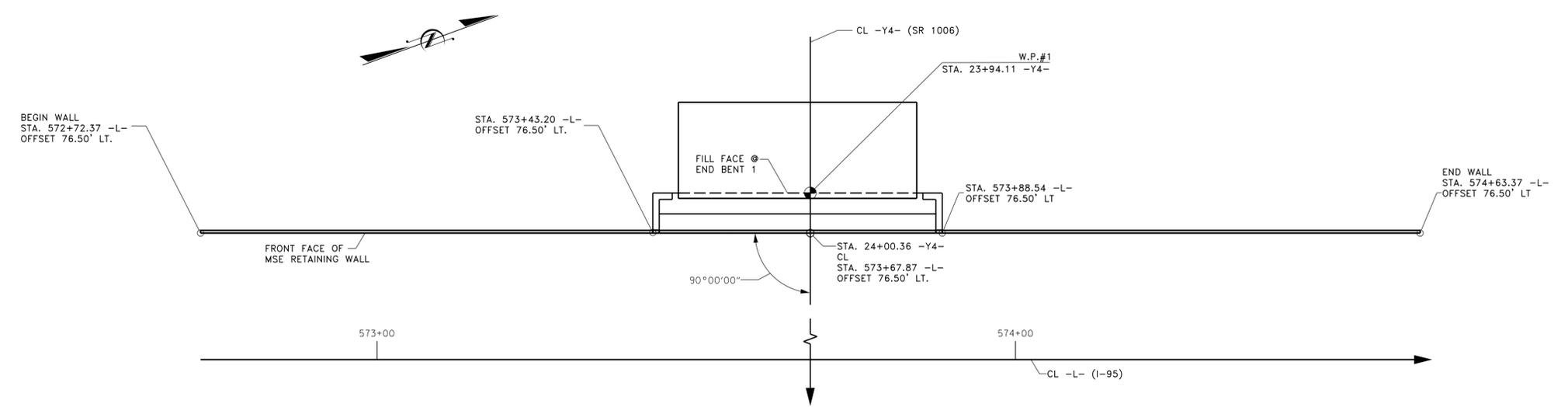


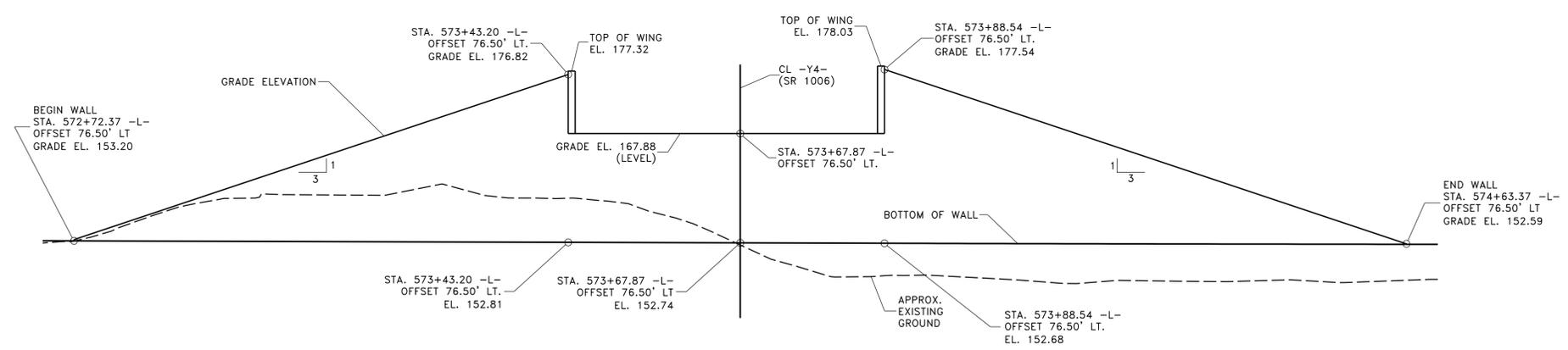
GEOTECHNICAL ENGINEER  
 ENGINEER  
 NORTH CAROLINA PROFESSIONAL SEAL 048207  
 ENGINEER  
 STEPHEN C. CROCKETT  
 Documented by: Stephen C. Crockett 04/12/2022  
 DATE: 04/12/2022  
 SIGNATURE: DATE: SIGNATURE: DATE:

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



ESTIMATED MSE WALL QUANTITIES (SQUARE FEET)	
MSE RETAINING WALL NO. W4A	2,900 SF

RETAINING WALL NO. W4A PLAN - END BENT 1 MSE WALL



RETAINING WALL NO. W4A ENVELOPE - END BENT 1 MSE WALL

DIMENSIONS OF WALL TAKEN ALONG FRONT FACE OF MSE WALL FACING DOWNSTATION ON -Y4-

PROJECT NO.: I-5987B  
 ROBESON COUNTY  
 STATION: 24+74.16 -Y4-  
 SHEET 1 OF 19 WALL ID W4A

PREPARED BY: S. CROCKETT	DATE: 3/29/22
REVIEWED BY: J. HAMM	DATE: 3/29/22

FALCON ENGINEERING, INC.  
 1210 TRINITY ROAD, SUITE 110  
 CARY, NC 27513  
 PHONE: 919.871.0800  
 www.falconengineers.com

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

RETAINING WALL NO. W4A WALL PLAN AND ENVELOPE					
REVISIONS					
NO.	BY	DATE	NO.	BY	DATE
1			3		
2			4		

SHEET NO. W-1

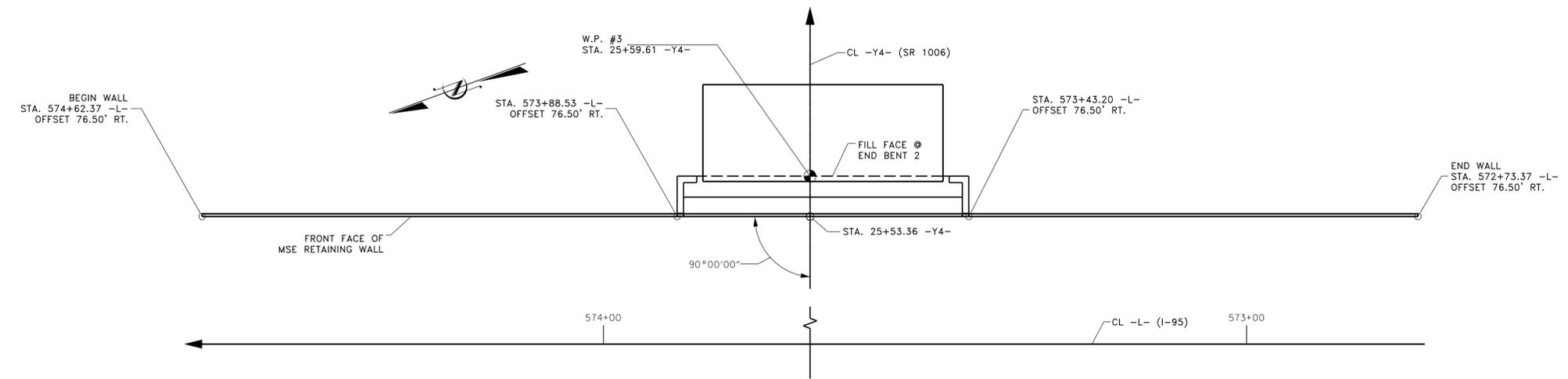
GEOTECHNICAL ENGINEER

DocuSigned by:  
*Stephen C. Crockett* 04/12/2022

ENGINEER

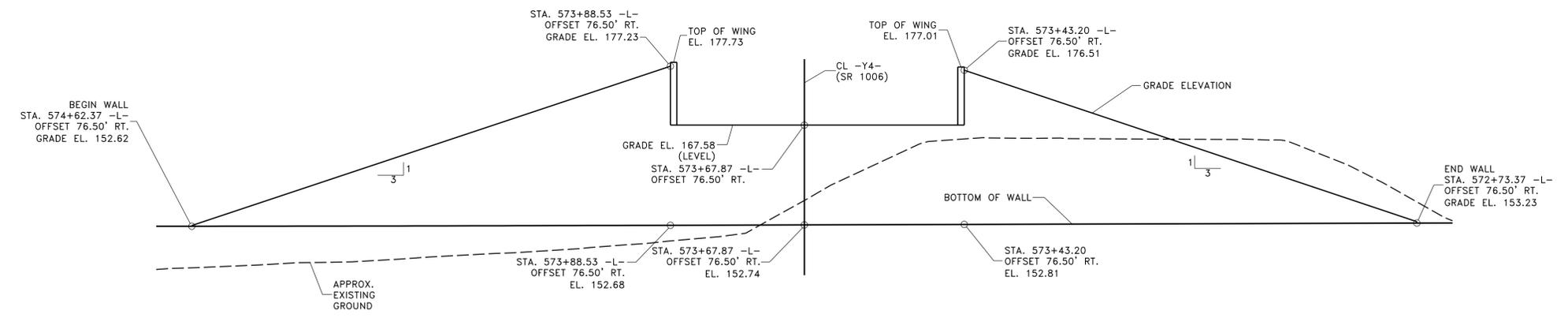
\_\_\_\_\_  
SIGNATURE      DATE

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



ESTIMATED MSE WALL QUANTITIES (SQUARE FEET)	
MSE RETAINING WALL NO. W4B	2,850 SF

### RETAINING WALL NO. W4B PLAN - END BENT 2 MSE WALL



### RETAINING WALL NO. W4B ENVELOPE - END BENT 2 MSE WALL

DIMENSIONS OF WALL TAKEN ALONG FRONT FACE OF MSE WALL  
FACING UPSTATION ON -Y4-

PROJECT NO.: I-5987B  
 ROBESON COUNTY  
 STATION: 24+74.16 -Y4-  
 SHEET 2 OF 19      WALL ID W4B

PREPARED BY: S. CROCKETT      DATE: 3/29/22  
 REVIEWED BY: J. HAMM      DATE: 3/29/22

FALCON ENGINEERING, INC.  
1210 TRINITY ROAD, SUITE 110  
CARY, NC 27513  
PHONE: 919.871.0800  
www.falconengineers.com

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

**GEOTECHNICAL  
ENGINEERING UNIT**

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

### RETAINING WALL NO. W4B WALL PLAN AND ENVELOPE

GEOTECHNICAL ENGINEER

ENGINEER

SEAL 048207

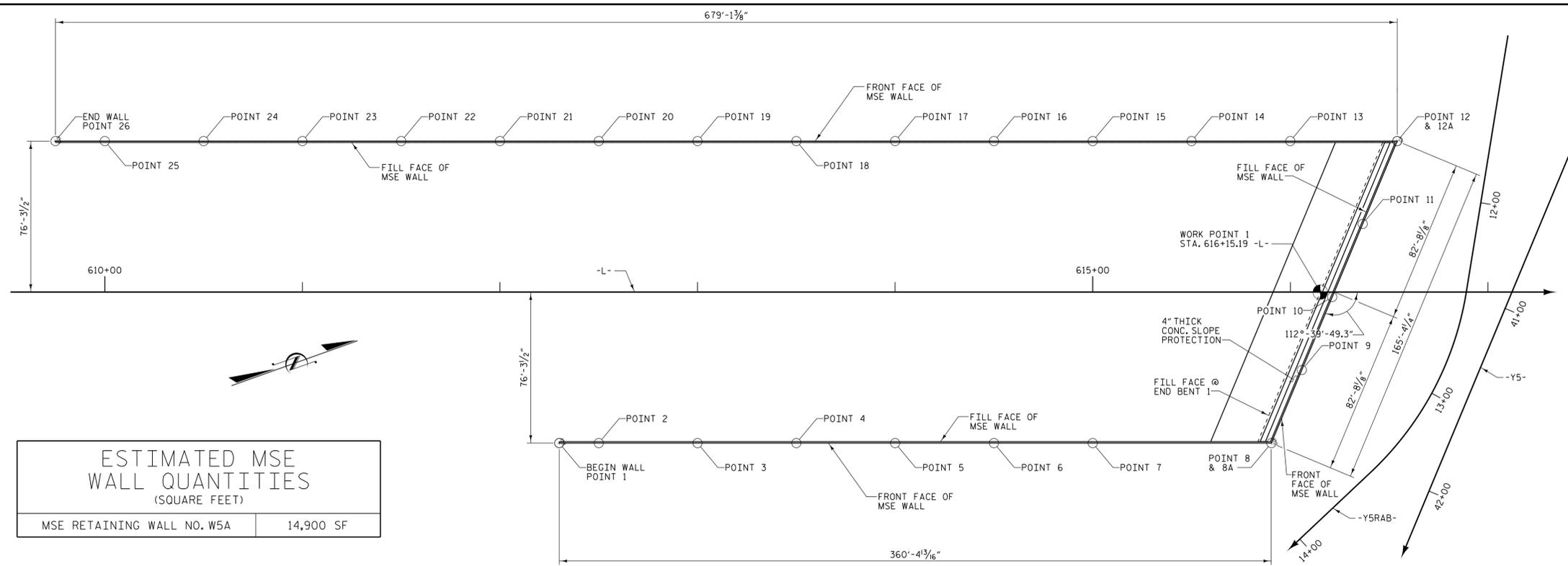
STEPHEN C. CROCKETT

DocuSigned by: Stephen C. Crockett 04/12/2022

DATE: 04/12/2022

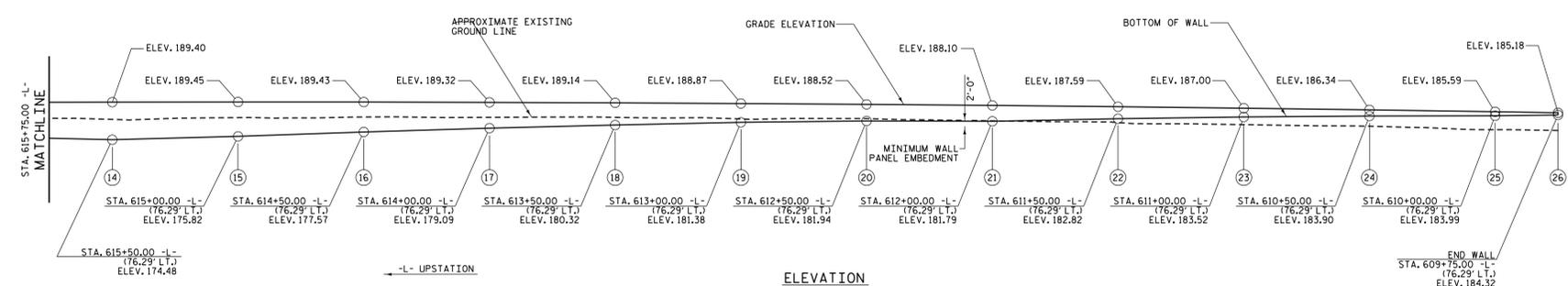
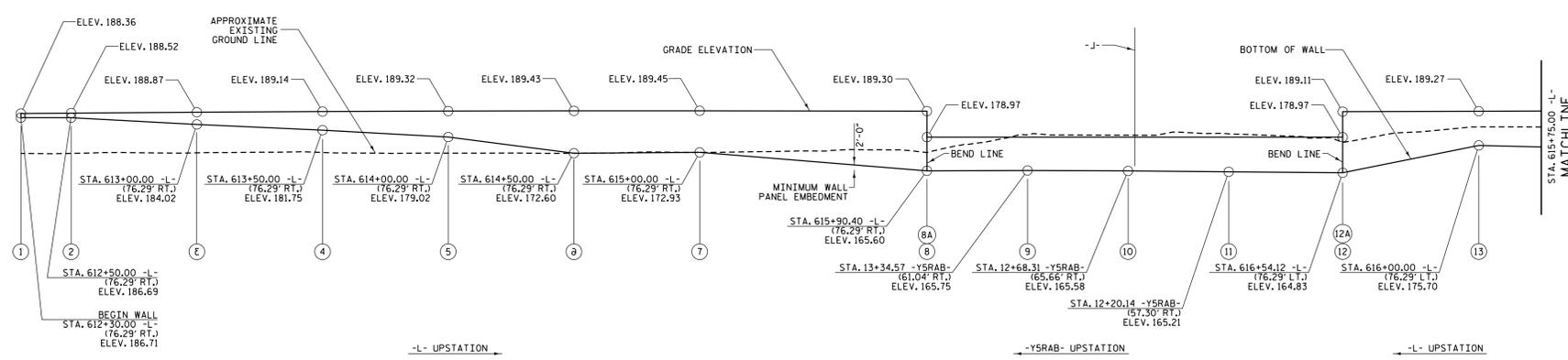
SIGNATURE: DATE:

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



ESTIMATED MSE WALL QUANTITIES (SQUARE FEET)	
MSE RETAINING WALL NO. W5A	14,900 SF

RETAINING WALL NO. W5A PLAN - END BENT 1 MSE WALL



RETAINING WALL NO. W5A ENVELOPE - END BENT 1 MSE WALL  
 DIMENSIONS OF WALL TAKEN ALONG FRONT FACE OF MSE WALL FACING DOWNSTATION ON -L-

PROJECT NO.: I-5987B

ROBESON COUNTY

STATION: 617+12.20 -L-

SHEET 3 OF 19 WALL ID W5A

PREPARED BY: S. CROCKETT DATE: 3/29/22

REVIEWED BY: J. HAMM DATE: 3/29/22

**FALCON ENGINEERING**

FALCON ENGINEERING, INC.  
 1210 TRINITY ROAD, SUITE 110  
 CARY, NC 27513

PHONE: 919.871.0800  
 www.falconengineers.com

**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

GEOTECHNICAL ENGINEER

ENGINEER

SEAL 048207

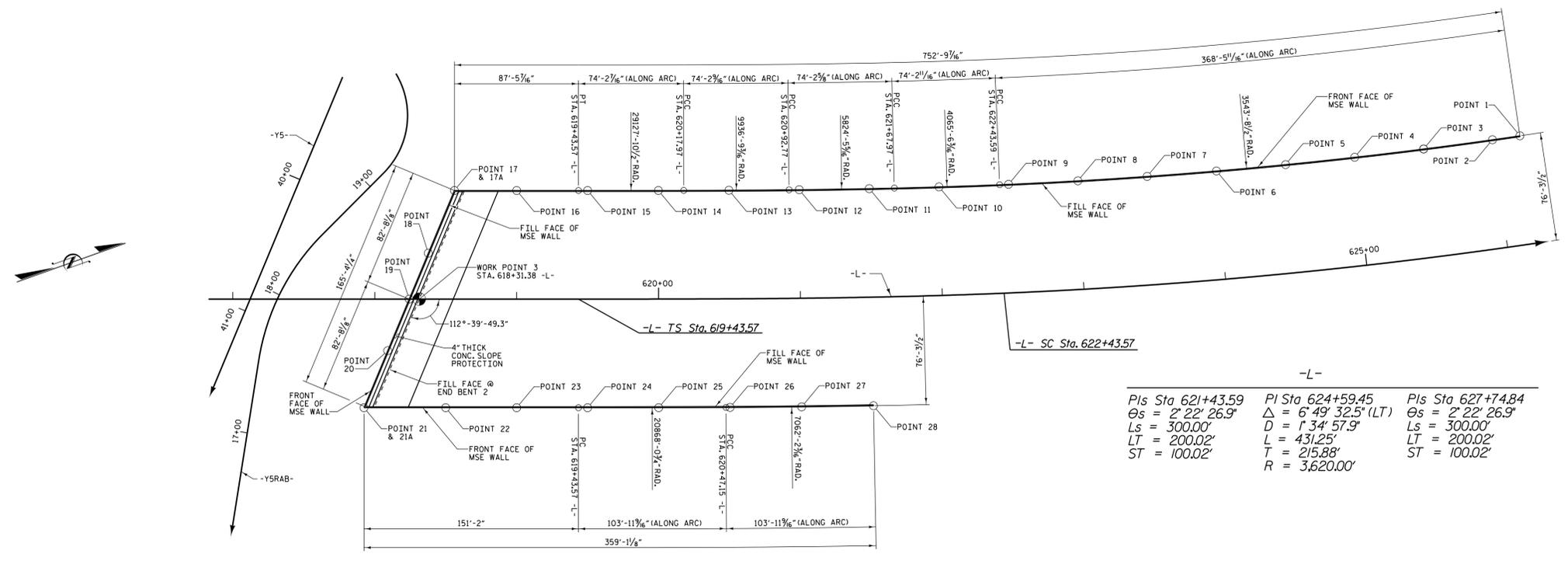
STEPHEN C. CROCKETT

DocuSigned by: Stephen C. Crockett 04/12/2022

DATE: 04/12/2022

SIGNATURE: DATE:

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

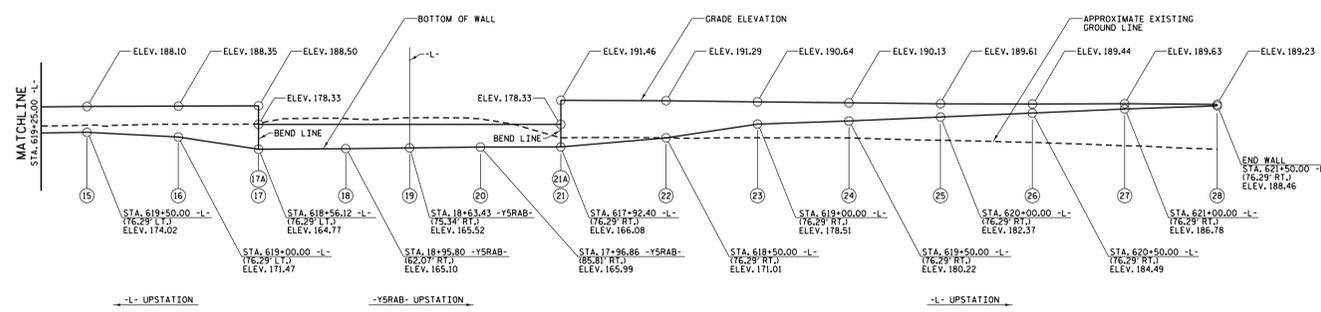
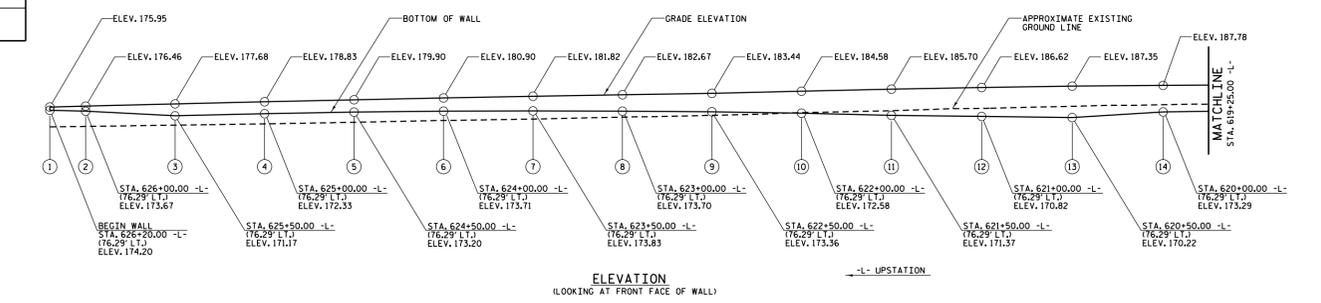


-L-

PIs Sta 621+43.59	PI Sta 624+59.45	PIs Sta 627+74.84
$\theta_s = 2^\circ 22' 26.9''$	$\Delta = 6^\circ 49' 32.5''$ (LT)	$\theta_s = 2^\circ 22' 26.9''$
$L_s = 300.00'$	$D = 1^\circ 34' 57.9''$	$L_s = 300.00'$
$LT = 200.02'$	$L = 431.25'$	$LT = 200.02'$
$ST = 100.02'$	$T = 215.88'$	$ST = 100.02'$
	$R = 3,620.00'$	

ESTIMATED MSE WALL QUANTITIES (SQUARE FEET)	
MSE RETAINING WALL NO. W5B	16,800 SF

RETAINING WALL NO. W5B PLAN - END BENT 2 MSE WALL



RETAINING WALL NO. W5B ENVELOPE - END BENT 2 MSE WALL

THE WALL ENVELOPE DOES NOT ACCURATELY DEPICT THE FACE OF THE WALL DIMENSIONS OF WALL TAKEN ALONG FRONT FACE OF MSE WALL FACING UPSTATION ON -L-

PROJECT NO.: I-5987B

ROBESON COUNTY

STATION: 617+12.20 -L-

SHEET 4 OF 19

WALL ID W5B

PREPARED BY: S. CROCKETT	DATE: 3/29/22
REVIEWED BY: J. HAMM	DATE: 3/29/22

**FALCON ENGINEERING**

FALCON ENGINEERING, INC.  
1210 TRINITY ROAD, SUITE 110  
CARY, NC 27513

PHONE: 919.871.0800  
www.falconengineers.com

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS

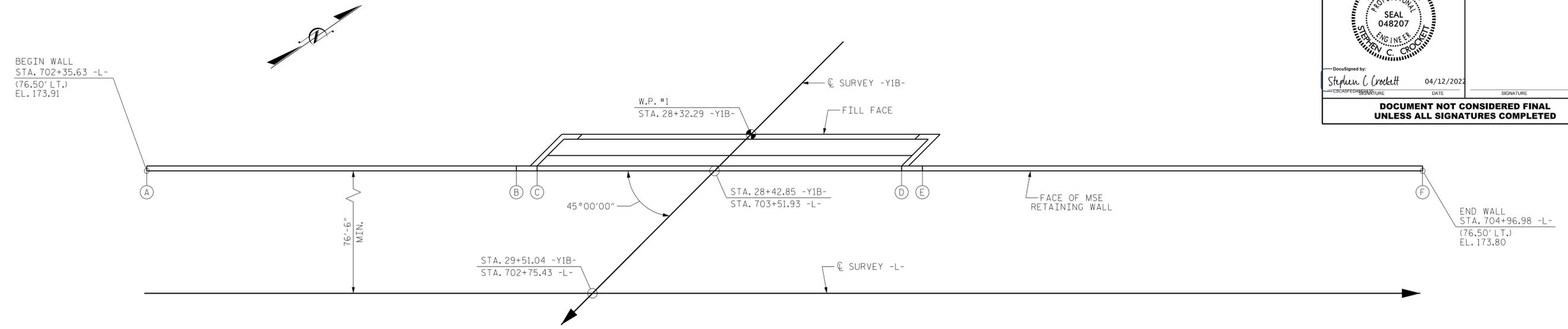
**GEOTECHNICAL ENGINEERING UNIT**

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

SHEET NO. W-4

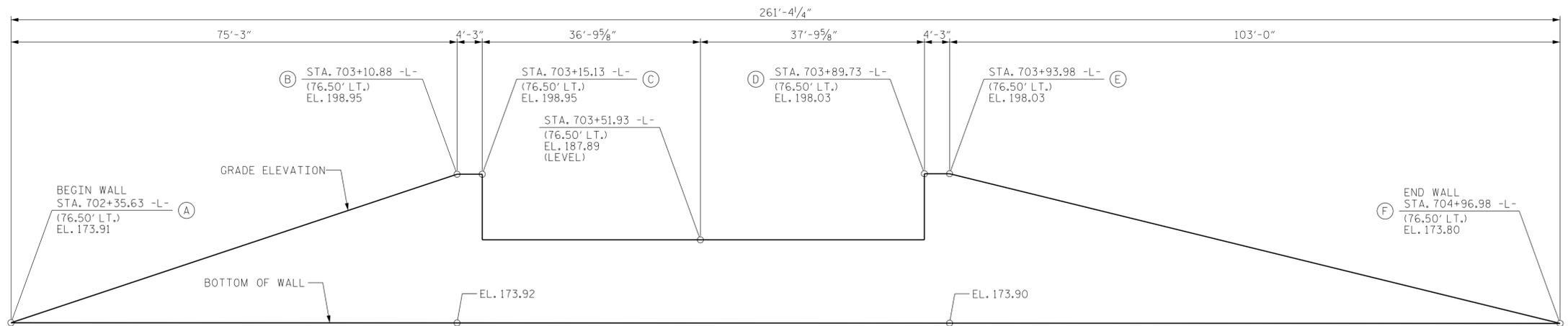
GEOTECHNICAL ENGINEER  
 ENGINEER  
 NORTH CAROLINA PROFESSIONAL SEAL 048207  
 ENGINEER  
 STEPHEN C. CROCKETT  
 Documented by: Stephen C. Crockett 04/12/2022  
 DATE: 04/12/2022  
 SIGNATURE: DATE: SIGNATURE: DATE:

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



ESTIMATED MSE WALL QUANTITIES (SQUARE FEET)	
MSE RETAINING WALL NO. W6A	4,025 SF

RETAINING WALL NO. W6A PLAN - END BENT 1 MSE WALL



RETAINING WALL NO. W6A ENVELOPE - END BENT 1 MSE WALL

DIMENSIONS OF WALL TAKEN ALONG FRONT FACE OF MSE WALL FACING DOWNSTATION ON -Y1B-

PROJECT NO.: I-5987B  
 ROBESON COUNTY  
 STATION: 29+51.04 -Y1B-  
 SHEET 5 OF 19 WALL ID W6A

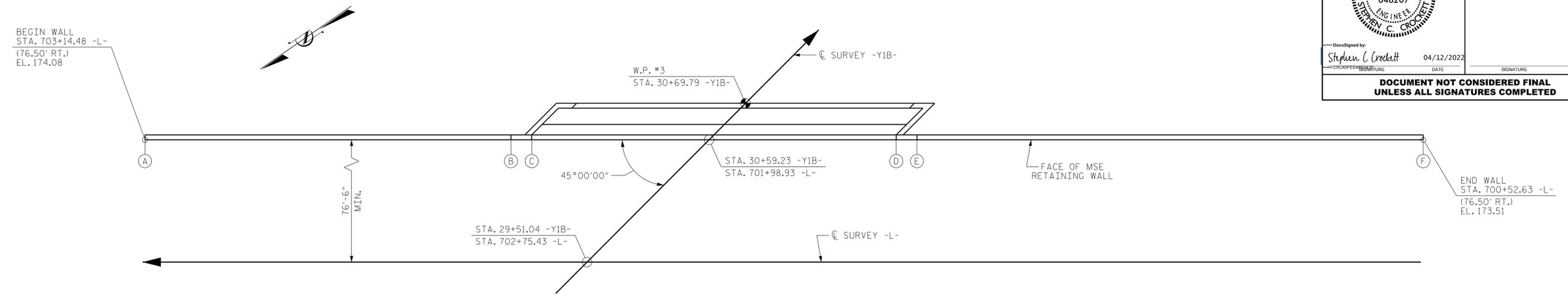
PREPARED BY: S. CROCKETT DATE: 3/29/22  
 REVIEWED BY: J. HAMM DATE: 3/29/22

FALCON ENGINEERING, INC.  
 1210 TRINITY ROAD, SUITE 110  
 CARY, NC 27513  
 PHONE: 919.871.0800  
 www.falconengineers.com

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

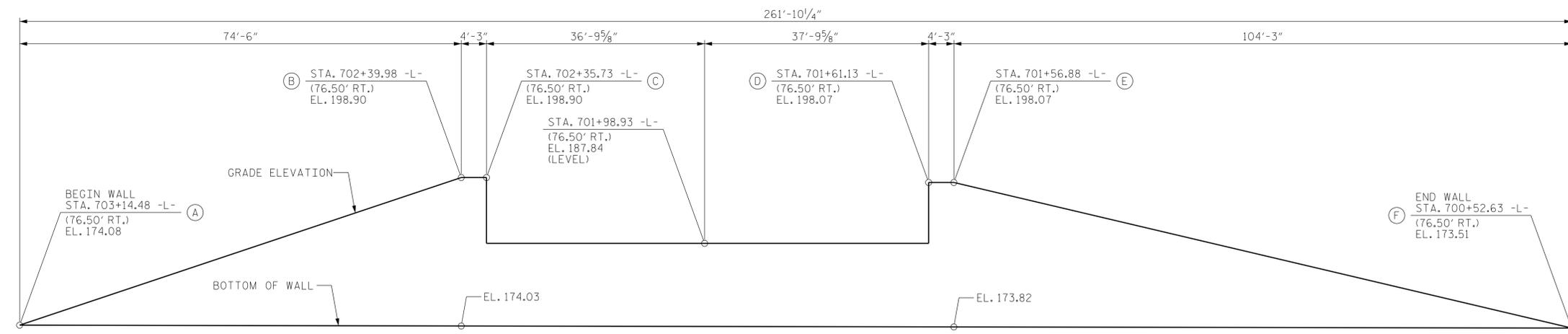
REVISIONS						SHEET NO. W-5
NO.	BY	DATE	NO.	BY	DATE	
1			3			W-5
2			4			

GEOTECHNICAL ENGINEER  
 ENGINEER  
  
 Documented by: Stephen C. Crockett 04/12/2022  
 DATE: 04/12/2022  
 SIGNATURE: \_\_\_\_\_ DATE: \_\_\_\_\_  
**DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED**



ESTIMATED MSE WALL QUANTITIES (SQUARE FEET)	
MSE RETAINING WALL NO. W6B	3,975 SF

RETAINING WALL NO. W6B PLAN - END BENT 2 MSE WALL



RETAINING WALL NO. W6B ENVELOPE - END BENT 2 MSE WALL

DIMENSIONS OF WALL TAKEN ALONG FRONT FACE OF MSE WALL FACING UPSTATION ON -Y1B-

PROJECT NO.: I-5987B  
 ROBESON COUNTY  
 STATION: 29+51.04 -Y1B-  
 SHEET 6 OF 19 WALL ID W6B

PREPARED BY: S. CROCKETT DATE: 3/29/22  
 REVIEWED BY: J. HAMM DATE: 3/29/22

  
 FALCON ENGINEERING, INC.  
 1210 TRINITY ROAD, SUITE 110  
 CARY, NC 27513  
 PHONE: 919.871.0800  
 www.falconengineers.com

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

REVISIONS						SHEET NO. W-6
NO.	BY	DATE	NO.	BY	DATE	
1			3			
2			4			

GEOTECHNICAL ENGINEER

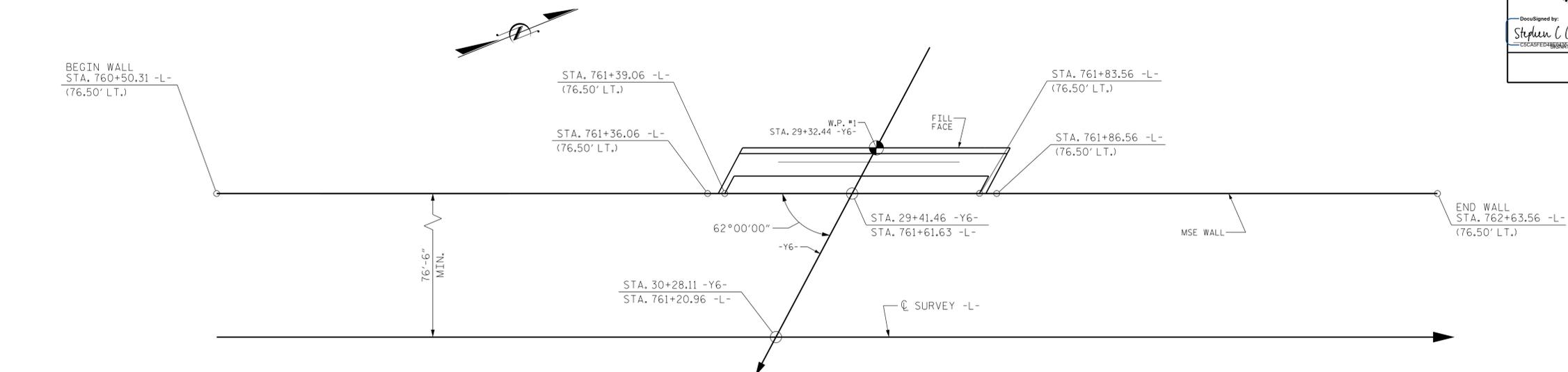
ENGINEER

NORTH CAROLINA  
PROFESSIONAL  
SEAL  
048207  
ENGINEER  
STEPHEN C. CROCKETT

DocuSigned by:  
*Stephen C. Crockett* 04/12/2022

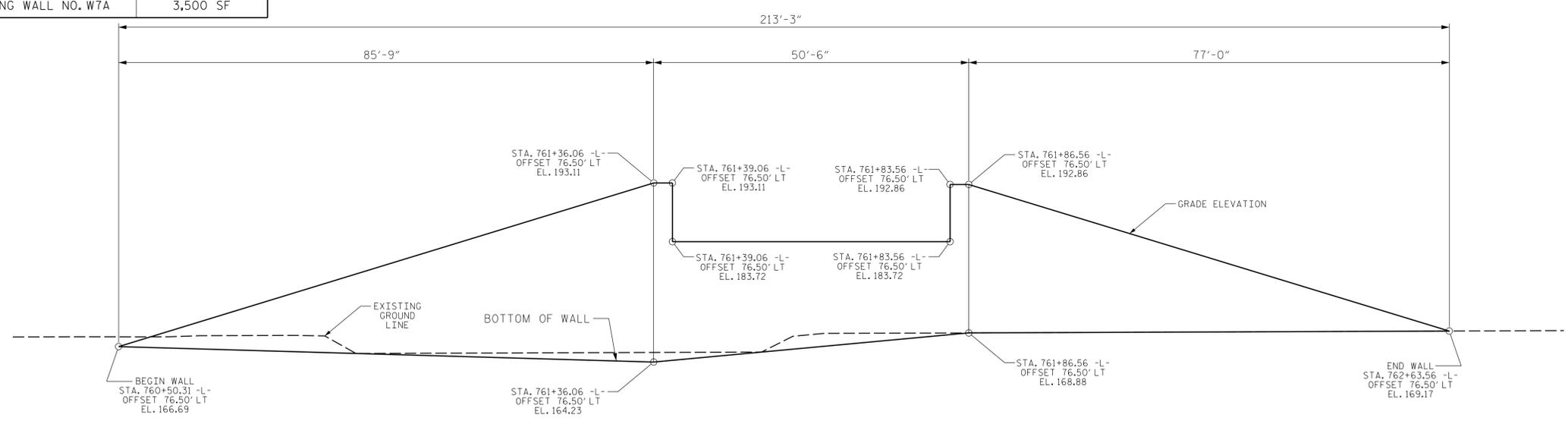
DATE SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED



ESTIMATED MSE WALL QUANTITIES (SQUARE FEET)	
MSE RETAINING WALL NO. W7A	3,500 SF

RETAINING WALL NO. W7A PLAN - END BENT 1 MSE WALL



RETAINING WALL NO. W7A ENVELOPE - END BENT 1 MSE WALL

DIMENSIONS OF WALL TAKEN ALONG FRONT FACE OF MSE WALL  
FACING DOWNSTATION ON -Y6-

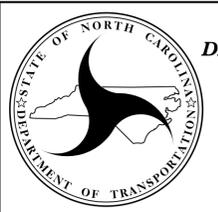
PROJECT NO.: I-5987B  
ROBESON COUNTY  
STATION: 30+28.11 -Y6-  
SHEET 7 OF 19 WALL ID W7A

PREPARED BY: S. CROCKETT	DATE: 3/29/22
REVIEWED BY: J. HAMM	DATE: 3/29/22

FALCON

ENGINEERING

FALCON ENGINEERING, INC.  
1210 TRINITY ROAD, SUITE 110  
CARY, NC 27513  
PHONE: 919.871.0800  
www.falconengineers.com



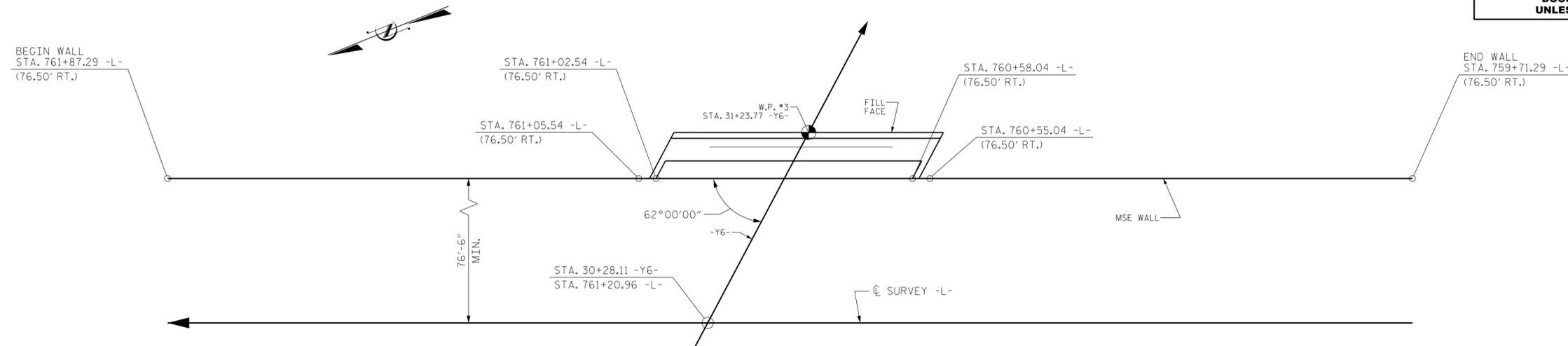
NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS

GEOTECHNICAL  
ENGINEERING UNIT

RETAINING WALL NO. W7A WALL PLAN AND ENVELOPE					
REVISIONS					
NO.	BY	DATE	NO.	BY	DATE
1			3		
2			4		

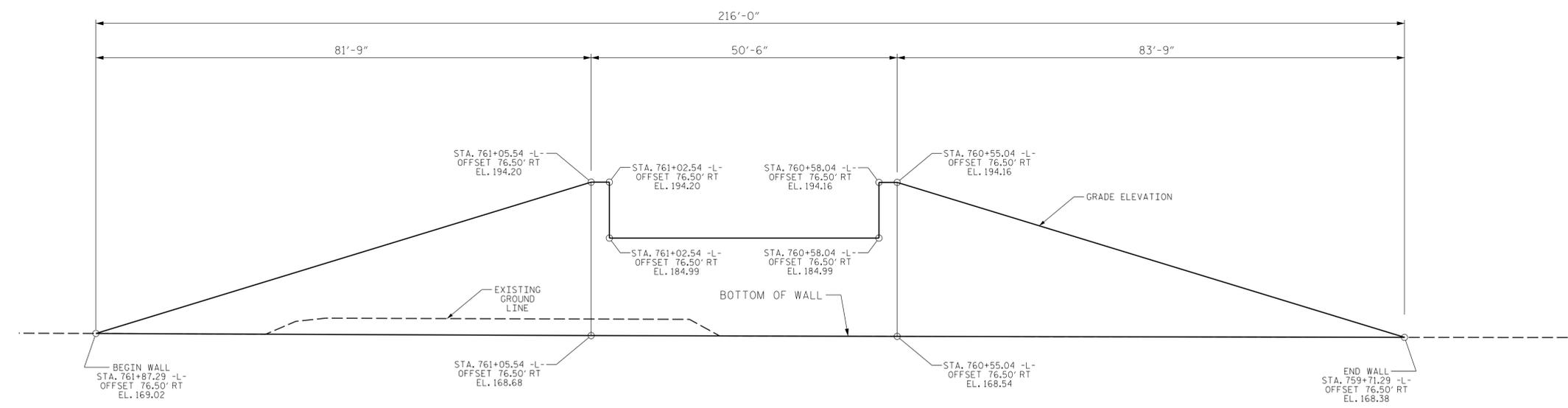
SHEET NO. W-7

GEOTECHNICAL ENGINEER  
 ENGINEER  
  
 DocuSigned by:  
 Stephen C. Crockett 04/12/2022  
 SIGNATURE DATE SIGNATURE DATE  
**DOCUMENT NOT CONSIDERED FINAL  
 UNLESS ALL SIGNATURES COMPLETED**



ESTIMATED MSE WALL QUANTITIES (SQUARE FEET)	
MSE RETAINING WALL NO. W7B	3,400 SF

RETAINING WALL NO. W7B PLAN - END BENT 2 MSE WALL



RETAINING WALL NO. W7B ENVELOPE - END BENT 2 MSE WALL

DIMENSIONS OF WALL TAKEN ALONG FRONT FACE OF MSE WALL FACING UPSTATION ON -Y6-

PROJECT NO.: I-5987B  
 ROBESON COUNTY  
 STATION: 30+28.11 -Y6-  
 SHEET 8 OF 19 WALL ID W7B

PREPARED BY: S. CROCKETT	DATE: 3/29/22
REVIEWED BY: J. HAMM	DATE: 3/29/22

  
 FALCON ENGINEERING, INC.  
 1210 TRINITY ROAD, SUITE 110  
 CARY, NC 27513  
 PHONE: 919.871.0800  
 www.falconengineers.com

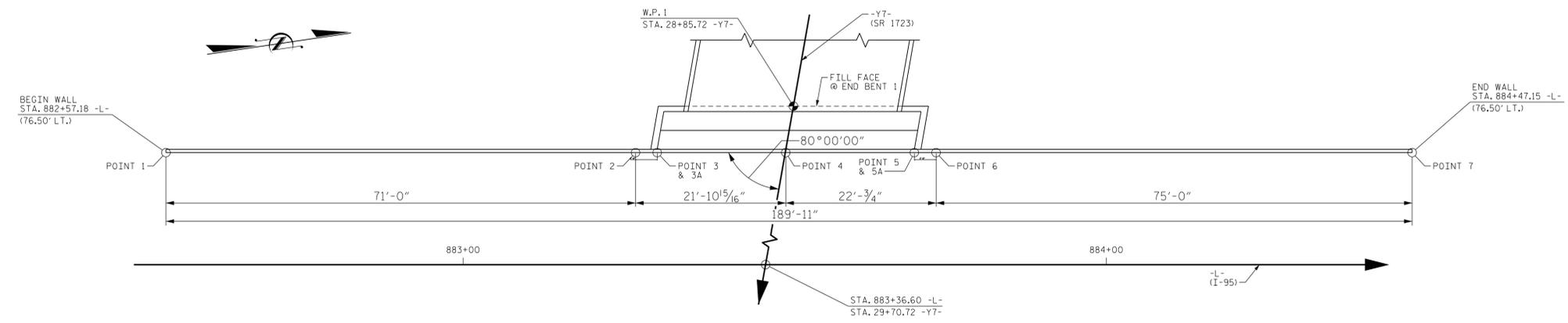
  
 NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 DIVISION OF HIGHWAYS  
**GEOTECHNICAL  
 ENGINEERING UNIT**

RETAINING WALL NO. W7B WALL PLAN AND ENVELOPE					
REVISIONS					
NO.	BY	DATE	NO.	BY	DATE
1			3		
2			4		

SHEET NO. W-8

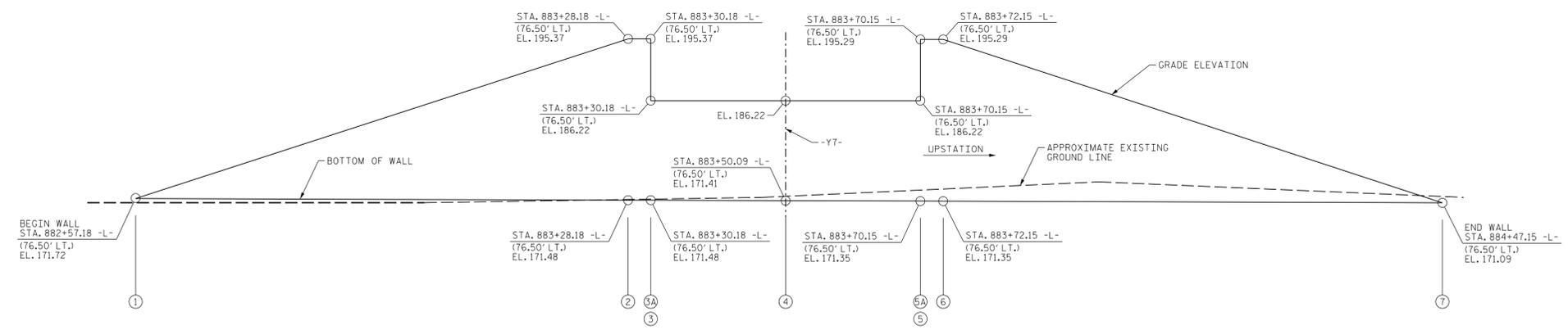
GEOTECHNICAL ENGINEER  
 ENGINEER  
 SEAL 048207  
 STEPHEN C. CROCKETT  
 DocuSigned by: Stephen C. Crockett 04/12/2022  
 DATE: 04/12/2022  
 SIGNATURE: DATE:

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



ESTIMATED MSE WALL QUANTITIES (SQUARE FEET)	
MSE RETAINING WALL NO. W8A	2,900 SF

RETAINING WALL NO. W8A PLAN - END BENT 1 MSE WALL



RETAINING WALL NO. W8A ENVELOPE - END BENT 1 MSE WALL

DIMENSIONS OF WALL TAKEN ALONG FRONT FACE OF MSE WALL FACING DOWNSTATION ON -Y7-

PROJECT NO.: I-5987B  
 ROBESON COUNTY  
 STATION: 29+70.72 -Y7-  
 SHEET 9 OF 19 WALL ID W8A

PREPARED BY: S. CROCKETT	DATE: 3/29/22
REVIEWED BY: J. HAMM	DATE: 3/29/22

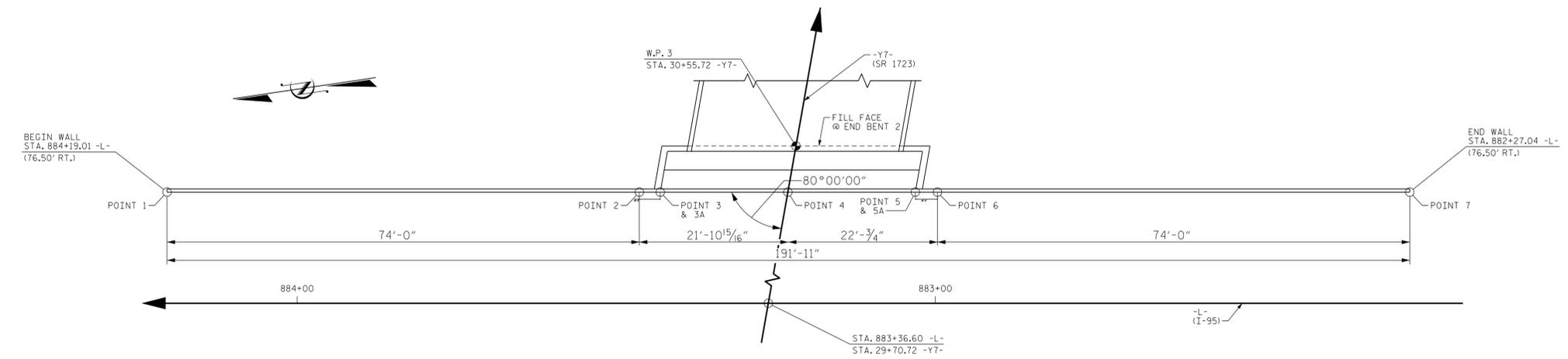
**FALCON ENGINEERING**  
 FALCON ENGINEERING, INC.  
 1210 TRINITY ROAD, SUITE 110  
 CARY, NC 27513  
 PHONE: 919.871.0800  
 www.falconengineers.com



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

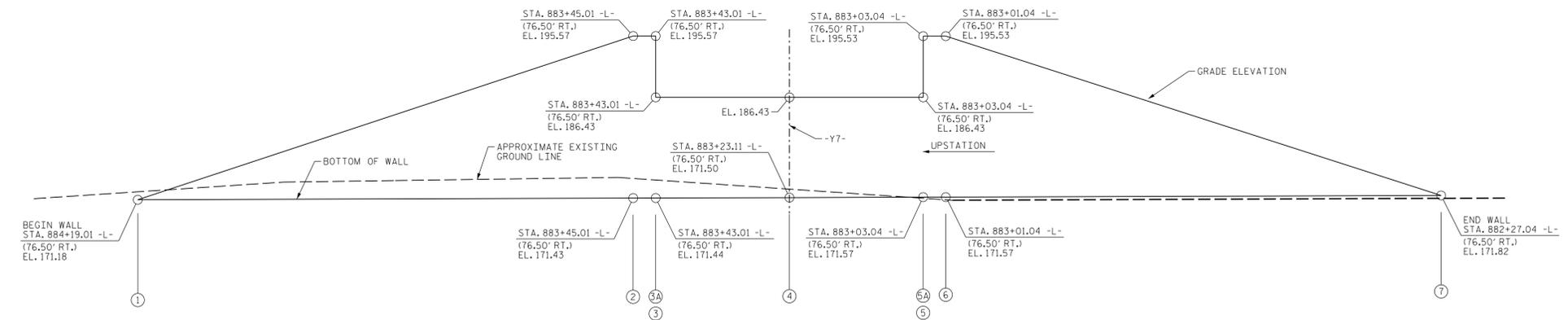
REVISIONS						SHEET NO. W-9
NO.	BY	DATE	NO.	BY	DATE	
1			3			
2			4			

GEOTECHNICAL ENGINEER  
 ENGINEER  
 NORTH CAROLINA PROFESSIONAL SEAL 048207  
 ENGINEER  
 STEPHEN C. CROCKETT  
 Documented by: Stephen C. Crockett 04/12/2022  
 DATE SIGNATURE DATE  
**DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED**



ESTIMATED MSE WALL QUANTITIES (SQUARE FEET)	
MSE RETAINING WALL NO. W8B	2,950 SF

RETAINING WALL NO. W8B PLAN - END BENT 2 MSE WALL



RETAINING WALL NO. W8B ENVELOPE - END BENT 2 MSE WALL

DIMENSIONS OF WALL TAKEN ALONG FRONT FACE OF MSE WALL FACING UPSTATION ON -Y7-

PROJECT NO.: I-5987B  
 ROBESON COUNTY  
 STATION: 29+70.72 -Y7-  
 SHEET 10 OF 19 WALL ID W8B

PREPARED BY: S. CROCKETT DATE: 3/29/22  
 REVIEWED BY: J. HAMM DATE: 3/29/22

FALCON ENGINEERING, INC.  
 1210 TRINITY ROAD, SUITE 110  
 CARY, NC 27513  
 PHONE: 919.871.0800  
 www.falconengineers.com

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

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

GEOTECHNICAL ENGINEER

ENGINEER

SEAL 048207

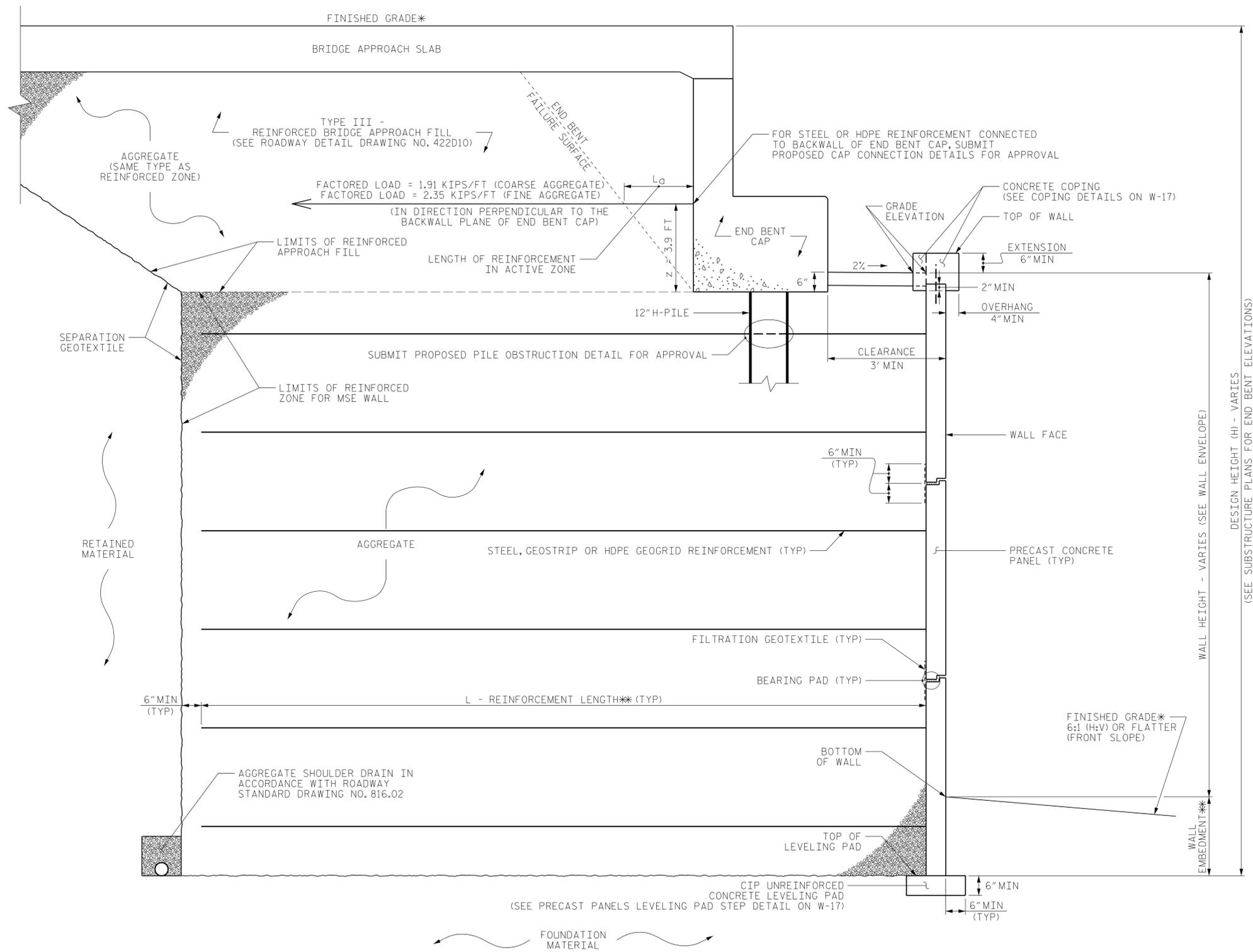
STEPHEN C. CROCKETT

DocuSigned by: Stephen C. Crockett 04/12/2022

CCSASPEMEMBER

DATE SIGNATURE DATE

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



**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 WALL EMBEDMENT AND REINFORCEMENT LENGTH REQUIREMENTS.

PROJECT NO.: I-5987B

ROBESON COUNTY

STATION: \_\_\_\_\_

SHEET 11 OF 19

PREPARED BY: S. CROCKETT DATE: 3/29/22

REVIEWED BY: J. HAMM DATE: 3/29/22

**FALCON ENGINEERING**

FALCON ENGINEERING, INC.  
 1210 TRINITY ROAD, SUITE 110  
 CARY, NC 27513

PHONE: 919.871.0800  
 www.falconengineers.com

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

**GEOTECHNICAL ENGINEERING UNIT**

**MSE WALL WITH PANELS TYPICAL FOR RETAINING WALLS. NO. W5A AND W5B**

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

SHEET NO. W-11

GEOTECHNICAL ENGINEER

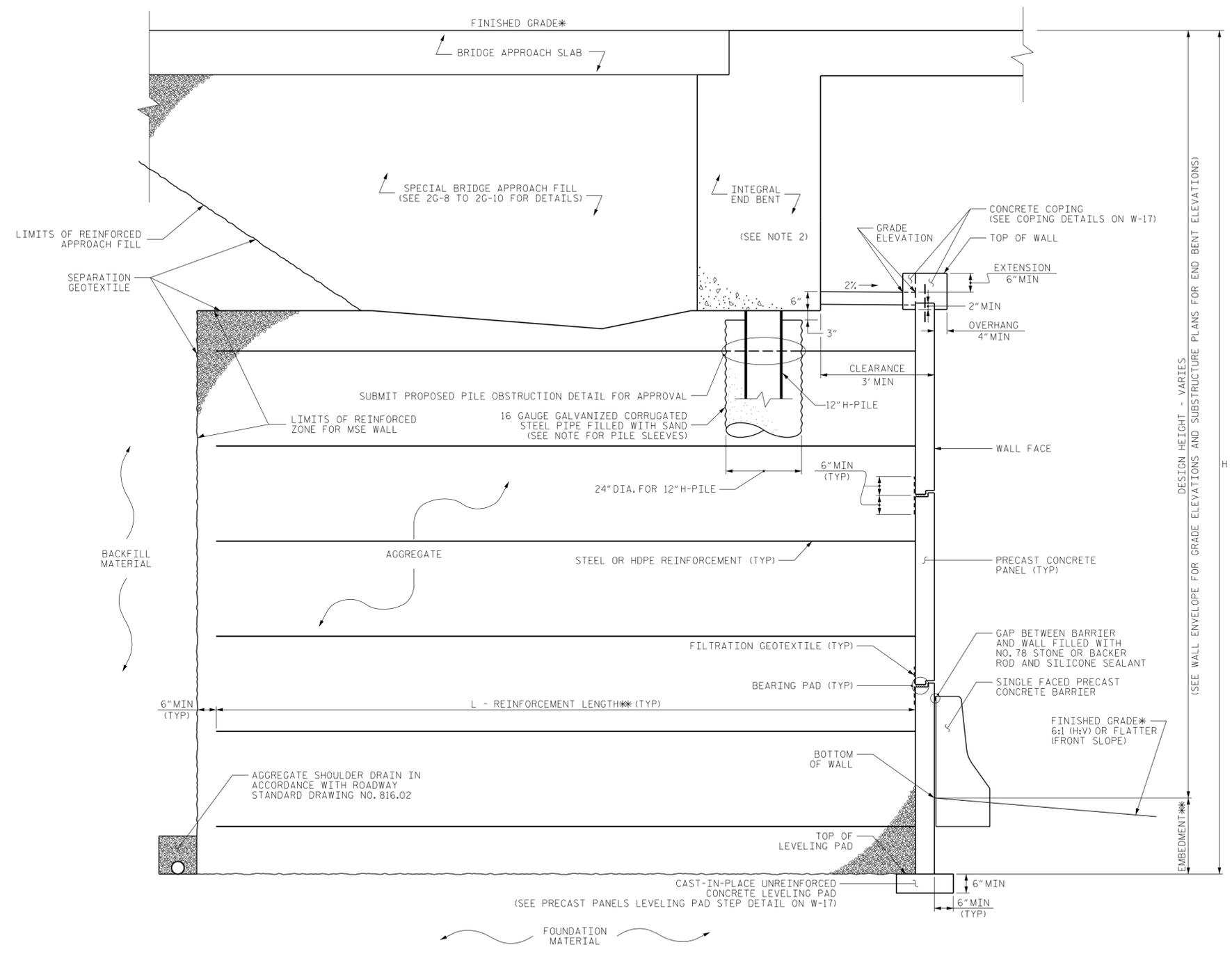
ENGINEER



DocuSigned by:  
*Stephen C. Crockett*      04/12/2022

\_\_\_\_\_  
 SIGNATURE      DATE      SIGNATURE      DATE

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



**MSE ABUTMENT WALL WITH PRECAST PANELS - TYPICAL SECTION FOR INTEGRAL ABUTMENTS**

\*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.: I-5987B  
 ROBESON COUNTY  
 STATION: \_\_\_\_\_  
 SHEET 12 OF 19

PREPARED BY: S. CROCKETT      DATE: 3/29/22  
 REVIEWED BY: J. HAMM      DATE: 3/29/22

**FALCON ENGINEERING**

FALCON ENGINEERING, INC.  
 1210 TRINITY ROAD, SUITE 110  
 CARY, NC 27513  
 PHONE: 919.871.0800  
 www.falconengineers.com

NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 DIVISION OF HIGHWAYS

**GEOTECHNICAL  
 ENGINEERING UNIT**

**MSE WALL WITH PANELS TYPICAL  
 FOR RETAINING WALLS. NO.  
 W4A, W4B, W8A, AND W8B**

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

SHEET NO. W-12

GEOTECHNICAL ENGINEER

ENGINEER

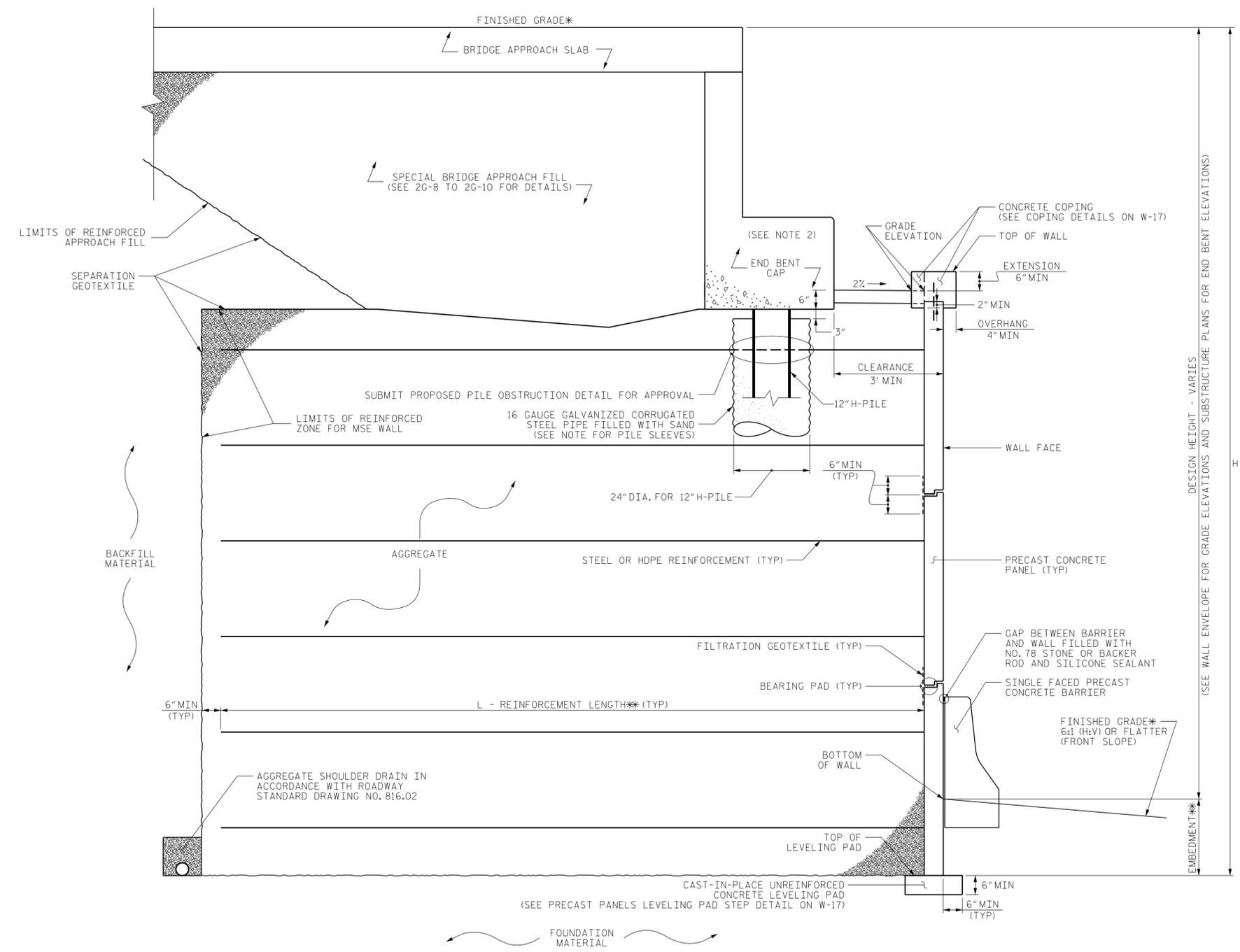
SEAL 048207

STEPHEN C. CROCKETT

DocuSigned by: Stephen C. Crockett 04/12/2022

DATE SIGNATURE DATE SIGNATURE

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



**MSE ABUTMENT WALL WITH PRECAST PANELS - TYPICAL SECTION FOR END BENT CAPS**

\*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.: I-5987B

ROBESON COUNTY

STATION: \_\_\_\_\_

SHEET 13 OF 19

PREPARED BY: S. CROCKETT DATE: 3/29/22

REVIEWED BY: J. HAMM DATE: 3/29/22

**FALCON ENGINEERING**

FALCON ENGINEERING, INC.  
 1210 TRINITY ROAD, SUITE 110  
 CARY, NC 27513

PHONE: 919.871.0800  
 www.falconengineers.com

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

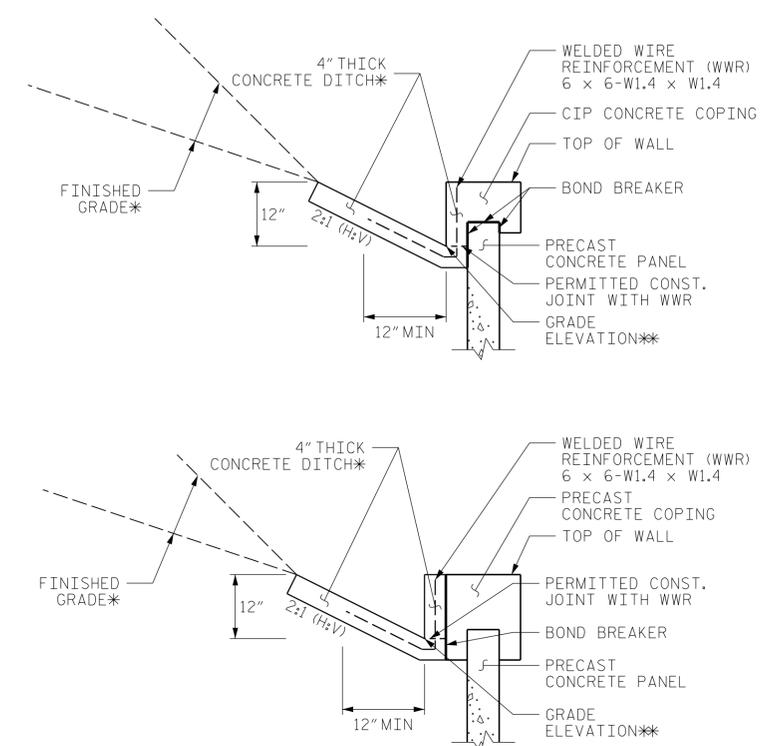
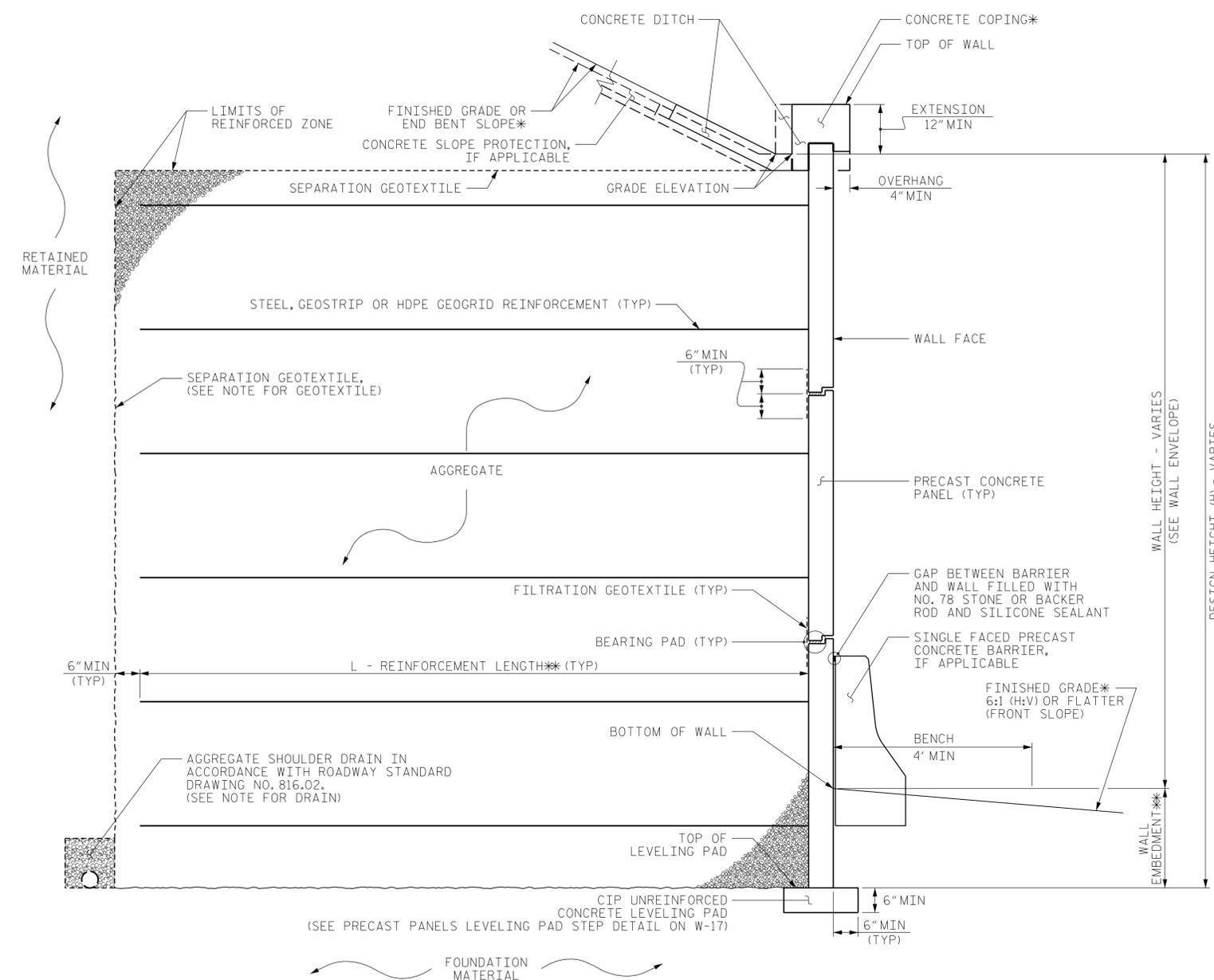
**GEOTECHNICAL ENGINEERING UNIT**

**MSE WALL WITH PANELS TYPICAL FOR RETAINING WALLS. NO. W6A, W6B, W7A, AND W7B**

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

SHEET NO. W-13

GEOTECHNICAL ENGINEER  
 ENGINEER  
 NORTH CAROLINA PROFESSIONAL SEAL 048207  
 ENGINEER STEPHEN C. CROCKETT  
 DocuSigned by: Stephen C. Crockett 04/12/2022  
 DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

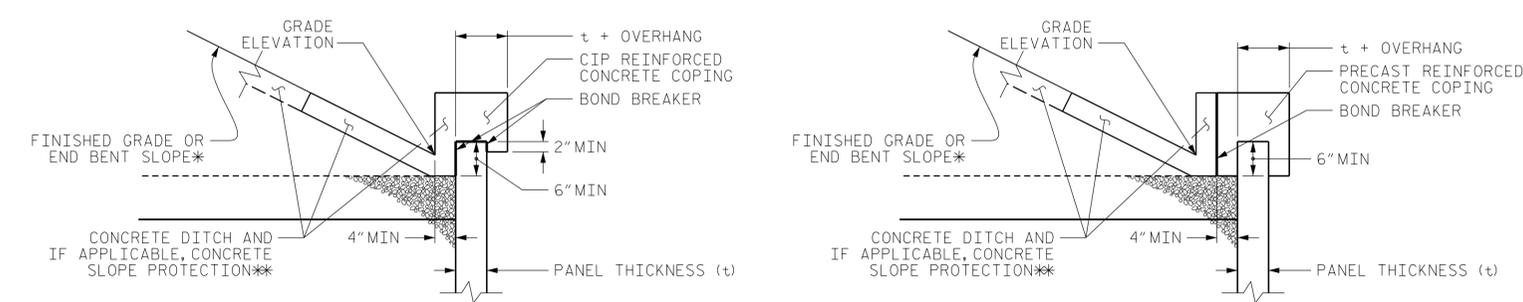


CONCRETE DITCH BEHIND WALL WITH CONCRETE COPING

\*SEE ROADWAY PLANS FOR CONCRETE DITCH AND FINISHED GRADE DETAILS.  
 \*\*SEE WALL ENVELOPE FOR GRADE ELEVATIONS.

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 WALL 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.: I-5987B  
 ROBESON COUNTY  
 STATION: VARIES  
 SHEET 14 OF 19

PREPARED BY: S. CROCKETT DATE: 3/29/22  
 REVIEWED BY: J. HAMM DATE: 3/29/22

FALCON ENGINEERING, INC.  
 1210 TRINITY ROAD, SUITE 110  
 CARY, NC 27513  
 PHONE: 919.871.0800  
 www.falconengineers.com

NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 DIVISION OF HIGHWAYS  
 GEOTECHNICAL  
 ENGINEERING UNIT

MSE WALL WITH PANELS AND BACKSLOPE TYPICAL, COPING DETAILS, AND CONCRETE DITCH BEHIND WALL DETAILS FOR RETAINING WALLS NO. W4A, W4B, W6A, W6B, WY7A, W7B, W8A, AND W8B

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

SHEET NO. W-14

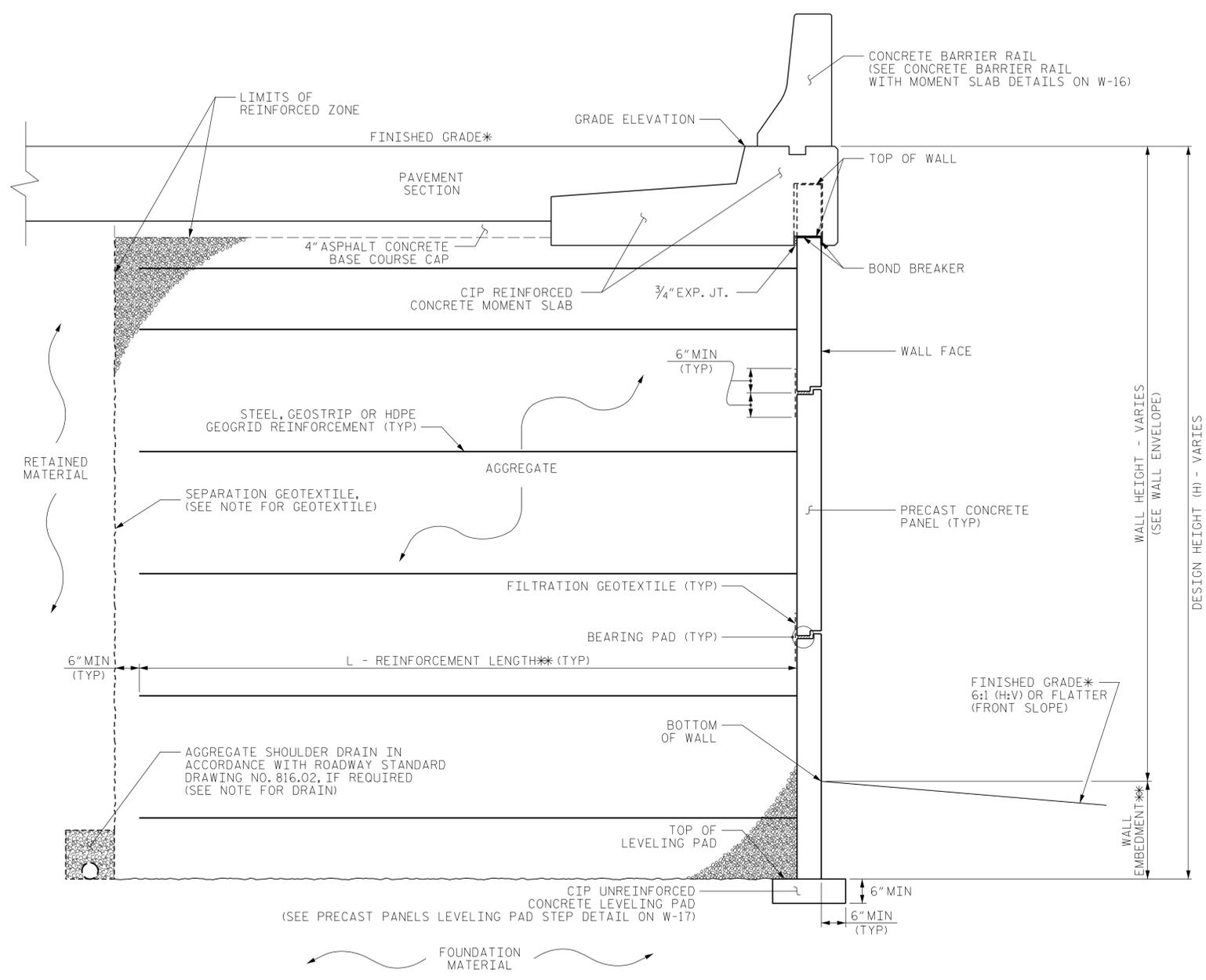
GEOTECHNICAL ENGINEER

ENGINEER

DocuSigned by:  
*Stephen C Crockett* 04/12/2022

DATE: 04/12/2022

**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 WALL EMBEDMENT AND REINFORCEMENT LENGTH REQUIREMENTS.

PROJECT NO.: I-5987B  
 ROBESON COUNTY  
 STATION: 24+74.16 -Y4-  
 SHEET 15 OF 19

PREPARED BY: S. CROCKETT      DATE: 3/29/22  
 REVIEWED BY: J. HAMM         DATE: 3/29/22

**FALCON ENGINEERING**

FALCON ENGINEERING, INC.  
 1210 TRINITY ROAD, SUITE 110  
 CARY, NC 27513  
 PHONE: 919.871.0800  
 www.falconengineers.com

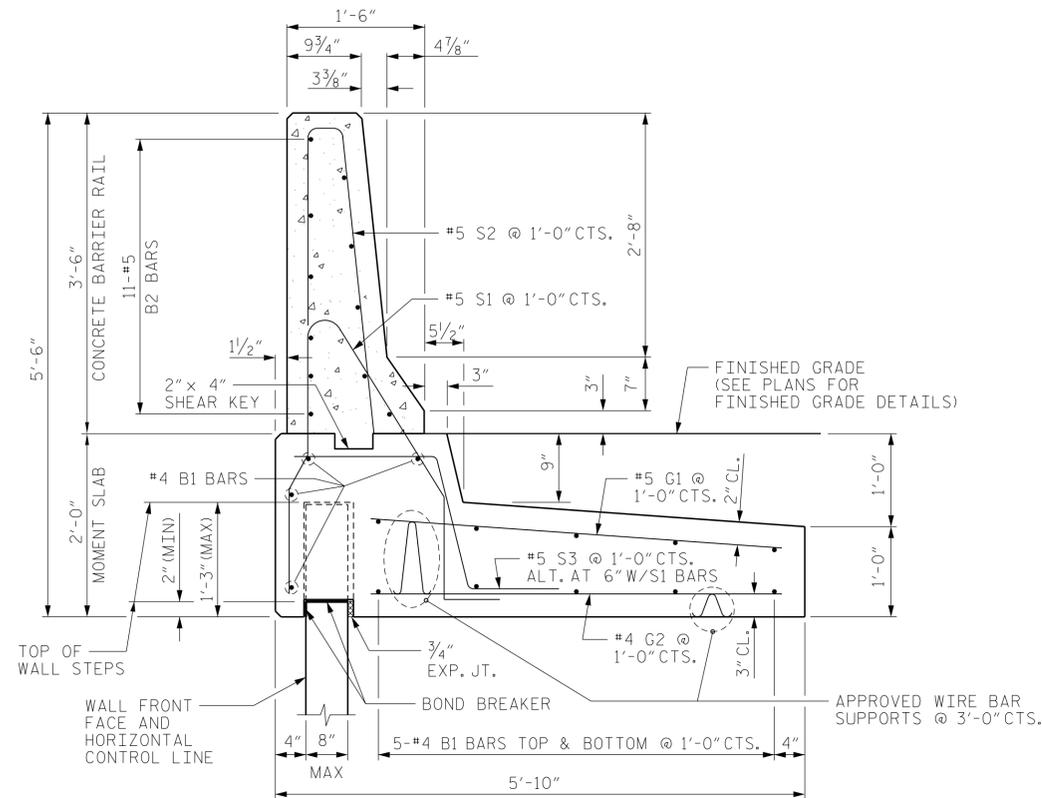
NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 DIVISION OF HIGHWAYS

**GEOTECHNICAL  
 ENGINEERING UNIT**

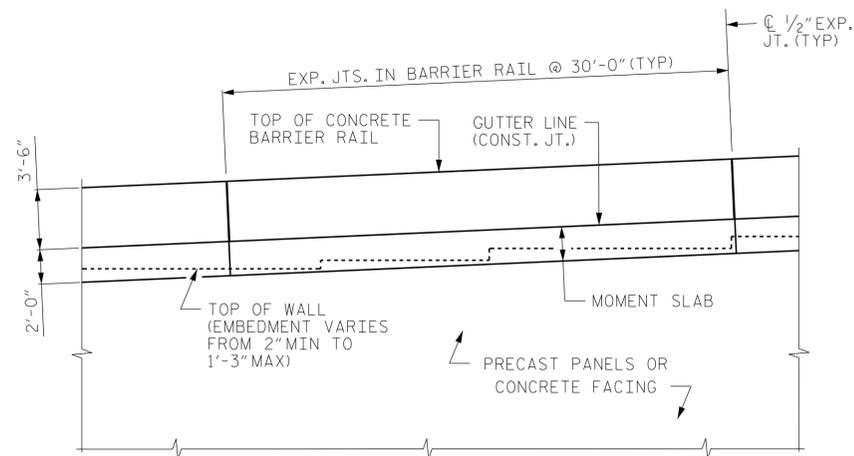
MSE WALL WITH PANELS AND  
 CONCRETE BARRIER RAIL WITH  
 MOMENT SLAB TYPICAL FOR  
 RETAINING WALLS NO. W5A AND W5B

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

SHEET NO.  
W-15



CONCRETE BARRIER RAIL WITH MOMENT SLAB



CONCRETE BARRIER RAIL WITH MOMENT SLAB - PARTIAL ELEVATION

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.

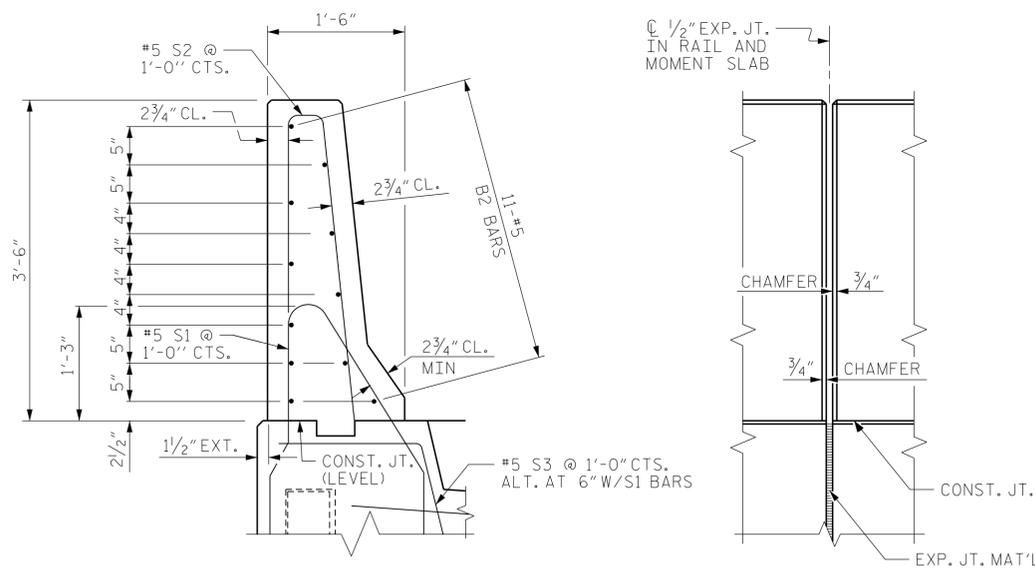
EXPANSION OR CONTRACTION JOINTS IN THE BARRIER RAIL AND MOMENT SLAB SHALL BE ALIGNED WITH JOINTS IN WALL FACING BELOW.

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	
MSE RETAINING WALL NO. W5A	PAY LENGTH = 1039 LIN FT
MSE RETAINING WALL NO. W5B	PAY LENGTH = 1122 LIN FT



SECTION THRU RAIL

ELEV. @ EXP. JOINTS

BARRIER RAIL DETAILS

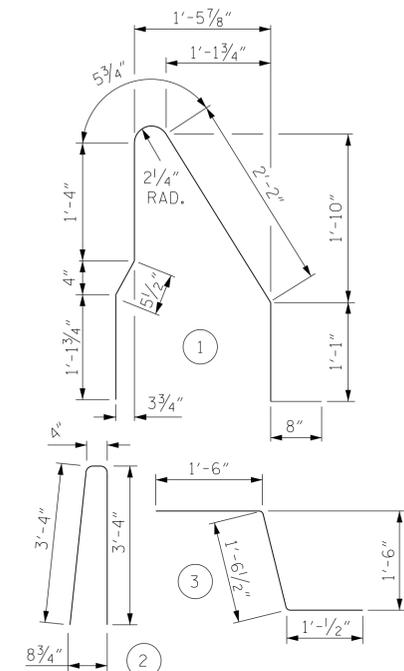
STRUCTURE ENGINEER  
ENGINEER

PROFESSIONAL SEAL  
048207  
ENGINEER  
STEPHEN C. CROCKETT

DocuSigned by:  
Stephen C. Crockett  
05/02/2022

DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED

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

PROJECT NO.: I-5987B

ROBESON COUNTY

STATION:

SHEET 16 OF 19



NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS

GEOTECHNICAL  
ENGINEERING UNIT

CONCRETE BARRIER RAIL WITH MOMENT SLAB FOR PRECAST PANELS AND CONCRETE FACING FOR RETAINING WALLS NO. W5A AND W5B

REVISIONS

NO.	BY	DATE	NO.	BY	DATE
1	S. CROCKETT	5/2/22	3		
2			4		

SHEET NO.  
W-16

PREPARED BY: S. CROCKETT	DATE: 3/29/22
REVIEWED BY: J. HAMM	DATE: 3/29/22

GEOTECHNICAL ENGINEER

ENGINEER

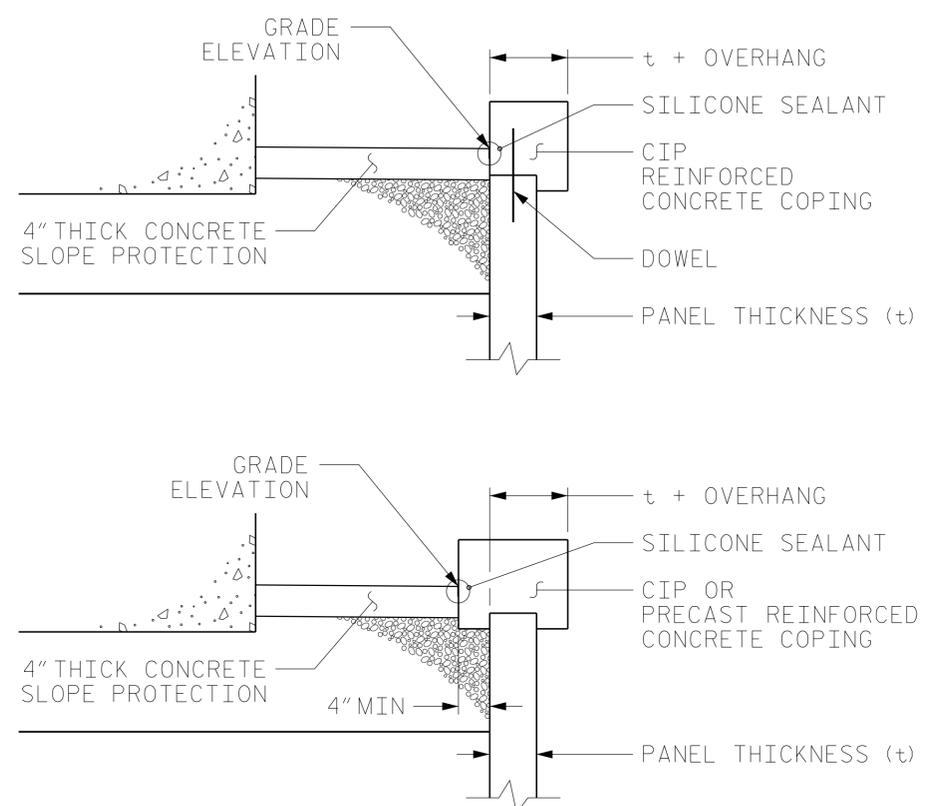
---

DocuSigned by: Stephen C. Crockett      04/12/2022

SIGNATURE      DATE

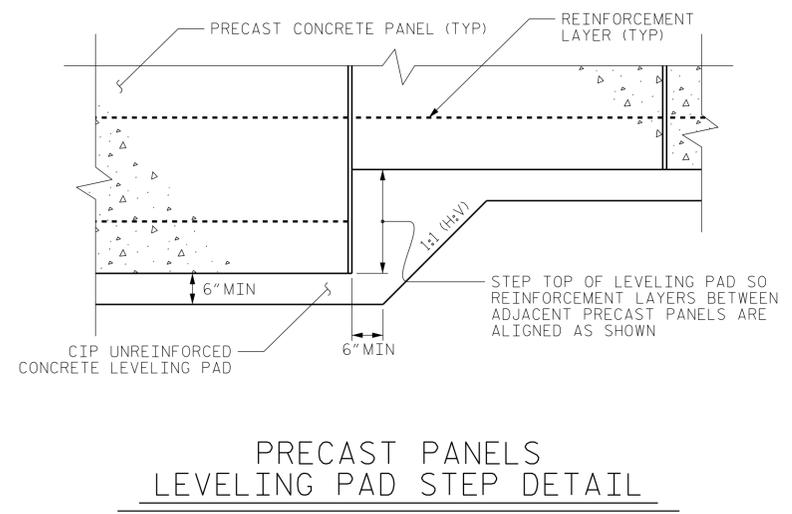
---

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



### COPING DETAILS

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



### PRECAST PANELS LEVELING PAD STEP DETAIL

PROJECT NO.: I-5987B

ROBESON COUNTY

STATION: \_\_\_\_\_

SHEET 17 OF 19

PREPARED BY: S. CROCKETT	DATE: 3/29/22
REVIEWED BY: J. HAMM	DATE: 3/29/22

FALCON ENGINEERING, INC.  
 1210 TRINITY ROAD, SUITE 110  
 GARY, NC 27513  
 PHONE: 919.871.0800  
 www.falconengineers.com

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

MSE WALL WITH PANELS COPING AND LEVELING PAD STEP DETAILS FOR RETAINING WALLS. NO. W4A, W4B, W5A, W5B, W6A, W6B, W7A, W7B, W8A, AND W8B

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	
1			3			W-17
2			4			

**NOTES:**

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

FOR TYPE III REINFORCED BRIDGE APPROACH FILL, SEE BRIDGE APPROACH FILLS PROVISION AND ROADWAY DETAIL DRAWING NO. 422D10 FOR RETAINING WALLS NO. W5A AND W5B.

FOR SPECIAL BRIDGE APPROACH FILL, SEE SPECIAL BRIDGE APPROACH FILLS (SPECIAL) PROVISION AND ROADWAY DETAILS 2G-8 TO 2G-10.

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 WALLS NO. W5A AND W5B. SEE PLANS FOR CONCRETE BARRIER RAIL WITH MOMENT SLAB DETAILS.

AT THE CONTRACTOR'S OPTION, USE FINE AGGREGATE IN THE REINFORCED ZONE OF RETAINING WALLS NO. W4A, W4B, W5A, W5B, W8A, AND W8B.

AN ASHLAR STONE ARCHITECTURAL FINISH IS REQUIRED FOR PRECAST CONCRETE PANELS FOR RETAINING WALL NO. W4A, W4B, W5A, W5B, W6A, W6B, W7A, W7B, W8A, AND W8B.

A SEPARATION GEOTEXTILE IS REQUIRED AT THE BACK OF THE REINFORCED ZONE FOR RETAINING WALLS NO. W4A, W4B, W5A, W5B, W6A, W6B, W7A, W7B, W8A, AND W8B.

A DRAIN IS REQUIRED FOR RETAINING WALLS NO. W4A, W4B, W5A, W5B, W6A, W6B, W7A, W7B, W8A, AND W8B.

PILE SLEEVES ARE REQUIRED AROUND PILES FOR THE END BENTS AT RETAINING WALLS NO. W4A, W4B, W6A, W6B, W7A, W7B, W8A, AND W8B.

BEFORE BEGINNING MSE WALL DESIGN FOR RETAINING WALLS NO. W4A, W4B, W5A, W5B, W6A, W6B, W7A, W7B, W8A, AND W8B, SURVEY WALL LOCATION AND SUBMIT A REVISED WALL PROFILE VIEW (WALL ENVELOPE) FOR REVIEW. DO NOT START WALL DESIGN OR CONSTRUCTION UNTIL THE REVISED WALL ENVELOPE IS ACCEPTED.

- DESIGN RETAINING WALLS FOR THE FOLLOWING:
- 1) DESIGN HEIGHT (H) = WALL HEIGHT + WALL EMBEDMENT
  - 2) DESIGN LIFE = 100 YEARS
  - 3) MAXIMUM FACTORED VERTICAL PRESSURE ON FOUNDATION MATERIAL =
    - 5,150 PSF (WALLS NO. W4A AND W4B)
    - 5,050 PSF (WALL NO. W5A)
    - 4,925 PSF (WALL NO. W5B -L- STA. 626+20, 76.29' LT TO -L- STA. 619+00, 76.29' LT, W5B -L- STA. 618+50, 76.29' RT TO -L- STA. 621+50, 76.29' RT)
    - 4,975 PSF (WALL NO. W5B -L- STA. 619+00, 76.29' LT TO -L- STA. 618+50, 76.29' RT)
    - 4,350 PSF (WALLS NO. W6A AND W6B)
    - 6,250 PSF (WALL NO. W7A)
    - 5,425 PSF (WALL NO. W7B)
    - 4,850 PSF (WALLS NO. W8A AND W8B)
  - 4) MINIMUM REINFORCEMENT LENGTH (L) = FOLLOWING OR 6 FT, WHICHEVER IS LONGER
    - 0.7H (WALLS NO. W5B -L- STA. 626+20, 76.29' LT TO -L- STA. 619+00, 76.29' LT, W5B -L- STA. 618+50, 76.29' RT TO -L- STA. 621+50, 76.29' RT, W7A, AND W7B)
    - 0.8H (WALLS NO. W4A, W4B, W5A, W8A, AND W8B)
    - 0.9H (WALLS NO. W6A AND W6B)
    - 1.0H (WALL NO. W5B -L- STA. 619+00, 76.29' LT TO -L- STA. 618+50, 76.29' RT)
  - 5) MINIMUM EMBEDMENT DEPTH = 2 FT OR H/10, WHICHEVER IS GREATER
  - 6) REINFORCED ZONE AGGREGATE PARAMETERS:

AGGREGATE TYPE*	UNIT WEIGHT (γ) PCF	FRICTION ANGLE (φ) DEGREES	COHESION (c) PSF	WALL
COARSE	110	38	0	ALL WALLS
FINE	115	34	0	W4A, W4B, W5A, W5B, W8A, W8B

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

7) IN-SITU ASSUMED MATERIAL PARAMETERS:

MATERIAL TYPE	UNIT WEIGHT (γ) PCF	FRICTION ANGLE (φ) DEGREES	COHESION (c) PSF	WALL
RETAINED	120	30	0	ALL WALLS
FOUNDATION	115	28	0	W4A, W4B, W5A, W5B -L- STA. 626+20, 76.29' LT TO -L- STA. 619+00, 76.29' LT, W5B -L- STA. 618+50, 76.29' RT TO -L- STA. 621+50, 76.29' RT, W8A, W8B
	115	24	800	W5B -L- STA. 619+00, 76.29' LT TO -L- STA. 618+50, 76.29' RT
	115	20	800	W6A, W6B
	120	15	1500	W7A, W7B

DESIGN RETAINING WALLS NO. W4A, W4B, W5A, W5B, W6A, W6B, W7A, W7B, W8A, AND W8B FOR A LIVE LOAD (TRAFFIC) SURCHARGE.

DESIGN REINFORCEMENT CONNECTED TO END BENT CAPS FOR FACTORED LOAD AND LENGTH OF REINFORCEMENT IN ACTIVE ZONE (L) SHOWN. CAST REINFORCEMENT OR CONNECTORS INTO CAP BACKWALL FOR END BENT NO. 1 LOCATED AT STATION 616+14.60 -L- AND END BENT NO. 2 LOCATED AT STATION 618+31.89 -L-. 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 REINFORCEMENT FOR RETAINING WALLS NO. W4A, W4B, W5A, W5B, W6A, W6B, W7A, W7B, W8A, AND W8B.

FOUNDATIONS FOR END BENTS WILL INTERFERE WITH REINFORCEMENT FOR RETAINING WALLS NO. W4A, W4B, W5A, W5B, W6A, W6B, W7A, W7B, W8A, AND W8B. SEE "FOUNDATION LAYOUT" SHEET FOR FOUNDATION LOCATIONS.

DO NOT PLACE LEVELING PAD CONCRETE, AGGREGATE OR REINFORCEMENT FOR RETAINING WALL NO. W4A, W4B, W5A, W5B, W6A, W6B, W7A, W7B, W8A, AND W8B UNTIL EXCAVATION DIMENSIONS AND FOUNDATION MATERIAL ARE APPROVED.

"TEMPORARY SHORING" MAY BE REQUIRED FOR RETAINING WALLS NO. W4A, W4B, W5A, W5B, W6A, W6B, W7A, W7B, W8A, AND W8B IN ACCORDANCE WITH THE TEMPORARY SHORING PROVISION. SEE ROADWAY PLANS.

INSTALL PILE SLEEVES FOR END BENT NO. 1 LOCATED AT STA. 23+91.41 -Y4- WHILE CONSTRUCTING RETAINING WALL NO. W4A. OBSERVE A 2 MONTH WAITING PERIOD AFTER CONSTRUCTING THE RETAINING WALL AND THE REINFORCED BRIDGE APPROACH FILL TO WITHIN 1 FT OF THE FINAL GRADE ELEVATION. FOR BRIDGE WAITING PERIODS, SEE ROADWAY PLANS AND SECTION 235 OF THE STANDARD SPECIFICATIONS.

GEOTECHNICAL ENGINEER   DocuSigned by: Stephen C. Crockett CC6A5FED48E9E35	ENGINEER          DATE: 04/12/2022 SIGNATURE: _____ DATE: _____
<b>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</b>	

PREPARED BY: S. CROCKETT	DATE: 3/29/22
REVIEWED BY: J. HAMM	DATE: 3/29/22



FALCON ENGINEERING, INC.  
1210 TRINITY ROAD, SUITE 110  
CARY, NC 27513  
PHONE: 919.871.0800  
www.falconengineers.com



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

PROJECT NO.: I-5987B  
 ROBESON COUNTY  
 STATION: \_\_\_\_\_  
 SHEET 18 OF 19

REVISIONS						SHEET NO. W-18
NO.	BY	DATE	NO.	BY	DATE	
1			3			
2			4			

NOTES (CONT.):

INSTALL PILE SLEEVES FOR END BENT NO.2 LOCATED AT STA.25+56.91 -Y4- WHILE CONSTRUCTING RETAINING WALL NO.W4B.OBSERVE A 2 MONTH WAITING PERIOD AFTER CONSTRUCTING THE RETAINING WALL AND THE REINFORCED BRIDGE APPROACH FILL TO WITHIN 1 FT OF THE FINAL GRADE ELEVATION.FOR BRIDGE WAITING PERIODS,SEE ROADWAY PLANS AND SECTION 235 OF THE STANDARD SPECIFICATIONS.

INSTALL PILE SLEEVES FOR END BENT NO.1 LOCATED AT STA.28+32.29 -Y1B- WHILE CONSTRUCTING RETAINING WALL NO.W6A.OBSERVE A 4 MONTH WAITING PERIOD AFTER CONSTRUCTING THE RETAINING WALL AND THE REINFORCED BRIDGE APPROACH FILL TO WITHIN 1 FT OF THE FINAL GRADE ELEVATION.FOR BRIDGE WAITING PERIODS,SEE ROADWAY PLANS AND SECTION 235 OF THE STANDARD SPECIFICATIONS.

INSTALL PILE SLEEVES FOR END BENT NO.2 LOCATED AT STA.30+69.79 -Y1B- WHILE CONSTRUCTING RETAINING WALL NO.W6B.OBSERVE A 4 MONTH WAITING PERIOD AFTER CONSTRUCTING THE RETAINING WALL AND THE REINFORCED BRIDGE APPROACH FILL TO WITHIN 1 FT OF THE FINAL GRADE ELEVATION.FOR BRIDGE WAITING PERIODS,SEE ROADWAY PLANS AND SECTION 235 OF THE STANDARD SPECIFICATIONS.

INSTALL PILE SLEEVES FOR END BENT NO.1 LOCATED AT STA.29+32.44 -Y6- WHILE CONSTRUCTING RETAINING WALL NO.W7A.OBSERVE A 2 MONTH WAITING PERIOD AFTER CONSTRUCTING THE RETAINING WALL AND THE REINFORCED BRIDGE APPROACH FILL TO WITHIN 1 FT OF THE FINAL GRADE ELEVATION.FOR BRIDGE WAITING PERIODS,SEE ROADWAY PLANS AND SECTION 235 OF THE STANDARD SPECIFICATIONS.

INSTALL PILE SLEEVES FOR END BENT NO.2 LOCATED AT STA.31+23.77 -Y6- WHILE CONSTRUCTING RETAINING WALL NO.W7B.OBSERVE A 3 MONTH WAITING PERIOD AFTER CONSTRUCTING THE RETAINING WALL AND THE REINFORCED BRIDGE APPROACH FILL TO WITHIN 1 FT OF THE FINAL GRADE ELEVATION.FOR BRIDGE WAITING PERIODS,SEE ROADWAY PLANS AND SECTION 235 OF THE STANDARD SPECIFICATIONS.

INSTALL PILE SLEEVES FOR END BENT NO.1 LOCATED AT STA.28+85.72 -Y7- WHILE CONSTRUCTING RETAINING WALL NO.W8A.OBSERVE A 2 MONTH WAITING PERIOD AFTER CONSTRUCTING THE RETAINING WALL AND THE REINFORCED BRIDGE APPROACH FILL TO WITHIN 1 FT OF THE FINAL GRADE ELEVATION.FOR BRIDGE WAITING PERIODS,SEE ROADWAY PLANS AND SECTION 235 OF THE STANDARD SPECIFICATIONS.

INSTALL PILE SLEEVES FOR END BENT NO.2 LOCATED AT STA.30+55.72 -Y7- WHILE CONSTRUCTING RETAINING WALL NO.W8B.OBSERVE A 2 MONTH WAITING PERIOD AFTER CONSTRUCTING THE RETAINING WALL AND THE REINFORCED BRIDGE APPROACH FILL TO WITHIN 1 FT OF THE FINAL GRADE ELEVATION.FOR BRIDGE WAITING PERIODS,SEE ROADWAY PLANS AND SECTION 235 OF THE STANDARD SPECIFICATIONS.

GEOTECHNICAL ENGINEER   DocuSigned by: Stephen C. Crockett DATE: 04/12/2022	ENGINEER           DATE: _____ SIGNATURE: _____
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

PROJECT NO.: I-5987B  
 ROBESON COUNTY  
 STATION: \_\_\_\_\_  
 SHEET 19 OF 19

PREPARED BY: S. CROCKETT	DATE: 3/29/22
REVIEWED BY: J. HAMM	DATE: 3/29/22



FALCON ENGINEERING, INC.  
 1210 TRINITY ROAD, SUITE 110  
 CARY, NC 27513  
 PHONE: 919.871.0800  
 www.falconengineers.com



NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 DIVISION OF HIGHWAYS  
  
 GEOTECHNICAL  
 ENGINEERING UNIT

MSE WALL WITH PANELS NOTES  
CONTINUED

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	
1			3			W-19
2			4			

NOISE WALL #19 PANELS 1 THRU 58

PANEL NO.	START POST STATION -NW19-	LENGTH (FEET)	GROUND ELEV. OF START POST (FEET)	TOP ELEV. OF PANEL (FEET)	RECOMMENDED PANEL HEIGHT (FEET)	AREA (SQ. FT.)	TOP ELEV. OF EXCAVATION (FEET)	PILE EXCAVATION DEPTH "D"	PILE TIP ELEV. & BOTTOM OF HOLE (FEET)
1	10+30.00	15	170.0	189.0	19	285	170.0	14.0	156.0
2	10+45.00	15	170.0	189.0	19	285	170.0	14.0	156.0
3	10+60.00	15	170.0	189.0	19	285	170.0	14.0	156.0
4	10+75.00	15	170.0	189.0	19	285	170.0	14.0	156.0
5	10+90.00	15	170.0	189.0	19	285	170.0	14.0	156.0
6	11+05.00	15	170.0	189.0	19	285	170.0	14.0	156.0
7	11+20.00	15	170.0	189.0	19	285	170.0	14.0	156.0
8	11+35.00	15	170.0	189.0	19	285	170.0	14.0	156.0
9	11+50.00	15	170.0	189.0	19	285	170.0	14.0	156.0
10	11+65.00	15	170.0	189.0	19	285	170.0	14.0	156.0
11	11+80.00	15	170.0	189.0	19	285	170.0	14.0	156.0
12	11+95.00	15	170.0	189.0	19	285	170.0	14.0	156.0
13	12+10.00	15	169.0	189.0	20	300	169.0	14.0	155.0
14	12+25.00	15	169.0	189.0	20	300	169.0	14.0	155.0
15	12+40.00	15	169.0	189.0	20	300	169.0	14.0	155.0
16	12+55.00	15	169.0	189.0	20	300	169.0	14.0	155.0
17	12+70.00	15	169.0	189.0	20	300	169.0	14.0	155.0
18	12+85.00	15	169.0	189.0	20	300	169.0	14.0	155.0
19	13+00.00	15	169.0	188.0	19	285	169.0	14.0	155.0
20	13+15.00	15	169.0	188.0	19	285	169.0	14.0	155.0
21	13+30.00	15	169.0	188.0	19	285	169.0	14.0	155.0
22	13+45.00	15	169.0	188.0	19	285	169.0	14.0	155.0
23	13+60.00	15	169.0	188.0	19	285	169.0	14.0	155.0
24	13+75.00	15	169.0	188.0	19	285	169.0	14.0	155.0
25	13+90.00	10	169.0	188.0	19	190	169.0	14.0	155.0
26	14+00.00	10	169.0	188.0	19	190	169.0	12.0	157.0
27	14+10.00	10	169.0	188.0	19	190	169.0	12.0	157.0
28	14+20.00	15	169.0	187.0	18	270	169.0	13.0	156.0
29	14+35.00	15	169.0	187.0	18	270	169.0	13.0	156.0
30	14+50.00	15	169.0	187.0	18	270	169.0	13.0	156.0
31	14+65.00	15	169.0	187.0	18	270	169.0	13.0	156.0
32	14+80.00	15	169.0	186.0	17	255	169.0	13.0	156.0
33	14+95.00	15	169.0	186.0	17	255	169.0	13.0	156.0
34	15+10.00	15	168.0	186.0	18	270	168.0	13.0	155.0
35	15+25.00	15	168.0	186.0	18	270	168.0	13.0	155.0
36	15+40.00	15	168.0	186.0	18	270	168.0	13.0	155.0
37	15+55.00	15	168.0	186.0	18	270	168.0	13.0	155.0
38	15+70.00	15	168.0	186.0	18	270	168.0	13.0	155.0
39	15+85.00	15	168.0	186.0	18	270	168.0	13.0	155.0
40	16+00.00	15	168.0	185.0	17	255	168.0	13.0	155.0
41	16+15.00	15	168.0	185.0	17	255	168.0	13.0	155.0
42	16+30.00	15	168.0	185.0	17	255	168.0	13.0	155.0
43	16+45.00	15	168.0	185.0	17	255	168.0	13.0	155.0
44	16+60.00	15	168.0	185.0	17	255	168.0	13.0	155.0
45	16+75.00	15	168.0	185.0	17	255	168.0	13.0	155.0
46	16+90.00	15	168.0	185.0	17	255	168.0	13.0	155.0
47	17+05.00	15	168.0	185.0	17	255	168.0	13.0	155.0
48	17+20.00	15	168.0	185.0	17	255	168.0	13.0	155.0
49	17+35.00	15	168.0	185.0	17	255	168.0	13.0	155.0
50	17+50.00	15	168.0	185.0	17	255	168.0	13.0	155.0
51	17+65.00	15	168.0	185.0	17	255	168.0	13.0	155.0
52	17+80.00	15	168.0	185.0	17	255	168.0	13.0	155.0
53	17+95.00	15	168.0	185.0	17	255	168.0	13.0	155.0
54	18+10.00	15	167.0	185.0	18	270	167.0	13.0	154.0
55	18+25.00	15	167.0	185.0	18	270	167.0	13.0	154.0
56	18+40.00	15	167.0	185.0	18	270	167.0	13.0	154.0
57	18+55.00	15	167.0	185.0	18	270	167.0	13.0	154.0
58	18+70.00	15	167.0	185.0	18	270	167.0	13.0	154.0

NOISE WALL #19 PANELS 59 THRU 89

PANEL NO.	START POST STATION -NW19-	LENGTH (FEET)	GROUND ELEV. OF START POST (FEET)	TOP ELEV. OF PANEL (FEET)	RECOMMENDED PANEL HEIGHT (FEET)	AREA (SQ. FT.)	TOP ELEV. OF EXCAVATION (FEET)	PILE EXCAVATION DEPTH "D"	PILE TIP ELEV. & BOTTOM OF HOLE (FEET)
59	18+85.00	15	167.0	185.0	18	270	167.0	13.0	154.0
60	19+00.00	15	167.0	184.0	17	255	167.0	13.0	154.0
61	19+15.00	15	167.0	184.0	17	255	167.0	13.0	154.0
62	19+30.00	15	167.0	184.0	17	255	167.0	13.0	154.0
63	19+45.00	15	167.0	184.0	17	255	167.0	13.0	154.0
64	19+60.00	15	167.0	184.0	17	255	167.0	13.0	154.0
65	19+75.00	15	167.0	184.0	17	255	167.0	13.0	154.0
66	19+90.00	15	167.0	184.0	17	255	167.0	13.0	154.0
67	20+05.00	15	167.0	184.0	17	255	167.0	13.0	154.0
68	20+20.00	15	167.0	184.0	17	255	167.0	13.0	154.0
69	20+35.00	15	167.0	184.0	17	255	167.0	13.0	154.0
70	20+50.00	15	167.0	184.0	17	255	167.0	13.0	154.0
71	20+65.00	15	166.0	184.0	18	270	166.0	13.0	153.0
72	20+80.00	10	166.0	184.0	18	180	166.0	13.0	153.0
73	20+90.00	20	166.0	184.0	18	360	166.0	14.0	152.0
74	21+10.00	15	166.0	184.0	18	270	166.0	14.0	152.0
75	21+25.00	15	166.0	184.0	18	270	166.0	13.0	153.0
76	21+40.00	15	166.0	184.0	18	270	166.0	13.0	153.0
77	21+55.00	15	166.0	184.0	18	270	166.0	13.0	153.0
78	21+70.00	15	166.0	184.0	18	270	166.0	13.0	153.0
79	21+85.00	15	166.0	184.0	18	270	166.0	13.0	153.0
80	22+00.00	15	166.0	183.0	17	255	166.0	13.0	153.0
81	22+15.00	15	166.0	183.0	17	255	166.0	13.0	153.0
82	22+30.00	15	166.0	183.0	17	255	166.0	13.0	153.0
83	22+45.00	15	166.0	183.0	17	255	166.0	13.0	153.0
84	22+60.00	15	166.0	183.0	17	255	166.0	13.0	153.0
85	22+75.00	15	166.0	183.0	17	255	166.0	13.0	153.0
86	22+90.00	15	166.0	183.0	17	255	166.0	13.0	153.0
87	23+05.00	15	166.0	183.0	17	255	166.0	13.0	153.0
88	23+20.00	15	166.0	183.0	17	255	166.0	13.0	153.0
89	23+35.00	15	166.0	183.0	17	255	166.0	13.0	153.0

NOTE: FOR SOUND BARRIER WALL STATIONS, OFFSETS, AND ELEVATIONS, SEE ROADWAY PLANS.

PROJECT NO. I-5987B  
ROBESON COUNTY  
 STATION: 10+30.00 -NW19-  
884+25.27 -L-  
 SHEET 1 OF 4



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**SOUND BARRIER WALL  
 -NW19-  
 DATA TABLES**

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED					
TGS ENGINEERS 706 HILLSBOROUGH STREET SUITE 200 RALEIGH, NC 27603 PH (919) 773-8887 CORP. LICENSE NO.: C-0275					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

SHEET NO. W19-1  
 TOTAL SHEETS 4

DRAWN BY : STM DATE : 03/22  
 CHECKED BY : MGC DATE : 03/22

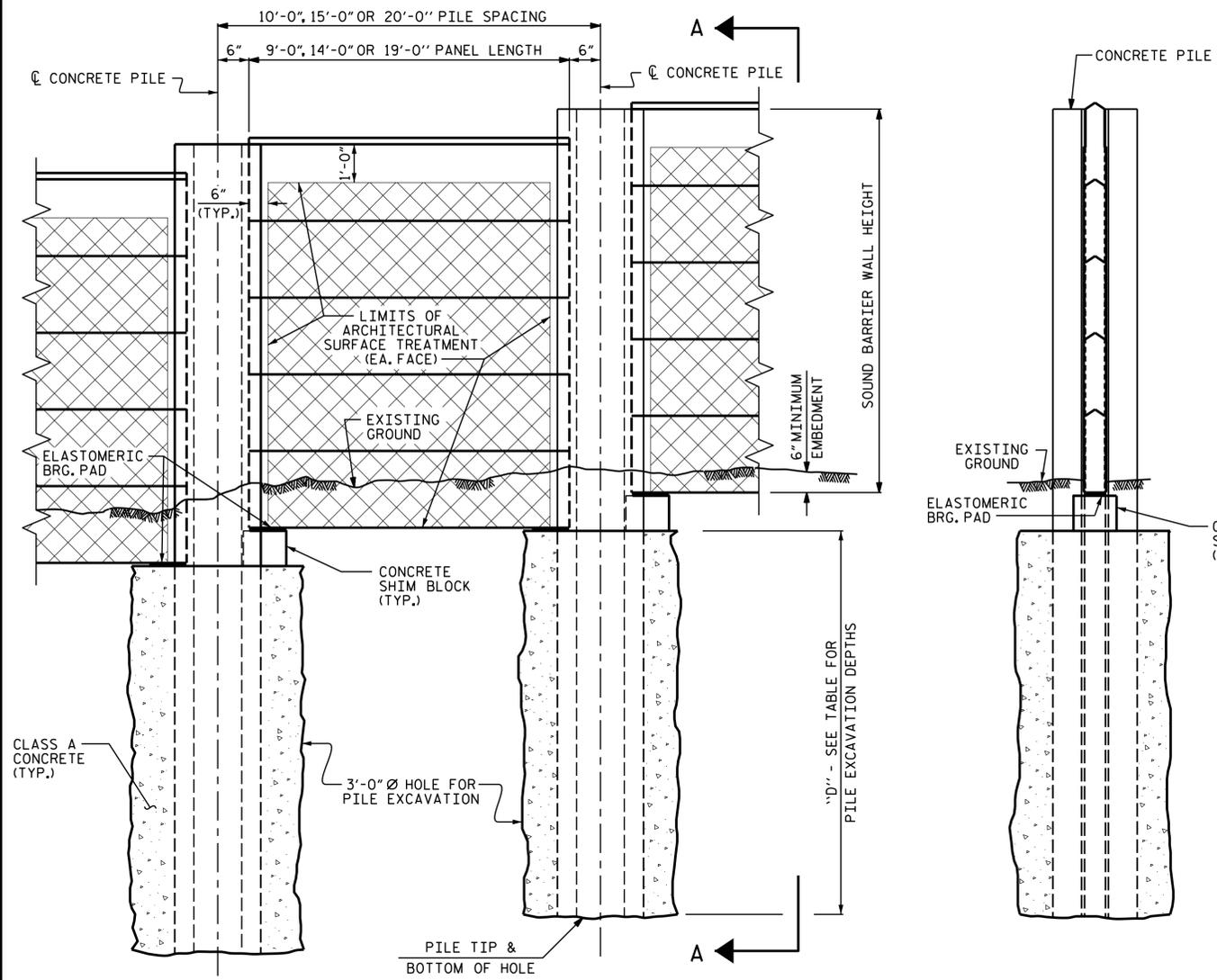
**NOTES**

- 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.
- 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.
- AT THE CONTRACTOR'S OPTION, CONTINUOUS FLIGHT AUGER PILES MAY BE USED IN LIEU OF PILE EXCAVATION. FOR CONTINUOUS FLIGHT AUGER PILES, SEE SPECIAL PROVISIONS.
- FOR ARCHITECTURAL SURFACE TREATMENT, SEE SOUND BARRIER WALL SPECIAL PROVISIONS.
- FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.
- FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

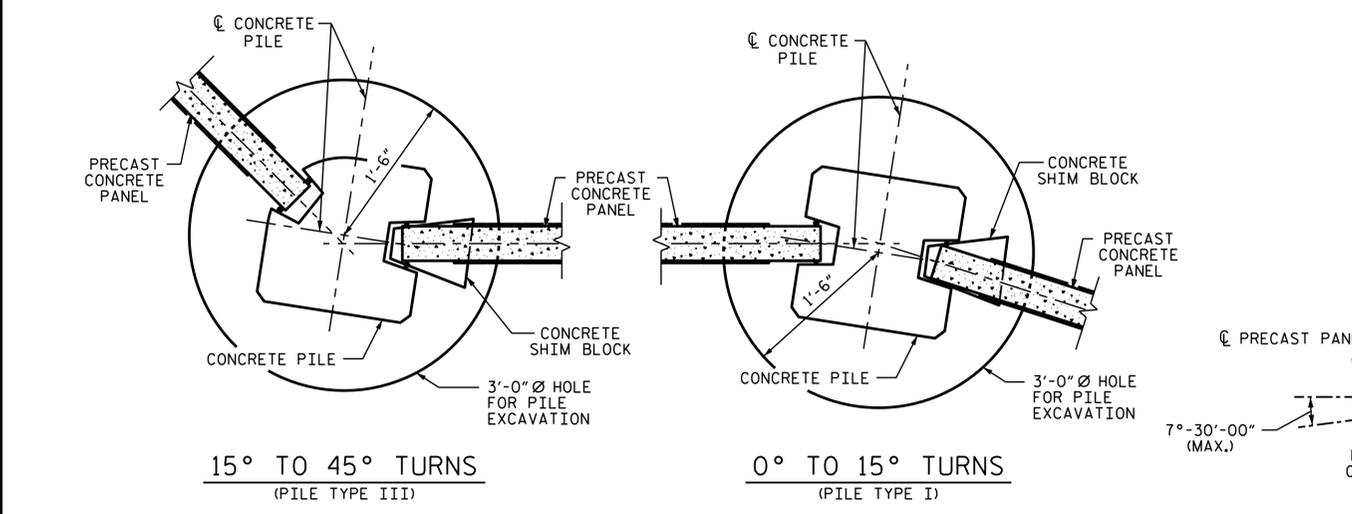
PILE EXCAVATION DEPTHS "D"				
NOISE WALL #19 FROM : STA. 10+30 -NW19- TO : STA. 23+50 -NW19-				
BEGIN STATION	END STATION	WALL HEIGHT (FT)	PILE SPACING (FT)	PILE EXCAV. DEPTH (FT)
10+30 -NW19-	14+00 -NW19-	19-20	15	14
14+00 -NW19-	14+20 -NW19-	19	10	12
14+20 -NW19-	20+90 -NW19-	17-18	10-15	13
20+90 -NW19-	21+10 -NW19-	18	20	14
21+10 -NW19-	23+50 -NW19-	17-18	15	13

BILL OF MATERIAL	
SOUND BARRIER WALL	23,685 S.F.
ARCHITECTURAL SURFACE TREATMENT	38,694 S.F.
QUANTITIES PROVIDED ARE APPROXIMATE AND ARE FOR BID PURPOSES ONLY.	
ARCHITECTURAL SURFACE TREATMENT	
TEXTURE OPTION:	ASHLAR STONE
STAIN OPTION:	36270

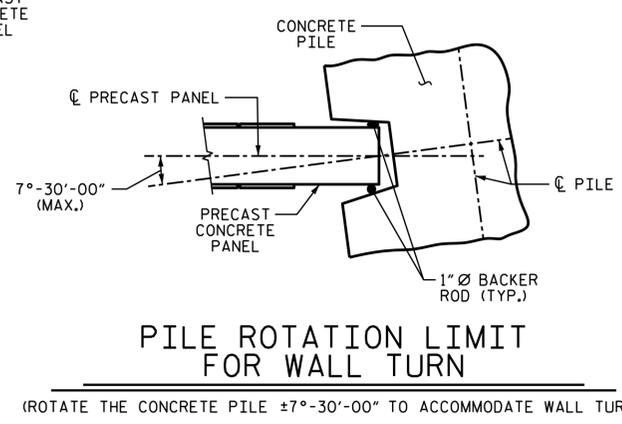
PILE REINFORCING STEEL DESIGN WIND PRESSURE = 40 PSF							
PILE TYPE I				PILE TYPE III			
PILE SPACING	MAXIMUM WALL HEIGHT (H)	VERTICAL REINFORCING STEEL	TIES	PILE SPACING	MAXIMUM WALL HEIGHT (H)	VERTICAL REINFORCING STEEL	TIES
10'-0"	H ≤ 25'	4 - #8 EA. FACE	#3 @ 1'-4"CTS.	10'-0"	H ≤ 25'	3 - #9 SHORT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



**ELEVATION** and **SECTION A-A**



**TYPICAL WALL TURN DETAILS**



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

PROJECT NO. I-5987B  
ROBESON COUNTY  
 STATION: 10+30.00 -NW19-  
 SHEET 2 OF 4

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD  
 SOUND BARRIER WALL  
 -NW19-

3/15/2022  
 X:\NCDOT\I-5987B\Structures\Noise Wall\DCN\I-5987B Noise Wall.SMU.STM.dgn  
 User:smassinopie

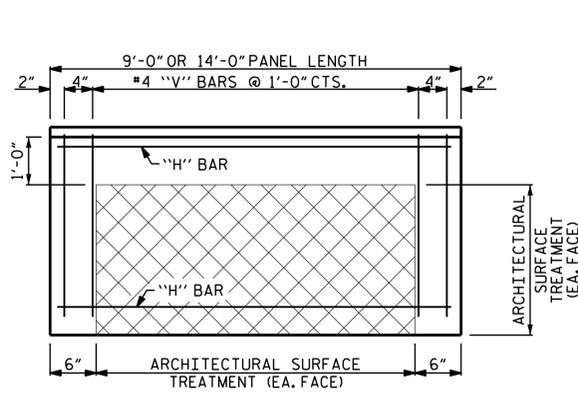
4/12/2022 | 10:20 AM EDT

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

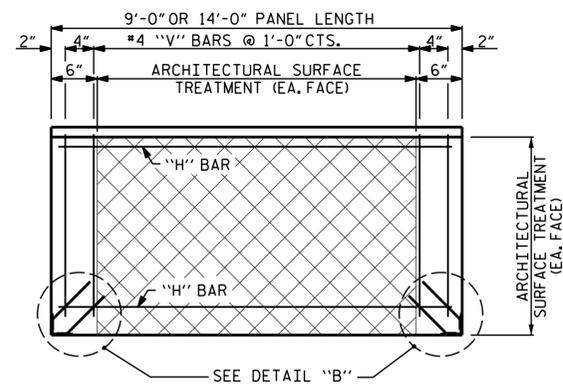
TGS ENGINEERS  
 706 HILLSBOROUGH STREET  
 SUITE 200  
 RALEIGH, NC 27603  
 PH (919) 773-8887  
 CORP. LICENSE NO.: C-0275

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	TOTAL SHEETS
1			3			W19-2
2			4			4

ASSEMBLED BY :	STM	DATE :	03/22
CHECKED BY :	MGC	DATE :	03/22
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



FRONT ELEVATION OF UPPER PRECAST PANEL



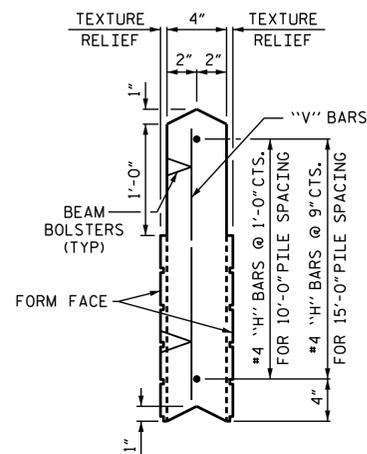
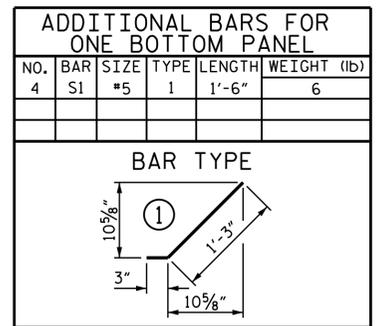
FRONT ELEVATION OF BOTTOM PRECAST PANEL

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

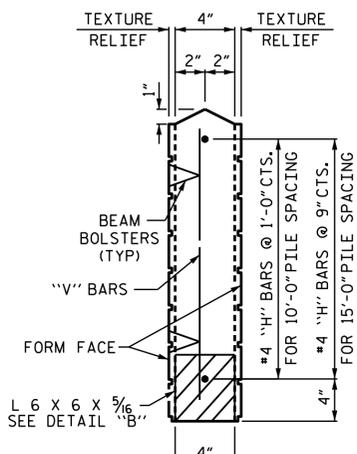
PANEL HEIGHT	CLASS AA CONCRETE C.Y.	BAR TYPES											
		HORIZONTAL						VERTICAL					
		NO.	BAR	SIZE	TYPE	LENGTH	WEIGHT (lb)	NO.	BAR	SIZE	TYPE	LENGTH	WEIGHT (lb)
2'-0"	0.22	3	H1	#4	STR	8'-8"	17	11	V1	#4	STR	1'-8"	12
3'-0"	0.33	4	H2	#4	STR	8'-8"	23	11	V2	#4	STR	2'-8"	20
4'-0"	0.44	5	H3	#4	STR	8'-8"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

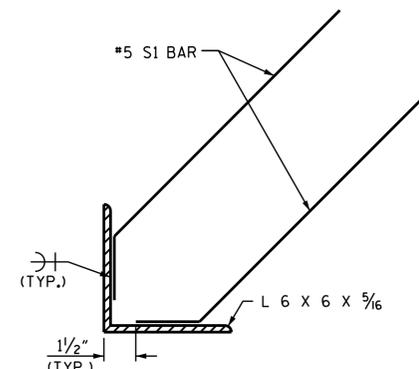


UPPER PANEL

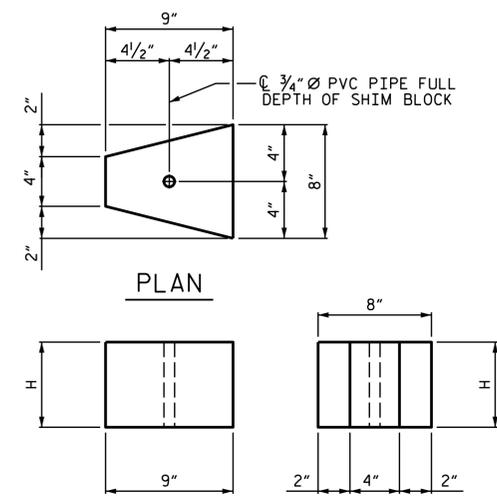


BOTTOM PANEL

SECTION THROUGH PRECAST PANELS



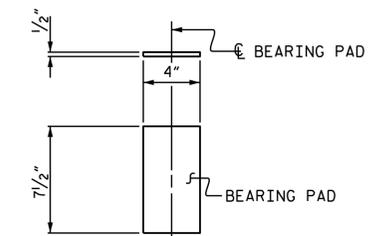
DETAIL "B"



ELEVATION END

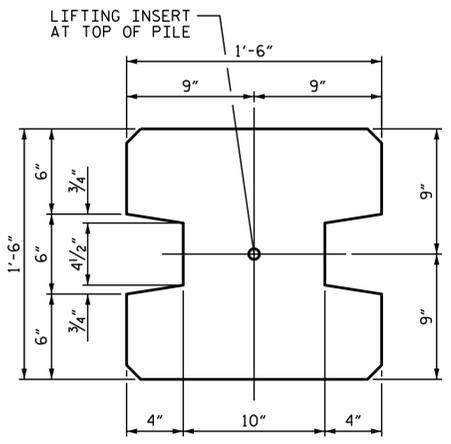
CONCRETE SHIM BLOCK

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

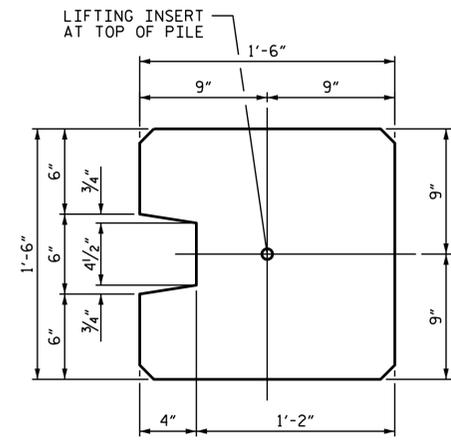


ELASTOMERIC BEARING DETAILS

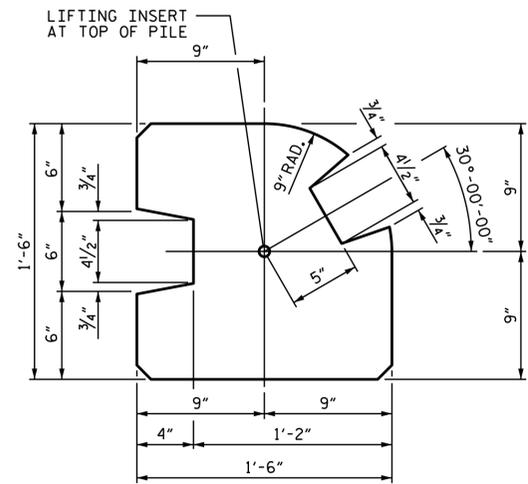
ELASTOMER IN BEARINGS SHALL BE 50 DUROMETER HARDNESS.



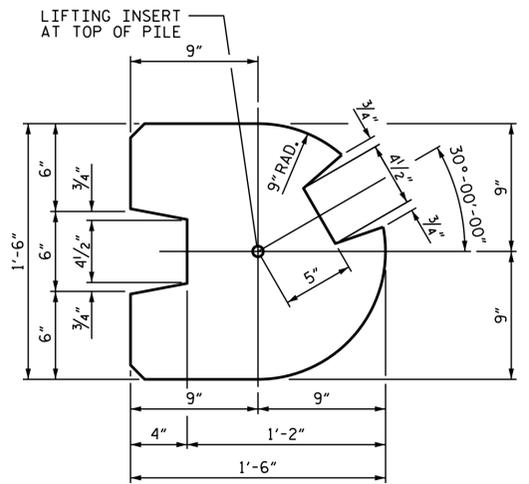
TYPE - I (AREA = 1.9444 SQ. FT.)



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-5987B  
ROBESON COUNTY  
STATION: 10+30.00 -NW19-

SHEET 3 OF 4

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
STANDARD  
SOUND BARRIER WALL  
-NW19-  
DETAILS

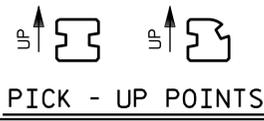
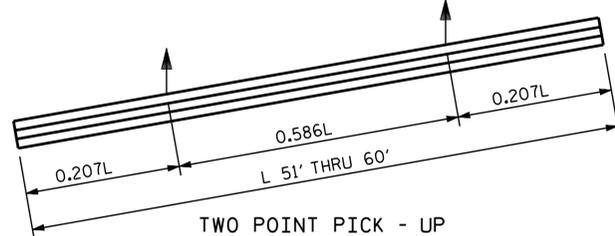
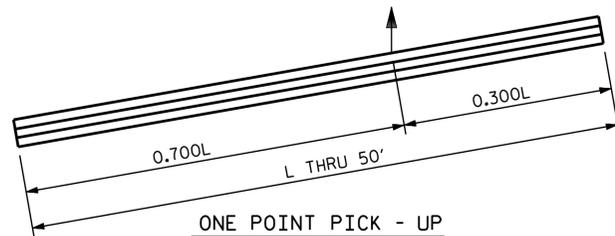
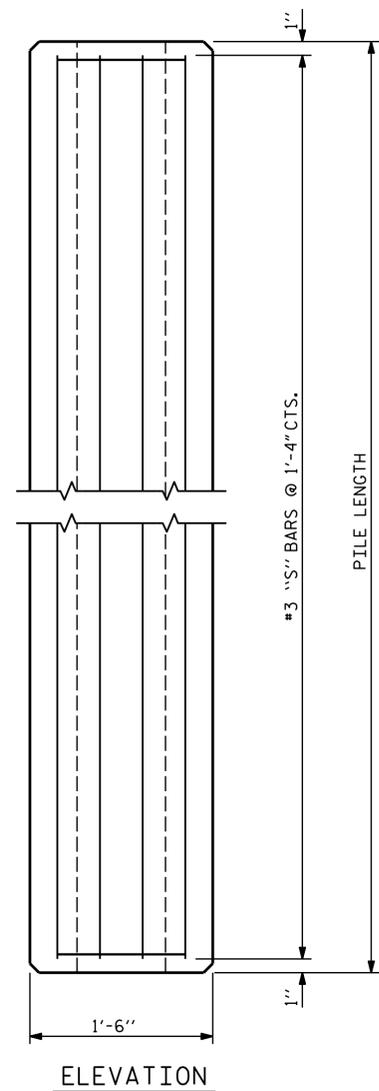
4/12/2022 10:20 AM EDT

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

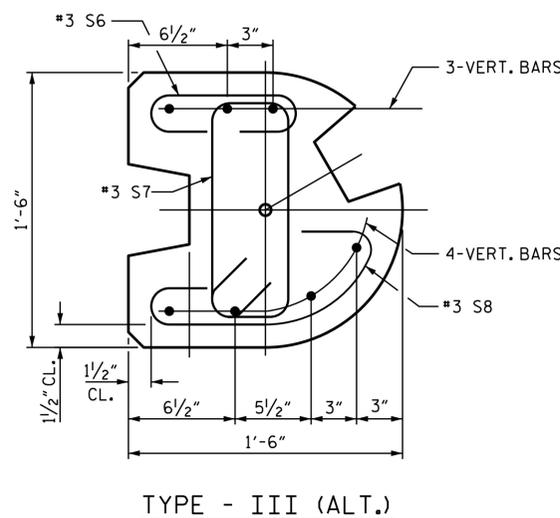
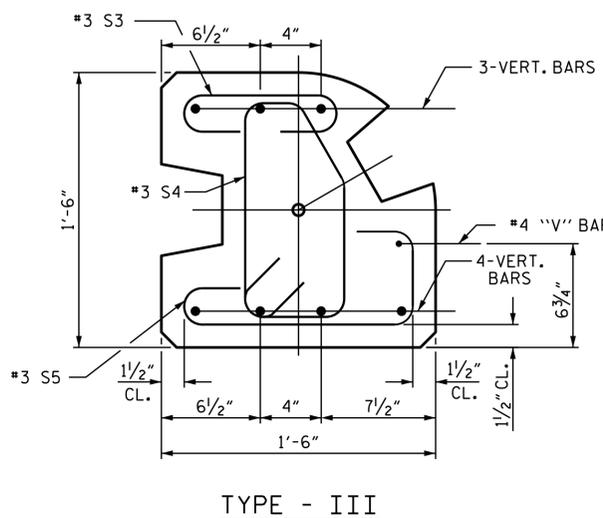
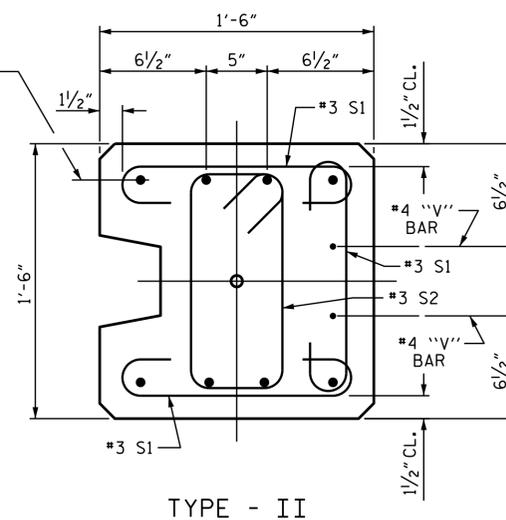
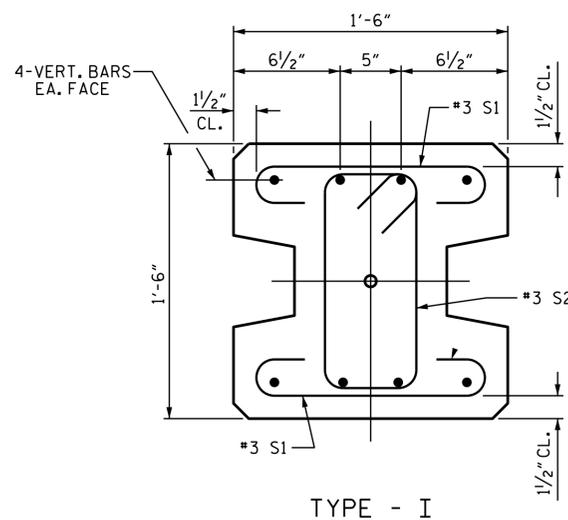
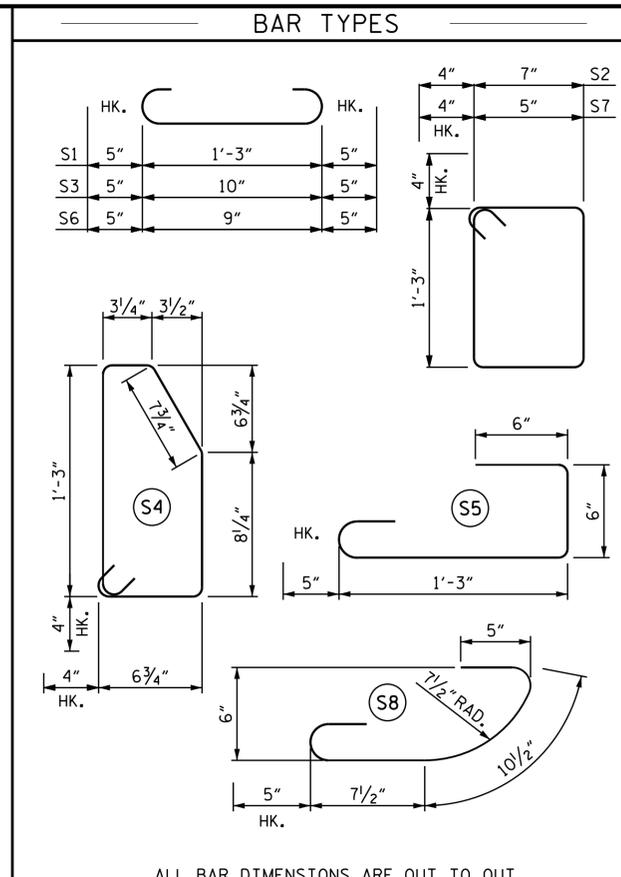
TGS ENGINEERS  
706 HILLSBOROUGH STREET  
SUITE 200  
RALEIGH, NC 27603  
PH (919) 773-8887  
CORP. LICENSE NO.: C-0275

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	W19-3
1			3			TOTAL SHEETS
2			4			4

ASSEMBLED BY :	STM	DATE :	03/22
CHECKED BY :	MGC	DATE :	03/22
DRAWN BY :	MAA 6/11	REV. 1/15/14	RWW/TMG
CHECKED BY :	CM 6/11	REV. 10/17	MAA/THC
		REV. 5/18	MAA/THC



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".

PROJECT NO. I-5987B  
ROBESON COUNTY  
 STATION: 10+30.00 -NW19-  
 SHEET 4 OF 4

ASSEMBLED BY : STM DATE : 03/22  
 CHECKED BY : MGC DATE : 03/22  
 DRAWN BY : MAA 6/11 REV. 1/15/14 RWW/TMG  
 CHECKED BY : GM 6/11 REV. 12/17 MAA/THC

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

STANDARD  
 SOUND BARRIER WALL  
 -NW19-  
 DETAILS

3/15/2022  
 X:\NCDOT\I-5987B\Structures\Noise Wall\DCN\I-5987B Noise Wall.SMU.STM.dgn  
 User:smassinapple

4/12/2022 | 10:20 AM EDT

DOCUMENT NOT CONSIDERED FINAL  
 UNLESS ALL SIGNATURES COMPLETED

TGS ENGINEERS  
 706 HILLSBOROUGH STREET  
 SUITE 200  
 RALEIGH, NC 27603  
 PH (919) 773-8887  
 CORP. LICENSE NO.: C-0275

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	W19-4
1			3			TOTAL SHEETS 4
2			4			

FOR VERTICAL BAR PILE REINFORCING, SEE SHEET 2 OF 4

STD. NO. SBW3