





# RETAINING WALL ENVELOPE WALL 2



FALCON ENGINEERING, INC.  
1210 TRINITY ROAD, SUITE 110  
CARY, NC 27513  
Firm License C-319  
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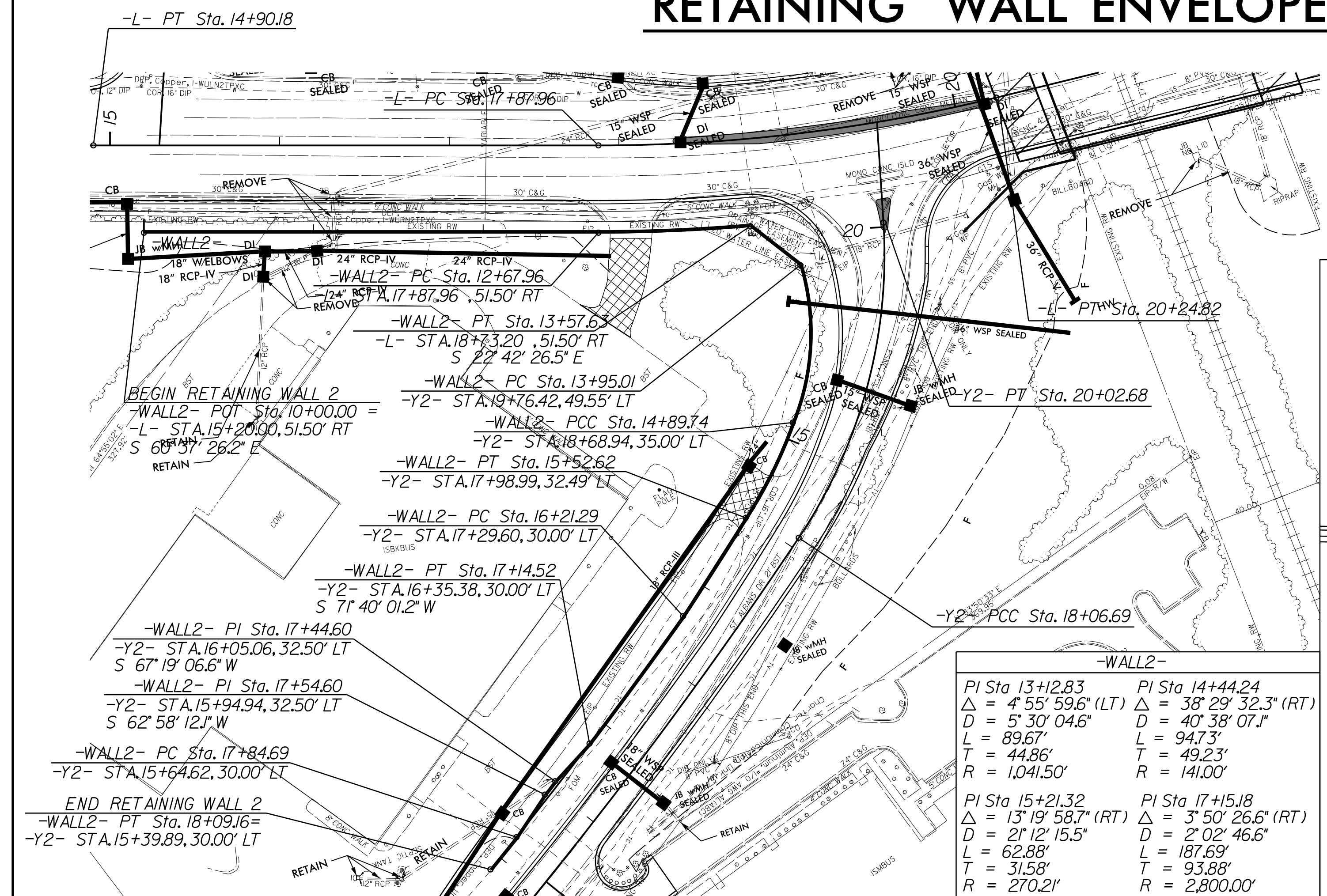
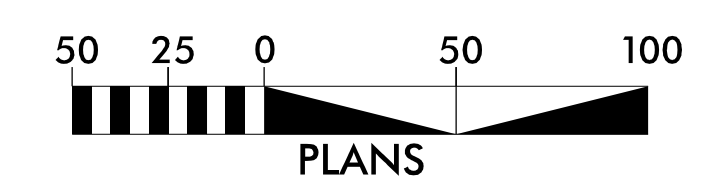
GEOTECHNICAL ENGINEER

ENGINEER

DocuSigned by:  
Jeremy Hamm  
4622023485C4EA  
SIGNATURE

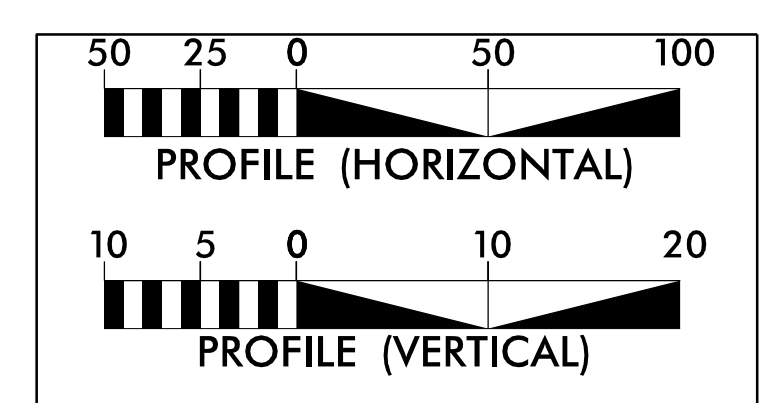
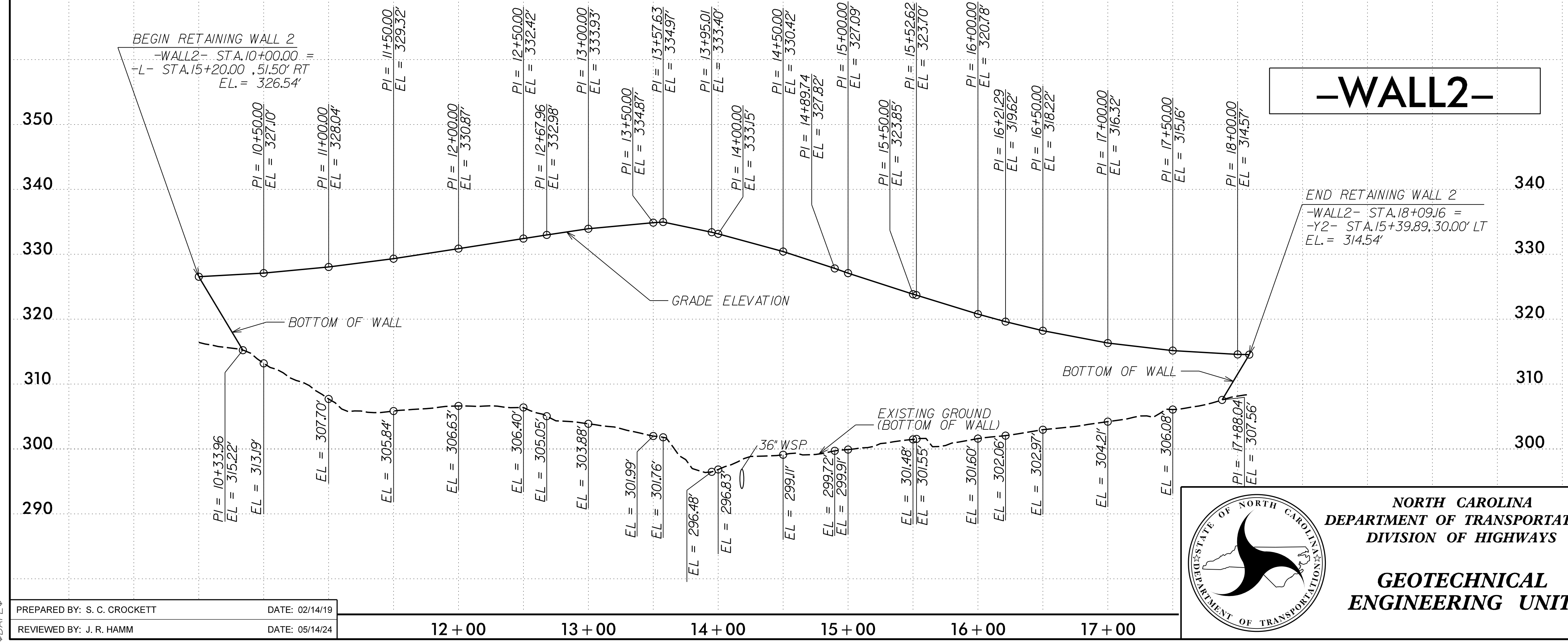
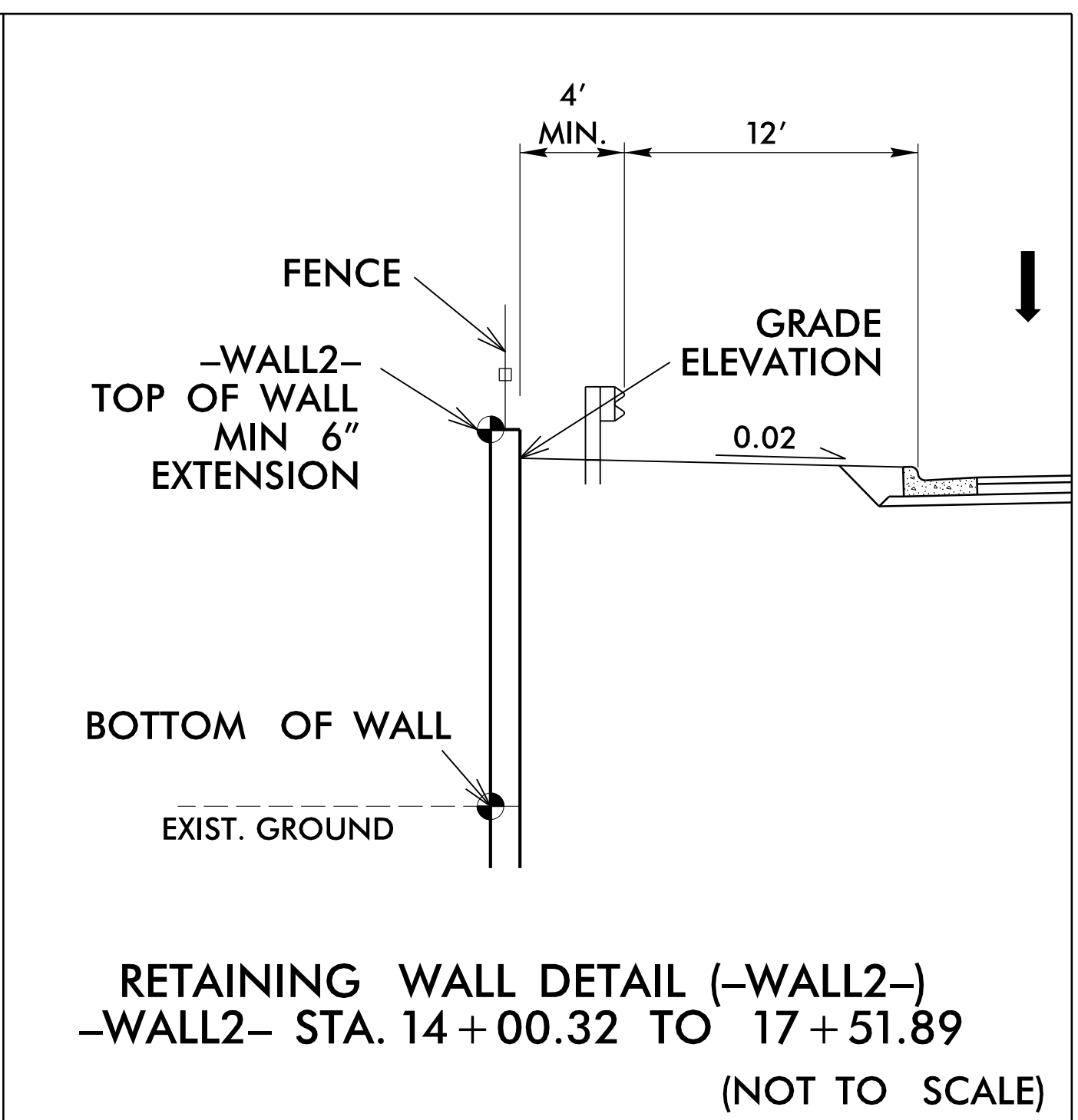
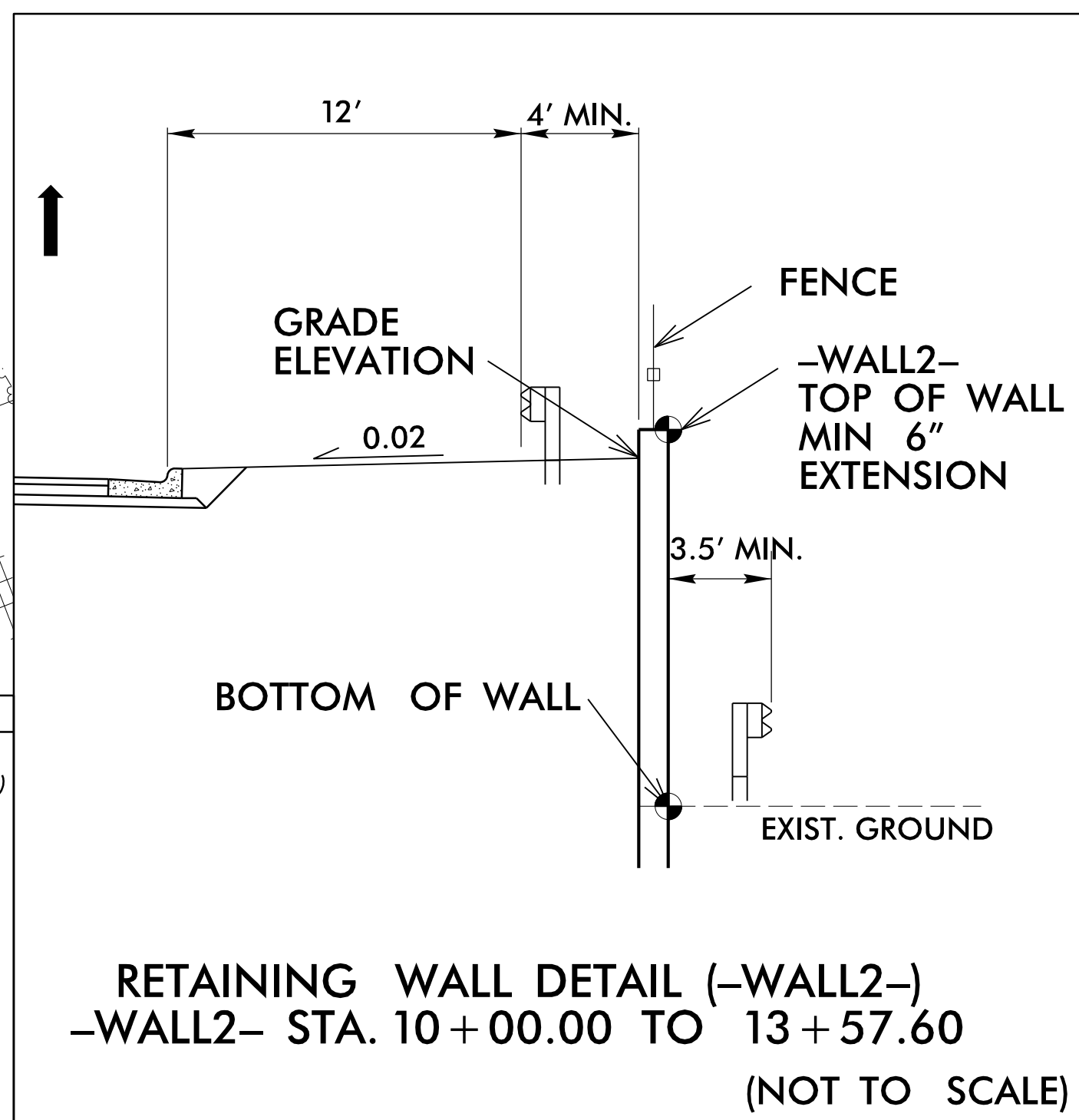
7/8/2024  
DATE

DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED



**-WALL2-**

PI Sta 13+12.83	PI Sta 14+44.24
Δ = 4° 55' 59.6" (LT)	Δ = 38° 29' 32.3" (RT)
D = 5' 30' 04.6"	D = 40' 38' 07.1"
L = 89.67'	L = 94.73'
T = 44.86'	T = 49.23'
R = 1,041.50'	R = 141.00'
PI Sta 15+21.32	PI Sta 17+15.18
Δ = 13° 19' 58.7" (RT)	Δ = 3° 50' 26.6" (RT)
D = 2' 12' 15.5"	D = 2' 02' 46.6"
L = 62.88'	L = 187.69'
T = 31.58'	T = 93.88'
R = 270.21'	R = 2,800.00'



ESTIMATED MSE WALL QUANTITY (SQ. FEET)

MSE RETAINING WALL NO. 1	21,200
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PROJECT NO.: P-5715  
WAKE COUNTY  
STATION: -L- 15+30, RIGHT  
SHEET 2 OF 5

NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS

GEOTECHNICAL  
ENGINEERING UNIT

RETAINING WALL #2  
WALL PLAN AND ENVELOPE

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

SHEET NO. W-2

PREPARED BY: S. C. CROCKETT DATE: 02/14/19  
REVIEWED BY: J. R. HAMM DATE: 05/14/24

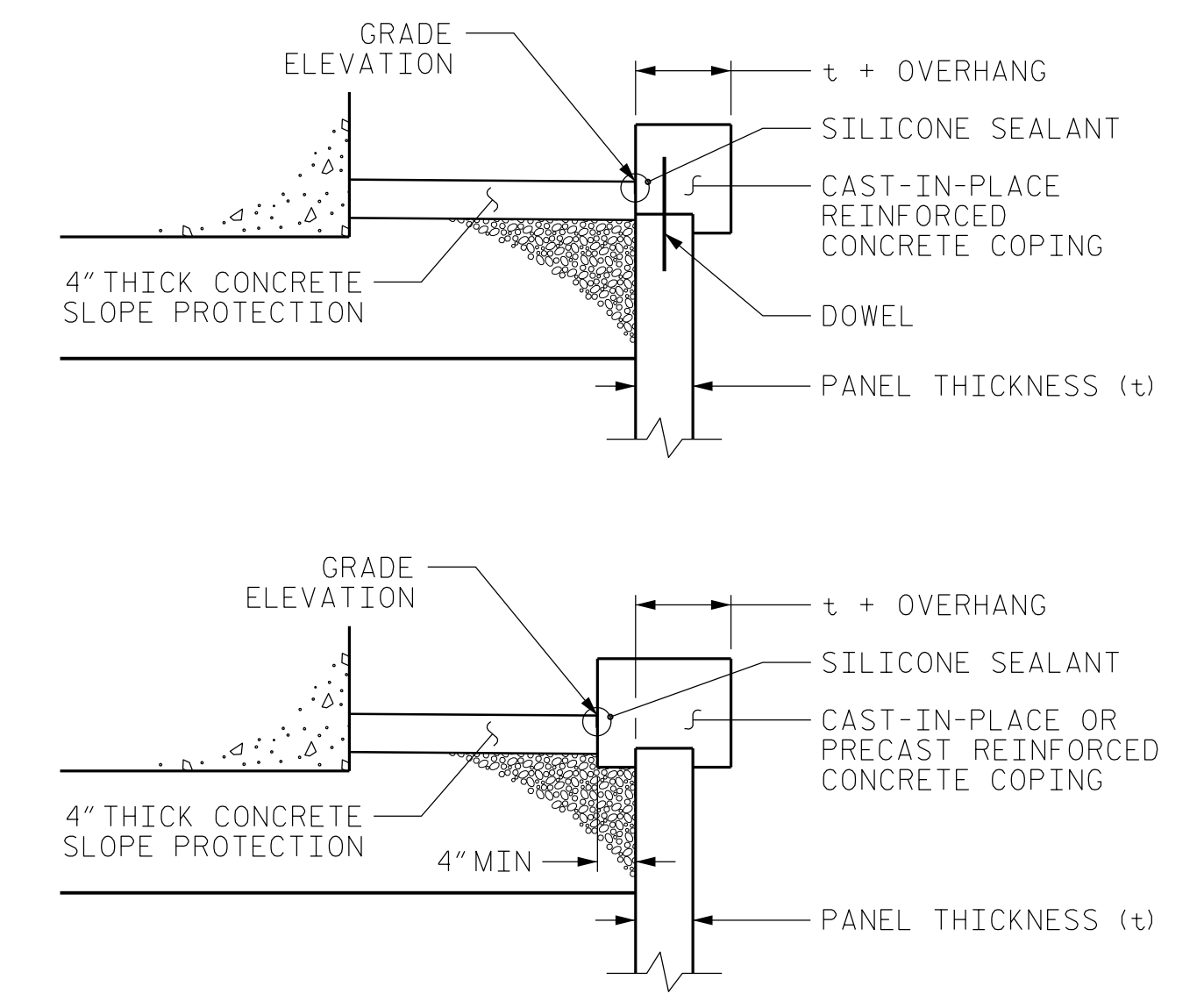
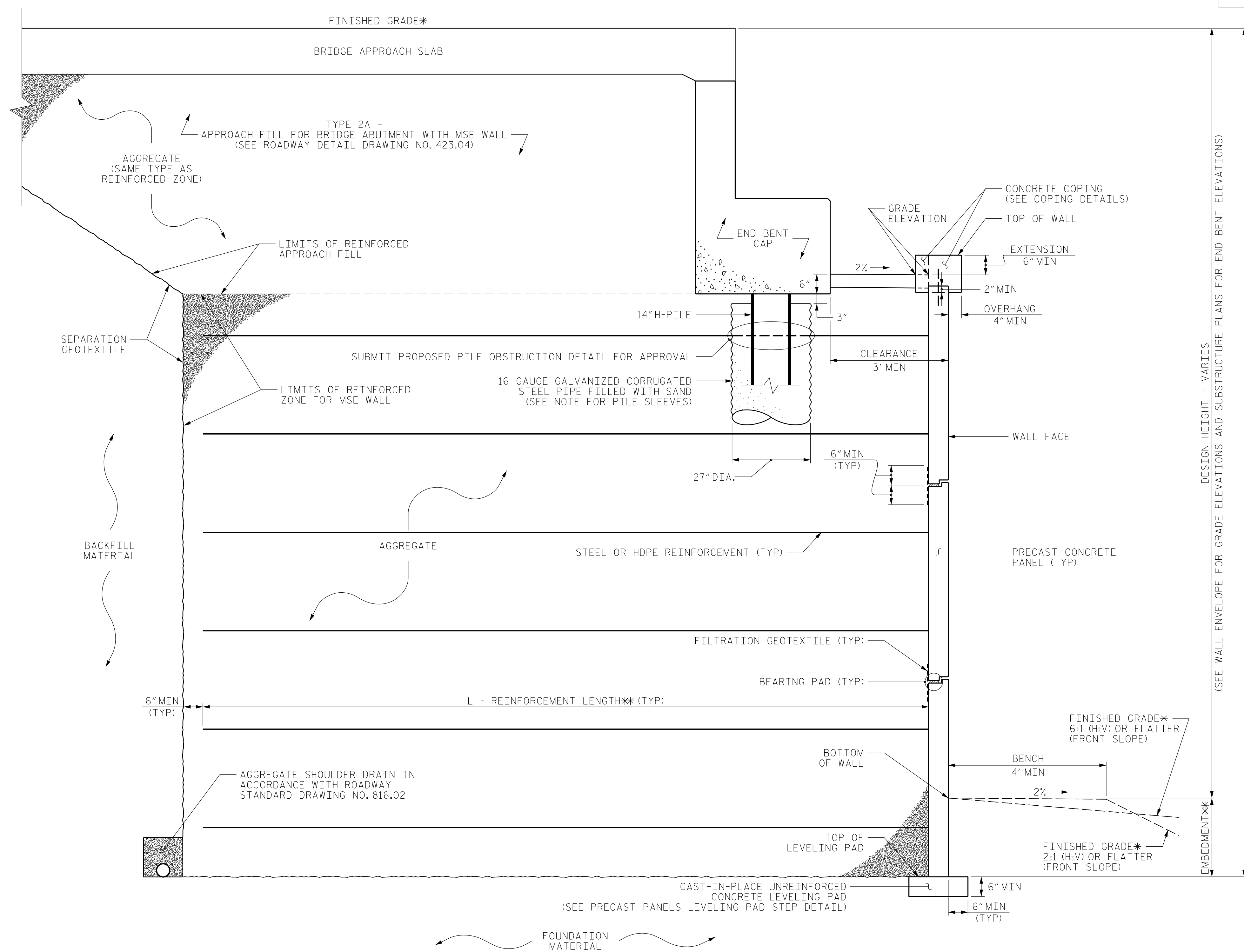
12+00 13+00 14+00 15+00 16+00 17+00





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GEOTECHNICAL ENGINEER 	ENGINEER _____ 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.: P-5715  
WAKE COUNTY  
STATION: -WALL1- 8+99.01 TO 10+07.16  
SHEET 3 OF 5

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

**GEOTECHNICAL  
ENGINEERING UNIT**

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

SHEET NO.  
W-3

PREPARED BY: S. C. CROCKETT	DATE: 02/14/19
REVIEWED BY: J. R. HAMM	DATE: 04/03/24



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GEOTECHNICAL ENGINEER

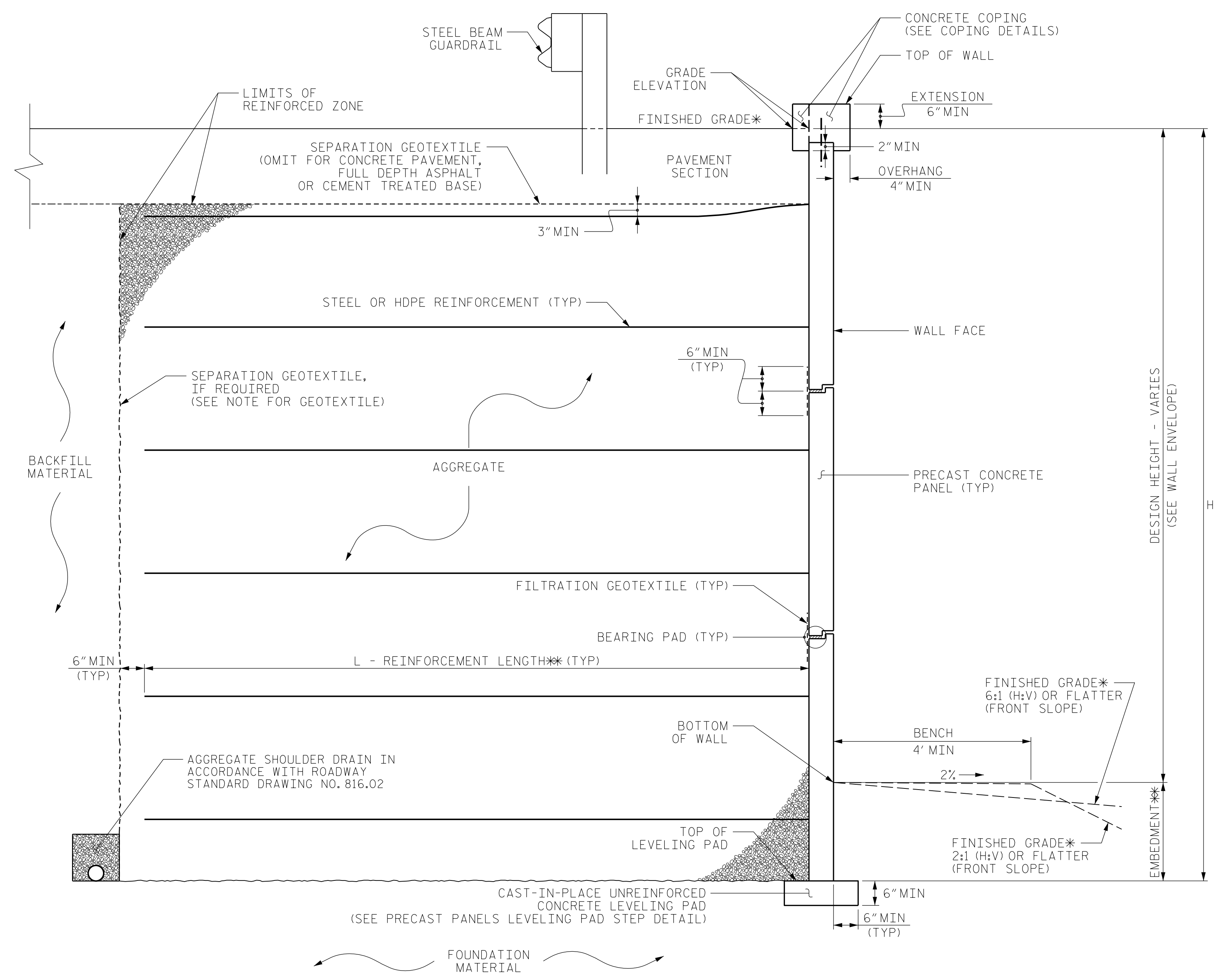
ENGINEER

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SIGNATURE

7/8/2024  
DATE

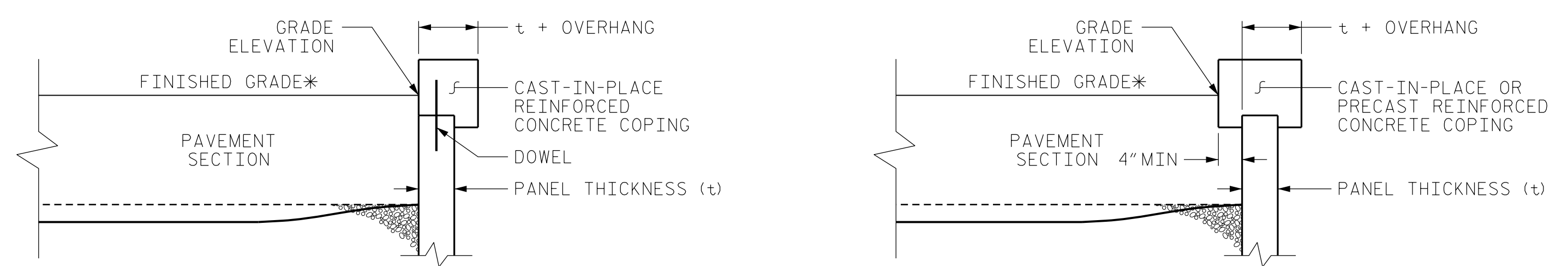
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JEREMY R. HAMM

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**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.



**COPING DETAILS**

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

PROJECT NO.: P-5715  
WAKE COUNTY  
STATION: -WALL1 - 8+24.66 TO 8+99.01 AND  
-WALL1- 10+07.16 TO 14+73.67, -WALL2-  
SHEET 4 OF 5

NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS

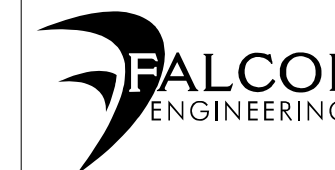
GEOTECHNICAL  
ENGINEERING UNIT

RETAINING WALLS #1 & 2  
WITH PANELS AND GUARDRAIL  
TYPICAL & COPING DETAILS

PREPARED BY: S. C. CROCKETT	DATE: 02/14/19
REVIEWED BY: J. R. HAMM	DATE: 04/03/24

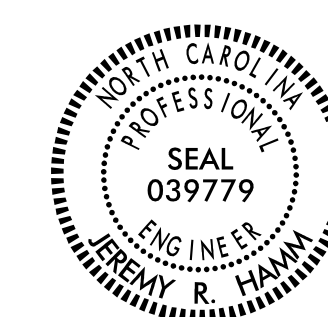
REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	
1			3			W-4
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GEOTECHNICAL ENGINEER



ENGINEER

DocuSigned by:

Jeremy Hamm

7/9/2024

46220214583C46A

SIGNATURE

DATE

SIGNATURE

DATE

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**NOTES:**

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

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

A SEPARATION GEOTEXTILE IS REQUIRED AT THE BACK OF THE REINFORCED ZONE FOR RETAINING WALL NO.1 AND NO.2.

A DRAIN IS REQUIRED FOR RETAINING WALLS NO.1 AND NO.2.

PILE SLEEVES ARE REQUIRED AROUND PILES FOR END BENT NO.1 LOCATED AT STATION 20+48.87 -L-.

BEFORE BEGINNING MSE WALL DESIGN FOR RETAINING WALLS NO.1 & 2, SURVEY WALL LOCATIONS AND SUBMIT A REVISED WALL PROFILE VIEW (WALL ENVELOPE) FOR REVIEW. DO NOT START WALL DESIGN OR CONSTRUCTION UNTIL THE REVISED WALL ENVELOPES ARE ACCEPTED.

DESIGN RETAINING WALL NO.1 FOR THE FOLLOWING:

- 1) H = DESIGN HEIGHT + EMBEDMENT
- 2) DESIGN LIFE = 100 YEARS
- 3) MAXIMUM FACTORED VERTICAL PRESSURE ON FOUNDATION MATERIAL = 9510 PSF (WALL NO.1), 8530 PSF (WALL NO.2)
- 4) MINIMUM REINFORCEMENT LENGTH (L) = 0.7 H (WALL NO.1), 0.75H (WALL NO.2)
- 5) REINFORCED ZONE AGGREGATE PARAMETERS:

AGGREGATE TYPE*	UNIT WEIGHT ( $\gamma$ ) PCF	FRICTION ANGLE ( $\phi$ ) DEGREES	COHESION (c) PSF
COARSE	110	38	0

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

6) IN-SITU ASSUMED MATERIAL PARAMETERS:

MATERIAL TYPE	UNIT WEIGHT ( $\gamma$ ) PCF	FRICTION ANGLE ( $\phi$ ) DEGREES	COHESION (c) PSF
BACKFILL	120	30	0
FOUNDATION	115	28	0

DESIGN RETAINING WALLS NO.1 & 2 FOR A LIVE LOAD (TRAFFIC) SURCHARGE.

DESIGN RETAINING WALLS NO.1 & 2 FOR PIPES EXTENDING THROUGH THE WALL AS SHOWN. VERIFY PIPE LOCATIONS AND ELEVATIONS BEFORE BEGINNING MSE WALL DESIGN OR CONSTRUCTION. WALL CONTRACTOR SHALL PROVIDE NECESSARY DETAILS FOR PIPE INSTALLATION THROUGH WALL.

DESIGN TOP OF LEVEL PAD MINIMUM 1' BELOW THE BOTTOM OF THE 36" WSP AT STATION 10+40.51 -WALL1- AND STATION 14+18.23 -WALL2-.

DESIGN TOP OF LEVELING PAD NO HIGHER THAN ELEVATION 291.72' FROM STATION 8+99.01 -WALL1- TO STATION 10+07.16 -WALL1-.

EXISTING OR FUTURE OBSTRUCTIONS SUCH AS FOUNDATIONS, GUARDRAIL, FENCE OR HANDRAIL POSTS, PAVEMENTS, PIPES, INLETS OR UTILITIES WILL INTERFERE WITH REINFORCEMENT FOR RETAINING WALLS NO.1 AND 2.

FOUNDATIONS FOR END BENT NO.1 LOCATED AT STATION 20+48.87 -L- WILL INTERFERE WITH REINFORCEMENT FOR RETAINING WALL NO.1. SEE "FOUNDATION LAYOUT" SHEET FOR FOUNDATION LOCATIONS.

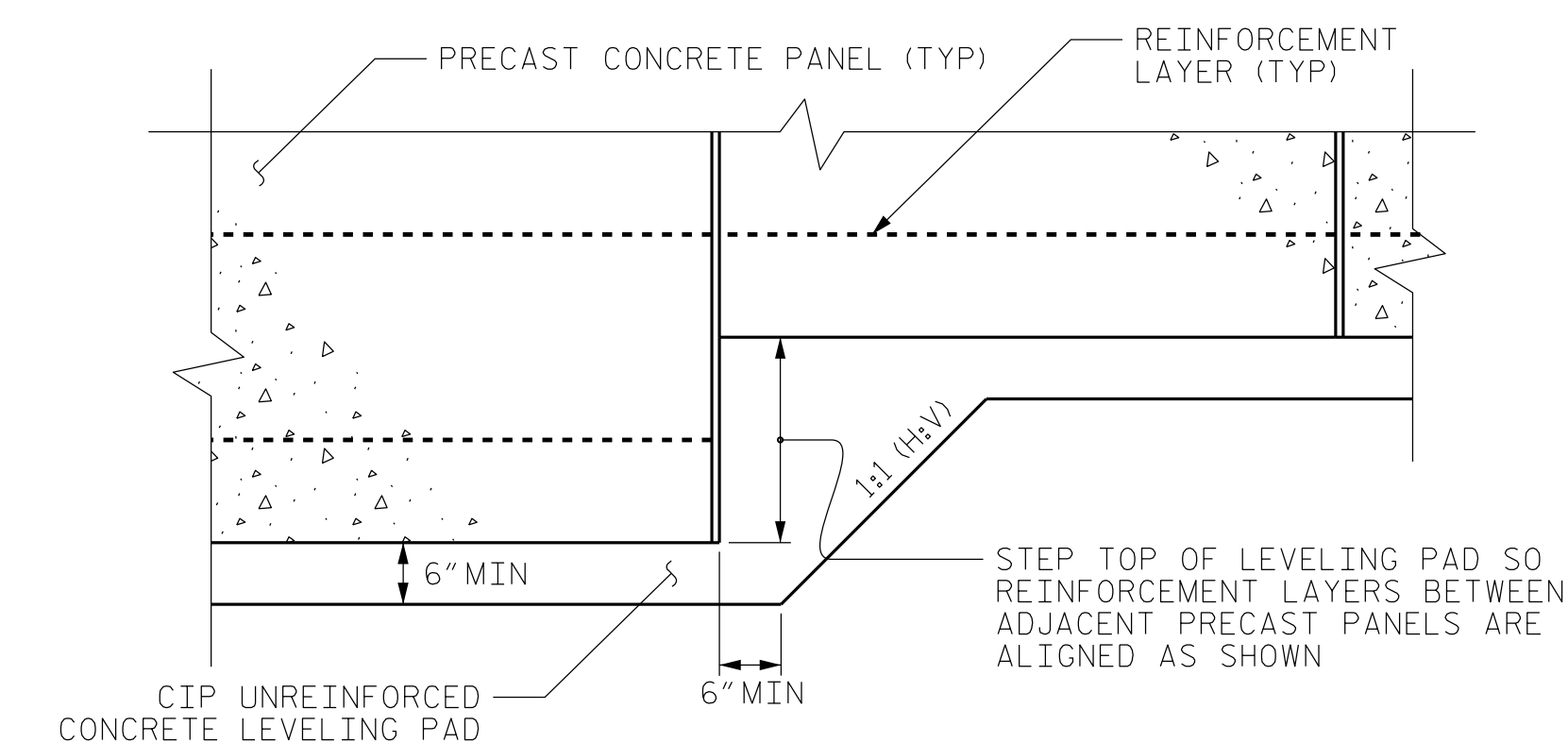
INSTALL PILE SLEEVES FOR END BENT NO.1 LOCATED AT STATION 20+48.87 -L- WHILE CONSTRUCTING RETAINING WALL NO.1. THEN, INSTALL PILES THROUGH THE SLEEVES AND FILL WITH LOOSE UNCOMPACTED SAND BEFORE CONSTRUCTING END BENT CAPS.

OBSERVE A ONE MONTH WAITING PERIOD AFTER CONSTRUCTING END BENT AND BRIDGE APPROACH FILL BEFORE BEGINNING APPROACH SLAB CONSTRUCTION AT END BENT NO.1.

DO NOT PLACE LEVELING PAD CONCRETE, AGGREGATE OR REINFORCEMENT FOR RETAINING WALLS NO.1 & 2 UNTIL EXCAVATION DIMENSIONS AND FOUNDATION MATERIAL ARE APPROVED.

REINFORCEMENT FOR TEMPORARY WALL WILL INTERFERE WITH REINFORCEMENT FOR RETAINING WALL NO.1. SEE TEMPORARY SHORING PROVISION, STRUCTURE PLANS, AND TRAFFIC CONTROL PLANS.

AT THE CONTRACTOR'S OPTION, "TEMPORARY SHORING FOR WALL CONSTRUCTION" MAY BE USED TO CONSTRUCT RETAINING WALLS NO.1 & 2. SEE MSE RETAINING WALLS PROVISION FOR TEMPORARY SHORING FOR WALL CONSTRUCTION.



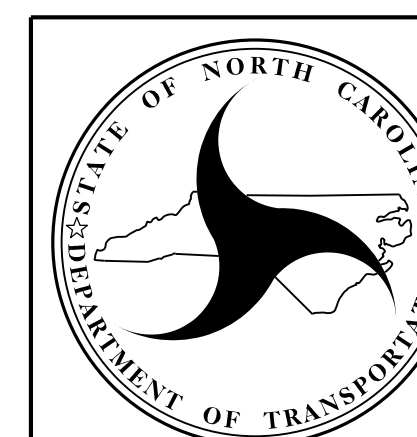
**PRECAST PANELS  
LEVELING PAD STEP DETAIL**

PROJECT NO.: P-5715

WAKE COUNTY

STATION: -WALL1-, -WALL2-

SHEET 5 OF 5



**NORTH CAROLINA  
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DIVISION OF HIGHWAYS**

**GEOTECHNICAL  
ENGINEERING UNIT**

**RETAINING WALLS #1 & 2  
NOTES AND PRECAST PANELS  
LEVEL PAD STEP DETAIL**

**REVISIONS**

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1			3		
2			4		

SHEET NO.  
W-5

PREPARED BY: S. C. CROCKETT	DATE: 02/14/19
REVIEWED BY: J. R. HAMM	DATE: 04/03/24