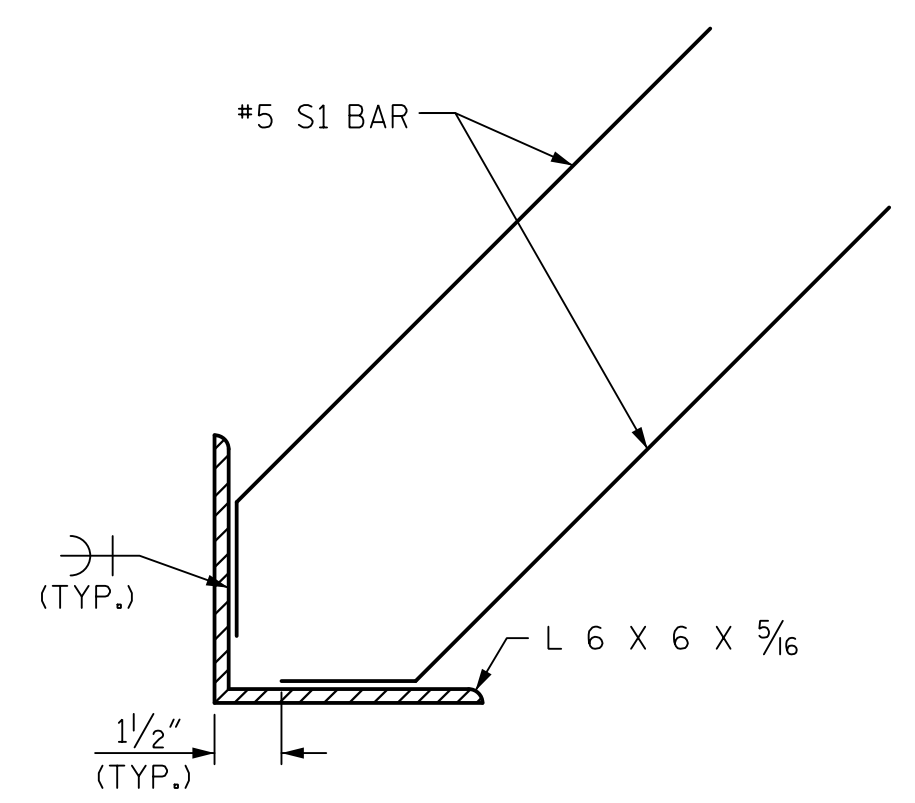
PANEL HEIGHT	CLASS AA CONCRETE C.Y.	BAR TYPES											
		HORIZONTAL					VERTICAL						
		NO.	BAR SIZE	TYPE	LENGTH	WEIGHT (lb)	NO.	BAR SIZE	TYPE	LENGTH	WEIGHT (lb)		
3'-0"	0.52	5	H1	#4	STR	13'-8"	46	16	V1	#4	STR	2'-8"	29
4'-0"	0.69	6	H2	#4	STR	13'-8"	55	16	V2	#4	STR	3'-8"	39
5'-0"	0.86	7	H3	#4	STR	13'-8"	64	16	V3	#4	STR	4'-8"	50
6'-0"	1.04	8	H4	#4	STR	13'-8"	73	16	V4	#4	STR	5'-8"	61



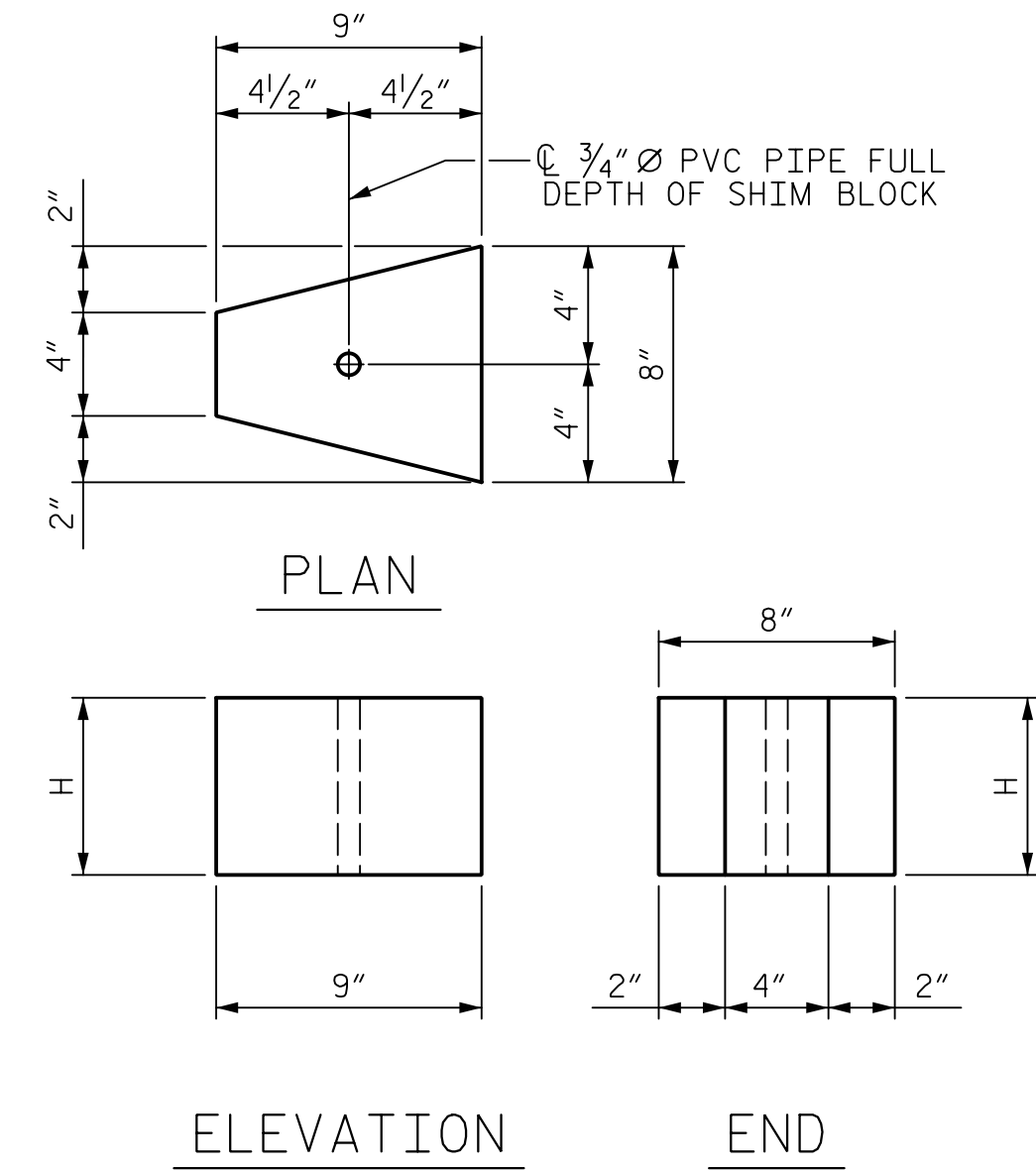
UPPER PANEL



BOTTOM PANEL

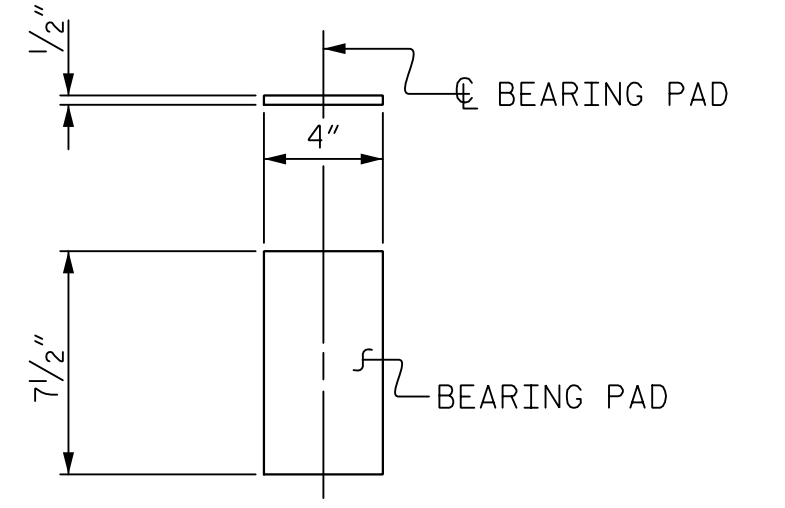


DETAIL "B"



CONCRETE SHIM BLOCK

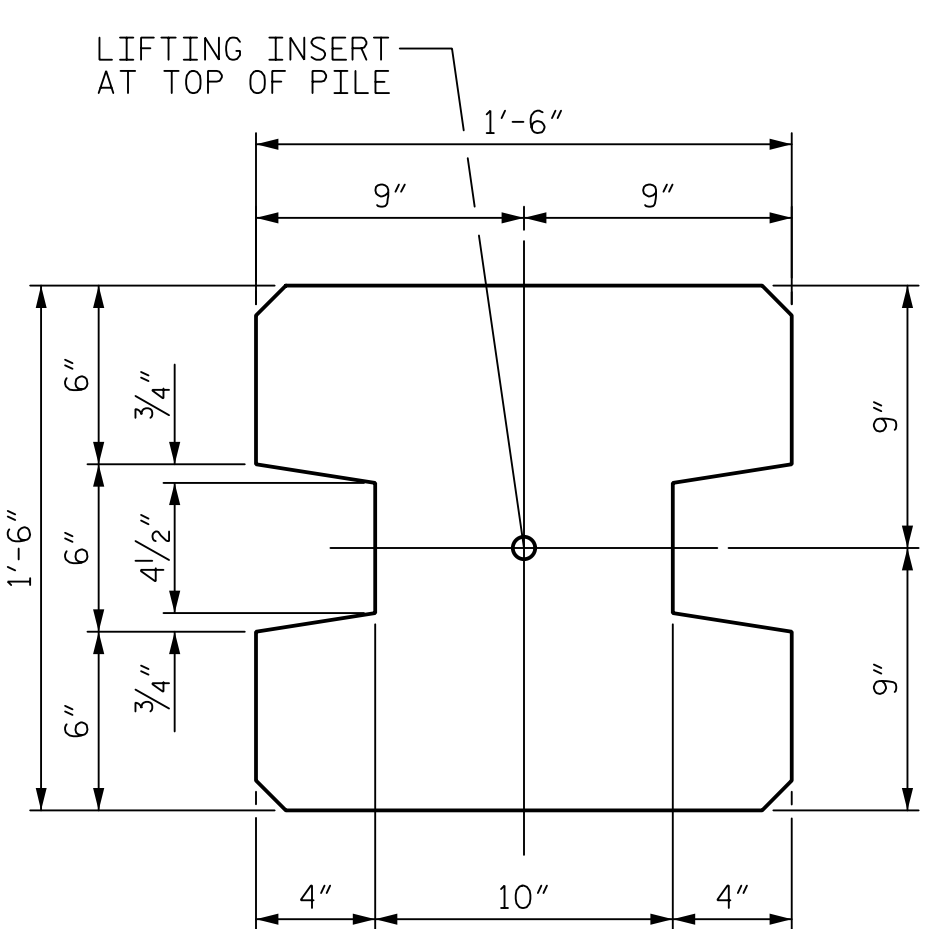
H = 3", 6" or 1'-0"



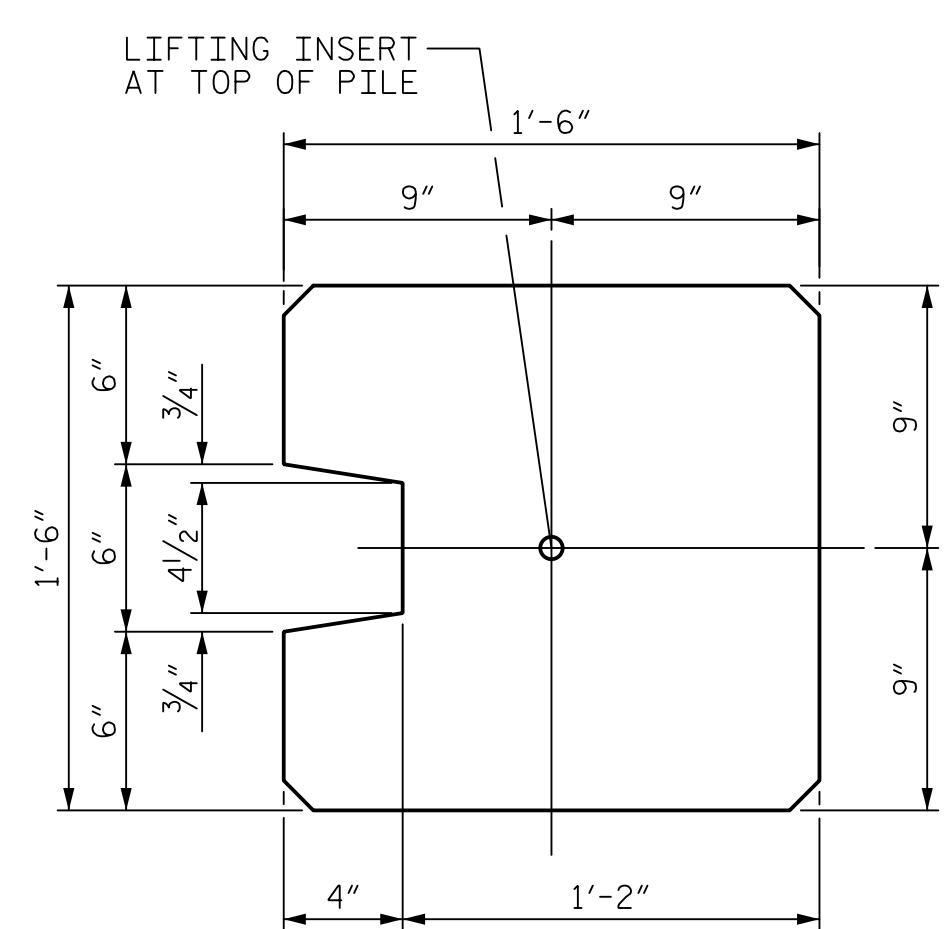
ELASTOMERIC BEARING DETAILS

ELASTOMER IN BEARINGS SHALL BE 50 DUROMETER HARDNESS.

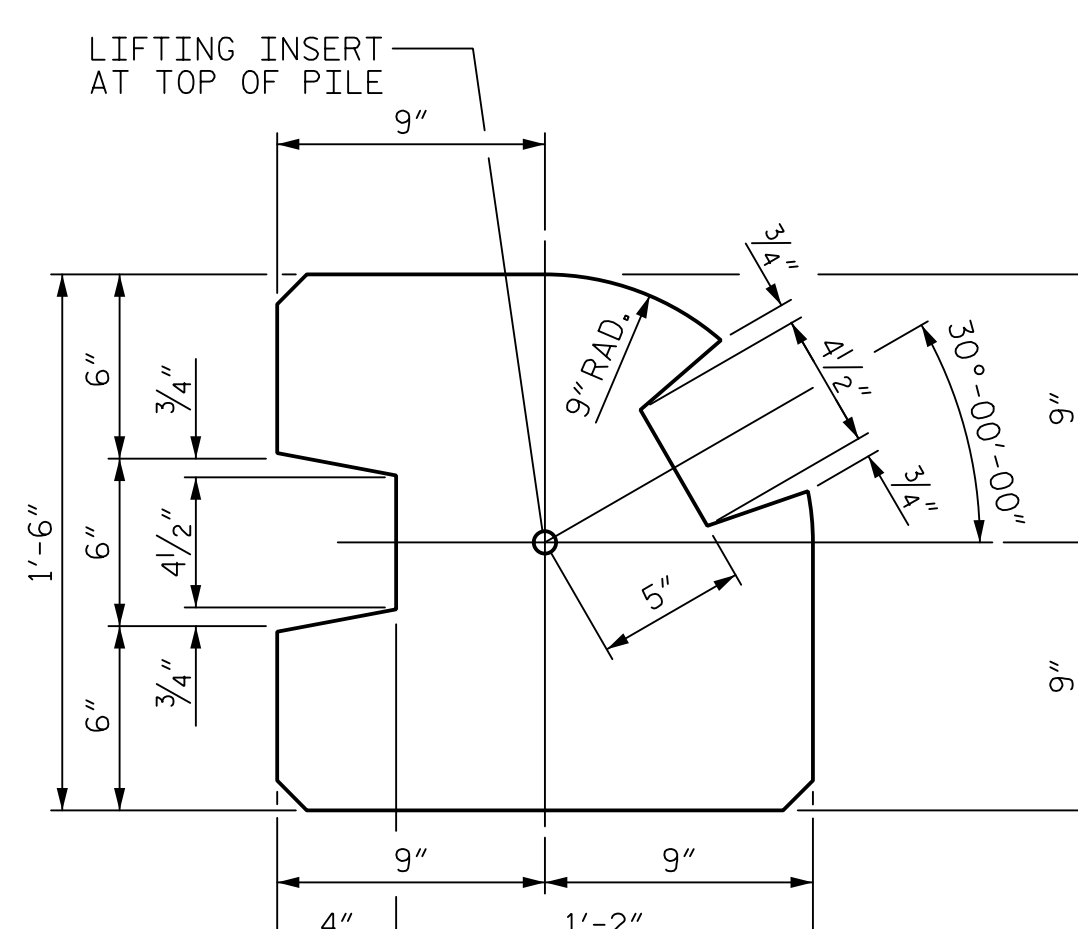
SECTION THROUGH PRECAST PANELS



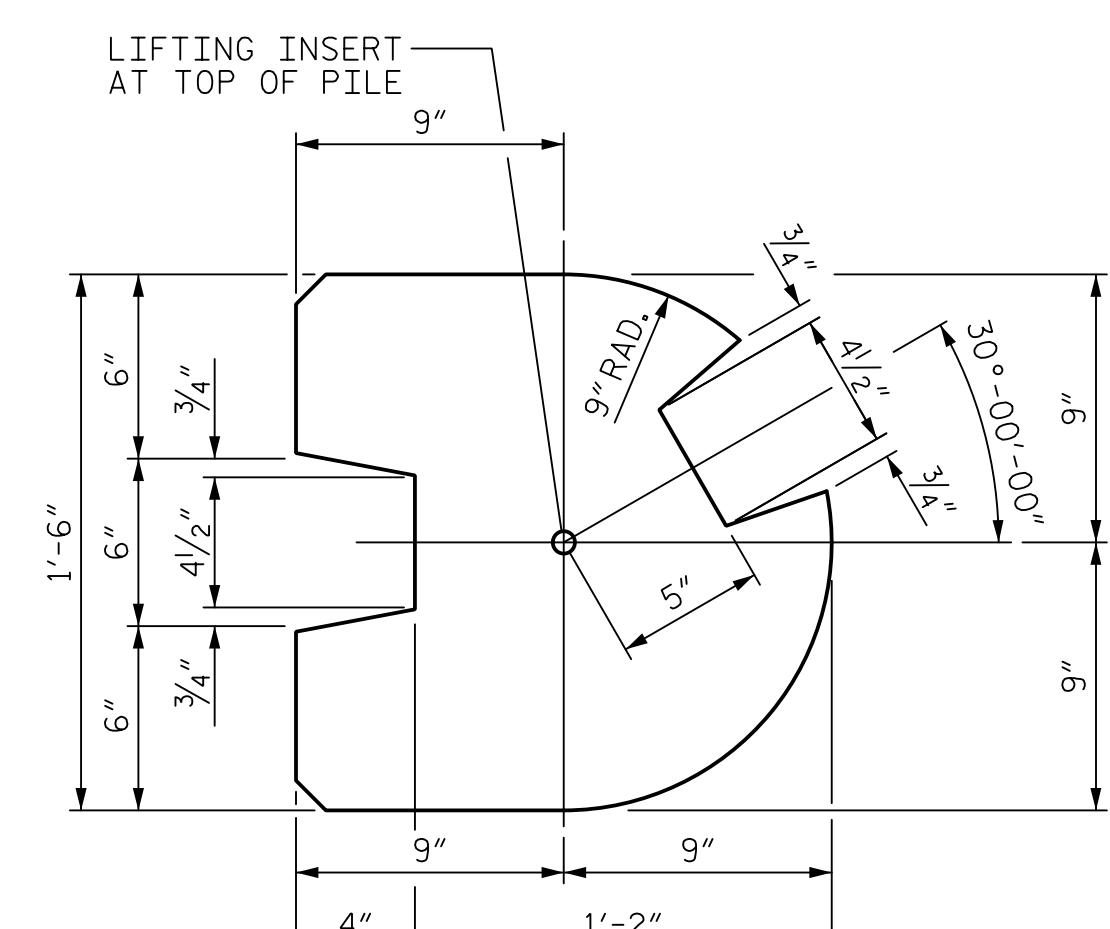
TYPE - I (AREA = 1.9444 SQ. FT.)



TYPE - II (AREA = 2.0903 SQ. FT.)



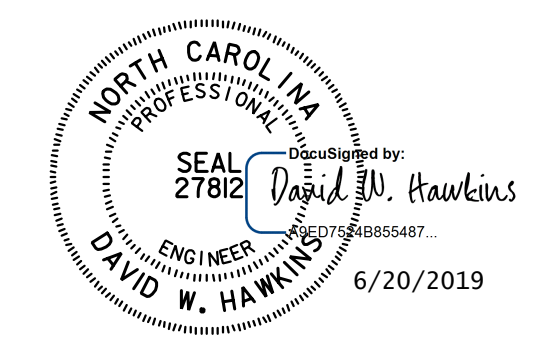
TYPE - III (AREA = 1.8336 SQ. FT.)



TYPE - III (ALT.) (AREA = 1.7163 SQ. FT.)

PILE DETAIL

(ALL CORNERS TO BE CHAMFERED 1")



PROJECT NO. I-4400C
 HENDERSON COUNTY
 STATION: VARIES

SHEET 5 OF 7

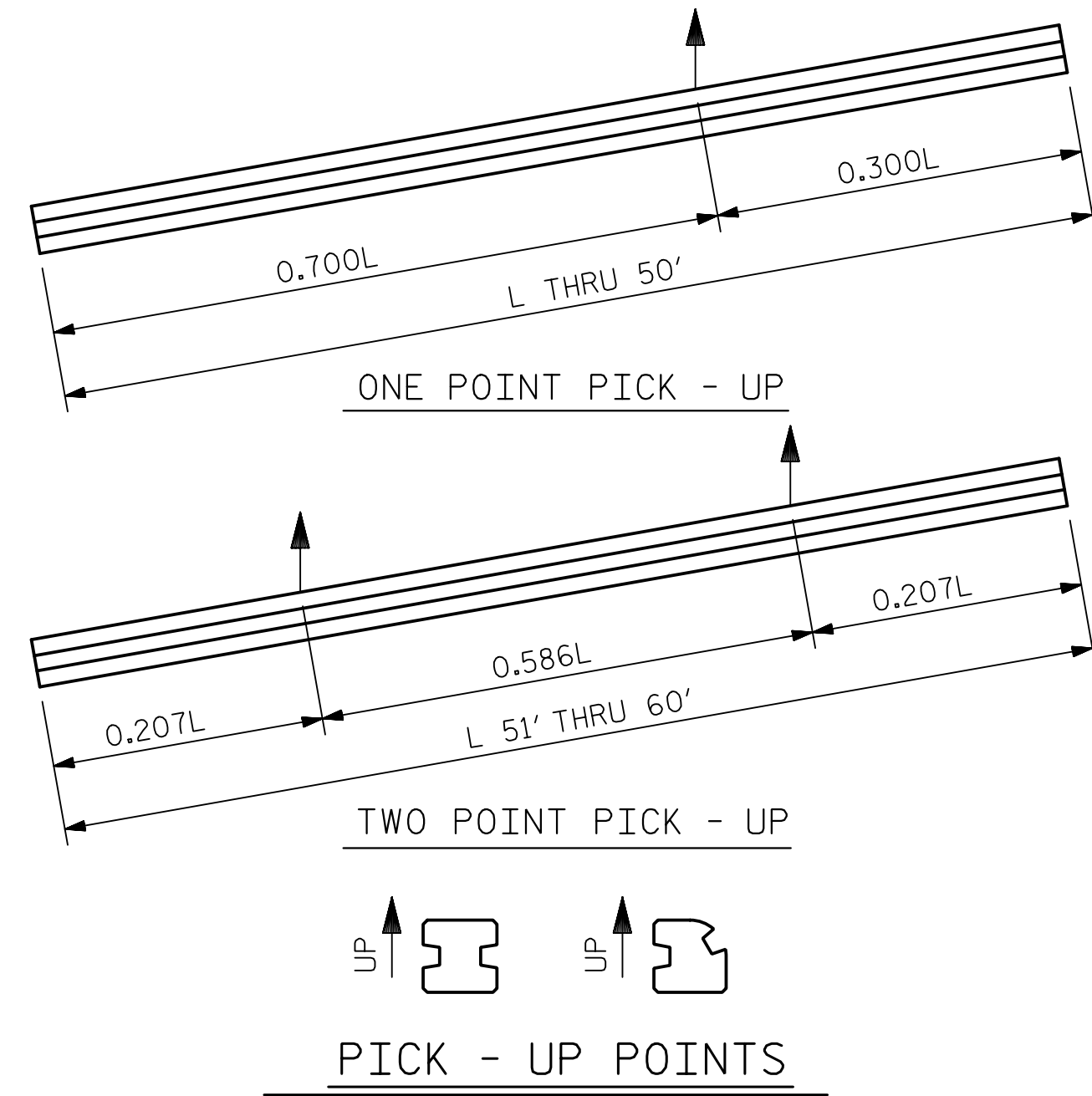
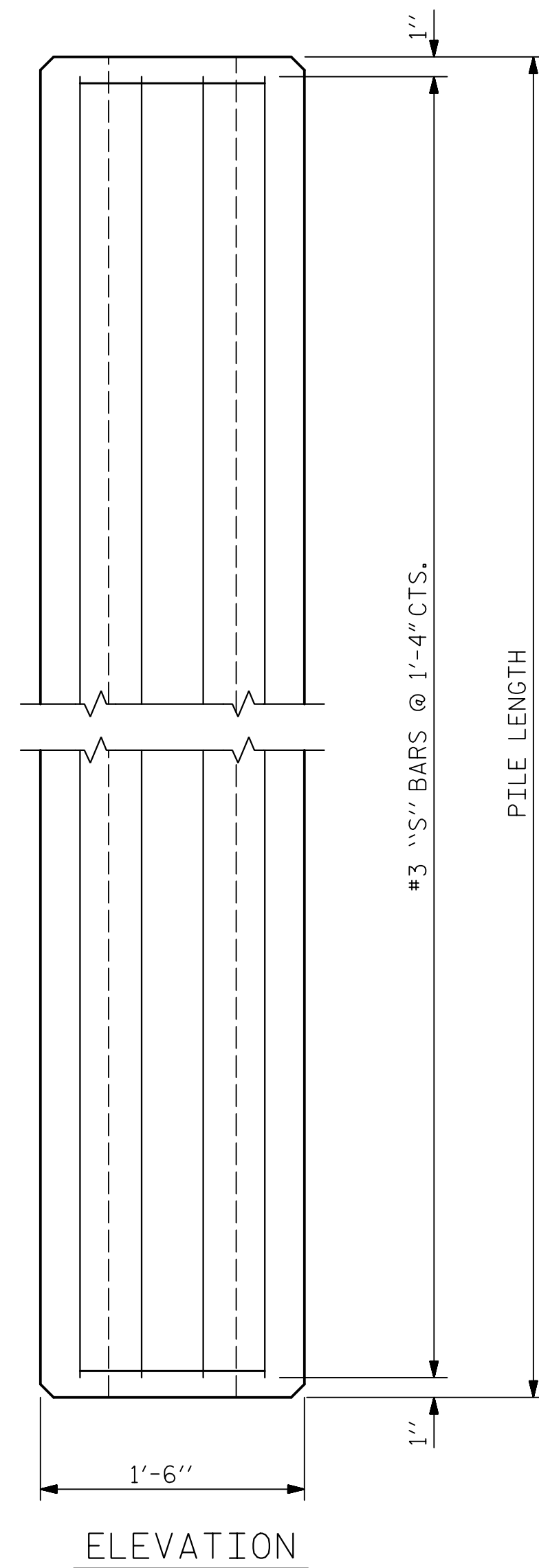
STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 STANDARD
 SOUND BARRIER WALL
 DETAILS

ASSEMBLED BY : M. WRIGHT	DATE : 6/19
CHECKED BY : N. HART	DATE : 6/19
DRAWN BY : MAA 6/11	REV. 1/15/14 RWW/TMG
CHECKED BY : GM 6/11	REV. 10/17 MAA/THC
	REV. 5/18 MAA/THC

DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED

HNTB		HNTB NORTH CAROLINA, P.C. NC License No. C-1554 343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609	
DRAWN BY : M. WRIGHT	DATE : 6/19	DWG. NO. : 5	
CHECKED BY : N. HART	DATE : 6/19		
DESIGN ENGINEER OF RECORD : D. HAWKINS	DATE : 6/19		

REVISIONS					SHEET NO. SW-5
NO.	BY	DATE	NO.	BY	
1			3		TOTAL SHEETS 7
2			4		



QUANTITIES FOR ONE PRECAST CONCRETE PILE

LENGTH	APPROX. PILE WT. TONS	ONE PICK-UP POINT		TWO PICK-UP POINT	
		0.300L	0.700L	0.207L	0.586L
10'-0"	1.56	3'-0"	7'-0"		
15'-0"	2.35	4'-6"	10'-6"		
20'-0"	3.14	6'-0"	14'-0"		
25'-0"	3.93	7'-6"	17'-6"		
30'-0"	4.70	9'-0"	21'-0"		
35'-0"	5.49	10'-6"	24'-6"		
40'-0"	6.28	12'-0"	28'-0"		
45'-0"	7.05	13'-6"	31'-6"		
50'-0"	7.84	15'-0"	35'-0"		
55'-0"	8.63			11'-4 1/2"	32'-3"
60'-0"	9.42			12'-5"	35'-2"

NOTES

CONCRETE DESIGN DATA : $f'c = 5,000$ PSI

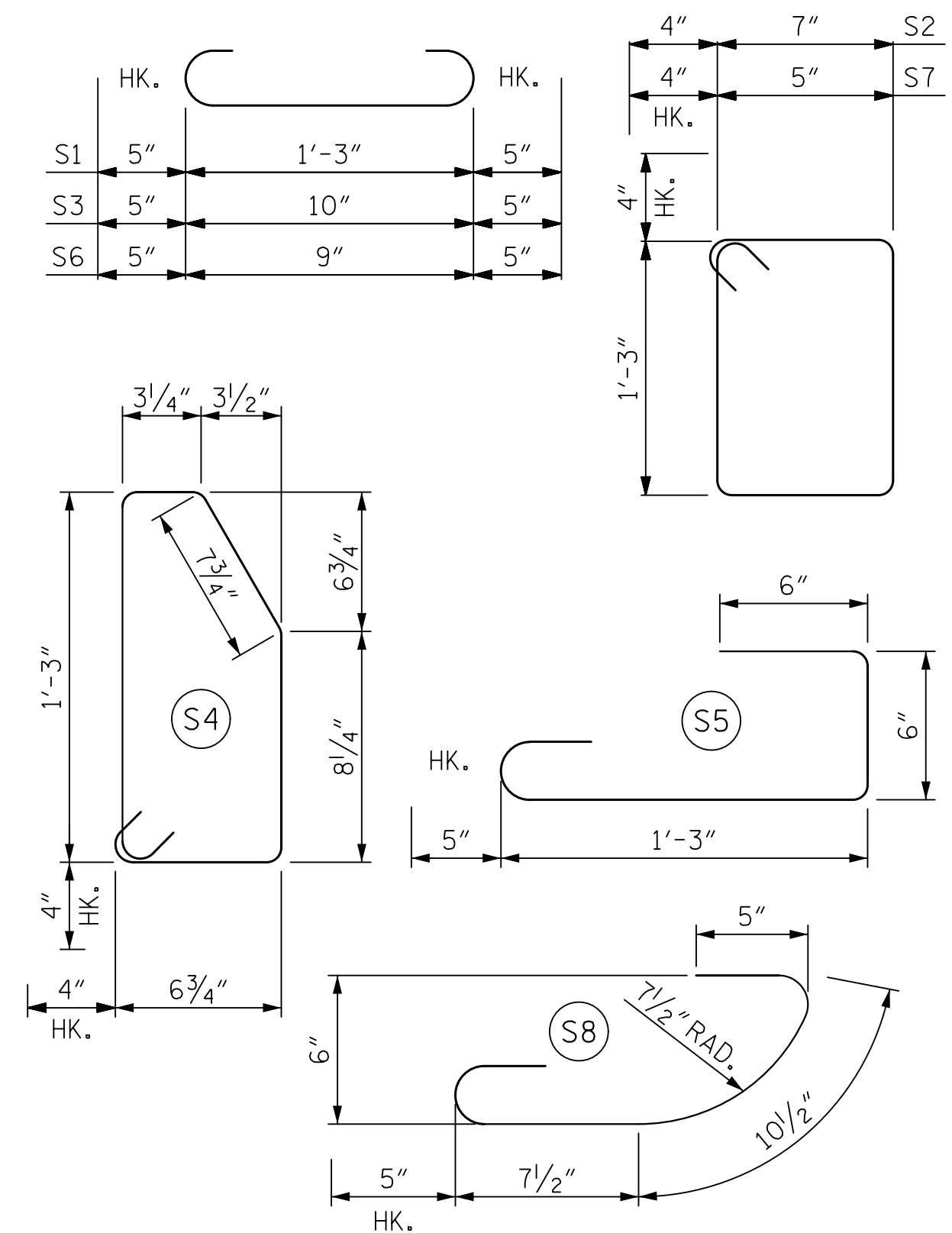
PROPOSED DEVICES FOR LIFTING PILES, RECESS DETAILS, AND PATCHING MATERIAL SHALL BE DETAILED IN SHOP DRAWINGS. AFTER ATTACHMENTS HAVE BEEN REMOVED, OPENINGS SHALL BE REPAIRED SUCH THAT THE APPEARANCE OF THE PILE IS UNIFORM.

WHERE CAST-IN-PLACE LIFTING DEVICES ARE NOT USED, PICK-UP POINTS TO BE INDICATED WITH A BLACK MARK 2" WIDE.

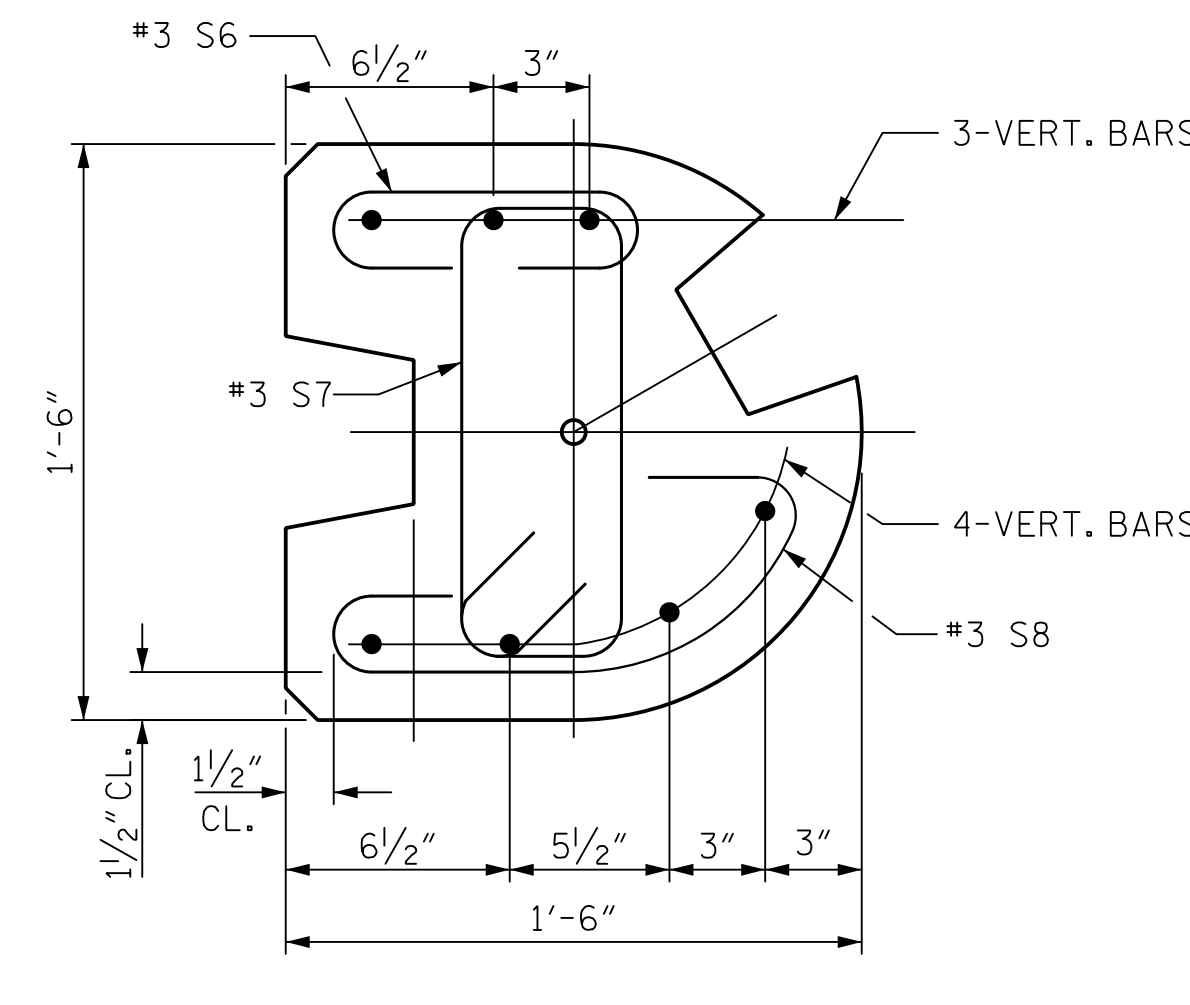
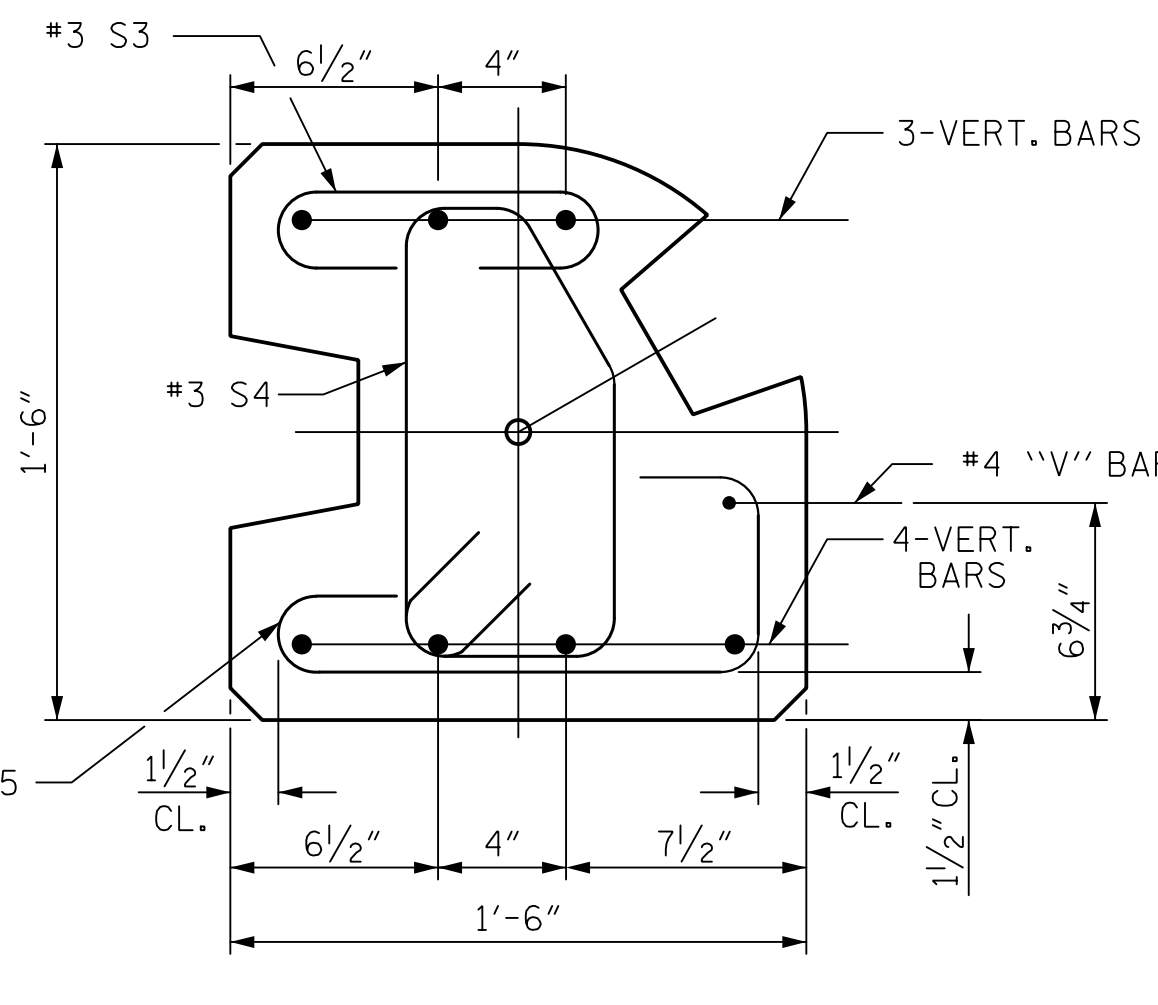
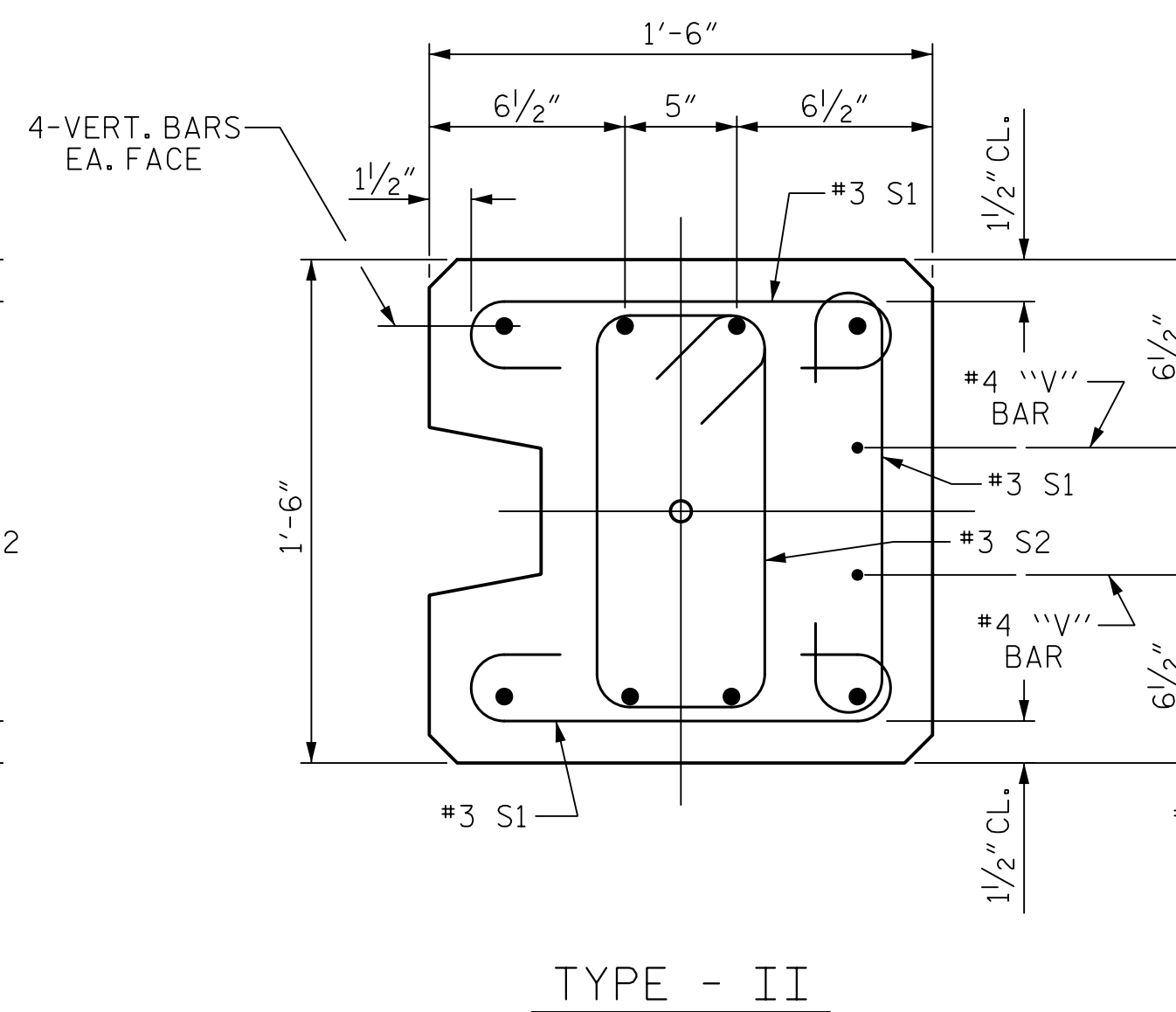
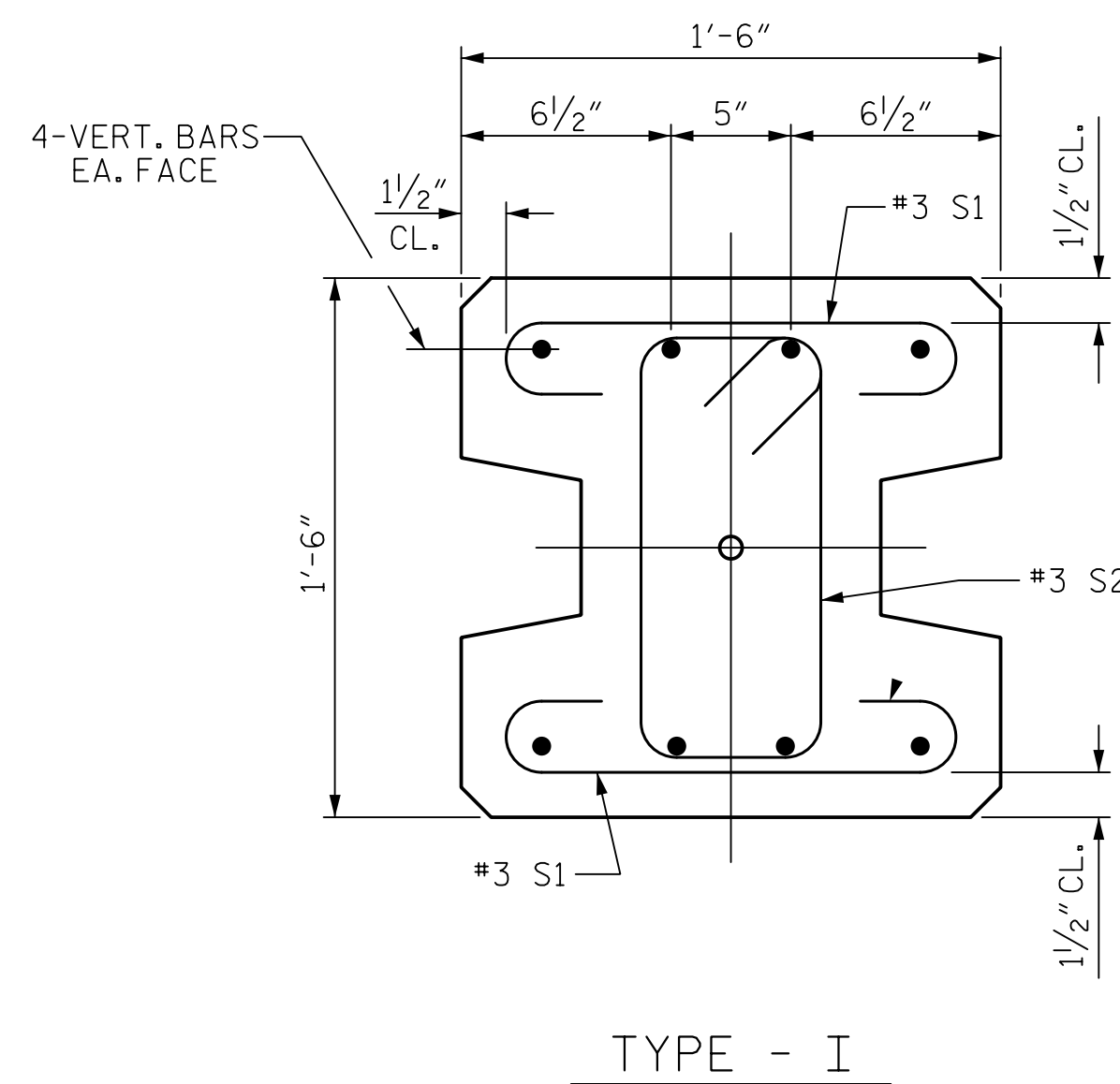
THE SLIP-FORM METHOD OF CASTING PILES WILL NOT BE PERMITTED.

ALL CORNERS TO BE CHAMFERED 1".

BAR TYPES

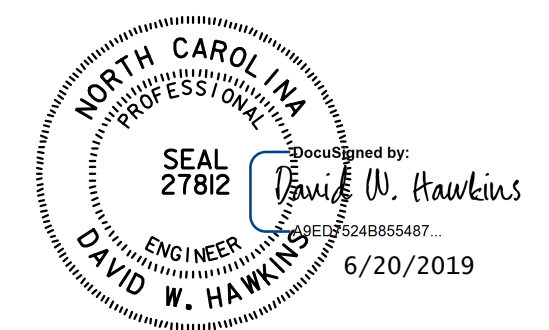


ALL BAR DIMENSIONS ARE OUT TO OUT.



PILE DETAIL

FOR VERTICAL BAR PILE REINFORCING, SEE SHEET 1 OF 3



PROJECT NO. I-4400C
HENDERSON COUNTY
 STATION: VARIABLES

SHEET 6 OF 7

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 STANDARD
 SOUND BARRIER
 WALL
 DETAILS

ASSEMBLED BY : M. WRIGHT	DATE : 6/19
CHECKED BY : N. HART	DATE : 6/19
DRAWN BY : MAA 6/11	REV. 1/15/14 RWW/TMG
CHECKED BY : GM 6/11	REV. 12/17 MAA/THC

HNTB		HNTB NORTH CAROLINA, P.C. NC License No. C-1554 343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609	
DRAWN BY : M. WRIGHT	DATE : 6/19	DWG. NO. : 6	
CHECKED BY : N. HART	DATE : 6/19		
DESIGN ENGINEER OF RECORD : D. HAWKINS	DATE : 6/19		

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

TOTAL SHEETS: 7

**DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED**

NOTES

WALL SUPPORT SYSTEM

POSTS, BEARING PLATES AND MISCELLANEOUS STEEL SHALL BE AASHTO 270 GRADE 50 STRUCTURAL STEEL - GALVANIZED TO AASHTO M111 AND IN ACCORDANCE TO SECTION 1076 OF THE STANDARD SPECIFICATIONS.

BOLTS, NUTS AND WASHERS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A325 AND SHALL BE GALVANIZED IN ACCORDANCE TO AASHTO M111.

ALL POSTS SHALL BE PLUMB.

W12x53 STEEL POST SHALL BE A MINIMUM OF TWO FEET FROM C OF POST TO C OF BARRIER RAIL EXPANSION JOINT. POSTS SHALL BE SPACED AT A MAXIMUM OF 7'-6".

SOUND BARRIER WALL

COLOR OF THE SOUND BARRIER WALL PANEL SHALL BE UNIFORM THROUGHOUT THE PULTRUDED COMPOSITE AND IS TO BE APPROVED BY THE ENGINEER. SOUND BARRIER WALL PANEL SHALL HAVE A DRY STACK PATTERN WITH STAIN COLOR FS36173.

SOUND BARRIER WALL SHALL BE DESIGNED TO WITHSTAND A MINIMUM WIND VELOCITY OF 115 MPH AND A MINIMUM WIND PRESSURE OF 0.04 KSF.

WEIGHT OF SOUND BARRIER WALL INCLUDING POSTS AND PANELS SHALL NOT EXCEED 590 LBS/FT.

SOUND BARRIER WALL SHALL CONSIST OF STACKED TONGUE AND GROOVE STRUCTURAL PLANKS AS DETAILED ON PLANS. THE PLANKS SHALL BE COMPRISED OF A PULTRUDED GLASS REINFORCED THERMOSET COMPOSITE STRUCTURAL BOX FILLED WITH RECYCLED TIRE RUBBER OR ANOTHER SUBSTANCE OF COMPARABLE DENSITY AND NOISE REDUCTION CAPABILITY. ENDS SHALL BE CAPPED SO NOT TO ALLOW FILL MATERIAL TO FALL OUT.

LENGTH OF PLANKS SHALL BE CUT TO A LENGTH NO LESS THAN 4" LESS THAN THE CLEAR SPACING PROVIDED BETWEEN SUPPORT POSTS, NOR SHALL THE LENGTH BE GREATER THAN 3" LESS THAN THE CLEAR SPACING PROVIDED BETWEEN SUPPORT POSTS.

PLANKS SHALL BE CUT SO THAT THE ENDS ARE SMOOTH AND PERPENDICULAR TO EACH PLANKS BASE AND SHALL BE APPROVED BY THE ENGINEER.

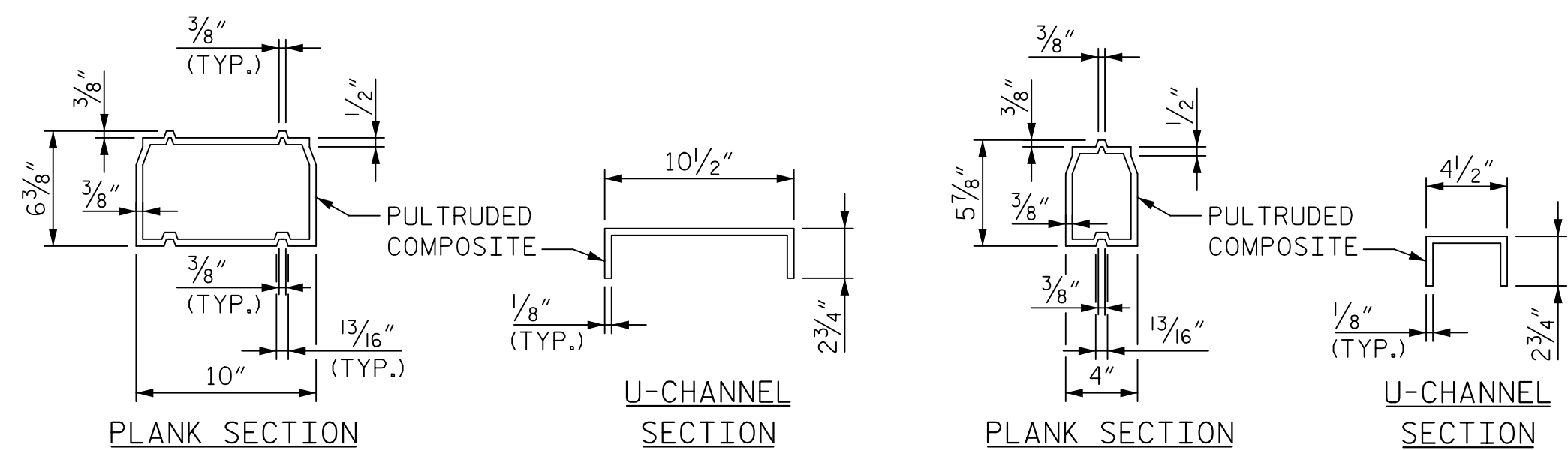
EACH PANEL SHALL BE PLACED SO THAT THE TOP OF THE FINISHED PANEL MEETS FLUSH WITH THE TOP OF EACH SUPPORT POST.

FOR PREFORMED BEARING PADS AND ELASTOMERIC BEARING, SEE SECTION 1079 OF THE STANDARD SPECIFICATIONS.

FOR SOUND BARRIER WALL, SEE SPECIAL PROVISION MOMENT SLAB WITH SOUND BARRIER WALL.

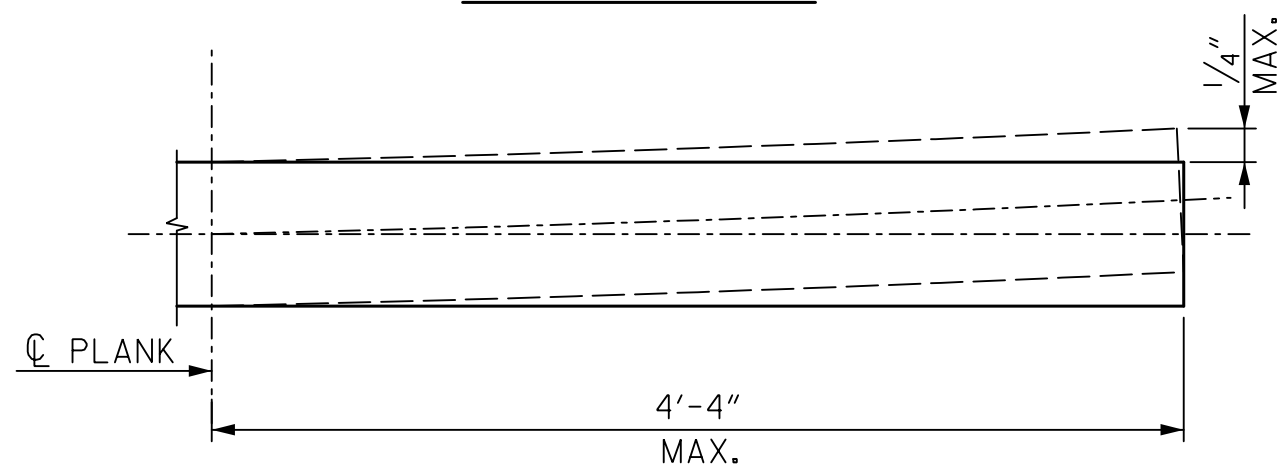
PRIOR TO DRILLING HOLES FOR ANCHOR BOLTS, CONTRACTOR SHALL LOCATE BARRIER RAIL REINFORCING. CONTRACTOR SHALL AVOID DRILLING THROUGH REINFORCING STEEL.

CONTRACTOR SHALL DRILL HOLES FOR ANCHOR BOLTS PRIOR TO PANEL FABRICATION.

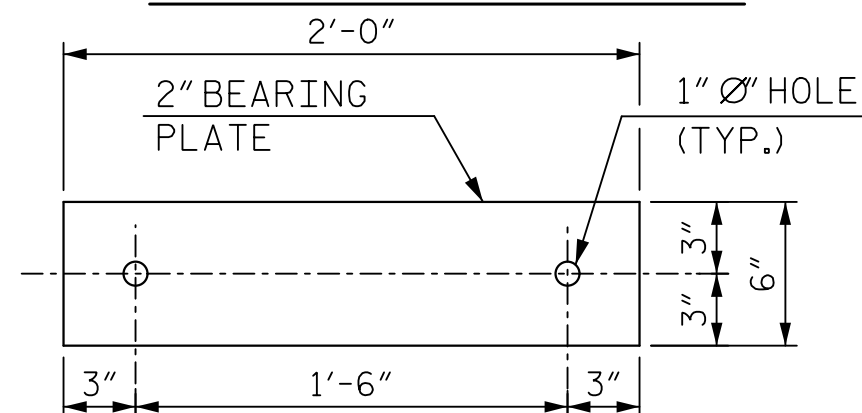


PANEL TYPE 1

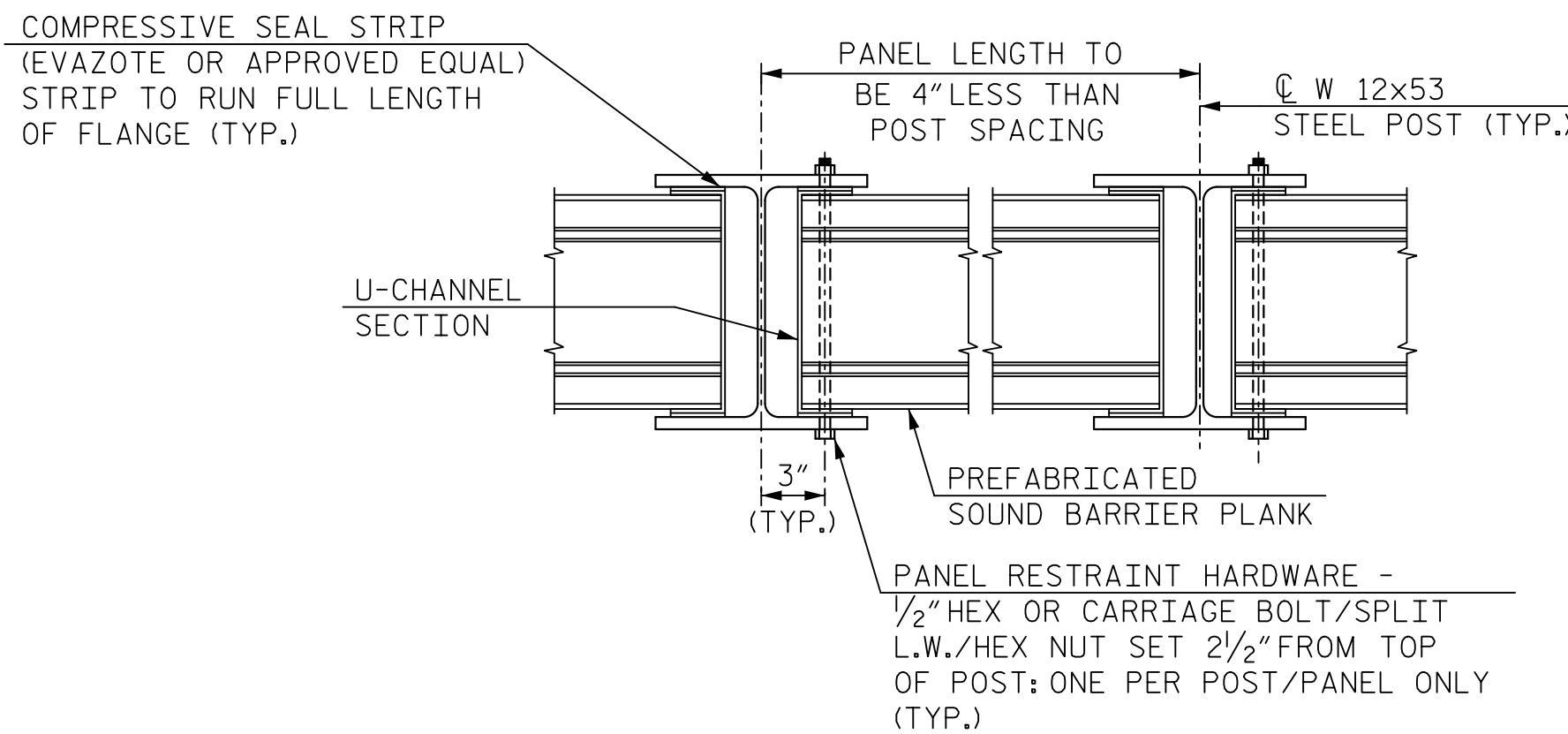
PANEL TYPE 2



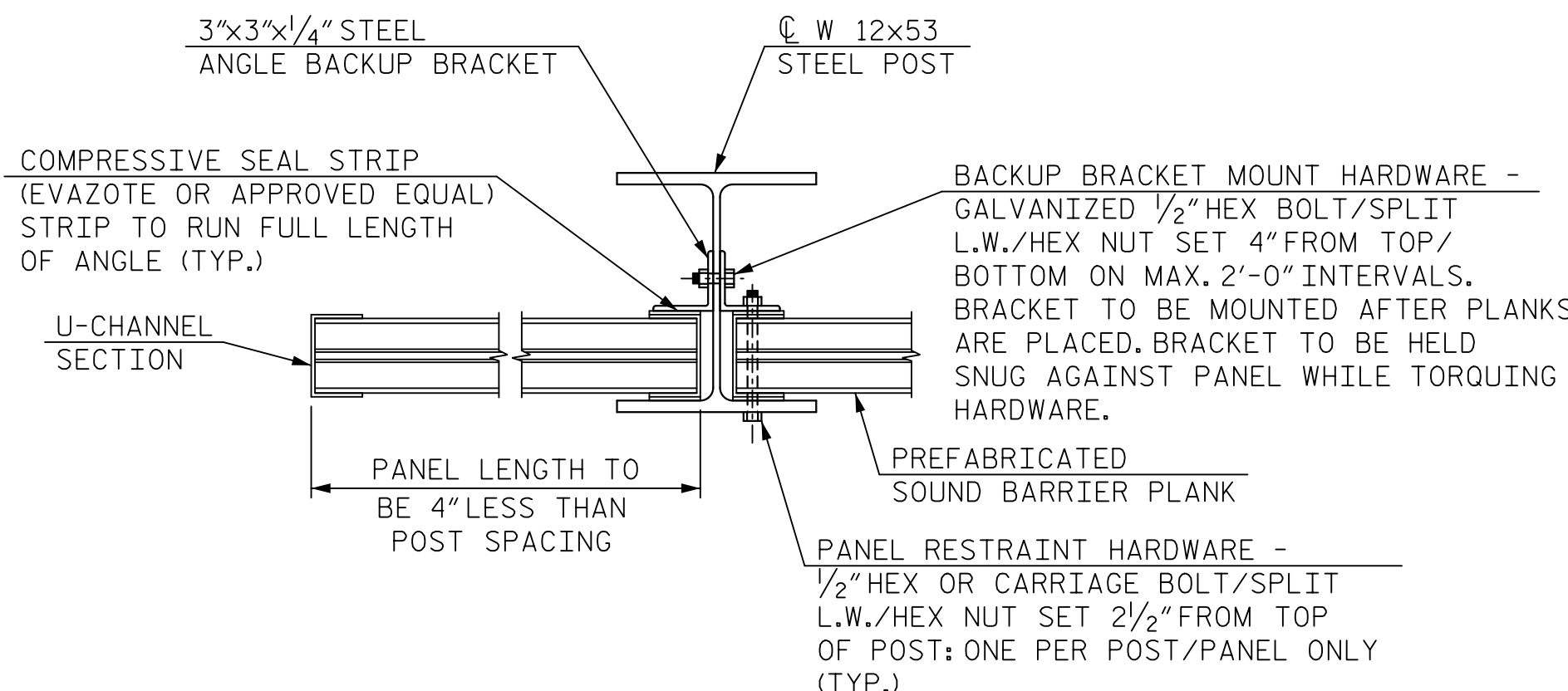
PLANK BOW TOLERANCE



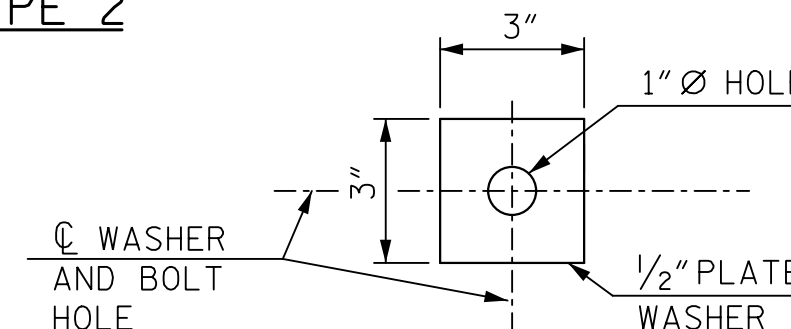
DETAIL "C"



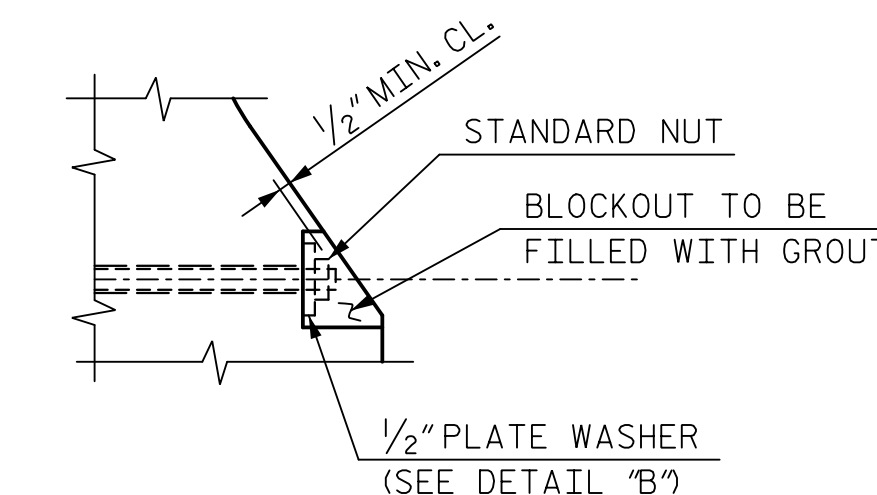
MOUNTING DETAIL - PANEL TYPE 1



MOUNTING DETAIL - PANEL TYPE 2

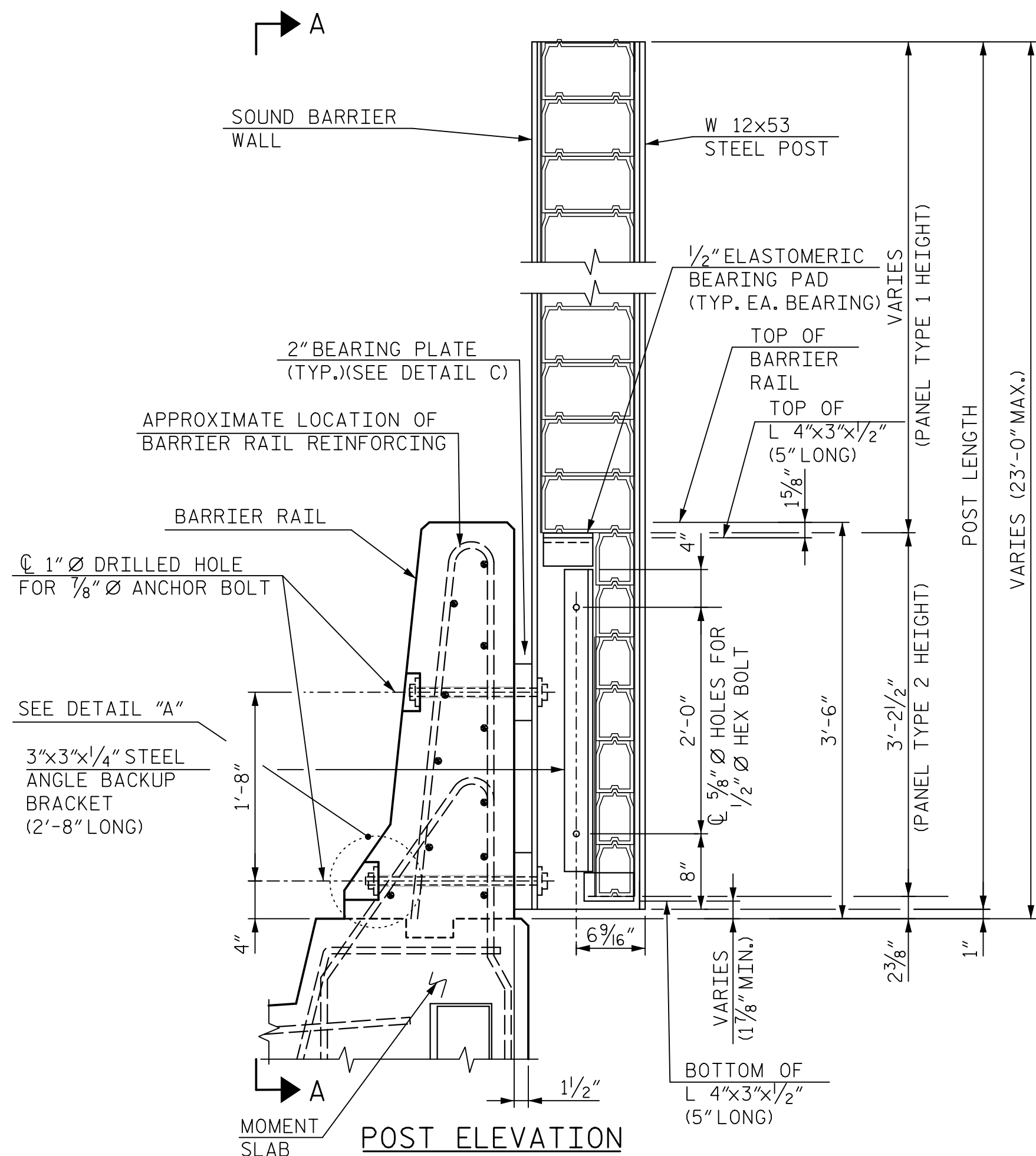


DETAIL "B"

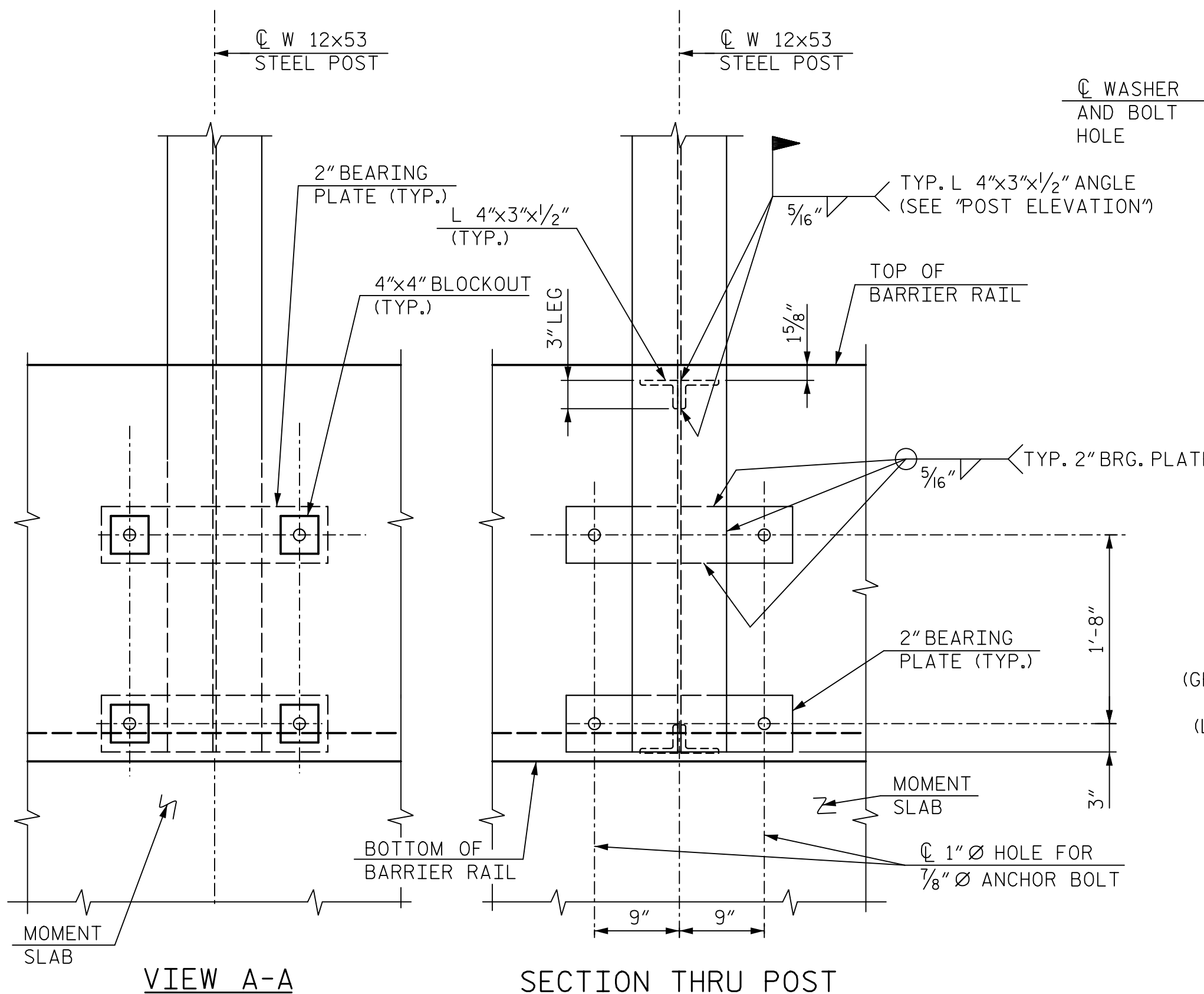


DETAIL "A"

(GROUT SHALL BE IN ACCORDANCE WITH SPECIAL PROVISIONS) (LOWER BLOCKOUT SHOWN, UPPER BLOCKOUT SIMILAR)



POST ELEVATION



VIEW A-A

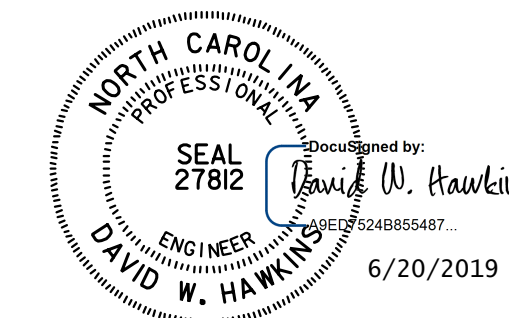
SECTION THRU POST

PROJECT NO. I-4400C
HENDERSON COUNTY
 STATION: 662+34.64 -L- =
10+00.00 -NW4.6-

SHEET 7 OF 7

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

SUPERSTRUCTURE
 MOMENT SLAB WITH
 SOUND BARRIER WALL
 DETAILS



HNTB		HNTB NORTH CAROLINA, P.C. NC License No. C-1554 343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609	
DRAWN BY: M. WRIGHT	DATE: 4/19	DWG. NO. 7	
CHECKED BY: N. HART	DATE: 4/19		
DESIGN ENGINEER OF RECORD: D. HAWKINS	DATE: 6/19		

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REVISIONS						SHEET NO. SW-7
NO.	BY	DATE	NO.	BY	DATE	
1			3			TOTAL SHEETS 7
2			4			