

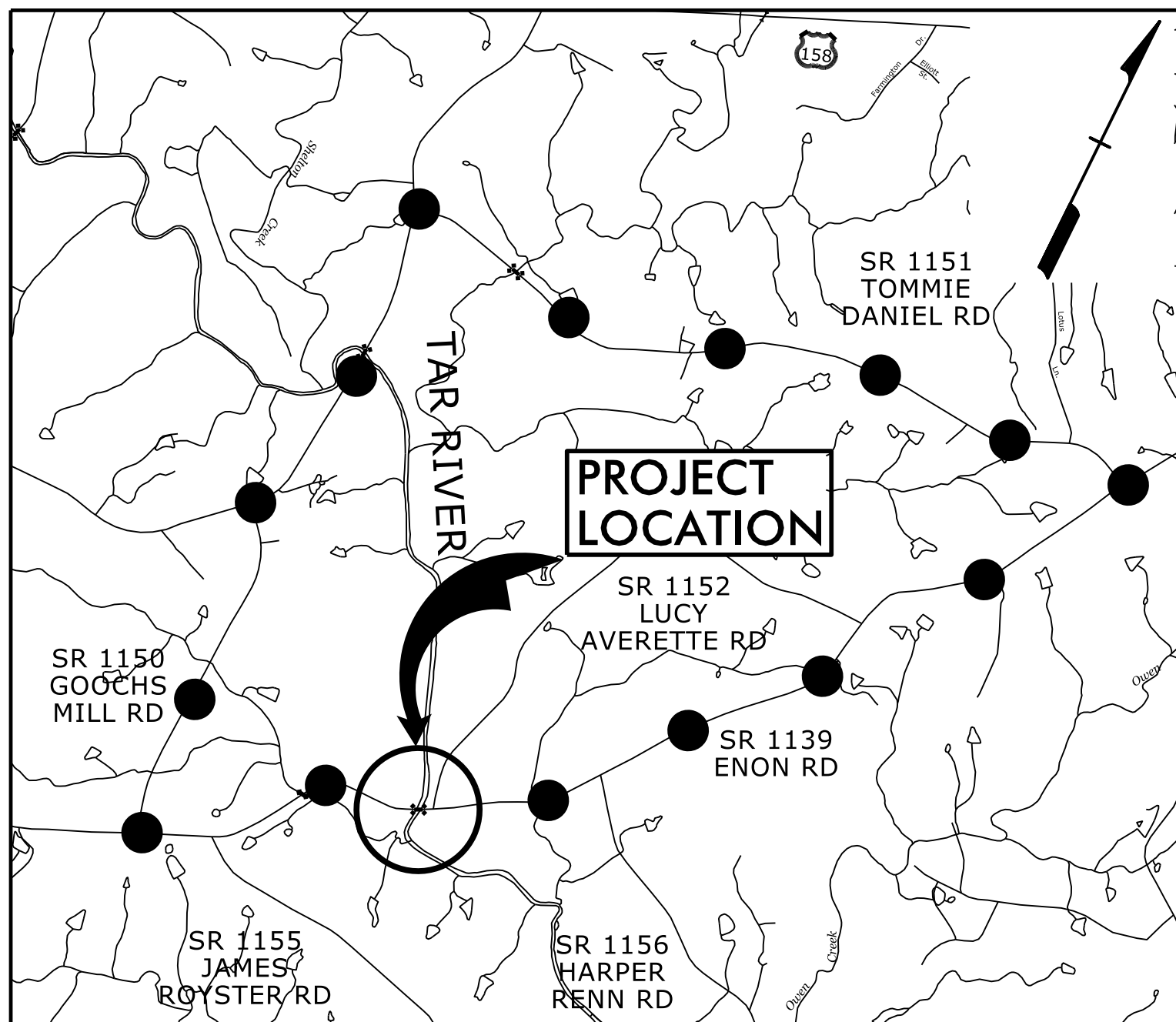
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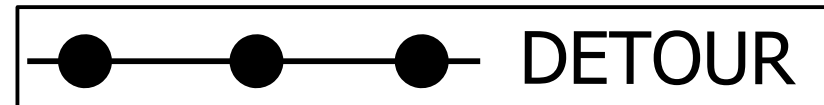
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TIP PROJECT NO: B-5320

CONTRACT: C204099



VICINITY MAP

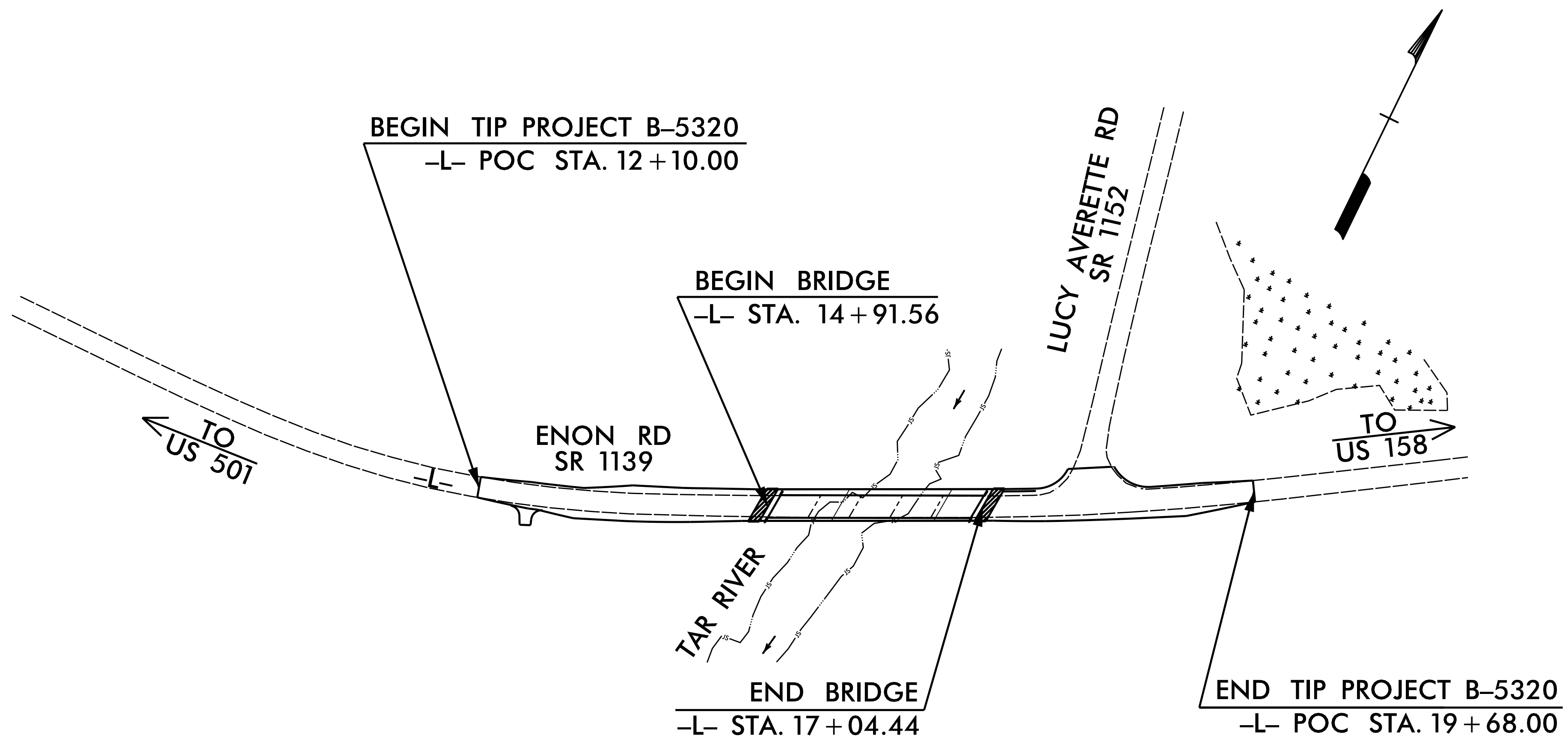


STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

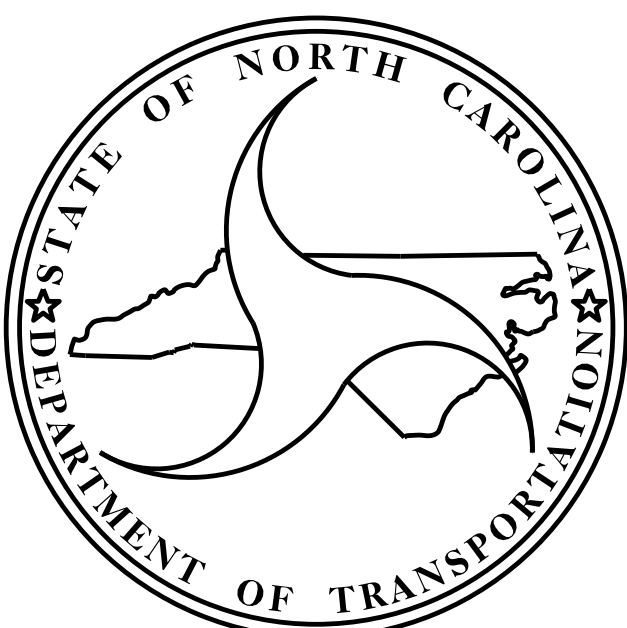
# GRANVILLE COUNTY

**LOCATION: REPLACE BRIDGE NO. 96  
OVER TAR RIVER ON SR 1139 (ENON RD)**  
**TYPE OF WORK: GRADING, PAVING, DRAINAGE, AND STRUCTURE**

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-5320		
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
46034.1.1	BRZ-1139(4)	PE	
46034.2.1	BRZ-1139(4)	RW & UTILITY	
46034.3.1	BRZ-1139(4)	CONST.	



## STRUCTURES



**DESIGN DATA**

ADT 2018 = 1409  
ADT 2038 = 2105  
K = 9 %  
D = 55 %  
T = 8 % \*  
V = 60 MPH  
\* (TTST 3%, DUAL 5%)  
FUNC CLASS =  
MINOR COLLECTOR  
SUBREGIONAL TIER

**PROJECT LENGTH**

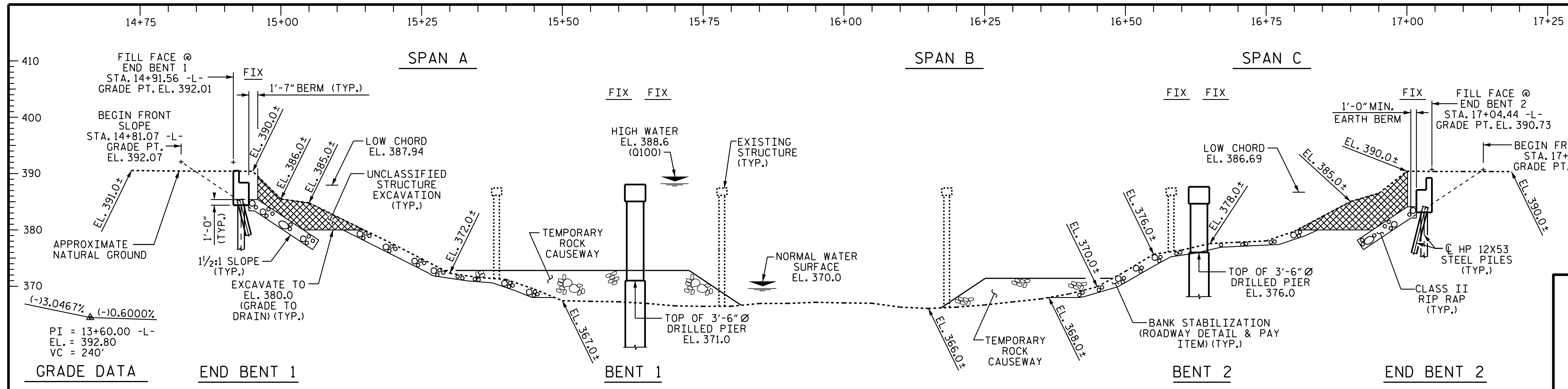
LENGTH ROADWAY TIP PROJECT B-5320 = 0.104 MILES  
LENGTH STRUCTURE TIP PROJECT B-5320 = 0.040 MILES  
TOTAL LENGTH OF TIP PROJECT B-5320 = 0.144 MILES

Prepared in the Office of:  
**DIVISION OF HIGHWAYS**  
STRUCTURES MANAGEMENT UNIT  
1000 BIRCH RIDGE DR.  
RALEIGH, N.C. 27610

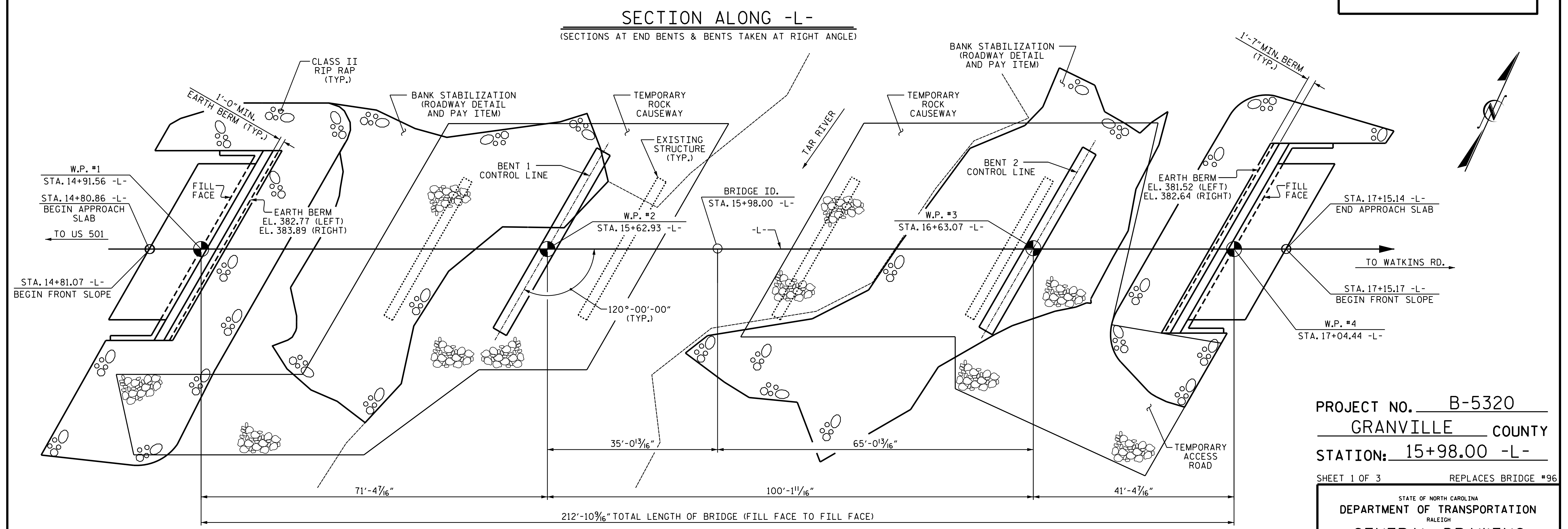
2018 STANDARD SPECIFICATIONS  
  
LETTING DATE : MAY 15, 2018

G. W. DICKEY, PE  
PROJECT ENGINEER

K. W. ALFORD, PE  
PROJECT DESIGN ENGINEER



I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS

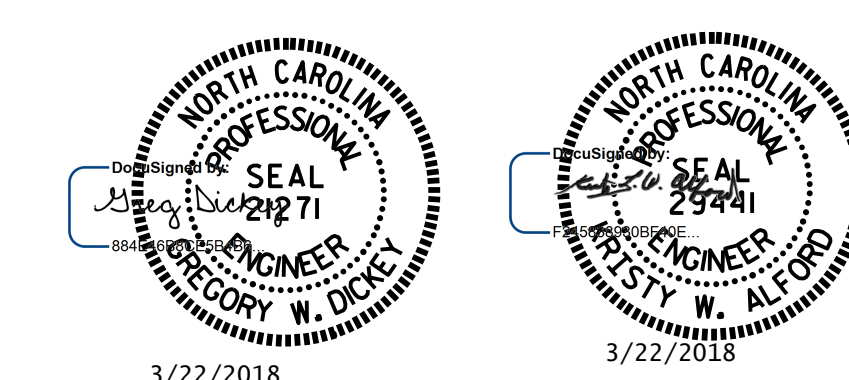


PROJECT NO. B-5320  
 GRANVILLE COUNTY  
 STATION: 15+98.00 -L-  
 SHEET 1 OF 3 REPLACES BRIDGE #96

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**GENERAL DRAWING**  
 FOR BRIDGE OVER TAR RIVER ON SR 1139 (ENON RD.) BETWEEN MILL RD.) & SR 1156 (WATKINS RD.)

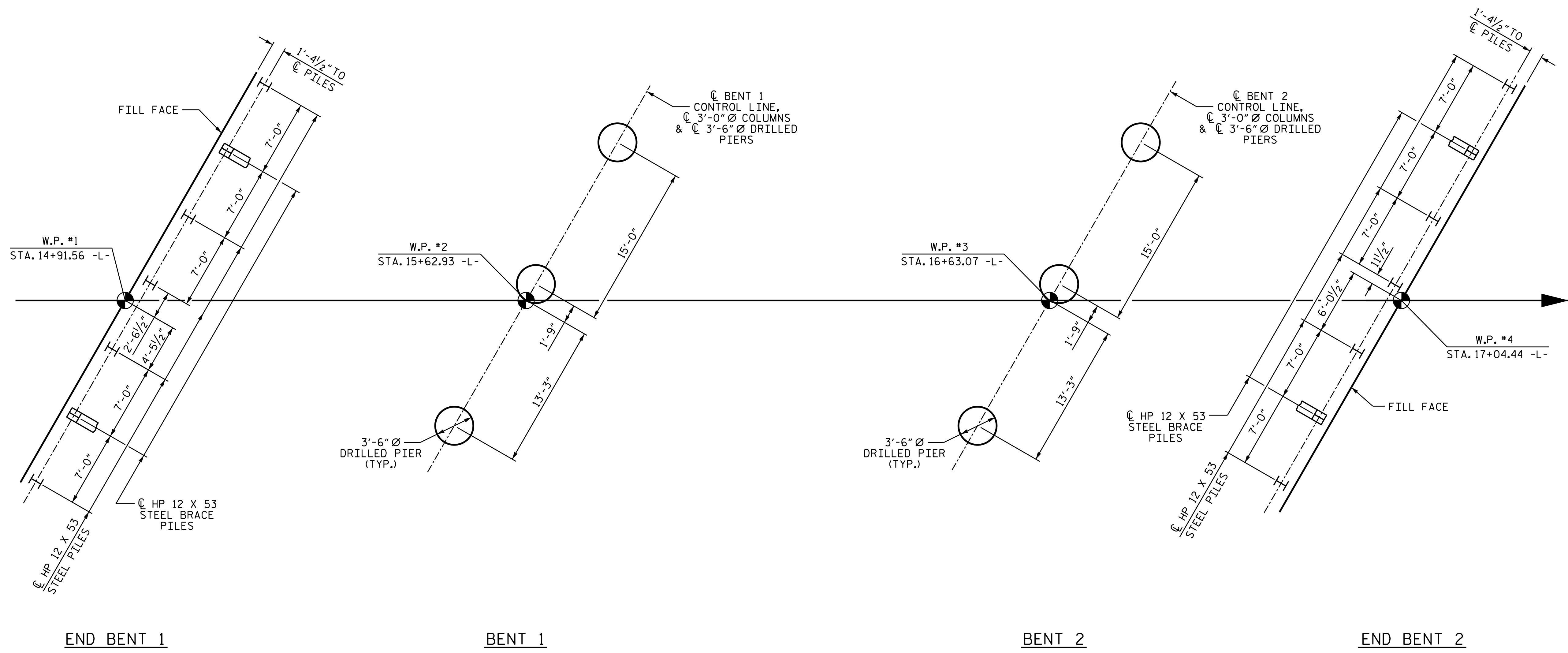
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-1
1			3			TOTAL SHEETS
2			4			26

DRAWN BY : M.K. BEARD DATE : 2/6/18  
 CHECKED BY : K.W. ALFORD DATE : 2/7/18



DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED





### FOUNDATION LAYOUT

DIMENSIONS LOCATING PILES & DRILLED PIERS ARE TO THE CENTERLINE OF PILES & DRILLED PIERS  
BRACE PILES AT END BENTS ARE BATTERED 3:12

### NOTES

FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

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

PILES AT END BENT 1 AND END BENT 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 95 TONS PER PILE.

DRIVE PILES AT END BENT 1 AND END BENT 2 TO A REQUIRED DRIVING RESISTANCE OF 160 TONS PER PILE.

DRILLED PIERS AT BENT 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 505 TONS PER PIER. CHECK FIELD CONDITIONS FOR THE REQUIRED TIP RESISTANCE OF 120 TSF.

DRILLED PIERS AT BENT 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 440 TONS PER PIER. CHECK FIELD CONDITIONS FOR THE REQUIRED TIP RESISTANCE OF 40 TSF.

PERMANENT STEEL CASINGS ARE REQUIRED FOR DRILLED PIERS AT BENT 1. DO NOT EXTEND PERMANENT CASINGS BELOW ELEVATION 355' (LT) AND 353' (CTR, RT) WITHOUT PRIOR APPROVAL FROM THE ENGINEER.

INSTALL PERMANENT STEEL CASING AT BENT 1 BY VIBRATING, SCREWING OR DRIVING PERMANENT CASINGS BEFORE EXCAVATION OR DISTURBING ANY MATERIAL BELOW ELEVATION 360' (LT) AND 357' (CTR, RT).

INSTALL DRILLED PIERS AT BENT 1 TO A TIP ELEVATION NO HIGHER THAN 349' (LT) AND 347' (CTR, RT) WITH THE REQUIRED TIP RESISTANCE AND A PENETRATION OF AT LEAST 6' INTO ROCK AS DEFINED BY ARTICLE 411-1 OF THE STANDARD SPECIFICATIONS.

INSTALL DRILLED PIERS AT BENT 2 TO A TIP ELEVATION NO HIGHER THAN 350' (LT) AND 348' (CTR, RT) WITH THE REQUIRED TIP RESISTANCE.

THE SCOUR CRITICAL ELEVATIONS FOR BENT 1 ARE ELEVATION 358' (LT) AND 355' (CTR, RT). SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.

THE SCOUR CRITICAL ELEVATIONS FOR BENT 2 ARE ELEVATION 363'. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.

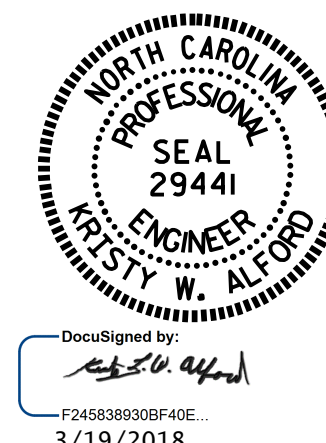
SPT TESTING IS REQUIRED FOR DRILLED PIERS AT BENT 2. FOR SPT TESTING, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.

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

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

PROJECT NO. B-5320  
GRANVILLE COUNTY  
STATION: 15+98.00 -L-

SHEET 2 OF 3



STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
GENERAL DRAWING  
FOR BRIDGE OVER TAR  
RIVER ON SR 1139 (ENON RD.)  
BETWEEN SR 1150 (GOOCH'S  
MILL RD.) & SR 1156  
(WATKINS RD.)

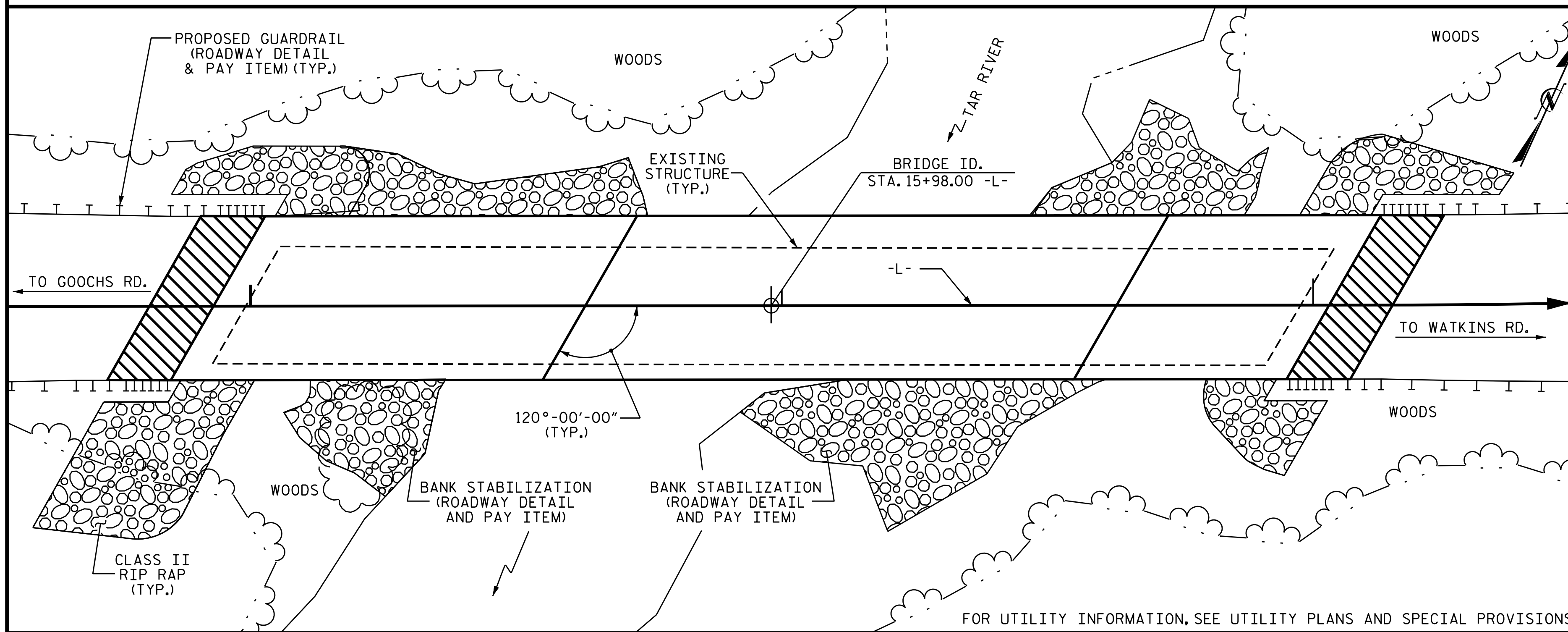
DRAWN BY : M.K. BEARD DATE : 2/6/18  
CHECKED BY : K.W. ALFORD DATE : 2/7/18

DOCUMENT NOT CONSIDERED  
FINAL UNLESS ALL  
SIGNATURES COMPLETED

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



**BENCHMARK #2: RAILROAD SPIKE IN 18-INCH ELM; STA. 14+30.00 -L-, 125' RT. ELEV. 381.99**



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

AT THE CONTRACTOR'S OPTION, AND UPON REMOVAL OF THE CAUSEWAY, THE CLASS II RIP RAP USED IN THE CAUSEWAY MAY BE PLACED AS RIP RAP SLOPE PROTECTION OR BANK STABILIZATION. SEE SPECIAL PROVISIONS FOR CONSTRUCTION, MAINTENANCE AND REMOVAL OF TEMPORARY ACCESS AT STA. 15+98.00 -L-.

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 STA. 15+98.00 -L-."

THE MATERIAL SHOWN IN THE CROSS-HATCHED AREA ON SHEET S-1 SHALL BE EXCAVATED FOR A DISTANCE OF 45 FT. EACH SIDE 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 5 SPANS: 1 @ 40'-4", 3 @ 40'-0" AND 1 @ 40'-4" WITH A CLEAR ROADWAY WIDTH OF 21'-11" ON A RC FLOOR ON I-BEAMS WITH 5" AWS ON END BENTS AND BENTS CONSISTING OF RC CAPS ON TIMBER PILES AND RC POST AND BEAM SHALL BE REMOVED. SUBSTRUCTURE OF THE EXISTING BRIDGE SHALL BE REMOVED IN ITS ENTIRETY.

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 IN A MANNER THAT PREVENTS DEBRIS FROM FALLING INTO THE WATER. THE CONTRACTOR SHALL SUBMIT DEMOLITION PLANS FOR REVIEW AND REMOVE THE BRIDGE IN ACCORDANCE WITH ARTICLE 402-2 OF THE STANDARD SPECIFICATIONS.

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

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 ASBESTOS ASSESSMENT FOR BRIDGE DEMOLITION AND RENOVATION ACTIVITIES, SEE SPECIAL PROVISIONS.

ONLY ONE CAUSEWAY SHALL BE INSTALLED IN THE WATERWAY AT ANY GIVEN TIME. AT NO TIME SHALL MORE THAN HALF OF THE STREAM BE BLOCKED BY THE TEMPORARY CAUSEWAY.

**TOTAL BILL OF MATERIAL**

	CONSTRUCTION, MAINTENANCE & REMOVAL OF TEMPORARY ACCESS	REMOVAL OF EXISTING STRUCTURE	ASBESTOS ASSESSMENT	3'-6" Ø DRILLED PIERS IN SOIL	3'-6" Ø DRILLED PIERS NOT IN SOIL	PERMANENT STEEL CASING FOR 3'-6" Ø DRILLED PIER	SID INSPECTIONS	SPT TESTING	CSL TESTING	UNCLASSIFIED STRUCTURE EXCAVATION	CLASS A CONCRETE
	LUMP SUM	LUMP SUM	LUMP SUM	LIN.FT.	LIN.FT.	LIN.FT.	EACH	EACH	EACH	LUMP SUM	CU. YDS.
SUPERSTRUCTURE	LUMP SUM	LUMP SUM	LUMP SUM							LUMP SUM	
END BENT 1											32.1
BENT 1				40	30	52					33.4
BENT 2				64	18			3			29.0
END BENT 2											32.1
TOTAL	LUMP SUM	LUMP SUM	LUMP SUM	104	48	52	1	3	1	LUMP SUM	126.6

**TOTAL BILL OF MATERIAL**

	BRIDGE APPROACH SLABS	REINFORCING STEEL	SPIRAL COLUMN REINFORCING STEEL	PILE DRIVING EQUIPMENT SETUP FOR HP 12 X 53 STEEL PILES	HP 12 X 53 STEEL PILES	VERTICAL CONCRETE BARRIER RAIL	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE	ELASTOMERIC BEARINGS	3'-0" X 3'-3" PRESTRESSED CONCRETE BOX BEAMS		
	LUMP SUM	LBS.	LBS.	EA.	NO.	LIN.FT.	LIN.FT.	TONS	SO.YDS.	LUMP SUM	NO.	LIN.FT.
SUPERSTRUCTURE	LUMP SUM						420.0			LUMP SUM	33	2,310.0
END BENT 1		4,962		7	7	195		140	155			
BENT 1		12,191	2,362									
BENT 2		10,771	2,240									
END BENT 2		4,962		7	7	160		180	200			
TOTAL	LUMP SUM	32,886	4,602	14	14	355	420.0	320	355	LUMP SUM	33	2,310.0

**HYDRAULIC DATA**

DESIGN DISCHARGE = 9300 CFS  
 FREQUENCY OF DESIGN FLOOD = 25 YEARS  
 DESIGN HIGH WATER ELEVATION = 386.4  
 DRAINAGE AREA = 104.6 SQ.MI.  
 BASE DISCHARGE (Q100) = 13600 CFS  
 BASE HIGH WATER ELEVATION = 388.6

**OVERTOPPING FLOOD DATA**

OVERTOPPING DISCHARGE = 11000 CFS  
 FREQUENCY OF OVERTOPPING FLOOD = 50 YR.  
 OVERTOPPING FLOOD ELEVATION = 387.3  
 @ OF ROADWAY AT SAG STA. 21+19.00 -L-

PROJECT NO. B-5320  
GRANVILLE COUNTY  
 STATION: 15+98.00 -L-

SHEET 3 OF 3



DocuSigned by:  
 K.W. Alford  
 3/19/2018

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**GENERAL DRAWING**  
 FOR BRIDGE OVER TAR RIVER ON SR 1139 (ENON RD.) BETWEEN SR 1150 (GOOCHS MILL RD.) & SR 1156 (WATKINS RD.)

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

DRAWN BY: M.K. BEARD DATE: 2/6/18  
 CHECKED BY: K.W. ALFORD DATE: 2/7/18

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

LOAD FACTORS:

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

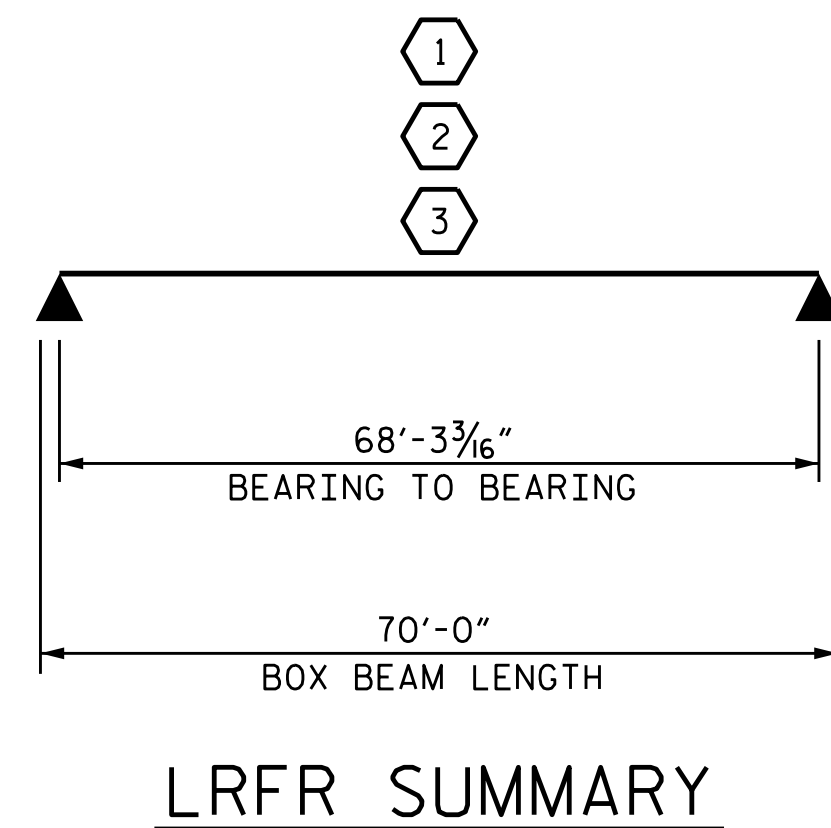
LEVEL	VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING #	MINIMUM RATING FACTORS (RF)	TONS = W X RF	STRENGTH I LIMIT STATE										SERVICE III LIMIT STATE					COMMENT NUMBER			
						LIVELOAD FACTORS	MOMENT					SHEAR					LIVELOAD FACTORS	MOMENT						
							DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	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	1.04	--	1.75	0.247	1.53	A	EL	34.133	0.608	1.14	A	EL	6.827	0.80	0.247	1.04	A	EL	34.133		
	HL-93(0pr)	N/A	--	1.47	--	1.35	0.247	1.98	A	EL	34.133	0.608	1.47	A	EL	6.827	N/A	--	--	--	--	--		
	HS-20(Inv)	36.000	2	1.34	48.357	1.75	0.247	1.98	A	EL	34.133	0.608	1.42	A	EL	6.827	0.80	0.247	1.34	A	EL	34.133		
	HS-20(0pr)	36.000	--	1.84	66.087	1.35	0.247	2.57	A	EL	34.133	0.608	1.84	A	EL	6.827	N/A	--	--	--	--	--		
LEGAL LOAD RATING	SV	SNSH	13.500	--	2.99	40.407	1.4	0.247	5.52	A	EL	34.133	0.608	4.18	A	EL	6.827	0.80	0.247	2.99	A	EL	34.133	
		SNGARBS2	20.000	--	2.25	44.942	1.4	0.247	4.14	A	EL	34.133	0.608	2.98	A	EL	6.827	0.80	0.247	2.25	A	EL	34.133	
		SNAGRIS2	22.000	--	2.14	46.971	1.4	0.247	3.94	A	EL	34.133	0.608	2.77	A	EL	6.827	0.80	0.247	2.14	A	EL	34.133	
		SNCOTTS3	27.250	--	1.49	40.601	1.4	0.247	2.75	A	EL	34.133	0.608	2.09	A	EL	6.827	0.80	0.247	1.49	A	EL	34.133	
		SNAGGRS4	34.925	--	1.25	43.707	1.4	0.247	2.31	A	EL	34.133	0.608	1.74	A	EL	6.827	0.80	0.247	1.25	A	EL	34.133	
		SNS5A	35.550	--	1.22	43.490	1.4	0.247	2.26	A	EL	34.133	0.608	1.77	A	EL	6.827	0.80	0.247	1.22	A	EL	34.133	
		SNS6A	39.950	--	1.13	44.947	1.4	0.247	2.07	A	EL	34.133	0.608	1.61	A	EL	6.827	0.80	0.247	1.13	A	EL	34.133	
	SNS7B	42.000	--	1.07	45.004	1.4	0.247	1.98	A	EL	34.133	0.608	1.59	A	EL	6.827	0.80	0.247	1.07	A	EL	34.133		
	TTST	TNAGRIT3	33.000	--	1.37	45.301	1.4	0.247	2.53	A	EL	34.133	0.608	1.92	A	EL	6.827	0.80	0.247	1.37	A	EL	34.133	
		TNT4A	33.075	--	1.38	45.629	1.4	0.247	2.54	A	EL	34.133	0.608	1.87	A	EL	6.827	0.80	0.247	1.38	A	EL	34.133	
		TNT6A	41.600	--	1.13	47.029	1.4	0.247	2.08	A	EL	34.133	0.608	1.7	A	EL	6.827	0.80	0.247	1.13	A	EL	34.133	
		TNT7A	42.000	--	1.14	47.776	1.4	0.247	2.1	A	EL	34.133	0.608	1.66	A	EL	6.827	0.80	0.247	1.14	A	EL	34.133	
		TNT7B	42.000	--	1.18	49.567	1.4	0.247	2.18	A	EL	34.133	0.608	1.55	A	EL	6.827	0.80	0.247	1.18	A	EL	34.133	
		TNAGRIT4	43.000	--	1.12	48.168	1.4	0.247	2.07	A	EL	34.133	0.608	1.5	A	EL	6.827	0.80	0.247	1.12	A	EL	34.133	
TNAGT5A		45.000	--	1.06	47.476	1.4	0.247	1.95	A	EL	34.133	0.608	1.49	A	EL	6.827	0.80	0.247	1.06	A	EL	34.133		
TNAGT5B	45.000	3	1.04	46.856	1.4	0.247	1.92	A	EL	34.133	0.608	1.43	A	EL	6.827	0.80	0.247	1.04	A	EL	34.133			

NOTES:

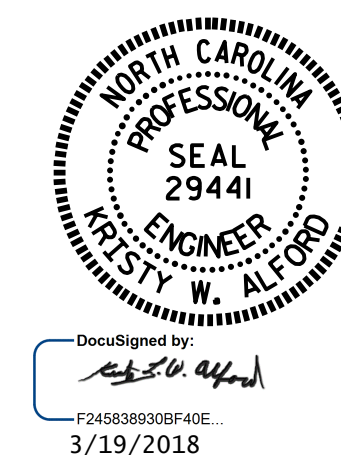
MINIMUM RATING FACTORS ARE BASED ON THE STRENGTH I AND SERVICE III LIMIT STATES.

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-5320  
GRANVILLE COUNTY  
 STATION: 15+98.00 -L-



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

ASSEMBLED BY : R.L. CHESSON	DATE : 1/18
CHECKED BY : K. W. ALFORD	DATE : 2/18
DRAWN BY : MAA	1/08
CHECKED BY : GM/DI	2/08
REV. 11/27/08RR	MAA/GM
REV. 10/1/11	MAA/GM

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

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	1.146	--	1.75	0.246	1.4	B	EL	49.134	0.614	1.15	B	EL	9.827	0.80	0.246	1.15	B	EL	49.134		
	HL-93(0pr)	N/A	--	1.486	--	1.35	0.246	1.81	B	EL	49.134	0.614	1.49	B	EL	9.827	N/A	--	--	--	--	--		
	HS-20(Inv)	36.000	2	1.519	54.686	1.75	0.246	1.95	B	EL	49.134	0.614	1.52	B	EL	9.827	0.80	0.246	1.60	B	EL	49.134		
	HS-20(0pr)	36.000	--	1.969	70.889	1.35	0.246	2.52	B	EL	49.134	0.614	1.97	B	EL	9.827	N/A	--	--	--	--	--		
LEGAL LOAD RATING	SV	SNSH	13.500	--	3.795	51.239	1.4	0.246	5.76	B	EL	49.134	0.614	4.67	B	EL	9.827	0.80	0.246	3.80	B	EL	49.134	
		SNGARBS2	20.000	--	2.75	55	1.4	0.246	4.18	B	EL	49.134	0.614	3.27	B	EL	9.827	0.80	0.246	2.75	B	EL	49.134	
		SNAGRIS2	22.000	--	2.573	56.599	1.4	0.246	3.91	B	EL	49.134	0.614	3.02	B	EL	9.827	0.80	0.246	2.57	B	EL	49.134	
		SNCOTTS3	27.250	--	1.886	51.405	1.4	0.246	2.86	B	EL	49.134	0.614	2.32	B	EL	9.827	0.80	0.246	1.89	B	EL	49.134	
		SNAGGRS4	34.925	--	1.546	54.002	1.4	0.246	2.35	B	EL	49.134	0.614	1.9	B	EL	9.827	0.80	0.246	1.55	B	EL	49.134	
		SNS5A	35.550	--	1.514	53.825	1.4	0.246	2.3	B	EL	49.134	0.614	1.9	B	EL	9.827	0.80	0.246	1.51	B	EL	49.134	
		SNS6A	39.950	--	1.377	55.004	1.4	0.246	2.09	B	EL	49.134	0.614	1.72	B	EL	9.827	0.80	0.246	1.38	B	EL	49.134	
	SNS7B	42.000	--	1.311	55.05	1.4	0.246	1.99	B	EL	49.134	0.614	1.68	B	EL	9.827	0.80	0.246	1.31	B	EL	49.134		
	TTST	TNAGRIT3	33.000	--	1.675	55.287	1.4	0.246	2.54	B	EL	49.134	0.614	2.06	B	EL	9.827	0.80	0.246	1.68	B	EL	49.134	
		TNT4A	33.075	--	1.679	55.547	1.4	0.246	2.55	B	EL	49.134	0.614	2.02	B	EL	9.827	0.80	0.246	1.68	B	EL	49.134	
		TNT6A	41.600	--	1.362	56.644	1.4	0.246	2.07	B	EL	49.134	0.614	1.76	B	EL	9.827	0.80	0.246	1.36	B	EL	49.134	
		TNT7A	42.000	--	1.362	57.22	1.4	0.246	2.07	B	EL	49.134	0.614	1.73	B	EL	9.827	0.80	0.246	1.36	B	EL	49.134	
		TNT7B	42.000	--	1.395	58.575	1.4	0.246	2.12	B	EL	49.134	0.614	1.65	B	EL	9.827	0.80	0.246	1.39	B	EL	49.134	
		TNAGRIT4	43.000	--	1.338	57.52	1.4	0.246	2.03	B	EL	49.134	0.614	1.6	B	EL	9.827	0.80	0.246	1.34	B	EL	49.134	
TNAGT5A		45.000	--	1.266	56.99	1.4	0.246	1.92	B	EL	49.134	0.614	1.57	B	EL	9.827	0.80	0.246	1.27	B	EL	49.134		
TNAGT5B	45.000	3	1.256	56.51	1.4	0.246	1.91	B	EL	49.134	0.614	1.53	B	EL	9.827	0.80	0.246	1.26	B	EL	49.134			

LOAD FACTORS:

DESIGN LOAD RATING FACTORS	LIMIT STATE	$\gamma_{DC}$	$\gamma_{DW}$
	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.

**# CONTROLLING LOAD RATING**

1 DESIGN LOAD RATING (HL-93)

2 DESIGN LOAD RATING (HS-20)

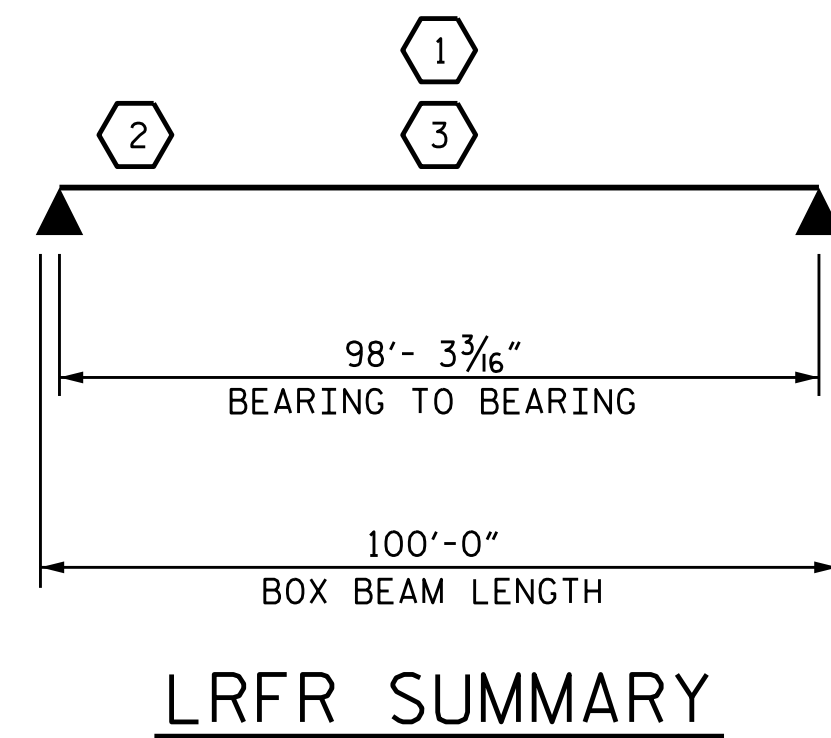
3 LEGAL LOAD RATING \*\*

\*\* SEE CHART FOR VEHICLE TYPE

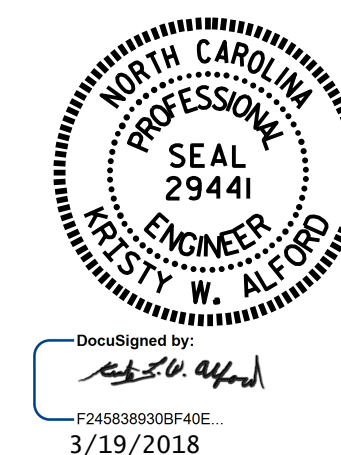
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**GIRDER LOCATION**

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



PROJECT NO. B-5320  
GRANVILLE COUNTY  
 STATION: 15+98.00 -L-



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD  
 LRFR SUMMARY FOR  
 100' BOX BEAM UNIT  
 120° SKEW  
 (NON-INTERSTATE TRAFFIC)

ASSEMBLED BY : R.L. CHESSON	DATE : 1/18
CHECKED BY : K. W. ALFORD	DATE : 2/18
DRAWN BY : TMG II/II	
CHECKED BY : AAC II/II	

DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-5
1			3			TOTAL SHEETS
2			4			26



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

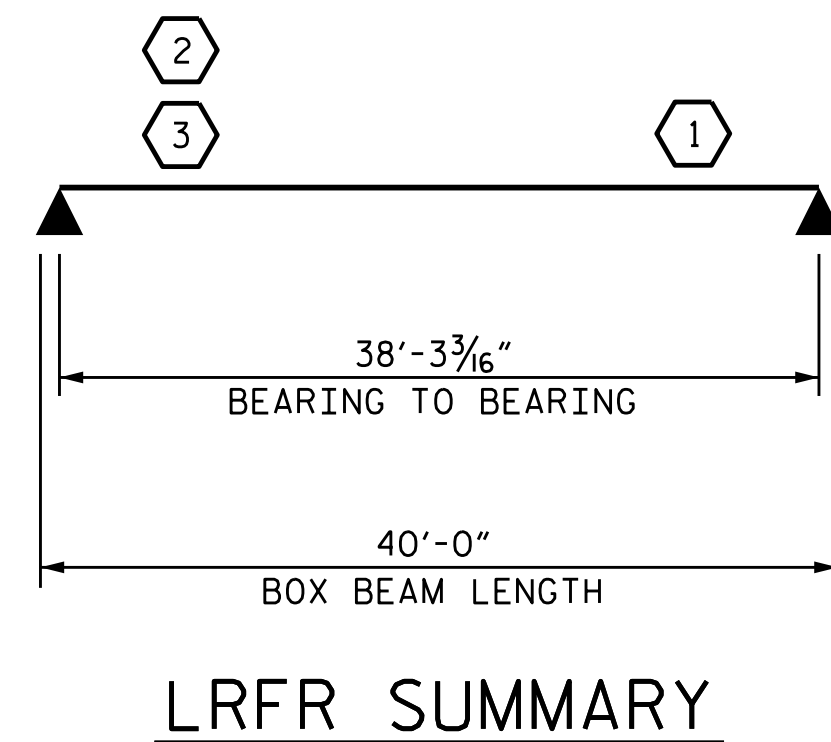
LEVEL	VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING	MINIMUM RATING FACTORS (RF)	TONS = W X RF	STRENGTH I LIMIT STATE										SERVICE III LIMIT STATE					COMMENT NUMBER			
						LIVELOAD FACTORS	MOMENT					SHEAR					LIVELOAD FACTORS	MOMENT						
							DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	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	2.41	--	1.75	0.259	5.2	C	EL	19.133	0.619	<b>2.41</b>	C	EL	<b>30.613</b>	0.80	0.259	5.09	C	EL	19.133		
	HL-93(0pr)	N/A	--	3.13	--	1.35	0.259	6.74	C	EL	19.133	0.619	3.13	C	EL	30.613	N/A	--	--	--	--	--		
	HS-20(Inv)	36.000	2	2.77	99.794	1.75	0.259	6.51	C	EL	15.307	0.619	<b>2.77</b>	C	EL	<b>7.653</b>	0.80	0.259	6.31	C	EL	15.307		
	HS-20(0pr)	36.000	--	3.59	129.363	1.35	0.259	8.44	C	EL	15.307	0.619	3.59	C	EL	7.653	N/A	--	--	--	--	--		
LEGAL LOAD RATING	SV	SNSH	13.500	--	7.02	94.735	1.4	0.259	15.03	C	EL	19.133	0.619	7.02	C	EL	7.653	0.80	0.259	11.74	C	EL	19.133	
		SNGARBS2	20.000	--	5.34	106.872	1.4	0.259	12.28	C	EL	15.307	0.619	5.34	C	EL	7.653	0.80	0.259	9.60	C	EL	15.307	
		SNAGRIS2	22.000	--	5.11	112.417	1.4	0.259	12.02	C	EL	15.307	0.619	5.11	C	EL	7.653	0.80	0.259	9.44	C	EL	15.307	
		SNCOTTS3	27.250	--	3.54	96.389	1.4	0.259	7.51	C	EL	19.133	0.619	3.54	C	EL	7.653	0.80	0.259	5.88	C	EL	19.133	
		SNAGGRS4	34.925	--	3.19	111.460	1.4	0.259	6.79	C	EL	19.133	0.619	3.19	C	EL	7.653	0.80	0.259	5.30	C	EL	19.133	
		SNS5A	35.550	--	3.39	120.329	1.4	0.259	6.6	C	EL	19.133	0.619	3.38	C	EL	7.653	0.80	0.259	5.16	C	EL	19.133	
		SNS6A	39.950	--	3.22	128.488	1.4	0.259	6.29	C	EL	19.133	0.619	3.22	C	EL	7.653	0.80	0.259	4.92	C	EL	19.133	
	SNS7B	42.000	--	3.32	139.541	1.4	0.259	6	C	EL	19.133	0.619	3.32	C	EL	7.653	0.80	0.259	4.69	C	EL	19.133		
	TTST	TNAGRIT3	33.000	--	3.72	122.818	1.4	0.259	7.74	C	EL	19.133	0.619	3.72	C	EL	7.653	0.80	0.259	6.06	C	EL	19.133	
		TNT4A	33.075	--	3.5	115.659	1.4	0.259	7.85	C	EL	19.133	0.619	3.5	C	EL	7.653	0.80	0.259	6.09	C	EL	19.133	
		TNT6A	41.600	--	3.42	142.313	1.4	0.259	6.67	C	EL	19.133	0.619	3.42	C	EL	7.653	0.80	0.259	5.21	C	EL	19.133	
		TNT7A	42.000	--	3.22	135.251	1.4	0.259	6.84	C	EL	19.133	0.619	3.22	C	EL	7.653	0.80	0.259	5.32	C	EL	19.133	
		TNT7B	42.000	--	3.11	130.397	1.4	0.259	6.96	C	EL	19.133	0.619	3.1	C	EL	7.653	0.80	0.259	5.44	C	EL	19.133	
		TNAGRIT4	43.000	--	2.99	128.342	1.4	0.259	6.73	C	EL	15.307	0.619	2.98	C	EL	7.653	0.80	0.259	5.26	C	EL	15.307	
TNAGT5A		45.000	--	3.18	143.126	1.4	0.259	6.3	C	EL	19.133	0.619	3.18	C	EL	7.653	0.80	0.259	4.93	C	EL	19.133		
TNAGT5B	45.000	3	2.82	126.728	1.4	0.259	6.11	C	EL	19.133	0.619	<b>2.82</b>	C	EL	<b>7.653</b>	0.80	0.259	4.75	C	EL	19.133			

NOTES:

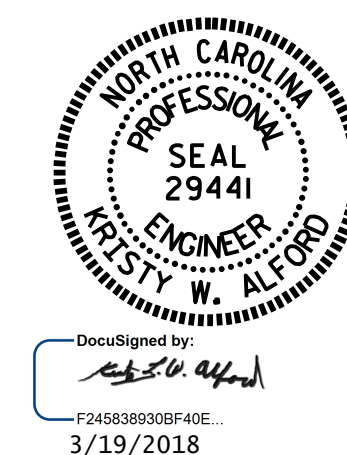
MINIMUM RATING FACTORS ARE BASED ON THE STRENGTH I AND SERVICE III LIMIT STATES.

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-5320  
GRANVILLE COUNTY  
 STATION: 15+98.00 -L-



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

ASSEMBLED BY : R.L. CHESSON	DATE : 1/18
CHECKED BY : K. W. ALFORD	DATE : 2/18
DRAWN BY : MAA	1/08
CHECKED BY : GM/DI	2/08
REV. 11/12/08RR	MAA/GM
REV. 10/1/11	MAA/GM

DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-6
1			3			TOTAL SHEETS 26
2			4			



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.

FLAME CUTTING OF THE TRANSVERSE POST-TENSIONING STRAND IS NOT ALLOWED.

RECESSES FOR TRANSVERSE STRANDS SHALL BE GROUTED 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 5,500 PSI FOR THE 100 FT BOX BEAMS AND NOT LESS THAN 4,000 PSI FOR THE 70 FT BOX BEAMS AND THE 40 FT BOX BEAMS.

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.

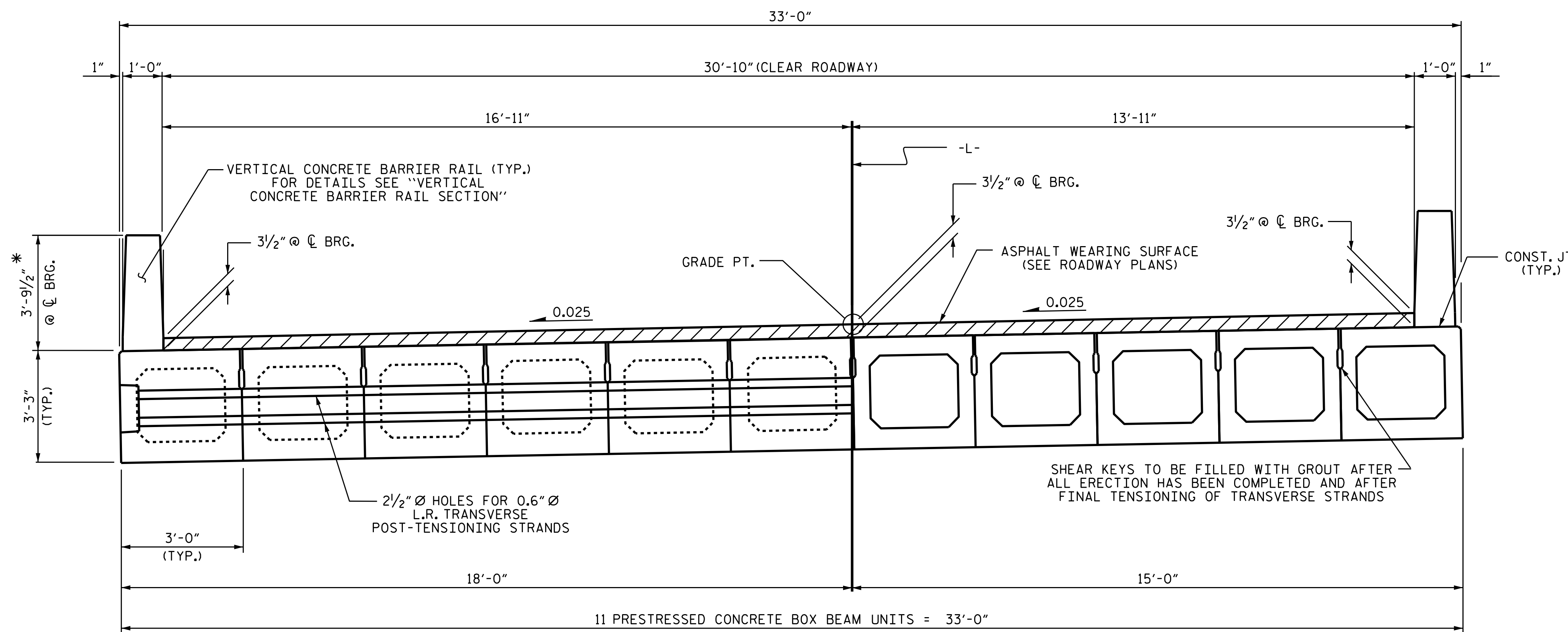
FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

THE PERMITTED THREADED INSERTS ARE DETAILED AS AN OPTION FOR THE CONTRACTOR TO ATTACH FALSEWORK AND FORMWORK DURING CONSTRUCTION.

THE PERMITTED THREADED INSERTS IN THE EXTERIOR UNITS SHALL BE SIZED BY THE CONTRACTOR, SPACED AT 4'-0" CENTERS AND GALVANIZED IN ACCORDANCE WITH SECTION 1076 OF THE STANDARD SPECIFICATIONS. STAINLESS STEEL THREADED INSERTS MAY BE USED AS AN ALTERNATE.

THE PERMITTED THREADED INSERTS SHALL BE GROUTED WITH THE CONTRACTOR IMMEDIATELY FOLLOWING REMOVAL OF THE FALSEWORK.

THE COST OF THE PERMITTED THREADED INSERTS SHALL BE INCLUDED IN THE PRICE BID FOR THE PRECAST UNITS.



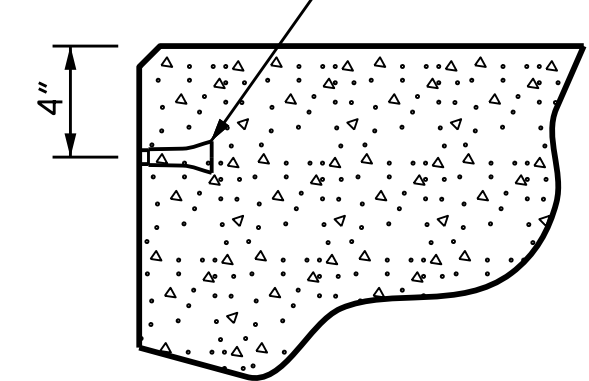
HALF SECTION  
AT INTERMEDIATE DIAPHRAGMS

HALF SECTION  
THROUGH VOIDS

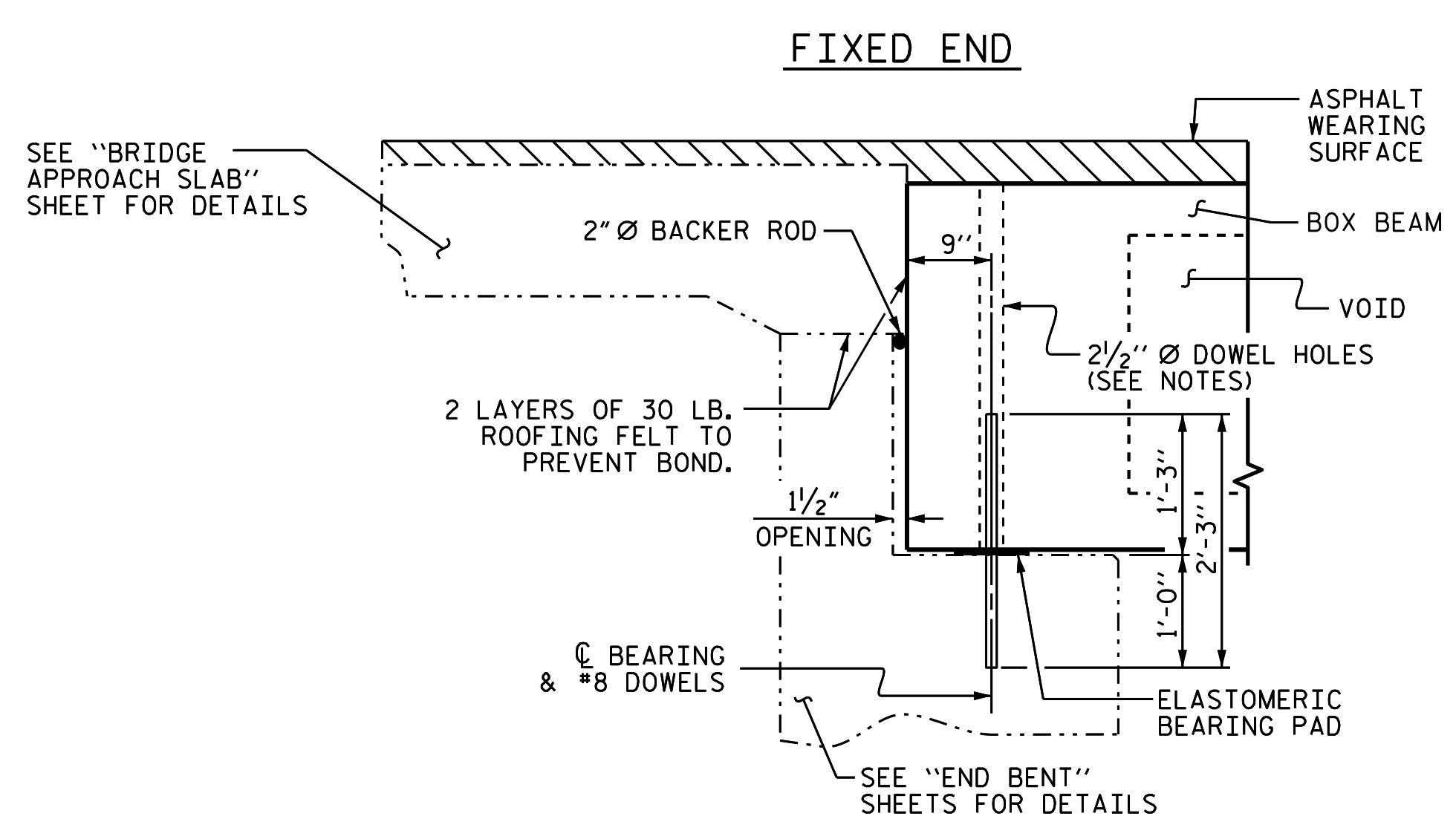
TYPICAL SECTION

\* 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 GUTTERLINE. FOR RAIL HEIGHT DETAILS AND ASPHALT THICKNESS, SEE THE "VERTICAL CONCRETE BARRIER RAIL SECTION" DETAIL.

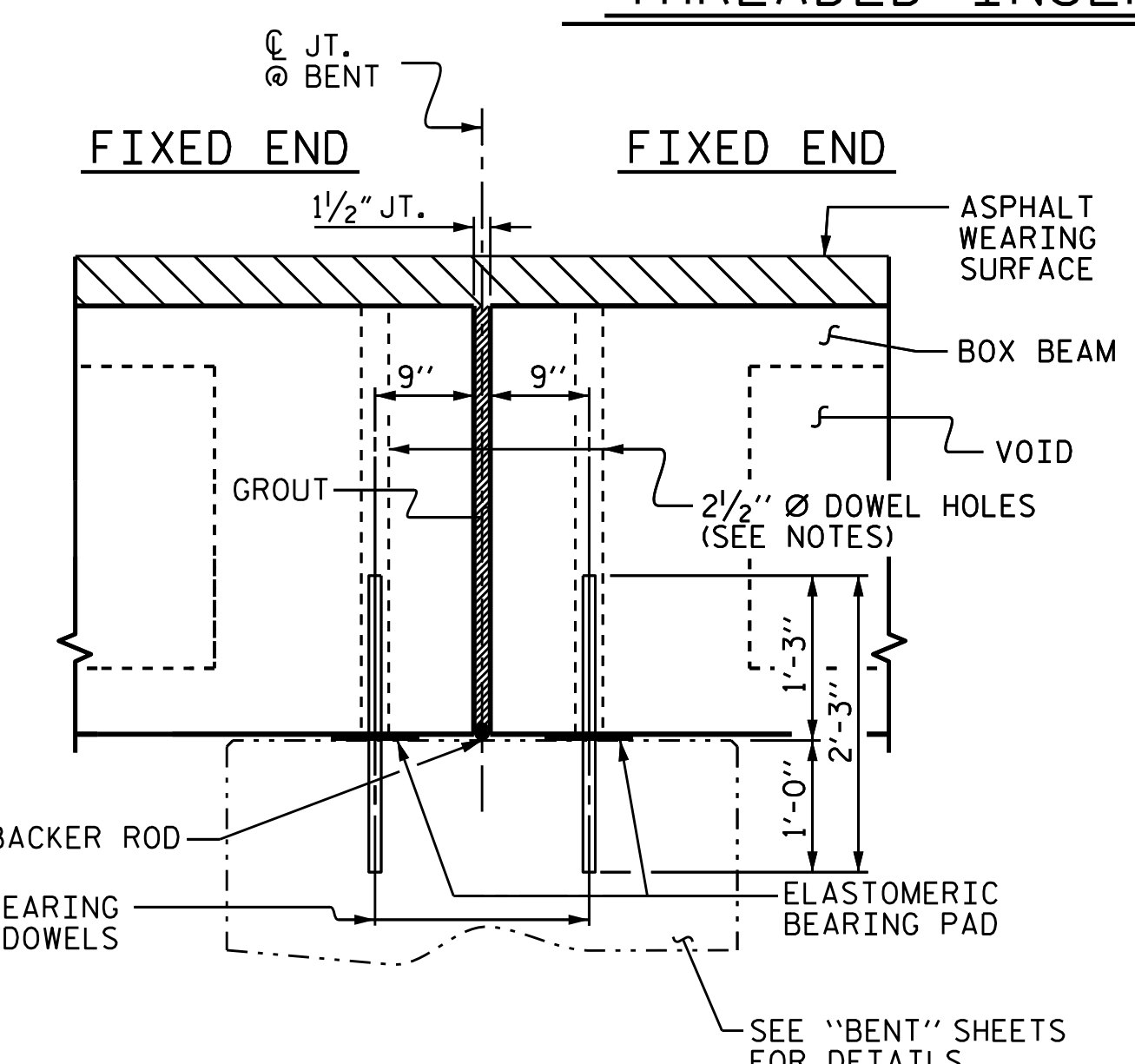
PERMITTED THREADED INSERT  
CAST IN OUTSIDE FACE OF  
EXTERIOR UNIT AND  
RECESSED 3/8" SIZE TO BE  
DETERMINED  
BY CONTRACTOR.



THREADED INSERT DETAIL



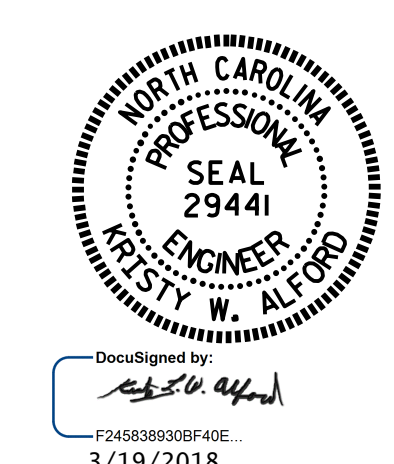
SECTION AT END BENT



SECTION AT BENT

PROJECT NO. B-5320  
GRANVILLE COUNTY  
STATION: 15+98.00 -L-

SHEET 1 OF 9

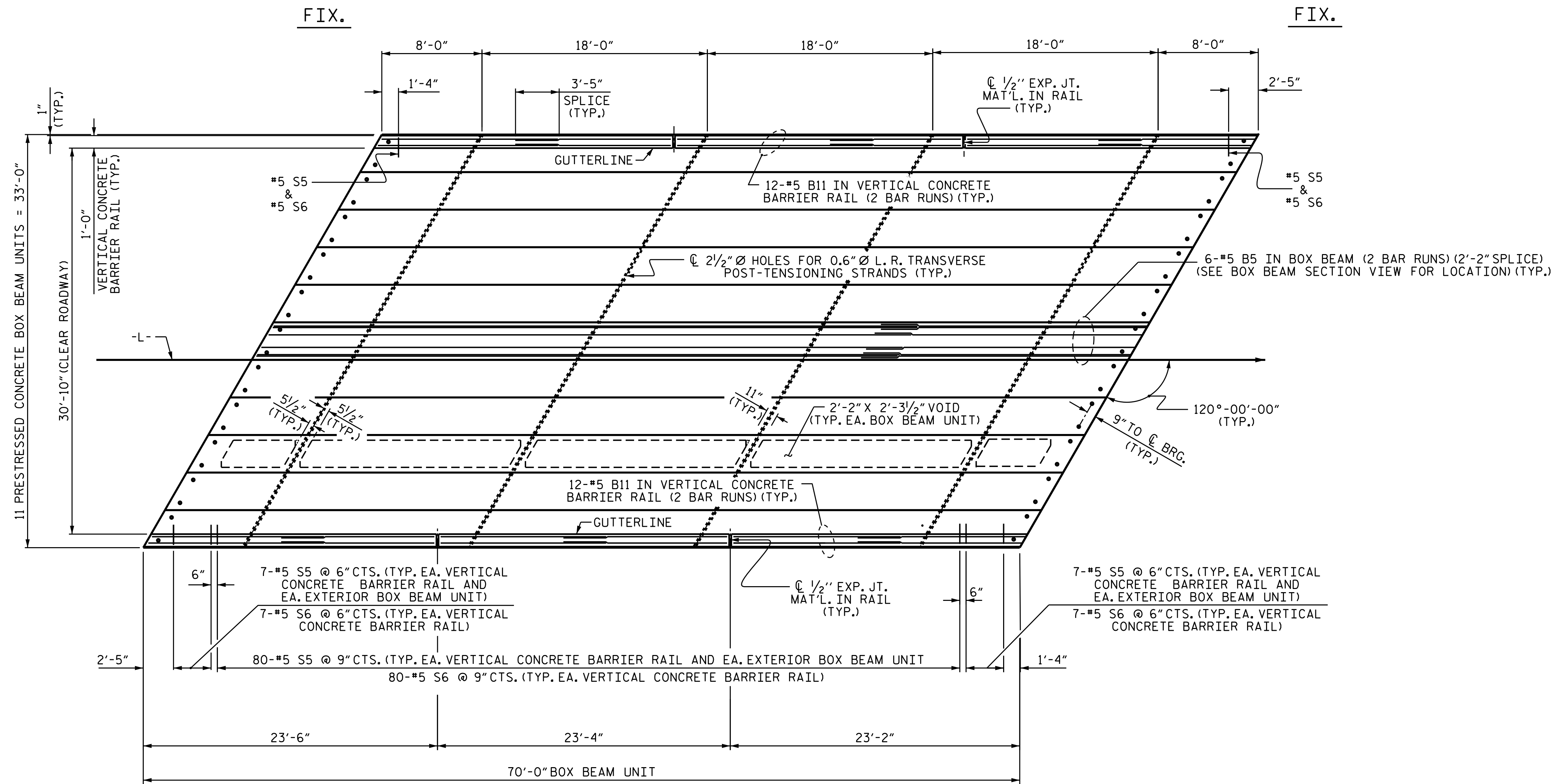


STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
STANDARD  
3'-0" X 3'-3"  
PRESTRESSED CONCRETE  
BOX BEAM UNIT

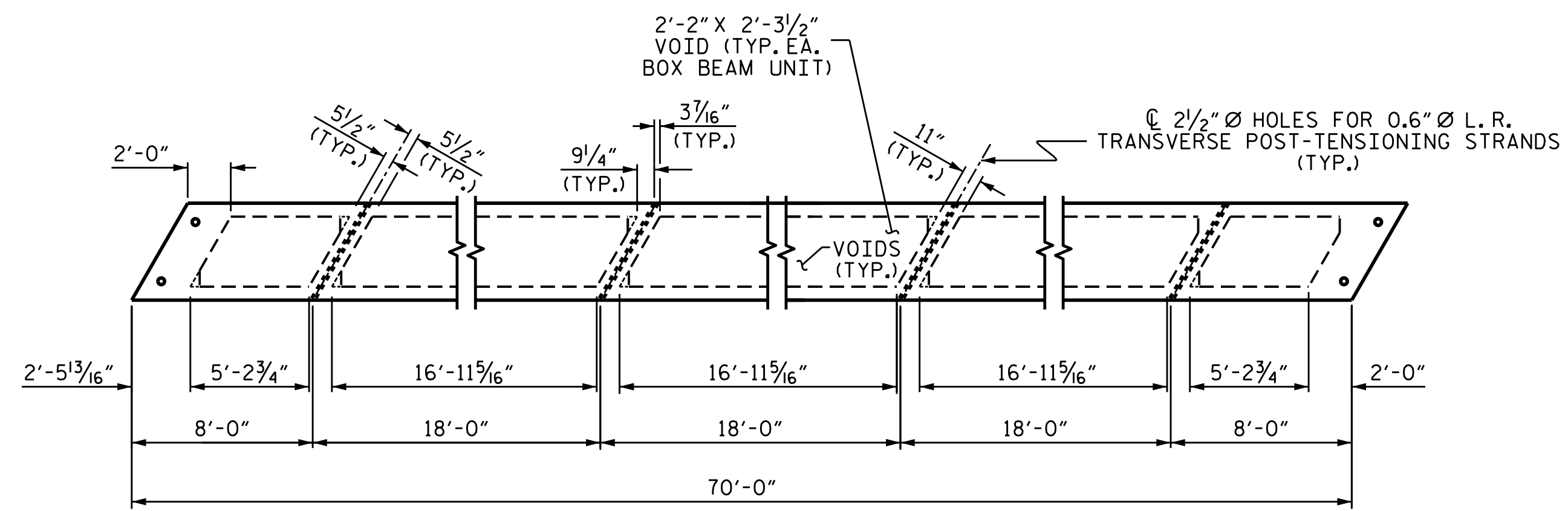
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-7
1			3			TOTAL SHEETS
2			4			26

DOCUMENT NOT CONSIDERED  
FINAL UNLESS ALL  
SIGNATURES COMPLETED

ASSEMBLED BY : M. A. LESHURE DATE : 1/4/18  
CHECKED BY : R. L. CHESSON DATE : 1/18  
DRAWN BY : DGE 8/II  
CHECKED BY : TMG II/II



PLAN OF UNIT

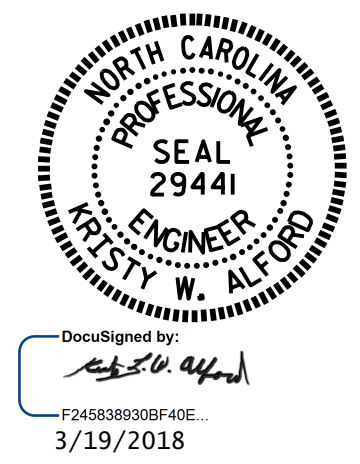


DIAPHRAGM AND VOID LAYOUT

PROJECT NO. B-5320  
GRANVILLE COUNTY  
 STATION: 15+98.00 -L-

SHEET 2 OF 9

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 PLAN OF 70' UNIT  
 30'-10" CLEAR ROADWAY  
 120° SKEW

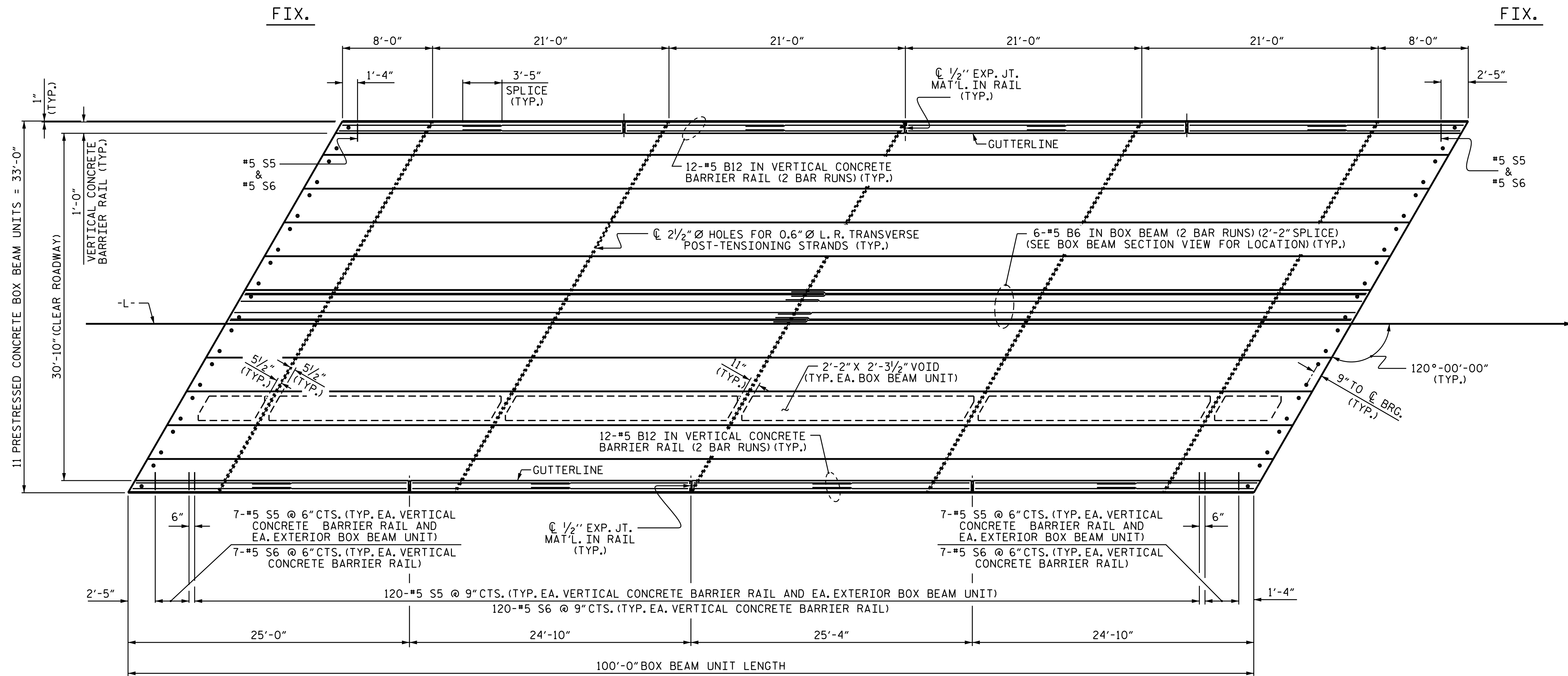


DRAWN BY : M. A. LESHURE DATE : 1/18  
 CHECKED BY : R. L. CHESSON DATE : 1/18  
 DESIGN ENGINEER OF RECORD : H. B. DESAI DATE : 2/18

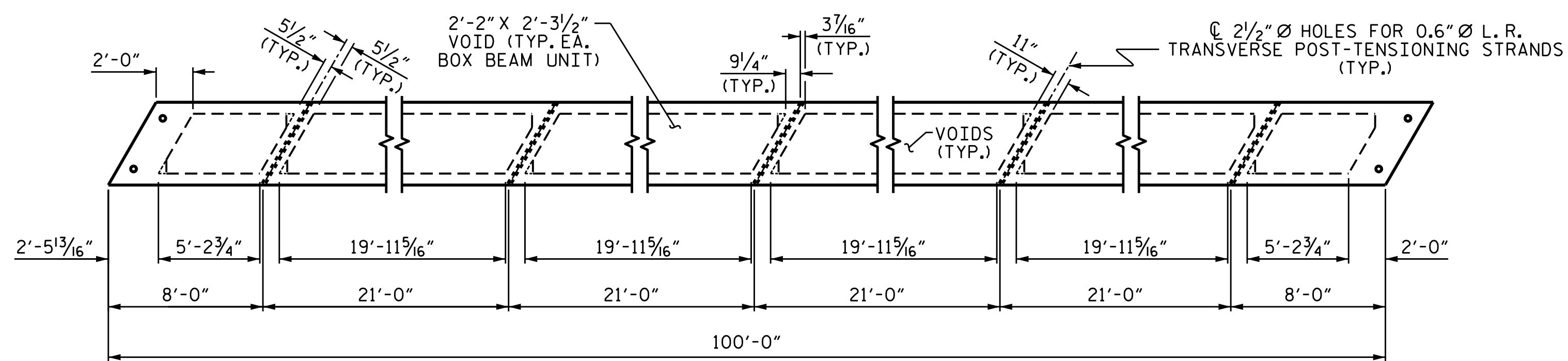
DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-8
1			3			TOTAL SHEETS
2			4			26





PLAN OF UNIT



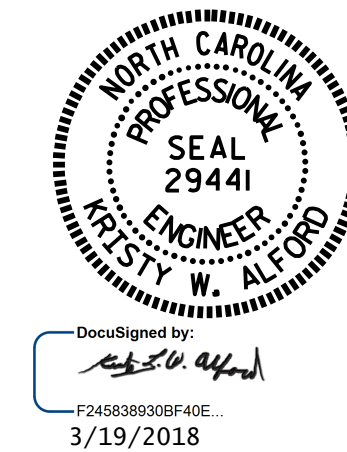
DIAPHRAGM AND VOID LAYOUT

PROJECT NO. B-5320  
GRANVILLE COUNTY  
 STATION: 15+98.00 -L-

SHEET 3 OF 9

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

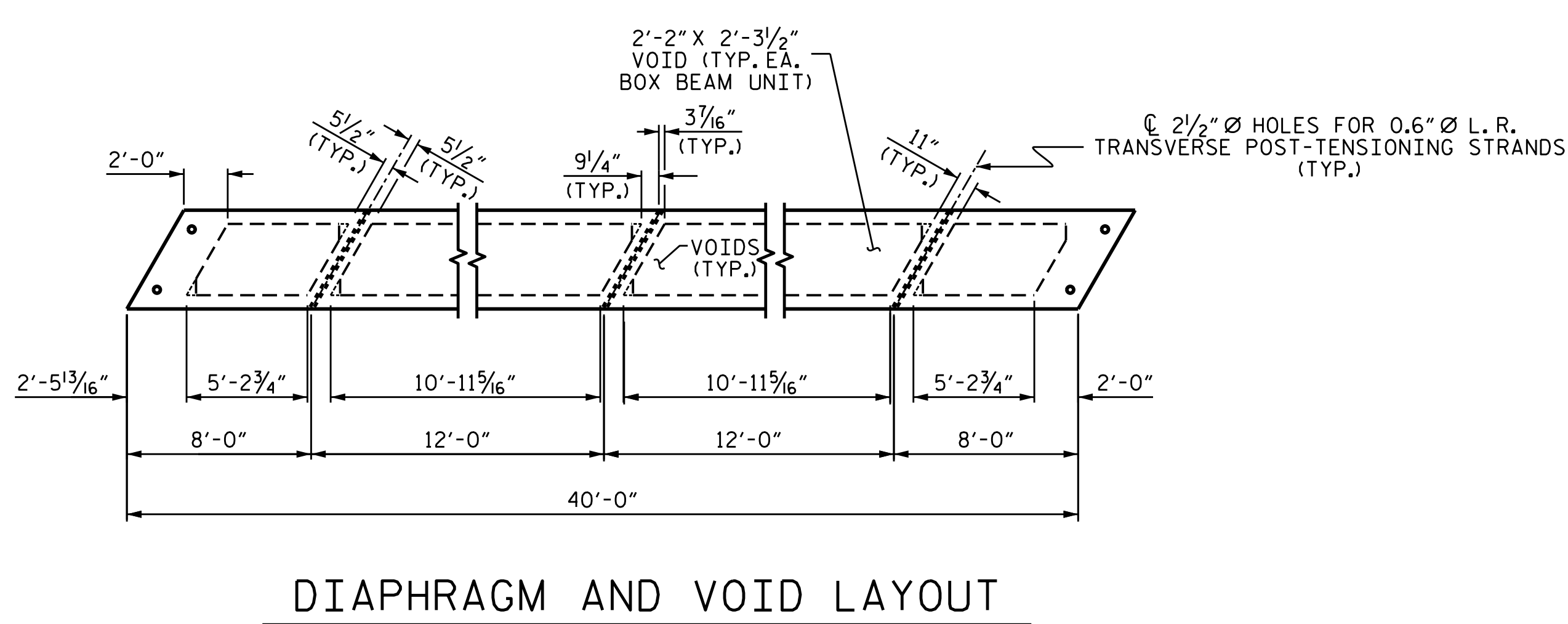
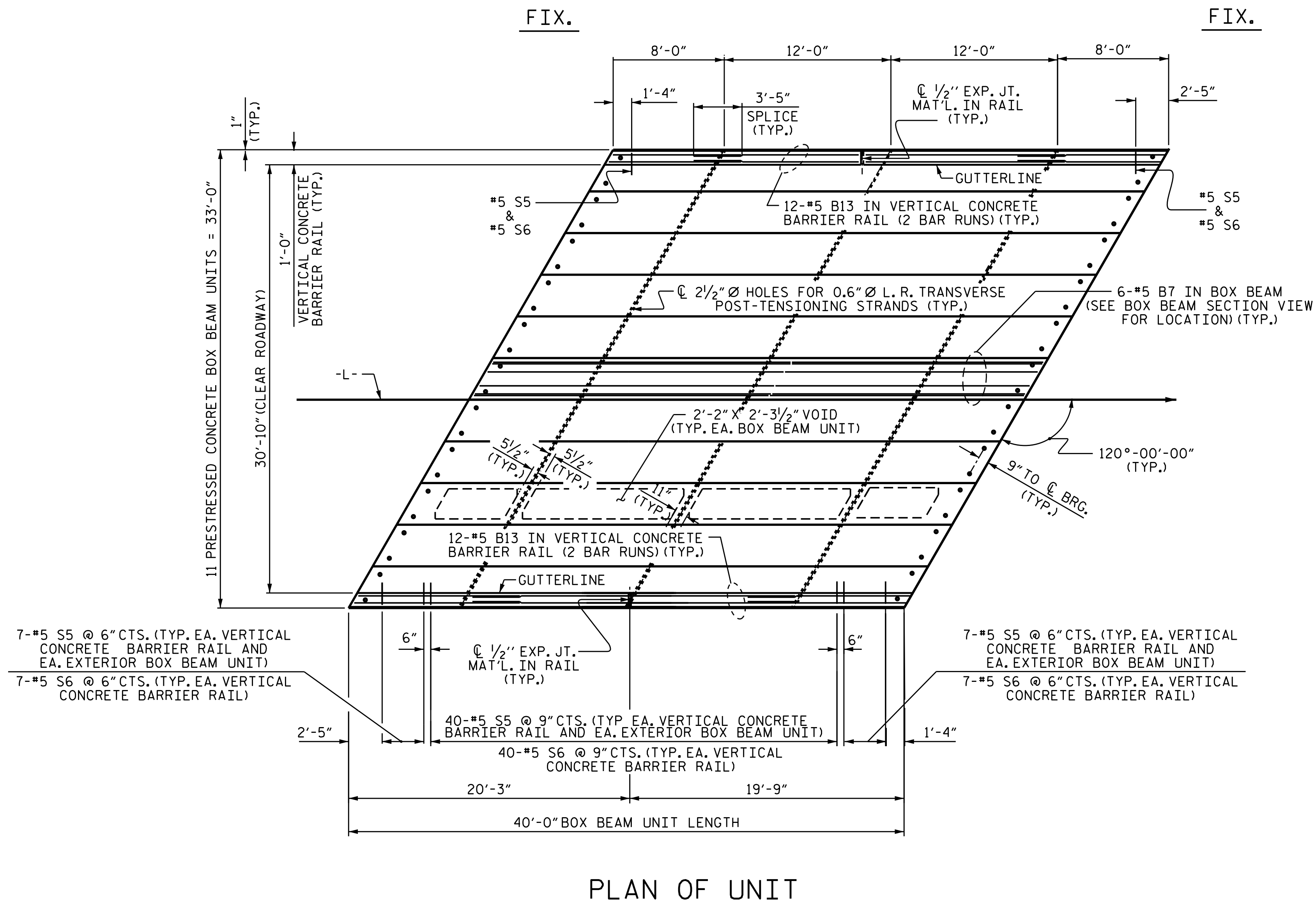
PLAN OF 100' UNIT  
 30'-10" CLEAR ROADWAY  
 120° SKEW



ASSEMBLED BY : M. A. LESHURE	DATE : 1/4/18
CHECKED BY : R. L. CHESSON	DATE : 1/18
DRAWN BY : DGE 10/11	REV. 8/14
CHECKED BY : TMG 11/11	MAA/TMG

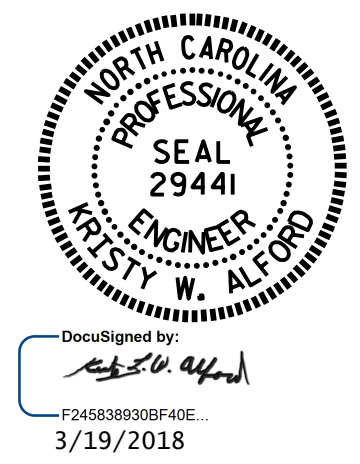
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 SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-9
1			3			TOTAL SHEETS 26
2			4			



DRAWN BY : M. A. LESHURE DATE : 1/18  
 CHECKED BY : R. L. CHESSON DATE : 1/18  
 DESIGN ENGINEER OF RECORD: H. B. DESAI DATE : 2/18

19-MAR-2018 10:57  
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 kaiford



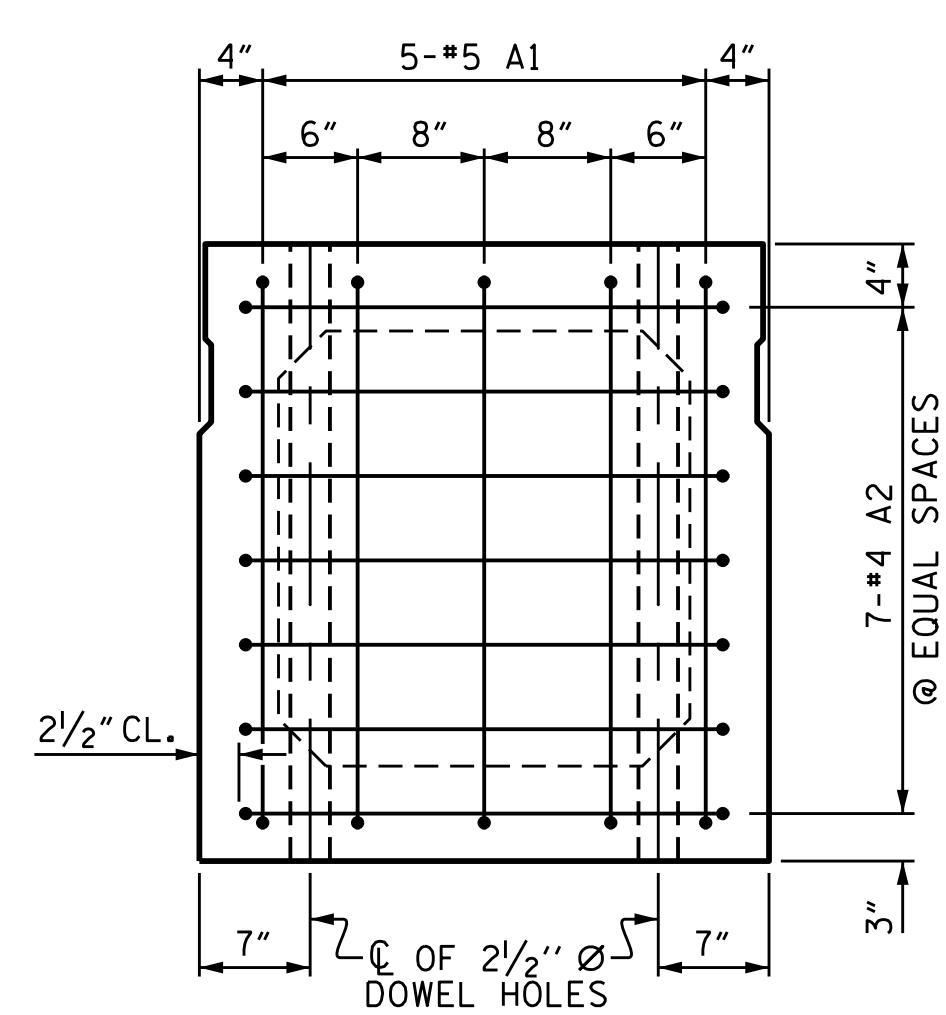
DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

PROJECT NO. B-5320  
 GRANVILLE COUNTY  
 STATION: 15+98.00 -L-

SHEET 4 OF 9

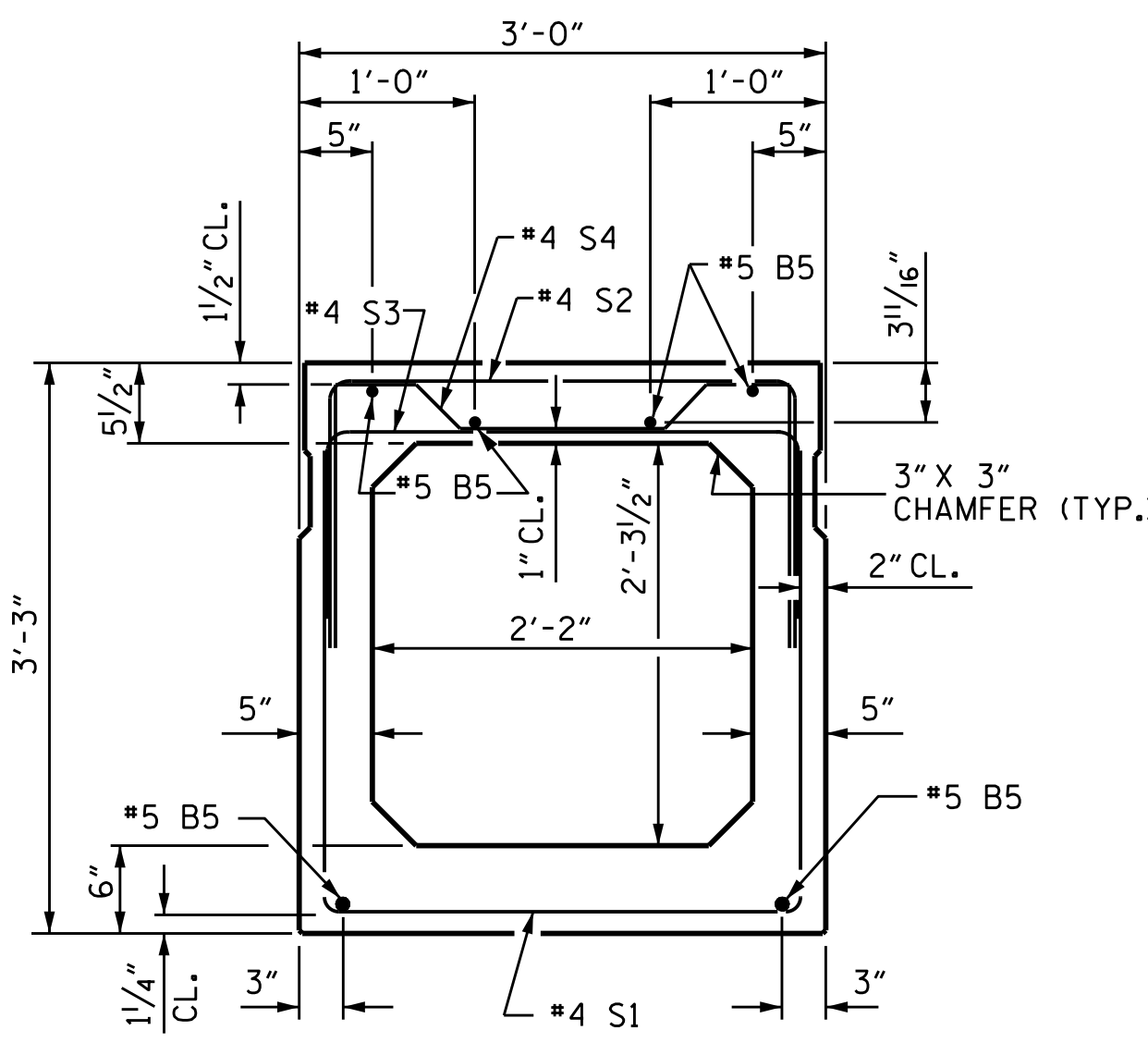
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH						SHEET NO. S-10
PLAN OF 40' UNIT 30'-10" CLEAR ROADWAY 120° SKEW						TOTAL SHEETS 26
REVISIONS						NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			
2			4			





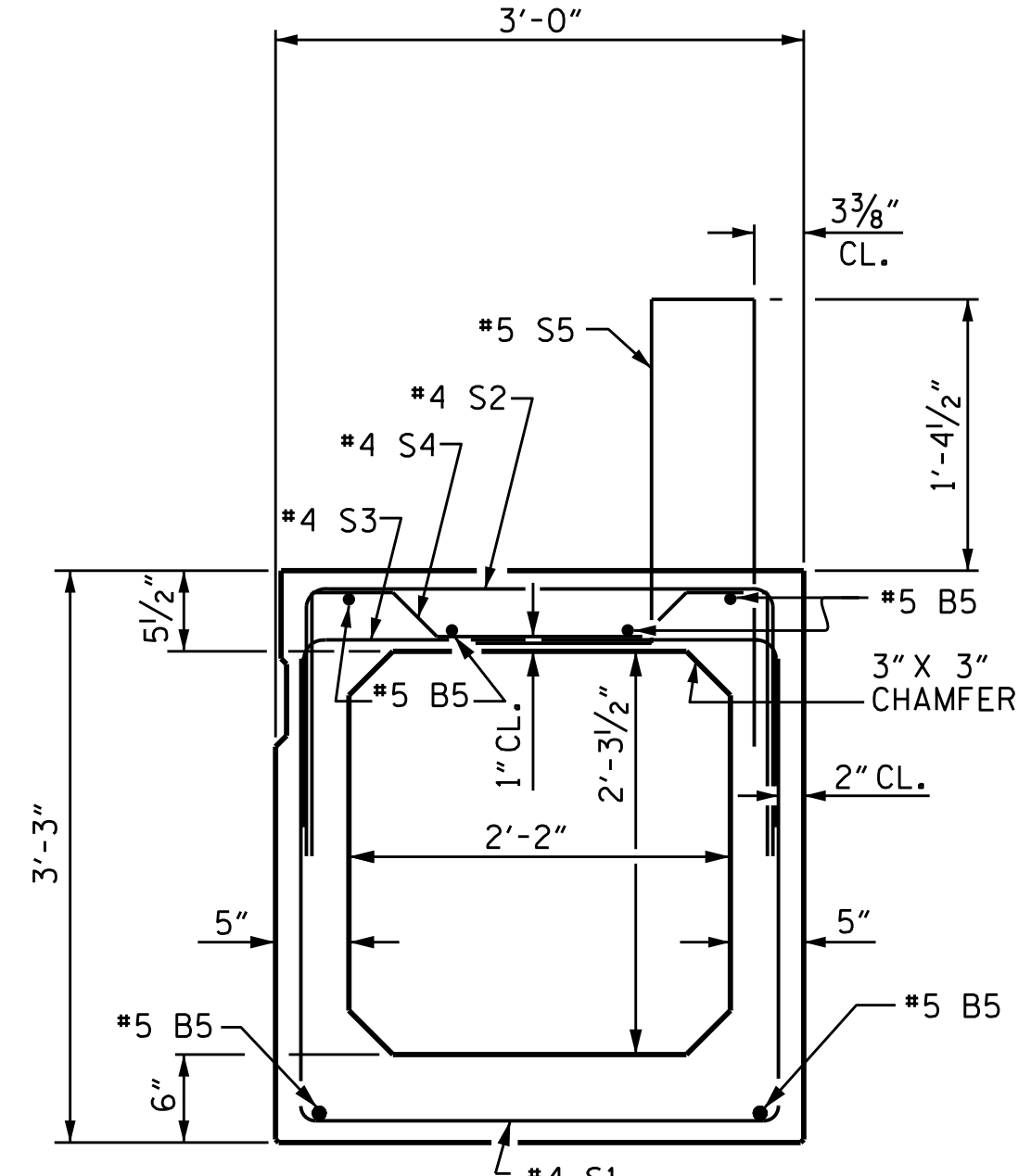
**END ELEVATION**

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**

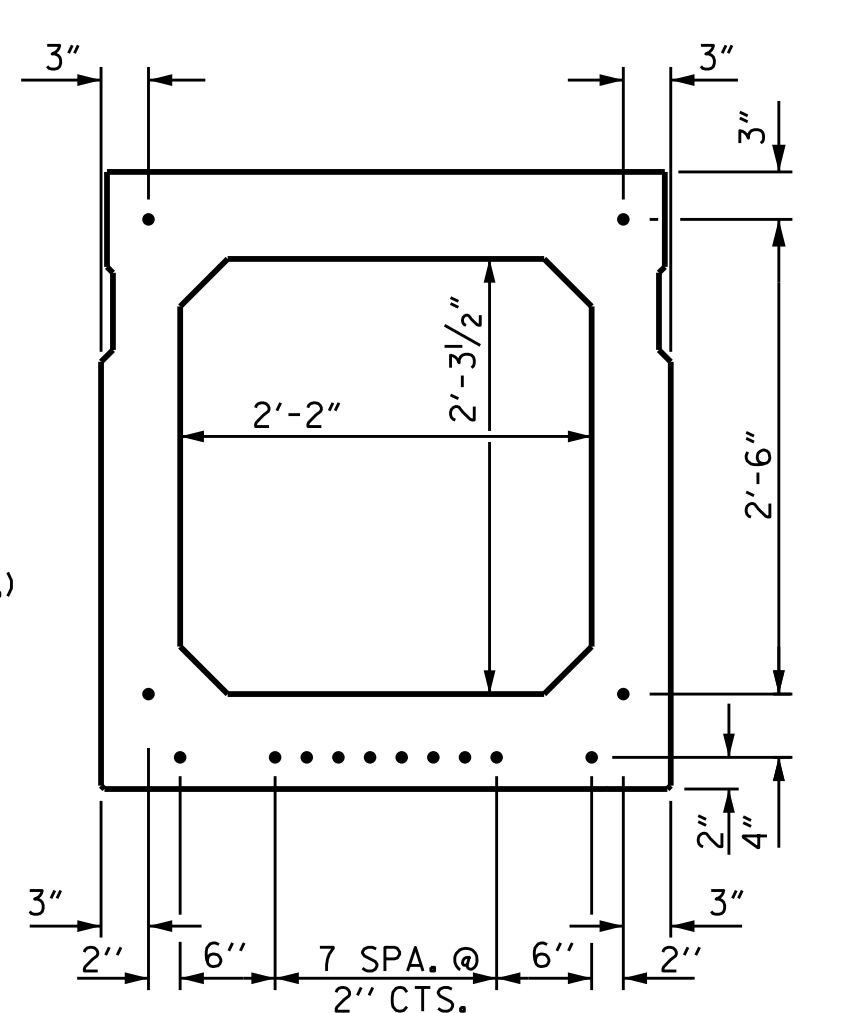
(STRAND LAYOUT NOT SHOWN)



**EXTERIOR BOX BEAM SECTION**

(STRAND LAYOUT NOT SHOWN)

**0.6" Ø LOW RELAXATION STRAND LAYOUT**

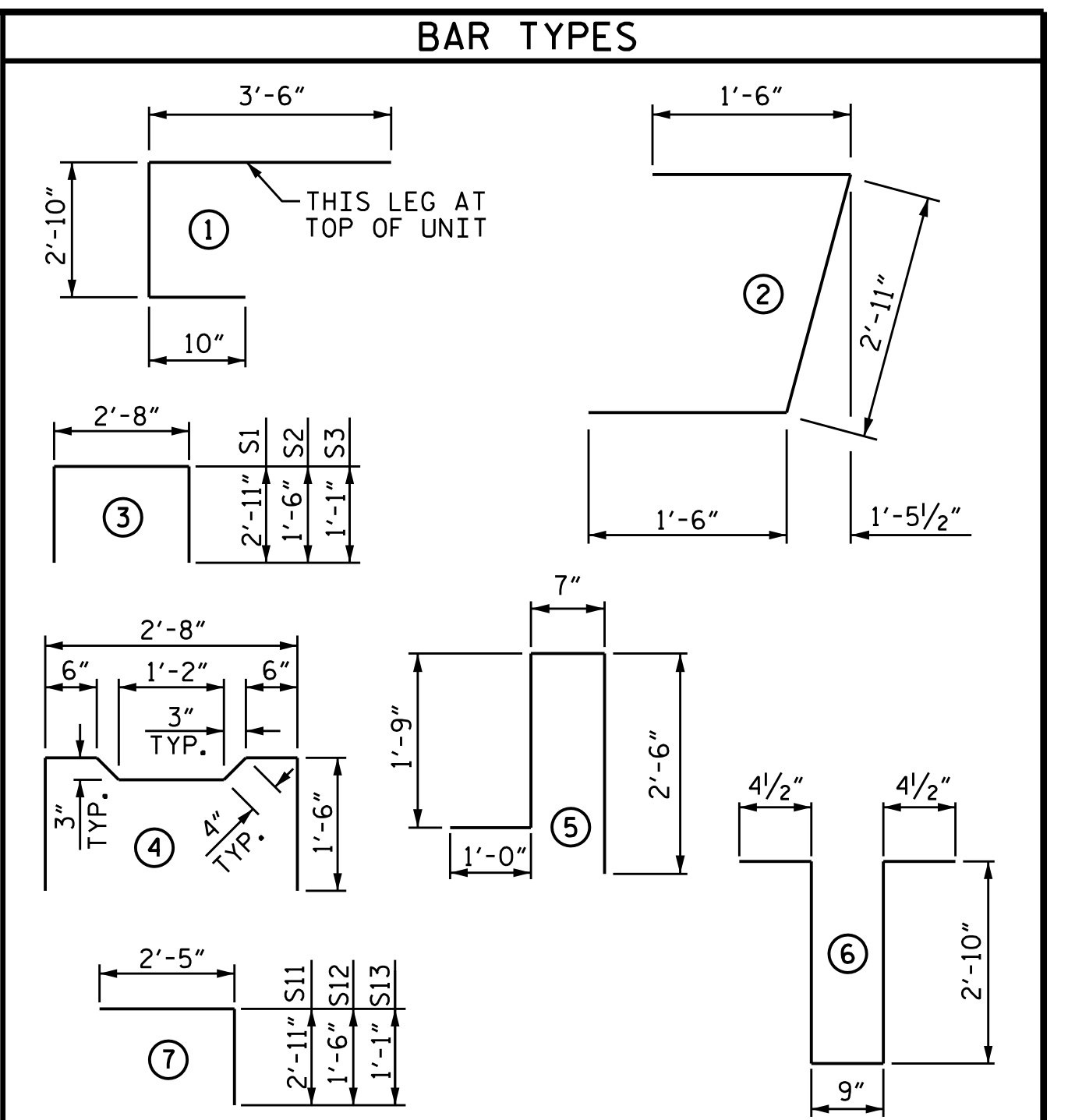


**TYPICAL STRAND LOCATION**

(14 STRANDS REQUIRED)

**DEBONDING LEGEND**

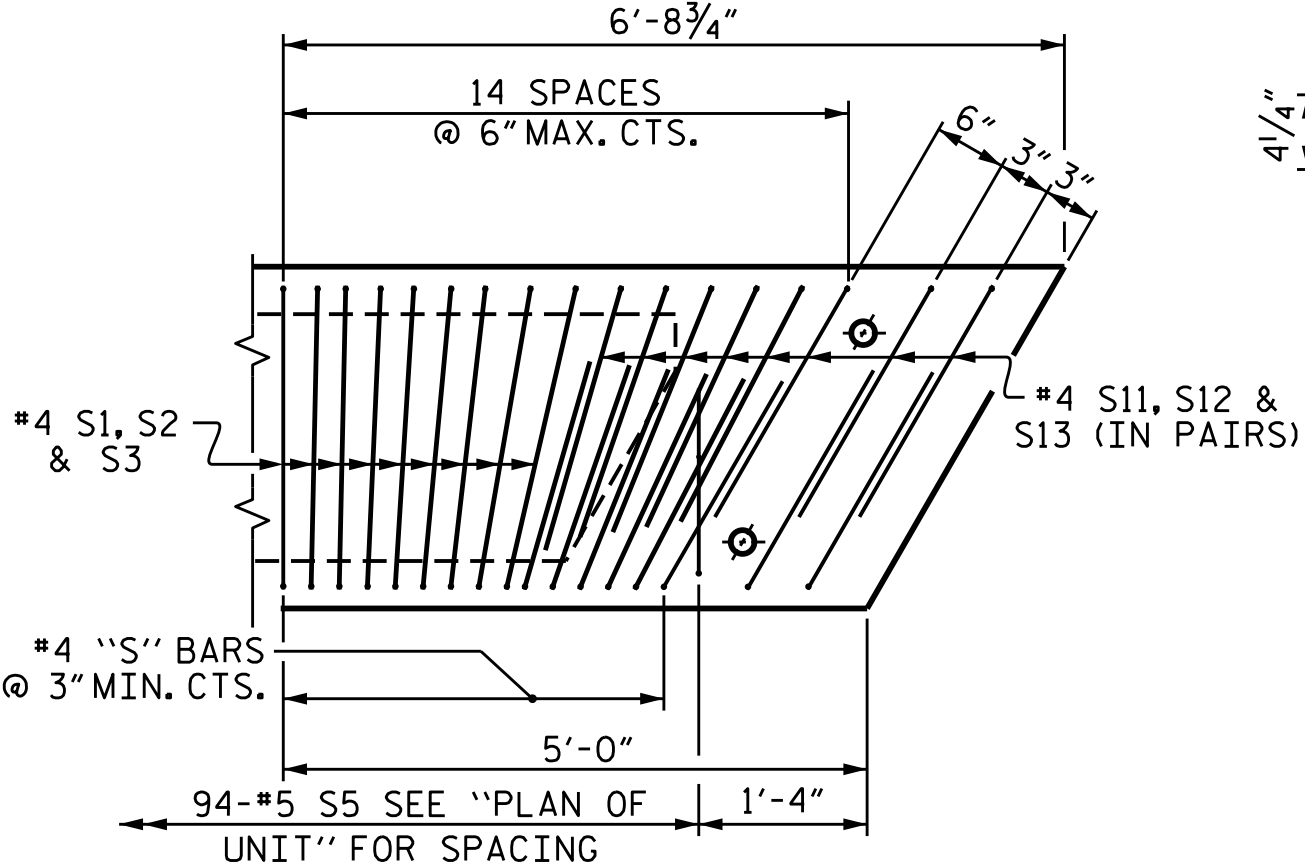
● FULLY BONDED STRANDS



ALL BAR DIMENSIONS ARE OUT TO OUT

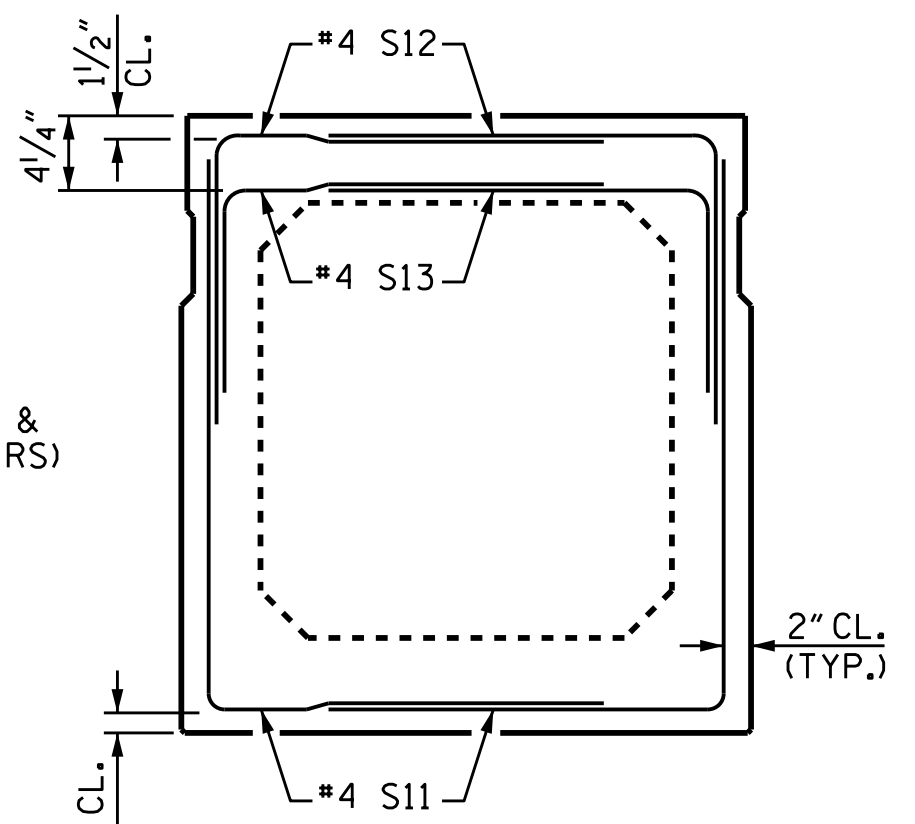
**BILL OF MATERIAL FOR ONE BOX BEAM SECTION**

BAR	NUMBER	SIZE	TYPE	EXTERIOR UNIT		INTERIOR UNIT	
				LENGTH	WEIGHT	LENGTH	WEIGHT
A1	10	#5	1	7'-2"	75	7'-2"	75
A2	38	#4	2	5'-11"	150	5'-11"	150
B5	12	#5	STR	35'-11"	450	35'-11"	450
K1	12	#4	6	7'-2"	57	7'-2"	57
K2	8	#4	STR	2'-10"	15	2'-10"	15
S1	57	#4	3	8'-6"	324	8'-6"	324
S2	57	#4	3	5'-8"	216	5'-8"	216
S3	95	#4	3	4'-10"	307	4'-10"	307
S4	38	#4	4	5'-10"	148	5'-10"	148
S11	32	#4	7	5'-4"	114	5'-4"	114
S12	32	#4	7	3'-11"	84	3'-11"	84
S13	32	#4	7	3'-6"	75	3'-6"	75
*S5	94	#5	5	5'-10"	572	--	--
REINFORCING STEEL				2015	LBS.	2015	LBS.
* EPOXY COATED REINF. STEEL				572	LBS.		
5000 P.S.I. CONCRETE				14.1	CU. YDS.	14.0	CU. YDS.
0.6" Ø L.R. STRANDS				No.	14	No.	14



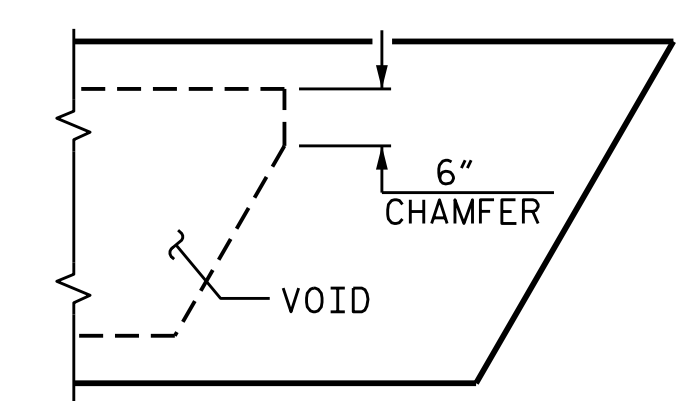
**DETAIL "B"**

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



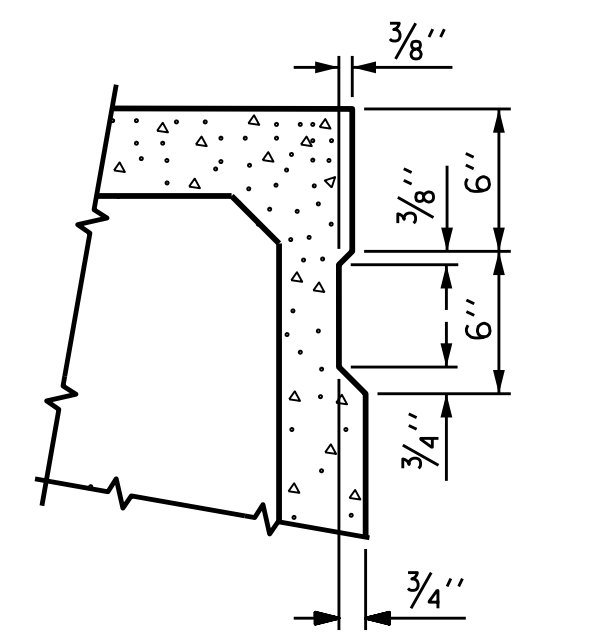
**END VIEW**

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



**CHAMFER DETAIL**

SHOWING 6" VOID CHAMFER

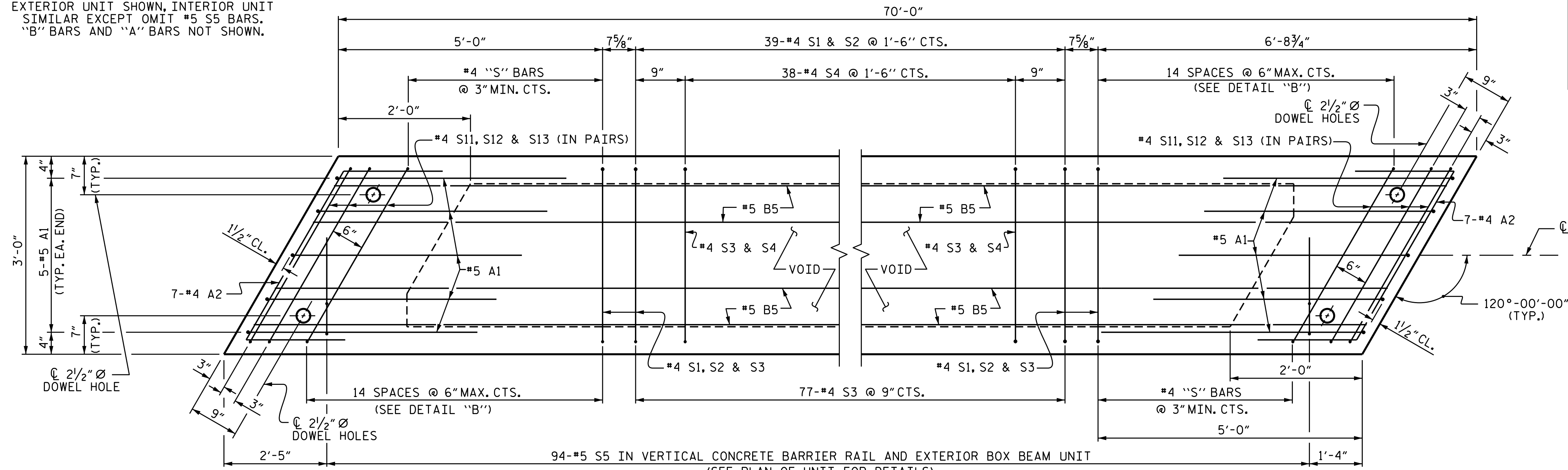


**SHEAR KEY DETAIL**

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

**GRADE 270 STRANDS**

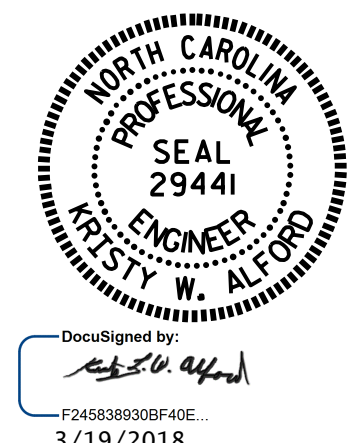
	0.6" Ø L.R.
AREA ( SQUARE INCHES )	0.217
ULTIMATE STRENGTH ( LBS. PER STRAND )	58,600
APPLIED PRESTRESS ( LBS. PER STRAND )	43,950



**PLAN OF BOX BEAM**

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

PROJECT NO. **B-5320**  
 GRANVILLE COUNTY  
 STATION: **15+98.00 -L-**  
 SHEET 5 OF 9



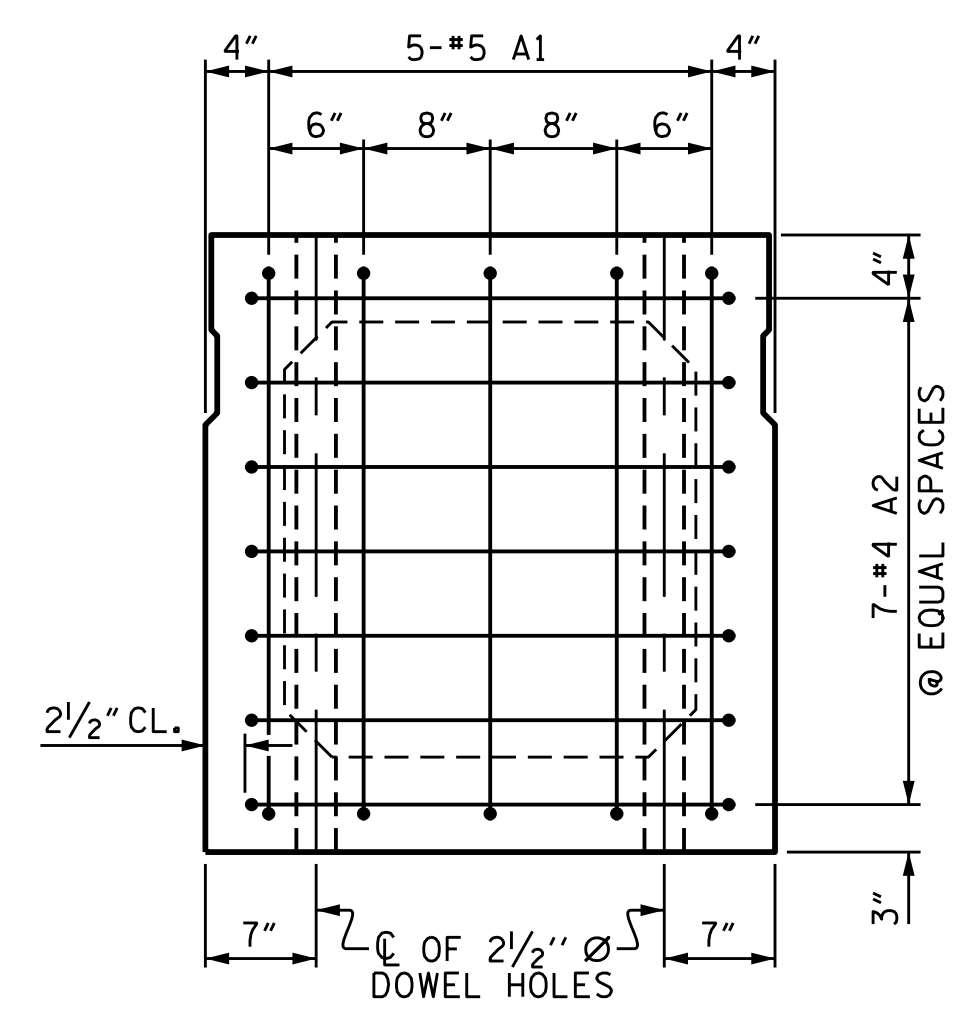
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD  
 SPAN A  
 3'-0" X 3'-3"  
 PRESTRESSED CONCRETE  
 BOX BEAM UNIT

NO.	BY:	DATE:	REVISIONS		SHEET NO.
			NO.	DATE:	
1			3		S-11
2			4		TOTAL SHEETS 26

ASSEMBLED BY : M. A. LESHURE DATE : 1/4/18  
 CHECKED BY : R. L. CHESSON DATE : 1/18  
 DRAWN BY : TLA 5/05 REV. 10/11 MAA/GM  
 CHECKED BY : GM 6/05 REV. 1/15 RWW/TMG  
 REV. 12/17 MAA/THC

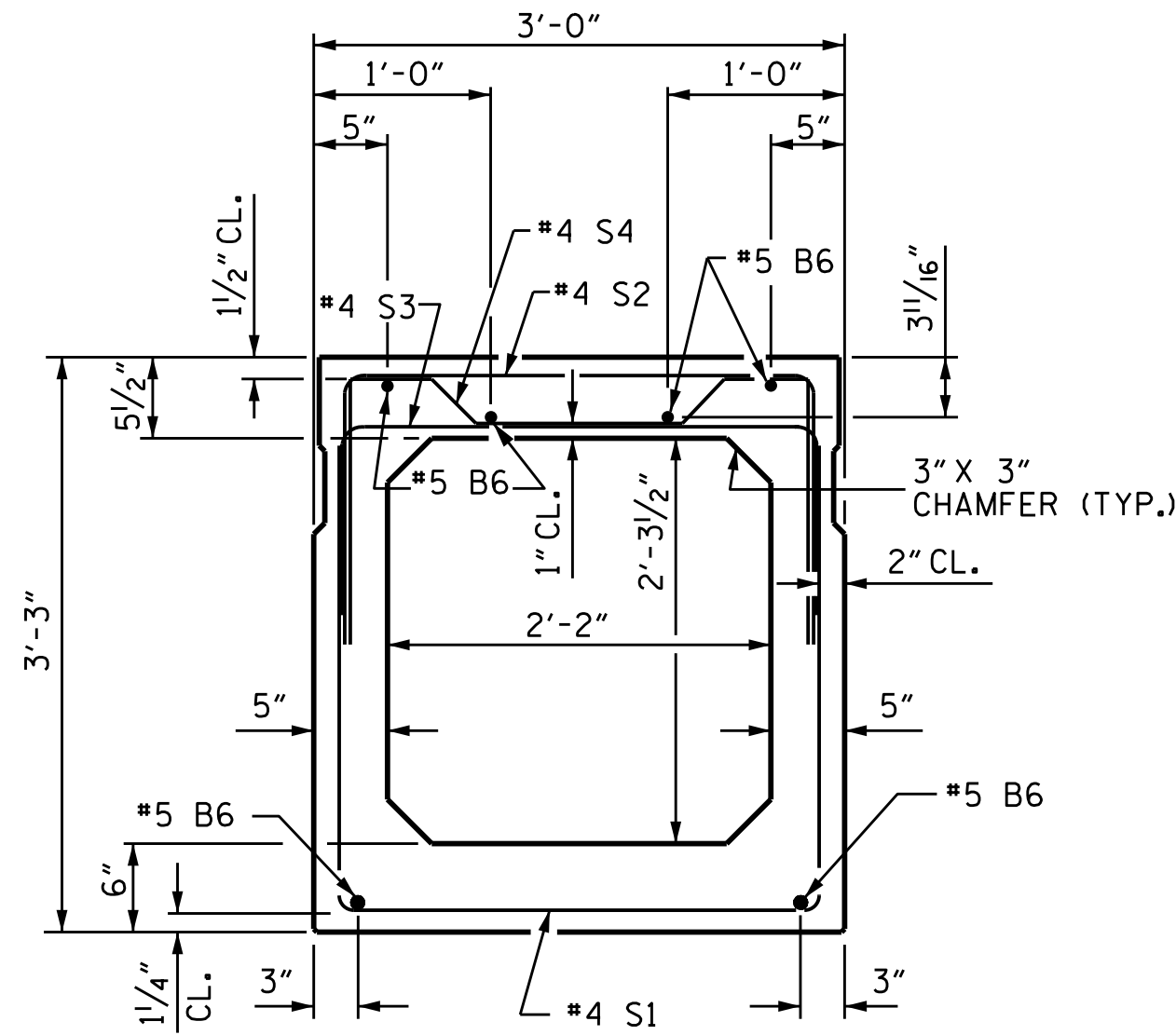
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED





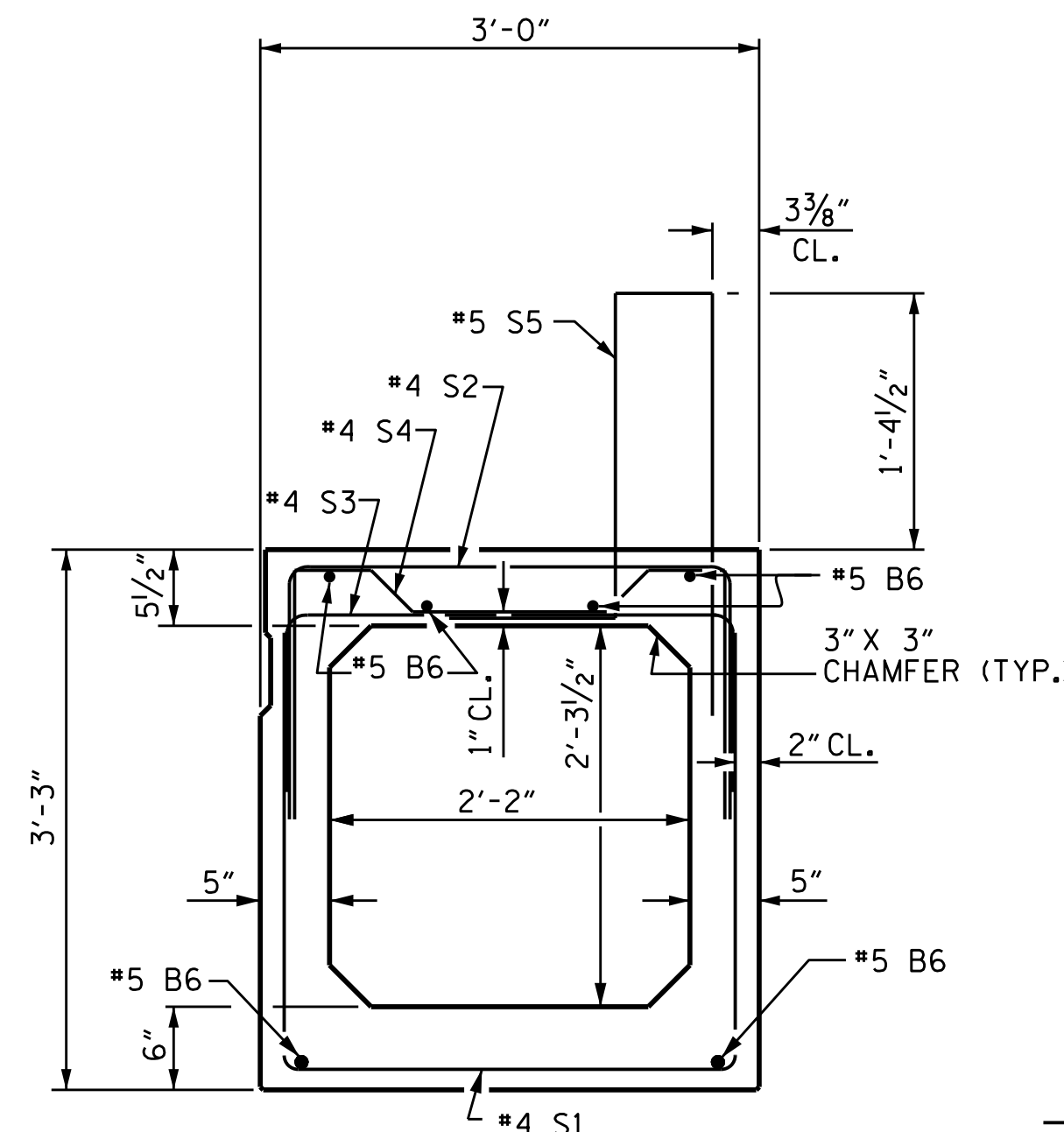
**END ELEVATION**

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**

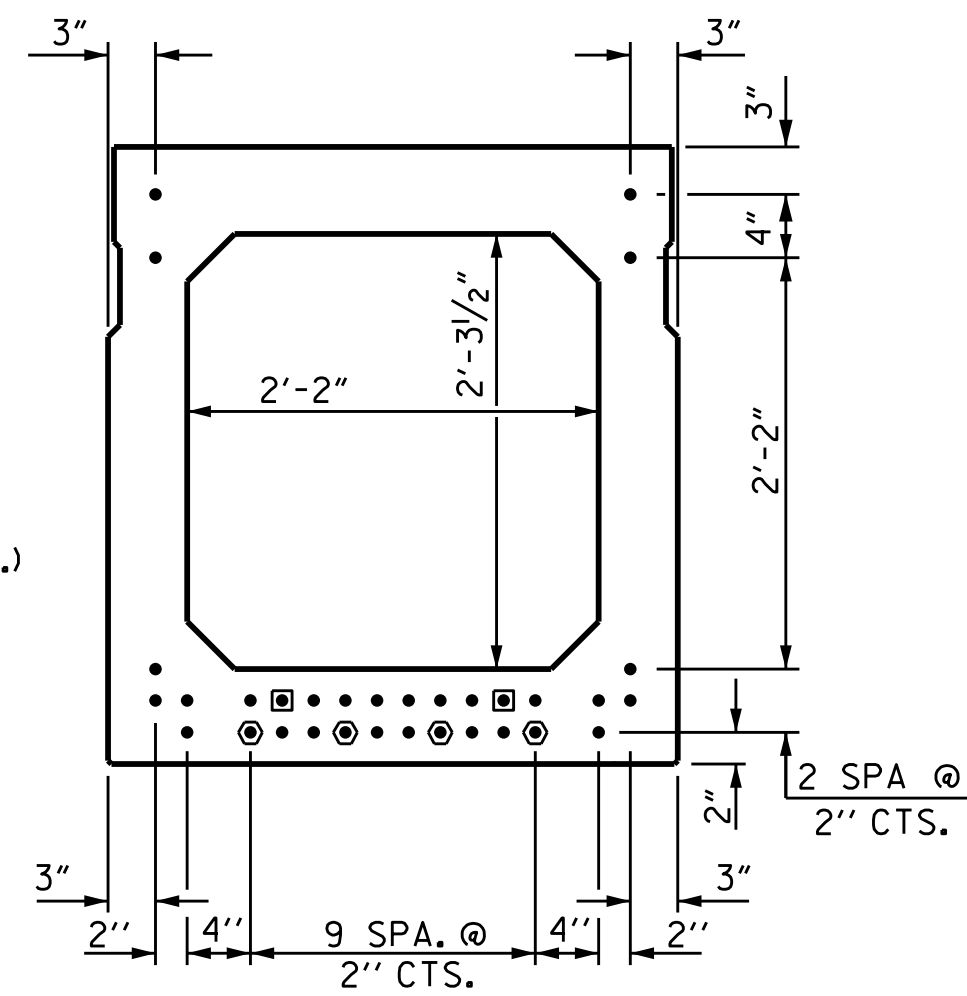
(STRAND LAYOUT NOT SHOWN)



**EXTERIOR BOX BEAM SECTION**

(STRAND LAYOUT NOT SHOWN)

**0.6" Ø LOW RELAXATION STRAND LAYOUT**



**TYPICAL STRAND LOCATION**

(32 STRANDS REQUIRED)

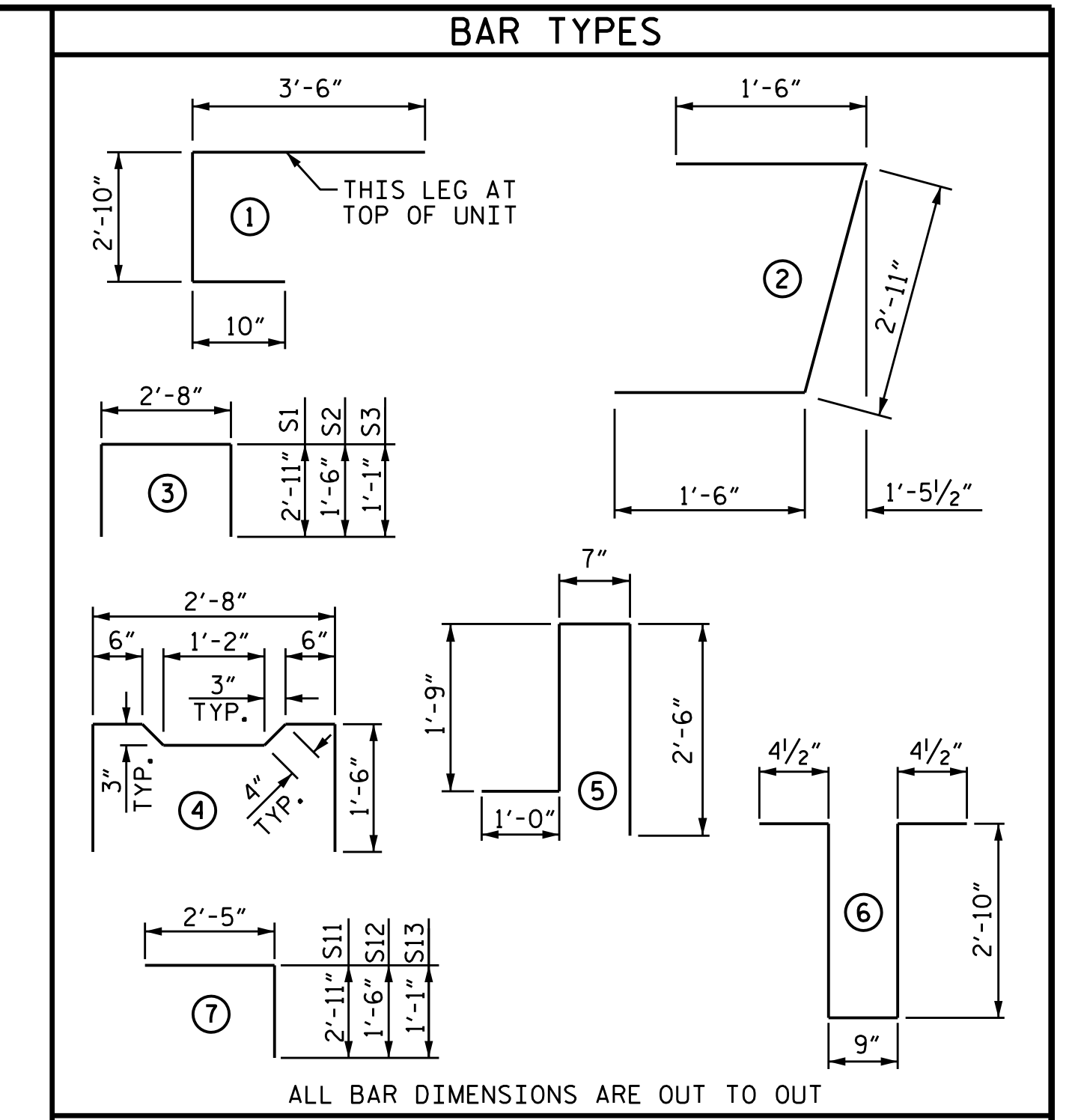
**DEBONDING LEGEND**

- 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**

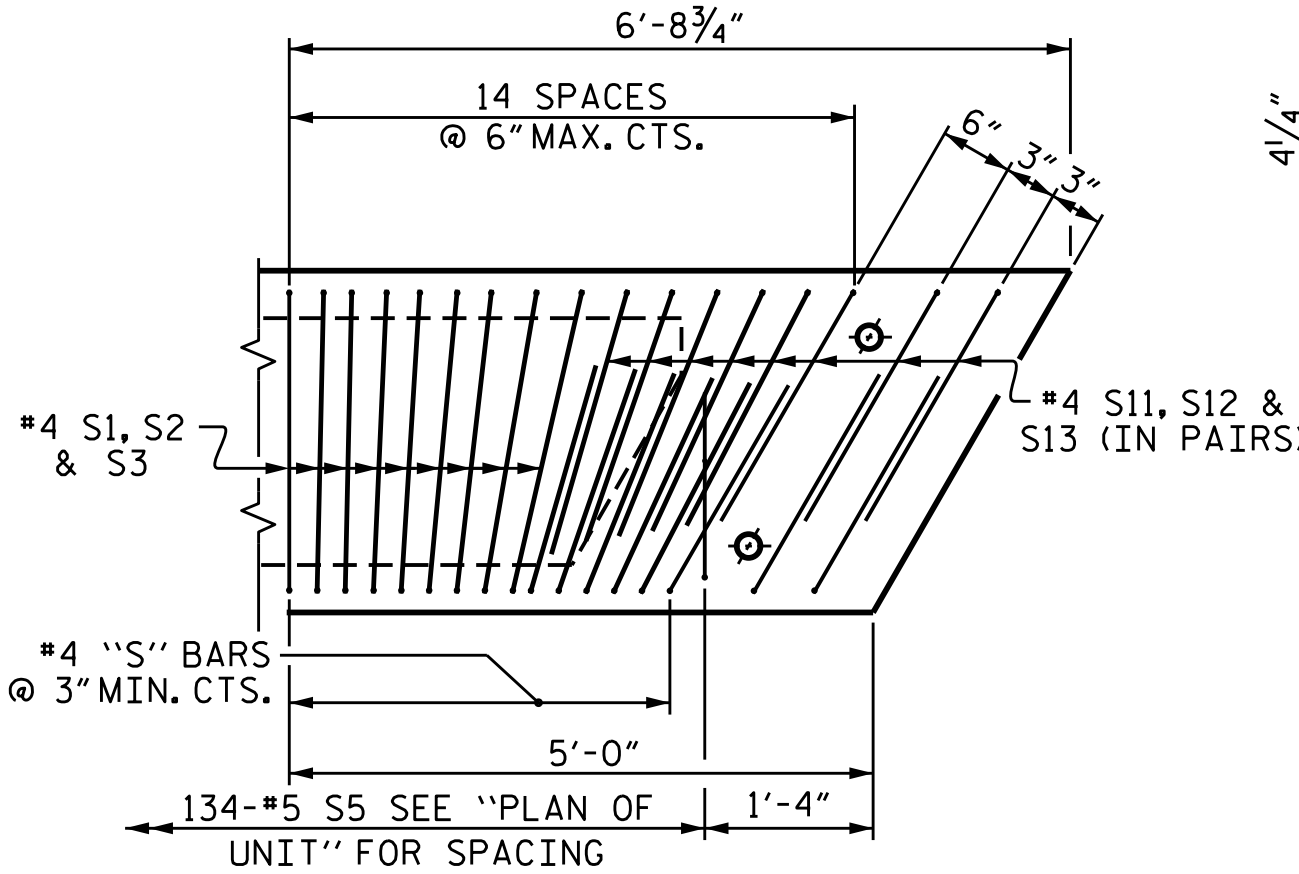
		0.6" Ø L.R.
AREA (SQ. INCHES)		0.217
ULTIMATE STRENGTH (LBS. PER STRAND)		58,600
APPLIED PRESTRESS (LBS. PER STRAND)		43,950



ALL BAR DIMENSIONS ARE OUT TO OUT

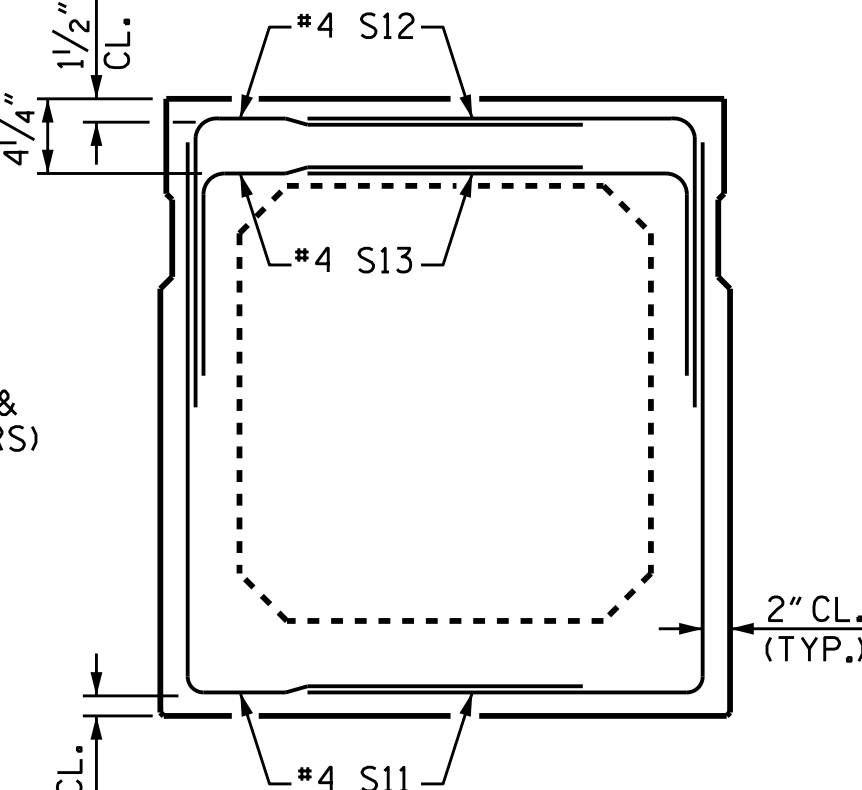
**BILL OF MATERIAL FOR ONE BOX BEAM SECTION**

BAR	NUMBER	SIZE	TYPE	EXTERIOR UNIT LENGTH	EXTERIOR UNIT WEIGHT	INTERIOR UNIT LENGTH	INTERIOR UNIT WEIGHT
A1	10	#5	1	7'-2"	75	7'-2"	75
A2	44	#4	2	5'-11"	174	5'-11"	174
B6	12	#5	STR	50'-11"	637	50'-11"	637
K1	15	#4	6	7'-2"	72	7'-2"	72
K2	10	#4	STR	2'-10"	19	2'-10"	19
S1	77	#4	3	8'-6"	437	8'-6"	437
S2	77	#4	3	5'-8"	291	5'-8"	291
S3	135	#4	3	4'-10"	436	4'-10"	436
S4	58	#4	4	5'-10"	226	5'-10"	226
S11	32	#4	7	5'-4"	114	5'-4"	114
S12	32	#4	7	3'-11"	84	3'-11"	84
S13	32	#4	7	3'-6"	75	3'-6"	75
*S5	134	#5	5	5'-10"	815	--	--
REINFORCING STEEL					2640 LBS.		2640 LBS.
*EPOXY COATED REINF. STEEL					815 LBS.		
7500 P.S.I. CONCRETE					19.7 CU. YDS.		19.6 CU. YDS.
0.6" Ø L.R. STRANDS					No. 32		No. 32



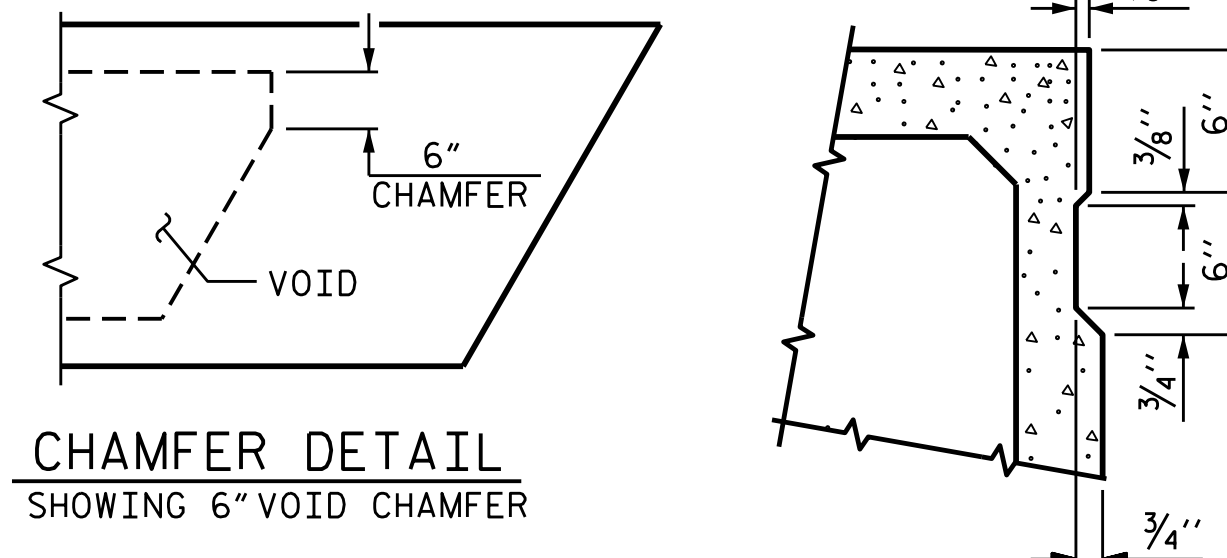
**DETAIL "B"**

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)

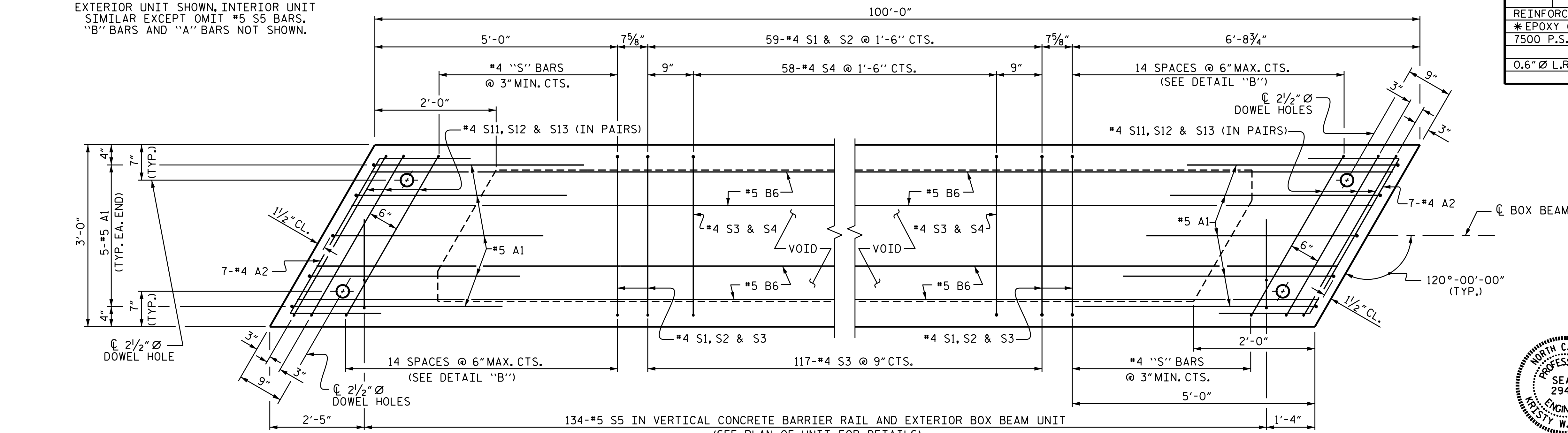


**CHAMFER DETAIL**

SHOWING 6" VOID CHAMFER

**SHEAR KEY DETAIL**

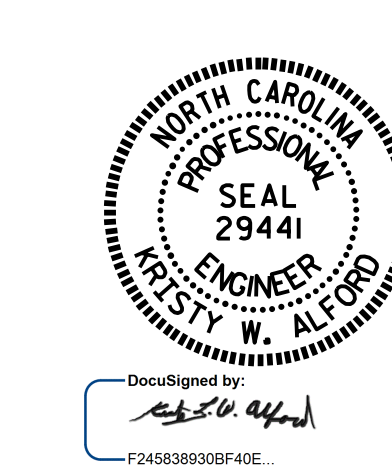
NOTE: OMIT SHEAR KEY ON OUTSIDE FACE OF EXTERIOR BOX BEAMS.



**PLAN OF BOX BEAM**

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

ASSEMBLED BY : M. A. LESHURE	DATE : 1/4/18
CHECKED BY : R. L. CHESSON	DATE : 1/18
DRAWN BY : DGE II/II	REV. 9/14
CHECKED BY : TMG II/II	MAA/TMG



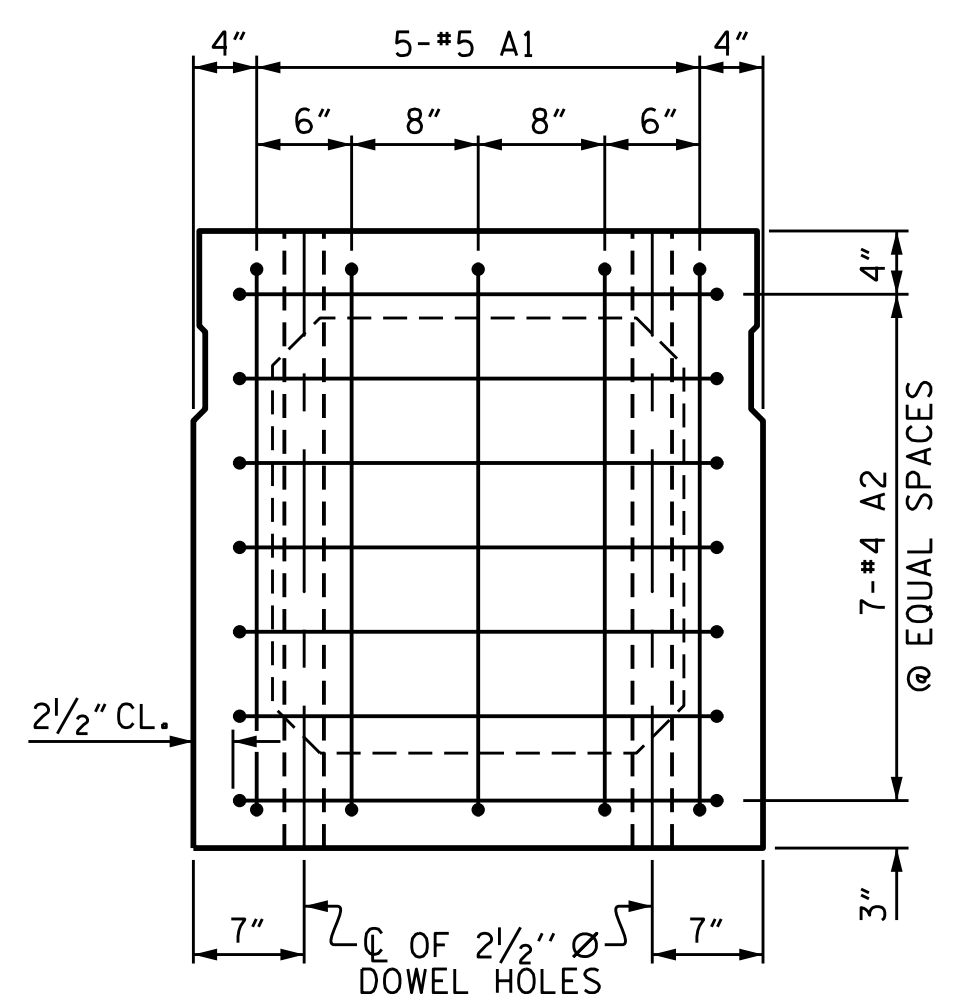
**PROJECT NO. B-5320**  
**GRANVILLE COUNTY**  
**STATION: 15+98.00 -L-**  
 SHEET 6 OF 9

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

REVISIONS					SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	S-12
1			3			TOTAL SHEETS 26
2			4			

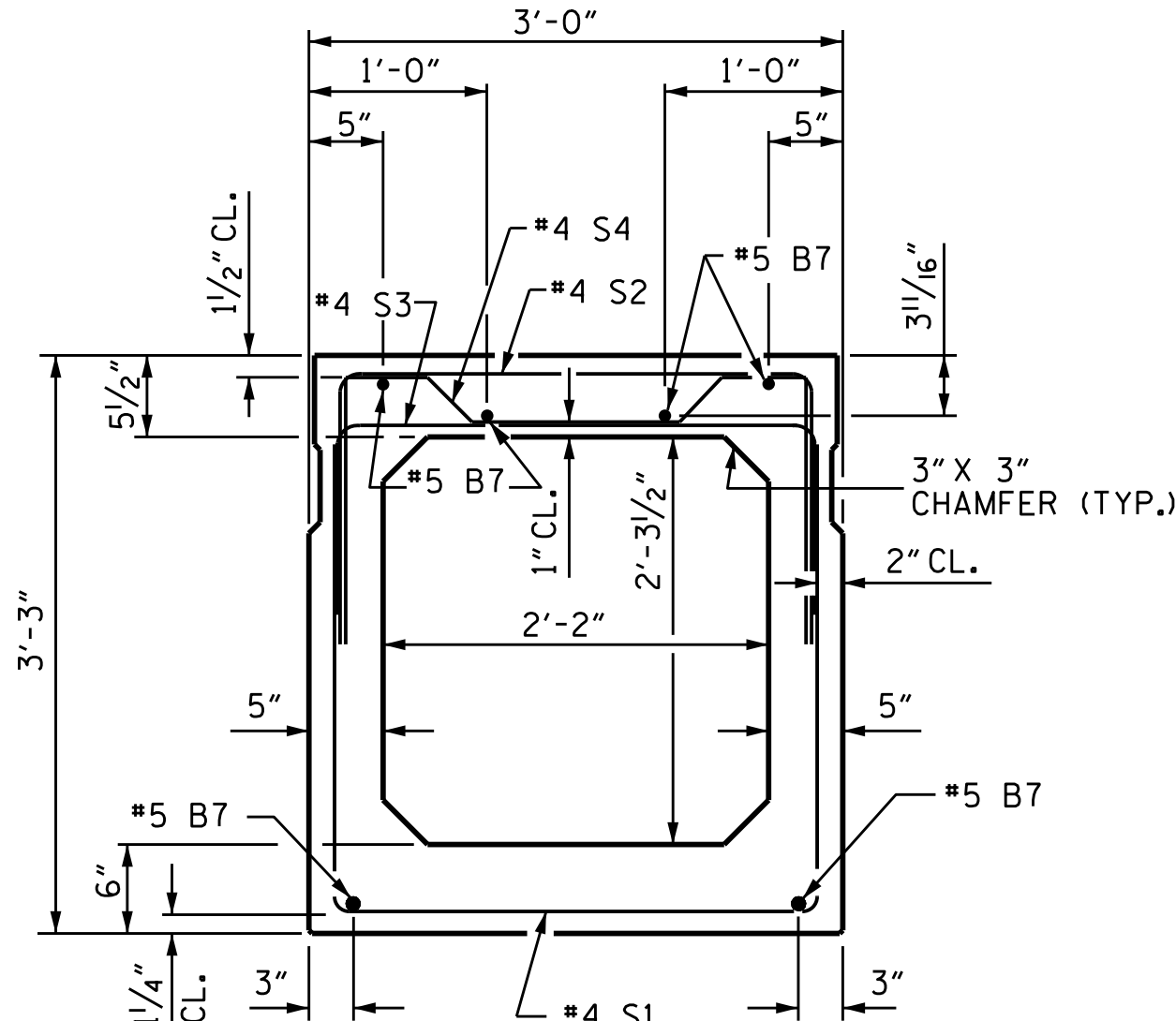
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED





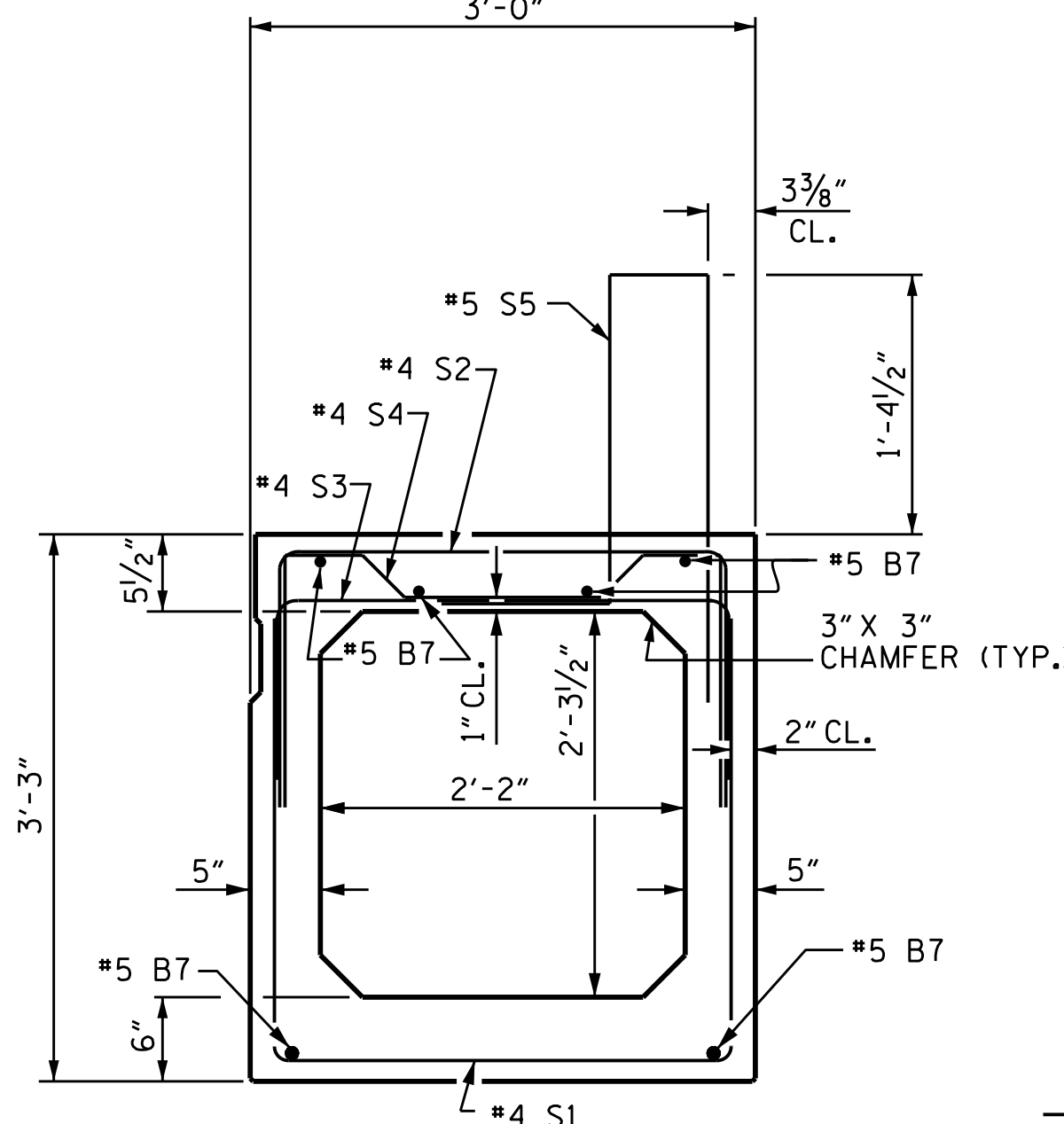
**END ELEVATION**

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**

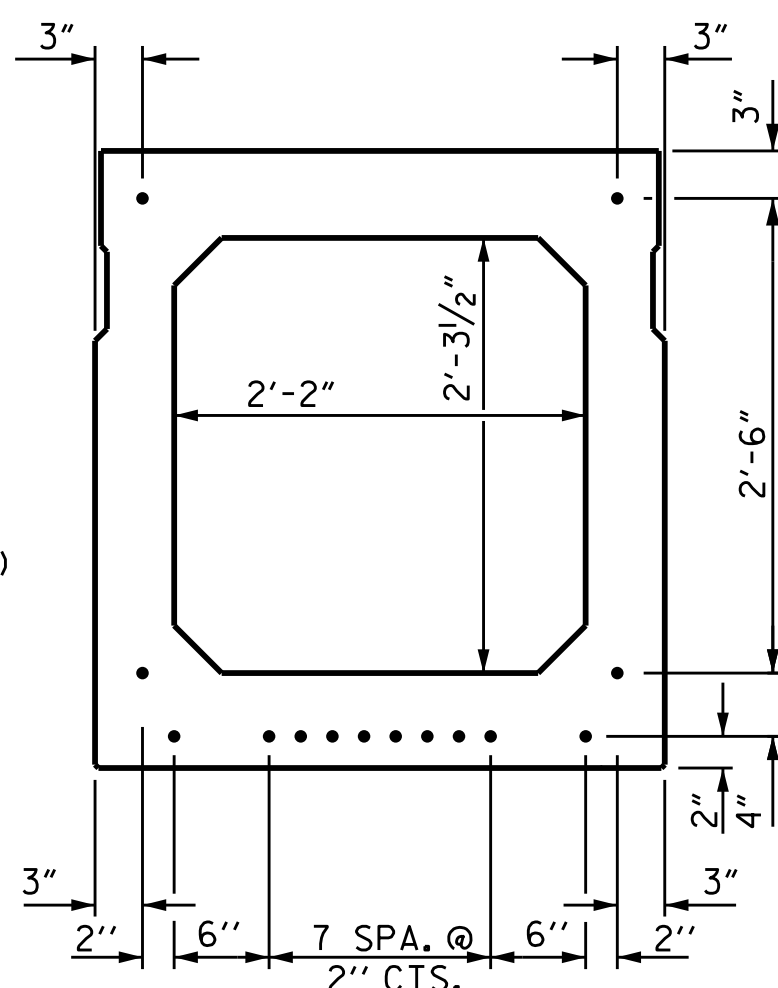
(STRAND LAYOUT NOT SHOWN)



**EXTERIOR BOX BEAM SECTION**

(STRAND LAYOUT NOT SHOWN)

**0.6" Ø LOW RELAXATION STRAND LAYOUT**

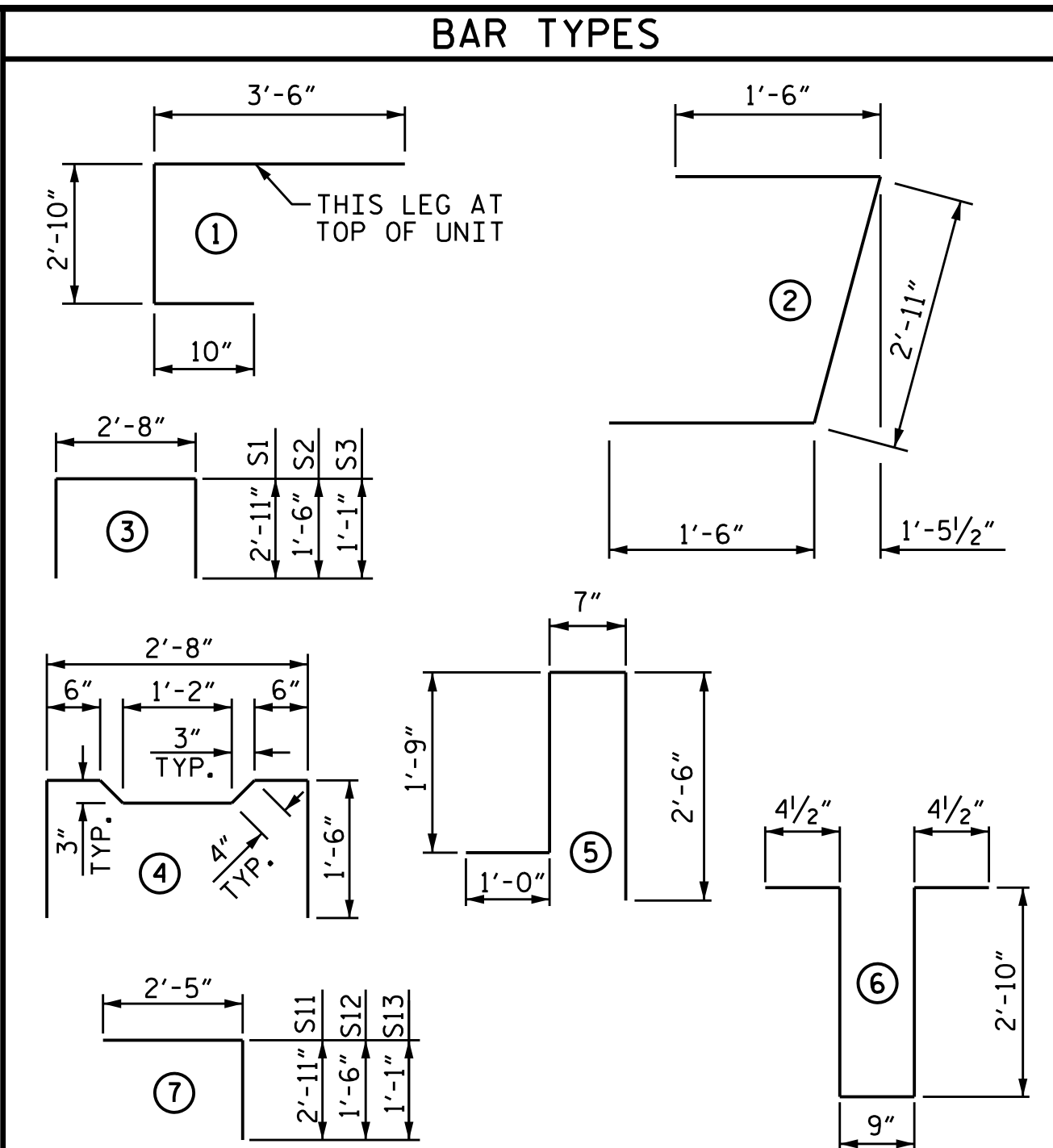


**TYPICAL STRAND LOCATION**

(14 STRANDS REQUIRED)

**DEBONDING LEGEND**

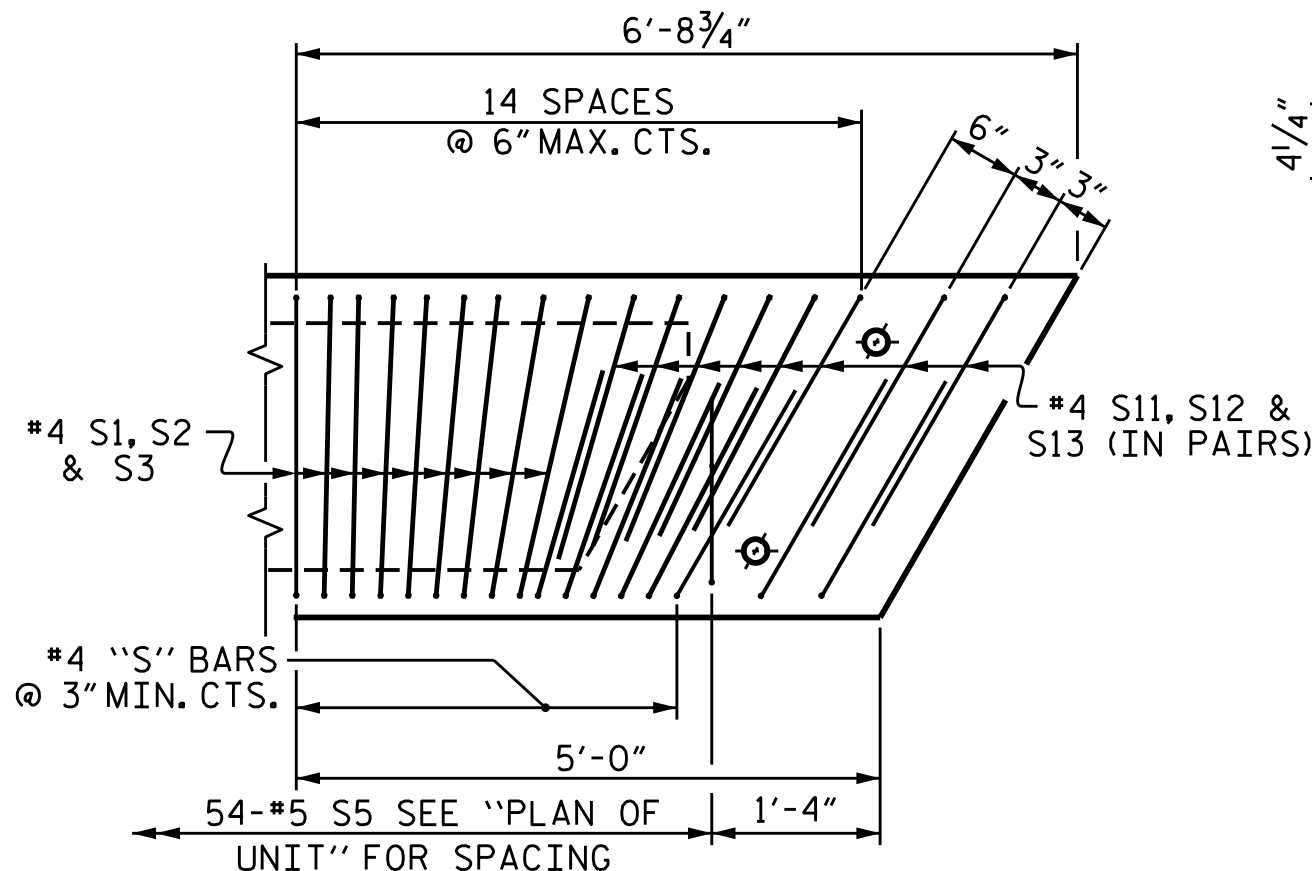
● FULLY BONDED STRANDS



ALL BAR DIMENSIONS ARE OUT TO OUT

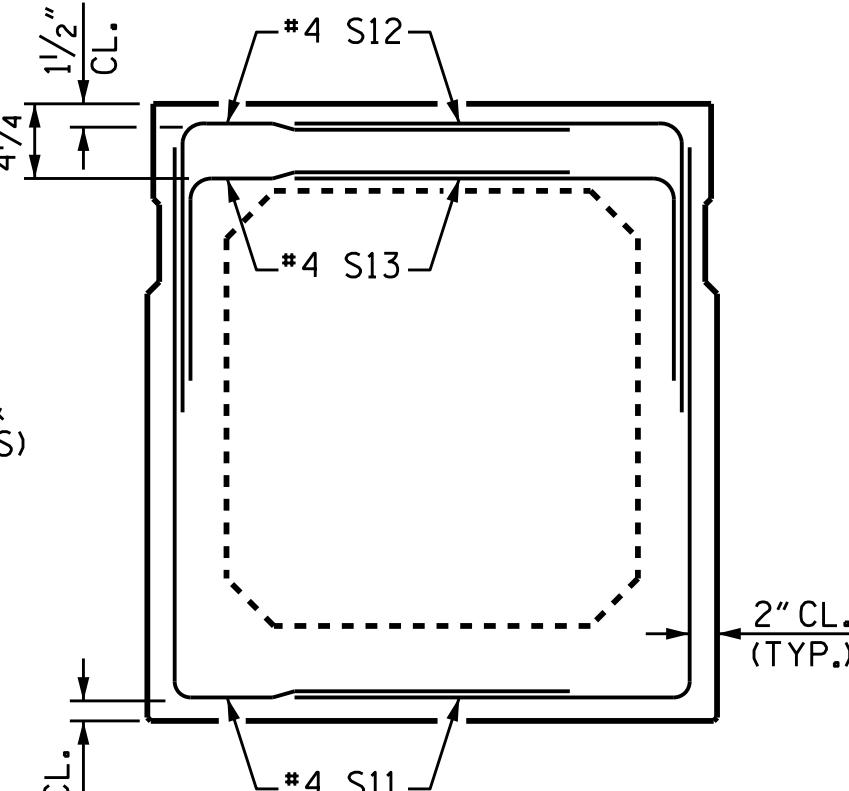
**BILL OF MATERIAL FOR ONE BOX BEAM SECTION**

BAR	NUMBER	SIZE	TYPE	EXTERIOR UNIT LENGTH	EXTERIOR UNIT WEIGHT	INTERIOR UNIT LENGTH	INTERIOR UNIT WEIGHT
A1	10	#5	1	7'-2"	75	7'-2"	75
A2	32	#4	2	5'-11"	126	5'-11"	126
B7	6	#5	STR	39'-7"	248	39'-7"	248
K1	9	#4	6	7'-2"	43	7'-2"	43
K2	6	#4	STR	2'-10"	11	2'-10"	11
S1	37	#4	3	8'-6"	210	8'-6"	210
S2	37	#4	3	5'-8"	140	5'-8"	140
S3	55	#4	3	4'-10"	178	4'-10"	178
S4	18	#4	4	5'-10"	70	5'-10"	70
S11	32	#4	7	5'-4"	114	5'-4"	114
S12	32	#4	7	3'-11"	84	3'-11"	84
S13	32	#4	7	3'-6"	75	3'-6"	75
*S5	54	#5	5	5'-10"	329	--	--
REINFORCING STEEL				1374	LBS.	1374	LBS.
*EPOXY COATED REINF. STEEL				329	LBS.		
5000 P.S.I. CONCRETE				8.5	CU. YDS.	8.4	CU. YDS.
0.6" Ø L.R. STRANDS				No. 14		No. 14	



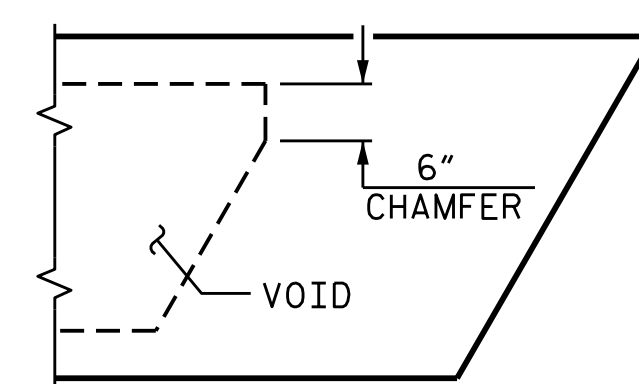
**DETAIL "B"**

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



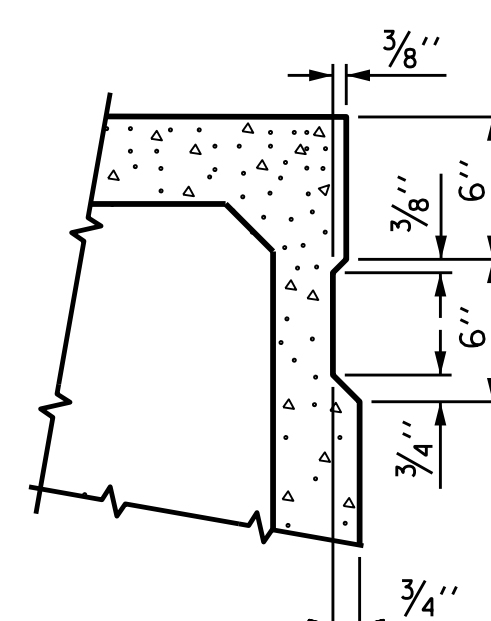
**END VIEW**

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



**CHAMFER DETAIL**

SHOWING 6" VOID CHAMFER

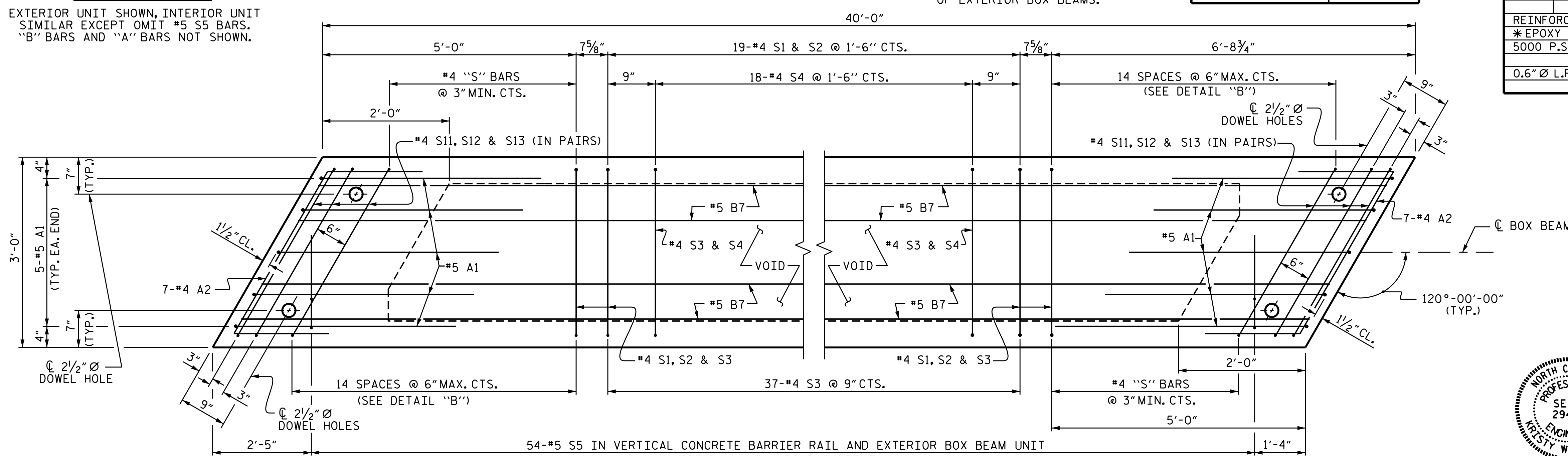


**SHEAR KEY DETAIL**

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

**GRADE 270 STRANDS**

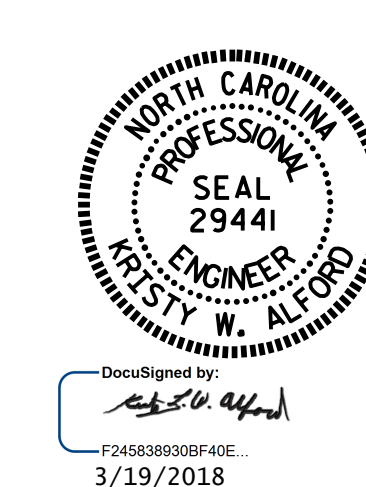
0.6" Ø L.R.	
AREA ( SQUARE INCHES )	0.217
ULTIMATE STRENGTH ( LBS. PER STRAND )	58,600
APPLIED PRESTRESS ( LBS. PER STRAND )	43,950



**PLAN OF BOX BEAM**

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

ASSEMBLED BY : M. A. LESHURE	DATE : 1/4/18
CHECKED BY : R. L. CHESSON	DATE : 1/18
DRAWN BY : TLA 5/05	REV. 10/11/11
CHECKED BY : GM 6/05	REV. 1/15
	REV. 12/17
	MAA/GM
	RWW/TMG
	MAA/THC

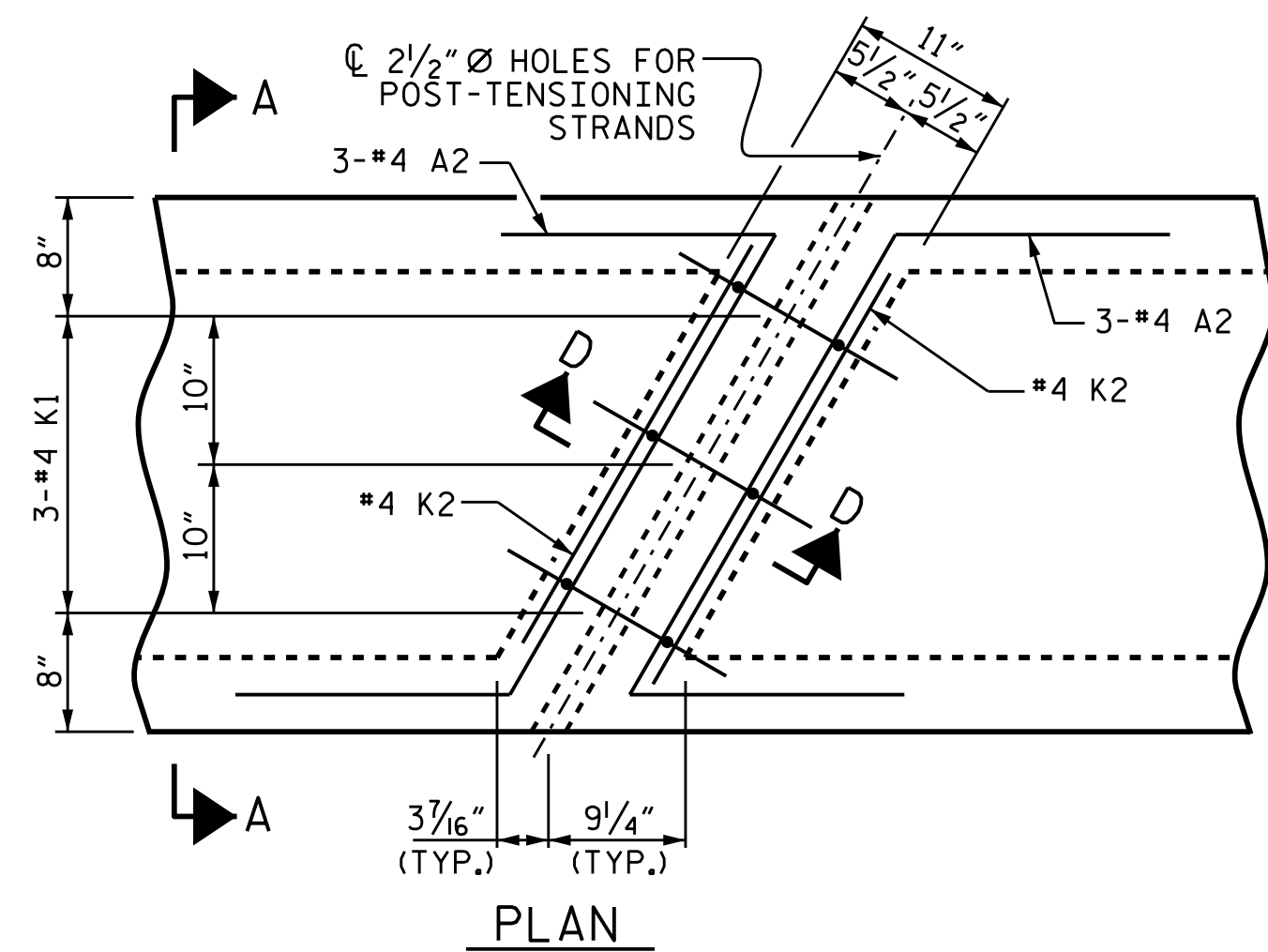


PROJECT NO. B-5320  
GRANVILLE COUNTY  
 STATION: 15+98.00 -L-  
 SHEET 7 OF 9

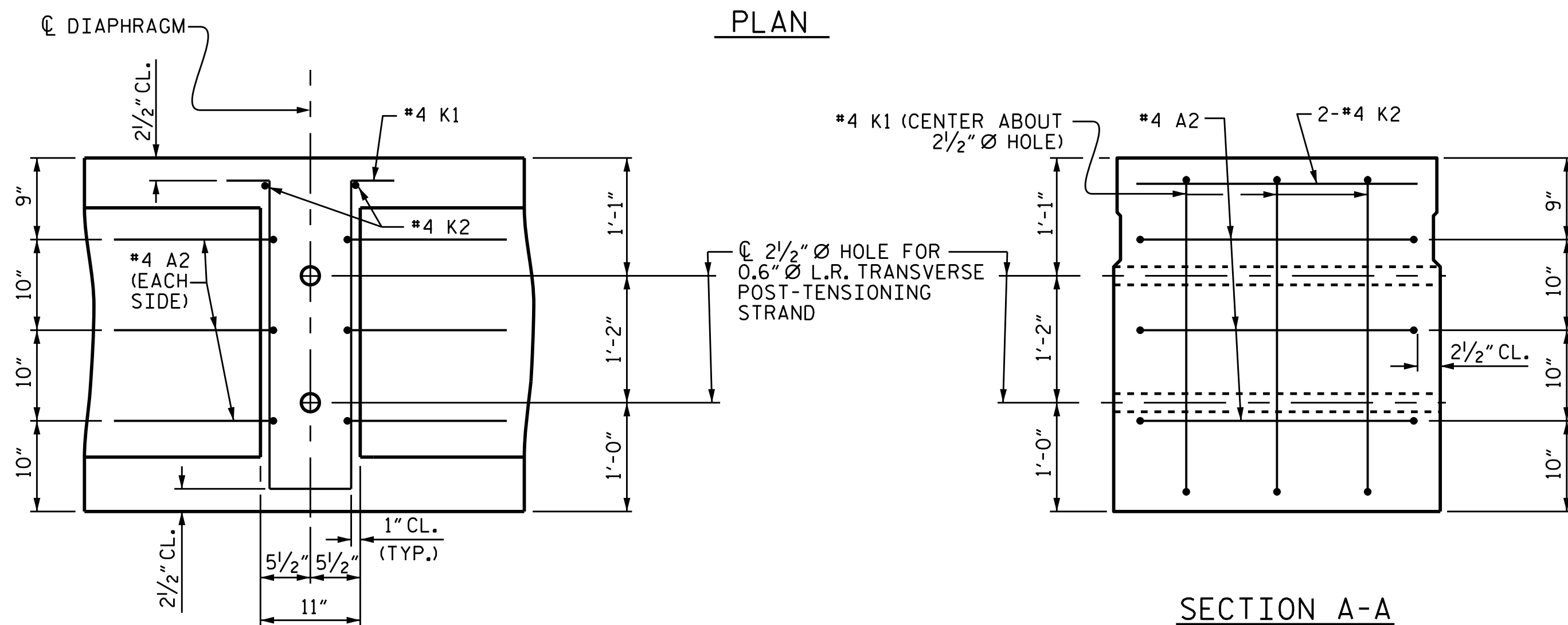
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD  
 SPAN C  
 3'-0" X 3'-3"  
 PRESTRESSED CONCRETE  
 BOX BEAM UNIT

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

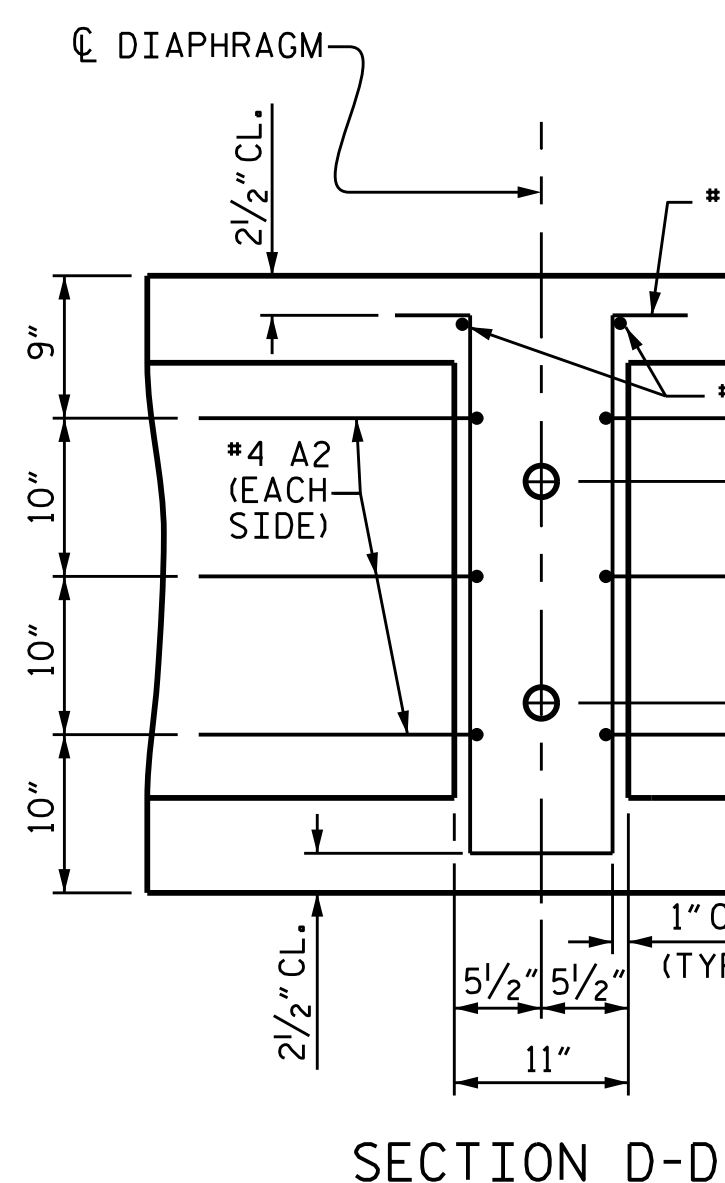
REVISIONS				SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		



PLAN



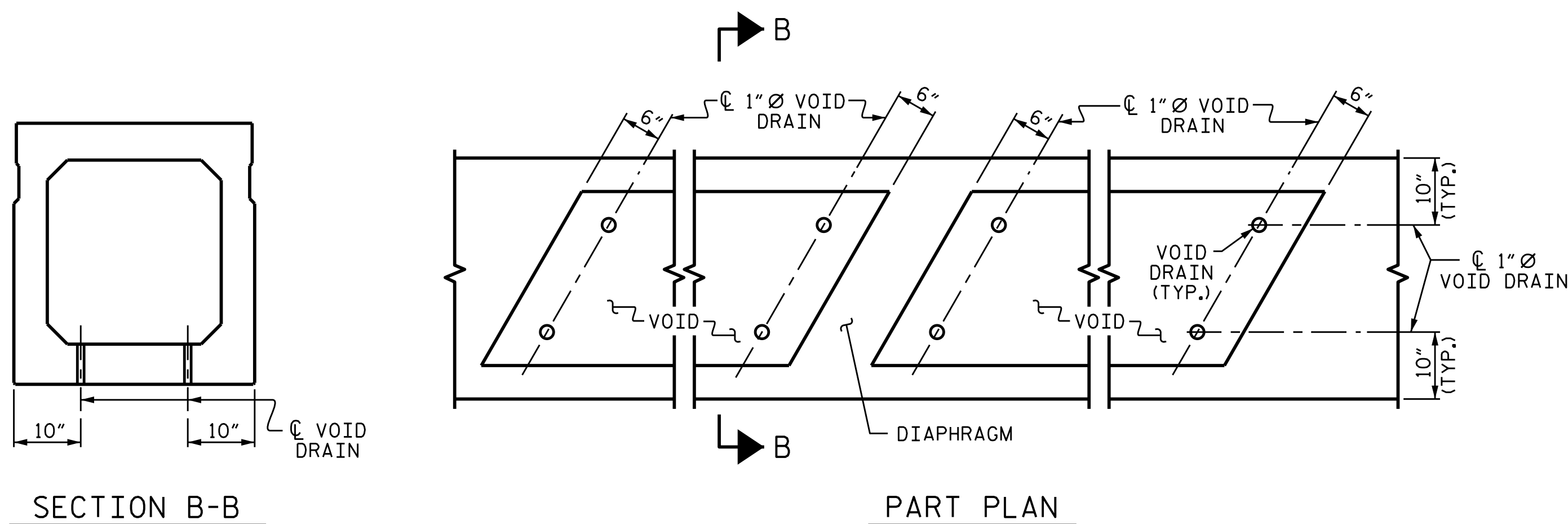
SECTION A-A  
VOIDS NOT SHOWN



SECTION D-D

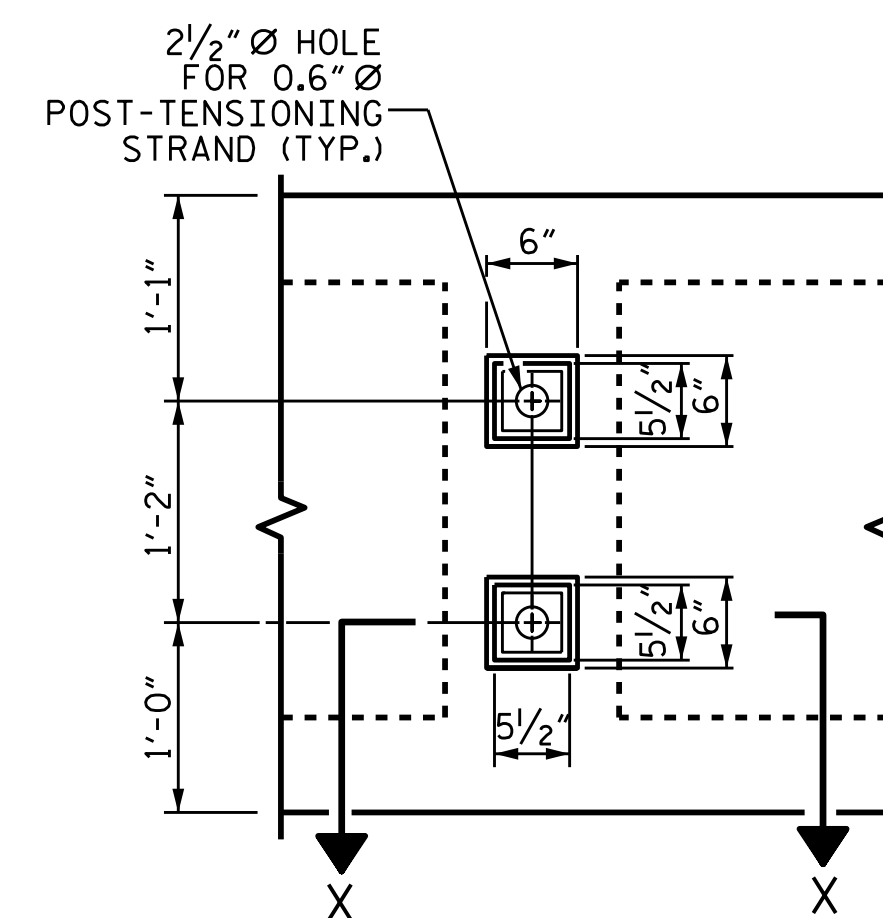
**DOUBLE DIAPHRAGM DETAILS**

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

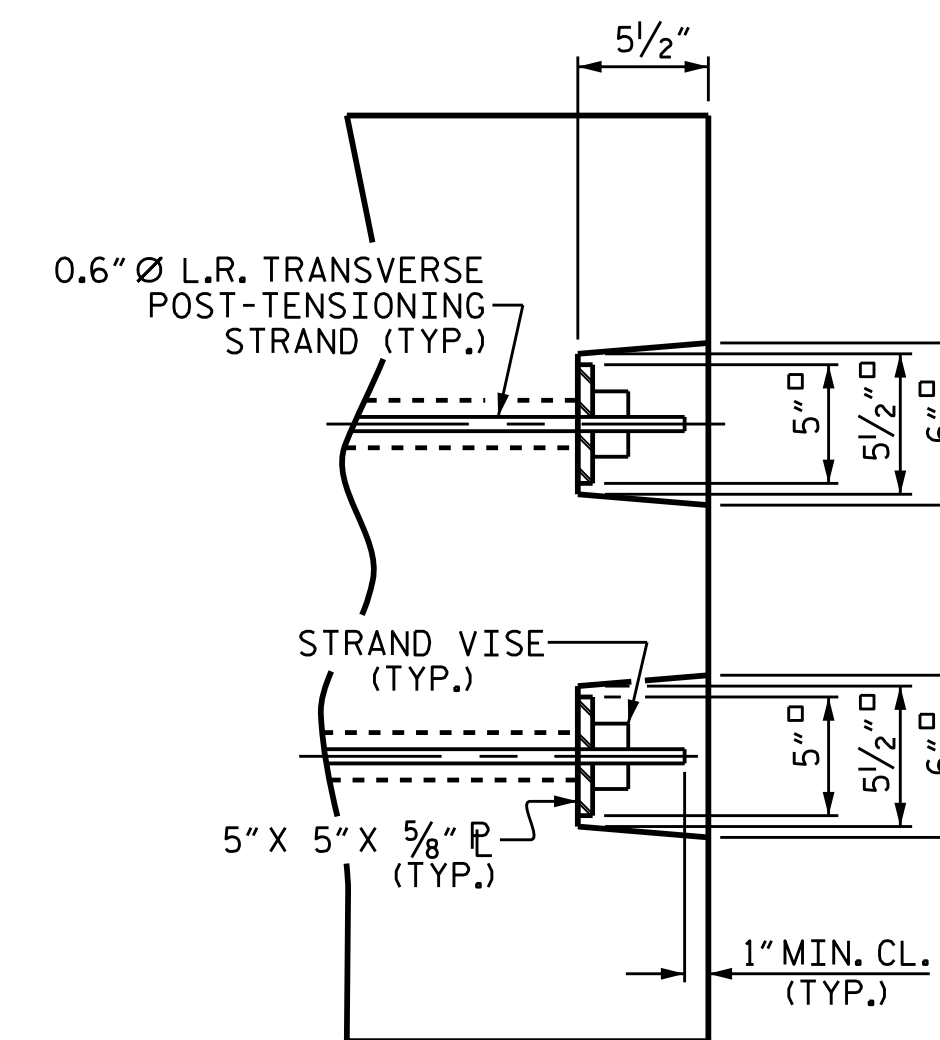


**VOID DRAIN DETAILS**

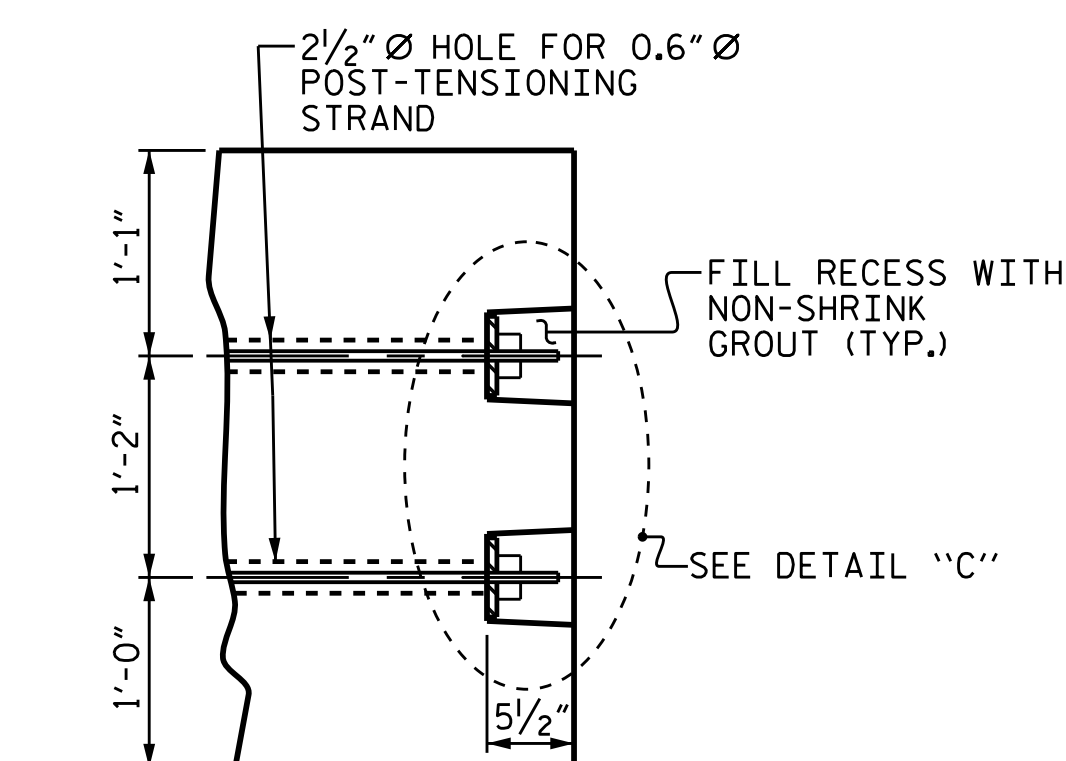
(DIMENSIONS SHOWN ARE TYPICAL FOR EACH VOID)



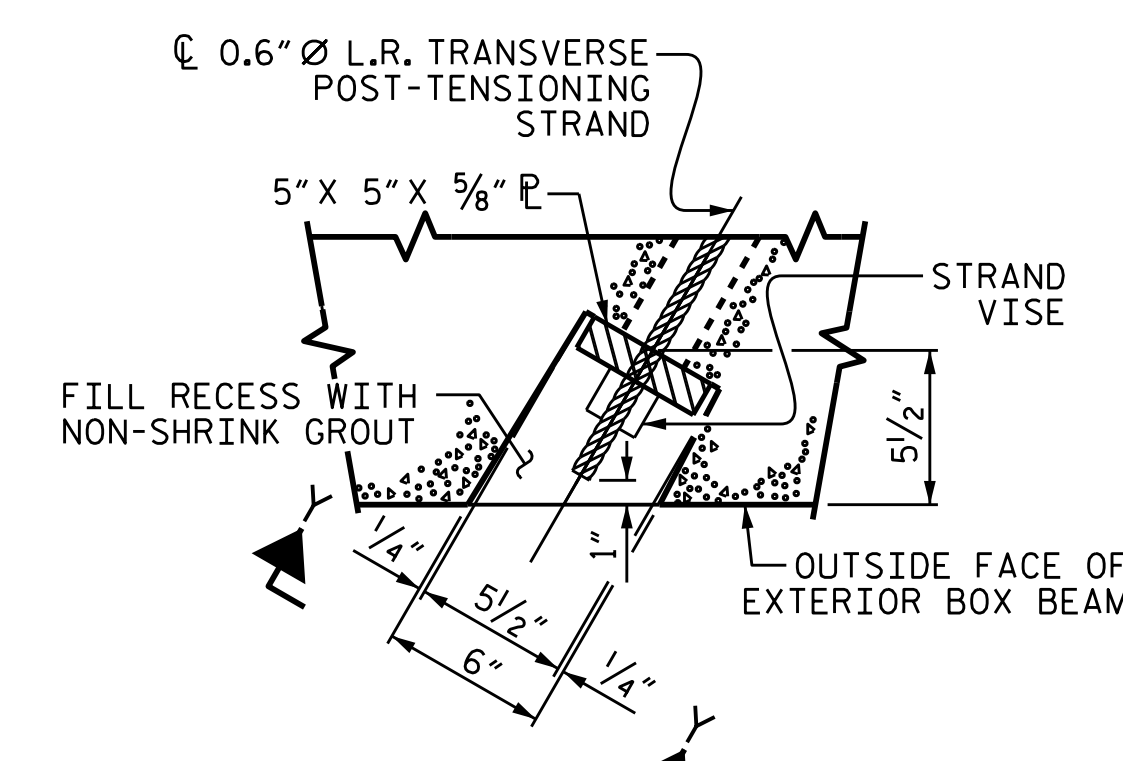
VIEW Y-Y  
SHOWING ELEVATION VIEW OF GROUDED RECESS



DETAIL "C"



PART SECTION AT RECESS



SECTION X-X  
SHOWING PLAN VIEW OF GROUDED RECESS

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

DEAD LOAD DEFLECTION AND CAMBER	
70' BOX BEAM UNIT	3'-0" x 3'-3"
	0.6" Ø L.R. STRAND
CAMBER (SLAB ALONE IN PLACE)	7/16" ↑
DEFLECTION DUE TO SUPERIMPOSED DEAD LOAD**	1/4" ↓
FINAL CAMBER	3/16" ↑

\*\* INCLUDES FUTURE WEARING SURFACE

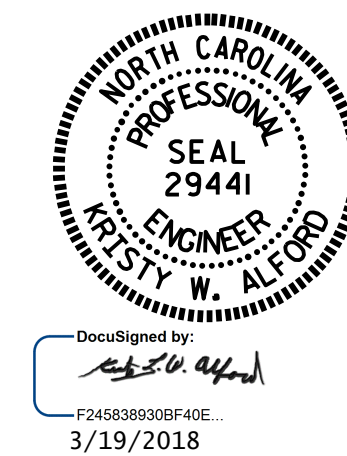
DEAD LOAD DEFLECTION AND CAMBER	
100' BOX BEAM UNIT	3'-0" x 3'-3"
	0.6" Ø L.R. STRAND
CAMBER (SLAB ALONE IN PLACE)	2" ↑
DEFLECTION DUE TO SUPERIMPOSED DEAD LOAD**	7/8" ↓
FINAL CAMBER	1 1/8" ↑

\*\* INCLUDES FUTURE WEARING SURFACE

DEAD LOAD DEFLECTION AND CAMBER	
40' BOX BEAM UNIT	3'-0" x 3'-3"
	0.6" Ø L.R. STRAND
CAMBER (SLAB ALONE IN PLACE)	7/16" ↑
DEFLECTION DUE TO SUPERIMPOSED DEAD LOAD**	1/16" ↓
FINAL CAMBER	3/8" ↑

\*\* INCLUDES FUTURE WEARING SURFACE

PROJECT NO. B-5320  
GRANVILLE COUNTY  
 STATION: 15+98.00 -L-  
 SHEET 8 OF 9



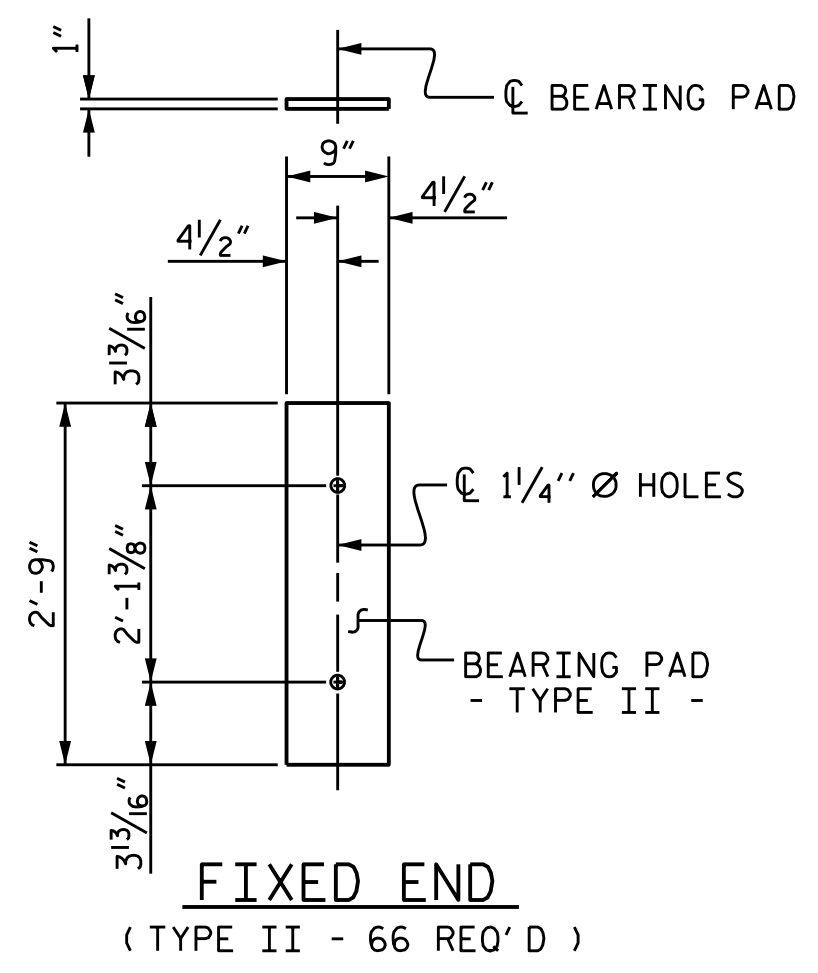
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD  
 3'-0" X 3'-3"  
 PRESTRESSED CONCRETE  
 BOX BEAM UNIT

REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	S-14	
1			3			TOTAL SHEETS 26	
2			4				

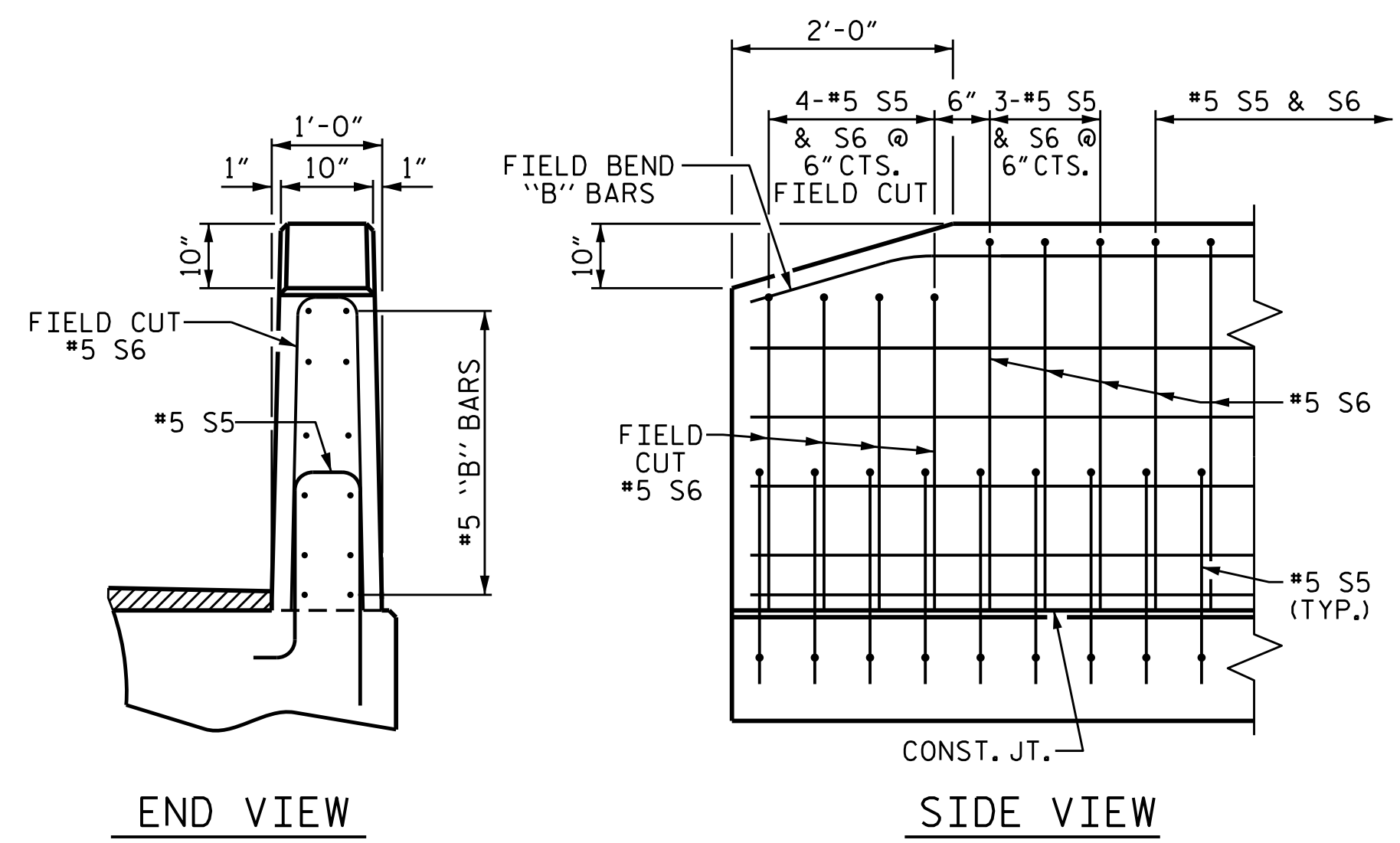
ASSEMBLED BY : M. A. LESHURE DATE : 1/4/18  
 CHECKED BY : R. L. CHESSON DATE : 1/18  
 DRAWN BY : DGE 11/11 REV. 8/14 MAA/TMG  
 CHECKED BY : TMG 11/11

DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED





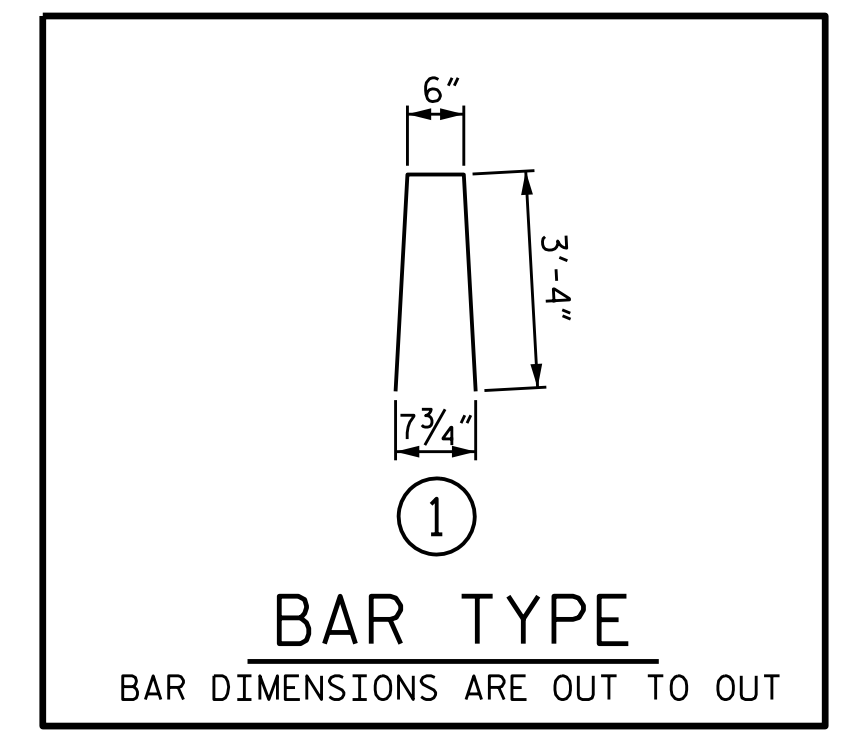
**ELASTOMERIC BEARING DETAILS**  
ELASTOMER IN ALL BEARINGS SHALL BE 60 DUROMETER HARDNESS.



**END OF RAIL DETAILS**

**BOX BEAM UNITS REQUIRED**

	NUMBER	LENGTH	TOTAL LENGTH
EXTERIOR B.B.	2	70'-0"	140'-0"
	2	100'-0"	200'-0"
	2	40'-0"	80'-0"
INTERIOR B.B.	9	70'-0"	630'-0"
	9	100'-0"	900'-0"
	9	40'-0"	360'-0"
TOTAL	33		2310'-0"



**BAR TYPE**  
BAR DIMENSIONS ARE OUT TO OUT

**BILL OF MATERIAL FOR VERTICAL CONCRETE BARRIER RAIL**

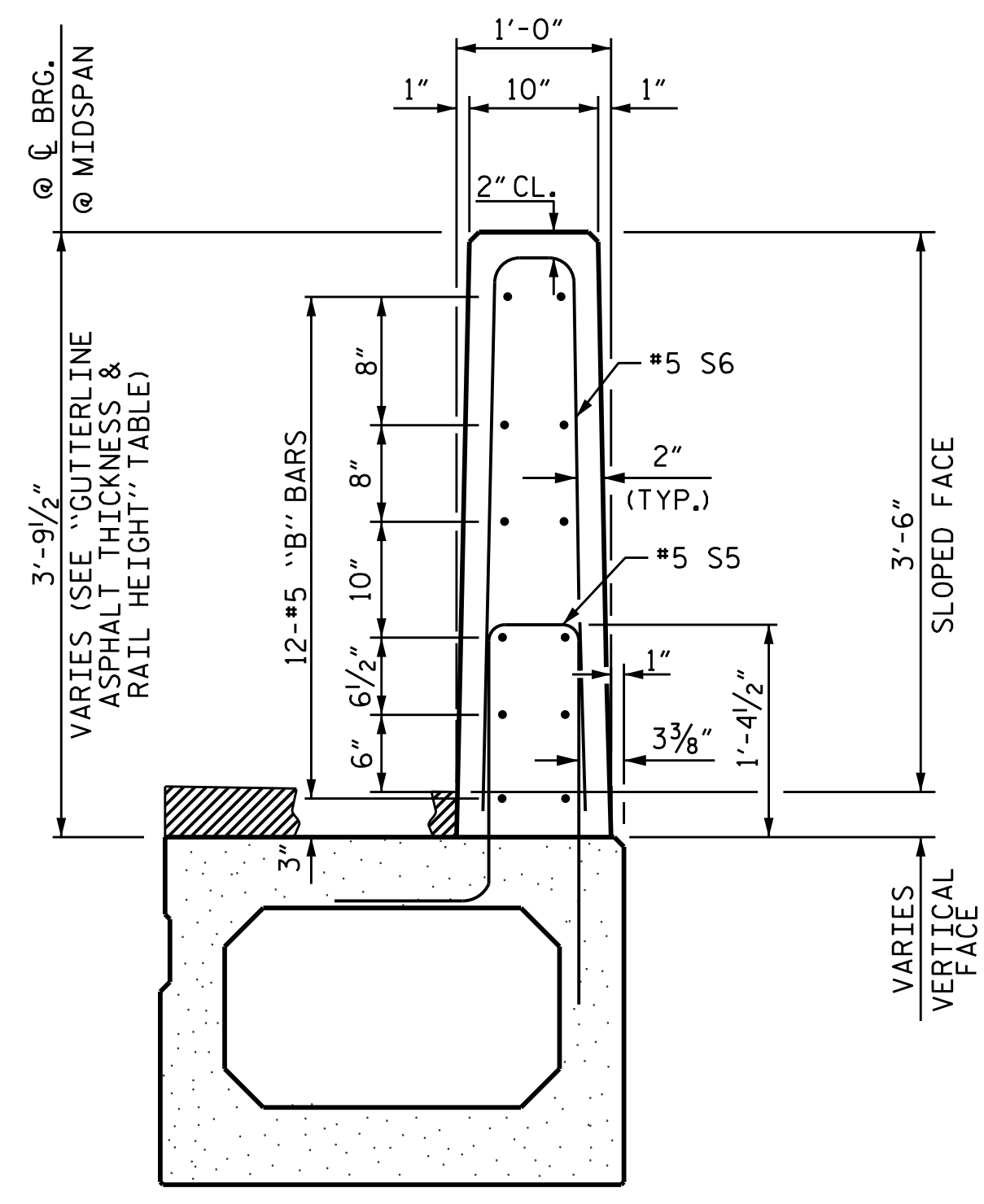
BAR	BARS PER PAIR OF EXTERIOR UNITS 70' UNIT	SIZE	TYPE	LENGTH	WEIGHT
*B11	144	#5	STR	13'-6"	2028
*S6	188	#5	1	7'-2"	1405
* EPOXY COATED REINFORCING STEEL				LBS.	3433
CLASS AA CONCRETE				CU.YDS.	18.2
TOTAL VERTICAL CONCRETE BARRIER RAIL				LN. FT.	140.0

**BILL OF MATERIAL FOR VERTICAL CONCRETE BARRIER RAIL**

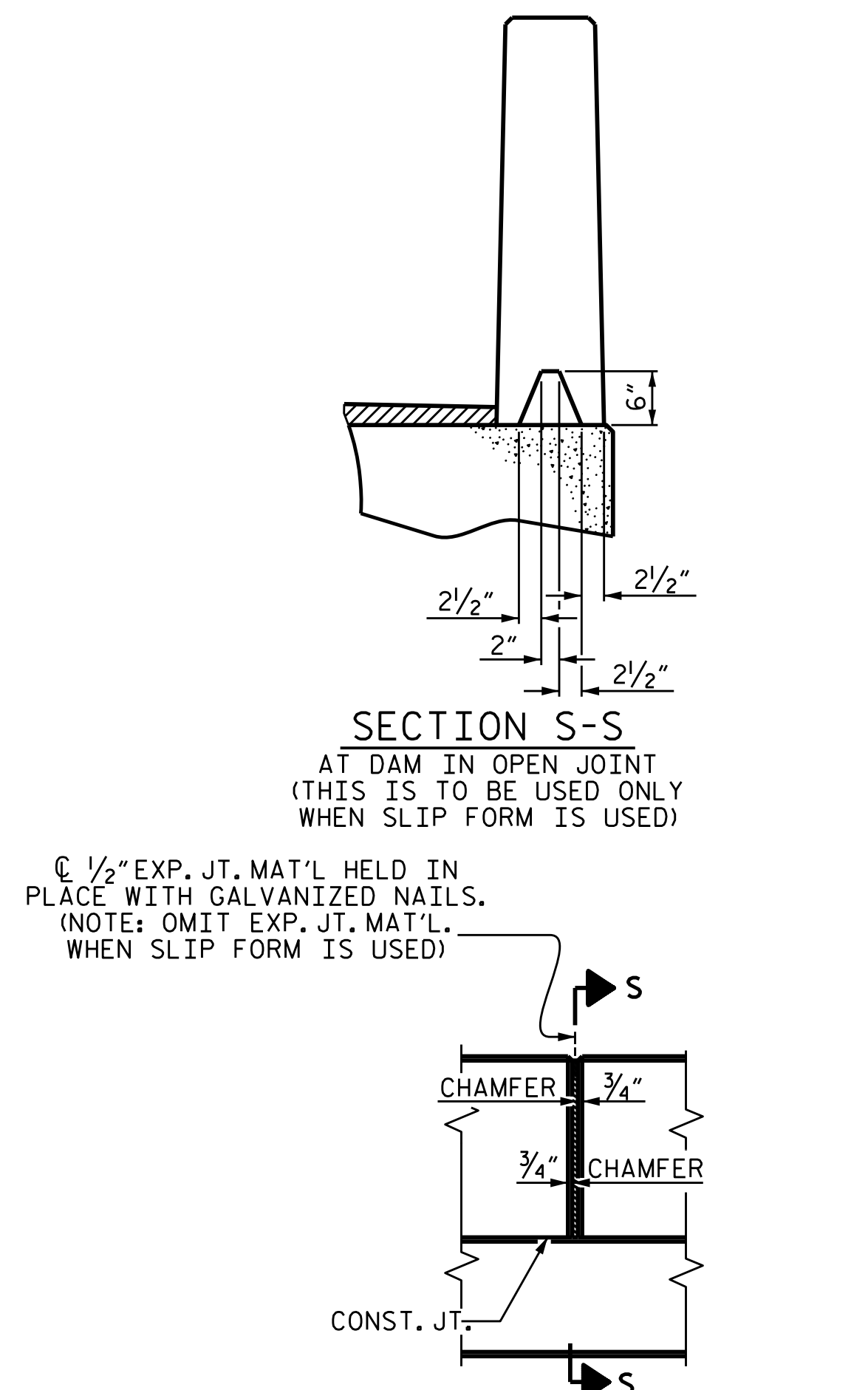
BAR	BARS PER PAIR OF EXTERIOR UNITS 100' UNIT	SIZE	TYPE	LENGTH	WEIGHT
*B12	192	#5	STR	14'-3"	2854
*S6	268	#5	1	7'-2"	2003
* EPOXY COATED REINFORCING STEEL				LBS.	4857
CLASS AA CONCRETE				CU.YDS.	25.9
TOTAL VERTICAL CONCRETE BARRIER RAIL				LN. FT.	200.0

**BILL OF MATERIAL FOR VERTICAL CONCRETE BARRIER RAIL**

BAR	BARS PER PAIR OF EXTERIOR UNITS 40' UNIT	SIZE	TYPE	LENGTH	WEIGHT
*B13	96	#5	STR	11'-9"	1177
*S6	108	#5	1	7'-2"	807
* EPOXY COATED REINFORCING STEEL				LBS.	1984
CLASS AA CONCRETE				CU.YDS.	10.4
TOTAL VERTICAL CONCRETE BARRIER RAIL				LN. FT.	80.0



**SECTION THRU RAIL**



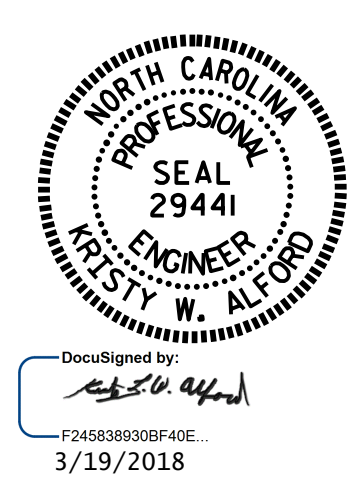
**SECTION S-S**  
AT DAM IN OPEN JOINT  
(THIS IS TO BE USED ONLY WHEN SLIP FORM IS USED)  
1/2" EXP. JT. MAT'L HELD IN PLACE WITH GALVANIZED NAILS.  
(NOTE: OMIT EXP. JT. MAT'L WHEN SLIP FORM IS USED)

	ASPHALT OVERLAY THICKNESS @ MID-SPAN	RAIL HEIGHT @ MID-SPAN
70' UNITS	3 5/16"	3'-9 1/16"
100' UNITS	2 3/8"	3'-8 3/8"
40' UNITS	3/8"	3'-9 1/8"

**GUTTERLINE ASPHALT THICKNESS & RAIL HEIGHT**

PROJECT NO. B-5320  
GRANVILLE COUNTY  
STATION: 15+98.00 -L-

SHEET 9 OF 9



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

ASSEMBLED BY : M. A. LESHURE	DATE : 1/4/18
CHECKED BY : R. L. CHESSON	DATE : 1/18
DRAWN BY : DGE 10/11	REV. 4/15
CHECKED BY : TMG 11/11	MAA/TMG

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-15
1			3			TOTAL SHEETS 26
2			4			

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.)

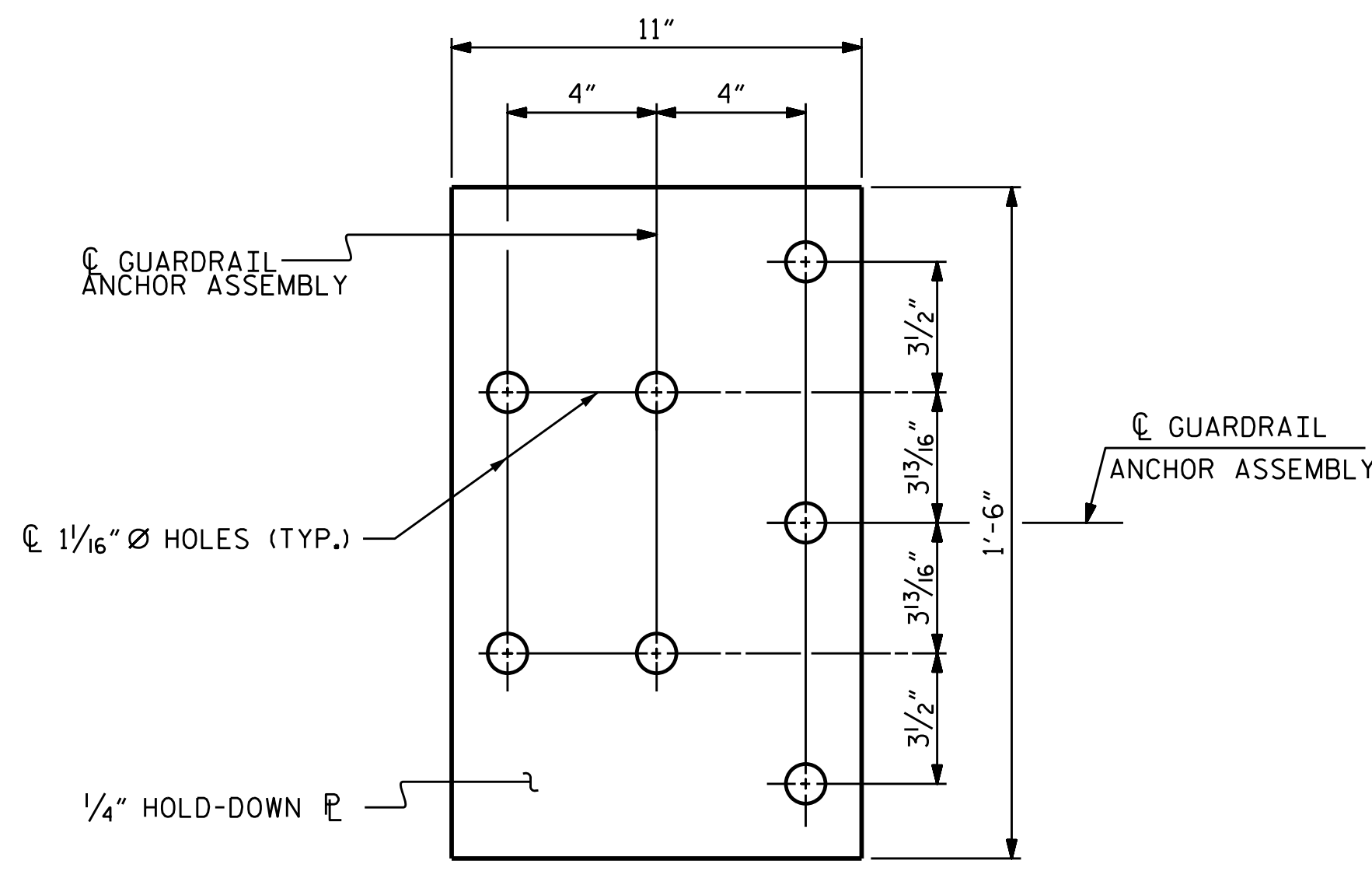
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF BARRIER RAIL. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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

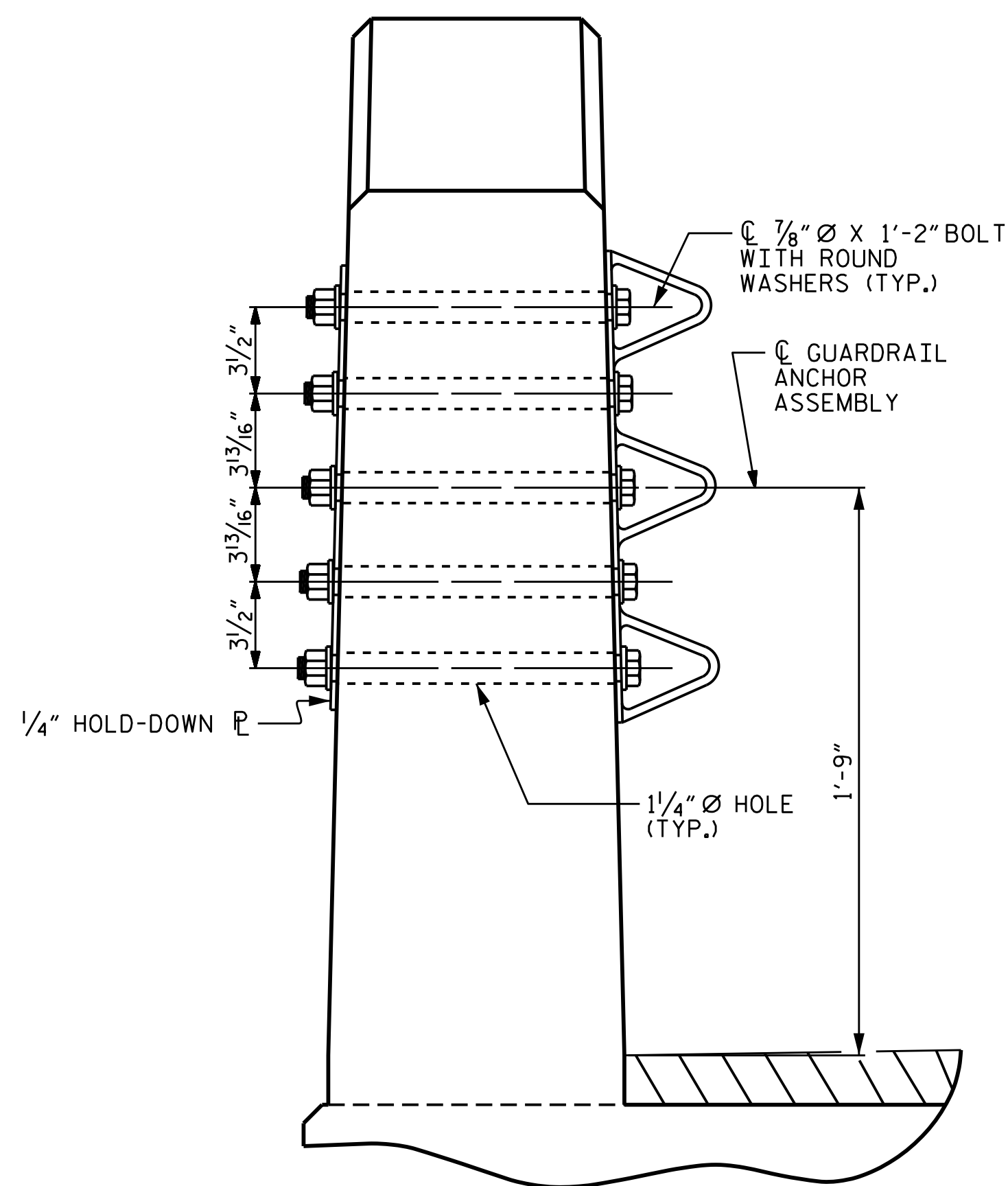
THE COST OF THE GUARDRAIL ANCHOR ASSEMBLY SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR VERTICAL CONCRETE BARRIER RAIL.

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

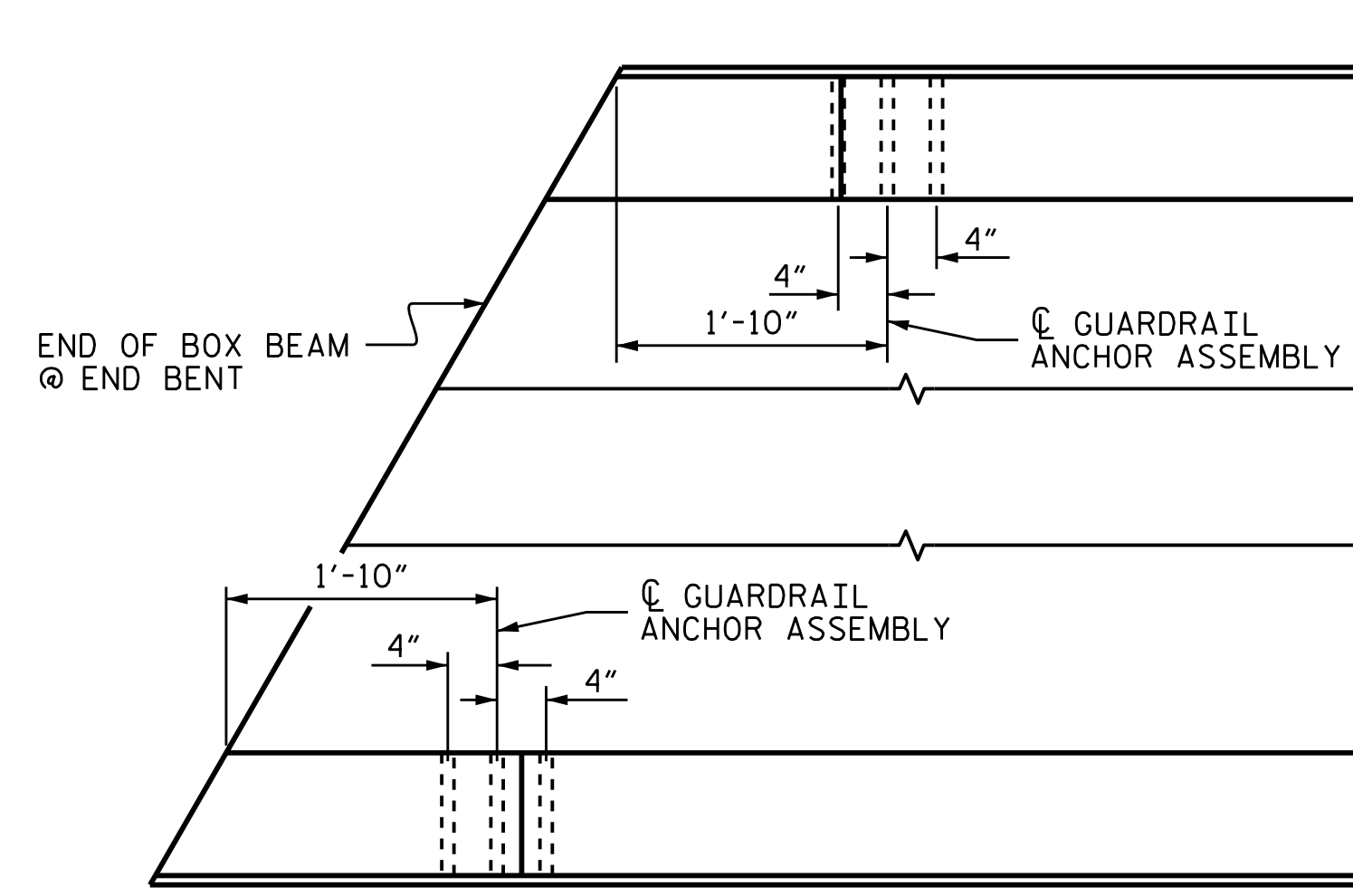
THE 1 1/4" Ø HOLES SHALL BE FORMED OR DRILLED WITH A CORE BIT. IMPACT TOOLS WILL NOT BE PERMITTED. ANY CONCRETE DAMAGED BY THIS WORK SHALL BE REPAIRED TO THE SATISFACTION OF THE ENGINEER.



PLAN



SECTION E-E  
GUARDRAIL ANCHOR ASSEMBLY DETAILS



PLAN

LOCATION OF ANCHORS FOR GUARDRAIL

END BENT 1 SHOWN, END BENT 2 SIMILAR.

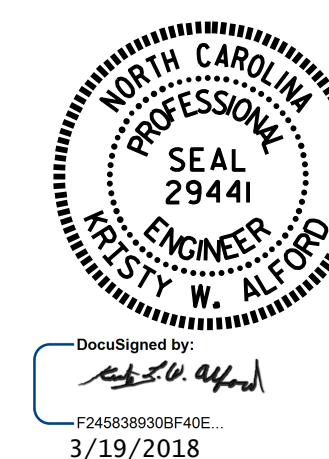


SKETCH SHOWING POINTS OF ATTACHMENT

\* DENOTES GUARDRAIL ANCHOR ASSEMBLY

PROJECT NO. B-5320  
GRANVILLE COUNTY  
 STATION: 15+98.00 -L-

SHEET 1 OF 1



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

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-16
1			3			TOTAL SHEETS
2			4			26

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ASSEMBLED BY : M. A. LESHURE	DATE : 1/4/18
CHECKED BY : R. L. CHESSON	DATE : 1/18
DRAWN BY : MAA 5/10	REV. 6/13 MAA/GM
CHECKED BY : GM 5/10	REV. 1/15 MAA/TMG
	REV. 12/17 MAA/THC



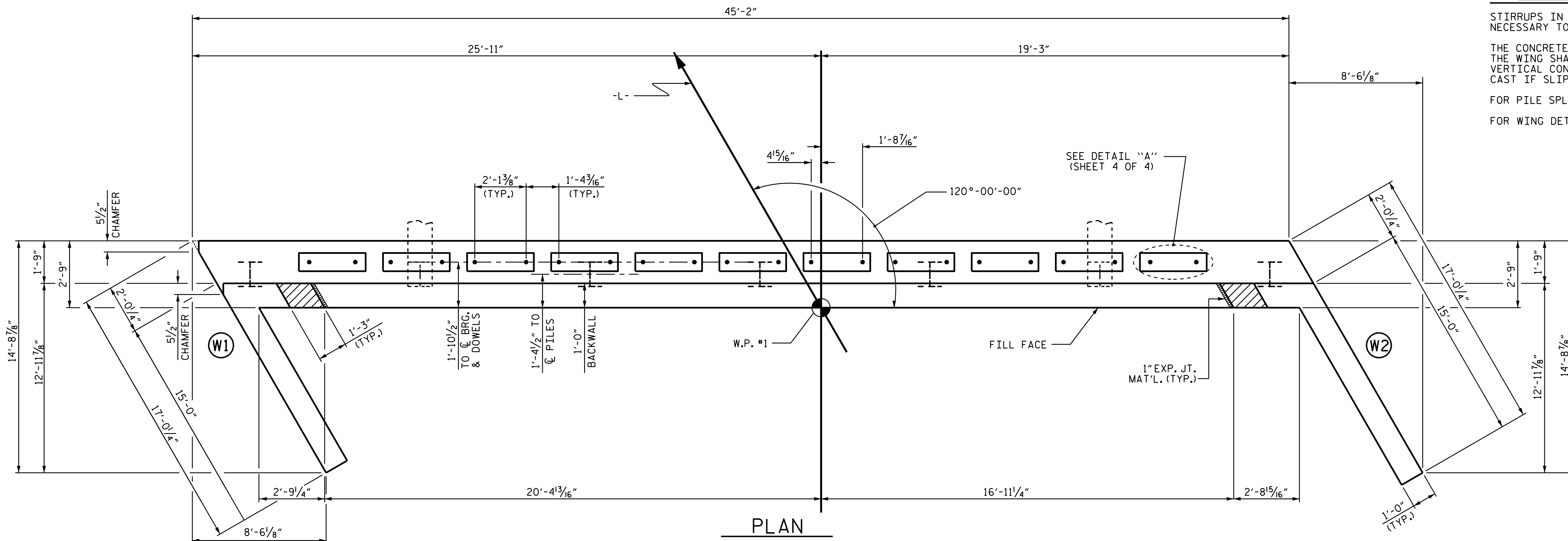
**NOTES**

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.

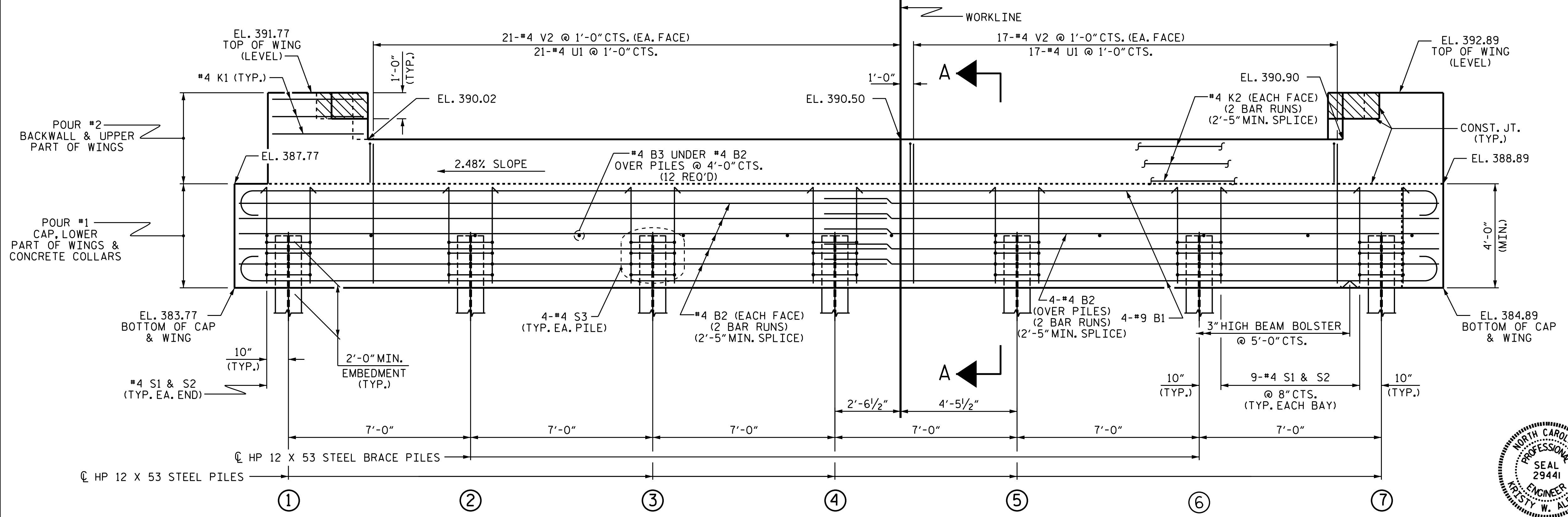
FOR PILE SPLICE DETAILS, SEE SHEET 4 OF 4.

FOR WING DETAILS, SEE SHEET 3 OF 4.



**PLAN**

TOP OF PILE ELEVATIONS	
①	385.82
②	386.00
③	386.17
④	386.34
⑤	386.52
⑥	386.69
⑦	386.86



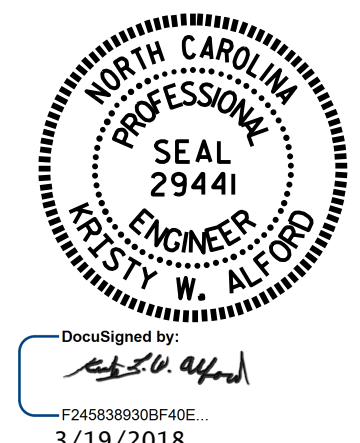
**ELEVATION**

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-5320  
GRANVILLE COUNTY  
STATION: 15+98.00 -L-

SHEET 1 OF 4

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
  
SUBSTRUCTURE  
END BENT No. 1



ASSEMBLED BY : M. A. LESHURE DATE : 1/18  
CHECKED BY : K. W. ALFORD DATE : 2/18  
DRAWN BY : WJH 12/11 REV. 4/15 MAA/TMG  
CHECKED BY : AAC 12/11

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	S-17	
1			3			TOTAL SHEETS 26	
2			4				

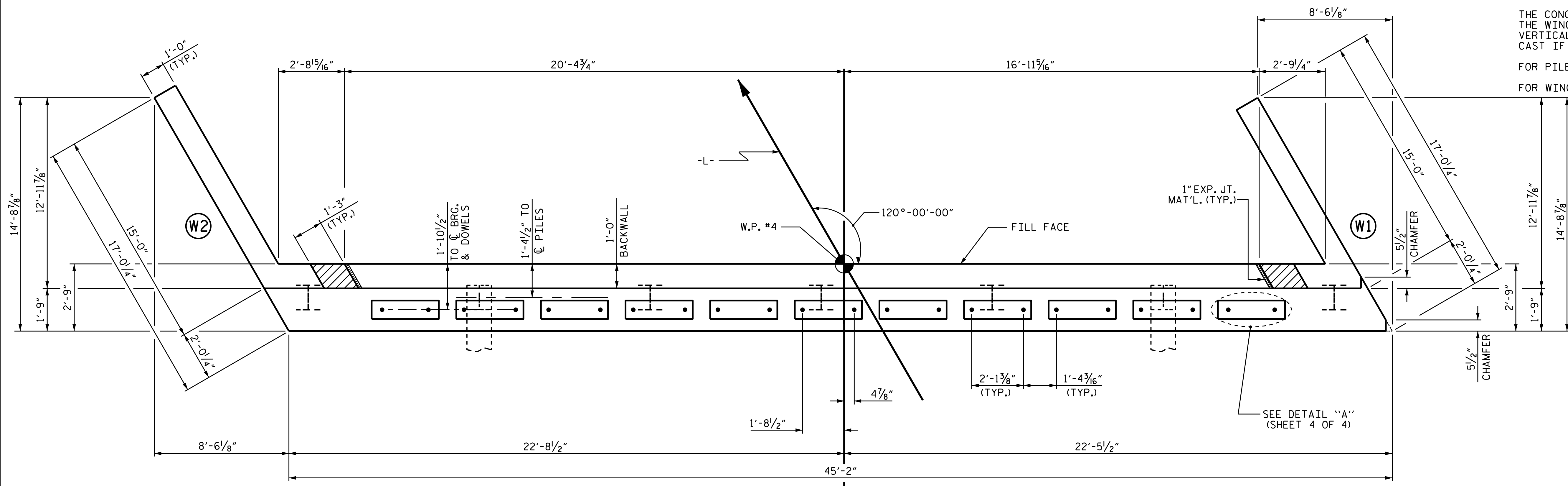
**NOTES**

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.

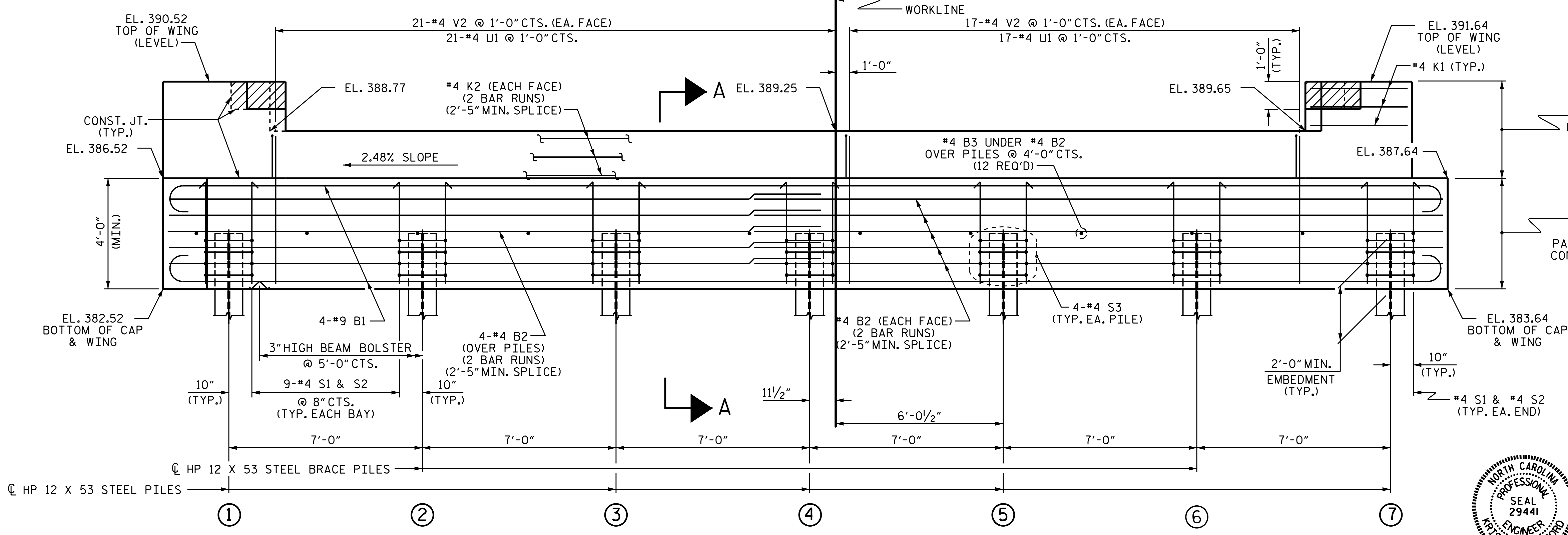
FOR PILE SPLICE DETAILS, SEE SHEET 4 OF 4.

FOR WING DETAILS, SEE SHEET 3 OF 4.



**PLAN**

TOP OF PILE ELEVATIONS	
①	384.57
②	384.75
③	384.92
④	385.09
⑤	385.27
⑥	385.44
⑦	385.61



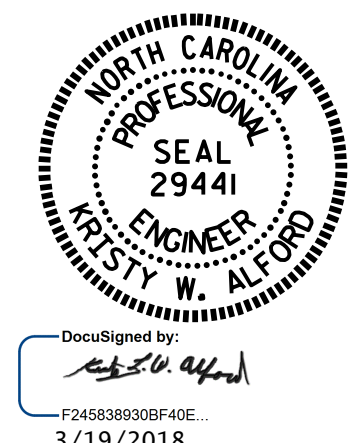
**ELEVATION**

PROJECT NO. B-5320  
GRANVILLE COUNTY  
 STATION: 15+98.00 -L-

SHEET 2 OF 4

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

SUBSTRUCTURE  
 END BENT No. 2



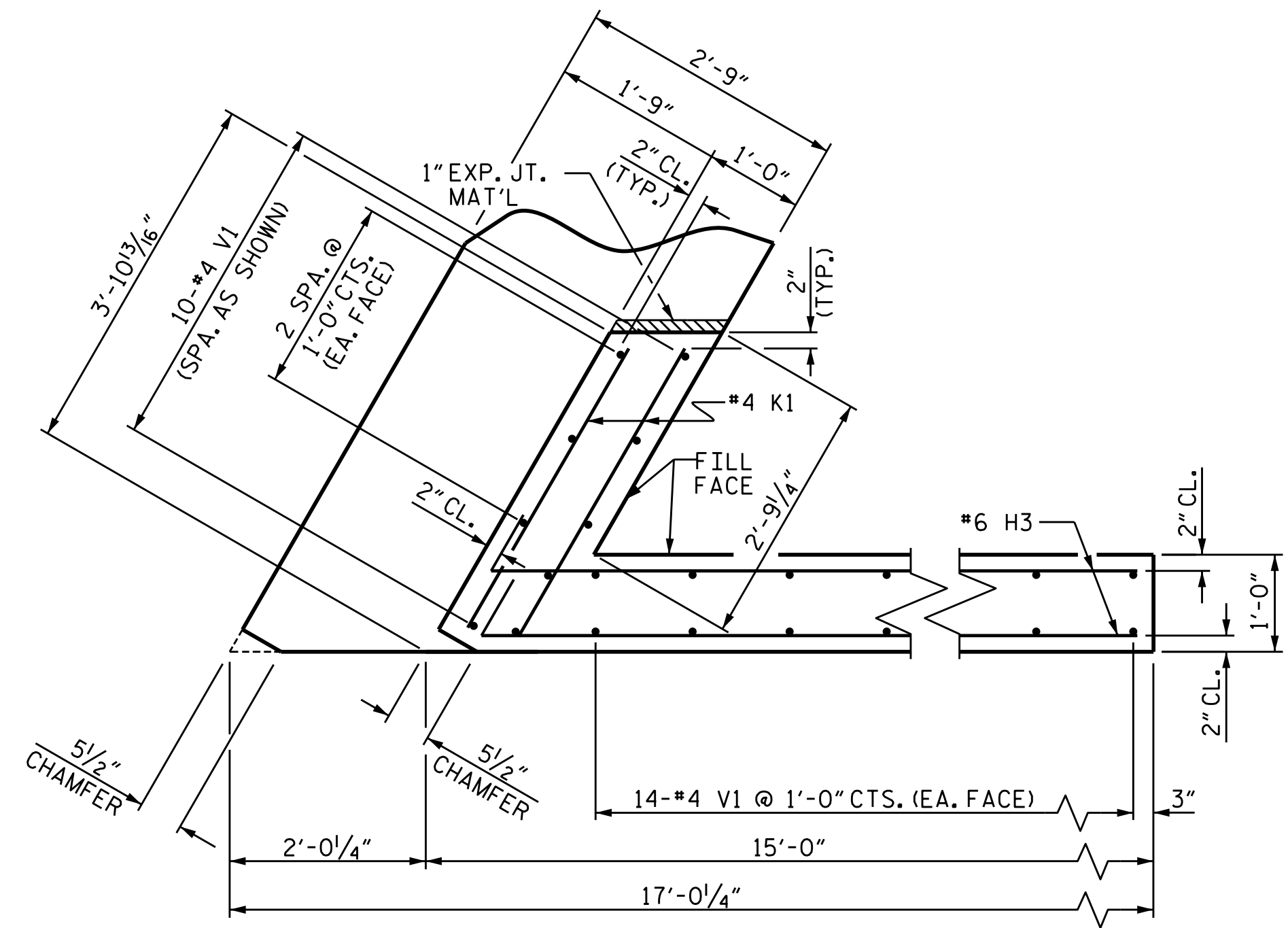
WINGS NOT SHOWN FOR CLARITY.  
 FOR SECTION A-A, SEE SHEET 4 OF 4.  
 CONCRETE COLLARS FOR STEEL PILES NOT SHOWN IN PLAN AND ELEVATION VIEWS FOR CLARITY.  
 SEE "CORROSION PROTECTION FOR STEEL PILES DETAIL", SHEET 4 OF 4.

ASSEMBLED BY : M. A. LESHURE	DATE : 1/18
CHECKED BY : K. W. ALFORD	DATE : 2/18
DRAWN BY : WJH	12/11
CHECKED BY : AAC	12/11
	REV. 4/15
	MAA/TMG

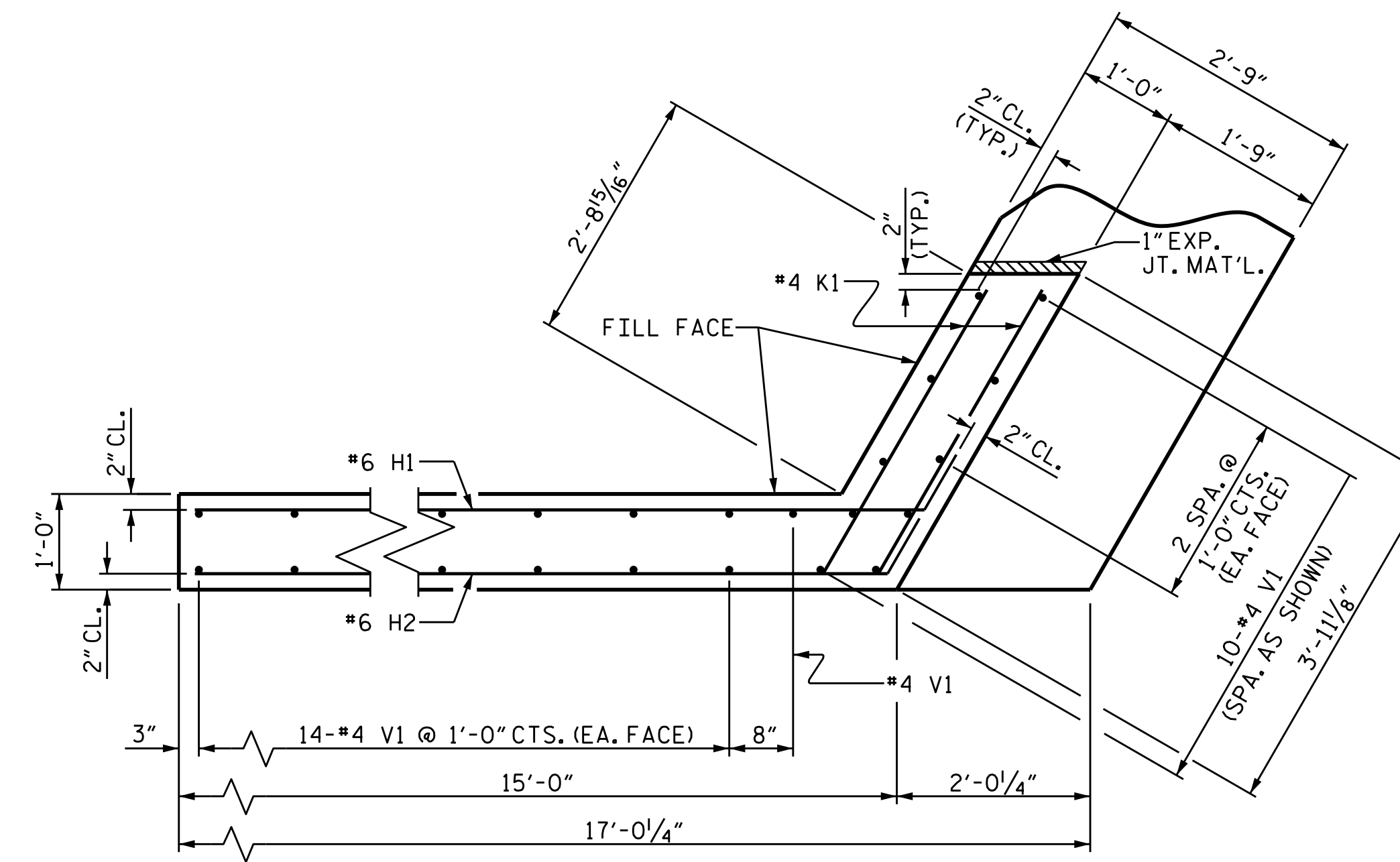
DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-18
1			3			TOTAL SHEETS 26
2			4			

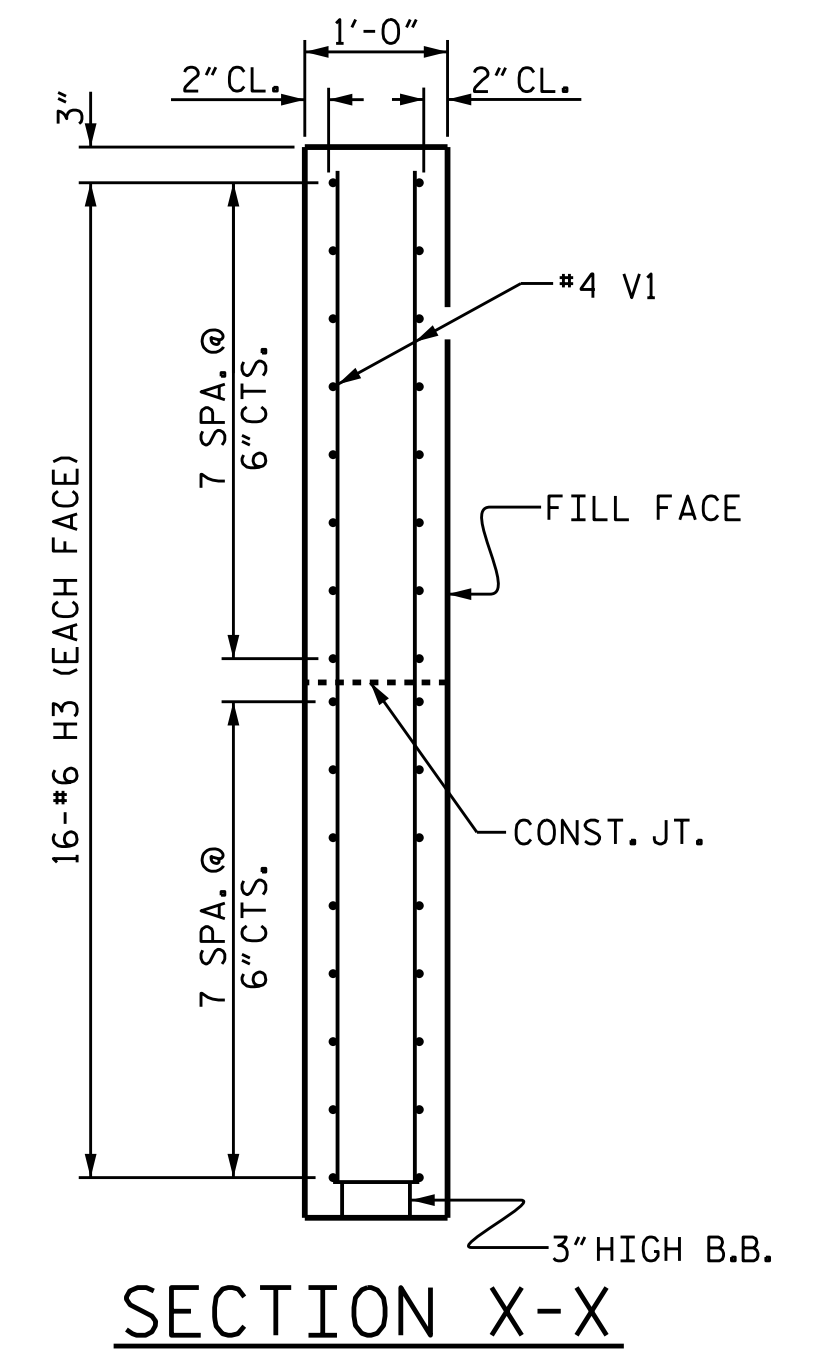




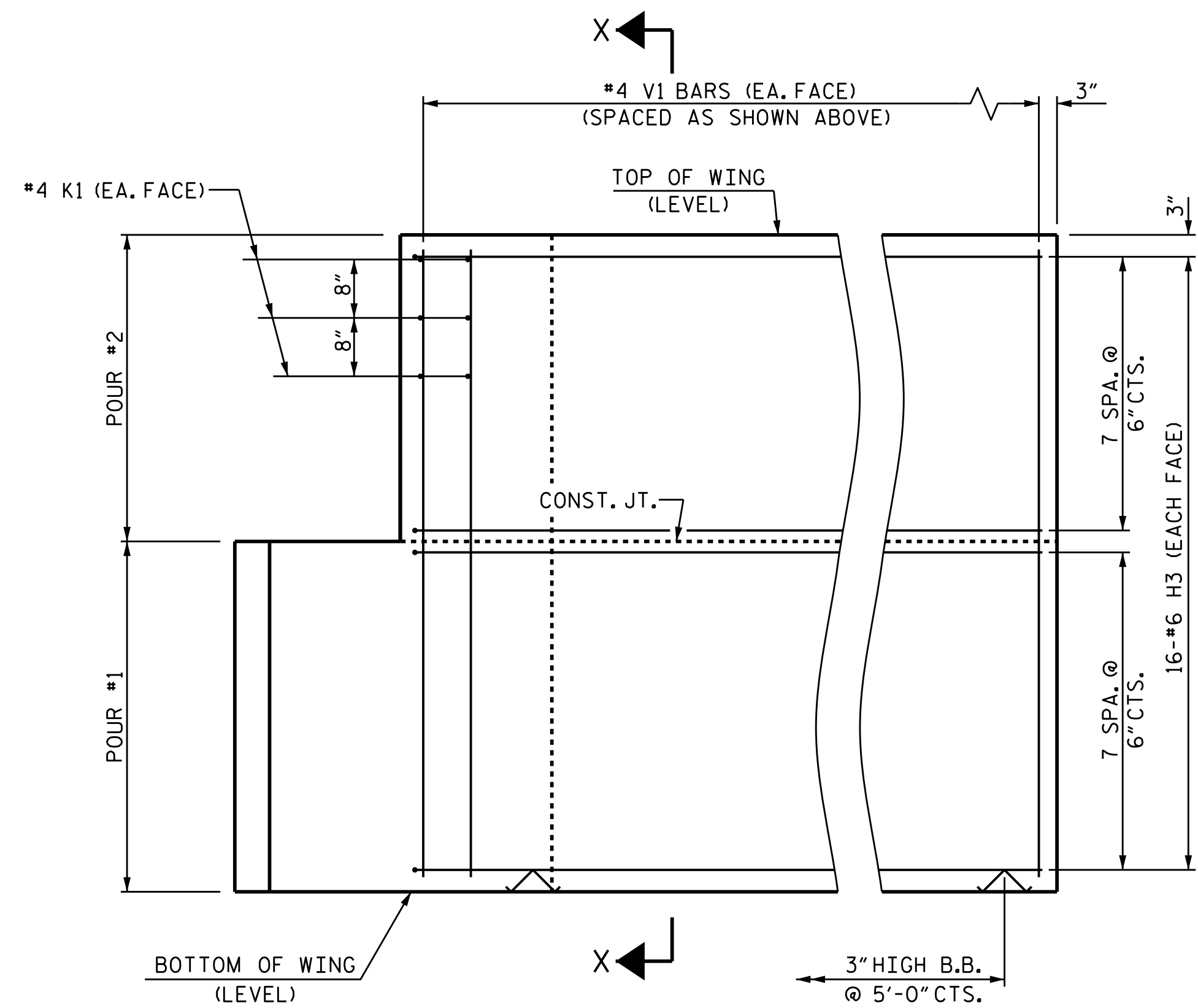
PLAN OF WING (W1)



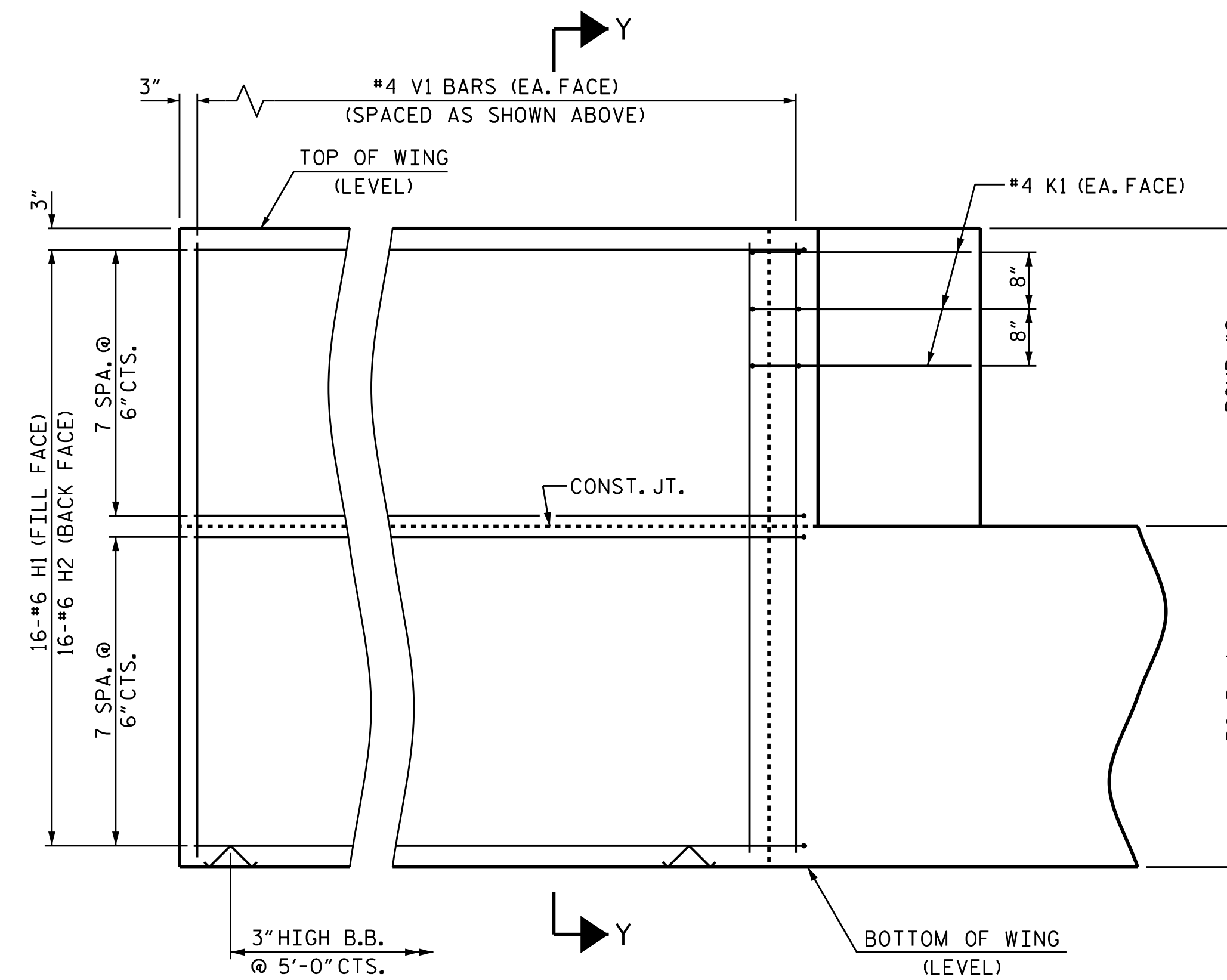
PLAN OF WING (W2)



SECTION X-X

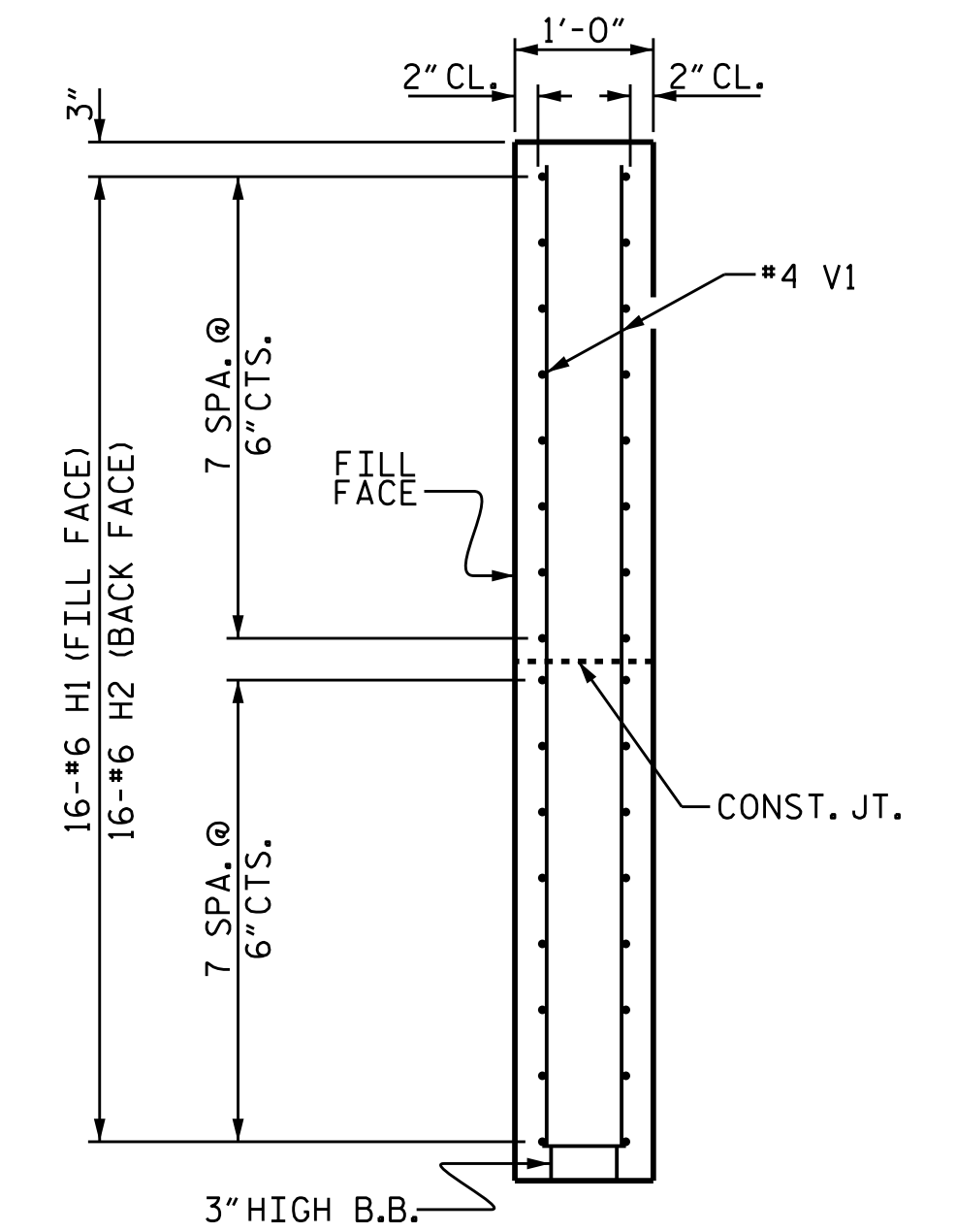


ELEVATION OF WING (W1)



ELEVATION OF WING (W2)

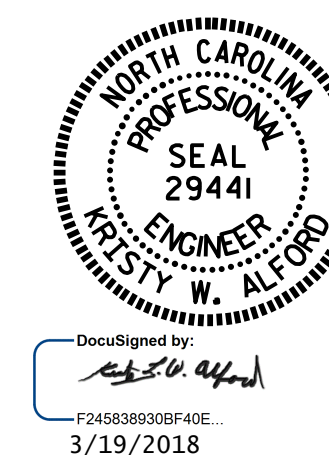
WING DETAILS



SECTION Y-Y

PROJECT NO. B-5320  
 GRANVILLE COUNTY  
 STATION: 15+98.00 -L-

SHEET 3 OF 4

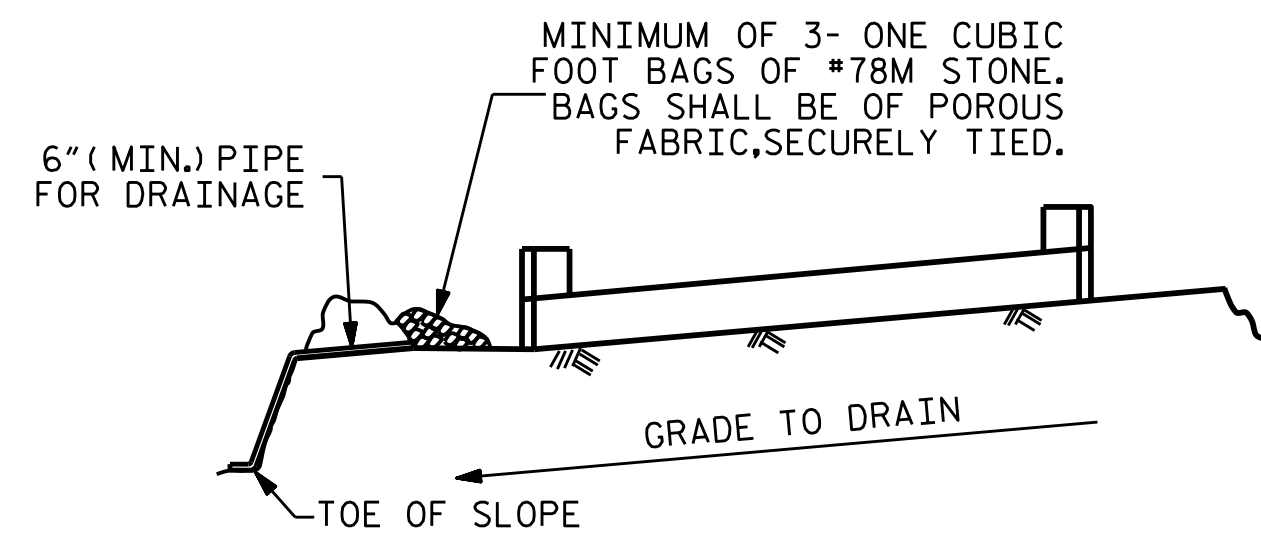


STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 SUBSTRUCTURE  
 END BENT  
 WING DETAILS

ASSEMBLED BY : M. A. LESHURE DATE : 1/18  
 CHECKED BY : K. W. ALFORD DATE : 2/18  
 DRAWN BY : WJH 12/11 REV. 4/15 MAA/TMG  
 CHECKED BY : AAC 12/11

DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	S-19	
1			3			TOTAL SHEETS	
2			4			26	

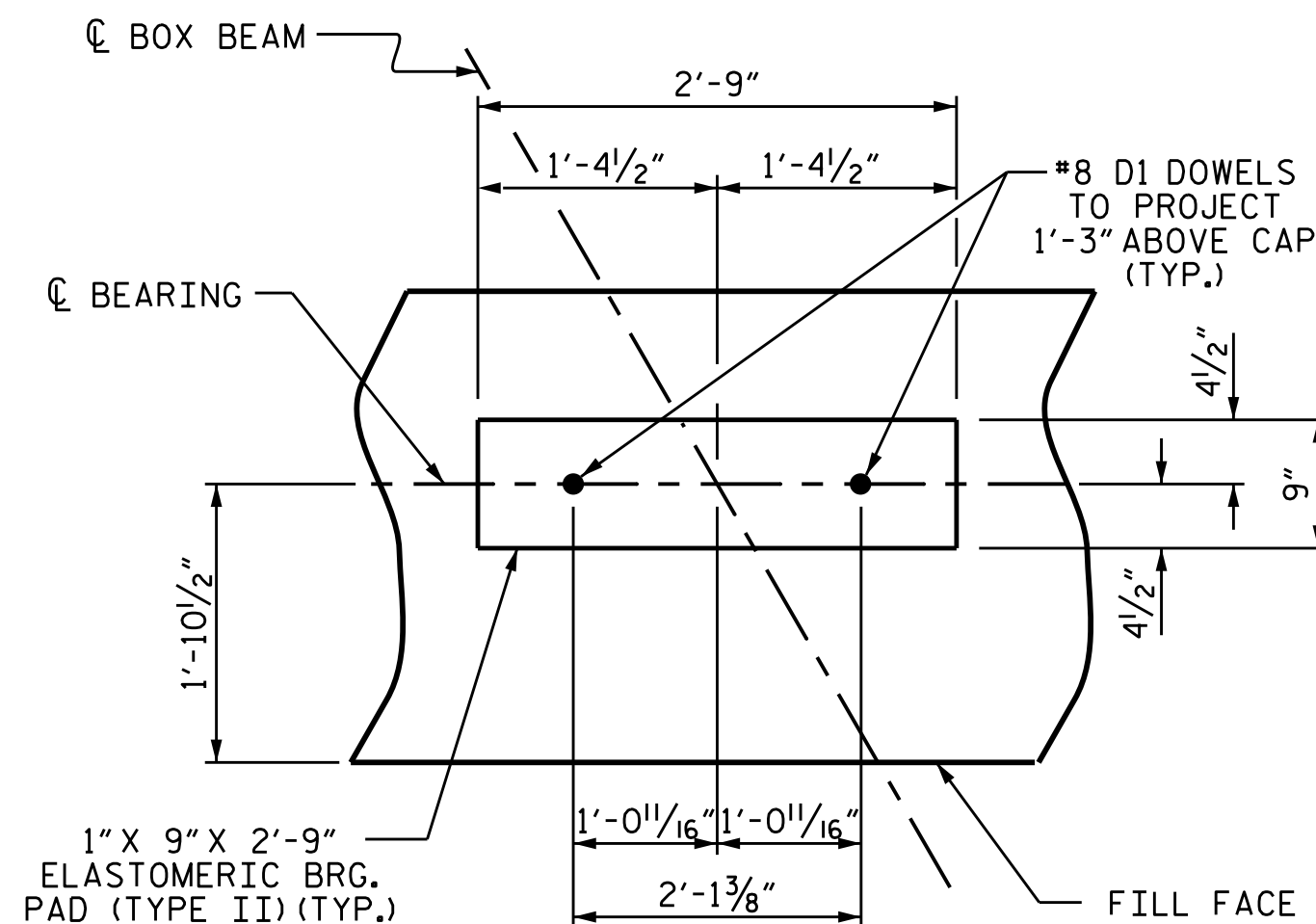


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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.

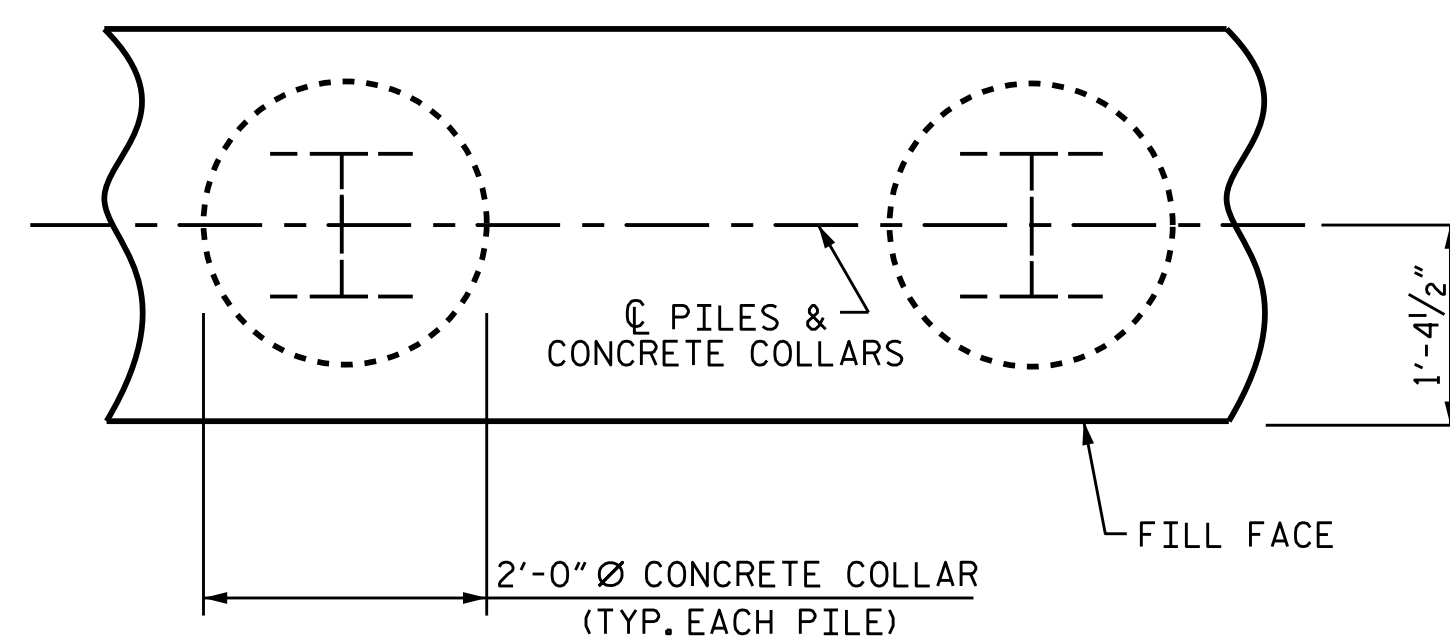
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

### TEMPORARY DRAINAGE AT END BENT



DETAIL "A"

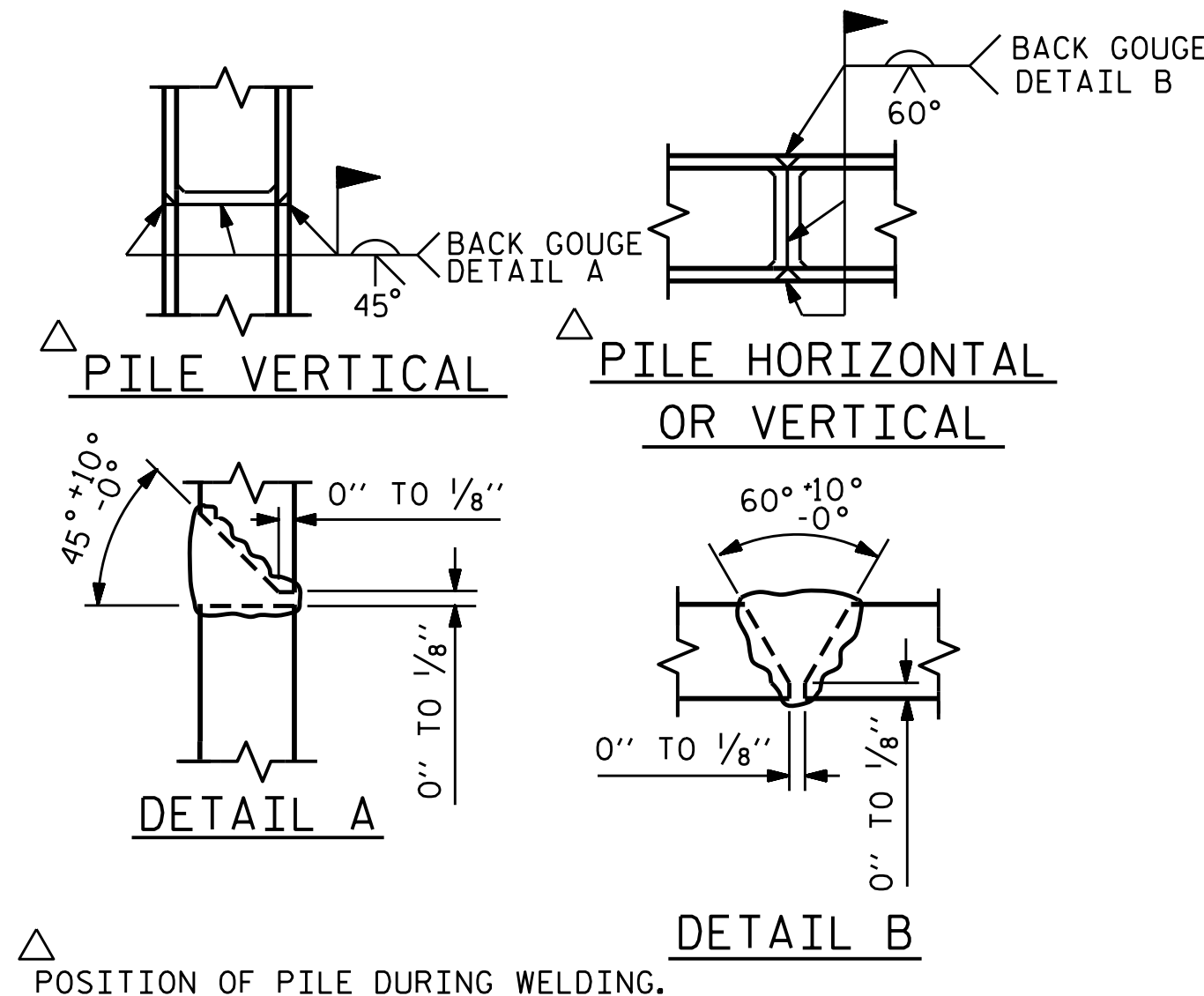
(END BENT No. 1 SHOWN, END BENT No. 2 SIMILAR BY ROTATION)



PLAN

### CORROSION PROTECTION FOR STEEL PILES DETAIL

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



### PILE SPLICE DETAILS

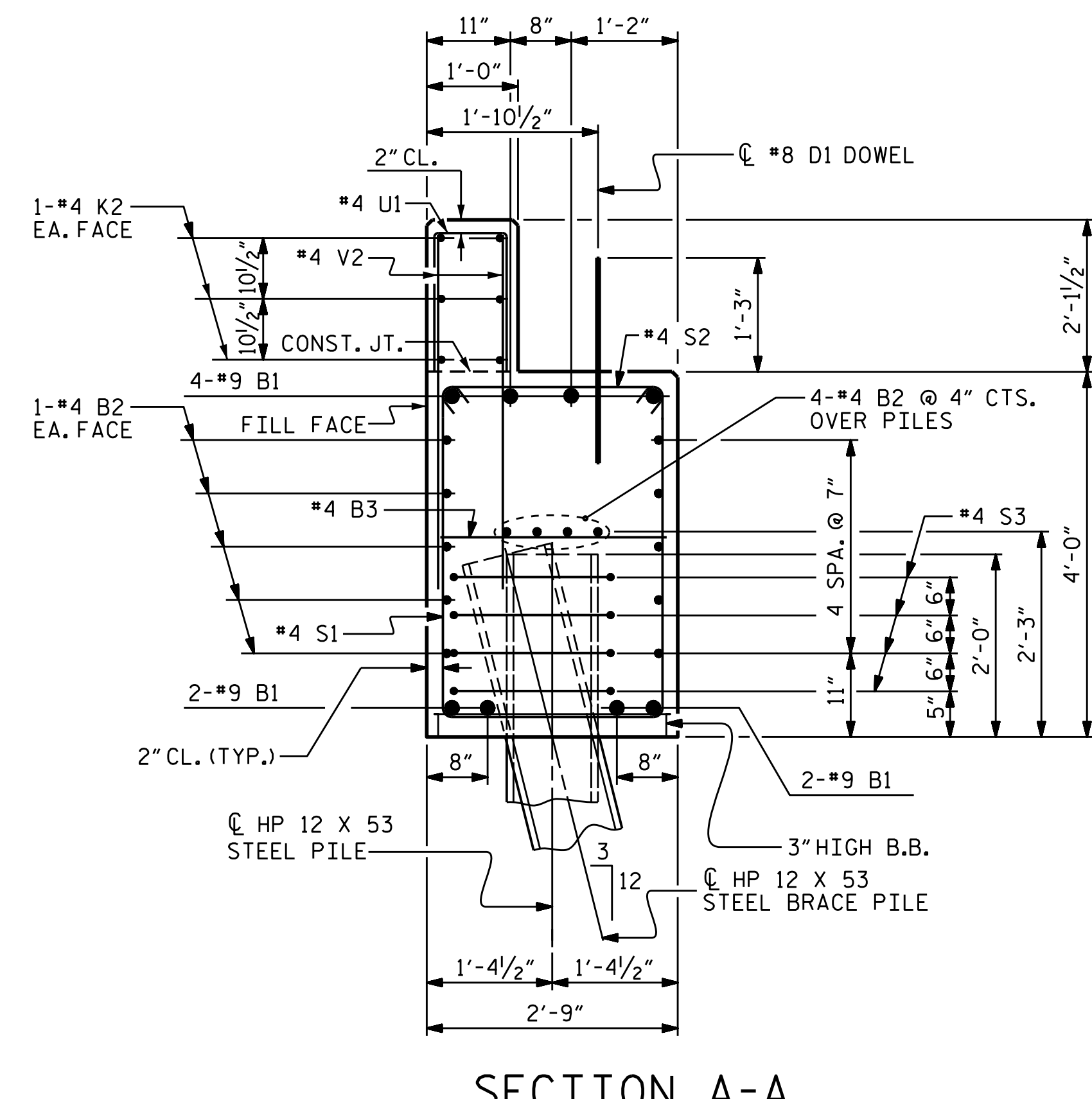
BAR TYPES	
①	②
③	④
⑤	⑥
⑦	

ALL BAR DIMENSIONS ARE OUT TO OUT.

END BENT No. 1	END BENT No. 2
HP 12 X 53 STEEL PILES	HP 12 X 53 STEEL PILES
NO: 7	NO: 7
LIN. FT. = 195	LIN. FT. = 160

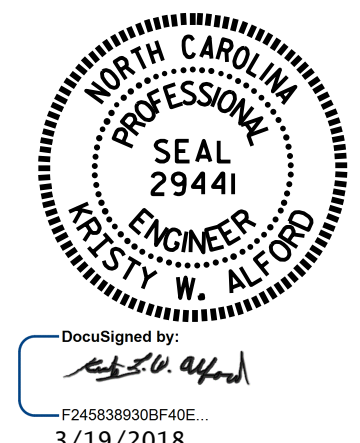
PILE DRIVING EQUIPMENT SETUP FOR HP 12 X 53 STEEL PILES	PILE DRIVING EQUIPMENT SETUP FOR HP 12 X 53 STEEL PILES
NO: 7	NO: 7

BILL OF MATERIAL FOR ONE END BENT					
BAR NO.	SIZE	TYPE	LENGTH	WEIGHT	
B1	#9	1	47'-2"	1283	
B2	#4	STR	23'-8"	443	
B3	#4	STR	2'-5"	19	
D1	#8	STR	2'-3"	132	
H1	#6	2	15'-9"	379	
H2	#6	2	15'-4"	368	
H3	#6	3	14'-10"	713	
K1	#4	STR	3'-3"	26	
K2	#4	STR	23'-8"	190	
S1	#4	4	10'-5"	390	
S2	#4	5	3'-2"	118	
S3	#4	6	6'-6"	122	
U1	#4	7	3'-8"	93	
V1	#4	STR	7'-8"	394	
V2	#4	STR	5'-9"	292	
REINFORCING STEEL (FOR ONE END BENT)				4962 LBS.	
CLASS A CONCRETE BREAKDOWN (FOR ONE END BENT)					
POUR #1 CAP, LOWER PART OF WINGS & COLLARS				23.8 C.Y.	
POUR #2 BACKWALL & UPPER PART OF WINGS				8.3 C.Y.	
TOTAL CLASS A CONCRETE				32.1 C.Y.	



SECTION A-A

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



PROJECT NO. B-5320  
 GRANVILLE COUNTY  
 STATION: 15+98.00 -L-  
 SHEET 4 OF 4

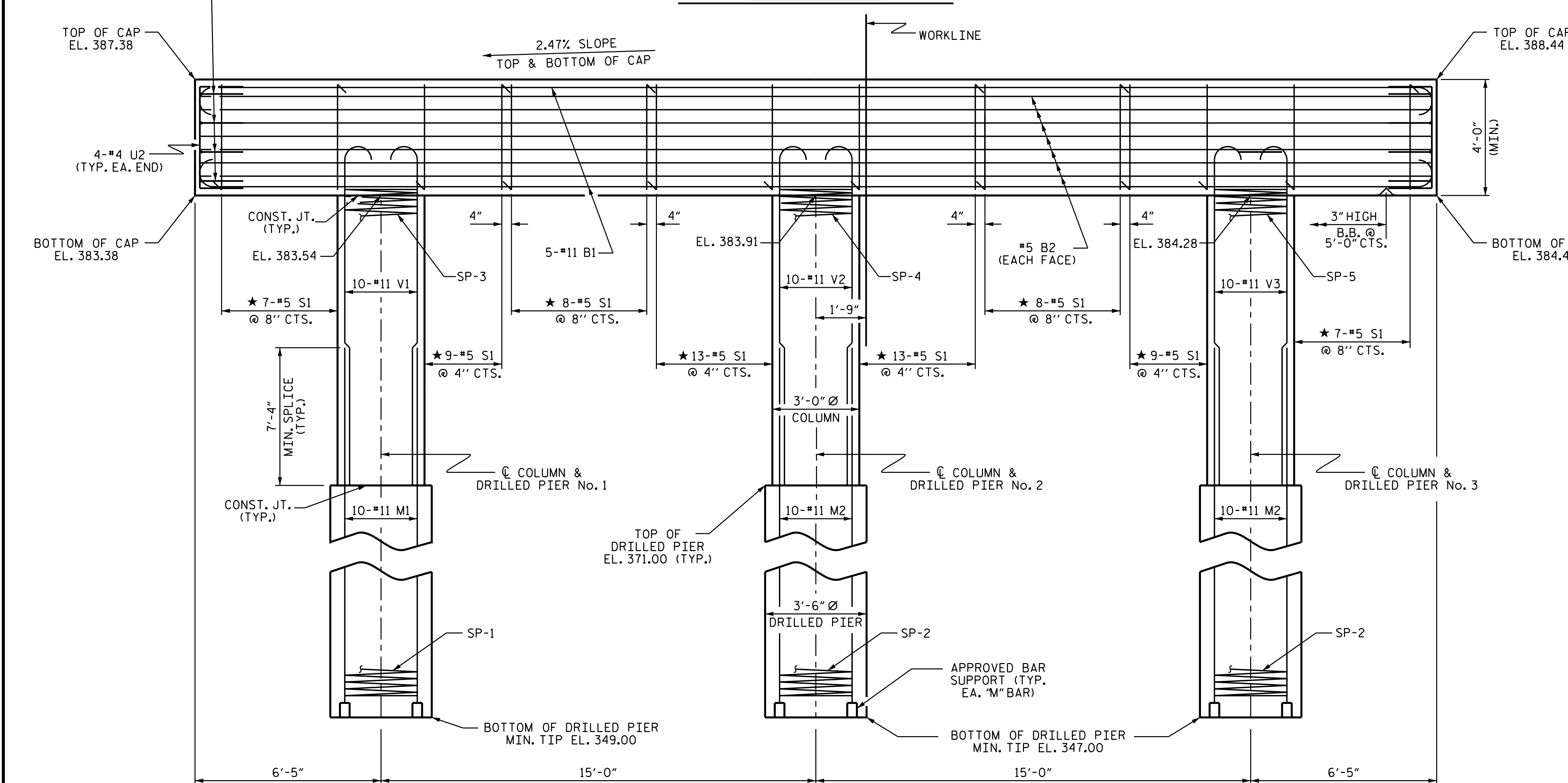
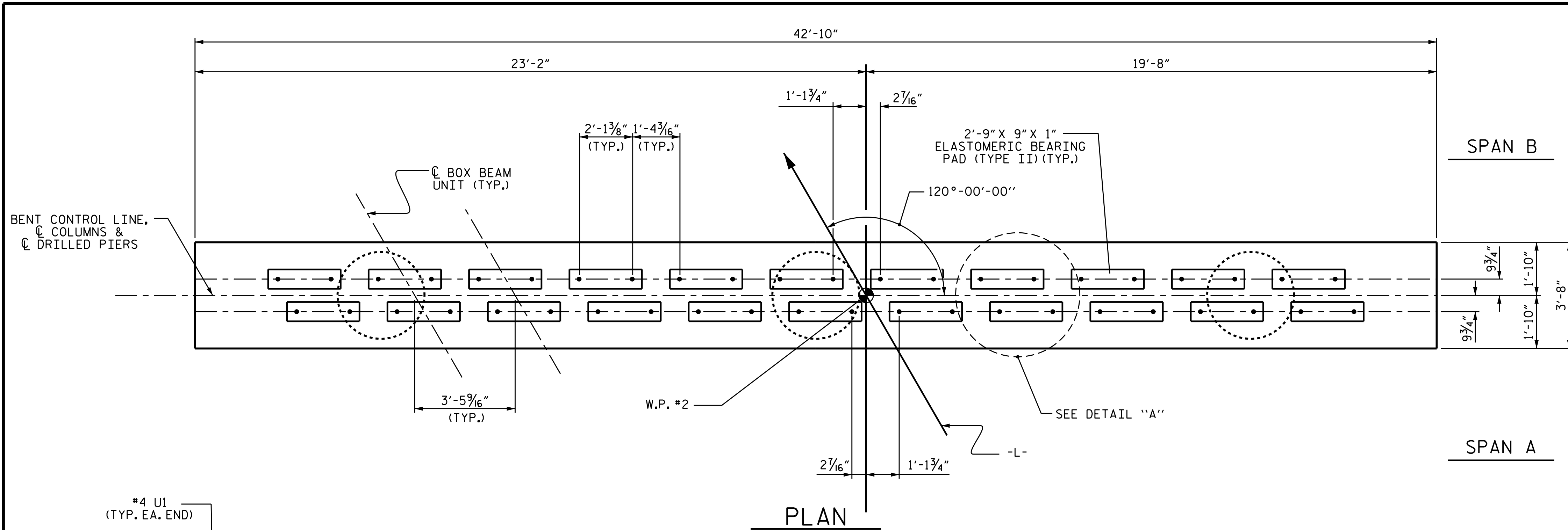
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 SUBSTRUCTURE  
 END BENT No. 1 & 2  
 DETAILS

ASSEMBLED BY : M. A. LESHURE	DATE : 1/18
CHECKED BY : K. W. ALFORD	DATE : 2/18
DRAWN BY : WJH	12/11
CHECKED BY : AAC	12/11
REV. 4/17	MAA/THC

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-20
1			3			TOTAL SHEETS 26
2			4			





**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.

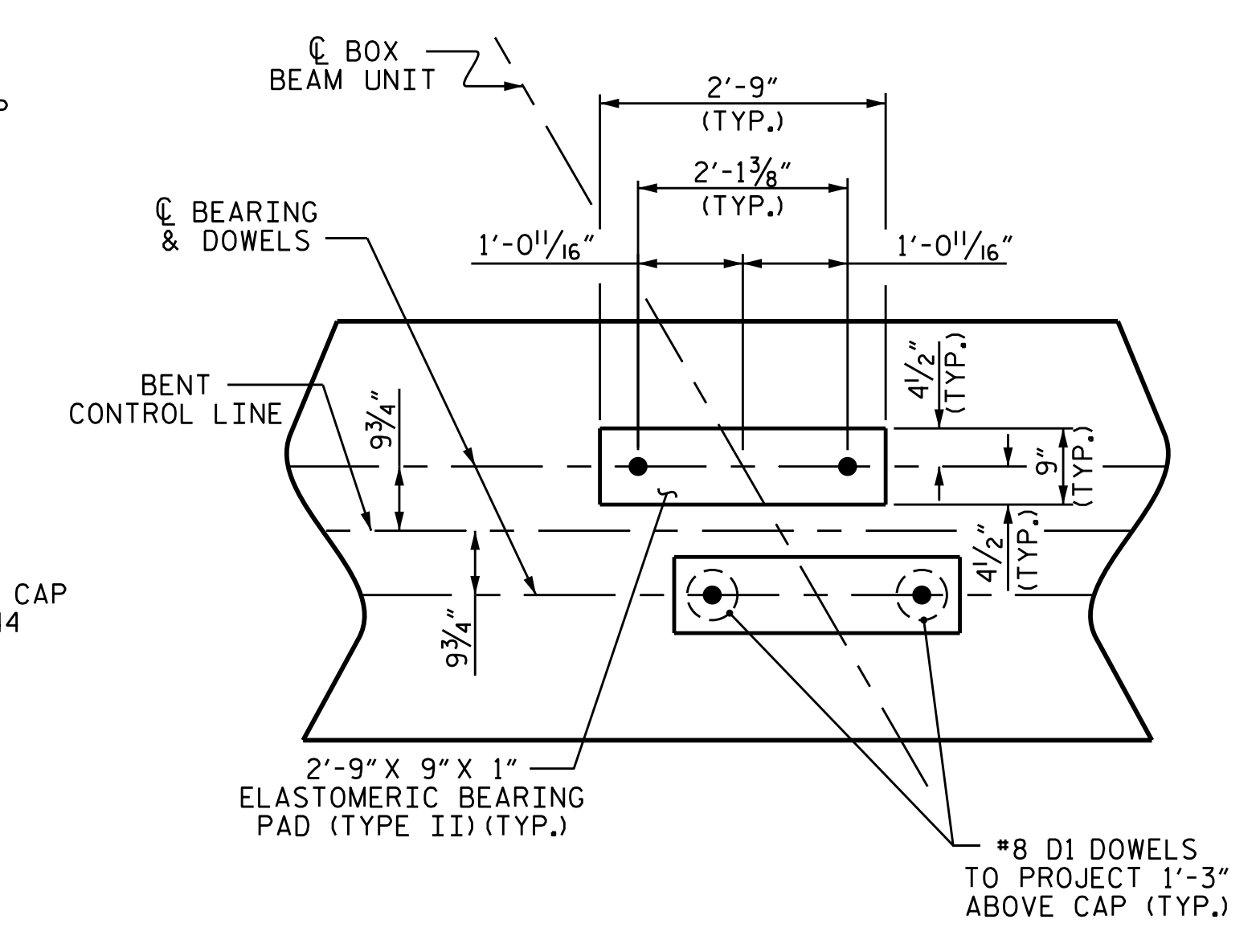
FOR DRILLED PIERS, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.

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

★ INVERT ALTERNATE STIRRUPS.

DRILLED PIERS SHALL BE TERMINATED ONE FOOT ± ABOVE NORMAL WATER SURFACE ELEVATION FOR SHAFTS LOCATED IN WATER.

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



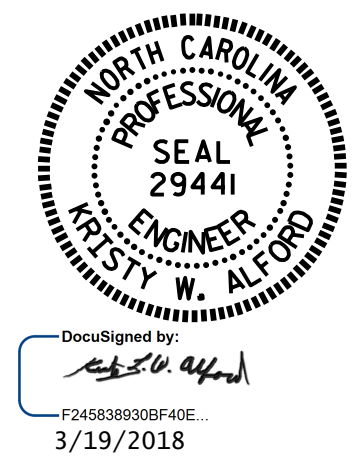
**DETAIL "A"**  
(DIMENSIONS ARE TYPICAL EACH BEARING)

PROJECT NO. B-5320  
GRANVILLE COUNTY  
 STATION: 15+98.00 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

SUBSTRUCTURE  
 BENT No. 1



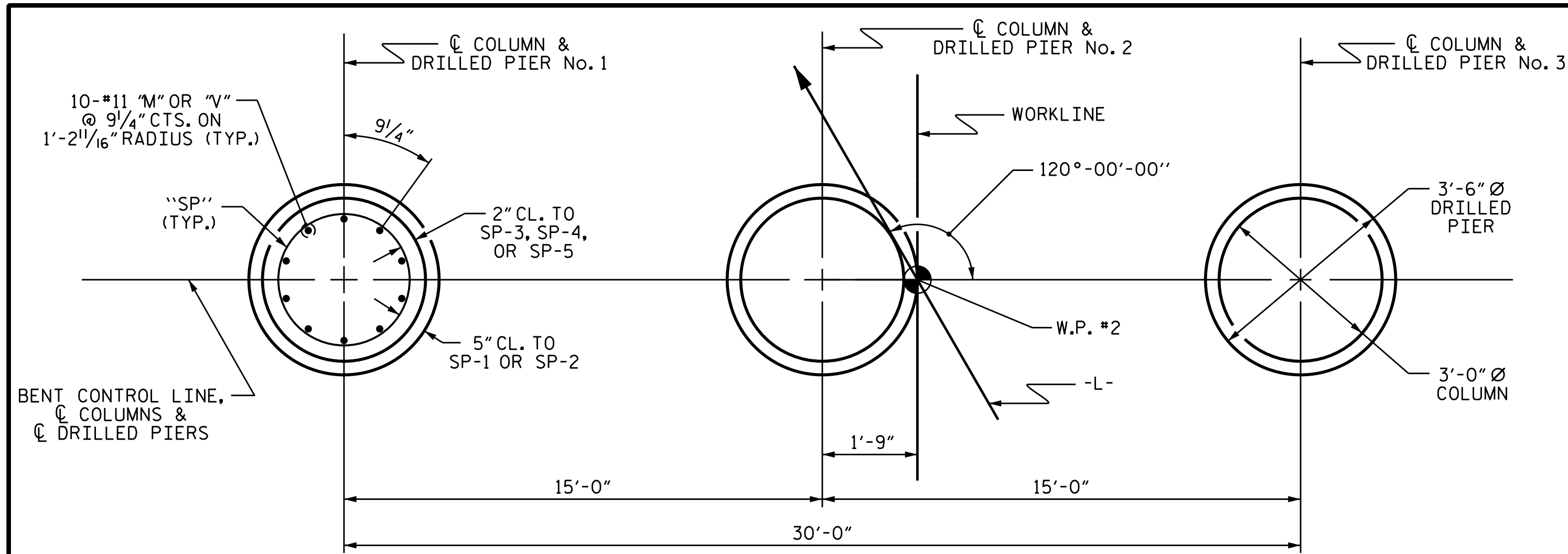
DRAWN BY : S. N. MEGAHED DATE : 01/2018  
 CHECKED BY : R. L. CHESSON DATE : 01/2018  
 DESIGN ENGINEER OF RECORD : R. L. CHESSON DATE : 01/2018

**ELEVATION**

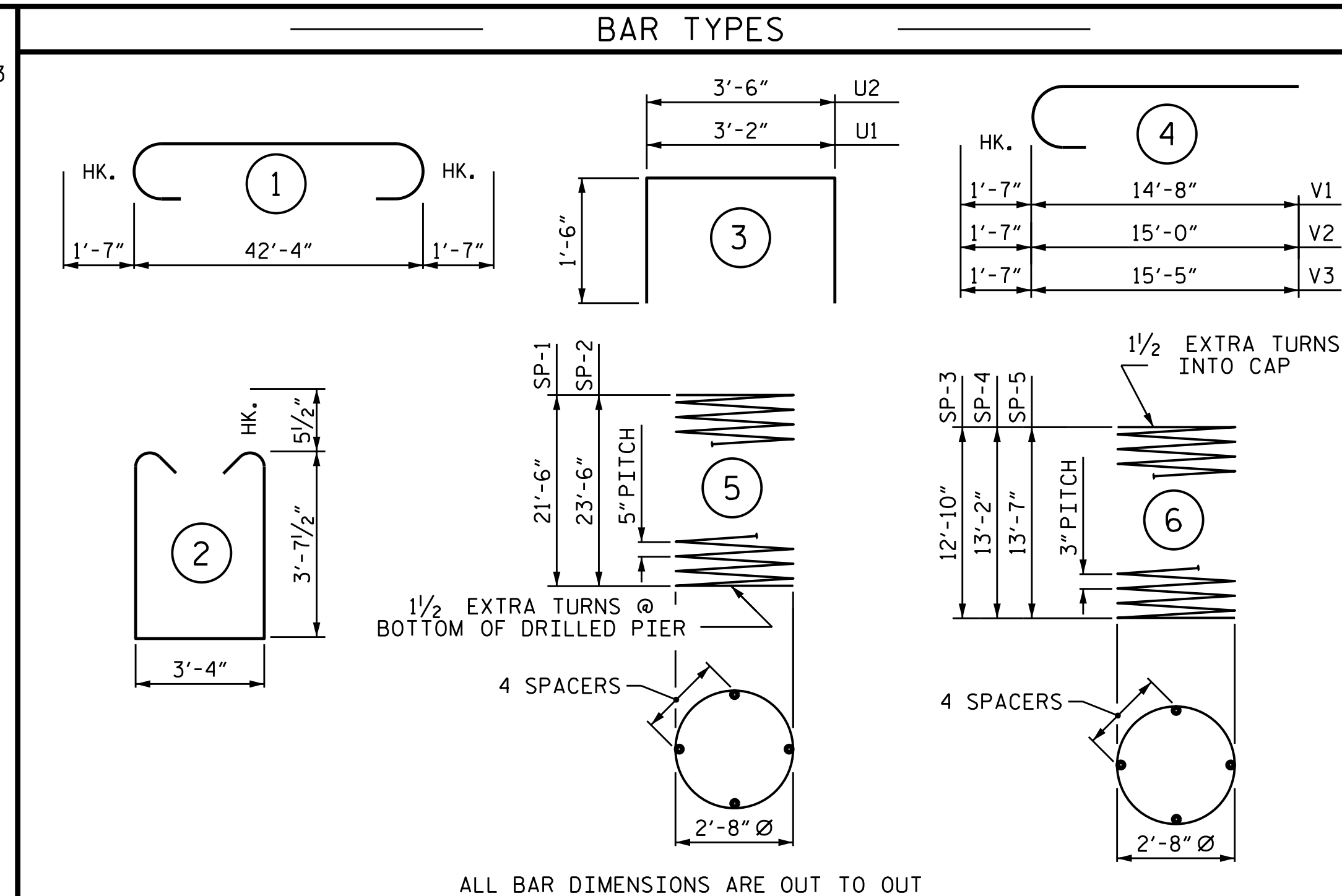
DIMENSIONS & REINFORCING STEEL ARE TYPICAL FOR EACH COLUMN & DRILLED PIER UNLESS OTHERWISE NOTED.

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-21
1			3			TOTAL SHEETS 26
2			4			

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

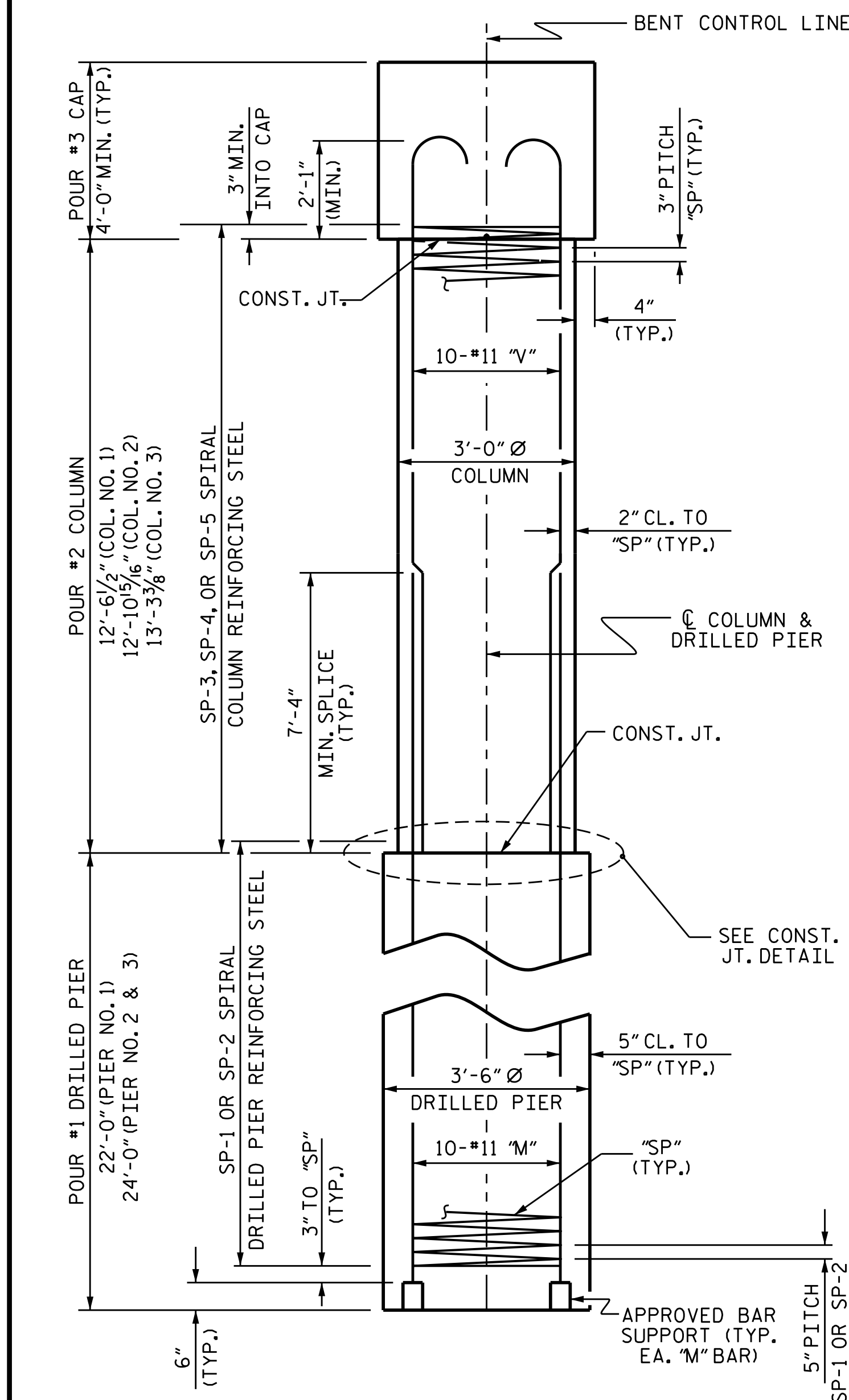


PLAN OF DRILLED PIERS & COLUMNS

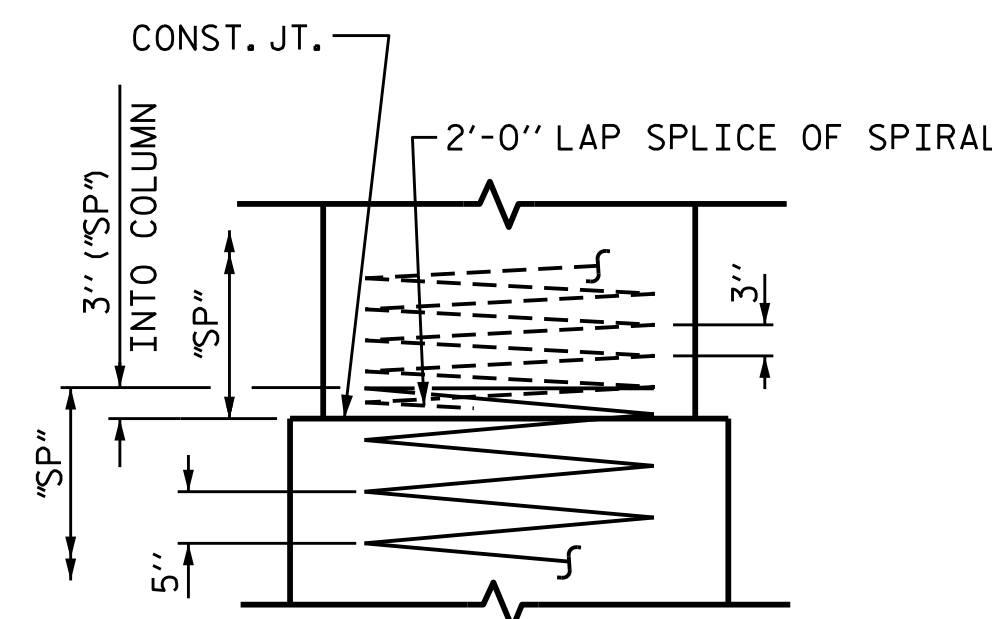


ALL BAR DIMENSIONS ARE OUT TO OUT

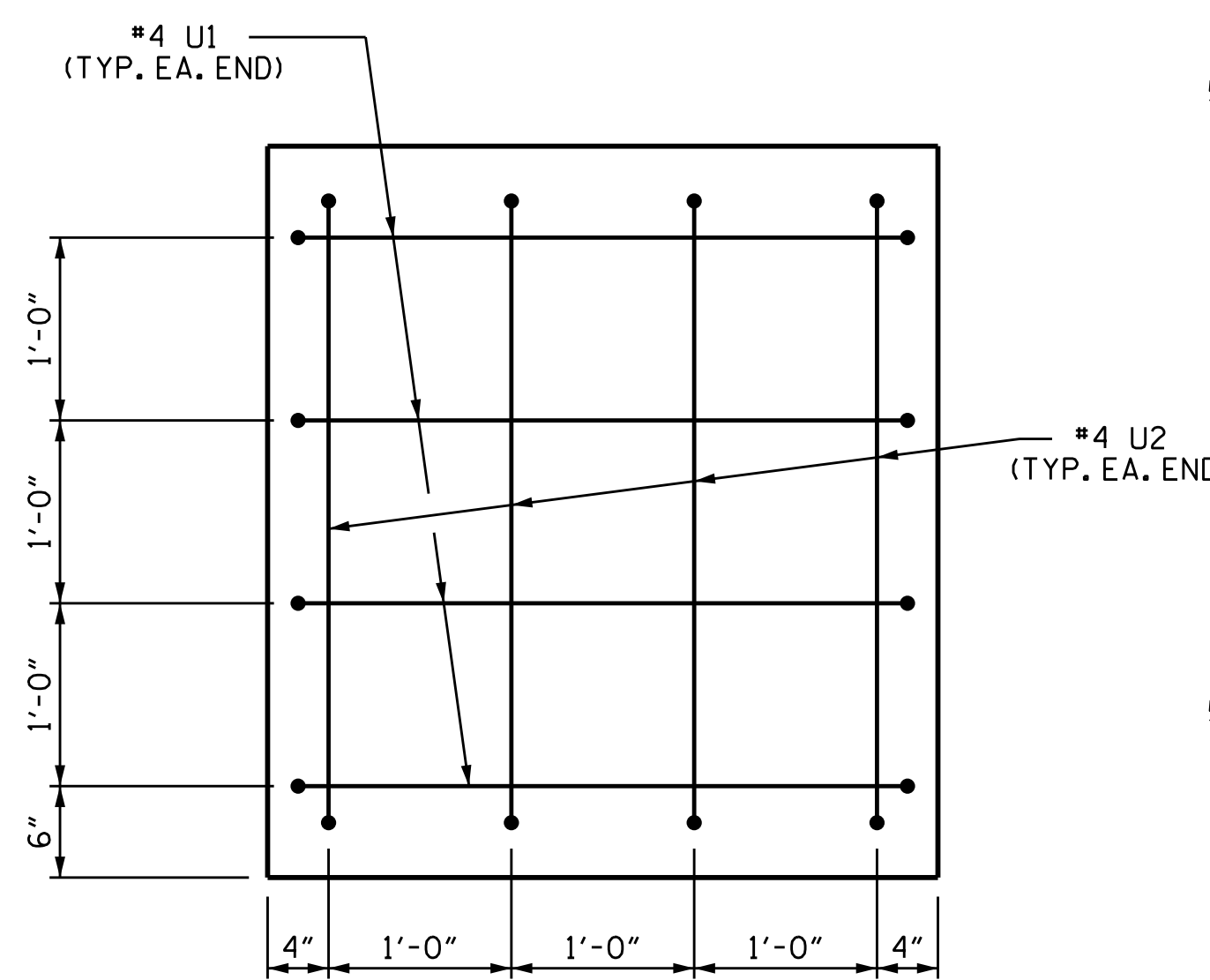
BILL OF MATERIAL FOR ONE BENT					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	10	#11	1	45'-6"	2417
B2	14	#5	STR	42'-6"	621
D1	44	#8	STR	2'-3"	264
M1	10	#11	STR	31'-10"	1691
M2	20	#11	STR	33'-10"	3595
S1	74	#5	2	11'-6"	888
U1	8	#4	3	6'-2"	33
U2	8	#4	3	6'-6"	35
V1	10	#11	4	16'-3"	863
V2	10	#11	4	16'-7"	881
V3	10	#11	4	17'-0"	903
REINFORCING STEEL (FOR ONE BENT)					12191 LBS.
SPIRAL COLUMN REINFORCING STEEL (FOR ONE BENT)					2362 LBS.
* THE SP-1 & SP-2 SPIRAL REINFORCING STEEL SHALL BE W31 OR D-31 COLD DRAWN WIRE OR #5 PLAIN OR DEFORMED BAR					
** THE SP-3 THRU SP-5 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)				10.1 C.Y.	
POUR #3 (CAP)				23.3 C.Y.	
TOTAL CLASS A CONCRETE				33.4 C.Y.	
DRILLED PIERS: (FOR ONE BENT)					
DRILLED PIER CONCRETE				24.9 C.Y.	
POUR #1 (DRILLED PIERS)				24.9 C.Y.	
3'-6" Ø DRILLED PIER NOT IN SOIL				30 LIN. FT.	
3'-6" Ø DRILLED PIER IN SOIL				40 LIN. FT.	
PERMANENT STEEL CASING FOR 3'-6" Ø DRILLED PIER				52 LIN. FT.	
CSL TUBES				298 LIN. FT.	



END ELEVATION

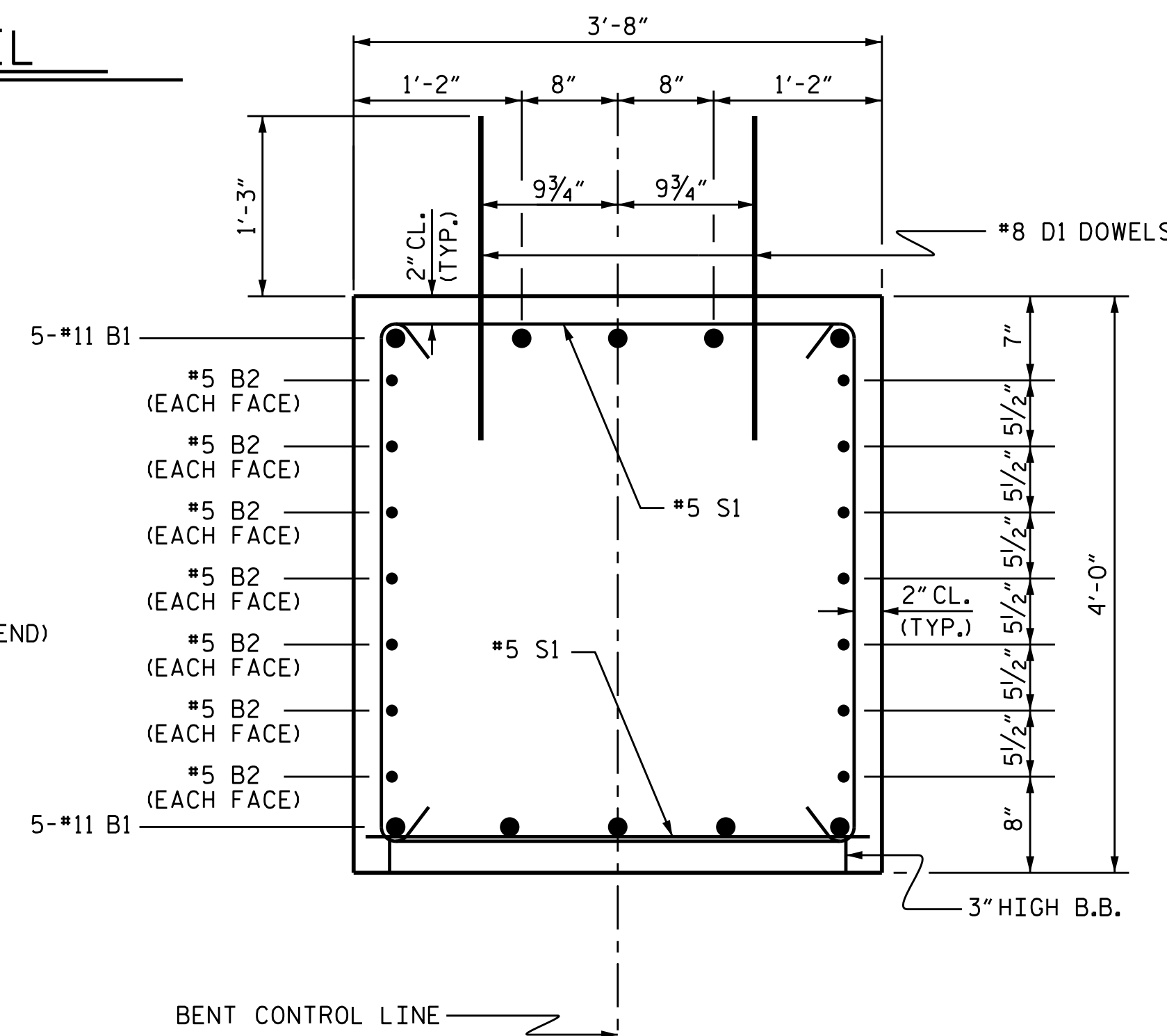


CONSTRUCTION JOINT DETAIL



END OF CAP VIEW

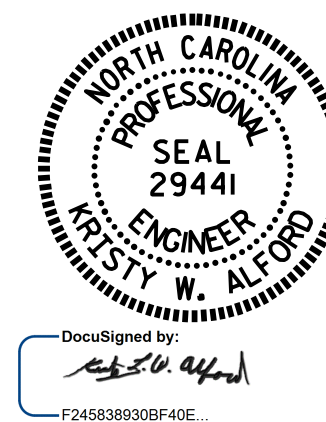
(TYPICAL BOTH ENDS)



SECTION THRU CAP

DRAWN BY : S. N. MEGAHED DATE : 01/2018  
 CHECKED BY : R. L. CHESSON DATE : 01/2018  
 DESIGN ENGINEER OF RECORD : R. L. CHESSON DATE : 01/2018

19-MAR-2018 10:57  
 F:\Structures\Plans\Bents Sam\B-5320.SMU. B1.380096.dgn  
 kaiford

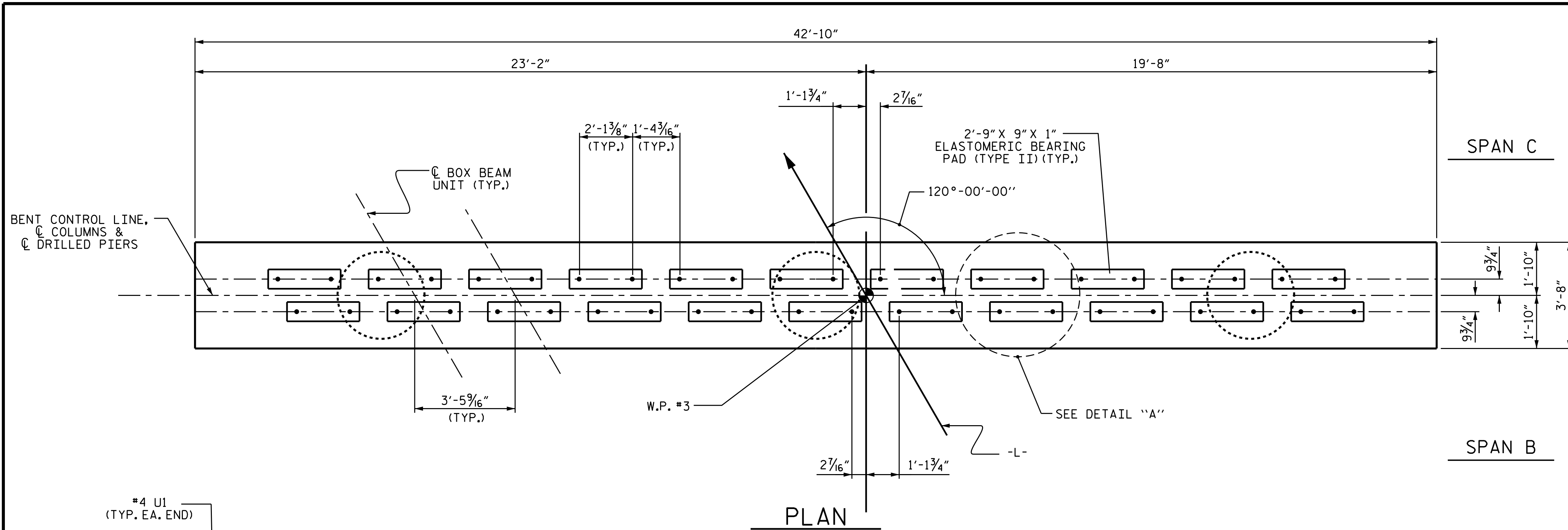


DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT NO. B-5320  
 GRANVILLE COUNTY  
 STATION: 15+98.00 -L-  
 SHEET 2 OF 2

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-22
1			3			TOTAL SHEETS
2			4			26





**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.

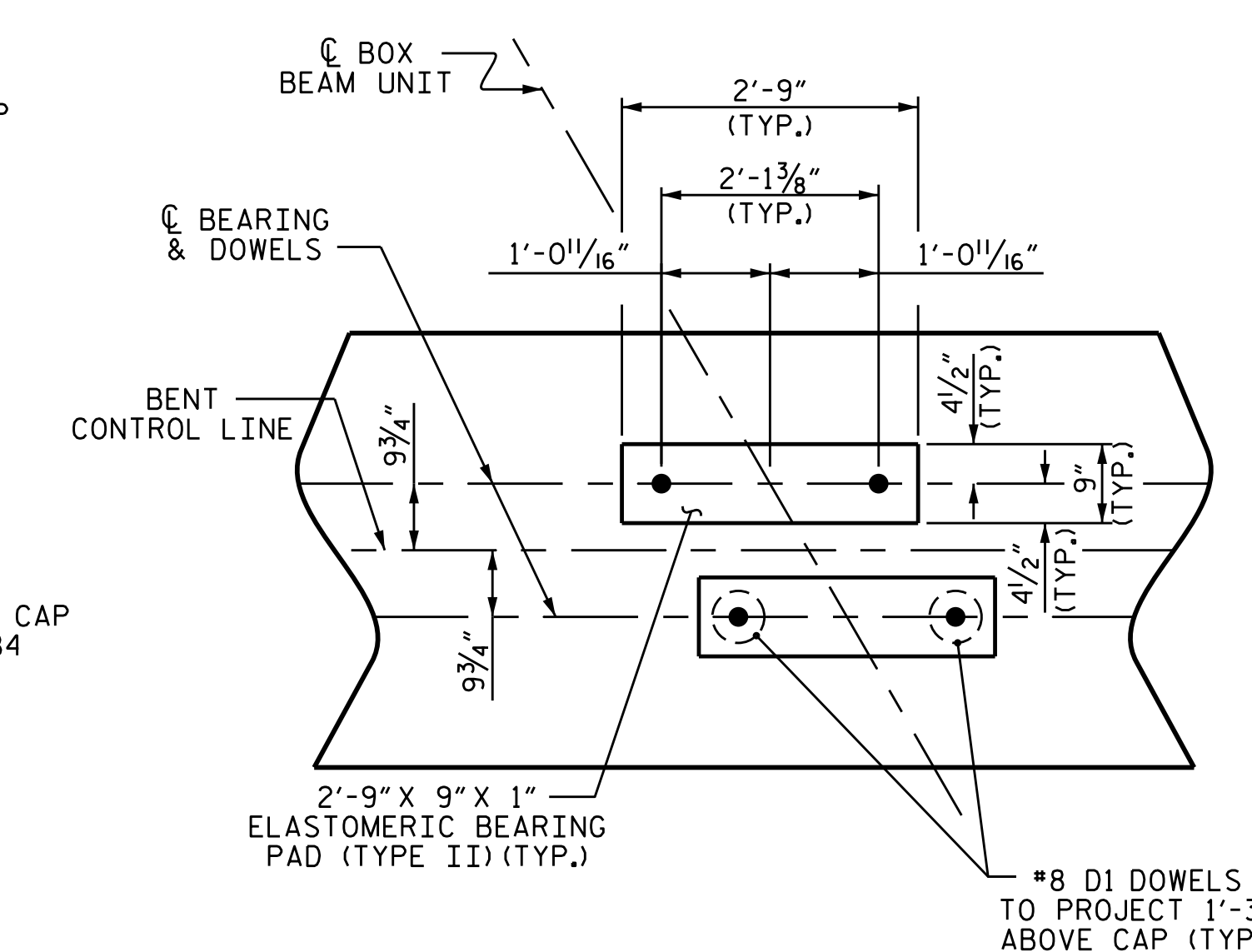
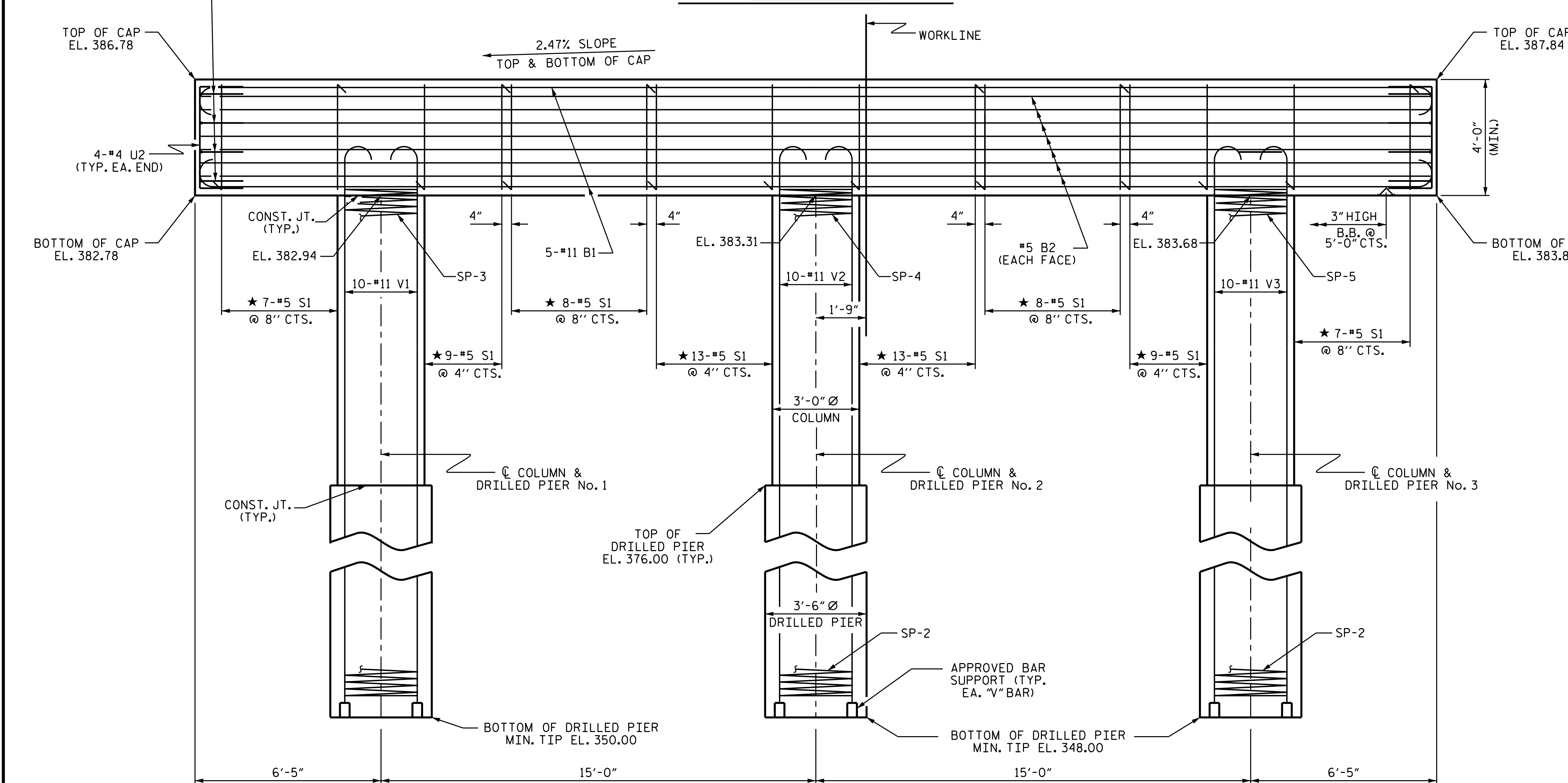
FOR DRILLED PIERS, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.

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.



PROJECT NO. B-5320

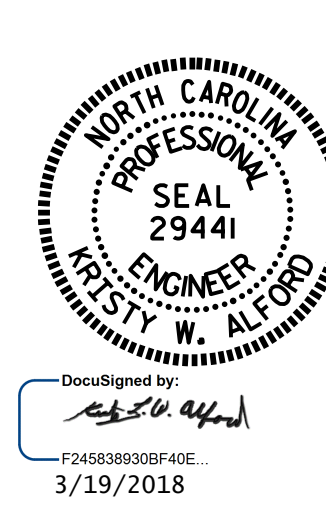
GRANVILLE COUNTY

STATION: 15+98.00 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

SUBSTRUCTURE  
BENT No. 2



DRAWN BY: S. N. MEGAHED DATE: 01/2018

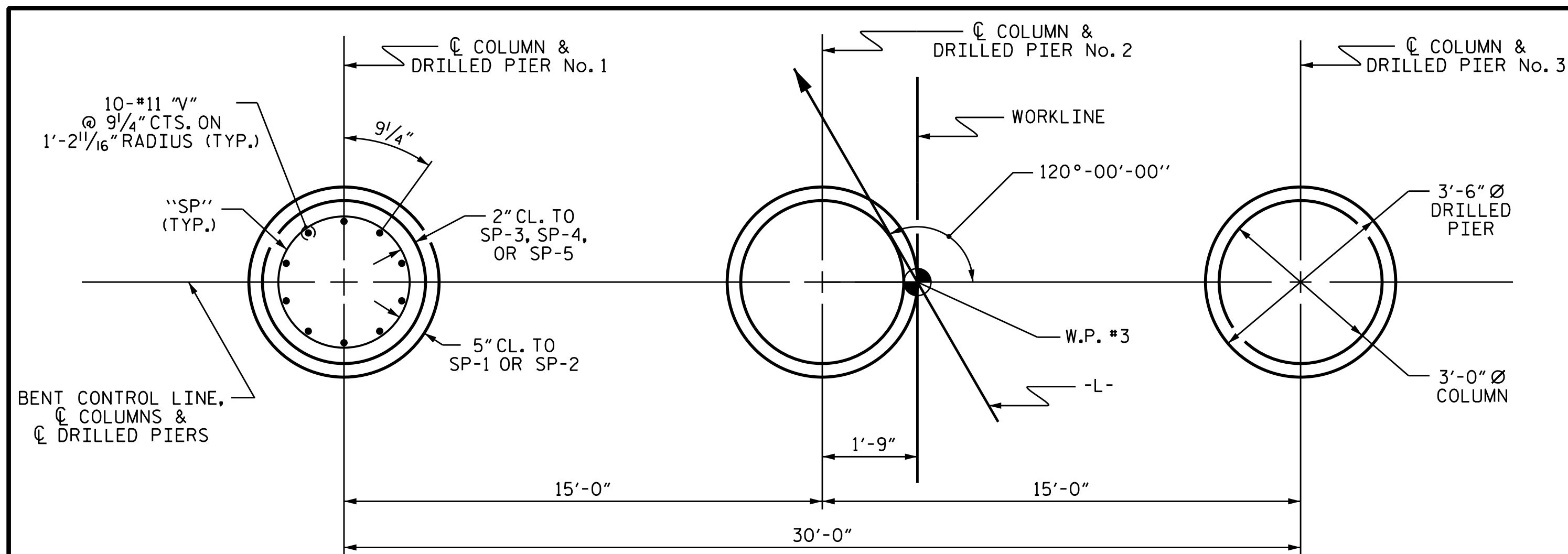
CHECKED BY: R. L. CHESSON DATE: 01/2018

DESIGN ENGINEER OF RECORD: R. L. CHESSON DATE: 01/2018

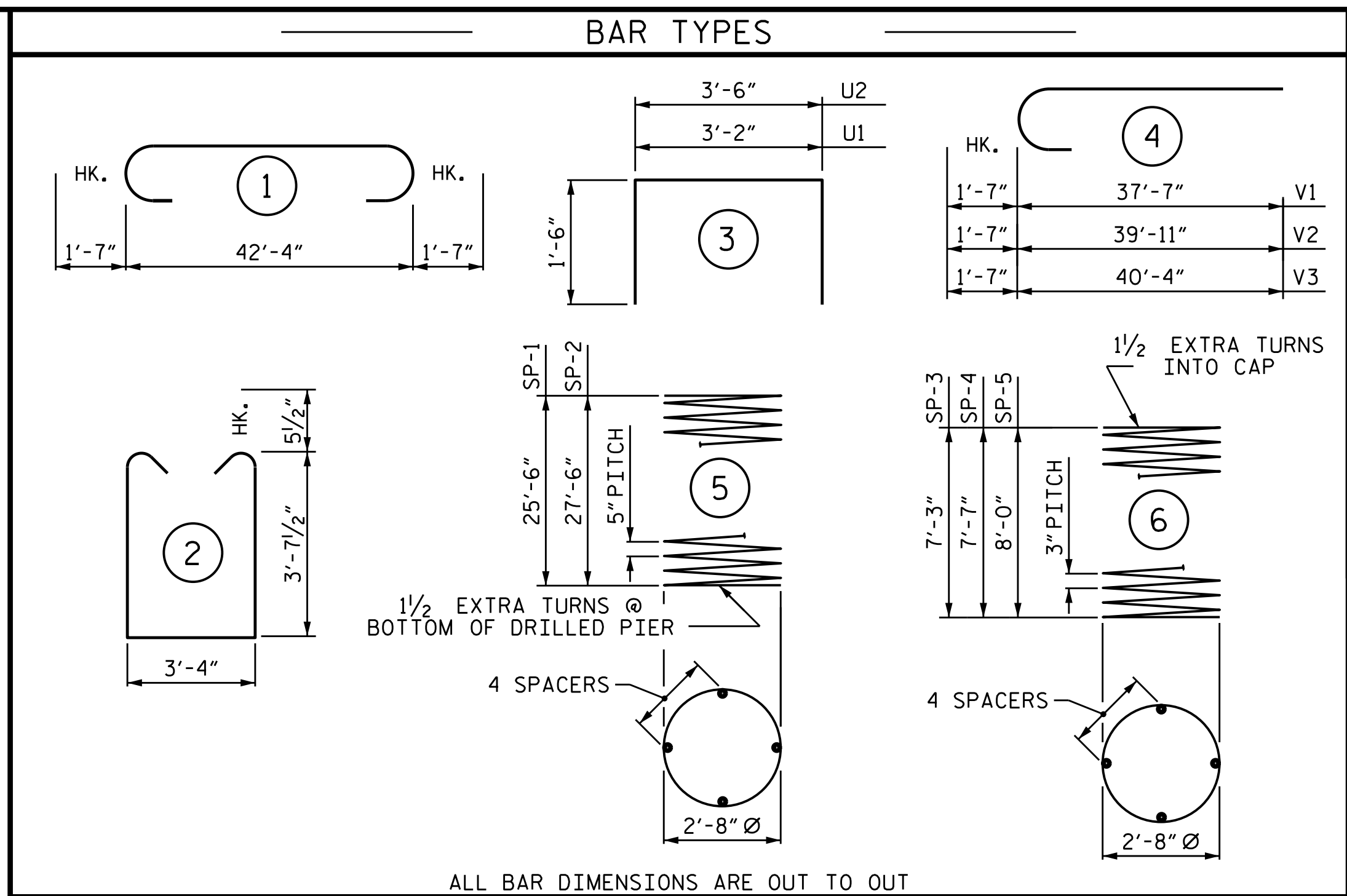
DIMENSIONS & REINFORCING STEEL ARE TYPICAL FOR EACH COLUMN & DRILLED PIER UNLESS OTHERWISE NOTED.

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-23
1			3			TOTAL SHEETS 26
2			4			



PLAN OF DRILLED PIERS & COLUMNS



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL FOR ONE BENT

BAR NO.	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	10	#11	1	45'-6"	2417
B2	14	#5	STR	42'-6"	621
D1	44	#8	STR	2'-3"	264
S1	74	#5	2	11'-6"	888
U1	8	#4	3	6'-2"	33
U2	8	#4	3	6'-6"	35
V1	10	#11	4	39'-2"	2081
V2	10	#11	4	41'-6"	2205
V3	10	#11	4	41'-11"	2227

REINFORCING STEEL (FOR ONE BENT) 10771 LBS.

SP-1	1	*	5	518'-2"	540
SP-2	2	*	5	559'-4"	1166
SP-3	1	**	6	255'-9"	171
SP-4	1	**	6	264'-0"	176
SP-5	1	**	6	280'-6"	187

SPIRAL COLUMN REINFORCING STEEL (FOR ONE BENT) 2240 LBS.

THE SP-1 & SP-2 SPIRAL REINFORCING STEEL SHALL BE W31 OR D-31 COLD DRAWN WIRE OR #5 PLAIN OR DEFORMED BAR

\*\*THE SP-3 THRU SP-5 SPIRAL REINFORCING STEEL SHALL BE W20 OR D-20 COLD DRAWN WIRE OR #4 PLAIN OR DEFORMED BAR

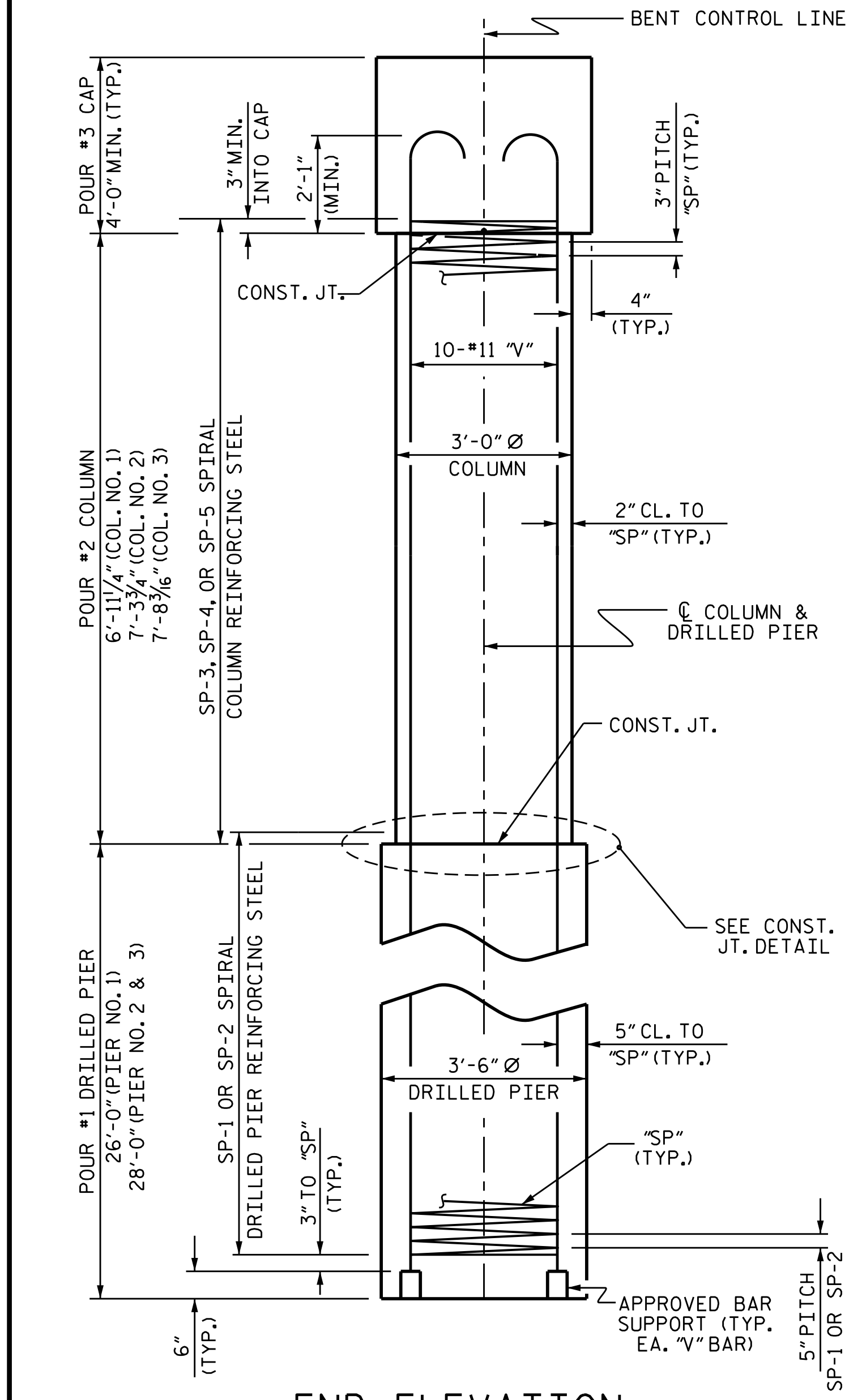
CLASS A CONCRETE BREAKDOWN (FOR ONE BENT)

POUR #2 (COLUMNS)	5.7 C.Y.
POUR #3 (CAP)	23.3 C.Y.

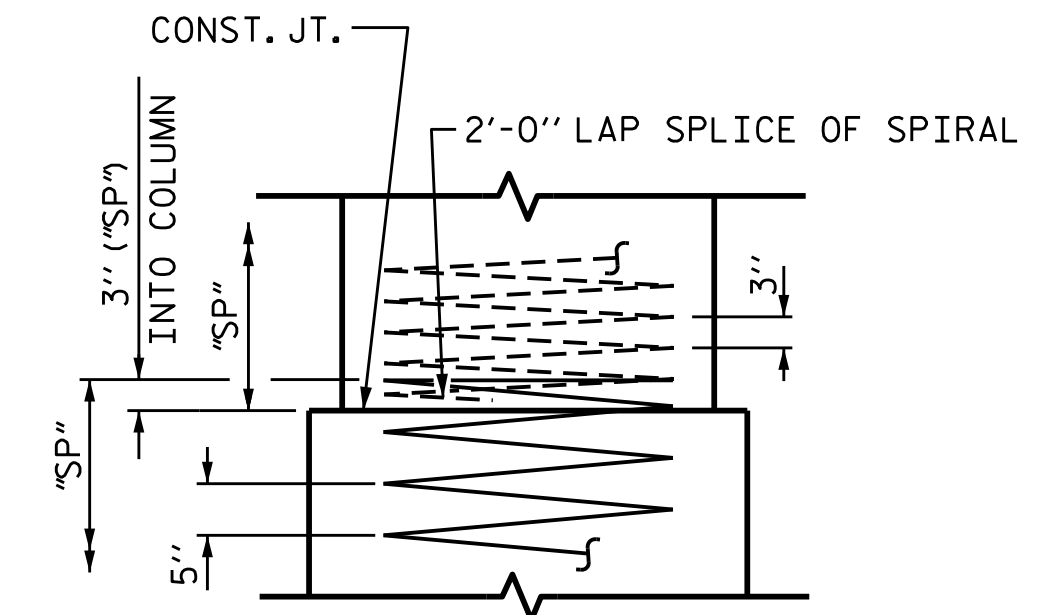
TOTAL CLASS A CONCRETE 29.0 C.Y.

DRILLED PIERS: (FOR ONE BENT)

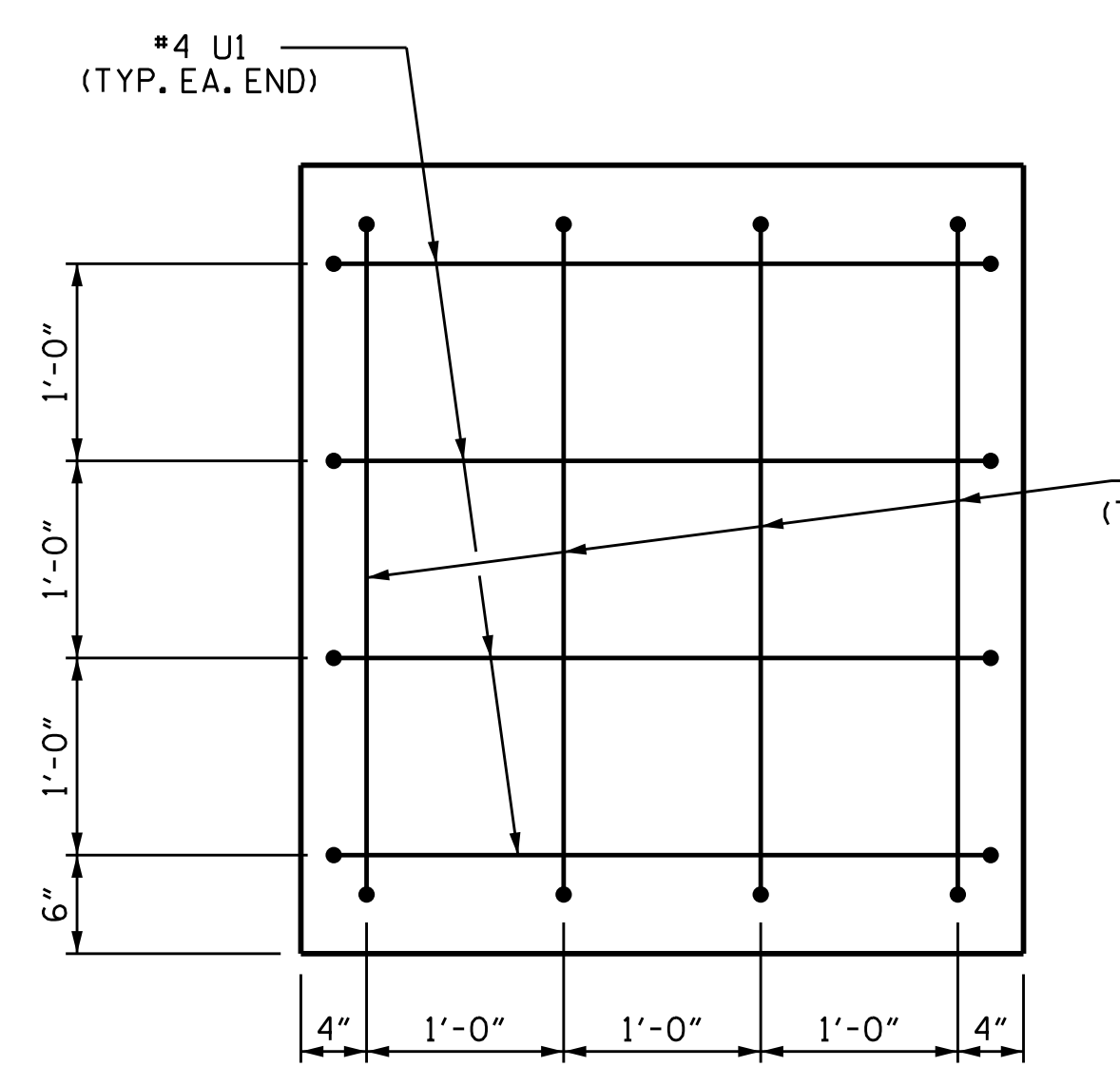
DRILLED PIER CONCRETE	
POUR #1 (DRILLED PIERS)	29.2 C.Y.
3'-6" Ø DRILLED PIER NOT IN SOIL	18 LIN. FT.
3'-6" Ø DRILLED PIER IN SOIL	64 LIN. FT.
SPT TESTING	3 EA.
CSL TUBES	346 LIN. FT.



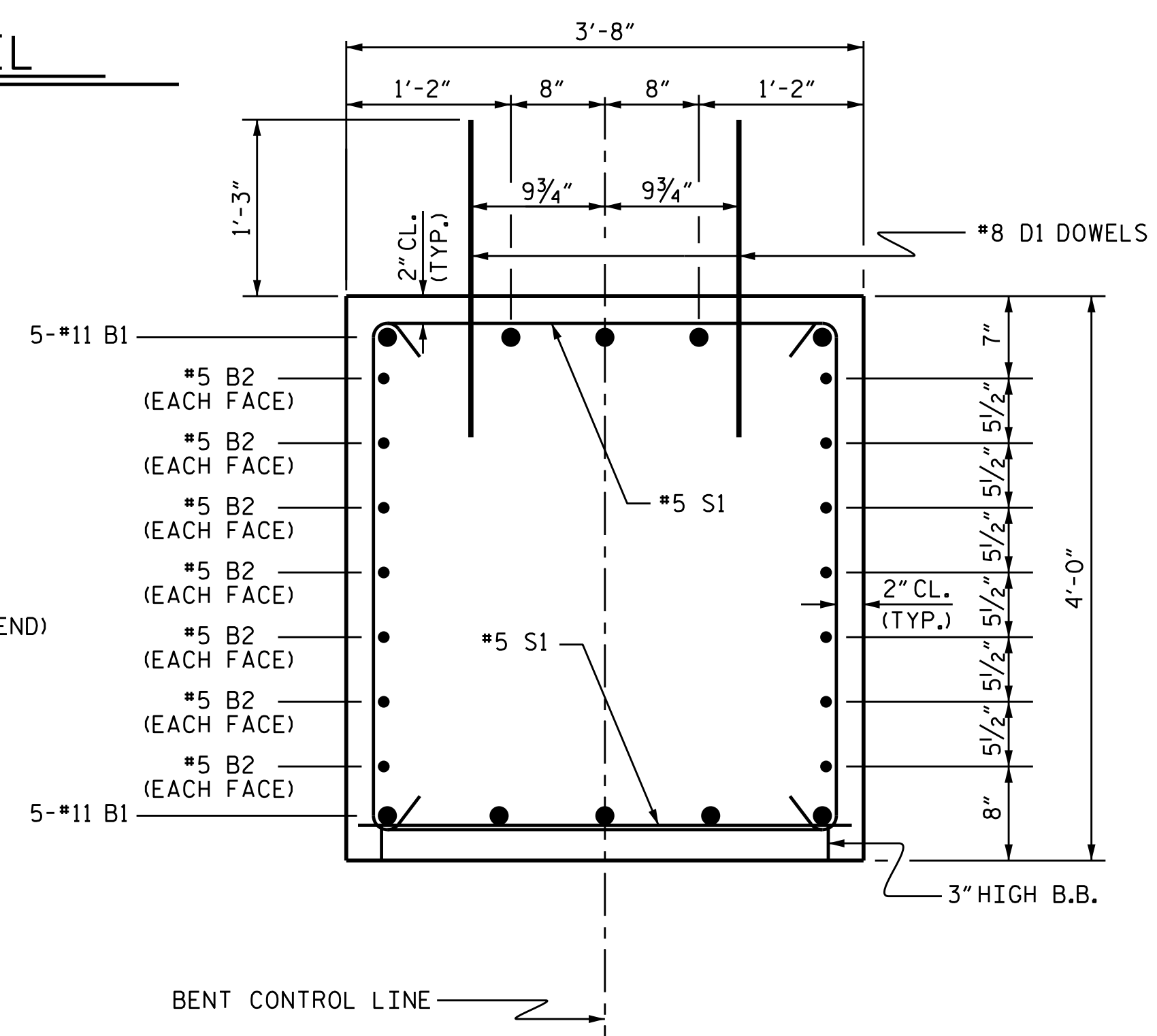
END ELEVATION



CONSTRUCTION JOINT DETAIL



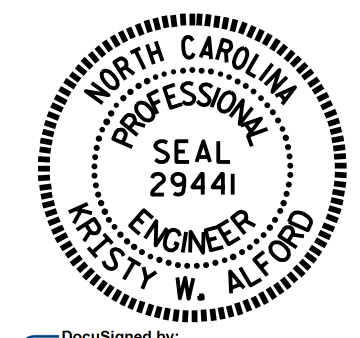
END OF CAP VIEW (TYPICAL BOTH ENDS)



SECTION THRU CAP

PROJECT NO. B-5320  
 GRANVILLE COUNTY  
 STATION: 15+98.00 -L-

SHEET 2 OF 2



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

SUBSTRUCTURE  
 BENT No. 2

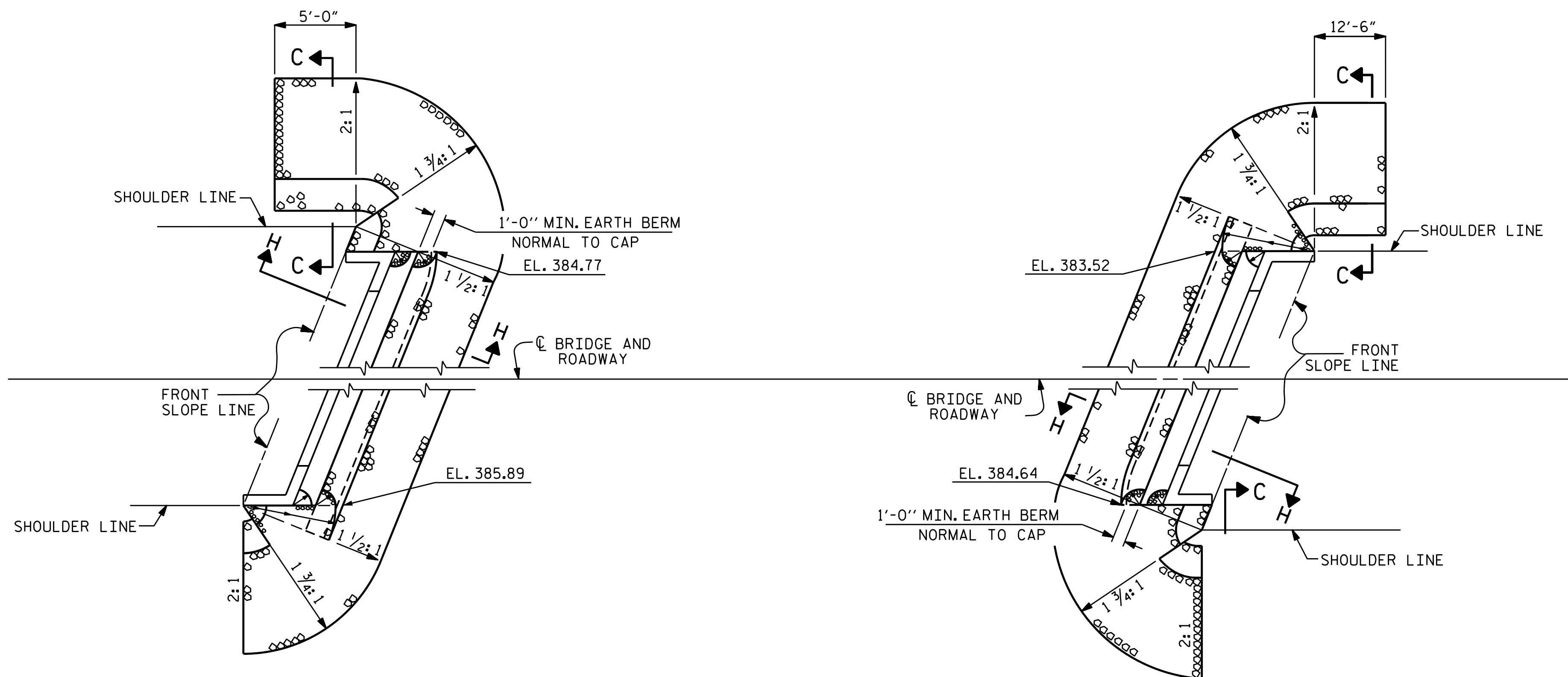
REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	S-24	
1			3			TOTAL SHEETS	26
2			4				

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

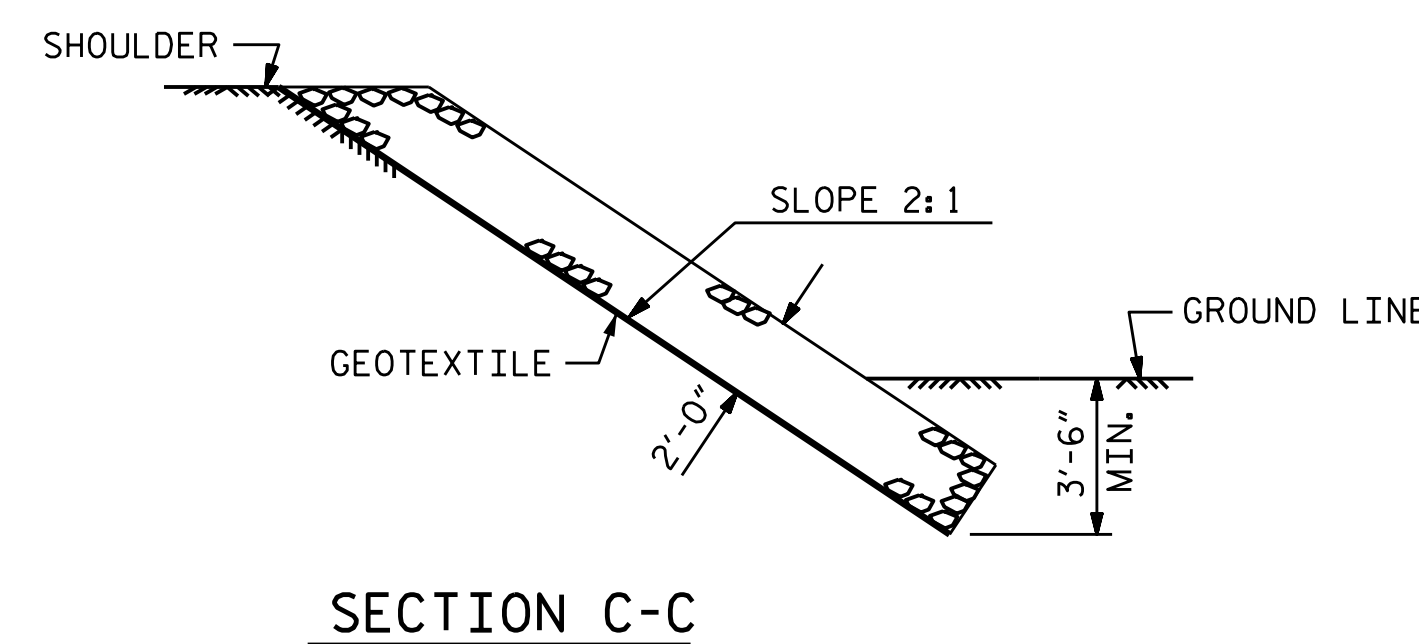
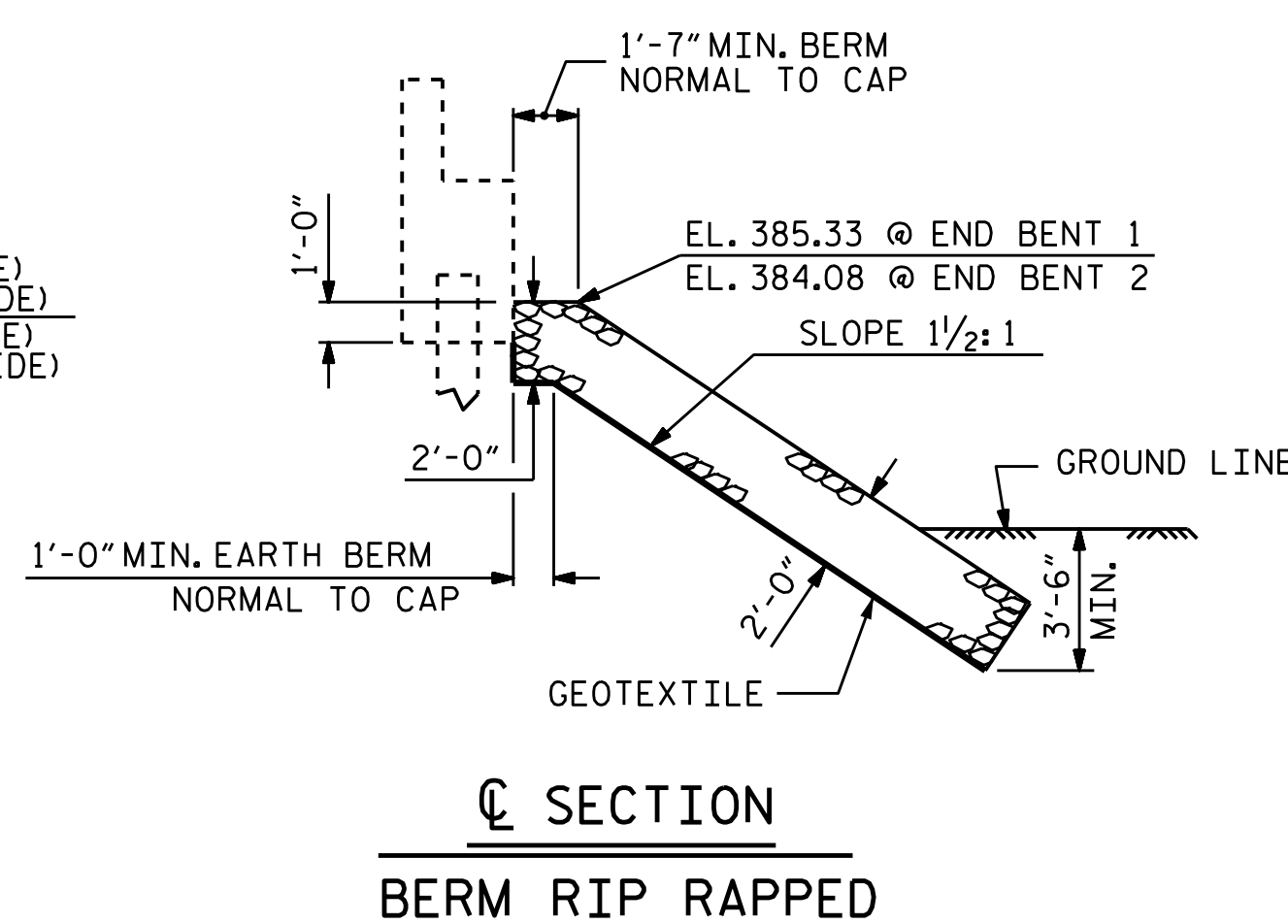
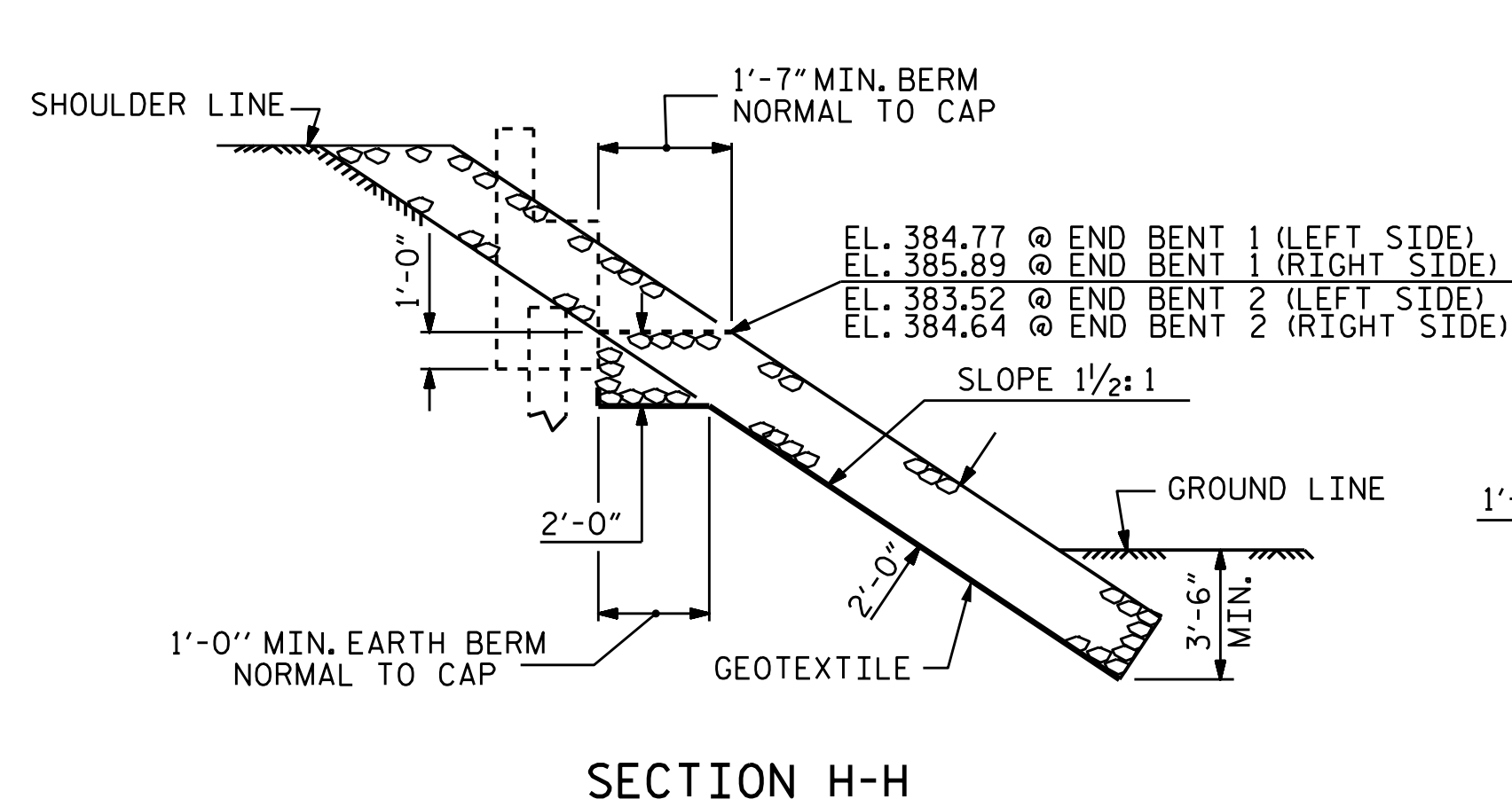
DRAWN BY: S. N. MEGAHED DATE: 01/2018  
 CHECKED BY: R. L. CHESSON DATE: 01/2018  
 DESIGN ENGINEER OF RECORD: R. L. CHESSON DATE: 01/2018



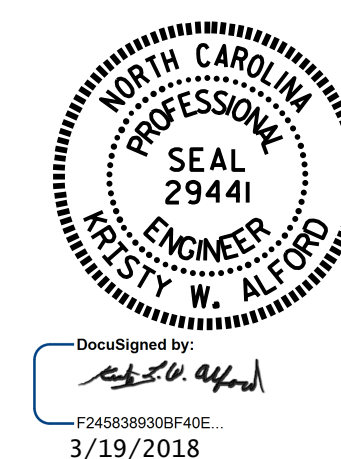
NOTES :  
FOR BERM WIDTH DIMENSIONS, SEE GENERAL DRAWING.



ESTIMATED QUANTITIES		
BRIDGE @ STA. 15+98.00 -L-	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE
	TONS	SQUARE YARDS
END BENT 1	140	155
END BENT 2	180	200



PROJECT NO. B-5320  
GRANVILLE COUNTY  
STATION: 15+98.00 -L-



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

ASSEMBLED BY : W. D. REAMS	DATE : 02/02/18
CHECKED BY : K. W. ALFORD	DATE : 02/06/18
DRAWN BY : REK 1/84	REV. 10/1/11 MAA/GM
CHECKED BY : ROU 1/84	REV. 12/21/11 MAA/GM
	REV. 12/17 MAA/THC

DOCUMENT NOT CONSIDERED  
FINAL UNLESS ALL  
SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			S-25
2			4			TOTAL SHEETS 26

**NOTES**

FOR BRIDGE APPROACH FILL INCLUDING GEOTEXTILE, 4"Ø DRAINAGE PIPE, AND SELECT MATERIAL BACKFILL, 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.

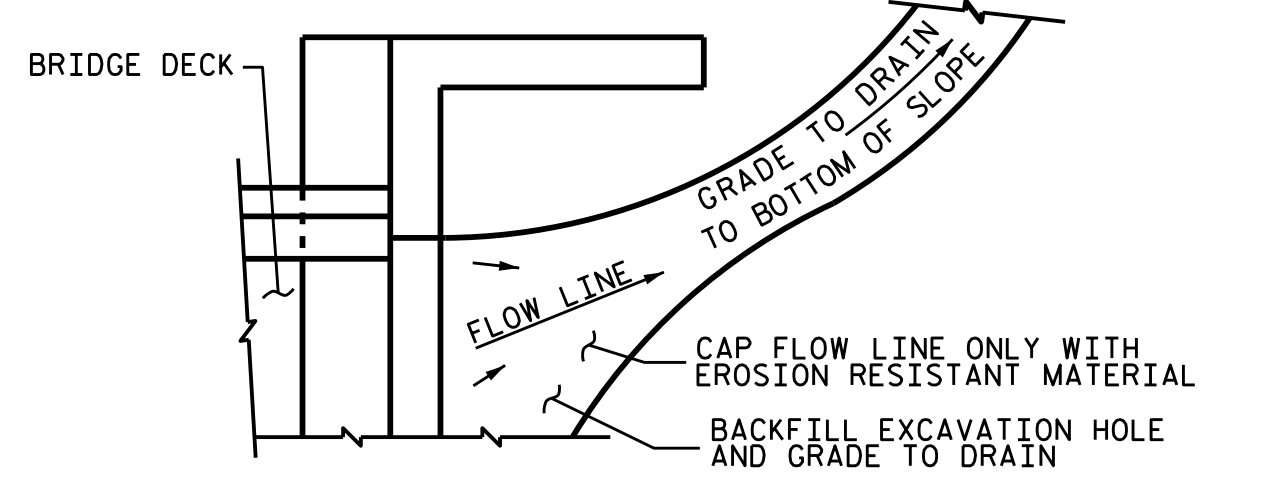
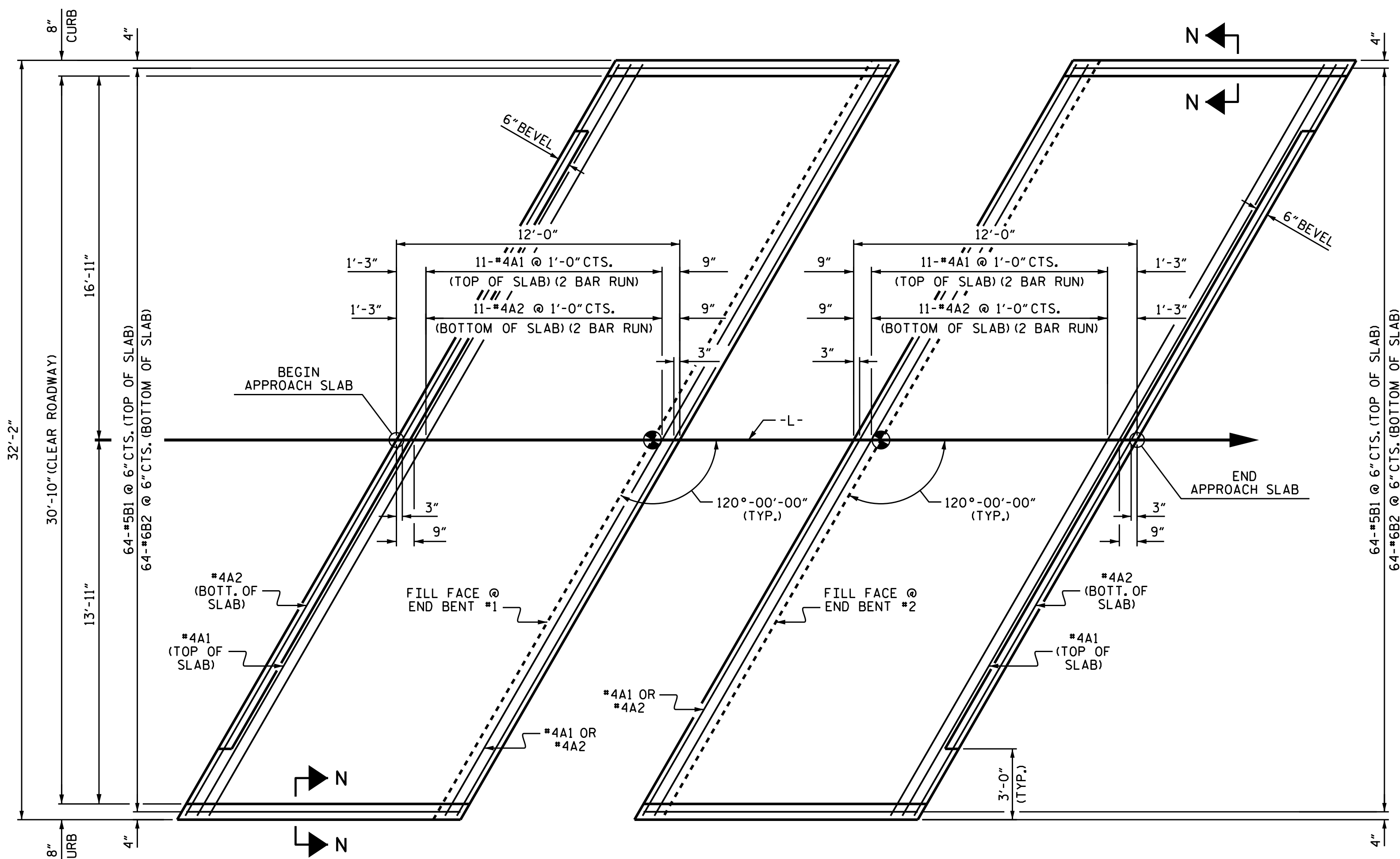
SELECT MATERIAL BACKFILL IS TO BE CONTINUOUS ALONG FILL FACE OF BACKWALL FROM OUTSIDE EDGE TO OUTSIDE EDGE OF APPROACH SLAB.

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

FOR THE 4"Ø DRAINAGE PIPE OUTLET(S), SEE ROADWAY STANDARD DRAWINGS.

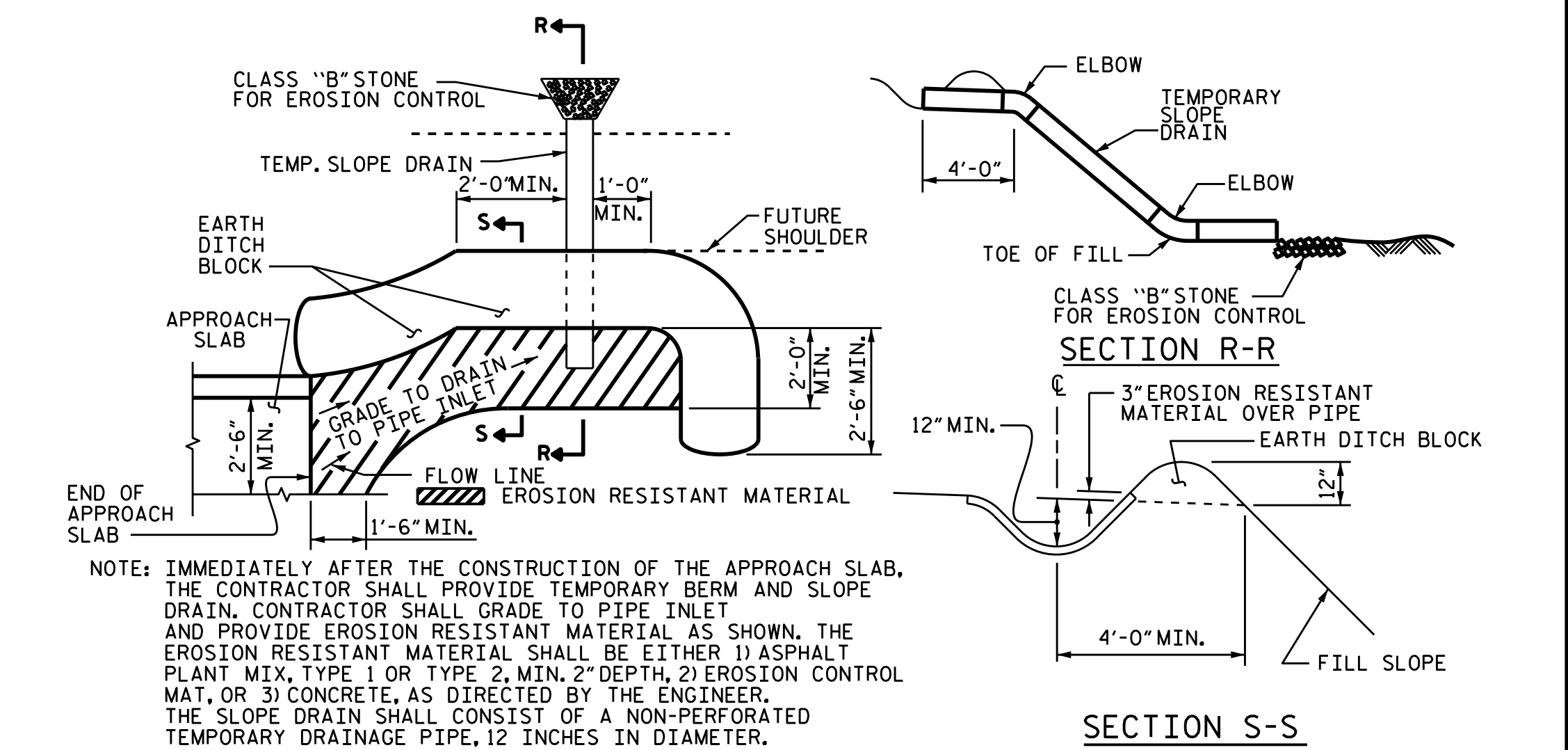
APPROACH SLAB GROOVING IS NOT REQUIRED.

BILL OF MATERIAL					
APPROACH SLAB AT EB #1					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
*A1	26	#4	STR	19'-5"	337
A2	26	#4	STR	19'-4"	336
*B1	64	#5	STR	11'-1"	740
B2	64	#6	STR	11'-7"	1113
REINFORCING STEEL					LBS. 1449
*EPOXY COATED REINFORCING STEEL					LBS. 1077
CLASS AA CONCRETE					C. Y. 17.0
APPROACH SLAB AT EB #2					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
*A1	26	#4	STR	19'-5"	337
A2	26	#4	STR	19'-4"	336
*B1	64	#5	STR	11'-1"	740
B2	64	#6	STR	11'-7"	1113
REINFORCING STEEL					LBS. 1449
*EPOXY COATED REINFORCING STEEL					LBS. 1077
CLASS AA CONCRETE					C. Y. 17.0



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**

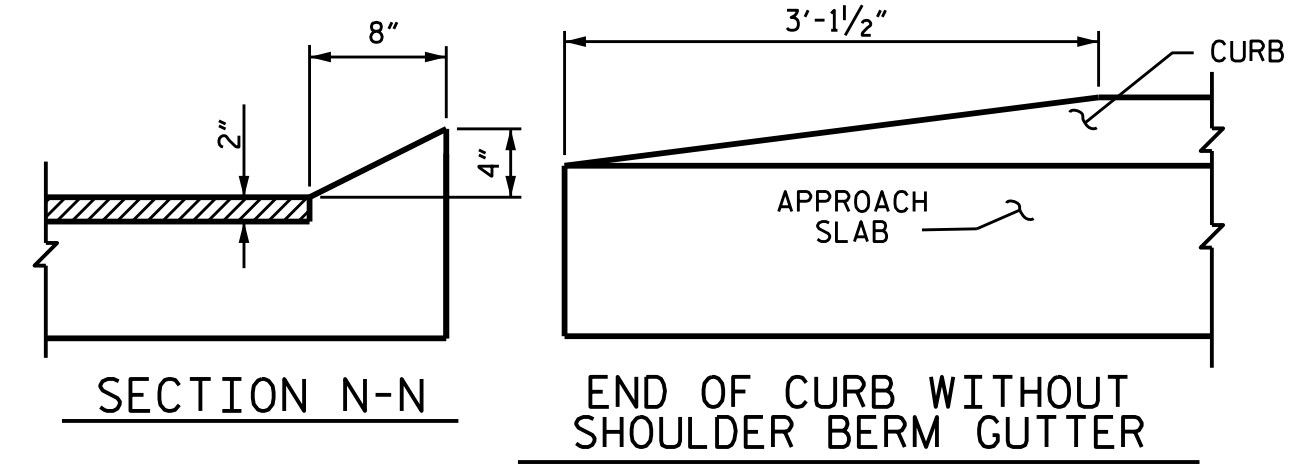


NOTE: IMMEDIATELY AFTER THE CONSTRUCTION OF THE APPROACH SLAB, THE CONTRACTOR SHALL PROVIDE TEMPORARY BERM AND SLOPE DRAIN. CONTRACTOR SHALL GRADE TO PIPE INLET AND PROVIDE EROSION RESISTANT MATERIAL AS SHOWN. THE EROSION RESISTANT MATERIAL SHALL BE EITHER 1) ASPHALT PLANT MIX, TYPE 1 OR TYPE 2, MIN. 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**

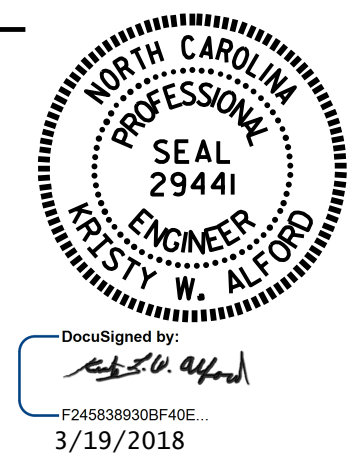
**TEMPORARY BERM AND SLOPE DRAIN DETAILS**

(TO BE USED WHEN SHOULDER BERM GUTTER IS REQUIRED)

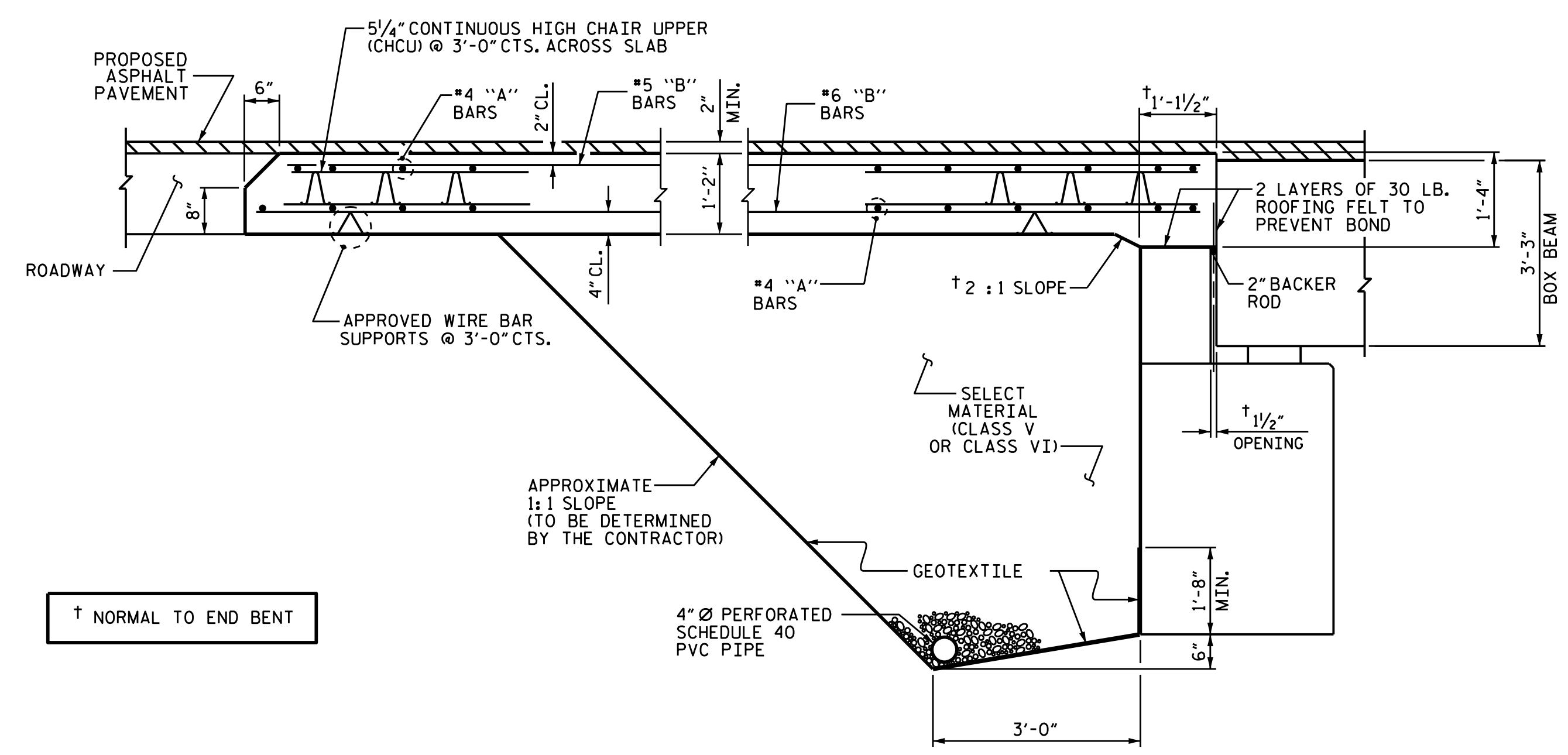


**CURB DETAILS**

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



DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



**SECTION THRU SLAB**

(TYPE II - MODIFIED APPROACH FILL)

ASSEMBLED BY : M. A. LESHURE DATE : 1/4/18  
 CHECKED BY : W. D. REAMS DATE : 02/01/18  
 DRAWN BY : MAA 11/11  
 CHECKED BY : AAC 11/11

REV. 12-17 MAA/THC

PROJECT NO. B-5320  
 GRANVILLE COUNTY  
 STATION: 15+98.00 -L-

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD  
 BRIDGE APPROACH SLAB  
 FOR PRESTRESSED CONCRETE  
 BOX BEAM UNIT  
 (SUB-REGIONAL TIER)  
 120° SKEW

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



## 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 2018 "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  $\frac{3}{4}$ " WITH THE FOLLOWING EXCEPTIONS: TOP CORNERS OF CURBS MAY BE ROUNDED TO  $1\frac{1}{2}$ " RADIUS WHICH IS BUILT INTO CURB FORMS; CORNERS OF TRANSVERSE FLOOR EXPANSION JOINTS SHALL BE ROUNDED WITH A  $\frac{1}{4}$ " 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  $\frac{1}{4}$ " 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  $\frac{1}{8}$ "  $\emptyset$  SHEAR STUDS FOR THE  $\frac{3}{4}$ "  $\emptyset$  STUDS SPECIFIED ON THE PLANS. THIS SUBSTITUTION SHALL BE MADE AT THE RATE OF 3 -  $\frac{1}{8}$ "  $\emptyset$  STUDS FOR 4 -  $\frac{3}{4}$ "  $\emptyset$  STUDS, AND STUD SPACING CHANGES SHALL BE MADE AS NECESSARY TO PROVIDE THE SAME EQUIVALENT NUMBER OF  $\frac{1}{8}$ "  $\emptyset$  STUDS ALONG THE BEAM AS SHOWN FOR  $\frac{3}{4}$ "  $\emptyset$  STUDS BASED ON THE RATIO OF 3 -  $\frac{1}{8}$ "  $\emptyset$  STUDS FOR 4 -  $\frac{3}{4}$ "  $\emptyset$  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  $\frac{3}{16}$ " 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  $\frac{1}{16}$ " 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

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