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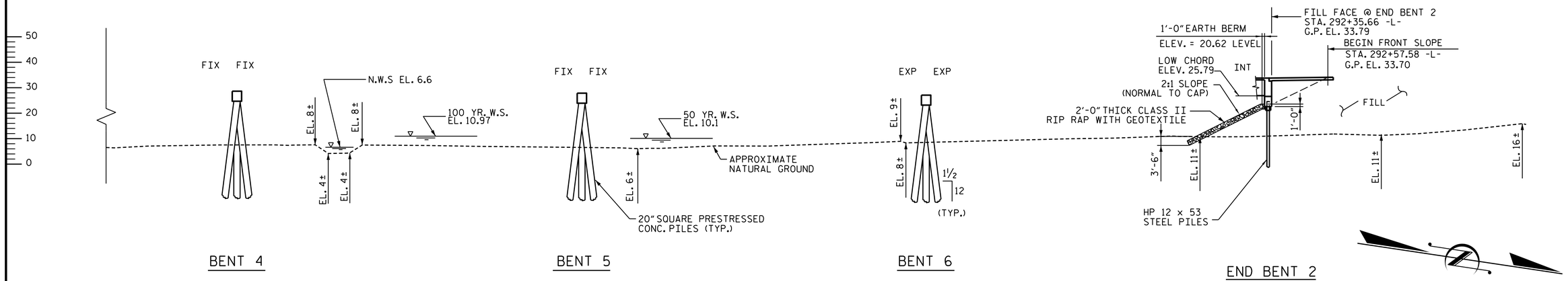
288+00 289+00 290+00 291+00 292+00 293+00

(-)0.3813% (+)0.5000%

PI STA. = 307+38.00 -L-
EL. = 28.06
VC = 230'

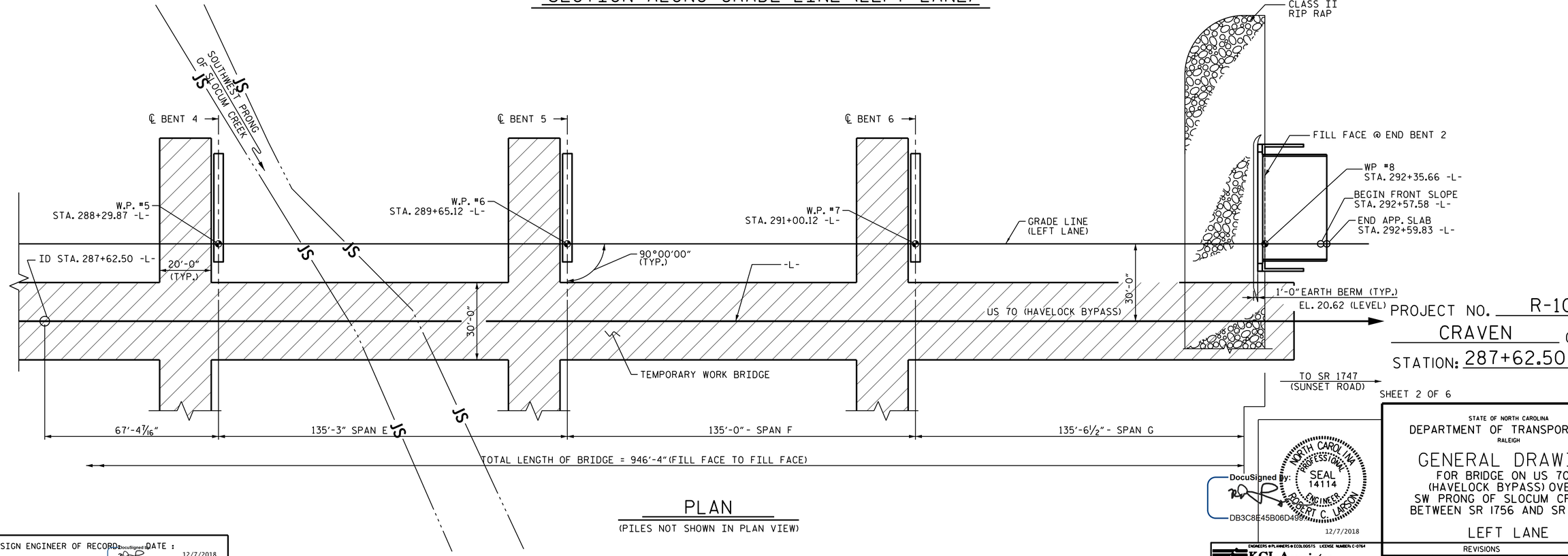
GRADE DATA -L-

SPAN E SPAN F SPAN G



BENT 4 BENT 5 BENT 6 END BENT 2

SECTION ALONG GRADE LINE (LEFT LANE)



PLAN

(PILES NOT SHOWN IN PLAN VIEW)

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 2 OF 6

KCI JOB NO. 25146789.11

DESIGN ENGINEER OF RECORD: DocuSigned by: DB3C8E45B06D496... DATE: 12/7/2018

DRAWN BY: R.J. FLORY DATE: 10/30/15

CHECKED BY: R.C. LARSON DATE: 11/01/15

DocuSigned by: DB3C8E45B06D496... 12/7/2018

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ENGINEERS ● PLANNERS ● ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
SUITE 220, LANDMARK CENTER ● 4601 SIX FORKS RD. ● RALEIGH, N.C. 27609-5210 (919) 783-9214
DWG. REF. NO. 2 OF 44

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

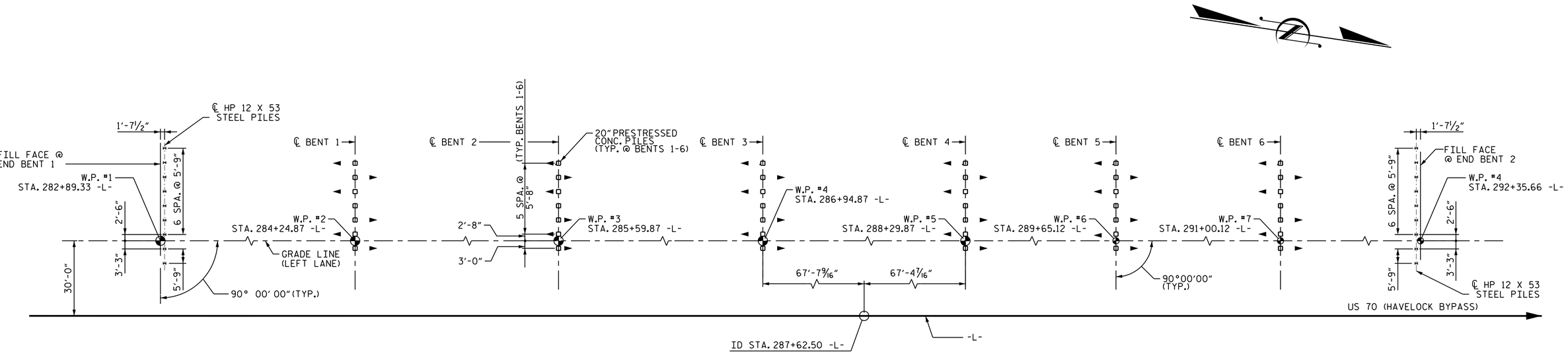
FOR BRIDGE ON US 70
(HAVELOCK BYPASS) OVER
SW PRONG OF SLOCUM CREEK
BETWEEN SR 1756 AND SR 1747

LEFT LANE

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

SHEET NO. S10-2
TOTAL SHEETS 44

STR-#10



FOUNDATION LAYOUT PLAN

(NOTE: ALL END BENT PILES ARE VERTICAL.
PILES FOR BENTS 1-6 ARE BATTERED AT 1½:12
IN DIRECTION INDICATED BY ARROW HEAD
EXCEPT PILE 4 VERTICAL)

DIMENSIONS LOCATING PILES ARE SHOWN TO ℄ OF PILE

FOUNDATION NOTES

1) FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.
2) PILES AT END BENT NO. 1 AND END BENT NO. 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 125 TONS PER PILE.
3) PILES AT BENT NO. 1 THROUGH BENT NO. 6 ARE DESIGNED FOR A FACTORED RESISTANCE OF 310 TONS PER PILE.
4) DRIVE PILES AT END BENT NO. 1 AND END BENT NO. 2 TO A REQUIRED DRIVING RESISTANCE OF 170 TONS PER PILE.
5) DRIVE PILES AT BENT NO. 1 THROUGH BENT NO. 6 TO A REQUIRED DRIVING RESISTANCE OF 440, 425, 425, 425, 425 AND 430 TONS PER PILE, RESPECTIVELY. THESE REQUIRED DRIVING RESISTANCES INCLUDE ADDITIONAL RESISTANCE FOR DOWNDRAG OR SCOUR.
6) INSTALL PILES AT BENT NO. 4 TO A TIP ELEVATION NO HIGHER THAN -20 FT.
7) INSTALL PILES AT BENT NO. 6 TO A TIP ELEVATION NO HIGHER THAN -15 FT.
8) THE SCOUR CRITICAL ELEVATIONS FOR BENT NO. 1 THROUGH BENT NO. 6 ARE ELEVATION 3.0, 0.0, 0.0, 0.0, -1.0 AND 0.0 FT., RESPECTIVELY. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.
9) IT HAS BEEN ESTIMATED THAT A HAMMER WITH AN EQUIVALENT RATED ENERGY IN THE RANGE OF 90-160 FT-KIPS PER BLOW WILL BE REQUIRED TO DRIVE PILES AT BENT NO. 1 THROUGH BENT NO.6. 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.
10) TESTING THE FIRST PRODUCTION PILE WITH THE PDA DURING DRIVING, RESTRIKING OR REDRIVING IS REQUIRED AT END BENT NO. 1 OR END BENT NO. 2. FOR PDA TESTING, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.
11) TESTING THE FIRST PRODUCTION PILE WITH THE PDA DURING DRIVING, RESTRIKING OR REDRIVING IS REQUIRED AT BENT NO. 1, BENT NO. 4 AND BENT NO. 6. FOR PDA TESTING, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.
12) IF NECESSARY, PREDRILL PILE LOCATIONS AT BENT NO. 1 TO AN ELEVATION NO LOWER THAN -2.0 FT WITH EQUIPMENT THAT WILL RESULT IN A MAXIMUM PREDRILLING DIAMETER OF 20". FOR PREDRILLING FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.
13) SPUDDING MAY BE USED INSTEAD OF PREDRILLING AT BENT NO. 1.

PROJECT NO. R-1015
CRAVEN COUNTY
STATION: 287+62.50 -L-

SHEET 3 OF 6

DESIGN ENGINEER OF RECORD: DocuSigned by: DB3C8E45B06D4... DATE : 9/18/2018
DRAWN BY : R.J. FLORY DATE : 10/30/15
CHECKED BY : R.C. LARSON DATE : 11/01/15

DocuSigned by: DB3C8E45B06D4... 9/18/2018
NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

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ENGINEERS ● PLANNERS ● ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
SUITE 220, LANDMARK CENTER ● 4601 SIX FORKS RD, RALEIGH, N.C. 27609-5320 (919) 783-9214
DWG. REF. NO. 3 OF 44

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S10-3
1			3			TOTAL SHEETS
2			4			44

STR-#10

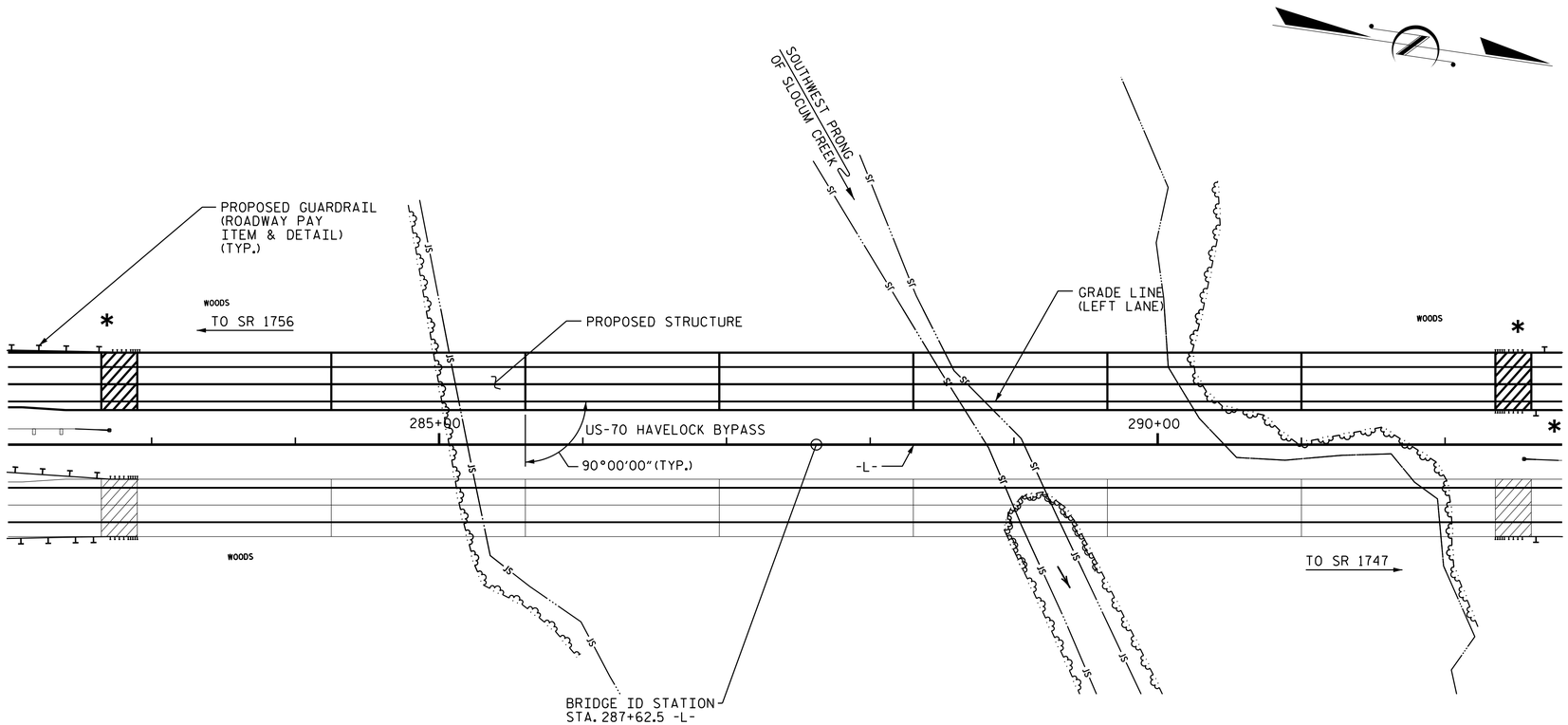
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
FOR BRIDGE ON US 70
(HAVELOCK BYPASS) OVER
SW PRONG OF SLOCUM CREEK
BETWEEN SR 1756 AND SR 1747

LEFT LANE

KCI JOB NO: 25146789.11

BENCHMARK: BM15 RR SPIKE IN TREE -Y4- STATION 41+83.00 97' RIGHT ELEVATION 27.08 NGVD 29



FOR UTILITY INFORMATION, SEE UTILTIY PLANS AND SPECIAL PROVISIONS.

* TYPE B-77 GUARDRAIL ATTACHMENT REQUIRED

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 SAMPLE BARS SHOULD COME FROM STEEL ACTUALLY USED IN THE PROJECT AND THE SAMPLE BARS SHOULD BE REPLACED BY SPLICED BARS AS SPECIFIED IN THE SAMPLE BAR REPLACEMENT CHART. PAYMENT FOR THE SAMPLE BARS AND REPLACEMENT 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.

THE CLASS AA CONCRETE IN THE BRIDGE DECK SHALL CONTAIN FLY ASH OR GROUND GRANULATED BLAST FURNACE SLAG AT THE SUBSTITUTION RATE SPECIFIED IN ARTICLE 1024-1 AND IN ACCORDANCE WITH ARTICLES 1024-5 AND 1024-6 OF THE STANDARD SPECIFICATIONS. NO PAYMENT WILL BE MADE FOR THIS SUBSTITUTION AS IT IS CONSIDERED INCIDENTAL TO THE COST OF THE REINFORCED CONCRETE DECK SLAB.

NOTES (CONT'D)

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 BARRIER RAIL, DECK, AND 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."

THE SCOUR CRITICAL ELEVATIONS FOR BENT NO. 1 THROUGH BENT NO. 6 ARE ELEVATION 3.0, 0.0, 0.0, 0.0, -1.0 AND 0.0 FT., RESPECTIVELY. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.

FOR EROSION CONTROL MEASURES SEE EROSION CONTROL PLANS.

FOR CONSTRUCTION, MAINTENANCE, AND REMOVAL OF TEMPORARY ACCESS, SEE SPECIAL PROVISIONS.

FOR 74" MODIFIED PRESTRESSED CONCRETE GIRDERS, SEE SPECIAL PROVISIONS.

SAMPLE BAR REPLACEMENT	
SIZE	LENGTH
#3	6'-2"
#4	7'-4"
#5	8'-6"
#6	9'-8"
#7	10'-10"
#8	12'-0"
#9	13'-2"
#10	14'-6"
#11	15'-10"

NOTE:
SAMPLE BAR REPLACEMENT LENGTH BASED ON 30" (SAMPLE LENGTH) PLUS TWO SPLICE LENGTHS AND f_y = 60ksi.

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

DocuSigned by: DB3C8E45B06D499... 12/7/2018

DESIGN ENGINEER OF RECORD: DocuSigned by: DB3C8E45B06D499... DATE: 12/7/2018

DRAWN BY: R.J. FLORY DATE: 10/30/15

CHECKED BY: R.C. LARSON DATE: 11/01/15

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ENGINEERS ⊕ PLANNERS ⊕ ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
SUITE 220, LANDMARK CENTER II 4601 SIX FORKS RD, RALEIGH, N.C. 27609-5210 (919) 783-9214

DWG. REF. NO. 4 OF 44

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S10-4
1			3			TOTAL SHEETS
2			4			44

STR-#10

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 4 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR BRIDGE ON US 70 (HAVELOCK BYPASS) OVER SW PRONG OF SLOCUM CREEK BETWEEN SR 1756 AND SR 1747

LEFT LANE

KCI JOB NO. 25146789.11

TOTAL BILL OF MATERIAL

	CONSTRUCTION, MAINTENANCE AND REMOVAL OF TEMP ACCESS AT STA. 287+62.50 -L-	PDA TESTING	REINFORCED CONCRETE DECK SLAB	GROOVING BRIDGE FLOORS	CLASS AA CONCRETE	BRIDGE APPROACH SLABS	EPOXY COATED REIN-FORCING STEEL	PILE DRIVING EQUIPMENT SETUP FOR 20" PRESTRESSED CONCRETE PILES	PILE DRIVING EQUIPMENT SETUP FOR HP 12X53 STEEL PILES	20" PRESTRESSED CONCRETE PILES		HP 12X53 STEEL PILES		PREDRILLING FOR PILES	PILE REDRIVES	CONRETE BARRIER RAIL	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE	ELASTOMERIC BEARINGS	EXPANSION JOINT SEALS	MODIFIED 74" PRESTRESSED CONCRETE GIRDERS	
	LUMP SUM	EA	SQ.FT.	SQ.FT.	CU.YDS.	LUMP SUM	LBS.	EA.	EA.	NO.	LIN.FT.	NO.	LIN.FT.	LIN.FT.	EA.	LIN.FT.	TON	SY	LUMP SUM	LUMP SUM	NO.	LIN.FT.
SUPERSTRUCTURE			40,929	31,623		LUMP SUM										1889.33			LUMP SUM	LUMP SUM	35	4704.58
END BENT 1					46.5		6989		9			9	540		5		410	455				
BENT 1					23.1		3383	7		7	385			97	4							
BENT 2					23.1		3383	7		7	455				4							
BENT 3					23.1		3383	7		7	420				4							
BENT 4					23.1		3383	7		7	420				4							
BENT 5					23.1		3383	7		7	385				4							
BENT 6					23.1		3383	7		7	385				4							
END BENT 2					46.5		6989		9			9	495		5		300	335				
TOTAL	LUMP SUM	5	40,929	31,623	231.6	LUMP SUM	34,276	42	18	42	2450	18	1035	97	34	1889.33	710	790	LUMP SUM	LUMP SUM	35	4704.58

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 5 OF 6

DocuSigned by:
DB3C8E45B06D4...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

11/2/2018

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR BRIDGE ON US 70
(HAVELOCK BYPASS) OVER
SW PRONG OF SLOCUM CREEK
BETWEEN SR 1756 AND SR 1747

LEFT LANE

KCI JOB NO: 25146789.11

DESIGN ENGINEER OF RECORD: DocuSigned by: DATE: 11/2/2018

DRAWN BY: R. C. LARSON DATE: 04/17/17

CHECKED BY: K. SU DATE: 04/27/17

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ENGINEERS • PLANNERS • ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
SUITE 220, LANDMARK CENTER II 4601 SIX FORKS RD. RALEIGH, N.C. 27609-5210 (919) 783-9214

DWG. REF. NO. 5 OF 44

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

SHEET NO. S10-5

TOTAL SHEETS 44

STR-#10

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
							LIVE-LOAD FACTORS (γ_{LL})	MOMENT					SHEAR					LIVE-LOAD FACTORS (γ_{LL})	MOMENT					
								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)		DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING		HL-93 (INVENTORY)	N/A	1	1.43	--	1.75	0.752	1.63	B	E	44.3	0.947	1.69	B	I	12.7	0.80	0.752	1.43	B	E	44.3	
		HL-93 (OPERATING)	N/A		2.12	--	1.35	0.752	2.12	B	E	44.3	0.947	2.23	B	I	12.7	N/A	--	--	--	--	--	
		HS-20 (INVENTORY)	36.000	2	2.09	75.24	1.75	0.752	2.46	B	E	44.3	0.947	2.48	B	I	12.7	0.80	0.752	2.09	B	E	44.3	
		HS-20 (OPERATING)	36.000		3.19	114.84	1.35	0.752	3.19	B	E	44.3	0.947	3.27	B	I	12.7	N/A	--	--	--	--	--	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		5.26	71.01	1.40	0.752	7.53	B	E	44.3	0.947	8.14	B	I	12.7	0.80	0.752	5.26	B	E	44.3	
		SNGARBS2	20.000		3.74	74.80	1.40	0.752	5.35	B	E	44.3	0.947	5.60	B	I	12.7	0.80	0.752	3.74	B	E	44.3	
		SNAGRIS2	22.000		3.47	76.34	1.40	0.752	4.96	B	E	44.3	0.947	5.13	B	I	12.7	0.80	0.752	3.47	B	E	44.3	
		SNCOTTS3	27.250		2.61	71.12	1.40	0.752	3.74	B	E	44.3	0.947	3.97	B	I	12.7	0.80	0.752	2.61	B	E	44.3	
		SNAGGRS4	34.925		2.11	73.69	1.40	0.752	3.02	B	E	44.3	0.947	3.17	B	I	12.7	0.80	0.752	2.11	B	E	44.3	
		SNS5A	35.550		2.07	73.58	1.40	0.752	2.96	B	E	44.3	0.947	3.16	B	I	12.7	0.80	0.752	2.07	B	E	44.3	
		SNS6A	39.950		1.87	74.70	1.40	0.752	2.68	B	E	44.3	0.947	2.83	B	I	12.7	0.80	0.752	1.87	B	E	44.3	
		SNS7B	42.000		1.78	74.76	1.40	0.752	2.55	B	E	44.3	0.947	2.73	B	I	12.7	0.80	0.752	1.78	B	E	44.3	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		2.27	74.91	1.40	0.752	3.25	B	E	44.3	0.947	343	B	I	12.7	0.80	0.752	2.27	B	E	44.3	
		TNT4A	33.075		2.28	75.41	1.40	0.752	3.26	B	E	44.3	0.947	3.38	B	I	12.7	0.80	0.752	2.28	B	E	44.3	
		TNT6A	41.600		1.83	76.12	1.40	0.752	2.63	B	E	44.3	0.947	2.84	B	I	12.7	0.80	0.752	1.83	B	E	44.3	
		TNT7A	42.000		1.83	76.86	1.40	0.752	2.62	B	E	44.3	0.947	2.80	B	I	12.7	0.80	0.752	1.83	B	E	44.3	
		TNT7B	42.000		1.86	78.12	1.40	0.752	2.66	B	E	44.3	0.947	2.70	B	I	12.7	0.80	0.752	1.86	B	E	44.3	
		TNAGRIT4	43.000		1.79	76.97	1.40	0.752	2.57	B	E	44.3	0.947	2.62	B	I	12.7	0.80	0.752	1.79	B	E	44.3	
		TNAGT5A	45.000		1.70	76.50	1.40	0.752	2.44	B	E	44.3	0.947	2.55	B	I	12.7	0.80	0.752	1.70	B	E	44.3	
		TNAGT5B	45.000	3	1.69	76.05	1.40	0.752	2.42	B	E	44.3	0.947	2.49	B	I	12.7	0.80	0.752	1.69	B	E	44.3	

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)

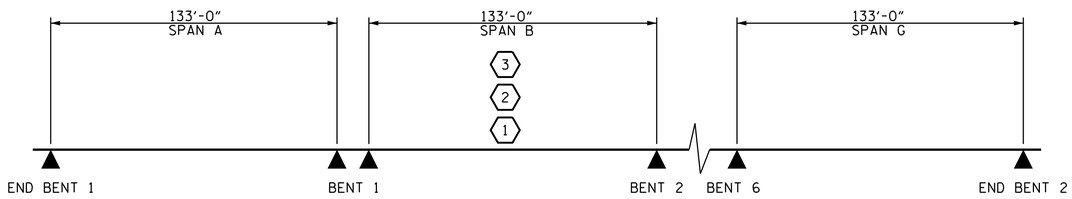
(2) DESIGN LOAD RATING (HS-20)

(3) LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

I - INTERIOR GIRDER
E - EXTERIOR



LRFR SUMMARY

74" MODIFIED BULB TEE SECTION PROPERTIES	
Ag	881.6 in^2
Ixx	636,755 in^4
y_c	36.440 in
W	918.3 lb/ft
V/S	3.401 in

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 6 OF 6

DocuSigned by: DB3C8E45BCBD439...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

11/2/2018

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

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

ENGINEERS ● PLANNERS ● ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
SUITE 220, LANDMARK CENTER II 4601 SIX FORKS RD, RALEIGH, N.C. 27609-5320 (919) 783-9214

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S10-6
1			3			TOTAL SHEETS
2			4			44

DWG. REF. NO. 6 OF 44

STR-#10

DESIGN ENGINEER OF RECORD: DocuSigned by: DB3C8E45BCBD439... DATE: 11/2/2018

ASSEMBLED BY : K. SU DATE : 12/31/15
CHECKED BY : R. C. LARSON DATE : 01/14/16

DRAWN BY : MAA 1/08 REV. 11/12/08RR MAA/GM
CHECKED BY : GM/DI 2/08 REV. 10/1/11 MAA/GM

KCI JOB NO. 25146789.11

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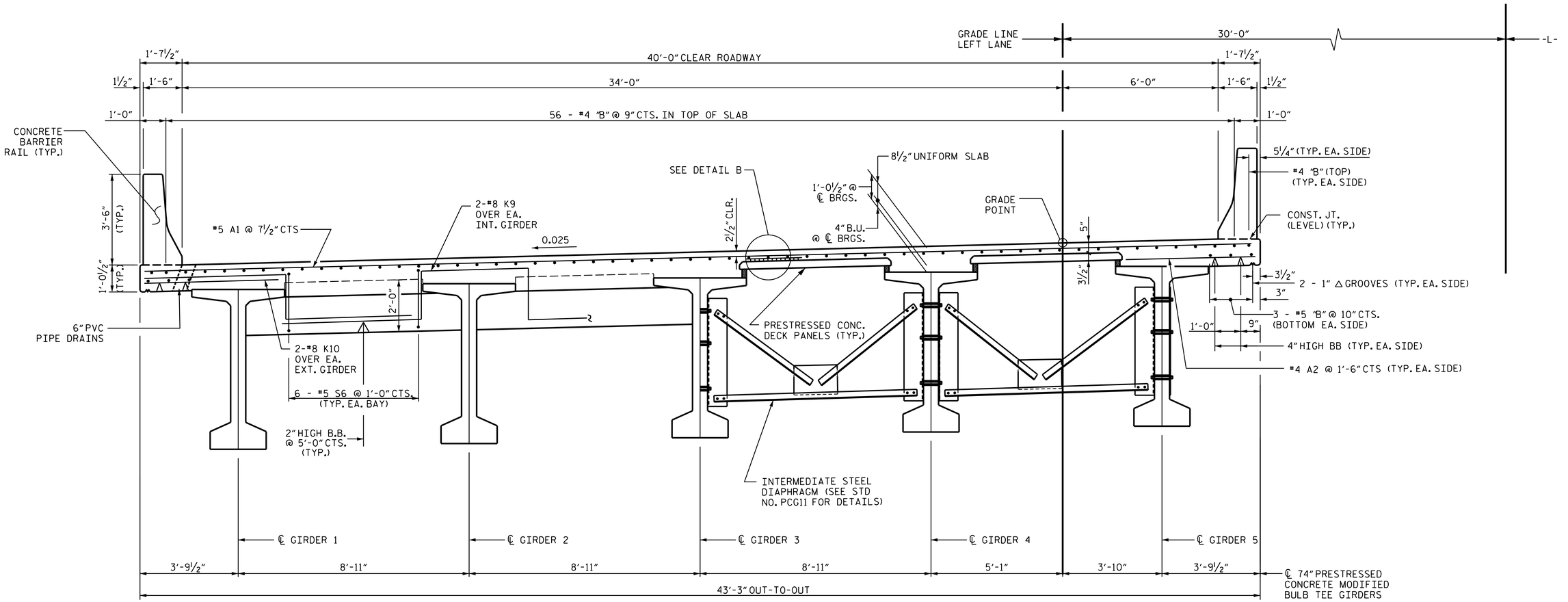
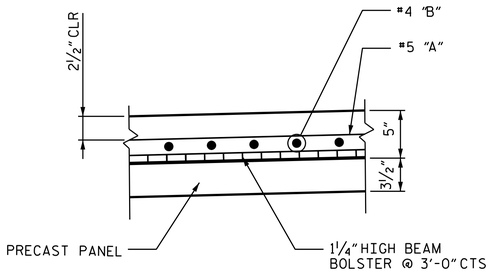


TYPICAL HALF SECTION AT END DIAPHRAGM (BENTS 1, 3 & 6)

TYPICAL HALF SECTION AT INTERMEDIATE DIAPHRAGM

TYPICAL SECTION



DETAIL "B"

NOTES

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

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 STD. NO. CBR1 FOR ADDITIONAL REINFORCING STEEL EMBEDDED IN DECK.

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

PROJECT NO. R-1015
CRAVEN COUNTY
STATION: 287+62.50 -L-

SHEET 1 OF 5

DocuSigned by: DB3C8E45B06D499...
6/8/2018

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE TYPICAL SECTION

LEFT LANE

DESIGN ENGINEER OF RECORD: DocuSigned by: DB3C8E45B06D499... DATE: 6/8/2018
DRAWN BY: R.J. FLORY DATE: 01/31/16
CHECKED BY: R. C. LARSON DATE: 02/15/16

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ENGINEERS ⊕ PLANNERS ⊕ ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
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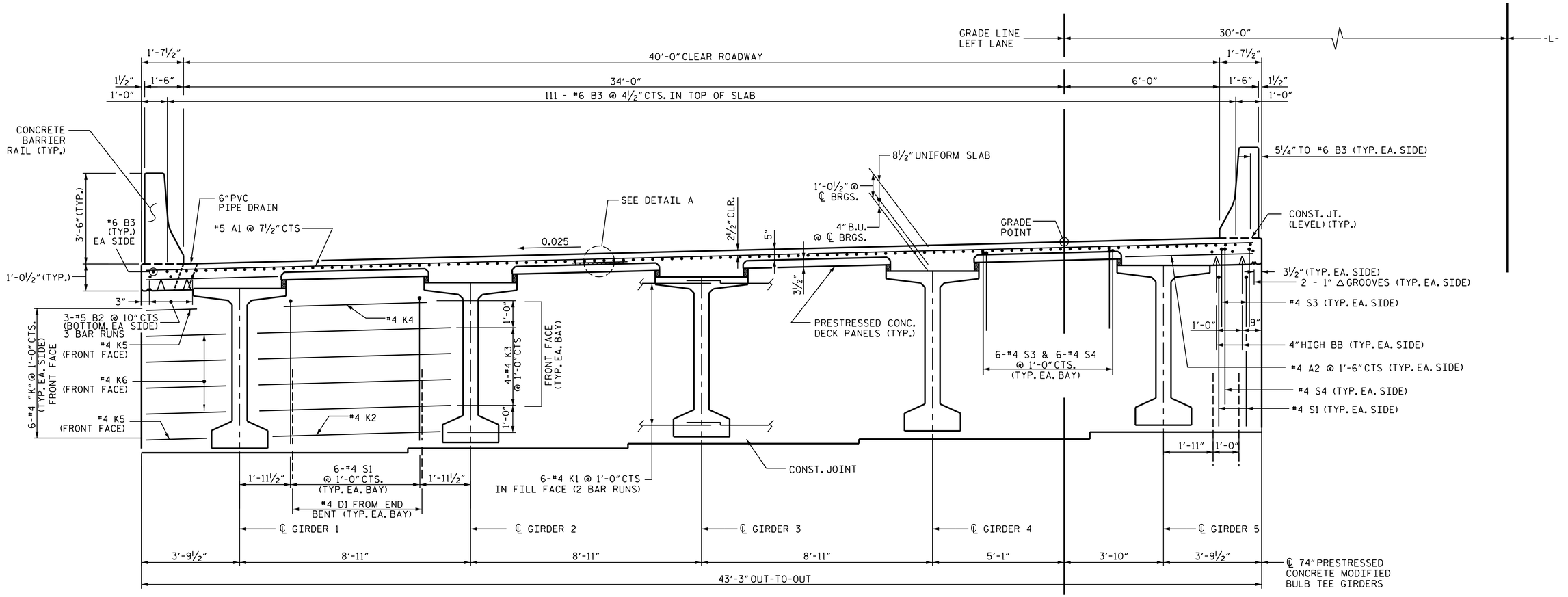
DWG. REF. NO. 7 OF 44

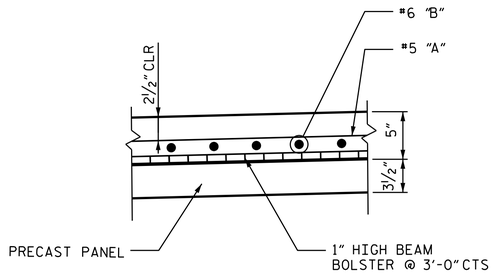
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S10-7
1			3			TOTAL SHEETS
2			4			44

STR-#10

KCI JOB NO. 25146789.11



TYPICAL SECTION AT INTEGRAL END BENT



DETAIL "A"

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 2 OF 5

DocuSigned by: DB3C8E45806D495...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

11/2/2018

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE TYPICAL SECTION

LEFT LANE

KCI JOB NO: 251467891.11

DESIGN ENGINEER OF RECORD:	DATE: 11/2/2018
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CHECKED BY: R. C. LARSON	DATE: 02/15/16

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DWG. REF. NO. 8 OF 44

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S10-8
1			3			TOTAL SHEETS
2			4			44

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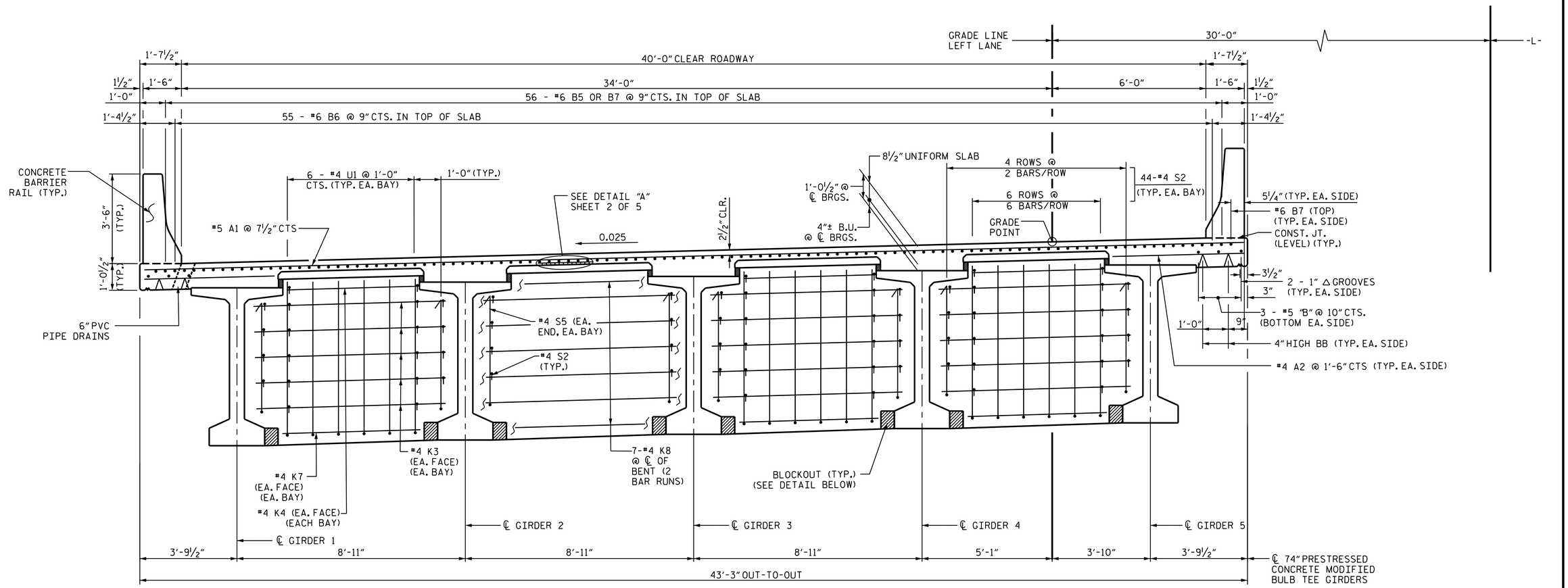
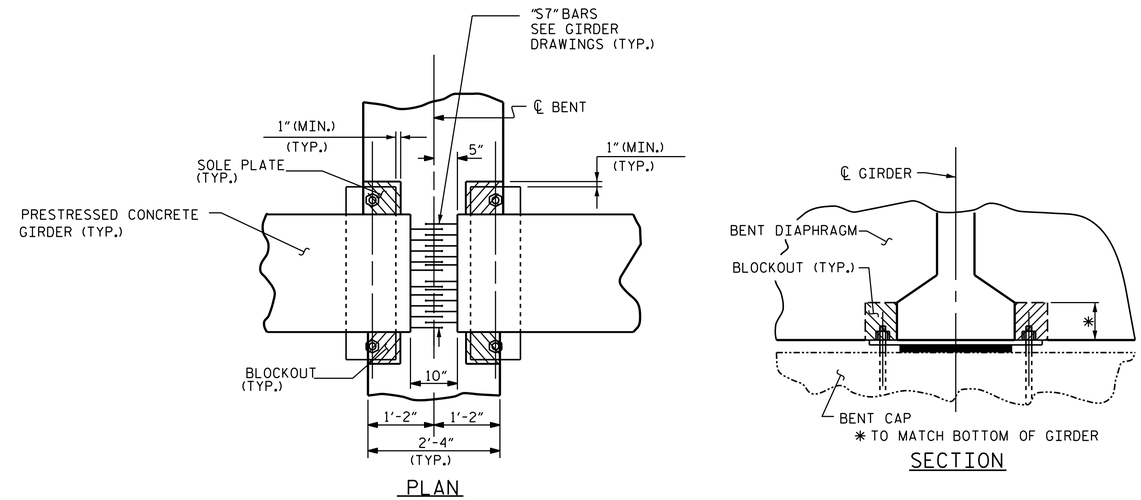


TYPICAL SECTION AT CONTINUOUS BENT DIAPHRAGM



BENT DIAPHRAGM BLOCKOUT DETAIL

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 3 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE TYPICAL SECTION

LEFT LANE

DocuSigned by: DB3C8E45B06D499...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

12/7/2018

DESIGN ENGINEER OF RECORD: DATE : 12/7/2018

DRAWN BY : R. J. FLORY DATE : 1/31/16

CHECKED BY : R. C. LARSON DATE : 2/15/16

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DWG. REF. NO. 9 OF 44

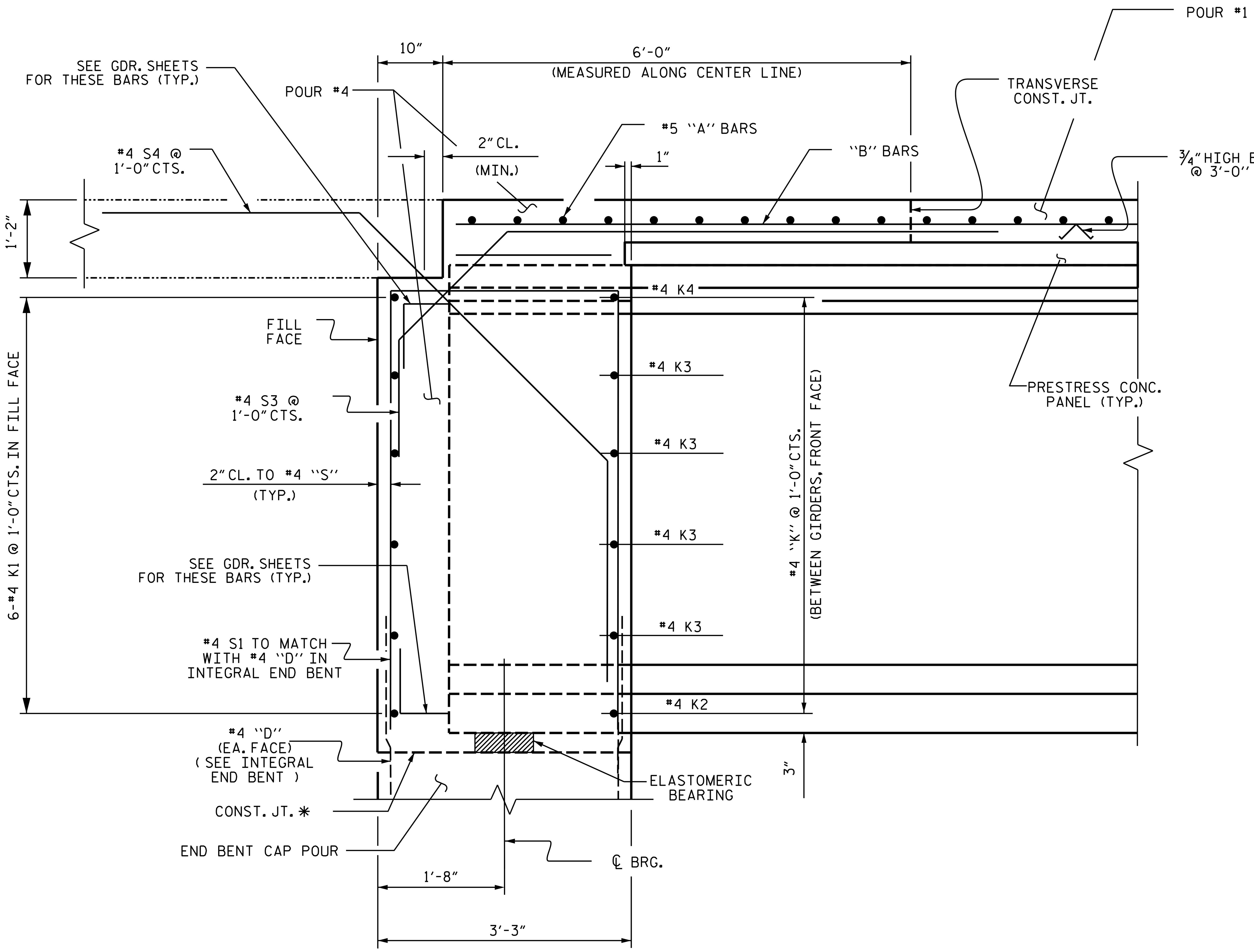
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

SHEET NO. S10-9

TOTAL SHEETS 44

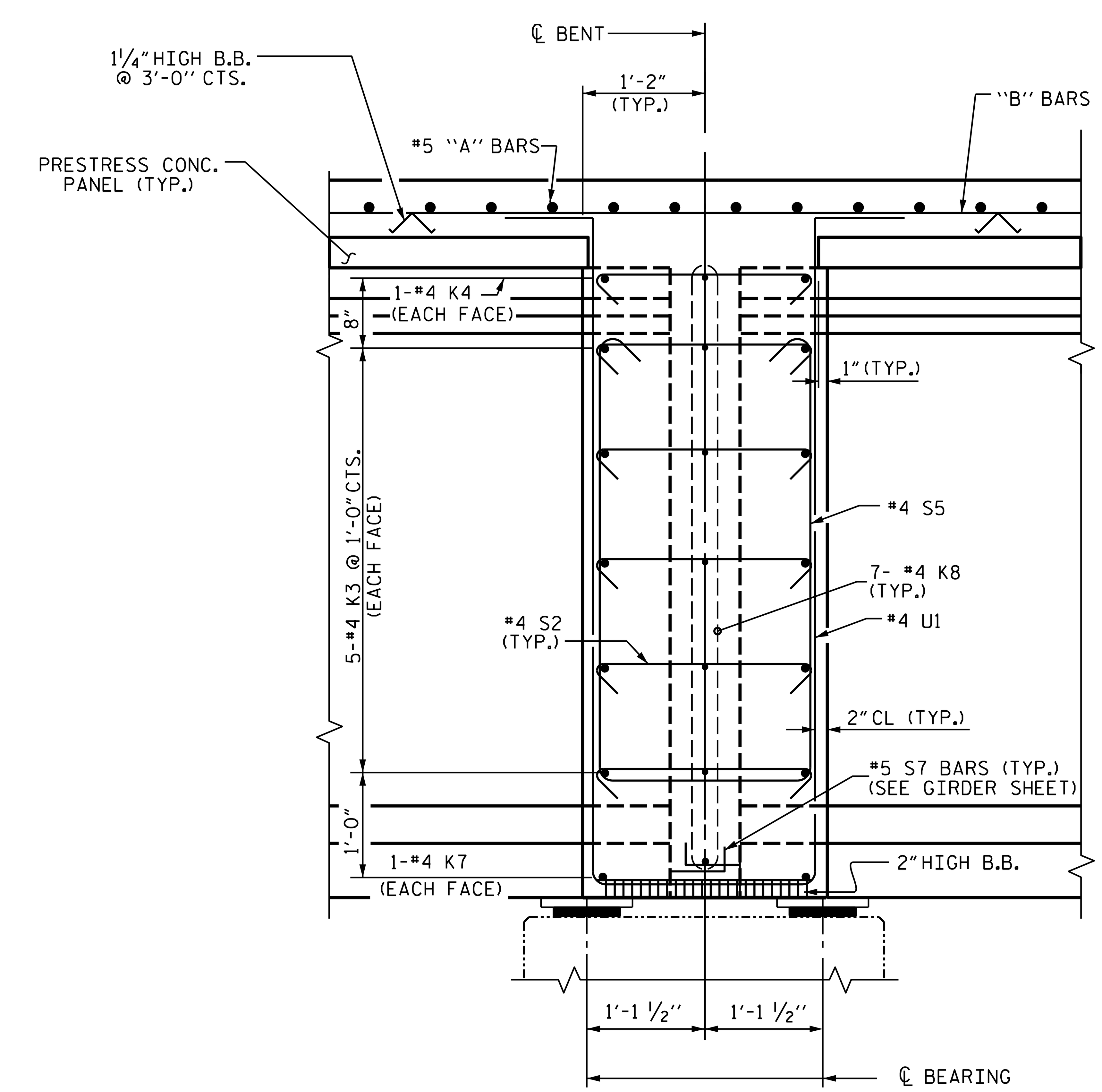
STR-#10

KCI JOB NO. 25146789.11



SECTION THRU INTEGRAL END BENT DIAPHRAGM

✱ THE TOP SURFACE OF THE END BENT CAP AND WINGS EXCLUDING THE BEARING AREA SHALL BE RAKED TO A DEPTH OF ¼"



SECTION THRU CONTINUOUS BENT DIAPHRAGM

(BENTS 2, 4 & 5)

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 4 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
TYPICAL SECTION

LEFT LANE

DocuSigned by:
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NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

6/8/2018

KCI Associates of North Carolina, P.A.

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NO.	BY:	DATE:	NO.	BY:	DATE:			S10-10
1			3					TOTAL SHEETS
2			4					44

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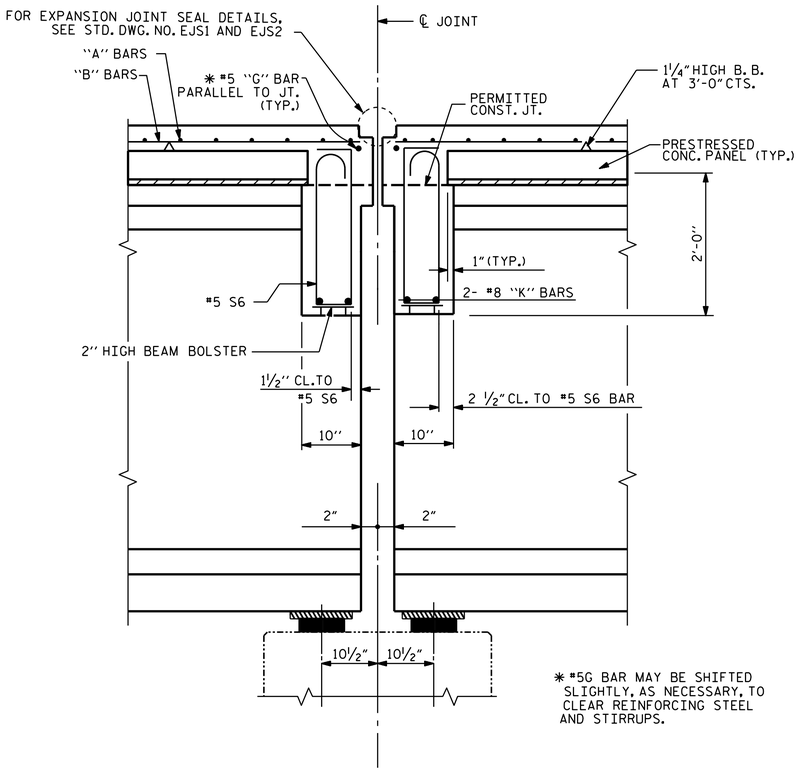
DESIGN ENGINEER OF RECORD: DATE : 6/8/2018
DRAWN BY : R. J. FLORY DATE : 01/29/16
CHECKED BY : R. C. LARSON DATE : 02/15/16

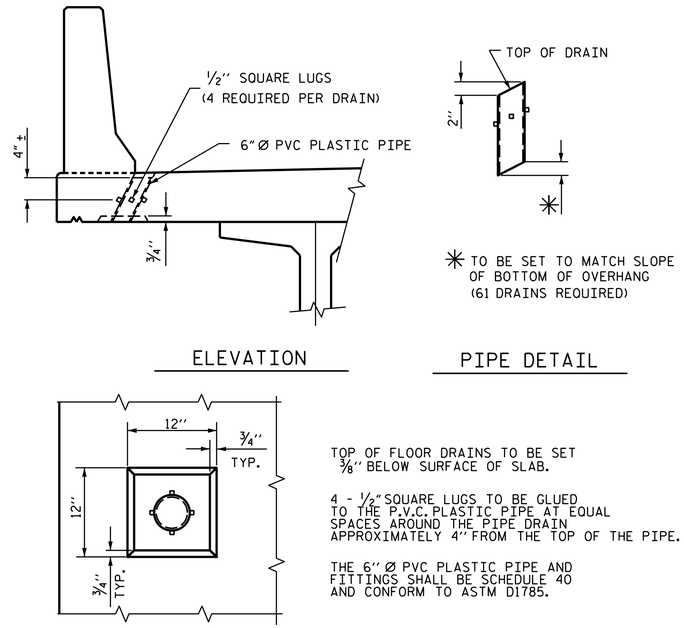
KCI JOB NO: 251467891.11



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

SECTION THRU END DIAPHRAGM

(BENT 1, 3 & 6)



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

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 5 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE TYPICAL SECTION

LEFT LANE

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

DocuSigned by: DB3C8E45B06D499...

6/8/2018

ENGINEERS ● PLANNERS ● ECOLOGISTS LICENSE NUMBER: C-0764
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DWG. REF. NO. 11 OF 44

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

SHEET NO. S10-11

TOTAL SHEETS 44

STR-#10

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DRAWN BY: R. J. FLORY DATE: 01/29/16

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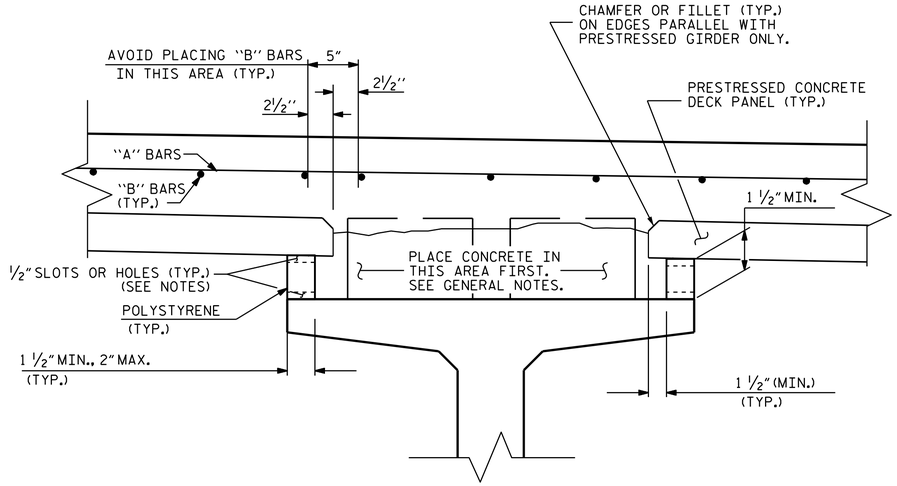
KCI JOB NO. 25146789.11

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. PRECAST PANELS SHALL BE DESIGNED FOR AN ALLOWABLE TENSILE STRESS OF 0 psi IN THE PRECOMPRESSED TENSILE ZONE UNDER ALL LOADING CONDITIONS.
10. PRESTRESSED CONCRETE PRECAST DECK PANELS SHALL CONTAIN CALCIUM NITRATE CORROSION INHIBITION

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

KCI JOB NO: 25146789.11

DESIGN ENGINEER OF RECORD: DocuSigned by: DB3C8E45306D499...	DATE : 6/8/2018	
ASSEMBLED BY : R. C. LARSON	DATE : 01/18/16	
CHECKED BY : K. SU	DATE : 04/24/17	
DRAWN BY : ELR 1/92	REV. 5/7/03R	RWW/JTE
CHECKED BY : GRP 4/92	REV. 5/1/06R	TLA/GM
	REV. 10/1/11	MAA/GM

DocuSigned by: DB3C8E45306D499...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

6/8/2018

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ENGINEERS ● PLANNERS ● ECOLOGISTS LICENSE NUMBER: C-0764

KCI Associates of North Carolina, P.A.

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DWG. REF. NO. 12 OF 44

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD

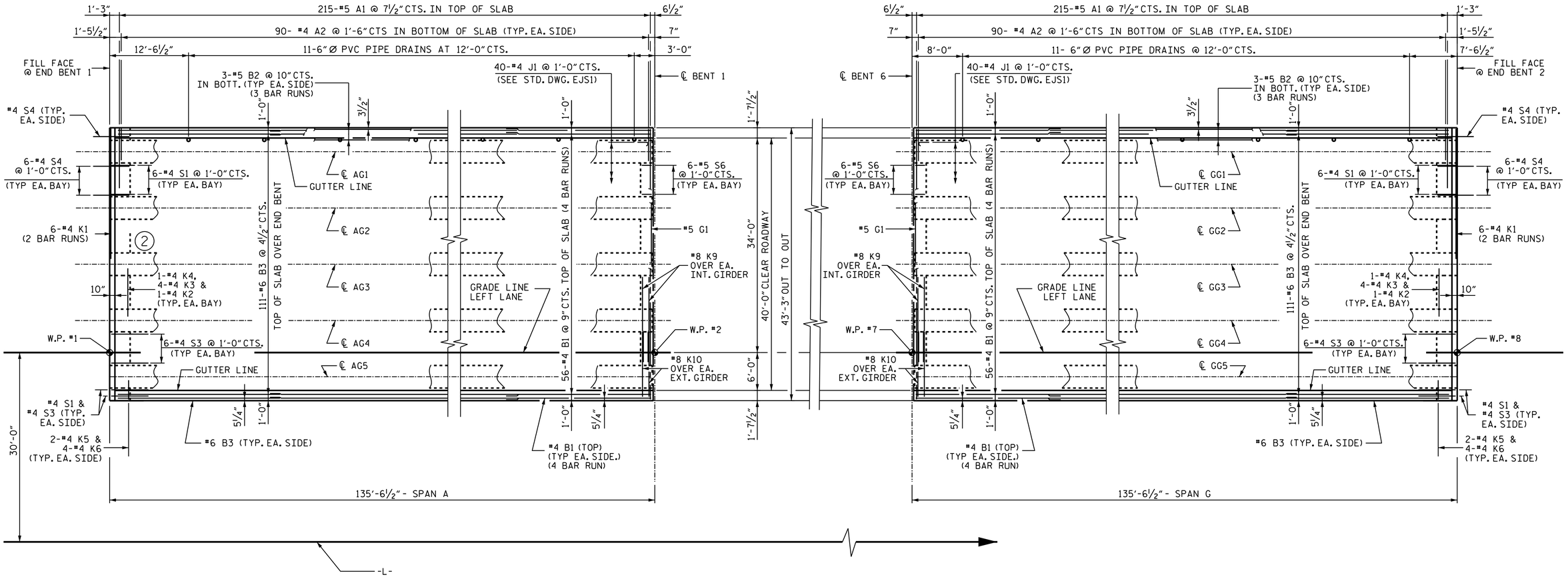
PRECAST PRESTRESSED CONCRETE DECK PANELS

LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S10-12
1			3			TOTAL SHEETS
2			4			44

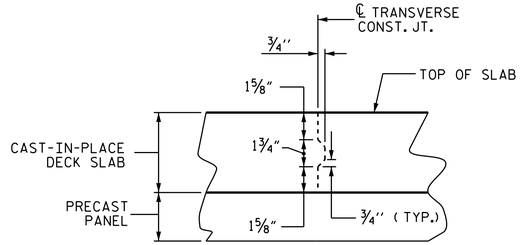
STR-#10

STD. NO. PDP1



PLAN - SPAN A

PLAN - SPAN G



TRANSVERSE CONSTRUCTION JOINT DETAIL

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

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 1 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE PLAN OF SPANS A & G

LEFT LANE

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NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

12/7/2018

DESIGN ENGINEER OF RECORD: DATE: 12/7/2018
DRAWN BY: R. C. LARSON DATE: 01/21/16
CHECKED BY: E. C. DECOLA DATE: 08/20/16

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DWG. REF. NO. 13 OF 44

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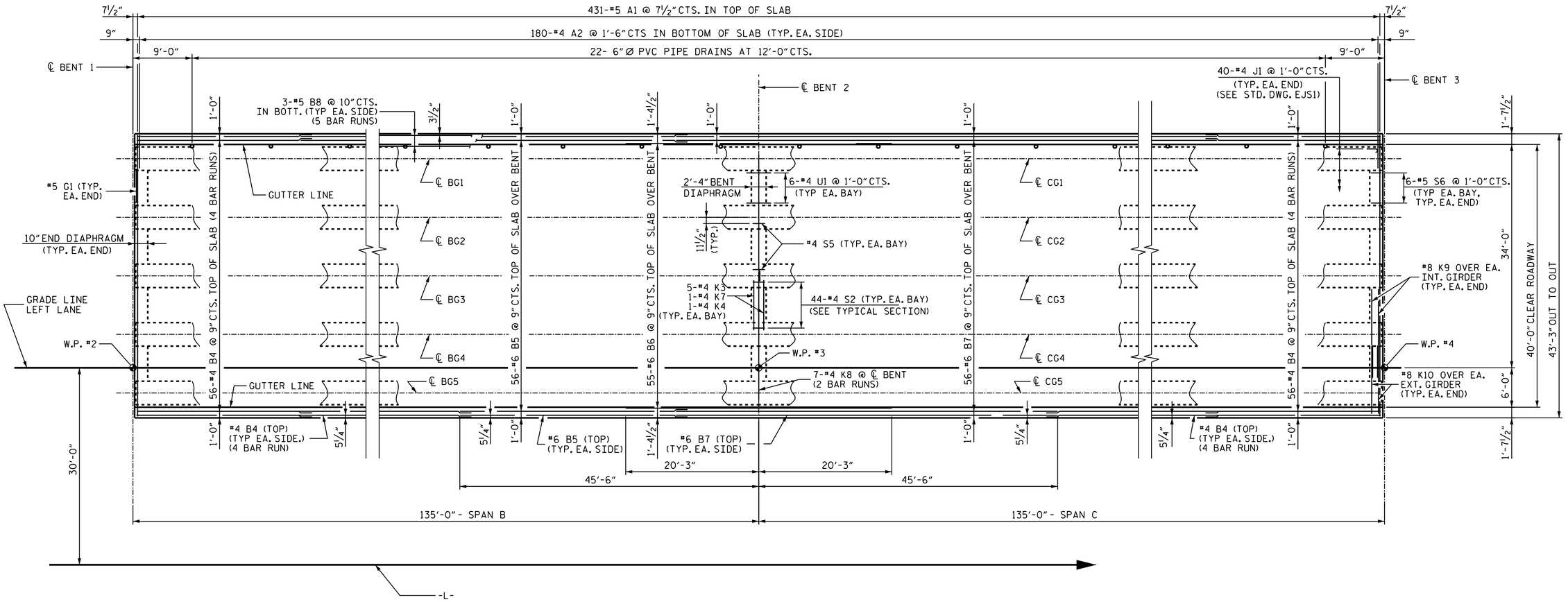

PLAN - SPANS B & C

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 2 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE PLAN OF SPANS B & C

LEFT LANE

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12/7/2018

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DWG. REF. NO. 14 OF 44

REVISIONS						SHEET NO.
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2			4			44

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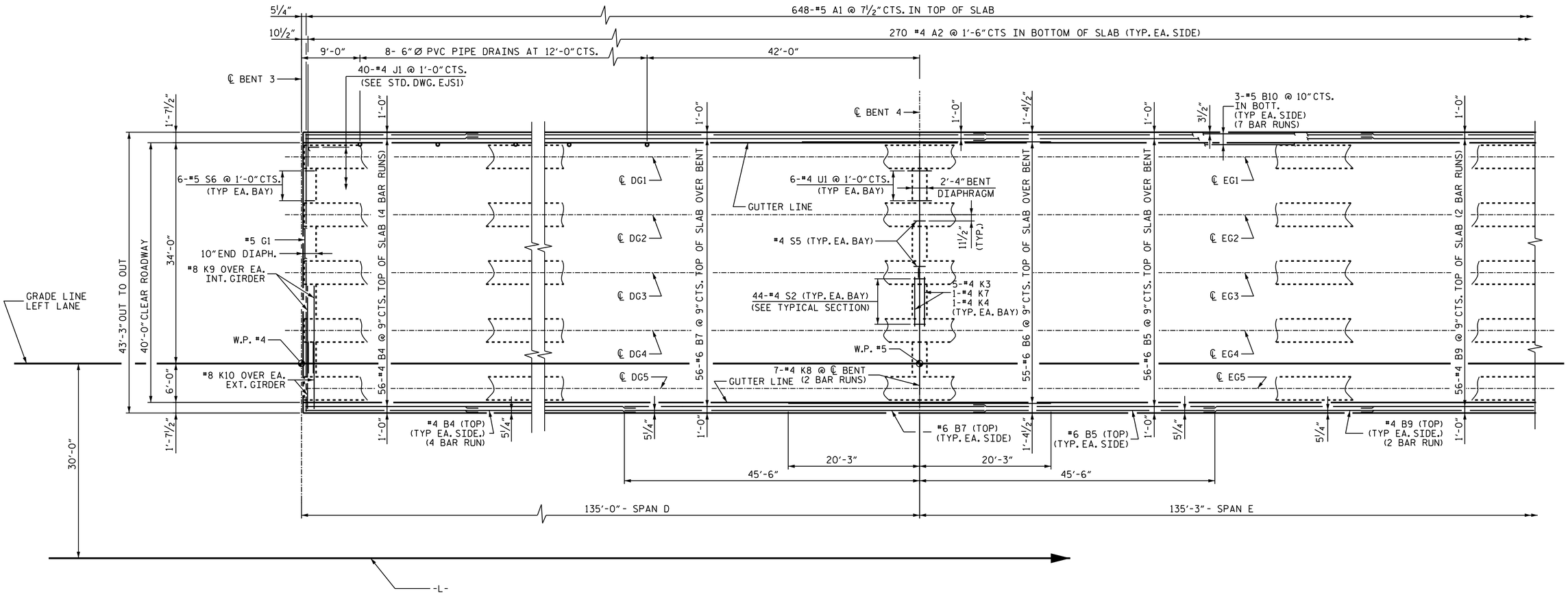

PLAN - SPANS D & E

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 3 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE PLAN OF SPANS D & E

LEFT LANE

DocuSigned by:
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NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON
12/7/2018

KCI JOB NO: 25146789.11

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DRAWN BY: R. C. LARSON DATE: 01/21/16

CHECKED BY: E. C. DECOLA DATE: 08/20/16

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DWG. REF. NO. 15 OF 44

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NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
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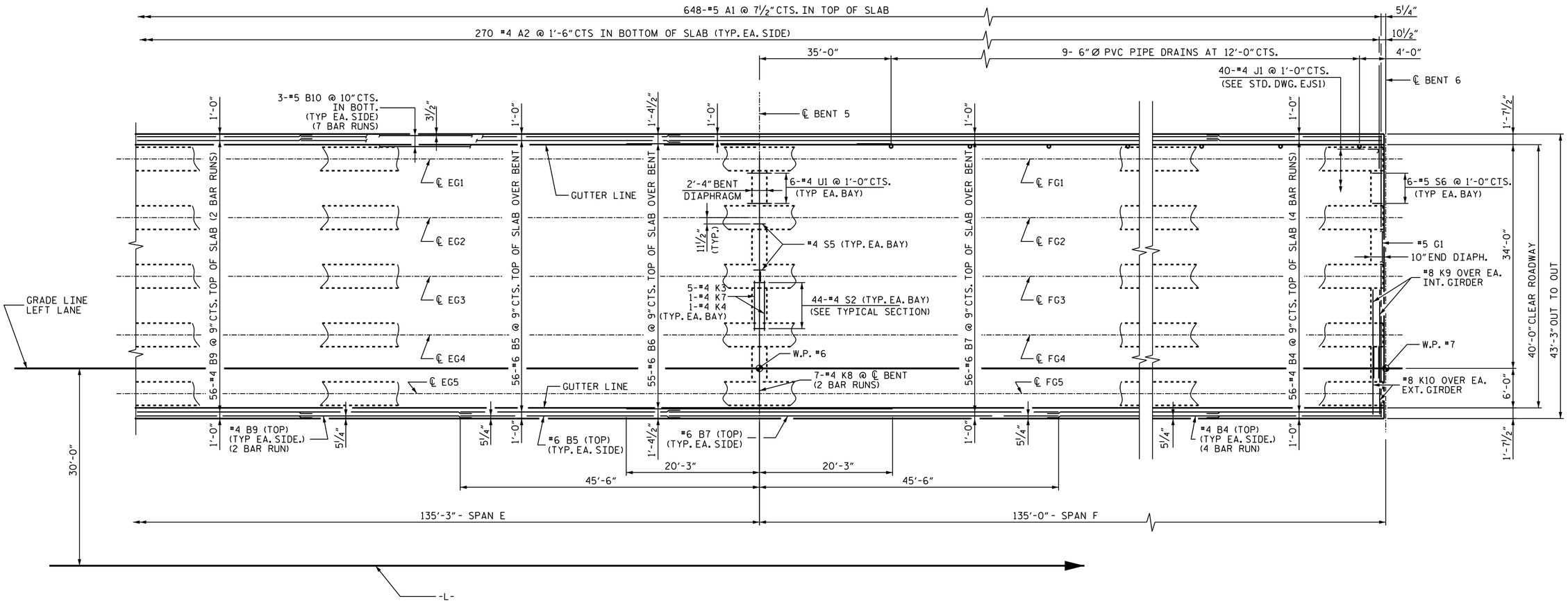
SHEET NO. S10-15

TOTAL SHEETS 44

STR-#10



PLAN - SPANS E & F

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 4 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE PLAN OF SPANS E & F

LEFT LANE

DocuSigned by:
DB3C8E45B06D4...
12/7/2018

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

KCI JOB NO: 251467891.11

DESIGN ENGINEER OF RECORD: DocuSigned by: DB3C8E45B06D4... DATE: 12/7/2018

DRAWN BY: R. C. LARSON DATE: 01/21/16

CHECKED BY: E. C. DECOLA DATE: 08/20/16

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S10-16
1			3			TOTAL SHEETS
2			4			44

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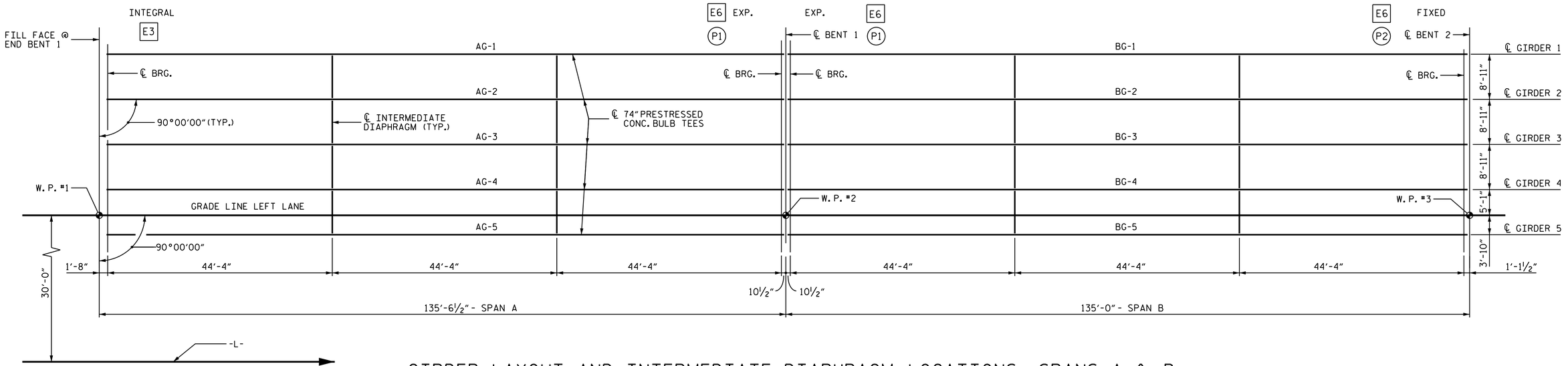
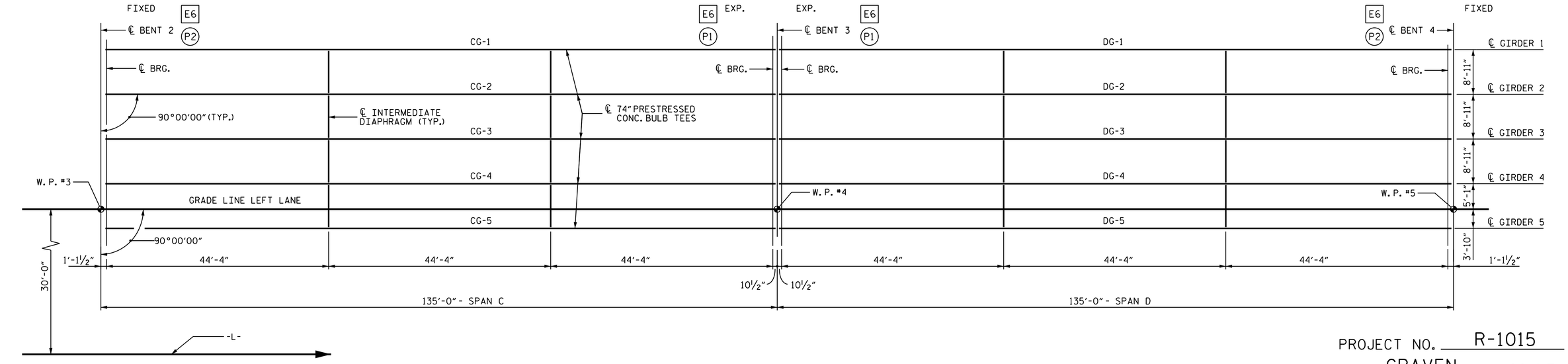


GIRDER LAYOUT AND INTERMEDIATE DIAPHRAGM LOCATIONS- SPANS A & B



GIRDER LAYOUT AND INTERMEDIATE DIAPHRAGM LOCATIONS- SPANS C & D

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 1 OF 2

NOTES

1. ELASTOMERIC BEARINGS INDICATED THUS:
   EN (N = NUMBER)
2. SOLE PLATES INDICATED THUS:
   PN (N = NUMBER)

(SEE BEARING SHEET FOR DETAILS)

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NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

6/8/2018

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE GIRDER LAYOUT SPANS A-D

LEFT LANE

DESIGN ENGINEER OF RECORD:	DATE: 6/8/2018
DRAWN BY: R. C. LARSON	DATE: 01/15/16
CHECKED BY: E. C. DECOLA	DATE: 08/31/16

ENGINEERS • PLANNERS • ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
SUITE 220, LANDMARK CENTER II 4601 SIX FORKS RD. RALEIGH, N.C. 27609-5260 (919) 783-9214

DWG. REF. NO. 17 OF 44

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

SHEET NO. S10-17

TOTAL SHEETS 44

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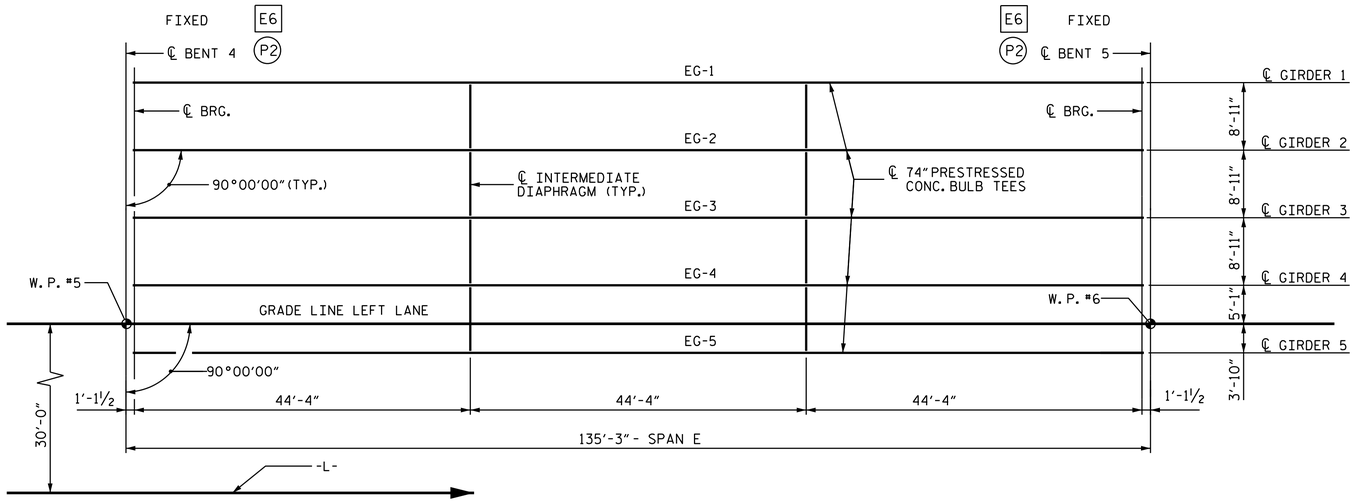
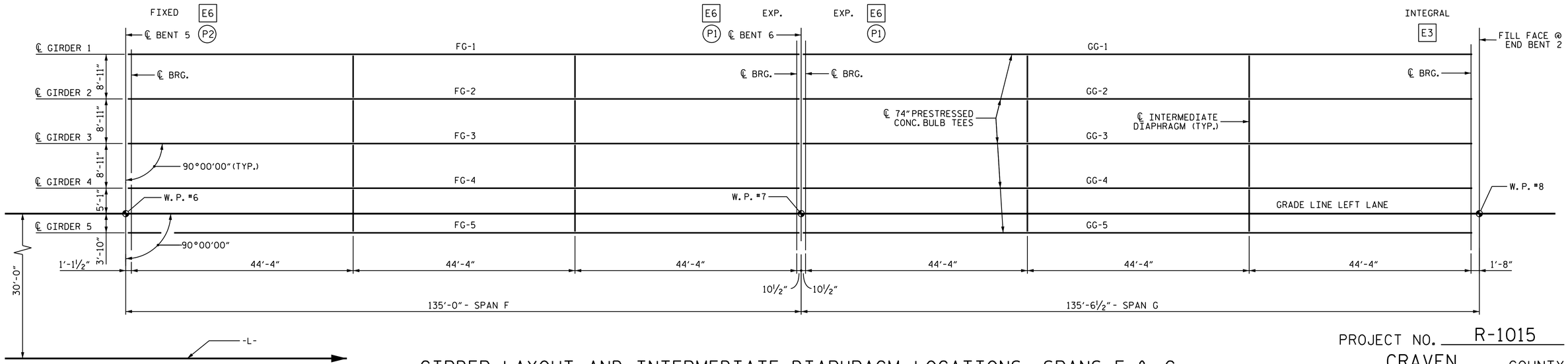
KCI JOB NO: 25146789.11

STR-#10



GIRDER LAYOUT AND INTERMEDIATE DIAPHRAGM LOCATIONS- SPAN E



GIRDER LAYOUT AND INTERMEDIATE DIAPHRAGM LOCATIONS- SPANS F & G

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 2 OF 2

NOTES

1. ELASTOMERIC BEARINGS INDICATED THUS:
   EN (N = NUMBER)
2. SOLE PLATES INDICATED THUS:
   PN (N = NUMBER)
   (SEE BEARING SHEET FOR DETAILS)

KCI JOB NO. 25146789.11

DESIGN ENGINEER OF RECORD: DocuSigned by: DATE: 6/8/2018
DB3C8E45B06D499...

DRAWN BY: R. C. LARSON DATE: 01/15/16

CHECKED BY: E. C. DECOLA DATE: 08/31/16

DocuSigned by:
DB3C8E45B06D499...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

6/8/2018

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ENGINEERS ◆ PLANNERS ◆ ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
SUITE 220, LANDMARK CENTER ◆ 4601 SIX FORKS RD, RALEIGH, N.C. 27609-5290 (919) 783-9214

DWG. REF. NO. 18 OF 44

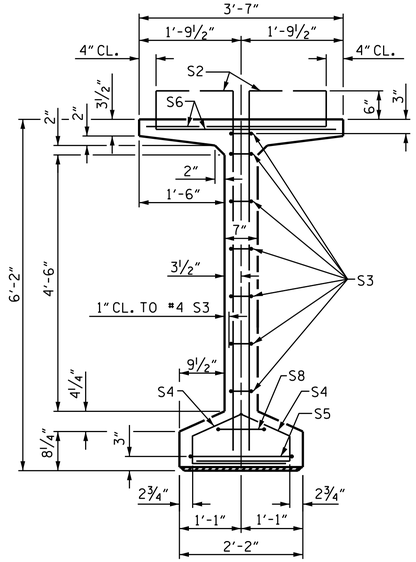
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE GIRDER LAYOUT SPANS E-G

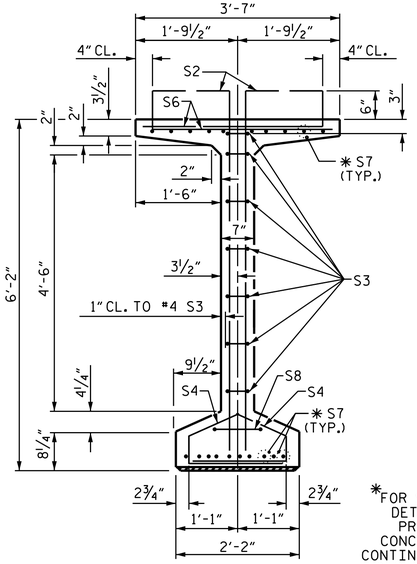
LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S10-18
1			3			TOTAL SHEETS
2			4			44

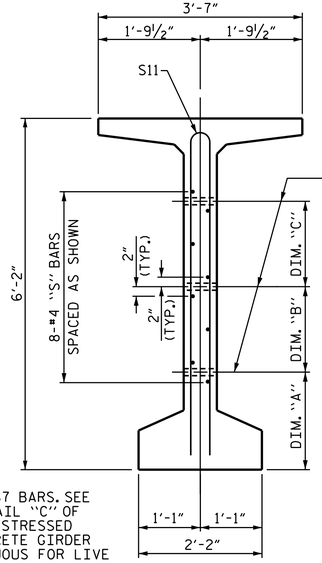
STR-#10



SECTION A-A



SECTION B-B



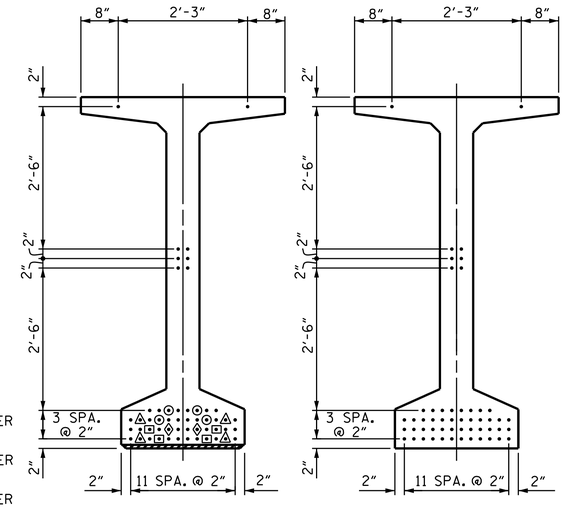
SECTION C-C

✱FOR S7 BARS. SEE DETAIL "C" OF PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS SHEET

(S1, S6 AND S9 BARS NOT SHOWN)

DEBONDING LEGEND

- ● FULLY BONDED STRANDS
- ▣ STRANDS DEBONDED FOR 4'-0" FROM END OF GIRDER
- ◬ STRANDS DEBONDED FOR 6'-0" FROM END OF GIRDER
- ⊙ STRANDS DEBONDED FOR 8'-0" FROM END OF GIRDER
- ◈ STRANDS DEBONDED FOR 14'-0" FROM END OF GIRDER



AT END OF GIRDER

AT ℄ OF GIRDER

0.6"Ø LOW RELAXATION STRAND LAYOUT

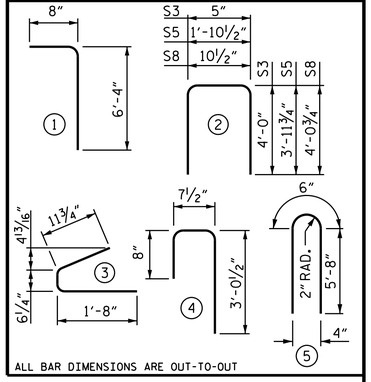
0.6"Ø L. R. GRADE 270 STRANDS		
AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

REINFORCING STEEL FOR ONE GDR

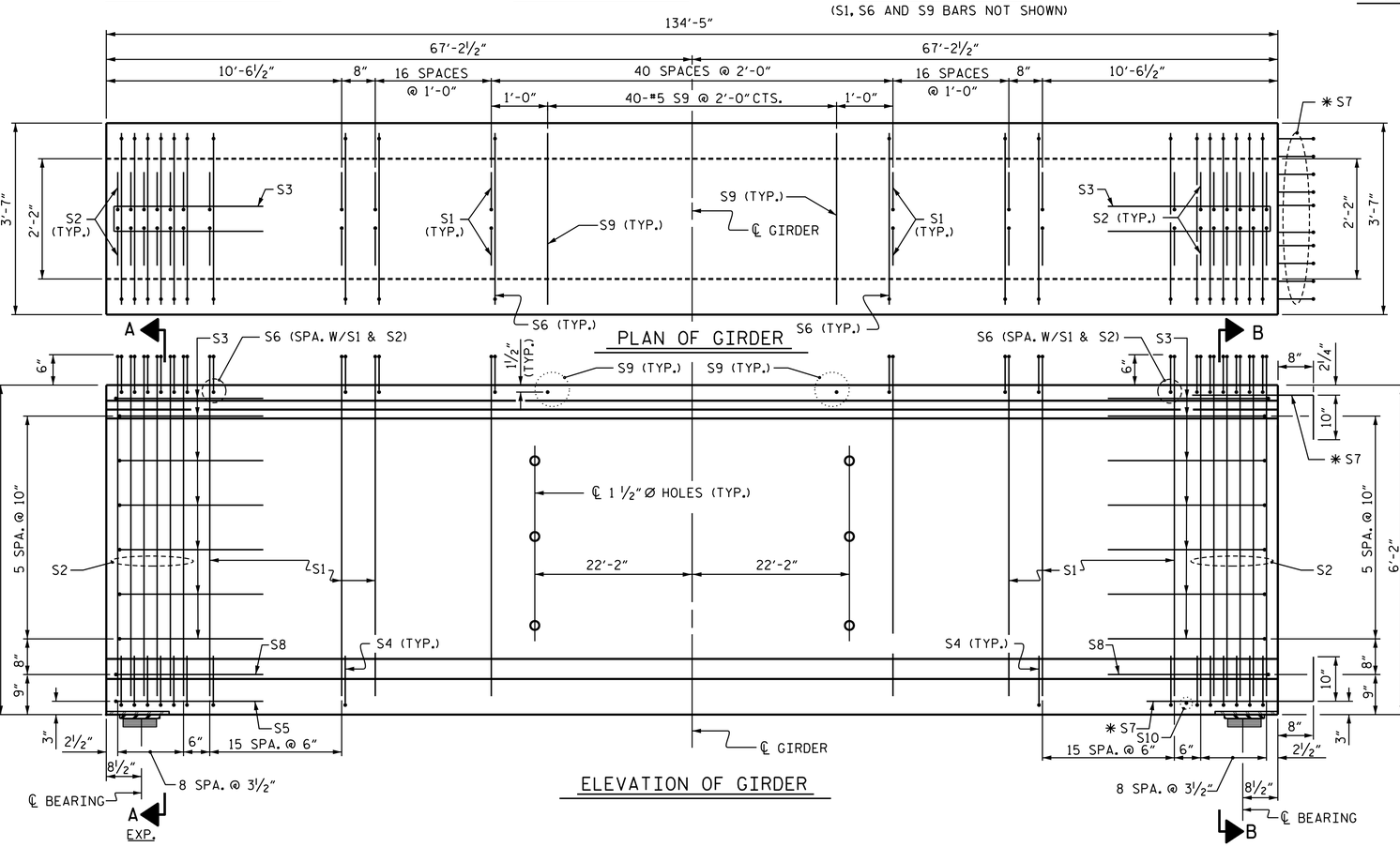
BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	210	#4	1	7'-0"	982
S2	36	#5	1	7'-0"	263
S3	14	#4	2	8'-5"	79
S4	100	#4	3	3'-2"	212
S5	1	#5	2	9'-10"	10
S6	246	#5	4	4'-4"	1112
✱ S7	20	#5	STR	3'-8"	76
S8	2	#5	2	9'-0"	19
S9	40	#5	STR	3'-3"	136
S10	1	#3	STR	1'-10"	1
S11	8	#5	5	11'-10"	99
S12	16	#4	STR	8'-0"	86

✱ NOTE: S7 BARS SHALL BE BENT BEFORE SHIPMENT. HEAT BENDING SHALL NOT BE ALLOWED.

BAR TYPES

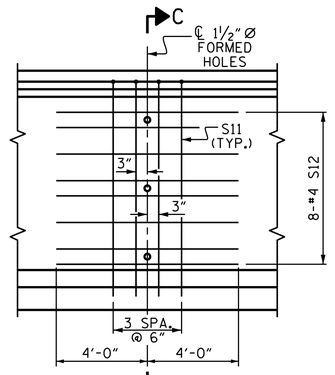


ALL BAR DIMENSIONS ARE OUT-TO-OUT



PLAN OF GIRDER

ELEVATION OF GIRDER



PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR ALL GIRDERS (FOR ALL EXTERIOR GIRDERS AND INTERIOR GIRDERS WITH 70° ≤ SKEW ≤ 110°)

QUANTITIES FOR ONE GIRDER

	REINFORCING STEEL	9500 PSI CONCRETE	0.6"Ø L.R. STRANDS
	LB.	C.Y.	No.
	3075	30.5	52

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
5 (SPAN A)	134'-5"	672'-1"
5 (SPAN G)	134'-5"	672'-1"

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 1 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

74" PRESTRESSED CONCRETE MODIFIED BULB TEE CONTINUOUS FOR LIVE LOAD SPAN A OR G

LEFT LANE

DocuSigned by: DB3C8E45B06D4... 6/8/2018

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

KCI JOB NO: 25146789.11

ASSEMBLED BY : R. C. LARSON	DATE : 5/9/18
CHECKED BY : R. A. PRUETT	DATE : 5/15/18
DRAWN BY : EEM 2/6/97	REV. 6/13 MAA/GM
CHECKED BY : VAP 2/6/97	REV. 1/15 MAA/TMG
	REV. 12/17 MAA/THC

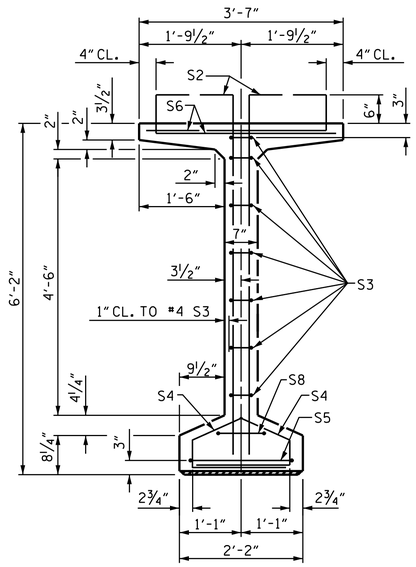
DESIGN ENGINEER OF RECORD: DocuSigned by: DATE : 6/8/2018

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

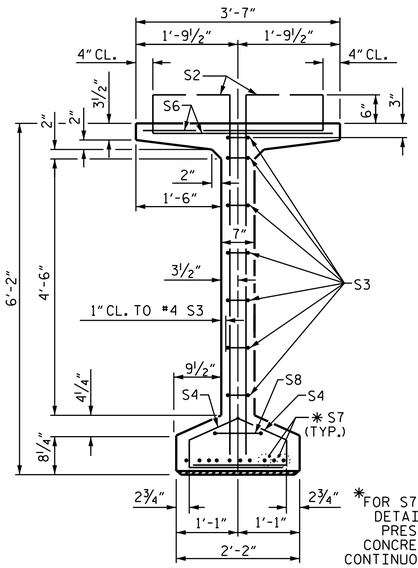
ENGINEERS ● PLANNERS ● ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
SUITE 220, LANDMARK CENTER II 4601 SIX FORKS RD, RALEIGH, N.C. 27609-5290 (919) 783-9214
DWG. REF. NO. 19 OF 44

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S10-19
1			3			TOTAL SHEETS
2			4			44

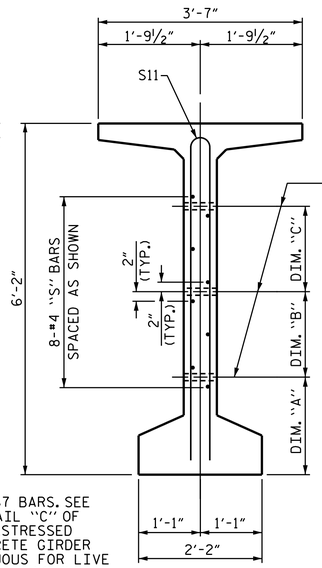
STR-#10



SECTION A-A



SECTION B-B

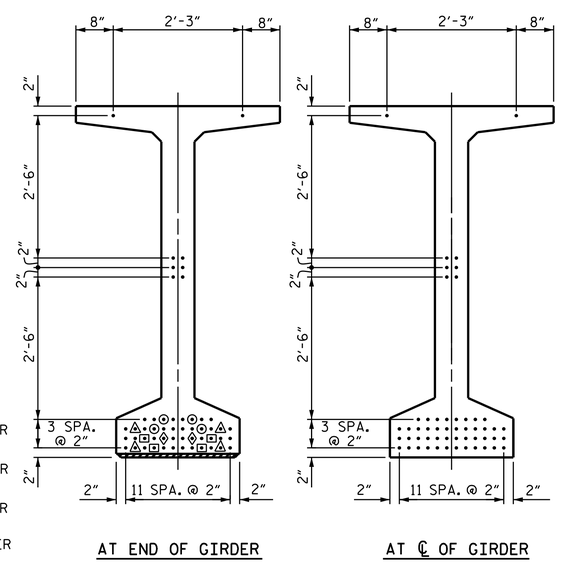


SECTION C-C

✱FOR S7 BARS. SEE DETAIL "C" OF PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS SHEET

DEBONDING LEGEND

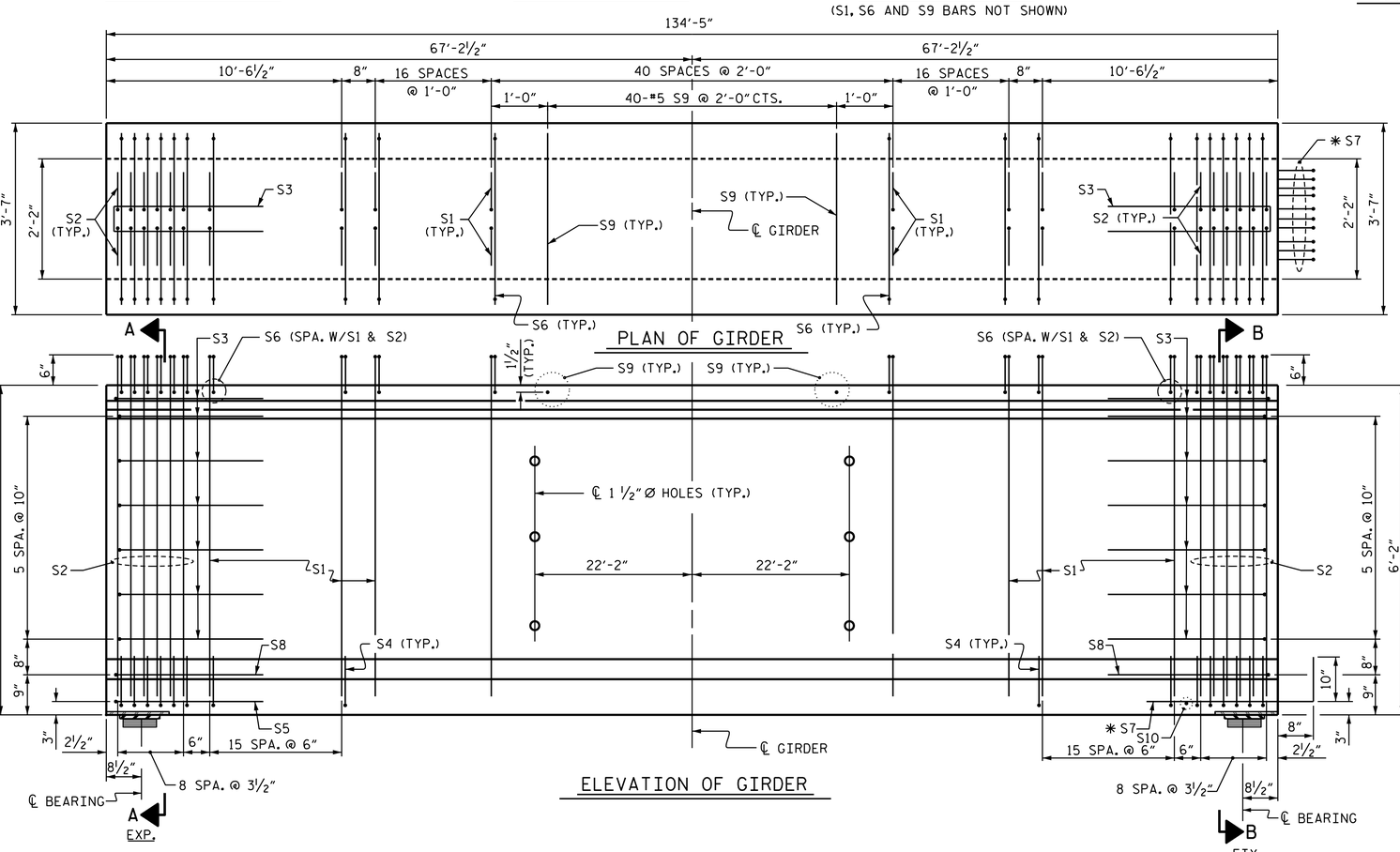
- FULLY BONDED STRANDS
- STRANDS DEBONDED FOR 4'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 6'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 8'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 14'-0" FROM END OF GIRDER



AT END OF GIRDER

AT ℄ OF GIRDER

0.6" Ø LOW RELAXATION STRAND LAYOUT



PLAN OF GIRDER

ELEVATION OF GIRDER

PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR ALL GIRDERS (FOR ALL EXTERIOR GIRDERS AND INTERIOR GIRDERS WITH 70° ≤ SKEW ≤ 110°)

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 GDR

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	210	#4	1	7'-0"	982
S2	36	#5	1	7'-0"	263
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S4	100	#4	3	3'-2"	212
S5	1	#5	2	9'-10"	10
S6	246	#5	4	4'-4"	1112
✱ S7	10	#5	STR	3'-8"	38
S8	2	#5	2	9'-0"	19
S9	40	#5	STR	3'-3"	136
S10	1	#3	STR	1'-10"	1
S11	8	#5	5	11'-10"	99
S12	16	#4	STR	8'-0"	86

✱ NOTE: S7 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	9500 PSI CONCRETE	0.6" Ø L.R. STRANDS
	LB.	C.Y.	No.
	3037	30.5	52

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
5 (SPAN B)	134'-5"	672'-1"
5 (SPAN C)	134'-5"	672'-1"
5 (SPAN D)	134'-5"	672'-1"
5 (SPAN F)	134'-5"	672'-1"

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 2 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

74" PRESTRESSED CONCRETE MODIFIED BULB TEE CONTINUOUS FOR LIVE LOAD SPAN B, C, D, OR F

LEFT LANE

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

DocuSigned by: DB3C8E45B06D4...

6/8/2018

ASSEMBLED BY : R. C. LARSON	DATE : 5/9/18
CHECKED BY : R. A. PRUETT	DATE : 5/15/18
DRAWN BY : EEM 2/6/97	REV. 6/13 MAA/GM
CHECKED BY : VAP 2/6/97	REV. 1/15 MAA/TMG
	REV. 12/17 MAA/THC

DESIGN ENGINEER OF RECORD: DocuSigned by: DATE : 6/8/2018

DB3C8E45B06D4...

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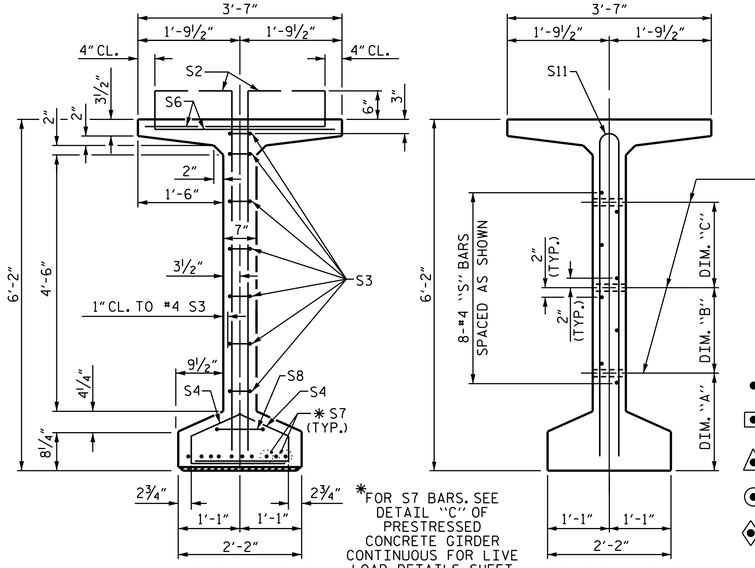
ENGINEERS ● PLANNERS ● ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
SUITE 220, LANDMARK CENTER II 4601 SIX FORKS RD, RALEIGH, N.C. 27609-5290 (919) 783-9214
DWG. REF. NO. 20 OF 44

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S10-20
1			3			TOTAL SHEETS
2			4			44

STR-#10

KCI JOB NO: 25146789.11



✱FOR S7 BARS. SEE DETAIL "C" OF PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS SHEET

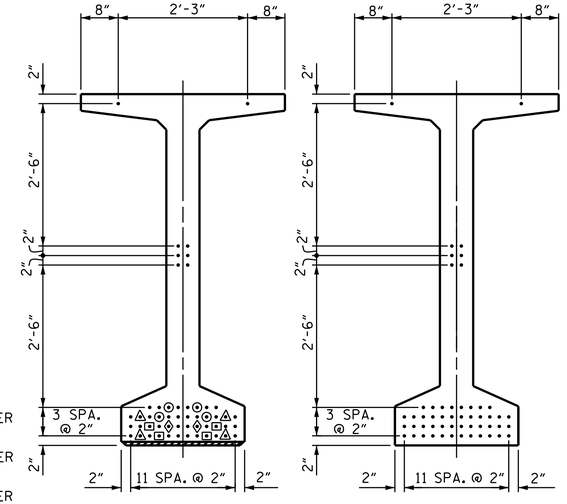
SECTION B-B

SECTION C-C

(S1, S6 AND S9 BARS NOT SHOWN)

DEBONDING LEGEND

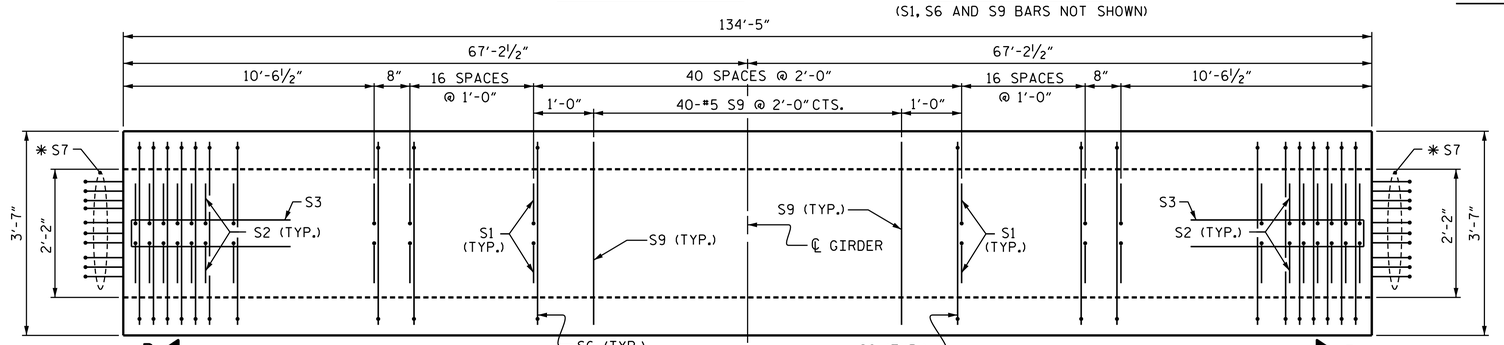
- FULLY BONDED STRANDS
- STRANDS DEBONDED FOR 4'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 6'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 8'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 14'-0" FROM END OF GIRDER



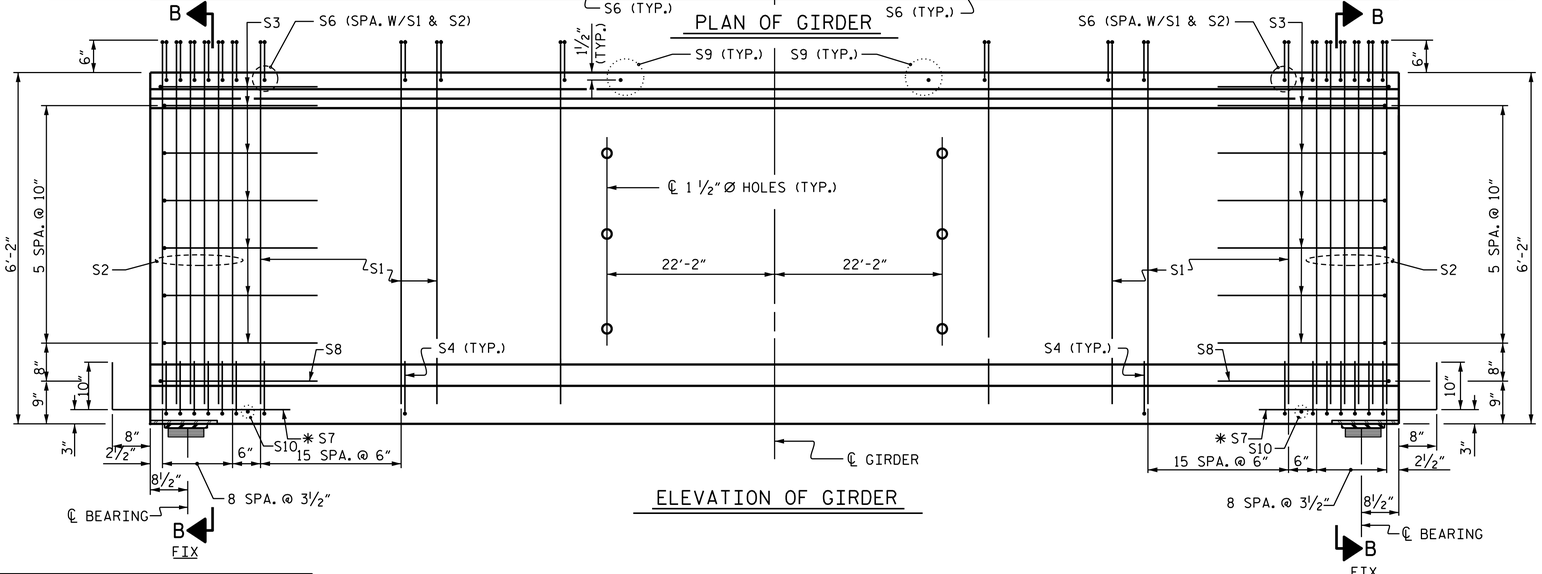
AT END OF GIRDER

AT ℄ OF GIRDER

0.6" Ø LOW RELAXATION STRAND LAYOUT



PLAN OF GIRDER



ELEVATION OF GIRDER

PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR ALL GIRDERS (FOR ALL EXTERIOR GIRDERS AND INTERIOR GIRDERS WITH 70° ≤ SKEW ≤ 110°)

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REINFORCING STEEL FOR ONE GDR

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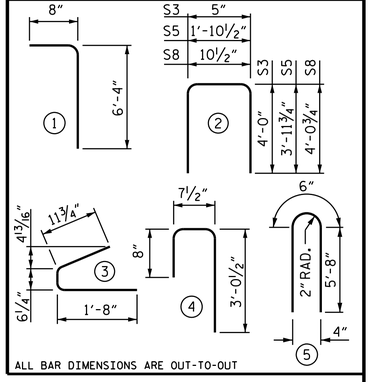
S9	40	#5	STR	3'-3"	136
S10	2	#3	STR	1'-10"	1
S11	8	#5	5	11'-10"	99
S12	16	#4	STR	8'-0"	86

✱ NOTE: S7 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	9500 PSI CONCRETE	0.6" Ø L.R. STRANDS
	LB.	C.Y.	No.
	3065	30.5	52

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
5 (SPAN E)	134'-5"	672'-1"

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 3 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

74" PRESTRESSED CONCRETE MODIFIED BULB TEE CONTINUOUS FOR LIVE LOAD SPAN E

LEFT LANE

DocuSigned by: DB3C8E45B06D499...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

6/8/2018

ASSEMBLED BY : R. C. LARSON	DATE : 5/9/18
CHECKED BY : R. A. PRUETT	DATE : 5/15/18
DRAWN BY : EEM 2/6/97	REV. 6/13 MAA/GM
CHECKED BY : VAP 2/6/97	REV. 1/15 MAA/TMG
	REV. 12/17 MAA/THC

DESIGN ENGINEER OF RECORD: DocuSigned by: DB3C8E45B06D499... DATE : 6/8/2018

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DWG. REF. NO. 21 OF 44

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

SHEET NO. S10-21

TOTAL SHEETS 44

STR-#10

KCI JOB NO: 25146789.11

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

.6" Ø LOW RELAXATION	SPANS A - G INTERIOR GIRDERS																				
TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	1.00
CAMBER (GIRDER ALONE IN PLACE)	0	0.052↑	0.103↑	0.150↑	0.194↑	0.233↑	0.266↑	0.292↑	0.311↑	0.323↑	0.327↑	0.323↑	0.311↑	0.292↑	0.266↑	0.233↑	0.194↑	0.150↑	0.103↑	0.052↑	0
* DEFLECTION DUE TO SUPERIMPOSED D.L.	0	0.035↓	0.066↓	0.101↓	0.129↓	0.157↓	0.178↓	0.197↓	0.210↓	0.218↓	0.220↓	0.218↓	0.210↓	0.197↓	0.178↓	0.157↓	0.129↓	0.101↓	0.066↓	0.035↓	0
FINAL CAMBER	0	3/16" ↑	7/16" ↑	9/16" ↑	3/4" ↑	15/16" ↑	1 1/16" ↑	1 1/8" ↑	1 3/16" ↑	1 1/4" ↑	1 1/4" ↑	1 1/4" ↑	1 3/16" ↑	1 1/8" ↑	1 1/16" ↑	15/16 ↑	3/4" ↑	9/16" ↑	7/16" ↑	3/16" ↑	0

.6" Ø LOW RELAXATION	SPANS A - G EXTERIOR GIRDERS																				
TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	1.00
CAMBER (GIRDER ALONE IN PLACE)	0	0.052↑	0.103↑	0.150↑	0.194↑	0.233↑	0.266↑	0.292↑	0.311↑	0.323↑	0.327↑	0.323↑	0.311↑	0.292↑	0.266↑	0.233↑	0.194↑	0.150↑	0.103↑	0.052↑	0
* DEFLECTION DUE TO SUPERIMPOSED D.L.	0	0.033↓	0.063↓	0.096↓	0.123↓	0.149↓	0.170↓	0.187↓	0.199↓	0.207↓	0.210↓	0.207↓	0.199↓	0.187↓	0.170↓	0.149↓	0.123↓	0.096↓	0.063↓	0.033↓	0
FINAL CAMBER	0	1/4" ↑	1/2" ↑	5/8" ↑	7/8" ↑	1" ↑	1 3/16" ↑	1 1/4" ↑	1 5/16" ↑	1 3/8" ↑	1 7/16" ↑	1 3/8" ↑	1 5/16" ↑	1 1/4" ↑	1 3/16" ↑	1" ↑	7/8" ↑	5/8" ↑	1/2" ↑	1/4" ↑	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.

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 7800 PSI.

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

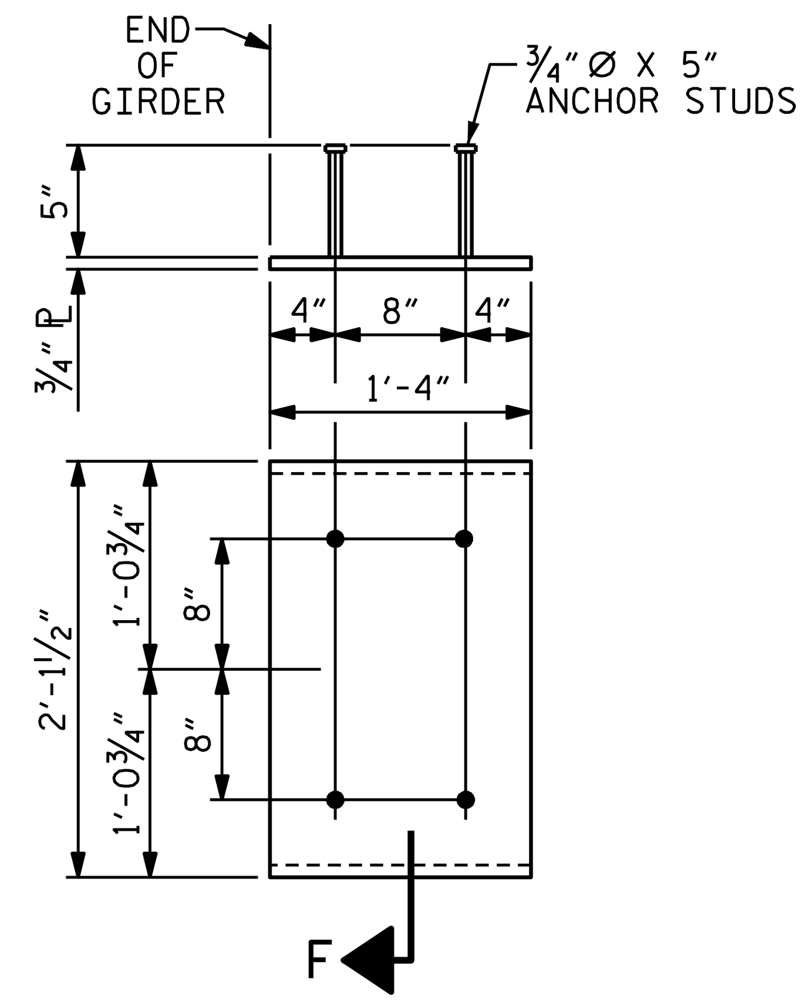
THE TOP SURFACE OF THE GIRDER, EXCLUDING THE OUTSIDE 4", SHALL BE RAKED TO A DEPTH OF 1/4".

A 2" X 2" CHAMFER IS ALLOWED AT THE INTERSECTION OF THE WEB AND THE BOTTOM FLANGE OF THE 74" MODIFIED BULB TEES ONLY.

THE CONTRACTOR HAS THE OPTION TO PROVIDE, AT NO ADDITIONAL COST TO THE DEPARTMENT, 2 ADDITIONAL STRANDS AT THE TOP OF THE GIRDER TO FACILITATE TYING OF THE REINFORCING STEEL. THESE STRANDS SHALL BE PULLED TO A LOAD OF 4500 LBS.

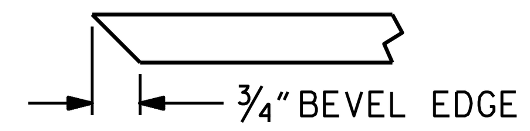
PRESTRESSED CONCRETE GIRDERS ARE DESIGNED FOR AN ALLOWABLE TENSILE STRESS OF 0 PSI IN THE PRECOMPRESSED TENSILE ZONE UNDER ALL LOADING CONDITIONS.

PRESTRESSED CONCRETE GIRDERS SHALL CONTAIN CALCIUM NITRITE CORROSION INHIBITOR.



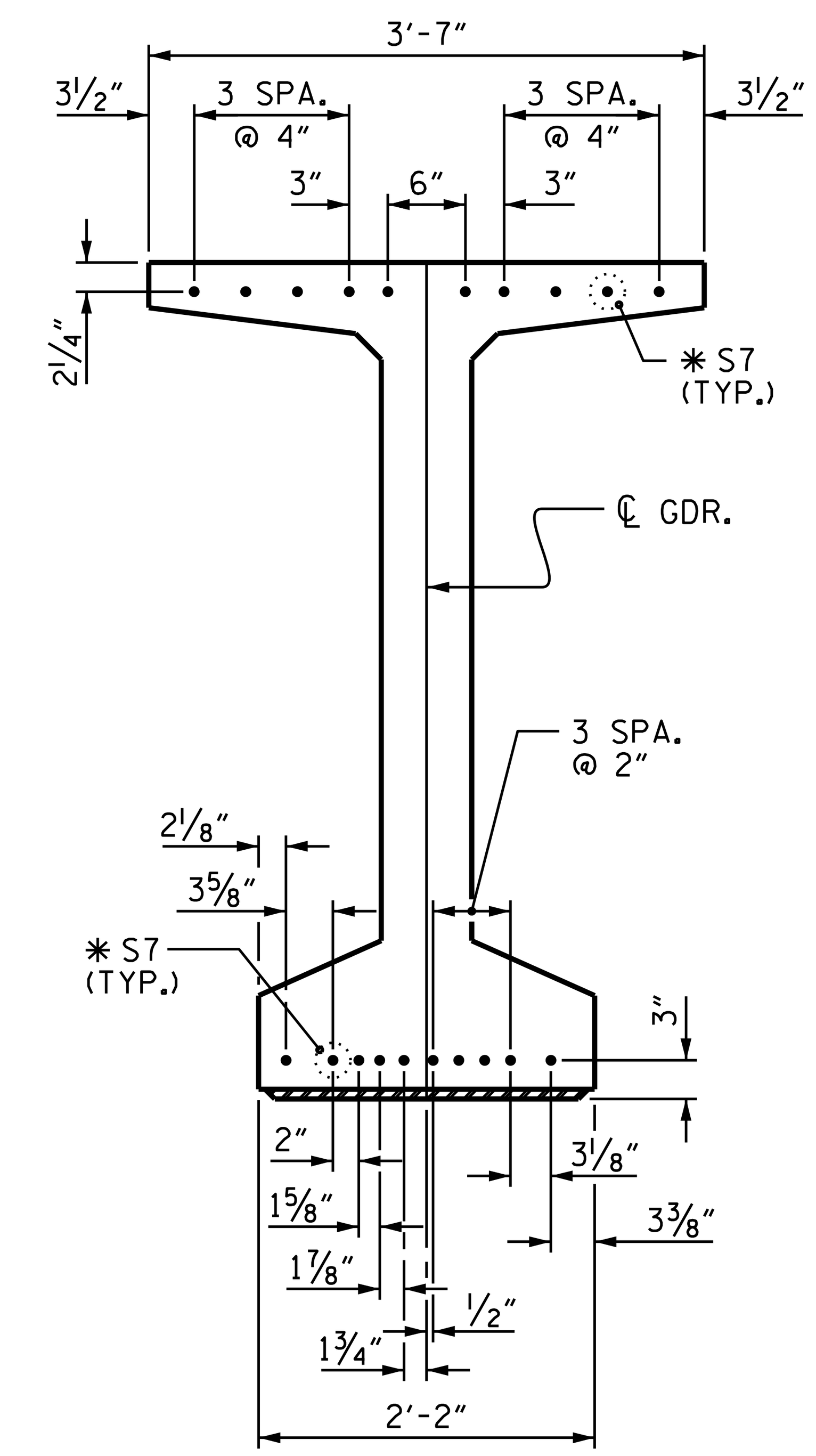
EMBEDDED PLATE "B-1" DETAILS FOR AASHTO TYPE IV GIRDER AND 74" MODIFIED BULB TEES

(2 REQ'D PER GIRDER)



SECTION "F"

(SEE NOTES)



DETAIL "C"

(FOR 74" MODIFIED BULB TEES)

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 4 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS

LEFT LANE

DocuSigned by:
DB3C8E45B06D4...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

12/7/2018

KCI Associates of North Carolina, P.A.

DWG. REF. NO. 22 OF 44

REVISIONS								SHEET NO.
NO.	BY:	DATE:		NO.	BY:	DATE:		S10-22
1				3				TOTAL SHEETS
2				4				44

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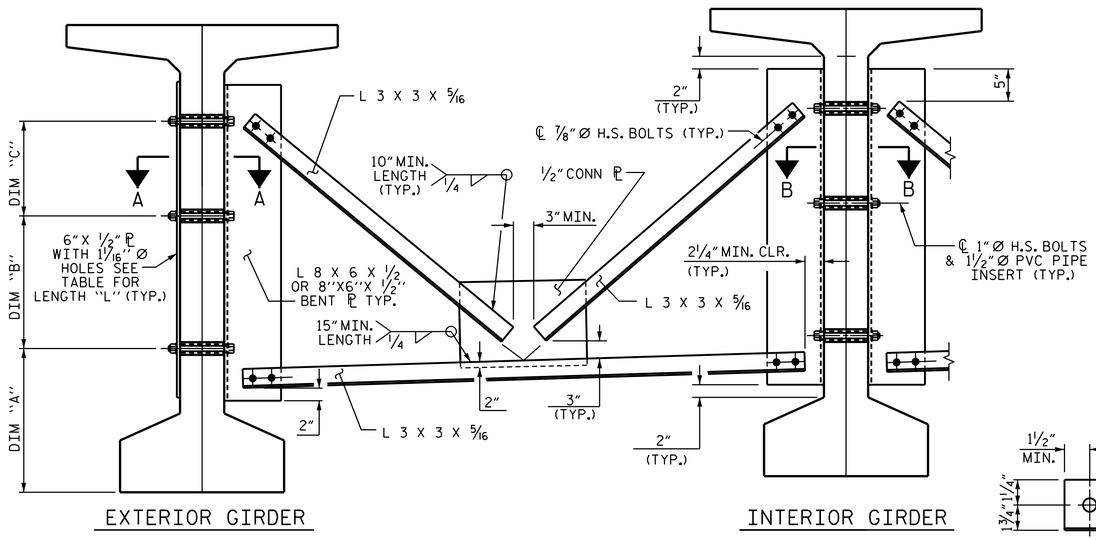
DESIGN ENGINEER OF RECORD:	DATE: 12/7/2018
ASSEMBLED BY: R. C. LARSON	DATE: 02/23/16
CHECKED BY: K. SU	DATE: 04/26/17
DRAWN BY: ELR 11/91	REV. 10/1/11 MAA/GM
CHECKED BY: GRP 11/91	REV. 1/15 MAA/TMG
	REV. 2/15 MAA/TMG

KCI JOB NO: 25146789.11

STR-#10

STD. NO. PCG9 (Sht. 4a)

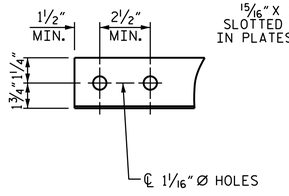


EXTERIOR GIRDER

INTERIOR GIRDER

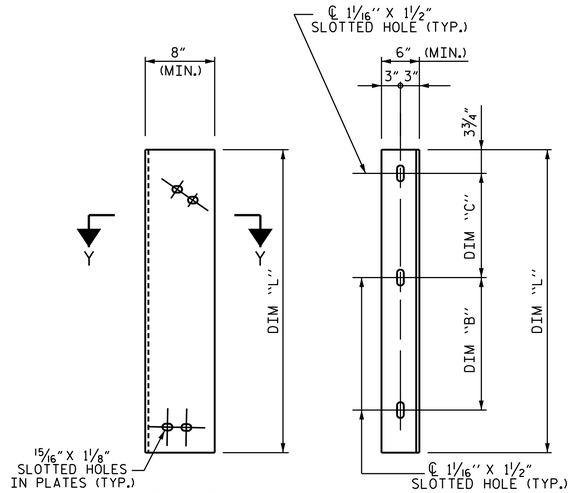
PART SECTION AT INTERMEDIATE DIAPHRAGM

(74" BULB TEE GIRDER SHOWN)



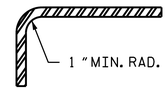
ANGLE END

(L 3 X 3 X 5/16)



DIAPHRAGM FACE

WEB FACE



SECTION Y-Y

CONNECTOR PLATE DETAIL

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 ANGLE 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 1/4 TURN.

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

FOR METALLIZATION, APPLY A THERMAL SPRAYED COATING WITH A SEAL COAT TO ALL STEEL DIAPHRAGM SURFACES IN ACCORDANCE WITH THE DEPARTMENT'S THERMAL SPRAYED COATINGS (METALLIZATION) PROGRAM. THERMAL SPRAYED COATING 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 1/4" PROJECTION BEYOND THE NUT.

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

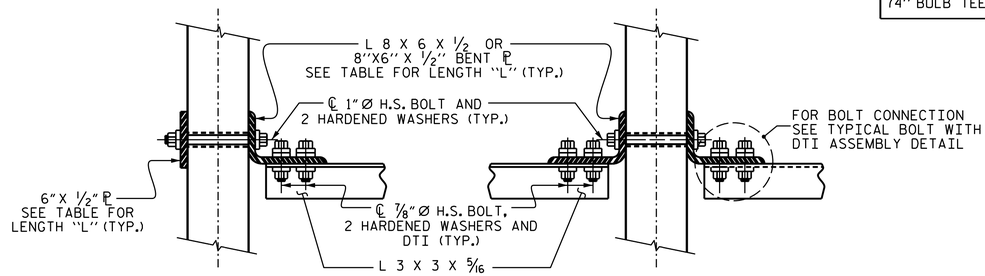
SUBMIT TWO SETS OF WORKING DRAWINGS FOR THE INTERMEDIATE DIAPHRAGM ASSEMBLY FOR REVIEW, COMMENTS AND ACCEPTANCE. AFTER REVIEW, COMMENTS, AND ACCEPTANCE, SUBMIT SEVEN SETS FOR DISTRIBUTION.

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

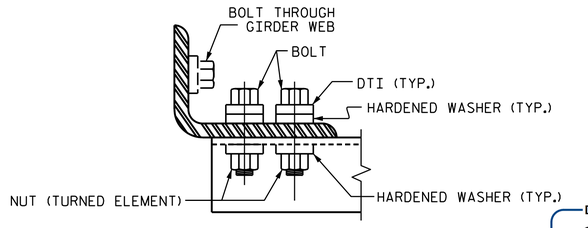
GIRDER TYPE	DIM "A"	DIM "B"	DIM "C"	DIM "L"
74" BULB TEE	1'-10"	1'-10"	1'-4 3/4"	4'-2"



SECTION A-A

SECTION B-B

CONNECTION DETAILS



BOLT WITH DTI ASSEMBLY DETAIL

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 5 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

INTERMEDIATE STEEL DIAPHRAGMS FOR MODIFIED BULB TEE PRESTRESSED CONCRETE GIRDERS

LEFT LANE

DocuSigned by: DB3C8E45B06D490...
6/8/2018

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

DESIGN ENGINEER OF RECORD: DocuSigned by: DATE : 6/8/2018

ASSEMBLED BY : R. C. LARSON DATE : 3/31/16
CHECKED BY : K. SU DATE : 04/04/17

DRAWN BY : RWW 11/09
CHECKED BY : GM 11/09

ADDED 11/23/09R
REV. 10/1/11 MAA/GM

KCI JOB NO: 251467891.11

ENGINEERS ● PLANNERS ● ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
SUITE 220, LANDMARK CENTER II 4601 SIX FORKS RD. RALEIGH, N.C. 27609-5210 (919) 783-9214

DWG. REF. NO. 23 OF 44

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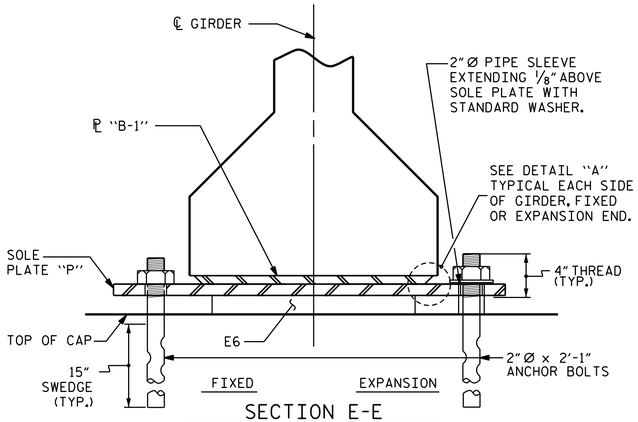
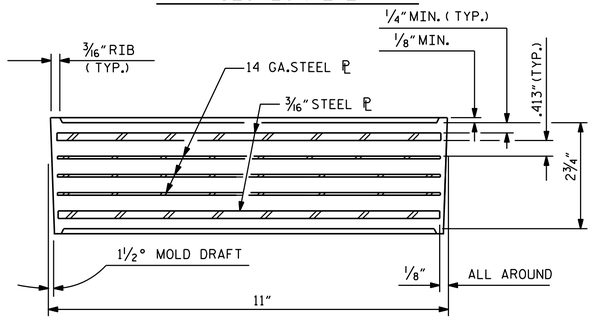
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S10-23
1			3			TOTAL SHEETS
2			4			44

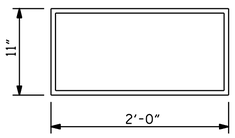
STR-#10 STD. NO. PCG11 (SHT 3)



SECTION E-E



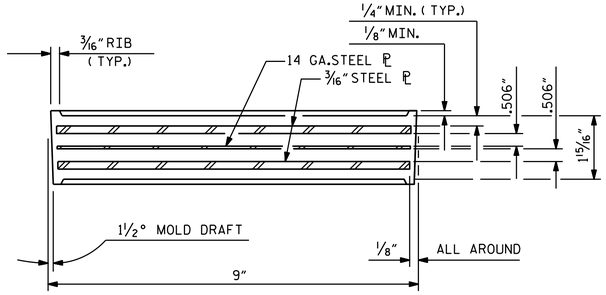
TYPICAL SECTION OF ELASTOMERIC BEARINGS



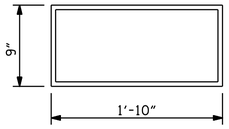
E6 (60 REQ'D)

PLAN VIEW OF ELASTOMERIC BEARING

TYPE VII



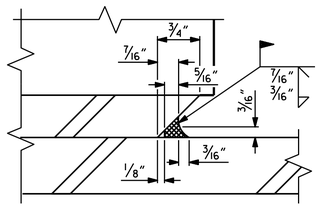
TYPICAL SECTION OF ELASTOMERIC BEARINGS



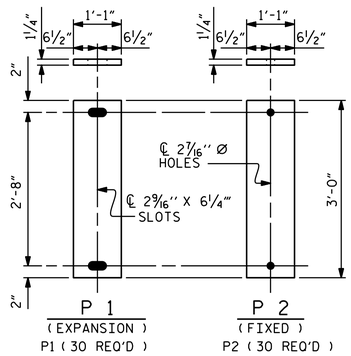
E3 (10 REQ'D)

PLAN VIEW OF ELASTOMERIC BEARING

TYPE IV



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.

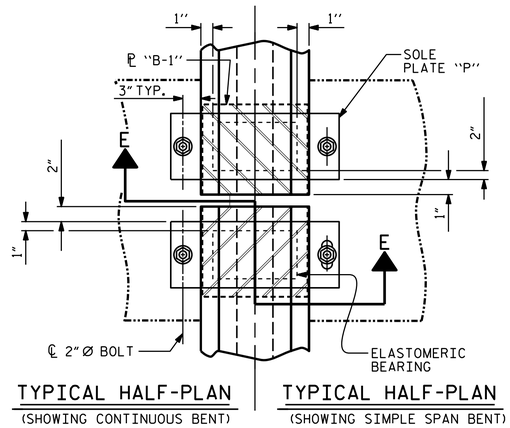
ANCHOR BOLTS SHALL MEET THE REQUIREMENTS OF ASTM A449. NUTS SHALL MEET THE REQUIREMENTS OF AASHTO M291-DH OR AASHTO M292-2H. WASHERS SHALL MEET THE REQUIREMENTS OF AASHTO M293. NO SHOP DRAWINGS ARE REQUIRED FOR ANCHOR BOLTS, NUTS AND WASHERS. SHOP INSPECTION IS REQUIRED.

ALL SURFACES OF BEARING PLATES SHALL BE SMOOTH AND STRAIGHT.

THE ELASTOMER IN THE STEEL REINFORCED BEARINGS SHALL HAVE A SHEAR MODULUS OF 0.160 KSI, IN ACCORDANCE WITH AASHTO M251.

FOR STEEL REINFORCED ELASTOMERIC BEARINGS, SEE SPECIAL PROVISIONS.

ALL SOLE PLATES SHALL BE AASHTO M270 GRADE 36.



TYPICAL HALF-PLAN (SHOWING CONTINUOUS BENT)

TYPICAL HALF-PLAN (SHOWING SIMPLE SPAN BENT)

MAXIMUM ALLOWABLE SERVICE LOADS	
D.L.+L.L. (NO IMPACT)	
TYPE IV	225 k
TYPE VII	470 k

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

KCI JOB NO: 25146789.11

DESIGN ENGINEER OF RECORD: DocuSigned by: DB3C8E45B06D499...	DATE : 6/8/2018	
ASSEMBLED BY : R. C. LARSON	DATE : 02/16/16	
CHECKED BY : K. SU	DATE : 04/04/17	
DRAWN BY : EEM 2/97	REV. 10/1/11	MAA/GM
CHECKED BY : VAP 2/97	REV. 6/13	AAC/MAA
	REV. 1/15	MAA/TMC

DocuSigned by: DB3C8E45B06D499...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

6/8/2018

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ENGINEERS • PLANNERS • ECOLOGISTS LICENSE NUMBER: C-0764

KCI Associates of North Carolina, P.A.

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DWG. REF. NO. 24 OF 44

STR-#10

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD ELASTOMERIC BEARING DETAILS

PRESTRESSED CONCRETE GIRDER SUPERSTRUCTURE LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S10-24
1			3			TOTAL SHEETS
2			4			44

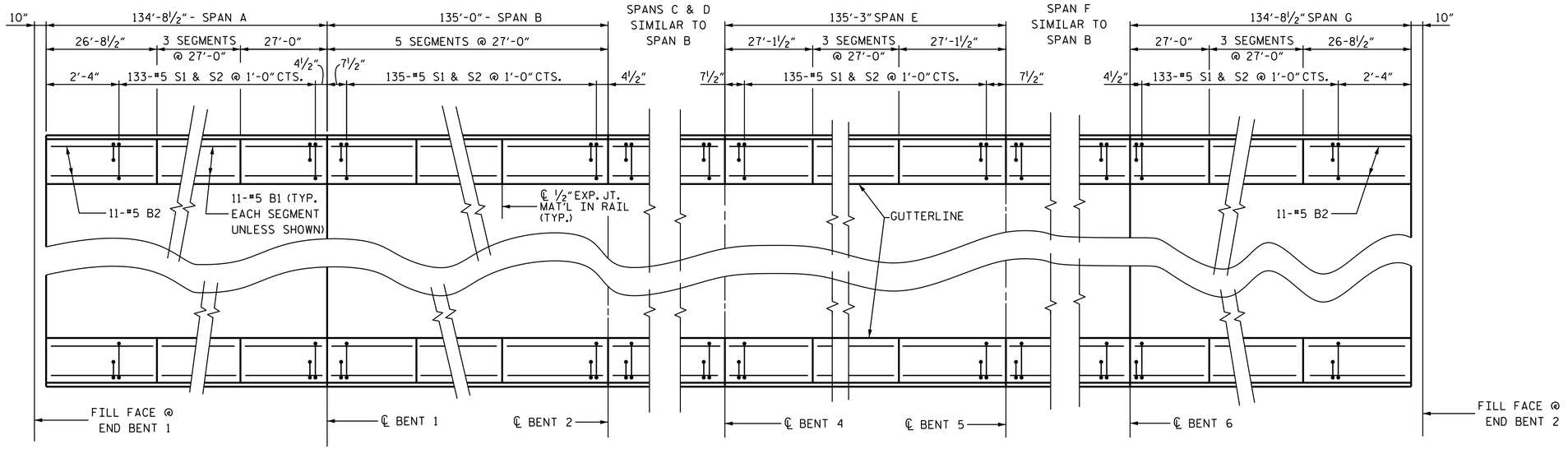
STD. NO. EB4

NOTES

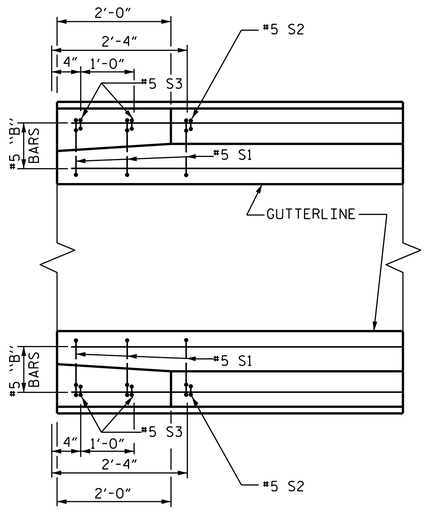
THE BARRIER RAIL IN EACH SPAN SHALL NOT BE CAST UNTIL ALL SLAB CONCRETE IN THAT SPAN HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

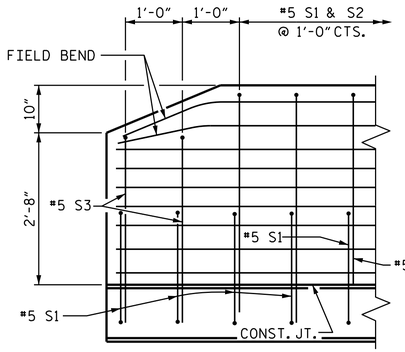
GROOVED CONTRACTION JOINTS, ½" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE BARRIER RAIL AND IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. THE CONTRACTION JOINT SHALL BE LOCATED AT EACH THIRD POINT BETWEEN BARRIER RAIL EXPANSION JOINTS. ONLY ONE CONTRACTION JOINT IS REQUIRED 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.



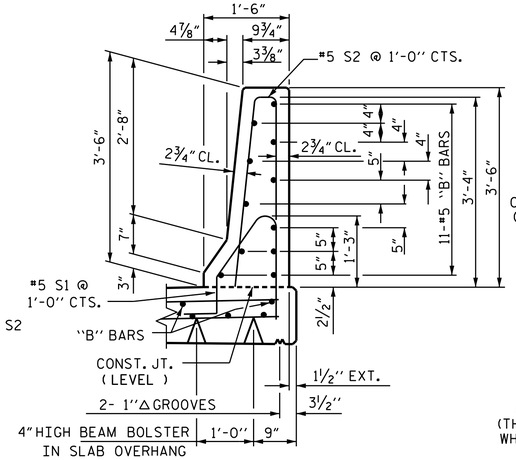
PLAN



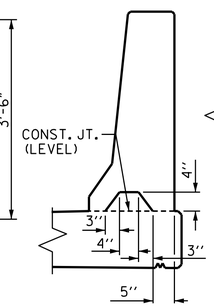
PLAN



SIDE VIEW

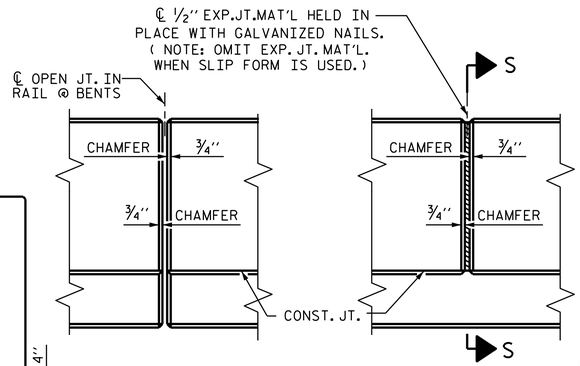


SECTION THRU RAIL



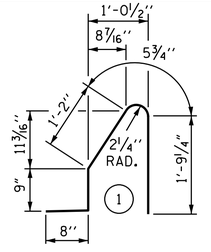
SECTION S-S

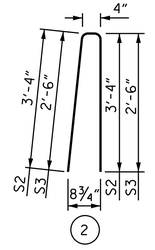
AT DAM IN OPEN JOINT
(THIS IS TO BE USED ONLY WHEN SLIP FORM IS USED)



ELEVATION AT EXPANSION JOINTS

BAR TYPES





ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

FOR CONCRETE BARRIER RAIL ONLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* B1	726	#5	STR	26'-6"	20,066
* B2	44	#5	STR	26'-4"	1,208
* S1	1890	#5	1	4'-10"	9,528
* S2	1882	#5	2	7'-0"	13,740
* S3	8	#5	2	5'-4"	45

* EPOXY COATED REINFORCING STEEL	44,587 LBS.
CLASS AA CONCRETE	256.8 CU. YDS.
CONCRETE BARRIER RAIL	1889.33 LIN. FT.

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

KCI JOB NO: 25146789.11

DESIGN ENGINEER OF RECORD: DocuSigned by DB3C8E45B06D490...	DATE : 6/8/2018	
ASSEMBLED BY : R. C. LARSON	DATE : 02/15/16	
CHECKED BY : E. C. DECOLA	DATE : 8/31/16	
DRAWN BY : ARB 5/87	REV. 10/1/11	MAA/GM
CHECKED BY : SJD 9/87	REV. 7/12	MAA/GM
	REV. 6/13	MAA/GM

END OF RAIL DETAILS

BARRIER RAIL DETAILS

DocuSigned by: DB3C8E45B06D490...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

6/8/2018

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ENGINEERS ◆ PLANNERS ◆ ECOLOGISTS LICENSE NUMBER: C-0764

KCI Associates of North Carolina, P.A.

SUITE 220, LANDMARK CENTER 4 601 SIX FORKS RD, RALEIGH, N.C. 27609-5310 (919) 783-9214

DWG. REF. NO. 25 OF 44

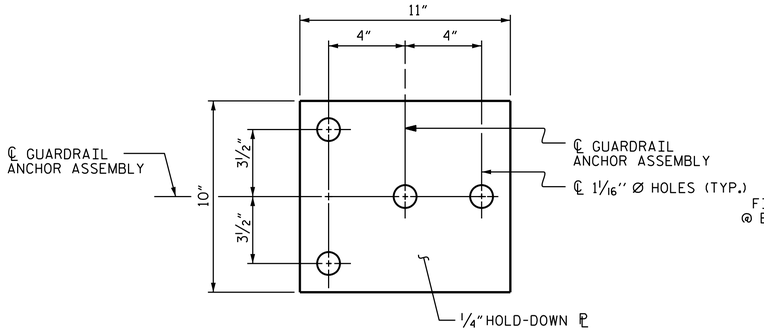
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
CONCRETE BARRIER RAIL
LEFT LANE

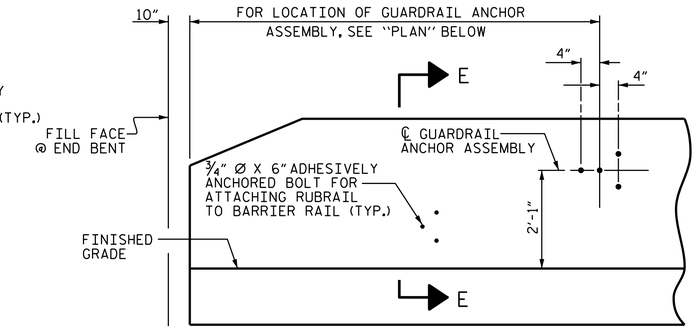
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S10-25
1			3			TOTAL SHEETS
2			4			44

STR-#10

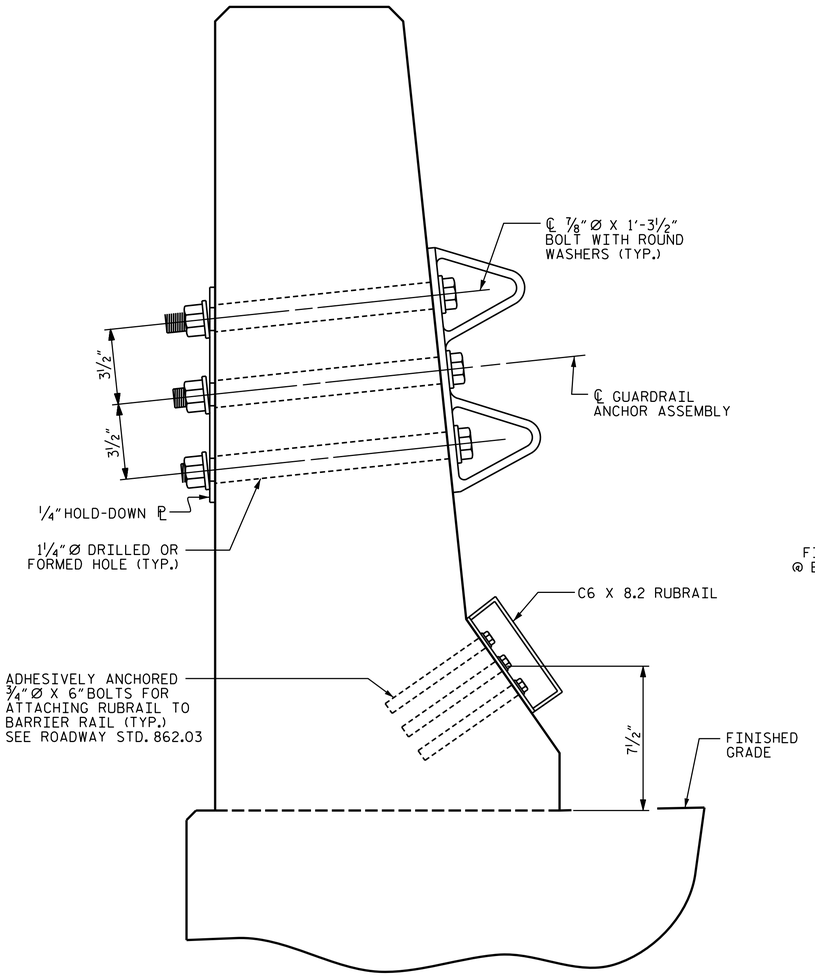
STD. NO. CBR1 (SHT 1)



PLAN

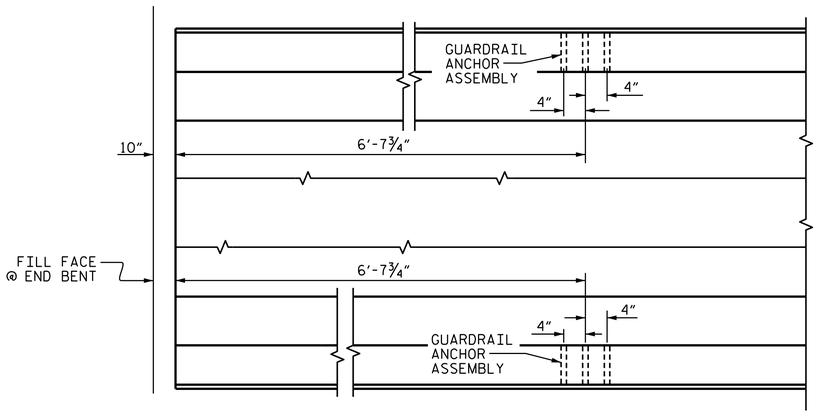


ELEVATION



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.)

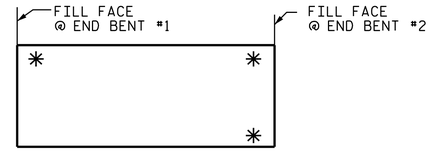
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF BARRIER RAIL. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

KCI JOB NO: 25146789.11

ASSEMBLED BY : R. C. LARSON	DATE : 02/16/16		
CHECKED BY : K. SU	DATE : 04/04/17		
DRAWN BY : TLA 5/06	REV. 10/1/11	MAA/GM	DESIGN ENGINEER OF RECORD: DocuSigned by: DB3C8E45B06D499... DATE : 6/8/2018
CHECKED BY : GM 5/06	REV. 7/12	MAA/GM	
	REV. 6/13	MAA/GM	

DocuSigned by: DB3C8E45B06D499...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

6/8/2018

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ENGINEERS ● PLANNERS ● ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
SUITE 220, LANDMARK CENTER II 4601 SIX FORKS RD. RALEIGH, N.C. 27609-5292 (919) 783-9214

DWG. REF. NO. 26 OF 44

STR-#10

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

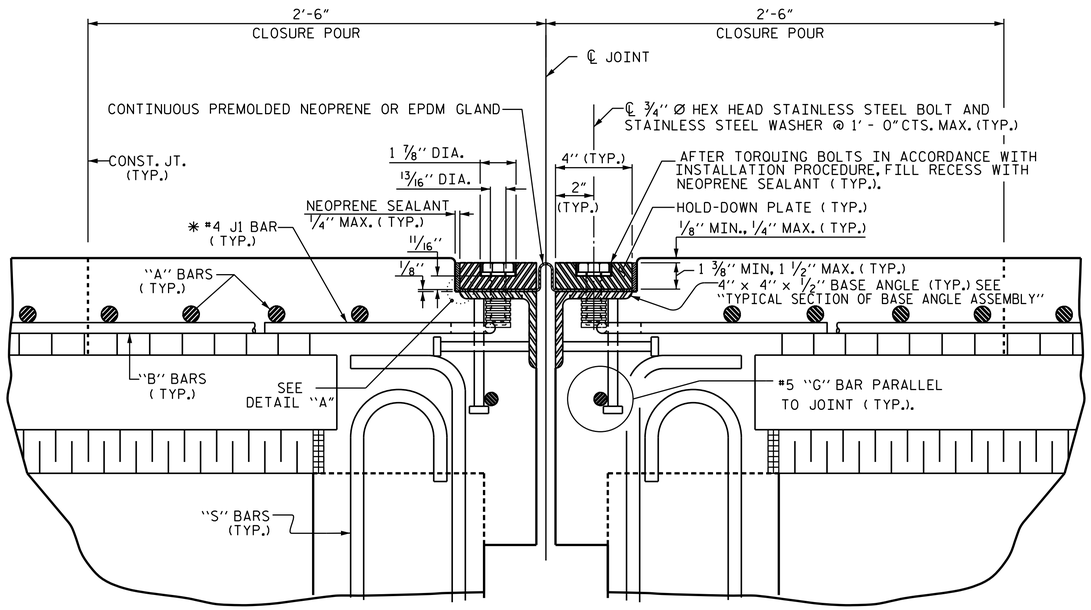
STANDARD

GUARDRAIL ANCHORAGE FOR BARRIER RAIL

LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S10-26
1			3			TOTAL SHEETS
2			4			44

STD. NO. GRA2



EXPANSION JOINT DETAILS

SECTION NORMAL TO JOINT -- PRESTRESSED GIRDER SUPERSTRUCTURE

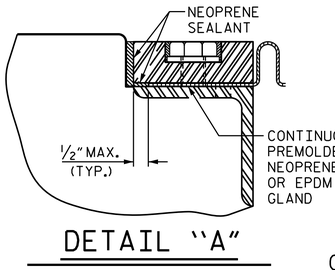
* THE QUANTITY OF #4 J1 BARS ON THE BILL OF MATERIAL IS BASED ON 1'-0" CENTERS. J1 BARS SHALL BE PLACED AT EACH VERTICAL STUD ANCHOR BOLT. IN THE EVENT THAT THE NUMBER OF VERTICAL STUD ANCHORS EXCEEDS THE NUMBER OF J1 BARS SPECIFIED, ADDITIONAL J1 BARS WILL NOT BE REQUIRED.

INSTALLATION PROCEDURE

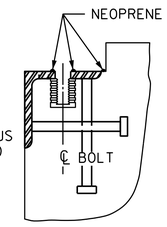
1. A TEMPLATE OR OTHER SUITABLE DEVICE SHALL BE USED TO FORM THE TOP OF THE EXPANSION JOINT SEAL BLOCKOUT TO THE PROPER DEPTH AND WIDTH. THE TEMPLATE SHALL BE 4 1/8" TO 4 1/4" WIDE AND OF SUCH THICKNESS AS TO PROVIDE FOR CORRECT FINAL ELEVATION OF TOP OF HOLD-DOWN PLATES. THE TEMPLATE SHALL BE ATTACHED 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 REPAIRED IN ACCORDANCE WITH THE SPECIAL PROVISION FOR THERMAL SPRAYED COATINGS (METALLIZATION).
3. LAY THE GLAND ON THE BASE ANGLE AND FIELD MARK THE GLAND FOR THE BOLT HOLES. HOLES IN THE GLAND SHALL BE PUNCHED ⅞" 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 TORQUING, CLEAN THE BOLT HOLE RECESSES, THE RECESS BETWEEN THE JOINT SEAL DEVICE AND CONCRETE, AND THE LIFTING HOLES IN THE HOLD-DOWN PLATE, AND COMPLETELY FILL THE RECESSES AND LIFTING HOLES WITH NEOPRENE SEALANT.

GENERAL NOTES

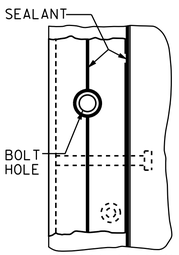
1. FOR EXPANSION JOINT SEALS, SEE SPECIAL PROVISIONS.
2. ALL PLATES AND ANGLES SHALL CONFORM TO AASHTO M270 GRADE 36 STEEL OR APPROVED EQUAL. ALL HOLD-DOWN BOLTS SHALL CONFORM TO ASTM F593 ALLOY 304 STAINLESS STEEL AND WASHERS SHALL CONFORM TO ASTM F844 EXCEPT THEY SHALL BE MADE FROM ALLOY 304 STAINLESS 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. MINIMUM.
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 IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS. FOR THERMAL SPRAYED COATINGS (METALLIZATION), SEE SPECIAL PROVISIONS.
7. THE COVER PLATES SHALL BE GALVANIZED OR METALLIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS. FOR THERMAL SPRAYED COATINGS (METALLIZATION), SEE SPECIAL PROVISIONS.
8. 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 REPAIRED IN ACCORDANCE WITH THE SPECIAL PROVISION FOR THERMAL SPRAYED COATINGS (METALLIZATION).
9. 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.
10. NO ALTERNATE JOINT DETAILS SHALL BE PERMITTED IN LIEU OF THOSE SHOWN ON THESE PLANS.
11. 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.
12. THE FABRICATOR SHALL PROVIDE ½" Ø THREADED HOLES IN THE HOLD-DOWN PLATES TO ASSIST IN LIFTING AND PLACING. THE HOLES SHALL BE ¾" DEEP AT 6'-0" MAXIMUM SPACING AND A MINIMUM OF TWO HOLES PER PLATE.



DETAIL ''A''

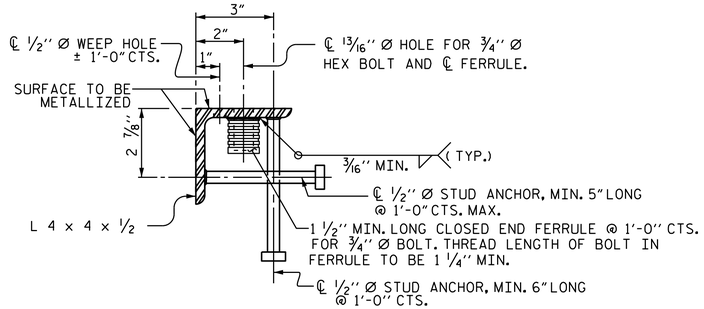


CROSS SECTION

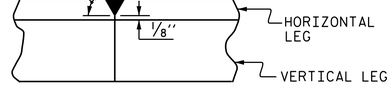


PLAN VIEW

INSTALLATION SKETCH



TYPICAL SECTION OF BASE ANGLE ASSEMBLY



DETAIL- FIELD WELD SPLICE OF BASE ANGLE

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
1	90°	1 5/8"	2 3/16"	1 7/8"	1 5/16"
3	90°	2 1/16"	2 1/16"	2 1/8"	1 3/8"
6	90°	2 1/16"	2 1/16"	2 1/8"	1 3/8"

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

KCI JOB NO. 25146789.11

DESIGN ENGINEER OF RECORD: DATE : 12/7/2018 (DocuSigned by: DB3C8E45B06D4...)			
ASSEMBLED BY : R. C. LARSON	DATE : 02/11/16		
CHECKED BY : K. SU	DATE : 04/04/17		
DRAWN BY : REK 9/87	REV. 10/17/11	MAA/GM	
CHECKED BY : CRK 10/87	REV. 10/17	MAA/THC	
	REV. 6/18	MAA/THC	

DocuSigned by: DB3C8E45B06D4... 12/7/2018

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ENGINEERS ● PLANNERS ● ECOLOGISTS LICENSE NUMBER: C-0764

KCI Associates of North Carolina, P.A.

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DWG. REF. NO. 27 OF 44

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

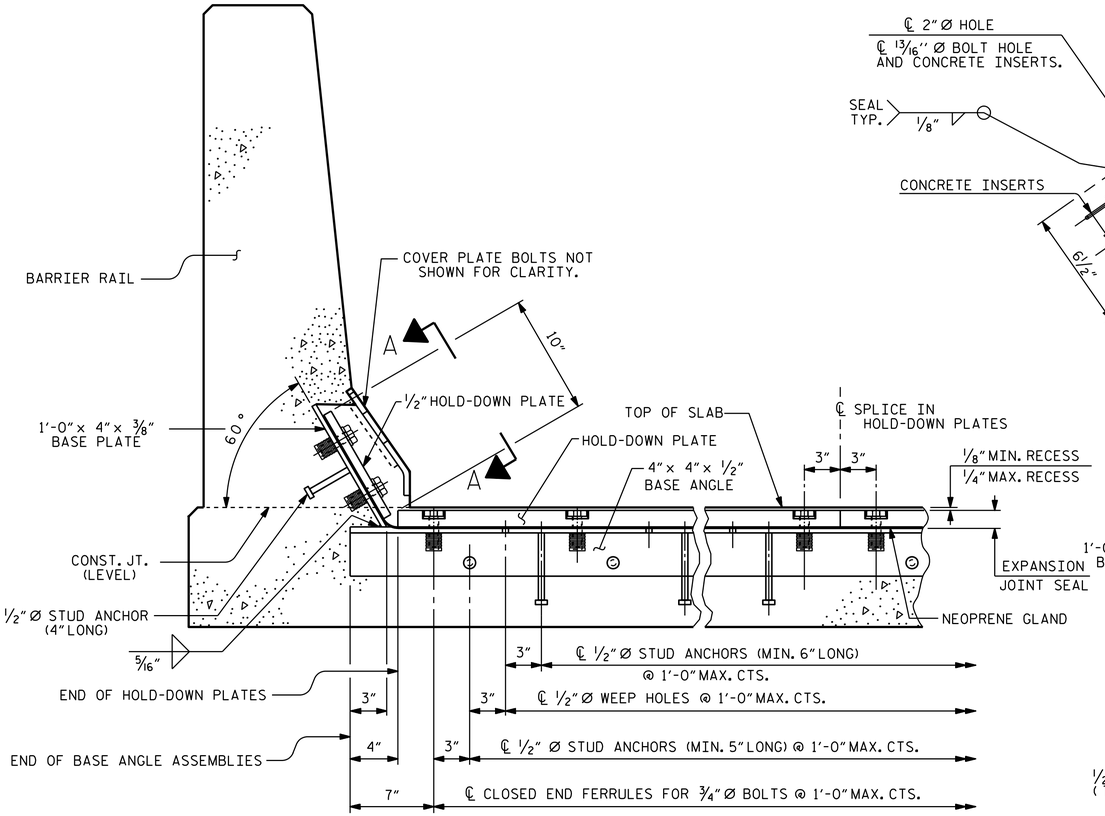
EXPANSION JOINT SEAL DETAILS

LEFT LANE

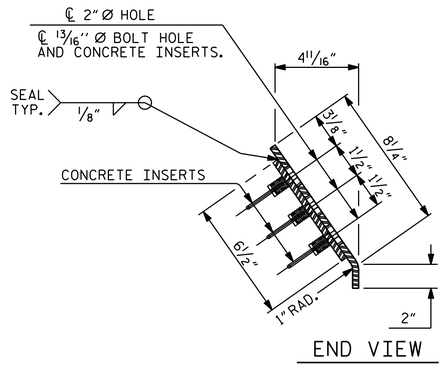
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S10-27
1			3			TOTAL SHEETS
2			4			44

STR-#10

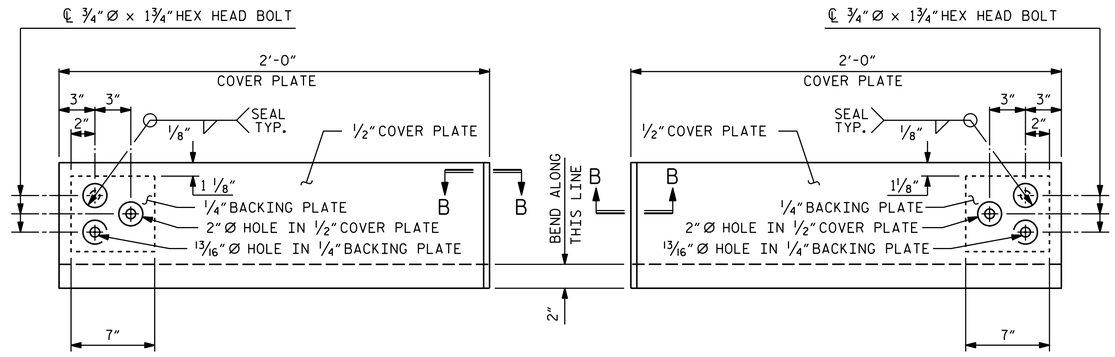
STD. NO. EJS1 (SHT 1)



SECTION THRU RAIL NORMAL TO JOINT



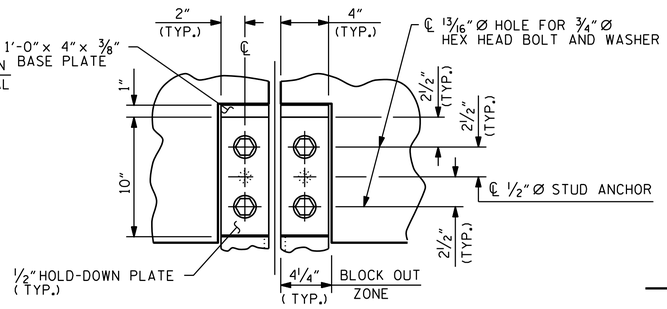
END VIEW



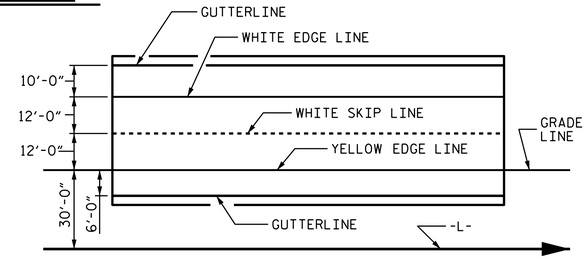
TYPE I - ELEVATION VIEW

TYPE II - ELEVATION VIEW

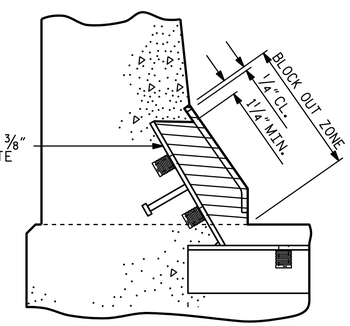
COVER PLATE DETAILS



SECTION A - A

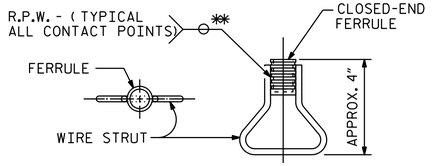


PAVEMENT MARKING ALIGNMENT



BLOCK OUT DETAIL

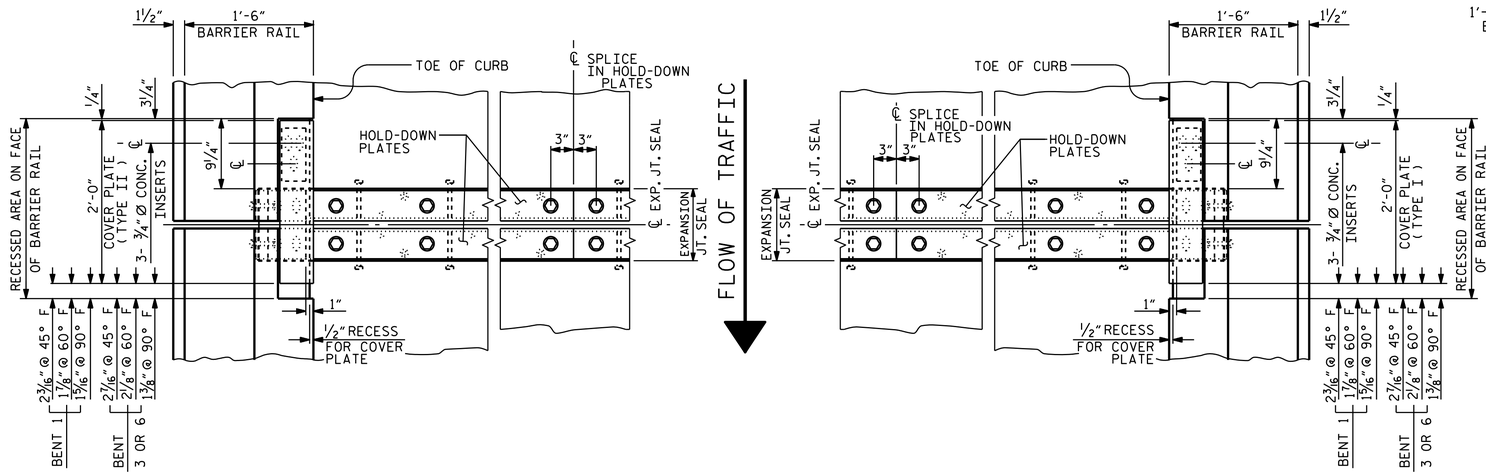
SEE "SECTION A - A" FOR OTHER DETAILS.



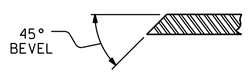
PLAN ELEVATION

CONCRETE INSERT

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



PLAN OF EXPANSION JOINT SEAL



SECTION B - B

DESIGN ENGINEER OF RECORD: DocuSigned by: DB3C8E45B06D499	DATE : 6/8/2018		
ASSEMBLED BY : R. C. LARSON	DATE : 02/11/16		
CHECKED BY : K. SU	DATE : 04/04/17		
DRAWN BY : REK 9/87	REV. 10/1/11	MAA/GM	
CHECKED BY : CRK 10/87	REV. 7/12	MAA/GM	
	REV. 6/13	MAA/GM	

KCI JOB NO: 251467891.11

DocuSigned by: DB3C8E45B06D499 6/8/2018

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

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ENGINEERS ● PLANNERS ● ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
SUITE 220, LANDMARK CENTER 4 401 SW FORNS RD, RALEIGH, N.C. 27609-5320 (919) 783-9214
DWG. REF. NO. 28 OF 44

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD

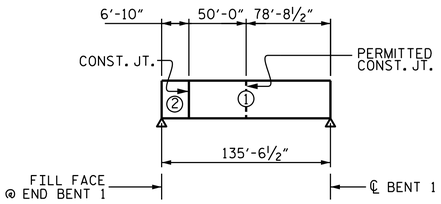
EXPANSION JOINT SEAL DETAILS FOR BARRIER RAIL

LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S10-28
1			3			TOTAL SHEETS
2			4			44

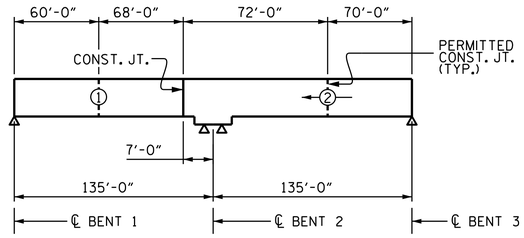
STR-#10

STD. NO. EJS2 SHT 1a

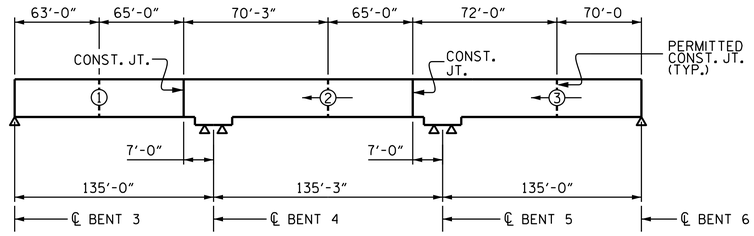


SPAN A OR G

(SPAN A SHOWN, SPAN G OPPOSITE HAND)



SPANS B-C



SPANS D-F

DECK POURING SEQUENCE

(1) INDICATES POUR SEQUENCE AND DIRECTION. WHERE ARROW IS OMITTED EITHER DIRECTION IS PERMITTED.

REINFORCING STEEL SCHEDULE

SPAN A OR G						SPANS B-C						SPANS D-F					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	215	5	STR.	42'-9"	9586	A1	431	5	STR.	42'-9"	19218	A1	648	5	STR.	42'-9"	28893
A2	180	4	STR.	4'-10"	581	A2	360	4	STR.	4'-10"	1162	A2	540	4	STR.	4'-10"	1743
B1	232	4	STR.	28'-10"	4468	B4	464	4	STR.	24'-4"	7542	B4	464	4	STR.	24'-4"	7542
B2	18	5	STR.	46'-6"	873	B5	58	6	STR.	36'-3"	3158	B5	116	6	STR.	36'-3"	6316
B3	113	6	STR.	27'-0"	4583	B6	55	6	STR.	40'-6"	3346	B6	110	6	STR.	40'-6"	6691
						B7	58	6	STR.	60'-0"	5227	B7	116	6	STR.	60'-0"	10454
G1	1	5	STR.	42'-9"	45	B8	30	5	STR.	56'-0"	1752	B9	116	4	STR.	25'-2"	1950
												B10	42	5	STR.	60'-0"	2628
J1	40	4	9	1'-5"	38	G1	2	5	STR.	42'-9"	89						
												G1	2	5	STR.	42'-9"	89
K1	12	4	STR.	22'-6"	180	J1	80	4	9	1'-5"	76						
K2	4	4	STR.	6'-5"	17							J1	80	4	9	1'-5"	76
K3	16	4	STR.	8'-0"	86	K3	40	4	STR.	8'-0"	214						
K4	4	4	STR.	5'-0"	13	K4	8	4	STR.	5'-0"	27	K3	80	4	STR.	8'-0"	428
K5	4	4	STR.	2'-3"	6	K7	8	4	STR.	5'-4"	29	K4	16	4	STR.	5'-0"	53
K6	8	4	STR.	3'-0"	16	K8	14	4	STR.	19'-9"	185	K7	16	4	STR.	5'-4"	57
K9	6	8	2	20'-1"	322	K9	12	8	2	20'-1"	643	K8	28	4	STR.	19'-9"	369
K10	4	8	1	13'-7"	145	K10	8	8	1	13'-7"	290	K9	12	8	2	20'-1"	643
												K10	8	8	1	13'-7"	290
S1	28	4	8	14'-7"	273	S2	176	4	5	2'-9"	323						
S3	28	4	7	11'-11"	223	S5	8	4	6	13'-3"	71	S2	352	4	5	2'-9"	647
S4	26	4	7	11'-8"	203	S6	48	5	3	6'-0"	300	S5	16	4	6	13'-3"	142
S6	24	5	3	6'-0"	150							S6	48	5	3	6'-0"	300
						U1	24	4	4	17'-6"	281						
												U1	48	4	4	17'-6"	561

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"			

SUPERSTRUCTURE BILL OF MATERIAL

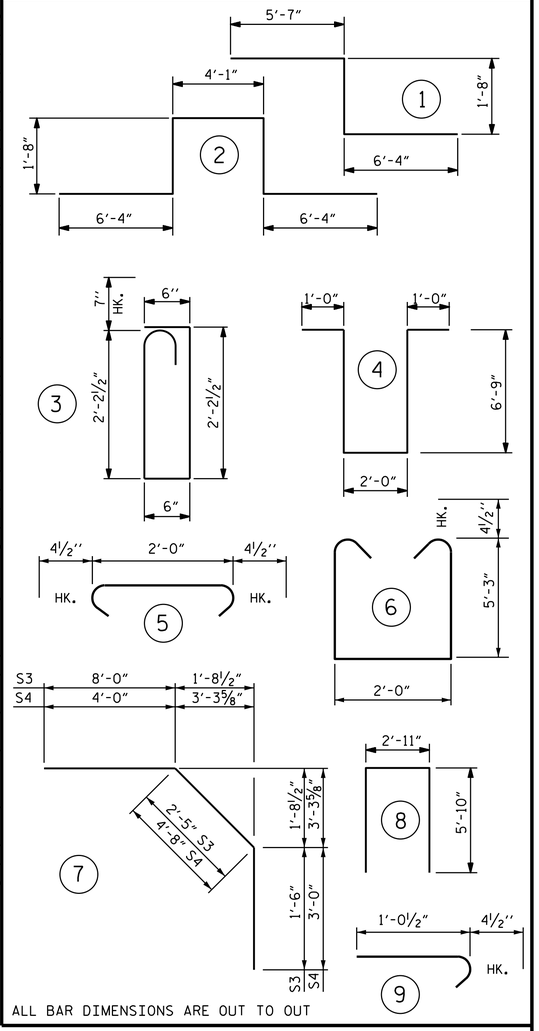
		CLASS AA CONCRETE	EPOXY COATED REINFORCING STEEL
		(CU. YDS.)	(LBS.)
SPAN A	POUR 1	120.1	21,808
	POUR 2	38.6	
SPANS BC	POUR 1	119.4	43,933
	POUR 2	151.1	
SPANS DEF	POUR 1	151.1	69,872
	POUR 2	142.8	
	POUR 3	119.4	
SPAN G	POUR 1	120.1	21,808
	POUR 2	38.6	
TOTALS**		1001.2	157,421

** QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED

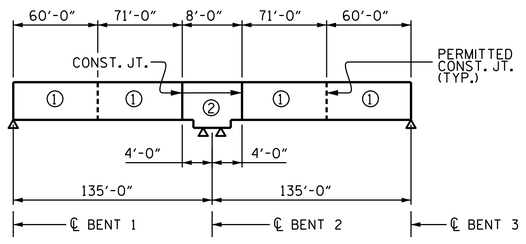
GROOVING BRIDGE FLOORS

APPROACH SLABS	1,787	SQ.FT.
BRIDGE DECK	29,836	SQ.FT.
TOTAL	31,623	SQ.FT.

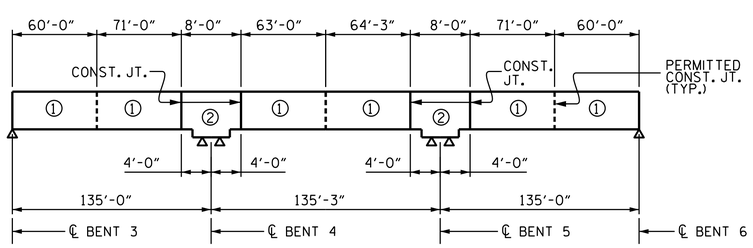
BAR TYPES



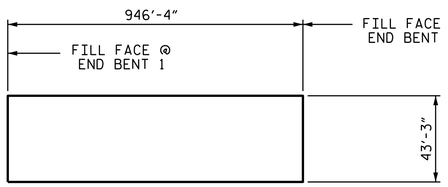
ALL BAR DIMENSIONS ARE OUT TO OUT



SPANS B-C



SPANS D-F



LAYOUT FOR COMPUTING AREA REINFORCED CONCRETE DECK SLAB (SQ. FT. = 40,929)

OPTIONAL POURING SEQUENCE

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

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE BILL OF MATERIAL

LEFT LANE

DocuSigned by: DB3C8E45B06D399...
NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON
12/7/2018

KCI JOB NO: 25146789.11

DESIGN ENGINEER OF RECORD: DocuSigned by: DB3C8E45B06D399...	DATE : 12/7/2018		
ASSEMBLED BY : R. C. LARSON	DATE : 02/11/16		
CHECKED BY : E. C. DECOLA	DATE : 08/10/16		
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	

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ENGINEERS ● PLANNERS ● ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
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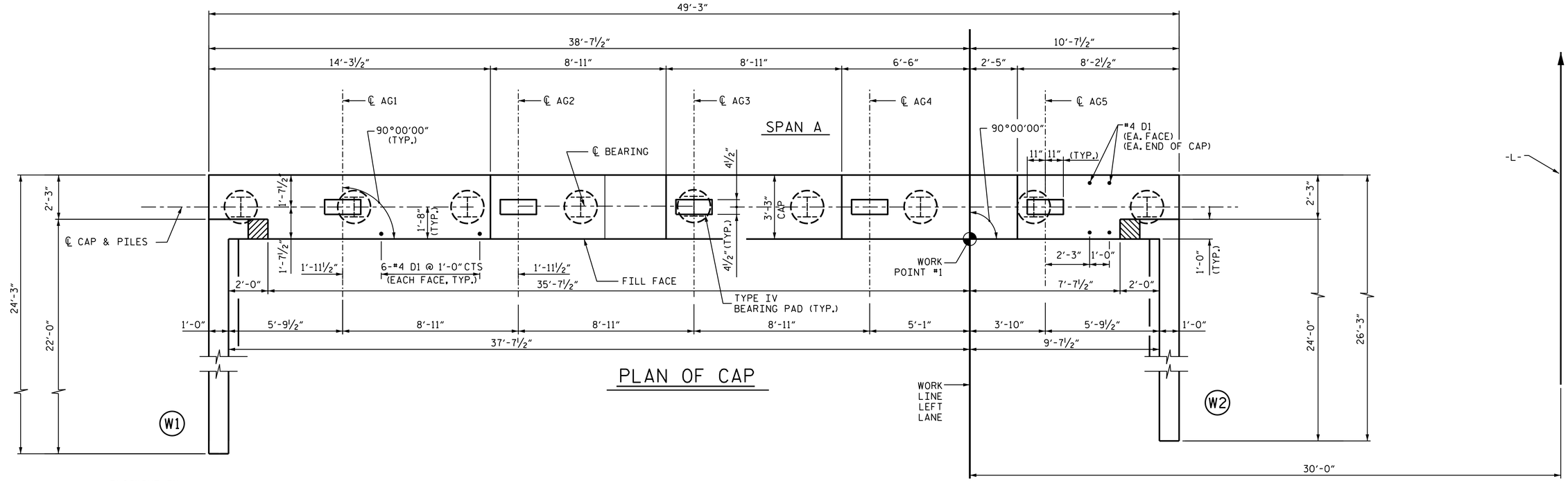
DWG. REF. NO. 29 OF 44

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

SHEET NO. S10-29
TOTAL SHEETS 44

STR-#10



ELEVATION

NOTES

FOR PILE SPLICE DETAIL, SEE END BENT 2.

FOR SECTION A-A SEE SHEET 4 OF 4.

FOR BLOCKOUT DETAIL SEE SHEET 2 OF 4.

THE TOP SURFACE OF THE END BENT CAP AND WINGS EXCLUDING THE BEARING AREAS SHALL BE RAKED TO A DEPTH OF ¼".

STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR "D" BARS.

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 1 OF 4

KCI JOB NO: 25146789.11

DESIGN ENGINEER OF RECORD: DocuSigned by: DATE : 12/7/2018

DRAWN BY : R. J. FLORY DATE : 10/15/15

CHECKED BY : R. C. LARSON DATE : 11/14/15

DocuSigned by: DB3C8E45B06D48D...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

12/7/2018

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DWG. REF. NO. 30 OF 44

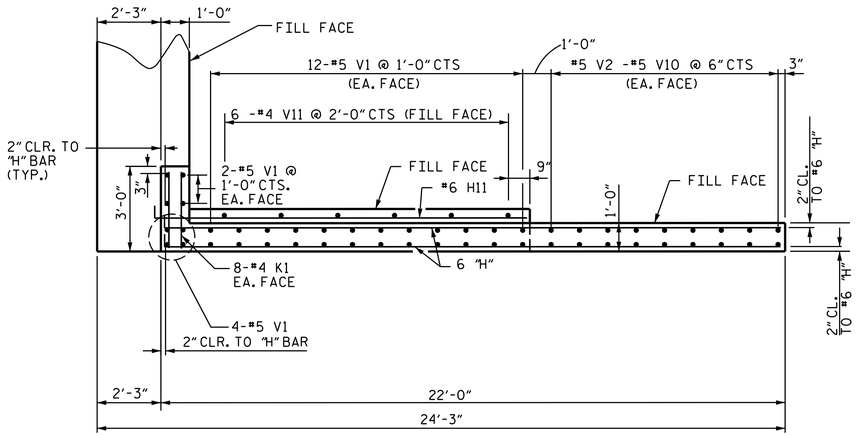
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE END BENT 1

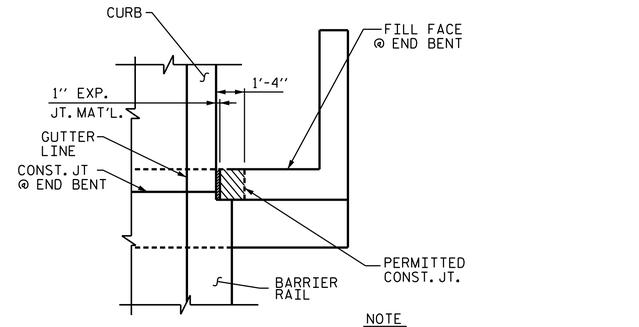
LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S10-30
1			3			TOTAL SHEETS
2			4			44

STR-#10



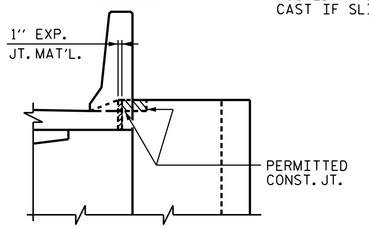
PLAN W1



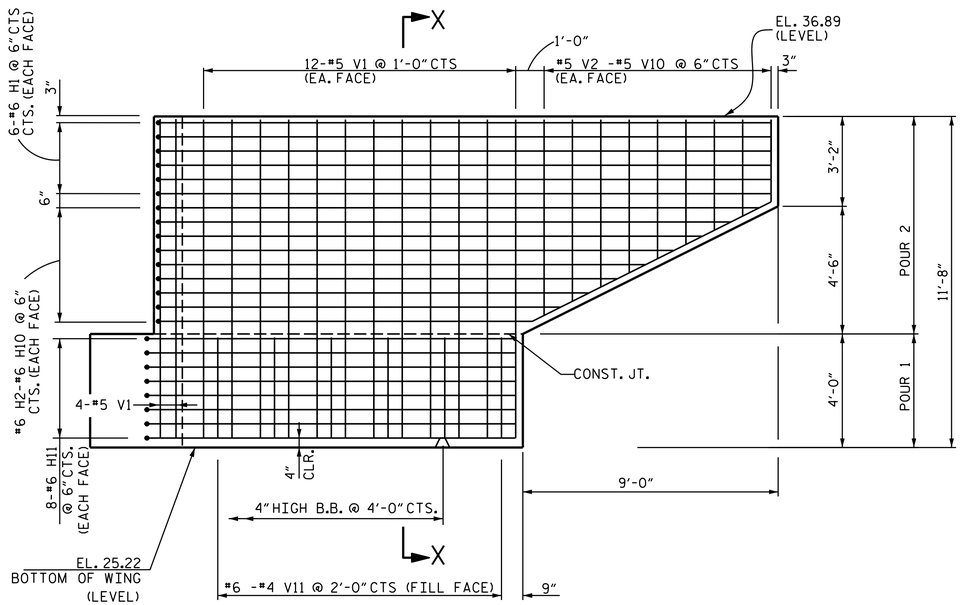
NOTE

THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE PARAPET IS CAST IF SLIP FORMING IS USED.

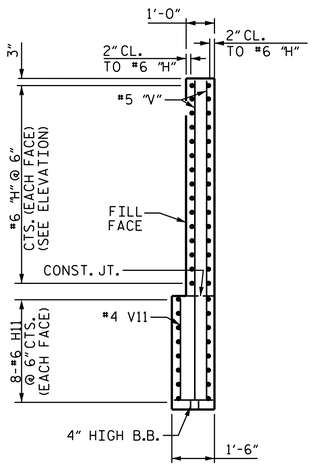
PLAN



ELEVATION



ELEVATION W1



SECTION X-X

BLOCKOUT IN WING WALL

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 2 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE END BENT 1

LEFT LANE

DocuSigned by: DB3C8E45B06D499...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

6/8/2018

ENGINEERS ● PLANNERS ● ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
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DWG. REF. NO. 31 OF 44

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S10-31
1			3			TOTAL SHEETS
2			4			44

STR-#10

DESIGN ENGINEER OF RECORD: DocuSigned by: DB3C8E45B06D499... DATE: 6/8/2018

DRAWN BY: R.J. FLORY DATE: 10/27/15

CHECKED BY: R. C. LARSON DATE: 03/27/17

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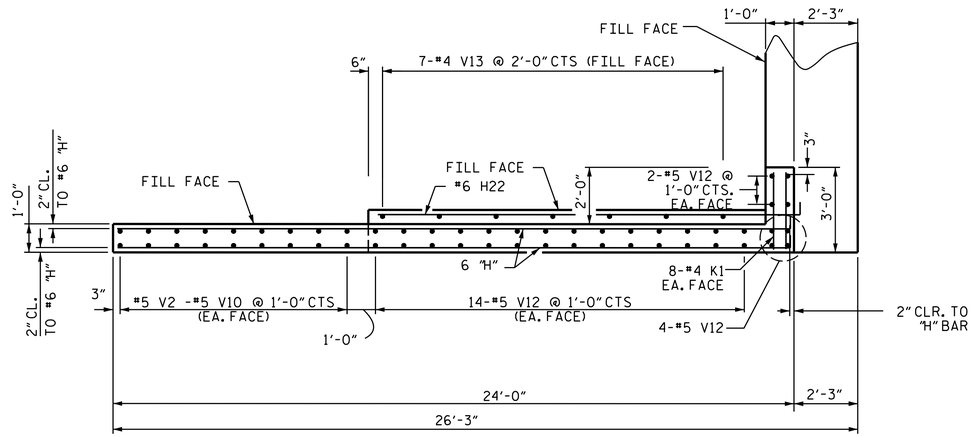
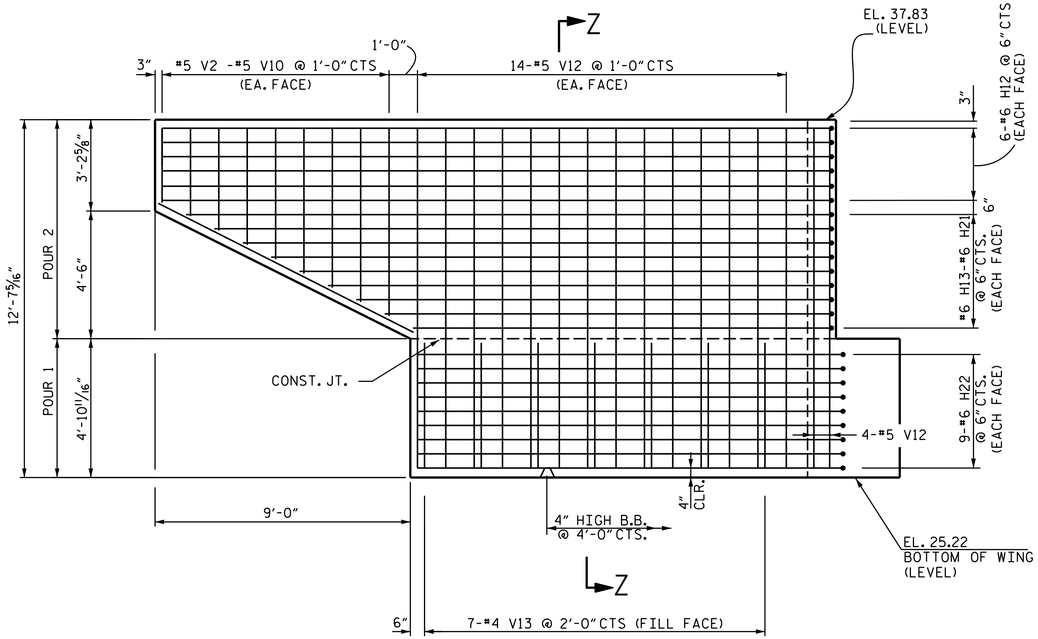
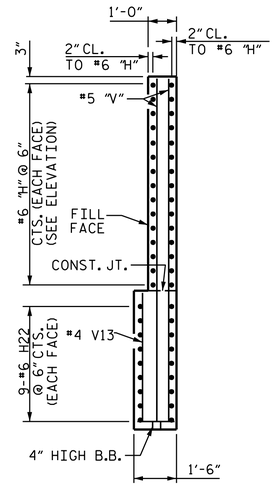
KCI JOB NO: 251467891.11



PLAN W2



ELEVATION W2



SECTION Z-Z

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 3 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE END BENT 1

LEFT LANE

DESIGN ENGINEER OF RECORD: DocuSigned by DB3C8E45B06D499... DATE: 6/8/2018

DRAWN BY: R.J. FLORY DATE: 10/27/15

CHECKED BY: R. C. LARSON DATE: 04/06/17

DocuSigned by DB3C8E45B06D499... 6/8/2018

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

ENGINEERS ● PLANNERS ● ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
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DWG. REF. NO. 32 OF 44

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S10-32
1			3			TOTAL SHEETS
2			4			44

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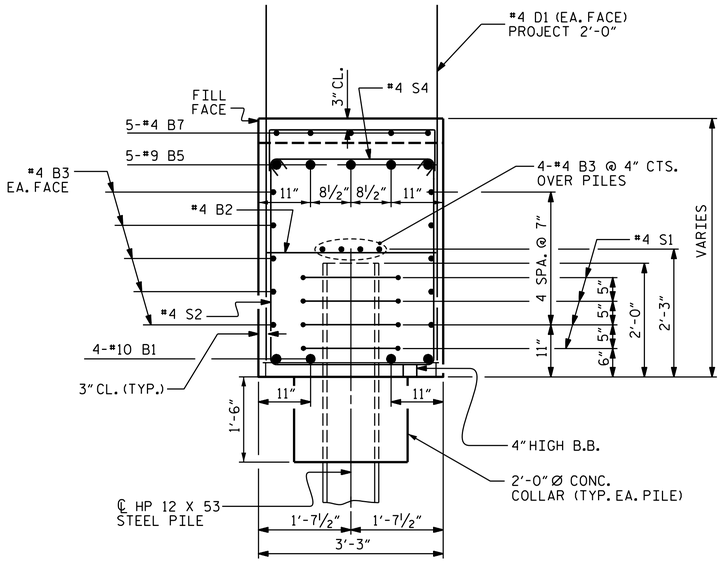
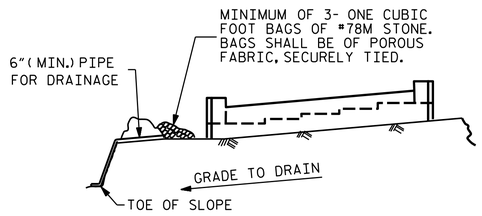
KCI JOB NO: 251467891.11

STR-#10



SECTION A-A



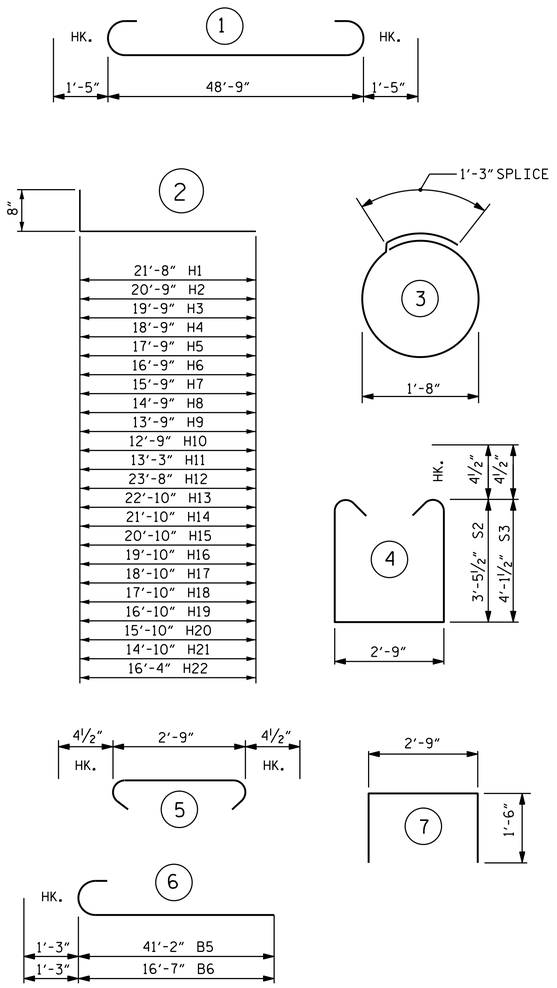
BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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	4	10	1	51'-7"	888
B2	13	4	STR.	2'-11"	25
B3	28	4	STR.	25'-8"	480
B4	2	4	STR.	10'-2"	14
B5	5	9	6	42'-5"	721
B6	5	9	6	17'-10"	303
B7	5	4	STR.	11'-0"	37
D1	56	4	STR.	6'-8"	249
H1	12	6	2	22'-4"	403
H2	2	6	2	21'-5"	64
H3	2	6	2	20'-5"	61
H4	2	6	2	19'-5"	58
H5	2	6	2	18'-5"	55
H6	2	6	2	17'-5"	52
H7	2	6	2	16'-5"	49
H8	2	6	2	15'-5"	46
H9	2	6	2	14'-5"	43
H10	2	6	2	13'-5"	40
H11	16	6	2	13'-11"	334
H12	12	6	2	24'-4"	439
H13	2	6	2	23'-6"	71
H14	2	6	2	22'-6"	68
H15	2	6	2	21'-6"	65
H16	2	6	2	20'-6"	62

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H17	2	6	2	19'-6"	59
H18	2	6	2	18'-6"	56
H19	2	6	2	17'-6"	53
H20	2	6	2	16'-6"	50
H21	2	6	2	15'-6"	47
H22	18	6	2	17'-0"	460
K1	32	4	STR.	2'-8"	57
S1	32	4	3	6'-6"	139
S2	32	4	4	10'-5"	223
S3	16	4	4	11'-9"	126
S4	48	4	5	3'-6"	112
U1	6	4	7	5'-9"	23
V1	32	5	STR.	11'-4"	378
V2	4	5	STR.	6'-11"	29
V3	4	5	STR.	6'-5"	27
V4	4	5	STR.	5'-11"	25
V5	4	5	STR.	5'-5"	23
V6	4	5	STR.	4'-11"	21
V7	4	5	STR.	4'-5"	18
V8	4	5	STR.	3'-11"	16
V9	4	5	STR.	3'-5"	14
V10	4	5	STR.	2'-11"	12
V11	6	4	STR.	3'-8"	15
V12	28	5	STR.	12'-3"	358
V13	7	4	STR.	4'-5"	21

EPOXY COATED REINFORCING STEEL, LB		6989
CLASS AA CONCRETE, CY	POUR 1	33.9
	POUR 2	12.6
	TOTAL	46.5
HP 12X53 STEEL PILES	NO.	9
	LF	540
PILE DRIVING EQUIPMENT SETUP FOR HP 12X53 STEEL PILES, EA.		9
PILE REDRIVES, EA.		5

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 4 OF4

DESIGN ENGINEER OF RECORD: DocuSigned by: DATE : 9/18/2018

DRAWN BY : R. J. FLORY DATE : 08/01/16

CHECKED BY : R.C. LARSON DATE : 08/11/16

DocuSigned by: DB3C8E45B06D4B9...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

9/18/2018

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ENGINEERS ◆ PLANNERS ◆ ECOLOGISTS LICENSE NUMBER: C-0764

KCI Associates of North Carolina, P.A.

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DWG. REF. NO. 33 OF 44

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

RALEIGH

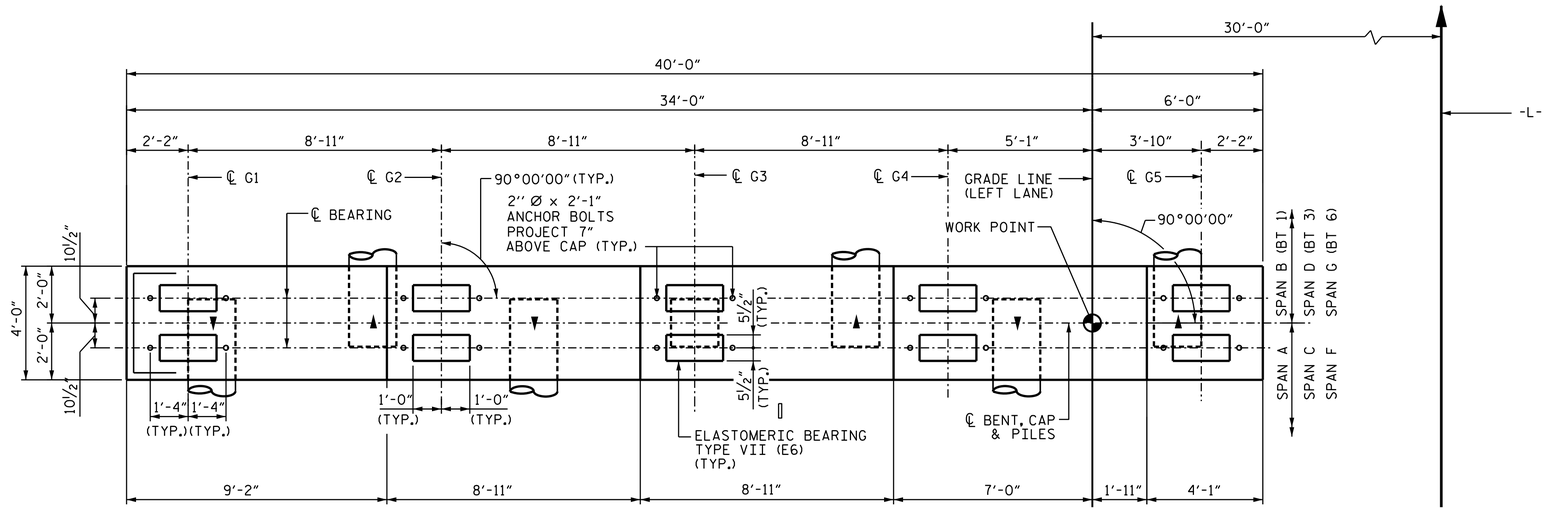
SUBSTRUCTURE END BENT 1

LEFT LANE

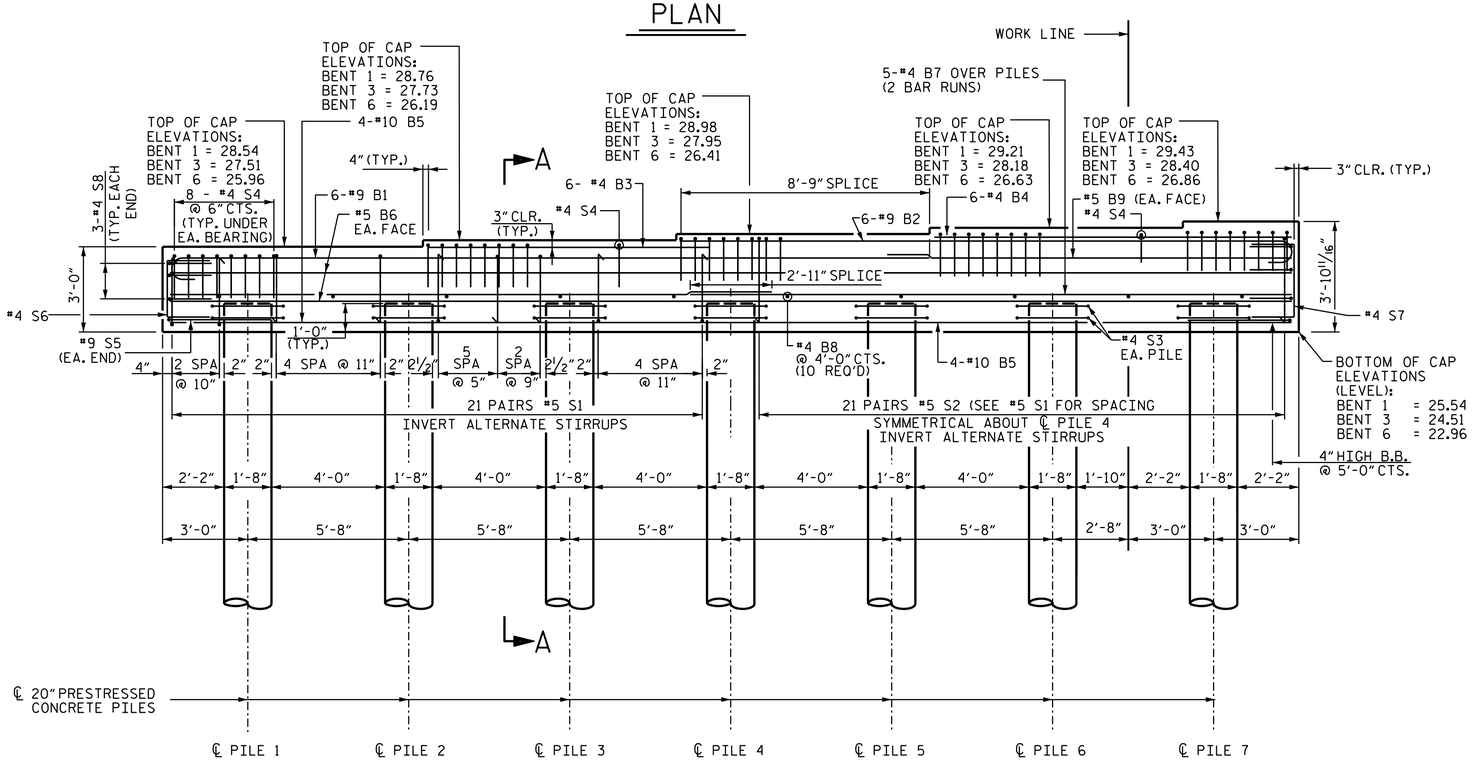
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S10-33
1			3			TOTAL SHEETS
2			4			44

STR-#10

KCI JOB NO. 25146789.11



PLAN



ELEVATION

END ELEVATION

NOTES

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

▼ INDICATES PILE BATTERED 1½":1 IN DIRECTION OF ARROW HEAD.

EPOXY COAT THE TOP SURFACE OF THE BENT CAP EXCEPT FOR AREAS UNDER ELASTOMERIC BEARINGS

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

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE BENT 1,3,6

LEFT LANE

DocuSigned by: DB3C8E45B06D495...
6/8/2018

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

ENGINEERS ● PLANNERS ● ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
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DWG. REF. NO. 34 OF 44

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S10-34
1			3			TOTAL SHEETS
2			4			44

DESIGN ENGINEER OF RECORD: DocuSigned by: DB3C8E45B06D495... DATE: 6/8/2018

DRAWN BY: R. A. PRUETT DATE: 03/15/14

CHECKED BY: R. C. LARSON DATE: 03/25/14

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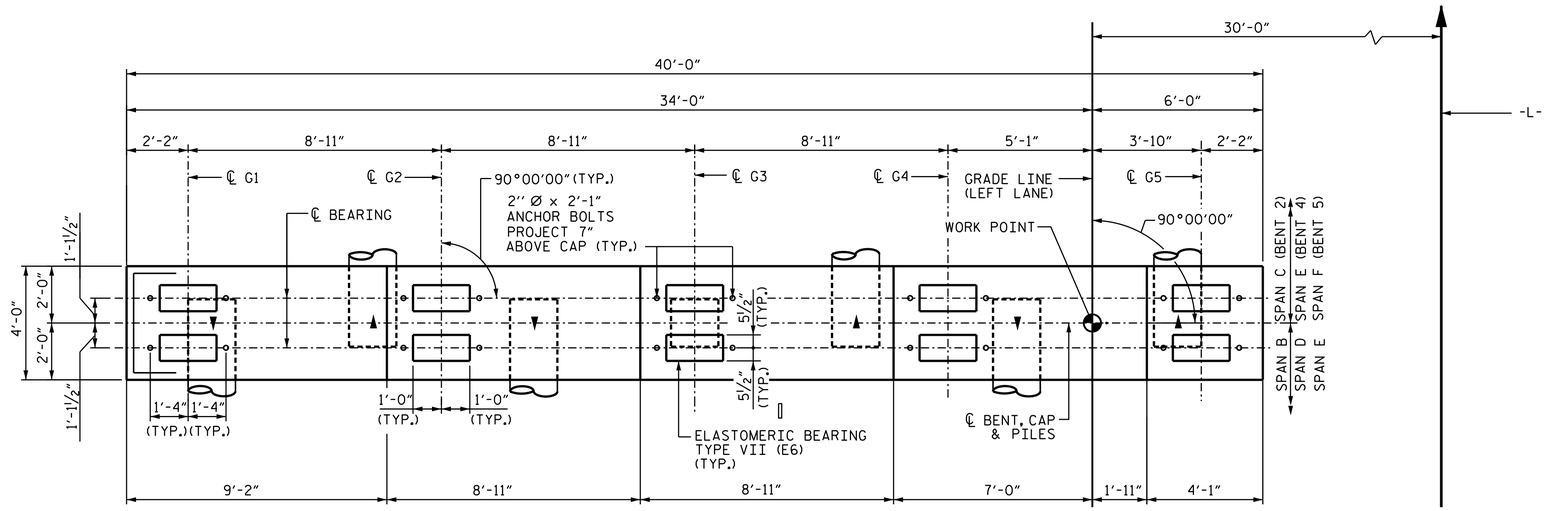
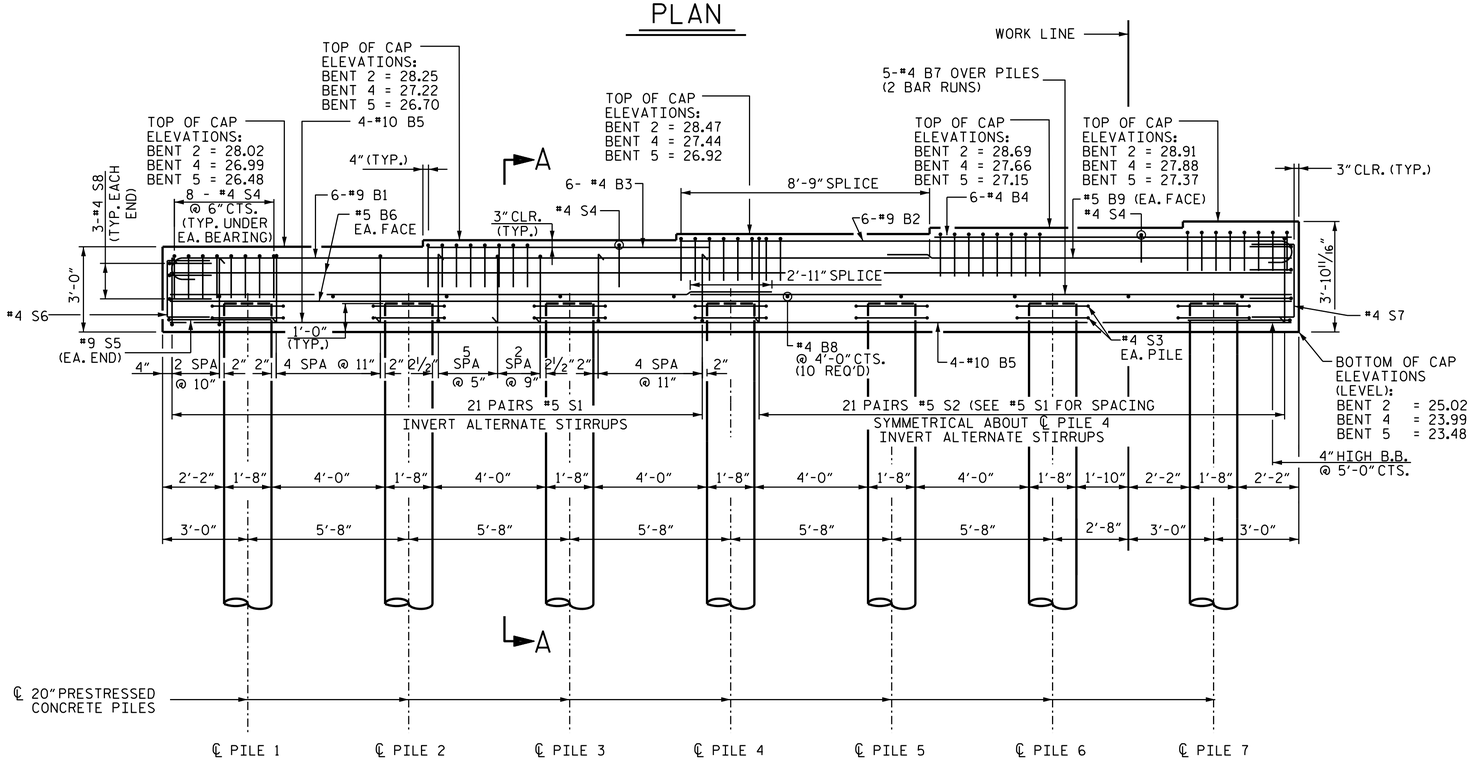
KCI JOB NO: 25146789.11

STR-#10



PLAN

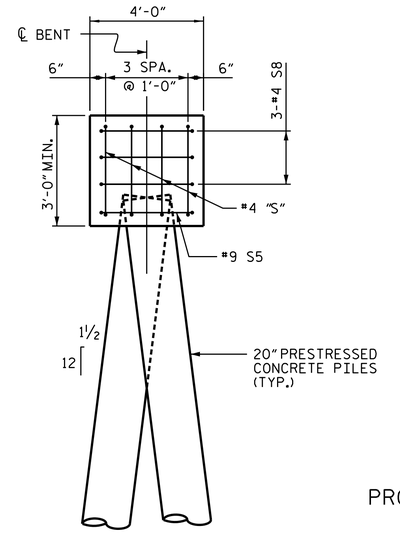


ELEVATION

NOTES

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

▼ INDICATES PILE BATTERED 1½":1 IN DIRECTION OF ARROW HEAD.



END ELEVATION

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE BENT 2,4,5

LEFT LANE

DocuSigned by: DB3C8E45B06D490...
6/8/2018

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

DESIGN ENGINEER OF RECORD: DATE: 6/8/2018
DRAWN BY: R. A. PRUETT DATE: 03/15/17
CHECKED BY: R. C. LARSON DATE: 03/25/17

ENGINEERS ● PLANNERS ● ECOLOGISTS LICENSE NUMBER: C-0764
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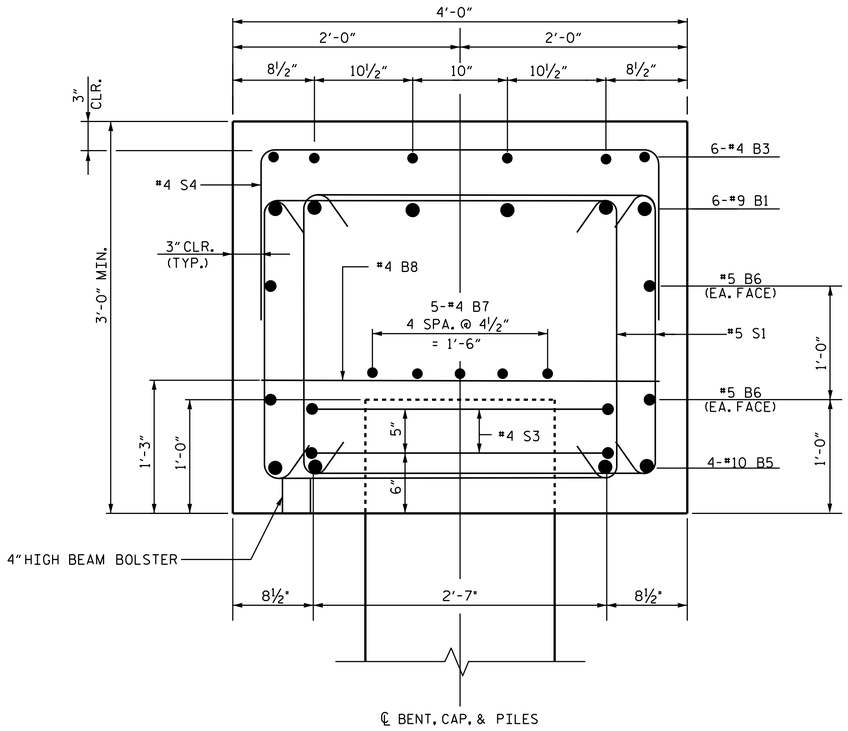
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S10-35
1			3			TOTAL SHEETS
2			4			44

STR-#10

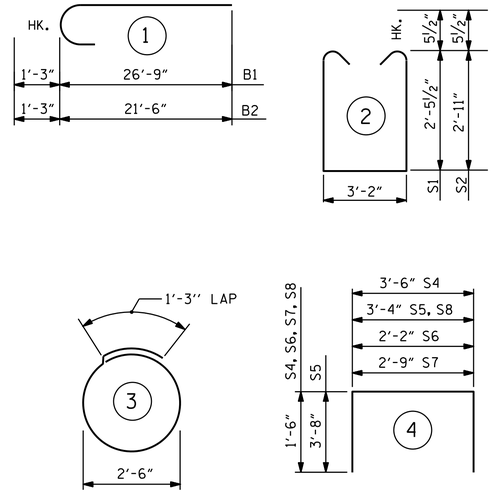
KCI JOB NO: 25146789.11



℄ BENT, CAP, & PILES

SECTION A-A

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL FOR ONE BENT

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	6	9	1	28'-0"	571
B2	6	9	1	22'-9"	464
B3	6	4	STR.	9'-9"	39
B4	6	4	STR.	12'-7"	50
B5	4	10	STR.	39'-6"	680
B6	4	5	STR.	39'-6"	165
B7	10	4	STR.	21'-3"	142
B8	10	4	STR.	3'-6"	23
B9	2	5	STR.	15'-8"	33
S1	42	5	2	8'-10"	387
S2	42	5	2	9'-11"	434
S3	14	4	3	9'-2"	86
S4	42	4	4	6'-6"	182
S5	2	9	4	10'-8"	73
S6	4	4	4	5'-2"	14
S7	4	4	4	5'-9"	15
S8	6	4	4	6'-4"	25

EPOXY COATED REINFORCING STEEL LBS. 3383

CLASS AA CONCRETE, CU. YD. 23.1

PILE DRIVING EQUIPMENT SETUP FOR 20" PRESTRESSED PILES, EA. 7

20" PRESTRESSED CONCRETE PILES

NO.		7
LIN. FT.	BENT 1	385
	BENT 2	455
	BENT 3	420
	BENT 4	420
	BENT 5	385
	BENT 6	385

PREDRILLING FOR PILES, LIN. FT. BENT 1 ONLY 97

PILE REDRIVES, EA. 4

(NOTE: PILE HEADS HAVE BEEN DEDUCTED FROM CLASS AA CONCRETE)

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE BENT 1-6

LEFT LANE

DocuSigned by: DB3C8E45B06D4...
NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON
6/8/2018

ENGINEERS ● PLANNERS ● ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
SUITE 220, LANDMARK CENTER II 4601 SIX FORKS RD. RALEIGH, N.C. 27609-5210 (919) 783-9214
DWG. REF. NO. 36 OF 44

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

SHEET NO. S10-36
TOTAL SHEETS 44

STR-#10

DESIGN ENGINEER OF RECORD: DocuSigned by: DB3C8E45B06D4... DATE: 6/8/2018
DRAWN BY: R. A. PRUETT DATE: 04/20/17
CHECKED BY: R. C. LARSON DATE: 04/22/17

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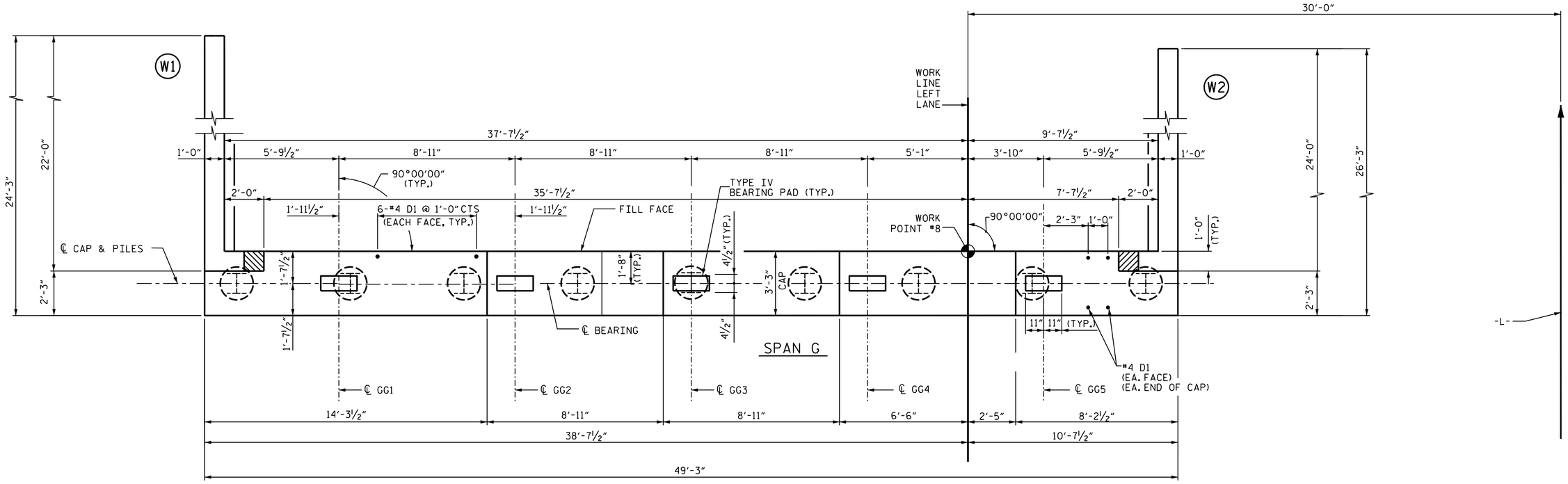
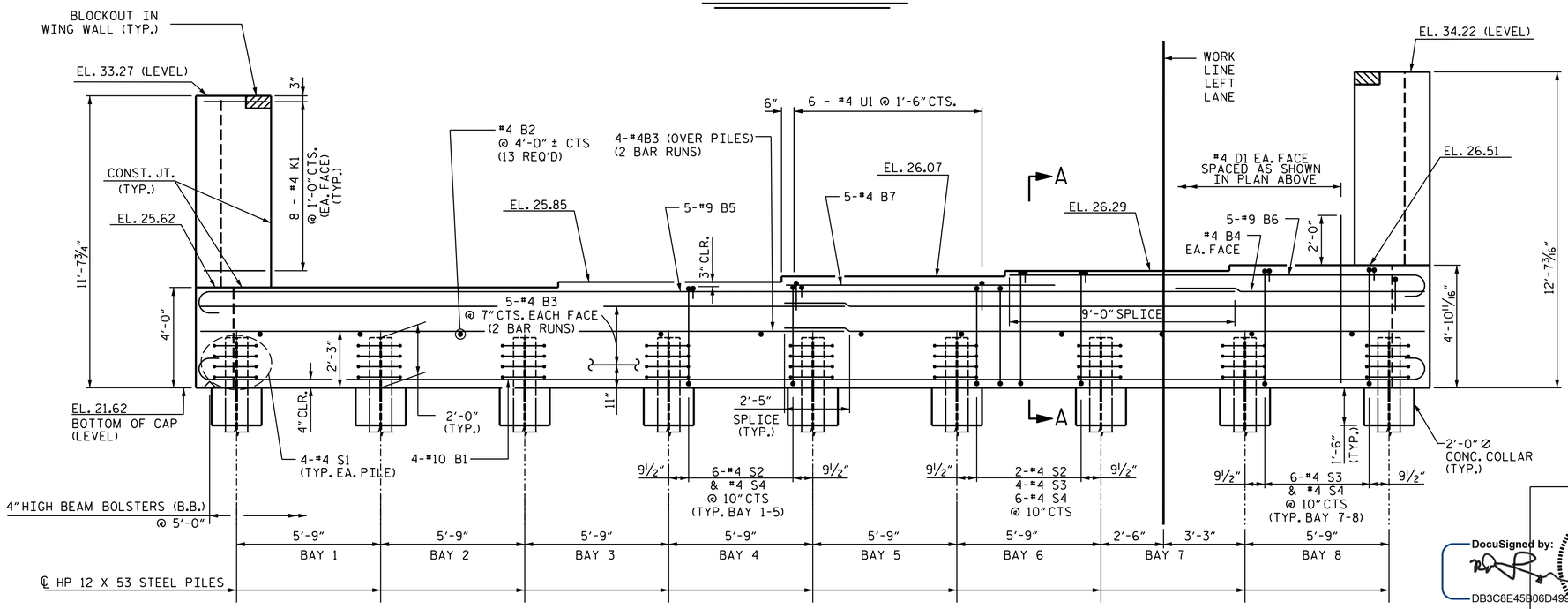


PLAN OF CAP



ELEVATION

NOTES

FOR BLOCKOUT IN WING, SEE END BENT 1.

FOR TEMPORARY DRAINAGE AT END BENT, SEE END BENT 1.

FOR SECTION A-A SEE SHEET 4 OF 4.

THE TOP SURFACE OF THE END BENT CAP AND WINGS EXCLUDING THE BEARING AREAS SHALL BE RAKED TO A DEPTH OF ¼".

STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR "D" BARS.

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 1 OF 4

DocuSigned by: DB3C8E45B06D499...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

12/7/2018

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE END BENT 2

LEFT LANE

DESIGN ENGINEER OF RECORD: DocuSigned by: DB3C8E45B06D499... DATE: 12/7/2018

DRAWN BY: R. J. FLORY DATE: 10/15/15

CHECKED BY: R. C. LARSON DATE: 11/14/15

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DWG. REF. NO. 37 OF 44

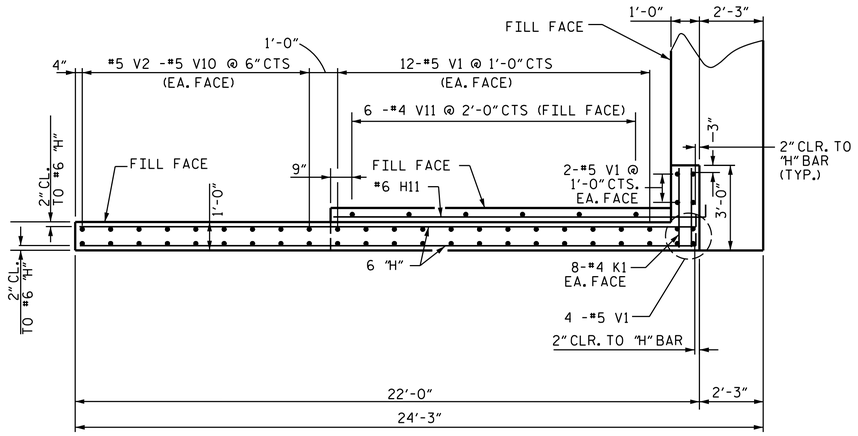
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

SHEET NO. S10-37

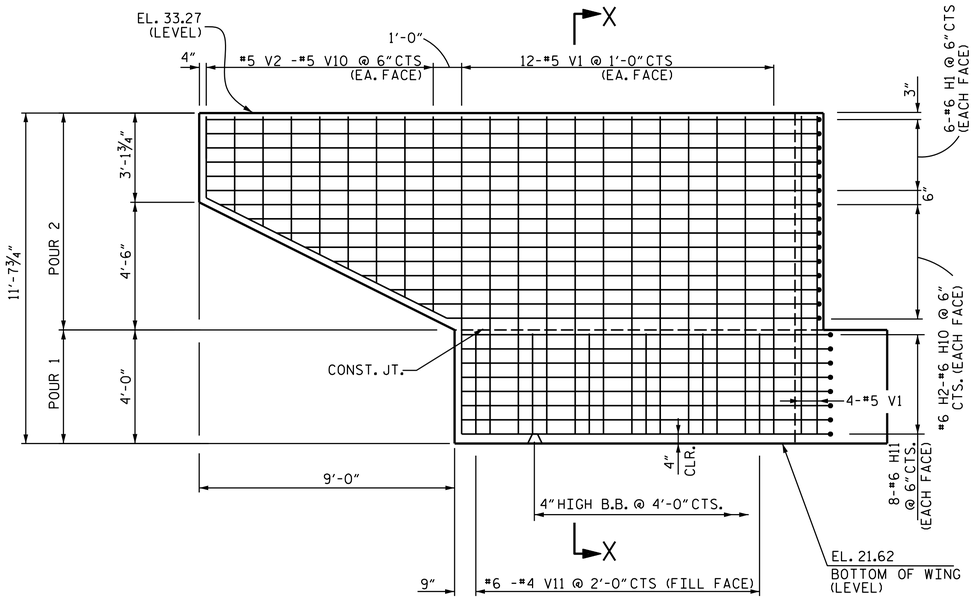
TOTAL SHEETS 44

STR-#10

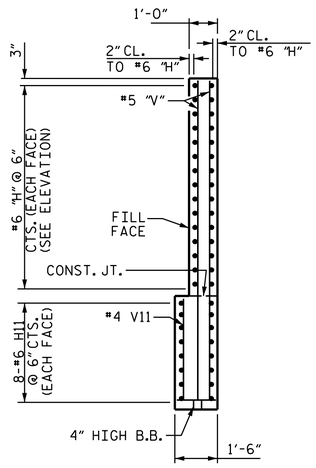
KCI JOB NO: 251467989.11



PLAN W1



ELEVATION W1



SECTION X-X

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 2 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE END BENT 2

LEFT LANE

DESIGN ENGINEER OF RECORD: DocuSigned by: DB3C8E45B06D499... DATE: 6/8/2018

DRAWN BY: R.J. FLORY DATE: 10/27/15

CHECKED BY: R. C. LARSON DATE: 03/27/17

DocuSigned by: DB3C8E45B06D499... 6/8/2018

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

ENGINEERS ● PLANNERS ● ECOLOGISTS LICENSE NUMBER: C-0764

KCI Associates of North Carolina, P.A.

SUITE 220, LANDMARK CENTER ▪ 4601 SIX FORKS RD, RALEIGH, N.C. 27609-5320 (919) 783-9214

DWG. REF. NO. 38 OF 44

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S10-38
1			3			TOTAL SHEETS
2			4			44

STR-#10

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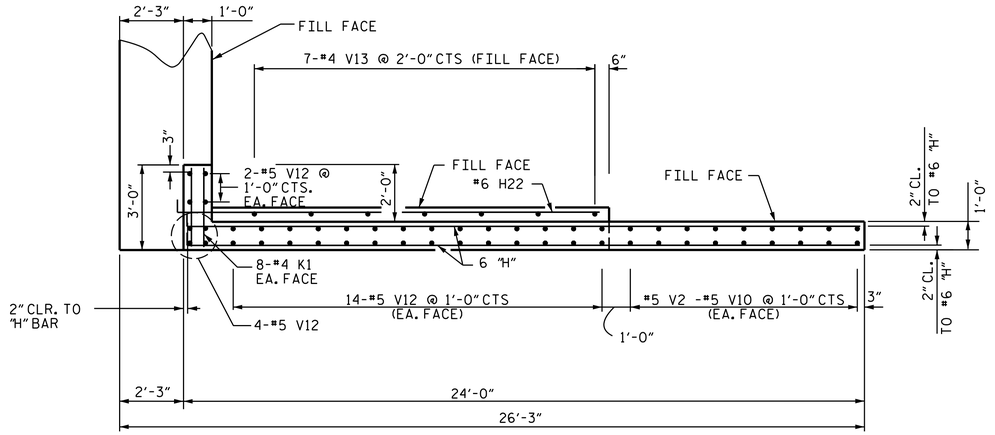
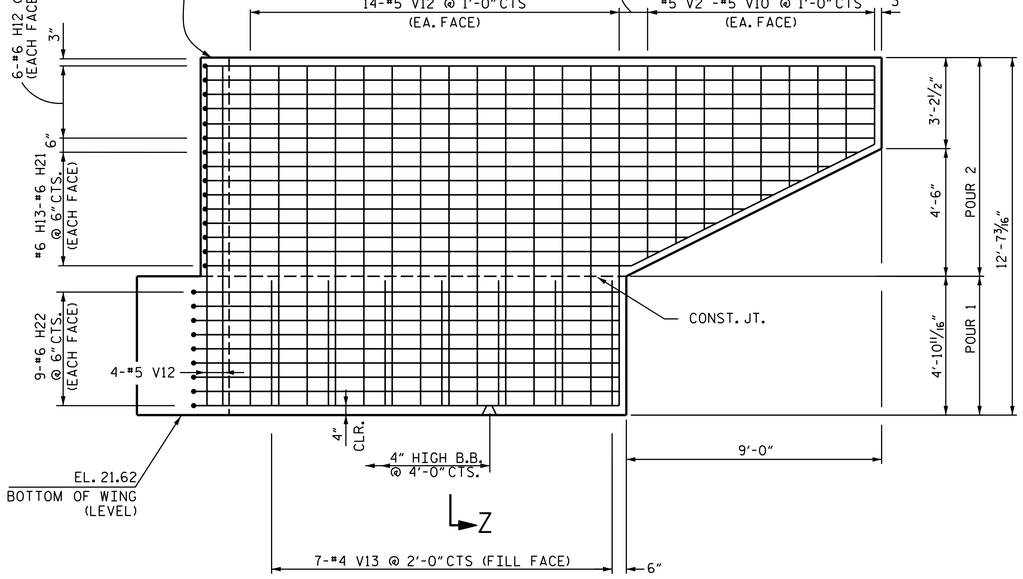
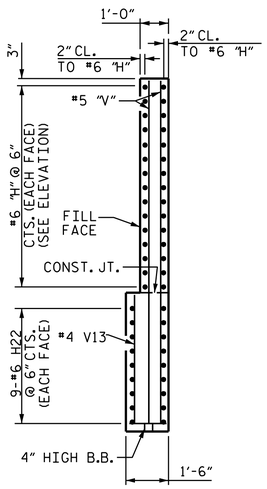


PLAN W2



ELEVATION W2



SECTION Z-Z

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 3 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE END BENT 2

LEFT LANE

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT G. LARSON

DocuSigned by: DB3C8E45B06D499...

6/8/2018

KCI JOB NO: 25146789.11

DESIGN ENGINEER OF RECORD: DocuSigned by: DATE : 6/8/2018

DRAWN BY : R.J. FLORY DATE : 10/27/15

CHECKED BY : R. C. LARSON DATE : 04/06/17

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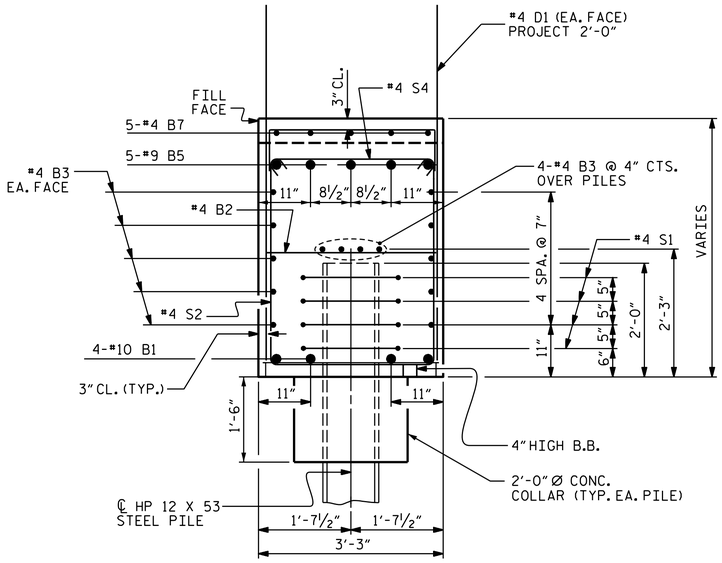
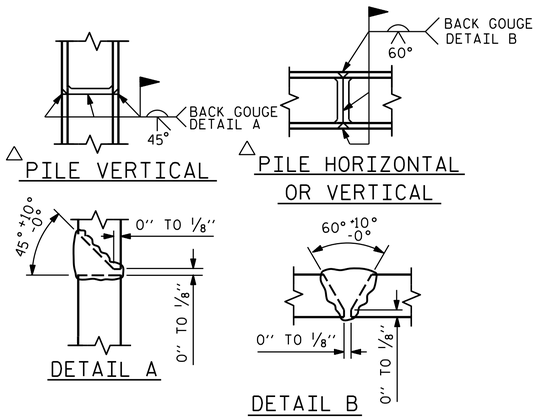
DWG. REF. NO. 39 OF 44

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S10-39
1			3			TOTAL SHEETS
2			4			44

STR-#10



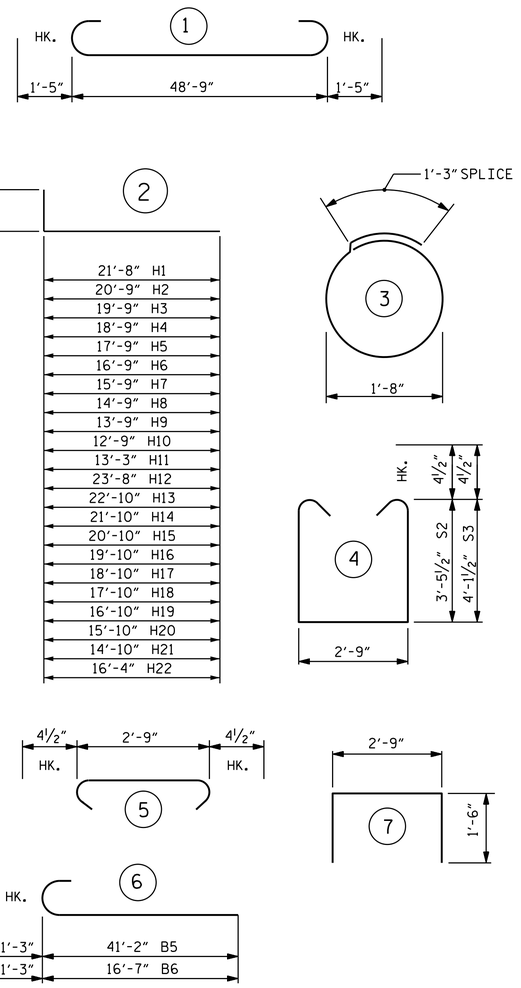
SECTION A-A



△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

END BENT 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	4	10	1	51'-7"	888
B2	13	4	STR.	2'-11"	25
B3	28	4	STR.	25'-8"	480
B4	2	4	STR.	10'-2"	14
B5	5	9	6	42'-5"	721
B6	5	9	6	17'-10"	303
B7	5	4	STR.	11'-0"	37
D1	56	4	STR.	6'-8"	249
H1	12	6	2	22'-4"	403
H2	2	6	2	21'-5"	64
H3	2	6	2	20'-5"	61
H4	2	6	2	19'-5"	58
H5	2	6	2	18'-5"	55
H6	2	6	2	17'-5"	52
H7	2	6	2	16'-5"	49
H8	2	6	2	15'-5"	46
H9	2	6	2	14'-5"	43
H10	2	6	2	13'-5"	40
H11	16	6	2	13'-11"	334
H12	12	6	2	24'-4"	439
H13	2	6	2	23'-6"	71
H14	2	6	2	22'-6"	68
H15	2	6	2	21'-6"	65
H16	2	6	2	20'-6"	62

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H17	2	6	2	19'-6"	59
H18	2	6	2	18'-6"	56
H19	2	6	2	17'-6"	53
H20	2	6	2	16'-6"	50
H21	2	6	2	15'-6"	47
H22	18	6	2	17'-0"	460
K1	32	4	STR.	2'-8"	57
S1	32	4	3	6'-6"	139
S2	32	4	4	10'-5"	223
S3	16	4	4	11'-9"	126
S4	48	4	5	3'-6"	112
U1	6	4	7	5'-9"	23
V1	32	5	STR.	11'-4"	378
V2	4	5	STR.	6'-11"	29
V3	4	5	STR.	6'-5"	27
V4	4	5	STR.	5'-11"	25
V5	4	5	STR.	5'-5"	23
V6	4	5	STR.	4'-11"	21
V7	4	5	STR.	4'-5"	18
V8	4	5	STR.	3'-11"	16
V9	4	5	STR.	3'-5"	14
V10	4	5	STR.	2'-11"	12
V11	6	4	STR.	3'-8"	15
V12	28	5	STR.	12'-3"	358
V13	7	4	STR.	4'-5"	21

EPOXY COATED REINFORCING STEEL, LB		6989
CLASS AA CONCRETE, CY	POUR 1	33.9
	POUR 2	12.6
	TOTAL	46.5
HP 12X53 STEEL PILES	NO.	9
	LF	495
PILE DRIVING EQUIPMENT SETUP FOR HP 12X53 STEEL PILES, EA.		9
PILE REDRIVES, EA.		5

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 4 OF 4

DocuSigned by: DB3C8E45B06D4...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

9/18/2018

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE END BENT 2

LEFT LANE

DESIGN ENGINEER OF RECORD: DocuSigned by: DB3C8E45B06D4... DATE: 9/18/2018

DRAWN BY: R. J. FLORY DATE: 08/01/16

CHECKED BY: R.C. LARSON DATE: 08/11/16

ENGINEERS ◆ PLANNERS ◆ ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
SUITE 220, LANDMARK CENTER ◆ 4601 SIX FORKS RD, RALEIGH, N.C. 27609-5320 (919) 783-9214

DWG. REF. NO. 40 OF 44

REVISIONS					
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1			3		
2			4		

SHEET NO. S10-40

TOTAL SHEETS 44

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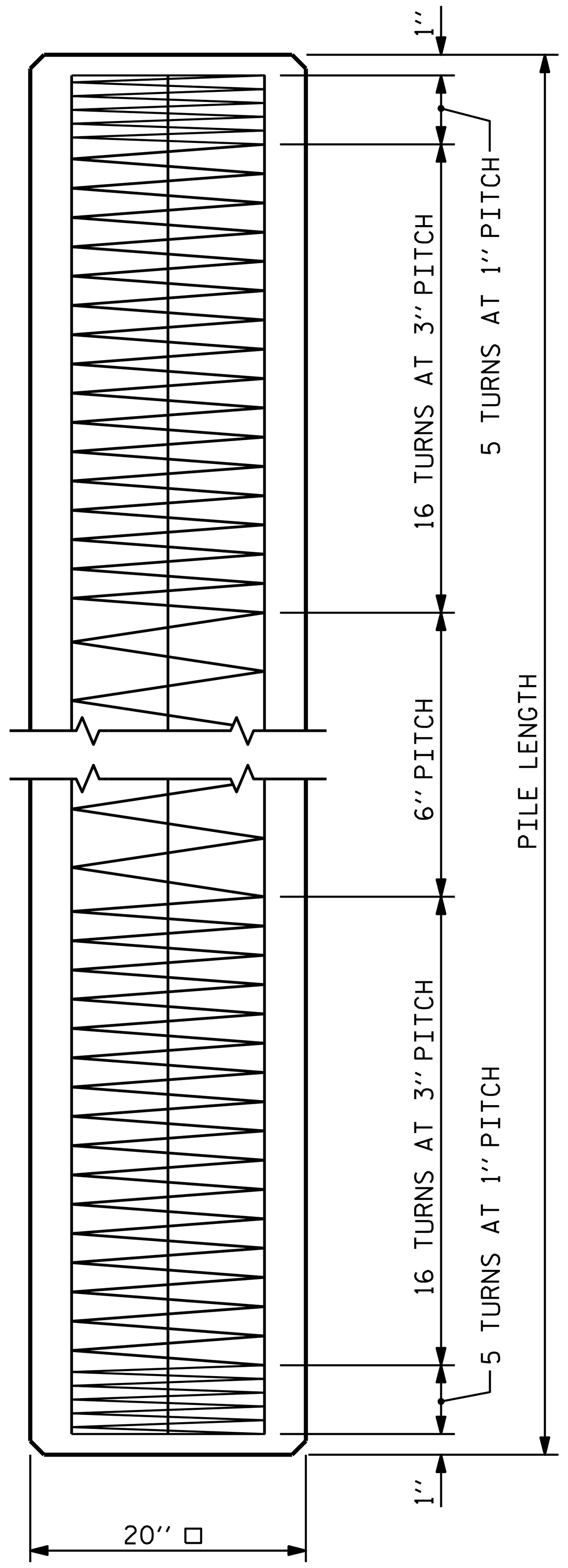
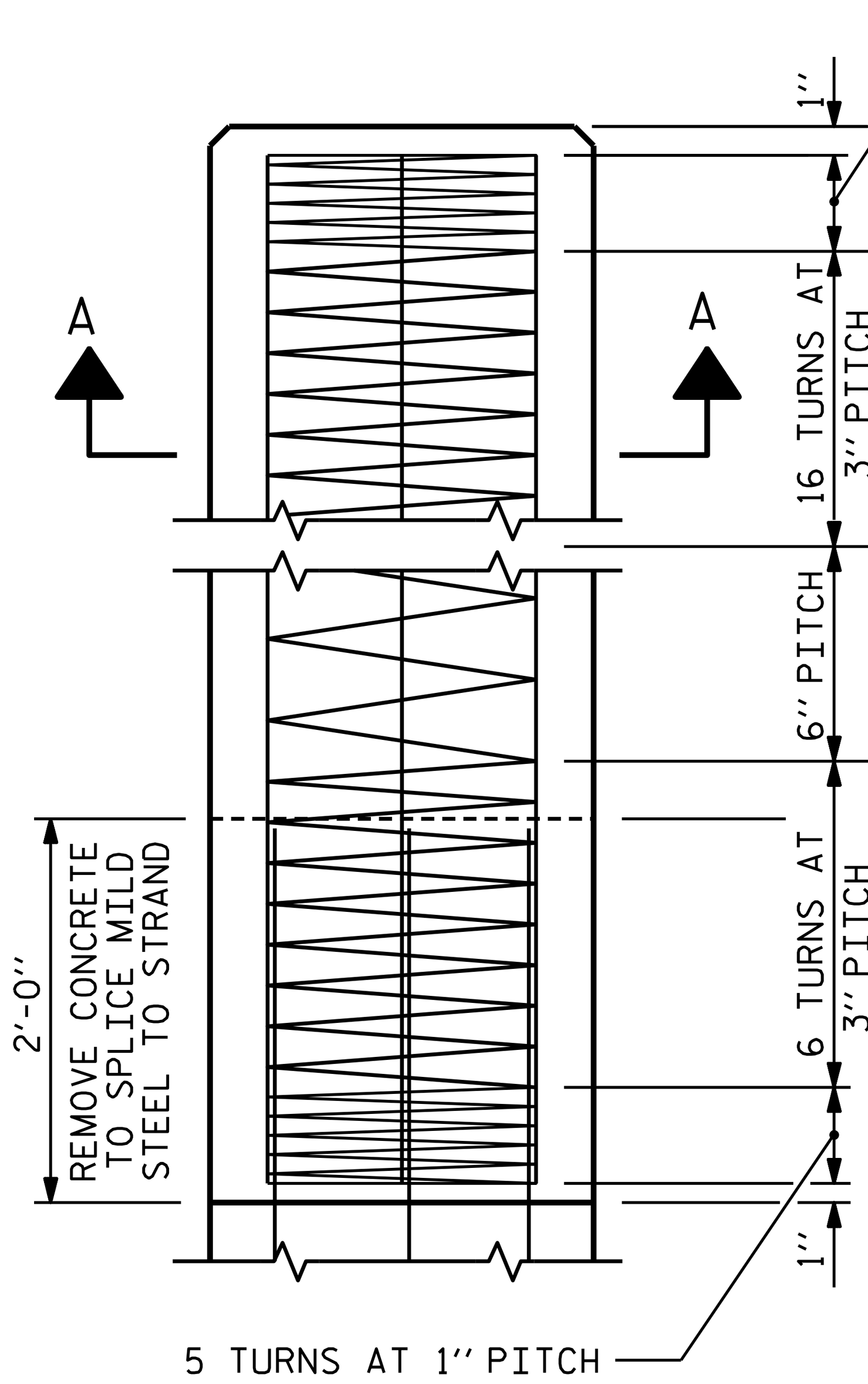
KCI JOB NO. 25146789.11

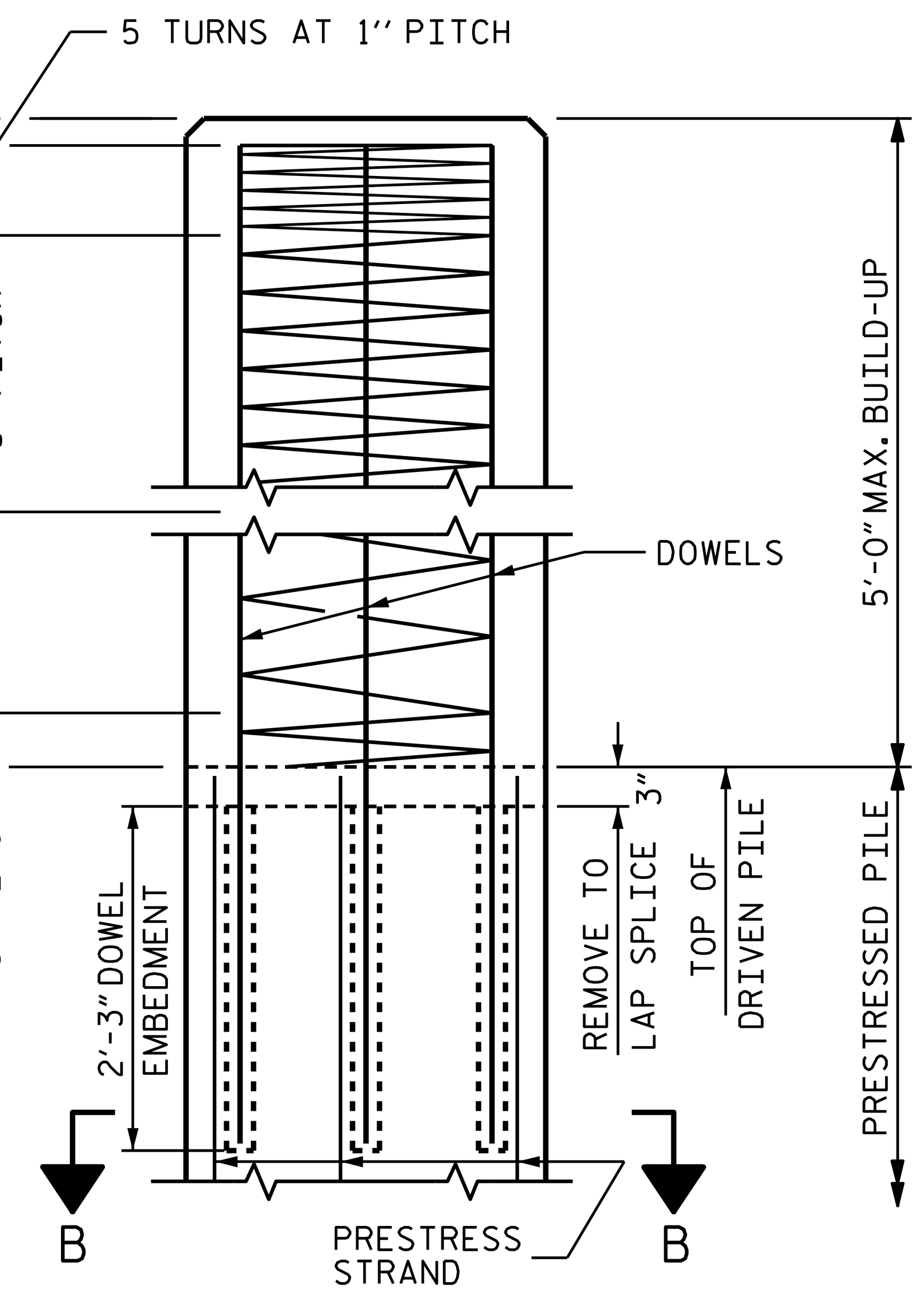
STR-#10



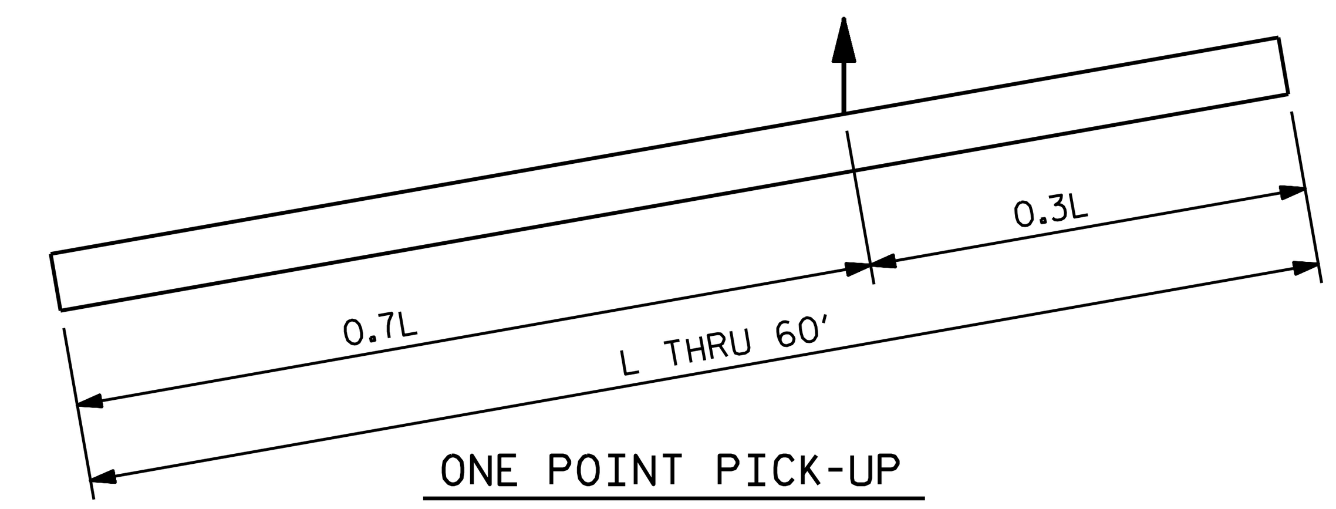
ELEVATION



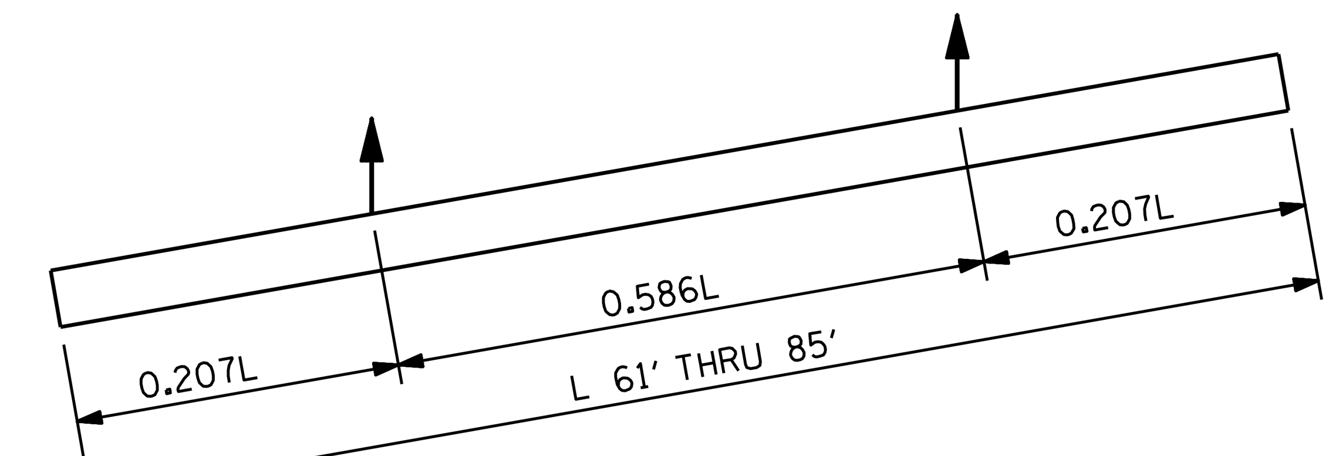
BUILD-UP AND SPIRAL REINFORCING



OPTIONAL BUILD-UP WITH DOWELS



ONE POINT PICK-UP



TWO POINT PICK-UP

PICK-UP POINTS

QUANTITIES FOR ONE 20" SQUARE PILE						
	CONCRETE	PILE WT.	ONE POINT PICK-UP		TWO POINT PICK-UP	
LENGTH	CU. YDS.	TONS	0.3L	0.7L	0.207L	0.586L
25'-0"	2.56	5.18	7'-6"	17'-6"		
30'-0"	3.07	6.22	9'-0"	21'-0"		
35'-0"	3.58	7.26	10'-6"	24'-6"		
40'-0"	4.09	8.29	12'-0"	28'-0"		
45'-0"	4.61	9.33	13'-6"	31'-6"		
50'-0"	5.12	10.36	15'-0"	35'-0"		
55'-0"	5.63	11.40	16'-6"	38'-6"		
60'-0"	6.14	12.44	18'-0"	42'-0"		
65'-0"	6.65	13.47			13'-5½"	38'-1"
70'-0"	7.17	14.51			14'-6"	41'-0"
75'-0"	7.68	15.55			15'-6½"	43'-11"
80'-0"	8.19	16.58			16'-6½"	46'-11"
85'-0"	8.70	17.62			17'-7"	49'-10"

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 THE STRAND CONFIGURATION SHOWN IN THE TYPICAL SECTION DETAIL. MIXING OF STRAND SIZE IS NOT ALLOWED.

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

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

PRESTRESSED CONCRETE PILES SHALL CONTAIN CALCIUM NITRITE CORROSION INHIBITOR

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

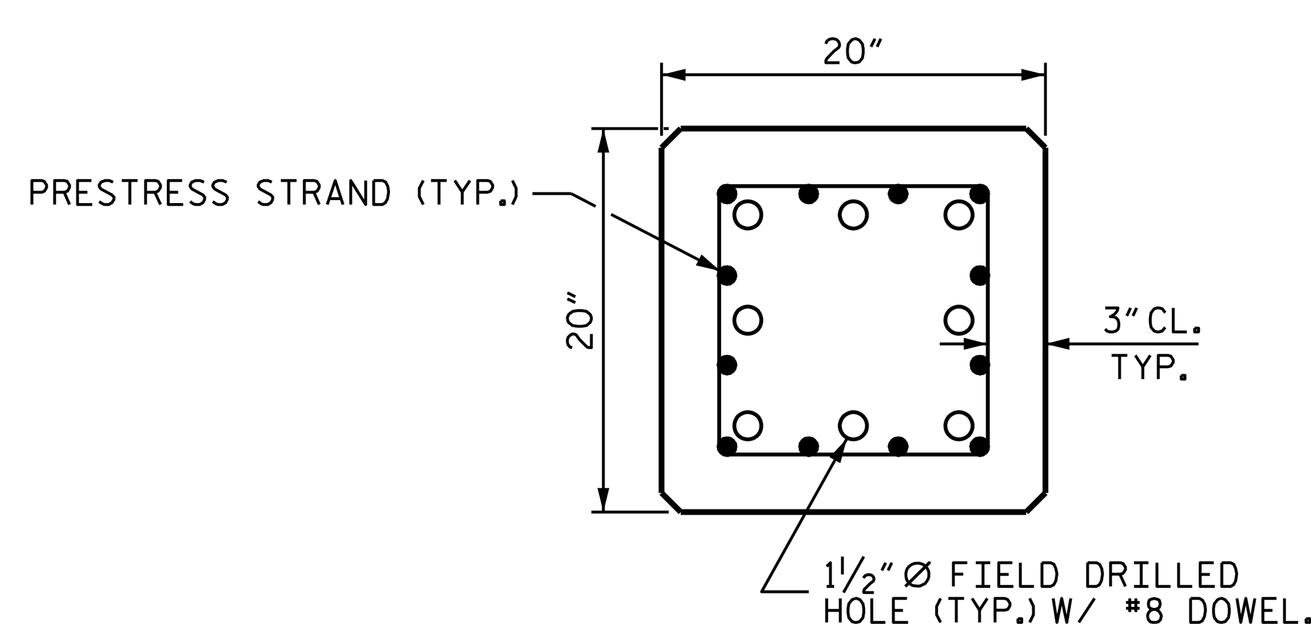
IF STRAND STRESS IS RELIEVED BY BURNING, THE STRANDS SHALL BE BURNED IN OPPOSITE PAIRS AS INDICATED IN THE TYPICAL PATTERN SHOWN. FOR ANY NUMBER OF STRANDS, BURN IN OPPOSITE PAIRS AND SYMMETRICALLY ABOUT BOTH THE VERTICAL AND HORIZONTAL AXES. STRANDS 1-1 SHALL BE BURNED BEFORE 2-2, ETC. NOT MORE THAN 4 STRANDS, SAY 5-5 AND 6-6, 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.



SECTION "B-B"

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

DOWEL INSTALLATION FOR OPTIONAL BUILD-UP

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

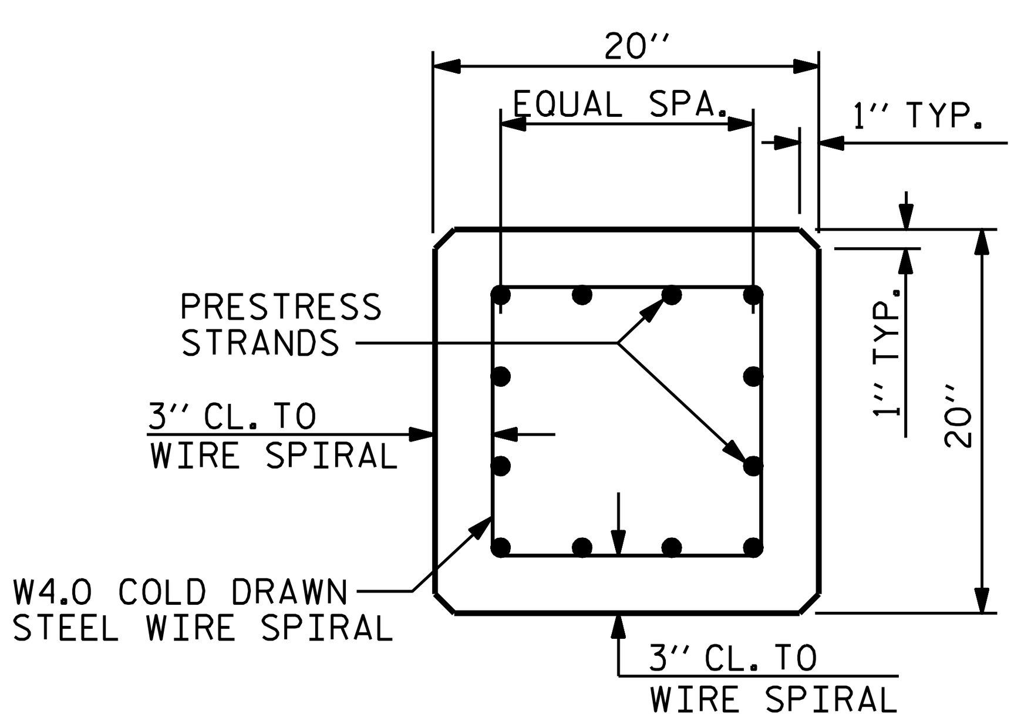
BEFORE DRILLING DOWEL HOLES, REMOVE THE UPPER 3" OF CONCRETE FROM THE TOP OF THE PILE WITHOUT DAMAGE TO THE REINFORCING STEEL. THE REMOVAL PLANE SHOULD BE NORMAL TO THE EDGE OF THE PILE.

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

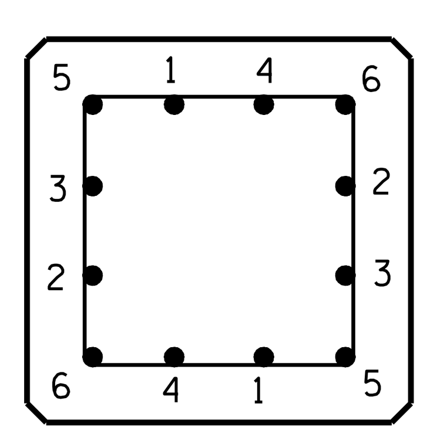
FIELD DRILLED HOLES SHALL BE CLEAN AND FREE OF ANY OBSTRUCTIONS BEFORE GROUTING OF DOWELS. DOWEL BARS SHALL BE INSTALLED AND GROUTED WITH AN APPROVED NON-SHRINK GROUT.

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.

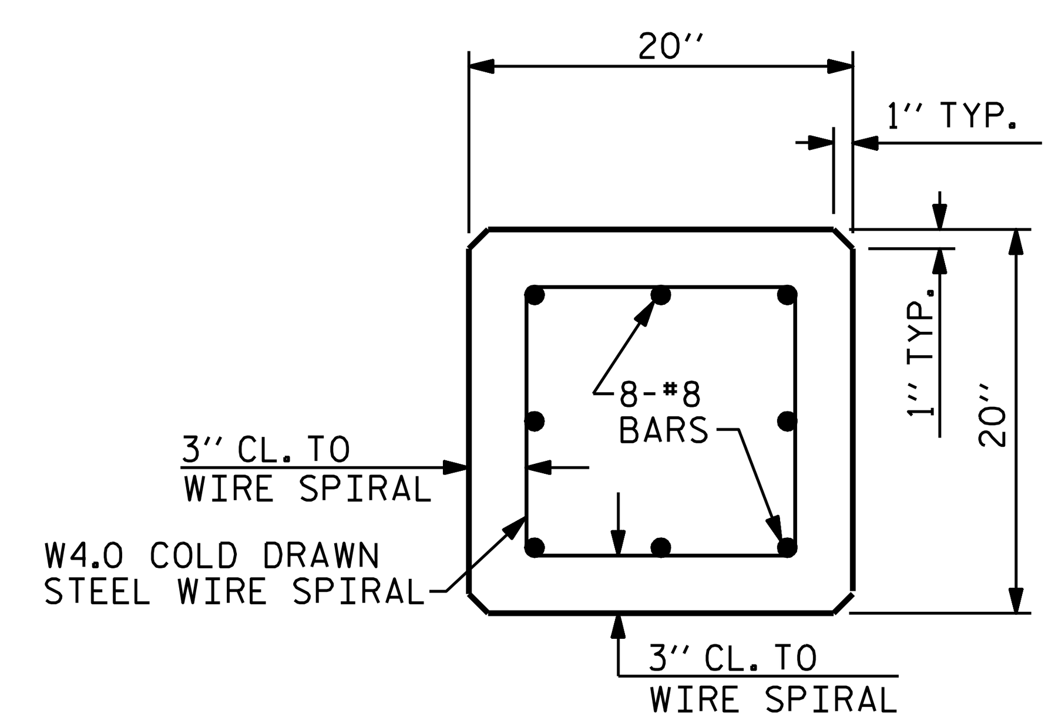
THE SPIRAL REINFORCING IN THE BUILD-UP AND THE PRESTRESSED CONCRETE PILE SHALL BE SPLICED BY OVERLAPPING A MIN. OF ONE TURN.



TYPICAL SECTION



TYPICAL PATTERN FOR BURNING STRANDS



SECTION A-A

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

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

20" PRESTRESSED CONCRETE PILE

LEFT LANE

DocuSigned by: DB3C8E45B06D...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

6/8/2018

DESIGN ENGINEER OF RECORD: DATE : 6/8/2018

ASSEMBLED BY : R. C. LARSON		DATE :	04/29/16
CHECKED BY :		DATE :	
DRAWN BY : WJH 1/89	REV. 11/30/10	WMC/GM	
CHECKED BY : CRK 3/89	REV. 10/1/11	MAA/GM	
	REV. 12/14	MAA/TMG	

KCI JOB NO: 251467891.1

KCI Associates of North Carolina, P.A.

DWG. REF. NO. 41 OF 44

REVISIONS							
NO.	BY:	DATE:	NO.	BY:	DATE:	SHEET NO.	S10-41
1			3			TOTAL SHEETS	44
2			4				

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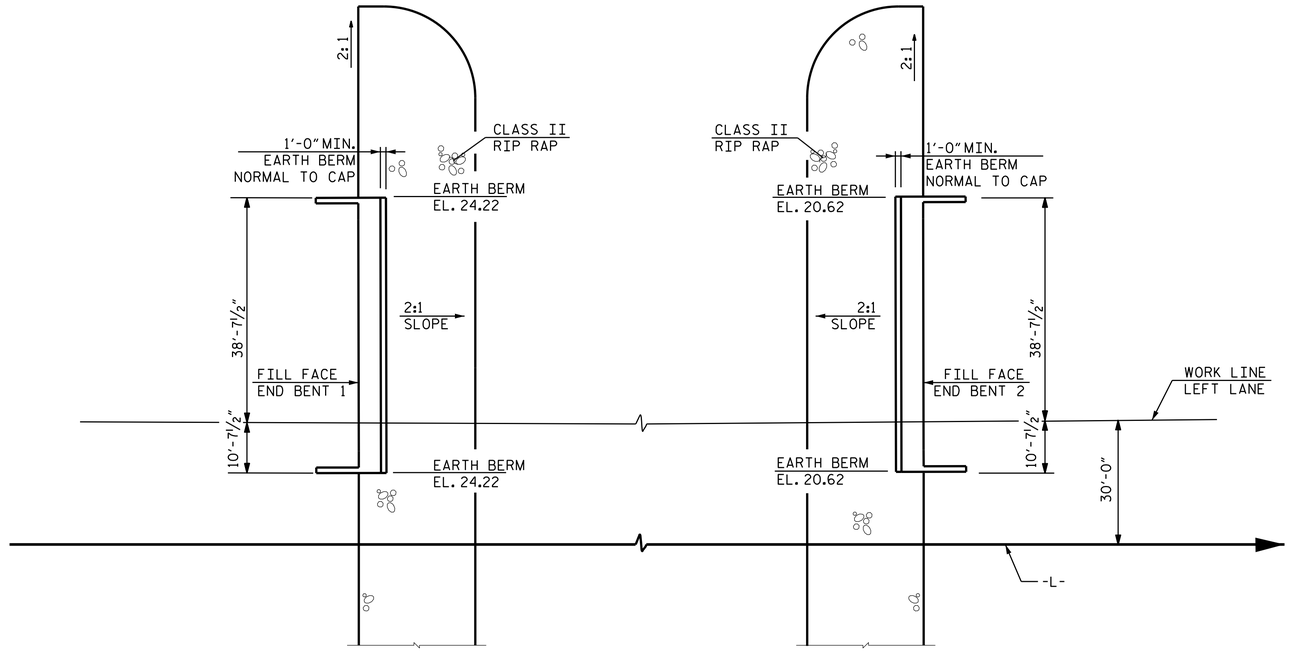
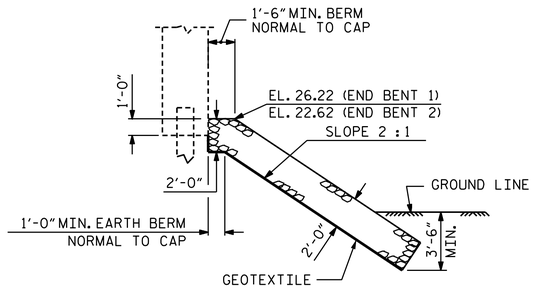
STR-#10

STD. NO. PCP3 (SHT 1)



PLAN OF RIP RAP



℄ SECTION
BERM RIP RAPPED

ESTIMATED QUANTITIES

BRIDGE @ STA. 287+62.50 -L-	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE
	TONS	SQUARE YARDS
END BENT 1	410	455
END BENT 2	300	335

PROJECT NO. R-1015
CRAVEN COUNTY
STATION: 287+62.50 -L-

KCI JOB NO: 25146789.11

DESIGN ENGINEER OF RECORD: DocuSigned by: DB3C8E45B06D459...	DATE :	6/8/2018
ASSEMBLED BY : R. J. FLORY	DATE :	02/23/16
CHECKED BY : R. C. LARSON	DATE :	03/30/16
DRAWN BY : REK 1/84	REV. 5/1/06R	TLA/GM
CHECKED BY : RDU 1/84	REV. 10/1/11	MAA/GM
	REV. 12/21/11	MAA/GM

DocuSigned by: DB3C8E45B06D459...
NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON
6/8/2018

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

RIP RAP DETAILS

LEFT LANE

ENGINEERS • PLANNERS • ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
SUITE 220, LANDMARK CENTER II 4601 SIX FORKS RD. RALEIGH, N.C. 27609-5210 (919) 783-9214
DWG. REF. NO. 42 OF 44

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S10-42
1			3			TOTAL SHEETS
2			4			44

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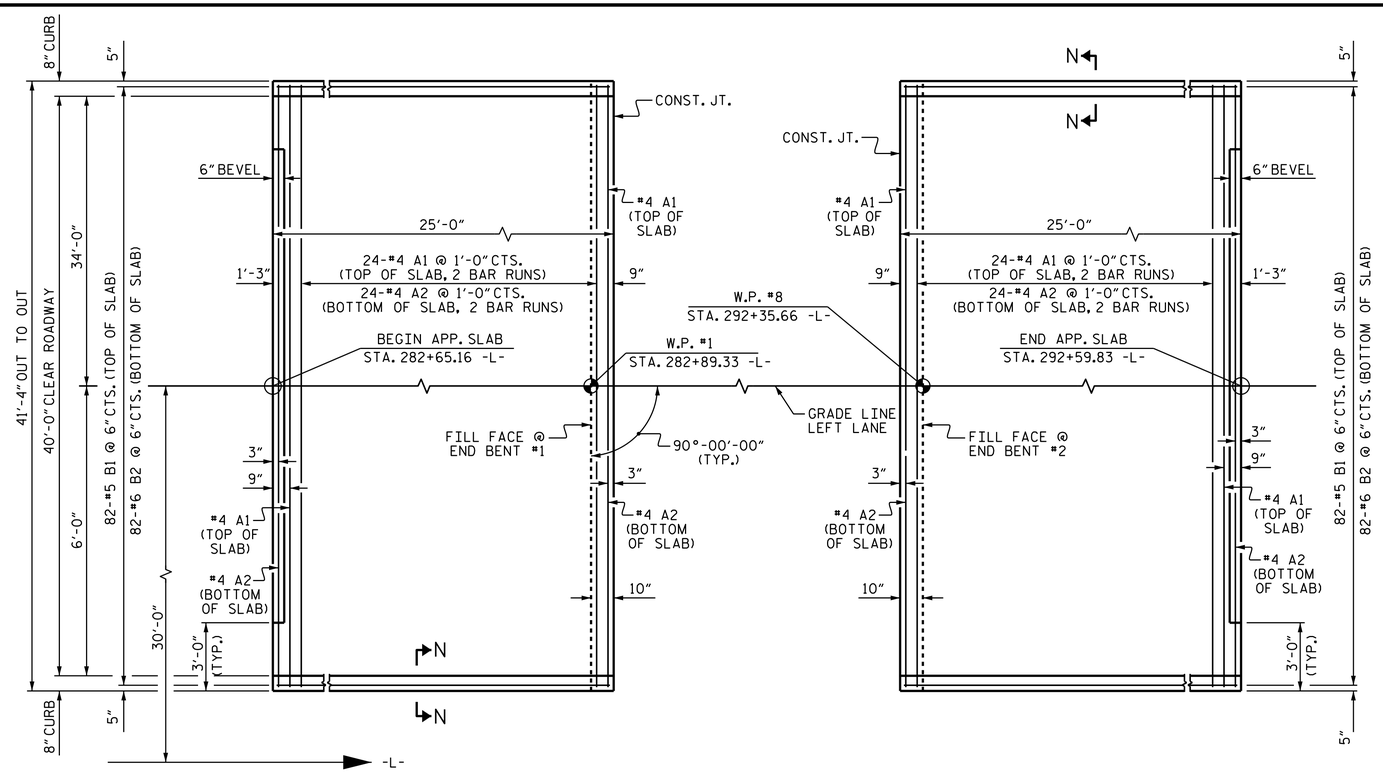
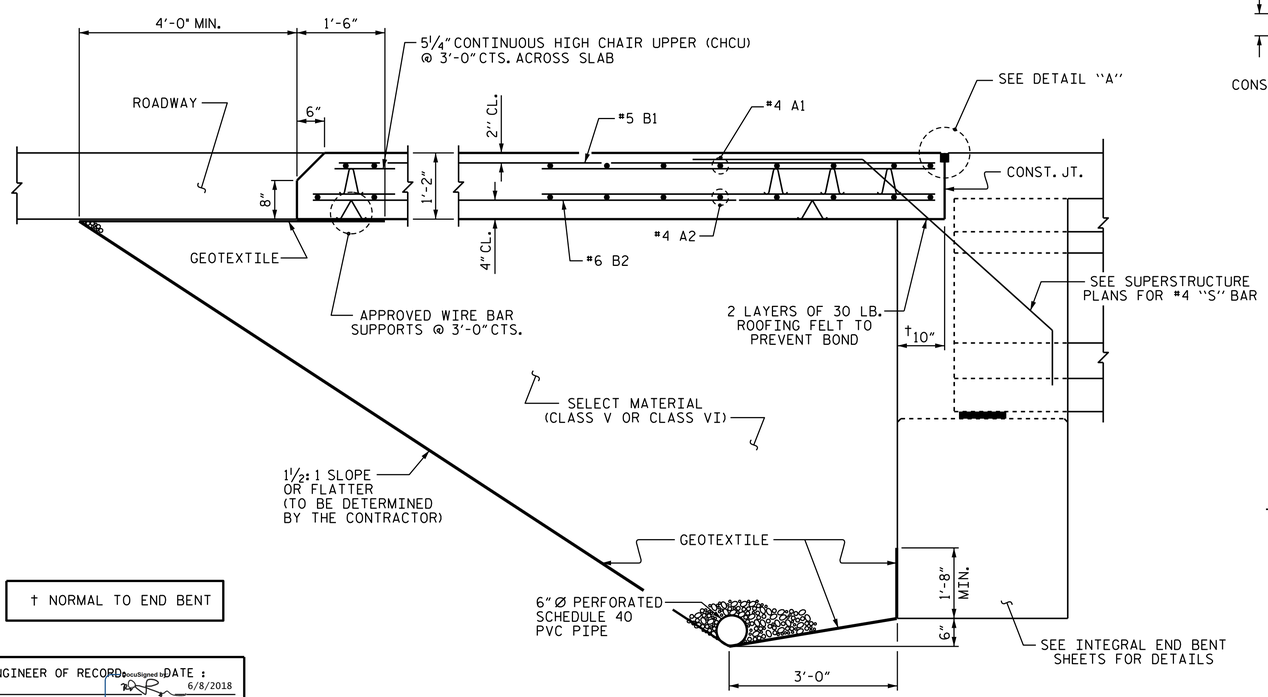
STR-#10

STD. NO. RR1 (Sht 2)



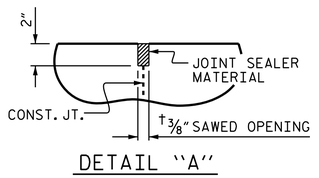
DIMENSIONS SHOWN ARE TYPICAL FOR BOTH APPROACH SLABS



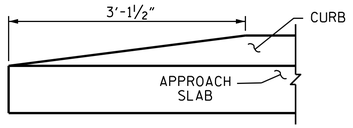
† NORMAL TO END BENT

SECTION THRU SLAB

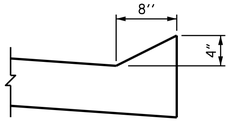
(TYPE I - STANDARD APPROACH FILL)



DETAIL "A"



END OF CURB WITHOUT SHOULDER BERM GUTTER



SECTION N-N

NOTES

APPROACH SLAB SHALL NOT BE CONSTRUCTED PRIOR TO COMPLETION OF THE BRIDGE DECK.

FOR BRIDGE APPROACH FILL INCLUDING GEOTEXTILE, 6" Ø DRAINAGE PIPE, AND SELECT MATERIAL, SEE ROADWAY PLANS.

GEOTEXTILE SHALL BE TYPE 1 IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS SECTION 1056.

SELECT MATERIAL BACKFILL (CLASS V OR CLASS VI) SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATIONS SECTION 1016.

SELECT MATERIAL BACKFILL IS TO BE CONTINUOUS ALONG FILL FACE OF BACKWALL FROM OUTSIDE EDGE TO OUTSIDE EDGE OF APPROACH SLAB.

FOR THE 6" Ø DRAINAGE PIPE OUTLET(S), SEE ROADWAY STANDARD DRAWINGS.

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.

THE JOINT OPENING AT THE APPROACH SLAB/DECK INTERFACE SHALL BE SAWED NO MORE THAN 12 HOURS AFTER THE APPROACH SLAB IS CAST. THE JOINT SHALL BE CLEANED OF ALL DEBRIS BEFORE THE SEALANT IS APPLIED. THE JOINT SEALER MATERIAL SHALL CONFORM TO THE REQUIREMENTS OF SECTION 1028-3 OF THE STANDARD SPECIFICATIONS.

AT THE CONTRACTORS OPTION, "TYPE A - ALTERNATE APPROACH FILL" IN LIEU OF "TYPE I - STANDARD APPROACH FILL" MAY BE CONSTRUCTED AT NO ADDITIONAL COST TO THE DEPARTMENT. SEE SHEET 2 OF 2 FOR DETAILS AND NOTES.

BILL OF MATERIAL

FOR ONE APPROACH SLAB (2 REQ'D)

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	52	#4	STR	22'-0"	764
A2	52	#4	STR	22'-0"	764
B1	82	#5	STR	24'-2"	2067
B2	82	#6	STR	24'-8"	3038

EPOXY COATED REINFORCING STEEL 6633 LBS.

CLASS AA CONCRETE 44.7 C. Y.

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-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB FOR INTEGRAL ABUTMENT

LEFT LANE

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

DocuSigned by: DB3C8E45B06D499...

6/8/2018

ENGINEERS ● PLANNERS ● ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
SUITE 220, LANDMARK CENTER II 4601 SIX FORKS RD, RALEIGH, N.C. 27609-5210 (919) 783-9214

DWG. REF. NO. 43 OF 44

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S10-43
1			3			TOTAL SHEETS
2			4			44

STR-#10

STD. NO. BAS5 (SHT 2)

DESIGN ENGINEER OF RECORD: DocuSigned by: DB3C8E45B06D499... DATE: 6/8/2018

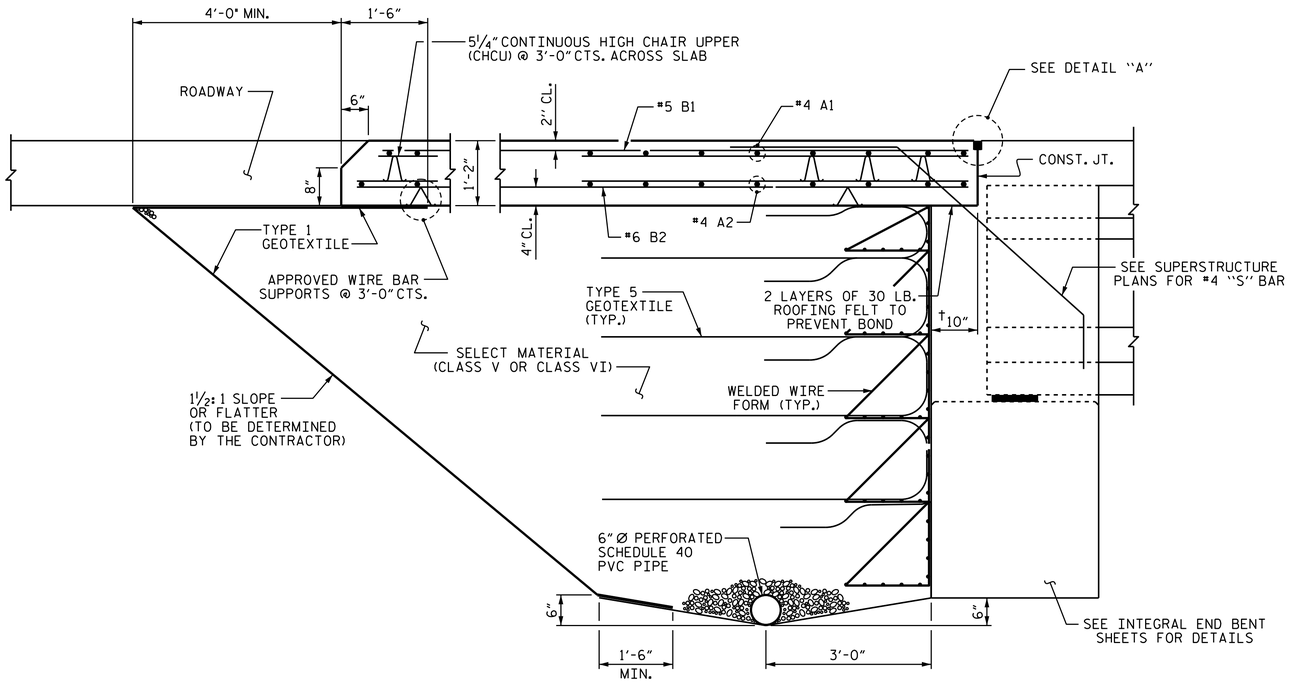
ASSEMBLED BY: R.C. LARSON DATE: 02/08/16
CHECKED BY: E.C. DECOLA DATE: 02/14/16

DRAWN BY: TLA 10/05
CHECKED BY: GM 5/06

REV. 10/1/11	MAA/GM
REV. 12/21/11	MAA/GM
REV. 6/13	MAA/GM

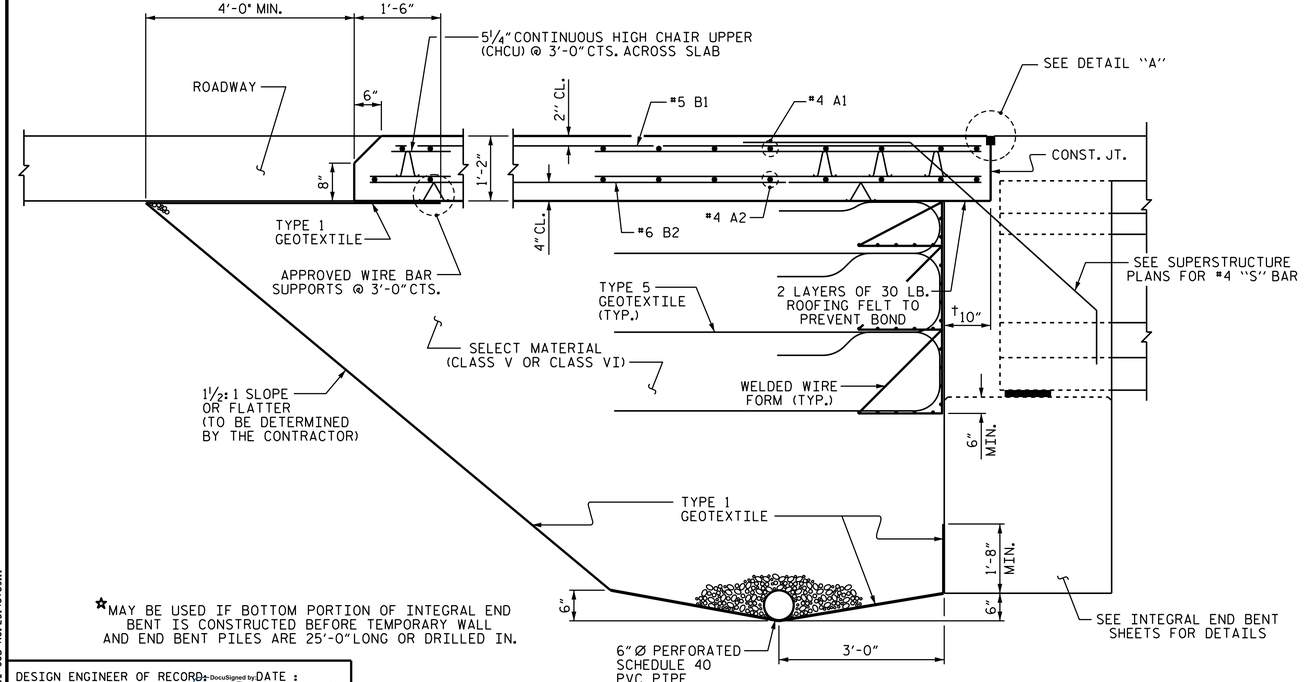
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

KCI JOB NO. 25146789.11



SECTION THRU SLAB

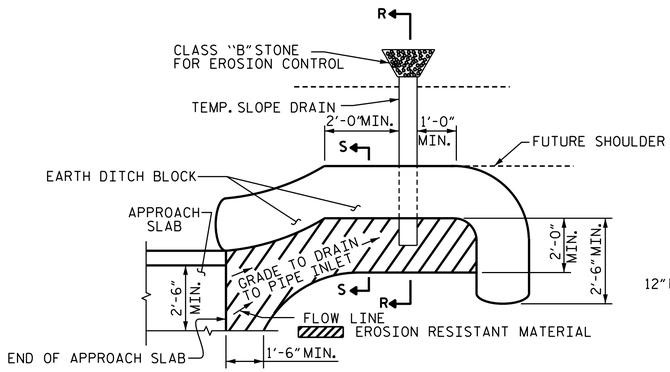
(TYPE A - ALTERNATE APPROACH FILL)



SECTION THRU SLAB

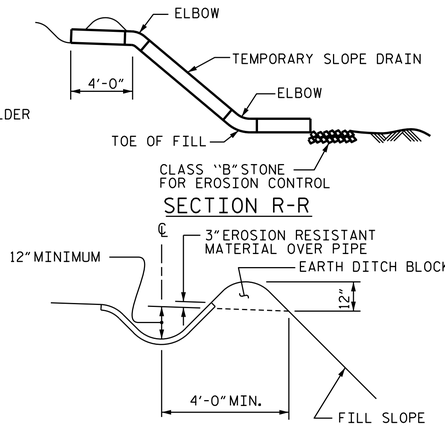
★(TYPE A - ALTERNATE APPROACH FILL)

★MAY BE USED IF BOTTOM PORTION OF INTEGRAL END BENT IS CONSTRUCTED BEFORE TEMPORARY WALL AND END BENT PILES ARE 25'-0" LONG OR DRILLED IN.



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.

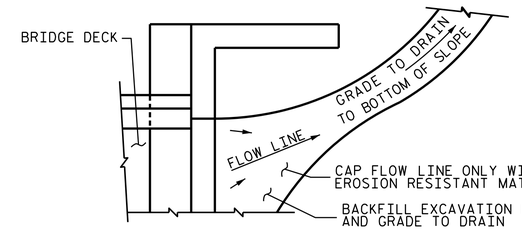
PLAN VIEW



SECTION 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

APPROACH SLAB SHALL NOT BE CONSTRUCTED PRIOR TO COMPLETION OF THE BRIDGE DECK.

FOR TEMPORARY GEOTEXTILE WALL INCLUDING GEOTEXTILE, 6" Ø DRAINAGE PIPE, WELDED WIRE FORM, AND SELECT MATERIAL, SEE ROADWAY PLANS.

GEOTEXTILE (TYPE 1 OR TYPE 5) SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS SECTION 1056.

SELECT MATERIAL BACKFILL (CLASS V OR CLASS VI) SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATIONS SECTION 1016.

SELECT MATERIAL BACKFILL IS TO BE CONTINUOUS ALONG FILL FACE OF BACKWALL FROM OUTSIDE EDGE TO OUTSIDE EDGE OF APPROACH SLAB.

FOR THE 6" Ø DRAINAGE PIPE OUTLET(S), SEE ROADWAY STANDARD DRAWINGS.

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.

THE JOINT OPENING AT THE APPROACH SLAB/DECK INTERFACE SHALL BE SAWED NO MORE THAN 12 HOURS AFTER THE APPROACH SLAB IS CAST. THE JOINT SHALL BE CLEANED OF ALL DEBRIS BEFORE THE SEALANT IS APPLIED. THE JOINT SEALER MATERIAL SHALL CONFORM TO THE REQUIREMENTS OF SECTION 1028-3 OF THE STANDARD SPECIFICATIONS.

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 2 OF 2

DESIGN ENGINEER OF RECORD: DocuSigned by DB3C8E45B06D499...	DATE : 6/8/2018		
ASSEMBLED BY : R.C. LARSON	DATE : 02/08/16		
CHECKED BY : E.C. DECOLA	DATE : 02/12/16		
DRAWN BY : FCJ 11/88	REV. 10/1/11	MAA/GM	
CHECKED BY : ARB 11/88	REV. 7/12	MAA/GM	
	REV. 6/13	MAA/GM	

DocuSigned by: DB3C8E45B06D499... 6/8/2018

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB DETAILS

LEFT LANE

ENGINEERS ● PLANNERS ● ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
SUITE 220, LANDMARK CENTER II ● 4601 SIX FORKS RD. RALEIGH, N.C. 27609-5210 (919) 783-9214

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S10-44
1			3			TOTAL SHEETS
2			4			44

DWG. REF. NO. 44 OF 44

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STR-#10

STD. NO. BAS4

KCI JOB NO: 25146789.11

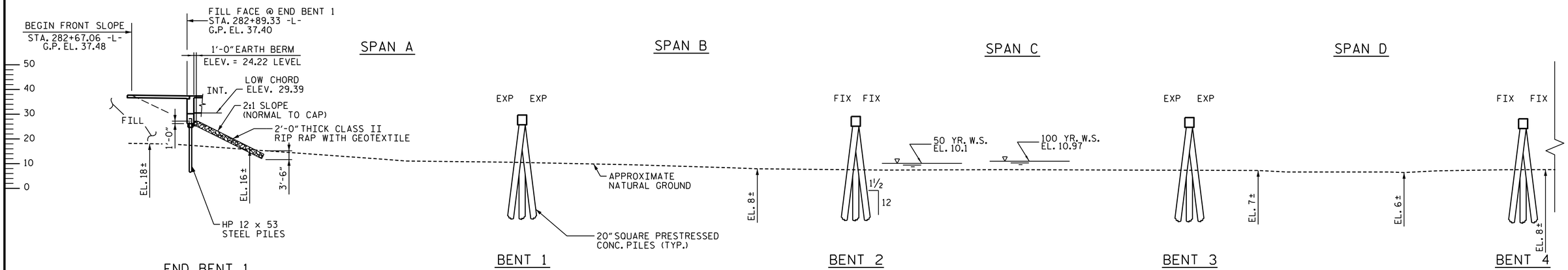
F.A. PROJ. NO. NHF-70(49)

283+00 284+00 285+00 286+00 287+00

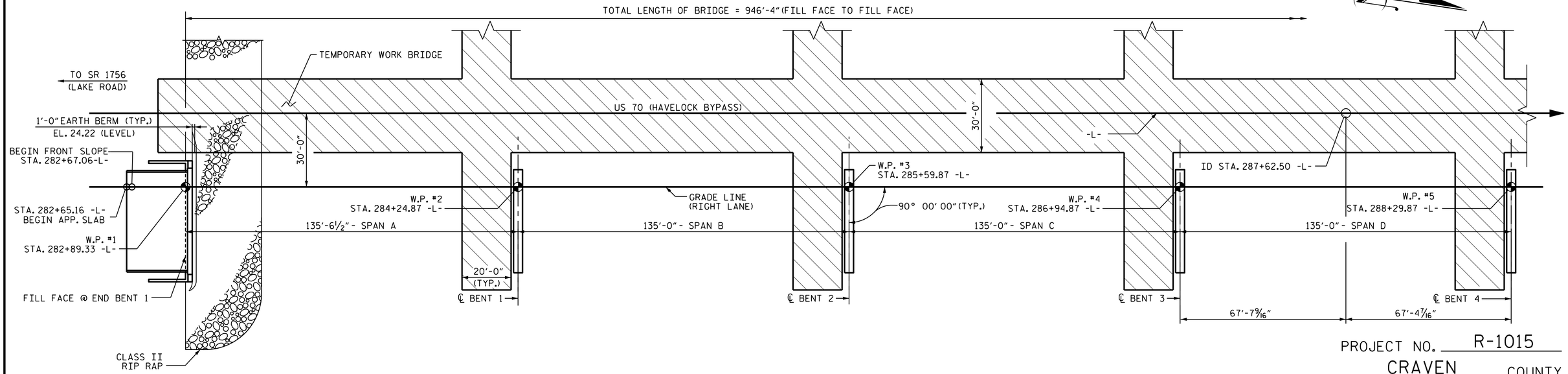
(+)0.3466% (-)0.3813%

PI STA. = 278+87.00 -L-
EL. = 38.93
VC = 200'

GRADE DATA -L-



SECTION ALONG GRADE LINE (RIGHT LANE)



PLAN
(PILES NOT SHOWN IN PLAN VIEW)

BRIDGE HYDRAULIC DATA	
DESIGN DISCHARGE	= 2000 CFS
DESIGN FREQUENCY	= 50 YR.
DESIGN HW ELEV.	= 10.1 FT.
DRAINAGE AREA	= 22 SQ. MI.
BASE DISCHARGE	= 2658 CFS
BASE FREQUENCY	= 100 YR.
BASE HW ELEV.	= 10.97 FT
OVERTOPPING DISCHARGE	= N/A*
OVERTOPPING FREQUENCY	= N/A*
OVERTOPPING ELEV.	= N/A*

* OVERTOPPING FREQUENCY EXCEEDS 500 YR.

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS

DocuSigned by: DB3C8E45B06D495...
NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON
12/7/2018

PROJECT NO. R-1015
CRAVEN COUNTY
STATION: 287+62.50 -L-

SHEET 1 OF 6 BRIDGE NO. 282

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
FOR BRIDGE ON US 70
(HAVELOCK BYPASS) OVER
SW PRONG OF SLOCUM CREEK
BETWEEN SR 1756 AND SR 1747

RIGHT LANE

KCI JOB NO. 25146789.11

DESIGN ENGINEER OF RECORD: DocuSigned by: DB3C8E45B06D495... DATE: 12/7/2018
DRAWN BY: R.J. FLORY DATE: 10/30/15
CHECKED BY: R.C. LARSON DATE: 11/01/15

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ENGINEERS ● PLANNERS ● ECOLOGISTS LICENSE NUMBER: C-0761
KCI Associates of North Carolina, P.A.
SUITE 220, LANDMARK CENTER II 4601 SIX FORKS RD. RALEIGH, N.C. 27609-5260 (919) 783-9214

DWG. REF. NO. 1 OF 44

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S11-1
1			3			TOTAL SHEETS
2			4			44

STR-#11

PLAN

(PILES NOT SHOWN IN PLAN VIEW)

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 2 OF 6

BRIDGE NO. 282

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR BRIDGE ON US 70 (HAVELOCK BYPASS) OVER SW PRONG OF SLOCUM CREEK BETWEEN SR 1756 AND SR 1747

RIGHT LANE

DocuSigned by:
DB3C8E45B06...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

12/7/2018

KCI Associates of North Carolina, P.A.

DWG. REF. NO. 2 OF 44

REVISIONS							SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:		S11-2
1			3				TOTAL SHEETS
2			4				44

DESIGN ENGINEER OF RECORD: DATE : 12/7/2018

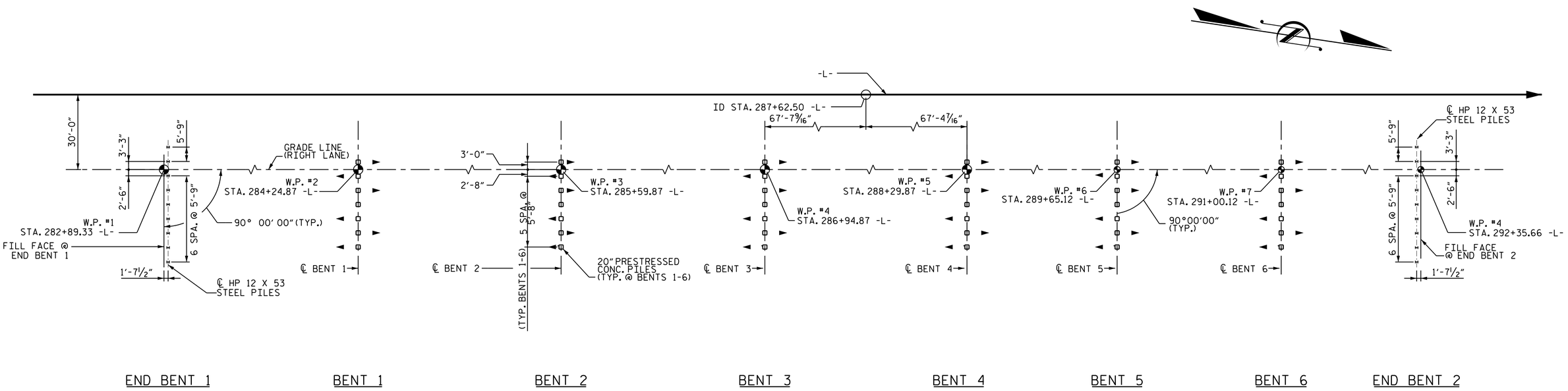
DRAWN BY : R.J. FLORY DATE : 10/30/15

CHECKED BY : R.C. LARSON DATE : 11/01/15

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STR-#11

KCI JOB NO: 25146789.11



FOUNDATION LAYOUT PLAN

(NOTE: ALL END BENT PILES ARE VERTICAL.
PILES FOR BENTS 1-6 ARE BATTERED AT 1½:12
IN DIRECTION INDICATED BY ARROW HEAD EXCEPT
PILE FOUR VERTICAL)
DIMENSIONS LOCATING PILES ARE SHOWN TO ℄ PILE

FOUNDATION NOTES

1) FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.
2) PILES AT END BENT NO. 1 AND END BENT NO. 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 125 TONS PER PILE.
3) PILES AT BENT NO. 1 THROUGH BENT NO. 6 ARE DESIGNED FOR A FACTORED RESISTANCE OF 310 TONS PER PILE.
4) DRIVE PILES AT END BENT NO. 1 AND END BENT NO. 2 TO A REQUIRED DRIVING RESISTANCE OF 170 TONS PER PILE.
5) DRIVE PILES AT BENT NO. 1 THROUGH BENT NO. 6 TO A REQUIRED DRIVING RESISTANCE OF 425 TONS PER PILE. THIS REQUIRED DRIVING RESISTANCE INCLUDES ADDITIONAL RESISTANCE FOR DOWNDRAG OR SCOUR.
6) THE SCOUR CRITICAL ELEVATIONS FOR BENT NO. 1 THROUGH BENT NO. 6 ARE ELEVATION 3.0, 0.0, 0.0, 0.0, -1.0 AND 0.0 FT., RESPECTIVELY. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.
7) IT HAS BEEN ESTIMATED THAT A HAMMER WITH AN EQUIVALENT RATED ENERGY IN THE RANGE OF 90-160 FT-KIPS PER BLOW WILL BE REQUIRED TO DRIVE PILES AT BENT NO. 1 THROUGH BENT NO.6. 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.
8) TESTING THE FIRST PRODUCTION PILE WITH THE PDA DURING DRIVING, RESTRIKING OR REDRIVING IS REQUIRED AT END BENT NO. 1 OR END BENT NO. 2. FOR PDA TESTING, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.
9) TESTING THE FIRST PRODUCTION PILE WITH THE PDA DURING DRIVING, RESTRIKING OR REDRIVING IS REQUIRED AT BENT NO. 1 FOR PDA TESTING, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.
10) IF NECESSARY, PREDRILL PILE LOCATIONS AT BENT NO. 1 TO AN ELEVATION NO LOWER THAN -3.0 FT WITH EQUIPMENT THAT WILL RESULT IN A MAXIMUM PREDRILLING DIAMETER OF 20". FOR PREDRILLING FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.
11) IF NECESSARY, PREDRILL PILE LOCATIONS AT BENT NO. 3 TO AN ELEVATION NO LOWER THAN -5.5 FT WITH EQUIPMENT THAT WILL RESULT IN A MAXIMUM PREDRILLING DIAMETER OF 20". FOR PREDRILLING FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.
12) SPUDDING MAY BE USED INSTEAD OF PREDRILLING AT BENT NO. 1 AND BENT NO. 3.
13) OBSERVE A ONE MONTH WAITING PERIOD AFTER CONSTRUCTING THE EMBANKMENT TO WITHIN 2.0 FT. OF FINISHED GRADE BEFORE BEGINNING END BENT CONSTRUCTION AT END BENT NO. 2. FOR BRIDGE WAITING PERIODS, SEE ROADWAY PLANS AND SPECIAL PROVISIONS.

PROJECT NO. R-1015
CRAVEN COUNTY
STATION: 287+62.50 -L-

SHEET 3 OF 6

DocuSigned by: DB3C8E45B06D498...
NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON
9/18/2018

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
FOR BRIDGE ON US 70
(HAVELOCK BYPASS) OVER
SW PRONG OF SLOCUM CREEK
BETWEEN SR 1756 AND SR 1747

RIGHT LANE

DESIGN ENGINEER OF RECORD: DocuSigned by: DB3C8E45B06D498... DATE: 9/18/2018
DRAWN BY: R.J. FLORY DATE: 10/30/15
CHECKED BY: R.C. LARSON DATE: 11/01/15

ENGINEERS ◆ PLANNERS ◆ ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
SUITE 220, LANDMARK CENTER II 4601 SIX FORKS RD, RALEIGH, N.C. 27609-5200 (919) 783-9214
DWG. REF. NO. 3 OF 44

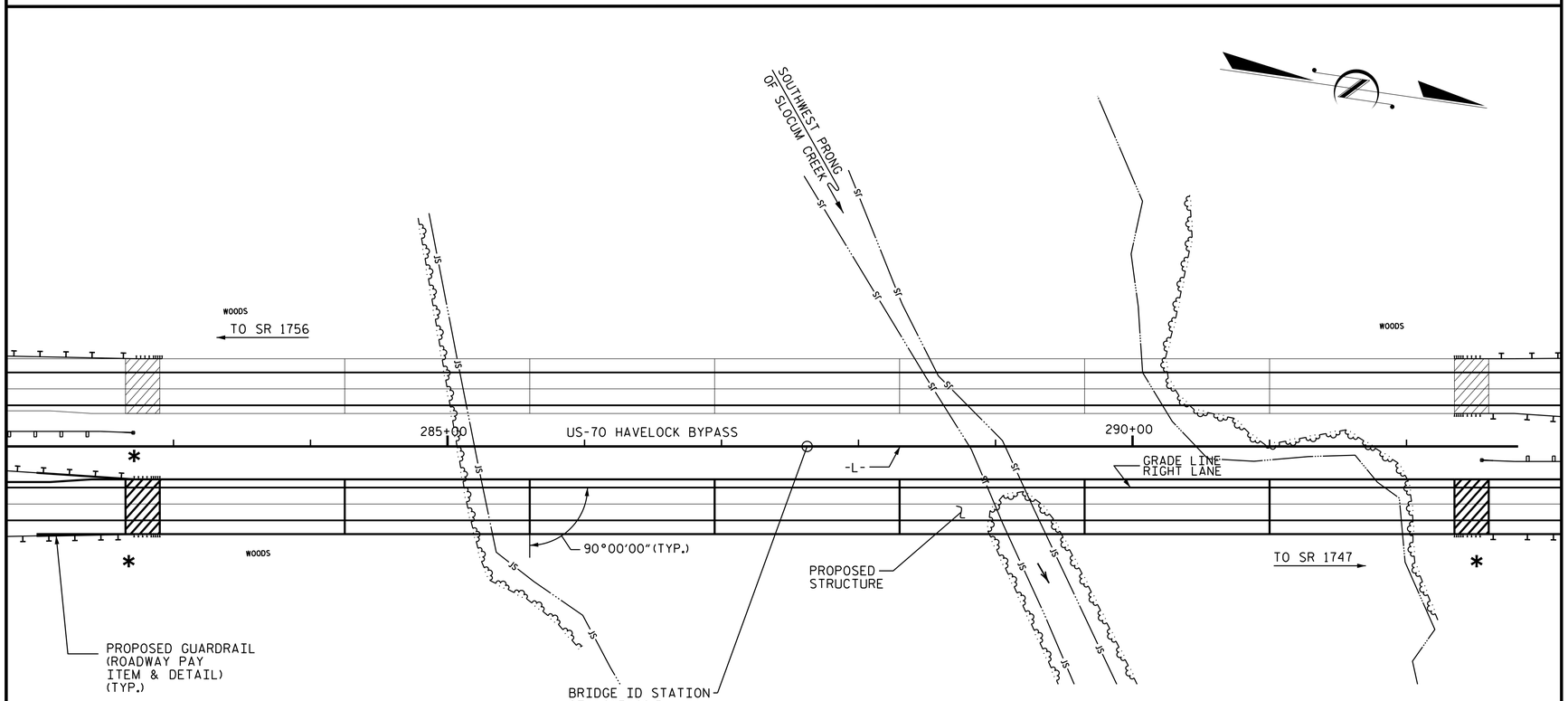
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S11-3
1			3			TOTAL SHEETS
2			4			44

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

KCI JOB NO: 251467891.11

STR-#11

BENCHMARK: BM15 RR SPIKE IN TREE -Y4- STATION 41+83.00 97' RIGHT ELEVATION 27.08 NGVD 29



FOR UTILITY INFORMATION, SEE UTILTIY PLANS AND SPECIAL PROVISIONS.

* TYPE B-77 GUARDRAIL ATTACHMENT REQUIRED

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 SAMPLE BARS SHOULD COME FROM STEEL ACTUALLY USED IN THE PROJECT AND THE SAMPLE BARS SHOULD BE REPLACED BY SPLICED BARS AS SPECIFIED IN THE SAMPLE BAR REPLACEMENT CHART. PAYMENT FOR THE SAMPLE BARS AND REPLACEMENT 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.

THE CLASS AA CONCRETE IN THE BRIDGE DECK SHALL CONTAIN FLY ASH OR GROUND GRANULATED BLAST FURNACE SLAG AT THE SUBSTITUTION RATE SPECIFIED IN ARTICLE 1024-1 AND IN ACCORDANCE WITH ARTICLES 1024-5 AND 1024-6 OF THE STANDARD SPECIFICATIONS. NO PAYMENT WILL BE MADE FOR THIS SUBSTITUTION AS IT IS CONSIDERED INCIDENTAL TO THE COST OF THE REINFORCED CONCRETE DECK SLAB.

NOTES (CONT'D)

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 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."

THE SCOUR CRITICAL ELEVATIONS FOR BENT NO. 1 THROUGH BENT NO. 6 ARE ELEVATION 3.0, 0.0, 0.0, 0.0, -1.0 AND 0.0 FT., RESPECTIVELY. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.

FOR EROSION CONTROL MEASURES SEE EROSION CONTROL PLANS.

FOR CONSTRUCTION, MAINTENANCE, AND REMOVAL OF TEMPORARY ACCESS, SEE SPECIAL PROVISIONS.

FOR 74" MODIFIED PRESTRESSED CONCRETE GIRDERS, SEE SPECIAL PROVISIONS.

SAMPLE BAR REPLACEMENT	
SIZE	LENGTH
#3	6'-2"
#4	7'-4"
#5	8'-6"
#6	9'-8"
#7	10'-10"
#8	12'-0"
#9	13'-2"
#10	14'-6"
#11	15'-10"

NOTE:
SAMPLE BAR REPLACEMENT LENGTH BASED ON 30" (SAMPLE LENGTH) PLUS TWO SPLICE LENGTHS AND f_y = 60ksi.

PROJECT NO. R-1015
CRAVEN COUNTY
STATION: 287+62.50 -L-

SHEET 4 OF 6

KCI JOB NO. 25146789.11

DESIGN ENGINEER OF RECORD: DocuSigned by: DATE: 12/7/2018
DRAWN BY: R.J. FLORY DATE: 10/30/15
CHECKED BY: R.C. LARSON DATE: 11/01/15

DocuSigned by: DB3C8E45B06D499...
NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON
12/7/2018

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ENGINEERS ● PLANNERS ● ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
SUITE 220, LANDMARK CENTER 4601 SIX FORKS RD, RALEIGH, N.C. 27609-5210 (919) 783-9214
DWG. REF. NO. 4 OF 44

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
FOR BRIDGE ON US 70 (HAVELOCK BYPASS) OVER SW PRONG OF SLOCUM CREEK BETWEEN SR 1756 AND SR 1747
RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S11-4
1			3			TOTAL SHEETS
2			4			44

STR-#11

TOTAL BILL OF MATERIAL

	PDA TESTING	REINFORCED CONCRETE DECK SLAB	GROOVING BRIDGE FLOORS	CLASS AA CONCRETE	BRIDGE APPROACH SLABS	EPOXY COATED REIN-FORCING STEEL	PILE DRIVING EQUIPMENT SETUP FOR 20" PRESTRESSED CONCRETE PILES	PILE DRIVING EQUIPMENT SETUP FOR HP 12X53 STEEL PILES	20" PRESTRESSED CONCRETE PILES		HP 12X53 STEEL PILES		PREDRILLING FOR PILES	PILE REDRIVES	CONRETE BARRIER RAIL	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE	ELASTOMERIC BEARINGS	EXPANSION JOINT SEALS	MODIFIED 74" PRESTRESSED CONCRETE GIRDERS	
	EA	SQ.FT.	SQ.FT.	CU.YDS.	LUMP SUM	LBS.	EA.	EA.	NO.	LIN.FT.	NO.	LIN.FT.	LIN.FT.	EA.	LIN.FT.	TON	SY	LUMP SUM	LUMP SUM	NO.	LIN.FT.
SUPERSTRUCTURE		40,929	31,623		LUMP SUM										1889.33			LUMP SUM	LUMP SUM	35	4704.58
END BENT 1				46.5		6989		9			9	540		5		280	310				
BENT 1				23.1		3383	7		7	315			93	4							
BENT 2				23.1		3383	7		7	420				4							
BENT 3				23.1		3383	7		7	420			84	4							
BENT 4				23.1		3383	7		7	385				4							
BENT 5				23.1		3383	7		7	385				4							
BENT 6				23.1		3383	7		7	385				4							
END BENT 2				46.5		6989		9			9	495		5		420	465				
TOTAL	3	40,929	31,623	231.6	LUMP SUM	34,276	42	18	42	2310	18	1035	177	34	1889.33	700	775	LUMP SUM	LUMP SUM	35	4704.58

FOR CONSTRUCTION, MAINTENANCE AND REMOVAL OF TEMPORARY ACCESS, SEE LEFT LANE.

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 5 OF 6

KCI JOB NO: 25146789.11

DESIGN ENGINEER OF RECORD: DocuSigned by: DB3C8E45B06D499... DATE: 12/7/2018

DRAWN BY: R. C. LARSON DATE: 04/17/17

CHECKED BY: K. SU DATE: 04/27/17

DocuSigned by: DB3C8E45B06D499... 12/7/2018

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ENGINEERS • PLANNERS • ECOLOGISTS LICENSE NUMBER: C-0764

KCI Associates of North Carolina, P.A.

SUITE 220, LANDMARK CENTER II 4601 SIX FORKS RD. RALEIGH, N.C. 27609-5210 (919) 783-9214

DWG. REF. NO. 5 OF 44

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

RALEIGH

GENERAL DRAWING

FOR BRIDGE ON US 70 (HAVELOCK BYPASS) OVER SW PRONG OF SLOCUM CREEK BETWEEN SR 1756 AND SR 1747

RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S11-5
1			3			TOTAL SHEETS
2			4			44

STR-#11

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	1.43	--	1.75	0.752	1.63	B	E	44.3	0.947	1.69	B	I	12.7	0.80	0.752	1.43	B	E	44.3	
		HL-93 (OPERATING)	N/A		2.12	--	1.35	0.752	2.12	B	E	44.3	0.947	2.23	B	I	12.7	N/A	--	--	--	--	--	
		HS-20 (INVENTORY)	36.000	2	2.09	75.24	1.75	0.752	2.46	B	E	44.3	0.947	2.48	B	I	12.7	0.80	0.752	2.09	B	E	44.3	
		HS-20 (OPERATING)	36.000		3.19	114.84	1.35	0.752	3.19	B	E	44.3	0.947	3.27	B	I	12.7	N/A	--	--	--	--	--	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		5.26	71.01	1.40	0.752	7.53	B	E	44.3	0.947	8.14	B	I	12.7	0.80	0.752	5.26	B	E	44.3	
		SNGARBS2	20.000		3.74	74.80	1.40	0.752	5.35	B	E	44.3	0.947	5.60	B	I	12.7	0.80	0.752	3.74	B	E	44.3	
		SNAGRIS2	22.000		3.47	76.34	1.40	0.752	4.96	B	E	44.3	0.947	5.13	B	I	12.7	0.80	0.752	3.47	B	E	44.3	
		SNCOTTS3	27.250		2.61	71.12	1.40	0.752	3.74	B	E	44.3	0.947	3.97	B	I	12.7	0.80	0.752	2.61	B	E	44.3	
		SNAGGRS4	34.925		2.11	73.69	1.40	0.752	3.02	B	E	44.3	0.947	3.17	B	I	12.7	0.80	0.752	2.11	B	E	44.3	
		SNS5A	35.550		2.07	73.58	1.40	0.752	2.96	B	E	44.3	0.947	3.16	B	I	12.7	0.80	0.752	2.07	B	E	44.3	
		SNS6A	39.950		1.87	74.70	1.40	0.752	2.68	B	E	44.3	0.947	2.83	B	I	12.7	0.80	0.752	1.87	B	E	44.3	
		SNS7B	42.000		1.78	74.76	1.40	0.752	2.55	B	E	44.3	0.947	2.73	B	I	12.7	0.80	0.752	1.78	B	E	44.3	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		2.27	74.91	1.40	0.752	3.25	B	E	44.3	0.947	343	B	I	12.7	0.80	0.752	2.27	B	E	44.3	
		TNT4A	33.075		2.28	75.41	1.40	0.752	3.26	B	E	44.3	0.947	3.38	B	I	12.7	0.80	0.752	2.28	B	E	44.3	
		TNT6A	41.600		1.83	76.12	1.40	0.752	2.63	B	E	44.3	0.947	2.84	B	I	12.7	0.80	0.752	1.83	B	E	44.3	
		TNT7A	42.000		1.83	76.86	1.40	0.752	2.62	B	E	44.3	0.947	2.80	B	I	12.7	0.80	0.752	1.83	B	E	44.3	
		TNT7B	42.000		1.86	78.12	1.40	0.752	2.66	B	E	44.3	0.947	2.70	B	I	12.7	0.80	0.752	1.86	B	E	44.3	
		TNAGRIT4	43.000		1.79	76.97	1.40	0.752	2.57	B	E	44.3	0.947	2.62	B	I	12.7	0.80	0.752	1.79	B	E	44.3	
		TNAGT5A	45.000		1.70	76.50	1.40	0.752	2.44	B	E	44.3	0.947	2.55	B	I	12.7	0.80	0.752	1.70	B	E	44.3	
		TNAGT5B	45.000	3	1.69	76.05	1.40	0.752	2.42	B	E	44.3	0.947	2.49	B	I	12.7	0.80	0.752	1.69	B	E	44.3	

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)

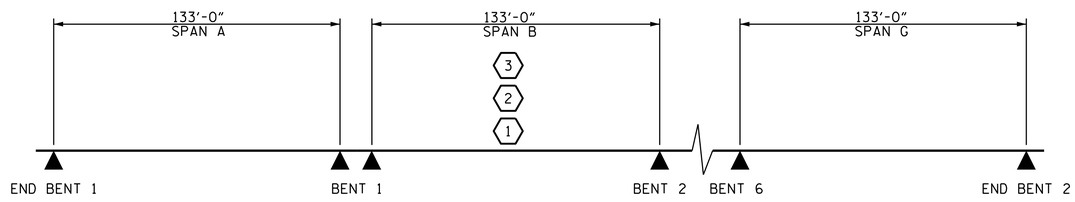
(2) DESIGN LOAD RATING (HS-20)

(3) LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

I - INTERIOR GIRDER
E - EXTERIOR



74" MODIFIED BULB TEE SECTION PROPERTIES	
Ag	881.6 in^2
Ixx	636,755 in^4
y_c	36.440 in
W	918.3 lb/ft
V/S	3.401 in

LRFR SUMMARY

PROJECT NO. R-1015
CRAVEN COUNTY
STATION: 287+62.50 -L-

SHEET 6 OF 6

KCI JOB NO. 25146789.11

DESIGN ENGINEER OF RECORD: DocuSigned by: DB3C8E45B06B496... DATE : 11/2/2018
ASSEMBLED BY : K. SU DATE : 12/31/15
CHECKED BY : R. C. LARSON DATE : 01/14/16
DRAWN BY : MAA 1/08 REV. 11/12/08RR MAA/GM
CHECKED BY : GM/DI 2/08 REV. 10/1/11 MAA/GM

DocuSigned by: DB3C8E45B06B496...
NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON
11/2/2018

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

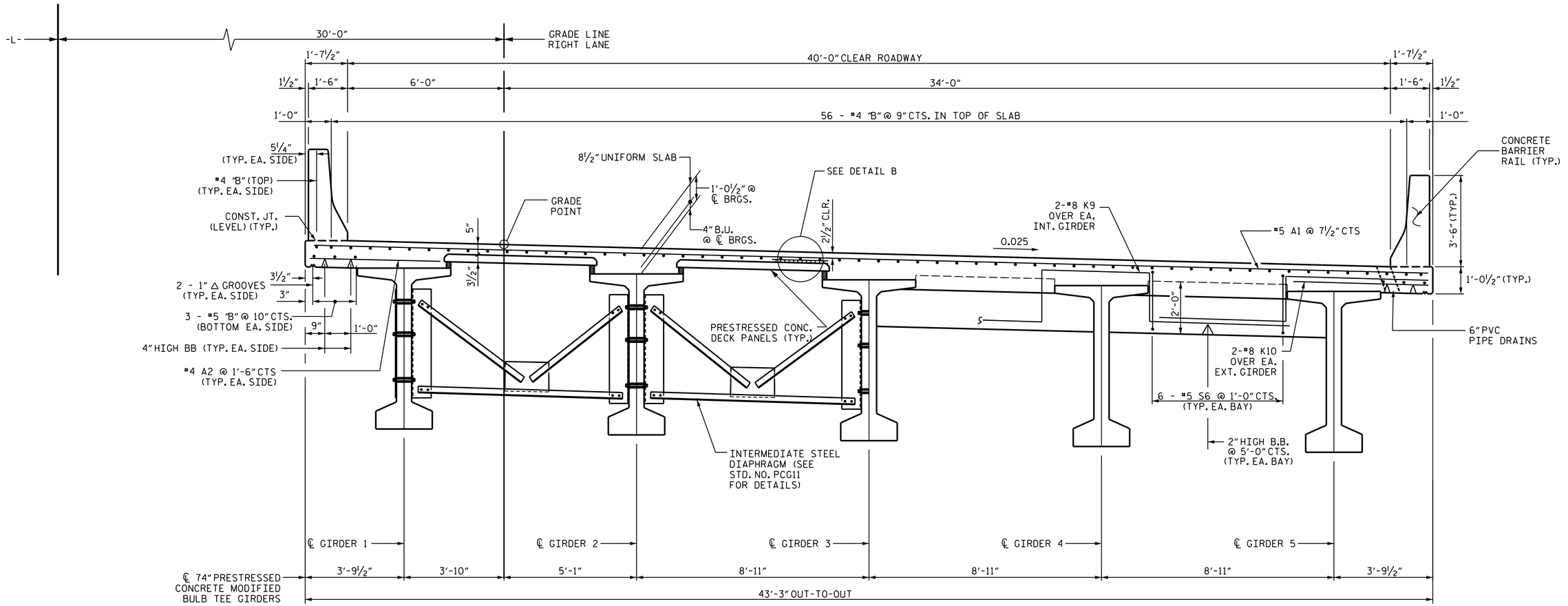
ENGINEERS ● PLANNERS ● ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
SUITE 220, LANDMARK CENTER ● 4601 SIX FORKS RD, RALEIGH, N.C. 27609-5210 (919) 783-9214
DWG. REF. NO. 6 OF 44

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

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

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S11-6
1			3			TOTAL SHEETS
2			4			44

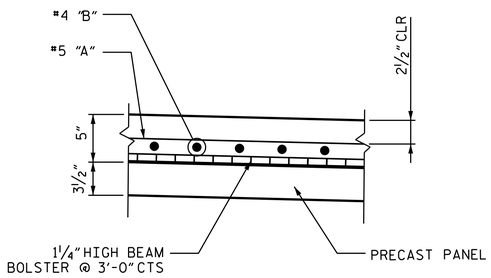
STR-*11



TYPICAL HALF SECTION AT INTERMEDIATE DIAPHRAGM

TYPICAL HALF SECTION AT END DIAPHRAGM (BENTS 1, 3 & 6)

TYPICAL SECTION



DETAIL "B"

NOTES

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

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 STD. NO. CBR1 FOR ADDITIONAL REINFORCING STEEL EMBEDDED IN DECK.

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

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 1 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE TYPICAL SECTION

RIGHT LANE

DocuSigned by: DB3C8E45B06D495...
NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON
6/10/2018

DESIGN ENGINEER OF RECORD: DocuSigned DATE : 6/10/2018
DRAWN BY : R.J. FLORY DATE : 01/31/16
CHECKED BY : R. C. LARSON DATE : 02/15/16

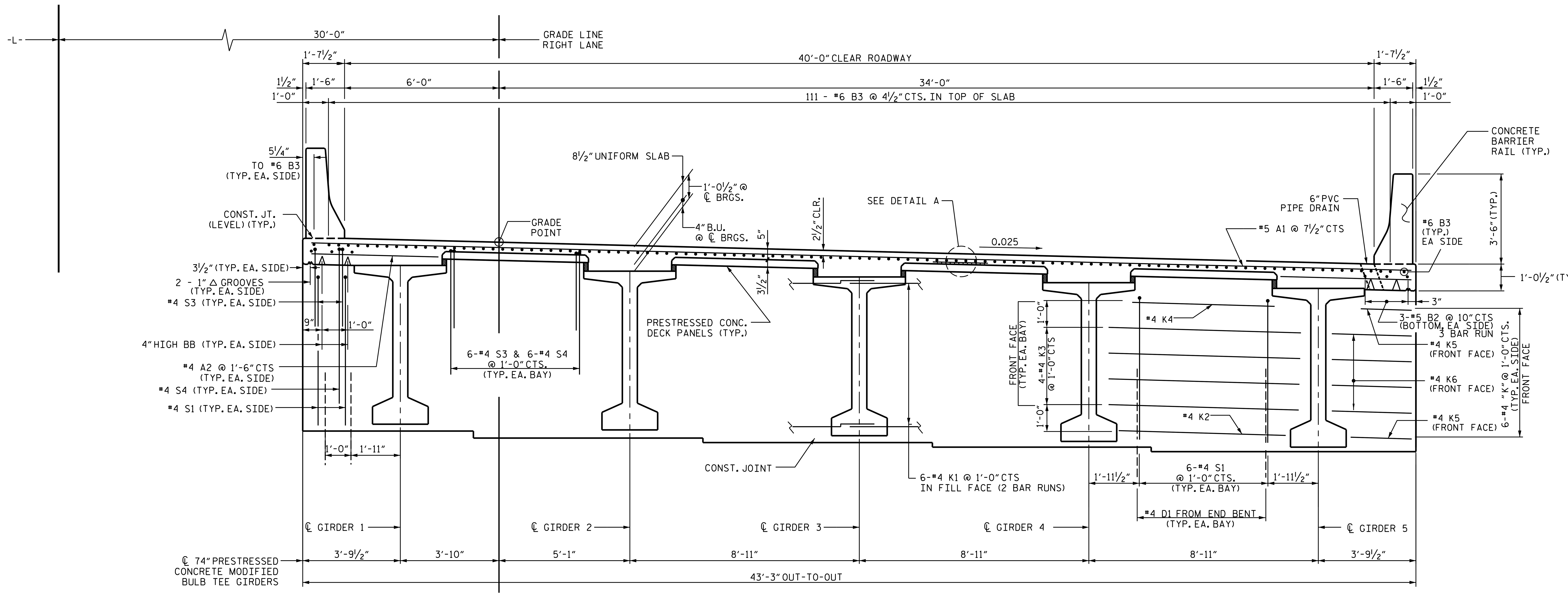
ENGINEERS ● PLANNERS ● ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
SUITE 220, LANDMARK CENTER ● 4601 SIX FORKS RD, RALEIGH, N.C. 27609-5210 (919) 783-9214
DWG. REF. NO. 7 OF 44

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S11-7
1			3			TOTAL SHEETS
2			4			44

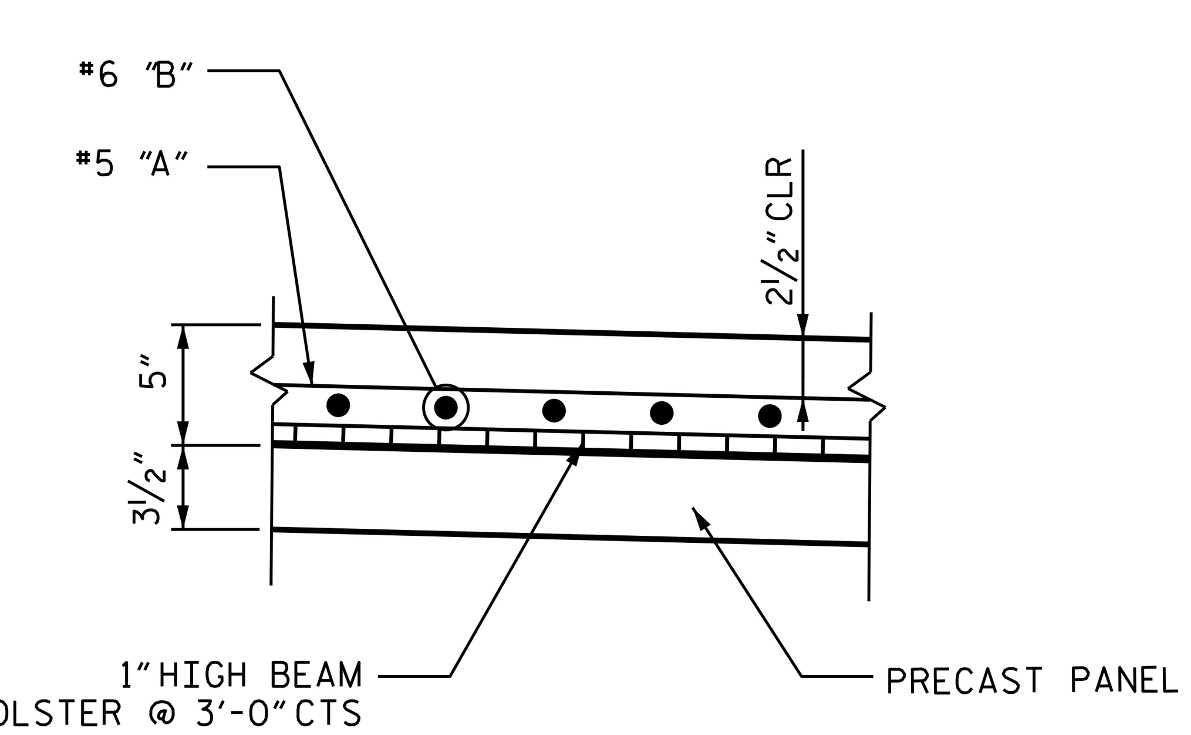
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

KCI JOB NO: 251467891.11

STR-#11



TYPICAL SECTION AT INTEGRAL END BENT



DETAIL "A"

PROJECT NO. R-1015
CRAVEN COUNTY
STATION: 287+62.50 -L-

SHEET 2 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
TYPICAL SECTION

RIGHT LANE

DocuSigned by:
DB3C8E45B06D4...
SEAL 14114 NORTH CAROLINA PROFESSIONAL ENGINEER ROBERT C. LARSON
11/2/2018

KCI Associates of North Carolina, P.A.
DWG. REF. NO. 8 OF 44

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

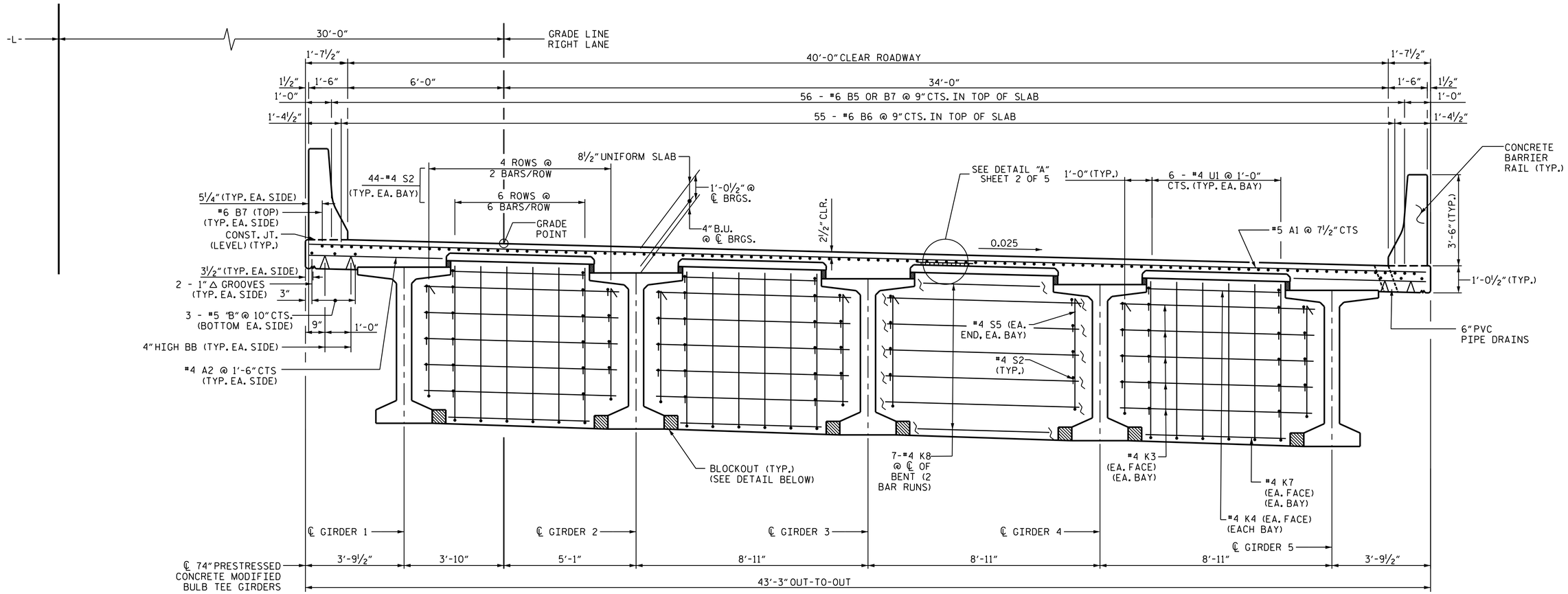
SHEET NO. S11-8
TOTAL SHEETS 44

DESIGN ENGINEER OF RECORD: DATE : 11/2/2018
DRAWN BY : R.J. FLORY DATE : 01/31/16
CHECKED BY : R. C. LARSON DATE : 02/15/16

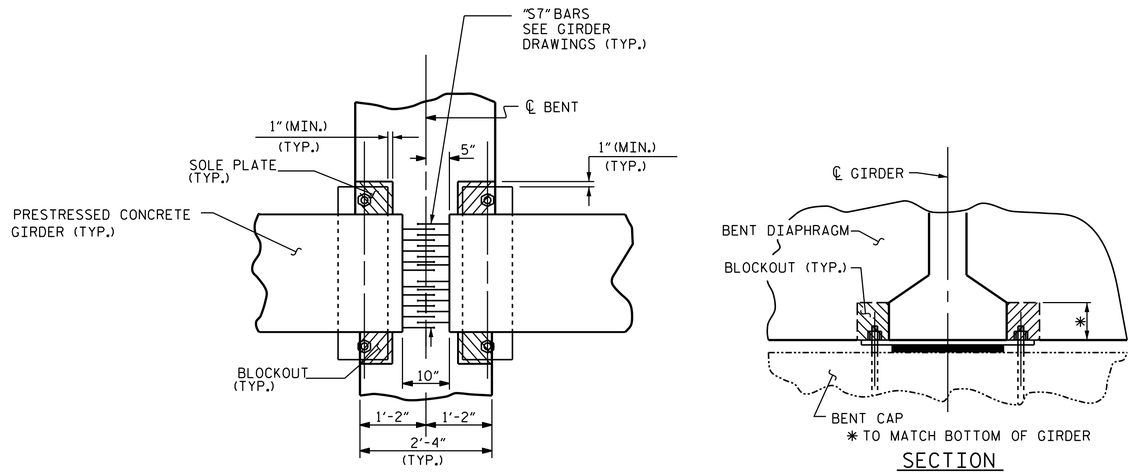
KCI JOB NO: 25146789.11

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

STR-#11



TYPICAL SECTION AT CONTINUOUS BENT DIAPHRAGM



PLAN

SECTION

BENT DIAPHRAGM BLOCKOUT DETAIL

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 3 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE TYPICAL SECTION

RIGHT LANE

DocuSigned by: DB3C8E45B0D4490...
12/7/2018

NORTH CAROLINA PROFESSIONAL SEAL 4114 ENGINEER ROBERT C. LARSON

DESIGN ENGINEER OF RECORD:	DATE : 12/7/2018
DRAWN BY : R. J. FLORY	DATE : 1/31/16
CHECKED BY : R. C. LARSON	DATE : 2/15/16

ENGINEERS ● PLANNERS ● ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
SUITE 220, LANDMARK CENTER II 4601 SIX FORKS RD, RALEIGH, N.C. 27609-5210 (919) 783-9214
DWG. REF. NO. 9 OF 44

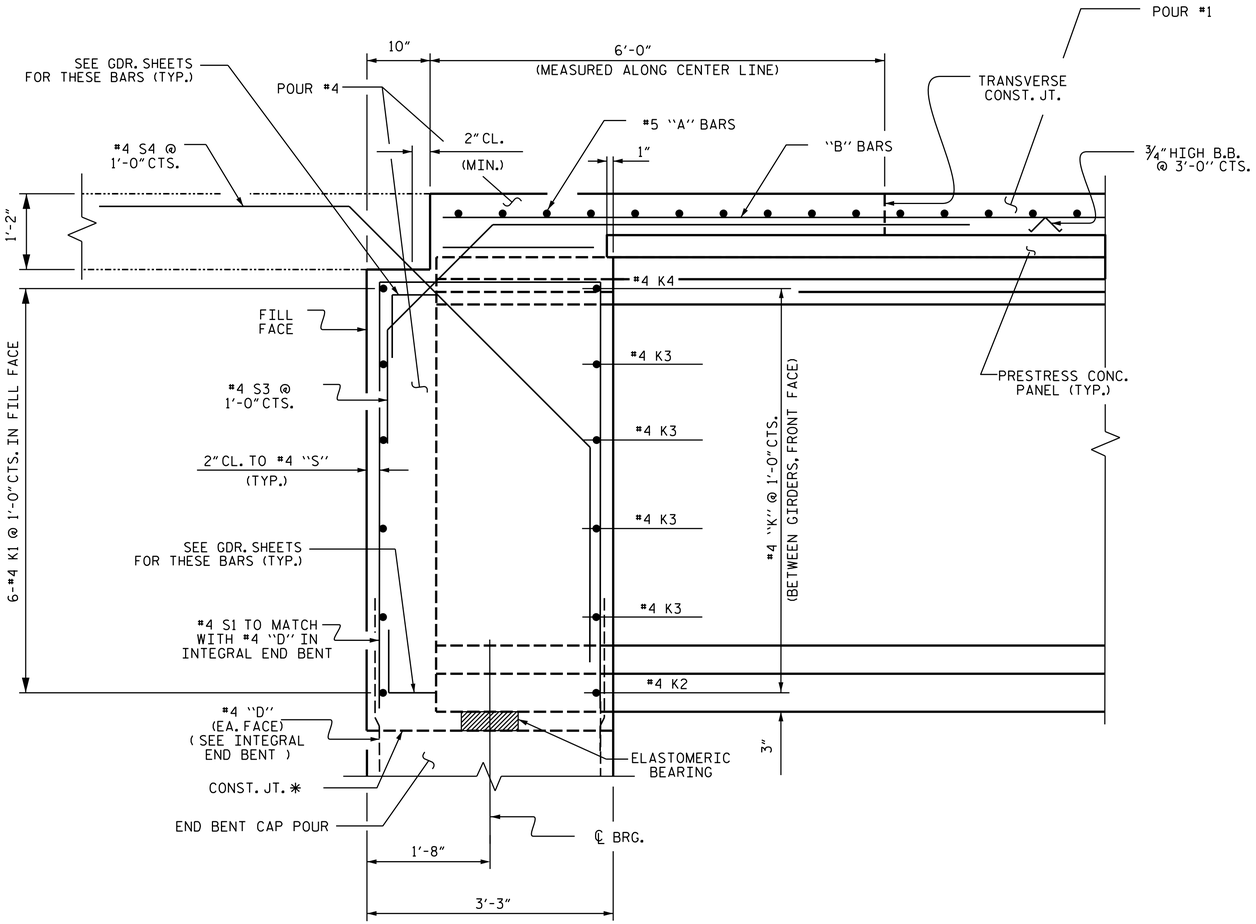
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

SHEET NO. S11-9
TOTAL SHEETS 44

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

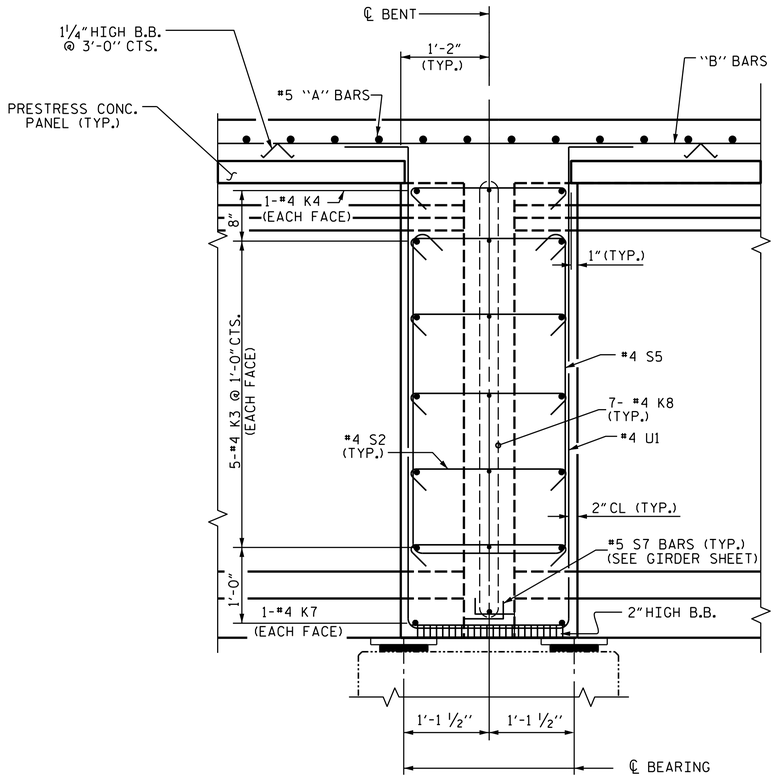
KCI JOB NO. 25146789.11

STR-#11



SECTION THRU INTEGRAL END BENT DIAPHRAGM

* THE TOP SURFACE OF THE END BENT CAP AND WINGS EXCLUDING THE BEARING AREA SHALL BE RAKED TO A DEPTH OF 1/4"



SECTION THRU CONTINUOUS BENT DIAPHRAGM

(BENTS 2, 4 & 5)

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 4 OF 5

KCI JOB NO. 25146789.11

DESIGN ENGINEER OF RECORD: DocuSigned by: DB3C8E45B06D499	DATE : 6/10/2018		
DRAWN BY : R. J. FLORY	DATE : 01/29/16		
CHECKED BY : R. C. LARSON	DATE : 02/15/16		

DocuSigned by: DB3C8E45B06D499

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

6/10/2018

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE TYPICAL SECTION

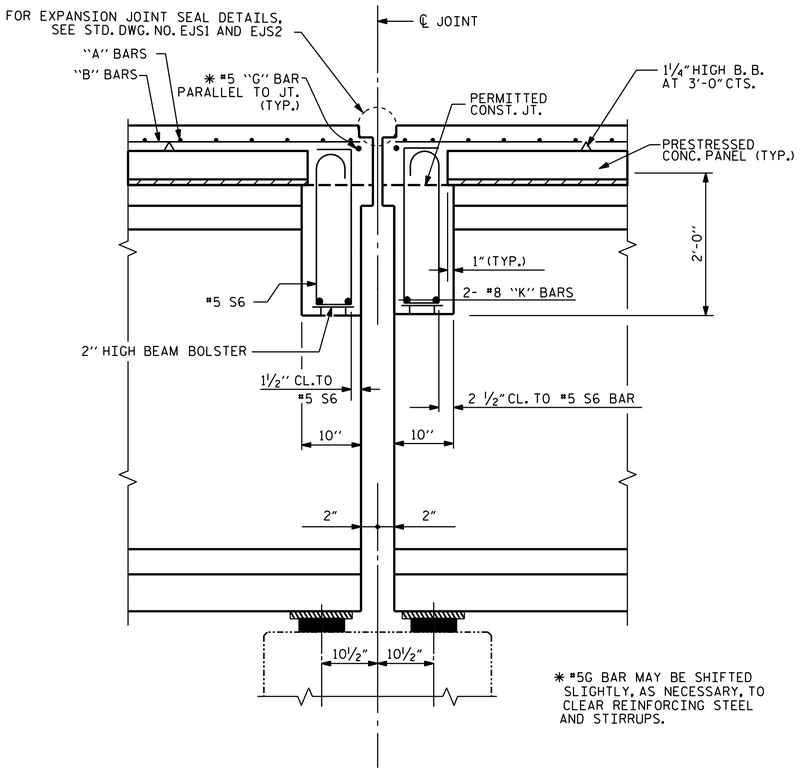
RIGHT LANE

ENGINEERS ● PLANNERS ● ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
SUITE 220, LANDMARK CENTER ● 4601 SIX FORKS RD., RALEIGH, N.C. 27609-5210 (919) 783-9214

DWG. REF. NO. 10 OF 44

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S11-10
1			3			TOTAL SHEETS
2			4			44

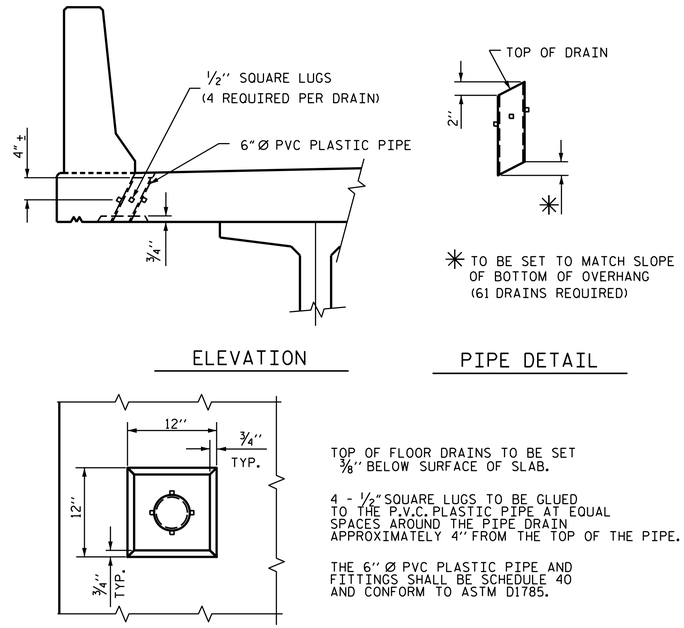
STR-#11



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

SECTION THRU END DIAPHRAGM

(BENT 1, 3 & 6)



PLAN OF RECESS

DRAIN DETAILS

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 5 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE TYPICAL SECTION

RIGHT LANE

DocuSigned by: DB3C8E45B06D4A8...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

6/10/2018

DESIGN ENGINEER OF RECORD: DocuSigned DATE: 6/10/2018
DRAWN BY: R. J. FLORY DATE: 01/29/16
CHECKED BY: R. C. LARSON DATE: 02/15/16

KCI JOB NO. 25146789.11

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ENGINEERS ● PLANNERS ● ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
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DWG. REF. NO. 11 OF 44

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S11-11
1			3			TOTAL SHEETS
2			4			44

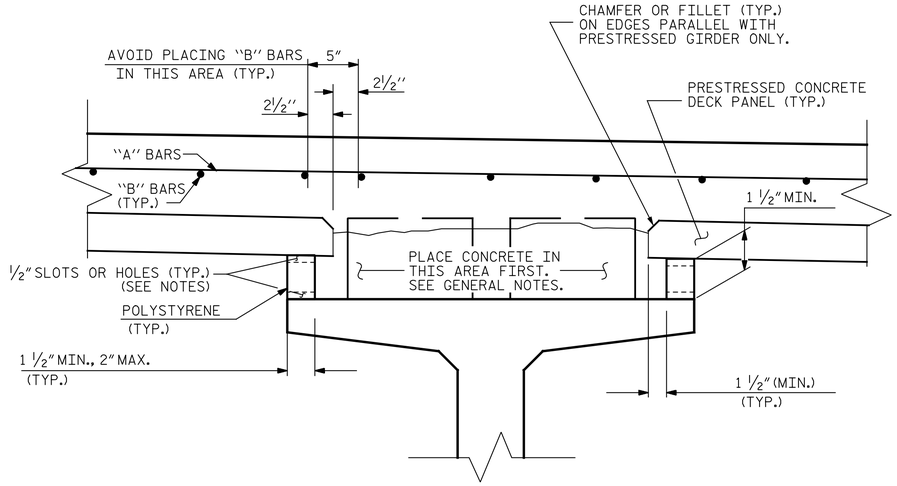
STR-#11

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. PRECAST PANELS SHALL BE DESIGNED FOR AN ALLOWABLE TENSILE STRESS OF 0 psi IN THE PRECOMPRESSED TENSILE ZONE UNDER ALL LOADING CONDITIONS.
10. PRESTRESSED CONCRETE PRECAST DECK PANELS SHALL CONTAIN CALCIUM NITRATE CORROSION INHIBITION

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

KCI JOB NO: 25146789.11

DESIGN ENGINEER OF RECORD: DocuSigned by: DB3C8E45B06D499...	DATE :	8/2/2018
ASSEMBLED BY : R. C. LARSON	DATE :	01/18/16
CHECKED BY : K. SU	DATE :	04/24/17
DRAWN BY : ELR 1/92	REV. 5/7/03R	RWW/JTE
CHECKED BY : GRP 4/92	REV. 5/1/06R	TLA/GM
	REV. 10/1/11	MAA/GM

DocuSigned by: DB3C8E45B06D499...

8/2/2018

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

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ENGINEERS • PLANNERS • ECOLOGISTS LICENSE NUMBER: C-0764

KCI Associates of North Carolina, P.A.

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DWG. REF. NO. 12 OF 44

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

RALEIGH

STANDARD

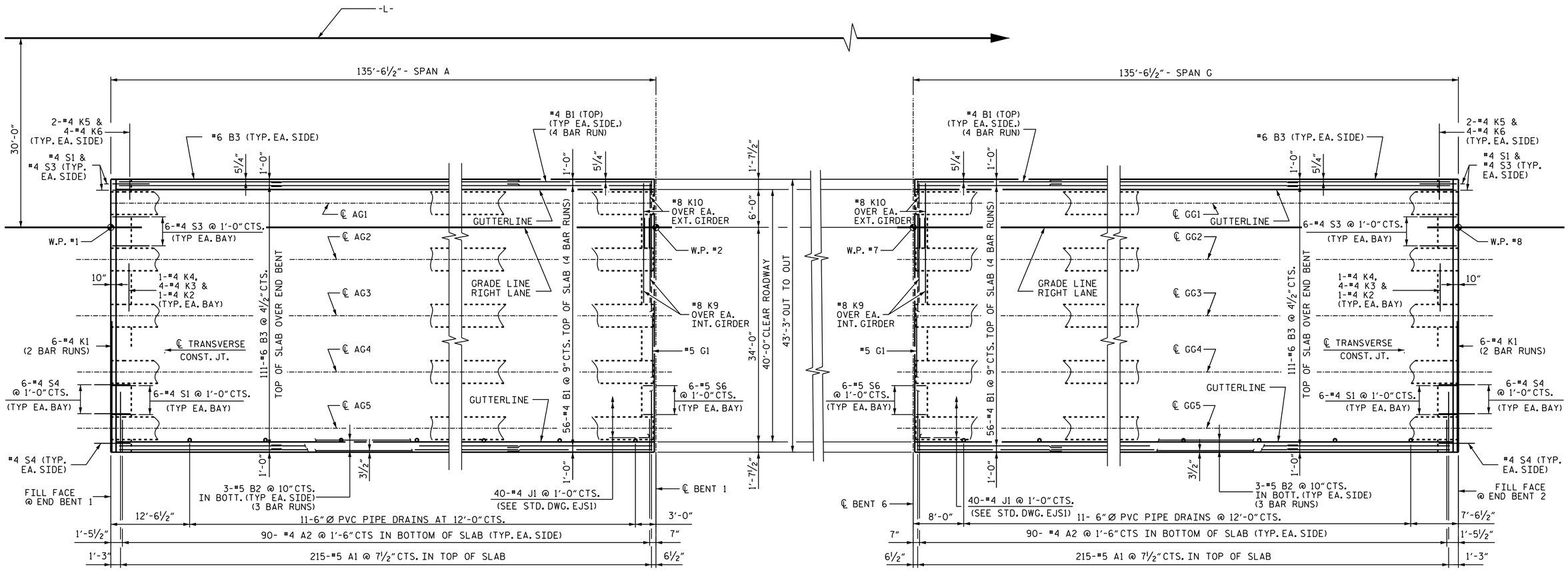
PRECAST PRESTRESSED CONCRETE DECK PANELS

RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S11-12
1			3			TOTAL SHEETS
2			4			44

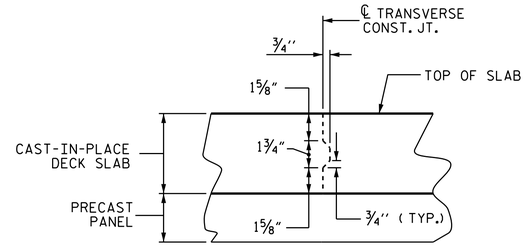
STR-#11

STD. NO. PDP1



PLAN - SPAN A

PLAN - SPAN G



TRANSVERSE CONSTRUCTION JOINT DETAIL

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

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 1 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE PLAN OF SPANS A & G

RIGHT LANE

DocuSigned by: DB3C8E45B06D49F...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

12/7/2018

DESIGN ENGINEER OF RECORD: DocuSigned by: DB3C8E45B06D49F... DATE: 12/7/2018

DRAWN BY: R. C. LARSON DATE: 01/21/16

CHECKED BY: E. C. DECOLA DATE: 08/20/16

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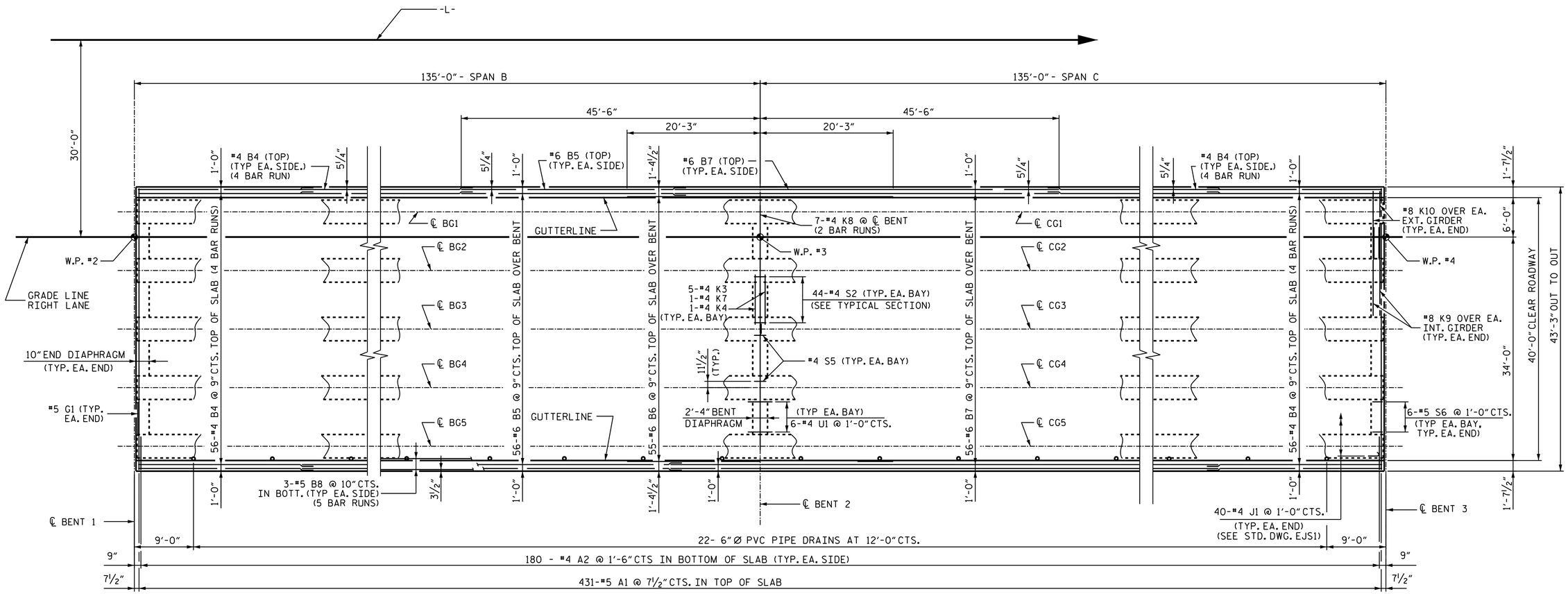
2			4			44

STR-#11

KCI JOB NO: 251467891.11



PLAN - SPANS B & C

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 2 OF 4

KCI JOB NO: 25146789.11

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NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

12/7/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
PLAN OF SPANS B & C

RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S11-14
1			3			TOTAL SHEETS
2			4			44

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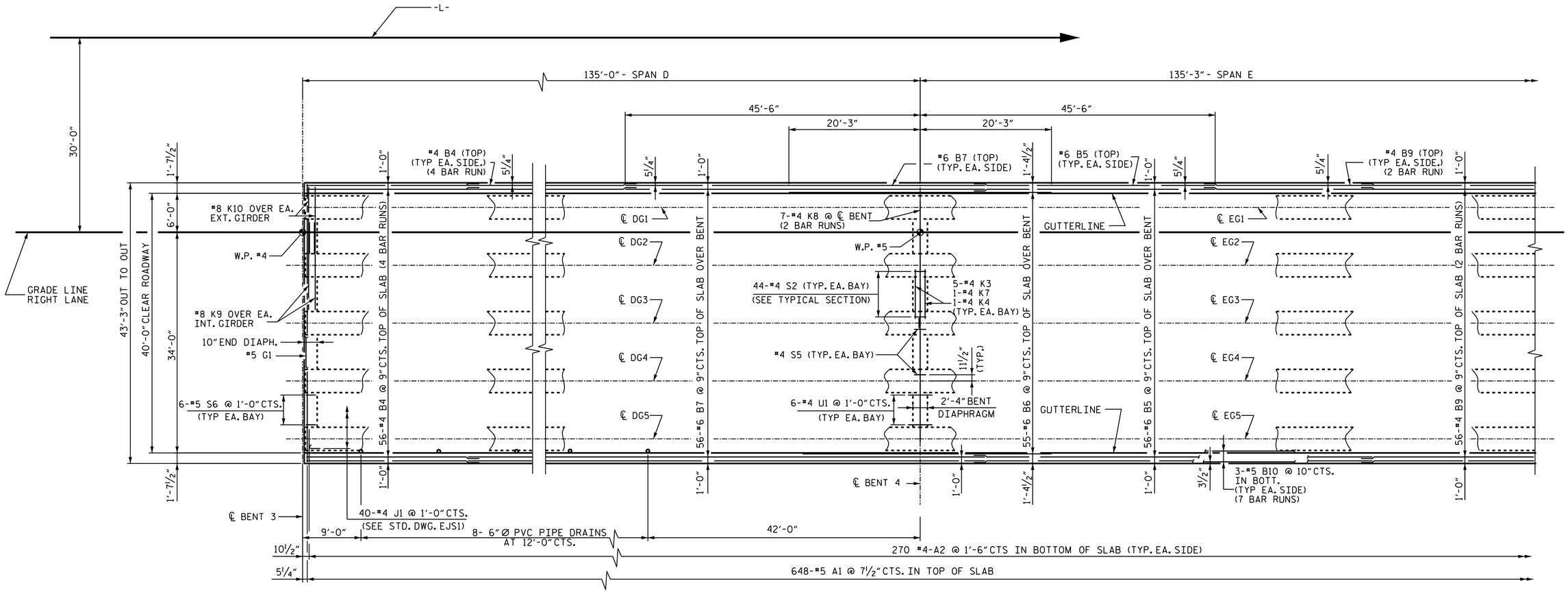

PLAN - SPANS D & E

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 3 OF 4

KCI JOB NO: 25146789.11

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12/7/2018

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STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

RALEIGH

SUPERSTRUCTURE PLAN OF SPANS D & E

RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S11-15
1			3			TOTAL SHEETS
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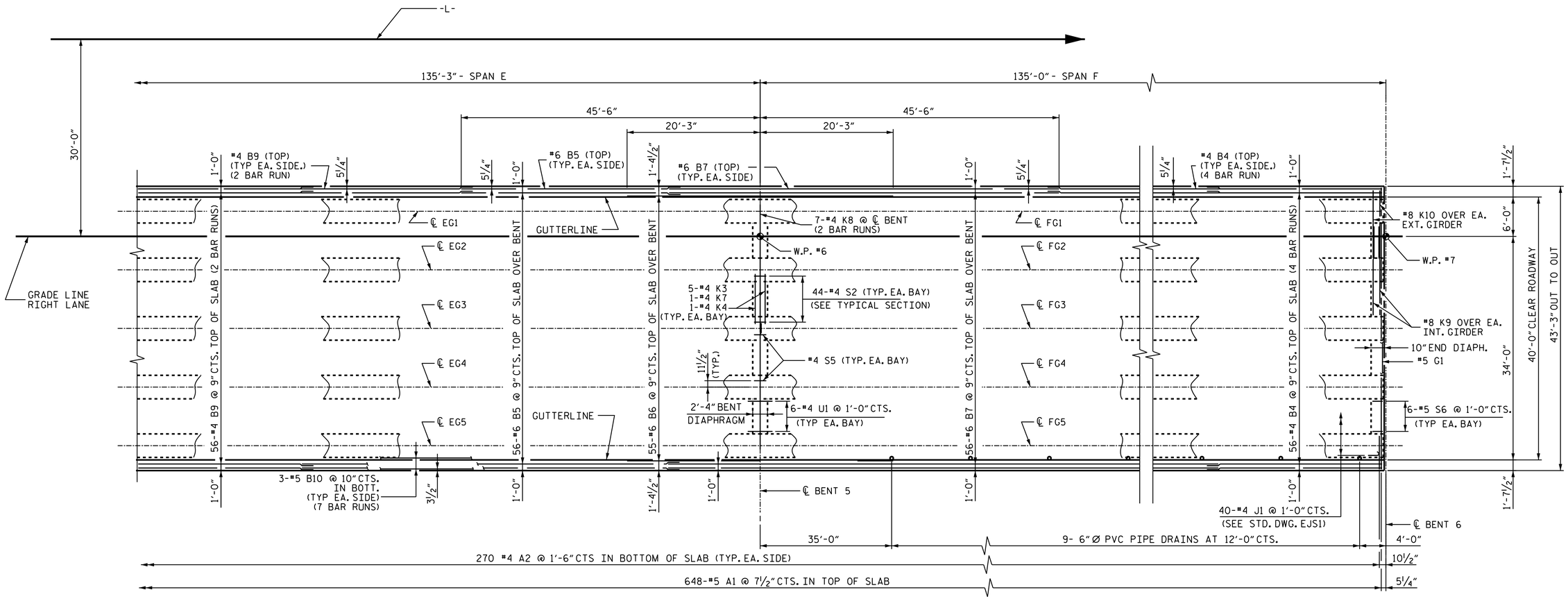

PLAN - SPANS E & F

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 4 OF 4

KCI JOB NO: 25146789.11

DESIGN ENGINEER OF RECORD: DocuSigned by: DATE : 12/7/2018

DRAWN BY : R. C. LARSON DATE : 01/21/16

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NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

12/7/2018

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STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

RALEIGH

SUPERSTRUCTURE PLAN OF SPANS E & F

RIGHT LANE

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NO.	BY:	DATE:	NO.	BY:	DATE:	S11-16
1			3			TOTAL SHEETS
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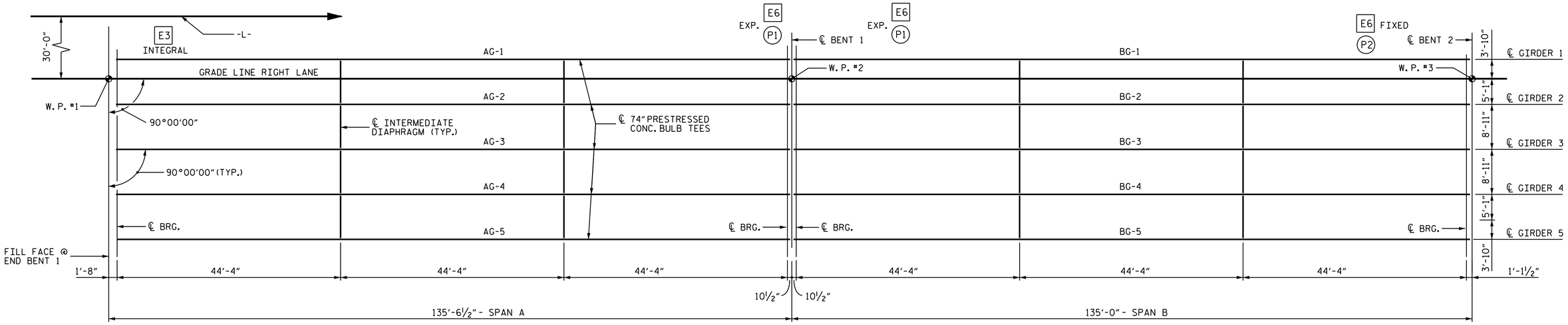
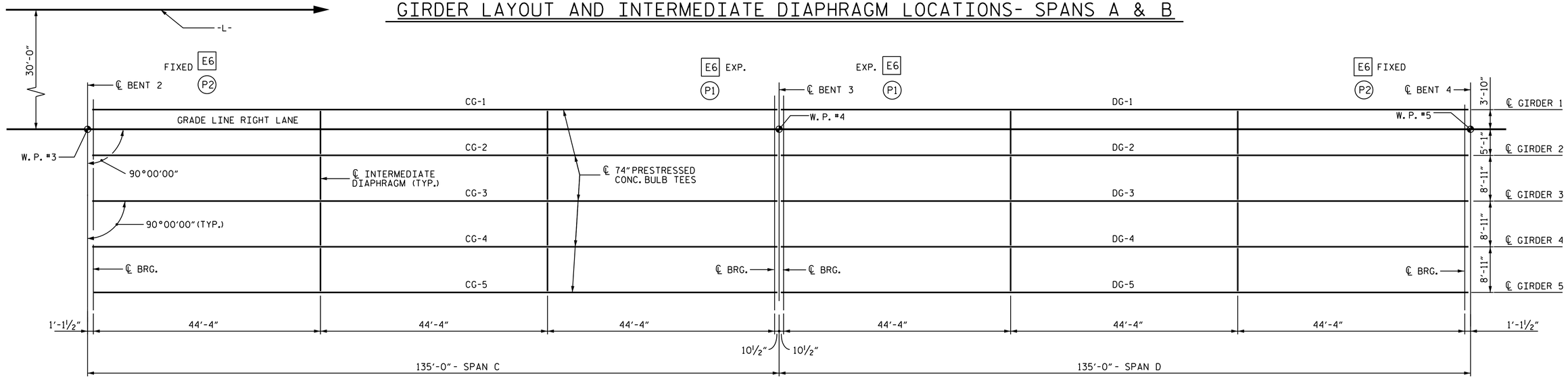


GIRDER LAYOUT AND INTERMEDIATE DIAPHRAGM LOCATIONS- SPANS A & B



NOTES

1. ELASTOMERIC BEARINGS INDICATED THUS:
   [EN] (N = NUMBER)
2. SOLE PLATES INDICATED THUS:
   (PN) (N = NUMBER)
   (SEE BEARING SHEET FOR DETAILS)

GIRDER LAYOUT AND INTERMEDIATE DIAPHRAGM LOCATIONS- SPANS C & D

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE GIRDER LAYOUT SPANS A-D

RIGHT LANE

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6/10/2018

KCI JOB NO. 25146789.11

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S11-17
1			3			TOTAL SHEETS
2			4			44

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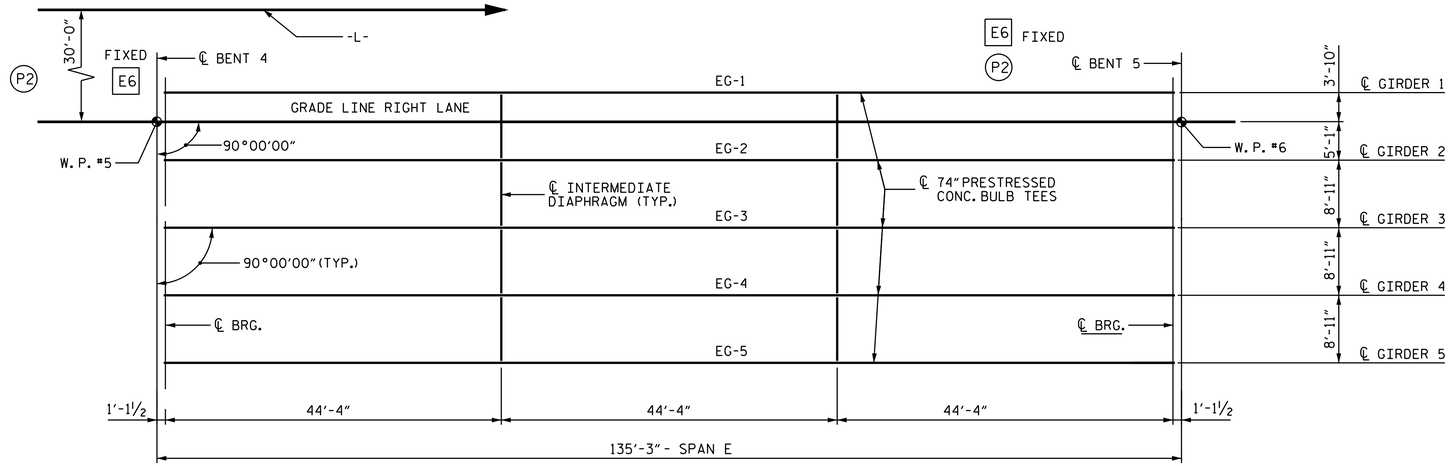
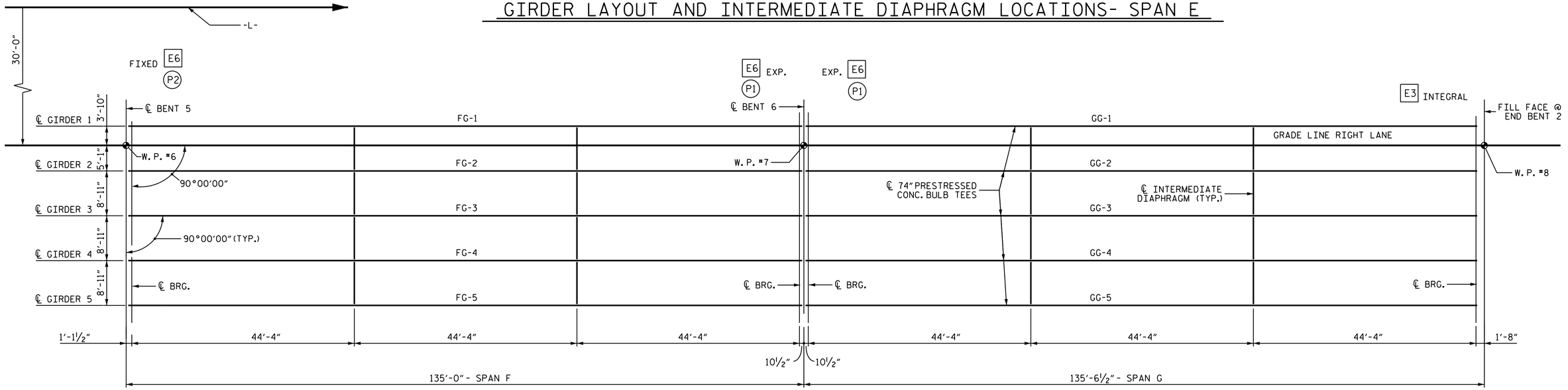


GIRDER LAYOUT AND INTERMEDIATE DIAPHRAGM LOCATIONS- SPAN E



NOTES

1. ELASTOMERIC BEARINGS INDICATED THUS:
   EN (N = NUMBER)
2. SOLE PLATES INDICATED THUS:
   (PN) (N = NUMBER)
   (SEE BEARING SHEET FOR DETAILS)

GIRDER LAYOUT AND INTERMEDIATE DIAPHRAGM LOCATIONS- SPANS F & G

PROJECT NO. R-1015
CRAVEN COUNTY
STATION: 287+62.50 -L-

SHEET 2 OF 2

KCI JOB NO. 25146789.11

DESIGN ENGINEER OF RECORD: DocuSigned by: DATE: 6/10/2018
DRAWN BY: R C LARSON DATE: 01/15/16
CHECKED BY: E C DECOLA DATE: 08/31/16

DocuSigned by: DB3C8E45B06D499...
NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON
6/10/2018

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DWG. REF. NO. 18 OF 44

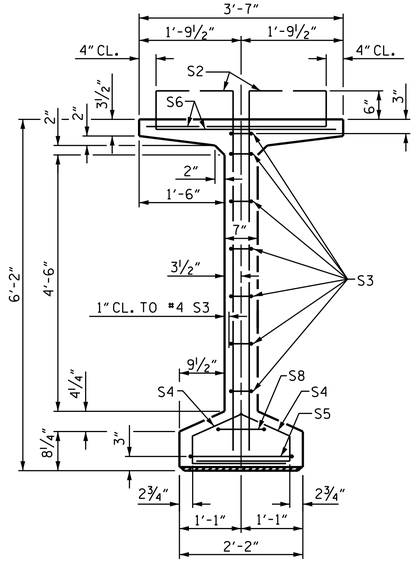
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE GIRDER LAYOUT SPANS E-G

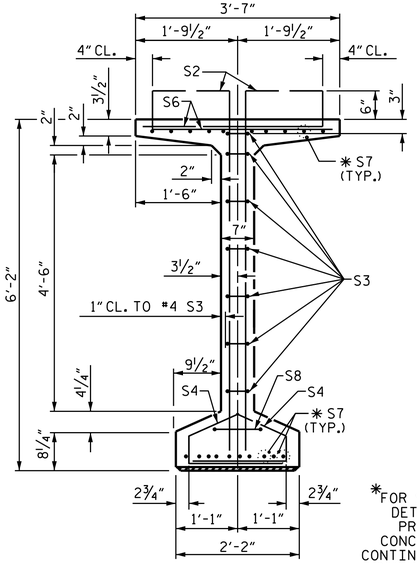
RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S11-18
1			3			TOTAL SHEETS
2			4			44

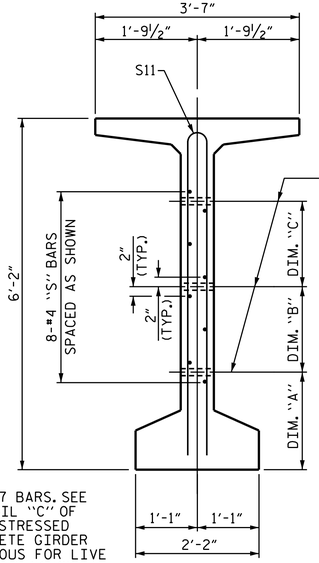
STR-#11



SECTION A-A



SECTION B-B



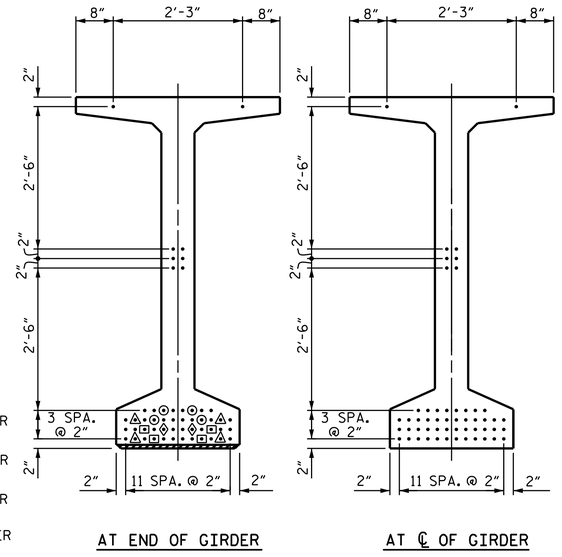
✱FOR S7 BARS. SEE DETAIL "C" OF PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS SHEET

SECTION C-C

(S1, S6 AND S9 BARS NOT SHOWN)

DEBONDING LEGEND

- FULLY BONDED STRANDS
- STRANDS DEBONDED FOR 4'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 6'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 8'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 14'-0" FROM END OF GIRDER



AT END OF GIRDER

AT ℄ OF GIRDER

0.6" Ø LOW RELAXATION STRAND LAYOUT

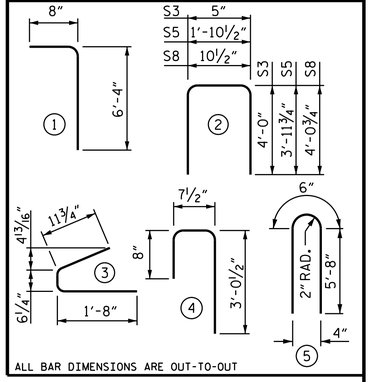
0.6" Ø L. R. GRADE 270 STRANDS		
AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

REINFORCING STEEL FOR ONE GDR

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	210	#4	1	7'-0"	982
S2	36	#5	1	7'-0"	263
S3	14	#4	2	8'-5"	79
S4	100	#4	3	3'-2"	212
S5	1	#5	2	9'-10"	10
S6	246	#5	4	4'-4"	1112
✱ S7	20	#5	STR	3'-8"	76
S8	2	#5	2	9'-0"	19
S9	40	#5	STR	3'-3"	136
S10	1	#3	STR	1'-10"	1
S11	8	#5	5	11'-10"	99
S12	16	#4	STR	8'-0"	86

✱ NOTE: S7 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	9500 PSI CONCRETE	0.6" Ø L.R. STRANDS
	LB.	C.Y.	No.
	3075	30.5	52

GIRDERS REQUIRED

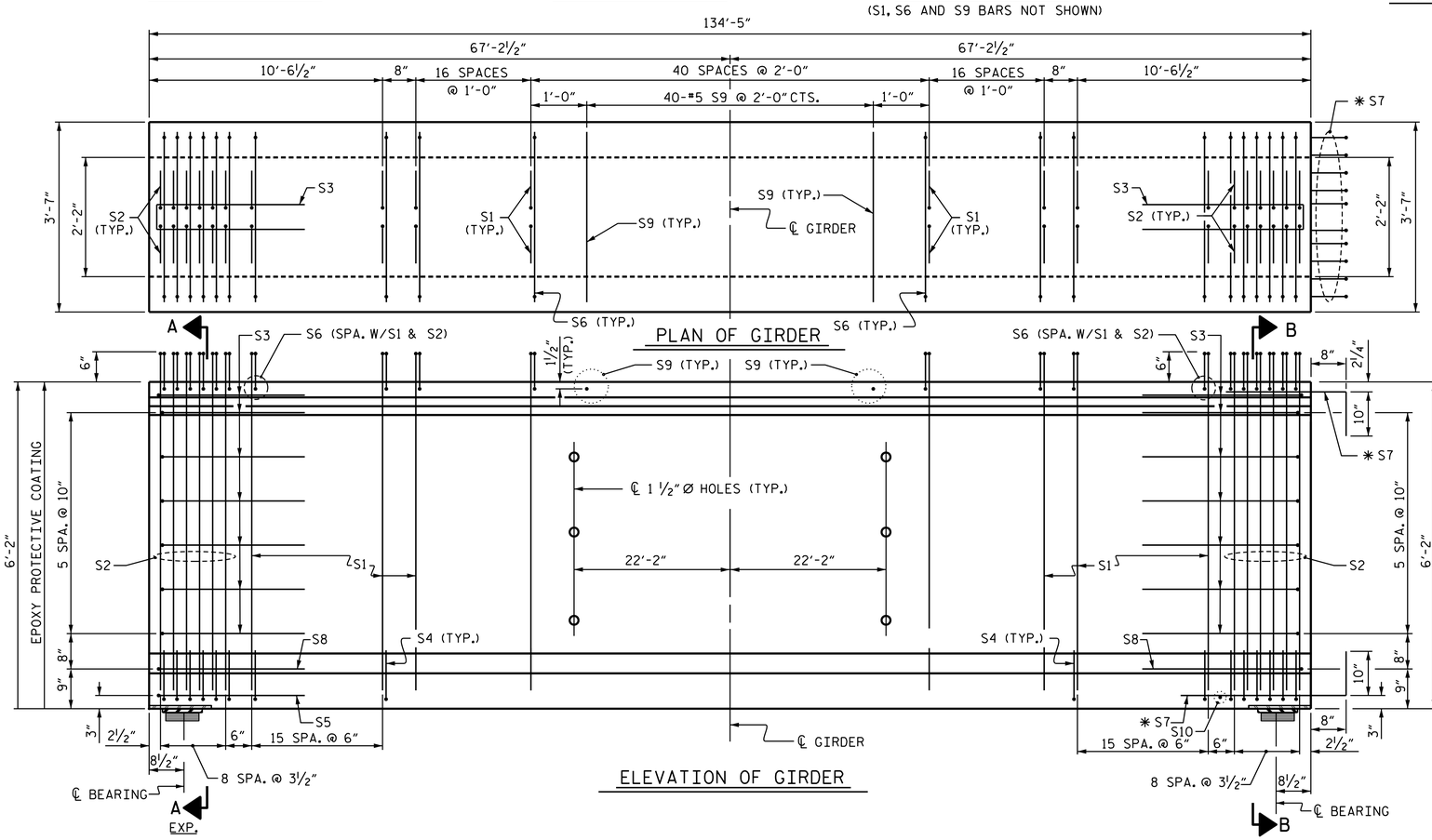
NUMBER	LENGTH	TOTAL LENGTH
5 (SPAN A)	134'-5"	672'-1"
5 (SPAN G)	134'-5"	672'-1"

PROJECT NO. R-1015

CRAVEN COUNTY

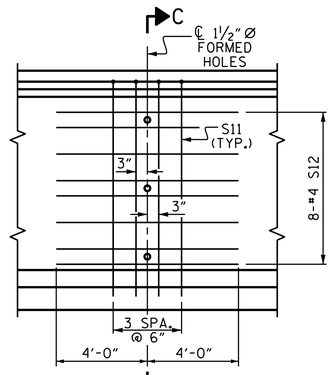
STATION: 287+62.50 -L-

SHEET 1 OF 5



PLAN OF GIRDER

ELEVATION OF GIRDER



PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR ALL GIRDERS (FOR ALL EXTERIOR GIRDERS AND INTERIOR GIRDERS WITH 70° ≤ SKEW ≤ 110°)

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

74" PRESTRESSED CONCRETE MODIFIED BULB TEE CONTINUOUS FOR LIVE LOAD SPAN A OR G

RIGHT LANE

DocuSigned by: DB3C8E45B06D499...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

6/10/2018

ENGINEERS ● PLANNERS ● ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
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DWG. REF. NO. 19 OF 44

REVISIONS						SHEET NO.
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1			3			TOTAL SHEETS
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STR-#11

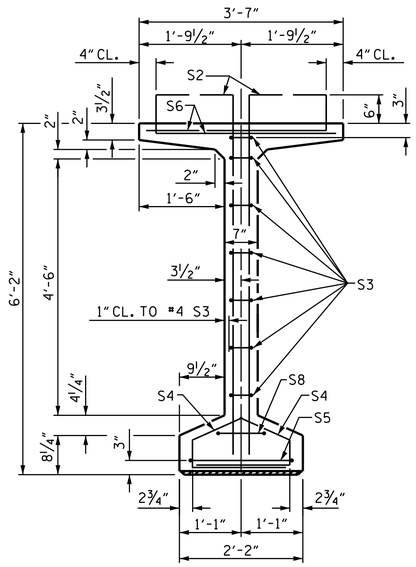
STD. NO. PCG8 (Sht. 2)

ASSEMBLED BY : R. C. LARSON	DATE : 02/23/16	
CHECKED BY : K. SU	DATE : 03/31/17	
DRAWN BY : EEM 2/6/97	REV. 10/1/11	MAA/GM
CHECKED BY : VAP 2/6/97	REV. 6/13	MAA/GM
	REV. 1/15	MAA/TMG

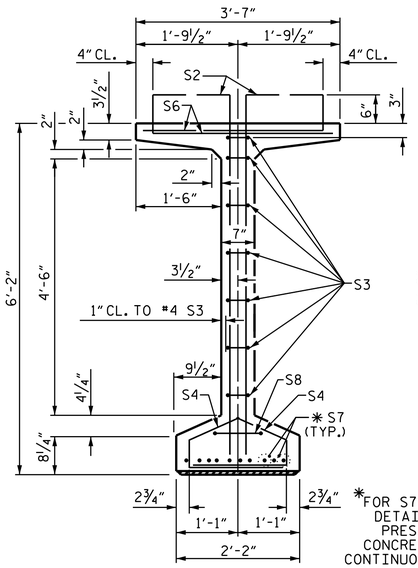
DESIGN ENGINEER OF RECORD: DocuSigned by: DB3C8E45B06D499... DATE : 6/10/2018

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

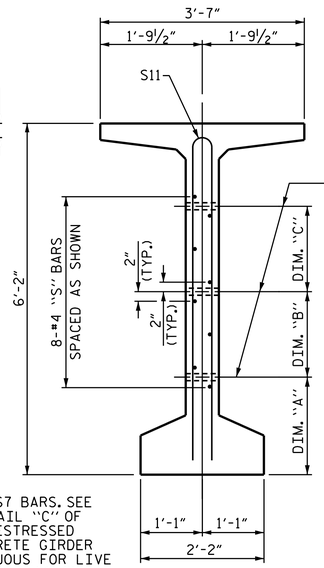
KCI JOB NO: 25146789.11



SECTION A-A



SECTION B-B



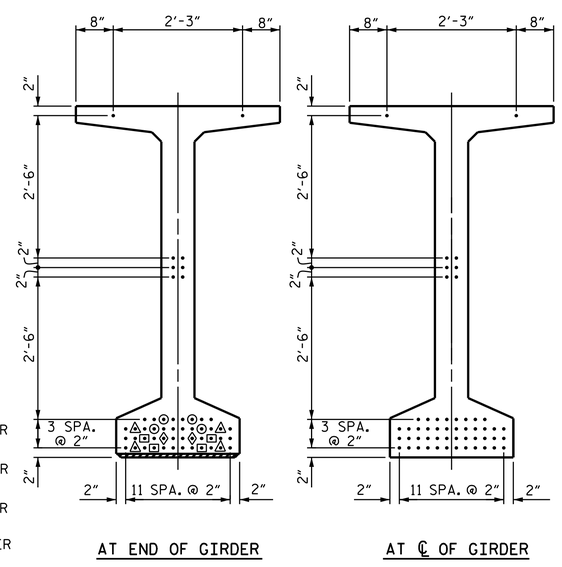
SECTION C-C

✱FOR S7 BARS. SEE DETAIL "C" OF PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS SHEET

(S1, S6 AND S9 BARS NOT SHOWN)

DEBONDING LEGEND

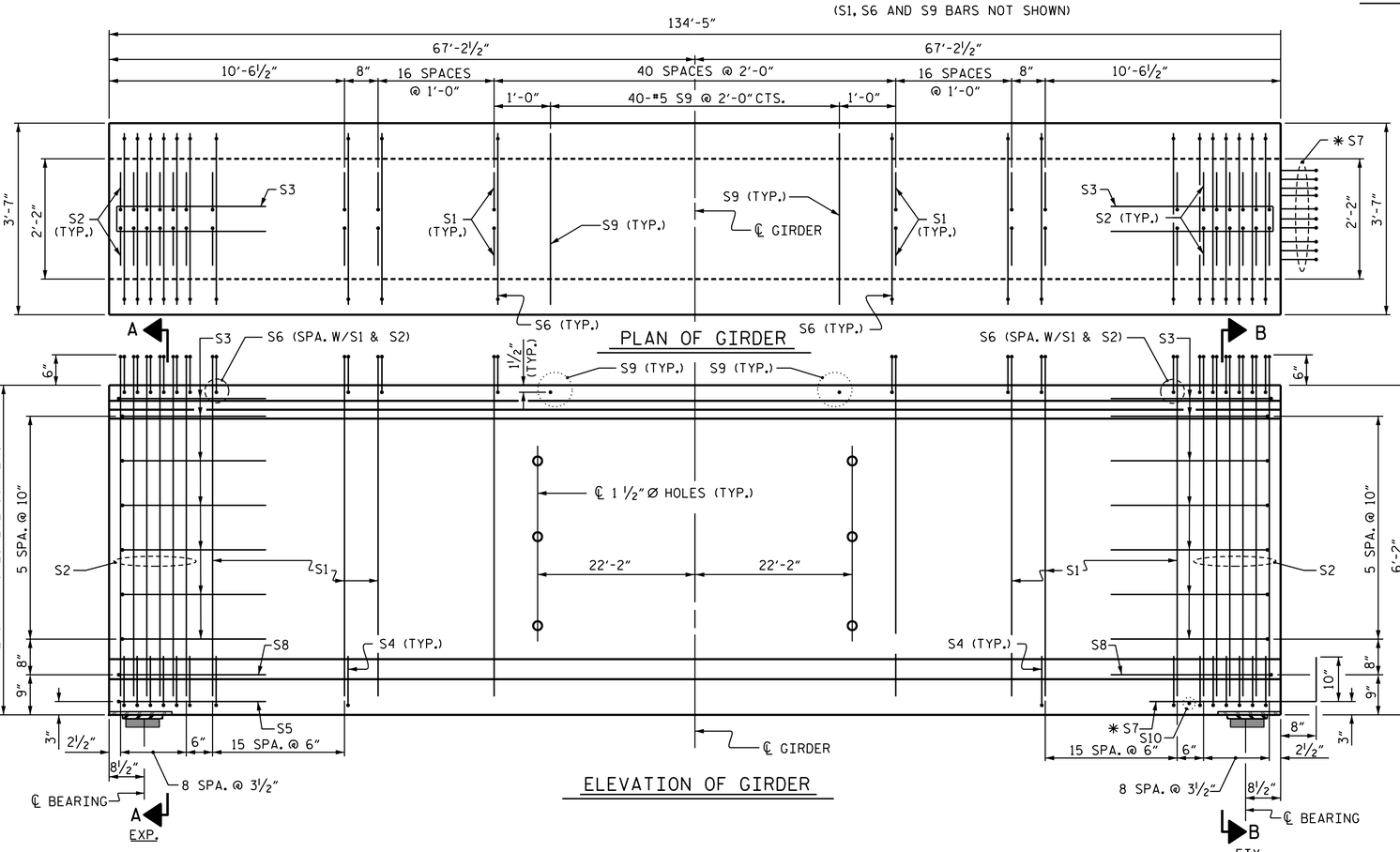
- ● FULLY BONDED STRANDS
- ▣ STRANDS DEBONDED FOR 4'-0" FROM END OF GIRDER
- ◬ STRANDS DEBONDED FOR 6'-0" FROM END OF GIRDER
- ⊙ STRANDS DEBONDED FOR 8'-0" FROM END OF GIRDER
- ◈ STRANDS DEBONDED FOR 14'-0" FROM END OF GIRDER



AT END OF GIRDER

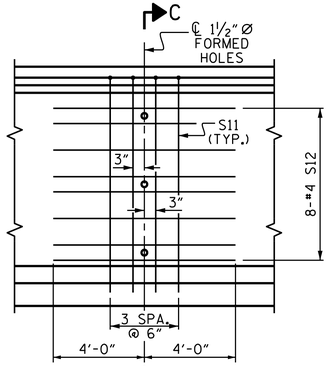
AT ℄ OF GIRDER

0.6"Ø LOW RELAXATION STRAND LAYOUT



PLAN OF GIRDER

ELEVATION OF GIRDER



PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR ALL GIRDERS (FOR ALL EXTERIOR GIRDERS AND INTERIOR GIRDERS WITH 70° ≤ SKEW ≤ 110°)

0.6"Ø L. R. GRADE 270 STRANDS

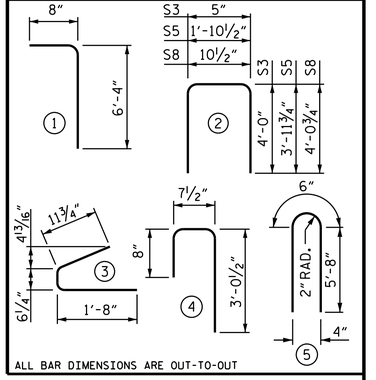
AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

REINFORCING STEEL FOR ONE GDR

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	210	#4	1	7'-0"	982
S2	36	#5	1	7'-0"	263
S3	14	#4	2	8'-5"	79
S4	100	#4	3	3'-2"	212
S5	1	#5	2	9'-10"	10
S6	246	#5	4	4'-4"	1112
✱S7	10	#5	STR	3'-8"	38
S8	2	#5	2	9'-0"	19
S9	40	#5	STR	3'-3"	136
S10	1	#3	STR	1'-10"	1
S11	8	#5	5	11'-10"	99
S12	16	#4	STR	8'-0"	86

✱NOTE: S7 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	9500 PSI CONCRETE	0.6"Ø L.R. STRANDS
	LB.	C.Y.	No.
	3037	30.5	52

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
5 (SPAN B)	134'-5"	672'-1"
5 (SPAN C)	134'-5"	672'-1"
5 (SPAN D)	134'-5"	672'-1"
5 (SPAN F)	134'-5"	672'-1"

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 2 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

74" PRESTRESSED CONCRETE MODIFIED BULB TEE CONTINUOUS FOR LIVE LOAD SPAN B, C, D, OR F

RIGHT LANE

DocuSigned by: DB3C8E45B06B499...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

6/10/2018

KCI JOB NO: 25146789.11

ASSEMBLED BY : R. C. LARSON	DATE : 02/23/16		
CHECKED BY : K. SU	DATE : 03/31/17		
DRAWN BY : EEM 2/6/97	REV. 10/1/11	MAA/GM	DESIGN ENGINEER OF RECORD: DocuSigned by: DATE : 6/10/2018
CHECKED BY : VAP 2/6/97	REV. 6/13	MAA/GM	
	REV. 1/15	MAA/TMG	

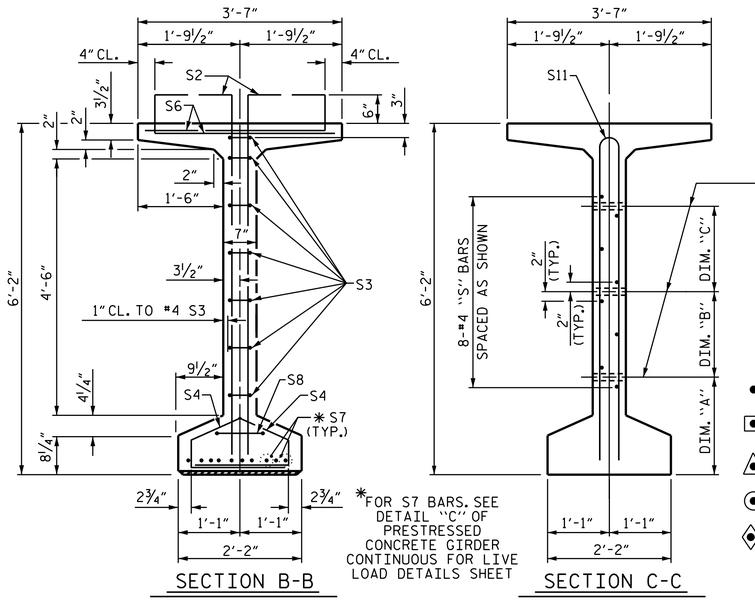
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ENGINEERS ● PLANNERS ● ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
SUITE 220, LANDMARK CENTER II 4601 SIX FORKS RD, RALEIGH, N.C. 27609-5290 (919) 783-9214
DWG. REF. NO. 20 OF 44

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S11-20
1			3			TOTAL SHEETS
2			4			44

STR-#11

STD. NO. PCG8 (Sht. 2)



✱FOR S7 BARS. SEE DETAIL "C" OF PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS SHEET

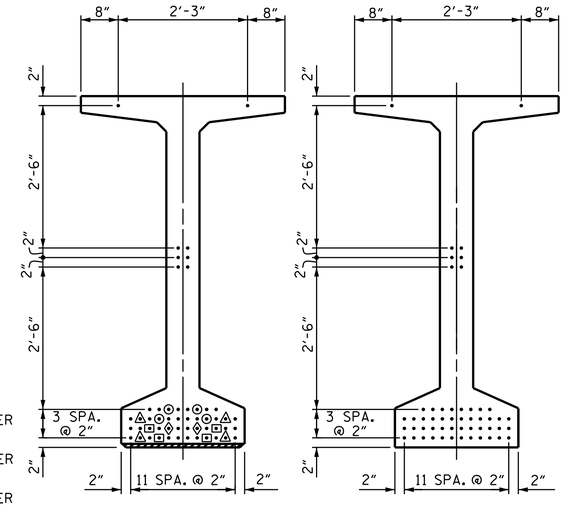
SECTION B-B

SECTION C-C

(S1, S6 AND S9 BARS NOT SHOWN)

DEBONDING LEGEND

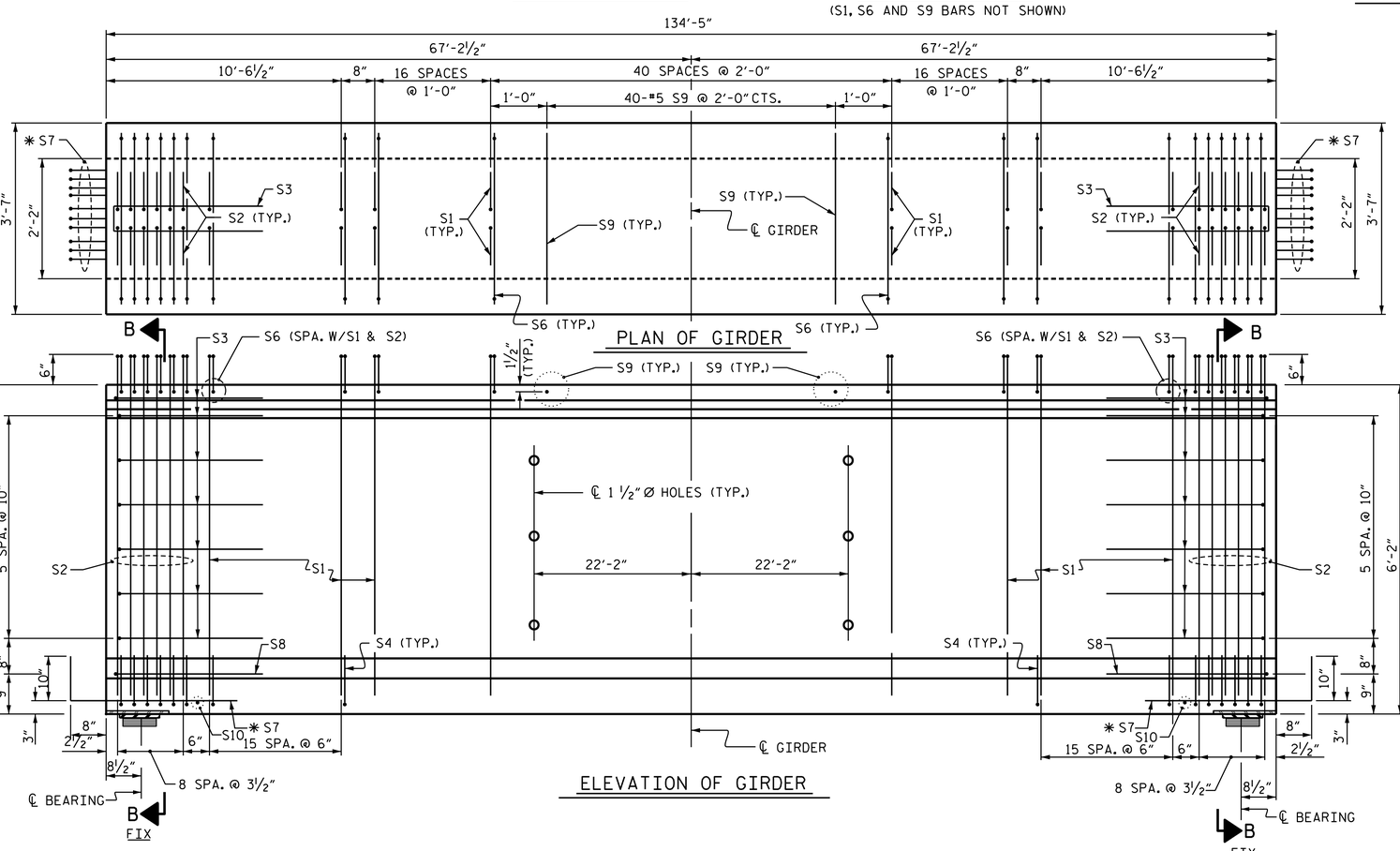
- FULLY BONDED STRANDS
- STRANDS DEBONDED FOR 4'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 6'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 8'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 14'-0" FROM END OF GIRDER



AT END OF GIRDER

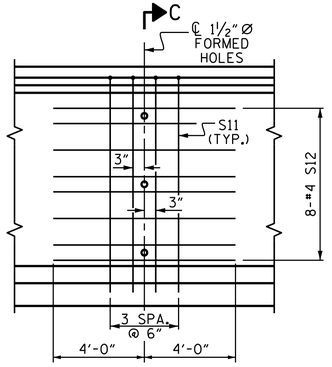
AT ℄ OF GIRDER

0.6" Ø LOW RELAXATION STRAND LAYOUT



PLAN OF GIRDER

ELEVATION OF GIRDER



PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR ALL GIRDERS (FOR ALL EXTERIOR GIRDERS AND INTERIOR GIRDERS WITH 70° ≤ SKEW ≤ 110°)

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AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
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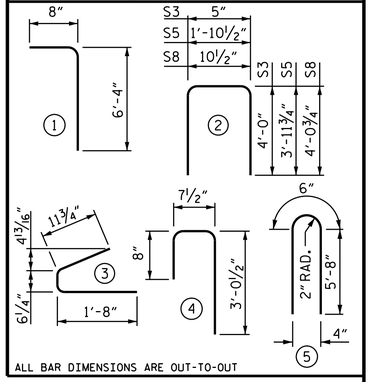
✱ NOTE: S7 BARS SHALL BE BENT BEFORE SHIPMENT. HEAT BENDING SHALL NOT BE ALLOWED.

BAR TYPES



ALL BAR DIMENSIONS ARE OUT-TO-OUT

QUANTITIES FOR ONE GIRDER

	REINFORCING STEEL	9500 PSI CONCRETE	0.6" Ø L.R. STRANDS
	LB.	C.Y.	No.
	3065	30.5	52

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
5 (SPAN E)	134'-5"	672'-1"

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 3 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

74" PRESTRESSED CONCRETE MODIFIED BULB TEE CONTINUOUS FOR LIVE LOAD SPAN E

RIGHT LANE

DocuSigned by: DB3C8E45E06D49...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

6/10/2018

ENGINEERS ● PLANNERS ● ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
SUITE 220, LANDMARK CENTER II 4601 SIX FORKS RD, RALEIGH, N.C. 27609-5290 (919) 783-9214

DWG. REF. NO. 21 OF 44

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S11-21
1			3			TOTAL SHEETS
2			4			44

STR-#11

STD. NO. PCG8 (Sht. 2)

ASSEMBLED BY : R. C. LARSON	DATE : 02/23/16		
CHECKED BY : K. SU	DATE : 03/31/17		
DRAWN BY : EEM 2/6/97	REV. 10/1/11	MAA/GM	DESIGN ENGINEER OF RECORD: DocuSigned by: DATE : 6/10/2018
CHECKED BY : VAP 2/6/97	REV. 6/13	MAA/GM	
	REV. 1/15	MAA/TMG	

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

KCI JOB NO: 25146789.11

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

.6" Ø LOW RELAXATION	SPANS A - G INTERIOR GIRDERS																					
TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	1.00
CAMBER (GIRDER ALONE IN PLACE)	0	0.052↑	0.103↑	0.150↑	0.194↑	0.233↑	0.266↑	0.292↑	0.311↑	0.323↑	0.327↑	0.323↑	0.311↑	0.292↑	0.266↑	0.233↑	0.194↑	0.150↑	0.103↑	0.052↑	0
✱ DEFLECTION DUE TO SUPERIMPOSED D.L.	0	0.035↓	0.066↓	0.101↓	0.129↓	0.157↓	0.178↓	0.197↓	0.210↓	0.218↓	0.220↓	0.218↓	0.210↓	0.197↓	0.178↓	0.157↓	0.129↓	0.101↓	0.066↓	0.035↓	0
FINAL CAMBER	0	3/16"↑	7/16"↑	9/16"↑	3/4"↑	15/16"↑	1 1/16"↑	1 1/8"↑	1 3/16"↑	1 1/4"↑	1 1/4"↑	1 1/4"↑	1 3/16"↑	1 1/8"↑	1 1/16"↑	15/16↑	3/4"↑	9/16"↑	7/16"↑	3/16"↑	0

.6" Ø LOW RELAXATION	SPANS A - G EXTERIOR GIRDERS																					
TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	1.00
CAMBER (GIRDER ALONE IN PLACE)	0	0.052↑	0.103↑	0.150↑	0.194↑	0.233↑	0.266↑	0.292↑	0.311↑	0.323↑	0.327↑	0.323↑	0.311↑	0.292↑	0.266↑	0.233↑	0.194↑	0.150↑	0.103↑	0.052↑	0
✱ DEFLECTION DUE TO SUPERIMPOSED D.L.	0	0.033↓	0.063↓	0.096↓	0.123↓	0.149↓	0.170↓	0.187↓	0.199↓	0.207↓	0.210↓	0.207↓	0.199↓	0.187↓	0.170↓	0.149↓	0.123↓	0.096↓	0.063↓	0.033↓	0
FINAL CAMBER	0	1/4"↑	1/2"↑	5/8"↑	7/8"↑	1"↑	1 3/16"↑	1 1/4"↑	1 5/16"↑	1 3/8"↑	1 1/16"↑	1 3/8"↑	1 5/16"↑	1 1/4"↑	1 3/16"↑	1"↑	7/8"↑	5/8"↑	1/2"↑	1/4"↑	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.

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 7800 PSI.

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

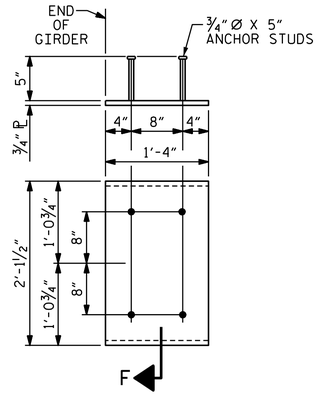
THE TOP SURFACE OF THE GIRDER, EXCLUDING THE OUTSIDE 4", SHALL BE RAKED TO A DEPTH OF 1/4".

A 2" X 2" CHAMFER IS ALLOWED AT THE INTERSECTION OF THE WEB AND THE BOTTOM FLANGE OF THE 74" MODIFIED BULB TEES ONLY.

THE CONTRACTOR HAS THE OPTION TO PROVIDE, AT NO ADDITIONAL COST TO THE DEPARTMENT, 2 ADDITIONAL STRANDS AT THE TOP OF THE GIRDER TO FACILITATE TYING OF THE REINFORCING STEEL. THESE STRANDS SHALL BE PULLED TO A LOAD OF 4500 LBS.

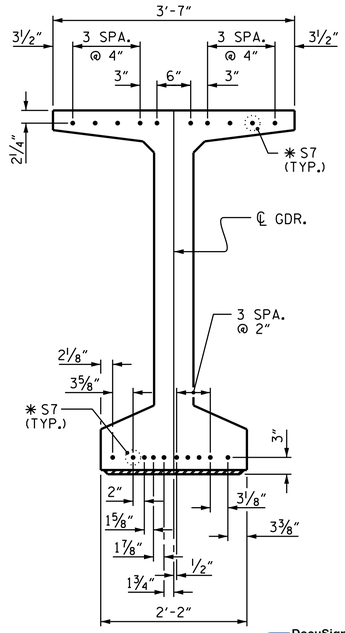
PRESTRESSED CONCRETE GIRDERS ARE DESIGNED FOR AN ALLOWABLE TENSILE STRESS OF 0 PSI IN THE PRECOMPRESSED TENSILE ZONE UNDER ALL LOADING CONDITIONS.

PRESTRESSED CONCRETE GIRDERS SHALL CONTAIN CALCIUM NITRITE CORROSION INHIBITOR.



EMBEDDED PLATE "B-1" DETAILS
FOR AASHTO TYPE IV GIRDER AND
74" MODIFIED BULB TEES
(2 REQ'D PER GIRDER)

SECTION "F"
(SEE NOTES)



DETAIL "C"
(FOR 74" MODIFIED BULB TEES)

DocuSigned by: DB3C8E45B06D499...
12/7/2018

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

PROJECT NO. R-1015
CRAVEN COUNTY
STATION: 287+62.50 -L-

SHEET 4 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD
PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS
RIGHT LANE

DESIGN ENGINEER OF RECORD: DocuSigned by: DB3C8E45B06D499...	DATE: 12/7/2018
ASSEMBLED BY: R. C. LARSON	DATE: 02/23/16
CHECKED BY: K. SU	DATE: 04/26/17
DRAWN BY: ELR 11/91	REV. 10/1/11 MAA/GM
CHECKED BY: GRP 11/91	REV. 1/15 MAA/TMG
	REV. 2/15 MAA/TMG

KCI JOB NO. 25146789.11

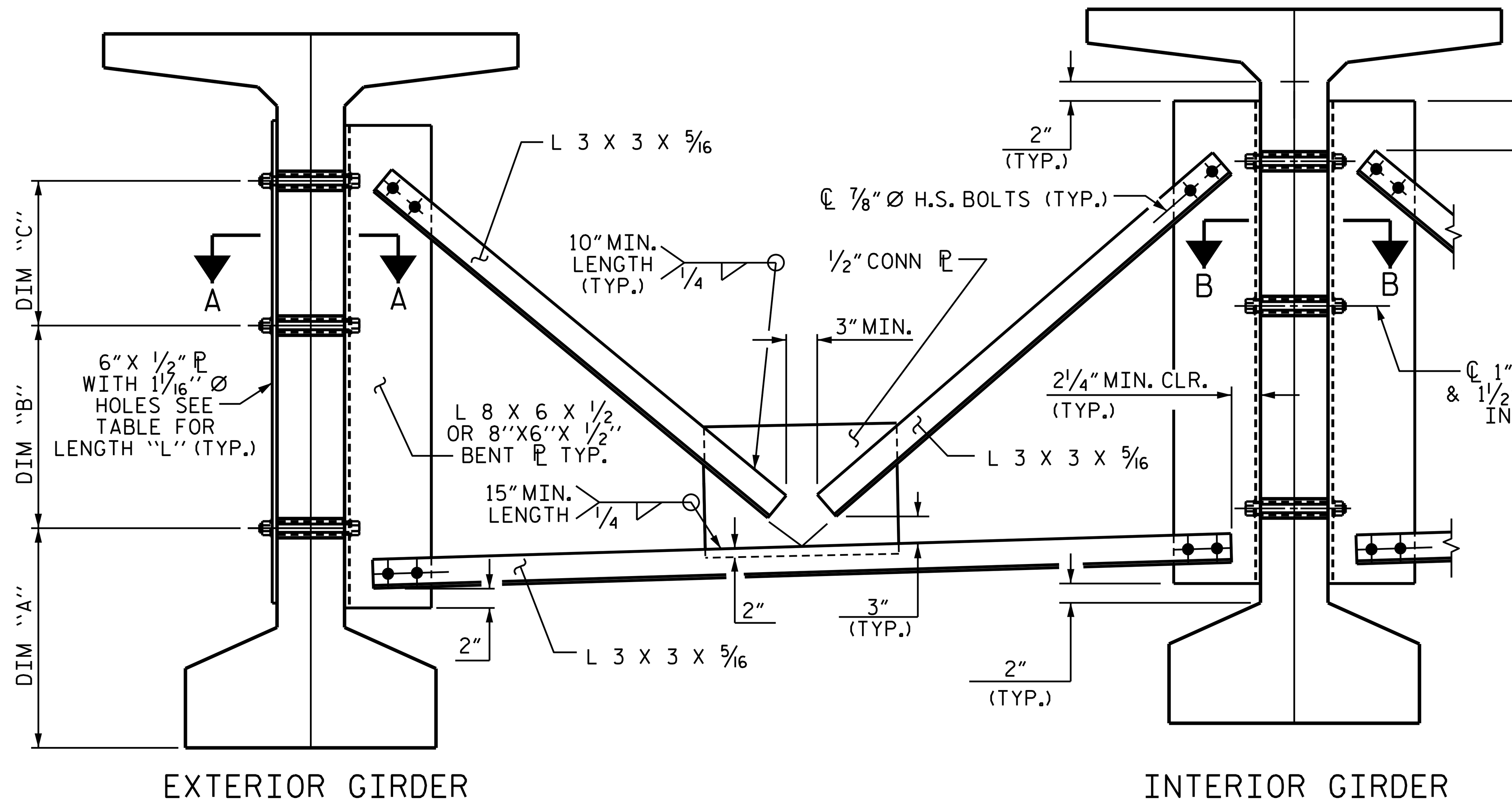
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ENGINEERS ● PLANNERS ● ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
SUITE 220, LANDMARK CENTER ● 4601 SIX FORKS RD, RALEIGH, N.C. 27609-5320 (919) 783-9214
DWG. REF. NO. 22 OF 44

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S11-22
1			3			TOTAL SHEETS
2			4			44

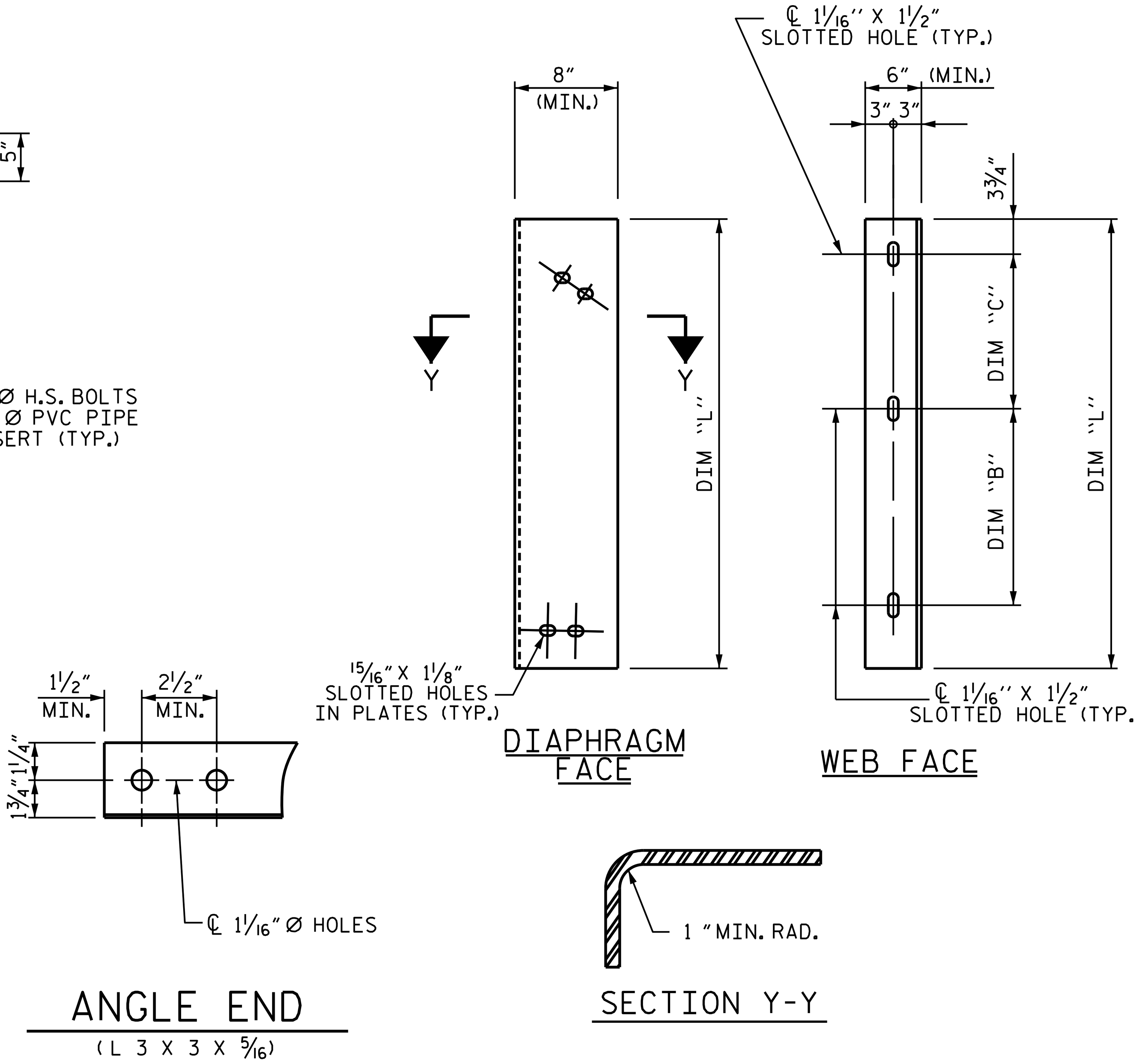
STR-#11

STD. NO. PCG9 (Sht. 4a)



PART SECTION AT INTERMEDIATE DIAPHRAGM

(74" BULB TEE GIRDER SHOWN)



CONNECTOR PLATE DETAIL

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 ANGLE 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 1/4 TURN.

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

FOR METALLIZATION, APPLY A THERMAL SPRAYED COATING WITH A SEAL COAT TO ALL STEEL DIAPHRAGM SURFACES IN ACCORDANCE WITH THE DEPARTMENT'S THERMAL SPRAYED COATINGS (METALLIZATION) PROGRAM, THERMAL SPRAYED COATING 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 1/4" PROJECTION BEYOND THE NUT.

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

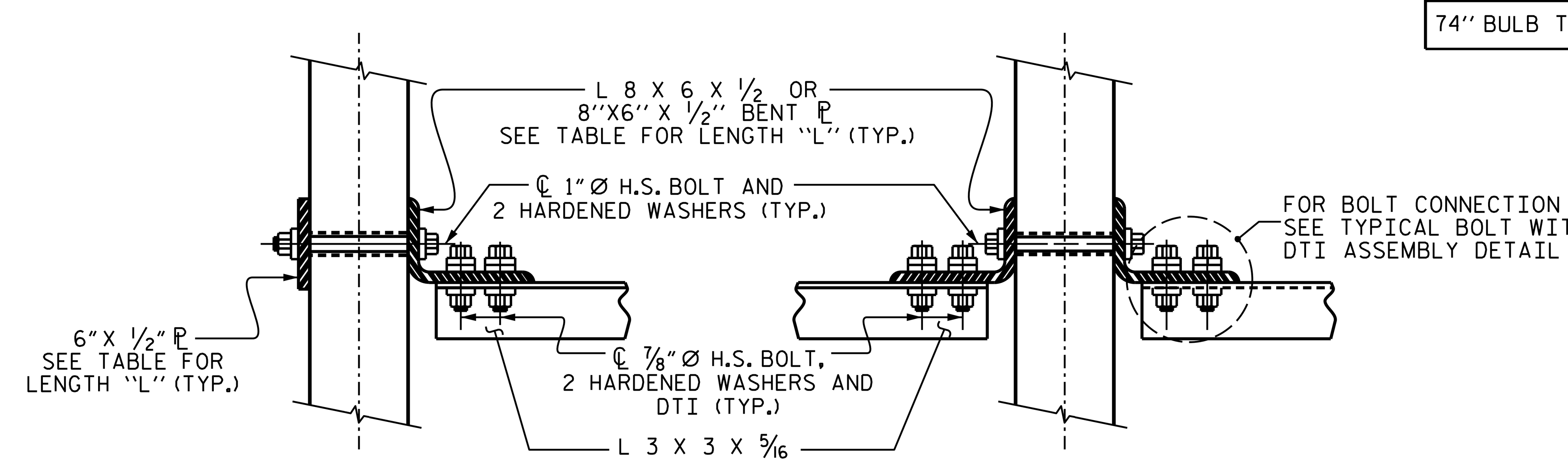
SUBMIT TWO SETS OF WORKING DRAWINGS FOR THE INTERMEDIATE DIAPHRAGM ASSEMBLY FOR REVIEW, COMMENTS AND ACCEPTANCE. AFTER REVIEW, COMMENTS, AND ACCEPTANCE, SUBMIT SEVEN SETS FOR DISTRIBUTION.

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.

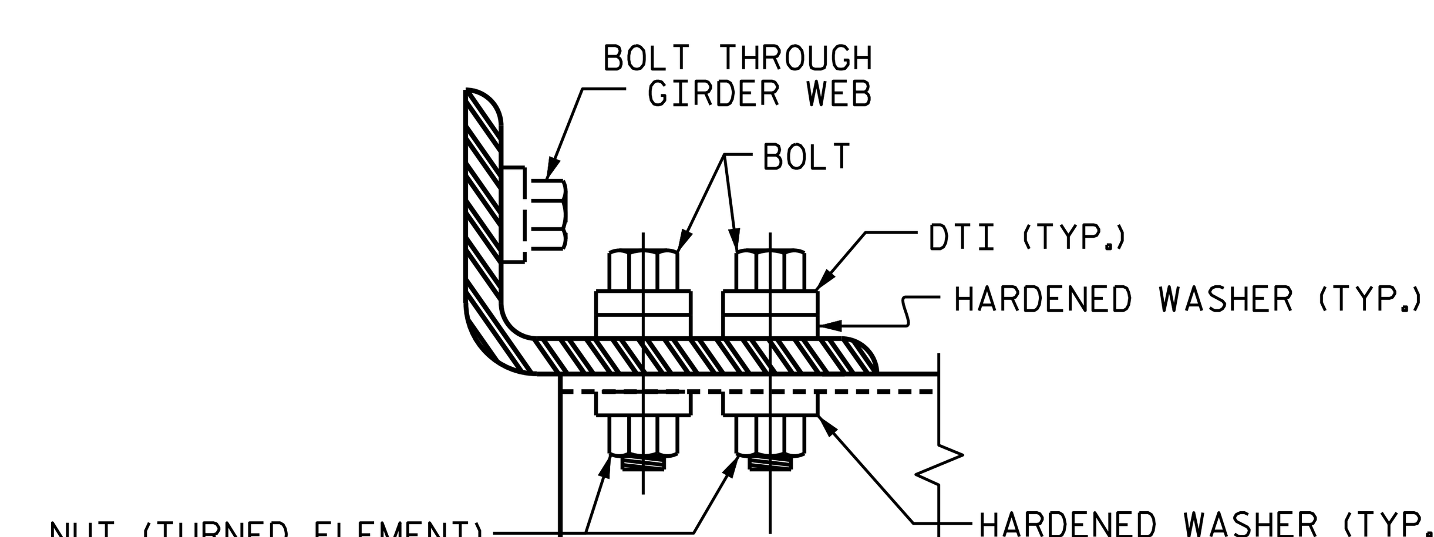
THE COST OF THE STEEL DIAPHRAGMS AND ASSEMBLIES SHALL BE INCLUDED IN THE UNIT PRICE BID FOR PRESTRESSED CONCRETE GIRDERS.

TABLE

GIRDER TYPE	DIM "A"	DIM "B"	DIM "C"	DIM "L"
74" BULB TEE	1'-10"	1'-10"	1'-4 3/4"	4'-2"



CONNECTION DETAILS



BOLT WITH DTI ASSEMBLY DETAIL

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 5 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

INTERMEDIATE STEEL DIAPHRAGMS FOR MODIFIED BULB TEE PRESTRESSED CONCRETE GIRDERS

RIGHT LANE

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

DocuSigned by: DB3C8E45B06D49... 6/10/2018

KCI Associates of North Carolina, P.A.

DWG. REF. NO. 23 OF 44

REVISIONS							
NO.	BY:	DATE:	NO.	BY:	DATE:	SHEET NO.	S11-23
1			3			TOTAL SHEETS	44
2			4				

DESIGN ENGINEER OF RECORD:	DATE: 6/10/2018
ASSEMBLED BY: R.C. LARSON	DATE: 3/31/16
CHECKED BY: K. SU	DATE: 04/04/17
DRAWN BY: RWW 11/09 / CHECKED BY: GM 11/09	ADDED 11/23/09R REV. 10/1/11 MAA/GM

KCI JOB NO: 25146789.11

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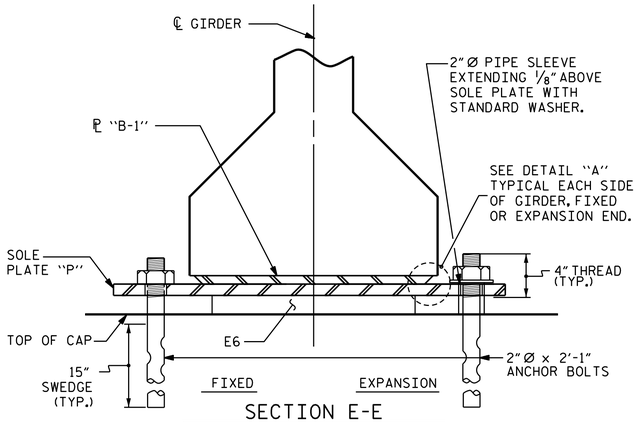
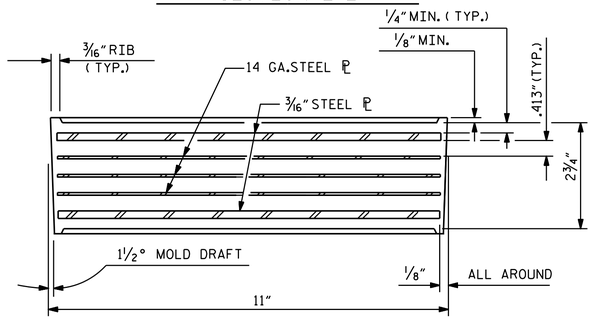
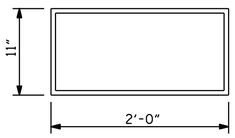
STR-#11 STD. NO. PCG11 (SHT 3)



SECTION E-E



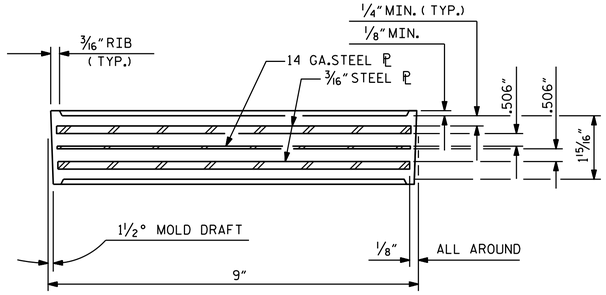
TYPICAL SECTION OF ELASTOMERIC BEARINGS



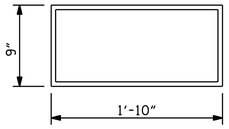
E6 (60 REQ'D)

PLAN VIEW OF ELASTOMERIC BEARING

TYPE VII



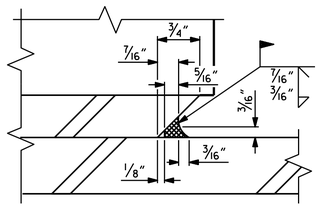
TYPICAL SECTION OF ELASTOMERIC BEARINGS



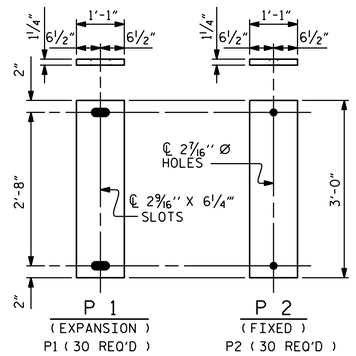
E3 (10 REQ'D)

PLAN VIEW OF ELASTOMERIC BEARING

TYPE IV



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.

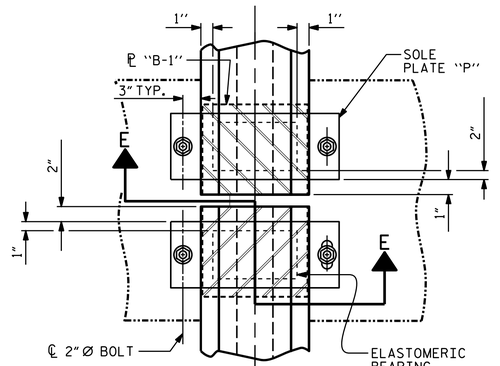
ANCHOR BOLTS SHALL MEET THE REQUIREMENTS OF ASTM A449. NUTS SHALL MEET THE REQUIREMENTS OF AASHTO M291-DH OR AASHTO M292-2H. WASHERS SHALL MEET THE REQUIREMENTS OF AASHTO M293. NO SHOP DRAWINGS ARE REQUIRED FOR ANCHOR BOLTS, NUTS AND WASHERS. SHOP INSPECTION IS REQUIRED.

ALL SURFACES OF BEARING PLATES SHALL BE SMOOTH AND STRAIGHT.

THE ELASTOMER IN THE STEEL REINFORCED BEARINGS SHALL HAVE A SHEAR MODULUS OF 0.160 KSI, IN ACCORDANCE WITH AASHTO M251.

FOR STEEL REINFORCED ELASTOMERIC BEARINGS, SEE SPECIAL PROVISIONS.

ALL SOLE PLATES SHALL BE AASHTO M270 GRADE 36.



TYPICAL HALF-PLAN (SHOWING CONTINUOUS BENT)

TYPICAL HALF-PLAN (SHOWING SIMPLE SPAN BENT)

MAXIMUM ALLOWABLE SERVICE LOADS	
D.L.+L.L. (NO IMPACT)	
TYPE IV	225 k
TYPE VII	470 k

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

KCI JOB NO: 25146789.11

DESIGN ENGINEER OF RECORD: DocuSigned by: DB3C8E45B06D499...		DATE : 6/10/2018	
ASSEMBLED BY : R. C. LARSON		DATE : 02/16/16	
CHECKED BY : K. SU		DATE : 04/04/17	
DRAWN BY : EEM 2/97	REV. 10/1/11		MAA/GM
CHECKED BY : VAP 2/97	REV. 6/13		AAC/MAA
	REV. 1/15		MAA/TMG

DocuSigned by: DB3C8E45B06D499...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

6/10/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD ELASTOMERIC BEARING DETAILS

PRESTRESSED CONCRETE GIRDER SUPERSTRUCTURE
RIGHT LANE

ENGINEERS ● PLANNERS ● ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
SUITE 220, LANDMARK CENTER II 4601 SIX FORKS RD. RALEIGH, N.C. 27609-5210 (919) 783-9214

DWG. REF. NO. 24 OF 44

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S11-24
1			3			TOTAL SHEETS
2			4			44

STR-#11

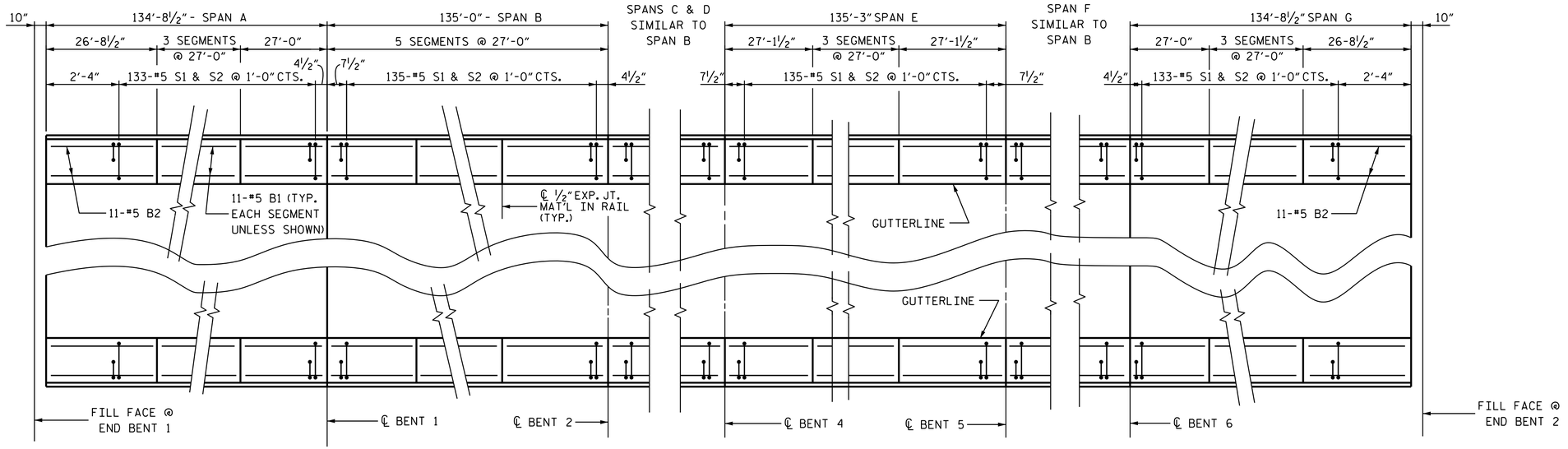
STD. NO. EB4

NOTES

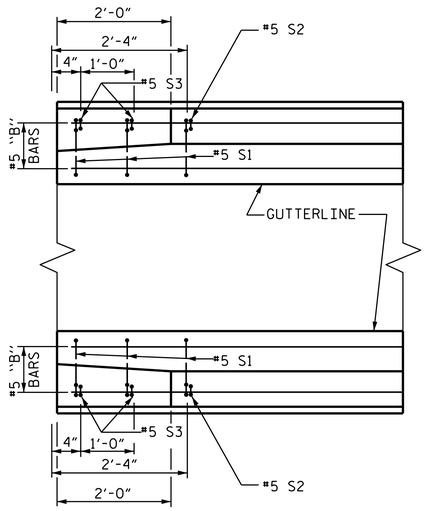
THE BARRIER RAIL IN EACH SPAN SHALL NOT BE CAST UNTIL ALL SLAB CONCRETE IN THAT SPAN HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

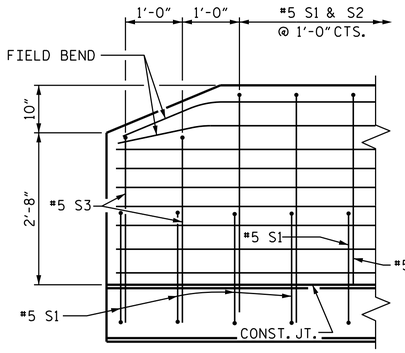
GROOVED CONTRACTION JOINTS, ½" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE BARRIER RAIL AND IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. THE CONTRACTION JOINT SHALL BE LOCATED AT EACH THIRD POINT BETWEEN BARRIER RAIL EXPANSION JOINTS. ONLY ONE CONTRACTION JOINT IS REQUIRED 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.



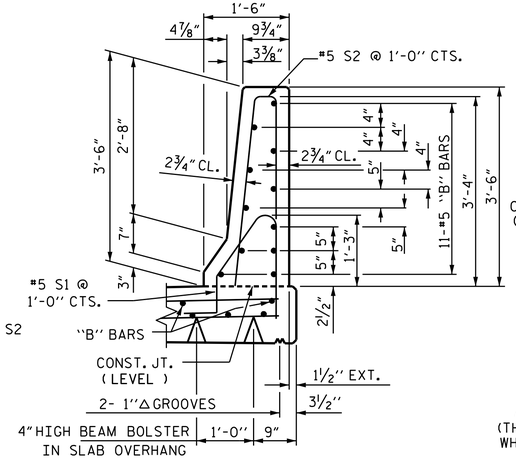
PLAN



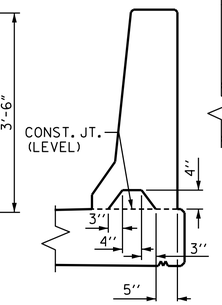
PLAN



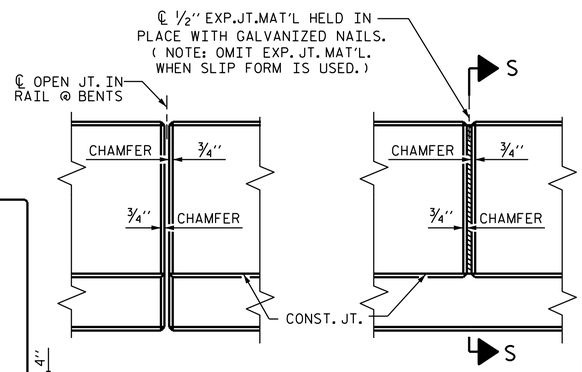
SIDE VIEW



SECTION THRU RAIL

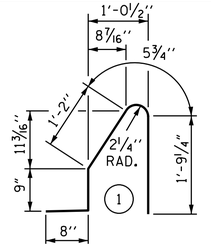


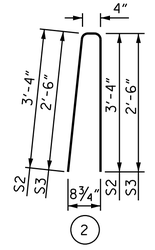
SECTION S-S
AT DAM IN OPEN JOINT
(THIS IS TO BE USED ONLY WHEN SLIP FORM IS USED)



ELEVATION AT EXPANSION JOINTS

BAR TYPES





ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

FOR CONCRETE BARRIER RAIL ONLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* B1	726	#5	STR	26'-6"	20,066
* B2	44	#5	STR	26'-4"	1,208
* S1	1890	#5	1	4'-10"	9,528
* S2	1882	#5	2	7'-0"	13,740
* S3	8	#5	2	5'-4"	45

* EPOXY COATED REINFORCING STEEL	44,587 LBS.
CLASS AA CONCRETE	256.8 CU. YDS.
CONCRETE BARRIER RAIL	1889.33 LIN. FT.

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

END OF RAIL DETAILS

BARRIER RAIL DETAILS

DESIGN ENGINEER OF RECORD: DocuSigned by DATE: 6/10/2018
DB3C8E45B06D499...

ASSEMBLED BY : R. C. LARSON DATE : 02/15/16
CHECKED BY : E. C. DECOLA DATE : 8/31/16

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

REV. 10/1/11	MAA/GM
REV. 7/12	MAA/GM
REV. 6/13	MAA/GM

KCI JOB NO: 25146789.11

DocuSigned by: DB3C8E45B06D499...
6/10/2018

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

ENGINEERS ● PLANNERS ● ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
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DWG. REF. NO. 25 OF 44

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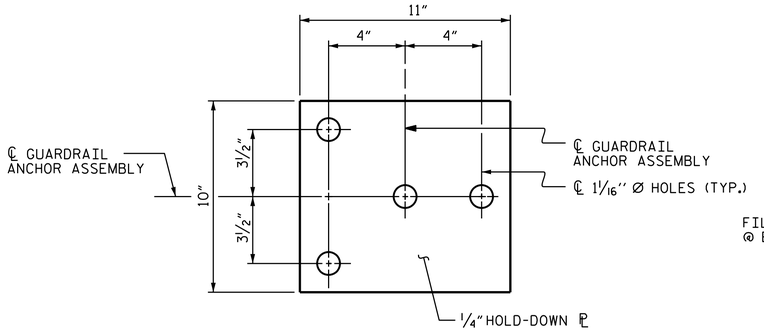
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
CONCRETE BARRIER RAIL
RIGHT LANE

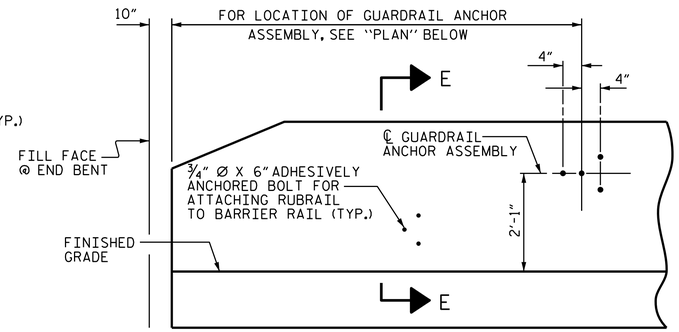
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S11-25
1			3			TOTAL SHEETS
2			4			44

STR-#11

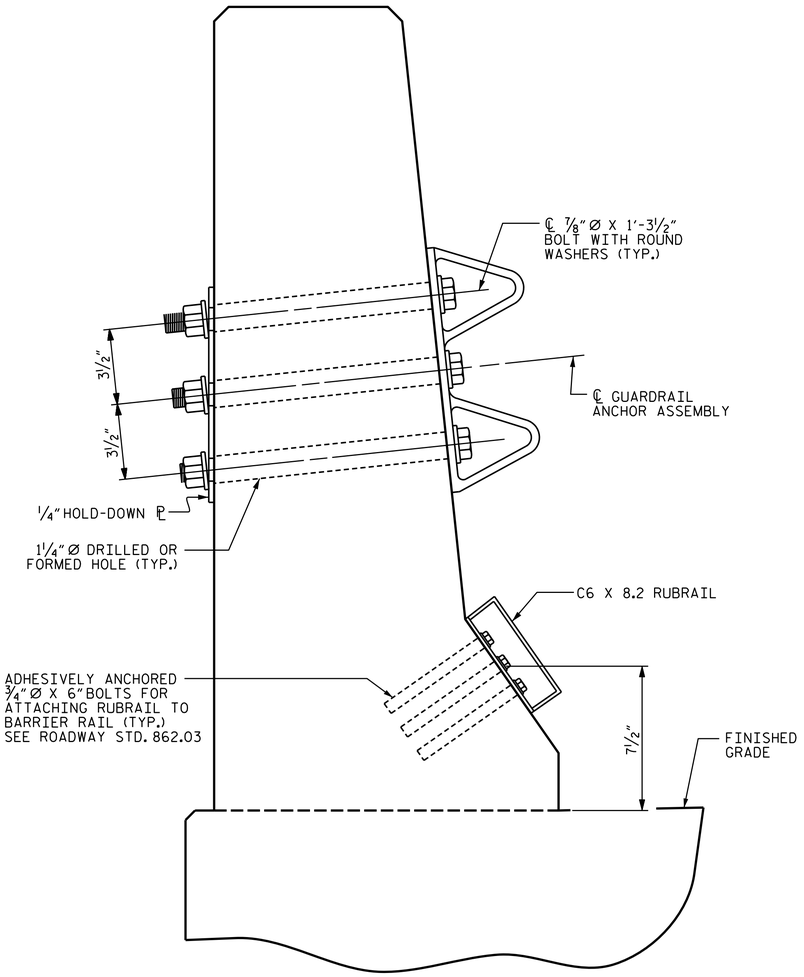
STD. NO. CBR1 (SHT 1)



PLAN

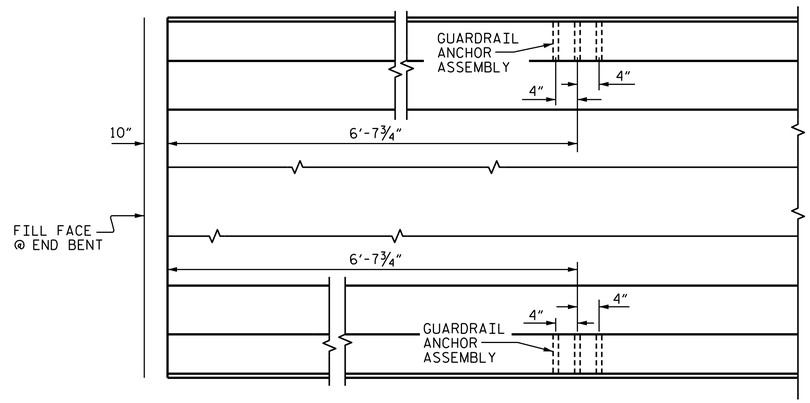


ELEVATION



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.)

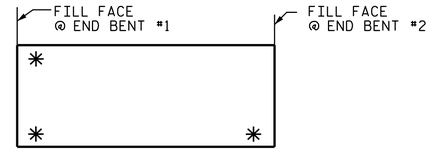
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF BARRIER RAIL. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

KCI JOB NO: 25146789.11

ASSEMBLED BY : R. C. LARSON	DATE : 02/16/16				
CHECKED BY : K. SU	DATE : 04/04/17				
DRAWN BY : TLA 5/06	REV. 10/1/11	MAA/GM	DESIGN ENGINEER OF RECORD: DocuSigned by: DB3C8E45B06D4...	DATE : 6/10/2018	
CHECKED BY : GM 5/06	REV. 7/12	MAA/GM			
	REV. 6/13	MAA/GM			

DocuSigned by:
DB3C8E45B06D4...
6/10/2018

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

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ENGINEERS ● PLANNERS ● ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
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DWG. REF. NO. 26 OF 44

STR-#11

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

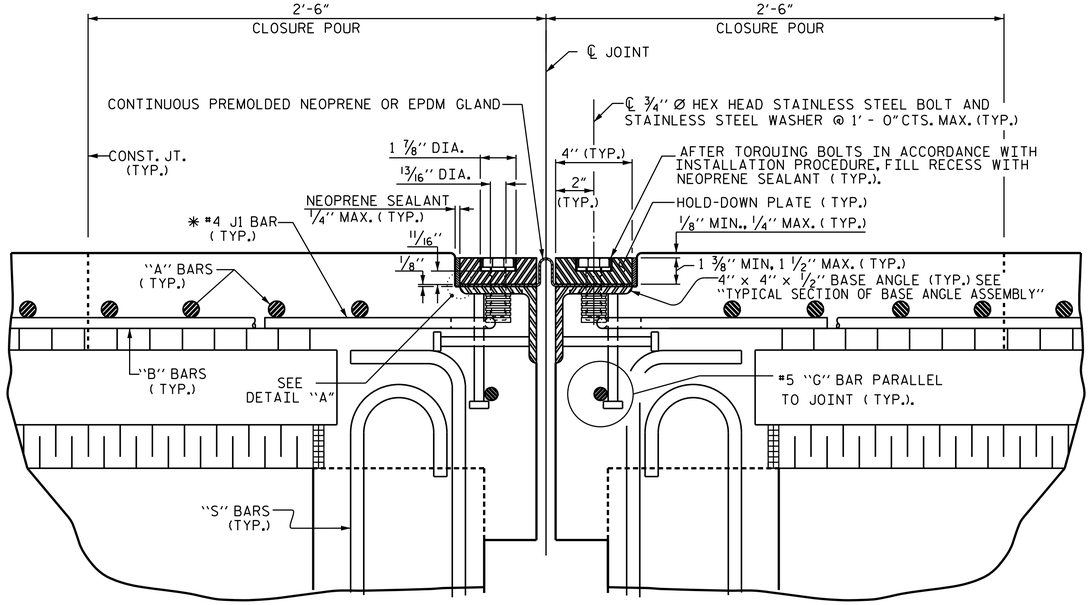
STANDARD

GUARDRAIL ANCHORAGE FOR BARRIER RAIL

RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S11-26
1			3			TOTAL SHEETS
2			4			44

STD. NO. GRA2



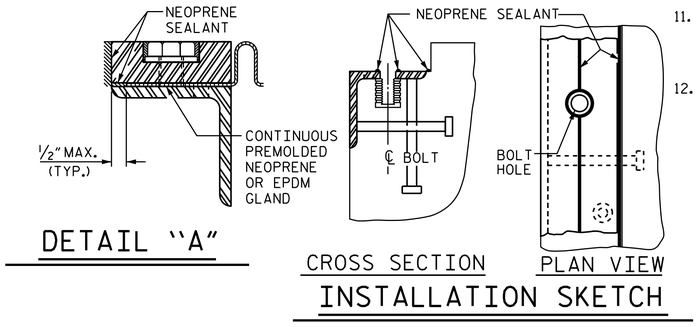
EXPANSION JOINT DETAILS

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 4 1/8" TO 4 1/4" 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 REPAIRED IN ACCORDANCE WITH THE SPECIAL PROVISION FOR THERMAL SPRAYED COATINGS (METALLIZATION).
3. LAY THE GLAND ON THE BASE ANGLE AND FIELD MARK THE GLAND FOR THE BOLT HOLES. HOLES IN THE GLAND SHALL BE PUNCHED ⅞" 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. TOROUE SHALL NOT BE LESS THAN 80 FT-LBS AFTER SEVEN (7) DAYS.
6. AFTER PROPER TOROUING, CLEAN THE BOLT HOLE RECESSES, THE RECESS BETWEEN THE JOINT SEAL DEVICE AND CONCRETE, AND THE LIFTING HOLES IN THE HOLD-DOWN PLATE, AND COMPLETELY FILL THE RECESSES AND LIFTING HOLES WITH NEOPRENE SEALANT.



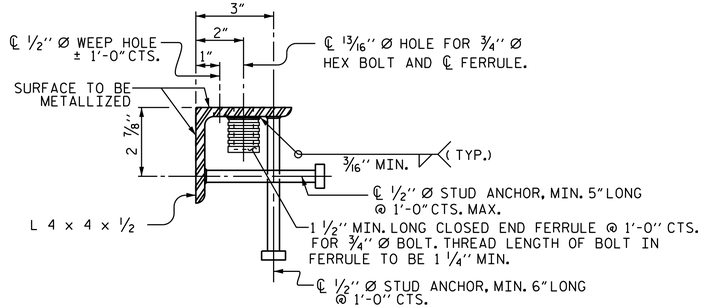
DETAIL "A"

CROSS SECTION PLAN VIEW

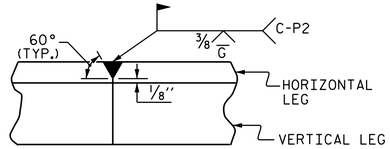
INSTALLATION SKETCH

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. MINIMUM.
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 IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS. FOR THERMAL SPRAYED COATINGS (METALLIZATION), SEE SPECIAL PROVISIONS.
7. THE COVER PLATES SHALL BE GALVANIZED OR METALLIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS. FOR THERMAL SPRAYED COATINGS (METALLIZATION), SEE SPECIAL PROVISIONS.
8. 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 REPAIRED IN ACCORDANCE WITH THE SPECIAL PROVISION FOR THERMAL SPRAYED COATINGS (METALLIZATION).
9. 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.
10. NO ALTERNATE JOINT DETAILS SHALL BE PERMITTED IN LIEU OF THOSE SHOWN ON THESE PLANS.
11. 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.
12. THE FABRICATOR SHALL PROVIDE ½" Ø THREADED HOLES IN THE HOLD-DOWN PLATES TO ASSIST IN LIFTING AND PLACING. THE HOLES SHALL BE ¾" DEEP AT 6'-0" MAXIMUM SPACING AND A MINIMUM OF TWO HOLES PER PLATE.



TYPICAL SECTION OF BASE ANGLE ASSEMBLY



DETAIL- FIELD WELD SPLICE OF BASE ANGLE

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
1	90°	1 5/8"	2 3/16"	1 7/8"	1 5/16"
3	90°	2 1/16"	2 7/16"	2 1/8"	1 3/8"
6	90°	2 1/16"	2 7/16"	2 1/8"	1 3/8"

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

DocuSigned by: DB3C8E45B06D499...

12/7/2018

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD

EXPANSION JOINT SEAL DETAILS

RIGHT LANE

KCI JOB NO. 25146789.11

DESIGN ENGINEER OF RECORD: DATE : 12/7/2018		
ASSEMBLED BY : R. C. LARSON DATE : 02/11/16		
CHECKED BY : K. SU DATE : 04/04/17		
DRAWN BY : REK 9/87	REV. 10/17/11	MAA/GM
CHECKED BY : CRK 10/87	REV. 10/17	MAA/THC
	REV. 6/18	MAA/THC

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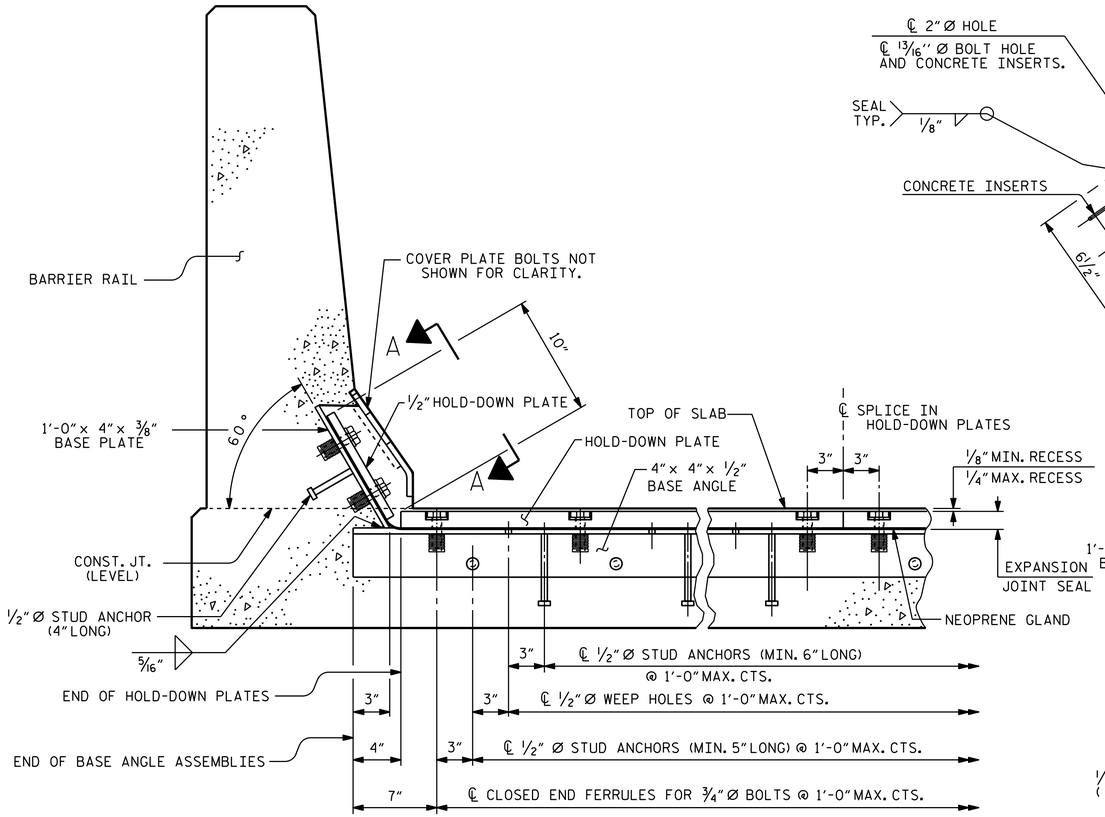
ENGINEERS ● PLANNERS ● ECOLOGISTS LICENSE NUMBER: C-0761
KCI Associates of North Carolina, P.A.
SUITE 220, LANDMARK CENTER ● 4601 SIX FORKS RD, RALEIGH, N.C. 27609-5210 (919) 783-9214
DWG. REF. NO. 27 OF 44

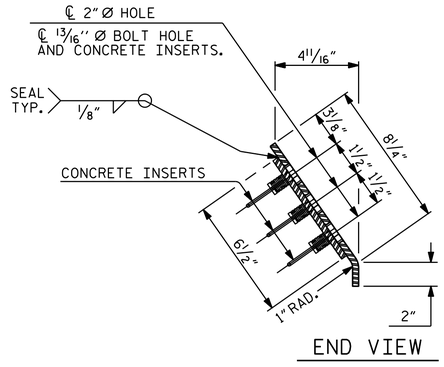
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S11-27
1			3			TOTAL SHEETS
2			4			44

STR-#11

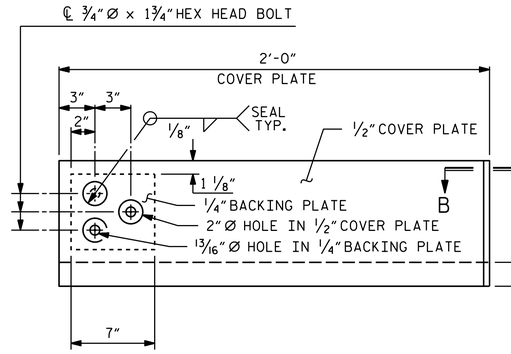
STD. NO. EJS1 (SHT 1)



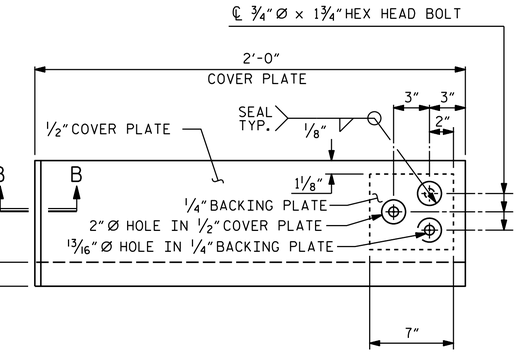
SECTION THRU RAIL NORMAL TO JOINT



END VIEW

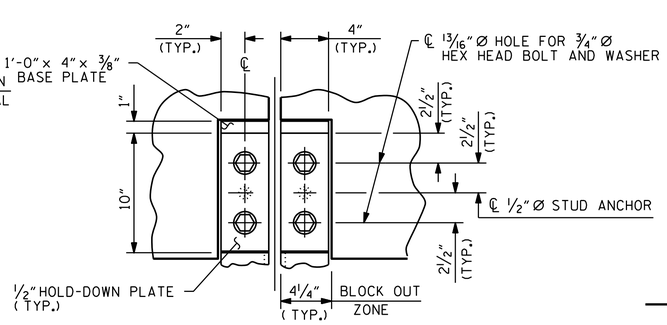


TYPE I - ELEVATION VIEW

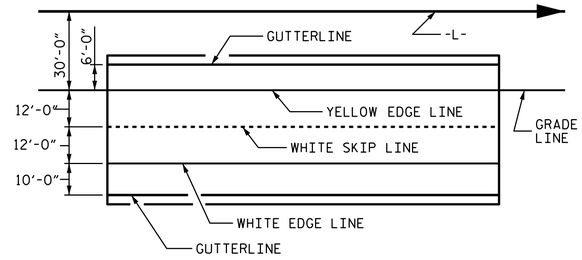


TYPE II - ELEVATION VIEW

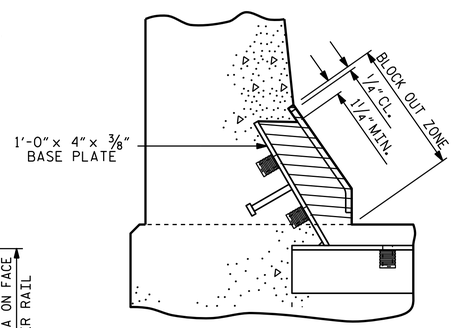
COVER PLATE DETAILS



SECTION A - A

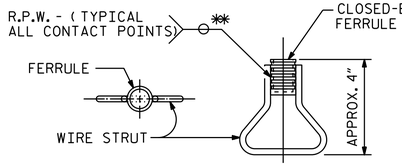


PAVEMENT MARKING ALIGNMENT



BLOCK OUT DETAIL

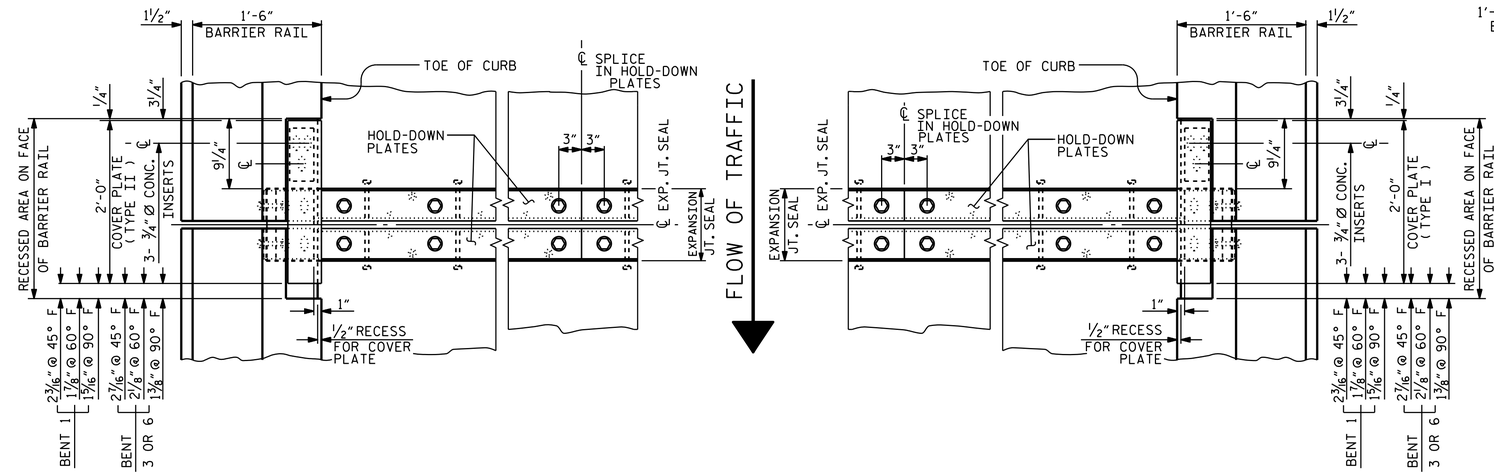
SEE "SECTION A - A" FOR OTHER DETAILS.



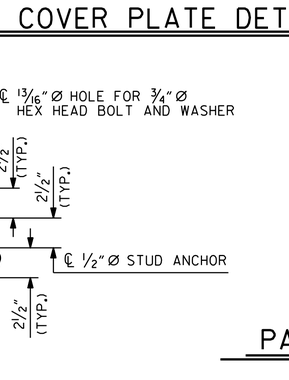
PLAN ELEVATION

CONCRETE INSERT

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



PLAN OF EXPANSION JOINT SEAL



SECTION B - B

DocuSigned by:
DB3C8E45B06B499...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

6/10/2018

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD

EXPANSION JOINT SEAL DETAILS FOR BARRIER RAIL

RIGHT LANE

PROJECT NO. R-1015
CRAVEN COUNTY
STATION: 287+62.50 -L-

DESIGN ENGINEER OF RECORD:	DATE: 6/10/2018
ASSEMBLED BY: R. C. LARSON	DATE: 02/11/16
CHECKED BY: K. SU	DATE: 04/04/17
DRAWN BY: REK 9/87	REV. 10/1/11 MAA/GM
CHECKED BY: CRK 10/87	REV. 7/12 MAA/GM
	REV. 6/13 MAA/GM

DocuSigned by: DB3C8E45B06B499...

KCI JOB NO: 25146789.11

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ENGINEERS ● PLANNERS ● ECOLOGISTS LICENSE NUMBER: C-0762
KCI Associates of North Carolina, P.A.
SUITE 220, LANDMARK CENTER 4 401 SW FORKS RD, RALEIGH, N.C. 27609-5320 (919) 783-9214

DWG. REF. NO. 28 OF 44

REVISIONS						SHEET NO.
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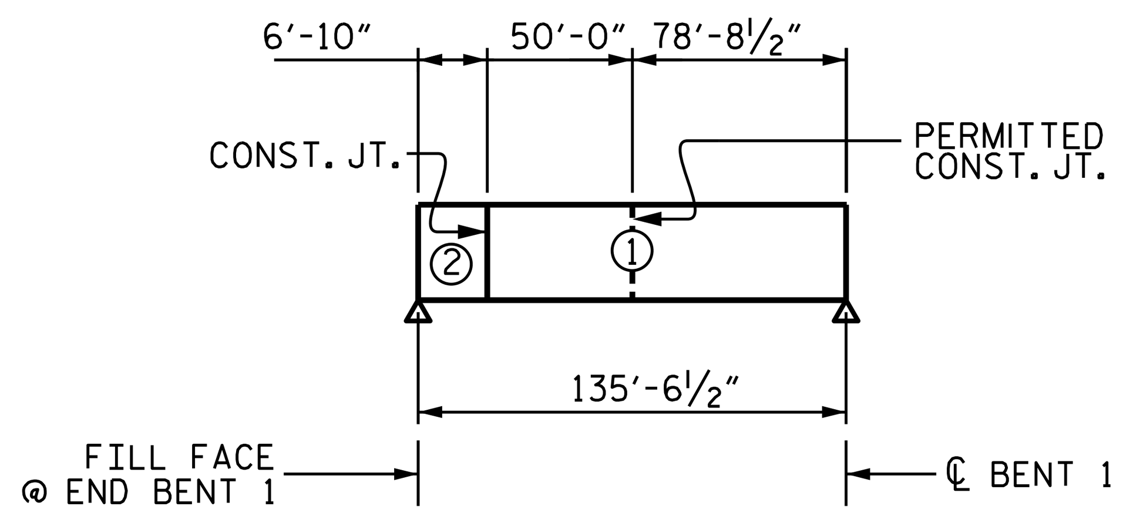
2			4			44

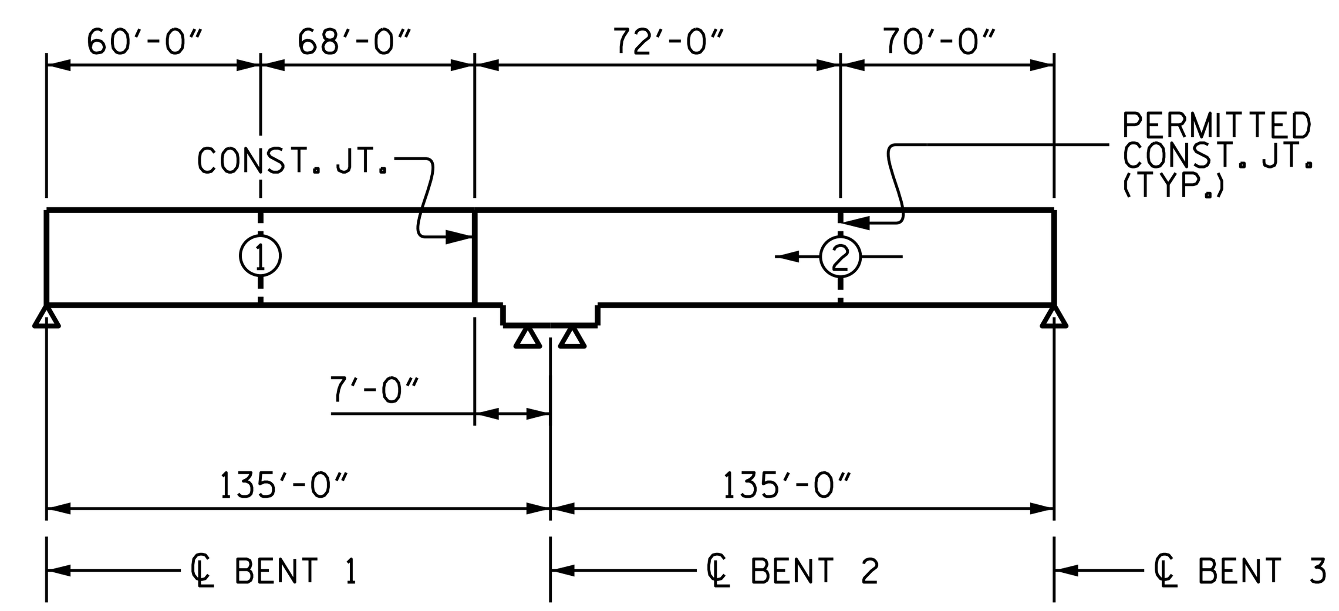
STR-*11

STD. NO. EJS2 SHT 1a

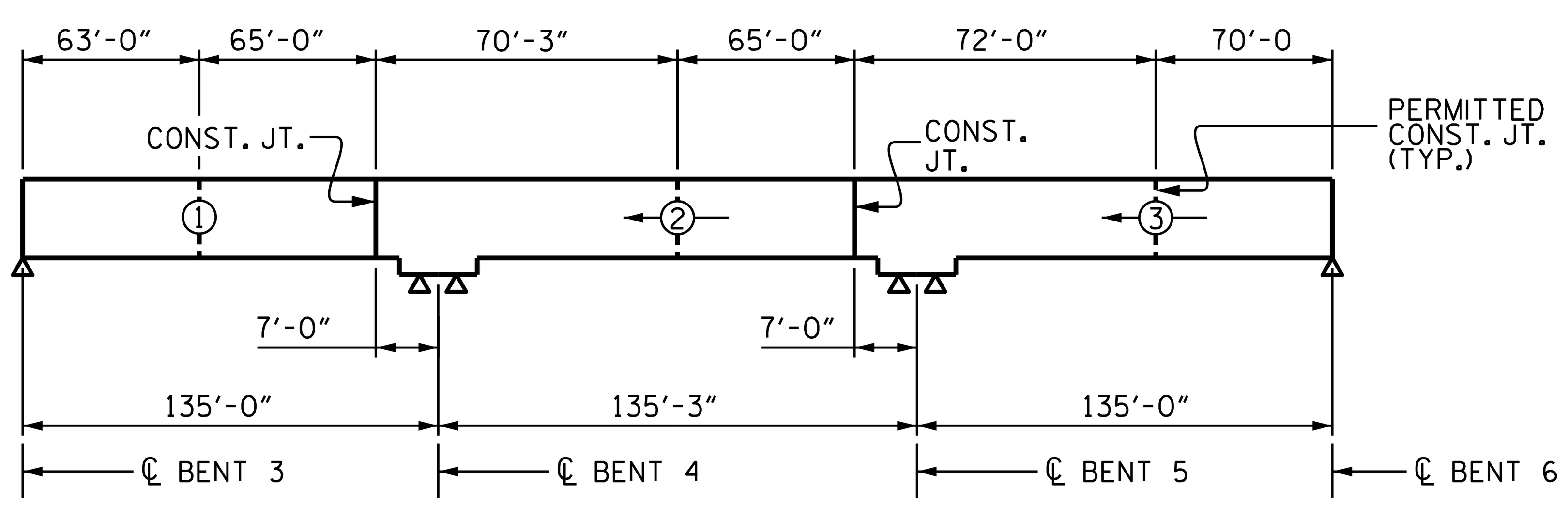


SPAN A OR G

(SPAN A SHOWN, SPAN G OPPOSITE HAND)



SPANS B-C



SPANS D-F

DECK POURING SEQUENCE

(1) INDICATES POUR SEQUENCE AND DIRECTION. WHERE ARROW IS OMITTED EITHER DIRECTION IS PERMITTED.

REINFORCING STEEL SCHEDULE

SPAN A OR G

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	215	5	STR.	42'-9"	9586
A2	180	4	STR.	4'-10"	581
B1	232	4	STR.	28'-10"	4468
B2	18	5	STR.	46'-6"	873
B3	113	6	STR.	27'-0"	4583
G1	1	5	STR.	42'-9"	45
J1	40	4	9	1'-5"	38
K1	12	4	STR.	22'-6"	180
K2	4	4	STR.	6'-5"	17
K3	16	4	STR.	8'-0"	86
K4	4	4	STR.	5'-0"	13
K5	4	4	STR.	2'-3"	6
K6	8	4	STR.	3'-0"	16
K9	6	8	2	20'-1"	322
K10	4	8	1	13'-7"	145
S1	28	4	8	14'-7"	273
S3	28	4	7	11'-11"	223
S4	26	4	7	11'-8"	203
S6	24	5	3	6'-0"	150

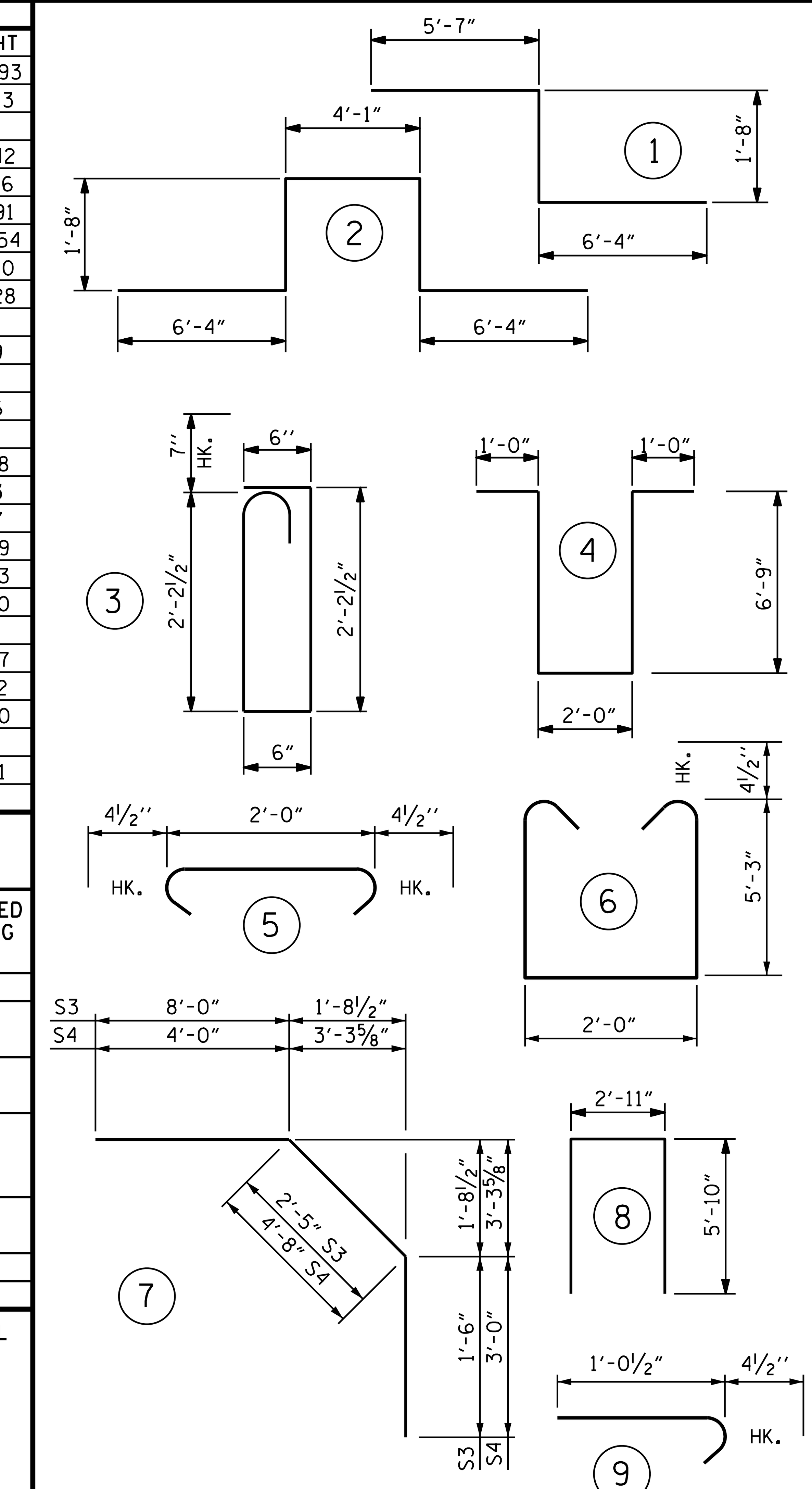
SPANS B-C

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	431	5	STR.	42'-9"	19218
A2	360	4	STR.	4'-10"	1162
B4	464	4	STR.	24'-4"	7542
B5	58	6	STR.	36'-3"	3158
B6	55	6	STR.	40'-6"	3346
B7	58	6	STR.	60'-0"	5227
B8	30	5	STR.	56'-0"	1752
G1	2	5	STR.	42'-9"	89
J1	80	4	9	1'-5"	76
K3	40	4	STR.	8'-0"	214
K4	8	4	STR.	5'-0"	27
K7	8	4	STR.	5'-4"	29
K8	14	4	STR.	19'-9"	185
K9	12	8	2	20'-1"	643
K10	8	8	1	13'-7"	290
S2	176	4	5	2'-9"	323
S5	8	4	6	13'-3"	71
S6	48	5	3	6'-0"	300
U1	24	4	4	17'-6"	281

SPANS D-F

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	648	5	STR.	42'-9"	28893
A2	540	4	STR.	4'-10"	1743
B4	464	4	STR.	24'-4"	7542
B5	116	6	STR.	36'-3"	6316
B6	110	6	STR.	40'-6"	6691
B7	116	6	STR.	60'-0"	10454
B9	116	4	STR.	25'-2"	1950
B10	42	5	STR.	60'-0"	2628
G1	2	5	STR.	42'-9"	89
J1	80	4	9	1'-5"	76
K3	80	4	STR.	8'-0"	428
K4	16	4	STR.	5'-0"	53
K7	16	4	STR.	5'-4"	57
K8	28	4	STR.	19'-9"	369
K9	12	8	2	20'-1"	643
K10	8	8	1	13'-7"	290
S2	352	4	5	2'-9"	647
S5	16	4	6	13'-3"	142
S6	48	5	3	6'-0"	300
U1	48	4	4	17'-6"	561

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

SUPERSTRUCTURE BILL OF MATERIAL

		CLASS AA CONCRETE	EPOXY COATED REINFORCING STEEL
		(CU. YDS.)	(LBS.)
SPAN A	POUR 1	120.1	21,808
	POUR 2	38.6	
SPANS BC	POUR 1	119.4	43,933
	POUR 2	151.1	
SPANS DEF	POUR 1	151.1	69,872
	POUR 2	142.8	
	POUR 3	119.4	
SPAN G	POUR 1	120.1	21,808
	POUR 2	38.6	
TOTALS**		1001.2	157,421

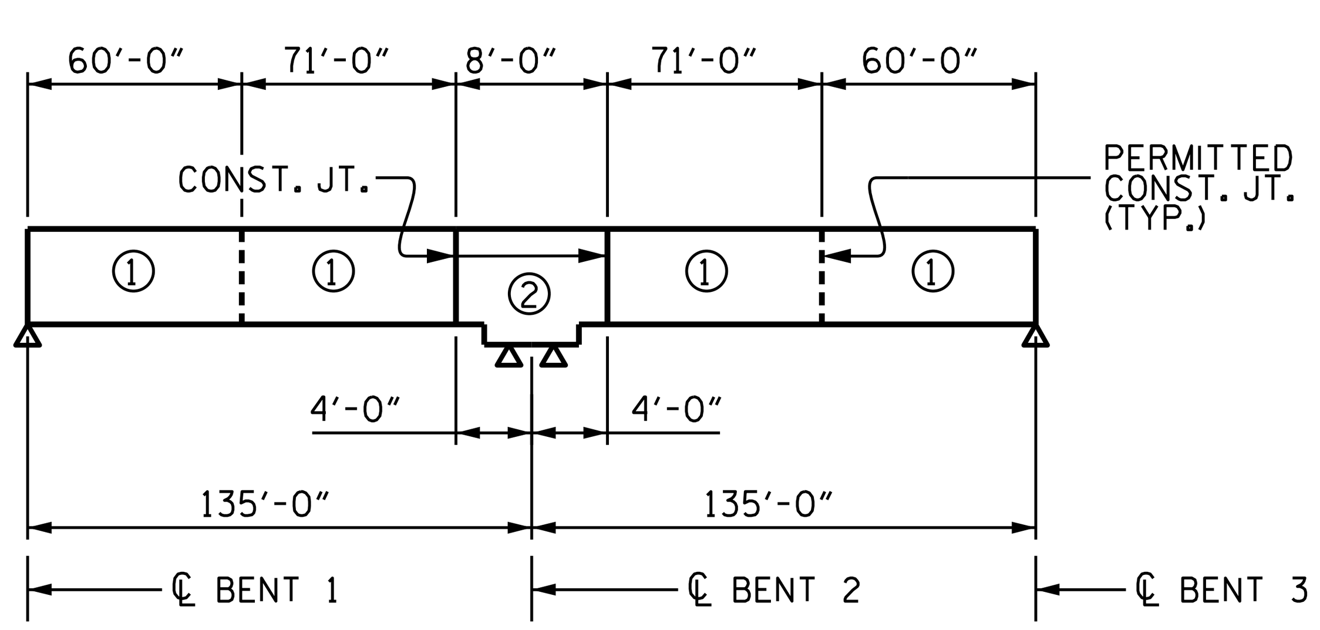
** QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED

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

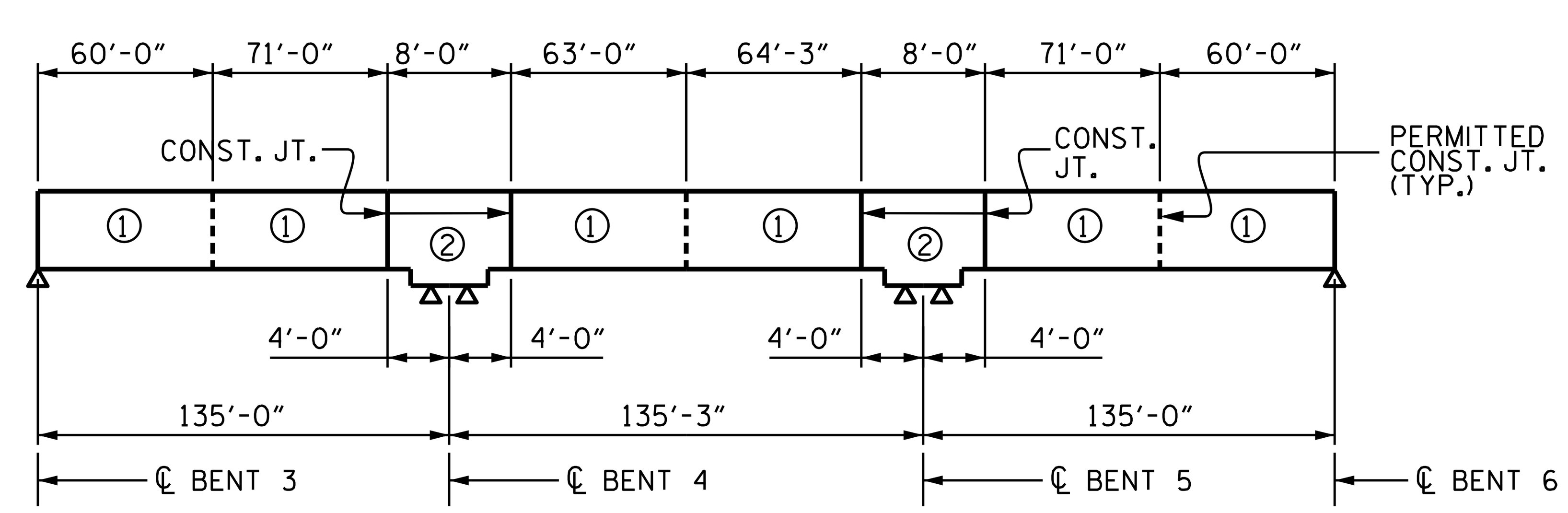
BAR SIZE	SUPERSTRUCTURE EXCEPT APPROACH SLABS, PARAPET, AND BARRIER RAIL		APPROACH SLABS		PARAPET AND BARRIER RAIL
	EPOXY COATED	UNCOATED	EPOXY COATED	UNCOATED	
#4	2'-0"	1'-9"	2'-0"	1'-9"	2'-9"
#5	2'-6"	2'-2"	2'-6"	2'-2"	3'-5"
#6	3'-0"	2'-7"	3'-10"	2'-7"	4'-4"
#7	5'-3"	3'-6"			
#8	6'-10"	4'-7"			

GROOVING BRIDGE FLOORS

APPROACH SLABS	1,787	SQ.FT.
BRIDGE DECK	29,836	SQ.FT.
TOTAL	31,623	SQ.FT.



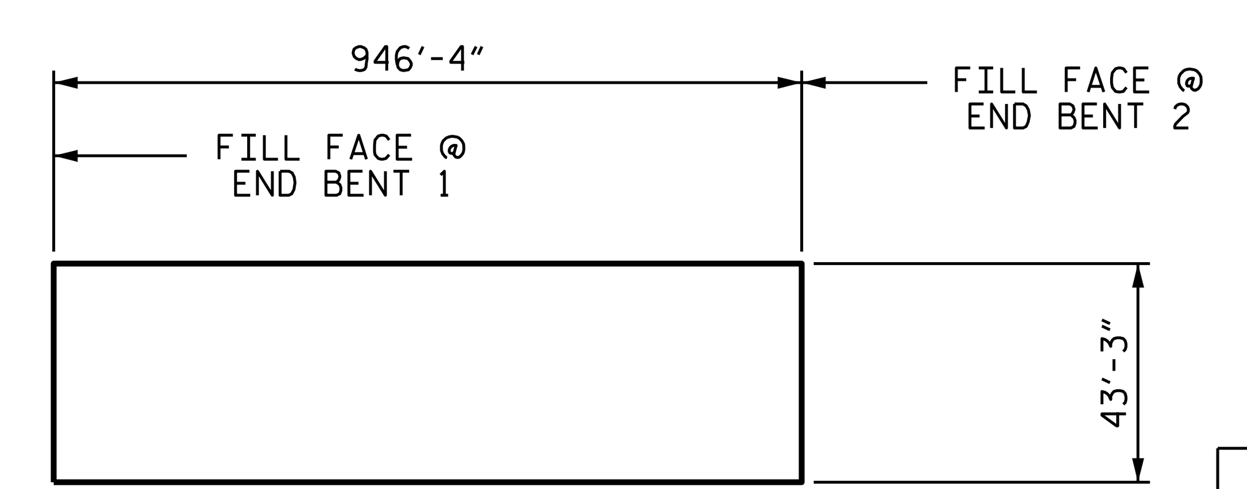
SPANS B-C



SPANS D-F

OPTIONAL POURING SEQUENCE

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



LAYOUT FOR COMPUTING AREA REINFORCED CONCRETE DECK SLAB
(SQ. FT. = 40,929)

PROJECT NO. R-1015
CRAVEN COUNTY
STATION: 287+62.50 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
BILL OF MATERIAL

RIGHT LANE

DocuSigned by:
DB3C8E45B06D495...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON
12/7/2018

KCI Associates of North Carolina, P.A.
DWG. REF. NO. 29 OF 44

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DESIGN ENGINEER OF RECORD:	DATE: 12/7/2018
ASSEMBLED BY : R. C. LARSON	DATE : 02/11/16
CHECKED BY : E. C. DECOLA	DATE : 08/10/16

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

REVISIONS							SHEET NO.
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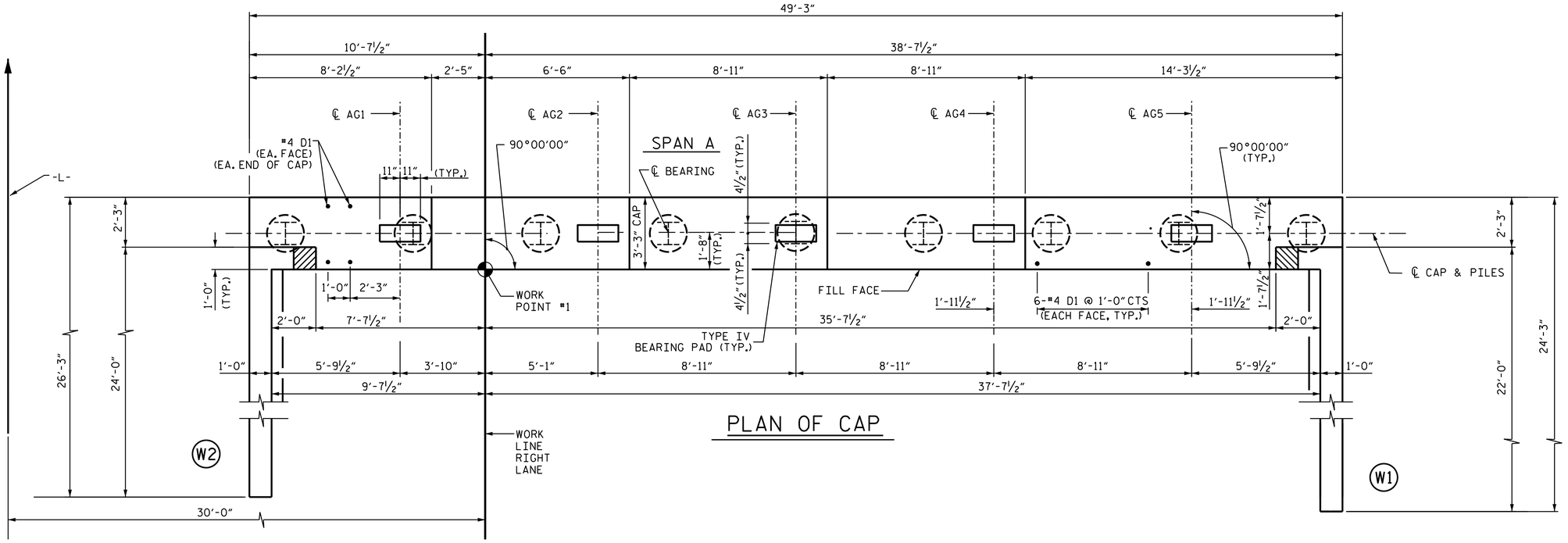
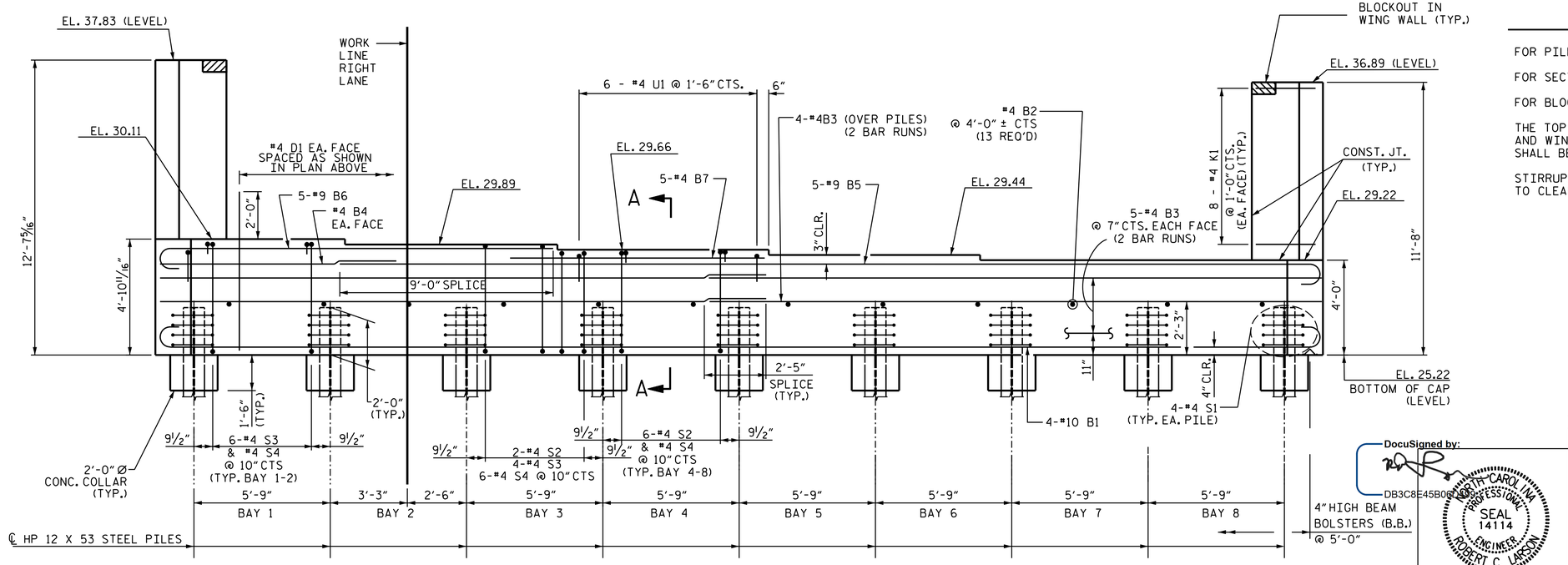
2			4				44

KCI JOB NO: 251467B9.11

STR-#11



PLAN OF CAP



ELEVATION

NOTES

FOR PILE SPLICE DETAIL, SEE END BENT 2.

FOR SECTION A-A SEE SHEET 4 OF 4.

FOR BLOCKOUT DETAIL SEE SHEET 2 OF 4.

THE TOP SURFACE OF THE END BENT CAP AND WINGS EXCLUDING THE BEARING AREAS SHALL BE RAKED TO A DEPTH OF ¼".

STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR "D" BARS.

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 1 OF 4

KCI JOB NO. 25146789.11

DESIGN ENGINEER OF RECORD: DocuSigned by: DATE : 12/7/2018

DRAWN BY : R. J. FLORY DATE : 10/15/15

CHECKED BY : R. C. LARSON DATE : 11/14/15

DocuSigned by: DB3C8E45B06040D... 12/7/2018

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE END BENT 1

RIGHT LANE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ENGINEERS ⊕ PLANNERS ⊕ ECOLOGISTS LICENSE NUMBER: C-0764

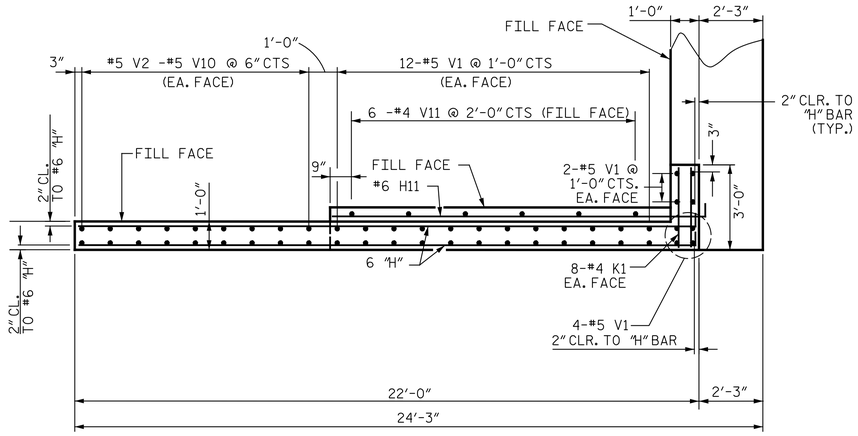
KCI Associates of North Carolina, P.A.

SUITE 220, LANDMARK CENTER II 4601 SIX FORKS RD, RALEIGH, N.C. 27609-5210 (919) 783-9214

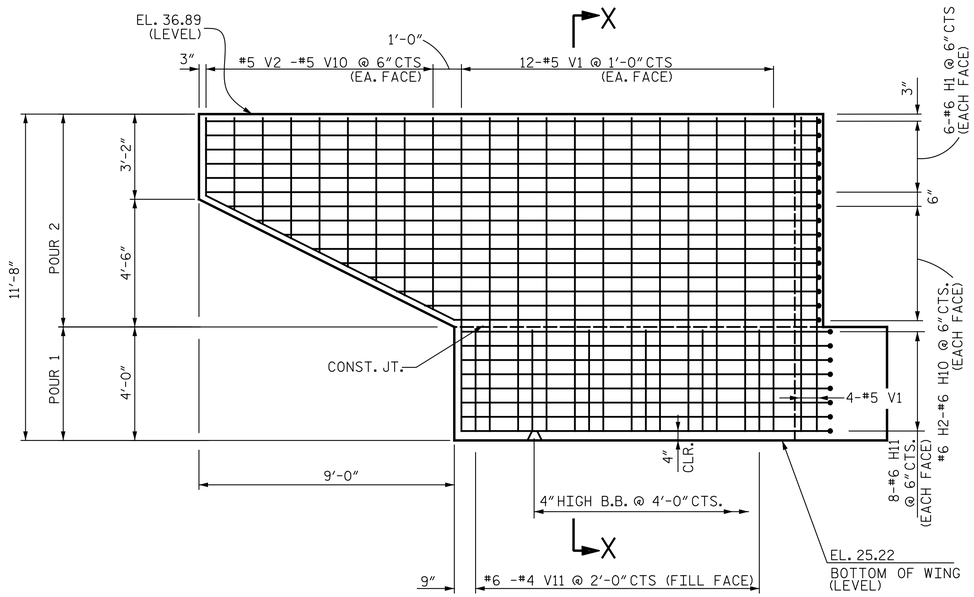
DWG. REF. NO. 30 OF 44

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S11-30
1			3			TOTAL SHEETS
2			4			44

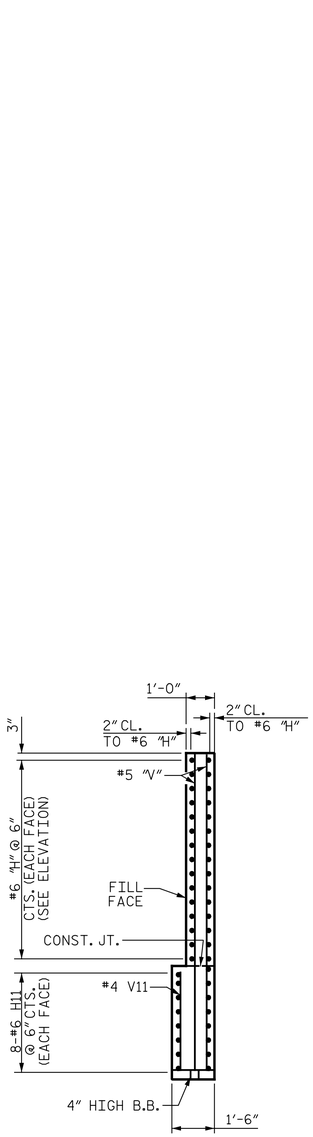
STR-#11



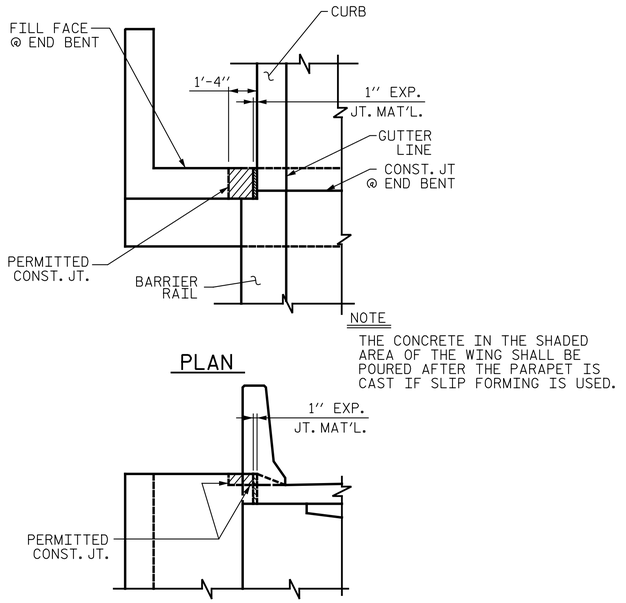
PLAN W1



ELEVATION W1



SECTION X-X



NOTE

THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE PARAPET IS CAST IF SLIP FORMING IS USED.

PLAN

ELEVATION

BLOCKOUT IN WING WALL

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 2 OF 4

KCI JOB NO: 25146789.11

DESIGN ENGINEER OF RECORD: DATE : 8/2/2018

DRAWN BY : R.J. FLORY DATE : 10/27/15

CHECKED BY : R. C. LARSON DATE : 03/27/17

DocuSigned by: DB3C8E45B06D45...

DocuSigned by: DB3C8E45B06D45...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

8/2/2018

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ENGINEERS ● PLANNERS ● ECOLOGISTS LICENSE NUMBER C-0764

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SUITE 220, LANDMARK CENTER II 4601 SIX FORKS RD. RALEIGH, N.C. 27609-5200 (919) 783-9214

DWG. REF. NO. 31 OF 44

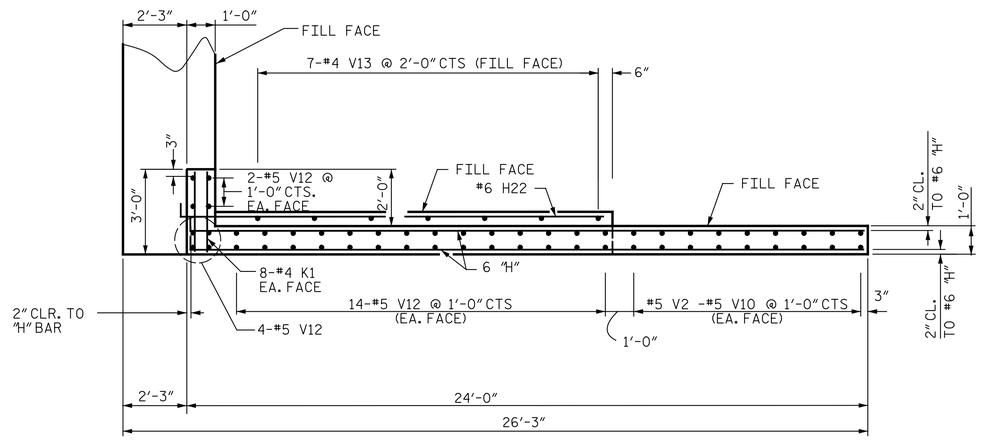
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE END BENT 1

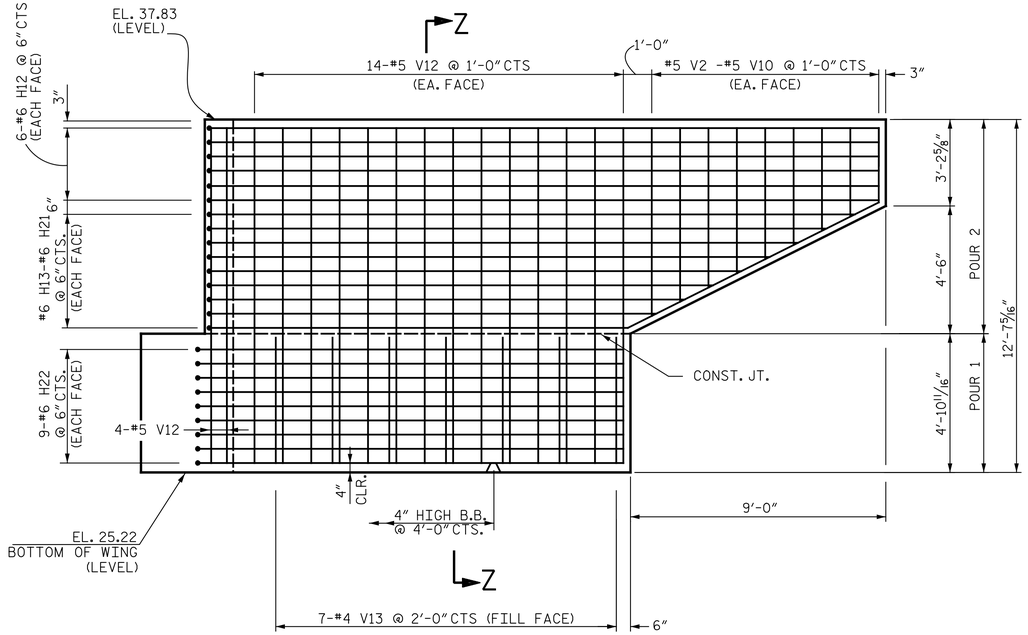
RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S11-31
1			3			TOTAL SHEETS
2			4			44

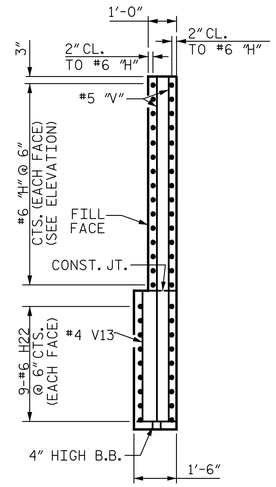
STR-#11



PLAN W2



ELEVATION W2



SECTION Z-Z

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 3 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE END BENT 1

RIGHT LANE

KCI JOB NO: 25146789.11

DESIGN ENGINEER OF RECORD: DocuSigned by: DB3C8E45B06D499... DATE : 8/2/2018

DRAWN BY : R.J. FLORY DATE : 10/27/15

CHECKED BY : R. C. LARSON DATE : 04/06/17

DocuSigned by: DB3C8E45B06D499... 8/2/2018

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

ENGINEERS ● PLANNERS ● ECOLOGISTS LICENSE NUMBER C-0764

KCI Associates of North Carolina, P.A.

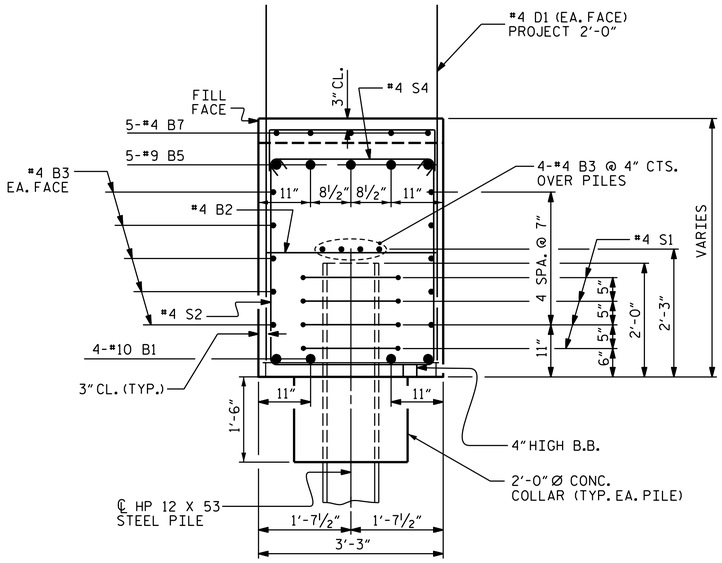
SUITE 220, LANDMARK CENTER II 4601 SIX FORKS RD. RALEIGH, N.C. 27609-5310 (919) 783-9214

DWG. REF. NO. 32 OF 44

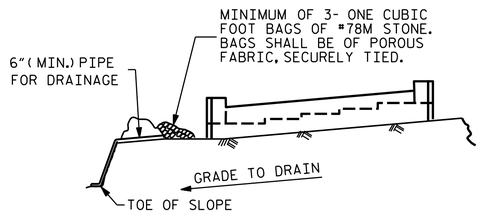
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S11-32
1			3			TOTAL SHEETS
2			4			44

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STR-#11



SECTION A-A



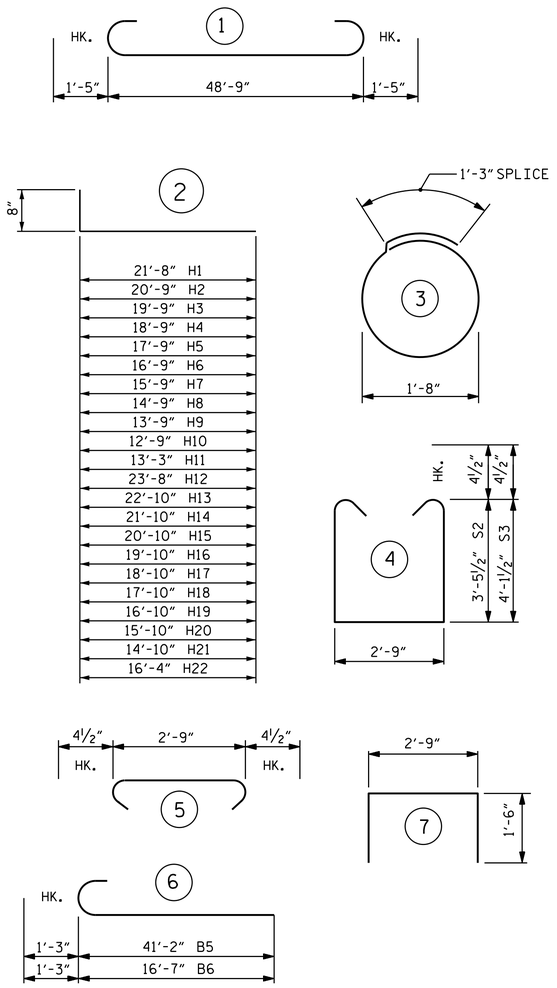
BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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	4	10	1	51'-7"	888
B2	13	4	STR.	2'-11"	25
B3	28	4	STR.	25'-8"	480
B4	2	4	STR.	10'-2"	14
B5	5	9	6	42'-5"	721
B6	5	9	6	17'-10"	303
B7	5	4	STR.	11'-0"	37
D1	56	4	STR.	6'-8"	249
H1	12	6	2	22'-4"	403
H2	2	6	2	21'-5"	64
H3	2	6	2	20'-5"	61
H4	2	6	2	19'-5"	58
H5	2	6	2	18'-5"	55
H6	2	6	2	17'-5"	52
H7	2	6	2	16'-5"	49
H8	2	6	2	15'-5"	46
H9	2	6	2	14'-5"	43
H10	2	6	2	13'-5"	40
H11	16	6	2	13'-11"	334
H12	12	6	2	24'-4"	439
H13	2	6	2	23'-6"	71
H14	2	6	2	22'-6"	68
H15	2	6	2	21'-6"	65
H16	2	6	2	20'-6"	62

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H17	2	6	2	19'-6"	59
H18	2	6	2	18'-6"	56
H19	2	6	2	17'-6"	53
H20	2	6	2	16'-6"	50
H21	2	6	2	15'-6"	47
H22	18	6	2	17'-0"	460
K1	32	4	STR.	2'-8"	57
S1	32	4	3	6'-6"	139
S2	32	4	4	10'-5"	223
S3	16	4	4	11'-9"	126
S4	48	4	5	3'-6"	112
U1	6	4	7	5'-9"	23
V1	32	5	STR.	11'-4"	378
V2	4	5	STR.	6'-11"	29
V3	4	5	STR.	6'-5"	27
V4	4	5	STR.	5'-11"	25
V5	4	5	STR.	5'-5"	23
V6	4	5	STR.	4'-11"	21
V7	4	5	STR.	4'-5"	18
V8	4	5	STR.	3'-11"	16
V9	4	5	STR.	3'-5"	14
V10	4	5	STR.	2'-11"	12
V11	6	4	STR.	3'-8"	15
V12	28	5	STR.	12'-3"	358
V13	7	4	STR.	4'-5"	21

EPOXY COATED REINFORCING STEEL, LB		6989
CLASS AA CONCRETE, CY	POUR 1	33.9
	POUR 2	12.6
	TOTAL	46.5
HP 12X53 STEEL PILES	NO.	9
	LF	540
PILE DRIVING EQUIPMENT SETUP FOR HP 12X53 STEEL PILES, EA.		9
PILE REDRIVES, EA.		5

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 4 OF4

DocuSigned by: DB3C8E45B06D499...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

9/19/2018

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE END BENT 1

RIGHT LANE

DESIGN ENGINEER OF RECORD: DocuSigned by: DB3C8E45B06D499... DATE: 9/19/2018

DRAWN BY: R. J. FLORY DATE: 08/01/16

CHECKED BY: R.C. LARSON DATE: 08/11/16

ENGINEERS ◆ PLANNERS ◆ ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
SUITE 220, LANDMARK CENTER II 4601 SIX FORKS RD, RALEIGH, N.C. 27609-5320 (919) 783-9214
DWG. REF. NO. 33 OF 44

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

SHEET NO. S11-33

TOTAL SHEETS 44

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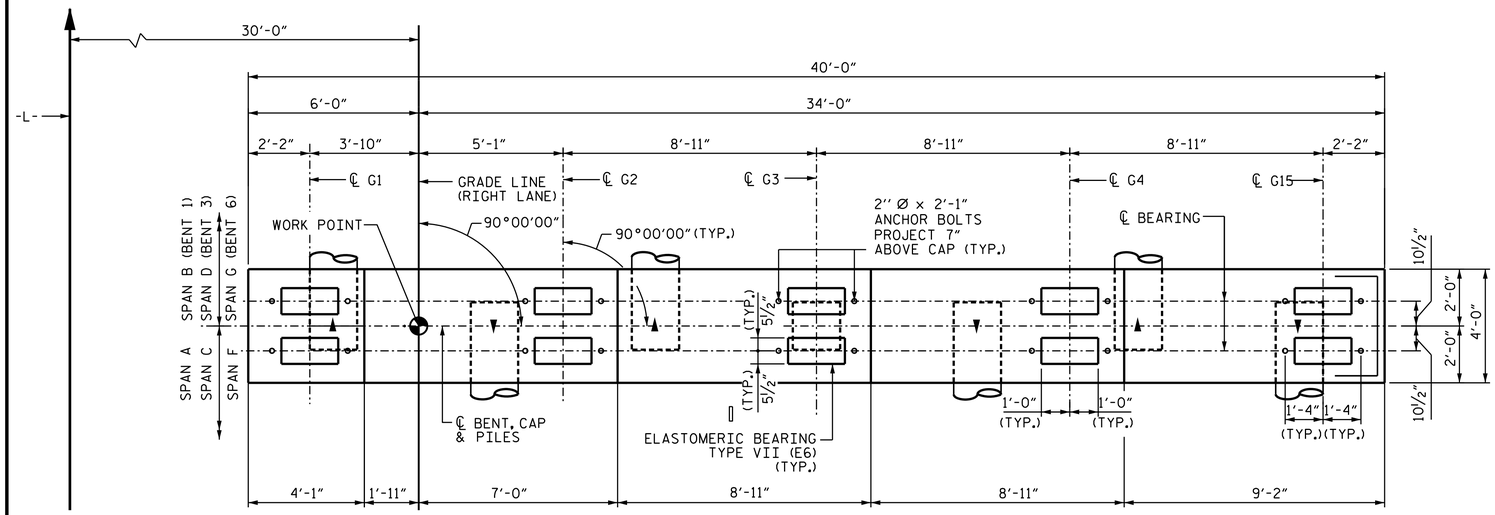
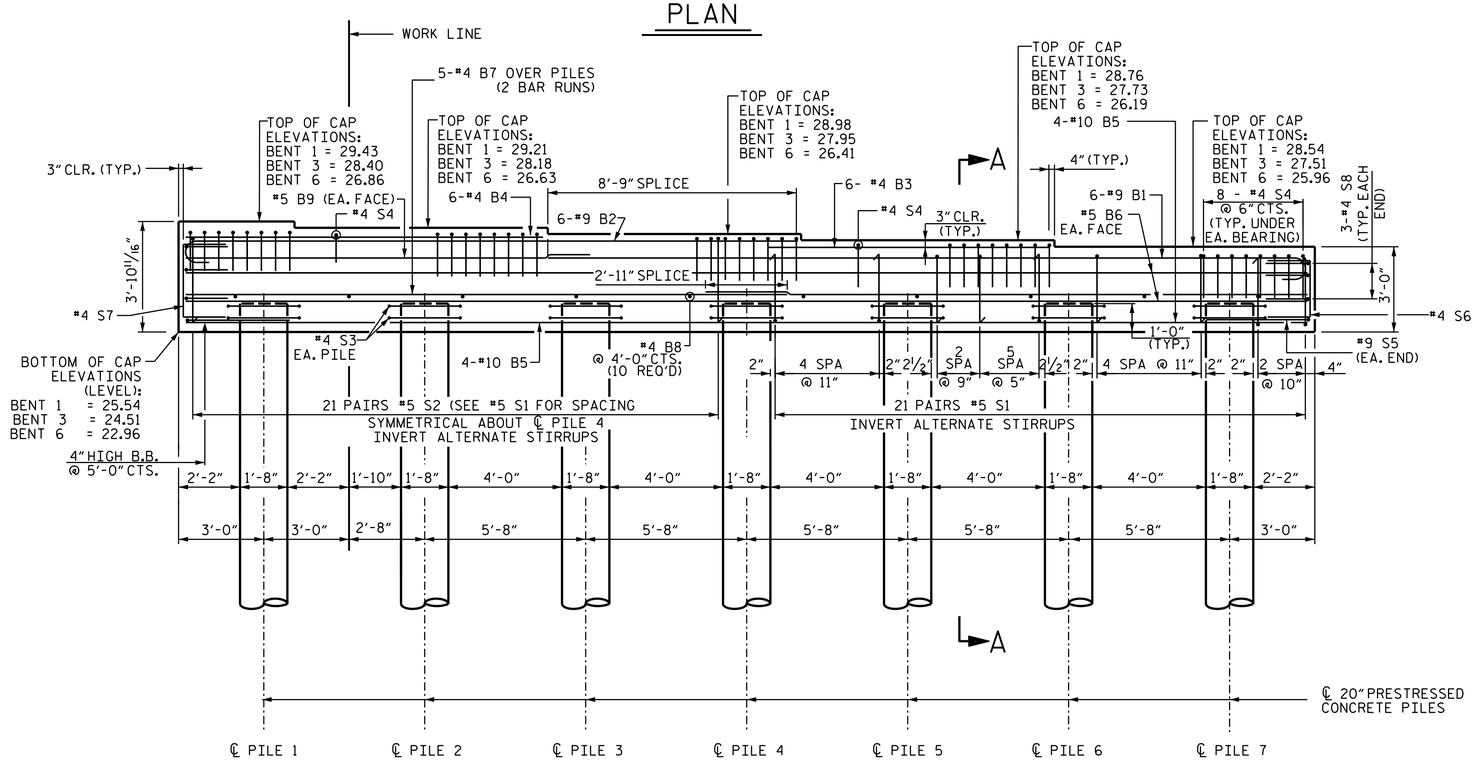
KCI JOB NO. 25146789.11

STR-#11



PLAN



ELEVATION

END ELEVATION

NOTES

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

▼ INDICATES PILE BATTERED 1½":1 IN DIRECTION OF ARROW HEAD.

EPOXY COAT THE TOP SURFACE OF THE BENT CAP EXCEPT FOR AREAS UNDER ELASTOMERIC BEARINGS

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

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE BENT 1,3,6

RIGHT LANE

DocuSigned by: DB3C8E45B06D49...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

6/11/2018

ENGINEERS ● PLANNERS ● ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
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DWG. REF. NO. 34 OF 44

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S11-34
1			3			TOTAL SHEETS
2			4			44

DESIGN ENGINEER OF RECORD: DocuSigned by: DB3C8E45B06D49... DATE: 6/11/2018

DRAWN BY: R. A. PRUETT DATE: 03/15/17

CHECKED BY: R. C. LARSON DATE: 03/25/17

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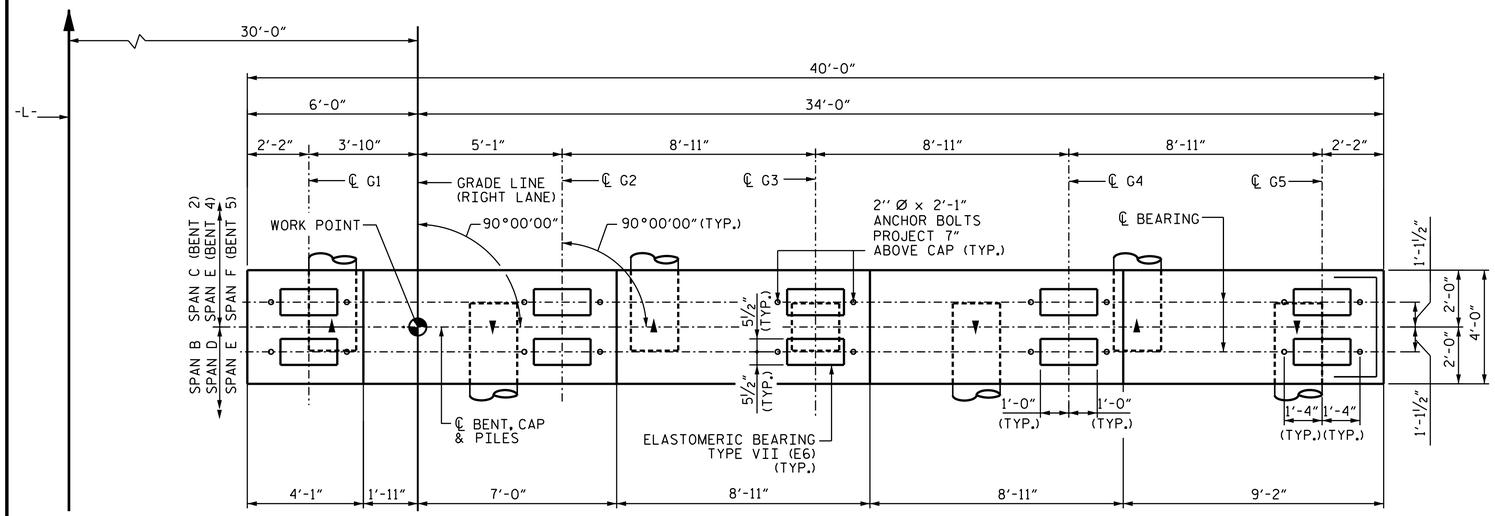
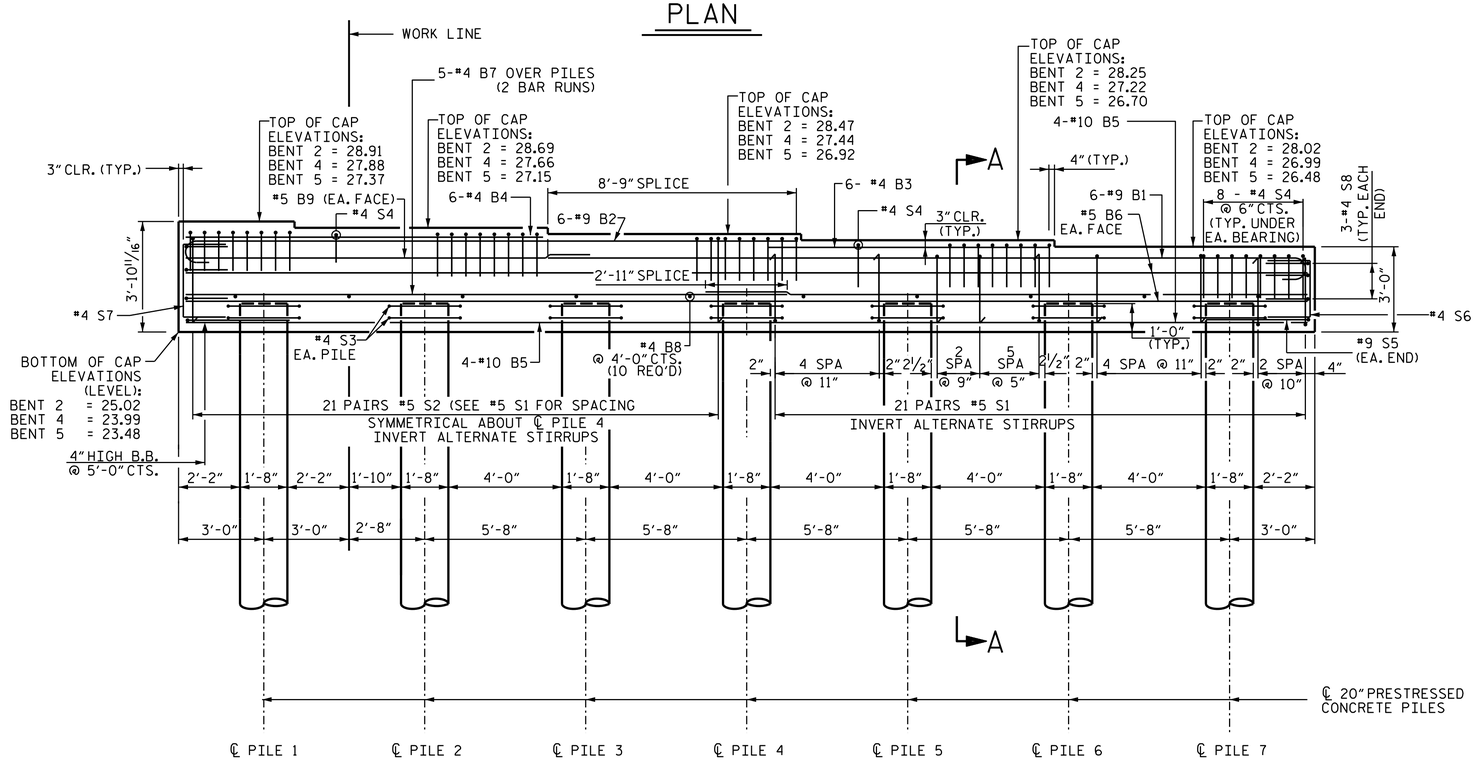
KCI JOB NO: 25146789.11

STR-#11



PLAN

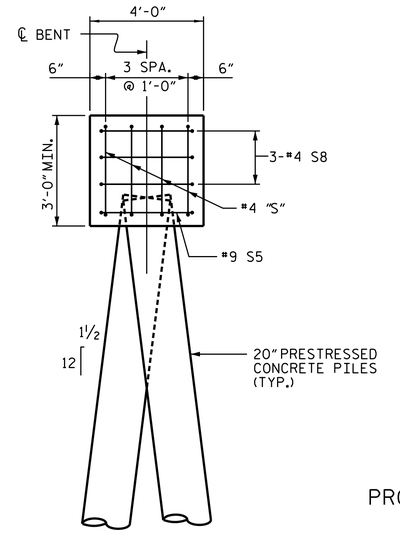


ELEVATION

NOTES

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

▼ INDICATES PILE BATTERED 1½":1 IN DIRECTION OF ARROW HEAD.



END ELEVATION

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 2 OF 3

DocuSigned by: DB3C8E45E06D498...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

6/11/2018

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE BENT 2,4,5

RIGHT LANE

DESIGN ENGINEER OF RECORD: DATE: 6/11/2018

DRAWN BY: R. A. PRUETT DATE: 03/15/17

CHECKED BY: R. C. LARSON DATE: 03/25/17

ENGINEERS ● PLANNERS ● ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
SUITE 220, LANDMARK CENTER II 4601 SIX FORKS RD. RALEIGH, N.C. 27609-5290 (919) 783-9214

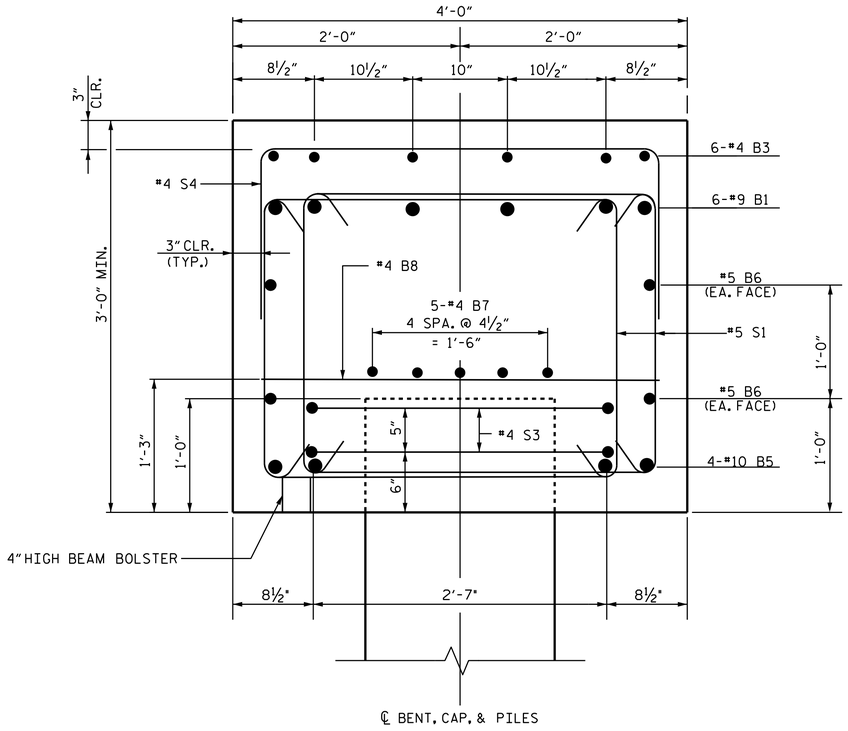
DWG. REF. NO. 35 OF 44

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S11-35
1			3			TOTAL SHEETS
2			4			44

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

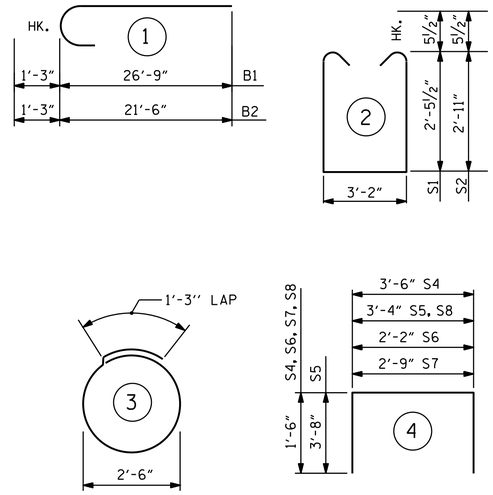
KCI JOB NO: 25146789.11

STR-#11



SECTION A-A

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL FOR ONE BENT

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	6	9	1	28'-0"	571
B2	6	9	1	22'-9"	464
B3	6	4	STR.	9'-9"	39
B4	6	4	STR.	12'-7"	50
B5	4	10	STR.	39'-6"	680
B6	4	5	STR.	39'-6"	165
B7	10	4	STR.	21'-3"	142
B8	10	4	STR.	3'-6"	23
B9	2	5	STR.	15'-8"	33
S1	42	5	2	8'-10"	387
S2	42	5	2	9'-11"	434
S3	14	4	3	9'-2"	86
S4	42	4	4	6'-6"	182
S5	2	9	4	10'-8"	73
S6	4	4	4	5'-2"	14
S7	4	4	4	5'-9"	15
S8	6	4	4	6'-4"	25

EPOXY COATED REINFORCING STEEL LBS. 3383

CLASS AA CONCRETE, CU. YD. 23.1

PILE DRIVING EQUIPMENT SETUP
FOR 20"PRESTRESSED PILES, EA. 7

20"PRESTRESSED CONCRETE PILES
NO. 7
LIN. FT. BENT 1 315
BENT 2 420
BENT 3 420
BENT 4 385
BENT 5 385
BENT 6 385

PREDRILLING FOR PILES, LIN. FT.
BENT 1 ONLY 93
BENT 3 ONLY 84

PILE REDRIVES, EA. 4

(NOTE: PILE HEADS HAVE BEEN DEDUCTED FROM CLASS AA CONCRETE)

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE BENT 1-6

RIGHT LANE

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

DocuSigned by: DB3C8E45B06D498...

6/11/2018

DESIGN ENGINEER OF RECORD: DocuSigned by: DB3C8E45B06D498... DATE : 6/11/2018

DRAWN BY : R. A. PRUETT DATE : 04/20/17

CHECKED BY : R. C. LARSON DATE : 04/22/17

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ENGINEERS ● PLANNERS ● ECOLOGISTS LICENSE NUMBER: C-0764
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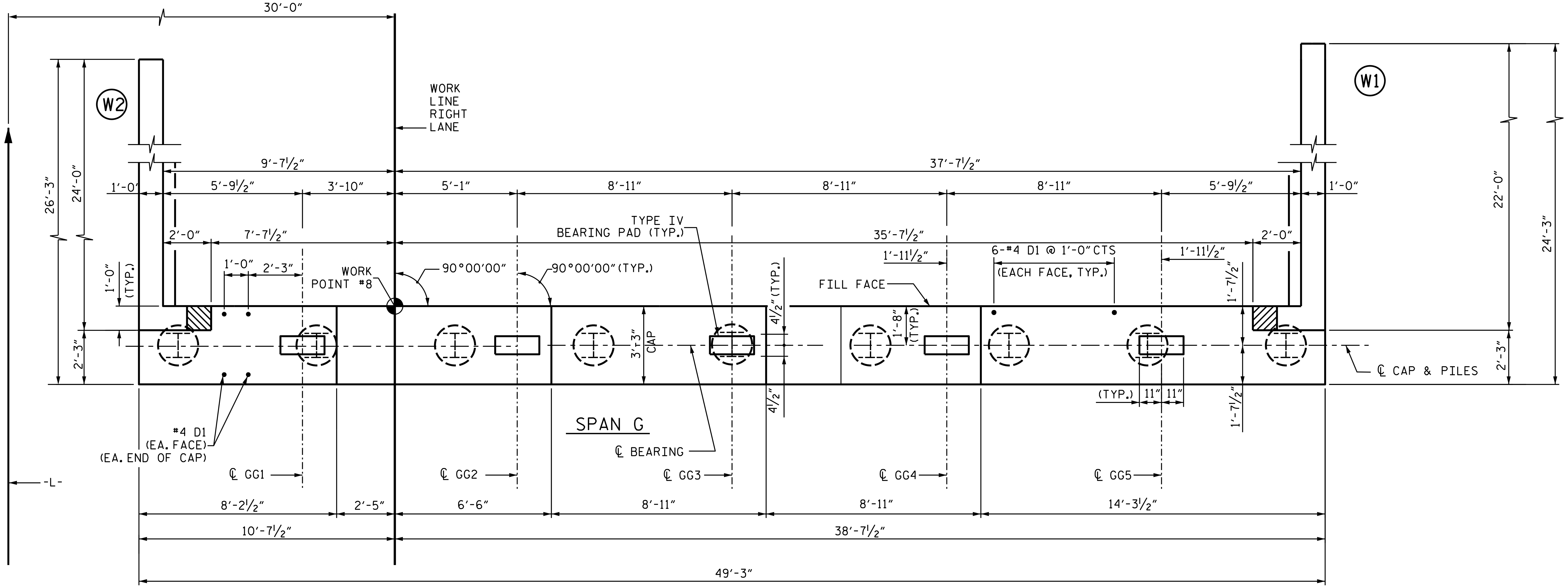
SUITE 220, LANDMARK CENTER ● 4601 SIX FORKS RD, RALEIGH, N.C. 27609-5210 (919) 783-9214

DWG. REF. NO. 36 OF 44

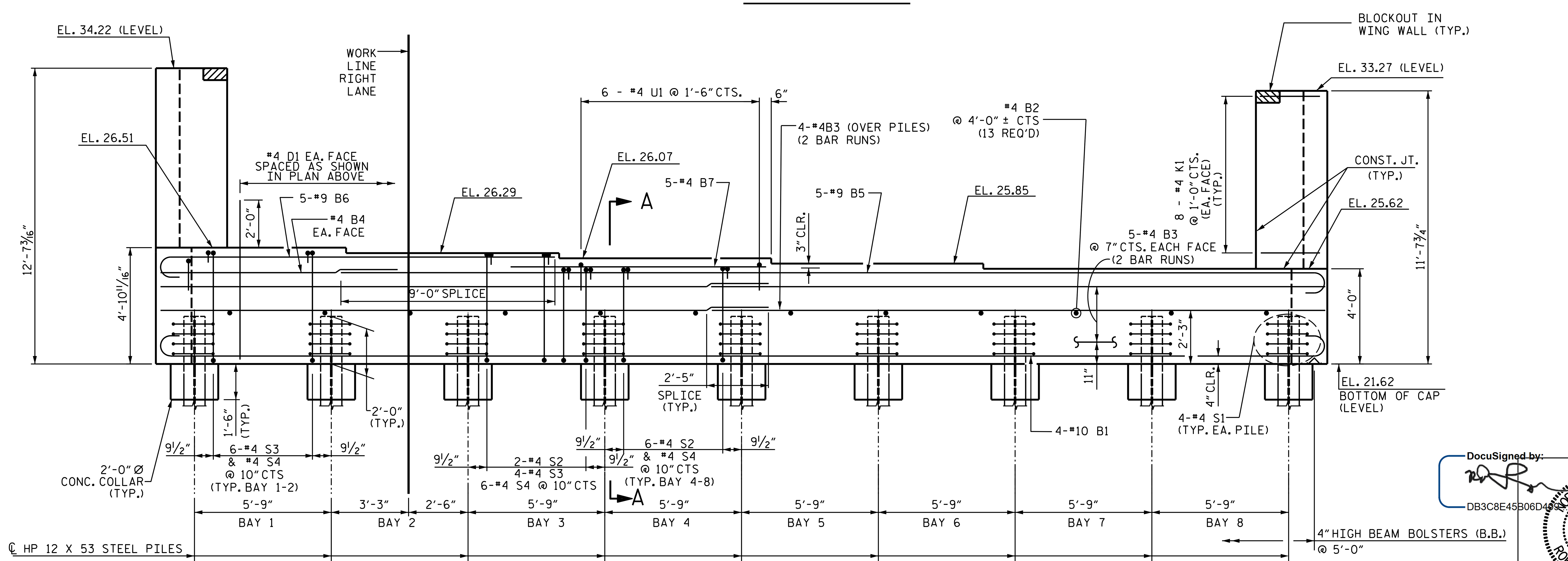
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S11-36
1			3			TOTAL SHEETS
2			4			44

STR-#11

KCI JOB NO. 25146789.11



PLAN OF CAP



ELEVATION

NOTES

FOR BLOCKOUT IN WING, SEE END BENT 1.

FOR TEMPORARY DRAINAGE AT END BENT, SEE END BENT 1.

FOR SECTION A-A SEE SHEET 4 OF 4.

THE TOP SURFACE OF THE END BENT CAP AND WINGS EXCLUDING THE BEARING AREAS SHALL BE RAKED TO A DEPTH OF ¼".

STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR "D" BARS.

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 1 OF 4

DocuSigned by: DB3C8E45B06D4...

SEAL 14114 NORTH CAROLINA PROFESSIONAL ENGINEER ROBERT C. LARSON

12/7/2018

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE END BENT 2

RIGHT LANE

REVISIONS								SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:			S11-37
1			3					TOTAL SHEETS
2			4					44

KCI Associates of North Carolina, P.A.

DWG. REF. NO. 37 OF 44

STR-#11

DESIGN ENGINEER OF RECORD: DATE: 12/7/2018

DRAWN BY: R. J. FLORY DATE: 10/15/15

CHECKED BY: R. C. LARSON DATE: 11/14/15

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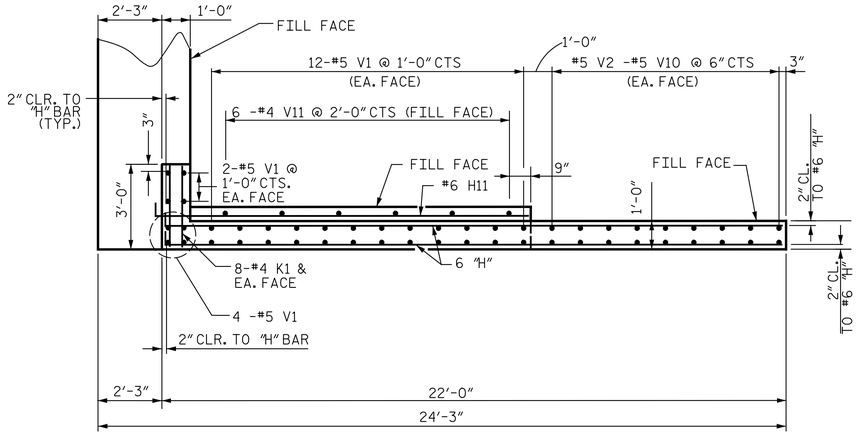
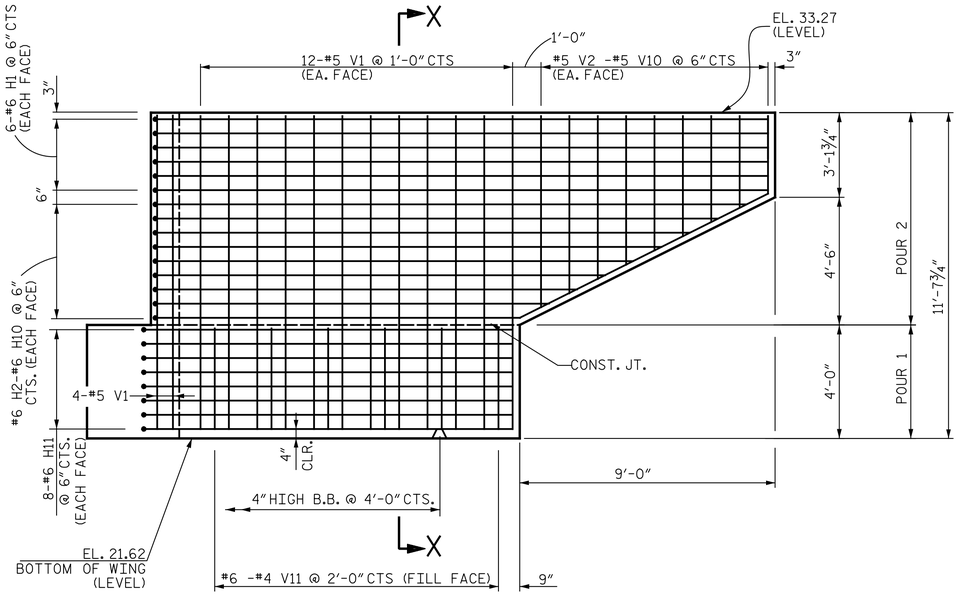
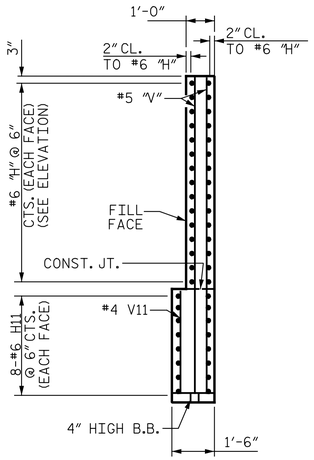
KCI JOB NO: 25146789.11



PLAN W1



ELEVATION W1



SECTION X-X

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 2 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE END BENT 2

RIGHT LANE

DocuSigned by: DB3C8E45B06D499...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

8/2/2018

DESIGN ENGINEER OF RECORD:	DATE : 8/2/2018
DRAWN BY : R.J. FLORY	DATE : 10/27/15
CHECKED BY : R. C. LARSON	DATE : 03/27/17

DocuSigned by: DB3C8E45B06D499...

ENGINEERS ● PLANNERS ● ECOLOGISTS LICENSE NUMBER C-0764
KCI Associates of North Carolina, P.A.
SUITE 220, LANDMARK CENTER II 4601 SIX FORKS RD. RALEIGH, N.C. 27609-5200 (919) 783-9214

DWG. REF. NO. 38 OF 44

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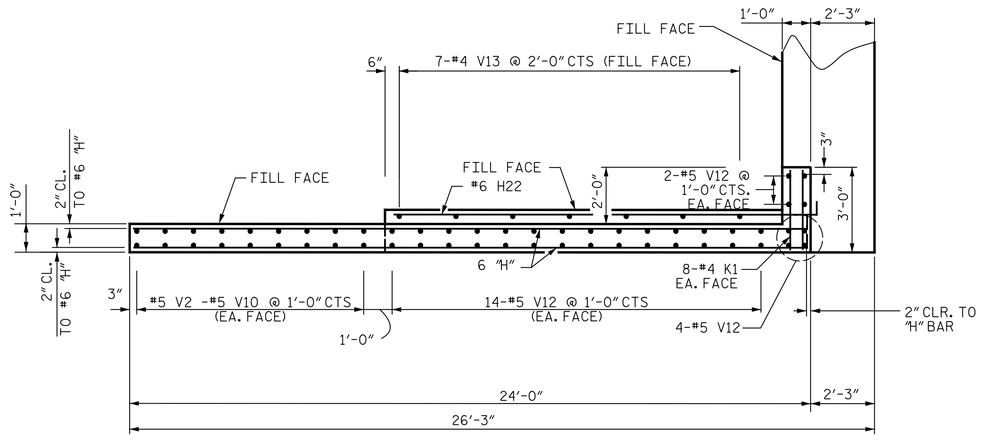
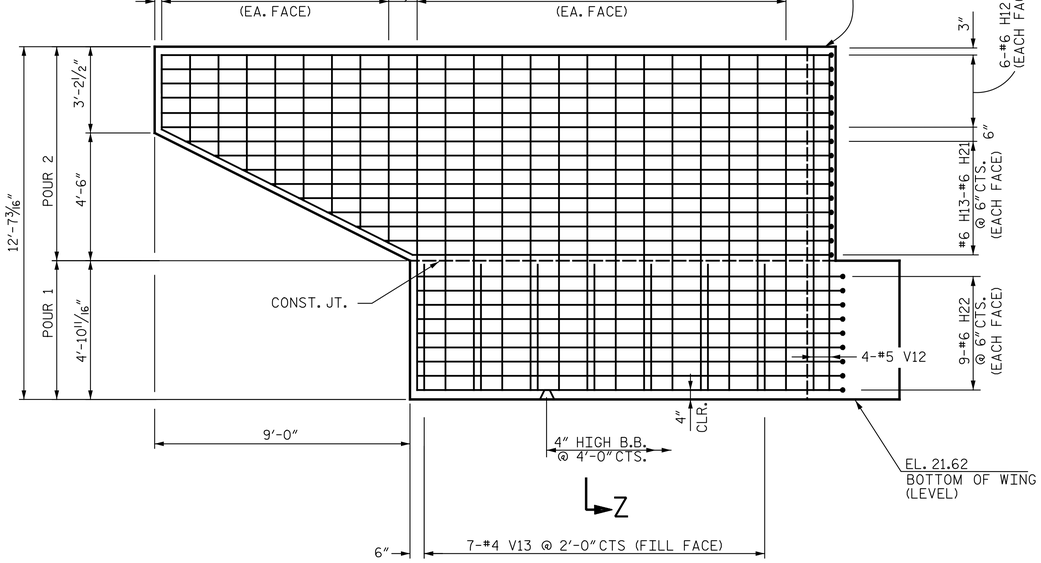
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S11-38
1			3			TOTAL SHEETS
2			4			44

STR-#11

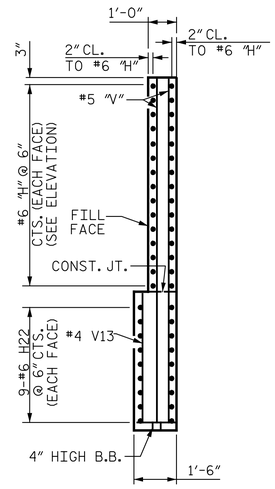
KCI JOB NO: 25146789.11



PLAN W2



ELEVATION W2



SECTION Z-Z

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 3 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE END BENT 2

RIGHT LANE

DESIGN ENGINEER OF RECORD: DocuSigned by: DATE : 8/2/2018
DB3C8E45B0BD499...

DRAWN BY : R.J. FLORY DATE : 10/27/15
CHECKED BY : R. C. LARSON DATE : 04/06/17

DocuSigned by:
DB3C8E45B0BD499...
8/2/2018

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

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ENGINEERS ● PLANNERS ● ECOLOGISTS LICENSE NUMBER: C-0764
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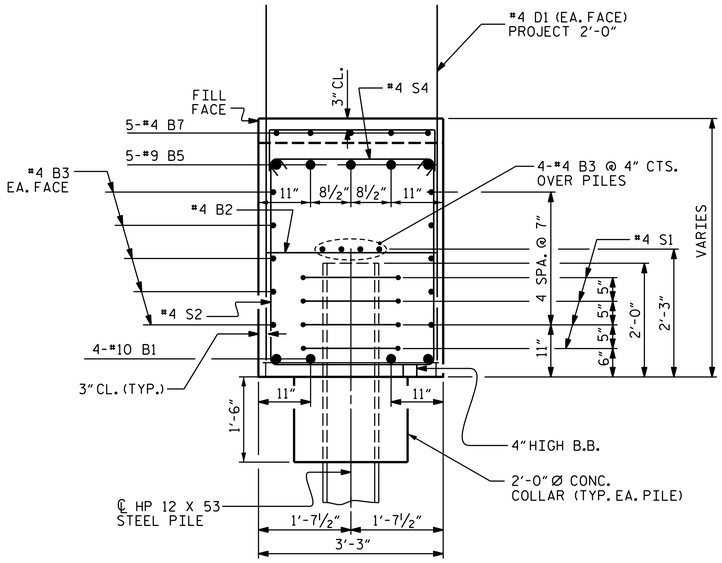
DWG. REF. NO. 39 OF 44

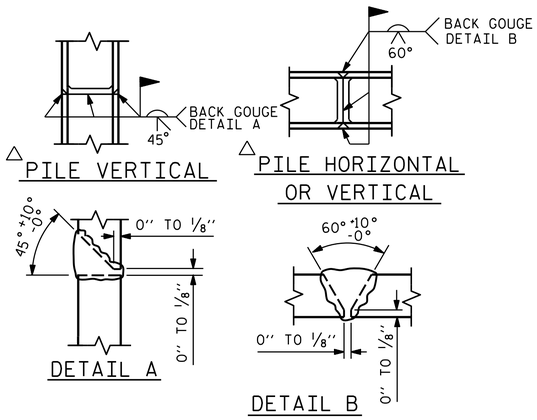
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S11-39
1			3			TOTAL SHEETS
2			4			44

KCI JOB NO. 25146789.11

STR-#11



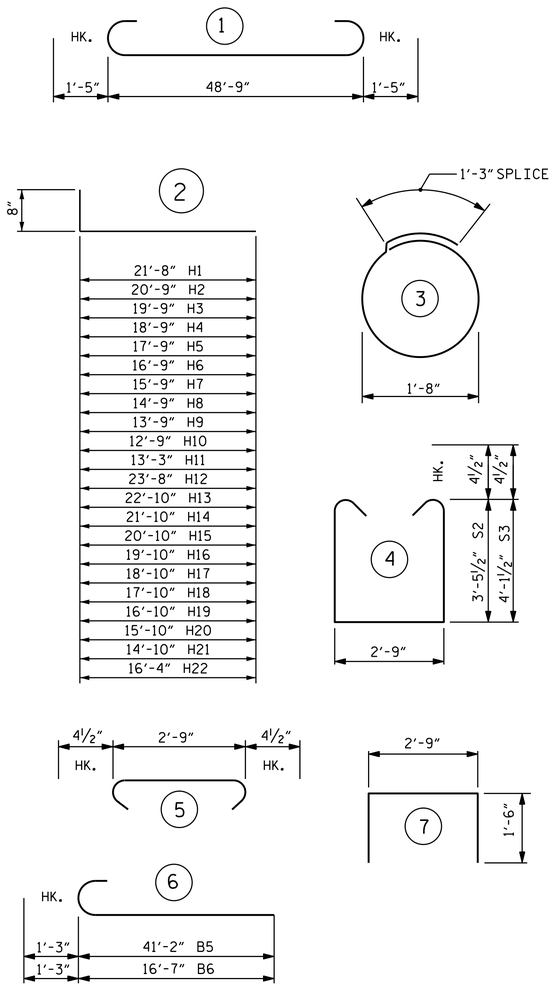
SECTION A-A



△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

END BENT 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	4	10	1	51'-7"	888
B2	13	4	STR.	2'-11"	25
B3	28	4	STR.	25'-8"	480
B4	2	4	STR.	10'-2"	14
B5	5	9	6	42'-5"	721
B6	5	9	6	17'-10"	303
B7	5	4	STR.	11'-0"	37
D1	56	4	STR.	6'-8"	249
H1	12	6	2	22'-4"	403
H2	2	6	2	21'-5"	64
H3	2	6	2	20'-5"	61
H4	2	6	2	19'-5"	58
H5	2	6	2	18'-5"	55
H6	2	6	2	17'-5"	52
H7	2	6	2	16'-5"	49
H8	2	6	2	15'-5"	46
H9	2	6	2	14'-5"	43
H10	2	6	2	13'-5"	40
H11	16	6	2	13'-11"	334
H12	12	6	2	24'-4"	439
H13	2	6	2	23'-6"	71
H14	2	6	2	22'-6"	68
H15	2	6	2	21'-6"	65
H16	2	6	2	20'-6"	62

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H17	2	6	2	19'-6"	59
H18	2	6	2	18'-6"	56
H19	2	6	2	17'-6"	53
H20	2	6	2	16'-6"	50
H21	2	6	2	15'-6"	47
H22	18	6	2	17'-0"	460
K1	32	4	STR.	2'-8"	57
S1	32	4	3	6'-6"	139
S2	32	4	4	10'-5"	223
S3	16	4	4	11'-9"	126
S4	48	4	5	3'-6"	112
U1	6	4	7	5'-9"	23
V1	32	5	STR.	11'-4"	378
V2	4	5	STR.	6'-11"	29
V3	4	5	STR.	6'-5"	27
V4	4	5	STR.	5'-11"	25
V5	4	5	STR.	5'-5"	23
V6	4	5	STR.	4'-11"	21
V7	4	5	STR.	4'-5"	18
V8	4	5	STR.	3'-11"	16
V9	4	5	STR.	3'-5"	14
V10	4	5	STR.	2'-11"	12
V11	6	4	STR.	3'-8"	15
V12	28	5	STR.	12'-3"	358
V13	7	4	STR.	4'-5"	21

EPOXY COATED REINFORCING STEEL, LB		6989
CLASS AA CONCRETE, CY	POUR 1	33.9
	POUR 2	12.6
	TOTAL	46.5
HP 12X53 STEEL PILES	NO.	9
	LF	495
PILE DRIVING EQUIPMENT SETUP FOR HP 12X53 STEEL PILE, EA.		9
PILE REDRIVES, EA.		5

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 4 OF 4

DocuSigned by: DB3C8E45B06D499...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

9/19/2018

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
END BENT 2

RIGHT LANE

DESIGN ENGINEER OF RECORD: DATE : 9/19/2018

DRAWN BY : R. J. FLORY DATE : 08/01/16

CHECKED BY : R.C. LARSON DATE : 08/11/16

ENGINEERS ◆ PLANNERS ◆ ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
SUITE 220, LANDMARK CENTER ◆ 4601 SIX FORKS RD, RALEIGH, N.C. 27609-5320 (919) 783-9214

DWG. REF. NO. 40 OF 44

REVISIONS					
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1			3		
2			4		

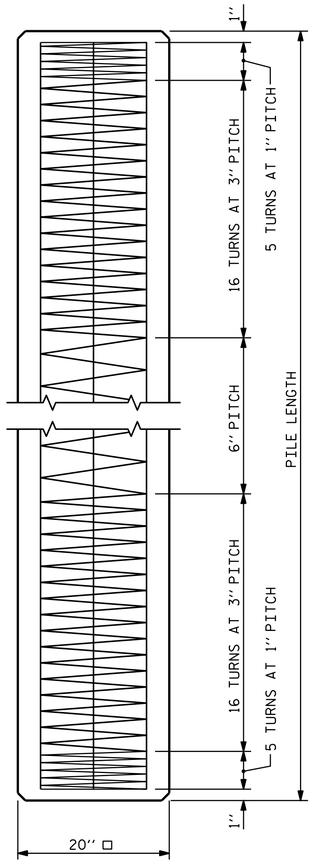
SHEET NO. S11-40

TOTAL SHEETS 44

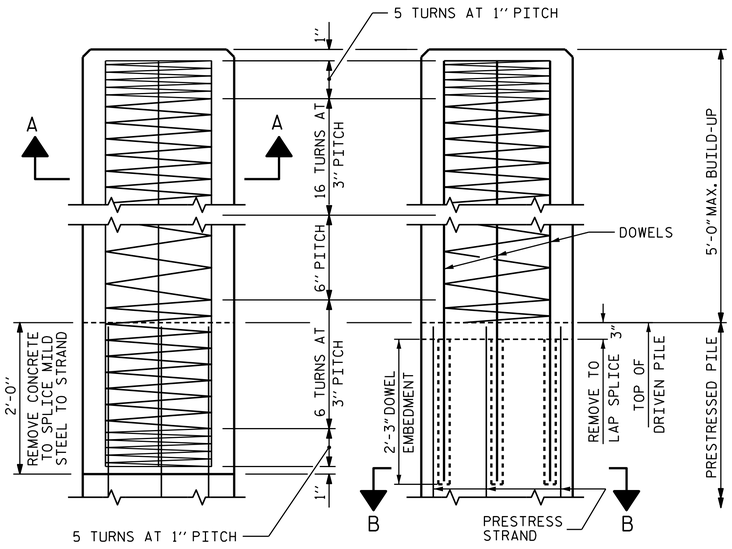
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

KCI JOB NO. 25146789.11

STR-#11

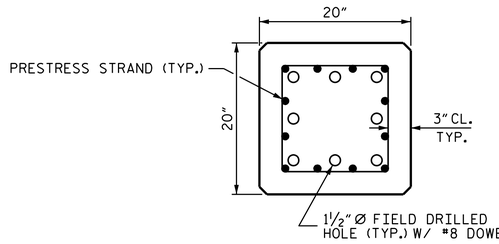


ELEVATION



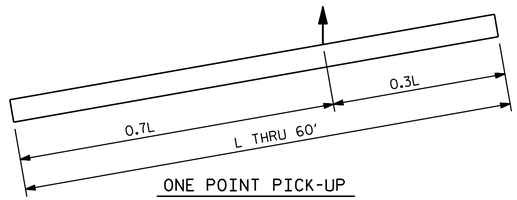
BUILD-UP AND SPIRAL REINFORCING

OPTIONAL BUILD-UP WITH DOWELS

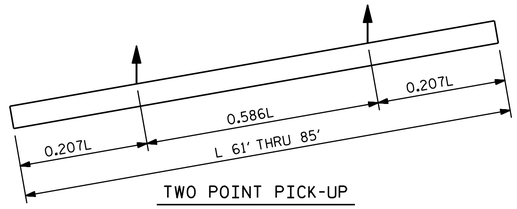


SECTION ''B-B''

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



ONE POINT PICK-UP



TWO POINT PICK-UP

PICK-UP POINTS

QUANTITIES FOR ONE 20'' SQUARE PILE

LENGTH	CONCRETE CU. YDS.	PILE WT. TONS	ONE POINT PICK-UP 0.3L	ONE POINT PICK-UP 0.7L	TWO POINT PICK-UP 0.207L	TWO POINT PICK-UP 0.586L
25'-0''	2.56	5.18	7'-6''	17'-6''		
30'-0''	3.07	6.22	9'-0''	21'-0''		
35'-0''	3.58	7.26	10'-6''	24'-6''		
40'-0''	4.09	8.29	12'-0''	28'-0''		
45'-0''	4.61	9.33	13'-6''	31'-6''		
50'-0''	5.12	10.36	15'-0''	35'-0''		
55'-0''	5.63	11.40	16'-6''	38'-6''		
60'-0''	6.14	12.44	18'-0''	42'-0''		
65'-0''	6.65	13.47			13'-5½''	38'-1''
70'-0''	7.17	14.51			14'-6''	41'-0''
75'-0''	7.68	15.55			15'-6½''	43'-11''
80'-0''	8.19	16.58			16'-6½''	46'-11''
85'-0''	8.70	17.62			17'-7''	49'-10''

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 THE STRAND CONFIGURATION SHOWN IN THE TYPICAL SECTION DETAIL. MIXING OF STRAND SIZE IS NOT ALLOWED.

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

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

PRESTRESSED CONCRETE PILES SHALL CONTAIN CALCIUM NITRITE CORROSION INHIBITOR

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

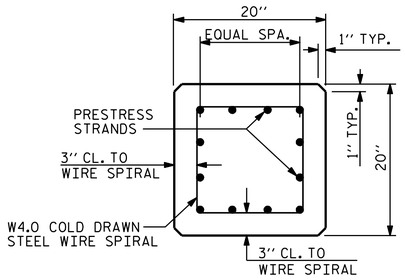
IF STRAND STRESS IS RELIEVED BY BURNING, THE STRANDS SHALL BE BURNED IN OPPOSITE PAIRS AS INDICATED IN THE TYPICAL PATTERN SHOWN. FOR ANY NUMBER OF STRANDS, BURN IN OPPOSITE PAIRS AND SYMMETRICALLY ABOUT BOTH THE VERTICAL AND HORIZONTAL AXES, STRANDS 1-1 SHALL BE BURNED BEFORE 2-2, ETC. NOT MORE THAN 4 STRANDS, SAY 5-5 AND 6-6, 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.

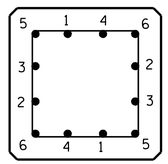
WHERE CAST-IN-PLACE LIFTING DEVICES ARE NOT USED, PICK-UP POINTS ARE TO BE INDICATED WITH A 2'' WIDE BLACK MARK.

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

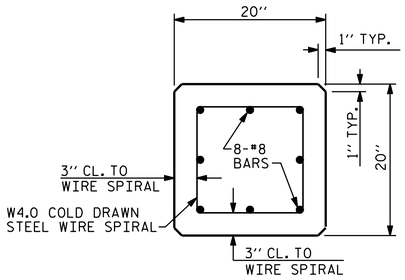
DRIVING OF THE BUILT-UP PILE WILL NOT BE PERMITTED UNTIL THE CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF 5,000 PSI AND UNTIL A PERIOD OF SEVEN DAYS HAS ELAPSED SINCE CASTING OF THE BUILD-UP.



TYPICAL SECTION



TYPICAL PATTERN FOR BURNING STRANDS



SECTION A-A

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.

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

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

DocuSigned by: DB3C8E45B06D499...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

6/11/2018

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

20'' PRESTRESSED CONCRETE PILE

RIGHT LANE

DESIGN ENGINEER OF RECORD:	DATE : 6/11/2018
ASSEMBLED BY : R. C. LARSON	DATE : 04/29/16
CHECKED BY :	DATE :
DRAWN BY : WJH 1/89	REV. 11/30/10 WMC/GM
CHECKED BY : CRK 3/89	REV. 10/1/11 MAA/GM
	REV. 12/14 MAA/TMG

ENGINEERS ◆ PLANNERS ◆ ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
SUITE 220, LANDMARK CENTER II 4601 SIX FORKS RD, RALEIGH, N.C. 27609-5290 (919) 783-9214
DWG. REF. NO. 41 OF 44

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

SHEET NO. S11-41

TOTAL SHEETS 44

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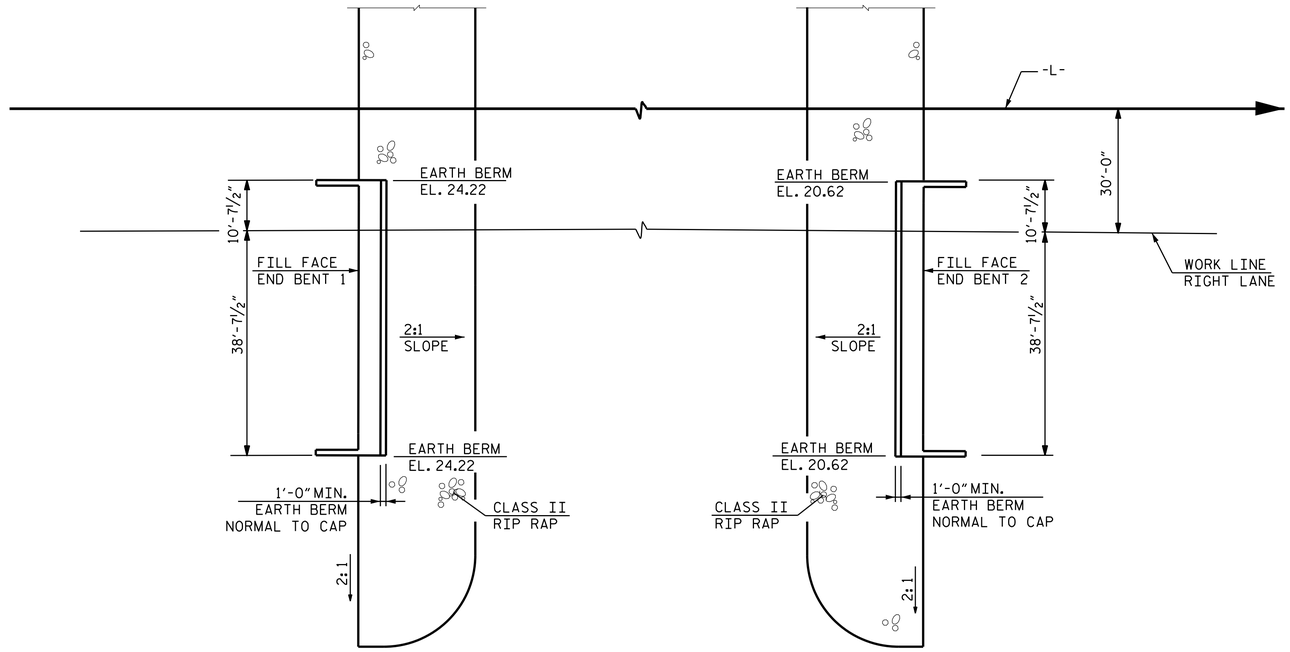
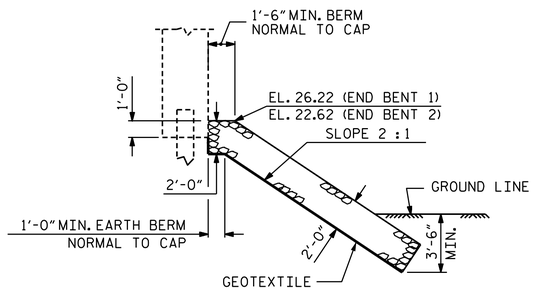
STR-#11

STD. NO. PCP3 (SHT 1)

KCI JOB NO: 25146789.11



PLAN OF RIP RAP



℄ SECTION

BERM RIP RAPPED

ESTIMATED QUANTITIES

BRIDGE @ STA. 287+62.50 -L-	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE
	TONS	SQUARE YARDS
END BENT 1	280	310
END BENT 2	420	465

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

KCI JOB NO: 25146789.11

DESIGN ENGINEER OF RECORD: DocuSigned by: DB3C8E45806D499...		DATE : 6/11/2018
ASSEMBLED BY : R. J. FLORY		DATE : 02/23/16
CHECKED BY : R. C. LARSON		DATE : 03/30/16
DRAWN BY : REK 1/84	REV. 5/1/06R	TLA/GM
CHECKED BY : RDU 1/84	REV. 10/1/11	MAA/GM
	REV. 12/21/11	MAA/GM

DocuSigned by: DB3C8E45806D499...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

6/11/2018

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

RIP RAP DETAILS

RIGHT LANE

ENGINEERS ● PLANNERS ● ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
SUITE 220, LANDMARK CENTER II 4601 SIX FORKS RD. RALEIGH, N.C. 27609-5210 (919) 783-9214

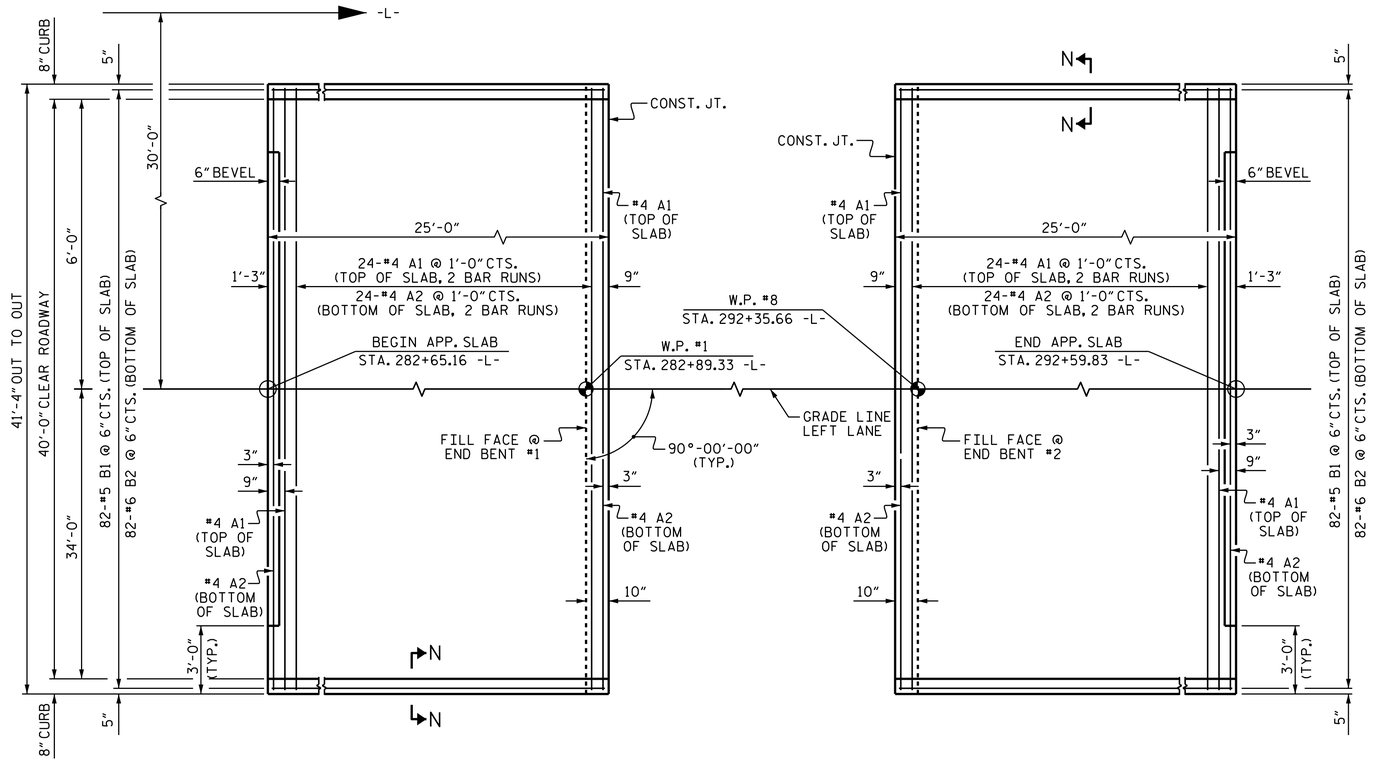
DWG. REF. NO. 42 OF 44

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S11-42
1			3			TOTAL SHEETS
2			4			44

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STR-#11

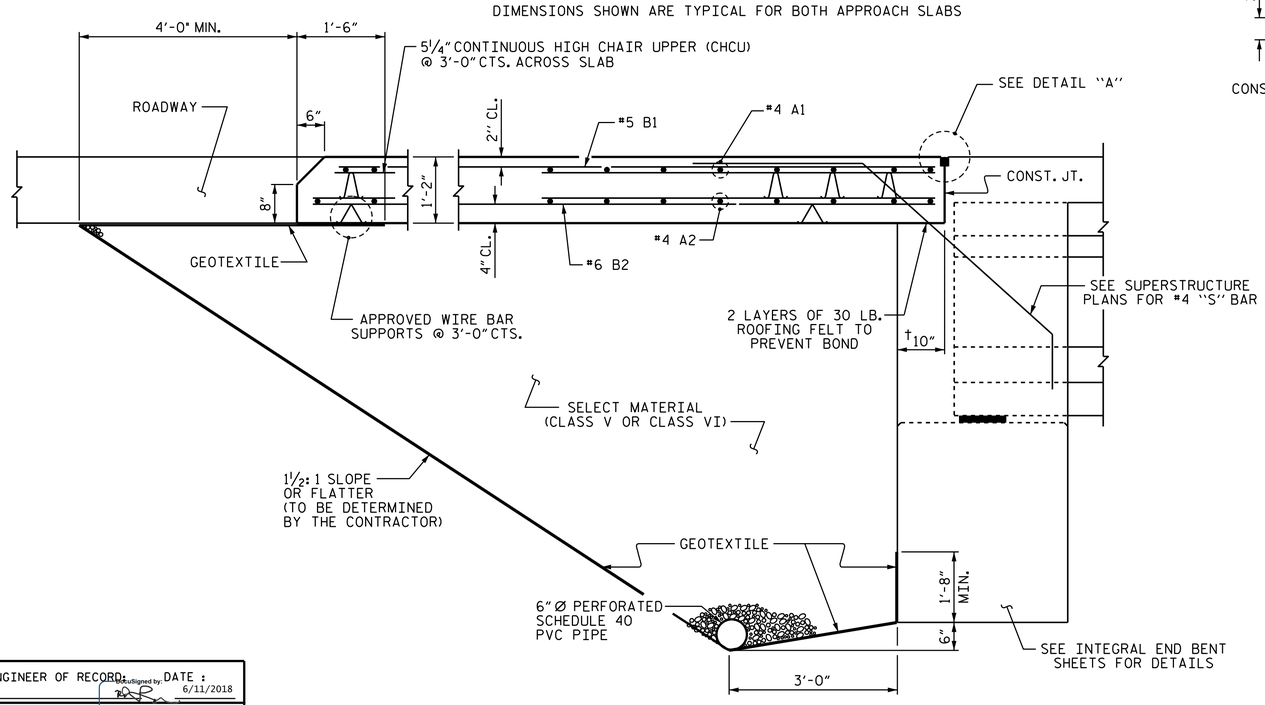
STD. NO. RR1 (Sht 2)



PLAN @ END BENT #1

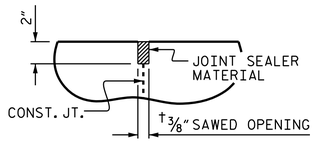
PLAN @ END BENT #2

DIMENSIONS SHOWN ARE TYPICAL FOR BOTH APPROACH SLABS

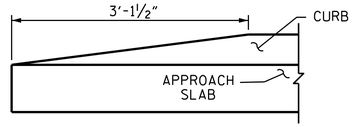


SECTION THRU SLAB

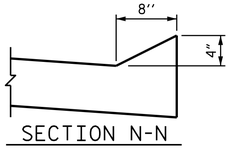
(TYPE I - STANDARD APPROACH FILL)



DETAIL "A"



END OF CURB WITHOUT SHOULDER BERM GUTTER



SECTION N-N

NOTES

APPROACH SLAB SHALL NOT BE CONSTRUCTED PRIOR TO COMPLETION OF THE BRIDGE DECK.

FOR BRIDGE APPROACH FILL INCLUDING GEOTEXTILE, 6"Ø DRAINAGE PIPE, AND SELECT MATERIAL, SEE ROADWAY PLANS.

GEOTEXTILE SHALL BE TYPE 1 IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS SECTION 1056.

SELECT MATERIAL BACKFILL (CLASS V OR CLASS VI) SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATIONS SECTION 1016.

SELECT MATERIAL BACKFILL IS TO BE CONTINUOUS ALONG FILL FACE OF BACKWALL FROM OUTSIDE EDGE TO OUTSIDE EDGE OF APPROACH SLAB.

FOR THE 6"Ø DRAINAGE PIPE OUTLET(S), SEE ROADWAY STANDARD DRAWINGS.

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.

THE JOINT OPENING AT THE APPROACH SLAB/DECK INTERFACE SHALL BE SAWED NO MORE THAN 12 HOURS AFTER THE APPROACH SLAB IS CAST. THE JOINT SHALL BE CLEANED OF ALL DEBRIS BEFORE THE SEALANT IS APPLIED. THE JOINT SEALER MATERIAL SHALL CONFORM TO THE REQUIREMENTS OF SECTION 1028-3 OF THE STANDARD SPECIFICATIONS.

AT THE CONTRACTORS OPTION, "TYPE A - ALTERNATE APPROACH FILL" IN LIEU OF "TYPE I - STANDARD APPROACH FILL" MAY BE CONSTRUCTED AT NO ADDITIONAL COST TO THE DEPARTMENT. SEE SHEET 2 OF 2 FOR DETAILS AND NOTES.

BILL OF MATERIAL

FOR ONE APPROACH SLAB (2 REQ'D)

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	52	#4	STR	22'-0"	764
A2	52	#4	STR	22'-0"	764
B1	82	#5	STR	24'-2"	2067
B2	82	#6	STR	24'-8"	3038

EPOXY COATED REINFORCING STEEL 6633 LBS.

CLASS AA CONCRETE 44.7 C.Y.

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-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB FOR INTEGRAL ABUTMENT

RIGHT LANE

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

DocuSigned by: DB3C8E45B06D498...

6/11/2018

ENGINEERS • PLANNERS • ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
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DWG. REF. NO. 43 OF 44

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NO.	BY:	DATE:	NO.	BY:	DATE:	S11-43
1			3			TOTAL SHEETS
2			4			44

STR-#11

STD. NO. BAS5 (SHT 2)

DESIGN ENGINEER OF RECORD: DocuSigned by: DATE: 6/11/2018

ASSEMBLED BY : R. C. LARSON	DATE :	02/08/16
CHECKED BY : E. C. DECOLA	DATE :	02/14/16
DRAWN BY : TLA 10/05	REV. 10/1/11	MAA/GM
CHECKED BY : GM 5/06	REV. 12/21/11	MAA/GM
	REV. 6/13	MAA/GM

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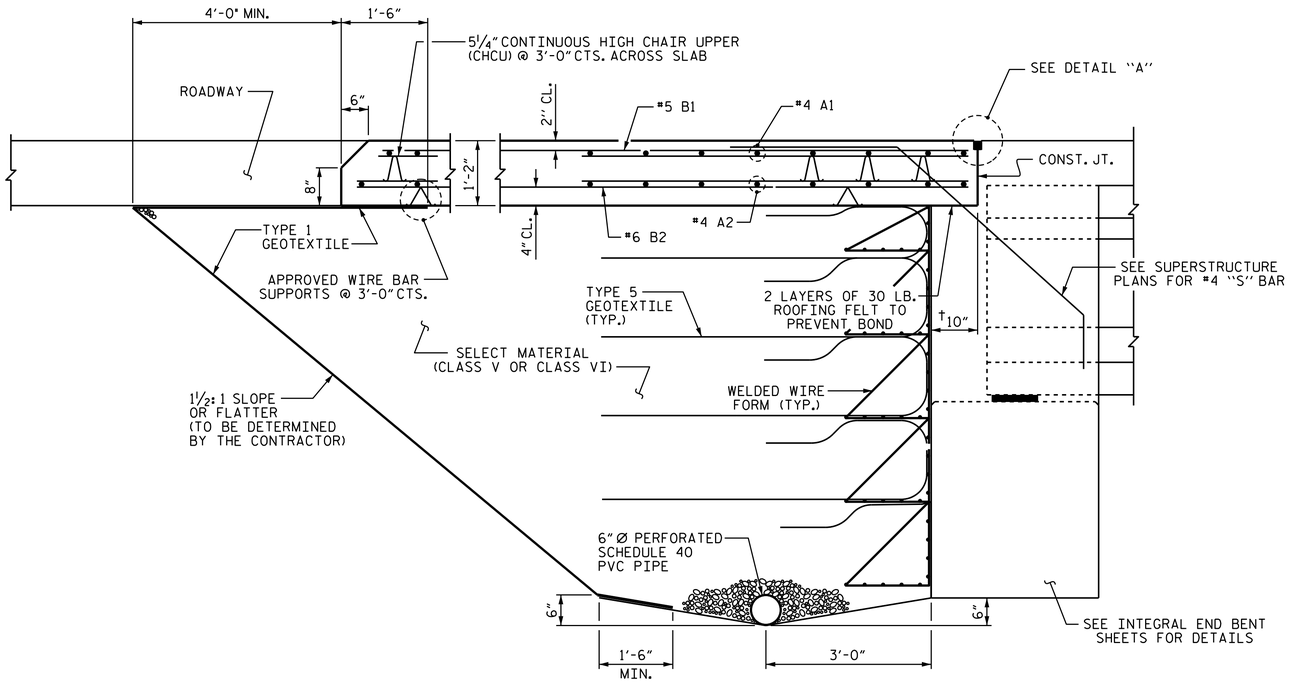
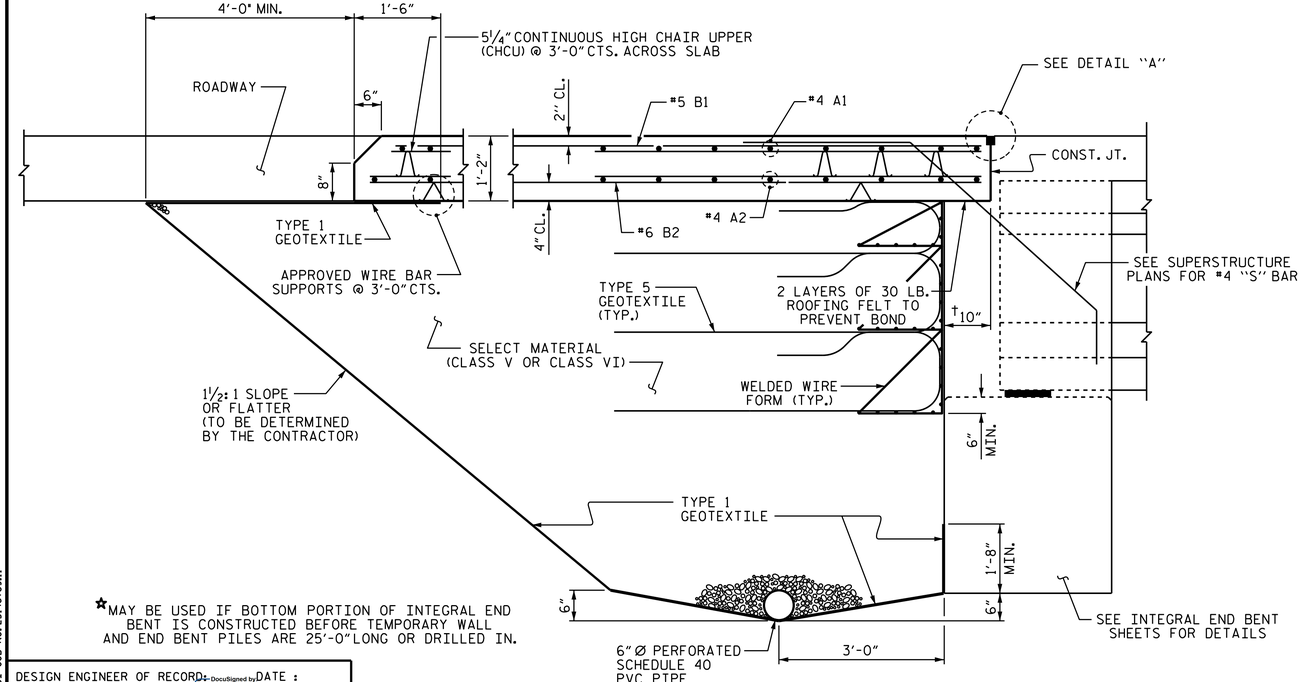
KCI JOB NO: 25146789.11



SECTION THRU SLAB

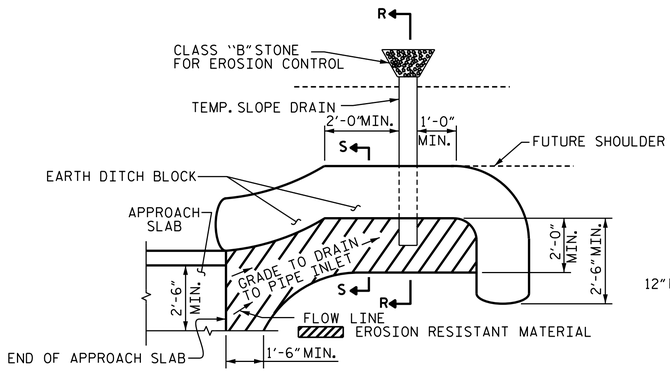
(TYPE A - ALTERNATE APPROACH FILL)



SECTION THRU SLAB

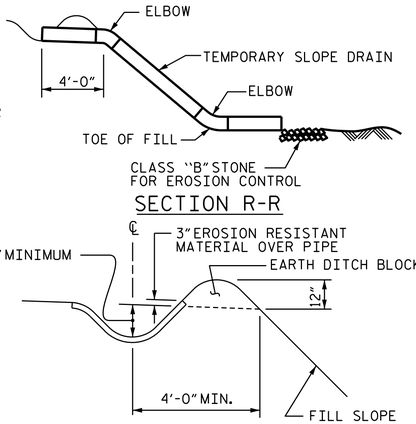
☆(TYPE A - ALTERNATE APPROACH FILL)

☆MAY BE USED IF BOTTOM PORTION OF INTEGRAL END BENT IS CONSTRUCTED BEFORE TEMPORARY WALL AND END BENT PILES ARE 25'-0" LONG OR DRILLED IN.



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.

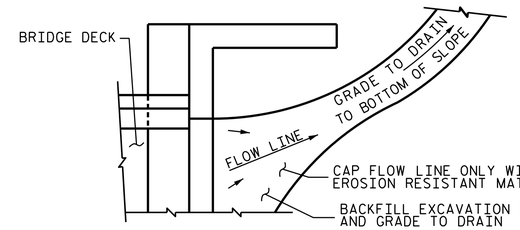
PLAN VIEW



SECTION 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

APPROACH SLAB SHALL NOT BE CONSTRUCTED PRIOR TO COMPLETION OF THE BRIDGE DECK.

FOR TEMPORARY GEOTEXTILE WALL INCLUDING GEOTEXTILE, 6" Ø DRAINAGE PIPE, WELDED WIRE FORM, AND SELECT MATERIAL, SEE ROADWAY PLANS.

GEOTEXTILE (TYPE 1 OR TYPE 5) SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS SECTION 1056.

SELECT MATERIAL BACKFILL (CLASS V OR CLASS VI) SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATIONS SECTION 1016.

SELECT MATERIAL BACKFILL IS TO BE CONTINUOUS ALONG FILL FACE OF BACKWALL FROM OUTSIDE EDGE TO OUTSIDE EDGE OF APPROACH SLAB.

FOR THE 6" Ø DRAINAGE PIPE OUTLET(S), SEE ROADWAY STANDARD DRAWINGS.

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.

THE JOINT OPENING AT THE APPROACH SLAB/DECK INTERFACE SHALL BE SAWED NO MORE THAN 12 HOURS AFTER THE APPROACH SLAB IS CAST. THE JOINT SHALL BE CLEANED OF ALL DEBRIS BEFORE THE SEALANT IS APPLIED. THE JOINT SEALER MATERIAL SHALL CONFORM TO THE REQUIREMENTS OF SECTION 1028-3 OF THE STANDARD SPECIFICATIONS.

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 287+62.50 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB DETAILS

RIGHT LANE

DESIGN ENGINEER OF RECORD: DocuSigned by DB3C8E45B06D499...	DATE: 6/11/2018
ASSEMBLED BY: R.C. LARSON	DATE: 02/08/16
CHECKED BY: E.C. DECOLA	DATE: 02/12/16
DRAWN BY: FCJ 11/88	REV. 10/1/11 MAA/GM
CHECKED BY: ARB 11/88	REV. 7/12 MAA/GM
	REV. 6/13 MAA/GM

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

DocuSigned by: DB3C8E45B06D499... 6/11/2018

ENGINEERS ⊕ PLANNERS ⊕ ECOLOGISTS LICENSE NUMBER C-0764
KCI Associates of North Carolina, P.A.
SUITE 220, LANDMARK CENTER II 4601 SIX FORKS RD. RALEIGH, N.C. 27609-5290 (919) 783-9214

DWG. REF. NO. 44 OF 44

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S11-44
1			3			TOTAL SHEETS
2			4			44

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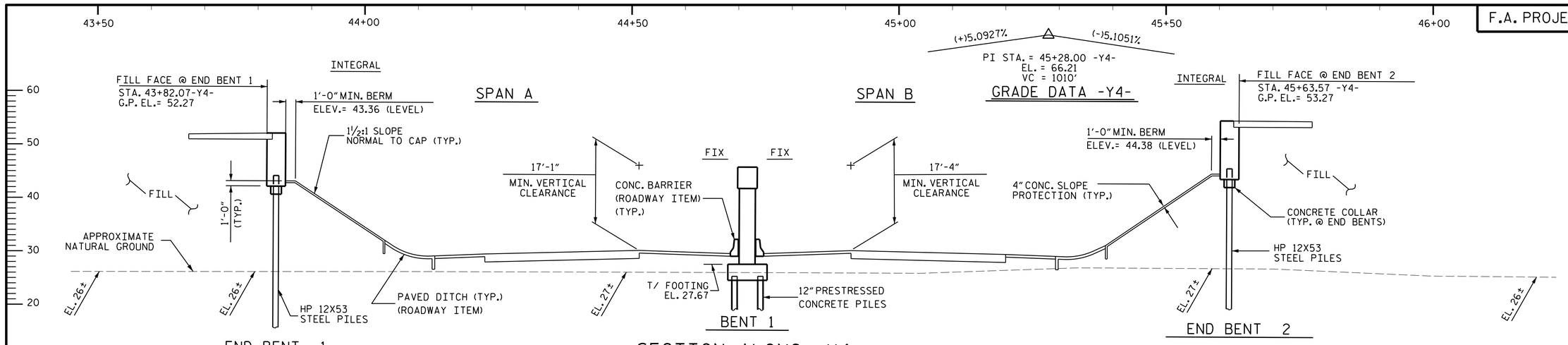
STR-#11

STD. NO. BAS4

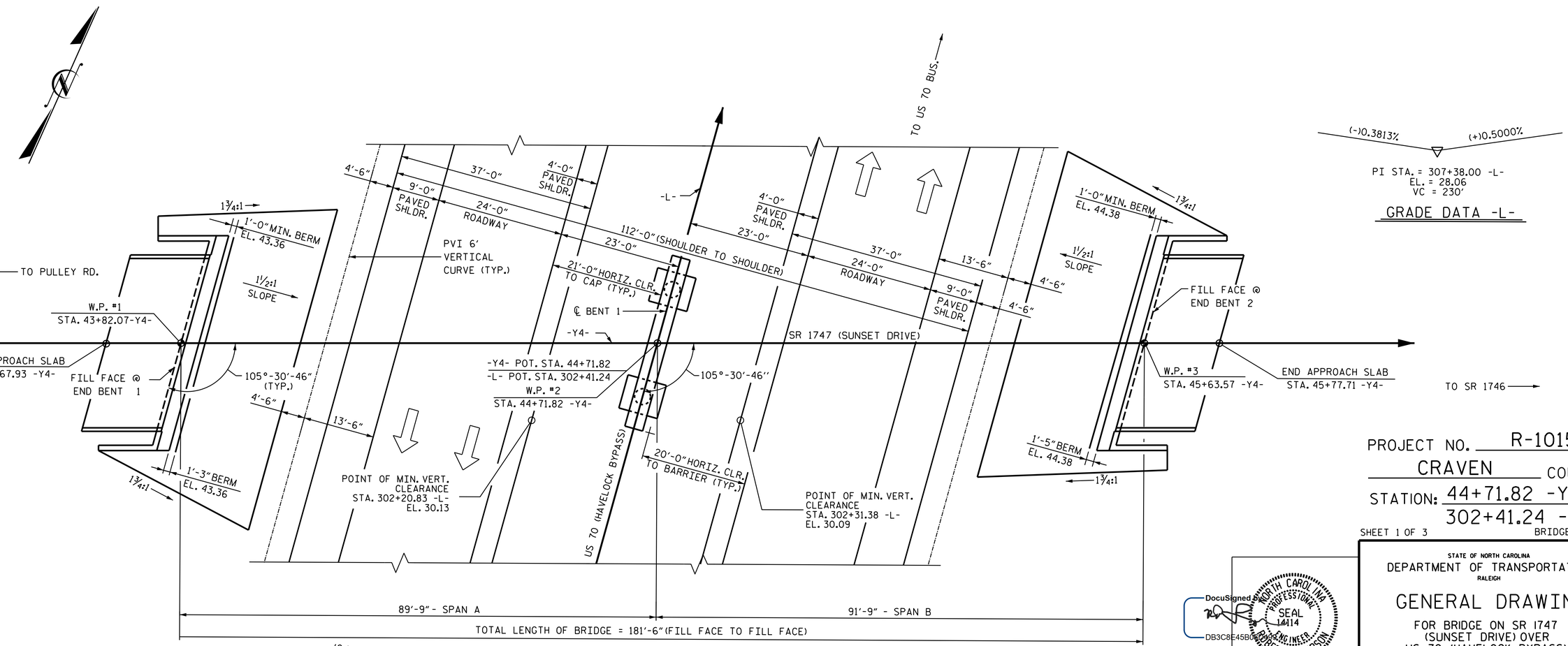
KCI JOB NO: 25146789.11

F.A. PROJECT NO. NHF-70(49)



SECTION ALONG -Y4-

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



PLAN

(PILES NOT SHOWN IN PLAN VIEW)

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 44+71.82 -Y4-
302+41.24 -L-

SHEET 1 OF 3 BRIDGE NO. 283

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR BRIDGE ON SR 1747
(SUNSET DRIVE) OVER
US 70 (HAVELOCK BYPASS)
BETWEEN PULLEY RD. AND SR 1746

DocuSigned by:
DB3C8E45B0B6499...
NORTH CAROLINA PROFESSIONAL SEAL 14414 ENGINEER ROBERT C. LARSON
12/7/2018

DESIGN ENGINEER OF RECORD: DocuSigned by: DB3C8E45B0B6499... DATE: 12/7/2018

DRAWN BY: E. C. DECOLA DATE: 11/11/2015
CHECKED BY: R. C. LARSON DATE: 11/16/2015

KCI JOB NO. 231467891.11

ENGINEERS ◆ PLANNERS ◆ ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
SUITE 220, LANDMARK CENTER ◆ 4601 SIX FORKS RD, RALEIGH, N.C. 27609-5290 (919) 783-9214
DWG. REF. NO. 1 OF 32

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S12-1
1			3			TOTAL SHEETS
2			4			32

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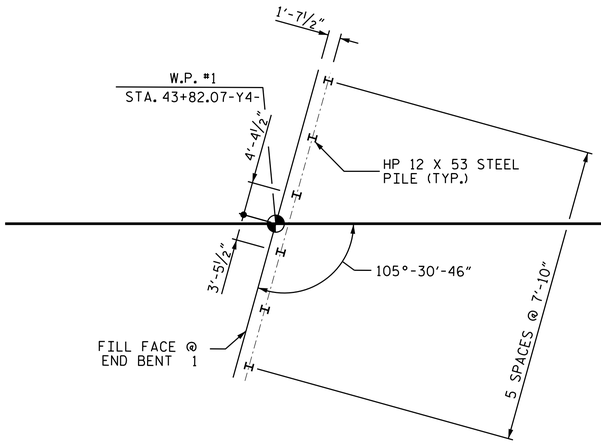
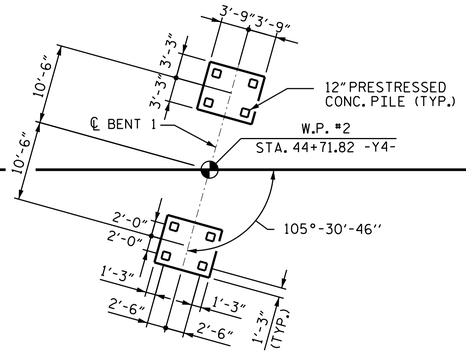
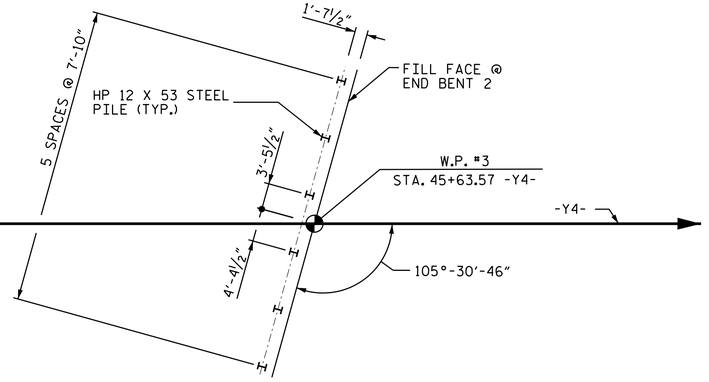


END BENT 1



BENT 1

(DIMENSIONS AND PILE LAYOUT
SIMILAR FOR EACH FOOTING)



END BENT 2

FOUNDATION LAYOUT PLAN

(NOTE: ALL PILES ARE VERTICAL)

FOUNDATION NOTES

FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

PILES AT END BENT 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 125 TONS PER PILE.

DRIVE PILES AT END BENT 1 TO A REQUIRED DRIVING RESISTANCE OF 170 TONS PER PILE.

PILES AT END BENT 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 125 TONS PER PILE.

DRIVE PILES AT END BENT 2 TO A REQUIRED DRIVING RESISTANCE OF 170 TONS PER PILE.

PILES AT BENT NO. 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 165 TONS PER PILE.

DRIVE PILES AT BENT NO. 1 TO A REQUIRED DRIVING RESISTANCE OF 220 TONS PER PILE.

TESTING THE FIRST PRODUCTION PILES WITH THE PDA DURING DRIVING, RESTRIKING OR REDRIVING IS REQUIRED AT END BENT NO.1 OR NO.2 AND BENT NO. 1 FOR PDA TESTING, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 44+71.82 -Y4-

SHEET 2 OF 3

DocuSigned by:
DB3C8E45B06D499...
12/7/2018

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR BRIDGE ON SR 1747
(SUNSET DRIVE) OVER
US 70 (HAVELOCK BYPASS)
BETWEEN PULLEY RD. AND SR 1746

KCI JOB NO. 23146789.11

DESIGN ENGINEER OF RECORD: DocuSigned by: DATE : 12/7/2018
DB3C8E45B06D499...

DRAWN BY : E. C. DECOLA DATE : 08/16/2016

CHECKED BY : R. C. LARSON DATE : 08/16/2016

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ENGINEERS ● PLANNERS ● ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
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DWG. REF. NO. 2 OF 32

REVISIONS						SHEET NO.
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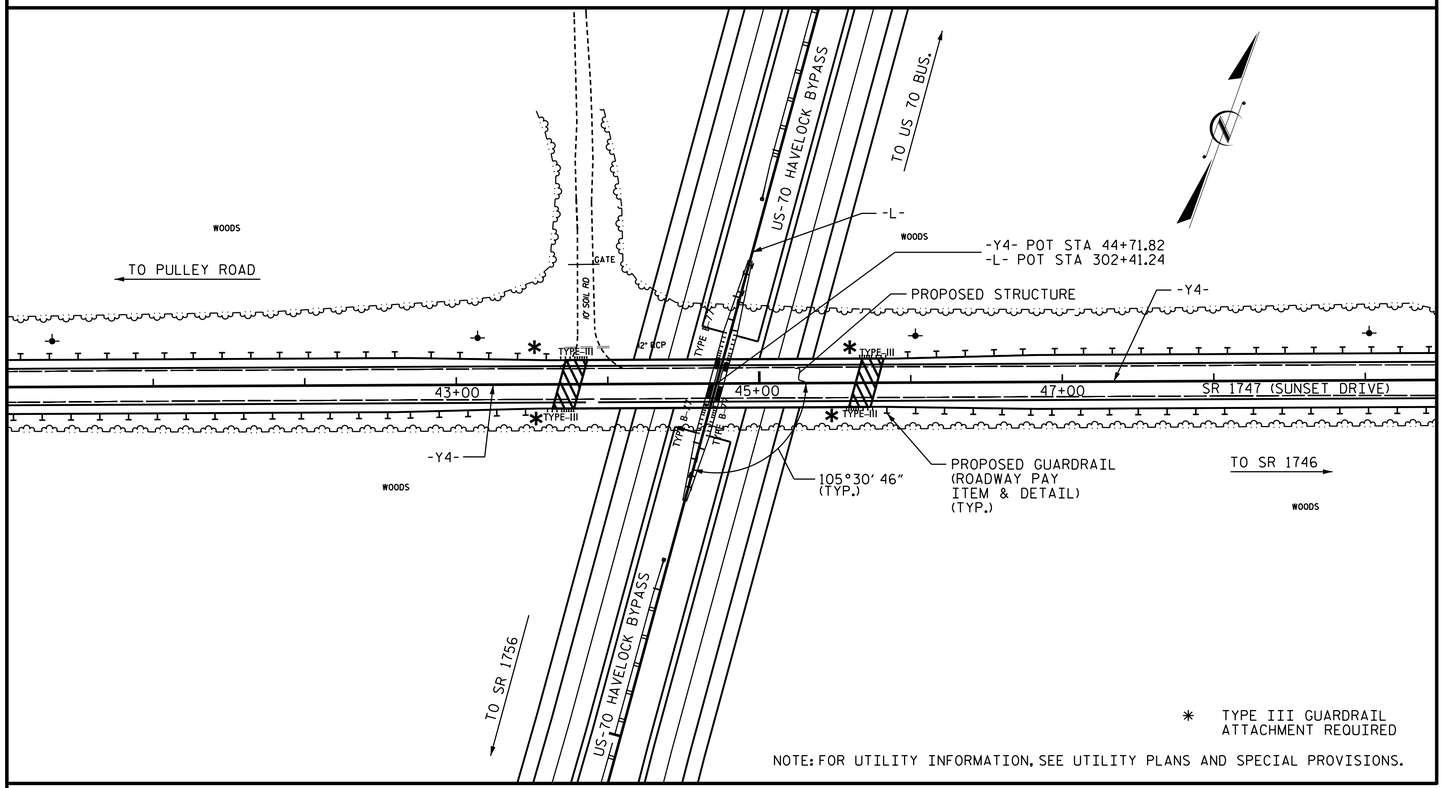
1			3			TOTAL SHEETS
2			4			32



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

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 SAMPLE BARS SHOULD COME FROM STEEL ACTUALLY USED IN THE PROJECT AND THE SAMPLE BARS SHOULD BE REPLACED BY SPLICED BARS AS SPECIFIED IN THE SAMPLE BAR REPLACEMENT CHART. PAYMENT FOR THE SAMPLE BARS AND REPLACEMENT REINFORCING STEEL SHALL BE CONSIDERED INCIDENTAL TO VARIOUS PAY ITEMS.

PRESTRESSED CONCRETE DECK PANELS MAY BE USED IN LIEU OF METAL STAY-IN-PLACE FORMS IN ACCORDANCE WITH ARTICLE 420-3 OF THE STANDARD SPECIFICATION.

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

REMOVABLE FORMS MAY BE USED IN LIEU OF METAL STAY-IN-PLACE FORMS IN ACCORDANCE WITH ARTICLE 420-3 OF THE STANDARD SPECIFICATION.

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

FOR EROSION CONTROL MEASURES SEE EROSION CONTROL PLANS.

TOTAL BILL OF MATERIAL

	FOUNDATION EXCAVATION FOR BENT 1 @ STA. 44+71.82 - Y4-	PDA TESTING	REINFORCED CONCRETE DECK SLAB	GROOVING BRIDGE FLOORS	CLASS A CONCRETE	BRIDGE APPROACH SLABS	REIN-FORCING STEEL	SPIRAL COLUMN REINFORCING STEEL	54" PRESTRESSED CONCRETE GIRDERS		PILE DRIVING EQUIPMENT SETUP FOR 12" PRESTRESSED CONCRETE PILES	PILE DRIVING EQUIPMENT SETUP FOR HP12X53 STEEL PILES	12" PRESTRESSED CONCRETE PILES		HP 12 X 53 STEEL PILES		PILE REDRIVES	TWO BAR METAL RAIL	1'-2" X 2'-6" CONCRETE PARAPET	4" SLOPE PROTECTION	ELASTOMERIC BEARINGS
	LUMP SUM	EA	SQ.FT.	SQ.FT.	CU.YDS.	LUMP SUM	LBS.	LBS.	NO.	LIN.FT.	EA.	EA.	NO.	LIN.FT.	NO.	LIN.FT.	EA.	LIN.FT.	LIN.FT.	SQ. YDS.	LUMP SUM
SUPERSTRUCTURE			6277	6023		LUMP SUM			8	712.7								343.89	359.54		LUMP SUM
END BENT 1					30.8		3666					6			6	510	3			175	
BENT 1	LUMP SUM				39.0		6665	739			8		8	400			4				
END BENT 2					30.4		3664					6			6	510	3			195	
TOTAL	LUMP SUM	2	6277	6023	100.2	LUMP SUM	13,995	739	8	712.7	8	12	8	400	12	1020	10	343.89	359.54	370	LUMP SUM

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 44+71.82 -Y4-

SHEET 3 OF 3

SAMPLE BAR REPLACEMENT	
SIZE	LENGTH
#3	6'-2"
#4	7'-4"
#5	8'-6"
#6	9'-8"
#7	10'-10"
#8	12'-0"
#9	13'-2"
#10	14'-6"
#11	15'-10"

NOTE:
SAMPLE BAR REPLACEMENT LENGTH BASED ON 30"(SAMPLE LENGTH) PLUS TWO SPLICE LENGTHS AND f_y = 60ksi.

DocuSigned by: DB3C8E45B06D439...
NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON
12/7/2018

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DESIGN ENGINEER OF RECORD: DocuSigned by: DB3C8E45B06D439... DATE: 12/7/2018
DRAWN BY: R. C. LARSON DATE: 08/16/16
CHECKED BY: K. SU DATE: 08/16/16

KCI JOB NO. 23146789.11

ENGINEERS ● PLANNERS ● ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
SUITE 220, LANDMARK CENTER ● 4601 SIX FORKS RD., RALEIGH, N.C. 27609-5310 (919) 783-9214
DWG. REF. NO. 3 OF 32

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR BRIDGE ON SR 1747 (SUNSET DRIVE) OVER US 70 (HAVELOCK BYPASS) BETWEEN PULLEY RD. AND SR 1746

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S12-3
1			3			TOTAL SHEETS
2			4			32

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: LIVE-LOAD FACTORS (γ_{LL})	STRENGTH I – MOMENT: DISTRIBUTION FACTORS (DF)	STRENGTH I – MOMENT: RATING FACTOR	STRENGTH I – MOMENT: SPAN	STRENGTH I – MOMENT: GIRDER LOCATION	STRENGTH I – MOMENT: DISTANCE FROM LEFT END OF SPAN (ft)	STRENGTH I – SHEAR: DISTRIBUTION FACTORS (DF)	STRENGTH I – SHEAR: RATING FACTOR	STRENGTH I – SHEAR: SPAN	STRENGTH I – SHEAR: GIRDER LOCATION	STRENGTH I – SHEAR: DISTANCE FROM LEFT END OF SPAN (ft)	SERVICE III LIMIT STATE: LIVE-LOAD FACTORS (γ_{LL})	SERVICE III – MOMENT: DISTRIBUTION FACTORS (DF)	SERVICE III – MOMENT: RATING FACTOR	SERVICE III – MOMENT: SPAN	SERVICE III – MOMENT: GIRDER LOCATION	SERVICE III – MOMENT: DISTANCE FROM LEFT END OF SPAN (ft)	COMMENT NUMBER
DESIGN LOAD RATING		HL-93 (INVENTORY)	N/A	1	1.06	--	1.75	0.752	1.31	B	E	44.3	0.947	1.39	B	I	8.3	0.80	0.752	1.06	B	E	44.3	
		HL-93 (OPERATING)	N/A		1.70	--	1.35	0.752	1.70	B	E	44.3	0.947	1.83	B	I	8.3	N/A	--	--	--	--	--	
		HS-20 (INVENTORY)	36.000	2	1.45	52.20	1.75	0.752	1.80	B	E	44.3	0.947	1.87	B	I	8.3	0.80	0.752	1.45	B	E	44.3	
		HS-20 (OPERATING)	36.000		2.33	83.88	1.35	0.752	2.33	B	E	44.3	0.947	2.45	B	I	8.3	N/A	--	--	--	--	--	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		3.42	46.17	1.40	0.752	5.30	B	E	44.3	0.947	6.06	B	I	8.3	0.80	0.752	3.42	B	E	44.3	
		SNGARBS2	20.000		2.48	49.60	1.40	0.752	3.84	B	E	44.3	0.947	4.23	B	I	8.3	0.80	0.752	2.48	B	E	44.3	
		SNAGRIS2	22.000		2.32	51.04	1.40	0.752	3.59	B	E	44.3	0.947	3.91	B	I	8.3	0.80	0.752	2.32	B	E	44.3	
		SNCOTTS3	27.250		1.69	46.05	1.40	0.752	2.62	B	E	44.3	0.947	2.92	B	I	8.3	0.80	0.752	1.69	B	E	44.3	
		SNAGGRS4	34.925		1.39	48.54	1.40	0.752	2.16	B	E	44.3	0.947	2.30	B	I	8.3	0.80	0.752	1.39	B	E	44.3	
		SNS5A	35.550		1.36	48.34	1.40	0.752	2.11	B	E	44.3	0.947	2.32	B	I	8.3	0.80	0.752	1.36	B	E	44.3	
		SNS6A	39.950		1.24	49.53	1.40	0.752	1.92	B	E	44.3	0.947	2.09	B	I	8.3	0.80	0.752	1.24	B	E	44.3	
		SNS7B	42.000		1.18	49.56	1.40	0.752	1.83	B	E	44.3	0.947	2.04	B	I	8.3	0.80	0.752	1.18	B	E	44.3	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.51	49.83	1.40	0.752	2.34	B	E	44.3	0.947	2.49	B	I	8.3	0.80	0.752	1.51	B	E	44.3	
		TNT4A	33.075		1.67	55.23	1.40	0.752	2.47	B	E	44.3	0.947	2.65	B	I	8.3	0.80	0.752	1.67	B	E	44.3	
		TNT6A	41.600		1.23	51.16	1.40	0.752	1.90	B	E	44.3	0.947	2.15	B	I	8.3	0.80	0.752	1.23	B	E	44.3	
		TNT7A	42.000		1.23	51.66	1.40	0.752	1.91	B	E	44.3	0.947	2.11	B	I	8.3	0.80	0.752	1.23	B	E	44.3	
		TNT7B	42.000		1.26	52.92	1.40	0.752	1.95	B	E	44.3	0.947	2.00	B	I	8.3	0.80	0.752	1.26	B	E	44.3	
		TNAGRIT4	43.000		1.21	52.03	1.40	0.752	1.87	B	E	44.3	0.947	1.97	B	I	8.3	0.80	0.752	1.21	B	E	44.3	
		TNAGT5A	45.000		1.14	51.30	1.40	0.752	1.77	B	E	44.3	0.947	1.91	B	I	8.3	0.80	0.752	1.14	B	E	44.3	
		TNAGT5B	45.000	3	1.13	50.85	1.40	0.752	1.76	B	E	44.3	0.947	1.84	B	I	8.3	0.80	0.752	1.13	B	E	44.3	

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)

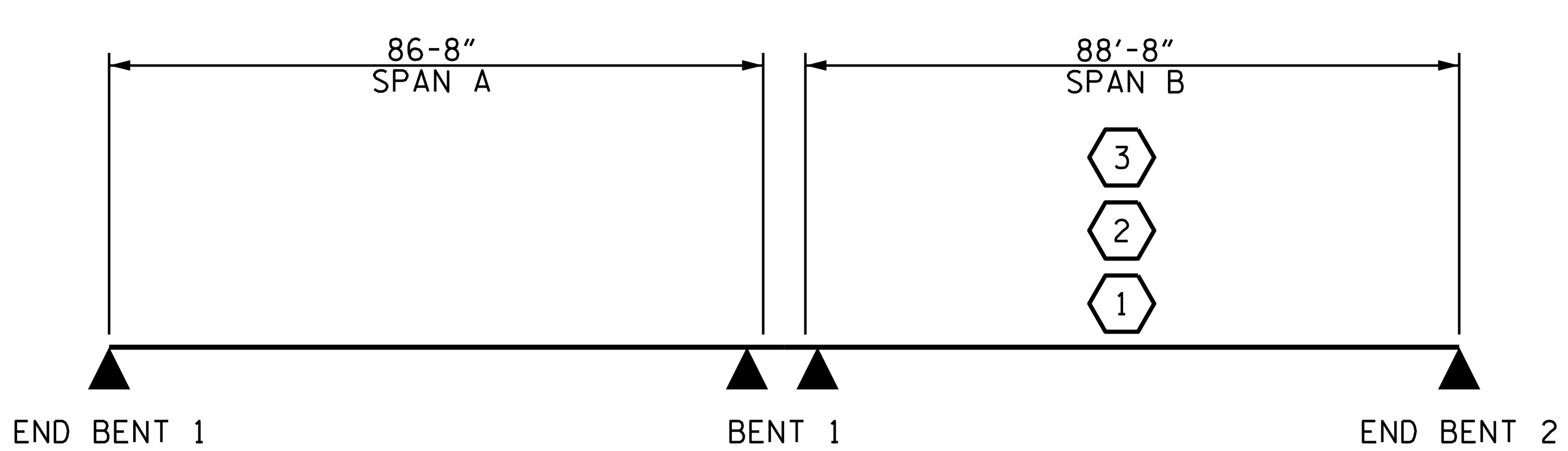
(3) LEGAL LOAD RATING ✱✱

✱✱ SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

I - INTERIOR GIRDER

E - EXTERIOR



LRFR SUMMARY

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 44+71.82 -Y4-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

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

DocuSigned by: DB3C8E45B0...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

12/7/2018

KCI Associates of North Carolina, P.A.

DWG. REF. NO. 4 OF 32

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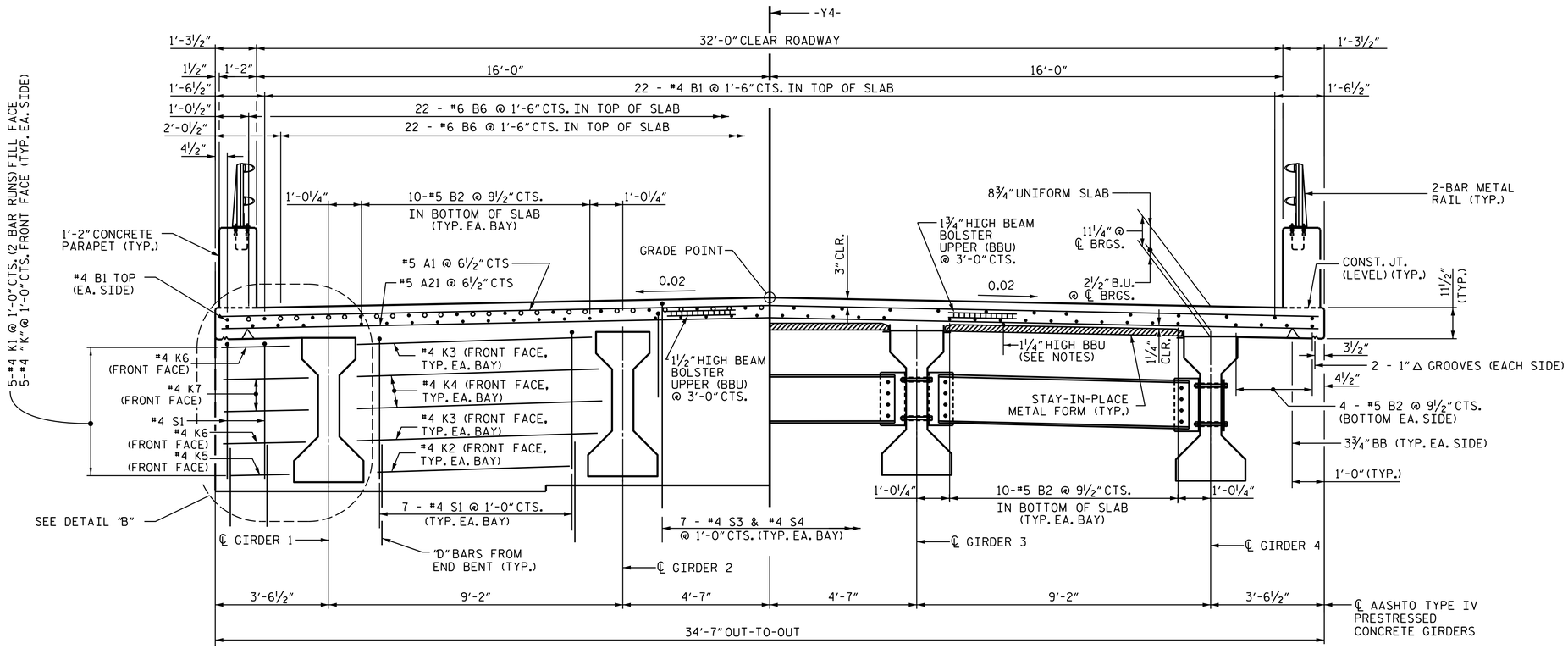
REVISIONS							
NO.	BY:	DATE:	NO.	BY:	DATE:	SHEET NO.	S12-4
1			3			TOTAL SHEETS	32
2			4				

DESIGN ENGINEER OF RECORD: DATE: 12/7/2018

ASSEMBLED BY : K. SU DATE : 12/31/15
CHECKED BY : R. C. LARSON DATE : 01/14/16

DRAWN BY : MAA 1/08
CHECKED BY : GM/DI 2/08
REV. 11/12/08RR MAA/GM
REV. 10/1/11 MAA/GM

KCI JOB NO: 23146789.11

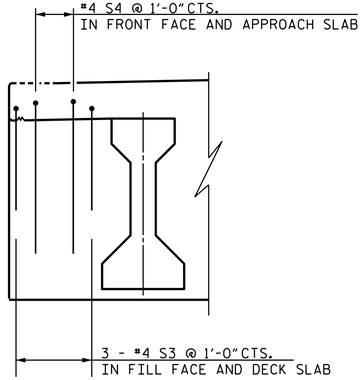


TYPICAL HALF SECTION AT END BENT DIAPHRAGM

TYPICAL HALF SECTION AT INTERMEDIATE DIAPHRAGM

- ● INDICATES CONTINUOUS REINFORCING
- ○ INDICATES ADDITIONAL REINFORCING OVER END BENT

TYPICAL SECTION



DETAIL B

(TYP. EA. SIDE @ END BENTS)

NOTES

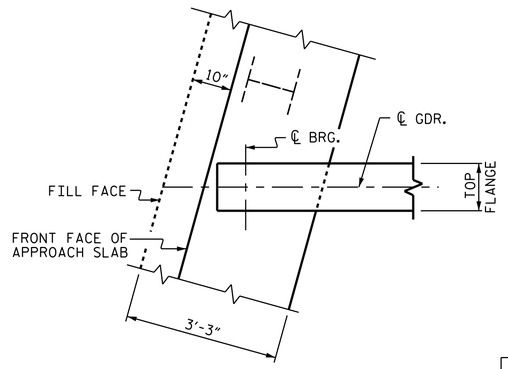
PROVIDE 1¼" HIGH BEAM BOLSTERS UPPER AT 4'-0" CTS. ATOP THE METAL STAY-IN-PLACE FORMS TO SUPPORT THE BOTTOM MAT OF 'A' BARS. WHEN USING REMOVABLE FORMS, PROVIDE CONTINUOUS HIGH CHAIRS FOR METAL DECK (CHCM) @ 4'-0" CTS. WITH A HEIGHT TO SUPPORT THE BOTTOM MAT OF 'A' BARS A CLEAR DISTANCE OF 2½" ABOVE THE TOP OF THE REMOVABLE FORM.

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

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

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

SEE PARAPET DRAWINGS FOR ADDITIONAL REINFORCING STEEL EMBEDDED IN DECK.



PLAN OF GIRDER AT INTEGRAL END BENT

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 44+71.82 -Y4-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE TYPICAL SECTION

DESIGN ENGINEER OF RECORD: DocuSigned by: DB3C8E45B06D499... DATE: 12/7/2018

DRAWN BY: R.J. FLORY DATE: 08/08/16

CHECKED BY: R. C. LARSON DATE: 08/09/16

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NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

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DWG. REF. NO. 5 OF 32

REVISIONS						SHEET NO.
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1			3			TOTAL SHEETS
2			4			32

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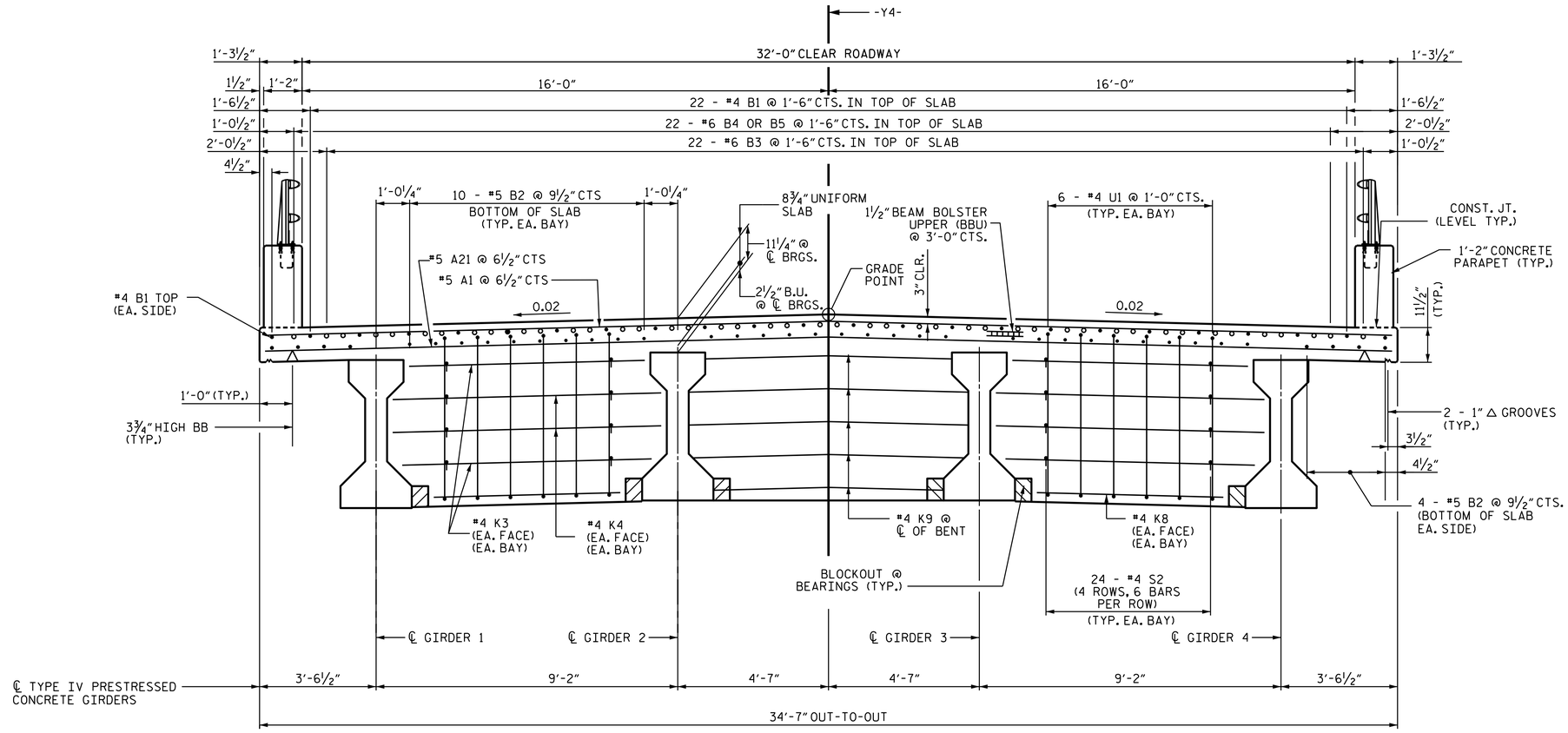
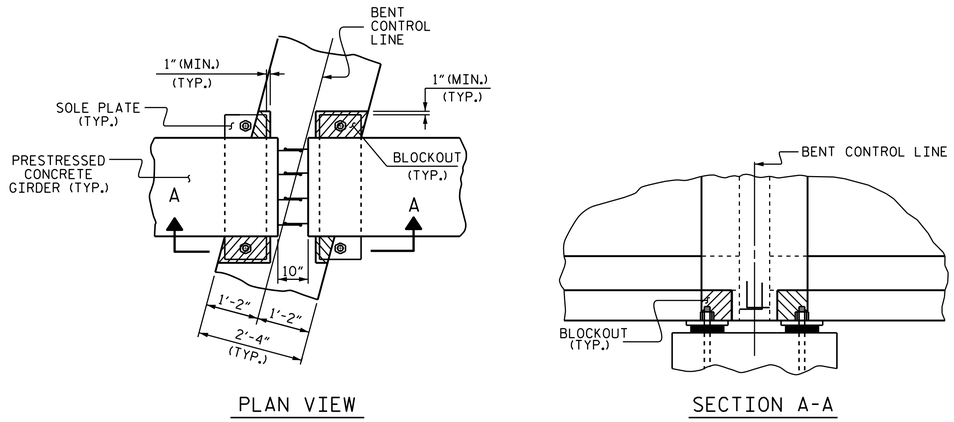


TYPICAL SECTION AT BENT DIAPHRAGM

- ● INDICATES CONTINUOUS REINFORCING
- ○ INDICATES ADDITIONAL REINFORCING OVER BENT



BENT DIAPHRAGM BLOCKOUT DETAIL

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 44+71.82 -Y4-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE TYPICAL SECTION

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DRAWN BY : R. C. LARSON	DATE : 08/15/16		
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2			4			32

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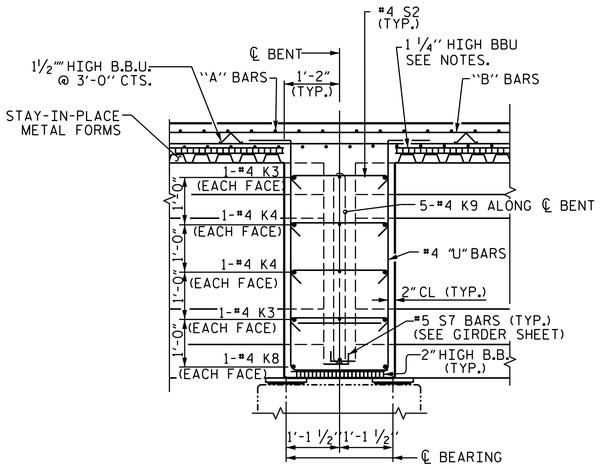
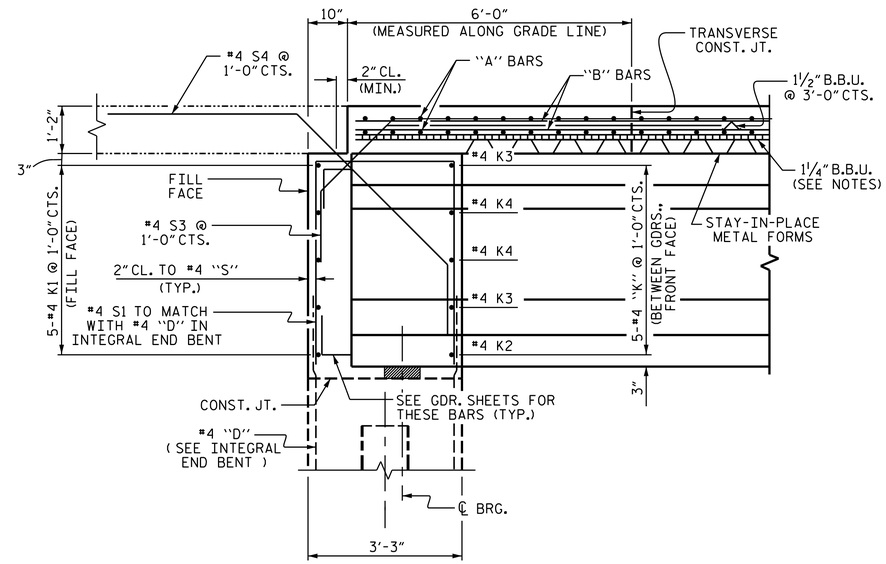
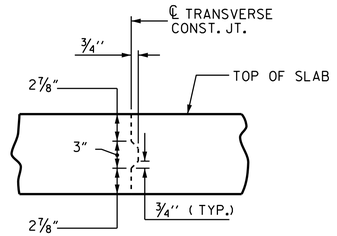


SECTION THRU BENT DIAPHRAGM



SECTION THRU INTEGRAL END BENT



TRANSVERSE CONSTRUCTION JOINT DETAIL

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

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 44+71.82 -Y4-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE TYPICAL SECTION

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

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DESIGN ENGINEER OF RECORD: DocuSigned by: DB3C8E45B06D499... DATE : 12/7/2018

DRAWN BY : R.J. FLORY DATE : 11/11/2015

CHECKED BY : R. C. LARSON DATE : 11/16/2015

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1			3			TOTAL SHEETS
2			4			32

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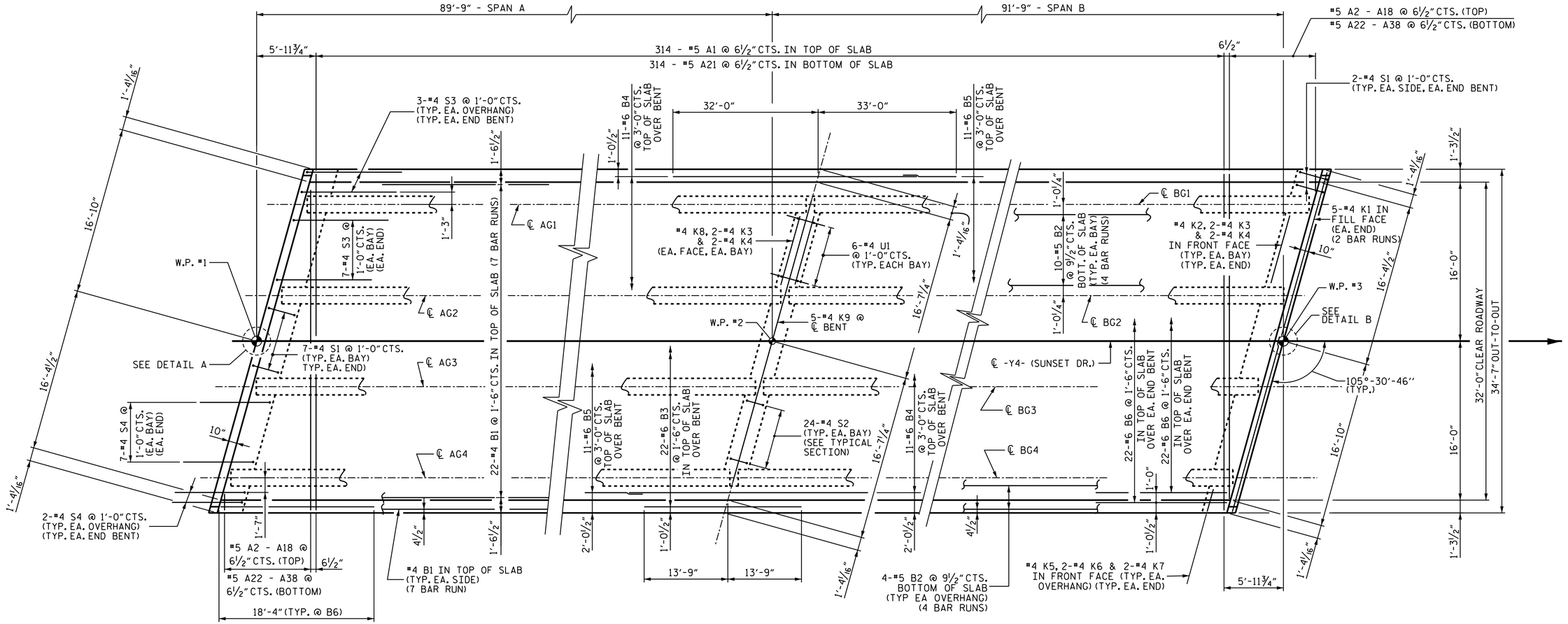
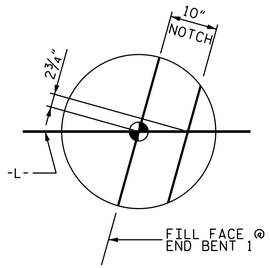
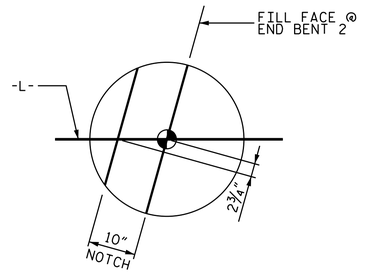


PLAN - SPANS A & B



DETAIL A



DETAIL B

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 44+71.82 -Y4-

KCI JOB NO: 23146789.11

DESIGN ENGINEER OF RECORD: DocuSigned by: DATE : 12/7/2018

DRAWN BY : R. C. LARSON DB3C8E45B06D499... DATE : 02/08/16

CHECKED BY : K. SU DATE : 08/23/16

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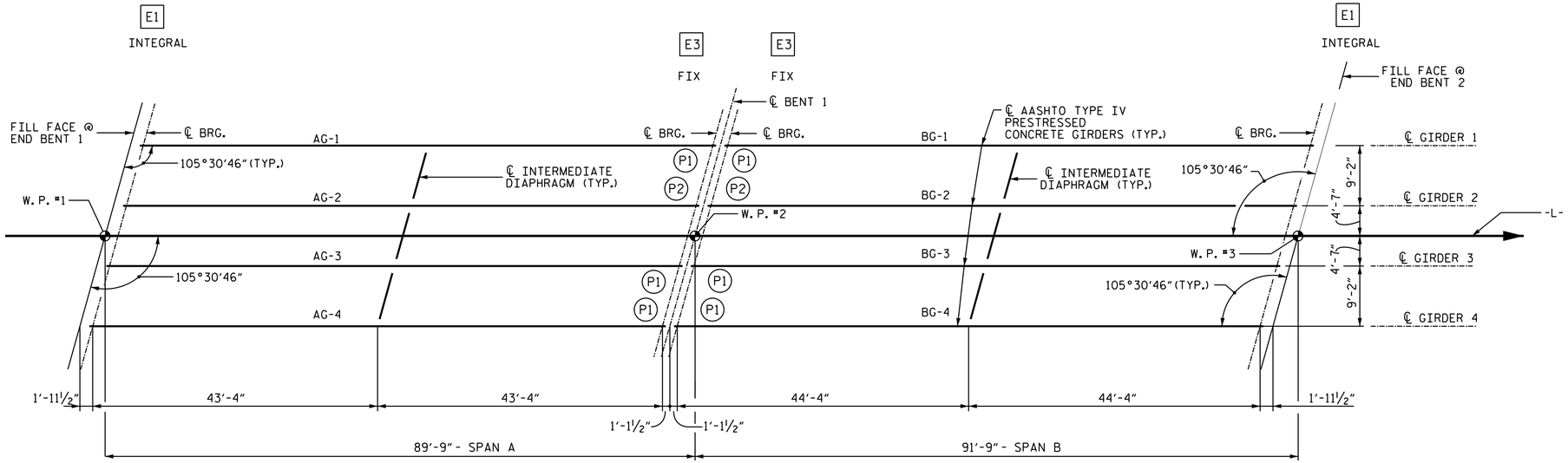
2			4			32

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE PLAN OF SPANS A & B



GIRDER LAYOUT AND INTERMEDIATE DIAPHRAGM LOCATIONS

NOTES

1. ELASTIC BEARINGS INDICATED THUS:
   EN (N = NUMBER)
2. SOLE PLATES INDICATED THUS:
   (PN) (N = NUMBER)

(SEE BEARING SHEET FOR DETAILS)

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 44+71.82 -Y4-

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12/7/2018

STATE OF NORTH CAROLINA
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RALEIGH

SUPERSTRUCTURE GIRDER LAYOUT

KCI JOB NO: 23146789.11

DESIGN ENGINEER OF RECORD: DocuSigned by: DB3C8E45B06D4A9... DATE: 12/7/2018

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REVISIONS						SHEET NO.
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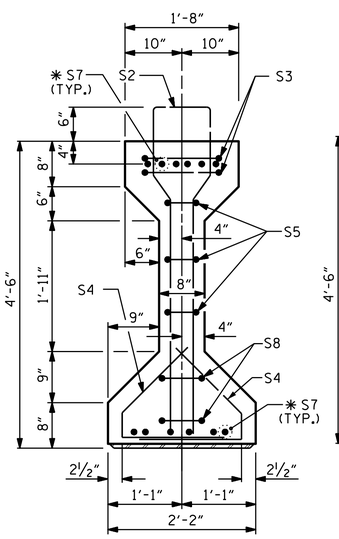
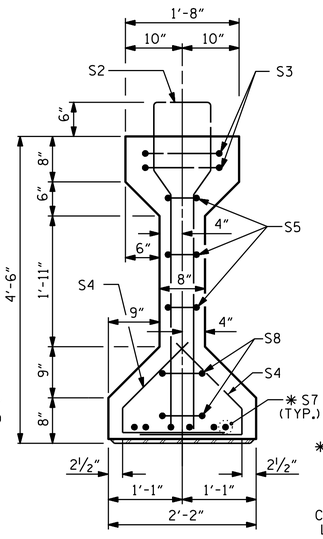
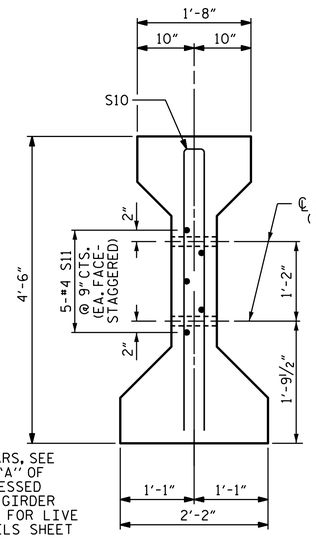
1			3			TOTAL SHEETS
2			4			32



SECTION A-A



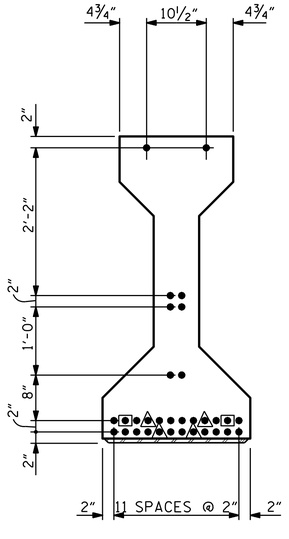
SECTION B-B



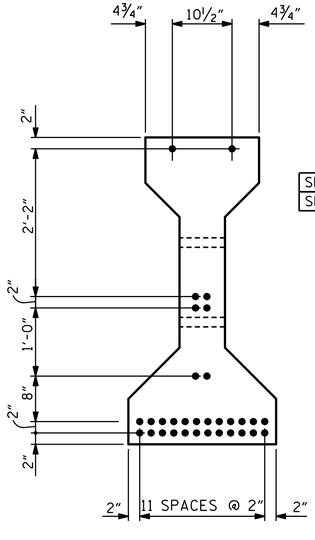
SECTION C-C
(S1 BARS NOT SHOWN)

✱ FOR S7 BARS, SEE DETAIL "A" OF PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS SHEET

DEBONDING LEGEND
- ● FULLY BONDED STRANDS
- △ STRANDS DEBONDED FOR 4'-0" FROM END OF GIRDER
- ▣ STRANDS DEBONDED FOR 10'-0" FROM END OF GIRDER

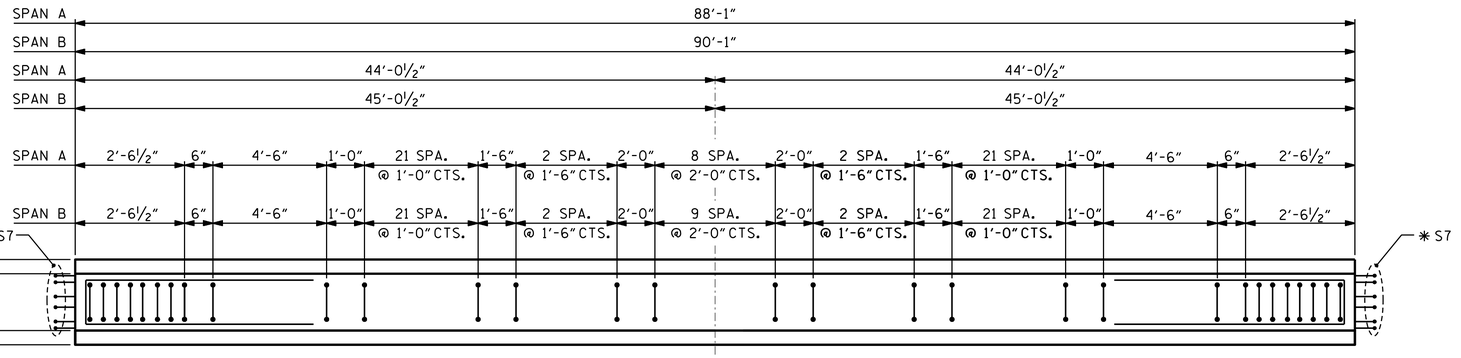


AT END OF GIRDER

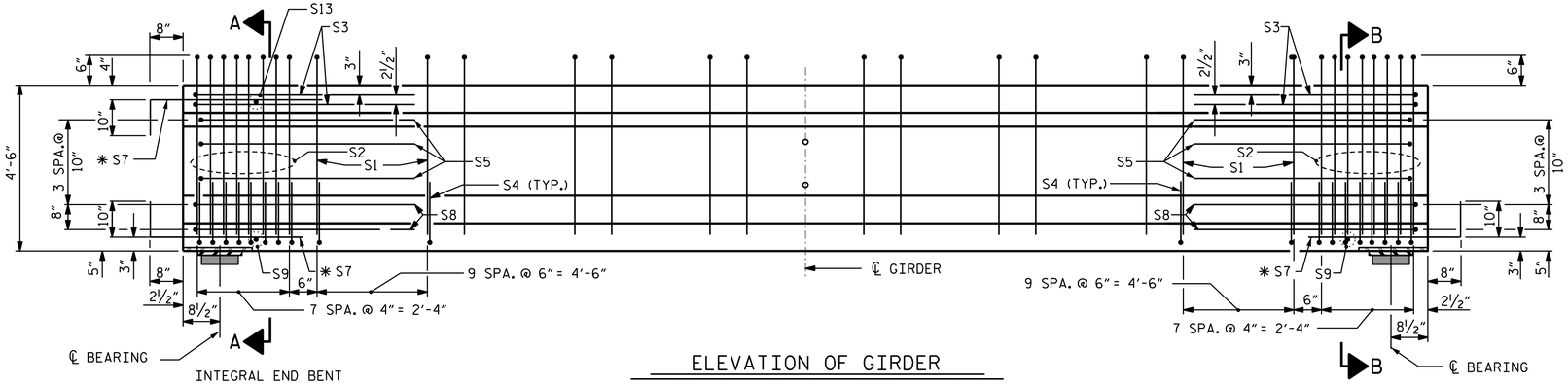


AT ℄ OF GIRDER

0.6"Ø LOW RELAXATION STRAND LAYOUT



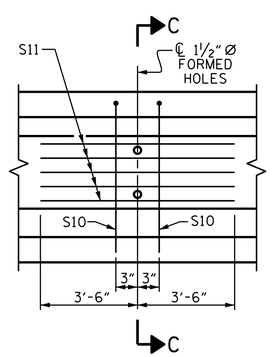
PLAN OF GIRDER



INTEGRAL END BENT

ELEVATION OF GIRDER
(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS)
(SPAN A AS SHOWN; SPAN B OPPOSITE HAND)

FIX



PARTIAL ELEVATION
SHOWING INTERMEDIATE DIAPHRAGM REINFORCING STEEL

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

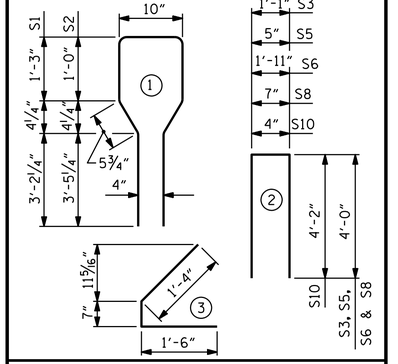
REINFORCING STEEL FOR ONE GIRDER

	BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
SPAN A	S1	79	#4	1	10'-8"	563
SPAN B	S1	80	#4	1	10'-8"	570
	S2	16	#6	1	10'-8"	256
	S3	4	#4	2	9'-1"	24
	S4	72	#4	3	3'-5"	164
	S5	6	#4	2	8'-5"	34
	✱S7	18	#5	STR	3'-8"	69
	S8	4	#4	2	8'-7"	23
	S9	2	#3	STR	1'-10"	1
	S10	2	#5	2	8'-8"	18
	S11	5	#4	STR	7'-0"	23

✱ NOTE: S7 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.)	6500 PSI CONCRETE (C.Y.)	0.6"Ø L.R. STRANDS (No.)
SPAN A	1175	17.9	32
SPAN B	1182	18.3	32

GIRDERS REQUIRED

	NUMBER	LENGTH	TOTAL LENGTH
SPAN A	4	88'-1"	352'-4"
SPAN B	4	90'-1"	360'-4"

PROJECT NO. R-1015
CRAVEN COUNTY
STATION: 44+71.82 -Y4-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

AASHTO TYPE IV
PRESTRESSED CONCRETE GIRDER
CONTINUOUS FOR LIVE LOAD

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NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON
12/7/2018

KCI JOB NO. 23146789.11

ASSEMBLED BY : K. SU DATE : 01/15/16
CHECKED BY : R.C. LARSON DATE : 01/18/16

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

REV. 5/1/06R TLA/GM
REV. 10/1/11 MAA/GM
REV. 1/15 MAA/TMG

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DEAD LOAD DEFLECTION TABLE FOR GIRDERS

0.6" Ø LOW RELAXATION	SPAN A INTERIOR GIRDERS											SPAN B INTERIOR GIRDERS										
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	0.051	0.097	0.132	0.155	0.163	0.155	0.132	0.097	0.051	0	0	0.052	0.098	0.134	0.157	0.165	0.157	0.134	0.098	0.052	0
✳ DEFLECTION DUE TO SUPERIMPOSED D.L.	0	0.035	0.067	0.093	0.109	0.115	0.109	0.093	0.067	0.035	0	0	0.037	0.073	0.101	0.119	0.125	0.119	0.101	0.073	0.037	0
FINAL CAMBER	0	3/16"	3/8"	1/2"	9/16"	9/16"	9/16"	1/2"	3/8"	3/16"	0	0	3/16"	5/16"	3/8"	7/16"	1/2"	7/16"	3/8"	5/16"	3/16"	0
0.6" Ø LOW RELAXATION	**SPAN A EXTERIOR GIRDERS**											**SPAN B EXTERIOR GIRDERS**										
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	0.051	0.097	0.132	0.155	0.163	0.155	0.132	0.097	0.051	0	0	0.052	0.098	0.134	0.157	0.165	0.157	0.134	0.098	0.052	0
✳ DEFLECTION DUE TO SUPERIMPOSED D.L.	0	0.032	0.062	0.085	0.100	0.105	0.100	0.085	0.062	0.032	0	0	0.035	0.068	0.093	0.110	0.115	0.110	0.093	0.068	0.035	0
FINAL CAMBER	0	1/4"	7/16"	9/16"	5/8"	11/16"	5/8"	9/16"	7/16"	1/4"	0	0	3/16"	3/8"	1/2"	9/16"	5/8"	9/16"	1/2"	3/8"	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.

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.

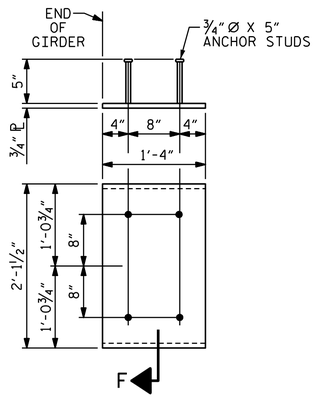
THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE GIRDER SHALL BE DONE WHEN CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN 5000 PSI.

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".

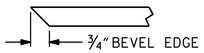
WHEN DRAPED STRANDS ARE DETAILED, THE LONGITUDINAL LOCATION OF THE HOLD DOWN DEVICES SHALL BE WITHIN 6" OF THE LOCATION SHOWN AND THE CENTER OF GRAVITY OF THE GROUP OF DRAPED STRANDS SHALL BE LOCATED WITHIN 1/2" OF THE THEORETICAL LOCATION SHOWN.

THE CONTRACTOR HAS THE OPTION TO PROVIDE, AT NO ADDITIONAL COST TO THE DEPARTMENT, 2 ADDITIONAL STRANDS AT THE TOP OF THE GIRDER TO FACILITATE TYING OF THE REINFORCING STEEL. THESE STRANDS SHALL BE PULLED TO A LOAD OF 4500 lbs.



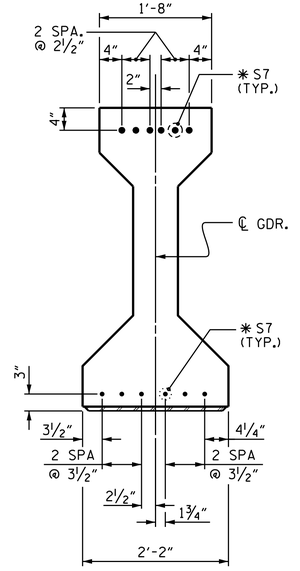
EMBEDDED PLATE "B-1" DETAILS FOR AASHTO TYPE IV GIRDER AND 63" & 72" MODIFIED BULB TEES

(2 REQ'D PER GIRDER)



SECTION "F"

(SEE NOTES)



DETAIL "A"

(FOR AASHTO TYPE IV GIRDERS)

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 44+71.82 -Y4-

KCI JOB NO. 23146789.11

DESIGN ENGINEER OF RECORD: DocuSigned by: DB3C8E45B06D499... DATE :

ASSEMBLED BY : R. C. LARSON DATE : 01/14/16
CHECKED BY : K. SU DATE : 08/24/16

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

REV. 1/15 MAA/TMG
REV. 2/15 MAA/TMG
REV. 12/17 MAA/THC

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DocuSigned by: DB3C8E45B06D499...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

12/7/2018

ENGINEERS ● PLANNERS ● ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
SUITE 220, LANDMARK CENTER 4 NEW DR. FORKS RD, RALEIGH, N.C. 27609-5210 (919) 783-9214

DWG. REF. NO. 11 OF 32

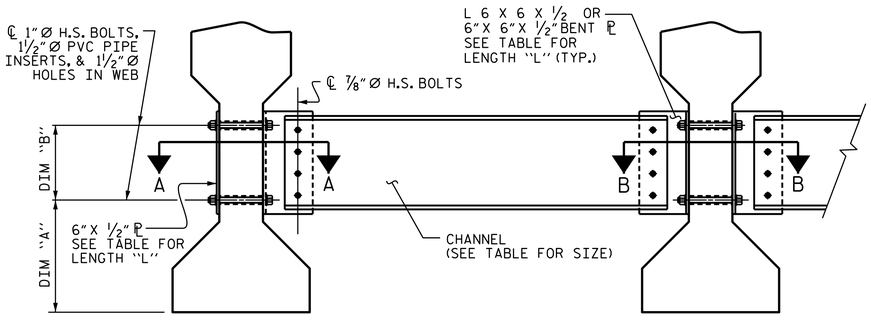
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS

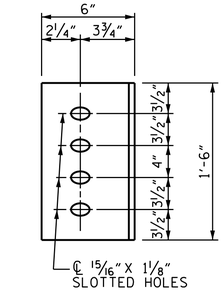
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S12-11
1			3			TOTAL SHEETS
2			4			32

STD. NO. PCG9 (Sht. 3a)

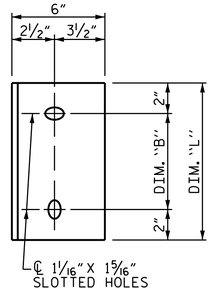


PART SECTION AT INTERMEDIATE DIAPHRAGM

(TYPE III OR TYPE IV GIRDER SHOWN)

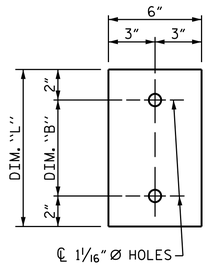


DIAPHRAGM FACE



WEB FACE

CONNECTION PLATE DETAILS



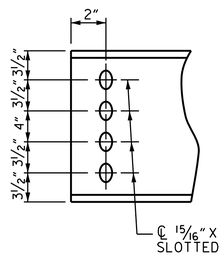
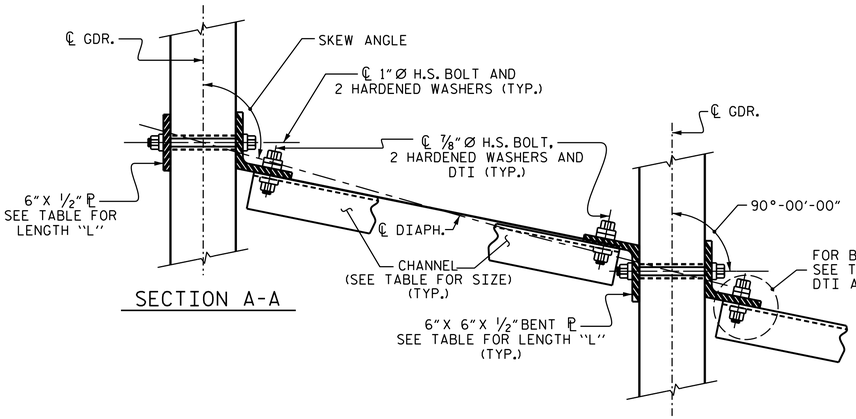


PLATE DETAILS CHANNEL END



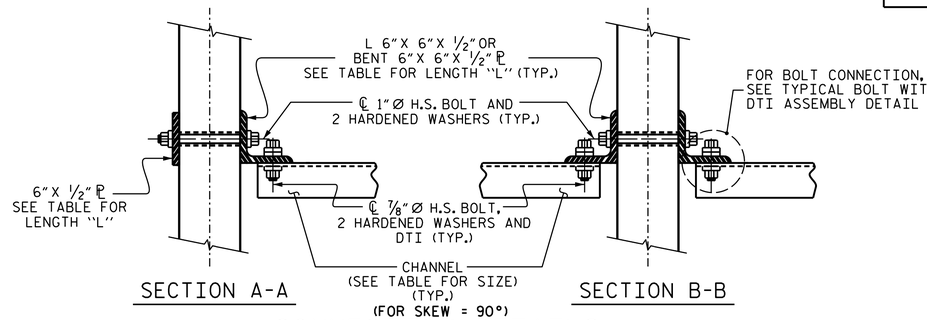
SECTION A-A

SECTION B-B

(90°< SKEW ≤ 110°)

CONNECTION DETAILS

(90°< SKEW ≤ 110° SHOWN
70°≤ SKEW < 90° SIM.)

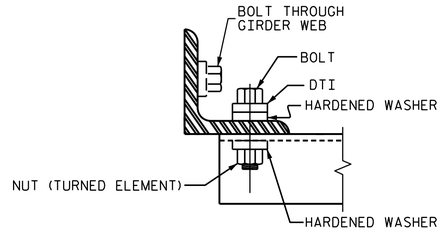


SECTION A-A SECTION B-B

(FOR SKEW = 90°)

CONNECTION DETAILS

(FOR SKEW = 90°)



BOLT WITH DTI ASSEMBLY DETAIL

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 GALVANIZED OR METALLIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS. FOR THERMAL SPRAYED COATINGS (METALLIZATION), SEE SPECIAL PROVISIONS.

FOR METALLIZATION, APPLY A THERMAL SPRAYED COATING WITH A SEAL COAT TO ALL STEEL DIAPHRAGM SURFACES IN ACCORDANCE WITH THE DEPARTMENTS THERMAL SPRAYED COATINGS (METALLIZATION) PROGRAM, 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"
IV	MC 18 x 42.7	1'-9½"	1'-2"	1'-6"

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 44+71.82 -Y4-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD

INTERMEDIATE STEEL DIAPHRAGMS FOR TYPE II, III, & IV PRESTRESSED CONCRETE GIRDERS

DocuSigned by: DB3C8E45B06D499...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

12/7/2018

DESIGN ENGINEER OF RECORD: DocuSigned by: DB3C8E45B06D499...	DATE : 12/7/2018
ASSEMBLED BY : R. C. LARSON	DATE : 12/05/18
CHECKED BY : R. A. PRUETT	DATE : 12/05/18
DRAWN BY : TLA 6/05	REV. 5/1/06RRR KMM/GM
CHECKED BY : VC 6/05	REV. 10/1/11 MAA/GM
	REV. 12/17 MAA/THC

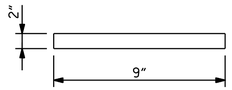
KCI JOB NO. 23146789.11

ENGINEERS ● PLANNERS ● ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
SUITE 220, LANDMARK CENTER II 4601 SIX FORKS RD, RALEIGH, N.C. 27609-5210 (919) 783-9214
DWG. REF. NO. 12 OF 32

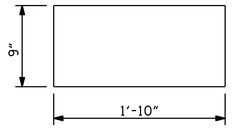
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S12-12
1			3			TOTAL SHEETS
2			4			32

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STD. NO. PCG10



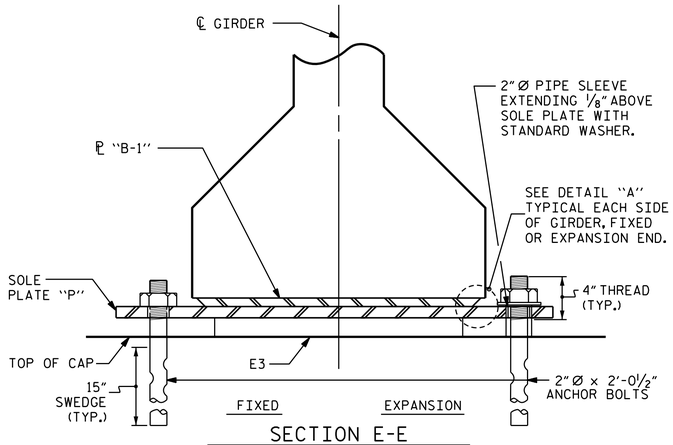
TYPICAL SECTION OF ELASTOMERIC BEARINGS



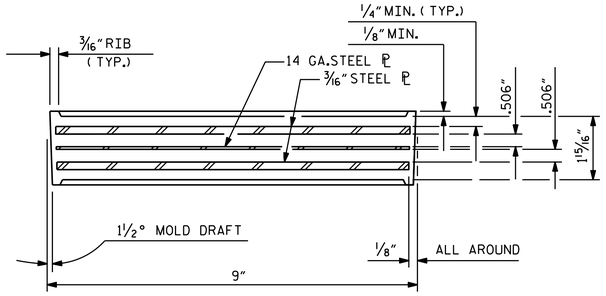
E1 (8 REQ'D)

PLAN VIEW OF ELASTOMERIC BEARING

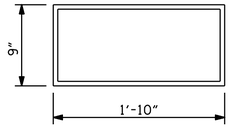
TYPE I



SECTION E-E



TYPICAL SECTION OF ELASTOMERIC BEARINGS



E3 (__ REQ'D)

PLAN VIEW OF ELASTOMERIC BEARING

TYPE IV

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.

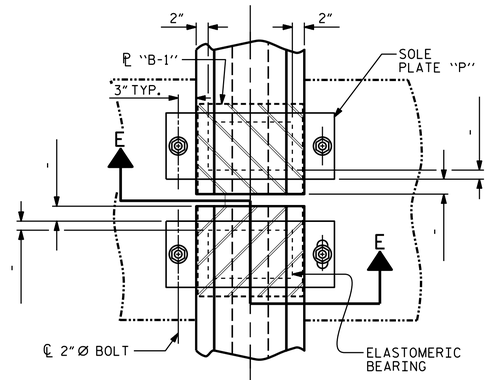
ANCHOR BOLTS SHALL MEET THE REQUIREMENTS OF ASTM A449. NUTS SHALL MEET THE REQUIREMENTS OF AASHTO M291-DH OR AASHTO M292-2H. WASHERS SHALL MEET THE REQUIREMENTS OF AASHTO M293. SHOP DRAWINGS ARE NOT REQUIRED FOR ANCHOR BOLT, NUTS AND WASHERS. SHOP INSPECTION IS REQUIRED.

ALL SURFACES OF BEARING PLATES SHALL BE SMOOTH AND STRAIGHT.

THE ELASTOMER IN THE STEEL REINFORCED BEARINGS SHALL HAVE A SHEAR MODULUS OF 0.160 KSI, IN ACCORDANCE WITH AASHTO M251.

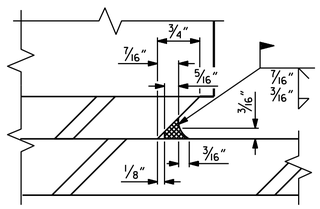
FOR STEEL REINFORCED ELASTOMERIC BEARINGS, SEE SPECIAL PROVISIONS.

ALL SOLE PLATES SHALL BE AASHTO M270 GRADE 36.

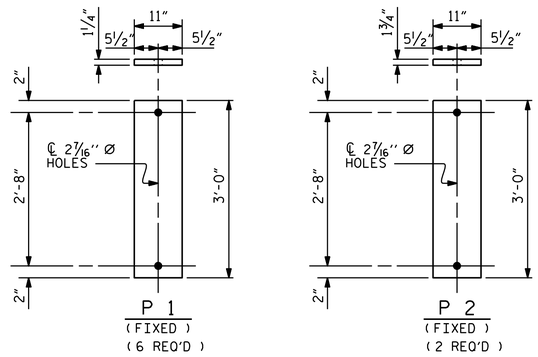


TYPICAL HALF-PLAN (SHOWING CONTINUOUS BENT)

TYPICAL HALF-PLAN (SHOWING SIMPLE SPAN BENT)



DETAIL "A"



SOLE PLATE DETAILS ("P")

MAXIMUM ALLOWABLE SERVICE LOADS	
D.L.+L.L. (NO IMPACT)	
TYPE IV	225 k

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 44+71.82 -Y4-

DocuSigned by: DB3C8E45B06D499...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

2/7/2019

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD

ELASTOMERIC BEARING DETAILS

PRESTRESSED CONCRETE GIRDER SUPERSTRUCTURE

DESIGN ENGINEER OF RECORD: DocuSigned	DATE: 2/7/2019		
ASSEMBLED BY: R. C. LARSON	DATE: 08/12/16		
CHECKED BY: R. A. PRUETT	DATE: 08/24/16		
DRAWN BY: WJH 8/89	REV. 6/13	AAC/MAA	
CHECKED BY: CRK 8/89	REV. 1/15	MAA/TMG	
	REV. 12/17	MAA/THC	

ENGINEERS ● PLANNERS ● ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
SUITE 220, LANDMARK CENTER ● 4601 SIX FORKS RD, RALEIGH, N.C. 27609-5210 (919) 783-9214

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

DWG. REF. NO. 13 OF 32

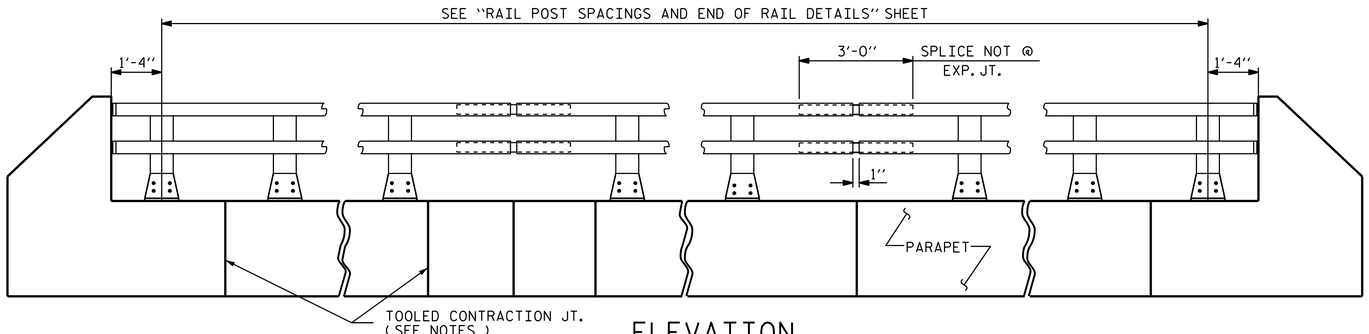
SHEET NO. S12-13

TOTAL SHEETS 32

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

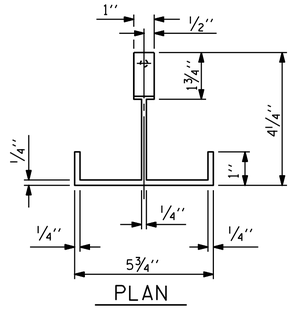
STD. NO. EB3 (SHT 3)

KCI JOB NO. 23146789.11

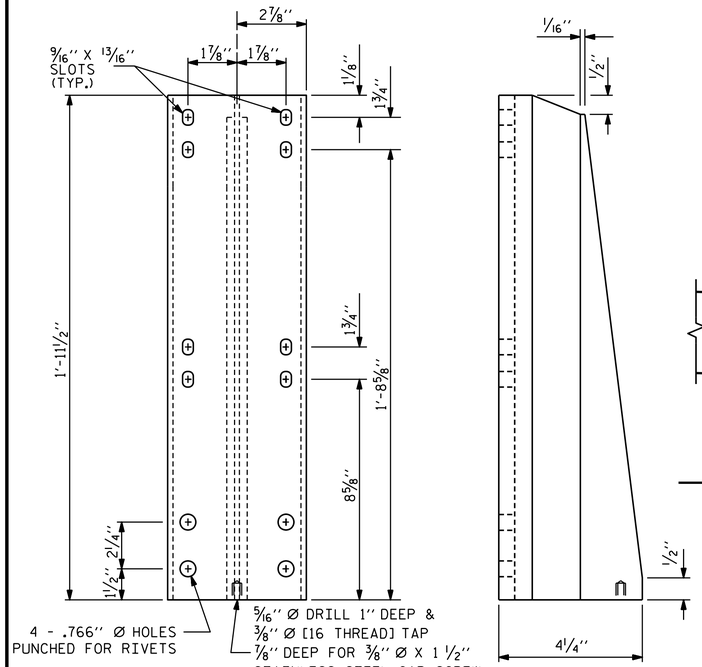


ELEVATION

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



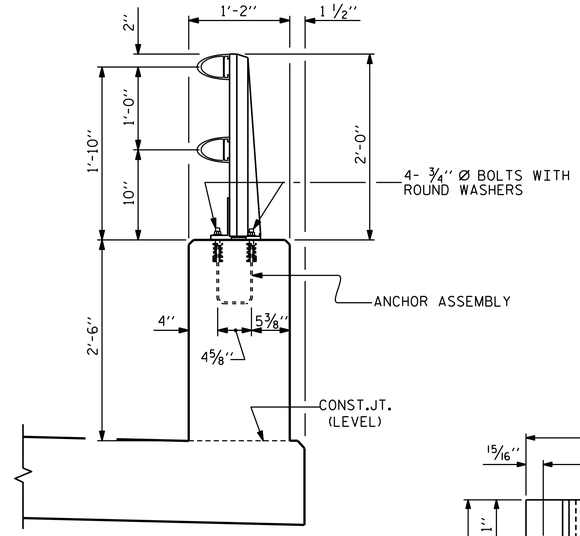
PLAN



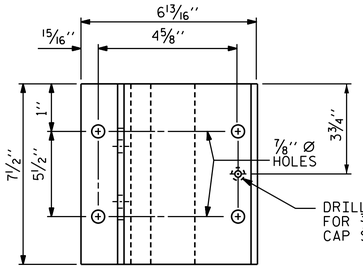
FRONT ELEVATION

SIDE ELEVATION

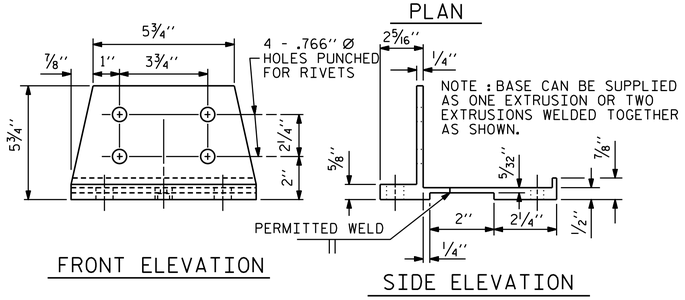
DETAILS OF POST



SECTION THRU PARAPET AND RAIL



PLAN



FRONT ELEVATION

SIDE ELEVATION

POST BASE DETAILS

NOTES

AT THE CONTRACTOR'S OPTION, METAL RAIL MAY BE EITHER ALUMINUM OR GALVANIZED STEEL IN ACCORDANCE WITH THE REQUIREMENTS OF THE GENERAL NOTES AND THE FOLLOWING SPECIFICATIONS FOR THE ALTERNATE MATERIALS; HOWEVER, THE CONTRACTOR WILL BE REQUIRED TO USE THE SAME RAIL MATERIAL ON ALL STRUCTURES ON THE PROJECT FOR WHICH METAL RAIL IS DESIGNATED.

UNLESS OTHERWISE REQUIRED IN THE CONTRACT DOCUMENTS, THE CONTRACTOR HAS THE OPTION TO USE AN ALTERNATE TO THE 2 BAR METAL RAIL. THE ALTERNATE RAIL SHALL MEET THE REQUIREMENTS OF THE AASHTO LRFDBRIDGE DESIGN SPECIFICATIONS AND MUST BE LISTED ON THE DEPARTMENT'S APPROVED PRODUCTS LIST (APL) UNDER "2 BAR METAL RAIL ALTERNATE". ADJUSTMENTS TO THE CONCRETE PARAPET WILL NOT BE ALLOWED.

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.

GALVANIZED STEEL RAILS

MATERIAL AND GALVANIZING ARE TO CONFORM TO THE FOLLOWING SPECIFICATIONS:

POST, POST BASES, RAILS, EXPANSION BARS AND CLAMP BARS: AASHTO M270 GRADE 36 STRUCTURAL STEEL - GALVANIZED TO AASHTO M111.

RIVETS: RIVETS SHALL MEET THE REQUIREMENTS OF ASTM A502 FOR GRADE 1 RIVETS.

THE CUT ENDS OF GALVANIZED STEEL RAILING, AFTER GRINDING SMOOTH SHALL BE GIVEN TWO COATS OF ZINC RICH PAINT MEETING THE REQUIREMENTS OF FEDERAL SPECIFICATION MIL-P-26915 USAF TYPE 1, OR OF FEDERAL SPECIFICATIONS TT-P-641.

SHIMS: SHIMS SHALL MEET THE REQUIREMENTS OF ASTM A570 FOR GRADE 33 OR A611 FOR GRADE C AND SHALL BE GALVANIZED IN ACCORDANCE WITH AASHTO M111.

RAIL CAPS: RAIL CAPS SHALL MEET THE REQUIREMENTS OF ASTM A570 FOR GRADE 33 OR A611 FOR GRADE C AND SHALL BE GALVANIZED IN ACCORDANCE WITH AASHTO M111.

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.

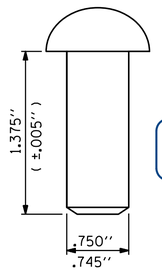
SHIMS SHALL BE USED AS NECESSARY FOR POST ALIGNMENT.

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.

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.

PAY LENGTH = 343.89 LIN. FT.



RIVET DETAIL

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 44+71.82 -Y4-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

2 BAR METAL RAIL

DocuSigned by:
DB3C8E45B06D498...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

12/7/2018

KCI JOB NO: 23146789.11

DESIGN ENGINEER OF RECORD: DocuSigned by: DB3C8E45B06D498...	DATE : 12/7/2018	
ASSEMBLED BY : R. C. LARSON	DATE : 04/12/16	
CHECKED BY : R. A. PRUETT	DATE : 08/24/16	
DRAWN BY : EEM 6/94	REV. 5/1/06	TLA/GM
CHECKED BY : RGW 6/94	REV. 10/1/11	MAA/GM
	REV. 6/13	MAA/GM

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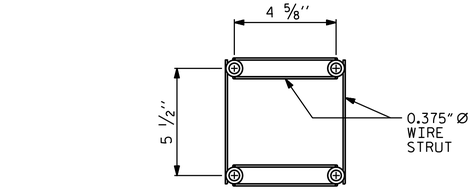
ENGINEERS ● PLANNERS ● ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
SUITE 220, LANDMARK CENTER II 4601 SIX FORKS RD, RALEIGH, N.C. 27609-5310 (919) 783-9214
DWG. REF. NO. 14 OF 32

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S12-14
1			3			TOTAL SHEETS
2			4			32

STD. NO. BMR3



4-BOLT METAL RAIL ANCHOR ASSEMBLY

(60 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 7/16'' Ø WIRE STRUT WITH A MINIMUM TENSILE STRENGTH OF 90,000 PSI IS ACCEPTABLE.

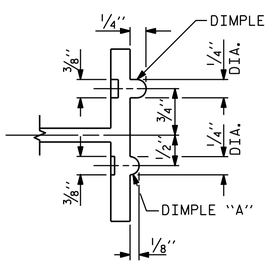
D. THE METAL RAIL ANCHOR ASSEMBLIES TO BE HOT DIPPED GALVANIZED TO CONFORM TO REQUIREMENTS OF AASHTO M111.

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.

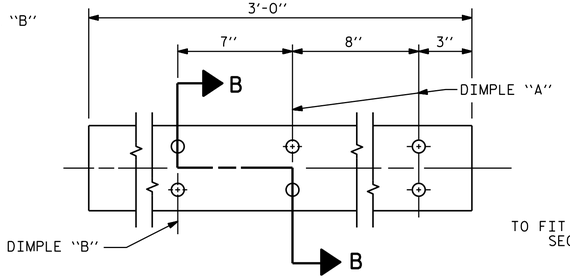
F. BOLTS TO BE TIGHTENED ONE-HALF TURN WITH A WRENCH FROM A FINGER-TIGHT POSITION.

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.

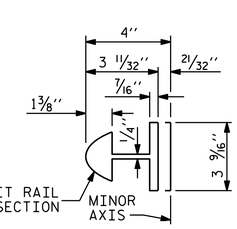
WHEN ADHESIVELY ANCHORED ANCHOR BOLTS ARE USED, BOLTS SHALL MEET THE REQUIREMENTS OF ASTM F593 ALLOY 304 STAINLESS STEEL WITH MINIMUM 75,000 PSI ULTIMATE STRENGTH. NUTS SHALL MEET THE REQUIREMENTS OF ASTM F594 ALLOY 304 STAINLESS STEEL AND WASHERS SHALL MEET THE REQUIREMENTS OF ASTM F844 EXCEPT THEY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



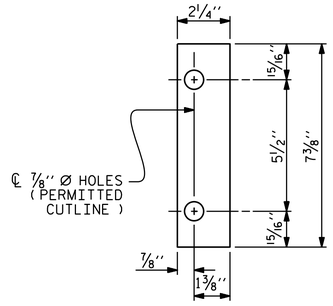
SECTION B - B



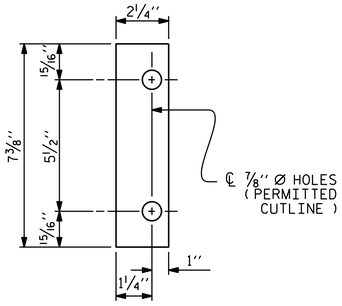
EXPANSION BAR DETAILS



BAR SECTION



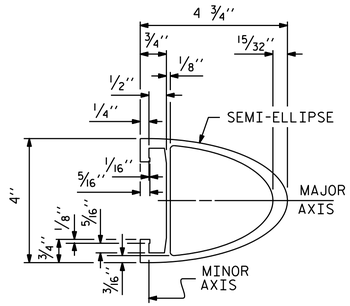
FRONT PLATE



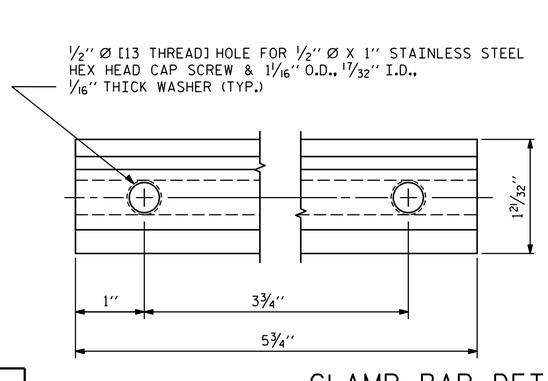
REAR PLATE

SHIM DETAILS

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

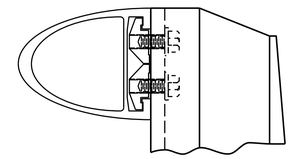


RAIL SECTION

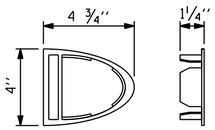


CLAMP BAR DETAIL

(4 REQUIRED PER POST)



CLAMP ASSEMBLY



RAIL CAP

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 44+71.82 -Y4-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

2 BAR METAL RAIL

DocuSigned by: DB3C8E45B06D498...
NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON
12/7/2018

KCI JOB NO: 23146789.11

DESIGN ENGINEER OF RECORD: DocuSigned by: DB3C8E45B06D498...	DATE: 12/7/2018		
ASSEMBLED BY : R. C. LARSON	DATE : 04/12/16		
CHECKED BY : R. A. PRUETT	DATE : 08/24/16		
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	

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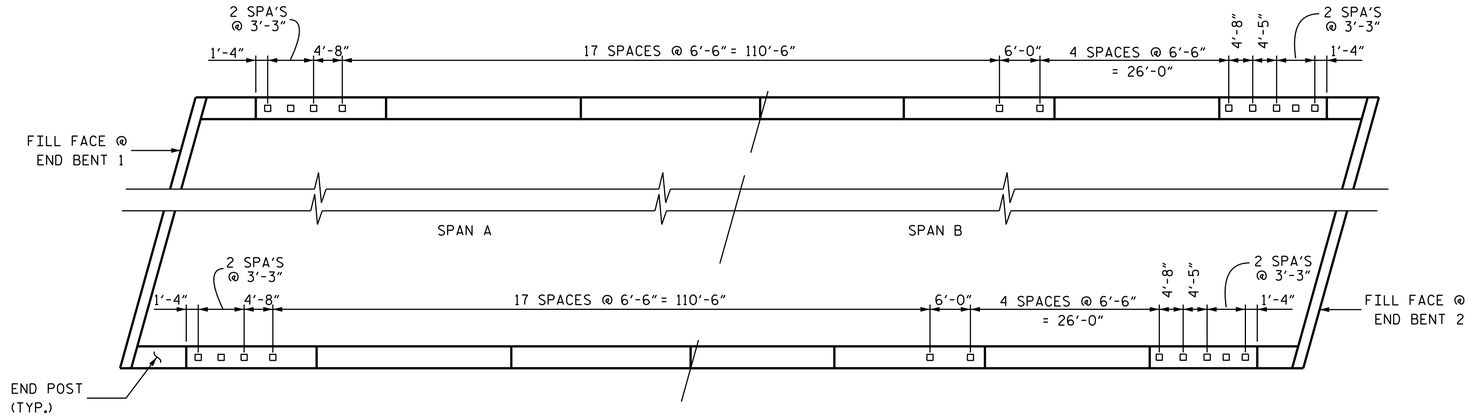
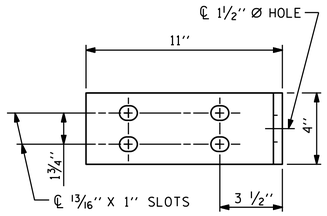
ENGINEERS ◆ PLANNERS ◆ ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
SUITE 220, LANDMARK CENTER II 4601 DX FORKS RD, RALEIGH, N.C. 27609-5320 (919) 783-9214
DWG. REF. NO. 15 OF 32

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S12-15
1			3			TOTAL SHEETS
2			4			32

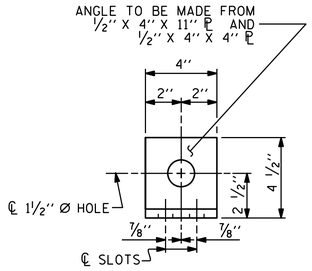
STD. NO. BMR4



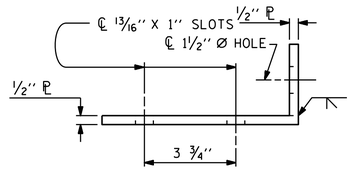
PLAN OF RAIL POST SPACINGS



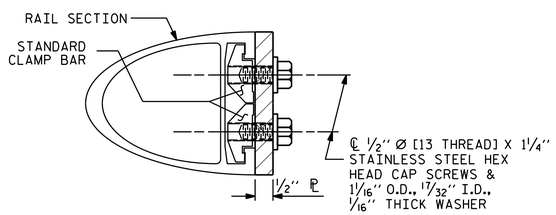
ELEVATION



END VIEW (FIX AND EXP.)



TOP VIEW



SECTION H-H (FIX)

FIXED

DETAILS FOR ATTACHING METAL RAIL TO END POST

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).

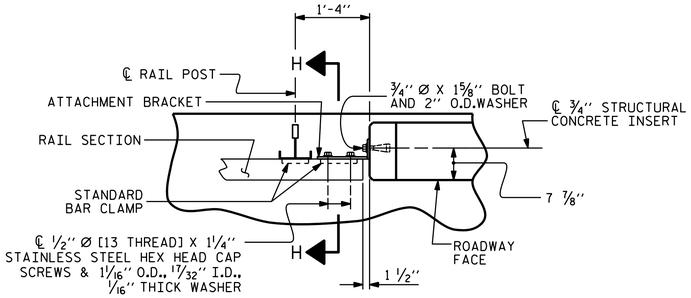
E. ½" Ø PIPE SLEEVES (IF REQUIRED) TO BE GALVANIZED.

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.

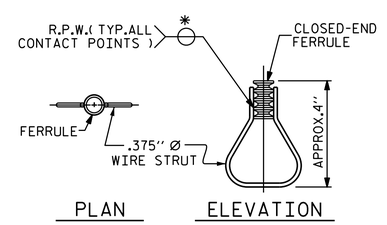
THE ¾" STRUCTURAL CONCRETE INSERT WITH BOLT SHALL BE ASSEMBLED IN THE SHOP.

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.



PLAN - RAIL AND END POST



STRUCTURAL CONCRETE INSERT

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

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 44+71.82 -Y4-

DocuSigned by: DB3C8E45BC6D499...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

12/7/2018

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD

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

DESIGN ENGINEER OF RECORD:		DATE : 12/7/2018
ASSEMBLED BY : R. C. LARSON		DATE : 08/19/16
CHECKED BY : R. A. PRUETT		DATE : 08/24/16
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

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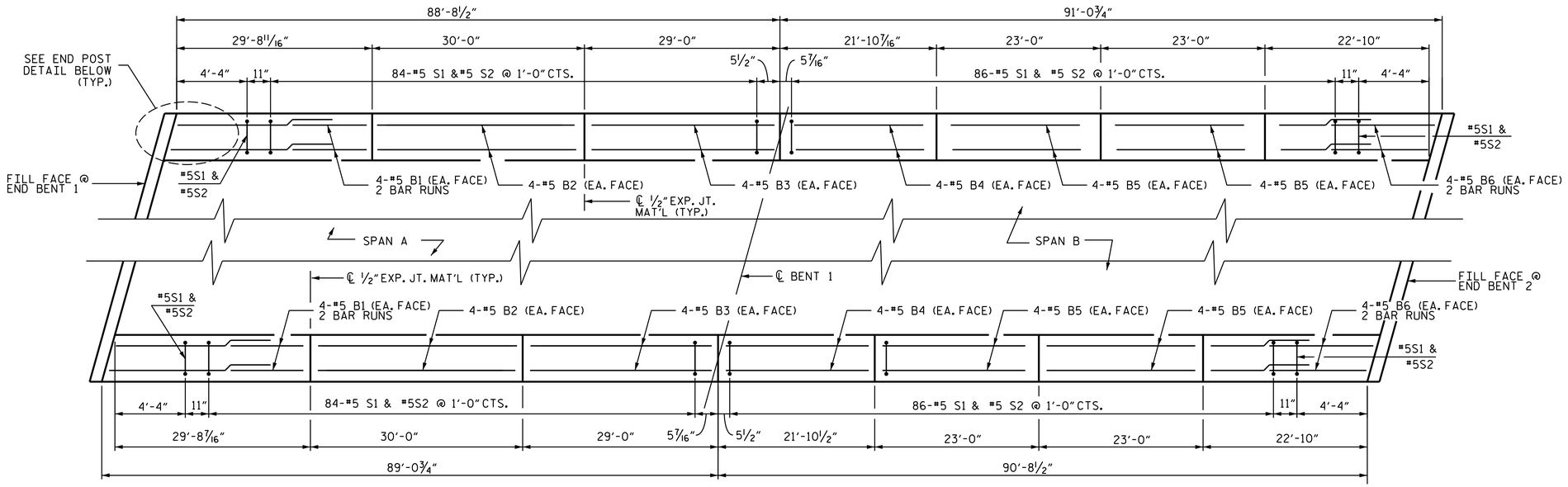
ENGINEERS • PLANNERS • ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
SUITE 220, LANDMARK CENTER II • 4601 SIX FORKS RD, RALEIGH, N.C. 27609-5210 (919) 783-9214
DWG. REF. NO. 16 OF 32

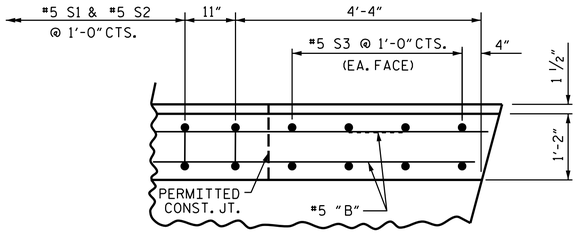
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S12-16
1			3			TOTAL SHEETS
2			4			32

STD. NO. BMR2

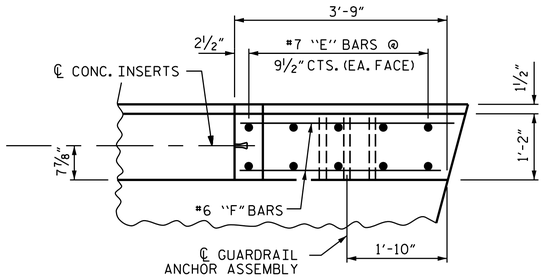
KCI JOB NO: 23146789.11



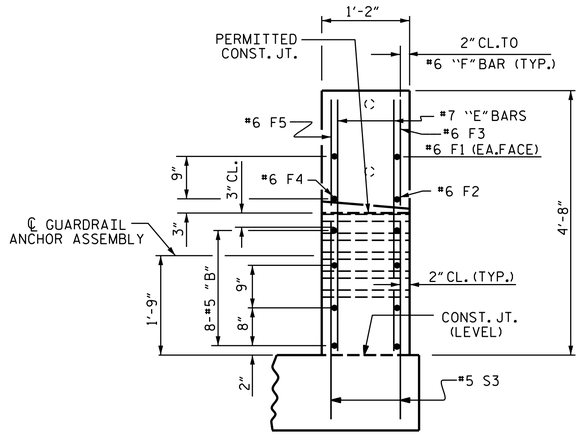
PLAN OF PARAPET



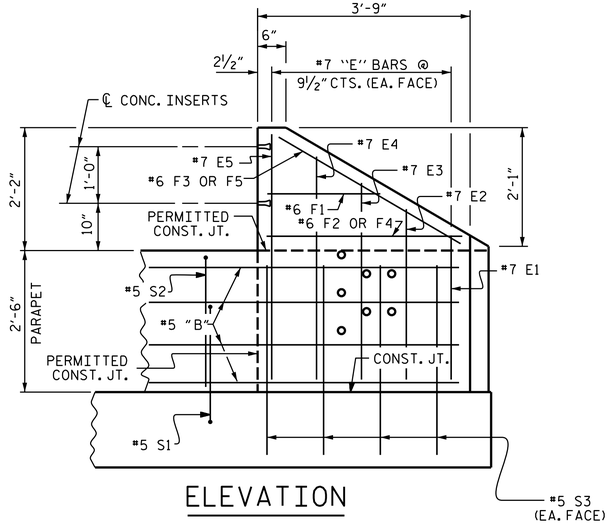
PLAN OF PARAPET



PLAN OF END POST



END VIEW



ELEVATION

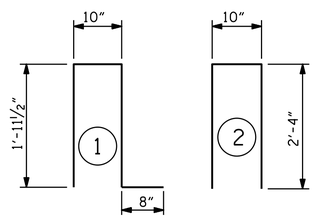
PARAPET AND END POST FOR TWO BAR RAIL

BILL OF MATERIAL FOR PARAPET AND FOUR END POSTS

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	32	5	STR.	16'-5"	548
B2	16	5	STR.	29'-8"	495
B3	16	5	STR.	28'-8"	478
B4	16	5	STR.	21'-6"	359
B5	32	5	STR.	22'-8"	757
B6	32	5	STR.	13'-2"	439
E1	8	7	STR.	2'-6"	41
E2	8	7	STR.	3'-0"	49
E3	8	7	STR.	3'-6"	57
E4	8	7	STR.	4'-0"	65
E5	8	7	STR.	4'-4"	71
F1	8	6	STR.	2'-0"	24
F2	4	6	STR.	3'-4"	20
F3	4	6	STR.	3'-10"	23
F4	4	6	STR.	3'-3"	20
F5	4	6	STR.	4'-3"	26
S1	344	5	1	5'-5"	1884
S2	344	5	2	5'-6"	1973
S3	32	5	STR.	3'-0"	100

EPOXY COATED REINFORCING STEEL. LBS		7429
CLASS AA CONCRETE,	CU. YD.	39.7
1'-2" X 2'-6" CONCRETE PARAPET,	LIN. FT.	359.54

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 44+71.82 -Y4-

KCI JOB NO: 231467891.11

DESIGN ENGINEER OF RECORD: DocuSigned by: DB3C8E45B06D499... DATE : 12/7/2018

DRAWN BY : R. C. LARSON DATE : 04/12/16

CHECKED BY : R. A. PRUETT DATE : 08/24/16

DocuSigned by: DB3C8E45B06D499...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

12/7/2018

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ENGINEERS ◆ PLANNERS ◆ ECOLOGISTS LICENSE NUMBER: C-0764

KCI Associates of North Carolina, P.A.

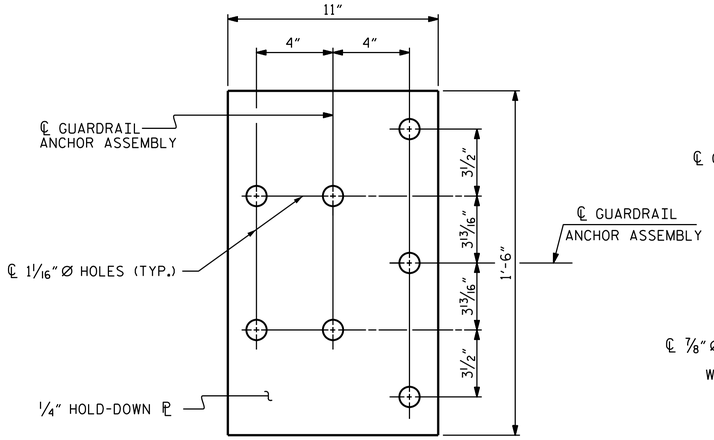
SUITE 220, LANDMARK CENTER ▪ 4601 SIX FORKS RD, RALEIGH, N.C. 27609-5210 (919) 783-9214

DWG. REF. NO. 17 OF 32

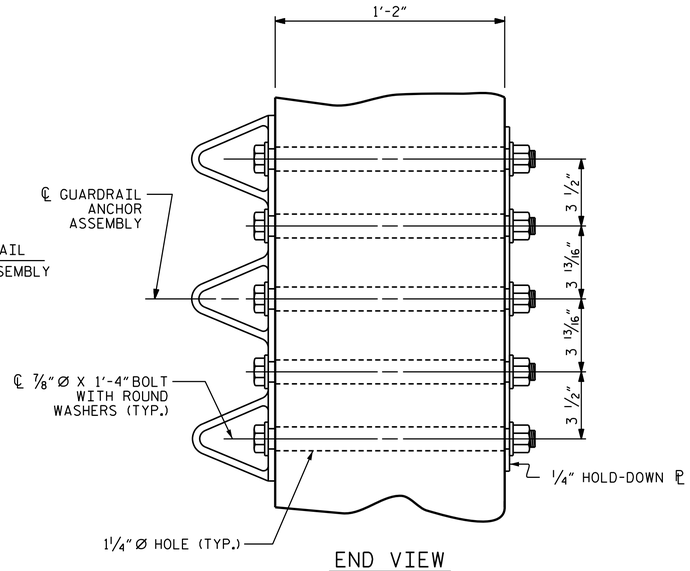
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S12-17
1			3			TOTAL SHEETS
2			4			32

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

PARAPET AND END POST FOR TWO BAR METAL RAIL



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.

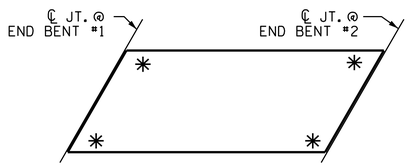
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF THE PARAPET. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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.

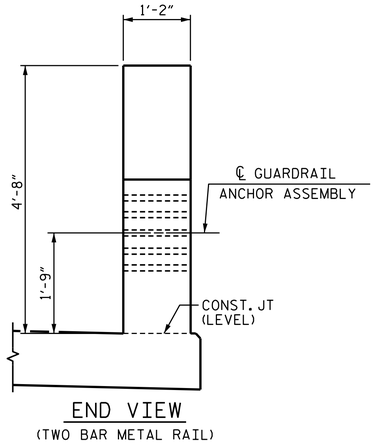
THE VERTICAL REINFORCING BARS MAY BE SHIFTED SLIGHTLY IN THE END POST TO CLEAR ASSEMBLY BOLTS.

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.

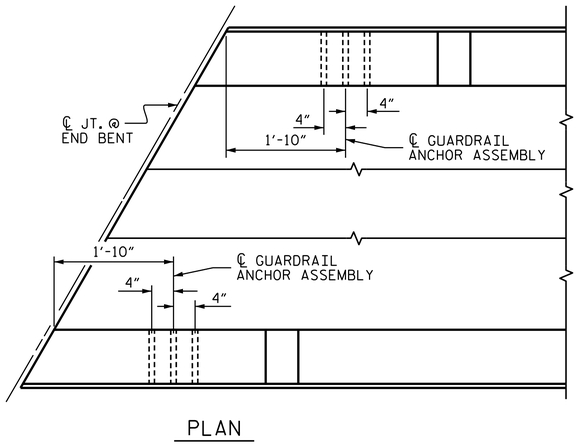


SKETCH SHOWING POINTS OF ATTACHMENT

✳ LOCATION OF GUARDRAIL ATTACHMENT



END VIEW
(TWO BAR METAL RAIL)



PLAN

LOCATION OF GUARDRAIL ANCHOR AT END POST

PROJECT NO. R-1015
CRAVEN COUNTY
STATION: 44+71.82 -Y4-

KCI JOB NO. 23146789.11

DESIGN ENGINEER OF RECORD: DocuSigned by: DATE : 12/7/2018
ASSEMBLED BY : R. C. LARSON DATE : 04/13/16
CHECKED BY : R. A. PRUETT DATE : 08/23/16
DRAWN BY : MAA 5/10
CHECKED BY : GM 5/10
REV. 12/5/11 MAA/GM
REV. 6/13 MAA/GM
REV. 1/15 MAA/TMG

DocuSigned by: DB3C8E45B06D499...
NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON
12/7/2018

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD
GUARDRAIL ANCHORAGE DETAILS FOR METAL RAILS

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ENGINEERS ● PLANNERS ● ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
SUITE 220, LANDMARK CENTER ● 4601 SIX FORKS RD., RALEIGH, N.C. 27609-5310 (919) 783-9214
DWG. REF. NO. 18 OF 32

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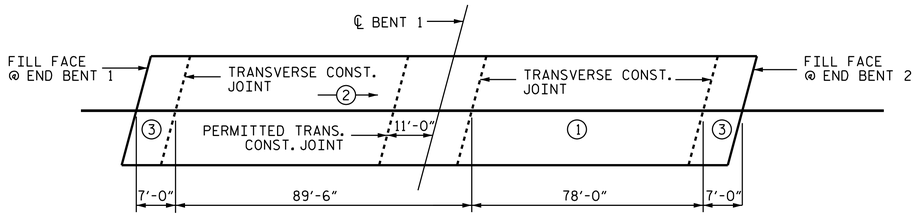
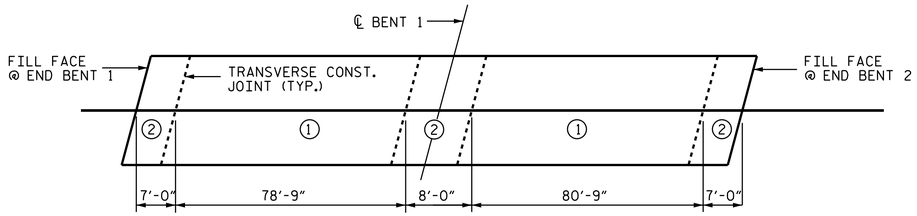
2			4			32

STD. NO. GRA3



DECK POURING SEQUENCE

—②→ INDICATES POUR SEQUENCE AND DIRECTION

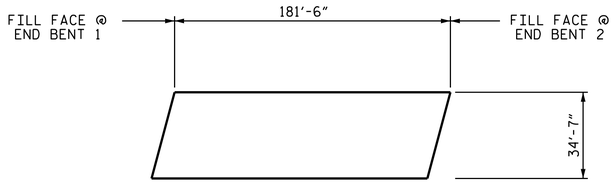


OPTIONAL DECK POURING SEQUENCE

—②→ INDICATES POUR SEQUENCE AND DIRECTION

NO POUR 2 MAY BE STARTED UNTIL BOTH ADJACENT POURS 1 HAVE REACHED A MINIMUM STRENGTH OF 3000 PSI.

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"			



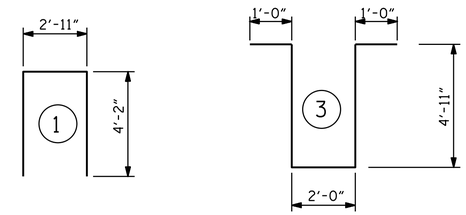
LAYOUT FOR COMPUTING AREA REINFORCED CONCRETE DECK SLAB (SQ. FT. = 6277)

BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱A1	314	5	STR.	34'-3"	11217	✱B1	168	4	STR.	27'-5"	3077
✱A2	2	5	STR.	33'-2"	69	B2	152	5	STR.	46'-6"	7372
✱A3	2	5	STR.	31'-2"	65	✱B3	22	6	STR.	27'-6"	909
✱A4	2	5	STR.	29'-3"	61	✱B4	22	6	STR.	60'-0"	1983
✱A5	2	5	STR.	27'-3"	57	✱B5	22	6	STR.	8'-0"	264
✱A6	2	5	STR.	25'-4"	53	✱B6	88	6	STR.	18'-2"	2401
✱A7	2	5	STR.	23'-4"	49						
✱A8	2	5	STR.	21'-5"	45	K1	20	4	STR.	19'-0"	254
✱A9	2	5	STR.	19'-6"	41	K2	6	4	STR.	7'-0"	28
✱A10	2	5	STR.	17'-6"	37	K3	24	4	STR.	7'-6"	120
✱A11	2	5	STR.	15'-7"	33	K4	24	4	STR.	8'-6"	136
✱A12	2	5	STR.	13'-7"	28	K5	4	4	STR.	2'-2"	6
✱A13	2	5	STR.	11'-8"	24	K6	8	4	STR.	2'-6"	13
✱A14	2	5	STR.	9'-9"	20	K7	8	4	STR.	3'-0"	16
✱A15	2	5	STR.	7'-9"	16	K8	6	4	STR.	5'-9"	23
✱A16	2	5	STR.	5'-10"	12	K9	5	4	STR.	28'-10"	96
✱A17	2	5	STR.	3'-10"	8						
✱A18	2	5	STR.	1'-11"	4	S1	50	4	1	11'-3"	376
A21	314	5	STR.	34'-3"	11217	S2	72	4	2	2'-9"	132
A22	2	5	STR.	33'-2"	69	S3	54	4	4	11'-11"	430
A23	2	5	STR.	31'-2"	65	S4	50	4	4	10'-2"	340
A24	2	5	STR.	29'-3"	61						
A25	2	5	STR.	27'-3"	57	U1	18	4	3	13'-10"	166
A26	2	5	STR.	25'-4"	53						
A27	2	5	STR.	23'-4"	49						
A28	2	5	STR.	21'-5"	45						
A29	2	5	STR.	19'-6"	41						
A30	2	5	STR.	17'-6"	37						
A31	2	5	STR.	15'-7"	33						
A32	2	5	STR.	13'-7"	28						
A33	2	5	STR.	11'-8"	24						
A34	2	5	STR.	9'-9"	20						
A35	2	5	STR.	7'-9"	16						
A36	2	5	STR.	5'-10"	12						
A37	2	5	STR.	3'-10"	8						
A38	2	5	STR.	1'-11"	4						

✱EPOXY COATED REINFORCING STEEL

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

SUPERSTRUCTURE BILL OF MATERIAL

	CLASS AA CONCRETE	REINFORCING STEEL	EPOXY COATED REINFORCING STEEL
	(CU. YDS.)	(LBS.)	(LBS.)
SPANS AB	POUR 1 85.5	21,347	20,473
	POUR 2 108.1		
	POUR 3 50.4		
TOTALS✱✱	244.0	21,347	20,473

✱✱QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED

GROOVING BRIDGE FLOORS		
APPROACH SLABS	820	SQ.FT.
BRIDGE DECK	5203	SQ.FT.
TOTAL	6023	SQ.FT.

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 44+71.82 -Y4-

KCI JOB NO. 23146789.11

DESIGN ENGINEER OF RECORD: DocuSigned by: DATE : 12/7/2018

ASSEMBLED BY : R. C. LARSON DATE : 08/17/16
CHECKED BY : K. SU DATE : 08/24/16

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

REV. 8/16/99 RWW/LES
REV. 5/1/06 TLA/GM
REV. 10/1/11 MAA/GM

DocuSigned by: DB3C8E45306D498... 12/7/2018

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

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ENGINEERS ◆ PLANNERS ◆ ECOLOGISTS LICENSE NUMBER: C-0764
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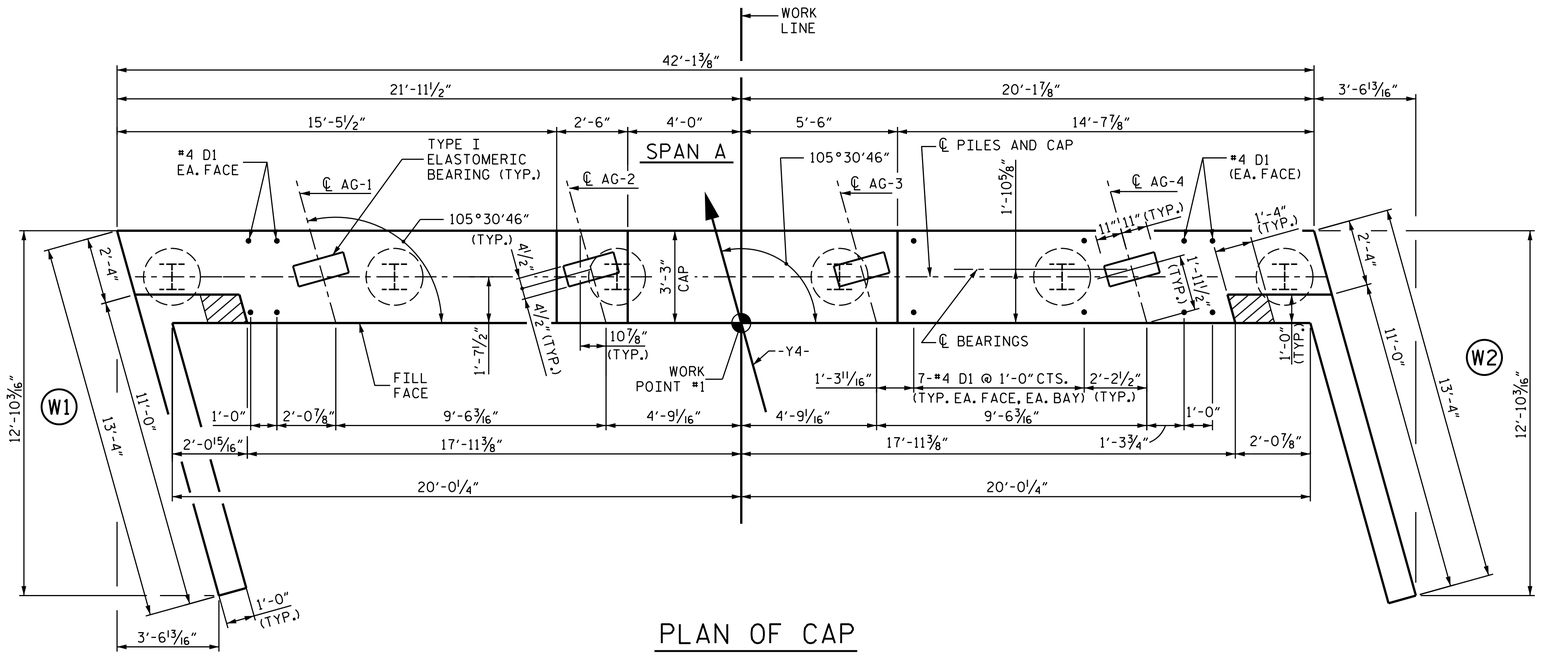
DWG. REF. NO. 19 OF 32

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
SUPERSTRUCTURE BILL OF MATERIAL

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S12-19
1			3			TOTAL SHEETS
2			4			32

STD. NO. BOM2



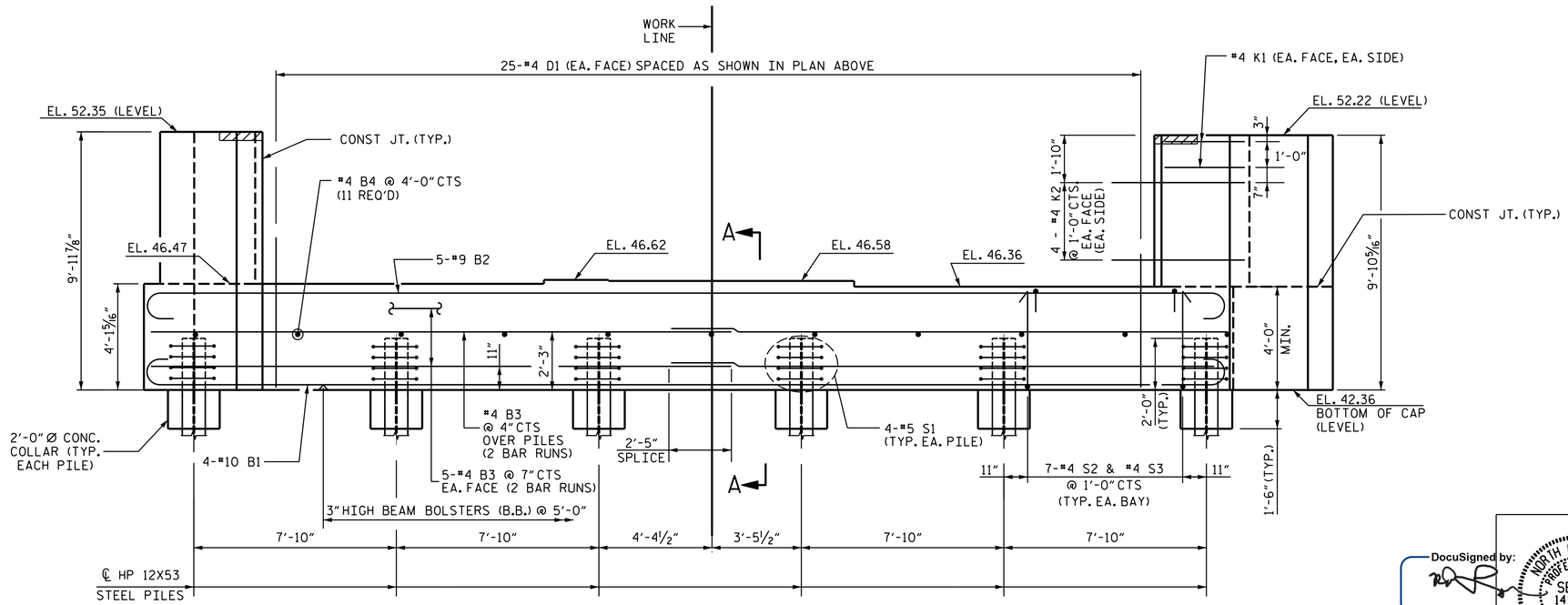
PLAN OF CAP

NOTES

THE TOP SURFACE OF THE END BENT CAP AND WINGS (POUR 1) EXCEPT THE BEARING AREA AND THE AREA OUTSIDE OF THE SUPERSTRUCTURE SHALL BE RAKED TO A DEPTH OF 1/4"

FOR "PILE SPLICE DETAIL", SEE END BENT 2.

STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR "D" BARS.



ELEVATION

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 44+71.82 -Y4-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE END BENT 1

DocuSigned by: DB3C8E45B06D489...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

12/7/2018

KCI JOB NO: 23146789.11

DESIGN ENGINEER OF RECORD: DocuSigned by: 12/7/2018 DATE :

DRAWN BY : R. J. FLORY DATE : 03/20/16

CHECKED BY : R. C. LARSON DATE : 03/29/16

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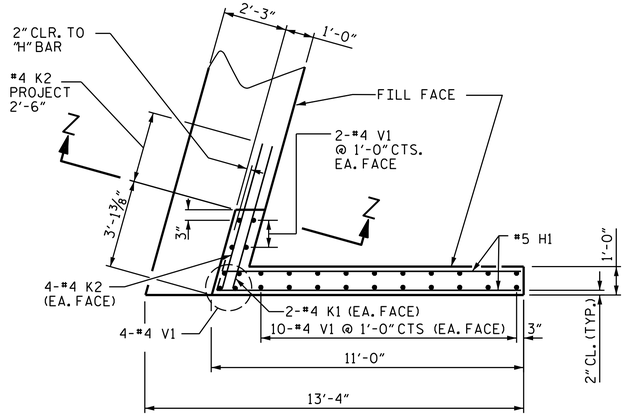
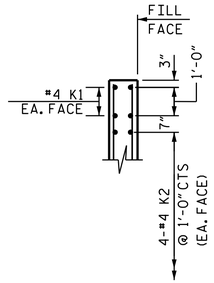
DWG. REF. NO. 20 OF 32

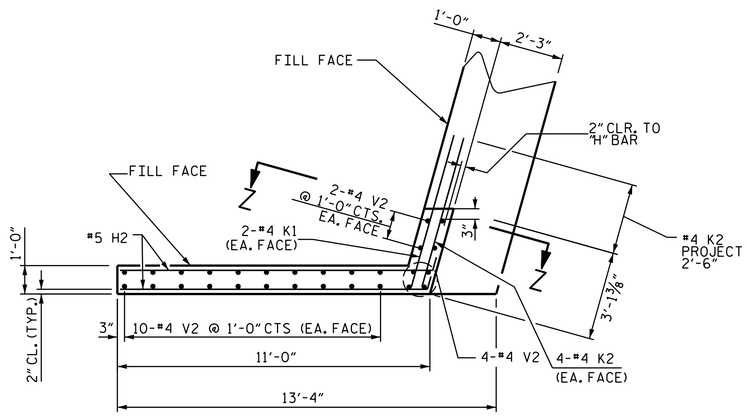
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S12-20
1			3			TOTAL SHEETS
2			4			32



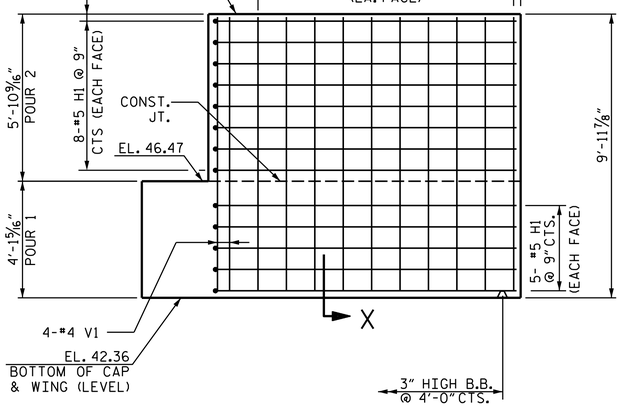
PLAN W1



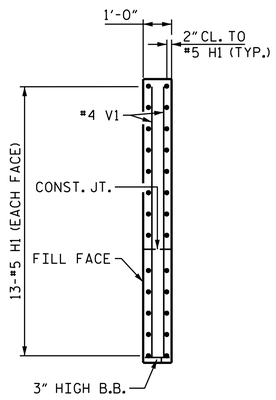
SECTION Z-Z



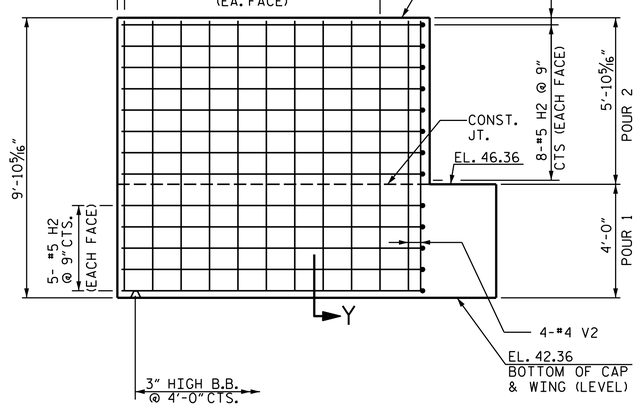
PLAN W2



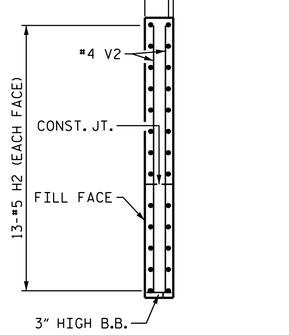
ELEVATION W1



SECTION X-X



ELEVATION W2



SECTION Y-Y

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 44+71.82 -Y4-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE END BENT 1

DocuSigned by: DB3C8E45B06D499...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

12/7/2018

KCI JOB NO: 23146789.11

DESIGN ENGINEER OF RECORD: DATE: 12/7/2018

DRAWN BY: R. J. FLORY DATE: 05/05/16

CHECKED BY: R. C. LARSON DATE: 05/06/16

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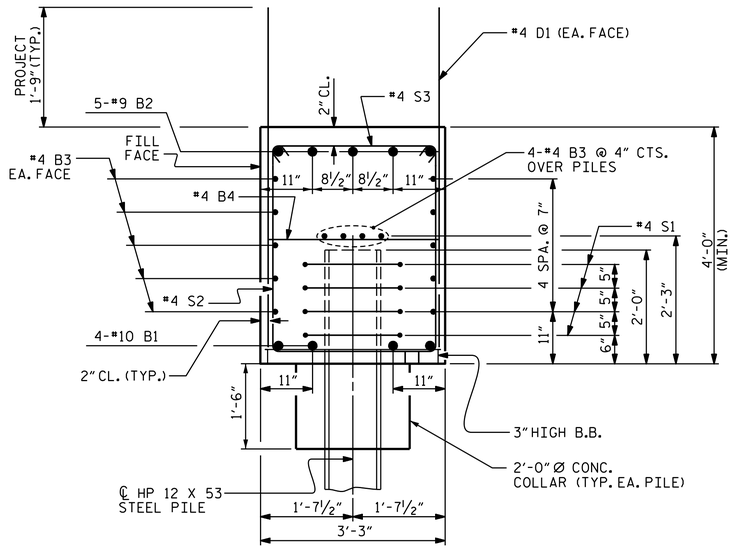
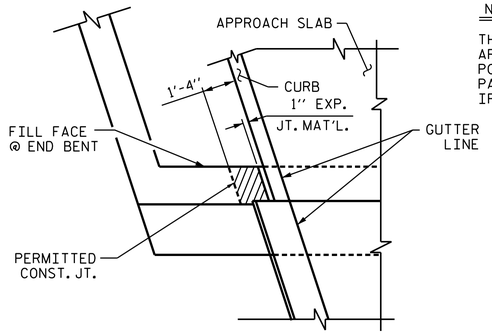
DWG. REF. NO. 21 OF 32

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S12-21
1			3			TOTAL SHEETS
2			4			32



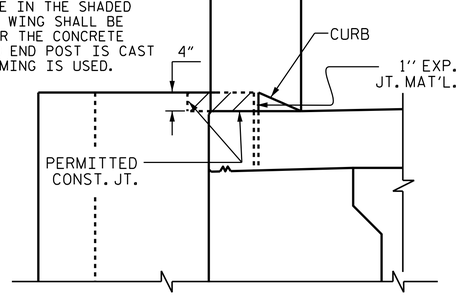
SECTION A-A



PLAN

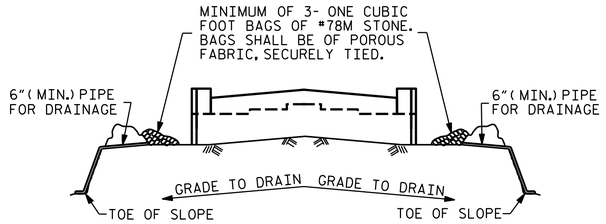
NOTE

THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE CONCRETE PARAPET AND END POST IS CAST IF SLIP FORMING IS USED.



ELEVATION

BLOCKOUT IN WING WALL



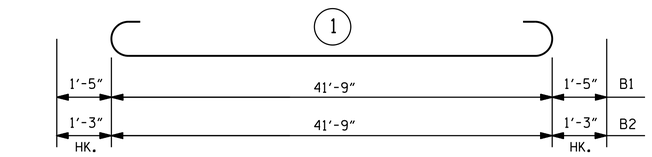
BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

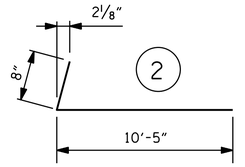
BAGGED STONE SHALL REMAIN IN PLACE UNTIL THE ENGINEER DIRECTS THAT IT BE REMOVED. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF SILT ACCUMULATIONS AT BAGGED STONE WHEN SO DIRECTED BY THE ENGINEER. BAGS SHALL BE REMOVED AND REPLACED WHENEVER THE ENGINEER DETERMINES THAT THEY HAVE DETERIORATED AND LOST THEIR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

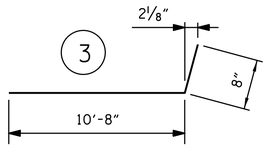
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

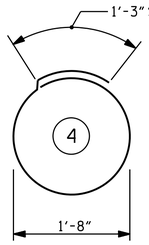
TEMPORARY DRAINAGE AT END BENT

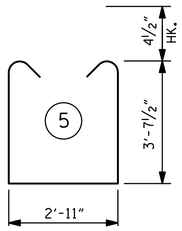
BAR TYPES

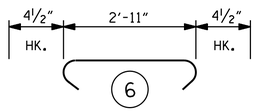












ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

END BENT 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	4	10	1	44'-7"	767
B2	5	9	1	44'-3"	752
B3	28	4	STR.	22'-2"	415
B4	11	4	STR.	2'-11"	21
D1	50	4	STR.	5'-9"	192
H1	26	5	2	11'-1"	301
H2	26	5	3	11'-4"	307
K1	8	4	STR.	2'-10"	15
K2	16	4	STR.	5'-6"	92
S1	24	4	4	6'-6"	104
S2	35	4	5	10'-11"	255
S3	35	4	6	3'-8"	86
V1	28	4	STR.	9'-8"	181
V2	28	4	STR.	9'-6"	178

REINFORCING STEEL, LB		3666
CLASS A CONCRETE, CY	POUR 1	24.9
	POUR 2	5.9
	TOTAL	30.8
HP 12X53 STEEL PILES	NO.	6
	LF	510
PILE REDRIVES, EA.		3
PILE DRIVING EQUIPMENT SETUP FOR HP 12X53 STEEL PILES, EA.		6

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 44+71.82 -Y4-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE END BENT 1

DocuSigned by: DB3C8E45B06D498...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

12/7/2018

DESIGN ENGINEER OF RECORD: DATE : 12/7/2018

DRAWN BY : R. J. FLORY DATE : 08/01/16

CHECKED BY : R.C. LARSON DATE : 08/11/16

KCI JOB NO. 23146789.11

ENGINEERS ● PLANNERS ● ECOLOGISTS LICENSE NUMBER: C-0764

KCI Associates of North Carolina, P.A.

SUITE 220, LANDMARK CENTER ● 4601 SIX FORKS RD, RALEIGH, N.C. 27609-5210 (919) 783-9214

DWG. REF. NO. 22 OF 32

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2			4			32

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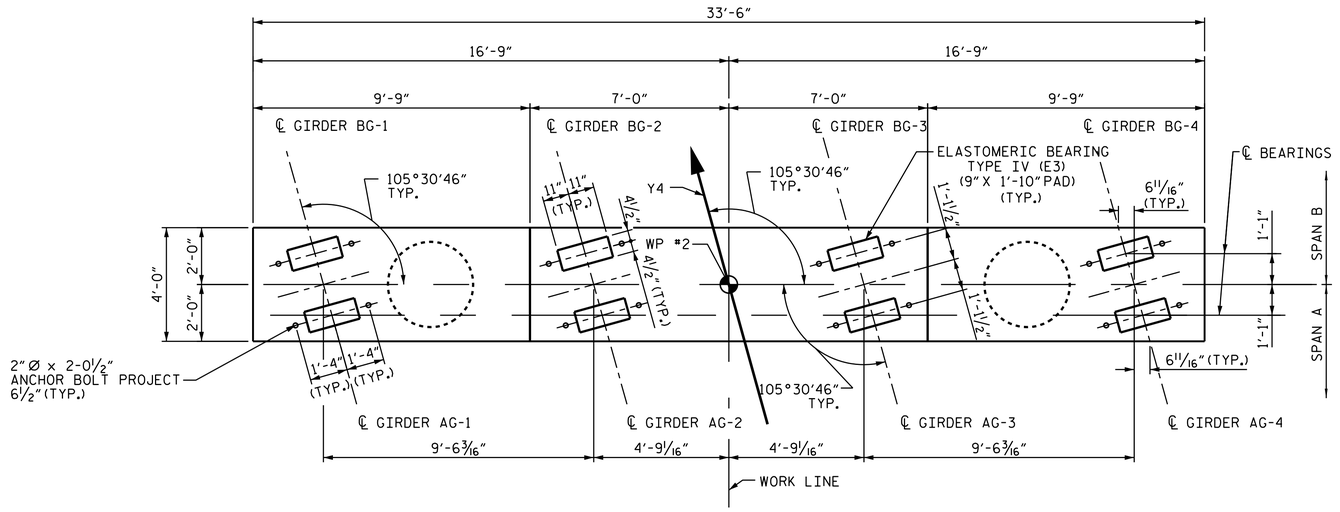
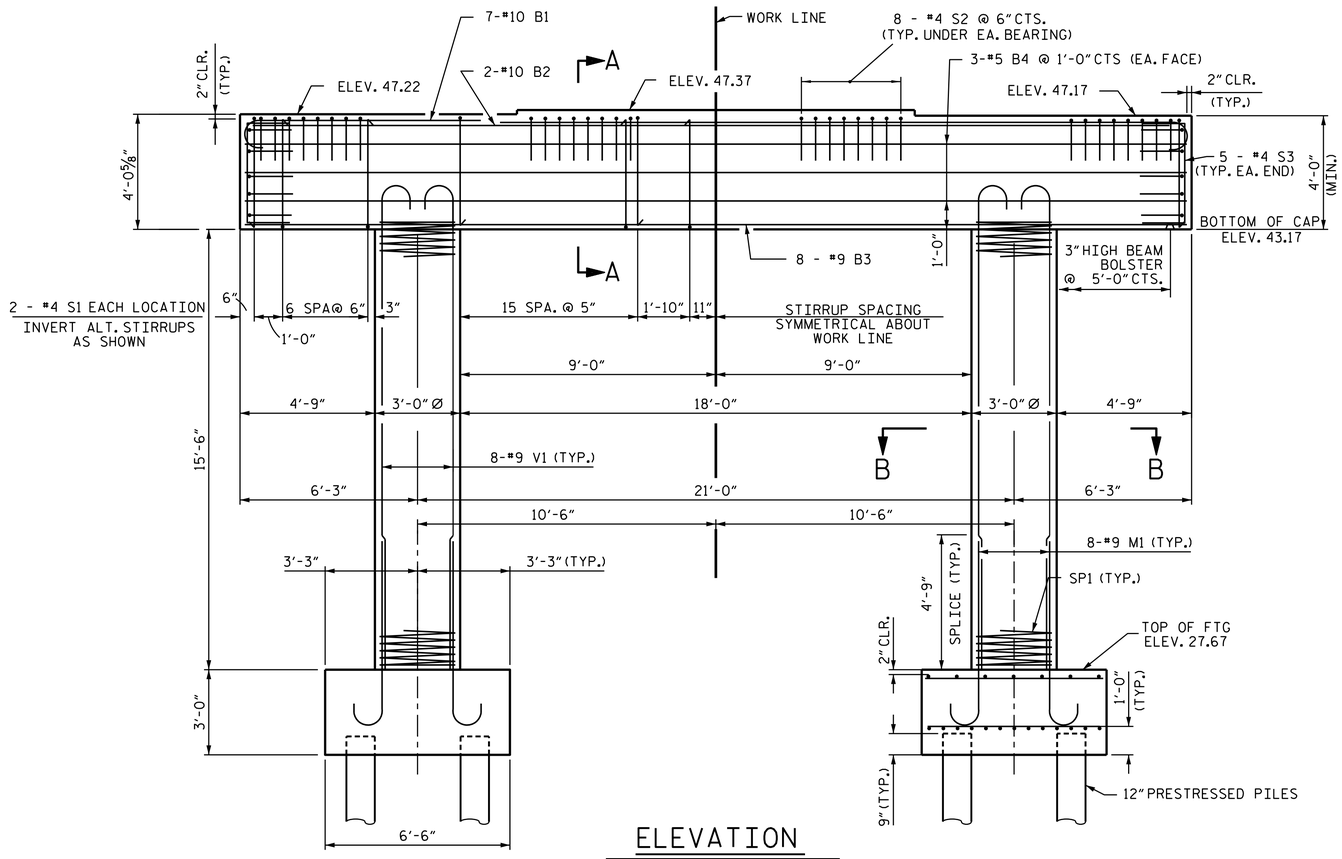


PLAN OF CAP



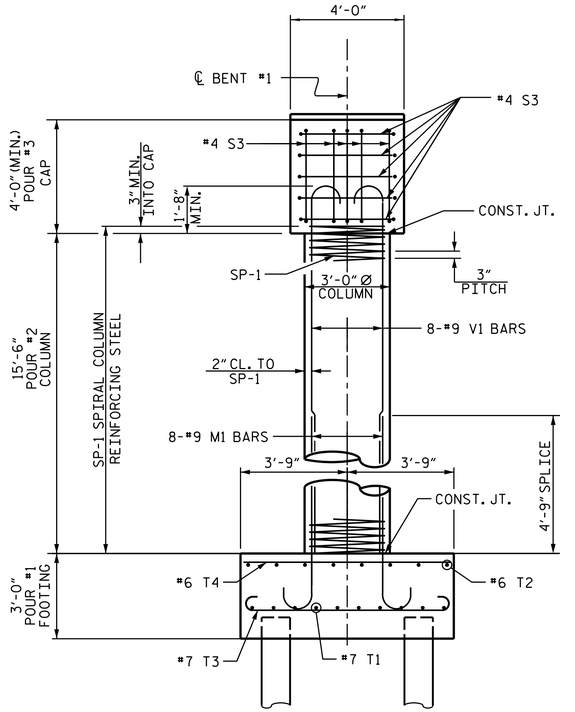
ELEVATION

NOTE: COLUMNS AND FOOTINGS ARE IDENTICAL

NOTES

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

HOOKS ON "V" BARS MAY BE TURNED AS NECESSARY FOR PLACING REINFORCING STEEL.



END ELEVATION

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 44+71.82 -Y4-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
BENT 1

DocuSigned by: DB3C8E45B06D499...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

12/7/2018

DESIGN ENGINEER OF RECORD: DocuSigned by: DB3C8E45B06D499... DATE: 12/7/2018

DRAWN BY: R.J. FLORY DATE: 08/08/16

CHECKED BY: R. C. LARSON DATE: 08/09/16

KCI JOB NO. 23146789.11

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ENGINEERS ◆ PLANNERS ◆ ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
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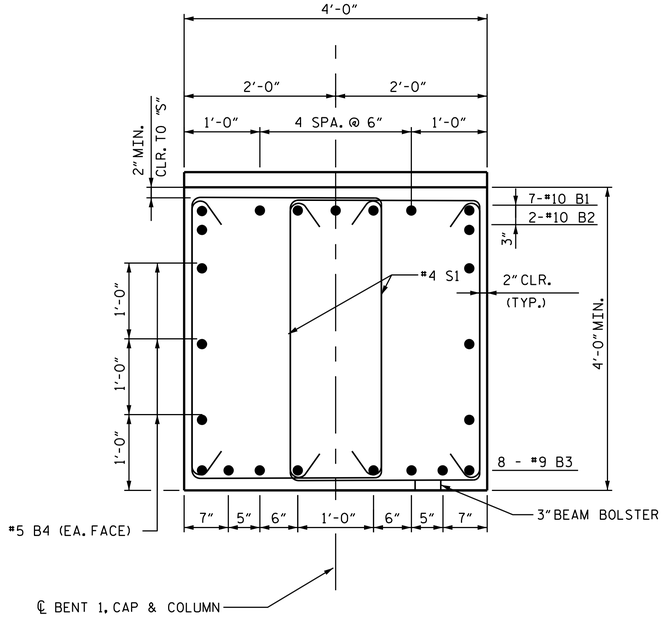
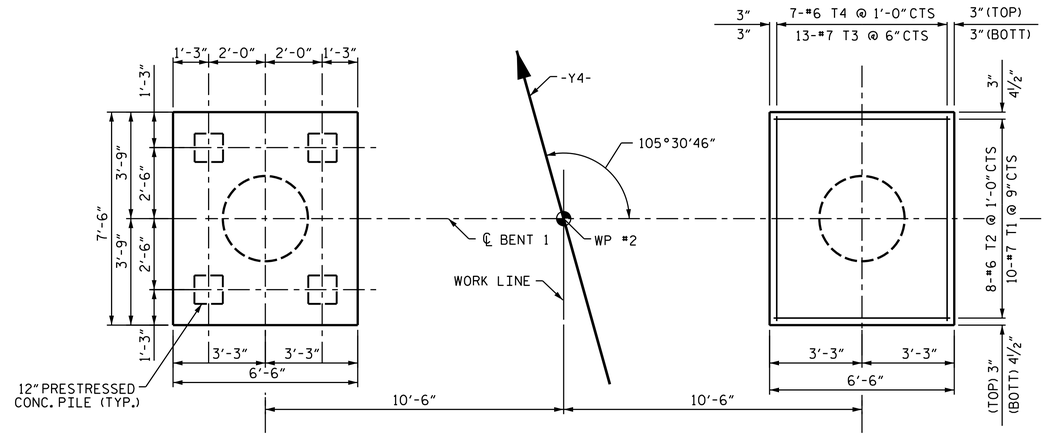
DWG. REF. NO. 23 OF 32

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S12-23
1			3			TOTAL SHEETS
2			4			32



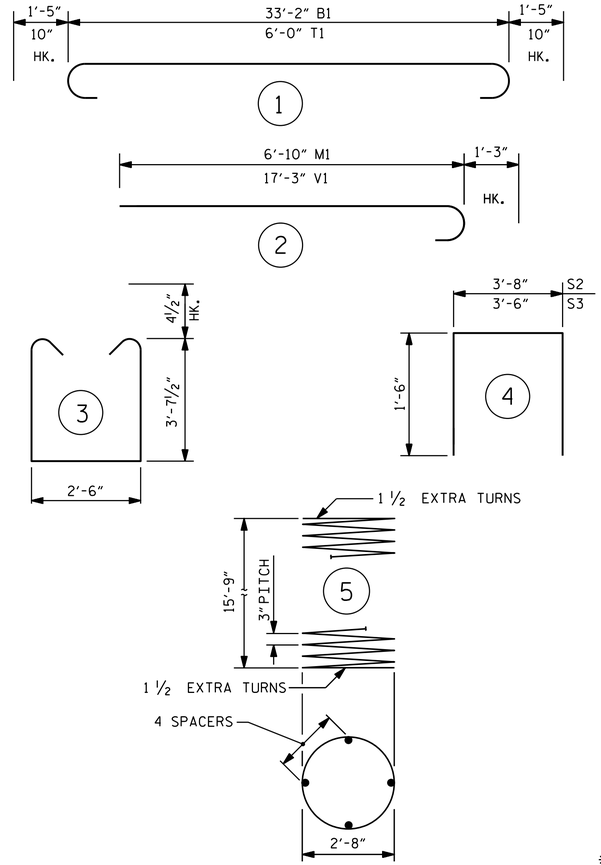
SECTION A-A



PLAN OF FOOTINGS

NOTE: FOOTINGS ARE IDENTICAL

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

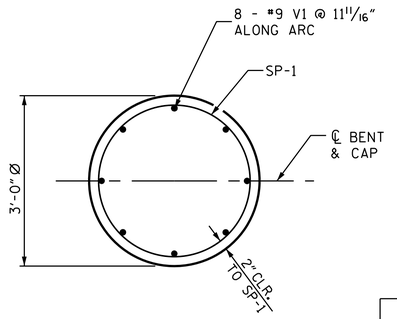
BILL OF MATERIAL

BENT 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	7	10	1	36'-0"	1339
B2	2	10	STR.	33'-2"	226
B3	8	9	STR.	33'-2"	708
B4	6	5	STR.	33'-2"	208
M1	16	9	2	8'-1"	687
S1	100	4	3	10'-6"	701
S2	32	4	4	6'-8"	143
S3	20	4	4	6'-6"	87
T1	20	7	1	7'-8"	313
T2	16	6	STR.	6'-2"	148
T3	26	7	STR.	7'-2"	381
T4	14	6	STR.	7'-2"	151
V1	16	9	2	18'-6"	1573
SP-1	2	*	5	553'-2"	739

REINFORCING STEEL, LBS.	6665
SPIRAL COL. REINFORCING STEEL, LBS.	739
CLASS A CONCRETE, CU. YD.	
POUR 1	10.6
POUR 2	8.1
POUR 3	20.3
TOTAL	39.0
12" PRESTRESSED CONC. PILES	
NO.	8
LIN. FT.	400
PILE REDRIVES, EA.	4
PILE DRIVING EQUIPMENT SETUP FOR 12" PRESTRESSED CONC. PILES, EA.	8
FOUNDATION EXCAVATION	LUMP SUM
(NOTE: PILE HEADS HAVE BEEN DEDUCTED FROM CLASS A CONCRETE)	

* THE SP-1 SPIRAL REINFORCING STEEL SHALL BE W20 OR D-20 COLD DRAWN WIRE OR #4 PLAIN OR DEFORMED BAR



SECTION B-B

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 44+71.82 -Y4-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE BENT 1

DocuSigned by: DB3C8E45B06D499...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

12/7/2018

DESIGN ENGINEER OF RECORD: DocuSigned by: DB3C8E45B06D499... DATE: 12/7/2018

DRAWN BY: R.J. FLORY DATE: 08/24/16

CHECKED BY: R. C. LARSON DATE: 08/26/16

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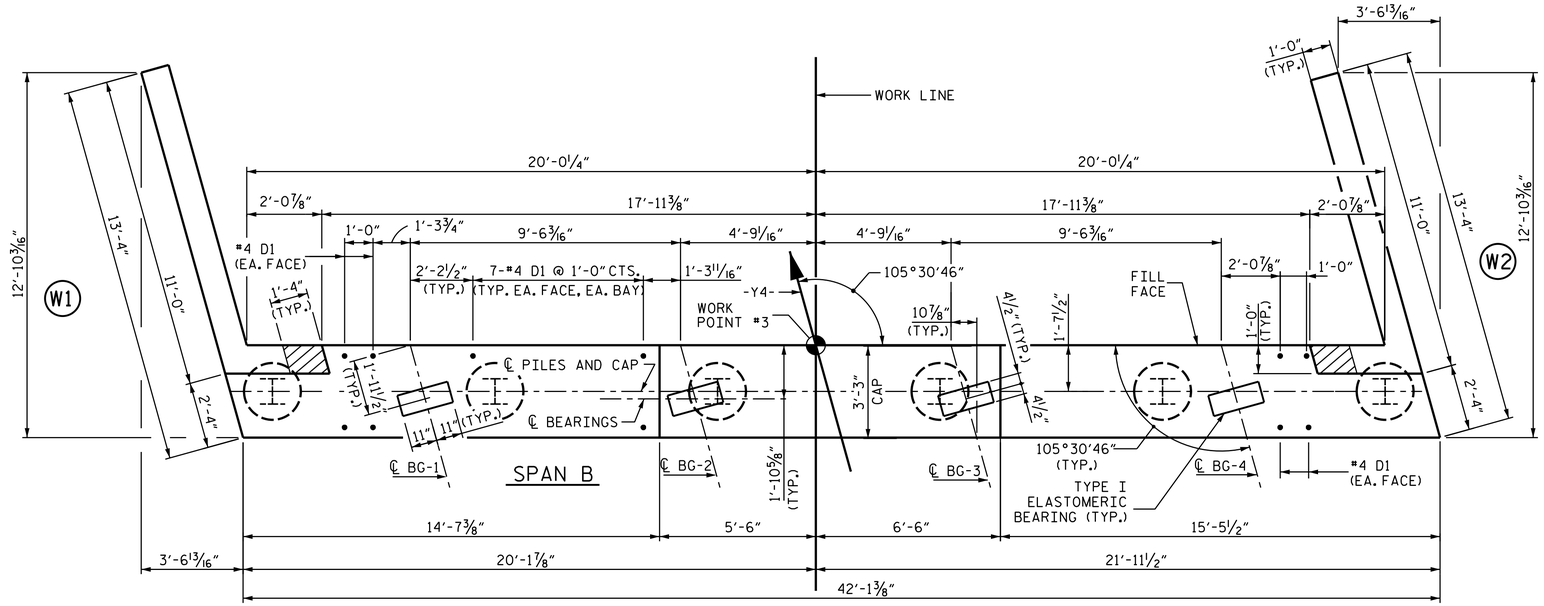
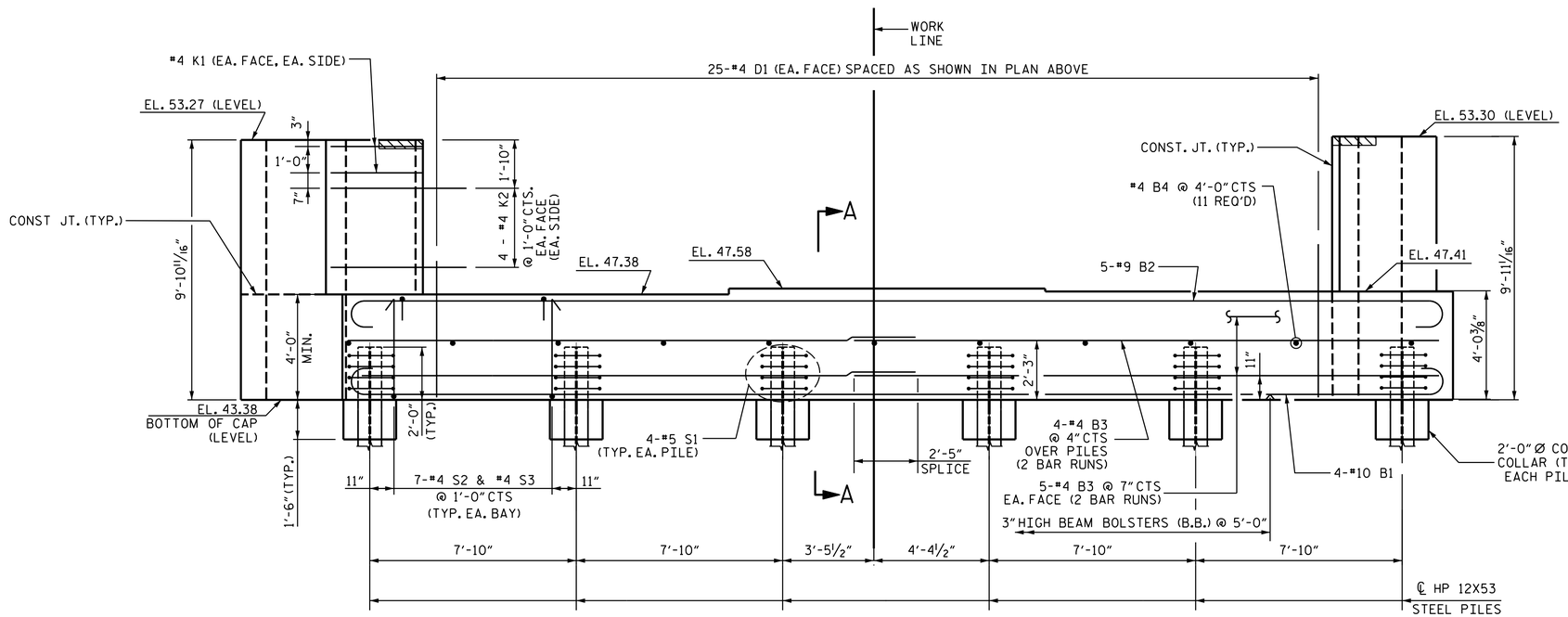
KCI Associates of North Carolina, P.A.
SUITE 220, LANDMARK CENTER II 4601 SIX FORKS RD, RALEIGH, N.C. 27609-5210 (919) 783-9214
DWG. REF. NO. 24 OF 32

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S12-24
1			3			TOTAL SHEETS
2			4			32

KCI JOB NO: 231467891.11



PLAN OF CAP



ELEVATION

NOTES

THE TOP SURFACE OF THE END BENT CAP AND WINGS (POUR 1) EXCEPT THE BEARING AREAS AND AREAS OUTSIDE OF SUPERSTRUCTURE SHALL BE RAKED TO A DEPTH OF 1/4"

FOR "BLOCKOUT IN WING WALL" AND "TEMPORARY DRAINAGE AT END BENT", SEE END BENT 1.

STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR "D" BARS.

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 44+71.82 -Y4-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE END BENT 2

DocuSigned by: DB3C8E45B06D43...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

12/7/2018

DESIGN ENGINEER OF RECORD: DocuSigned by: DATE: 12/7/2018

DRAWN BY: R. J. FLORY DATE: 03/20/16

CHECKED BY: R. C. LARSON DATE: 09/01/16

KCI JOB NO. 23146789.11

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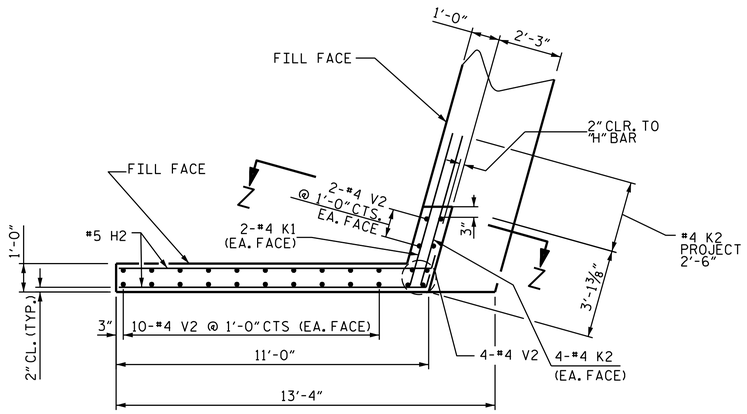
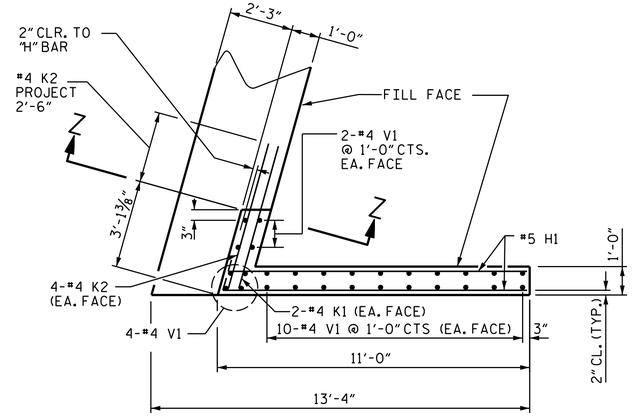
DWG. REF. NO. 25 OF 32

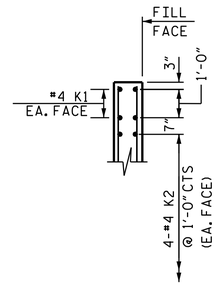
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S12-25
1			3			TOTAL SHEETS
2			4			32



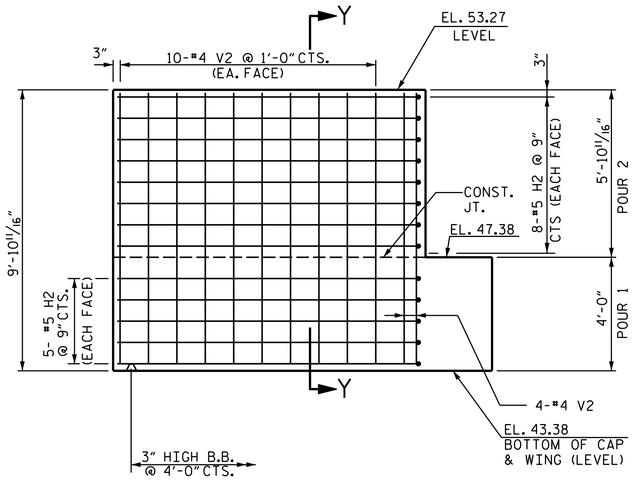
PLAN W1



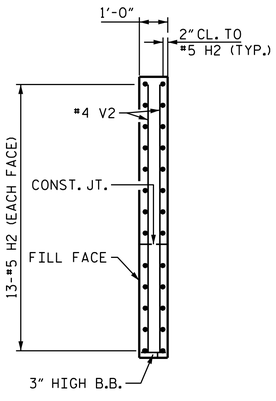
PLAN W2



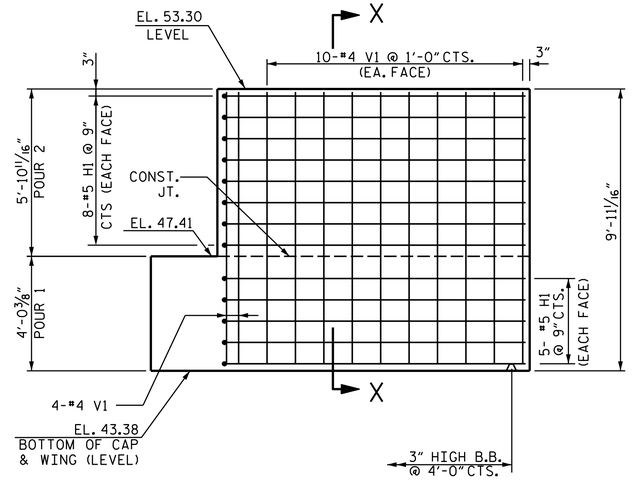
SECTION Z-Z



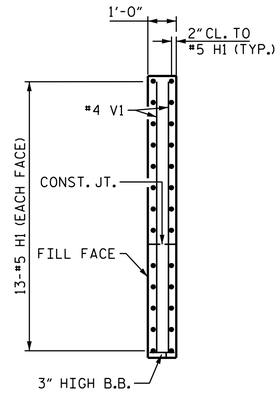
ELEVATION W1



SECTION Y-Y



ELEVATION W2



SECTION X-X

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 44+71.82 -Y4-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE END BENT 2

DocuSigned by: DB3C8E45B06D43C...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

12/7/2018

KCI JOB NO: 23146789.11

DESIGN ENGINEER OF RECORD: DocuSigned by: DATE: 12/7/2018

DRAWN BY: R. J. FLORY DATE: 05/05/16

CHECKED BY: R. C. LARSON DATE: 05/06/16

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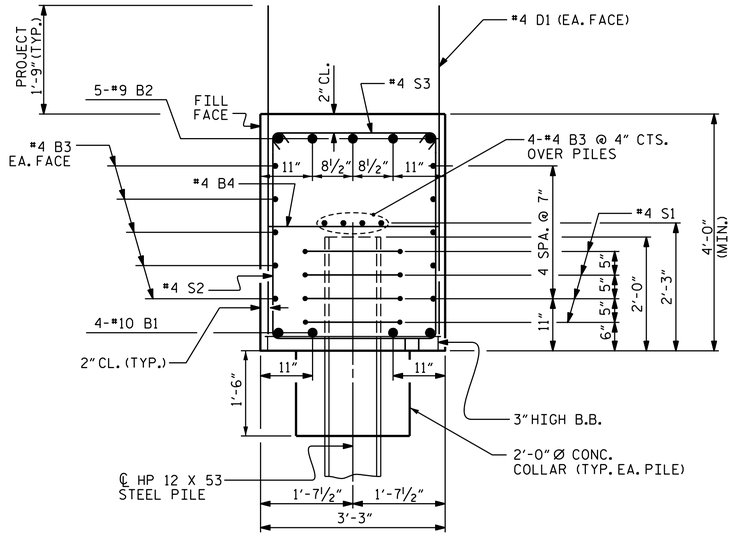
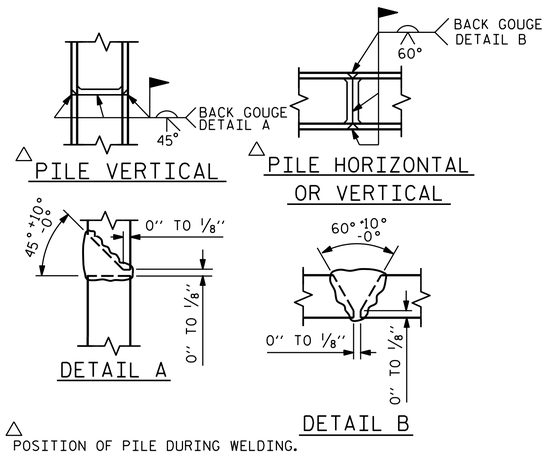
DWG. REF. NO. 26 OF 32

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S12-26
1			3			TOTAL SHEETS
2			4			32



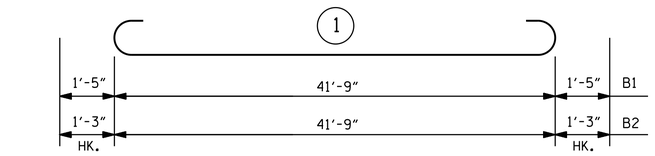
SECTION A-A

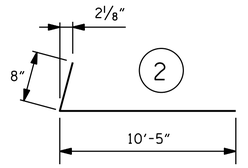


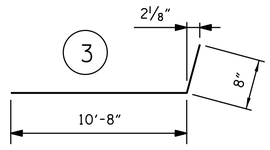
△ POSITION OF PILE DURING WELDING.

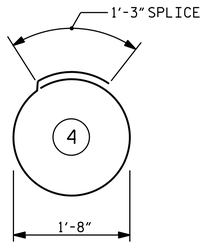
PILE SPLICE DETAILS

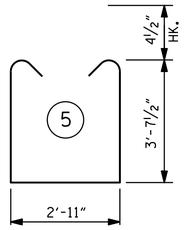
BAR TYPES

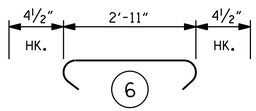












ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

END BENT 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	4	10	1	44'-7"	767
B2	5	9	1	44'-3"	752
B3	28	4	STR.	22'-2"	415
B4	11	4	STR.	2'-11"	21
D1	50	4	STR.	5'-9"	192
H1	26	5	2	11'-1"	301
H2	26	5	3	11'-4"	307
K1	8	4	STR.	2'-10"	15
K2	16	4	STR.	5'-6"	92
S1	24	4	4	6'-6"	104
S2	35	4	5	10'-11"	255
S3	35	4	6	3'-8"	86
V1	28	4	STR.	9'-7"	179
V2	28	4	STR.	9'-6"	178

REINFORCING STEEL, LB		3664
CLASS A CONCRETE, CY	POUR 1	24.5
	POUR 2	5.9
	TOTAL	30.4
HP 12X53 STEEL PILES	NO.	6
	LF	510
PILE REDRIVES, EA.		3
PILE DRIVING EQUIPMENT SETUP FOR HP 12X53 STEEL PILES, EA.		6

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 44+71.82 -Y4-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE END BENT 2

DocuSigned by: DB3C8E45B06D499...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

12/7/2018

DESIGN ENGINEER OF RECORD: DocuSigned by: DB3C8E45B06D499... DATE : 12/7/2018

DRAWN BY : R. J. FLORY DATE : 8/01/16

CHECKED BY : R.C. LARSON DATE : 9/01/16

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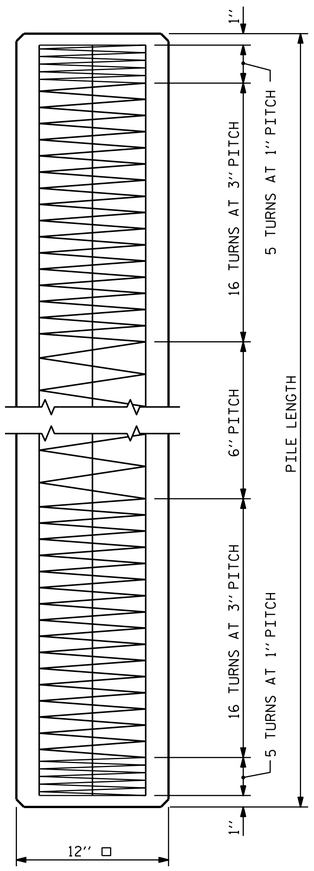
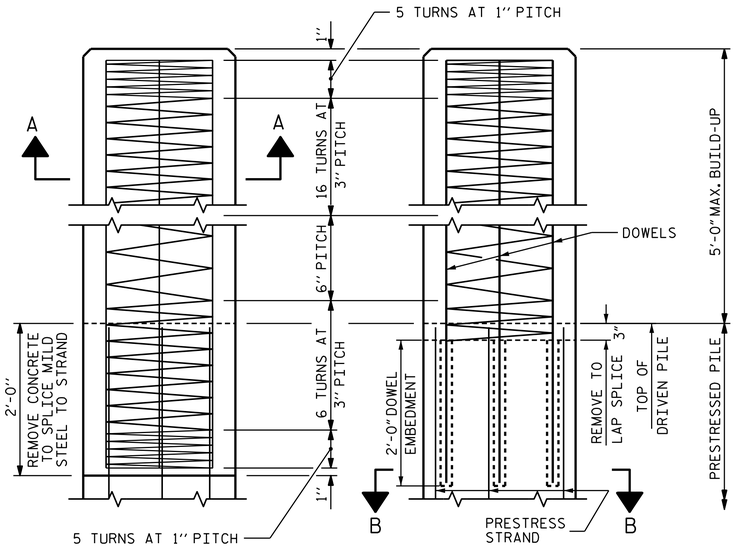
DWG. REF. NO. 27 OF 32

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S12-27
1			3			TOTAL SHEETS
2			4			32

KCI JOB NO: 23146789.11

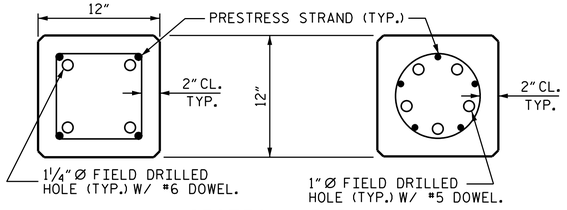


ELEVATION



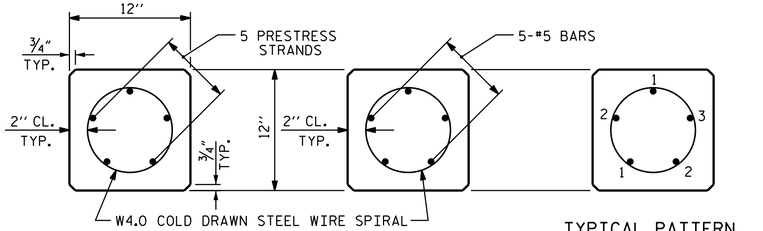
BUILD-UP AND SPIRAL REINFORCING

OPTIONAL BUILD-UP WITH DOWELS



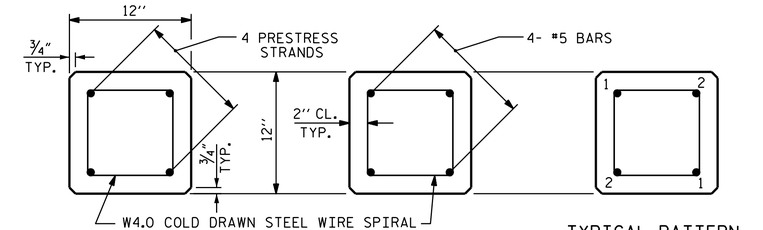
SECTION ''B-B''

(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

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.

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.

ONE POINT PICK-UP

TWO POINT PICK-UP

PICK-UP POINTS

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''

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 44+71.82 -Y4-

DocuSigned by: DB3C8E45B06D499...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

12/7/2018

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

12'' PRESTRESSED CONCRETE PILE

DESIGN ENGINEER OF RECORD: DocuSigned by: DATE : 12/7/2018

ASSEMBLED BY : R. C. LARSON DATE : 04/29/16
CHECKED BY : K. SU DATE : 08/24/16

DRAWN BY : FCJ 7/88
CHECKED BY : CRK 3/89

REV. 11/30/10 WMC/GM
REV. 10/1/11 MAA/GM
REV. 12/14 MAA/TMG

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

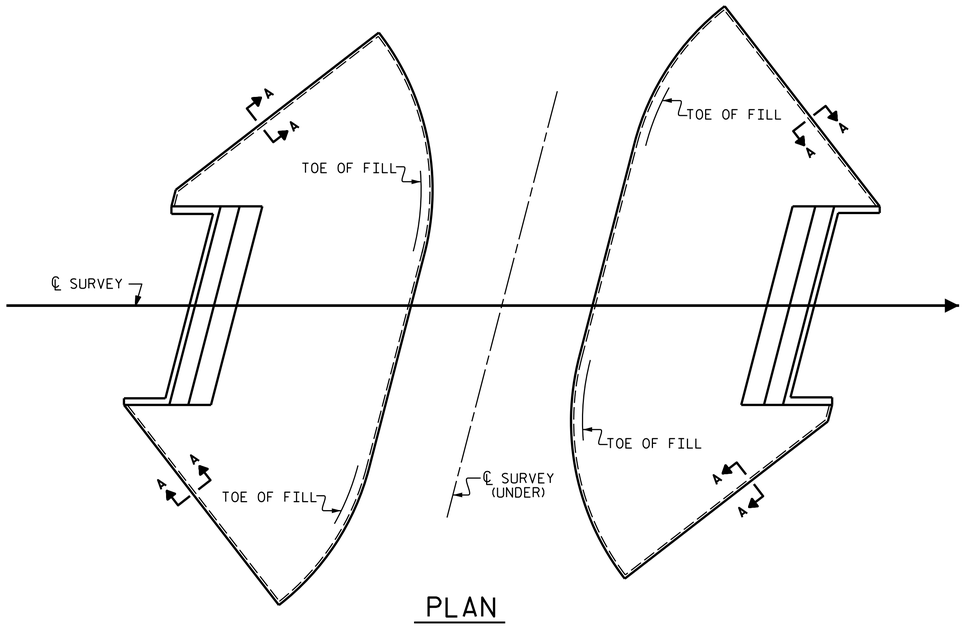
ENGINEERS & PLANNERS & ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
SUITE 220, LANDMARK CENTER II 4601 SIX FORKS RD, RALEIGH, N.C. 27609-5290 (919) 783-9214

DWG. REF. NO. 28 OF 32

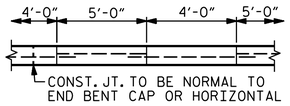
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S12-28
1			3			TOTAL SHEETS
2			4			32

STD. NO. PCP1 (SHT 1)

KCI JOB NO: 23146789.11

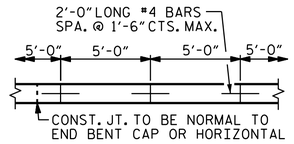


PLAN



POUR A 4'-0" STRIP FIRST. STRIP WIDTHS MAY VARY IN CURVED PORTION.

OPTIONAL POURING DETAIL



STRIP WIDTHS MAY VARY IN CURVED PORTION.

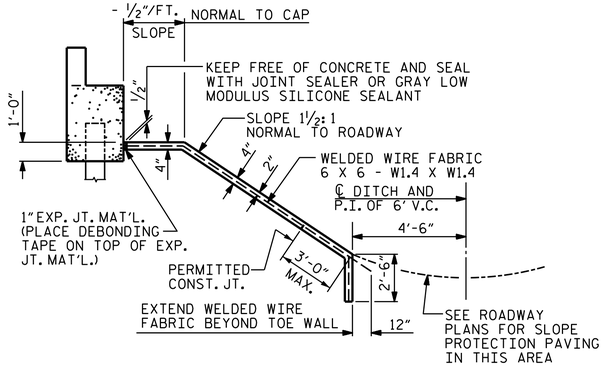
POURING DETAIL

GENERAL NOTES

STRAIGHT EDGING WILL NOT BE REQUIRED UNLESS, IN THE OPINION OF THE ENGINEER, VISUAL INSPECTION INDICATES A NEED FOR IT. MEASUREMENT AND PAYMENT SHALL BE AS PRESCRIBED IN SECTION 462 OF THE STANDARD SPECIFICATIONS. FOR BERM WIDTH, SEE GENERAL DRAWING. SLOPE PROTECTION SHALL CONSIST OF 4" POURED-IN-PLACE CONCRETE PAVING AS SHOWN IN THE DETAILS ON THIS SHEET. CONCRETE SHALL BE CLASS "B". THE CONCRETE SURFACE SHALL BE FLOATED WITH A WOODEN FLOAT AND FINISHED. WELDED WIRE FABRIC REINFORCING SHALL BE 6 X 6 - W1.4 X W1.4, 60" WIDE. SLOPE PROTECTION SHALL BE POURED IN 5' STRIPS AS SHOWN IN THE "POURING DETAIL" WITH 2'-0" LONG #4 BARS PLACED ALONG THE SLOPE BETWEEN STRIPS AT 1'-6" MAXIMUM SPACING. SLOPE PROTECTION MAY BE POURED IN ALTERNATE 4' AND 5' STRIPS AS SHOWN IN THE "OPTIONAL POURING DETAIL" WITH ADJACENT RUNS OF WELDED WIRE FABRIC LAPPING AT LEAST 6". THE COST OF THE WELDED WIRE FABRIC AND #4 BARS, IF USED, SHALL BE INCLUDED IN THE CONTRACT UNIT PRICE BID PER SQUARE YARD FOR SLOPE PROTECTION.

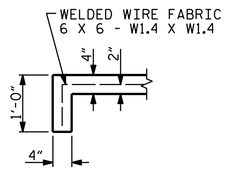
BRIDGE @ STA. 44+71.82 -Y4-	4 INCH SLOPE PROTECTION	* WELDED WIRE FABRIC 60 INCHES WIDE
	SQUARE YARDS	APPROX. L.F.
END BENT 1	175	320
END BENT 2	195	350

* QUANTITY SHOWN IS BASED ON 5' POURS.



SECTION ALONG ℄ SURVEY WHEN FILL CATCHES IN DITCH

SECTION



SECTION A-A

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 44+71.82 -Y4-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

SLOPE PROTECTION DETAILS

DocuSigned by:
DB3C8E45B06D4...
12/7/2018

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

DESIGN ENGINEER OF RECORD: GRP	DATE: 12/7/2018
ASSEMBLED BY: R. C. LARSON	DATE: 04/18/16
CHECKED BY: K. SU	DATE: 08/29/16
DRAWN BY: ELR 5/92	REV. 5/1/06 TLA/GM
CHECKED BY: GRP 6/92	REV. 10/1/11 MAA/GM
	REV. 12/21/11 MAA/GM

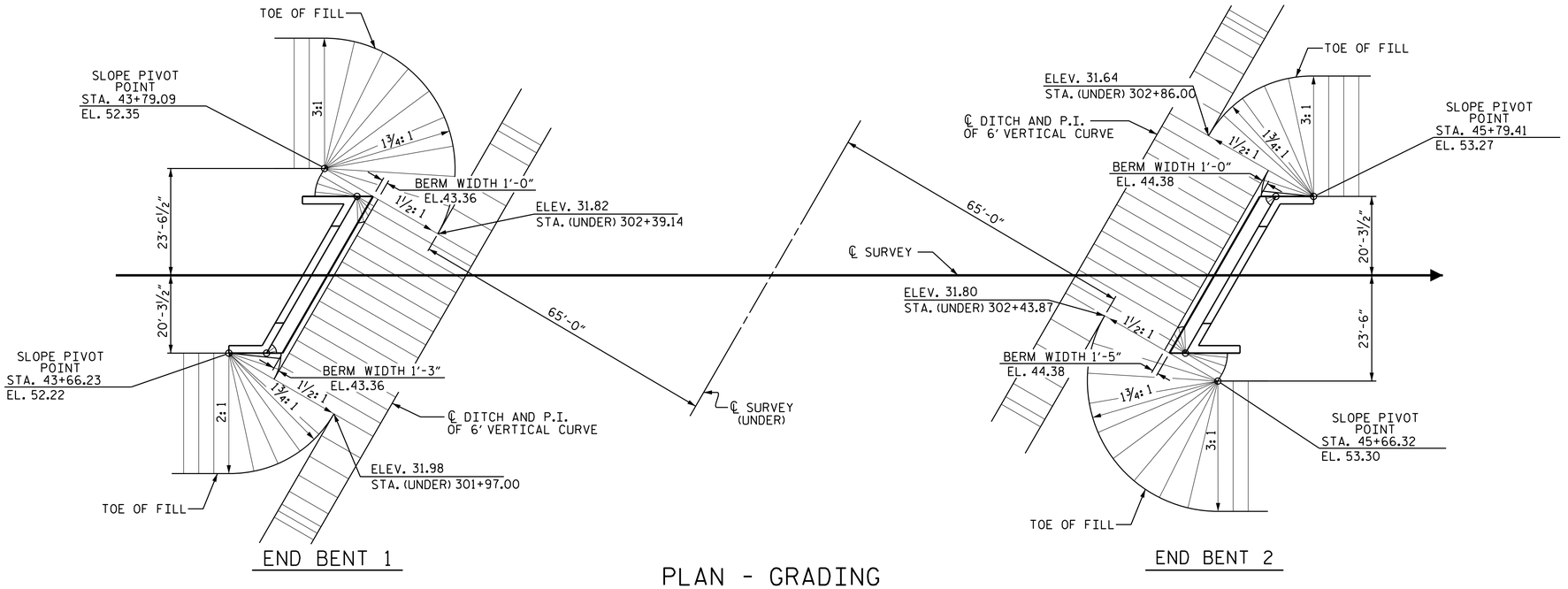
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ENGINEERS ◆ PLANNERS ◆ ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
SUITE 220, LANDMARK CENTER II 4601 SIX FORKS RD, RALEIGH, N.C. 27609-5210 (919) 783-9214
DWG. REF. NO. 29 OF 32

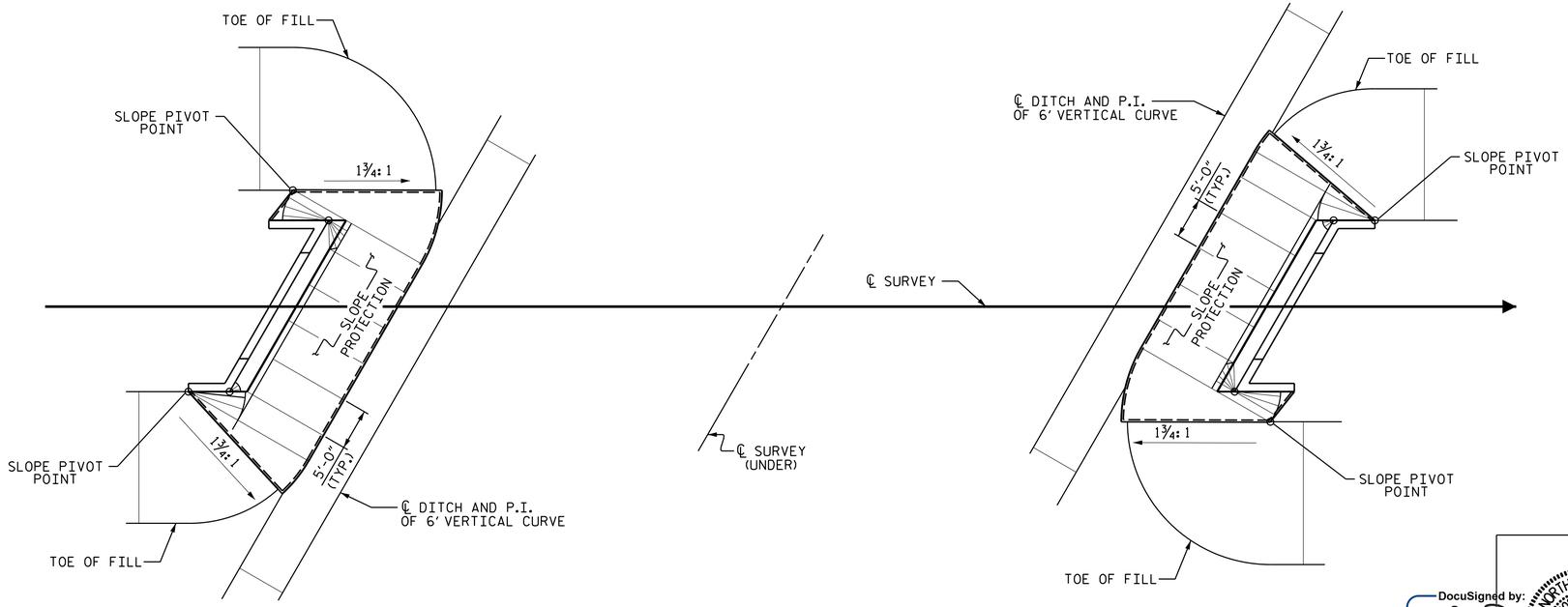
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S12-29
1			3			TOTAL SHEETS
2			4			32

STD. NO. SP1 (SHT 6)

KCI JOB NO. 231467891.11



PLAN - GRADING



PLAN - CONCRETE PLACEMENT

(1½ : 1 SLOPE)

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 44+71.82 -Y4-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

SLOPE PROTECTION DETAILS

DocuSigned by: DB3C8E45B06D499...
12/7/2018

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

KCI JOB NO: 23146789.11

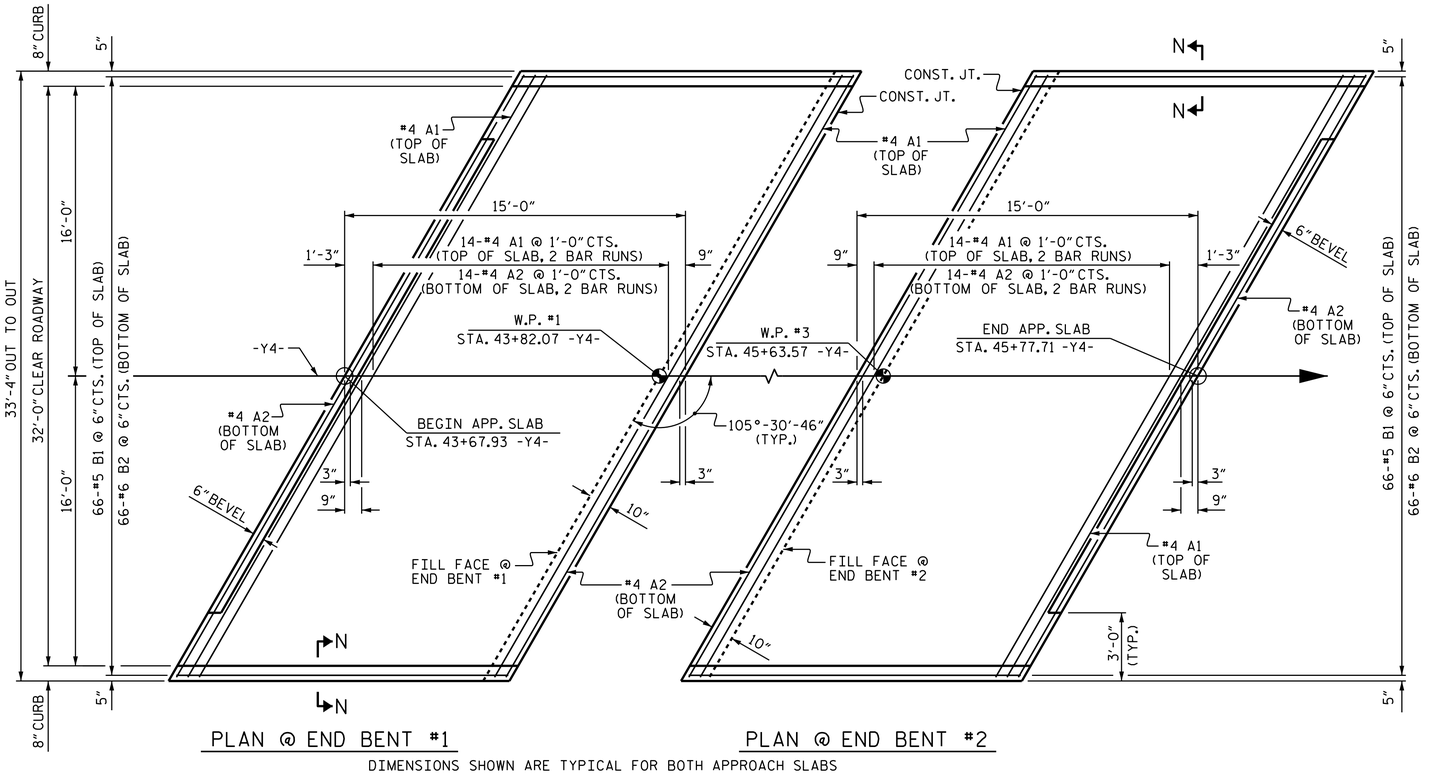
DESIGN ENGINEER OF RECORD:	DATE: 12/7/2018
ASSEMBLED BY: R. C. LARSON	DATE: 04/18/2016
CHECKED BY: K. SU	DATE: 08/29/2016
DRAWN BY: WJH 10/88	REV. 7/17/98 REK/RWW
CHECKED BY: FCJ 10/88	REV. 5/1/06 TLA/GM
	REV. 10/1/11 MAA/GM

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ENGINEERS ● PLANNERS ● ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.
SUITE 220, LANDMARK CENTER II 4601 SIX FORKS RD, RALEIGH, N.C. 27609-5290 (919) 783-9214
DWG. REF. NO. 30 OF 32

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S12-30
1			3			TOTAL SHEETS
2			4			32

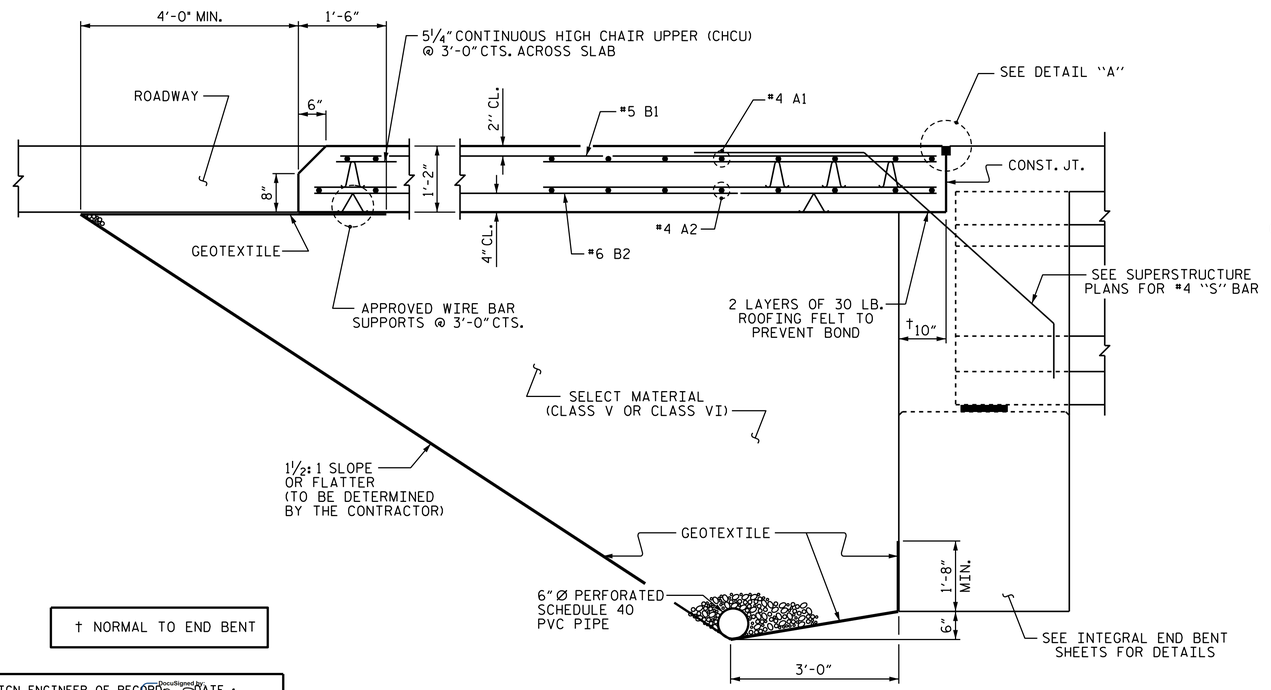
STD. NO. SP2



PLAN @ END BENT #1

PLAN @ END BENT #2

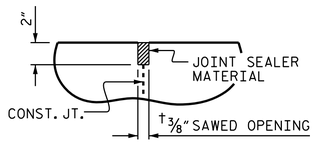
DIMENSIONS SHOWN ARE TYPICAL FOR BOTH APPROACH SLABS



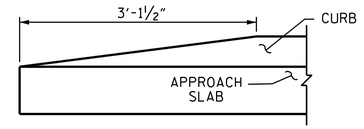
† NORMAL TO END BENT

SECTION THRU SLAB

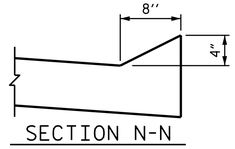
(TYPE I - STANDARD APPROACH FILL)



DETAIL "A"



END OF CURB WITHOUT SHOULDER BERM GUTTER



SECTION N-N

NOTES

APPROACH SLAB SHALL NOT BE CONSTRUCTED PRIOR TO COMPLETION OF THE BRIDGE DECK.

FOR BRIDGE APPROACH FILL INCLUDING GEOTEXTILE, 6" Ø DRAINAGE PIPE, AND SELECT MATERIAL, SEE ROADWAY PLANS.

GEOTEXTILE SHALL BE TYPE 1 IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS SECTION 1056.

SELECT MATERIAL BACKFILL (CLASS V OR CLASS VI) SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATIONS SECTION 1016.

SELECT MATERIAL BACKFILL IS TO BE CONTINUOUS ALONG FILL FACE OF BACKWALL FROM OUTSIDE EDGE TO OUTSIDE EDGE OF APPROACH SLAB.

FOR THE 6" Ø DRAINAGE PIPE OUTLET(S), SEE ROADWAY STANDARD DRAWINGS.

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.

THE JOINT OPENING AT THE APPROACH SLAB/DECK INTERFACE SHALL BE SAWED NO MORE THAN 12 HOURS AFTER THE APPROACH SLAB IS CAST. THE JOINT SHALL BE CLEANED OF ALL DEBRIS BEFORE THE SEALANT IS APPLIED. THE JOINT SEALER MATERIAL SHALL CONFORM TO THE REQUIREMENTS OF SECTION 1028-3 OF THE STANDARD SPECIFICATIONS.

AT THE CONTRACTORS OPTION, "TYPE A - ALTERNATE APPROACH FILL" IN LIEU OF "TYPE I - STANDARD APPROACH FILL" MAY BE CONSTRUCTED AT NO ADDITIONAL COST TO THE DEPARTMENT. SEE SHEET 2 OF 2 FOR DETAILS AND NOTES.

BILL OF MATERIAL

FOR ONE APPROACH SLAB (2 REQ'D)

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	32	#4	STR	18'-2"	388
A2	32	#4	STR	18'-0"	385
* B1	66	#5	STR	14'-2"	975
B2	66	#6	STR	14'-7"	1446
REINFORCING STEEL				LBS.	1831
* EPOXY COATED REINFORCING STEEL				LBS.	1363
CLASS AA CONCRETE				C.Y.	21.4

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 44+71.82 -Y4-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD

BRIDGE APPROACH SLAB FOR INTEGRAL ABUTMENT

DocuSigned by: DB3C8E45B06D49...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

12/7/2018

DESIGN ENGINEER OF RECORD: DATE: 12/7/2018

ASSEMBLED BY : R. C. LARSON	DATE : 04/13/16	
CHECKED BY : K. SU	DATE : 08/24/16	
DRAWN BY : TLA 10/05	REV. 10/1/11	MAA/GM
CHECKED BY : GM 5/06	REV. 12/21/11	MAA/GM
	REV. 6/13	MAA/GM

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ENGINEERS ◆ PLANNERS ◆ ECOLOGISTS LICENSE NUMBER: C-0764

KCI Associates of North Carolina, P.A.

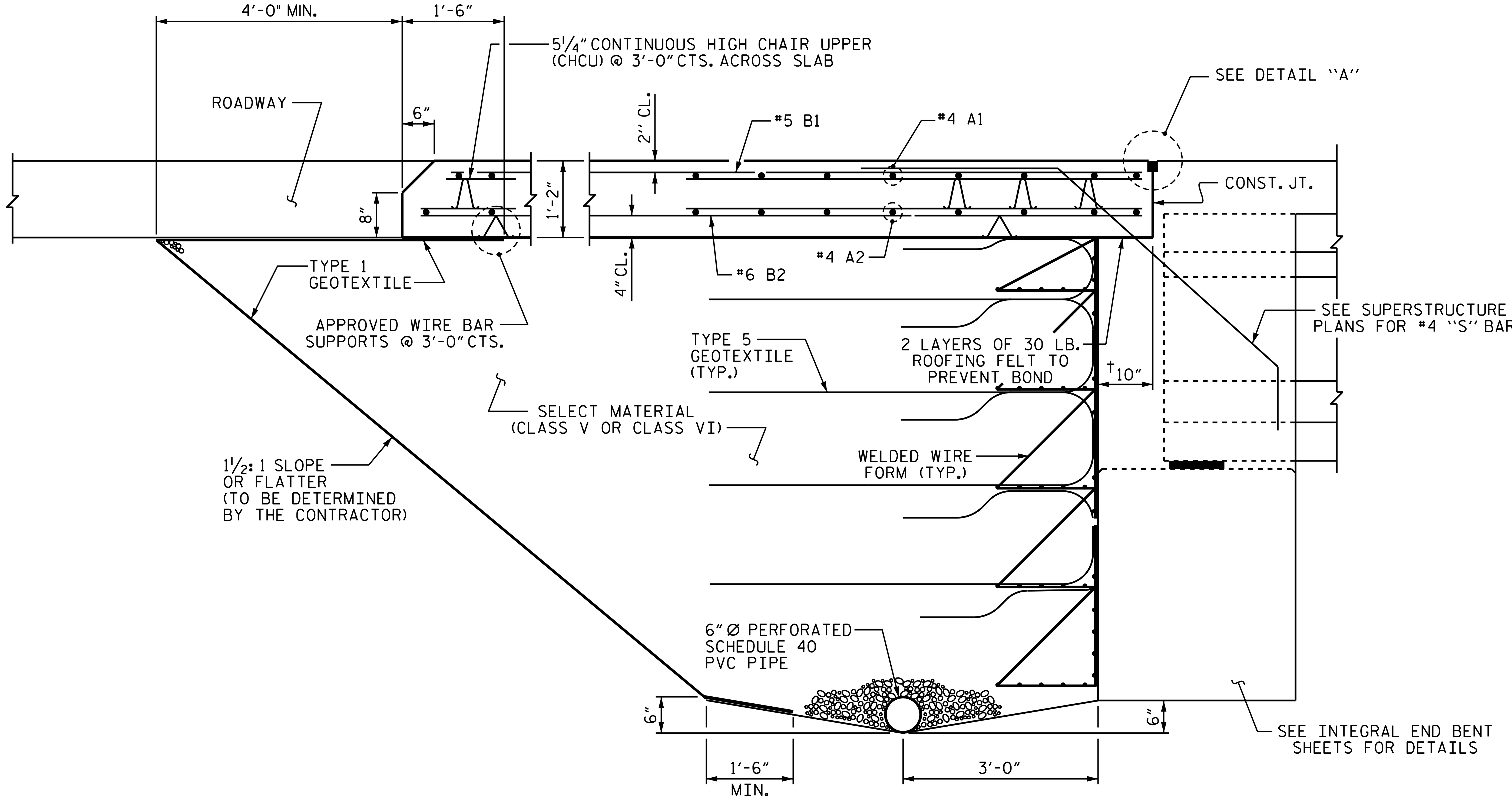
SUITE 220, LANDMARK CENTER II 4601 SIX FORKS RD, RALEIGH, N.C. 27609-5290 (919) 783-9214

DWG. REF. NO. 31 OF 32

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S12-31
1			3			TOTAL SHEETS
2			4			32

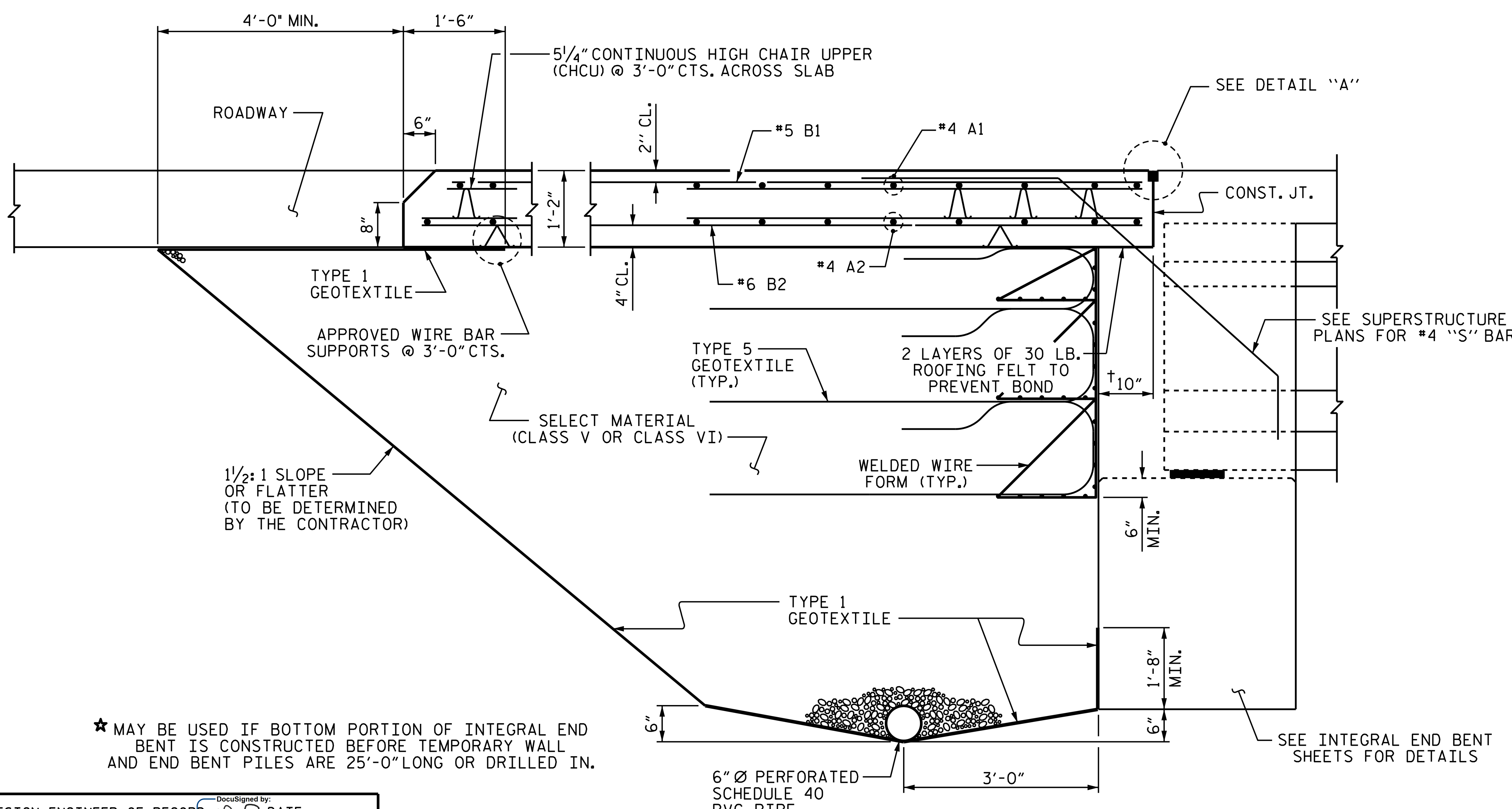
STD. NO. BAS5 (SHT 1b)

KCI JOB NO: 23146789.11



SECTION THRU SLAB

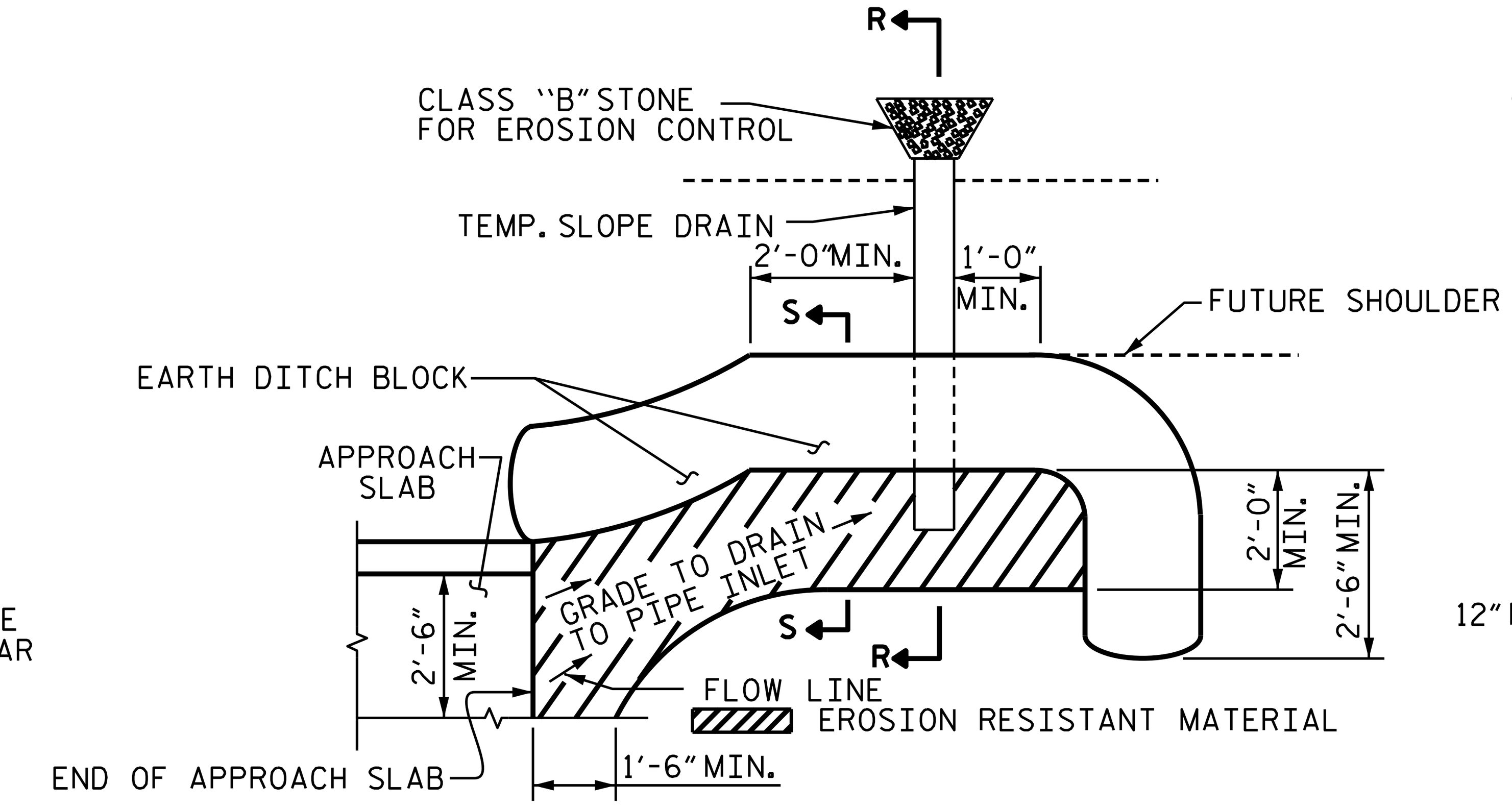
(TYPE A - ALTERNATE APPROACH FILL)



☆ MAY BE USED IF BOTTOM PORTION OF INTEGRAL END BENT IS CONSTRUCTED BEFORE TEMPORARY WALL AND END BENT PILES ARE 25'-0" LONG OR DRILLED IN.

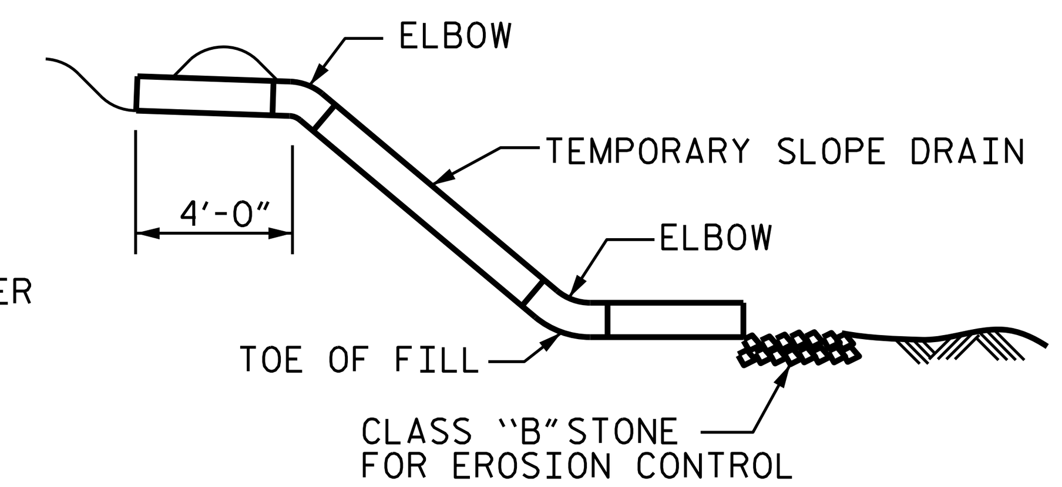
SECTION THRU SLAB

☆ (TYPE A - ALTERNATE APPROACH FILL)

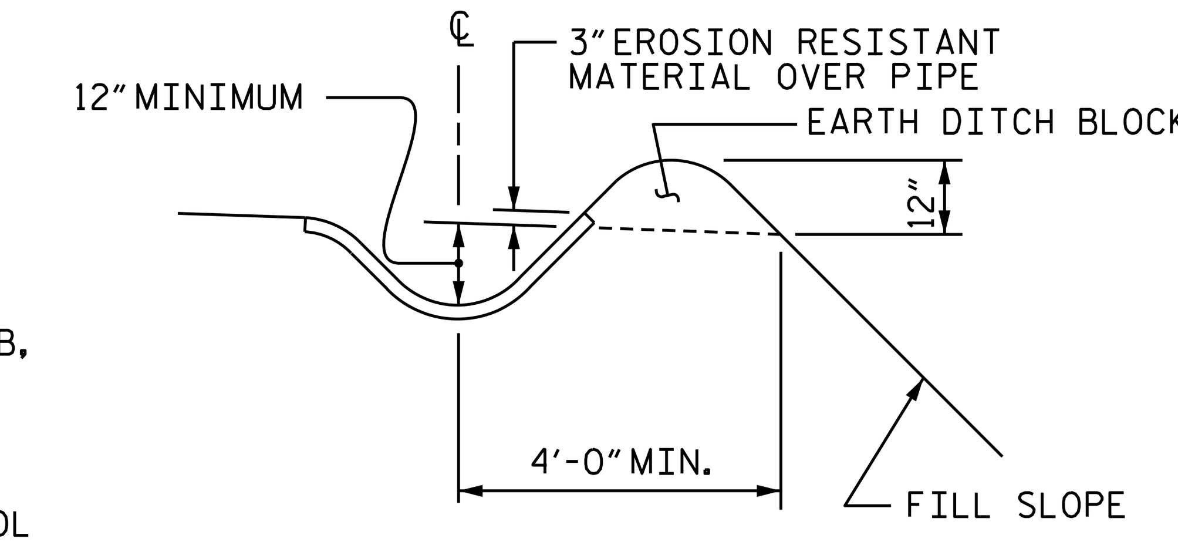


NOTE: IMMEDIATELY AFTER THE CONSTRUCTION OF THE APPROACH SLAB, THE CONTRACTOR SHALL PROVIDE TEMPORARY BERM AND SLOPE DRAIN. CONTRACTOR SHALL GRADE TO PIPE INLET AND PROVIDE EROSION RESISTANT MATERIAL AS SHOWN. THE EROSION RESISTANT MATERIAL SHALL BE EITHER 1) ASPHALT PLANT MIX, TYPE 1 OR TYPE 2, MIN. 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)

NOTES

APPROACH SLAB SHALL NOT BE CONSTRUCTED PRIOR TO COMPLETION OF THE BRIDGE DECK.

FOR TEMPORARY GEOTEXTILE WALL INCLUDING GEOTEXTILE, 6" Ø DRAINAGE PIPE, WELDED WIRE FORM, AND SELECT MATERIAL, SEE ROADWAY PLANS.

GEOTEXTILE (TYPE 1 OR TYPE 5) SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS SECTION 1056.

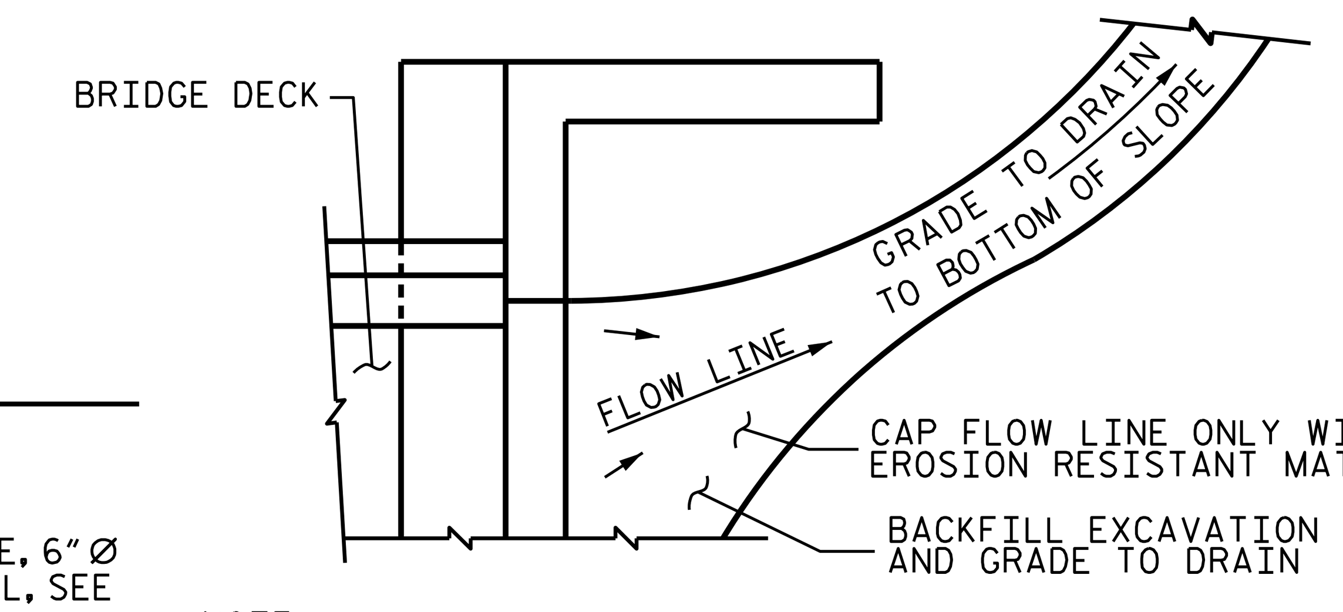
SELECT MATERIAL BACKFILL (CLASS V OR CLASS VI) SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATIONS SECTION 1016.

SELECT MATERIAL BACKFILL IS TO BE CONTINUOUS ALONG FILL FACE OF BACKWALL FROM OUTSIDE EDGE TO OUTSIDE EDGE OF APPROACH SLAB.

FOR THE 6" Ø DRAINAGE PIPE OUTLET(S), SEE ROADWAY STANDARD DRAWINGS.

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.

THE JOINT OPENING AT THE APPROACH SLAB/DECK INTERFACE SHALL BE SAWED NO MORE THAN 12 HOURS AFTER THE APPROACH SLAB IS CAST. THE JOINT SHALL BE CLEANED OF ALL DEBRIS BEFORE THE SEALANT IS APPLIED. THE JOINT SEALER MATERIAL SHALL CONFORM TO THE REQUIREMENTS OF SECTION 1028-3 OF THE STANDARD SPECIFICATIONS.



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

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 44+71.82 -Y4-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB DETAILS

DocuSigned by:
DB3C8E45B06D4...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

12/7/2018

ENGINEERS • PLANNERS • ECOLOGISTS LICENSE NUMBER: C-0764
KCI Associates of North Carolina, P.A.

DWG. REF. NO. 32 OF 32

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS							
NO.	BY:	DATE:	NO.	BY:	DATE:	SHEET NO.	S12-32
1			3			TOTAL SHEETS	32
2			4				

DESIGN ENGINEER OF RECORD: DATE: 12/7/2018

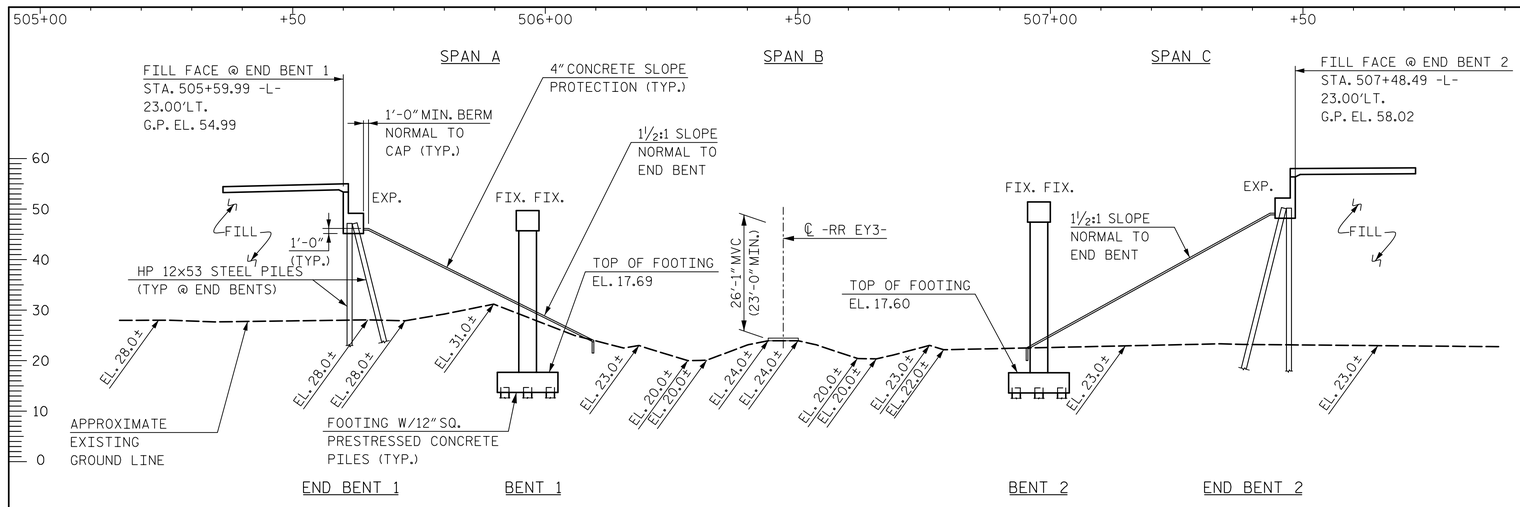
ASSEMBLED BY :	R. C. LARSON	DATE :	04/14/16
CHECKED BY :	K. SU	DATE :	08/24/16

DRAWN BY : FCJ	11/88	REV. 10/1/11	MAA/GM
CHECKED BY : ARB	11/88	REV. 7/12	MAA/GM
		REV. 6/13	MAA/GM

KCI JOB NO: 23146789.11

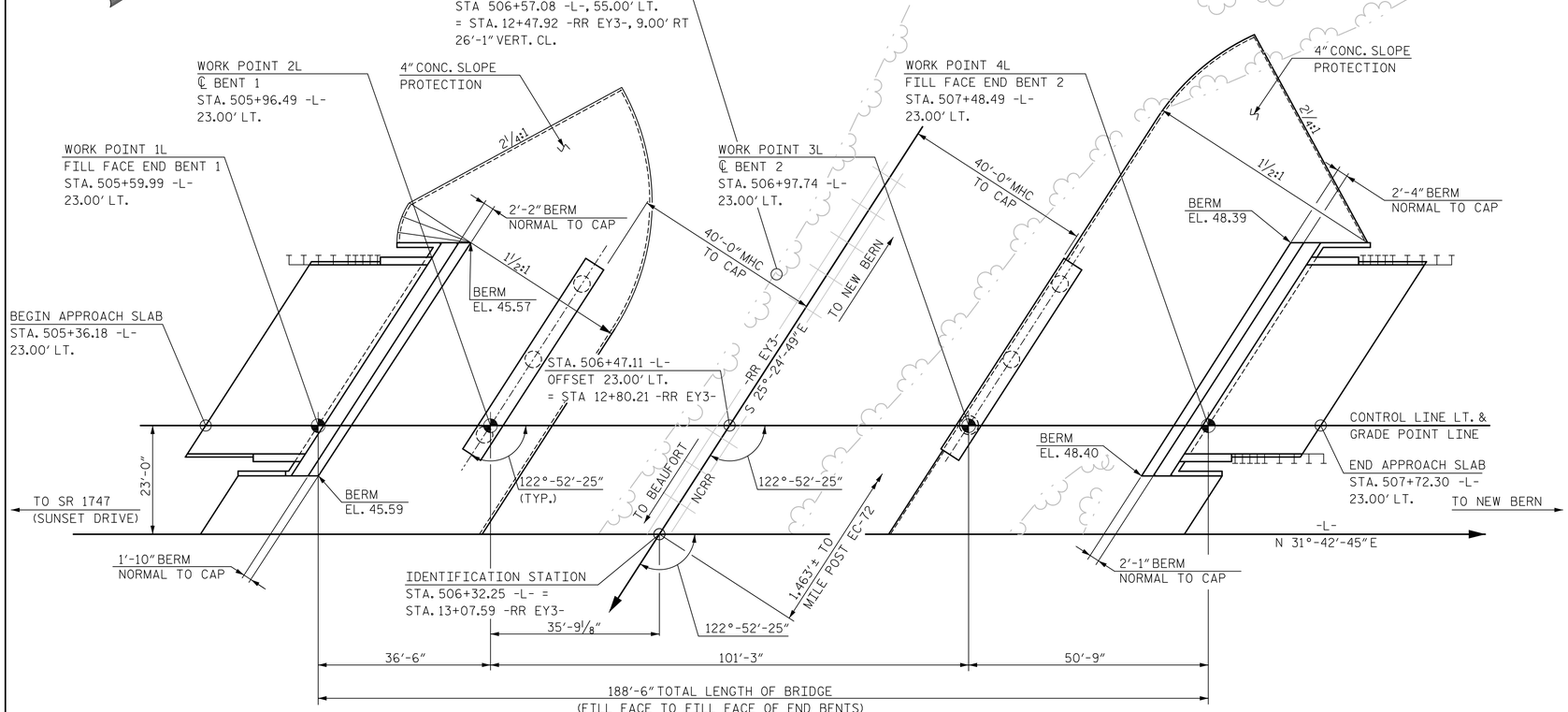
STD. NO. BAS4

F.A. PROJECT NO. NHF-70(49)



SECTION ALONG CONTROL LINE LEFT

SECTIONS @ BENTS & END BENTS ARE AT RIGHT ANGLES



PLAN

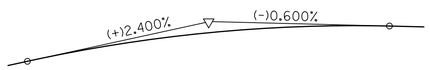
NOTES: PILES NOT SHOWN FOR CLARITY.
ALL END BENTS AND BENTS ARE PARALLEL.

NOTES:

FOR NOTES, SEE GENERAL DRAWING SHEET 3 OF 3.

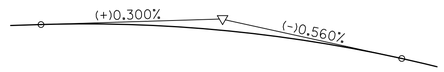
MVC = MINIMUM VERTICAL CLEARANCE
MHC = MINIMUM HORIZONTAL CLEARANCE

PI STA. = 508+90.00 -L-
EL = 63.34
V.C. = 1,000.00'



GRADE DATA -L-

PI STA. = 10+00.00 -RR EY3-
EL = 26.02
L = 1,200.00'



GRADE DATA -RR EY3-

NOTE: TOP OF RAIL PROFILE WAS APPROXIMATED FROM AVAILABLE SURVEY INFORMATION.

PROJECT NO. R-1015

CRAVEN **COUNTY**

STATION: 506+32.25 -L- =
13+07.59 -RR EY3-

BRIDGE NO. 284
SHEET 1 OF 3 NCRR MILE POST EC-72.3

DocuSigned by: Paul J. Barber 18DF1B57368741E...

STATE OF NORTH CAROLINA PROFESSIONAL SEAL 12916 ENGINEER PAUL J. BARBER

11/14/2018

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR BRIDGE OVER NCRR
ON US 70 (HAVELOCK BYPASS)
BETWEEN SR 1747 AND US 70
LEFT LANE

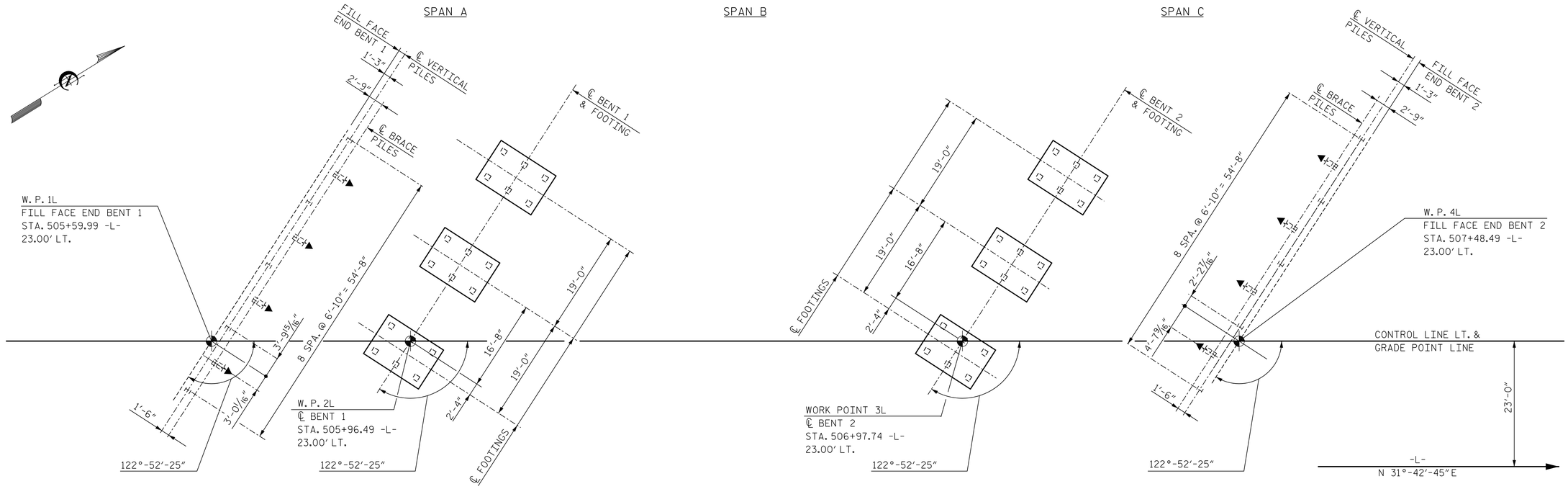
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY	M. WRIGHT	DATE 8/18
CHECKED BY	N. HART	DATE 8/18
DESIGN ENGINEER OF RECORD	P. BARBER	DATE 8/18

DWG. NO. 1

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S13-1
1			3			TOTAL SHEETS
2			4			39



END BENT 1 BENT 1 BENT 2 END BENT 2

FOUNDATION LAYOUT

FOUNDATION 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 95 TONS PER PILE.

PILES AT BENT NO. 1 AND BENT NO. 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 100 TONS PER PILE.

DRIVE PILES AT END BENT NO. 1 AND END BENT NO. 2 TO A REQUIRED DRIVING RESISTANCE OF 130 TONS PER PILE.

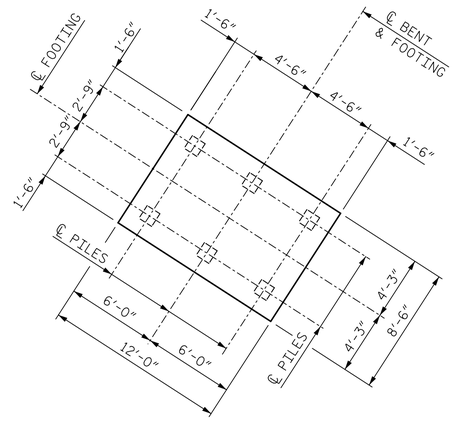
DRIVE PILES AT BENT NO. 1 AND BENT NO. 2 TO A REQUIRED DRIVING RESISTANCE OF 135 TONS PER PILE.

TESTING THE FIRST PRODUCTION PILE WITH THE PDA DURING DRIVING, RESTRIKING OR REDRIVING IS REQUIRED AT END BENT NO. 1 OR END BENT NO. 2. FOR PDA TESTING, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

TESTING THE FIRST PRODUCTION PILE WITH THE PDA DURING DRIVING, RESTRIKING OR REDRIVING IS REQUIRED AT BENT NO. 1 OR BENT NO. 2. FOR PDA TESTING, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

OBSERVE A TWO MONTH WAITING PERIOD AFTER CONSTRUCTING THE EMBANKMENT WITHIN 2 FT. OF FINISHED GRADE BEFORE BEGINNING END BENT CONSTRUCTION AT END BENT NO. 1 AND END BENT NO. 2. FOR BRIDGE WAITING PERIODS, SEE ROADWAY PLANS AND SECTION 235 OF THE STANDARD SPECIFICATIONS.

GROUNDWATER OR PERCHED WATER MAY BE ENCOUNTERED ABOVE THE BOTTOM OF FOOTING ELEVATIONS AT BENT NO. 1 AND BENT NO. 2. DEWATERING MAY BE REQUIRED FOR FOOTING CONSTRUCTION AT BENT NO. 1 AND BENT NO. 2.



TYPICAL FOOTING LAYOUT
BENT 1 AND BENT 2

NOTES:

ALL DIMENSIONS ARE PARALLEL OR NORMAL TO BENT CONTROL LINES AND FILL FACES.

◀╋▭ INDICATES PILE BATTER IN DIRECTION SHOWN. BRACE PILES AT END BENTS ARE TO BE BATTERED AT 3:12.

ALL END BENT PILES ARE HP 12x53 STEEL PILES. ALL BENT PILES ARE 12" PRESTRESSED CONCRETE PILES.

FOR FOUNDATION ELEVATIONS AND DETAILS, SEE BENT AND END BENT SHEETS.

ALL PILE DIMENSIONS ARE TO CENTERS OF PILES AT BOTTOM OF END BENTS AND FOOTINGS.

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 506+32.25 -L-

SHEET 2 OF 3

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NORTH CAROLINA PROFESSIONAL SEAL 12916 ENGINEER PAUL J. BARBER

11/14/2018

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343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY M. WRIGHT DATE 8/18
CHECKED BY M. BARRAGAN DATE 8/18
DESIGN ENGINEER OF RECORD P. BARBER DATE 8/18

DWG. NO. 2

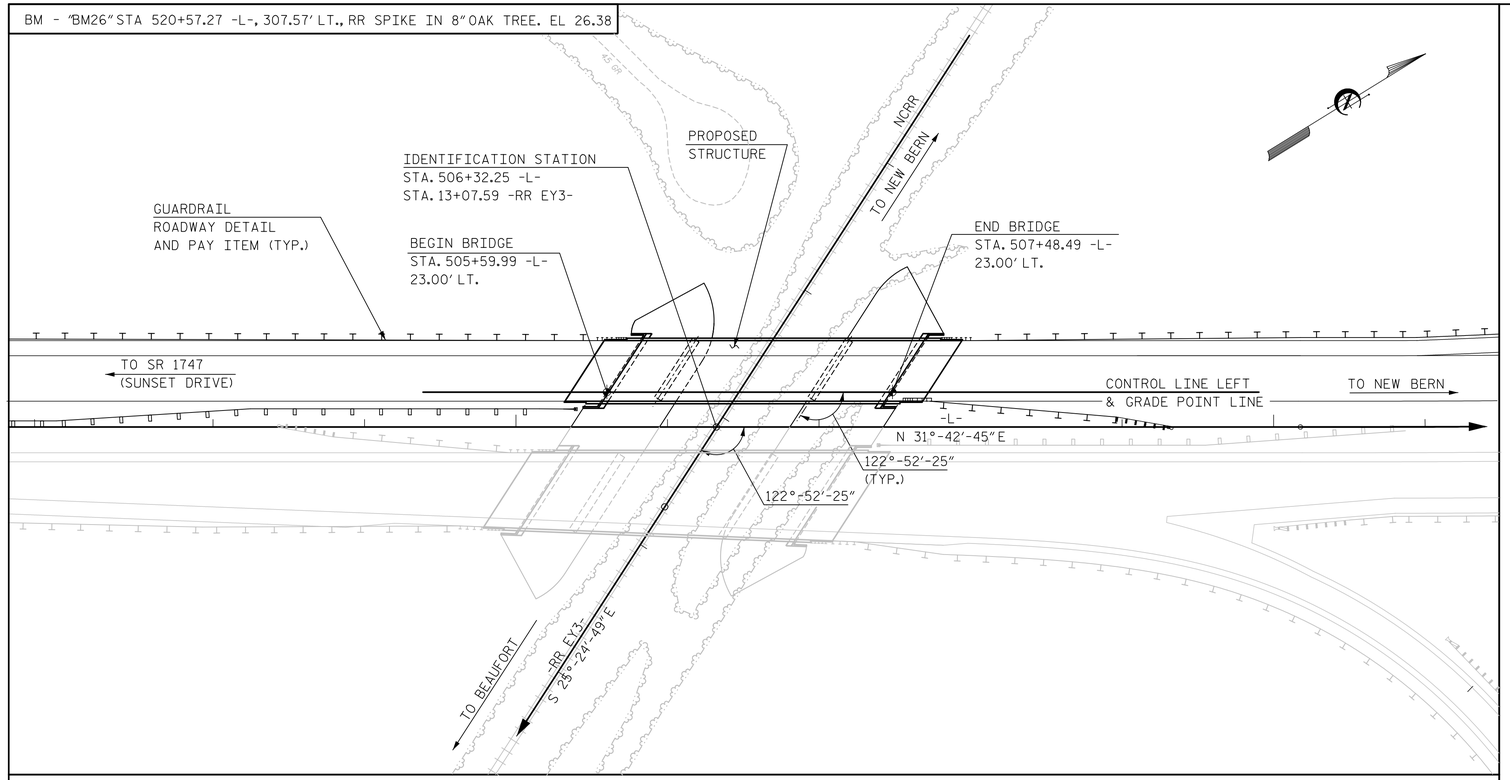
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOUNDATION LAYOUT

LEFT LANE

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S13-2
1			3			TOTAL SHEETS
2			4			39



LOCATION SKETCH

NOTE: FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

GENERAL NOTES:

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.

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

THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.

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 SAMPLE BARS SHOULD COME FROM STEEL ACTUALLY USED IN THE PROJECT AND THE SAMPLE BARS SHOULD BE REPLACED BY SPLICED BARS AS SPECIFIED IN THE SAMPLE BAR REPLACEMENT CHART. PAYMENT FOR THE SAMPLE BARS AND REPLACEMENT REINFORCING STEEL SHALL BE CONSIDERED INCIDENTAL TO VARIOUS PAY ITEMS.

PRESTRESSED CONCRETE DECK PANELS MAY BE USED IN LIEU OF METAL STAY-IN-PLACE FORMS IN ACCORDANCE WITH ARTICLE 420-3 OF THE STANDARD SPECIFICATIONS.

REMOVABLE FORMS MAY BE USED IN LEIU OF METAL STAY-IN-PLACE FORMS IN ACCORDANCE WITH ARTICLE 420-3 OF THE STANDARD SPECIFICATIONS.

THE RAILROAD TRACK TOP OF RAIL ELEVATIONS SHOWN ON THE PLANS ARE FROM THE BEST INFORMATION AVAILABLE. PRIOR TO BEGINNING BRIDGE CONSTRUCTION, VERIFY THE TOP OF RAIL ELEVATIONS AND REPORT ANY VARIATIONS TO THE ENGINEER. ANY PLAN REVISIONS NECESSARY TO ACHIEVE THE REQUIRED MINIMUM VERTICAL CLEARANCE WILL BE PROVIDED BY THE DEPARTMENT.

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

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

TOTAL BILL OF MATERIAL

	FOUNDATION EXCAVATION FOR BENT AT STATION 506+32.25 (LEFT LANE)	PDA TESTING	REINFORCED CONCRETE DECK SLAB	GROOVING BRIDGE FLOORS	CLASS A CONCRETE	BRIDGE APPROACH SLAB AT STATION 506+32.25 (LEFT LANE)	REINFORCING STEEL	SPIRAL COLUMN REINFORCING STEEL	54" PRESTRESSED CONCRETE GIRDERS	
	LUMP SUM	EACH	SQ. FT.	SQ. FT.	CU. YDS.	LUMP SUM	LBS.	LBS.	NO.	L.F.
SUPERSTRUCTURE	———	———	8,044	8,596	———	LUMP SUM	———	———	15	910.10
END BENT 1	———	———	———	———	64.0	———	7,310	———	—	———
BENT 1	LUMP SUM	———	———	———	108.6	———	13,917	2,263	—	———
BENT 2	LUMP SUM	———	———	———	110.7	———	14,182	2,401	—	———
END BENT 2	———	———	———	———	65.0	———	7,225	———	—	———
TOTAL	LUMP SUM	2	8,044	8,596	348.3	LUMP SUM	42,634	4,664	15	910.10

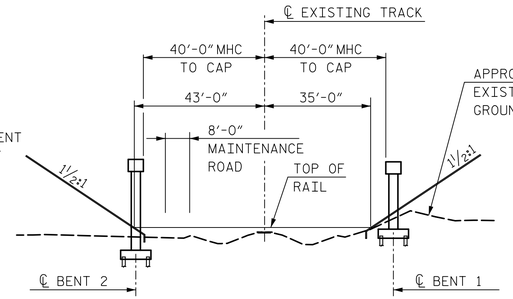
TOTAL BILL OF MATERIAL

	PILE DRIVING EQUIPMENT SETUP FOR 12" PRESTRESSED CONCRETE PILES	PILE DRIVING EQUIPMENT SETUP FOR HP 12x53 STEEL PILES	12" PRESTRESSED CONCRETE PILES		HP 12x53 STEEL PILES		PILE REDRIVES	CONCRETE BARRIER RAIL	4" SLOPE PROTECTION	ELASTOMERIC BEARINGS	EXPANSION JOINT SEALS
	EACH	EACH	NO.	L.F.	NO.	L.F.	EACH	L.F.	SQ. YD.	LUMP SUM	LUMP SUM
SUPERSTRUCTURE	———	———	—	———	—	———	———	413.7	———	LUMP SUM	LUMP SUM
END BENT 1	———	9	—	———	9	585	5	———	565	———	———
BENT 1	18	———	18	990	—	———	9	———	———	———	———
BENT 2	18	———	18	990	—	———	9	———	———	———	———
END BENT 2	———	9	—	———	9	540	5	———	720	———	———
TOTAL	36	18	36	1,980	18	1,125	28	413.7	1,285	LUMP SUM	LUMP SUM

SAMPLE BAR REPLACEMENT

SIZE	LENGTH
#3	6'-2"
#4	7'-4"
#5	8'-6"
#6	9'-8"
#7	10'-10"
#8	12'-0"
#9	13'-2"
#10	14'-6"
#11	15'-10"

NOTE:
SAMPLE BAR REPLACEMENT LENGTHS BASED ON 30" (SAMPLE LENGTH) PLUS TWO SPLICE LENGTHS AND fy = 60ksi.



SECTION THRU RAILROAD

LOOKING IN DIRECTION OF INCREASING STATIONS ON RAILROAD
(SPAN LENGTH IS BASED ON THIS SECTION)

MHC = MINIMUM HORIZONTAL CLEARANCE

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NORTH CAROLINA PROFESSIONAL SEAL 12916 ENGINEER PAUL J. BARBER
12/6/2018

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PROJECT NO. R-1015
CRAVEN COUNTY
STATION: 506+32.25 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
LOCATION SKETCH,
GENERAL NOTES AND
TOTAL BILL OF MATERIAL
LEFT LANE

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343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY M. WRIGHT DATE 8/18
CHECKED BY N. HART DATE 8/18
DESIGN ENGINEER OF RECORD P. BARBER DATE 8/18

DWG. NO. 3

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S13-3
1			3			TOTAL SHEETS
2			4			39

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 × 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	1.03	--	1.75	0.80	1.62	C	I	23.3	0.99	1.28	B	I	19.3	0.80	0.76	1.03	B	ER	49.4	
		HL-93 (OPERATING)	N/A	--	1.70	--	1.35	0.80	2.11	C	I	23.3	0.99	1.70	B	I	19.3	N/A	--	--	--	--	--	
		HS-20 (INVENTORY)	36.000	2	1.44	51.8	1.75	0.80	2.00	C	I	23.3	0.99	1.70	B	I	19.3	0.80	0.76	1.44	B	ER	49.4	
		HS-20 (OPERATING)	36.000	--	2.25	81.0	1.35	0.80	2.60	C	I	23.3	0.99	2.25	B	I	19.3	N/A	--	--	--	--	--	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500	--	3.41	46.0	1.40	0.80	5.01	C	I	23.3	0.99	5.30	B	I	19.3	0.80	0.76	3.41	B	ER	49.4	
		SNGARBS2	20.000	--	2.47	49.4	1.40	0.80	3.99	C	I	23.3	0.99	3.69	B	I	19.3	0.80	0.76	2.47	B	ER	49.4	
		SNAGRIS2	22.000	--	2.31	50.8	1.40	0.80	3.90	C	I	23.3	0.99	3.40	B	I	19.3	0.80	0.76	2.31	B	ER	49.4	
		SNCOTTS3	27.250	--	1.70	46.3	1.40	0.80	2.50	C	I	23.3	0.99	2.56	B	I	19.3	0.80	0.76	1.70	B	ER	49.4	
		SNAGGRS4	34.925	--	1.39	48.6	1.40	0.80	2.19	C	I	23.3	0.99	2.07	B	I	19.3	0.80	0.76	1.39	B	ER	49.4	
		SNS5A	35.550	--	1.36	48.4	1.40	0.80	2.13	C	I	23.3	0.99	2.09	B	I	19.3	0.80	0.76	1.36	B	ER	49.4	
		SNS6A	39.950	--	1.24	49.5	1.40	0.80	2.00	C	I	23.3	0.99	1.88	B	I	19.3	0.80	0.76	1.24	B	ER	49.4	
		SNS7B	42.000	--	1.18	49.6	1.40	0.80	1.91	C	I	23.3	0.99	1.83	B	I	19.3	0.80	0.76	1.18	B	ER	49.4	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000	--	1.51	49.8	1.40	0.80	2.45	C	I	23.3	0.99	2.28	B	I	19.3	0.80	0.76	1.51	B	ER	49.4	
		TNT4A	33.075	--	1.51	49.9	1.40	0.80	2.48	C	I	23.3	0.99	2.23	B	I	19.3	0.80	0.76	1.51	B	ER	49.4	
		TNT6A	41.600	--	1.22	50.8	1.40	0.80	2.07	C	I	23.3	0.99	1.93	B	I	19.3	0.80	0.76	1.22	B	ER	49.4	
		TNT7A	42.000	--	1.22	51.2	1.40	0.80	2.10	C	I	23.3	0.99	1.90	B	I	19.3	0.80	0.76	1.22	B	ER	49.4	
		TNT7B	42.000	--	1.25	52.5	1.40	0.80	2.19	C	I	23.3	0.99	1.80	B	I	19.3	0.80	0.76	1.25	B	ER	49.4	
		TNAGRIT4	43.000	--	1.20	51.6	1.40	0.80	2.08	C	I	23.3	0.99	1.74	B	I	19.3	0.80	0.76	1.20	B	ER	49.4	
		TNAGT5A	45.000	--	1.14	51.3	1.40	0.80	1.94	C	I	23.3	0.99	1.71	B	I	19.3	0.80	0.76	1.14	B	ER	49.4	
		TNAGT5B	45.000	3	1.13	50.9	1.40	0.80	1.90	C	I	23.3	0.99	1.65	B	I	19.3	0.80	0.76	1.13	B	ER	49.4	

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)

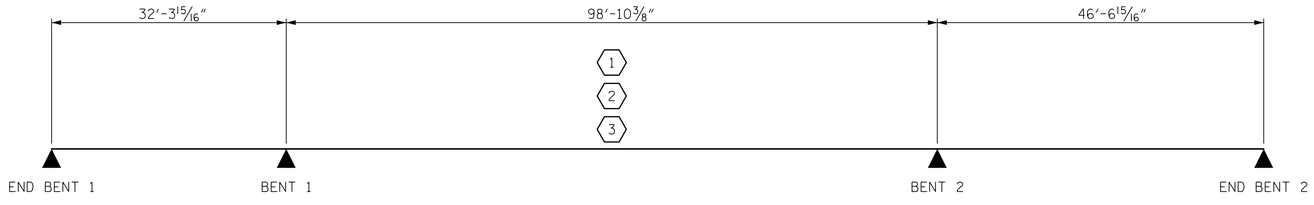
(2) DESIGN LOAD RATING (HS-20)

(3) LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

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



LRFR SUMMARY

NOTE: SPAN LENGTHS PROVIDED ARE BEARING TO BEARING LENGTHS.

DocuSigned by: Paul J. Barber

NORTH CAROLINA PROFESSIONAL SEAL 12916 ENGINEER PAUL J. BARBER

11/14/2018

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 506+32.25 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

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

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S13-4
1			3			TOTAL SHEETS
2			4			39

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DRAWN BY M. WRIGHT DATE 8/18
CHECKED BY N. HART DATE 8/18
DESIGN ENGINEER OF RECORD P. BARBER DATE 8/18

DWG. NO. 4

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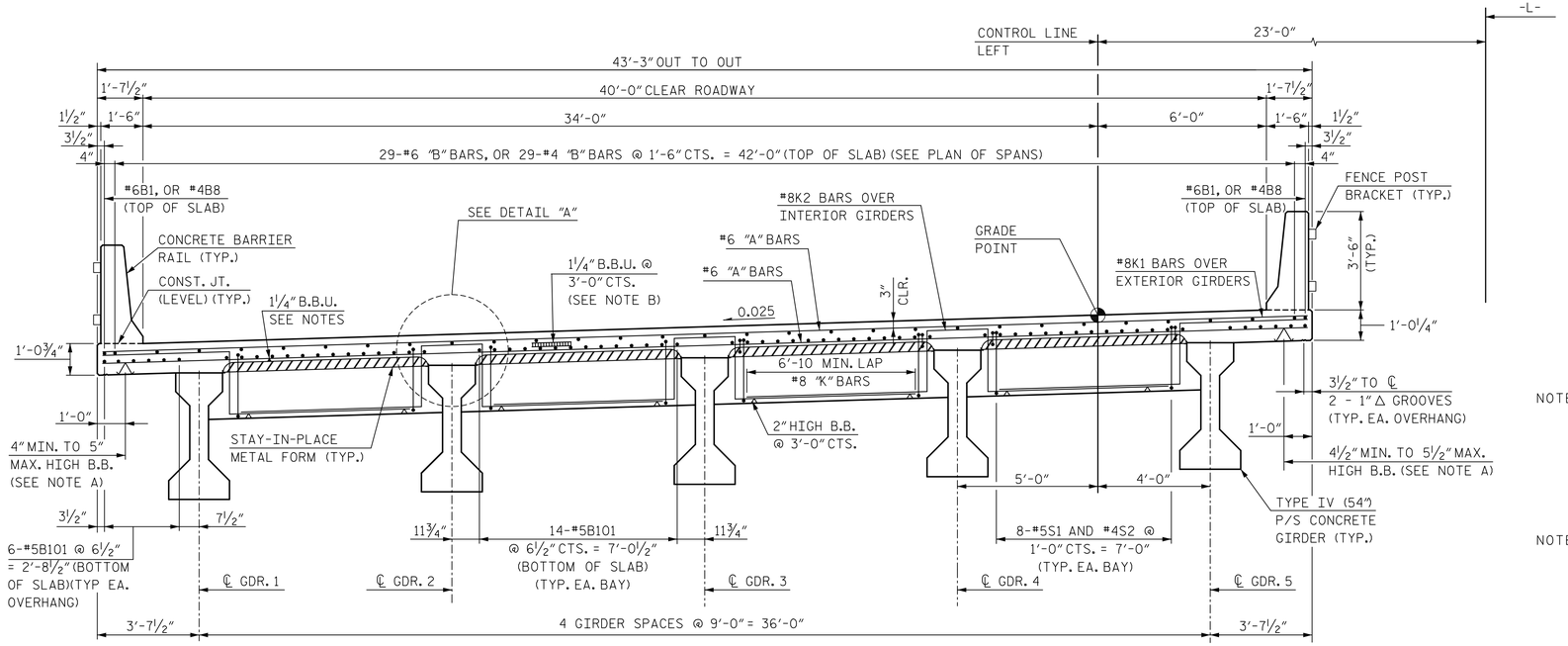
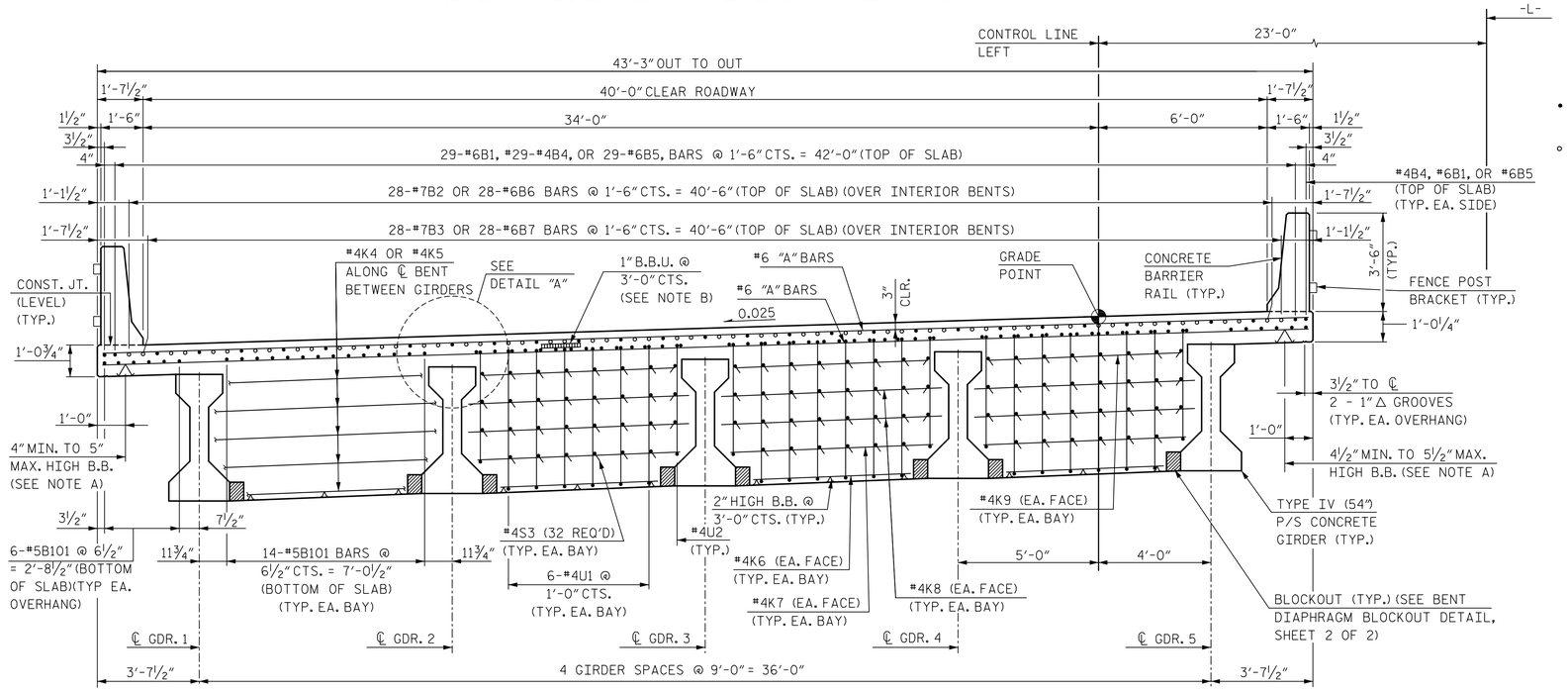
ASSEMBLED BY : M. WRIGHT	DATE : 8/18		
CHECKED BY : N. HART	DATE : 8/18		
DRAWN BY : MAA 1/08	REV. 11/12/08RR	MAA/GM	
CHECKED BY : GM/DI 2/08	REV. 10/1/11	MAA/GM	
	REV. 12/17	MAA/THC	

STD. NO. LRFR1



TYPICAL SECTION AT END BENT

FOR SECTION THRU END BENT DIAPHRAGM, SEE SECTION A-A, SHEET 2 OF 2.



TYPICAL SECTION AT BENT

FOR SECTION THRU BENT, SEE SECTION B-B, SHEET 2 OF 2.

NOTES:

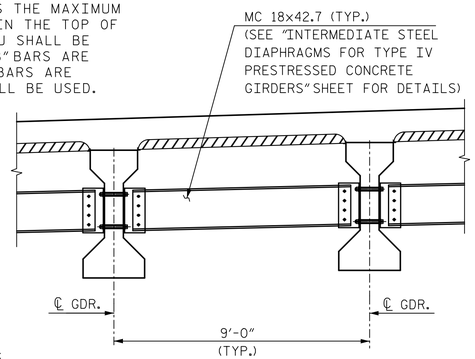
PROVIDE 1¼" HIGH BEAM BOLSTERS UPPER AT 4'-0" CTS. ATOP THE METAL STAY-IN-PLACE FORMS TO SUPPORT THE BOTTOM MAT OF "A" BARS. WHEN USING REMOVABLE FORMS, PROVIDE CONTINUOUS HIGH CHAIRS FOR METAL DECK (C.H.C.M.) @ 4'-0" CTS. WITH A HEIGHT TO SUPPORT THE BOTTOM MAT OF "A" BARS A CLEAR DISTANCE OF 2½" ABOVE THE TOP OF THE REMOVABLE FORM.

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.

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

NOTE A: THE HEIGHT OF THE BEAM BOLSTER VARIES ALONG THE LENGTH OF THE SPAN DUE TO CAMBER AND THE VARYING HEIGHT REQUIRED FOR THE BUILDUP. THE CONTRACTOR SHALL HAVE SUFFICIENT SIZES TO PROPERLY SUPPORT THE REINFORCING STEEL.

NOTE B: TO MAINTAIN PROPER LOCATION OF "A" BARS IN TOP OF SLAB, BBU DEPTH MUST VARY IN UNIT AS THE MAXIMUM SIZE OF THE "B" BARS IN THE TOP OF SLAB VARIES. A 1¼" BBU SHALL BE USED WHERE ONLY #4 "B" BARS ARE PRESENT. WHERE #6 "B" BARS ARE PRESENT, A ¾" BBU SHALL BE USED.

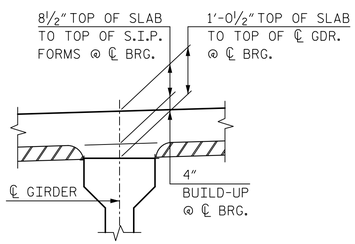


PARTIAL TYPICAL SECTION

(SHOWING INTERMEDIATE DIAPHRAGM)

"B" BAR KEY

- CONTINUOUS BAR RUN SEE PLAN OF SPAN SHEETS.
- NON-CONTINUOUS BAR RUN FOR NEGATIVE MOMENT REGIONS SEE PLAN OF SPAN SHEETS.



DETAIL "A"

NOTE: BUILDUP VARIES BETWEEN ℄ BEARINGS.

DocuSigned by: Paul J. Barber 18DF1B57368741E...

11/14/2018

NORTH CAROLINA PROFESSIONAL SEAL 12916 ENGINEER PAUL J. BARBER

PROJECT NO. R-1015

CRAVEN **COUNTY**

STATION: 506+32.25 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

TYPICAL SECTIONS

LEFT LANE

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY M. WRIGHT DATE 7/16
CHECKED BY P. BARBER DATE 8/16
DESIGN ENGINEER OF RECORD P. BARBER DATE 8/18

DWG. NO. 5

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S13-5
1			3			TOTAL SHEETS
2			4			39

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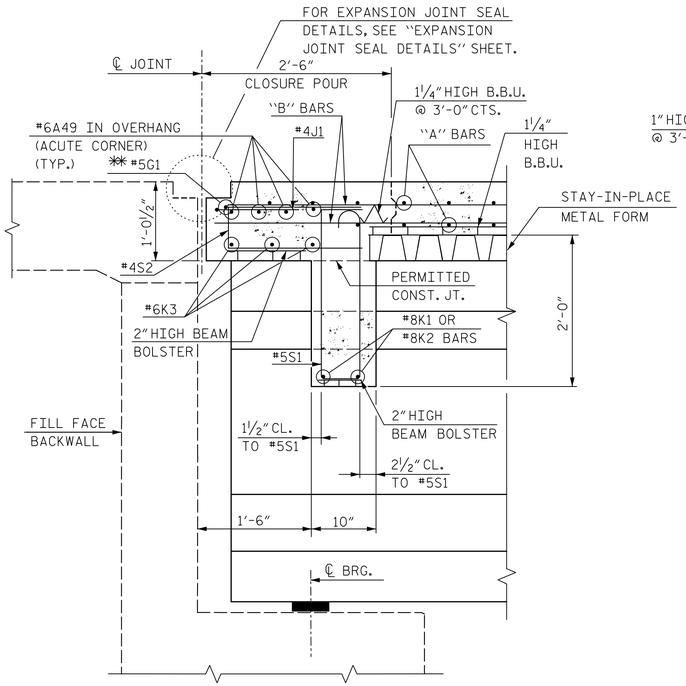
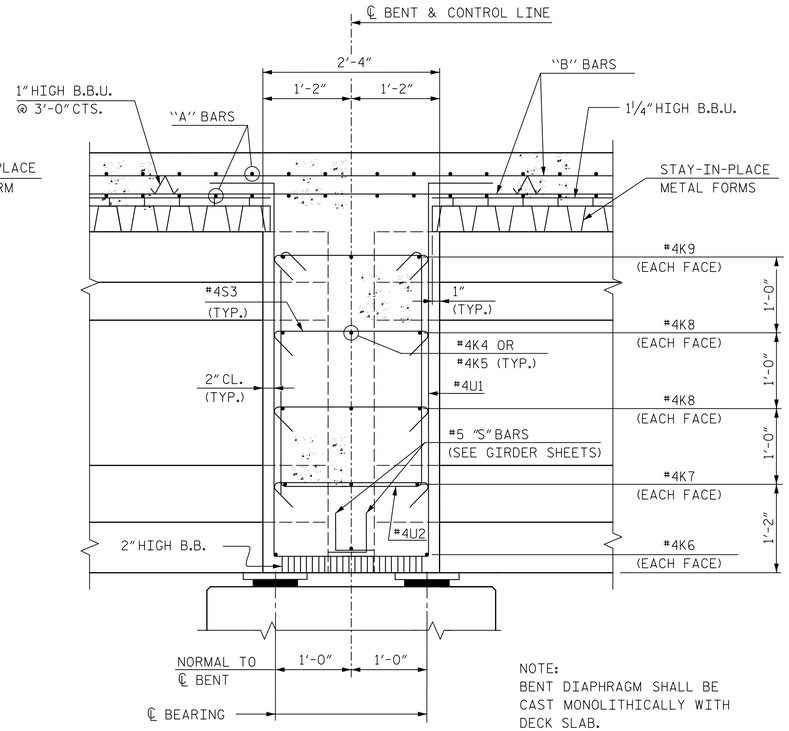


SECTION A-A

SECTION NORMAL THRU END BENT 1 DIAPHRAGM, END BENT 2 SIMILAR

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

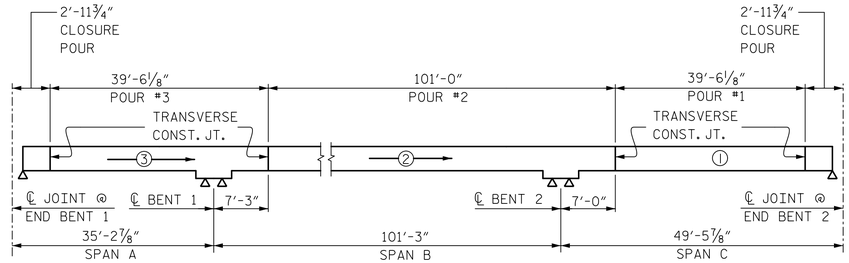


SECTION B-B

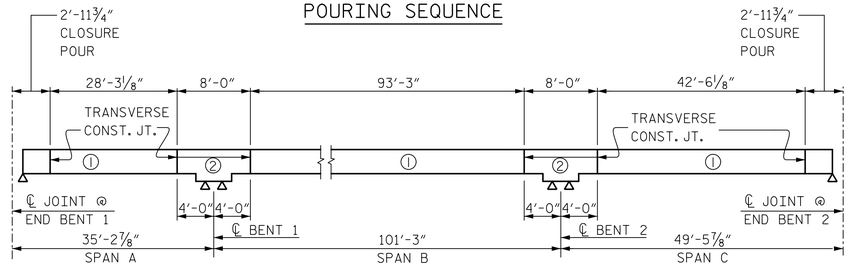
SECTION NORMAL THRU BENT 1 & BENT 2 DIAPHRAGM

NOTE:
BENT DIAPHRAGM SHALL BE CAST MONOLITHICALLY WITH DECK SLAB.

NOTE: ALL DIMENSIONS FOR POURING SEQUENCE AND OPTIONAL POURING SEQUENCE ARE ALONG CONTROL LINE LEFT.

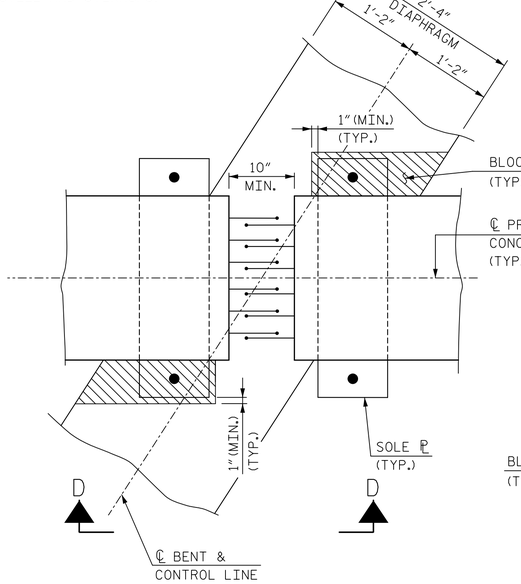


POURING SEQUENCE



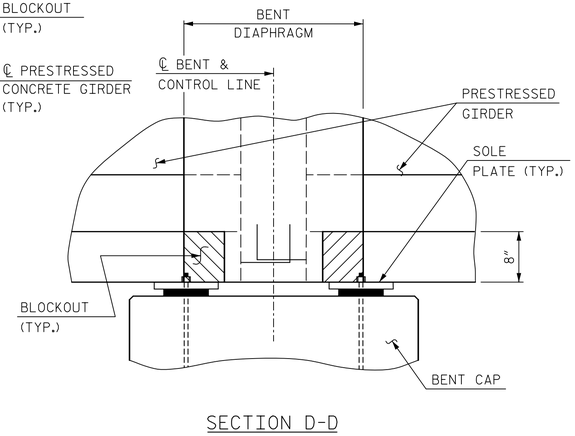
OPTIONAL POURING SEQUENCE

NOTE: POUR ② CAN NOT BE STARTED UNTIL BOTH ADJACENT ① POURS REACH A MINIMUM OF 3000 PSI



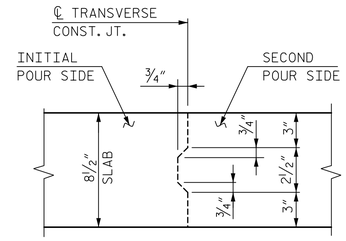
PLAN VIEW

(AT INTERIOR BENTS)



SECTION D-D

BENT DIAPHRAGM BLOCKOUT DETAILS



DECK SLAB TRANSVERSE CONSTRUCTION JOINT DETAIL

REINFORCING STEEL IN SLAB NOT SHOWN. LONGITUDINAL REINFORCING STEEL SHALL BE CONTINUOUS THROUGH JOINT.

DocuSigned by: Paul J. Barber 18DF1B57368741E...

NORTH CAROLINA PROFESSIONAL SEAL 12916 ENGINEER PAUL J. BARBER

11/14/2018

PROJECT NO. R-1015

CRAVEN COUNTY

STATION: 506+32.25 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

TYPICAL SECTION DETAILS

LEFT LANE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HNTB NORTH CAROLINA, P.C.
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DRAWN BY M. WRIGHT DATE 7/16
CHECKED BY P. BARBER DATE 8/16
DESIGN ENGINEER OF RECORD P. BARBER DATE 8/18

DWG. NO. 6

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S13-6
1			3			TOTAL SHEETS
2			4			39