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TO SR 1105
(LEMONS LOOP)

POT STA. 90+64.493 -LREV_SB- =
POC STA. 13+10.588 -NC68_NB-



GEOTECHNICAL ENGINEER

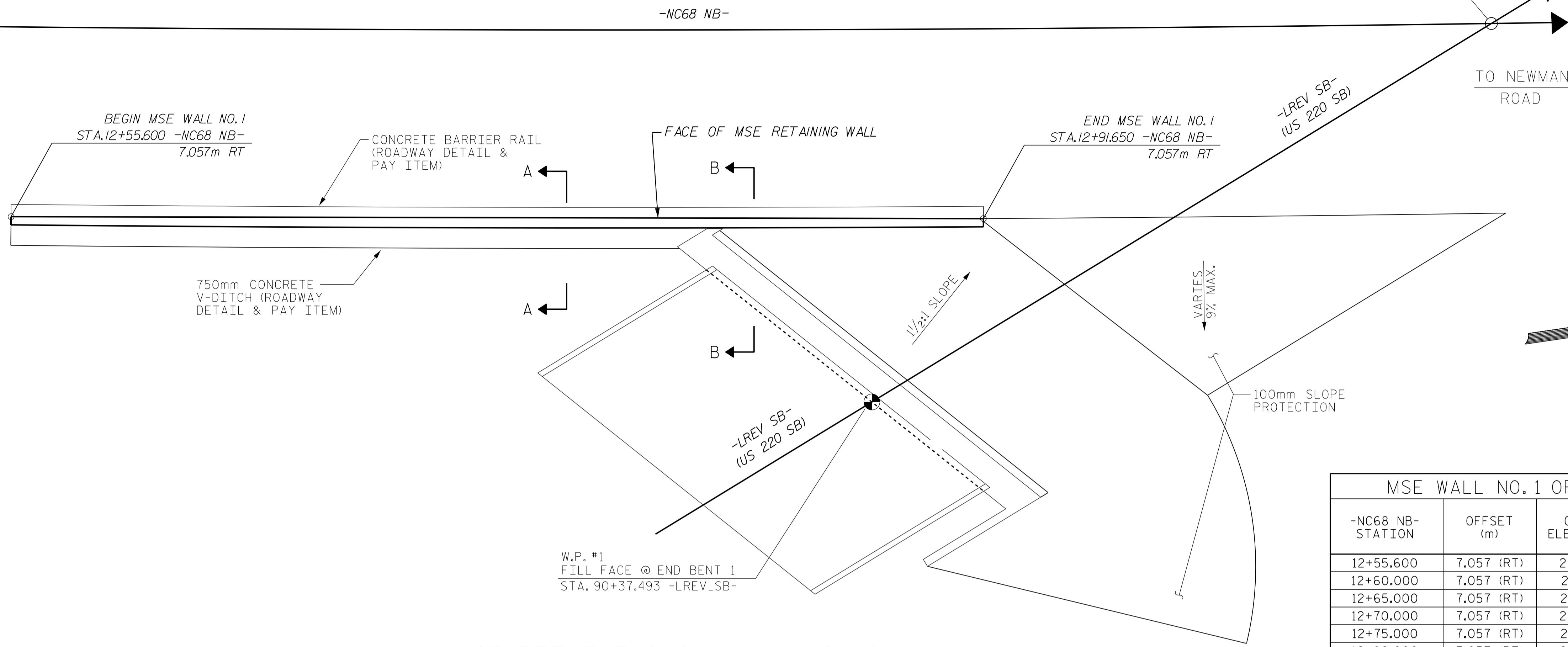
ENGINEER

SEAL 030943

THEIN TUN ZAN

DocuSigned by:
Thein Tun Zan 2/18/2015

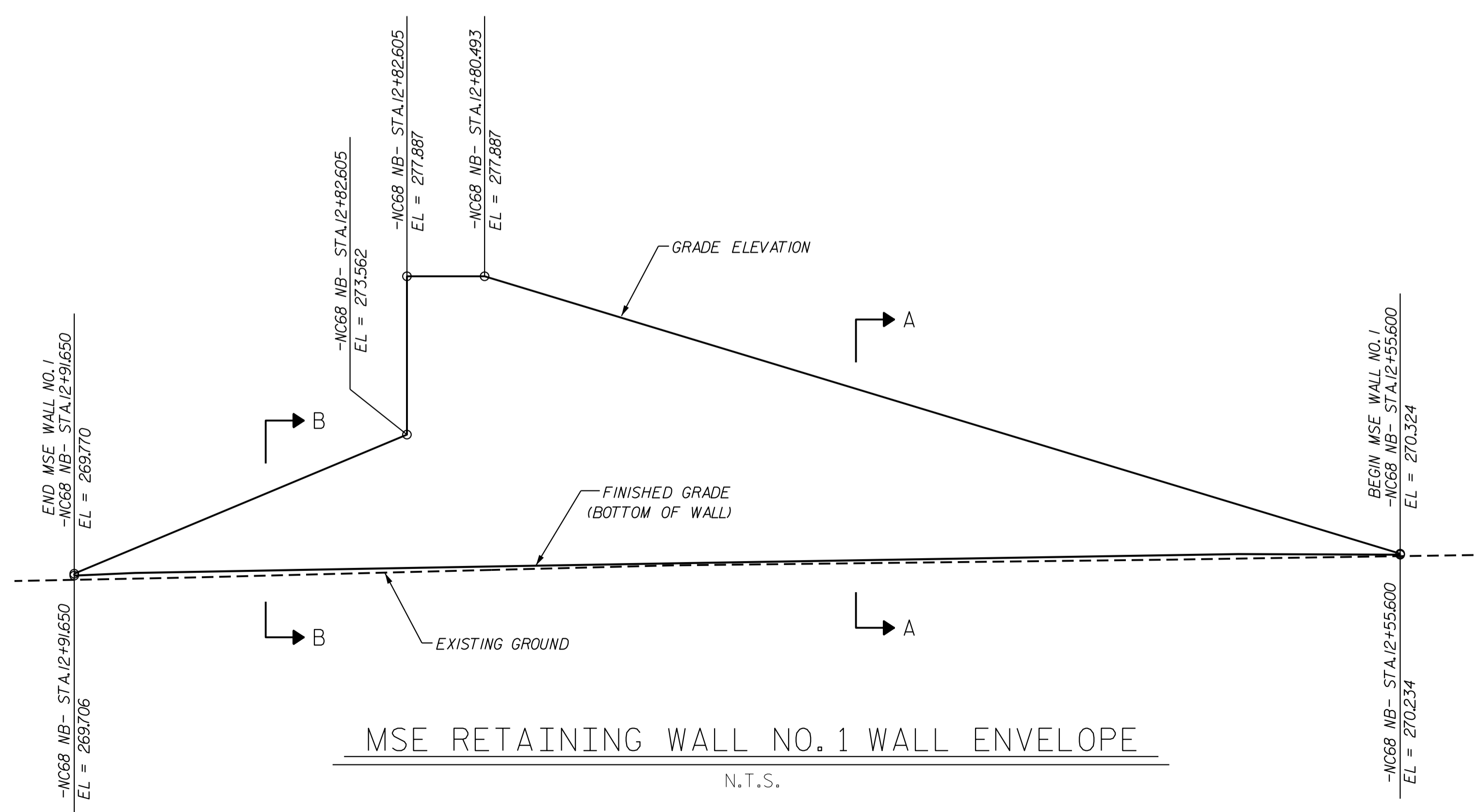
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MSE RETAINING WALL NO. 1 PLAN
N.T.S.

MSE WALL NO. 1 OFFSETS & ELEVATIONS				
-NC68 NB- STATION	OFFSET (m)	GRADE ELEVATION	BOTTOM OF WALL ELEVATION	EXISTING GROUND ELEVATION
12+55.600	7.057 (RT)	270.324	270.234	270.1
12+60.000	7.057 (RT)	271.661	270.252	270.1
12+65.000	7.057 (RT)	273.180	270.170	270.0
12+70.000	7.057 (RT)	274.699	270.088	270.0
12+75.000	7.057 (RT)	276.218	270.005	269.9
12+80.000	7.057 (RT)	277.737	269.919	269.8
12+80.493	7.057 (RT)	277.887	269.910	269.8
12+82.605	7.057 (RT)	277.887	269.873	269.7
12+82.605	7.057 (RT)	273.562	269.873	269.7
12+85.000	7.057 (RT)	272.557	269.829	269.6
12+90.000	7.057 (RT)	270.461	269.737	269.5
12+91.650	7.057 (RT)	269.770	269.706	269.5

ESTIMATED MSE WALL QUANTITIES (SQUARE METER)	
MSE RETAINING WALL NO. 1	162 SQ. METER



MSE RETAINING WALL NO. 1 WALL ENVELOPE
N.T.S.

PROJECT NO.: R-2413CA
ROCKINGHAM COUNTY
STATION: 12+56.000 -NC68 NB- RT
SHEET 1 OF 7

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

GEOTECHNICAL
ENGINEERING UNIT

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

SHEET NO. W-1

PREPARED BY: THEIN T. ZAN DATE: 02/2015
REVIEWED BY: JAMES R. BATTS DATE: 02/2015

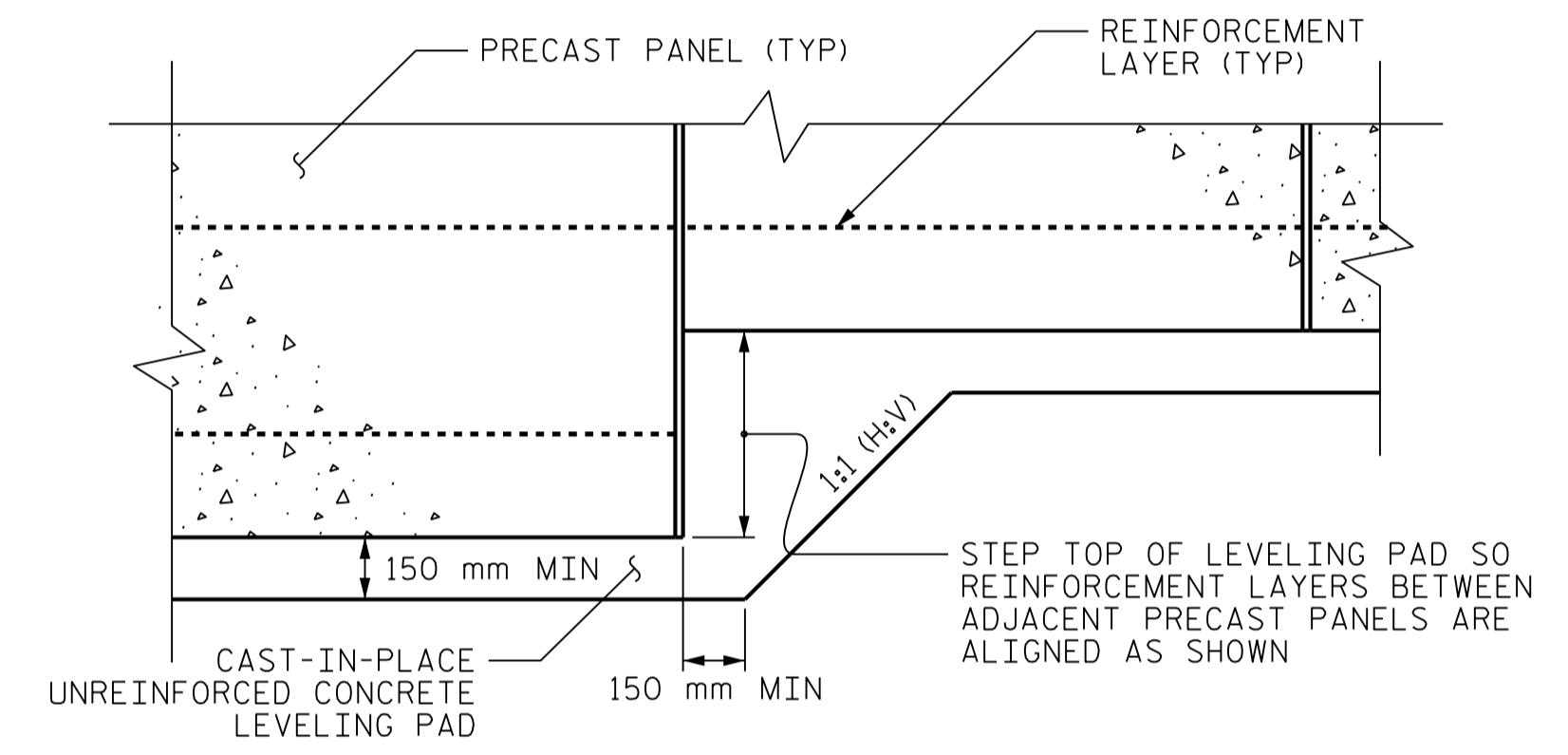
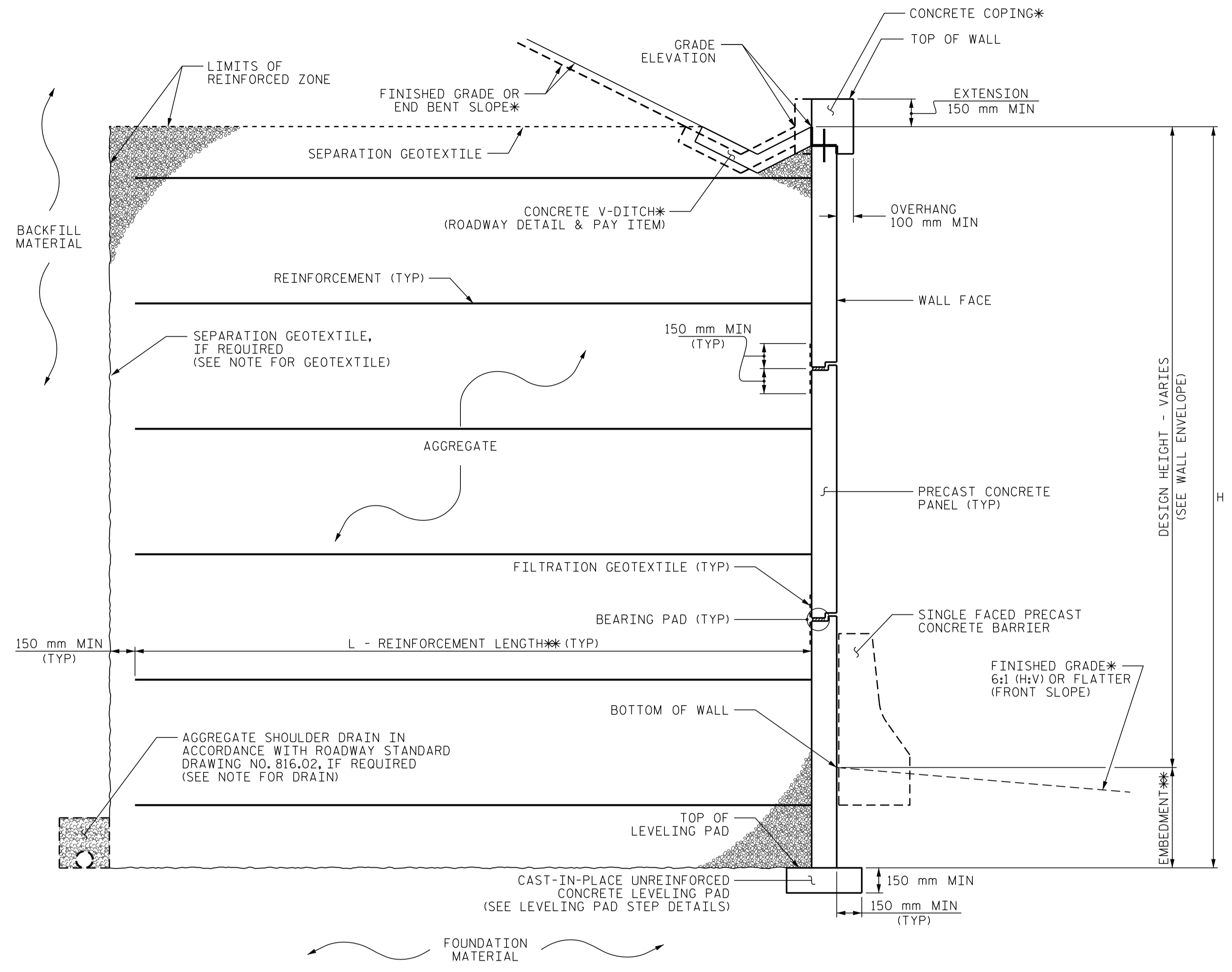


GEOTECHNICAL ENGINEER

ENGINEER

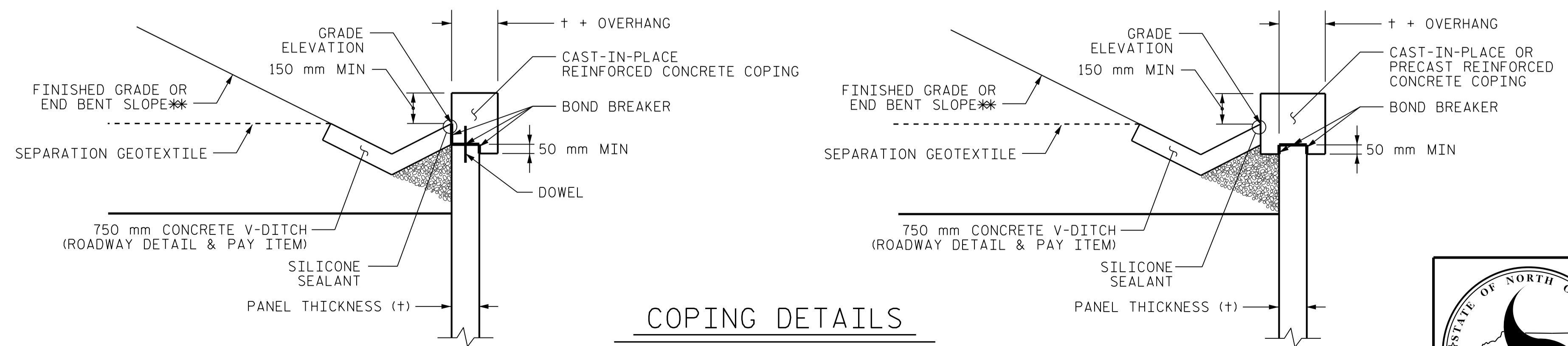
DocuSigned by:
Thein T. Zan 2/18/2015

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MSE WALL WITH PRECAST PANELS - TYPICAL SECTION A-A

*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.



COPING DETAILS

AT THE CONTRACTOR'S OPTION, CONNECT COPING TO PANELS WITH DOWELS OR EXTEND COPING DOWN BACK OF PANELS.
**SEE PLANS FOR FINISHED GRADE OR END BENT SLOPE DETAILS.

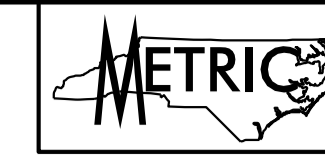
PROJECT NO.: R-2413CA
ROCKINGHAM COUNTY
STATION: VARIES
SHEET 3 OF 7

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

GEOTECHNICAL
ENGINEERING UNIT

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

PREPARED BY: THEIN T. ZAN DATE: 02/2015
REVIEWED BY: JAMES R. BATTS DATE: 02/2015



GEOTECHNICAL ENGINEER

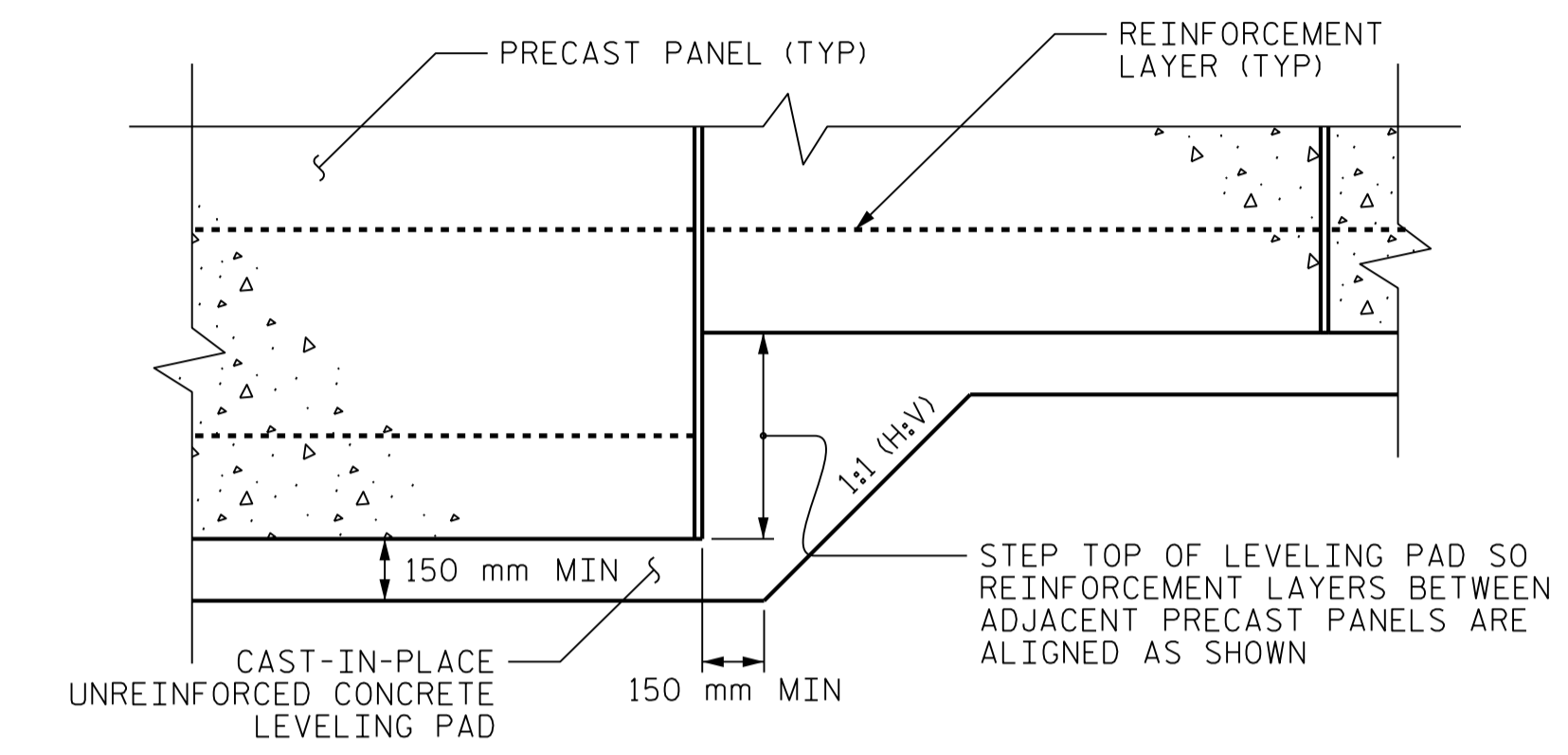
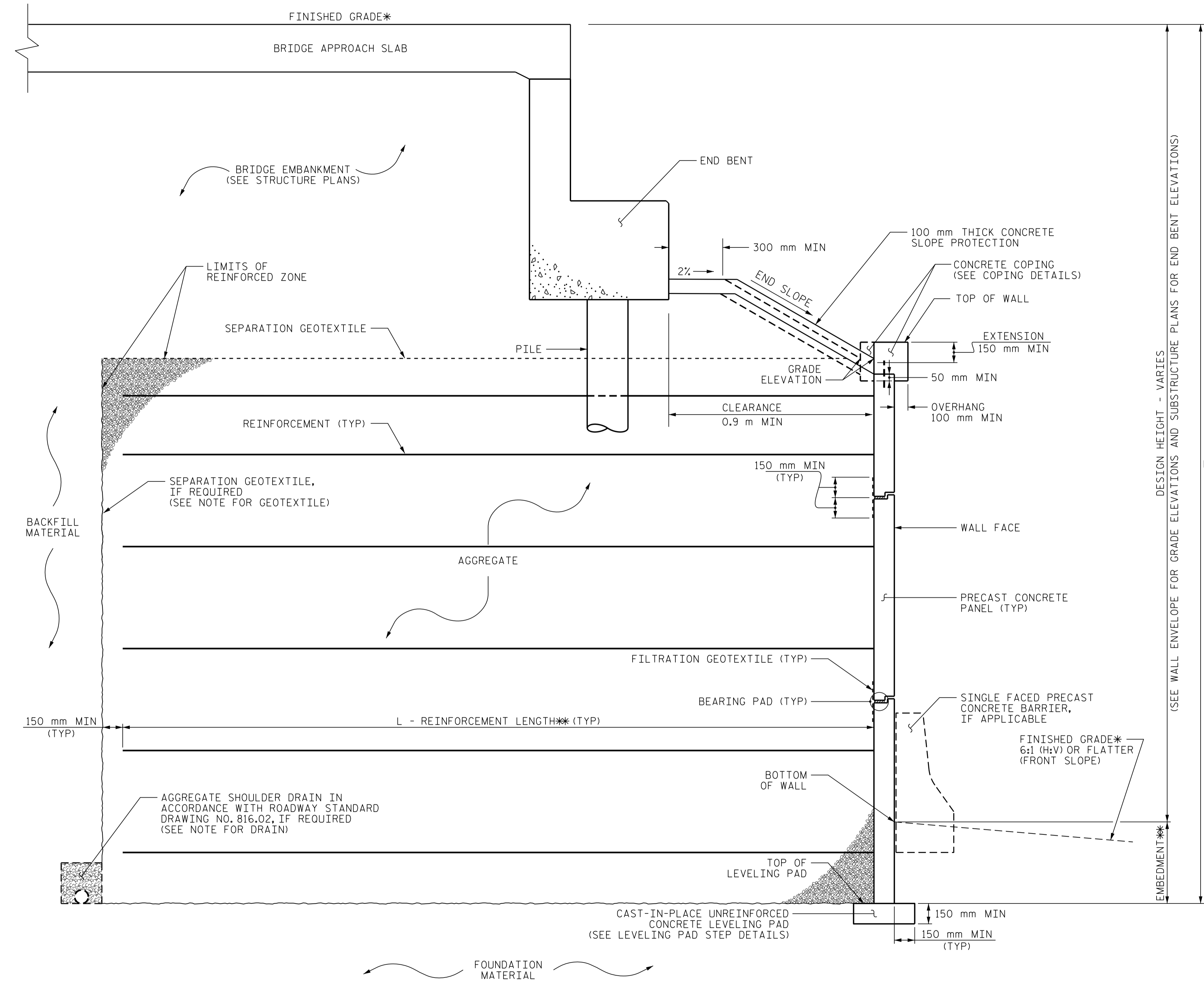
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SEAL 030943

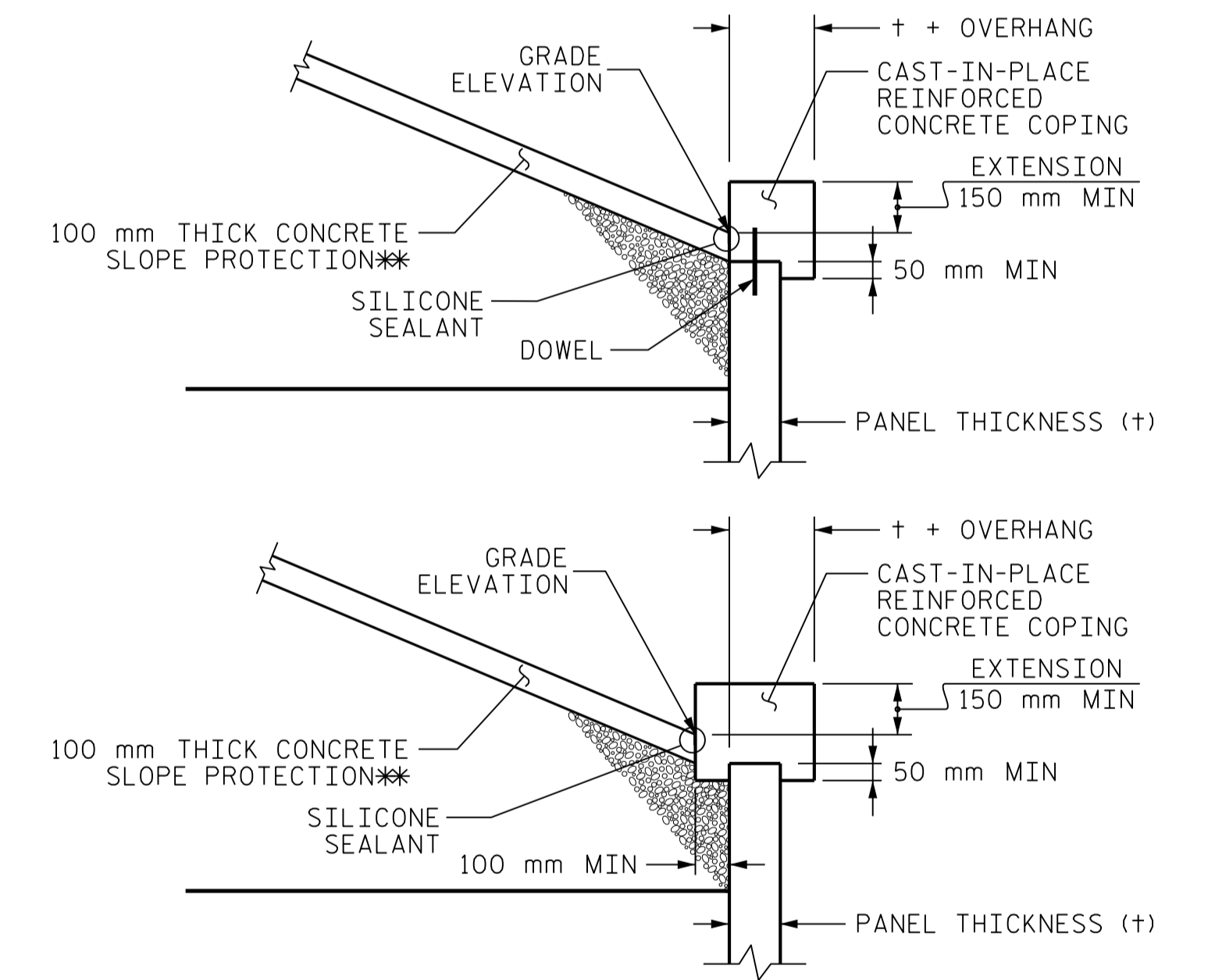
THEIN TUN ZAN

DocuSigned by: *Thein Tun Zan* 2/18/2015

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LEVELING PAD STEP DETAILS



COPING DETAILS

AT THE CONTRACTOR'S OPTION, CONNECT COPING TO PANELS WITH DOWELS OR EXTEND COPING DOWN BACK OF PANELS.
**SEE PLANS FOR CONCRETE SLOPE PROTECTION & END SLOPE DETAILS.

MSE ABUTMENT WALL WITH PRECAST PANELS - TYPICAL SECTION B-B

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

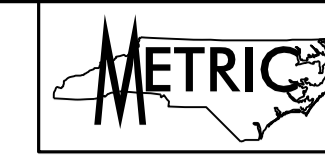
PROJECT NO.: R-2413CA
ROCKINGHAM COUNTY
STATION: VARIES
SHEET 4 OF 8

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

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

PREPARED BY: THEIN T. ZAN	DATE: 02/2015
REVIEWED BY: JAMES R. BATTS	DATE: 02/2015



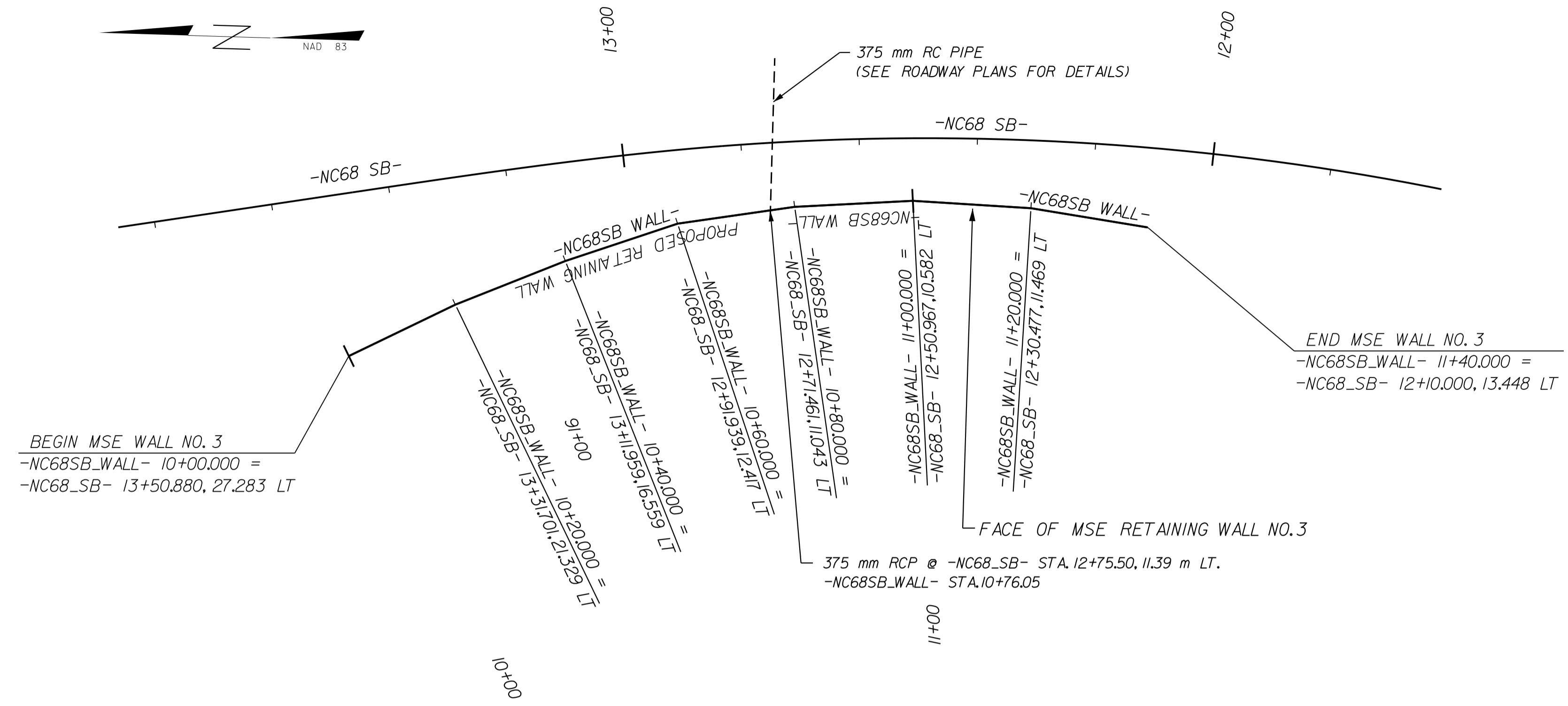
GEOTECHNICAL ENGINEER

THEIN T. ZAN

SEAL 030943

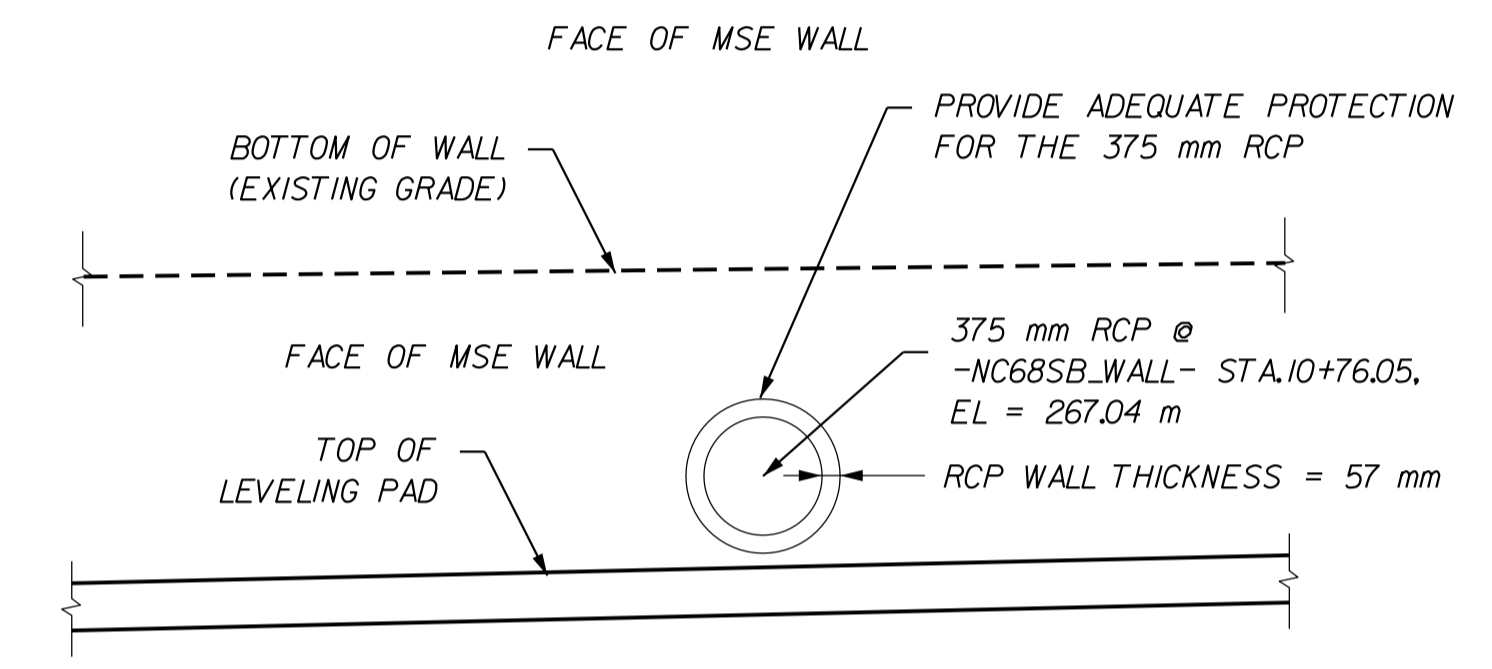
2/18/2015

ENGINEER



MSE RETAINING WALL NO. 3 PLAN

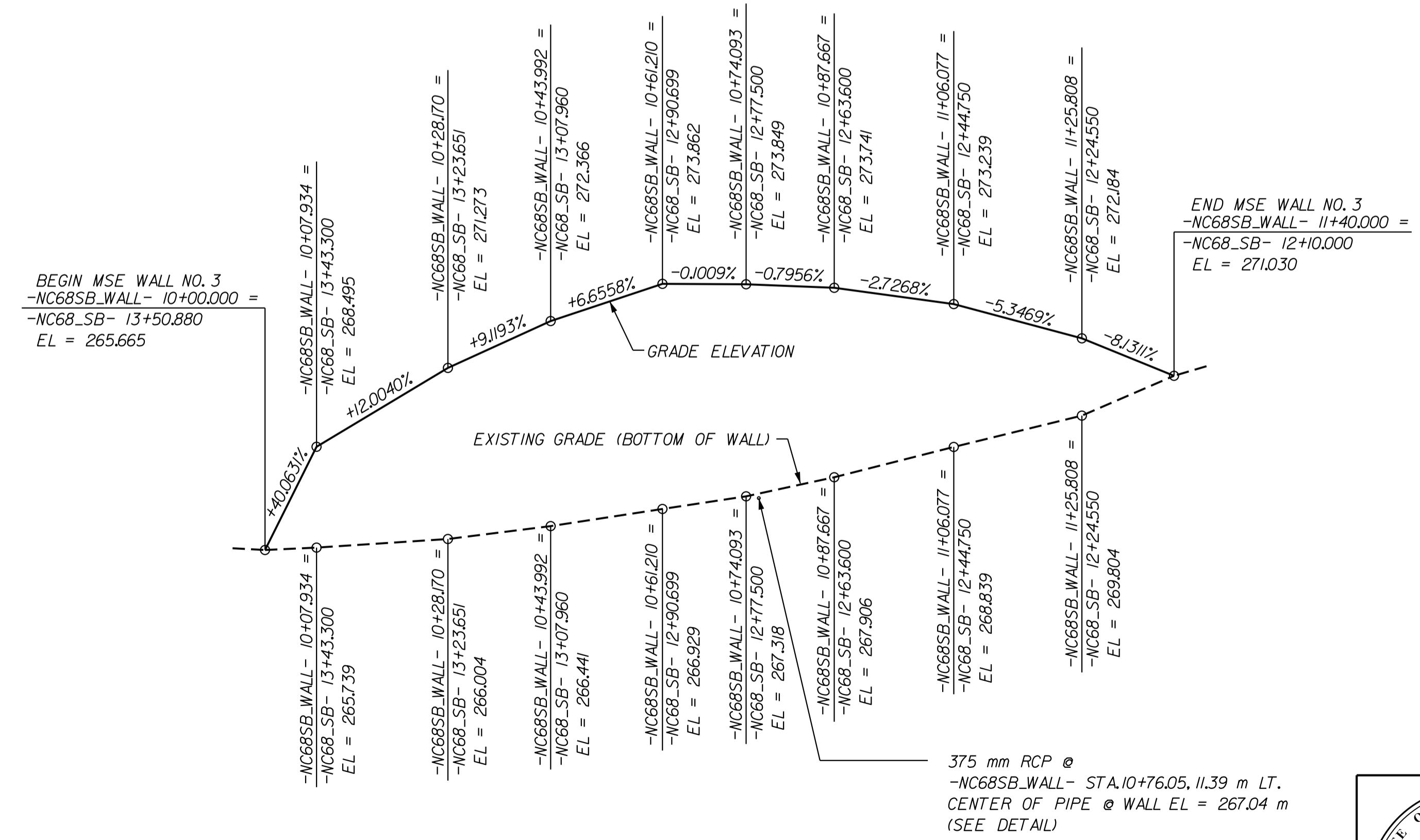
N.T.S.



375 mm RCP THRU MSE WALL

N.T.S.

ESTIMATED MSE WALL QUANTITIES (SQUARE METER)	
MSE RETAINING WALL NO. 3	755 SQ. METER



MSE RETAINING WALL NO. 3 WALL ENVELOPE

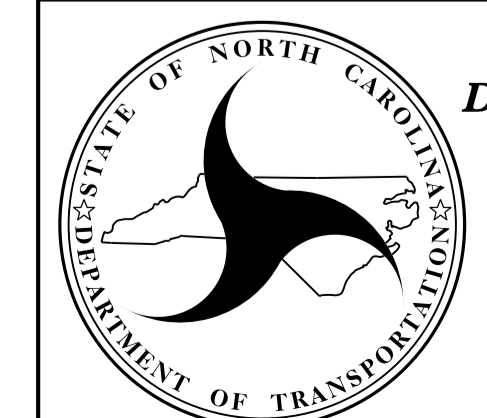
N.T.S.

PROJECT NO.: R-2413CA

ROCKINGHAM COUNTY

STATION: 13+51 -NC68_SB- LT

SHEET 5 OF 8



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

RETAINING WALL NO. 3 PLAN & WALL ENVELOPE

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

SHEET NO. W-5

PREPARED BY: THEIN T. ZAN	DATE: 02/2015
REVIEWED BY: JAMES R. BATTS	DATE: 02/2015



GEOTECHNICAL ENGINEER

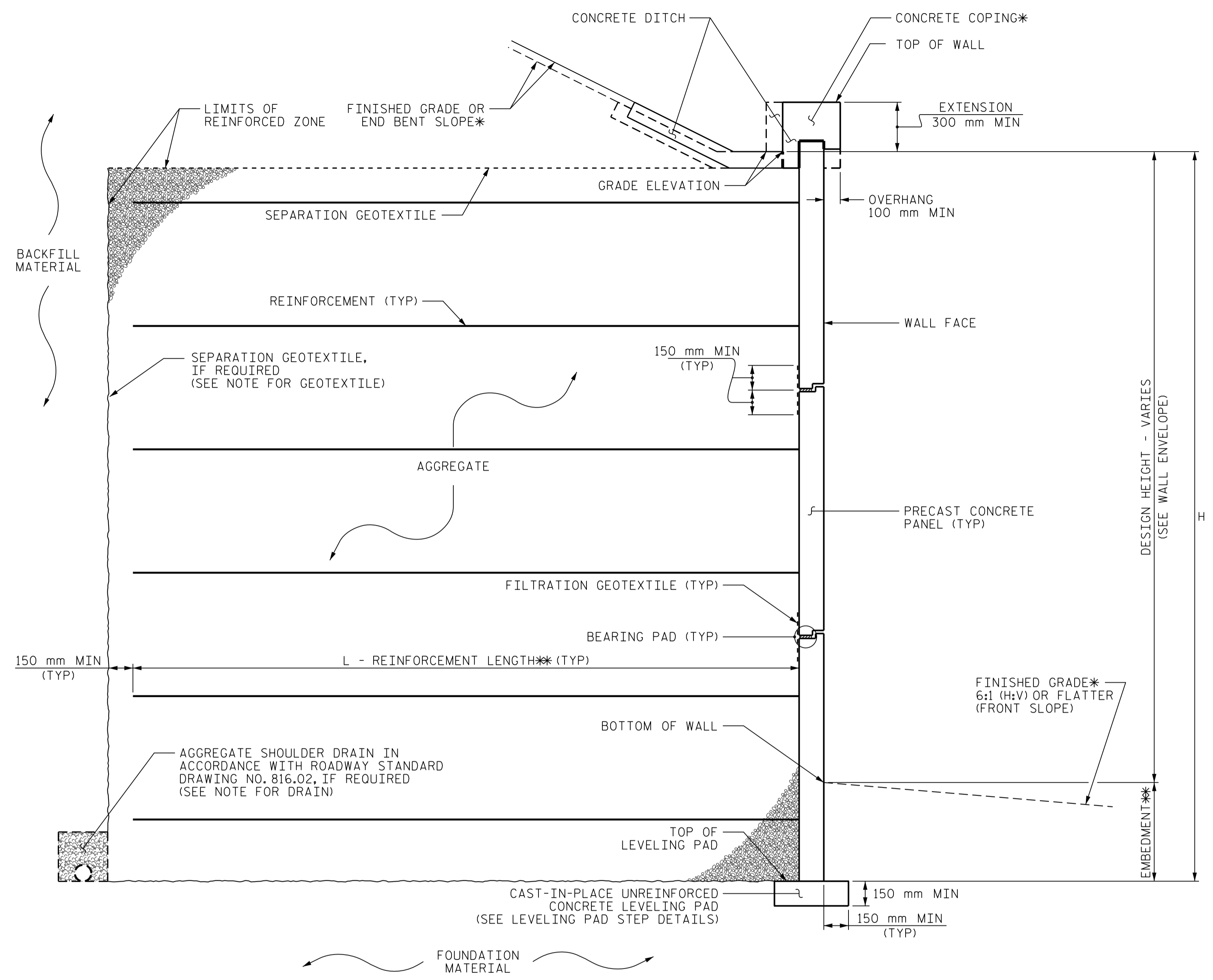
ENGINEER

SEAL 030943

DocuSigned by: *Thein T. Zan* 2/18/2015

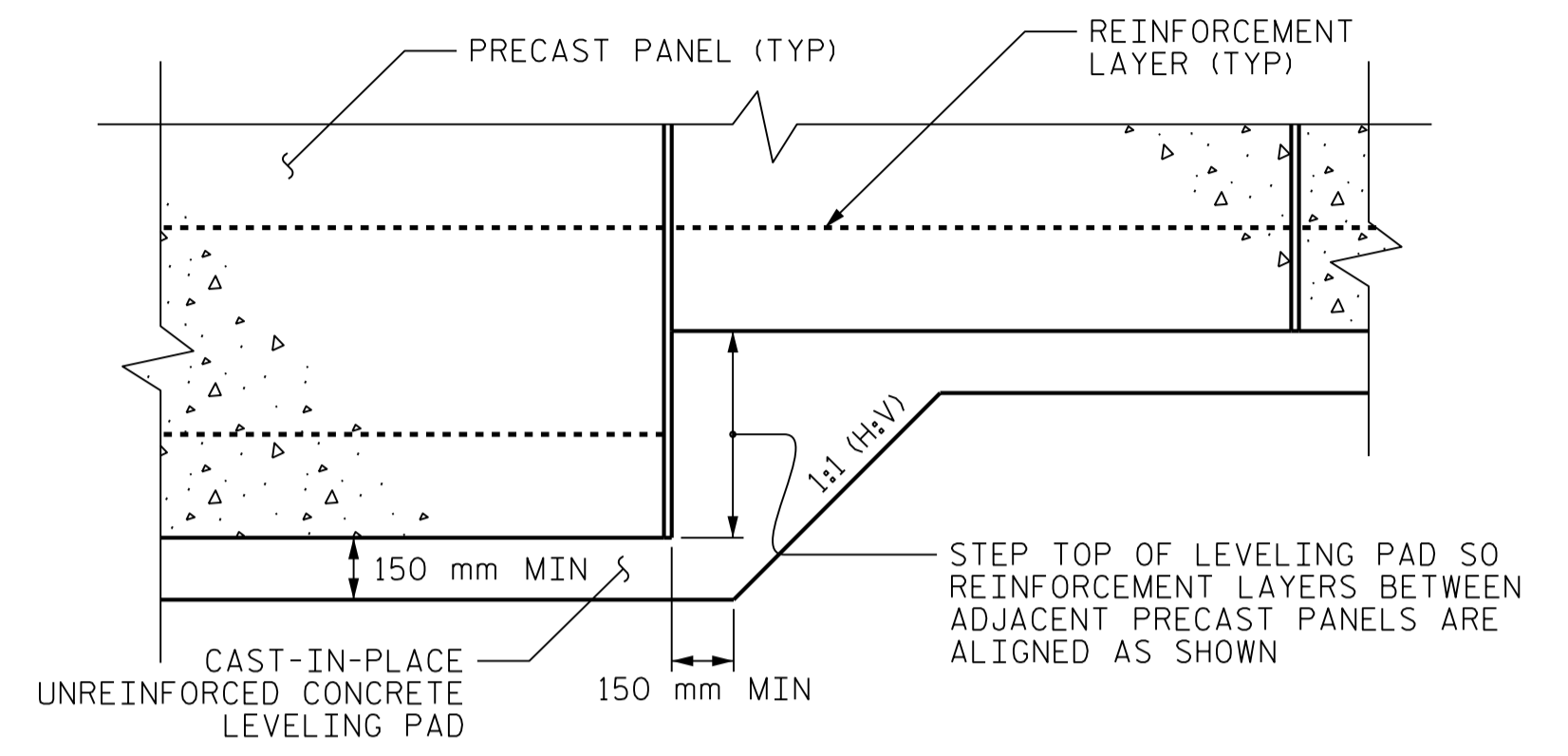
DATE: 2/18/2015

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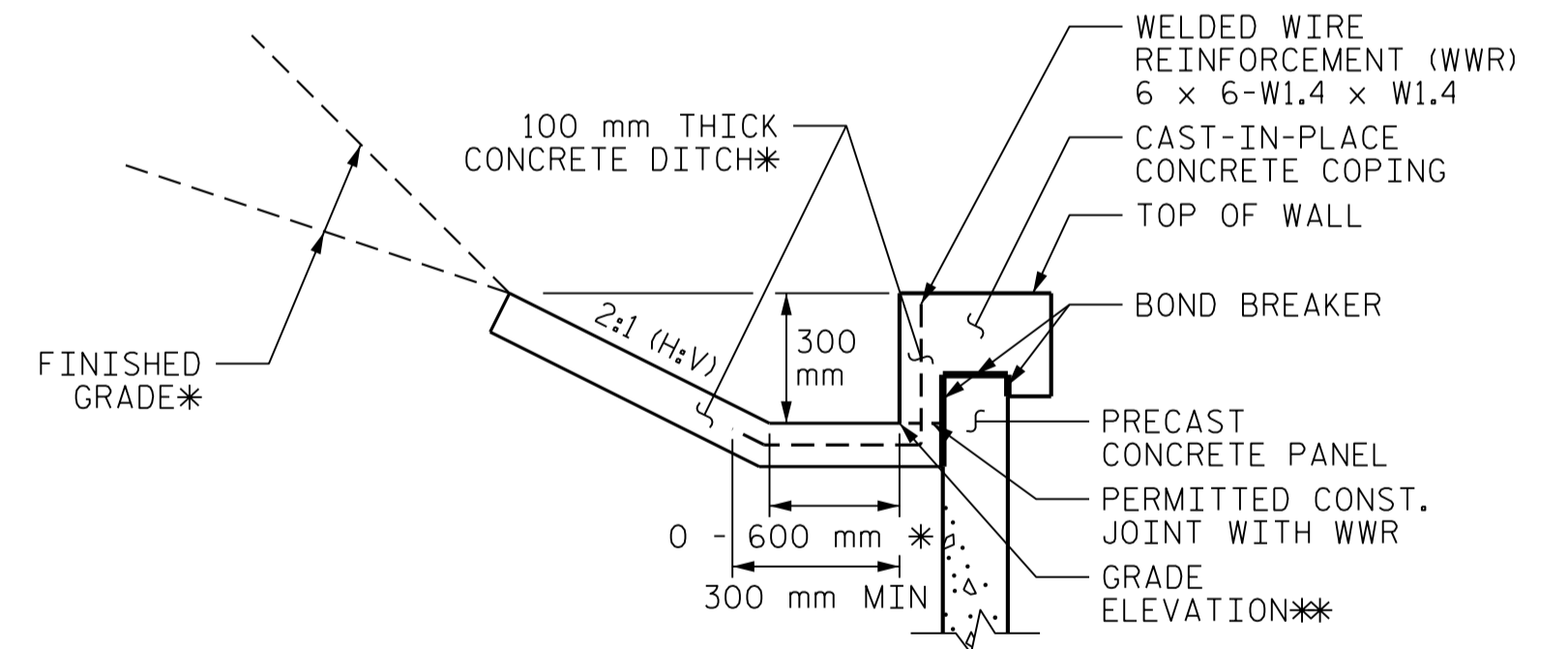
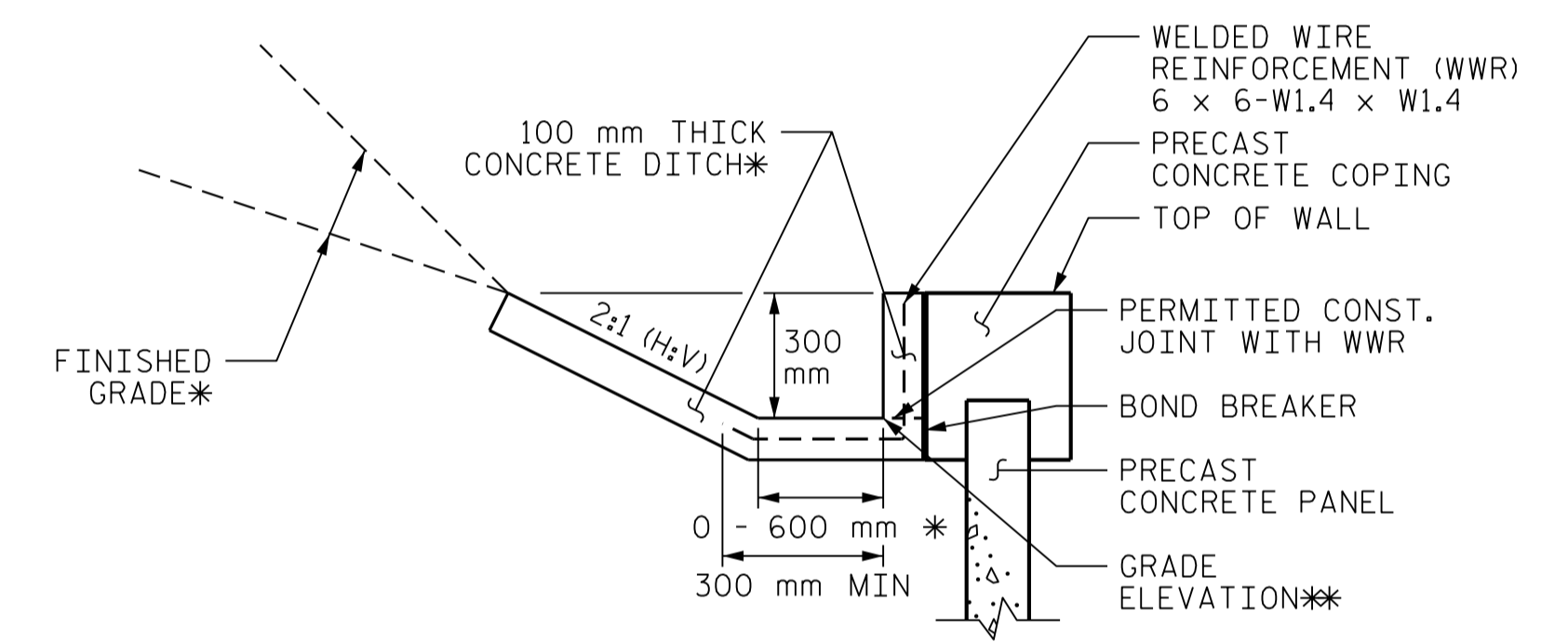


MSE WALL WITH PRECAST PANELS - TYPICAL SECTION

*SEE COPING DETAILS AND PLANS FOR FINISHED GRADE OR END BENT SLOPE DETAILS.
 **SEE MSE RETAINING WALLS PROVISION FOR EMBEDMENT AND REINFORCEMENT LENGTH REQUIREMENTS.

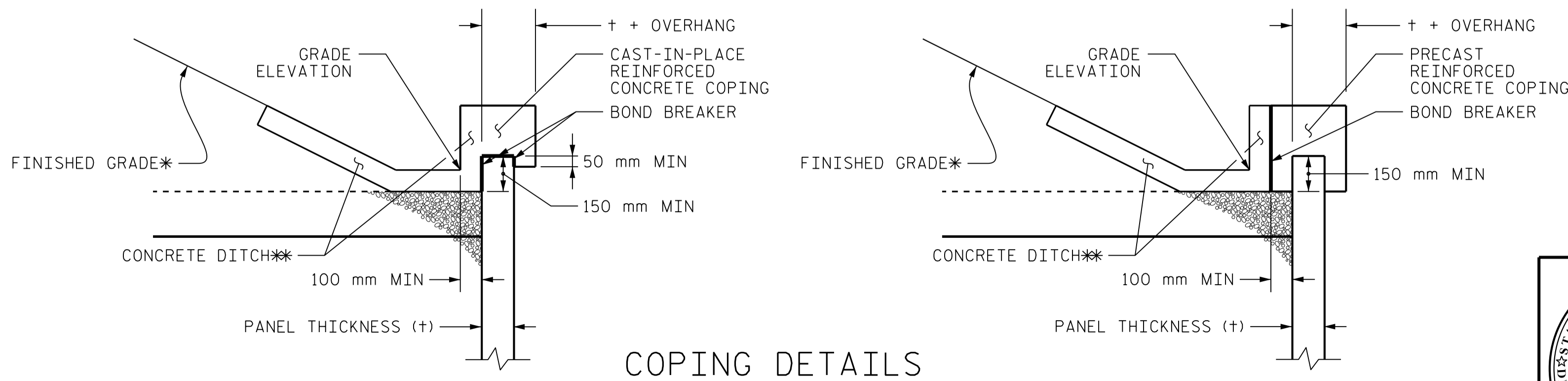


LEVELING PAD STEP DETAILS



CONCRETE DITCH BEHIND WALL WITH CONCRETE COPING

*SEE ROADWAY PLANS FOR FINISHED GRADE AND DITCH DETAILS.
 **SEE WALL ENVELOPE FOR GRADE ELEVATIONS.
 FOR CONCRETE DITCHES, SEE SECTION 850 OF THE STANDARD SPECIFICATIONS.



COPING DETAILS

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

PROJECT NO.: R-2413CA
 ROCKINGHAM COUNTY
 STATION: 13+51 -NC68_SB-LT
 SHEET 6 OF 8

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

MSE RETAINING WALL NO. 3 TYPICAL SECTION & DETAILS FOR MSE WALL WITH PANELS

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

PREPARED BY: THEIN T. ZAN	DATE: 02/2015
REVIEWED BY: JAMES R. BATTS	DATE: 02/2015



GEOTECHNICAL ENGINEER

SEAL 030943

THEIN TUN ZAN

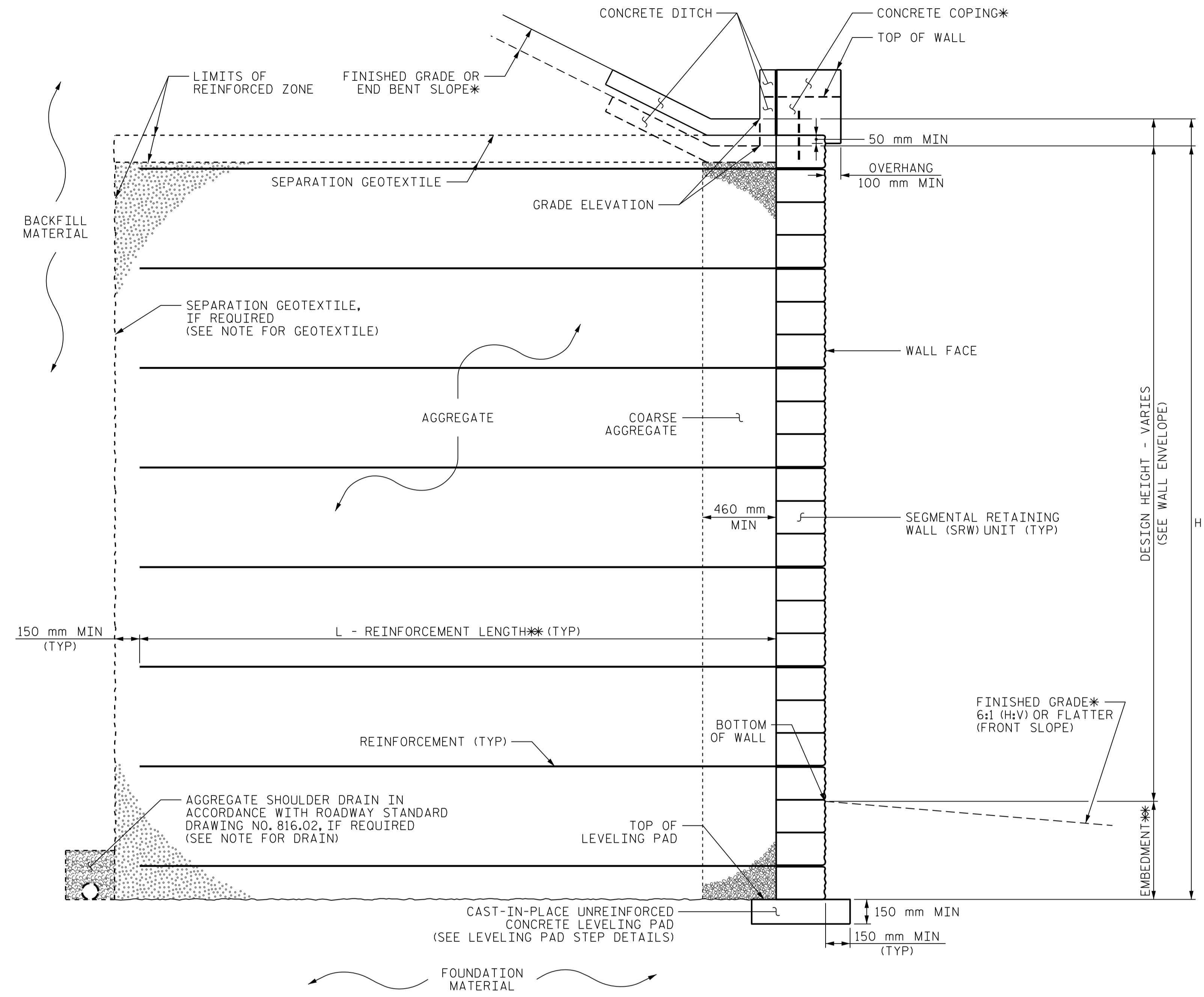
DocuSigned by: Thein Tun Zan 2/18/2015

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ENGINEER

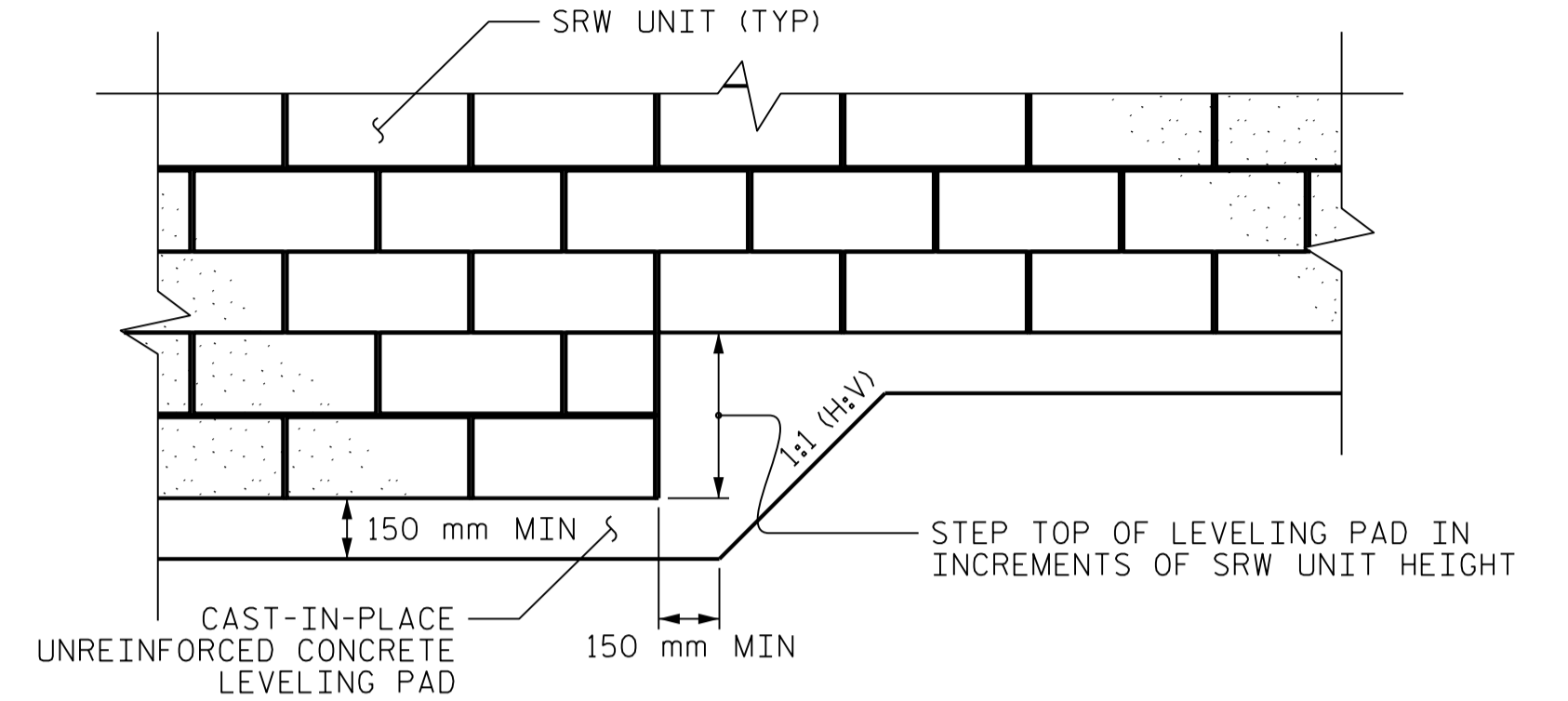
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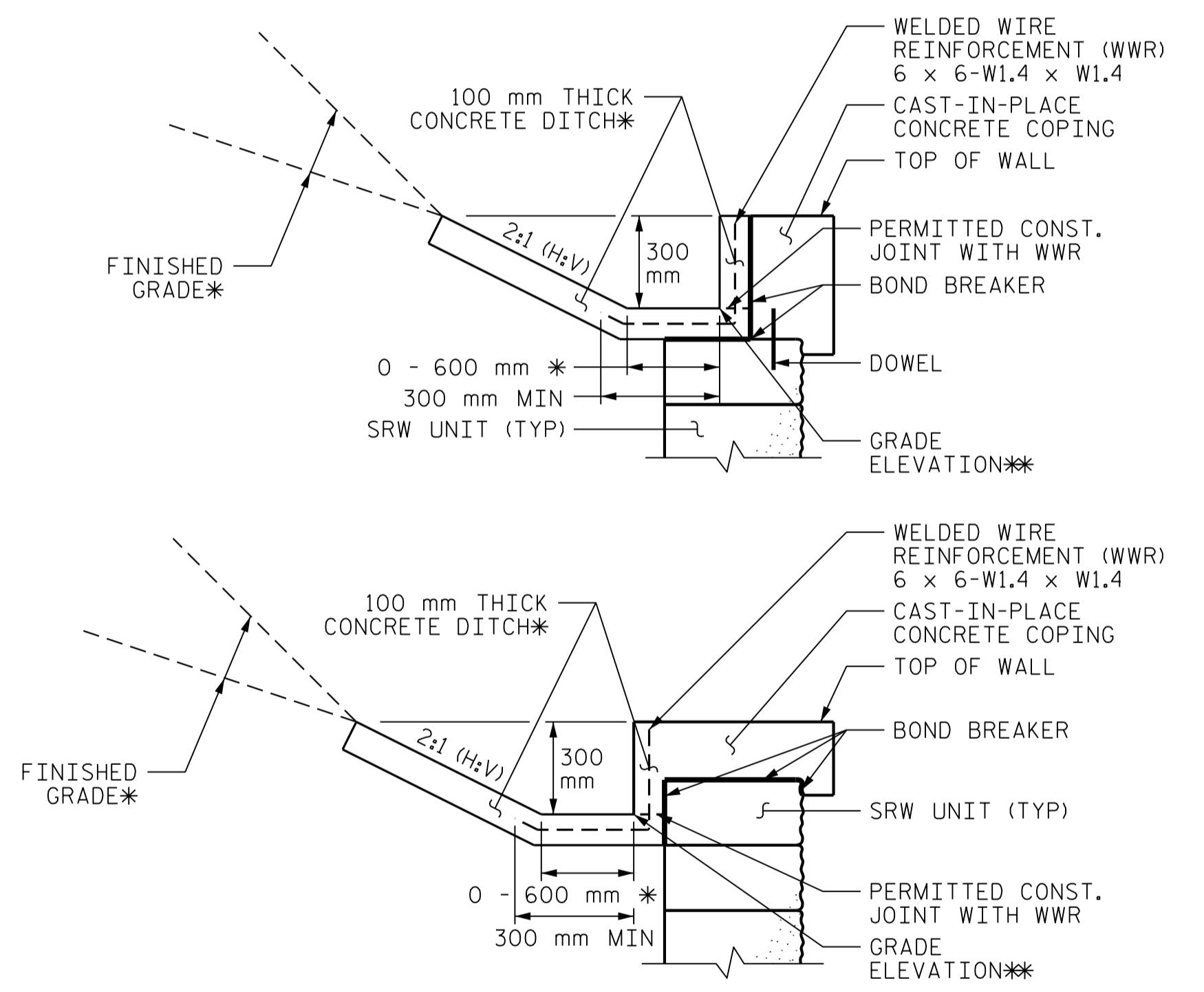


MSE WALL WITH SRW UNITS - TYPICAL SECTION

*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.

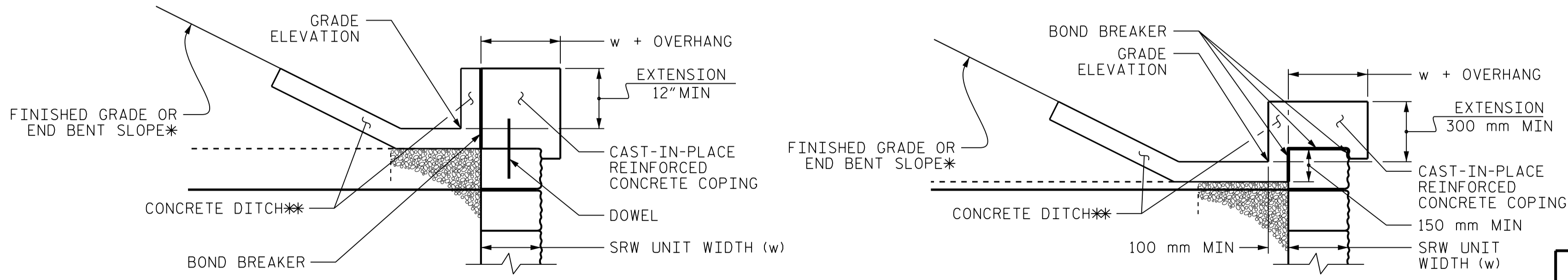


LEVELING PAD STEP DETAILS



CONCRETE DITCH BEHIND WALL WITH CONCRETE COPING

*SEE ROADWAY PLANS FOR FINISHED GRADE AND DITCH DETAILS.
 **SEE WALL ENVELOPE FOR GRADE ELEVATIONS.
 FOR CONCRETE DITCHES, SEE SECTION 850 OF THE STANDARD SPECIFICATIONS.



COPING DETAILS

AT THE CONTRACTOR'S OPTION, CONNECT COPING TO SRW UNITS WITH DOWELS OR EXTEND COPING DOWN BACK OF SRW UNITS.
 *SEE PLANS FOR FINISHED GRADE OR END BENT SLOPE DETAILS.
 **SEE CONCRETE DITCH BEHIND WALL DETAILS.

PROJECT NO.: R-2413CA
 ROCKINGHAM COUNTY
 STATION: 13+51 -NC68_SB-LT
 SHEET 7 OF 8

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

MSE RETAINING WALL NO. 3 TYPICAL SECTION & DETAILS FOR MSE WALL WITH SRW UNITS

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	
1			3			W-7
2			4			

PREPARED BY: THEIN T. ZAN	DATE: 02/2015
REVIEWED BY: JAMES R. BATTS	DATE: 02/2015



GEOTECHNICAL ENGINEER

DocuSigned by:
Thein T. Zan 2/18/2015

44388808C15472 SIGNATURE DATE

ENGINEER

SIGNATURE DATE

NOTES:

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

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

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

AT THE CONTRACTOR'S OPTION, USE AN MSE WALL SYSTEM WITH SEGMENTAL RETAINING WALL (SRW) UNITS THAT MEET ARTICLE 1040-4 OF THE STANDARD SPECIFICATIONS FOR RETAINING WALL NO. 3.

AT THE CONTRACTOR'S OPTION, USE FINE AGGREGATE IN THE REINFORCED ZONE OF RETAINING WALL NO. 1, RETAINING WALL NO. 2 AND RETAINING WALL NO. 3.

A SEPARATION GEOTEXTILE IS REQUIRED AT THE BACK OF THE REINFORCED ZONE FOR RETAINING WALL NO. 1, RETAINING WALL NO. 2 AND RETAINING WALL NO. 3.

A DRAIN IS REQUIRED FOR RETAINING WALL NO. 1, RETAINING WALL NO. 2 AND RETAINING WALL NO. 3.

BEFORE BEGINNING MSE WALL DESIGN FOR RETAINING WALL NO. 1, RETAINING WALL NO. 2 AND RETAINING WALL NO. 3, SURVEY WALL LOCATIONS AND SUBMIT REVISED WALL PROFILE VIEWS (WALL ENVELOPES) FOR REVIEW. DO NOT START WALL DESIGN OR CONSTRUCTION UNTIL THE REVISED WALL ENVELOPE IS ACCEPTED.

DESIGN RETAINING WALLS FOR THE FOLLOWING:

- 1) H = DESIGN HEIGHT + EMBEDMENT
- 2) DESIGN LIFE = 100 YEARS
- 3) MAXIMUM FACTORED VERTICAL PRESSURE ON FOUNDATION MATERIAL = 355 kPa (FOR WALL NO. 1 & WALL NO. 2)
- 4) MAXIMUM FACTORED VERTICAL PRESSURE ON FOUNDATION MATERIAL = 340 kPa (FOR WALL NO. 3)
- 5) AGGREGATE PARAMETERS:

AGGREGATE TYPE*	UNIT WEIGHT (γ) kN/m ³	FRICTION ANGLE (ϕ) DEGREE	COHESION (c) kPa
COARSE	17.2	38	0
FINE	18.0	34	0

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

6) IN-SITU ASSUMED MATERIAL PARAMETERS:

MATERIAL TYPE	UNIT WEIGHT (γ) kN/m ³	FRICTION ANGLE (ϕ) DEGREE	COHESION (c) kPa
BACKFILL	18.8	30	0
FOUNDATION	18.8	28	0

DESIGN RETAINING WALL NO. 1, RETAINING WALL NO. 2 AND RETAINING WALL NO. 3 FOR A LIVE LOAD (TRAFFIC) SURCHARGE.

DESIGN RETAINING WALL NO. 3 FOR A PIPE EXTENDING THROUGH THE WALL AS SHOWN. VERIFY PIPE LOCATION AND ELEVATION BEFORE BEGINNING MSE WALL DESIGN OR CONSTRUCTION.

EXISTING OR FUTURE OBSTRUCTIONS SUCH AS FOUNDATIONS, GUARDRAIL, FENCE OR HANDRAIL POSTS, PAVEMENTS, PIPES, INLETS OR UTILITIES MAY INTERFERE WITH REINFORCEMENT FOR RETAINING WALL NO. 1, RETAINING WALL NO. 2 AND RETAINING WALL NO. 3.

FOUNDATIONS FOR END BENT NO. 1 LOCATED AT STATION 90+37.493 -LREV_SB- AND END BENT NO. 2 LOCATED AT STATION 90+81.993 -LREV_SB- MAY INTERFERE WITH REINFORCEMENT FOR RETAINING WALL NO. 1 AND RETAINING WALL NO. 2, RESPECTIVELY. SEE 'FOUNDATION LAYOUT' SHEET FOR FOUNDATION LOCATIONS.

DO NOT PLACE LEVELING PAD CONCRETE, AGGREGATE OR REINFORCEMENT FOR RETAINING WALL NO. 1, RETAINING WALL NO. 2 AND RETAINING WALL NO. 3, UNTIL EXCAVATION DIMENSIONS AND FOUNDATION MATERIAL ARE APPROVED.

PROJECT NO.: R-2413CA
 ROCKINGHAM COUNTY
 STATION: VARIES
 SHEET 7 OF 8

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

**GEOTECHNICAL
 ENGINEERING UNIT**

**MSE RETAINING WALL NO. 1, 2 & 3
 NOTES**

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	
1			3			W-8
2			4			

PREPARED BY: THEIN T. ZAN	DATE: 02/2015
REVIEWED BY: JAMES R. BATTS	DATE: 02/2015

