

Retaining Wall Summary

Table with 17 columns: Retaining Wall No., Begin Alignment, Begin Station, Offset (LT / RT), End Alignment, End Station, Offset (LT / RT), Length (ft), Exposed Wall Area (sft), Embedment (ft), Wall Area (sft)*, Avg. Height (ft)*, Max. Exposed Height (ft), Max. Design Height (ft)*, Maximum Factored Vertical Pressure on Foundation Materials (psf), Cut / Fill, Wall Type**. Rows 1-46.

Notes:
* Wall area includes embedment.
** MSE - MSE Retaining Walls
SPW - Soldier Pile Walls
PGW - Precast Gravity Walls

Professional Engineer seal for Michael H. Stiefel, State of North Carolina, License No. 028893, dated 07/12/2024. Includes 'DOCUMENT NOT CONSIDERED FINAL' warning.

PROJECT NO.: 37944.1.FR5 (R-2307B)
IREDELL COUNTY
STATION: SEE SUMMARY TABLE
SHEET 1 OF 19

Logo of North Carolina Department of Transportation, Division of Highways, Geotechnical Engineering Unit.

Table with 2 columns: NO., BY, DATE, NO., BY, DATE. Includes 'REVISIONS' and 'SHEET NO. W-1'.


PREPARED BY: MHS DATE: 7/24
REVIEWED BY: SCC DATE: 7/24

WALL 2

WALL ADJACENT -L-

RETAINING WALL 2
SEE WALL SUMMARY FOR WALL EMBEDMENT AND
INSTALLED WALL AREAS

GEOTECHNICAL ENGINEER



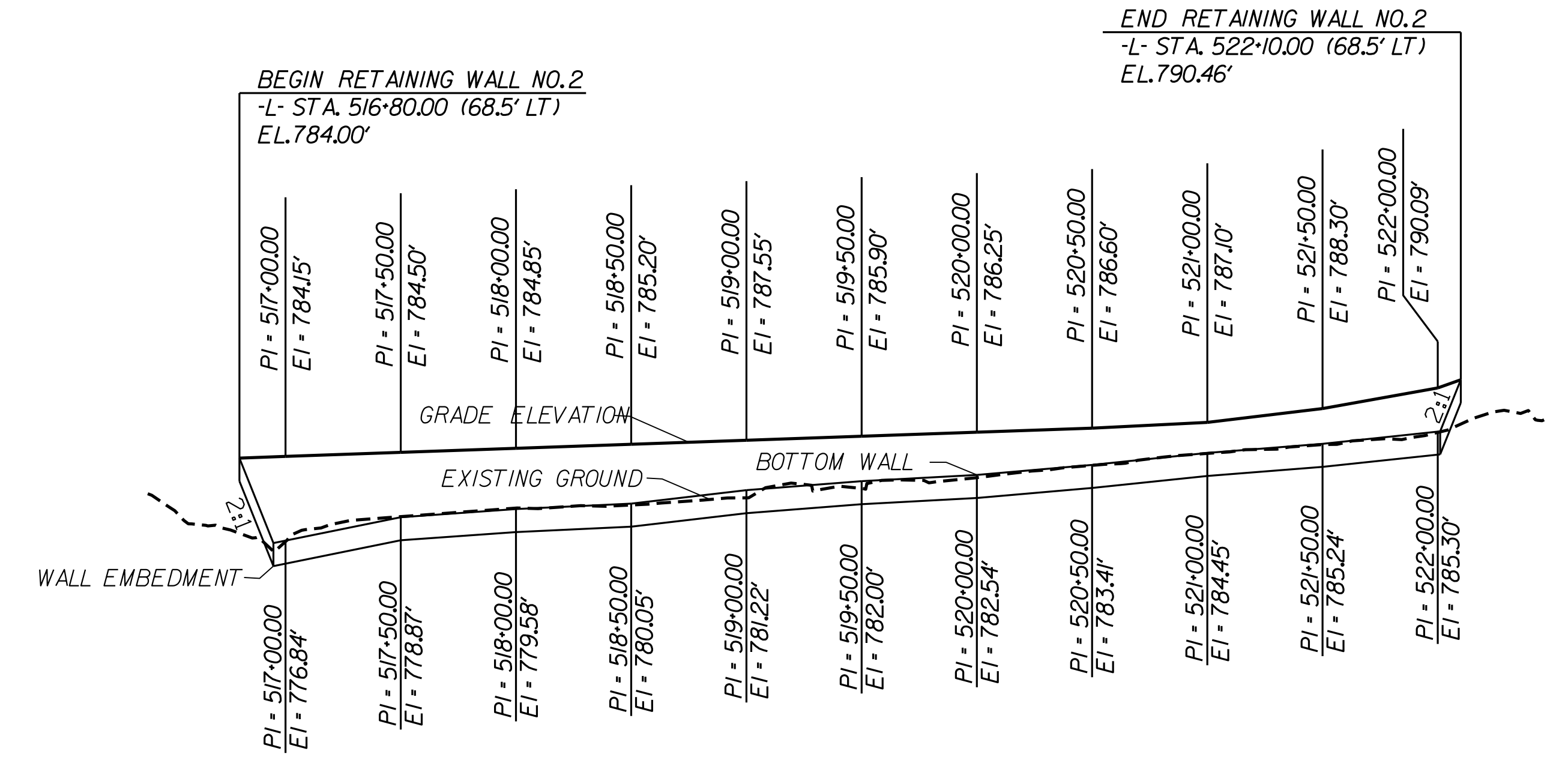
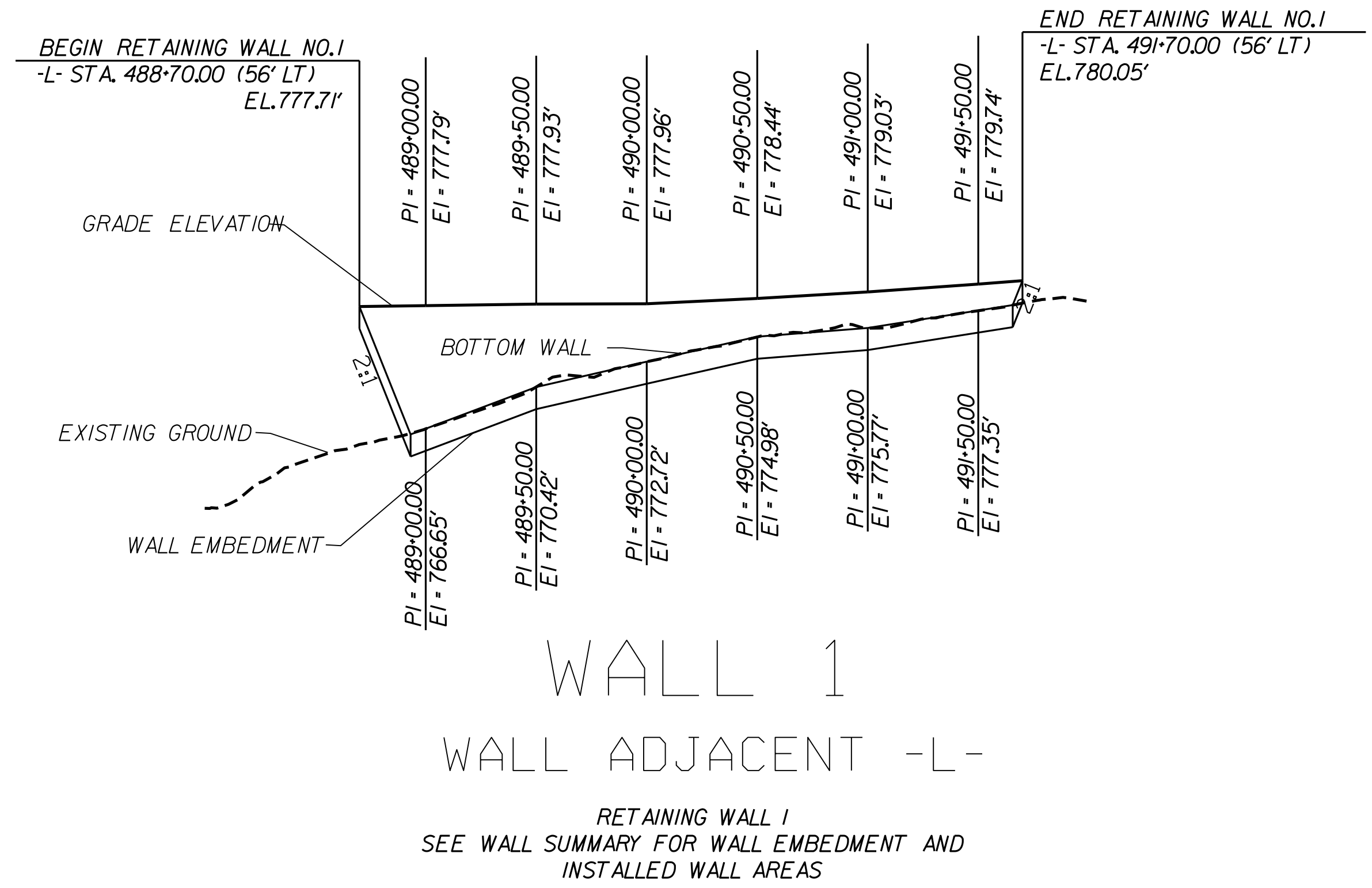
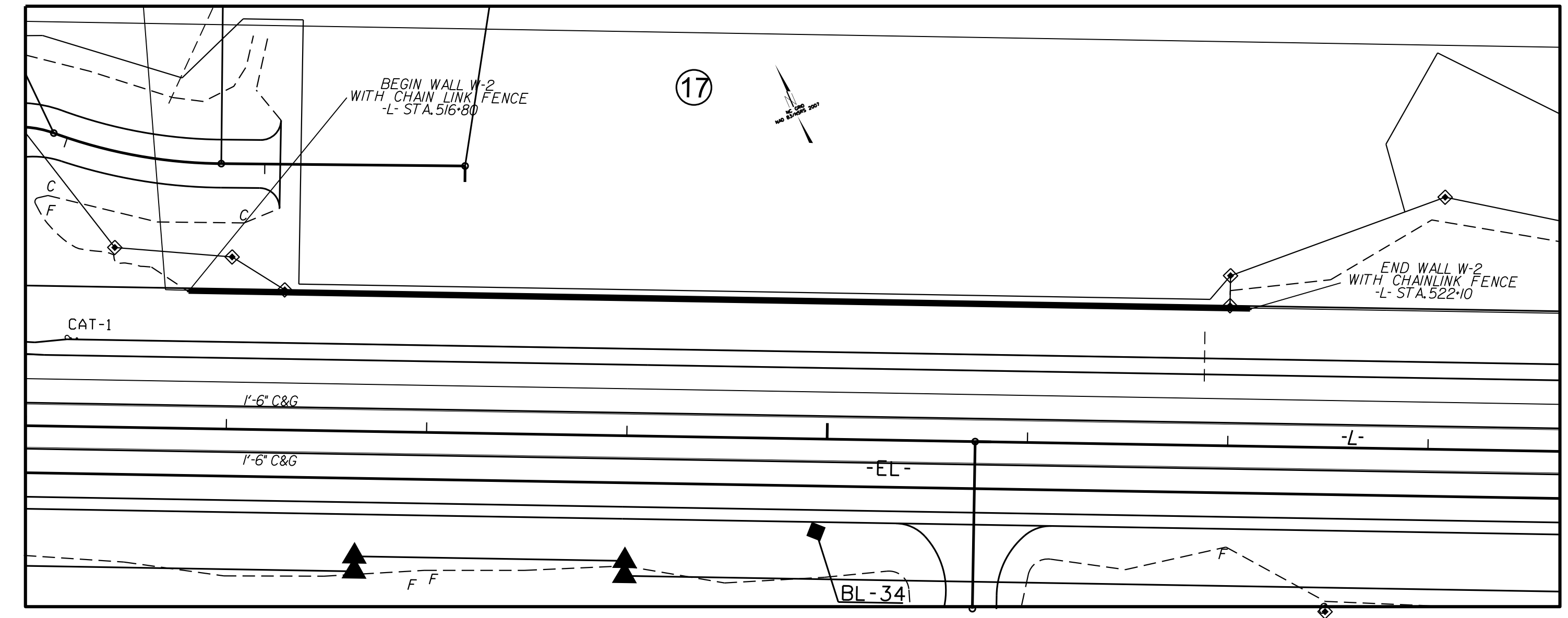
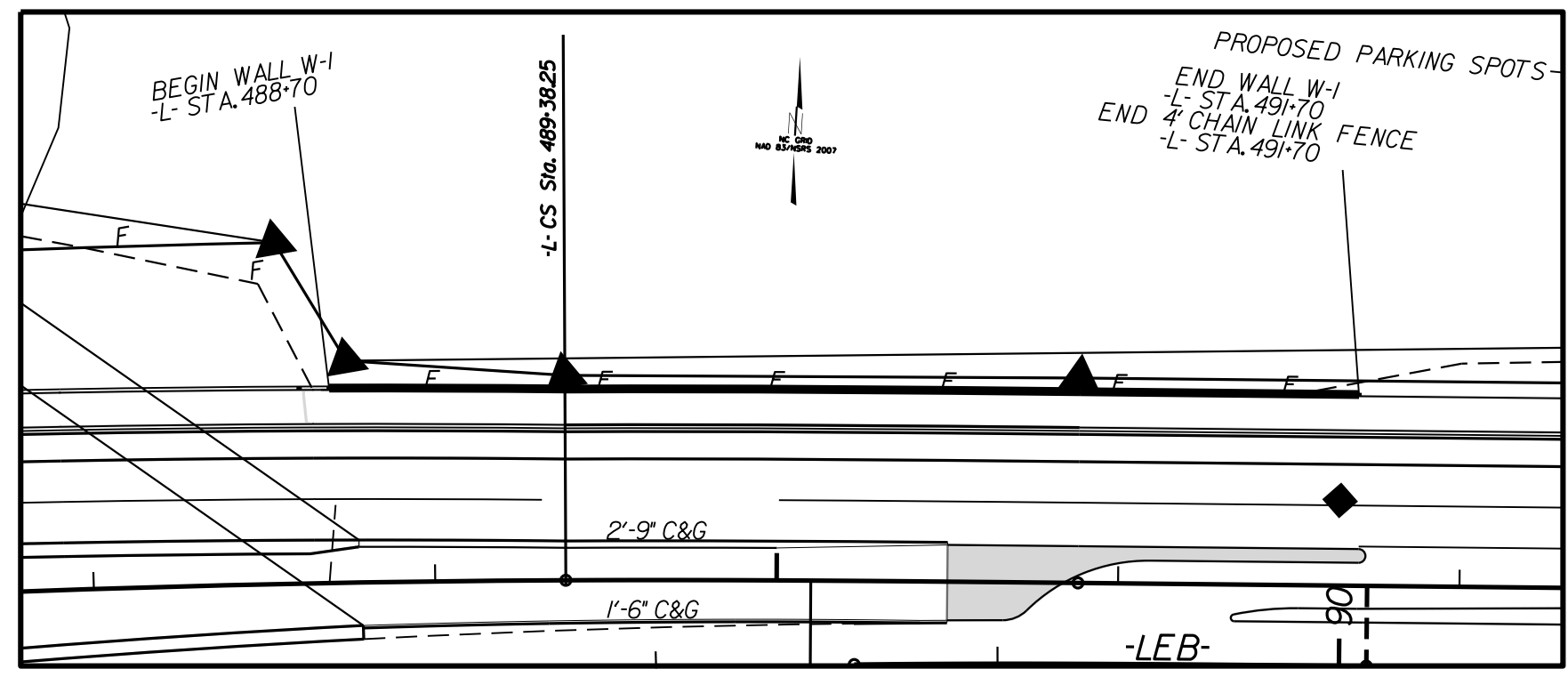
DocuSigned by:
Michael H. Stiefel
07/12/2024

Signature: _____ Date: _____

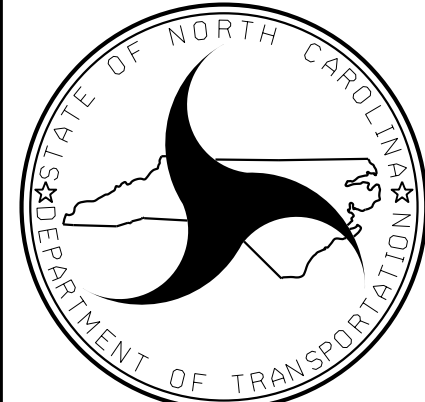
ENGINEER

Signature: _____ Date: _____

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PREPARED BY: MHS	DATE: 7/24
REVIEWED BY: SCC	DATE: 7/24



NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS


GEOTECHNICAL
ENGINEERING UNIT

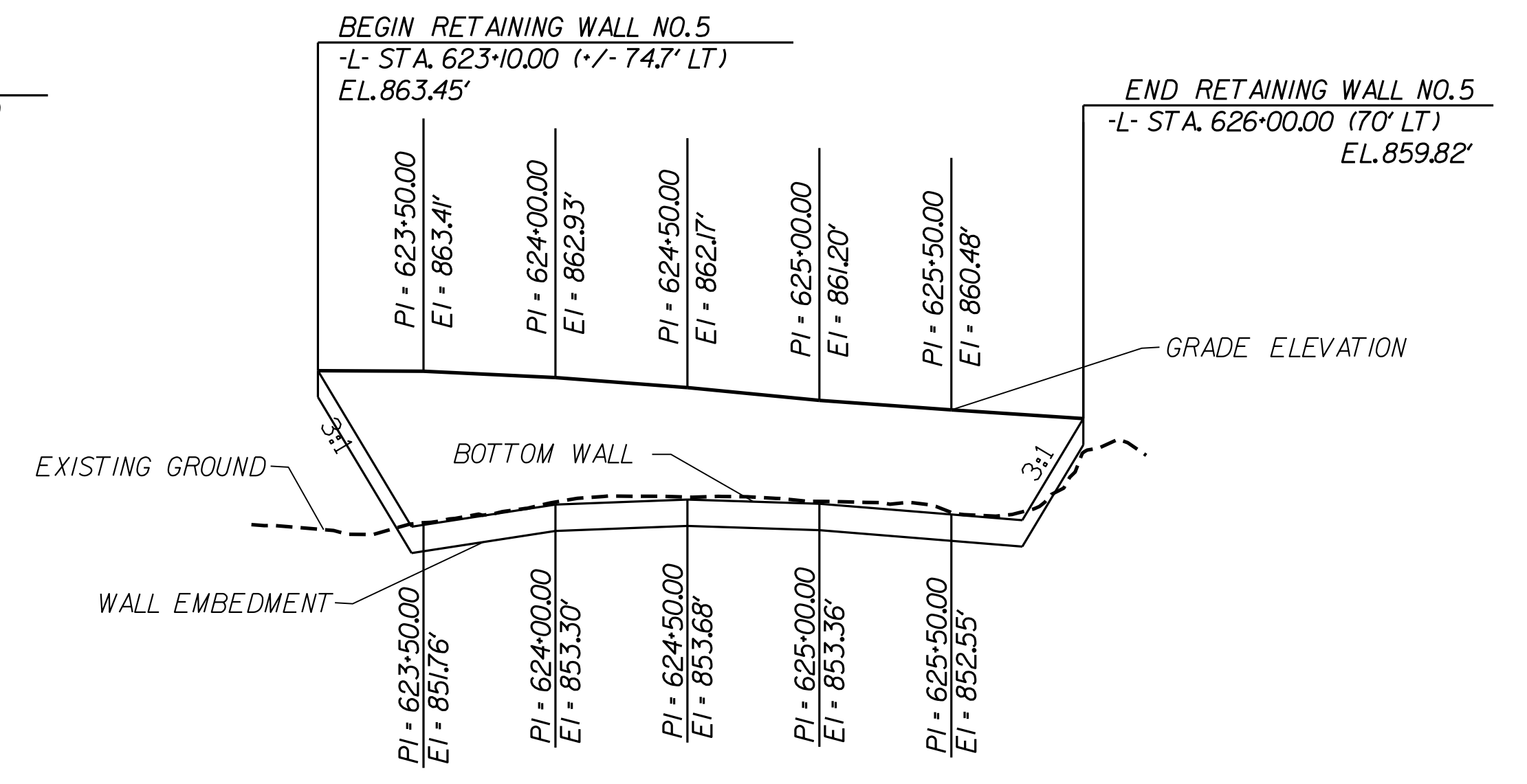
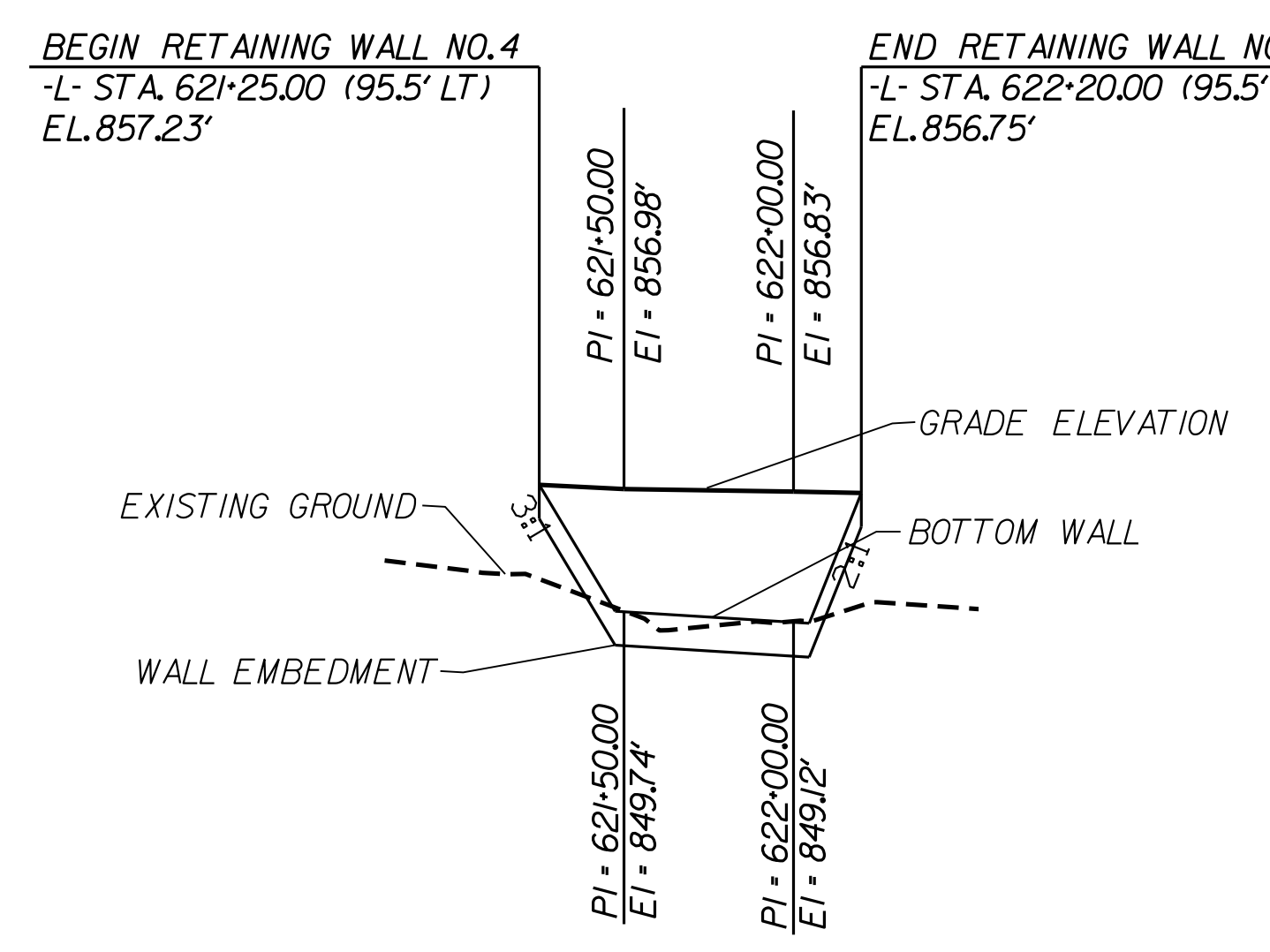
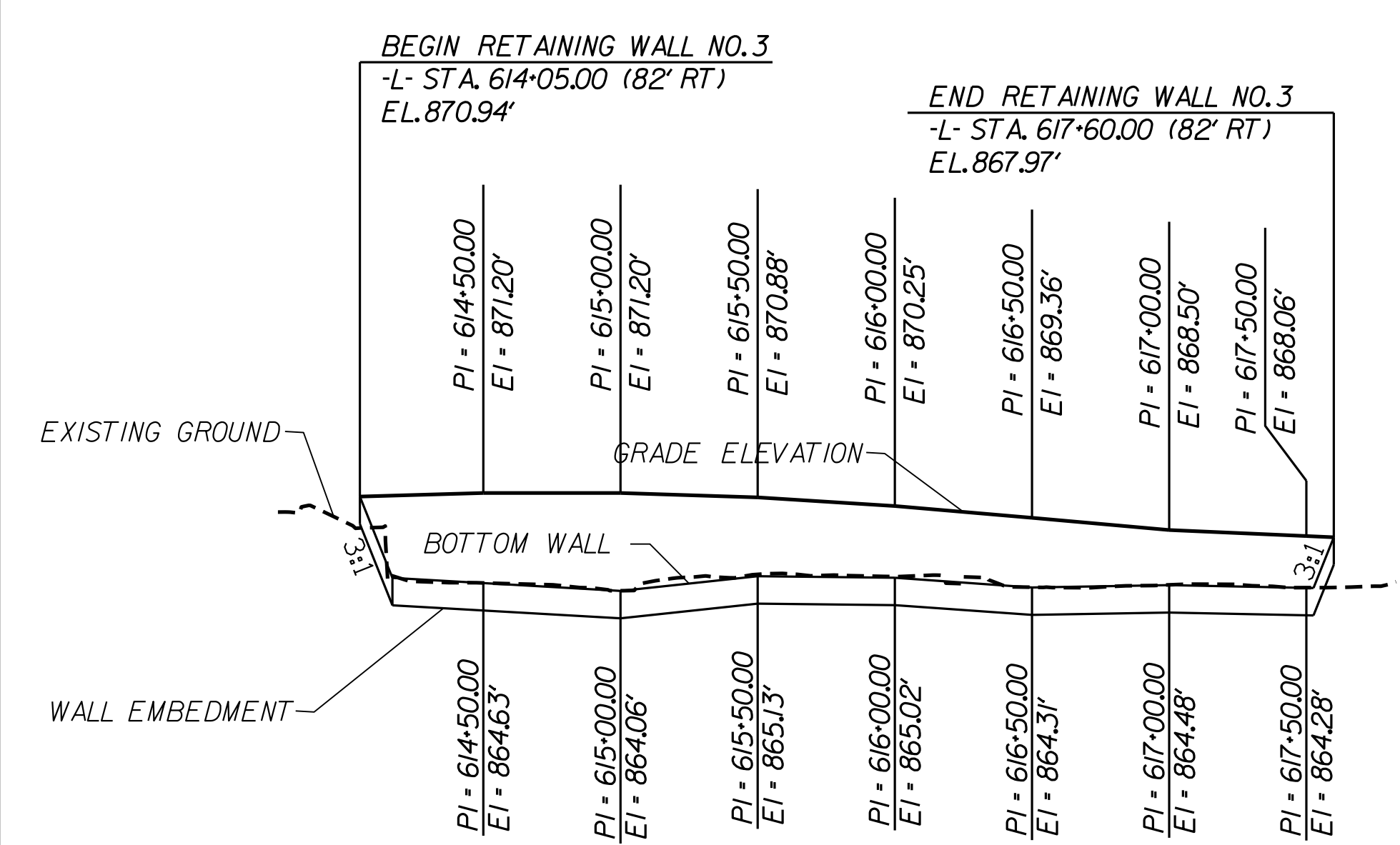
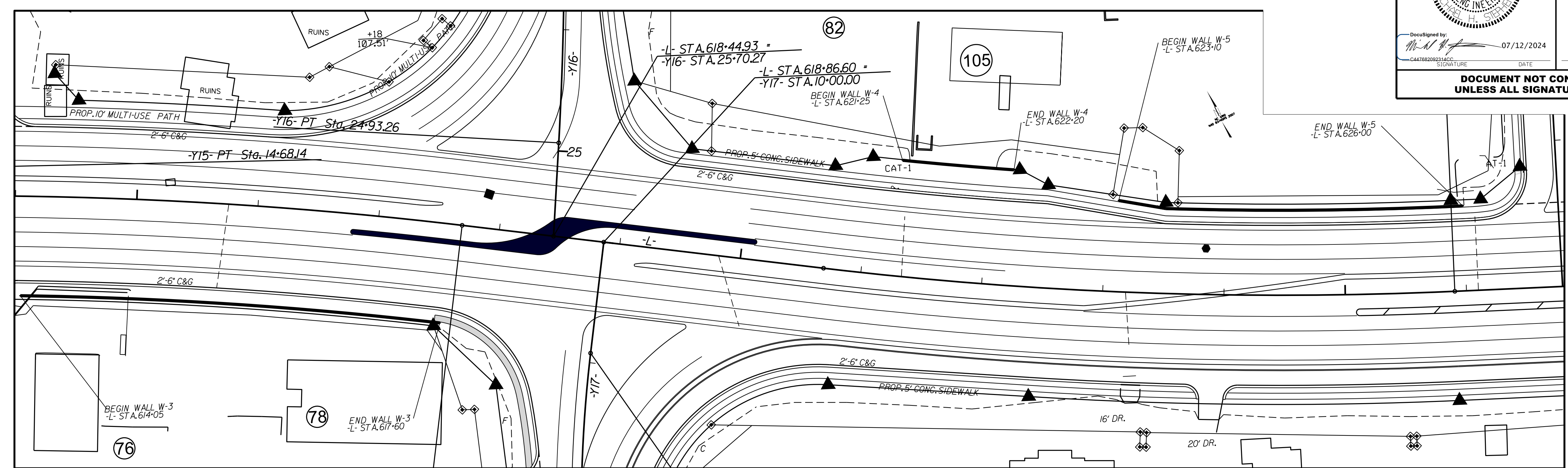
PROJECT NO.: 37944.1.FR5 (R-2307B)
IREDELL COUNTY
STATION: SEE SUMMARY TABLE
SHEET 2 OF 19

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

RETAINING WALL
NOS. 1 AND 2

SHEET NO.
W-2

GEOTECHNICAL ENGINEER
 ENGINEER

 Documented by: *M.H.S.* 07/12/2024
 SIGNATURE DATE SIGNATURE DATE
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



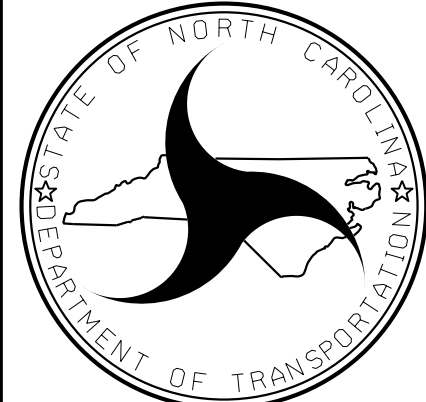
WALL 3
 WALL ADJACENT -L-
 RETAINING WALL 3
 SEE WALL SUMMARY FOR WALL EMBEDMENT AND
 INSTALLED WALL AREA

WALL 4
 WALL ADJACENT -L-
 RETAINING WALL 4
 SEE WALL SUMMARY FOR WALL EMBEDMENT AND
 INSTALLED WALL AREA

WALL 5
 WALL ADJACENT -L-
 RETAINING WALL 5
 SEE WALL SUMMARY FOR WALL EMBEDMENT AND
 INSTALLED WALL AREA

PROJECT NO.: 37944.1.FR5 (R-2307B)
 IREDELL COUNTY
 STATION: SEE SUMMARY TABLE
 SHEET 3 OF 19

PREPARED BY: MHS	DATE: 7/24
REVIEWED BY: SCC	DATE: 7/24


 NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 DIVISION OF HIGHWAYS
 GEOTECHNICAL
 ENGINEERING UNIT

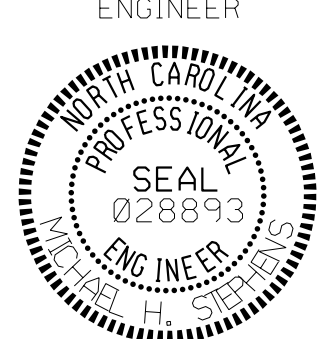
RETAINING WALL NOS. 3, 4, AND 5

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

SHEET NO. W-3

GEOTECHNICAL ENGINEER

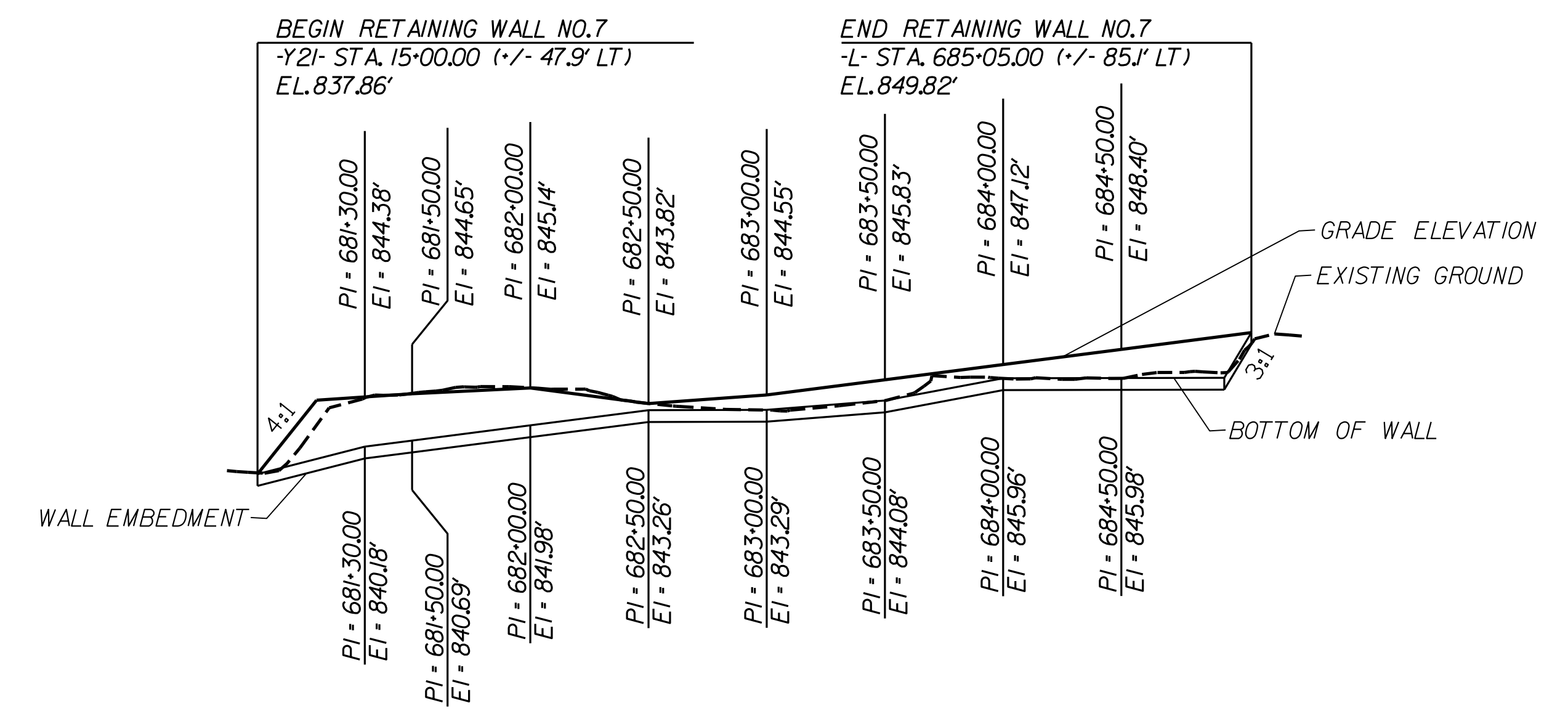
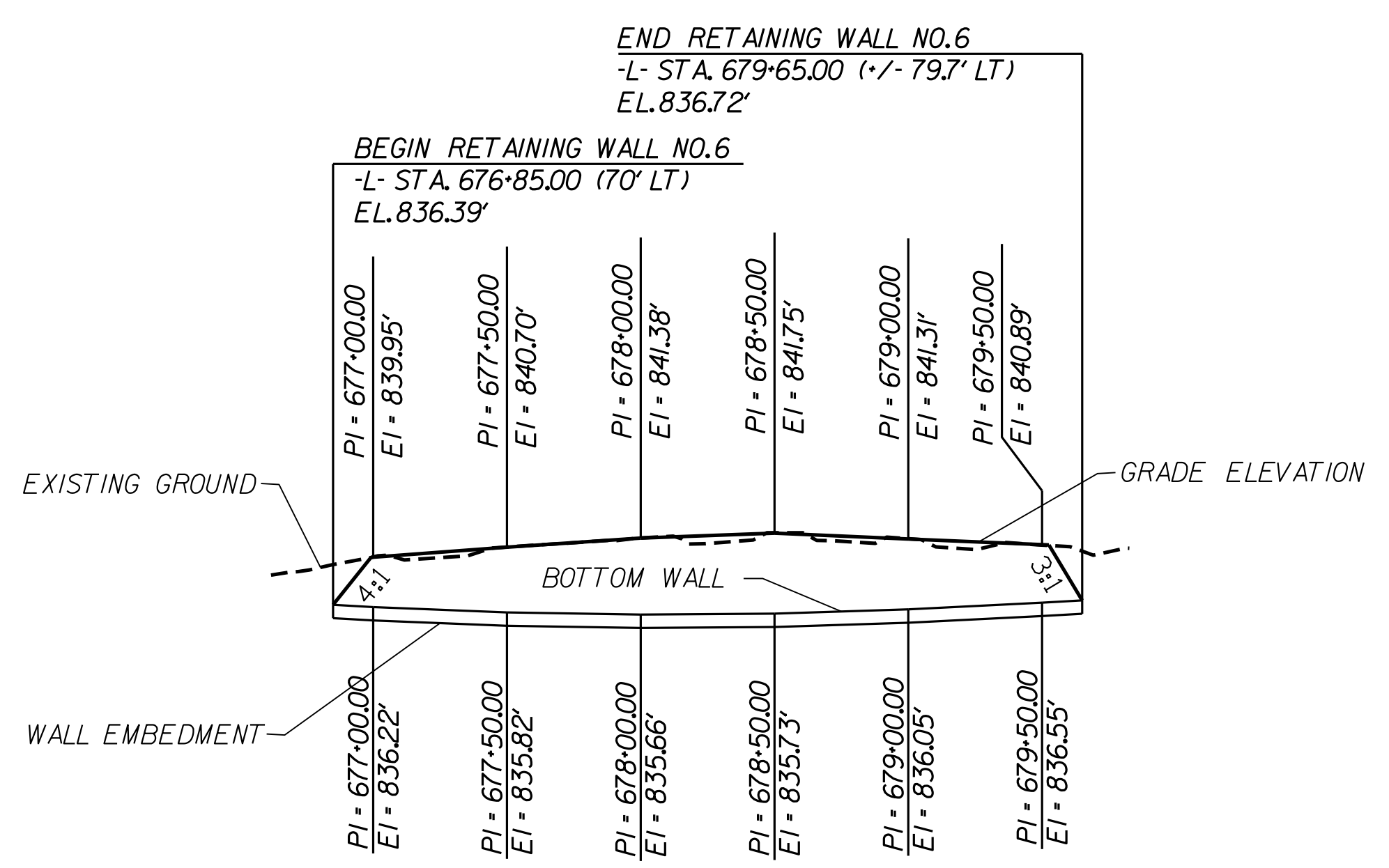
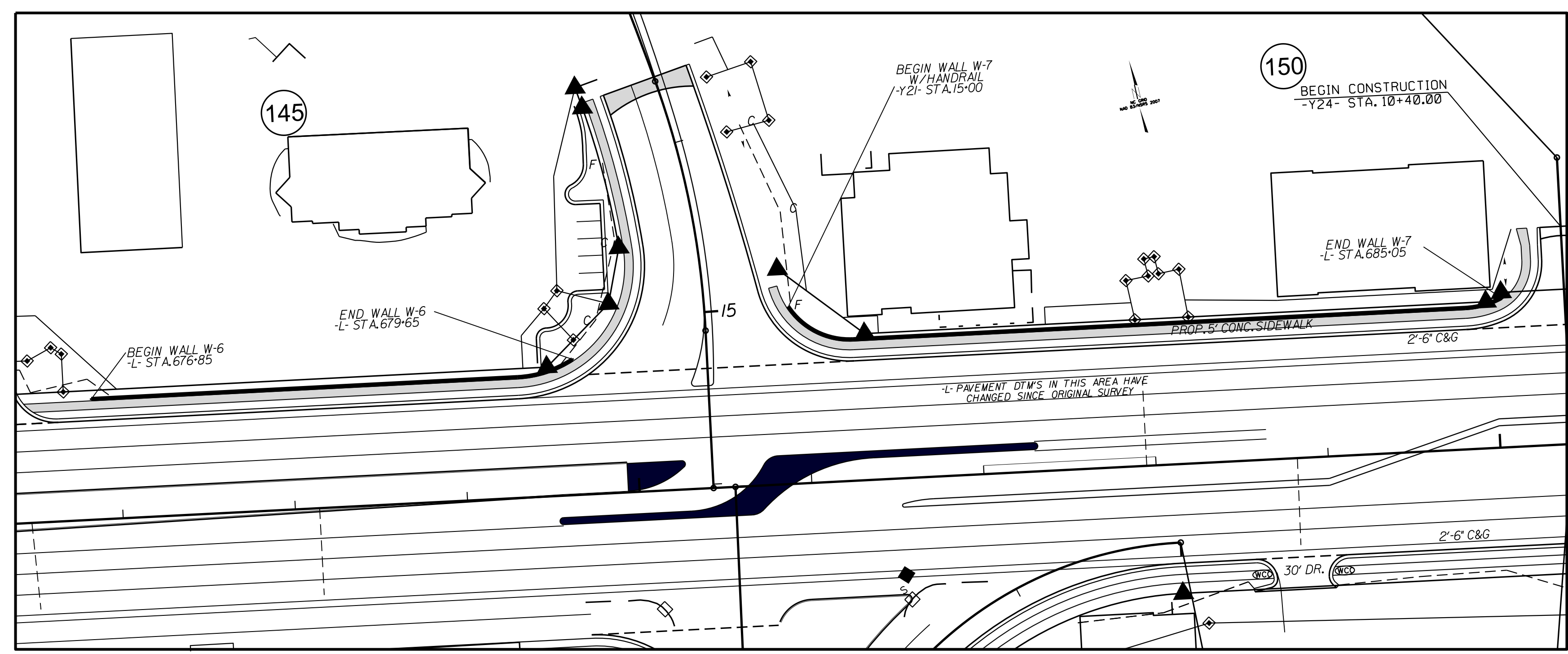
ENGINEER



Seal of Michael H. Steffen, North Carolina Professional Engineer No. 028893

DocuSign by: *[Signature]* 07/12/2024
 C44788292314CC
 SIGNATURE DATE SIGNATURE DATE

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WALL 6
WALL ADJACENT -L- & -Y21-
RETAINING WALL 6
SEE WALL SUMMARY FOR WALL EMBEDMENT AND
INSTALLED WALL AREA

WALL 7
WALL ADJACENT -L-, -Y21- & -Y24-
RETAINING WALL 7
SEE WALL SUMMARY FOR WALL EMBEDMENT AND
INSTALLED WALL AREA

PROJECT NO.: 37944.1.FR5 (R-2307B)
IREDELL COUNTY
STATION: SEE SUMMARY TABLE
SHEET 4 OF 19

PREPARED BY: MHS	DATE: 7/24
REVIEWED BY: SCC	DATE: 7/24

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

GEOTECHNICAL
ENGINEERING UNIT

RETAINING WALL
NOS. 6 AND 7

REVISIONS					SHEET NO.
NO.	BY	DATE	NO.	BY	
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2			4		

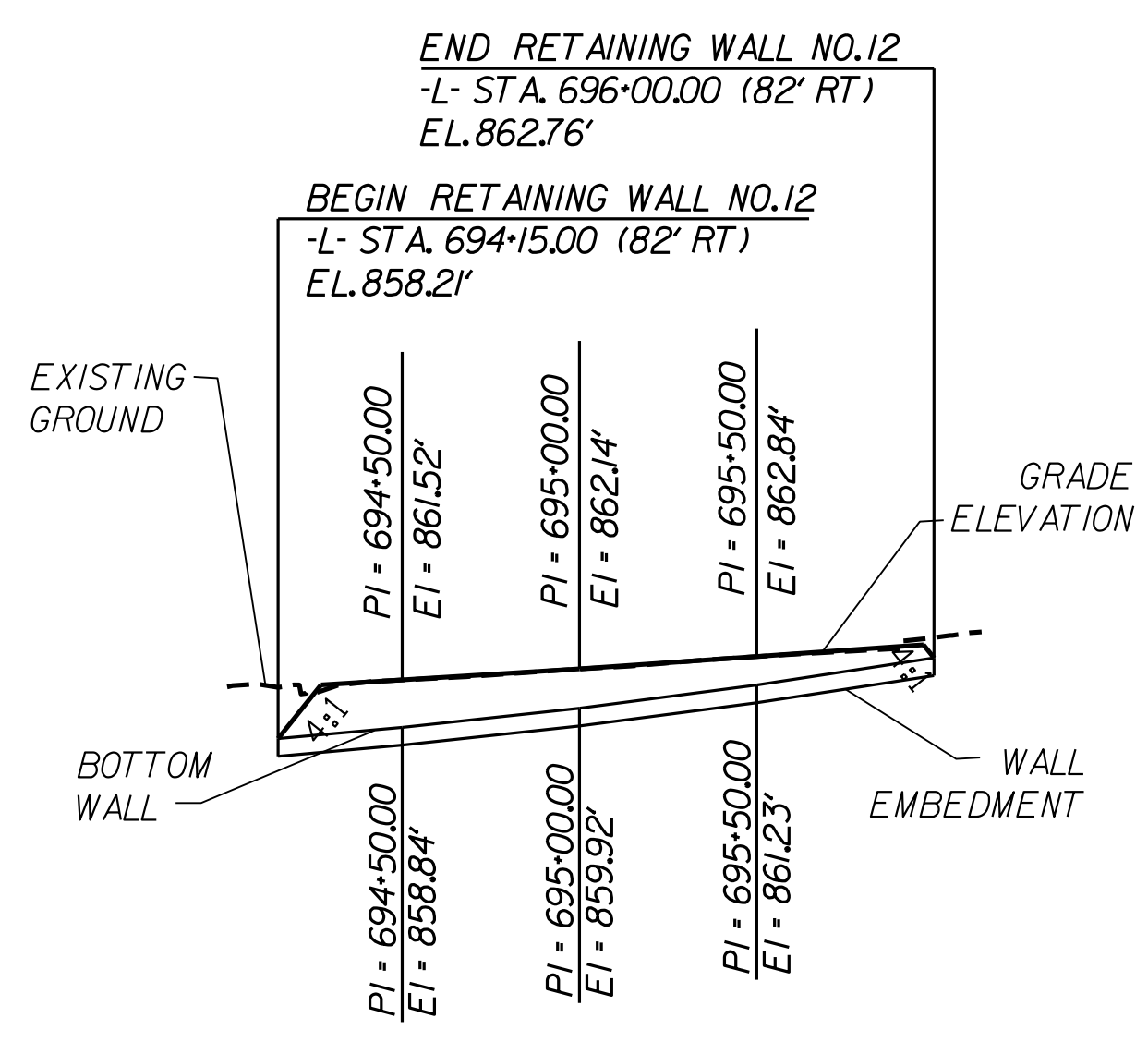
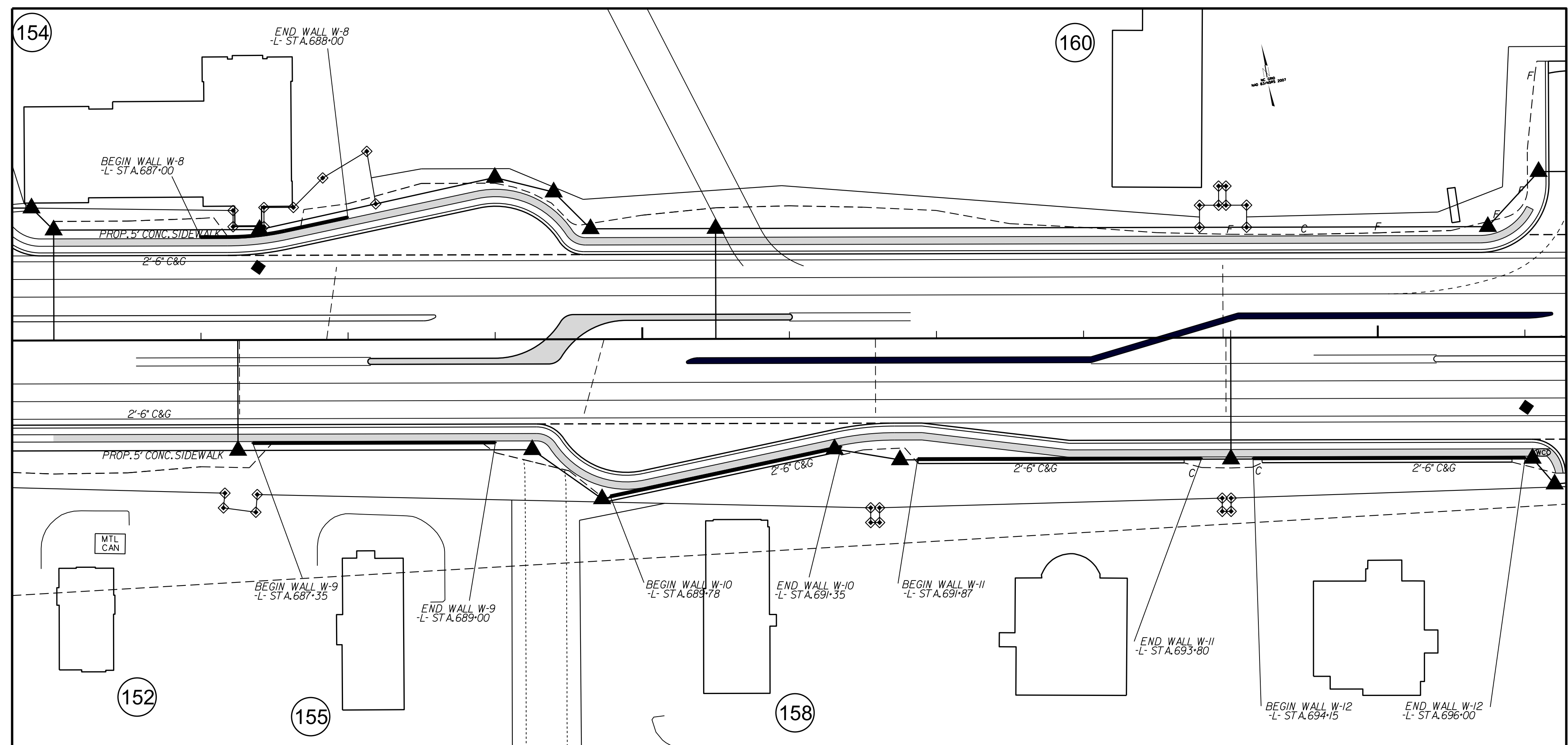
GEOTECHNICAL ENGINEER

ENGINEER

SEAL 028893

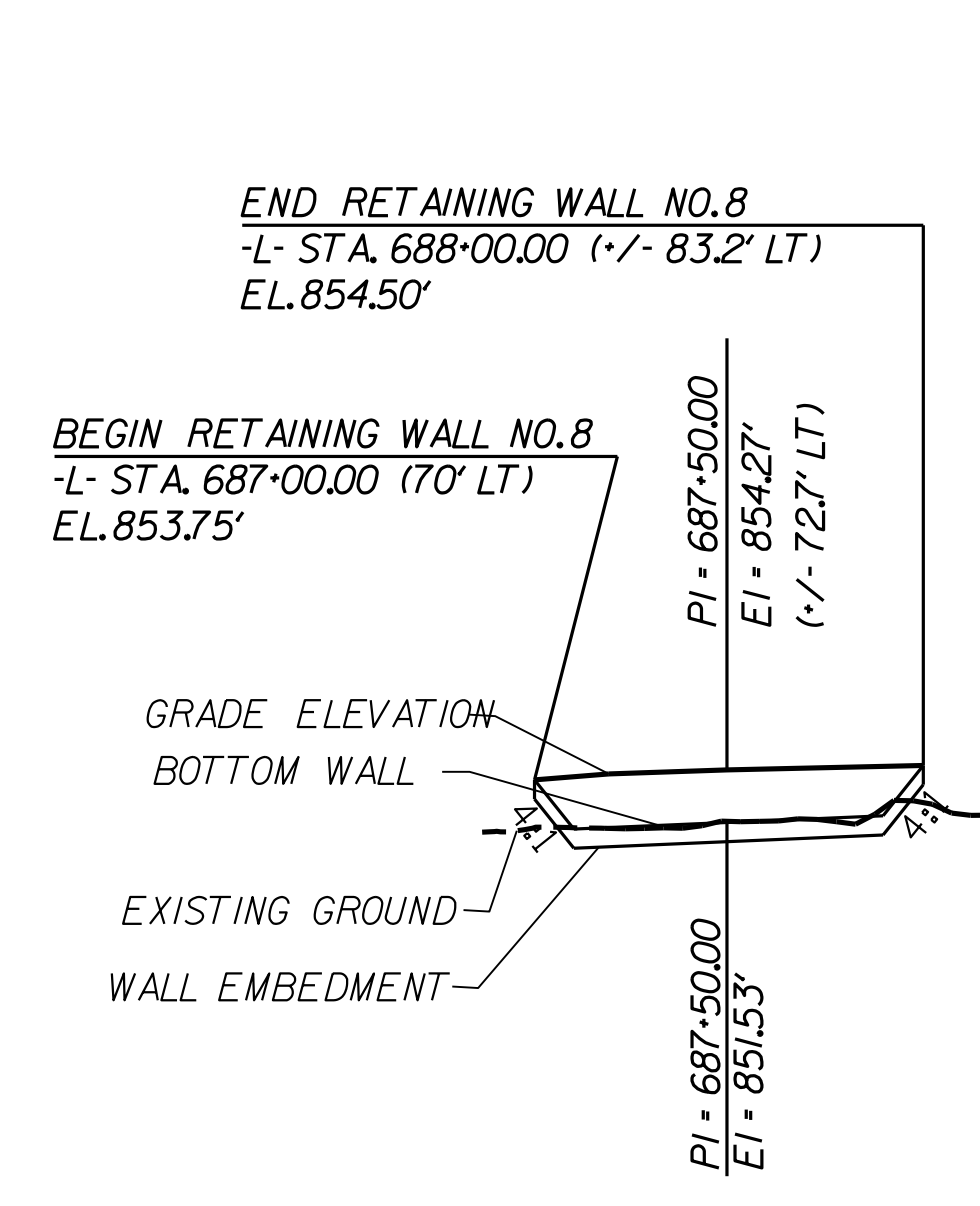
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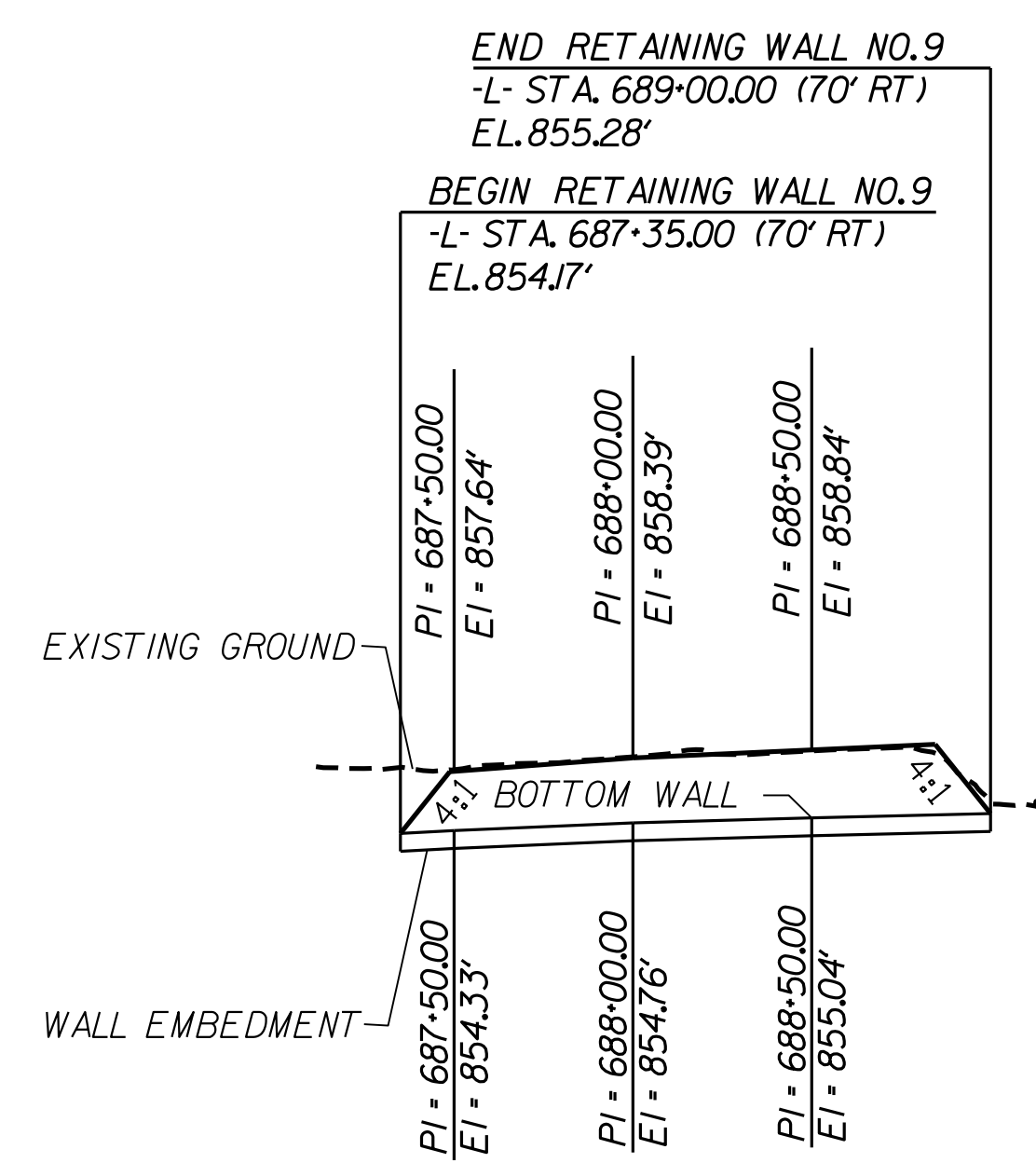
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WALL ADJACENT -L-

RETAINING WALL 12
SEE WALL SUMMARY FOR WALL EMBEDMENT AND
INSTALLED WALL AREA



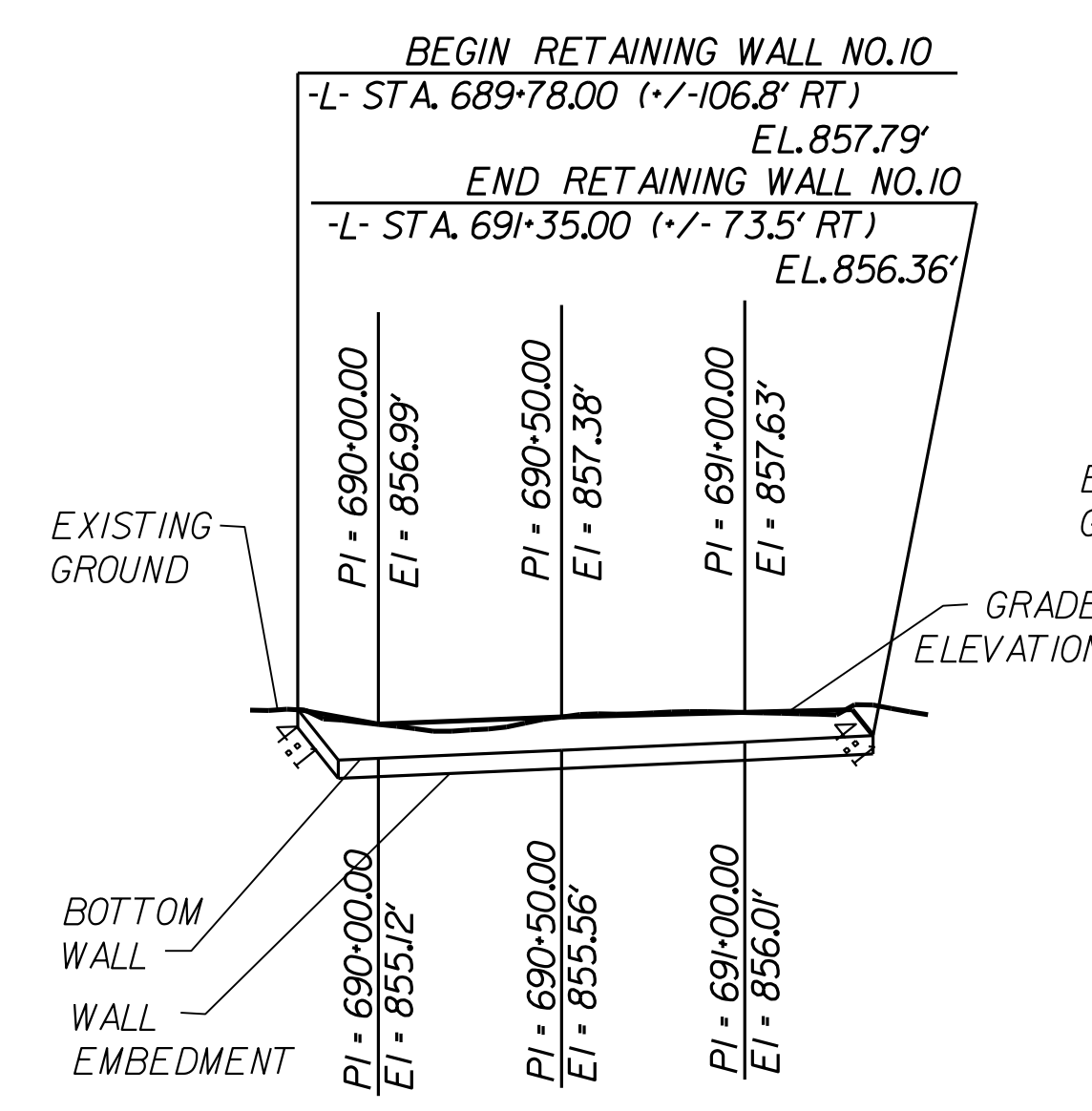
WALL 8
WALL ADJACENT -L-

RETAINING WALL 8
SEE WALL SUMMARY FOR WALL EMBEDMENT AND
INSTALLED WALL AREA



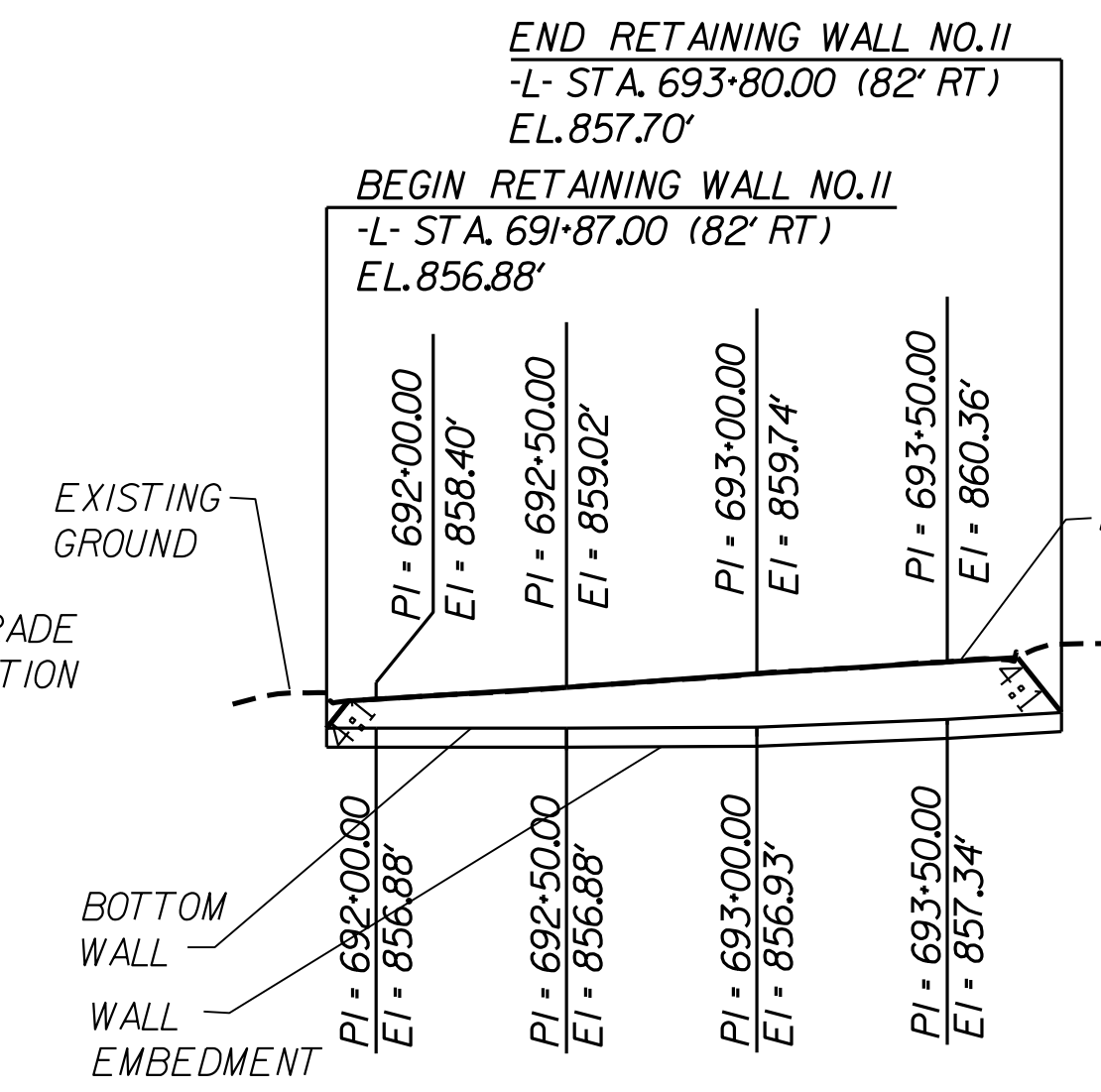
WALL 9
WALL ADJACENT -L-

RETAINING WALL 9
SEE WALL SUMMARY FOR WALL EMBEDMENT AND
INSTALLED WALL AREA



WALL 10
WALL ADJACENT -L-

RETAINING WALL 10
SEE WALL SUMMARY FOR WALL EMBEDMENT AND
INSTALLED WALL AREA



WALL 11
WALL ADJACENT -L-

RETAINING WALL 11
SEE WALL SUMMARY FOR WALL EMBEDMENT AND
INSTALLED WALL AREA

PROJECT NO.: 37944.1.FR5 (R-2307B)
IREDELL COUNTY
STATION: SEE SUMMARY TABLE
SHEET 5 OF 19

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

GEOTECHNICAL ENGINEERING UNIT

RETAINING WALL NOS. 8, 9, 10, 11, 12

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

SHEET NO. W-5

PREPARED BY: MHS	DATE: 7/24
REVIEWED BY: SCC	DATE: 7/24

GEOTECHNICAL ENGINEER

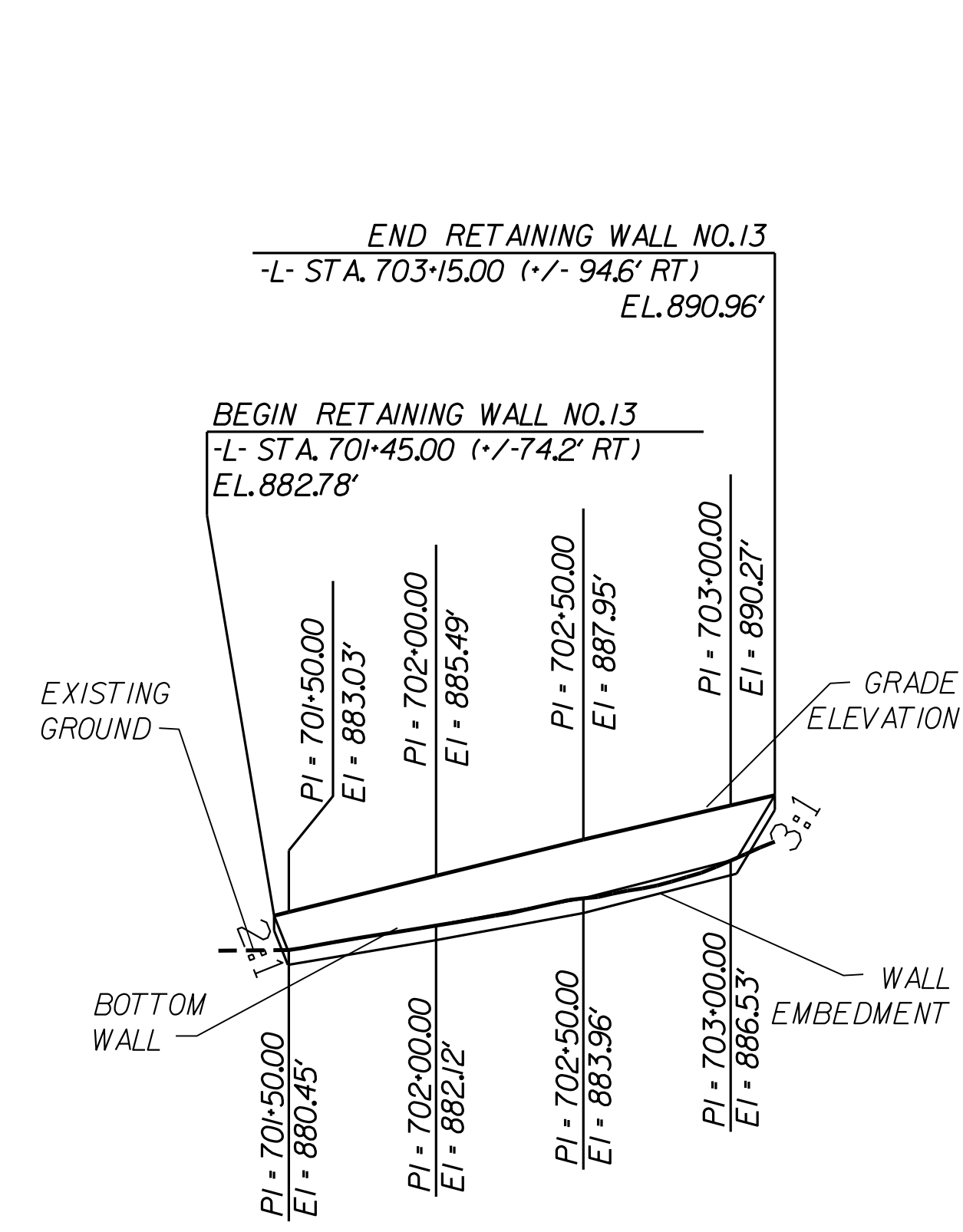
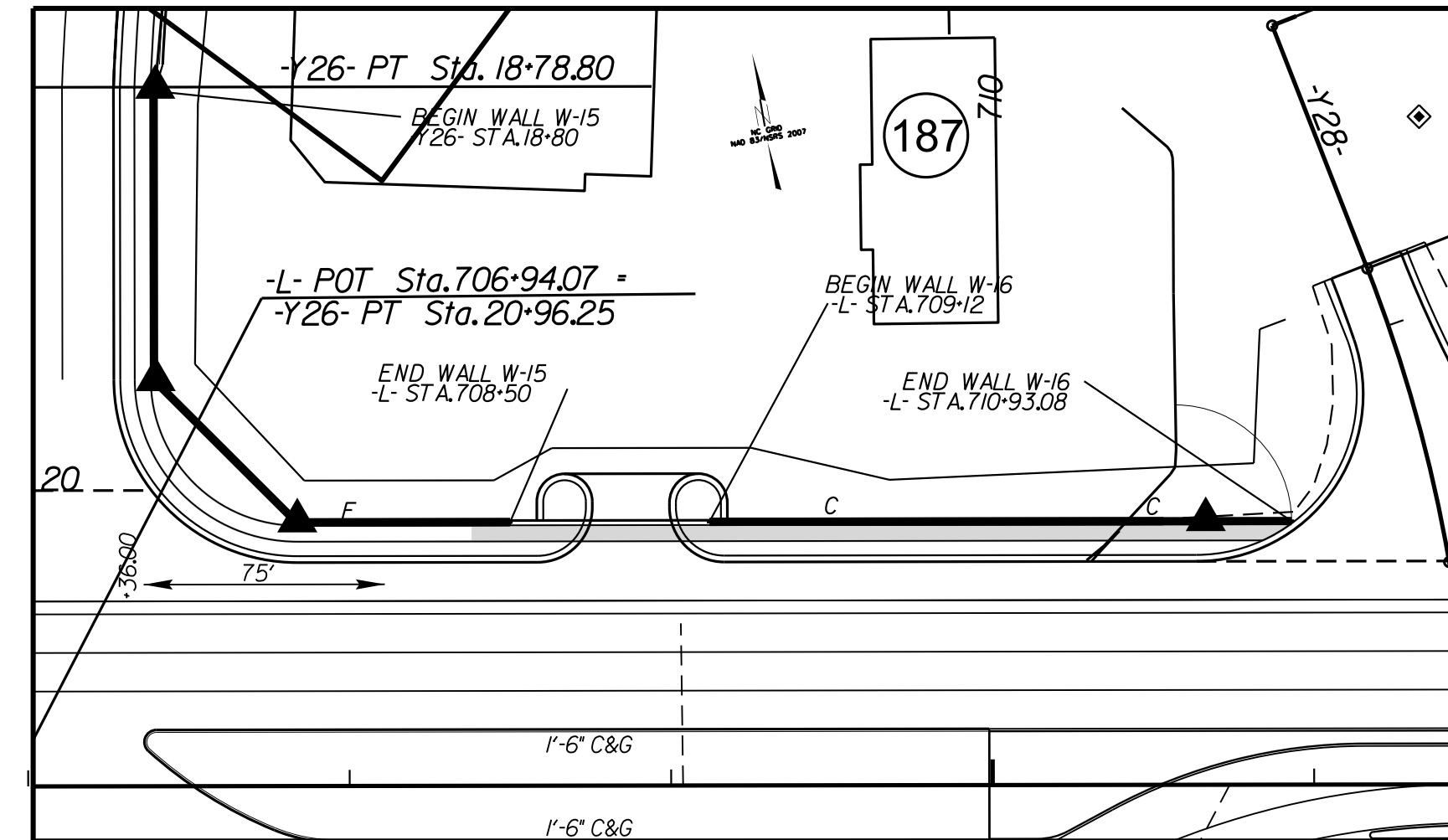
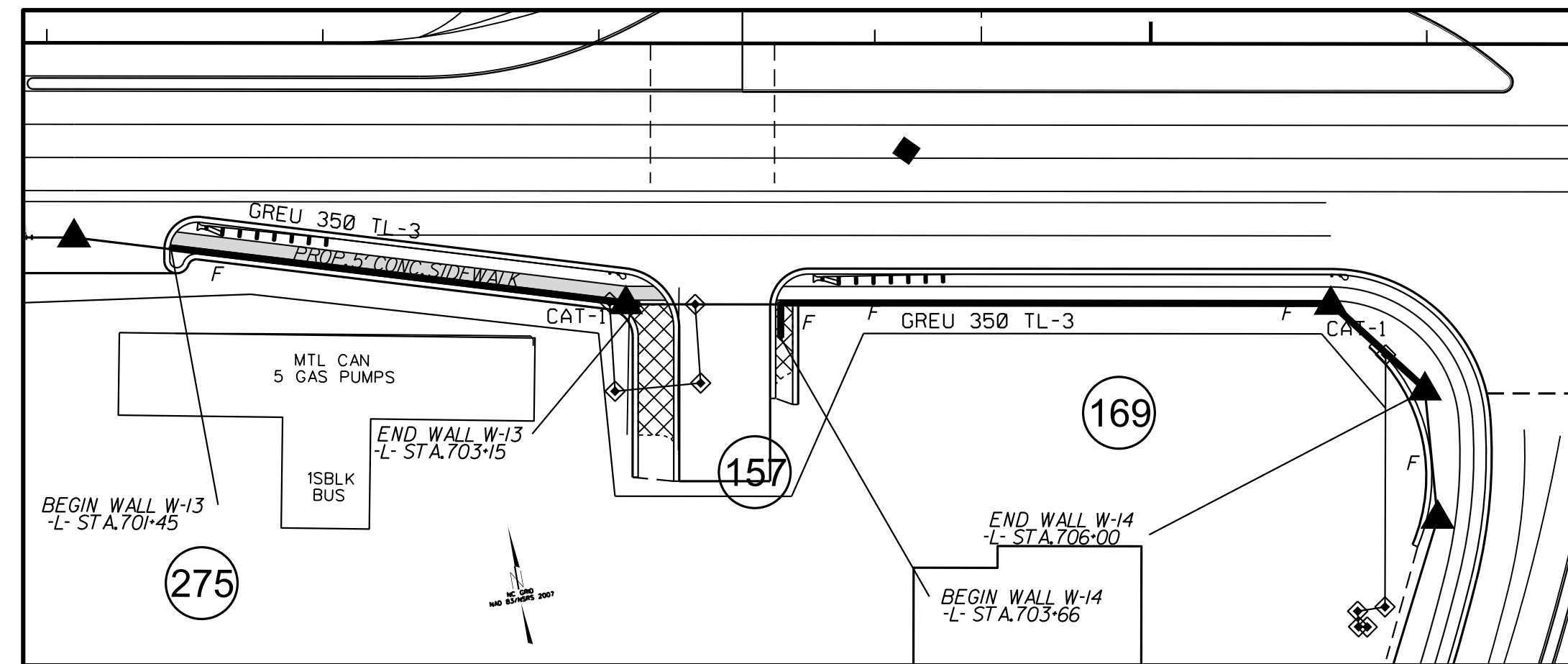
ENGINEER

SEAL
028893
MICHAEL H. STEPHENSON

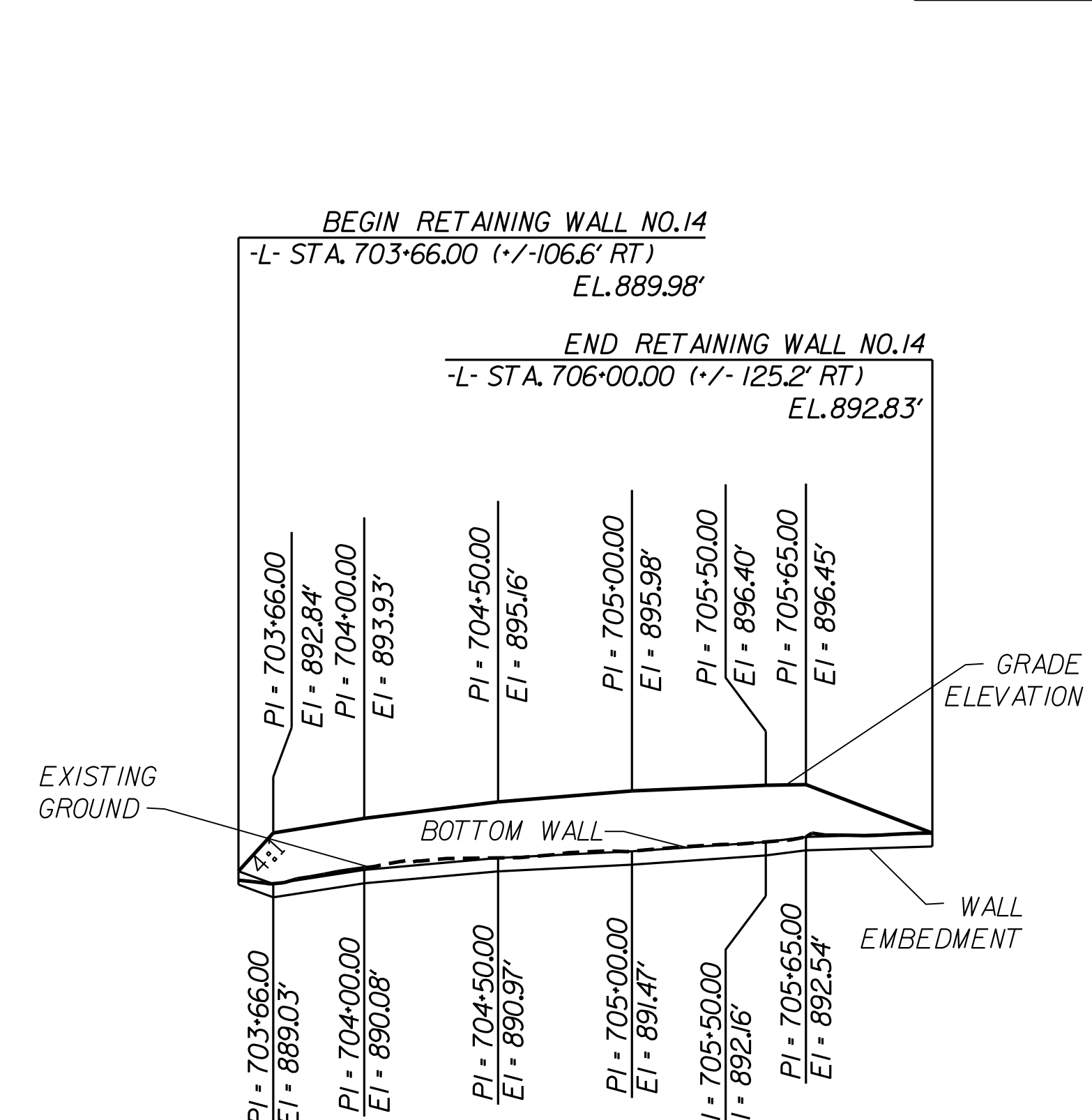
DocuSigned by: *MHS* 07/12/2024

CA4782002314CC SIGNATURE DATE SIGNATURE DATE

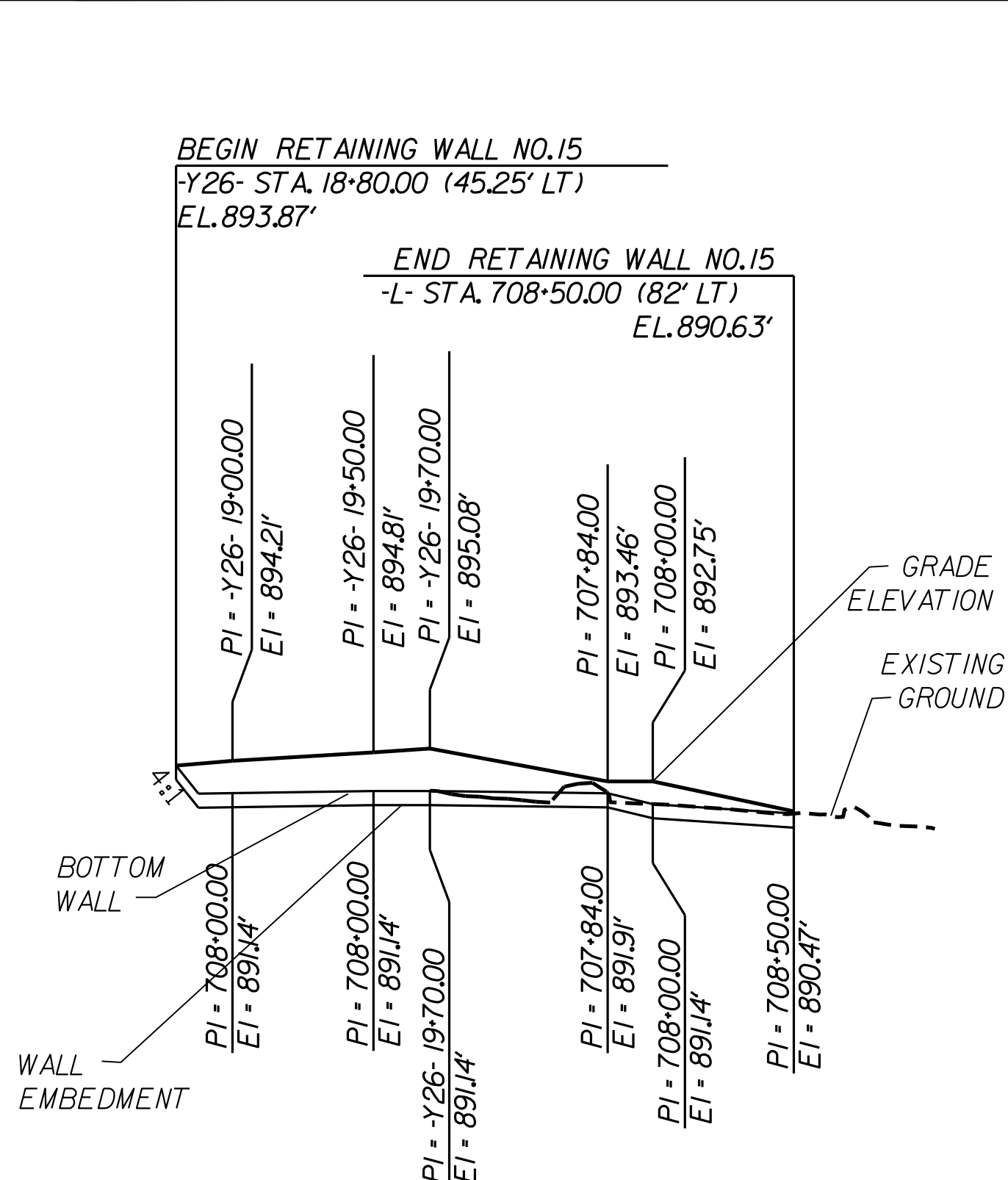
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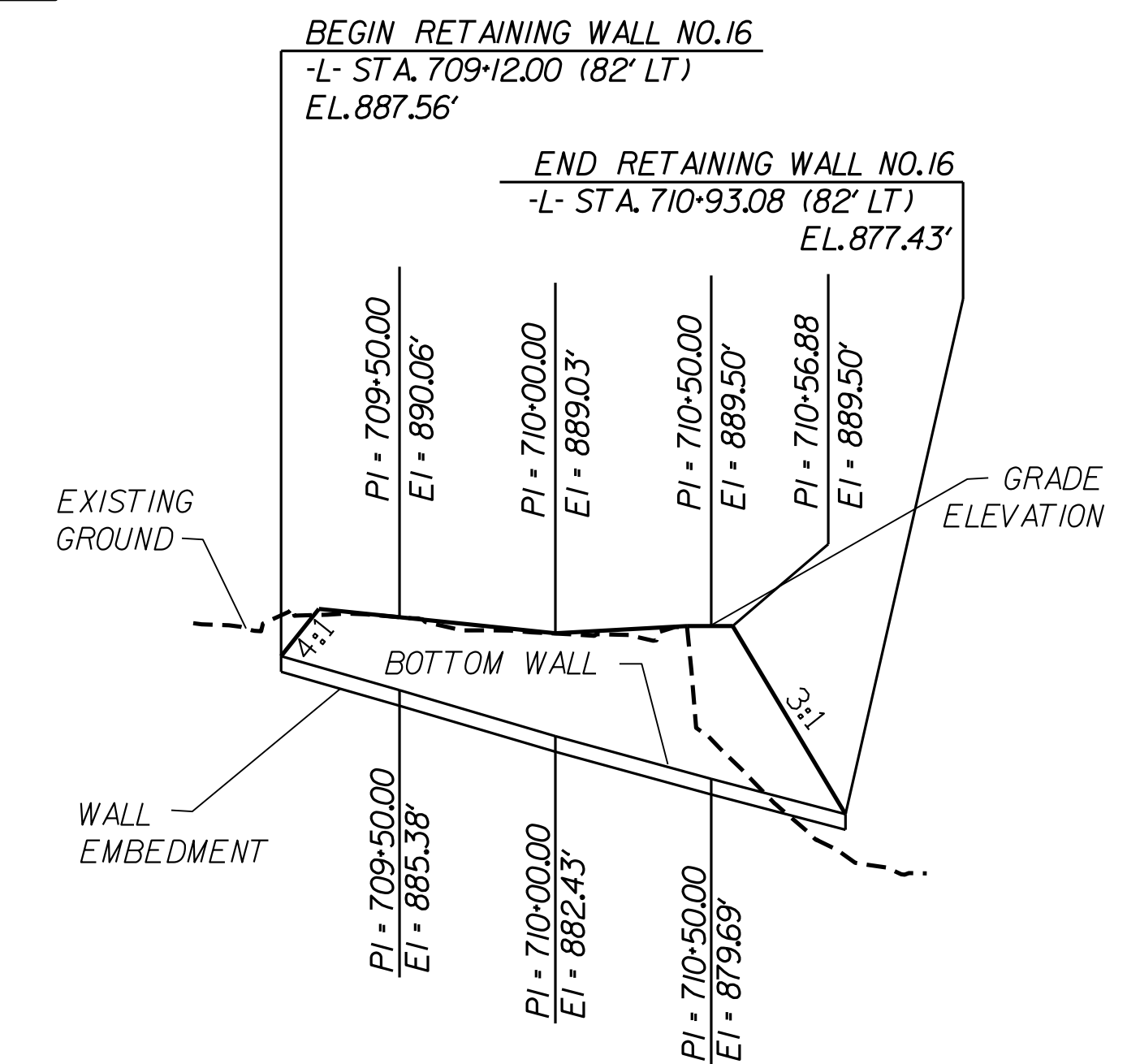
WALL 13
WALL ADJACENT -L-
RETAINING WALL 13
SEE WALL SUMMARY FOR WALL EMBEDMENT AND INSTALLED WALL AREA



WALL 14
WALL ADJACENT -L-
RETAINING WALL 14
SEE WALL SUMMARY FOR WALL EMBEDMENT AND INSTALLED WALL AREA



WALL 15
WALL ADJACENT -L- & -Y26-
RETAINING WALL 15
SEE WALL SUMMARY FOR WALL EMBEDMENT AND INSTALLED WALL AREA



WALL 16
WALL ADJACENT -L-
RETAINING WALL 16
SEE WALL SUMMARY FOR WALL EMBEDMENT AND INSTALLED WALL AREA

PREPARED BY: MHS	DATE: 7/24
REVIEWED BY: SCC	DATE: 7/24

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS

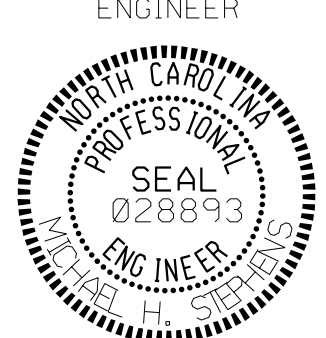
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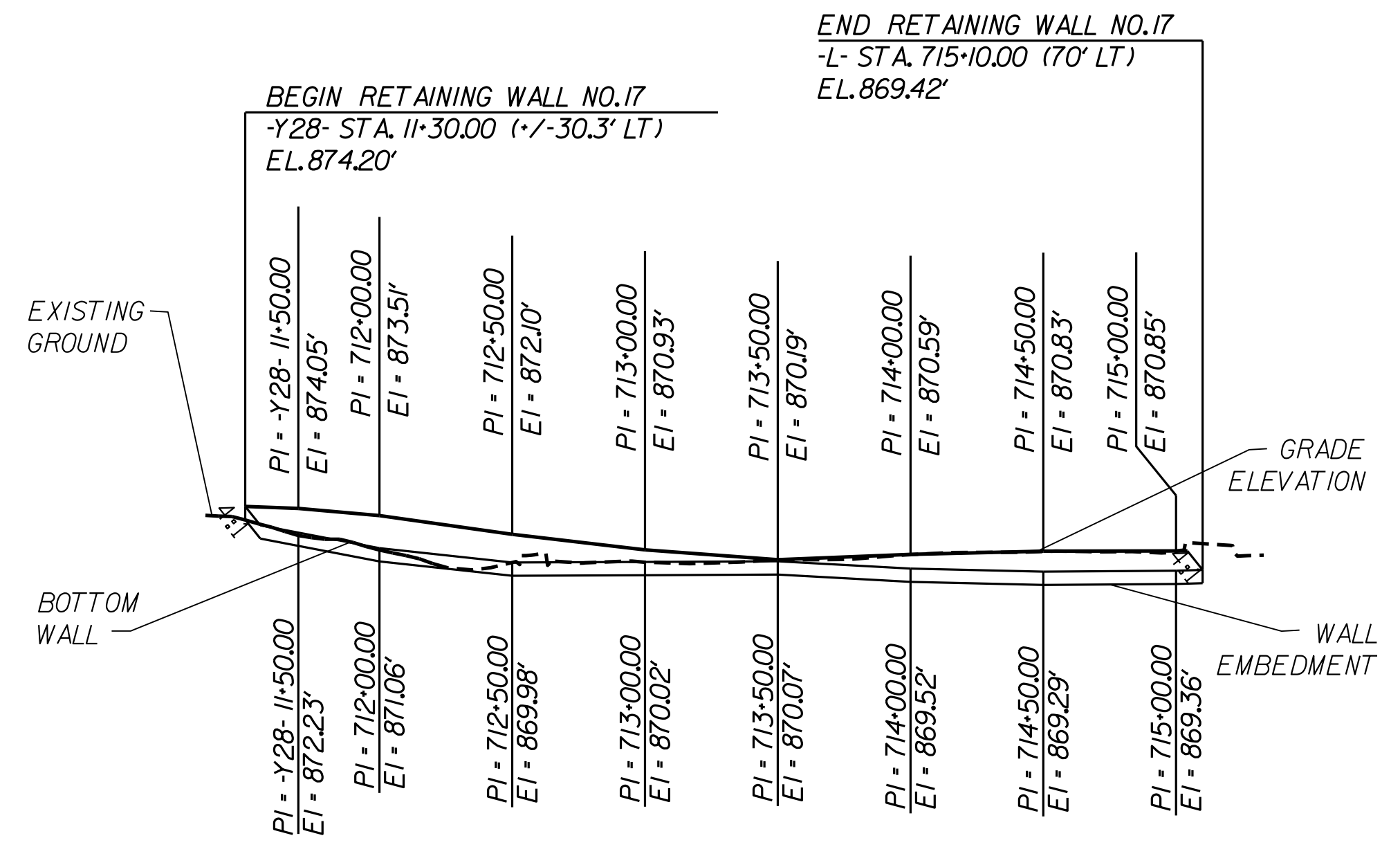
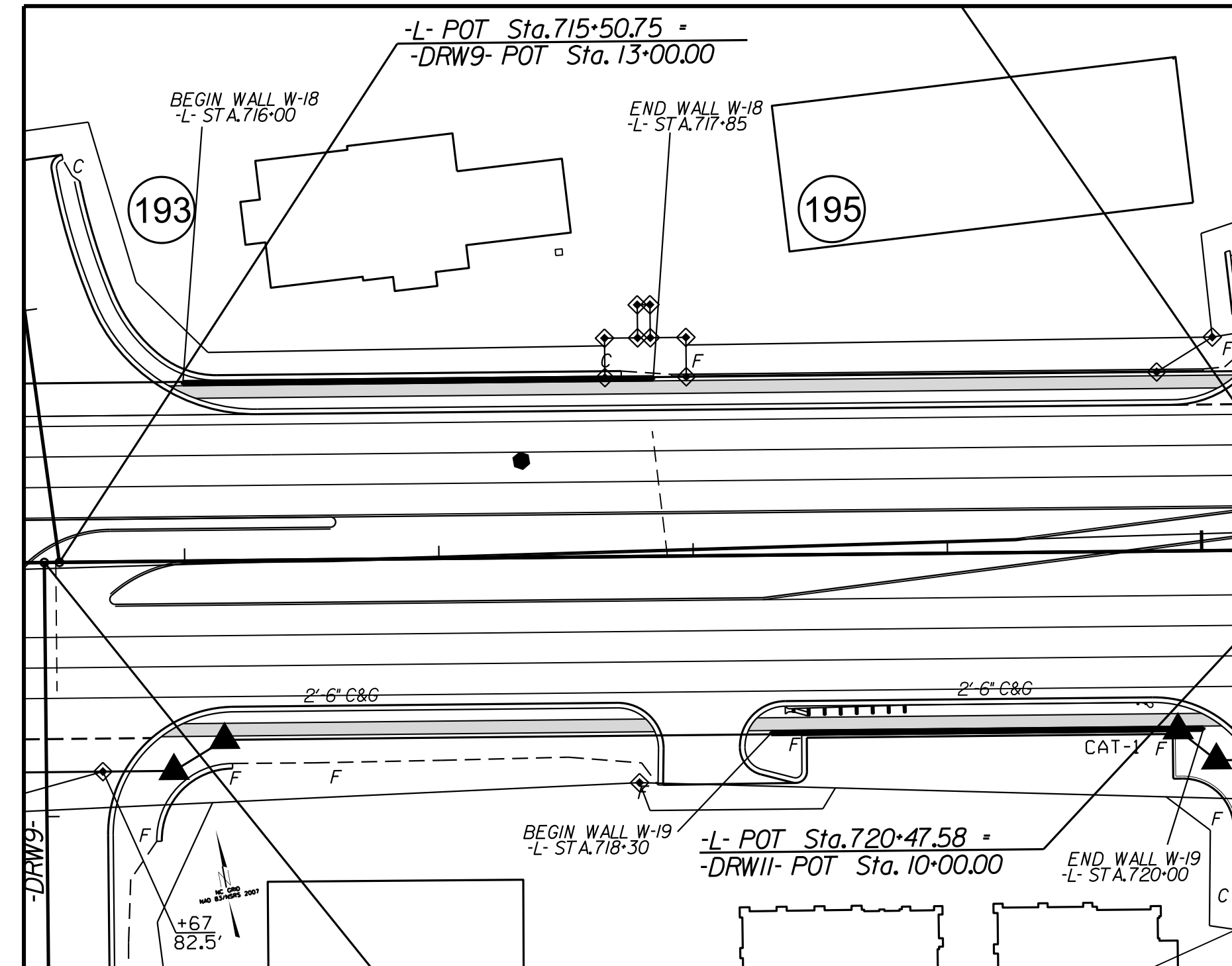
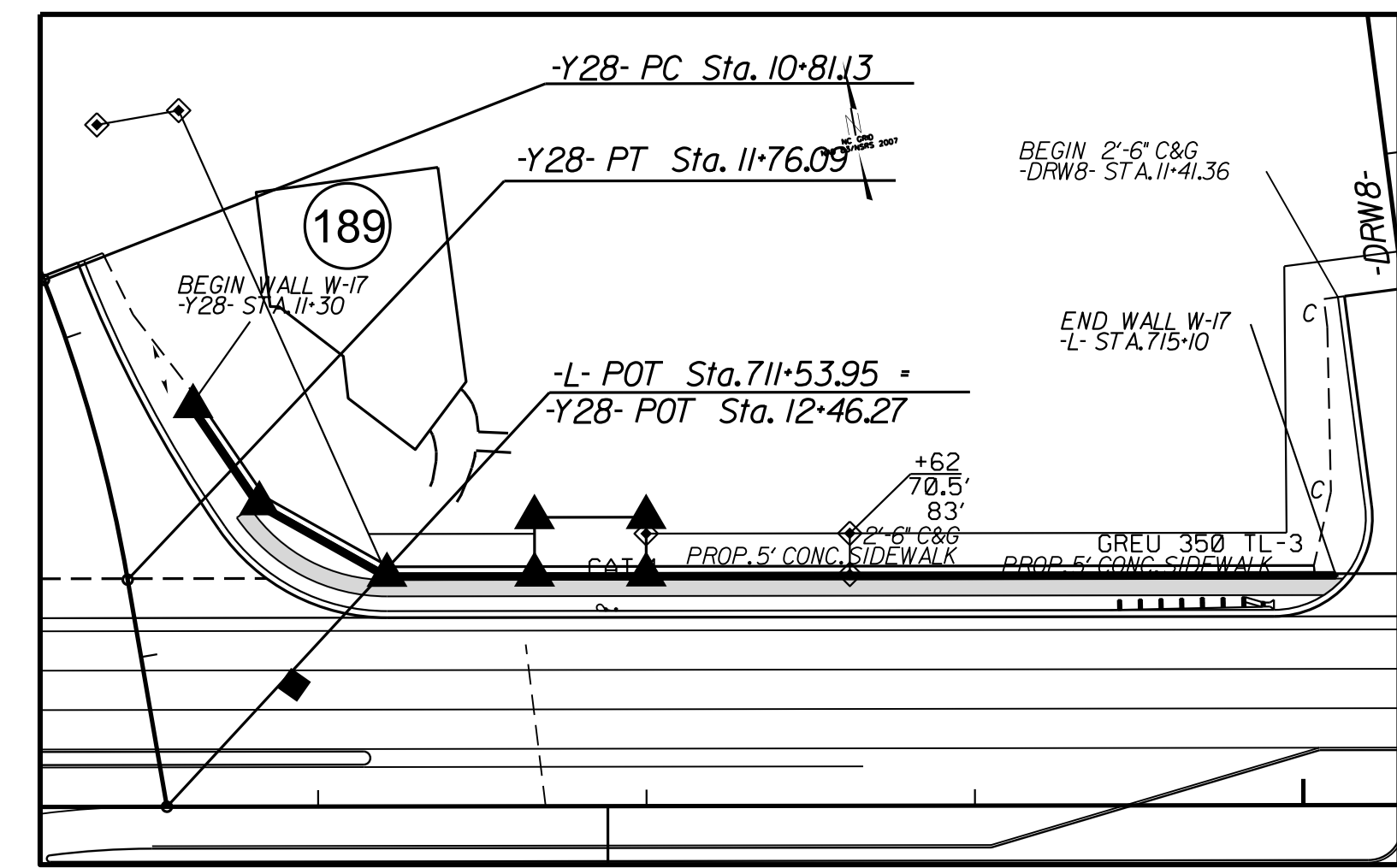
PROJECT NO.: 37944.1.FR5 (R-2307B)
IREDELL COUNTY
STATION: SEE SUMMARY TABLE
SHEET 6 OF 19

REVISIONS					
NO.	BY	DATE	NO.	BY	DATE
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2			4		

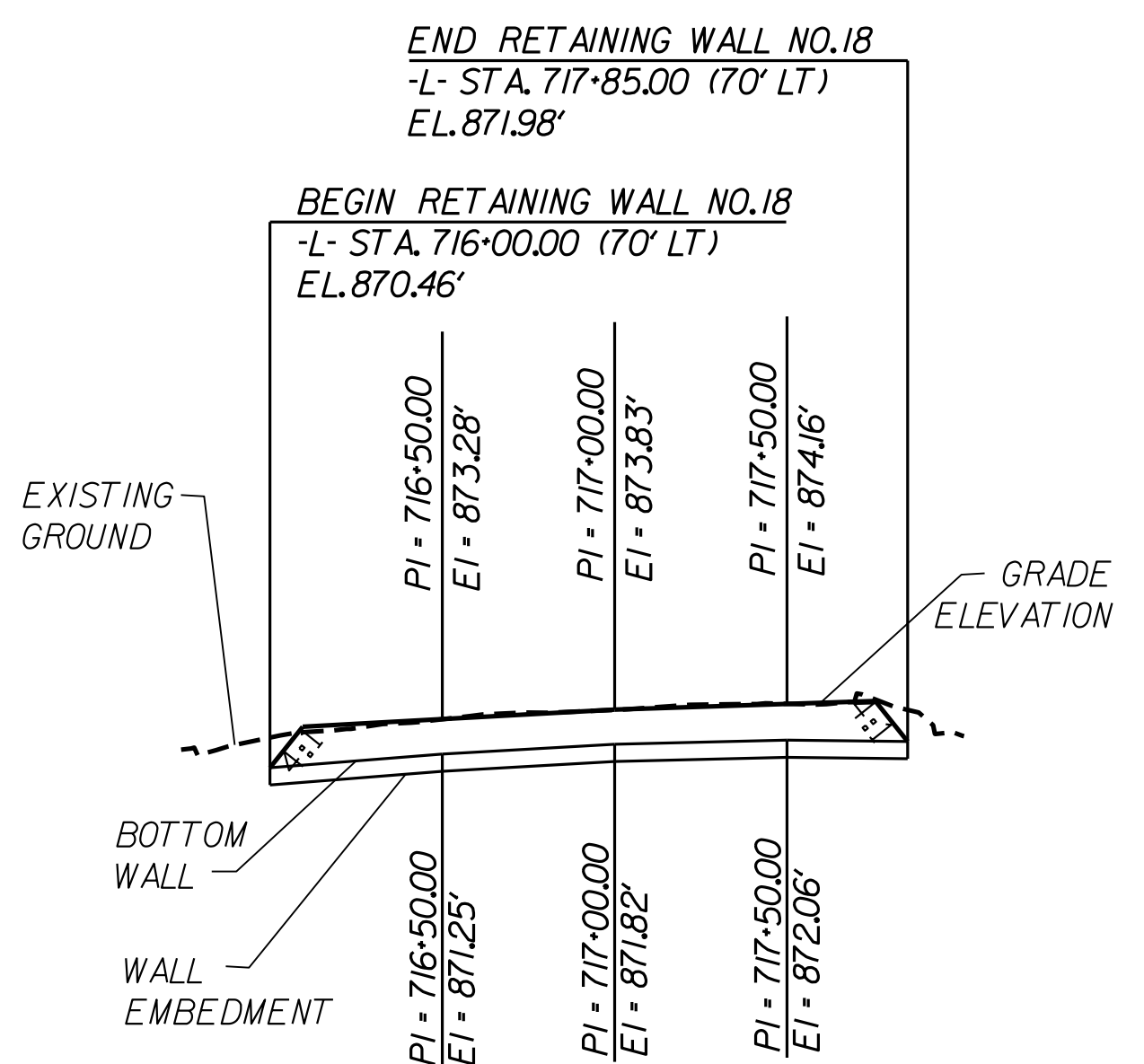
RETAINING WALL NOS. 13, 14, 15, AND 16

W-6

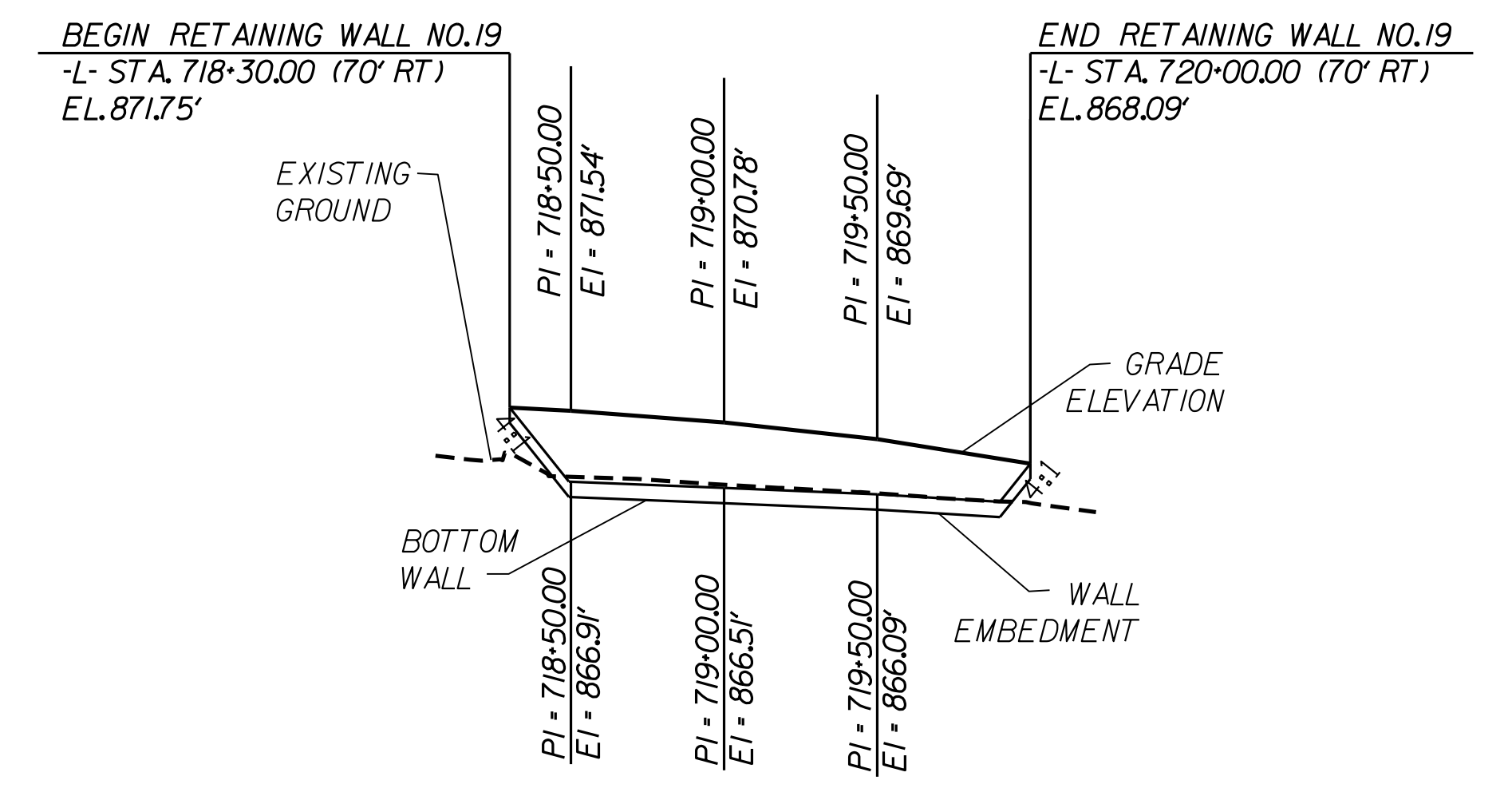
GEOTECHNICAL ENGINEER
 ENGINEER

 Dispatched by: *M.H. Stierman* 07/12/2024
 C4478029234ACC
 SIGNATURE DATE SIGNATURE DATE
**DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED**



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 WALL ADJACENT -L- & -Y28-
 RETAINING WALL 17
 SEE WALL SUMMARY FOR WALL EMBEDMENT AND
 INSTALLED WALL AREA

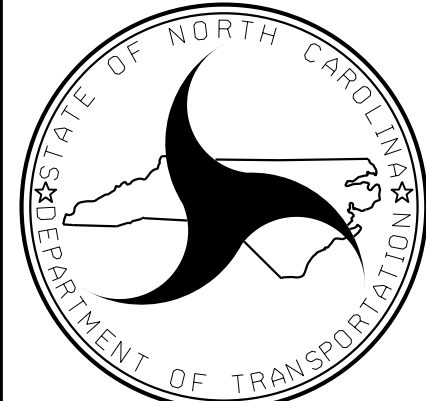


WALL 18
 WALL ADJACENT -L-
 RETAINING WALL 18
 SEE WALL SUMMARY FOR WALL EMBEDMENT AND
 INSTALLED WALL AREA



WALL 19
 WALL ADJACENT -L-
 RETAINING WALL 19
 SEE WALL SUMMARY FOR WALL EMBEDMENT AND
 INSTALLED WALL AREA

PROJECT NO.: 37944.1.FR5 (R-2307B)
 IREDELL COUNTY
 STATION: SEE SUMMARY TABLE
 SHEET 7 OF 19


 NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 DIVISION OF HIGHWAYS
 GEOTECHNICAL
 ENGINEERING UNIT

RETAINING WALL NOS. 17, 18, AND 19

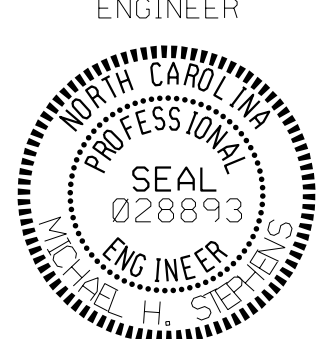
REVISIONS					
NO.	BY	DATE	NO.	BY	DATE
1			3		
2			4		

SHEET NO. W-7

PREPARED BY: MHS	DATE: 7/24
REVIEWED BY: SCC	DATE: 7/24

GEOTECHNICAL ENGINEER

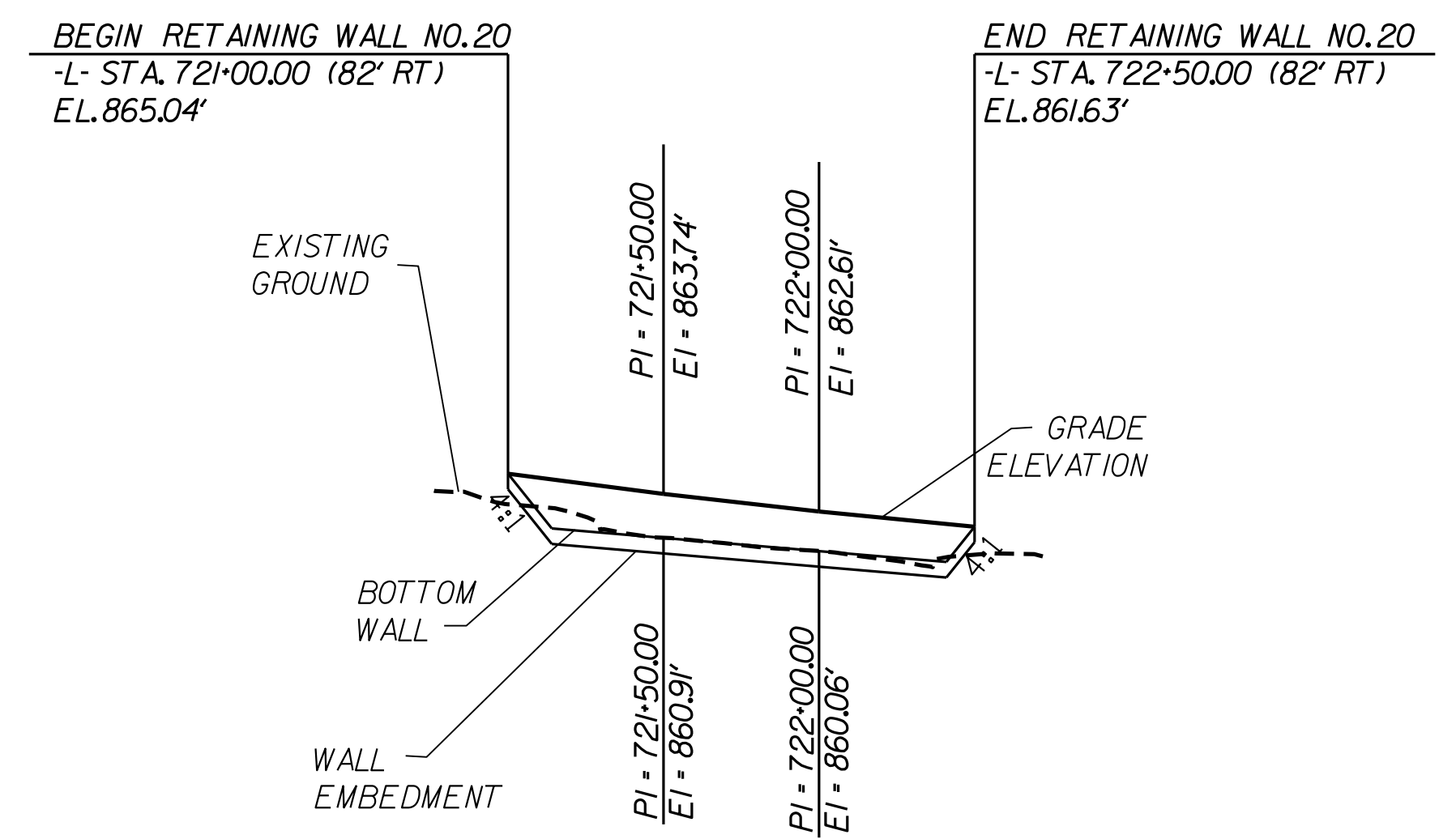
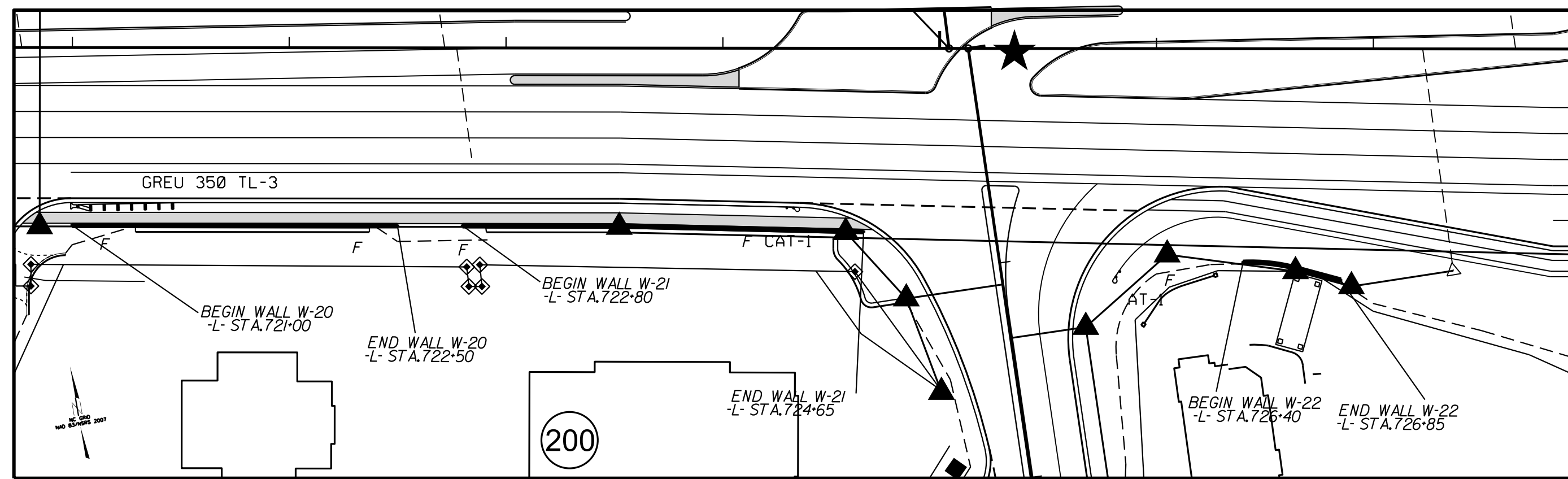
ENGINEER



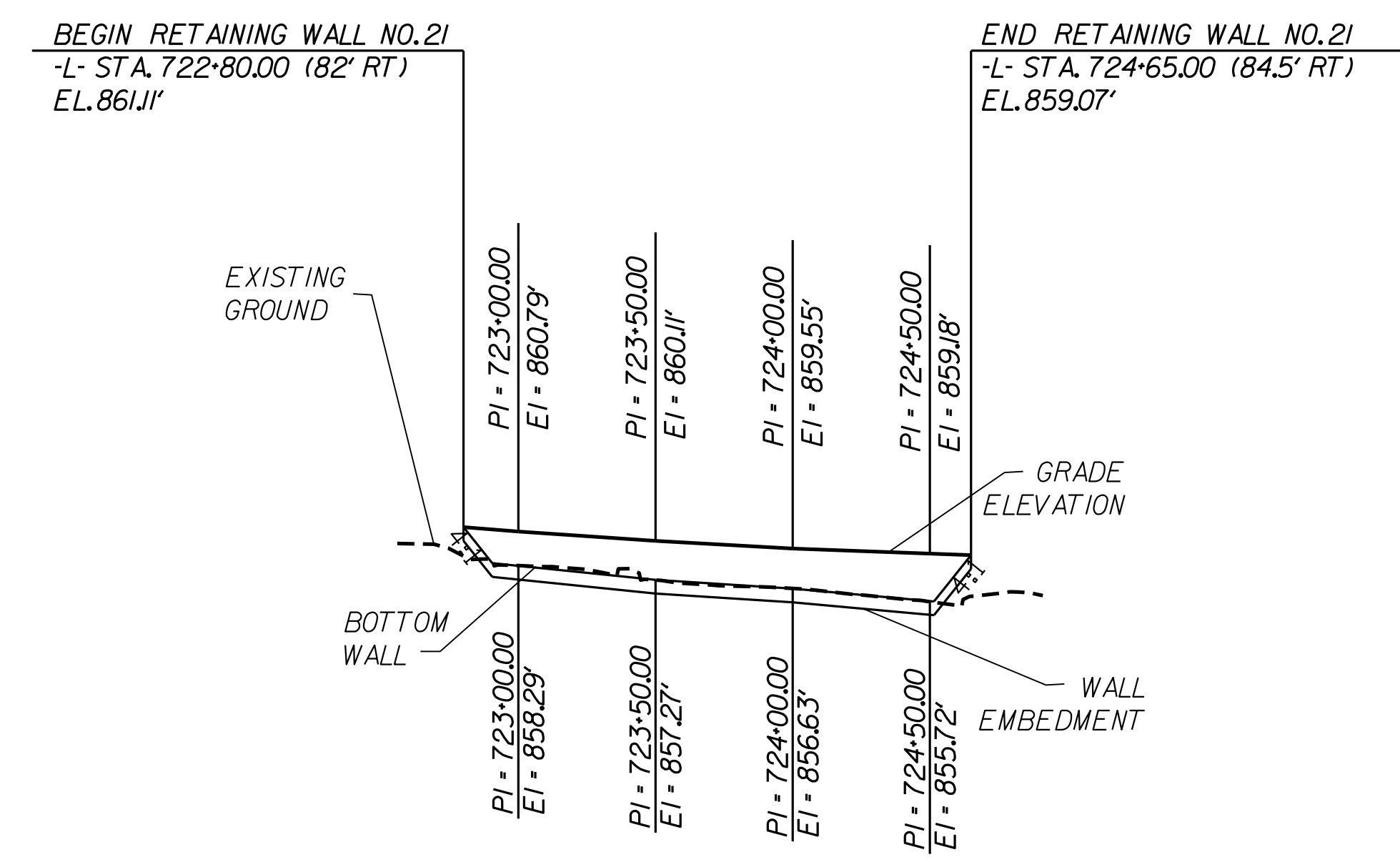
DocuSigned by: *M. H. Stephens* 07/12/2024

C447882092314CC SIGNATURE DATE

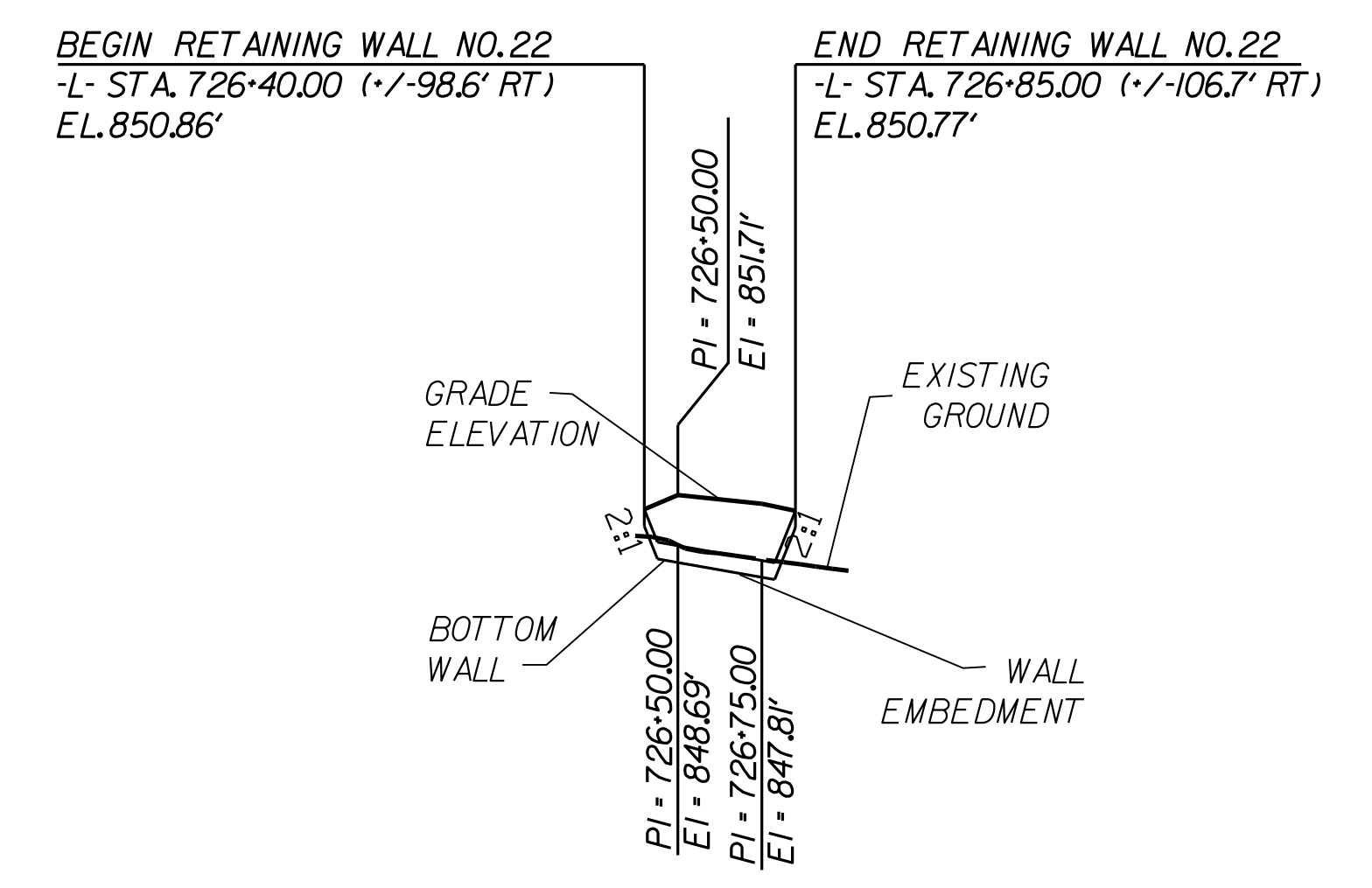
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WALL 20
WALL ADJACENT -L-
RETAINING WALL 20
SEE WALL SUMMARY FOR WALL EMBEDMENT AND
INSTALLED WALL AREA

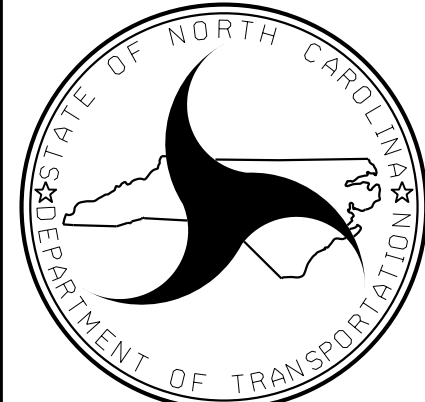


WALL 21
WALL ADJACENT -L-
RETAINING WALL 21
SEE WALL SUMMARY FOR WALL EMBEDMENT AND
INSTALLED WALL AREA



WALL 22
WALL ADJACENT -L-
RETAINING WALL 22
SEE WALL SUMMARY FOR WALL EMBEDMENT AND
INSTALLED WALL AREA

PROJECT NO.: 37944.1.FR5 (R-2307B)
IREDELL COUNTY
STATION: SEE SUMMARY TABLE
SHEET 8 OF 19



NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

GEOTECHNICAL
ENGINEERING UNIT

RETAINING WALL
NOS. 20, 21, AND 22

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

SHEET NO. W-8

PREPARED BY: MHS	DATE: 7/24
REVIEWED BY: SCC	DATE: 7/24

GEOTECHNICAL ENGINEER

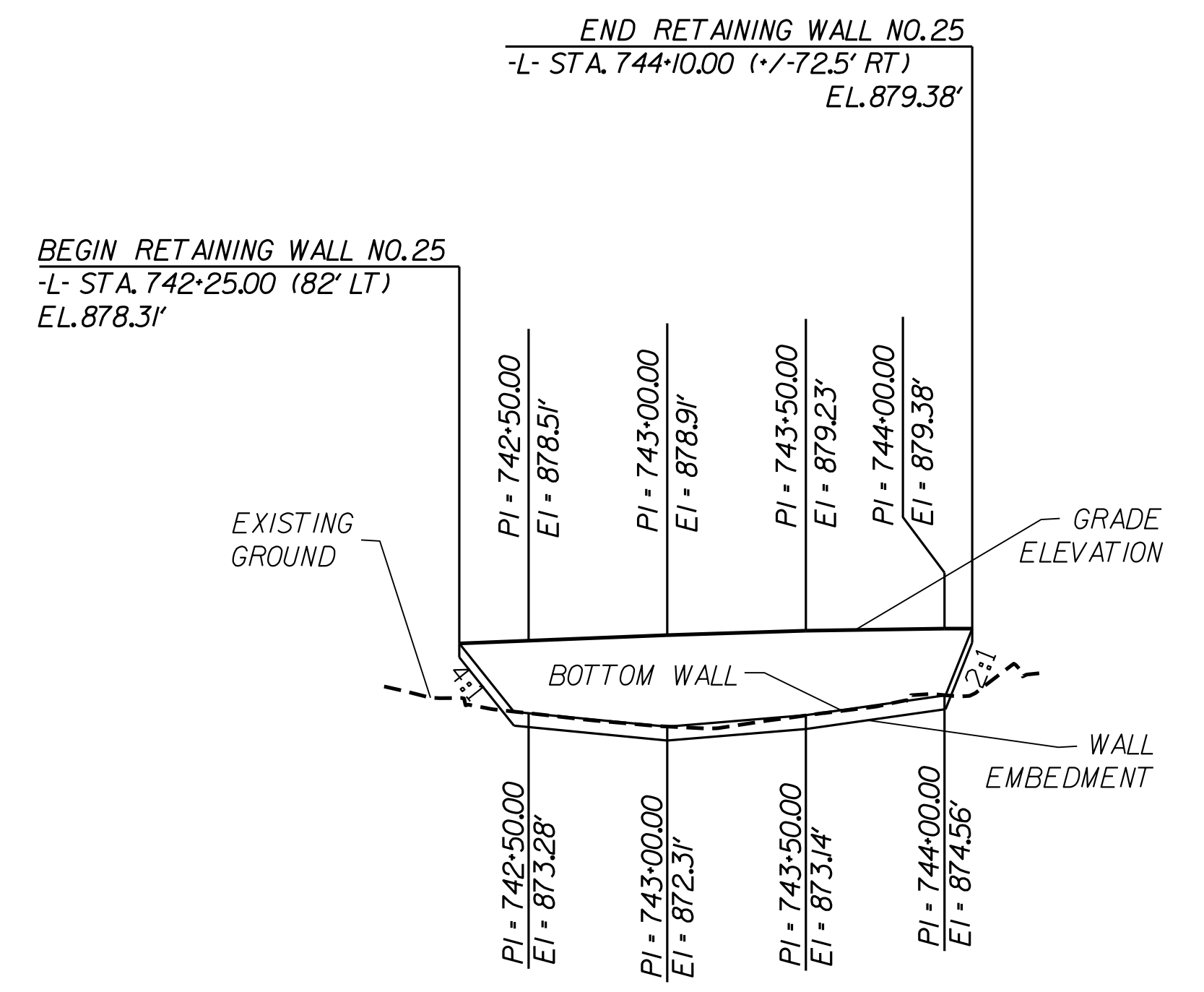
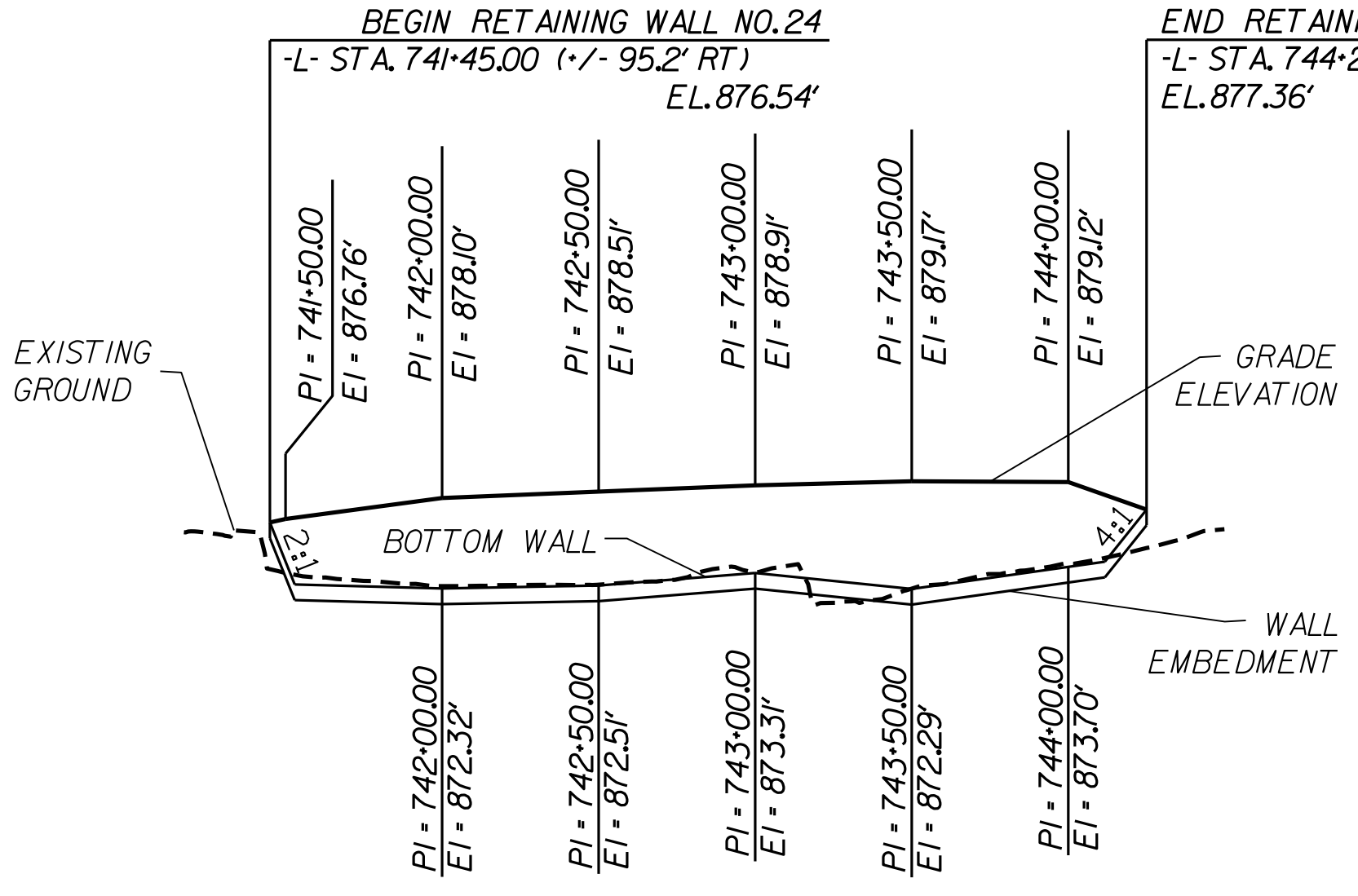
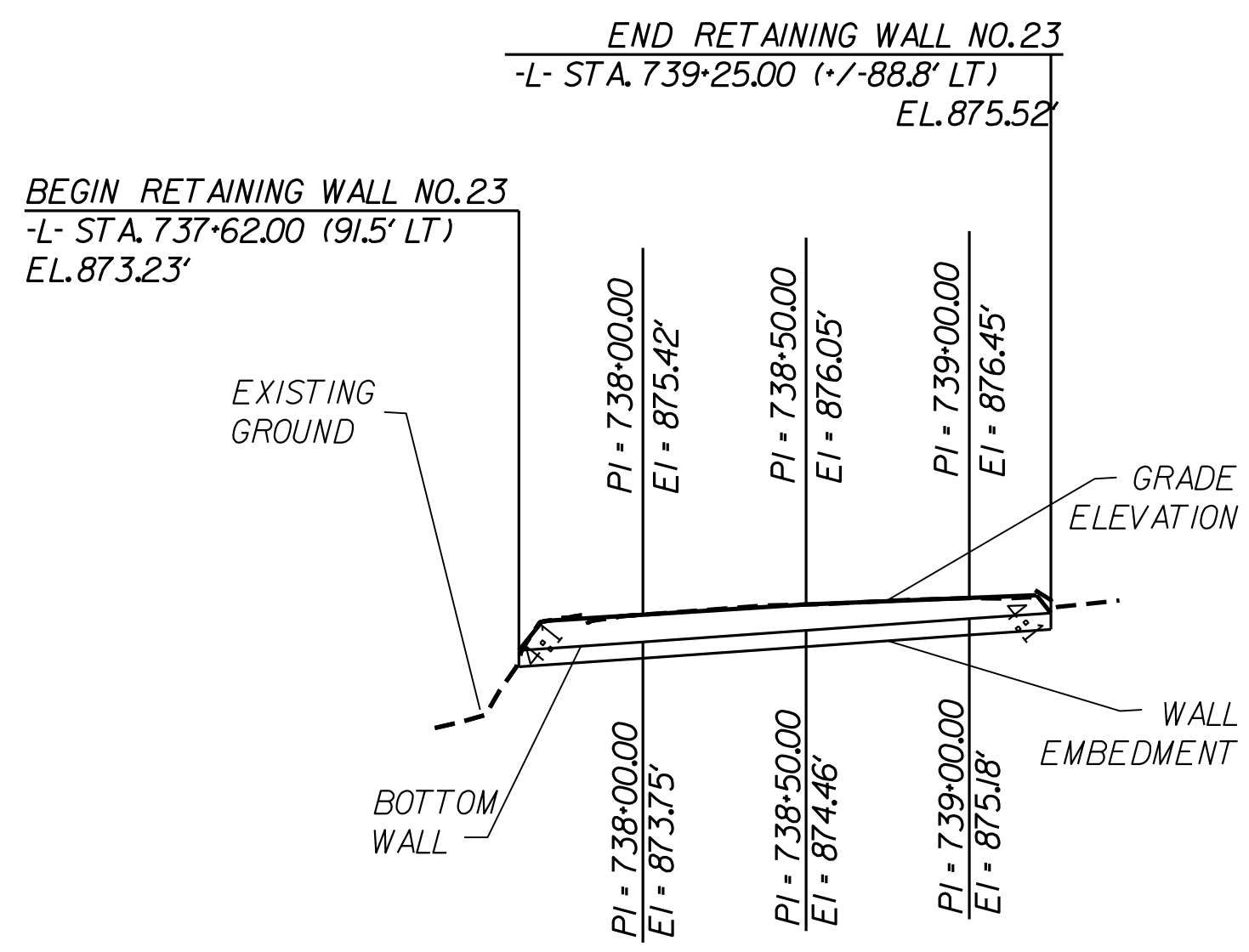
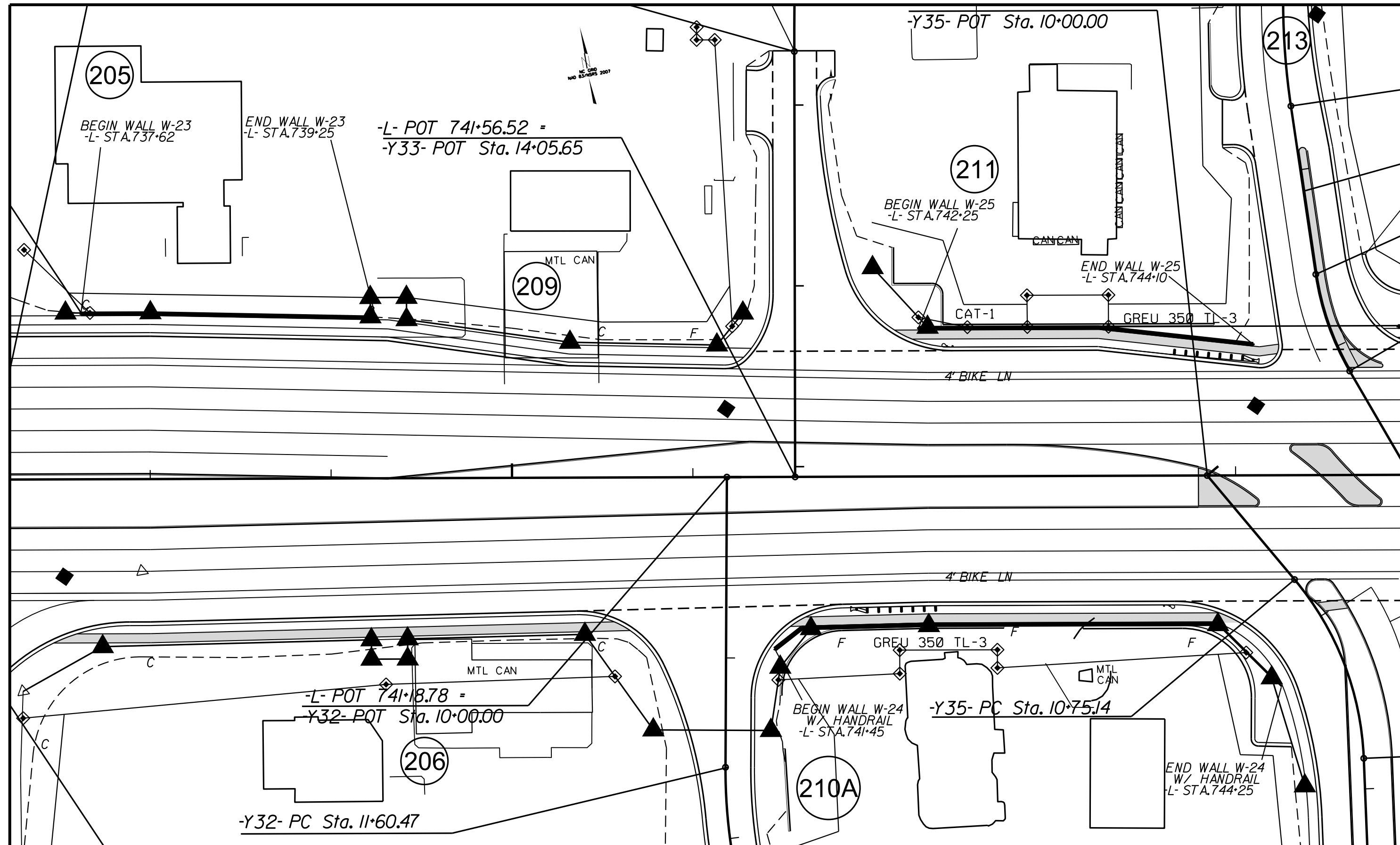
ENGINEER

SEAL
028893
MICHAEL H. STEPHENSON

Designed by: *M.H.S.* 07/12/2024

SIGNATURE DATE SIGNATURE DATE

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UNLESS ALL SIGNATURES COMPLETED**



PROJECT NO.: 37944.1.FR5 (R-2307B)
IREDELL COUNTY
STATION: SEE SUMMARY TABLE
SHEET 9 OF 19

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

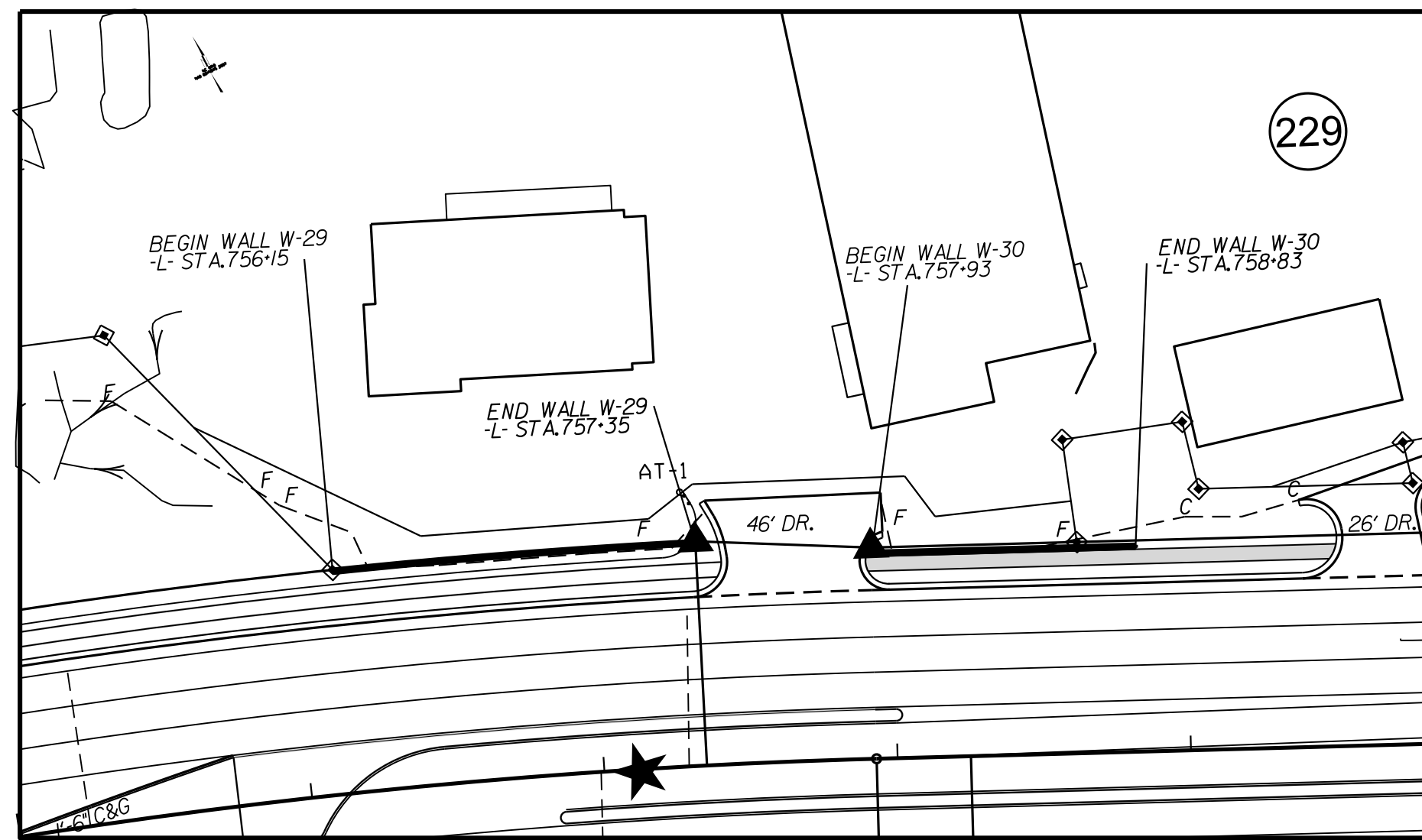
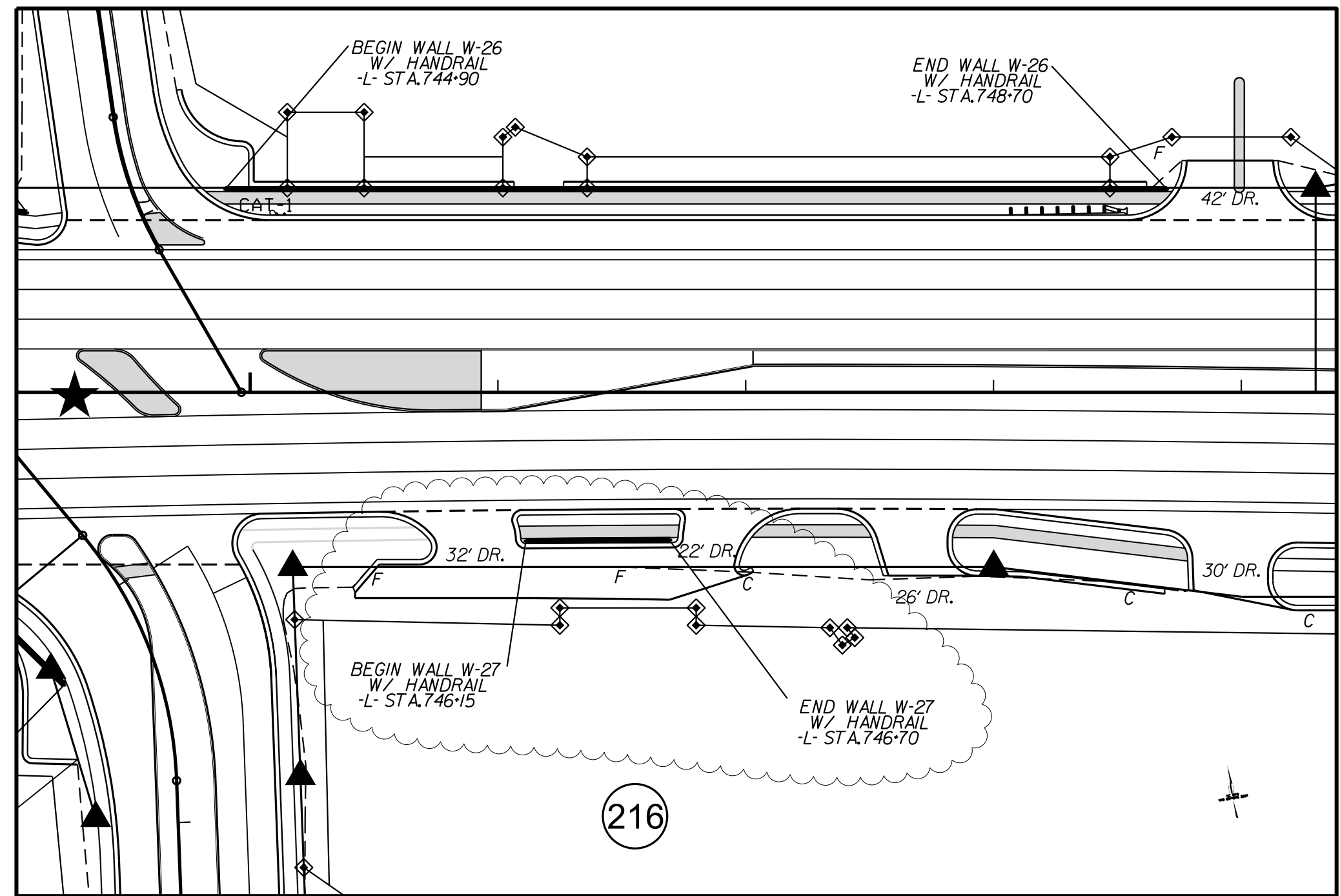
GEOTECHNICAL
ENGINEERING UNIT

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

RETAINING WALL
NOS. 23, 24, AND 25

SHEET NO. W-9

PREPARED BY: MHS	DATE: 7/24
REVIEWED BY: SCC	DATE: 7/24

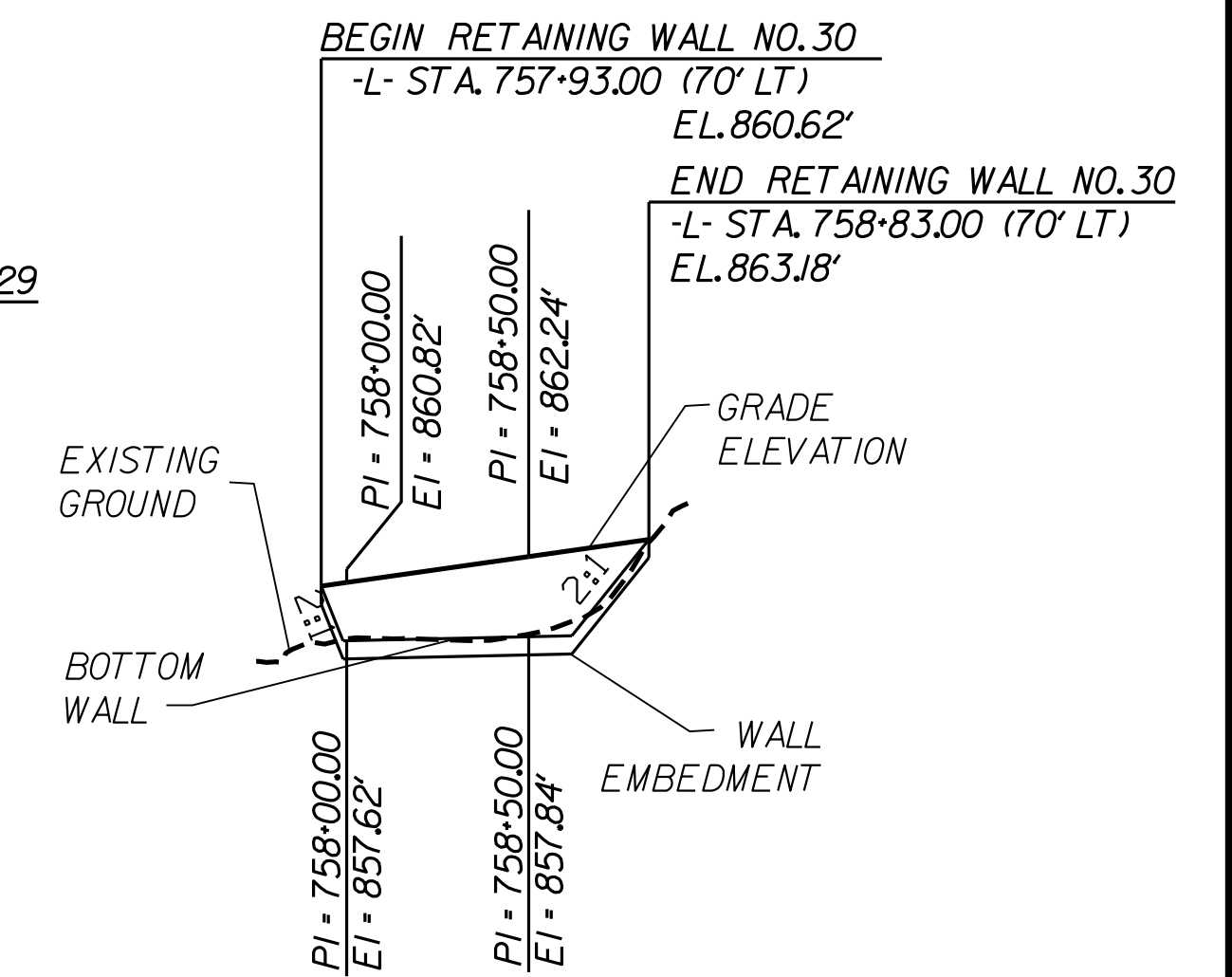
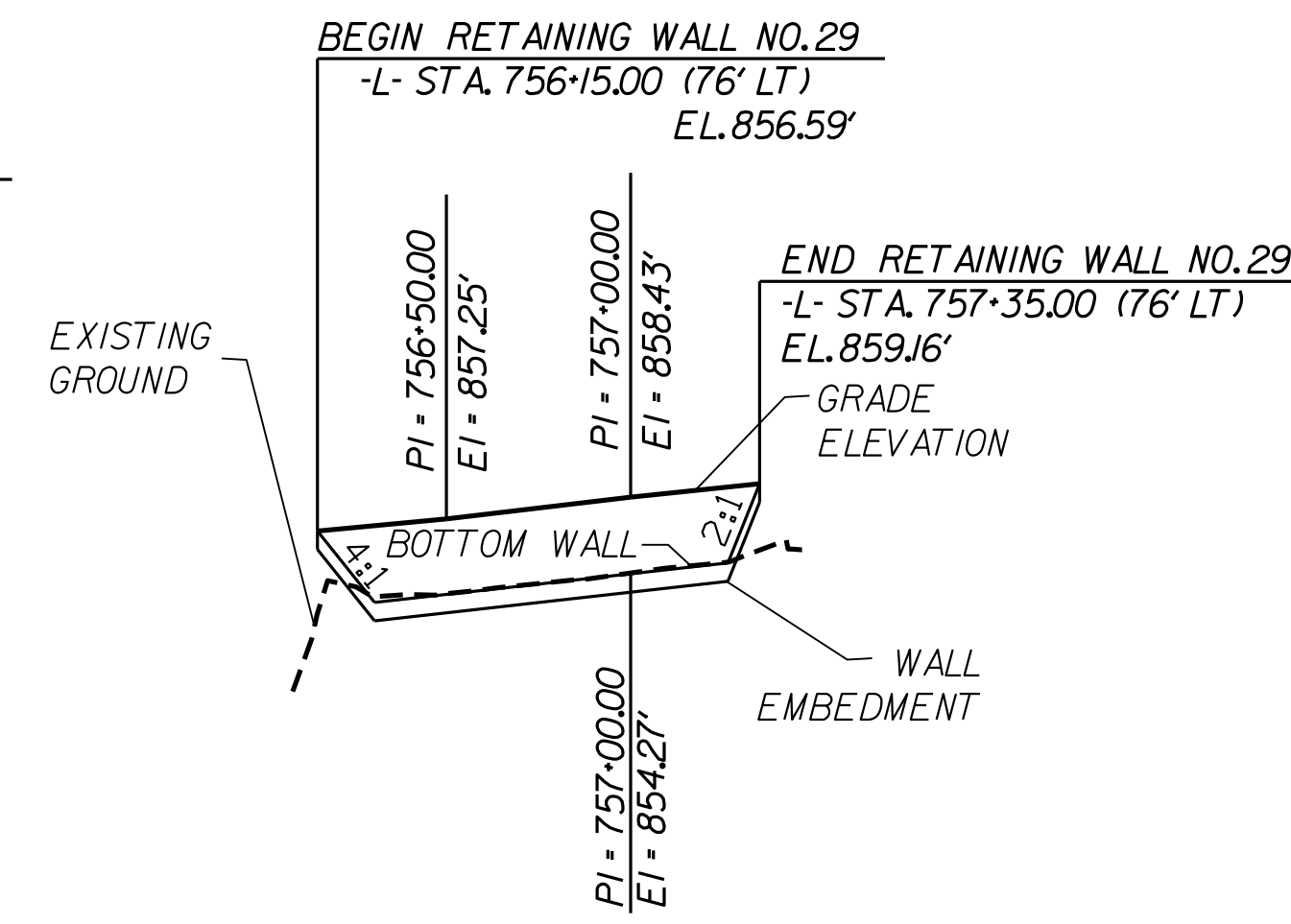
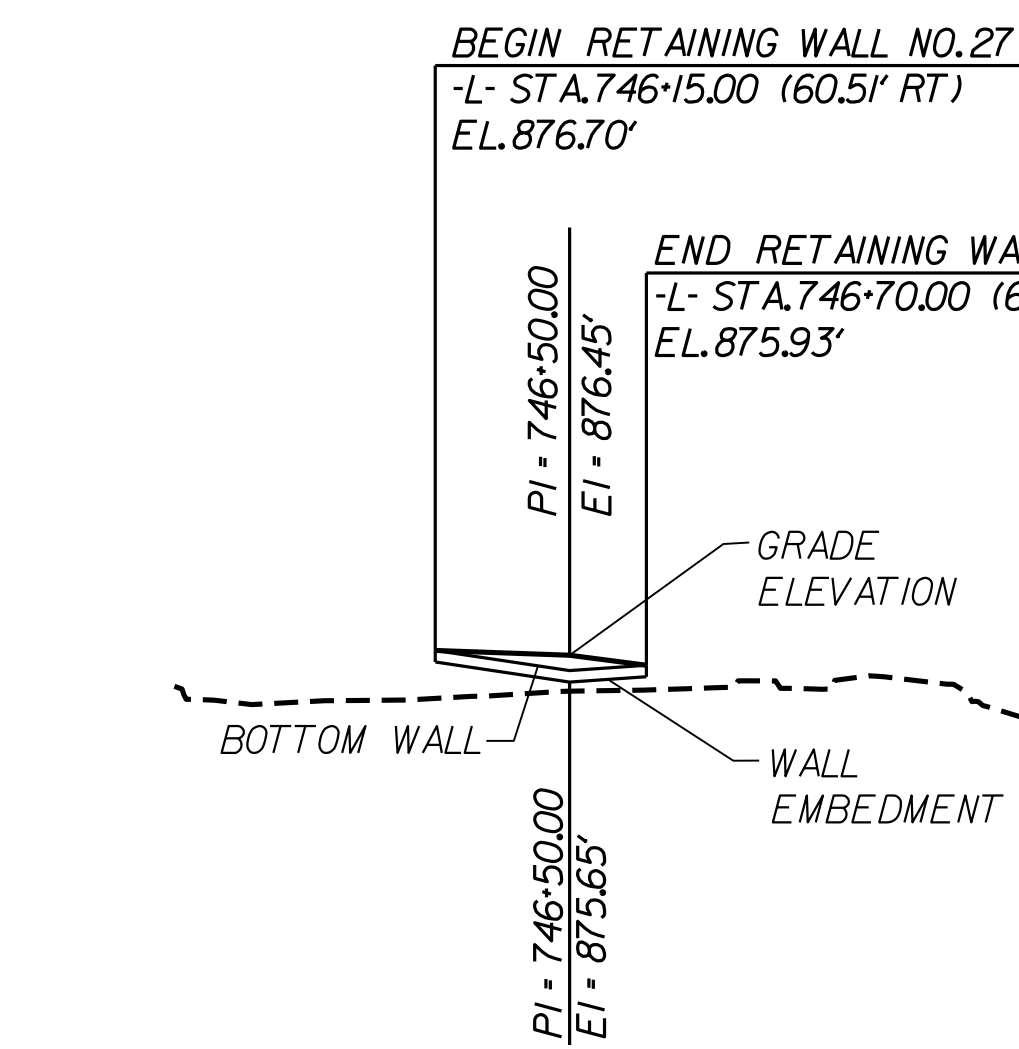
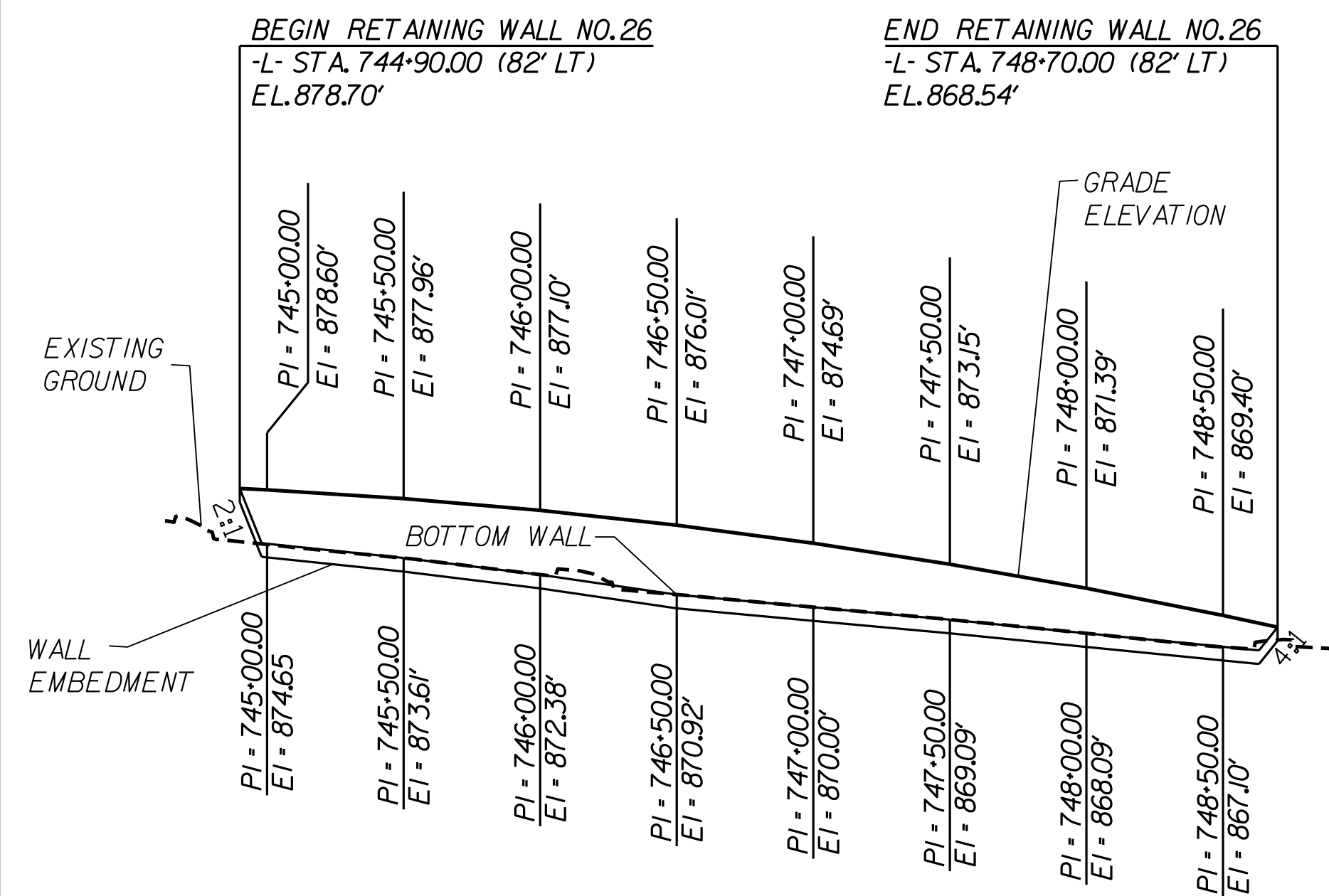


GEOTECHNICAL ENGINEER

ENGINEER

DocuSigned by: *M. H. Steffen* 07/12/2024
 C447882092314CC SIGNATURE DATE

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



WALL 26
WALL ADJACENT -L-
RETAINING WALL 26
SEE WALL SUMMARY FOR WALL EMBEDMENT AND
INSTALLED WALL AREA

WALL 27*
WALL ADJACENT -L-
RETAINING WALL 27
SEE WALL SUMMARY FOR WALL EMBEDMENT AND
INSTALLED WALL AREA

WALL 29
WALL ADJACENT -L-
RETAINING WALL 29
SEE WALL SUMMARY FOR WALL EMBEDMENT AND
INSTALLED WALL AREA

WALL 30
WALL ADJACENT -L-
RETAINING WALL 30
SEE WALL SUMMARY FOR WALL EMBEDMENT AND
INSTALLED WALL AREA

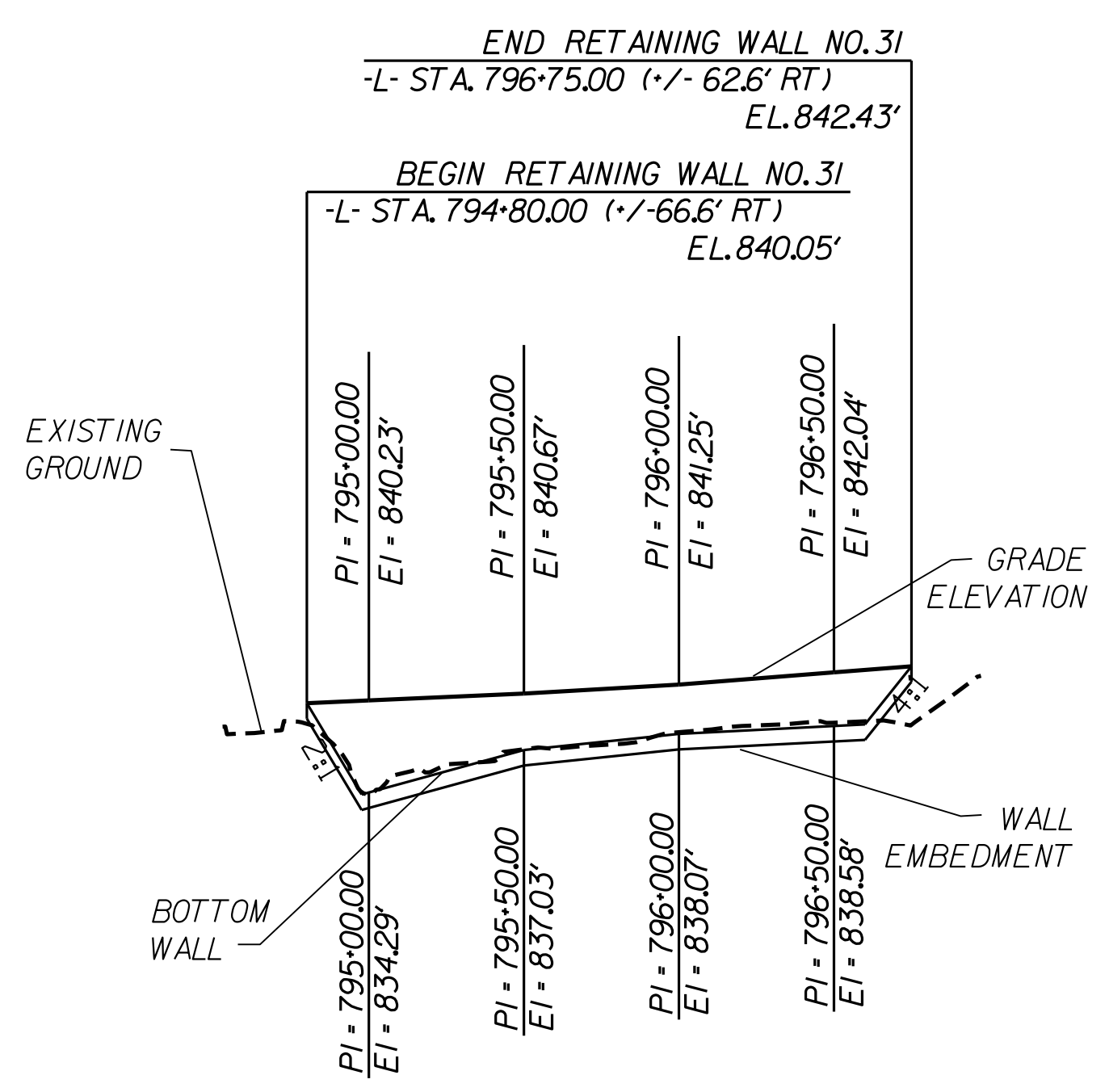
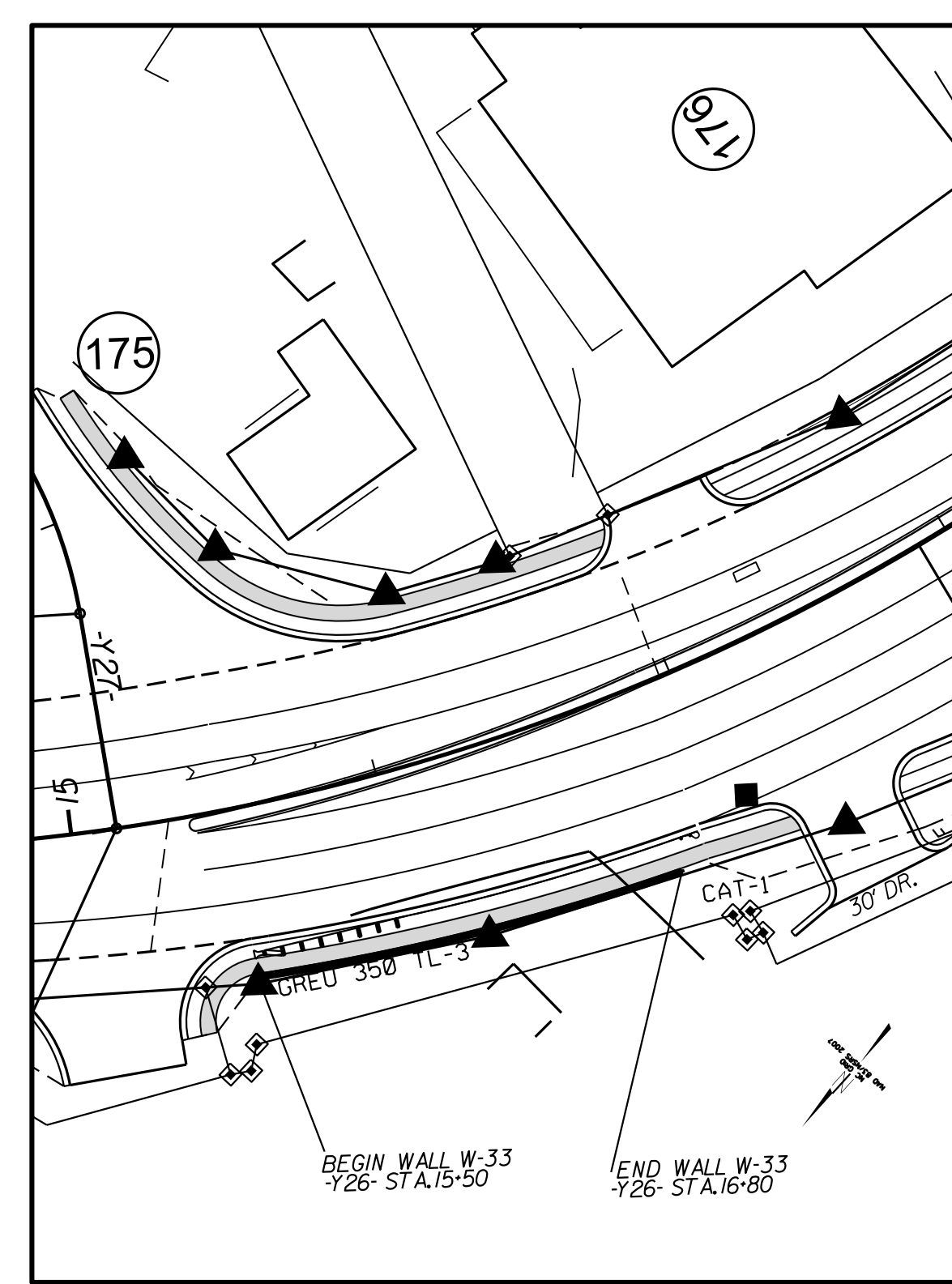
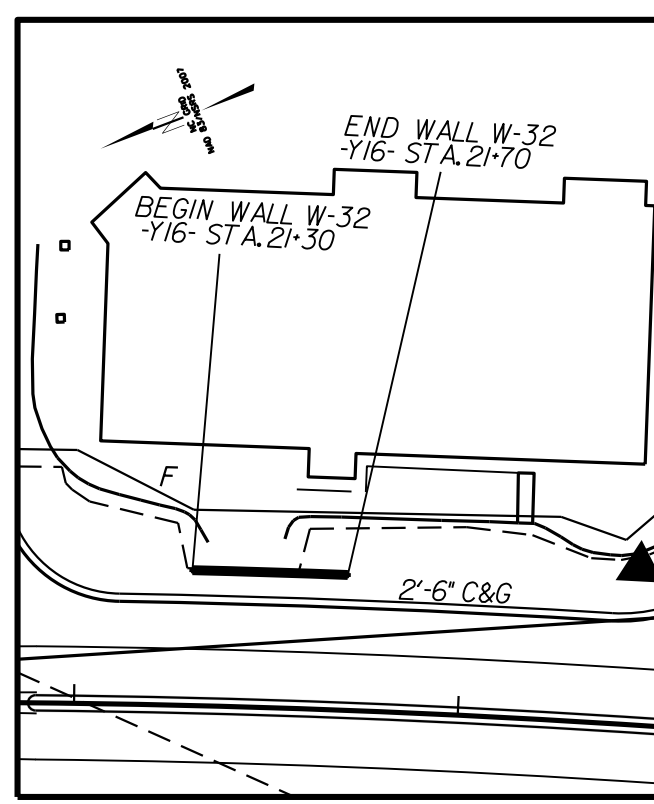
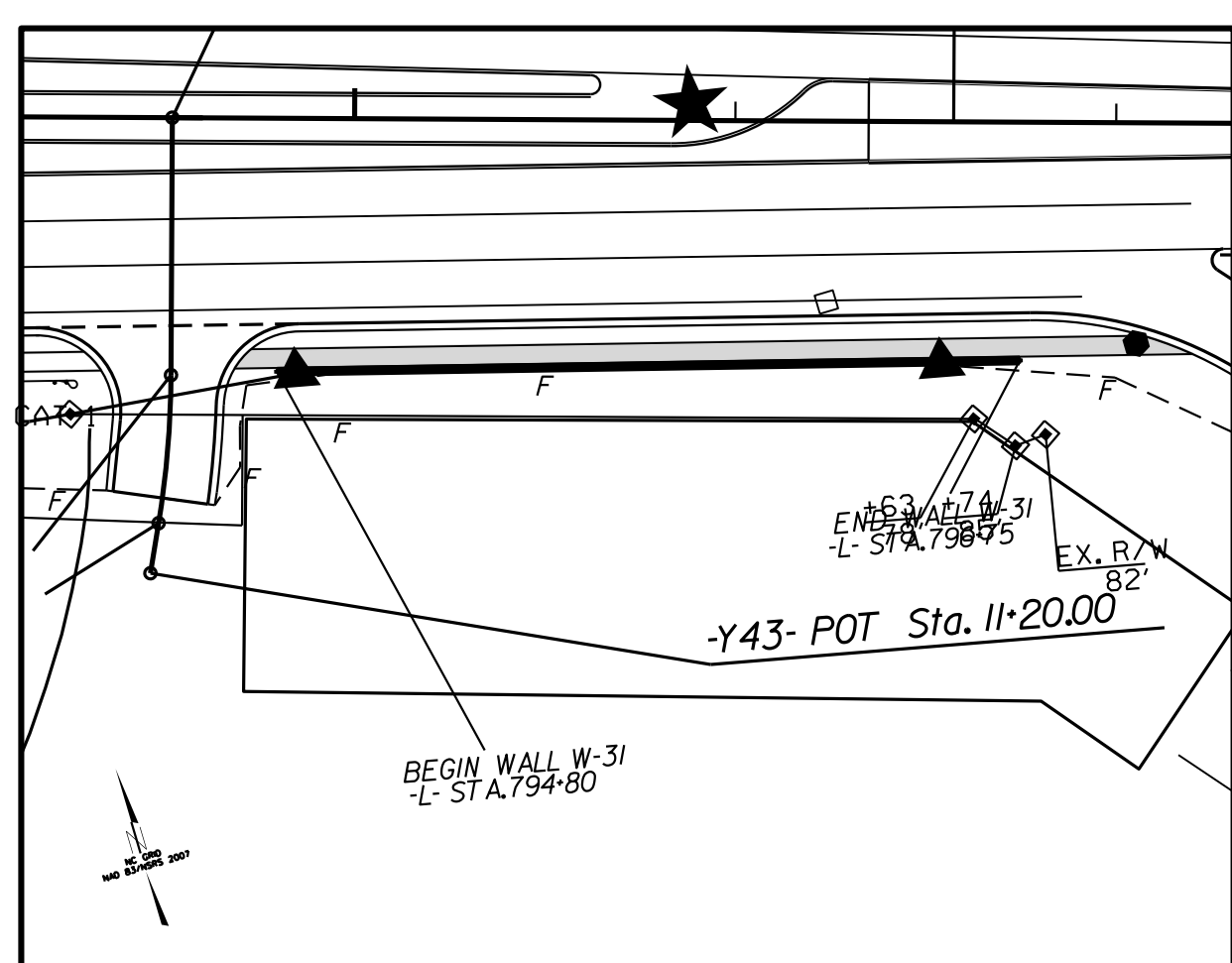
PROJECT NO.: 37944.1.FR5 (R-2307B)
 IREDELL COUNTY
 STATION: SEE SUMMARY TABLE
 SHEET 10 OF 19

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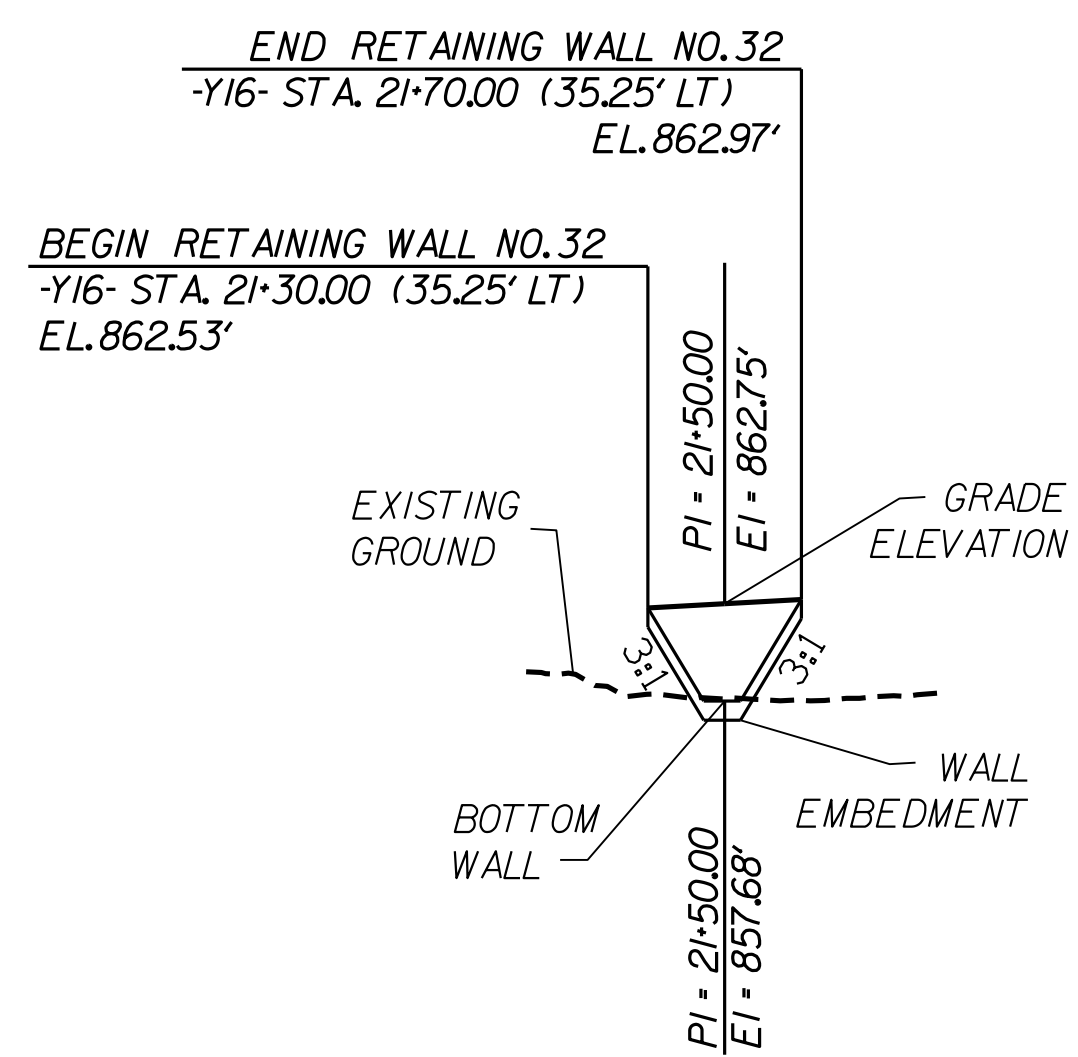
NORTH CAROLINA
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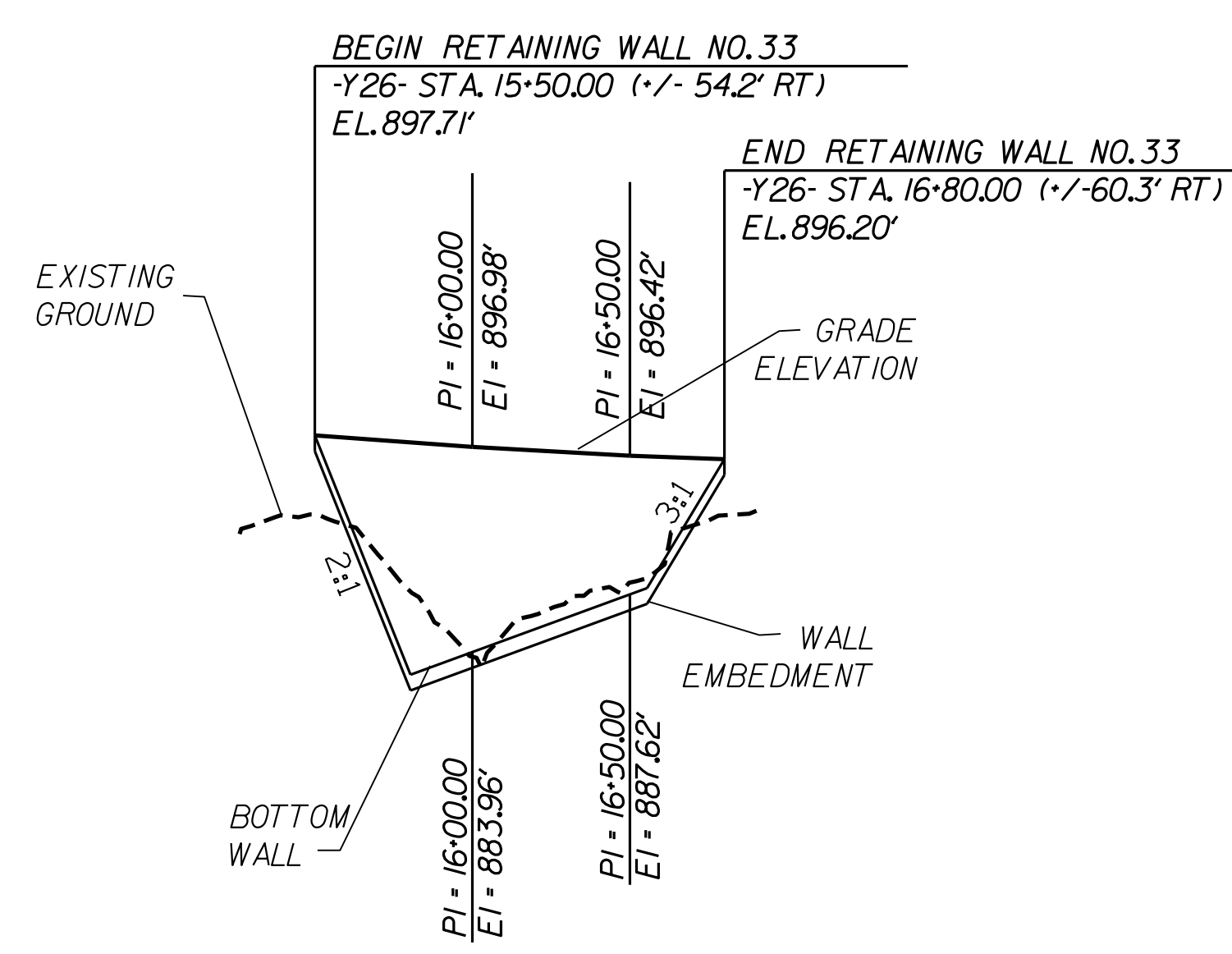
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2	-	-	4	-	-	



WALL 31
WALL ADJACENT -L-
RETAINING WALL 31
SEE WALL SUMMARY FOR WALL EMBEDMENT AND
INSTALLED WALL AREA



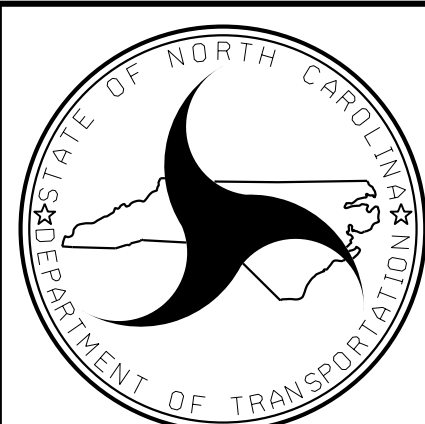
WALL 32
WALL ADJACENT -Y16-
RETAINING WALL 32
SEE WALL SUMMARY FOR WALL EMBEDMENT AND
INSTALLED WALL AREA



WALL 33
WALL ADJACENT -Y26-
RETAINING WALL 33
SEE WALL SUMMARY FOR WALL EMBEDMENT AND
INSTALLED WALL AREA

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IREDELL COUNTY
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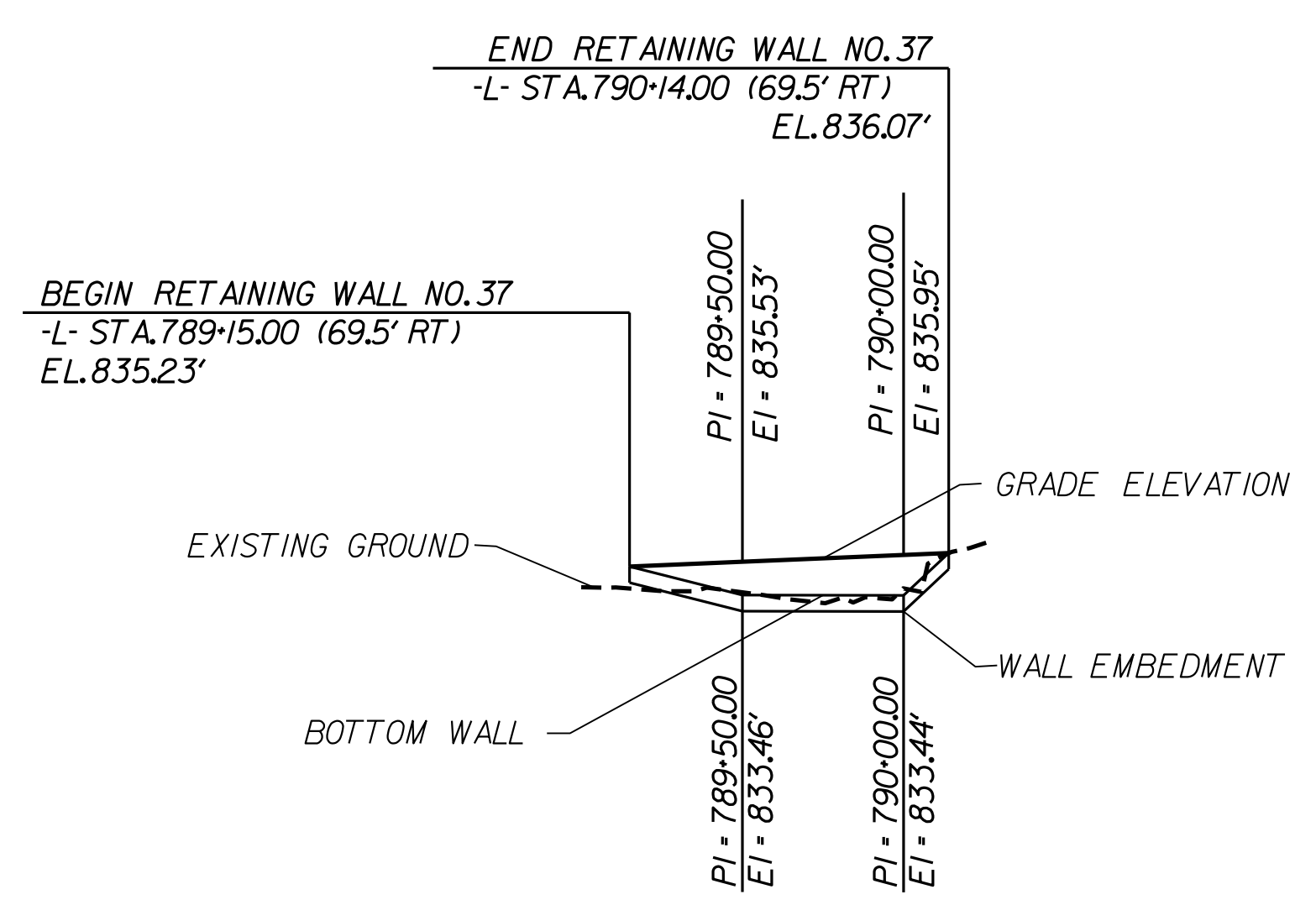
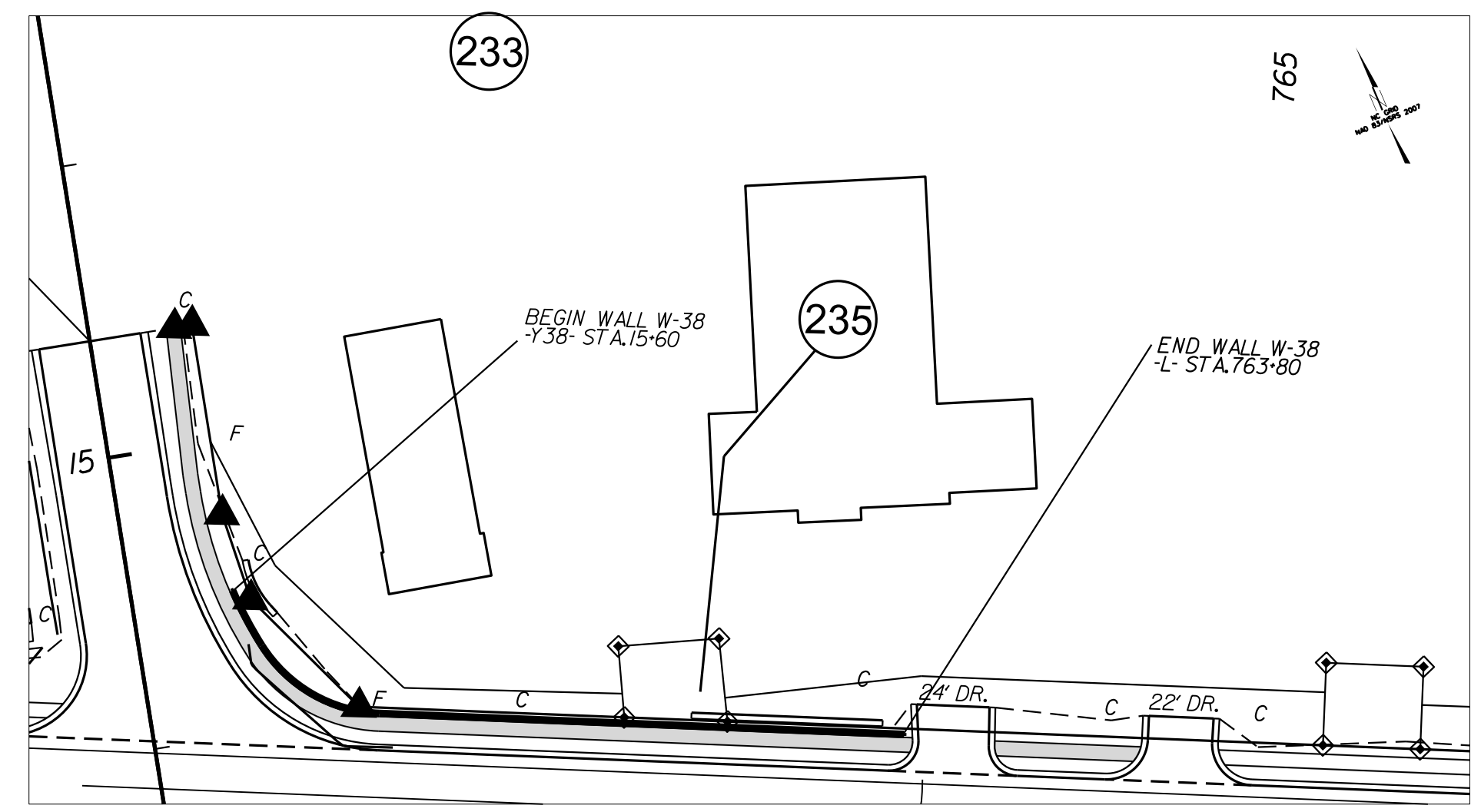
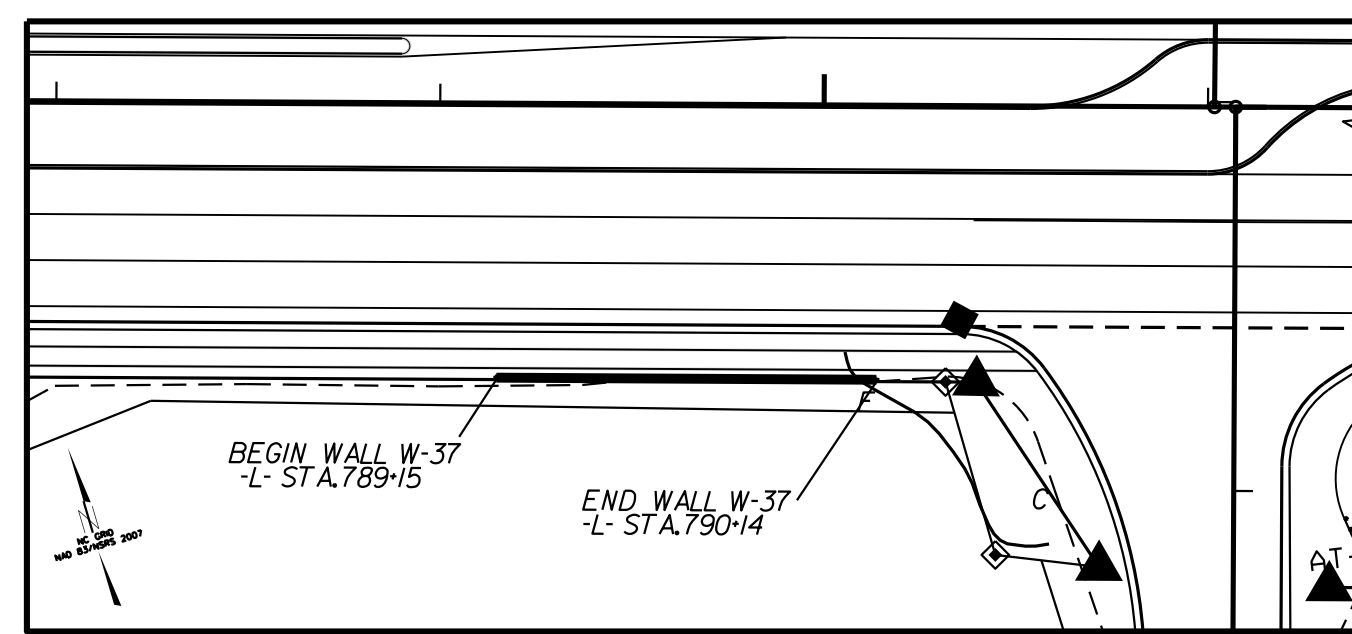
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ENGINEER

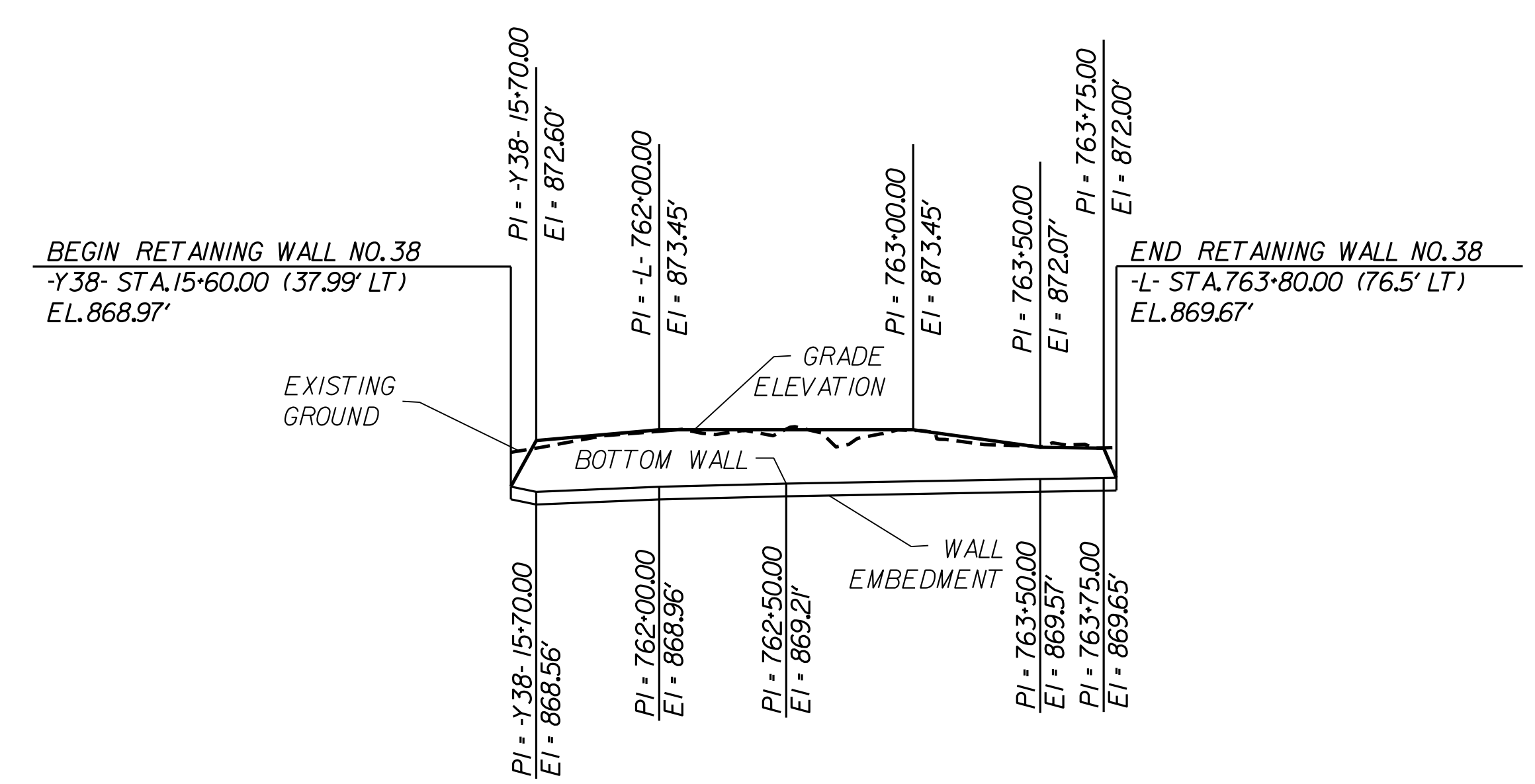
SEAL 028893

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WALL 37
WALL ADJACENT -L-
RETAINING WALL 37
SEE WALL SUMMARY FOR WALL EMBEDMENT AND
INSTALLED WALL AREA



WALL 38
WALL ADJACENT -Y38- & -L-
RETAINING WALL 38
SEE WALL SUMMARY FOR WALL EMBEDMENT AND
INSTALLED WALL AREA

PROJECT NO.: 37944.1.FR5 (R-2307B)
IREDELL COUNTY
STATION: SEE SUMMARY TABLE
SHEET 12 OF 19

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS

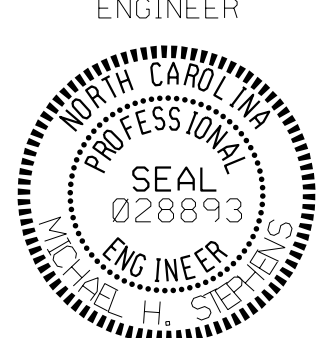
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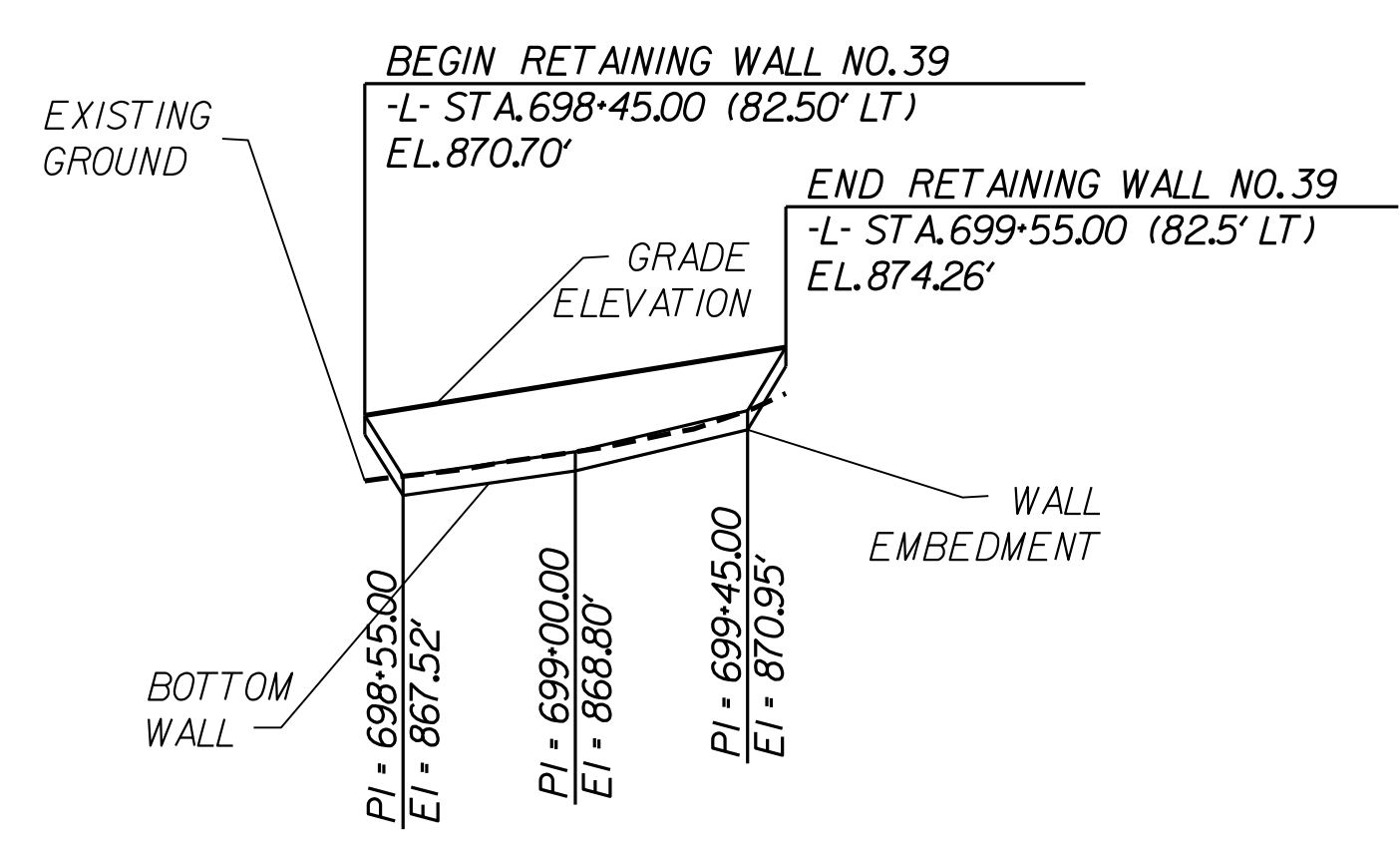
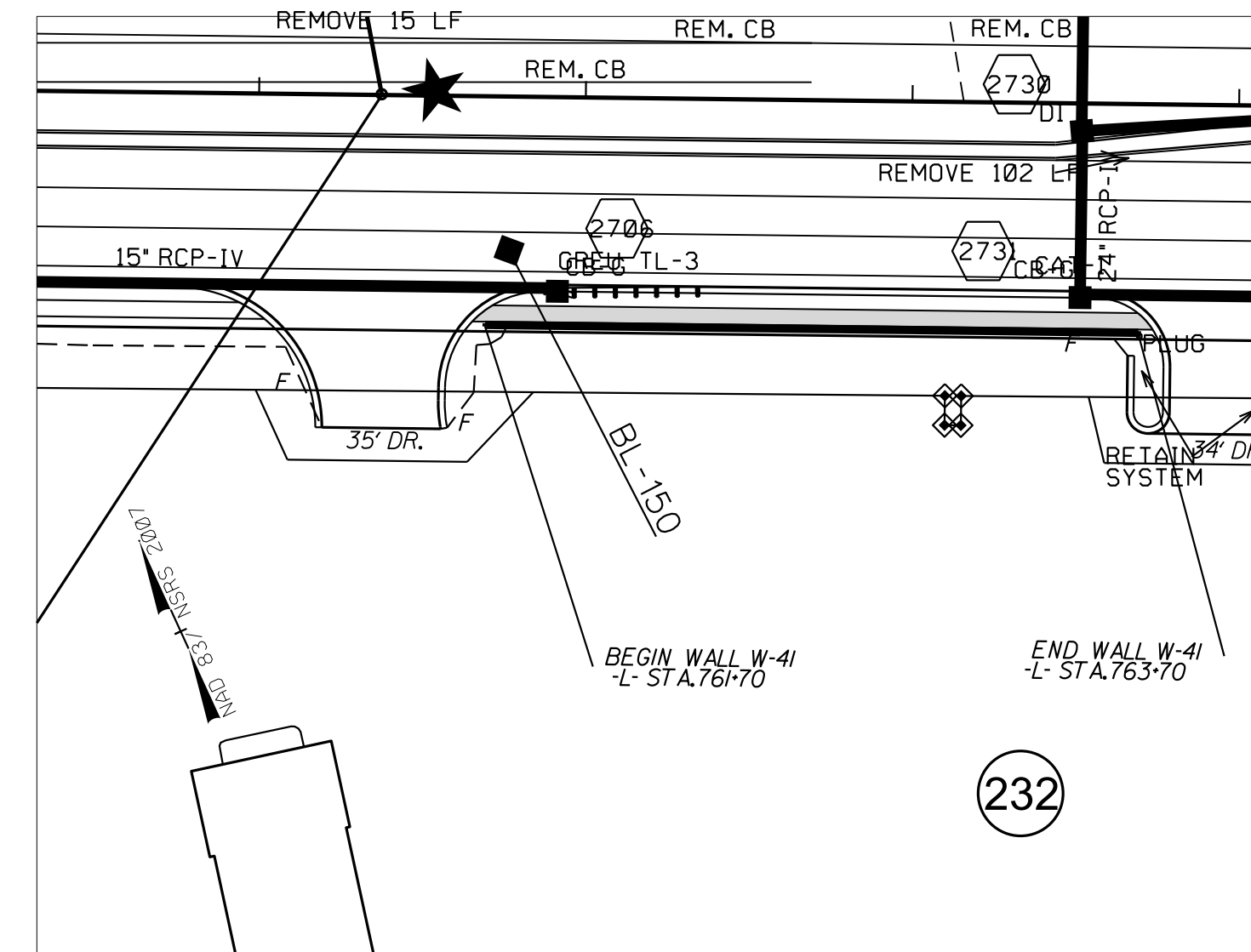
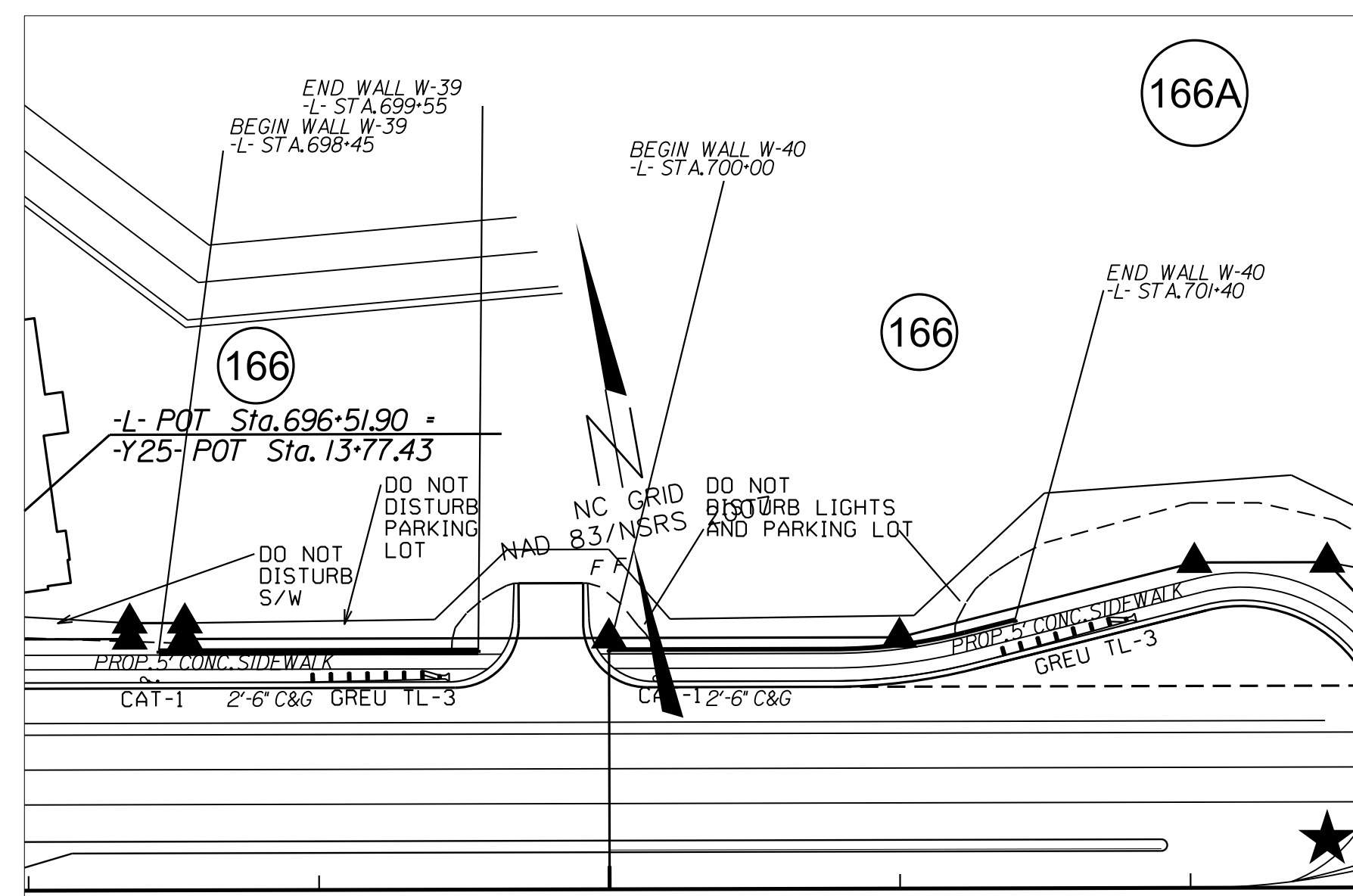
ENGINEER



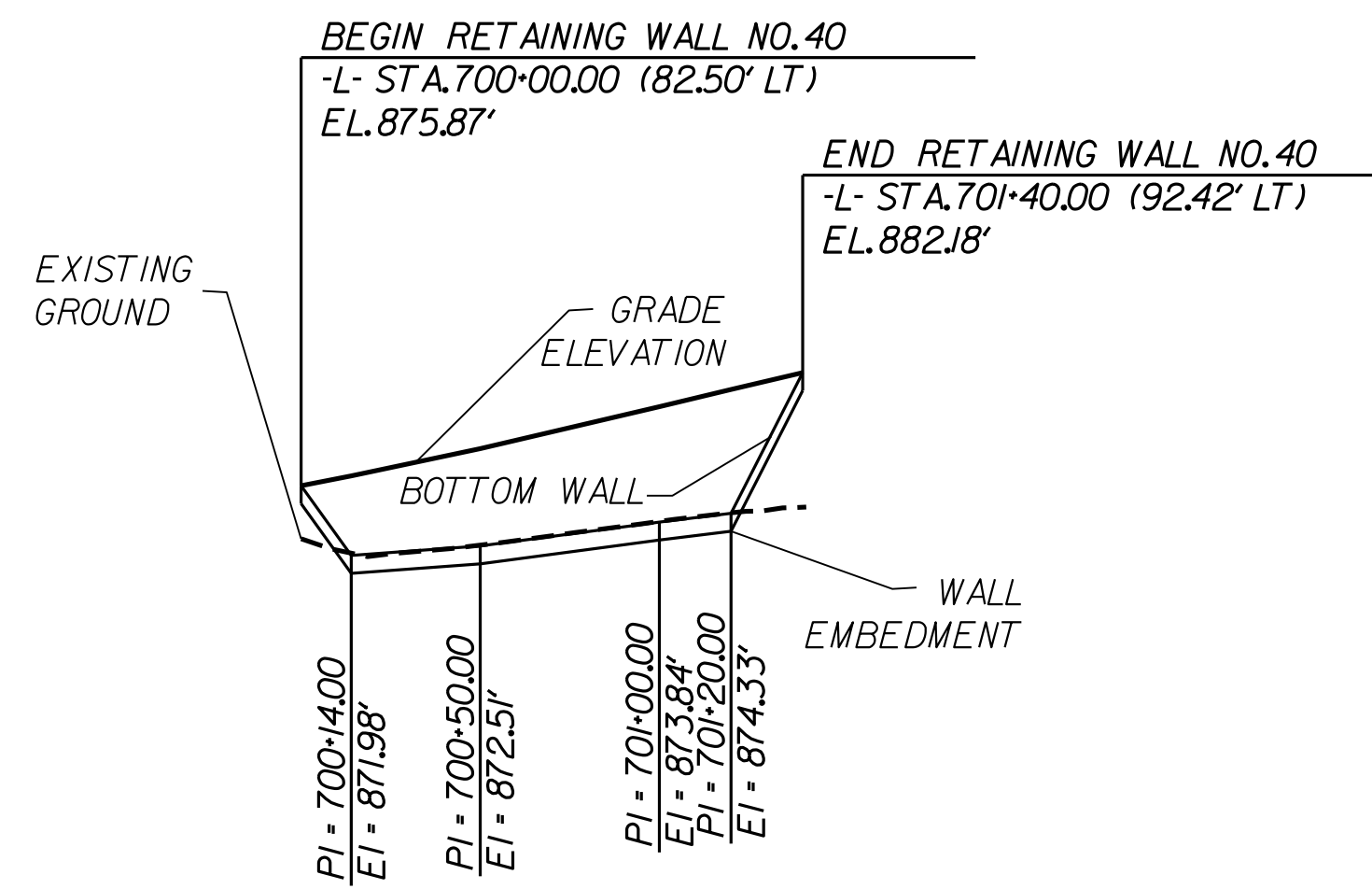
DocuSigned by: *M. H. Stiefel* 07/12/2024

Signature: _____ Date: _____

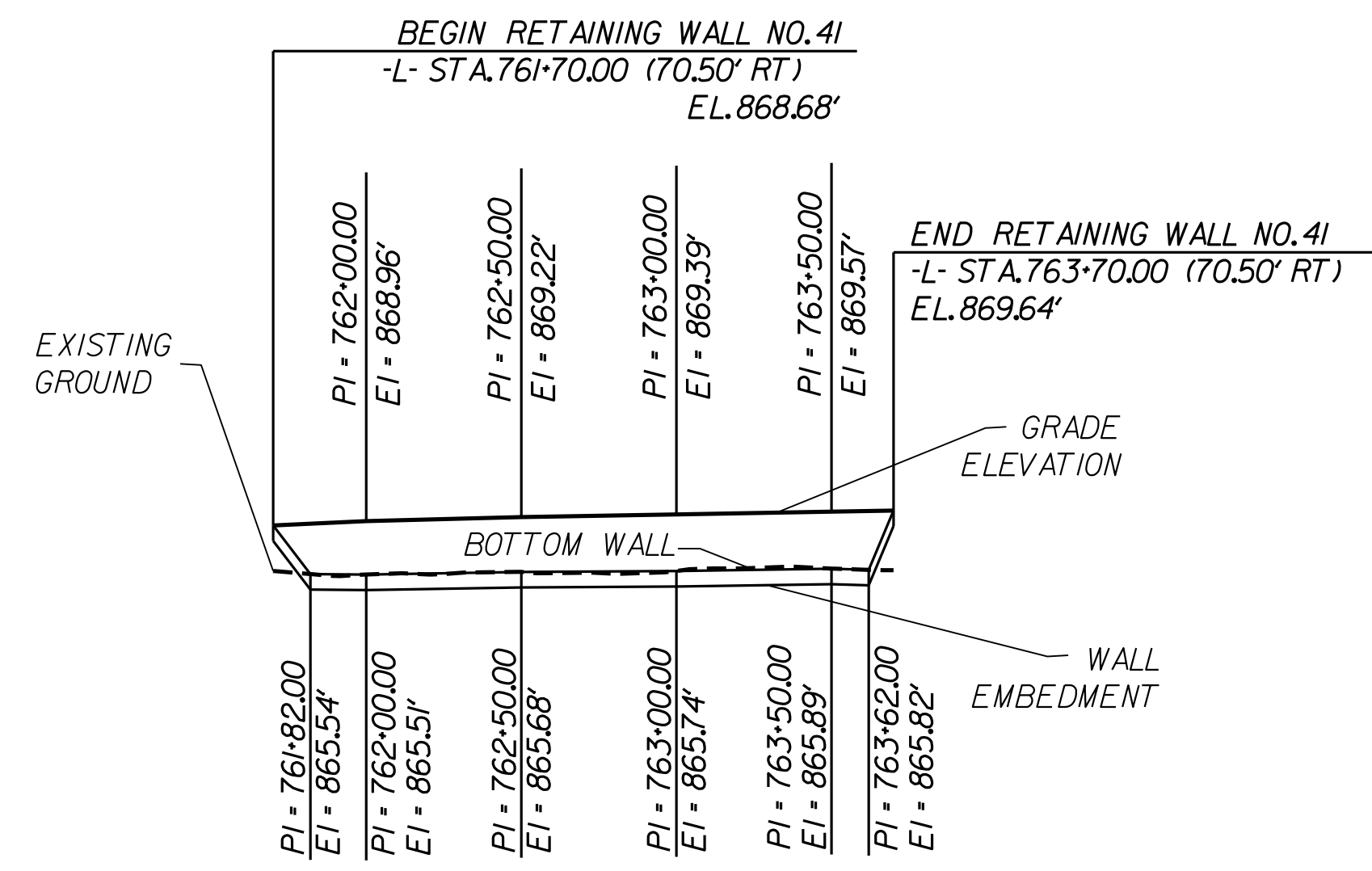
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UNLESS ALL SIGNATURES COMPLETED**



WALL 39
WALL ADJACENT -L-
RETAINING WALL 39
SEE WALL SUMMARY FOR WALL EMBEDMENT AND
INSTALLED WALL AREA

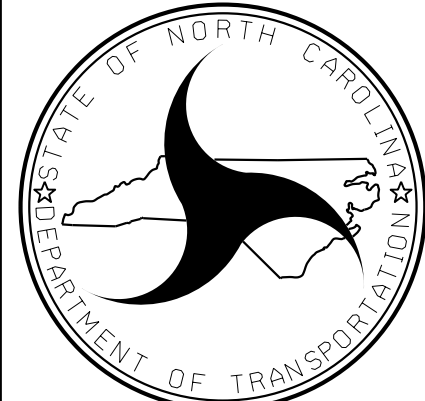


WALL 40
WALL ADJACENT -L-
RETAINING WALL 40
SEE WALL SUMMARY FOR WALL EMBEDMENT AND
INSTALLED WALL AREA



WALL 41
WALL ADJACENT -L-
RETAINING WALL 41
SEE WALL SUMMARY FOR WALL EMBEDMENT AND
INSTALLED WALL AREA

PROJECT NO.: 37944.1.FR5 (R-2307B)
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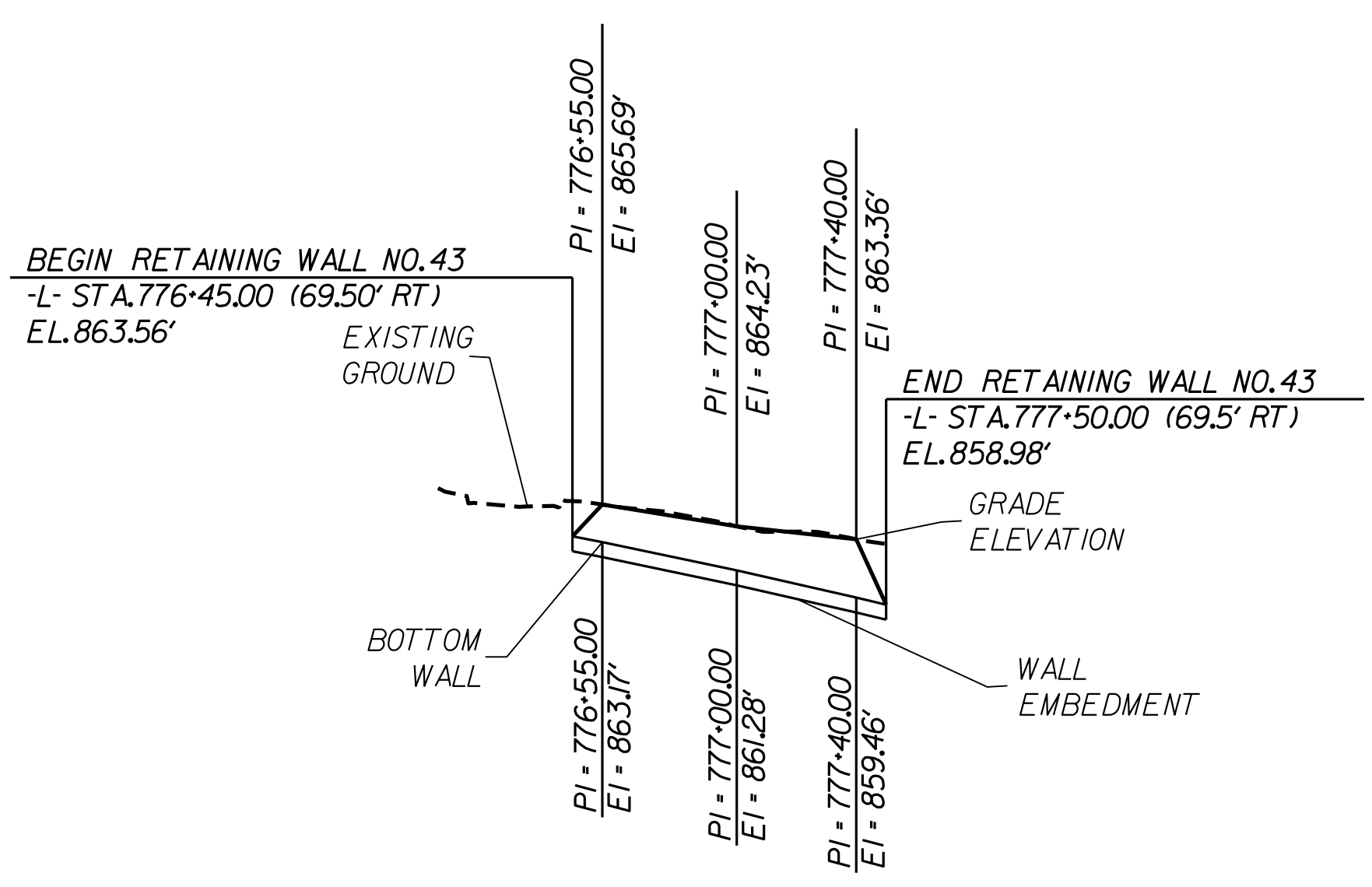
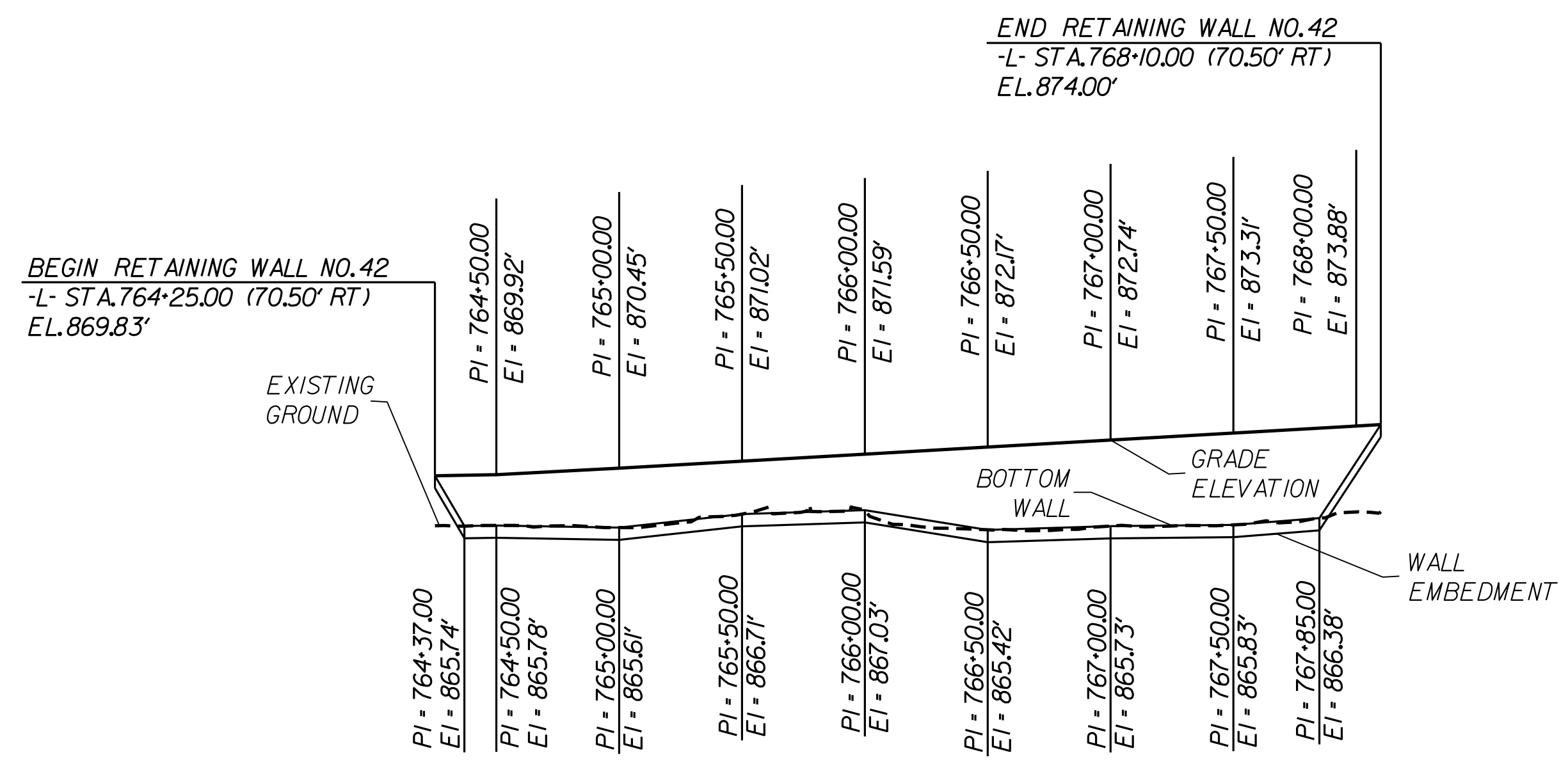
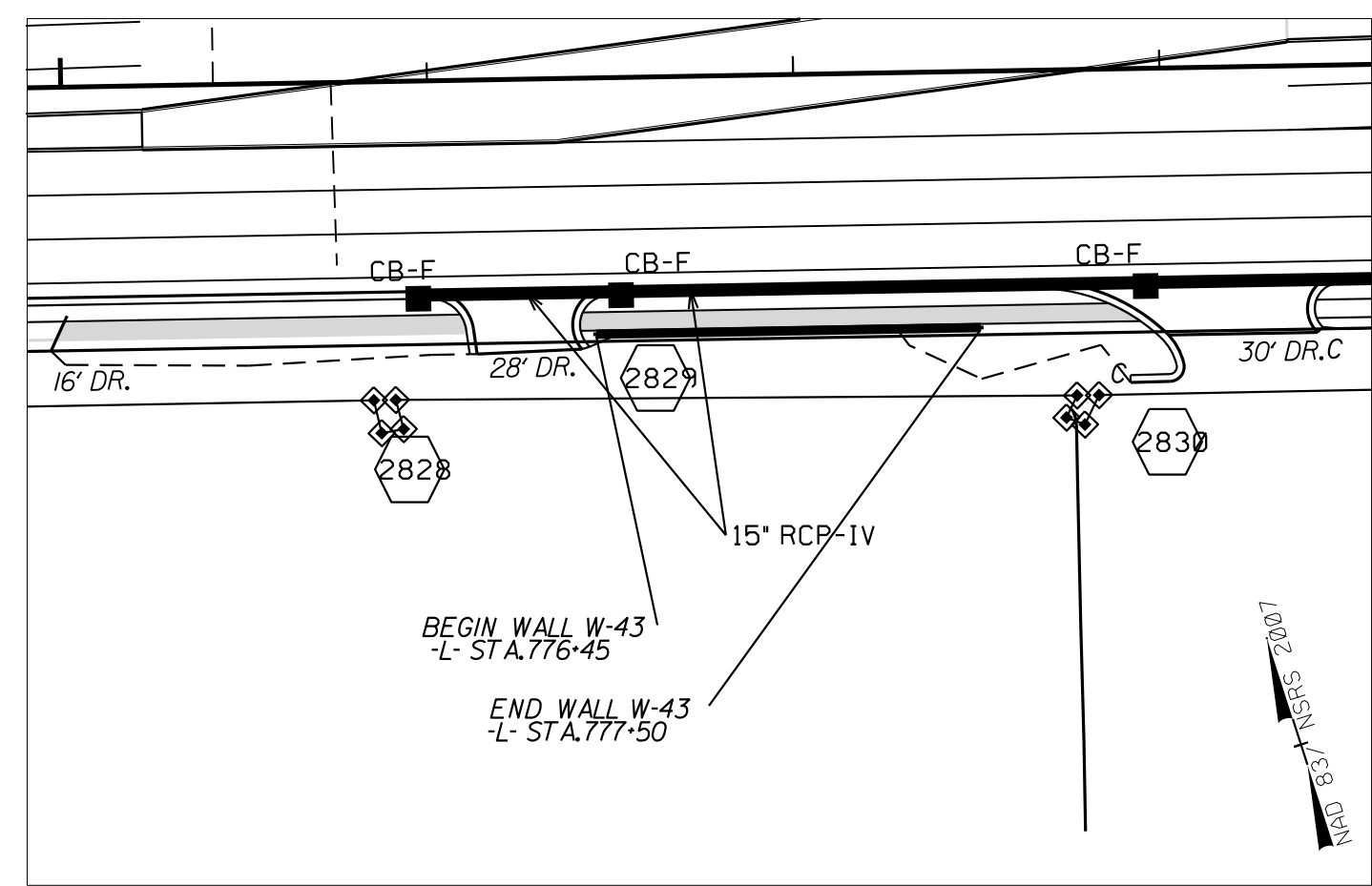
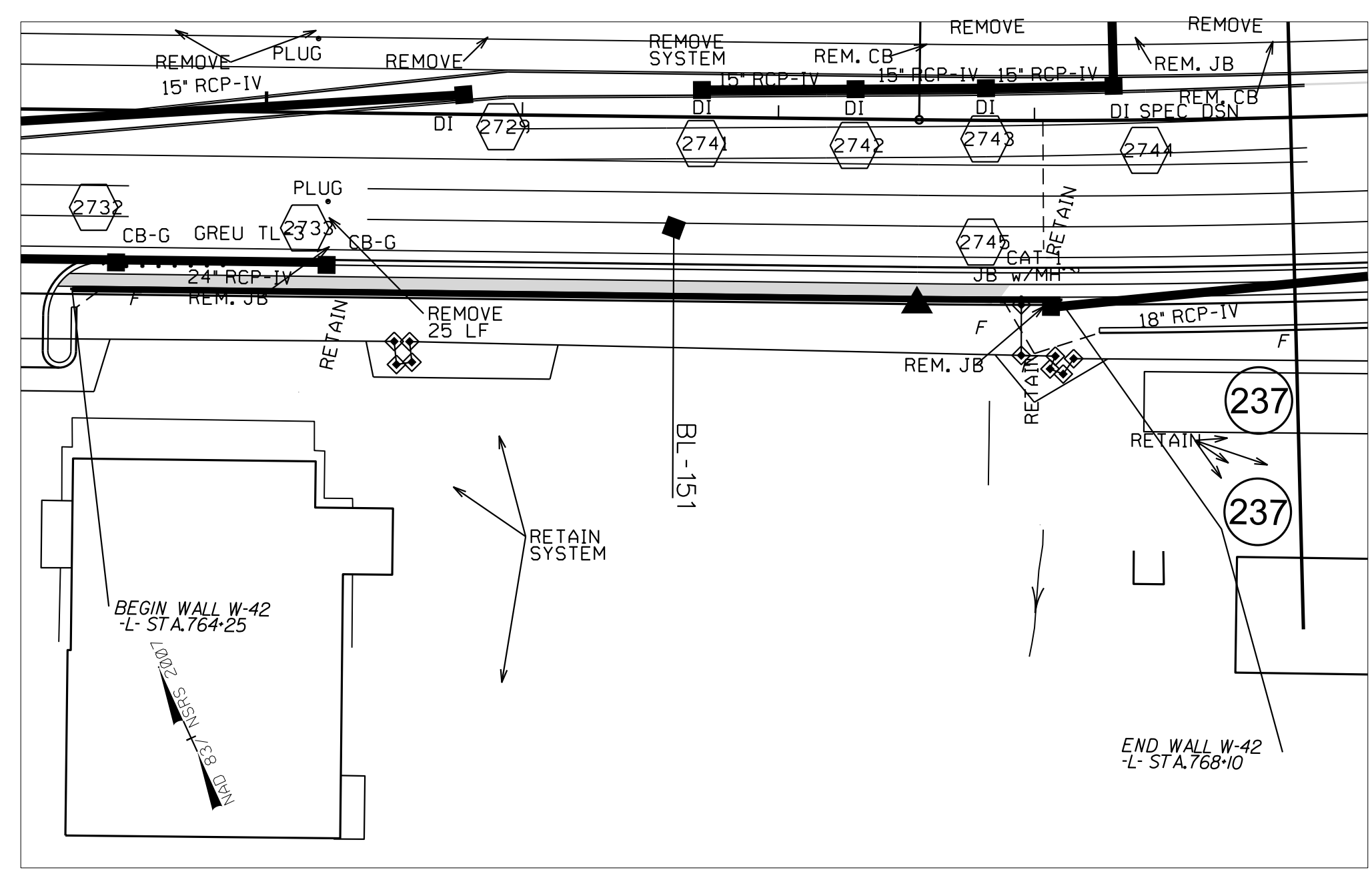
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ENGINEERING UNIT

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RETAINING WALL
NOS. 39, 40, AND 41

PREPARED BY: MHS	DATE: 7/24
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W-13

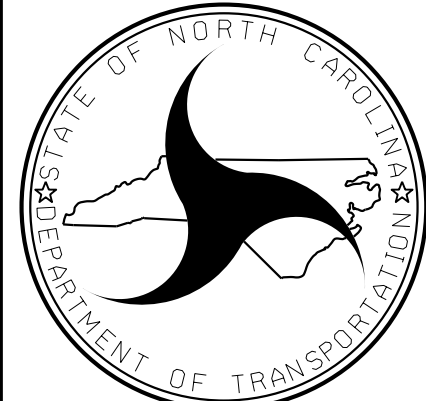


WALL 42
WALL ADJACENT -L-
RETAINING WALL 42
SEE WALL SUMMARY FOR WALL EMBEDMENT AND
INSTALLED WALL AREA

WALL 43
WALL ADJACENT -L-
RETAINING WALL 43
SEE WALL SUMMARY FOR WALL EMBEDMENT AND
INSTALLED WALL AREA

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SHEET NO. W-14

GEOTECHNICAL ENGINEER

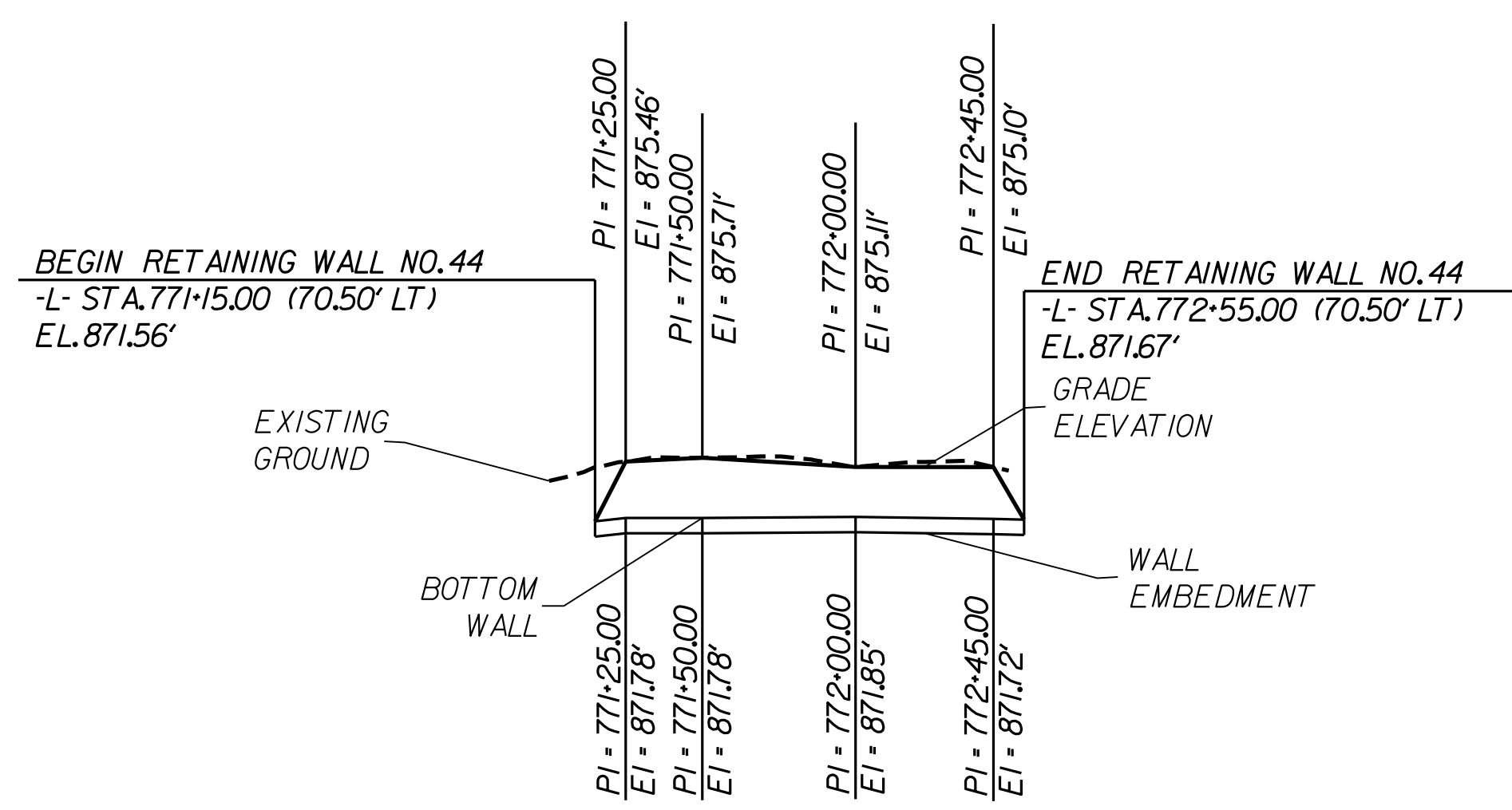
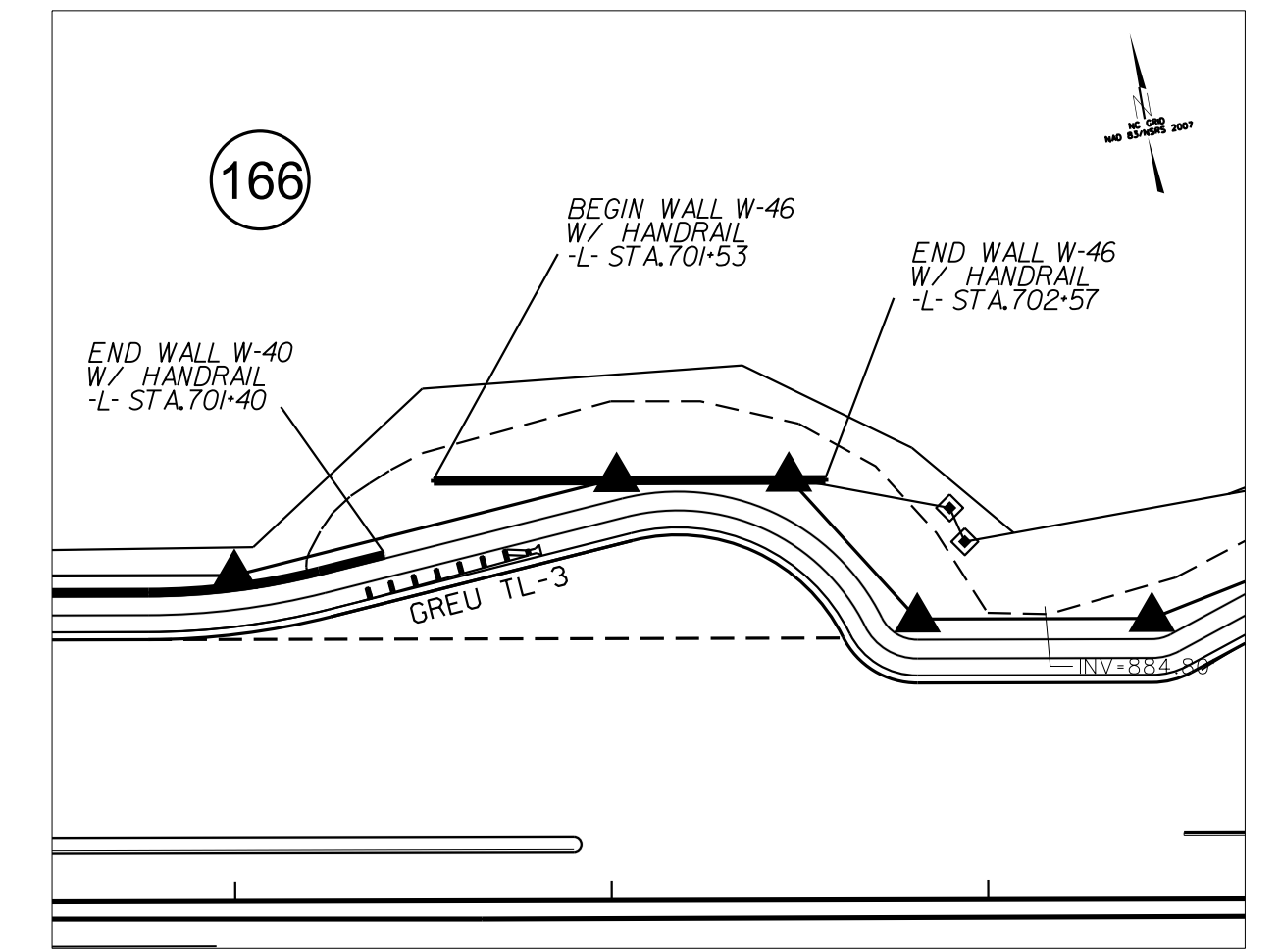
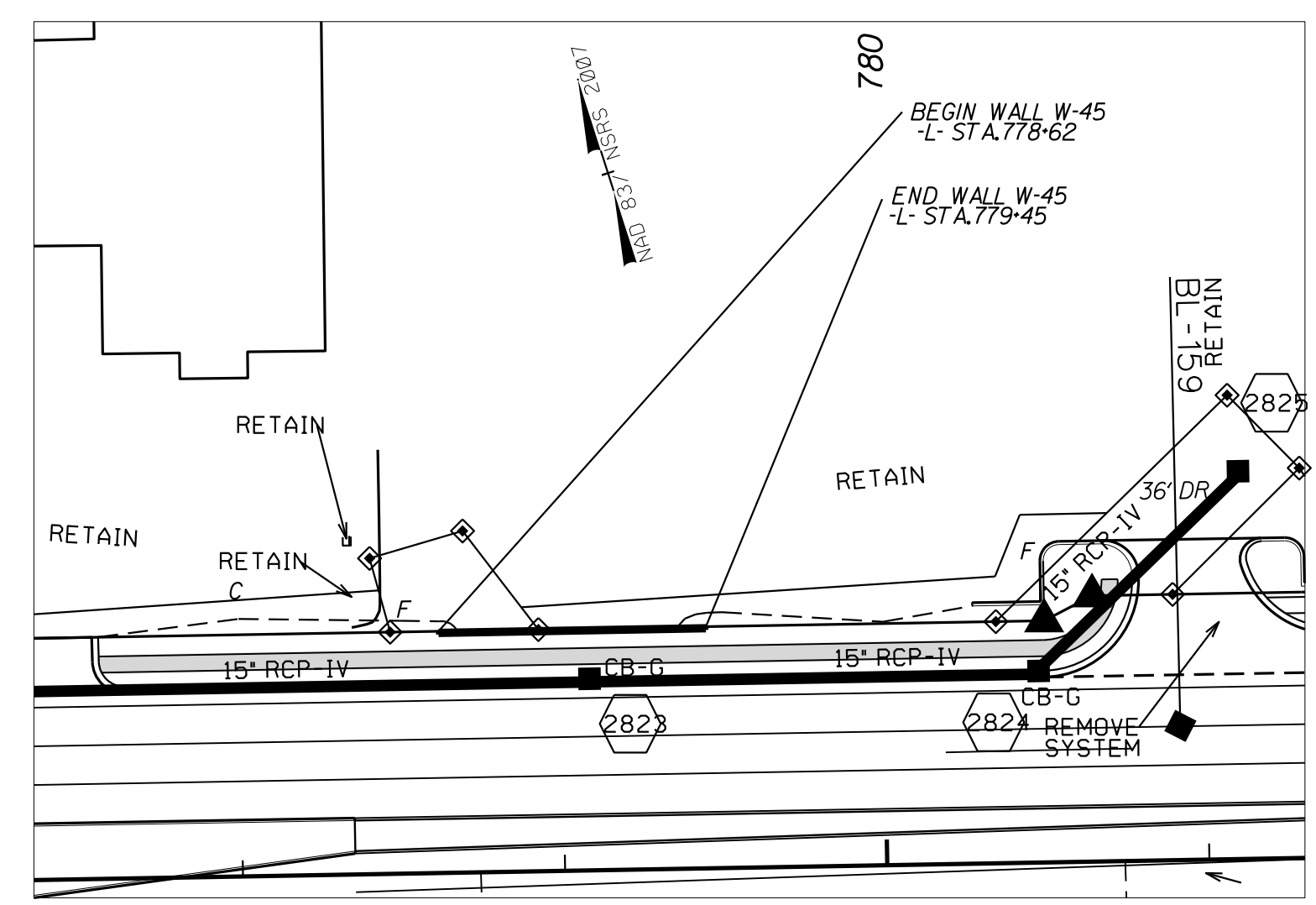
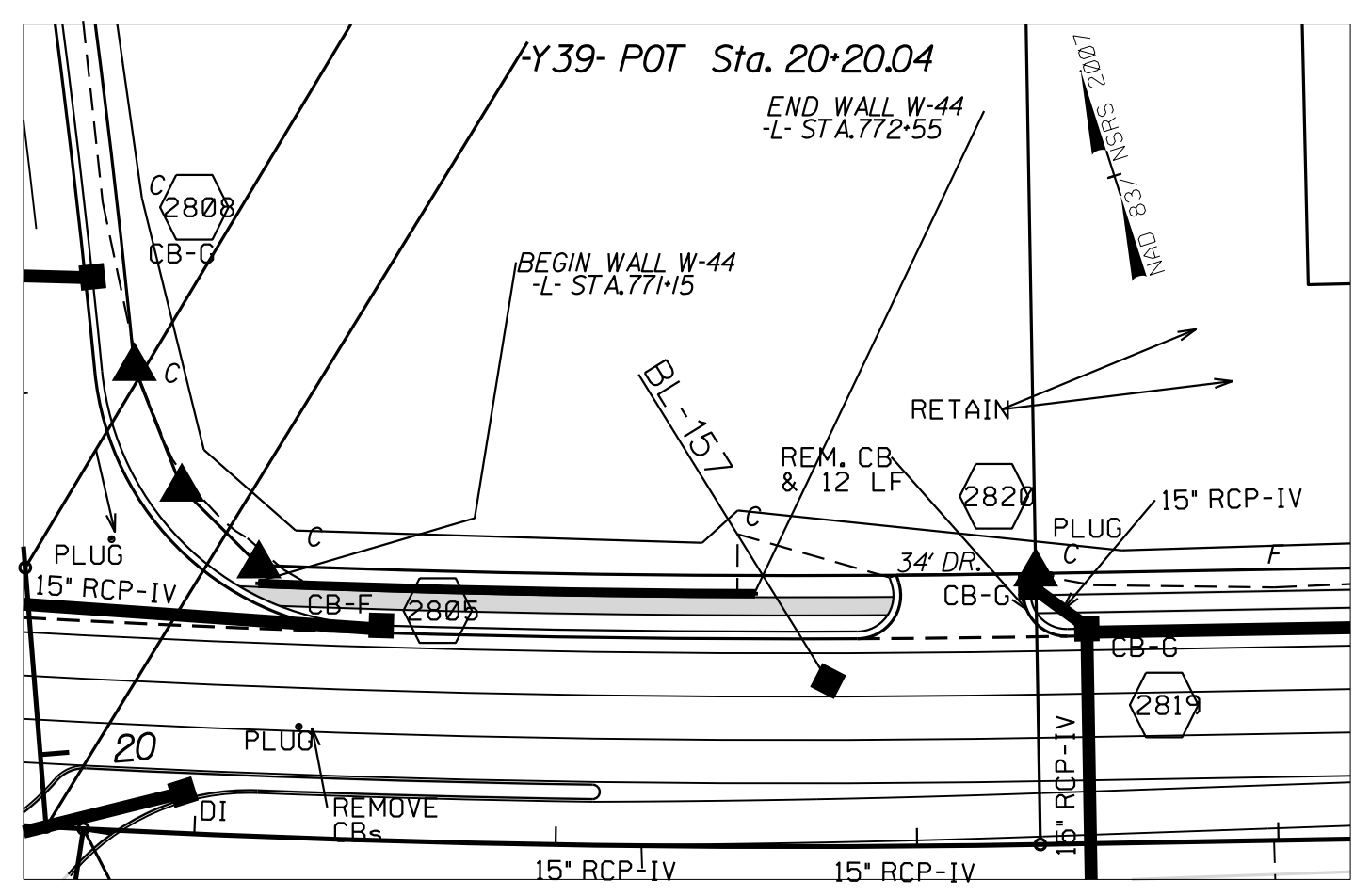
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DocuSigned by: *Michael H. Stiefel* 07/12/2024

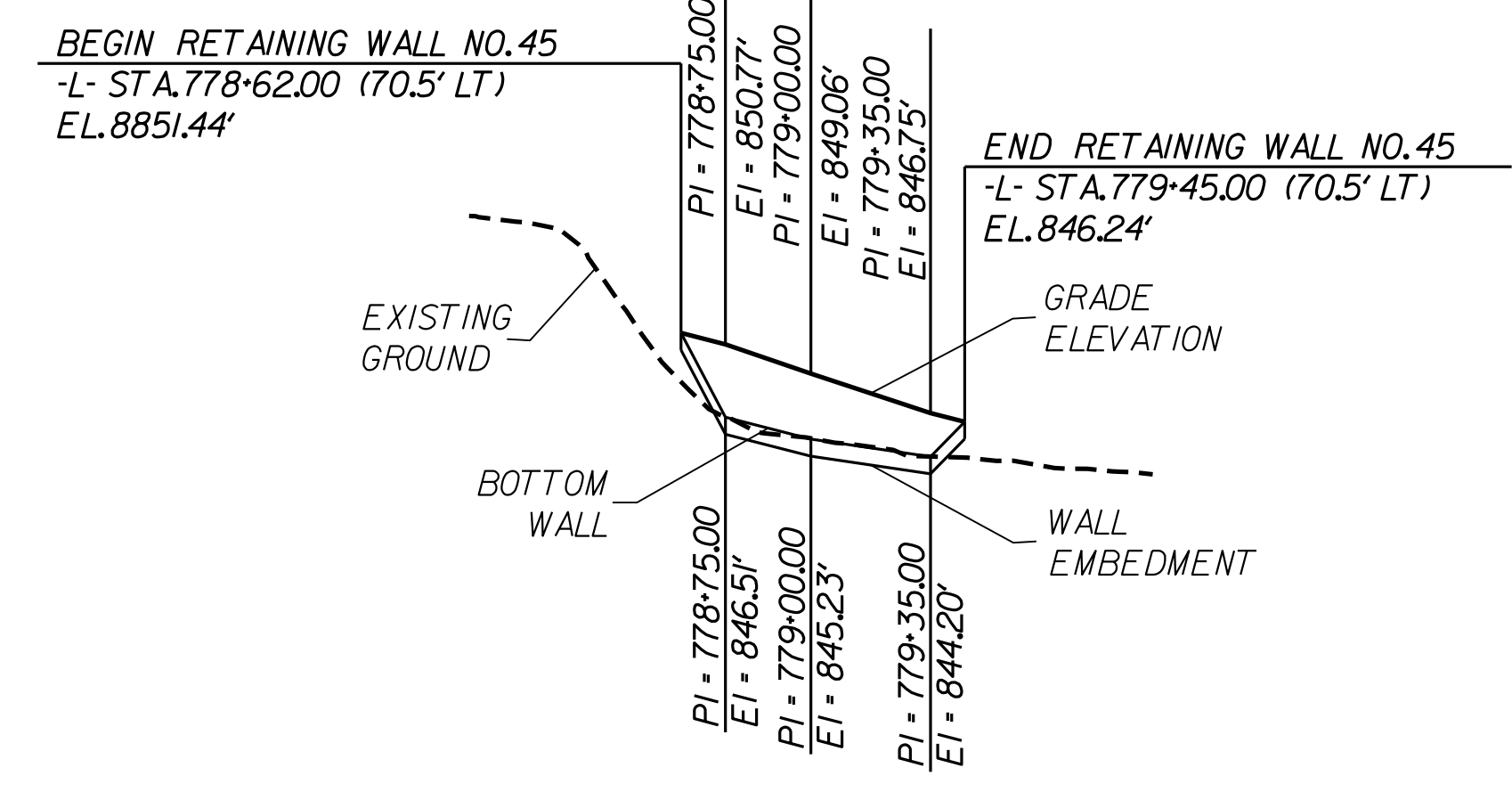
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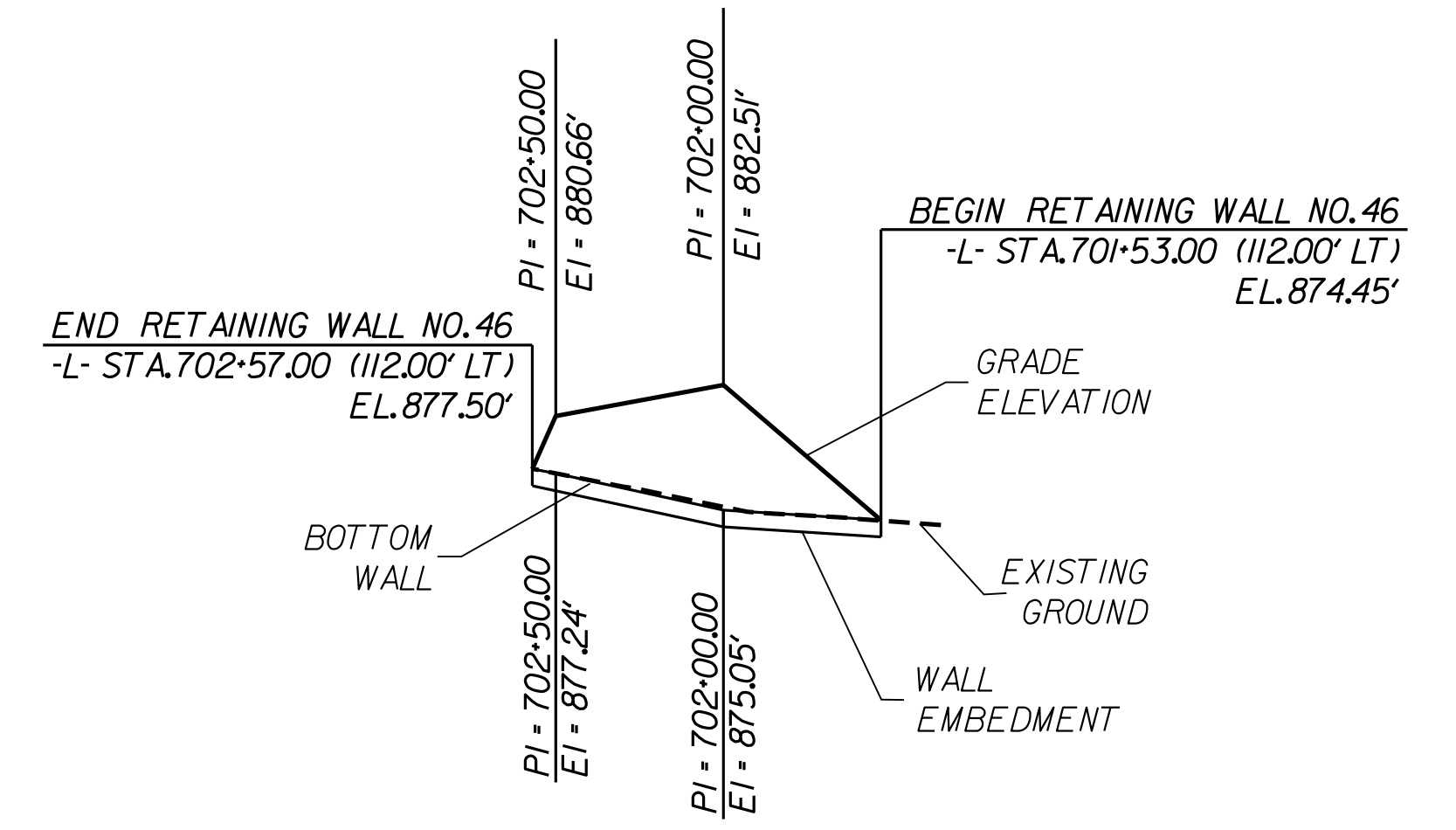
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WALL 44
WALL ADJACENT -L-
RETAINING WALL 44
SEE WALL SUMMARY FOR WALL EMBEDMENT AND
INSTALLED WALL AREA



WALL 45
WALL ADJACENT -L-
RETAINING WALL 45
SEE WALL SUMMARY FOR WALL EMBEDMENT AND
INSTALLED WALL AREA



WALL 46
WALL ADJACENT -L-
RETAINING WALL 46*
SEE WALL SUMMARY FOR WALL EMBEDMENT
AND INSTALLED WALL AREA

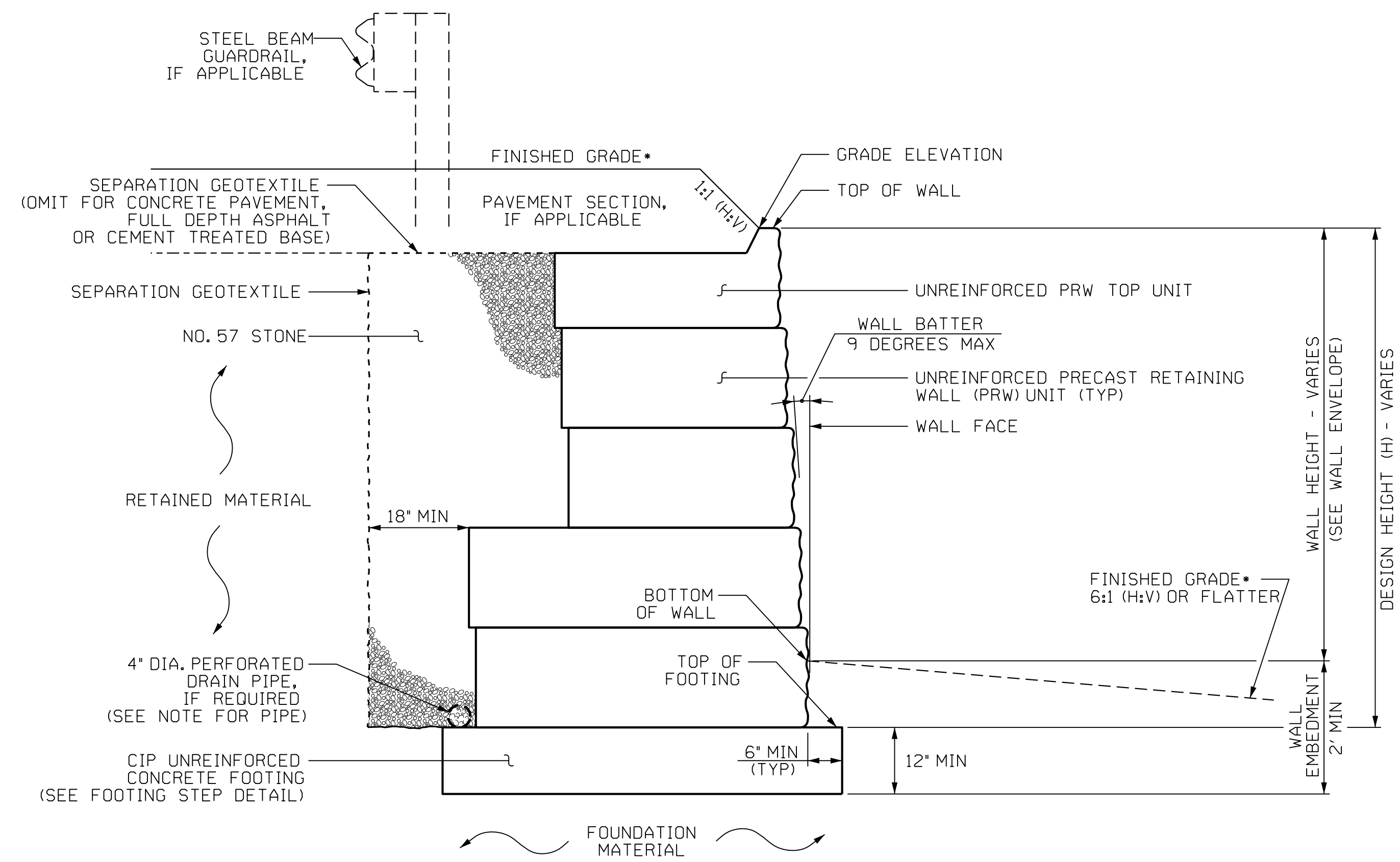
PROJECT NO.: 37944.1.FR5 (R-2307B)
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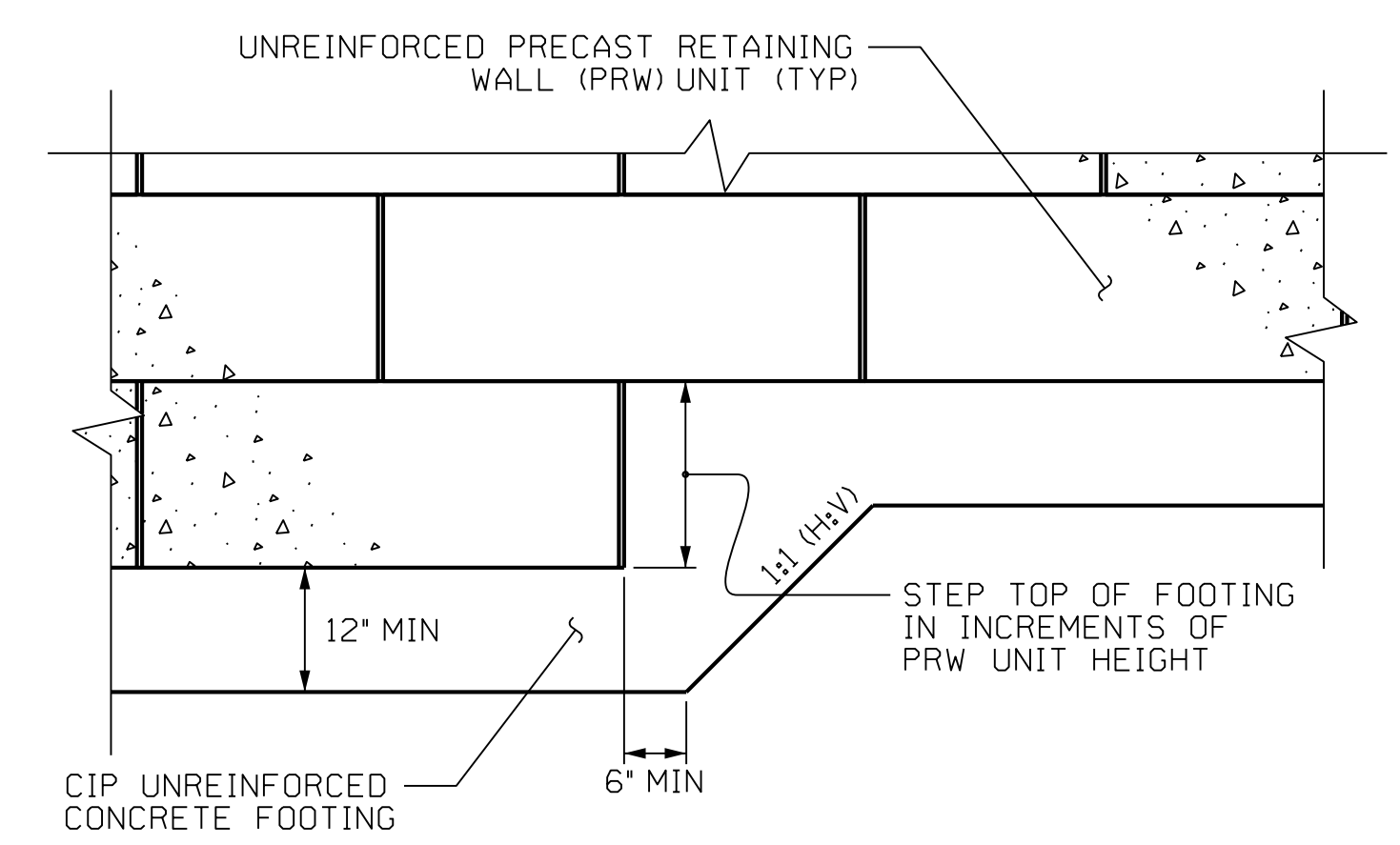
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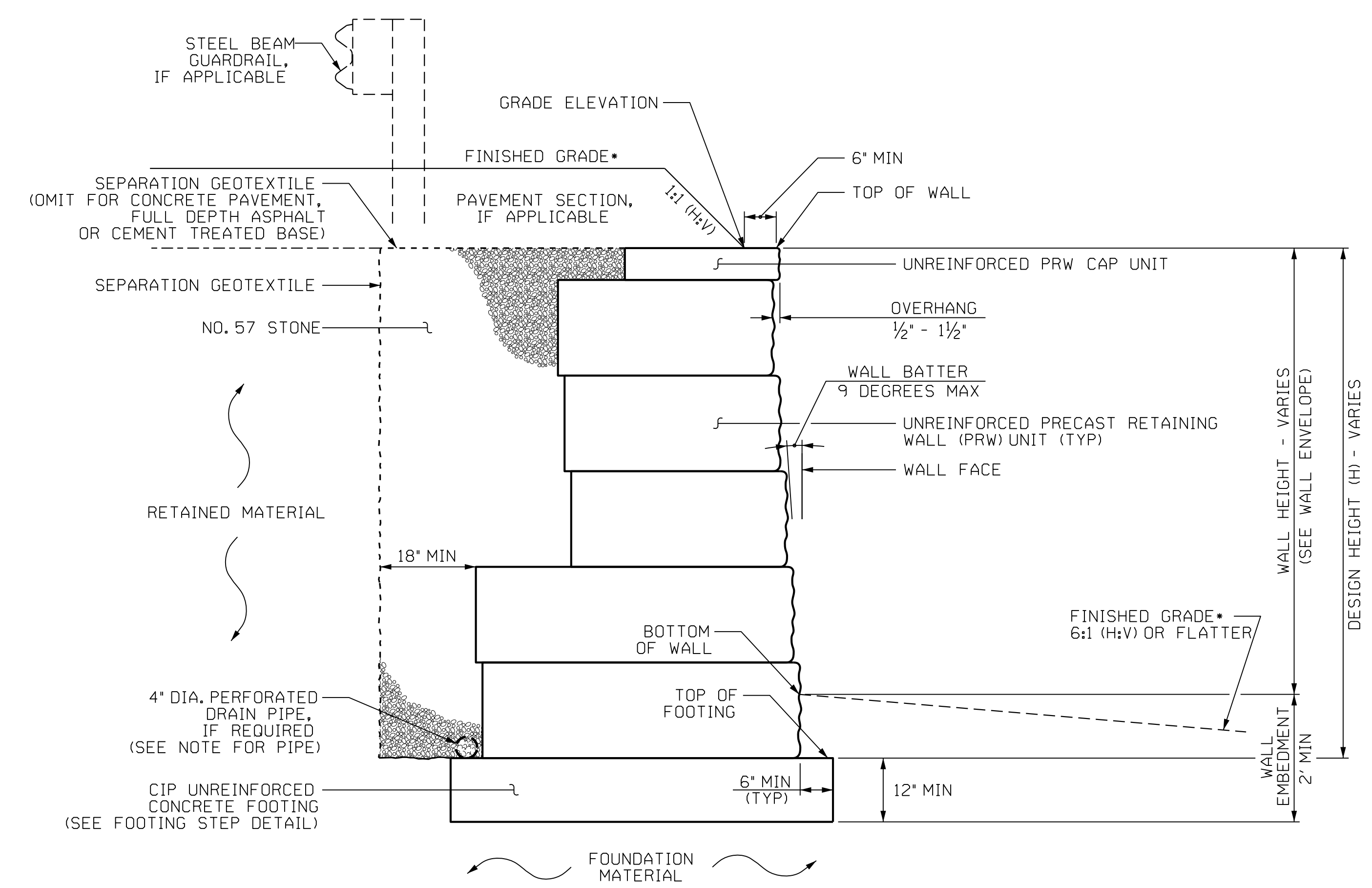


PRECAST GRAVITY WALL WITH TOP PRW UNIT - TYPICAL SECTION

*SEE ROADWAY PLANS FOR FINISHED GRADE DETAILS.



FOOTING STEP DETAIL



PRECAST GRAVITY WALL WITH CAP PRW UNIT - TYPICAL SECTION

*SEE ROADWAY PLANS FOR FINISHED GRADE DETAILS.

NOTES:

- FOR PRECAST GRAVITY RETAINING WALLS, SEE SECTION 455 OF THE STANDARD SPECIFICATIONS.
- THE FOLLOWING PRECAST GRAVITY RETAINING WALL NOTES ARE FOR RETAINING WALLS NOS. 8, 10, 11, 12, 18, AND 23
- FOR STEEL BEAM GUARDRAIL, SEE ROADWAY PLANS AND SECTION 862 OF THE STANDARD SPECIFICATIONS.
- USE PRW UNITS WITH A TRI PLANE SPLIT FACE FOR THE PRECAST GRAVITY WALL.
- USE PRW UNITS WITH A BROWN COLOR FOR THE PRECAST GRAVITY WALL.
- A DRAIN PIPE IS REQUIRED FOR THE PRECAST GRAVITY WALL.
- BEFORE BEGINNING PRECAST GRAVITY WALL DESIGNS, SURVEY WALL LOCATION AND SUBMIT REVISED WALL PROFILE VIEWS (WALL ENVELOPES) FOR REVIEW. DO NOT START WALL DESIGNS OR CONSTRUCTION UNTIL THE REVISED WALL ENVELOPES ARE ACCEPTED.
- DESIGN THE PRECAST GRAVITY WALL FOR DESIGN HEIGHTS EQUAL TO THE WALL HEIGHT PLUS DEPTH TO TOP OF FOOTING (DIFFERENCE BETWEEN GRADE ELEVATION AND TOP OF FOOTING ELEVATION).
- DESIGN THE PRECAST GRAVITY WALL FOR THE FOLLOWING:
 - 1) MAXIMUM FACTORED VERTICAL PRESSURE ON FOUNDATION MATERIAL = VARIES, SEE SUMMARY TABLE
 - 2) MINIMUM WALL EMBEDMENT ELEVATION = 2 FT
 - 3) IN-SITU ASSUMED MATERIAL PARAMETERS:

MATERIAL TYPE	UNIT WEIGHT (γ) PCF	FRICTION ANGLE (φ) DEGREES	COHESION (c) PSF
RETAINED	120	30	0
FOUNDATION	120	30	0

DESIGN THE PRECAST GRAVITY WALLS FOR A LIVE LOAD (TRAFFIC) SURCHARGE, WHERE APPLICABLE.

DO NOT PLACE CONCRETE FOR FOOTINGS FOR THE PRECAST GRAVITY WALLS UNTIL EXCAVATION DIMENSIONS AND FOUNDATION MATERIAL ARE APPROVED.

GEOTECHNICAL ENGINEER SEAL 028893 MICHAEL H. STEPHENS ENGINEER	ENGINEER SIGNATURE _____ DATE _____
DocuSigned by: 07/12/2024 C447682922107	DATE _____ SIGNATURE _____ DATE _____
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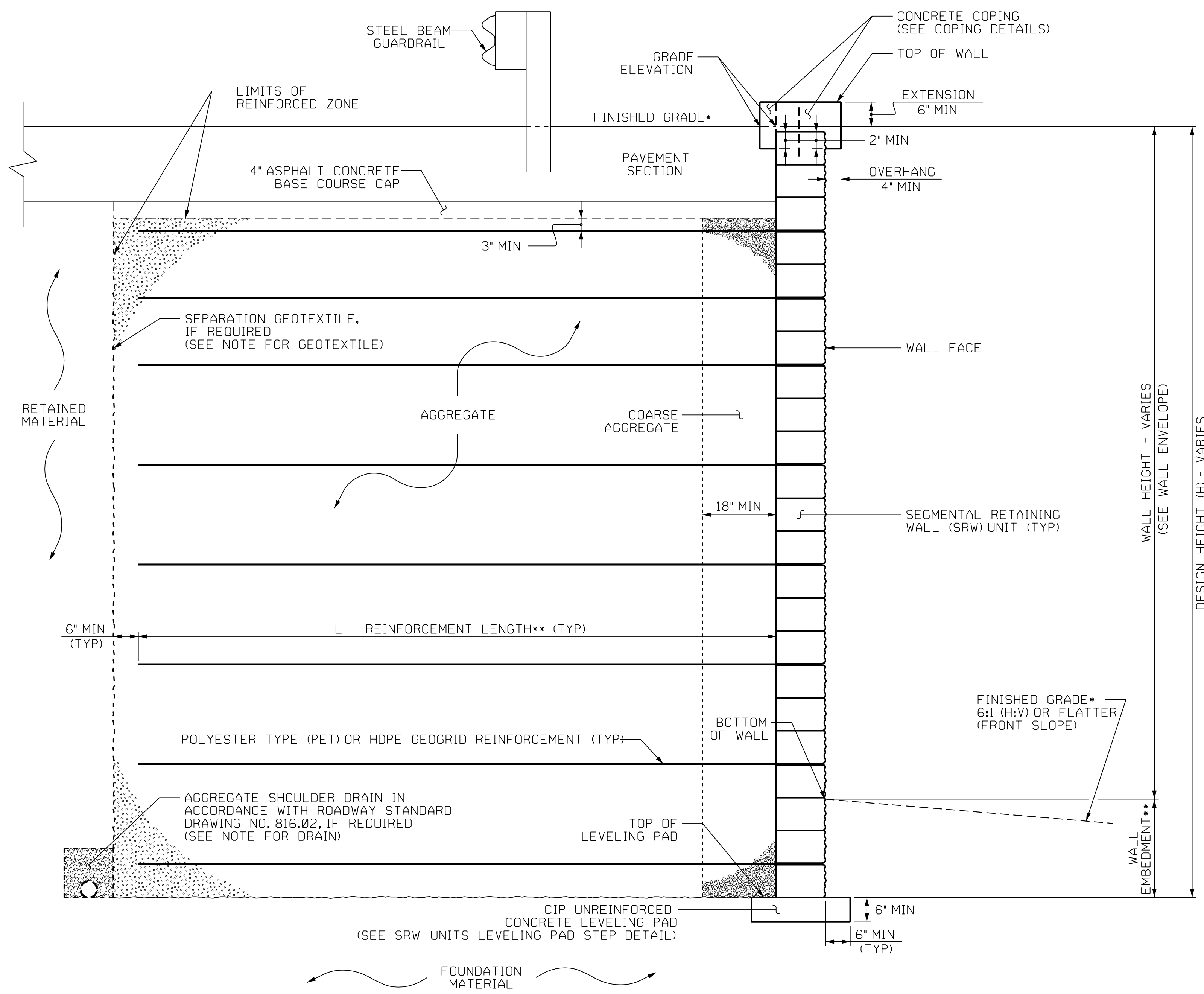
SEAL
028893
MICHAEL H. STEPHENS
ENGINEER

ENGINEER

DocuSigned by:
Michael H. Stephens
07/12/2024

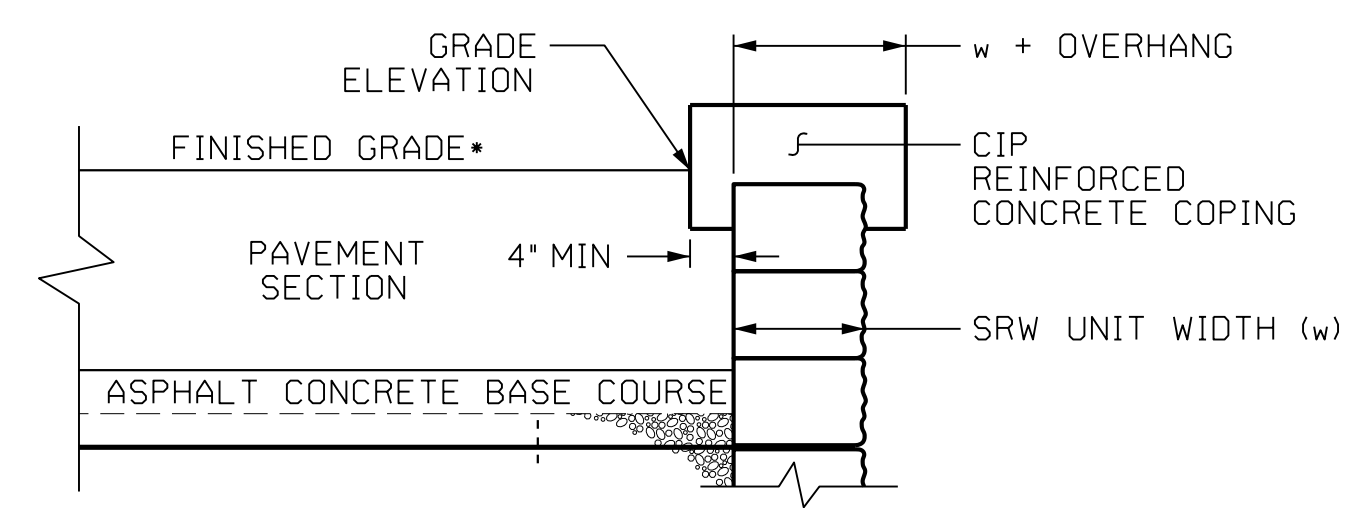
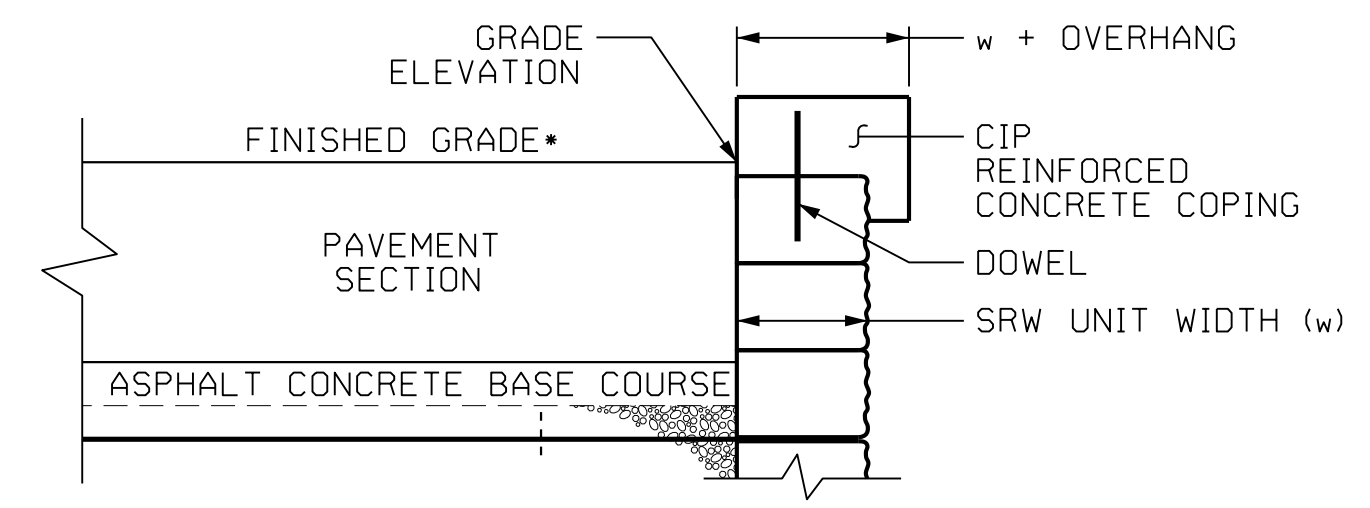
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MSE WALL WITH SRW UNITS - TYPICAL SECTION

••SEE MSE RETAINING WALLS PROVISION AND IF APPLICABLE, MSE WALL NOTES FOR WALL EMBEDMENT AND REINFORCEMENT LENGTH REQUIREMENTS.
 *SEE ROADWAY PLANS FOR FINISHED GRADE DETAILS.



COPING DETAILS

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

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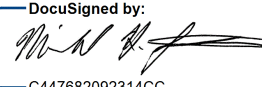
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DIVISION OF HIGHWAYS

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NOTES:

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

THE FOLLOWING MSE RETAINING WALL NOTES ARE FOR RETAINING WALLS NOS. 1, 2, 3, 4, 5, 13, 14, 16, 17, 19, 20, 21, 22, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 39, 40, 41, 42, 45, AND 46.

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

A FENCE OR HANDRAIL MAYBE REQUIRED ON TOP OF THE RETAINING WALLS. SEE ROADWAY PLANS FOR FENCE OR HANDRAIL ATTACHMENT DETAILS.

USE AN MSE WALL SYSTEM WITH SEGMENTAL RETAINING WALL UNITS (SRW) UNITS THAT MEET ARTICLE 1040-4 OF THE STANDARD SPECIFICATIONS FOR MSE RETAINING WALLS.

USE SRW UNITS WITH A TRI PLANE SPLIT FACE FACE FOR MSE RETAINING WALLS.

USE SRW UNITS WITH A BROWN COLOR FOR MSE RETAINING WALLS.

AT THE CONTRACTOR'S OPTION, USE FINE AGGREGATE IN THE REINFORCED ZONE OF MSE RETAINING WALLS.

A SEPARATION GEOTEXTILE IS REQUIRED AT THE BACK OF THE REINFORCED ZONE FOR MSE RETAINING WALLS.

A DRAIN IS REQUIRED FOR MSE RETAINING WALLS.

BEFORE BEGINNING MSE WALL DESIGN FOR MSE RETAINING WALLS, SURVEY WALL LOCATIONS AND SUBMIT REVISED WALL PROFILE VIEWS (WALL ENVELOPES) FOR REVIEW. DO NOT START WALL DESIGNS OR CONSTRUCTION UNTIL THE REVISED WALL ENVELOPES ARE ACCEPTED.

DESIGN MSE RETAINING WALLS FOR THE FOLLOWING:
 1) H = DESIGN HEIGHT + EMBEDMENT
 2) DESIGN LIFE = 100 YEARS
 3) MAXIMUM FACTORED VERTICAL PRESSURE ON FOUNDATION MATERIAL = VARIES, SEE SUMMARY TABLE
 4) MINIMUM REINFORCEMENT LENGTH (L) = 0.7H OR 6 FT, WHICHEVER IS LONGER
 5) MINIMUM EMBEDMENT ELEVATION = 2 FT
 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:

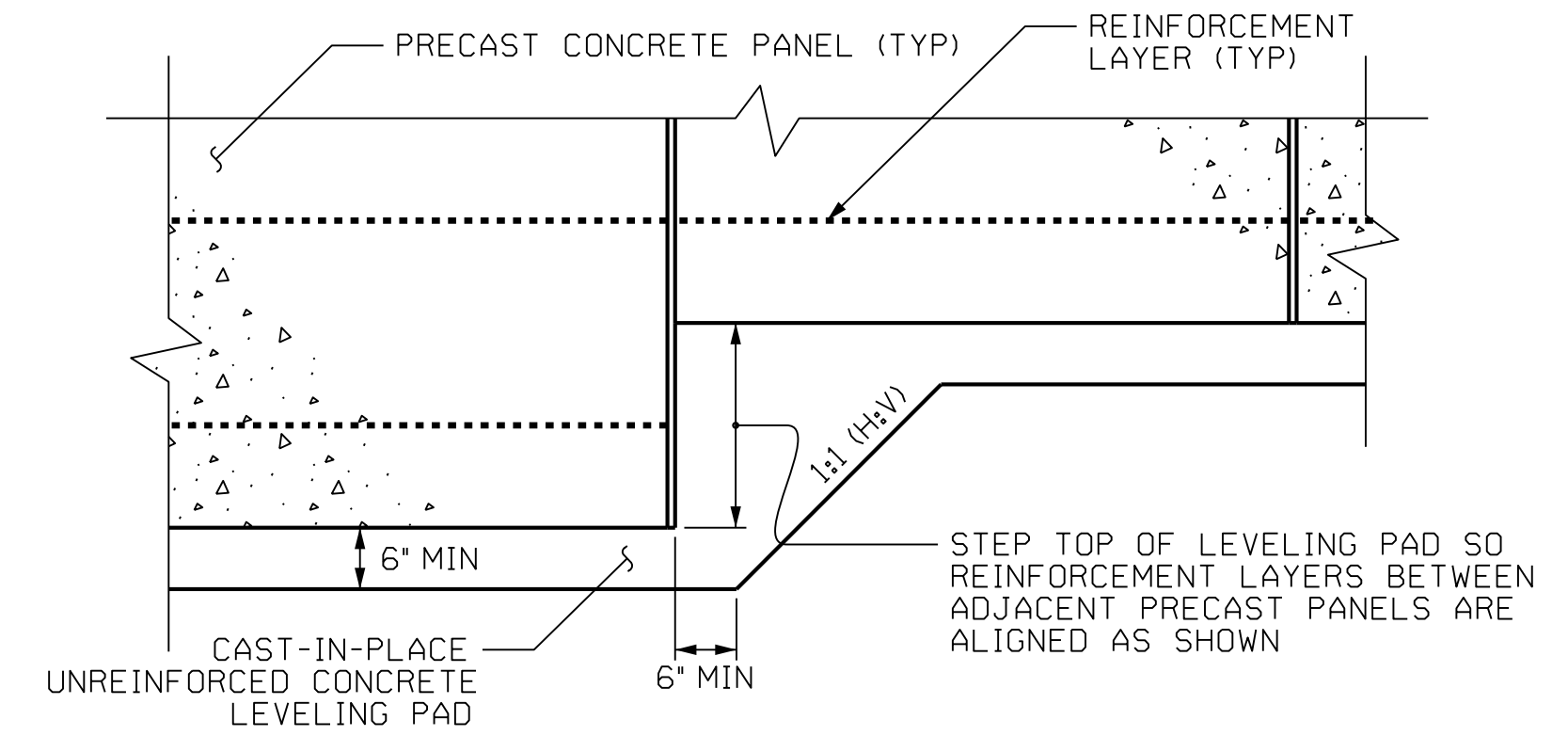
MATERIAL TYPE	UNIT WEIGHT (γ) LB/CF	FRICTION ANGLE (ϕ) DEGREES	COHESION (c) LB/SF
BACKFILL	120	30	0
FOUNDATION	120	30	0

DESIGN MSE RETAINING WALLS FOR A LIVE LOAD (TRAFFIC) SURCHARGE.

FOUNDATIONS FOR SIGNS, LIGHTING, AND SIGNALS MAY BE LOCATED BEHIND MSE RETAINING WALLS AND MAY INTERFERE WITH REINFORCEMENT. BEFORE BEGINNING MSE WALL CONSTRUCTION, SUBMIT PROPOSED CONSTRUCTION METHODS FOR THESE FOUNDATIONS FOR APPROVAL.

EXISTING OR FUTURE OBSTRUCTIONS SUCH AS FOUNDATIONS, GUARDRAIL, FENCE OR HANDRAIL POSTS, PAVEMENTS, PIPES, INLETS AND UTILITIES MAY INTERFERE WITH REINFORCEMENT MSE RETAINING WALLS.

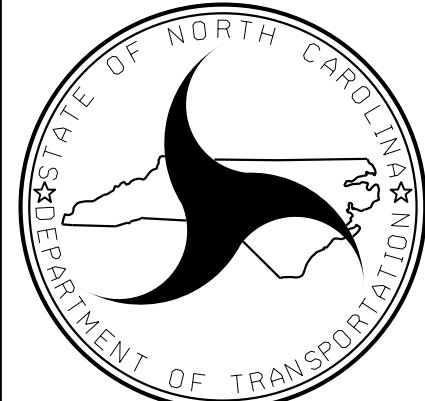
DO NOT PLACE LEVELING PAD CONCRETE, AGGREGATE OR REINFORCEMENT FOR MSE RETAINING WALLS UNTIL EXCAVATION DIMENSIONS AND FOUNDATION MATERIAL ARE APPROVED.



**PRECAST PANELS
LEVELING PAD STEP DETAIL**

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 IREDELL COUNTY
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 NORTH CAROLINA
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MSE RETAINING WALL
NOTES AND DETAIL

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GEOTECHNICAL ENGINEER

ENGINEER

DocuSigned by: *M. H. Stephens* 07/12/2024

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NOTES:

FOR SOLDIER PILE RETAINING WALLS, SEE SOLDIER PILE RETAINING WALLS PROVISION.

THE FOLLOWING SOLDIER PILE RETAINING WALL NOTES ARE FOR RETAINING WALL NOS. 6, 7, 9, 16, 38, 43, AND 44.

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

A FENCE OR HANDRAIL MAYBE REQUIRED ON TOP OF THE RETAINING WALLS. SEE ROADWAY PLANS FOR FENCE OR HANDRAIL ATTACHMENT DETAILS.

DRILLED-IN H-PILES ARE REQUIRED FOR THE SOLDIER PILE RETAINING WALLS.

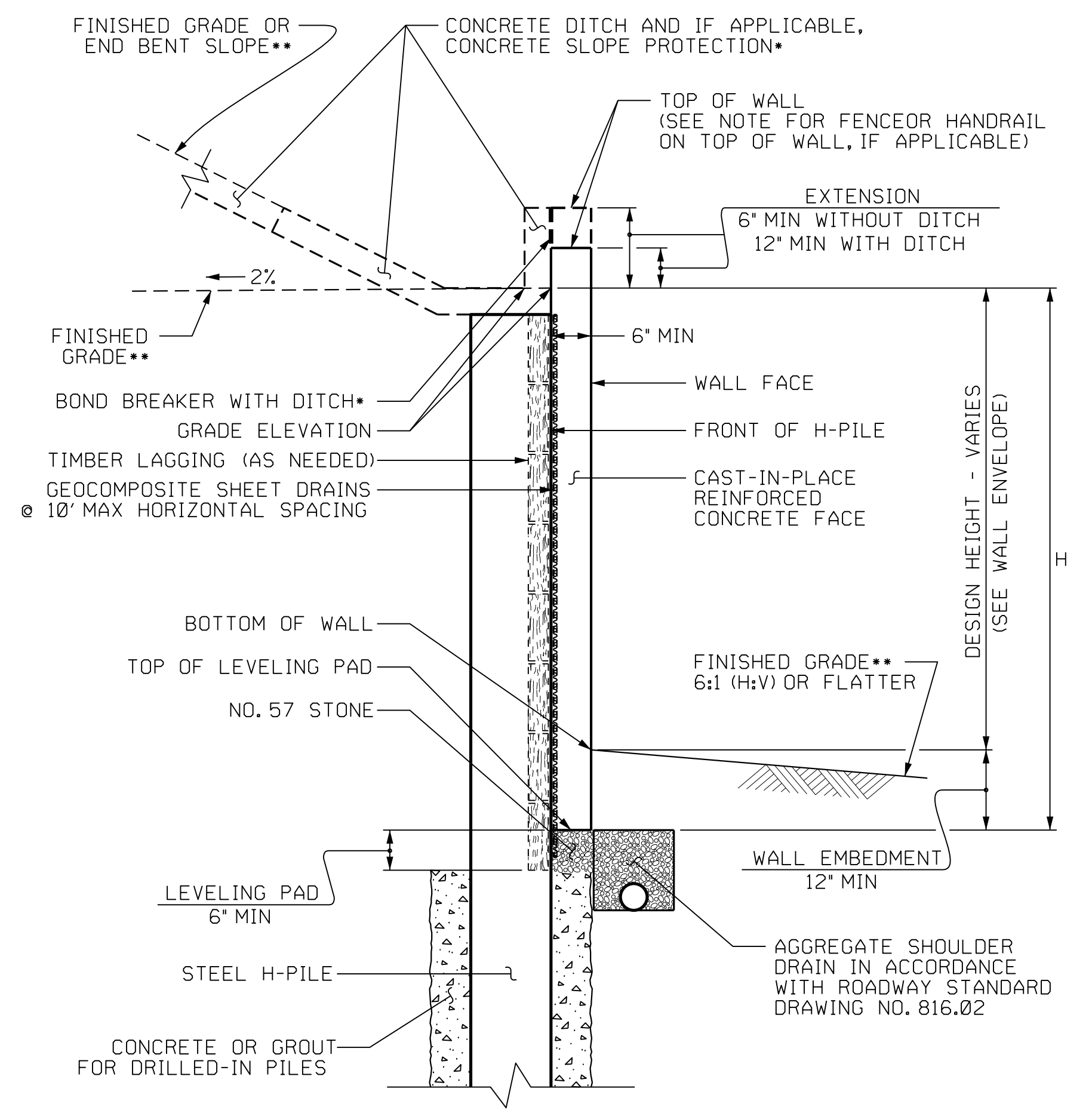
USE A SOLDIER PILE RETAINING WALL WITH A CAST-IN-PLACE REINFORCED CONCRETE FACE FOR THE SOLDIER PILE RETAINING WALLS.

BEFORE BEGINNING SOLDIER PILE WALL DESIGN, SURVEY WALL LOCATIONS AND SUBMIT A REVISED WALL PROFILE VIEWS (WALL ENVELOPES) FOR REVIEW. DO NOT START WALL DESIGNS OR CONSTRUCTION UNTIL THE REVISED WALL ENVELOPES ARE ACCEPTED.

DESIGN SOLDIER PILE RETAINING WALLS FOR THE FOLLOWING:

- 1) H = DESIGN HEIGHT + WALL EMBEDMENT
- 2) DESIGN LIFE = 100 YEARS
- 3) MINIMUM WALL EMBEDMENT ELEVATION = 1 FT
- 4) IN-SITU ASSUMED MATERIAL PARAMETERS:
 UNIT WEIGHT, $\gamma = 120$ LB/CF
 FRICTION ANGLE, $\phi = 30$ DEGREES
 COHESION, $c = 0$ LB/SF

DESIGN SOLDIER PILE RETAINING WALLS FOR A LIVE LOAD (TRAFFIC) SURCHARGE.



**SOLDIER PILE WALL WITH
CAST-IN-PLACE FACE - TYPICAL SECTION**

*SEE CONCRETE DITCH BEHIND WALL DETAILS.
 **SEE PLANS FOR FINISHED GRADE OR END BENT SLOPE DETAILS.

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DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

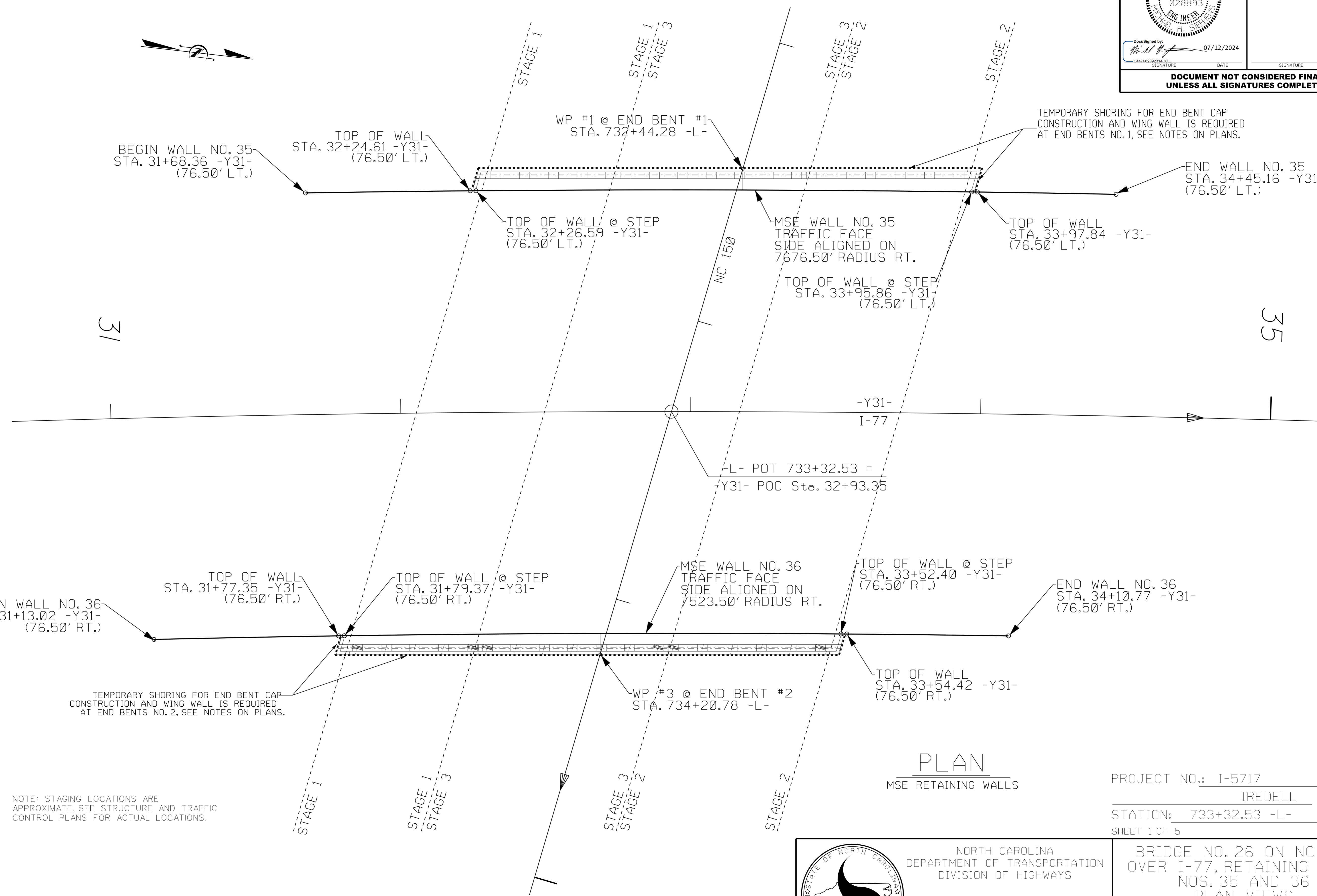
GEOTECHNICAL
ENGINEERING UNIT

REVISIONS					
NO.	BY	DATE	NO.	BY	DATE
1			3		
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SOLDIER PILE WALLS

SHEET NO.
W-19

GEOTECHNICAL ENGINEER
 ENGINEER
 NORTH CAROLINA PROFESSIONAL SEAL
 028893
 C4478282314CC
 DocuSigned by: *M. N. H.* 07/12/2024
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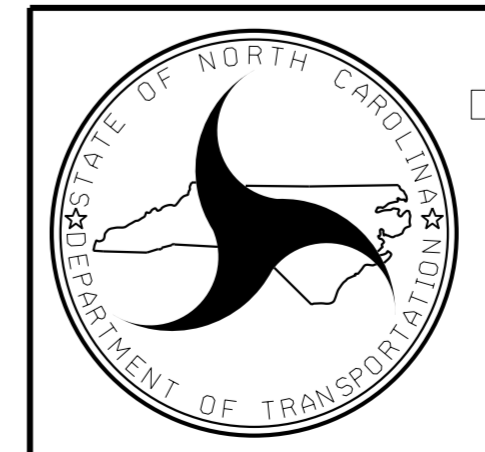


NOTE: STAGING LOCATIONS ARE APPROXIMATE, SEE STRUCTURE AND TRAFFIC CONTROL PLANS FOR ACTUAL LOCATIONS.

PLAN
MSE RETAINING WALLS

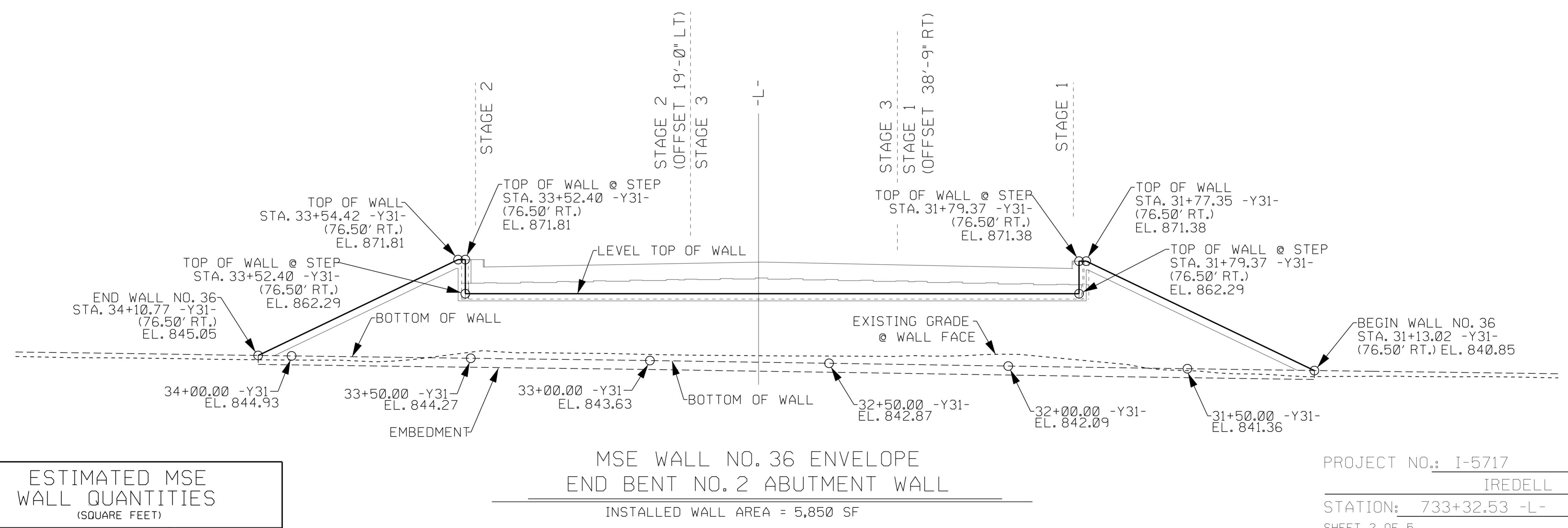
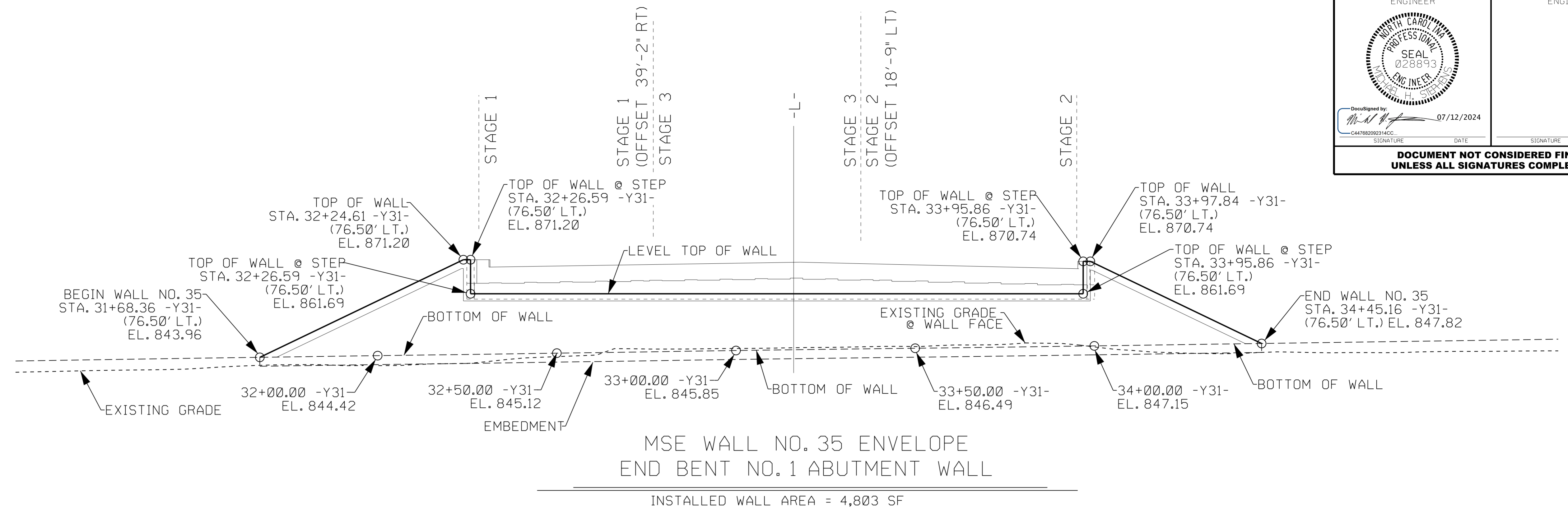
PROJECT NO.: I-5717
 IREDELL COUNTY
 STATION: 733+32.53 -L-
 SHEET 1 OF 5

PREPARED BY: MHS	DATE: 7/24
REVIEWED BY: SCC	DATE: 7/24



NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 DIVISION OF HIGHWAYS
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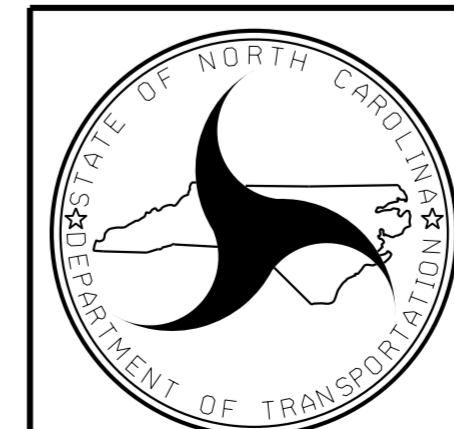
REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	
1	-	-	3	-	-	W-20
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ESTIMATED MSE WALL QUANTITIES (SQUARE FEET)	
MSE RETAINING WALL NO. 1	4,805 SF
MSE RETAINING WALL NO. 2	5,850 SF

NOTE: STAGING LOCATIONS ARE APPROXIMATE, SEE STRUCTURE AND TRAFFIC CONTROL PLANS FOR ACTUAL LOCATIONS.

PREPARED BY: MHS	DATE: 7/24
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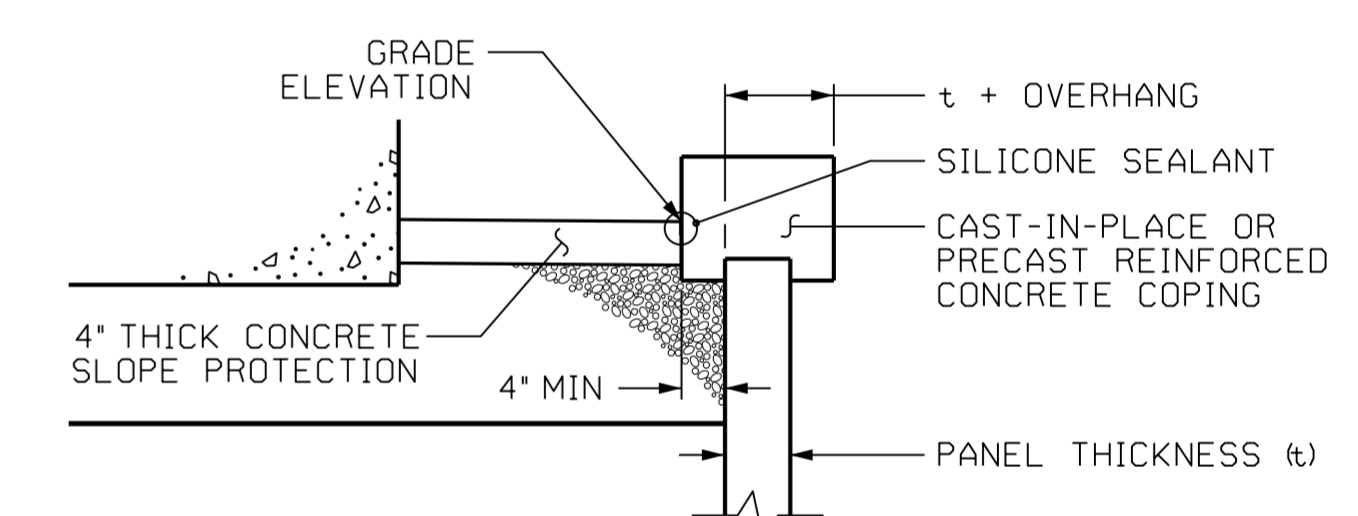
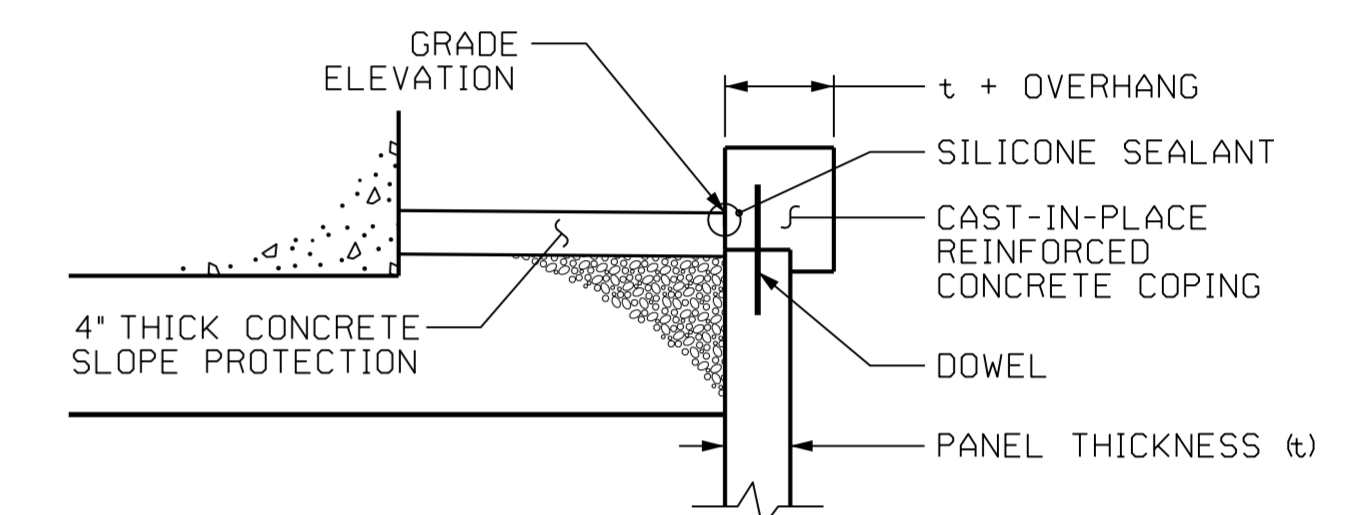
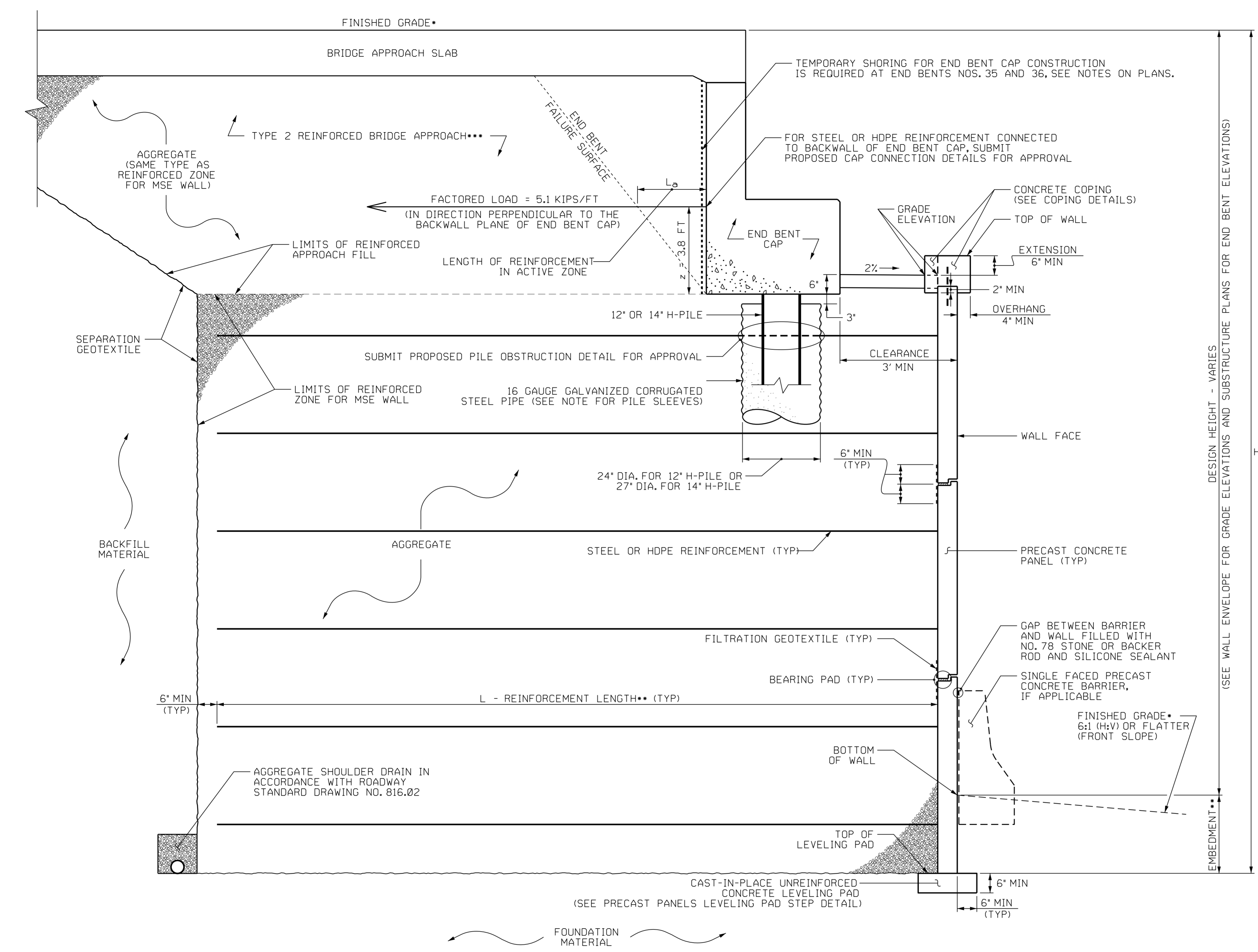


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PROJECT NO.: I-5717
 IREDELL COUNTY
 STATION: 733+32.53 -L-
 SHEET 2 OF 5

BRIDGE NO. 26 ON NC 150 OVER I-77, RETAINING WALL NOS. 35 AND 36 ENVELOPE VIEWS					
REVISIONS					
NO.	BY	DATE	NO.	BY	DATE
1	-	-	3	-	-
2	-	-	4	-	-

SHEET NO. W-21



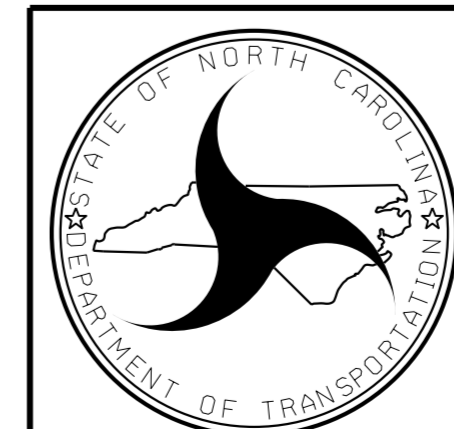
COPING DETAILS

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.: I-5717
 IREDELL COUNTY
 STATION: 733+32.53 -L-
 SHEET 3 OF 5

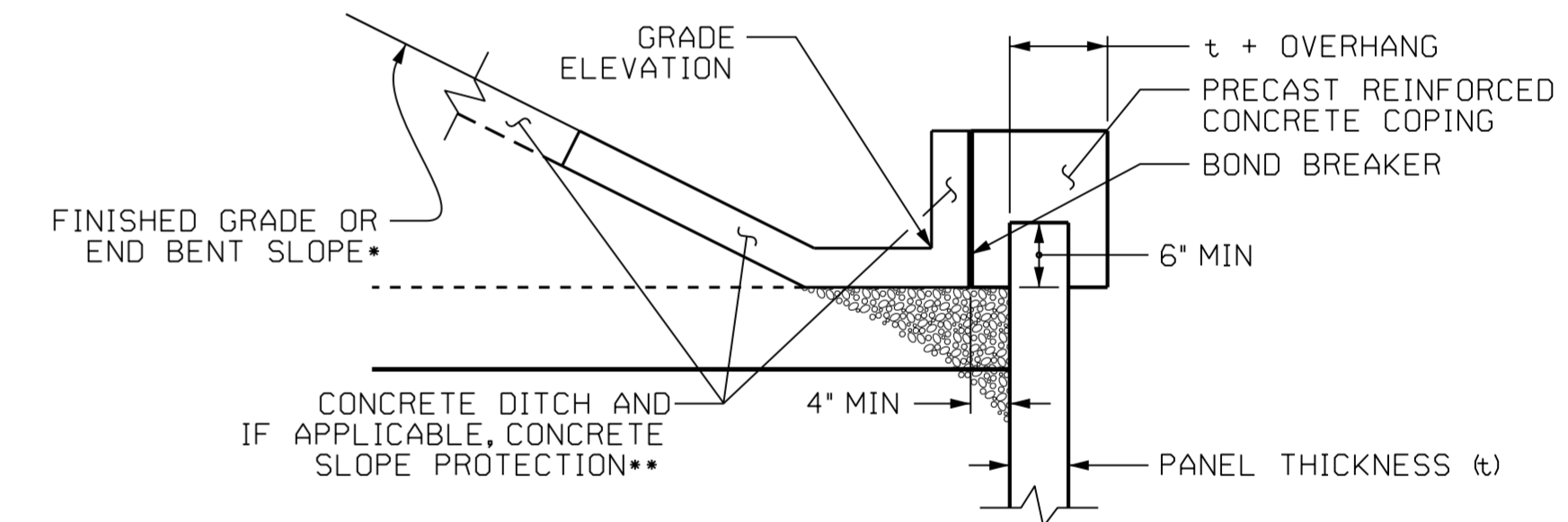
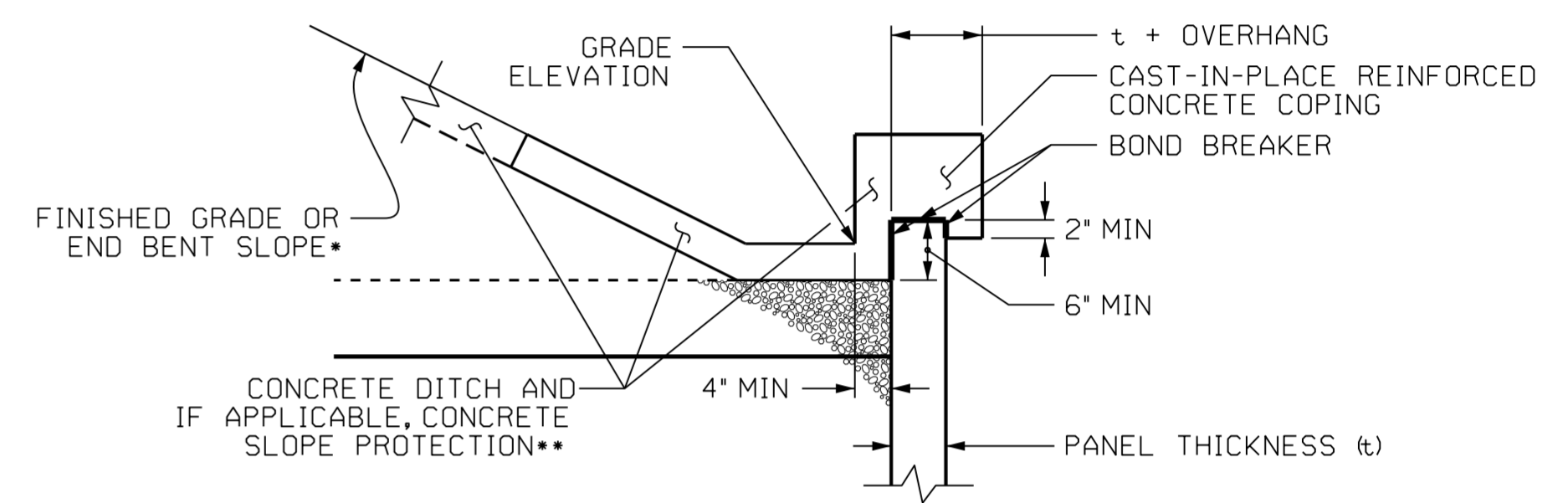
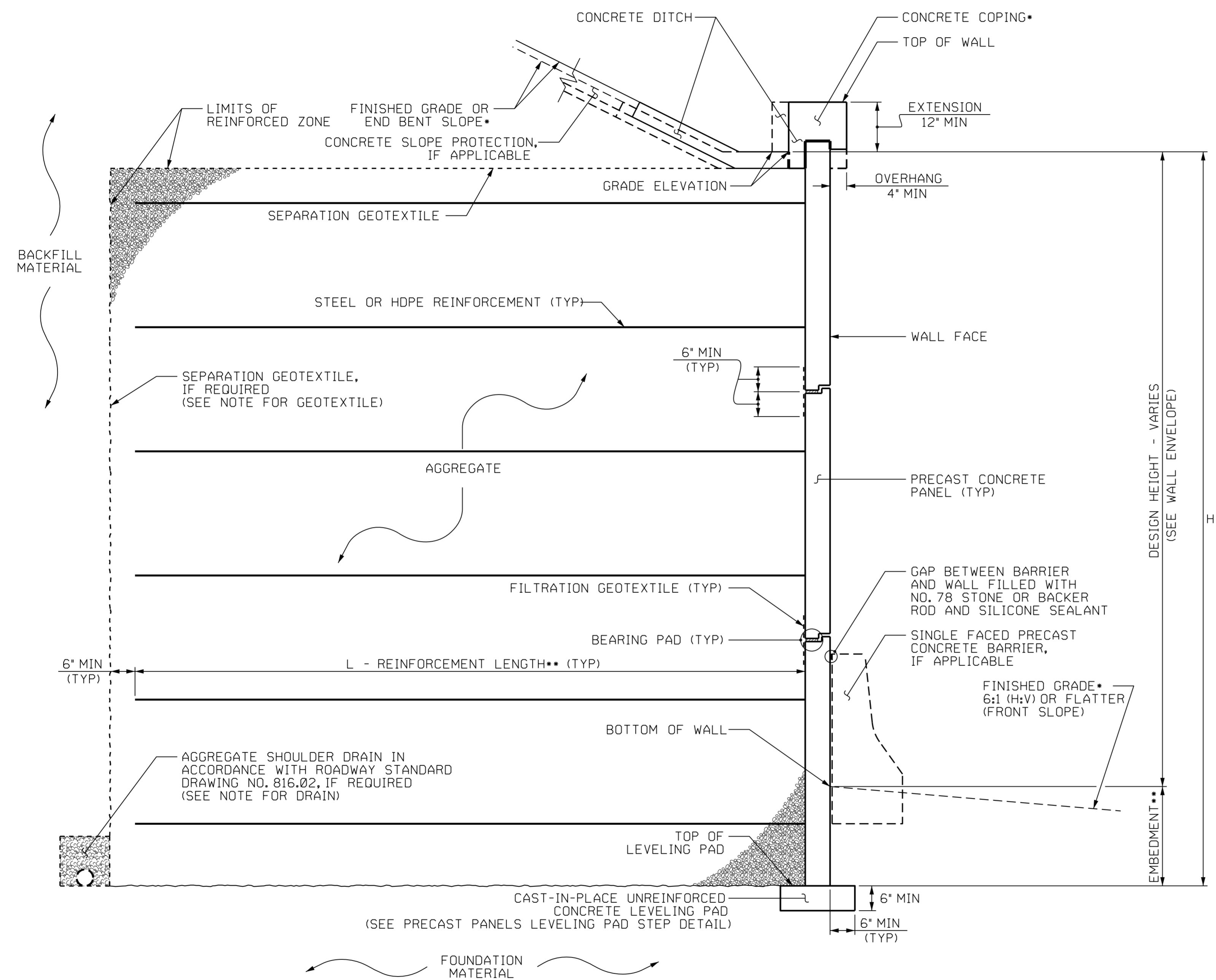


NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 DIVISION OF HIGHWAYS
 GEOTECHNICAL
 ENGINEERING UNIT

BRIDGE NO. 26 ON NC 150
 OVER I-77, RETAINING WALL
 NOS. 35 AND 36
 ABUTMENT WALL DETAIL

REVISIONS						SHEET NO.
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1	-	-	3	-	-	W-22
2	-	-	4	-	-	

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REVIEWED BY: SCC	DATE: 7/24



COPING DETAILS

*SEE PLANS FOR FINISHED GRADE OR END BENT SLOPE DETAILS.
 **SEE CONCRETE DITCH BEHIND WALL DETAILS.

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 EMBEDMENT AND REINFORCEMENT LENGTH REQUIREMENTS.

PROJECT NO.: I-5717
 IREDELL COUNTY
 STATION: 733+32.53 -L-
 SHEET 4 OF 5


NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 DIVISION OF HIGHWAYS
 GEOTECHNICAL
 ENGINEERING UNIT

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	
1	-	-	3	-	-	W-23
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PREPARED BY: MHS	DATE: 7/24
REVIEWED BY: SCC	DATE: 7/24

GEOTECHNICAL ENGINEER

ENGINEER



DocuSigned by:
M. A. H. 07/12/2024

C4478202314CC SIGNATURE DATE

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NOTES:

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

FOR TYPE 2 REINFORCED BRIDGE APPROACH FILL, SEE BRIDGE APPROACH FILLS PROVISION AND ROADWAY DETAIL DRAWING NO. 423.03.

FOR SINGLE FACED PRECAST CONCRETE BARRIER, SEE ROADWAY PLANS AND SECTION 857 OF THE STANDARD SPECIFICATIONS.

MSE WALL PANELS WILL BE RECTANGULAR OR SQUARE AND CONSTRUCTED WITH ALL VERTICAL JOINTS ALIGNED.

MSE WALL VERTICAL SLIP JOINTS WILL BE REQUIRED AT THE STAGING LOCATIONS.

A SEPARATION GEOTEXTILE IS REQUIRED AT THE BACK OF THE REINFORCED ZONE FOR RETAINING WALL NOS. 35 AND 36.

A DRAIN IS REQUIRED FOR RETAINING WALL NOS. 35 AND 36.

BEFORE BEGINNING MSE WALL DESIGN FOR RETAINING WALL NOS. 35 AND 36, 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 NOS. 35 AND 36 FOR THE FOLLOWING:

- 1) H = DESIGN HEIGHT + EMBEDMENT
- 2) DESIGN LIFE = 100 YEARS
- 3) MAXIMUM FACTORED VERTICAL PRESSURE ON FOUNDATION MATERIAL = 7,100 LB/SF
- 4) MINIMUM REINFORCEMENT LENGTH (L) = 0.8H OR 6 FT, WHICHEVER IS LONGER
- 5) MINIMUM EMBEDMENT ELEVATION = H/10 OR 2 FT, WHICHEVER IS DEEPER
- 6) REINFORCED ZONE AGGREGATE PARAMETERS:

AGGREGATE TYPE*	UNIT WEIGHT (γ) LB/CF	FRICTION ANGLE (ϕ) DEGREES	COHESION (c) LB/SF
COARSE	110	38	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	115	29	0

DESIGN RETAINING WALL NOS. 35 AND 36 FOR A LIVE LOAD (TRAFFIC) SURCHARGE.

DESIGN REINFORCEMENT CONNECTED TO END BENT CAPS FOR FACTORED LOAD AND LENGTH OF REINFORCEMENT IN ACTIVE ZONE (L_a) SHOWN. CAST REINFORCEMENT OR CONNECTORS INTO CAP BACKWALL FOR END BENT NOS. 1 LOCATED AT STATION 732+21.32 -L- AND END BENT NO. 2 LOCATED AT STATION 734+19.78 -L-. MAINTAIN A CLEARANCE OF AT LEAST 3" BETWEEN REINFORCEMENT OR CONNECTORS AND REINFORCING STEEL IN CAP.

FOUNDATIONS FOR END BENT NOS. 1 LOCATED AT STATION 732+21.32 -L- AND END BENT NO. 2 LOCATED AT STATION 734+19.78 -L- WILL INTERFERE WITH REINFORCEMENT FOR RETAINING WALL NOS. 35 AND 36. SEE "FOUNDATION LAYOUT" SHEET FOR FOUNDATION LOCATIONS.

PRIOR TO INSTALLING MSE RETAINING WALL DRIVE END BENT FOUNDATION PILES AT END BENT NOS. 35 AND 36 TO A DEPTH OF 20 FEET BELOW THE TOP OF MSE WALL LEVELING PAD.

INSTALL PILE SLEEVES FOR END BENT NOS. 1 LOCATED AT STATION 732+21.32 -L- AND END BENT NO. 2 LOCATED AT STATION 734+19.78 -L- WHILE CONSTRUCTING RETAINING WALL NOS. 35 AND 36. OBSERVE A 2 MONTH WAITING PERIOD AFTER CONSTRUCTING THE MSE ABUTMENT WALLS AND APPROACH FILLS TO GRADE.

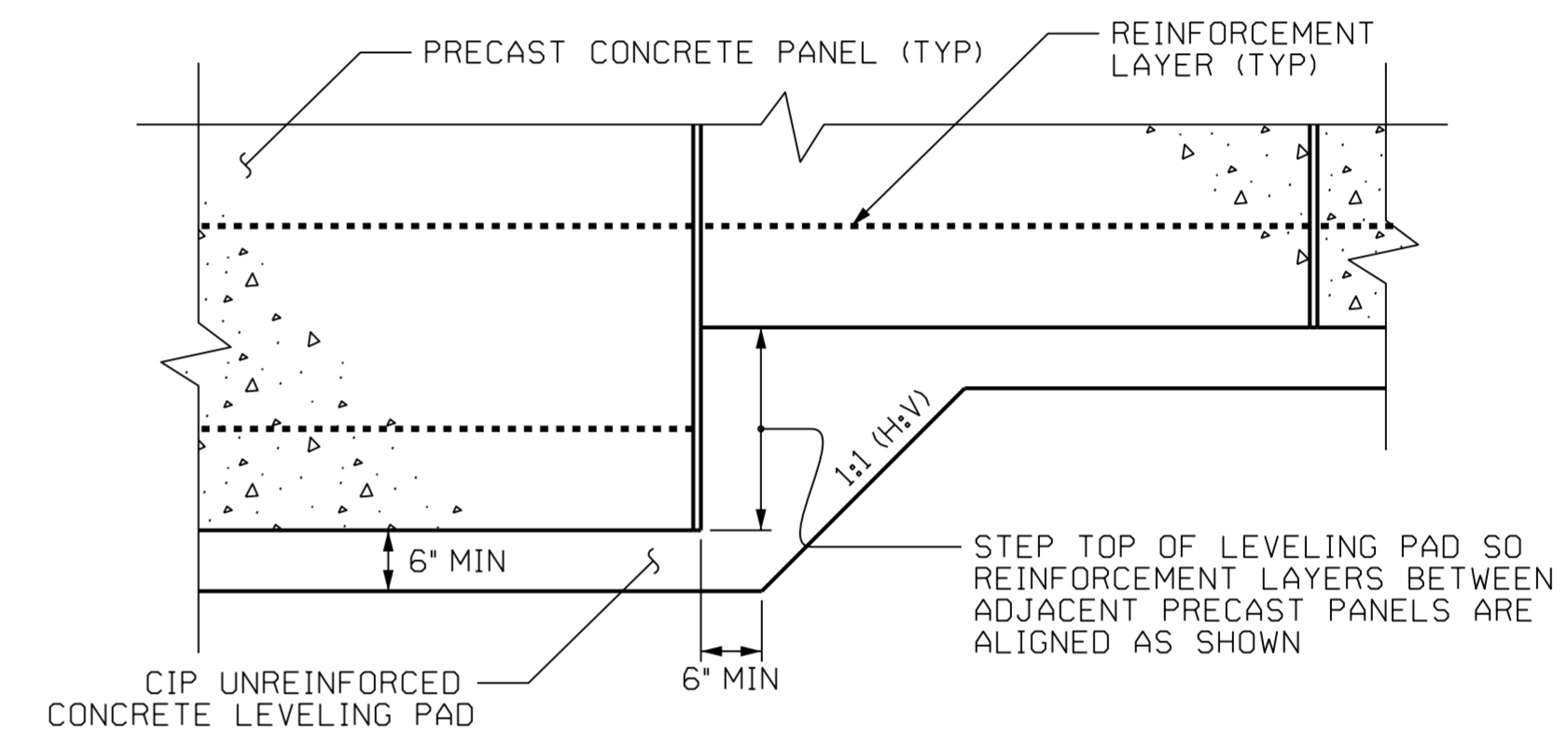
SHORING FOR BOTH END BENT CAPS, BACK WALLS AND WING WALL CONSTRUCTION WILL BE REQUIRED TO RETAIN THE END BENT APPROACH FILLS DURING STAGES 1, 2 AND 3. THIS SHORING WILL BE LOCATED DIRECTLY BEHIND AND ALONG THE ENTIRE LENGTH OF THE END BENT CAPS AND WILL INCORPORATE THE END BENT CAP REINFORCEMENT NOTED ABOVE. THIS SHORING OCCURS AT 6 (SIX) LOCATIONS AND WILL BE CONSIDERED INCIDENTAL TO THE UNIT PRICE OF THE MSE RETAINING WALL WITH NO SEPARATE OR ADDITIONAL PAYMENT FROM THE DEPARTMENT. SUBMIT ALL SHORING AND CONNECTION DETAILS FOR APPROVAL PRIOR TO BEGINNING CONSTRUCTION.

AFTER THE WAITING PERIOD HAS BEEN CLEARED BY THE ENGINEER, CONTINUE DRIVING PILES THROUGH THE CORRUGATED STEEL PIPES AND FILL PIPES WITH LOOSE UNCOMPACTED MSE BACKFILL BEFORE CONSTRUCTING END BENT CAPS.

EXISTING OR FUTURE OBSTRUCTIONS SUCH AS FOUNDATIONS, GUARDRAIL, FENCE OR HANDRAIL POSTS, PAVEMENTS, PIPES, INLETS OR UTILITIES MAY INTERFERE WITH REINFORCEMENT FOR RETAINING WALL NOS. 35 AND 36.


DO NOT PLACE LEVELING PAD CONCRETE, AGGREGATE OR REINFORCEMENT FOR RETAINING WALL NOS. 35 AND 36 UNTIL EXCAVATION DIMENSIONS AND FOUNDATION MATERIAL ARE APPROVED.

TEMPORARY SHORING IS REQUIRED FOR RETAINING WALL NOS. 35 AND 36 IN ACCORDANCE WITH THE TEMPORARY SHORING PROVISION. SEE TRAFFIC CONTROL PLANS.



**PRECAST PANELS
LEVELING PAD STEP DETAIL**

PROJECT NO.: I-5717
 IREDELL COUNTY
 STATION: 733+32.53 -L-
 SHEET 5 OF 5



NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

**GEOTECHNICAL
ENGINEERING UNIT**

BRIDGE NO. 26 ON NC 150 OVER I-77, RETAINING WALL NOS. 35 AND 36 RETAINING WALL NOTES					
REVISIONS					
NO.	BY	DATE	NO.	BY	DATE
1	-	-	3	-	-
2	-	-	4	-	-

SHEET NO. W-24

PREPARED BY: MHS	DATE: 7/24
REVIEWED BY: SCC	DATE: 7/24