

ESTIMATED SOIL NAIL WALL QUANTITIES			
RETAINING WALL NO.	SOIL NAIL RETAINING WALLS (SQUARE FEET)	SOIL NAIL VERIFICATION TESTS	SOIL NAIL PROOF TESTS
13	3,280*	3	15
FORM LINER ARCHITECTURAL FINISH			3,280* SF
HORIZONTAL DRAINS (CONTIGENCY)			105 LF

\*INCLUDES RETAINING WALL EMBEDMENT

SOIL NAIL RETAINING WALL #13						
STA. -L-	OFFSET FROM -L- (LT) FT.	ELEV. @ TOP OF WALL	BOW PROPOSED FINISHED GRADE	TOP OF LEVELING PAD	ESTIMATED WALL EMBEDMENT FT.	WALL DESIGN HEIGHT "H"
344+68.69	36.10	2887.55	2887.55	2886.55	1.00	1.00
344+75.00	58.90	2889.47	2886.19	2885.19	1.00	3.28
344+81.80	21.50	2892.87	2886.49	2885.49	1.00	6.38
344+85.00	21.50	2894.06	2886.72	2885.72	1.00	7.34
345+00.00	21.50	2900.62	2887.76	2886.76	1.00	12.86
345+50.00	21.50	2911.77	2891.21	2890.21	1.00	20.56
346+00.00	21.50	2916.19	2894.31	2893.31	1.00	21.88
346+50.00	21.50	2907.60	2897.31	2896.31	1.00	10.29
346+60.00	21.50	2904.27	2897.92	2896.92	1.00	6.35
346+70.00	21.50	2900.93	2898.52	2897.52	1.00	2.41
346+76.12	21.50	2898.89	2898.89	2897.89	1.00	1.00

**NOTES:**

FOR SOIL NAIL RETAINING WALLS, SEE SOIL NAIL RETAINING WALLS PROVISION.

FOR SINGLE FACED PRECAST CONCRETE BARRIER (STAINED), SEE ROADWAY PLANS, SECTION 857 OF THE STANDARD SPECIFICATION, AND SIMULATED STONE FORM LINER FINISH SPECIAL PROVISION.

A HANDRAIL IS REQUIRED ON TOP OF RETAINING WALL #13. SEE ROADWAY PLANS FOR FENCE ATTACHMENT DETAILS.

A FENCE IS REQUIRED ON TOP OF RETAINING WALL #14. SEE ROADWAY PLANS FOR FENCE ATTACHMENT DETAILS.

A FORM LINER ARCHITECTURAL FINISH IS REQUIRED FOR THE CIP REINFORCED CONCRETE FACE FOR RETAINING WALL #13 AND #14. THE CONTRACTOR SHALL PROVIDE THE REQUESTED FINISH BEFORE BEGINNING CIP REINFORCED CONCRETE FACE CONSTRUCTION. THE APPEARANCE (STONE SIZE AND SHAPE, STONE COLOR, AND STONE TEXTURE, PATTERN, AND RELIEF) SHOULD MATCH NATURAL STONE AND ROCK. FOR FORM LINER ARCHITECTURAL FINISH, SEE THE SIMULATED STONE FORM LINER FINISH SPECIAL PROVISION.

BEFORE BEGINNING SOIL NAIL WALL DESIGN FOR RETAINING WALL #13 AND #14, 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 #13 AND #14 FOR THE FOLLOWING:
- DESIGN HEIGHT (H) = WALL HEIGHT + WALL EMBEDMENT
  - DESIGN LIFE = 75 YEARS
  - MINIMUM WALL EMBEDMENT ELEVATION = VARIES (MIN. 1 FT BELOW PROPOSED FINISHED GRADE ELEVATION)
  - IN-SITU ASSUMED MEDIUM STIFF TO STIFF RESIDUAL SOIL PARAMETERS:  
UNIT WEIGHT,  $\gamma$  = 120 PCF  
FRICTION ANGLE,  $\phi$  = 30 DEGREES  
COHESION,  $c$  = 0 PSF
  - IN-SITU ASSUMED VERY STIFF TO HARD RESIDUAL SOIL PARAMETERS:  
UNIT WEIGHT,  $\gamma$  = 125 PCF  
FRICTION ANGLE,  $\phi$  = 36 DEGREES  
COHESION,  $c$  = 0 PSF
  - IN-SITU ASSUMED WEATHERED ROCK (META-SANDSTONE) PARAMETERS:  
UNIT WEIGHT,  $\gamma$  = 135 PCF  
FRICTION ANGLE,  $\phi$  = 32 DEGREES  
COHESION,  $c$  = 500 PSF
  - IN-SITU ASSUMED CRYSTALLINE ROCK (META-SANDSTONE) PARAMETERS:  
UNIT WEIGHT,  $\gamma$  = 170 PCF  
FRICTION ANGLE,  $\phi$  = 34 DEGREES  
COHESION,  $c$  = 1,000 PSF
  - WHERE ROCK IS ENCOUNTERED IN THE WALL ENVELOPE, DESIGNERS SHOULD REFER TO THE FHWA PRESUMPTIVE STRENGTH PARAMETERS OR OTHER REPRESENTATIVE AND REPEATABLE VALUES AND PROVIDE SOURCE REFERENCES IN THEIR DESIGN SUBMITTAL.

WHEN ANALYZING FOR INFINITE SLOPE CONDITIONS, DESIGNERS SHOULD ANALYZE UP TO TWO (2) TIMES THE WALL HEIGHT BEHIND THE WALL FACE FOR FAILURE PLANE SEARCHES. THIS INFORMATION SHOULD BE INCLUDED WITH THE DESIGN SUBMITTAL.

EXISTING OR FUTURE OBSTRUCTIONS SUCH AS FOUNDATIONS, GUARDRAIL, FENCE OR HANDRAIL POSTS, PAVEMENTS, PIPES, INLETS OR UTILITIES MAY INTERFERE WITH SOIL NAILS FOR RETAINING WALLS #13 AND #14.

PREPARED BY: R. KRAL	DATE: 6/2/2022
REVIEWED BY: M. BREWER	DATE: 6/2/2022

ESTIMATED SOIL NAIL WALL QUANTITIES			
RETAINING WALL NO.	SOIL NAIL RETAINING WALLS (SQUARE FEET)	SOIL NAIL VERIFICATION TESTS	SOIL NAIL PROOF TESTS
14	3,540*	3	15
FORM LINER ARCHITECTURAL FINISH			3,540* SF
HORIZONTAL DRAINS (CONTIGENCY)			135 LF

\*INCLUDES RETAINING WALL EMBEDMENT

SOIL NAIL RETAINING WALL #14						
STA. -L-	OFFSET FROM -L- (LT) FT.	ELEV. @ TOP OF WALL	BOW PROPOSED FINISHED GRADE	TOP OF LEVELING PAD	ESTIMATED WALL EMBEDMENT FT.	WALL DESIGN HEIGHT "H"
347+94.84	21.50	2906.53	2906.53	2905.53	1.00	1.00
348+00.00	21.50	2909.11	2906.88	2905.88	1.00	2.23
348+15.00	21.50	2913.56	2907.93	2906.93	1.00	5.63
348+25.00	21.50	2914.39	2908.62	2907.62	1.00	5.77
348+45.00	21.50	2924.66	2910.04	2909.04	1.00	14.62
348+60.00	21.50	2927.22	2911.06	2910.06	1.00	16.16
349+00.00	21.50	2930.11	2913.84	2912.84	1.00	16.27
349+50.00	21.50	2933.29	2917.38	2916.38	1.00	15.91
350+00.00	21.50	2934.82	2920.91	2919.91	1.00	13.91
350+50.00	21.50	2928.51	2924.38	2923.38	1.00	4.13
350+60.00	21.50	2926.39	2925.07	2924.07	1.00	1.32
350+64.13	21.50	2925.35	2925.35	2924.35	1.00	1.00

**NOTES (continued):**


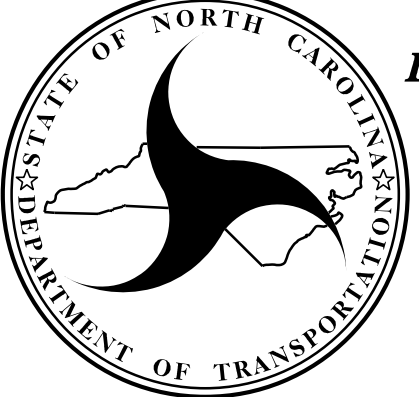
THE PROPOSED RIGHT OF WAY (ROW) BOUNDARY IS 18.5 FT FROM THE FACE OF RETAINING WALL #13 AND #14. THE PROPOSED PERMANENT EASEMENT (PE) IS 39.0 FEET AND 33.5 FEET FROM THE FACE OF RETAINING WALL #13 AND #14, RESPECTIVELY. SOIL NAILS MAY NOT BE INSTALLED BEYOND THE PE BOUNDARY. SEE "SOIL NAIL WALL - TYPICAL SECTION" DETAIL.


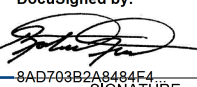
IF GROUNDWATER IS ENCOUNTERED BEHIND THE FACE OF RETAINING WALLS #13 AND #14, HORIZONTAL DRAINS MAY BE REQUIRED AS DIRECTED BY THE ENGINEER. FOR HORIZONTAL DRAINS, SEE THE RETAINING WALL HORIZONTAL DRAIN DETAIL.

WHERE ROCK IS PRESENT IN THE WALL ENVELOPE, CONTROLLED BLASTING IS RECOMMENDED, BUT NOT REQUIRED, TO MAINTAIN THE NEAT EXCAVATION LINE. VOIDS, RESULTING FROM BLASTING OR EXCAVATING, THAT EXTEND BEYOND THE NEAT LINES ARE TO BE FILLED WITH A COMBINATION OF SHORT SOIL NAILS, WELDED WIRE, AND SHOTCRETE, AT THE DISCRETION OF THE ENGINEER. THE COSTS ASSOCIATED WITH THIS WORK WILL BE CONSIDERED INCIDENTAL TO WALL CONSTRUCTION AND NO ADDITIONAL COMPENSATION WILL BE MADE. FOR BLASTING, SEE THE BLASTING PROVISION.

WHERE CONSTRUCTION VOIDS EXIST ALONG THE TOP OF RETAINING WALLS #13 AND #14, THE CONTRACTOR SHOULD BE PREPARED TO FORM THE CANTILEVERED SECTION OF THE CIP REINFORCED CONCRETE FACE TO THE TOP OF WALL ELEVATION. THE CONSTRUCTION VOID SHOULD BE FILLED WITH CONCRETE OR SHOTCRETE PRIOR TO CONSTRUCTION OF THE CONCRETE DITCH. ADDITIONAL WALL FACE REINFORCEMENT OR SOIL NAILS MAY BE REQUIRED FOR TALLER THAN TYPICAL CANTILEVER FACE HEIGHTS.

PROJECT NO.: A-0009CB  
 GRAHAM COUNTY  
 RETAINING WALL #13: -L- 344+69, 36' LT TO 346+76, 22' LT  
 RETAINING WALL #14: -L- 347+95, 22' LT TO 350+64, 22' LT  
 SHEET 2 OF 4

<p>Prepared in the Office of:</p>  <p><b>CARLINAS GEOTECHNICAL GROUP</b>                  2400 CROWNPOINT EXECUTIVE DRIVE                  SUITE 800                  CHARLOTTE, NC 28227                  (980) 339-8684</p>	 <p><b>NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS</b></p> <p><b>GEOTECHNICAL ENGINEERING UNIT</b></p>	<p>RETAINING WALL #13 AND #14 SOIL NAIL RETAINING WALL</p>		<p><b>REVISIONS</b></p> <table border="1"> <tr> <th>NO.</th> <th>BY</th> <th>DATE</th> <th>NO.</th> <th>BY</th> <th>DATE</th> </tr> <tr> <td>1</td> <td></td> <td></td> <td>3</td> <td></td> <td></td> </tr> <tr> <td>2</td> <td></td> <td></td> <td>4</td> <td></td> <td></td> </tr> </table>			NO.	BY	DATE	NO.	BY	DATE	1			3			2			4			<p>SHEET NO. W13-2</p>
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<p>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</p>																									

<p>GEOTECHNICAL ENGINEER</p>  <p>SEAL 042642 ROBERT E. KRAL</p> <p>DocuSigned by:                    06/08/2022</p>	<p>ENGINEER</p> <p>DATE</p>
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