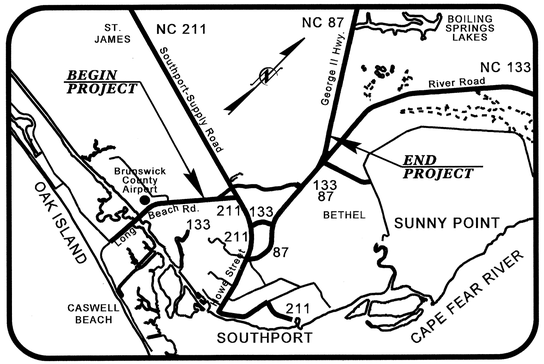
TIP PROJECT: R-3324

CONTRACT: C202155



STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

BRUNSWICK COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-3324		

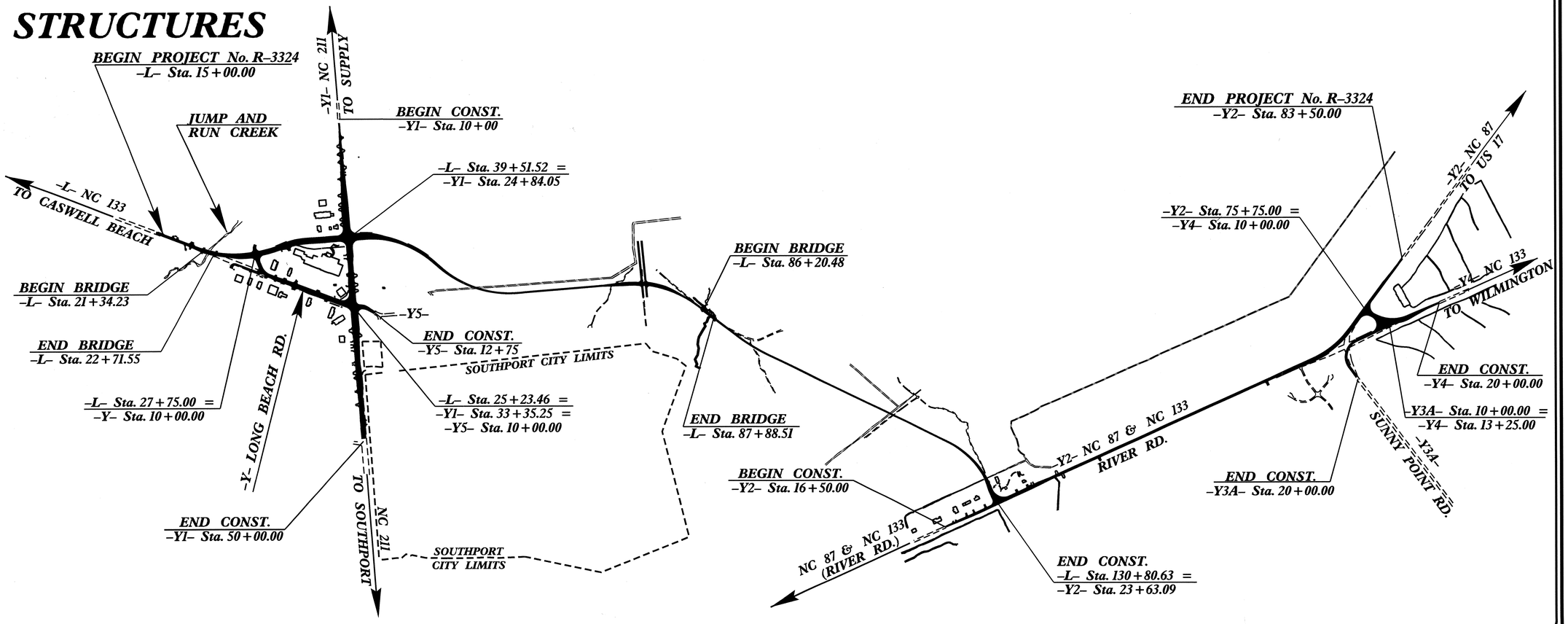
STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
34531.1.1	STP-133(3)	PE
34531.2.1	STP-133(3)	R/W & Utilities
34531.3.1	STP-133(7)	CONST.

LOCATION: *NEW ROUTE FROM NC 133 (LONG BEACH RD.) TO NC 133 & NC 87 (RIVER RD.), NORTH OF SOUTHPORT.*

TYPE OF WORK: *GRADING, PAVING, DRAINAGE, STRUCTURES, SIGNALS. CULVERTS, RETAINING WALL*

NAD 83

STRUCTURES



DESIGN DATA

ADT 2009 = 9,514 – 13,720
ADT 2033 = 13,620 – 47,170
DHV = 50 %
D = 10 %
T = 5 % *
V = 50 MPH
FUNCTIONAL CLASSIFICATION: LOCAL
* TTST 2% DUAL 3%

PROJECT LENGTH

LENGTH ROADWAY TIP No. R-3324 (-L-)	=	*2.193 MILES*
LENGTH ROADWAY TIP No. R-3324 (-Y2-)	=	*1.134 MILES*
LENGTH STRUCTURES PROJECT No. R-3324:		
(@ Jump-n-Run Creek)	=	*0.026 MILES*
(@ Trib. to Dutchman Creek)	=	*0.032 MILES*
TOTAL LENGTH TIP PROJECT No. R-3324	=	*3.271 MILES*

Prepared in the Office of:
DIVISION OF HIGHWAYS
1000 Birch Ridge Dr., Raleigh NC, 27610

2012 STANDARD SPECIFICATIONS

LETTING DATE:
MARCH 19, 2013

OMAR R. AZIZI, PE
PROJECT ENGINEER

EMILY E. MURRAY, PE
PROJECT DESIGN ENGINEER

STRUCTURES MANAGEMENT UNIT

F.A. PROJECT NO.: STP-133(7)

21+00 21+25 21+50 21+75 22+00 22+25 22+50 22+75 23+00

-3.4640% +0.9579%

GRADE DATA

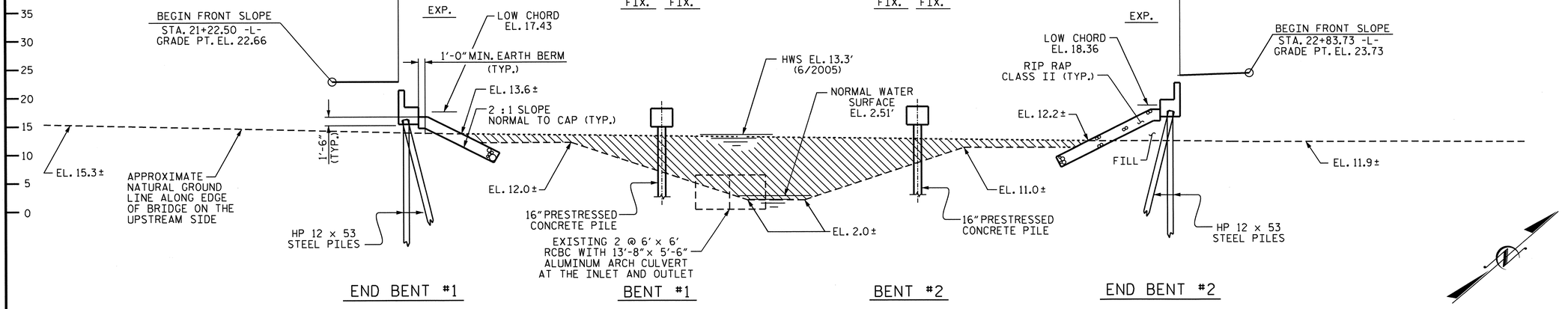
P.I. STA. = 18+75.00 -L-
EL. = 19.81'
V.C. = 750.00'

FILL FACE @ END BENT #1
STA. 21+34.23 -L-
GRADE PT. EL. 22.69

BEGIN FRONT SLOPE
STA. 21+22.50 -L-
GRADE PT. EL. 22.66

FILL FACE @ END BENT #2
STA. 22+71.55 -L-
GRADE PT. EL. 23.61

BEGIN FRONT SLOPE
STA. 22+83.73 -L-
GRADE PT. EL. 23.73



UNCLASSIFIED STRUCTURE EXCAVATION

SECTION ALONG -L-

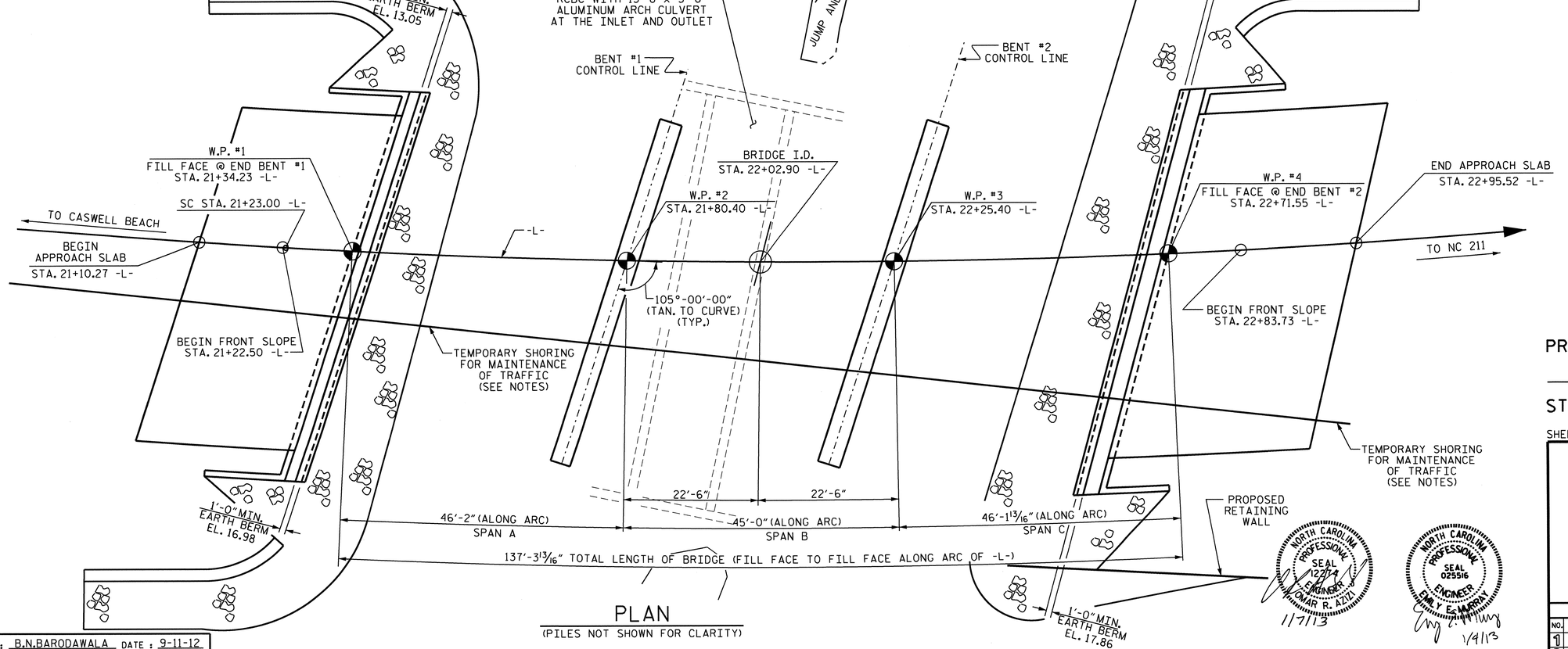
(SECTIONS AT END BENTS AND BENTS ARE TAKEN AT RIGHT ANGLES)

HORIZONTAL CURVE DATA

P.I. STA. = 25+50.41 -L-
Δ = 32°-50'-51.0" (LT)
L = 831.28'
T = 427.41'
R = 1450.00'

SPIRAL CURVE DATA

PIs STA. = 20+73.01-L-
θs = 2°-57'-48.9"
Ls = 150.00'
LT = 100.01'
ST = 50.01'



PLAN

(PILES NOT SHOWN FOR CLARITY)

NORTH CAROLINA PROFESSIONAL SEAL 12274 ENGINEER OMAR R. AZIZ
1/7/13

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY E. MURRAY
1/9/13

DRAWN BY : B.N.BARODAWALA DATE : 9-11-12
CHECKED BY : PEGGY ADKINS DATE : 10-11-12

PROJECT NO. R-3324
BRUNSWICK COUNTY
STATION: 22+02.90 -L-

SHEET 1 OF 4 BRIDGE NO. 230

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

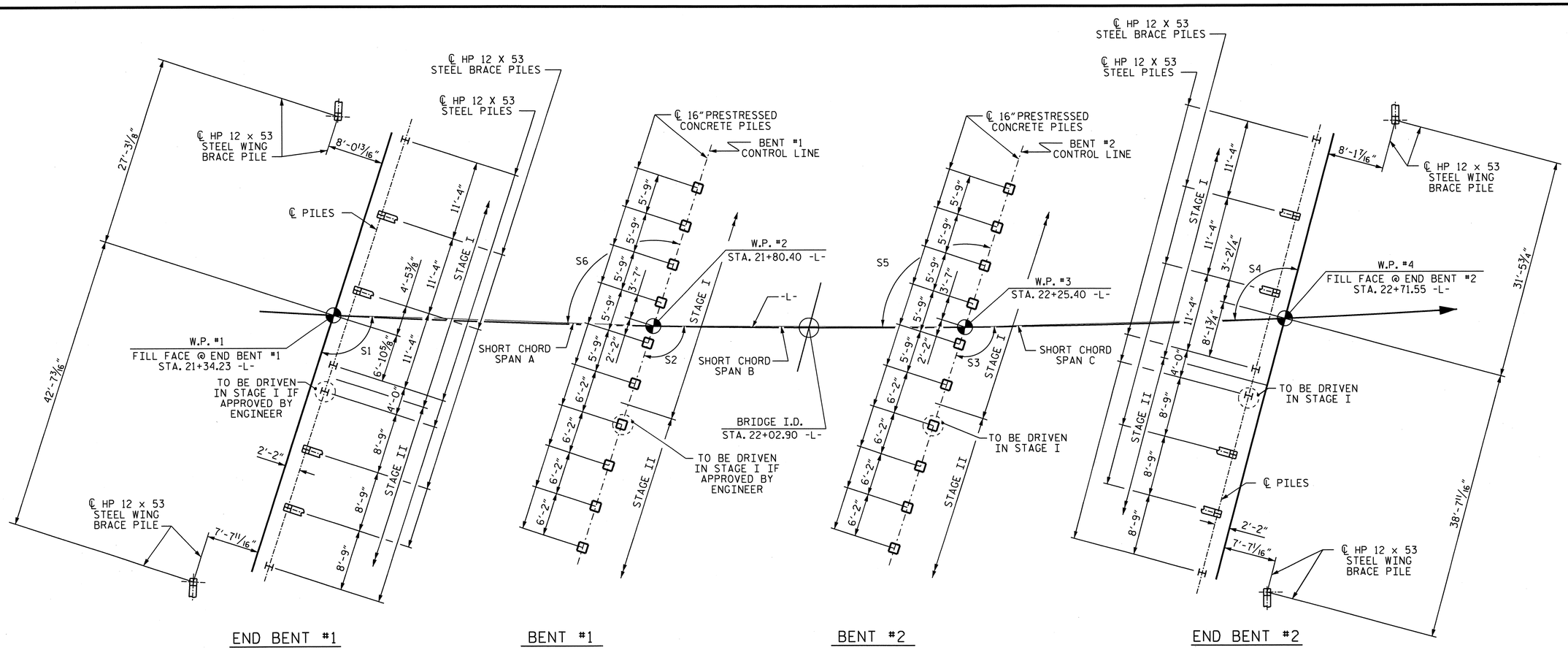
GENERAL DRAWING

FOR BRIDGE OVER
JUMP AND RUN CREEK
ON NC 133 BETWEEN
OAK ISLAND AND NC 211

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-1
1			3			TOTAL SHEETS
2			4			76

STR. #1

04-JAN-2013 14:05



END BENT #1 BENT #1 BENT #2 END BENT #2

FOUNDATION LAYOUT

DIMENSIONS LOCATING PILES ARE SHOWN TO THE PILE CENTERLINE.
BRACE PILES ARE TO BE BATTERED @ 3 : 12.

NOTES

FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

PILES AT END BENT NO. 1 AND END BENT NO. 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 90 TONS PER PILE.

PILES AT BENT NO. 1 AND BENT NO. 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 150 TONS PER PILE.

DRIVE PILES AT END BENT NO. 1 AND END BENT NO. 2 TO A REQUIRED DRIVING RESISTANCE OF 150 TONS PER PILE.

DRIVE PILES AT BENT NO. 1 AND BENT NO. 2 TO A REQUIRED DRIVING RESISTANCE OF 265 TONS PER PILE. THIS REQUIRED DRIVING RESISTANCE INCLUDES ADDITIONAL RESISTANCE FOR DOWNDRAG OR SCOUR.

INSTALL PILES AT BENT NO. 1 AND BENT NO. 2 TO A TIP ELEVATION NO HIGHER THAN -24.0 FT. AND -20.0 FT., RESPECTIVELY.

SCOUR CRITICAL ELEVATION FOR BENT NO. 1 AND BENT NO. 2 ELEVATION -3.0 FT. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.

TESTING PILES WITH THE PDA DURING DRIVING, RESTRIKING OR REDRIVING MAY BE REQUIRED. THE ENGINEER WILL DETERMINE THE NEED FOR PDA TESTING. FOR PDA TESTING, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS AND FOR PILE DRIVING CRITERIA, SEE PILE DRIVING CRITERIA PROVISION.

IT HAS BEEN ESTIMATED THAT A HAMMER WITH AN EQUIVALENT RATED ENERGY IN THE RANGE OF 50-110 FT-KIPS PER BLOW WILL BE REQUIRED TO DRIVE PILES AT BENT NO. 1 AND BENT NO. 2. THIS ESTIMATED ENERGY RANGE DOES NOT RELEASE THE CONTRACTOR FROM PROVIDING DRIVING EQUIPMENT IN ACCORDANCE WITH SUBARTICLE 450-3(D)(2) OF THE STANDARD SPECIFICATIONS.

OBSERVE A ONE MONTH WAITING PERIOD AFTER CONSTRUCTING THE EMBANKMENT TO WITHIN 2 FT. OF FINISHED GRADE BEFORE BEGINNING END BENT CONSTRUCTION AT END BENT NO. 1 AND END BENT NO. 2.

ANGLES	
SHORT CHORD	
S1	105°-54'-44"
S2	105°-53'-21"
S3	105°-54'-43"
S4	104°-05'-18"
S5	104°-06'-39"
S6	104°-05'-16"

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EARL E. MURRAY
7/9/13

DRAWN BY : B. N. BARODAWALA DATE : 9-11-12
CHECKED BY : PEGGY ADKINS DATE : 10-11-12

PROJECT NO. R-3324
BRUNSWICK COUNTY
STATION: 22+02.90 -L-

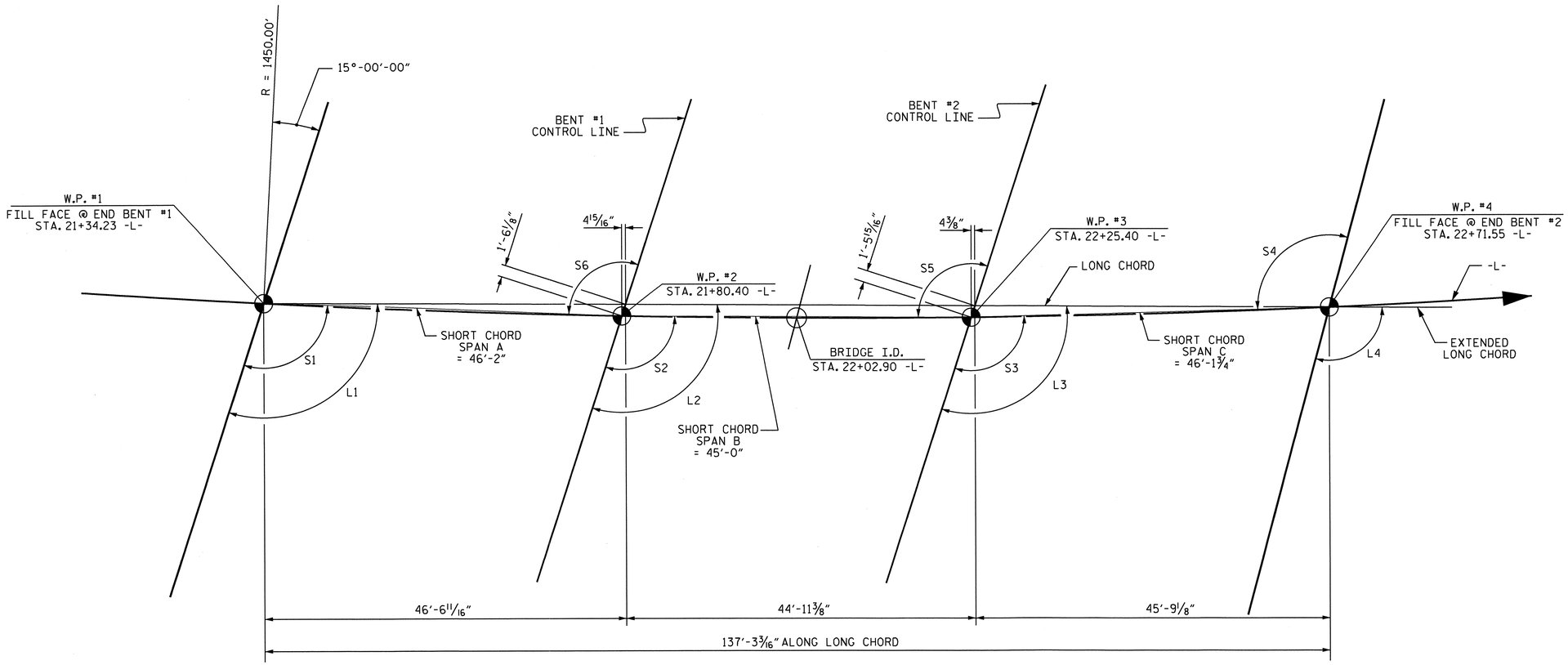
SHEET 2 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
FOR BRIDGE OVER
JUMP AND RUN CREEK
ON NC 133 BETWEEN
OAK ISLAND AND NC 211

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-2
1			3			TOTAL SHEETS
2			4			76

STP #1



LONG CHORD LAYOUT

ANGLES			
LONG CHORD		SHORT CHORD	
L1	107°-42'-47"	S1	105°-54'-44"
L2	105°-53'-19"	S2	105°-53'-21"
L3	104°-06'-38"	S3	105°-54'-43"
L4	102°-17'-13"	S4	104°-05'-18"
		S5	104°-06'-39"
		S6	104°-05'-16"

HORIZONTAL CURVE DATA

P.I. STA. = 25+50.41 -L-
△ = 32°-50'-51.0"(LT)
L = 831.28'
T = 427.41'
R = 1450.00'

PROJECT NO. R-3324
BRUNSWICK COUNTY
STATION: 22+02.90 -L-

SHEET 3 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR BRIDGE OVER
JUMP AND RUN CREEK
ON NC 133 BETWEEN
OAK ISLAND AND NC 211

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY E. MURRAY
1/4/13

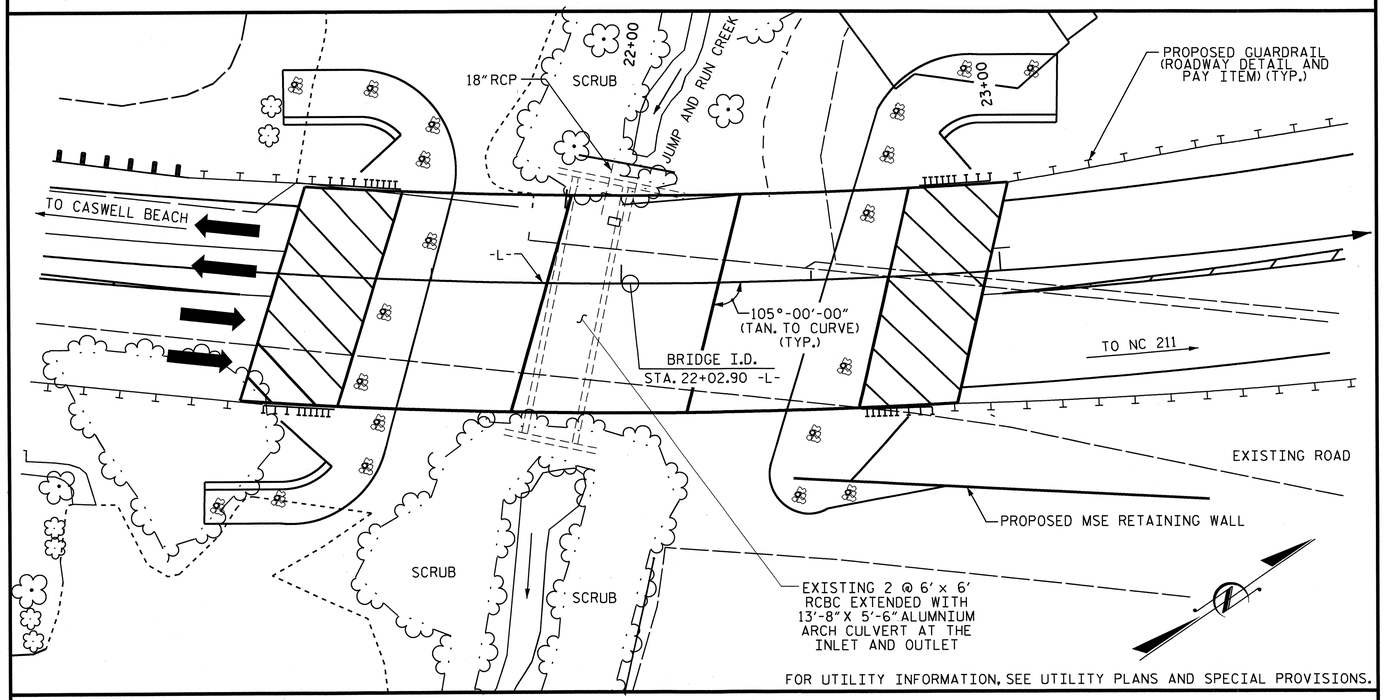
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-3
1			3			TOTAL SHEETS
2			4			76

DRAWN BY : B. N. BARODAWALA DATE : 9-11-12
CHECKED BY : PEGGY ADKINS DATE : 10-11-12

04 JAN 2013 14:05

STR #1

BM #37 - RR SPIKE IN BASE OF 10" BAY TREE 374' LEFT OF -L- STA. 59+13.00, EL. 34.91'.



LOCATION SKETCH

HYDRAULIC DATA

DESIGN DISCHARGE	= 1,600 CFS
FREQUENCY OF DESIGN FLOOD	= 50 YR.
DESIGN HIGH WATER ELEVATION	= 12.9'
DRAINAGE AREA	= 2.7 Sq. MILES
BASE DISCHARGE (Q100)	= 1,800 CFS
BASE HIGH WATER ELEVATION	= 13.4'

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE	= 9,500 CFS
FREQUENCY OF OVERTOPPING FLOOD	= 500+ YR.
OVERTOPPING FLOOD ELEVATION	= 20.7'

NOTES

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.

THIS BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.

THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.

THIS STRUCTURE CONTAINS THE NECESSARY CORROSION PROTECTION REQUIRED FOR A CORROSIVE SITE.

FOR OTHER DESIGN DATA AND GENERAL NOTES, SEE SHEET SN.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

THE CONTRACTOR SHALL PROVIDE INDEPENDENT ASSURANCE SAMPLES OF REINFORCING STEEL AS FOLLOWS: FOR PROJECTS REQUIRING UP TO 400 TONS OF REINFORCING STEEL, ONE 30 INCH SAMPLE OF EACH SIZE BAR USED, AND FOR PROJECTS REQUIRING OVER 400 TONS OF REINFORCING STEEL, TWO 30 INCH SAMPLES OF EACH SIZE BAR USED. THE BARS FROM WHICH THE SAMPLES ARE TAKEN MUST THEN BE SPLICED WITH REPLACEMENT BARS OF THE SIZE AND LENGTH OF THE SAMPLE, PLUS A MINIMUM LAP SPLICE OF THIRTY BAR DIAMETERS. PAYMENT FOR THE SAMPLES OF REINFORCING STEEL SHALL BE CONSIDERED INCIDENTAL TO VARIOUS PAY ITEMS.

NEEDLE BEAMS WILL NOT BE ALLOWED UNLESS OTHERWISE CALLED FOR ON THE PLANS OR APPROVED BY THE ENGINEER.

ALL METALIZED SURFACES SHALL RECEIVE A SEAL COATING AS SPECIFIED IN THE SPECIAL PROVISION FOR THERMAL SPRAYED COATINGS (METALIZATION).

CLASS AA CONCRETE SHALL BE USED IN ALL CAST-IN-PLACE BENT CAPS AND SHALL CONTAIN CALCIUM NITRITE CORROSION INHIBITOR.

ALL BAR SUPPORTS USED IN THE PARAPET, DECK, BENT CAPS AND ALL INCIDENTAL REINFORCING STEEL SHALL BE EPOXY COATED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

THE CONCRETE IN THE PILES OF BENT NO. 1 AND NO. 2 SHALL CONTAIN SILICA FUME. SILICA FUME SHALL BE SUBSTITUTED FOR 5% OF THE PORTLAND CEMENT BY WEIGHT. IF THE OPTION OF ARTICLE 1024-1 OF THE STANDARD SPECIFICATIONS TO PARTIALLY SUBSTITUTE CLASS F FLY ASH FOR PORTLAND CEMENT IS EXERCISED, THEN THE RATE OF FLY ASH SUBSTITUTION SHALL BE REDUCED TO 1.0 LB OF FLY ASH PER 1.0 LB OF CEMENT. NO PAYMENT WILL BE MADE FOR THIS SUBSTITUTION AS IT IS CONSIDERED INCIDENTAL TO THE VARIOUS PAY ITEMS.

THE MATERIAL SHOWN IN THE CROSS-HATCHED AREA SHALL BE EXCAVATED FOR A DISTANCE OF 42 FT LEFT AND 53 FT RIGHT OF CENTERLINE ROADWAY AS DIRECTED BY THE ENGINEER. THIS WORK WILL BE PAID FOR AT THE CONTRACT LUMP SUM PRICE FOR UNCLASSIFIED STRUCTURE EXCAVATION. SEE SECTION 412 OF THE STANDARD SPECIFICATIONS.

FOR LIMITS OF TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC, SEE TRAFFIC CONTROL PLANS. FOR PAY ITEM FOR TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC, SEE ROADWAY PLANS.

AFTER SERVING AS A TEMPORARY STRUCTURE THE 2 @ 6' X 6' REINFORCED CONCRETE BOX CULVERT EXTENDED WITH 13'-8" X 5'-6" ALUMINUM ARCH CULVERT AT THE INLET AND OUTLET AND LOCATED AT THE SITE OF THE PROPOSED STRUCTURE SHALL BE REMOVED.

THIS STRUCTURE HAS BEEN DESIGNED IN ACCORDANCE WITH "HEC 18-EVALUATING SCOUR AT BRIDGES."

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

FOR MAINTENANCE OF TRAFFIC, SEE TRAFFIC CONTROL PLANS.

TOTAL BILL OF MATERIAL

	REMOVAL OF EXISTING STRUCTURE	PDA TESTING	UNCLASSIFIED STRUCTURE EXCAVATION	REINFORCED CONCRETE DECK SLAB	GROOVING BRIDGE FLOORS	CLASS AA CONCRETE	BRIDGE APPROACH SLABS	EPOXY COATED REINFORCING STEEL	36" PRESTRESSED CONCRETE GIRDERS		16" PRESTRESSED CONCRETE PILES		HP 12 X 53 STEEL PILES		PILE REDRIVES	2 BAR METAL RAIL	1'-2" X 2'-6" CONCRETE PARAPET	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE	ELASTOMERIC BEARINGS	EXPANSION JOINT SEALS
	LUMP SUM	EACH	LUMP SUM	SQ. FT.	SQ. FT.	CU. YDS.	LUMP SUM	LBS.	NO.	LIN. FT.	NO.	LIN. FT.	NO.	LIN. FT.	EA.	LIN. FT.	LIN. FT.	TONS	SQ. YDS.	LUMP SUM	LUMP SUM
SUPERSTRUCTURE				8083	9853		LUMP SUM		27	1197.34						255.49	287.16			LUMP SUM	LUMP SUM
END BENT 1						44.4		6078					10	600	4			230	256		
BENT 1						27.0		4176			10	450			5						
BENT 2						27.0		4176			10	450			5						
END BENT 2						44.7		6072					10	500	4			279	310		
TOTAL	LUMP SUM	1	LUMP SUM	8083	9853	143.1	LUMP SUM	20502	27	1197.34	20	900	20	1100	18	255.49	287.16	509	566	LUMP SUM	LUMP SUM

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER AMY E. MURRAY
1/4/13

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 22+02.90 -L-

SHEET 4 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
FOR BRIDGE OVER
JUMP AND RUN CREEK
ON NC 133 BETWEEN
OAK ISLAND AND NC 211

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-4
1			3			TOTAL SHEETS
2			4			76

STR #1

DRAWN BY : B.N.BARODAWALA DATE : 9-11-12
CHECKED BY : PEGGY ADKINS DATE : 10-11-12

LOAD AND RESISTANCE FACTOR RATING (LRFR) SUMMARY FOR PRESTRESSED CONCRETE GIRDERS

LEVEL		VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING (#)	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE										SERVICE III LIMIT STATE						COMMENT NUMBER
								MOMENT					SHEAR					MOMENT						
							LIVE-LOAD FACTORS (γ_{LL})	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	LIVE-LOAD FACTORS (γ_{LL})	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING		HL-93 (INVENTORY)	N/A	(1)	1.214	--	1.75	0.665	2.07	A	I	21.825	0.803	2.14	A	I	2.182	0.80	0.665	1.21	A	I	21.825	
		HL-93 (OPERATING)	N/A		2.682	--	1.35	0.665	2.68	A	I	21.825	0.803	2.78	A	I	2.182	N/A	--	--	--	--	--	
		HS-20 (INVENTORY)	36.000	(2)	1.489	53.604	1.75	0.665	2.54	A	I	21.825	0.803	2.52	A	I	2.182	0.80	0.665	1.49	A	I	21.825	
		HS-20 (OPERATING)	36.000		3.269	117.697	1.35	0.665	3.29	A	I	21.825	0.803	3.27	A	I	2.182	N/A	--	--	--	--	--	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		2.9	39.152	1.40	0.665	6.18	A	I	21.825	0.803	6.95	A	I	2.182	0.80	0.665	2.90	A	I	21.825	
		SNGARBS2	20.000		2.346	46.915	1.40	0.665	4.96	A	I	17.46	0.803	5.11	A	I	2.182	0.80	0.665	2.35	A	I	21.825	
		SNAGRIS2	22.000		2.309	50.791	1.40	0.665	4.8	A	I	17.46	0.803	4.81	A	I	2.182	0.80	0.665	2.31	A	I	21.825	
		SNCOTTS3	27.250		1.448	39.46	1.40	0.665	3.09	A	I	21.825	0.803	3.49	A	I	2.182	0.80	0.665	1.45	A	I	21.825	
		SNAGGRS4	34.925		1.279	44.683	1.40	0.665	2.73	A	I	21.825	0.803	3.01	A	I	2.182	0.80	0.665	1.28	A	I	21.825	
		SNS5A	35.550		1.246	44.302	1.40	0.665	2.66	A	I	21.825	0.803	3.12	A	I	2.182	0.80	0.665	1.25	A	I	21.825	
		SNS6A	39.950		1.175	46.947	1.40	0.665	2.5	A	I	21.825	0.803	2.9	A	I	2.182	0.80	0.665	1.17	A	I	21.825	
		SNS7B	42.000	(3)	1.12	47.052	1.40	0.665	2.39	A	I	21.825	0.803	2.92	A	I	2.182	0.80	0.665	1.12	A	I	21.825	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.442	47.582	1.40	0.665	3.07	A	I	21.825	0.803	3.4	A	I	2.182	0.80	0.665	1.44	A	I	21.825	
		TNT4A	33.075		1.457	48.196	1.40	0.665	3.11	A	I	21.825	0.803	3.26	A	I	2.182	0.80	0.665	1.46	A	I	21.825	
		TNT6A	41.600		1.224	50.931	1.40	0.665	2.61	A	I	21.825	0.803	3.17	A	I	2.182	0.80	0.665	1.22	A	I	21.825	
		TNT7A	42.000		1.248	52.433	1.40	0.665	2.66	A	I	21.825	0.803	2.93	A	I	2.182	0.80	0.665	1.25	A	I	21.825	
		TNT7B	42.000		1.299	54.554	1.40	0.665	2.77	A	I	17.46	0.803	2.8	A	I	2.182	0.80	0.665	1.30	A	I	21.825	
		TNAGRIT4	43.000		1.237	53.212	1.40	0.665	2.64	A	I	21.825	0.803	2.69	A	I	2.182	0.80	0.665	1.24	A	I	21.825	
		TNAGT5A	45.000		1.151	51.801	1.40	0.665	2.45	A	I	21.825	0.803	2.76	A	I	2.182	0.80	0.665	1.15	A	I	21.825	
		TNAGT5B	45.000		1.124	50.588	1.40	0.665	2.39	A	I	21.825	0.803	2.55	A	I	2.182	0.80	0.665	1.12	A	I	21.825	

LOAD FACTORS:

DESIGN LOAD RATING FACTORS	LIMIT STATE	γ_{DC}	γ_{DW}
	STRENGTH I	1.25	1.50
	SERVICE III	1.00	1.00

NOTES:

MINIMUM RATING FACTORS ARE BASED ON THE STRENGTH I AND SERVICE III LIMIT STATES.

ALLOWABLE STRESSES FOR SERVICE III LIMIT STATE ARE AS REQUIRED FOR DESIGN.

COMMENTS:

1.
2.
3.
4.

(#) CONTROLLING LOAD RATING

(1) DESIGN LOAD RATING (HL-93)

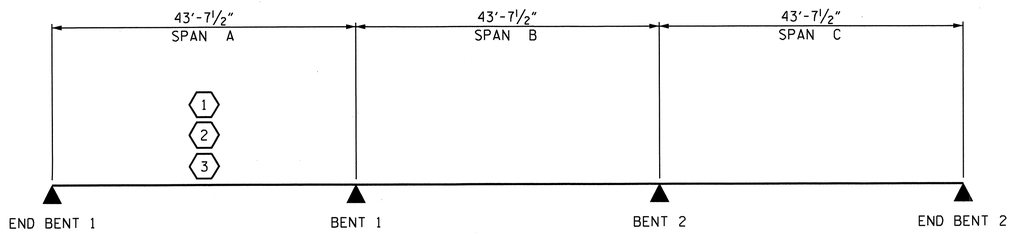
(2) DESIGN LOAD RATING (HS-20)

(3) LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

I - INTERIOR GIRDER
EL - EXTERIOR LEFT GIRDER
ER - EXTERIOR RIGHT GIRDER



LRFR SUMMARY

SPAN LENGTHS SHOWN ARE BEARING TO BEARING.
SPAN LENGTH REFLECTS LONGEST INTERIOR GIRDER.

ASSEMBLED BY : PEGGY ADKINS DATE : 10-11-12
CHECKED BY : T.L. AVERETTE DATE : 10-16-12

DRAWN BY : MAA 1/08
CHECKED BY : GM/DI 2/08

REV. 11/12/08RR MAA/GM
REV. 10/1/11 MAA/GM

06-NOV-2012 14:31

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY E. MURRAY
1/4/13

PROJECT NO. R-3324
BRUNSWICK COUNTY
STATION: 22+02.90 -L-

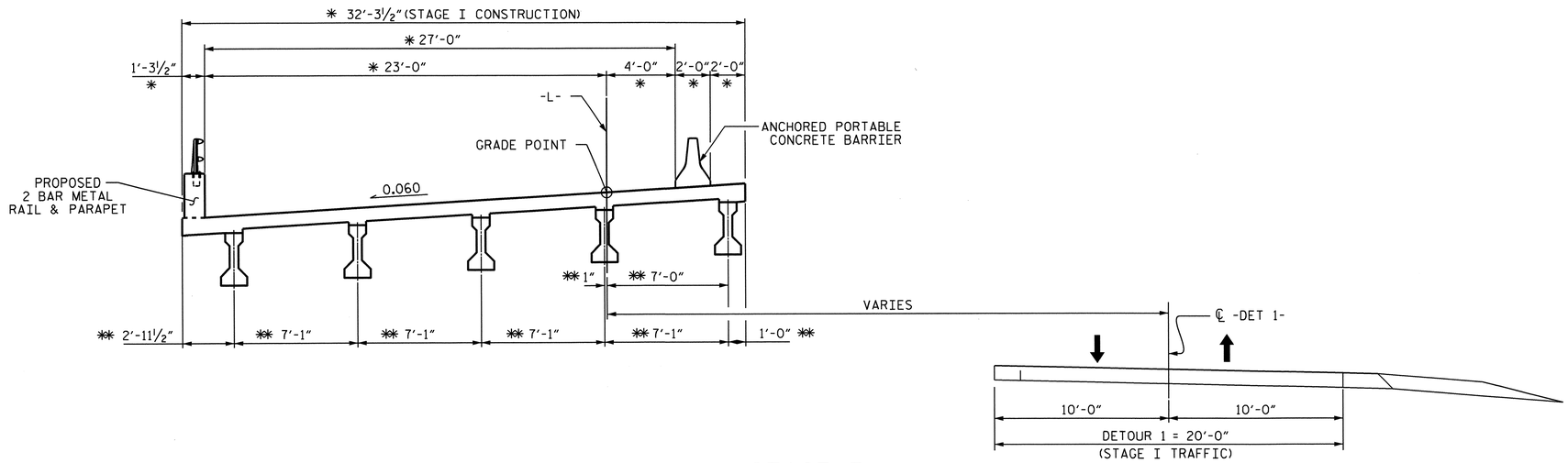
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

LRFR SUMMARY FOR PRESTRESSED CONCRETE GIRDERS
(NON-INTERSTATE TRAFFIC)

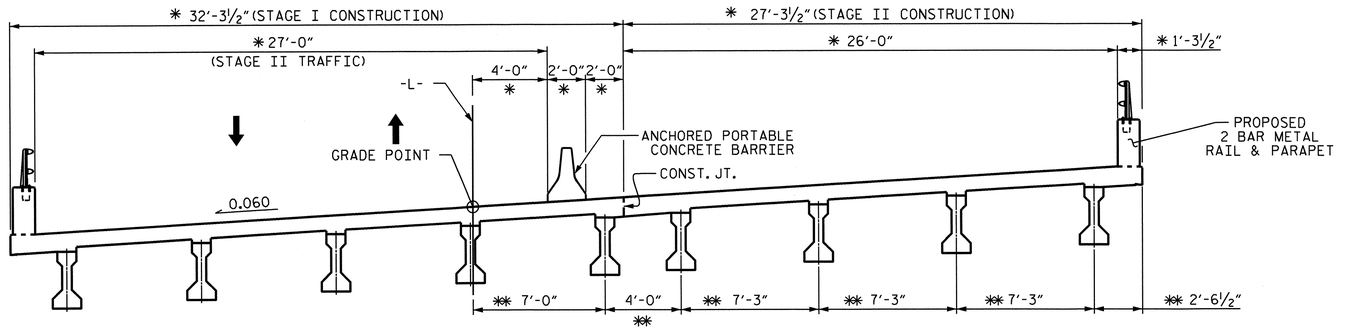
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-5
1			3			TOTAL SHEETS
2			4			76

SIR #1 STD. NO. LRFR1



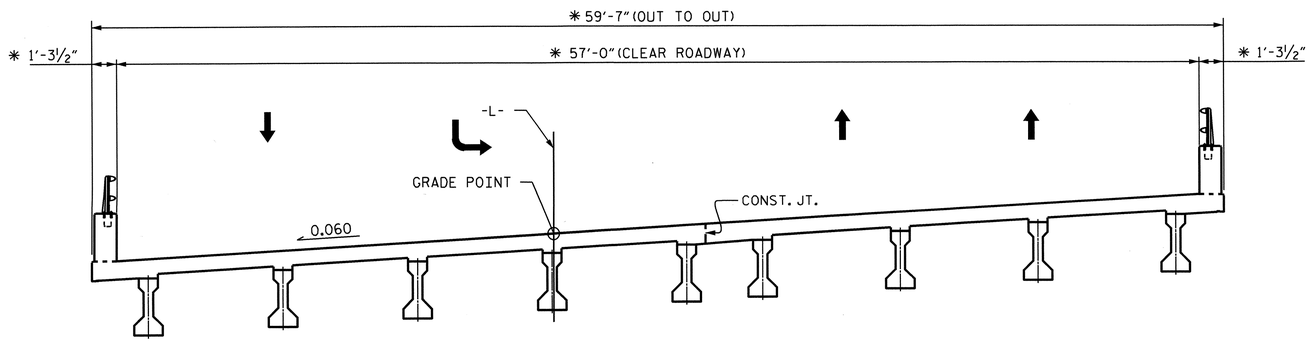
STAGE I

MAINTAIN 2-WAY TRAFFIC ON -DET 1-.
REMOVE 50± FT. OF CULVERT NORTH OF -DET 1-.
CONSTRUCT STAGE I OF PROPOSED BRIDGE.



STAGE II

SHIFT 2-WAY TRAFFIC TO STAGE I.
COMPLETELY REMOVE EXISTING CULVERT.
CONSTRUCT STAGE II OF PROPOSED BRIDGE.



FINAL

REMOVE ANCHORED PORTABLE CONCRETE BARRIER AND SHIFT TRAFFIC TO FINAL 2-WAY PATTERN.

NOTE:

SEE TRAFFIC CONTROL PLANS FOR LOCATION AND PAY LIMITS OF THE ANCHORED PORTABLE CONCRETE BARRIER.

* RADIAL DIMENSIONS
** RADIAL THRU THE WORKPOINT

PROJECT NO. R-3324
BRUNSWICK COUNTY
STATION: 22+02.90 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

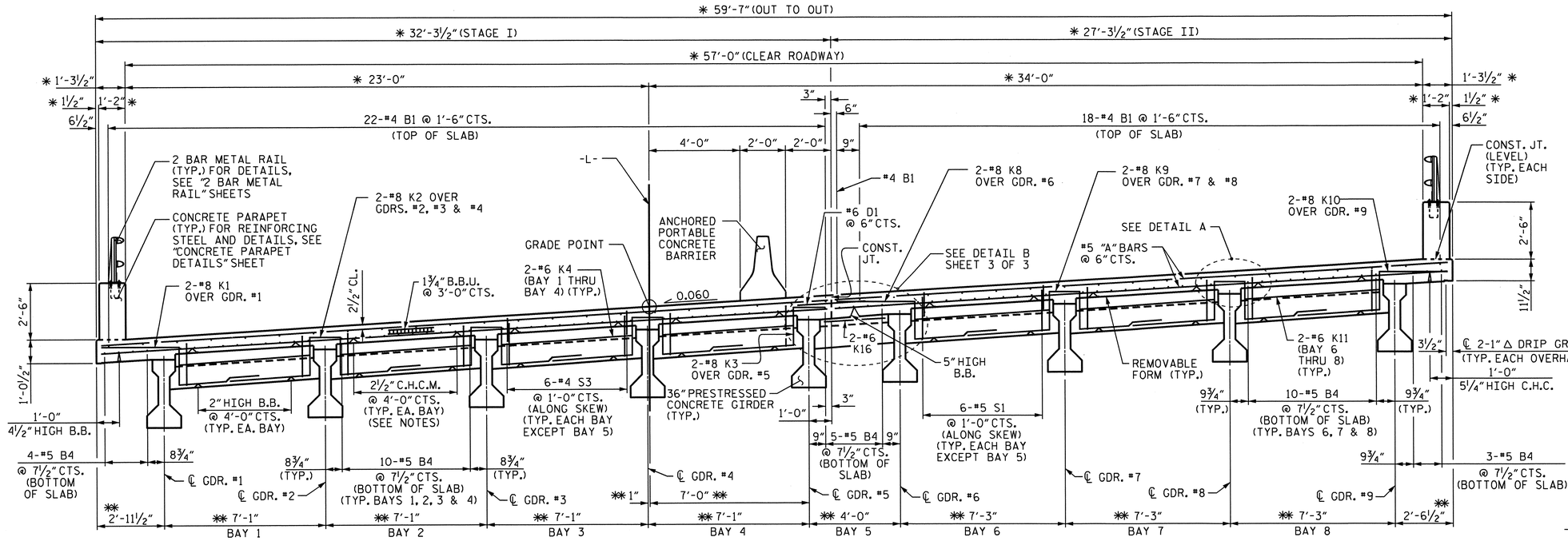
CONSTRUCTION SEQUENCE

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY E. MURRAY
1/4/13

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-6
1			3			TOTAL SHEETS
2			4			76

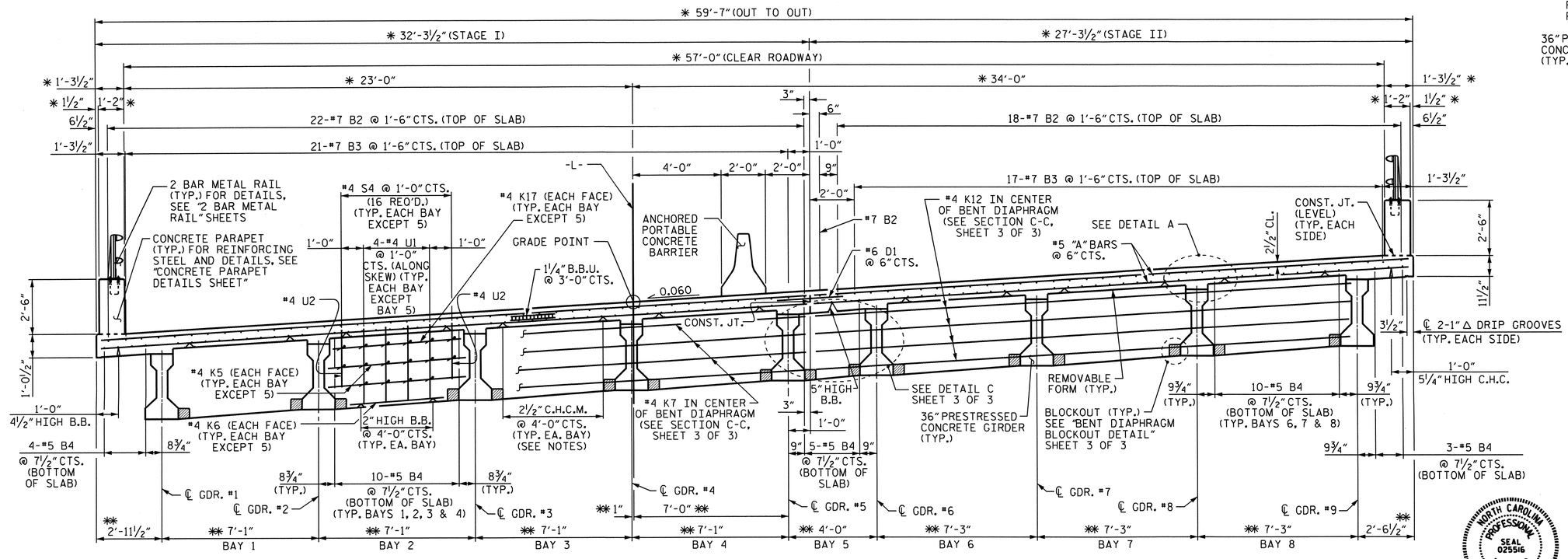
DRAWN BY : PEGGY ADKINS DATE : 10-8-12
CHECKED BY : T.L. AVERETTE DATE : 10-17-12

04-JAN-2013 14:05



TYPICAL SECTION @ END BENT DIAPHRAGM

FOR ADDITIONAL REINFORCING STEEL IN BAY 5, SEE "DETAIL B" SHEET 3 OF 3.



TYPICAL SECTION @ BENT DIAPHRAGM

FOR ADDITIONAL REINFORCING STEEL IN BAY 5, SEE "DETAIL C" SHEET 3 OF 3.

NOTES:

WHEN USING REMOVABLE FORMS, PROVIDE CONTINUOUS HIGH CHAIRS (C.H.C.M.) @ 4'-0" CTS. WITH A HEIGHT TO SUPPORT THE BOTTOM MAT OF 'A' BARS A CLEAR DISTANCE OF 2½" ABOVE THE TOP OF THE REMOVABLE FORM.

LONGITUDINAL STEEL MAY BE SHIFTED SLIGHTLY, AS NECESSARY, TO AVOID INTERFERENCE WITH STIRRUPS IN PRESTRESSED CONCRETE GIRDERS.

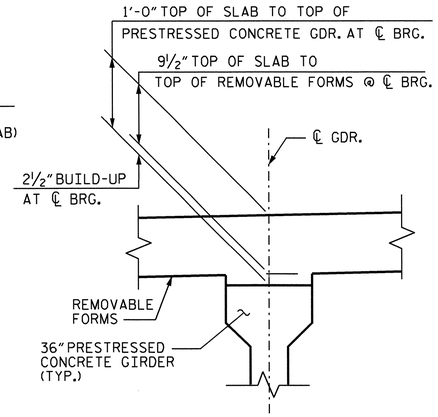
DOWELS SHALL BE PLACED IN THE SAME HORIZONTAL PLANE AS THE TOP SLAB REINFORCING STEEL.

PREVIOUSLY CAST CONCRETE IN A CONTINUOUS UNIT SHALL HAVE ATTAINED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI BEFORE ADDITIONAL CONCRETE IS CAST IN THE UNIT.

SEE TRAFFIC CONTROL PLANS FOR LOCATION AND PAY LIMITS OF THE ANCHORED PORTABLE CONCRETE BARRIER.

#5 "C" BAR MAY BE SHIFTED SLIGHTLY, AS NECESSARY, TO CLEAR REINFORCING STEEL AND STIRRUPS.

PARAPET IN A CONTINUOUS UNIT SHALL NOT BE CAST UNTIL ALL SLAB CONCRETE IN THE UNIT HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI.



DETAIL A

* RADIAL DIMENSIONS
** RADIAL THRU THE WORKPOINT

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 22+02.90 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

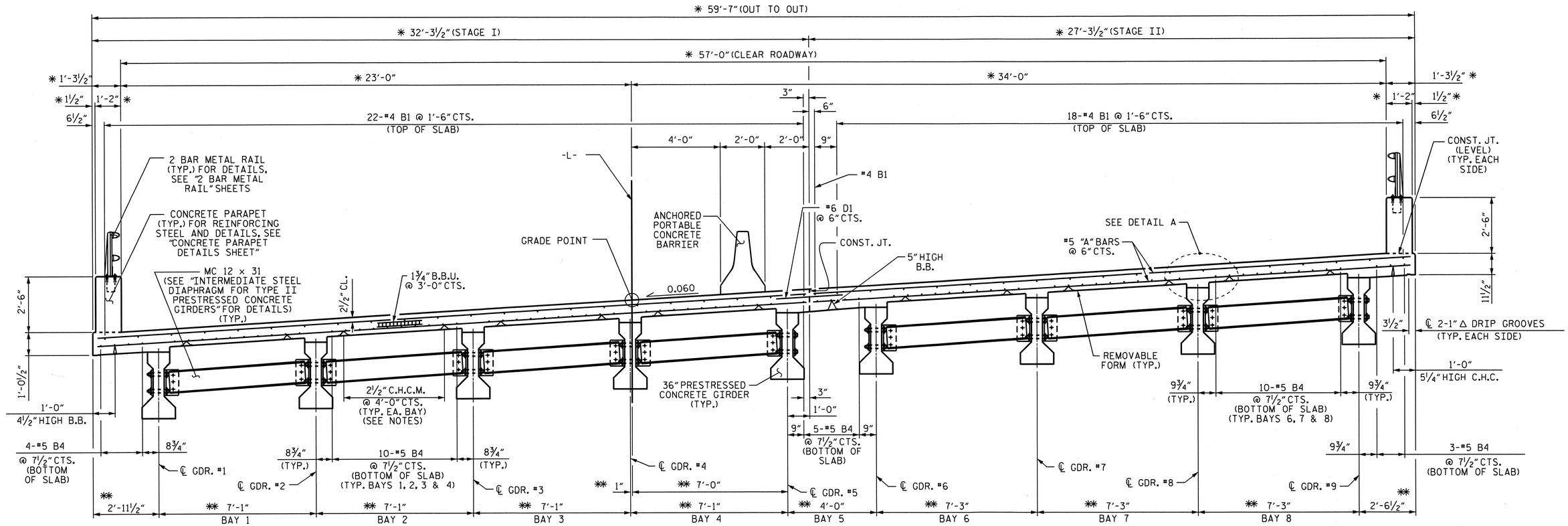
TYPICAL SECTION

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-7
1			3			TOTAL SHEETS
2			4			76

DRAWN BY : PEGGY ADKINS DATE : 11-5-08
CHECKED BY : B.N. BARODAWALA DATE : 1-2-09

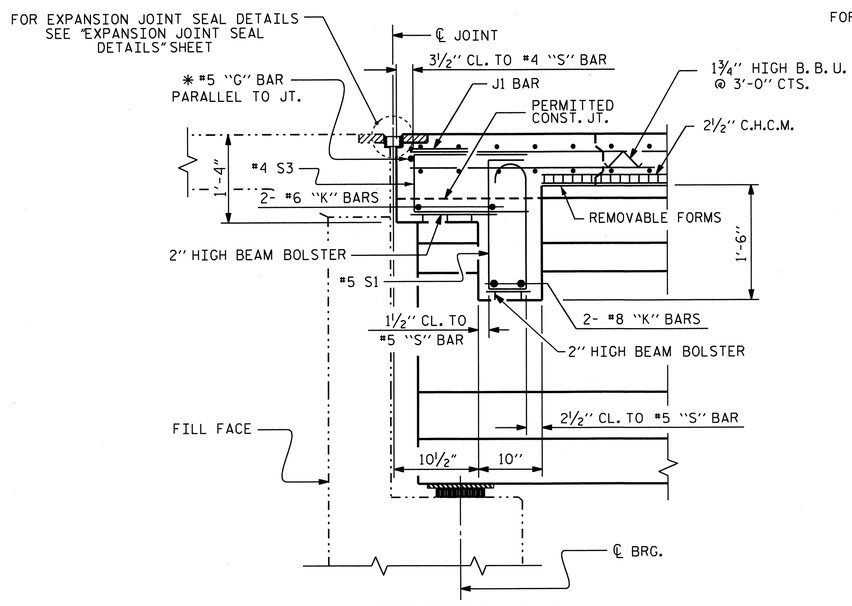
NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER AMY E. CLARK
1/4/11

04-JAN-2013 14:07



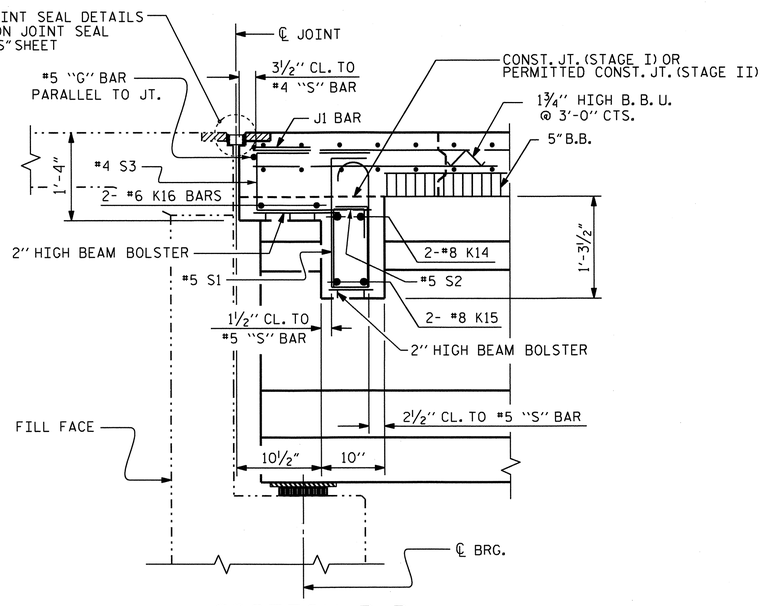
TYPICAL SECTION @ INTERMEDIATE DIAPHRAGM

REINFORCING STEEL SHOWN FOR SPANS A & C ONLY. SEE PLAN OF SPANS FOR REINFORCING STEEL ABOVE INTERMEDIATE DIAPHRAGMS IN SPAN C.



SECTION A-A

SECTION THRU END BENT DIAPHRAGM
(TYPICAL BAYS 1 THRU 4 & BAYS 6 THRU 8)



SECTION B-B

SECTION THRU END BENT DIAPHRAGM
(SHOWING BAY 5 ONLY)

* RADIAL DIMENSIONS
** RADIAL THRU THE WORKPOINT

PROJECT NO. R-3324
BRUNSWICK COUNTY
STATION: 22+02.90 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

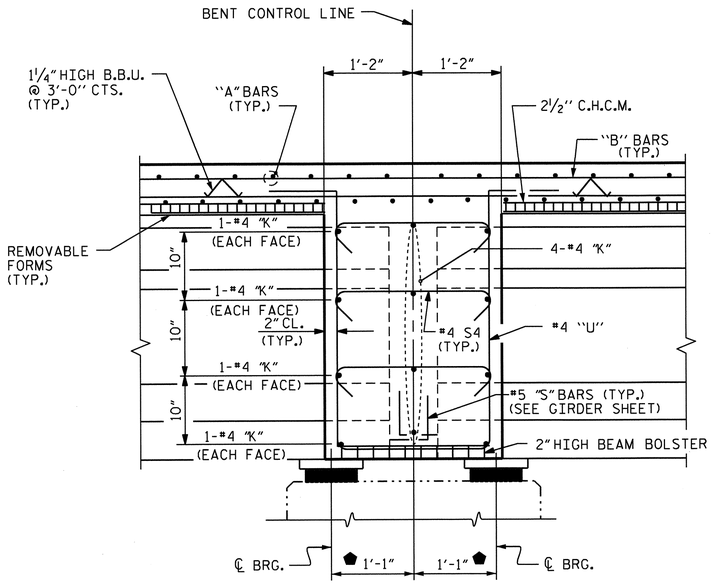
TYPICAL SECTION AND DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-8
1			3			TOTAL SHEETS
2			4			76

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER GARY E. MURRAY
1/9/13

DRAWN BY : PEGGY ADKINS DATE : 11-2-08
CHECKED BY : B.N. BARODAWALA DATE : 1-2-09

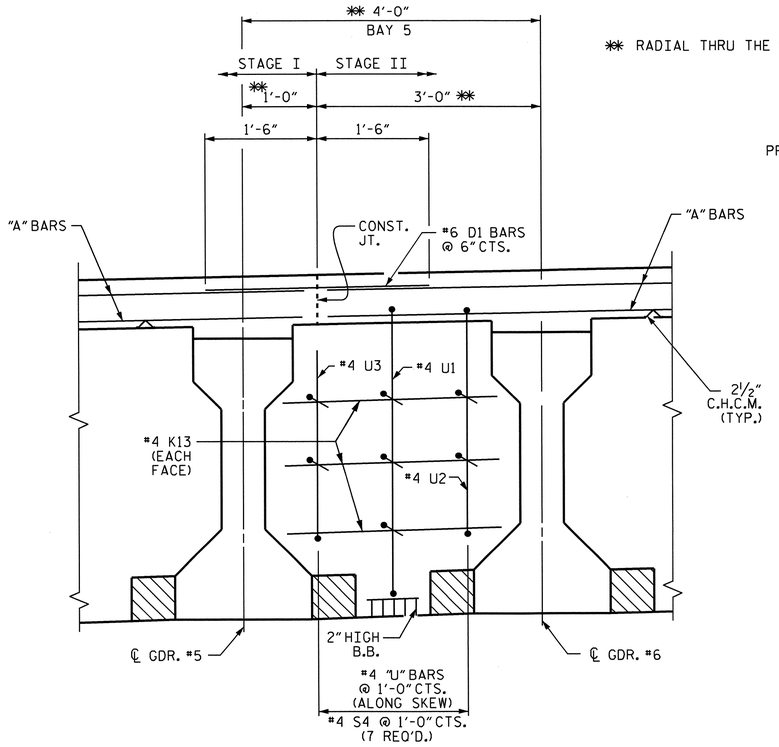
06-NOV-2013 15:43



SECTION C-C

SECTION THRU BENT DIAPHRAGM

⬟ MEASURED ALONG ℄ GDR.

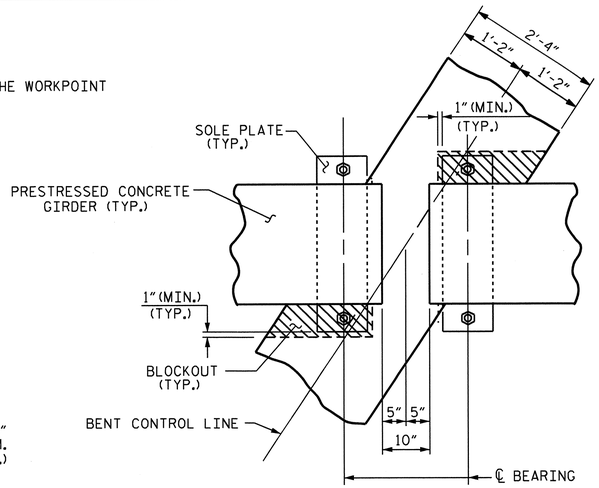


DETAIL "C"

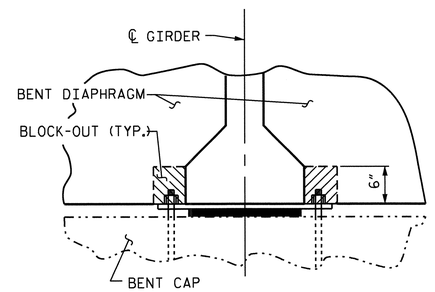
SHOWING BENT DIAPHRAGM FOR BAY 5

"B" BARS IN TOP AND BOTTOM OF SLAB NOT SHOWN FOR CLARITY.

✱✱ RADIAL THRU THE WORKPOINT

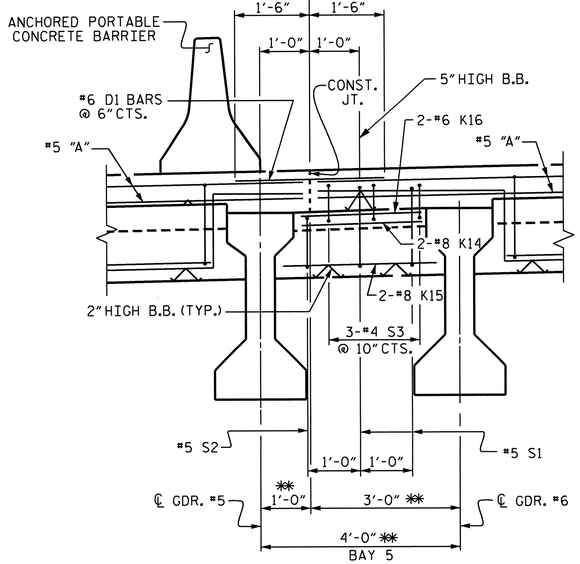


PLAN



SECTION

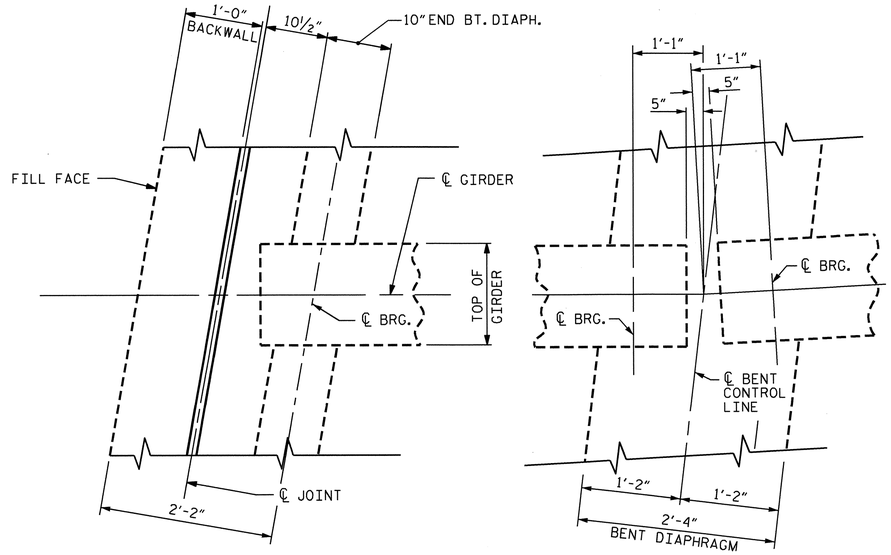
BENT DIAPHRAGM BLOCKOUT DETAIL



DETAIL "B"

SHOWING END BENT DIAPHRAGM FOR BAY 5

"B" BARS IN TOP AND BOTTOM OF SLAB NOT SHOWN FOR CLARITY.
#6 D1 DOWELS ARE TO BE PLACED IN STAGE I.



END BENT DIAPHRAGM

PLAN

BENT DIAPHRAGM

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 22+02.90 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

TYPICAL SECTION DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-9
1			3			TOTAL SHEETS
2			4			76

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER AMY E. MURRAY
1/9/13

DRAWN BY : PEGGY ADKINS DATE : 11-5-08
CHECKED BY : B.N. BARODAWALA DATE : 1-2-09

TOTAL BRIDGE LENGTH = 137'-3 13/16" (FILL FACE @ W.P. #1 TO FILL FACE @ W.P. #4 ALONG ARC)
137'-3 3/16" (FILL FACE @ W.P. #1 TO FILL FACE @ W.P. #4 ALONG LONG CHORD)

46'-2" (W.P. #1 TO W.P. #2 ALONG ARC)

45'-0" (W.P. #2 TO W.P. #3 ALONG ARC)

#5 A101 THRU #5 A109 @ 6" CTS. (TOP OF SLAB) (2 BARS PER MARK)
#5 A201 THRU #5 A209 @ 6" CTS. (BOTTOM OF SLAB) (2 BARS PER MARK)

6"

9'-0" TO FIRST A1 OR A2 BAR

251-#5 A1 @ 6" CTS. (TOP OF SLAB)
251-#5 A2 @ 6" CTS. (BOTTOM OF SLAB)

23'-0" (TYP.)

2'-0" MIN. (TYP.)

7'-6" (TYP.)

7'-6" (TYP.)

BENT #1 CONTROL LINE

5'-3" MIN. SPLICE (TYP.)

* 59'-7" (OUT TO OUT)
* 32'-3 1/2" (STAGE I)
* 27'-3 1/2" (STAGE II)
* 57'-0" (CLEAR ROADWAY)
* 34'-0"
* 23'-0"
* 1'-3 1/2"
* 1'-2"
* 1/2"

61'-8 3/16"

25'-5 7/16"

36'-2 3/4"

SEE "EXP. JT. SEAL DETAILS" SHEET

32-#4 J1 (STAGE I) AND 27-#4 J1 (STAGE II)

1'-0" BACKWALL

SEE DETAIL D (SHEET 2 OF 2)

FILL FACE @ END BENT #1

W.P. #1

W.P. #2

W.P. #3

W.P. #4

SPAN A

SPAN B

SHORT CHORD SPAN A

SHORT CHORD SPAN B

104°-05'-16" TO SHORT CHORD SPAN A

105°-54'-44" TO SHORT CHORD SPAN A

105°-53'-21" TO SHORT CHORD SPAN B

MATCH LINE A-A

-L-

CONST. JT.

℄ GDR. A1
℄ GDR. A2
℄ GDR. A3
℄ GDR. A4
℄ GDR. A5
℄ GDR. A6
℄ GDR. A7
℄ GDR. A8
℄ GDR. A9

℄ GDR. B1
℄ GDR. B2
℄ GDR. B3
℄ GDR. B4
℄ GDR. B5
℄ GDR. B6
℄ GDR. B7
℄ GDR. B8
℄ GDR. B9

℄ JT. @ END BENT #1

℄ INTERMEDIATE STEEL DIAPHRAGM (TYP.)

10" END BENT DIAPHRAGM (TYP.)

℄ BENT DIAPHRAGM (TYP.)

2'-4" BENT DIAPHRAGM (TYP.)

TRANSVERSE CONST. JT.

#8 K1 OVER GDR #1
#8 K2 OVER GDRS. #2, #3 & #4
#8 K3 OVER GDR #5
#8 K8 OVER GDR. #6
#8 K9 OVER GDRS. #7 & #8
#8 K10 OVER GDR. #9

#4 B1 (TYP.)
#7 B2 (TYP.)
#7 B3 (TYP.)

4-#5 B4 @ 7 1/2" CTS. (3 BAR RUNS) (BOTT. OF SLAB)

10-#5 B4 @ 7 1/2" CTS. (3 BAR RUNS) (BOTT. OF SLAB) (TYP. BAYS 1 THRU 4)

10-#5 B4 @ 7 1/2" CTS. (3 BAR RUNS) (BOTT. OF SLAB) (TYP. BAYS 6, 7 & 8)

5-#5 B4 @ 7 1/2" CTS. (3 BAR RUNS) (BOTT. OF SLAB) (BAY 5 ONLY)

3-#5 B4 @ 7 1/2" CTS. (3 BAR RUNS) (BOTT. OF SLAB)

4-#4 K7

#4 "K" (TYP.)

4-#4 K12

#4 U2

#4 U4

#4 S4 @ 1'-0" CTS. (16 REQ'D) (TYP. EACH BAY EXCEPT 5)

#4 S3 @ 1'-0" CTS. (TYP. EACH BAY EXCEPT 5)

#5 G1
#5 G2

#6 K4 (TYP. BAYS 1 THRU 4)
#6 K11 (TYP. BAYS 6, 7 & 8)

6-#4 S3 @ 1'-0" CTS. (TYP. EACH BAY EXCEPT 5)

6-#5 S1 @ 1'-0" CTS. (TYP. EACH BAY EXCEPT 5)

22-#4 B1 @ 1'-6" CTS. (TOP OF SLAB)

18-#4 B1 @ 1'-6" CTS. (TOP OF SLAB)

22-#7 B2 @ 1'-6" CTS. (TOP OF SLAB) (2 BAR RUNS)

21-#7 B3 @ 1'-6" CTS. (TOP OF SLAB)

18-#7 B2 @ 1'-6" CTS. (TOP OF SLAB) (2 BAR RUNS)

17-#7 B3 @ 1'-6" CTS. (TOP OF SLAB)

#5 A101 OR #5 A201

#5 A1 OR #5 A2

#5 A301 OR #5 A401

#5 A3 OR #5 A4

#5 A301 THRU #5 A308 @ 6" CTS. (TOP OF SLAB) (2 BARS PER MARK EXCEPT A308)
#5 A401 THRU #5 A408 @ 6" CTS. (BOTTOM OF SLAB) (2 BARS PER MARK)

1'-0" TO FIRST A3 OR A4 BAR

259-#5 A3 @ 6" CTS. (TOP OF SLAB)
259-#5 A4 @ 6" CTS. (BOTTOM OF SLAB)

CONCRETE PARAPET WITH 2 BAR METAL RAIL (TYP.)
FOR REINFORCING STEEL & DETAILS, SEE "CONCRETE PARAPET DETAILS" AND "2 BAR METAL RAIL" SHEETS.

FOR REINFORCING STEEL IN BAY 5, SEE DETAIL "B" ON TYPICAL SECTION SHEET 3 OF 3.

FOR REINFORCING STEEL IN BAY 5, SEE DETAIL "C" ON TYPICAL SECTION SHEET 3 OF 3

PLAN OF SPAN

* RADIAL DIMENSIONS.
FOR LOCATION OF INTERMEDIATE DIAPHRAGMS, SEE "FRAMING PLAN".
"A" BARS AND D1 DOWELS ARE TO BE PLACED PERPENDICULAR TO LONG CHORD.
FOR ARC OFFSETS, SEE "ARC OFFSETS" SHEET.

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER CARY F. MURRAY
1/9/13

PROJECT NO. R-3324
BRUNSWICK COUNTY
STATION: 22+02.90 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
PLAN OF SPAN A AND PART PLAN OF SPAN B

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-10
1			3			TOTAL SHEETS
2			4			76

DRAWN BY : PEGGY ADKINS DATE : 12-5-08
CHECKED BY : B.N. BARODAWALA DATE : 1-2-09

TOTAL BRIDGE LENGTH = 137'-3 13/16" (FILL FACE @ W.P. #1 TO FILL FACE @ W.P. #4 ALONG ARC)
137'-3 3/16" (FILL FACE @ W.P. #1 TO FILL FACE @ W.P. #4 ALONG LONG CHORD)

45'-0" (W.P. #2 TO W.P. #3 ALONG ARC)

46'-1 13/16" (W.P. #3 TO W.P. #4 ALONG ARC)

23'-0" (TYP.)

7'-6" (TYP.)

7'-6" (TYP.)

6"

#5 A110 THRU #5 A115 @ 6" CTS. (TOP OF SLAB) (2 BARS PER MARK)
#5 A210 THRU #5 A216 @ 6" CTS. (BOTTOM OF SLAB) (2 BARS PER MARK EXCEPT A216)

251-#5 A1 @ 6" CTS. (TOP OF SLAB)
251-#5 A2 @ 6" CTS. (BOTTOM OF SLAB)

3'-3 1/4" TO FIRST A1 OR A2 BAR

2'-0" MIN. (TYP.)

BENT #2 CONTROL LINE

#7 B2 (TYP.)

#7 B3 (TYP.)

#4 B1 (TYP.)

1'-3 1/2" (TYP.)

6 1/2" (TYP.)

4-#5 B4 @ 7 1/2" CTS. (3 BAR RUNS) (BOTT. OF SLAB)

8 3/4"

℄ GDR. B1

℄ GDR. B2

℄ GDR. B3

℄ GDR. B4

℄ GDR. B5

℄ GDR. B6

℄ GDR. B7

℄ GDR. B8

℄ GDR. B9

℄ INTERMEDIATE STEEL DIAPHRAGM (TYP.)

22-#7 B2 @ 1'-6" CTS. (TOP OF SLAB) (2 BAR RUNS)

21-#7 B3 @ 1'-6" CTS. (TOP OF SLAB) (2 BAR RUNS)

22-#4 B1 @ 1'-6" CTS. (TOP OF SLAB)

#4 S4 @ 1'-0" CTS. (16 REQ'D) (TYP. EACH BAY EXCEPT 5)

#4 "K" (TYP.)

10-#5 B4 @ 7 1/2" CTS. (3 BAR RUNS) (BOTT. OF SLAB) (TYP. BAYS 1 THRU 4)

10-#5 B4 @ 7 1/2" CTS. (3 BAR RUNS) (BOTT. OF SLAB) (TYP. BAYS 6, 7 & 8)

18 3/4"

104°-06'-39" TO SHORT CHORD SPAN B

4-#4 K7

SHORT CHORD SPAN B

W.P. #3

SHORT CHORD SPAN C

℄ GDR. C4

105°-54'-43" TO SHORT CHORD SPAN C

MATCH LINE A-A

-L-

2'-4" BENT DIAPHRAGM (TYP.)

CONST. JT.

5-#5 B4 @ 7 1/2" CTS. (3 BAR RUNS) (BOTT. OF SLAB) (BAY 5 ONLY)

FOR REINFORCING STEEL IN BAY 5, SEE DETAIL "C" ON TYPICAL SECTION SHEET 3 OF 3

SPAN B

SPAN C

℄ BENT DIAPHRAGM (TYP.)

4-#4 K12

TRANSVERSE CONST. JT.

#4 U2

4-#4 U1 @ 1'-0" CTS. (TYP. EACH BAY EXCEPT 5)

1'-0" (TYP.)

#4 B1

#7 B2

18-#7 B2 @ 1'-6" CTS. (TOP OF SLAB) (2 BAR RUNS)

17-#7 B3 @ 1'-6" CTS. (TOP OF SLAB) (2 BAR RUNS)

18-#4 B1 @ 1'-6" CTS. (TOP OF SLAB)

9" (TYP.)

3" (TYP.)

2'-0" (TYP.)

6" (TYP.)

3-#5 B4 @ 7 1/2" CTS. (3 BAR RUNS) (BOTT. OF SLAB)

1'-3 1/2" (TYP.)

6 1/2" (TYP.)

CONCRETE PARAPET WITH 2 BAR METAL RAIL (TYP.)
FOR REINFORCING STEEL & DETAILS, SEE "CONCRETE PARAPET DETAILS" AND "2 BAR METAL RAIL" SHEETS.

259-#5 A3 @ 6" CTS. (TOP OF SLAB)
259-#5 A4 @ 6" CTS. (BOTTOM OF SLAB)

9'-3 1/4" TO FIRST A3 OR A4 BAR

6"

#5 A309 THRU #5 A313 @ 6" CTS. (TOP OF SLAB) (2 BARS PER MARK)
#5 A409 THRU #5 A414 @ 6" CTS. (BOTTOM OF SLAB) (2 BARS PER MARK EXCEPT A414)

PLAN OF SPAN

℄ GDR. C1

℄ GDR. C2

℄ GDR. C3

℄ GDR. C5

℄ GDR. C6

℄ GDR. C7

℄ GDR. C8

℄ GDR. C9

#8 K1 OVER GDR #1

#8 K2 OVER GDRS. #2, #3 & #4

℄ JT. @ END BENT #2

#5 G1

#5 A1 OR #5 A2

#5 A110 OR #5 A210

6-#4 S3 @ 1'-0" CTS. (TYP. EACH BAY EXCEPT 5)

24'-10 1/2"

32-#4 J1 (STAGE I) AND 27-#4 J1 (STAGE II) SEE "EXP. JT. SEAL DETAILS" SHEET

#6 K4 (TYP. BAYS 1 THRU 4)

10" END BENT DIAPHRAGM (TYP.)

FILL FACE @ END BENT #2

104°-05'-18" TO SHORT CHORD SPAN C

268-#6 D1 @ 6" CTS.

SEE DETAIL E

#8 K3 OVER GDR #5

W.P. #4

1'-0" BACKWALL

61'-7 7/8"

#8 K8 OVER GDR. #6

#5 G2

6-#5 S1 @ 1'-0" CTS. (TYP. EACH BAY EXCEPT 5)

#8 K9 OVER GDRS. #7 & #8

#6 K11 (TYP. BAYS 6, 7 & 8)

36'-9 3/8"

#5 A3 OR #5 A4

#5 A309 OR #5 A409

#8 K10 OVER GDR #9

FOR REINFORCING STEEL IN BAY 5, SEE DETAIL "B" ON TYPICAL SECTION SHEET 3 OF 3.

* 1 1/2"

* 1'-2"

* 1'-3 1/2"

* 32'-3 1/2" (STAGE I)

* 23'-0"

* 57'-0" (CLEAR ROADWAY)

* 59'-7" (OUT TO OUT)

* 34'-0"

* 27'-3 1/2" (STAGE II)

1 1/2"

1'-2"

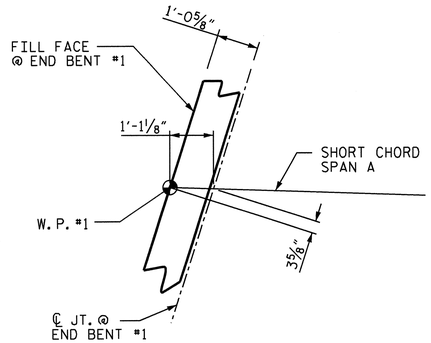
1'-3 1/2"

* RADIAL DIMENSIONS.

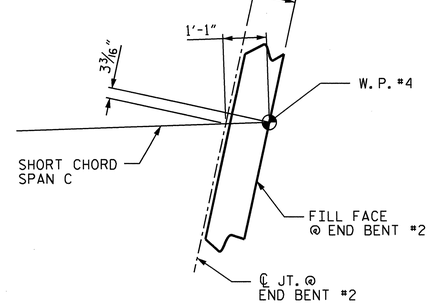
FOR LOCATION OF INTERMEDIATE DIAPHRAGMS, SEE "FRAMING PLAN".

"A" BARS AND D1 DOWELS ARE TO BE PLACED PERPENDICULAR TO LONG CHORD.

FOR ARC OFFSETS, SEE "ARC OFFSETS" SHEET.



DETAIL D



DETAIL E

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 22+02.90 -L-

SHEET 2 OF 2

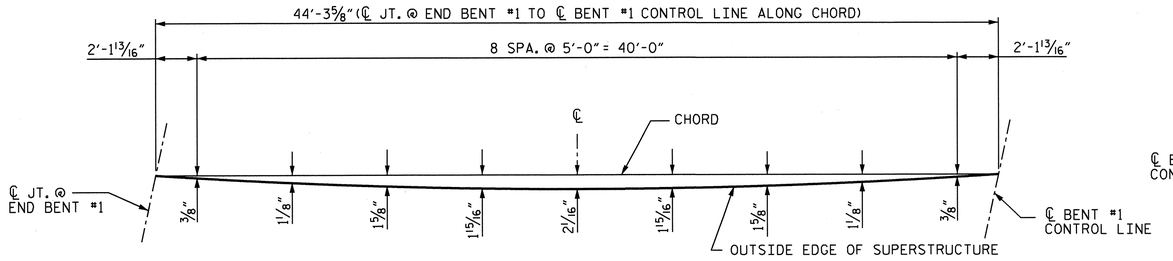
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
PART PLAN OF SPAN B AND PLAN OF SPAN C

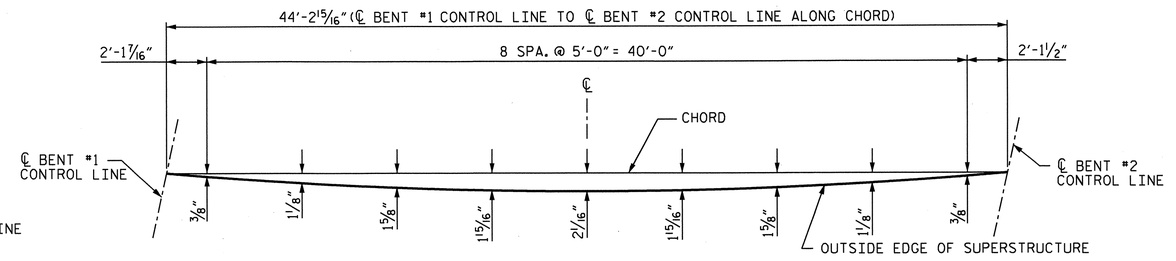
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-11
1			3			TOTAL SHEETS
2			4			76

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EARL E. MURRAY
1/4/13

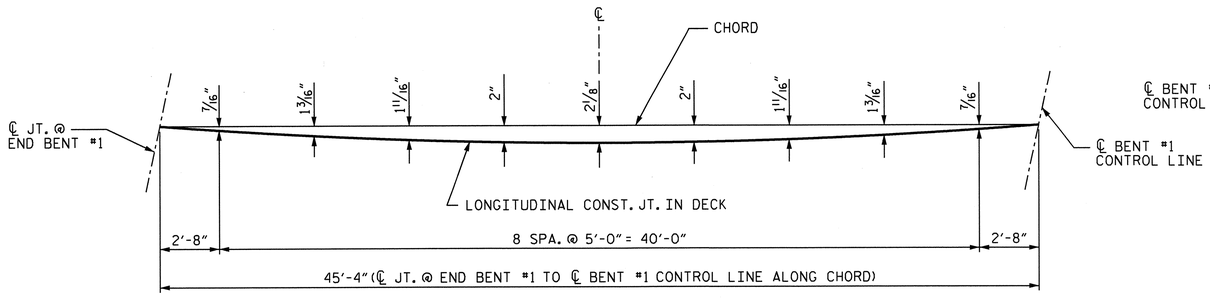
DRAWN BY : PEGGY ADKINS DATE : 12-5-08
CHECKED BY : B.N. BARODAWALA DATE : 1-2-09



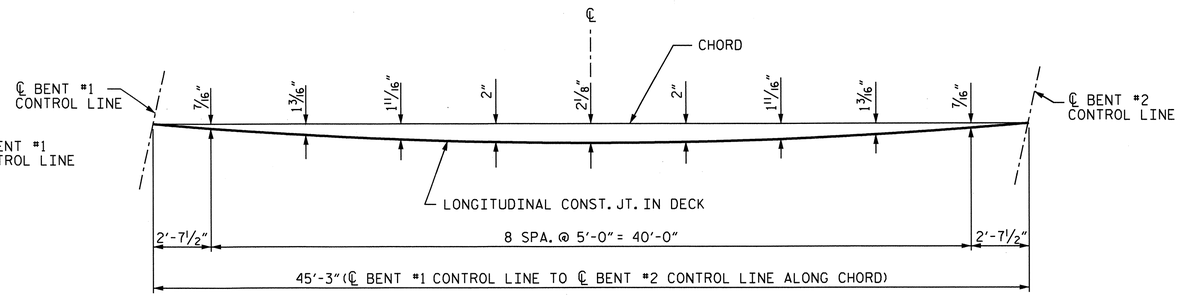
ARC OFFSETS @ LEFT SIDE SPAN A



ARC OFFSETS @ LEFT SIDE SPAN B



ARC OFFSETS @ SPAN A LONGITUDINAL CONSTRUCTION JOINT



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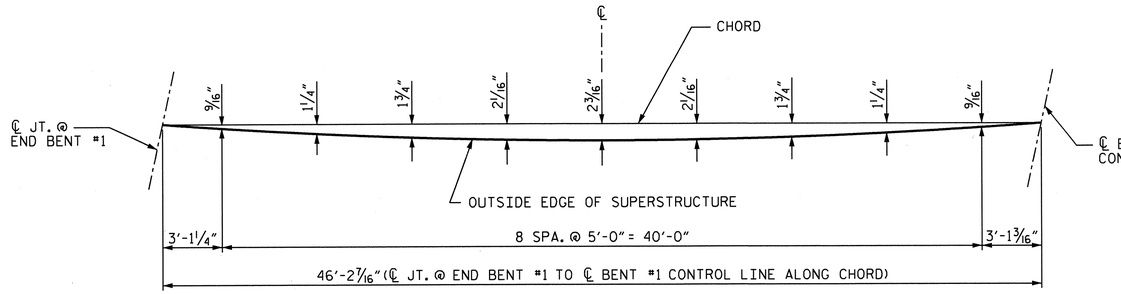
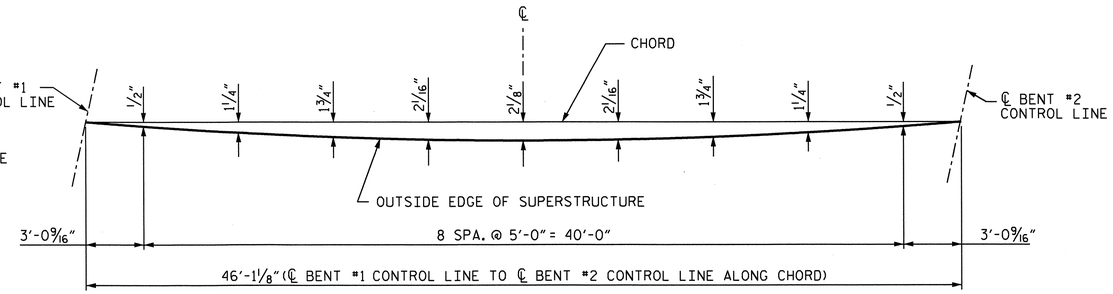


ARC OFFSETS @ RIGHT SIDE SPAN A



ARC OFFSETS @ RIGHT SIDE SPAN B

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 22+02.90 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

ARC OFFSETS
SPANS A & B

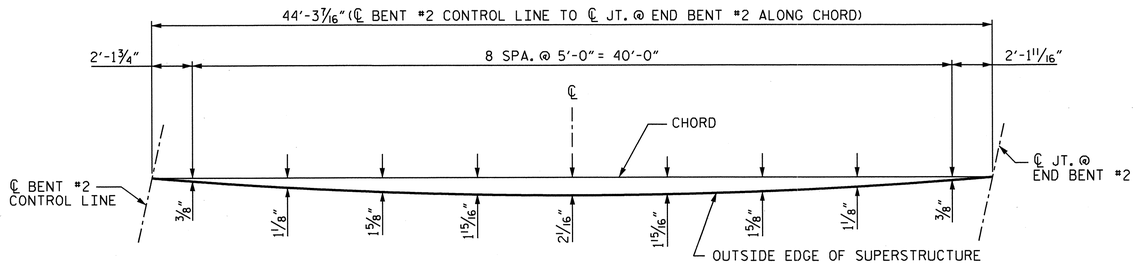
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-12
1			3			TOTAL SHEETS
2			4			76

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY E. MURRAY
1/4/13

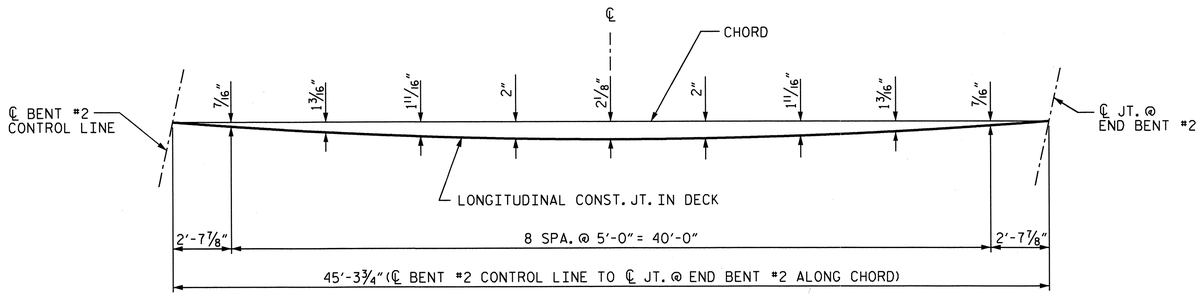
DRAWN BY : PEGGY ADKINS DATE : 12-5-08
CHECKED BY : A.M. LEE DATE : 9-6-12

06-NOV-2012 15:40

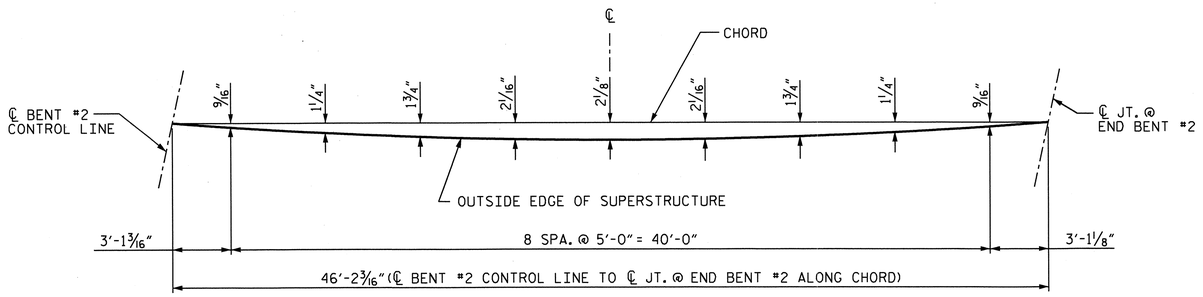
STR #1



ARC OFFSETS @ LEFT SIDE SPAN C



ARC OFFSETS @ SPAN C LONGITUDINAL CONSTRUCTION JOINT



ARC OFFSETS @ RIGHT SIDE SPAN C

DRAWN BY : PEGGY ADKINS DATE : 12-5-08
CHECKED BY : A.M. LEE DATE : 9-6-12

06-NOV-2012 15:41

PROJECT NO. R-3324
BRUNSWICK COUNTY
STATION: 22+02.90 -L-

SHEET 2 OF 2

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY E. MARRA
1/21/13

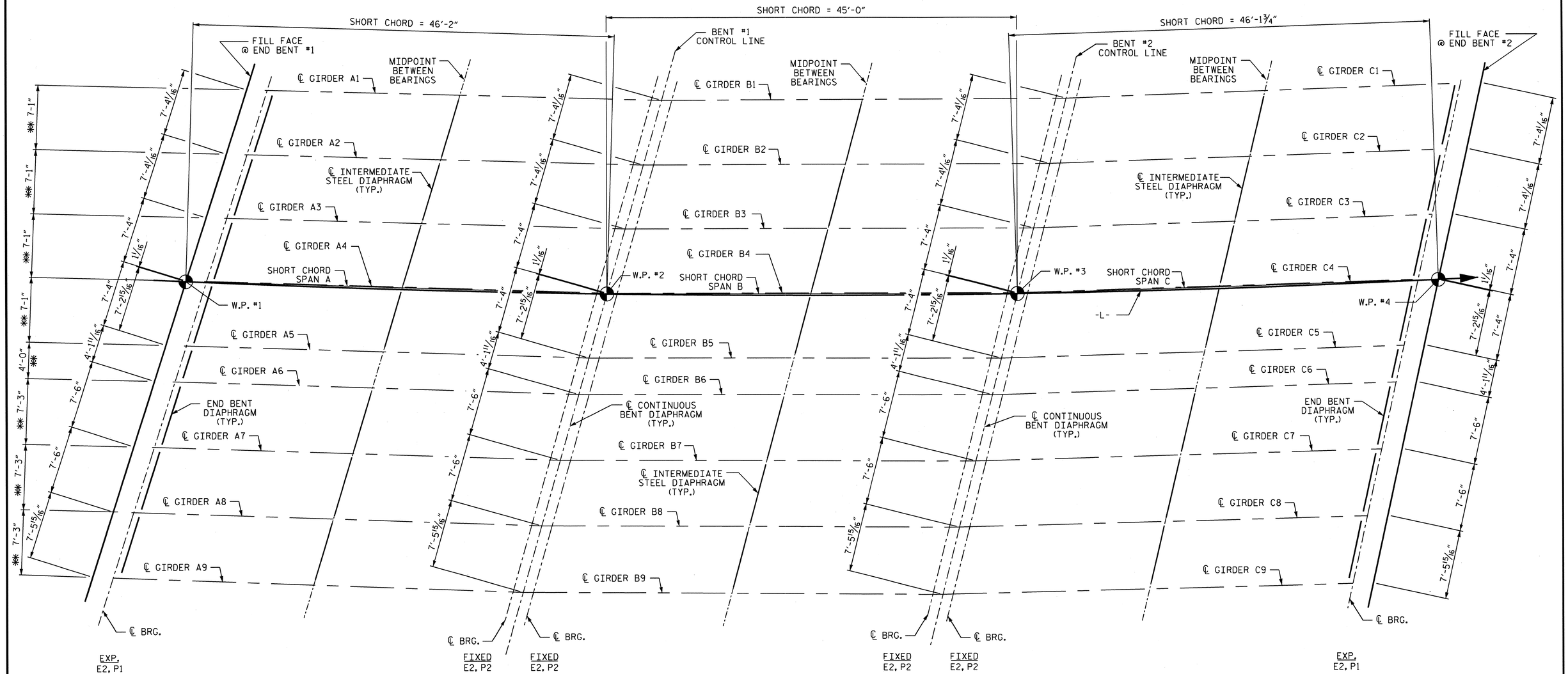
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

ARC OFFSETS
SPAN C

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-13
1			3			TOTAL SHEETS
2			4			76

SIR #1



SPAN A

SPAN B

SPAN C

✱✱ RADIAL THRU THE WORKPOINT

FRAMING PLAN

FOR DIMENSION TO INTERMEDIATE DIAPHRAGMS, SEE PRESTRESSED CONCRETE GIRDER SHEETS.

GIRDER ANGLES SPAN A

GIRDER	NEAR ANGLE	FAR ANGLE
A1	106°-08'-30"	104°-19'-02"
A2	106°-03'-53"	104°-14'-25"
A3	105°-59'-19"	104°-09'-51"
A4	105°-54'-47"	104°-05'-19"
SHORT CHORD	105°-54'-44"	104°-05'-16"
A5	105°-50'-18"	104°-00'-51"
A6	105°-47'-48"	103°-58'-20"
A7	105°-43'-17"	103°-53'-50"
A8	105°-38'-49"	103°-49'-22"
A9	105°-34'-24"	103°-44'-56"

GIRDER ANGLES SPAN B

GIRDER	NEAR ANGLE	FAR ANGLE
B1	106°-07'-06"	104°-20'-25"
B2	106°-02'-29"	104°-15'-48"
B3	105°-57'-55"	104°-11'-14"
B4	105°-53'-24"	104°-06'-43"
SHORT CHORD	105°-53'-21"	104°-06'-39"
B5	105°-48'-55"	104°-02'-14"
B6	105°-46'-25"	103°-59'-43"
B7	105°-41'-54"	103°-55'-13"
B8	105°-37'-26"	103°-50'-45"
B9	105°-33'-01"	103°-46'-20"

GIRDER ANGLES SPAN C

GIRDER	NEAR ANGLE	FAR ANGLE
C1	106°-08'-28"	104°-19'-03"
C2	106°-03'-51"	104°-14'-26"
C3	105°-59'-17"	104°-09'-52"
C4	105°-54'-46"	104°-05'-21"
SHORT CHORD	105°-54'-43"	104°-05'-18"
C5	105°-50'-17"	104°-00'-52"
C6	105°-47'-47"	103°-58'-22"
C7	105°-43'-16"	103°-53'-51"
C8	105°-38'-48"	103°-49'-23"
C9	105°-34'-23"	103°-44'-58"

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER E. MURRAY
1/9/13

PROJECT NO. R-3324
BRUNSWICK COUNTY
STATION: 22+02.90 -L-

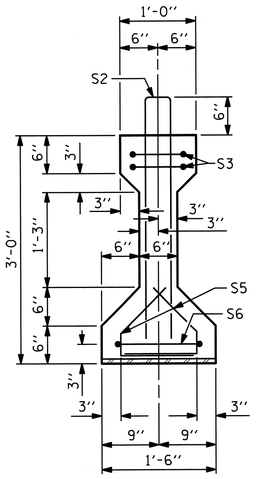
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

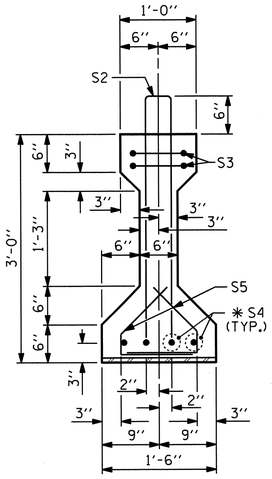
FRAMING PLAN

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-14
1			3			TOTAL SHEETS
2			4			76

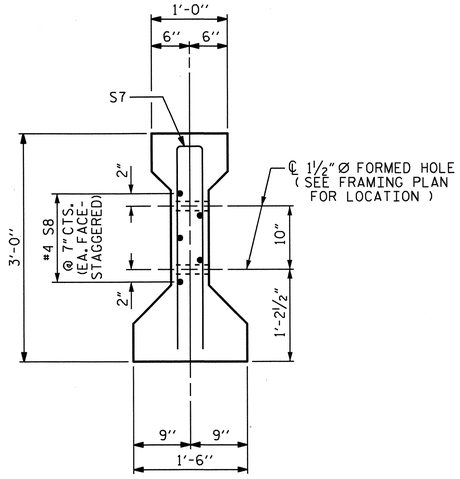
DRAWN BY : PEGGY ADKINS DATE : 11-5-08
CHECKED BY : B.N. BARODAWALA DATE : 1-2-09



SECTION A-A

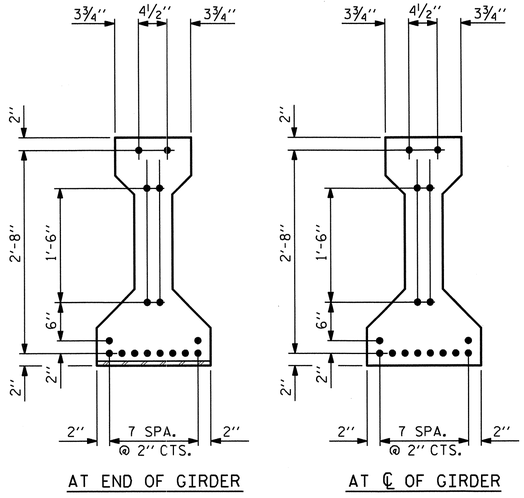


SECTION B-B



SECTION C-C

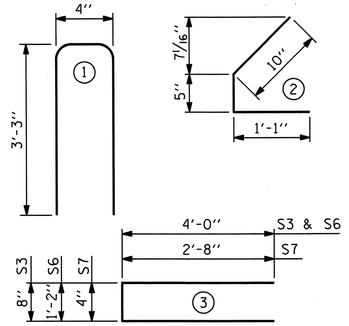
(S1 BARS NOT SHOWN)



0.6" Ø LOW RELAXATION STRAND LAYOUT

BAR TYPES

ALL BAR DIMENSIONS ARE OUT-TO-OUT



0.6" Ø L. R. GRADE 270 STRANDS

AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

REINFORCING STEEL FOR ONE GIRDER

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	62	#4	1	6'-10"	283
S2	12	#5	1	6'-10"	86
S3	4	#4	3	8'-8"	23
✱S4	4	#5	STR	3'-8"	15
S5	44	#4	2	2'-4"	69
S6	1	#4	3	9'-2"	6
S7	2	#5	3	5'-8"	12
S8	5	#4	STR	7'-0"	23

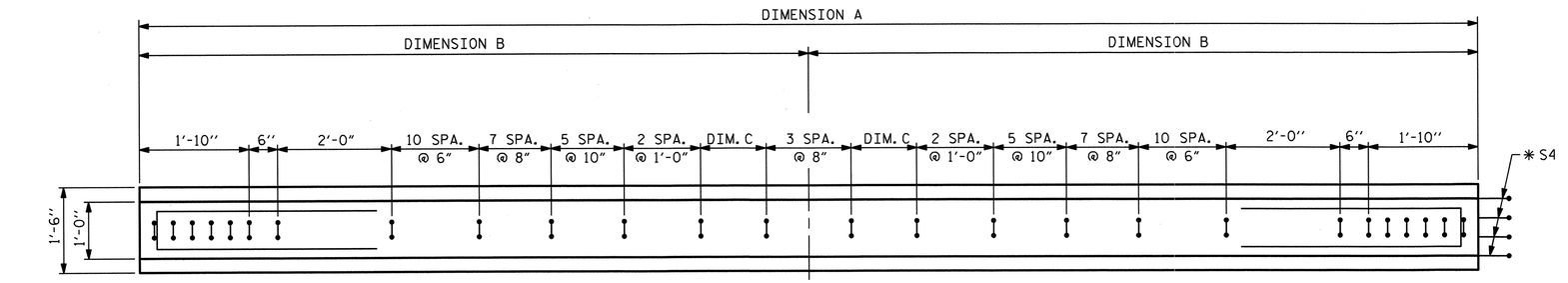
✱NOTE: S4 BARS SHALL BE BENT BEFORE SHIPMENT. HEAT BENDING SHALL NOT BE ALLOWED.

QUANTITIES FOR ONE GIRDER

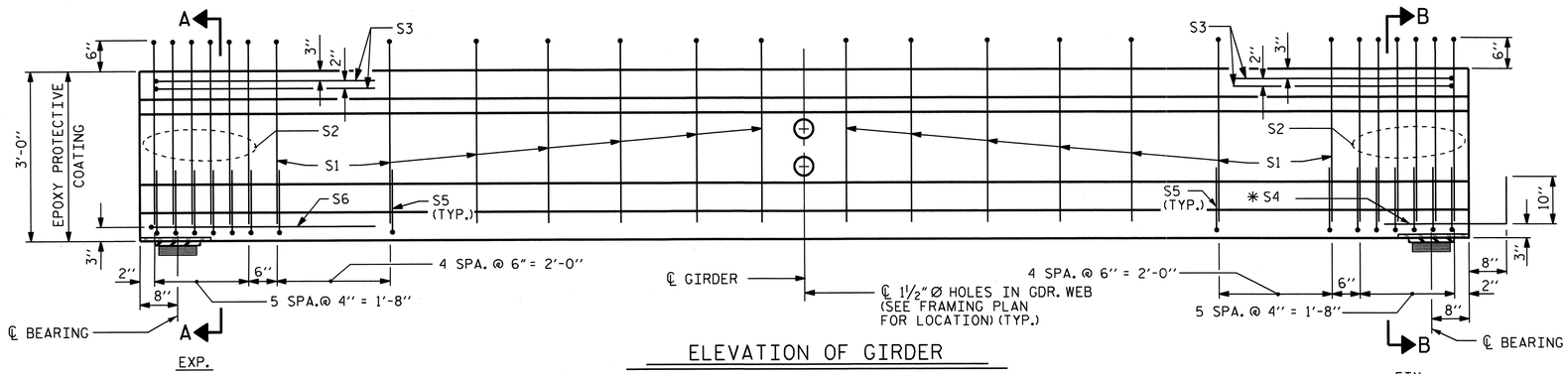
	REINFORCING STEEL LB.	5000 PSI CONCRETE C.Y.	0.6" Ø L.R. STRANDS No.
	517	4.2	16

GIRDERS REQUIRED

	NUMBER	LENGTH	TOTAL LENGTH
GDR. #1	2	43'-6"	87'-0"
GDR. #2	2	43'-8¾"	87'-5½"
GDR. #3	2	43'-11⅜"	87'-10¾"
GDR. #4	2	44'-2"	88'-4"
GDR. #5	2	44'-4⅝"	88'-9¼"
GDR. #6	2	44'-6⅛"	89'-0¼"
GDR. #7	2	44'-8¾"	89'-5½"
GDR. #8	2	44'-11½"	89'-11"
GDR. #9	2	45'-2¼"	90'-4½"
TOTAL			798'-2¾"

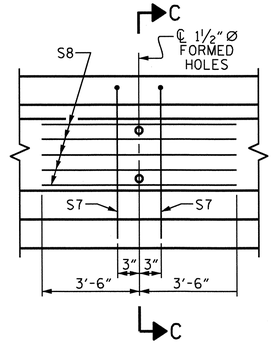


PLAN OF GIRDER



ELEVATION OF GIRDER

(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS)



PARTIAL ELEVATION

SHOWING INTERMEDIATE DIAPHRAGM REINFORCING STEEL FOR GIRDER Nos. 1 THRU 9

GIRDER DIMENSIONS

	DIM. A	DIM. B	DIM. C
GDR. 1	43'-6"	21'-9"	7"
GDR. 2	43'-8¾"	21'-10⅜"	8⅜"
GDR. 3	43'-11⅜"	21'-11 11/16"	9 11/16"
GDR. 4	44'-2"	22'-1"	11"
GDR. 5	44'-4⅝"	22'-2 5/16"	1'-0 5/16"
GDR. 6	44'-6⅛"	22'-3 1/16"	1'-1 1/16"
GDR. 7	44'-8¾"	22'-4⅜"	1'-2⅜"
GDR. 8	44'-11½"	22'-5¾"	1'-3¾"
GDR. 9	45'-2¼"	22'-7⅛"	1'-5⅛"

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 22+02.90 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

AASHTO TYPE II
PRESTRESSED CONCRETE GIRDER
CONTINUOUS FOR LIVE LOAD
SPANS A & C

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-15
1			3			TOTAL SHEETS
2			4			76

ASSEMBLED BY : PEGGY ADKINS DATE : 7-31-12
CHECKED BY : A.M. LEE DATE : 9-6-12

DRAWN BY : ELR 8/91
CHECKED BY : GRP 8/91

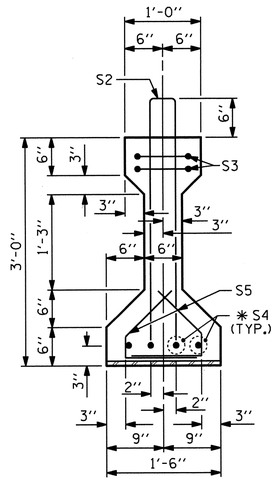
REV. 10/17/00R RWW/LES
REV. 5/1/06R TLA/GM
REV. 10/1/11 MAA/GM

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY E. MURRAY

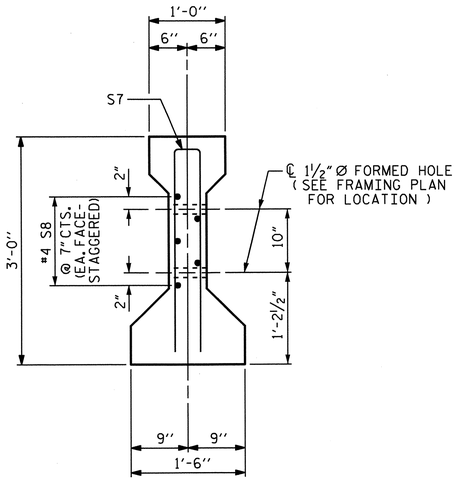
1/9/12

06-NOV-2012 15:58

STD. NO. RSC4 (Sht. 1)

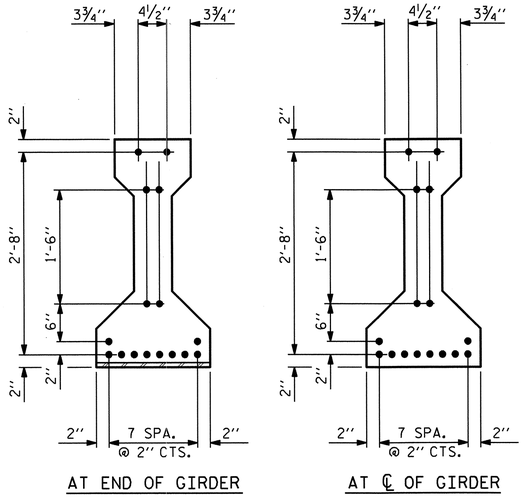


SECTION B-B



SECTION C-C

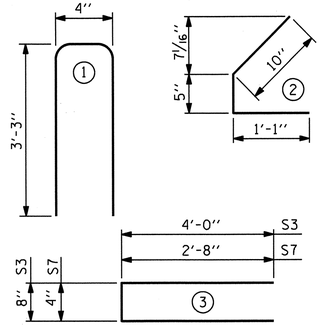
(S1 BARS NOT SHOWN)



0.6" Ø LOW RELAXATION STRAND LAYOUT

BAR TYPES

ALL BAR DIMENSIONS ARE OUT-TO-OUT



0.6" Ø L. R. GRADE 270 STRANDS

AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

REINFORCING STEEL FOR ONE GIRDER

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	62	#4	1	6'-10"	283
S2	12	#5	1	6'-10"	86
S3	4	#4	3	8'-8"	23
✱S4	8	#5	STR	3'-8"	31
S5	44	#4	2	2'-4"	69
S7	2	#5	3	5'-8"	12
S8	5	#4	STR	7'-0"	23

✱NOTE: S4 BARS SHALL BE BENT BEFORE SHIPMENT. HEAT BENDING SHALL NOT BE ALLOWED.

QUANTITIES FOR ONE GIRDER

	REINFORCING STEEL (LB.)	5000 PSI CONCRETE (C.Y.)	0.6" Ø L.R. STRANDS (No.)
	527	4.2	16

GIRDERS REQUIRED

	NUMBER	LENGTH	TOTAL LENGTH
GDR. #1	1	43'-6"	43'-6"
GDR. #2	1	43'-8¾"	43'-8¾"
GDR. #3	1	43'-11⅜"	43'-11⅜"
GDR. #4	1	44'-2"	44'-2"
GDR. #5	1	44'-4⅝"	44'-4⅝"
GDR. #6	1	44'-6⅛"	44'-6⅛"
GDR. #7	1	44'-8¾"	44'-8¾"
GDR. #8	1	44'-11½"	44'-11½"
GDR. #9	1	45'-2¼"	45'-2¼"
TOTAL			399'-1⅜"

DIMENSION A

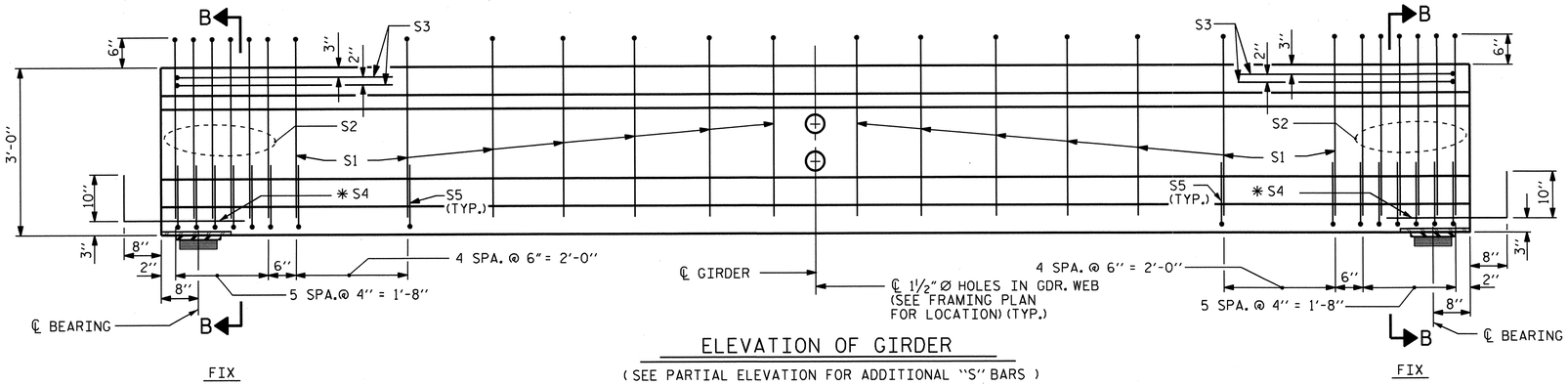
DIMENSION B DIMENSION B

1'-10" 6" 2'-0" 10 SPA. @ 6" 7 SPA. @ 8" 5 SPA. @ 10" 2 SPA. @ 1'-0" DIM. C 3 SPA. @ 8" DIM. C 2 SPA. @ 1'-0" 5 SPA. @ 10" 7 SPA. @ 8" 10 SPA. @ 6" 2'-0" 6" 1'-10"

✱S4 ✱S4

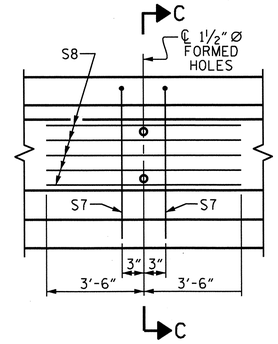
1'-6" 1'-0"

PLAN OF GIRDER



ELEVATION OF GIRDER

(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS)



PARTIAL ELEVATION

SHOWING INTERMEDIATE DIAPHRAGM REINFORCING STEEL FOR GIRDER Nos. 1 THRU 9

GIRDER DIMENSIONS

	DIM. A	DIM. B	DIM. C
GDR. 1	43'-6"	21'-9"	7"
GDR. 2	43'-8¾"	21'-10⅜"	8⅜"
GDR. 3	43'-11⅜"	21'-11 11/16"	9 11/16"
GDR. 4	44'-2"	22'-1"	11"
GDR. 5	44'-4⅝"	22'-2 5/16"	1'-0 5/16"
GDR. 6	44'-6⅛"	22'-3 1/16"	1'-1 1/16"
GDR. 7	44'-8¾"	22'-4⅜"	1'-2⅜"
GDR. 8	44'-11½"	22'-5¾"	1'-3¾"
GDR. 9	45'-2¼"	22'-7⅛"	1'-5⅛"

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 22+02.90 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

AASHTO TYPE II
PRESTRESSED CONCRETE GIRDER
CONTINUOUS FOR LIVE LOAD
SPAN B

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-16
1			3			TOTAL SHEETS
2			4			76

ASSEMBLED BY : PEGGY ADKINS	DATE : 7-31-12	
CHECKED BY : A.M. LEE	DATE : 9-6-12	
DRAWN BY : ELR 8/91	REV. 10/17/00R	RWW/LES
CHECKED BY : GRP 8/91	REV. 5/1/06R	TLA/GM
	REV. 10/1/11	MAA/GM

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY E. GARRAY

1/4/13

06-NOV-2012 15:58

SIP #1 STD. NO. PCG4 (Sht. 1)

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

0.6" Ø LOW RELAXATION	SPANS A, B & C ALL GIRDERS										
TENTH POINTS	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.023	0.044	0.060	0.070	0.074	0.070	0.060	0.044	0.023	0.000
* DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.009	0.016	0.022	0.026	0.027	0.026	0.022	0.016	0.009	0.000
FINAL CAMBER ↑	0	3/16"	5/16"	7/16"	1/2"	9/16"	1/2"	7/16"	5/16"	3/16"	0

* INCLUDES FUTURE WEARING SURFACE
ALL VALUES ARE SHOWN IN FEET (DECIMAL FORM), EXCEPT "FINAL CAMBER", WHICH IS GIVEN IN INCHES (FRACTION FORM).

NOTES

ALL PRESTRESSING STRANDS SHALL BE 7-WIRE LOW-RELAXATION GRADE 270 STRANDS AND SHALL CONFORM TO AASHTO M203 EXCEPT FOR SAMPLING REQUIREMENTS WHICH SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

ALL REINFORCING STEEL SHALL BE GRADE 60.

APPLY EPOXY PROTECTIVE COATING TO END OF GIRDER SURFACES INDICATED IN ELEVATION VIEW.

EMBEDDED PLATE "B-1" SHALL BE GALVANIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS. BEVEL EDGES OF PLATE "B-1" TO GIVE CLOSE FIT BUT NOT TIGHT FIT TO STEEL CASTING FORM.

ANCHOR STUDS SHALL CONFORM TO AASHTO M169 GRADES 1010 THROUGH 1020 OR APPROVED EQUAL, AND SHALL MEET THE TYPE "B" REQUIREMENTS OF SUBSECTION 7.3 OF THE ANSI/AASHTO/AWS D1.5 BRIDGE WELDING CODE.

AT ENDS OF GIRDERS TO BE EMBEDDED IN CONCRETE DIAPHRAGMS OR END WALLS, PRESTRESSING STRANDS MAY EXTEND A MAXIMUM OF 2" BEYOND THE GIRDER ENDS. OTHERWISE, PRESTRESSING STRANDS SHALL BE CUT FLUSH WITH THE GIRDER ENDS.

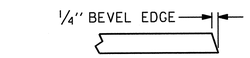
THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE GIRDER SHALL BE DONE WHEN CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN 4600 PSI.

DEPENDING ON THE TYPE OF SYSTEM USED TO SUPPORT THE DECK SLAB FORMS, PRESET ANCHORS MAY BE NECESSARY IN THE PRESTRESSED CONCRETE GIRDER.

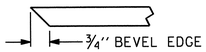
THE TOP SURFACE OF THE GIRDER, EXCLUDING THE OUTSIDE 4", SHALL BE RAKED TO A DEPTH OF 1/4".

PRESTRESSED CONCRETE GIRDERS ARE DESIGNED FOR 0 PSI TENSION IN THE PRECOMPRESSED TENSILE ZONE UNDER ALL LOADING CONDITIONS.

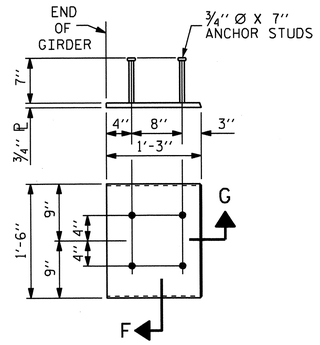
PRESTRESSED CONCRETE GIRDERS SHALL CONTAIN CALCIUM NITRITE CORROSION INHIBITOR.



SECTION "G"



SECTION "F"
(SEE NOTES)



EMBEDDED PLATE "B-1" DETAILS
FOR AASHTO TYPE II GIRDER
(2 REQ'D PER GIRDER)

PROJECT NO. R-3324
BRUNSWICK COUNTY
STATION: 22+02.90 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

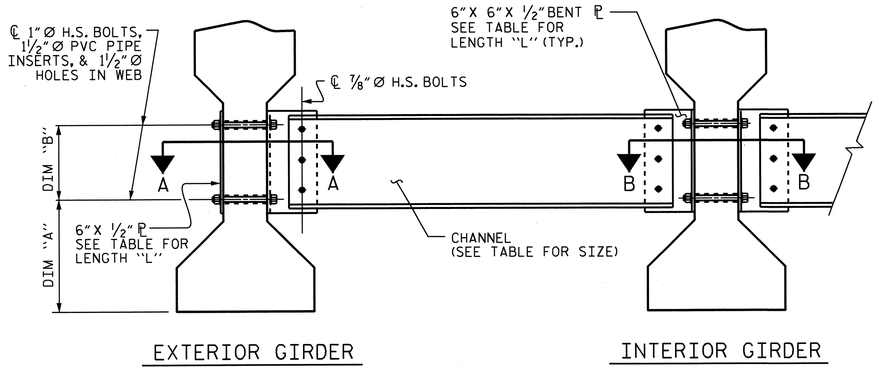
PRESTRESSED CONCRETE GIRDER
CONTINUOUS FOR LIVE LOAD
DETAILS

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY P. MURRAY
1/4/13

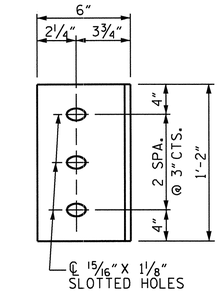
ASSEMBLED BY : PEGGY ADKINS	DATE : 7-31-12
CHECKED BY : A.M. LEE	DATE : 9-6-12
DRAWN BY : ELR 11/91	REV. 7/10/01RR LES/RDR
CHECKED BY : GRP 11/91	REV. 5/1/06 TLA/GM
	REV. 10/1/11 MAA/GM

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-17
1			3			TOTAL SHEETS
2			4			76

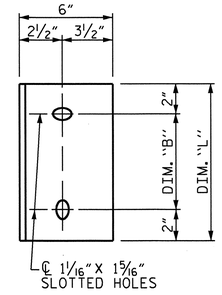
STD. NO. PCG9 (Sht 1)



PART SECTION AT INTERMEDIATE DIAPHRAGM



DIAPHRAGM FACE



WEB FACE

CONNECTOR PLATE DETAILS

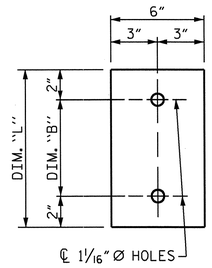
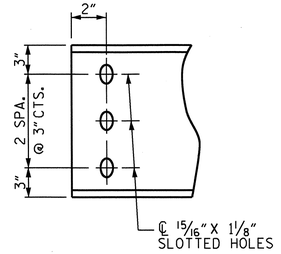


PLATE DETAILS



CHANNEL END

STRUCTURAL STEEL NOTES

ALL INTERMEDIATE DIAPHRAGM STEEL AND CONNECTOR PLATES SHALL BE AASHTO M270 GRADE 50 OR APPROVED EQUAL.

TENSION ON THE ASTM A325 BOLTS THROUGH THE CHANNEL MEMBER SHALL BE CALIBRATED USING DIRECT TENSION INDICATOR WASHERS IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

TENSION ON THE ASTM A449 BOLTS THROUGH THE GIRDER WEB SHALL BE SNUG TIGHTENED FOLLOWED BY AN ADDITIONAL ¼ TURN.

THE PLATES, BENT PLATES, CHANNELS, AND ANGLES SHALL BE METALLIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS. FOR THERMAL SPRAYED COATINGS (METALLIZATION), SEE SPECIAL PROVISIONS.

FOR METALLIZATION, APPLY AN 8 MIL THICK 99.99 PERCENT ZINC (W-Zn-1) THERMAL SPRAYED COATING WITH A 0.5 MIL THICK SEAL COAT TO ALL STEEL DIAPHRAGM SURFACES IN ACCORDANCE WITH THE THERMAL SPRAYED COATINGS SPECIAL PROVISION AND SECTION 442 OF THE STANDARD SPECIFICATIONS.

GALVANIZE THE HIGH STRENGTH BOLTS, NUTS, WASHERS AND DIRECT TENSION INDICATORS IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

USE AN ASTM F436 HARDENED WASHER WITH STANDARD AND SLOTTED HOLES UNDER EACH BOLT HEAD AND NUT.

FOR BOLTS THROUGH THE GIRDER WEB, PROVIDE SUFFICIENT LENGTH OF THREADS ON ALL BOLTS TO ACCOMMODATE WASHERS AND THE THICKNESS OF CONNECTING MEMBER PLUS AT LEAST ¼" PROJECTION BEYOND THE NUT.

INTERMEDIATE DIAPHRAGM ASSEMBLY SHALL COMPLY WITH SECTION 1072 OF THE STANDARD SPECIFICATIONS.

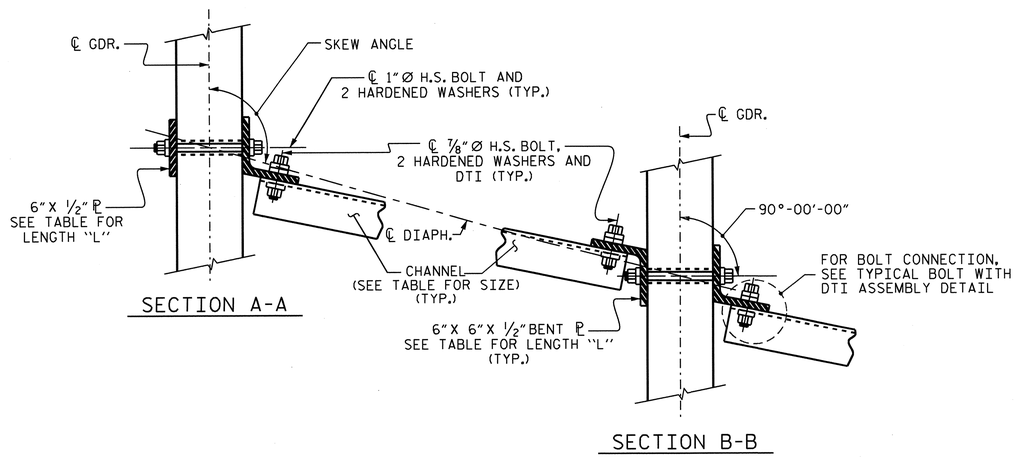
SUBMIT TWO SETS OF WORKING DRAWINGS FOR THE INTERMEDIATE DIAPHRAGM ASSEMBLY FOR REVIEW, COMMENTS AND ACCEPTANCE. AFTER REVIEW, COMMENTS, AND ACCEPTANCE, SUBMIT SEVEN SETS FOR DISTRIBUTION.

IN THE EXTERIOR BAYS, PLACE TEMPORARY STRUTS BETWEEN PRESTRESSED GIRDERS ADJACENT TO THE STEEL DIAPHRAGMS. STRUTS SHALL REMAIN IN PLACE 3 DAYS AFTER CONCRETE IS PLACED.

THE COST OF THE STEEL DIAPHRAGMS AND ASSEMBLIES SHALL BE INCLUDED IN THE UNIT PRICE BID FOR PRESTRESSED CONCRETE GIRDERS.

TABLE

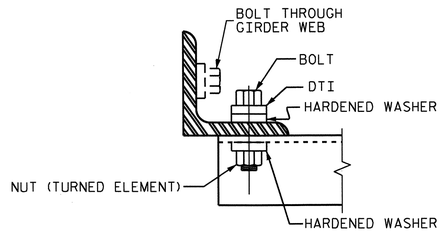
GIRDER TYPE	CHANNEL SIZE	DIM "A"	DIM "B"	DIM "L"
II	MC 12 x 31	1'-2½"	10"	1'-2"



SECTION A-A

SECTION B-B

CONNECTION DETAILS



BOLT WITH DTI ASSEMBLY DETAIL

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 22+02.90 -L-

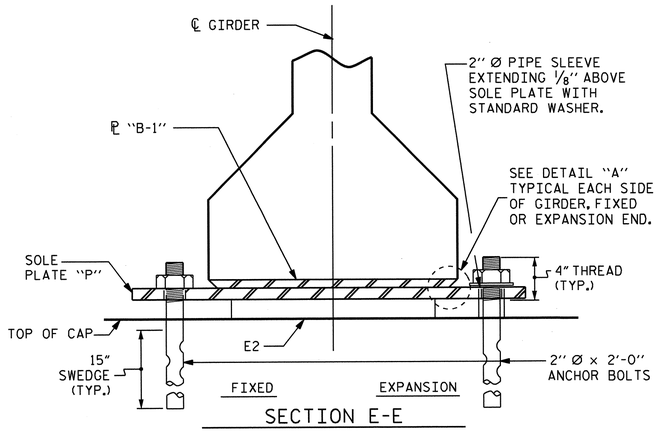
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD
INTERMEDIATE STEEL DIAPHRAGMS FOR TYPE II PRESTRESSED CONCRETE GIRDERS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-18
1			3			TOTAL SHEETS
2			4			76

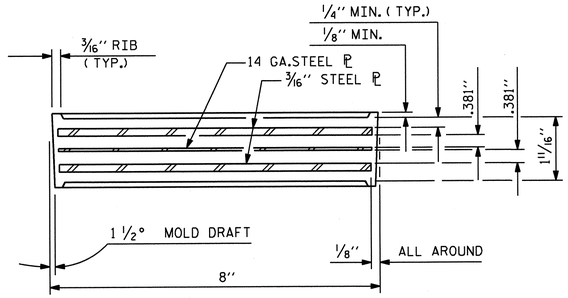
NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY P. MURRAY
1/9/13

ASSEMBLED BY : PEGGY ADKINS	DATE : 7-31-12	
CHECKED BY : A.M. LEE	DATE : 9-6-12	
DRAWN BY : TLA 6/05	ADDED 10/21/05	
CHECKED BY : VC 6/05	REV. 5/1/06RRR	KMM/GM
	REV. 10/1/11	MAA/GM

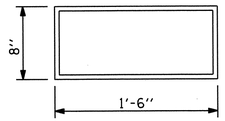
SEE STD. NO. RCC10 (SHT 4)



SECTION E-E



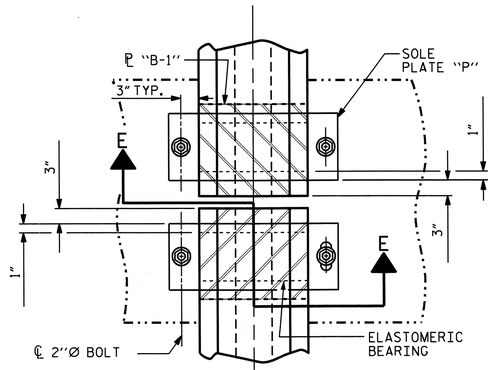
TYPICAL SECTION OF ELASTOMERIC BEARINGS



E2 (54 REQ'D)

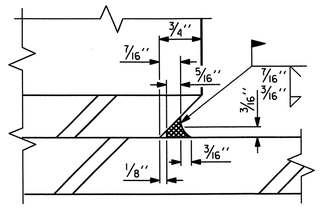
PLAN VIEW OF ELASTOMERIC BEARING

TYPE III

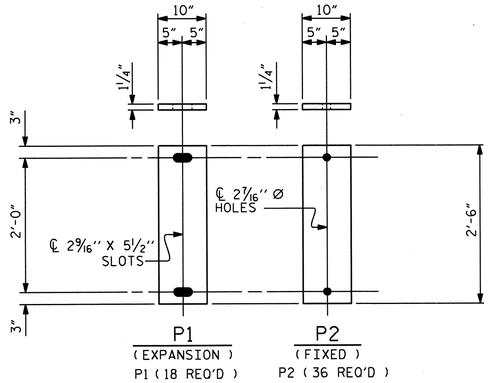


TYPICAL HALF-PLAN (SHOWING CONTINUOUS BENT)

TYPICAL HALF-PLAN (SHOWING SIMPLE SPAN BENT)



DETAIL "A"



SOLE PLATE DETAILS ("P")

NOTES

AT ALL FIXED POINTS OF SUPPORT, NUTS FOR ANCHOR BOLTS ARE TO BE TIGHTENED FINGER TIGHT AND THEN BACKED OFF 1/2 TURN. THE THREAD OF THE NUT AND BOLT SHALL THEN BE BURRED WITH A SHARP POINTED TOOL.

THE 2" Ø PIPE SLEEVE SHALL BE CUT FROM SCHEDULE 40 PVC PLASTIC PIPE. THE PVC PLASTIC PIPE SHALL MEET THE REQUIREMENTS OF ASTM D1785.

STEEL SOLE PLATES, ANCHOR BOLTS, NUTS, AND WASHERS SHALL BE GALVANIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

PRIOR TO WELDING, GRIND THE GALVANIZED SURFACE OF THE PORTION OF THE EMBEDDED PLATE AND SOLE PLATE THAT ARE TO BE WELDED. AFTER WELDING, DAMAGED GALVANIZED SURFACES SHALL BE REPAIRED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

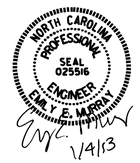
WHEN WELDING THE SOLE PLATE TO THE EMBEDDED PLATE IN THE GIRDER, USE TEMPERATURE INDICATING WAX PENS, OR OTHER SUITABLE MEANS, TO ENSURE THAT THE TEMPERATURE OF THE SOLE PLATE DOES NOT EXCEED 300°F. TEMPERATURES ABOVE THIS MAY DAMAGE THE ELASTOMER.

SOLE PLATE "P", BOLTS, NUTS, WASHERS, AND PIPE SLEEVE SHALL BE INCLUDED IN THE PAY ITEM FOR PRESTRESSED CONCRETE GIRDERS.

ANCHOR BOLTS SHALL MEET THE REQUIREMENTS OF ASTM A449. NUTS SHALL MEET THE REQUIREMENTS OF AASHTO M291-DH OR AASHTO M292-2H. WASHERS SHALL MEET THE REQUIREMENTS OF AASHTO M293. SHOP DRAWINGS ARE NOT REQUIRED FOR ANCHOR BOLT, NUTS AND WASHERS. SHOP INSPECTION IS REQUIRED.

ALL SURFACES OF BEARING PLATES SHALL BE SMOOTH AND STRAIGHT.

— LOAD RATINGS —	
	MAX.D.L.+L.L.
TYPE III	115 K



PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 22+02.90 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

ELASTOMERIC BEARING DETAILS

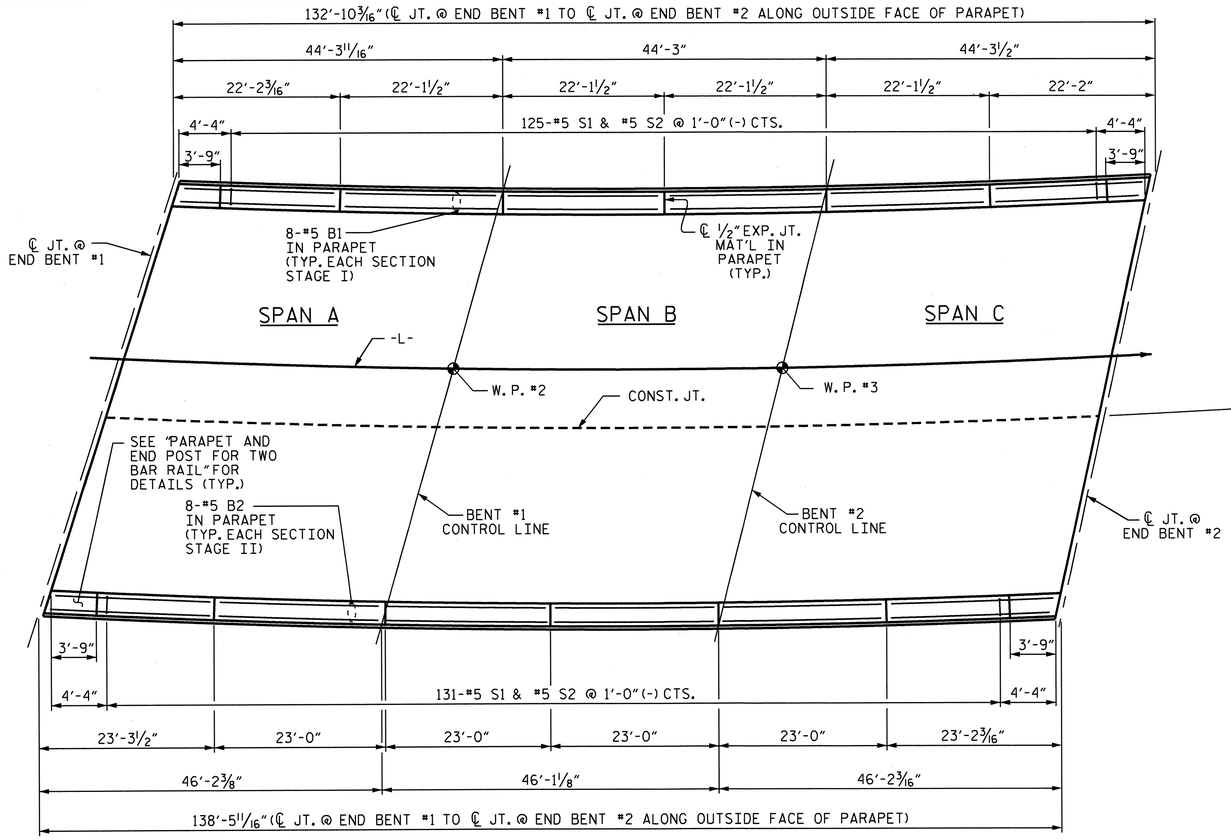
PRESTRESSED CONCRETE GIRDER SUPERSTRUCTURE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-19
1			3			TOTAL SHEETS
2			4			76

ASSEMBLED BY : PEGGY ADKINS	DATE :	8-1-12
CHECKED BY : A.M. LEE	DATE :	9-6-12
DRAWN BY : WJH 8/89	REV. 7/10/01	RWW/LES
CHECKED BY : CRK 8/89	REV. 5/1/06	TLA/GM
	REV. 10/1/11	MAA/GM

06-NOV-2012 15:59

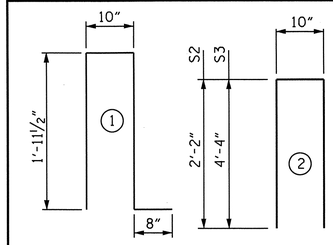
SIP #1 SID NO. FB3 (SHT 2)



PLAN OF PARAPET

(DIMENSIONS ARE ALONG ARC)

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL (STAGE I)

FOR LEFT SIDE PARAPET AND END POSTS ONLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳B1	48	5	STR	21'-8"	1085
✳B3	12	6	STR	3'-5"	62
✳S1	135	5	1	5'-5"	763
✳S2	125	5	2	5'-2"	674
✳S3	10	5	2	9'-6"	99

✳EPOXY COATED REINFORCING STEEL	LBS.	2683
CLASS AA CONCRETE	C.Y.	15.1
1'-2" X 2'-6" CONCRETE PARAPET SUPERSTRUCTURE	LIN. FT.	132.85
● APPROACH SLABS	LIN. FT.	7.92
TOTAL	LIN. FT.	140.77

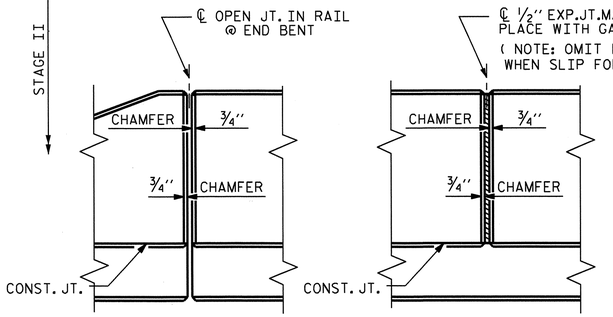
BILL OF MATERIAL (STAGE II)

FOR RIGHT SIDE PARAPET AND END POSTS ONLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳B2	48	5	STR	22'-7"	1131
✳B3	12	6	STR	3'-5"	62
✳S1	141	5	1	5'-5"	797
✳S2	131	5	2	5'-2"	706
✳S3	10	5	2	9'-6"	99

✳EPOXY COATED REINFORCING STEEL	LBS.	2795
CLASS AA CONCRETE	C.Y.	15.7
1'-2" X 2'-6" CONCRETE PARAPET SUPERSTRUCTURE	LIN. FT.	138.47
● APPROACH SLABS	LIN. FT.	7.92
TOTAL	LIN. FT.	146.39

● FOR EPOXY COATED REINFORCING STEEL AND CLASS AA CONCRETE IN THE END POSTS ON THE APPROACH SLABS, SEE "BRIDGE APPROACH SLAB DETAILS" SHEET.



ELEVATION AT EXPANSION JOINTS

NOTES

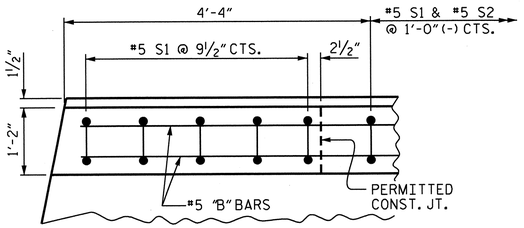
PARAPET IN A CONTINUOUS UNIT SHALL NOT BE CAST UNTIL ALL SLAB CONCRETE IN THE UNIT HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

ALL REINFORCING STEEL IN PARAPETS AND END POSTS SHALL BE EPOXY COATED.

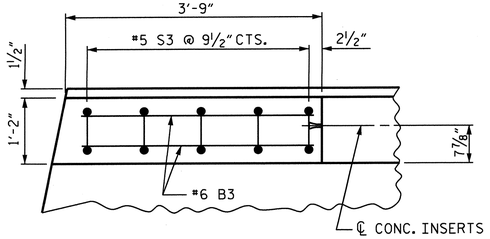
GROOVED CONTRACTION JOINTS, 1/2" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE PARAPET AND IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. A CONTRACTION JOINT SHALL BE LOCATED AT EACH THIRD POINT BETWEEN PARAPET EXPANSION JOINTS. ONLY ONE CONTRACTION JOINT IS REQUIRED AT MIDPOINT OF PARAPET SEGMENTS LESS THAN 20 FEET IN LENGTH AND NO CONTRACTION JOINTS ARE REQUIRED FOR THOSE SEGMENTS LESS THAN 10 FEET IN LENGTH.

FOR END POSTS ON APPROACH SLABS, SEE BRIDGE APPROACH SLAB SHEETS.

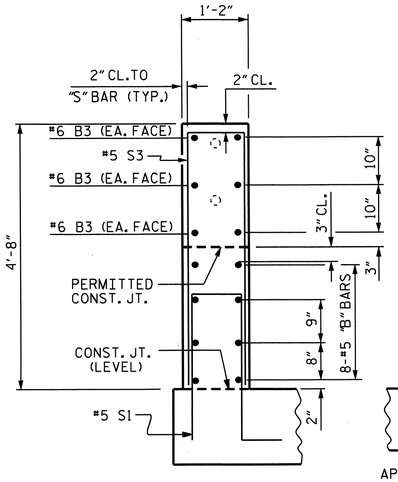
PARAPET DETAILS



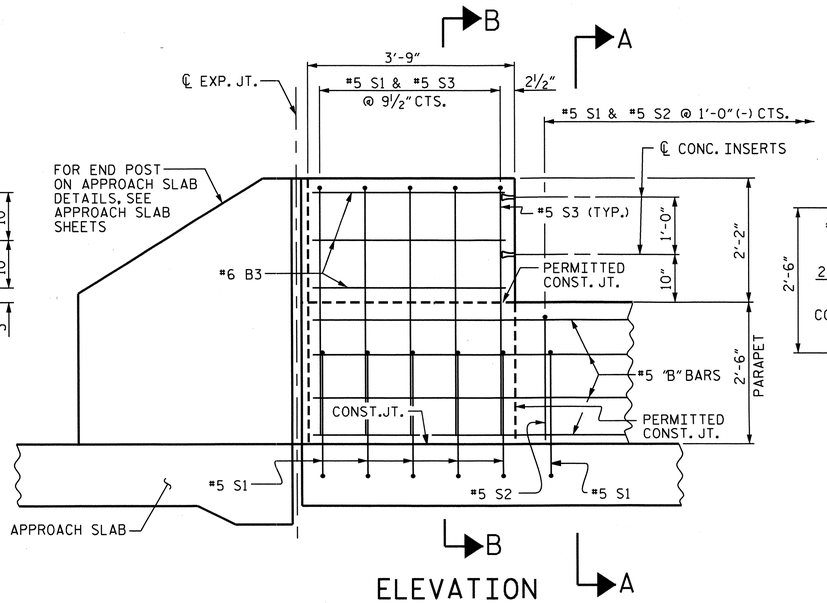
PLAN OF PARAPET



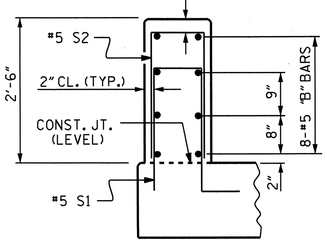
PLAN OF END POST



SECTION B-B



ELEVATION



SECTION A-A

PARAPET AND END POST FOR TWO BAR RAIL

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 22+02.90 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

1'-2" X 2'-6" CONCRETE PARAPET DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-20
1			3			TOTAL SHEETS
2			4			76

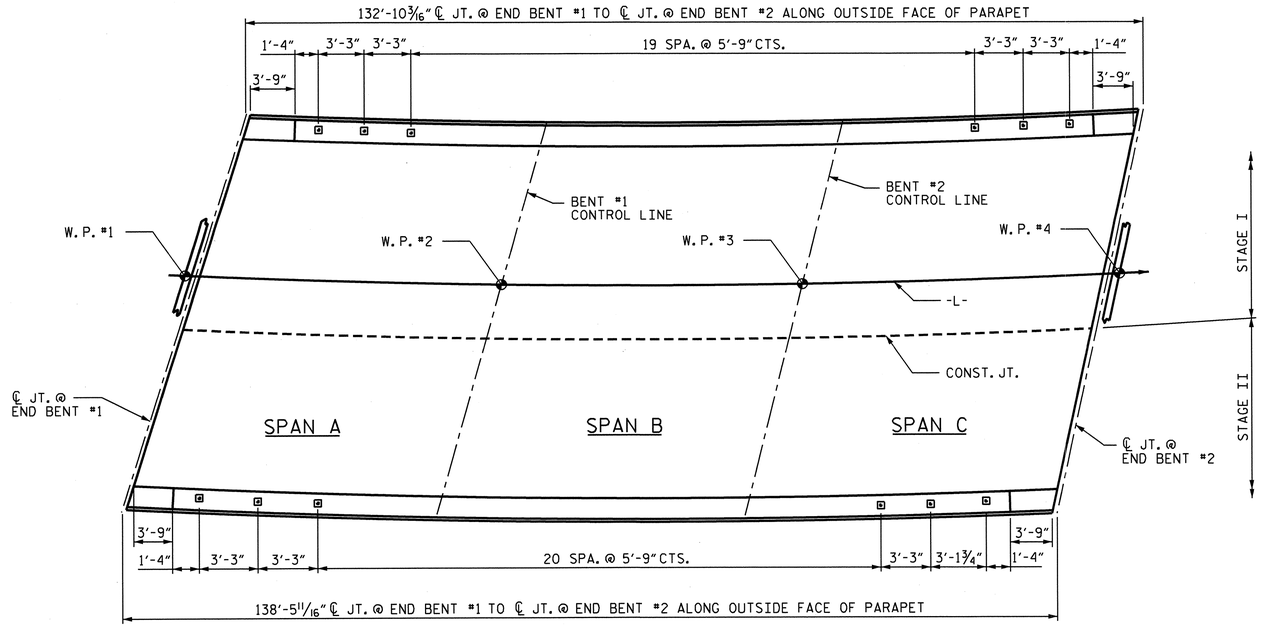
NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY G. MURRAY

1/21/13

ASSEMBLED BY : PEGGY ADKINS DATE : 9-4-12
CHECKED BY : A.M. LEE DATE : 9-6-12

05 NOV 2012 15:04

STD. #1



PLAN OF RAIL POST SPACINGS

NOTES

STRUCTURAL CONCRETE INSERT

THE STRUCTURAL CONCRETE INSERT ASSEMBLY SHALL CONSIST OF THE FOLLOWING COMPONENTS:

A. FERRULES SHALL BE MADE FROM STEEL MEETING THE REQUIREMENTS OF AASHTO M169, GRADE 12L14 AND SHALL HAVE A MINIMUM LENGTH OF THREADS OF 1½".

B. 1 - ¾" Ø X 1⅝" BOLT WITH WASHER. BOLT SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307. BOLT AND WASHER SHALL BE GALVANIZED. (AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLT AND WASHER MAY BE USED AS AN ALTERNATE FOR THE ¾" Ø X 1⅝" GALVANIZED BOLT AND WASHER. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.)

C. WIRE STRUT SHOWN IN THE CONCRETE INSERT ASSEMBLY DETAIL IS THE MINIMUM ALLOWABLE SIZE AND SHALL HAVE A MINIMUM TENSILE STRENGTH OF 100,000 PSI. AS AN OPTION, A 7/16" Ø WIRE STRUT WITH A MINIMUM TENSILE STRENGTH OF 90,000 PSI IS ACCEPTABLE.

NOTES

METAL RAIL TO END POST CONNECTION

THE METAL RAIL TO END POST CONNECTION SHALL CONSIST OF THE FOLLOWING COMPONENTS:

A. ½" PLATES SHALL CONFORM TO AASHTO M270 GRADE 36 AND SHALL BE GALVANIZED AFTER FABRICATION.

B. ¾" STRUCTURAL CONCRETE INSERT SHALL HAVE A WORKING LOAD SHEAR CAPACITY OF 4800 LBS. THE FERRULES SHALL ENGAGE A ¾"Ø X 1⅝" BOLT WITH 2" O.D. WASHER IN PLACE. THE ¾"Ø X 1⅝" BOLT SHALL HAVE N. C. THREADS.

C. CAP SCREWS FOR RAIL ATTACHMENT TO ANGLE SHALL CONFORM TO THE REQUIREMENTS OF ASTM F593 ALLOY 305 STAINLESS STEEL. CAP SCREWS TO BE CENTERED IN SLOTS AT 60°F.

D. STANDARD CLAMP BARS (SEE METAL RAIL SHEET).

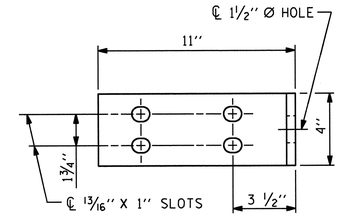
E. ½" Ø PIPE SLEEVES (IF REQUIRED) TO BE GALVANIZED.

THE COST OF THE STANDARD CLAMP BARS AND CAP SCREWS USED IN THE METAL RAIL TO END POST CONNECTION SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR LINEAR FEET OF 1 OR 2 BAR METAL RAILS.

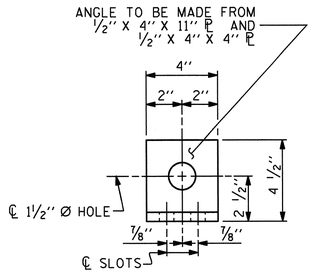
THE ¾" STRUCTURAL CONCRETE INSERT WITH BOLT SHALL BE ASSEMBLED IN THE SHOP.

THE COST OF THE ¾" STRUCTURAL CONCRETE INSERT ASSEMBLY, AND THE ½" PLATES COMPLETE IN PLACE SHALL BE INCLUDED IN THE VARIOUS PAY ITEMS.

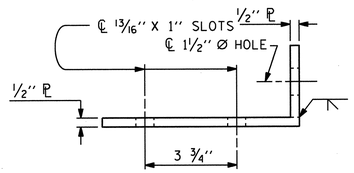
THE CONTRACTOR, AT HIS OPTION, MAY USE AN ADHESIVE BONDING SYSTEM IN LIEU OF THE STRUCTURAL CONCRETE INSERT EMBEDDED IN THE END POST. IF THE ADHESIVE BONDING SYSTEM IS USED, THE ¾" Ø X 1⅝" BOLT WITH WASHER SHALL BE REPLACED WITH A ¾"Ø X 6½" BOLT AND 2" O.D. WASHER. ALL SPECIFICATIONS THAT APPLY TO THE ¾" Ø X 1⅝" BOLT SHALL APPLY TO THE ¾"Ø X 6 ½" BOLT. FIELD TESTING OF THE ADHESIVE BONDING SYSTEM IS NOT REQUIRED.



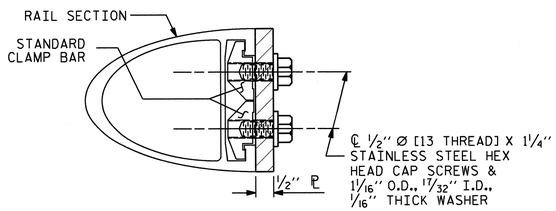
ELEVATION



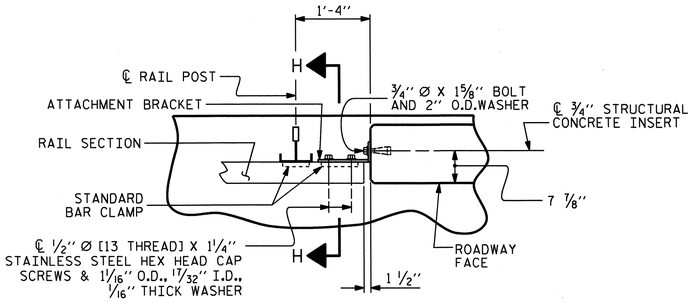
END VIEW



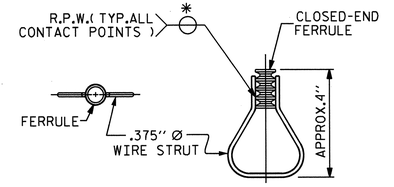
TOP VIEW



SECTION H-H



PLAN - RAIL AND END POST



STRUCTURAL CONCRETE INSERT

* EACH WELDED ATTACHMENT OF WIRE TO FERRULE SHALL DEVELOP THE TENSILE STRENGTH OF THE WIRE.

FIXED

DETAILS FOR ATTACHING METAL RAIL TO END POST

ASSEMBLED BY : PEGGY ADKINS	DATE : 8-2-12		
CHECKED BY : A.M. LEE	DATE : 9-6-12		
DRAWN BY : FCJ 1/88	REV. 5/7/03	RWW/JTE	
CHECKED BY : CRK 3/89	REV. 5/1/06	TLA/GM	
	REV. 10/1/11	MAA/GM	

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 22+02.90 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD

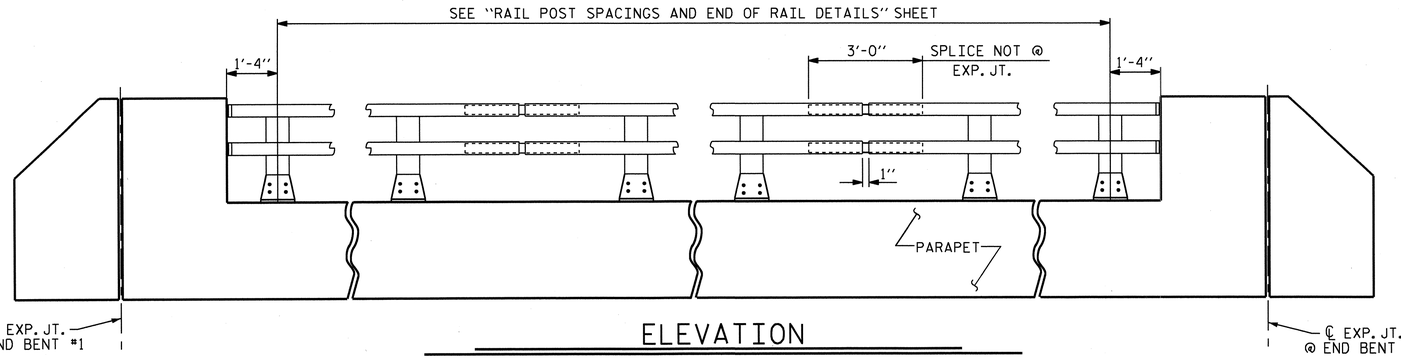
RAIL POST SPACINGS AND END OF RAIL DETAILS
FOR TWO BAR METAL RAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-21
1			3			TOTAL SHEETS
2			4			76

SIR #1 SID NO. RMR2

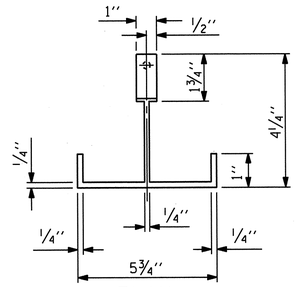
NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY E. CARRAWAY
1/9/13

06-NOV-2012 15:04

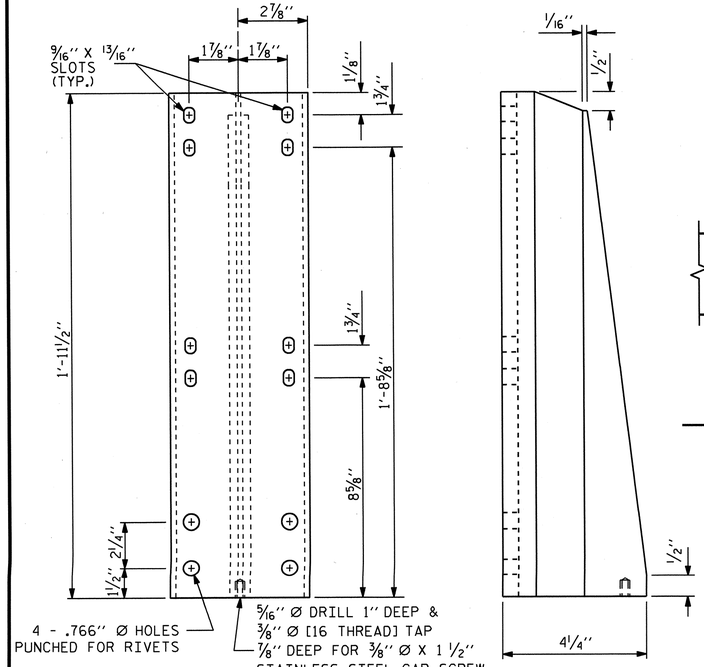


ELEVATION

NOTE : FOR ATTACHMENT OF METAL RAIL TO END POST, SEE STANDARD NO. BMR2.



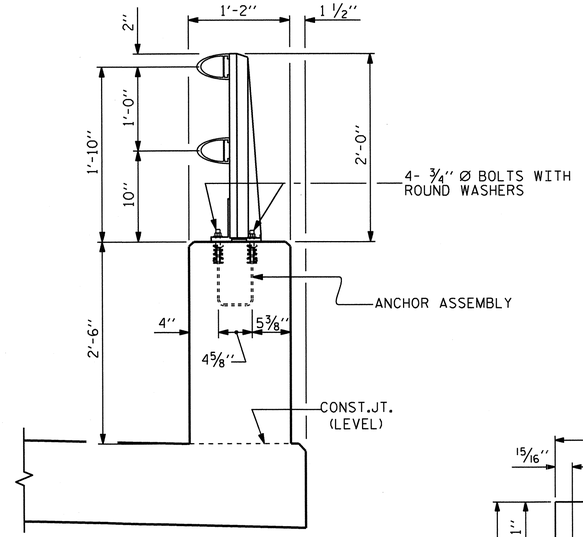
PLAN



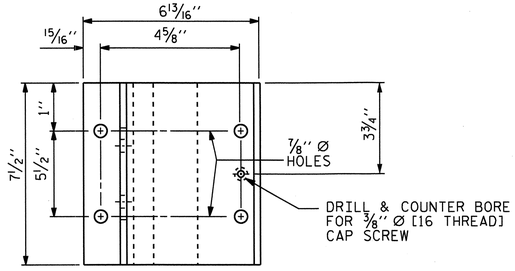
FRONT ELEVATION

SIDE ELEVATION

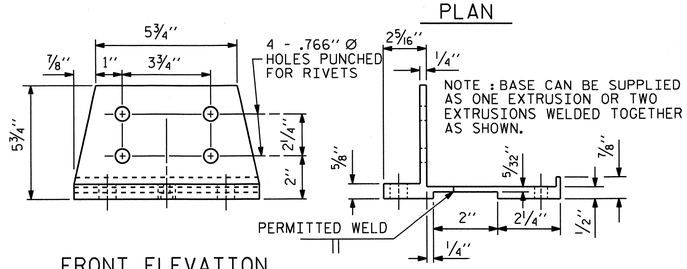
DETAILS OF POST



SECTION THRU PARAPET AND RAIL



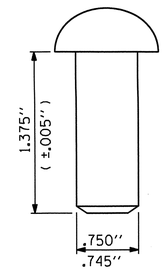
PLAN



FRONT ELEVATION

SIDE ELEVATION

POST BASE DETAILS



RIVET DETAIL

NOTES

AT THE CONTRACTOR'S OPTION, METAL RAIL SHALL BE ALUMINUM IN ACCORDANCE WITH THE REQUIREMENTS OF THE GENERAL NOTES AND THE FOLLOWING SPECIFICATIONS.

ALUMINUM RAILS

MATERIAL FOR POSTS, BASES AND RAILS, EXPANSION BARS AND CLAMP BARS SHALL BE ASTM B-221 ALLOY 6061-T6.

MATERIAL FOR RIVETS SHALL BE ASTM B316 ALLOY 6061-T6. RIVETS SHALL BE STANDARD BUTTON HEAD AND CONE POINT COLD DRIVEN AS PER DRAWING.

THE BASE OF RAIL POSTS, OR ANY OTHER ALUMINUM SURFACE IN CONTACT WITH CONCRETE SHALL BE THOROUGHLY COATED WITH AN ALUMINUM IMPREGNATED CAULKING COMPOUND OF APPROVED QUALITY.

MATERIAL FOR SHIMS TO BE ASTM B209 ALLOY 6061-T6.

GENERAL NOTES

RAILING SHALL BE CONTINUOUS FROM END POST TO END POST OF BRIDGE. EACH JOINT IN RAIL LENGTH SHALL BE SPLICED AS DETAILED. PANEL LENGTHS OF RAIL SHALL BE ATTACHED TO A MINIMUM OF THREE POSTS.

FOR END OF RAIL TO CLEAR FACE OF CONCRETE END POST DIMENSION, SEE STANDARD NO. BMR2.

CAP SCREWS SHALL BE ASTM F593 ALLOY 305 STAINLESS STEEL. WASHERS SHALL MEET THE REQUIREMENTS OF ASTM F844 EXCEPT THEY SHALL BE MADE FROM ALLOY 304 STAINLESS STEEL.

CERTIFIED MILL REPORTS ARE REQUIRED FOR RAILS AND POSTS. SHOP INSPECTION IS NOT REQUIRED.

METAL RAIL POSTS SHALL BE SET NORMAL TO CURB GRADE.

METHOD OF MEASUREMENT FOR METAL RAILS: FOR LENGTH OF METAL RAILS TO BE PAID FOR, SEE THE STANDARD SPECIFICATIONS.

CURVED RAIL USAGE: WHERE RAILS ARE TO BE USED ON BRIDGES ON HORIZONTAL AND/OR VERTICAL CURVATURE THE CONTRACTOR MAY, AT HIS OPTION, HAVE THE REQUIRED CURVATURE IN THE RAIL FORMED IN THE SHOP OR IN THE FIELD. IN EITHER EVENT, THE RAIL SHALL CONFORM WITHOUT BUCKLING OR KINKING TO THE REQUIRED CURVATURE IN A UNIFORM MANNER ACCEPTABLE TO THE ENGINEER.

TO INSURE FUTURE IDENTIFICATION OF THE FABRICATOR, A PERMANENT IDENTIFYING MARK SHALL BE PLACED ON EACH POST. THE METHOD OF MARKING AND LOCATION SHALL BE SUCH THAT IT DOES NOT DETRACT FROM THE APPEARANCE OF THE POST, BUT REMAINS VISIBLE AFTER RAIL PLACEMENT.

SHIMS SHALL BE USED AS NECESSARY FOR POST ALIGNMENT.

ALLOY 6351-T5 MAY BE SUBSTITUTED FOR ALLOY 6061-T6 WHERE APPLICABLE.

MINOR VARIATIONS IN DETAILS OF METAL RAIL WILL BE CONSIDERED. DETAILS OF SUCH VARIATIONS, IF DESIRED, SHALL BE SUBMITTED FOR APPROVAL.

PAY LENGTH = 124.93 LIN. FT. STAGE I
130.56 LIN. FT. STAGE II
TOTAL = 255.49 LIN. FT.

PROJECT NO. R-3324
BRUNSWICK COUNTY
STATION: 22+02.90 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

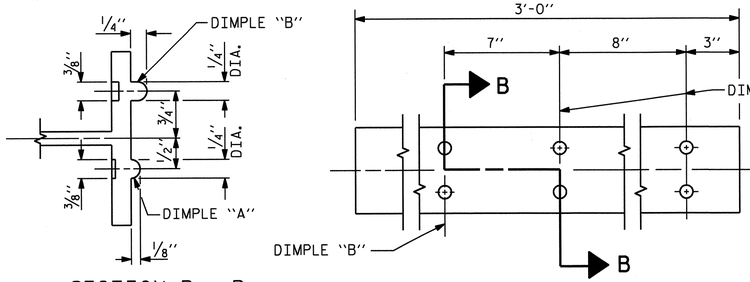
2 BAR METAL RAIL

ASSEMBLED BY : PEGGY ADKINS	DATE : 8-2-12
CHECKED BY : A.M. LEE	DATE : 9-6-12

DRAWN BY : EEM 6/94	REV. 5/7/03R	RWW/JTE
CHECKED BY : RGW 6/94	REV. 5/1/06	TLA/GM
	REV. 10/1/11	MAA/GM

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-22
1			3			TOTAL SHEETS
2			4			76

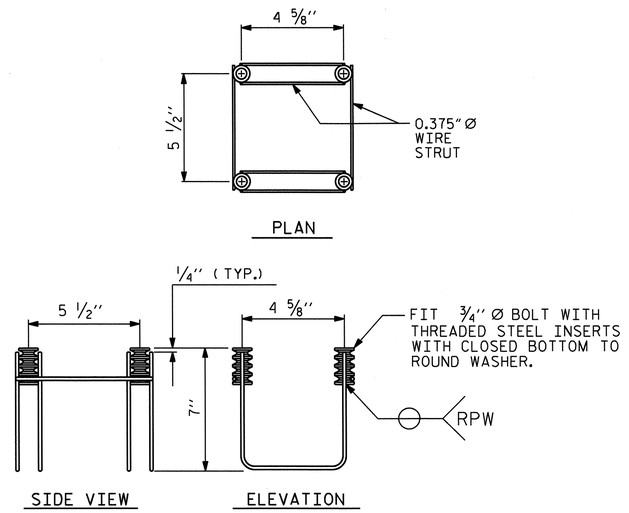
NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER
1/4/13



SECTION B - B

BAR SECTION

EXPANSION BAR DETAILS



4-BOLT METAL RAIL ANCHOR ASSEMBLY

24 ASSEMBLIES REQUIRED STAGE I
25 ASSEMBLIES REQUIRED STAGE II
49 TOTAL ASSEMBLIES REQUIRED

NOTES

STRUCTURAL CONCRETE ANCHOR ASSEMBLY

THE STRUCTURAL CONCRETE ANCHOR ASSEMBLY SHALL CONSIST OF THE FOLLOWING COMPONENTS :

A. FERRULES SHALL BE MADE FROM STEEL MEETING THE REQUIREMENTS OF AASHTO M169, GRADE 12L14 AND SHALL HAVE A MINIMUM LENGTH OF THREADS OF 2" FOR 3/4" FERRULES.

B. 4 - 3/4" Ø X 2 1/2" BOLTS WITH WASHERS. BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307. BOLTS AND WASHERS SHALL BE GALVANIZED. AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLTS AND WASHERS MAY BE USED AS AN ALTERNATE FOR THE 3/4" Ø X 2 1/2" GALVANIZED BOLTS 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.

C. WIRE STRUT SHOWN IN THE CONCRETE ANCHOR ASSEMBLY DETAIL IS THE MINIMUM ALLOWABLE SIZE AND SHALL HAVE A MINIMUM TENSILE STRENGTH OF 100,000 PSI. AS AN OPTION, A 1/16" Ø WIRE STRUT WITH A MINIMUM TENSILE STRENGTH OF 90,000 PSI IS ACCEPTABLE.

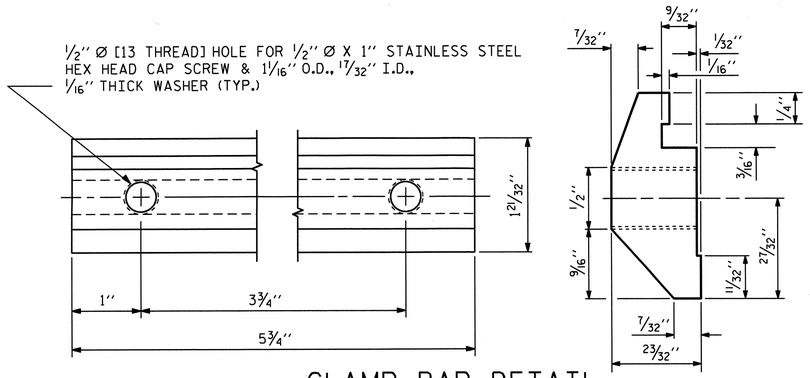
D. THE METAL RAIL ANCHOR ASSEMBLIES TO BE HOT DIPPED GALVANIZED TO CONFORM TO REQUIREMENTS OF AASHTO M111.

E. THE COST OF THE METAL RAIL ANCHOR ASSEMBLY WITH BOLTS AND WASHERS COMPLETE IN PLACE SHALL BE INCLUDED IN THE PRICE BID FOR LINEAR FEET OF METAL RAIL.

F. BOLTS TO BE TIGHTENED ONE-HALF TURN WITH A WRENCH FROM A FINGER-TIGHT POSITION.

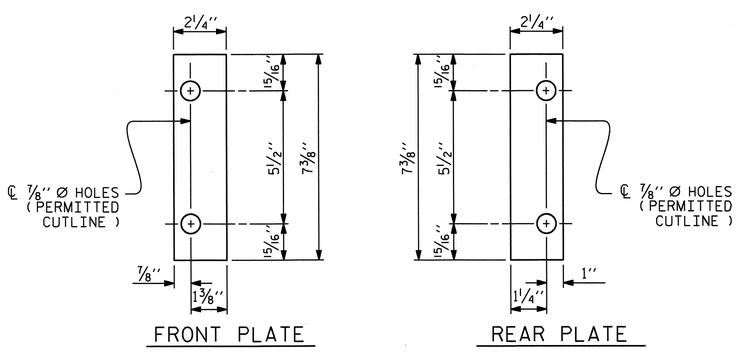
THE CONTRACTOR MAY USE ADHESIVELY ANCHORED ANCHOR BOLTS IN PLACE OF THE METAL RAIL ANCHOR ASSEMBLY. LEVEL ONE FIELD TESTING IS REQUIRED, AND THE YIELD LOAD OF THE 3/4"Ø BOLT IS 10 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE THE STANDARD SPECIFICATIONS.

WHEN ADHESIVELY ANCHORED ANCHOR BOLTS ARE USED, BOLTS SHALL MEET THE REQUIREMENTS OF ASTM F593 ALLOY 304 STAINLESS STEEL WITH MINIMUM 75,000 PSI ULTIMATE STRENGTH. NUTS SHALL MEET THE REQUIREMENTS OF ASTM F594 ALLOY 304 STAINLESS STEEL AND WASHERS SHALL MEET THE REQUIREMENTS OF ASTM F844 EXCEPT THEY SHALL BE MADE FROM ALLOY 304 STAINLESS STEEL.



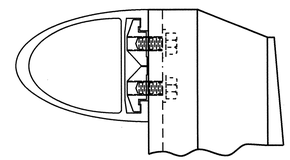
CLAMP BAR DETAIL

(4 REQUIRED PER POST)

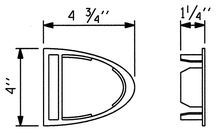


SHIM DETAILS

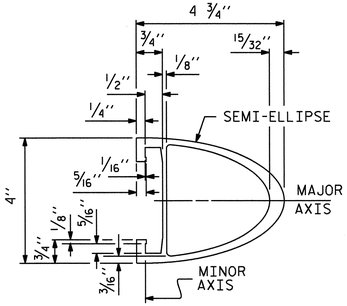
NOTE :
SHIMS MAY BE CUT ALONG PERMITTED CUTLINE OR SLOTTED TO EDGE OF PLATE TO FACILITATE PLACEMENT.



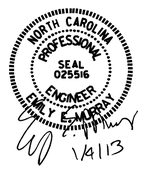
CLAMP ASSEMBLY



RAIL CAP



RAIL SECTION



PROJECT NO. R-3324
BRUNSWICK COUNTY
STATION: 22+02.90 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

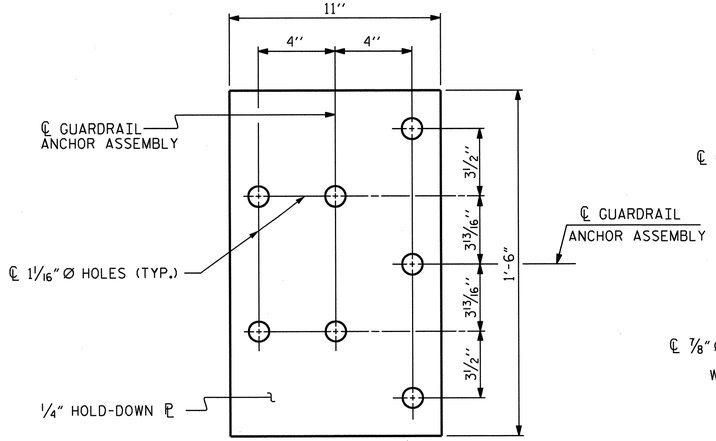
STANDARD

2 BAR METAL RAIL

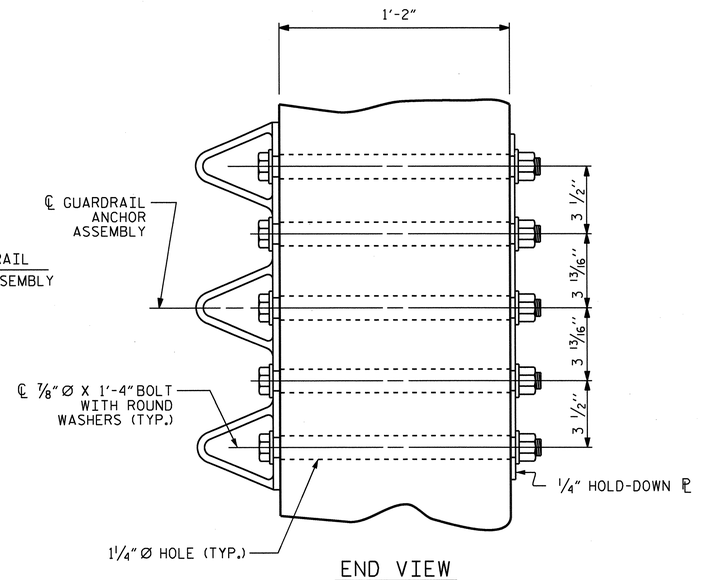
ASSEMBLED BY : PEGGY ADKINS	DATE : 8-2-12
CHECKED BY : A.M. LEE	DATE : 9-6-12

DRAWN BY : EEM 6/94	REV. 8/16/99	MAB/LES
CHECKED BY : RGW 6/94	REV. 5/1/06R	KMM/GM
	REV. 10/1/11	MAA/GM

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-23
1			3			TOTAL SHEETS
2			4			76



PLAN



END VIEW

GUARDRAIL ANCHOR ASSEMBLY DETAILS

NOTES

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

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.

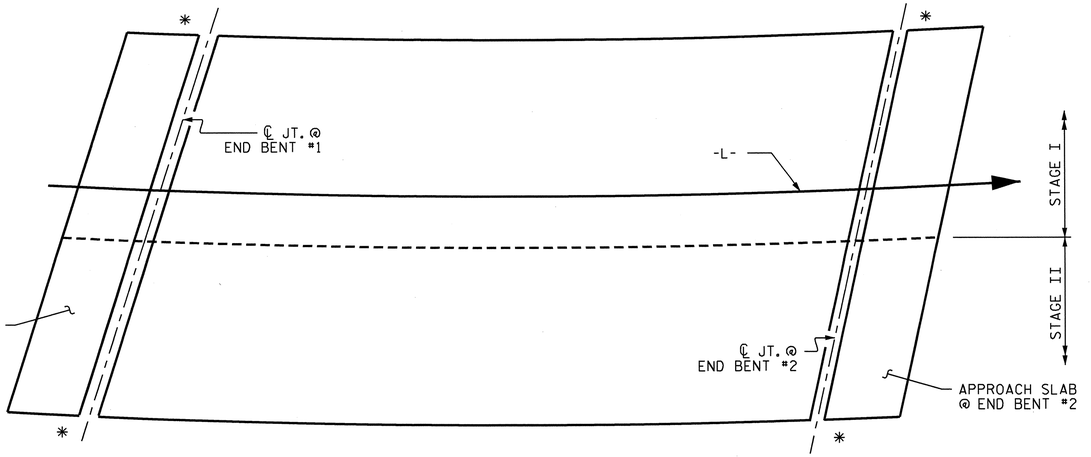
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF THE PARAPET. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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

THE COST OF THE GUARDRAIL ANCHOR ASSEMBLIES WITH BOLTS, NUTS AND WASHERS COMPLETE IN PLACE, SHALL BE INCLUDED IN THE VARIOUS PAY ITEMS.

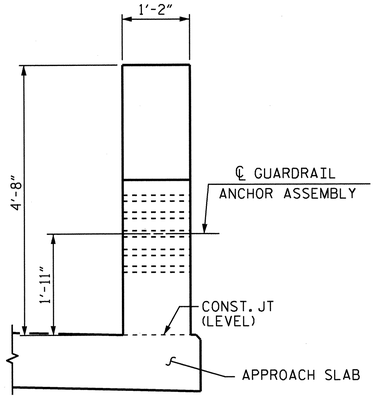
THE VERTICAL REINFORCING BARS MAY BE SHIFTED SLIGHTLY IN THE END POST TO CLEAR ASSEMBLY BOLTS.

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.

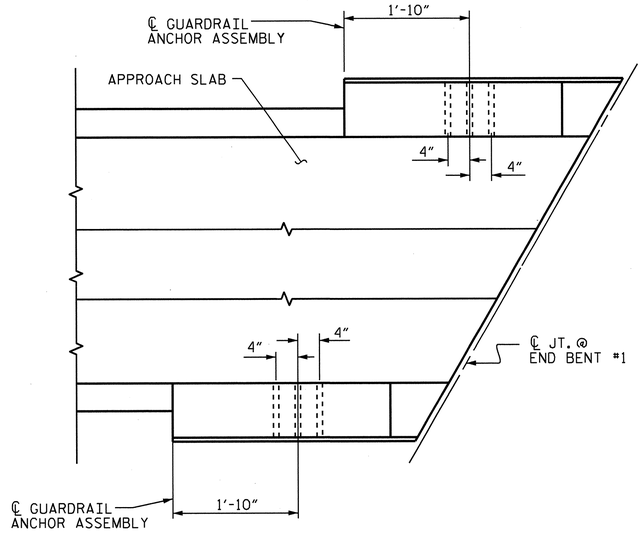


SKETCH SHOWING POINTS OF ATTACHMENT

* LOCATION OF GUARDRAIL ATTACHMENT



END VIEW



PLAN

LOCATION OF GUARDRAIL ANCHOR AT END POST

END POSTS ON APPROACH SLAB @ END BENT #1 SHOWN,
END POSTS ON APPROACH SLAB @ END BENT #2 SIMILAR.

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 22+02.90 -L-

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY E. MURRAY

1/4/13

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

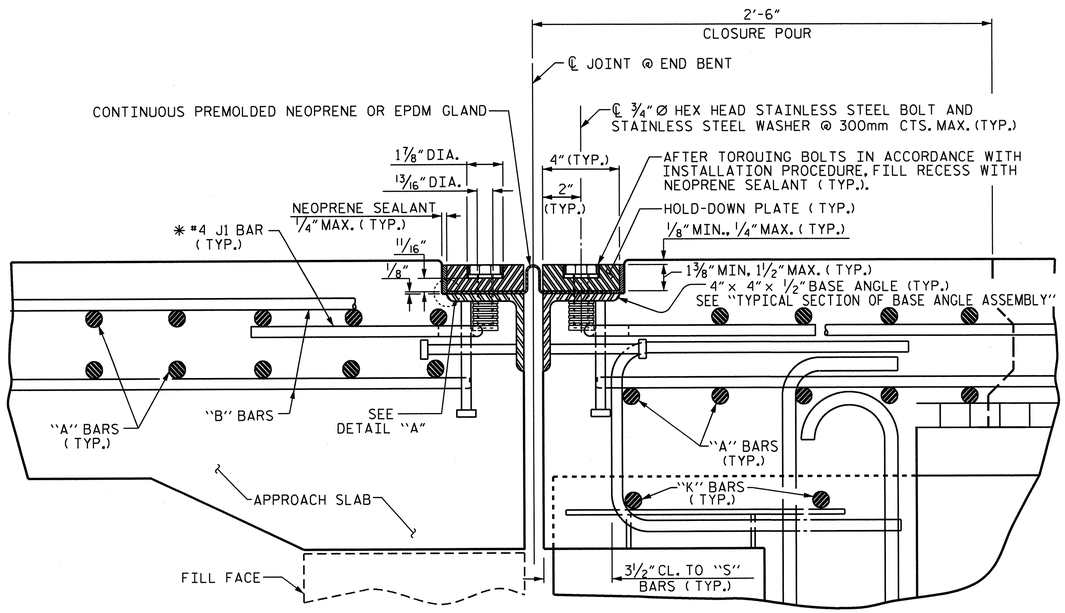
GUARDRAIL ANCHORAGE DETAILS FOR METAL RAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-24
1			3			TOTAL SHEETS
2			4			76

ASSEMBLED BY : PEGGY ADKINS	DATE : 8-1-12
CHECKED BY : A.M. LEE	DATE : 9-6-12
DRAWN BY : MAA 5/10	ADDED 5/6/10
CHECKED BY : GM 5/10	REV. 10/1/11 MAA/GM
	REV. 12/5/11 MAA/GM

05-NOV-2013 15:04

SIP NO. GRA3



EXPANSION JOINT DETAILS

SECTION NORMAL TO JOINT -- PRESTRESSED GIRDER SUPERSTRUCTURE

* THE QUANTITY OF #4 J1 BARS ON THE BILL OF MATERIAL IS BASED ON 1'-0" CENTERS. J1 BARS SHALL BE PLACED AT EACH VERTICAL STUD ANCHOR BOLT. IN THE EVENT THAT THE NUMBER OF VERTICAL STUD ANCHORS EXCEEDS THE NUMBER OF J1 BARS SPECIFIED, ADDITIONAL J1 BARS WILL NOT BE REQUIRED.

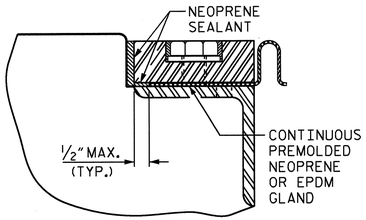
INSTALLATION PROCEDURE

1. A TEMPLATE OR OTHER SUITABLE DEVICE SHALL BE USED TO FORM THE TOP OF THE EXPANSION JOINT SEAL BLOCKOUT TO THE PROPER DEPTH AND WIDTH. THE TEMPLATE SHALL BE 4⅛" TO 4¼" WIDE AND OF SUCH THICKNESS AS TO PROVIDE FOR CORRECT FINAL ELEVATION OF TOP OF HOLD-DOWN PLATES. THE TEMPLATE SHALL BE ATTACHED TO THE BASE ANGLE ASSEMBLY WITH THE ¾"Ø HEX HEAD BOLTS PROVIDED FOR THE HOLD-DOWN PLATES. A 1"Ø HOLE SHALL BE PROVIDED IN THE TEMPLATE CENTERED OVER EACH WEEP HOLE IN THE 4"X 4"X ½" BASE ANGLE. OTHER METHODS OF INSURING DRAINAGE THROUGH WEEP HOLES MAY BE EMPLOYED SUBJECT TO ENGINEER'S APPROVAL.
2. AFTER THE CONCRETE HAS BEEN CAST ON BOTH SIDES OF THE JOINT, REMOVE THE TEMPLATE. THOROUGHLY CLEAN THE BOLT HOLES AND THE ANGLE PLATE. REMOVE ANY EXCESS CONCRETE THAT COMES OUT OF THE WEEP HOLES. ANY DAMAGED STEEL SHALL BE COATED WITH A MINIMUM THICKNESS OF 4 DRY MILS OF ZINC-RICH PAINT IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.
3. LAY THE GLAND ON THE BASE ANGLE AND FIELD MARK THE GLAND FOR THE BOLT HOLES. HOLES IN THE GLAND SHALL BE PUNCHED ⅛" IN DIAMETER WITH A HAND PUNCH.
4. IN ORDER TO CHECK FOR PROPER ALIGNMENT, PLACE THE GLAND AND HOLD-DOWN PLATES ON THE BASE ANGLE. DO NOT APPLY NEOPRENE SEALANT. BOLT THE HOLD-DOWN PLATES TO THE BASE ANGLE BUT DO NOT TIGHTEN. THE ENGINEER SHALL INSPECT THE JOINT SEAL DEVICE FOR PROPER ALIGNMENT.
5. AFTER INSPECTION, REMOVE THE HOLD-DOWN PLATES AND GLAND. APPLY NEOPRENE SEALANT TO THE BASE ANGLE IN ACCORDANCE WITH THE "INSTALLATION SKETCH". PLACE GLAND AND HOLD-DOWN PLATES ON THE BASE ANGLE. BOLT THE HOLD-DOWN PLATES TO THE BASE ANGLE ASSEMBLY AND TORQUE THE BOLTS TO 88 FT-LBS WITH A TORQUE WRENCH. CHECK THE TORQUE AFTER THREE (3) HOURS AND, IF NECESSARY, RETIGHTEN TO 88 FT-LBS. A FINAL CHECK SHALL BE MADE AT SEVEN (7) DAYS. TORQUE SHALL NOT BE LESS THAN 80 FT-LBS AFTER SEVEN (7) DAYS.
6. AFTER PROPER TOROUING, CLEAN THE BOLT HOLE RECESSES AND THE RECESS BETWEEN THE JOINT SEAL DEVICE AND CONCRETE, COMPLETELY FILL THESE RECESSES WITH NEOPRENE SEALANT.

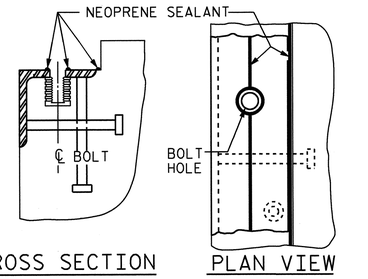
GENERAL NOTES

1. FOR EXPANSION JOINT SEALS, SEE SPECIAL PROVISIONS.
2. ALL PLATES AND ANGLES SHALL CONFORM TO AASHTO M270 GRADE 36 STEEL OR APPROVED EQUAL. ALL HOLD-DOWN BOLTS SHALL CONFORM TO ASTM F593 ALLOY 304 STAINLESS STEEL AND WASHERS SHALL CONFORM TO ASTM F844 EXCEPT THEY SHALL BE MADE FROM ALLOY 304 STAINLESS STEEL. ALL STUD ANCHORS SHALL CONFORM TO AASHTO M169, GRADES 1010 THRU 1020 OR APPROVED EQUAL. ALL CONCRETE INSERTS SHALL BE CLOSED END AND SHALL CONFORM TO AASHTO M169, GRADE 12L14. TENSILE CAPACITY SHALL BE 3000 LBS. MIN.
3. A PREMOLDED CORRUGATED OR NON-CORRUGATED GLAND SHALL BE USED FOR JOINTS SKEWED BETWEEN 50° THRU 130°. FOR JOINTS SKEWED LESS THAN 50° OR MORE THAN 130°, ONLY A CORRUGATED GLAND SHALL BE USED.
4. CLOSED END FERRULES AND STUD ANCHORS SHALL BE SHOP WELDED AND ALL HOLES SHALL BE SHOP DRILLED AS SHOWN ON PLANS. STUD ANCHORS SHALL BE ELECTRIC ARC END WELDED WITH COMPLETE FUSION.
5. SURFACES COMING IN CONTACT WITH NEOPRENE SHALL BE GROUND SMOOTH PRIOR TO METALLIZING.
6. UPON COMPLETION OF SHOP FABRICATION, THE HOLD DOWN PLATE AND BASE ANGLE ASSEMBLY, AS SHOWN IN THE " TYPICAL SECTION OF BASE ANGLE ASSEMBLY", SHALL BE METALLIZED. SEE SPECIAL PROVISION FOR THERMAL SPRAYED COATINGS (METALLIZATION).
7. BASE ANGLE ASSEMBLY SHALL BE CONTINUOUS FOR THE LENGTH OF THE JOINT. AT CROWN BREAKS, THE ENDS OF THE BASE ANGLE ASSEMBLY SHALL BE CUT PARALLEL TO THE BRIDGE CENTERLINE FOR SKEWS LESS THAN 80° AND GREATER THAN 100°. FINISHED WELD SHALL BE GROUND SMOOTH AND COATED WITH A MINIMUM THICKNESS OF 4 DRY MILS OF ZINC-RICH PAINT IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.
8. FIELD SPLICES OF HOLD-DOWN PLATES SHALL BE KEPT TO A MINIMUM. CONTRACTOR SHALL FURNISH DETAILED PLANS SHOWING PROPOSED SPLICE LOCATIONS FOR APPROVAL. HOLD-DOWN PLATES SHALL NOT EXCEED 20' LENGTHS UNLESS APPROVED BY THE ENGINEER.
9. NO ALTERNATE JOINT DETAILS SHALL BE PERMITTED IN LIEU OF THOSE SHOWN ON THESE PLANS.
10. THE CONTRACTOR MAY, AT HIS OPTION, USE ADHESIVELY ANCHORED ANCHOR BOLTS IN PLACE OF CONCRETE INSERTS FOR COVER PLATES. THE YIELD LOAD OF THE ¾"Ø BOLT IS 10 KIPS. FIELD TESTING OF THE ADHESIVE BONDING SYSTEM IS NOT REQUIRED.

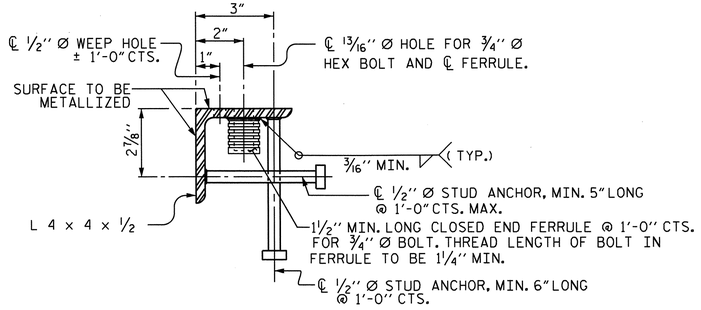
MOVEMENT AND SETTING AT JOINT					
BENT NO.	SKEW ANGLE	TOTAL MOVEMENT (ALONG ℄ RDWY)	PERPENDICULAR JOINT OPENING AT 45° F	PERPENDICULAR JOINT OPENING AT 60° F	PERPENDICULAR JOINT OPENING AT 90° F
END BENT #1	105°	9/16"	1⅜"	1¼"	1⅛"
END BENT #2	105°	9/16"	1⅜"	1¼"	1⅛"



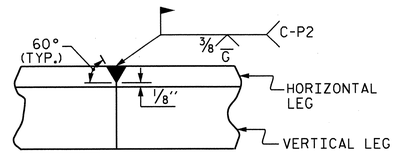
DETAIL "A"



INSTALLATION SKETCH



TYPICAL SECTION OF BASE ANGLE ASSEMBLY



DETAIL- FIELD WELD SPLICE OF BASE ANGLE

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 22+02.90 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

EXPANSION JOINT SEAL DETAILS

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY E. MURRAY

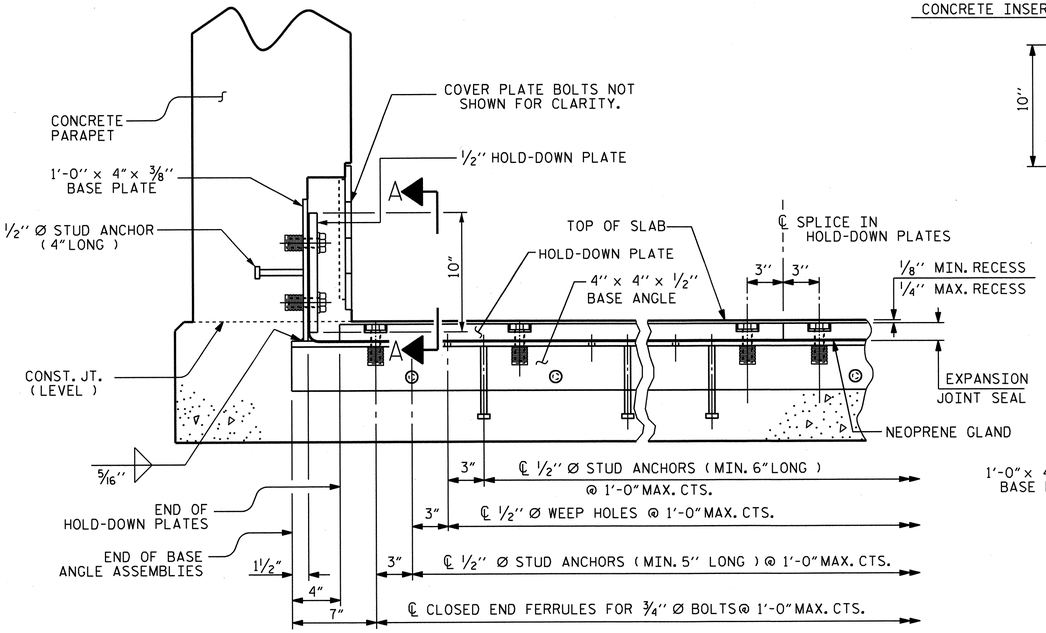
1/4/13

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-25
1			3			TOTAL SHEETS
2			4			76

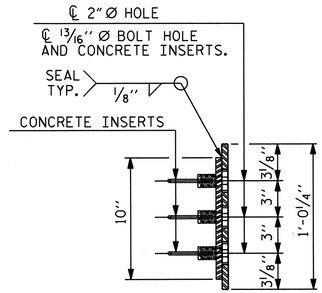
ASSEMBLED BY : PEGGY ADKINS	DATE : 7-16-12	
CHECKED BY : A.M. LEE	DATE : 9-6-12	
DRAWN BY : REK 9/87	REV. 5/7/03R	RWW/JTE
CHECKED BY : CRK 10/87	REV. 5/1/06R	TLA/GM
	REV. 10/1/11	MAA/GM

06-NOV-2012 16:07

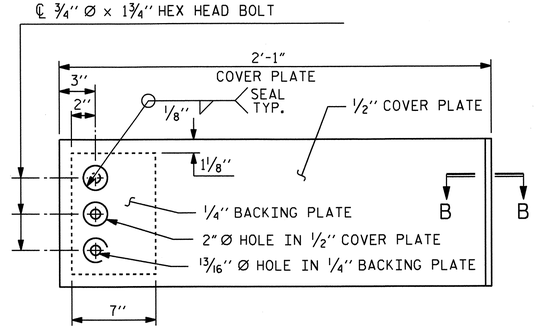
SIR #1 SID NO. EJS1 (SHT 1)



SECTION THRU PARAPET NORMAL TO JOINT

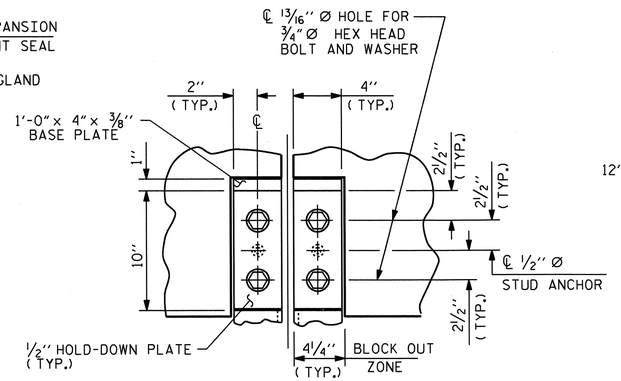


END VIEW

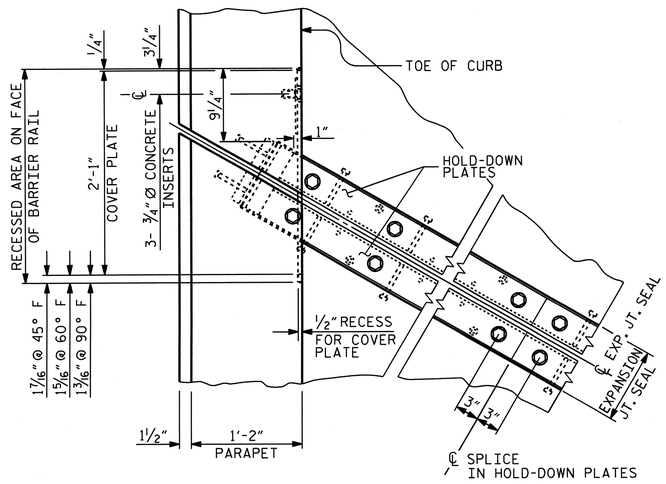


ELEVATION VIEW

COVER PLATE DETAILS

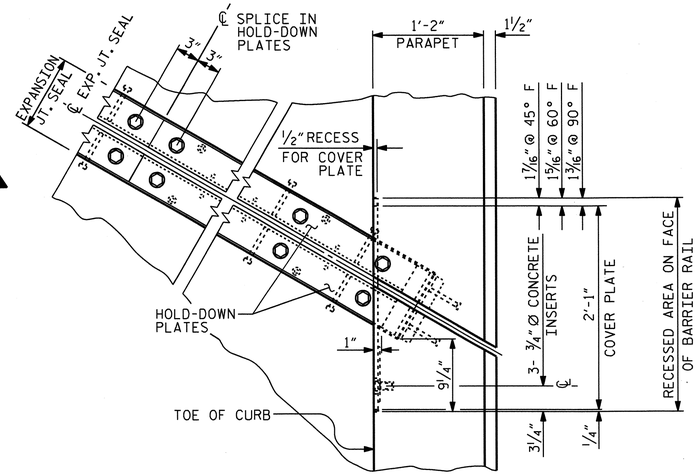


SECTION A - A



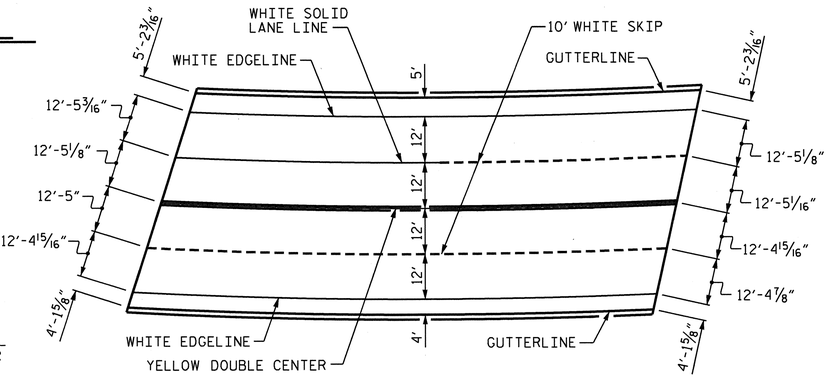
FLOW OF TRAFFIC

FLOW OF TRAFFIC

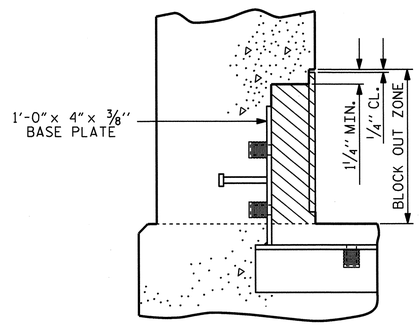


PLAN OF EXPANSION JOINT SEAL

SHOWING END BENT #1 OR END BENT #2

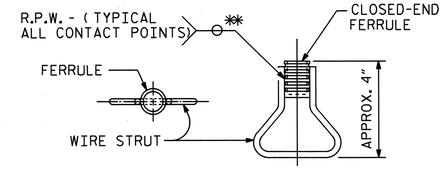


PAVEMENT MARKING ALIGNMENT



BLOCK OUT DETAIL

SEE " SECTION A - A " FOR OTHER DETAILS.



PLAN ELEVATION

CONCRETE INSERT

** EACH WELDED ATTACHMENT OF WIRE TO FERRULE SHALL DEVELOP THE TENSILE STRENGTH OF THE WIRE.

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 22+02.90 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

EXPANSION JOINT SEAL DETAILS FOR CONCRETE PARAPET

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-26
1			3			TOTAL SHEETS
2			4			76

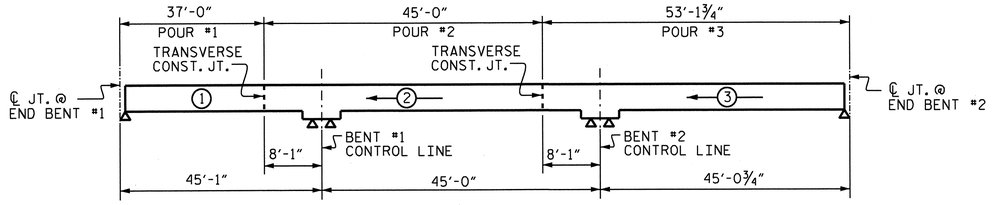
NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY E. MURRAY

1/4/13

ASSEMBLED BY : PEGGY ADKINS DATE : 7-24-12
CHECKED BY : T.L. AVERETTE DATE : 9-17-12

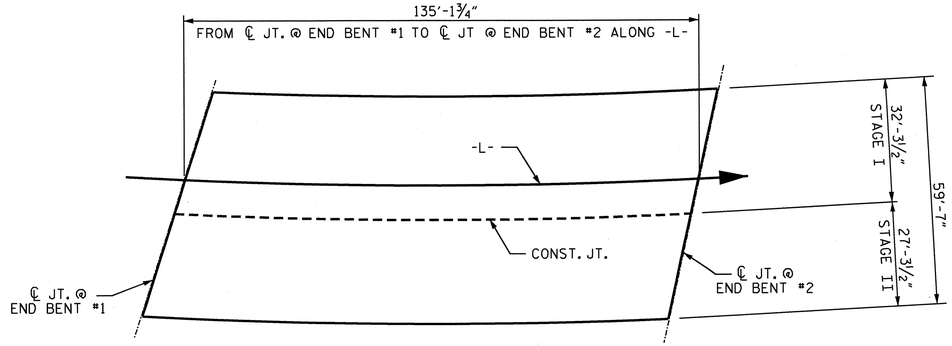
06-NOV-2012 15:07

SIP #1



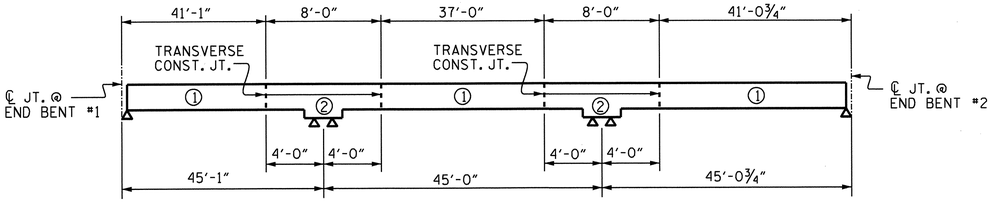
POURING SEQUENCE

(DIMENSIONS MEASURED ALONG -L-)



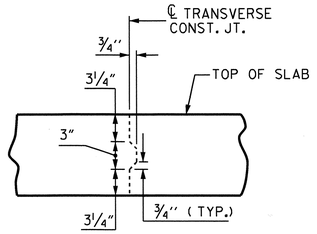
LAYOUT FOR COMPUTING AREA OF REINFORCED CONCRETE DECK SLAB

STAGE I = 4339 SQ. FT.
STAGE II = 3744 SQ. FT.
TOTAL = 8083 SQ. FT.



OPTIONAL POURING SEQUENCE

POUR (2) CANNOT BE STARTED UNTIL BOTH ADJACENT (1) POURS REACH A MIN. OF 3000 PSI.
(DIMENSIONS MEASURED ALONG -L-)



TRANSVERSE CONSTRUCTION JOINT DETAIL

NOTE: REINFORCING STEEL IN SLAB NOT SHOWN.
LONGITUDINAL REINFORCING STEEL SHALL BE CONTINUOUS THRU JOINT.

PROJECT NO. R-3324
BRUNSWICK COUNTY
STATION: 22+02.90 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE BILL OF MATERIAL

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER BILLY E. GARRY
1/4/13

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-27
1			3			TOTAL SHEETS
2			4			76

ASSEMBLED BY : PEGGY ADKINS DATE : 12-5-08
CHECKED BY : A.M. LEE DATE : 9-6-12

SUPERSTRUCTURE BILL OF MATERIAL

		CLASS AA CONCRETE (CU. YDS.)	EPOXY COATED REINFORCING STEEL (LBS.)
STAGE I	POUR 1	38.5	34361
	POUR 2	52.0	
	POUR 3	61.9	
	STAGE I TOTAL	152.4	
STAGE II	POUR 1	33.3	28256
	POUR 2	44.9	
	POUR 3	53.4	
	STAGE II TOTAL	131.6	
TOTALS **		284.0	62617

** QUANTITIES FOR PARAPET ARE NOT INCLUDED

SUPERSTRUCTURE REINFORCING STEEL LENGTHS ARE BASED ON THE FOLLOWING MINIMUM SPLICE LENGTHS

BAR SIZE	SUPERSTRUCTURE EXCEPT APPROACH SLABS, PARAPET, AND BARRIER RAIL		APPROACH SLABS		PARAPET AND BARRIER RAIL
	EPOXY COATED	UNCOATED	EPOXY COATED	UNCOATED	
#4	2'-0"	1'-9"	2'-0"	1'-9"	2'-9"
#5	2'-6"	2'-2"	2'-6"	2'-2"	3'-5"
#6	3'-0"	2'-7"	3'-10"	2'-7"	4'-4"
#7	5'-3"	3'-6"			
#8	6'-10"	4'-7"			

GROOVING BRIDGE FLOORS

APPROACH SLABS	2589	SQ.FT.
BRIDGE DECK	7264	SQ.FT.
TOTAL	9853	SQ.FT.

BILL OF MATERIAL

STAGE I — SPANS A, B & C

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱A1	251	#5	STR	31'-11"	8356
✱A2	251	#5	STR	31'-11"	8356
✱A101	2	#5	STR	27'-11"	58
✱A102	2	#5	STR	24'-9"	52
✱A103	2	#5	STR	21'-7"	45
✱A104	2	#5	STR	18'-5"	38
✱A105	2	#5	STR	15'-3"	32
✱A106	2	#5	STR	12'-1"	25
✱A107	2	#5	STR	8'-11"	19
✱A108	2	#5	STR	5'-9"	12
✱A109	2	#5	STR	2'-6"	5
✱A110	2	#5	STR	26'-11"	56
✱A111	2	#5	STR	22'-4"	47
✱A112	2	#5	STR	17'-10"	37
✱A113	2	#5	STR	13'-3"	28
✱A114	2	#5	STR	8'-9"	18
✱A115	2	#5	STR	4'-2"	9
✱A201	2	#5	STR	29'-0"	60
✱A202	2	#5	STR	25'-10"	54
✱A203	2	#5	STR	22'-8"	47
✱A204	2	#5	STR	19'-6"	41
✱A205	2	#5	STR	16'-4"	34
✱A206	2	#5	STR	13'-2"	27
✱A207	2	#5	STR	10'-0"	21
✱A208	2	#5	STR	6'-10"	14
✱A209	2	#5	STR	3'-8"	8
✱A210	2	#5	STR	28'-5"	59
✱A211	2	#5	STR	23'-11"	50
✱A212	2	#5	STR	19'-4"	40
✱A213	2	#5	STR	14'-10"	31
✱A214	2	#5	STR	10'-3"	21
✱A215	2	#5	STR	5'-9"	12
✱A216	1	#5	STR	3'-6"	4
✱B1	44	#4	STR	25'-3"	742
✱B2	44	#7	STR	48'-9"	4384
✱B3	42	#7	STR	15'-0"	1288
✱B4	135	#5	STR	47'-8"	6712
✱D1	268	#6	STR	3'-0"	1208
✱G1	2	#5	STR	33'-1"	69
✱J1	32	#4	7	1'-5"	30
✱K1	4	#8	1	11'-1"	118
✱K2	12	#8	2	16'-4"	523
✱K3	4	#8	1	9'-1"	97
✱K4	16	#6	STR	5'-9"	138
✱K5	32	#4	STR	6'-5"	137
✱K6	16	#4	STR	4'-5"	47
✱K7	8	#4	STR	30'-0"	160
✱K17	16	#4	STR	4'-8"	50
✱S1	48	#5	3	4'-11"	246
✱S3	48	#4	6	3'-1"	99
✱S4	128	#4	5	2'-9"	235
✱U1	32	#4	2	11'-10"	253
✱U2	16	#4	2	10'-2"	109

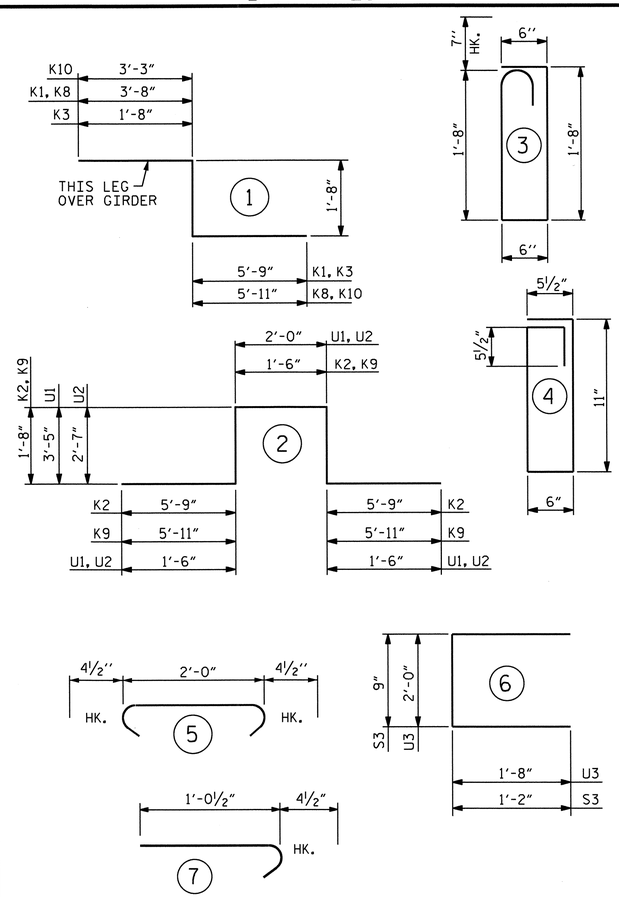
✱EPOXY COATED REINFORCING STEEL = 34361 LBS

STAGE II — SPANS A, B & C

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱A3	259	#5	STR	26'-11"	7271
✱A4	259	#5	STR	26'-11"	7271
✱A301	2	#5	STR	23'-6"	49
✱A302	2	#5	STR	20'-4"	42
✱A303	2	#5	STR	17'-2"	36
✱A304	2	#5	STR	14'-0"	29
✱A305	2	#5	STR	10'-9"	22
✱A306	2	#5	STR	7'-7"	16
✱A307	2	#5	STR	4'-5"	9
✱A308	1	#5	STR	2'-10"	3
✱A309	2	#5	STR	21'-10"	46
✱A310	2	#5	STR	17'-4"	36
✱A311	2	#5	STR	12'-9"	27
✱A312	2	#5	STR	8'-2"	17
✱A313	2	#5	STR	3'-8"	8
✱A401	2	#5	STR	24'-7"	51
✱A402	2	#5	STR	21'-5"	45
✱A403	2	#5	STR	18'-3"	38
✱A404	2	#5	STR	15'-1"	31
✱A405	2	#5	STR	11'-11"	25
✱A406	2	#5	STR	8'-8"	18
✱A407	2	#5	STR	5'-6"	11
✱A408	2	#5	STR	2'-4"	5
✱A409	2	#5	STR	23'-5"	49
✱A410	2	#5	STR	18'-10"	39
✱A411	2	#5	STR	14'-4"	30
✱A412	2	#5	STR	9'-9"	20
✱A413	2	#5	STR	5'-3"	11
✱A414	1	#5	STR	2'-11"	3
✱B1	38	#4	STR	25'-3"	641
✱B2	38	#7	STR	48'-9"	3787
✱B3	34	#7	STR	15'-0"	1042
✱B4	111	#5	STR	47'-8"	5519
✱G2	2	#5	STR	27'-10"	58
✱J1	27	#4	7	1'-5"	26
✱K5	24	#4	STR	6'-5"	103
✱K6	12	#4	STR	4'-5"	35
✱K8	4	#8	1	11'-3"	120
✱K9	8	#8	2	16'-8"	356
✱K10	4	#8	1	10'-10"	116
✱K11	12	#6	STR	5'-11"	107
✱K12	8	#4	STR	25'-4"	135
✱K13	12	#4	STR	3'-4"	27
✱K14	4	#8	STR	2'-8"	28
✱K15	4	#8	STR	3'-3"	35
✱K16	4	#6	STR	2'-8"	16
✱K17	12	#4	STR	4'-8"	37
✱S1	40	#5	3	4'-11"	205
✱S2	2	#5	4	3'-9"	8
✱S3	42	#4	6	3'-1"	87
✱S4	110	#4	5	2'-9"	202
✱U1	26	#4	2	11'-10"	206
✱U2	14	#4	2	10'-2"	95
✱U3	2	#4	6	5'-4"	7

✱EPOXY COATED REINFORCING STEEL = 28256 LBS

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 22+02.90 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
SUPERSTRUCTURE
BILL OF MATERIAL

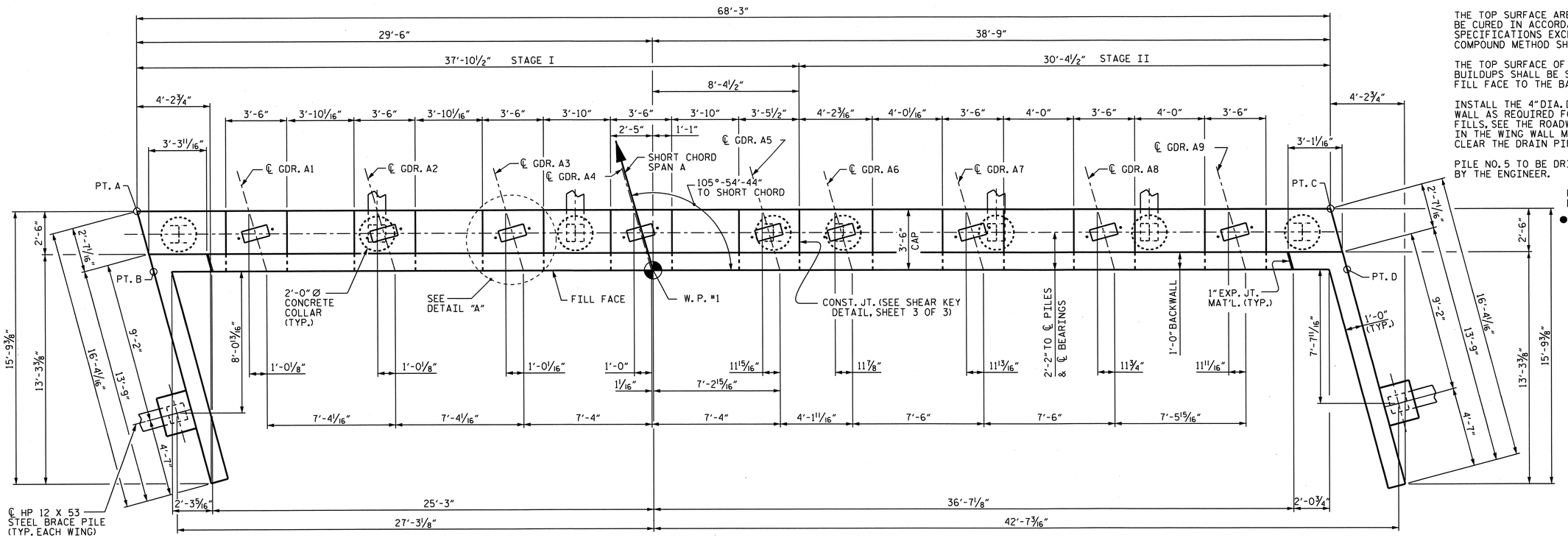
NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY E. MURRAY
1/4/13

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-28
1			3			TOTAL SHEETS
2			4			76

ASSEMBLED BY : PEGGY ADKINS DATE : 12-5-08
CHECKED BY : A.M. LEE DATE : 9-6-12

DRAWN BY : JMB 5/87
CHECKED BY : SJD 9/87

REV. 6/1/94	EEM/GRP
REV. 8/16/99	RWW/LES
REV. 5/1/06	TLA/GM



NOTES:

STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

THE TOP SURFACE AREAS OF THE END BENT CAPS SHALL BE CURED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS EXCEPT THE MEMBRANE CURING COMPOUND METHOD SHALL NOT BE USED.

THE TOP SURFACE OF THE CAP EXCEPT THE BRIDGE SEAT BUILDUPS SHALL BE SLOPED TRANSVERSELY FROM THE FILL FACE TO THE BACK FACE AT THE RATE OF 2%.

INSTALL THE 4" DIA. DRAIN PIPE THROUGH THE WING WALL AS REQUIRED FOR REINFORCED BRIDGE APPROACH FILLS, SEE THE ROADWAY PLANS. REINFORCING STEEL IN THE WING WALL MAY BE SHIFTED AS NECESSARY TO CLEAR THE DRAIN PIPE.

PILE NO. 5 TO BE DRIVEN IN STAGE I IF APPROVED BY THE ENGINEER.

FOR TEMPORARY DRAINAGE AT END BENT, SEE END BENT NO. 2.

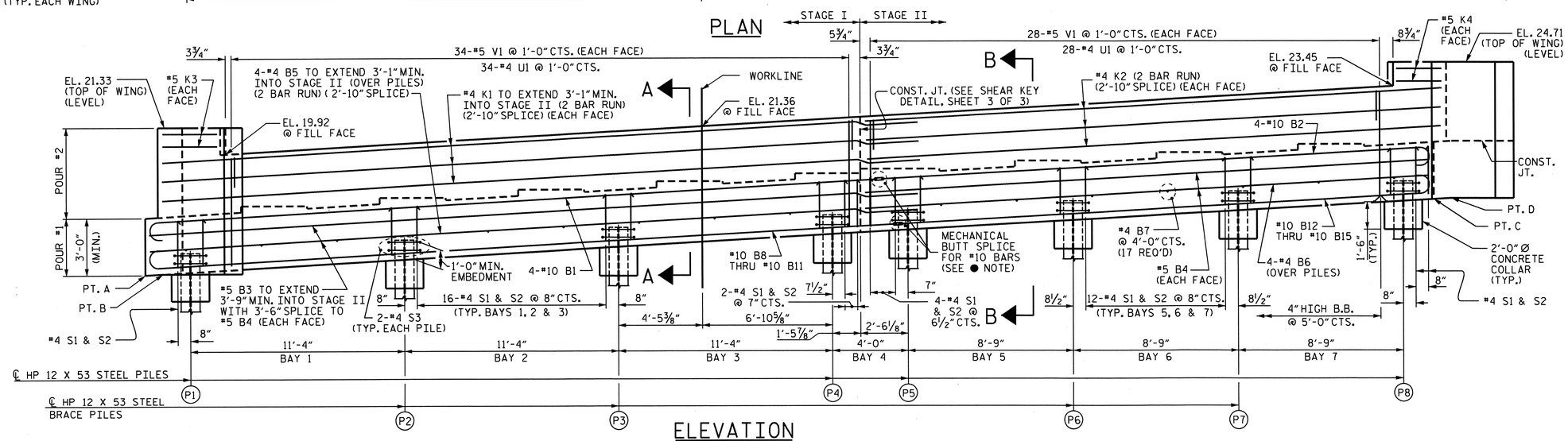
- MECHANICAL COUPLERS SHALL BE USED TO JOIN THE #10 "B" BARS IN STAGE I WITH THE #10 "B" BARS IN STAGE II. SEE SHEET 3 OF 3 FOR DETAILS.

THE CONTRACTOR'S ATTENTION IS CALLED TO THE FACT THAT THE LENGTHS OF THE #10 "B" BARS AT THE STAGED CONSTRUCTION JOINT MAY NEED TO BE ADJUSTED DUE TO THE TYPE OF MECHANICAL BUTT SPLICE CHOSEN BY THE CONTRACTOR. NO ADDITIONAL PAYMENT WILL BE MADE FOR ANY ADJUSTMENTS.

TOP OF PILE ELEVATIONS

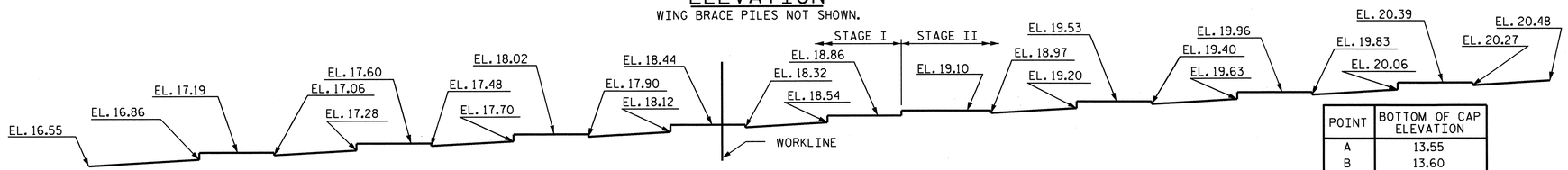
PILE	ELEVATION
P1	14.72
P2	15.37
P3	16.02
P4	16.67
P5	16.90
P6	17.41
P7	17.91
P8	18.42

PLAN



ELEVATION

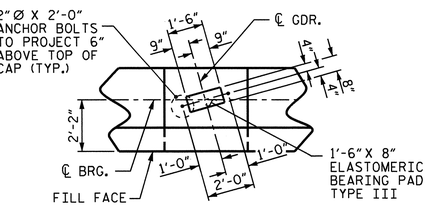
WING BRACE PILES NOT SHOWN.



POINT	BOTTOM OF CAP ELEVATION
A	13.55
B	13.60
C	17.48
D	17.53

BRIDGE SEAT ELEVATIONS

(ELEVATIONS AT FRONT FACE OF CAP)



DETAIL "A"

DIMENSIONS ARE TYPICAL FOR EACH GIRDER.

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 22+02.90 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

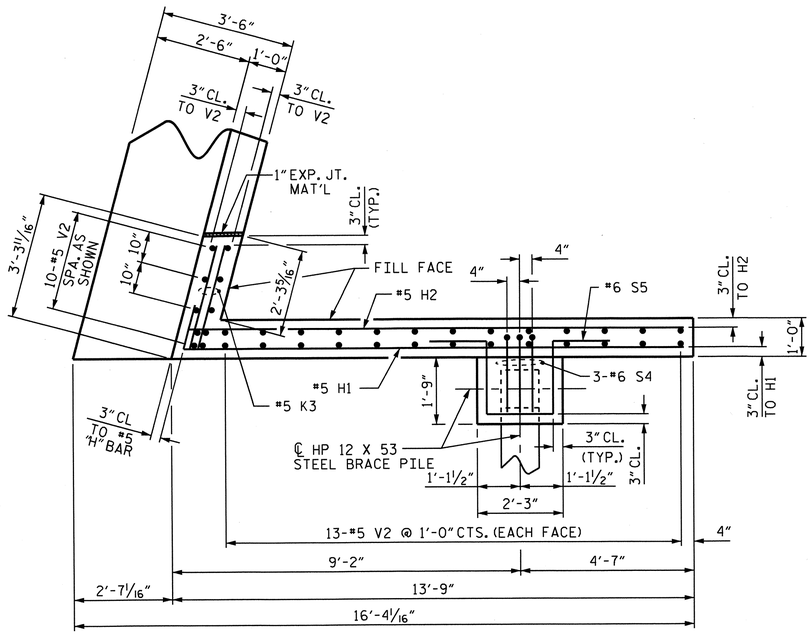
END BENT #1

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY E. CLAYTON
1/4/13

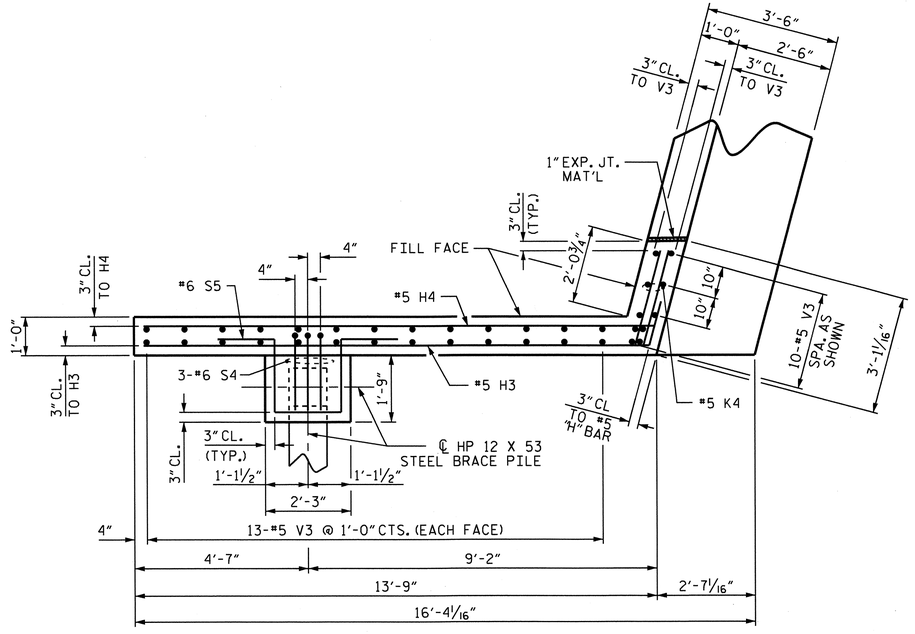
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-29
1			3			TOTAL SHEETS
2			4			76

DRAWN BY : PEGGY PARISI DATE : 6-16-09
CHECKED BY : B.N. BARODAWALA DATE : 8-31-12

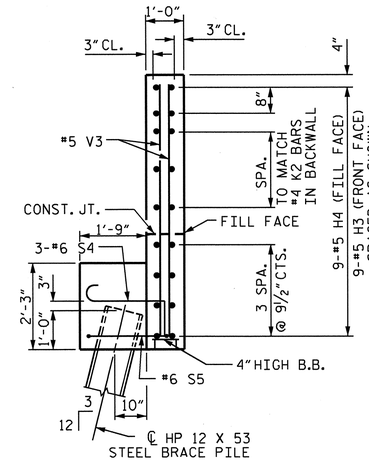
07-NOV-2013 08:11



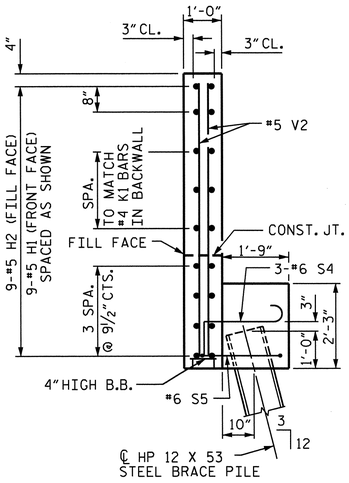
PLAN OF LEFT WING - STAGE I



PLAN OF RIGHT WING - STAGE II



SECTION Y-Y



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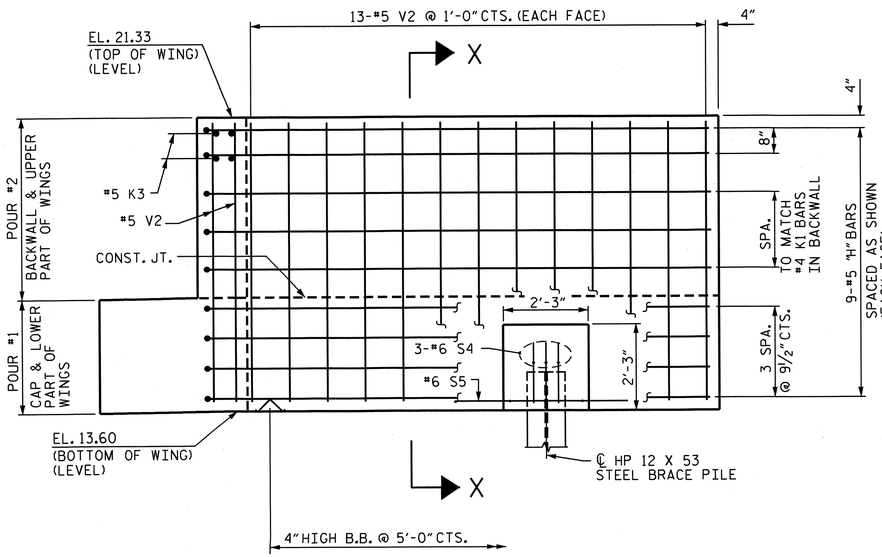
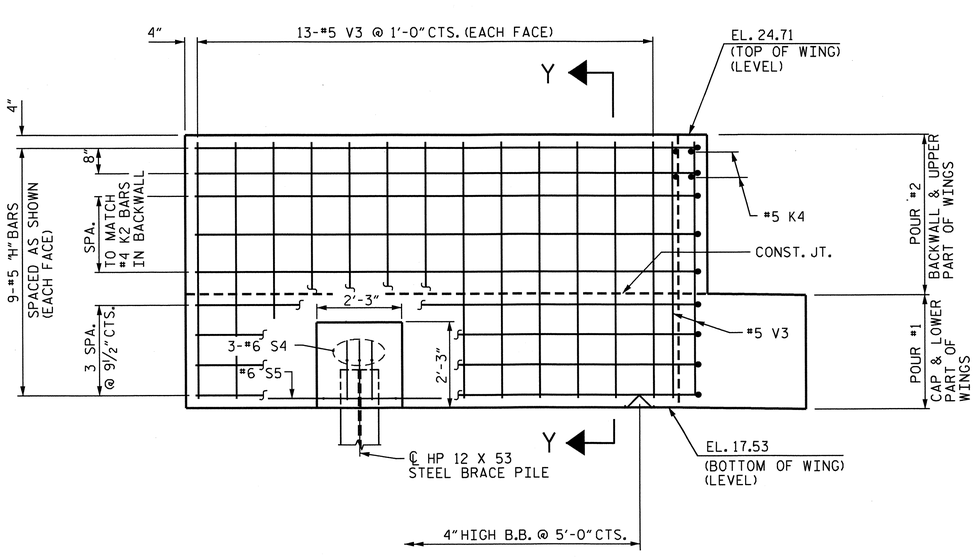
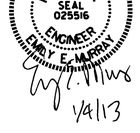


ELEVATION OF LEFT WING - STAGE I



ELEVATION OF RIGHT WING - STAGE II



PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 22+02.90 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

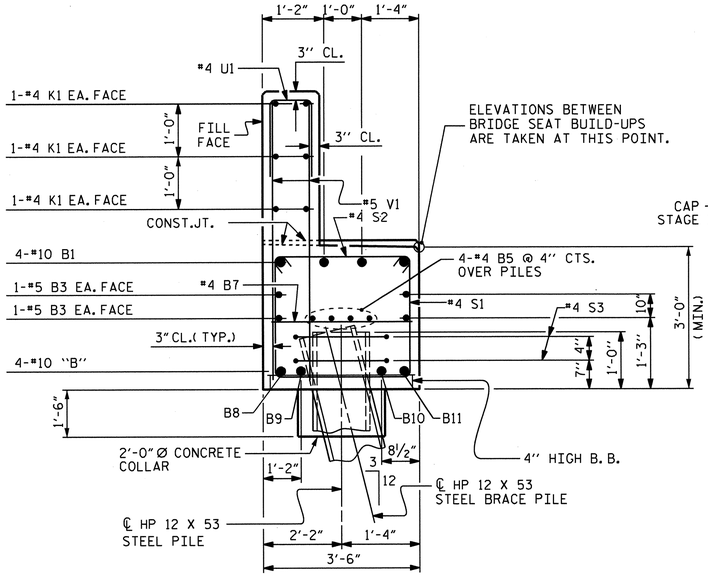
END BENT #1

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-30
1			3			TOTAL SHEETS
2			4			76

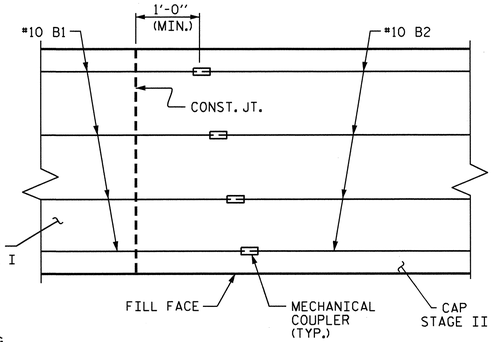
DRAWN BY : PEGGY PARISI DATE : 6-16-09
CHECKED BY : B.N. BARODAWALA DATE : 8-31-12

06-NOV-2012 16:36

STR. #1

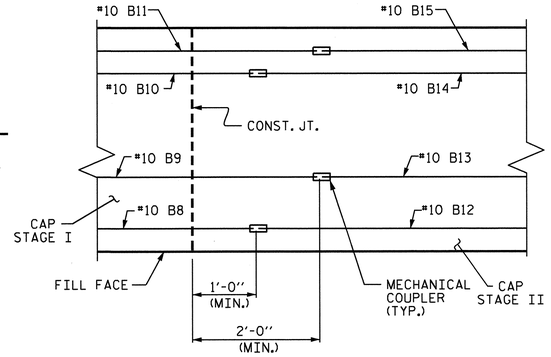


SECTION A-A



MECHANICAL COUPLER DETAIL

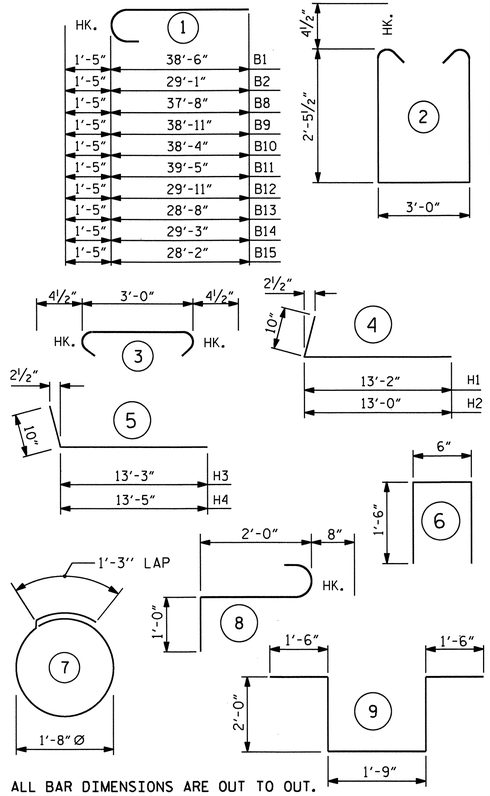
PLAN VIEW OF TOP MAIN STEEL



MECHANICAL COUPLER STAGGER DETAIL

PLAN VIEW OF BOTTOM MAIN STEEL

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL — STAGE I

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* B1	4	10	1	39'-11"	687
* B3	4	5	STR	41'-3"	172
* B5	8	4	STR	21'-8"	116
* B7	9	4	STR	3'-0"	18
* B8	1	10	1	39'-1"	168
* B9	1	10	1	40'-4"	174
* B10	1	10	1	39'-9"	171
* B11	1	10	1	40'-10"	176
* H1	9	5	4	14'-0"	131
* H2	9	5	4	13'-10"	130
* K1	12	4	STR	21'-5"	172
* K3	4	5	STR	2'-9"	11
* S1	51	4	2	8'-8"	295
* S2	51	4	3	3'-9"	128
* S3	8	4	7	6'-6"	35
* S4	3	6	8	3'-8"	17
* S5	1	6	9	8'-9"	13
* U1	34	4	6	3'-6"	79
* V1	68	5	STR	5'-6"	390
* V2	36	5	STR	7'-1"	266

* EPOXY COATED REINFORCING STEEL 3349 LBS.

CLASS AA CONCRETE BREAKDOWN

POUR #1 CAP, LOWER PART OF WINGS & CONCRETE COLLARS 17.5 CU. YDS.

POUR #2 BACKWALL & UPPER PART OF WINGS 6.5 CU. YDS.

TOTAL CLASS AA CONCRETE 24.0 CU. YDS.

HP 12 X 53 STEEL PILES

NO. 5 300 LIN. FT.

BILL OF MATERIAL — STAGE II

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* B2	4	10	1	30'-6"	525
* B4	4	5	STR	29'-11"	125
* B6	4	4	STR	30'-0"	80
* B7	8	4	STR	3'-0"	16
* B12	1	10	1	31'-4"	135
* B13	1	10	1	30'-1"	129
* B14	1	10	1	30'-8"	132
* B15	1	10	1	29'-7"	127
* H3	9	5	5	14'-1"	132
* H4	9	5	5	14'-3"	134
* K2	12	4	STR	16'-10"	135
* K4	4	5	STR	2'-6"	10
* S1	42	4	2	8'-8"	243
* S2	42	4	3	3'-9"	105
* S3	8	4	7	6'-6"	35
* S4	3	6	8	3'-8"	17
* S5	1	6	9	8'-9"	13
* U1	28	4	6	3'-6"	65
* V1	56	5	STR	5'-6"	321
* V3	36	5	STR	6'-8"	250

* EPOXY COATED REINFORCING STEEL 2729 LBS.

CLASS AA CONCRETE BREAKDOWN

POUR #1 CAP, LOWER PART OF WINGS & CONCRETE COLLARS 14.9 CU. YDS.

POUR #2 BACKWALL & UPPER PART OF WINGS 5.5 CU. YDS.

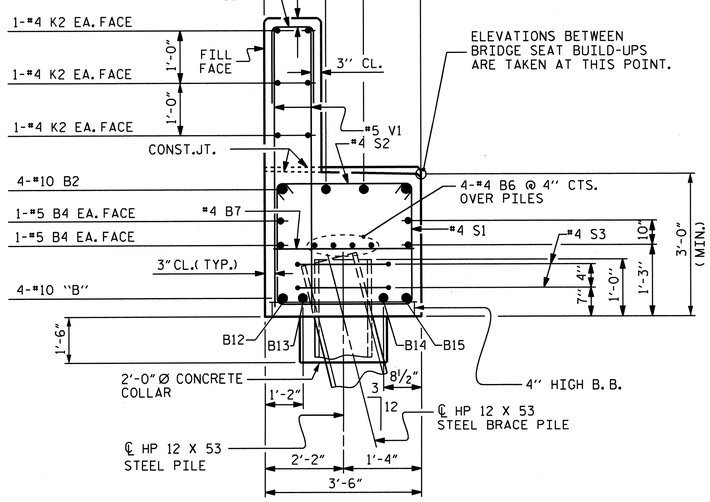
TOTAL CLASS AA CONCRETE 20.4 CU. YDS.

HP 12 X 53 STEEL PILES

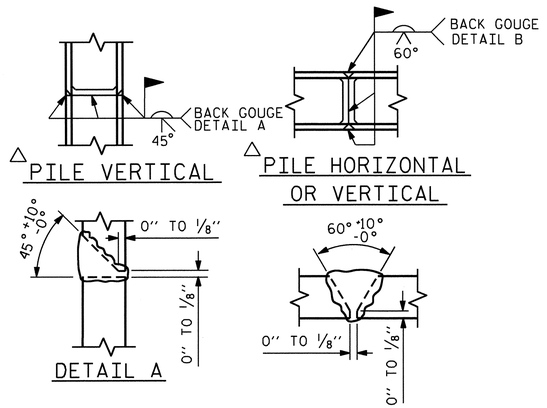
NO. 5 300 LIN. FT.

TOTAL BILL OF MATERIAL

TOTAL EPOXY COATED REINF. STEEL	6078 LBS.
TOTAL CLASS AA CONCRETE	44.4 CU. YDS.
HP 12 X 53 STEEL PILES NO. 10	600 LIN. FT.
PILE REDRIVES	4 EACH

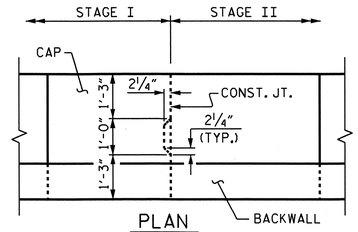


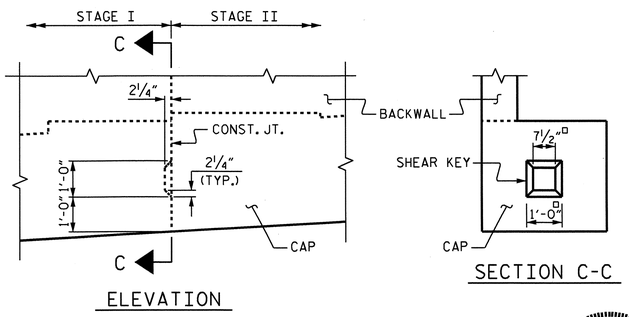
SECTION B-B



△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS





SHEAR KEY DETAIL

REINFORCING STEEL NOT SHOWN

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY E. MURRAY 1/4/13

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 22+02.90 L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT #1

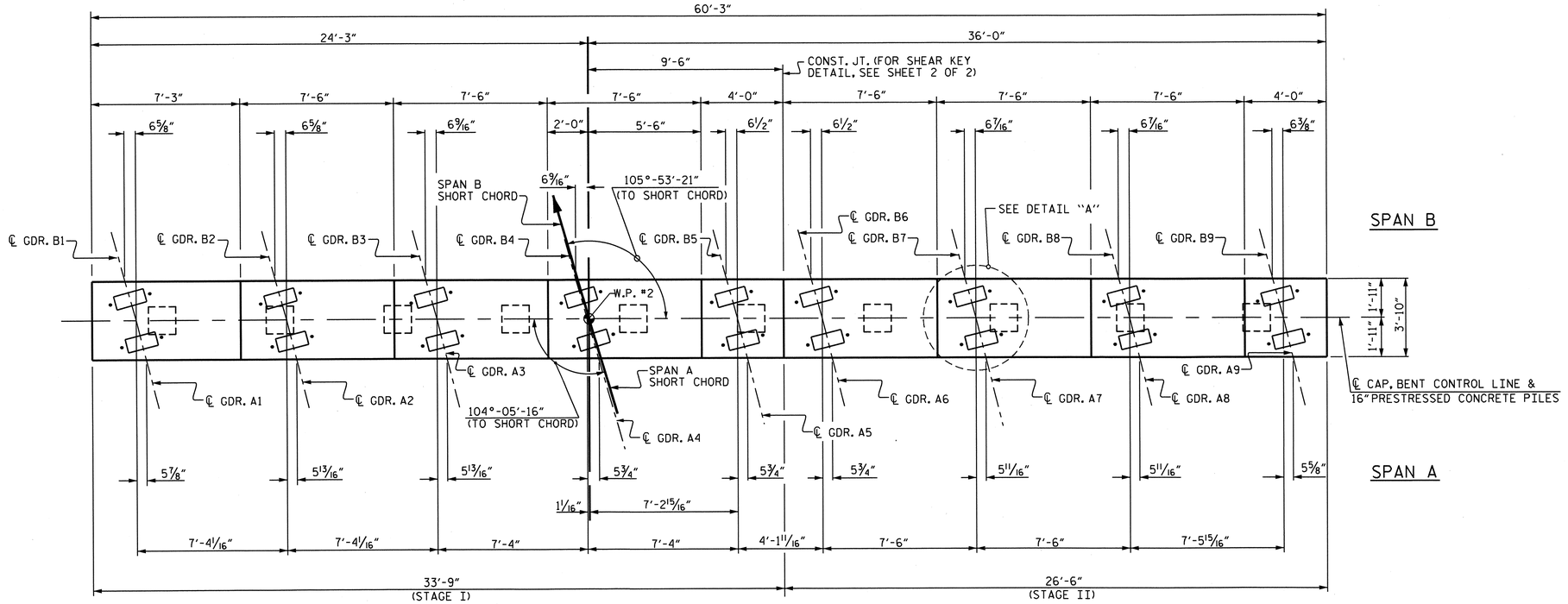
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-31
1			3			TOTAL SHEETS
2			4			76

DRAWN BY : PEGGY PARISI DATE : 6-18-09

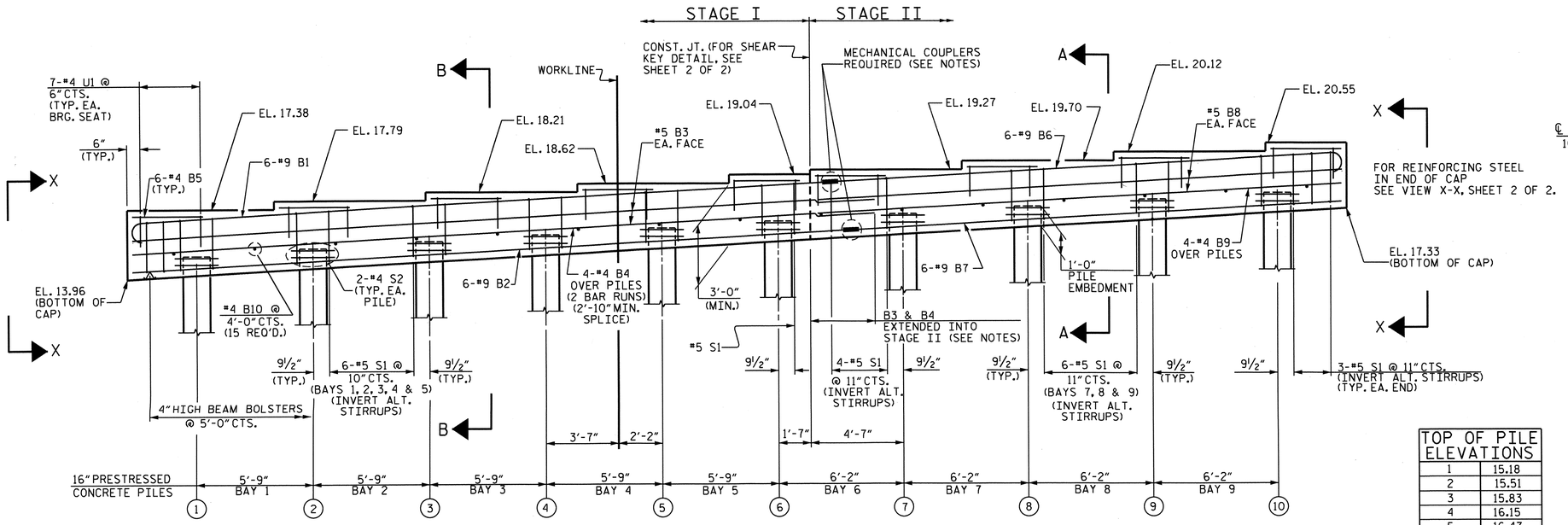
CHECKED BY : B.N. BARODAWALA DATE : 8-31-12

06-NOV-2012 16:36

SIR #1



PLAN



ELEVATION

TOP OF PILE ELEVATIONS	
1	15.18
2	15.51
3	15.83
4	16.15
5	16.47
6	16.79
7	17.14
8	17.48
9	17.83
10	18.18

NOTES:

STIRRUPS AND "U" BARS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

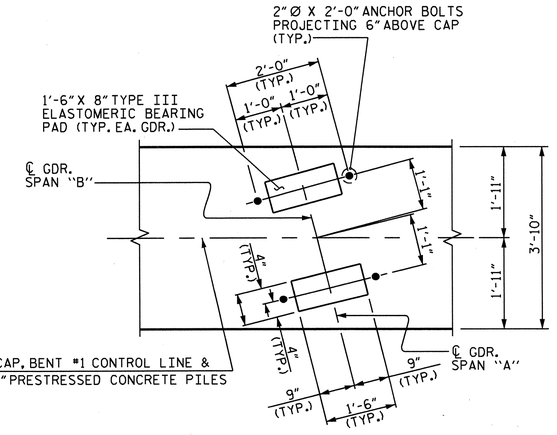
MECHANICAL COUPLERS SHALL BE USED TO JOIN THE #9 "B" BARS IN STAGE I WITH THE THE #9 "B" BARS IN STAGE II. THE LOCATION OF THE COUPLERS SHALL BE STAGGERED ON ALTERNATNG BARS BY ONE (1) FOOT AND THE STAGE I BARS SHALL BE CUT ACCORDINGLY TO ALLOW A MINIMUM OF 1'-0" AND A MAXIMUM OF 2'-0" EXTENSION INTO STAGE II CONSTRUCTION.

THE CONTRACTOR'S ATTENTION IS CALLED TO THE FACT THAT THE LENGTHS OF THE #9 "B" BARS AT THE STAGED CONSTRUCTION JOINT MAY NEED TO BE ADJUSTED DUE TO THE TYPE OF MECHANICAL BUTT SPLICE CHOSEN BY THE CONTRACTOR. NO ADDITIONAL PAYMENT WILL BE MADE FOR ANY ADJUSTMENTS.

THE #5 B3 BARS IN STAGE I SHALL EXTEND 3'-9" PAST THE CONSTRUCTION JOINT.

THE #4 B4 BARS IN STAGE I SHALL EXTEND 3'-1" PAST THE CONSTRUCTION JOINT.

PILE NO. 7 TO BE DRIVEN IN STAGE I IF APPROVED BY THE ENGINEER.



DETAIL A

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 22+02.90 -L-

SHEET 1 OF 2

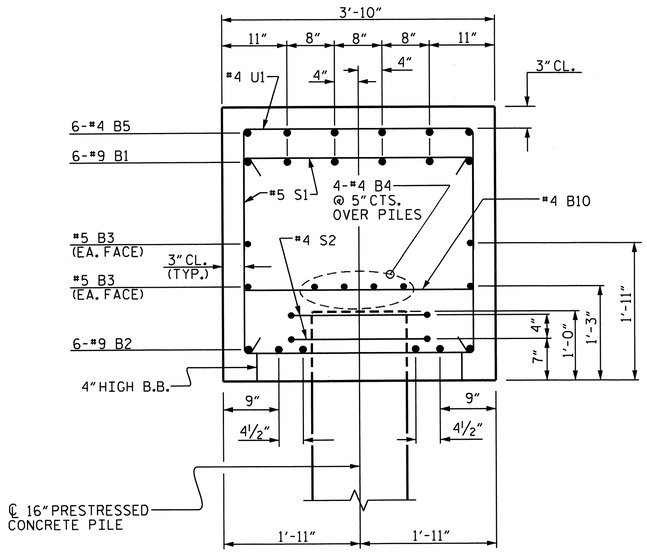
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUBSTRUCTURE
BENT #1

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-32
1			3			TOTAL SHEETS
2			4			76

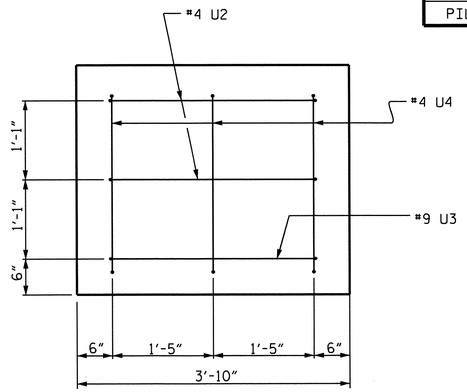
DRAWN BY : M.D.PISO DATE : 03-22-12
CHECKED BY : A.M.LEE DATE : 06-11-12

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY E. HUTRAY 6/14/13

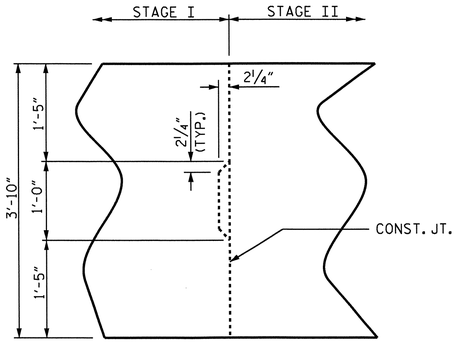
SIP #1



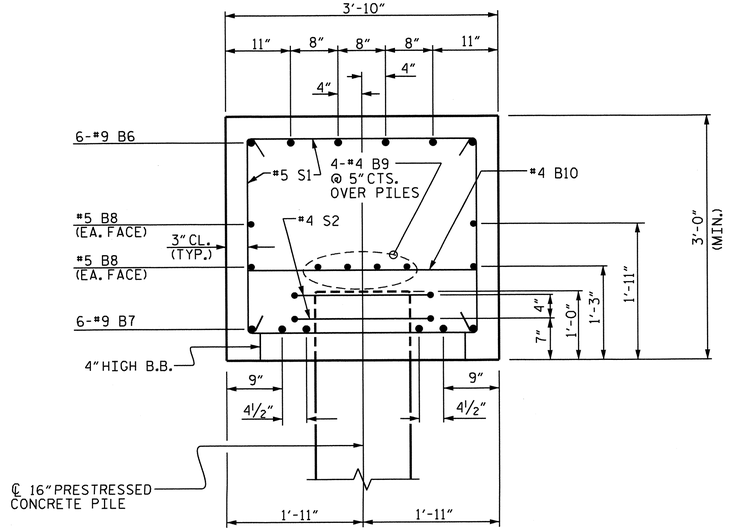
SECTION B-B



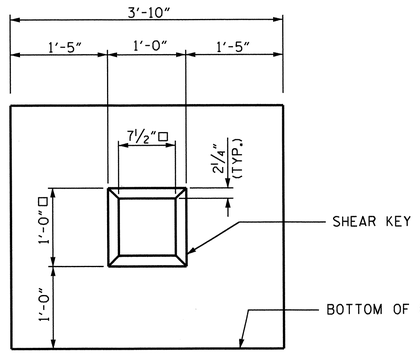
END OF CAP VIEW X-X



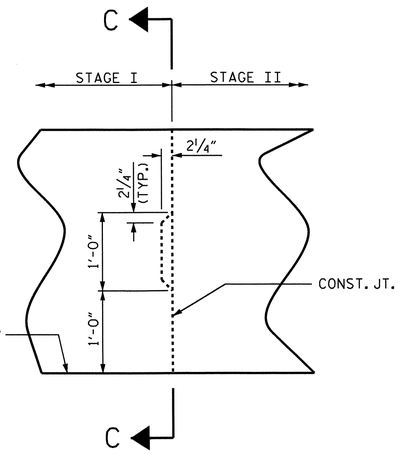
PLAN VIEW



SECTION A-A



SECTION C-C



ELEVATION VIEW

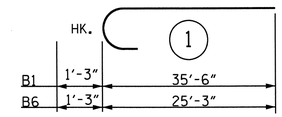
SHEAR KEY DETAIL

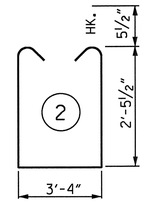
NOTE: REINFORCING STEEL IN CAP NOT SHOWN.

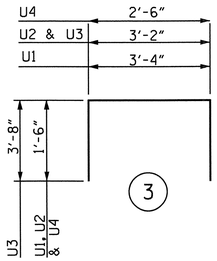
TOTAL BILL OF MATERIAL

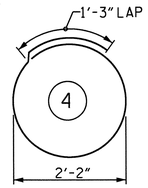
✱EPOXY COATED REINFORCING STEEL	4,176 LBS.
CLASS AA CONCRETE	● 27.0 CU. YDS.
16"PRESTRESSED CONCRETE PILES NO. 10	450 LIN. FT.
PILE REDRIVES	5 EA.

BAR TYPES









ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL
STAGE I

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱B1	6	#9	1	36'-9"	750
✱B2	6	#9	STR.	35'-6"	724
✱B3	4	#5	STR.	37'-3"	155
✱B4	8	#4	STR.	19'-9"	106
✱B5	30	#4	STR.	3'-6"	70
✱B10	8	#4	STR.	3'-4"	18
✱S1	34	#5	2	9'-2"	325
✱S2	12	#4	4	8'-1"	65
✱U1	35	#4	3	6'-4"	148
✱U2	2	#4	3	6'-2"	8
✱U3	1	#9	3	10'-6"	36
✱U4	3	#4	3	5'-6"	11

✱EPOXY COATED REINFORCING STEEL 2,416 LBS.

CLASS AA CONCRETE ●15.1 CU.YDS.

16"PRESTRESSED CONCRETE PILES
NO. 6 270 LIN. FT.

BILL OF MATERIAL
STAGE II

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱B5	24	#4	STR.	3'-6"	56
✱B6	6	#9	1	26'-6"	541
✱B7	6	#9	STR.	25'-3"	515
✱B8	4	#5	STR.	26'-0"	108
✱B9	4	#4	STR.	26'-0"	69
✱B10	7	#4	STR.	3'-4"	16
✱S1	25	#5	2	9'-2"	239
✱S2	8	#4	4	8'-1"	43
✱U1	28	#4	3	6'-4"	118
✱U2	2	#4	3	6'-2"	8
✱U3	1	#9	3	10'-6"	36
✱U4	3	#4	3	5'-6"	11

✱EPOXY COATED REINFORCING STEEL 1,760 LBS.

CLASS AA CONCRETE ● 11.9 CU.YDS.

16"PRESTRESSED CONCRETE PILES
NO. 4 180 LIN. FT.

● CONCRETE DISPLACED BY THE 16"PRESTRESSED CONCRETE PILES HAS BEEN DEDUCTED FROM THE CONCRETE QUANTITY.

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 20+02.90 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

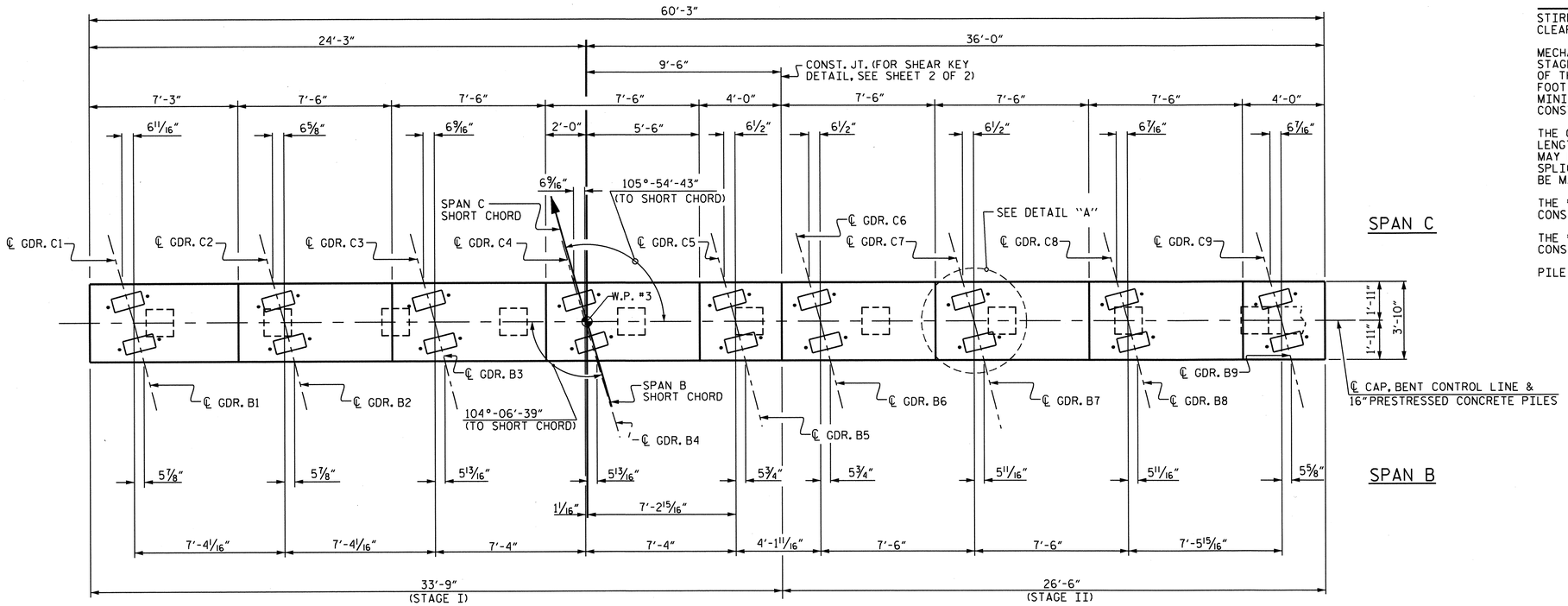
BENT #1

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY E. MARSH
1/14/13

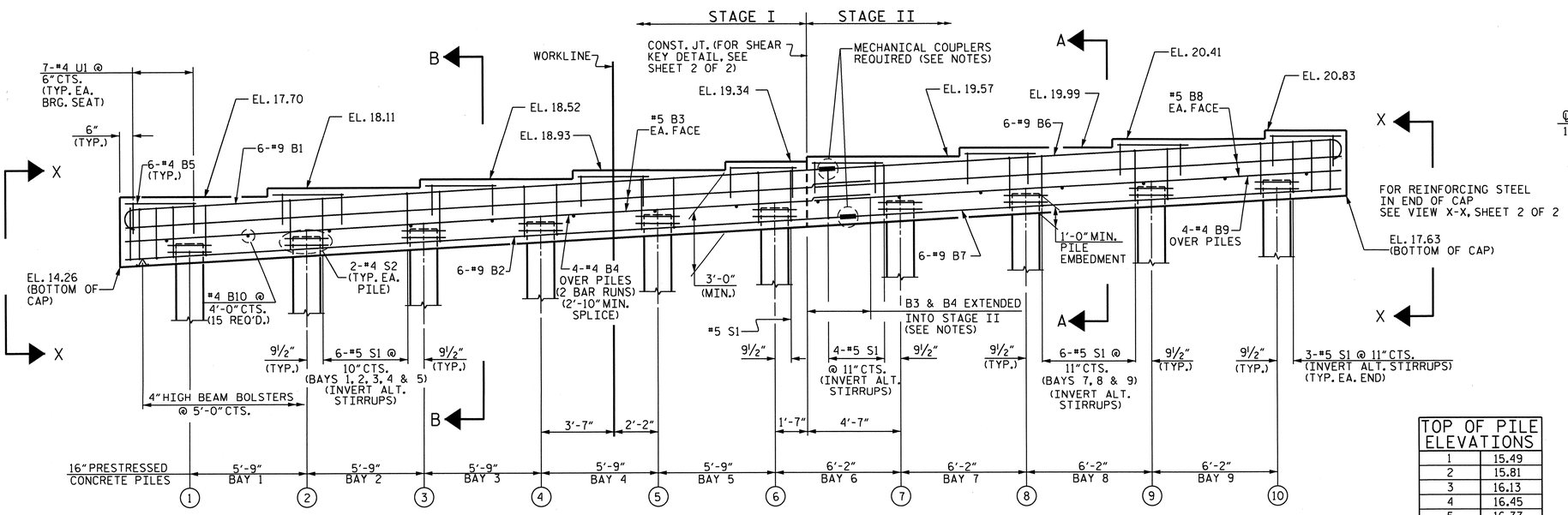
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-33
1			3			TOTAL SHEETS
2			4			76

DRAWN BY : M.D.PISO DATE : 03-22-12
CHECKED BY : A.M.LEE DATE : 06-11-12

STR #1



PLAN



ELEVATION

TOP OF PILE ELEVATIONS	
1	15.49
2	15.81
3	16.13
4	16.45
5	16.77
6	17.10
7	17.44
8	17.79
9	18.13
10	18.48

NOTES:

STIRRUPS AND "U" BARS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

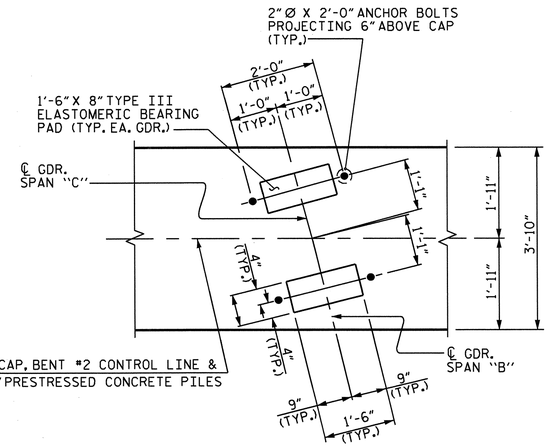
MECHANICAL COUPLERS SHALL BE USED TO JOIN THE #9 "B" BARS IN STAGE I WITH THE THE #9 "B" BARS IN STAGE II. THE LOCATION OF THE COUPLERS SHALL BE STAGGERED ON ALTERNATNG BARS BY (1) ONE FOOT AND THE STAGE I BARS SHALL BE CUT ACCORDINGLY TO ALLOW A MINIMUM OF 1'-0" AND A MAXIMUM OF 2'-0" EXTENSION INTO STAGE II CONSTRUCTION.

THE CONTRACTOR'S ATTENTION IS CALLED TO THE FACR THAT THE LENGTHS OF THE #9 "B" BARS AT THE STAGED CONSTRUCTION JOINT MAY NEED TO BE ADJUSTED DUE TO THE TYPE OF MECHANICAL BUTT SPLICE CHOSEN BY THE CONTRACTOR. NO ADDITIONAL PAYMENT WILL BE MADE FOR ANY ADJUSTMENTS.

THE #5 B3 BARS IN STAGE I SHALL EXTEND 3'-9" PAST THE CONSTRUCTION JOINT.

THE #4 B4 BARS IN STAGE I SHALL EXTEND 3'-1" PAST THE CONSTRUCTION JOINT.

PILE NO. 7 TO BE DRIVEN IN STAGE I.



DETAIL A

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 22+02.90 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

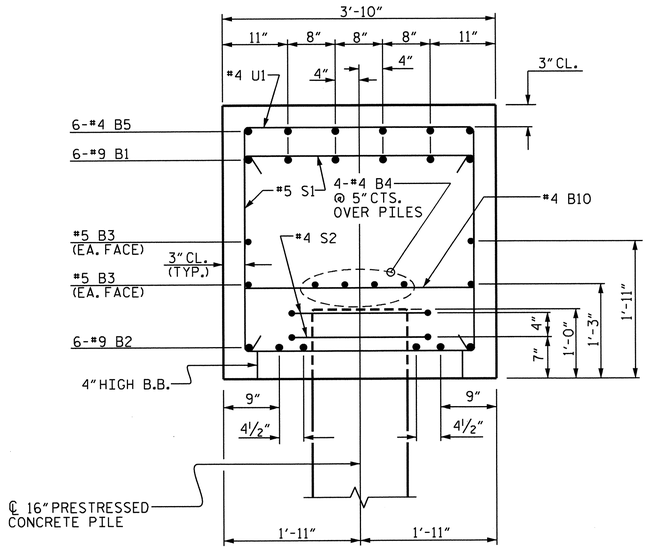
SUBSTRUCTURE

BENT #2

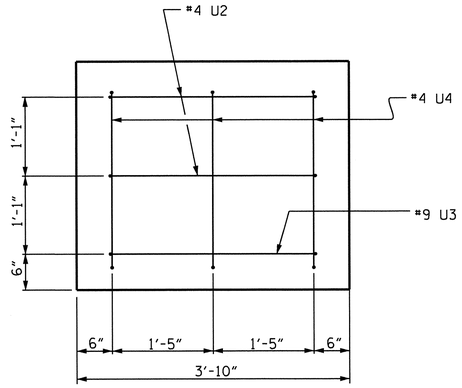
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-34
1			3			TOTAL SHEETS
2			4			76

DRAWN BY : M.D.PISO DATE : 03-22-12
CHECKED BY : A.M.LEE DATE : 06-11-12

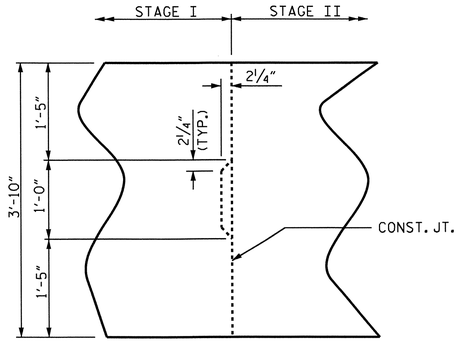
NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY E. MURRAY
1/9/13



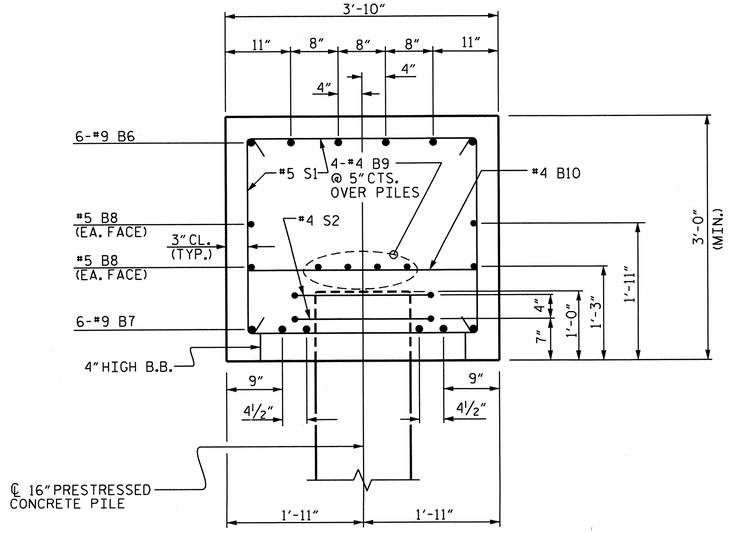
SECTION B-B



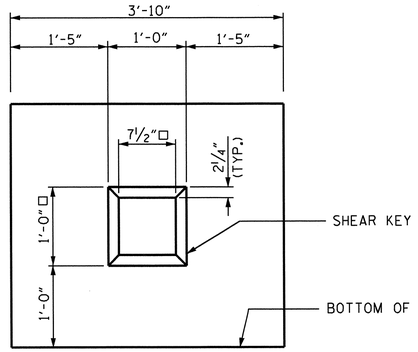
END OF CAP VIEW X-X



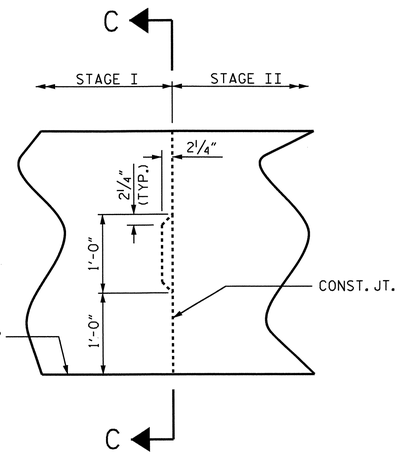
PLAN VIEW



SECTION A-A



SECTION C-C



ELEVATION VIEW

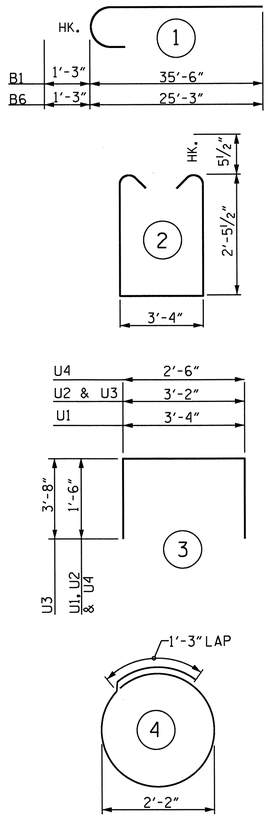
SHEAR KEY DETAIL

NOTE: REINFORCING STEEL IN CAP NOT SHOWN.

TOTAL BILL OF MATERIAL

✱EPOXY COATED REINFORCING STEEL	4,176 LBS.
CLASS AA CONCRETE	● 27.0 CU. YDS.
16" PRESTRESSED CONCRETE PILES NO. 10	450 LIN. FT.
PILE REDRIVES	5 EA.

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL
STAGE II

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱B1	6	#9	1	36'-9"	750
✱B2	6	#9	STR.	35'-6"	724
✱B3	4	#5	STR.	37'-3"	155
✱B4	8	#4	STR.	19'-9"	106
✱B5	30	#4	STR.	3'-6"	70
✱B10	8	#4	STR.	3'-4"	18
✱S1	34	#5	2	9'-2"	325
✱S2	12	#4	4	8'-1"	65
✱U1	35	#4	3	6'-4"	148
✱U2	2	#4	3	6'-2"	8
✱U3	1	#9	3	10'-6"	36
✱U4	3	#4	3	5'-6"	11

✱EPOXY COATED REINFORCING STEEL 2,416 LBS.

CLASS AA CONCRETE ● 15.1 CU.YDS.

16" PRESTRESSED CONCRETE PILES
NO. 6 270 LIN. FT

BILL OF MATERIAL
STAGE II

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱B5	24	#4	STR.	3'-6"	56
✱B6	6	#9	1	26'-6"	541
✱B7	6	#9	STR.	25'-3"	515
✱B8	4	#5	STR.	26'-0"	108
✱B9	4	#4	STR.	26'-0"	69
✱B10	7	#4	STR.	3'-4"	16
✱S1	25	#5	2	9'-2"	239
✱S2	8	#4	4	8'-1"	43
✱U1	28	#4	3	6'-4"	118
✱U2	2	#4	3	6'-2"	8
✱U3	1	#9	3	10'-6"	36
✱U4	3	#4	3	5'-6"	11

✱EPOXY COATED REINFORCING STEEL 1,760 LBS.

CLASS AA CONCRETE ●11.9 CU.YDS.

16" PRESTRESSED CONCRETE PILES
NO. 4 180 LIN. FT.

● CONCRETE DISPLACED BY THE 16" PRESTRESSED CONCRETE PILES HAS BEEN DEDUCTED FROM THE CONCRETE QUANTITY.

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 20+02.90 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

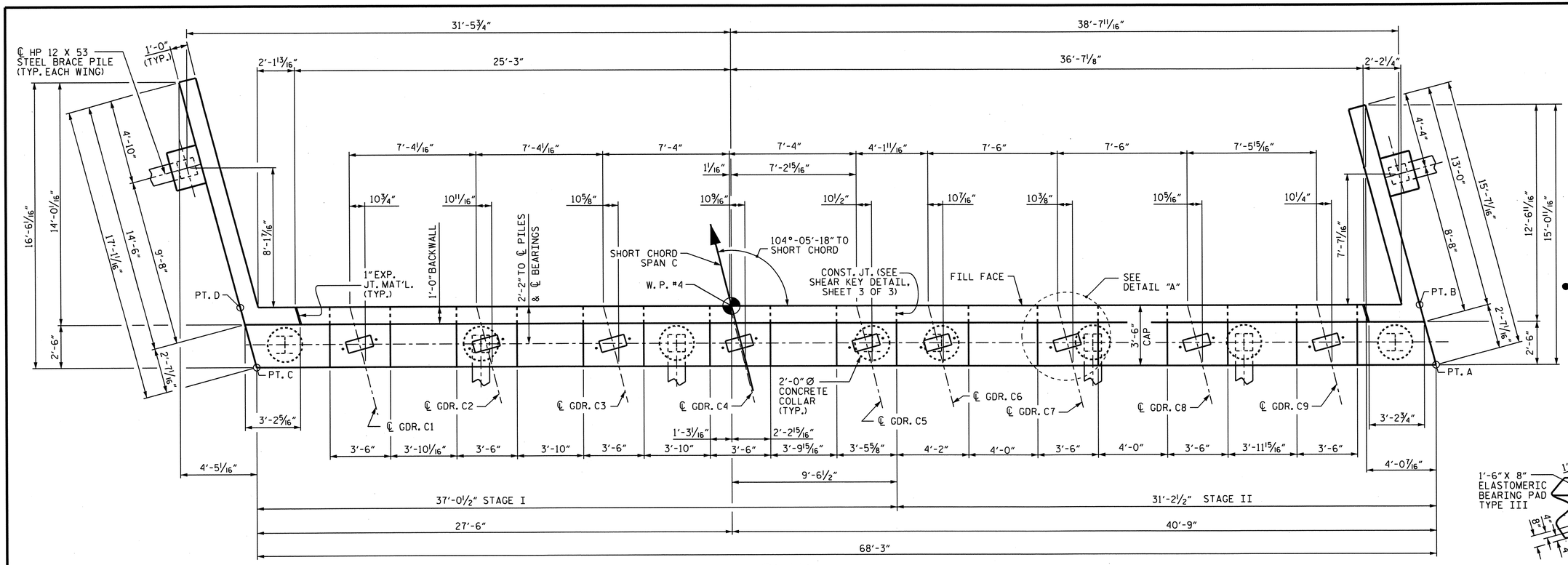
BENT #2

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY E. MURRAY
1/8/13

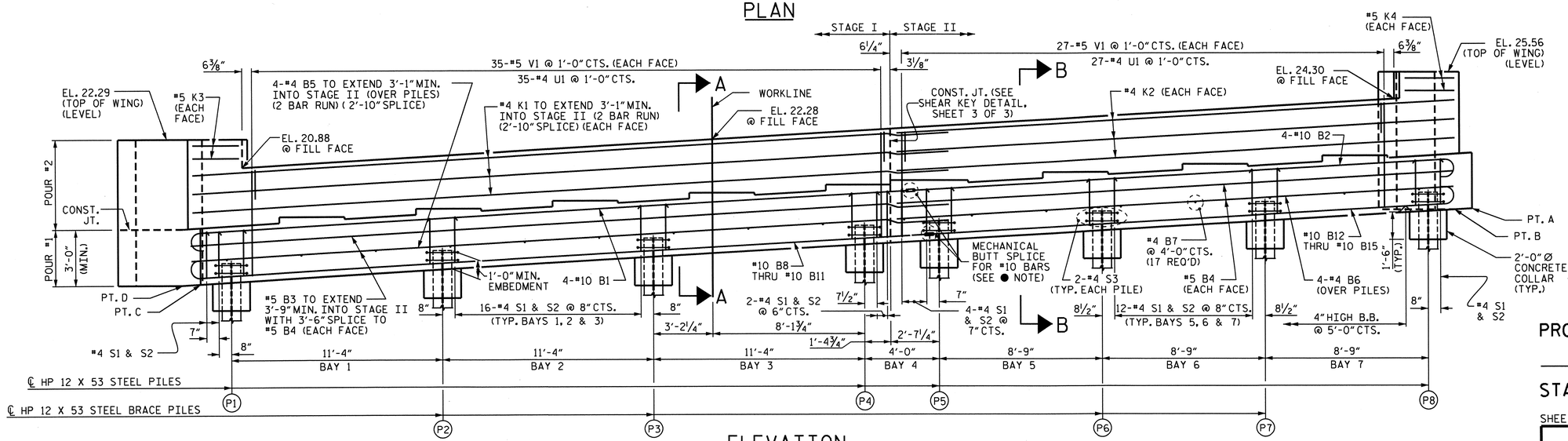
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-35
1			3			TOTAL SHEETS
2			4			76

DRAWN BY : M.D.PISO DATE : 03-22-12
CHECKED BY : A.M.LEE DATE : 06-11-12

STR #1

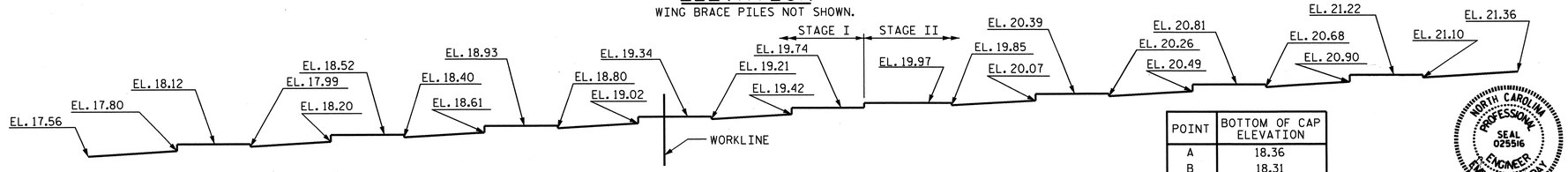


PLAN



ELEVATION

WING BRACE PILES NOT SHOWN.



BRIDGE SEAT ELEVATIONS

(ELEVATIONS AT FRONT FACE OF CAP)

POINT	BOTTOM OF CAP ELEVATION
A	18.36
B	18.31
C	14.56
D	14.51

NOTES:

STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

THE TOP SURFACE OF THE CAP EXCEPT THE BRIDGE SEAT BUILDUPS SHALL BE SLOPED TRANSVERSELY FROM THE FILL FACE TO THE BACK FACE AT THE RATE OF 2%.

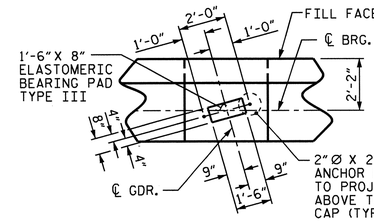
INSTALL THE 4" DIA. DRAIN PIPE THROUGH THE WING WALL AS REQUIRED FOR REINFORCED BRIDGE APPROACH FILLS. SEE THE ROADWAY PLANS. REINFORCING STEEL IN THE WING WALL MAY BE SHIFTED AS NECESSARY TO CLEAR THE DRAIN PIPE.

PILE NO. 5 TO BE DRIVEN IN STAGE I.

FOR PILE SPLICE DETAILS, SEE END BENT NO. 1.

● MECHANICAL COUPLERS SHALL BE USED TO JOIN THE #10 "B" BARS IN STAGE I WITH THE #10 "B" BARS IN STAGE II. SEE SHEET 3 OF 3 FOR DETAILS.

THE CONTRACTOR'S ATTENTION IS CALLED TO THE FACT THAT THE LENGTHS OF THE #10 "B" BARS AT THE STAGED CONSTRUCTION JOINT MAY NEED TO BE ADJUSTED DUE TO THE TYPE OF MECHANICAL BUTT SPLICE CHOSEN BY THE CONTRACTOR. NO ADDITIONAL PAYMENT WILL BE MADE FOR ANY ADJUSTMENTS.



DETAIL "A"

DIMENSIONS ARE TYPICAL FOR EACH GIRDER.

TOP OF PILE ELEVATIONS	
PILE	ELEVATION
P1	15.68
P2	16.31
P3	16.94
P4	17.57
P5	17.80
P6	18.28
P7	18.77
P8	19.26

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 22+02.90 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

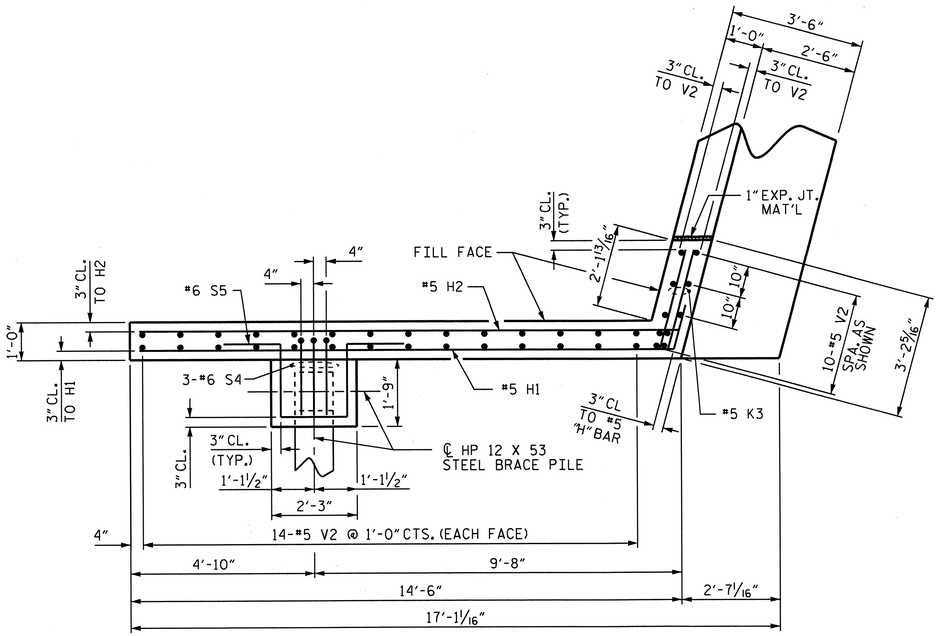
SUBSTRUCTURE

END BENT #2

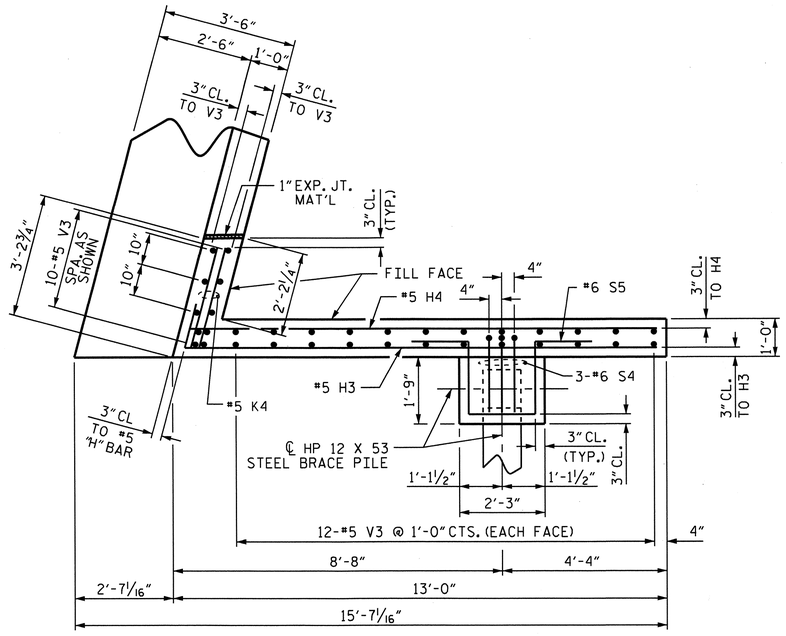
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-36
1			3			TOTAL SHEETS
2			4			76

DRAWN BY : PEGGY PARISI DATE : 6-16-09
CHECKED BY : B.N. BARODAWALA DATE : 8-31-12

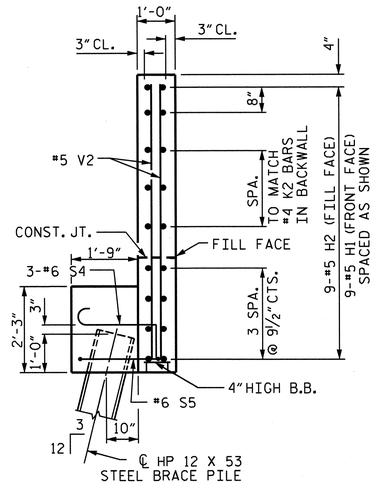
NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY E. MURRAY
-14/13



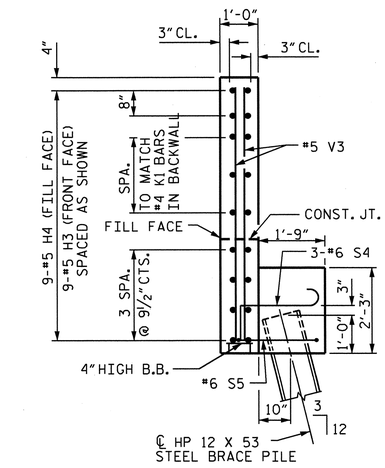
PLAN OF LEFT WING - STAGE I



PLAN OF RIGHT WING - STAGE II



SECTION Y-Y



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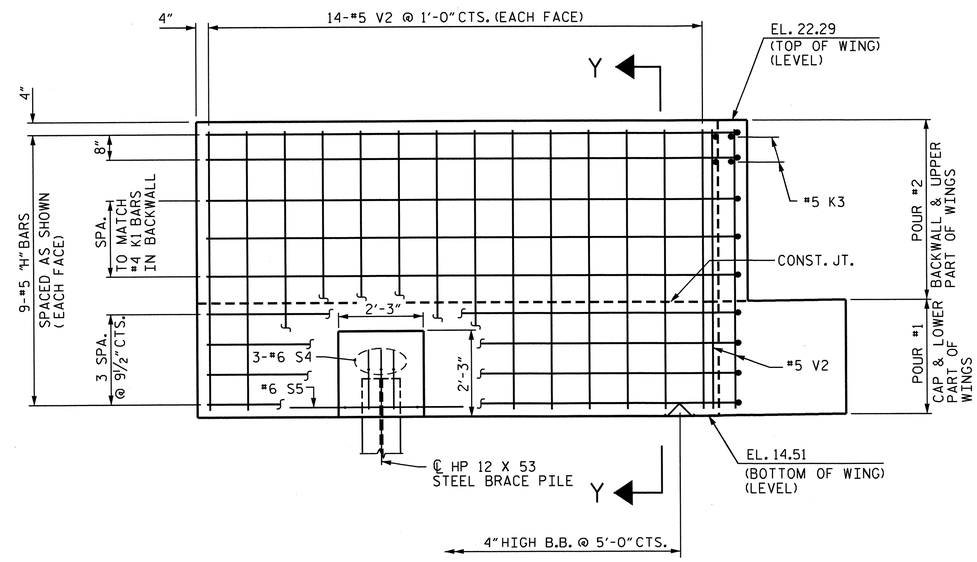
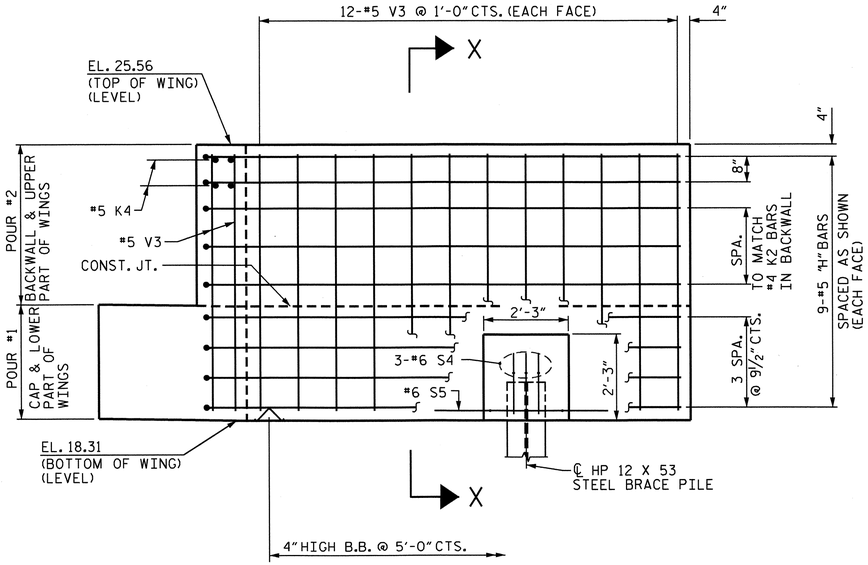


ELEVATION OF LEFT WING - STAGE I



ELEVATION OF RIGHT WING - STAGE II

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 22+02.90 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT #2

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-37
1			3			TOTAL SHEETS
2			4			76

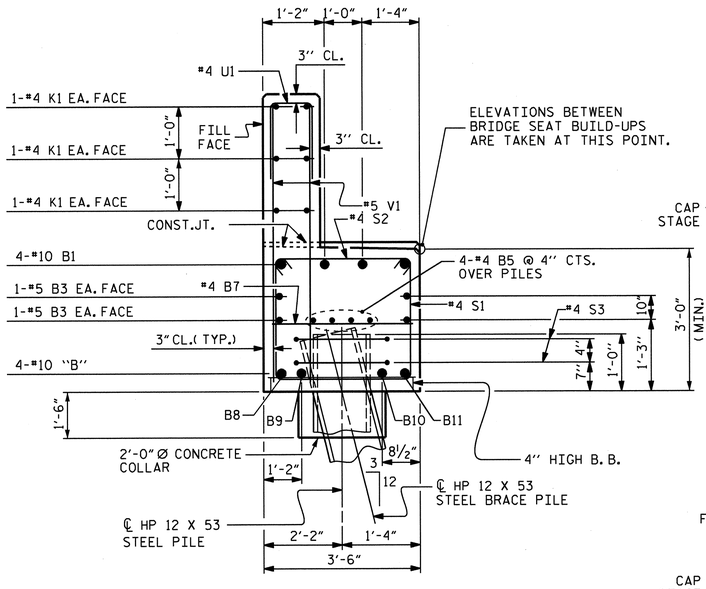
DRAWN BY : PEGGY PARISI DATE : 6-16-09
CHECKED BY : B.N. BARODAWALA DATE : 8-31-12

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY E. MURRAY

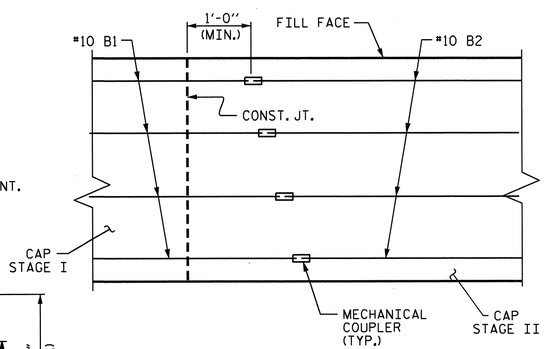
1/4/13

06-NOV-2013 16:34

SIP #1

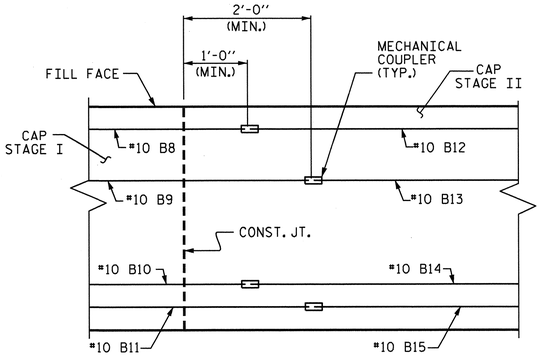


SECTION A-A



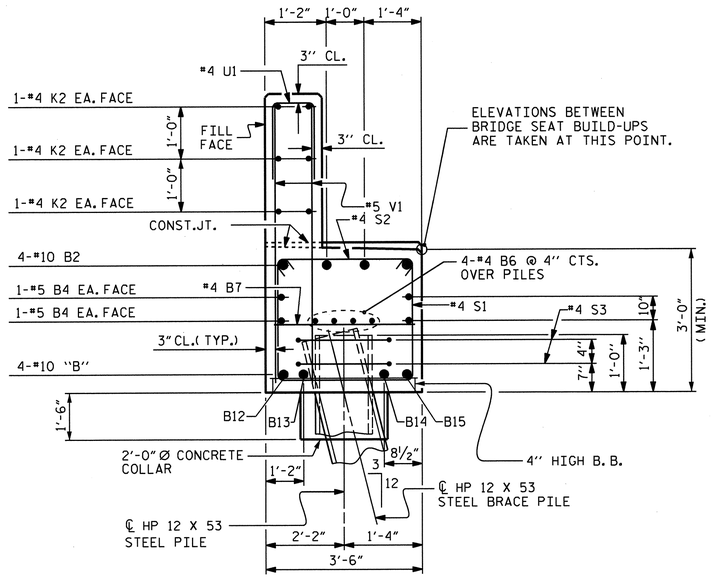
MECHANICAL COUPLER DETAIL

PLAN VIEW OF TOP MAIN STEEL

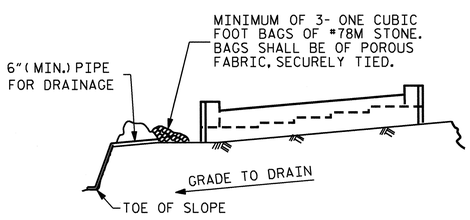


MECHANICAL COUPLER STAGGER DETAIL

PLAN VIEW OF BOTTOM MAIN STEEL



SECTION B-B



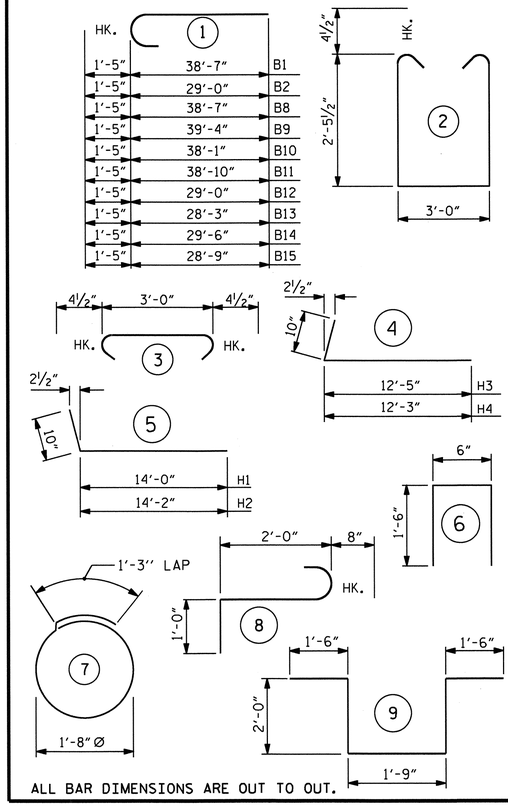
BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

BAGGED STONE SHALL REMAIN IN PLACE UNTIL THE ENGINEER DIRECTS THAT IT BE REMOVED. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF SILT ACCUMULATIONS AT BAGGED STONE WHEN SO DIRECTED BY THE ENGINEER. BAGS SHALL BE REMOVED AND REPLACED WHENEVER THE ENGINEER DETERMINES THAT THEY HAVE DETERIORATED AND LOST THEIR EFFECTIVENESS.

NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

TEMPORARY DRAINAGE AT END BENT

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL — STAGE I

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱B1	4	10	1	40'-0"	688
✱B3	4	5	STR	41'-5"	173
✱B5	8	4	STR	21'-8"	116
✱B7	9	4	STR	3'-0"	18
✱B8	1	10	1	40'-0"	172
✱B9	1	10	1	40'-9"	175
✱B10	1	10	1	39'-6"	170
✱B11	1	10	1	40'-3"	173
✱H1	9	5	5	14'-10"	139
✱H2	9	5	5	15'-0"	141
✱K1	12	4	STR	21'-10"	175
✱K3	4	5	STR	2'-7"	11
✱S1	52	4	2	8'-8"	301
✱S2	52	4	3	3'-9"	130
✱S3	8	4	7	6'-6"	35
✱S4	3	6	8	3'-8"	17
✱S5	1	6	9	8'-9"	13
✱U1	35	4	6	3'-6"	82
✱V1	70	5	STR	5'-6"	402
✱V2	38	5	STR	7'-1"	281

✱ EPOXY COATED REINFORCING STEEL 3412 LBS.

CLASS AA CONCRETE BREAKDOWN

POUR #1 CAP, LOWER PART OF WINGS & CONCRETE COLLARS 17.7 CU. YDS.

POUR #2 BACKWALL & UPPER PART OF WINGS 6.8 CU. YDS.

TOTAL CLASS AA CONCRETE 24.5 CU. YDS.

HP 12 X 53 STEEL PILES NO. 5 250 LIN. FT.

BILL OF MATERIAL — STAGE II

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱B2	4	10	1	30'-5"	524
✱B4	4	5	STR	29'-10"	124
✱B6	4	4	STR	30'-0"	80
✱B7	8	4	STR	3'-0"	16
✱B12	1	10	1	30'-5"	131
✱B13	1	10	1	29'-8"	128
✱B14	1	10	1	30'-11"	133
✱B15	1	10	1	30'-2"	130
✱H3	9	5	4	13'-3"	124
✱H4	9	5	4	13'-1"	123
✱K2	6	4	STR	29'-8"	119
✱K4	4	5	STR	2'-8"	11
✱S1	41	4	2	8'-8"	237
✱S2	41	4	3	3'-9"	103
✱S3	8	4	7	6'-6"	35
✱S4	3	6	8	3'-8"	17
✱S5	1	6	9	8'-9"	13
✱U1	27	4	6	3'-6"	63
✱V1	54	5	STR	5'-6"	310
✱V3	34	5	STR	6'-9"	239

✱ EPOXY COATED REINFORCING STEEL 2660 LBS.

CLASS AA CONCRETE BREAKDOWN

POUR #1 CAP, LOWER PART OF WINGS & CONCRETE COLLARS 14.7 CU. YDS.

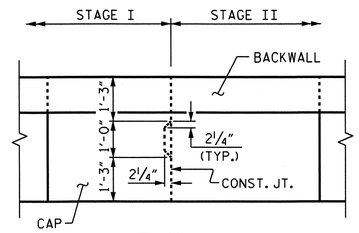
POUR #2 BACKWALL & UPPER PART OF WINGS 5.5 CU. YDS.

TOTAL CLASS AA CONCRETE 20.2 CU. YDS.

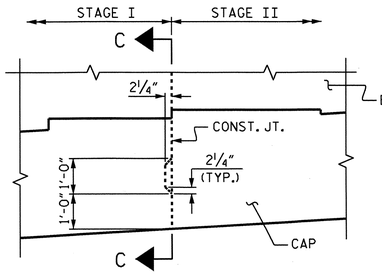
HP 12 X 53 STEEL PILES NO. 5 250 LIN. FT.

TOTAL BILL OF MATERIAL

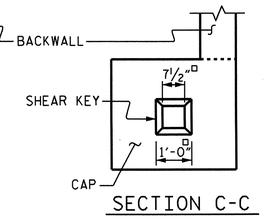
TOTAL EPOXY COATED REINF. STEEL	6072 LBS.
TOTAL CLASS AA CONCRETE	44.7 CU. YDS.
HP 12 X 53 STEEL PILES NO. 10	500 LIN. FT.
PILE REDRIVES	4 EACH



PLAN



ELEVATION



SECTION C-C

SHEAR KEY DETAIL

REINFORCING STEEL NOT SHOWN

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 22+02.90 L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

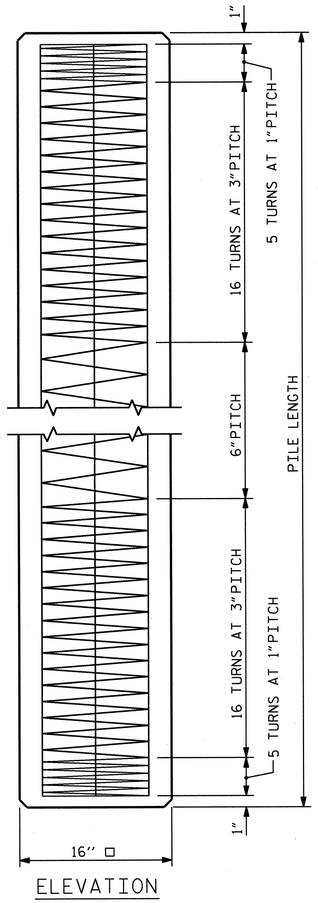
END BENT #2

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-38
1			3			TOTAL SHEETS
2			4			76

DRAWN BY : PEGGY PARISI DATE : 6-18-09
CHECKED BY : B.N. BARODAWALA DATE : 8-31-12

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY E. MURRAY 12/13

06-NOV-2012 16:34



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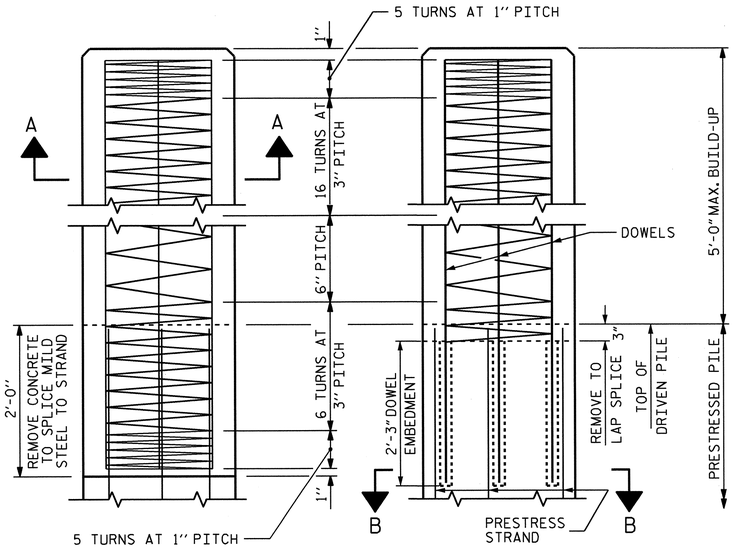
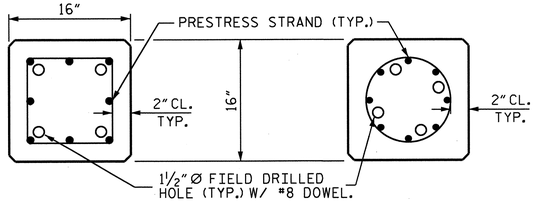


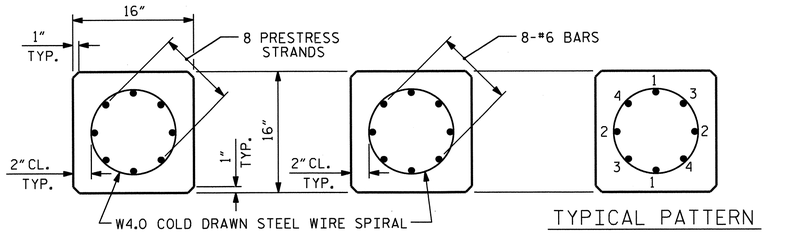
BUILD-UP AND SPIRAL REINFORCING

OPTIONAL BUILD-UP WITH DOWELS



SECTION "B-B"

(AT THE CONTRACTOR'S OPTION, PILE BUILD-UP MAY BE CONSTRUCTED WITH DOWELS.)

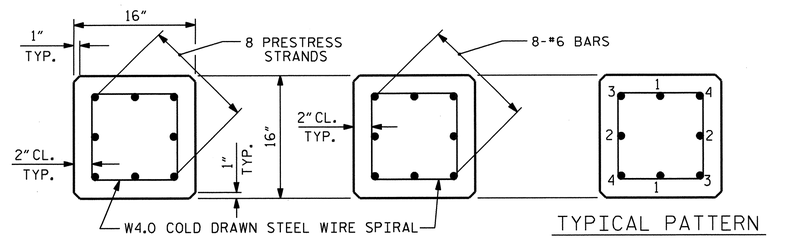


TYPICAL SECTION

SECTION "A-A"

TYPICAL PATTERN FOR BURNING STRANDS

½" OR 0.6" Ø GRADE 270 L.R. PRESTRESS STRANDS

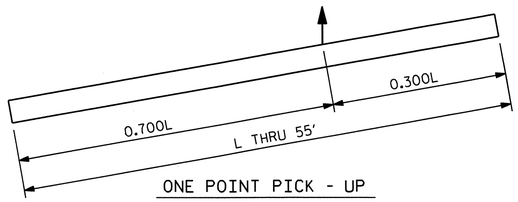


TYPICAL SECTION

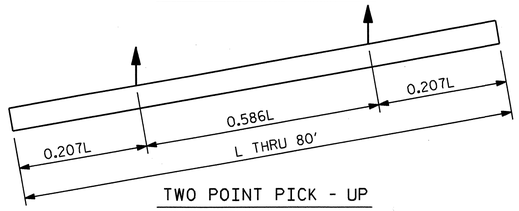
SECTION "A-A"

TYPICAL PATTERN FOR BURNING STRANDS

½" OR 0.6" Ø GRADE 270 L.R. PRESTRESS STRANDS



ONE POINT PICK - UP



TWO POINT PICK - UP

PICK - UP POINTS

QUANTITIES FOR ONE 16" PRESTRESSED PILE

LENGTH	CONCRETE CU. YDS.	PILE WT. TONS	ONE POINT PICK-UP 0.300L	ONE POINT PICK-UP 0.700L	TWO POINT PICK-UP 0.207L	TWO POINT PICK-UP 0.586L
25'-0"	1.63	3.31	7'-6"	17'-6"	5'-2"	14'-8"
30'-0"	1.96	3.97	9'-0"	21'-0"	6'-2½"	17'-7"
35'-0"	2.29	4.63	10'-6"	24'-6"	7'-3"	20'-6"
40'-0"	2.61	5.29	12'-0"	28'-0"	8'-3½"	23'-5"
45'-0"	2.94	5.95	13'-6"	31'-6"	9'-4"	26'-4"
50'-0"	3.27	6.61	15'-0"	35'-0"	10'-4"	29'-4"
55'-0"	3.59	7.28	16'-6"	38'-6"	11'-4½"	32'-3"
60'-0"	3.92	7.94			12'-5"	35'-2"
65'-0"	4.25	8.60			13'-5½"	38'-1"
70'-0"	4.57	9.26			14'-6"	41'-0"
75'-0"	4.90	9.92			15'-6½"	43'-11"
80'-0"	5.23	10.58			16'-7"	46'-10"

DOWEL INSTALLATION FOR OPTIONAL BUILD-UP

GROUT COMPRESSIVE STRENGTH: f'c= 5,000 PSI

BEFORE DRILLING DOWEL HOLES, REMOVE THE UPPER 3" OF CONCRETE FROM THE TOP OF THE PILE WITHOUT DAMAGE TO THE REINFORCING STEEL. THE REMOVAL PLANE SHOULD BE NORMAL TO THE EDGE OF THE PILE.

DOWEL HOLES SHALL BE POSITIONED TO MAINTAIN ½" CLEAR TO ALL EXISTING PRESTRESSING STRANDS IN THE CONCRETE PILE.

FIELD DRILLED HOLES SHALL BE CLEAN AND FREE OF ANY OBSTRUCTIONS BEFORE GROUTING OF DOWELS. DOWEL BARS SHALL BE INSTALLED AND GROUTED WITH AN APPROVED NON-SHRINK GROUT.

THE SPIRAL REINFORCING IN ALL BUILD-UPS SHALL BE W4.0 COLD DRAWN WIRE WHICH SHALL BE SECURED TO THE LONGITUDINAL REINFORCEMENT TO MAINTAIN PITCH.

THE SPIRAL REINFORCING IN THE BUILD-UP AND THE PRESTRESSED CONCRETE PILE SHALL BE SPLICED BY OVERLAPPING A MIN. OF ONE TURN.

NOTES

PRESTRESSED CONCRETE STRENGTH : f'c= 7,500 PSI

BUILD-UP CONCRETE STRENGTH : f'c= 7,500 PSI

STRAND DATA:

SIZE	GRADE	AREA	ULTIMATE STRENGTH	APPLIED PRESTRESS FORCE
½"	270 L.R.	0.153	41,300# PER STRAND	30,980# PER STRAND
0.6"	270 L.R.	0.217	58,600# PER STRAND	43,940# PER STRAND

ALL PRESTRESSING STRANDS SHALL BE 7-WIRE LOW-RELAXATION GRADE 270 STRANDS CONFORMING TO AASHTO M203. STRAND SAMPLING REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

AT THE CONTRACTOR'S OPTION, ½" OR 0.6" STRANDS MAY BE USED IN EITHER STRAND CONFIGURATION SHOWN IN THE TYPICAL SECTION DETAIL. MIXING OF STRAND SIZE IS NOT ALLOWED.

THE SLIP-FORM METHOD OF CASTING PILES WILL NOT BE PERMITTED.

TRANSFER THE LOAD FROM THE ANCHORAGES TO THE PILE AFTER THE CONCRETE HAS ATTAINED A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI.

IF STRAND STRESS IS RELIEVED BY BURNING, THE STRANDS SHALL BE BURNED IN OPPOSITE PAIRS AS INDICATED IN THE TYPICAL PATTERN SHOWN. FOR ANY NUMBER OF STRANDS, BURN IN OPPOSITE PAIRS AND SYMMETRICALLY ABOUT BOTH THE VERTICAL AND HORIZONTAL AXES. STRANDS 1-1 SHALL BE BURNED BEFORE 2-2, ETC. NOT MORE THAN 4 STRANDS, SAY 3-3 AND 4-4, MAY BE BURNED AT ANY ONE SECTION BEFORE THESE SAME PAIRS OF STRANDS ARE BURNED AT BOTH ENDS OF THE BED AND BETWEEN EACH PAIR OF PILES IN THE BED.

PROPOSED DEVICES FOR LIFTING PILES, RECESS DETAILS, AND PATCHING MATERIAL SHALL BE DETAILED IN SHOP DRAWINGS. AFTER ATTACHMENTS HAVE BEEN REMOVED, OPENINGS SHALL BE REPAIRED SUCH THAT THE APPEARANCE OF THE PILE IS UNIFORM.

WHERE CAST-IN-PLACE LIFTING DEVICES ARE NOT USED, PICK-UP POINTS ARE TO BE INDICATED WITH A 2" WIDE BLACK MARK.

DRIVE PILES USING A METHOD APPROVED BY THE ENGINEER, WHEREBY THE HEAD OF THE PILE IS NOT DAMAGED.

DRIVING OF THE BUILT-UP PILE WILL NOT BE PERMITTED UNTIL THE CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF 5,000 PSI AND UNTIL A PERIOD OF SEVEN DAYS HAS ELAPSED SINCE CASTING OF THE BUILD-UP.

THE WATER/CEMENT RATIO FOR CONCRETE PILES SHALL NOT EXCEED 0.40.

PRESTRESSED CONCRETE PILES SHALL CONTAIN CALCIUM NITRITE CORROSION INHIBITOR.

THE CONCRETE IN THE PILES OF BENT NOs. 1 & 2 SHALL CONTAIN SILICA FUME. SILICA FUME SHALL BE SUBSTITUTED FOR 5% OF THE PORTLAND CEMENT BY WEIGHT. IF THE OPTION OF ARTICLE 1024-1 OF THE STANDARD SPECIFICATIONS TO PARTIALLY SUBSTITUTE CLASS F FLY ASH FOR PORTLAND CEMENT IS EXERCISED, THEN THE RATE OF FLY ASH SUBSTITUTION SHALL BE REDUCED TO 1.0 LB OF FLY ASH PER 1.0 LB OF CEMENT. NO PAYMENT WILL BE MADE FOR THIS SUBSTITUTION AS IT IS CONSIDERED INCIDENTAL TO THE VARIOUS PAY ITEMS.

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 20+02.90 -L-

ASSEMBLED BY : M.D. PISO	DATE : 03-22-12
CHECKED BY : A.M. LEE	DATE : 06-11-12
DRAWN BY : RH 9/98	REV. 5/1/06R TLA/GM
CHECKED BY : LES 10/98	REV. 11/30/10 WMC/GM
	REV. 10/1/11 MAA/GM

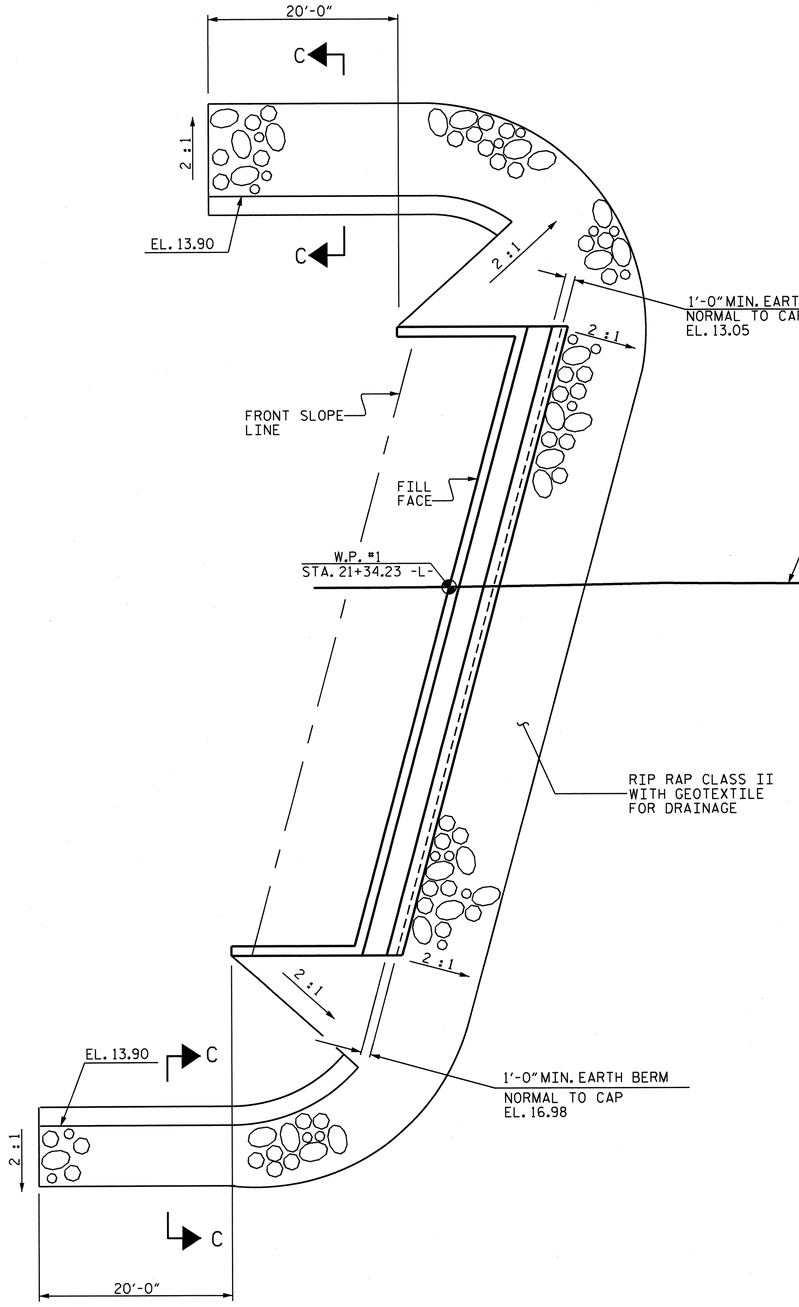
NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY E. MURRAY 1/18/13

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

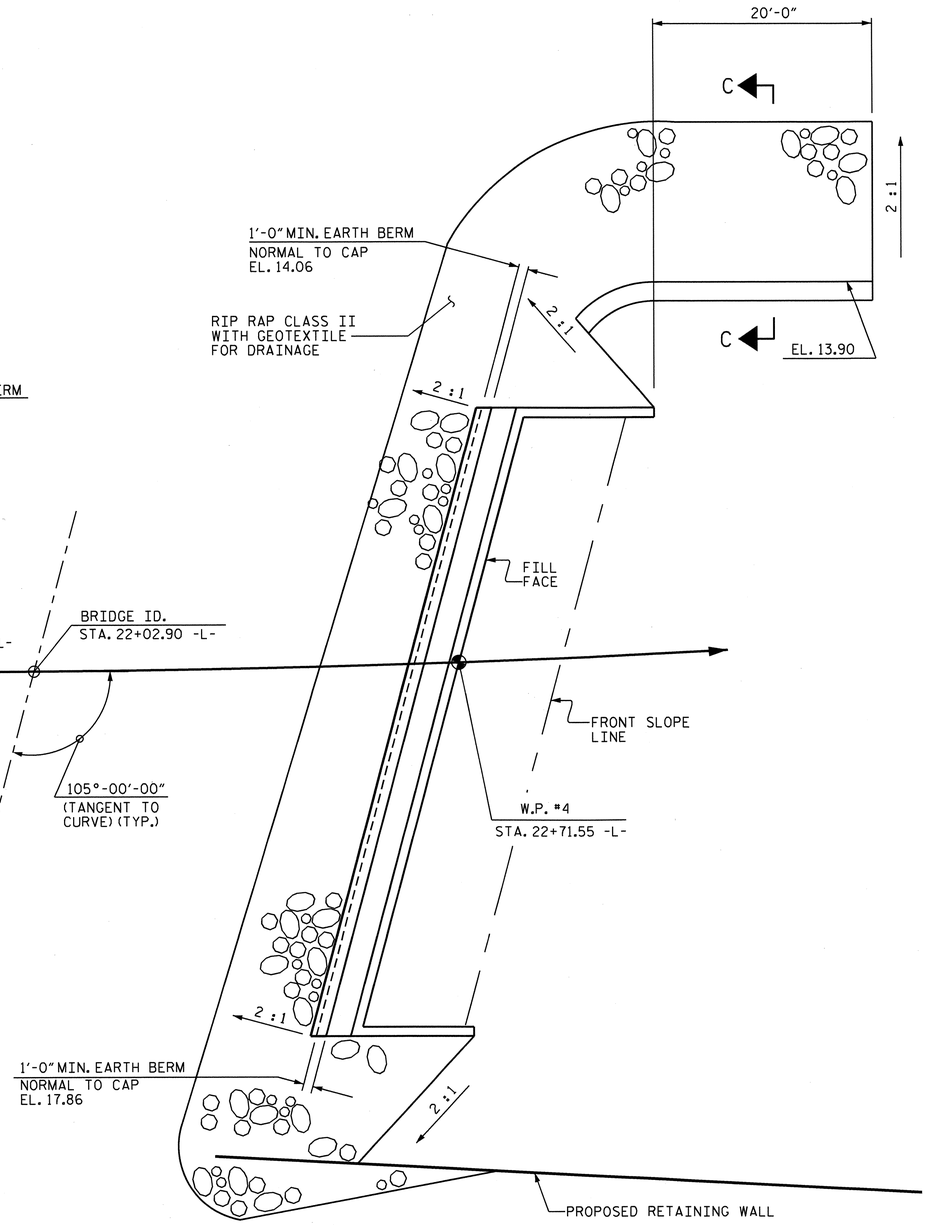
STANDARD

16" PRESTRESSED CONCRETE PILE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-39
1			3			TOTAL SHEETS
2			4			76



END BENT #1



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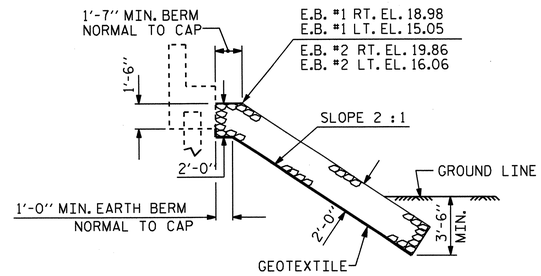
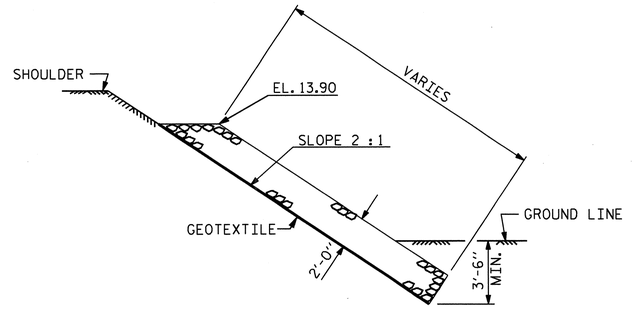


℄ SECTION
BERM RIP RAPPED



SECTION C-C

ESTIMATED QUANTITIES		
BRIDGE @ STA. 22+02.90 -L-	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE
	TONS	SQUARE YARDS
END BENT 1	230	256
END BENT 2	279	310

PROJECT NO. R-3324
BRUNSWICK COUNTY
STATION: 22+02.90 -L-

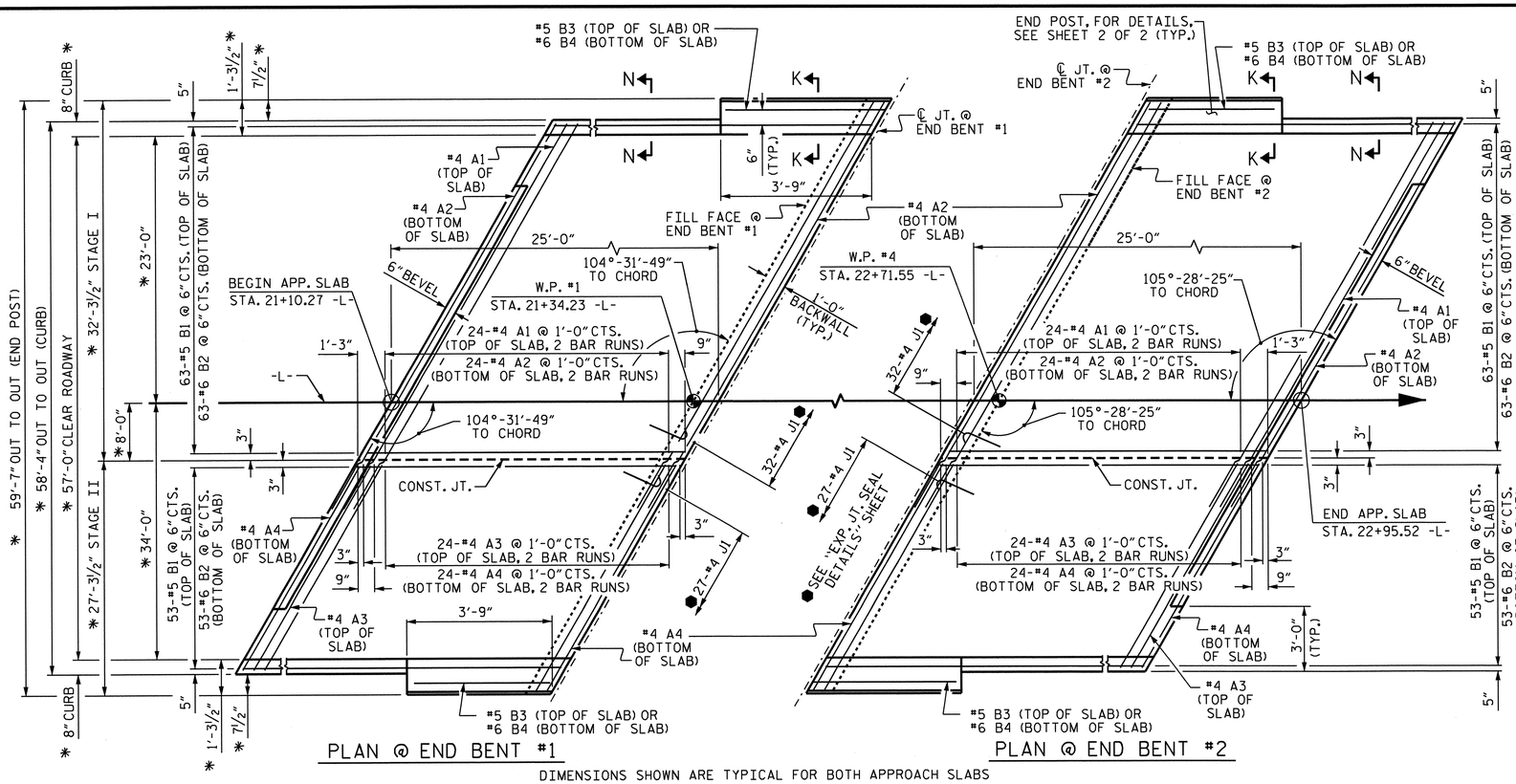
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

RIP RAP DETAILS

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY E. MURRAY
1/9/13

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-40
1			3			TOTAL SHEETS
2			4			76

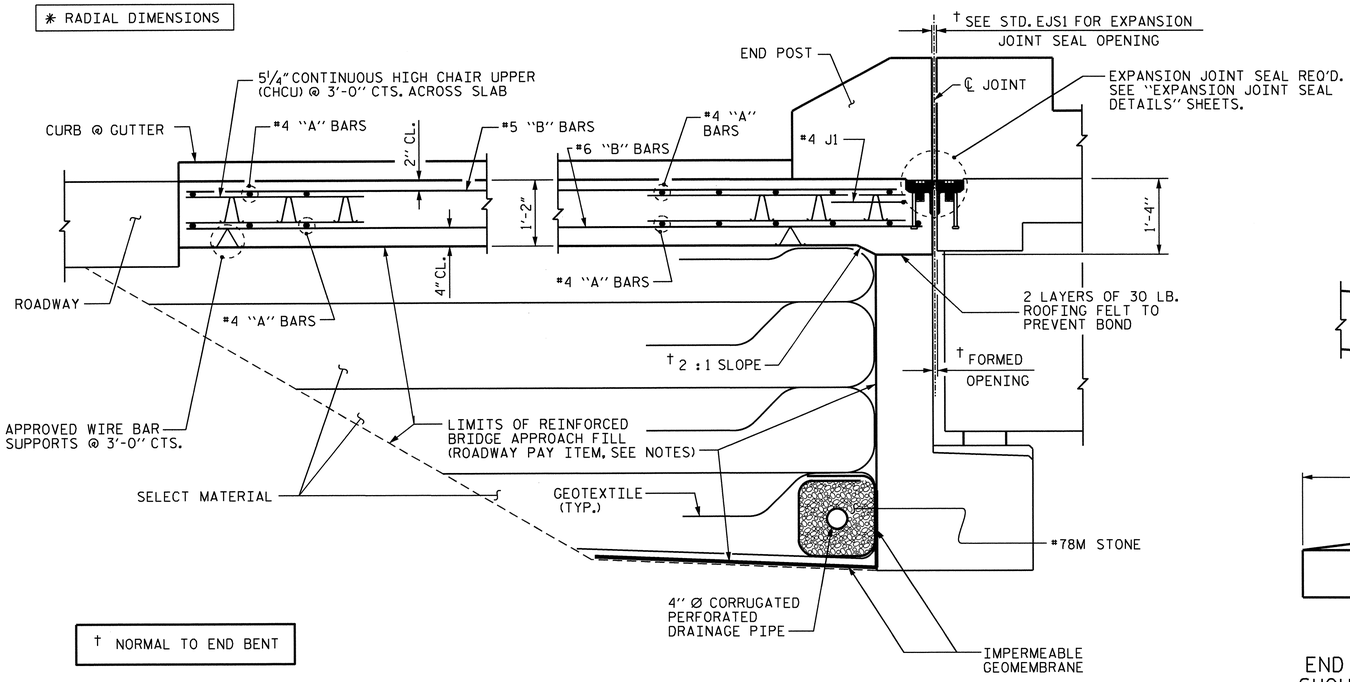
DRAWN BY : M.D.PISO DATE : 01/12/08
CHECKED BY : P.A.PARISI DATE : 10-11-12



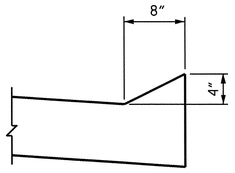
DIMENSIONS SHOWN ARE TYPICAL FOR BOTH APPROACH SLABS

* RADIAL DIMENSIONS

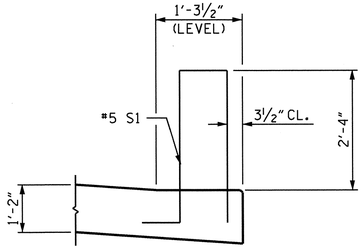
† NORMAL TO END BENT



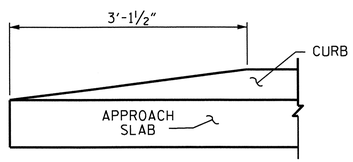
SECTION THRU SLAB



SECTION N-N



SECTION K-K



END OF CURB WITHOUT
SHOULDER BERM GUTTER

CURB DETAILS

NOTES

APPROACH SLAB FOR EACH STAGE SHALL NOT BE CONSTRUCTED PRIOR TO COMPLETION OF THE BRIDGE DECK IN EACH STAGE.

FOR REINFORCED BRIDGE APPROACH FILL INCLUDING GEOTEXTILE, IMPERMEABLE GEOMEMBRANE, 4" Ø DRAINAGE PIPE, *78M STONE, AND SELECT MATERIAL, SEE ROADWAY PLANS.

AREA BETWEEN THE WINGWALL AND APPROACH SLAB SHALL BE GRADED TO DRAIN THE WATER AWAY FROM THE FILL FACE OF THE BRIDGE AND SHALL BE PAVED. SEE ROADWAY PLANS.

FOR EXPANSION JOINT SEALS, SEE SPECIAL PROVISIONS.

ARC OFFSETS ARE NEGLIGIBLE.

THE QUANTITY OF *4 J1 BARS ON THE BILL OF MATERIAL IS BASED ON 1'-0" CENTERS. J1 BARS SHALL BE PLACED AT EACH VERTICAL STUD ANCHOR BOLT. IN THE EVENT THAT THE NUMBER OF VERTICAL STUD ANCHORS EXCEEDS THE NUMBER OF J1 BARS SPECIFIED, ADDITIONAL J1 BARS WILL NOT BE REQUIRED.

SPLICE LENGTHS		
BAR SIZE	EPOXY COATED	UNCOATED
#4	2'-0"	1'-9"
#5	2'-6"	2'-2"
#6	3'-10"	2'-7"

BILL OF MATERIAL

FOR ONE APPROACH SLAB (2 REQ'D)

STAGE I

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	50	#4	STR	18'-8"	623
* A2	52	#4	STR	18'-8"	648
* B1	63	#5	STR	23'-9"	1561
* B2	63	#6	STR	24'-7"	2326
* B3	1	#5	STR	3'-6"	4
* B4	1	#6	STR	3'-6"	5
* J1	32	#4	1	1'-5"	30

* EPOXY COATED REINFORCING STEEL ** LBS. 5197

CLASS AA CONCRETE ** C.Y. 34.4

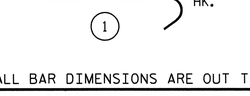
STAGE II

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A3	50	#4	STR	15'-0"	501
* A4	52	#4	STR	15'-0"	521
* B1	53	#5	STR	23'-9"	1313
* B2	53	#6	STR	24'-7"	1957
* B3	1	#5	STR	3'-6"	4
* B4	1	#6	STR	3'-6"	5
* J1	27	#4	1	1'-5"	26

* EPOXY COATED REINFORCING STEEL ** LBS. 4327

CLASS AA CONCRETE ** C.Y. 29.0

BAR TYPE



ALL BAR DIMENSIONS ARE OUT TO OUT

** QUANTITIES FOR END POST ON APPROACH SLAB ARE NOT INCLUDED. SEE SHEET 2 OF 2.

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 22+02.90 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB
FOR FLEXIBLE PAVEMENT

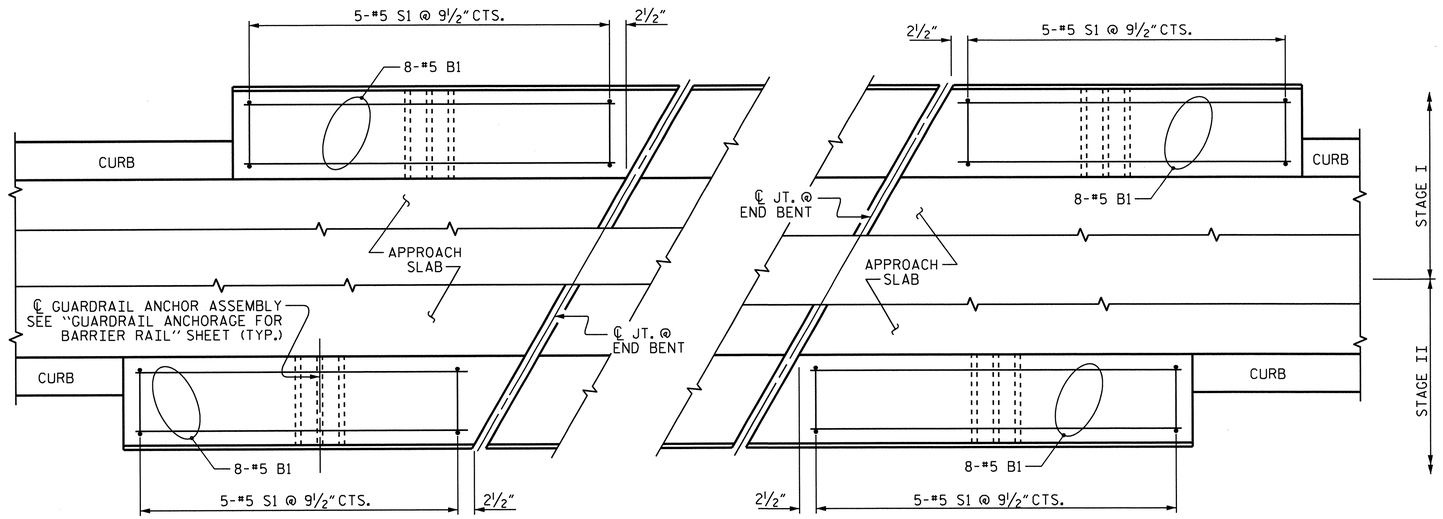
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-41
1			3			TOTAL SHEETS
2			4			76

ASSEMBLED BY : PEGGY ADKINS	DATE : 7-25-12		
CHECKED BY : A.M. LEE	DATE : 9-6-12		
DRAWN BY : EEM 3/95		REV. 5/1/03R	RWW/JTE
CHECKED BY : VAP 3/95		REV. 5/1/06RR	KMM/GM
		REV. 10/1/11	MAA/GM

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER MARY E. BURRAY 19113

04-JAN-2013 14:13

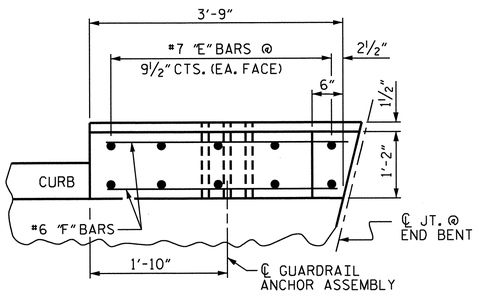
SIP NO. BA52 (SHT 1b)



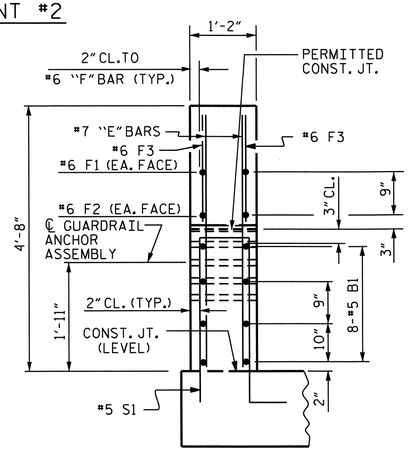
END BENT #1

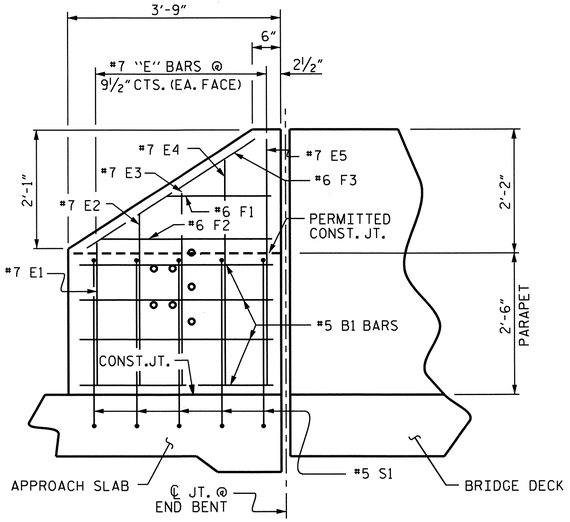
END BENT #2

PLAN OF PARAPET



PLAN OF END POST

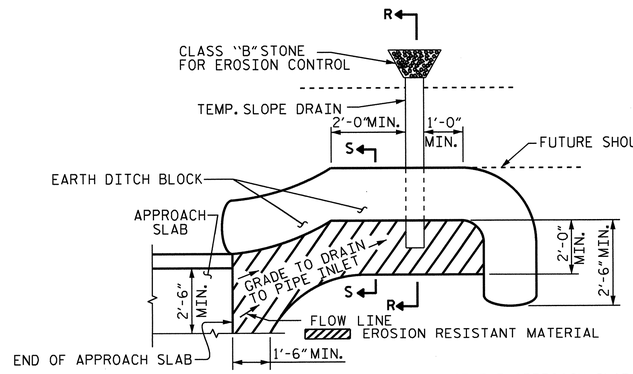




END VIEW

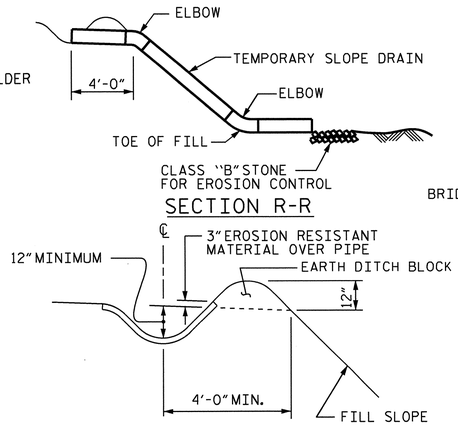
ELEVATION

PARAPET AND END POST FOR TWO BAR RAIL



NOTE: IMMEDIATELY AFTER THE CONSTRUCTION OF THE APPROACH SLAB, THE CONTRACTOR SHALL PROVIDE TEMPORARY BERM AND SLOPE DRAIN. CONTRACTOR SHALL GRADE TO PIPE INLET AND PROVIDE EROSION RESISTANT MATERIAL AS SHOWN. THE EROSION RESISTANT MATERIAL SHALL BE EITHER 1) ASPHALT PLANT MIX, TYPE 1 OR TYPE 2, MIN. 2" DEPTH, 2) EROSION CONTROL MAT, OR 3) CONCRETE, AS DIRECTED BY THE ENGINEER. THE SLOPE DRAIN SHALL CONSIST OF A NON-PERFORATED TEMPORARY DRAINAGE PIPE, 12 INCHES IN DIAMETER.

PLAN VIEW

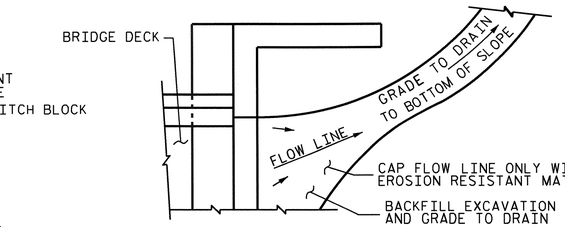


SECTION R-R

SECTION S-S

TEMPORARY BERM AND SLOPE DRAIN DETAILS

(TO BE USED WHEN SHOULDER BERM GUTTER IS REQUIRED)



NOTE: IF THE APPROACH SLAB IS NOT CONSTRUCTED IMMEDIATELY AFTER THE BACKFILLING OF THE END BENT EXCAVATION, GRADE TO DRAIN TO THE BOTTOM OF THE SLOPE AND PROVIDE EROSION RESISTANT MATERIAL, SUCH AS FIBERGLASS ROVING OR AS DIRECTED BY THE ENGINEER TO PREVENT SOIL EROSION AND TO PROTECT THE AREA ADJACENT TO THE STRUCTURE. THE CONTRACTOR WILL BE REQUIRED TO REMOVE THESE MATERIALS PRIOR TO CONSTRUCTION OF THE APPROACH SLAB.

TEMPORARY DRAINAGE DETAIL

NOTES

THE COST OF THE END POSTS ON THE APPROACH SLAB SHALL BE INCLUDED IN THE LINEAR FOOT CONTRACT PRICE BID FOR "1'-2" x 2'-6" PARAPET."

THE END POSTS ON EACH APPROACH SLAB SHALL NOT BE CAST UNTIL ALL APPROACH SLAB CONCRETE HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

ALL REINFORCING STEEL IN END POSTS SHALL BE EPOXY COATED.

BILL OF MATERIAL

STAGE I

TWO END POSTS ONLY

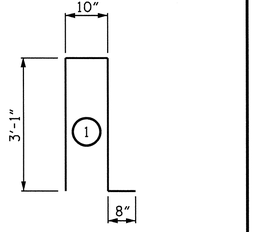
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳B1	16	#5	STR	3'-5"	57
✳E1	4	#7	STR	2'-6"	20
✳E2	4	#7	STR	3'-0"	25
✳E3	4	#7	STR	3'-6"	29
✳E4	4	#7	STR	4'-0"	33
✳E5	4	#7	STR	4'-4"	35
✳F1	4	#6	STR	1'-10"	11
✳F2	4	#6	STR	3'-0"	18
✳F3	4	#6	STR	3'-9"	23
✳S1	10	#5	1	7'-8"	80
✳EPOXY COATED REINFORCING STEEL				LBS.	331
CLASS AA CONCRETE				C.Y.	1.3
CONCRETE PARAPET				LIN.FT.	7.92

STAGE II

TWO END POSTS ONLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳B1	16	#5	STR	3'-5"	57
✳E1	4	#7	STR	2'-6"	20
✳E2	4	#7	STR	3'-0"	25
✳E3	4	#7	STR	3'-6"	29
✳E4	4	#7	STR	4'-0"	33
✳E5	4	#7	STR	4'-4"	35
✳F1	4	#6	STR	1'-10"	11
✳F2	4	#6	STR	3'-0"	18
✳F3	4	#6	STR	3'-9"	23
✳S1	10	#5	1	7'-8"	80
✳EPOXY COATED REINFORCING STEEL				LBS.	331
CLASS AA CONCRETE				C.Y.	1.3
CONCRETE PARAPET				LIN.FT.	7.92

BAR TYPE



ALL DIMENSIONS ARE OUT TO OUT

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 22+02.90 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB DETAILS

ASSEMBLED BY : PEGGY ADKINS	DATE : 7-31-12
CHECKED BY : A.M. LEE	DATE : 9-6-12

DRAWN BY : FCJ	11/88	REV. 5/7/03 RWW/JTE
CHECKED BY : ARB	11/88	REV. 5/1/06RRR MAA/KMM
		REV. 10/1/11 MAA/GM

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

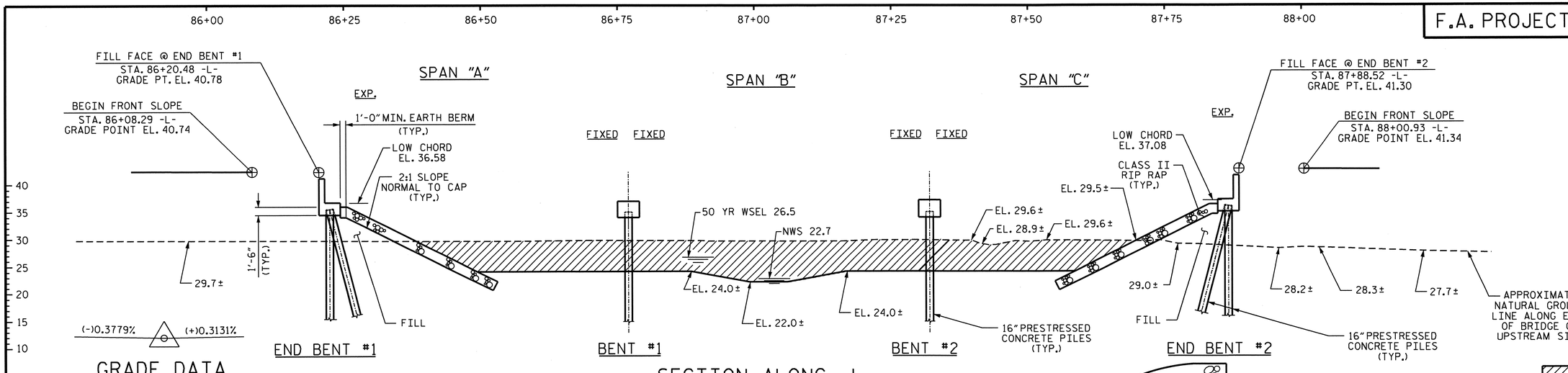
SHEET NO. S-42

TOTAL SHEETS 76

STP NO. BAS4

01-JAN-2013 14:13

F.A. PROJECT NO.: STP-133(7)

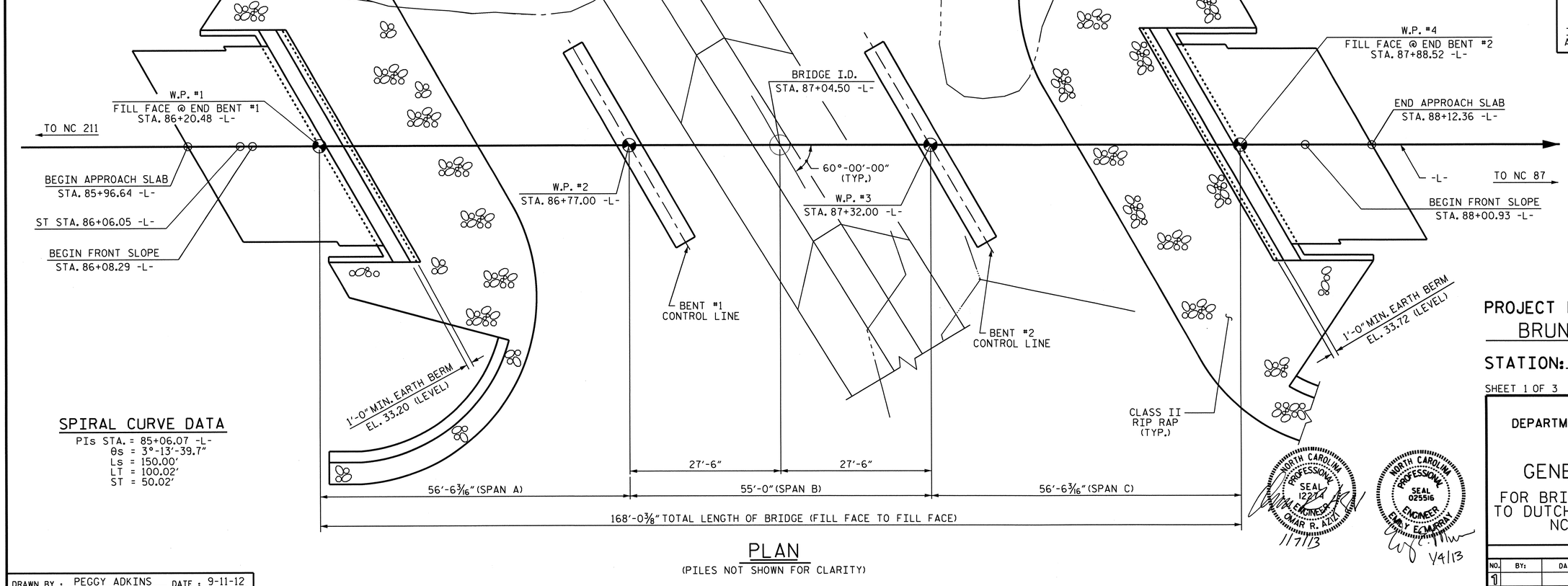


GRADE DATA

P.I. STA. = 83+50.00 -L-
EL. = 39.93'
V.C. = 300'

SECTION ALONG -L-

(BENTS ON SECTION AT RIGHT ANGLES TO BENTS)



PLAN

(PILES NOT SHOWN FOR CLARITY)

SPIRAL CURVE DATA

PIs STA. = 85+06.07 -L-
θs = 3°-13'-39.7"
Ls = 150.00'
LT = 100.02'
ST = 50.02'

I HEREBY CERTIFY THESE ARE THE AS-BUILT PLANS.

NORTH CAROLINA PROFESSIONAL SEAL 12274 ENGINEER OMAR R. AZIZ
11/7/13

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY C. McMARRY
11/4/13

PROJECT NO. R-3324
BRUNSWICK COUNTY
STATION: 87+04.50 -L-

SHEET 1 OF 3 BRIDGE NO. 231

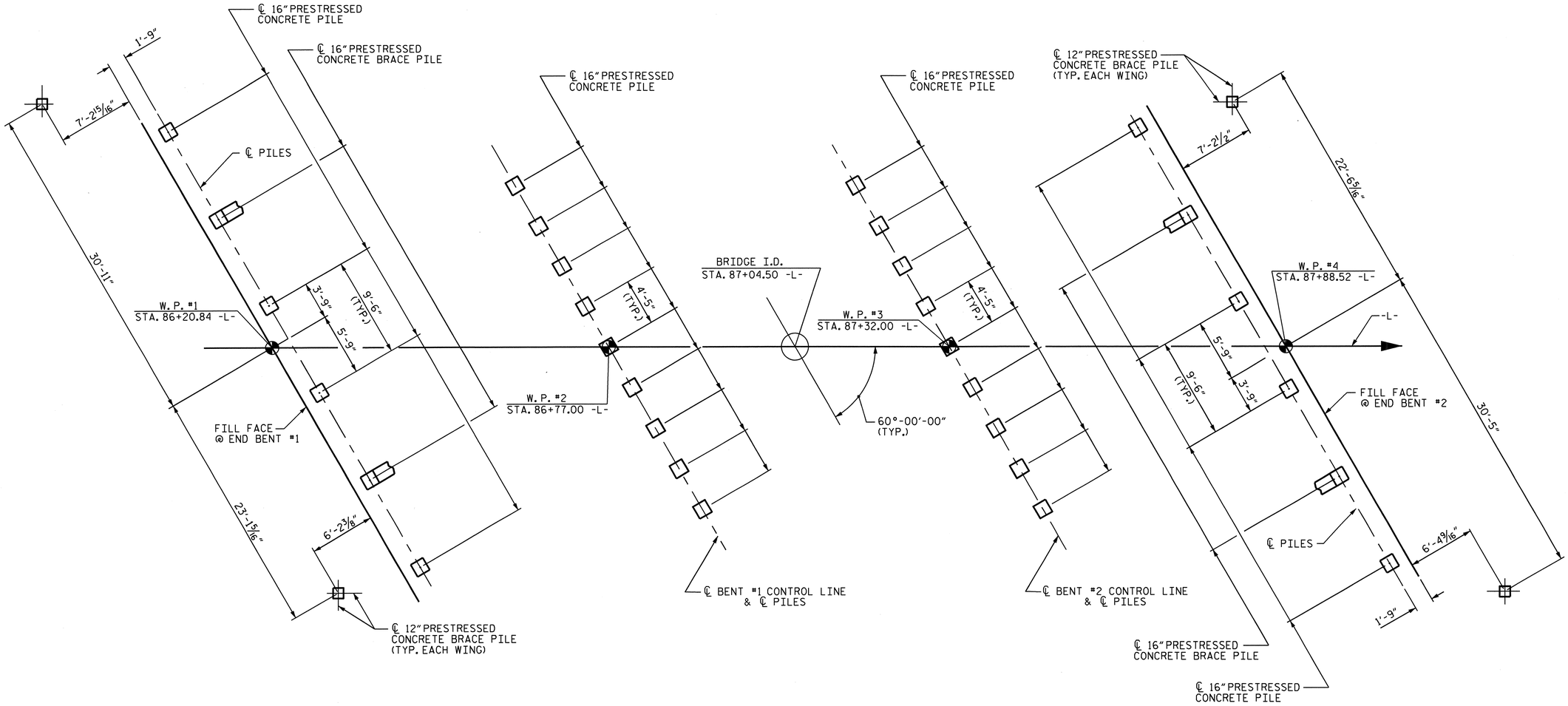
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR BRIDGE OVER TRIBUTARY TO DUTCHMAN'S CREEK BETWEEN NC 211 AND NC 87

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-43
1			3			TOTAL SHEETS
2			4			76

DRAWN BY : PEGGY ADKINS DATE : 9-11-12
CHECKED BY : T.L. AVERETTE DATE : 10-18-12



END BENT #1 BENT #1 BENT #2 END BENT #2

FOUNDATION LAYOUT

DIMENSIONS LOCATING PILES ARE SHOWN TO THE PILE CENTERLINE.
END BENT BRACE PILES ARE TO BE BATTERED AT 3:12.

NOTES:

FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

PILES AT ENDS BENT NOS. 1 & 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 85 TONS PER PILE.

PILES AT BENT NOS. 1 & 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 140 TONS PER PILE.

DRIVE PILES AT END BENT NOS. 1 & 2 TO A REQUIRED DRIVING RESISTANCE OF 115 TONS PER PILE.

DRIVE PILES AT BENT NOS. 1 & 2 TO A REQUIRED DRIVING RESISTANCE OF 230 TONS PER PILE. THIS REQUIRED DRIVING RESISTANCE INCLUDES ADDITIONAL RESISTANCE FOR DOWNDRAG OR SCOUR.

INSTALL PILES AT BENT NOS. 1 & 2 TO A TIP ELEVATION NO HIGHER THAN -3.0 FT.

THE SCOUR CRITICAL ELEVATION FOR BENT NOS. 1 & 2 IS ELEVATION 16.0 FT. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.

IT HAS BEEN ESTIMATED THAT A HAMMER WITH AN EQUIVALENT RATED ENERGY IN THE RANGE OF 55-110 FT-KIPS PER BLOW WILL BE REQUIRED TO DRIVE PILES AT BENT NOS. 1 & 2. THIS ESTIMATED ENERGY RANGE DOES NOT RELEASE THE CONTRACTOR FROM PROVIDING DRIVING EQUIPMENT IN ACCORDANCE WITH SUBARTICLE 450-3(D)(2) OF THE STANDARD SPECIFICATIONS.

TESTING THE FIRST PRODUCTION PILE WITH THE PDA DURING DRIVING, RESTRIKING OR REDRIVING IS REQUIRED AT BENT NOS. 1 & 2. FOR PDA TESTING, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS AND FOR PILE DRIVING CRITERIA, SEE PILE DRIVING CRITERIA PROVISION.

SPUDDING MAY BE USED ABOVE ELEVATION 5.0 FT.

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY E. MURRAY
1/4/13

DRAWN BY : PEGGY ADKINS DATE : 9-12-12
CHECKED BY : T.L. AVERETTE DATE : 10-18-12

PROJECT NO. R-3324
BRUNSWICK COUNTY
STATION: 87+04.50 -L-

SHEET 2 OF 3

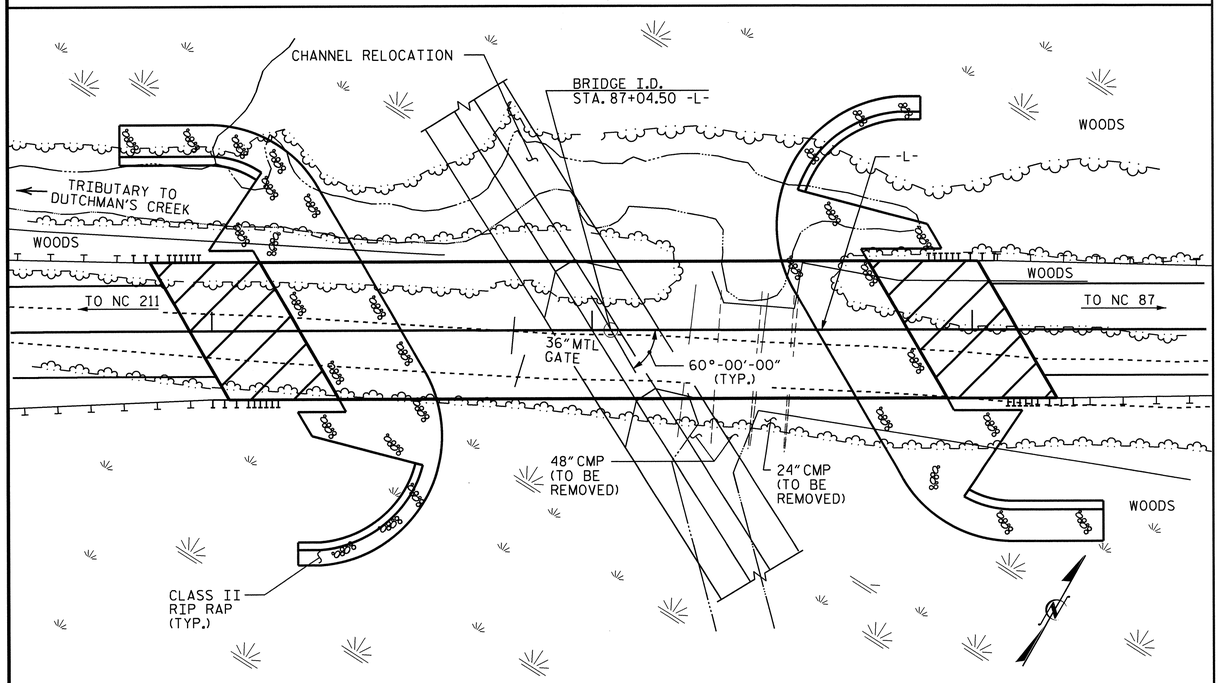
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR BRIDGE OVER TRIBUTARY TO DUTCHMAN'S CREEK BETWEEN NC 211 AND NC 87

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-44
1			3			TOTAL SHEETS
2			4			76

B.M. #43: RR SPIKE IN BASE OF 10" PINE 221' LT. OF -L- STA. 97+48, EL. 34.39'.



FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

LOCATION SKETCH

NOTES

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.

THIS BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.

THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.

THIS STRUCTURE CONTAINS THE NECESSARY CORROSION PROTECTION REQUIRED FOR A CORROSIVE SITE.

FOR OTHER DESIGN DATA AND GENERAL NOTES, SEE SHEET SN.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

THE CONTRACTOR SHALL PROVIDE INDEPENDENT ASSURANCE SAMPLES OF REINFORCING STEEL AS FOLLOWS: FOR PROJECTS REQUIRING UP TO 400 TONS OF REINFORCING STEEL, ONE 30 INCH SAMPLE OF EACH SIZE BAR USED, AND FOR PROJECTS REQUIRING OVER 400 TONS OF REINFORCING STEEL, TWO 30 INCH SAMPLES OF EACH SIZE BAR USED. THE BARS FROM WHICH THE SAMPLES ARE TAKEN MUST THEN BE SPLICED WITH REPLACEMENT BARS OF THE SIZE AND LENGTH OF THE SAMPLE, PLUS A MINIMUM LAP SPLICE OF THIRTY BAR DIAMETERS. PAYMENT FOR THE SAMPLES OF REINFORCING STEEL SHALL BE CONSIDERED INCIDENTAL TO VARIOUS PAY ITEMS.

NEEDLE BEAMS WILL NOT BE ALLOWED UNLESS OTHERWISE CALLED FOR ON THE PLANS OR APPROVED BY THE ENGINEER.

CLASS AA CONCRETE SHALL BE USED IN ALL CAST-IN-PLACE BENT CAPS AND SHALL CONTAIN CALCIUM NITRITE CORROSION INHIBITOR.

THE CONCRETE IN THE PILES OF BENT NOS. 1 & 2 SHALL CONTAIN SILICA FUME. SILICA FUME SHALL BE SUBSTITUTED FOR 5% OF THE PORTLAND CEMENT BY WEIGHT. IF THE OPTION OF ARTICLE 1024-1 OF THE STANDARD SPECIFICATIONS TO PARTIALLY SUBSTITUTE CLASS F FLY ASH FOR PORTLAND CEMENT IS EXERCISED, THEN THE RATE OF FLY ASH SUBSTITUTION SHALL BE REDUCED TO 1.0 LB OF FLY ASH PER 1.0 LB OF CEMENT. NO PAYMENT WILL BE MADE FOR THIS SUBSTITUTION AS IT IS CONSIDERED INCIDENTAL TO THE VARIOUS PAY ITEMS.

THE MATERIAL SHOWN IN THE CROSS-HATCHED AREA SHALL BE EXCAVATED FOR A DISTANCE OF 30 FT. LEFT AND OF 45 FT. RIGHT OF CENTERLINE ROADWAY AS DIRECTED BY THE ENGINEER. THIS WORK WILL BE PAID FOR AT THE CONTRACT LUMP SUM PRICE FOR UNCLASSIFIED STRUCTURE EXCAVATION. SEE SECTION 412 OF THE STANDARD SPECIFICATIONS.

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

ALL METALIZED SURFACES SHALL RECEIVE A SEAL COATING AS SPECIFIED IN THE SPECIAL PROVISION FOR THERMAL SPRAYED COATINGS (METALIZATION).

ALL BAR SUPPORTS USED IN THE BARRIER RAIL, DECK, BENT CAPS AND ALL INCIDENTAL REINFORCING STEEL SHALL BE EPOXY COATED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

THIS STRUCTURE HAS BEEN DESIGNED IN ACCORDANCE WITH "HEC 18 - EVALUATING SCOUR AT BRIDGES."

TOTAL BILL OF MATERIAL

	PDA TESTING	UNCLASSIFIED STRUCTURE EXCAVATION	REINFORCED CONCRETE DECK SLAB	GROOVING BRIDGE FLOORS	CLASS AA CONCRETE	BRIDGE APPROACH SLABS	EPOXY COATED REINFORCING STEEL	36" PRESTRESSED CONCRETE GIRDERS		12" PRESTRESSED CONCRETE PILES		16" PRESTRESSED CONCRETE PILES		PILE REDRIVES	CONCRETE BARRIER RAIL	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE	ELASTOMERIC BEARINGS	EXPANSION JOINT SEALS
	EACH	LUMP SUM	SQ. FT.	SQ. FT.	CU. YDS.	LUMP SUM	LBS.	NO.	LIN. FT.	NO.	LIN. FT.	NO.	LIN. FT.	EACH	LIN. FT.	TONS	SQ. YDS.	LUMP SUM	LUMP SUM
SUPERSTRUCTURE			6334	6786		LUMP SUM		15	812.50						372.92			LUMP SUM	LUMP SUM
END BENT NO. 1					31.4		4883			2	100	6	300	3		307	341		
BENT NO. 1	1				19.5		3092					9	630	5					
BENT NO. 2	1				19.5		3092					9	630	5					
END BENT NO. 2					31.5		4894			2	80	6	240	3		326	362		
TOTAL	2	LUMP SUM	6334	6786	101.9	LUMP SUM	15961	15	812.50	4	180	30	1800	16	372.92	633	703	LUMP SUM	LUMP SUM

HYDRAULIC DATA

DESIGN DISCHARGE	=	496 C.F.S.
FREQUENCY OF DESIGN FLOOD	=	50 YR.
DESIGN HIGH WATER ELEVATION	=	26.5'
DRAINAGE AREA	=	1.5 SQ. MI.
BASE DISCHARGE (Q100)	=	629 C.F.S.
BASE HIGH WATER ELEVATION	=	27.0'

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE	=	N/A
FREQUENCY OF OVERTOPPING FLOOD	=	500+ YR.
OVERTOPPING FLOOD ELEVATION	=	N/A

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY G. MURRAY 1/4/13

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 87+04.50 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR BRIDGE OVER TRIBUTARY TO DUTCHMAN'S CREEK BETWEEN NC 211 AND NC 87

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-45
1			3			TOTAL SHEETS
2			4			76

DRAWN BY : PEGGY ADKINS DATE : 9-11-12
CHECKED BY : T.L. AVERETTE DATE : 10-18-12

LOAD AND RESISTANCE FACTOR RATING (LRFR) SUMMARY FOR PRESTRESSED CONCRETE GIRDERS

LEVEL		VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING (#)	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE											SERVICE III LIMIT STATE						COMMENT NUMBER
								MOMENT					SHEAR						MOMENT						
							LIVE-LOAD FACTORS (γ_{LL})	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	LIVE-LOAD FACTORS (γ_{LL})	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING		HL-93 (INVENTORY)	N/A	(1)	1.123	---	1.75	0.695	2.08	C	ER	26.417	0.911	2.76	C	I	2.642	0.80	0.911	1.12	C	I	26.417	
		HL-93 (OPERATING)	N/A		2.7	---	1.35	0.695	2.7	C	ER	26.417	0.911	3.57	C	I	2.642	N/A	--	--	--	--	—	
		HS-20 (INVENTORY)	36.000	(2)	1.403	50.514	1.75	0.695	2.6	C	ER	26.417	0.911	3.32	C	I	2.642	0.80	0.659	1.40	C	I	26.417	
		HS-20 (OPERATING)	36.000		3.374	121.479	1.35	0.695	3.37	C	ER	26.417	0.911	4.31	C	I	2.642	N/A	--	--	--	--	—	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		2.927	39.521	1.40	0.695	6.79	C	ER	26.417	0.911	9.51	C	I	2.642	0.80	0.659	2.93	C	I	26.417	
		SNGARBS2	20.000		2.281	45.613	1.40	0.695	5.29	C	ER	26.417	0.911	6.88	C	I	2.642	0.80	0.659	2.28	C	I	26.417	
		SNAGRIS2	22.000		2.204	48.491	1.40	0.695	5.08	C	ER	21.134	0.911	6.43	C	I	2.642	0.80	0.659	2.20	C	I	26.417	
		SNCOTTS3	27.250		1.46	39.772	1.40	0.695	3.38	C	ER	26.417	0.911	4.76	C	I	2.642	0.80	0.659	1.46	C	I	26.417	
		SNAGGRS4	34.925		1.257	43.909	1.40	0.695	2.92	C	ER	26.417	0.911	4.03	C	I	2.642	0.80	0.659	1.26	C	I	26.417	
		SNS5A	35.550		1.227	43.614	1.40	0.695	2.84	C	ER	26.417	0.911	4.13	C	I	2.642	0.80	0.659	1.23	C	I	26.417	
		SNS6A	39.950		1.142	45.621	1.40	0.695	2.65	C	ER	26.417	0.911	3.8	C	I	2.642	0.80	0.659	1.14	C	I	26.417	
		SNS7B	42.000		1.088	45.701	1.40	0.695	2.52	C	ER	26.417	0.911	3.78	C	I	2.642	0.80	0.659	1.09	C	I	26.417	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.397	46.116	1.40	0.695	3.24	C	ER	26.417	0.911	4.49	C	I	2.642	0.80	0.659	1.40	C	I	26.417	
		TNT4A	33.075		1.408	46.576	1.40	0.695	3.27	C	ER	26.417	0.911	4.34	C	I	2.642	0.80	0.659	1.41	C	I	26.417	
		TNT6A	41.600		1.168	48.575	1.40	0.695	2.71	C	ER	26.417	0.911	4.12	C	I	2.642	0.80	0.659	1.17	C	I	26.417	
		TNT7A	42.000		1.182	49.66	1.40	0.695	2.74	C	ER	26.417	0.911	3.88	C	I	2.642	0.80	0.659	1.18	C	I	26.417	
		TNT7B	42.000		1.234	51.818	1.40	0.695	2.86	C	ER	26.417	0.911	3.66	C	I	2.642	0.80	0.659	1.23	C	I	26.417	
		TNAGRIT4	43.000		1.168	50.236	1.40	0.695	2.71	C	ER	26.417	0.911	3.53	C	I	2.642	0.80	0.659	1.17	C	I	26.417	
		TNAGT5A	45.000		1.094	49.224	1.40	0.695	2.54	C	ER	26.417	0.911	3.56	C	I	2.642	0.80	0.659	1.09	C	I	26.417	
		TNAGT5B	45.000	(3)	1.074	48.325	1.40	0.695	2.49	C	ER	26.417	0.911	3.35	C	I	2.642	0.80	0.659	1.07	C	I	26.417	

LOAD FACTORS:

DESIGN LOAD RATING FACTORS	LIMIT STATE	γ_{DC}	γ_{DW}
	STRENGTH I	1.25	1.50
	SERVICE III	1.00	1.00

NOTES:

MINIMUM RATING FACTORS ARE BASED ON THE STRENGTH I AND SERVICE III LIMIT STATES.

ALLOWABLE STRESSES FOR SERVICE III LIMIT STATE ARE AS REQUIRED FOR DESIGN.

COMMENTS:

1.
2.
3.
4.

(#) CONTROLLING LOAD RATING

(1) DESIGN LOAD RATING (HL-93)

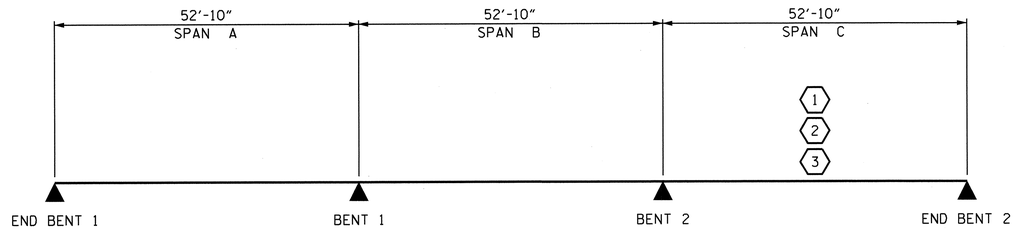
(2) DESIGN LOAD RATING (HS-20)

(3) LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

I - INTERIOR GIRDER
EL - EXTERIOR LEFT GIRDER
ER - EXTERIOR RIGHT GIRDER



LRFR SUMMARY

SPAN LENGTHS SHOWN ARE BEARING TO BEARING.

PROJECT NO. B-3324

BRUNSWICK COUNTY

STATION: 87+04.50 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

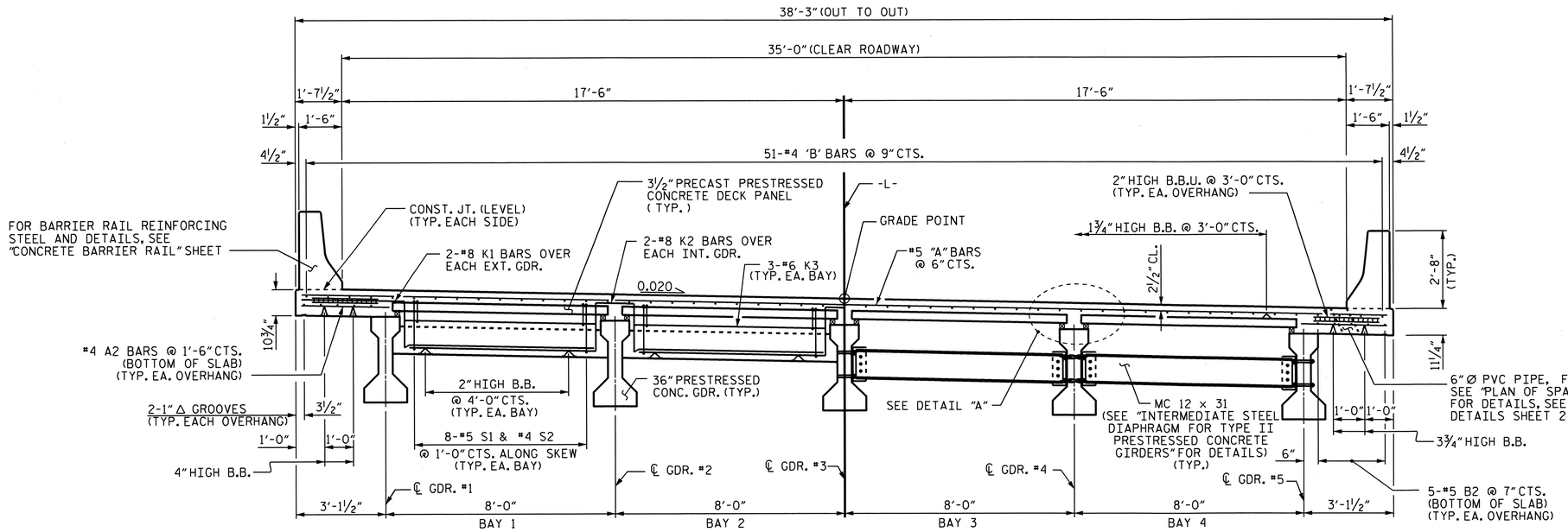
LRFR SUMMARY FOR PRESTRESSED CONCRETE GIRDERS
(NON-INTERSTATE TRAFFIC)

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER MARY E. HARRIS
1/14/13

ASSEMBLED BY : PEGGY ADKINS DATE : 11-6-12	
CHECKED BY : T.L. AVERETTE DATE : 11-6-12	
DRAWN BY : MAA 1/08	REV. 11/12/08RR MAA/GM
CHECKED BY : GM/DI 2/08	REV. 10/1/11 MAA/GM

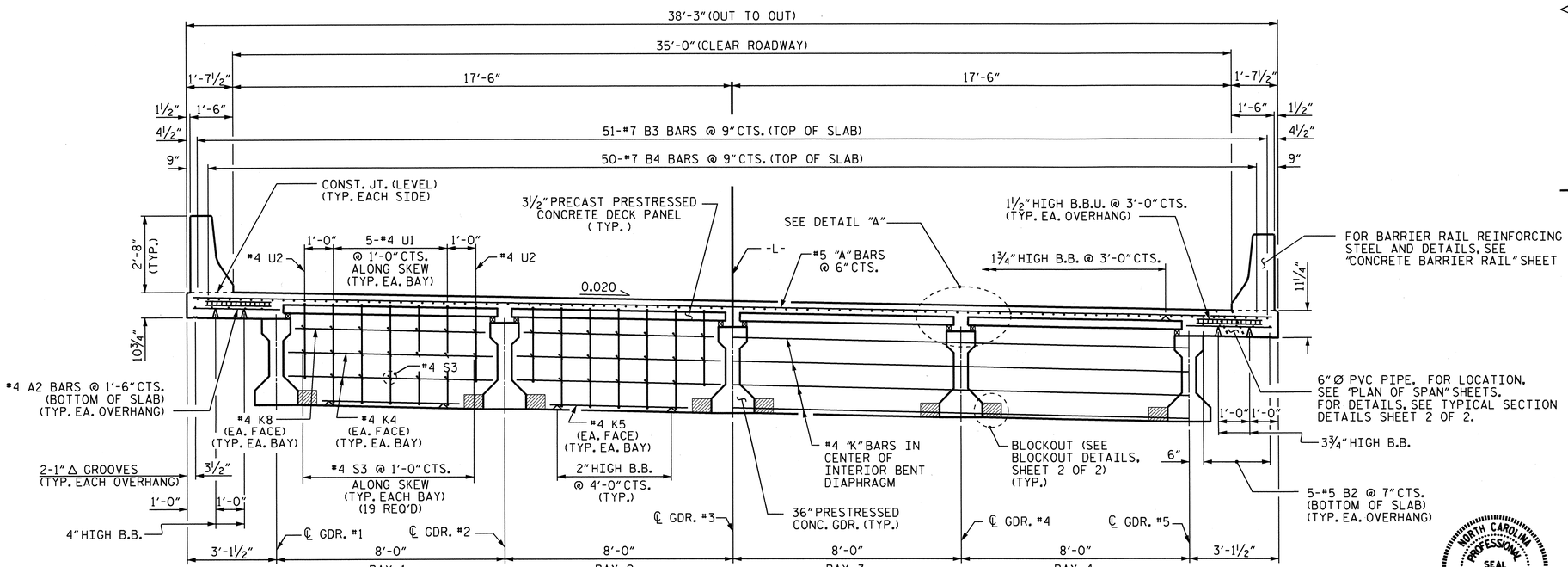
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-46
1			3			TOTAL SHEETS
2			4			76

STD NO. LRFR1

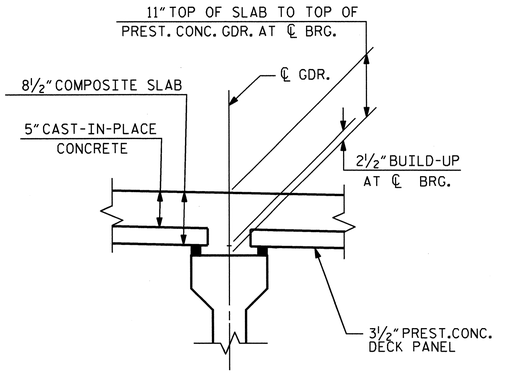


TYPICAL HALF SECTION
SHOWING END BENT DIAPHRAGMS

TYPICAL HALF SECTION
SHOWING INTERMEDIATE STEEL DIAPHRAGMS



TYPICAL SECTION
SHOWING BENT DIAPHRAGMS



DETAIL "A"

NOTES

LONGITUDINAL STEEL MAY BE SHIFTED SLIGHTLY, AS NECESSARY, TO AVOID INTERFERENCE WITH STIRRUPS IN PRESTRESSED CONCRETE GIRDERS AND DRAIN PIPES IN DECK.

BARRIER RAIL IN A CONTINUOUS UNIT SHALL NOT BE CAST UNTIL ALL SLAB CONCRETE IN THE UNIT HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

PREVIOUSLY CAST CONCRETE IN A CONTINUOUS UNIT SHALL HAVE ATTAINED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI BEFORE ADDITIONAL CONCRETE IS CAST IN THE UNIT.

#5 GI BAR MAY BE SHIFTED SLIGHTLY, AS NECESSARY, TO CLEAR REINFORCING STEEL AND STIRRUPS.

THE SKEWED END CONDITIONS AT THE END BENTS ARE SUCH THAT THE USE OF 4' WIDE PRESTRESSED CONCRETE DECK PANELS IS NOT POSSIBLE; USE OF 8' WIDE PRESTRESSED CONCRETE DECK PANELS IS NECESSARY.

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 87+04.50 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

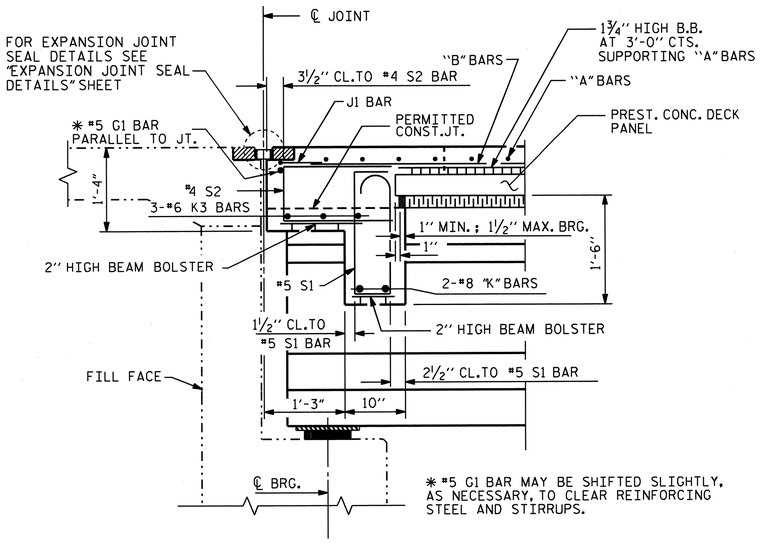
TYPICAL SECTION

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-47
1			3			TOTAL SHEETS
2			4			76

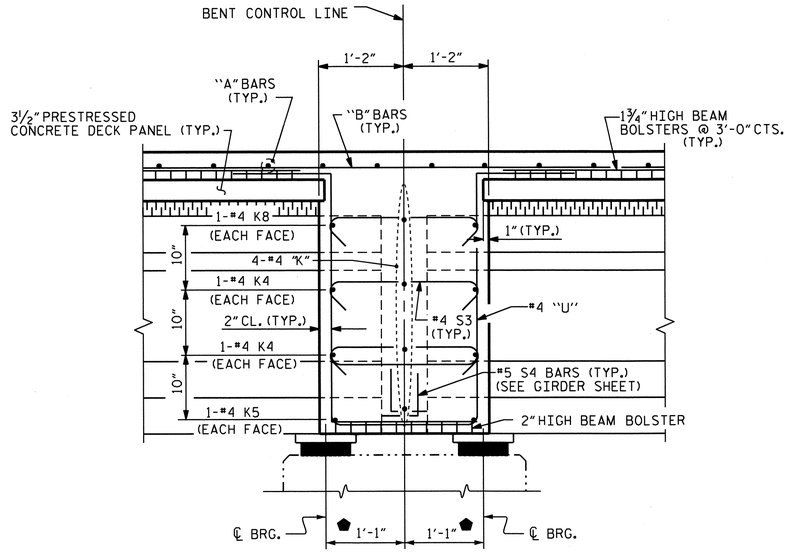
NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY E. MURRAY

1/4/13

DRAWN BY : M. GUDLAUGSSON DATE : 12/08
CHECKED BY : P. PARISI DATE : 01/09

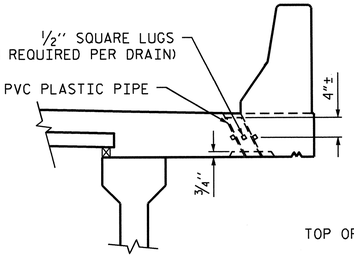


SECTION THRU END BENT DIAPHRAGM

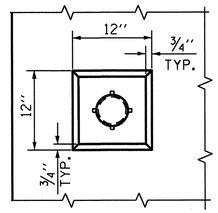


SECTION THRU BENT DIAPHRAGM

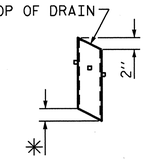
⬟ MEASURED ALONG ℄ GDR.



ELEVATION



PLAN OF RECESS



* TO BE SET TO MATCH SLOPE OF BOTTOM OF OVERHANG (8 DRAINS REQUIRED)

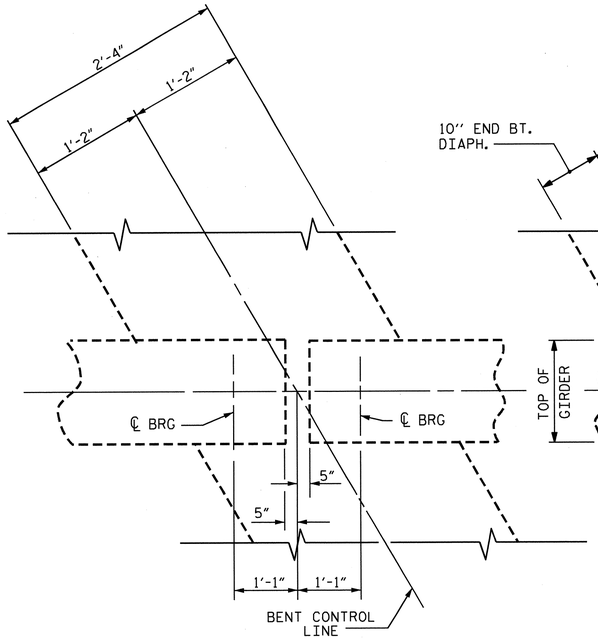
PIPE DETAIL

TOP OF FLOOR DRAINS TO BE SET ⅜" BELOW SURFACE OF SLAB.

4 - ½" SQUARE LUGS TO BE GLUED TO THE P.V.C. PLASTIC PIPE AT EQUAL SPACES AROUND THE PIPE DRAIN APPROXIMATELY 4" FROM THE TOP OF THE PIPE.

THE 6" Ø PVC PLASTIC PIPE AND FITTINGS SHALL BE SCHEDULE 40 AND CONFORM TO ASTM D1785.

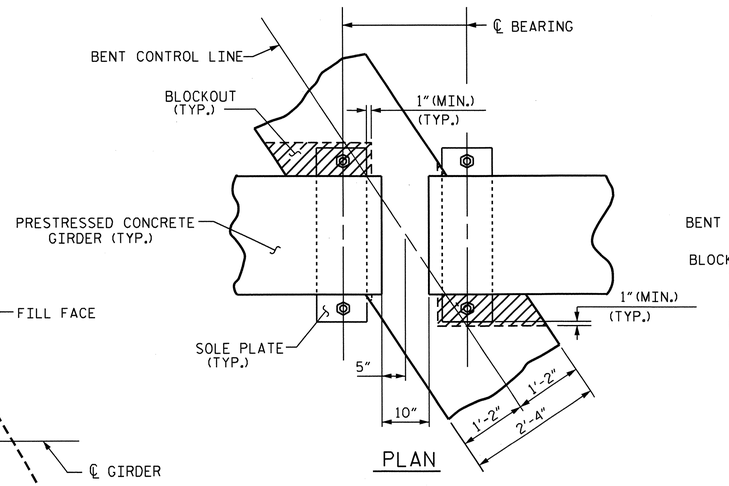
DRAIN DETAILS



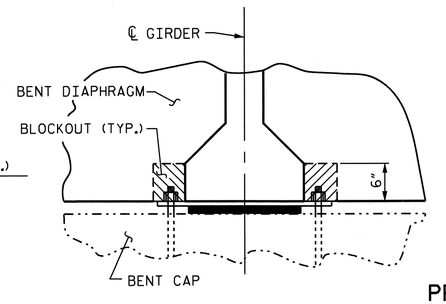
BENT DIAPHRAGM

END BENT DIAPHRAGM

PLAN



PLAN



SECTION

BENT DIAPHRAGM BLOCK-OUT DETAIL

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 87+04.50 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
TYPICAL SECTION
DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-48
1			3			TOTAL SHEETS
2			4			76

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER BARRY E. MURRAY

V4/13

DRAWN BY : M. GUDLAUGSSON DATE : 12/08
CHECKED BY : P. PARISI DATE : 01/09

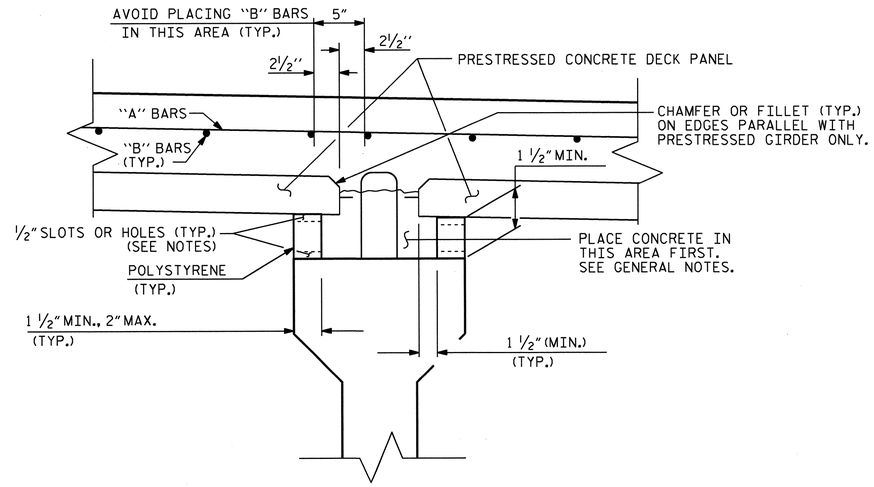
08 NOV 2013 10:01

DECK PANEL SUPPORTS

THE CONTRACTOR SHALL PROVIDE THE DECK PANEL SUPPORT SYSTEM SHOWN OR HE MAY SUBMIT A DECK PANEL SUPPORT SYSTEM OF HIS OWN DESIGN TO THE ENGINEER FOR APPROVAL.

POLYSTYRENE SUPPORT SYSTEM

1. ALL POLYSTYRENE SHALL BE DOW STYROFOAM 60 HIGH-LOAD, UC INDUSTRIES FOAMULAR 600 OR APPROVED EQUAL.
2. THE POLYSTYRENE SUPPORT SYSTEM SHALL CONSIST OF ONE LAYER WITH A MINIMUM WIDTH OF 1½" AND A MAXIMUM WIDTH OF 2". THE POLYSTYRENE SHALL HAVE ½" X ½" WIDE SLOTS OR ½" DIAMETER HOLES AT 4'-0" CENTERS STAGGERED ALONG THE TOP AND BOTTOM.
3. THE POLYSTYRENE MAY BE CUT AND PLACED ON EDGE AS NECESSARY TO MATCH THE REQUIRED BUILDUP PROFILE ALONG THE GIRDER.
4. ADHESIVE, AS APPROVED BY THE ENGINEER, SHALL BE APPLIED TO THE TOP OF THE GIRDER IN A CONTINUOUS BEAD AND IN SUFFICIENT AMOUNT TO PREVENT THE POLYSTYRENE FROM BLOWING OUT AND TO PREVENT GAPS FROM FORMING BETWEEN THE POLYSTYRENE AND THE GIRDER. PRIOR TO PLACEMENT OF THE DECK PANELS, THE ADHESIVE SHALL ALSO BE APPLIED TO THE TOP OF THE POLYSTYRENE.
5. CONCRETE-FILLED BUCKETS, STACKS OF DECK PANELS, BUNDLED REINFORCING BARS OR OTHER HEAVY CONCENTRATED LOADS WILL NOT BE PERMITTED ON THE DECK PANEL ONCE THE PANEL HAS BEEN PLACED ON THE POLYSTYRENE SUPPORT SYSTEM.



POLYSTYRENE SUPPORT

GENERAL NOTES

1. THE DESIGN COMPRESSIVE STRENGTH (f'c) FOR THE CONCRETE IN PRESTRESSED PANELS SHALL BE 5000 PSI MINIMUM AT 28 DAYS. COMPRESSIVE STRENGTH OF CONCRETE AT TIME OF RELEASE OF STRANDS SHALL BE 4000 PSI MINIMUM.
2. THE PRECAST PRESTRESSED PANEL SHALL HAVE A THICKNESS OF 3 ½" WITH THE PRESTRESSED STRANDS LOCATED AT HALF THE DEPTH OF THE PANEL.
3. FOR SKEWED SPANS, TRAPEZOIDAL CLOSURE PANELS SHALL HAVE A MINIMUM WIDTH OF 2 FEET ON THE SHORT SIDE.
4. ALL PRESTRESSING STRANDS SHALL EXTEND 2" BEYOND THE PANEL EDGES.
5. SHEAR REINFORCING OF 0.60 SQ. INCHES OF REINFORCING STEEL PER 10 SQ. FEET OF PANEL SURFACE SHALL BE PROVIDED IN THE PANEL TO ENSURE COMPOSITE ACTION BETWEEN PANEL AND THE CAST-IN-PLACE CONCRETE. SHEAR REINFORCEMENT SHALL BE MADE OF WELDED WIRE HAVING A MINIMUM YIELD STRENGTH OF 60 KSI.
6. SHEAR REINFORCEMENT AND LIFTING DEVICES SHALL BE CONSTRUCTED AND PLACED SO AS TO AVOID ANY INTERFERENCE WITH REINFORCING STEEL IN THE CAST-IN-PLACE DECK SLAB AND TO ALLOW FOR PROPER CONCRETE CONSOLIDATION IN THE DECK PANEL.
7. SHIFT LONGITUDINAL "B" BARS AS NECESSARY TO OBTAIN A MINIMUM CLEAR DISTANCE OF 2 ½" TO THE RIGHT OR LEFT OF THE EDGE OF THE DECK PANEL. IF, IN SHIFTING TO OBTAIN THIS CLEARANCE, THE "B" BAR INTERFERES WITH THE STIRRUP IN THE TOP OF THE GIRDER THE "B" BAR MAY BE ELIMINATED.
8. WHEN CASTING THE DECK, PLACE CONCRETE FIRST OVER THE GIRDERS IN CONTINUOUS STRIPS A MINIMUM OF THREE PANEL LENGTHS AHEAD OF THE REST OF THE CONCRETE. CAREFULLY VIBRATE THE CONCRETE OVER THE GIRDERS SO THAT CONCRETE COMPLETELY FILLS THE AREA UNDER THE DECK PANEL OVERHANGS. THEN PLACE AND VIBRATE THE REMAINING DECK CONCRETE.
9. PRESTRESSED CONCRETE DECK PANELS SHALL CONTAIN CALCIUM NITRITE CORROSION INHIBITOR.
10. PRECAST PANELS SHALL BE DESIGNED FOR AN ALLOWABLE TENSILE STRESS OF 0 PSI IN THE PRECOMPRESSED TENSILE ZONE UNDER ALL LOADING CONDITIONS.

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 87+04.50 -L-

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY E. MURRAY

1/4/13

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

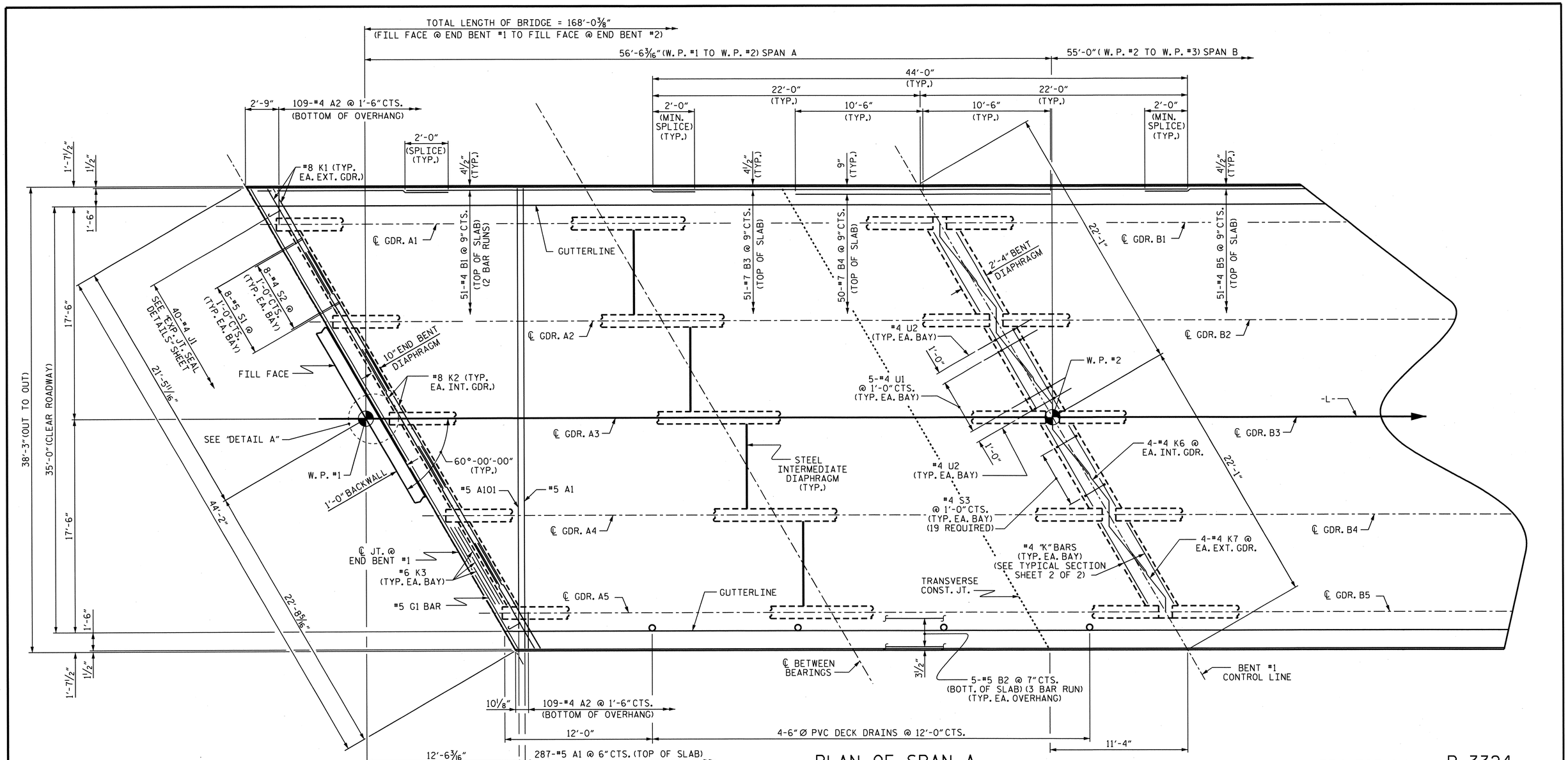
STANDARD

PRECAST PRESTRESSED CONCRETE DECK PANELS

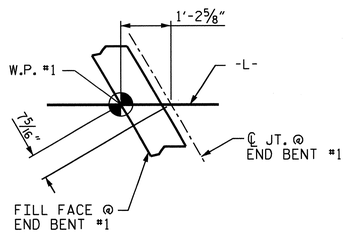
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-49
1			3			TOTAL SHEETS
2			4			76

ASSEMBLED BY : PEGGY ADKINS	DATE : 9-14-12	REV. 5/7/03R	RWW/JTE
CHECKED BY : A.M. LEE	DATE : 9-14-12	REV. 5/1/06R	TLA/GM
DRAWN BY : ELR 1/92		REV. 10/1/11	MAA/GM
CHECKED BY : GRP 4/92			

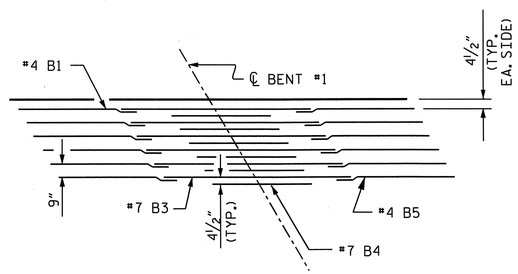
STD. NO. BDP1



PLAN OF SPAN A



DETAIL A



REINFORCING STEEL LAYOUT AT BENT #1

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 87+04.50 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

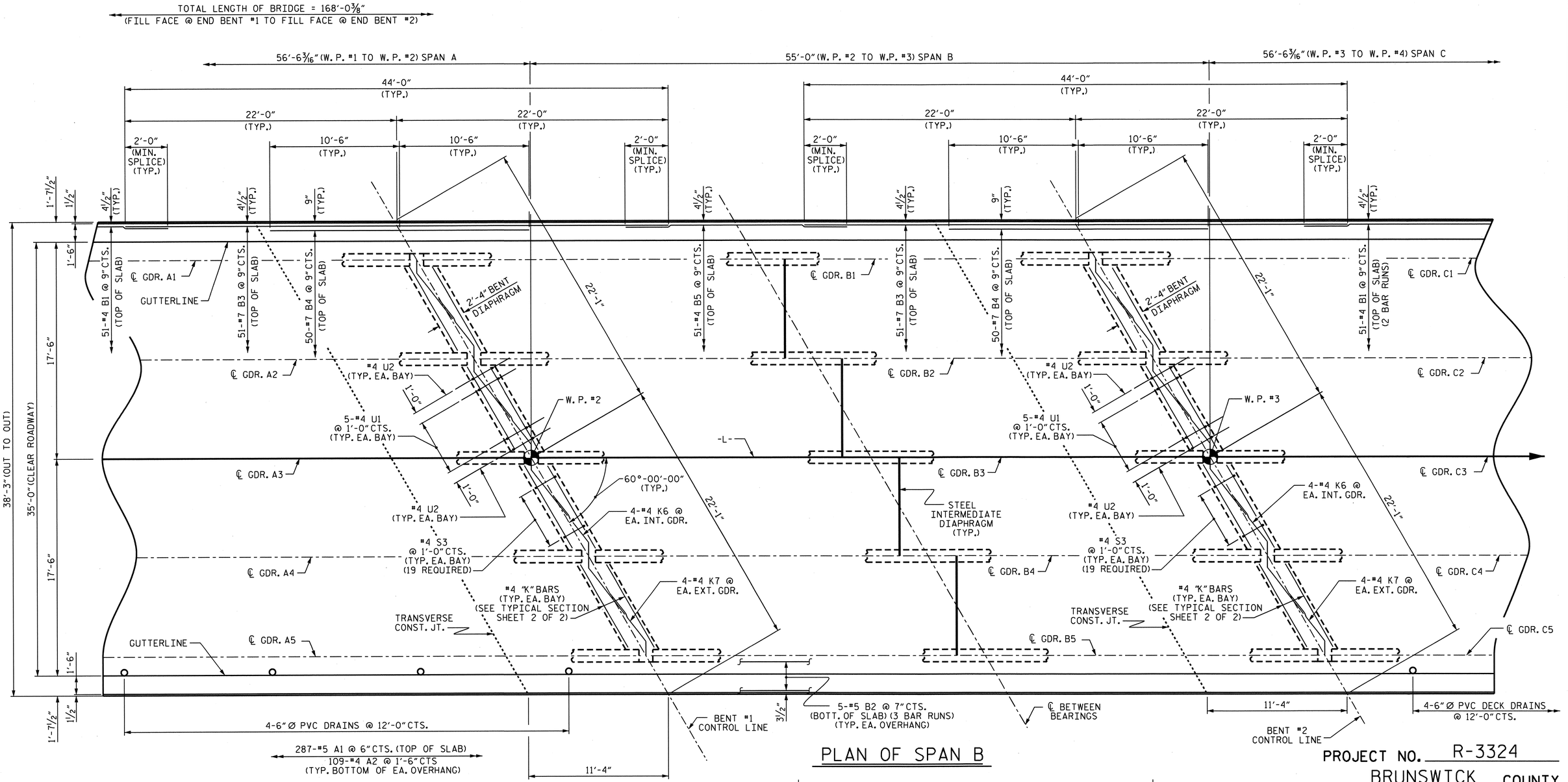
PLAN OF SPAN A

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-50
1			3			TOTAL SHEETS
2			4			76

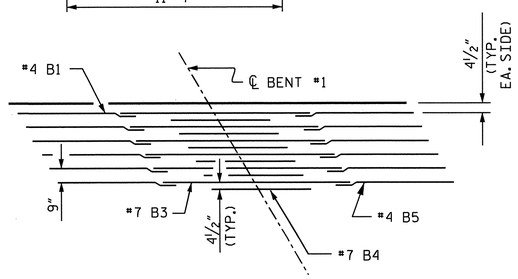
DRAWN BY : M. GUDLAUGSSON DATE : 12/08
CHECKED BY : P. PARISI DATE : 01/09

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY E. MURRAY

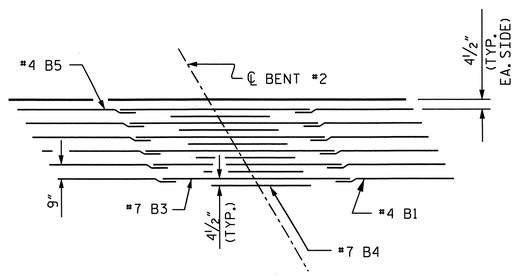
V4113



PLAN OF SPAN B



REINFORCING STEEL LAYOUT AT BENT #1



REINFORCING STEEL LAYOUT AT BENT #2

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMMY E. MURRAY 1/4/13

DRAWN BY : M. GUDLAUGSSON DATE : 12/08
CHECKED BY : P. PARISI DATE : 01/09

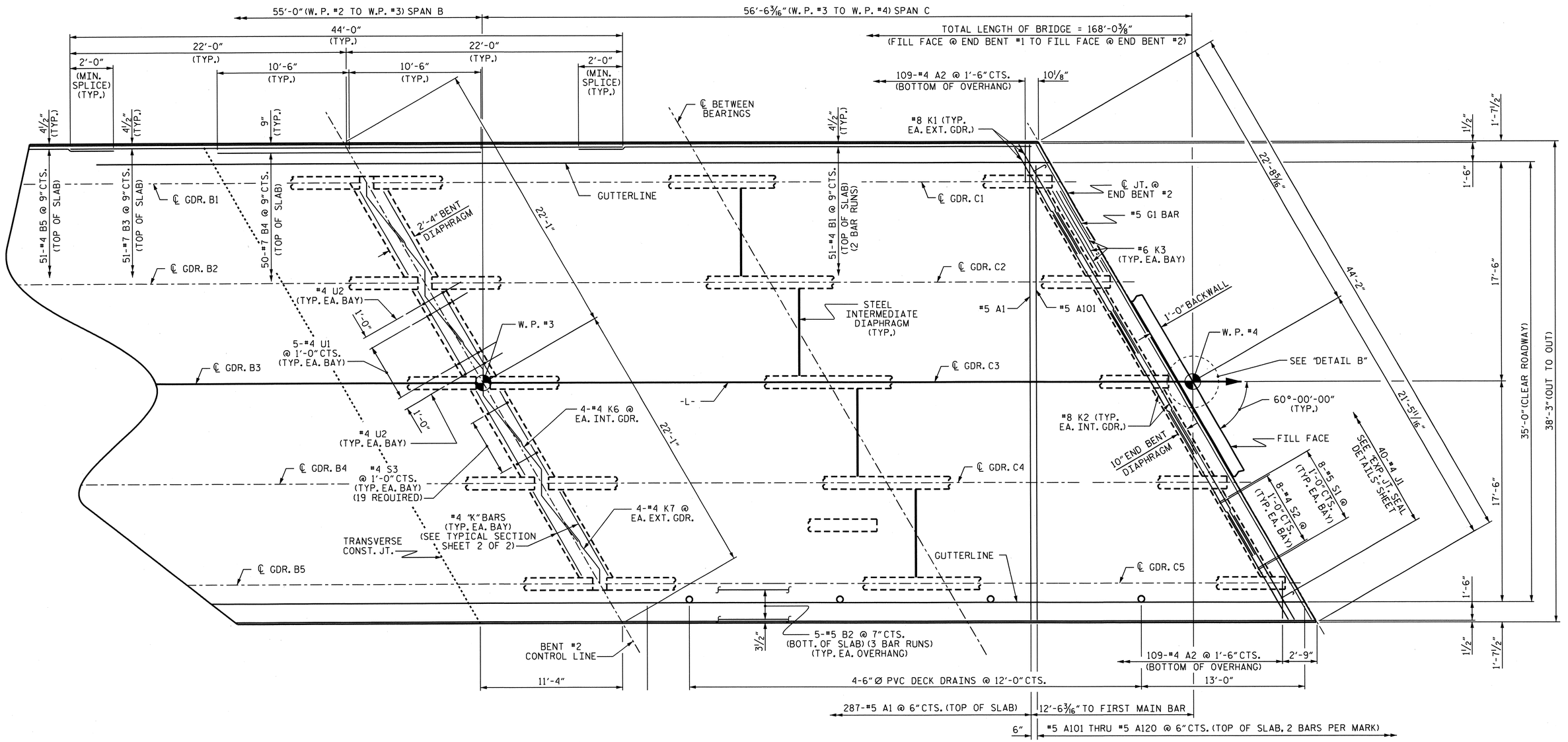
PROJECT NO. R-3324
BRUNSWICK COUNTY
STATION: 87+04.50 -L-
SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

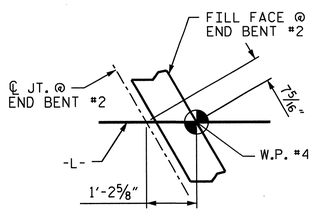
SUPERSTRUCTURE

PLAN OF SPAN B

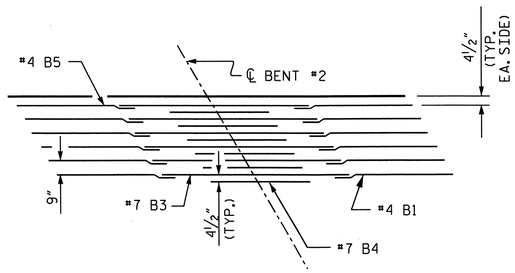
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-51
1			3			TOTAL SHEETS
2			4			76



PLAN OF SPAN C



DETAIL B



REINFORCING STEAL LAYOUT AT BENT #2

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 87+04.50 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

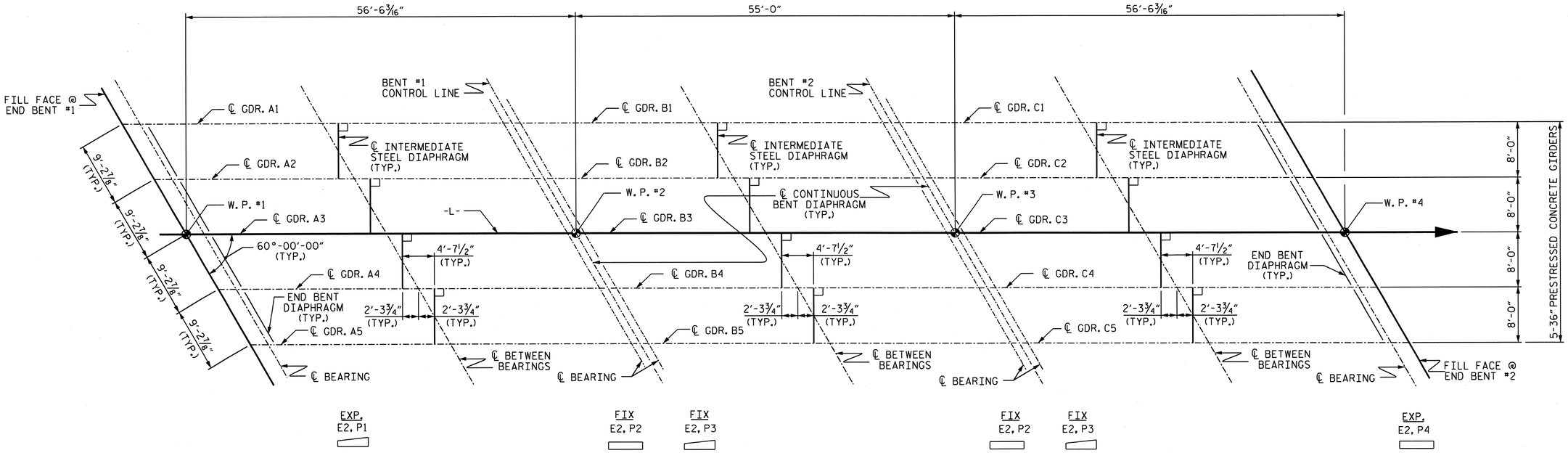
SUPERSTRUCTURE

PLAN OF SPAN C

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER AMY E. MURRAY 1/4/13

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-52
1			3			TOTAL SHEETS
2			4			76

DRAWN BY : M. GUDLAUGSSON DATE : 12/08
CHECKED BY : P. PARISI DATE : 01/09



FRAMING PLAN

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 87+04.50 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

FRAMING PLAN

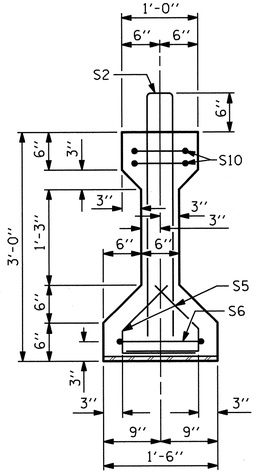
NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER GARY E. MURRAY

1/9/13

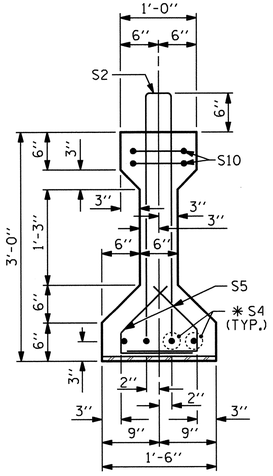
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-53
1			3			TOTAL SHEETS
2			4			76

DRAWN BY : M. GUDLAUGSSON DATE : 12/2008
CHECKED BY : P. PARISI DATE : 01/09

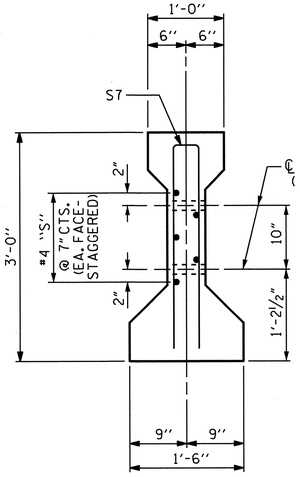
08-NOV-2013 09:59



SECTION A-A

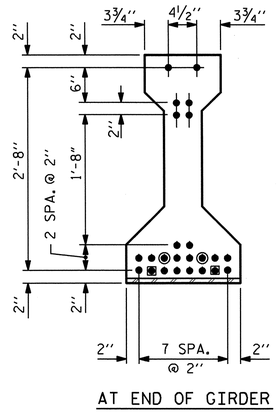


SECTION B-B

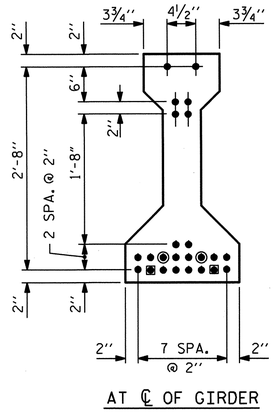


SECTION C-C

(S3 BARS NOT SHOWN)



AT END OF GIRDER



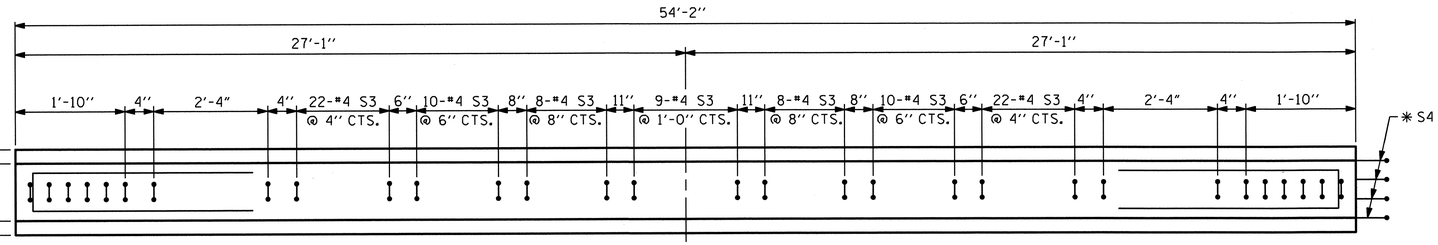
AT ℄ OF GIRDER

DEBONDING LEGEND

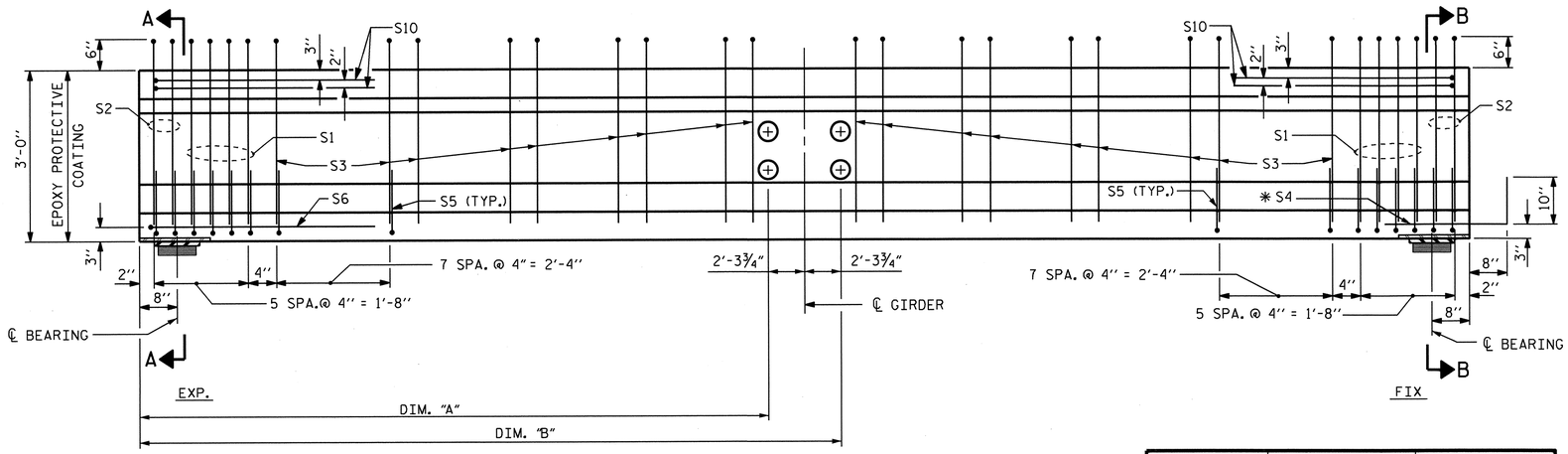
- ● FULLY BONDED
- ◙ STRANDS DEBONDED FOR 4'-0" FROM END OF GIRDER
- ◉ STRANDS DEBONDED FOR 8'-0" FROM END OF GIRDER

0.6" Ø LOW RELAXATION STRAND LAYOUT

	EXTERIOR GDR.	INTERIOR GDR.	EXTERIOR GDR.	INTERIOR GDR.
S1	8	8	8	8
S2	4	4	4	4
S3	105	105	105	105
✱S4	4	4	4	4
S5	56	56	56	56
S6	1	1	1	1
S7	2	4	2	4
S8	5		5	
S9	5		5	
S10	4	4	4	4



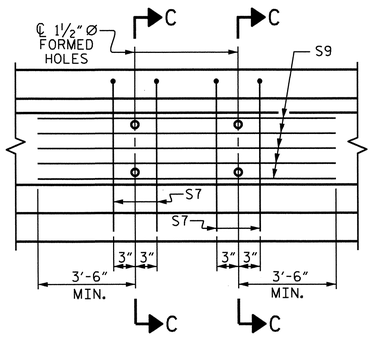
PLAN OF GIRDER



ELEVATION OF GIRDER

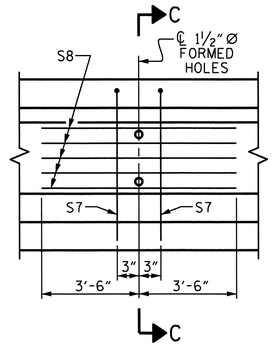
(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS)

GIRDER	DIM. "A"	DIM. "B"
GDR. 1	-----	29'-4¾"
GDR. 2	24'-9¼"	29'-4¾"
GDR. 3	24'-9¼"	29'-4¾"
GDR. 4	24'-9¼"	29'-4¾"
GDR. 5	24'-9¼"	-----



PARTIAL ELEVATION

SHOWING INTERMEDIATE DIAPHRAGM REINFORCING STEEL FOR INTERIOR GIRDERS



PARTIAL ELEVATION

SHOWING INTERMEDIATE DIAPHRAGM REINFORCING STEEL FOR EXTERIOR GIRDERS

0.6" Ø L. R. GRADE 270 STRANDS

AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

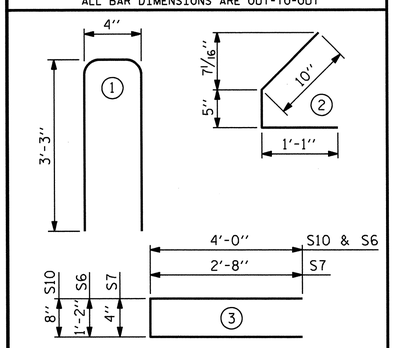
REINFORCING STEEL FOR ONE GIRDER

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	8	#5	1	6'-10"	57
S2	4	#6	1	6'-10"	41
S3	105	#4	1	6'-10"	479
✱S4	4	#5	STR	3'-8"	15
S5	56	#4	2	2'-4"	87
S6	1	#4	3	9'-2"	6
S7	2	#5	3	5'-8"	12
S7	4	#5	3	5'-8"	24
S8	5	#4	STR	7'-0"	23
S9	5	#4	STR	11'-8"	39
S10	4	#4	3	8'-8"	23

✱NOTE: S4 BARS SHALL BE BENT BEFORE SHIPMENT. HEAT BENDING SHALL NOT BE ALLOWED.

BAR TYPES

ALL BAR DIMENSIONS ARE OUT-TO-OUT



QUANTITIES FOR ONE GIRDER

	REINFORCING STEEL LB.	8500 PSI CONCRETE C.Y.	0.6" Ø L.R. STRANDS No.
EXTERIOR GIRDER	743	5.1	24
INTERIOR GIRDER	771	5.1	24

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
(SPAN A) 5	54'-2"	270'-10"
(SPAN C) 5	54'-2"	270'-10"

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 87+04.50 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

AASHTO TYPE II
PRESTRESSED CONCRETE GIRDER
CONTINUOUS FOR LIVE LOAD

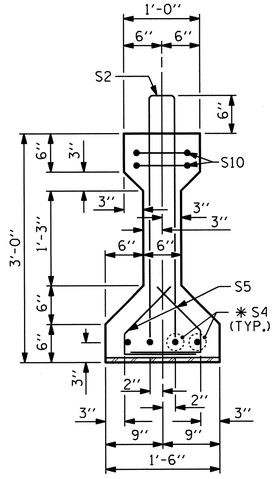
SPANS A & C

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-54
1			3			TOTAL SHEETS
2			4			76

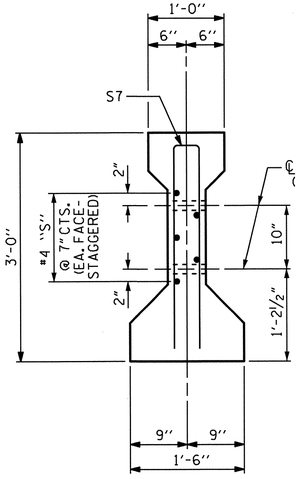
NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER AMY E. MARRAY

1/9/13

ASSEMBLED BY : PEGGY ADKINS	DATE : 7-18-12
CHECKED BY : A.M. LEE	DATE : 9-11-12
DRAWN BY : ELR 8/91	REV. 10/17/00R RWW/LES
CHECKED BY : GRP 8/91	REV. 5/1/06R TLA/GM
	REV. 10/1/11 MAA/GM

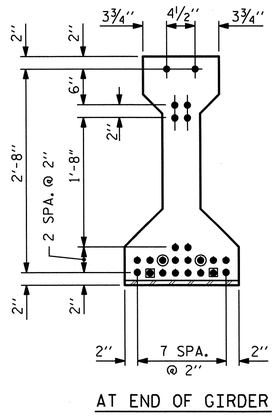


SECTION B-B

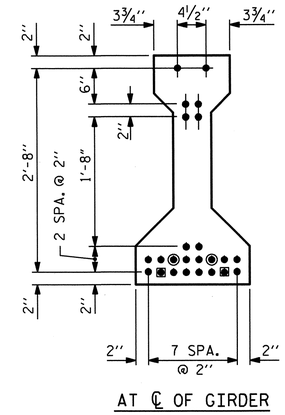


SECTION C-C

(S3 BARS NOT SHOWN)



AT END OF GIRDER

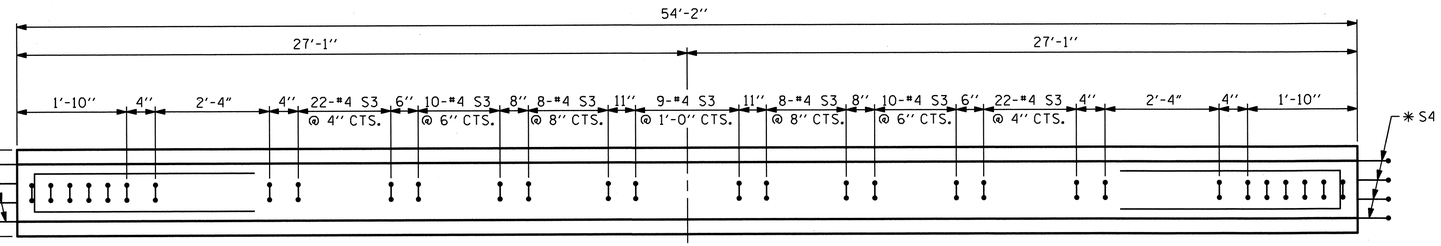


AT ℄ OF GIRDER

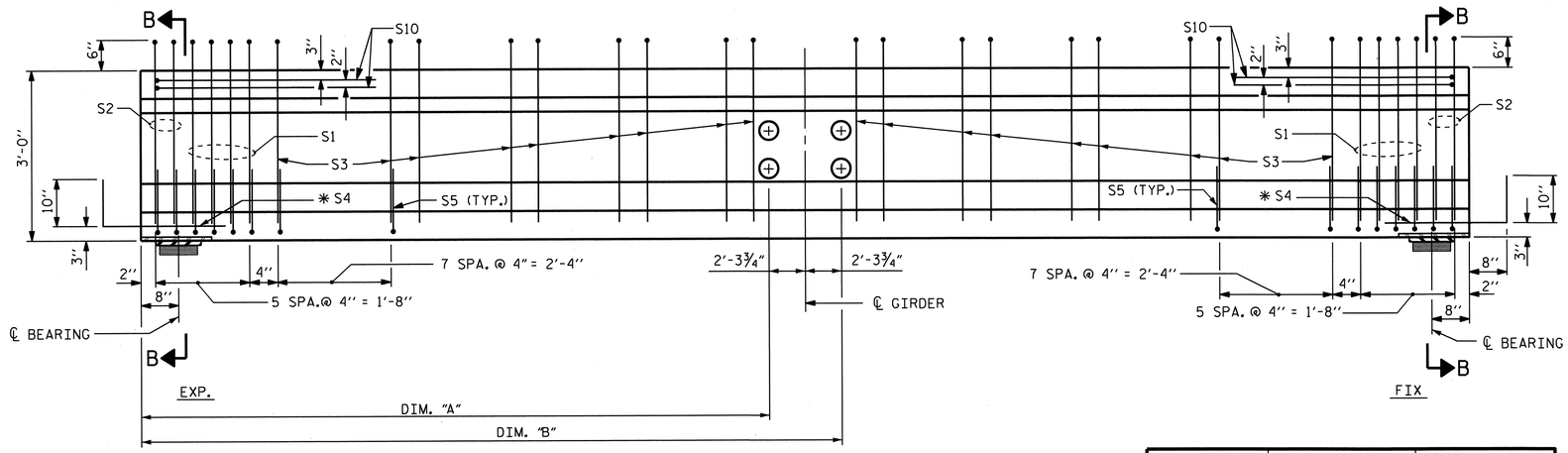
DEBONDING LEGEND

- ● FULLY BONDED
- ◙ STRANDS DEBONDED FOR 4'-0" FROM END OF GIRDER
- ◉ STRANDS DEBONDED FOR 8'-0" FROM END OF GIRDER

0.6" Ø LOW RELAXATION STRAND LAYOUT



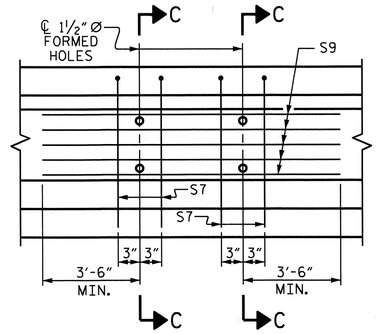
PLAN OF GIRDER



ELEVATION OF GIRDER

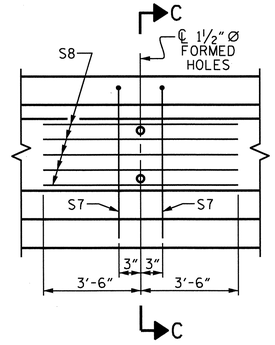
(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS)

GIRDER	DIM. "A"	DIM. "B"
GDR. 1	-----	29'-4¾"
GDR. 2	24'-9¼"	29'-4¾"
GDR. 3	24'-9¼"	29'-4¾"
GDR. 4	24'-9¼"	29'-4¾"
GDR. 5	24'-9¼"	-----



PARTIAL ELEVATION

SHOWING INTERMEDIATE DIAPHRAGM REINFORCING STEEL FOR INTERIOR GIRDERS



PARTIAL ELEVATION

SHOWING INTERMEDIATE DIAPHRAGM REINFORCING STEEL FOR EXTERIOR GIRDERS

0.6" Ø L. R. GRADE 270 STRANDS

AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

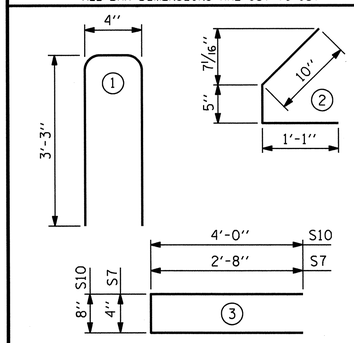
REINFORCING STEEL FOR ONE GIRDER

	BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
	S1	8	#5	1	6'-10"	57
	S2	4	#6	1	6'-10"	41
	S3	105	#4	1	6'-10"	479
	✱S4	8	#5	STR	3'-8"	31
	S5	56	#4	2	2'-4"	87
EXTERIOR GDR.	S7	2	#5	3	5'-8"	12
INTERIOR GDR.	S7	4	#5	3	5'-8"	24
EXTERIOR GDR.	S8	5	#4	STR	7'-0"	23
INTERIOR GDR.	S9	5	#4	STR	11'-8"	39
	S10	4	#4	3	8'-8"	23

✱NOTE: S4 BARS SHALL BE BENT BEFORE SHIPMENT. HEAT BENDING SHALL NOT BE ALLOWED.

BAR TYPES

ALL BAR DIMENSIONS ARE OUT-TO-OUT



QUANTITIES FOR ONE GIRDER

	REINFORCING STEEL LB.	8500 PSI CONCRETE C.Y.	0.6" Ø L.R. STRANDS No.
EXTERIOR GIRDER	753	5.1	24
INTERIOR GIRDER	781	5.1	24

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
(SPAN B) 5	54'-2"	270'-10"

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 87+04.50 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

AASHTO TYPE II PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD

SPAN B

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-55
1			3			TOTAL SHEETS 76
2			4			

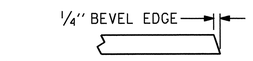
ASSEMBLED BY : PEGGY ADKINS DATE : 7-18-12
CHECKED BY : A.M. LEE DATE : 9-11-12

DRAWN BY : ELR 8/91
CHECKED BY : GRP 8/91

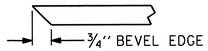
REV. 10/17/00R RWW/LES
REV. 5/1/06R TLA/GM
REV. 10/1/11 MAA/GM

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY E. MURRAY 7/4/13

STIP NO. R664 (Sht. 1)

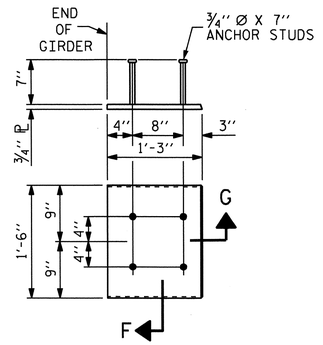


SECTION "G"



SECTION "F"

(SEE NOTES)



EMBEDDED PLATE "B-1" DETAILS FOR AASHTO TYPE II GIRDER

(2 REQ'D PER GIRDER)

NOTES

ALL PRESTRESSING STRANDS SHALL BE 7-WIRE LOW-RELAXATION GRADE 270 STRANDS AND SHALL CONFORM TO AASHTO M203 EXCEPT FOR SAMPLING REQUIREMENTS WHICH SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

ALL REINFORCING STEEL SHALL BE GRADE 60.

APPLY EPOXY PROTECTIVE COATING TO END OF GIRDER SURFACES INDICATED IN ELEVATION VIEW.

EMBEDDED PLATE "B-1" SHALL BE GALVANIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS. BEVEL EDGES OF PLATE "B-1" TO GIVE CLOSE FIT BUT NOT TIGHT FIT TO STEEL CASTING FORM.

ANCHOR STUDS SHALL CONFORM TO AASHTO M169 GRADES 1010 THROUGH 1020 OR APPROVED EQUAL, AND SHALL MEET THE TYPE "B" REQUIREMENTS OF SUBSECTION 7.3 OF THE ANSI/AASHTO/AWS D1.5 BRIDGE WELDING CODE.

AT ENDS OF GIRDERS TO BE EMBEDDED IN CONCRETE DIAPHRAGMS OR END WALLS, PRESTRESSING STRANDS MAY EXTEND A MAXIMUM OF 2" BEYOND THE GIRDER ENDS. OTHERWISE, PRESTRESSING STRANDS SHALL BE CUT FLUSH WITH THE GIRDER ENDS.

THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE GIRDER SHALL BE DONE WHEN CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN 6700 PSI.

DEPENDING ON THE TYPE OF SYSTEM USED TO SUPPORT THE DECK SLAB FORMS, PRESET ANCHORS MAY BE NECESSARY IN THE PRESTRESSED CONCRETE GIRDER.

THE TOP SURFACE OF THE GIRDER, EXCLUDING THE OUTSIDE 4", SHALL BE RAKED TO A DEPTH OF 1/4".

PRESTRESSED CONCRETE GIRDERS SHALL CONTAIN CALCIUM NITRITE CORROSION INHIBITOR.

PRESTRESSED CONCRETE GIRDERS ARE DESIGNED FOR 0 PSI TENSION IN THE PRECOMPRESSED TENSILE ZONE UNDER ALL LOADING CONDITIONS.

DEAD LOAD DEFLECTION TABLE

0.6"Ø LOW RELAXATION	SPANS A, B & C GIRDERS 1 AND 5											SPANS A, B & C GIRDERS 2, 3 & 4										
TENTH POINTS	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	0	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.0	0.047	0.089	0.121	0.142	0.149	0.142	0.121	0.089	0.047	0.0	0.0	0.047	0.089	0.121	0.142	0.149	0.142	0.121	0.089	0.047	0.0
✱DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.0	0.017	0.033	0.045	0.052	0.055	0.052	0.045	0.033	0.017	0.0	0.0	0.019	0.036	0.049	0.057	0.060	0.057	0.049	0.036	0.019	0.0
FINAL CAMBER ↑	0	3/8"	11/16"	15/16"	1 1/16"	1 1/8"	1 1/16"	15/16"	11/16"	3/8"	0	0	5/16"	5/8"	7/8"	1"	1 1/16"	1"	7/8"	5/8"	5/16"	0

✱ INCLUDES FUTURE WEARING SURFACE
ALL VALUES ARE SHOWN IN FEET (DECIMAL FORM), EXCEPT "FINAL CAMBER", WHICH IS GIVEN IN INCHES (FRACTION FORM).

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 87+04.50 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY E. MURRAY

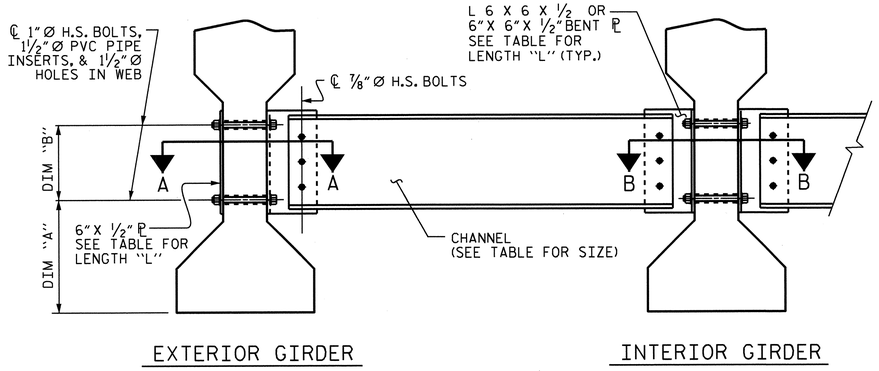
1/4/13

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-56
1			3			TOTAL SHEETS
2			4			76

ASSEMBLED BY : PEGGY ADKINS DATE : 7-18-12
CHECKED BY : A.M. LEE DATE : 9-11-12

DRAWN BY : ELR 11/91
CHECKED BY : GRP 11/91

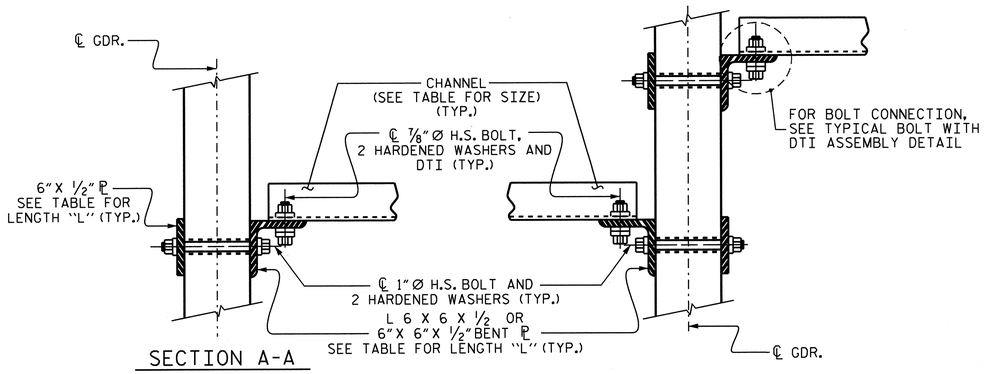
REV. 7/10/01RR LES/RDR
REV. 5/1/06 TLA/GM
REV. 10/1/11 MAA/GM



EXTERIOR GIRDER

INTERIOR GIRDER

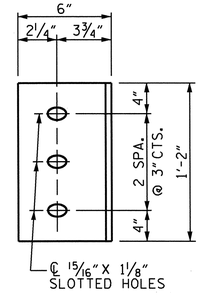
PART SECTION AT INTERMEDIATE DIAPHRAGM



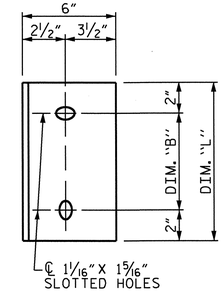
SECTION A-A

SECTION B-B

CONNECTION DETAILS



DIAPHRAGM FACE



WEB FACE

CONNECTOR PLATE DETAILS

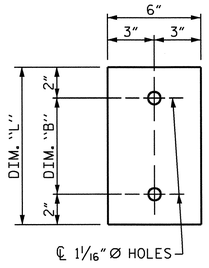
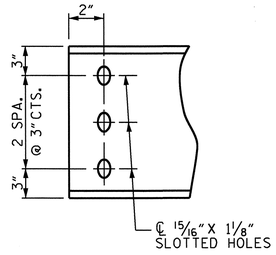


PLATE DETAILS



CHANNEL END

STRUCTURAL STEEL NOTES

ALL INTERMEDIATE DIAPHRAGM STEEL AND CONNECTOR PLATES SHALL BE AASHTO M270 GRADE 50 OR APPROVED EQUAL.

TENSION ON THE ASTM A325 BOLTS THROUGH THE CHANNEL MEMBER SHALL BE CALIBRATED USING DIRECT TENSION INDICATOR WASHERS IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

TENSION ON THE ASTM A449 BOLTS THROUGH THE GIRDER WEB SHALL BE SNUG TIGHTENED FOLLOWED BY AN ADDITIONAL ¼ TURN.

THE PLATES, BENT PLATES, CHANNELS, AND ANGLES SHALL BE METALLIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS. FOR THERMAL SPRAYED COATINGS (METALLIZATION), SEE SPECIAL PROVISIONS.

FOR METALLIZATION, APPLY AN 8 MIL THICK 99.99 PERCENT ZINC (W-Zn-1) THERMAL SPRAYED COATING WITH A 0.5 MIL THICK SEAL COAT TO ALL STEEL DIAPHRAGM SURFACES IN ACCORDANCE WITH THE THERMAL SPRAYED COATINGS SPECIAL PROVISION AND SECTION 442 OF THE STANDARD SPECIFICATIONS.

GALVANIZE THE HIGH STRENGTH BOLTS, NUTS, WASHERS AND DIRECT TENSION INDICATORS IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

USE AN ASTM F436 HARDENED WASHER WITH STANDARD AND SLOTTED HOLES UNDER EACH BOLT HEAD AND NUT.

FOR BOLTS THROUGH THE GIRDER WEB, PROVIDE SUFFICIENT LENGTH OF THREADS ON ALL BOLTS TO ACCOMMODATE WASHERS AND THE THICKNESS OF CONNECTING MEMBER PLUS AT LEAST ¼"PROJECTION BEYOND THE NUT.

INTERMEDIATE DIAPHRAGM ASSEMBLY SHALL COMPLY WITH SECTION 1072 OF THE STANDARD SPECIFICATIONS.

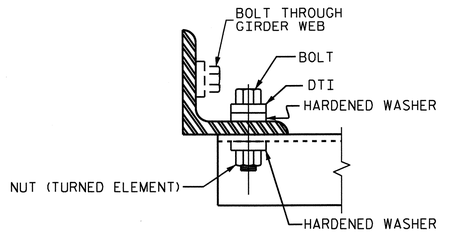
SUBMIT TWO SETS OF WORKING DRAWINGS FOR THE INTERMEDIATE DIAPHRAGM ASSEMBLY FOR REVIEW, COMMENTS AND ACCEPTANCE. AFTER REVIEW, COMMENTS, AND ACCEPTANCE, SUBMIT SEVEN SETS FOR DISTRIBUTION.

IN THE EXTERIOR BAYS, PLACE TEMPORARY STRUTS BETWEEN PRESTRESSED GIRDERS ADJACENT TO THE STEEL DIAPHRAGMS. STRUTS SHALL REMAIN IN PLACE 3 DAYS AFTER CONCRETE IS PLACED.

THE COST OF THE STEEL DIAPHRAGMS AND ASSEMBLIES SHALL BE INCLUDED IN THE UNIT PRICE BID FOR PRESTRESSED CONCRETE GIRDERS.

TABLE

GIRDER TYPE	CHANNEL SIZE	DIM "A"	DIM "B"	DIM "L"
II	MC 12 x 31	1'-2½"	10"	1'-2"



BOLT WITH DTI ASSEMBLY DETAIL

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 87+04.50 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

INTERMEDIATE STEEL DIAPHRAGMS FOR TYPE II PRESTRESSED CONCRETE GIRDERS

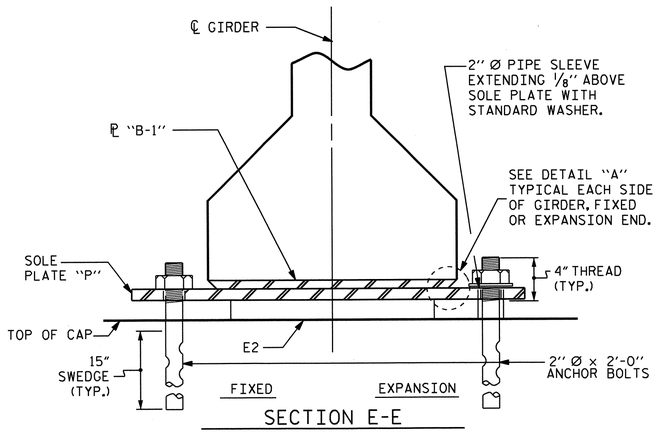
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-57
1			3			TOTAL SHEETS
2			4			76

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY E. MURRAY
1/14/13

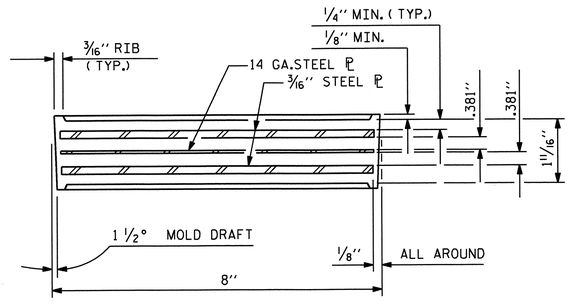
ASSEMBLED BY : PEGGY ADKINS	DATE : 7-18-12	ADDED 10/21/05	
CHECKED BY : A.M. LEE	DATE : 9-11-12	REV. 5/1/06RRR	KMM/GM
DRAWN BY : TLA 6/05		REV. 10/1/11	MAA/GM
CHECKED BY : VC 6/05			

08-NOV-2013 09:58

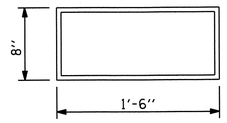
SID NO. RCC10 (SHT 1)



SECTION E-E



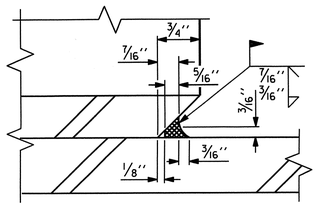
TYPICAL SECTION OF ELASTOMERIC BEARINGS



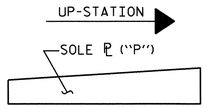
E2 (30 REQ'D)

PLAN VIEW OF ELASTOMERIC BEARING

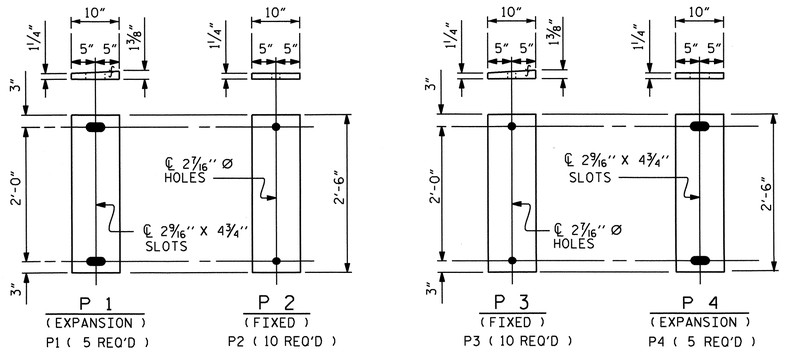
TYPE III



DETAIL "A"



SOLE ℄ PLACEMENT DETAIL



SOLE PLATE DETAILS ("P")

NOTES

AT ALL FIXED POINTS OF SUPPORT, NUTS FOR ANCHOR BOLTS ARE TO BE TIGHTENED FINGER TIGHT AND THEN BACKED OFF 1/2 TURN. THE THREAD OF THE NUT AND BOLT SHALL THEN BE BURRED WITH A SHARP POINTED TOOL.

THE 2" Ø PIPE SLEEVE SHALL BE CUT FROM SCHEDULE 40 PVC PLASTIC PIPE. THE PVC PLASTIC PIPE SHALL MEET THE REQUIREMENTS OF ASTM D1785.

STEEL SOLE PLATES, ANCHOR BOLTS, NUTS, AND WASHERS SHALL BE GALVANIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

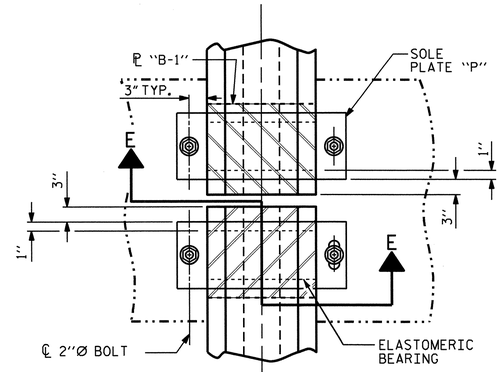
PRIOR TO WELDING, GRIND THE GALVANIZED SURFACE OF THE PORTION OF THE EMBEDDED PLATE AND SOLE PLATE THAT ARE TO BE WELDED. AFTER WELDING, DAMAGED GALVANIZED SURFACES SHALL BE REPAIRED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

WHEN WELDING THE SOLE PLATE TO THE EMBEDDED PLATE IN THE GIRDER, USE TEMPERATURE INDICATING WAX PENS, OR OTHER SUITABLE MEANS, TO ENSURE THAT THE TEMPERATURE OF THE SOLE PLATE DOES NOT EXCEED 300°F. TEMPERATURES ABOVE THIS MAY DAMAGE THE ELASTOMER.

SOLE PLATE "P", BOLTS, NUTS, WASHERS, AND PIPE SLEEVE SHALL BE INCLUDED IN THE PAY ITEM FOR PRESTRESSED CONCRETE GIRDERS.

ANCHOR BOLTS SHALL MEET THE REQUIREMENTS OF ASTM A449. NUTS SHALL MEET THE REQUIREMENTS OF AASHTO M291-DH OR AASHTO M292-2H. WASHERS SHALL MEET THE REQUIREMENTS OF AASHTO M293. SHOP DRAWINGS ARE NOT REQUIRED FOR ANCHOR BOLT, NUTS AND WASHERS. SHOP INSPECTION IS REQUIRED.

ALL SURFACES OF BEARING PLATES SHALL BE SMOOTH AND STRAIGHT.



TYPICAL HALF-PLAN (SHOWING CONTINUOUS BENT)

TYPICAL HALF-PLAN (SHOWING SIMPLE SPAN BENT)

LOAD RATINGS	
	MAX.D.L.+L.L.
TYPE III	115 K

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 87+04.50 -L-

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY E. MURRAY

1/14/13

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

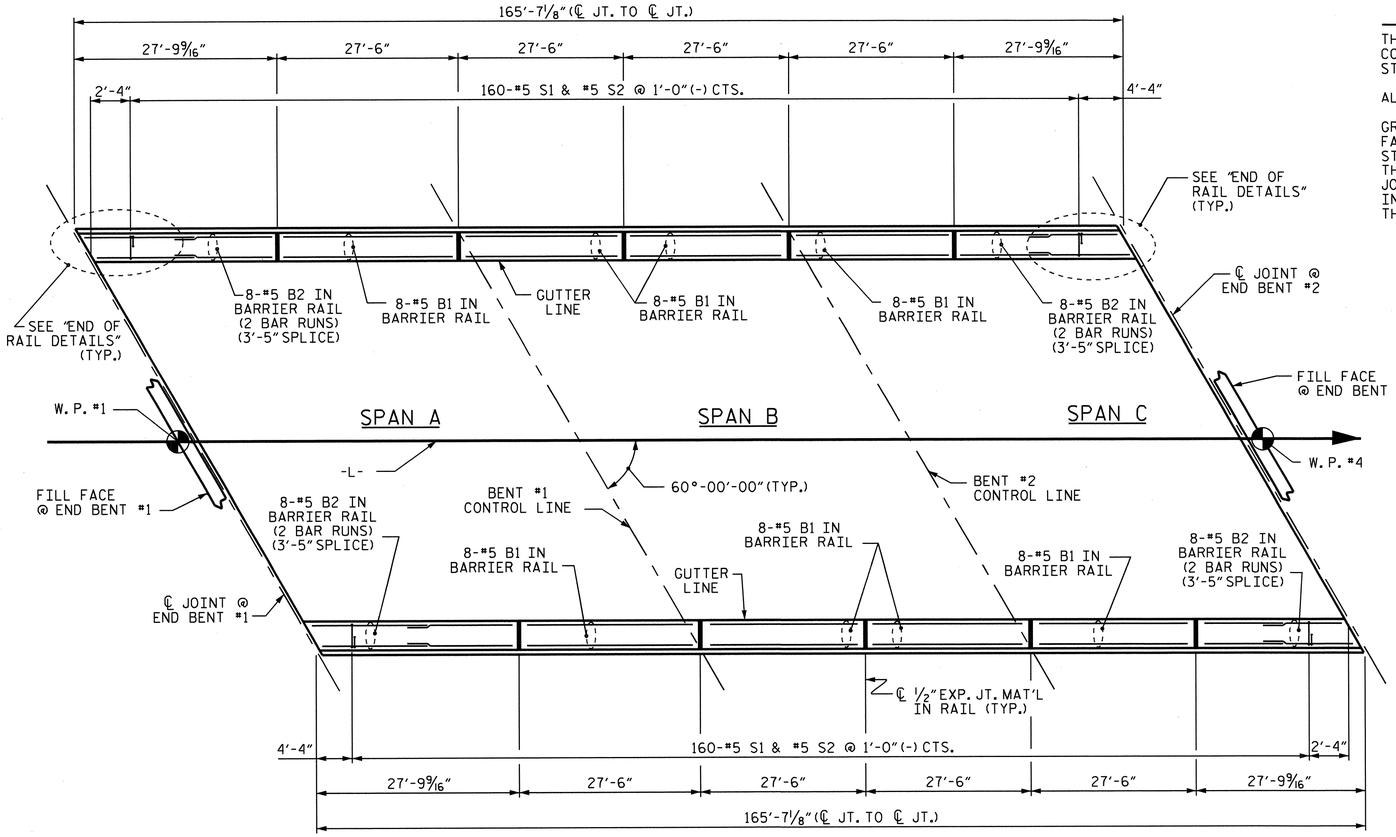
ELASTOMERIC BEARING DETAILS

PRESTRESSED CONCRETE GIRDER SUPERSTRUCTURE

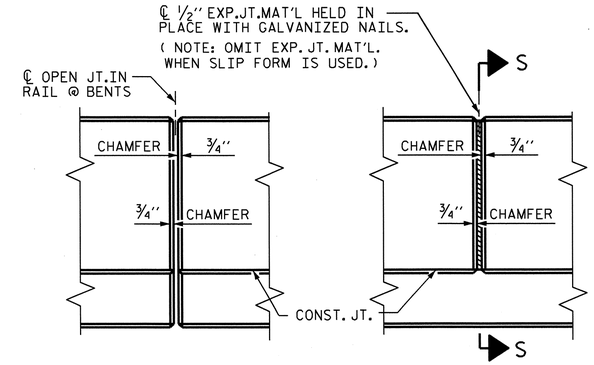
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-58
1			3			TOTAL SHEETS
2			4			76

ASSEMBLED BY : PEGGY ADKINS	DATE : 7-18-12	
CHECKED BY : A.M. LEE	DATE : 9-11-12	
DRAWN BY : WJH 8/89	REV. 7/10/01	RWW/LES
CHECKED BY : CRK 8/89	REV. 5/1/06	TLA/GM
	REV. 10/1/11	MAA/GM

STR #2 STR NO. ER3 (SHT 2)

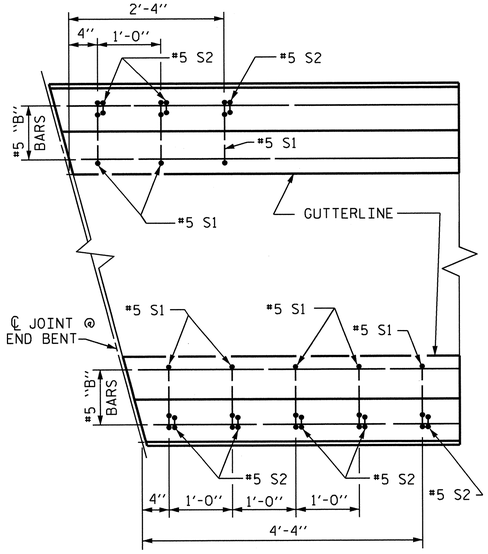


PLAN OF BARRIER RAIL

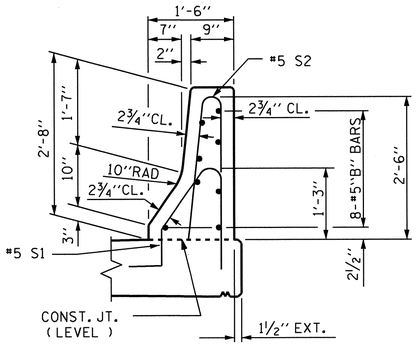


ELEVATION AT EXPANSION JOINTS

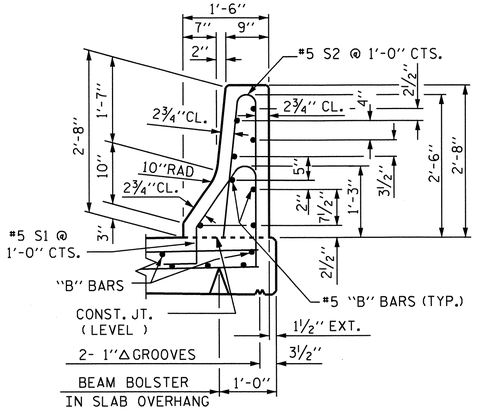
BARRIER RAIL DETAILS



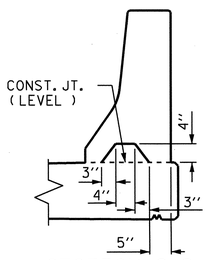
PLAN



END VIEW



SECTION THRU RAIL



SECTION S-S
AT DAM IN OPEN JOINT
(THIS IS TO BE USED ONLY WHEN SLIP FORM IS USED)

END OF RAIL DETAILS

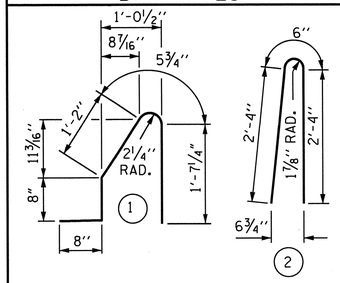
NOTES

THE BARRIER RAIL IN A CONTINUOUS UNIT SHALL NOT BE CAST UNTIL ALL SLAB CONCRETE IN THE UNIT HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

GROOVED CONTRACTION JOINTS, 1/2" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE BARRIER RAIL AND IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. THE CONTRACTION JOINT SHALL BE LOCATED AT EACH THIRD POINT BETWEEN BARRIER RAIL EXPANSION JOINTS. ONLY ONE CONTRACTION JOINT IS REQUIRED AT MIDPOINT OF BARRIER RAIL SEGMENTS LESS THAN 20 FEET IN LENGTH AND NO CONTRACTION JOINTS ARE REQUIRED FOR THOSE SEGMENTS LESS THAN 10 FEET IN LENGTH.

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

FOR CONCRETE BARRIER RAIL ONLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* B1	64	#5	STR	27'-1"	1808
* B2	64	#5	STR	15'-9"	1051
* S1	332	#5	1	4'-7"	1587
* S2	332	#5	2	5'-2"	1789

* EPOXY COATED REINFORCING STEEL	6235 LBS.
CLASS AA CONCRETE	33.2 CU. YDS.
CONCRETE BARRIER RAIL	
SUPERSTRUCTURE	331.19 LIN. FT.
● APPROACH SLABS	41.73 LIN. FT.
TOTAL	372.92 LIN. FT.

● FOR EPOXY COATED REINFORCING STEEL AND CLASS AA CONCRETE IN THE BARRIER RAIL ON THE APPROACH SLABS, SEE "BRIDGE APPROACH SLAB DETAILS" SHEET.

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 87+04.50 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

CONCRETE BARRIER RAIL

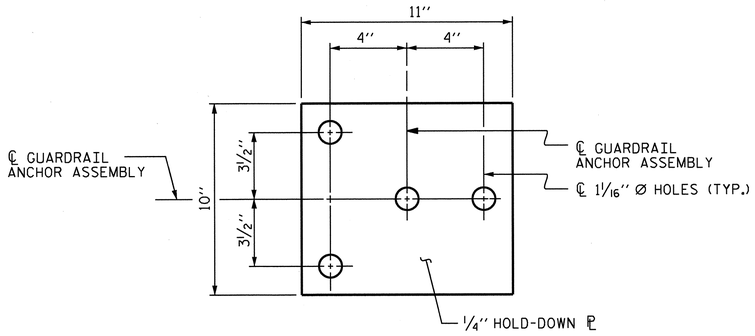
NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY E. MURRAY

1/14/13

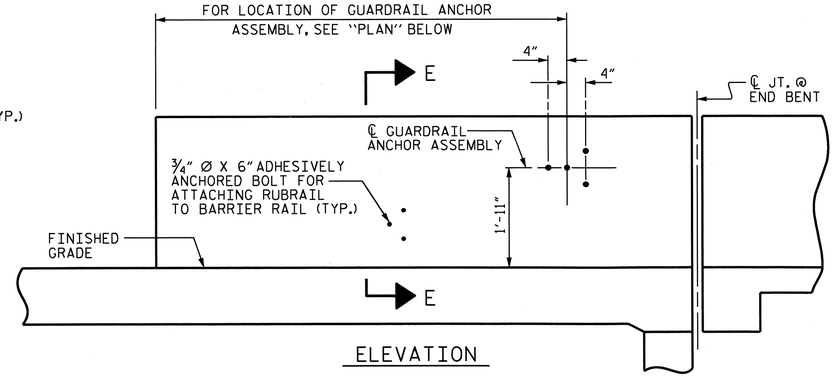
ASSEMBLED BY :	PEGGY ADKINS DATE : 7-18-12
CHECKED BY :	A.M. LEE DATE : 9-11-12
DRAWN BY :	ARB 5/87
CHECKED BY :	SJD 9/87

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-59
1			3			TOTAL SHEETS
2			4			76

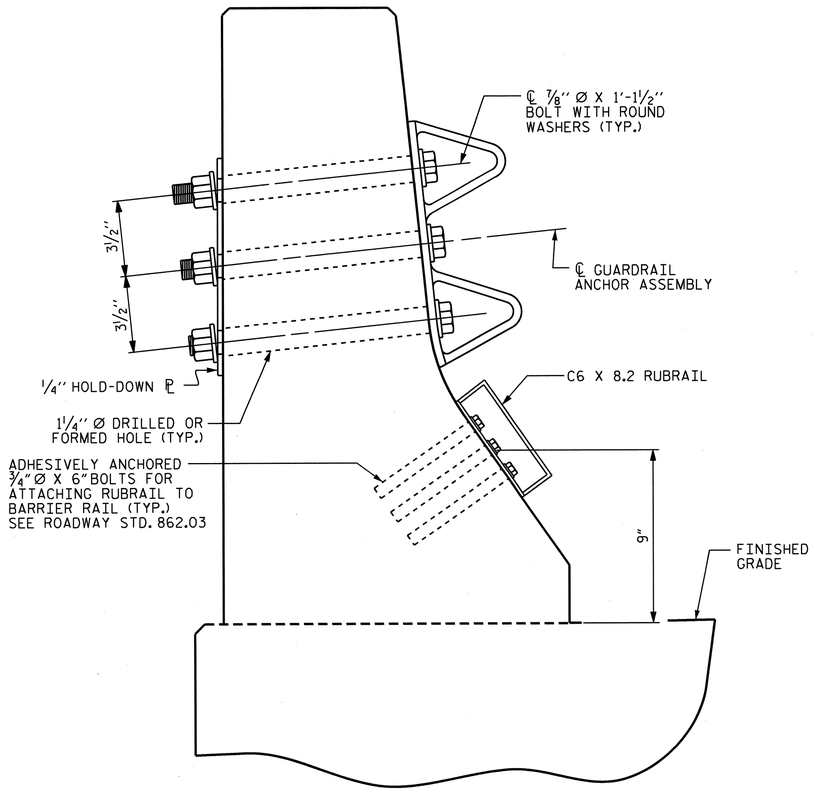
REV. 5/7/03R RWW/JTE
REV. 5/1/06R TLA/GM
REV. 10/1/11 MAA/GM



PLAN

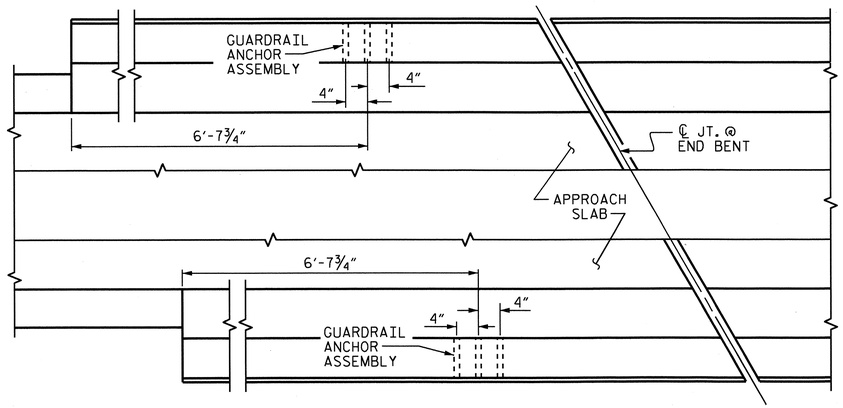


ELEVATION



SECTION E-E

GUARDRAIL ANCHOR ASSEMBLY DETAILS



PLAN

LOCATION OF ANCHORS FOR GUARDRAIL

END BENT #1 SHOWN, END BENT #2 SIMILAR.

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.)

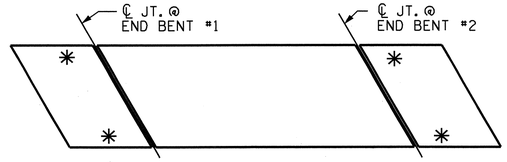
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF BARRIER RAIL. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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.



SKETCH SHOWING POINTS OF ATTACHMENTS

✳ DENOTES GUARDRAIL ANCHOR ASSEMBLY

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 87+04.50 -L-

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY E. MURRAY 1/9/13

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

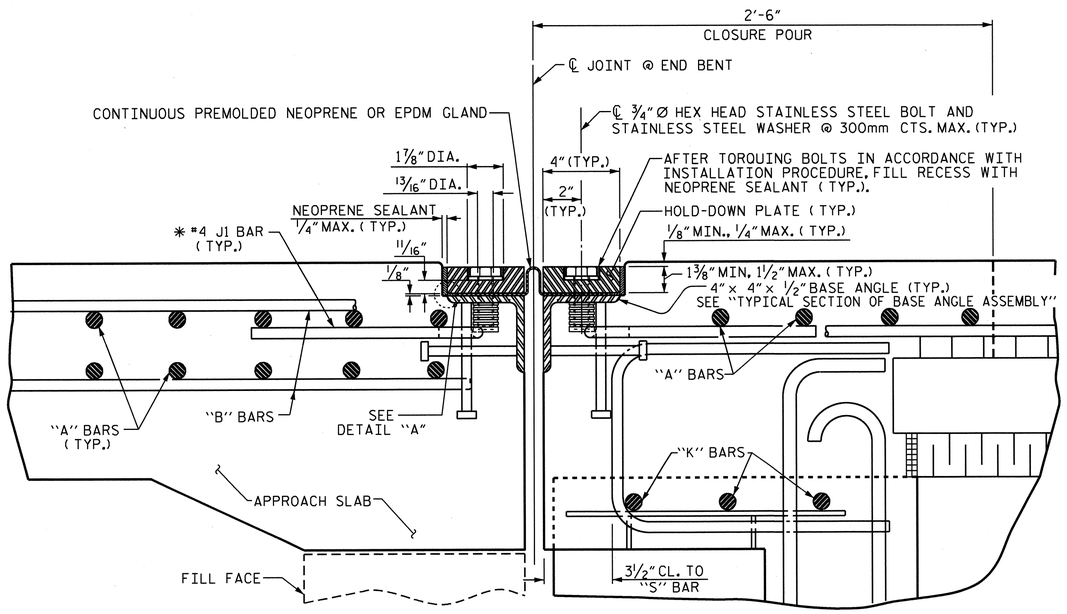
GUARDRAIL ANCHORAGE FOR BARRIER RAIL

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-60
1			3			TOTAL SHEETS
2			4			76

ASSEMBLED BY : PEGGY ADKINS	DATE : 7-18-12
CHECKED BY : A.M. LEE	DATE : 9-11-12
DRAWN BY : TLA 5/06	ADDED 5/1/06RR KMM/GM
CHECKED BY : GM 5/06	REV. 10/1/11 MAA/GM

02-NOV-2012 08:58

SID NO. GRA3



EXPANSION JOINT DETAILS

SECTION NORMAL TO JOINT -- PRESTRESSED GIRDER SUPERSTRUCTURE

* THE QUANTITY OF #4 J1 BARS ON THE BILL OF MATERIAL IS BASED ON 1'-0" CENTERS. J1 BARS SHALL BE PLACED AT EACH VERTICAL STUD ANCHOR BOLT. IN THE EVENT THAT THE NUMBER OF VERTICAL STUD ANCHORS EXCEEDS THE NUMBER OF J1 BARS SPECIFIED, ADDITIONAL J1 BARS WILL NOT BE REQUIRED.

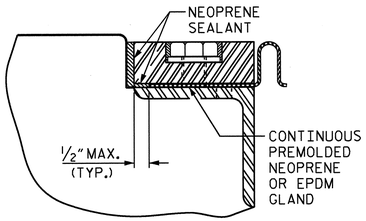
INSTALLATION PROCEDURE

1. A TEMPLATE OR OTHER SUITABLE DEVICE SHALL BE USED TO FORM THE TOP OF THE EXPANSION JOINT SEAL BLOCKOUT TO THE PROPER DEPTH AND WIDTH. THE TEMPLATE SHALL BE 4⅛" TO 4¼" WIDE AND OF SUCH THICKNESS AS TO PROVIDE FOR CORRECT FINAL ELEVATION OF TOP OF HOLD-DOWN PLATES. THE TEMPLATE SHALL BE ATTACHED TO THE BASE ANGLE ASSEMBLY WITH THE ¾"Ø HEX HEAD BOLTS PROVIDED FOR THE HOLD-DOWN PLATES. A 1"Ø HOLE SHALL BE PROVIDED IN THE TEMPLATE CENTERED OVER EACH WEEP HOLE IN THE 4"X 4"X ½" BASE ANGLE. OTHER METHODS OF INSURING DRAINAGE THROUGH WEEP HOLES MAY BE EMPLOYED SUBJECT TO ENGINEER'S APPROVAL.
2. AFTER THE CONCRETE HAS BEEN CAST ON BOTH SIDES OF THE JOINT, REMOVE THE TEMPLATE. THOROUGHLY CLEAN THE BOLT HOLES AND THE ANGLE PLATE. REMOVE ANY EXCESS CONCRETE THAT COMES OUT OF THE WEEP HOLES. ANY DAMAGED STEEL SHALL BE COATED WITH A MINIMUM THICKNESS OF 4 DRY MILS OF ZINC-RICH PAINT IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.
3. LAY THE GLAND ON THE BASE ANGLE AND FIELD MARK THE GLAND FOR THE BOLT HOLES. HOLES IN THE GLAND SHALL BE PUNCHED ⅛" IN DIAMETER WITH A HAND PUNCH.
4. IN ORDER TO CHECK FOR PROPER ALIGNMENT, PLACE THE GLAND AND HOLD-DOWN PLATES ON THE BASE ANGLE. DO NOT APPLY NEOPRENE SEALANT. BOLT THE HOLD-DOWN PLATES TO THE BASE ANGLE BUT DO NOT TIGHTEN. THE ENGINEER SHALL INSPECT THE JOINT SEAL DEVICE FOR PROPER ALIGNMENT.
5. AFTER INSPECTION, REMOVE THE HOLD-DOWN PLATES AND GLAND. APPLY NEOPRENE SEALANT TO THE BASE ANGLE IN ACCORDANCE WITH THE "INSTALLATION SKETCH". PLACE GLAND AND HOLD-DOWN PLATES ON THE BASE ANGLE. BOLT THE HOLD-DOWN PLATES TO THE BASE ANGLE ASSEMBLY AND TORQUE THE BOLTS TO 88 FT-LBS WITH A TORQUE WRENCH. CHECK THE TORQUE AFTER THREE (3) HOURS AND, IF NECESSARY, RETIGHTEN TO 88 FT-LBS. A FINAL CHECK SHALL BE MADE AT SEVEN (7) DAYS. TORQUE SHALL NOT BE LESS THAN 80 FT-LBS AFTER SEVEN (7) DAYS.
6. AFTER PROPER TOROUING, CLEAN THE BOLT HOLE RECESSES AND THE RECESS BETWEEN THE JOINT SEAL DEVICE AND CONCRETE, COMPLETELY FILL THESE RECESSES WITH NEOPRENE SEALANT.

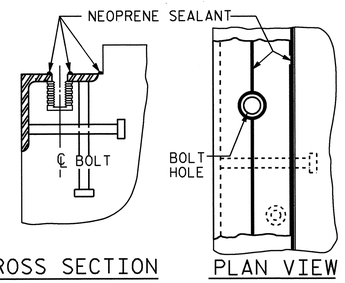
GENERAL NOTES

1. FOR EXPANSION JOINT SEALS, SEE SPECIAL PROVISIONS.
2. ALL PLATES AND ANGLES SHALL CONFORM TO AASHTO M270 GRADE 36 STEEL OR APPROVED EQUAL. ALL HOLD-DOWN BOLTS SHALL CONFORM TO ASTM F593 ALLOY 304 STAINLESS STEEL AND WASHERS SHALL CONFORM TO ASTM F844 EXCEPT THEY SHALL BE MADE FROM ALLOY 304 STAINLESS STEEL. ALL STUD ANCHORS SHALL CONFORM TO AASHTO M169, GRADES 1010 THRU 1020 OR APPROVED EQUAL. ALL CONCRETE INSERTS SHALL BE CLOSED END AND SHALL CONFORM TO AASHTO M169, GRADE 12L14. TENSILE CAPACITY SHALL BE 3000 LBS. MIN.
3. A PREMOLDED CORRUGATED OR NON-CORRUGATED GLAND SHALL BE USED FOR JOINTS SKEWED BETWEEN 50° THRU 130°. FOR JOINTS SKEWED LESS THAN 50° OR MORE THAN 130°, ONLY A CORRUGATED GLAND SHALL BE USED.
4. CLOSED END FERRULES AND STUD ANCHORS SHALL BE SHOP WELDED AND ALL HOLES SHALL BE SHOP DRILLED AS SHOWN ON PLANS. STUD ANCHORS SHALL BE ELECTRIC ARC END WELDED WITH COMPLETE FUSION.
5. SURFACES COMING IN CONTACT WITH NEOPRENE SHALL BE GROUND SMOOTH PRIOR TO METALLIZING.
6. UPON COMPLETION OF SHOP FABRICATION, THE HOLD DOWN PLATE AND BASE ANGLE ASSEMBLY, AS SHOWN IN THE "TYPICAL SECTION OF BASE ANGLE ASSEMBLY", SHALL BE METALLIZED. SEE SPECIAL PROVISION FOR THERMAL SPRAYED COATINGS (METALLIZATION).
7. BASE ANGLE ASSEMBLY SHALL BE CONTINUOUS FOR THE LENGTH OF THE JOINT. AT CROWN BREAKS, THE ENDS OF THE BASE ANGLE ASSEMBLY SHALL BE CUT PARALLEL TO THE BRIDGE CENTERLINE FOR SKEWS LESS THAN 80° AND GREATER THAN 100°. FINISHED WELD SHALL BE GROUND SMOOTH AND COATED WITH A MINIMUM THICKNESS OF 4 DRY MILS OF ZINC-RICH PAINT IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.
8. FIELD SPLICES OF HOLD-DOWN PLATES SHALL BE KEPT TO A MINIMUM. CONTRACTOR SHALL FURNISH DETAILED PLANS SHOWING PROPOSED SPLICE LOCATIONS FOR APPROVAL. HOLD-DOWN PLATES SHALL NOT EXCEED 20' LENGTHS UNLESS APPROVED BY THE ENGINEER.
9. NO ALTERNATE JOINT DETAILS SHALL BE PERMITTED IN LIEU OF THOSE SHOWN ON THESE PLANS.
10. THE CONTRACTOR MAY, AT HIS OPTION, USE ADHESIVELY ANCHORED ANCHOR BOLTS IN PLACE OF CONCRETE INSERTS FOR COVER PLATES. THE YIELD LOAD OF THE ¾"Ø BOLT IS 10 KIPS. FIELD TESTING OF THE ADHESIVE BONDING SYSTEM IS NOT REQUIRED.

MOVEMENT AND SETTING AT JOINT					
BENT NO.	SKEW ANGLE	TOTAL MOVEMENT (ALONG ℄ RDWY)	PERPENDICULAR JOINT OPENING AT 45° F	PERPENDICULAR JOINT OPENING AT 60° F	PERPENDICULAR JOINT OPENING AT 90° F
END BENT #1	60°	11/16"	1 7/16"	1 5/16"	1 1/8"
END BENT #2	60°	11/16"	1 7/16"	1 5/16"	1 1/8"

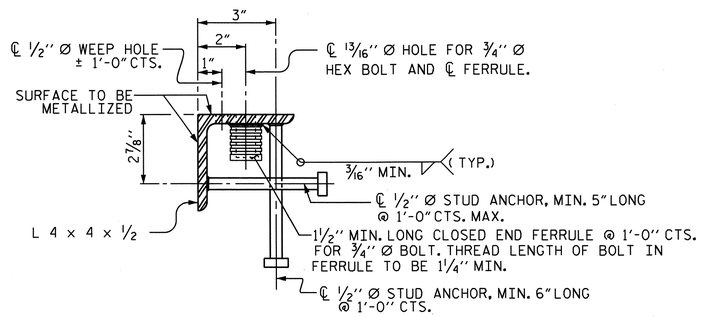


DETAIL "A"

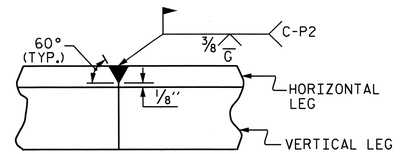


CROSS SECTION PLAN VIEW

INSTALLATION SKETCH



TYPICAL SECTION OF BASE ANGLE ASSEMBLY



DETAIL- FIELD WELD SPLICE OF BASE ANGLE

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 87+04.50 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

EXPANSION JOINT SEAL DETAILS

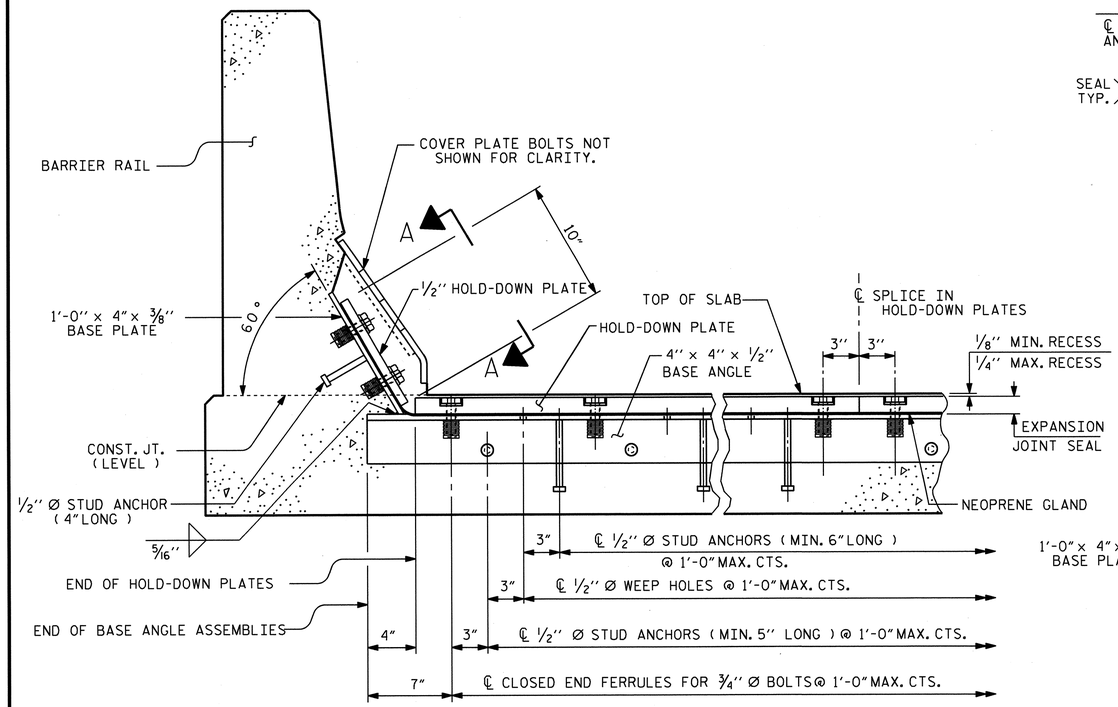
NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY E. MURPHY 1/4/13

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-61
1			3			TOTAL SHEETS
2			4			76

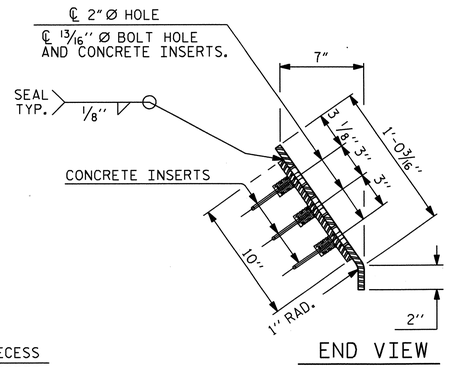
ASSEMBLED BY : PEGGY ADKINS	DATE : 7-16-12		
CHECKED BY : A.M. LEE	DATE : 9-11-12		
DRAWN BY : REK 9/87	REV. 5/7/03R	RWW/JTE	
CHECKED BY : CRK 10/87	REV. 5/1/06R	TLA/GM	
	REV. 10/1/11	MAA/GM	

08-NOV-2013 08:57

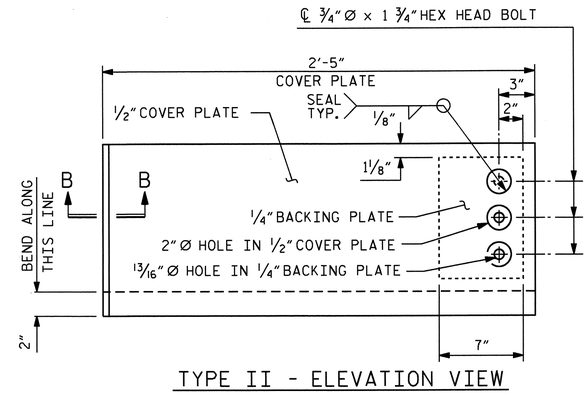
STD. NO. EJS1 (SHT 1)



SECTION THRU RAIL NORMAL TO JOINT

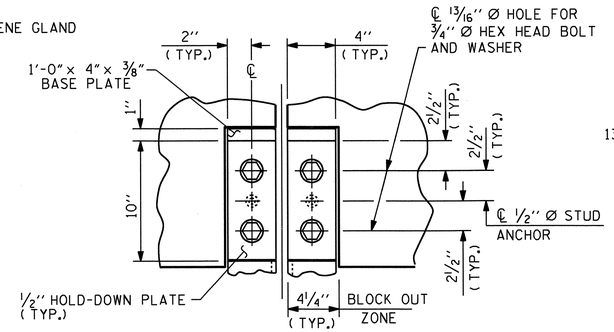


END VIEW

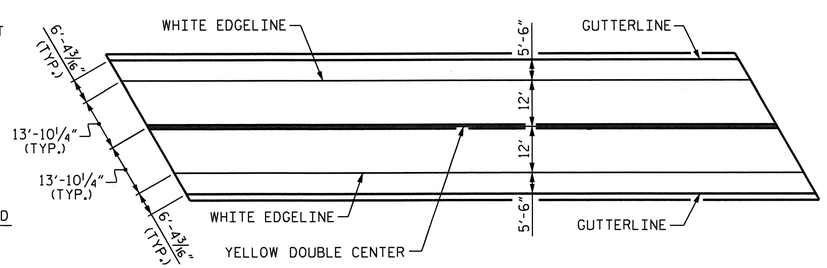


TYPE II - ELEVATION VIEW

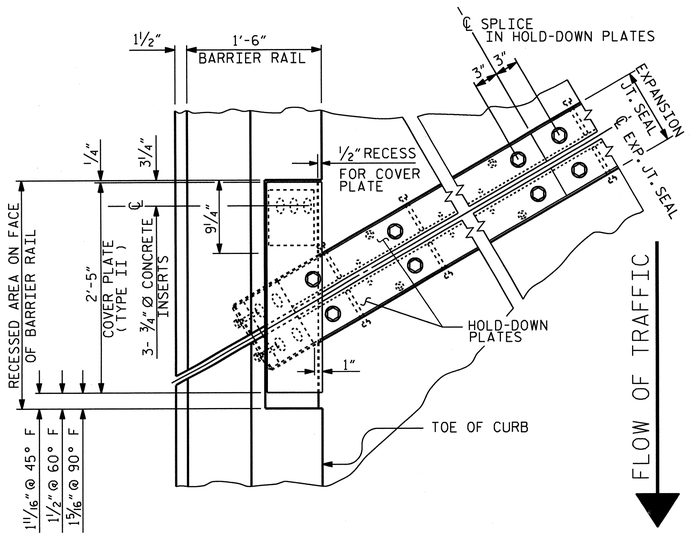
COVER PLATE DETAILS

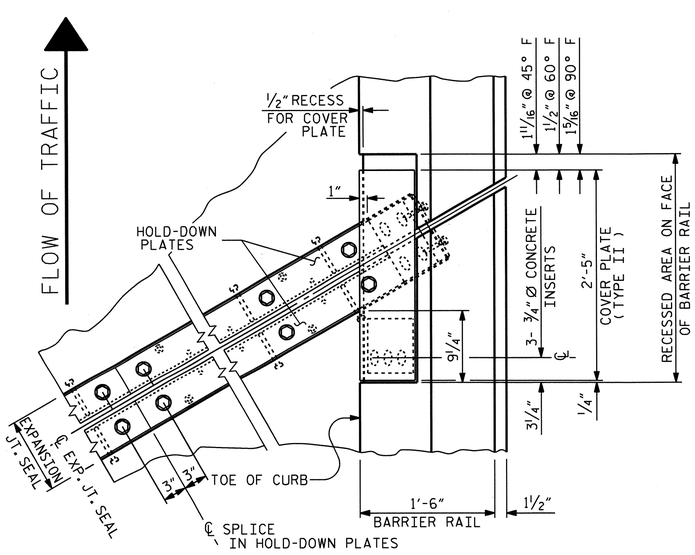


SECTION A - A



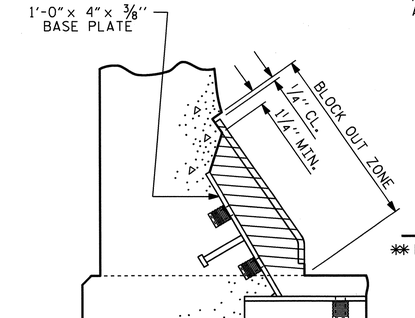
PAVEMENT MARKING ALIGNMENT





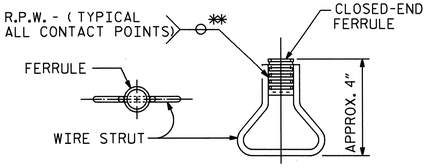
PLAN OF EXPANSION JOINT SEAL

SHOWING END BENT #1 OR END BENT #2



BLOCK OUT DETAIL

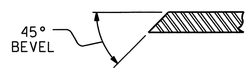
SEE " SECTION A - A " FOR OTHER DETAILS.



PLAN ELEVATION

CONCRETE INSERT

** EACH WELDED ATTACHMENT OF WIRE TO FERRULE SHALL DEVELOP THE TENSILE STRENGTH OF THE WIRE.



SECTION B - B

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY E. MURRAY

1/4/13

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 87+04.50 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

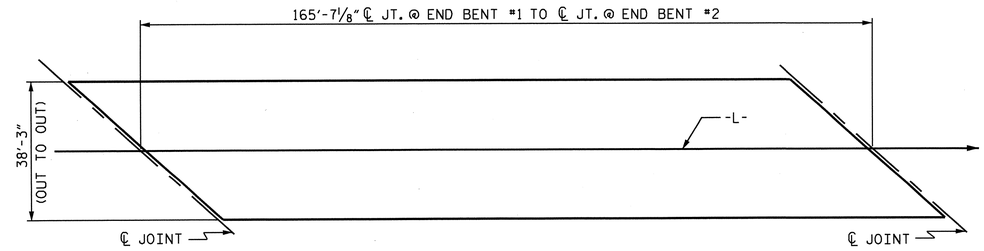
STANDARD

EXPANSION JOINT SEAL DETAILS FOR BARRIER RAIL

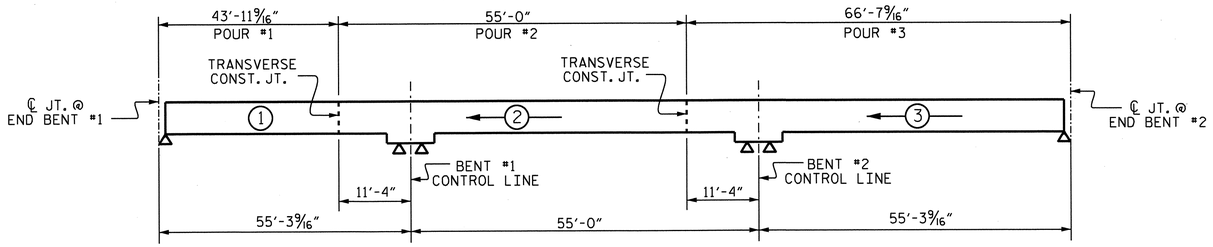
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-62
1			3			TOTAL SHEETS
2			4			76

ASSEMBLED BY : PEGGY ADKINS	DATE : 7-16-12	
CHECKED BY : T.L. AVERETTE	DATE : 10-23-12	
DRAWN BY : REK 9/87	REV. 10/17/00	RWW/LES
CHECKED BY : CRK 10/87	REV. 5/1/06	TLA/GM
	REV. 10/1/11	MAA/GM

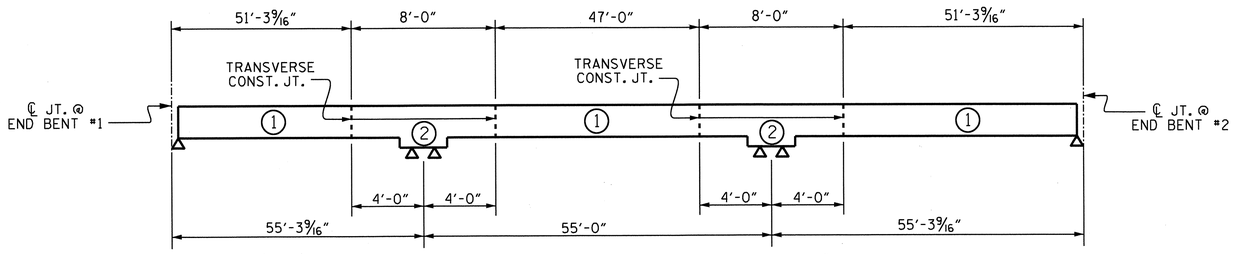
STIP #
STIP NO. EJ62



LAYOUT FOR COMPUTING AREA REINFORCED CONCRETE DECK SLAB (SQ.FT. = 6334)



POURING SEQUENCE



OPTIONAL POURING SEQUENCE

POUR ② CANNOT BE STARTED UNTIL BOTH ADJACENT ① POURS REACH A MIN. OF 3000 PSI.

GROOVING BRIDGE FLOORS	
APPROACH SLABS	1528 SQ.FT.
BRIDGE DECK	5258 SQ.FT.
TOTAL	6786 SQ.FT.

SUPERSTRUCTURE BILL OF MATERIAL		
	CLASS AA CONCRETE	EPOXY COATED REINFORCING STEEL
	(CU. YDS.)	(LBS.)
POUR #1	36.2	34750
POUR #2	51.6	
POUR #3	63.6	
TOTALS**	151.4	34750

QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED

SUPERSTRUCTURE REINFORCING STEEL LENGTHS ARE BASED ON THE FOLLOWING MINIMUM SPLICE LENGTHS

BAR SIZE	SUPERSTRUCTURE EXCEPT APPROACH SLABS, PARAPET, AND BARRIER RAIL		APPROACH SLABS		PARAPET AND BARRIER RAIL
	EPOXY COATED	UNCOATED	EPOXY COATED	UNCOATED	
#4	2'-0"	1'-9"	2'-0"	1'-9"	2'-9"
#5	2'-6"	2'-2"	2'-6"	2'-2"	3'-5"
#6	3'-0"	2'-7"	3'-10"	2'-7"	4'-4"
#7	5'-3"	3'-6"	——	——	——
#8	6'-10"	4'-7"	——	——	——

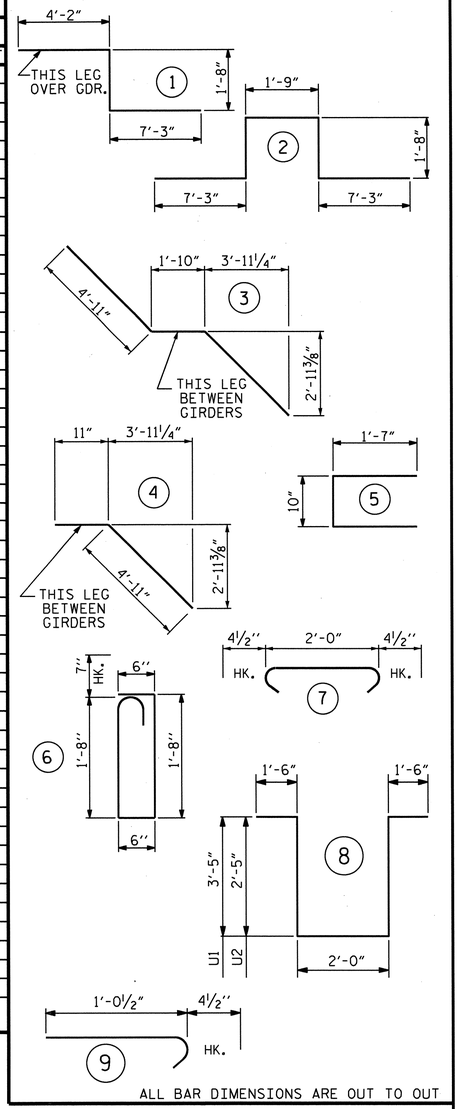
BILL OF MATERIAL

SPANS A, B, & C

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳ A1	287	#5	STR	37'-11"	11350
✳ A2	218	#4	STR	3'-0"	437
✳A101	4	#5	STR	35'-7"	148
✳A102	4	#5	STR	33'-11"	142
✳A103	4	#5	STR	32'-2"	134
✳A104	4	#5	STR	30'-5"	127
✳A105	4	#5	STR	28'-8"	120
✳A106	4	#5	STR	26'-11"	112
✳A107	4	#5	STR	25'-3"	105
✳A108	4	#5	STR	23'-6"	98
✳A109	4	#5	STR	21'-9"	91
✳A110	4	#5	STR	20'-0"	83
✳A111	4	#5	STR	18'-3"	76
✳A112	4	#5	STR	16'-7"	69
✳A113	4	#5	STR	14'-10"	62
✳A114	4	#5	STR	13'-1"	55
✳A115	4	#5	STR	11'-4"	47
✳A116	4	#5	STR	9'-8"	40
✳A117	4	#5	STR	7'-11"	33
✳A118	4	#5	STR	6'-2"	26
✳A119	4	#5	STR	4'-5"	18
✳A120	4	#5	STR	2'-8"	11
✳B1	204	#4	STR	18'-4"	2498
✳B2	30	#5	STR	56'-8"	1773
✳B3	102	#7	STR	44'-0"	9173
✳B4	100	#7	STR	21'-0"	4292
✳B5	51	#4	STR	15'-0"	511
✳G1	2	#5	STR	43'-8"	91
✳J1	80	#4	9	1'-5"	76
✳K1	8	#8	1	13'-1"	279
✳K2	12	#8	2	19'-7"	627
✳K3	24	#6	STR	7'-8"	276
✳K4	32	#4	STR	8'-3"	176
✳K5	16	#4	STR	6'-0"	64
✳K6	24	#4	3	11'-8"	187
✳K7	16	#4	4	5'-10"	62
✳K8	16	#4	STR	7'-8"	82
✳S1	64	#5	6	4'-11"	328
✳S2	64	#4	5	4'-0"	171
✳S3	152	#4	7	2'-9"	279
✳U1	40	#4	8	11'-10"	316
✳U2	16	#4	8	9'-10"	105

✳ EPOXY COATED REINFORCING STEEL LBS. 34750

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 87+04.50 -L-

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY E. MURRAY

1/14/13

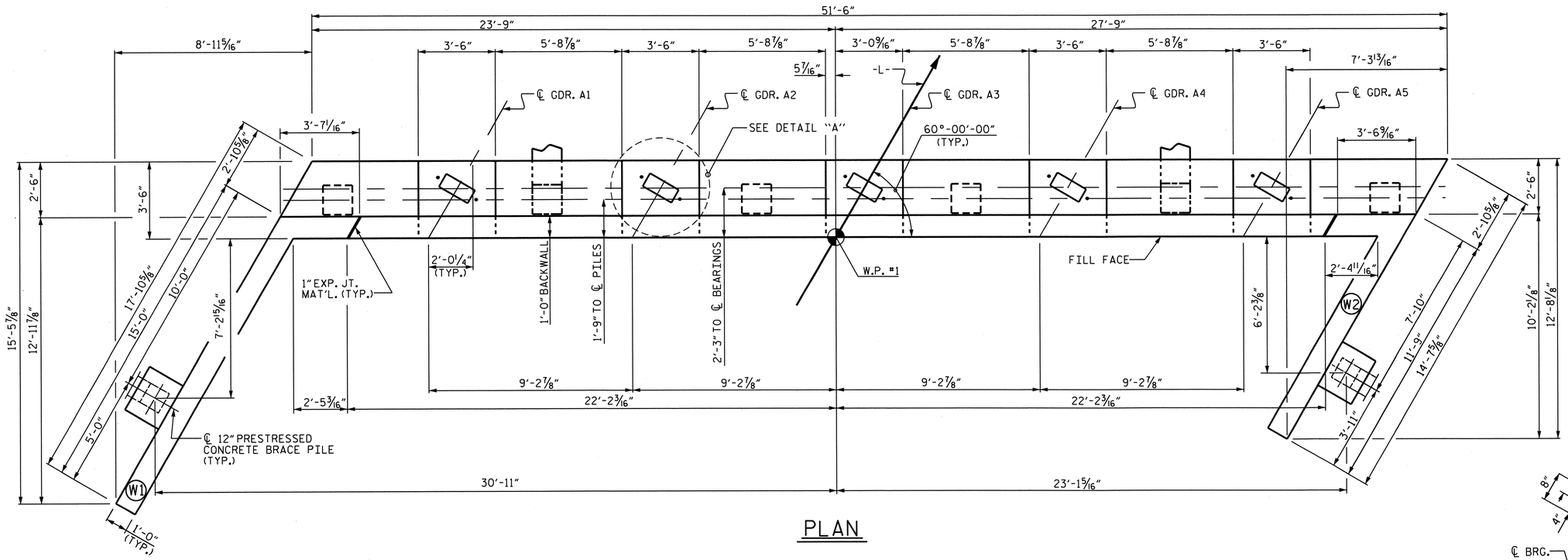
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

SUPERSTRUCTURE BILL OF MATERIAL

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-63
1			3			TOTAL SHEETS
2			4			76

ASSEMBLED BY : M. GUDLAUGSSON	DATE : 12/08		
CHECKED BY : P. PARISI	DATE : 01/09		
DRAWN BY : JMB 5/87	REV. 8/16/99	RWW/LES	
CHECKED BY : SJD 9/87	REV. 5/1/06	TLA/GM	
	REV. 10/1/11	MAA/GM	



NOTES

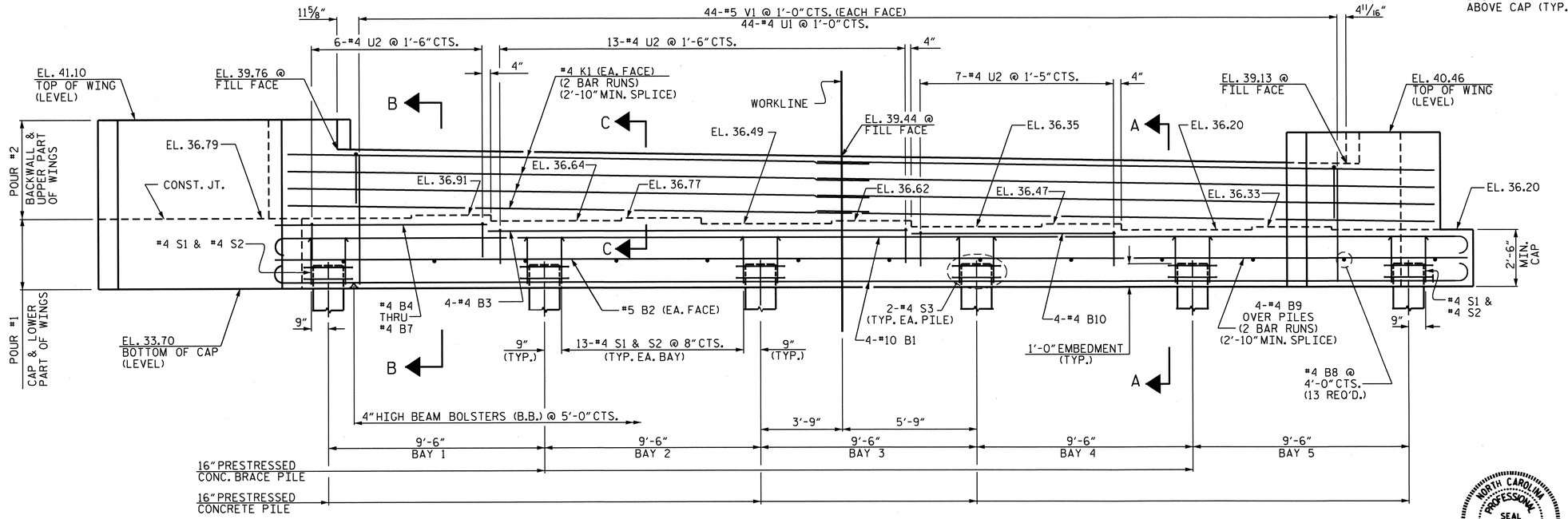
STIRRUPS AND "U" BARS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

THE TOP SURFACE AREAS OF THE END BENT CAPS SHALL BE CURED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS EXCEPT THE MEMBRANE CURING COMPOUND METHOD SHALL NOT BE USED.

INSTALL THE 4" DIA. DRAIN PIPE THROUGH THE WING WALL AS REQUIRED FOR REINFORCED BRIDGE APPROACH FILLS, SEE THE ROADWAY PLANS. REINFORCING STEEL IN THE WING WALL MAY BE SHIFTED AS NECESSARY TO CLEAR THE DRAIN PIPE.

THE TOP SURFACE OF THE CAP EXCEPT THE BRIDGE SEAT BUILDUPS SHALL BE SLOPED TRANSVERSELY FROM THE FILL FACE TO THE BACK FACE AT THE RATE OF 2%.



ELEVATION

(WING BRACE PILES NOT SHOWN FOR CLARITY)

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 87+04.50 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT #1

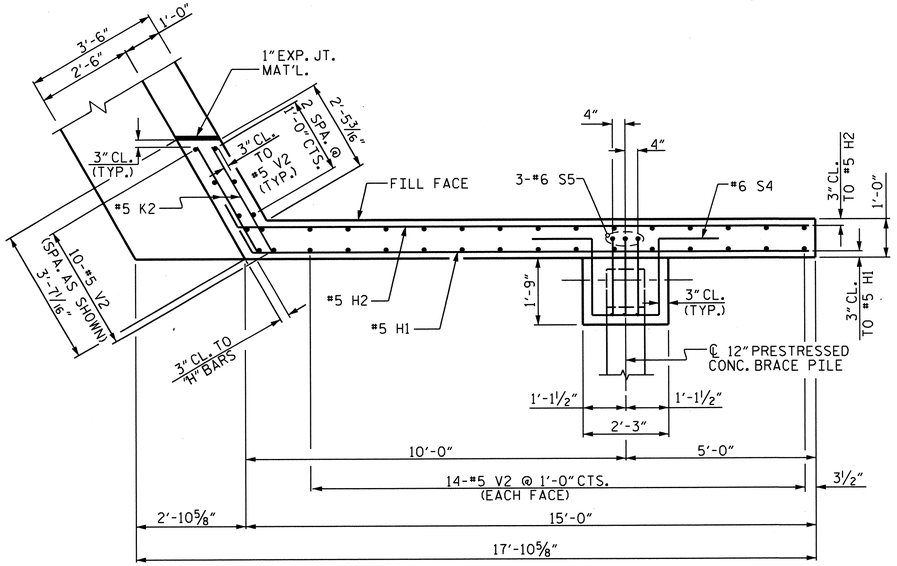
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-64
1			3			TOTAL SHEETS
2			4			76

STR. #2

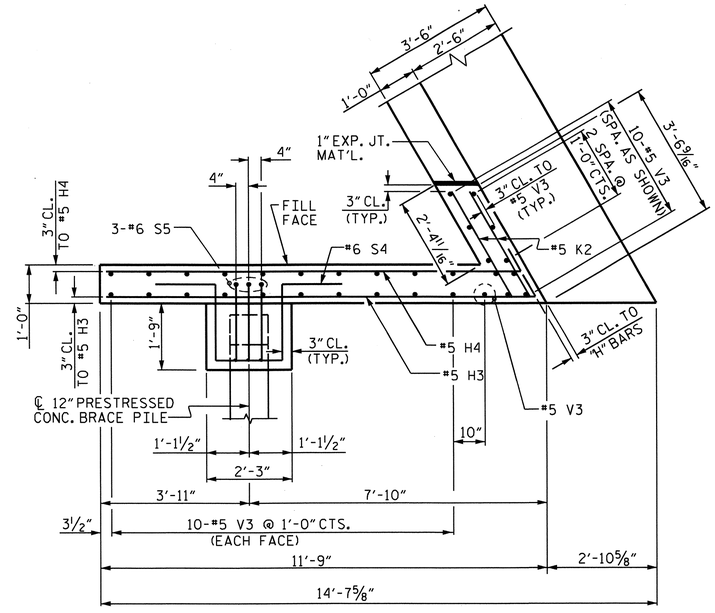
DRAWN BY : M.D.PISO DATE : 03/2009
CHECKED BY : PEGGY ADKINS DATE : 9-11-12

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY E. MURRAY

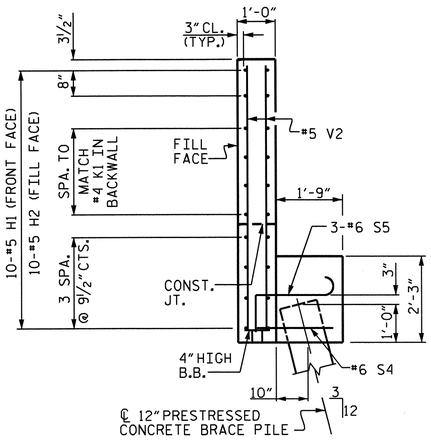
1/4/13



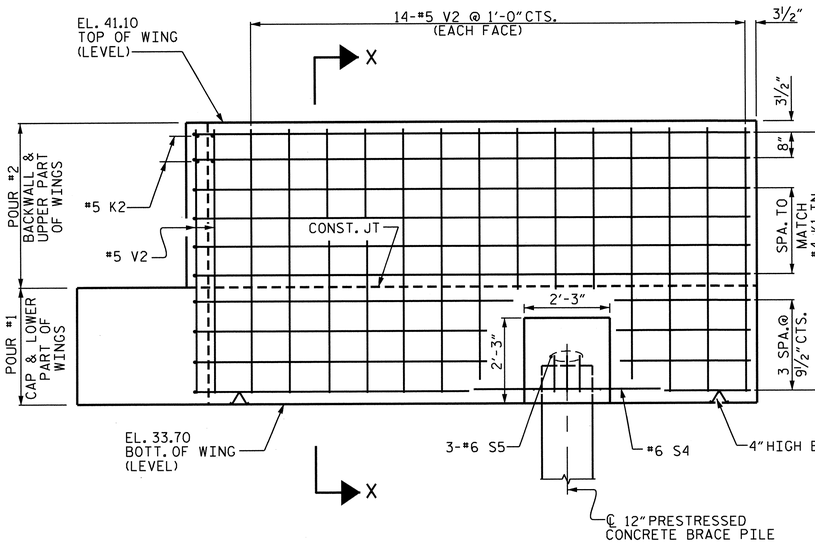
PLAN OF LEFT WING (W1)



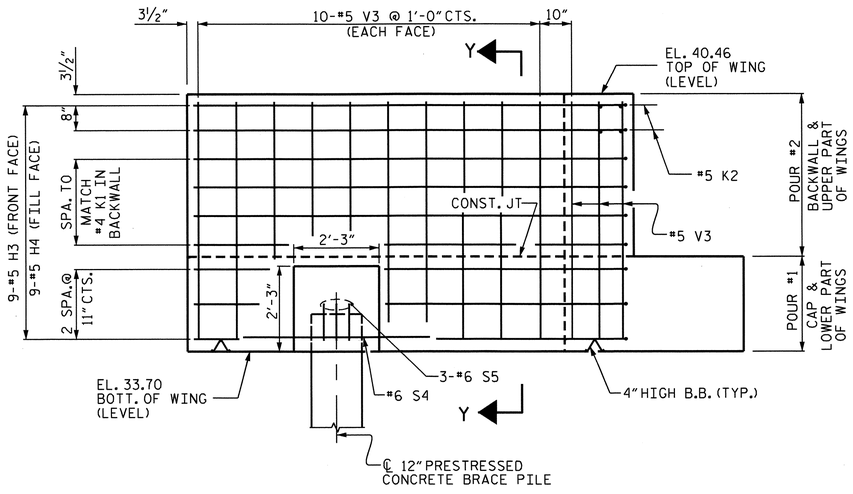
PLAN OF RIGHT WING (W2)



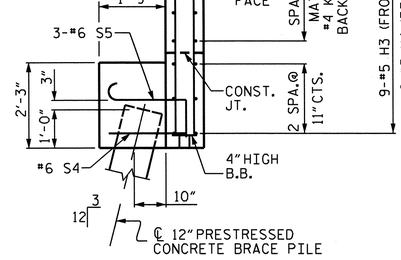
SECTION X-X



ELEVATION OF LEFT WING (W1)



ELEVATION OF RIGHT WING (W2)



SECTION Y-Y

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 87+04.50 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

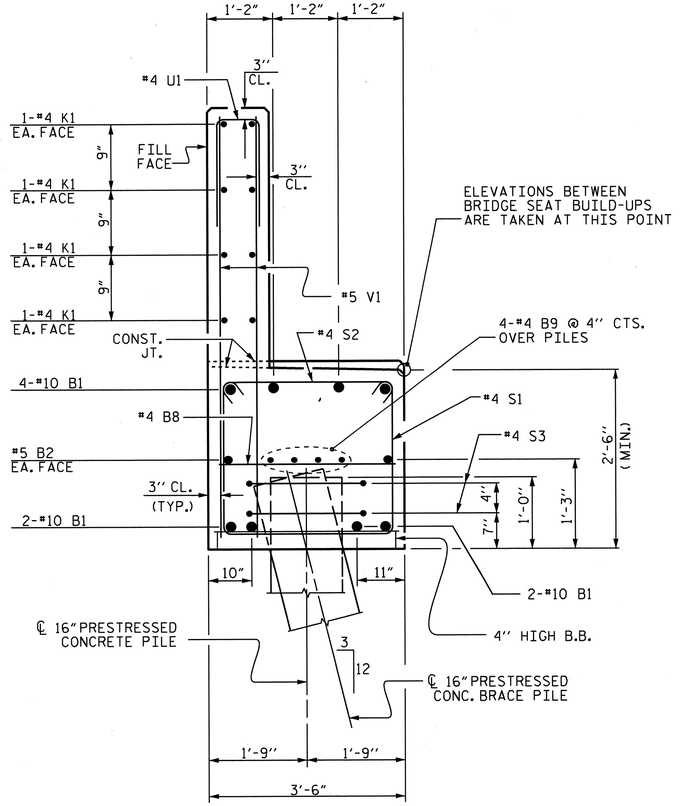
END BENT #1

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-65
1			3			TOTAL SHEETS
2			4			76

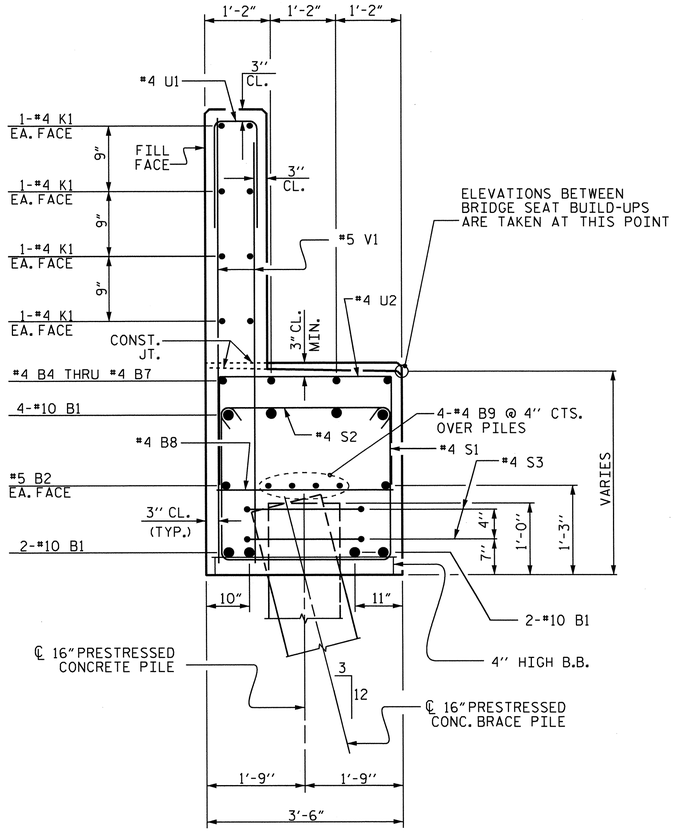
DRAWN BY : M.D.PISO DATE : 03/2009
CHECKED BY : PEGGY ADKINS DATE : 9-11-12

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY E. MURRAY

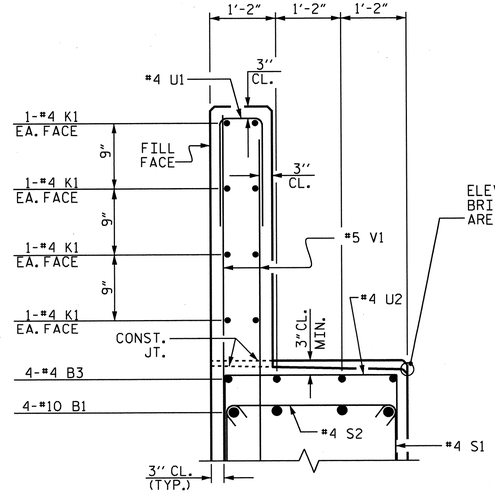
1/9/13



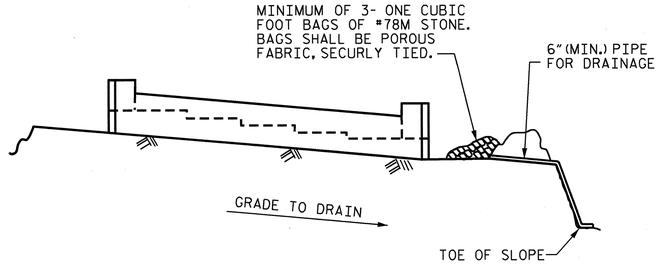
SECTION A-A



SECTION B-B



SECTION C-C



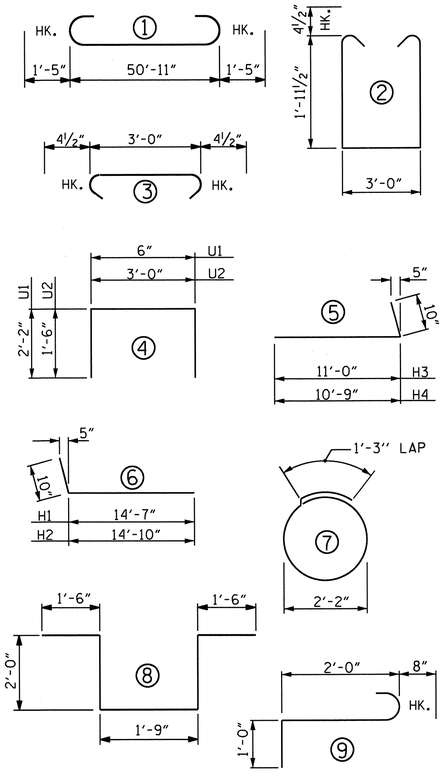
BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

BAGGED STONE SHALL REMAIN IN PLACE UNTIL THE ENGINEER DIRECTS THAT IT BE REMOVED. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF SILT ACCUMULATIONS AT BAGGED STONE WHEN SO DIRECTED BY THE ENGINEER. BAGS SHALL BE REMOVED AND REPLACED WHENEVER THE ENGINEER DETERMINES THAT THEY HAVE DETERIORATED AND LOST THEIR EFFECTIVENESS.

NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

TEMPORARY DRAINAGE AT END BENT

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

END BENT #1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱B1	8	#10	1	53'-9"	1850
✱B2	2	#5	STR.	50'-11"	106
✱B3	4	#4	STR.	18'-3"	49
✱B4	1	#4	STR.	9'-7"	6
✱B5	1	#4	STR.	9'-1"	6
✱B6	1	#4	STR.	8'-5"	6
✱B7	1	#4	STR.	7'-11"	5
✱B8	13	#4	STR.	3'-0"	26
✱B9	8	#4	STR.	26'-11"	144
✱B10	4	#4	STR.	9'-2"	24
✱H1	10	#5	6	15'-5"	161
✱H2	10	#5	6	15'-8"	163
✱H3	9	#5	5	11'-10"	111
✱H4	9	#5	5	11'-7"	109
✱K1	16	#4	STR.	26'-11"	288
✱K2	8	#5	STR.	2'-11"	24
✱S1	67	#4	2	7'-8"	343
✱S2	67	#4	3	3'-9"	168
✱S3	12	#4	7	8'-1"	65
✱S4	2	#6	8	8'-9"	26
✱S5	6	#6	9	3'-8"	33
✱U1	44	#4	4	4'-10"	142
✱U2	26	#4	4	6'-0"	104
✱V1	88	#5	STR.	4'-11"	451
✱V2	38	#5	STR.	6'-10"	271
✱V3	31	#5	STR.	6'-3"	202

✱EPOXY COATED REINFORCING STEEL 4883 LBS.

CLASS AA CONCRETE BREAKDOWN

POUR #1 : CAP & LOWER PART OF WINGS 21.6 C.Y.

POUR #2 : BACKWALL & UPPER PART OF WINGS 9.8 C.Y.

TOTAL CLASS AA CONCRETE ★ 31.4 C.Y.

16" PRESTRESSED CONCRETE PILES
No. 6 300 LIN. FT.

12" PRESTRESSED CONCRETE PILES
No. 2 100 LIN. FT.

PILE REDRIVES EACH 3

★CONCRETE DISPLACED BY THE 16" PRESTRESSED CONCRETE PILES HAS BEEN DEDUCTED FROM THE CONCRETE QUANTITY.

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 87+04.50 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT #1

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY E. MURRAY
1/14/13

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-66
1			3			TOTAL SHEETS
2			4			76

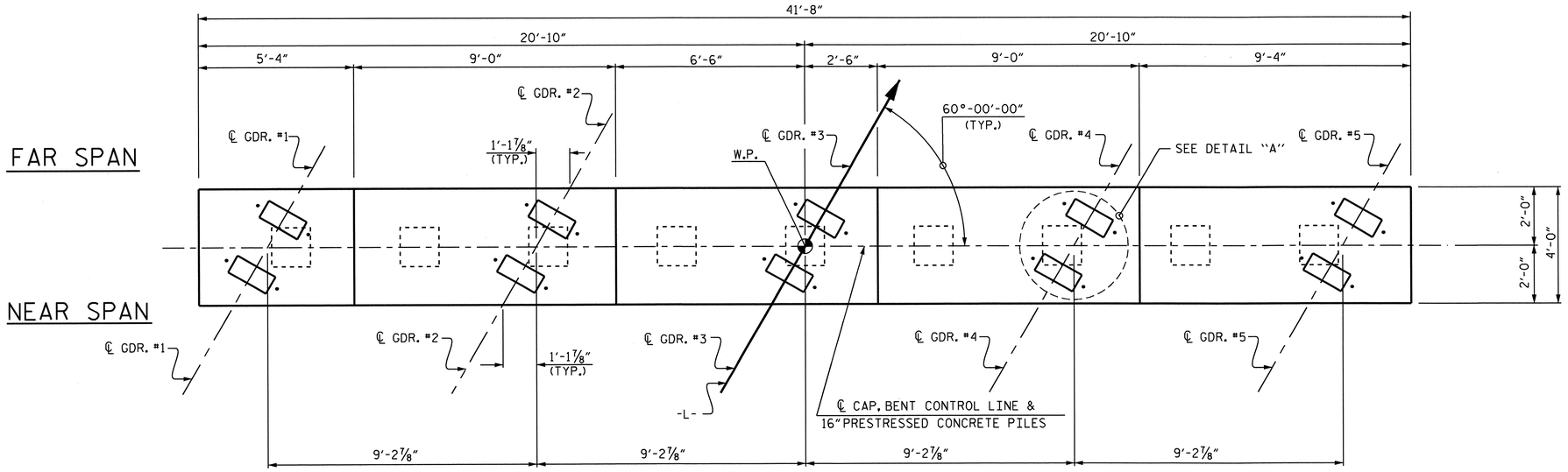
DRAWN BY : M.D.PISO DATE : 08-10-12
CHECKED BY : PEGGY ADKINS DATE : 9-11-12

08-NOV-2013 08:55

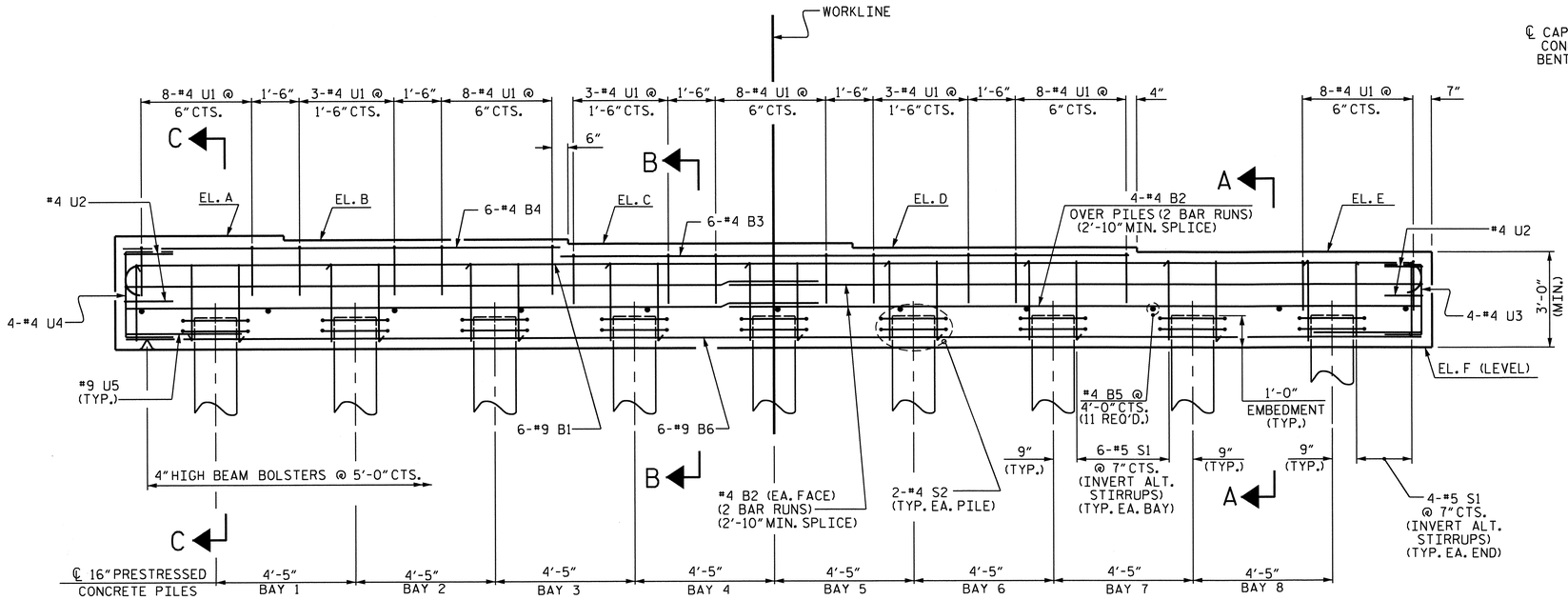
STR. #2

NOTES

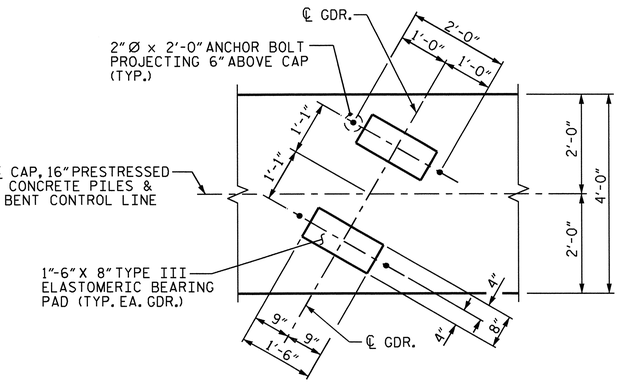
STIRRUPS AND "U" BARS IN CAP MAY BE SHIFTED AS necessary TO CLEAR ANCHOR BOLTS.



PLAN



ELEVATION



DETAIL "A"

(TYP. EA. GDR.)

ELEVATION	A	B	C	D	E	F
BENT #1	37.08	36.94	36.79	36.64	36.50	33.50
BENT #2	37.25	37.11	36.96	36.82	36.67	33.67

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 87+04.50 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT #1 & BENT #2

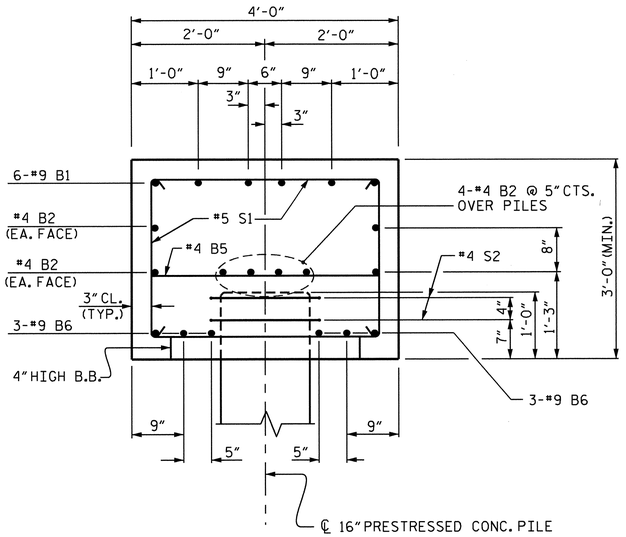
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-67
1			3			TOTAL SHEETS
2			4			76

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY E. MURRAY

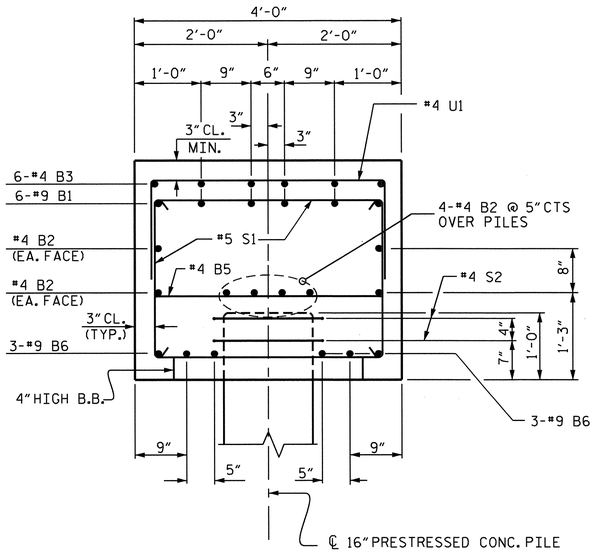
1/4/13

DRAWN BY : M.D.PISO DATE : 08-04-09

CHECKED BY : B.N. BARODAWALA DATE : 09-05-12

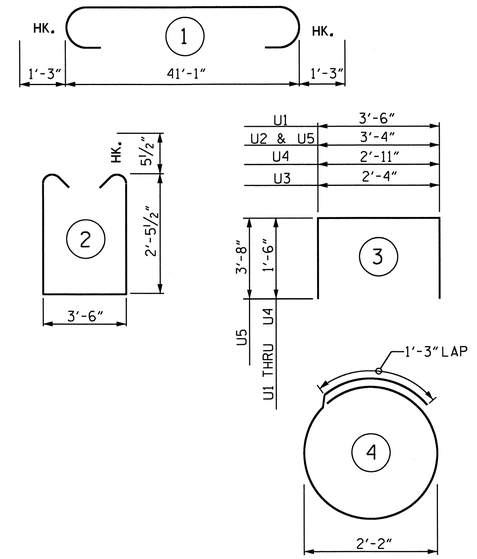


SECTION A-A



SECTION B-B

BAR TYPES



ALL DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

QUANTITIES FOR ONE BENT

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱B1	6	#9	1	43'-7"	889
✱B2	16	#4	STR.	22'-0"	235
✱B3	6	#4	STR.	18'-0"	72
✱B4	6	#4	STR.	13'-10"	55
✱B5	11	#4	STR.	3'-6"	26
✱B6	6	#9	STR.	41'-2"	840
✱S1	56	#5	2	9'-4"	545
✱S2	18	#4	4	8'-1"	97
✱U1	49	#4	3	6'-6"	213
✱U2	4	#4	3	6'-4"	17
✱U3	4	#4	3	5'-4"	14
✱U4	4	#4	3	5'-11"	16
✱U5	2	#9	3	10'-8"	73

✱EPOXY COATED REINFORCING STEEL 3092 LBS.

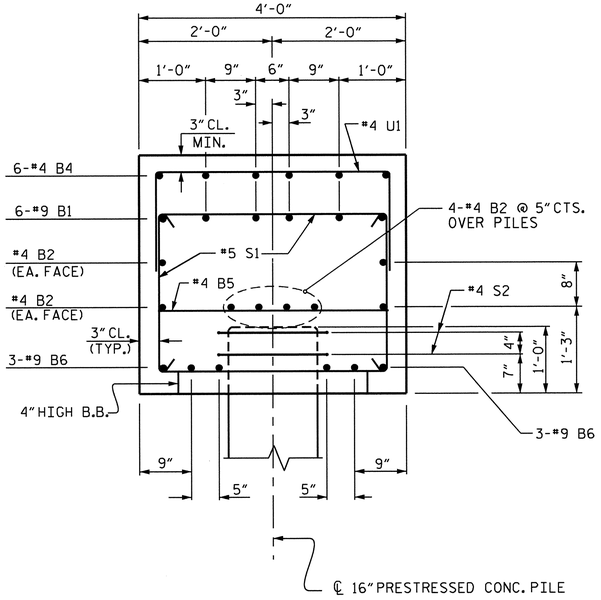
CLASS AA CONCRETE ● 19.5 C.Y.

16" PRESTRESSED CONCRETE PILES
NO. 9 630 LIN. FT.

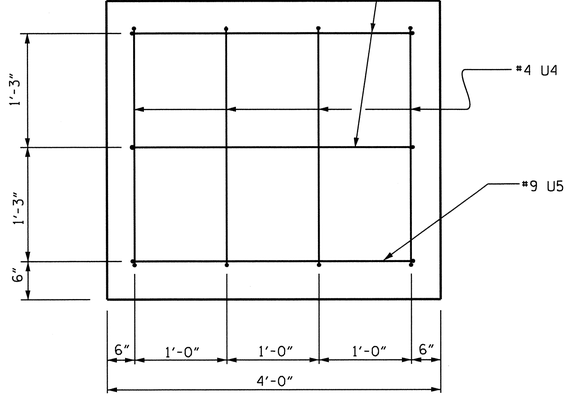
PILE REDRIVES 5 EA.

PDA TESTING 1 EA.

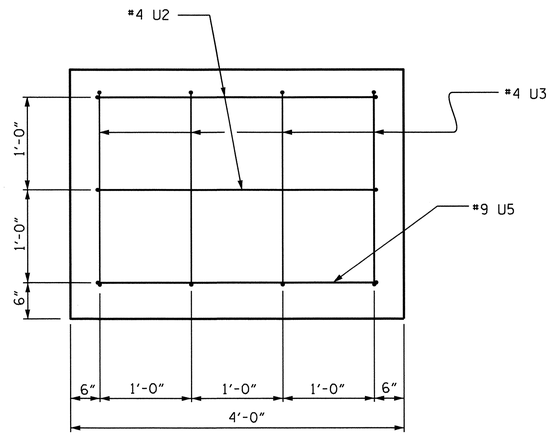
● CONCRETE DISPLACED BY THE 16" PRESTRESSED CONCRETE PILES HAS BEEN DEDUCTED FROM THE CONCRETE QUANTITY.



SECTION C-C



END OF CAP VIEW (LEFT)



END OF CAP VIEW (RIGHT)

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 87+04.50 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

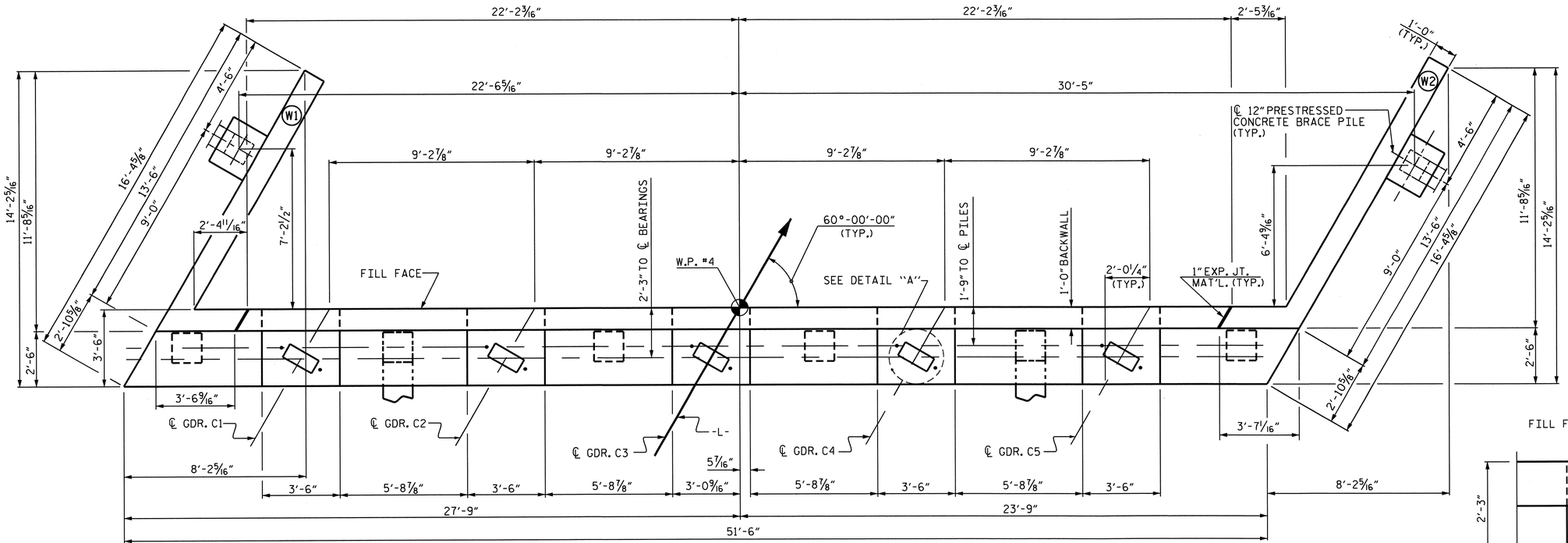
SUBSTRUCTURE

BENT #1 & BENT #2

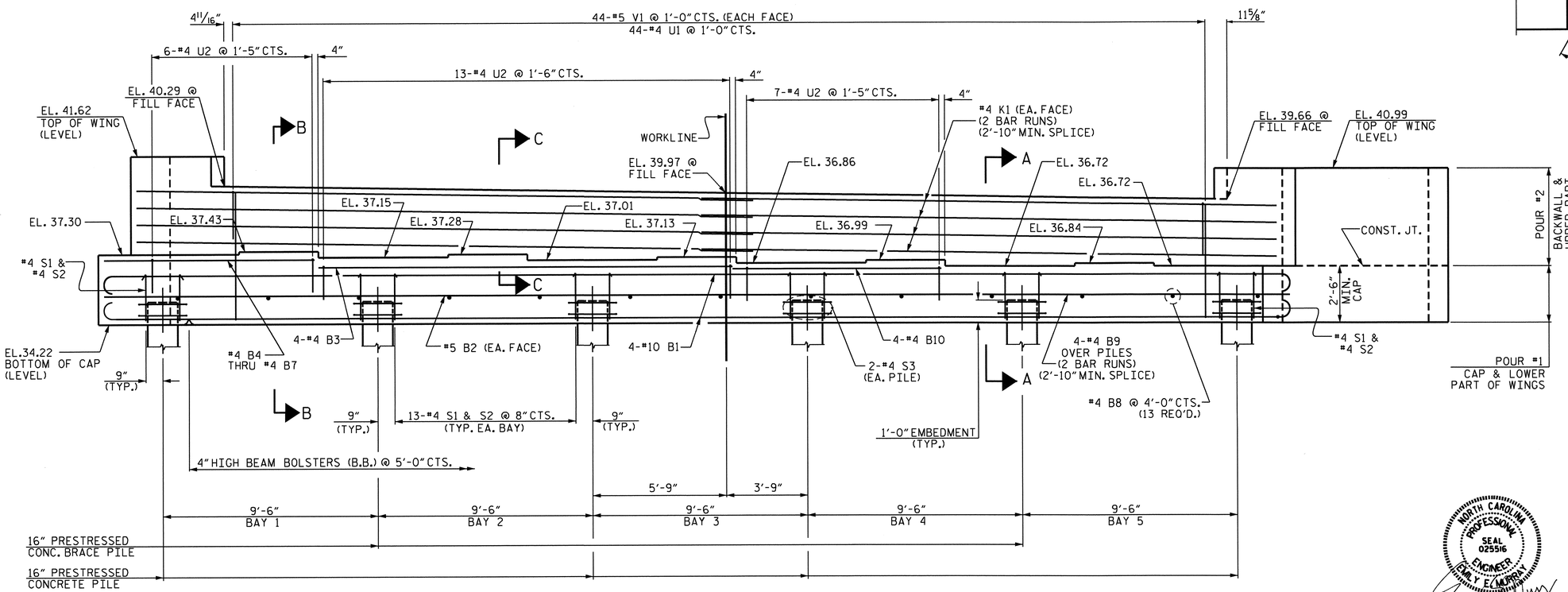
NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY E. MURRAY
1/4/13

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-68
1			3			TOTAL SHEETS
2			4			76

DRAWN BY : M.D.PISO DATE : 08/04/09
CHECKED BY : B.N.BARODAWALA DATE : 09-05-12

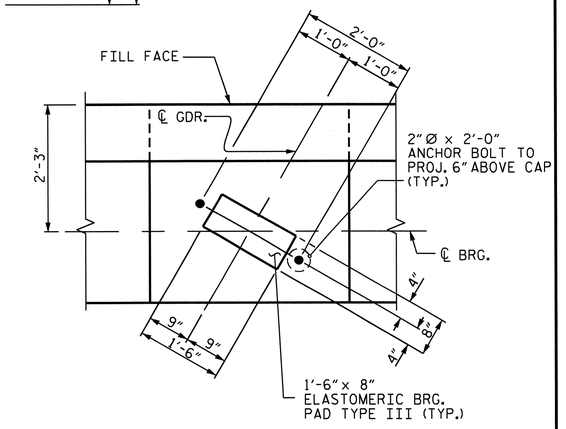


PLAN



ELEVATION

(WING BRACE PILES NOT SHOWN FOR CLARITY)



DETAIL "A"

(TYP. EA. BRG.)

NOTES

STIRRUPS AND "U" BARS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

THE TOP SURFACE AREAS OF THE END BENT CAPS SHALL BE CURED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS EXCEPT THE MEMBRANE CURING COMPOUND METHOD SHALL NOT BE USED.

INSTALL THE 4" DIA. DRAIN PIPE THROUGH THE WING WALL AS REQUIRED FOR REINFORCED BRIDGE APPROACH FILLS. SEE THE ROADWAY PLANS. REINFORCING STEEL IN THE WING WALL MAY BE SHIFTED AS NECESSARY TO CLEAR THE DRAIN PIPE.

THE TOP SURFACE OF THE CAP EXCEPT THE BRIDGE SEAT BUILDUPS SHALL BE SLOPED TRANSVERSELY FROM THE FILL FACE TO THE BACK FACE AT THE RATE OF 2%.

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 87+04.50 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

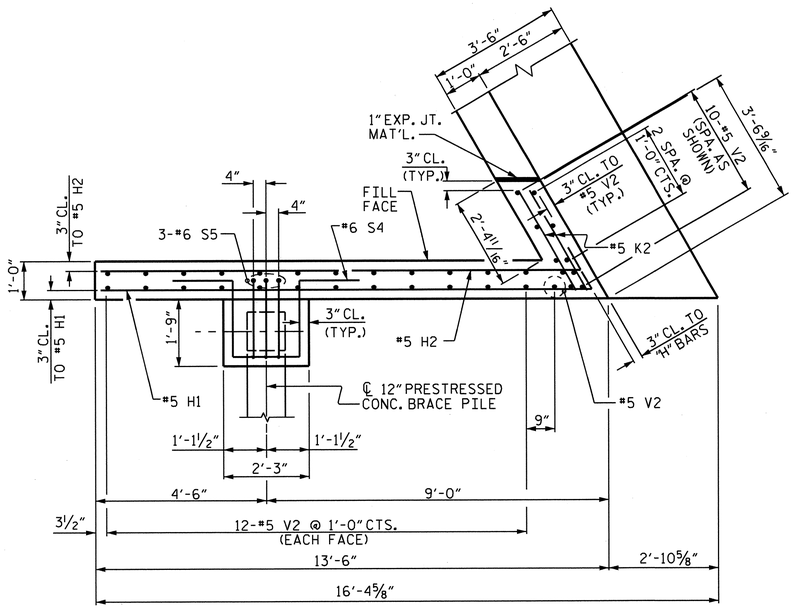
END BENT #2

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-69
1			3			TOTAL SHEETS
2			4			76

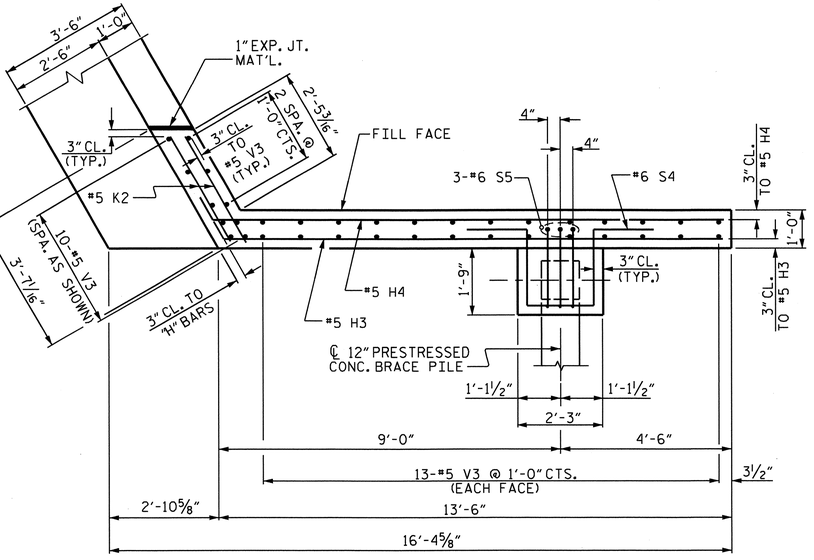
NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER M. D. PISO

1/9/13

DRAWN BY : M.D.PISO DATE : 03/2009
CHECKED BY : PEGGY ADKINS DATE : 9-11-12



PLAN OF LEFT WING (W1)



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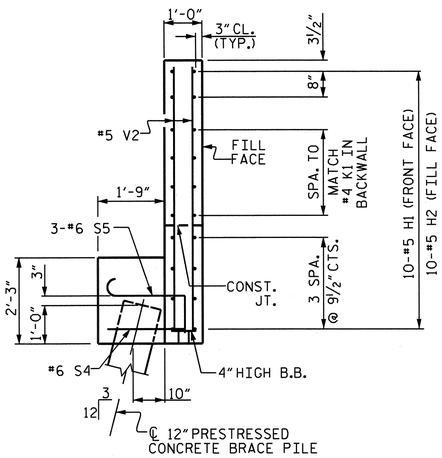
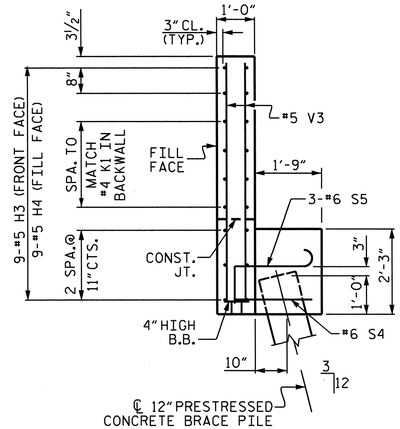


SECTION X-X



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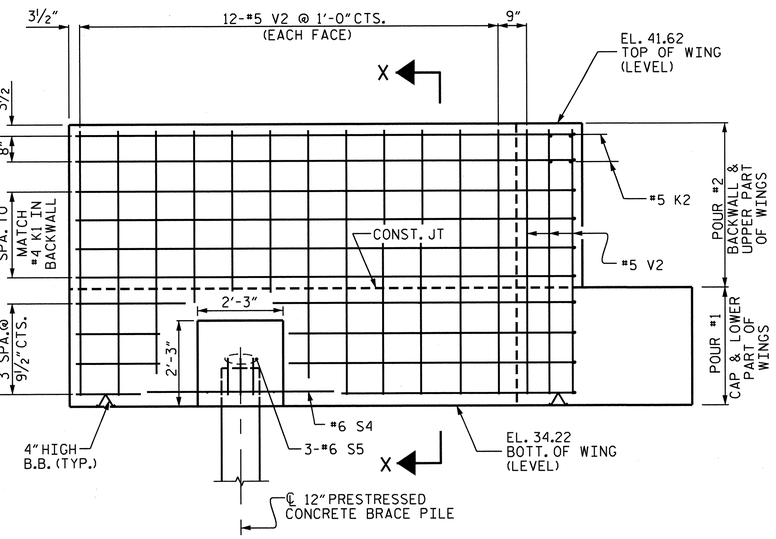

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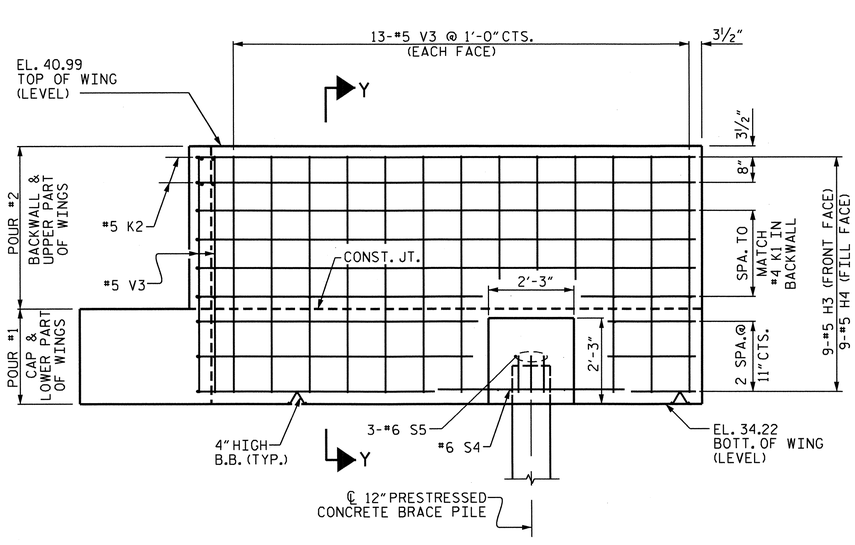

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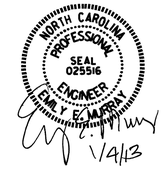


PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 87+04.50 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

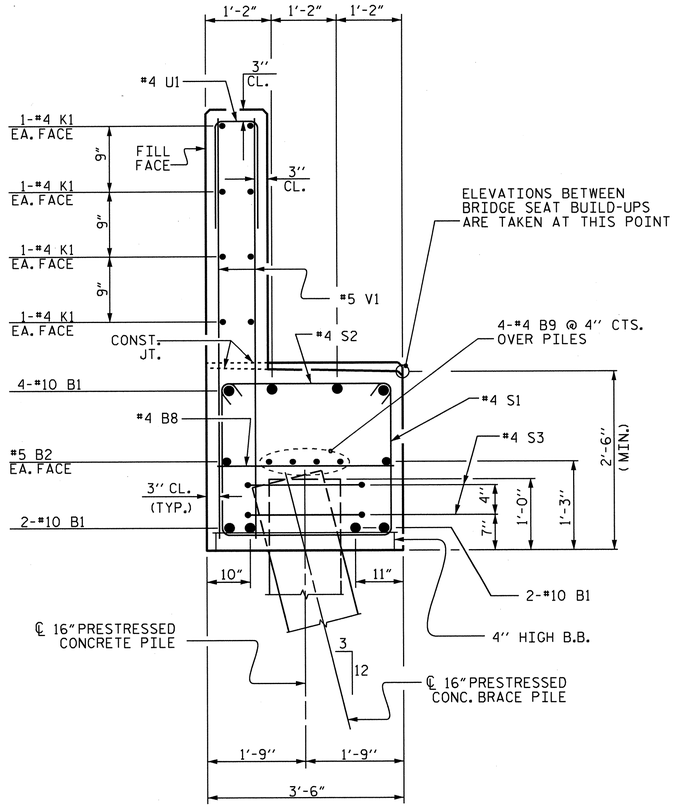
SUBSTRUCTURE

END BENT #2

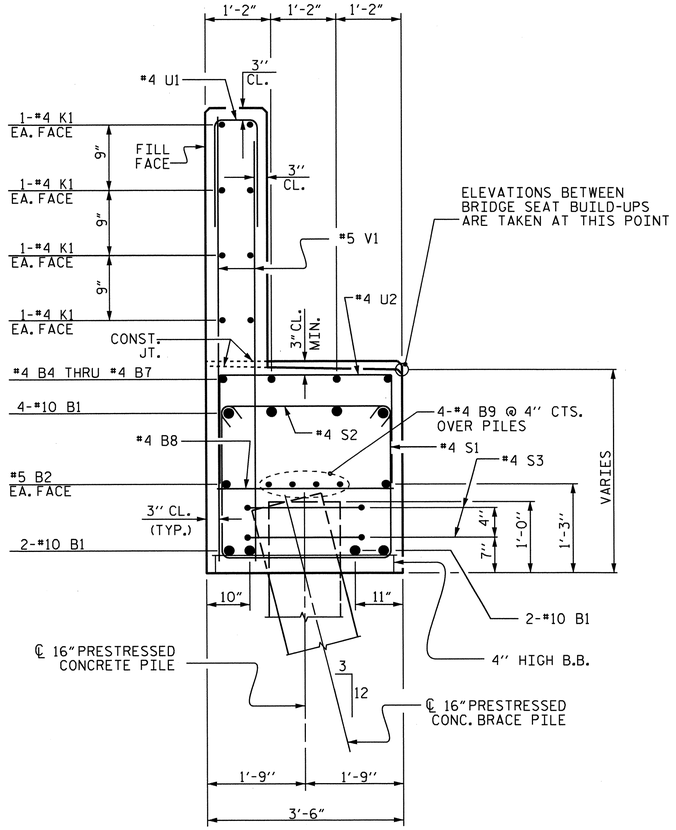
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-70
1			3			TOTAL SHEETS
2			4			76

DRAWN BY : M.D.PISO DATE : 03/2009
CHECKED BY : PEGGY ADKINS DATE : 9-11-12

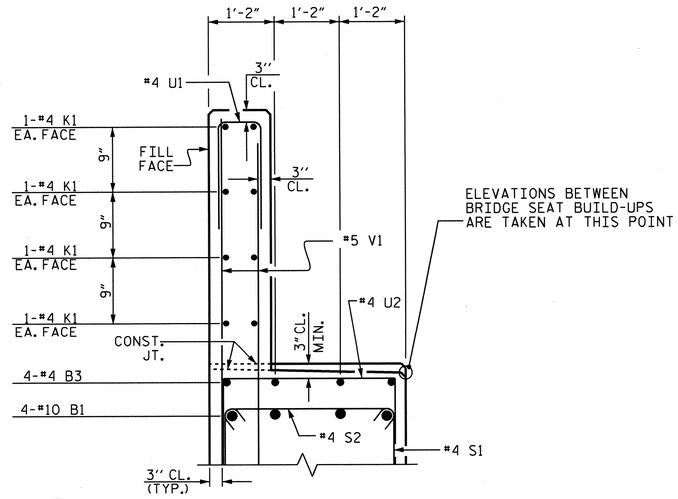
20 NOV 2012 08:54



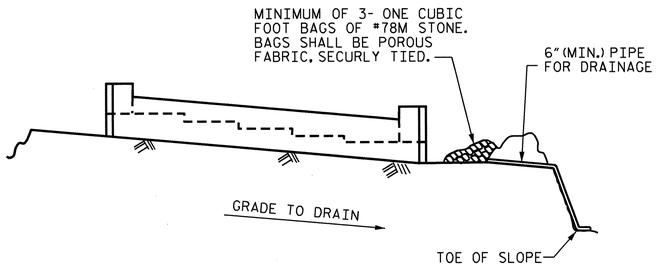
SECTION A-A



SECTION B-B



SECTION C-C



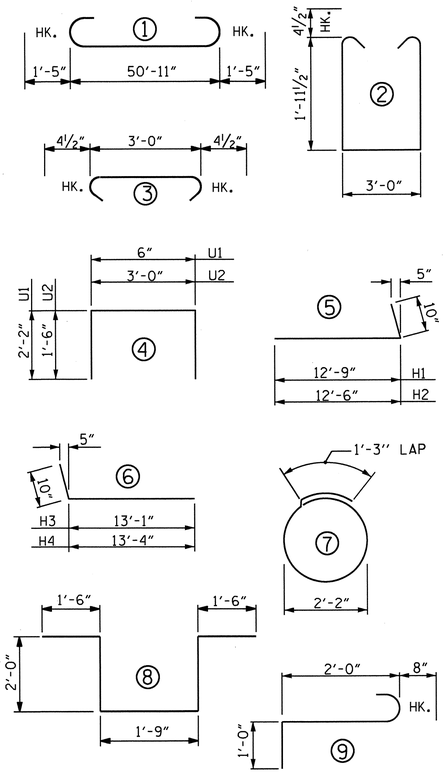
BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

BAGGED STONE SHALL REMAIN IN PLACE UNTIL THE ENGINEER DIRECTS THAT IT BE REMOVED. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF SILT ACCUMULATIONS AT BAGGED STONE WHEN SO DIRECTED BY THE ENGINEER. BAGS SHALL BE REMOVED AND REPLACED WHENEVER THE ENGINEER DETERMINES THAT THEY HAVE DETERIORATED AND LOST THEIR EFFECTIVENESS.

NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

TEMPORARY DRAINAGE AT END BENT

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

END BENT #2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱B1	8	#10	1	53'-9"	1850
✱B2	2	#5	STR.	50'-11"	106
✱B3	4	#4	STR.	18'-3"	49
✱B4	1	#4	STR.	7'-4"	5
✱B5	1	#4	STR.	7'-10"	5
✱B6	1	#4	STR.	8'-6"	6
✱B7	1	#4	STR.	9'-0"	6
✱B8	13	#4	STR.	3'-0"	26
✱B9	8	#4	STR.	26'-11"	144
✱B10	4	#4	STR.	9'-2"	24
✱H1	10	#5	5	13'-7"	142
✱H2	10	#5	5	13'-4"	139
✱H3	9	#5	6	13'-11"	131
✱H4	9	#5	6	14'-2"	133
✱K1	16	#4	STR.	26'-11"	288
✱K2	8	#5	STR.	2'-11"	24
✱S1	67	#4	2	7'-8"	343
✱S2	67	#4	3	3'-9"	168
✱S3	12	#4	7	8'-1"	65
✱S4	2	#6	8	8'-9"	26
✱S5	6	#6	9	3'-8"	33
✱U1	44	#4	4	4'-10"	142
✱U2	26	#4	4	6'-0"	104
✱V1	88	#5	STR.	4'-11"	451
✱V2	35	#5	STR.	6'-10"	249
✱V3	36	#5	STR.	6'-3"	235

✱EPOXY COATED REINFORCING STEEL 4894 LBS.

CLASS AA CONCRETE BREAKDOWN

POUR #1 : CAP & LOWER PART OF WINGS 21.4 C.Y.

POUR #2 : BACKWALL & UPPER PART OF WINGS 10.1 C.Y.

TOTAL CLASS AA CONCRETE ★ 31.5 C.Y.

16" PRESTRESSED CONCRETE PILES
No. 6 240 LIN. FT.

12" PRESTRESSED CONCRETE PILES
No. 2 80 LIN. FT.

PILE REDRIVES EACH 3

★CONCRETE DISPLACED BY THE 16" PRESTRESSED CONCRETE PILES HAS BEEN DEDUCTED FROM THE CONCRETE QUANTITY.

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 87+04.50 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT #2

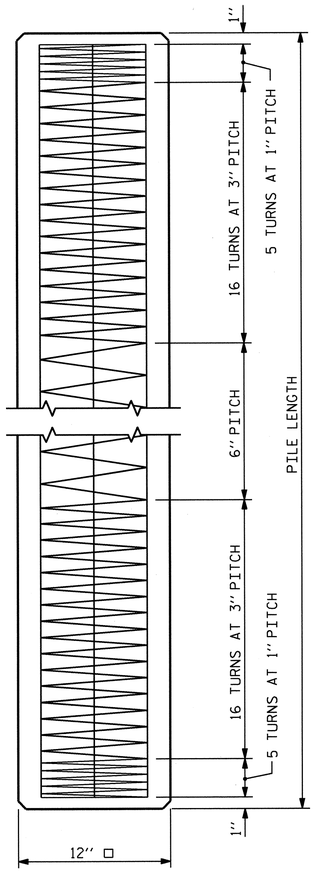
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-71
1			3			TOTAL SHEETS
2			4			76

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER DAVID E. MURRAY 1/4/13

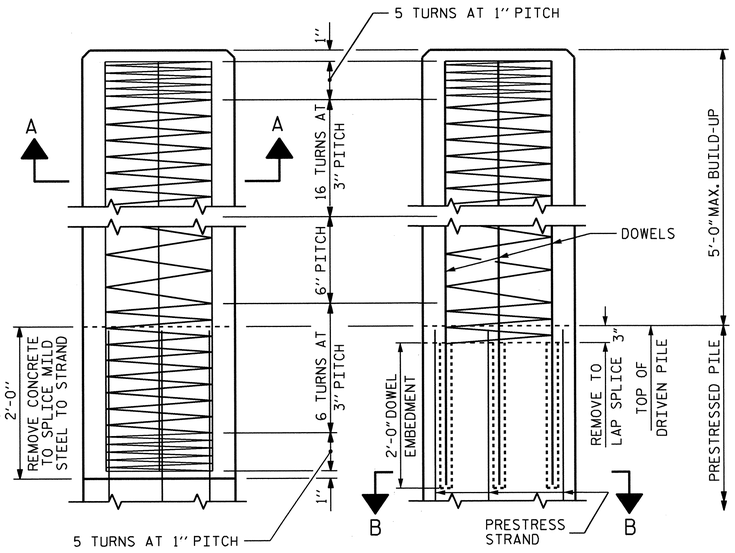
DRAWN BY : M.D.PISO DATE : 08-10-12
CHECKED BY : PEGGY ADKINS DATE : 9-11-12

08-NOV-2013 08:54

STR #2

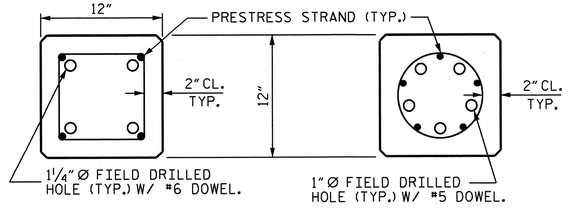


ELEVATION



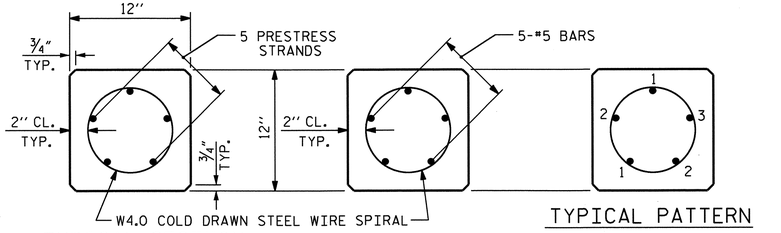
BUILD-UP AND SPIRAL REINFORCING

OPTIONAL BUILD-UP WITH DOWELS



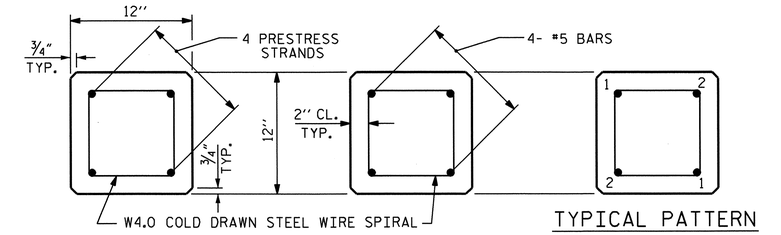
SECTION "B-B"

(AT THE CONTRACTOR'S OPTION, PILE BUILD-UP MAY BE CONSTRUCTED WITH DOWELS.)



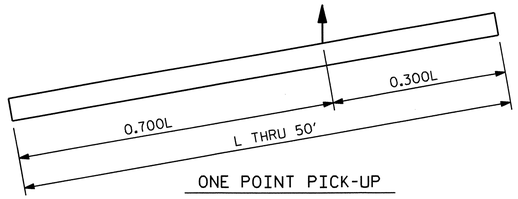
TYPICAL SECTION SECTION "A-A" TYPICAL PATTERN FOR BURNING STRANDS

½" OR 0.6" Ø GRADE 270 L.R. PRESTRESS STRANDS

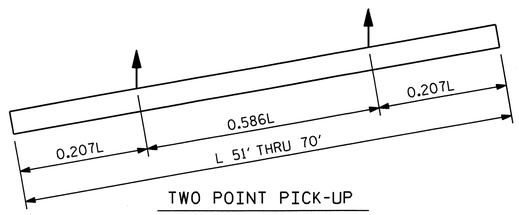


TYPICAL SECTION SECTION "A-A" TYPICAL PATTERN FOR BURNING STRANDS

½" OR 0.6" Ø GRADE 270 L.R. PRESTRESS STRANDS



ONE POINT PICK-UP



TWO POINT PICK-UP

PICK-UP POINTS

NOTES

PRESTRESSED CONCRETE STRENGTH : f'c= 7,500 PSI

BUILD-UP CONCRETE STRENGTH : f'c= 7,500 PSI

STRAND DATA:

SIZE	GRADE	AREA	ULTIMATE STRENGTH	APPLIED PRESTRESS FORCE
½"	270 L.R.	0.153	41,300# PER STRAND	30,980# PER STRAND
0.6"	270 L.R.	0.217	58,600# PER STRAND	43,940# PER STRAND

ALL PRESTRESSING STRANDS SHALL BE 7-WIRE LOW-RELAXATION GRADE 270 STRANDS CONFORMING TO AASHTO M203. STRAND SAMPLING REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

AT THE CONTRACTOR'S OPTION, ½" OR 0.6" STRANDS MAY BE USED IN EITHER THE 4 OR 5 STRAND CONFIGURATION SHOWN IN THE TYPICAL SECTION DETAIL. MIXING OF STRAND SIZE IS NOT ALLOWED.

THE SLIP-FORM METHOD OF CASTING PILES WILL NOT BE PERMITTED.

TRANSFER THE LOAD FROM THE ANCHORAGES TO THE PILE AFTER THE CONCRETE HAS ATTAINED A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI.

IF STRAND STRESS IS RELIEVED BY BURNING, THE STRANDS SHALL BE BURNED IN PAIRS, EXCEPT WHERE 5 STRANDS ARE USED, THE LAST STRAND MAY BE BURNED SINGLY ACCORDING TO BURNING PATTERNS SHOWN. NOT MORE THAN 4 STRANDS MAY BE BURNED AT ANY ONE SECTION BEFORE THE SAME STRANDS ARE BURNED AT BOTH ENDS OF THE BED AND BETWEEN EACH PAIR OF PILES IN THE BED.

PROPOSED DEVICES FOR LIFTING PILES, RECESS DETAILS, AND PATCHING MATERIAL SHALL BE DETAILED IN SHOP DRAWINGS. AFTER ATTACHMENTS HAVE BEEN REMOVED, OPENINGS SHALL BE REPAIRED SUCH THAT THE APPEARANCE OF THE PILE IS UNIFORM.

WHERE CAST-IN-PLACE LIFTING DEVICES ARE NOT USED, PICK-UP POINTS ARE TO BE INDICATED WITH A 2" WIDE BLACK MARK.

DRIVE PILES USING A METHOD APPROVED BY THE ENGINEER, WHEREBY THE HEAD OF THE PILE IS NOT DAMAGED.

DRIVING OF THE BUILT-UP PILE WILL NOT BE PERMITTED UNTIL THE CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF 5,000 PSI AND UNTIL A PERIOD OF SEVEN DAYS HAS ELAPSED SINCE CASTING OF THE BUILD-UP.

THE WATER/CEMENT RATIO FOR CONCRETE PILES SHALL NOT EXCEED 0.40.

PRESTRESSED CONCRETE PILES SHALL CONTAIN CALCIUM NITRITE CORROSION INHIBITOR.

DOWEL INSTALLATION FOR OPTIONAL BUILD-UP

GROUT COMPRESSIVE STRENGTH: f'c= 5,000 PSI

BEFORE DRILLING DOWEL HOLES, REMOVE THE UPPER 3" OF CONCRETE FROM THE TOP OF THE PILE WITHOUT DAMAGE TO THE REINFORCING STEEL. THE REMOVAL PLANE SHOULD BE NORMAL TO THE EDGE OF THE PILE.

DOWEL HOLES SHALL BE POSITIONED TO MAINTAIN ½" CLEAR TO ALL EXISTING PRESTRESSING STRANDS IN THE CONCRETE PILE.

FIELD DRILLED HOLES SHALL BE CLEAN AND FREE OF ANY OBSTRUCTIONS BEFORE GROUTING OF DOWELS. DOWEL BARS SHALL BE INSTALLED AND GROUTED WITH AN APPROVED NON-SHRINK GROUT.

THE SPIRAL REINFORCING IN ALL BUILD-UPS SHALL BE W4.0 COLD DRAWN WIRE WHICH SHALL BE SECURED TO THE LONGITUDINAL REINFORCEMENT TO MAINTAIN PITCH.

THE SPIRAL REINFORCING IN THE BUILD-UP AND THE PRESTRESSED CONCRETE PILE SHALL BE SPLICED BY OVERLAPPING A MIN. OF ONE TURN.

QUANTITIES FOR ONE 12" PRESTRESSED PILE

LENGTH	CONCRETE CU. YDS.	PILE WT. TONS	ONE POINT PICK-UP 0.300L	ONE POINT PICK-UP 0.700L	TWO POINT PICK-UP 0.207L	TWO POINT PICK-UP 0.586L
25'-0"	0.91	1.85	7'-6"	17'-6"		
30'-0"	1.10	2.22	9'-0"	21'-0"		
35'-0"	1.28	2.59	10'-6"	24'-6"		
40'-0"	1.46	2.96	12'-0"	28'-0"		
45'-0"	1.64	3.33	13'-6"	31'-6"		
50'-0"	1.83	3.72	15'-0"	35'-0"		
55'-0"	2.01	4.09			11'-4½"	32'-3"
60'-0"	2.19	4.46			12'-5"	35'-2"
65'-0"	2.38	4.81			13'-5½"	38'-1"
70'-0"	2.57	5.18			14'-6"	41'-0"

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY G. MURRAY

1/4/13

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 87+04.50 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

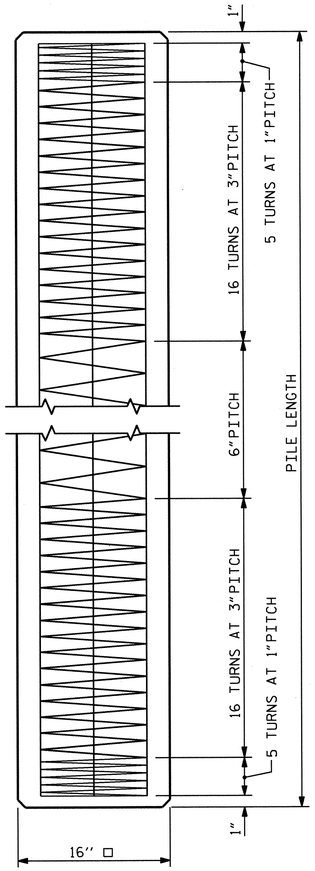
STANDARD

12" PRESTRESSED CONCRETE PILE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-72
1			3			TOTAL SHEETS
2			4			76

ASSEMBLED BY : M.D.PISO	DATE : 09-24-12	
CHECKED BY : PEGGY ADKINS	DATE : 9-11-12	
DRAWN BY : FCJ 7/88	REV. 5/1/06R	TLA/GM
CHECKED BY : CRK 3/89	REV. 11/30/10	WMC/GM
	REV. 10/1/11	MAA/GM

SID #2 SID NO. RCP1



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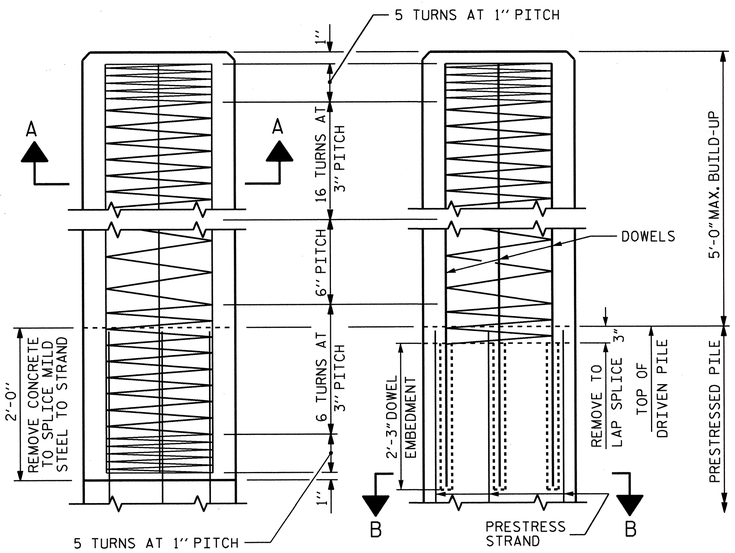
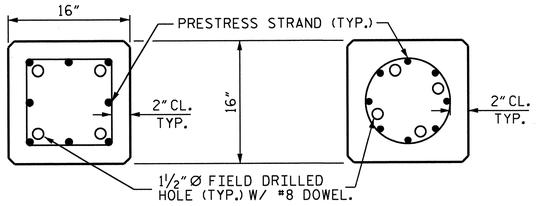


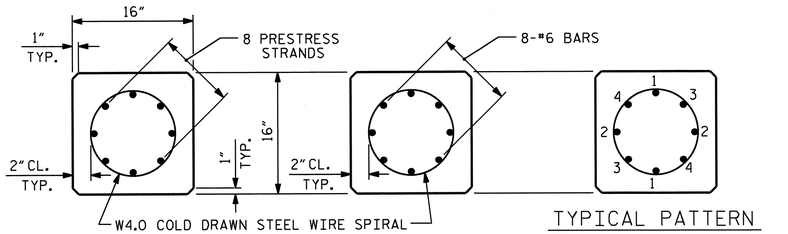
BUILD-UP AND SPIRAL REINFORCING

OPTIONAL BUILD-UP WITH DOWELS



SECTION "B-B"

(AT THE CONTRACTOR'S OPTION, PILE BUILD-UP MAY BE CONSTRUCTED WITH DOWELS.)

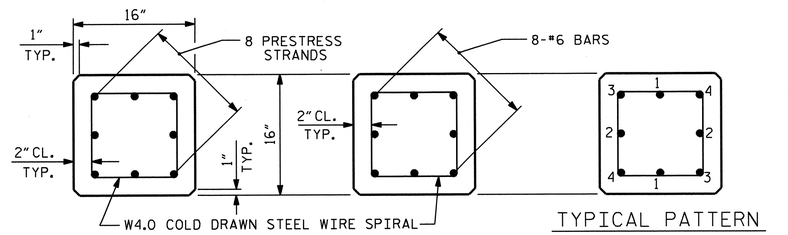


TYPICAL SECTION

SECTION "A-A"

TYPICAL PATTERN FOR BURNING STRANDS

½" OR 0.6" Ø GRADE 270 L.R. PRESTRESS STRANDS



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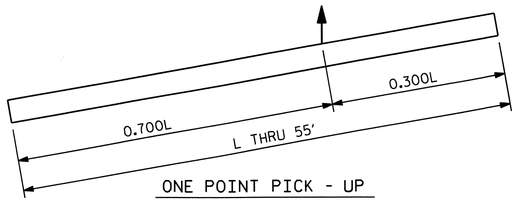
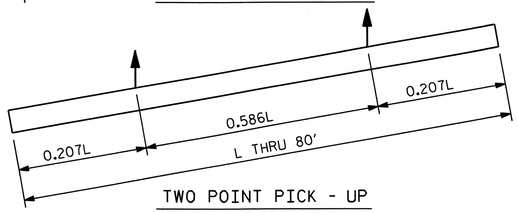


ONE POINT PICK - UP



TWO POINT PICK - UP

PICK - UP POINTS

QUANTITIES FOR ONE 16" PRESTRESSED PILE

LENGTH	CONCRETE CU. YDS.	PILE WT. TONS	ONE POINT PICK-UP 0.300L	ONE POINT PICK-UP 0.700L	TWO POINT PICK-UP 0.207L	TWO POINT PICK-UP 0.586L
25'-0"	1.63	3.31	7'-6"	17'-6"	5'-2"	14'-8"
30'-0"	1.96	3.97	9'-0"	21'-0"	6'-2½"	17'-7"
35'-0"	2.29	4.63	10'-6"	24'-6"	7'-3"	20'-6"
40'-0"	2.61	5.29	12'-0"	28'-0"	8'-3½"	23'-5"
45'-0"	2.94	5.95	13'-6"	31'-6"	9'-4"	26'-4"
50'-0"	3.27	6.61	15'-0"	35'-0"	10'-4"	29'-4"
55'-0"	3.59	7.28	16'-6"	38'-6"	11'-4½"	32'-3"
60'-0"	3.92	7.94			12'-5"	35'-2"
65'-0"	4.25	8.60			13'-5½"	38'-1"
70'-0"	4.57	9.26			14'-6"	41'-0"
75'-0"	4.90	9.92			15'-6½"	43'-11"
80'-0"	5.23	10.58			16'-7"	46'-10"

DOWEL INSTALLATION FOR OPTIONAL BUILD-UP

GROUT COMPRESSIVE STRENGTH: f'c= 5,000 PSI

BEFORE DRILLING DOWEL HOLES, REMOVE THE UPPER 3" OF CONCRETE FROM THE TOP OF THE PILE WITHOUT DAMAGE TO THE REINFORCING STEEL. THE REMOVAL PLANE SHOULD BE NORMAL TO THE EDGE OF THE PILE.

DOWEL HOLES SHALL BE POSITIONED TO MAINTAIN ½" CLEAR TO ALL EXISTING PRESTRESSING STRANDS IN THE CONCRETE PILE.

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THE SPIRAL REINFORCING IN ALL BUILD-UPS SHALL BE W4.0 COLD DRAWN WIRE WHICH SHALL BE SECURED TO THE LONGITUDINAL REINFORCEMENT TO MAINTAIN PITCH.

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NOTES

PRESTRESSED CONCRETE STRENGTH : f'c= 7,500 PSI

BUILD-UP CONCRETE STRENGTH : f'c= 7,500 PSI

STRAND DATA:

SIZE	GRADE	AREA	ULTIMATE STRENGTH	APPLIED PRESTRESS FORCE
½"	270 L.R.	0.153	41,300# PER STRAND	30,980# PER STRAND
0.6"	270 L.R.	0.217	58,600# PER STRAND	43,940# PER STRAND

ALL PRESTRESSING STRANDS SHALL BE 7-WIRE LOW-RELAXATION GRADE 270 STRANDS CONFORMING TO AASHTO M203. STRAND SAMPLING REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

AT THE CONTRACTOR'S OPTION, ½" OR 0.6" STRANDS MAY BE USED IN EITHER STRAND CONFIGURATION SHOWN IN THE TYPICAL SECTION DETAIL. MIXING OF STRAND SIZE IS NOT ALLOWED.

THE SLIP-FORM METHOD OF CASTING PILES WILL NOT BE PERMITTED.

TRANSFER THE LOAD FROM THE ANCHORAGES TO THE PILE AFTER THE CONCRETE HAS ATTAINED A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI.

IF STRAND STRESS IS RELIEVED BY BURNING, THE STRANDS SHALL BE BURNED IN OPPOSITE PAIRS AS INDICATED IN THE TYPICAL PATTERN SHOWN. FOR ANY NUMBER OF STRANDS, BURN IN OPPOSITE PAIRS AND SYMMETRICALLY ABOUT BOTH THE VERTICAL AND HORIZONTAL AXES. STRANDS 1-1 SHALL BE BURNED BEFORE 2-2, ETC. NOT MORE THAN 4 STRANDS, SAY 3-3 AND 4-4, MAY BE BURNED AT ANY ONE SECTION BEFORE THESE SAME PAIRS OF STRANDS ARE BURNED AT BOTH ENDS OF THE BED AND BETWEEN EACH PAIR OF PILES IN THE BED.

PROPOSED DEVICES FOR LIFTING PILES, RECESS DETAILS, AND PATCHING MATERIAL SHALL BE DETAILED IN SHOP DRAWINGS. AFTER ATTACHMENTS HAVE BEEN REMOVED, OPENINGS SHALL BE REPAIRED SUCH THAT THE APPEARANCE OF THE PILE IS UNIFORM.

WHERE CAST-IN-PLACE LIFTING DEVICES ARE NOT USED, PICK-UP POINTS ARE TO BE INDICATED WITH A 2" WIDE BLACK MARK.

DRIVE PILES USING A METHOD APPROVED BY THE ENGINEER, WHEREBY THE HEAD OF THE PILE IS NOT DAMAGED.

DRIVING OF THE BUILT-UP PILE WILL NOT BE PERMITTED UNTIL THE CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF 5,000 PSI AND UNTIL A PERIOD OF SEVEN DAYS HAS ELAPSED SINCE CASTING OF THE BUILD-UP.

THE WATER/CEMENT RATIO FOR CONCRETE PILES SHALL NOT EXCEED 0.40.

PRESTRESSED CONCRETE PILES SHALL CONTAIN CALCIUM NITRITE CORROSION INHIBITOR.

THE CONCRETE IN THE PILES OF BENT NOs. 1 & 2 SHALL CONTAIN SILICA FUME. SILICA FUME SHALL BE SUBSTITUTED FOR 5% OF THE PORTLAND CEMENT BY WEIGHT. IF THE OPTION OF ARTICLE 1024-1 OF THE STANDARD SPECIFICATIONS TO PARTIALLY SUBSTITUTE CLASS F FLY ASH FOR PORTLAND CEMENT IS EXERCISED, THEN THE RATE OF FLY ASH SUBSTITUTION SHALL BE REDUCED TO 1.0 LB OF FLY ASH PER 1.0 LB OF CEMENT. NO PAYMENT WILL BE MADE FOR THIS SUBSTITUTION AS IT IS CONSIDERED INCIDENTAL TO THE VARIOUS PAY ITEMS.

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 87+04.50 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

16" PRESTRESSED CONCRETE PILE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-73
1			3			TOTAL SHEETS
2			4			76

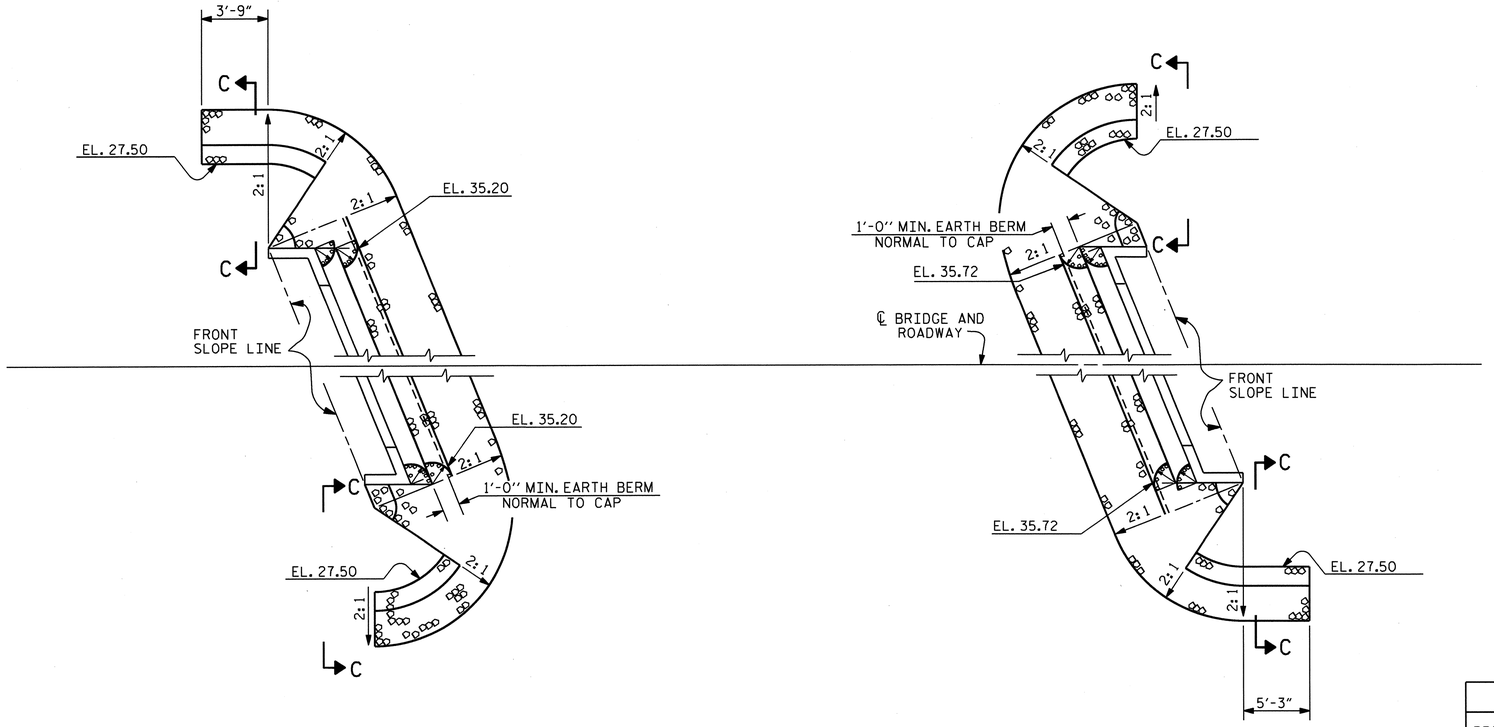
NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY E. MURRAY

1/4/13

ASSEMBLED BY : M.D.PISO	DATE : 09-24-12		
CHECKED BY : PEGGY ADKINS	DATE : 9-11-12		
DRAWN BY : RH 9/98	REV. 5/1/06R	TLA/GM	
CHECKED BY : LES 10/98	REV. 11/30/10	WMC/GM	
	REV. 10/1/11	MAA/GM	

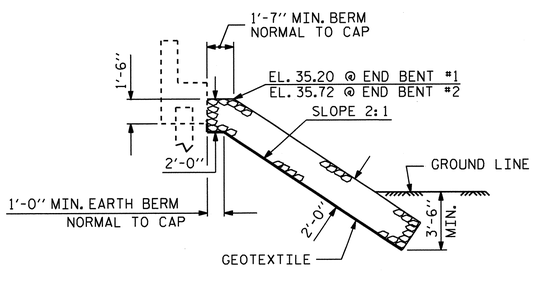
08-NOV-2013 09:53

SID NO. RCP2

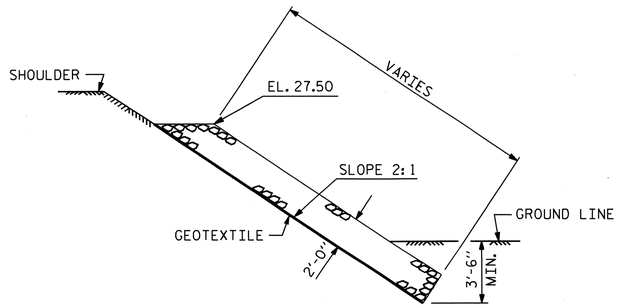


BERM RIP RAPPED

ESTIMATED QUANTITIES		
BRIDGE @ STA. 87+04.50 -L-	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE
	TONS	SQUARE YARDS
END BENT 1	307	341
END BENT 2	326	362



℄ SECTION
BERM RIP RAPPED



SECTION C-C

PROJECT NO. R-3324
BRUNSWICK COUNTY
STATION: 87+04.50 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD
RIP RAP DETAILS

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY E. MURRAY
1/4/13

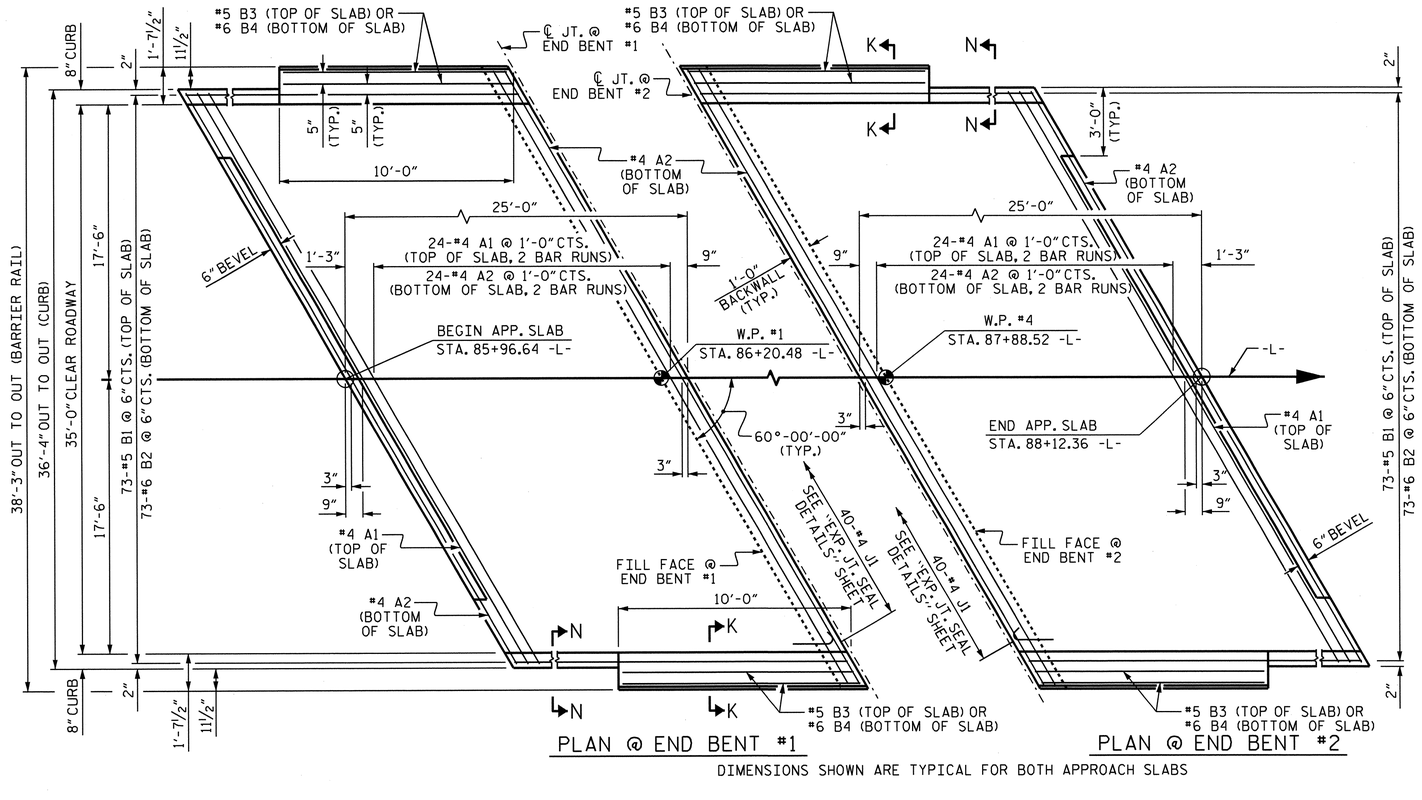
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-74
1			3			TOTAL SHEETS
2			4			76

ASSEMBLED BY : PEGGY ADKINS DATE : 11-6-12
CHECKED BY : T.L. AVERETTE DATE : 11-6-12

DRAWN BY : REK 1/84
CHECKED BY : RDU 1/84

REV. 5/1/06R TLA/GM
REV. 10/1/11 MAA/GM
REV. 12/21/11 MAA/GM

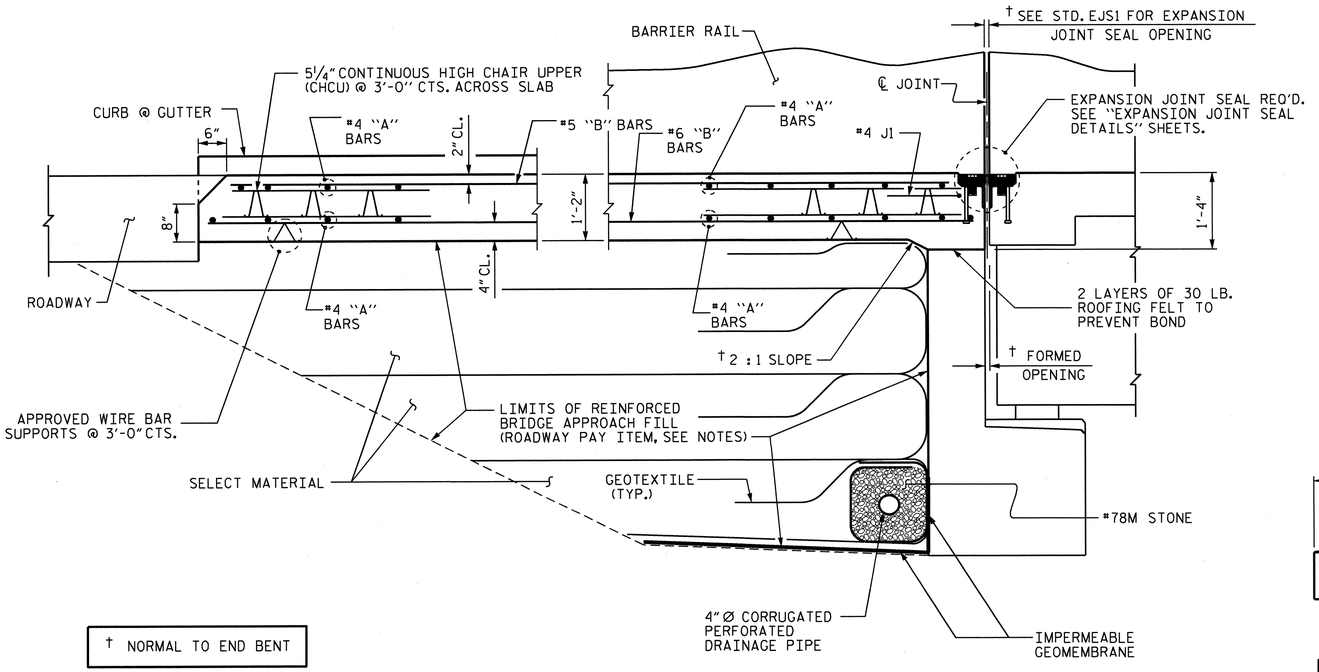
STR #2 STR NO. RR1



PLAN @ END BENT #1

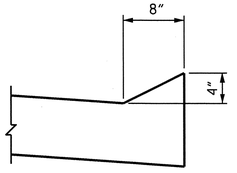
PLAN @ END BENT #2

DIMENSIONS SHOWN ARE TYPICAL FOR BOTH APPROACH SLABS

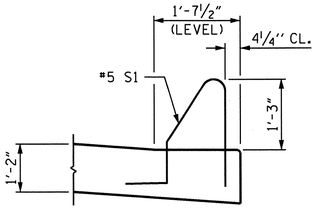


† NORMAL TO END BENT

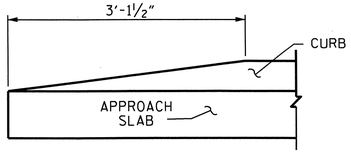
SECTION THRU SLAB



SECTION N-N



SECTION K-K



END OF CURB WITHOUT SHOULDER BERM GUTTER

CURB DETAILS

NOTES

APPROACH SLAB SHALL NOT BE CONSTRUCTED PRIOR TO COMPLETION OF THE BRIDGE DECK.

FOR REINFORCED BRIDGE APPROACH FILL INCLUDING GEOTEXTILE, IMPERMEABLE GEOMEMBRANE, 4" Ø DRAINAGE PIPE, #78M STONE, AND SELECT MATERIAL, SEE ROADWAY PLANS.

AREA BETWEEN THE WINGWALL AND APPROACH SLAB SHALL BE GRADED TO DRAIN THE WATER AWAY FROM THE FILL FACE OF THE BRIDGE AND SHALL BE PAVED. SEE ROADWAY PLANS.

FOR EXPANSION JOINT SEALS, SEE SPECIAL PROVISIONS.

BILL OF MATERIAL

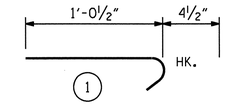
APPROACH SLAB AT EB #1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱A1	50	#4	STR	22'-11"	765
✱A2	52	#4	STR	22'-11"	796
✱B1	73	#5	STR	23'-8"	1802
✱B2	73	#6	STR	24'-7"	2695
✱B3	4	#5	STR	9'-7"	40
✱B4	4	#6	STR	9'-7"	58
✱J1	40	#4	1	1'-5"	38
✱EPOXY COATED REINFORCING STEEL ✱✱ LBS.					6194
CLASS AA CONCRETE ✱✱ C.Y.					40.4

APPROACH SLAB AT EB #2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱A1	50	#4	STR	22'-11"	765
✱A2	52	#4	STR	22'-11"	796
✱B1	73	#5	STR	23'-8"	1802
✱B2	73	#6	STR	24'-7"	2695
✱B3	4	#5	STR	9'-7"	40
✱B4	4	#6	STR	9'-7"	58
✱J1	40	#4	1	1'-5"	38
✱EPOXY COATED REINFORCING STEEL ✱✱ LBS.					6194
CLASS AA CONCRETE ✱✱ C.Y.					40.4

BAR TYPE



ALL BAR DIMENSIONS ARE OUT TO OUT

✱✱ QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED. SEE SHEET 2 OF 2.

THE QUANTITY OF #4 J1 BARS ON THE BILL OF MATERIAL IS BASED ON 1'-0" CENTERS. J1 BARS SHALL BE PLACED AT EACH VERTICAL STUD ANCHOR BOLT. IN THE EVENT THAT THE NUMBER OF VERTICAL STUD ANCHORS EXCEEDS THE NUMBER OF J1 BARS SPECIFIED, ADDITIONAL J1 BARS WILL NOT BE REQUIRED.

SPLICE LENGTHS		
BAR SIZE	EPOXY COATED	UNCOATED
#4	2'-0"	1'-9"
#5	2'-6"	2'-2"
#6	3'-10"	2'-7"

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 87+04.50 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB FOR FLEXIBLE PAVEMENT

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-75
1			3			TOTAL SHEETS
2			4			76

ASSEMBLED BY : PEGGY ADKINS	DATE : 7-18-12		
CHECKED BY : M. D. PISO	DATE : 7-23-12		
DRAWN BY : EEM 3/95	REV. 5/7/03R	RWW/JTE	
CHECKED BY : VAP 3/95	REV. 10/1/11	KMM/GM	
	REV.	MAA/GM	

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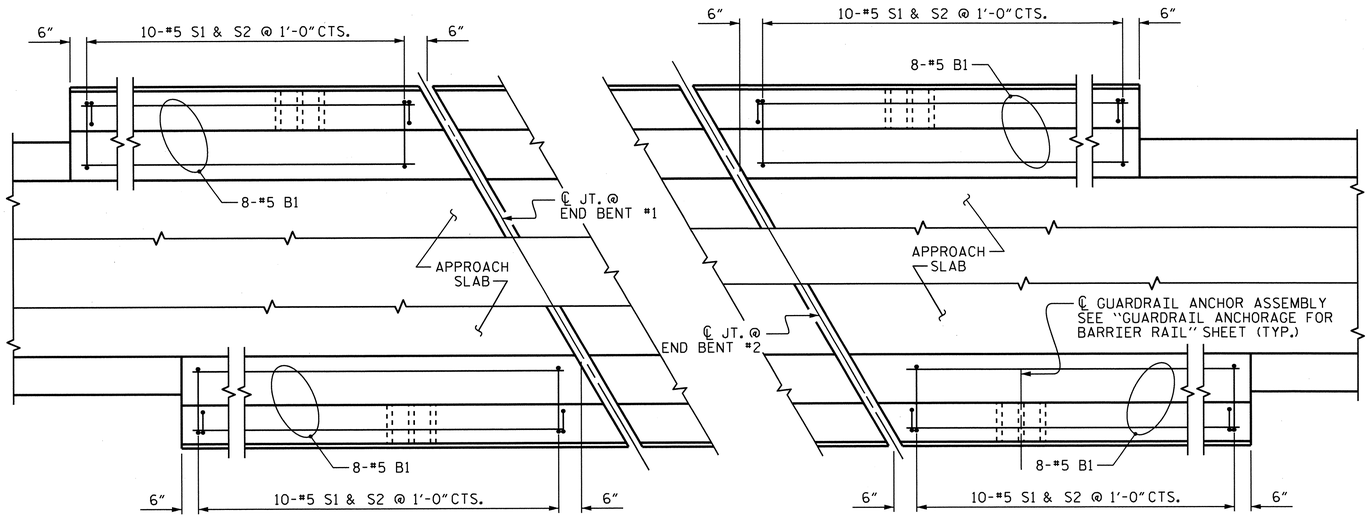
SID NO. B4GS (SHT 1)



PLAN OF BARRIER RAIL

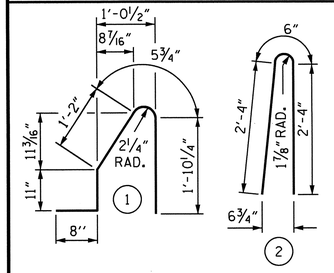
NOTES

THE COST OF THE BARRIER RAIL ON THE APPROACH SLAB SHALL BE INCLUDED IN THE LINEAR FOOT CONTRACT PRICE BID FOR "CONCRETE BARRIER RAIL".

THE BARRIER RAIL ON EACH APPROACH SLAB SHALL NOT BE CAST UNTIL ALL APPROACH SLAB CONCRETE HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

BAR TYPES

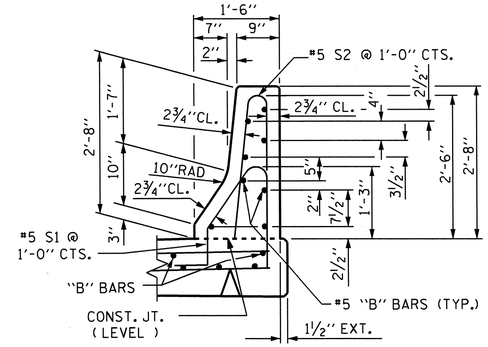


ALL BAR DIMENSIONS ARE OUT TO OUT

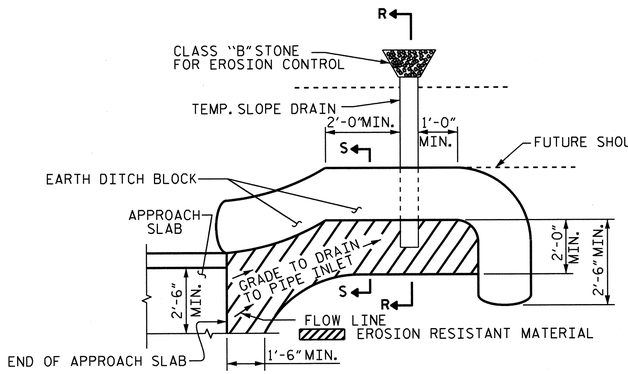
BILL OF MATERIAL

BARRIER RAIL ONLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱B1	32	#5	STR	9'-7"	320
✱S1	40	#5	1	5'-1"	212
✱S2	40	#5	2	5'-2"	216
✱EPOXY COATED REINFORCING STEEL				LBS.	748
CLASS AA CONCRETE				C.Y.	4.2
CONCRETE BARRIER RAIL				41.73	LIN. FT.

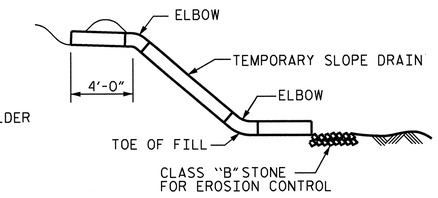


SECTION THRU RAIL

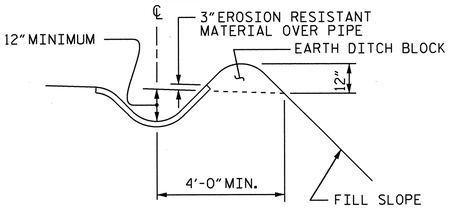


NOTE: IMMEDIATELY AFTER THE CONSTRUCTION OF THE APPROACH SLAB, THE CONTRACTOR SHALL PROVIDE TEMPORARY BERM AND SLOPE DRAIN. CONTRACTOR SHALL GRADE TO PIPE INLET AND PROVIDE EROSION RESISTANT MATERIAL AS SHOWN. THE EROSION RESISTANT MATERIAL SHALL BE EITHER 1) ASPHALT PLANT MIX, TYPE 1 OR TYPE 2, MIN. 2" DEPTH, 2) EROSION CONTROL MAT, OR 3) CONCRETE, AS DIRECTED BY THE ENGINEER. THE SLOPE DRAIN SHALL CONSIST OF A NON-PERFORATED TEMPORARY DRAINAGE PIPE, 12 INCHES IN DIAMETER.

PLAN VIEW



SECTION R-R



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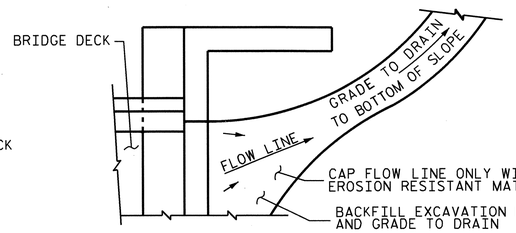


NOTE: IF THE APPROACH SLAB IS NOT CONSTRUCTED IMMEDIATELY AFTER THE BACKFILLING OF THE END BENT EXCAVATION, GRADE TO DRAIN TO THE BOTTOM OF THE SLOPE AND PROVIDE EROSION RESISTANT MATERIAL, SUCH AS FIBERGLASS ROVING OR AS DIRECTED BY THE ENGINEER TO PREVENT SOIL EROSION AND TO PROTECT THE AREA ADJACENT TO THE STRUCTURE. THE CONTRACTOR WILL BE REQUIRED TO REMOVE THESE MATERIALS PRIOR TO CONSTRUCTION OF THE APPROACH SLAB.

TEMPORARY DRAINAGE DETAIL

TEMPORARY BERM AND SLOPE DRAIN DETAILS

(TO BE USED WHEN SHOULDER BERM GUTTER IS REQUIRED)

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 87+04.50 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB DETAILS

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY E. MURRAY
1/4/13

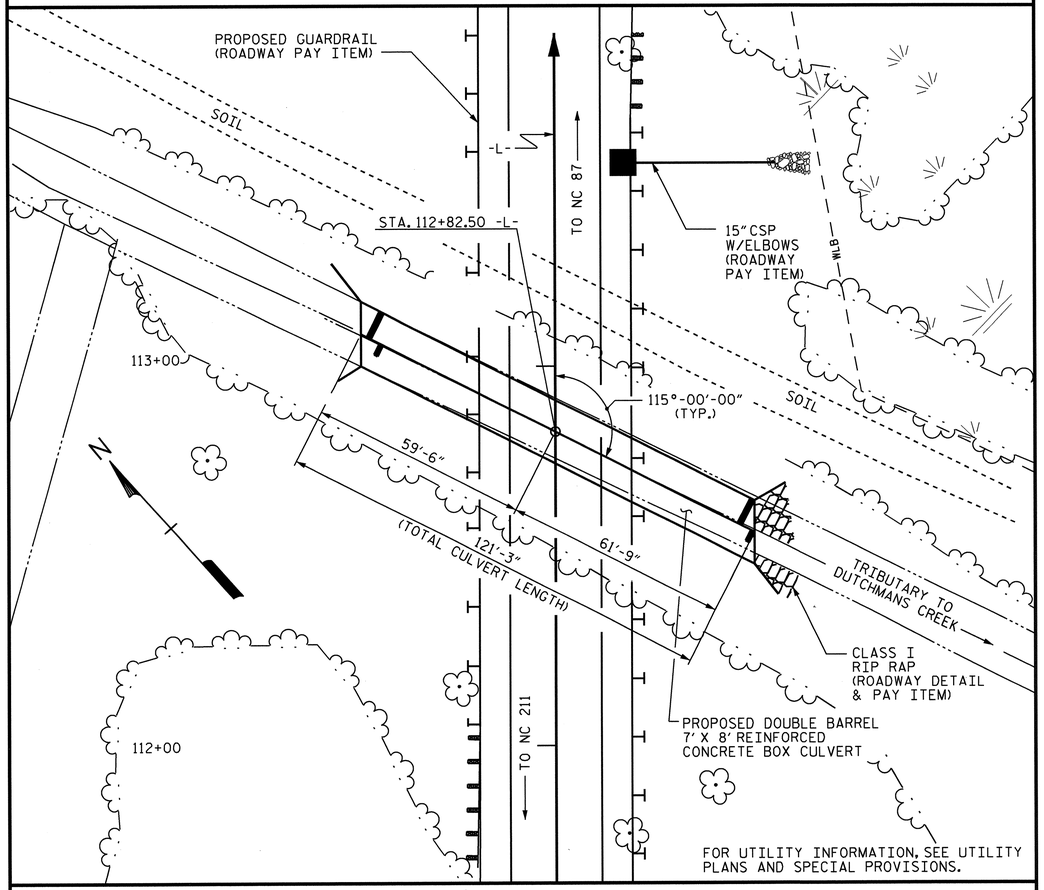
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-76
1			3			TOTAL SHEETS
2			4			76

ASSEMBLED BY : PEGGY ADKINS	DATE : 7-18-12		
CHECKED BY : M. D. PISO	DATE : 7-23-12		
DRAWN BY : FCJ	11/88	REV. 5/7/03	RWW/JTE
CHECKED BY : ARB	11/88	REV. 5/1/06RRR	MAA/KMM
		REV. 10/1/11	MAA/GM

STD. NO. BAS4

F. A. PROJECT NO. STP-133(7)

BM #45-RR SPIKE IN BASE OF 12" PINE 228' RT. OF -L- STA. 109+71 EL. 34.27



LOCATION SKETCH

HYDRAULIC DATA

DESIGN DISCHARGE	= 410 CFS.
FREQUENCY OF DESIGN FLOOD	= 50 YRS.
DESIGN HIGH WATER ELEVATION	= 33.5'
DRAINAGE AREA	= 1.2 SQ. MI.
BASE DISCHARGE (Q100)	= 500 CFS.
BASE HIGH WATER ELEVATION	= 33.7'

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE	= 1680 CFS.
FREQUENCY OF OVERTOPPING FLOOD	= 500 YR.+
OVERTOPPING FLOOD ELEVATION	= 43.4'

GRADE DATA

GRADE POINT ELEVATION @ STATION 112+82.50 -L-	= 45.29'
BED ELEVATION @ STA. 112+82.50 -L-	= 25.40'
ROADWAY SLOPE	= 3:1

TOTAL STRUCTURE QUANTITIES

CLASS A CONCRETE		
BARREL @ 1.613 CY/FT	195.6	C.Y.
WING ETC.	40.4	C.Y.
SILLS	1.4	C.Y.
TOTAL	237.4	C.Y.
EPOXY COATED REINFORCING STEEL		
BARREL	21019	LBS.
WINGS ETC.	2443	LBS.
TOTAL	23462	LBS.
CULVERT EXCAVATION		LUMP SUM
FOUNDATION CONDITIONING MAT'L		- 171 TONS
CLASS B RIP RAP		- 85 TONS

NOTES

ASSUMED LIVE LOAD ---------- HL-93 OR ALTERNATE LOADING.

DESIGN FILL---------- 12.35'

FOR OTHER DESIGN DATA AND NOTES SEE STANDARD NOTE SHEET.

3"Ø WEEP HOLES INDICATED TO BE IN ACCORDANCE WITH THE SPECIFICATIONS.

CONCRETE IN CULVERTS TO BE POURED IN THE FOLLOWING ORDER:

1. WING FOOTINGS AND FLOOR SLAB INCLUDING 4" OF ALL VERTICAL WALLS.
2. THE REMAINING PORTIONS OF THE WALLS AND WINGS FULL HEIGHT FOLLOWED BY ROOF SLAB AND HEADWALLS.

THE RESIDENT ENGINEER SHALL CHECK THE LENGTH OF CULVERT BEFORE STAKING IT OUT TO MAKE CERTAIN THAT IT WILL PROPERLY TAKE CARE OF THE FILL.

DIMENSIONS FOR WING LAYOUT AS WELL AS ADDITIONAL REINFORCING STEEL EMBEDDED IN BARREL ARE SHOWN ON WING SHEET.

A 3 FOOT STRIP OF FILTER FABRIC SHALL BE ATTACHED TO THE FILL FACE OF THE WING COVERING THE ENTIRE LENGTH OF THE EXPANSION JOINT.

TRANSVERSE CONSTRUCTION JOINTS SHALL BE USED IN THE BARREL, SPACED TO LIMIT THE POURS TO A MAXIMUM OF 70 FT. LOCATION OF JOINTS SHALL BE SUBJECT TO APPROVAL OF THE ENGINEER.

STEEL IN THE BOTTOM SLAB MAY BE SPLICED AT THE PERMITTED CONSTRUCTION JOINT AT THE CONTRACTOR'S OPTION. EXTRA WEIGHT OF STEEL DUE TO THE SPLICES SHALL BE PAID FOR BY CONTRACTOR.

AT THE CONTRACTOR'S OPTION, HE MAY SPLICE THE VERTICAL REINFORCING STEEL IN THE INTERIOR FACE OF EXTERIOR WALL AND BOTH FACES OF INTERIOR WALLS ABOVE LOWER WALL CONSTRUCTION JOINT. THE SPLICE LENGTH SHALL BE AS PROVIDED IN THE SPLICE LENGTH CHART SHOWN ON THE PLANS. EXTRA WEIGHT OF STEEL DUE TO THE SPLICES SHALL BE PAID FOR BY THE CONTRACTOR.

NO PRECAST REINFORCED BOX CULVERT OPTION WILL BE ALLOWED.

THE CONTRACTOR SHALL PROVIDE INDEPENDENT ASSURANCE SAMPLES OF REINFORCING STEEL AS FOLLOWS: FOR PROJECTS REQUIRING UP TO 400 TONS OF REINFORCING STEEL, ONE 30 INCH SAMPLE OF EACH SIZE BAR USED, AND FOR PROJECTS REQUIRING OVER 400 TONS OF REINFORCING STEEL, TWO 30 INCH SAMPLES OF EACH SIZE BAR USED. THE BARS FROM WHICH THE SAMPLES ARE TAKEN MUST THEN BE SPLICED WITH REPLACEMENT BARS OF THE SIZE AND LENGTH OF THE SAMPLE, PLUS A MINIMUM LAP SPLICE OF THIRTY BAR DIAMETERS. PAYMENT FOR THE SAMPLES OF REINFORCING STEEL SHALL BE CONSIDERED INCIDENTAL TO VARIOUS PAY ITEMS.

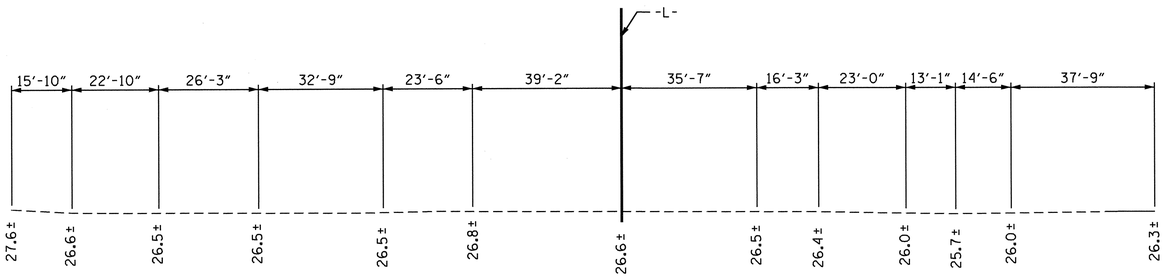
ALL BAR SUPPORTS USED IN THE CULVERT AND ALL INCIDENTAL REINFORCING STEEL SHALL BE EPOXY-COATED.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.



PROFILE ALONG ℄ CULVERT

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 112+82.50 -L-

SHEET 1 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 7 FT. X 8 FT. CONCRETE BOX CULVERT 115° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-1
1			3			TOTAL SHEETS
2			4			10

NORTH CAROLINA PROFESSIONAL SEAL 027624 ENGINEER OMAR R. AZIZI 11/1/13

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER E. MURRAY 1/4/13

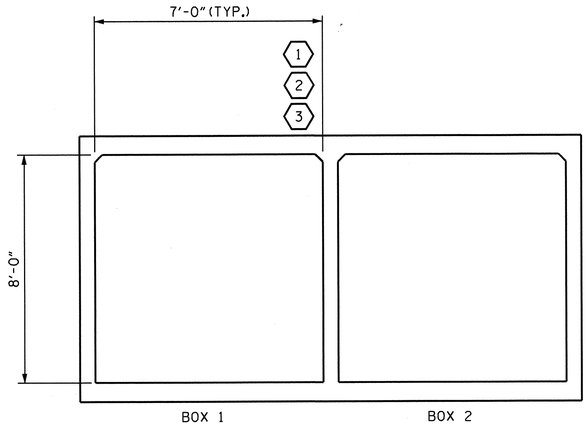
ASSEMBLED BY : B. L. GREEN DATE : 8/13/12
CHECKED BY : PEGGY PARISI DATE : 8/24/12 — SPECIAL

DRAWN BY : B.M. MEYERS DATE : AUG. 1989
CHECKED BY : A.R. BISSETTE DATE : AUG. 1989 — STANDARD

ADDED 11-90

LOAD AND RESISTANCE FACTOR RATING (LRFR) SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS

LEVEL		VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING (#)	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE									COMMENT NUMBER
							LIVE-LOAD FACTORS (γ_L)	MOMENT				SHEAR				
								RATING FACTOR	BOX NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (ft)	RATING FACTOR	BOX NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (ft)	
DESIGN LOAD RATING		HL-93 (INVENTORY)	N/A	1	1.85	--	1.75	2.16	1	Bottom Slab	7.48	1.85	1	Top Slab	6.76	
		HL-93 (OPERATING)	N/A		2.39	--	1.35	2.80	1	Bottom Slab	7.48	2.39	1	Top Slab	6.76	
		HS-20 (INVENTORY)	36.000	2	2.75	99.00	1.75	2.85	1	Bottom Slab	7.48	2.75	1	Top Slab	6.76	
		HS-20 (OPERATING)	36.000		3.57	128.52	1.35	3.70	1	Bottom Slab	7.48	3.57	1	Top Slab	6.76	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		4.11	55.48	1.40	4.62	1	Bot Corner Wall	8.41	4.11	1	Exterior Wall	7.92	
		SNGARBS2	20.000		4.11	82.20	1.40	4.54	1	Bot Corner Wall	8.41	4.11	1	Exterior Wall	7.92	
		SNAGRIS2	22.000		4.11	90.42	1.40	4.54	1	Bot Corner Wall	8.41	4.11	1	Exterior Wall	7.92	
		SNCOTTS3	27.250		2.30	62.68	1.40	2.70	1	Bottom Slab	7.48	2.30	1	Top Slab	6.76	
		SNAGGRS4	34.925		2.20	76.85	1.40	2.73	1	Bottom Slab	7.48	2.20	1	Top Slab	6.76	
		SNS5A	35.550	3	2.12	75.37	1.40	2.53	1	Bottom Slab	7.48	2.12	1	Top Slab	6.76	
		SNS6A	39.950		2.13	85.09	1.40	2.51	1	Bottom Slab	7.48	2.13	1	Top Slab	6.76	
		SNS7B	42.000		2.13	89.46	1.40	2.51	1	Bottom Slab	7.48	2.13	1	Top Slab	6.76	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		2.84	93.72	1.40	3.75	1	Bottom Slab	7.48	2.84	1	Top Slab	6.76	
		TNT4A	33.075		2.72	89.98	1.40	3.07	1	Bottom Slab	7.48	2.72	1	Top Slab	6.76	
		TNT6A	41.600		2.25	93.60	1.40	2.73	1	Bottom Slab	7.48	2.25	1	Top Slab	6.76	
		TNT7A	42.000		2.52	105.84	1.40	3.01	1	Bottom Slab	7.48	2.52	1	Top Slab	6.76	
		TNT7B	42.000		2.31	97.02	1.40	2.63	1	Bottom Slab	7.48	2.31	1	Top Slab	6.76	
		TNAGRIT4	43.000		2.47	106.21	1.40	2.70	1	Bottom Slab	7.48	2.47	1	Top Slab	6.76	
		TNAGT5A	45.000		2.47	111.15	1.40	2.75	1	Bottom Slab	7.48	2.47	1	Top Slab	6.76	
		TNAGT5B	45.000		2.53	113.85	1.40	2.80	1	Bottom Slab	7.48	2.53	1	Top Slab	6.76	



LRFR SUMMARY

(LOOKING DOWNSTREAM)

LOAD FACTORS:

DESIGN LOAD RATING FACTORS

LOAD TYPE	MAX FACTOR	MIN FACTOR
DC	1.25	0.90
DW	1.50	0.65
EV	1.30	0.90
EH	1.35	0.90
ES	1.35	0.90
LS	1.75	--
WA	1.00	--

NOTE:

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

COMMENTS:

1.
2.
3.
4.

(#) CONTROLLING LOAD RATING

(1) DESIGN LOAD RATING (HL-93)

(2) DESIGN LOAD RATING (HS-20)

(3) LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 112+82.50 -L-

SHEET 2 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

LRFR SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS
(NON-INTERSTATE TRAFFIC)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-2
1			3			TOTAL SHEETS
2			4			10

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER E. MURRAY 1/9/13

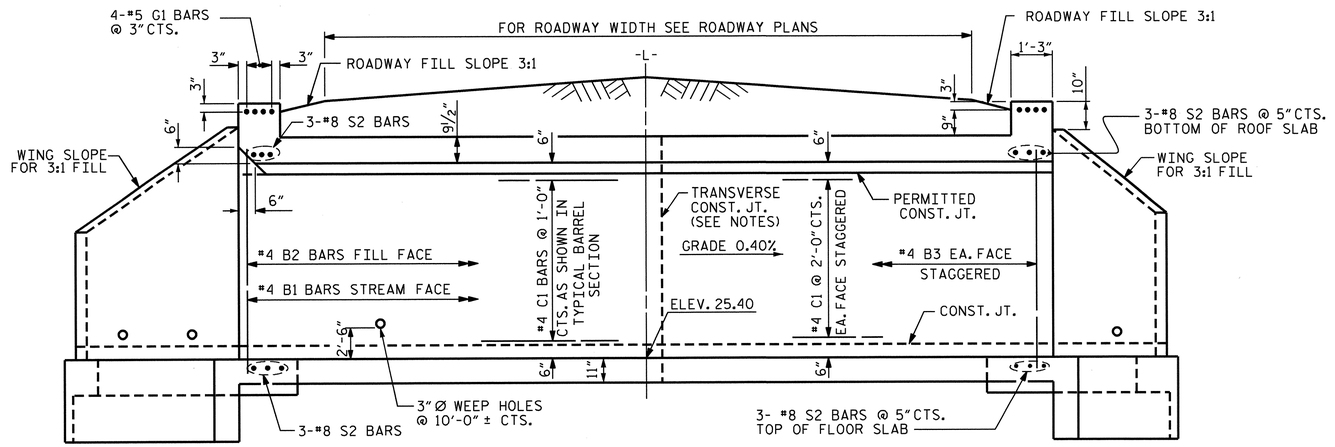
ASSEMBLED BY : B.L. GREEN DATE : 8/13/12
CHECKED BY : PEGGY PARISI DATE : 8/24/12

DRAWN BY : WMC 7/11
CHECKED BY : GM 7/11

REV. 10/1/11 MAA/GM

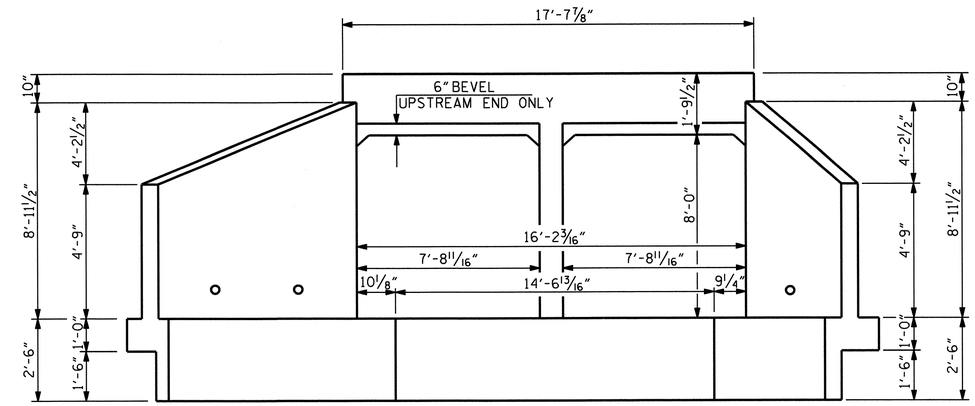
09-NOV-2012 14:13

STR #3 STD NO. LRFR5

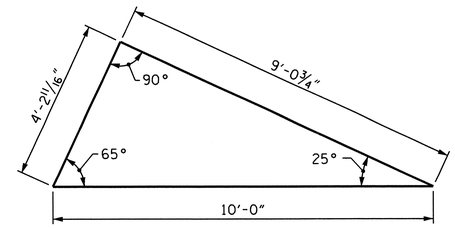


EXTERIOR WALL INTERIOR WALL

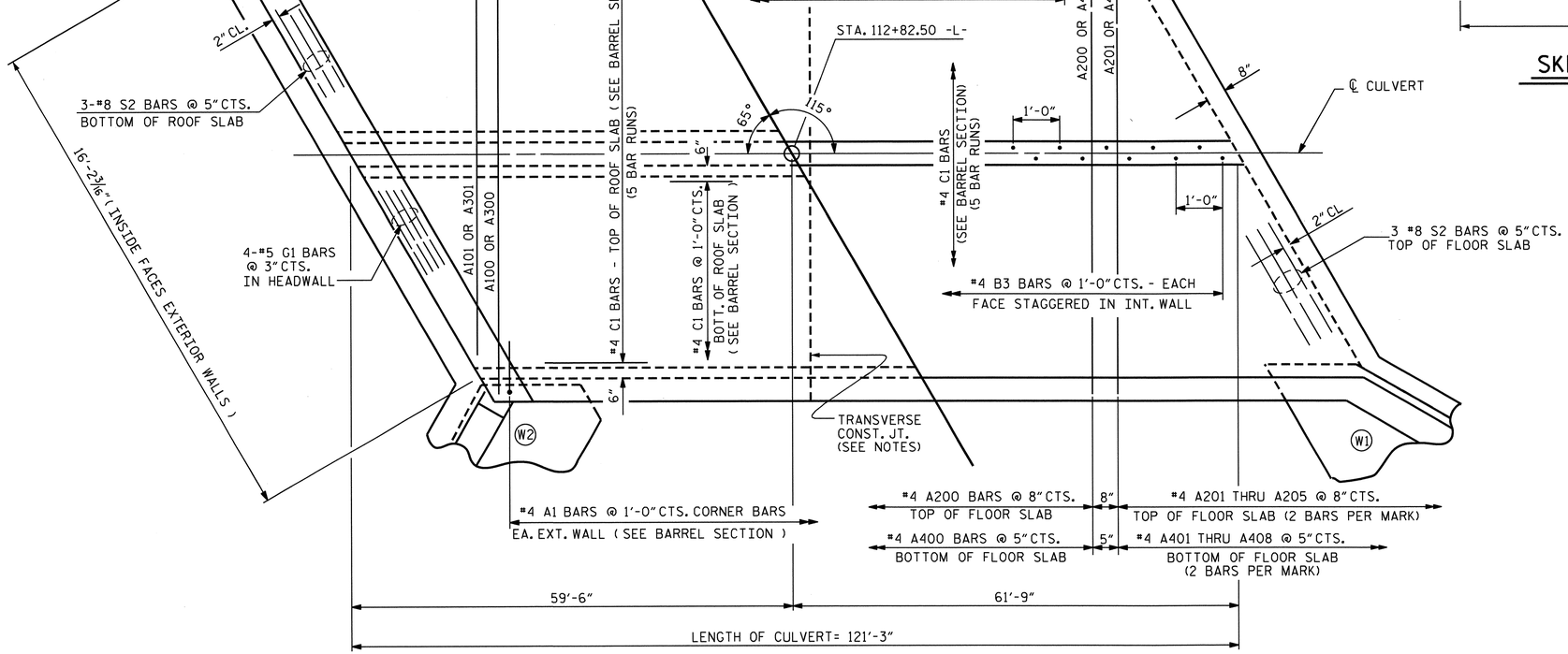
CULVERT SECTION NORMAL TO ROADWAY



END ELEVATION NORMAL TO SKEW



SKEW TRIANGLE



PART PLAN - ROOF SLAB

PART PLAN - FLOOR SLAB

(SILLS NOT SHOWN. FOR SILL DETAILS, SEE SHEET 4 OF 5.)

DRAWN BY : B. L. GREEN DATE : 8/13/12
CHECKED BY : PEGGY PARISI DATE : 8/24/12

04-JAN-2013 15:35

PROJECT NO. R-3324
BRUNSWICK COUNTY
STATION: 112+82.50 -L-

SHEET 3 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 7 FT.X 8 FT. CONCRETE BOX CULVERT 115° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-3
1			3			TOTAL SHEETS
2			4			10

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY E. MURRAY 1/9/13

SIP #3

NOTES:

BED MATERIAL BETWEEN SILLS IN THE CULVERT SHALL PROVIDE A CONTINUOUS LOW FLOW CHANNEL. THE MATERIAL SHALL BE NATURAL STONE WITH A GRADATION SIZE SIMILAR TO THAT OF CLASS 'B' RIP RAP. STONES LARGER THAN 6 INCHES SHALL NOT BE PLACED WITHIN THE LOW FLOW CHANNEL BED. MATERIALS SUBJECT TO APPROVAL BY THE ENGINEER.

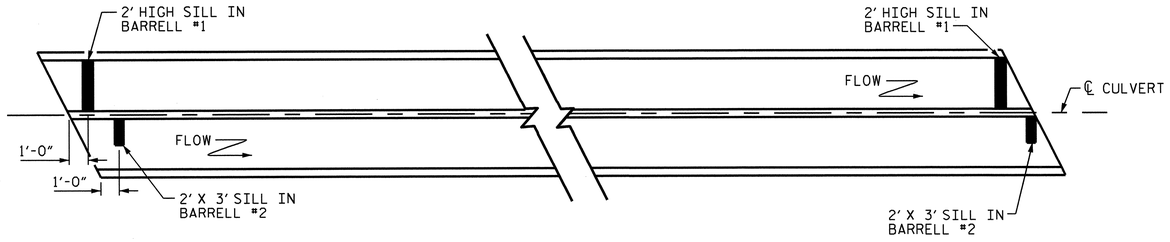
SILLS ARE TO BE 1.0 FT WIDE, CAST SEPARATELY AND ATTACHED BY DOWELS.

TOP OF LOW FLOW SILLS SHOULD MATCH STREAM BED ELEVATION IN LOW FLOW CHANNEL OF STREAM. (THALWEG)

CLASS 'B' RIP RAP MAY BE USED TO SUPPLEMENT NATURAL BED MATERIAL.

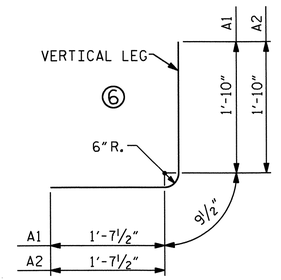
DO NOT SET ELEVATION OF HIGH SILL ABOVE BANK FULL.

NUMBER OF SILLS DETERMINED BY THE ENGINEER.



SILL LOCATION IN FLOOR SLAB

BAR TYPE



BAR DIMENSIONS ARE OUT TO OUT

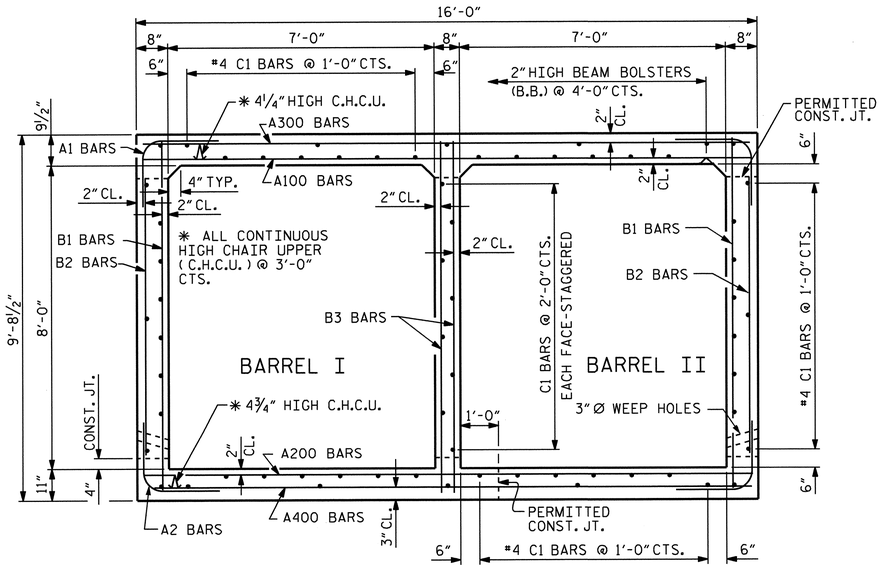
BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳ A1	244	#4	6	4'-3"	693
✳ A2	324	#4	6	4'-3"	920
✳A100	171	#4	STR	15'-8"	1790
✳A101	4	#4	STR	13'-0"	35
✳A102	4	#4	STR	10'-2"	27
✳A103	4	#4	STR	7'-4"	20
✳A104	4	#4	STR	4'-5"	12
✳A105	4	#4	STR	1'-7"	4
✳A200	171	#4	STR	15'-8"	1790
✳A201	4	#4	STR	13'-0"	35
✳A202	4	#4	STR	10'-2"	27
✳A203	4	#4	STR	7'-4"	20
✳A204	4	#4	STR	4'-5"	12
✳A205	4	#4	STR	1'-7"	4
✳A300	195	#4	STR	15'-8"	2041
✳A301	4	#4	STR	13'-7"	36
✳A302	4	#4	STR	11'-1"	30
✳A303	4	#4	STR	8'-7"	23
✳A304	4	#4	STR	6'-1"	16
✳A305	4	#4	STR	3'-7"	10

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳A400	273	#4	STR	15'-8"	2857
✳A401	4	#4	STR	14'-1"	38
✳A402	4	#4	STR	12'-4"	33
✳A403	4	#4	STR	10'-6"	28
✳A404	4	#4	STR	8'-9"	23
✳A405	4	#4	STR	6'-11"	18
✳A406	4	#4	STR	5'-2"	14
✳A407	4	#4	STR	3'-4"	9
✳A408	4	#4	STR	1'-7"	4
✳ B1	244	#4	STR	9'-3"	1508
✳ B2	244	#4	STR	7'-4"	1195
✳ B3	244	#4	STR	9'-3"	1508
✳ C1	320	#4	STR	26'-1"	5576
✳ D1	10	#6	STR	2'-6"	38
✳ G1	8	#5	STR	17'-3"	144
✳ S2	12	#8	STR	17'-3"	553
✳EPOXY COATED REINFORCING STEEL					21091

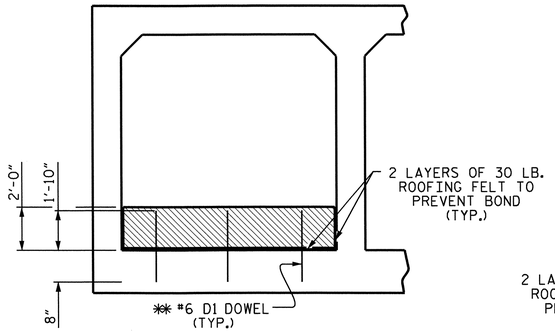
SPLICE CHART

BAR	SIZE	SPLICE LENGTH
A200	#4	2'-0"
A400	#4	2'-0"
B1	#4	2'-0"
B3	#4	2'-0"
C1	#4	2'-4"



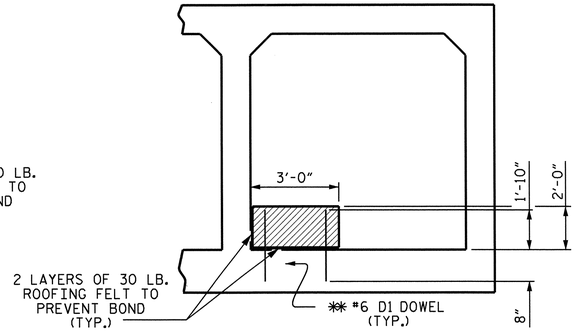
RIGHT ANGLE SECTION OF BARREL

THERE ARE 64 "C" BARS IN SECTION OF BARREL. (LOOKING DOWNSTREAM)



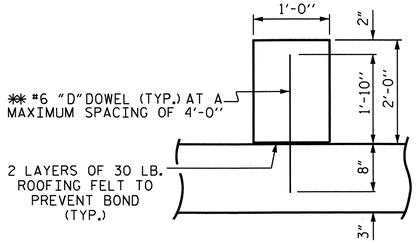
ELEVATION

(@ INLET & OUTLET, BARREL 1)



ELEVATION

(@ INLET & OUTLET, BARREL 2)



SECTION THROUGH HIGH SILL

SILL DETAILS

✳✳ DOWELS MAY BE PUSHED INTO GREEN CONCRETE AFTER SLAB HAS BEEN FLOAT FINISHED.

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER KEMI Y. E-MURRAY

1/9/13

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 112+82.50 -L-

SHEET 4 OF 5

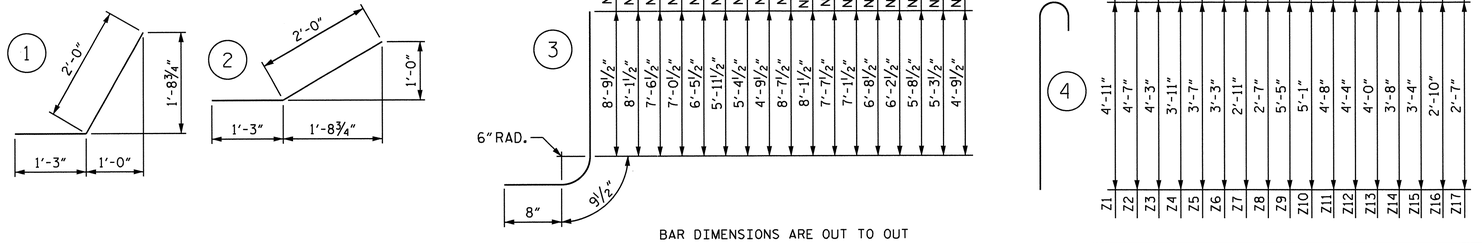
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 7 FT. X 8 FT. CONCRETE BOX CULVERT 115° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-4
1			3			TOTAL SHEETS
2			4			10

DRAWN BY : B. L. GREEN DATE : 8/13/12
CHECKED BY : PEGGY PARISI DATE : 8/24/12

BAR TYPES



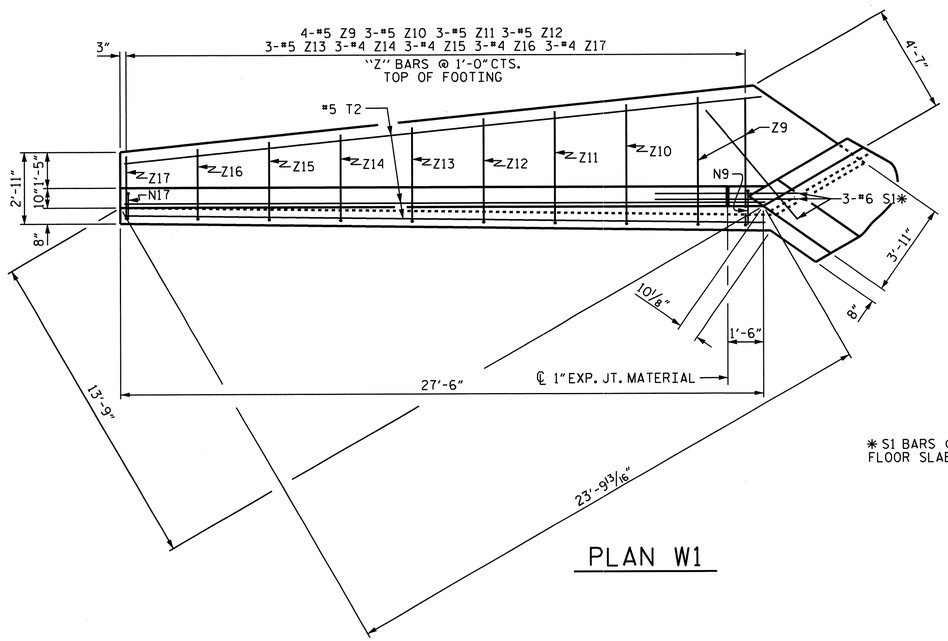
BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL FOR 4 WINGS

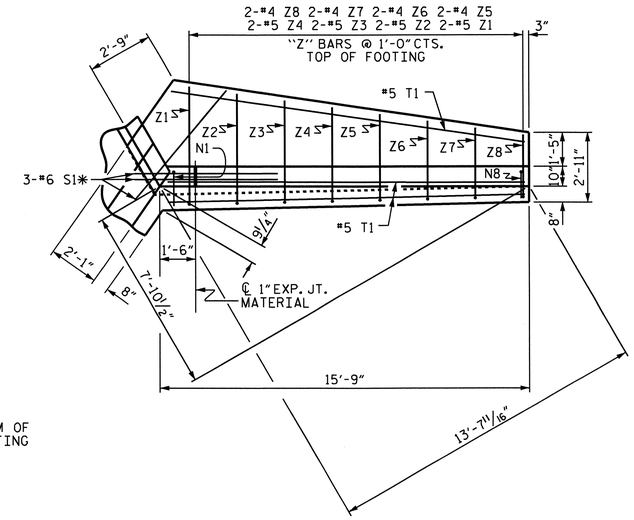
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱ H1	12	#4	STR	13'-10"	111
✱ H2	4	#4	STR	12'-6"	33
✱ H3	4	#4	STR	7'-1"	19
✱ H4	4	#4	STR	1'-7"	4
✱ H5	24	#4	1	3'-3"	52
✱ H6	4	#4	STR	14'-4"	38
✱ H7	12	#4	STR	25'-7"	205
✱ H8	4	#4	STR	23'-2"	62
✱ H9	4	#4	STR	13'-8"	37
✱ H10	4	#4	STR	4'-2"	11
✱ H11	24	#4	2	3'-3"	52
✱ H12	4	#4	STR	25'-11"	69
✱ N1	4	#5	3	10'-3"	43
✱ N2	4	#5	3	9'-7"	40
✱ N3	4	#5	3	9'-0"	38
✱ N4	4	#5	3	8'-6"	35
✱ N5	4	#4	3	7'-11"	21
✱ N6	4	#4	3	7'-5"	20
✱ N7	4	#4	3	6'-10"	18
✱ N8	4	#4	3	6'-3"	17
✱ N9	8	#5	3	10'-1"	84
✱ N10	6	#5	3	9'-7"	60
✱ N11	6	#5	3	9'-1"	57
✱ N12	6	#5	3	8'-7"	54
✱ N13	6	#5	3	8'-2"	51
✱ N14	6	#4	3	7'-8"	31
✱ N15	6	#4	3	7'-2"	29
✱ N16	6	#4	3	6'-9"	27
✱ N17	6	#4	3	6'-3"	25
✱ S1	12	#6	STR	6'-0"	108
✱ T1	6	#5	STR	15'-9"	99
✱ T2	6	#5	STR	27'-6"	172

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱ V1	4	#4	STR	8'-3"	22
✱ V2	4	#4	STR	7'-7"	20
✱ V3	4	#4	STR	7'-0"	19
✱ V4	4	#4	STR	6'-6"	17
✱ V5	4	#4	STR	5'-11"	16
✱ V6	4	#4	STR	5'-5"	14
✱ V7	4	#4	STR	4'-10"	13
✱ V8	4	#4	STR	4'-3"	11
✱ V9	8	#4	STR	8'-1"	43
✱ V10	6	#4	STR	7'-7"	30
✱ V11	6	#4	STR	7'-1"	28
✱ V12	6	#4	STR	6'-7"	26
✱ V13	6	#4	STR	6'-2"	25
✱ V14	6	#4	STR	5'-8"	23
✱ V15	6	#4	STR	5'-2"	21
✱ V16	6	#4	STR	4'-9"	19
✱ V17	6	#4	STR	4'-3"	17
✱ Z1	4	#5	4	5'-6"	23
✱ Z2	4	#5	4	5'-2"	22
✱ Z3	4	#5	4	4'-10"	20
✱ Z4	4	#5	4	4'-6"	19
✱ Z5	4	#4	4	4'-1"	11
✱ Z6	4	#4	4	3'-9"	10
✱ Z7	4	#4	4	3'-5"	9
✱ Z8	4	#4	4	3'-1"	8
✱ Z9	8	#5	4	6'-0"	50
✱ Z10	6	#5	4	5'-8"	35
✱ Z11	6	#5	4	5'-3"	33
✱ Z12	6	#5	4	4'-11"	31
✱ Z13	6	#5	4	4'-7"	29
✱ Z14	6	#4	4	4'-2"	17
✱ Z15	6	#4	4	3'-10"	15
✱ Z16	6	#4	4	3'-4"	13
✱ Z17	6	#4	4	3'-1"	12

✱EPOXY COATED REINFORCING STEEL FOR 4 WINGS	2443 LBS
CLASS A CONCRETE	37.0 CY
4 WINGS	1.6 CY
2 HEADWALLS	1.8 CY
2 END CURTAIN WALLS	40.4 CY
TOTAL	

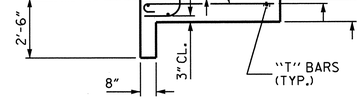


PLAN W1

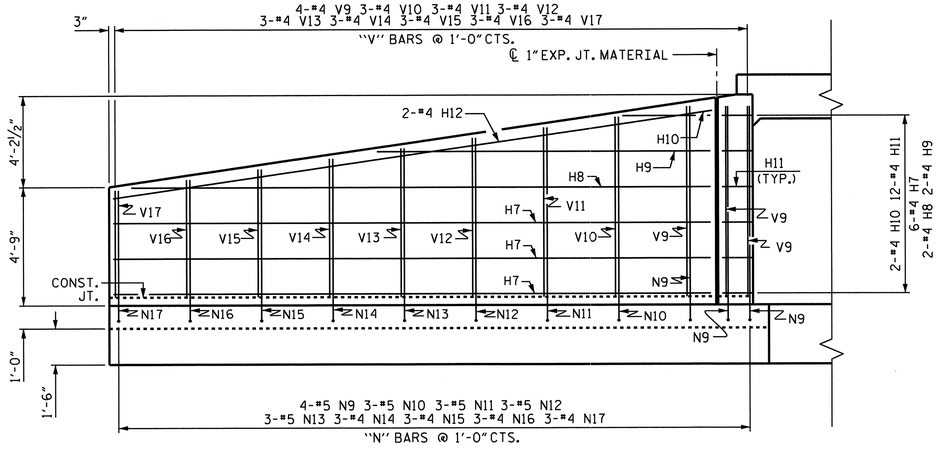


PLAN W2

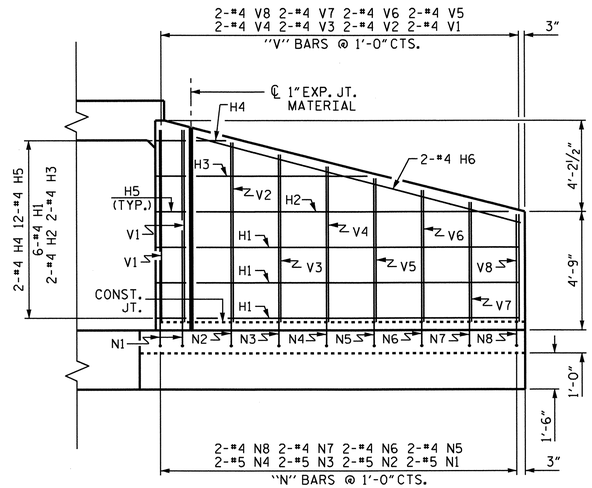
✱S1 BARS @ BOTTOM OF FLOOR SLAB & FOOTING



TYPICAL WING SECTION



ELEVATION W1



ELEVATION W2

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 112+82.50 -L-

SHEET 5 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

WINGS FOR CONCRETE BOX CULVERT

H = 8'-0" SLOPE = 3:1

115° SKEW

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY E. MURRAY
2/26/13

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-5
1			3			TOTAL SHEETS
2			4			10

STR #3

ASSEMBLED BY : B. L. GREEN DATE : 8/13/12
CHECKED BY : PEGGY PARISI DATE : 8/24/12

27-FEB-2013 08:49
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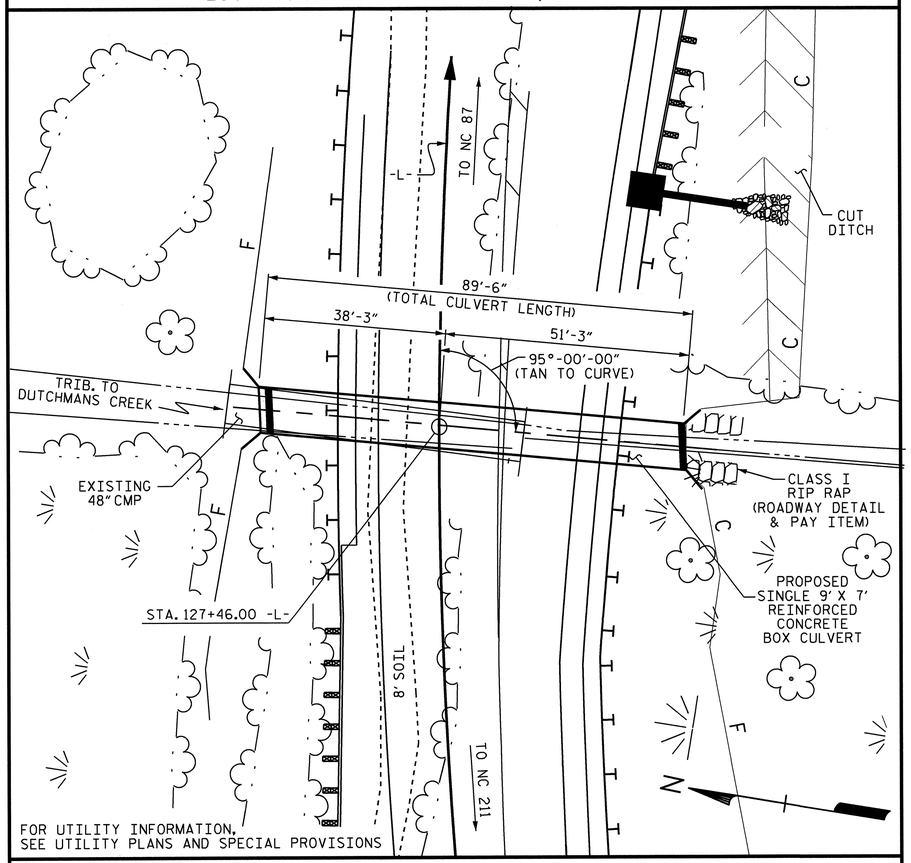
emurray

F.A. PROJECT NO. STP-133(7)



LOCATION SKETCH

GRADE DATA

GRADE POINT ELEV. @ STATION 127+46.00 -L-	35.88'
BED ELEV. @ STATION 127+46.00 -L-	23.30'
ROADWAY SLOPES	3:1

HYDRAULIC DATA

DESIGN DISCHARGE	380 C.F.S.
FREQUENCY OF DESIGN FLOOD	50 YRS
DESIGN HIGH WATER ELEVATION	30.0'
DRAINAGE AREA	160 AC
BASE DISCHARGE (Q100)	450 C.F.S
BASE HIGH WATER ELEVATION	30.6'

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE	603 C.F.S.
FREQUENCY OF OVERTOPPING FLOOD	500+ YR.
OVERTOPPING FLOOD ELEVATION	32.8'

TOTAL STRUCTURE QUANTITIES

CLASS A CONCRETE		
BARREL @ 0.876 CY/FT	78.4	C.Y.
WINGS ETC.	28.0	C.Y.
SILLS	0.8	C.Y.
TOTAL	107.2	C.Y.
EPOXY COATED REINFORCING STEEL		
BARREL	13352	LBS.
WINGS ETC.	1643	LBS.
TOTAL	14995	LBS.
CULVERT EXCAVATION	LUMP SUM	
FOUNDATION COND. MAT'L.	90	TONS
CLASS B RIP RAP	40	TONS

NOTES

ASSUMED LIVE LOAD ----------HL-93 OR ALTERNATE LOADING.

DESIGN FILL---------- 3.82 (MIN)
6.22 (MAX)

FOR OTHER DESIGN DATA AND NOTES SEE STANDARD NOTE SHEET.

3"Ø WEEP HOLES INDICATED TO BE IN ACCORDANCE WITH THE SPECIFICATIONS.

CONCRETE IN CULVERTS TO BE POURED IN THE FOLLOWING ORDER:

1. WING FOOTINGS AND FLOOR SLAB INCLUDING 4" OF ALL VERTICAL WALLS.
2. THE REMAINING PORTIONS OF THE WALLS AND WINGS FULL HEIGHT FOLLOWED BY ROOF SLAB AND HEADWALLS.

THE RESIDENT ENGINEER SHALL CHECK THE LENGTH OF CULVERT BEFORE STAKING IT OUT TO MAKE CERTAIN THAT IT WILL PROPERLY TAKE CARE OF THE FILL.

DIMENSIONS FOR WING LAYOUT AS WELL AS ADDITIONAL REINFORCING STEEL EMBEDDED IN BARREL ARE SHOWN ON WING SHEET.

A 3 FOOT STRIP OF FILTER FABRIC SHALL BE ATTACHED TO THE FILL FACE OF THE WING COVERING THE ENTIRE LENGTH OF THE EXPANSION JOINT.

TRANSVERSE CONSTRUCTION JOINTS SHALL BE USED IN THE BARREL, SPACED TO LIMIT THE POURS TO A MAXIMUM OF 70 FT. LOCATION OF JOINTS SHALL BE SUBJECT TO APPROVAL OF THE ENGINEER.

AT THE CONTRACTOR'S OPTION, HE MAY SPLICE THE VERTICAL REINFORCING STEEL IN THE INTERIOR FACE OF EXTERIOR WALL ABOVE LOWER WALL CONSTRUCTION JOINT. THE SPLICE LENGTH SHALL BE AS PROVIDED IN THE SPLICE LENGTH CHART SHOWN ON THE PLANS. EXTRA WEIGHT OF STEEL DUE TO THE SPLICES SHALL BE PAID FOR BY THE CONTRACTOR.

NO PRECAST REINFORCED BOX CULVERT OPTION WILL BE ALLOWED.

THE CONTRACTOR SHALL PROVIDE INDEPENDENT ASSURANCE SAMPLES OF REINFORCING STEEL AS FOLLOWS: FOR PROJECTS REQUIRING UP TO 400 TONS OF REINFORCING STEEL, ONE 30 INCH SAMPLE OF EACH SIZE BAR USED, AND FOR PROJECTS REQUIRING OVER 400 TONS OF REINFORCING STEEL, TWO 30 INCH SAMPLES OF EACH SIZE BAR USED. THE BARS FROM WHICH THE SAMPLES ARE TAKEN MUST THEN BE SPLICED WITH REPLACEMENT BARS OF THE SIZE AND LENGTH OF THE SAMPLE, PLUS A MINIMUM LAP SPLICE OF THIRTY BAR DIAMETERS. PAYMENT FOR THE SAMPLES OF REINFORCING STEEL SHALL BE CONSIDERED INCIDENTAL TO VARIOUS PAY ITEMS.

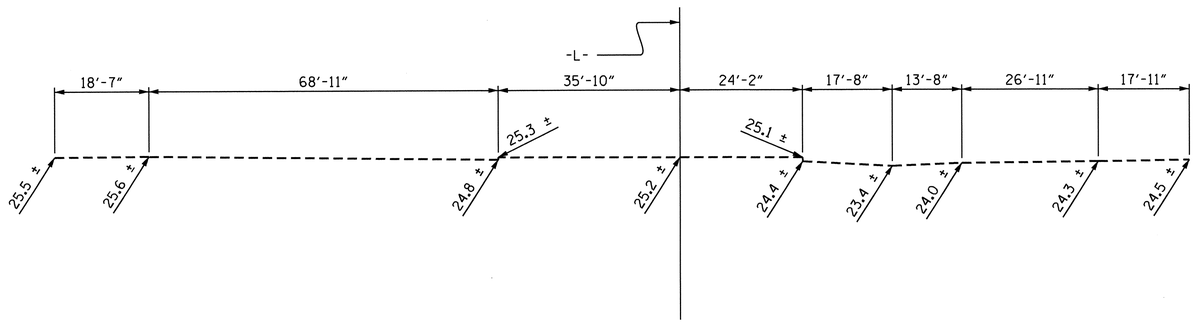
ALL BAR SUPPORTS USED IN THE CULVERT AND ALL INCIDENTAL REINFORCING STEEL SHALL BE EPOXY-COATED.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.



PROFILE ALONG ℄ CULVERT

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 127+46.00 -L-

SHEET 1 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SINGLE 9FT. X 7FT.
CONCRETE BOX CULVERT
95° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-6
1			3			TOTAL SHEETS
2			4			10

NORTH CAROLINA PROFESSIONAL SEAL 22274 ENGINEER OMAR R. NIZI
1/7/13

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY E. MURRAY
1/14/13

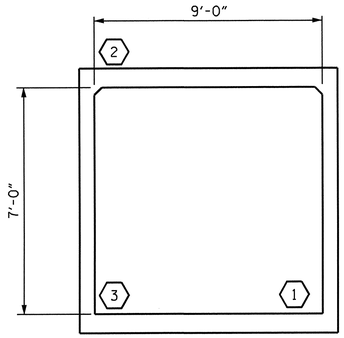
ASSEMBLED BY : B. L. GREEN DATE : 8/20/12
CHECKED BY : PEGGY PARISI DATE : 9/5/12
SPECIAL

DRAWN BY : R.W.WRIGHT DATE : AUG. 1989
CHECKED BY : A.R.BISSETTE DATE : AUG. 1989
STANDARD

REVISED 11-13-91 BY E.L.R. CHECKED BY G.R.P.
ADDED 8-22-89

LOAD AND RESISTANCE FACTOR RATING (LRFR) SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS

LEVEL		VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING (#)	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE									COMMENT NUMBER
							LIVE-LOAD FACTORS (γ_{LL})	MOMENT				SHEAR				
								RATING FACTOR	BOX NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (ft)	RATING FACTOR	BOX NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (ft)	
DESIGN LOAD RATING		HL-93 (INVENTORY)	N/A	(1)	1.11	--	1.75	1.35	1	Top Corner Wall	0.58	1.11	1	Bottom Slab	8.82	
		HL-93 (OPERATING)	N/A		1.44	--	1.35	1.74	1	Top Corner Wall	0.58	1.44	1	Bottom Slab	8.82	
		HS-20 (INVENTORY)	36.000	(2)	1.34	48.24	1.75	1.58	1	Top Slab	4.83	1.34	1	Top Slab	0.81	
		HS-20 (OPERATING)	36.000		1.73	62.28	1.35	2.05	1	Top Slab	4.83	1.73	1	Top Slab	0.81	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		2.42	32.67	1.40	2.87	1	Top Slab	4.83	2.42	1	Top Slab	0.81	
		SNGARBS2	20.000		2.27	45.40	1.40	2.69	1	Top Slab	4.83	2.27	1	Top Slab	0.81	
		SNAGRIS2	22.000		2.42	53.24	1.40	2.87	1	Top Slab	4.83	2.42	1	Top Slab	0.81	
		SNCOTTS3	27.250	(3)	1.39	37.88	1.40	1.68	1	Top Corner Wall	0.58	1.39	1	Bottom Slab	0.84	
		SNAGGRS4	34.925		1.60	55.89	1.40	1.92	1	Bot Corner Wall	7.50	1.60	1	Bottom Slab	0.84	
		SNS5A	35.550		1.59	56.52	1.40	1.92	1	Bot Corner Wall	7.50	1.59	1	Bottom Slab	8.82	
		SNS6A	39.950		1.59	63.52	1.40	1.92	1	Bot Corner Wall	7.50	1.59	1	Bottom Slab	8.82	
		SNS7B	42.000		1.59	66.78	1.40	1.92	1	Bot Corner Wall	7.50	1.59	1	Bottom Slab	8.82	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		2.42	79.86	1.40	2.87	1	Top Slab	4.83	2.42	1	Top Slab	0.81	
		TNT4A	33.075		1.65	54.58	1.40	1.99	1	Bot Corner Wall	7.50	1.65	1	Bottom Slab	0.84	
		TNT6A	41.600		1.55	64.48	1.40	1.92	1	Bot Corner Wall	7.50	1.55	1	Bottom Slab	8.82	
		TNT7A	42.000		1.65	69.30	1.40	2.00	1	Bot Corner Wall	7.50	1.65	1	Bottom Slab	0.84	
		TNT7B	42.000		1.59	66.78	1.40	1.97	1	Bot Corner Wall	7.50	1.59	1	Bottom Slab	8.82	
		TNAGRIT4	43.000		1.57	67.51	1.40	1.91	1	Top Corner Wall	0.58	1.57	1	Bottom Slab	8.82	
		TNAGT5A	45.000		1.61	72.45	1.40	1.96	1	Top Corner Wall	0.58	1.61	1	Bottom Slab	0.84	
		TNAGT5B	45.000		1.65	74.25	1.40	1.99	1	Bot Corner Wall	7.50	1.65	1	Bottom Slab	0.84	



LRFR SUMMARY

(LOOKING DOWNSTREAM)

LOAD FACTORS:

DESIGN LOAD RATING FACTORS

LOAD TYPE	MAX FACTOR	MIN FACTOR
DC	1.25	0.90
DW	1.50	0.65
EV	1.30	0.90
EH	1.35	0.90
ES	1.35	0.90
LS	1.75	--
WA	1.00	--

NOTE:

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

COMMENTS:

1.
2.
3.
4.

(#) CONTROLLING LOAD RATING

(1) DESIGN LOAD RATING (HL-93)

(2) DESIGN LOAD RATING (HS-20)

(3) LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 127+46.00 -L-

SHEET 2 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

LRFR SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS
(NON-INTERSTATE TRAFFIC)

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY E. MURRAY 1/9/13

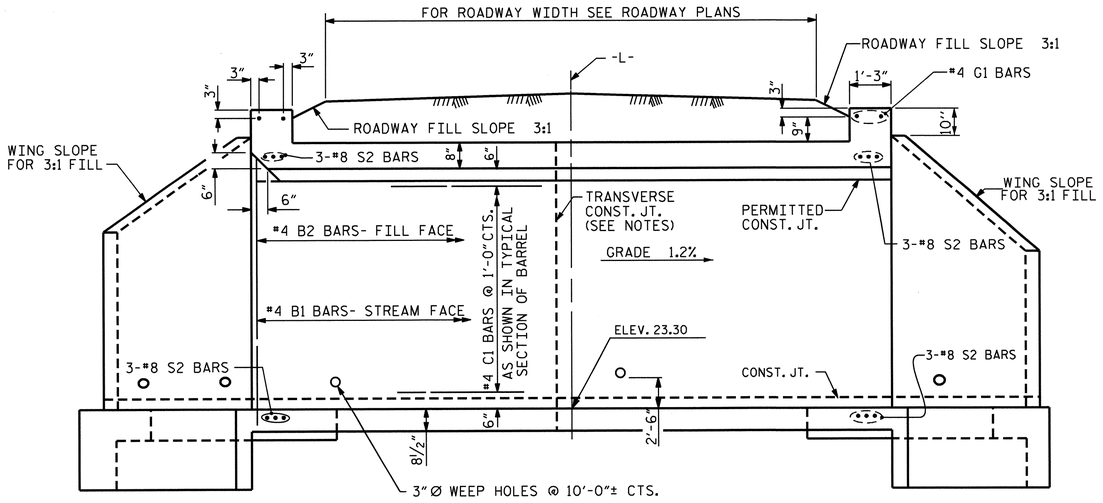
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-7
1			3			TOTAL SHEETS
2			4			10

ASSEMBLED BY : B. L. GREEN DATE : 8/13/12
CHECKED BY : PEGGY PARISI DATE : 9/5/12

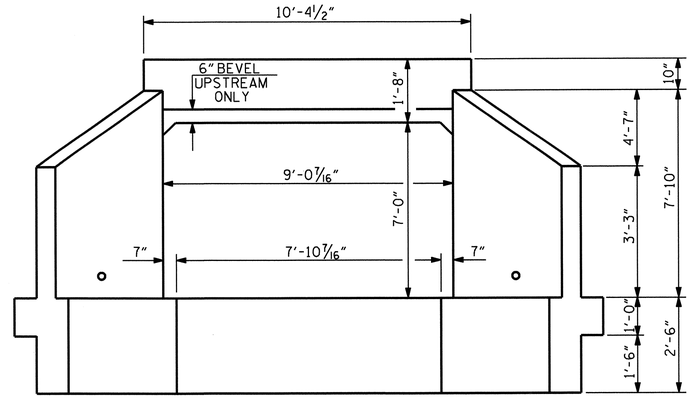
DRAWN BY : WMC 7/11
CHECKED BY : GM 7/11

REV. 10/1/11 MAA/GM

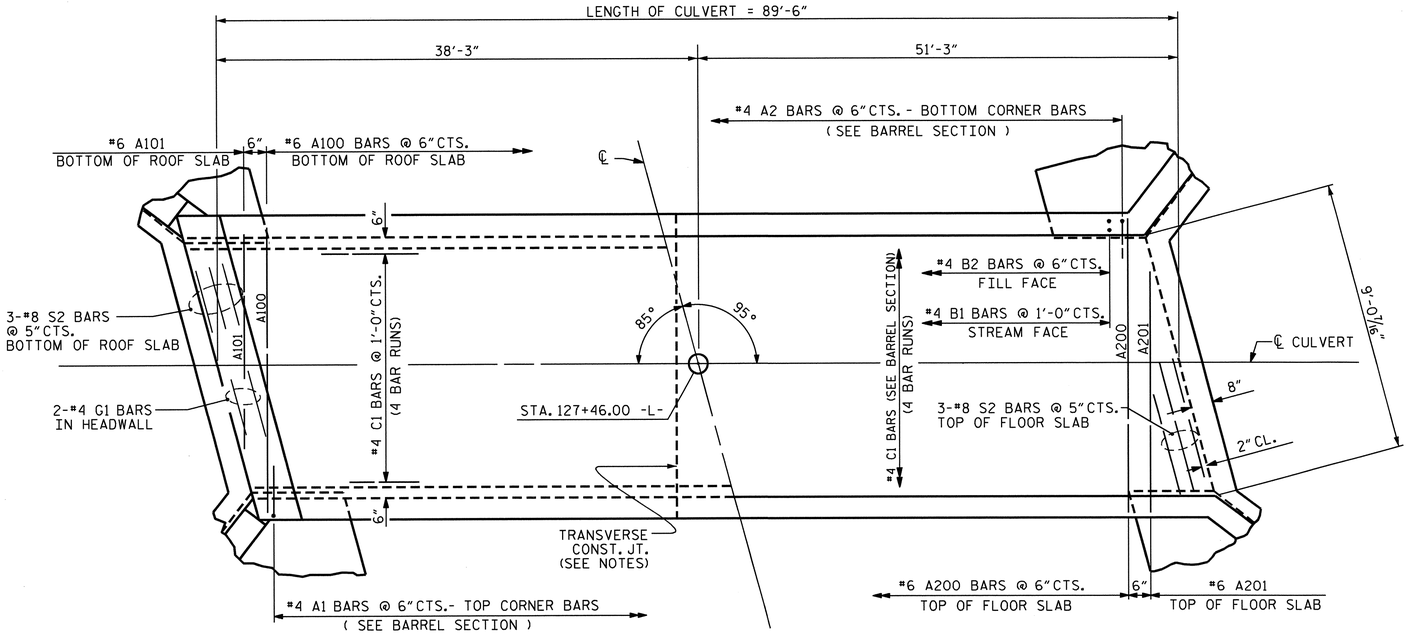
SIP #4 STD NO. LRFR5



CULVERT SECTION NORMAL TO ROADWAY



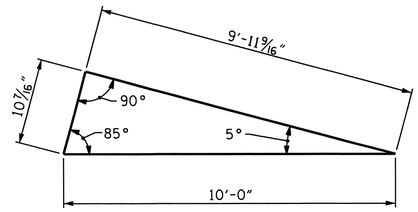
END ELEVATION NORMAL TO SKEW



PART PLAN - ROOF SLAB

PART PLAN - FLOOR SLAB

SILLS NOT SHOWN. FOR SILL LOCATION & DETAILS, SEE SHEET 4 OF 5.



SKEW TRIANGLE

REVISED 11-19-99 BY M.M. CHECKED BY R.W.W.

REVISED 8-28-92 BY E.L.R. CHECKED BY G.R.P.
REVISED 8-22-89 BY A.R.B. CHECKED BY C.R.K.
REDRAWN 8-22-89

ASSEMBLED BY : B. L. GREEN	DATE : 8/20/12	SPECIAL
CHECKED BY : PEGGY PARISI	DATE : 9/5/12	
DRAWN BY : R.W. WRIGHT	DATE : AUG. 1989	STANDARD
CHECKED BY : A.R. BISSETTE	DATE : AUG. 1989	

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 127+46.00 -L-

SHEET 3 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SINGLE 9 FT. X 7 FT. CONCRETE BOX CULVERT 95° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-8
1			3			TOTAL SHEETS
2			4			10

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY E. MURRAY

1/14/13

NOTES:

BED MATERIAL BETWEEN SILLS IN THE CULVERT SHALL PROVIDE A CONTINUOUS LOW FLOW CHANNEL. THE MATERIAL SHALL BE NATURAL STONE WITH A GRADATION SIZE SIMILAR TO THAT OF CLASS 'B' RIP RAP. STONES LARGER THAN 6 INCHES SHALL NOT BE PLACED WITHIN THE LOW FLOW CHANNEL BED. MATERIALS SUBJECT TO APPROVAL BY THE ENGINEER.

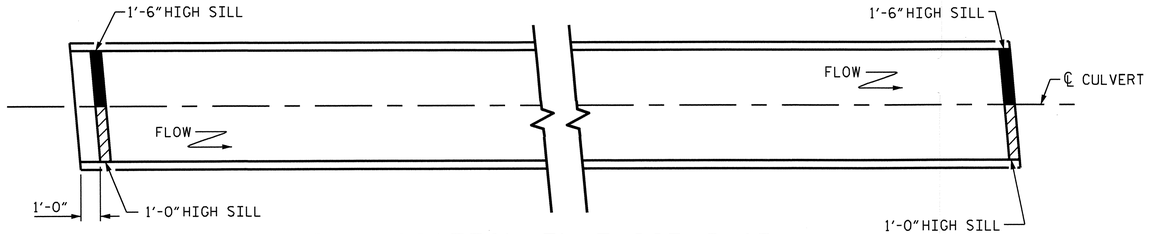
SILLS ARE TO BE 1.0 FT WIDE, CAST SEPARATELY AND ATTACHED BY DOWELS.

TOP OF LOW FLOW SILLS SHOULD MATCH STREAM BED ELEVATION IN LOW FLOW CHANNEL OF STREAM. (THALWEG)

CLASS 'B' RIP RAP MAY BE USED TO SUPPLEMENT NATURAL BED MATERIAL.

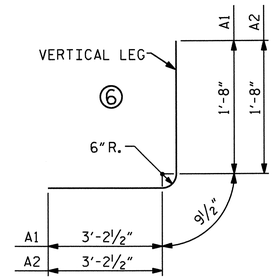
DO NOT SET ELEVATION OF HIGH SILL ABOVE BANK FULL.

NUMBER OF SILLS DETERMINED BY THE ENGINEER.



SILL LOCATION IN FLOOR SLAB

BAR TYPE



BAR DIMENSIONS ARE OUT TO OUT

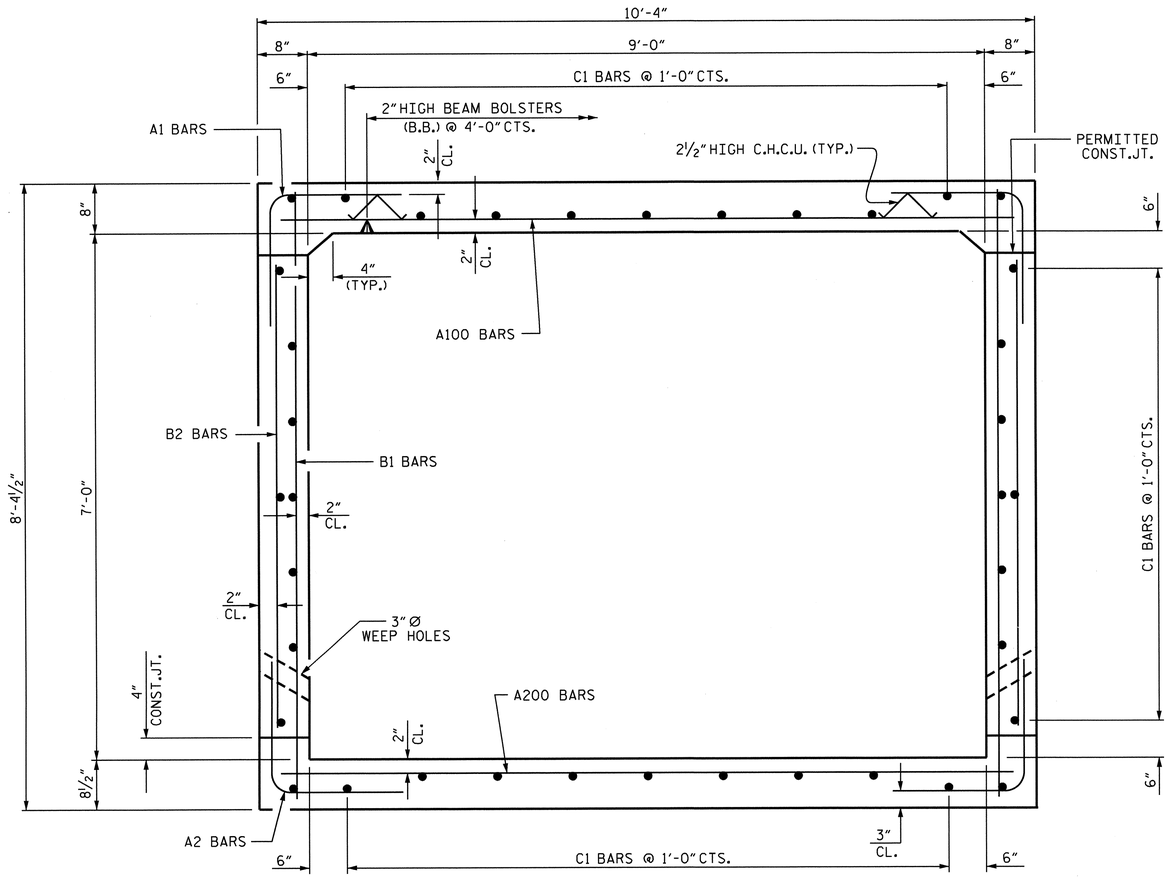
BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱ A1	358	#4	6	5'-8"	1355
✱ A2	358	#4	6	5'-8"	1355
✱A100	177	#6	STR	10'-0"	2659
✱A101	2	#6	STR	5'-11"	18
✱A200	177	#6	STR	10'-0"	2659
✱A201	2	#6	STR	5'-11"	18
✱ B1	180	#4	STR	8'-0"	962
✱ B2	358	#4	STR	6'-4"	1515
✱ C1	152	#4	STR	24'-1"	2445
✱ D1	4	#6	STR	1'-9"	11
✱ D2	4	#6	STR	1'-3"	8
✱ G1	4	#4	STR	10'-0"	27
✱ S2	12	#8	STR	10'-0"	320

✱ EPOXY COATED REINFORCING STEEL 13352

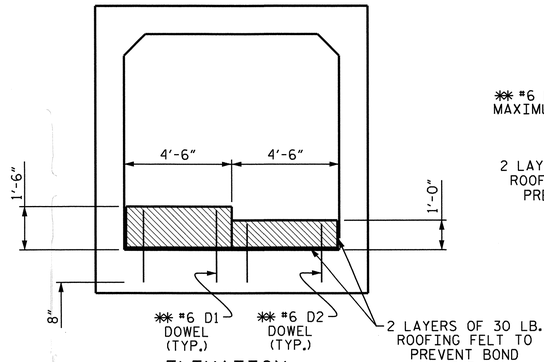
SPLICE CHART

BAR	SIZE	SPLICE LENGTH
B1	#4	2'-0"
C1	#4	2'-4"

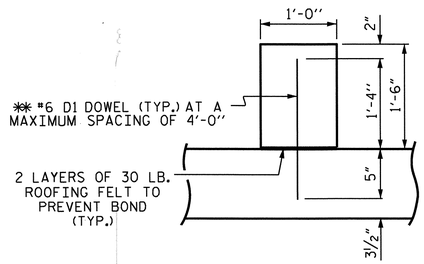


RIGHT ANGLE SECTION OF BARREL

THERE ARE 38 "C" BARS IN SECTION OF BARREL



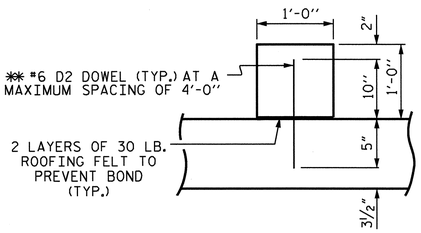
ELEVATION
(@ INLET & OUTLET)
(LOOKING DOWN STREAM)



SECTION THROUGH HIGH SILL

SILL DETAILS

✱✱ DOWELS MAY BE PUSHED INTO GREEN CONCRETE AFTER SLAB HAS BEEN FLOAT FINISHED.



SECTION THROUGH LOW SILL

PROJECT NO. R-3324

BRUNSWICK COUNTY

STATION: 127+46.00 -L-

SHEET 4 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

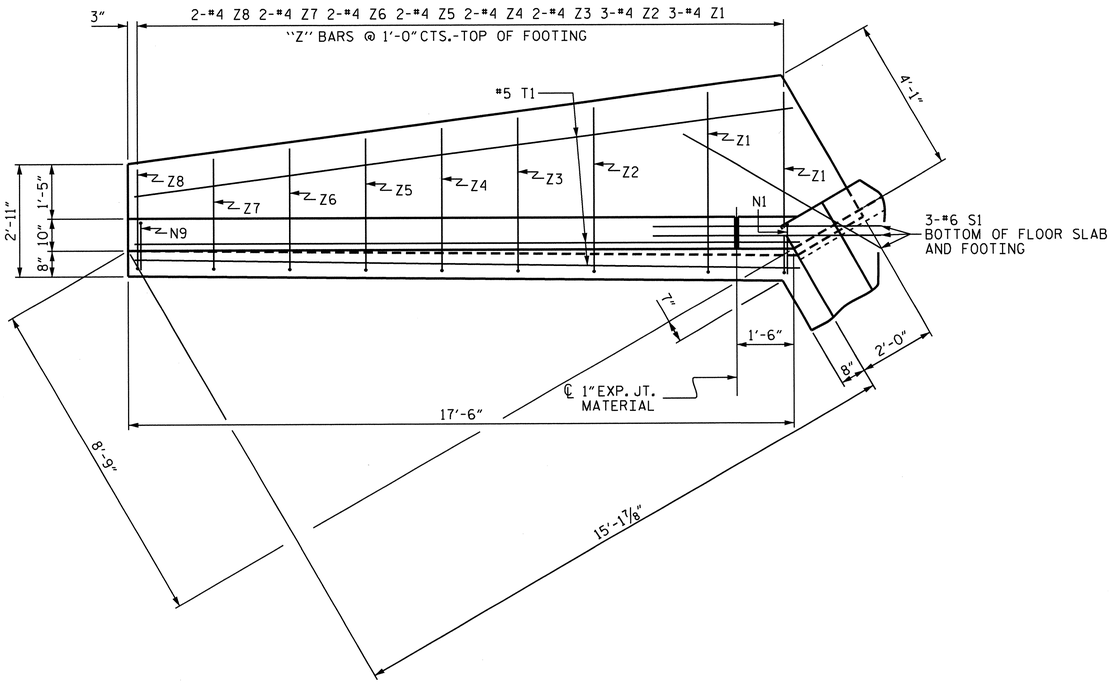
DOUBLE 9 FT. X 7 FT. CONCRETE BOX CULVERT 95° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-9
1			3			TOTAL SHEETS
2			4			10

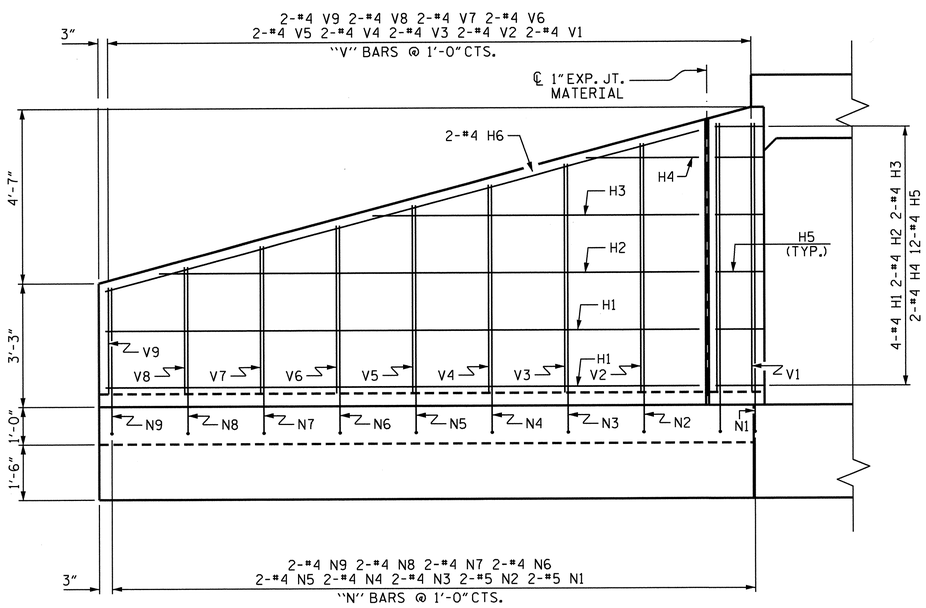
NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY F. MURRAY

1/4/13

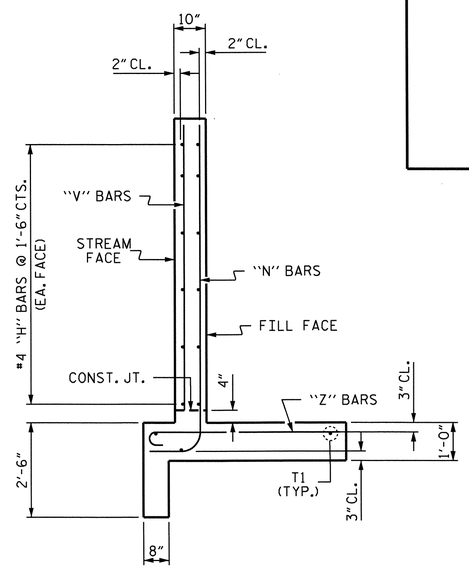
DRAWN BY : B. L. GREEN DATE : 8/20/12
CHECKED BY : PEGGY PARISI DATE : 9/5/12



PLAN



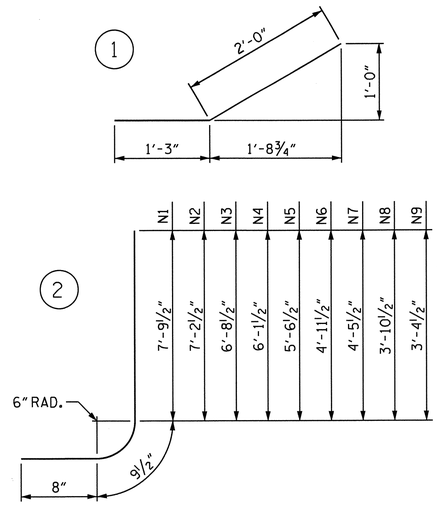
ELEVATION



TYPICAL WING SECTION

BAR TYPES

ALL BAR DIMENSIONS ARE OUT TO OUT.



BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱H1	16	#4	STR	15'-7"	167
✱H2	8	#4	STR	14'-2"	76
✱H3	8	#4	STR	8'-7"	46
✱H4	8	#4	STR	2'-11"	16
✱H5	48	#4	1	3'-3"	104
✱H6	8	#4	STR	16'-2"	86
✱N1	8	#5	2	9'-3"	77
✱N2	8	#5	2	8'-8"	72
✱N3	8	#4	2	8'-2"	44
✱N4	8	#4	2	7'-7"	41
✱N5	8	#4	2	7'-0"	37
✱N6	8	#4	2	6'-5"	34
✱N7	8	#4	2	5'-11"	32
✱N8	8	#4	2	5'-4"	29
✱N9	8	#4	2	4'-10"	26
✱S1	12	#6	STR	6'-0"	108
✱T1	12	#5	STR	17'-5"	218
✱V1	8	#4	STR	7'-1"	38
✱V2	8	#4	STR	6'-5"	34
✱V3	8	#4	STR	6'-0"	32
✱V4	8	#4	STR	5'-5"	29
✱V5	8	#4	STR	4'-11"	26
✱V6	8	#4	STR	4'-4"	23
✱V7	8	#4	STR	3'-10"	20
✱V8	8	#4	STR	3'-4"	18
✱V9	8	#4	STR	2'-9"	15
✱Z1	12	#4	3	5'-0"	40
✱Z2	12	#4	3	4'-8"	37
✱Z3	8	#4	3	4'-6"	24
✱Z4	8	#4	3	4'-2"	22
✱Z5	8	#4	3	3'-10"	20
✱Z6	8	#4	3	3'-7"	19
✱Z7	8	#4	3	3'-3"	17
✱Z8	8	#4	3	3'-0"	16

✱TOTAL EPOXY COATED REINFORCING STEEL FOR 4 WINGS	1643 LBS
CLASS A CONCRETE	
4 WINGS	26.0 CY
2 HEADWALLS	1.0 CY
2 END CURTAIN WALLS	1.0 CY
TOTAL	28.0 CY

ASSEMBLED BY : B. L. GREEN DATE : 8/20/12
CHECKED BY : PEGGY PARISI DATE : 9/5/12

PROJECT NO. R-3324
BRUNSWICK COUNTY
STATION: 127+46.00 -L-

SHEET 5 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

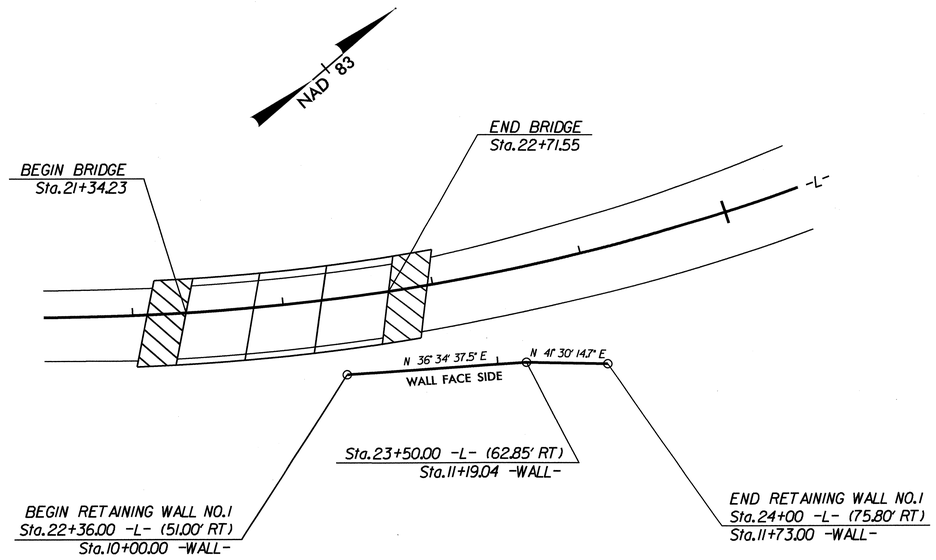
WINGS FOR CONCRETE BOX CULVERT

H = 7'-0" SLOPE = 3:1
95° SKEW

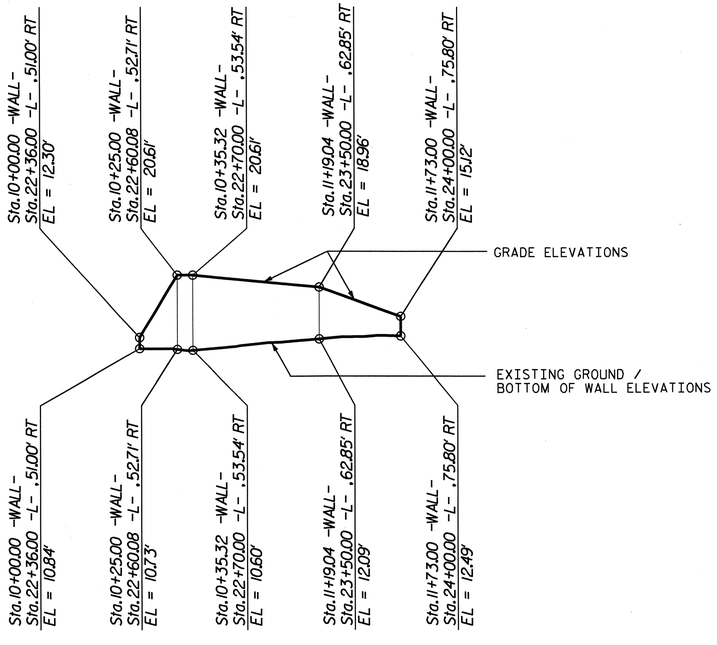
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-10
1			3			TOTAL SHEETS
2			4			10

NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER E.M.T. MURRAY
1/4/13

STD. #4



MSE WALL NO. 1 - PLAN VIEW (NTS)



MSE WALL NO. 1 - EXPOSED WALL FACE ENVELOPE (NTS)

PREPARED BY: J. PARK	DATE: 05/2012
REVIEWED BY: J. BATTS	DATE: 05/2012

GEOTECHNICAL ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 32171 ENGINEER INYOUNG PARK

SIGNATURE DATE

ENGINEER

SIGNATURE DATE

NOTES:

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

CAST-IN-PLACE REINFORCED CONCRETE COPING IS REQUIRED FOR RETAINING WALL NO. 1.

A DRAIN IS REQUIRED FOR RETAINING WALL NO. 1.

BEFORE BEGINNING MSE WALL DESIGN FOR RETAINING WALL NO. 1, 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 FOR THE FOLLOWING:
1) H = DESIGN HEIGHT + EMBEDMENT
2) DESIGN LIFE = 75 YEARS
3) MINIMUM REINFORCEMENT LENGTH (L) TO WALL HEIGHT (H) RATIO = 1.0
4) AGGREGATE PARAMETERS:

AGGREGATE TYPE*	UNIT WEIGHT (γ) LB/CF	FRICTION ANGLE (ϕ) 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.			

5) 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 RETAINING WALL NO. 1 FOR A LIVE LOAD (TRAFFIC) SURCHARGE.

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.

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

MSE WALL ESTIMATED QUANTITY (SQUARE FOOT)	
MSE RETAINING WALL NO. 1	1350 SF

PROJECT NO.: R-3324

BRUNSWICK ***COUNTY***

STATION: 22+50.00 -L-

SHEET 1 OF 3

GEOTECHNICAL ENGINEERING UNIT

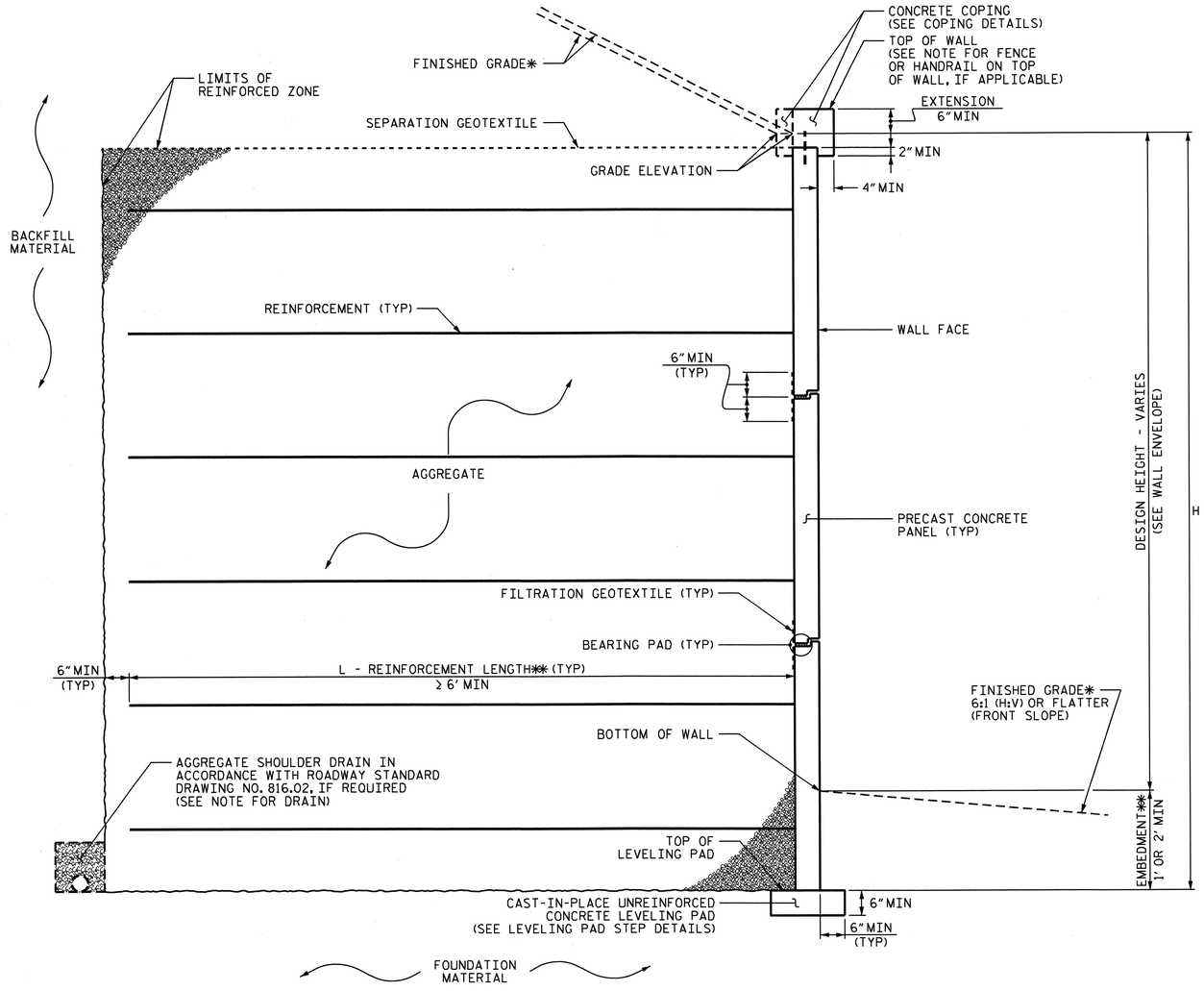
☒ ***EASTERN REGIONAL OFFICE***
☐ ***WESTERN REGIONAL OFFICE***
☐ ***CONTRACT OFFICE***

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

MSE WALL NO. 1 PLAN AND NOTES

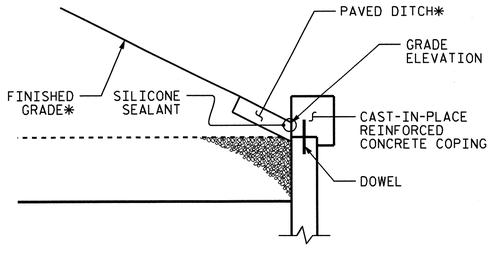
REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	W-1
1	-	-	3	-	-	TOTAL SHEETS
2	-	-	4	-	-	3

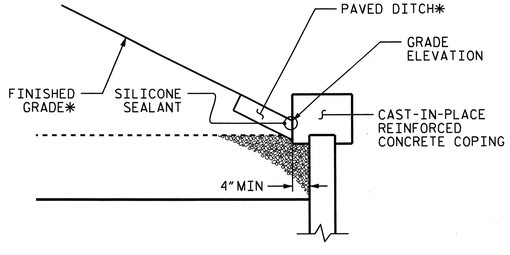
GEOTECHNICAL ENGINEER	ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 32071 ENGINEER JINYOUNG PARK	
SIGNATURE DATE	SIGNATURE DATE



MSE WALL WITH PRECAST PANELS - TYPICAL SECTION

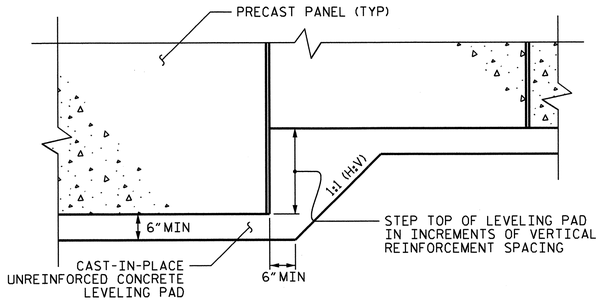
*SEE ROADWAY PLANS FOR FINISHED GRADE AND DITCH DETAILS.
**SEE MSE RETAINING WALLS PROVISION FOR EMBEDMENT AND REINFORCEMENT LENGTH REQUIREMENTS.





COPING DETAILS

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



PRECAST CONCRETE PANELS

LEVELING PAD STEP DETAILS

PREPARED BY: J. PARK	DATE: 05/2012
REVIEWED BY: J. BATTS	DATE: 05/2012

GEOTECHNICAL ENGINEERING UNIT

☒ EASTERN REGIONAL OFFICE
☐ WESTERN REGIONAL OFFICE
☐ CONTRACT OFFICE

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

PROJECT NO.: R-3324
BRUNSWICK *COUNTY*
STATION: 22+50.00 -L-
SHEET 2 OF 3

MSE WALL NO. 1
DETAILS WITH
PRECAST CONCRETE PANELS

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

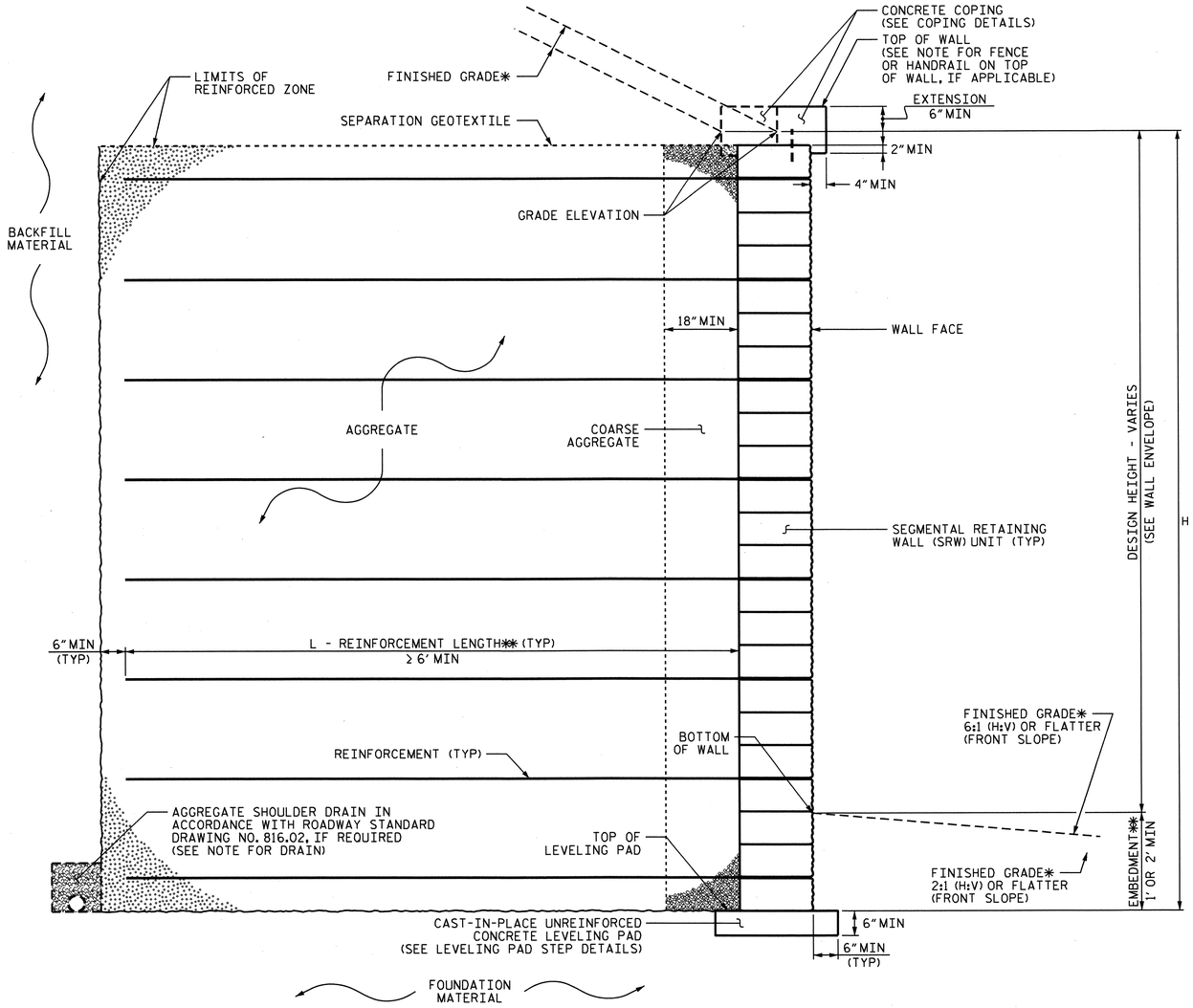
GEOTECHNICAL ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 32171 ENGINEER JINYOUNG PARK

SIGNATURE DATE

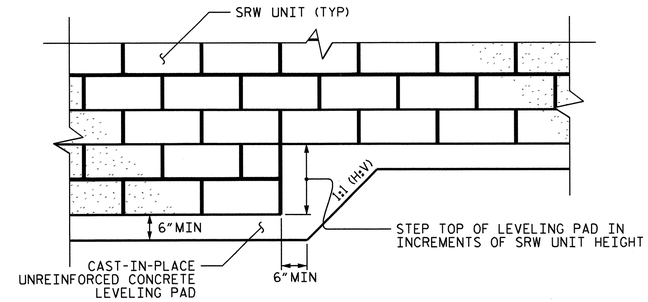
ENGINEER

SIGNATURE DATE



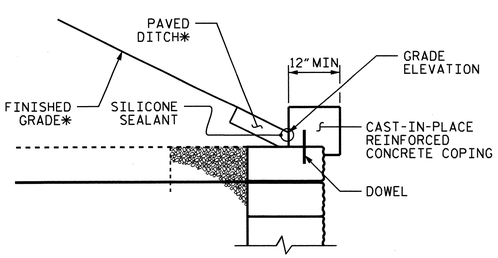
MSE WALL WITH SRW UNITS - TYPICAL SECTION

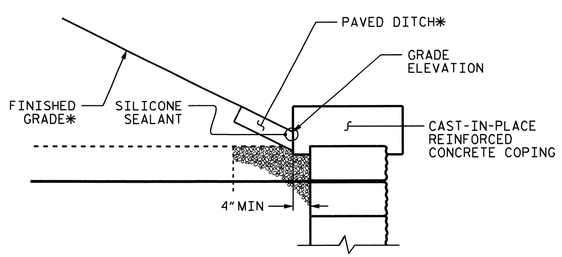
*SEE ROADWAY PLANS FOR FINISHED GRADE AND DITCH DETAILS.
**SEE MSE RETAINING WALLS PROVISION FOR EMBEDMENT AND REINFORCEMENT LENGTH REQUIREMENTS.



SEGMENTAL RETAINING WALL (SRW) UNITS

LEVELING PAD STEP 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 AND DITCH DETAILS.

PREPARED BY: J. PARK	DATE: 05/2012
REVIEWED BY: J. BATTS	DATE: 05/2012

PROJECT NO.: R-3324
BRUNSWICK ***COUNTY***
STATION: 22+50.00 -L-
SHEET 3 OF 3

GEOTECHNICAL ENGINEERING UNIT

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

- [X] ***EASTERN REGIONAL OFFICE***
- [ ] ***WESTERN REGIONAL OFFICE***
- [ ] ***CONTRACT OFFICE***

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

MSE WALL NO. 1
DETAILS WITH
SRW UNITS

REVISIONS

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

SHEET NO. W-3
TOTAL SHEETS 3

STANDARD NOTES

DESIGN DATA:

SPECIFICATIONS	A.A.S.H.T.O. (CURRENT)
LIVE LOAD	SEE PLANS
IMPACT ALLOWANCE	SEE A.A.S.H.T.O.
STRESS IN EXTREME FIBER OF	
STRUCTURAL STEEL - AASHTO M270 GRADE 36	20,000 LBS. PER SQ. IN.
- AASHTO M270 GRADE 50W	27,000 LBS. PER SQ. IN.
- AASHTO M270 GRADE 50	27,000 LBS. PER SQ. IN.
REINFORCING STEEL IN TENSION	
GRADE 60	24,000 LBS. PER SQ. IN.
CONCRETE IN COMPRESSION	1,200 LBS. PER SQ. IN.
CONCRETE IN SHEAR	SEE A.A.S.H.T.O.
STRUCTURAL TIMBER - TREATED OR	
UNTREATED - EXTREME FIBER STRESS	1,800 LBS. PER SQ. IN.
COMPRESSION PERPENDICULAR TO GRAIN OF TIMBER	375 LBS. PER SQ. IN.
EQUIVALENT FLUID PRESSURE OF EARTH	30 LBS. PER CU. FT. (MINIMUM)

MATERIAL AND WORKMANSHIP:

EXCEPT AS MAY OTHERWISE BE SPECIFIED ON PLANS OR IN THE SPECIAL PROVISIONS, ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE 2012 "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES" OF THE N. C. DEPARTMENT OF TRANSPORTATION.

STEEL SHEET PILING FOR PERMANENT OR TEMPORARY APPLICATIONS SHALL BE HOT ROLLED.

CONCRETE:

UNLESS OTHERWISE REQUIRED ON PLANS, CLASS A CONCRETE SHALL BE USED FOR ALL PORTIONS OF ALL STRUCTURES WITH THE EXCEPTION THAT: CLASS AA CONCRETE SHALL BE USED IN BRIDGE SUPERSTRUCTURES, ABUTMENT BACKWALLS, AND APPROACH SLABS; AND CLASS B CONCRETE SHALL BE USED FOR SLOPE PROTECTION AND RIP RAP.

CONCRETE CHAMFERS:

UNLESS OTHERWISE NOTED ON THE PLANS, ALL EXPOSED CORNERS ON STRUCTURES SHALL BE CHAMFERED 3/4" WITH THE FOLLOWING EXCEPTIONS: TOP CORNERS OF CURBS MAY BE ROUNDED TO 1-1/2" RADIUS WHICH IS BUILT INTO CURB FORMS; CORNERS OF TRANSVERSE FLOOR EXPANSION JOINTS SHALL BE ROUNDED WITH A 1/4" FINISHING TOOL UNLESS OTHERWISE REQUIRED ON PLANS; AND CORNERS OF EXPANSION JOINTS IN THE ROADWAY FACES AND TOPS OF CURBS AND SIDEWALKS SHALL BE ROUNDED TO A 1/4" RADIUS WITH A FINISHING STONE OR TOOL UNLESS OTHERWISE REQUIRED ON PLANS.

DOWELS:

DOWELS WHEN INDICATED ON PLANS AS FOR CULVERT EXTENSIONS, SHALL BE EMBEDDED AT LEAST 12" INTO THE OLD CONCRETE AND GROUTED INTO PLACE WITH 1:2 CEMENT MORTAR.

ALLOWANCE FOR DEAD LOAD DEFLECTION, SETTLEMENT, ETC. IN CASTING SUPERSTRUCTURES:

BRIDGES SHALL BE BUILT ON THE GRADE OR VERTICAL CURVE SHOWN ON PLANS. SLABS, CURBS AND PARAPETS SHALL CONFORM TO THE GRADE OR CURVE.

ALL DIMENSIONS WHICH ARE GIVEN IN SECTION AND ARE AFFECTED BY DEAD LOAD DEFLECTIONS ARE DIMENSIONS AT CENTER LINE OF BEARING UNLESS OTHERWISE NOTED ON PLANS. IN SETTING FORMS FOR STEEL BEAM BRIDGES AND PRESTRESSED CONCRETE GIRDER BRIDGES, ADJUSTMENTS SHALL BE MADE DUE TO THE DEAD LOAD DEFLECTIONS FOR THE ELEVATIONS SHOWN. WHERE BLOCKS ARE SHOWN OVER BEAMS FOR BUILDING UP TO THE SLAB, THE VERTICAL DIMENSIONS OF THE BLOCKS SHALL BE ADJUSTED BETWEEN BEARINGS TO COMPENSATE FOR DEAD LOAD DEFLECTIONS, VERTICAL CURVE ORDINATE, AND ACTUAL BEAM CAMBER. WHERE BOTTOM OF SLAB IS IN LINE WITH BOTTOM OF TOP FLANGES, DEPTH OF SLAB BETWEEN BEARINGS SHALL BE ADJUSTED TO COMPENSATE FOR DEAD LOAD DEFLECTION, VERTICAL CURVE ORDINATE, AND ACTUAL BEAM CAMBER.

IN SETTING FALSEWORK AND FORMS FOR REINFORCED CONCRETE SPANS, AN ALLOWANCE SHALL BE MADE FOR DEAD LOAD DEFLECTIONS, SETTLEMENT OF FALSEWORK, AND PERMANENT CAMBER WHICH SHALL BE PROVIDED FOR IN ADDITION TO THE ELEVATIONS SHOWN. AFTER REMOVAL OF THE FALSEWORK, THE FINISHED STRUCTURES SHALL CONFORM TO THE PROFILE AND ELEVATIONS SHOWN ON THE PLANS AND CONSTRUCTION ELEVATIONS FURNISHED BY THE ENGINEER.

DETAILED DRAWINGS FOR FALSEWORK OR FORMS FOR BRIDGE SUPERSTRUCTURE AND ANY STRUCTURE OR PARTS OF A STRUCTURE AS NOTED ON THE PLANS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL BEFORE CONSTRUCTION OF THE FALSEWORK OR FORMS IS STARTED.

REINFORCING STEEL:

ALL REINFORCING STEEL SHALL BE DEFORMED. DIMENSIONS RELATIVE TO PLACEMENT OF REINFORCING ARE TO CENTERS OF BARS UNLESS OTHERWISE INDICATED IN THE PLANS. DIMENSIONS ON BAR DETAILS ARE TO CENTERS OF BARS OR ARE OUT TO OUT AS INDICATED ON PLANS.

WIRE BAR SUPPORTS SHALL BE PROVIDED FOR REINFORCING STEEL WHERE INDICATED ON THE PLANS. WHEN BAR SUPPORT PIECES ARE PLACED IN CONTINUOUS LINES, THEY SHALL BE SO PLACED THAT THE ENDS OF THE SUPPORTING WIRES SHALL BE LAPPED TO LOCK LEGS ON ADJOINING PIECES.

STRUCTURAL STEEL:

AT THE CONTRACTOR'S OPTION, HE MAY SUBSTITUTE 7/8" Ø SHEAR STUDS FOR THE 3/4" Ø STUDS SPECIFIED ON THE PLANS. THIS SUBSTITUTION SHALL BE MADE AT THE RATE OF 3 - 7/8" Ø STUDS FOR 4 - 3/4" Ø STUDS, AND STUD SPACING CHANGES SHALL BE MADE AS NECESSARY TO PROVIDE THE SAME EQUIVALENT NUMBER OF 7/8" Ø STUDS ALONG THE BEAM AS SHOWN FOR 3/4" Ø STUDS BASED ON THE RATIO OF 3 - 7/8" Ø STUDS FOR 4 - 3/4" Ø STUDS. STUDS OF THE LENGTH SPECIFIED ON THE PLANS MUST BE PROVIDED. THE MAXIMUM SPACING SHALL BE 2'-0".

EXCEPT AT THE INTERIOR SUPPORTS OF CONTINUOUS BEAMS WHERE THE COVER PLATE IS IN CONTACT WITH BEARING PLATE, THE CONTRACTOR MAY, AT HIS OPTION, SUBSTITUTE FOR THE COVER PLATES DESIGNATED ON THE PLANS COVER PLATES OF THE EQUIVALENT AREA PROVIDED THESE PLATES ARE AT LEAST 5/16" IN THICKNESS AND DO NOT EXCEED A WIDTH EQUAL TO THE FLANGE WIDTH LESS 2" OR A THICKNESS EQUAL TO 2 TIMES THE FLANGE THICKNESS. THE SIZE OF FILLET WELDS SHALL CONFORM TO THE REQUIREMENTS OF THE CURRENT ANSI/AASHTO/AWS "BRIDGE WELDING CODE". ELECTROSLAG WELDING WILL NOT BE PERMITTED.

WITH THE SOLE EXCEPTION OF EDGES AT SURFACES WHICH BEAR ON OTHER SURFACES, ALL SHARP EDGES AND ENDS OF SHAPES AND PLATES SHALL BE SLIGHTLY ROUNDED BY SUITABLE MEANS TO A RADIUS OF APPROXIMATELY 1/16 INCH OR EQUIVALENT FLAT SURFACE AT A SUITABLE ANGLE PRIOR TO PAINTING, GALVANIZING, OR METALLIZING.

HANDRAILS AND POSTS:

METAL STANDARDS AND FACES OF THE CONCRETE END POSTS FOR THE METAL RAIL SHALL BE SET NORMAL TO THE GRADE OF THE CURB, UNLESS OTHERWISE SHOWN ON PLANS. THE METAL RAIL AND TOPS OF CONCRETE POSTS USED WITH THE ALUMINUM RAIL SHALL BE BUILT PARALLEL TO THE GRADE OF THE CURB.

METAL HANDRAILS SHALL BE IN ACCORDANCE WITH THE PLANS. RAILS SHALL BE AS MANUFACTURED FOR BRIDGE RAILING. CASTINGS SHALL BE OF A UNIFORM APPEARANCE. FINS AND OTHER DEFORMATIONS RESULTING FROM CASTING OR OTHERWISE SHALL BE REMOVED IN A MANNER SO THAT A UNIFORM COLORING OF THE COMPLETED CASTING SHALL BE OBTAINED. CASTINGS WITH DISCOLORATIONS OR OF NON-UNIFORM COLORING WILL NOT BE ACCEPTED. CERTIFIED MILL REPORTS ARE REQUIRED FOR METAL RAILS AND POSTS.

SPECIAL NOTES:

GENERALLY, IN CASE OF DISCREPANCY, THIS STANDARD SHEET OF NOTES SHALL GOVERN OVER THE SPECIFICATIONS, BUT THE REMAINDER OF THE PLANS SHALL GOVERN OVER NOTES HEREON, AND SPECIAL PROVISIONS SHALL GOVERN OVER ALL. SEE SPECIFICATIONS ARTICLE 105-4.

ENGLISH

JANUARY, 1990

STD. NO. SN

REV. 6-16-95 EEM W/ RGW REV. 5-7-03 RWW W/ JTE REV. 10-1-11 MAA W/ GM
REV. 8-16-99 RWW W/ LES REV. 5-1-06 TLA W/ GM