RETAINING WALL A ENVELOPE

SEE SHEET S-3 FOR DETAILS
SEE SHEET 5A & 6A FOR PLAN

PROJECT REFERENCE NO.	SHEET NO.
P-5206D	S-1
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER

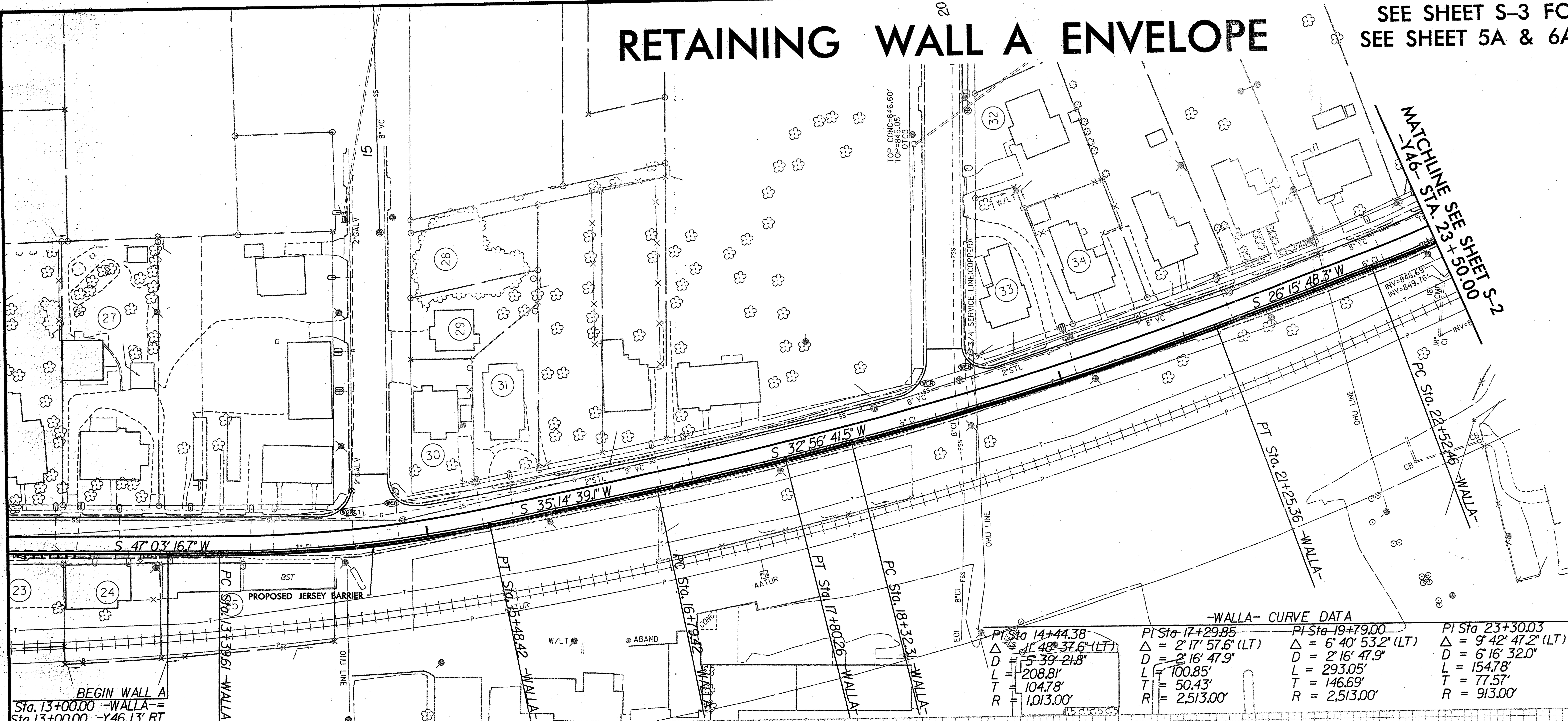
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 32606 BENJAMIN R. CRAWFORD 7/18/13

STEWART

Firm License No. C-1051, 421 Fayetteville St., Suite 400, Raleigh, NC 27601, T 919.380.8750, www.stewartinc.com

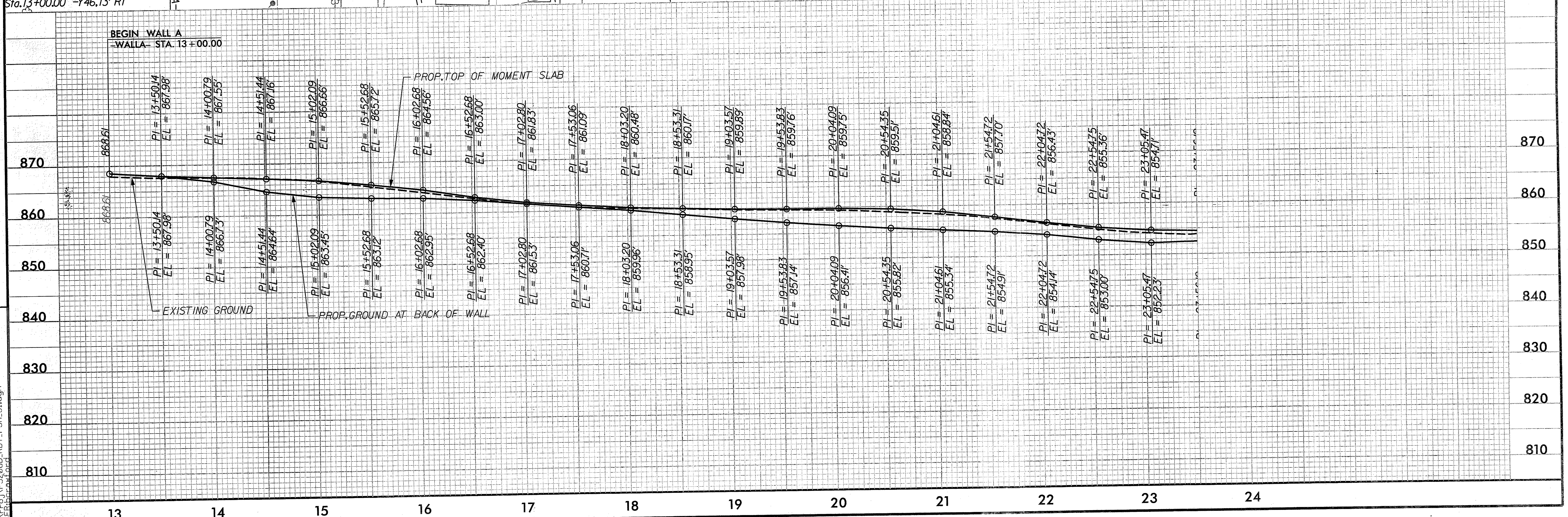
0164DEL_P10b2

REVISIONS



-WALLA- CURVE DATA

PI Sta 14+44.38	PI Sta 17+29.85	PI Sta 19+79.00	PI Sta 23+30.03
Δ = 11° 48' 37.6" (LT)	Δ = 2° 17' 57.6" (LT)	Δ = 6° 40' 53.2" (LT)	Δ = 9° 42' 47.2" (LT)
D = 5° 39' 21.8"	D = 2° 16' 47.9"	D = 2° 16' 47.9"	D = 6° 16' 32.0"
L = 208.81'	L = 100.85'	L = 293.05'	L = 154.78'
T = 104.78'	T = 50.43'	T = 146.69'	T = 77.57'
R = 1,013.00'	R = 2,513.00'	R = 2,513.00'	R = 913.00'



7/22/2013
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DGN 0164DEL_P10b2

REVISIONS

RETAINING WALL A ENVELOPE

SEE SHEET S-3 FOR DETAILS
SEE SHEET 5A & 6A FOR PLAN

PROJECT REFERENCE NO.	SHEET NO.
P-5206D	S-2
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER

SEAL 32606 — ENGINEER — BENJAMIN R. CRAWFORD — 7/1/13

STEWART — Firm License No. C-1051, 421 Fayetteville St., Suite 400, Raleigh, NC 27601, P. 919.380.8750, www.stewartinc.com

MATCHLINE SEE SHEET S-2
-Y46- STA. 23+50.00

END CONSTRUCTION
-Y46- STA. 28+89.59
TIE TO EXISTING

BM#17
-BL- STA. 497+65.56
88.82' LT.
ELEV. 845.97

S 76° 33' 01.1" W

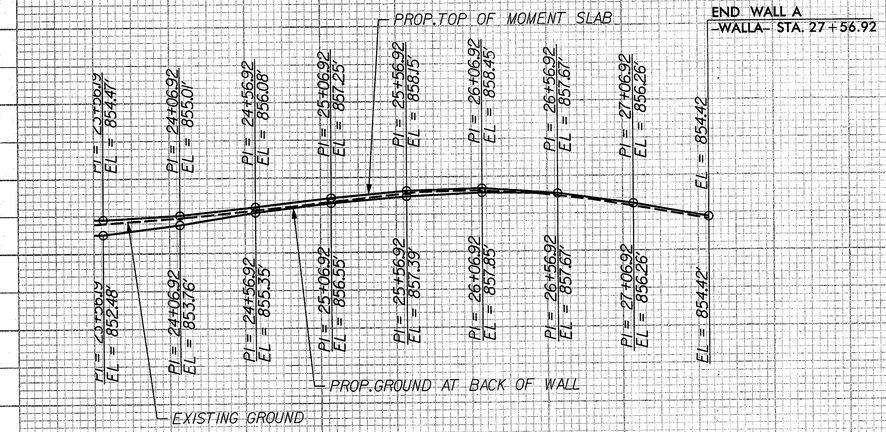
PROPOSED JERSEY BARRIER

END WALL B
27+50.00 -Y46- 13' RT

PT Sta. 24+07.23 -WALLA-

-WALLA- CURVE DATA
PI Sta 23+30.03
Δ = 9° 42' 47.2" (LT)
D = 6° 16' 32.0"
L = 154.78'
T = 77.57'
R = 913.00'

END WALL A
Sta. 27+56.92 -WALLA-=
Sta. 27+50 -Y46,13' RT



7/22/2013
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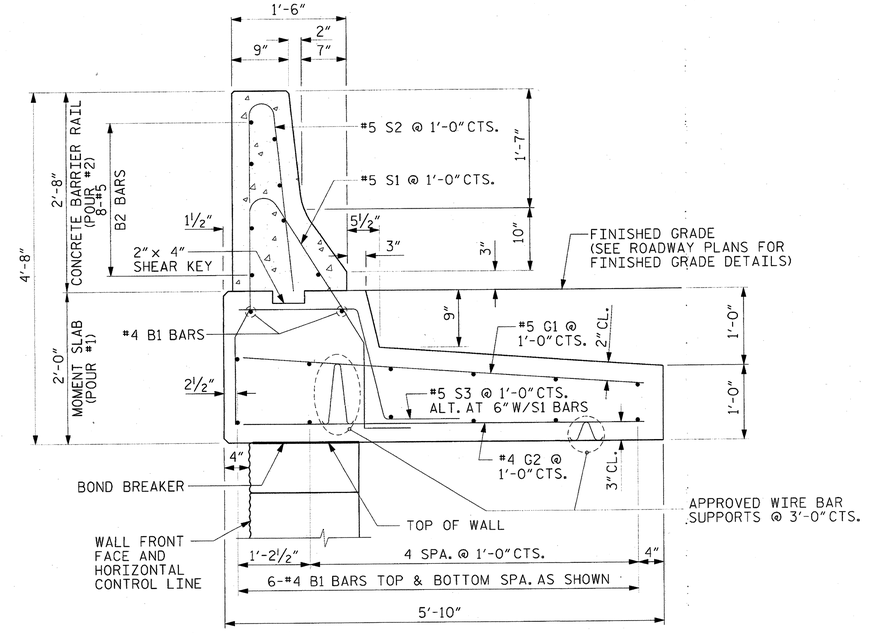
USER:crawford

DGN 0164DEL_P10b2



CONCRETE BARRIER RAIL WITH MOMENT SLAB

FOR STATION RANGES WHERE SEGMENTAL WALL IS TO BE USED, SEE ROADWAY PLANS AND SHEET S-4.

NOTES:

FOR CONCRETE BARRIER RAIL WITH MOMENT SLAB, SEE CONCRETE BARRIER RAIL WITH MOMENT SLAB PROVISION.

CONCRETE BARRIER RAIL WITH MOMENT SLAB SHALL BE A MINIMUM OF 15' IN LENGTH.

EXPANSION JOINTS SHALL BE PLACED IN THE BARRIER RAIL AND MOMENT SLAB AT A MAXIMUM SPACING OF 30'.

GROOVED CONTRACTION JOINTS, 1/2" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED SURFACES OF THE BARRIER RAIL AND IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. A CONTRACTION JOINT SHALL BE LOCATED AT EACH THIRD POINT BETWEEN BARRIER RAIL EXPANSION JOINTS. ONLY ONE CONTRACTION JOINT IS REQUIRED AT MID-POINT OF BARRIER RAIL SEGMENTS LESS THAN 20' IN LENGTH.

THE BARRIER RAIL SHALL NOT BE CAST UNTIL THE MOMENT SLAB HAS ATTAINED AN AGE OF THREE CURING DAYS OR A MINIMUM COMPRESSIVE STRENGTH OF 2,000 PSI. IN ADDITION, NO FILL MATERIAL, ASPHALT, OR CONSTRUCTION EQUIPMENT IS ALLOWED ON THE MOMENT SLAB PRIOR TO SATISFYING THE MINIMUM CONCRETE CURING AND STRENGTH REQUIREMENTS.

ALL REINFORCING STEEL IN THE BARRIER RAIL SHALL BE EPOXY COATED.

IF STEPS ARE REQUIRED AT TOP OF WALL, DETAILS SHOWING INTERFACE BETWEEN BOTTOM OF MOMENT SLAB AND STEPS SHALL BE SUBMITTED FOR APPROVAL.

IF EXISTING OR FUTURE OBSTRUCTIONS SUCH AS FOUNDATIONS, BARRIERS, PIPES, INLETS OR UTILITIES WILL INTERFERE WITH CONCRETE BARRIER RAIL WITH MOMENT SLAB, CONCRETE BARRIER RAIL WITH MOMENT SLAB DETAILS SHALL BE REVISED AND SUBMITTED FOR APPROVAL.

BILL OF MATERIAL (2 REQ'D)

FOR ONE 20'-0" SECTION OF CONCRETE BARRIER RAIL WITH MOMENT SLAB

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	14	#4	STR	19'-7"	183
* B2	8	#5	STR	19'-7"	163
G1	21	#5	STR	5'-6"	120
G2	21	#4	STR	5'-6"	77
* S1	21	#5	1	7'-3"	159
* S2	21	#5	2	5'-2"	113
S3	21	#5	3	4'-1"	89
REINFORCING STEEL					469 LB
* EPOXY COATED REINFORCING STEEL					435 LB
CLASS AA CONCRETE BARRIER RAIL					2.1 CY
CLASS A CONCRETE MOMENT SLAB					6.1 CY
CONCRETE BARRIER RAIL WITH MOMENT SLAB					20 LIN FT

BILL OF MATERIAL (47 REQ'D)

FOR ONE 30'-0" SECTION OF CONCRETE BARRIER RAIL WITH MOMENT SLAB

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	14	#4	STR	29'-7"	277
* B2	8	#5	STR	29'-7"	247
G1	31	#5	STR	5'-6"	178
G2	31	#4	STR	5'-6"	114
* S1	31	#5	1	7'-3"	234
* S2	31	#5	2	5'-2"	167
S3	31	#5	3	4'-1"	128
REINFORCING STEEL					697 LB
* EPOXY COATED REINFORCING STEEL					648 LB
CLASS AA CONCRETE BARRIER RAIL					3.1 CY
CLASS A CONCRETE MOMENT SLAB					9.1 CY
CONCRETE BARRIER RAIL WITH MOMENT SLAB					30 LIN FT

STRUCTURAL ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 037760 ENGINEER PAUL L. JACOB

SIGNATURE 7/22/13 DATE

GEOTECHNICAL ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 15741 ENGINEER XAVIER C. BARRETT

SIGNATURE 7/22/13 DATE

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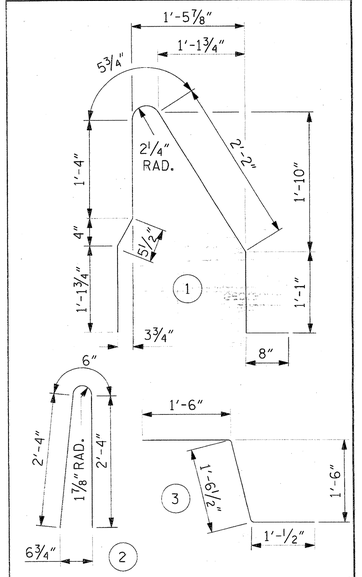
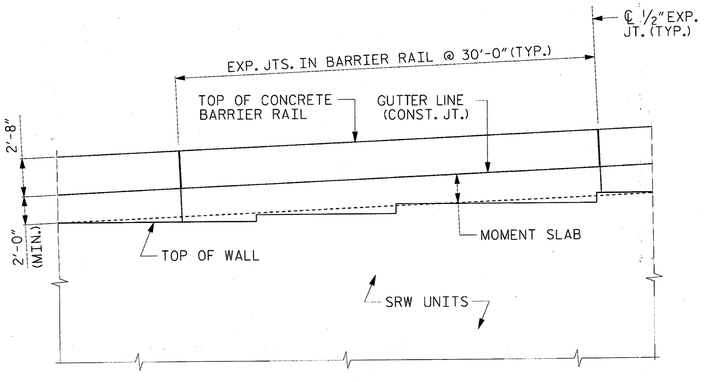
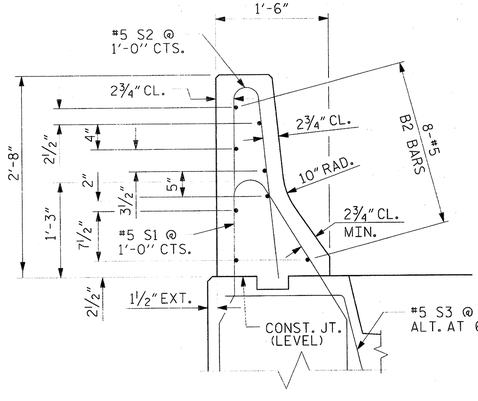
BAR TYPES



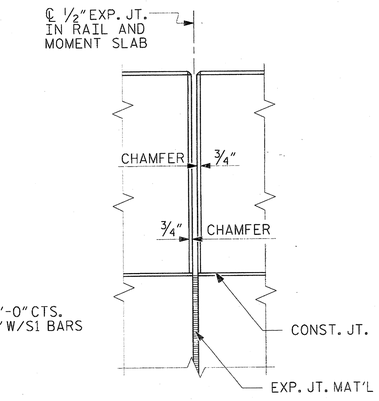
ALL BAR DIMENSIONS ARE OUT TO OUT



CONCRETE BARRIER RAIL WITH MOMENT SLAB - PARTIAL ELEVATION



SECTION THRU RAIL



ELEV. @ EXP. JOINTS

BARRIER RAIL DETAILS

CONCRETE BARRIER RAIL WITH MOMENT SLAB
PAY LENGTH = 1,450 LIN FT

PROJECT NO.: P5206-D

ROWAN ***COUNTY***

STATION: 13+00 -Y46- TO 27+50 -Y46-

CONCRETE BARRIER RAIL WITH MOMENT SLAB FOR SEGMENTAL RETAINING WALL (SRW) UNITS

PREPARED BY: PLJ	DATE: 1/28/13
REVIEWED BY: DRR	DATE: 1/28/13

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	–
1	–	–	3	–	–	TOTAL SHEETS
2	–	–	4	–	–	–

DWG. S3 OF 5

DGN 0164DEL_P10b2

NOTES:

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

A CONCRETE BARRIER RAIL WITH MOMENT SLAB IS REQUIRED ABOVE RETAINING WALL A. SEE PLANS FOR CONCRETE BARRIER RAIL WITH MOMENT SLAB DETAILS.

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

WHEN USING AN MSE WALL SYSTEM WITH SEGMENTAL RETAINING WALL (SRW) UNITS FOR RETAINING WALL A, FREEZE-THAW DURABLE SRW UNITS THAT MEET ARTICLE 1040-4 OF THE STANDARD SPECIFICATIONS ARE REQUIRED.

A DRAIN IS NOT REQUIRED FOR RETAINING WALL A.

BEFORE BEGINNING MSE WALL DESIGN FOR RETAINING WALL A, 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 A FOR A LIVE LOAD (TRAFFIC) SURCHARGE.

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

"TEMPORARY SHORING FOR WALL CONSTRUCTION" IS REQUIRED. SEE MSE RETAINING WALLS PROVISION FOR TEMPORARY SHORING FOR WALL CONSTRUCTION. TEMPORARY SLOPES ARE NOT PERMITTED FOR WALL A. SEE "TEMPORARY SHORING HEIGHT" CHART FOR ESTIMATED SHORING HEIGHT ALONG -Y46-.

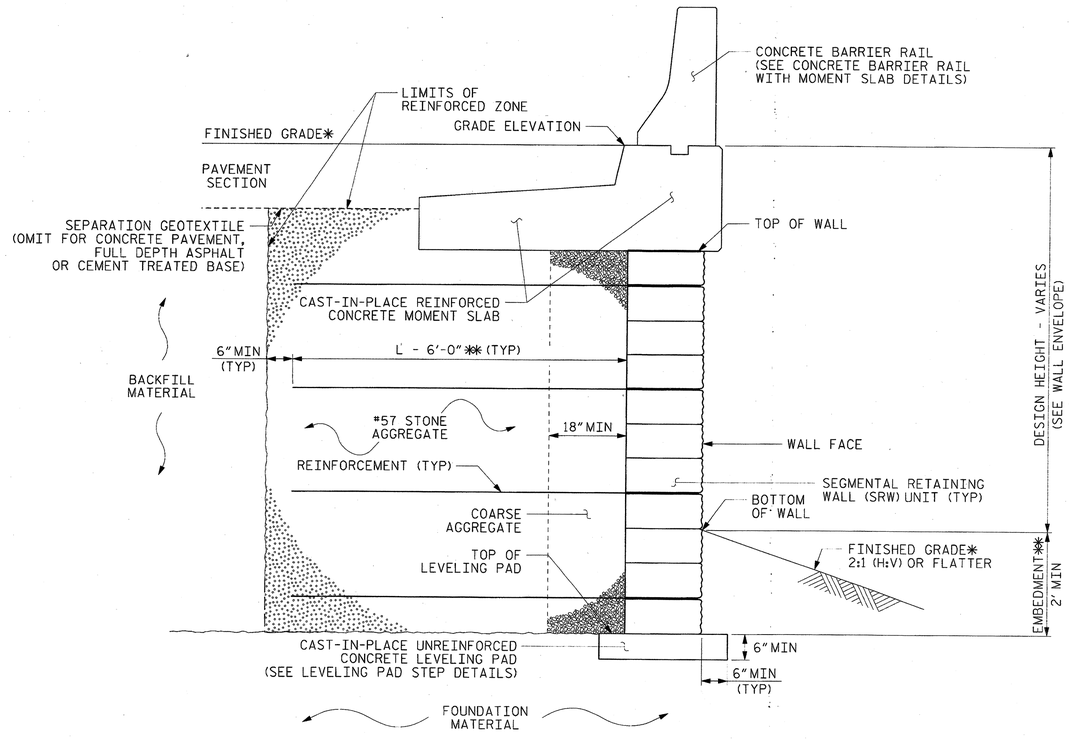
EXCAVATION IS REQUIRED BEHIND WALL TO PROVIDE FOR INSTALLATION OF STRAPS AND #57 STONE. NO ADDITIONAL PAYMENT WILL BE MADE FOR EXCAVATION OR DISPOSAL OF MATERIAL. THE ENTIRE COST OF EXCAVATION AND DISPOSAL OF MATERIAL SHALL BE INCLUDED IN THE PAY ITEM "MSE RETAINING WALLS".

DESIGN RETAINING WALL A FOR THE FOLLOWING:
1) H = DESIGN HEIGHT + EMBEDMENT
2) DESIGN LIFE = 100 YEARS
3) MAXIMUM FACTORED VERTICAL STRESS ON FOUNDATION MATERIAL = 4,500 LB/SF
4) MINIMUM REINFORCEMENT LENGTH (L) = 6 FT
5) MINIMUM EMBEDMENT = 2 FT
6) AGGREGATE PARAMETERS:

AGGREGATE TYPE*	UNIT WEIGHT (g) LB/CF	FRICTION ANGLE (f) DEGREES	COHESION (c) LB/SF
COARSE	110	38	0
FINE	125	34	0
*SEE MSE RETAINING WALLS PROVISION FOR COARSE AND FINE AGGREGATE MATERIAL REQUIREMENTS.			

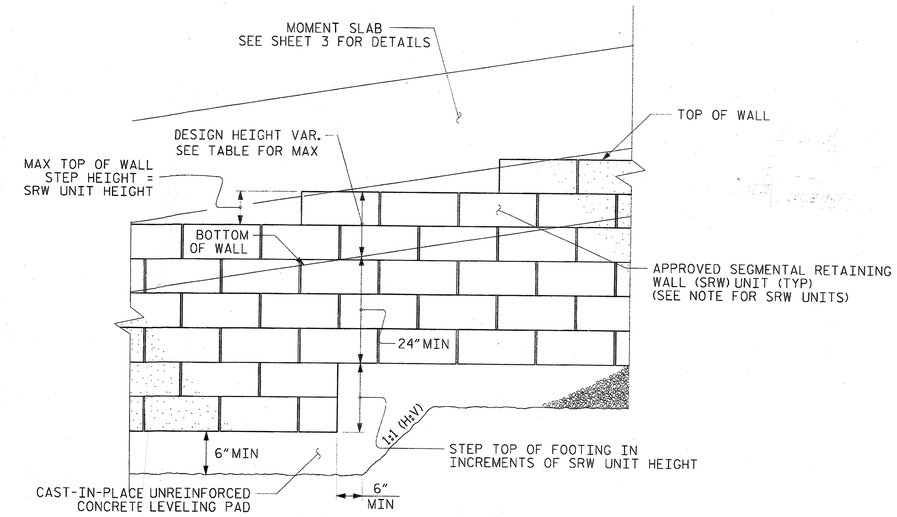
7) IN-SITU ASSUMED MATERIAL PARAMETERS:

MATERIAL TYPE	UNIT WEIGHT (g) LB/CF	FRICTION ANGLE (f) DEGREES	COHESION (c) LB/SF
BACKFILL	120	20	400
FOUNDATION	115	32	0



MSE WALL WITH SRW UNITS - TYPICAL SECTION

*SEE ROADWAY PLANS FOR FINISHED GRADE DETAILS.
**SEE MSE RETAINING WALLS PROVISION FOR EMBEDMENT AND REINFORCEMENT LENGTH REQUIREMENTS.



MSE WALL WITH SRW UNITS - PARTIAL ELEVATION

TEMPORARY SHORING HEIGHT

STATION	SHORING HEIGHT (FT)	STATION	SHORING HEIGHT (FT)	STATION	SHORING HEIGHT (FT)	STATION	SHORING HEIGHT (FT)
13+50	0.0	17+00	1.5	20+50	4.8	24+00	2.5
14+00	2.1	17+50	1.7	21+00	4.6	24+50	1.8
14+50	3.7	18+00	1.9	21+50	4.0	25+00	1.8
15+00	4.4	18+50	2.7	22+00	3.5	25+50	1.9
15+50	3.8	19+00	3.1	22+50	3.7	26+00	1.8
16+00	2.8	19+50	3.9	23+00	3.6	26+50	0.0
16+50	1.8	20+00	4.5	23+50	3.1		

WALL 'A" SRW SUMMARY

BEGIN STA.	END STA.	MAX. HEIGHT	AREA	#57 STONE
13+50.00	26+50.00	1.80	1288 SF	1060 TONS

NOTE:

FROM STA. 13+00.00 TO STA. 13+50.00 AND FROM STA. 26+50.00 TO STA. 27+50.00, THE MOMENT SLAB WILL BEAR ON SOIL. SRW WALL IS NOT REQUIRED BETWEEN THESE LIMITS.

THE CONTRACTOR'S ATTENTION IS CALLED TO THE FACT THAT THE MINIMUM WALL EMBEDMENT HAS BEEN INCREASED. WALL EMBEDMENT IS NOT SHOWN IN WALL QUANTITIES.

STRUCTURAL ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 037760 ENGINEER PAUL JACOB

SIGNATURE 7/22/13 DATE

GEOTECHNICAL ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 15741 ENGINEER XAVIER C. BARRETT

SIGNATURE 7/22/13 DATE

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PREPARED BY: PLJ	DATE: 2/22/13
REVIEWED BY: DRR	DATE: 2/22/13

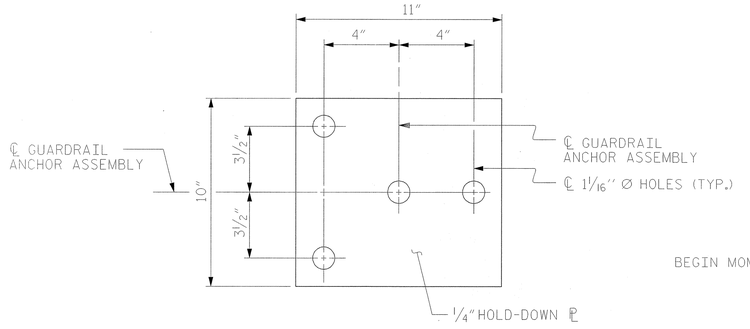
PROJECT NO.: P5206-D
ROWAN ***COUNTY***
STATION: 13+00 -Y46- TO 27+50 -Y46-

WALL "A" MSE WALL WITH SRW UNITS

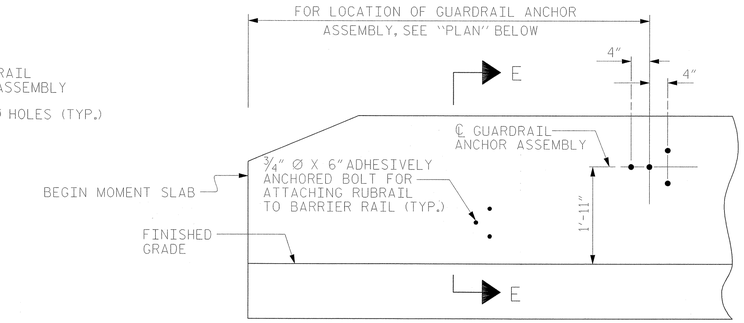
SHEET NO. –
TOTAL SHEETS –

DWG. S4 OF 5

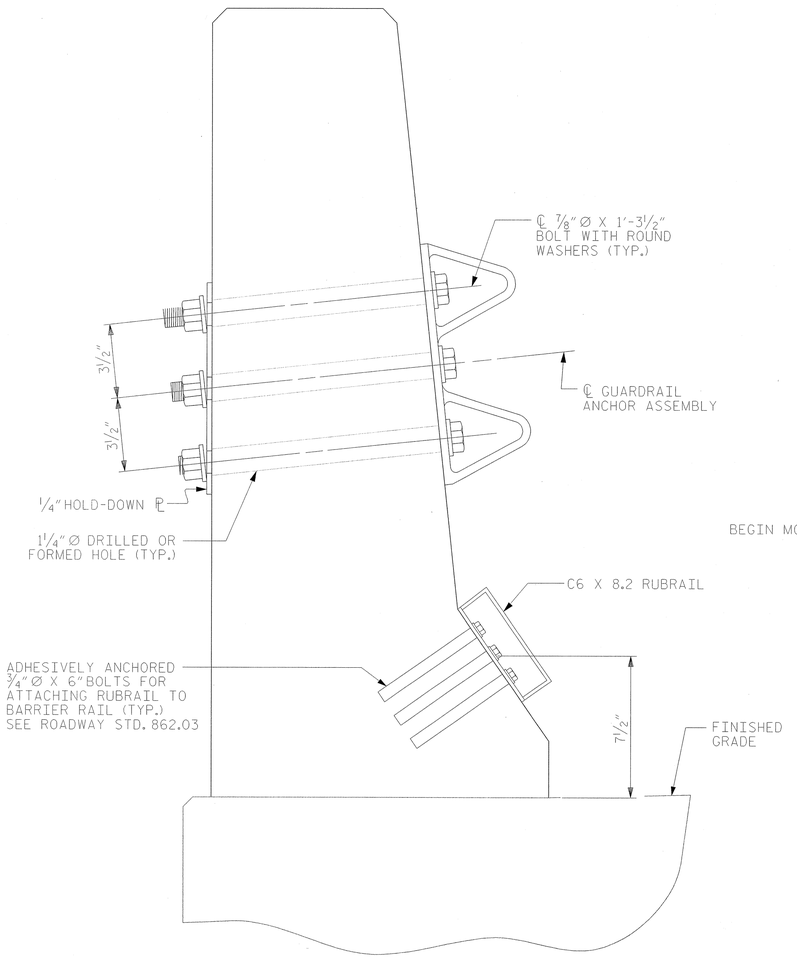
DGN 0160DEL_P10b2



PLAN



ELEVATION



SECTION E-E

GUARDRAIL ANCHOR ASSEMBLY DETAILS

NOTES

THE GUARDRAIL ANCHOR ASSEMBLY SHALL CONSIST OF A 1/4" HOLD-DOWN PLATE AND 4 - 7/8" Ø BOLTS WITH NUTS AND WASHERS, RUBRAIL, AND ADHESIVELY ANCHORED BOLTS.

THE HOLD-DOWN PLATE SHALL CONFORM TO AASHTO M270 GRADE 36. AFTER FABRICATION, THE HOLD-DOWN PLATE SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH AASHTO M111.

BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307 AND NUTS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M291. BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED. (AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLTS, NUTS AND WASHERS MAY BE USED AS AN ALTERNATE FOR THE 7/8" Ø GALVANIZED BOLTS, NUTS AND WASHERS. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.)

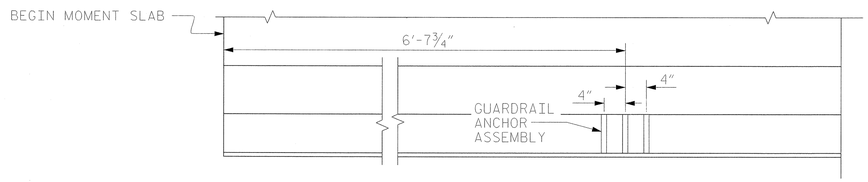
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF BARRIER RAIL. FOR POINTS OF ATTACHMENT, SEE SKETCH.

AFTER INSTALLATION, THE EXPOSED THREAD OF THE BOLT SHALL BE BURRED WITH A SHARP POINTED TOOL.

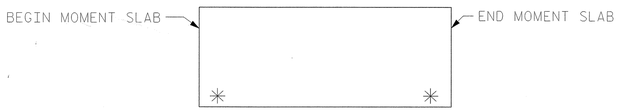
THE COST OF THE GUARDRAIL ANCHOR ASSEMBLY SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR CONCRETE BARRIER RAIL.

THE 1 1/4" Ø HOLES SHALL BE FORMED OR DRILLED WITH A CORE BIT. IMPACT TOOLS WILL NOT BE PERMITTED. ANY CONCRETE DAMAGED BY THIS WORK SHALL BE REPAIRED TO THE SATISFACTION OF THE ENGINEER.

THE C6 X 8.2 RUBRAIL IS TO BE ADHESIVELY ANCHORED TO THE RAIL USING THREE 3/4" Ø X 6" BOLTS WITH WASHERS. LEVEL ONE FIELD TESTING IS REQUIRED, AND THE YIELD LOAD OF THE 3/4" Ø BOLT IS 12 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE STANDARD SPECIFICATIONS. SEE ROADWAY STANDARD 862.03 FOR DETAILS AND LOCATION OF THE RUBRAIL.



PLAN



SKETCH SHOWING POINTS OF ATTACHMENTS

✳ DENOTES GUARDRAIL ANCHOR ASSEMBLY

LOCATION OF ANCHORS FOR GUARDRAIL

BEGIN MOMENT SLAB SHOWN, END MOMENT SLAB SIMILAR.

PROJECT NO. P5206-D

ROWAN COUNTY

STATION: 13+00 -Y46- TO 27+50 -Y46-

SHEET 5 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

GUARDRAIL ANCHORAGE FOR BARRIER RAIL

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS
2			4			

STD. NO. GRA2

ASSEMBLED BY : PLJ		DATE : 4/1/13	
CHECKED BY : DRR		DATE : 4/1/13	
DRAWN BY : TLA 5/06	REV. 10/1/11		MAA/GM
CHECKED BY : GM 5/06	REV. 7/12		MAA/GM
	REV. 10/12		MAA/GM

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 037760 PAUL L. JACOB
4-1-2013

DWG 55 of 5

4/1/2013
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USER:pjacob