

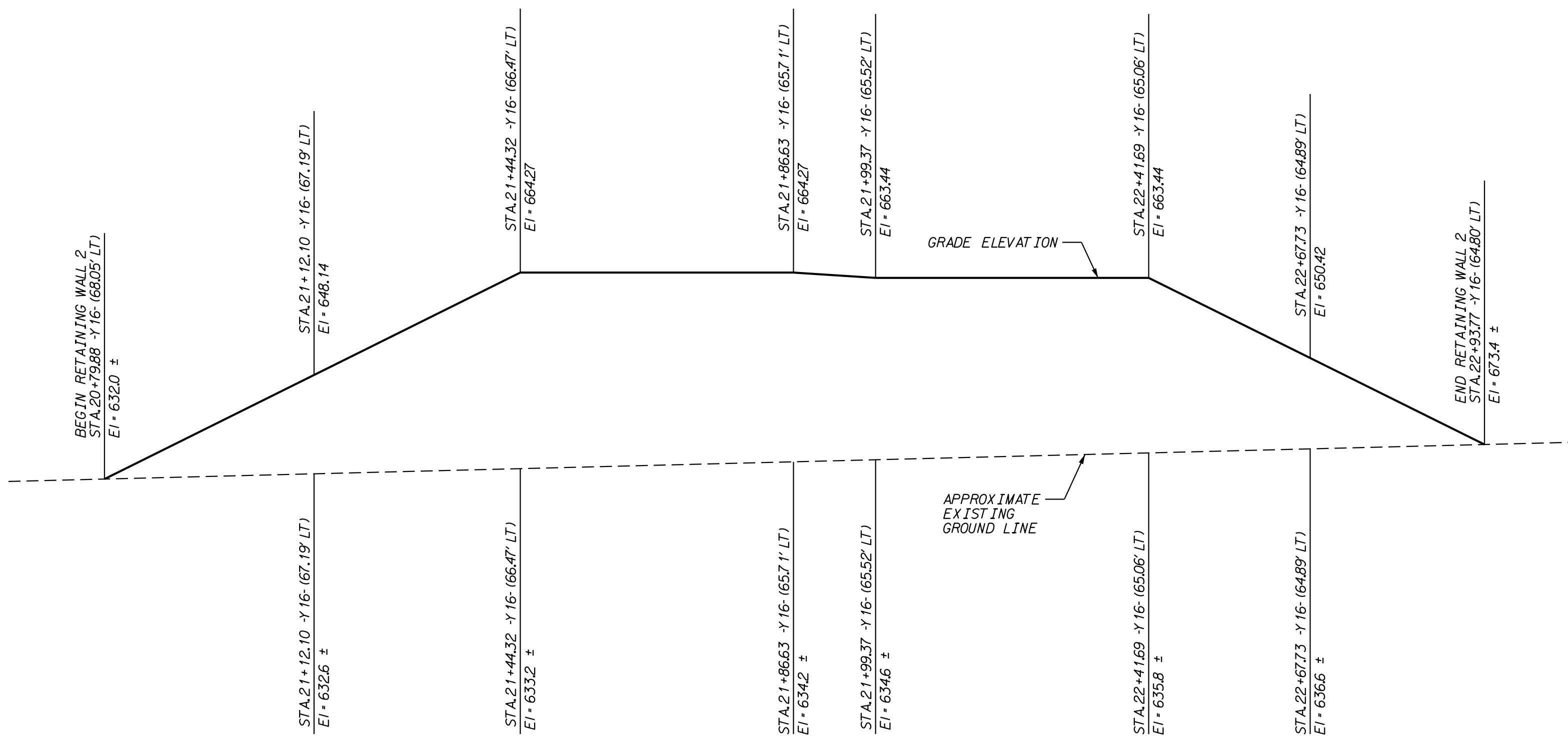
GEOTECHNICAL ENGINEER

ENGINEER

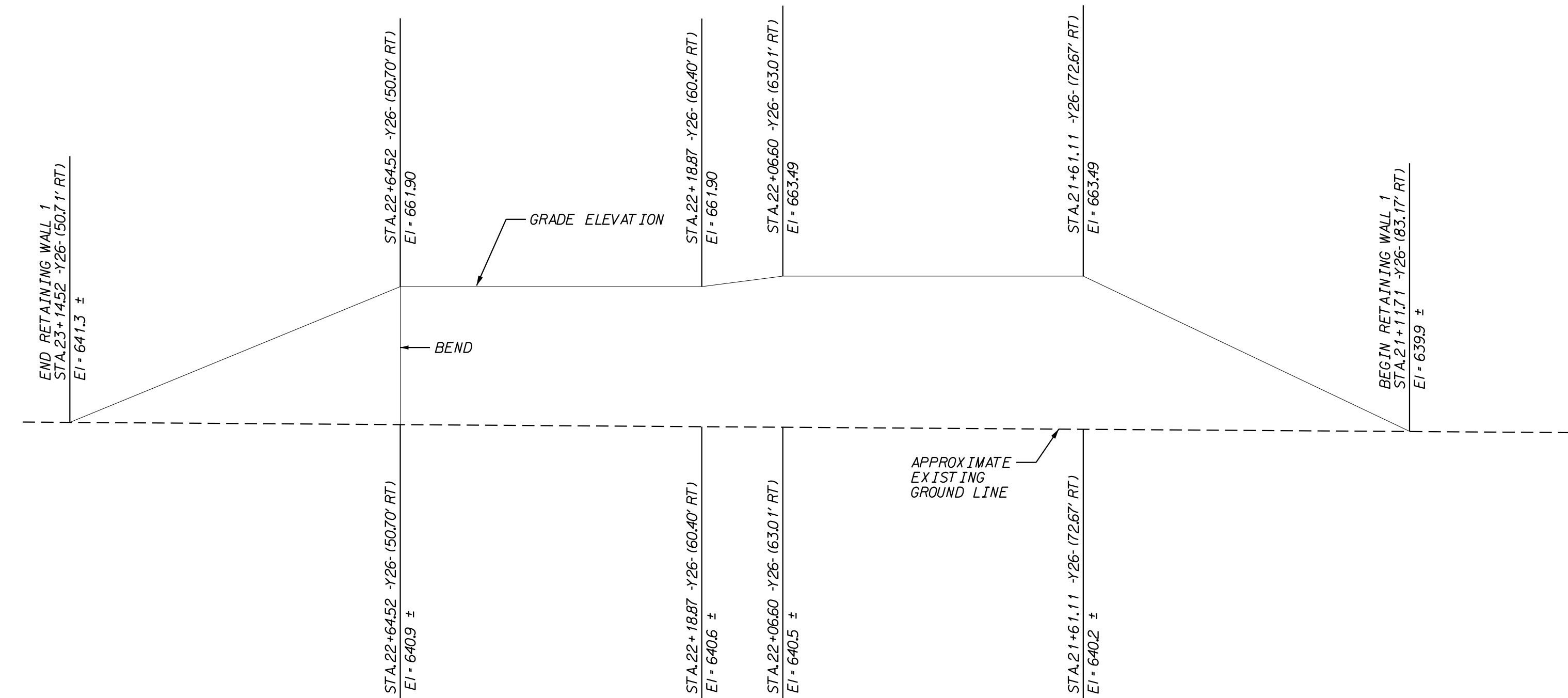
DocuSigned by:
Thomas Wells 2/22/2017

SIGNATURE DATE SIGNATURE DATE

NOT CONSIDERED FINAL UNLESS ALL SIGNATURES ARE COMPLETED



U-3109A: WALL NO. 2 ELEVATION
VIEWED UP STATION



U-3109A: WALL NO. 1 ELEVATION
VIEWED DOWN STATION

THE WALL ENVELOPE DOES NOT ACCURATELY DEPICT THE ACTUAL FACE OF THE WALL

PROJECT NO.: U-3109A
ALAMANCE COUNTY
STATION: 143+22.52 -L- 21+72.20 -Y26-
STATION: 146+61.35 -L- 22+02.76 -Y16-
SHEET 1 OF 4

PREPARED BY: TRW	DATE: 9/15
REVIEWED BY: XCB	DATE: 9/15

KLEINFELDER
Bright People. Right Solutions.

7343 WEST FRIENDLY AVE
GREENSBORO, NC 27410
NC ENGINEERING F-1143

MSE RETAINING WALL					
REVISIONS					
NO.	BY	DATE	NO.	BY	DATE
1			3		
2			4		

SHEET NO. W-1

GEOTECHNICAL ENGINEER

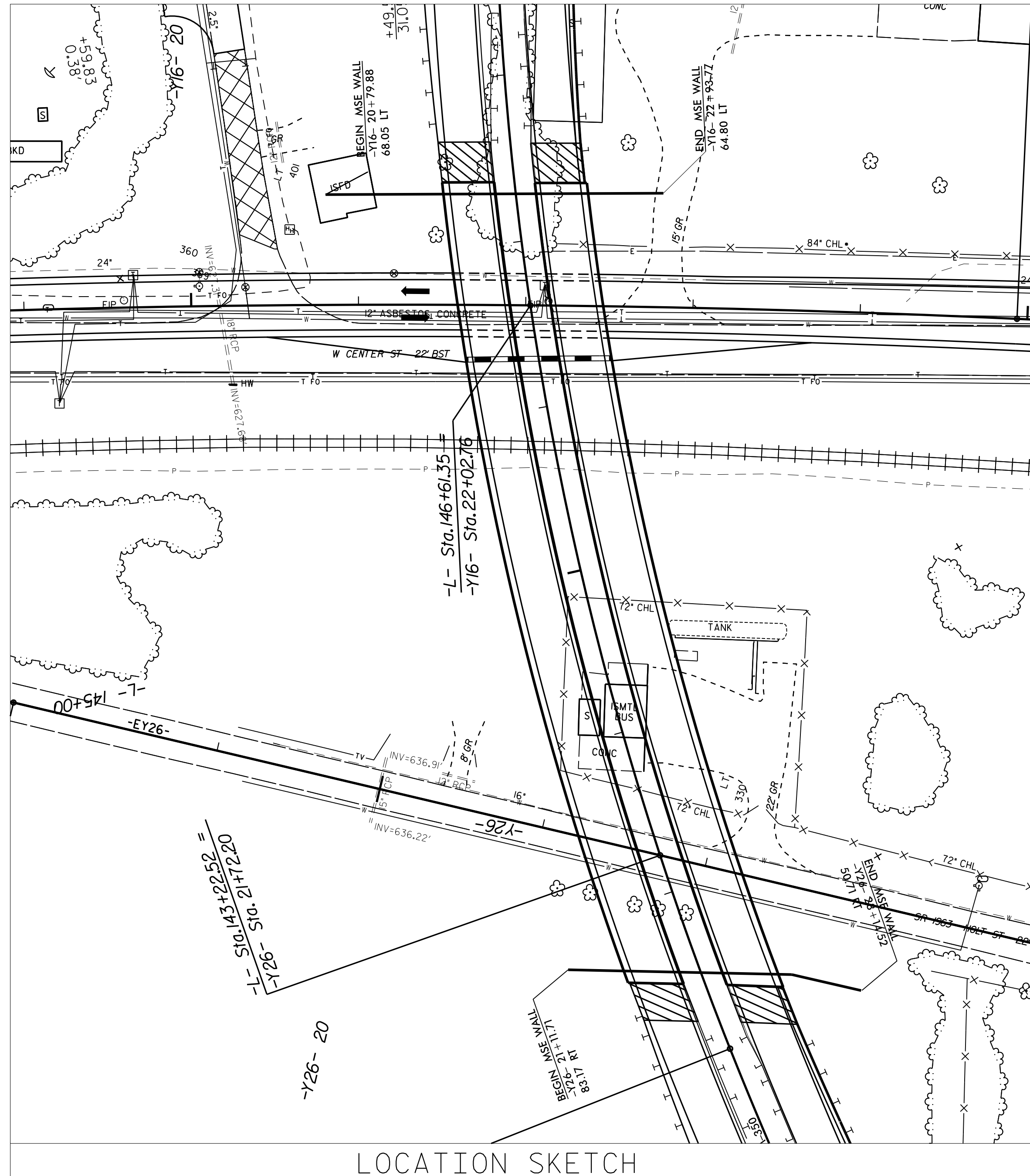
ENGINEER

DocuSigned by:
Thomas Wells 2/22/2017

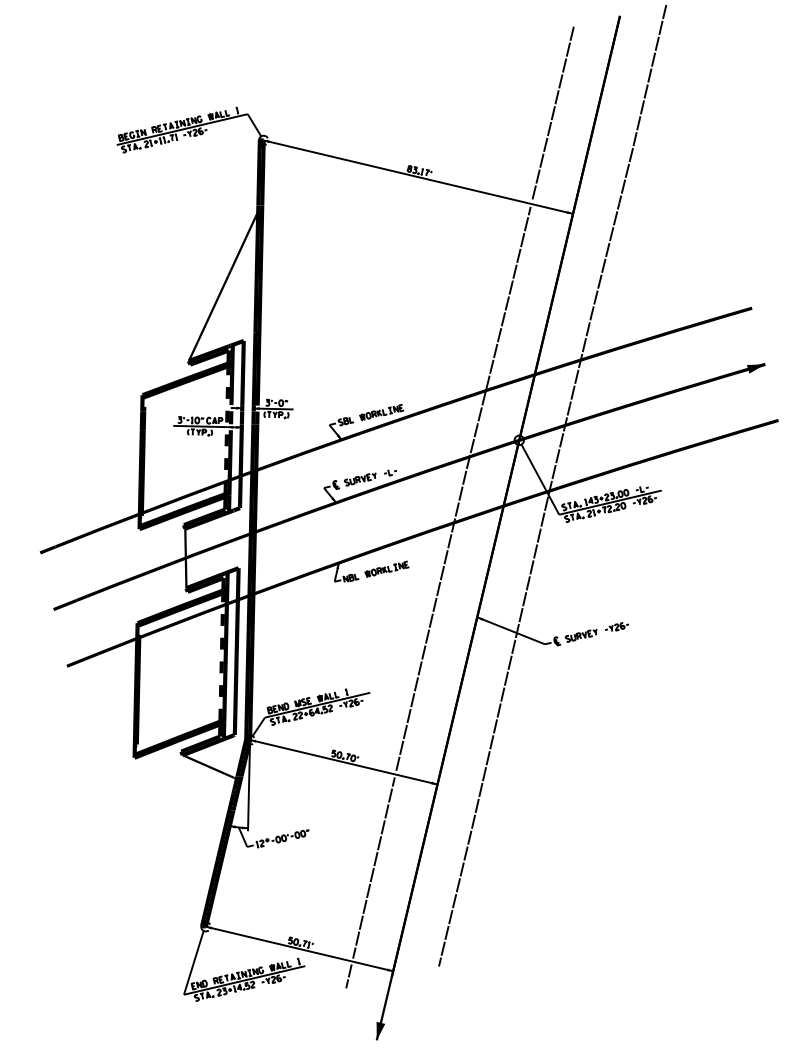
DATE: 2/22/2017

SIGNATURE: _____ DATE: _____

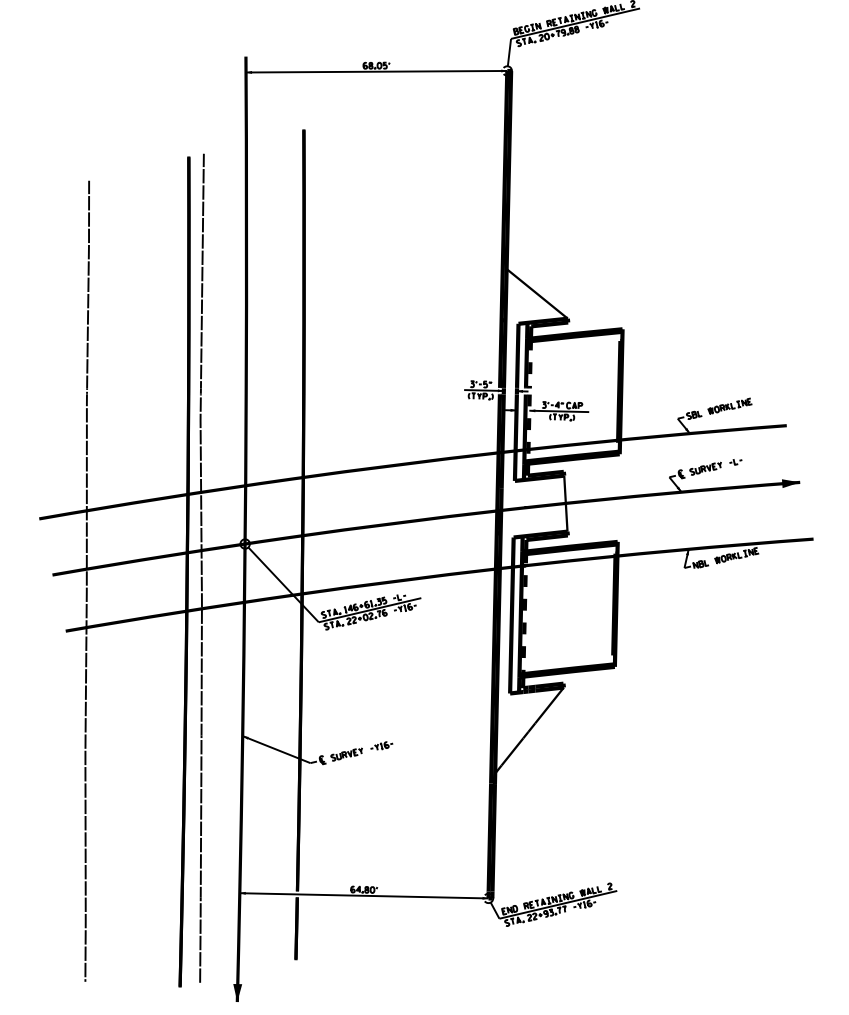
NOT CONSIDERED FINAL UNLESS ALL SIGNATURES ARE COMPLETED



LOCATION SKETCH



RETAINING WALL NO. 1
PLAN VIEW



RETAINING WALL NO. 2
PLAN VIEW

ESTIMATED MSE WALL QUANTITIES (SQUARE FEET)	
MSE RETAINING WALL NO. 1	3449 SF
MSE RETAINING WALL NO. 2	4617 SF

PROJECT NO.: U-3109A

ALAMANCE COUNTY

STATION: 143+22.52 -L- 21+72.20 -Y26-

STATION: 146+61.35 -L- 22+02.76 -Y26-

SHEET 2 OF 4

PREPARED BY: T. WELLS DATE: 9/15

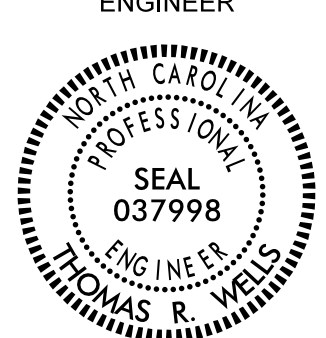
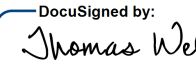
REVIEWED BY: X. BARRETT DATE: 9/15



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 GREENSBORO, NC 27410
 NC ENGINEERING F-1143

MSE RETAINING WALL					
REVISIONS					
NO.	BY	DATE	NO.	BY	DATE
1			3		
2			4		

SHEET NO. W-2

GEOTECHNICAL ENGINEER  SEAL 037998 THOMAS R. WELLS ENGINEER	ENGINEER
DocuSigned by:  Thomas Wells 2/22/2017	SIGNATURE DATE

NOT CONSIDERED FINAL UNLESS ALL SIGNATURES ARE COMPLETED

NOTES:

- FOR MECHANICALLY STABILIZED EARTH (MSE) RETAINING WALLS, SEE MECHANICALLY STABILIZED EARTH RETAINING WALLS PROVISION.
- FOR SINGLE FACED PRECAST CONCRETE BARRIER, SEE ROADWAY PLANS AND SECTION 857 OF THE STANDARD SPECIFICATIONS.
- AT THE CONTRACTOR'S OPTION, USE FINE AGGREGATE IN THE REINFORCED ZONE OF RETAINING WALL NO.1 AND 2.
- CAST-IN-PLACE REINFORCED CONCRETE COPING IS REQUIRED FOR RETAINING WALL NO 1 AND 2.
- A SEPARATION GEOTEXTILE IS REQUIRED AT THE BACK OF THE REINFORCED ZONE FOR RETAINING WALL NO.1 AND 2.
- A DRAIN IS NOT REQUIRED FOR RETAINING WALL NO.1 AND 2.
- BEFORE BEGINNING MSE WALL DESIGN FOR RETAINING WALL NO.1 AND 2, 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 NO.1 AND 2 FOR THE FOLLOWING:

- 1) H = DESIGN HEIGHT + EMBEDMENT
- 2) DESIGN LIFE = 100 YEARS
- 3) MAXIMUM FACTORED VERTICAL PRESSURE ON FOUNDATION MATERIAL = 44,352 LB/SF FOR WALL NO.1 AND 73,997 LB/SF FOR WALL NO.2
- 4) MINIMUM REINFORCEMENT LENGTH (L) = 0.7H OR 17 FT FOR WALL NO.1 AND 22 FT FOR WALL NO.2, WHICHEVER IS LONGER
- 5) MINIMUM EMBEDMENT ELEVATION = 637.4 FT FOR WALL NO.1 AND 629.0 FT FOR WALL NO.2
- 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	32	0

DESIGN RETAINING WALL NO.1 AND 2 FOR A LIVE LOAD (TRAFFIC) SURCHARGE.

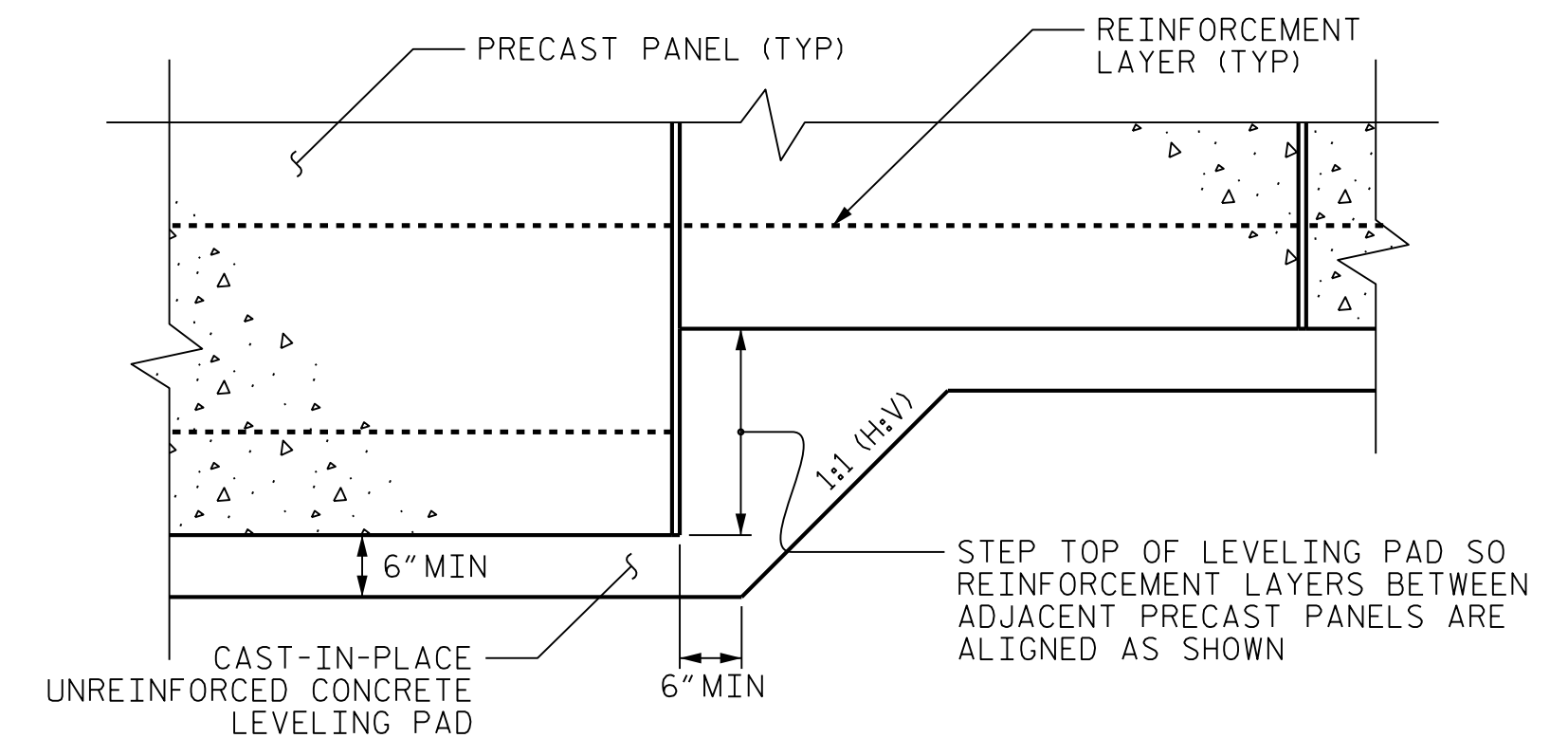
DESIGN REINFORCEMENT CONNECTED TO END BENT CAPS FOR FACTORED LOAD AND LENGTH OF REINFORCEMENT IN ACTIVE ZONE (L) SHOWN. CAST REINFORCEMENT CONNECTORS INTO CAP BACKWALL FOR END BENT NO.1 LOCATED AT STATION 142+47.09 -L-. MAINTAIN A CLEARANCE OF AT LEAST 3" BETWEEN CONNECTORS AND REINFORCING STEEL IN CAP.

DESIGN REINFORCEMENT CONNECTED TO END BENT CAPS FOR FACTORED LOAD AND LENGTH OF REINFORCEMENT IN ACTIVE ZONE (L) SHOWN. CAST REINFORCEMENT CONNECTORS INTO CAP BACKWALL FOR END BENT NO.2 LOCATED AT STATION 147+37.41 -L-. MAINTAIN A CLEARANCE OF AT LEAST 3" BETWEEN CONNECTORS AND REINFORCING STEEL IN CAP.

FOUNDATIONS FOR END BENT NO.1 LOCATED AT STATION 142+47.09 -L- WILL INTERFERE WITH REINFORCEMENT FOR RETAINING WALL NO.1. SEE "FOUNDATION LAYOUT" SHEET FOR FOUNDATION LOCATIONS.

FOUNDATIONS FOR END BENT NO.2 LOCATED AT STATION 147+37.41 -L- WILL INTERFERE WITH REINFORCEMENT FOR RETAINING WALL NO.2. SEE "FOUNDATION LAYOUT" SHEET FOR FOUNDATION LOCATIONS.

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



PRECAST CONCRETE PANELS

LEVELING PAD STEP DETAILS

PROJECT NO.: U-3109A

ALAMANCE COUNTY

STATION: 143+22.52 -L- 21+72.20 -Y26-

STATION: 146+61.35 -L- 22+02.76 -Y16-

SHEET 3 OF 4

PREPARED BY: TRW	DATE: 9/15
REVIEWED BY: XCB	DATE: 9/15



KLEINFELDER
7343 WEST FRIENDLY AVE
GREENSBORO, NC 27410
NC ENGINEERING F-1143

**MSE
RETAINING WALL**

REVISIONS

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

GEOTECHNICAL ENGINEER

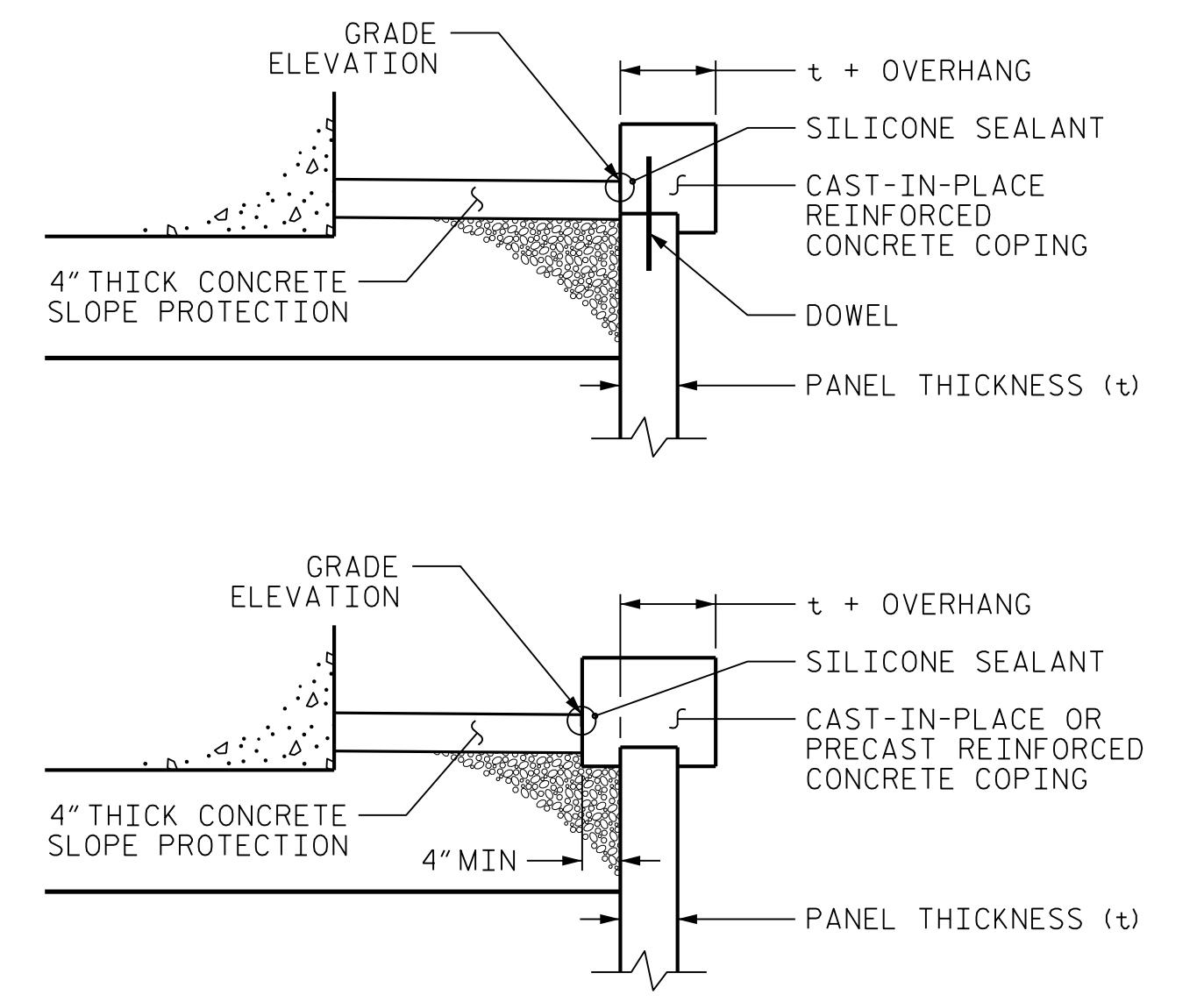
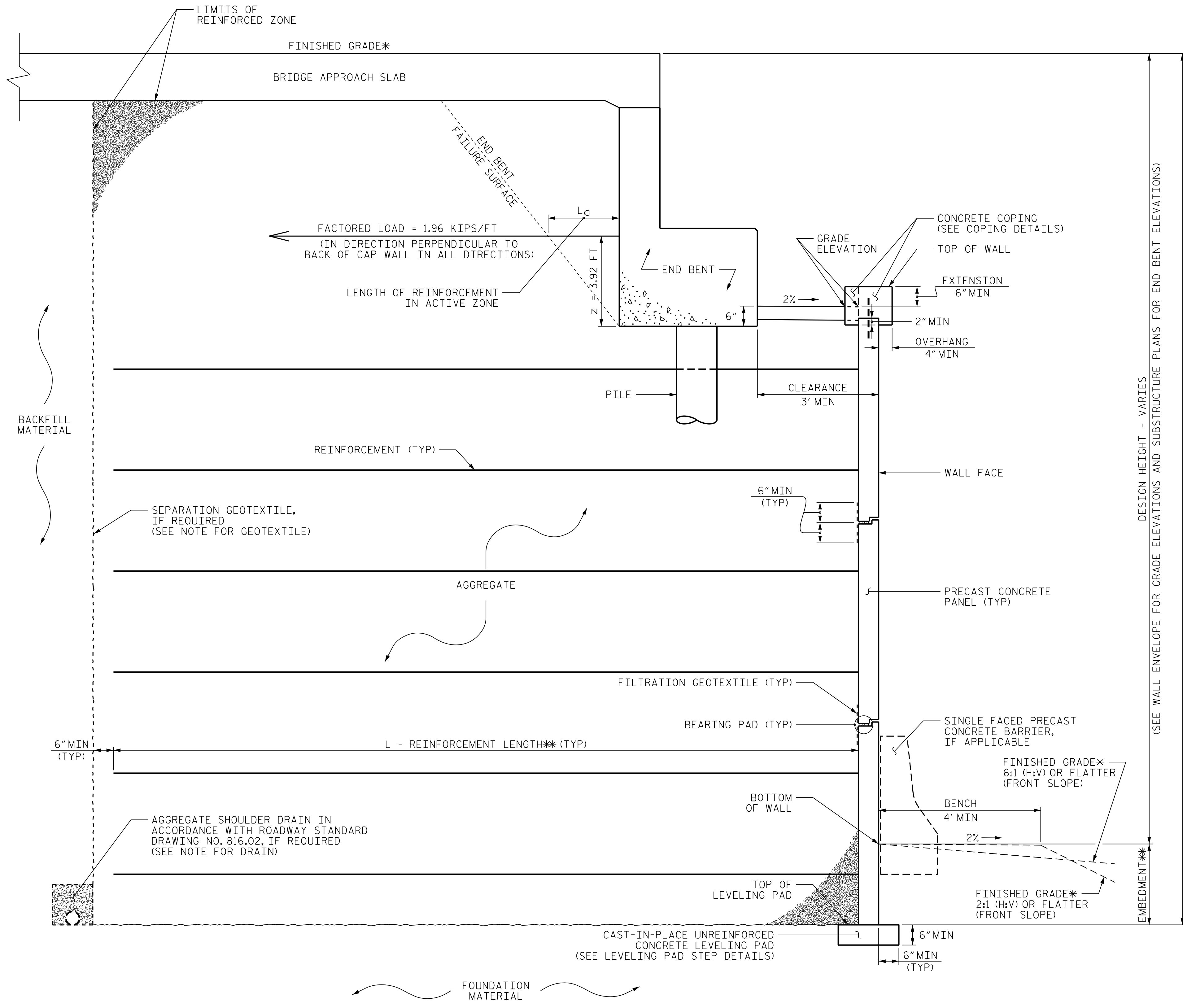
ENGINEER

SEAL 037998

THOMAS R. WELLS

DocuSigned by: Thomas Wells 2/22/2017

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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.: U-3109A
 ALAMANCE COUNTY
 STATION: 143+22.52 -L- 21+72.20 -Y26-
 STATION: 146+61.35 -L- 22+02.76 -Y16-
 SHEET 4 OF 4

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

PREPARED BY: TRW	DATE: 9/15
REVIEWED BY: XCB	DATE: 9/15

GEOTECHNICAL ENGINEER

ENGINEER

DocuSigned by:
David L. Teague
2/22/2017

DATE: 2/22/2017

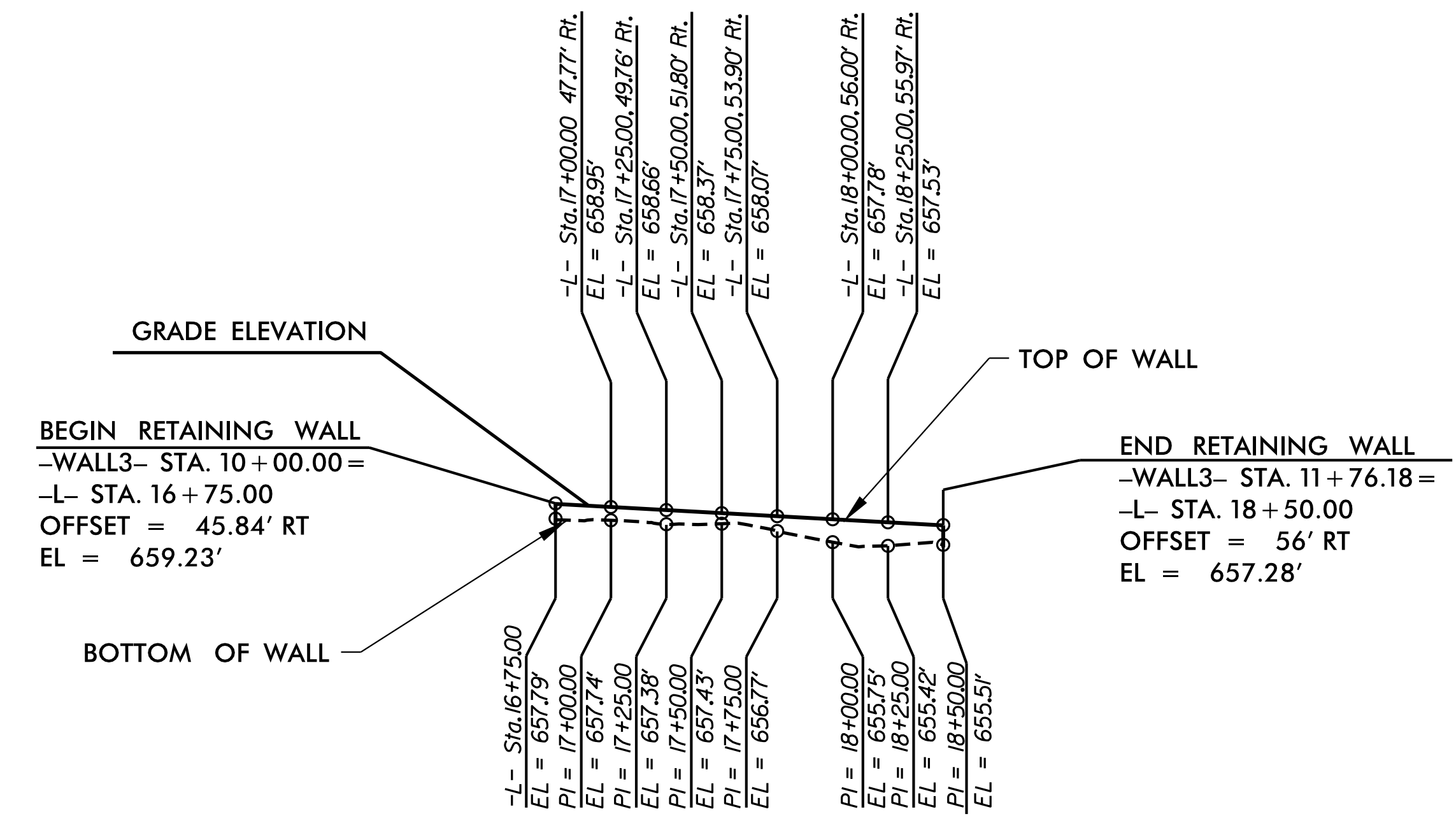
SIGNATURE: DAVID L. TEAGUE

DATE: _____

SIGNATURE: _____

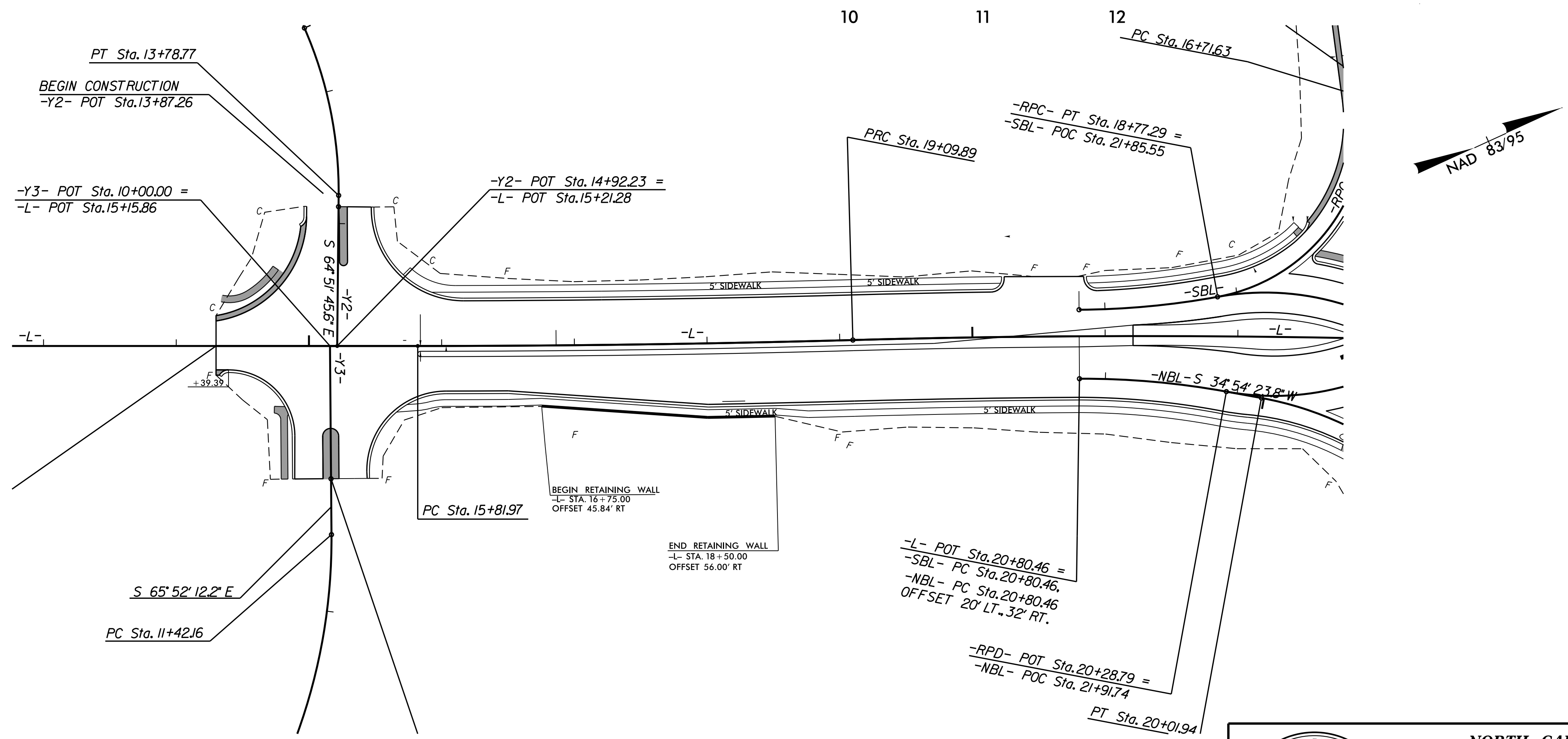
DATE: _____

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UNLESS ALL SIGNATURES COMPLETED**



ESTIMATED SEGMENTAL GRAVITY WALL QUANTITY

RETAINING WALL NO.	SEGMENTAL GRAVITY RETAINING WALLS (SQUARE FEET)
3	263
TOTAL QUANTITY = 263 SF	



PROJECT NO.: U-3109A (34900.1.2)

ALAMANCE COUNTY

STATION: 16+75 -L- TO 18+50 -L-

PREPARED BY: D. TEAGUE
REVIEWED BY: C. CHEN

DATE: 2/2017
DATE: 2/2017

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

**GEOTECHNICAL
ENGINEERING UNIT**

**SEGMENTAL GRAVITY
RETAINING WALL
WALL ENVELOPE AND
PLAN VIEW**

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

SHEET NO. W-5

GEOTECHNICAL ENGINEER

ENGINEER

DocuSigned by:
Scott A. Hadden 2/22/2017

DATE SIGNATURE DATE

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

NOTES:

FOR STANDARD SEGMENTAL GRAVITY RETAINING WALLS, SEE SEGMENTAL GRAVITY RETAINING WALLS PROVISION.

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

DO NOT ATTACH FENCES OR HANDRAILS TO STANDARD SEGMENTAL GRAVITY WALLS.

DO NOT USE STANDARD SEGMENTAL GRAVITY WALLS FOR INTERSTATE HIGHWAY OR RAILROAD PROJECTS.

DO NOT USE STANDARD SEGMENTAL GRAVITY WALLS WHEN SURCHARGE LOADS WILL BE WITHIN 5'-6" OF THE BACK OF SRW CAP UNITS.

DO NOT USE STANDARD SEGMENTAL GRAVITY WALLS WHEN VERY LOOSE OR SOFT SOIL OR MUCK IS BELOW WALLS.

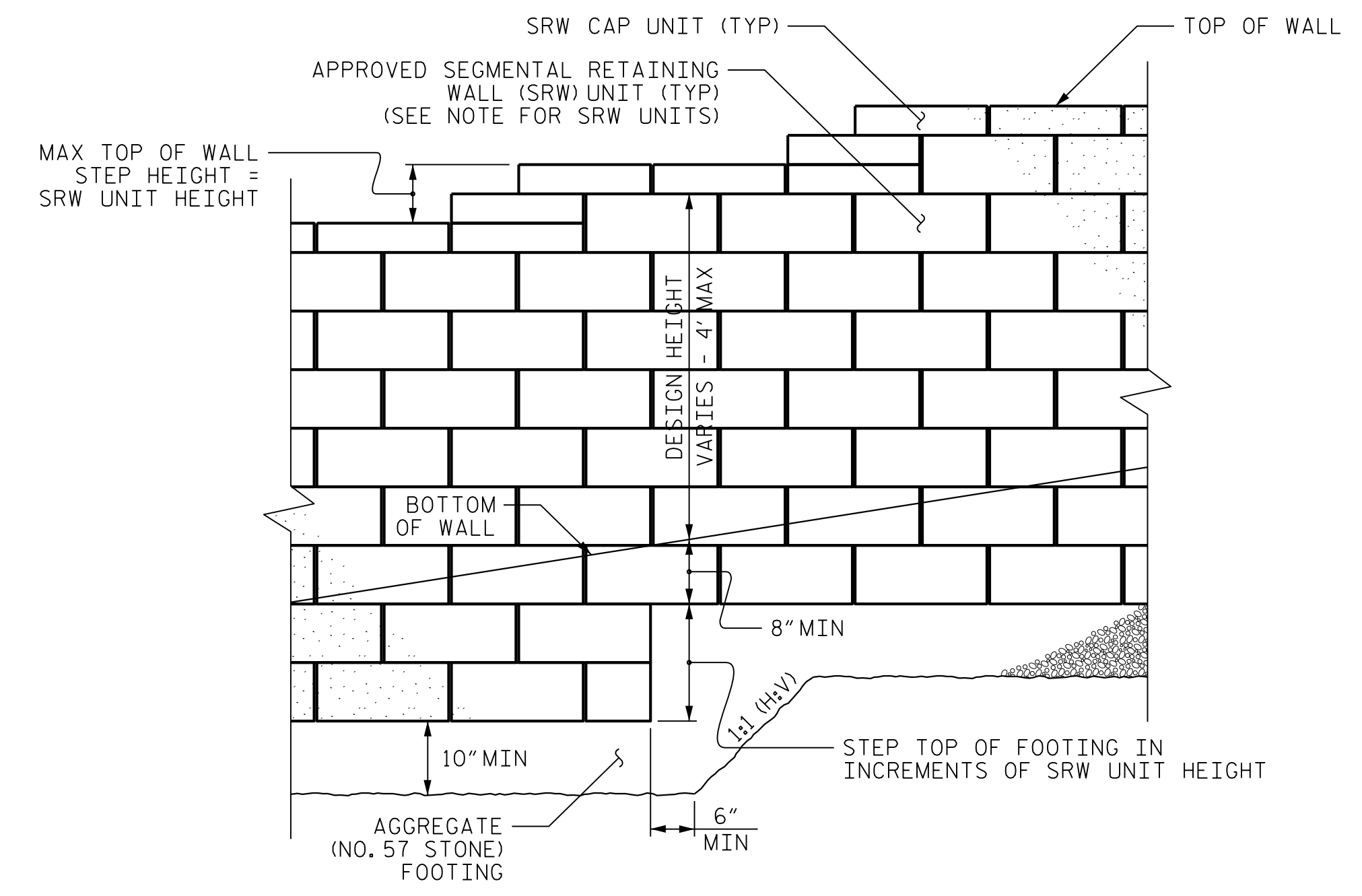
SEGMENTAL RETAINING WALL (SRW) UNITS ARE APPROVED FOR EITHER 2' OR 4' MAXIMUM DESIGN HEIGHTS. FOR DETAILS AND DIMENSIONS OF APPROVED SRW UNITS AND MAXIMUM DESIGN HEIGHTS, SEE connect.ncdot.gov/resources/Geological/Pages/Products.aspx

DO NOT MIX APPROVED SRW UNITS FROM DIFFERENT VENDORS ON THE SAME STANDARD SEGMENTAL GRAVITY WALL. USE THE SAME SIZE APPROVED SRW UNITS FOR EACH WALL SECTION.

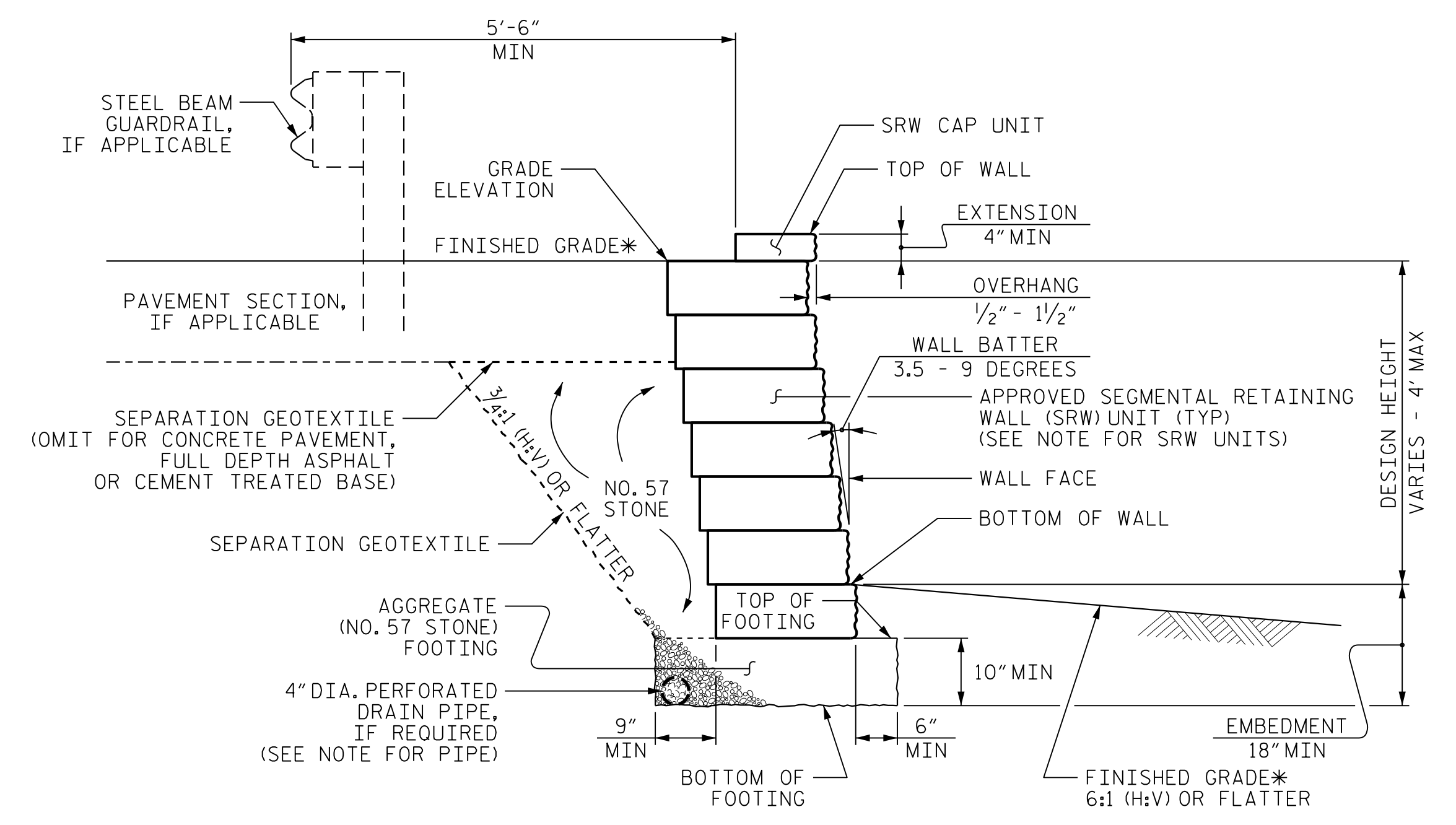
BEFORE BEGINNING STANDARD SEGMENTAL GRAVITY WALL CONSTRUCTION, SURVEY WALL LOCATIONS AND SUBMIT WALL PROFILE VIEWS (WALL ENVELOPES) FOR REVIEW. FOR WALL ENVELOPES, INCLUDE BOTTOM OF WALL, EXISTING GROUND AND GRADE ELEVATIONS AND OTHER ELEVATIONS AS NEEDED AT INTERVALS OF 25' OR LESS ALONG WALLS. DO NOT START WALL CONSTRUCTION UNTIL WALL ENVELOPES ARE ACCEPTED.

A DRAIN PIPE IS REQUIRED IF GROUNDWATER IS ABOVE BOTTOM OF FOOTINGS.

DO NOT PLACE NO. 57 STONE FOR FOOTINGS UNTIL EXCAVATION DIMENSIONS AND FOUNDATION MATERIAL ARE APPROVED.

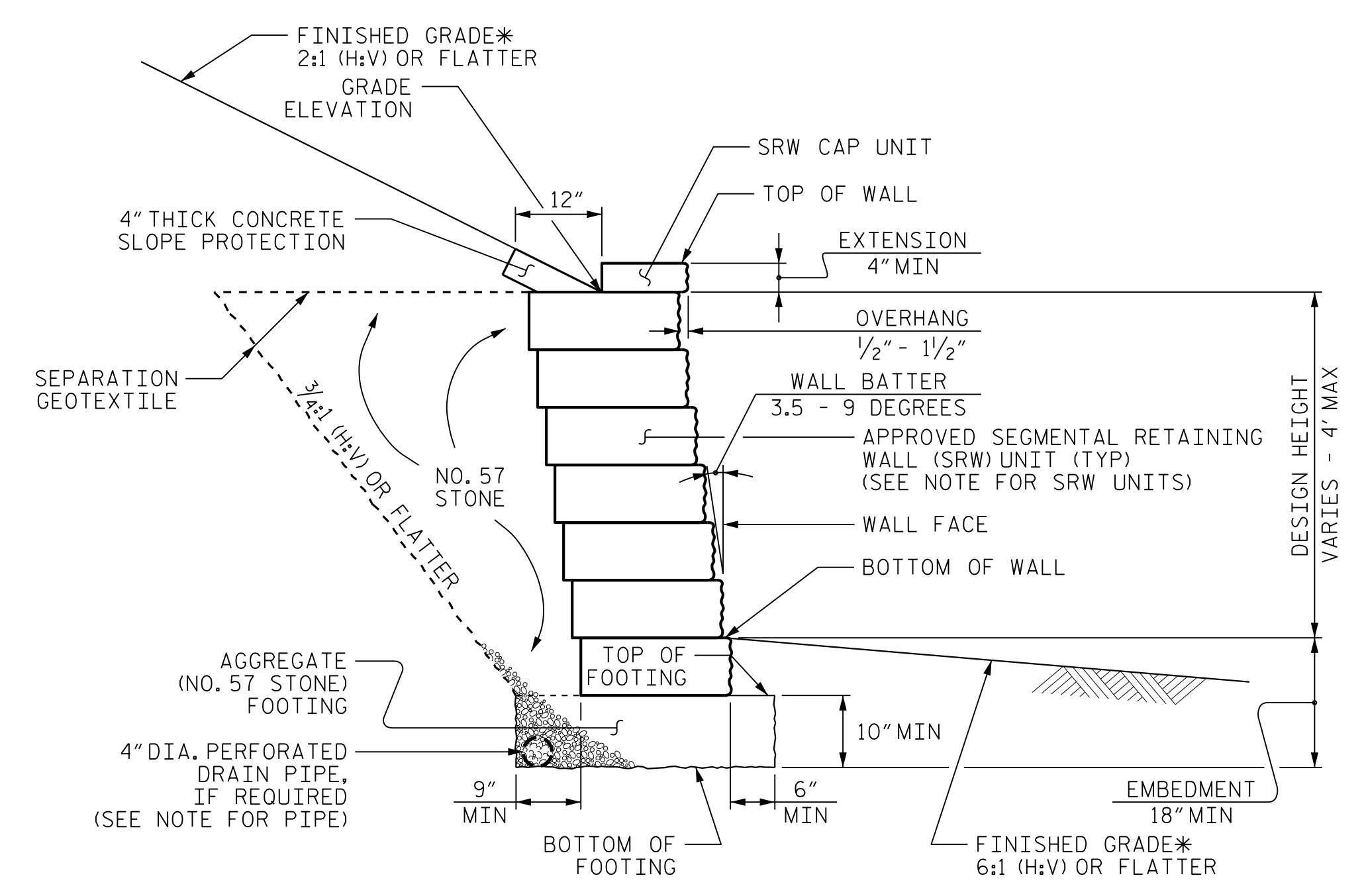


STANDARD SEGMENTAL GRAVITY WALL - PARTIAL ELEVATION



STANDARD SEGMENTAL GRAVITY WALL WITHOUT SLOPE

*SEE ROADWAY PLANS FOR FINISHED GRADE DETAILS.



STANDARD SEGMENTAL GRAVITY WALL WITH SLOPE

*SEE ROADWAY PLANS FOR FINISHED GRADE DETAILS.

PROJECT NO.: U-3109A

Alamance COUNTY

STATION: 16+75 -L- to 18+50 -L-

SHEET 1 OF 2

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

**GEOTECHNICAL
ENGINEERING UNIT**

STANDARD DETAIL NO. 453.02

**STANDARD
SEGMENTAL GRAVITY
RETAINING WALL**

SHEET NO.
W-6

DATE: 3-17-15