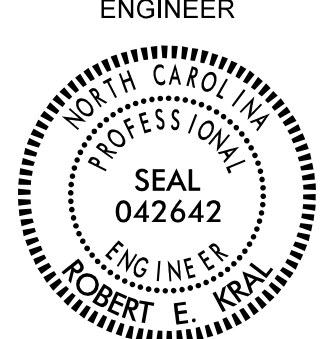
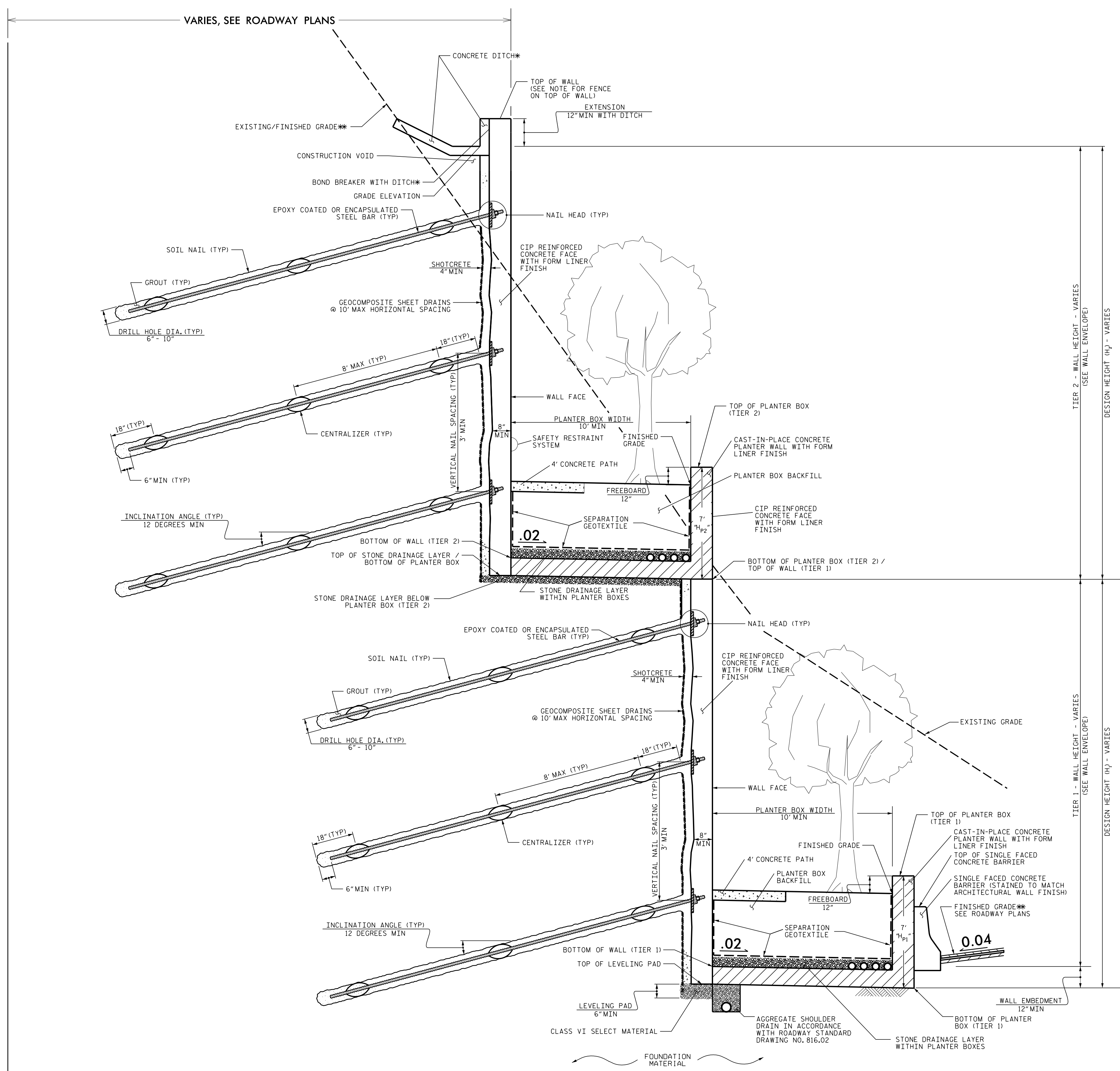


GEOTECHNICAL ENGINEER  SEAL 042642 ROBERT E. KRAL	ENGINEER  DATE SIGNATURE
7/14/2022 DATE	DATE
<b>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</b>	

PERMANENT EASEMENT



**NOTES:**

- FOR SOIL NAIL RETAINING WALLS, SEE TIERED SOIL NAIL RETAINING WALLS SPECIAL PROVISION.
- FOR TIERED SOIL NAIL RETAINING WALLS, SEE TIERED SOIL NAIL RETAINING WALLS SPECIAL 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.
- RETAINING WALL #9 HAS A SADDLE THAT REQUIRES A DRAINAGE STRUCTURE BE INSTALLED BEHIND THE WALL. SEE ROADWAY AND HYDRAULIC PLANS FOR STRUCTURE TYPE AND LOCATION.
- FOR PLANTER BOX, SEE TIERED SOIL NAIL RETAINING WALLS SPECIAL PROVISION.
- FOR SAFETY RESTRAINT SYSTEM, SEE TIERED SOIL NAIL RETAINING WALLS SPECIAL PROVISION.
- A FORM LINER ARCHITECTURAL FINISH IS REQUIRED FOR THE CIP REINFORCED CONCRETE FACE FOR RETAINING WALL #19A, #19B, PLANTER BOXES, AND SLOPE PROTECTION. 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 #19A AND #19B, 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 WALL #19A AND #19B FOR THE FOLLOWING:
  - 1) DESIGN HEIGHT (H) = WALL HEIGHT + WALL EMBEDMENT
  - 2) DESIGN LIFE = 75 YEARS
  - 3) MINIMUM WALL EMBEDMENT ELEVATION = VARIES (MIN. 1 FT BELOW FINISHED GRADE ELEVATION)
  - 4) IN-SITU ASSUMED DENSE RESIDUAL SOIL PARAMETERS:
    - UNIT WEIGHT,  $\gamma = 125$  PCF
    - FRICTION ANGLE,  $\phi = 36$  DEGREES
    - COHESION,  $c = 0$  PSF
  - 5) IN-SITU ASSUMED WEATHERED ROCK (META-SANDSTONE) PARAMETERS:
    - UNIT WEIGHT,  $\gamma = 135$  PCF
    - FRICTION ANGLE,  $\phi = 32$  DEGREES
    - COHESION,  $c = 500$  PSF
  - 6) IN-SITU ASSUMED CRYSTALLINE ROCK (META-SANDSTONE) PARAMETERS:
    - UNIT WEIGHT,  $\gamma = 170$  PCF
    - FRICTION ANGLE,  $\phi = 34$  DEGREES
    - COHESION,  $c = 1,000$  PSF
  - 7) 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 WALL #19 AND #19B.
- THE PROPOSED RIGHT OF WAY (ROW) AND PERMANENT EASEMENT (PE) BOUNDARY VARIES FROM THE FACE OF RETAINING WALL #19A AND #19B. SEE THE ROADWAY PLANS FOR OFFSET DISTANCES FROM THE FACE OF RETAINING WALL #19A AND #19B. SOIL NAILS MAY NOT BE INSTALLED BEYOND THE PE BOUNDARY. SEE TYPICAL SECTIONS ON SHEET W19-8, W19-9, AND W19-10.
- IF GROUNDWATER IS ENCOUNTERED BEHIND THE FACE OF RETAINING WALL #19A AND #19B, 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 WALL 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 FACE. THE WALL FACE REINFORCEMENT OR SOIL NAILS MAY BE REQUIRED FOR TALLER THAN TYPICAL CANTILEVER FACE HEIGHTS.
- FOR LAND BRIDGE PERMANENT SHORING, SEE SOIL NAIL WALLS SPECIAL PROVISION.
- A CAST-IN-PLACE CONCRETE WALL IS REQUIRED WITHIN PLANTER BOX (TIER 1) AND PANTER BOX (TIER 2) AT STATION -L- 376+73.59 AND 378+07.86, RESPECTIVELY.
- SLOPE PROTECTION WITH FORM LINER ARCHITECTURAL FINISH IS REQUIRED IN PLANTER BOX (TIER 1) AND PLANTER BOX (TIER 2) FROM STATION -L- 376+65.00 TO 376+73.59 AND 377+78.29 TO 378+07.86, RESPECTIVELY. FOR SLOPE PROTECTION, SEE SECTION 462 OF THE STANDARD SPECIFICATIONS.

**DOUBLE TIERED WALL - TYPICAL SECTION**

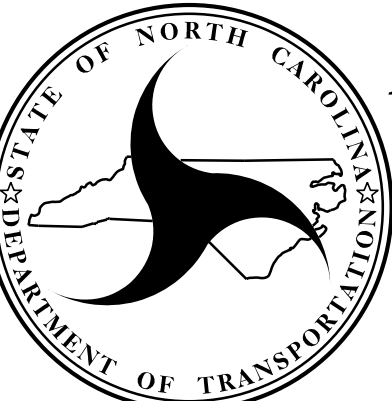
\*SEE CONCRETE DITCH BEHIND WALL DETAILS.  
\*\*SEE PLANS FOR FINISHED GRADE.

PREPARED BY: R. KRAL	DATE: 7/13/2022
REVIEWED BY: M. BREWER	DATE: 7/13/2022

Prepared in the Office of:



**CAROLINAS GEOTECHNICAL GROUP**  
2400 CROWNPPOINT EXECUTIVE DRIVE  
SUITE 800  
CHARLOTTE, NC 28227  
(980) 339-8684



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

**GEOTECHNICAL ENGINEERING UNIT**

**RETAINING WALL #19A & #19B TIERED SOIL NAIL RETAINING WALL**

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

SHEET NO. W19-10

PROJECT NO.: A-0009CB  
GRAHAM COUNTY  
RETAINING WALL #19A: -L- 376+65, 45'-56' LT TO 380+50, 48.5'-70.5' LT  
RETAINING WALL #19B: -L- 382+30, 48.5'-70.5' LT TO 408+04, 33.5' LT  
SHEET 10 OF 11