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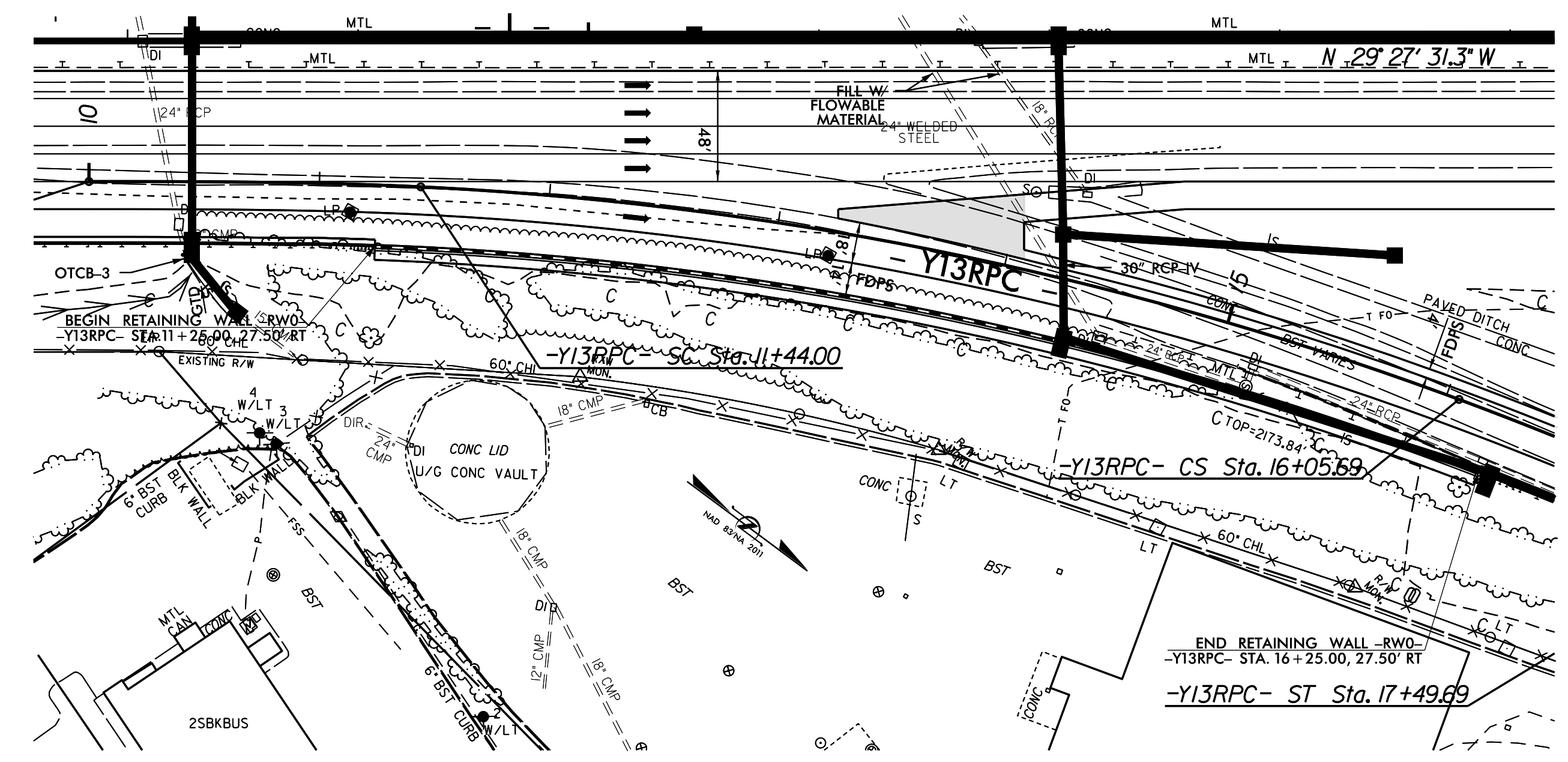
GEOTECHNICAL ENGINEER

ENGINEER

DocuSigned by: *M.H.S.* 6/11/2019

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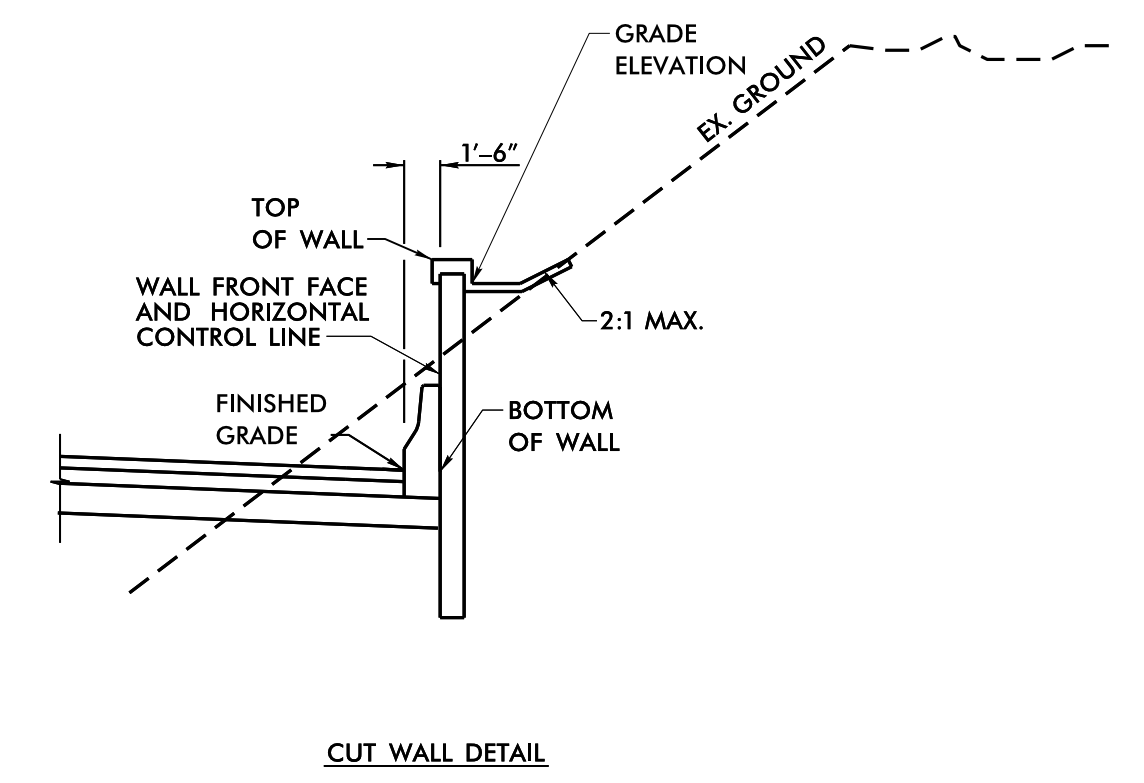
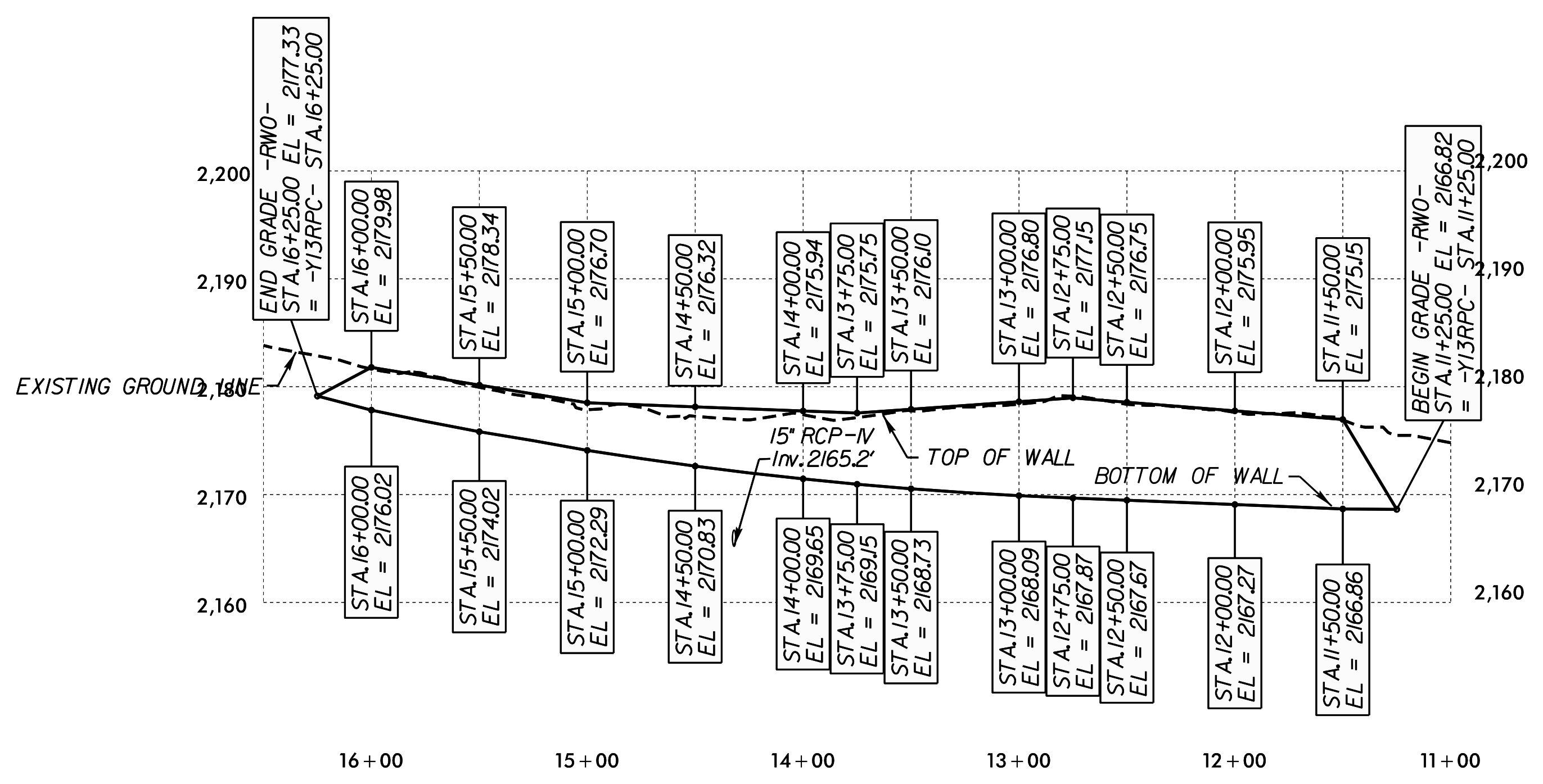
ESTIMATED SOIL NAIL WALL QUANTITIES

RETAINING WALL NO.	SOIL NAIL RETAINING WALLS (SQ. FEET)	SOIL NAIL VERIFICATION TESTS	SOIL NAIL PROOF TESTS
RWO	3,685	2	11
ARCHITECTURAL CONCRETE SURFACE TREATMENT		3,685 SQ. FT.	

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
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) RETAINING WALL -RWO- HAS A SADDLE THAT REQUIRES A DRAINAGE STRUCTURE BE INSTALLED BEHIND THE RETAINING WALL. SEE ROADWAY AND HYDRO PLANS FOR STRUCTURE TYPE AND LOCATION.



RETAINING WALL -RWO-

PROJECT NO.: 36030.1.1 (I-4700)
 BUNCOMBE COUNTY
 STATION: -Y13RPC- 11+25
 SHEET 2 OF 29

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

**GEOTECHNICAL
ENGINEERING UNIT**

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	
1	SCC	6/10/19	3			W-2
2			4			

PREPARED BY: MHS DATE: 3/1/19
 REVIEWED BY: SCC DATE: 3/1/19

NOTE: THE WALL ENVELOPE DOES NOT ACCURATELY DEPICT THE ACTUAL FACE OF WALL.

GEOTECHNICAL ENGINEER

ENGINEER

SEAL 028893

ENGINEER

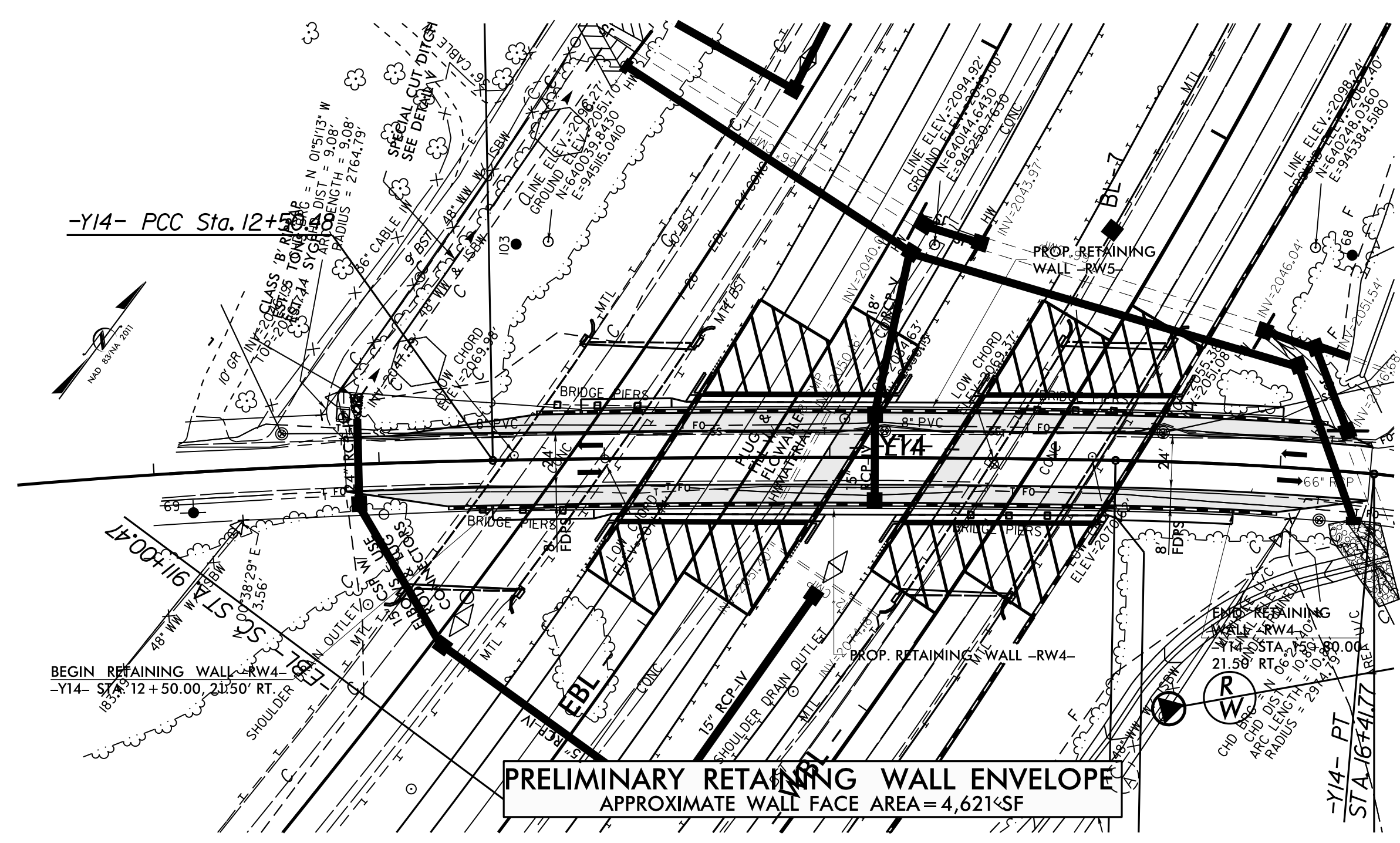
MICHAEL H. STEPHENS

DocuSigned by: *Michael H. Stephens* 6/11/2019

DATE 6/11/2019

SIGNATURE DATE

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ESTIMATED MSE WALL QUANTITIES (SQ. FEET)

MSE RETAINING WALL NO. RW4	5,620 SF
ARCHITECTURAL CONCRETE SURFACE TREATMENT	5,620 SF

- DESIGN RETAINING WALL NO. RW4 FOR THE FOLLOWING:
- 1) H = DESIGN HEIGHT + EMBEDMENT
 - 2) DESIGN LIFE = 100 YEARS
 - 3) MAXIMUM FACTORED VERTICAL PRESSURE ON FOUNDATION MATERIAL = 6,000 LB/SF
 - 4) MINIMUM REINFORCEMENT LENGTH (L) = 0.7 H OR 6 FT, WHICHEVER IS LONGER
 - 5) MINIMUM EMBEDMENT DEPTH = SEE WALL EMBEDMENT TABLE
 - 6) REINFORCED ZONE AGGREGATE PARAMETERS:

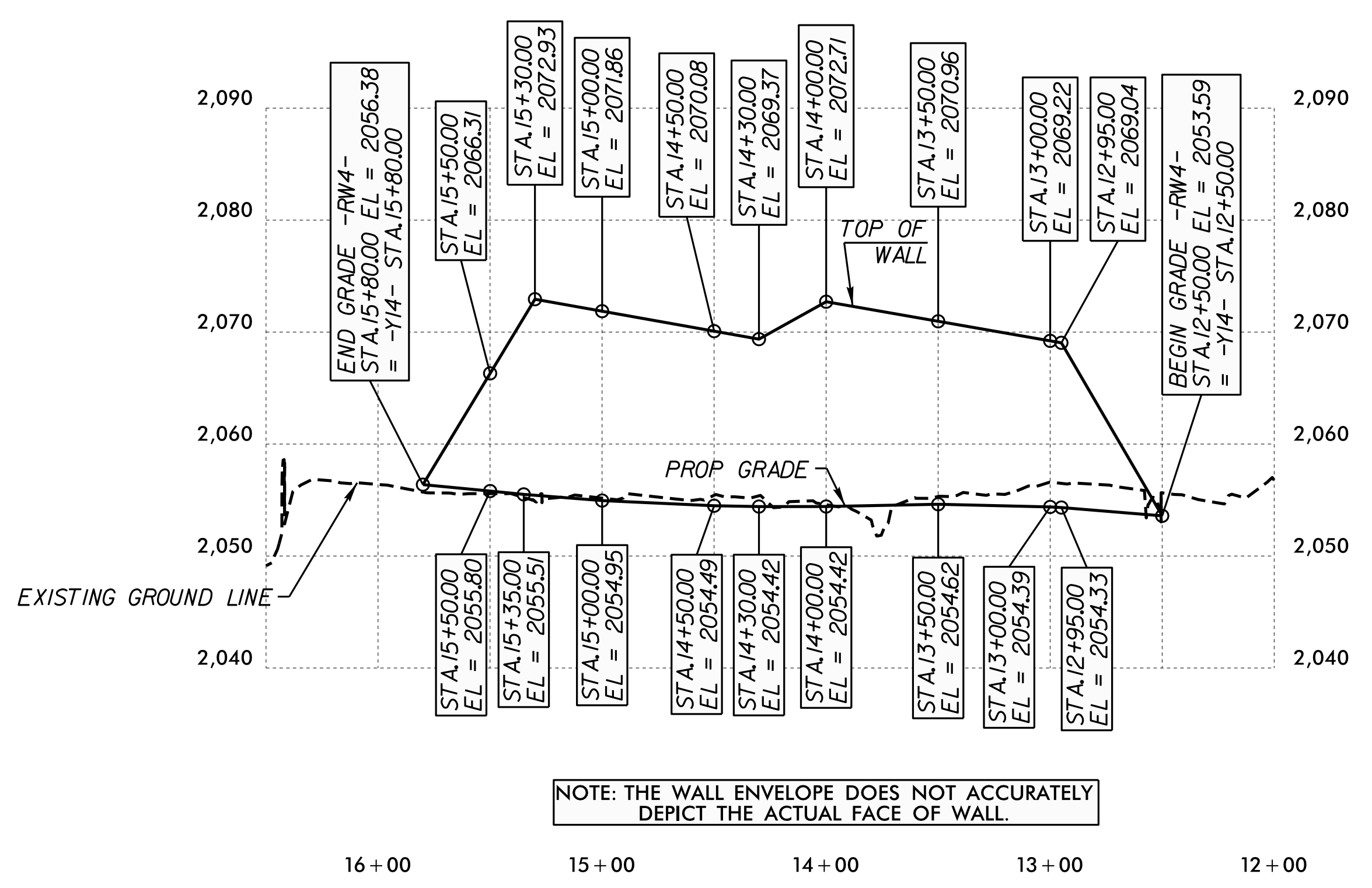
AGGREGATE TYPE*	UNIT WEIGHT (γ) LB/CF	FRICITION ANGLE (φ) DEGREES	COHESION (c) LB/SF
COARSE	110	38	0
FINE	115	34	0

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

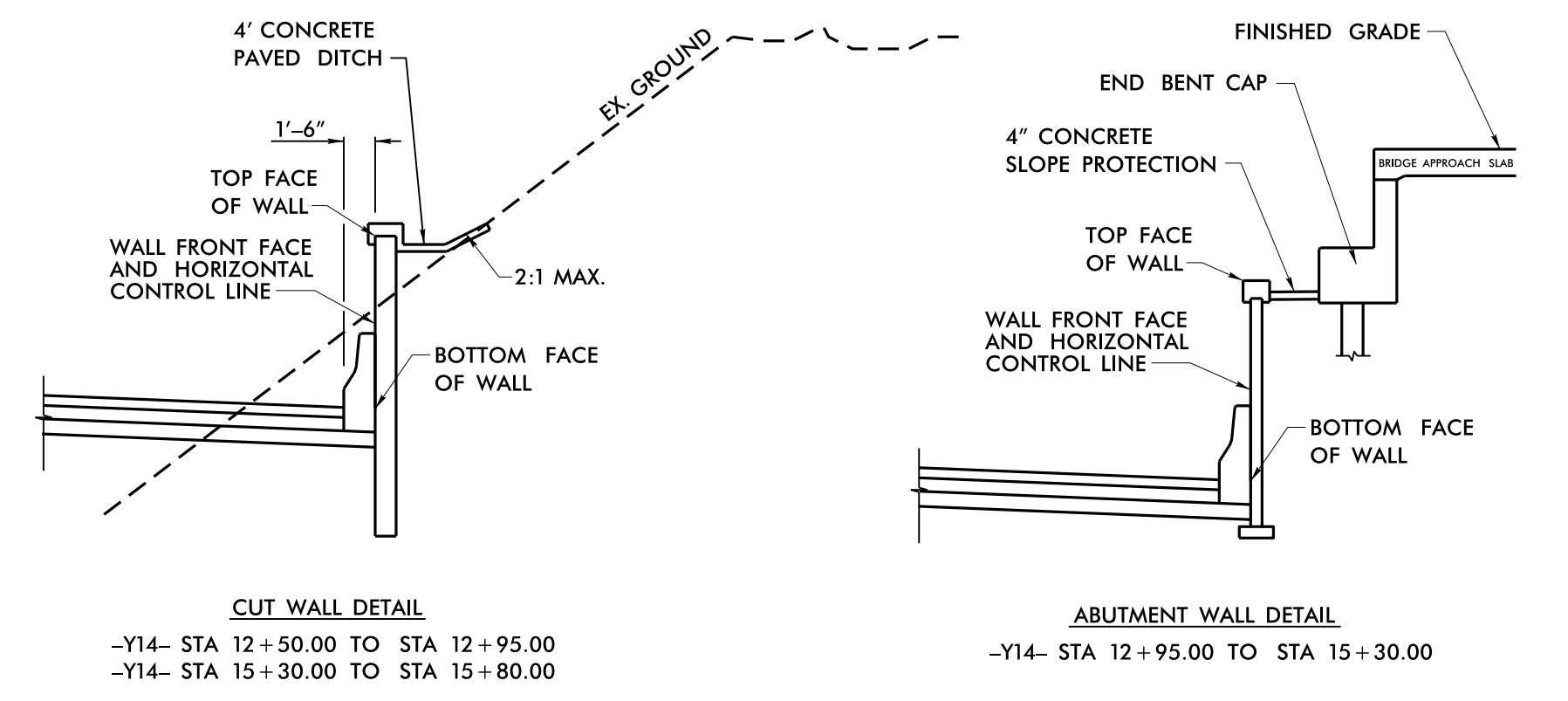
7) IN-SITU ASSUMED MATERIAL PARAMETERS:

MATERIAL TYPE	UNIT WEIGHT (γ) LB/CF	FRICITION ANGLE (φ) DEGREES	COHESION (c) LB/SF
BACKFILL	120	30	0
FOUNDATION	115	28	0

RETAINING WALL -RW4- HAS A SADDLE THAT REQUIRES A DRAINAGE STRUCTURE BE INSTALLED BEHIND THE RETAINING WALL. SEE ROADWAY AND HYDRO PLANS FOR STRUCTURE TYPE AND LOCATION.



NOTE: THE WALL ENVELOPE DOES NOT ACCURATELY DEPICT THE ACTUAL FACE OF WALL.



RETAINING WALL -RW4-

PROJECT NO.: 36030.1.1 (I-4700)

BUNCOMBE COUNTY

STATION: -Y14- 12+50

SHEET 4 OF 29

PREPARED BY: MHS DATE: 3/1/19

REVIEWED BY: SCC DATE: 3/1/19

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

RETAINING WALL NO. -RW4- MSE WALL

REVISIONS					
NO.	BY	DATE	NO.	BY	DATE
1	SCC	6/10/19	3		
2			4		

SHEET NO. W-4

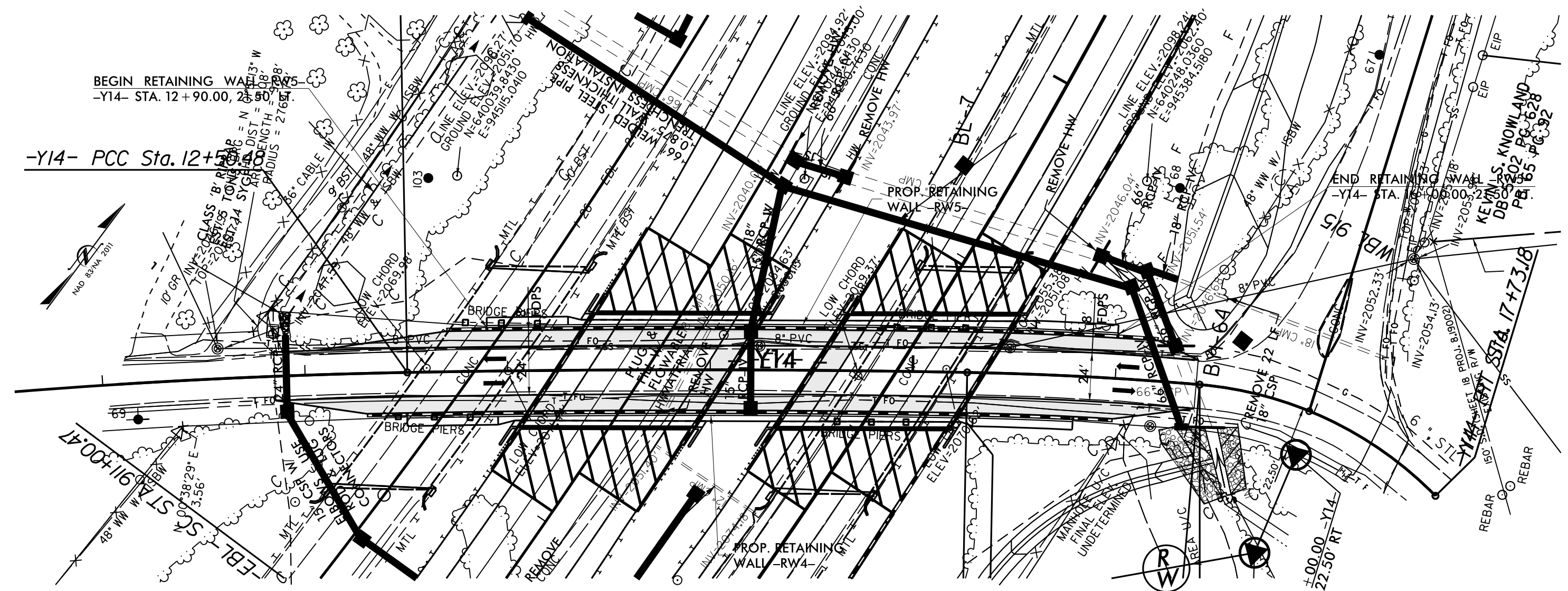
GEOTECHNICAL ENGINEER

ENGINEER

DocuSigned by: *Michael H. Stephens* 6/11/2019

DATE: 6/11/2019

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ESTIMATED MSE WALL QUANTITIES

(SQUARE FEET)

MSE RETAINING WALL NO. RW5	4,820 SF
ARCHITECTURAL CONCRETE SURFACE TREATMENT	4,820 SF

- DESIGN RETAINING WALL NO. RW5 FOR THE FOLLOWING:
- 1) H = DESIGN HEIGHT + EMBEDMENT
 - 2) DESIGN LIFE = 100 YEARS
 - 3) MAXIMUM FACTORED VERTICAL PRESSURE ON FOUNDATION MATERIAL = 6,000 LB/SF
 - 4) MINIMUM REINFORCEMENT LENGTH (L) = 0.7 H OR 6 FT, WHICHEVER IS LONGER
 - 5) MINIMUM EMBEDMENT DEPTH = SEE WALL EMBEDMENT TABLE
 - 6) REINFORCED ZONE AGGREGATE PARAMETERS:

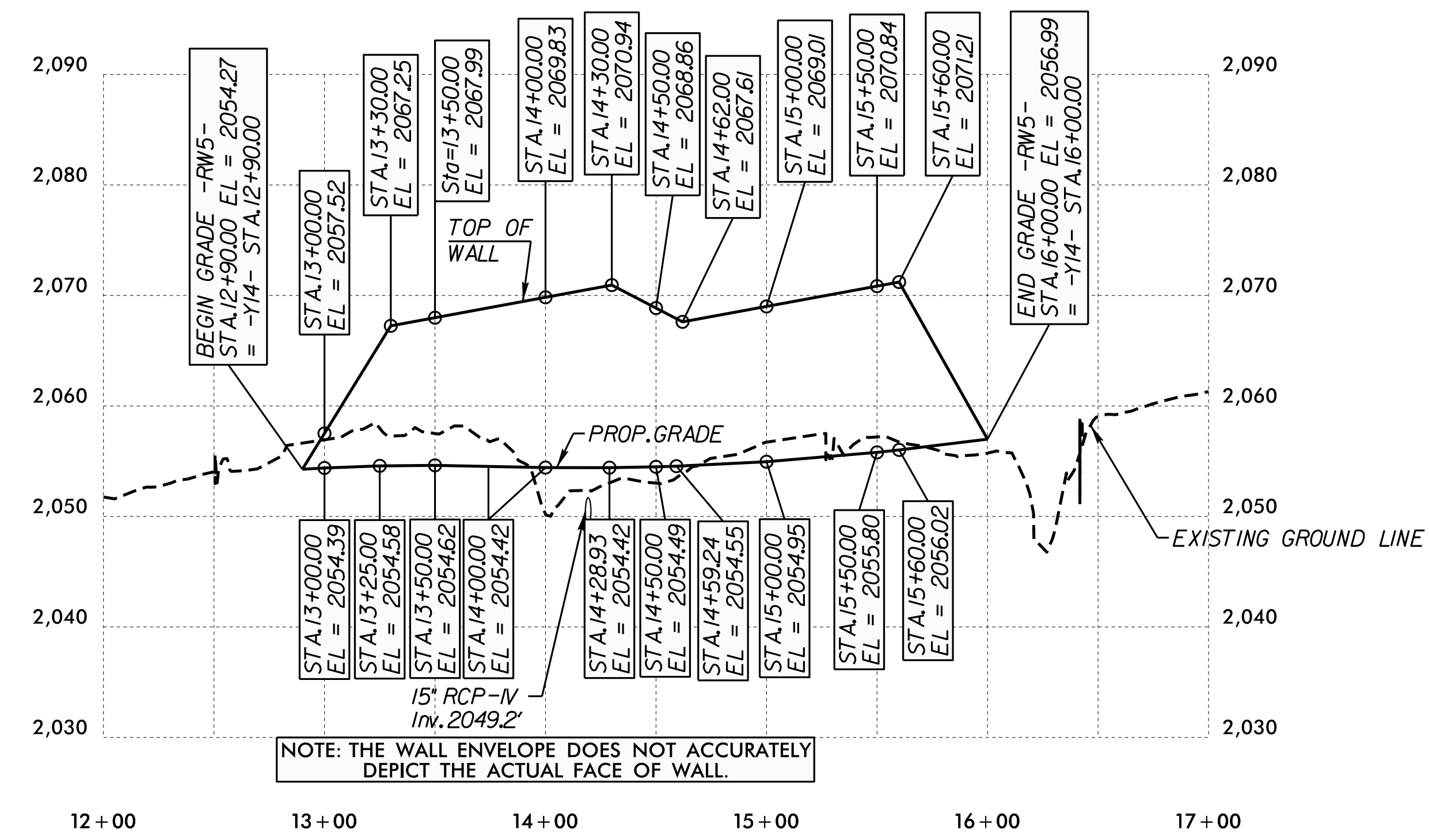
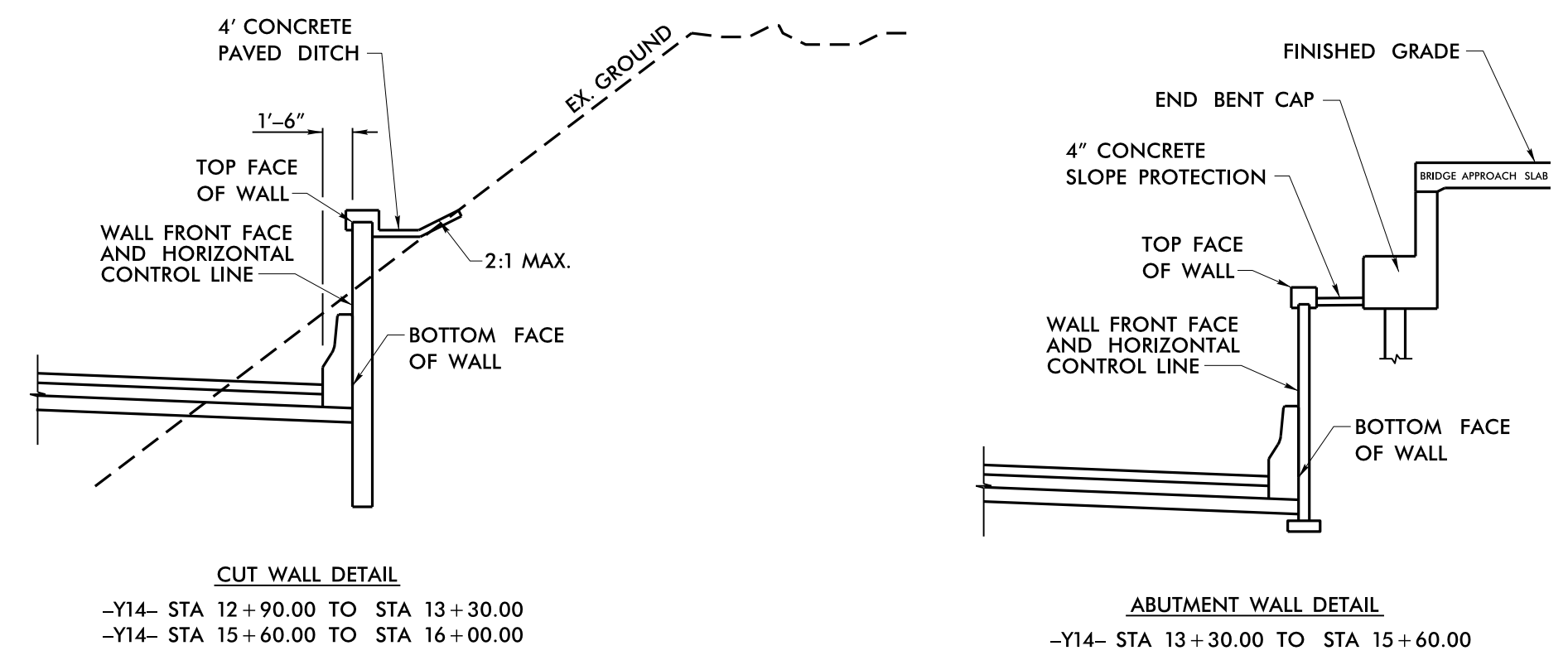
AGGREGATE TYPE*	UNIT WEIGHT (γ) LB/CF	FRICTION ANGLE (φ) DEGREES	COHESION (c) LB/SF
COARSE	110	38	0
FINE	115	34	0

*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	115	28	0

RETAINING WALL -RW5- HAS A SADDLE THAT REQUIRES A DRAINAGE STRUCTURE BE INSTALLED BEHIND THE RETAINING WALL. SEE ROADWAY AND HYDRO PLANS FOR STRUCTURE TYPE AND LOCATION.



NOTE: THE WALL ENVELOPE DOES NOT ACCURATELY DEPICT THE ACTUAL FACE OF WALL.

RETAINING WALL -RW5-

PROJECT NO.: 36030.1.1 (I-4700)
 BUNCOMBE COUNTY
 STATION: -Y14- 12+90
 SHEET 5 OF 29

PREPARED BY: MHS DATE: 3/1/19
 REVIEWED BY: SCC DATE: 3/1/19

NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

REVISIONS						SHEET NO. W-5
NO.	BY	DATE	NO.	BY	DATE	
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2			4			

GEOTECHNICAL ENGINEER

ENGINEER

SEAL 028893

ENGINEER

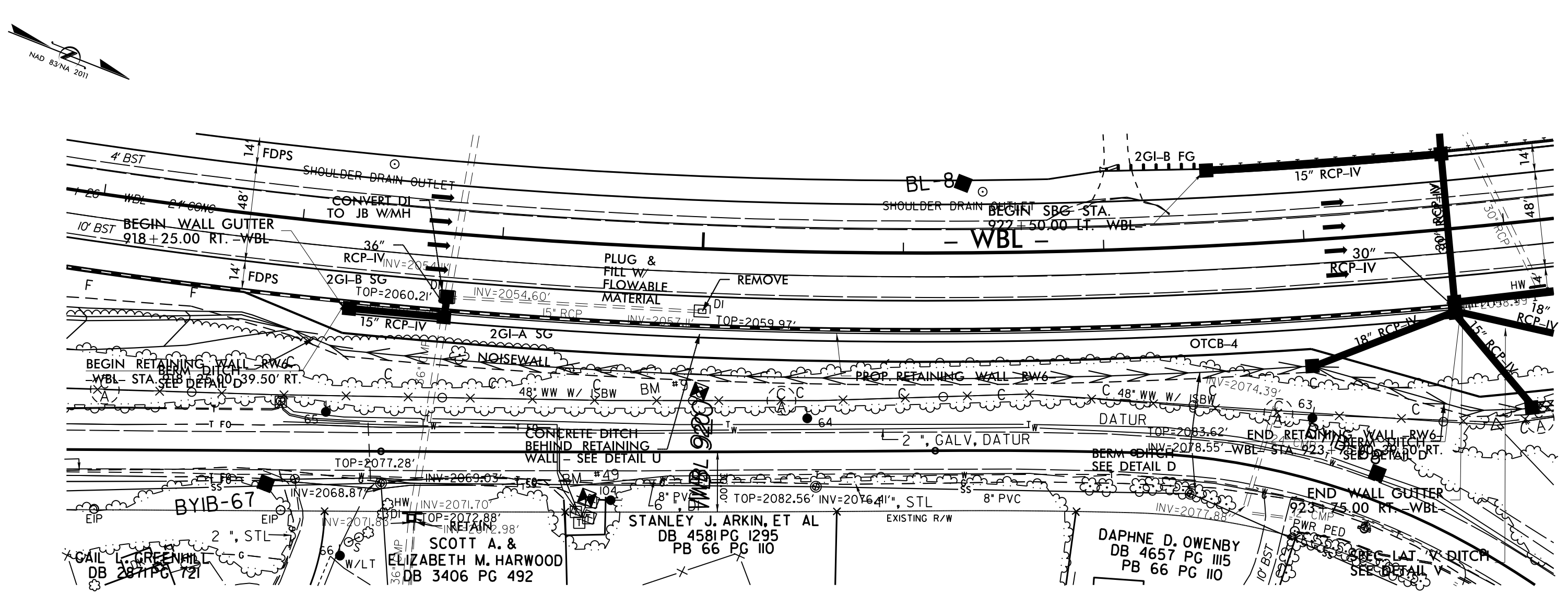
MICHAEL H. STEPHENS

DocuSigned by: *M. H. Stephens* 6/11/2019

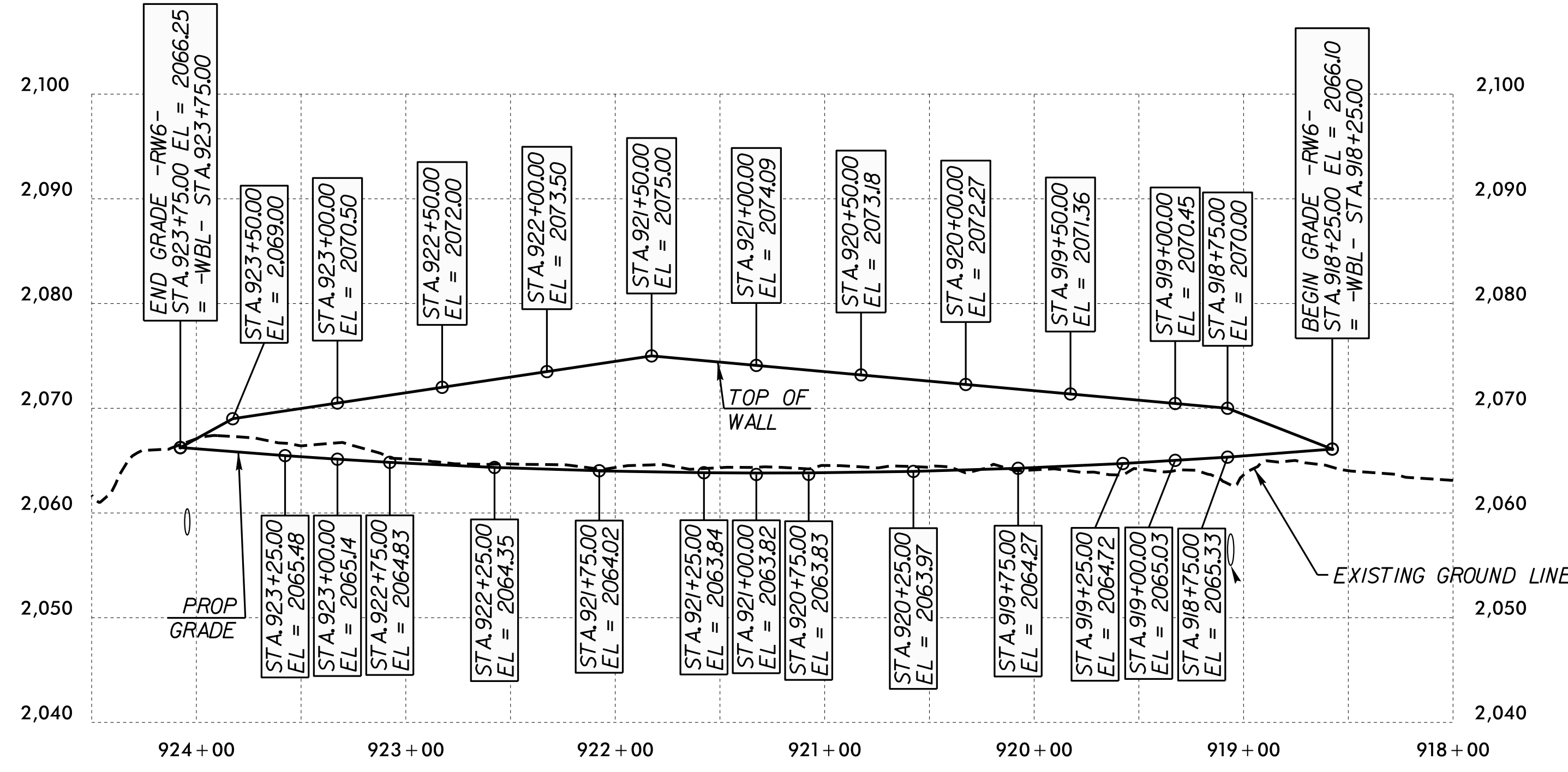
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PRELIMINARY RETAINING WALL ENVELOPE
APPROXIMATE WALL FACE AREA = 3,890 SF



NOTE: THE WALL ENVELOPE DOES NOT ACCURATELY DEPICT THE ACTUAL FACE OF WALL.

ESTIMATED MSE WALL QUANTITIES
(SQUARE FEET)

MSE RETAINING WALL NO. RW6	4,990 SF
ARCHITECTURAL CONCRETE SURFACE TREATMENT	4,990 SF

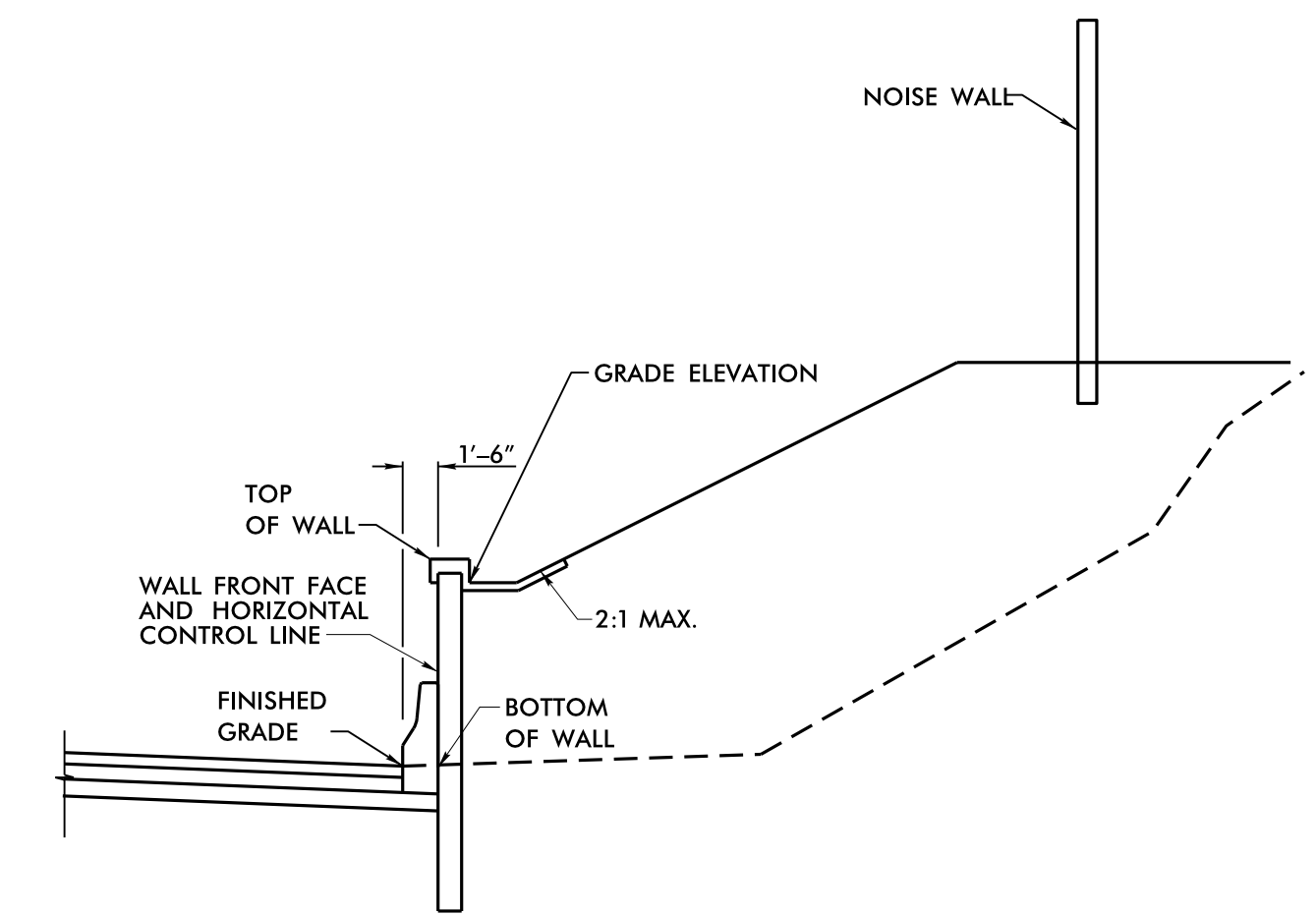
- DESIGN RETAINING WALL NO. RW6 FOR THE FOLLOWING:
- 1) H = DESIGN HEIGHT + EMBEDMENT
 - 2) DESIGN LIFE = 100 YEARS
 - 3) MAXIMUM FACTORED VERTICAL PRESSURE ON FOUNDATION MATERIAL = 3,600 LB/SF
 - 4) MINIMUM REINFORCEMENT LENGTH (L) = 1.1 H OR 6 FT, WHICHEVER IS LONGER
 - 5) MINIMUM EMBEDMENT DEPTH = SEE WALL EMBEDMENT TABLE
 - 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	115	27	0



RETAINING WALL -RW6-

PROJECT NO.: 36030.1.1 (I-4700)
BUNCOMBE COUNTY
STATION: -WBL- 918+25
SHEET 6 OF 29

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

RETAINING WALL NO. -RW6- MSE NAIL WALL

REVISIONS					
NO.	BY	DATE	NO.	BY	DATE
1	SCC	6/10/19	3		
2			4		

SHEET NO. W-6

PREPARED BY: MHS DATE: 3/1/19
REVIEWED BY: SCC DATE: 3/1/19

GEOTECHNICAL ENGINEER

ENGINEER

SEAL 028893

DATE: 6/11/2019

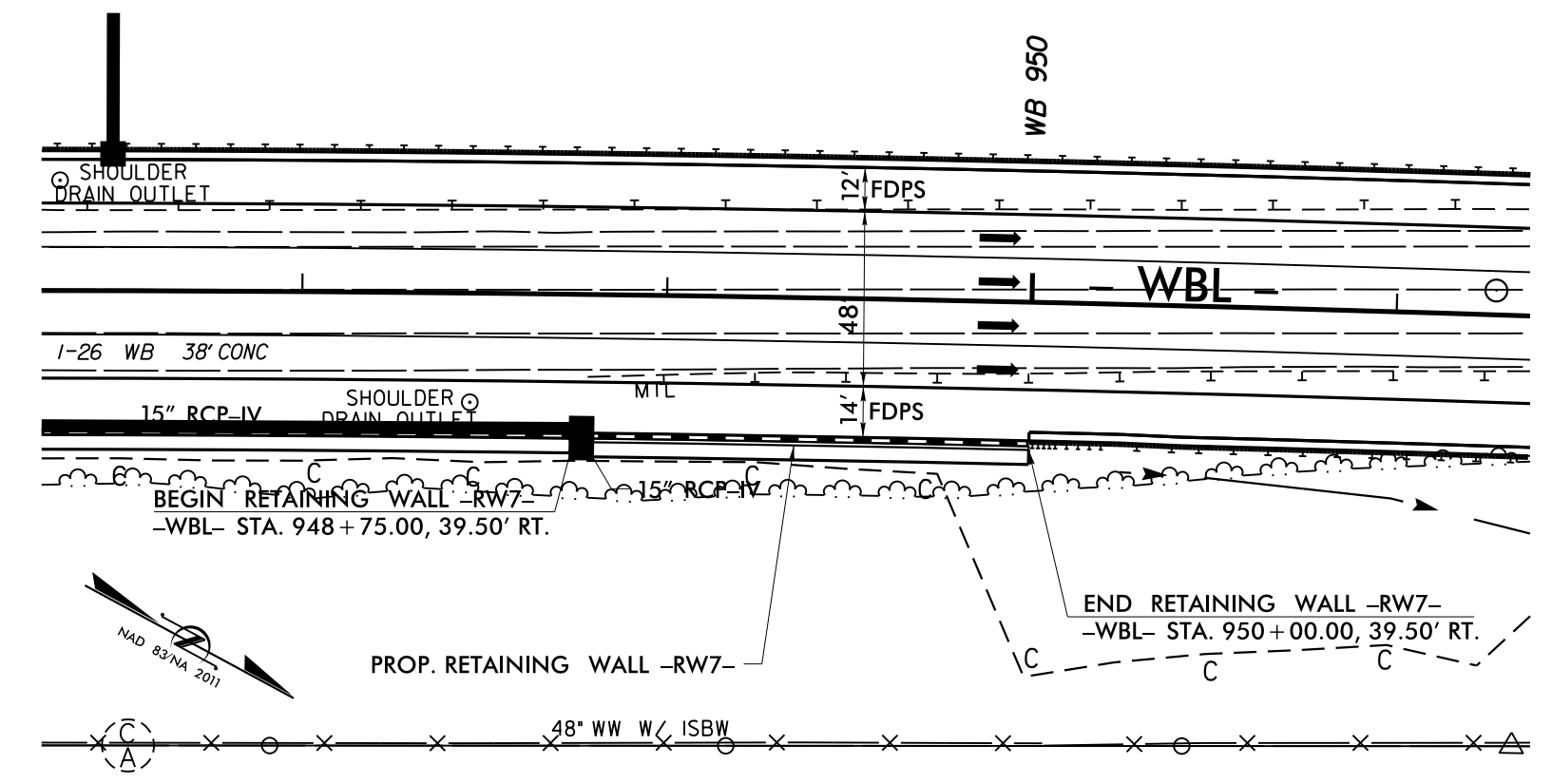
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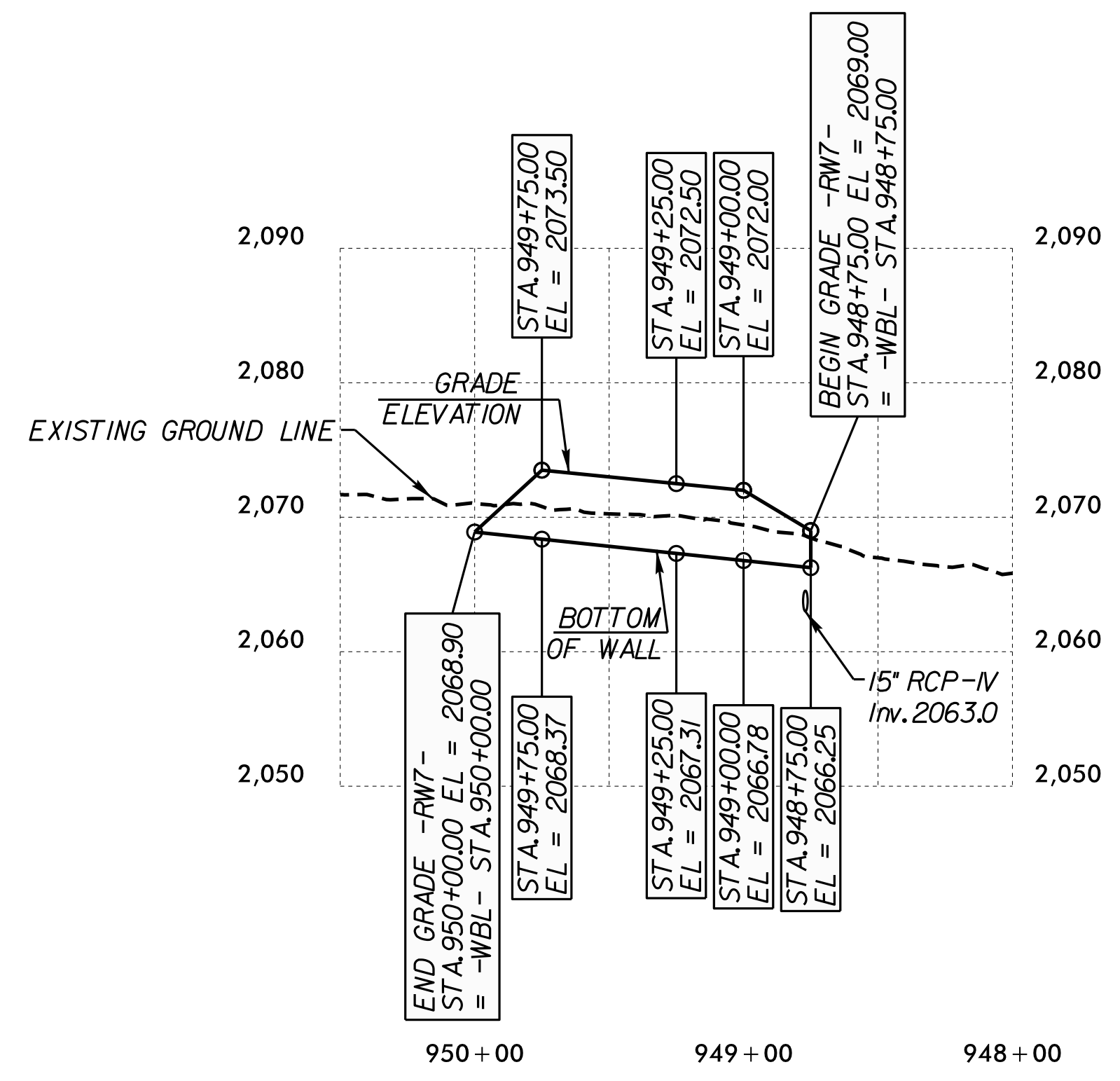
ESTIMATED SOIL NAIL WALL QUANTITIES

RETAINING WALL NO.	SOIL NAIL RETAINING WALLS (SQ. FEET)	SOIL NAIL VERIFICATION TESTS	SOIL NAIL PROOF TESTS
RW7	680	2	3
ARCHITECTURAL CONCRETE SURFACE TREATMENT		680 SF	

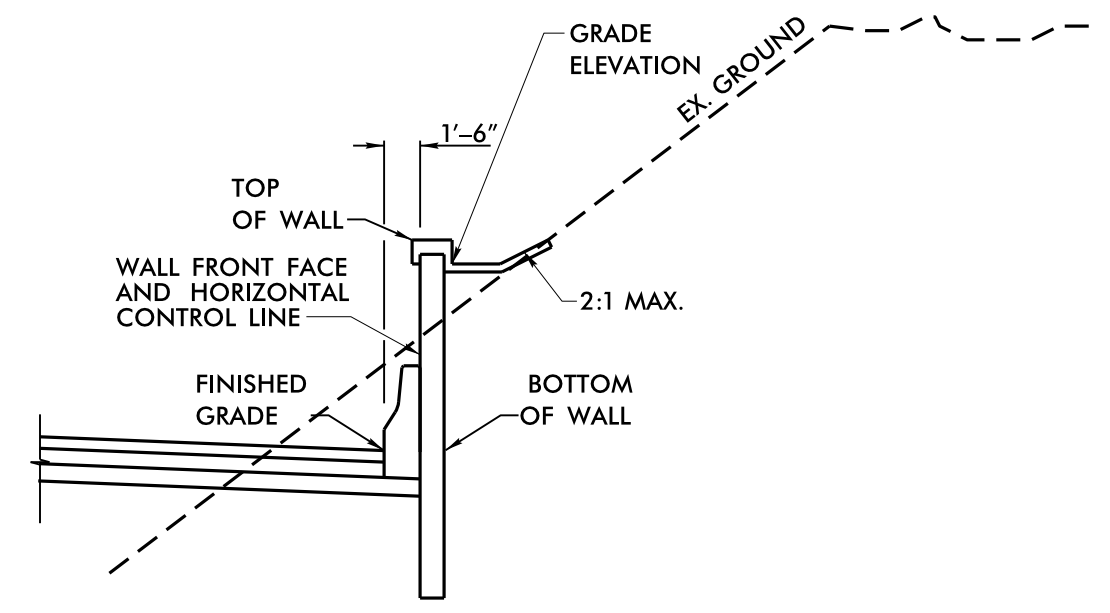
IN-SITU ASSUMED MATERIAL PARAMETERS:

MATERIAL TYPE	UNIT WEIGHT, γ (LB/CF)	FRICTION ANGLE, ϕ DEGREES	COHESION, c (LB/SF)
EMBANKMENT FILL	120	30	0
RESIDUAL	120	30	0
WEATHERED ROCK	135	36	0
ROCK	165	45	1,000

NOTES:
 1) A FENCE MAYBE REQUIRED ON TOP OF THE RETAINING WALLS.
 SEE ROADWAY PLANS FOR FENCE OR HANDRAIL ATTACHMENT DETAILS.



NOTE: THE WALL ENVELOPE DOES NOT ACCURATELY DEPICT THE ACTUAL FACE OF WALL.



CUT WALL DETAIL
RETAINING WALL -RW7-

PROJECT NO.: 36030.1.1 (I-4700)
 BUNCOMBE COUNTY
 STATION: -WBL- 948+75
 SHEET 7 OF 29

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

GEOTECHNICAL ENGINEERING UNIT

RETAINING WALL NO. -RW7- SOIL NAIL WALL

REVISIONS					
NO.	BY	DATE	NO.	BY	DATE
1	SCC	6/10/19	3		
2			4		

SHEET NO. W-7

PREPARED BY: MHS DATE: 3/1/19
 REVIEWED BY: SCC DATE: 3/1/19

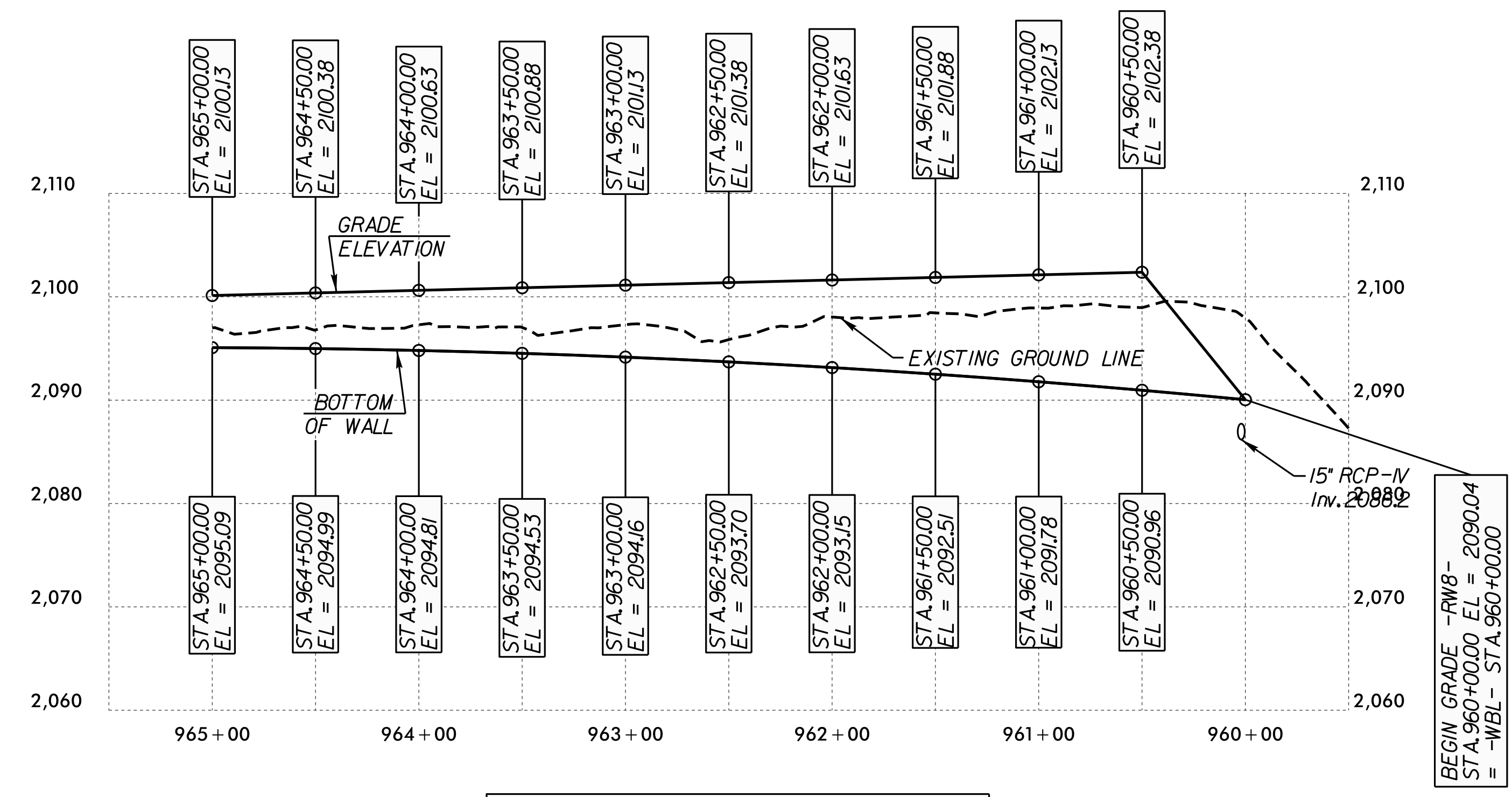
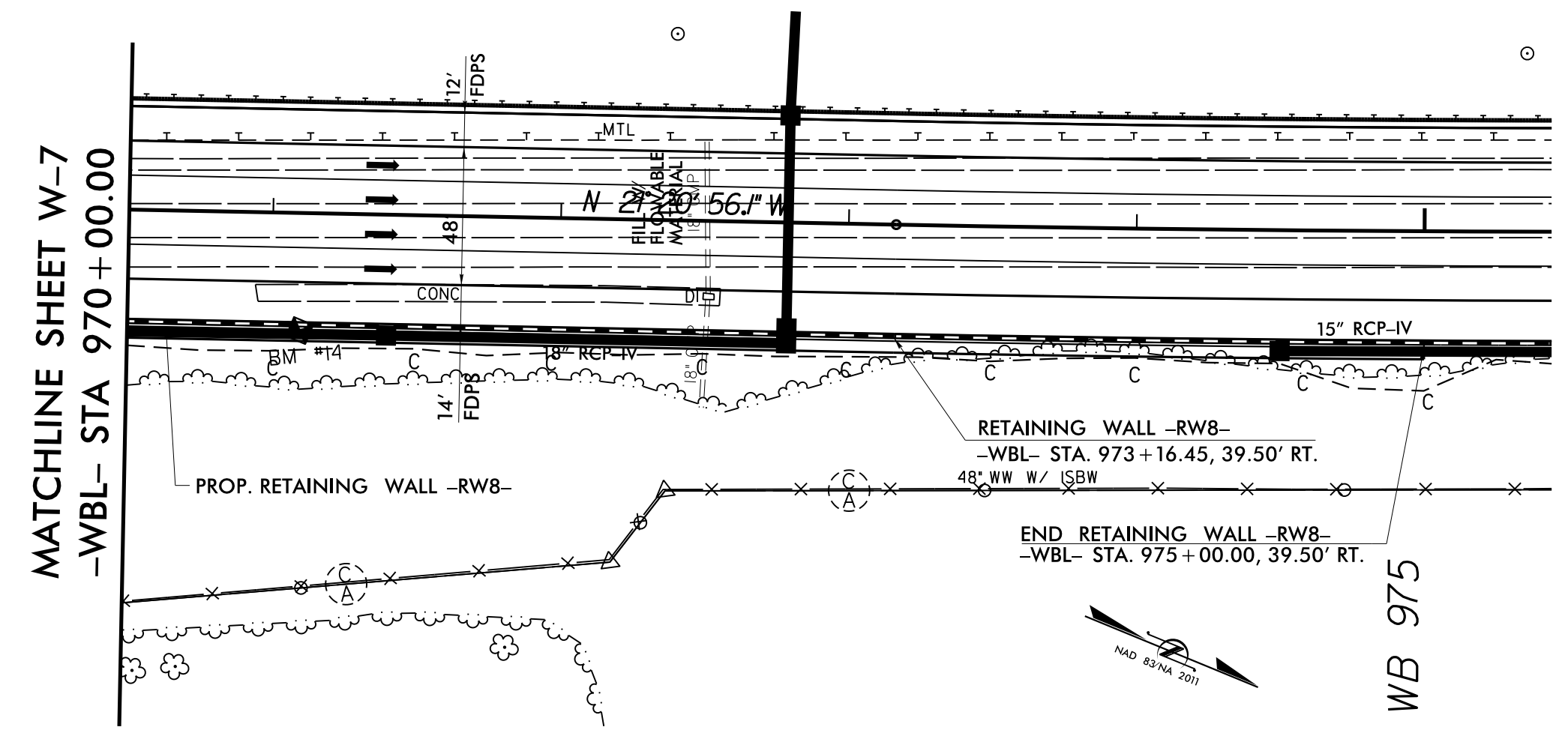
GEOTECHNICAL ENGINEER

ENGINEER

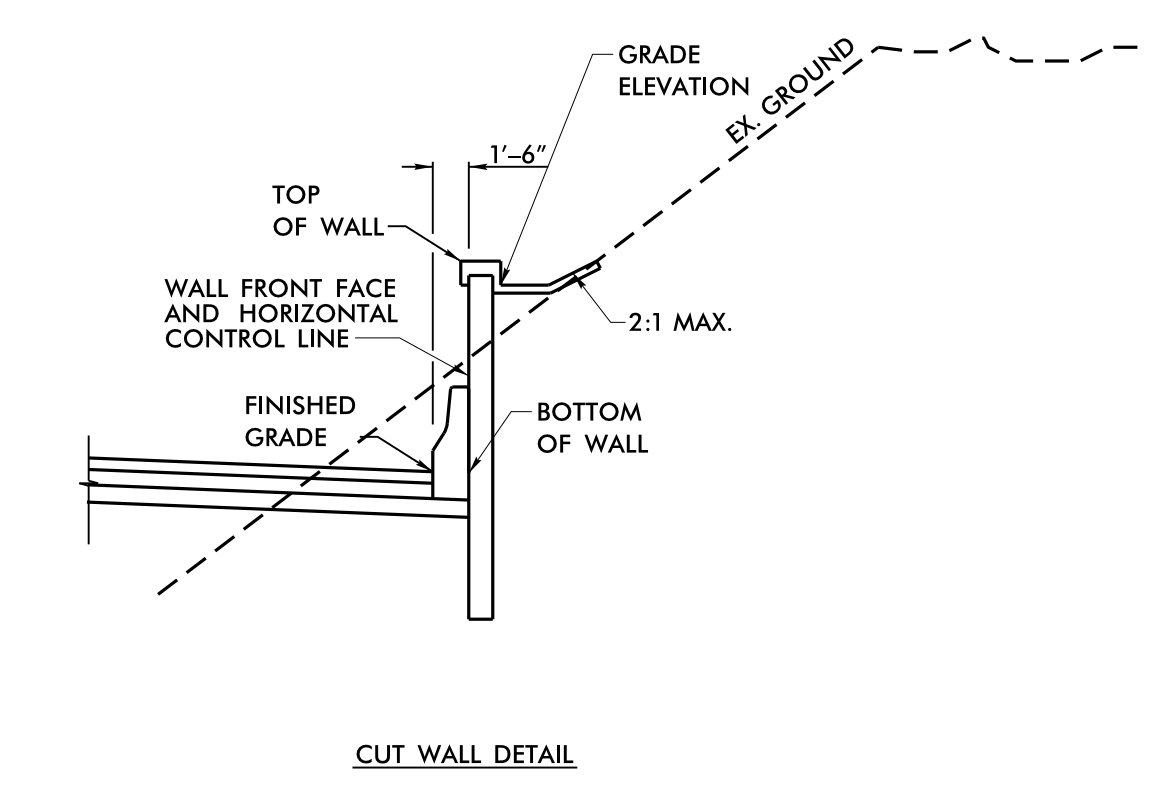
DocuSigned by: *M. Stephens* 6/11/2019

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NOTE: THE WALL ENVELOPE DOES NOT ACCURATELY DEPICT THE ACTUAL FACE OF WALL.



RETAINING WALL -RW8-

PROJECT NO.: 36030.1.1 (I-4700)
 BUNCOMBE COUNTY
 STATION: -WBL- 960+00
 SHEET 9 OF 29

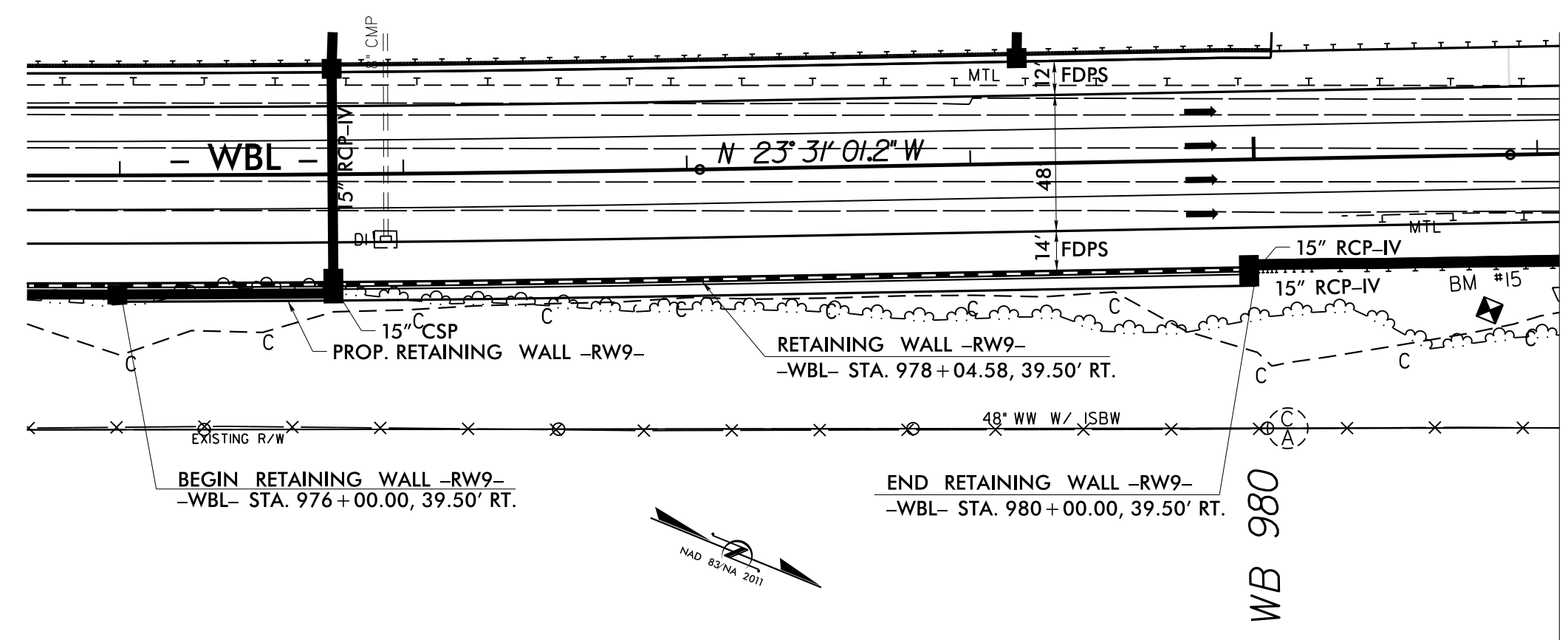
PREPARED BY: MHS DATE: 3/1/19
 REVIEWED BY: SCC DATE: 3/1/19

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

**GEOTECHNICAL
ENGINEERING UNIT**

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

GEOTECHNICAL ENGINEER
 ENGINEER
 SEAL 028893
 MICHAEL H. STEPHENS
 6/11/2019
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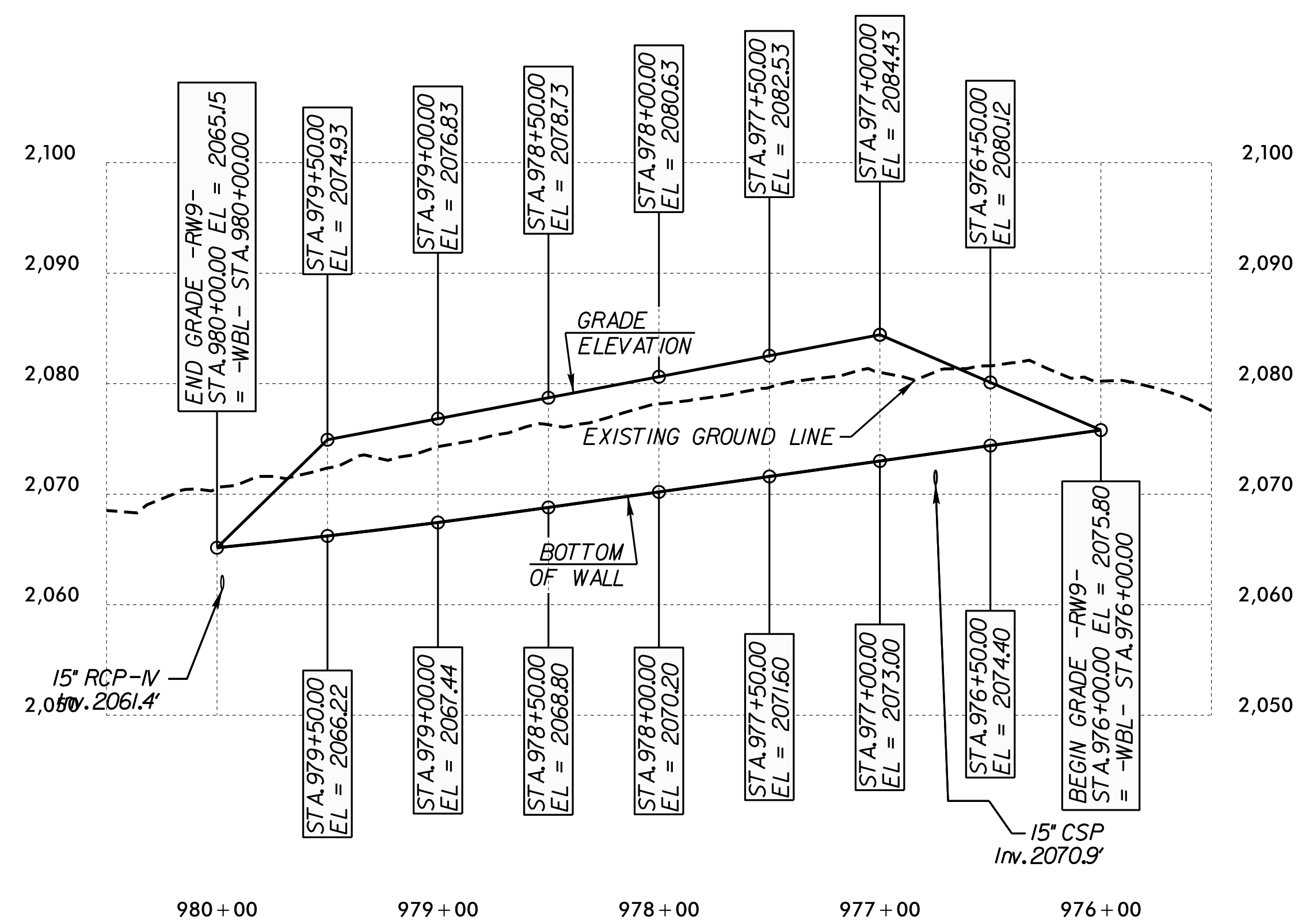


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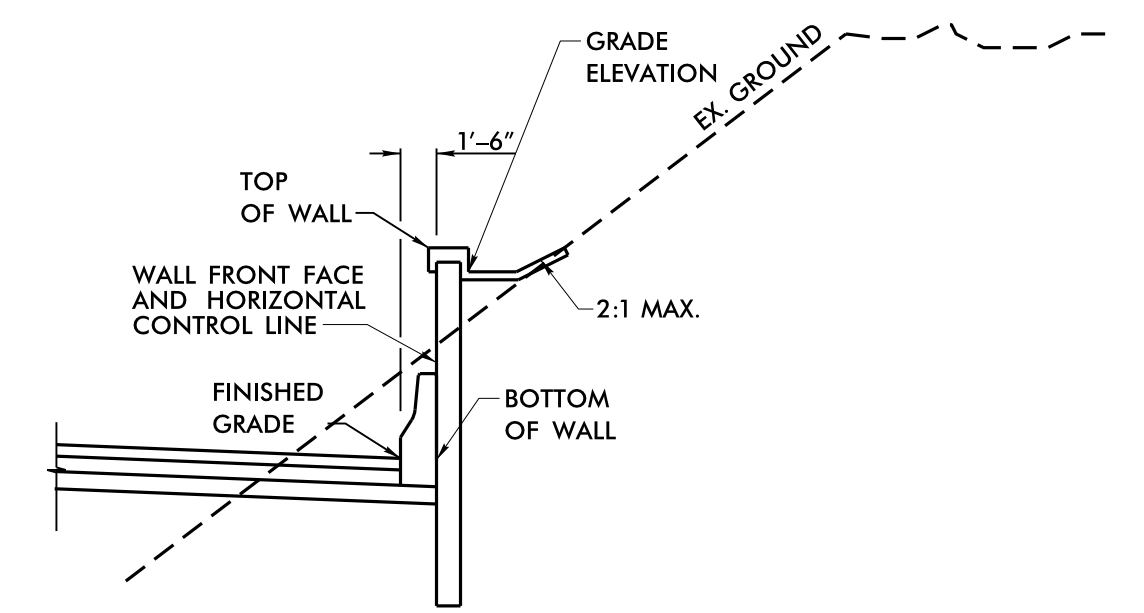
ESTIMATED SOIL NAIL WALL QUANTITIES			
RETAINING WALL NO.	SOIL NAIL RETAINING WALLS (SQUARE FEET)	SOIL NAIL VERIFICATION TESTS	SOIL NAIL PROOF TESTS
RW9	4,130	2	13
ARCHITECTURAL CONCRETE SURFACE TREATMENT		4,130 SF	

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.



NOTE: THE WALL ENVELOPE DOES NOT ACCURATELY DEPICT THE ACTUAL FACE OF WALL.



RETAINING WALL -RW9-

PROJECT NO.: 36030.1.1 (I-4700)
 BUNCOMBE COUNTY
 STATION: -WBL- 976+00
 SHEET 10 OF 29

NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 DIVISION OF HIGHWAYS
 GEOTECHNICAL
 ENGINEERING UNIT

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	
1	SCC	6/10/19	3			W-10
2			4			

PREPARED BY: MHS
 DATE: 3/1/19
 REVIEWED BY: SCC
 DATE: 3/1/19

ESTIMATED SOIL NAIL WALL QUANTITIES			
RETAINING WALL NO.	SOIL NAIL RETAINING WALLS (SQUARE FEET)	SOIL NAIL VERIFICATION TESTS	SOIL NAIL PROOF TESTS
RW10	17,225	3	37
ARCHITECTURAL CONCRETE SURFACE TREATMENT		17,225 SF	

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
ROCK	165	45	1,000

GEOTECHNICAL ENGINEER

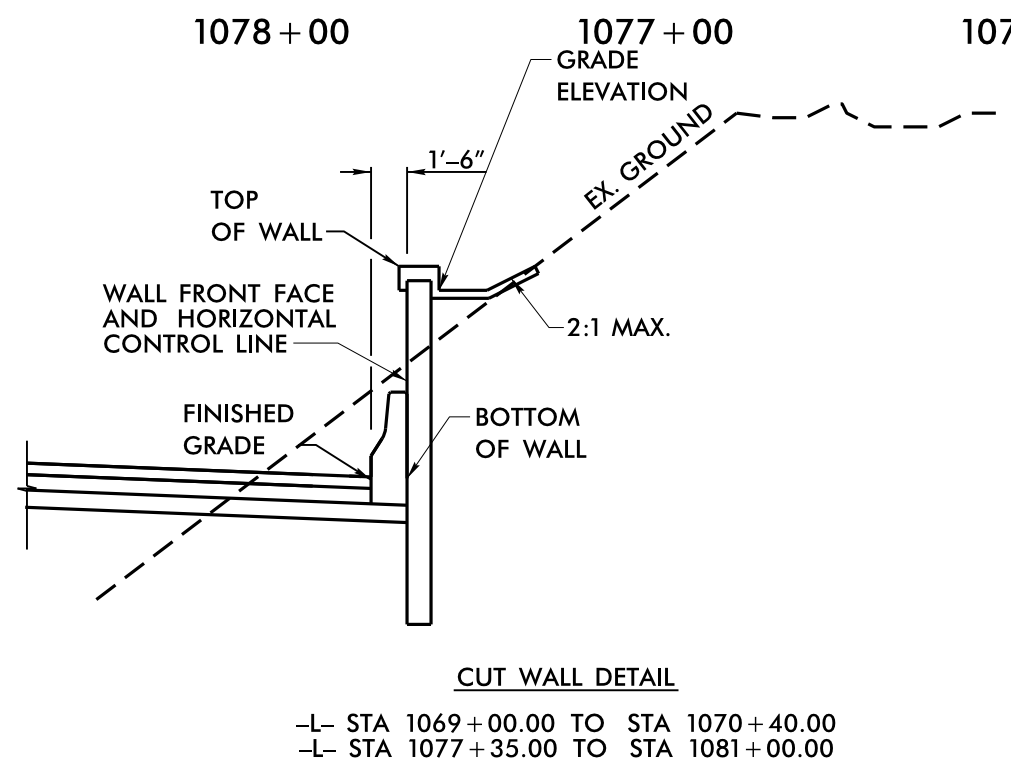
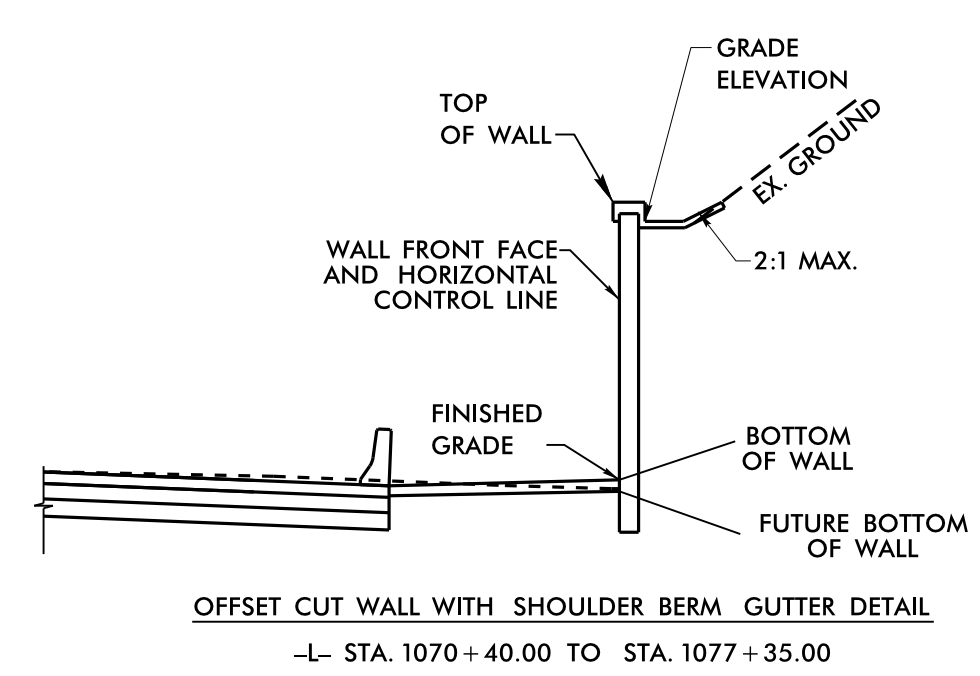
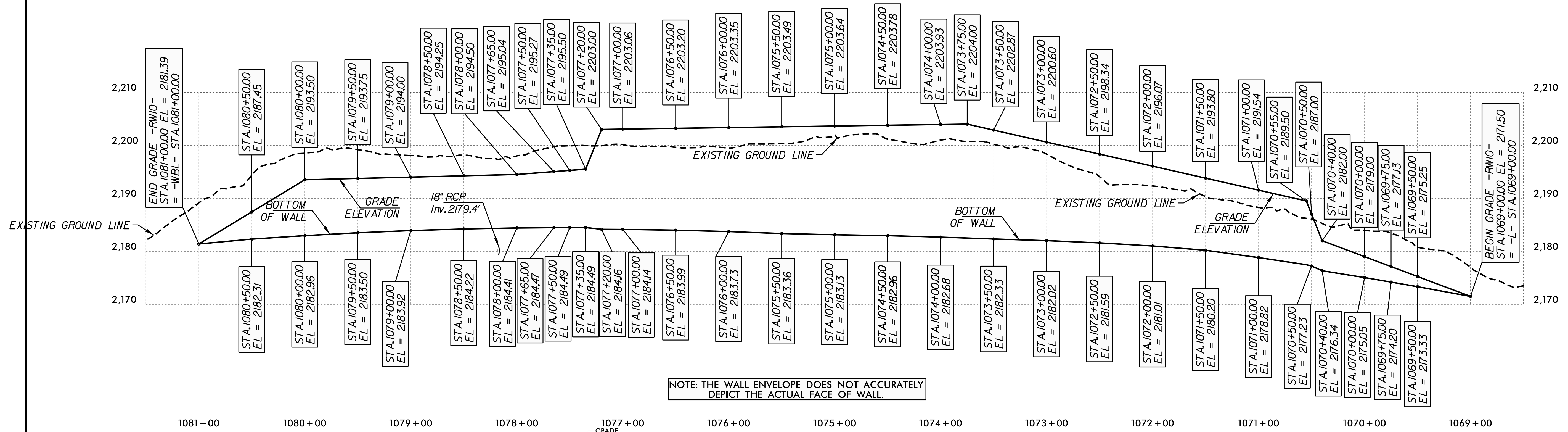
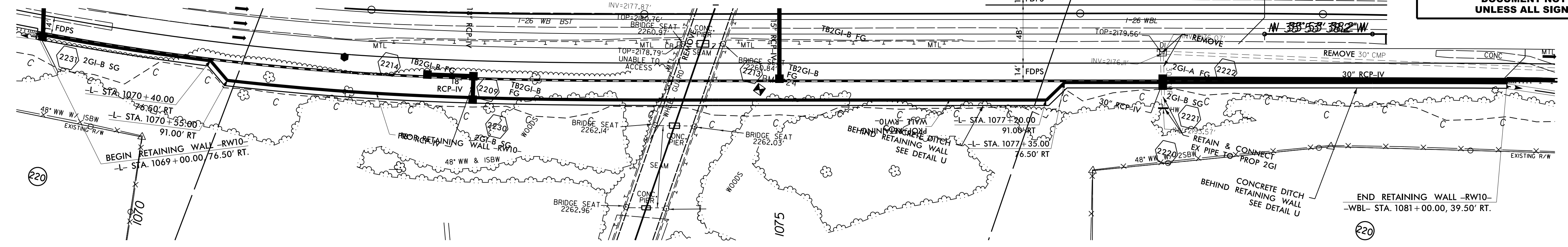
ENGINEER

SEAL 028893

6/11/2019

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NOTES:
 1. A FENCE MAYBE REQUIRED ON TOP OF THE RETAINING WALLS.
 SEE ROADWAY PLANS FOR FENCE OR HANDRAIL ATTACHMENT DETAILS.



RETAINING WALL -RW10-

PROJECT NO.: 36030.1.1 (I-4700)
 BUNCOMBE COUNTY
 STATION: -L- 1069+00
 SHEET 11 OF 29

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

REVISIONS					
NO.	BY	DATE	NO.	BY	DATE
1	SCC	6/10/19	3		
2			4		

SHEET NO. W-11

PREPARED BY: MHS DATE: 3/1/19
 REVIEWED BY: SCC DATE: 3/1/19

GEOTECHNICAL ENGINEER

ENGINEER

SEAL 028893

ENGINEER

MICHAEL H. STEPHENS

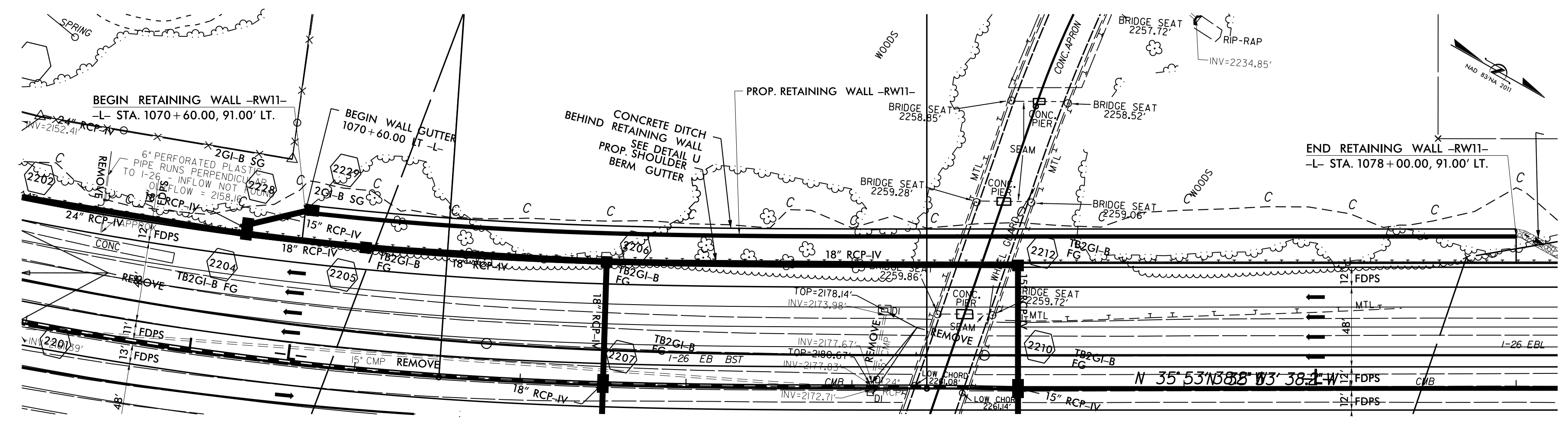
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DATE

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DATE

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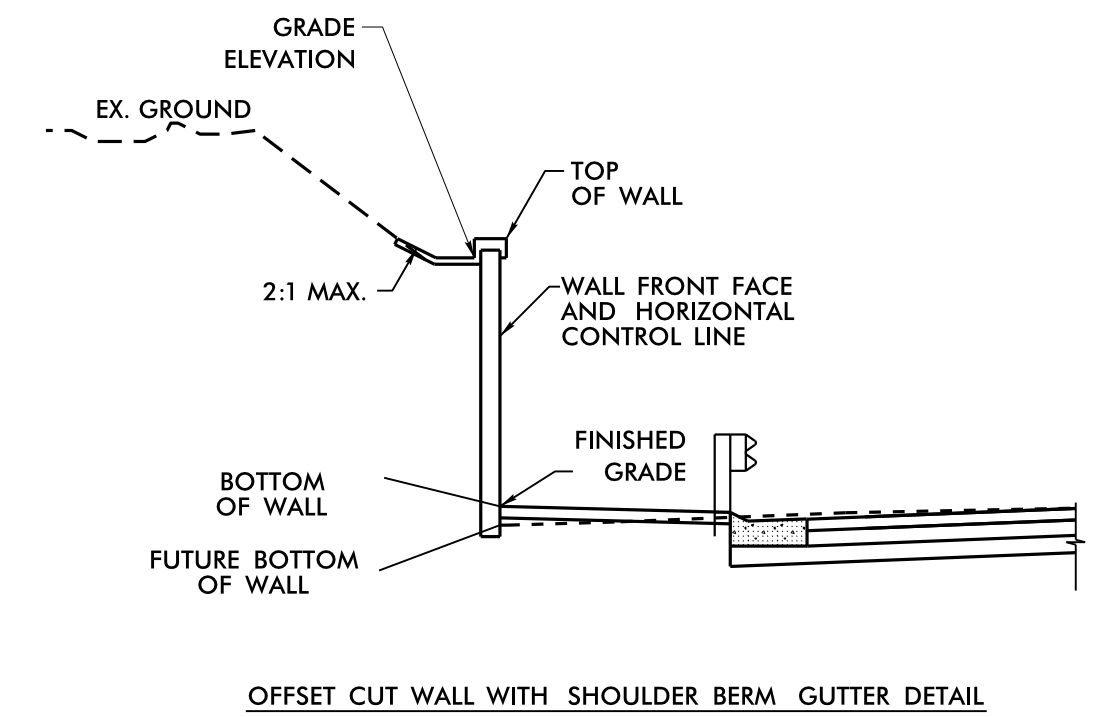
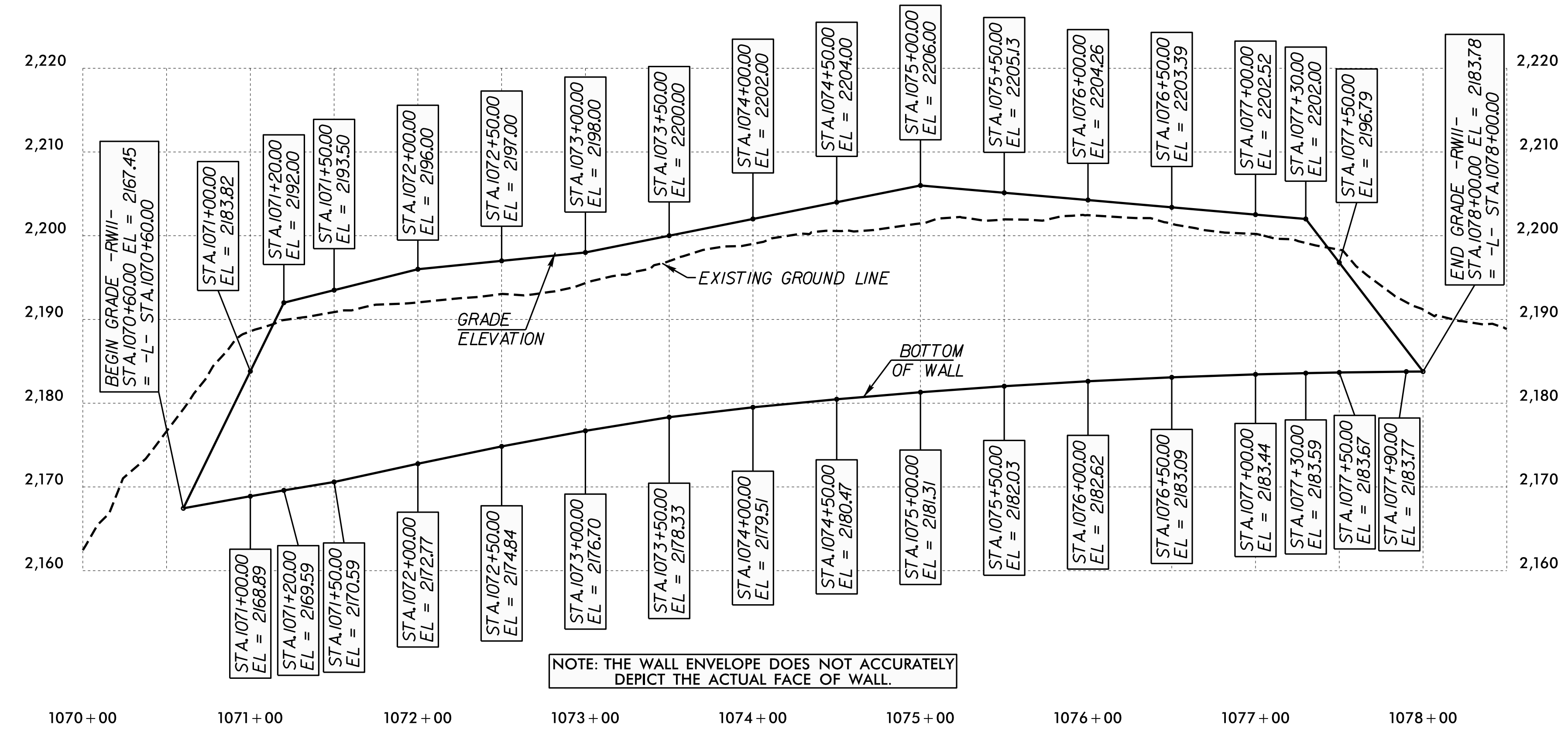
ESTIMATED SOIL NAIL WALL QUANTITIES

RETAINING WALL NO.	SOIL NAIL RETAINING WALLS (SQUARE FEET)	SOIL NAIL VERIFICATION TESTS	SOIL NAIL PROOF TESTS
RW11	15,555	3	38
ARCHITECTURAL CONCRETE SURFACE TREATMENT		15,555 SF	

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
ROCK	165	45	1,000

NOTES:
 1) A FENCE MAYBE REQUIRED ON TOP OF THE RETAINING WALLS.
 SEE ROADWAY PLANS FOR FENCE OR HANDRAIL ATTACHMENT DETAILS.



RETAINING WALL -RW11-

PROJECT NO.: 36030.1.1 (I-4700)

BUNCOMBE COUNTY

STATION: -L- 1070+60

SHEET 12 OF 29

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

RETAINING WALL NO. -RW11- SOIL NAIL WALL

REVISIONS					
NO.	BY	DATE	NO.	BY	DATE
1	SCC	6/10/19	3		
2			4		

SHEET NO. W-12

PREPARED BY: MHS DATE: 3/1/19

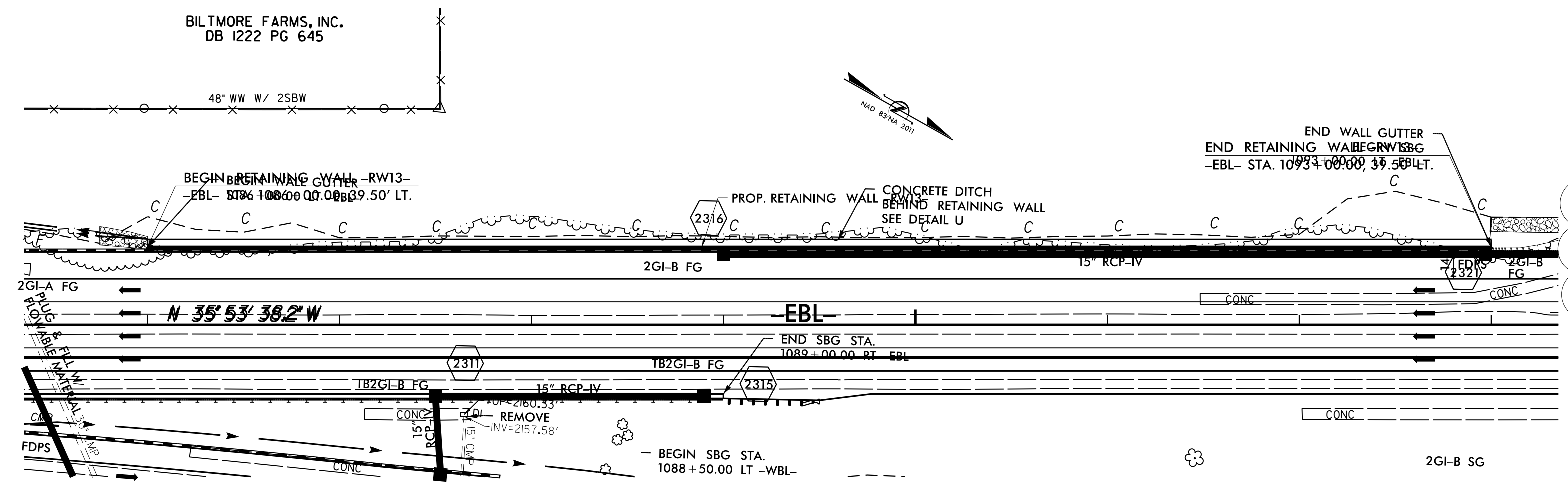
REVIEWED BY: SCC DATE: 3/1/19

GEOTECHNICAL ENGINEER

ENGINEER

DocuSigned by: *M. Stephens* 6/11/2019

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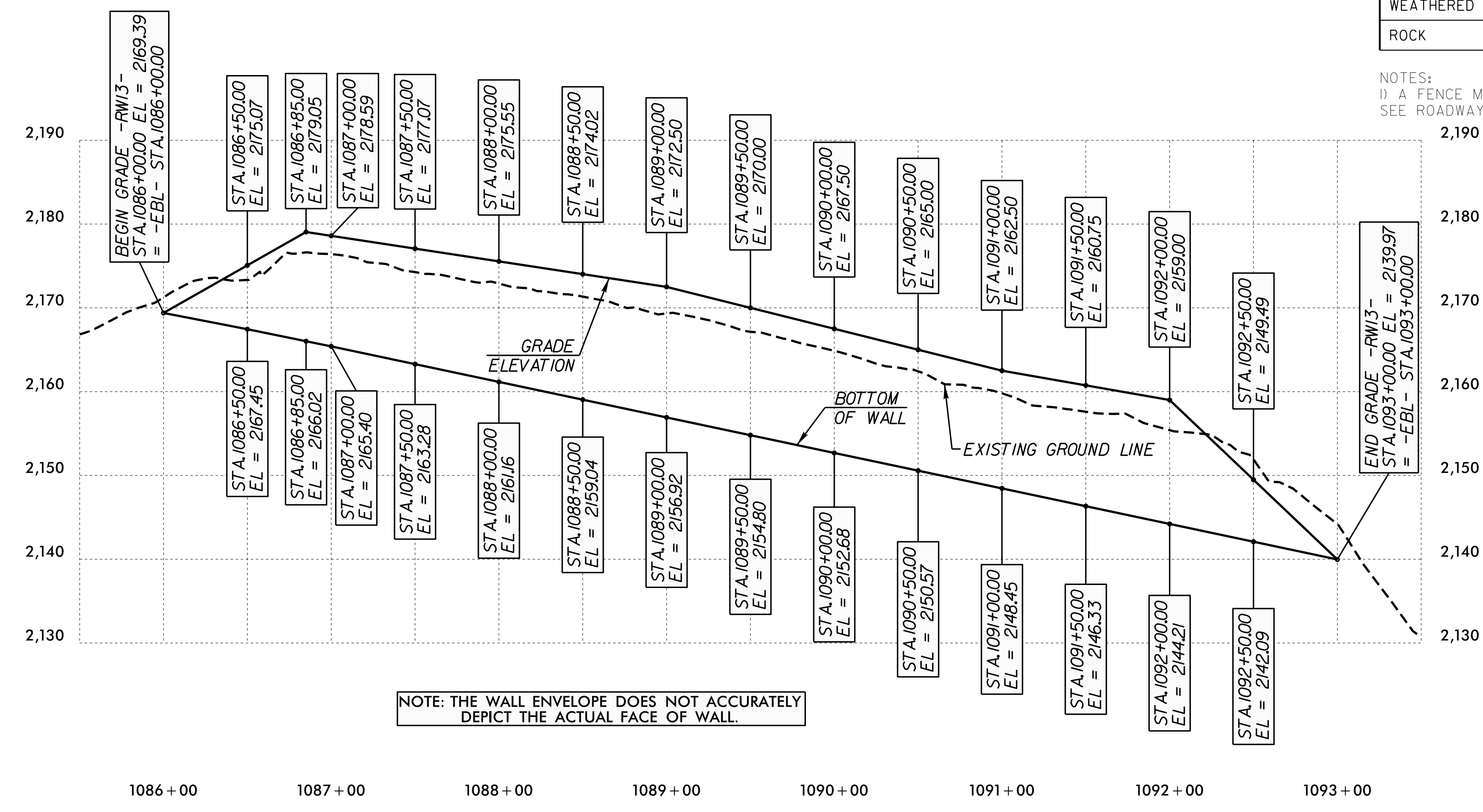


ESTIMATED SOIL NAIL WALL QUANTITIES			
RETAINING WALL NO.	SOIL NAIL RETAINING WALLS (SQ. FEET)	SOIL NAIL VERIFICATION TESTS	SOIL NAIL PROOF TESTS
RW13	9,470	2	22
ARCHITECTURAL CONCRETE SURFACE TREATMENT		9,470 SF	

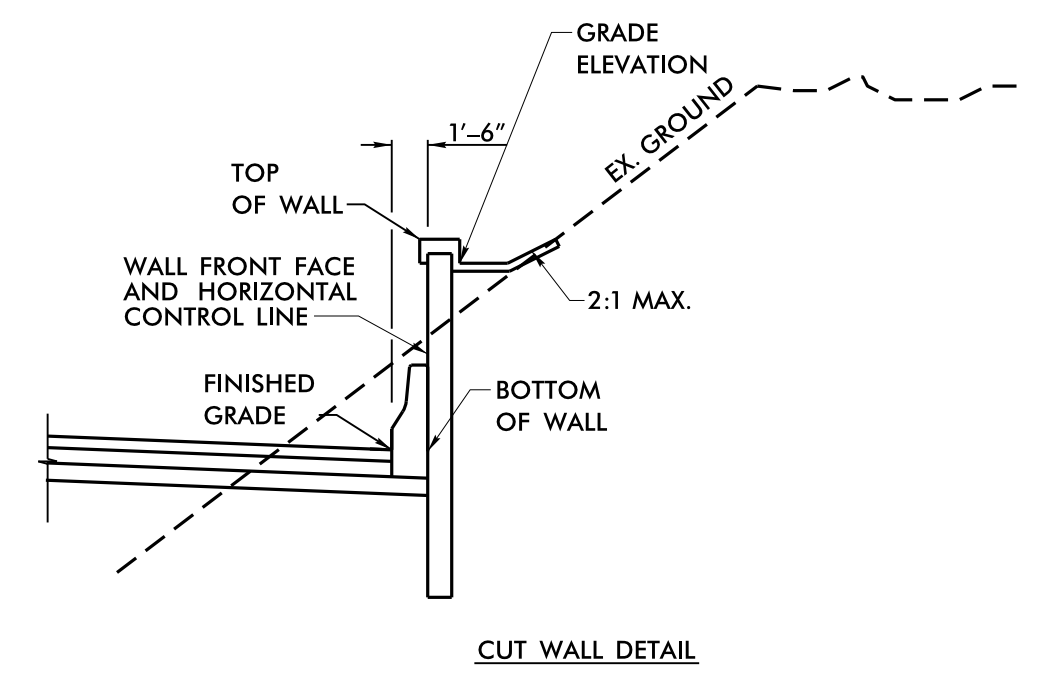
IN-SITU ASSUMED MATERIAL PARAMETERS:

MATERIAL TYPE	UNIT WEIGHT, γ (LB/CF)	FRICTION ANGLE, ϕ DEGREES	COHESION, c (LB/SF)
EMBANKMENT FILL	115	28	0
RESIDUAL	120	30	0
WEATHERED ROCK	135	36	0
ROCK	165	45	1,000

NOTES:
 1. A FENCE MAYBE REQUIRED ON TOP OF THE RETAINING WALLS.
 SEE ROADWAY PLANS FOR FENCE OR HANDRAIL ATTACHMENT DETAILS.



NOTE: THE WALL ENVELOPE DOES NOT ACCURATELY DEPICT THE ACTUAL FACE OF WALL.



RETAINING WALL -RW13-

PROJECT NO.: 36030.1.1 (I-4700)
 BUNCOMBE COUNTY
 STATION: -EBL- 1086+00
 SHEET 14 OF 29

NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 DIVISION OF HIGHWAYS

**GEOTECHNICAL
 ENGINEERING UNIT**

REVISIONS					
NO.	BY	DATE	NO.	BY	DATE
1	SCC	6/10/19	3		
2			4		

SHEET NO. W-14

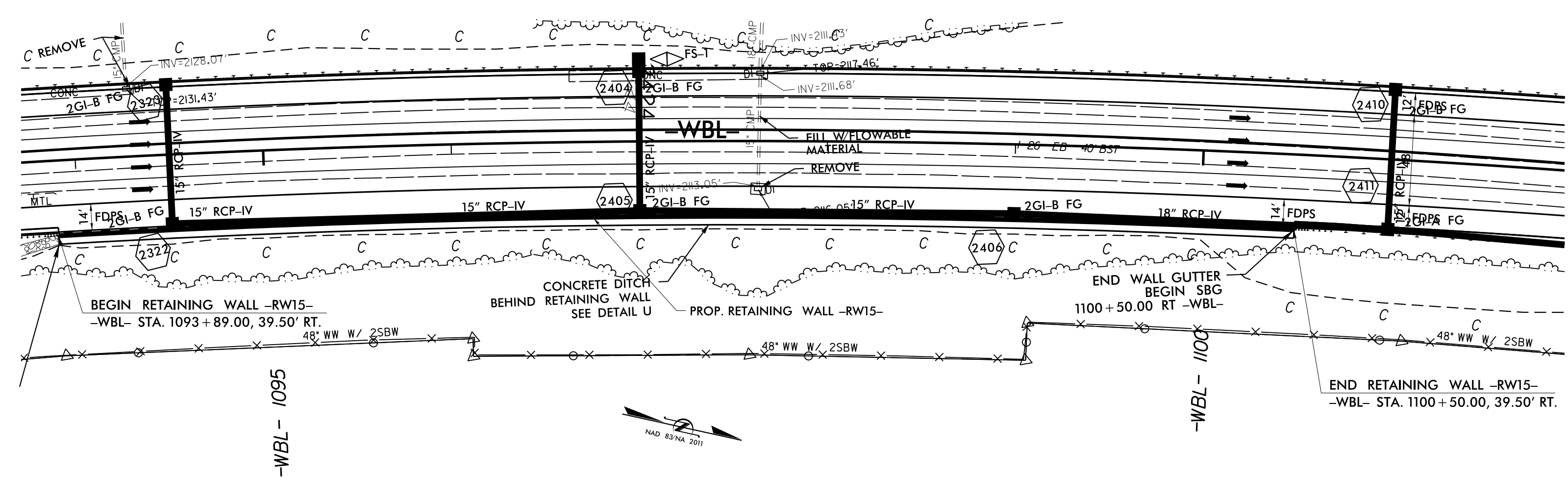
PREPARED BY: MHS DATE: 3/1/19
 REVIEWED BY: SCC DATE: 3/1/19

GEOTECHNICAL ENGINEER

ENGINEER

DocuSigned by:
Michael H. Stephens
6/11/2019

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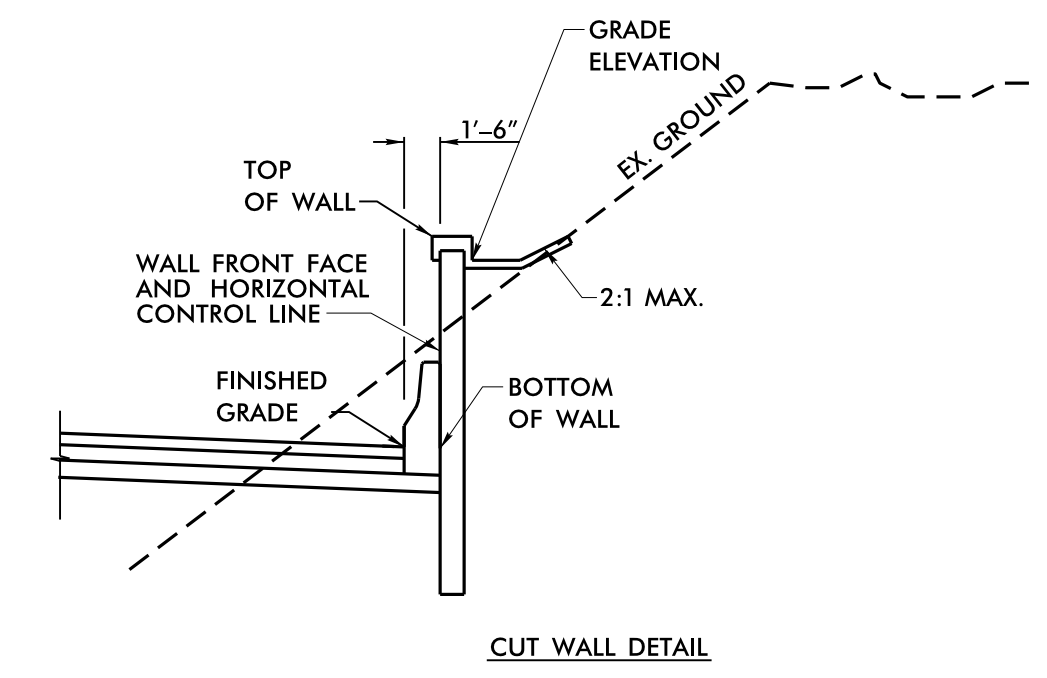
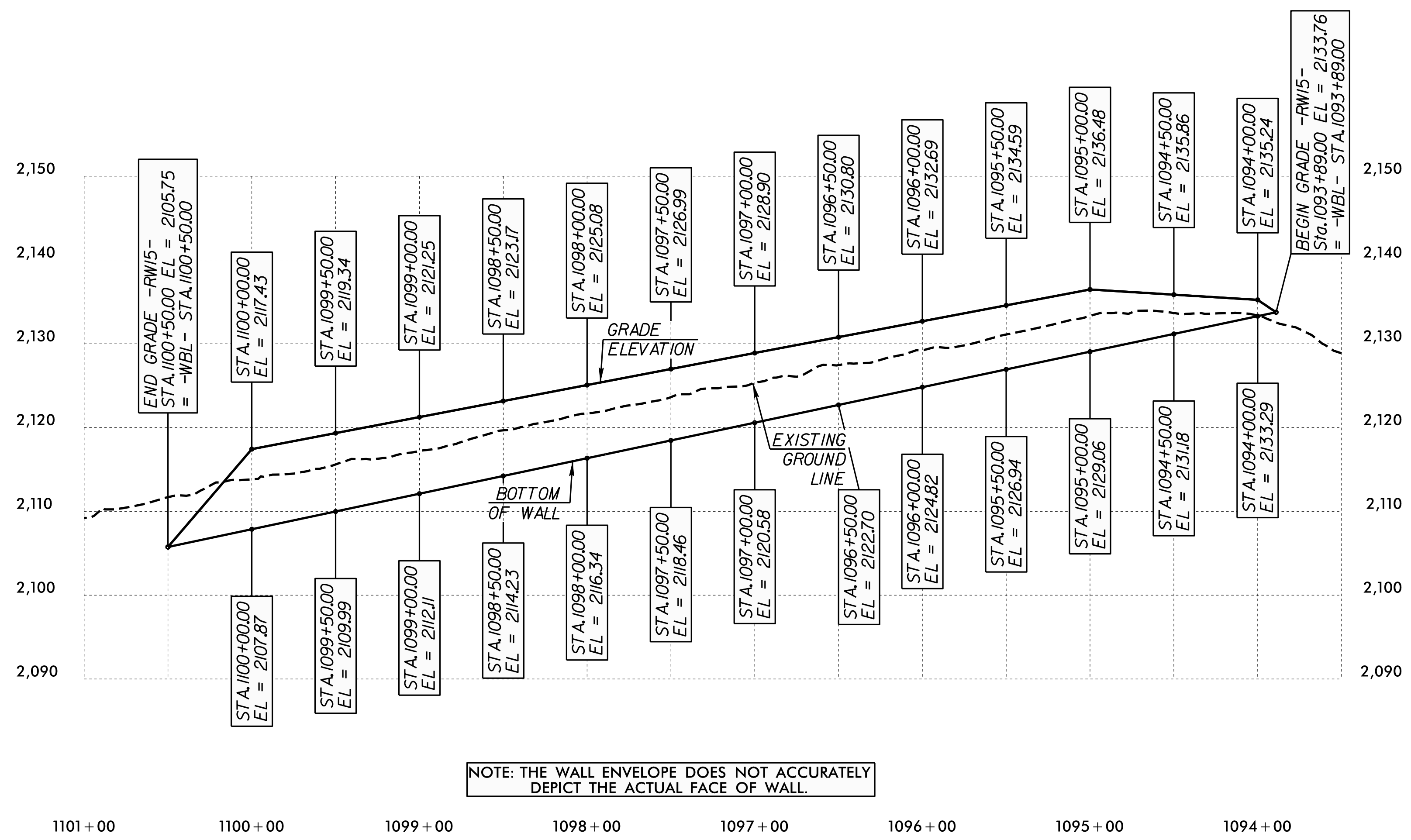
ESTIMATED SOIL NAIL WALL QUANTITIES

RETAINING WALL NO.	SOIL NAIL RETAINING WALLS (SQ. FEET)	SOIL NAIL VERIFICATION TESTS	SOIL NAIL PROOF TESTS
RW15	5,635	2	14
ARCHITECTURAL CONCRETE SURFACE TREATMENT		5,635 SF	

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	130	30	0

NOTES:
1) A FENCE MAYBE REQUIRED ON TOP OF THE RETAINING WALLS.
SEE ROADWAY PLANS FOR FENCE OR HANDRAIL ATTACHMENT DETAILS.



RETAINING WALL -RW15-

PROJECT NO.: 36030.1.1 (I-4700)
BUNCOMBE COUNTY
STATION: -WBL- 1093+89
SHEET 16 OF 29

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

**GEOTECHNICAL
ENGINEERING UNIT**

**RETAINING WALL NO. -RW15-
SOIL NAIL WALL**

REVISIONS					
NO.	BY	DATE	NO.	BY	DATE
1	SCC	6/10/19	3		
2			4		

SHEET NO. W-16

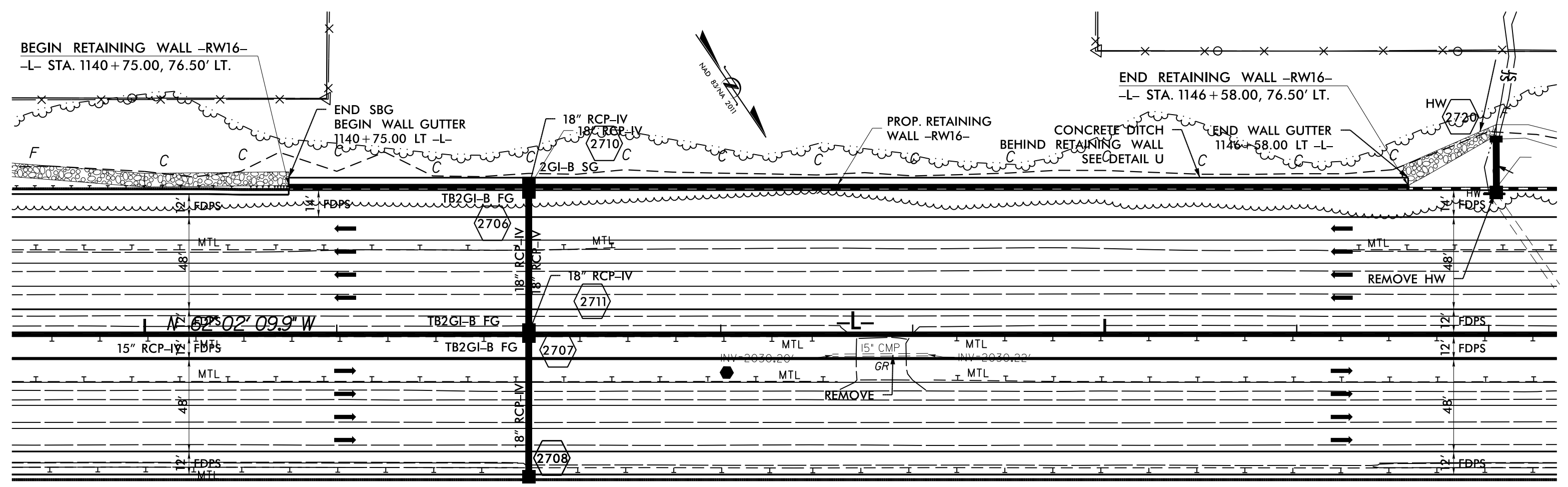
PREPARED BY: MHS DATE: 3/1/19
REVIEWED BY: SCC DATE: 3/1/19

GEOTECHNICAL ENGINEER

ENGINEER

DocuSigned by: *M. Stephens* 6/11/2019

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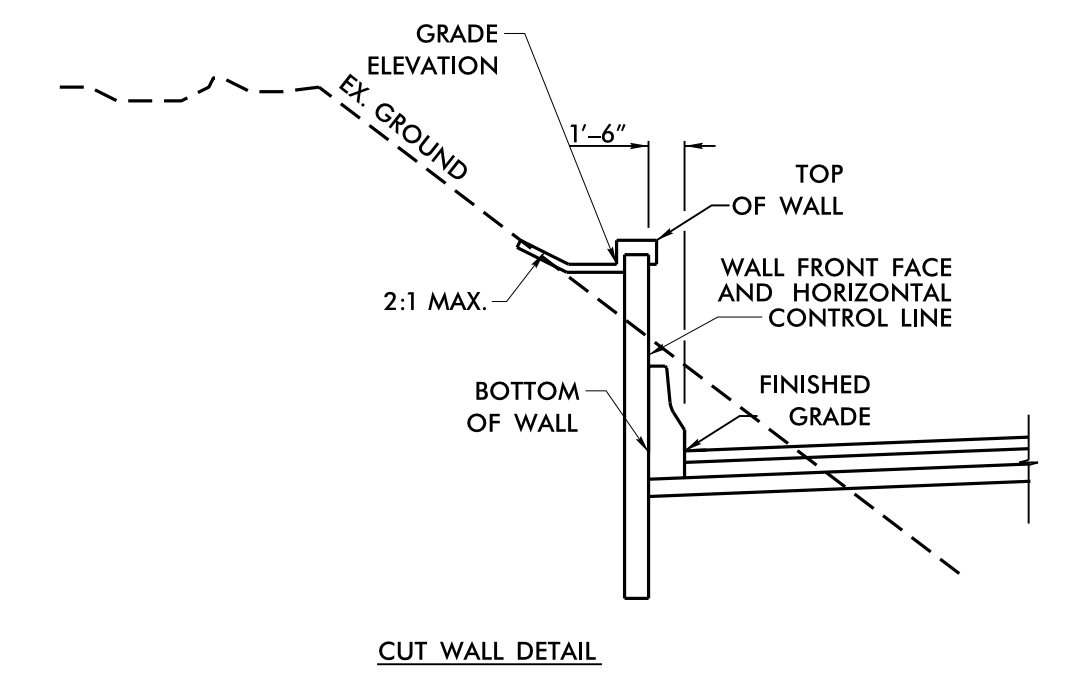
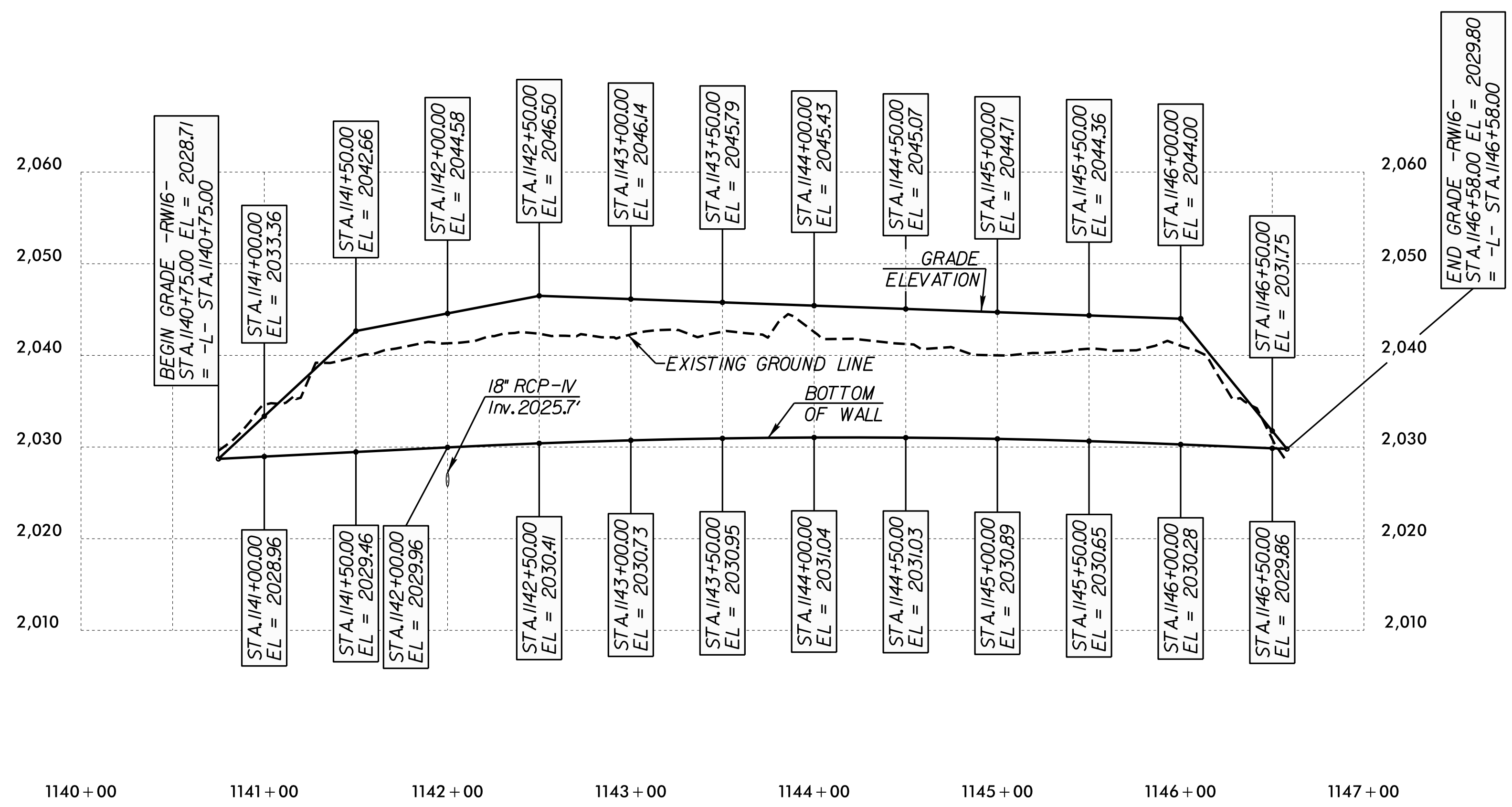
ESTIMATED SOIL NAIL WALL QUANTITIES

RETAINING WALL NO.	SOIL NAIL RETAINING WALLS (SQUARE FEET)	SOIL NAIL VERIFICATION TESTS	SOIL NAIL PROOF TESTS
RW16	7,990	2	18
ARCHITECTURAL CONCRETE SURFACE TREATMENT		7,990 SF	

IN-SITU ASSUMED MATERIAL PARAMETERS:

MATERIAL TYPE	UNIT WEIGHT, γ (LB/CF)	FRICTION ANGLE, ϕ DEGREES	COHESION, c (LB/SF)
RESIDUAL	130	30	0
ROCK	165	45	1,000

NOTES:
 1) A FENCE MAYBE REQUIRED ON TOP OF THE RETAINING WALLS.
 SEE ROADWAY PLANS FOR FENCE OR HANDRAIL ATTACHMENT DETAILS.



RETAINING WALL -RW16-

PROJECT NO.: 36030.1.1 (I-4700)
 BUNCOMBE COUNTY
 STATION: -L- 1140+75
 SHEET 17 OF 29

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

**GEOTECHNICAL
 ENGINEERING UNIT**

**RETAINING WALL NO. -RW16-
 SOIL NAIL WALL**

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	
1	SCC	6/10/19	3			W-17
2			4			

PREPARED BY: MHS DATE: 3/1/19
 REVIEWED BY: SCC DATE: 3/1/19

ESTIMATED SOIL NAIL WALL QUANTITIES

RETAINING WALL NO.	SOIL NAIL RETAINING WALLS (SQUARE FEET)	SOIL NAIL VERIFICATION TESTS	SOIL NAIL PROOF TESTS
RW17	27,310	6	69
ARCHITECTURAL CONCRETE SURFACE TREATMENT		27,310 SF	

NOTES:
 1) A FENCE MAYBE REQUIRED ON TOP OF THE RETAINING WALLS. SEE ROADWAY PLANS FOR FENCE OR HANDRAIL ATTACHMENT DETAILS.
 2) RETAINING WALL -RW17- HAS A SADDLE THAT REQUIRES A DRAINAGE STRUCTURE BE INSTALLED BEHIND THE RETAINING WALL. SEE ROADWAY AND HYDRO PLANS FOR STRUCTURE TYPE AND LOCATION.

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	130	30	0
ROCK	165	45	1,000

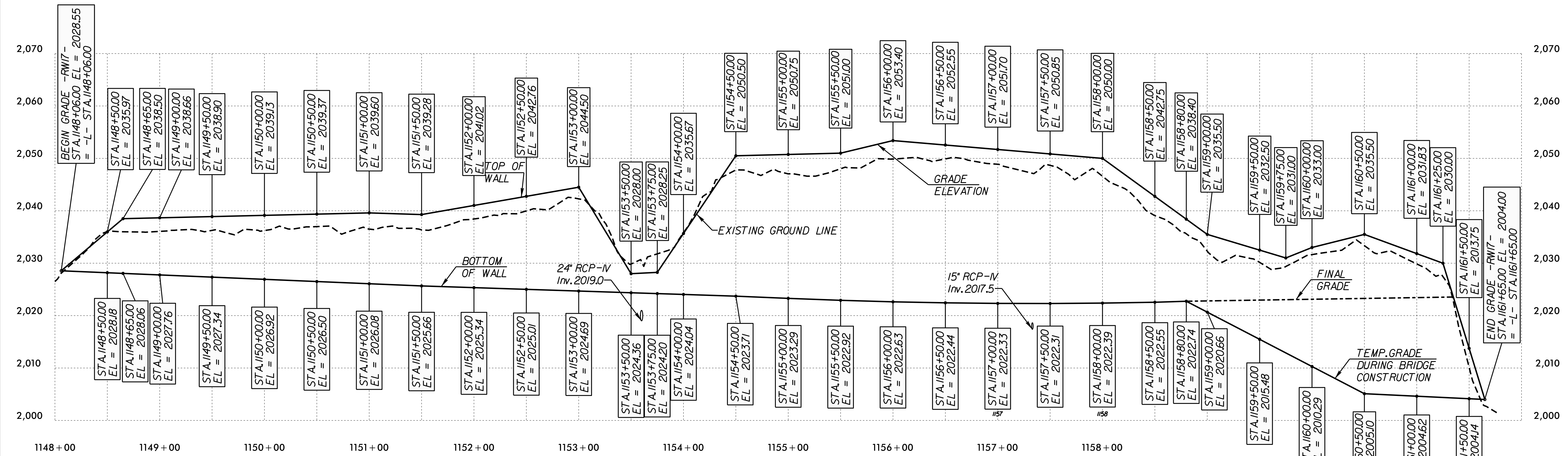
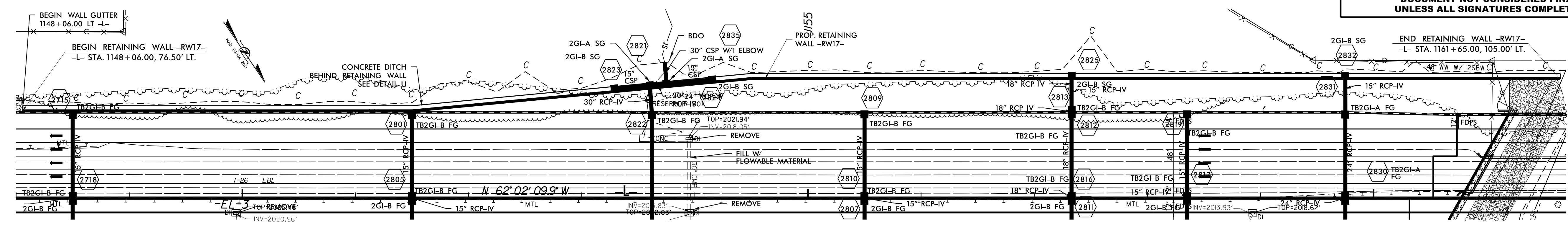
GEOTECHNICAL ENGINEER

ENGINEER

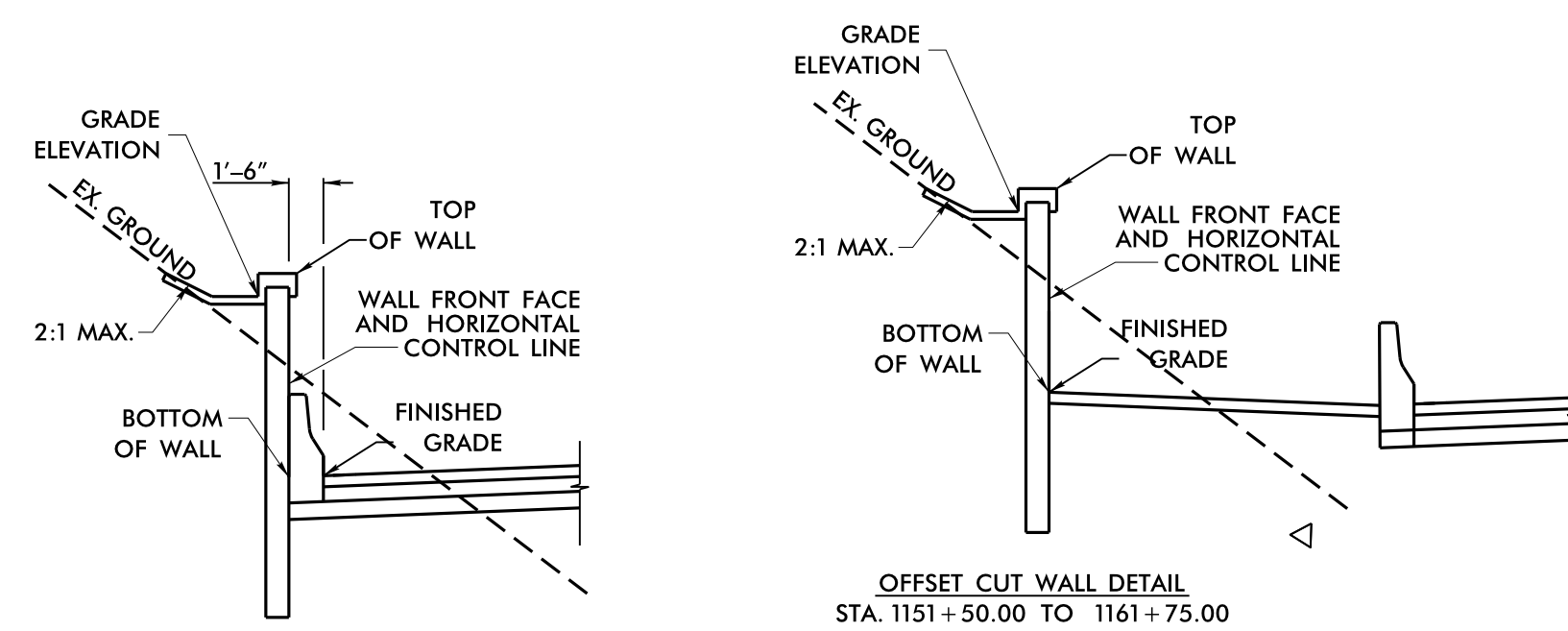
SEAL 028893

6/11/2019

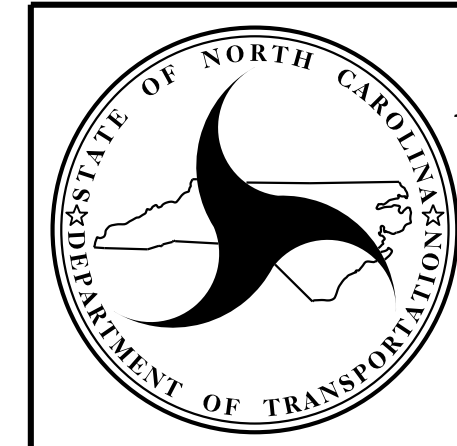
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NOTE: THE WALL ENVELOPE DOES NOT ACCURATELY DEPICT THE ACTUAL FACE OF WALL.



RETAINING WALL -RW17-



NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 DIVISION OF HIGHWAYS

**GEOTECHNICAL
 ENGINEERING UNIT**

PROJECT NO.: 36030.1.1 (I-4700)
 BUNCOMBE COUNTY
 STATION: -L- 1148+06
 SHEET 18 OF 29

REVISIONS					
NO.	BY	DATE	NO.	BY	DATE
1	SCC	6/10/19	3		
2			4		

PREPARED BY: MHS
 REVIEWED BY: SCC

DATE: 3/1/19
 DATE: 3/1/19

SHEET NO. W-18

GEOTECHNICAL ENGINEER

ENGINEER

SEAL 028893

ENGINEER

MICHAEL H. STEPHENS

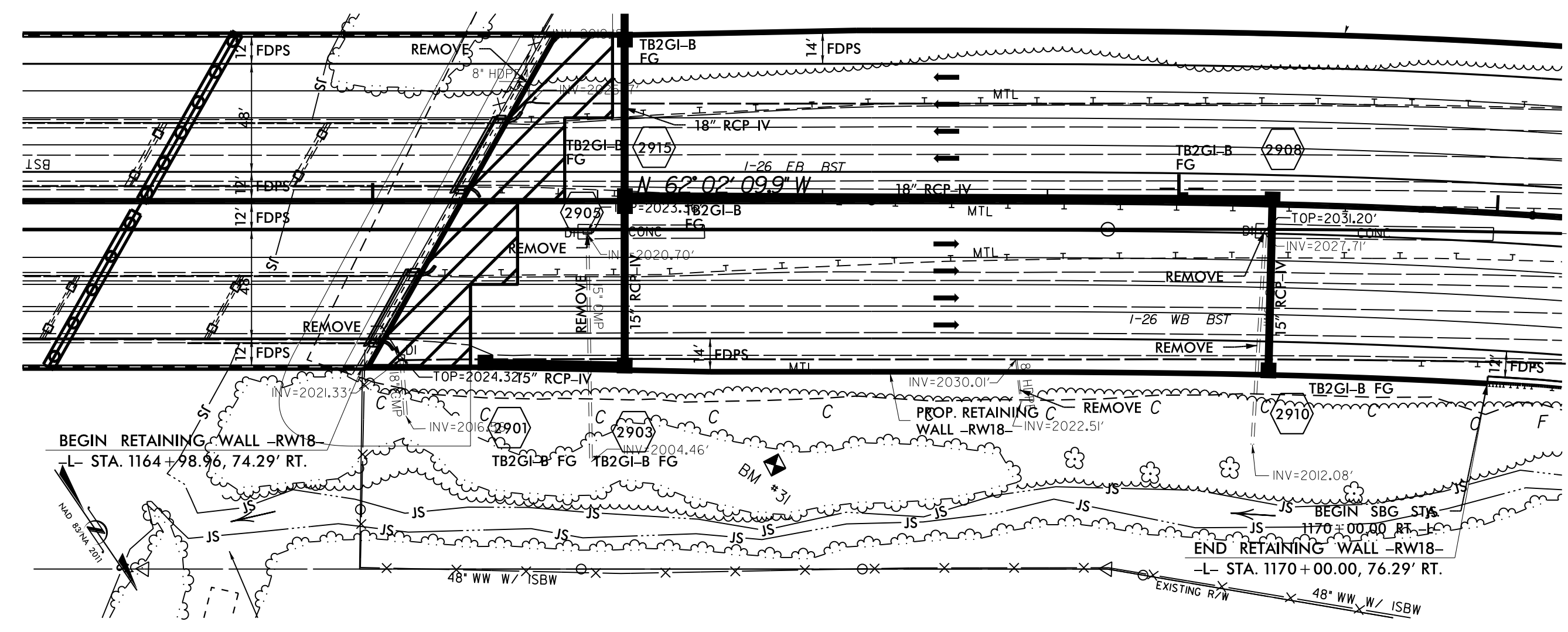
DocSigned by: *[Signature]* 6/11/2019

DATE

SIGNATURE

DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



ESTIMATED MSE WALL QUANTITIES
(SQUARE FEET)

MSE RETAINING WALL NO. RW18	3,340 SF
ARCHITECTURAL CONCRETE SURFACE TREATMENT	3,340 SF

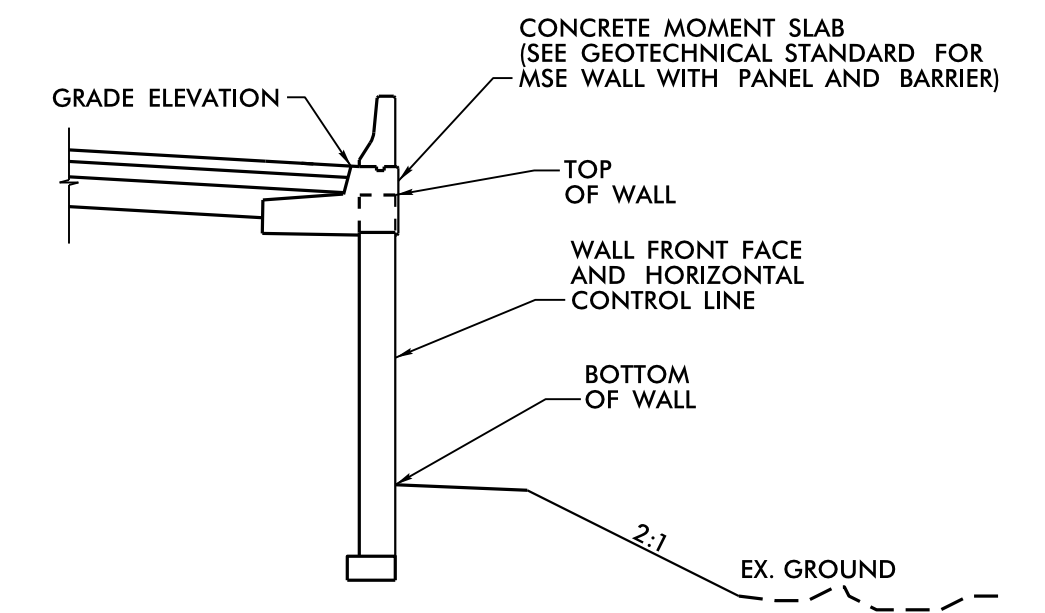
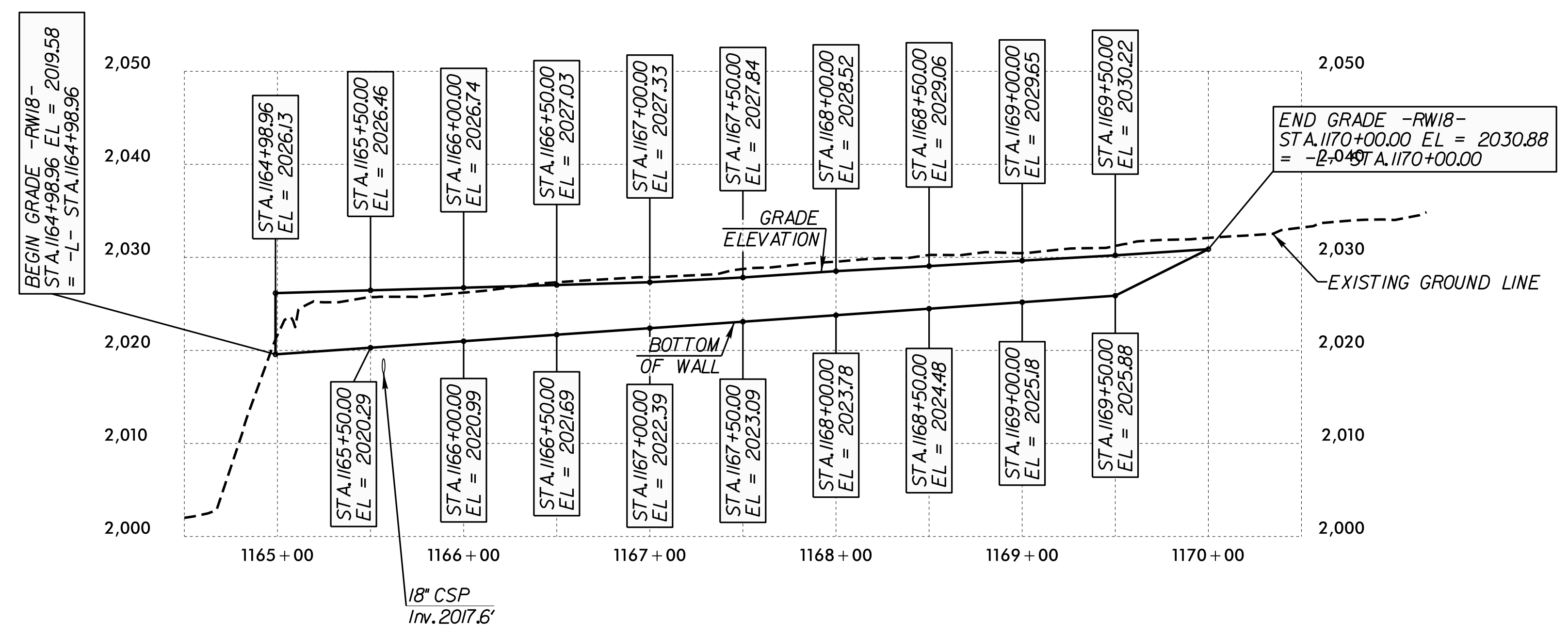
- DESIGN RETAINING WALL NO. RW18 FOR THE FOLLOWING:
- 1) H = DESIGN HEIGHT + EMBEDMENT
 - 2) DESIGN LIFE = 100 YEARS
 - 3) MAXIMUM FACTORED VERTICAL PRESSURE ON FOUNDATION MATERIAL = 2,100 LB/SF
 - 4) MINIMUM REINFORCEMENT LENGTH (L) = 1.5 H OR 6 FT, WHICHEVER IS LONGER
 - 5) MINIMUM EMBEDMENT DEPTH = H/5 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



NOTE:
BOTTOM OF WALL IS LOWER THAN NECESSARY FOR CONSTRUCTION ACCESS TO THE FRENCH BROAD RIVER.

RETAINING WALL -RW18-

PROJECT NO.: 36030.1.1 (I-4700)

BUNCOMBE COUNTY

STATION: -L- 1164+99

SHEET 19 OF 29

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

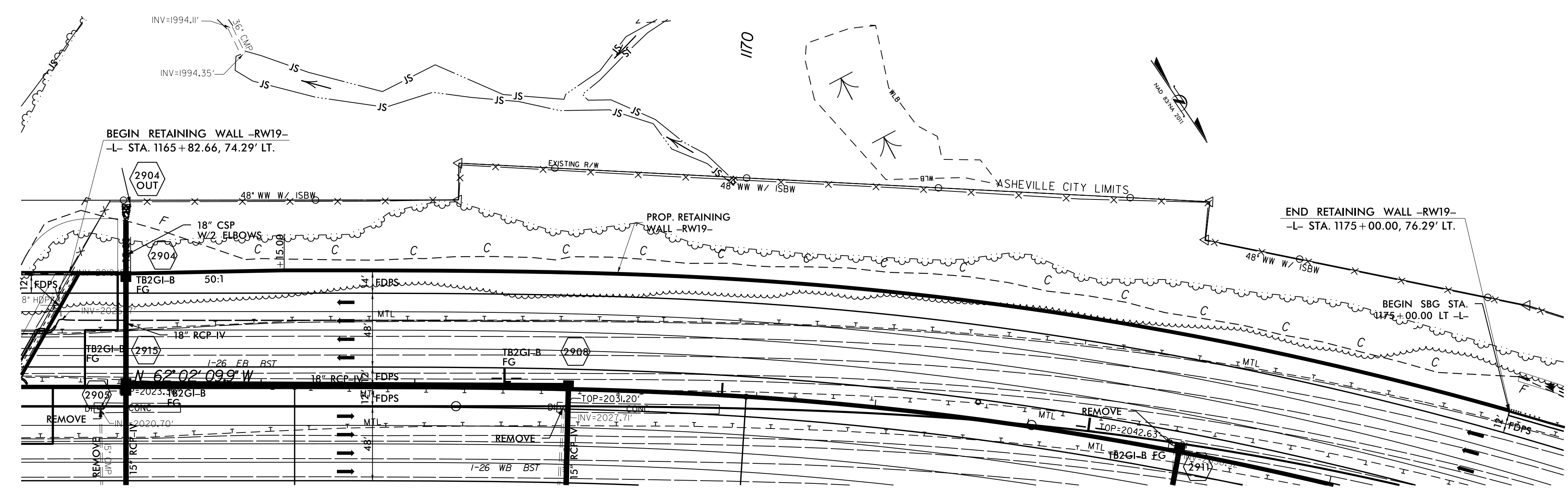
RETAINING WALL NO. -RW18- MSE WALL

REVISIONS					
NO.	BY	DATE	NO.	BY	DATE
1	SCC	6/10/19	3		
2			4		

SHEET NO. W-19

PREPARED BY: MHS DATE: 3/1/19

REVIEWED BY: SCC DATE: 3/1/19



ESTIMATED MSE WALL QUANTITIES (SQUARE FEET)

MSE RETAINING WALL NO. RW19	17,670 SF
ARCHITECTURAL CONCRETE SURFACE TREATMENT	17,670 SF

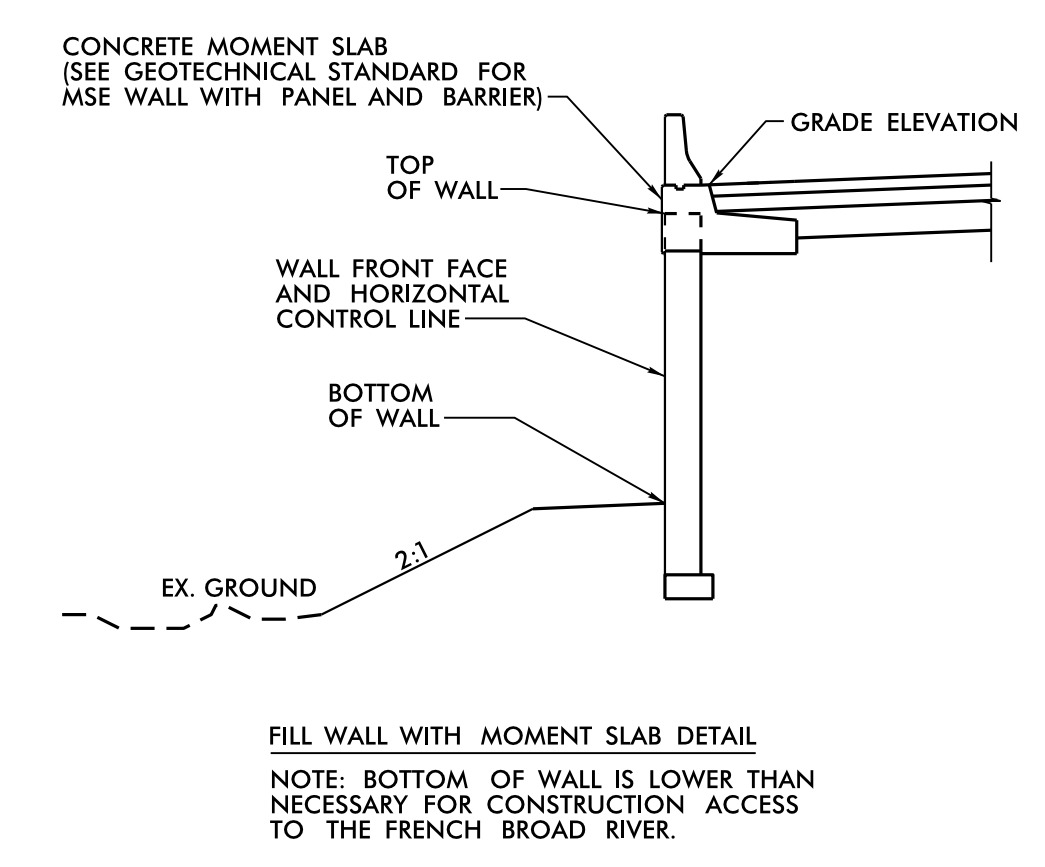
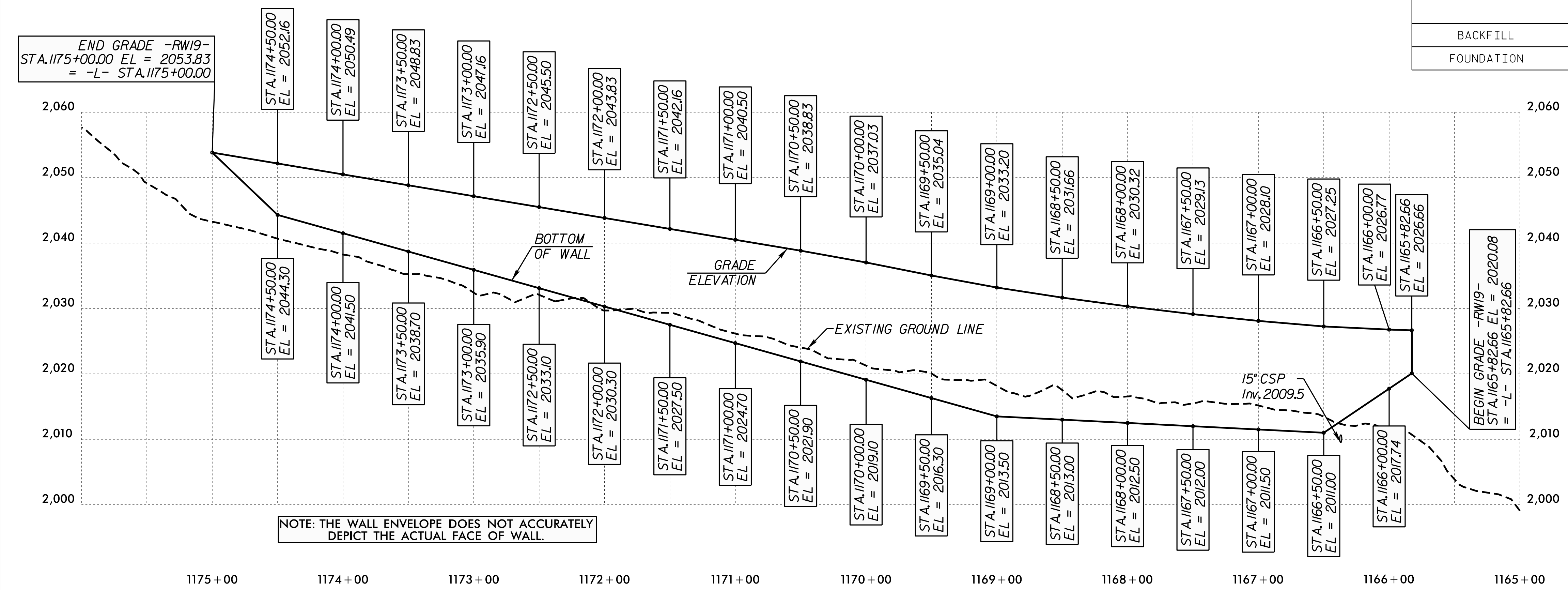
- DESIGN RETAINING WALL NO. RW19 FOR THE FOLLOWING:
- 1) H = DESIGN HEIGHT + EMBEDMENT
 - 2) DESIGN LIFE = 100 YEARS
 - 3) MAXIMUM FACTORED VERTICAL PRESSURE ON FOUNDATION MATERIAL = 5,700 LB/SF
 - 4) MINIMUM REINFORCEMENT LENGTH (L) ≥ 1.5 H OR 6 FT, WHICHEVER IS LONGER
 - 5) MINIMUM EMBEDMENT DEPTH = H/5 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.

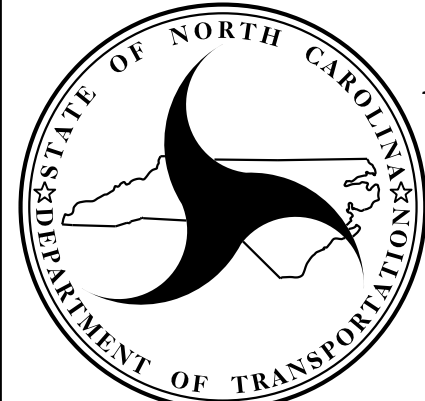
7) IN-SITU ASSUMED MATERIAL PARAMETERS:

MATERIAL TYPE	UNIT WEIGHT (γ) LB/CF	FRICTION ANGLE (φ) DEGREES	COHESION (c) LB/SF
BACKFILL	120	30	0
FOUNDATION	115	28	0



RETAINING WALL -RW19-

PROJECT NO.: 36030.1.1 (I-4700)
 BUNCOMBE COUNTY
 STATION: -L- 1165+82.7
 SHEET 20 OF 29


NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

PREPARED BY: MHS DATE: 3/1/19
 REVIEWED BY: SCC DATE: 3/1/19

RETAINING WALL NO. -RW19- MSE WALL

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	
1	SCC	6/10/19	3			W-20
2			4			

ESTIMATED MSE WALL QUANTITIES (SQUARE FEET)

MSE RETAINING WALL NO. RW20	13,880 SF
ARCHITECTURAL CONCRETE SURFACE TREATMENT	13,880 SF

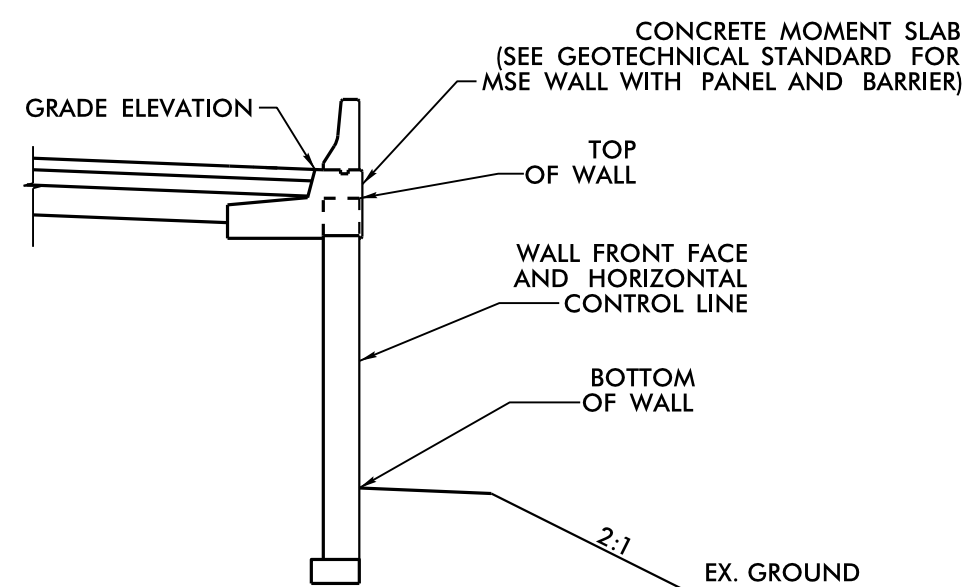
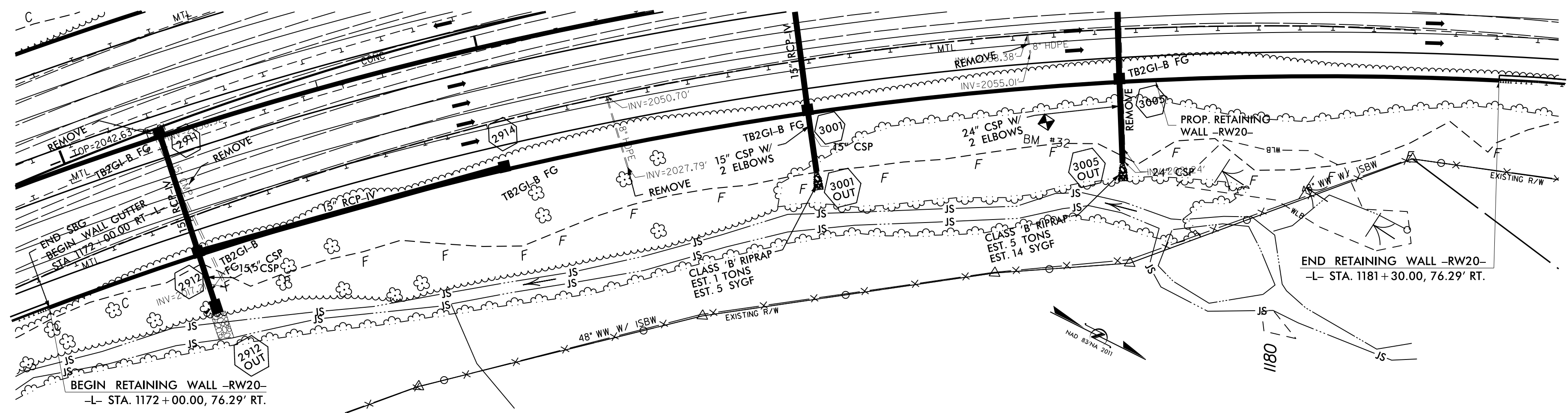
- DESIGN RETAINING WALL NO. RW20 FOR THE FOLLOWING:
- 1) H = DESIGN HEIGHT + EMBEDMENT
 - 2) DESIGN LIFE = 100 YEARS
 - 3) MAXIMUM FACTORED VERTICAL PRESSURE ON FOUNDATION MATERIAL = 5,100 LB/SF
 - 4) MINIMUM REINFORCEMENT LENGTH (L) = 1.5 H OR 6 FT, WHICHEVER IS LONGER
 - 5) MINIMUM EMBEDMENT DEPTH = H/5 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

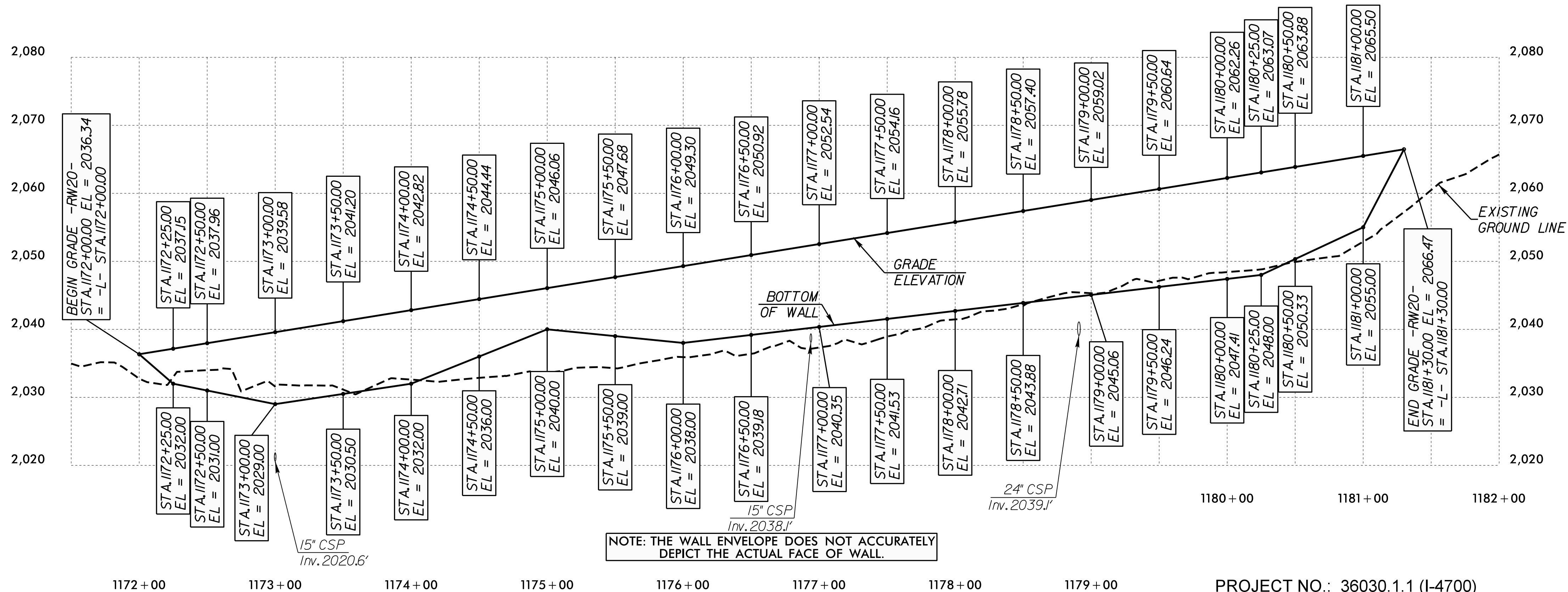
*SEE MSE RETAINING WALLS PROVISION FOR COARSE AND FINE AGGREGATE MATERIAL REQUIREMENTS.

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	115	28	0



RETAINING WALL -RW20-



PROJECT NO.: 36030.1.1 (I-4700)
 BUNCOMBE COUNTY
 STATION: -L- 1172+00
 SHEET 21 OF 29

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

**GEOTECHNICAL
 ENGINEERING UNIT**

REVISIONS					
NO.	BY	DATE	NO.	BY	DATE
1	SCC	6/10/19	3		
2			4		

PREPARED BY: MHS	DATE: 3/1/19
REVIEWED BY: SCC	DATE: 3/1/19

RETAINING WALL NO. -RW20- MSE WALL				
SHEET NO.				
W-21				

ESTIMATED SOIL NAIL WALL QUANTITIES

RETAINING WALL NO.	SOIL NAIL RETAINING WALLS (SQUARE FEET)	SOIL NAIL VERIFICATION TESTS	SOIL NAIL PROOF TESTS
RW21	8,870	2	18
ARCHITECTURAL CONCRETE SURFACE TREATMENT		8,870 SF	

NOTES:
 1) A FENCE MAY BE REQUIRED ON TOP OF THE RETAINING WALLS. SEE ROADWAY PLANS FOR FENCE OR HANDRAIL ATTACHMENT DETAILS.
 2) RETAINING WALL -RW21- HAS A SADDLE THAT REQUIRES A DRAINAGE STRUCTURE BE INSTALLED BEHIND THE RETAINING WALL. SEE ROADWAY AND HYDRO PLANS FOR STRUCTURE TYPE AND LOCATION.

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
ROCK	165	45	1,000

GEOTECHNICAL ENGINEER

ENGINEER

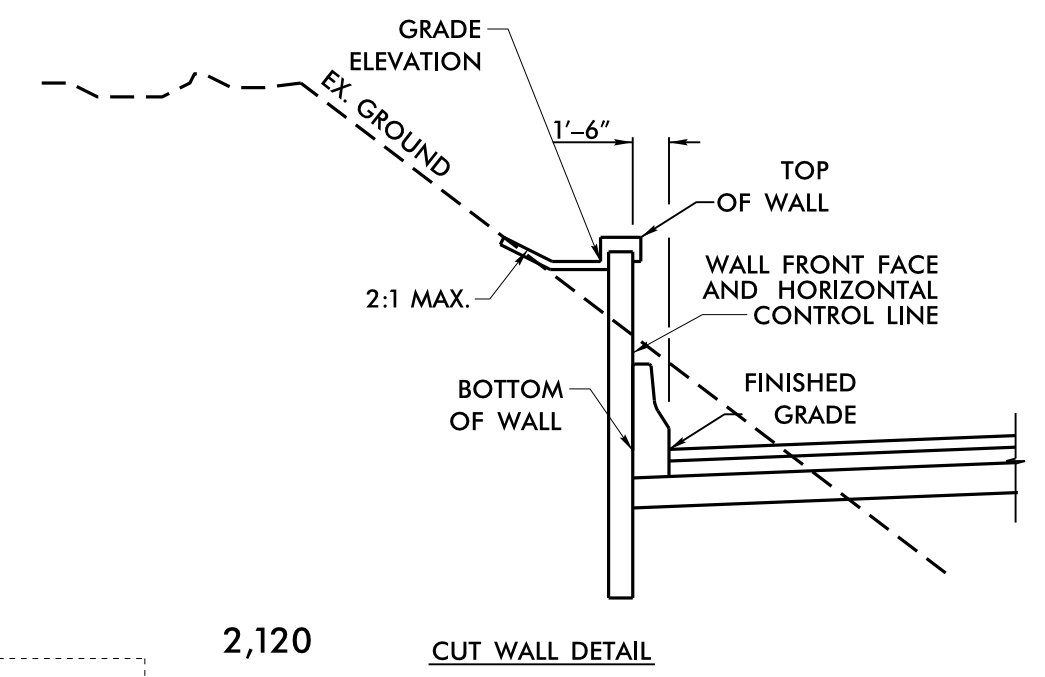
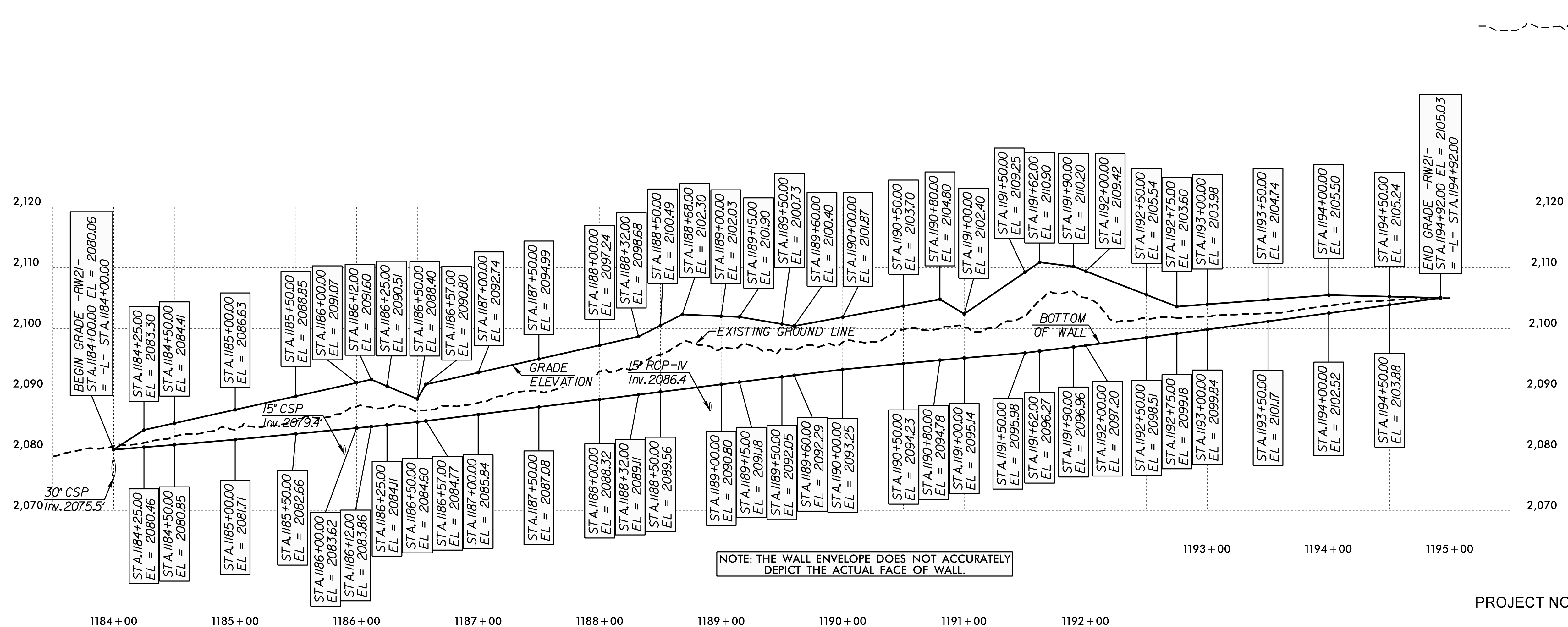
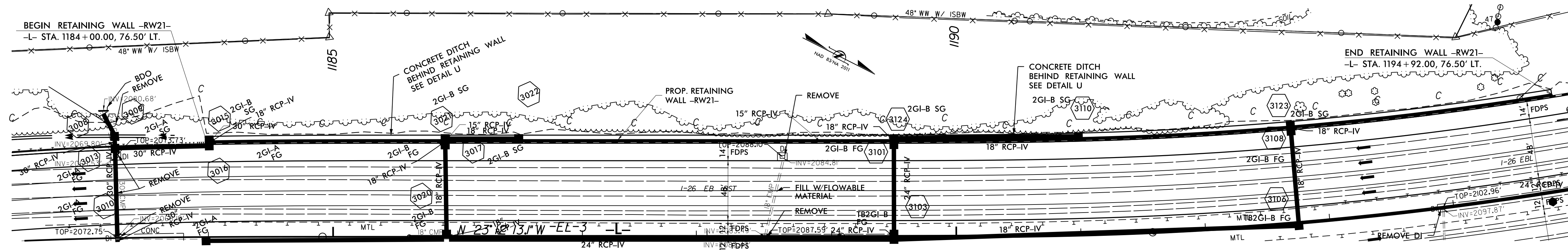


DocuSigned by:
Shane C. Clark
1FAE82040A0A0A
SIGNATURE

7/8/2019

DATE SIGNATURE DATE

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NOTE: THE WALL ENVELOPE DOES NOT ACCURATELY DEPICT THE ACTUAL FACE OF WALL.

RETAINING WALL -RW21-

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

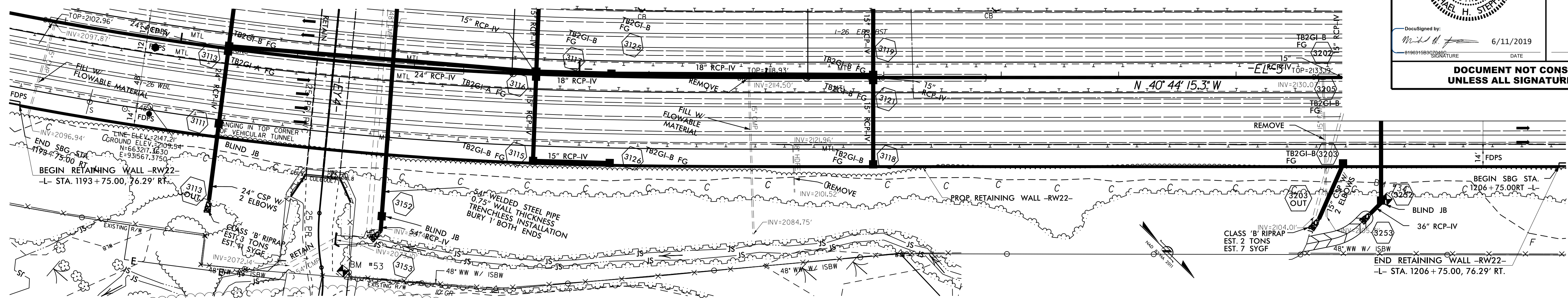
PROJECT NO.: 36030.1.1 (I-4700)
 BUNCOMBE COUNTY
 STATION: -L- 1184+00
 SHEET 22 OF 29

RETAINING WALL NO. -RW21- SOIL NAIL WALL

PREPARED BY: MHS DATE: 3/1/19
 REVIEWED BY: SCC DATE: 3/1/19

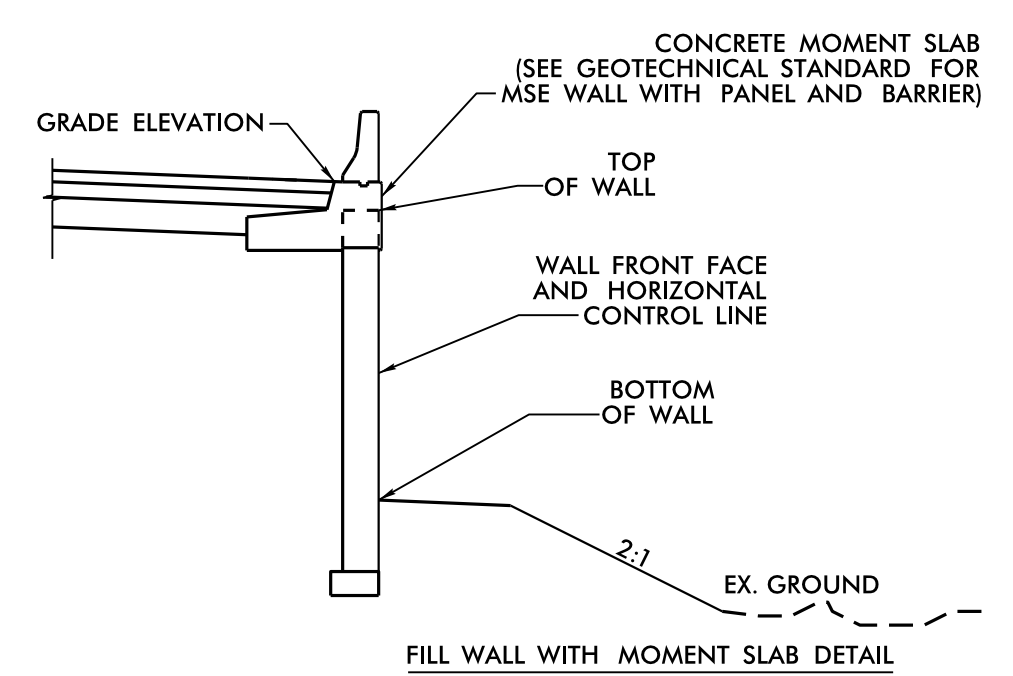
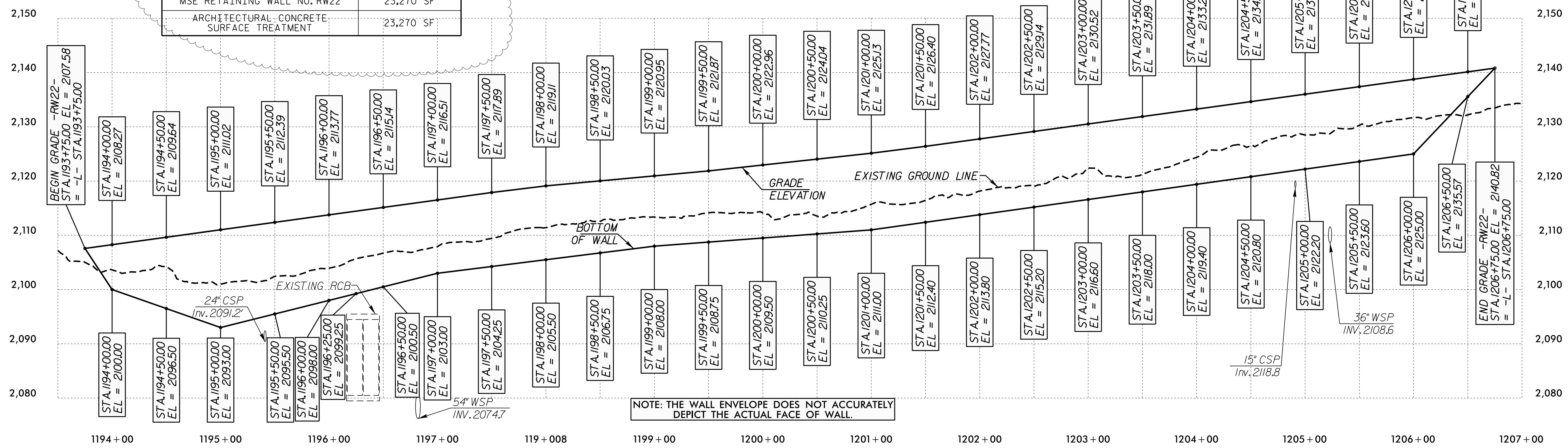
REVISIONS					
NO.	BY	DATE	NO.	BY	DATE
1	SCC	6/10/19	3		
2			4		

SHEET NO. W-22



ESTIMATED MSE WALL QUANTITIES
 (SQUARE FEET)

MSE RETAINING WALL NO. RW22	23,270 SF
ARCHITECTURAL CONCRETE SURFACE TREATMENT	23,270 SF



DESIGN RETAINING WALL NO. RW22 FOR THE FOLLOWING:
 1) H = DESIGN HEIGHT + EMBEDMENT
 2) DESIGN LIFE = 100 YEARS
 3) MAXIMUM FACTORED VERTICAL PRESSURE ON FOUNDATION MATERIAL = 5,200 LB/SF
 4) MINIMUM REINFORCEMENT LENGTH (L) = 1.5 H OR 6 FT, WHICHEVER IS LONGER
 5) MINIMUM EMBEDMENT DEPTH = H/5 OR 2 FT, WHICHEVER IS DEEPER
 6) REINFORCED ZONE AGGREGATE PARAMETERS:

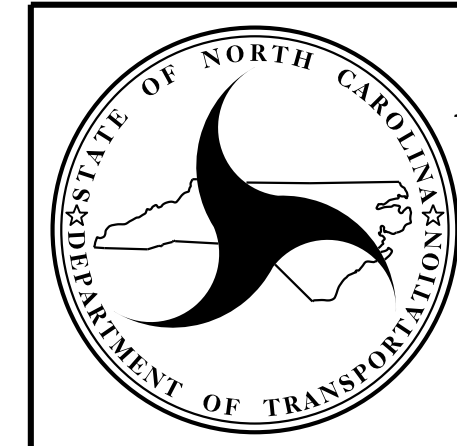
AGGREGATE TYPE*	UNIT WEIGHT (γ) LB/CF	FRICTION ANGLE (φ) DEGREES	COHESION (c) LB/SF
COARSE	110	38	0
FINE	115	34	0

*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	115	28	0

PROJECT NO.: 36030.1.1 (I-4700)
 BUNCOMBE COUNTY
 STATION: -L- 1193+75
 SHEET 23 OF 29



NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 DIVISION OF HIGHWAYS
 GEOTECHNICAL
 ENGINEERING UNIT

**RETAINING WALL NO. -RW22-
 MSE WALL**

REVISIONS					
NO.	BY	DATE	NO.	BY	DATE
1	SCC	6/10/19	3		
2			4		

SHEET NO. W-23

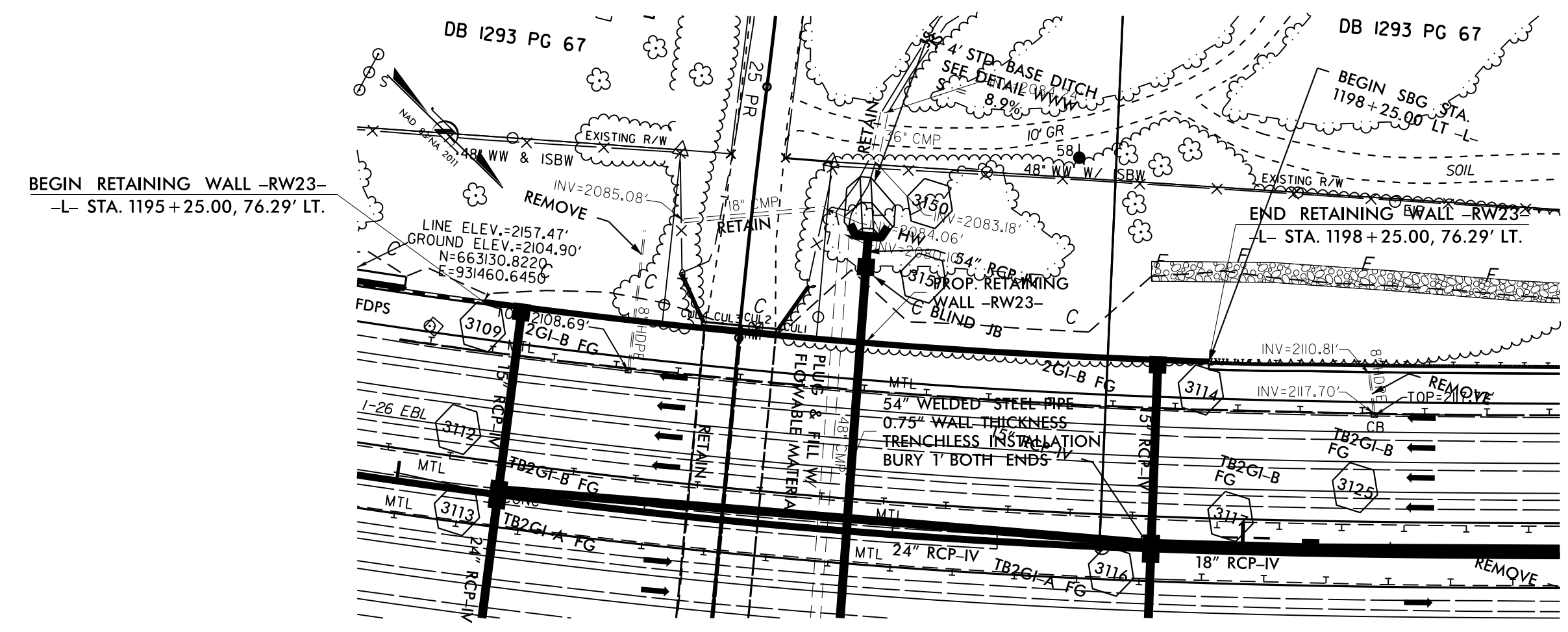
GEOTECHNICAL ENGINEER

ENGINEER

SEAL 028893

6/11/2019

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



1

ESTIMATED MSE WALL QUANTITIES (SQUARE FEET)

MSE RETAINING WALL NO. RW23	3,060 SF
ARCHITECTURAL CONCRETE SURFACE TREATMENT	3,060 SF

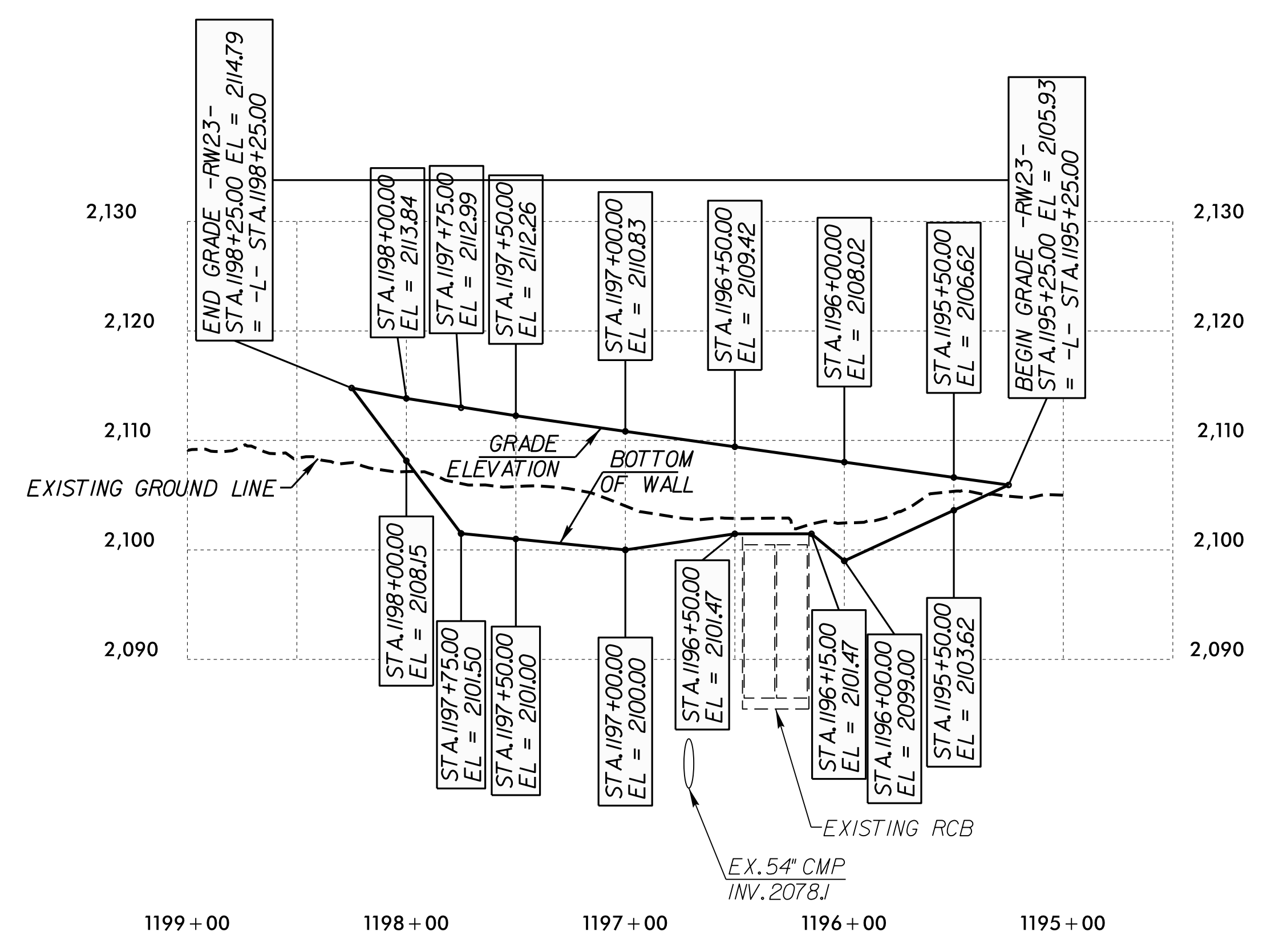
- DESIGN RETAINING WALL NO. FOR THE FOLLOWING:
- 1) H = DESIGN HEIGHT + EMBEDMENT
 - 2) DESIGN LIFE = 100 YEARS
 - 3) MAXIMUM FACTORED VERTICAL PRESSURE ON FOUNDATION MATERIAL = 3,700 LB/SF
 - 4) MINIMUM REINFORCEMENT LENGTH (L) = 1.5 H OR 6 FT, WHICHEVER IS LONGER
 - 5) MINIMUM EMBEDMENT DEPTH = H/5 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

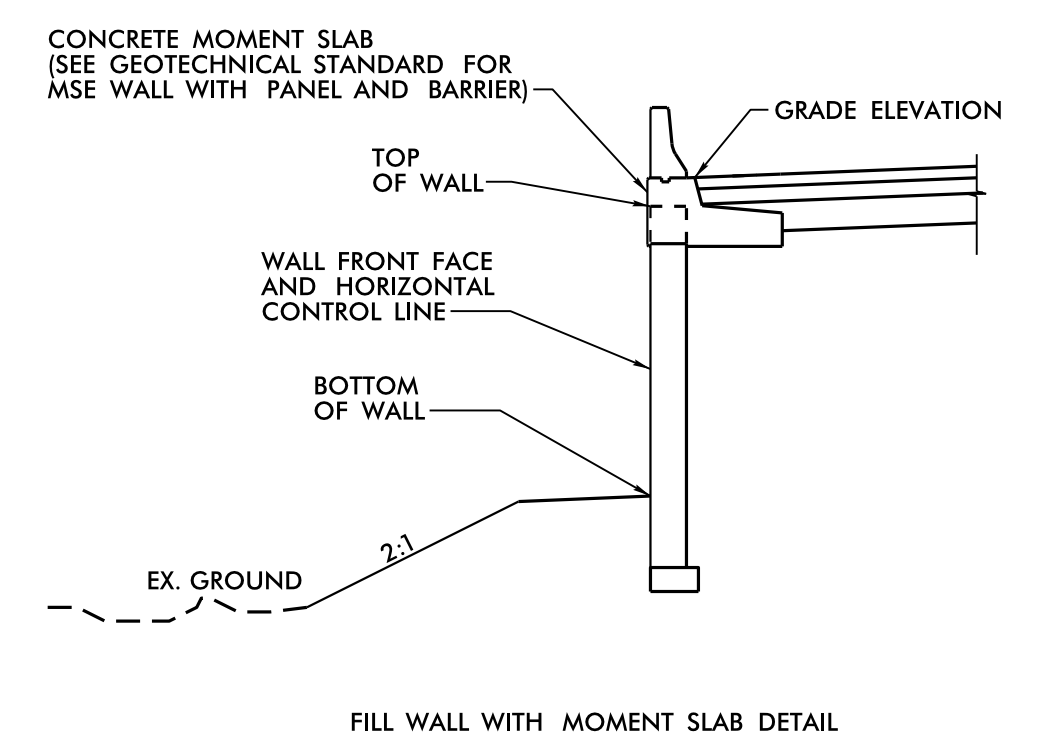
*SEE MSE RETAINING WALLS PROVISION FOR COARSE AND FINE AGGREGATE MATERIAL REQUIREMENTS.

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



NOTE: THE WALL ENVELOPE DOES NOT ACCURATELY DEPICT THE ACTUAL FACE OF WALL.



RETAINING WALL -RW23-

PROJECT NO.: 36030.1.1 (I-4700)

BUNCOMBE COUNTY

STATION: -L- 1195+25

SHEET 24 OF 29

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

RETAINING WALL NO. -RW23- MSE WALL

REVISIONS					
NO.	BY	DATE	NO.	BY	DATE
1	SCC	6/10/19	3		
2			4		

SHEET NO. W-24

PREPARED BY: MHS DATE: 3/1/19

REVIEWED BY: SCC DATE: 3/1/19

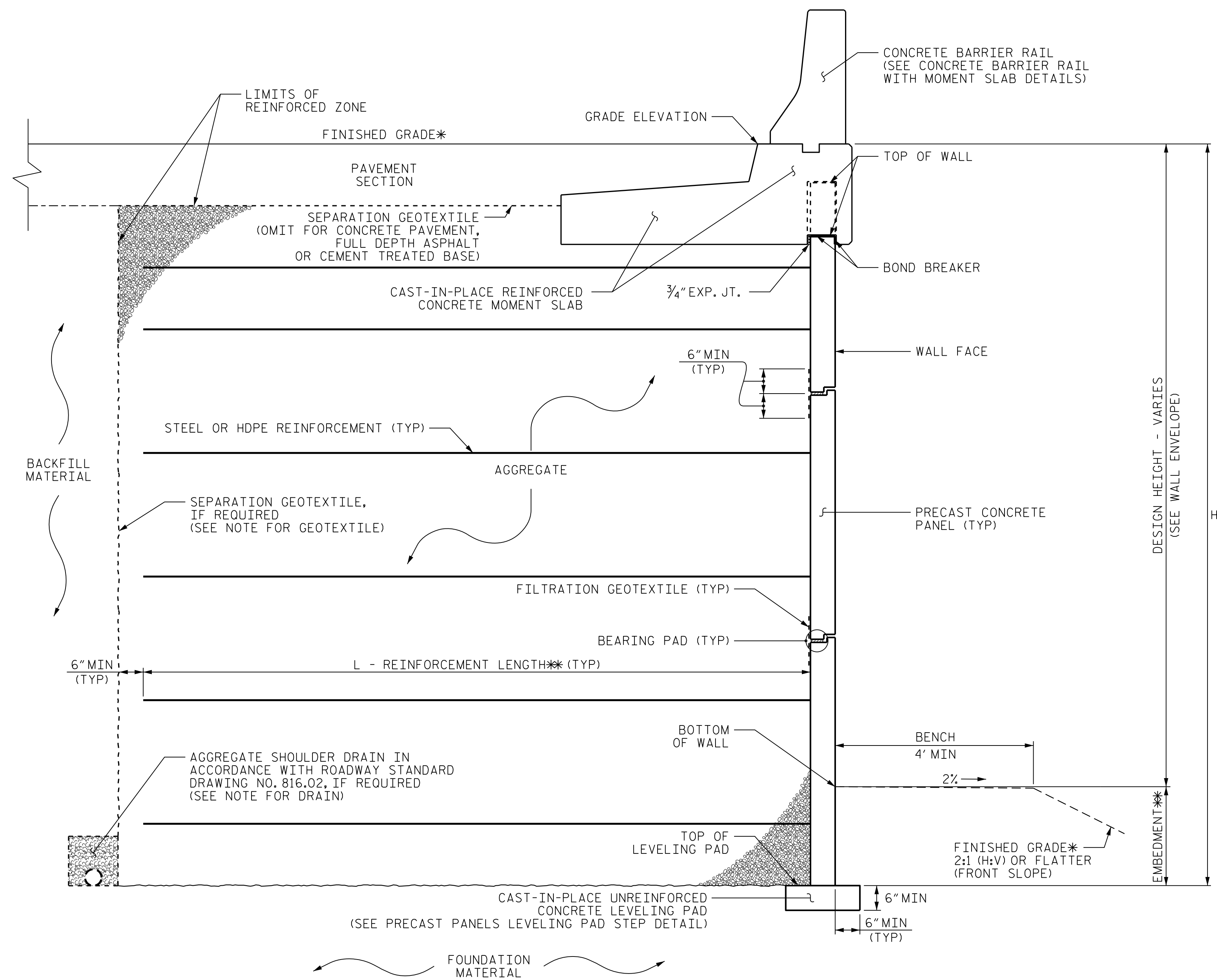
GEOTECHNICAL ENGINEER

ENGINEER

DocuSigned by: *M. H. Stephens* 3/4/2019

DATE: 3/4/2019

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



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.: 36030.1.1 (I-4700)
 BUNCOMBE COUNTY
 STATION: VARIES
 SHEET 25 OF 29

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

**GEOTECHNICAL
ENGINEERING UNIT**

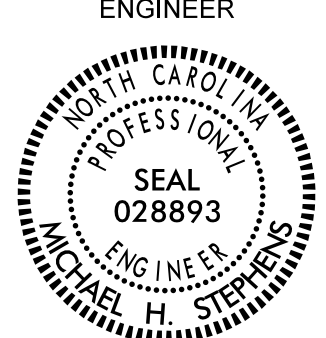
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**MSE WALL WITH
MOMENT SLAB DETAIL**

PREPARED BY: MHS	DATE: 3/1/19
REVIEWED BY: SCC	DATE: 3/1/19

SHEET NO.
W-25

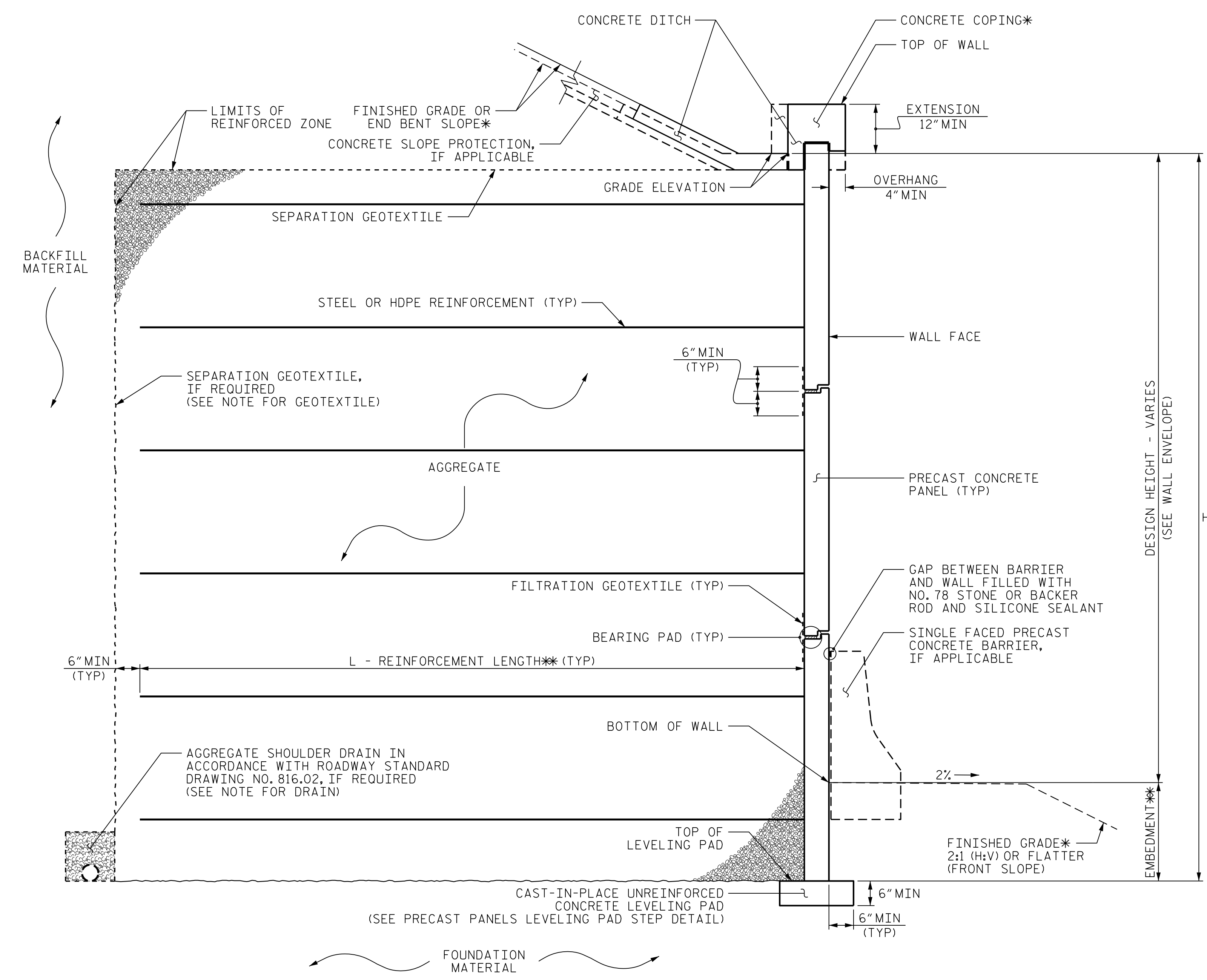
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ENGINEER

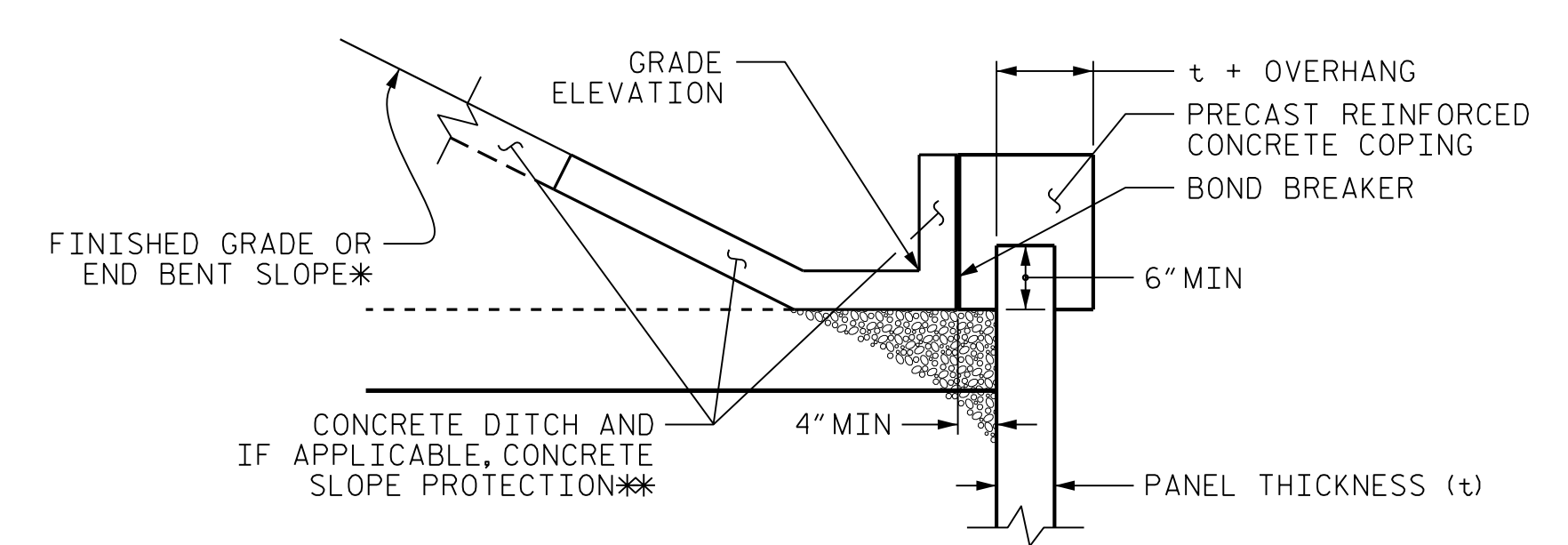
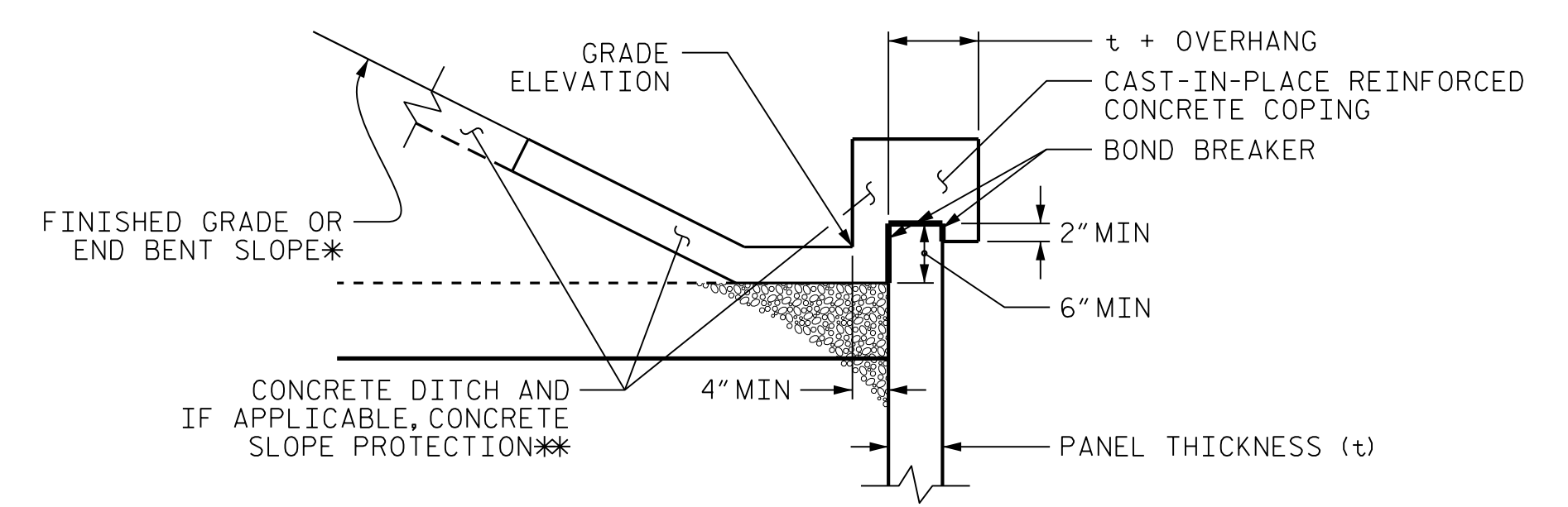
DocuSigned by: *Michael H. Stephens* 3/4/2019

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MSE WALL WITH PRECAST PANELS - TYPICAL SECTION

*SEE COPING DETAILS AND PLANS FOR FINISHED GRADE OR END BENT SLOPE DETAILS.
*SEE MSE RETAINING WALLS PROVISION AND IF APPLICABLE, MSE WALL NOTES FOR EMBEDMENT AND REINFORCEMENT LENGTH REQUIREMENTS.

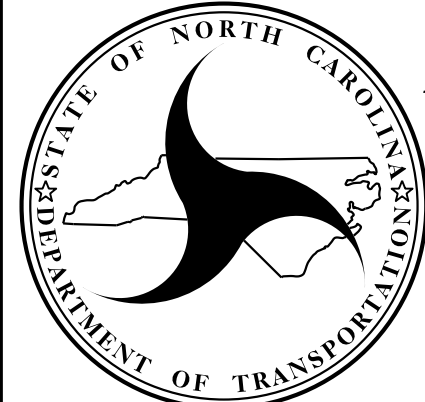


COPING DETAILS

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

PROJECT NO.: 36030.1.1 (I-4700)
BUNCOMBE COUNTY
STATION: VARIES
SHEET 26 OF 29

PREPARED BY: MHS DATE: 3/1/19
REVIEWED BY: SCC DATE: 3/1/19

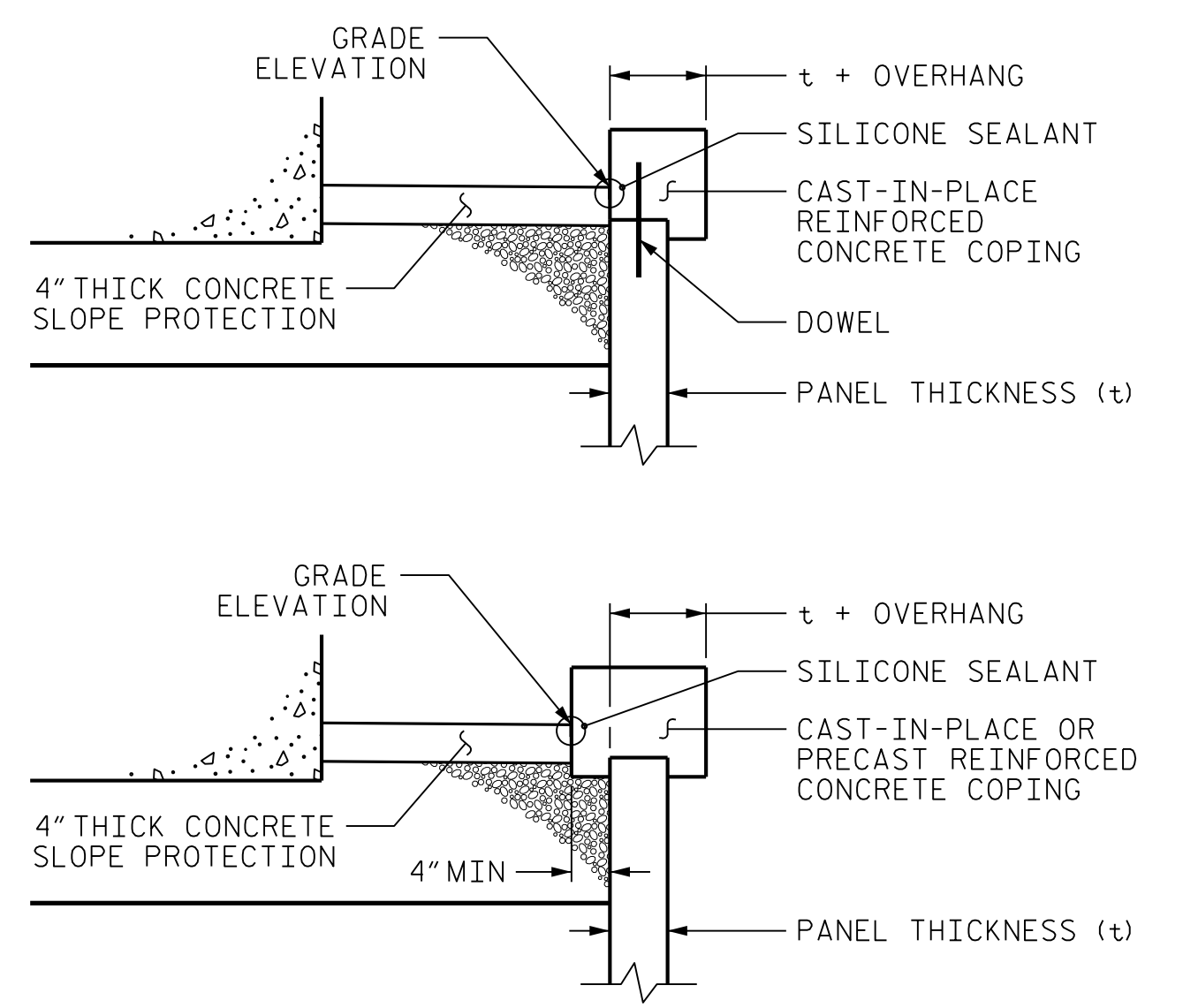
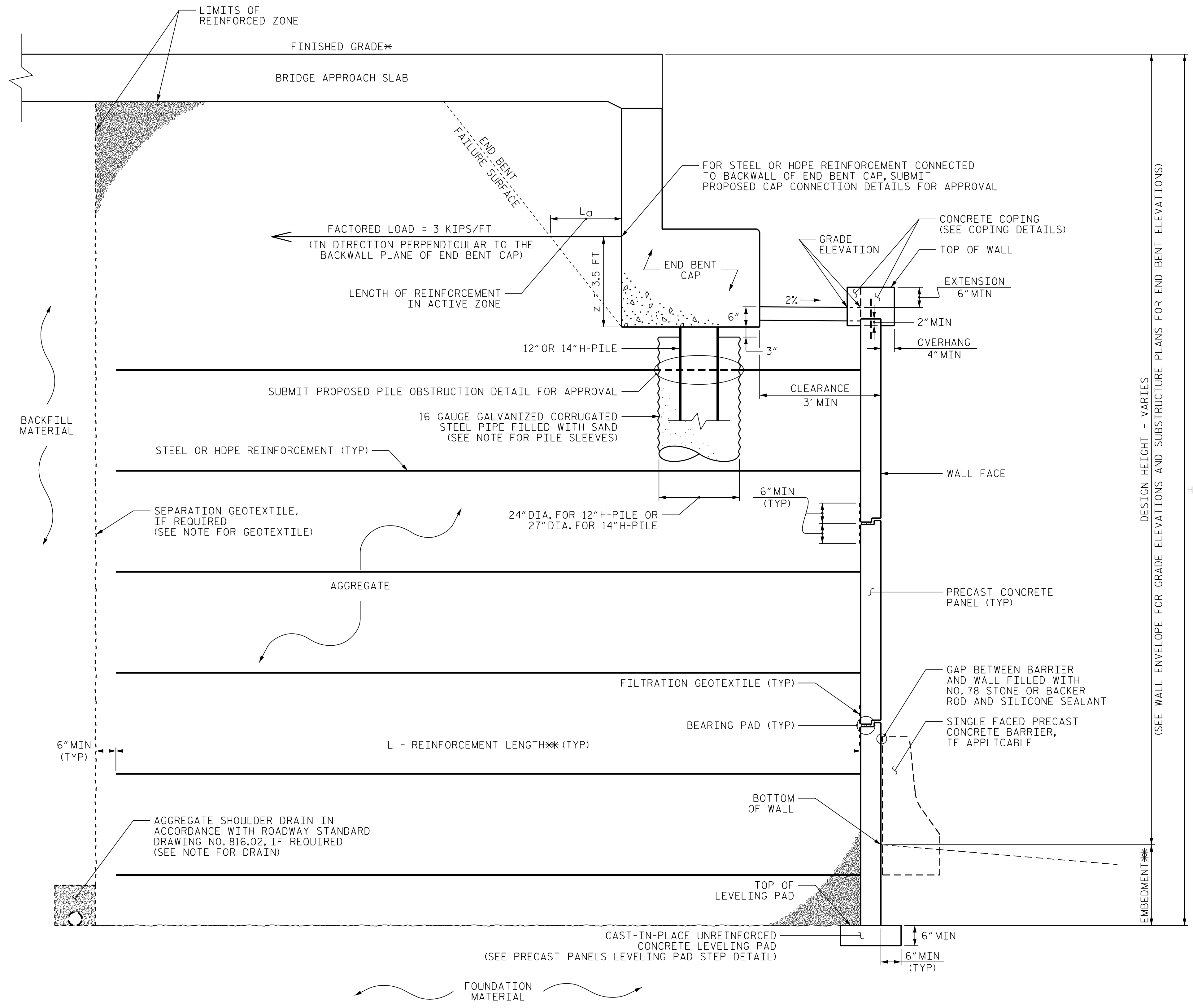


**NORTH CAROLINA
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GEOTECHNICAL ENGINEER
 ENGINEER
 NORTH CAROLINA PROFESSIONAL SEAL 028893
 MICHAEL H. STEPHENS
 DocuSigned by: *Michael H. Stephens* 3/4/2019
 DATE SIGNATURE DATE
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COPING DETAILS

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

MSE ABUTMENT 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.: 36030.1.1 (I-4700)
 BUNCOMBE COUNTY
 STATION: -Y14- 12+50 AND -Y14- 12+90
 SHEET 27 OF 29

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 DIVISION OF HIGHWAYS
 GEOTECHNICAL ENGINEERING UNIT

REVISIONS						SHEET NO.
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1			3			W-27
2			4			

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REVIEWED BY: SCC	DATE: 3/1/19

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NOTES:

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. RW3, RW4, RW5, RW6, RW14, RW18, RW19, RW20, RW22, AND RW23, 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. RW3, RW18, RW19, RW20, RW22, AND RW23. SEE STRUCTURE PLANS FOR CONCRETE BARRIER RAIL WITH MOMENT SLAB DETAILS AND QUANTITIES.

A FENCE OR HANDRAIL IS REQUIRED ON TOP OF THE RETAINING WALLS. SEE ROADWAY PLANS FOR FENCE OR HANDRAIL ATTACHMENT DETAILS.

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.

AS REQUIRED, DESIGN RETAINING WALLS FOR A PIPE EXTENDING THROUGH THE WALL AS SHOWN. VERIFY PIPE LOCATION AND ELEVATION BEFORE BEGINNING MSE WALL DESIGN OR CONSTRUCTION. SEE HYDRO PLANS FOR ADDITIONAL INFORMATION.

DESIGN REINFORCEMENT CONNECTED TO END BENT CAPS FOR FACTORED LOAD AND LENGTH OF REINFORCEMENT IN ACTIVE ZONE (L_d) SHOWN. CAST REINFORCEMENT OR CONNECTORS INTO CAP BACKWALL FOR END BENT NOS. 1 LOCATED AT STATION 912+55.14 -EBL- AND 2 LOCATED AT STATION 913+23.64 -EBL- AND WEST BOUND END BENT NOS. 1 LOCATED AT STATION 913+0.37 -WBL- AND 2 LOCATED AT STATION 913+68.75 -WBL-. MAINTAIN A CLEARANCE OF AT LEAST 3" BETWEEN REINFORCEMENT OR CONNECTORS AND REINFORCING STEEL IN CAP.

FOUNDATIONS FOR SIGNS, LIGHTING AND SIGNALS MAY BE LOCATED BEHIND THE RETAINING WALLS 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 THE RETAINING WALLS.

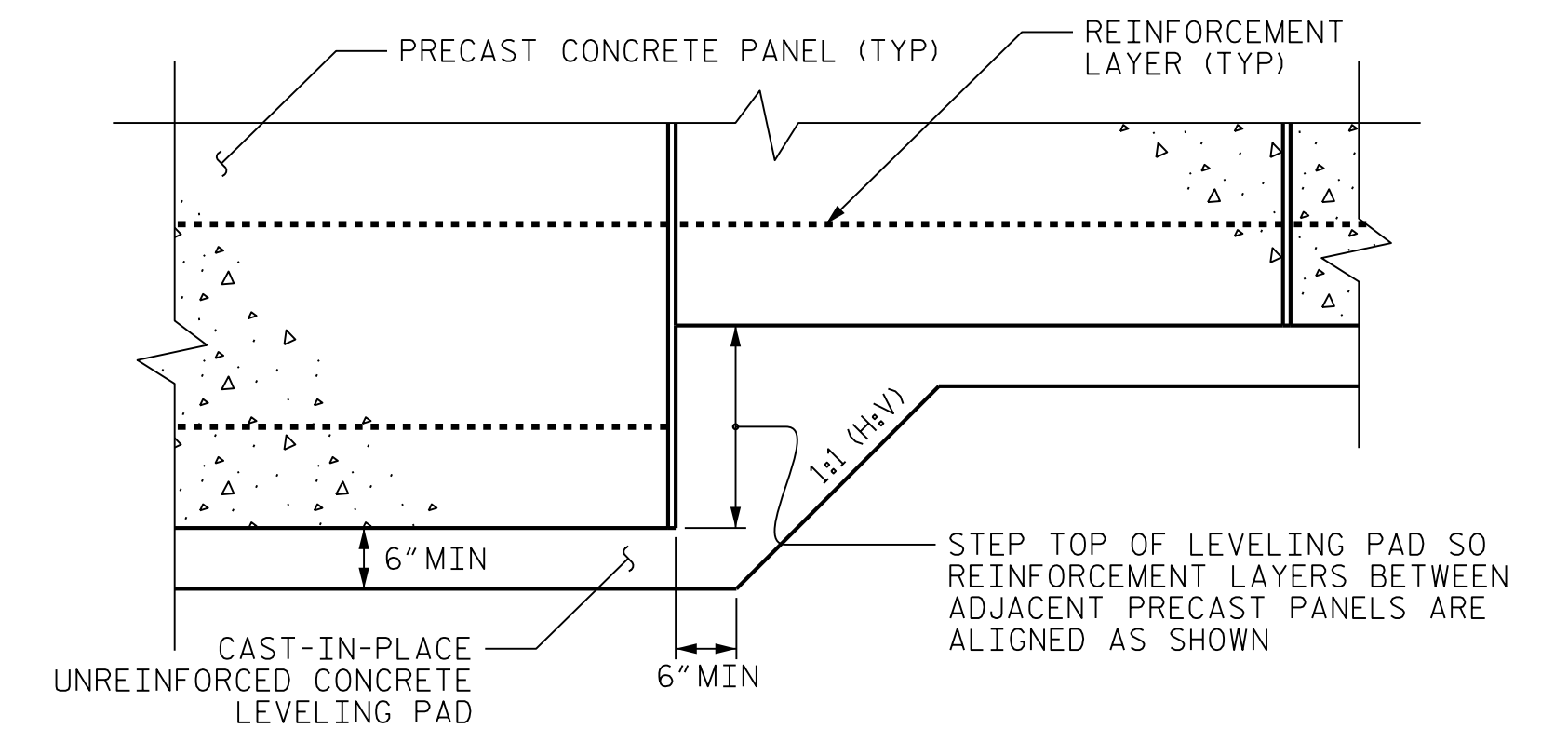
FOUNDATIONS FOR END BENT NOS. 1 LOCATED AT STATION 912+55.14 -EBL- AND 2 LOCATED AT STATION 913+23.64 -EBL- AND WEST BOUND END BENT NOS. 1 LOCATED AT STATION 913+0.37 -WBL- AND 2 LOCATED AT STATION 913+68.75 -WBL- WILL INTERFERE WITH REINFORCEMENT FOR RETAINING WALL NOS RW4 AND RW5. SEE "FOUNDATION LAYOUT" SHEET FOR FOUNDATION LOCATIONS.

INSTALL PILE SLEEVES FOR END BENT NOS. 1 LOCATED AT STATION 912+55.14 -EBL- AND 2 LOCATED AT STATION 913+23.64 -EBL- AND WEST BOUND END BENT NOS. 1 LOCATED AT STATION 913+0.37 -WBL- AND 2 LOCATED AT STATION 913+68.75 -WBL- WHILE CONSTRUCTING RETAINING WALL NOS RW4 AND RW5, OBSERVE A 1 MONTH WAITING PERIOD AFTER CONSTRUCTING THE MSE ABUTMENT WALL TO WITHIN 1 FT OF THE BOTTOM OF CAP ELEVATION. THEN, INSTALL PILES THROUGH THE CORRUGATED STEEL PIPES AND FILL PIPES WITH LOOSE UNCOMPACTED SAND BEFORE CONSTRUCTING END BENT CAPS.

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.: 36030.1.1 (I-4700)
 BUNCOMBE COUNTY
 STATION: VARIES
 SHEET 28 OF 29

PREPARED BY: MHS	DATE: 3/1/19
REVIEWED BY: SCC	DATE: 3/1/19



**NORTH CAROLINA
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DIVISION OF HIGHWAYS**

**GEOTECHNICAL
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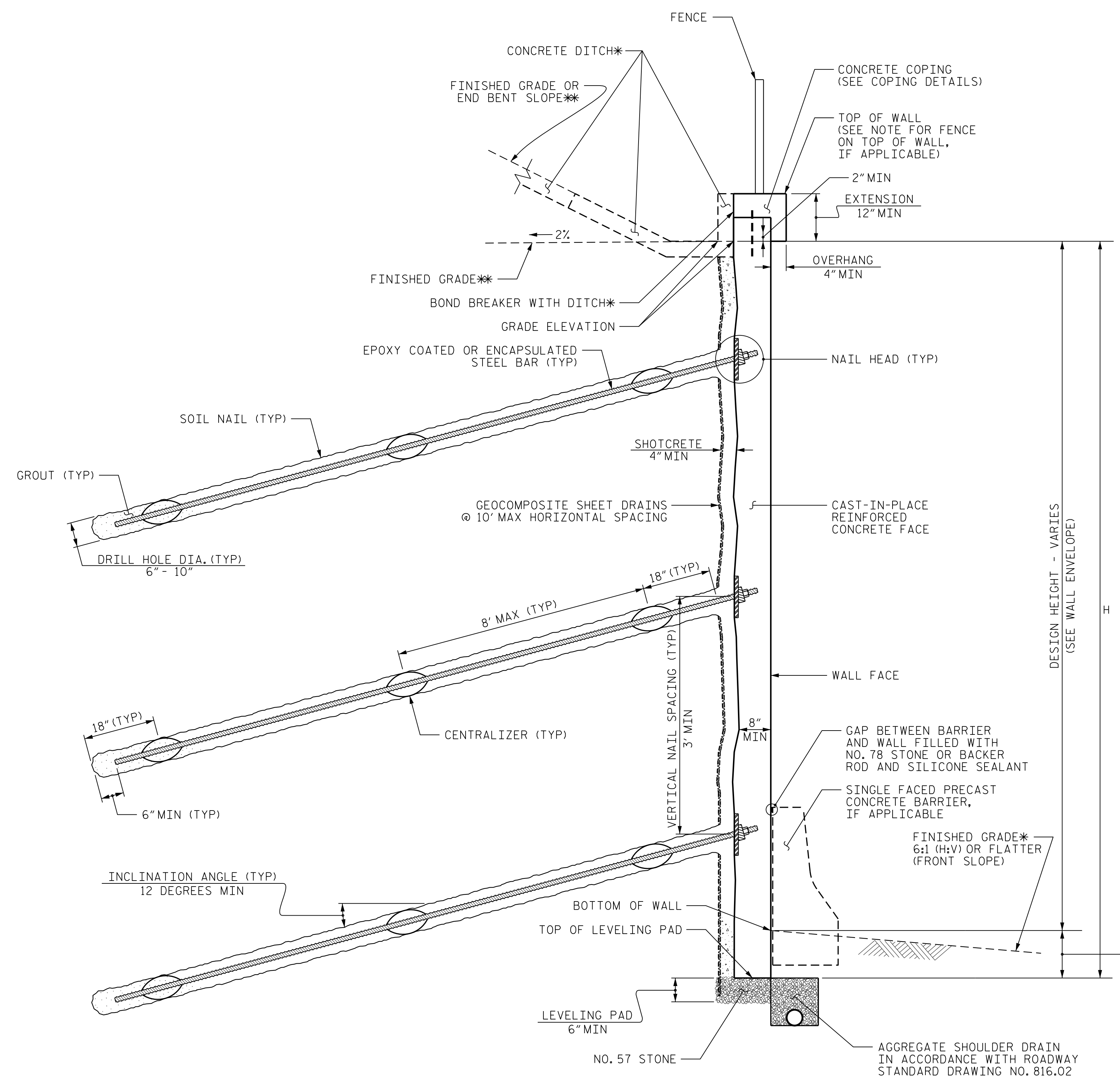
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DocuSigned by: *M. H. Stephens* 6/11/2019

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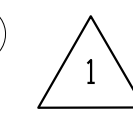


SOIL NAIL WALL - TYPICAL SECTION

*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. RW0, RW7, RW8, RW9, RW10, RW11, RW12, RW13, RW15, RW16, RW17, AND R21 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 THE CAST-IN-PLACE REINFORCED CONCRETE FACE FOR THE RETAINING WALLS. SEE ARCHITECTURAL CONCRETE SURFACE TREATMENT 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: 3/1/19
REVIEWED BY: SCC	DATE: 3/1/19

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

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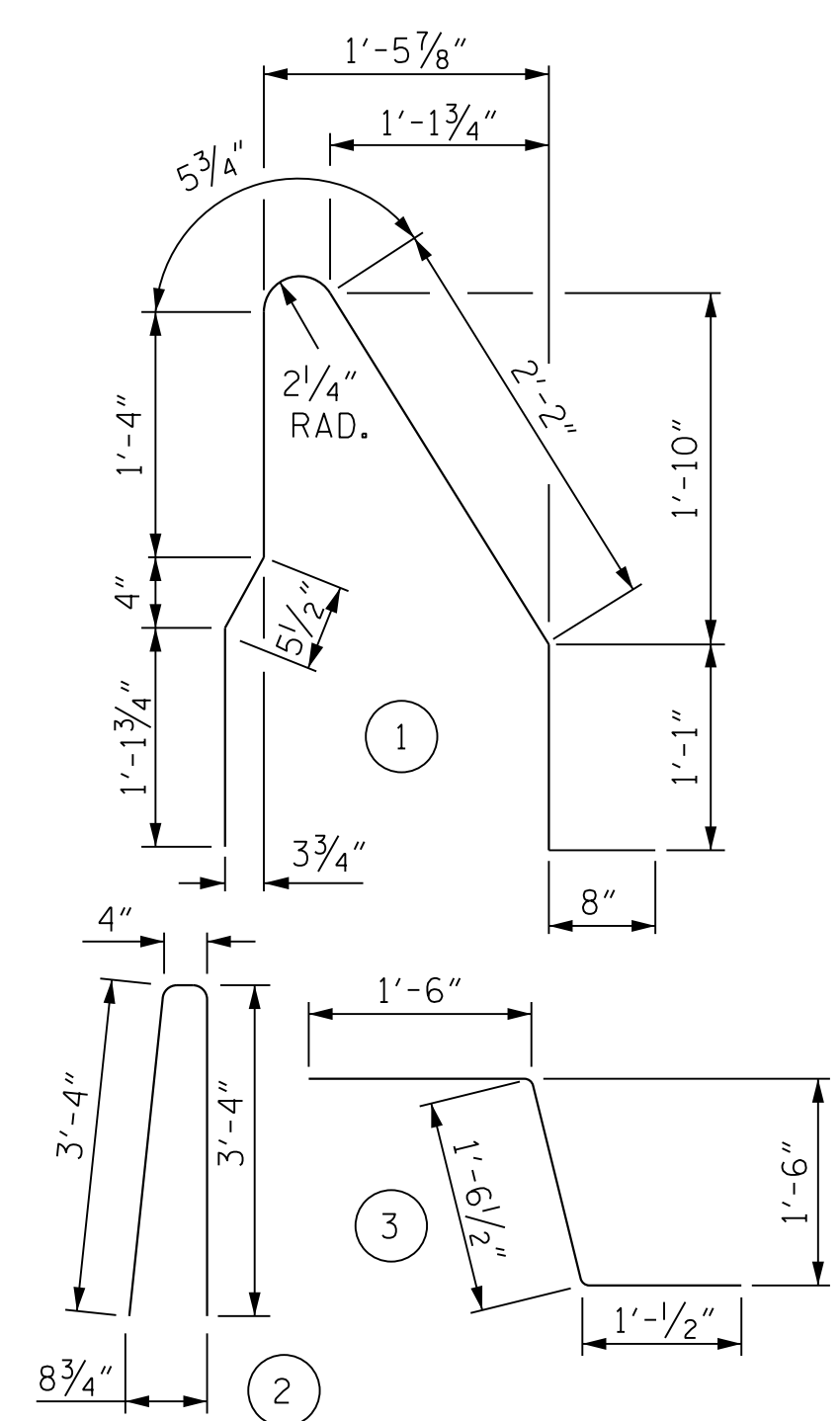
PROJECT NO.: 36030.1.1 (I-4700)
BUNCOMBE COUNTY
STATION: VARIES
SHEET 29 OF 29

SOIL NAIL WALL DETAIL					
REVISIONS					
NO.	BY	DATE	NO.	BY	DATE
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SHEET NO.
W-29

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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	14	#4	STR	29'-7"	277
* B2	11	#5	STR	29'-7"	339
G1	31	#5	STR	4'-4"	140
G2	31	#4	STR	4'-4"	90
* S1	31	#5	1	7'-4"	237
* S2	31	#5	2	7'-0"	226
S3	30	#5	3	4'-1"	128
REINFORCING STEEL					635 LB
* EPOXY COATED REINFORCING STEEL					802 LB
CLASS AA CONCRETE BARRIER RAIL					4.1 CY
CLASS A CONCRETE MOMENT SLAB					9.1 CY
CONCRETE BARRIER RAIL WITH MOMENT SLAB					30 LIN FT

NOTES:

FOR CONCRETE BARRIER RAIL WITH MOMENT SLAB, SEE SECTION 460 OF THE STANDARD SPECIFICATIONS.

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'.

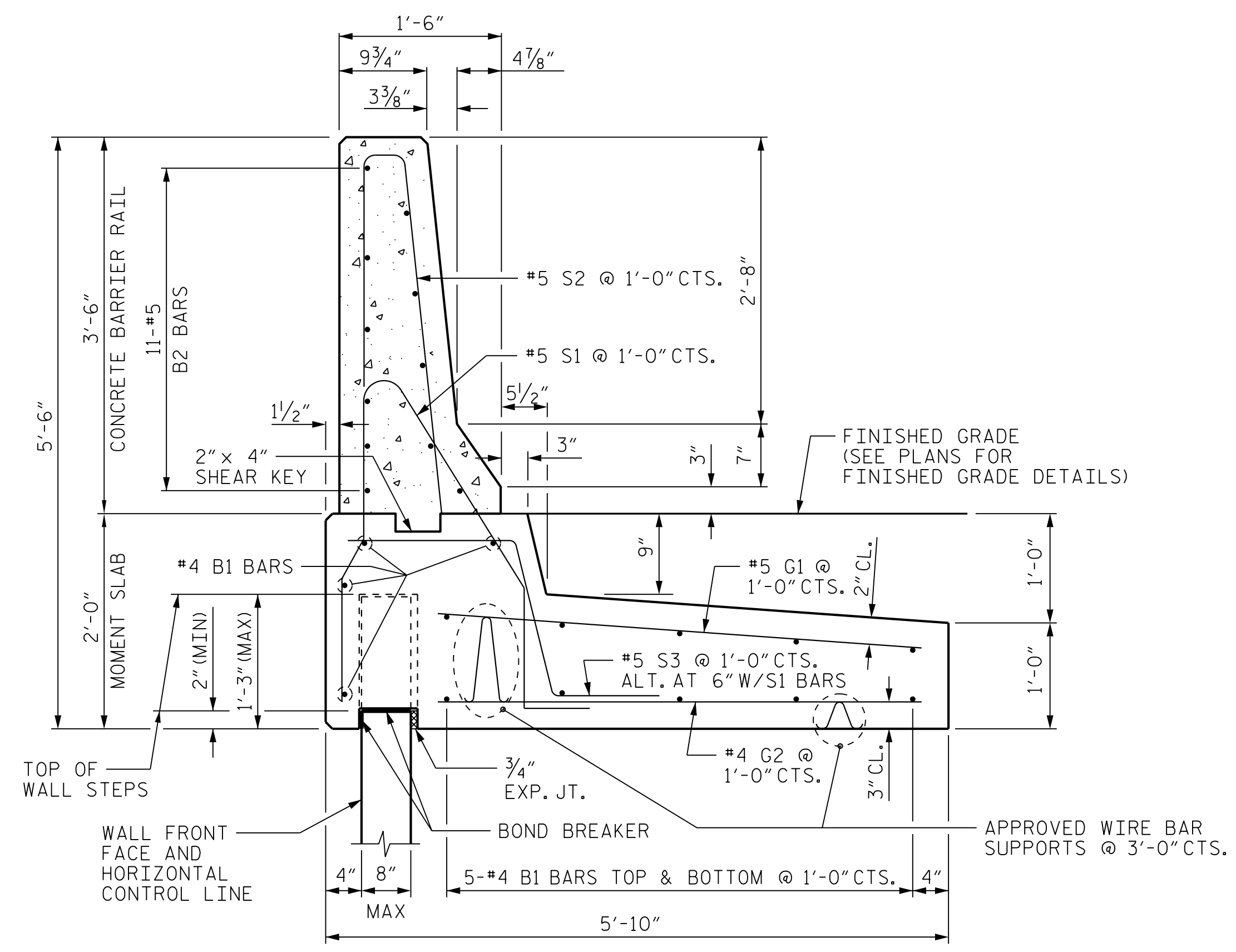
GROOVED CONTRACTION JOINTS, 1/2" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED SURFACES OF THE BARRIER RAIL AND IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. A CONTRACTION JOINT SHALL BE LOCATED AT EACH THIRD POINT BETWEEN BARRIER RAIL EXPANSION JOINTS. ONLY ONE CONTRACTION JOINT IS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

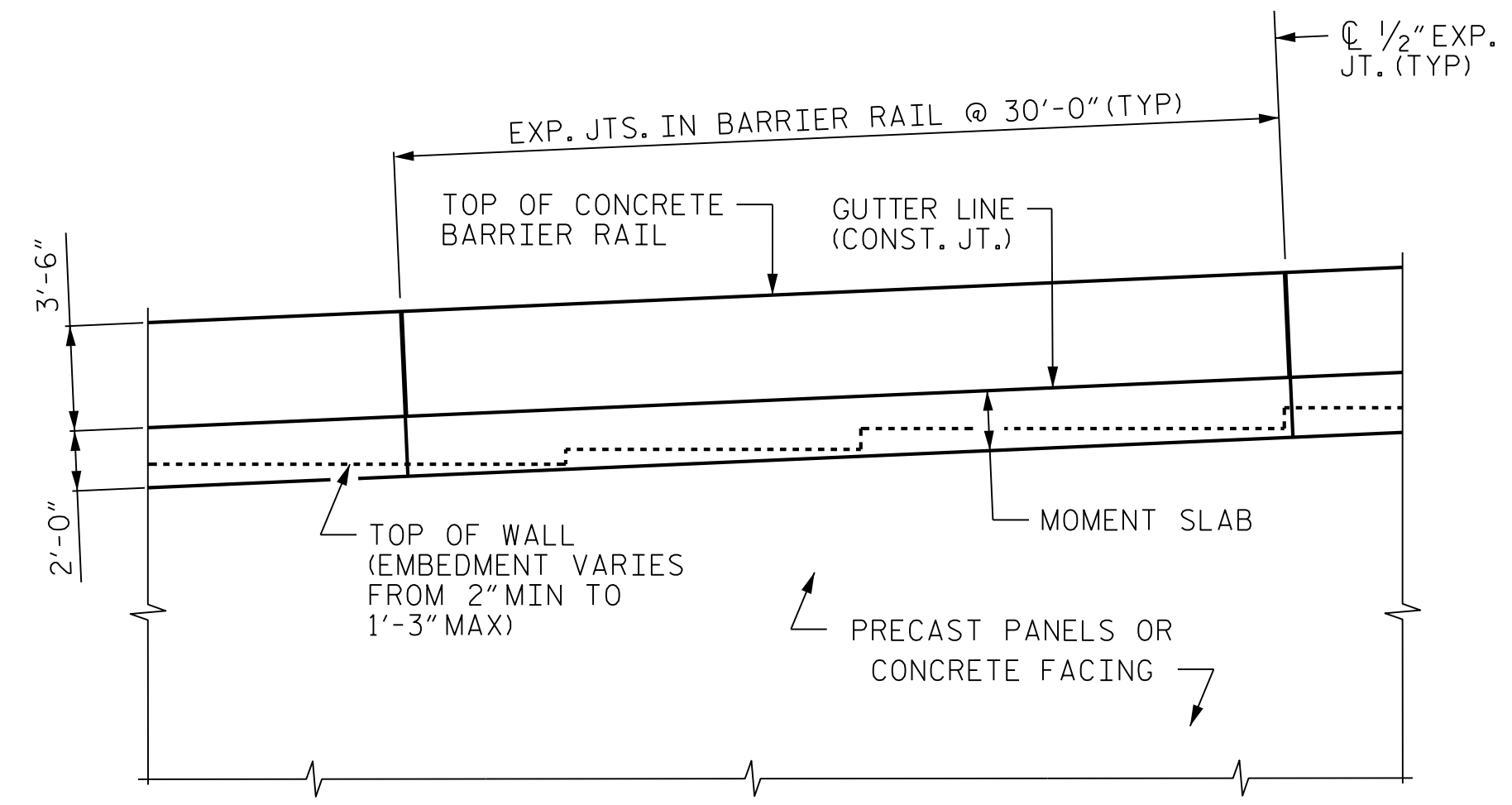
ALL REINFORCING STEEL IN THE BARRIER RAIL SHALL BE EPOXY COATED.

IF EXISTING OR FUTURE OBSTRUCTIONS SUCH AS FOUNDATIONS, BARRIERS, PIPES, INLETS OR UTILITIES WILL INTERFERE WITH CONCRETE BARRIER RAIL WITH MOMENT SLAB OR CONCRETE FACING FOR RETAINING WALL WILL BE THICKER THAN 8", CONCRETE BARRIER RAIL WITH MOMENT SLAB DETAILS SHALL BE REVISED AND SUBMITTED FOR APPROVAL.

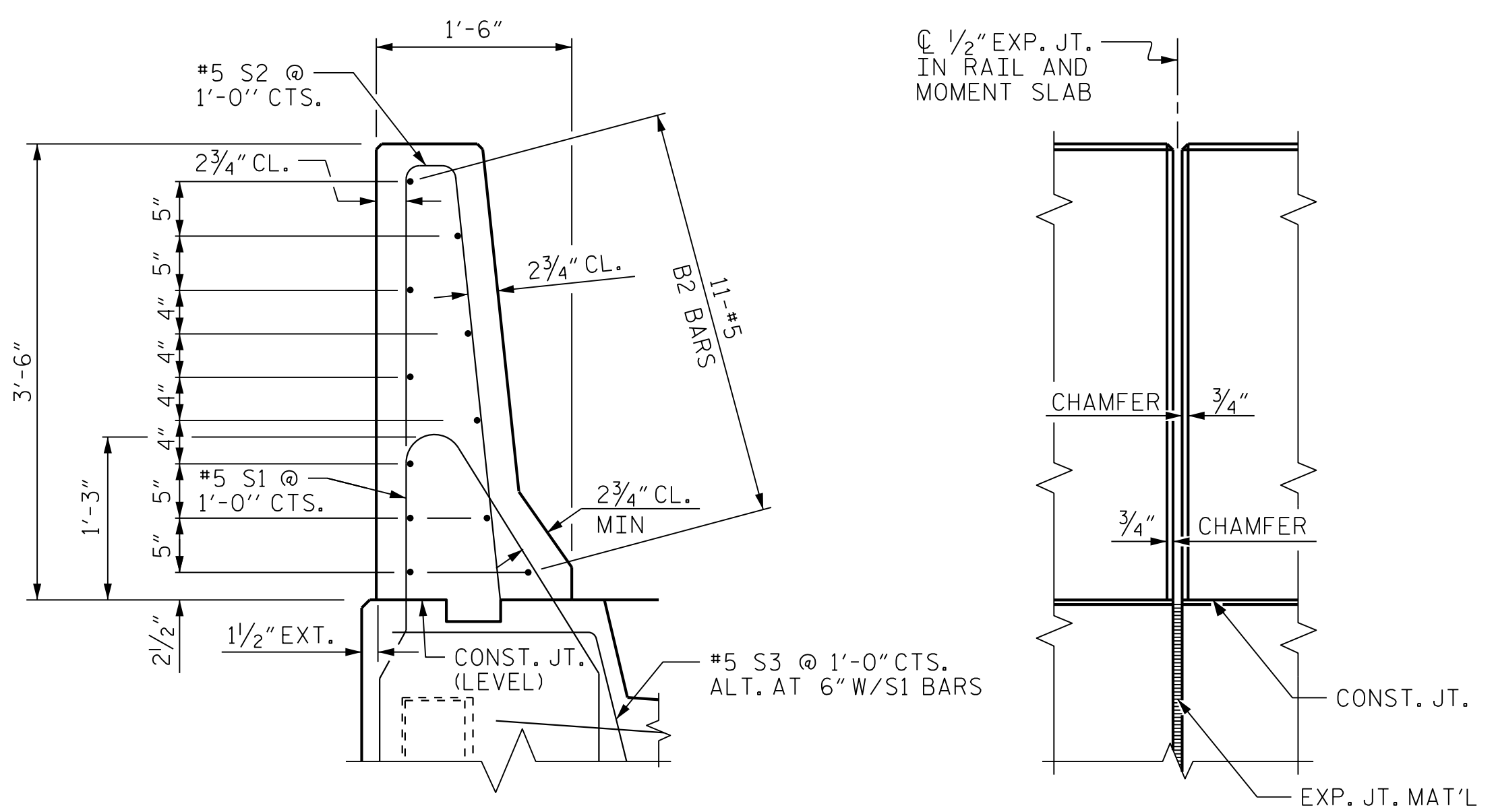
CONCRETE BARRIER RAIL WITH MOMENT SLAB
 PAY LENGTH = 5260 LIN FT



CONCRETE BARRIER RAIL WITH MOMENT SLAB



CONCRETE BARRIER RAIL WITH MOMENT SLAB - PARTIAL ELEVATION



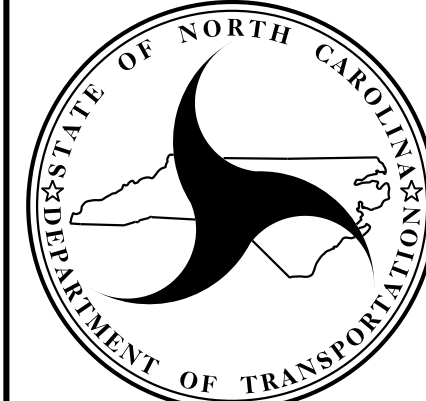
SECTION THRU RAIL

ELEV. @ EXP. JOINTS

BARRIER RAIL DETAILS

PROJECT NO.: 36030.1.1 (I-4700)
 BUNCOMBE/HENDERSON COUNTY
 STATION: VARIES, SEE INDIVIDUAL WALL PLANS
 SHEET 1 OF 1

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS



GEOTECHNICAL ENGINEERING UNIT

CONCRETE BARRIER RAIL WITH MOMENT SLAB FOR PRECAST PANELS AND CONCRETE FACING

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