

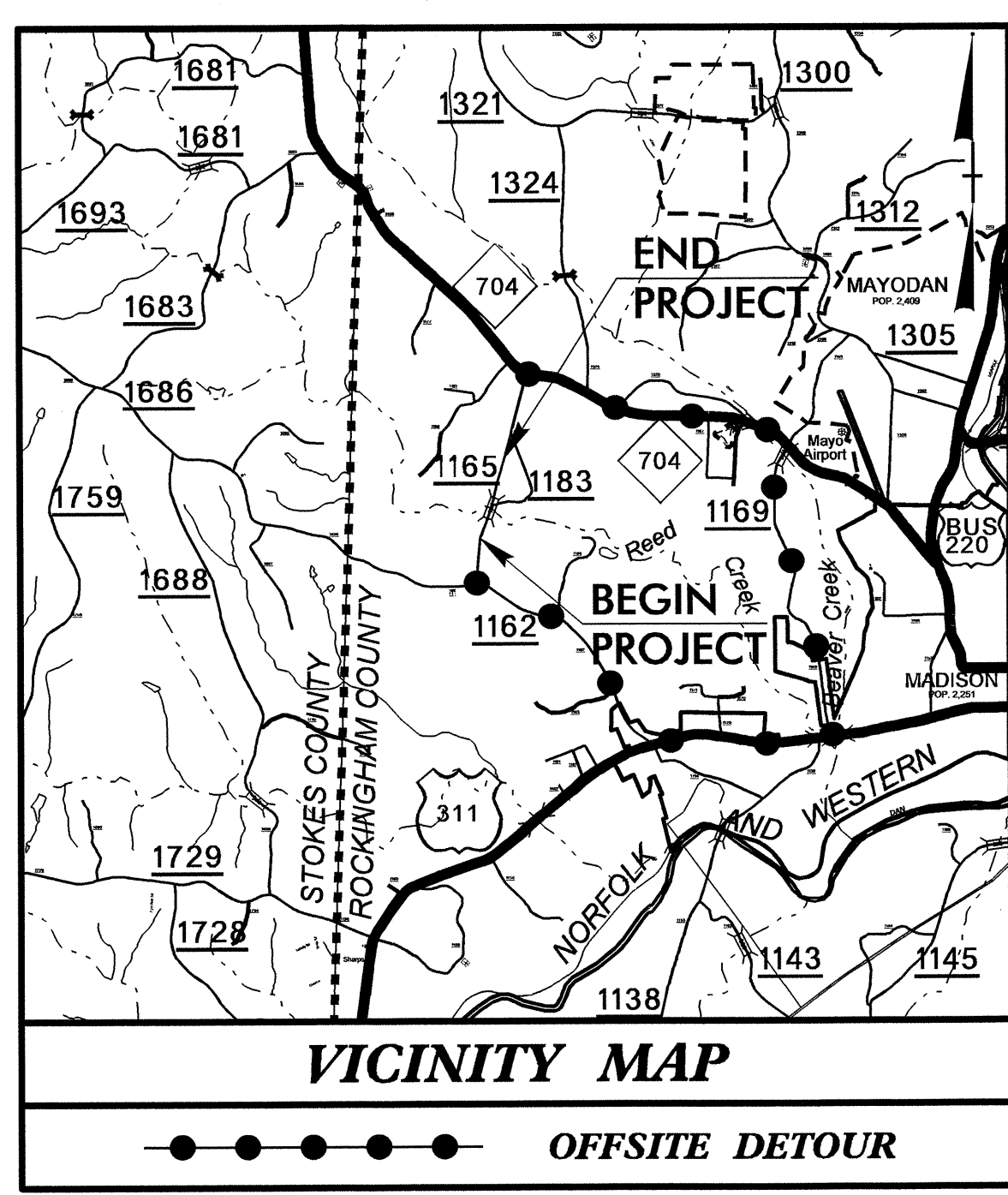
09/08/99  
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 CONTRACT: 203086

TIP PROJECT: B-4965

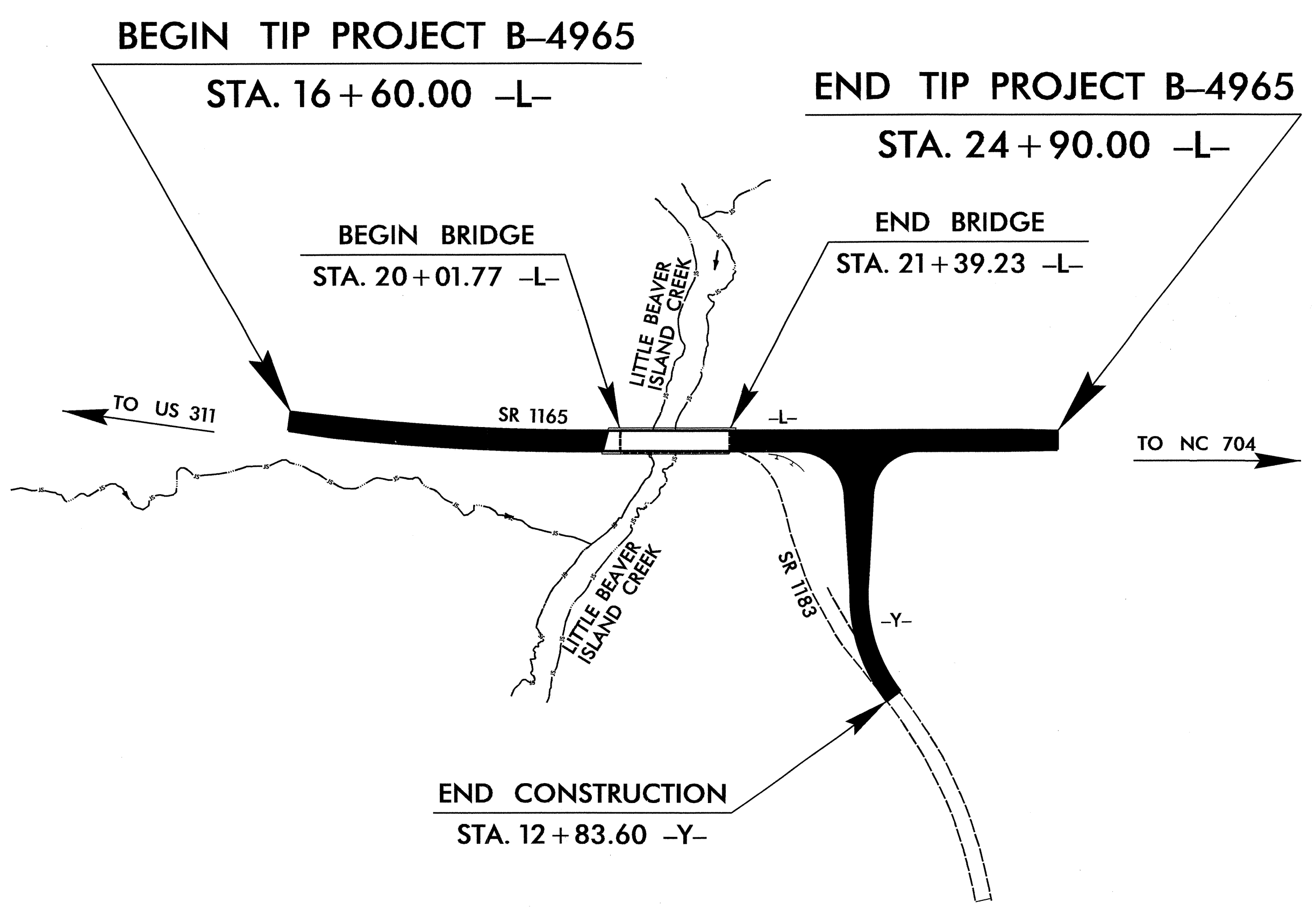
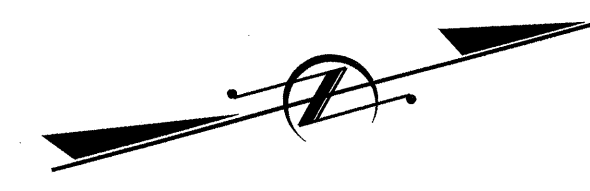
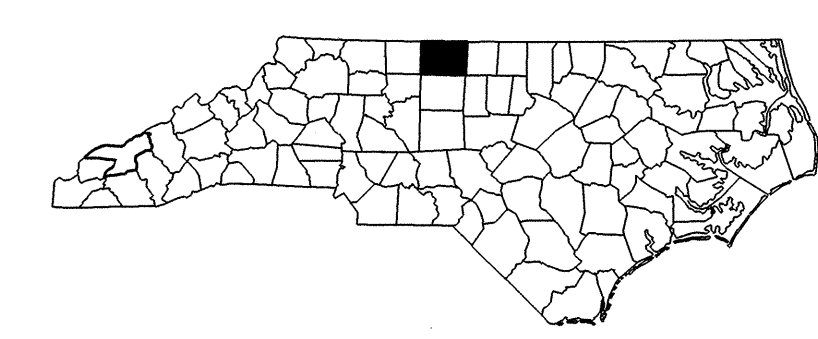
STATE OF NORTH CAROLINA  
 DIVISION OF HIGHWAYS

**ROCKINGHAM COUNTY**

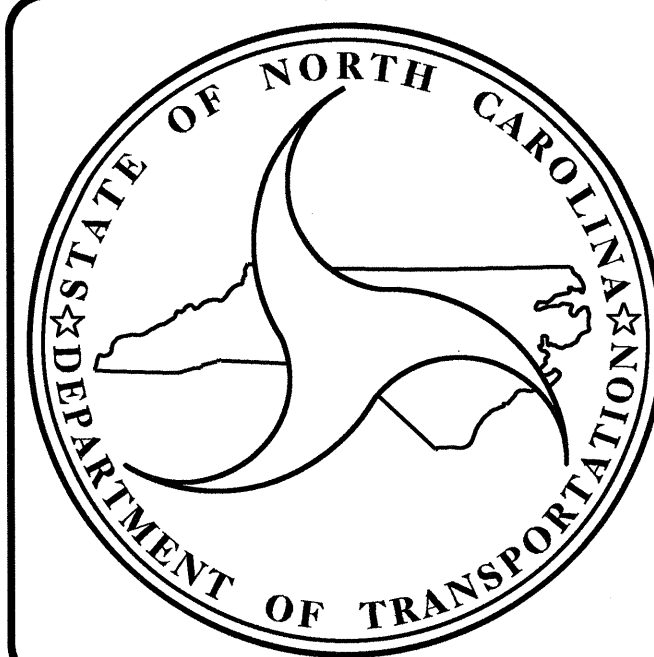
LOCATION: BRIDGE NO. 249 OVER LITTLE BEAVER ISLAND CREEK ON SR 1165 (CARDINAL RD.)  
 TYPE OF WORK: GRADING, DRAINAGE, PAVING, AND STRUCTURE



STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4965		
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
40243.1.1	BRZ-1165(6)	PE	
40243.2.1	BRZ-1165(6)	RW, UTIL.	
40243.3.1	BRZ-1165(6)	CONST.	



**STRUCTURE**



**DESIGN DATA**

ADT 2012	=	1,760
ADT 2035	=	2,200
DHV	=	12 %
D	=	60 %
T	=	4 % *
** V	=	60 MPH
* TTST	1% DUAL 3%	
FUNC CLASS	=	RUAL LOCAL
SUB REGIONAL TIER		

**PROJECT LENGTH**

LENGTH ROADWAY TIP PROJECT B-4965	=	0.131 mi.
LENGTH STRUCTURE TIP PROJECT B-4965	=	0.026 mi.
TOTAL LENGTH OF TIP PROJECT B-4965	=	0.157 mi.

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

2012 STANDARD SPECIFICATIONS

**LETTING DATE:**  
 MARCH 19, 2013

**J. M. BAILEY, PE**  
 PROJECT ENGINEER

**D. R. CALHOUN, P.E.**  
 PROJECT DESIGN ENGINEER

**STRUCTURES MANAGEMENT UNIT**  
 1000 BIRCH RIDGE DR.  
 RALEIGH, N.C. 27610

**DIVISION OF HIGHWAYS  
 STATE OF NORTH CAROLINA**

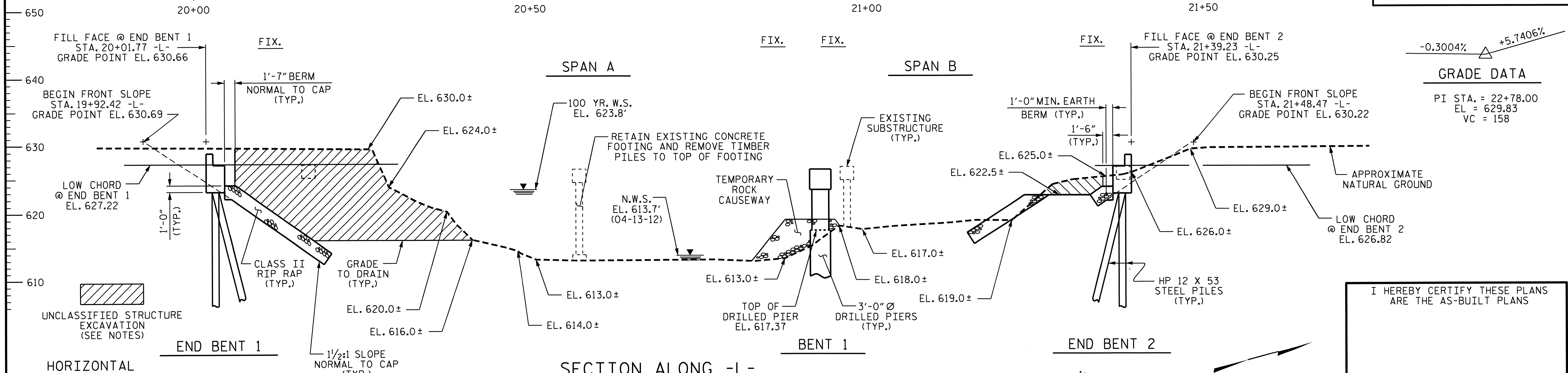
P.E.

STATE DESIGN ENGINEER

DEPARTMENT OF TRANSPORTATION  
 FEDERAL HIGHWAY ADMINISTRATION

DIVISION ADMINISTRATOR APPROVED

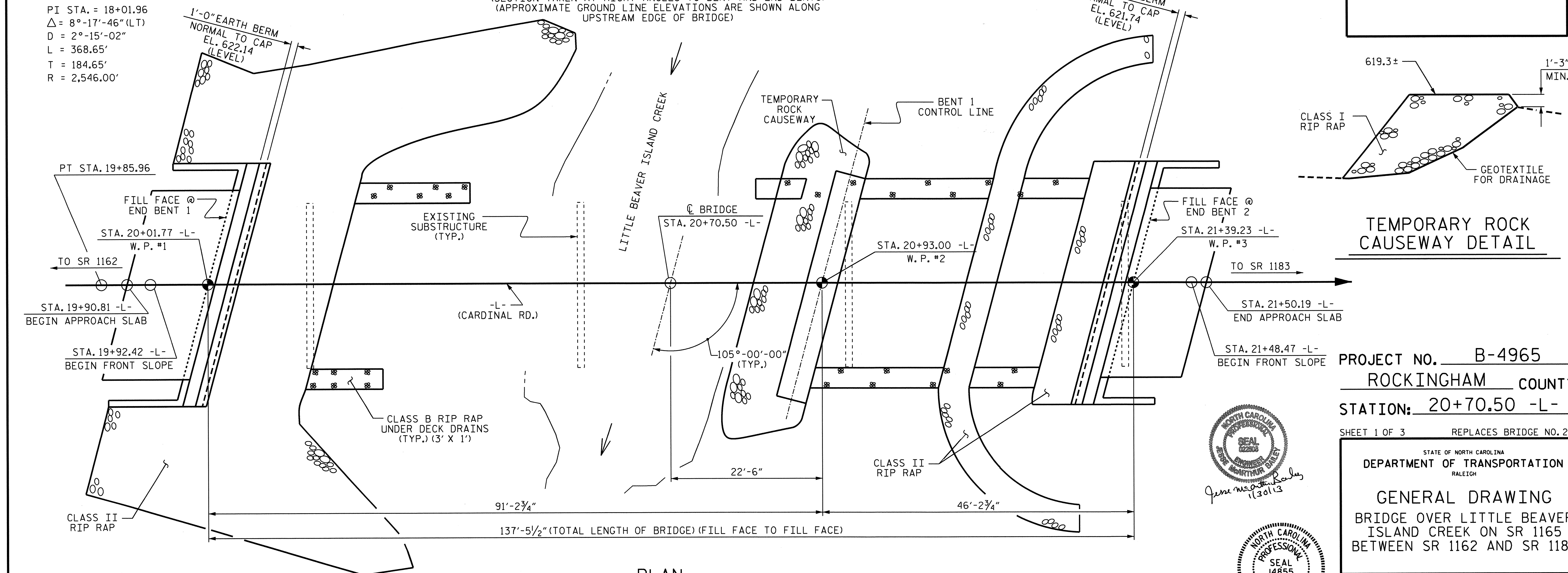
DATE



**HORIZONTAL CURVE DATA**

PI STA. = 18+01.96  
 Δ = 8°-17'-46" (LT)  
 D = 2°-15'-02"  
 L = 368.65'  
 T = 184.65'  
 R = 2,546.00'

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS



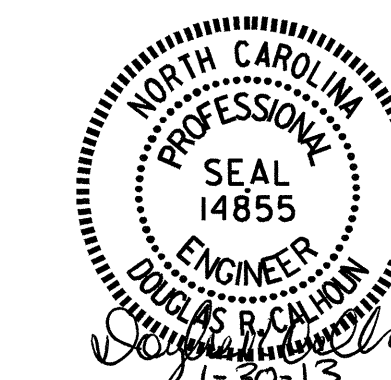
**TEMPORARY ROCK CAUSEWAY DETAIL**

PROJECT NO. B-4965  
 ROCKINGHAM COUNTY  
 STATION: 20+70.50 -L-

SHEET 1 OF 3      REPLACES BRIDGE NO. 249

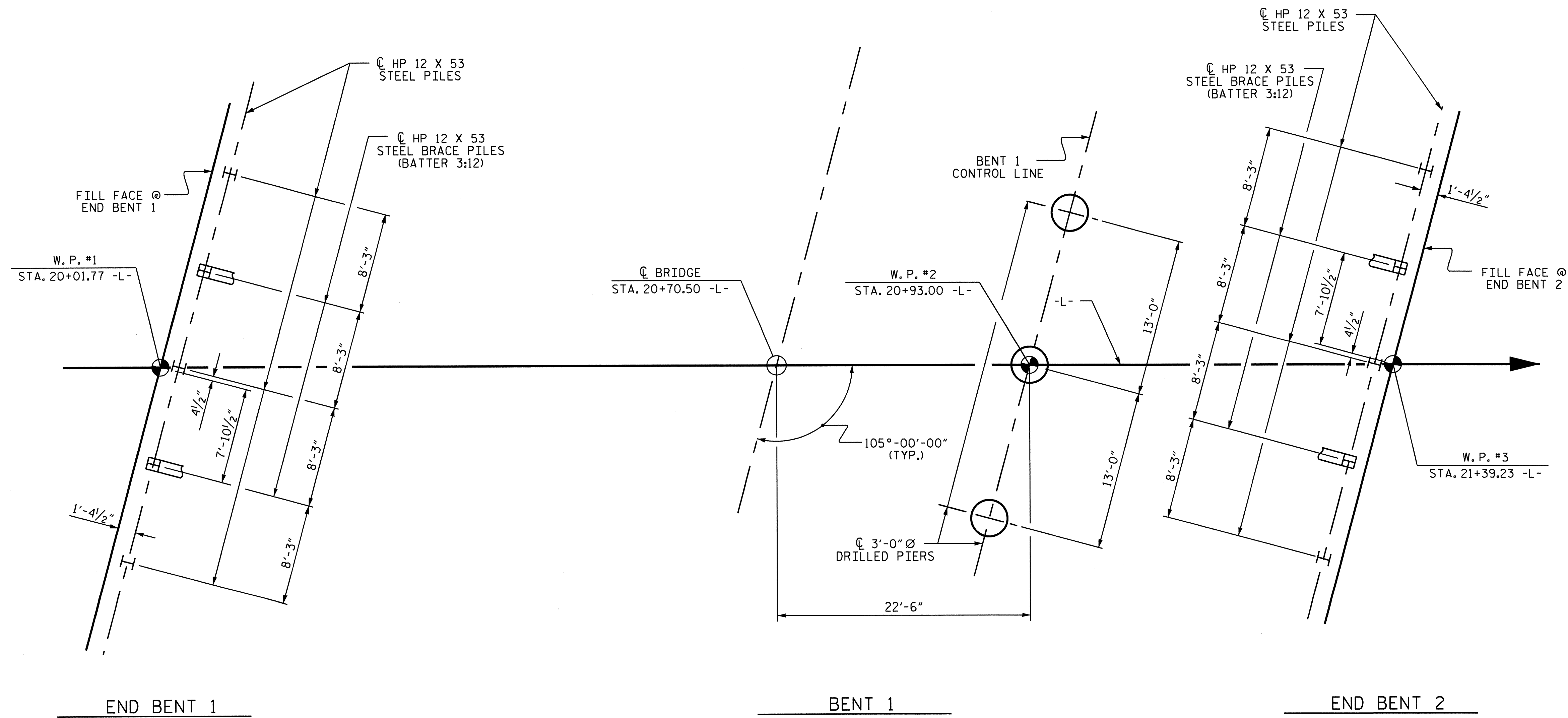
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**GENERAL DRAWING**  
 BRIDGE OVER LITTLE BEAVER ISLAND CREEK ON SR 1165 BETWEEN SR 1162 AND SR 1183



DRAWN BY : D. G. ELY      DATE : 11/2012  
 CHECKED BY : A. K. PATEL      DATE : 11/2012

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



**FOUNDATION LAYOUT**

(DIMENSIONS LOCATING PILES AND DRILLED PIERS ARE SHOWN TO THE CENTERLINE AT THE BOTTOM OF CAP)

**NOTES**

FOR DRILLED PIERS, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.

DRILLED PIERS AT BENT 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 370 TONS PER PIER. CHECK FIELD CONDITIONS FOR THE REQUIRED TIP RESISTANCE OF 120 TSF.

PERMANENT STEEL CASINGS MAY BE REQUIRED FOR DRILLED PIERS AT BENT 1. IF REQUIRED, DO NOT EXTEND CASING BELOW ELEVATION 604 FEET WITHOUT PRIOR APPROVAL FROM THE ENGINEER. THE ENGINEER WILL DETERMINE THE NEED FOR PERMANENT STEEL CASING.

INSTALL DRILLED PIERS AT BENT 1 THAT EXTEND TO AN ELEVATION NO HIGHER THAN 594 FEET AND WITH THE REQUIRED TIP RESISTANCE.

THE SCOUR CRITICAL ELEVATION FOR BENT 1 IS ELEVATION 604 FEET. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.

SID INSPECTIONS MAY BE REQUIRED FOR DRILLED PIERS. THE ENGINEER WILL DETERMINE THE NEED FOR SID INSPECTIONS.

CSL TUBES ARE REQUIRED AND CSL TESTING MAY BE REQUIRED FOR DRILLED PIERS. THE ENGINEER WILL DETERMINE THE NEED FOR CSL TESTING. FOR CSL TESTING, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.

SPT MAY BE REQUIRED FOR DRILLED PIERS. THE ENGINEER WILL DETERMINE THE NEED FOR SPT. FOR SPT TESTING, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.

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.

PILES AT END BENT 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 85 TONS PER PILE.

DRIVE PILES AT END BENT 1 TO A REQUIRED DRIVING RESISTANCE OF 210 TONS PER PILE.

DRIVE PILES AT END BENT 2 TO A REQUIRED DRIVING RESISTANCE OF 145 TONS PER PILE.

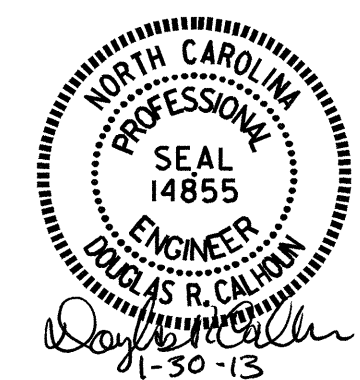
PROJECT NO. B-4965  
ROCKINGHAM COUNTY  
 STATION: 20+70.50 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**GENERAL DRAWING**

BRIDGE OVER LITTLE BEAVER  
 ISLAND CREEK ON SR 1165  
 BETWEEN SR 1162 AND SR 1183



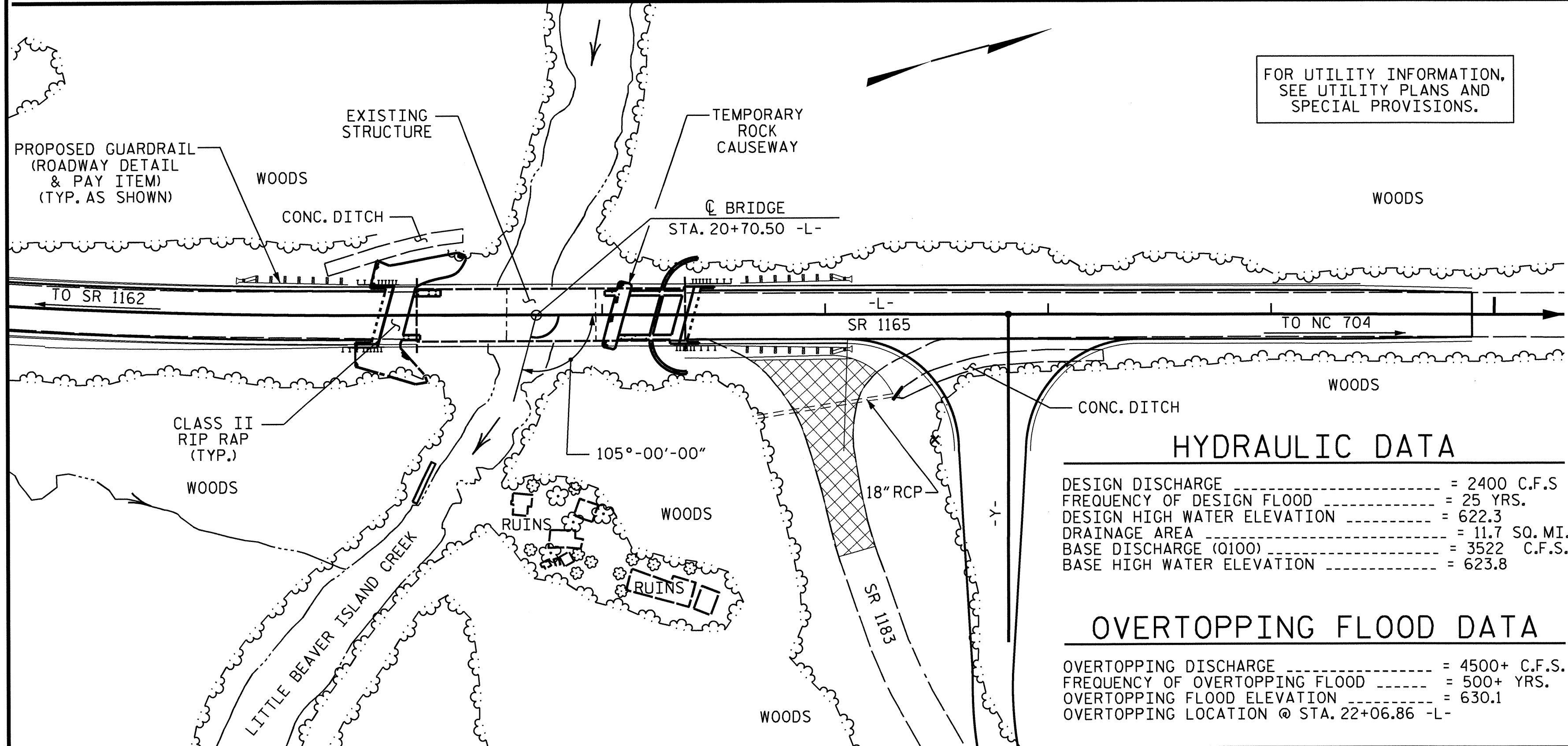
DRAWN BY : D. G. ELY DATE : 11/2012  
 CHECKED BY : A. K. PATEL DATE : 11/2012

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



BM #2 RR SPIKE IN ROOT OF 36 INCH TULIP POPLAR TREE, STA. 22+37.42 -L-, 141' LEFT, EL. 636.22

FOR UTILITY INFORMATION,  
SEE UTILITY PLANS AND  
SPECIAL PROVISIONS.



LOCATION SKETCH

HYDRAULIC DATA

DESIGN DISCHARGE	= 2400 C.F.S
FREQUENCY OF DESIGN FLOOD	= 25 YRS.
DESIGN HIGH WATER ELEVATION	= 622.3
DRAINAGE AREA	= 11.7 SQ. MI.
BASE DISCHARGE (Q100)	= 3522 C.F.S.
BASE HIGH WATER ELEVATION	= 623.8

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE	= 4500+ C.F.S.
FREQUENCY OF OVERTOPPING FLOOD	= 500+ YRS.
OVERTOPPING FLOOD ELEVATION	= 630.1
OVERTOPPING LOCATION @ STA. 22+06.86 -L-	

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 BARS FROM WHICH THE SAMPLES ARE TAKEN MUST THEN BE SPICED WITH REPLACEMENT BARS OF THE SIZE AND LENGTH OF THE SAMPLE, PLUS A MINIMUM LAP SPLICE OF THIRTY BAR DIAMETERS. PAYMENT FOR THE SAMPLES OF REINFORCING STEEL SHALL BE CONSIDERED INCIDENTAL TO VARIOUS PAY ITEMS.

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

THE LOCATION OF THE CONSTRUCTION JOINT IN THE DRILLED PIERS IS BASED ON AN APPROXIMATE GROUND LINE ELEVATION. IF THE CONSTRUCTION JOINT IS ABOVE THE ACTUAL GROUND ELEVATION, THE CONTRACTOR SHALL PLACE THE CONSTRUCTION JOINT 1 FT. BELOW THE GROUND LINE.

ASPHALT WEARING SURFACE IS INCLUDED IN ROADWAY QUANTITY ON ROADWAY PLANS.

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

INASMUCH AS THE PAINT SYSTEM ON THE EXISTING STRUCTURAL STEEL CONTAINS LEAD, THE CONTRACTOR'S ATTENTION IS DIRECTED TO ARTICLE 107-1 OF THE STANDARD SPECIFICATIONS. ANY COSTS RESULTING FROM COMPLIANCE WITH APPLICABLE STATE OR FEDERAL REGULATIONS PERTAINING TO HANDLING OF MATERIALS CONTAINING LEAD BASED PAINT SHALL BE INCLUDED IN THE BID PRICE FOR 'REMOVAL OF EXISTING STRUCTURE AT STATION 20+70.50 -L-.'

THE MATERIAL SHOWN ON SHEET S-1 IN THE CROSS-HATCHED AREA SHALL BE EXCAVATED FOR A DISTANCE UP TO 40 FEET LEFT AND RIGHT OF CENTERLINE ROADWAY AS DIRECTED BY THE ENGINEER. THIS WORK WILL BE PAID FOR AT THE CONTRACT LUMP SUM PRICE FOR UNCLASSIFIED STRUCTURE EXCAVATION. SEE SECTION 412 OF THE STANDARD SPECIFICATIONS.

THE EXISTING STRUCTURE CONSISTING OF 3 SPANS; 1 @ 40'-4", 1 @ 40'-0", 1 @ 40'-4" WITH A STEEL PLANK DECK ON STEEL GIRDERS/STRINGER/FLOORBEAM SYSTEM ON TIMBER END BENTS AND INTERIOR BENTS & CONCRETE ENCASED HELPER @ BENT 2; 24'-0" CLEAR ROADWAY WIDTH AND A 4" AWS AND LOCATED AT THE PROPOSED STRUCTURE SHALL BE REMOVED. THE EXISTING BRIDGE IS PRESENTLY CLOSED.

THE SUBSTRUCTURE OF THE EXISTING BRIDGE INDICATED ON THE PLANS IS FROM THE BEST INFORMATION AVAILABLE. SINCE THIS INFORMATION IS SHOWN FOR THE CONVENIENCE OF THE CONTRACTOR, THE CONTRACTOR SHALL HAVE NO CLAIM WHATSOEVER AGAINST THE DEPARTMENT OF TRANSPORTATION FOR ANY DELAYS OR ADDITIONAL COST INCURRED BASED ON DIFFERENCES BETWEEN THE EXISTING BRIDGE SUBSTRUCTURE SHOWN ON THE PLANS AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

REMOVAL OF THE EXISTING BRIDGE SHALL BE PERFORMED SO AS NOT TO ALLOW DEBRIS TO FALL INTO THE WATER. THE CONTRACTOR SHALL REMOVE THE BRIDGE AND SUBMIT PLANS FOR DEMOLITION IN ACCORDANCE WITH ARTICLE 402-2 OF THE STANDARD SPECIFICATIONS.

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

TOTAL BILL OF MATERIAL

	CONSTRUCTION, MAINTENANCE & REMOVAL OF TEMPORARY ACCESS	REMOVAL OF EXISTING STRUCTURE	3'-0" Ø DRILLED PIERS IN SOIL	3'-0" Ø DRILLED PIERS NOT IN SOIL	PERMANENT STEEL CASING FOR 3'-0" Ø DRILLED PIER	SID INSPECTIONS	SPT TESTING	CSL TESTING	UNCLASSIFIED STRUCTURE EXCAVATION	CLASS A CONCRETE	BRIDGE APPROACH SLABS	REINFORCING STEEL	SPIRAL COLUMN REINFORCING STEEL
	LUMP SUM	LUMP SUM	LIN. FEET	LIN. FEET	LIN. FEET	EACH	EACH	EACH	LUMP SUM	CU. YDS.	LUMP SUM	LBS	LBS
SUPERSTRUCTURE													
END BENT 1									LUMP SUM	24.5		3436	
BENT 1			48.0	24.0	40.1					17.5		8986	1563
END BENT 2									LUMP SUM	24.5		3436	
TOTAL	LUMP SUM	LUMP SUM	48.0	24.0	40.1	1	1	1	LUMP SUM	66.5	LUMP SUM	15,858	1563

TOTAL BILL OF MATERIAL

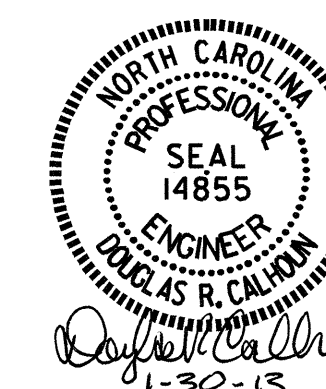
	HP 12 X 53 STEEL PILES		STEEL PILE POINTS	VERTICAL CONCRETE BARRIER RAIL	RIP RAP CLASS B	RIP RAP (CLASS II 2'-0" THICK)	GEOTEXTILE FOR DRAINAGE	ELASTOMERIC BEARINGS	3'-0" X 2'-9" PRESTRESSED CONCRETE BOX BEAMS	
	NO.	LIN. FT.	EACH	LIN. FT.	TONS	TONS	SQ. YDS.	LUMP SUM	NO.	LIN. FT.
SUPERSTRUCTURE				270.0				LUMP SUM	20	1350.0
END BENT 1	5	75	5		5	320	373			
BENT 1										
END BENT 2	5	50	5		12	210	285			
TOTAL	10	125	10	270.0	17	530	658	LUMP SUM	20	1350.0

PROJECT NO. B-4965  
ROCKINGHAM COUNTY  
STATION: 20+70.50 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

GENERAL DRAWING  
BRIDGE OVER LITTLE BEAVER  
ISLAND CREEK ON SR 1165  
BETWEEN SR 1162 AND SR 1183



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



LOAD AND RESISTANCE FACTOR RATING (LRFD) 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								
						LIVELOAD FACTORS	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)	LIVELOAD FACTORS	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN		GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING	HL-93(Inv)	N/A	1	1.126	--	1.75	0.267	1.49	A	EL	44,224	0.584	1.15	A	EL	8,845	0.80	0.267	1.13	A	EL	44,224		
	HL-93(Oper)	N/A	--	1.488	--	1.35	0.267	1.94	A	EL	44,224	0.584	1.49	A	EL	8,845	N/A	--	--	--	--	--		
	HS-20(Inv)	36.000	2	1.491	53.666	1.75	0.267	2.03	A	EL	44,224	0.584	1.49	A	EL	8,845	0.80	0.267	1.53	A	EL	44,224		
	HS-20(Oper)	36.000	--	1.932	69.567	1.35	0.267	2.63	A	EL	44,224	0.584	1.93	A	EL	8,845	N/A	--	--	--	--	--		
LEGAL LOAD RATING	SV	SNSH	13.500	--	3.573	48.237	1.4	0.267	5.92	A	EL	44,224	0.584	4.53	A	EL	8,845	0.80	0.267	3.57	A	EL	44,224	
		SNGARBS2	20.000	--	2.611	52.229	1.4	0.267	4.33	A	EL	44,224	0.584	3.19	A	EL	8,845	0.80	0.267	2.61	A	EL	44,224	
		SNAGRIS2	22.000	--	2.452	53.948	1.4	0.267	4.07	A	EL	44,224	0.584	2.95	A	EL	8,845	0.80	0.267	2.45	A	EL	44,224	
		SNCOTTS3	27.250	--	1.777	48.412	1.4	0.267	2.95	A	EL	44,224	0.584	2.26	A	EL	8,845	0.80	0.267	1.78	A	EL	44,224	
		SNAGGRS4	34.925	--	1.465	51.163	1.4	0.267	2.43	A	EL	44,224	0.584	1.85	A	EL	8,845	0.80	0.267	1.46	A	EL	44,224	
		SNS5A	35.550	--	1.434	50.974	1.4	0.267	2.38	A	EL	44,224	0.584	1.87	A	EL	8,845	0.80	0.267	1.43	A	EL	44,224	
		SNS6A	39.950	--	1.307	52.234	1.4	0.267	2.17	A	EL	44,224	0.584	1.69	A	EL	8,845	0.80	0.267	1.31	A	EL	44,224	
	SNS7B	42.000	--	1.245	52.283	1.4	0.267	2.06	A	EL	44,224	0.584	1.65	A	EL	8,845	0.80	0.267	1.24	A	EL	44,224		
	TTST	TNAGRIT3	33.000	--	1.592	52.537	1.4	0.267	2.64	A	EL	44,224	0.584	2.02	A	EL	8,845	0.80	0.267	1.59	A	EL	44,224	
		TNT4A	33.075	--	1.597	52.815	1.4	0.267	2.65	A	EL	44,224	0.584	1.98	A	EL	8,845	0.80	0.267	1.60	A	EL	44,224	
		TNT6A	41.600	--	1.298	53.997	1.4	0.267	2.15	A	EL	44,224	0.584	1.74	A	EL	8,845	0.80	0.267	1.30	A	EL	44,224	
		TNT7A	42.000	--	1.3	54.619	1.4	0.267	2.16	A	EL	44,224	0.584	1.71	A	EL	8,845	0.80	0.267	1.30	A	EL	44,224	
		TNT7B	42.000	--	1.335	56.09	1.4	0.267	2.21	A	EL	44,224	0.584	1.62	A	EL	8,845	0.80	0.267	1.34	A	EL	44,224	
		TNAGRIT4	43.000	--	1.278	54.943	1.4	0.267	2.12	A	EL	44,224	0.584	1.57	A	EL	8,845	0.80	0.267	1.28	A	EL	44,224	
TNAGT5A		45.000	--	1.208	54.37	1.4	0.267	2	A	EL	44,224	0.584	1.55	A	EL	8,845	0.80	0.267	1.21	A	EL	44,224		
TNAGT5B	45.000	3	1.197	53.852	1.4	0.267	1.98	A	EL	44,224	0.584	1.5	A	EL	8,845	0.80	0.267	1.20	A	EL	44,224			

LOAD FACTORS:

DESIGN LOAD RATING FACTORS	LIMIT STATE	γ <sub>DC</sub>	γ <sub>DW</sub>
	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.

# CONTROLLING LOAD RATING

① DESIGN LOAD RATING (HL-93)

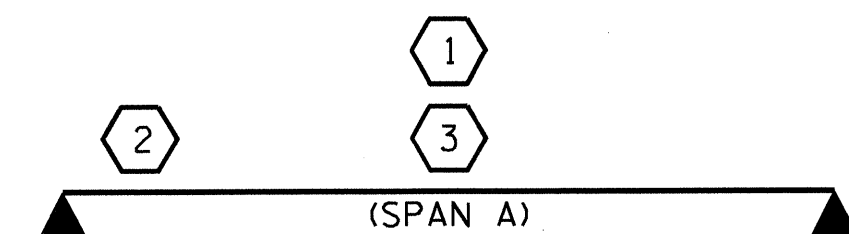
② DESIGN LOAD RATING (HS-20)

③ LEGAL LOAD RATING \*\*

\*\* SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

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

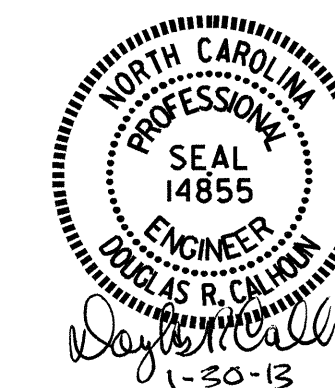


LRFR SUMMARY

PROJECT NO. B-4965  
ROCKINGHAM COUNTY  
 STATION: 20+70.50 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD  
 LRFR SUMMARY FOR  
 90' BOX BEAM UNIT  
 105° SKEW  
 (NON-INTERSTATE TRAFFIC)



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

ASSEMBLED BY : A.C. OUTLAW DATE : 7/11/12  
 CHECKED BY : A. SORSENGINH DATE : 7/12  
 DRAWN BY : TMG II/II  
 CHECKED BY : AAC II/II

LOAD FACTORS:

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

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

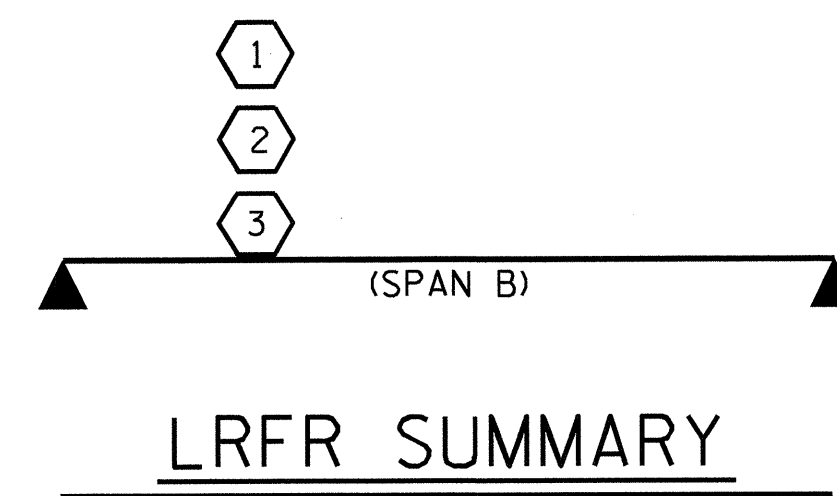
LEVEL	VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING #	MINIMUM RATING FACTORS (RF)	TONS = W X RF	STRENGTH I LIMIT STATE										SERVICE III LIMIT STATE					COMMENT NUMBER			
						LIVELOAD FACTORS	MOMENT					SHEAR					LIVELOAD FACTORS	MOMENT						
							DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	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(Inv)	N/A	1	1.73	--	1.75	0.276	2.55	B	EL	21.724	0.598	<b>1.73</b>	B	EL	<b>8.689</b>	0.80	0.276	2.28	B	EL	21.724		
	HL-93(0pr)	N/A	--	2.24	--	1.35	0.276	3.31	B	EL	21.724	0.598	2.24	B	EL	8.689	N/A	--	--	--	--	--		
	HS-20(Inv)	36.000	2	2.00	71.907	1.75	0.276	3.13	B	EL	21.724	0.598	<b>2.00</b>	B	EL	<b>8.689</b>	0.80	0.276	2.78	B	EL	21.724		
	HS-20(0pr)	36.000	--	2.59	93.213	1.35	0.276	4.06	B	EL	21.724	0.598	2.59	B	EL	8.689	N/A	--	--	--	--	--		
LEGAL LOAD RATING	SV	SNSH	13.500	--	5.26	71.047	1.4	0.276	7.6	B	EL	21.724	0.598	5.26	B	EL	8.689	0.80	0.276	5.43	B	EL	21.724	
		SNGARBS2	20.000	--	3.94	78.849	1.4	0.276	6.12	B	EL	17.379	0.598	3.94	B	EL	8.689	0.80	0.276	4.37	B	EL	21.724	
		SNAGRIS2	22.000	--	3.74	82.328	1.4	0.276	5.93	B	EL	17.379	0.598	3.74	B	EL	8.689	0.80	0.276	4.25	B	EL	17.379	
		SNCOTTS3	27.250	--	2.65	72.126	1.4	0.276	3.8	B	EL	21.724	0.598	2.65	B	EL	8.689	0.80	0.276	2.71	B	EL	21.724	
		SNAGGRS4	34.925	--	2.34	81.732	1.4	0.276	3.36	B	EL	21.724	0.598	2.34	B	EL	8.689	0.80	0.276	2.40	B	EL	21.724	
		SNS5A	35.550	--	2.34	83.043	1.4	0.276	3.27	B	EL	21.724	0.598	2.45	B	EL	8.689	0.80	0.276	2.34	B	EL	21.724	
		SNS6A	39.950	--	2.20	87.991	1.4	0.276	3.08	B	EL	21.724	0.598	2.31	B	EL	8.689	0.80	0.276	2.20	B	EL	21.724	
	SNS7B	42.000	--	2.10	88.189	1.4	0.276	2.94	B	EL	21.724	0.598	2.36	B	EL	8.689	0.80	0.276	2.10	B	EL	21.724		
	TTST	TNAGRIT3	33.000	--	2.69	88.721	1.4	0.276	3.78	B	EL	21.724	0.598	2.69	B	EL	8.689	0.80	0.276	2.70	B	EL	21.724	
		TNT4A	33.075	--	2.55	84.340	1.4	0.276	3.82	B	EL	21.724	0.598	2.55	B	EL	8.689	0.80	0.276	2.73	B	EL	21.724	
		TNT6A	41.600	--	2.30	95.509	1.4	0.276	3.21	B	EL	21.724	0.598	2.51	B	EL	8.689	0.80	0.276	2.30	B	EL	21.724	
		TNT7A	42.000	--	2.33	97.986	1.4	0.276	3.28	B	EL	21.724	0.598	2.33	B	EL	8.689	0.80	0.276	2.34	B	EL	21.724	
		TNT7B	42.000	--	2.24	93.903	1.4	0.276	3.41	B	EL	21.724	0.598	2.24	B	EL	8.689	0.80	0.276	2.42	B	EL	21.724	
		TNAGRIT4	43.000	--	2.14	92.045	1.4	0.276	3.25	B	EL	21.724	0.598	2.14	B	EL	8.689	0.80	0.276	2.32	B	EL	21.724	
TNAGT5A		45.000	--	2.16	97.198	1.4	0.276	3.02	B	EL	21.724	0.598	2.24	B	EL	8.689	0.80	0.276	2.16	B	EL	21.724		
TNAGT5B	45.000	3	2.02	91.078	1.4	0.276	2.95	B	EL	21.724	0.598	<b>2.02</b>	B	EL	<b>8.689</b>	0.80	0.276	2.11	B	EL	21.724			

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.

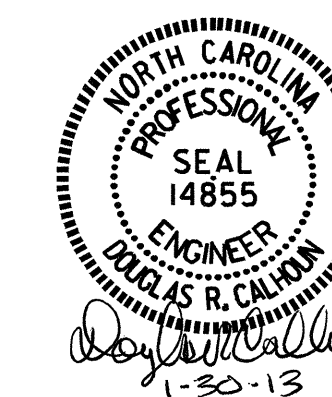
#	CONTROLLING LOAD RATING
1	DESIGN LOAD RATING (HL-93)
2	DESIGN LOAD RATING (HS-20)
3	LEGAL LOAD RATING **
** SEE CHART FOR VEHICLE TYPE	
GIRDER LOCATION	
I - INTERIOR GIRDER EL - EXTERIOR LEFT GIRDER ER - EXTERIOR RIGHT GIRDER	



PROJECT NO. B-4965  
ROCKINGHAM COUNTY  
 STATION: 20+70.50 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD  
 LRFR SUMMARY FOR  
 45' BOX BEAM UNIT  
 105° SKEW  
 (NON-INTERSTATE TRAFFIC)



REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-5
1			3			TOTAL SHEETS
2			4			21

ASSEMBLED BY : A.C. OUTLAW DATE : 7/11/12  
 CHECKED BY : A. SORSENGINH DATE : 7/12  
 DRAWN BY : MAA 1/08  
 CHECKED BY : GM/DI 2/08  
 REV. 11/12/08R MAA/GM



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 CAST WITH THE BOX BEAM SECTIONS SHALL BE GRADE 60 AND SHALL BE INCLUDED IN THE UNIT PRICE BID FOR PRESTRESSED CONCRETE BOX BEAMS.

RECESSES FOR TRANSVERSE STRANDS SHALL BE GROUDED AFTER THE TENSIONING OF THE STRANDS.

THE 2 1/2" Ø DOWEL HOLES AT FIXED ENDS OF BOX BEAM SECTIONS SHALL BE FILLED WITH NON-SHRINK GROUT.

THE BACKER RODS SHALL CONFORM TO THE REQUIREMENTS OF TYPE M BOND BREAKER. SEE SECTION 1028 OF THE STANDARD SPECIFICATIONS.

THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE BOX BEAM UNIT SHALL BE DONE WHEN THE CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN 6000 PSI FOR SPAN A AND 4000 PSI FOR SPAN B.

ALL REINFORCING STEEL IN VERTICAL CONCRETE BARRIER RAILS SHALL BE EPOXY COATED.

PRESTRESSING STRANDS SHALL BE CUT FLUSH WITH THE BOX BEAM UNIT ENDS.

APPLY EPOXY PROTECTIVE COATING TO BOX BEAM UNIT ENDS.

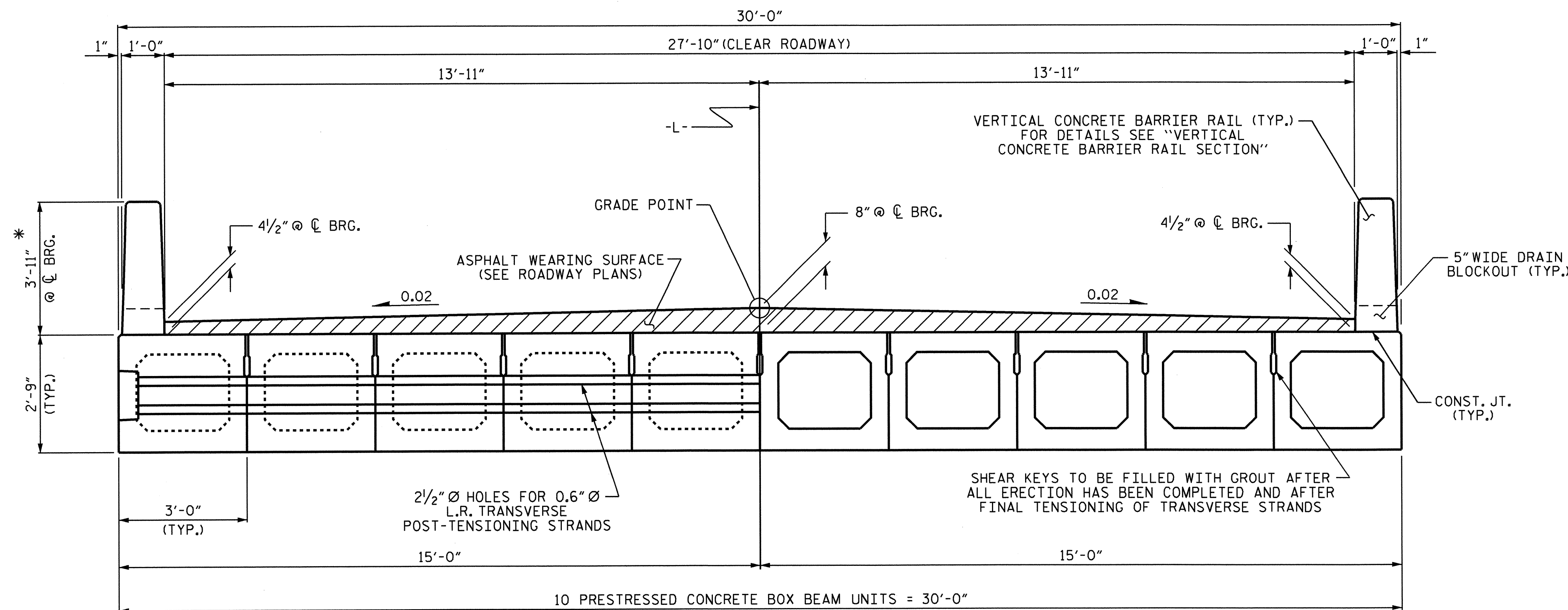
VERTICAL GROOVED CONTRACTION JOINTS, 1/2" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE BARRIER RAIL AND IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. A VERTICAL CONTRACTION JOINT SHALL BE LOCATED AT EACH THIRD POINT BETWEEN BARRIER RAIL EXPANSION JOINTS. ONLY ONE CONTRACTION 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.

THE LOCATION OF THE VOID DRAINS MAY BE SHIFTED SLIGHTLY WHERE NECESSARY TO CLEAR PRESTRESSING STRANDS OR TRANSVERSE REINFORCING STEEL.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

THE DRAIN OPENING AT THE GUTTERLINE SHALL BE 4" X 5". THE HEIGHT OF THE BLOCKOUT IN THE VERTICAL CONCRETE BARRIER RAIL SHALL EXTEND FROM THE TOP OF THE BOX BEAM UNIT TO THE TOP OF THE DRAIN OPENING.

APPLY EPOXY PROTECTIVE COATING TO EXTERIOR FACE OF THE EXTERIOR BOX BEAM UNITS THAT REQUIRE DRAINS IN THE BARRIER RAIL.



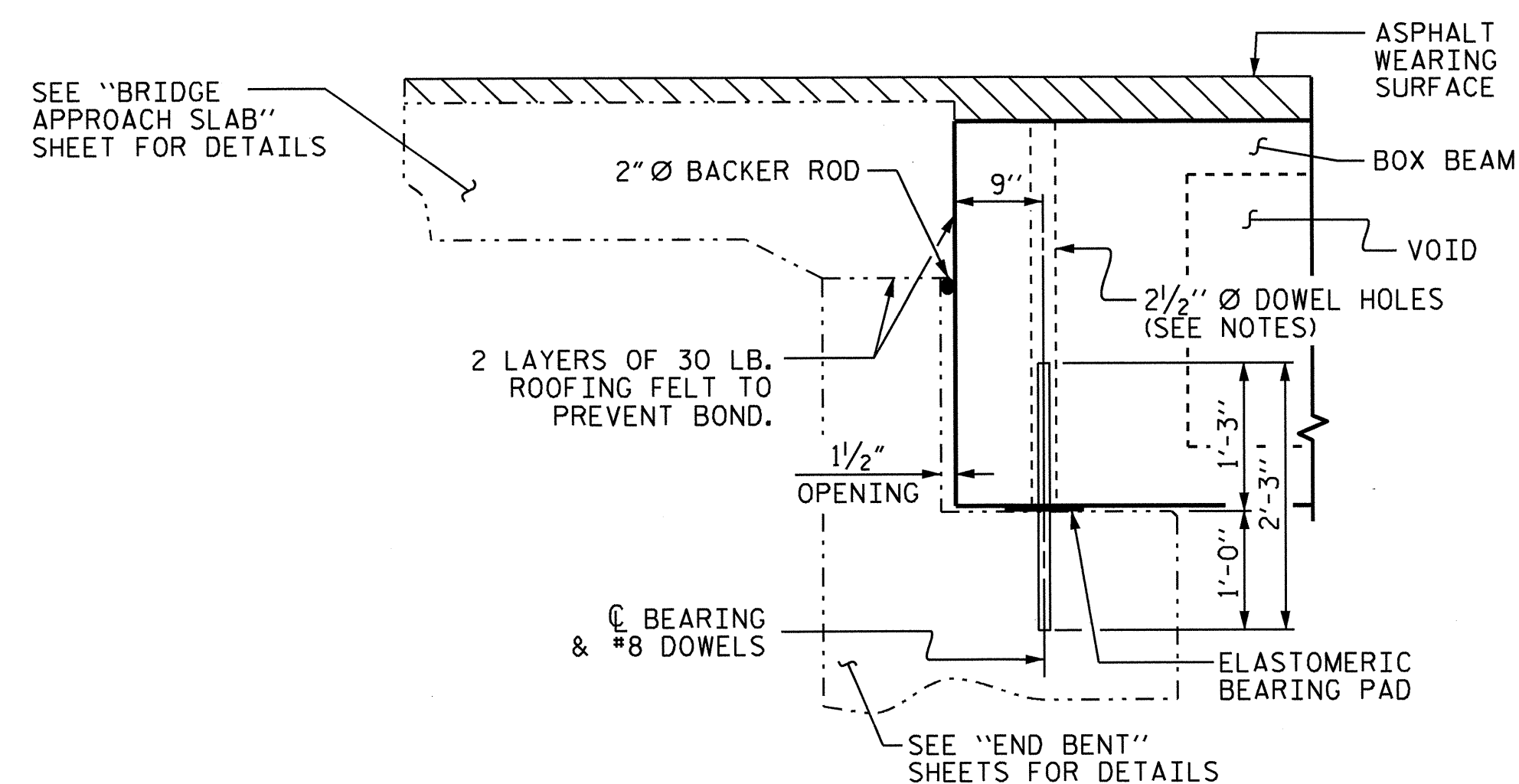
HALF SECTION AT INTERMEDIATE DIAPHRAGMS

HALF SECTION THROUGH VOIDS

TYPICAL SECTION

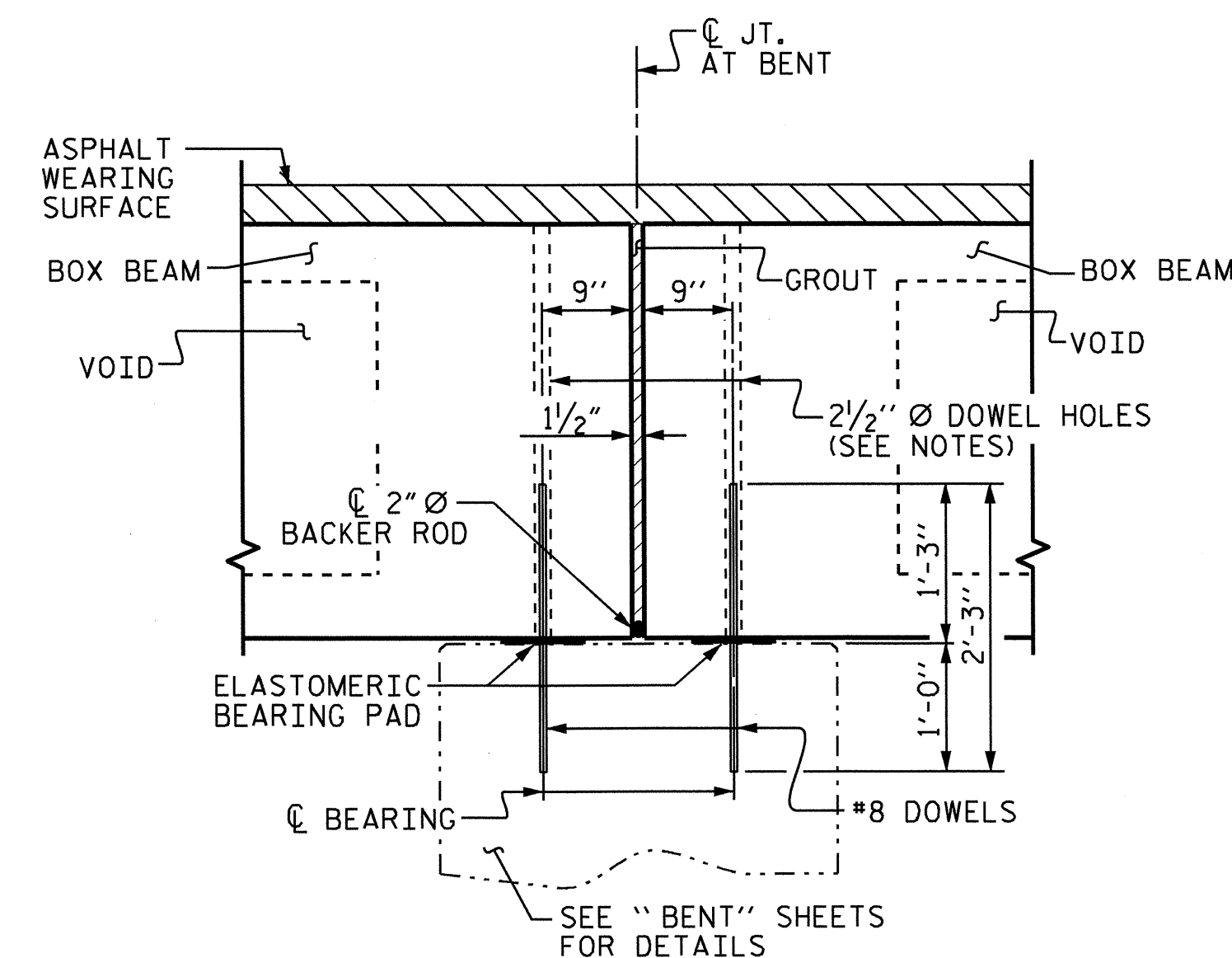
\*THE MAXIMUM BARRIER RAIL HEIGHT AND ASPHALT THICKNESS IS SHOWN. THE HEIGHT OF THE BARRIER RAIL AND ASPHALT THICKNESS VARIES WHILE THE TOP OF THE BARRIER RAIL FOLLOWS THE PROFILE OF THE CUTTERLINE. FOR RAIL HEIGHT DETAILS AND ASPHALT THICKNESS, SEE THE "VERTICAL CONCRETE BARRIER RAIL SECTION" DETAIL.

FIXED END



SECTION AT END BENT

FIXED END FIXED END



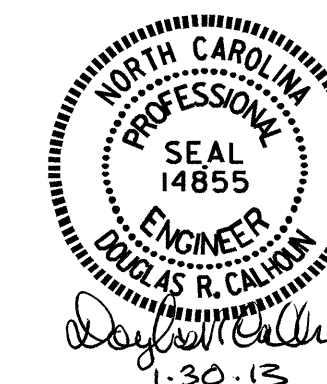
SECTION AT BENT

PROJECT NO. B-4965  
 ROCKINGHAM COUNTY  
 STATION: 20+70.50 -L-

SHEET 1 OF 7

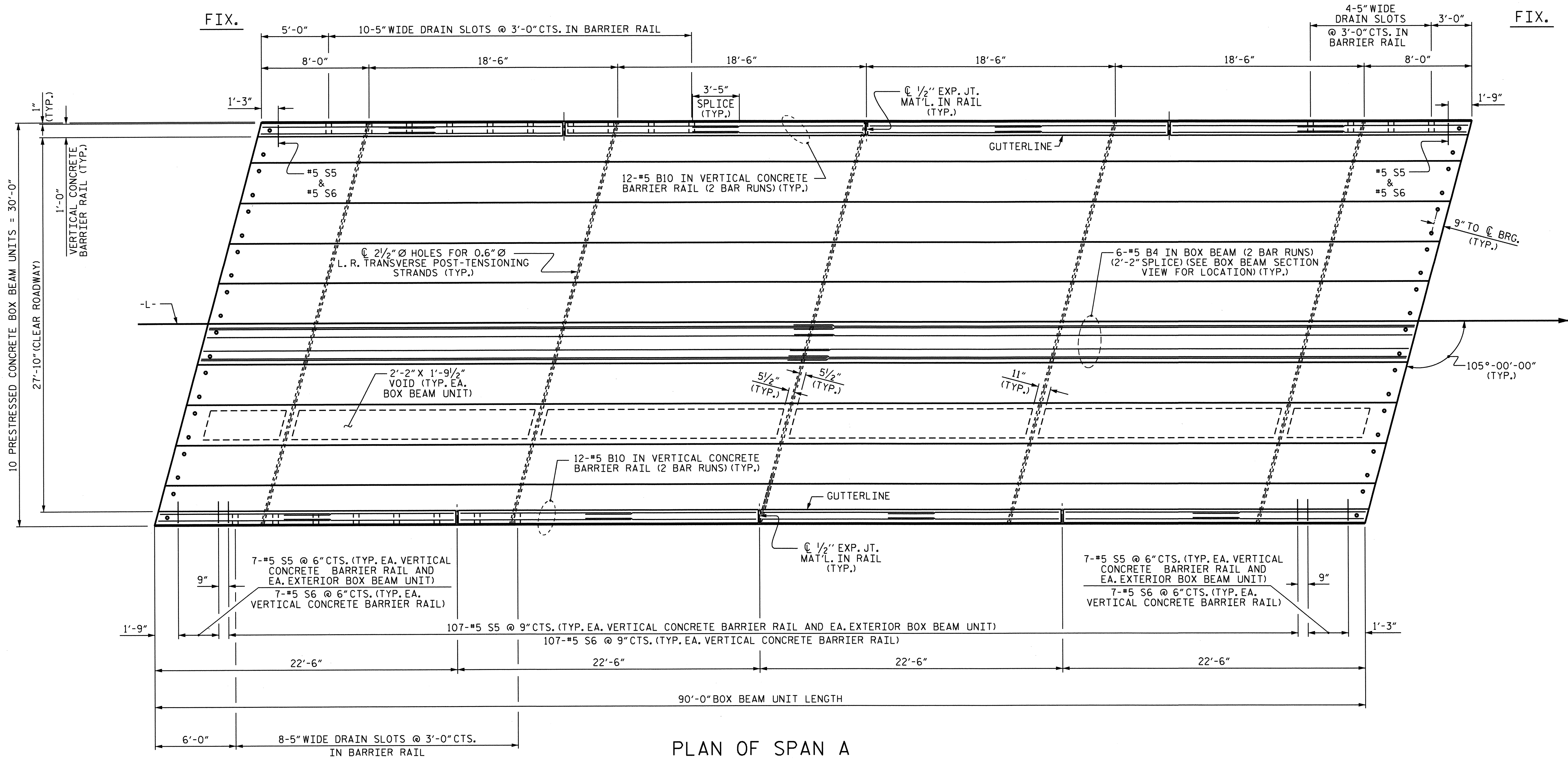
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD

3'-0" X 2'-9"  
 PRESTRESSED CONCRETE  
 BOX BEAM UNIT

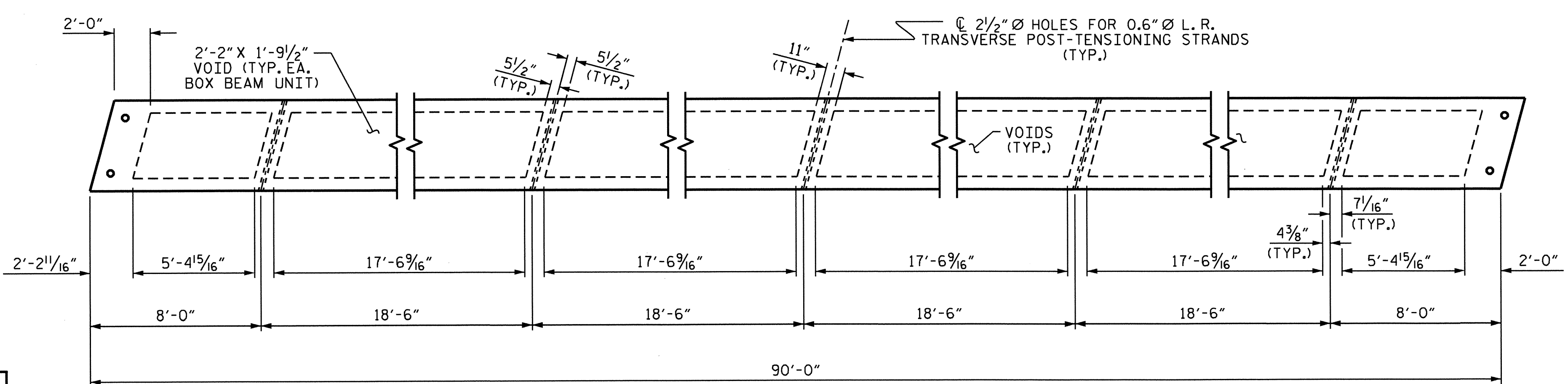


ASSEMBLED BY : A.C. OUTLAW DATE : 7/11/12  
 CHECKED BY : A. SORSENGINH DATE : 7/12  
 DRAWN BY : DGE 8/11  
 CHECKED BY : TMG 11/11

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-6
1			3			TOTAL SHEETS
2			4			21



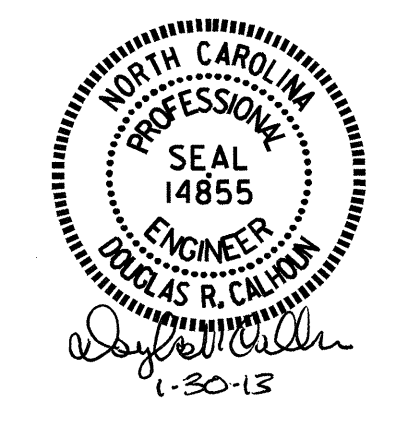
PLAN OF SPAN A



DIAPHRAGM AND VOID LAYOUT

PROJECT NO. B-4965  
ROCKINGHAM COUNTY  
 STATION: 20+70.50 -L-  
 SHEET 2 OF 7

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 PLAN OF 90' UNIT  
 27'-10" CLEAR ROADWAY  
 105° SKEW

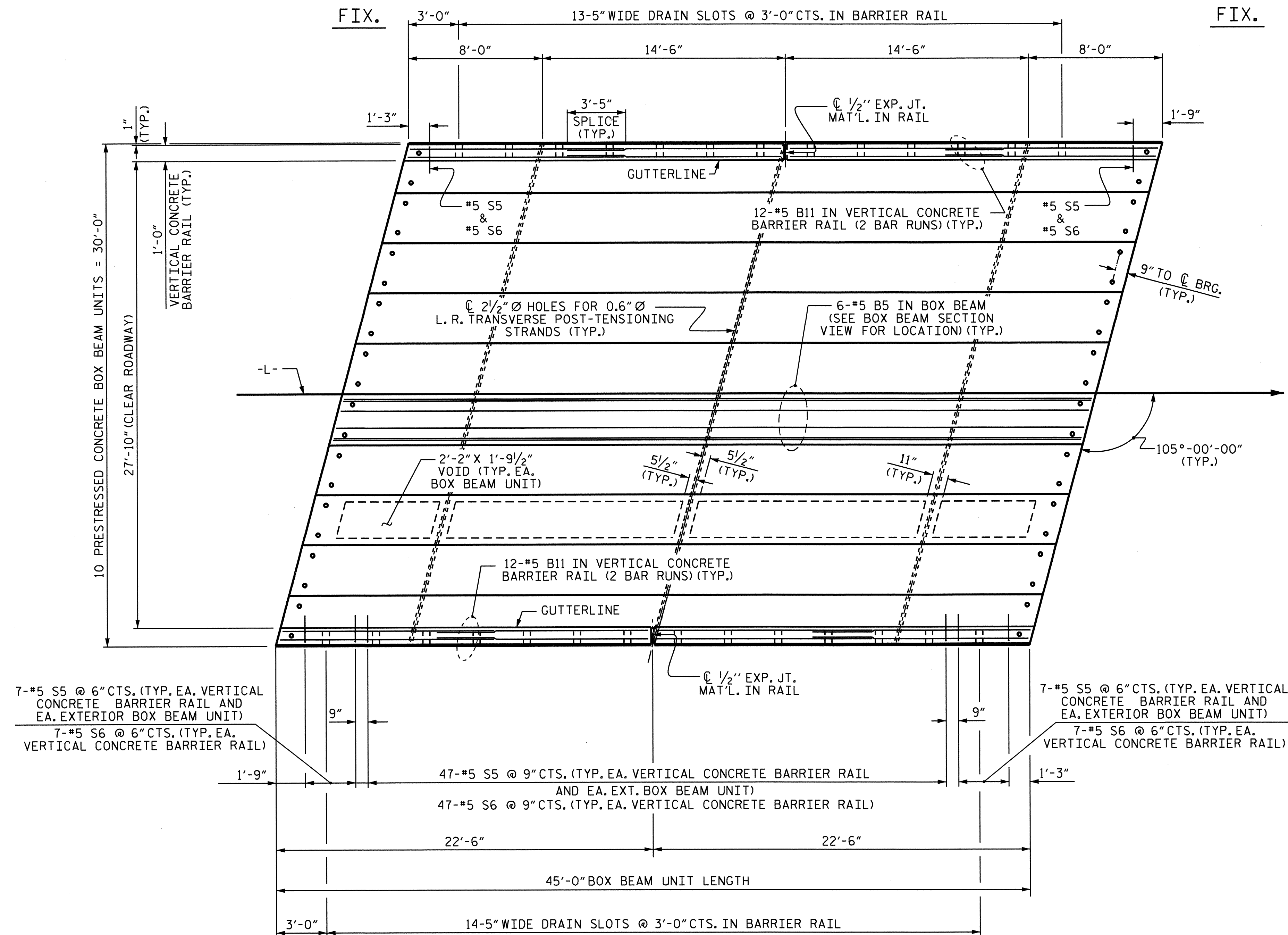


ASSEMBLED BY : A.C. OUTLAW DATE : 7/11/12  
 CHECKED BY : A. SORSENGINH DATE : 7/12  
 DRAWN BY : DGE 8/11  
 CHECKED BY : TMG 11/11

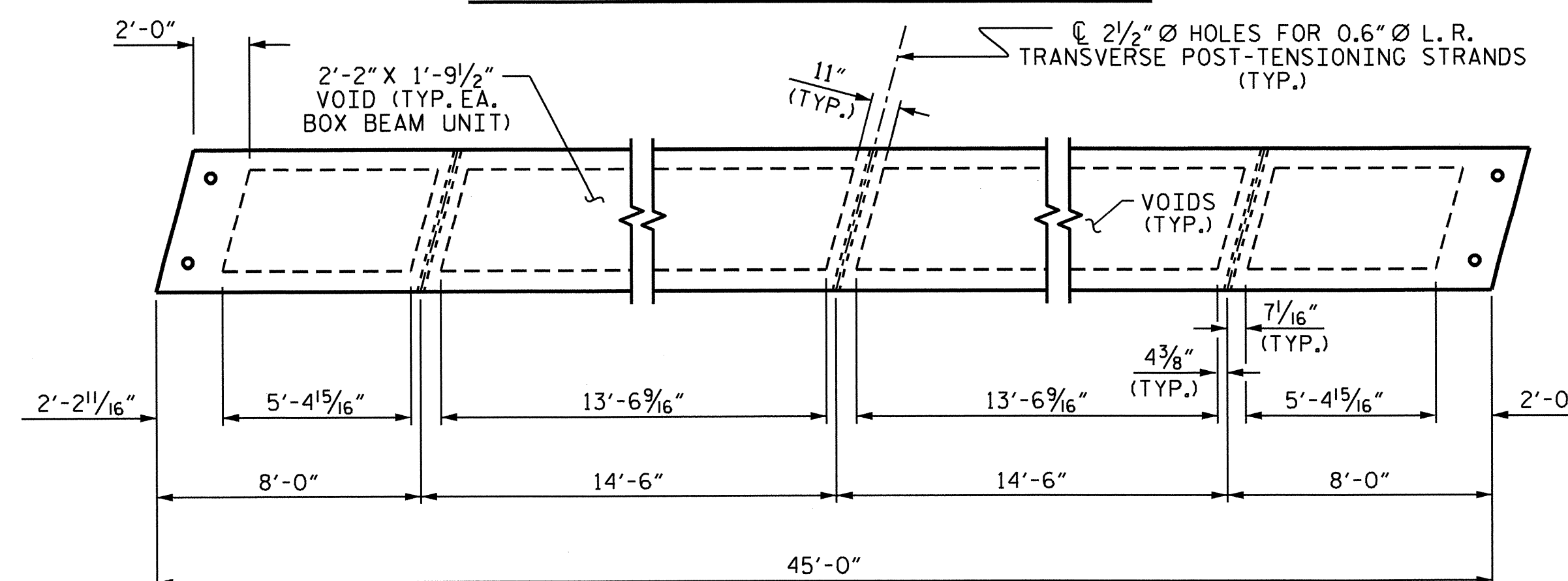
REVISIONS					SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

TOTAL SHEETS: 21





PLAN OF SPAN B



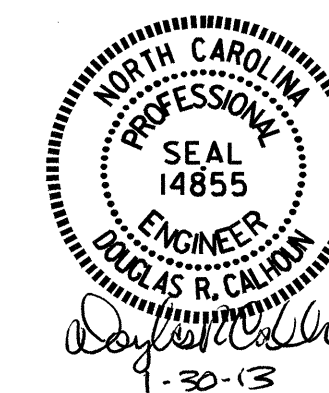
DIAPHRAGM AND VOID LAYOUT

PROJECT NO. B-4965  
ROCKINGHAM COUNTY  
 STATION: 20+70.50 -L-

SHEET 3 OF 7

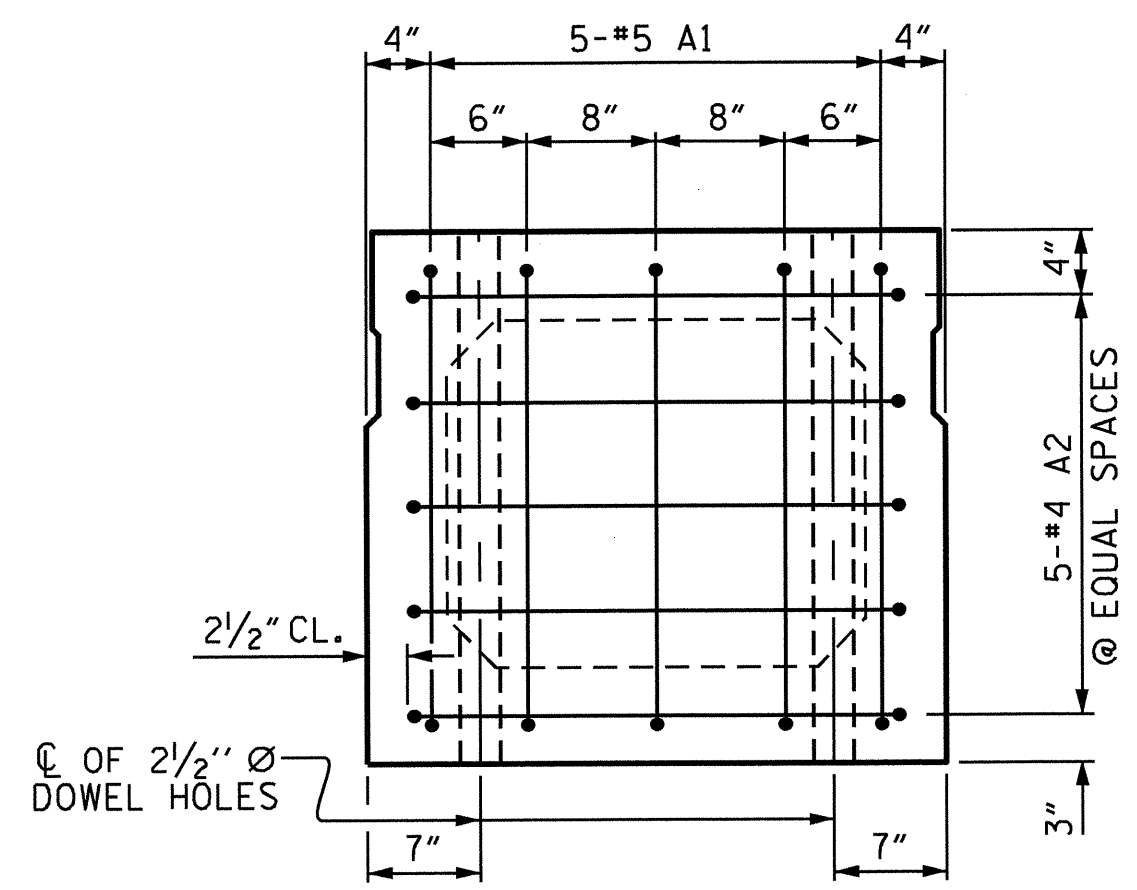
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

PLAN OF 45' UNIT  
 27'-10" CLEAR ROADWAY  
 105° SKEW

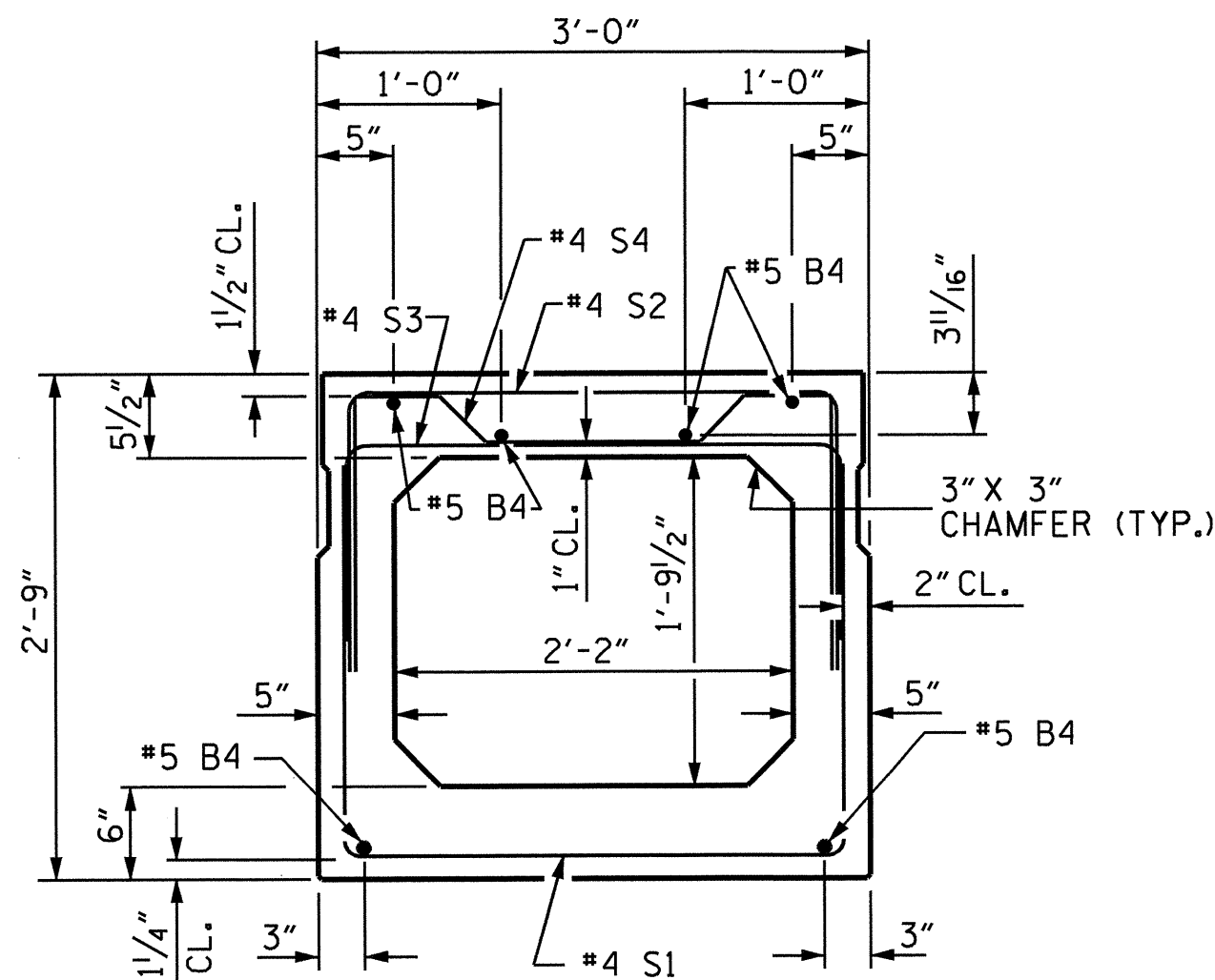


ASSEMBLED BY : A.C. OUTLAW DATE : 7/11/12  
 CHECKED BY : A. SORSENGINH DATE : 7/12  
 DRAWN BY : DGE 8/11  
 CHECKED BY : TMG 11/11

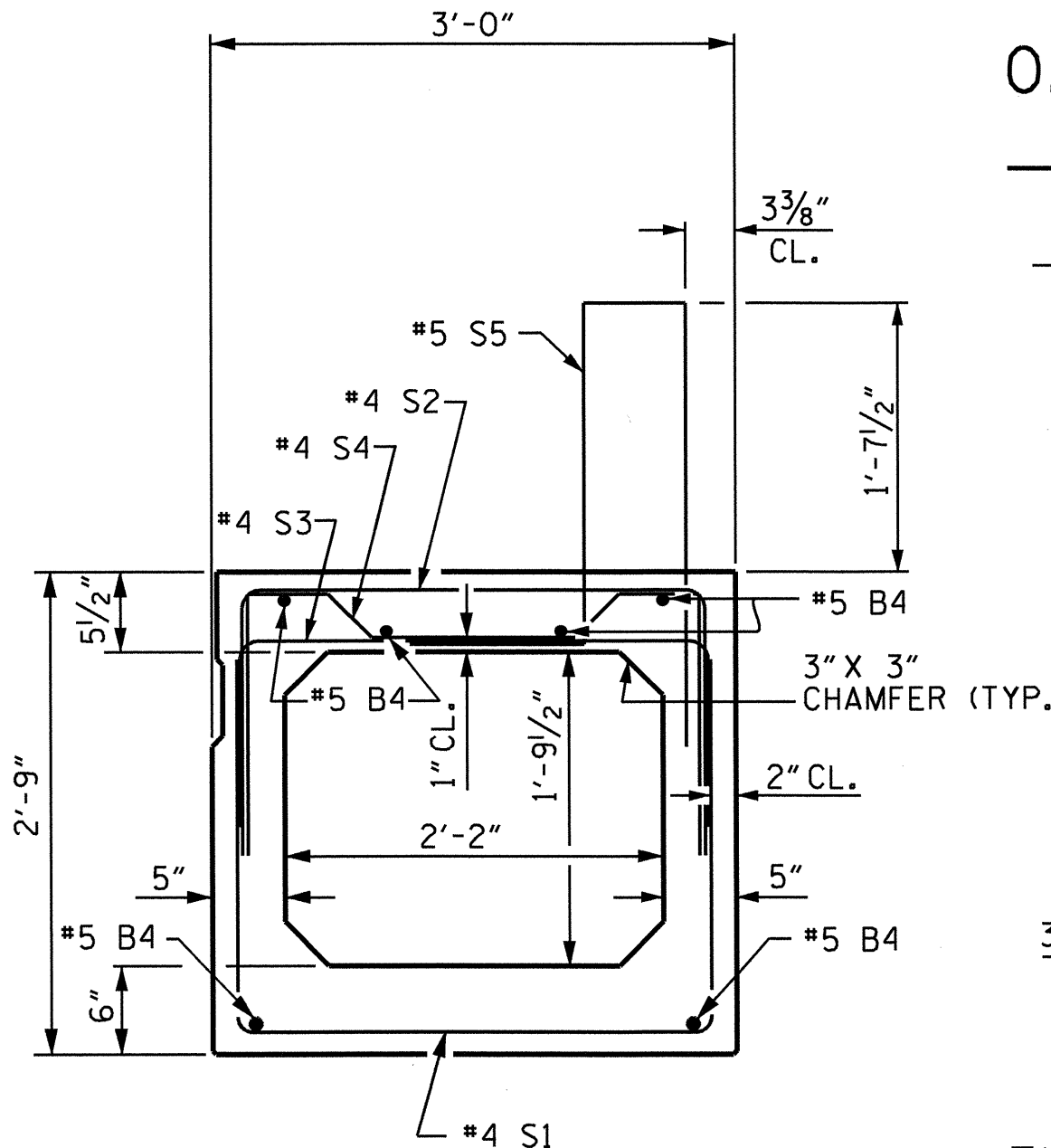
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-8
1			3			TOTAL SHEETS
2			4			21



**END ELEVATION**  
SHOWING PLACEMENT OF #5 & #4 "A" BARS AND LOCATION OF DOWEL HOLES. (INTERIOR BOX BEAM SECTION SHOWN-EXTERIOR SECTION SIMILAR EXCEPT SHEAR KEY LOCATION. STRAND LAYOUT NOT SHOWN.)

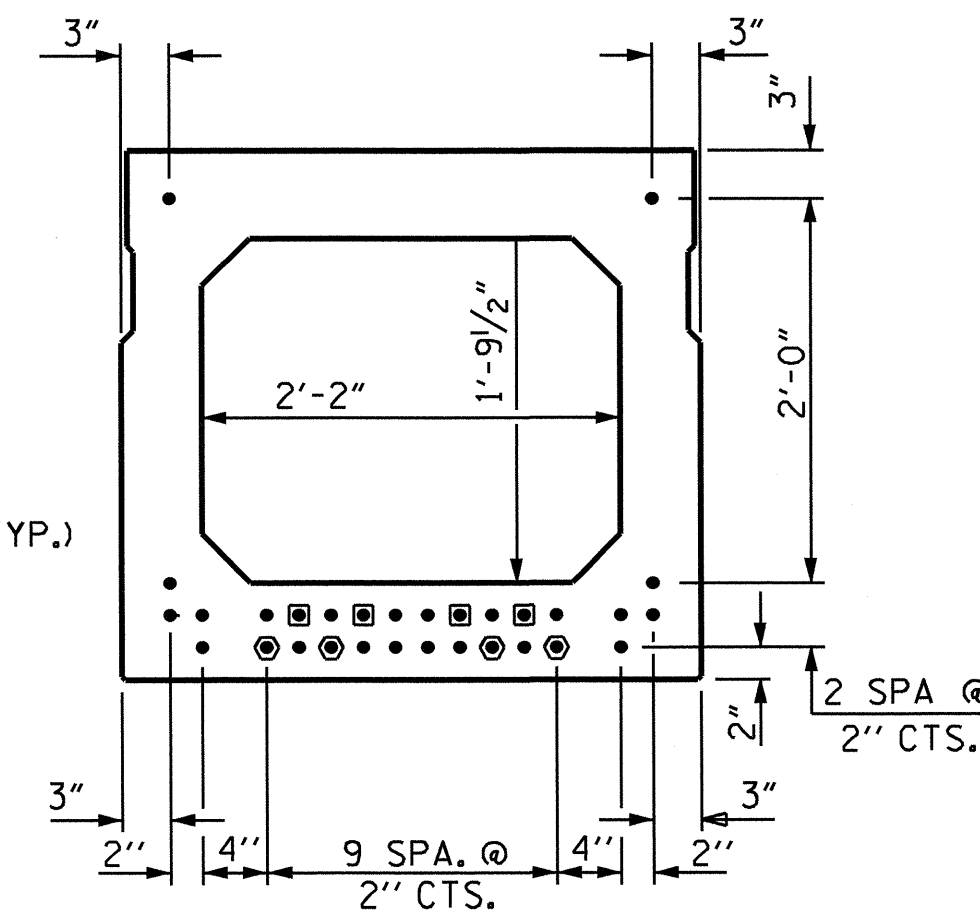


**INTERIOR BOX BEAM SECTION**  
(STRAND LAYOUT NOT SHOWN)



**EXTERIOR BOX BEAM SECTION**  
(STRAND LAYOUT NOT SHOWN)

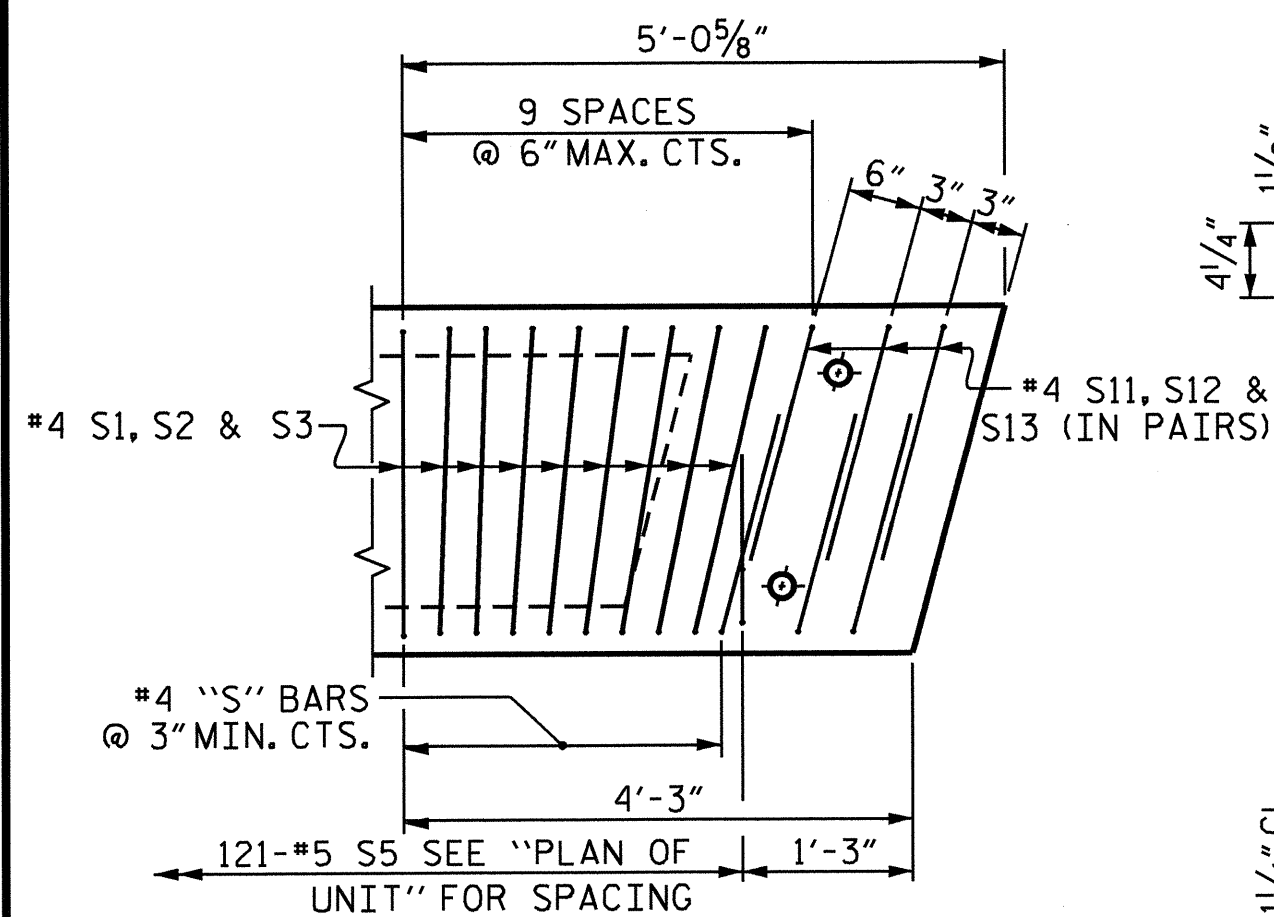
**0.6" Ø LOW RELAXATION STRAND LAYOUT**



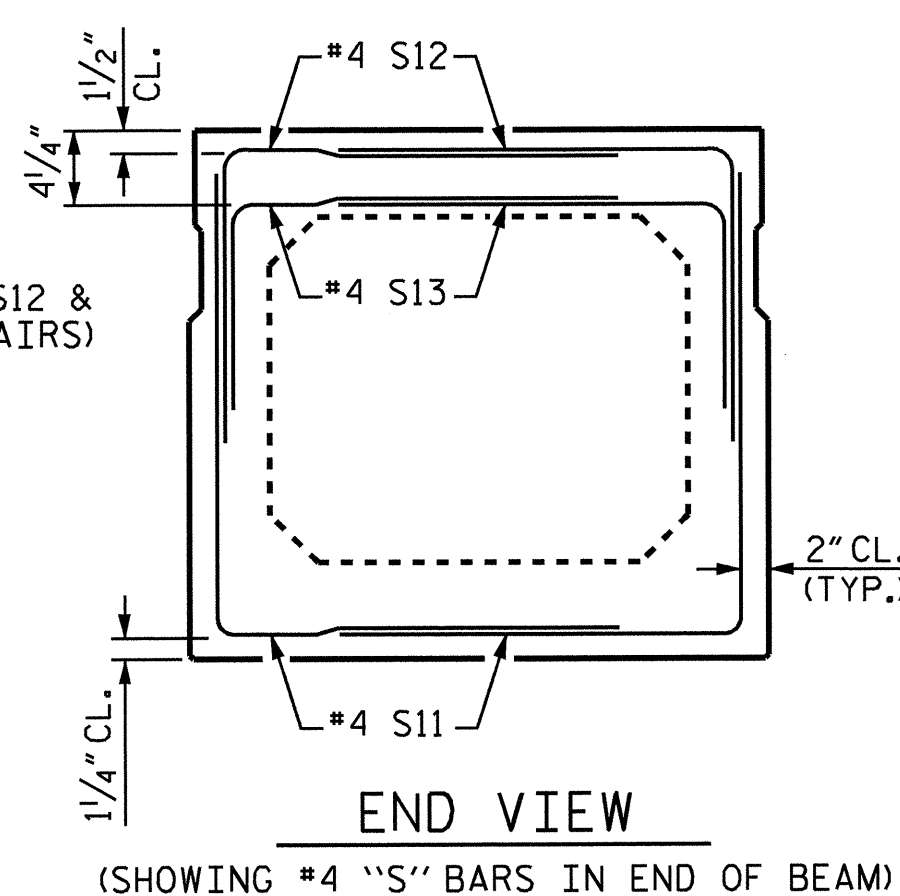
**TYPICAL STRAND LOCATION**  
(30 STRANDS REQUIRED)  
**DEBONDING LEGEND**

- FULLY BONDED STRANDS
  - STRANDS DEBONDED FOR 4'-0" FROM END OF GIRDER
  - ⊙ STRANDS DEBONDED FOR 12'-0" FROM END OF GIRDER
- BOND SHALL BE BROKEN ON STRANDS AS SHOWN FOR THE SPECIFIED LENGTH FROM EACH END OF THE BOX BEAM. SEE STANDARD SPECIFICATIONS ARTICLE 1078-7.

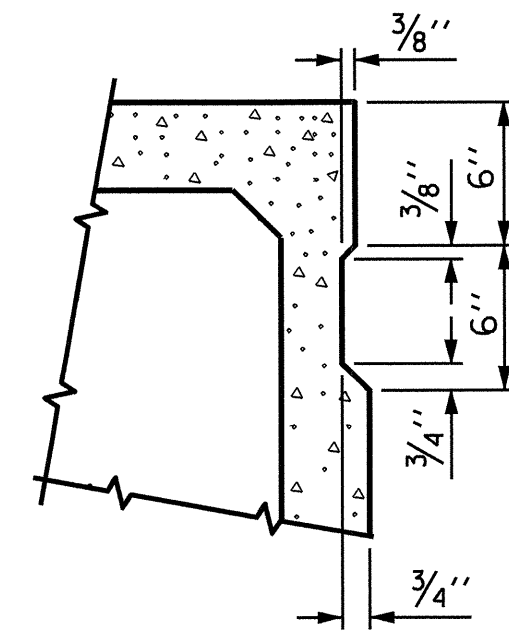
GRADE 270 STRANDS	
	0.6" Ø L.R.
AREA (SQUARE INCHES)	0.217
ULTIMATE STRENGTH (LBS. PER STRAND)	58,600
APPLIED PRESTRESS (LBS. PER STRAND)	43,950



**DETAIL "B"**  
EXTERIOR UNIT SHOWN, INTERIOR UNIT SIMILAR EXCEPT OMIT #5 S5 BARS. "B" BARS AND "A" BARS NOT SHOWN.

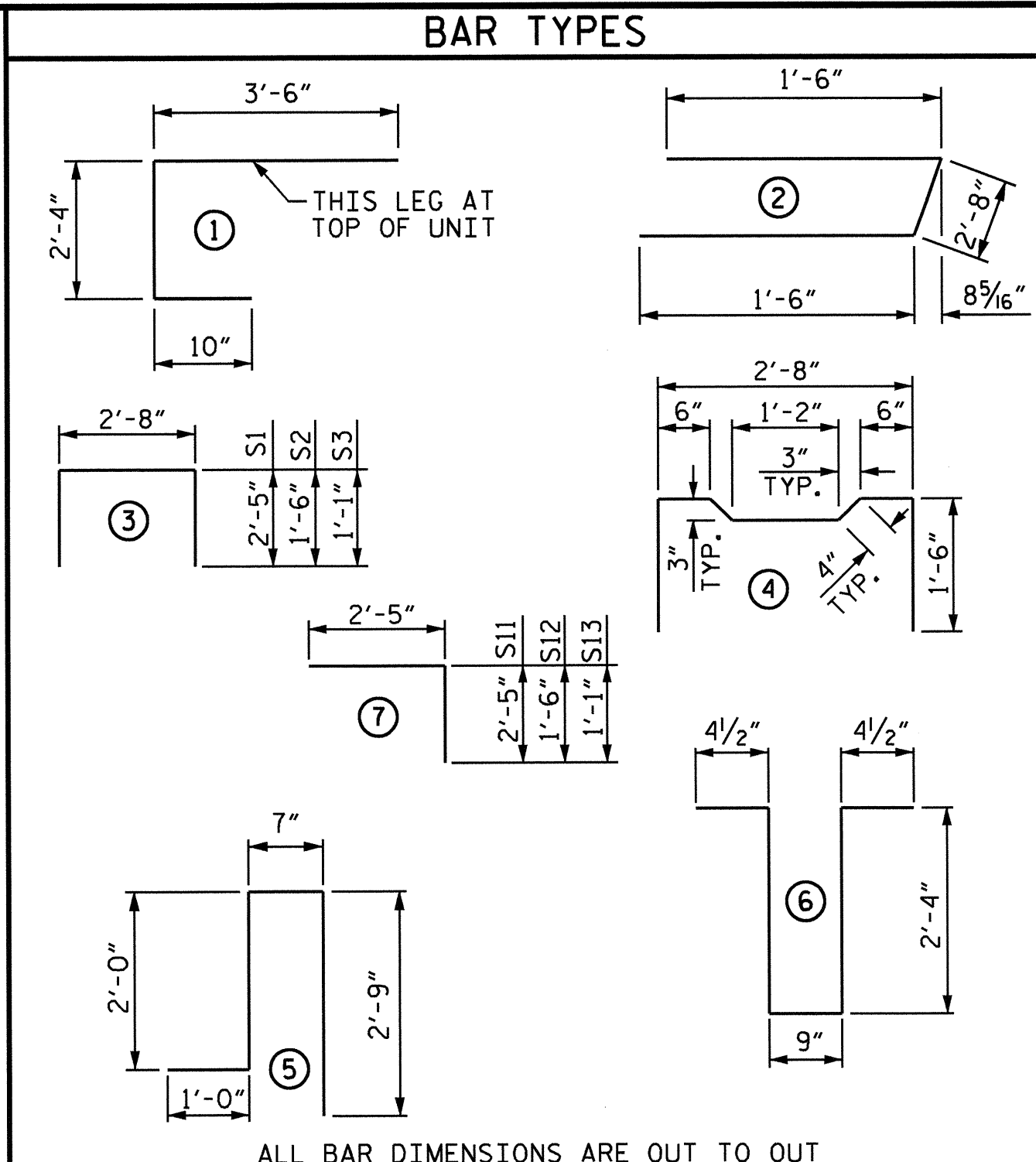


**END VIEW**  
(SHOWING #4 "S" BARS IN END OF BEAM)



**SHEAR KEY DETAIL**

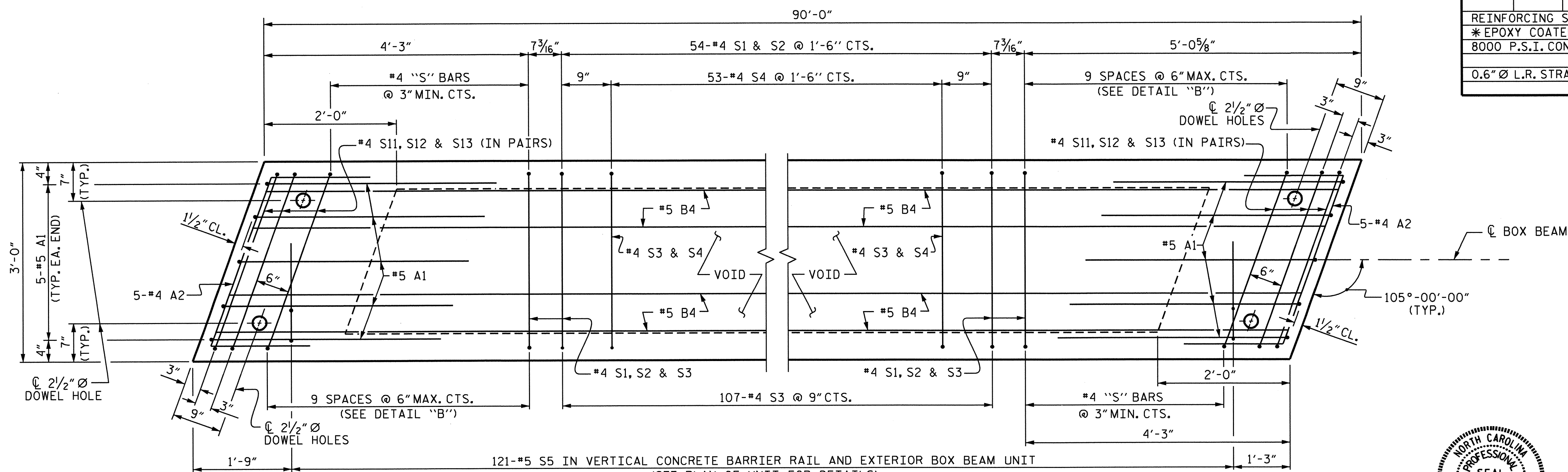
NOTE: OMIT SHEAR KEY ON OUTSIDE FACE OF EXTERIOR BOX BEAMS.



ALL BAR DIMENSIONS ARE OUT TO OUT

**BILL OF MATERIAL FOR ONE 90' BOX BEAM SECTION**

BAR	NUMBER	SIZE	TYPE	EXTERIOR UNIT		INTERIOR UNIT	
				LENGTH	WEIGHT	LENGTH	WEIGHT
A1	10	#5	1	6'-8"	70	6'-8"	70
A2	40	#4	2	5'-8"	151	5'-8"	151
B4	12	#5	STR	45'-11"	575	45'-11"	575
K1	15	#4	6	6'-2"	62	6'-2"	62
K2	10	#4	STR	2'-7"	17	2'-7"	17
S1	72	#4	3	7'-6"	361	7'-6"	361
S2	72	#4	3	5'-8"	273	5'-8"	273
S3	125	#4	3	4'-10"	404	4'-10"	404
S4	53	#4	4	5'-10"	207	5'-10"	207
S11	12	#4	7	4'-10"	39	4'-10"	39
S12	12	#4	7	3'-11"	31	3'-11"	31
S13	12	#4	7	3'-6"	28	3'-6"	28
*S5	121	#5	5	6'-4"	799	--	--
REINFORCING STEEL				2218	LBS.	2218	LBS.
*EPOXY COATED REINF. STEEL				799	LBS.		
8000 P.S.I. CONCRETE				16.0	CU. YDS.	15.9	CU. YDS.
0.6" Ø L.R. STRANDS				No. 30		No. 30	



**PLAN OF BOX BEAM**

EXTERIOR UNIT SHOWN, INTERIOR UNIT SIMILAR EXCEPT OMIT #5 S5 BARS. FOR LOCATION OF DIAPHRAGMS, SEE PLAN OF UNIT. FOR REINFORCING STEEL IN DIAPHRAGMS, SEE DIAPHRAGM DETAILS.

ASSEMBLED BY : A.C. OUTLAW DATE : 7/11/12  
CHECKED BY : A. SORSENGINH DATE : 7/12  
DRAWN BY : DGE 11/11  
CHECKED BY : TMG 11/11

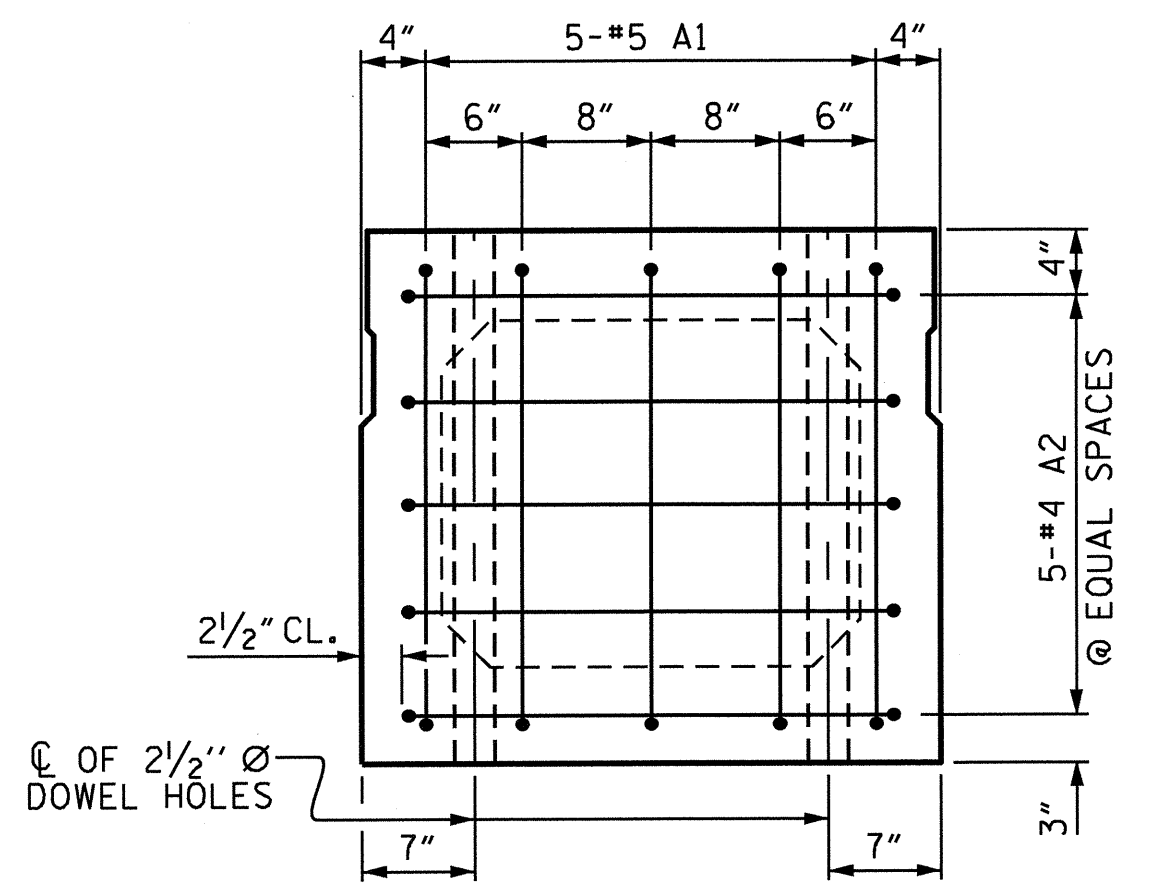


PROJECT NO. B-4965  
ROCKINGHAM COUNTY  
STATION: 20+70.50 -L-  
SHEET 4 OF 7

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
STANDARD  
3'-0" X 2'-9"  
PRESTRESSED CONCRETE  
90' BOX BEAM UNIT  
SPAN A

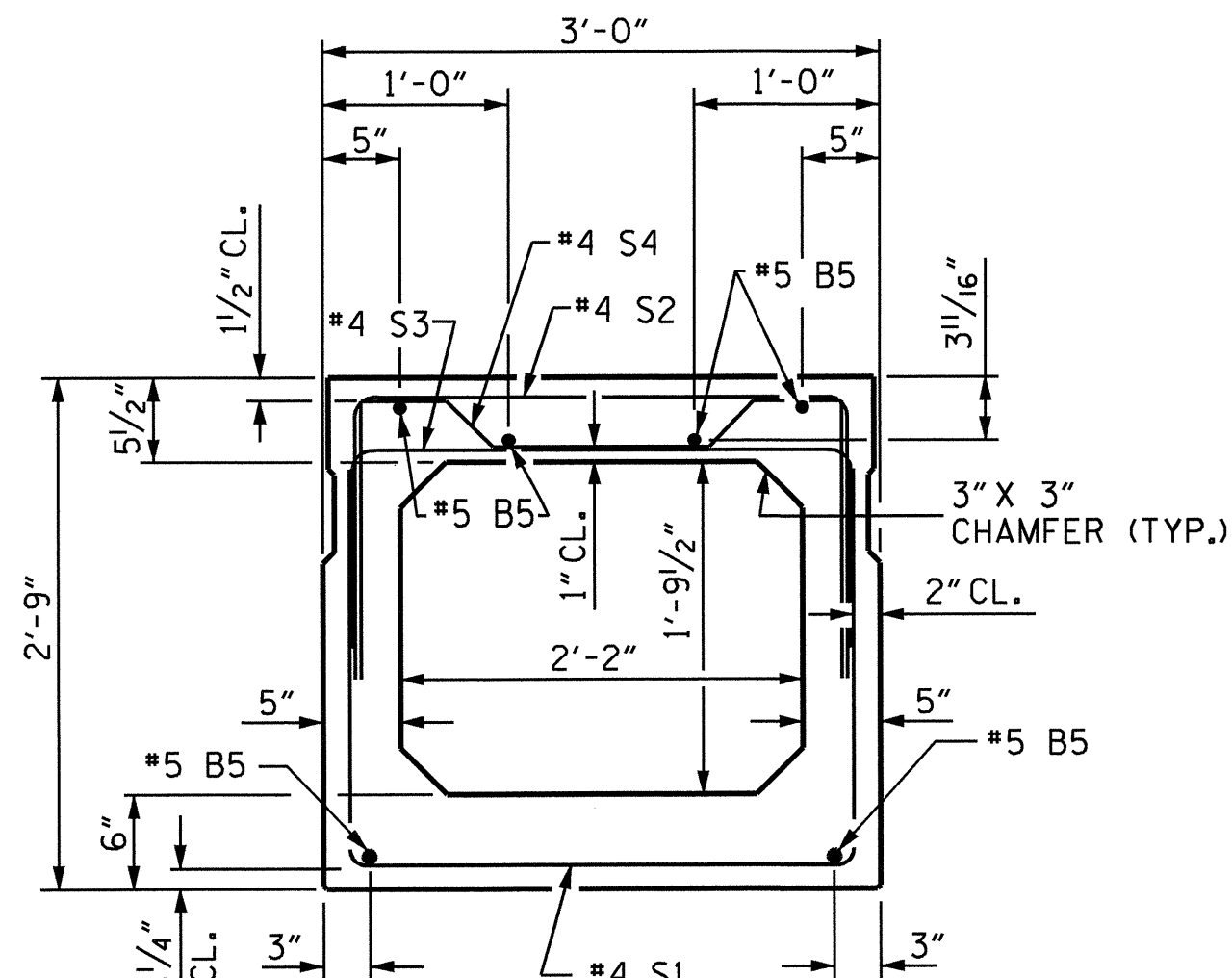
REVISIONS				SHEET NO.
NO.	BY:	DATE:	NO.	
1			3	S-9
2			4	





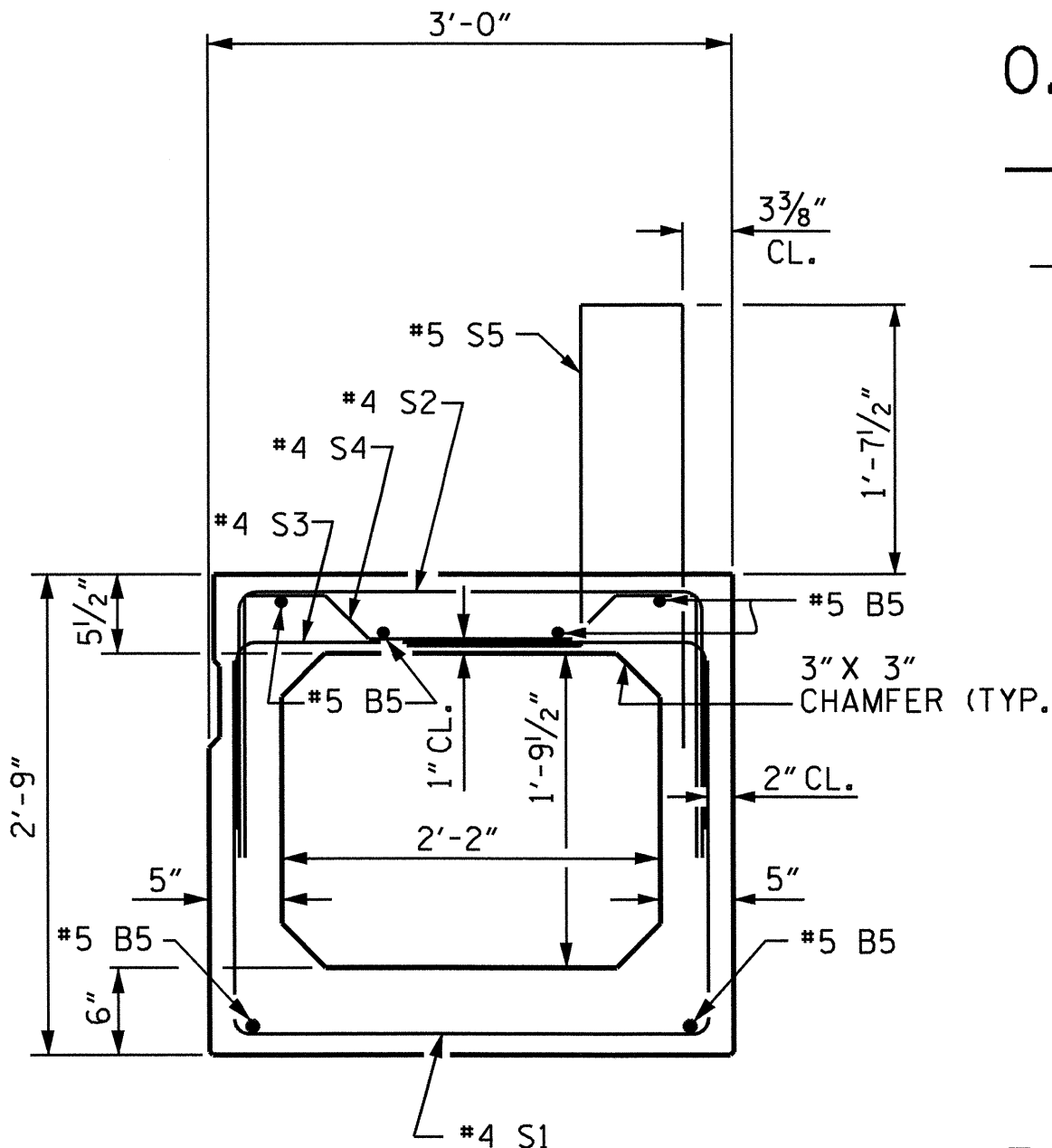
**END ELEVATION**

SHOWING PLACEMENT OF #5 & #4 "A" BARS AND LOCATION OF DOWEL HOLES.  
 (INTERIOR BOX BEAM SECTION SHOWN-EXTERIOR SECTION SIMILAR EXCEPT SHEAR KEY LOCATION, STRAND LAYOUT NOT SHOWN.)



**INTERIOR BOX BEAM SECTION**

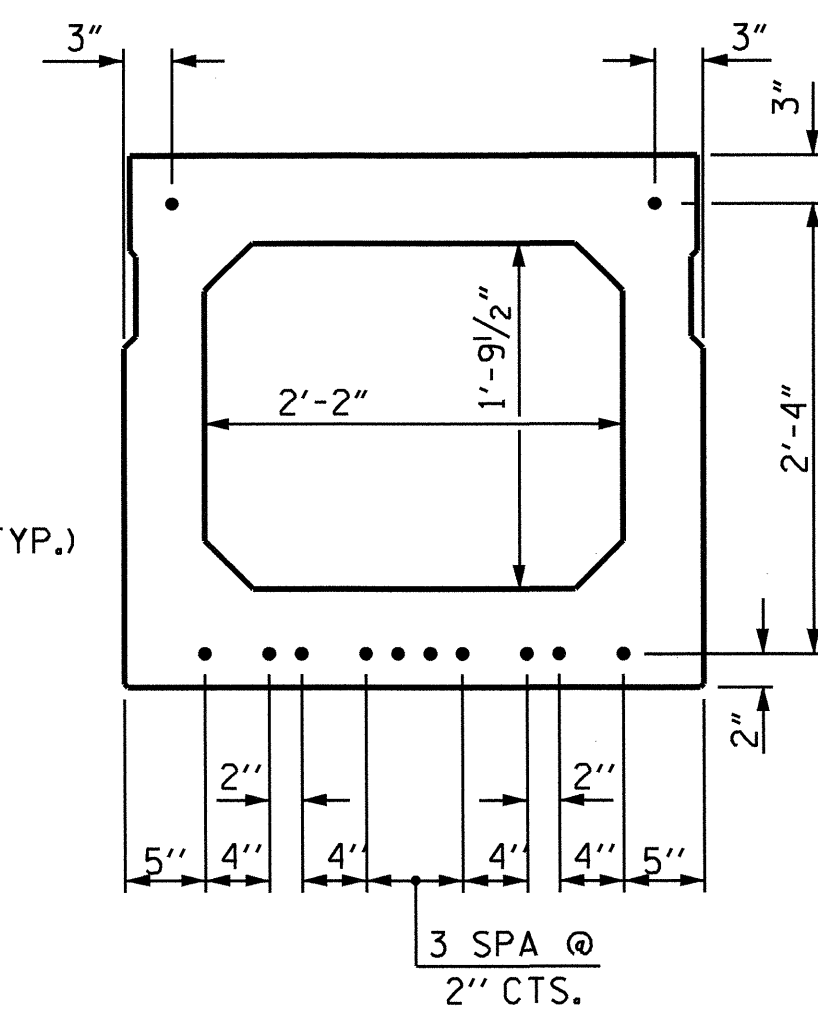
(STRAND LAYOUT NOT SHOWN)



**EXTERIOR BOX BEAM SECTION**

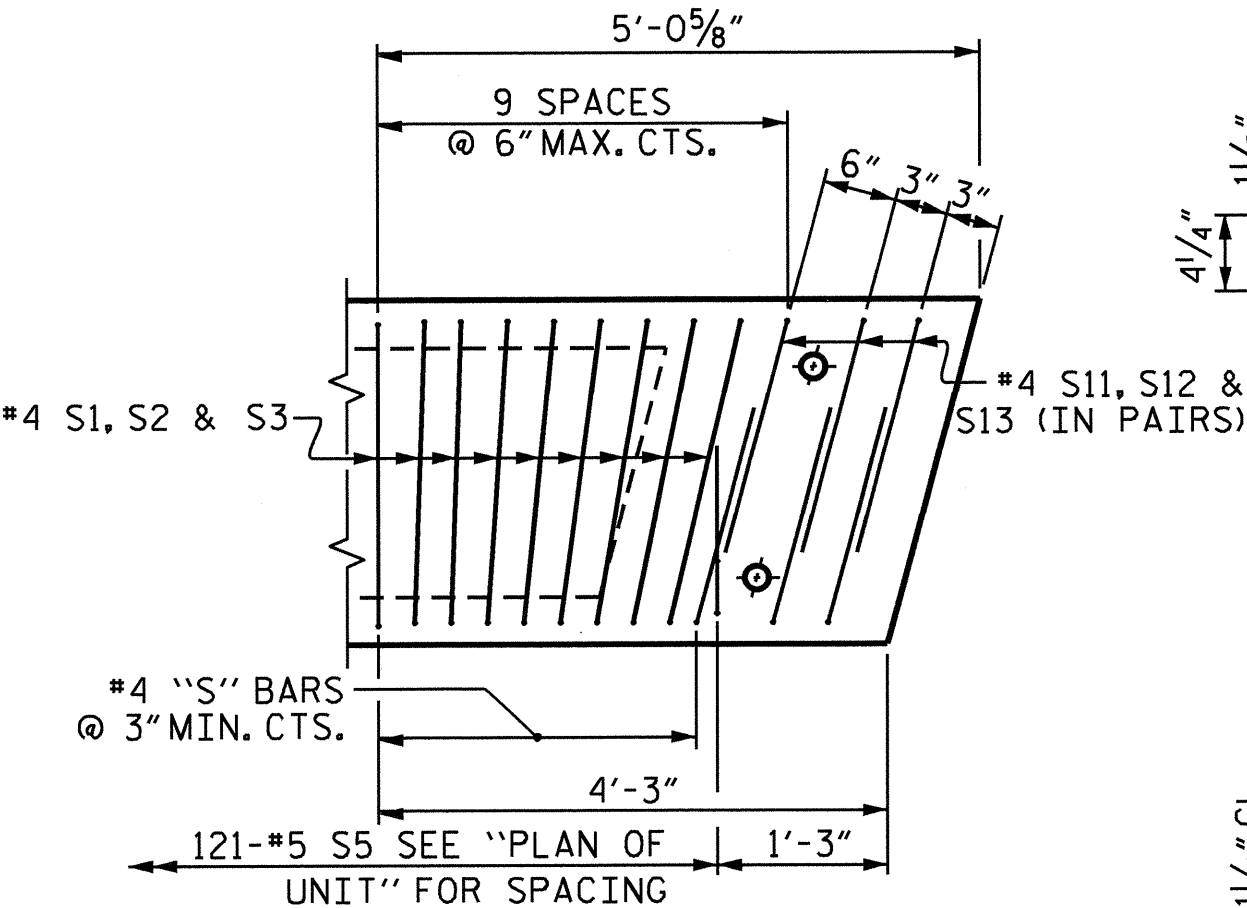
(STRAND LAYOUT NOT SHOWN)

**0.6" Ø LOW RELAXATION STRAND LAYOUT**



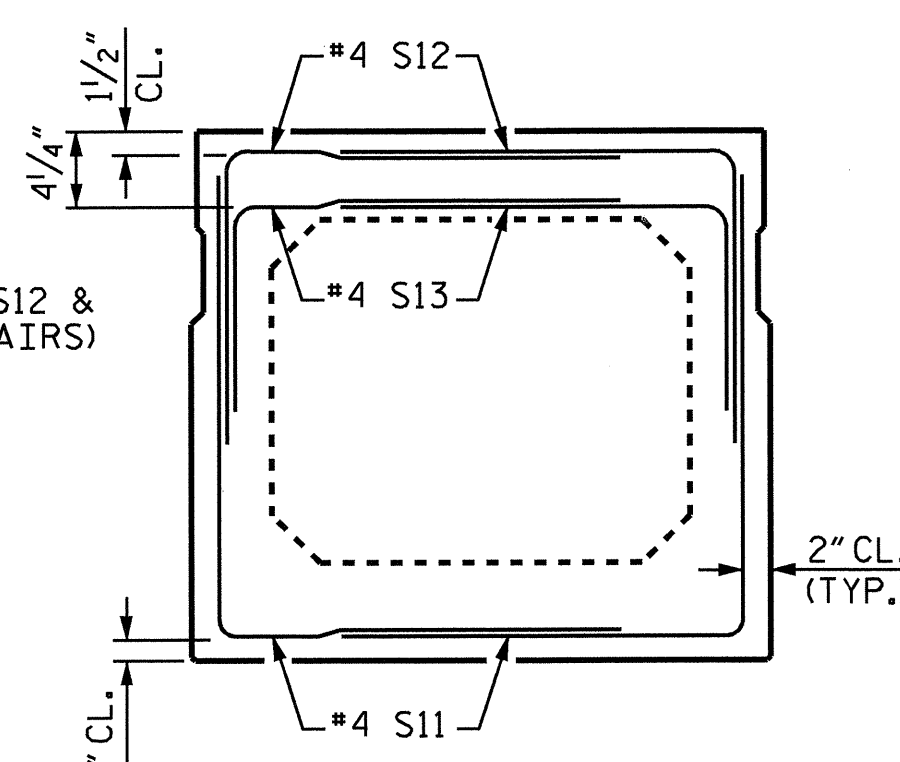
**TYPICAL STRAND LOCATION**

(12 STRANDS REQUIRED)



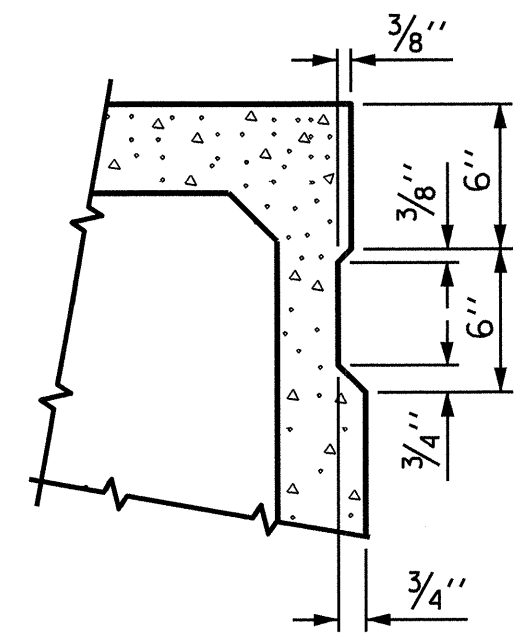
**DETAIL "B"**

EXTERIOR UNIT SHOWN, INTERIOR UNIT SIMILAR EXCEPT OMIT #5 S5 BARS. "B" BARS AND "A" BARS NOT SHOWN.



**END VIEW**

(SHOWING #4 "S" BARS IN END OF BEAM)



**SHEAR KEY DETAIL**

NOTE: OMIT SHEAR KEY ON OUTSIDE FACE OF EXTERIOR BOX BEAMS.

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

**DEBONDING LEGEND**

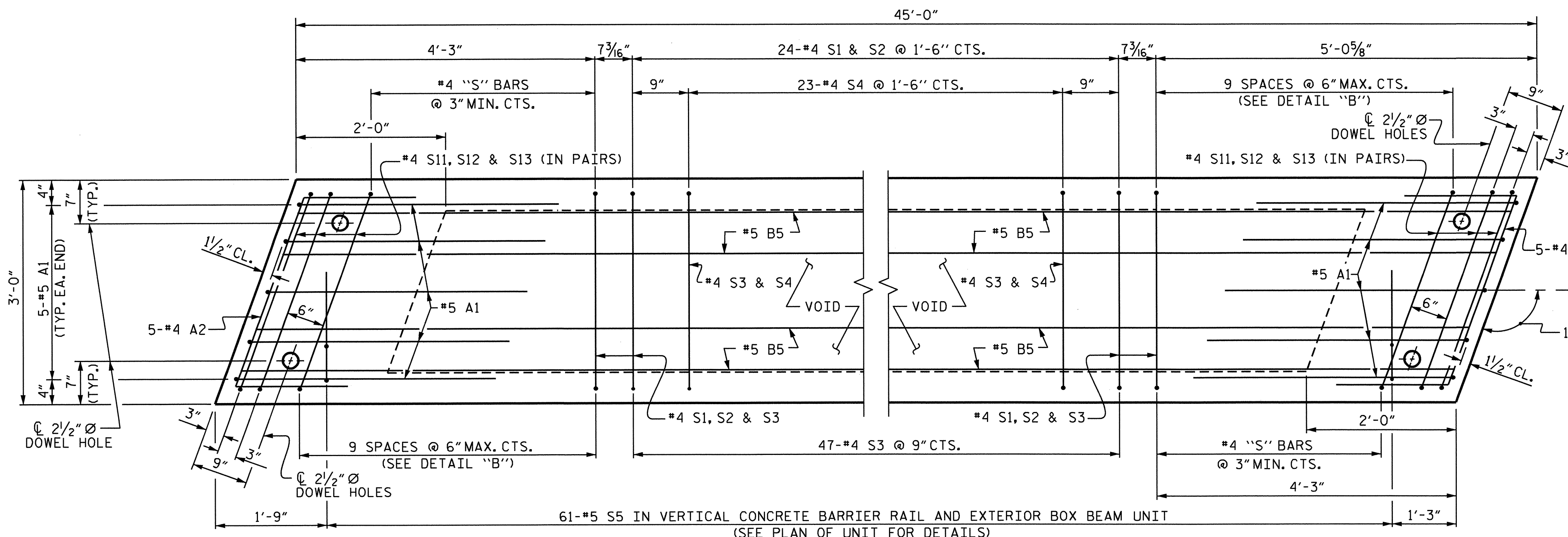
- FULLY BONDED STRANDS

**BAR TYPES**

ALL BAR DIMENSIONS ARE OUT TO OUT

**BILL OF MATERIAL FOR ONE 45' BOX BEAM SECTION**

BAR	NUMBER	SIZE	TYPE	EXTERIOR UNIT		INTERIOR UNIT	
				LENGTH	WEIGHT	LENGTH	WEIGHT
A1	10	#5	1	6'-8"	70	6'-8"	70
A2	28	#4	2	5'-8"	106	5'-8"	106
B5	6	#5	STR	44'-8"	280	44'-8"	280
K1	9	#4	6	6'-2"	37	6'-2"	37
K2	6	#4	STR	2'-7"	10	2'-7"	10
S1	42	#4	3	7'-6"	210	7'-6"	210
S2	42	#4	3	5'-8"	159	5'-8"	159
S3	65	#4	3	4'-10"	210	4'-10"	210
S4	23	#4	4	5'-10"	90	5'-10"	90
S11	12	#4	7	4'-10"	39	4'-10"	39
S12	12	#4	7	3'-11"	31	3'-11"	31
S13	12	#4	7	3'-6"	28	3'-6"	28
*S5	61	#5	5	6'-4"	403	--	--
REINFORCING STEEL				1270	LBS.	1270	LBS.
* EPOXY COATED REINF. STEEL				403	LBS.		
5000 P.S.I. CONCRETE				8.4	CU. YDS.	8.3	CU. YDS.
0.6" Ø L.R. STRANDS				No. 12		No. 12	



**PLAN OF BOX BEAM**

EXTERIOR UNIT SHOWN, INTERIOR UNIT SIMILAR EXCEPT OMIT #5 S5 BARS. FOR LOCATION OF DIAPHRAGMS, SEE PLAN OF UNIT. FOR REINFORCING STEEL IN DIAPHRAGMS, SEE DIAPHRAGM DETAILS.



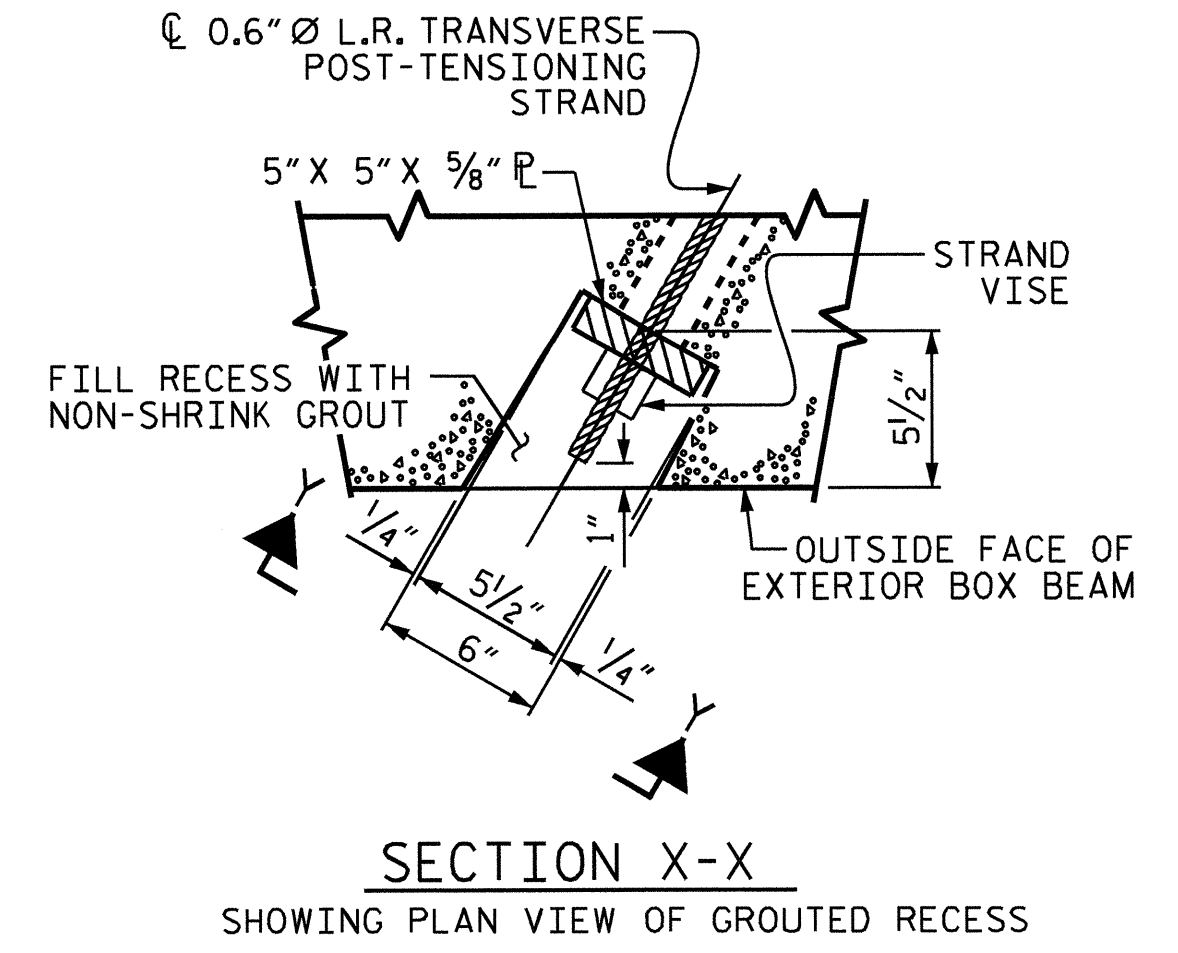
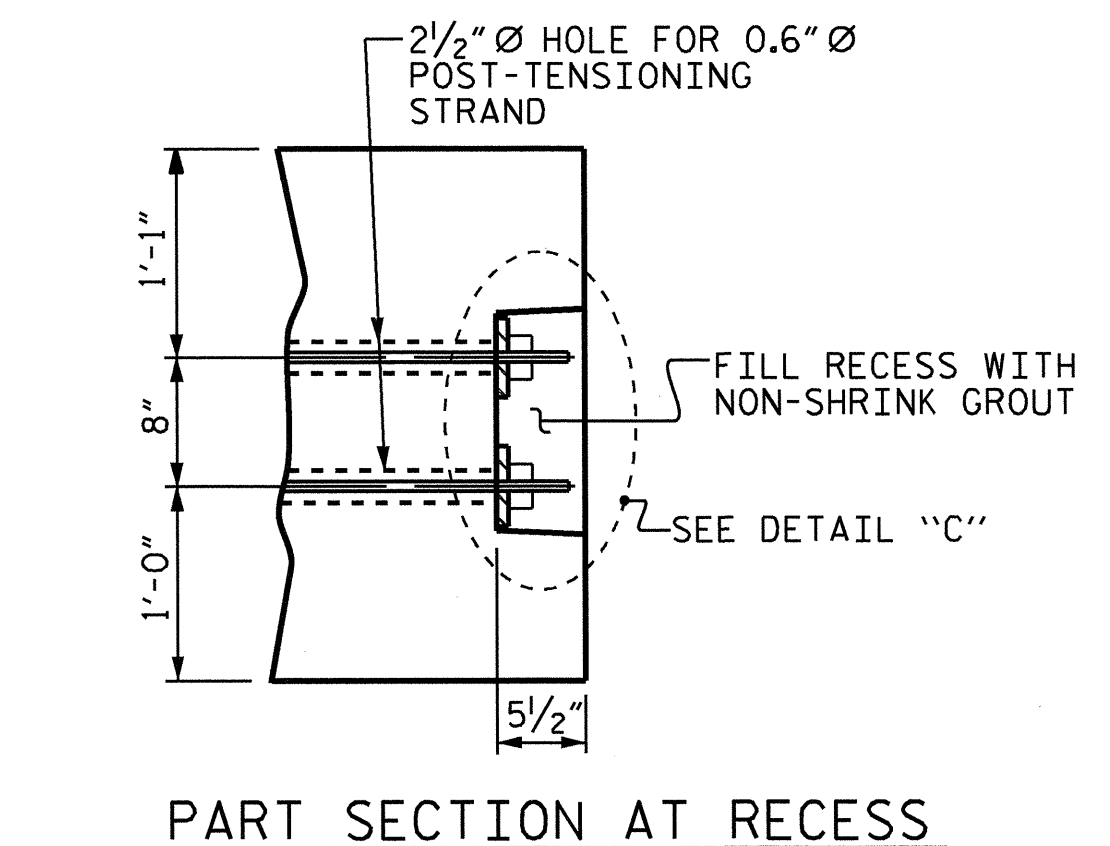
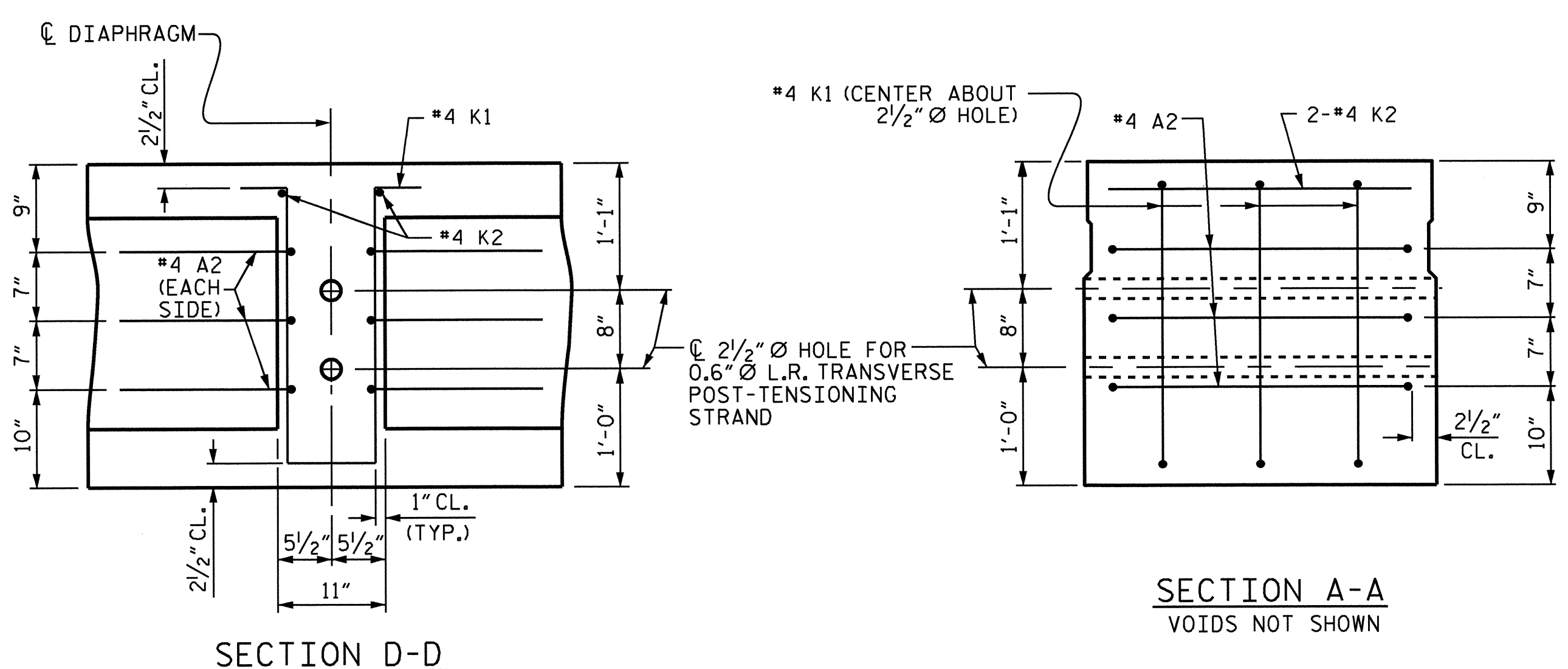
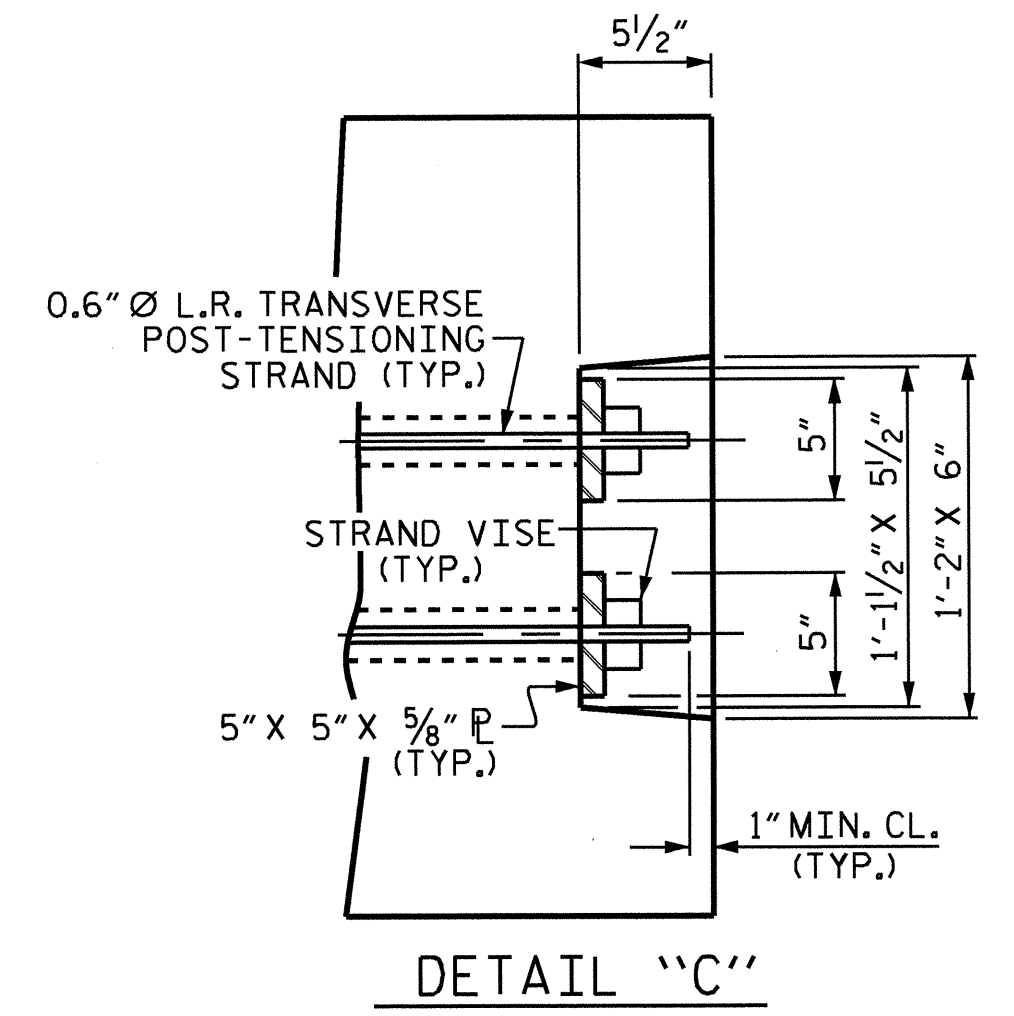
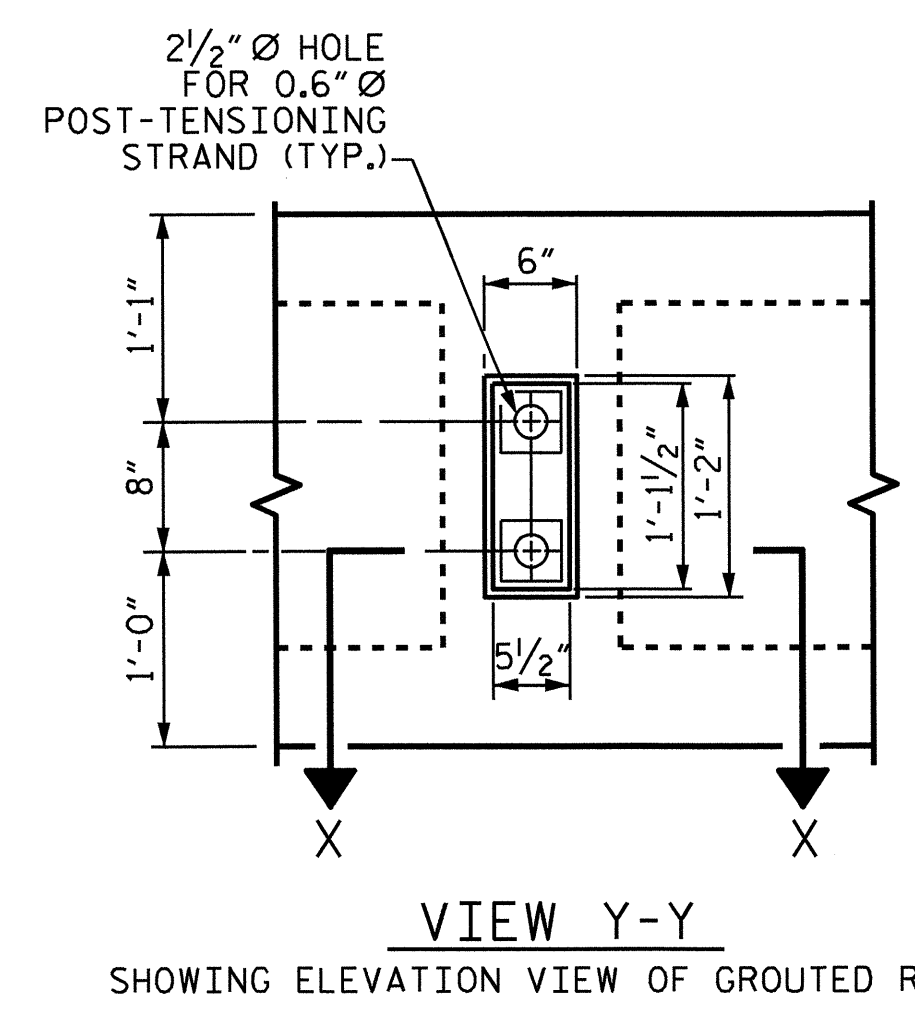
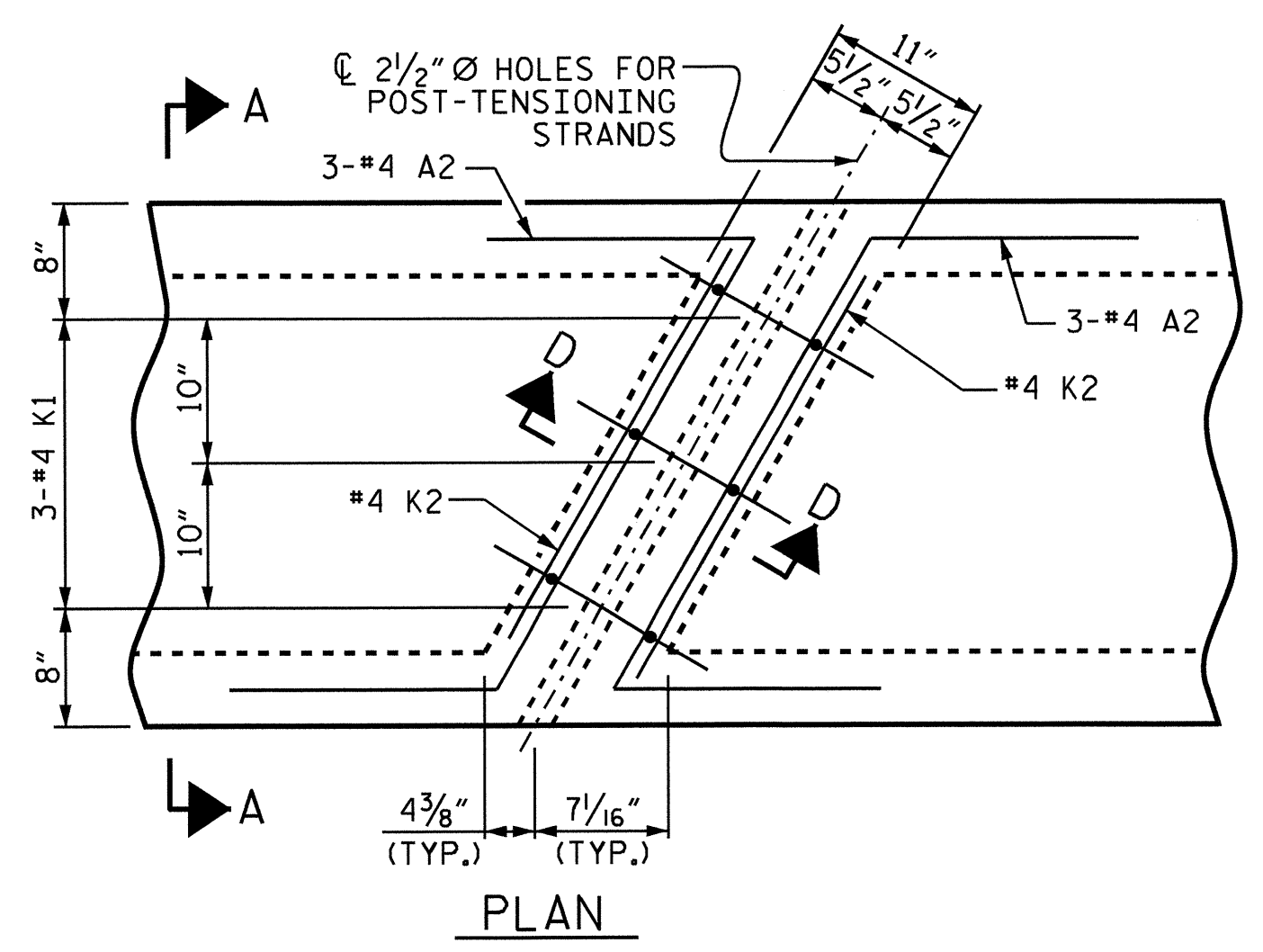
PROJECT NO. **B-4965**  
 ROCKINGHAM COUNTY  
 STATION: **20+70.50 -L-**

SHEET 5 OF 7

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD  
 3'-0" X 2'-9"  
 PRESTRESSED CONCRETE  
 45' BOX BEAM UNIT  
 SPAN B

ASSEMBLED BY: A.C. OUTLAW	DATE: 7/11/12
CHECKED BY: A. SORSENGINH	DATE: 7/12
DRAWN BY: DGE 11/11	
CHECKED BY: TMG 11/11	

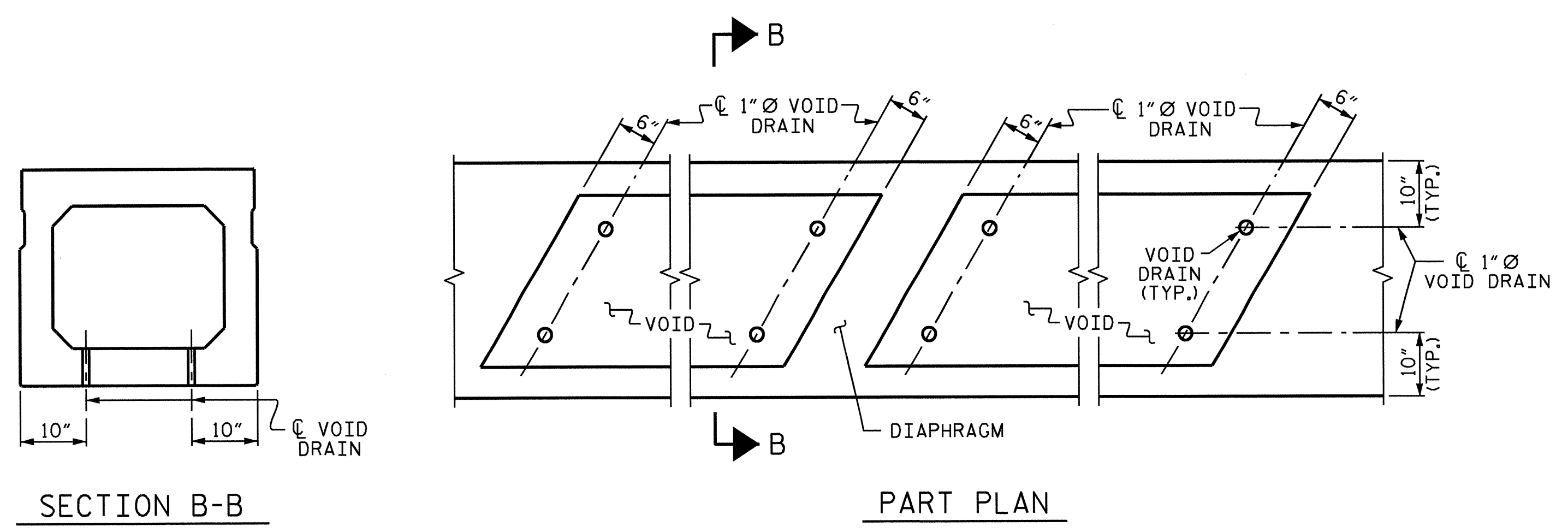
NO.	REVISIONS				SHEET NO.
	BY:	DATE:	NO.	BY:	
1			3		5-10
2			4		TOTAL SHEETS 21



**DOUBLE DIAPHRAGM DETAILS**

\*4 "S" BARS NOT SHOWN. \*4 "S" BARS MAY BE SHIFTED SLIGHTLY TO CLEAR 2 1/2" Ø HOLE.

**GROUTED RECESS DETAIL AT END OF POST-TENSIONED STRANDS OF EXTERIOR BOX BEAM**



**VOID DRAIN DETAILS**

(DIMENSIONS SHOWN ARE TYPICAL FOR EACH VOID)

DEAD LOAD DEFLECTION AND CAMBER	
	3'-0" x 2'-9"
90' BOX BEAM UNIT	0.6" Ø L.R. STRAND
CAMBER (SLAB ALONE IN PLACE)	3 3/4" ↑
DEFLECTION DUE TO SUPERIMPOSED DEAD LOAD**	3/4" ↓
FINAL CAMBER	3" ↑

DEAD LOAD DEFLECTION AND CAMBER	
	3'-0" x 2'-9"
45' BOX BEAM UNIT	0.6" Ø L.R. STRAND
CAMBER (SLAB ALONE IN PLACE)	5/8" ↑
DEFLECTION DUE TO SUPERIMPOSED DEAD LOAD**	1/16" ↓
FINAL CAMBER	9/16" ↑

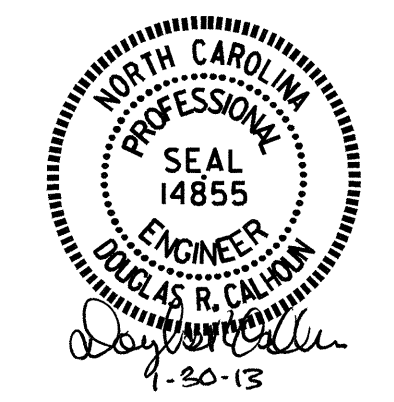
\*\* INCLUDES FUTURE WEARING SURFACE

\*\* INCLUDES FUTURE WEARING SURFACE

PROJECT NO. B-4965  
ROCKINGHAM COUNTY  
 STATION: 20+70.50 -L-

SHEET 6 OF 7

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD  
 3'-0" X 2'-9"  
 PRESTRESSED CONCRETE  
 BOX BEAM UNIT

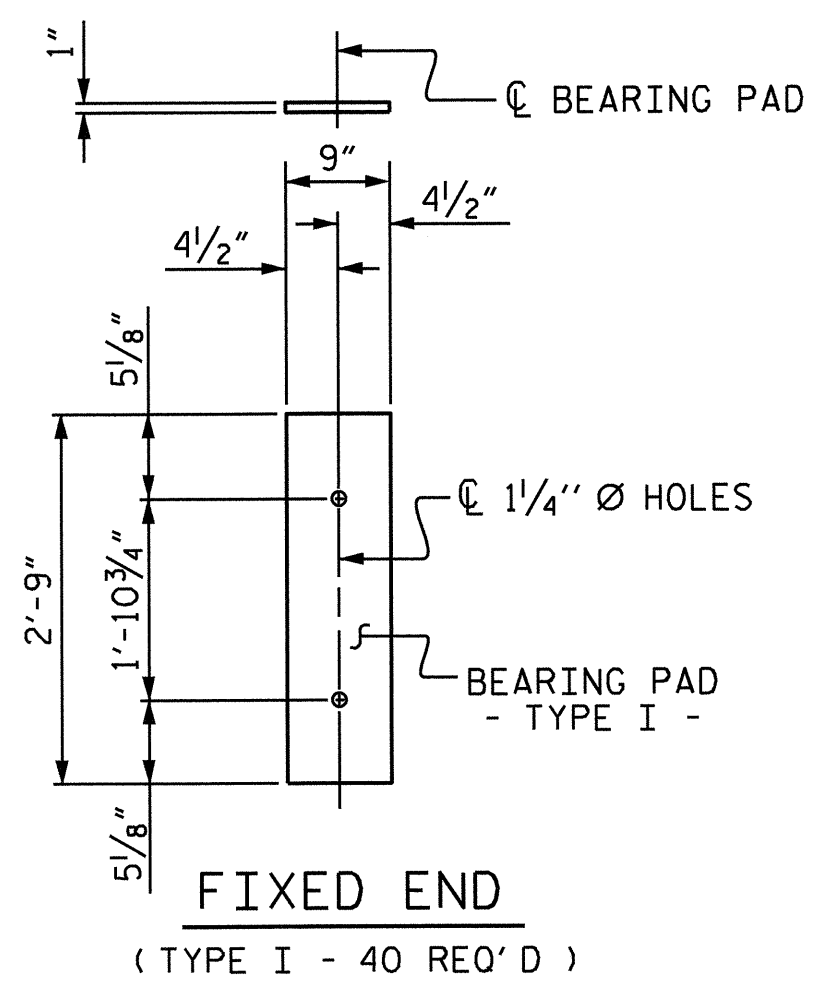


ASSEMBLED BY : A.C. OUTLAW DATE : 7/11/12  
 CHECKED BY : A. SORSENGIN DATE : 7/12  
 DRAWN BY : DGE 11/11  
 CHECKED BY : TMG 11/11

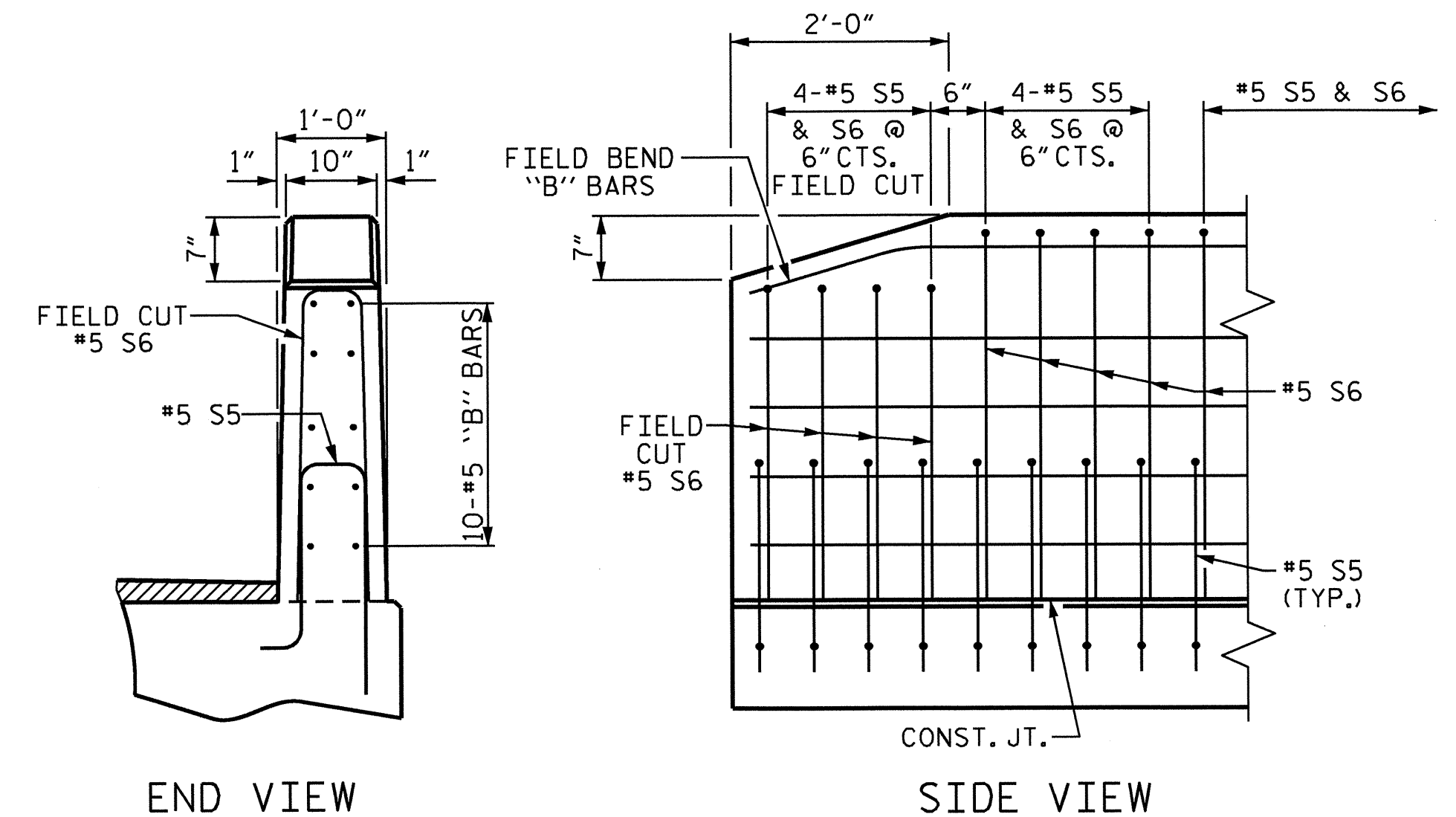
REVISIONS					SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

TOTAL SHEETS 21

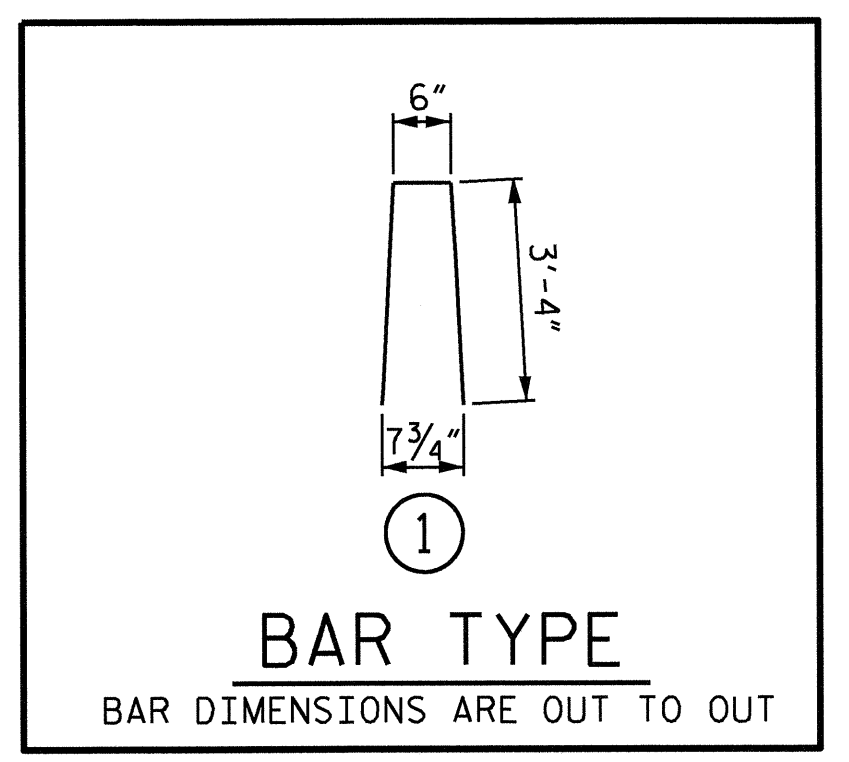




**ELASTOMERIC BEARING DETAILS**  
ELASTOMER IN ALL BEARINGS SHALL BE 60 DUROMETER HARDNESS.

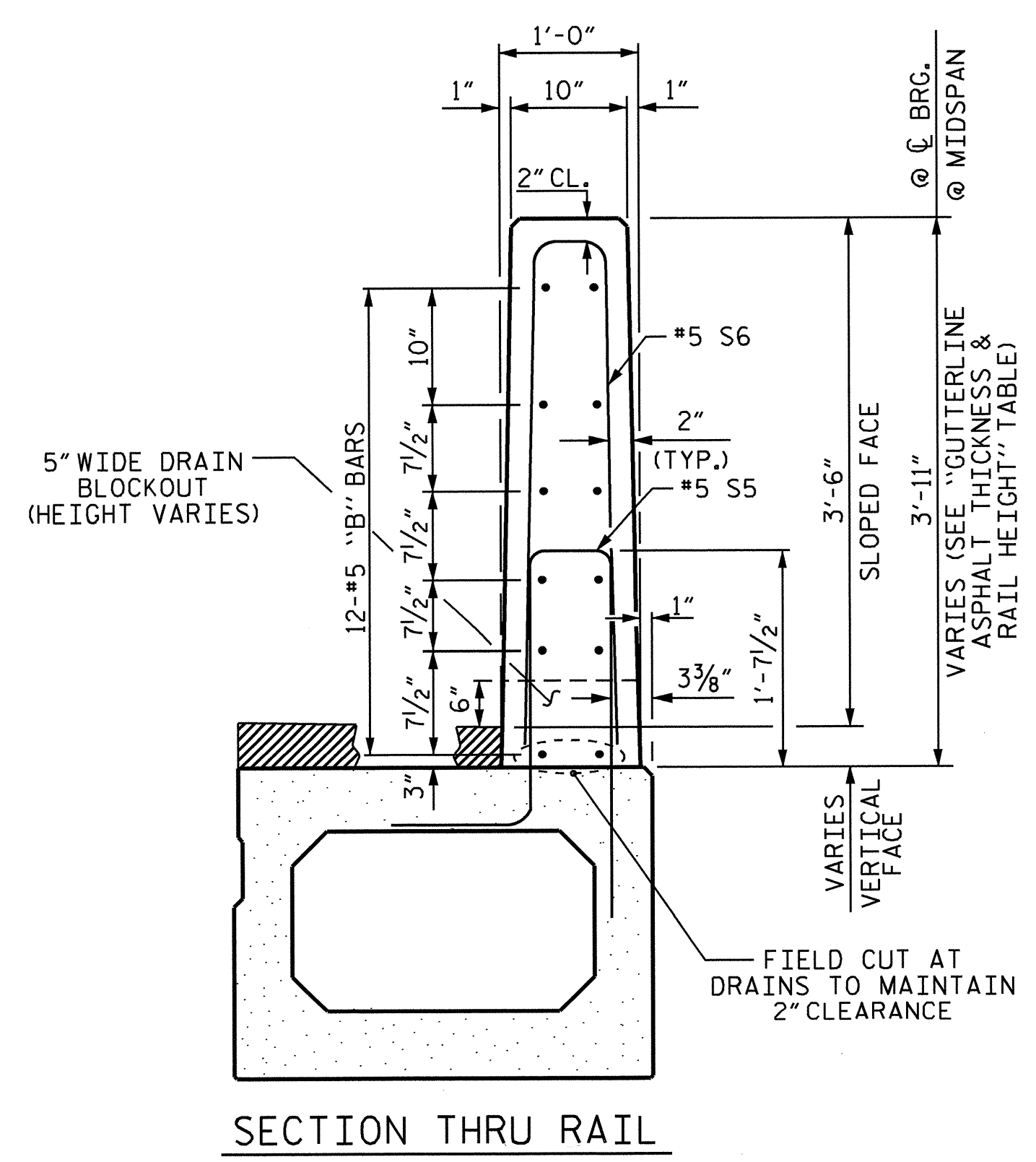


**END OF RAIL DETAILS**

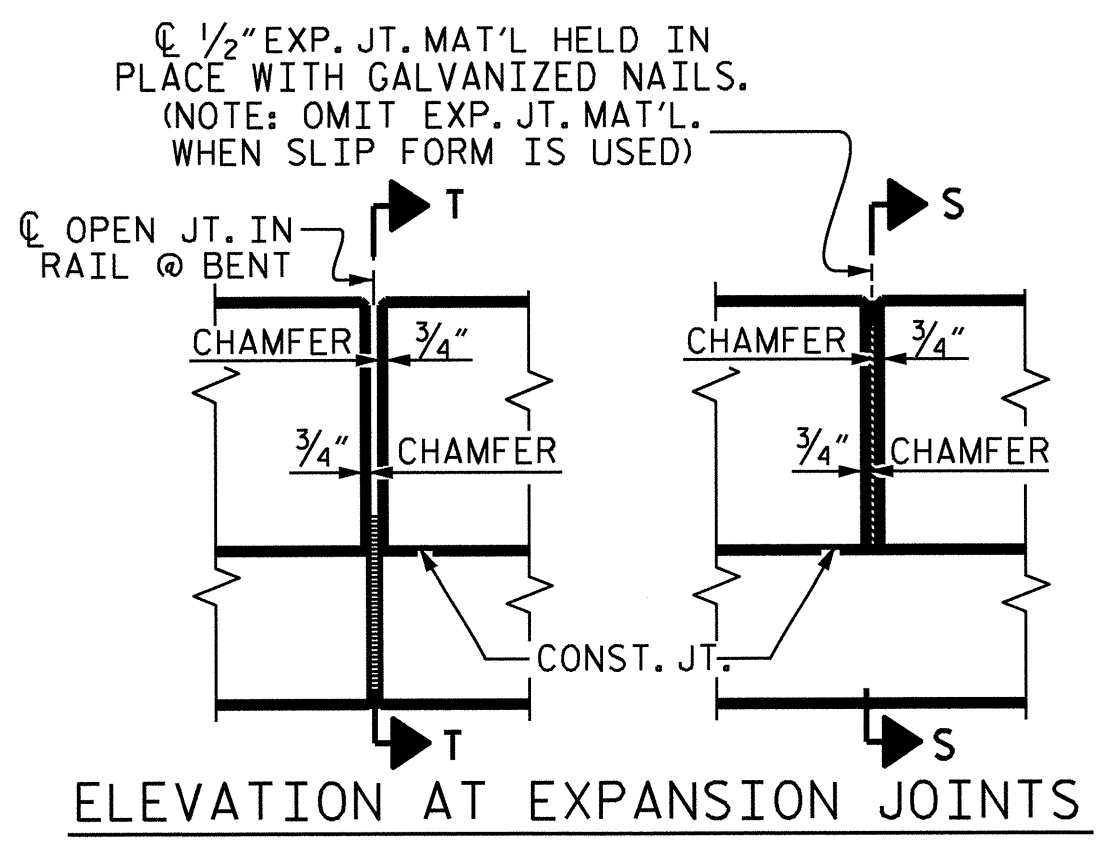
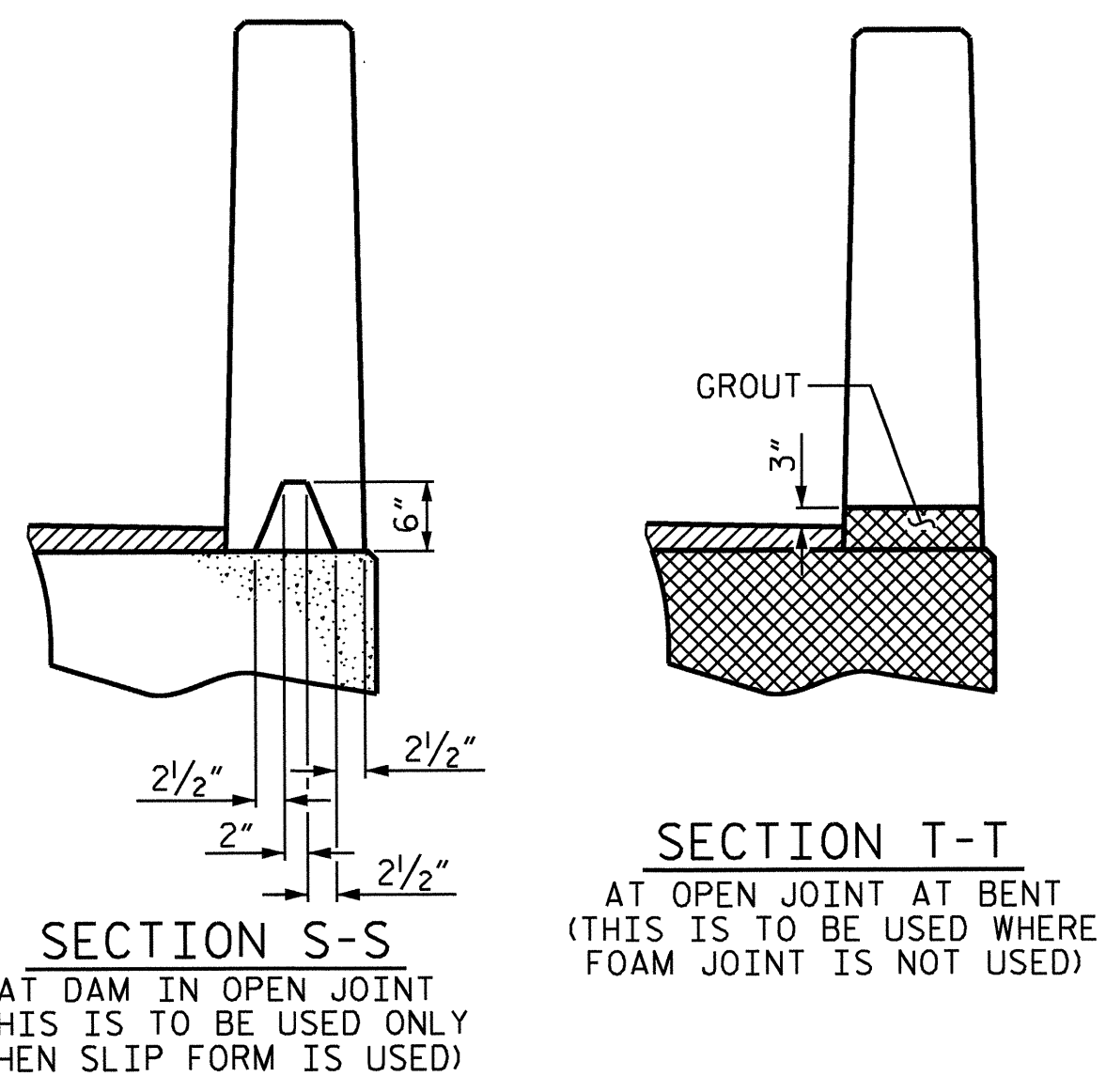


BILL OF MATERIAL FOR VERTICAL CONCRETE BARRIER RAIL					
BAR	BARS PER PAIR OF EXTERIOR UNITS	SIZE	TYPE	LENGTH	WEIGHT
	90' UNIT				
*B10	192	#5	STR	12'-10"	2570
*S6	242	#5	1	7'-2"	1809
* EPOXY COATED REINFORCING STEEL				LBS.	4379
CLASS AA CONCRETE				CU.YDS.	24.2
TOTAL VERTICAL CONCRETE BARRIER RAIL				LN. FT.	180.0

BILL OF MATERIAL FOR VERTICAL CONCRETE BARRIER RAIL					
BAR	BARS PER PAIR OF EXTERIOR UNITS	SIZE	TYPE	LENGTH	WEIGHT
	45' UNIT				
*B11	96	#5	STR	12'-10"	1285
*S6	122	#5	1	7'-2"	912
* EPOXY COATED REINFORCING STEEL				LBS.	2197
CLASS AA CONCRETE				CU.YDS.	12.1
TOTAL VERTICAL CONCRETE BARRIER RAIL				LN. FT.	90.0



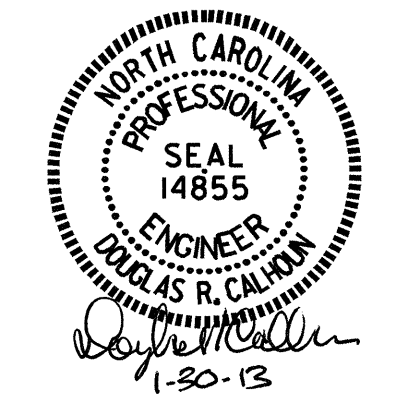
**VERTICAL CONCRETE BARRIER RAIL DETAILS**



GUTTERLINE ASPHALT THICKNESS & RAIL HEIGHT		
	ASPHALT OVERLAY THICKNESS @ MID-SPAN	RAIL HEIGHT @ MID-SPAN
45' UNITS	4"	3'-10 1/2"
90' UNITS	1 1/2"	3'-8"

BOX BEAM UNITS REQUIRED			
	NUMBER	LENGTH	TOTAL LENGTH
EXTERIOR B.B.	2	90'-0"	180'-0"
INTERIOR B.B.	8	90'-0"	720'-0"
TOTAL	10		900'-0"

BOX BEAM UNITS REQUIRED			
	NUMBER	LENGTH	TOTAL LENGTH
EXTERIOR B.B.	2	45'-0"	90'-0"
INTERIOR B.B.	8	45'-0"	360'-0"
TOTAL	10		450'-0"



PROJECT NO. B-4965  
ROCKINGHAM COUNTY  
STATION: 20+70.50 -L-  
SHEET 7 OF 7

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

3'-0" X 2'-9"  
PRESTRESSED CONCRETE  
BOX BEAM UNIT

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

TOTAL SHEETS 21

ASSEMBLED BY : A.C. OUTLAW DATE : 7/11/12  
CHECKED BY : A. SORSENGINH DATE : 7/12  
DRAWN BY : DGE 10/11  
CHECKED BY : TMG 11/11

NOTES

THE GUARDRAIL ANCHOR ASSEMBLY SHALL CONSIST OF A 1/4" HOLD DOWN PLATE AND 7 - 1/8" 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 1/8" 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.)

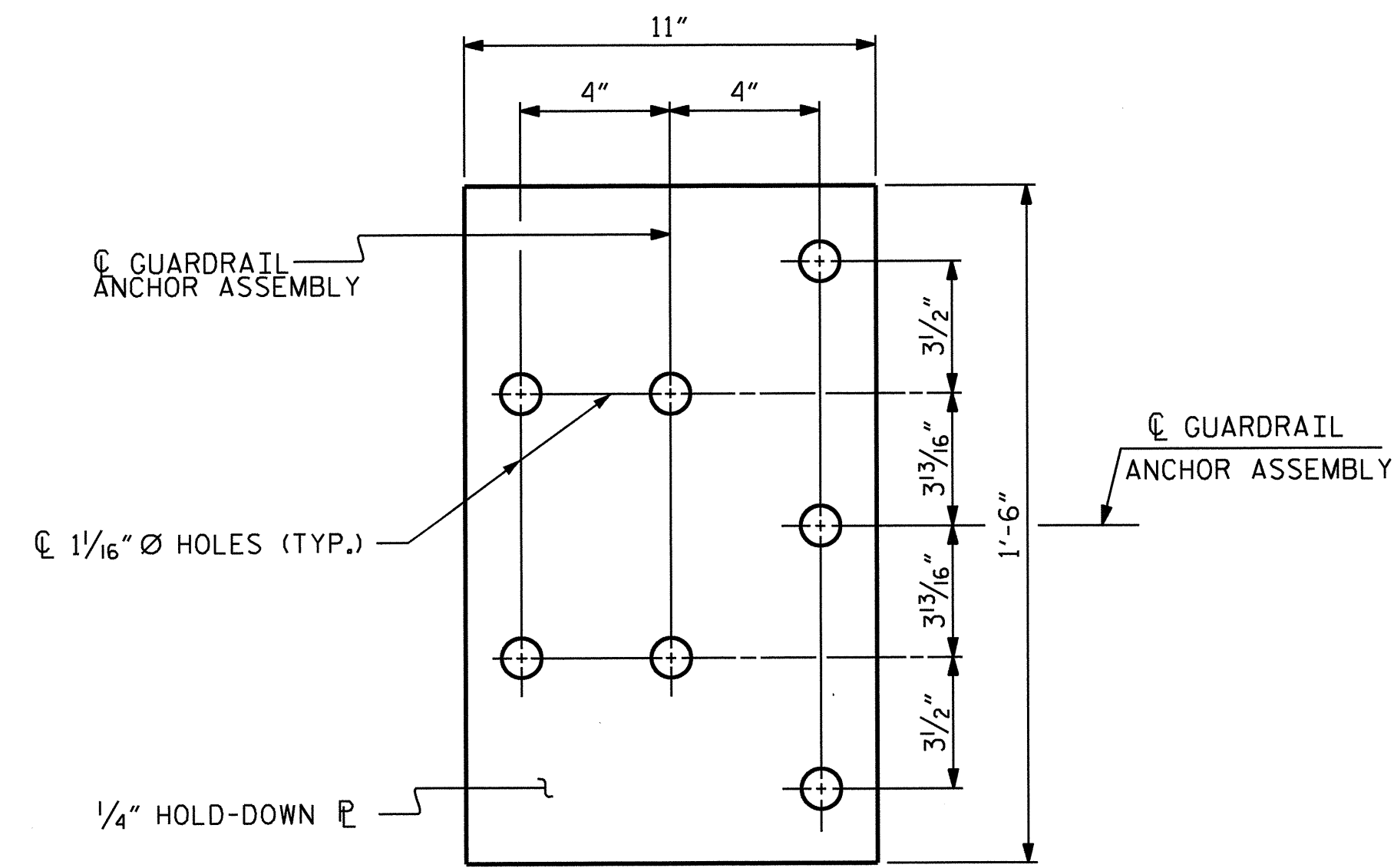
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF BARRIER RAIL. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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 VERTICAL CONCRETE BARRIER RAIL.

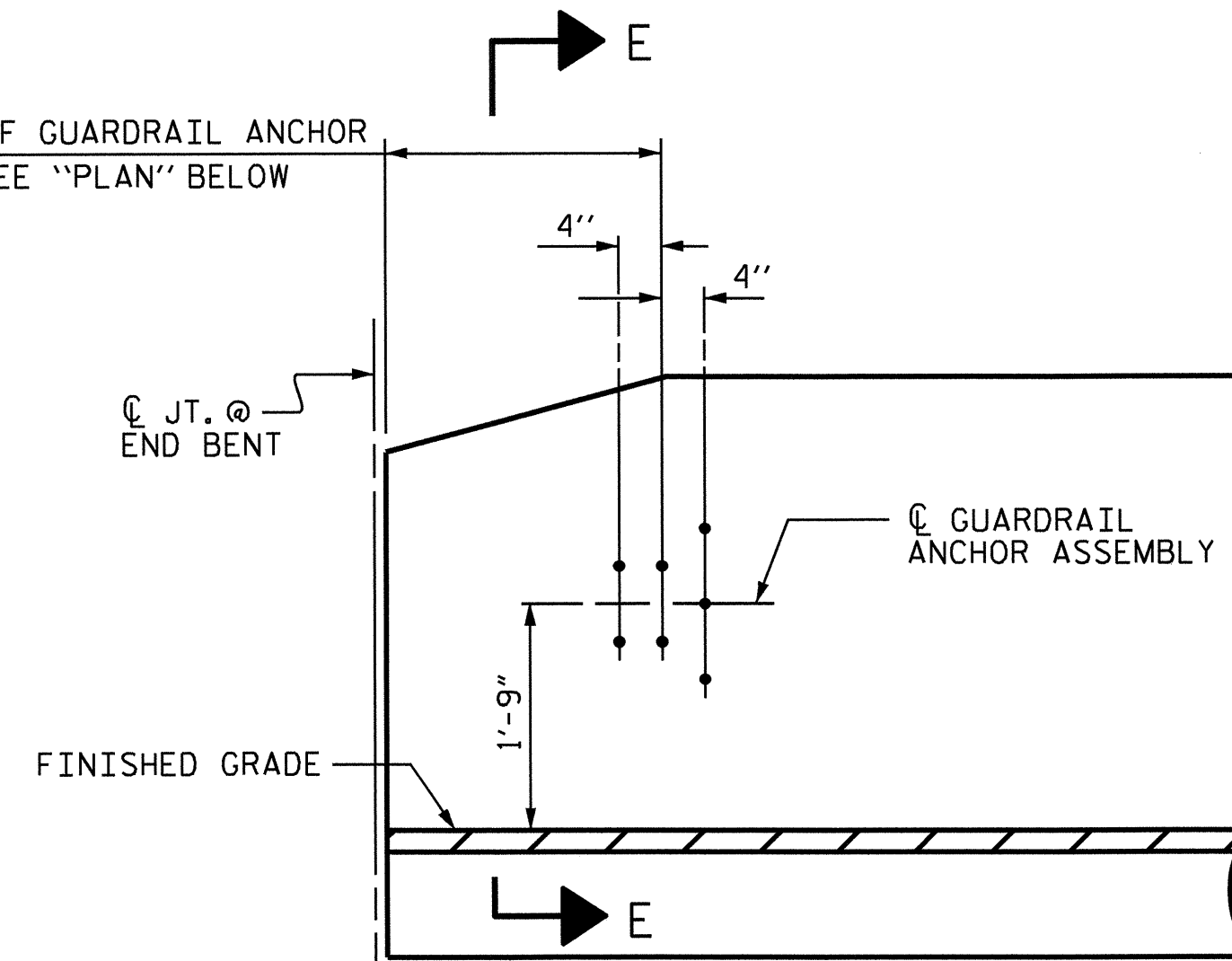
THE VERTICAL REINFORCING BARS MAY BE SHIFTED SLIGHTLY IN THE VERTICAL CONCRETE BARRIER RAIL TO CLEAR ASSEMBLY BOLTS.

THE 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.

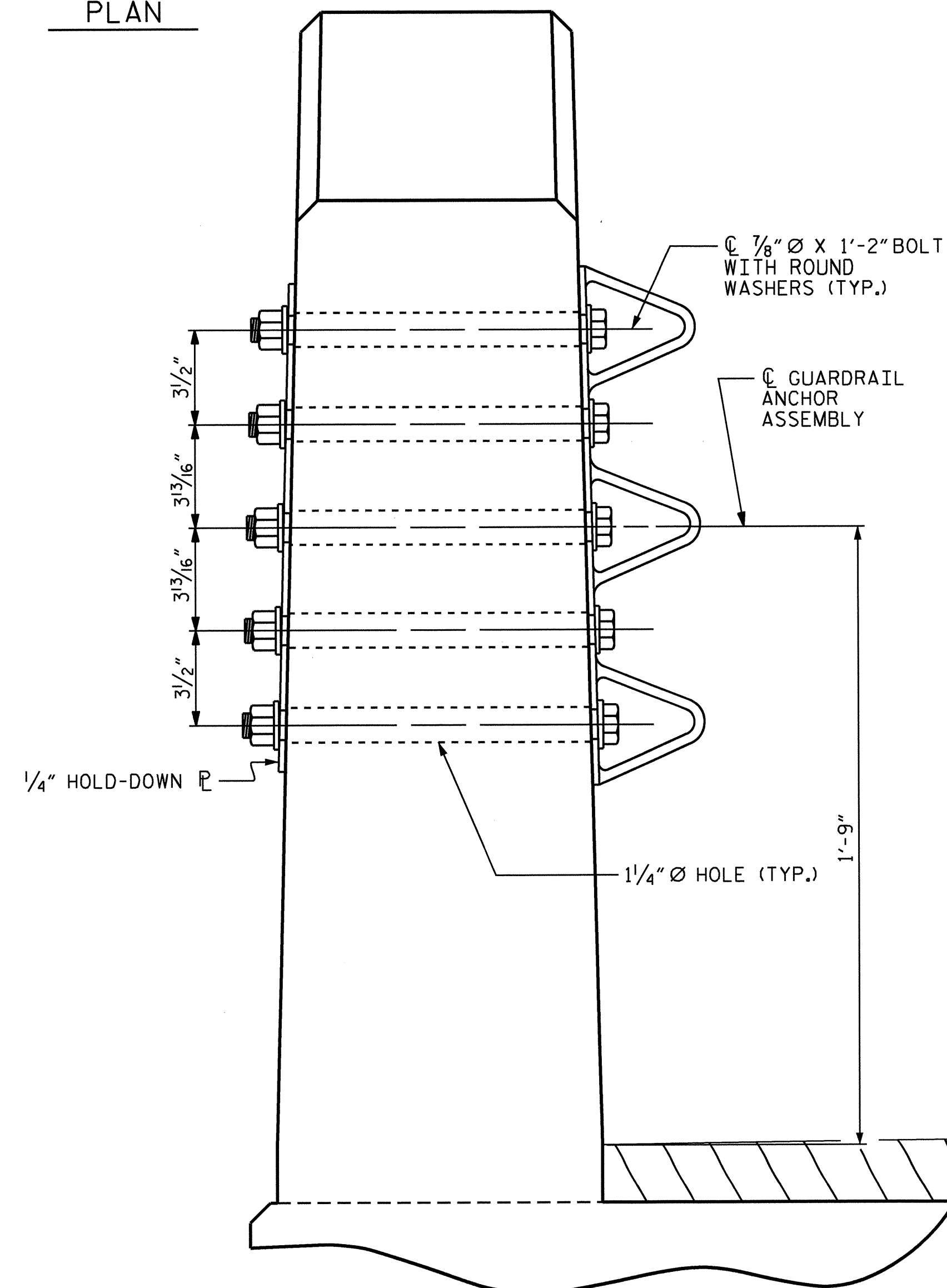


PLAN

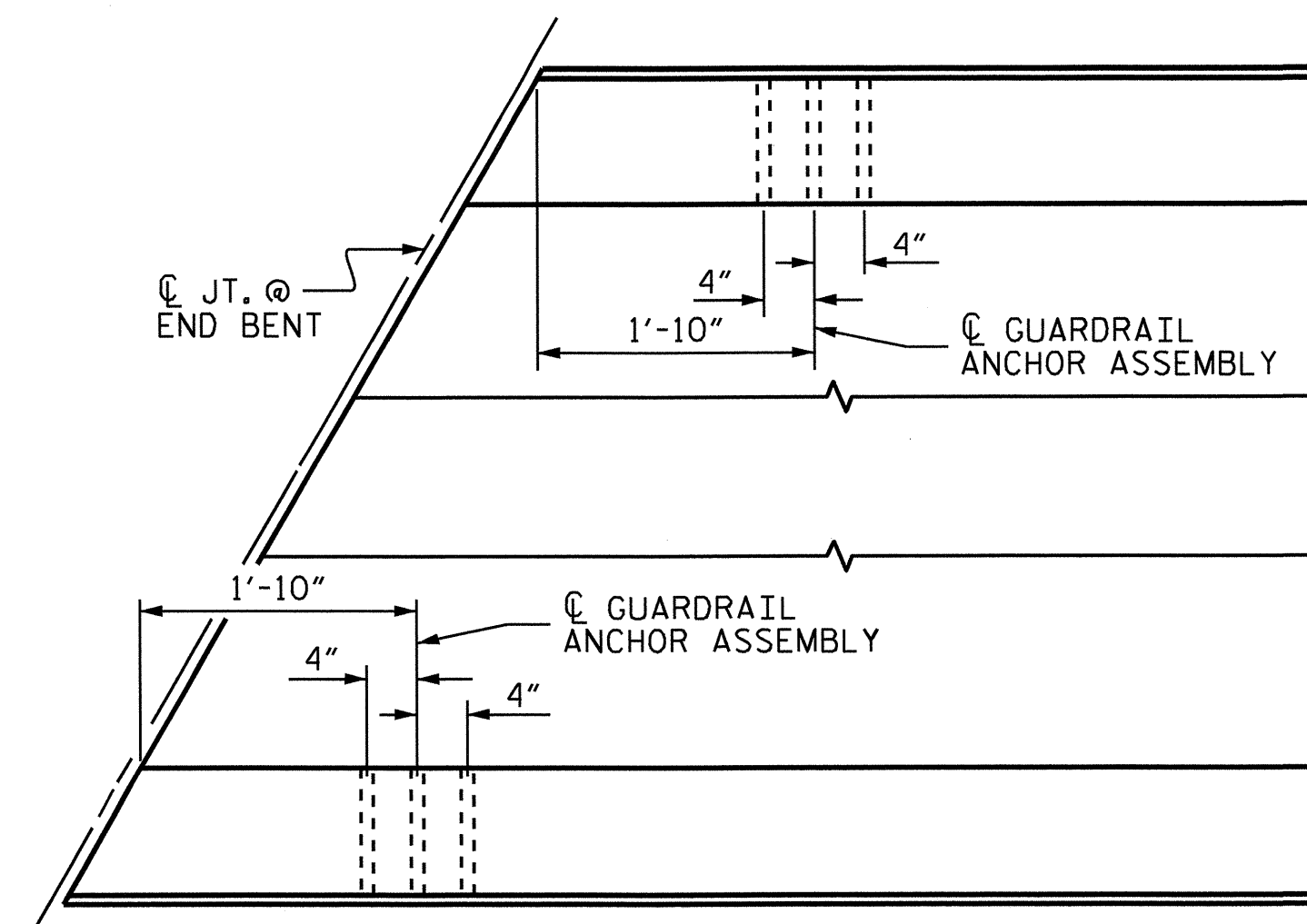
FOR LOCATION OF GUARDRAIL ANCHOR ASSEMBLY, SEE "PLAN" BELOW



ELEVATION



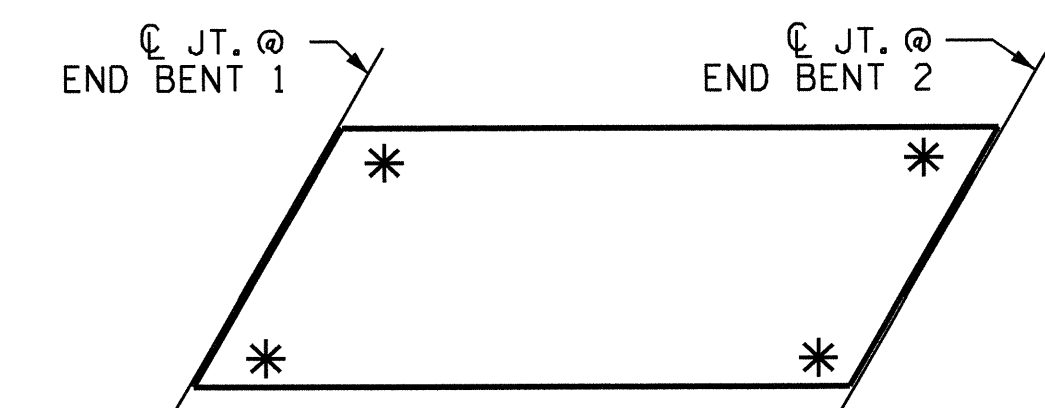
SECTION E-E  
GUARDRAIL ANCHOR ASSEMBLY DETAILS



PLAN

LOCATION OF ANCHORS FOR GUARDRAIL

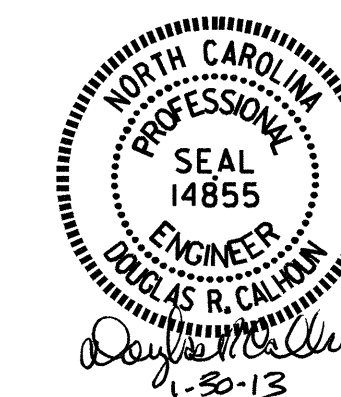
END BENT 1 SHOWN, END BENT 2 SIMILAR.



SKETCH SHOWING POINTS OF ATTACHMENT

\* DENOTES GUARDRAIL ANCHOR ASSEMBLY

PROJECT NO. B-4965  
ROCKINGHAM COUNTY  
STATION: 20+70.50 -L-



STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
STANDARD  
GUARDRAIL ANCHORAGE  
FOR VERTICAL CONCRETE  
BARRIER RAIL

ASSEMBLED BY : A.C. OUTLAW	DATE : 7/11/12
CHECKED BY : A. SORSENGINH	DATE : 7/12
DRAWN BY : MAA 5/10	ADDED 5/6/10
CHECKED BY : GM 5/10	REV. 10/1/11 MAA/GM
	REV. 12/5/11 MAA/GM

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

TOTAL SHEETS 21



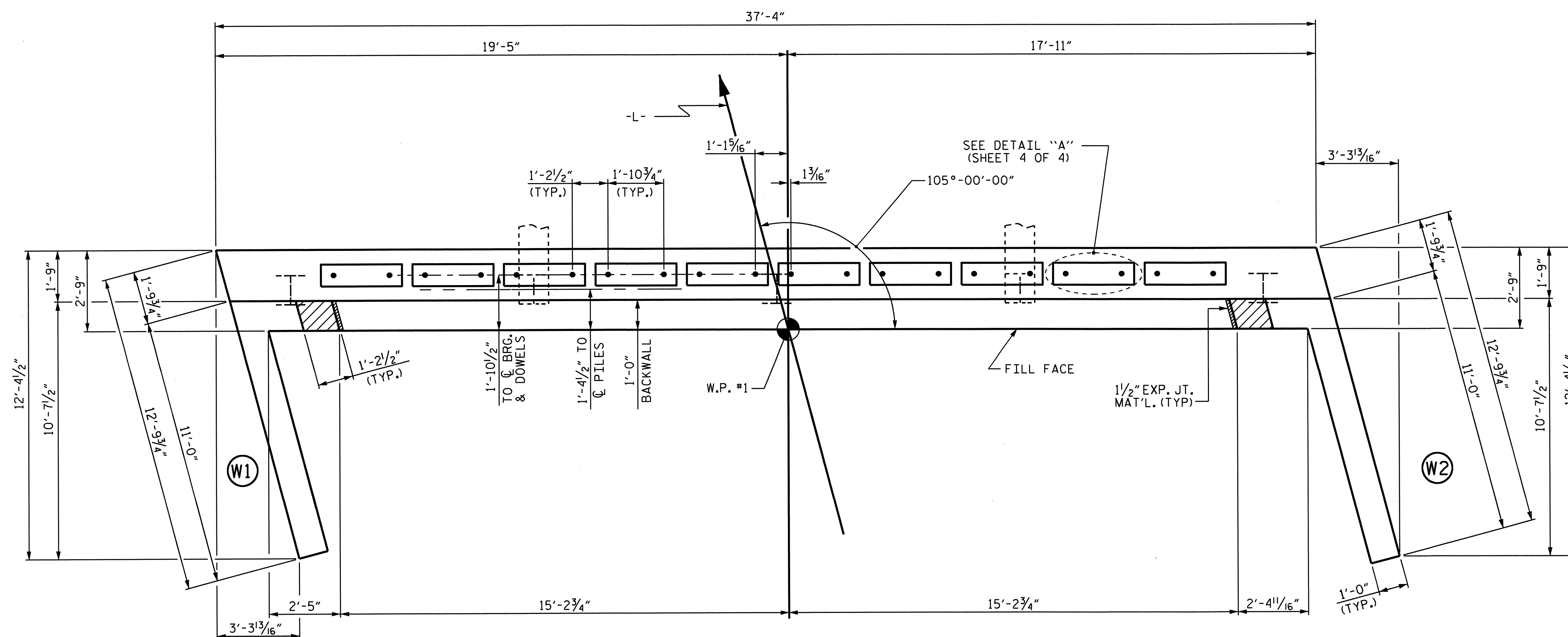
**NOTES**

STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR DOWELS.

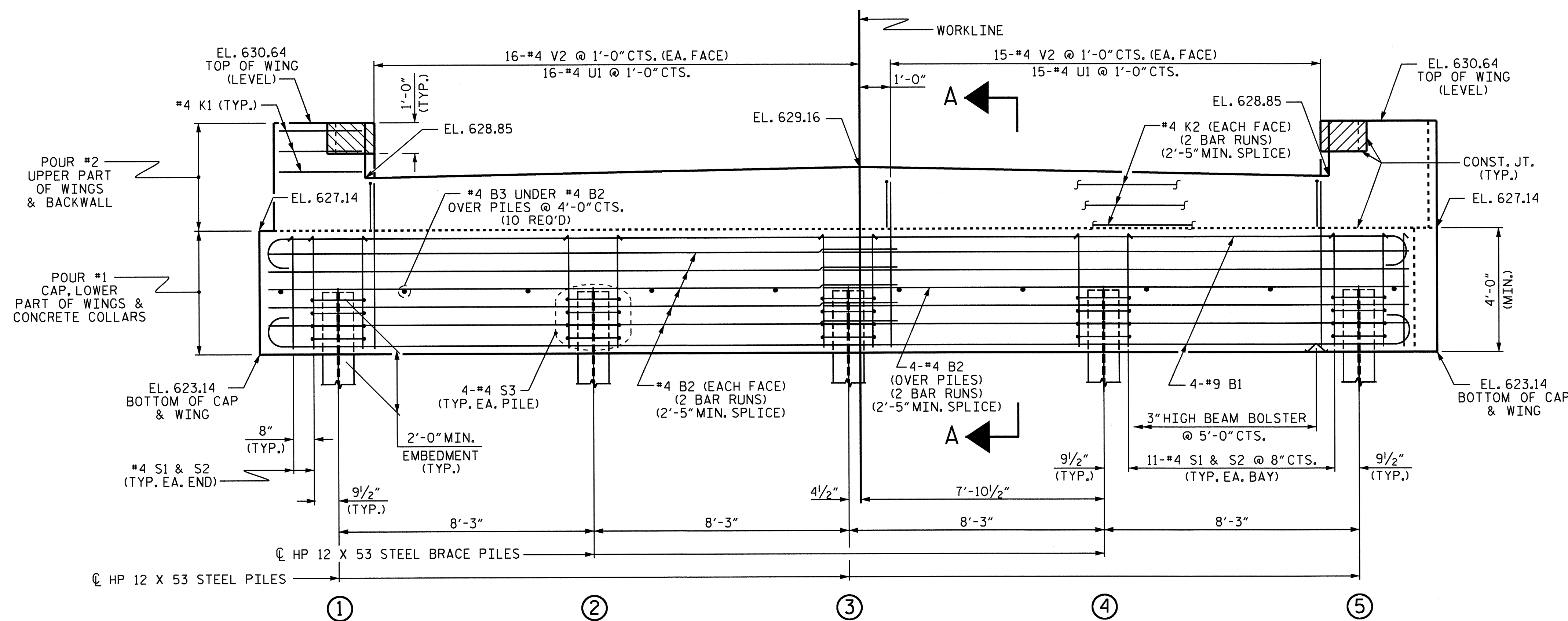
THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE VERTICAL CONCRETE BARRIER RAIL IS CAST IF SLIP FORMING IS USED.

FOR PILE SPLICE DETAILS, SEE SHEET 4 OF 4.

FOR WING DETAILS, SEE SHEET 3 OF 4.



**PLAN**



**ELEVATION**

WINGS NOT SHOWN FOR CLARITY.  
FOR SECTION A-A, SEE SHEET 4 OF 4.  
CONCRETE COLLARS FOR STEEL PILES NOT SHOWN IN PLAN AND ELEVATION VIEWS FOR CLARITY.  
SEE "CORROSION PROTECTION FOR STEEL PILES DETAIL", SHEET 4 OF 4.

PROJECT NO. B-4965  
ROCKINGHAM COUNTY  
STATION: 20+70.50 -L-

SHEET 1 OF 4

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

SUBSTRUCTURE  
END BENT 1



ASSEMBLED BY :	A. SORSENGINH	DATE :	8/20/12
CHECKED BY :	D.R. CALHOUN	DATE :	12/20/12
DRAWN BY :	WJH	DATE :	12/11
CHECKED BY :	AAC	DATE :	12/11

REVISIONS				SHEET NO.		
NO.	BY:	DATE:	NO.	BY:	DATE:	TOTAL SHEETS
1			3			14
2			4			21

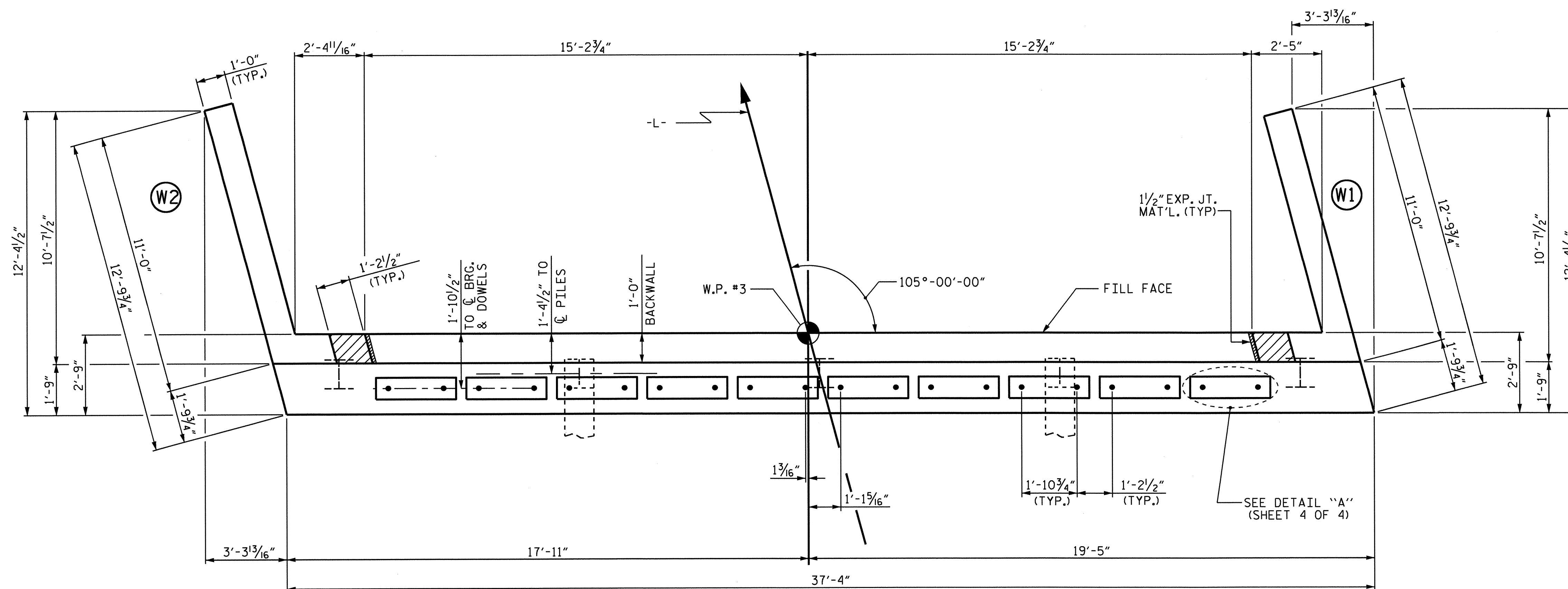
NOTES

STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR DOWELS.

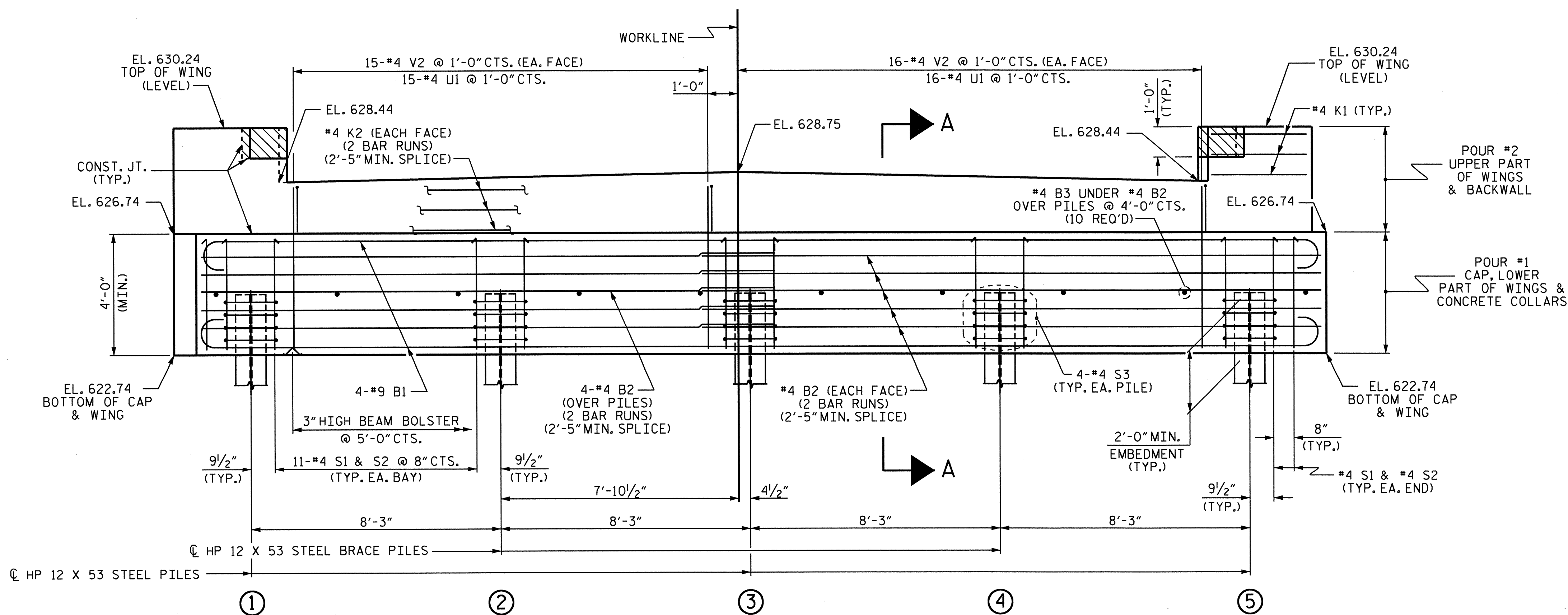
THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE VERTICAL CONCRETE BARRIER RAIL IS CAST IF SLIP FORMING IS USED.

FOR PILE SPLICE DETAILS, SEE SHEET 4 OF 4.

FOR WING DETAILS, SEE SHEET 3 OF 4.



PLAN



ELEVATION

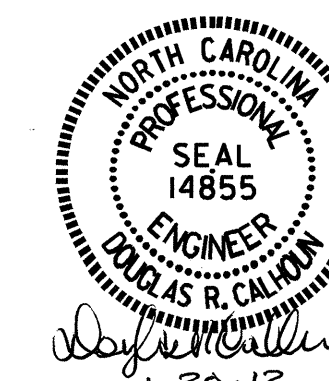
WINGS NOT SHOWN FOR CLARITY.  
FOR SECTION A-A, SEE SHEET 4 OF 4.  
CONCRETE COLLARS FOR STEEL PILES NOT SHOWN IN PLAN AND ELEVATION VIEWS FOR CLARITY.  
SEE "CORROSION PROTECTION FOR STEEL PILES DETAIL", SHEET 4 OF 4.

PROJECT NO. B-4965  
ROCKINGHAM COUNTY  
STATION: 20+70.50 -L-

SHEET 2 OF 4

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

SUBSTRUCTURE  
END BENT 2

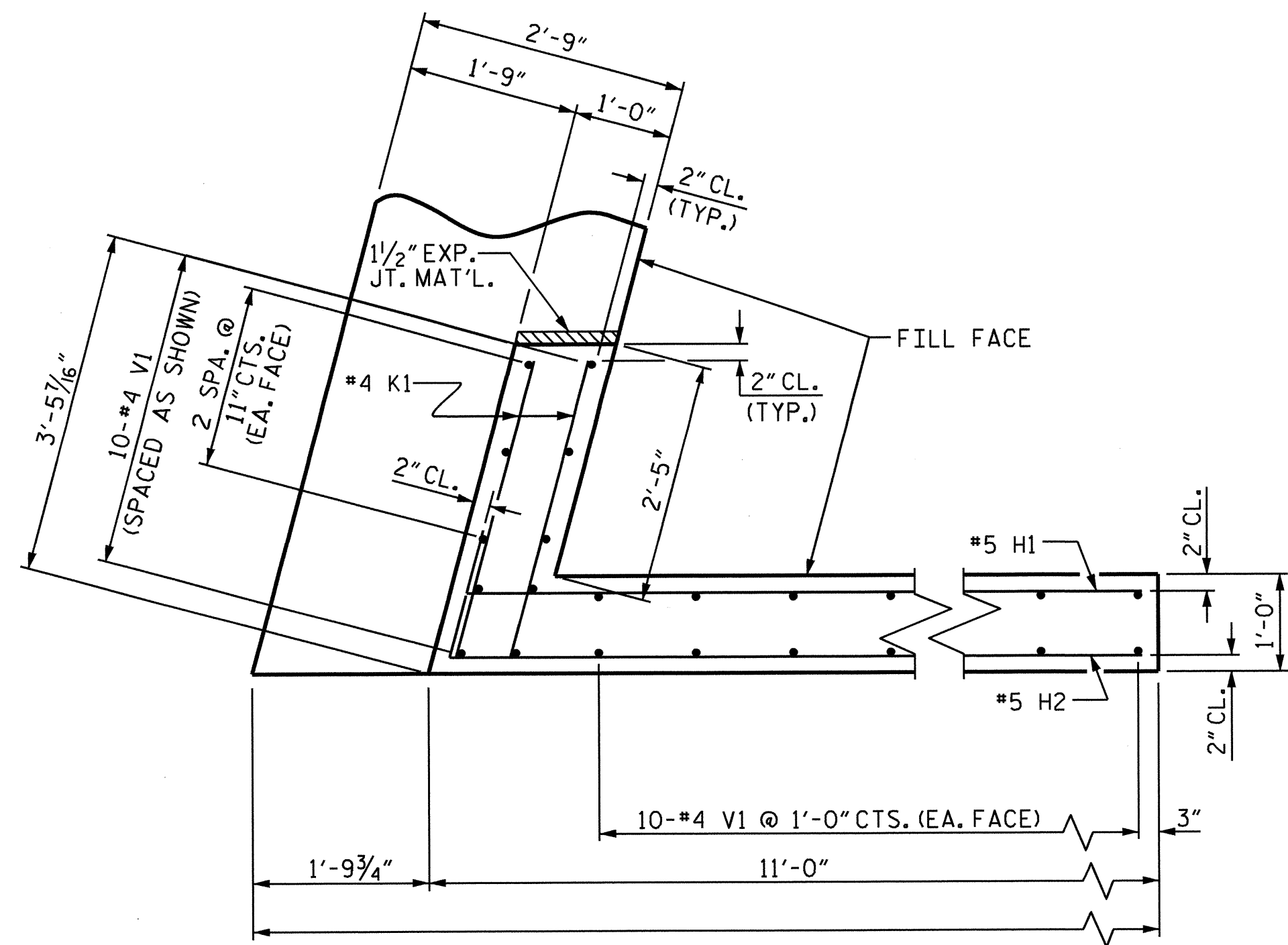


ASSEMBLED BY : A. SORSENGIH DATE : 8/2012  
CHECKED BY : D.R. CALHOUN DATE : 12/2012  
DRAWN BY : WJH 12/11  
CHECKED BY : AAC 12/11

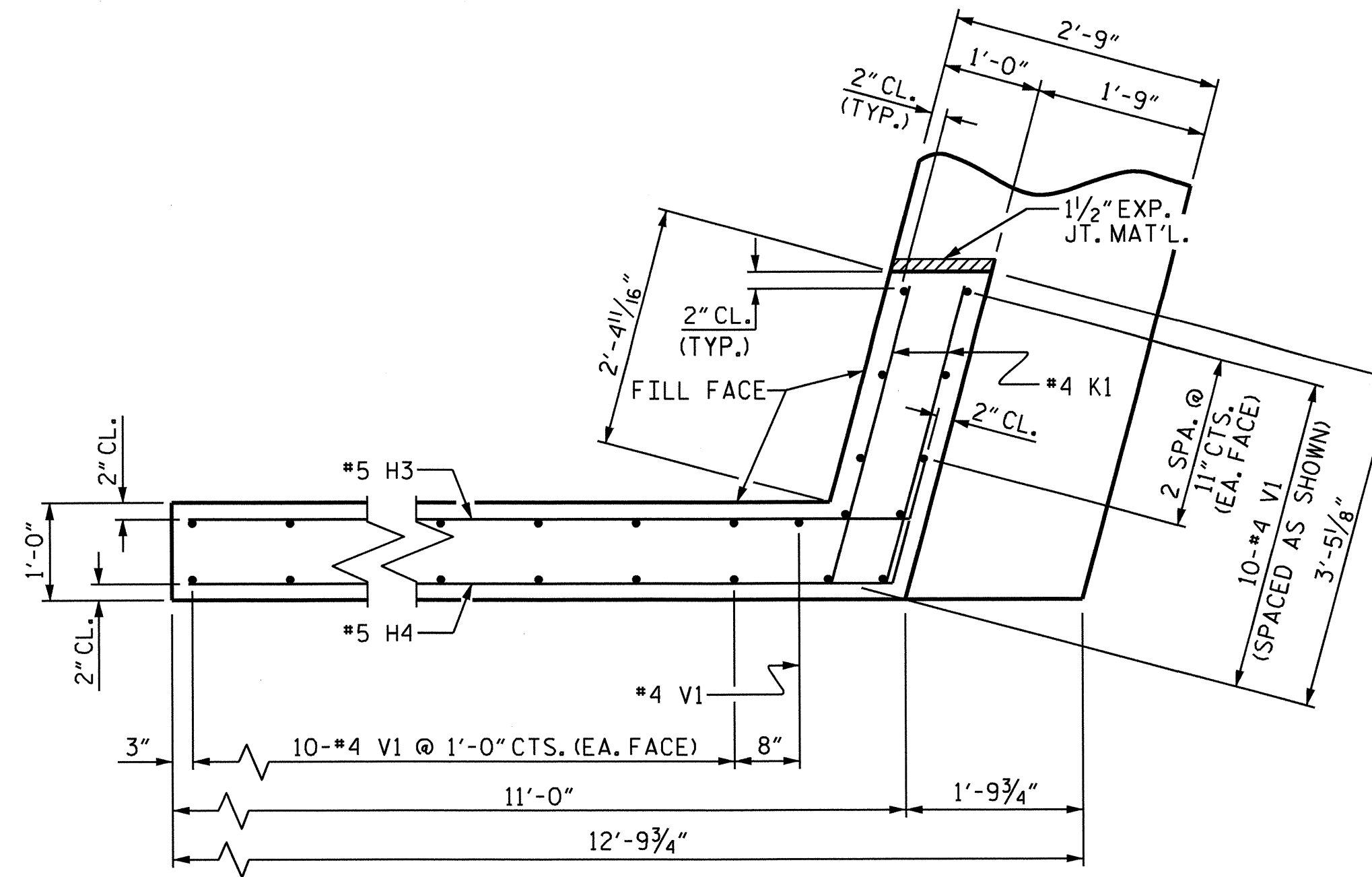
REVISIONS					SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

TOTAL SHEETS 21

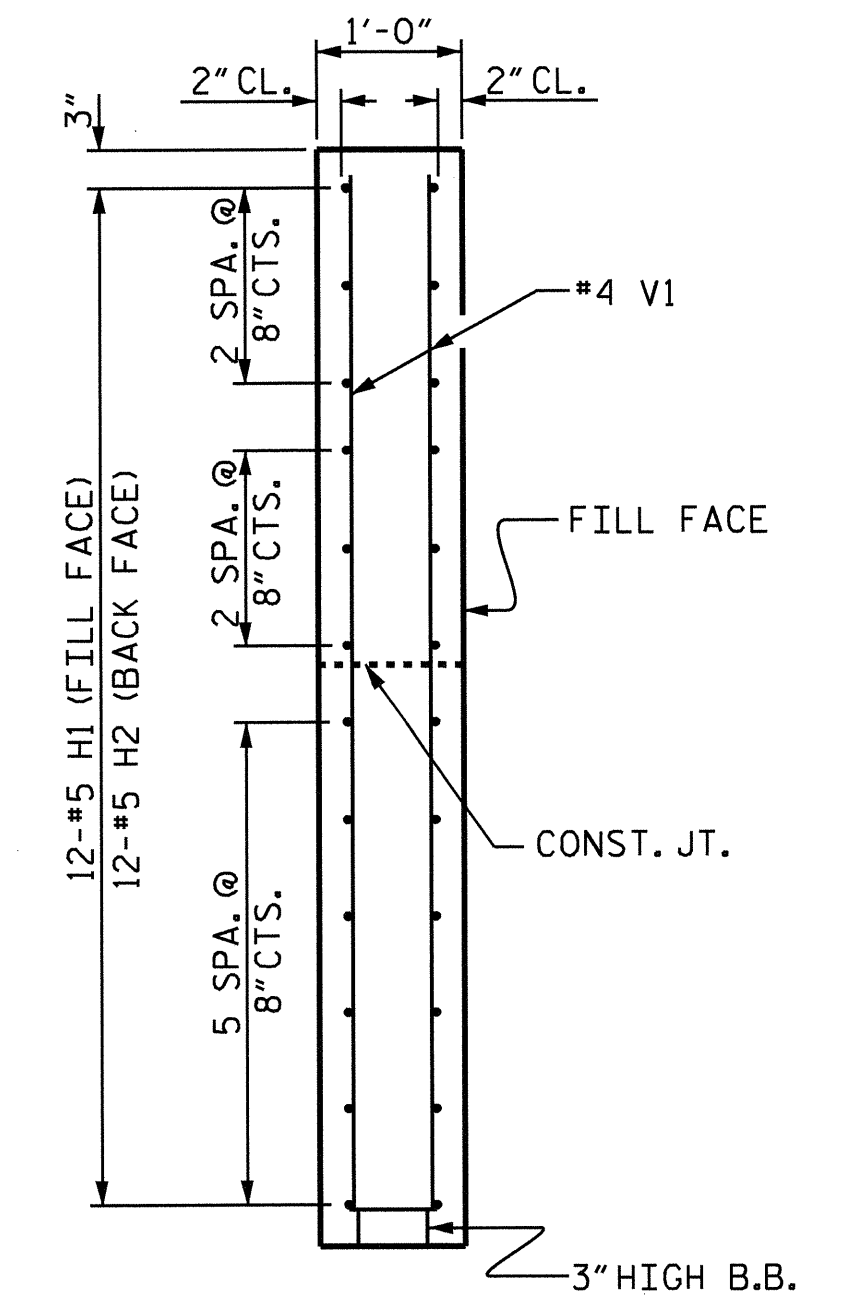




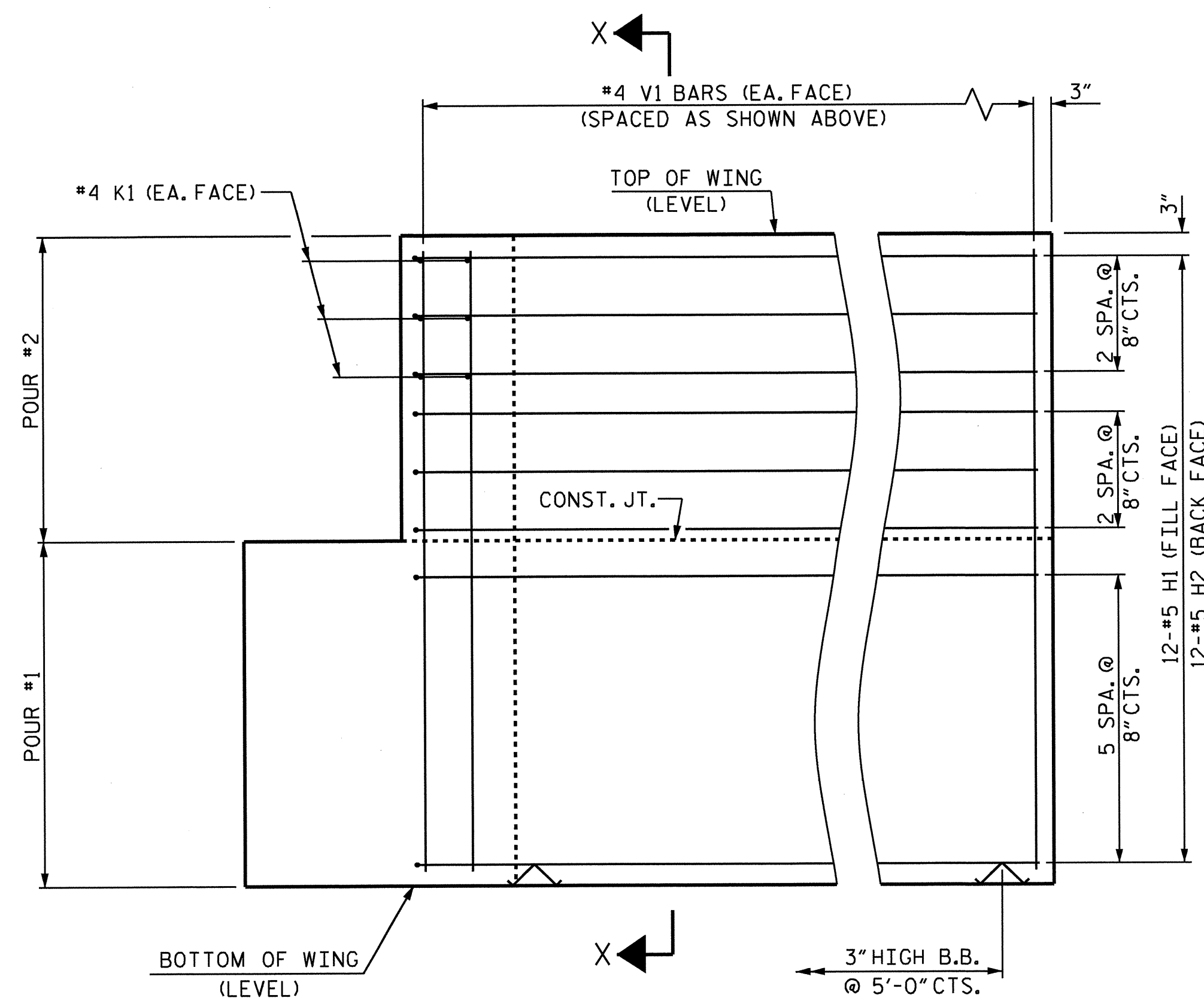
PLAN OF WING (W1)



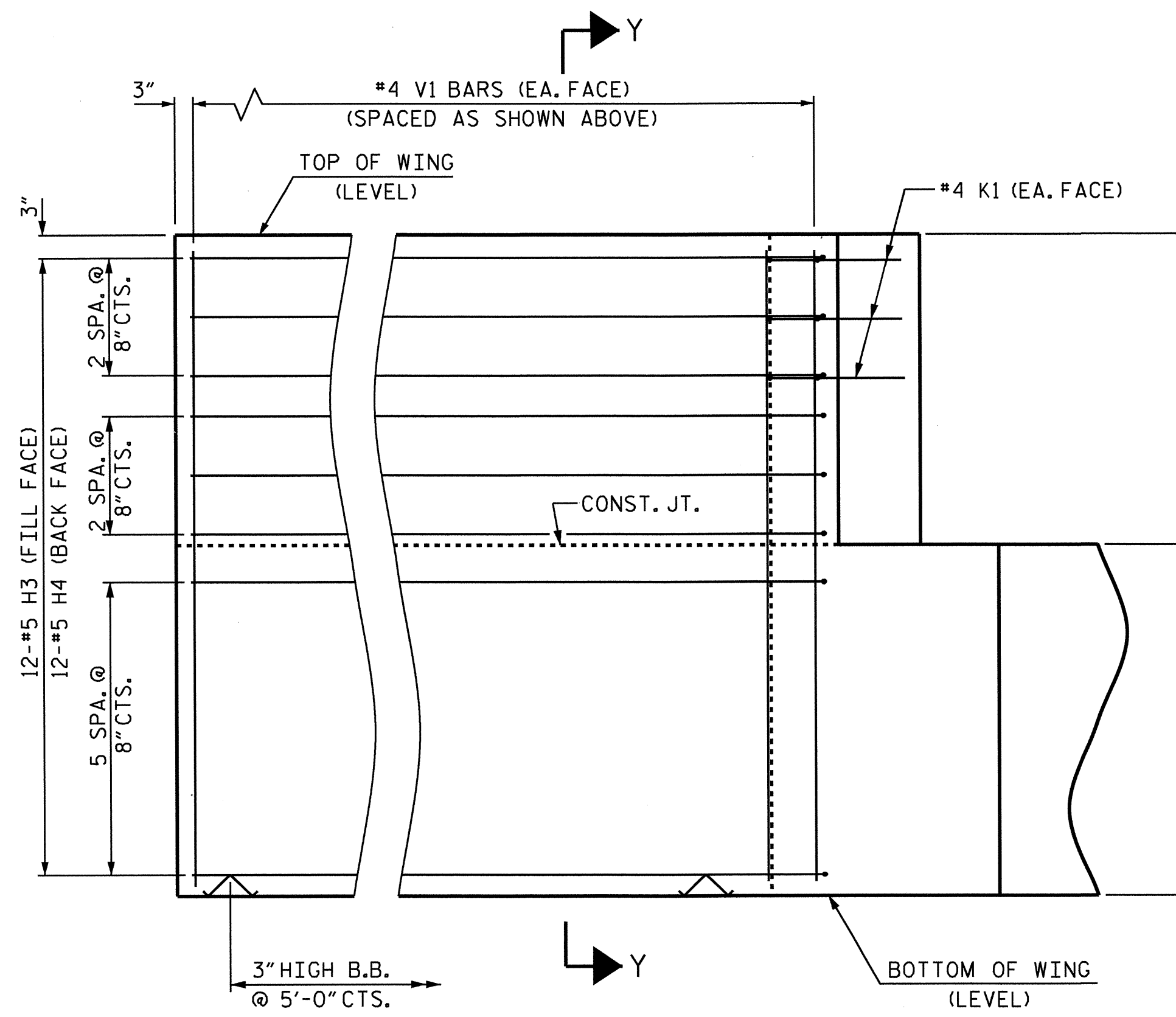
PLAN OF WING (W2)



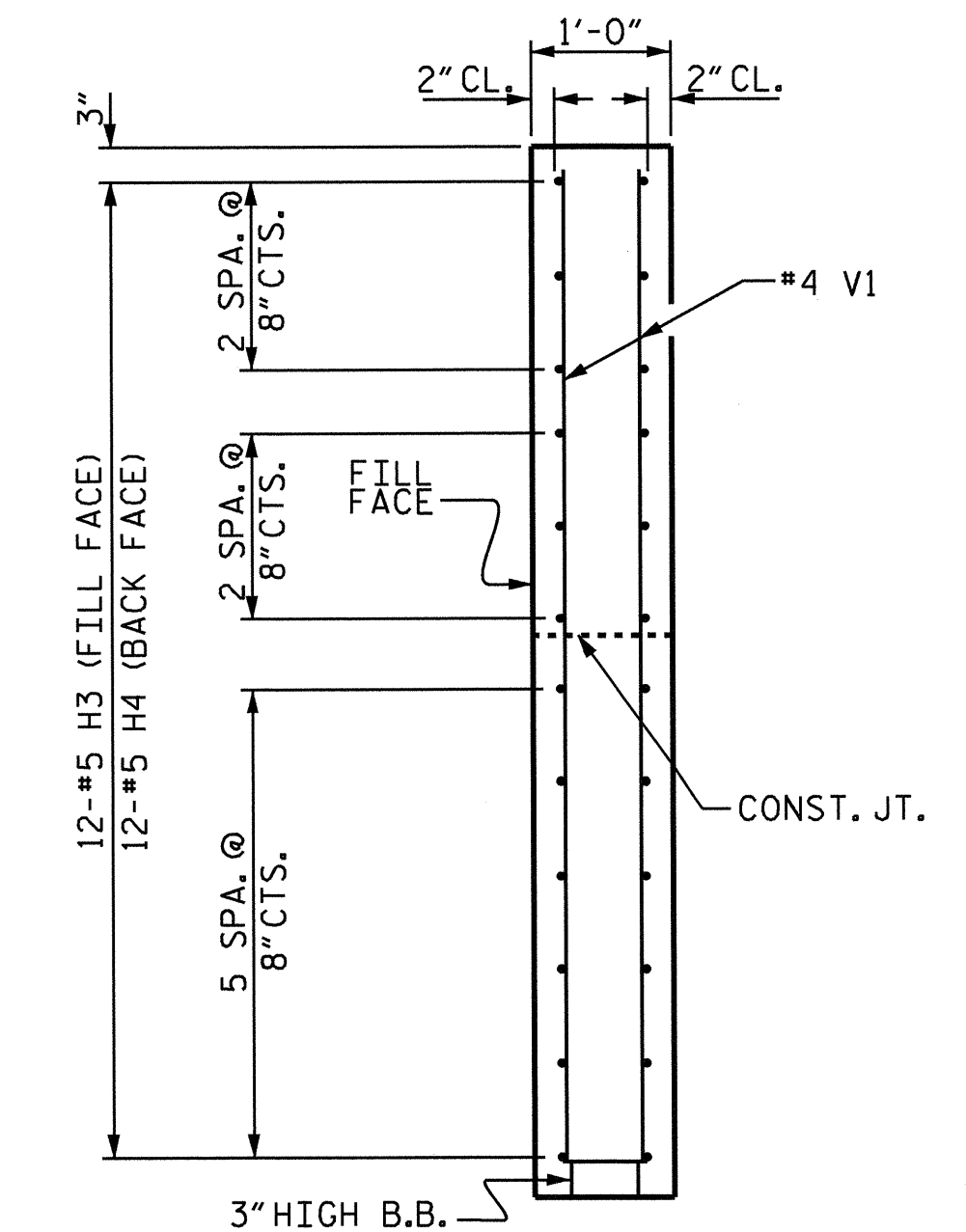
SECTION X-X



ELEVATION OF WING (W1)



ELEVATION OF WING (W2)



SECTION Y-Y

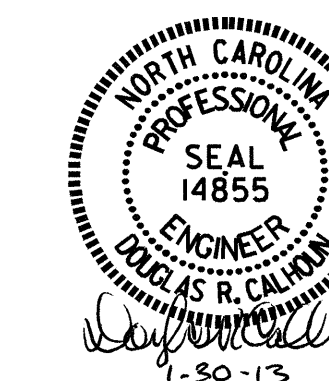
WING DETAILS

PROJECT NO. B-4965  
 ROCKINGHAM COUNTY  
 STATION: 20+70.50 -L-

SHEET 3 OF 4

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

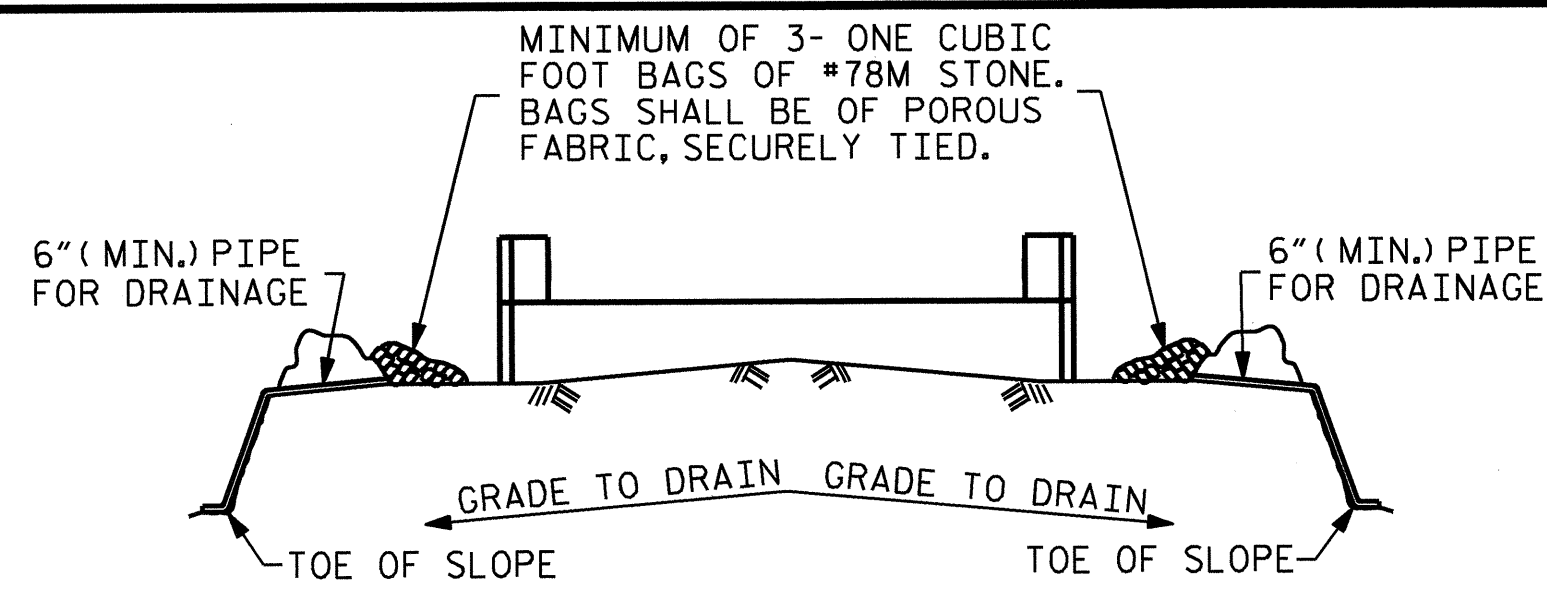
SUBSTRUCTURE  
 END BENT  
 WING DETAILS



ASSEMBLED BY : A. SORSENGINH DATE : 8/2012  
 CHECKED BY : D.R. CALHOUN DATE : 12/2012  
 DRAWN BY : WJH 12/11  
 CHECKED BY : AAC 12/11

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

TOTAL SHEETS: 21

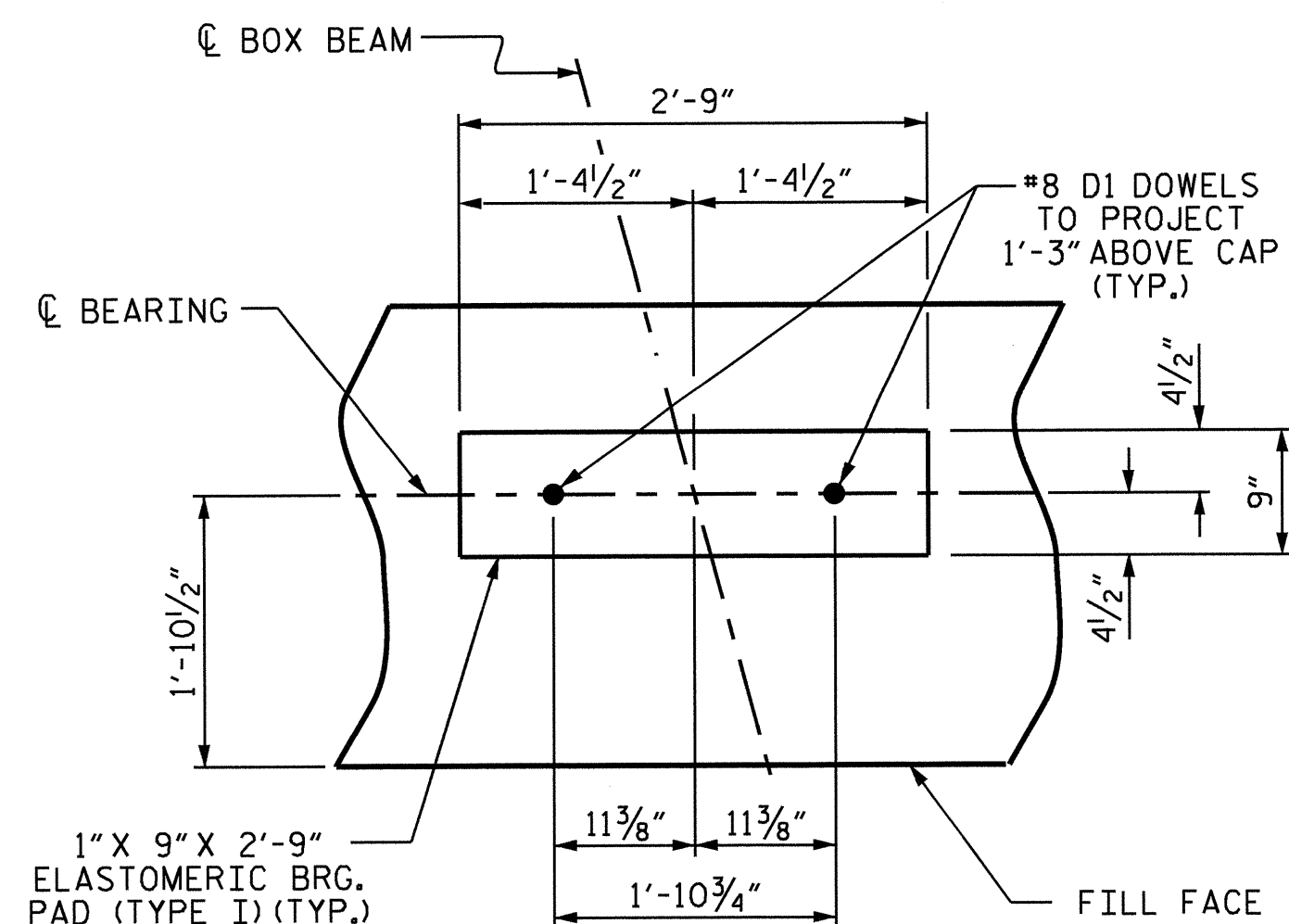


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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.

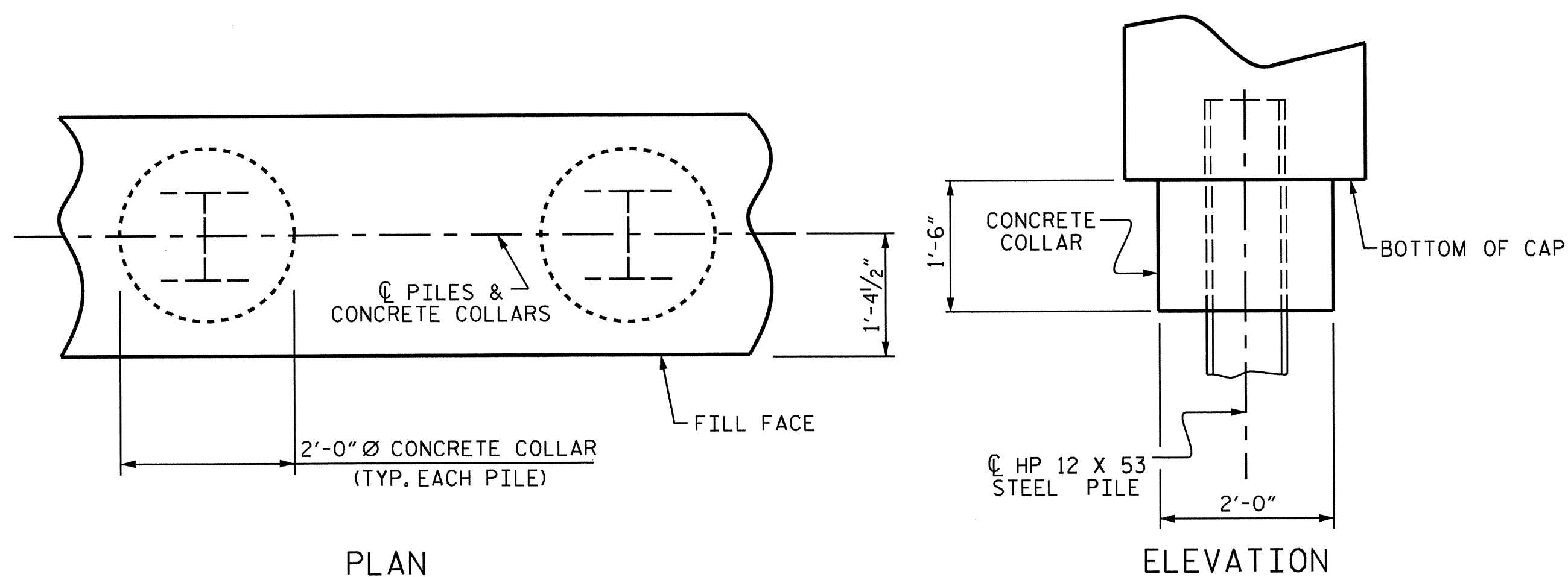
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

### TEMPORARY DRAINAGE AT END BENT



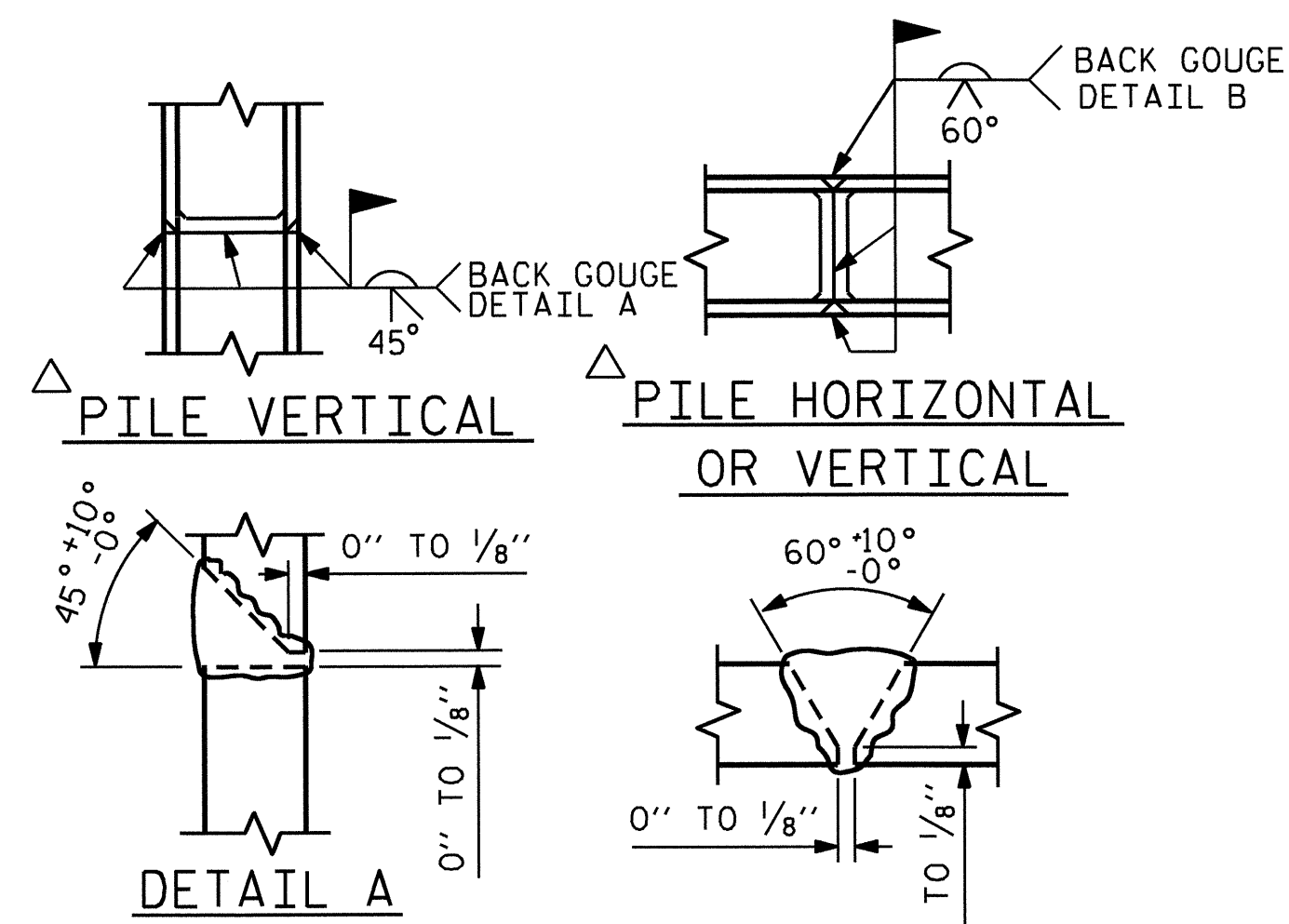
### DETAIL "A"

(END BENT No. 1 SHOWN, END BENT No. 2 SIMILAR BY ROTATION)



### CORROSION PROTECTION FOR STEEL PILES DETAIL

(END BENT No. 1 SHOWN, END BENT No. 2 SIMILAR BY ROTATION)



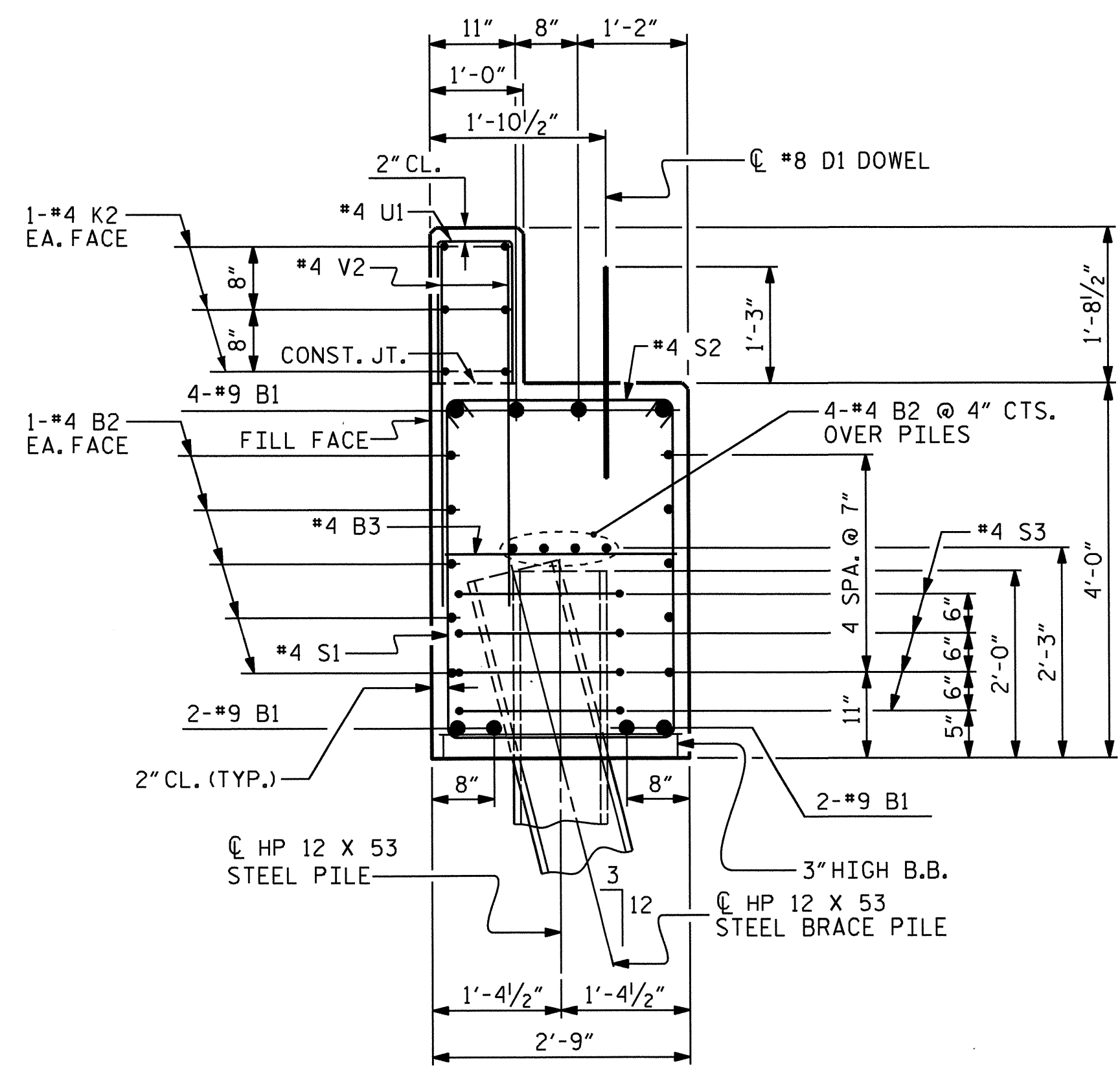
POSITION OF PILE DURING WELDING.

### PILE SPLICE DETAILS

BAR TYPES		BILL OF MATERIAL FOR ONE END BENT			
BAR NO.	SIZE	TYPE	LENGTH	WEIGHT	
B1	#8	#9	1	39'-4"	1070
B2	28	#4	STR	19'-9"	369
B3	10	#4	STR	2'-5"	16
D1	20	#8	STR	2'-3"	120
H1	12	#5	2	11'-1"	139
H2	12	#5	2	11'-3"	141
H3	12	#5	3	11'-6"	144
H4	12	#5	3	11'-4"	142
K1	12	#4	STR	3'-1"	25
K2	12	#4	STR	19'-9"	158
S1	48	#4	4	10'-5"	334
S2	48	#4	5	3'-2"	102
S3	20	#4	6	6'-6"	87
U1	31	#4	7	3'-8"	76
V1	61	#4	STR	7'-2"	292
V2	62	#4	STR	5'-4"	221
REINFORCING STEEL (FOR ONE END BENT)		3436 LBS.			
CLASS A CONCRETE BREAKDOWN (FOR ONE END BENT)					
POUR #1 CAP, LOWER PART OF WINGS & COLLARS				19.1 C.Y.	
POUR #2 BACKWALL & UPPER PART OF WINGS				5.4 C.Y.	
TOTAL CLASS A CONCRETE				24.5 C.Y.	

ALL BAR DIMENSIONS ARE OUT TO OUT.

END BENT 1		END BENT 2	
HP 12 X 53 STEEL PILES	NO: 5	HP 12 X 53 STEEL PILES	NO: 5
LIN. FT. = 75		LIN. FT. = 50	
STEEL PILE POINTS	NO: 5	STEEL PILE POINTS	NO: 5



### SECTION A-A

(CONCRETE COLLAR NOT SHOWN FOR CLARITY. SEE "CORROSION PROTECTION FOR STEEL PILES DETAIL.")



PROJECT NO. B-4965  
 ROCKINGHAM COUNTY  
 STATION: 20+70.50 -L-  
 SHEET 4 OF 4

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 SUBSTRUCTURE  
 END BENT 1 & 2  
 DETAILS

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

TOTAL SHEETS 21

ASSEMBLED BY : A. SORSENGIH DATE : 8/2012  
 CHECKED BY : D.R. CALHOUN DATE : 12/2012  
 DRAWN BY : WJH 12/11  
 CHECKED BY : AAC 12/11



**NOTES**

STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR DOWELS.

HOOKS ON "V" BARS MAY BE TURNED AS NECESSARY FOR PLACING REINFORCING STEEL.

FOR DRILLED PIERS, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.

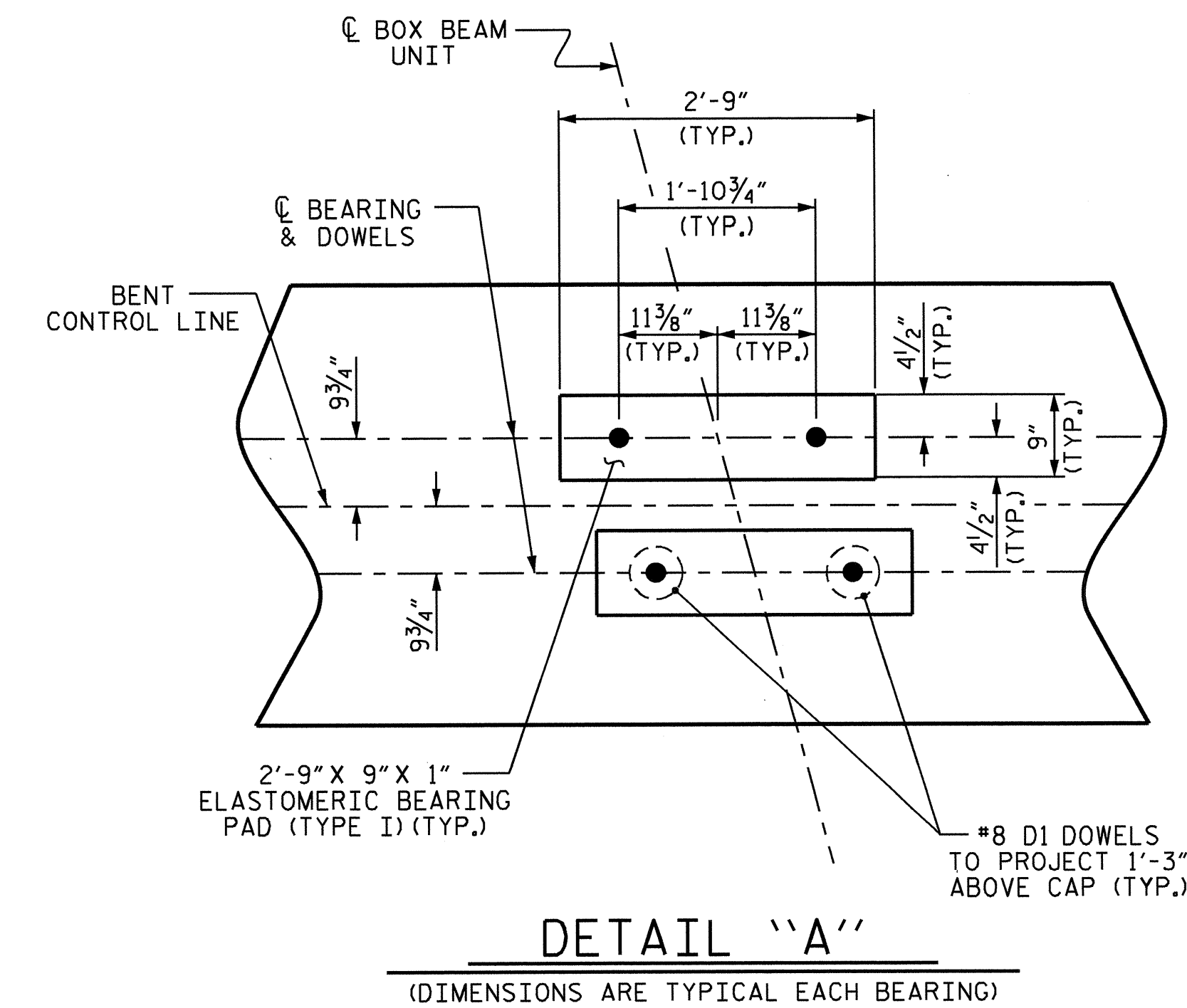
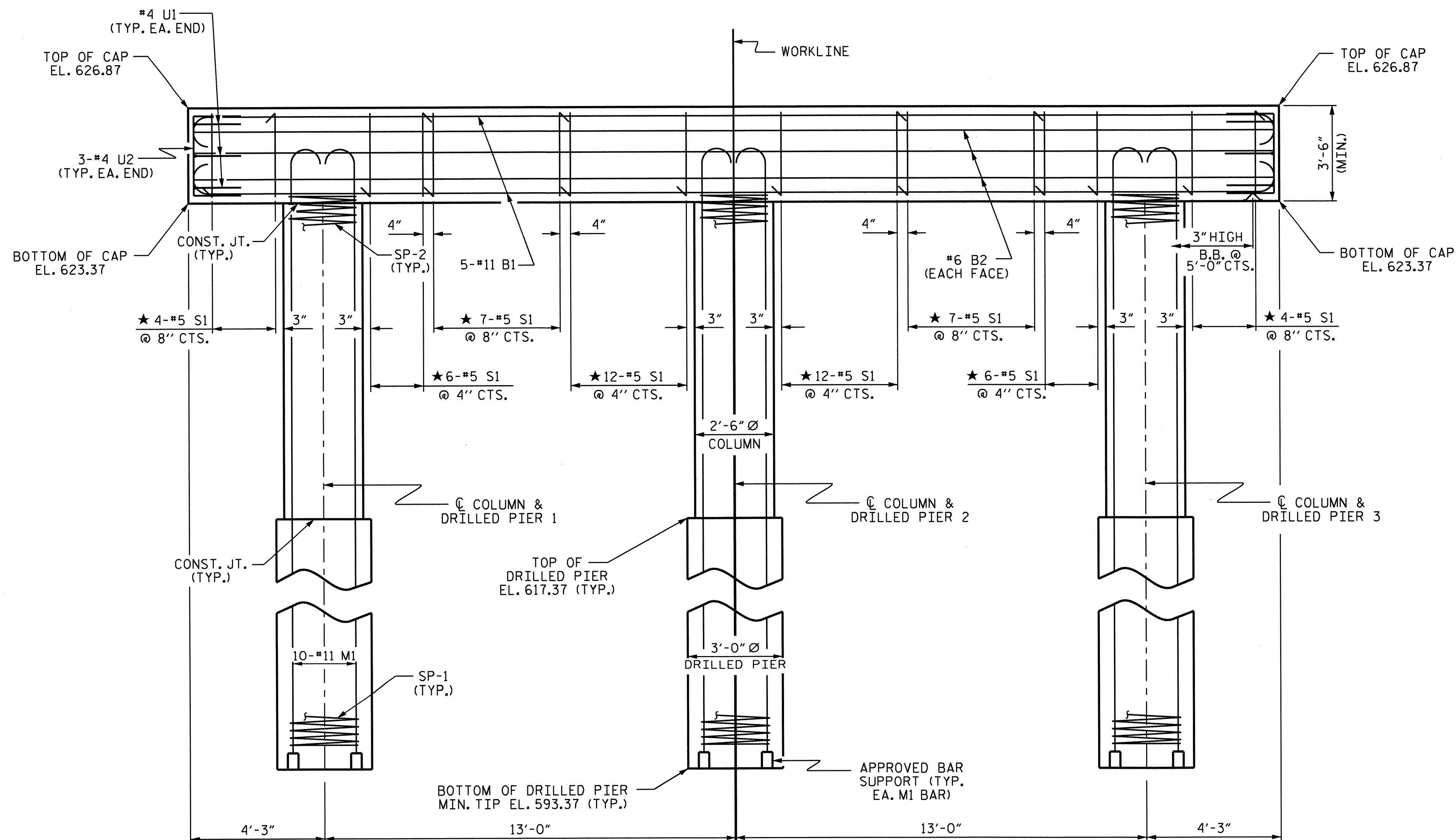
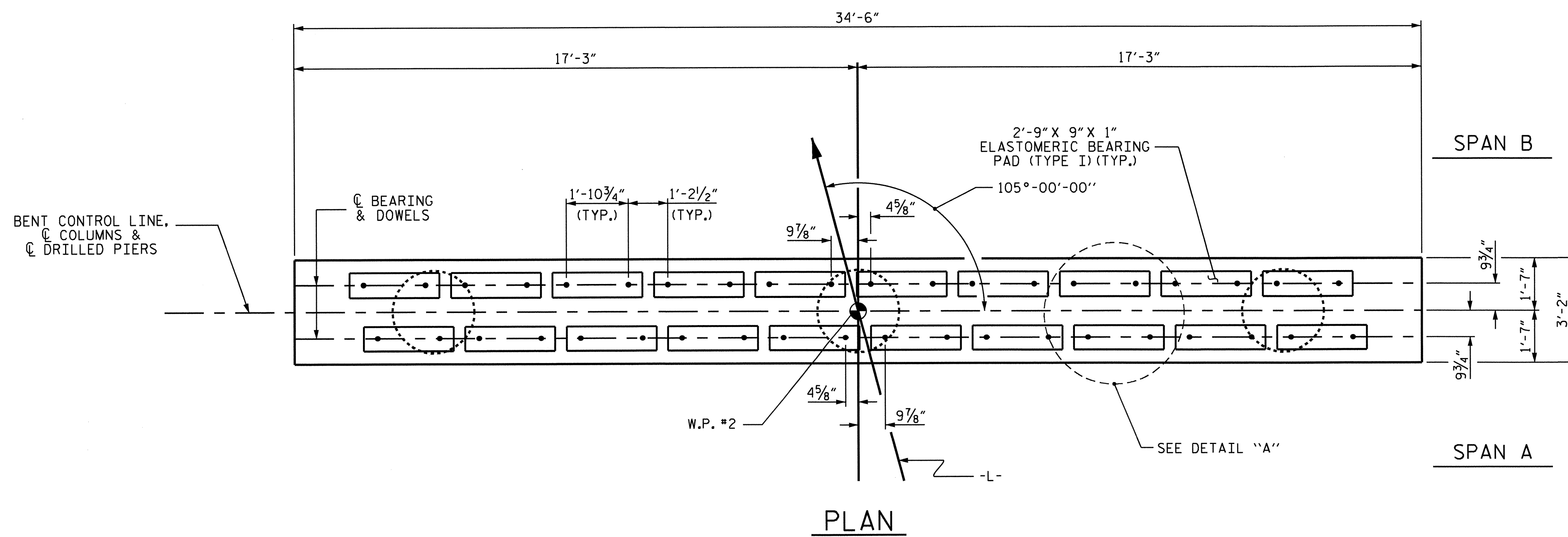
ALL STEEL IN THE DRILLED PIERS IS INCLUDED IN THE PAY ITEMS FOR "REINFORCING STEEL" AND "SPIRAL COLUMN REINFORCING STEEL."

★ INVERT ALTERNATE STIRRUPS.

THE LOCATION OF THE CONSTRUCTION JOINT IN THE DRILLED PIERS IS BASED ON AN APPROXIMATE GROUND LINE ELEVATION. IF THE CONSTRUCTION JOINT IS ABOVE THE ACTUAL GROUND LINE ELEVATION, THE CONTRACTOR SHALL PLACE THE CONSTRUCTION JOINT ONE FOOT BELOW THE GROUND LINE.

THE CONTRACTOR'S ATTENTION IS CALLED TO THE FACT THAT THE LONGITUDINAL REINFORCEMENT FOR DRILLED PIERS IS DETAILED WITH 3 FEET OF EXTRA LENGTH.

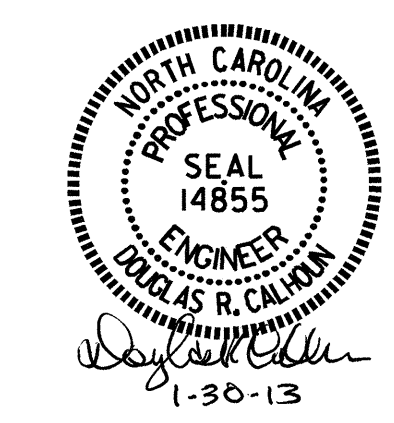
SPLICING OF THE LONGITUDINAL BARS IN THE DRILLED PIERS WILL NOT BE PERMITTED.



PROJECT NO. B-4965  
 ROCKINGHAM COUNTY  
 STATION: 20+70.50 -L-

SHEET 1 OF 2  
 STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

SUBSTRUCTURE  
 BENT 1

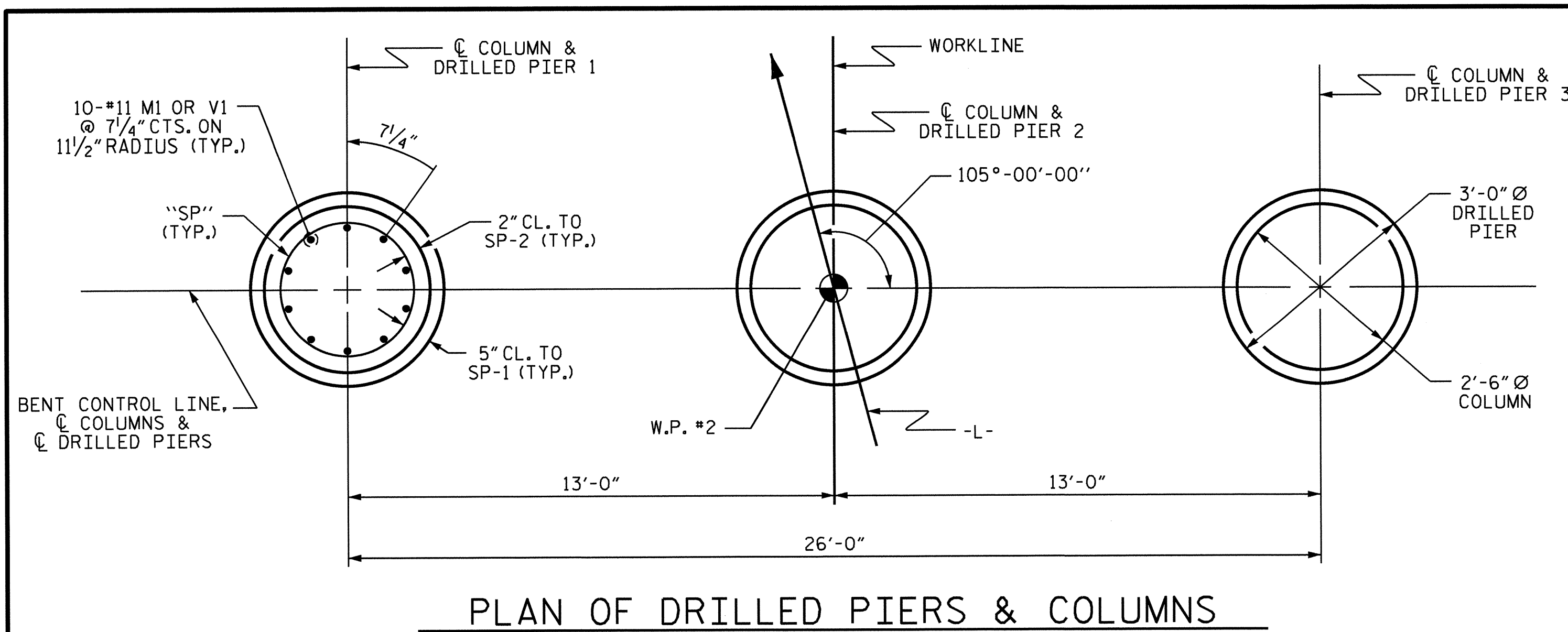


REVISIONS				SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

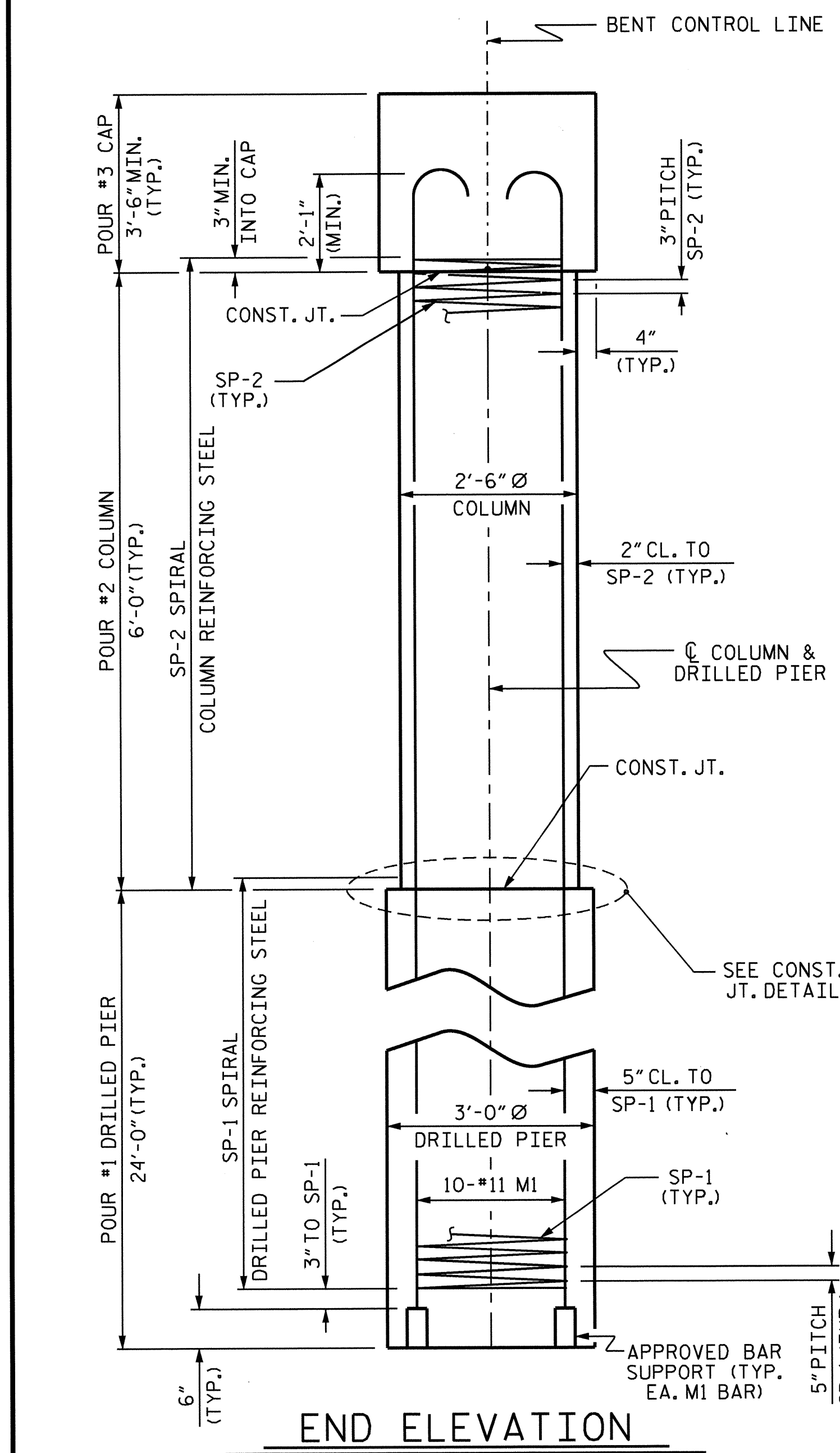
TOTAL SHEETS: 21

ASSEMBLED BY : A. SORSENGINH DATE : 8/2012  
 CHECKED BY : D.R. CALHOUN DATE : 12/2012  
 DRAWN BY : DGE 04/10  
 CHECKED BY : MKT 04/10

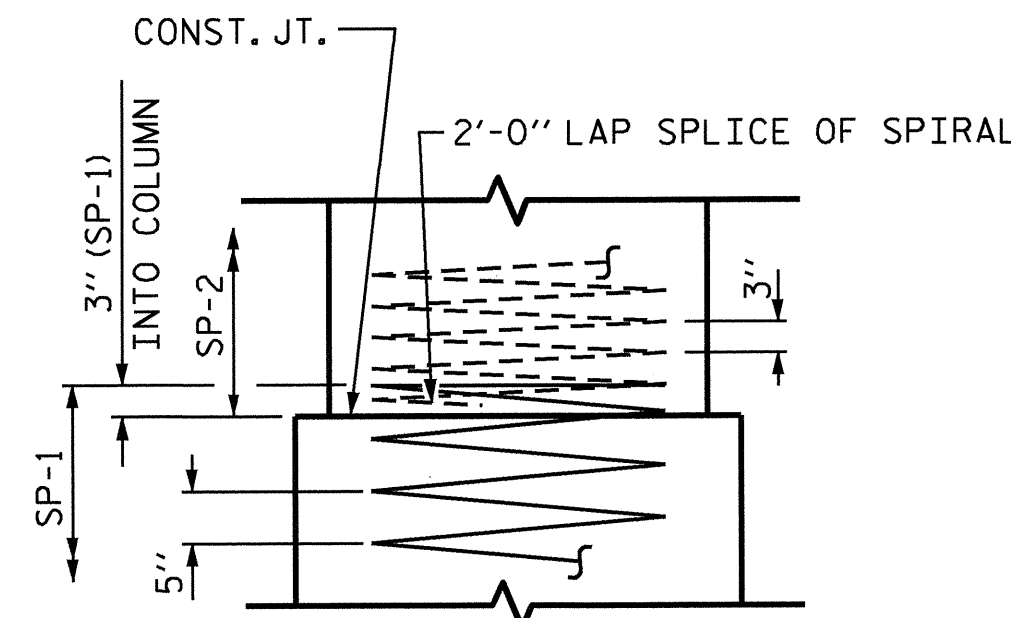
**ELEVATION**  
 DIMENSIONS & REINFORCING STEEL ARE TYPICAL FOR EACH COLUMN & DRILLED PIER UNLESS OTHERWISE NOTED.



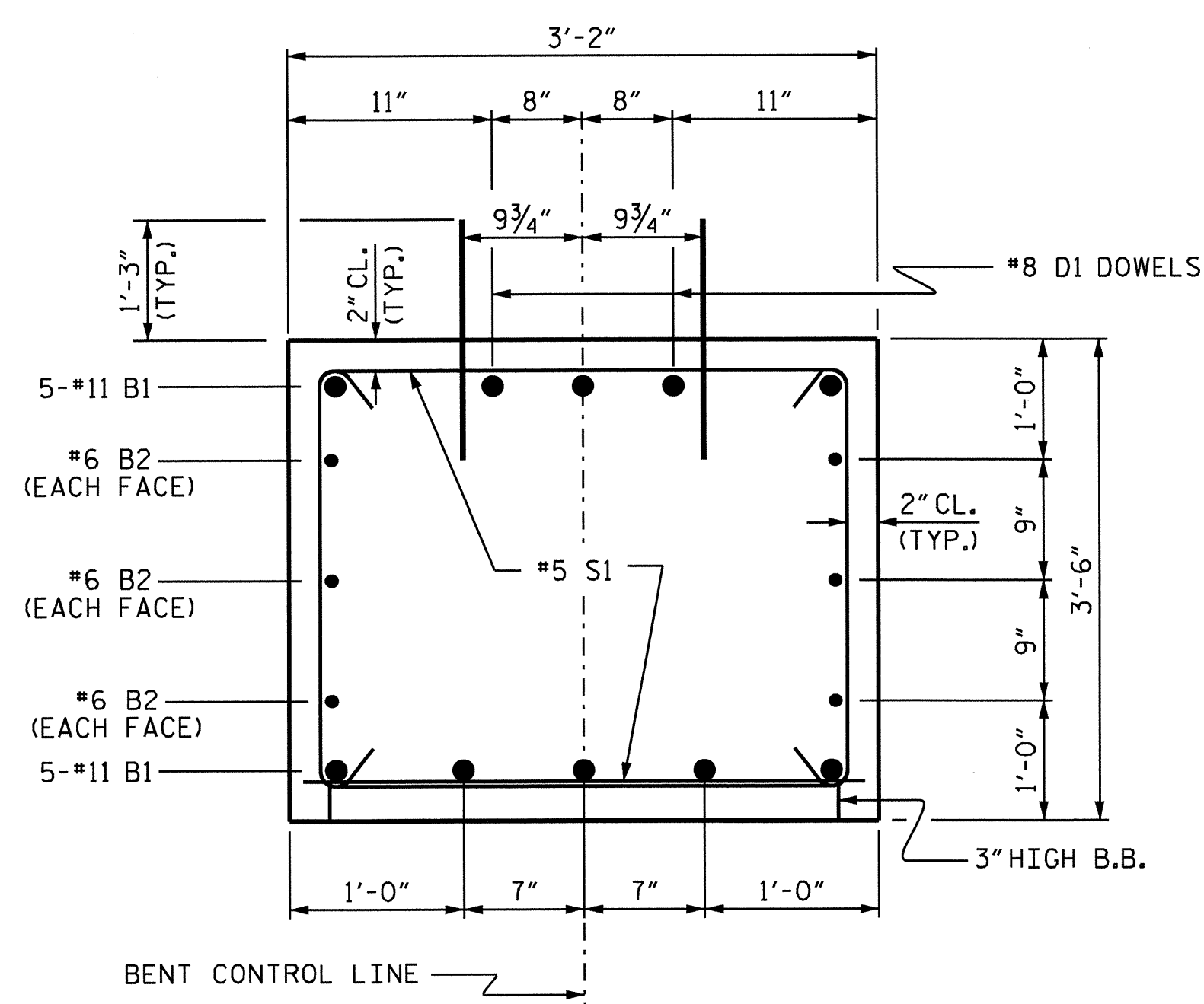
PLAN OF DRILLED PIERS & COLUMNS



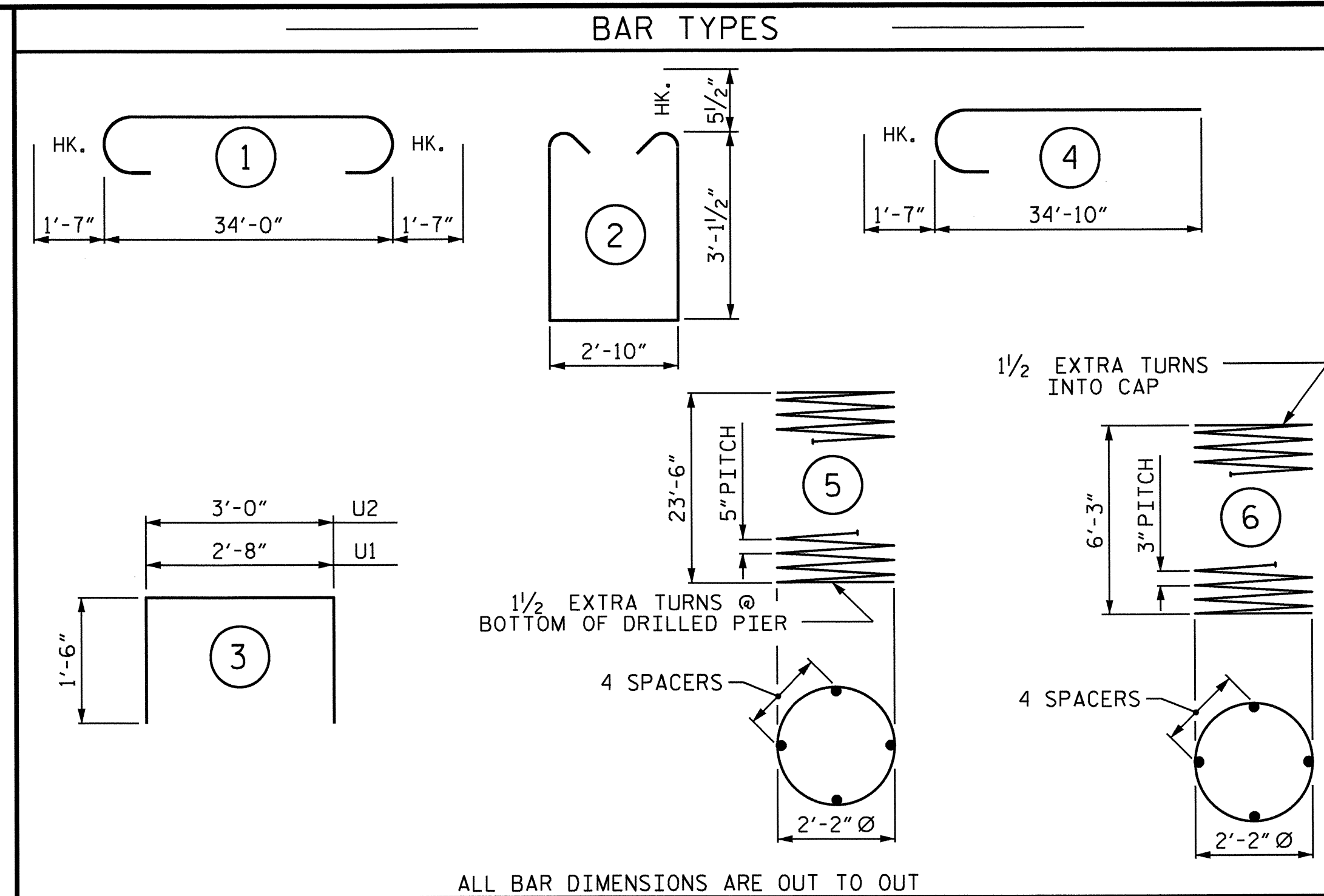
END ELEVATION



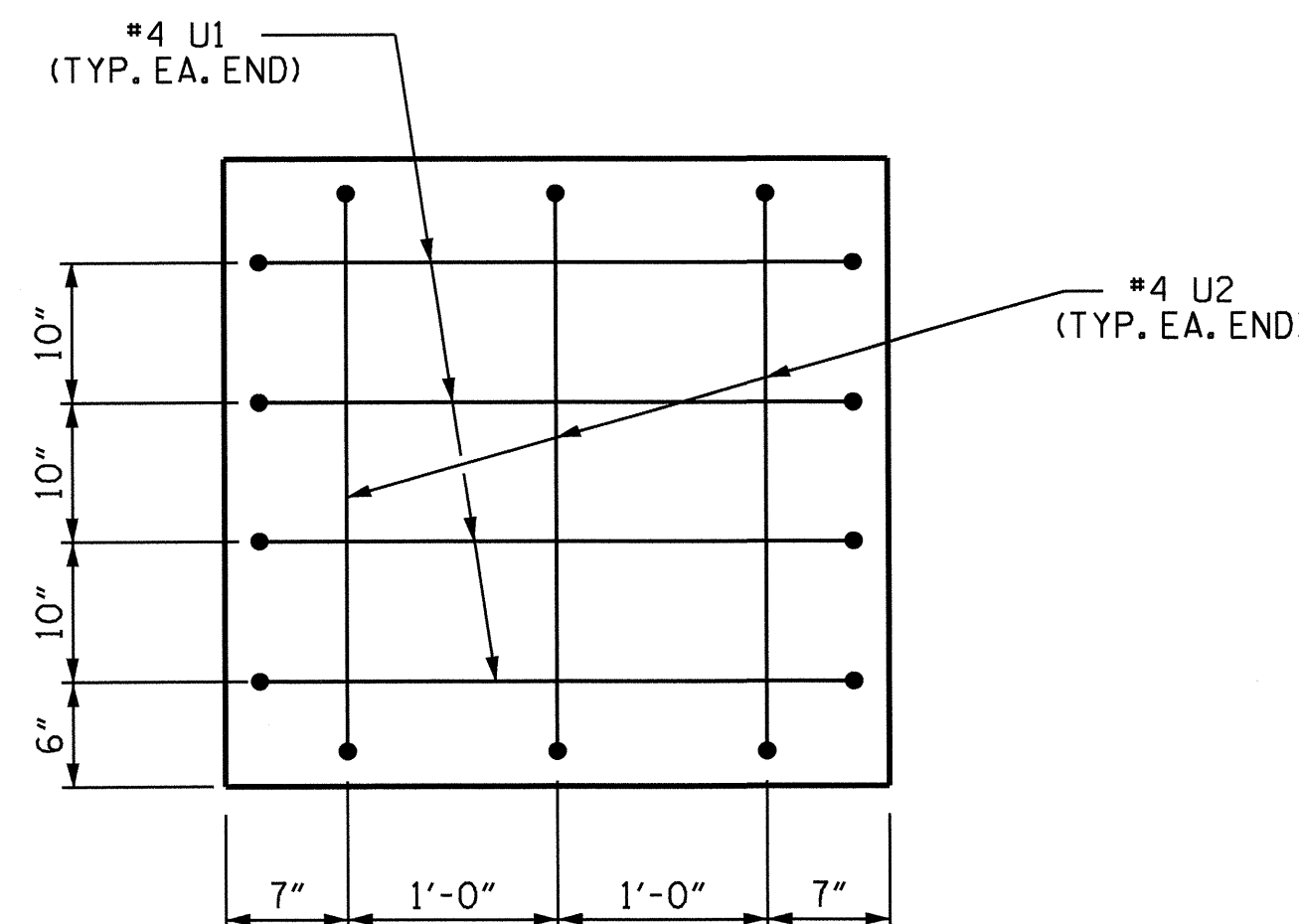
CONSTRUCTION JOINT DETAIL



SECTION THRU CAP



ALL BAR DIMENSIONS ARE OUT TO OUT



END OF CAP VIEW

(TYPICAL BOTH ENDS)

BILL OF MATERIAL FOR ONE BENT

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	10	#11	1	37'-2"	1975
B2	6	#6	STR	34'-2"	308
D1	40	#8	STR	2'-3"	240
M1	30	#11	4	36'-5"	5804
S1	58	#5	2	10'-0"	605
U1	8	#4	3	5'-8"	30
U2	6	#4	3	6'-0"	24

REINFORCING STEEL (FOR ONE BENT) 8,986 LBS.

SP-1 3 \* 5 386'-1" 1208  
 SP-2 3 \* 6 177'-1" 355

SPIRAL COLUMN REINFORCING STEEL (FOR ONE BENT) 1,563 LBS.

\* THE SP-1 SPIRAL REINFORCING STEEL SHALL BE W31 OR D-31 COLD DRAWN WIRE OR #5 PLAIN OR DEFORMED BAR  
 \* THE SP-2 SPIRAL REINFORCING STEEL SHALL BE W20 OR D-20 COLD DRAWN WIRE OR #4 PLAIN OR DEFORMED BAR

CLASS A CONCRETE BREAKDOWN (FOR ONE BENT)

POUR #2 (COLUMNS)	3.3 C.Y.
POUR #3 (CAP)	14.2 C.Y.
TOTAL CLASS A CONCRETE	17.5 C.Y.

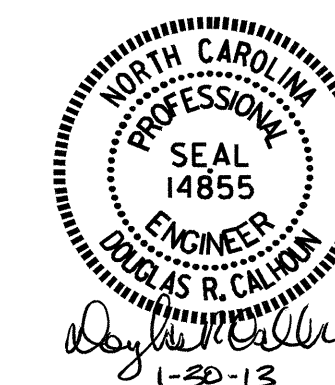
DRILLED PIERS: (FOR ONE BENT)	
DRILLED PIER CONCRETE SHALL BE W31 OR D-31 COLD DRAWN WIRE OR #5 PLAIN OR DEFORMED BAR	18.9 C.Y.
3'-0" Ø DRILLED PIERS NOT IN SOIL	24.0 LIN. FT.
3'-0" Ø DRILLED PIERS IN SOIL	48.0 LIN. FT.
PERMANENT STEEL CASING FOR 3'-0" Ø DRILLED PIERS	40.1 LIN. FT.
CSL TUBES	306 LIN. FT.

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 STATION: 20+70.50 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

SUBSTRUCTURE  
 BENT 1

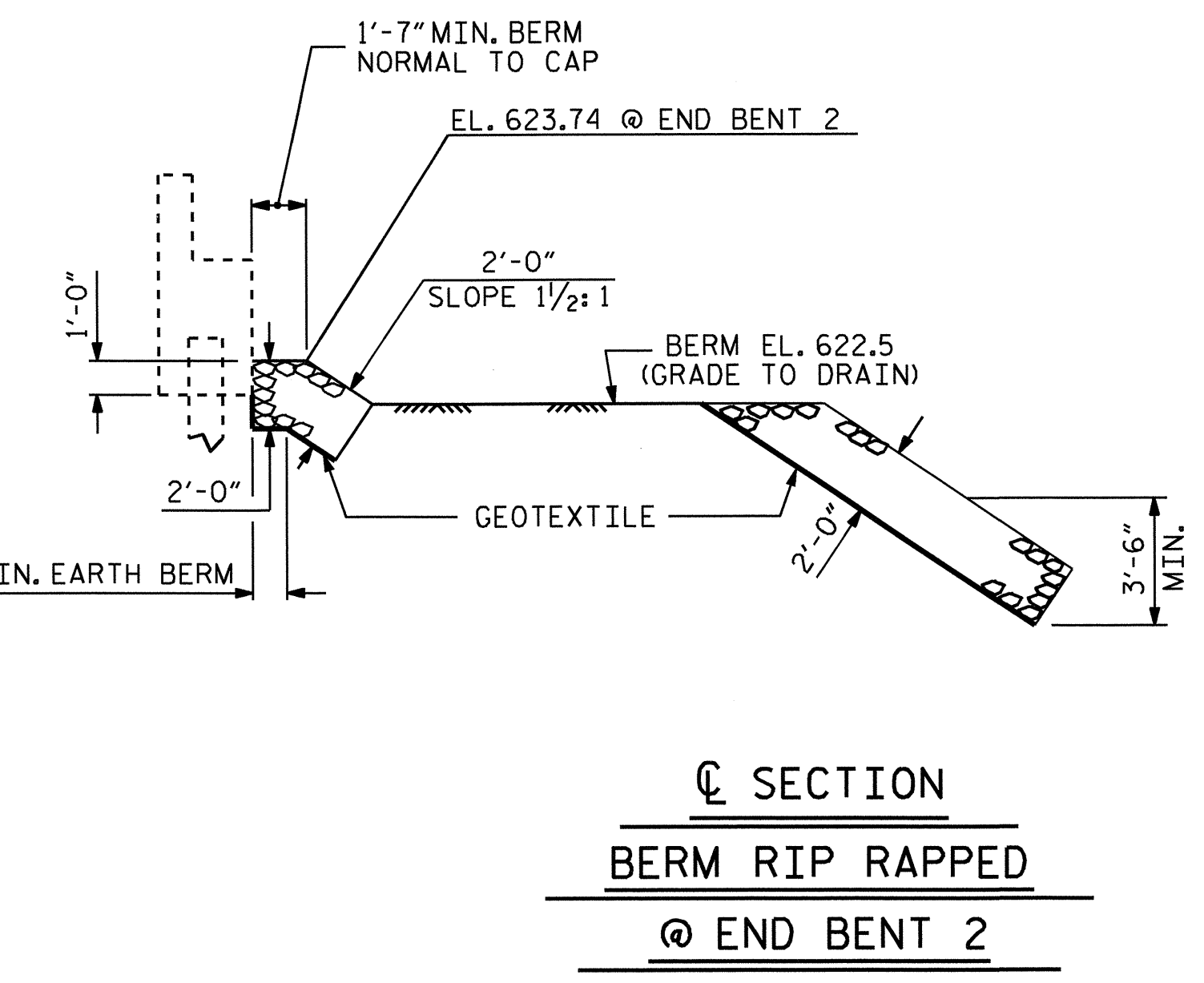
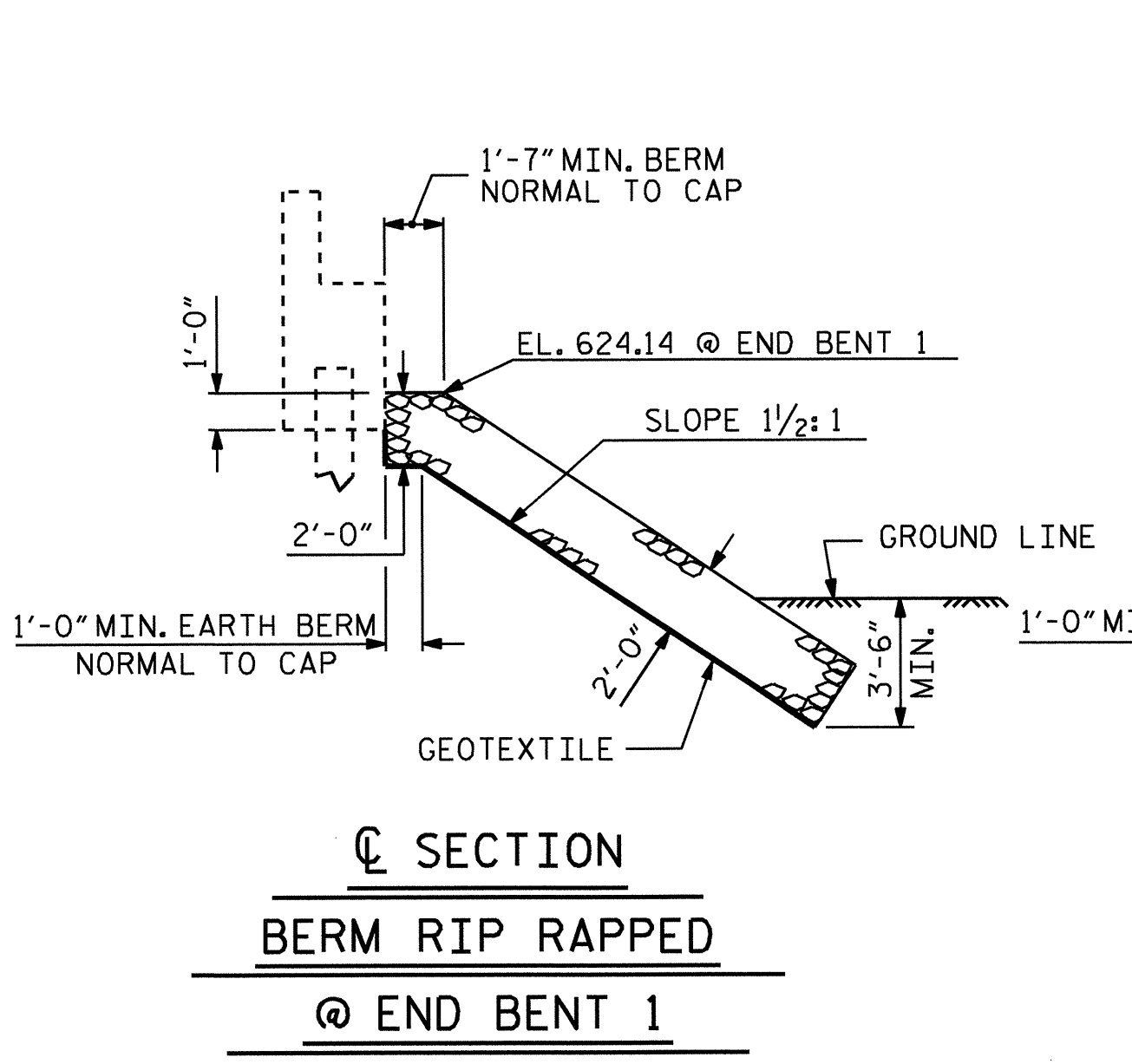
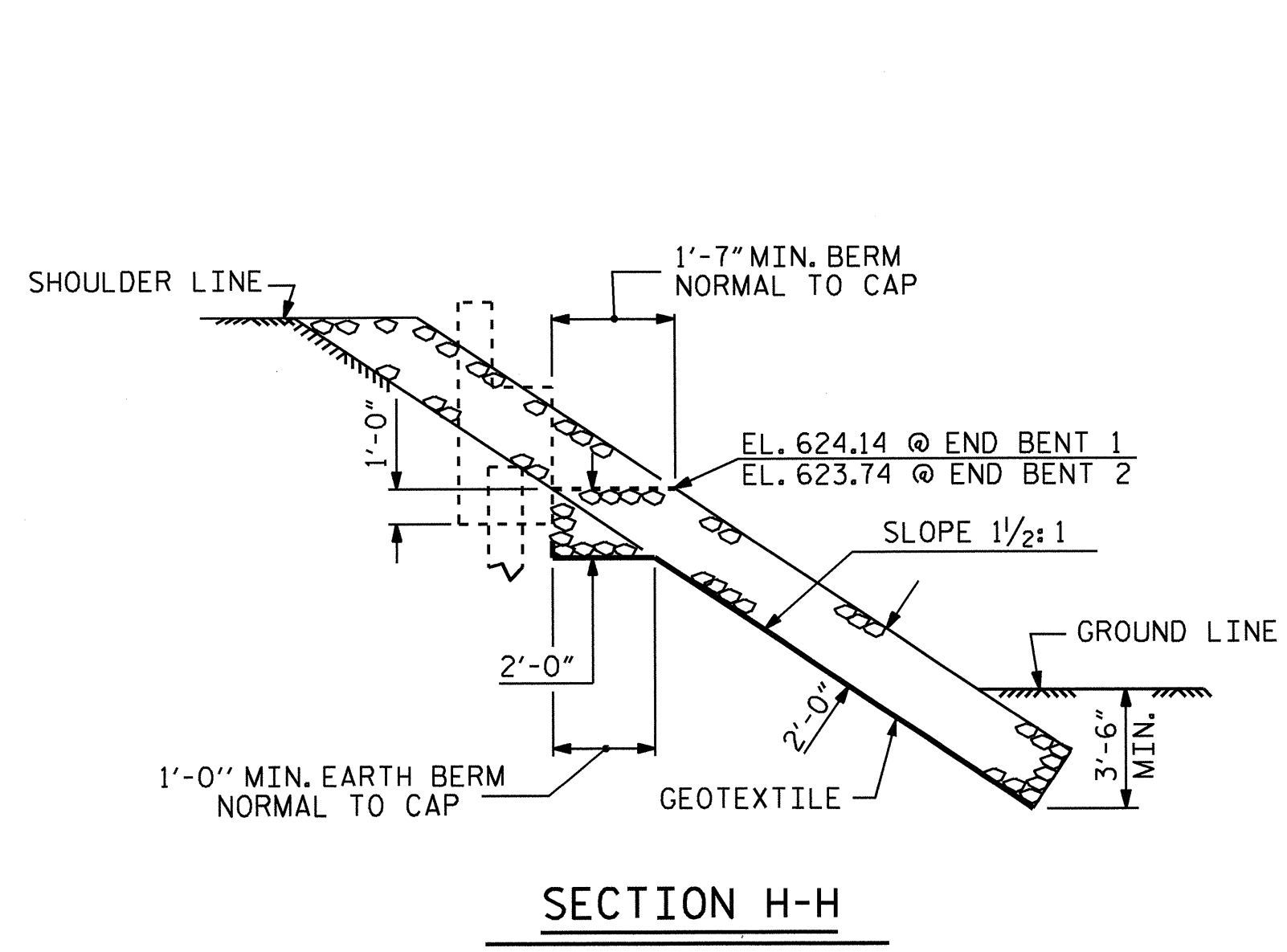
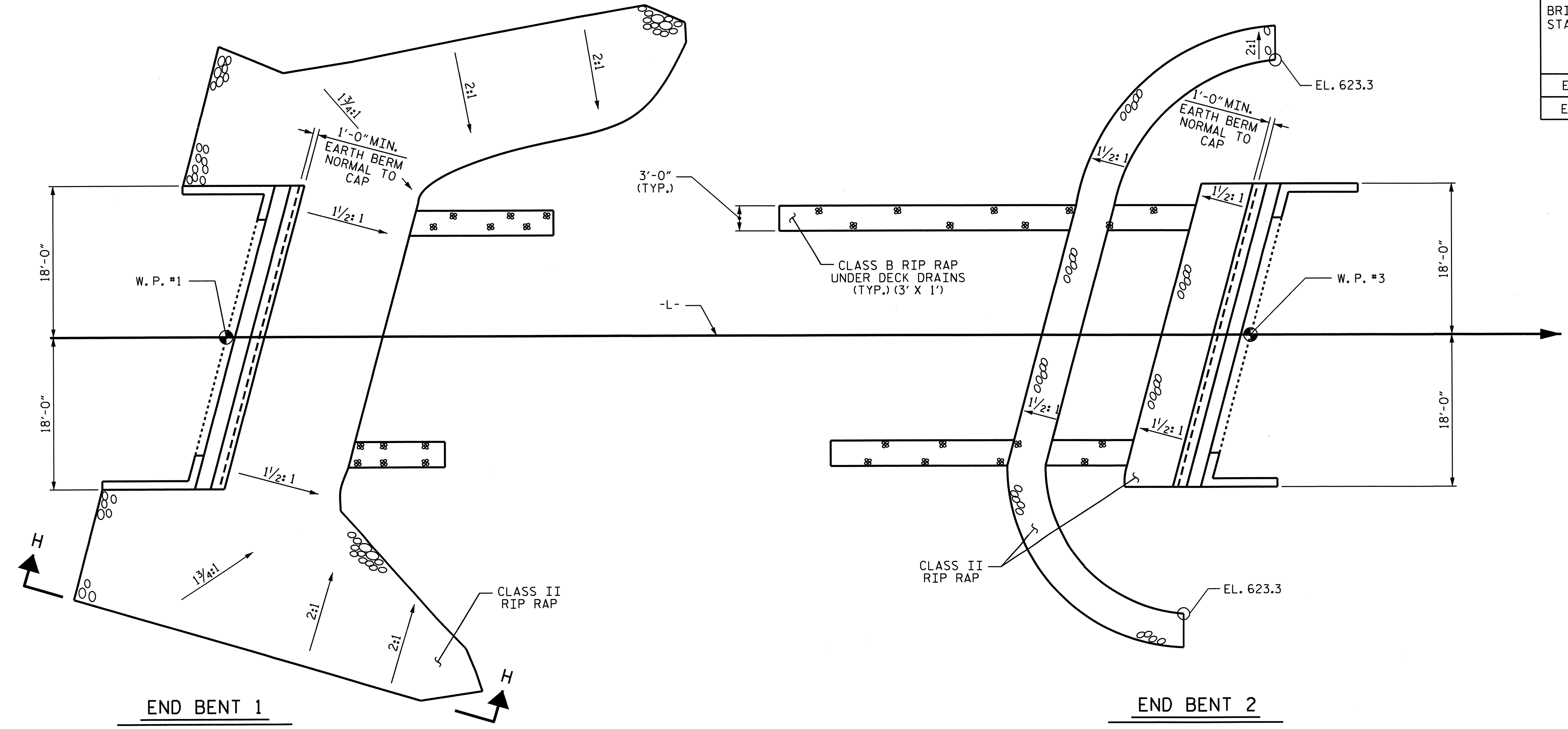


ASSEMBLED BY : A. SORSENGH DATE : 8/2012  
 CHECKED BY : D.R. CALHOUN DATE : 12/2012  
 DRAWN BY : DGE 03/10  
 CHECKED BY : MKT 03/10

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



ESTIMATED QUANTITIES			
BRIDGE @ STA. 20+70.50 -L-	RIP RAP CLASS B	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE
	TONS	TONS	SQUARE YARDS
END BENT 1	5	320	373
END BENT 2	12	210	285

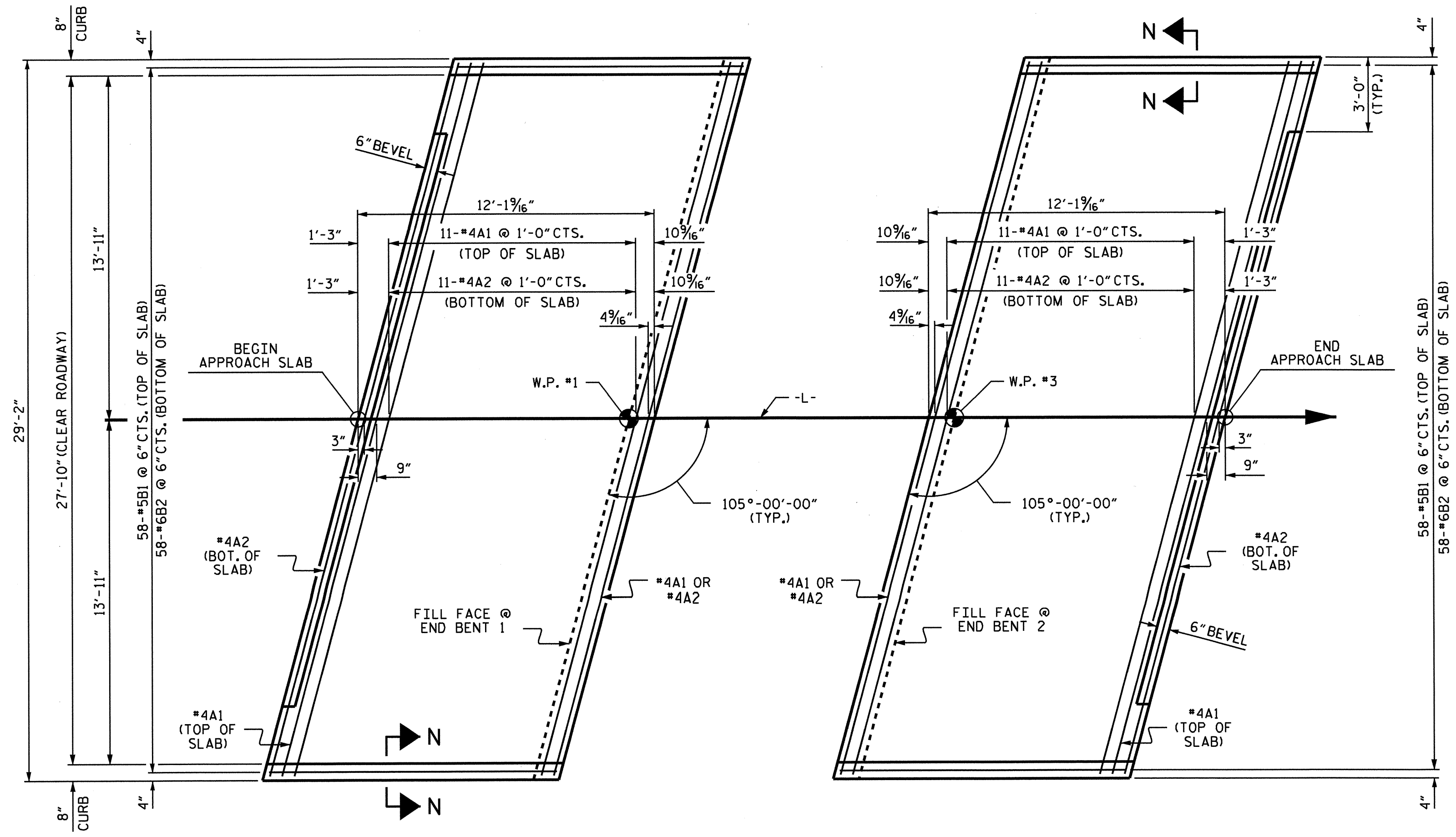


PROJECT NO. B-4965  
ROCKINGHAM COUNTY  
STATION: 20+70.50 -L-

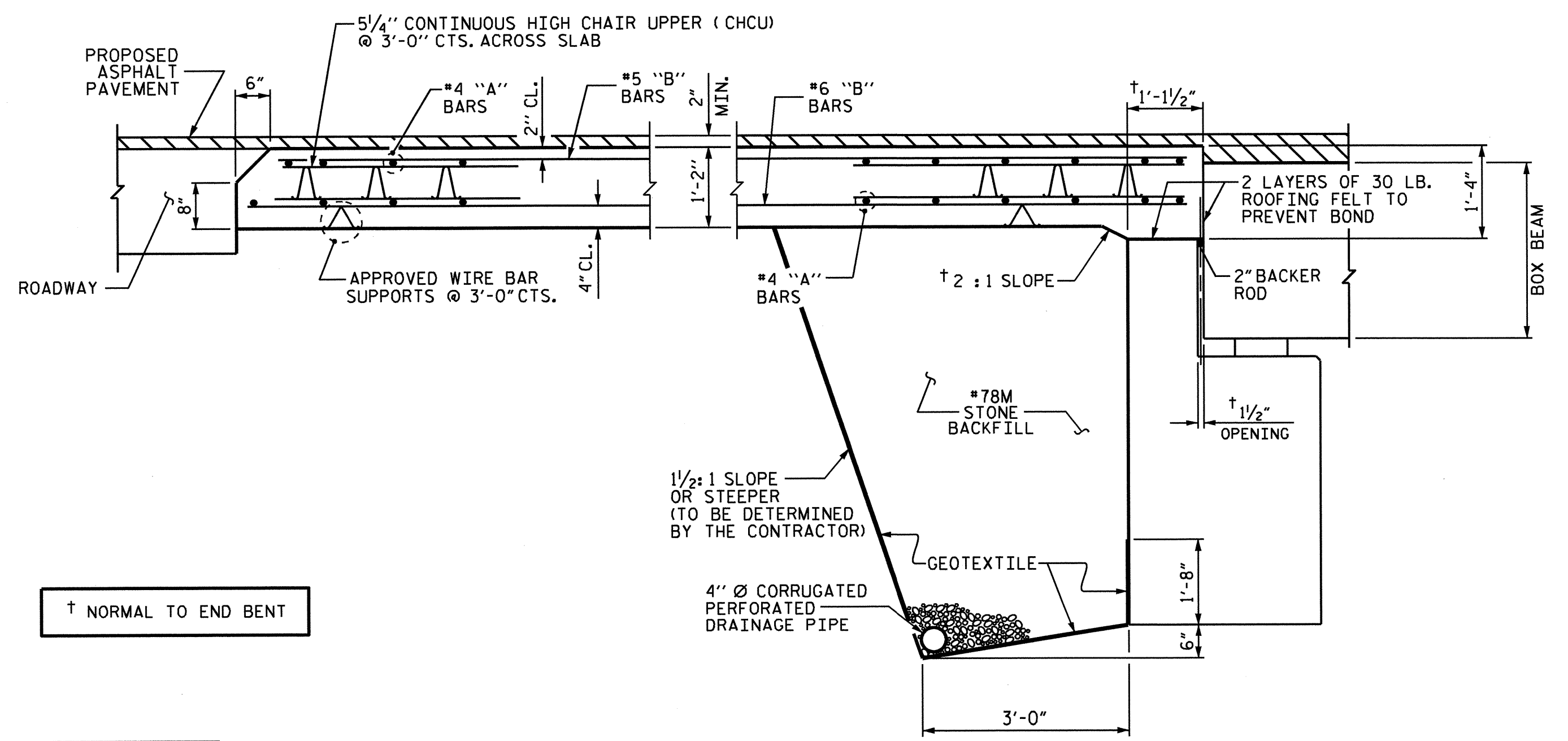
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
STANDARD					
= RIP RAP DETAILS =					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
					SHEET NO. S-20
					TOTAL SHEETS 21



ASSEMBLED BY : A.C. OUTLAW DATE : 07/2012  
CHECKED BY : D. G. ELY DATE : 12/2012  
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



**PLAN @ END BENT 1**      **PLAN @ END BENT 2**  
 DIMENSIONS SHOWN ARE TYPICAL FOR BOTH APPROACH SLABS

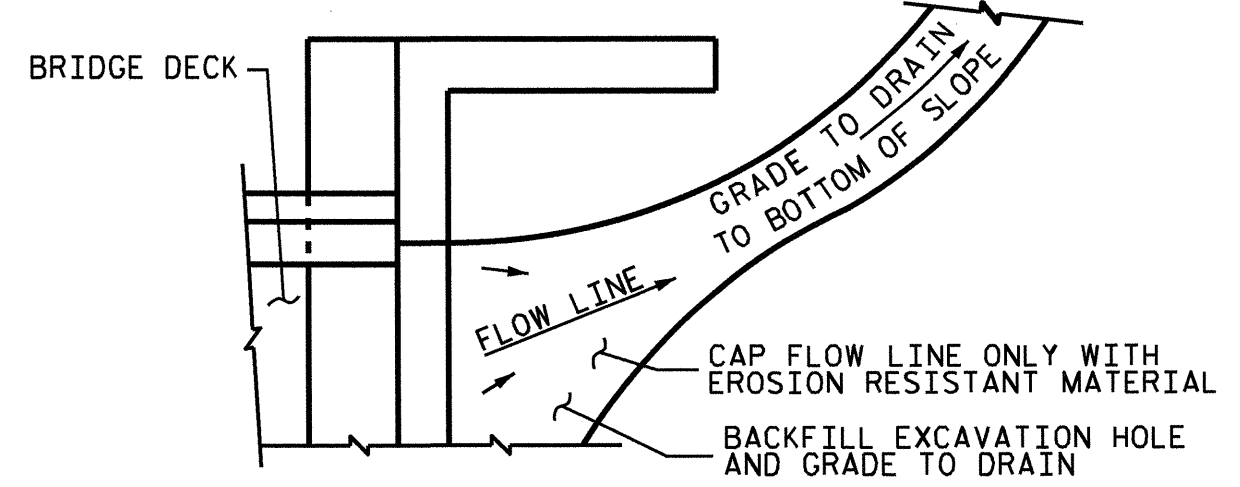


**SECTION THRU SLAB**

ASSEMBLED BY : A.C. OUTLAW DATE : 7/17/12  
 CHECKED BY : A. SORSENGINH DATE : 7/12  
 DRAWN BY : MAA 11/11  
 CHECKED BY : AAC 11/11

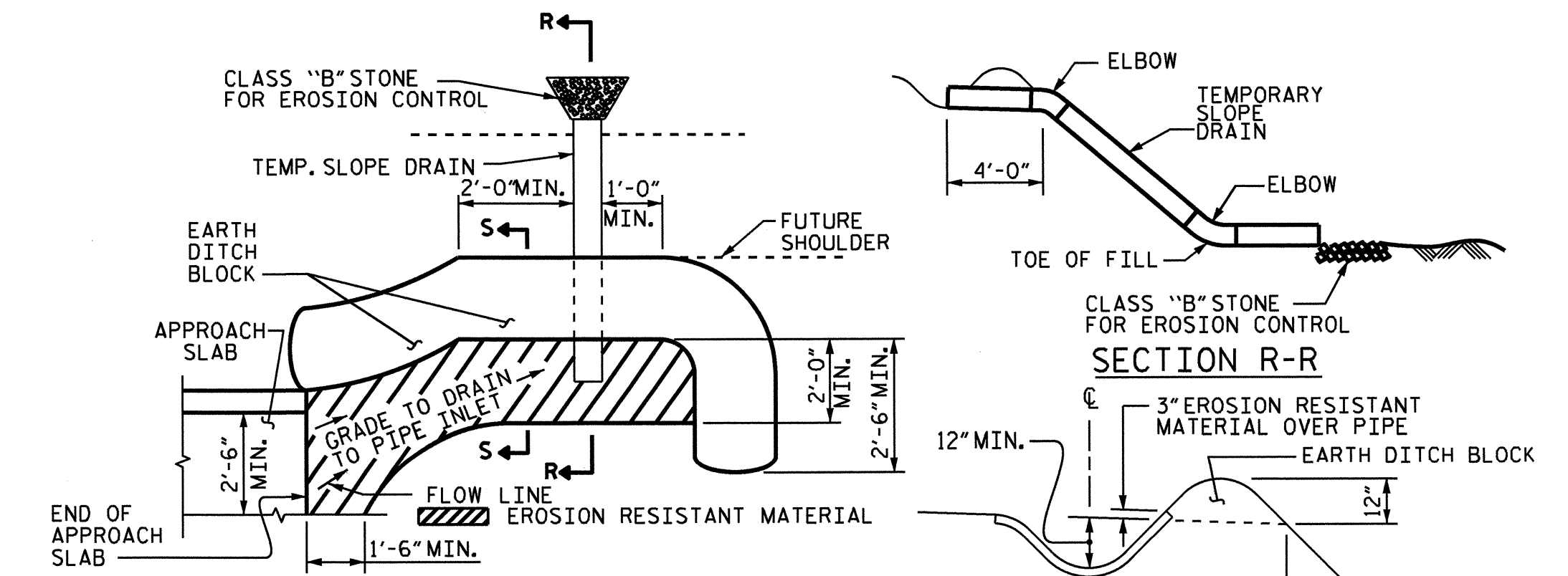
**NOTES**

FOR BRIDGE APPROACH FILL INCLUDING GEOTEXTILE, 4" Ø DRAINAGE PIPE, AND #78M STONE BACKFILL, SEE ROADWAY PLANS.  
 GEOTEXTILE SHALL BE TYPE 1 IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS SECTION 1056.  
 #78M STONE BACKFILL (CLASS V SELECT MATERIAL) SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATIONS SECTION 1016.  
 #78M STONE BACKFILL IS TO BE CONTINUOUS ALONG FILL FACE OF BACKWALL FROM OUTSIDE EDGE TO OUTSIDE EDGE OF APPROACH SLAB.  
 FOR THE 4" 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.  
 APPROACH SLAB GROOVING IS NOT REQUIRED.



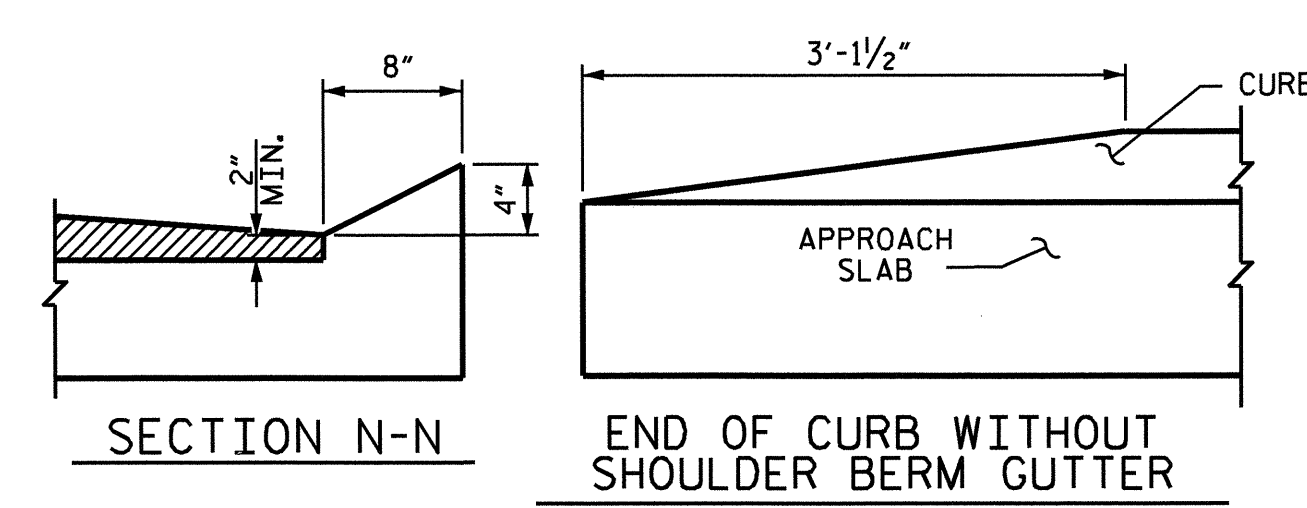
NOTE: IF THE APPROACH SLAB IS NOT CONSTRUCTED IMMEDIATELY AFTER THE BACKFILLING OF THE END BENT EXCAVATION, GRADE TO DRAIN TO THE BOTTOM OF THE SLOPE AND PROVIDE EROSION RESISTANT MATERIAL, SUCH AS FIBERGLASS ROVING OR AS DIRECTED BY THE ENGINEER TO PREVENT SOIL EROSION AND TO PROTECT THE AREA ADJACENT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

**TEMPORARY DRAINAGE DETAIL**



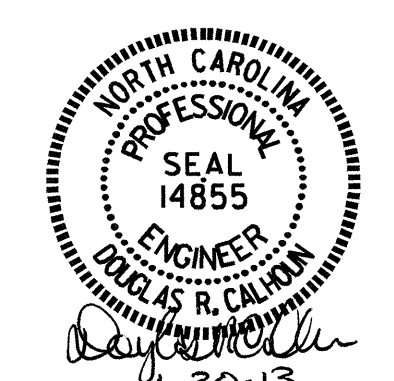
NOTE: IMMEDIATELY AFTER THE CONSTRUCTION OF THE APPROACH SLAB, THE CONTRACTOR SHALL PROVIDE TEMPORARY BERM AND SLOPE DRAIN. CONTRACTOR SHALL GRADE TO PIPE INLET AND PROVIDE EROSION RESISTANT MATERIAL AS SHOWN. THE EROSION RESISTANT MATERIAL SHALL BE EITHER 1) ASPHALT MAT, OR 2) CONCRETE, AS DIRECTED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

**TEMPORARY BERM AND SLOPE DRAIN DETAILS**  
 (TO BE USED WHEN SHOULDER BERM GUTTER IS REQUIRED)



**CURB DETAILS**

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



BILL OF MATERIAL					
APPROACH SLAB AT EB 1					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
*A1	13	#4	STR	29'-10"	259
A2	13	#4	STR	29'-10"	259
*B1	58	#5	STR	11'-1"	670
B2	58	#6	STR	11'-7"	1009
REINFORCING STEEL					LBS. 1268
*EPOXY COATED REINFORCING STEEL					LBS. 929
CLASS AA CONCRETE					C. Y. 15.6
APPROACH SLAB AT EB 2					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
*A1	13	#4	STR	29'-10"	259
A2	13	#4	STR	29'-10"	259
*B1	58	#5	STR	11'-1"	670
B2	58	#6	STR	11'-7"	1009
REINFORCING STEEL					LBS. 1268
*EPOXY COATED REINFORCING STEEL					LBS. 929
CLASS AA CONCRETE					C. Y. 15.6

PROJECT NO. B-4965  
ROCKINGHAM COUNTY  
 STATION: 20+70.50 -L-

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD  
 BRIDGE APPROACH SLAB  
 FOR PRESTRESSED CONCRETE  
 BOX BEAM UNIT  
 (SUB-REGIONAL TIER)  
 105° SKEW

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

TOTAL SHEETS: 21



## STANDARD NOTES

### DESIGN DATA:

SPECIFICATIONS	-----	A.A.S.H.T.O. (CURRENT)
LIVE LOAD	-----	SEE PLANS
IMPACT ALLOWANCE	-----	SEE A.A.S.H.T.O.
STRESS IN EXTREME FIBER OF		
STRUCTURAL STEEL - AASHTO M270 GRADE 36	-	20,000 LBS. PER SQ. IN.
- AASHTO M270 GRADE 50W	-	27,000 LBS. PER SQ. IN.
- AASHTO M270 GRADE 50	-	27,000 LBS. PER SQ. IN.
REINFORCING STEEL IN TENSION		
GRADE 60	--	24,000 LBS. PER SQ. IN.
CONCRETE IN COMPRESSION	-----	1,200 LBS. PER SQ. IN.
CONCRETE IN SHEAR	-----	SEE A.A.S.H.T.O.
STRUCTURAL TIMBER - TREATED OR		
UNTREATED - EXTREME FIBER STRESS	-----	1,800 LBS. PER SQ. IN.
COMPRESSION PERPENDICULAR TO GRAIN OF TIMBER	-----	375 LBS. PER SQ. IN.
EQUIVALENT FLUID PRESSURE OF EARTH	-----	30 LBS. PER CU. FT. (MINIMUM)

### MATERIAL AND WORKMANSHIP:

EXCEPT AS MAY OTHERWISE BE SPECIFIED ON PLANS OR IN THE SPECIAL PROVISIONS, ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE 2012 "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES" OF THE N. C. DEPARTMENT OF TRANSPORTATION.

STEEL SHEET PILING FOR PERMANENT OR TEMPORARY APPLICATIONS SHALL BE HOT ROLLED.

### CONCRETE:

UNLESS OTHERWISE REQUIRED ON PLANS, CLASS A CONCRETE SHALL BE USED FOR ALL PORTIONS OF ALL STRUCTURES WITH THE EXCEPTION THAT: CLASS AA CONCRETE SHALL BE USED IN BRIDGE SUPERSTRUCTURES, ABUTMENT BACKWALLS, AND APPROACH SLABS; AND CLASS B CONCRETE SHALL BE USED FOR SLOPE PROTECTION AND RIP RAP.

### CONCRETE CHAMFERS:

UNLESS OTHERWISE NOTED ON THE PLANS, ALL EXPOSED CORNERS ON STRUCTURES SHALL BE CHAMFERED 3/4" WITH THE FOLLOWING EXCEPTIONS: TOP CORNERS OF CURBS MAY BE ROUNDED TO 1-1/2" RADIUS WHICH IS BUILT INTO CURB FORMS; CORNERS OF TRANSVERSE FLOOR EXPANSION JOINTS SHALL BE ROUNDED WITH A 1/4" FINISHING TOOL UNLESS OTHERWISE REQUIRED ON PLANS; AND CORNERS OF EXPANSION JOINTS IN THE ROADWAY FACES AND TOPS OF CURBS AND SIDEWALKS SHALL BE ROUNDED TO A 1/4" RADIUS WITH A FINISHING STONE OR TOOL UNLESS OTHERWISE REQUIRED ON PLANS.

### DOWELS:

DOWELS WHEN INDICATED ON PLANS AS FOR CULVERT EXTENSIONS, SHALL BE EMBEDDED AT LEAST 12" INTO THE OLD CONCRETE AND GROUTED INTO PLACE WITH 1:2 CEMENT MORTAR.

### ALLOWANCE FOR DEAD LOAD DEFLECTION, SETTLEMENT, ETC. IN CASTING SUPERSTRUCTURES:

BRIDGES SHALL BE BUILT ON THE GRADE OR VERTICAL CURVE SHOWN ON PLANS. SLABS, CURBS AND PARAPETS SHALL CONFORM TO THE GRADE OR CURVE.

ALL DIMENSIONS WHICH ARE GIVEN IN SECTION AND ARE AFFECTED BY DEAD LOAD DEFLECTIONS ARE DIMENSIONS AT CENTER LINE OF BEARING UNLESS OTHERWISE NOTED ON PLANS. IN SETTING FORMS FOR STEEL BEAM BRIDGES AND PRESTRESSED CONCRETE GIRDER BRIDGES, ADJUSTMENTS SHALL BE MADE DUE TO THE DEAD LOAD DEFLECTIONS FOR THE ELEVATIONS SHOWN. WHERE BLOCKS ARE SHOWN OVER BEAMS FOR BUILDING UP TO THE SLAB, THE VERTICAL DIMENSIONS OF THE BLOCKS SHALL BE ADJUSTED BETWEEN BEARINGS TO COMPENSATE FOR DEAD LOAD DEFLECTIONS, VERTICAL CURVE ORDINATE, AND ACTUAL BEAM CAMBER. WHERE BOTTOM OF SLAB IS IN LINE WITH BOTTOM OF TOP FLANGES, DEPTH OF SLAB BETWEEN BEARINGS SHALL BE ADJUSTED TO COMPENSATE FOR DEAD LOAD DEFLECTION, VERTICAL CURVE ORDINATE, AND ACTUAL BEAM CAMBER.

IN SETTING FALSEWORK AND FORMS FOR REINFORCED CONCRETE SPANS, AN ALLOWANCE SHALL BE MADE FOR DEAD LOAD DEFLECTIONS, SETTLEMENT OF FALSEWORK, AND PERMANENT CAMBER WHICH SHALL BE PROVIDED FOR IN ADDITION TO THE ELEVATIONS SHOWN. AFTER REMOVAL OF THE FALSEWORK, THE FINISHED STRUCTURES SHALL CONFORM TO THE PROFILE AND ELEVATIONS SHOWN ON THE PLANS AND CONSTRUCTION ELEVATIONS FURNISHED BY THE ENGINEER.

DETAILED DRAWINGS FOR FALSEWORK OR FORMS FOR BRIDGE SUPERSTRUCTURE AND ANY STRUCTURE OR PARTS OF A STRUCTURE AS NOTED ON THE PLANS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL BEFORE CONSTRUCTION OF THE FALSEWORK OR FORMS IS STARTED.

### REINFORCING STEEL:

ALL REINFORCING STEEL SHALL BE DEFORMED. DIMENSIONS RELATIVE TO PLACEMENT OF REINFORCING ARE TO CENTERS OF BARS UNLESS OTHERWISE INDICATED IN THE PLANS. DIMENSIONS ON BAR DETAILS ARE TO CENTERS OF BARS OR ARE OUT TO OUT AS INDICATED ON PLANS.

WIRE BAR SUPPORTS SHALL BE PROVIDED FOR REINFORCING STEEL WHERE INDICATED ON THE PLANS. WHEN BAR SUPPORT PIECES ARE PLACED IN CONTINUOUS LINES, THEY SHALL BE SO PLACED THAT THE ENDS OF THE SUPPORTING WIRES SHALL BE LAPPED TO LOCK LEGS ON ADJOINING PIECES.

### STRUCTURAL STEEL:

AT THE CONTRACTOR'S OPTION, HE MAY SUBSTITUTE 7/8" Ø SHEAR STUDS FOR THE 3/4" Ø STUDS SPECIFIED ON THE PLANS. THIS SUBSTITUTION SHALL BE MADE AT THE RATE OF 3 - 7/8" Ø STUDS FOR 4 - 3/4" Ø STUDS, AND STUD SPACING CHANGES SHALL BE MADE AS NECESSARY TO PROVIDE THE SAME EQUIVALENT NUMBER OF 7/8" Ø STUDS ALONG THE BEAM AS SHOWN FOR 3/4" Ø STUDS BASED ON THE RATIO OF 3 - 7/8" Ø STUDS FOR 4 - 3/4" Ø STUDS. STUDS OF THE LENGTH SPECIFIED ON THE PLANS MUST BE PROVIDED. THE MAXIMUM SPACING SHALL BE 2'-0".

EXCEPT AT THE INTERIOR SUPPORTS OF CONTINUOUS BEAMS WHERE THE COVER PLATE IS IN CONTACT WITH BEARING PLATE, THE CONTRACTOR MAY, AT HIS OPTION, SUBSTITUTE FOR THE COVER PLATES DESIGNATED ON THE PLANS COVER PLATES OF THE EQUIVALENT AREA PROVIDED THESE PLATES ARE AT LEAST 5/16" IN THICKNESS AND DO NOT EXCEED A WIDTH EQUAL TO THE FLANGE WIDTH LESS 2" OR A THICKNESS EQUAL TO 2 TIMES THE FLANGE THICKNESS. THE SIZE OF FILLET WELDS SHALL CONFORM TO THE REQUIREMENTS OF THE CURRENT ANSI/AASHTO/AWS "BRIDGE WELDING CODE". ELECTROSLAG WELDING WILL NOT BE PERMITTED.

WITH THE SOLE EXCEPTION OF EDGES AT SURFACES WHICH BEAR ON OTHER SURFACES, ALL SHARP EDGES AND ENDS OF SHAPES AND PLATES SHALL BE SLIGHTLY ROUNDED BY SUITABLE MEANS TO A RADIUS OF APPROXIMATELY 1/16 INCH OR EQUIVALENT FLAT SURFACE AT A SUITABLE ANGLE PRIOR TO PAINTING, GALVANIZING, OR METALLIZING.

### HANDRAILS AND POSTS:

METAL STANDARDS AND FACES OF THE CONCRETE END POSTS FOR THE METAL RAIL SHALL BE SET NORMAL TO THE GRADE OF THE CURB, UNLESS OTHERWISE SHOWN ON PLANS. THE METAL RAIL AND TOPS OF CONCRETE POSTS USED WITH THE ALUMINUM RAIL SHALL BE BUILT PARALLEL TO THE GRADE OF THE CURB.

METAL HANDRAILS SHALL BE IN ACCORDANCE WITH THE PLANS. RAILS SHALL BE AS MANUFACTURED FOR BRIDGE RAILING. CASTINGS SHALL BE OF A UNIFORM APPEARANCE. FINIS AND OTHER DEFORMATIONS RESULTING FROM CASTING OR OTHERWISE SHALL BE REMOVED IN A MANNER SO THAT A UNIFORM COLORING OF THE COMPLETED CASTING SHALL BE OBTAINED. CASTINGS WITH DISCOLORATIONS OR OF NON-UNIFORM COLORING WILL NOT BE ACCEPTED. CERTIFIED MILL REPORTS ARE REQUIRED FOR METAL RAILS AND POSTS.

### SPECIAL NOTES:

GENERALLY, IN CASE OF DISCREPANCY, THIS STANDARD SHEET OF NOTES SHALL GOVERN OVER THE SPECIFICATIONS, BUT THE REMAINDER OF THE PLANS SHALL GOVERN OVER NOTES HEREON, AND SPECIAL PROVISIONS SHALL GOVERN OVER ALL. SEE SPECIFICATIONS ARTICLE 105-4.

ENGLISH

JANUARY, 1990