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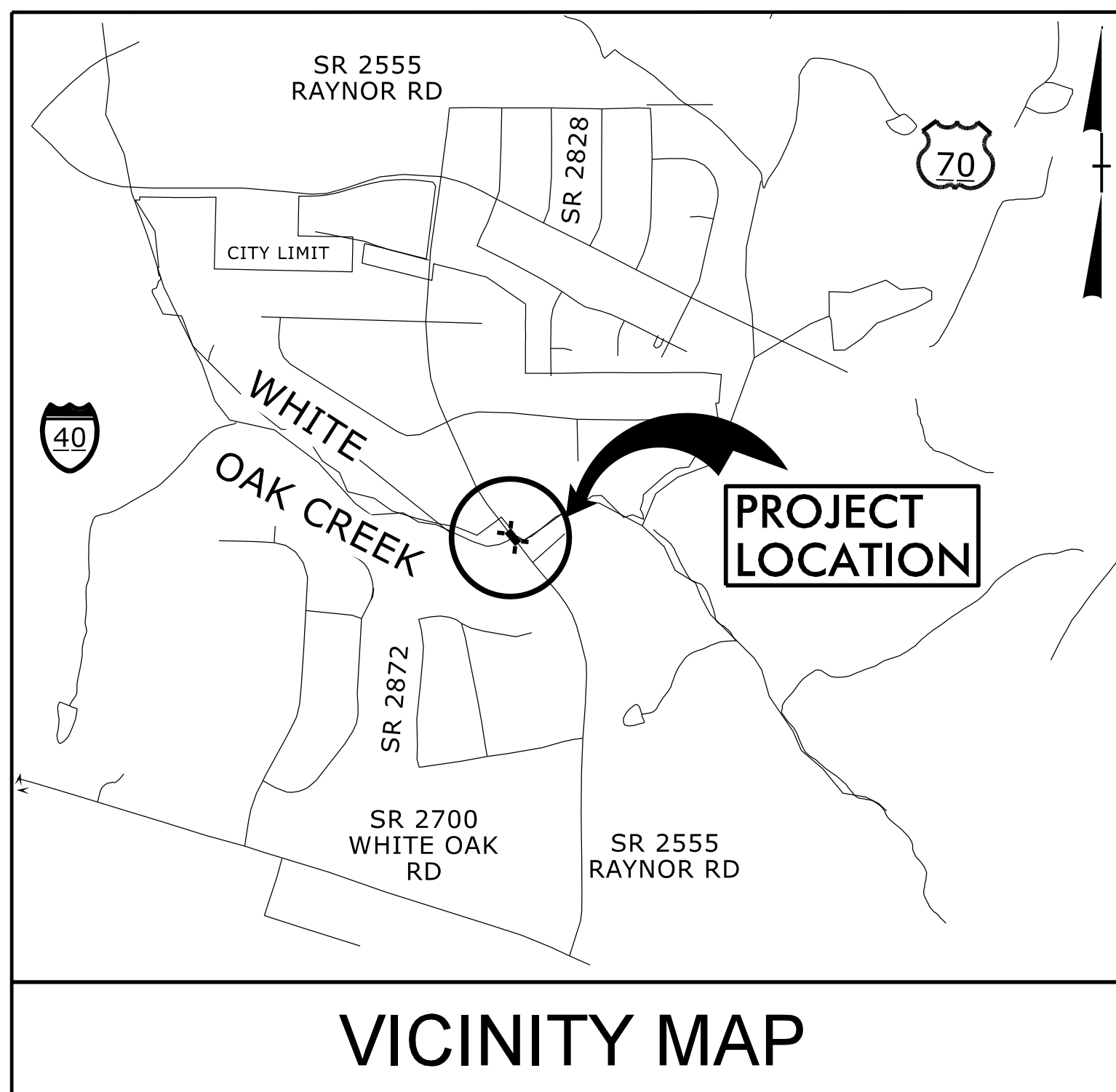
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TIP PROJECT NO: B-5326

CONTRACT: C204207

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-5326		
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
46040.1.1	BRZ-2555(1)	PE	
46040.2.1	BRZ-2555(1)	RW & UTILITY	
46040.3.1		CONST.	

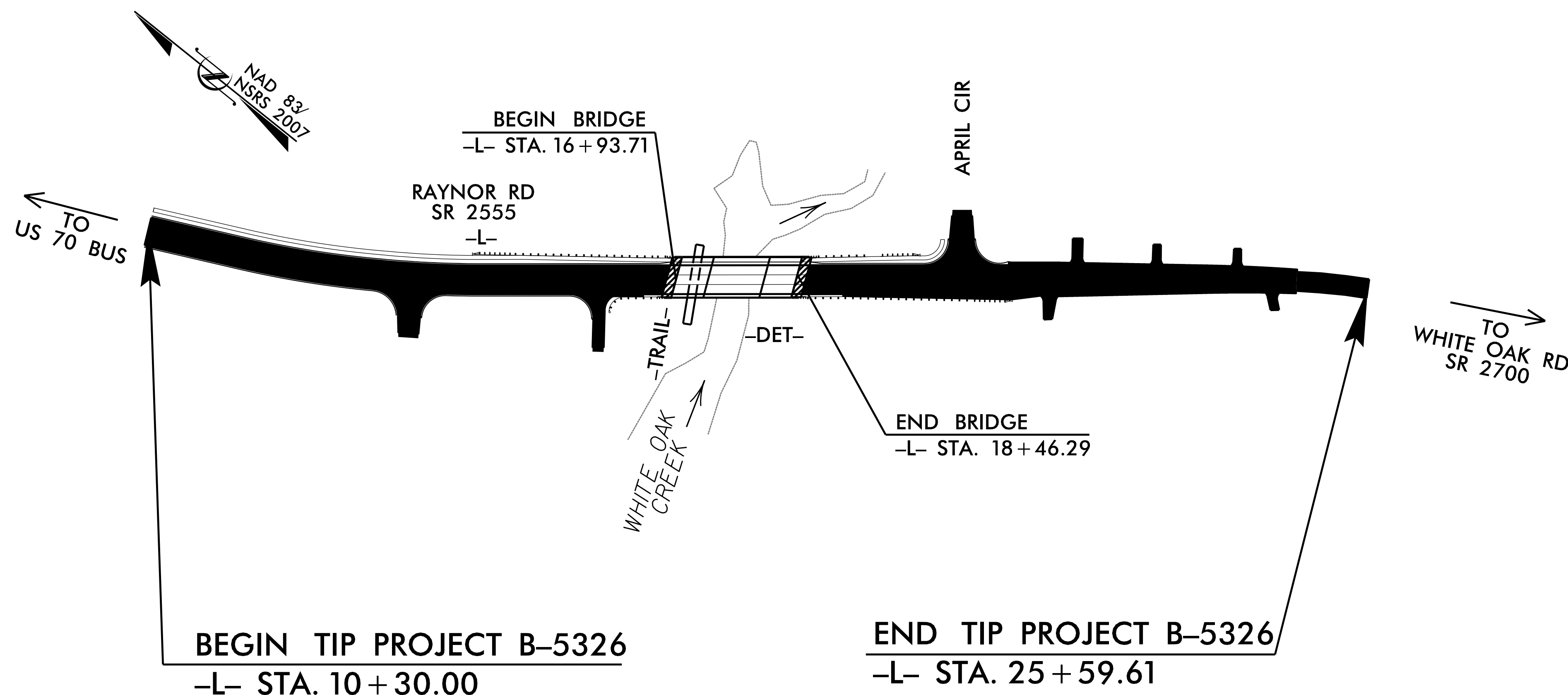


VICINITY MAP

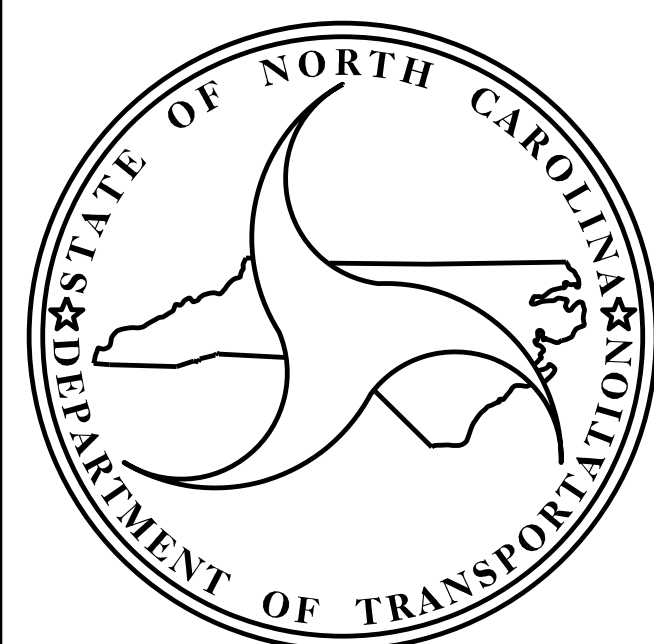
ON-SITE DETOUR

STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS  
**WAKE COUNTY**

**LOCATION: REPLACE BRIDGE NO. 247  
OVER WHITE OAK CREEK ON SR 2555 (RAYNOR RD)**  
**TYPE OF WORK: GRADING, PAVING, DRAINAGE, AND STRUCTURE**



**STRUCTURES**



**DESIGN DATA**  
 ADT 2019 = 4767  
 ADT 2040 = 6400  
 K = 12 %  
 D = 55 %  
 T = 4 % \*  
 V = 50 MPH  
 \* (TTST = 1% + DUAL = 3%)  
 FUNC CLASS =  
 MAJOR COLLECTOR  
 SUBREGIONAL TIER

**PROJECT LENGTH**  
 LENGTH ROADWAY TIP PROJECT B-5326 = 0.261 MILES  
 LENGTH STRUCTURE TIP PROJECT B-5326 = 0.029 MILES  
 TOTAL LENGTH OF TIP PROJECT B-5326 = 0.290 MILES

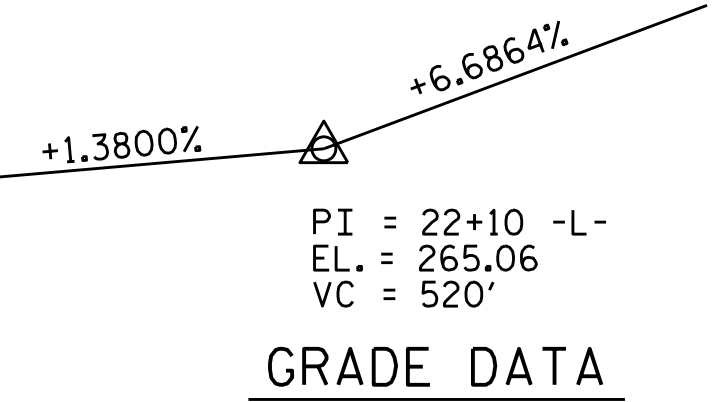
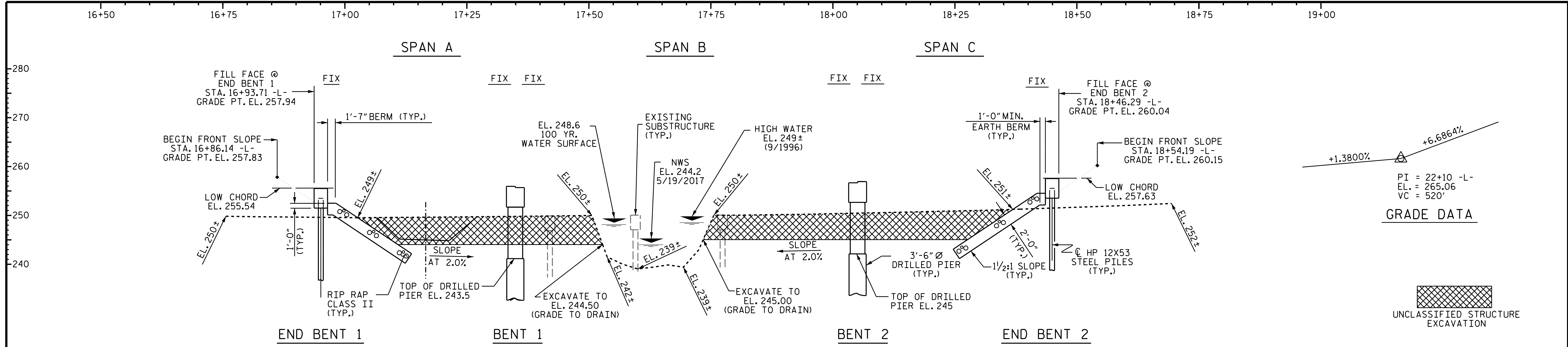
Prepared in the Office of:  
**DIVISION OF HIGHWAYS**  
 STRUCTURES MANAGEMENT UNIT  
 1000 BIRCH RIDGE DR.  
 RALEIGH, N.C. 27610

2018 STANDARD SPECIFICATIONS

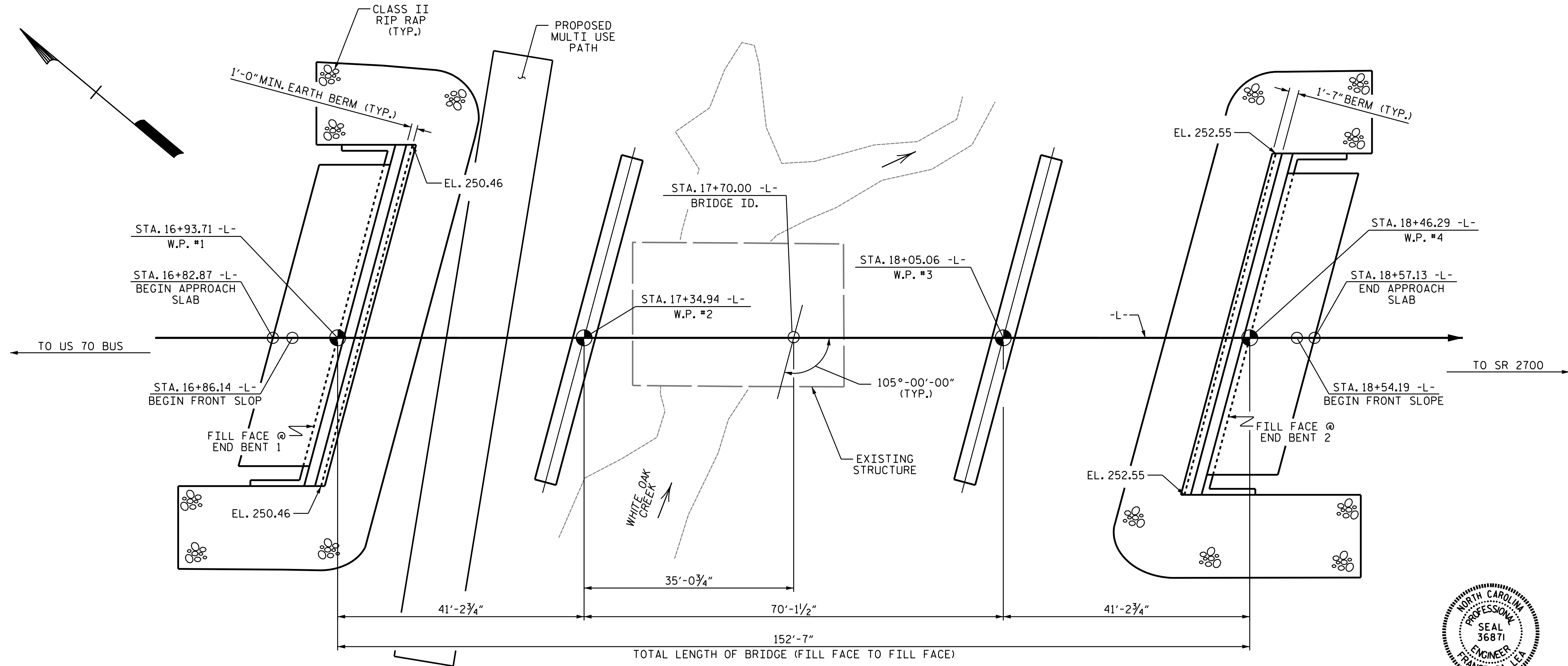
LETTING DATE : OCTOBER 18, 2022

K. W. ALFORD, PE  
PROJECT ENGINEER

F. LEA, PE  
PROJECT DESIGN ENGINEER



I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS.



PROJECT NO. B-5326  
WAKE COUNTY  
STATION: 17+70.00 -L-

SHEET 1 OF 3 REPLACES BRIDGE #247

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

**GENERAL DRAWING**  
FOR BRIDGE OVER  
WHITE OAK CREEK  
ON SR 2555  
BETWEEN SR 2700  
AND SR 2511

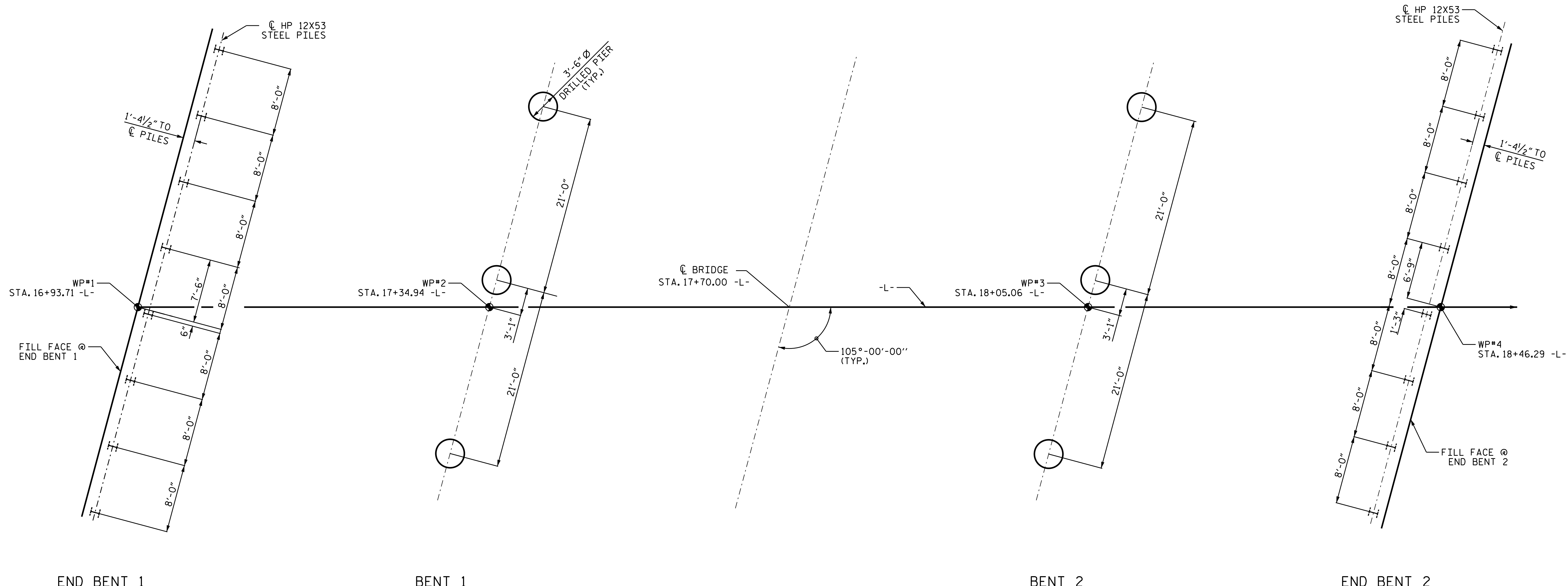


REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-1
1			3			TOTAL SHEETS
2			4			29

DRAWN BY : F. LEA      DATE : 12/2018  
CHECKED BY : S.N. MEGAHED      DATE : 01/2019

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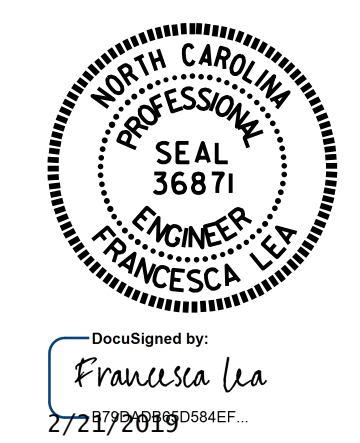


**FOUNDATION LAYOUT**  
 DIMENSIONS LOCATING PILES AND DRILLED PIERS ARE SHOWN TO THE CENTERLINE OF PILES & DRILLED PIERS.

**NOTES**

- FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.
- PILES AT END BENT NO.1 AND END BENT NO.2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 75 TONS PER PILE AND 70 TONS PER PILE, RESPECTIVELY.
- DRIVE PILES AT END BENT NO.1 AND END BENT NO.2 TO A REQUIRED DRIVING RESISTANCE OF 125 TONS PER PILE AND 120 TONS PER PILE, RESPECTIVELY.
- FOR DRILLED PIERS, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.
- DRILLED PIERS AT BENT NO.1 AND BENT NO.2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 570 TONS PER PIER. CHECK FIELD CONDITIONS FOR THE REQUIRED TIP RESISTANCE OF 270 TSF.
- PERMANENT STEEL CASINGS MAY BE REQUIRED FOR DRILLED PIERS AT BENT NO.1. IF REQUIRED, DO NOT EXTEND PERMANENT CASINGS BELOW ELEVATION 216.5 FT WITHOUT PRIOR APPROVAL FROM THE ENGINEER. THE ENGINEER WILL DETERMINE THE NEED FOR PERMANENT CASINGS.
- PERMANENT STEEL CASINGS MAY BE REQUIRED FOR DRILLED PIERS AT BENT NO.2. IF REQUIRED, DO NOT EXTEND PERMANENT CASINGS BELOW ELEVATION 215.5 FT (LEFT & CENTER), AND ELEVATION 221.5 FT (RIGHT) WITHOUT PRIOR APPROVAL FROM THE ENGINEER. THE ENGINEER WILL DETERMINE THE NEED FOR PERMANENT CASINGS.
- INSTALL PERMANENT STEEL CASINGS AT BENT NO.1 AND BENT NO.2 BY VIBRATING, SCREWING OR DRIVING PERMANENT CASINGS BEFORE EXCAVATION OR DISTURBING ANY MATERIAL BELOW 233.5 FT.
- INSTALL DRILLED PIERS AT BENT NO.1 TO A TIP ELEVATION NO HIGHER THAN 210 FT WITH THE REQUIRED TIP RESISTANCE AND A PENETRATION OF AT LEAST 2 FT INTO ROCK AS DEFINED BY ARTICLE 411-1 OF THE STANDARD SPECIFICATIONS.
- INSTALL DRILLED PIERS AT BENT NO.2 TO A TIP ELEVATION NO HIGHER THAN 210 FT (LEFT & CENTER) AND 216 FT (RIGHT) WITH THE REQUIRED TIP RESISTANCE AND A PENETRATION OF AT LEAST 7 FT INTO ROCK AS DEFINED BY ARTICLE 411-1 OF THE STANDARD SPECIFICATIONS.
- THE SCOUR CRITICAL ELEVATIONS FOR BENT NO.1 AND BENT NO.2 IS ELEVATION 231 FT. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.
- SID INSPECTIONS MAY BE REQUIRED FOR DRILLED PIERS. THE ENGINEER WILL DETERMINE THE NEED FOR SID INSPECTIONS. 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. FOR CSL TESTING, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.

DRAWN BY : S.N. MEGAHED DATE : 12/2018  
 CHECKED BY : F. LEA DATE : 01/2019  
 DESIGN ENGINEER OF RECORD: S.N. MEGAHED DATE : 12/2018



PROJECT NO. B-5326  
WAKE COUNTY  
 STATION: 17+70.00 -L-  
 SHEET 2 OF 3

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH						SHEET NO.
FOUNDATION LAYOUT						S-2
REVISIONS						TOTAL SHEETS
NO.	BY:	DATE:	NO.	BY:	DATE:	29
1			3			
2			4			

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

**TOTAL BILL OF MATERIAL**

	CONSTRUCTION, MAINTENANCE, & REMOVAL OF TEMP STRUCTURE	REMOVAL OF EXISTING STRUCTURE	ASBESTOS ASSESSMENT	3'-6" DIA DRILLED PIERS IN SOIL	3'-6" DIA DRILLED PIERS NOT IN SOIL	PERMANENT STEEL CASING FOR 3'-6" DIA DRILLED PIERS	SID INSPECTION	CSL TESTING	UNCLASSIFIED STRUCTURE EXCAVATION	CLASS AA CONCRETE	CLASS A CONCRETE	BRIDGE APPROACH SLABS	REINFORCING STEEL	EPOXY COATED REINFORCING STEEL
	LUMP SUM	LUMP SUM	LUMP SUM	LIN. FT.	LIN. FT.	LIN. FT.			LUMP SUM	CU. YDS.	CU. YDS.	LUMP SUM	LBS.	LBS.
SUPERSTRUCTURE										19.6		LUMP SUM		1114
END BENT NO. 1									LUMP SUM		29.9		3925	
BENT NO. 1				83.5	17	81					37.9		13534	
BENT NO. 2				78	21	82.5					37.5		13361	
END BENT NO. 2									LUMP SUM		29.9		3925	
TOTAL	LUMP SUM	LUMP SUM	LUMP SUM	161.5	38	163.5	1	1	LUMP SUM	19.6	135.2	LUMP SUM	34745	1114

	SPIRAL COLUMN REINFORCING STEEL	PILE DRIVING EQUIPMENT SETUP FOR HP 12X53 STEEL PILES	HP 12 X 53 STEEL PILES	TWO BAR METAL RAIL	VERTICAL CONCRETE BARRIER RAIL	1'-2" X 3'-5 3/8" CONCRETE PARAPET	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE	ELASTOMERIC BEARINGS	3'-0" X 1'-9" PRESTRESSED CONCRETE CORED SLABS	3'-0" X 2'-0" PRESTRESSED CONCRETE CORED SLABS			
	LBS.	EA	NO.	LIN.FT.	LIN.FT.	LIN.FT.	TONS	SY	LUMP SUM	NO.	LIN.FT.	NO.	LIN.FT.	
SUPERSTRUCTURE					142.75	150.38	150.25		LUMP SUM	34	1360	17	1190	
END BENT NO. 1		8	8	260				245	270					
BENT NO. 1	2679													
BENT NO. 2	2605													
END BENT NO. 2		8	8	340				280	310					
TOTAL	5284	16	16	600	142.75	150.25	150.25	525	580	LUMP SUM	34	1360	17	1190

**NOTES**

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.  
 FOR OTHER DESIGN DATA AND GENERAL NOTES, SEE SHEET SN.

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

THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.

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

THE EXISTING STRUCTURE CONSISTING OF 2 SPANS, EACH SPAN @ 18'-0" WITH A REINFORCED CONCRETE DECK ON TIMBER JOISTS WITH A CLEAR ROADWAY WIDTH OF 24'-0" ON TIMBER CAPS WITH TIMBER PILE BENT AND END BENTS AND STEEL CRUTCH BENTS AND LOCATED AT THE PROPOSED STRUCTURE SHALL BE REMOVED. THE EXISTING IS PRESENTLY POSTED FOR LOAD LIMIT. SHOULD THE STRUCTURAL INTEGRITY OF THE BRIDGE DETERIORATE DURING CONSTRUCTION OF THE PROPOSED BRIDGE, THE LOAD LIMIT MAY BE REDUCED AS FOUND NECESSARY DURING THE LIFE OF THE PROJECT.

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

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.

IN AS MUCH AS THE PAINT SYSTEM ON THE EXISTING STRUCTURAL STEEL CONTAINS LEAD, THE CONTRACTOR'S ATTENTION IS DIRECTED TO ARTICLE 107-1 OF THE STANDARD SPECIFICATIONS. ANY COSTS RESULTING FROM COMPLIANCE WITH APPLICABLE STATE OR FEDERAL REGULATIONS PERTAINING TO HANDLING OF MATERIALS CONTAINING LEAD BASED PAINT SHALL BE INCLUDED IN THE BID PRICE FOR "REMOVAL OF EXISTING STRUCTURE AT STATION 17+70.00 -L-"

THE MATERIAL SHOWN IN THE CROSS-HATCHED AREA ON SHEET S-1 SHALL BE EXCAVATED FOR A DISTANCE OF 30 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 CONTRACTOR WILL BE REQUIRED TO CONSTRUCT, MAINTAIN AND AFTERWARDS REMOVE A TEMPORARY STRUCTURE AT STATION 17+50.00 -DET- FOR USE DURING CONSTRUCTION OF THE PROPOSED STRUCTURE. FOR CONSTRUCTION, MAINTENANCE AND REMOVAL OF TEMPORARY STRUCTURE, SEE SPECIAL PROVISIONS.

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

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

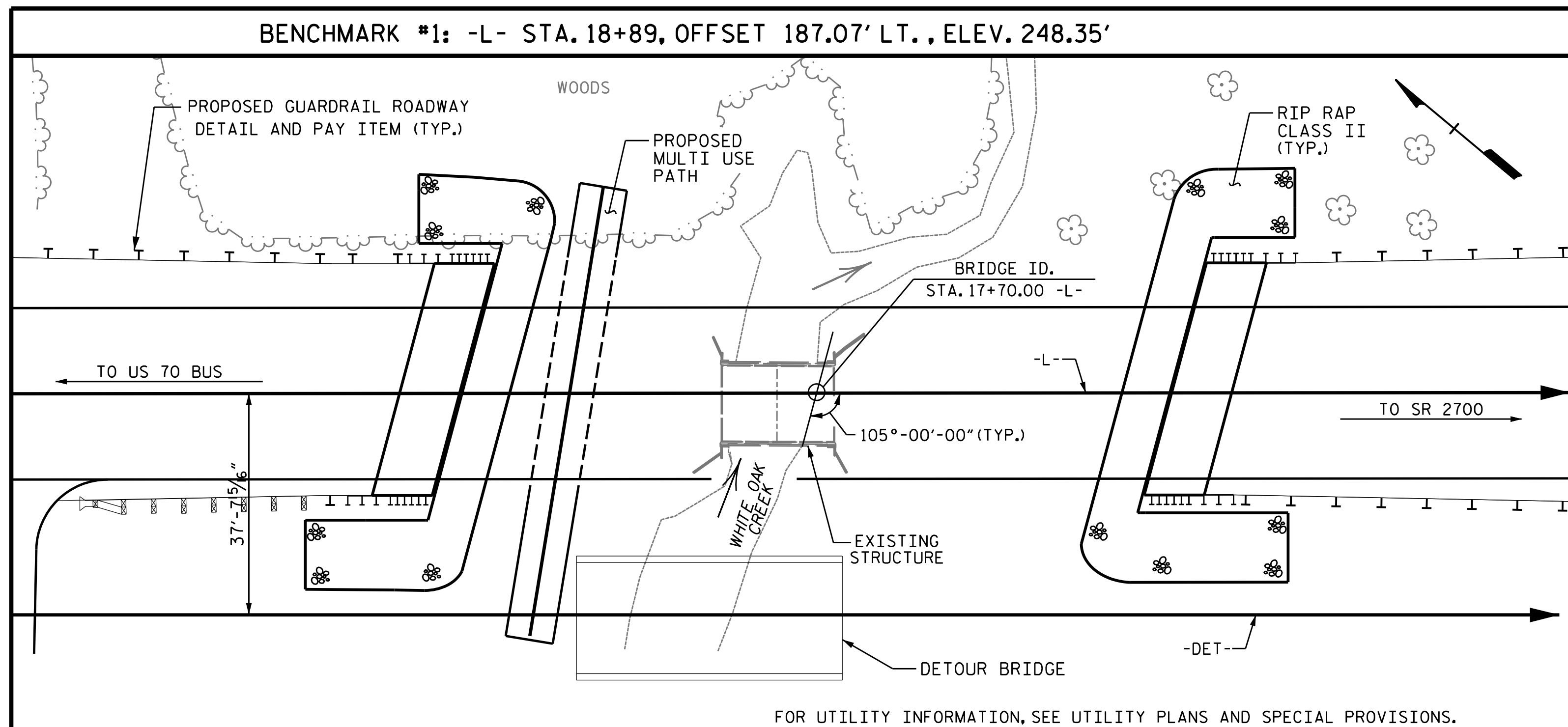
FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.



**LOCATION SKETCH**

**HYDRAULIC DATA**

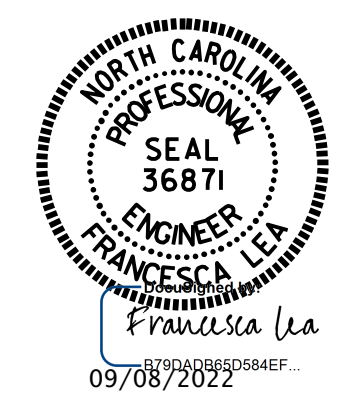
DESIGN DISCHARGE.....	1820 CFS
FREQUENCY OF DESIGN FLOOD.....	25 YEARS
DESIGN HIGH WATER ELEVATION.....	247.9
DRAINAGE AREA.....	3.6 SQ. MI.
BASE DISCHARGE (Q100).....	2300 CFS
BASE HIGH WATER ELEVATION.....	248.6

**OVERTOPPING FLOOD DATA**

OVERTOPPING DISCHARGE.....	>2960 CFS
FREQUENCY OF OVERTOPPING FLOOD.....	> 500 YR.
OVERTOPPING FLOOD ELEVATION.....	253.5
EOP RT @ STA. 12+66 -L-	

PROJECT NO. B-5326  
WAKE COUNTY  
 STATION: 17+70.00 -L-

SHEET 3 OF 3



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**GENERAL DRAWING**  
 FOR BRIDGE OVER  
 WHITE OAK CREEK  
 ON SR 2555  
 BETWEEN SR 2700  
 AND SR 2511

DRAWN BY :	F. LEA	DATE :	01/2019
CHECKED BY :	S.N. MEGAHED	DATE :	01/2019
DESIGN ENGINEER OF RECORD :	F. LEA	DATE :	01/2019

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

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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 (LRFR) SUMMARY FOR PRESTRESSED CONCRETE GIRDERS

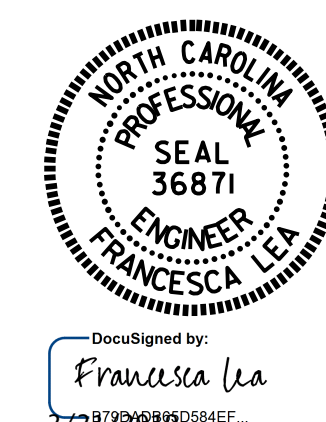
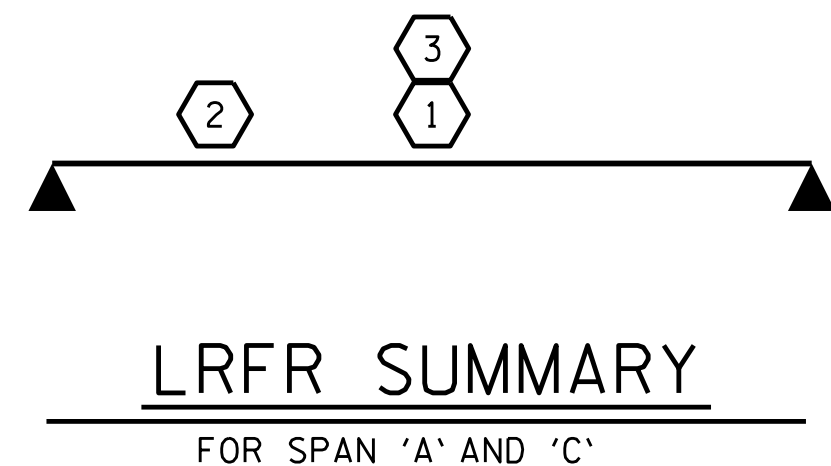
LEVEL	VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING #	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE										SERVICE III LIMIT STATE					COMMENT NUMBER			
						MOMENT					SHEAR					MOMENT								
						LIVE-LOAD FACTORS ( $\gamma_{LL}$ )	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	LIVE-LOAD FACTORS ( $\gamma_{LL}$ )	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN		GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING	HL-93 (INVENTORY)	N/A	①	1.655	--	1.75	0.256	1.962	A	17	19.48	0.620	1.752	A	17	7.79	0.80	0.256	1.655	A	17	19.48		
	HL-93 (OPERATING)	N/A		2.271	--	1.35	0.256	2.544	A	17	19.48	0.620	2.271	A	17	7.79	N/A	--	--	--	--	--		
	HS-20 (INVENTORY)	36.000	②	1.998	71.927	1.75	0.256	2.459	A	17	19.48	0.620	1.998	A	17	7.79	0.80	0.256	2.074	A	17	19.48		
	HS-20 (OPERATING)	36.000		2.59	93.24	1.35	0.256	3.187	A	17	19.48	0.620	2.59	A	17	7.79	N/A	--	--	--	--	--		
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		3.833	51.75	1.40	0.256	5.68	A	17	19.48	0.620	5.089	A	17	7.79	0.80	0.256	3.833	A	17	19.48	
		SNGARBS2	20.000		3.188	63.764	1.40	0.256	4.662	A	17	23.38	0.620	3.866	A	17	7.79	0.80	0.256	3.188	A	17	19.48	
		SNAGRIS2	22.000		3.116	68.552	1.40	0.256	4.555	A	17	23.38	0.620	3.692	A	17	7.79	0.80	0.256	3.116	A	17	23.38	
		SNCOTTS3	27.250		1.916	52.216	1.40	0.256	2.839	A	17	19.48	0.620	2.564	A	17	7.79	0.80	0.256	1.916	A	17	19.48	
		SNAGGRS4	34.925		1.725	60.242	1.40	0.256	2.556	A	17	19.48	0.620	2.307	A	17	7.79	0.80	0.256	1.725	A	17	19.48	
		SNS5A	35.550		1.678	59.646	1.40	0.256	2.486	A	17	19.48	0.620	2.442	A	17	7.79	0.80	0.256	1.678	A	17	19.48	
		SNS6A	39.950		1.597	63.781	1.40	0.256	2.366	A	17	19.48	0.620	2.316	A	17	7.79	0.80	0.256	1.597	A	17	19.48	
		SNS7B	42.000	③	1.523	63.948	1.40	0.256	2.256	A	17	19.48	0.620	2.402	A	17	7.79	0.80	0.256	1.523	A	17	19.48	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.965	64.829	1.40	0.256	2.911	A	17	19.48	0.620	2.684	A	17	7.79	0.80	0.256	1.965	A	17	19.48	
		TNT4A	33.075		1.99	65.814	1.40	0.256	2.948	A	17	19.48	0.620	2.525	A	17	7.79	0.80	0.256	1.99	A	17	19.48	
		TNT6A	41.600		1.721	74.021	1.40	0.256	2.544	A	17	23.38	0.620	2.15	A	17	7.79	0.80	0.256	1.721	A	17	19.48	
		TNT7A	42.000		1.593	71.681	1.40	0.256	2.36	A	17	19.48	0.620	2.284	A	17	7.79	0.80	0.256	1.593	A	17	19.48	
		TNT7B	42.000		1.548	69.65	1.40	0.256	2.293	A	17	19.48	0.620	2.029	A	17	7.79	0.80	0.256	1.548	A	17	19.48	
		TNAGRIT4	43.000		1.688	70.212	1.40	0.256	2.501	A	17	19.48	0.620	2.475	A	17	7.79	0.80	0.256	1.688	A	17	19.48	
		TNAGT5A	45.000		1.731	72.684	1.40	0.256	2.564	A	17	19.48	0.620	2.323	A	17	7.79	0.80	0.256	1.731	A	17	19.48	
TNAGT5B	45.000		1.769	74.298	1.40	0.256	2.621	A	17	19.48	0.620	2.238	A	17	7.79	0.80	0.256	1.769	A	17	19.48			

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-5326  
WAKE COUNTY  
 STATION: 17+70.00 -L-  
 SHEET 1 OF 2



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

LRFR SUMMARY FOR  
 40' CORED SLAB UNIT  
 105° SKEW  
 (NON-INTERSTATE TRAFFIC)

ASSEMBLED BY : F. LEA	DATE : 12/2018
CHECKED BY : S.N. MEGAHED	DATE : 1/2019
DRAWN BY : MAA 1/08	REV. 11/12/08RR MAA/GM
CHECKED BY : GM/DI 2/08	REV. 10/1/11 MAA/GM
	REV. 12/17 MAA/THC

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

LOAD AND RESISTANCE FACTOR RATING (LRFR) 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

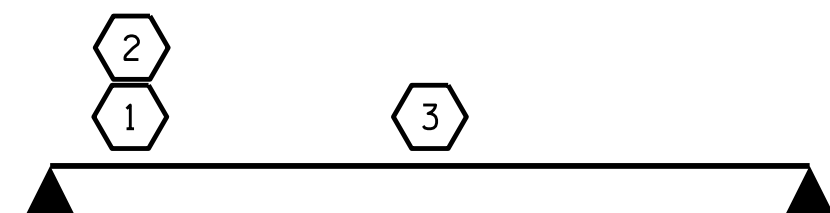
LEVEL	VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING #	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE										SERVICE III LIMIT STATE					COMMENT NUMBER			
						LIVE-LOAD FACTORS ( $\gamma_{LL}$ )	MOMENT					SHEAR					LIVE-LOAD FACTORS ( $\gamma_{LL}$ )	MOMENT						
							DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)		DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN		GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING	HL-93 (INVENTORY)	N/A	①	1.139	--	1.75	0.230	1.423	B	17	34.48	0.608	1.139	B	17	34.48	0.80	0.230	1.409	B	17	34.48		
	HL-93 (OPERATING)	N/A		1.477	--	1.35	0.230	1.845	B	17	34.48	0.608	1.477	B	17	34.48	N/A	--	--	--	--	--		
	HS-20 (INVENTORY)	36.000	②	1.438	51.773	1.75	0.230	1.846	B	17	34.48	0.608	1.438	B	17	34.48	0.80	0.230	1.828	B	17	34.48		
	HS-20 (OPERATING)	36.000		1.864	67.104	1.35	0.230	2.393	B	17	34.48	0.608	1.864	B	17	34.48	N/A	--	--	--	--	--		
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		4.081	55.096	1.40	0.230	5.152	B	17	34.48	0.608	4.28	B	17	34.48	0.80	0.230	4.081	B	17	34.48	
		SNGARBS2	20.000		3.043	60.861	1.40	0.230	3.863	B	17	34.48	0.608	3.043	B	17	34.48	0.80	0.230	3.06	B	17	34.48	
		SNAGRIS2	22.000		2.824	62.135	1.40	0.230	3.668	B	17	34.48	0.608	2.824	B	17	34.48	0.80	0.230	2.906	B	17	34.48	
		SNCOTTS3	27.250		2.031	55.357	1.40	0.230	2.564	B	17	34.48	0.608	2.137	B	17	34.48	0.80	0.230	2.031	B	17	34.48	
		SNAGGRS4	34.925		1.705	59.542	1.40	0.230	2.152	B	17	34.48	0.608	1.773	B	17	34.48	0.80	0.230	1.705	B	17	34.48	
		SNS5A	35.550		1.667	59.251	1.40	0.230	2.104	B	17	34.48	0.608	1.795	B	17	34.48	0.80	0.230	1.667	B	17	34.48	
		SNS6A	39.950		1.532	61.212	1.40	0.230	1.934	B	17	34.48	0.608	1.638	B	17	34.48	0.80	0.230	1.532	B	17	34.48	
		SNS7B	42.000		1.459	61.289	1.40	0.230	1.842	B	17	34.48	0.608	1.609	B	17	34.48	0.80	0.230	1.459	B	17	34.48	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.869	61.688	1.40	0.230	2.36	B	17	34.48	0.608	1.95	B	17	34.48	0.80	0.230	1.869	B	17	34.48	
		TNT4A	33.075		1.878	62.128	1.40	0.230	2.371	B	17	34.48	0.608	1.90	B	17	34.48	0.80	0.230	1.878	B	17	34.48	
		TNT6A	41.600		1.521	65.411	1.40	0.230	1.924	B	17	34.48	0.608	1.521	B	17	34.48	0.80	0.230	1.524	B	17	34.48	
		TNT7A	42.000		1.436	64.613	1.40	0.230	1.812	B	17	34.48	0.608	1.512	B	17	34.48	0.80	0.230	1.436	B	17	34.48	
		TNT7B	42.000	③	1.417	63.779	1.40	0.230	1.789	B	17	34.48	0.608	1.447	B	17	34.48	0.80	0.230	1.417	B	17	34.48	
		TNAGRIT4	43.000		1.539	64.012	1.40	0.230	1.942	B	17	34.48	0.608	1.713	B	17	34.48	0.80	0.230	1.539	B	17	34.48	
TNAGT5A	45.000		1.548	65.015	1.40	0.230	1.954	B	17	34.48	0.608	1.679	B	17	34.48	0.80	0.230	1.548	B	17	34.48			
TNAGT5B	45.000		1.571	65.994	1.40	0.230	2.026	B	17	34.48	0.608	1.571	B	17	34.48	0.80	0.230	1.605	B	17	34.48			

NOTES:

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

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

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



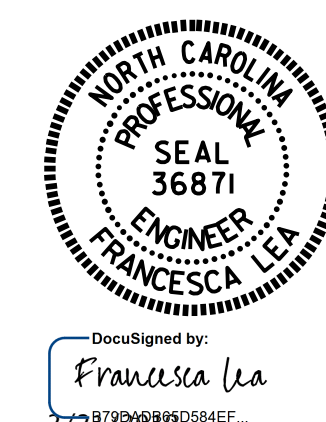
LRFR SUMMARY  
FOR SPAN 'B'

PROJECT NO. B-5326

WAKE COUNTY

STATION: 17+70.00 -L-

SHEET 2 OF 2



STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

LRFR SUMMARY FOR  
70' CORED SLAB UNIT  
105° SKEW  
(NON-INTERSTATE TRAFFIC)

ASSEMBLED BY : F. LEA	DATE : 12/2018
CHECKED BY : S.N. MEGAHED	DATE : 1/2019
DRAWN BY : MAA 1/08	REV. 11/12/08RR MAA/GM
CHECKED BY : GM/DI 2/08	REV. 10/1/11 MAA/GM
	REV. 12/17 MAA/THC

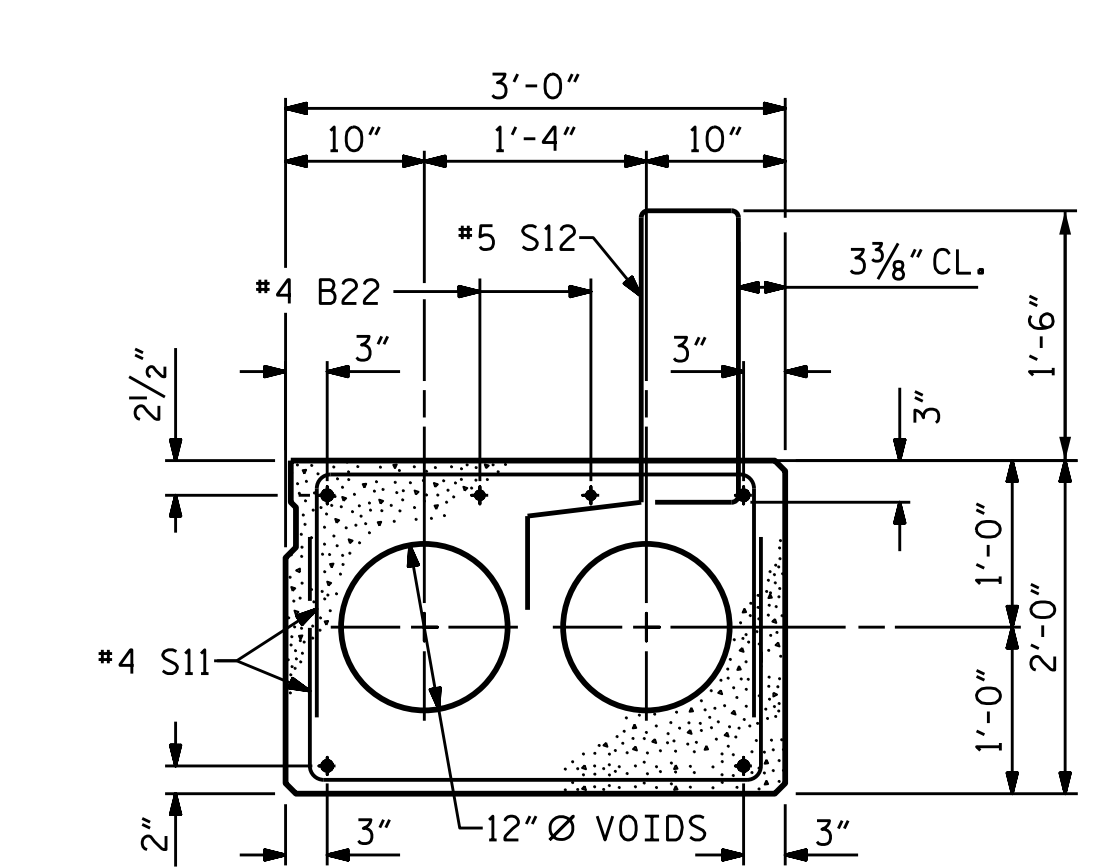
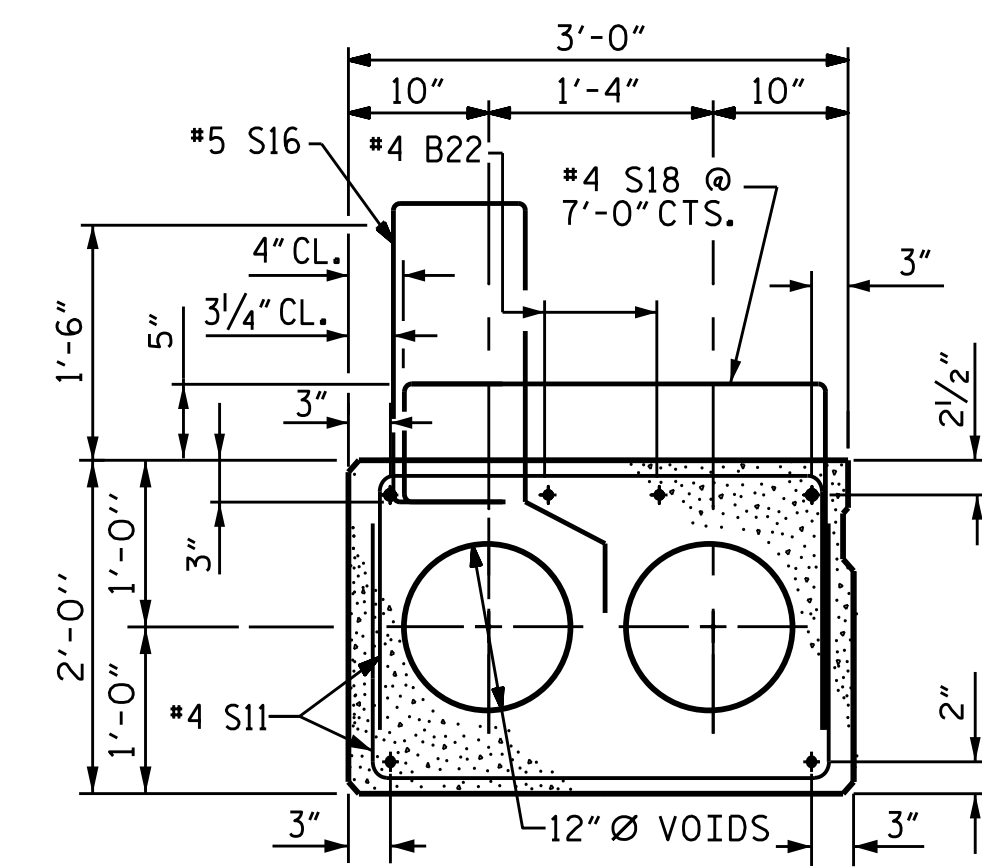
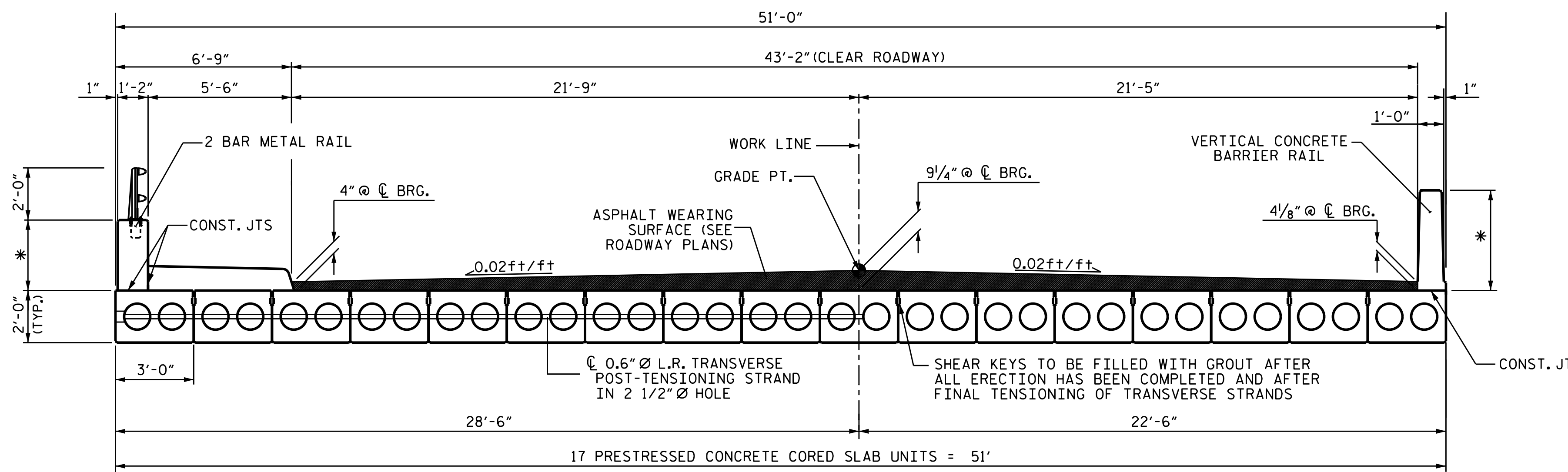
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-5
1			3			TOTAL SHEETS 29
2			4			









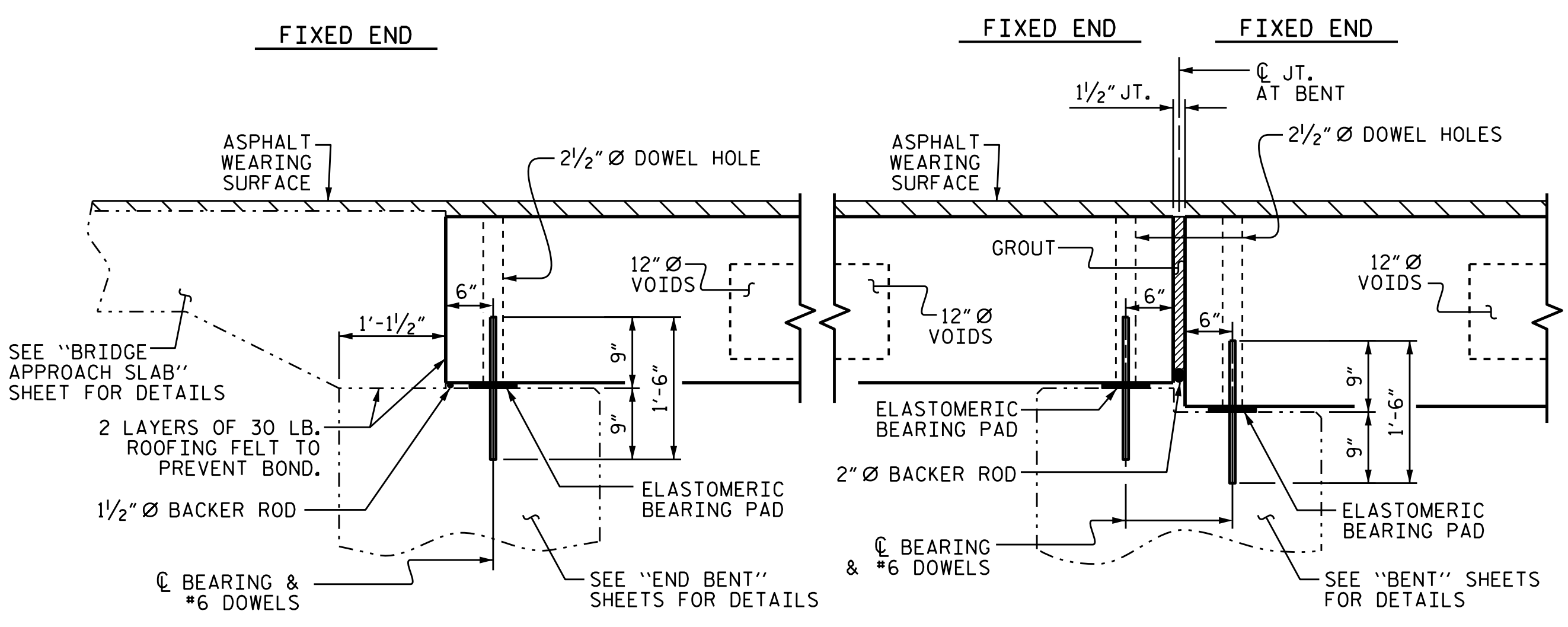
LT. EXT. SLAB SECTION  
 (FOR PRESTRESSED STRAND LAYOUT, SEE INTERIOR SLAB SECTION.)

RT. EXTERIOR SLAB SECTION  
 (FOR PRESTRESSED STRAND LAYOUT, SEE INTERIOR SLAB SECTION.)

HALF SECTION AT INTERMEDIATE DIAPHRAGMS  
 HALF SECTION THROUGH VOIDS

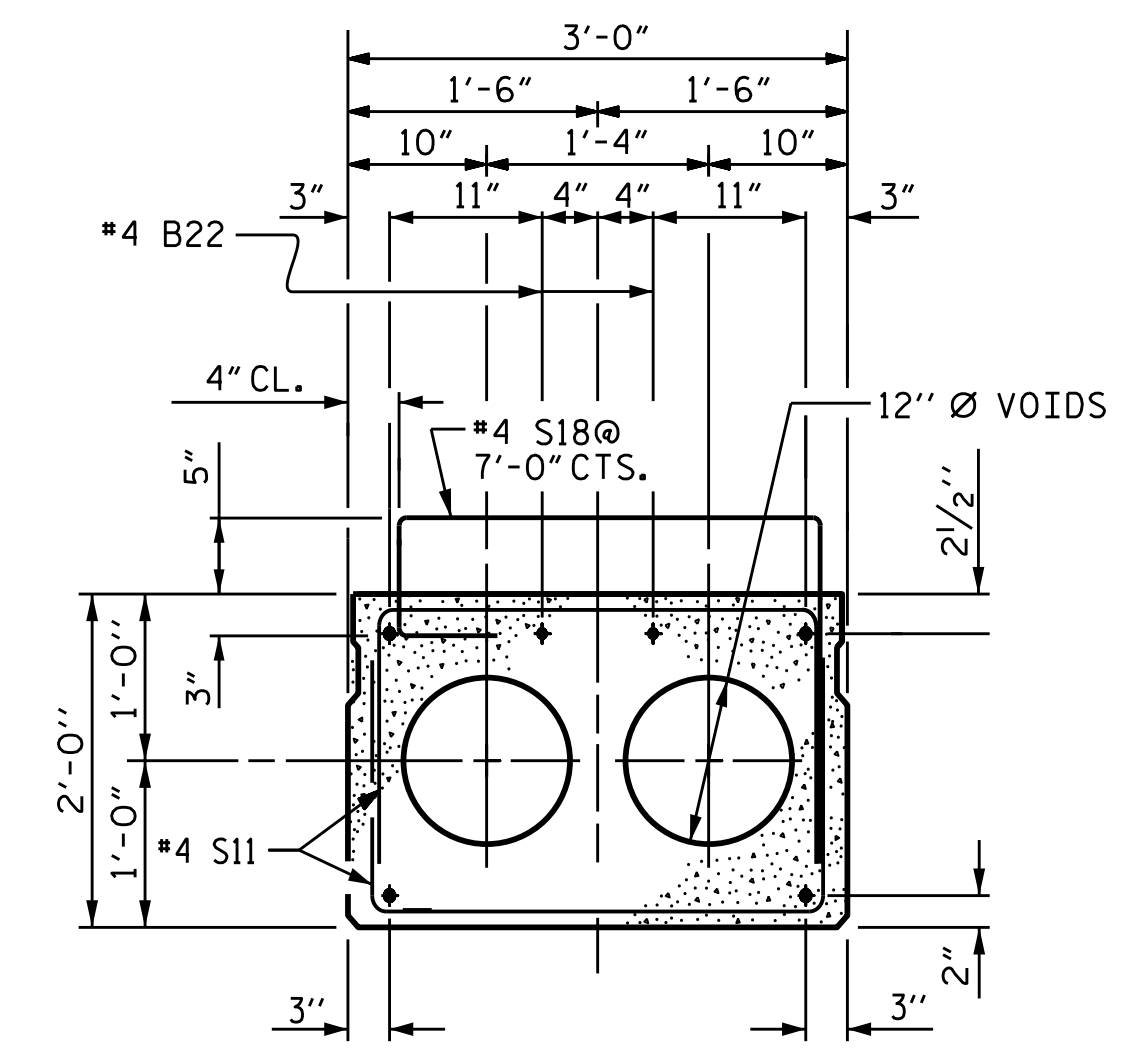
TYPICAL SECTION (SPAN B)

\* - THE HEIGHT OF THE PARAPET, 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 "TWO BAR METAL" DETAIL AND "VERTICAL CONCRETE BARRIER RAIL SECTION" DETAIL.

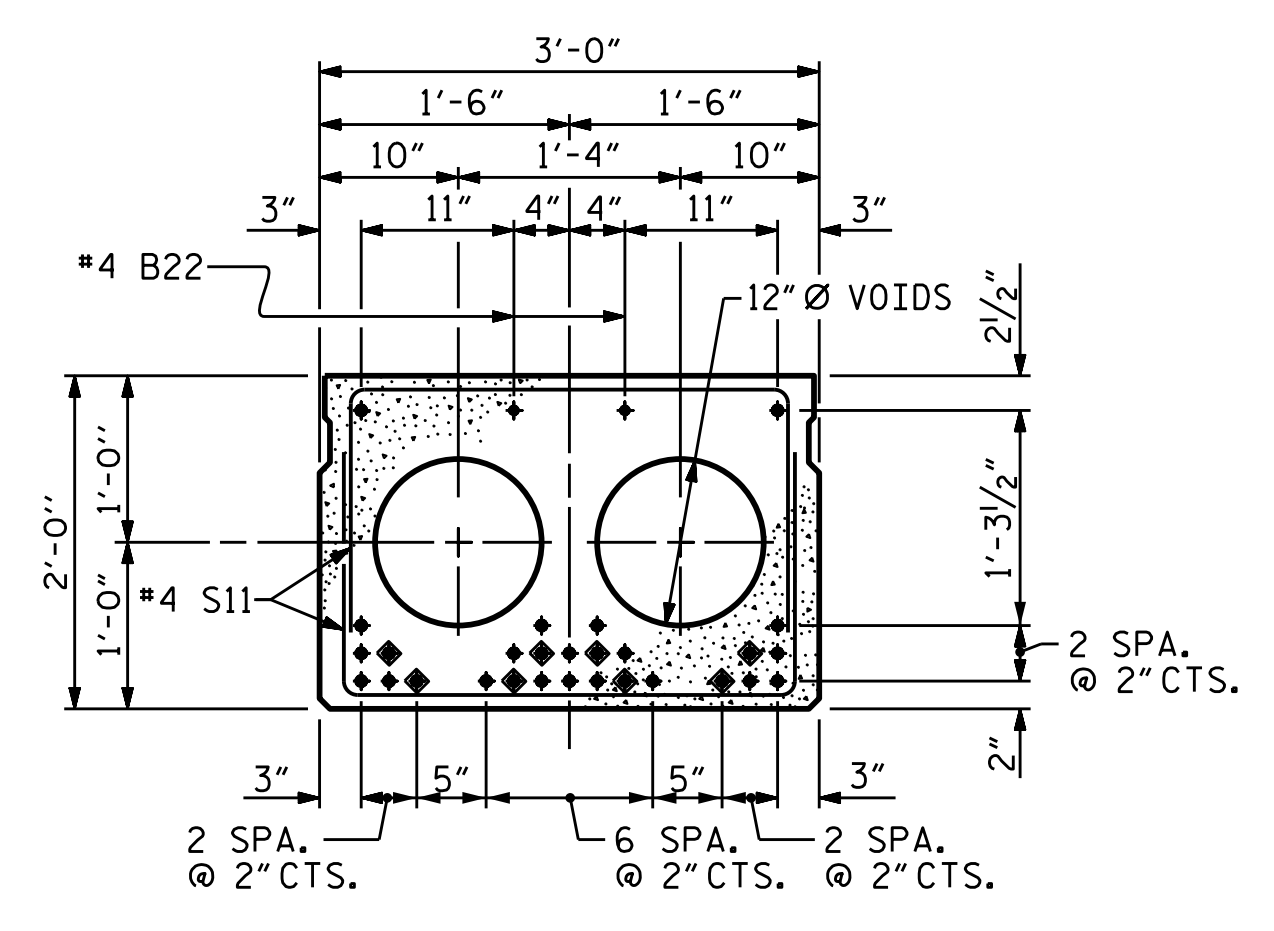


SECTION AT END BENT

SECTION AT BENT



INTERIOR SLAB UNDER SIDEWALK  
 (FOR PRESTRESSED STRAND LAYOUT, SEE INTERIOR SLAB SECTION.)

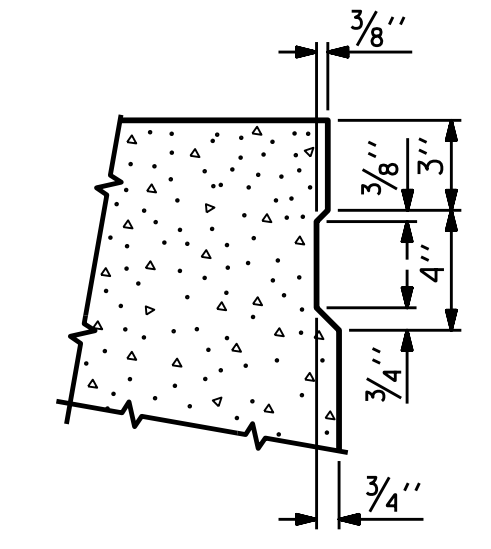


INTERIOR SLAB SECTION (70' UNIT)  
 (28 STRANDS REQUIRED)

0.6" Ø LOW RELAXATION STRAND LAYOUT

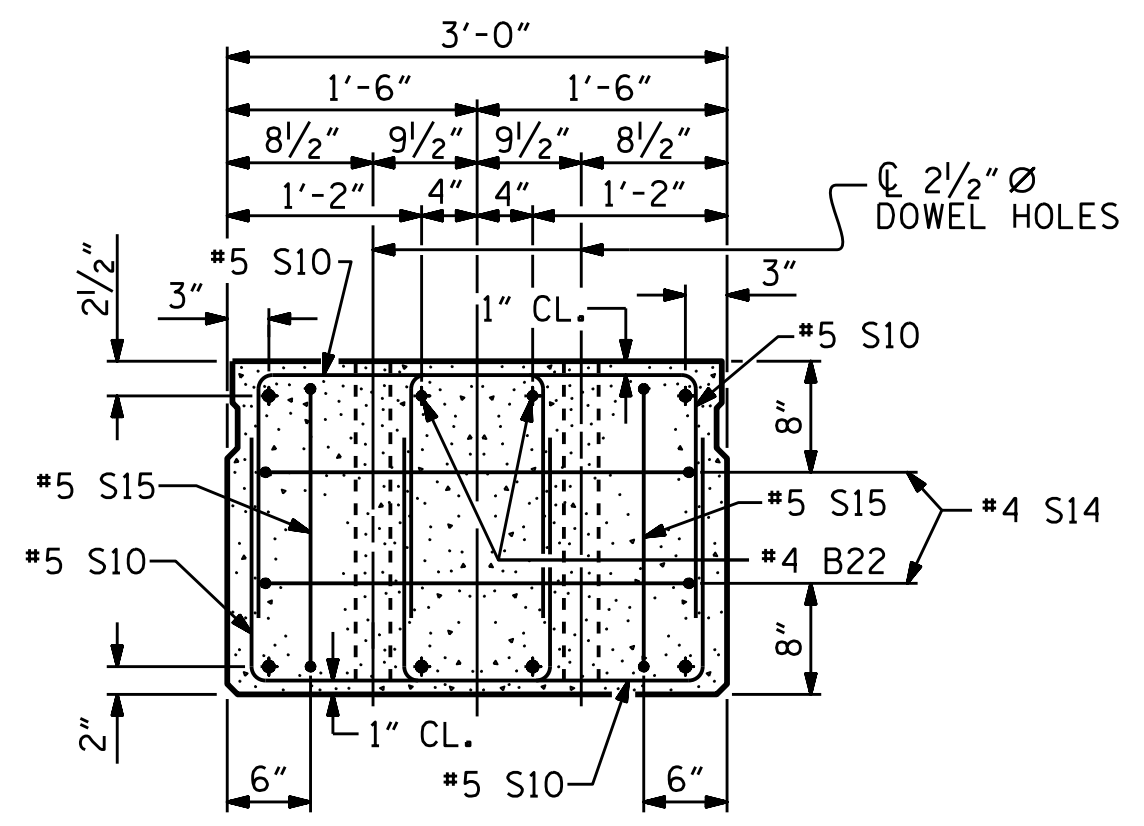
◆ BOND SHALL BE BROKEN ON THESE STRANDS FOR A DISTANCE OF 12'-0" FROM END OF CORED SLAB UNIT. SEE STANDARD SPECIFICATIONS, ARTICLE 1078-7.

DEBONDING LEGEND



SHEAR KEY DETAIL

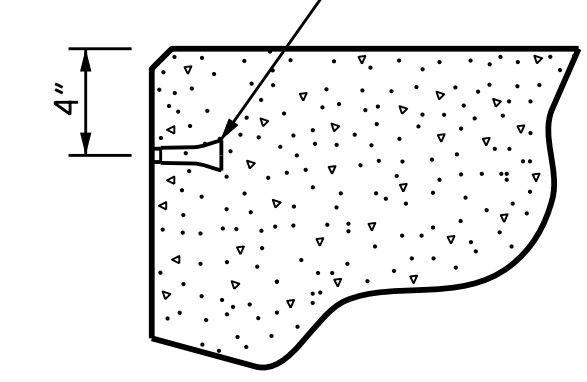
NOTE: OMIT SHEAR KEY ON OUTSIDE FACE OF EXTERIOR CORED SLABS.



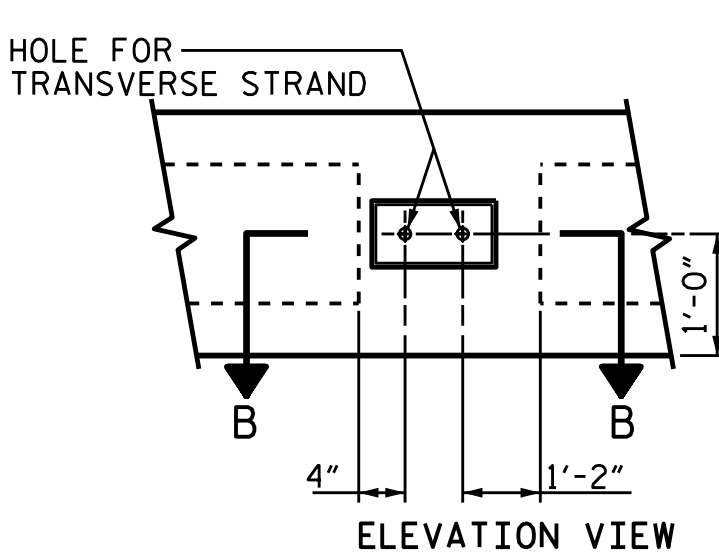
END ELEVATION

SHOWING PLACEMENT OF DOUBLE STIRRUPS AND LOCATION OF DOWEL HOLES. (STRAND LAYOUT NOT SHOWN.) INTERIOR SLAB UNIT SHOWN-EXTERIOR SLAB UNIT SIMILAR EXCEPT SHEAR KEY LOCATION.

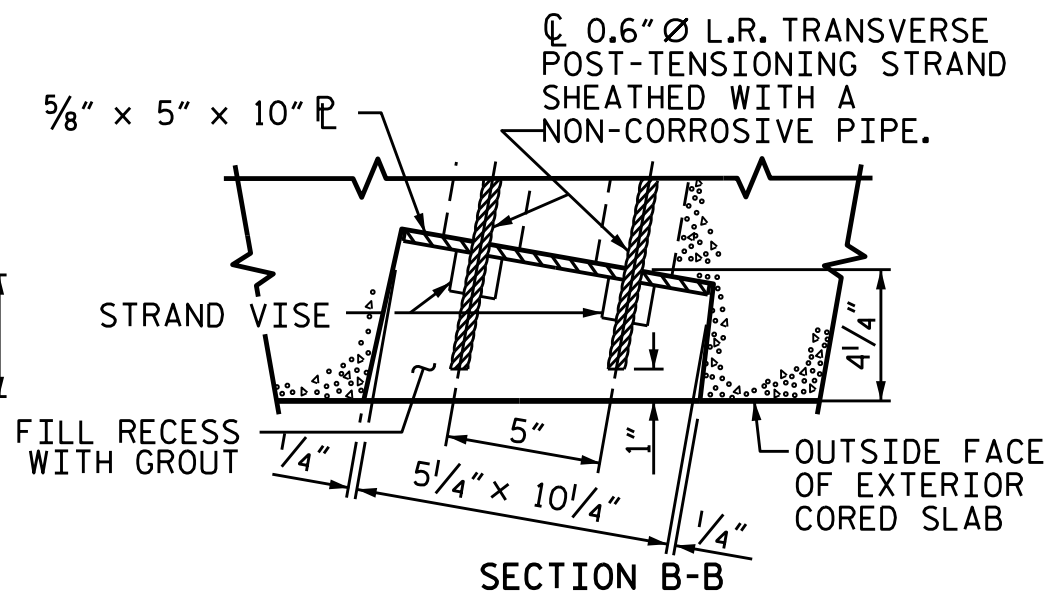
PERMITTED THREADED INSERT CAST IN OUTSIDE FACE OF EXTERIOR UNIT AND RECESSED 3/8" SIZE TO BE DETERMINED BY CONTRACTOR.



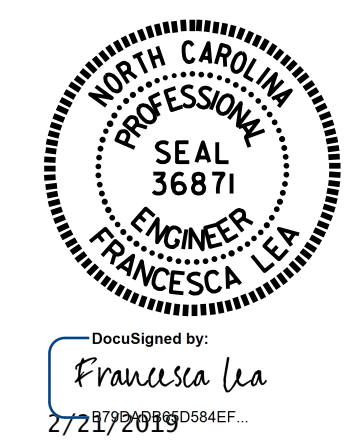
THREADED INSERT DETAIL



GROUTED RECESS AT END OF POST-TENSIONED STRAND CORED SLABS



ASSEMBLED BY : S. N. MEGAHED	DATE : 12/2018
CHECKED BY : F. LEA	DATE : 12/2018
DRAWN BY : DGE	4/10
CHECKED BY : MKT	4/10
REV. 11/14	MAA/TMG

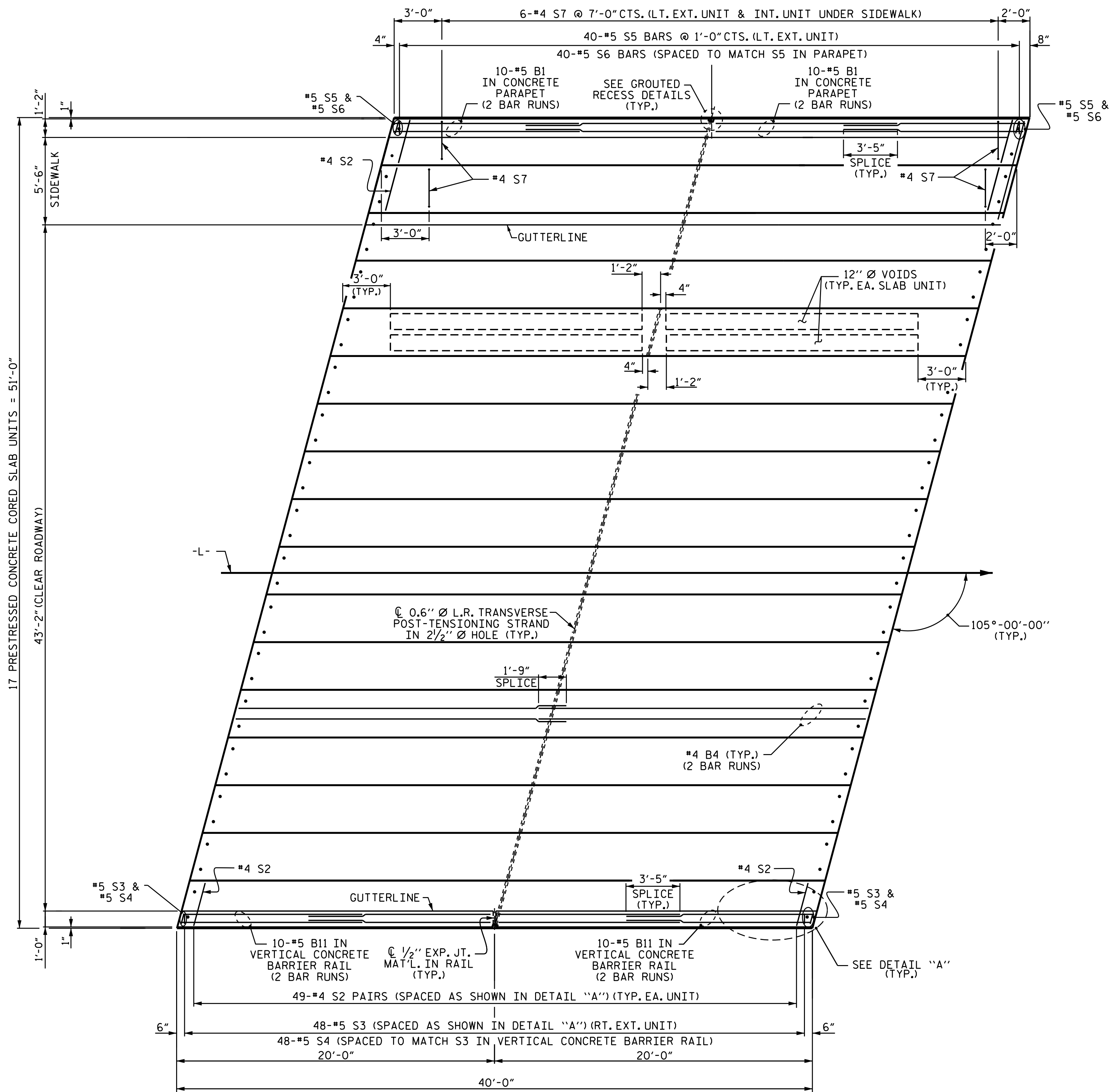


PROJECT NO. B-5326  
 WAKE COUNTY  
 STATION: 17+70.00 -L-  
 SHEET 2 OF 7

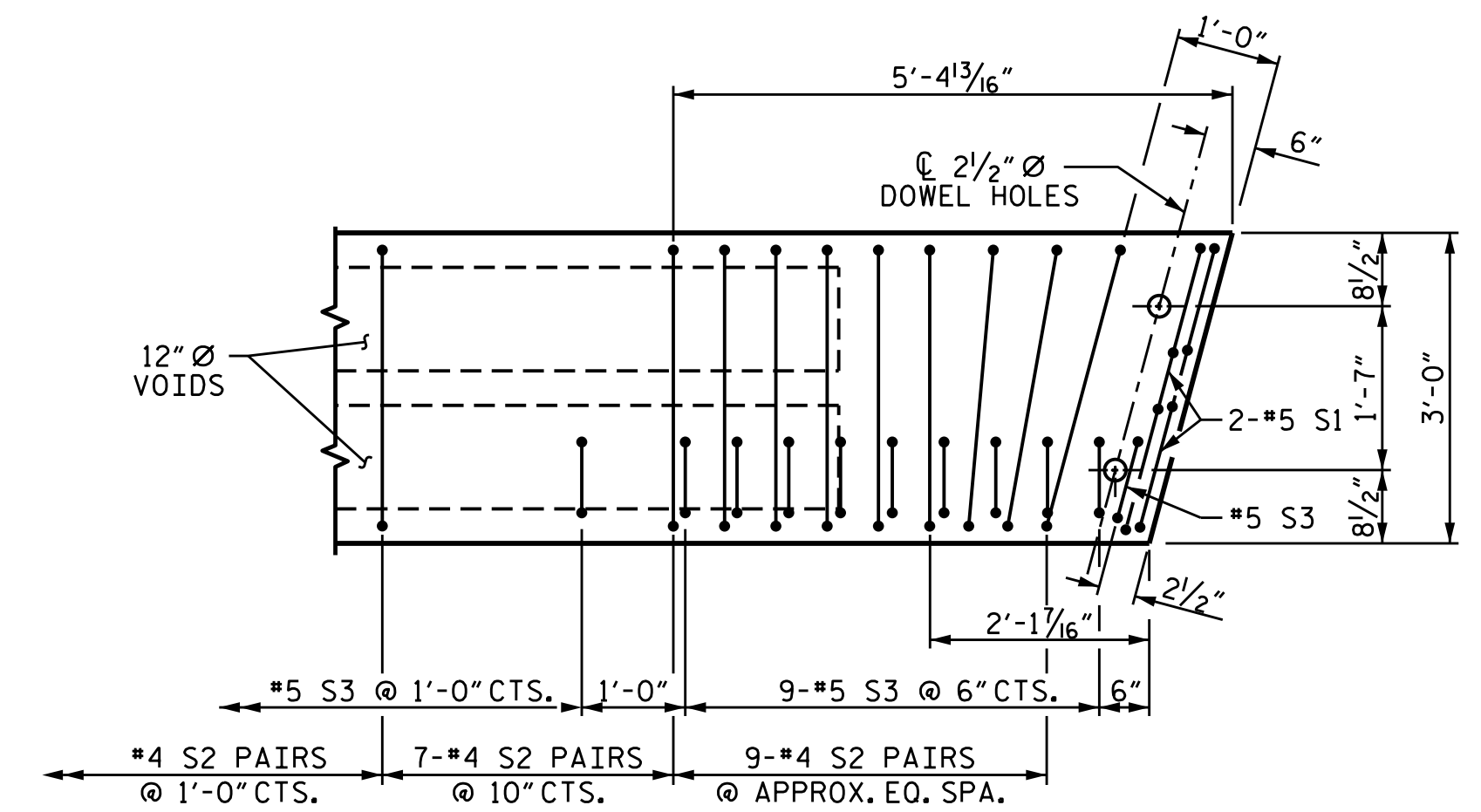
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD  
 3'-0" X 2'-0"  
 PRESTRESSED CONCRETE  
 CORED SLAB UNIT  
 105° SKEW

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-7
1			3			TOTAL SHEETS 29
2			4			



PLAN OF SPAN 'A'

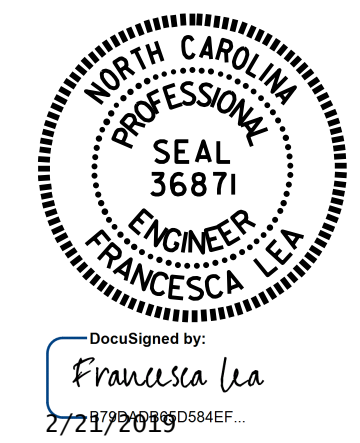


DETAIL 'A'

RIGHT EXTERIOR UNIT SHOWN - INTERIOR UNIT SIMILAR EXCEPT OMIT #5 S3 BARS. LEFT EXTERIOR UNIT SIMILAR EXCEPT OMIT #5 S3 BARS, AND INCLUDE #5 S5 AND #4 S7 BARS, AS SHOWN IN PLAN. INTERIOR UNIT UNDER SIDEWALK SIMILAR TO LEFT EXTERIOR UNIT, EXCEPT OMIT #5 S5 BARS.

PROJECT NO. B-5326  
WAKE COUNTY  
 STATION: 17+70.00 -L-

SHEET 3 OF 7



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

PLAN OF 40' UNIT  
 43'-2" CLEAR ROADWAY  
 105° SKEW  
 SPAN A

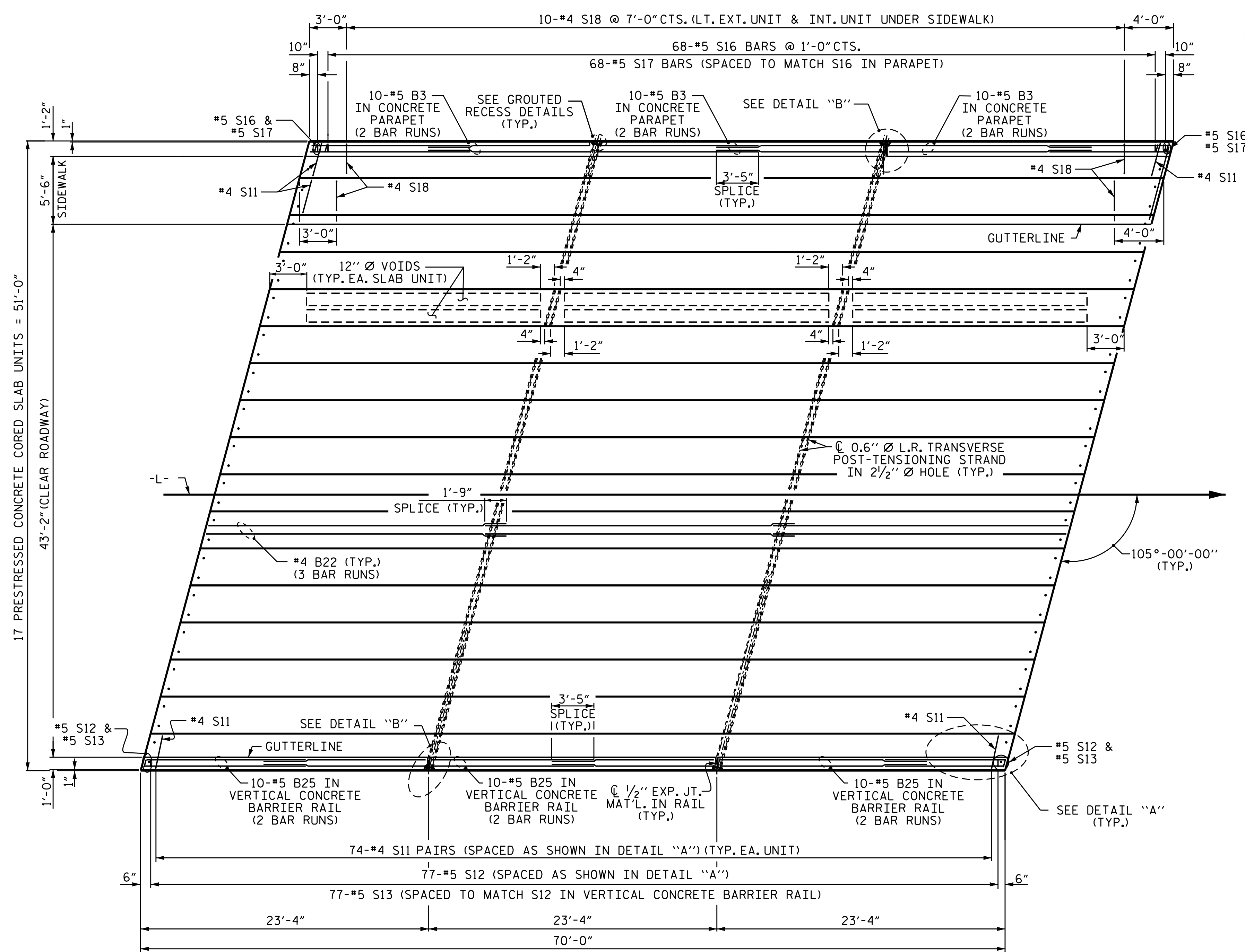
DRAWN BY : F. LEA DATE : 01/2019  
 CHECKED BY : S. N. MEGAHED DATE : 01/2019  
 DESIGN ENGINEER OF RECORD : S. N. MEGAHED DATE : 01/2019

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

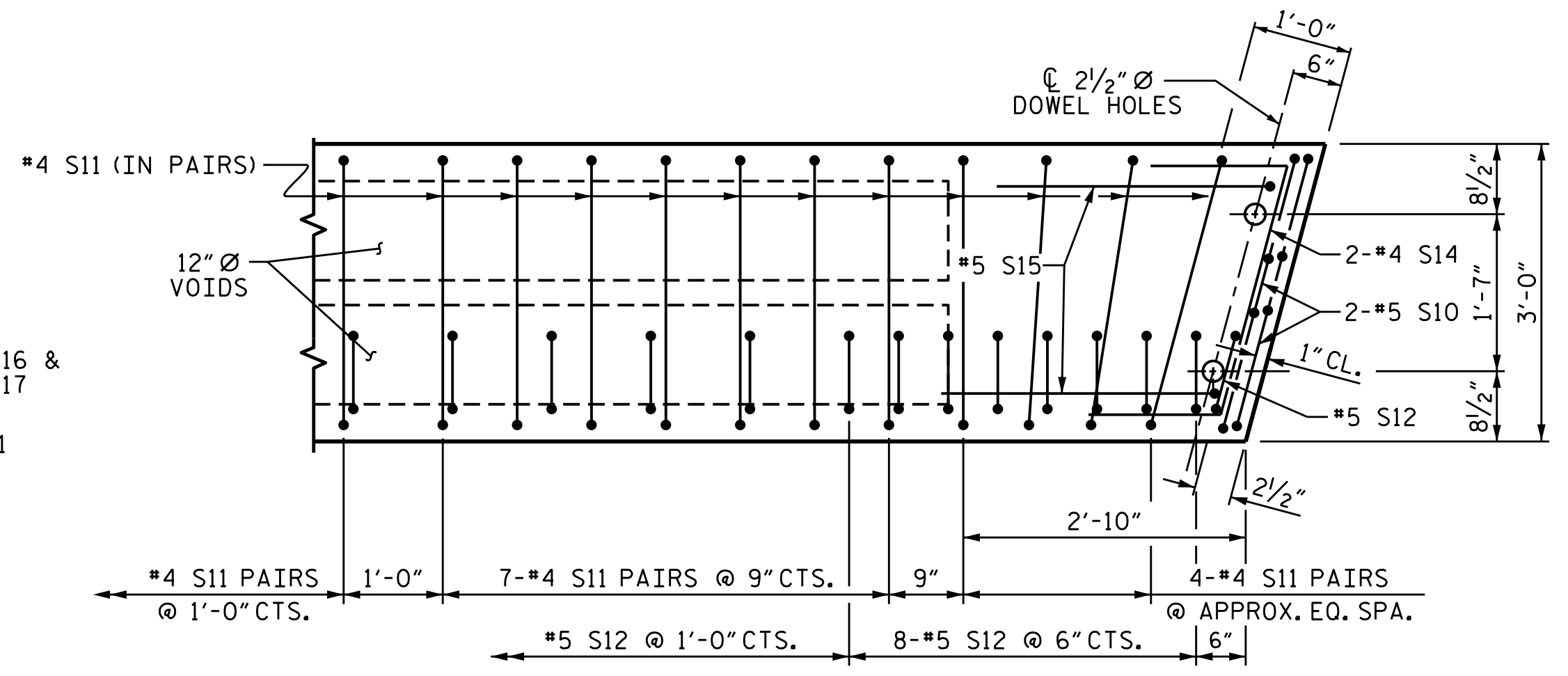
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NO.	BY:	DATE:	NO.	BY:	DATE:	S-8
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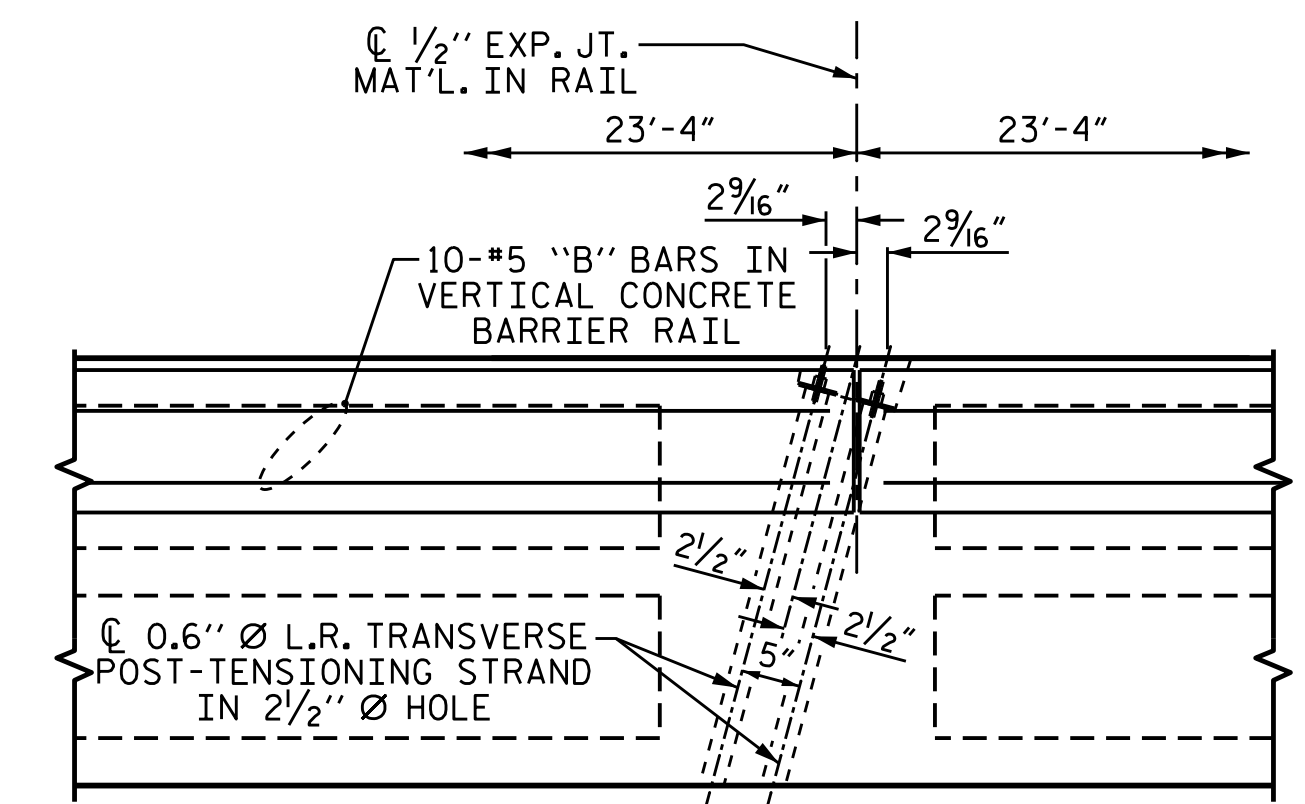


PLAN OF SPAN 'B'



DETAIL "A"

(SIMILAR EACH END OF UNIT)  
NOTE: EXTERIOR UNIT SHOWN - INTERIOR UNIT SIMILAR EXCEPT OMIT #5 S12 BARS.



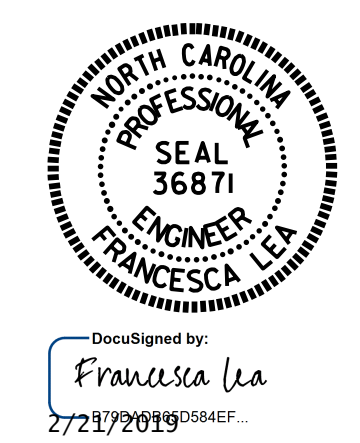
DETAIL "B"

#4 S11 BARS MAY BE SHIFTED AS NECESSARY TO MAINTAIN 1" CLEAR TO GROUDED RECESS AND 2 1/2" Ø TRANSVERSE POST-TENSIONING STRAND HOLES

PROJECT NO. B-5326  
WAKE COUNTY  
 STATION: 17+00.00 -L-

SHEET 4 OF 7

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 PLAN OF 70' UNIT  
 43'-2" CLEAR ROADWAY  
 105° SKEW  
 SPAN B



DRAWN BY: F. LEA DATE: 1/2019  
 CHECKED BY: S. N. MEGAHED DATE: 1/2019  
 DESIGN ENGINEER OF RECORD: S. N. MEGAHED DATE: 1/2019

DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

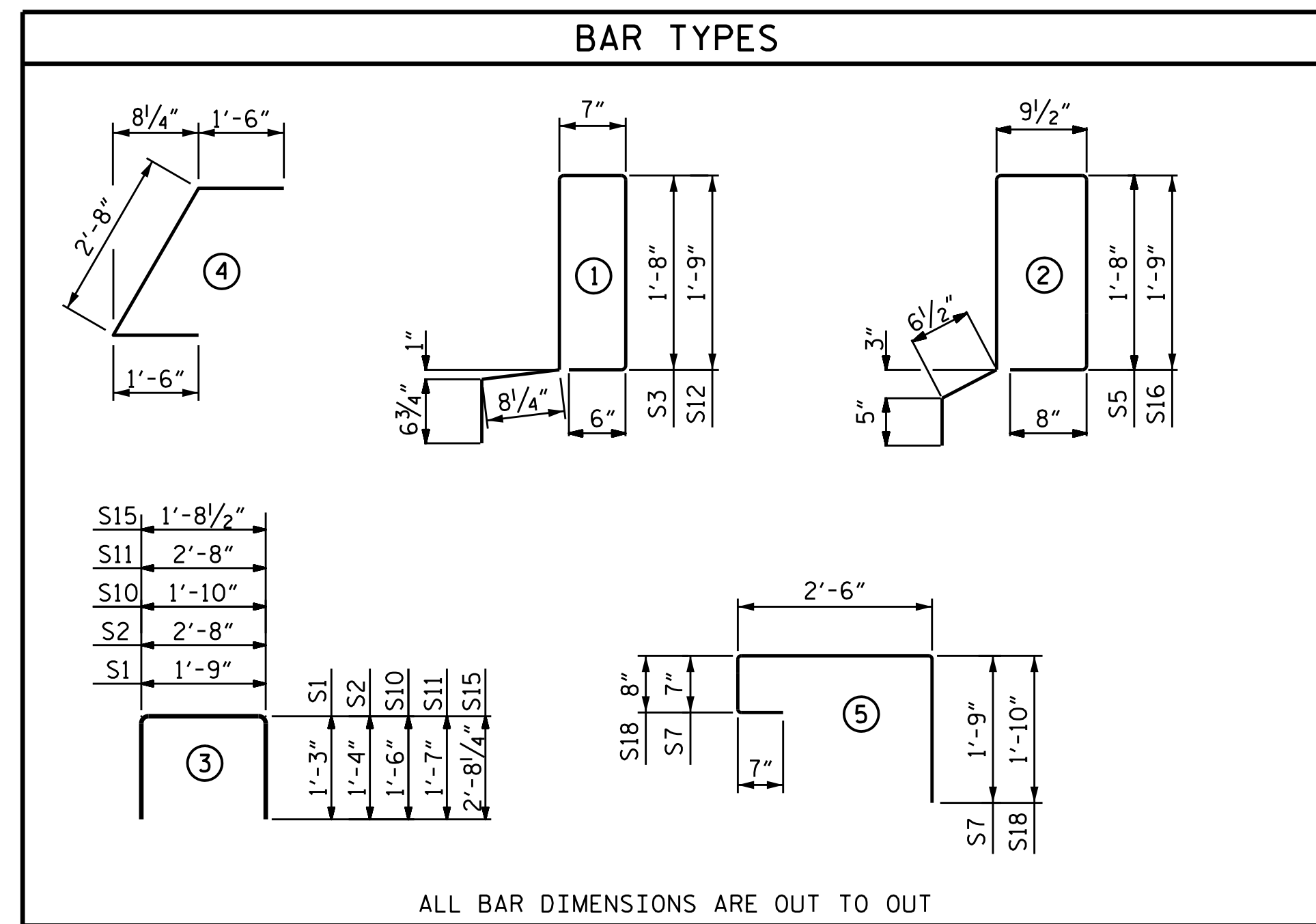
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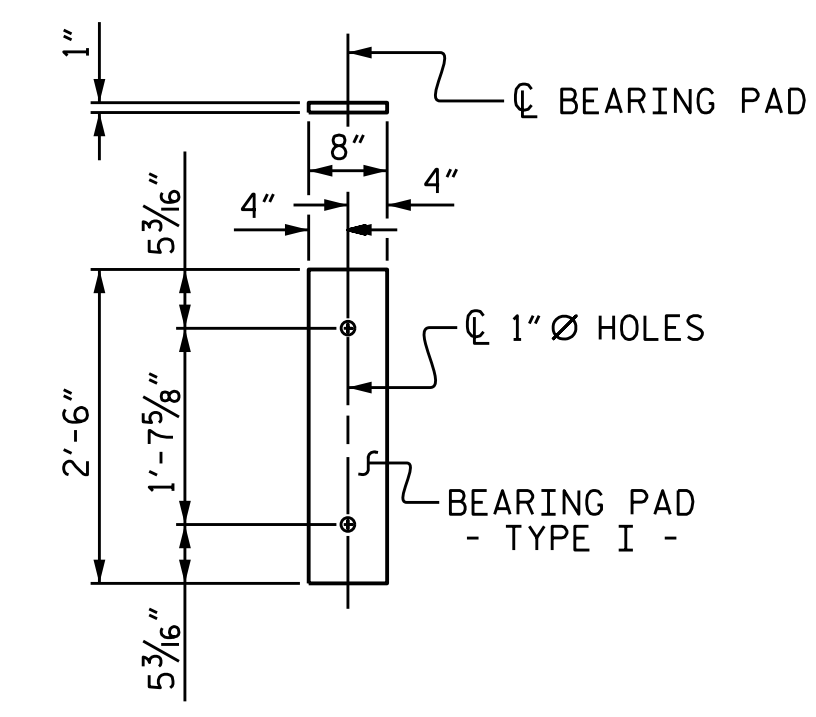


BILL OF MATERIAL FOR ONE 40' CORED SLAB UNIT											
				LT. EXTERIOR UNIT		RT. EXTERIOR UNIT		INTERIOR UNIT UNDER SIDEWALK		INTERIOR UNIT	
BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT	LENGTH	WEIGHT	LENGTH	WEIGHT	LENGTH	WEIGHT
B4	4	#4	STR	20'-9"	55	20'-9"	55	20'-9"	55	20'-9"	55
S1	8	#5	3	4'-3"	35	4'-3"	35	4'-3"	35	4'-3"	35
S2	98	#4	3	5'-4"	349	5'-4"	349	5'-4"	349	5'-4"	349
*S3	50	#5	1			5'-8"	296				
*S5	40	#5	2	5'-9"	240						
*S7	6	#4	5	5'-5"	22			5'-5"	22		
REINFORCING STEEL				LBS.	384		384		384		384
*EPOXY COATED REINFORCING STEEL				LBS.	262		296		22		
5000 P.S.I. CONCRETE				CU. YDS.	5.8		5.8		5.8		5.8
0.6" Ø L.R. STRANDS				No.	13		13		13		13

BILL OF MATERIAL FOR ONE 70' CORED SLAB UNIT											
				LT. EXTERIOR UNIT		RT. EXTERIOR UNIT		INTERIOR UNIT UNDER SIDEWALK		INTERIOR UNIT	
BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT	LENGTH	WEIGHT	LENGTH	WEIGHT	LENGTH	WEIGHT
B22	6	#4	STR	24'-6"	98	24'-6"	98	24'-6"	98	24'-6"	98
S10	8	#5	3	4'-10"	40	4'-10"	40	4'-10"	40	4'-10"	40
S11	148	#4	3	5'-10"	577	5'-10"	577	5'-10"	577	5'-10"	577
*S12	79	#5	1			5'-10"	481				
S14	4	#4	4	5'-8"	15	5'-8"	15	5'-8"	15	5'-8"	15
S15	4	#5	3	7'-1"	30	7'-1"	30	7'-1"	30	7'-1"	30
*S16	68	#5	2	5'-11"	420						
*S18	10	#4	5	5'-7"	37			5'-7"	37		
REINFORCING STEEL				LBS.	760		760		760		760
*EPOXY COATED REINFORCING STEEL				LBS.	457		481		37		
7000 P.S.I. CONCRETE				CU. YDS.	12.0		12.0		12.0		12.0
0.6" Ø L.R. STRANDS				No.	28		28		28		28



ALL BAR DIMENSIONS ARE OUT TO OUT



FIXED END (TYPE I - 102 REQ'D)

### ELASTOMERIC BEARING DETAILS

ELASTOMER IN ALL BEARINGS SHALL BE 60 DUROMETER HARDNESS.

### 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 CORED SLAB SECTIONS SHALL BE GRADE 60 AND SHALL BE INCLUDED IN THE UNIT PRICE BID FOR PRESTRESSED CONCRETE CORED SLABS.

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

THE 2 1/2" Ø DOWEL HOLES AT FIXED ENDS OF SLAB 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.

WHEN CORED SLABS ARE CAST, AN INTERNAL HOLD-DOWN SYSTEM SHALL BE EMPLOYED TO PREVENT VOIDS FROM RISING OR MOVING SIDEWAYS. AT LEAST SIX WEEKS PRIOR TO CASTING CORED SLABS, THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER FOR REVIEW AND COMMENT, DETAILED DRAWINGS OF THE PROPOSED HOLD-DOWN SYSTEM, IN ADDITION TO STRUCTURAL DETAILS, LOCATION AND SPACING OF THE HOLD-DOWNS SHALL BE INDICATED.

THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE CORED SLAB UNIT SHALL BE DONE WHEN THE CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN THE REQUIRED STRENGTH SHOWN IN THE "CONCRETE RELEASE STRENGTH" TABLE.

PRESTRESSING STRANDS SHALL BE CUT FLUSH WITH THE CORED SLAB UNIT ENDS.

APPLY EPOXY PROTECTIVE COATING TO CORED SLAB UNIT ENDS.

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

MAINTAIN A SYMMETRIC TENSION FORCE BETWEEN EACH PAIR OF TRANSVERSE POST TENSIONING STRANDS IN THE DIAPHRAGM.

THE #4 S11 STIRRUPS MAY BE SHIFTED AS NECESSARY TO MAINTAIN 1" CLEAR TO THE GROUTED RECESS.

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 BY 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.

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

\*\* INCLUDES FUTURE WEARING SURFACE

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

\*\* INCLUDES FUTURE WEARING SURFACE

CONCRETE RELEASE STRENGTH	
UNIT	PSI
40' UNITS	4000
70' UNITS	6000

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

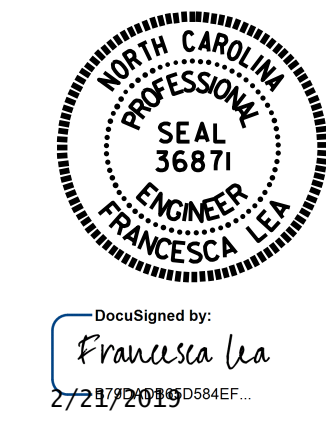
GUTTERLINE ASPHALT THICKNESS, RAIL & PARAPET HEIGHTS			
	ASPHALT OVERLAY THICKNESS	VERT. CONC. BARRIER RAIL HEIGHT	PARAPET HEIGHT
	@ MID-SPAN	@ MID-SPAN	@ MID-SPAN
40' UNITS	1 3/16"	3'-7 13/16"	3'-3 3/16"
70' UNITS	2 13/16"	3'-8 13/16"	3'-4 3/16"

CORED SLABS REQUIRED			
40' UNIT	NUMBER	LENGTH	TOTAL LENGTH
LT. EXTERIOR C.S. (SPAN A)	1	40'-0"	40'-0"
LT. EXTERIOR C.S. (SPAN C)	1	40'-0"	40'-0"
RT. EXTERIOR C.S.	2	40'-0"	80'-0"
INT. C.S. UNDER SIDEWALK	2	40'-0"	80'-0"
INTERIOR C.S.	28	40'-0"	1120'-0"
TOTAL	34	40'-0"	1360'-0"

CORED SLABS REQUIRED			
70' UNIT	NUMBER	LENGTH	TOTAL LENGTH
LT. EXTERIOR C.S.	1	70'-0"	70'-0"
RT. EXTERIOR C.S.	1	70'-0"	70'-0"
INT. C.S. UNDER SIDEWALK	1	70'-0"	70'-0"
INTERIOR C.S.	14	70'-0"	980'-0"
TOTAL	17	70'-0"	1190'-0"

PROJECT NO. B-5326  
WAKE COUNTY  
 STATION: 17+70.00 -L-

SHEET 7 OF 7



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD  
 3'-0" X 1'-9" &  
 3'-0" X 2'-0"  
 PRESTRESSED CONCRETE  
 CORED SLAB UNITS

ASSEMBLED BY : S. N. MEGAHED	DATE : 12/2018
CHECKED BY : F. LEA	DATE : 1/2019
DRAWN BY : MAA	6/10
CHECKED BY : MKT	7/10
REV. 5/18	MAA/THC

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-11
1			3			TOTAL SHEETS
2			4			29

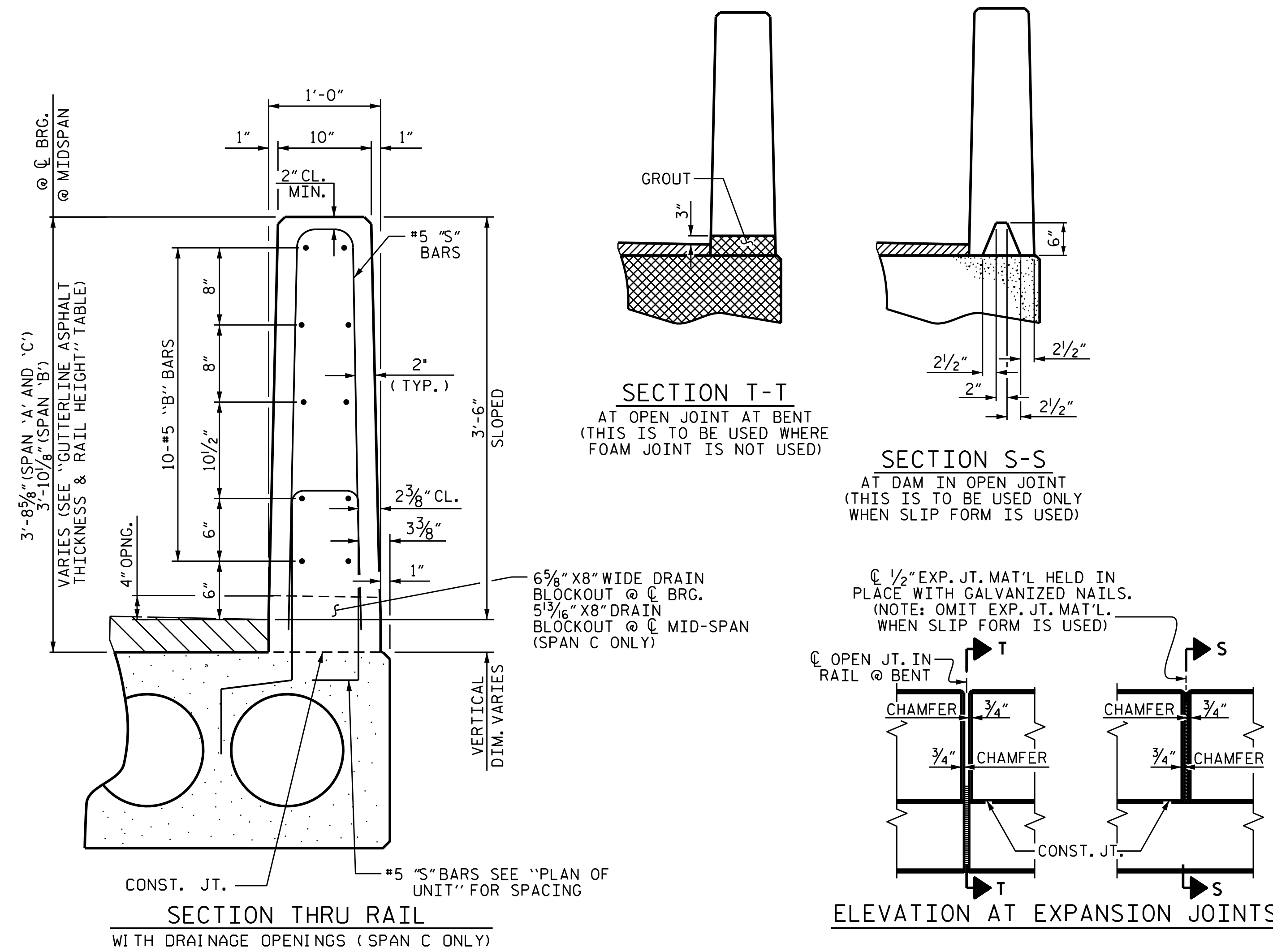
**NOTES**

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 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.

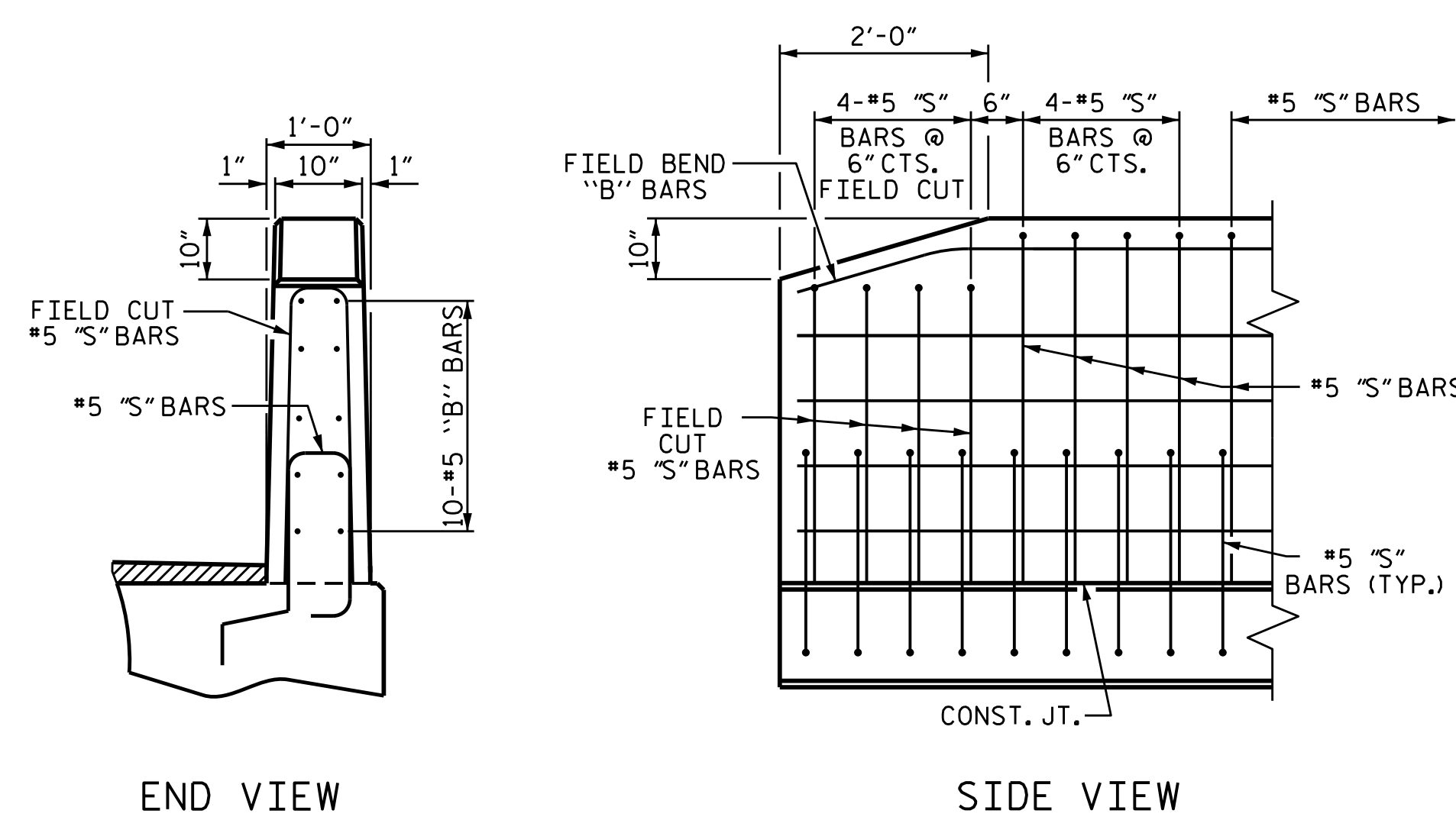
ALL REINFORCING STEEL IN VERTICAL CONCRETE BARRIER RAILS SHALL BE EPOXY COATED.

THE DRAIN OPENING AT THE GUTTERLINE SHALL BE 4" X 8". THE HEIGHT OF THE BLOCKOUT IN THE VERTICAL CONCRETE BARRIER RAIL SHALL EXTEND FROM THE TOP OF THE CORED SLAB UNIT TO THE TOP OF THE DRAIN OPENING.

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



**VERTICAL CONCRETE BARRIER RAIL DETAILS (RIGHT SIDE ONLY)**



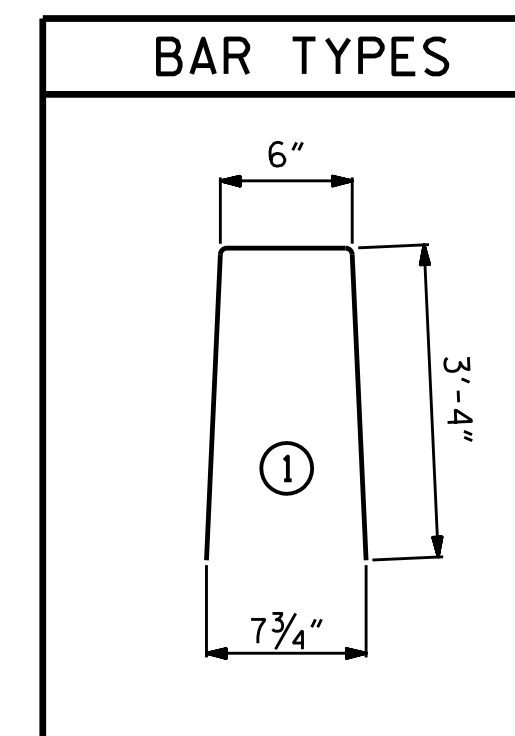
**END OF RAIL DETAILS**

**BILL OF MATERIAL FOR VERTICAL CONCRETE BARRIER RAIL FOR SPAN A AND C**

BAR	BARS FOR RIGHT SIDE ONLY PER SPAN	TOTAL NO.	SIZE	TYPE	LENGTH	WEIGHT	
	40' UNIT						
*B11	40	80	#5	STR	11'-8"	974	
*S4	50	100	#5	1	7'-2"	748	
* EPOXY COATED REINFORCING STEEL						LBS.	1722
CLASS AA CONCRETE						CU.YDS.	10.2
TOTAL VERTICAL CONCRETE BARRIER RAIL						LN. FT.	80.25

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

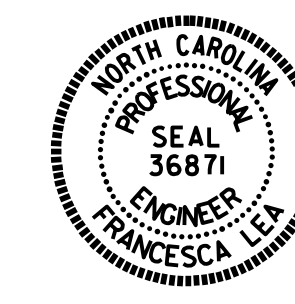
BAR	BARS FOR RIGHT SIDE ONLY PER SPAN	TOTAL NO.	SIZE	TYPE	LENGTH	WEIGHT	
	70' UNIT						
*B25	60	60	#5	STR	13'-8"	855	
*S13	79	79	#5	1	7'-2"	591	
* EPOXY COATED REINFORCING STEEL						LBS.	1446
CLASS AA CONCRETE						CU.YDS.	9.50
TOTAL VERTICAL CONCRETE BARRIER RAIL						LN. FT.	70.00



ALL BAR DIMENSIONS ARE OUT TO OUT

PROJECT NO. B-5326  
WAKE COUNTY  
 STATION: 17+70.00 -L-

SHEET 6 OF 7



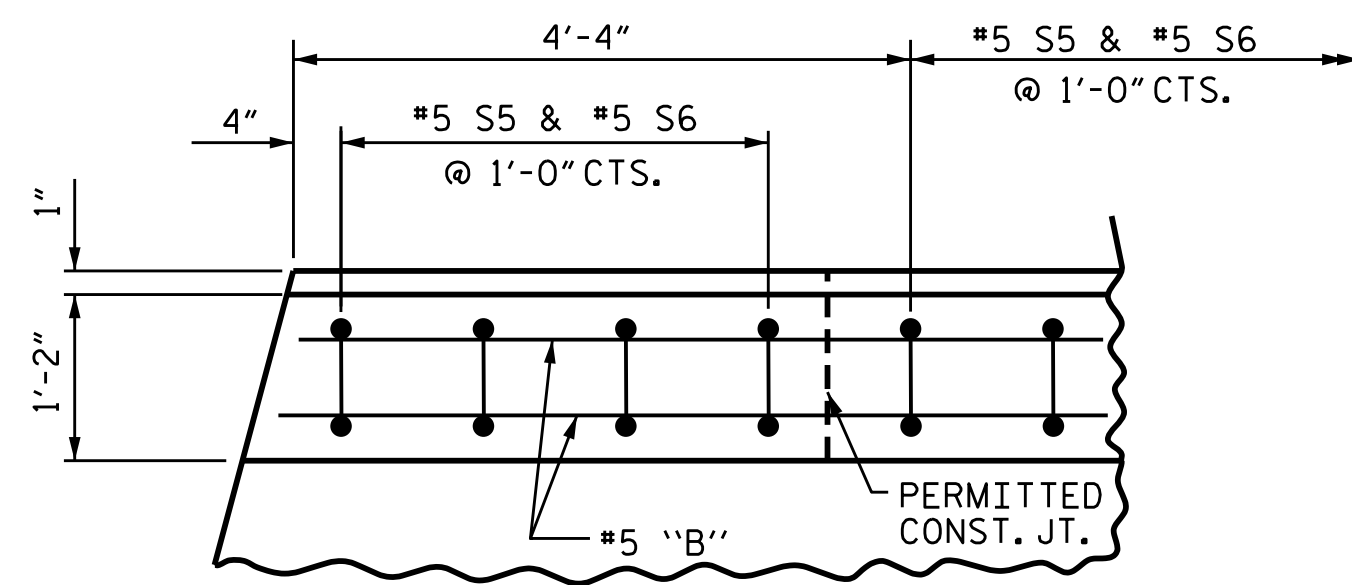
DocuSigned by:  
 Francesca Lea  
 2/21/2019 10:58:45 AM

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH STANDARD					
VERTICAL CONCRETE BARRIER RAIL DETAILS					
REVISIONS					SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
					TOTAL SHEETS 29

ASSEMBLED BY : S. N. MEGAHED	DATE : 12/2018
CHECKED BY : F. LEA	DATE : 1/2019
DRAWN BY : MAA	6/10
CHECKED BY : MKT	7/10
REV. 5/18	MAA/THC

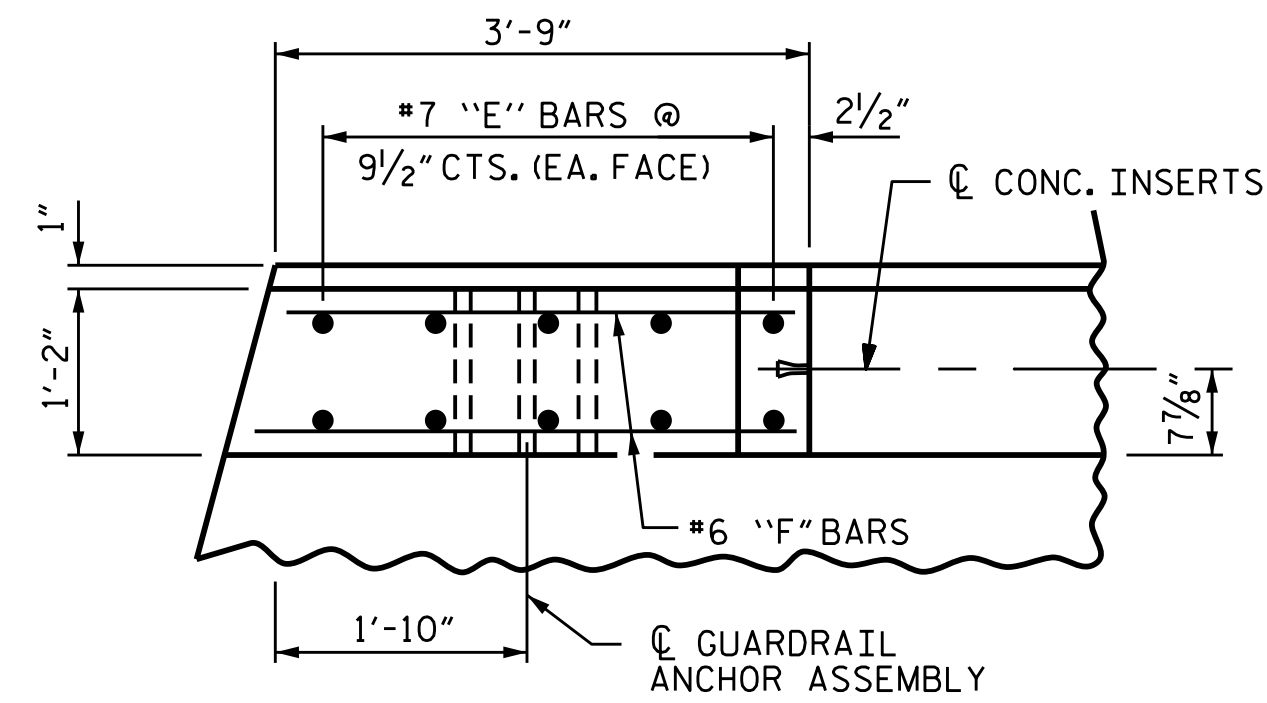
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED





PLAN OF PARAPET

PARAPET AT END BENT 1 SHOWN.  
PARAPET AT END BENT 2 SIMILAR BY ROTATION.



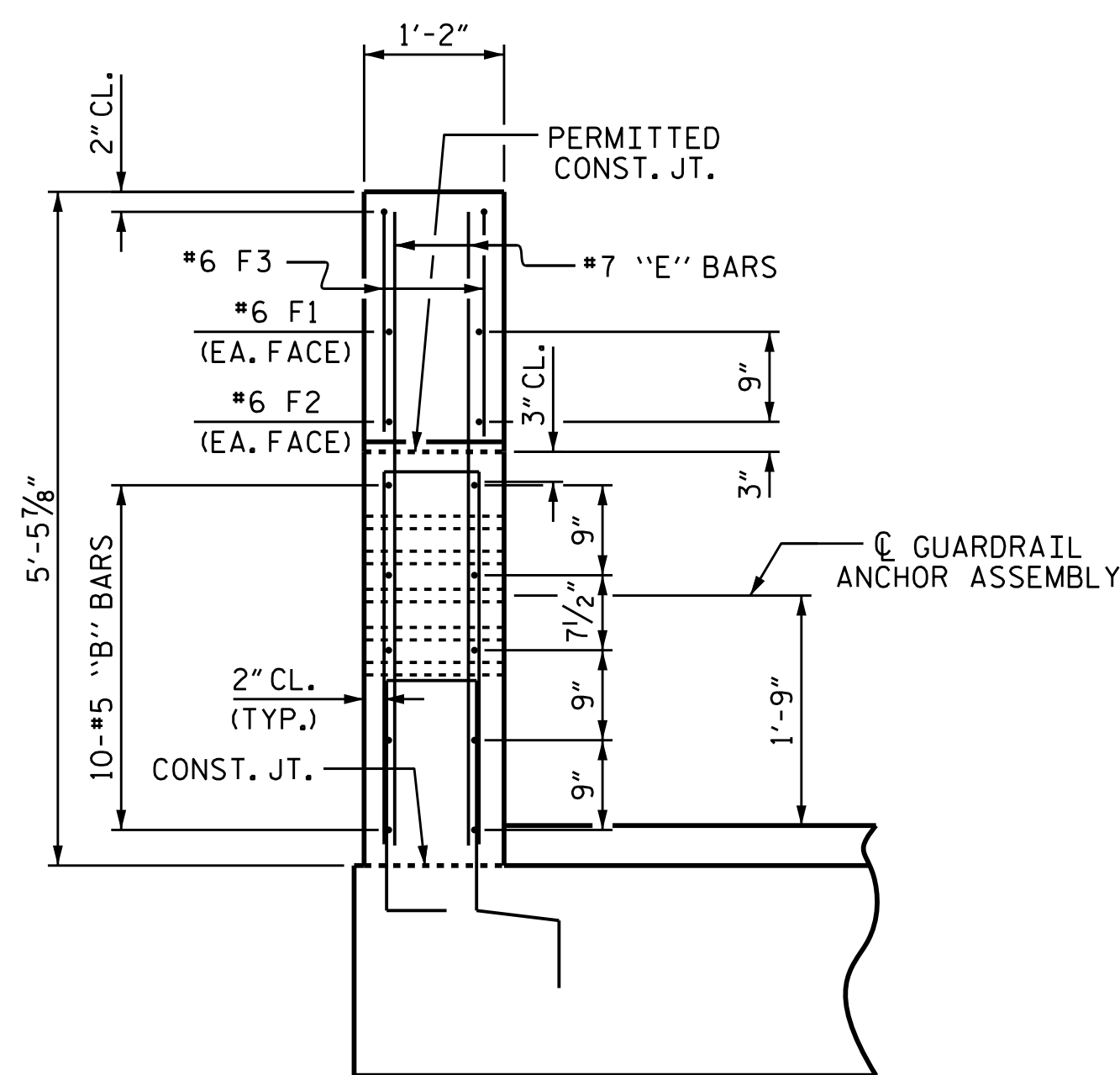
PLAN OF END POST

END POST AT END BENT 1 SHOWN.  
END POST AT END BENT 2 SIMILAR BY ROTATION.

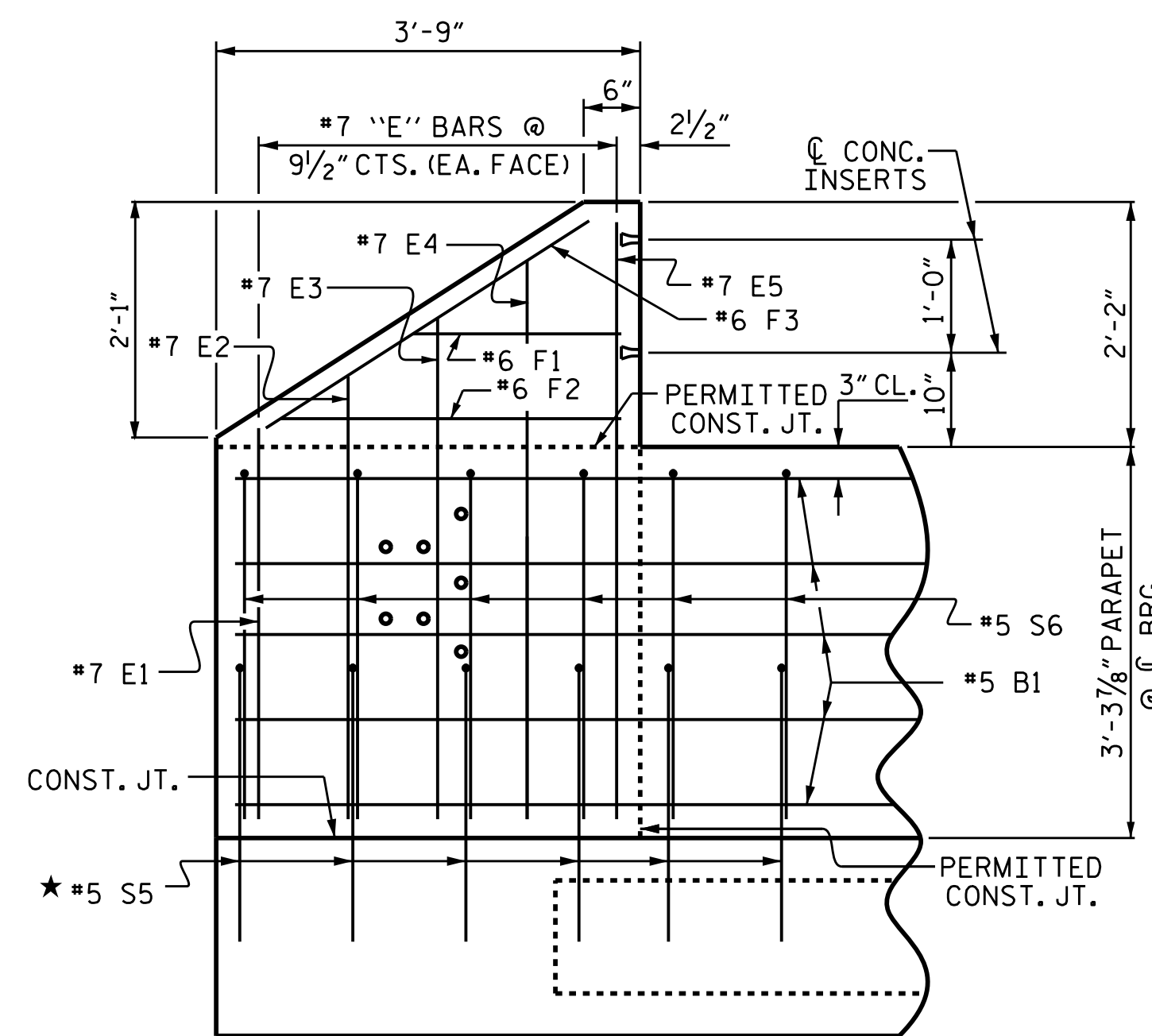
BAR TYPE		BILL OF MATERIAL				
PARAPETS AND END POSTS						
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	
* B1	80	#5	STR	11'-8"	974	
* B3	60	#5	STR	13'-8"	855	
* E1	4	#7	STR	2'-9"	22	
* E2	4	#7	STR	3'-3"	27	
* E3	4	#7	STR	3'-9"	31	
* E4	4	#7	STR	4'-3"	35	
* E5	4	#7	STR	4'-8"	38	
* F1	4	#6	STR	1'-10"	11	
* F2	4	#6	STR	3'-0"	18	
* F3	4	#6	STR	3'-4"	20	
* S6	80	#5	1	7'-0"	591	
* S17	68	#5	1	7'-2"	514	
* EPOXY COATED REINF. STEEL					3136	
CLASS AA CONCRETE					22.4 C.Y.	
1'-2" x 3'-5 3/8" CONCRETE PARAPET					150.25 L.F.	

NOTES

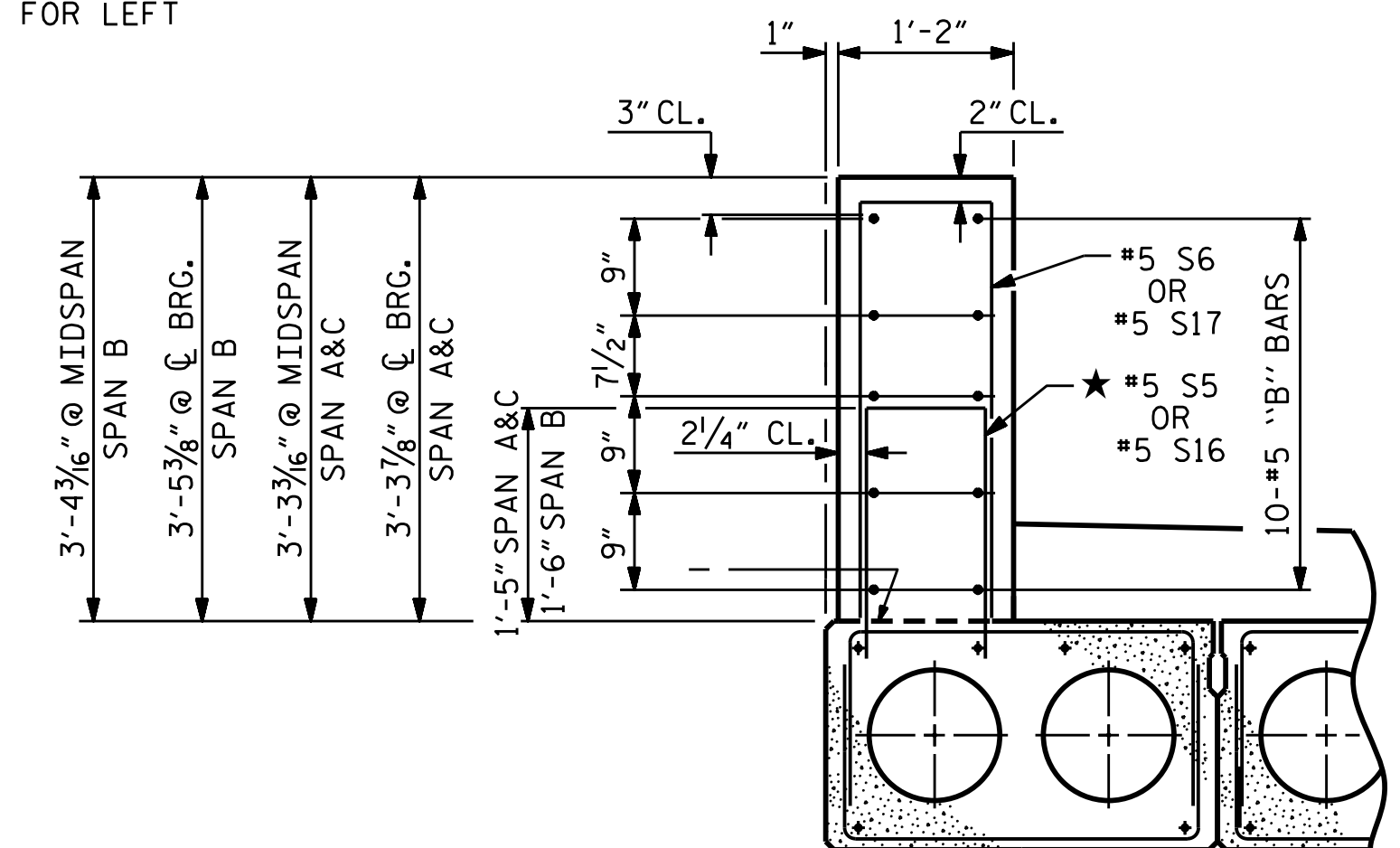
- ALL REINFORCING STEEL IN PARAPET SHALL BE EPOXY COATED.
- THE #5 'S' BARS MAY BE SHIFTED SLIGHTLY IN ORDER TO MAINTAIN A 2" MINIMUM CLEARANCE TO THE 1/2" EXPANSION JOINT MATERIAL IN PARAPET.
- FOR DETAILS FOR CONCRETE INSERTS IN END POSTS, SEE "RAIL POST SPACINGS AND END OF RAIL DETAILS" SHEET.
- FOR DETAILS OF GUARDRAIL ANCHOR ASSEMBLIES, SEE "GUARDRAIL ANCHORAGE DETAILS FOR METAL RAIL" SHEET.
- GROOVED CONTRACTION JOINTS, 1/2" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE PARAPET AND IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. A CONTRACTION JOINT SHALL BE LOCATED AT EACH THIRD POINT BETWEEN PARAPET EXPANSION JOINTS. ONLY ONE CONTRACTION JOINT IS REQUIRED AT MIDPOINT OF PARAPET SEGMENTS LESS THAN 20 FEET IN LENGTH AND NO CONTRACTION JOINTS ARE REQUIRED FOR THOSE SEGMENTS LESS THAN 10 FEET IN LENGTH.
- \* #5 S5 AND #5 S16 BARS INCLUDED IN BILL OF MATERIAL FOR LEFT EXTERIOR CORED SLAB UNIT.



END VIEW



ELEVATION



TWO BAR METAL RAIL PARAPET SECTION

(LEFT EXTERIOR UNIT ONLY)

PROJECT NO. B-5326  
WAKE COUNTY  
 STATION: 17+70.00 -L-

SHEET 1 OF 4

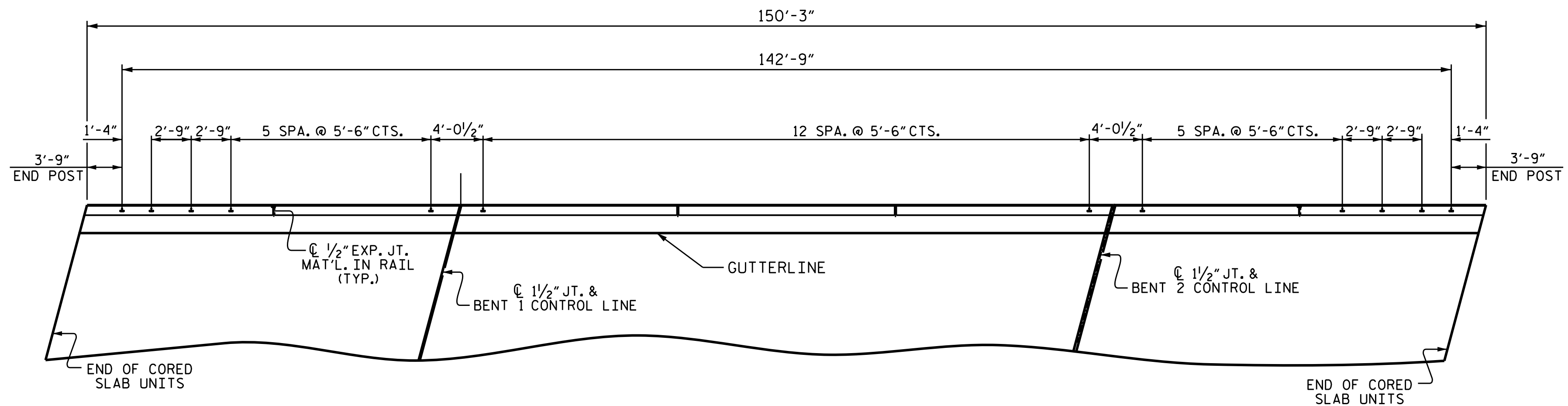


STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 SUPERSTRUCTURE  
 CONCRETE PARAPET

DRAWN BY: S. N. MEGAHED DATE: 01/2019  
 CHECKED BY: F. LEA DATE: 01/2019  
 DESIGN ENGINEER OF RECORD: S. N. MEGAHED DATE: 01/2019

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-13
1			3			TOTAL SHEETS 29
2			4			



**PLAN OF RAIL POST SPACINGS**  
2 BAR METAL RAIL ON LEFT SIDE ONLY

**NOTES**

STRUCTURAL CONCRETE INSERT

- THE STRUCTURAL CONCRETE INSERT ASSEMBLY SHALL CONSIST OF THE FOLLOWING COMPONENTS:
- A. FERRULES SHALL BE MADE FROM STEEL MEETING THE REQUIREMENTS OF AASHTO M169, GRADE 12L14 AND SHALL HAVE A MINIMUM LENGTH OF 1 1/2".
  - B. 1 - 3/4" Ø X 1 5/8" BOLT WITH WASHER. BOLT SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307. BOLT AND WASHER SHALL BE GALVANIZED. (AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLT AND WASHER MAY BE USED AS AN ALTERNATE FOR THE 3/4" Ø X 1 5/8" GALVANIZED BOLT AND WASHER. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.)
  - C. WIRE STRUT SHOWN IN THE CONCRETE INSERT ASSEMBLY DETAIL IS THE MINIMUM ALLOWABLE SIZE AND SHALL HAVE A MINIMUM TENSILE STRENGTH OF 100,000 PSI. AS AN OPTION, A 1/16" Ø WIRE STRUT WITH A MINIMUM TENSILE STRENGTH OF 90,000 PSI IS ACCEPTABLE.

**NOTES**

METAL RAIL TO END POST CONNECTION

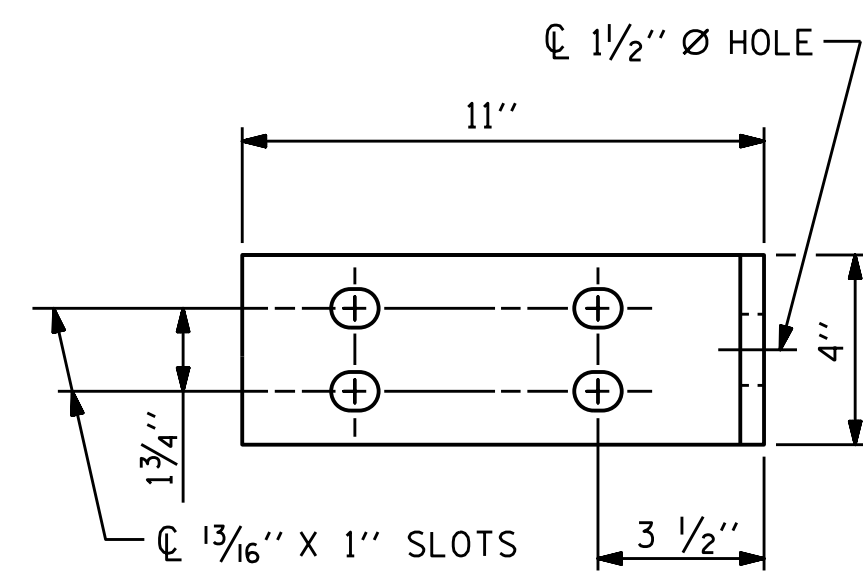
- THE METAL RAIL TO END POST CONNECTION SHALL CONSIST OF THE FOLLOWING COMPONENTS:
- A. 1/2" PLATES SHALL CONFORM TO AASHTO M270 GRADE 36 AND SHALL BE GALVANIZED AFTER FABRICATION.
  - B. 3/4" STRUCTURAL CONCRETE INSERT SHALL HAVE A WORKING LOAD SHEAR CAPACITY OF 4800 LBS. THE FERRULES SHALL ENGAGE A 3/4" Ø X 1 5/8" BOLT WITH 2" O.D. WASHER IN PLACE. THE 3/4" Ø X 1 5/8" BOLT SHALL HAVE N. C. THREADS.
  - C. CAP SCREWS FOR RAIL ATTACHMENT TO ANGLE SHALL CONFORM TO THE REQUIREMENTS OF ASTM F593 ALLOY 305 STAINLESS STEEL. CAP SCREWS TO BE CENTERED IN SLOTS AT 60°F.
  - D. STANDARD CLAMP BARS (SEE METAL RAIL SHEET).
  - E. 1/2" Ø PIPE SLEEVES (IF REQUIRED) TO BE GALVANIZED.

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

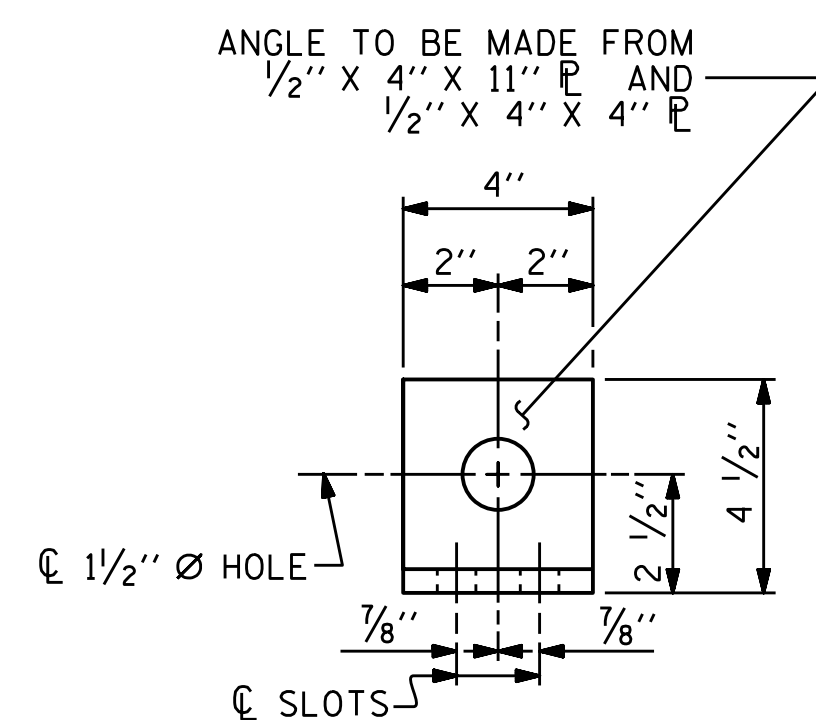
THE 3/4" STRUCTURAL CONCRETE INSERT WITH BOLT SHALL BE ASSEMBLED IN THE SHOP.

THE COST OF THE 3/4" STRUCTURAL CONCRETE INSERT ASSEMBLY, AND THE 1/2" PLATES COMPLETE IN PLACE SHALL BE INCLUDED IN THE VARIOUS PAY ITEMS.

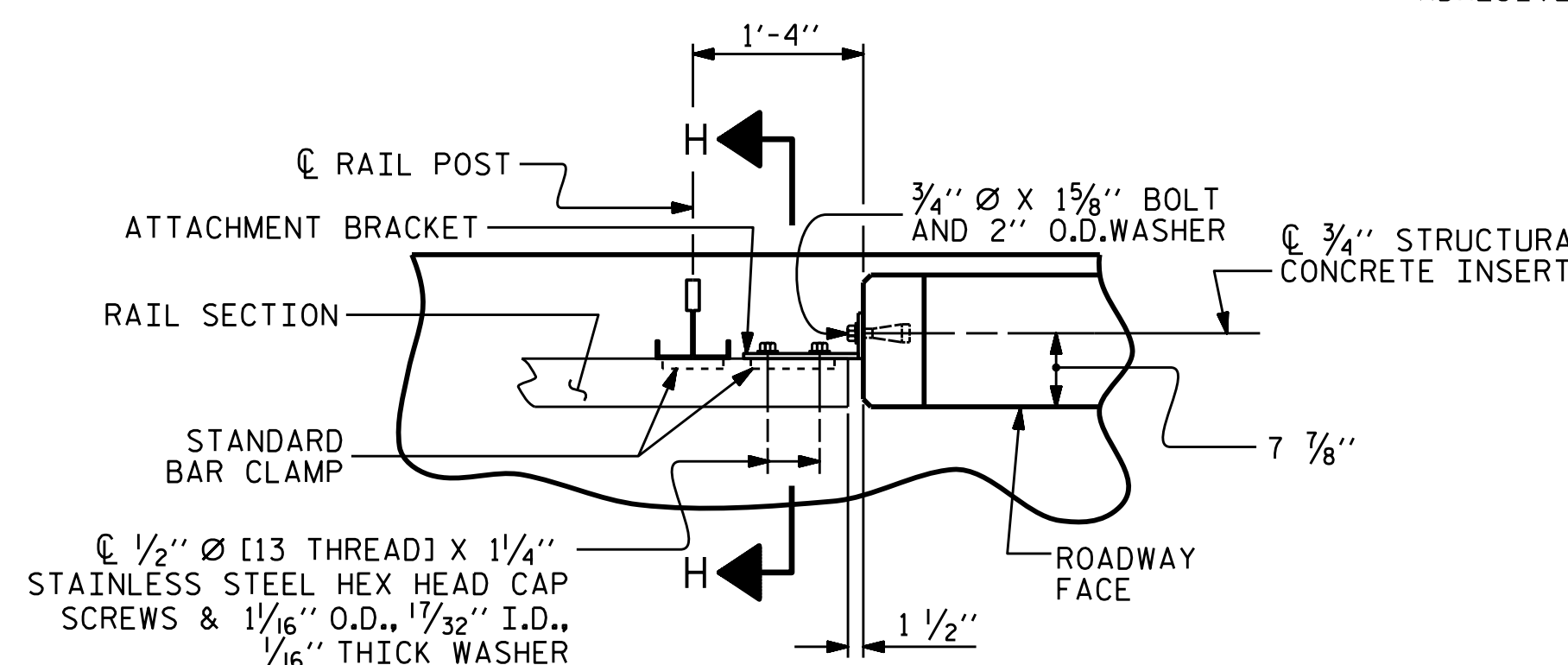
THE CONTRACTOR, AT HIS OPTION, MAY USE AN ADHESIVE BONDING SYSTEM IN LIEU OF THE STRUCTURAL CONCRETE INSERT EMBEDDED IN THE END POST. IF THE ADHESIVE BONDING SYSTEM IS USED, THE 3/4" Ø X 1 5/8" BOLT WITH WASHER SHALL BE REPLACED WITH A 3/4" Ø X 6 1/2" BOLT AND 2" O.D. WASHER. ALL SPECIFICATIONS THAT APPLY TO THE 3/4" Ø X 1 5/8" BOLT SHALL APPLY TO THE 3/4" Ø X 6 1/2" BOLT. FIELD TESTING OF THE ADHESIVE BONDING SYSTEM IS NOT REQUIRED.



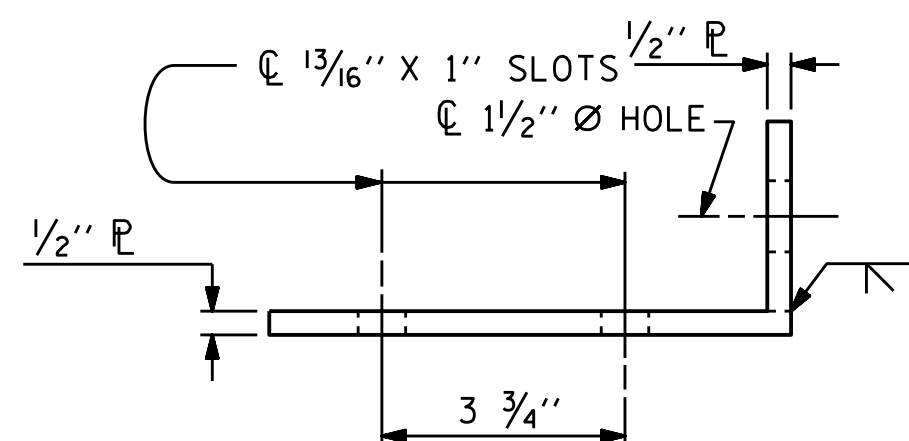
**ELEVATION**



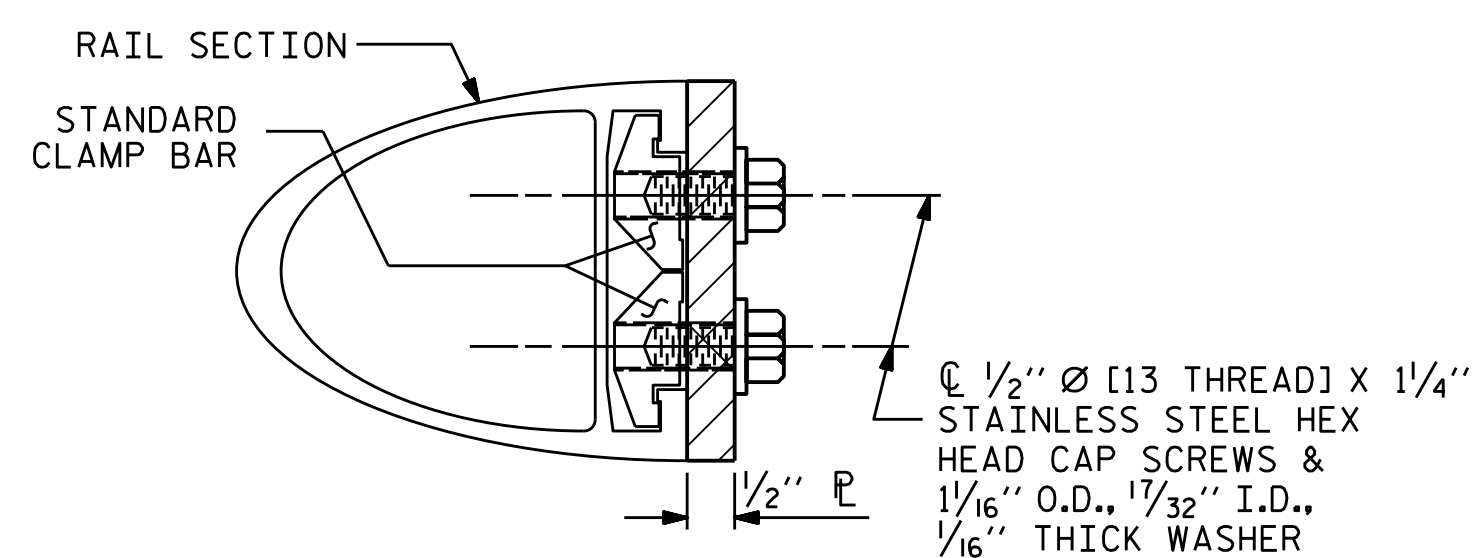
**END VIEW (FIX AND EXP.)**



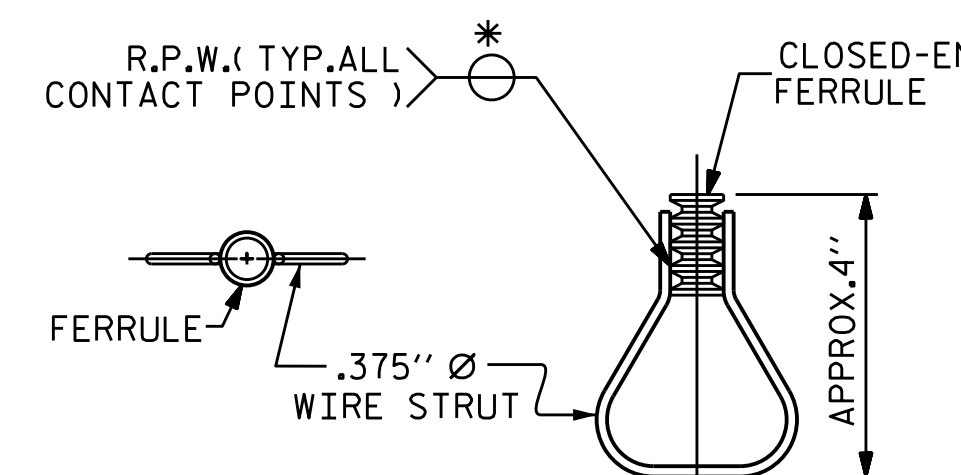
**PLAN - RAIL AND END POST**



**TOP VIEW**



**SECTION H-H (FIX)**

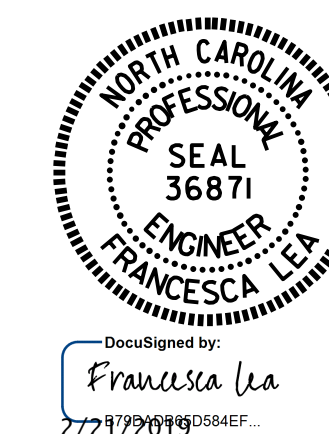


**PLAN ELEVATION**  
**STRUCTURAL CONCRETE INSERT**

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

PROJECT NO. B-5326  
WAKE COUNTY  
STATION: 17+70.00 -L-  
SHEET 2 OF 4

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
STANDARD  
RAIL POST SPACINGS  
AND  
END OF RAIL DETAILS  
FOR TWO BAR METAL RAILS



ASSEMBLED BY : S. N. MEGAHED	DATE : 01/2019
CHECKED BY : F. LEA	DATE : 01/2019
DRAWN BY : FCJ 1/88	REV. 5/1/06
CHECKED BY : CRK 3/89	REV. 10/1/11
	REV. 12/17
	TLA/GM
	MAA/GM
	MAA/THC

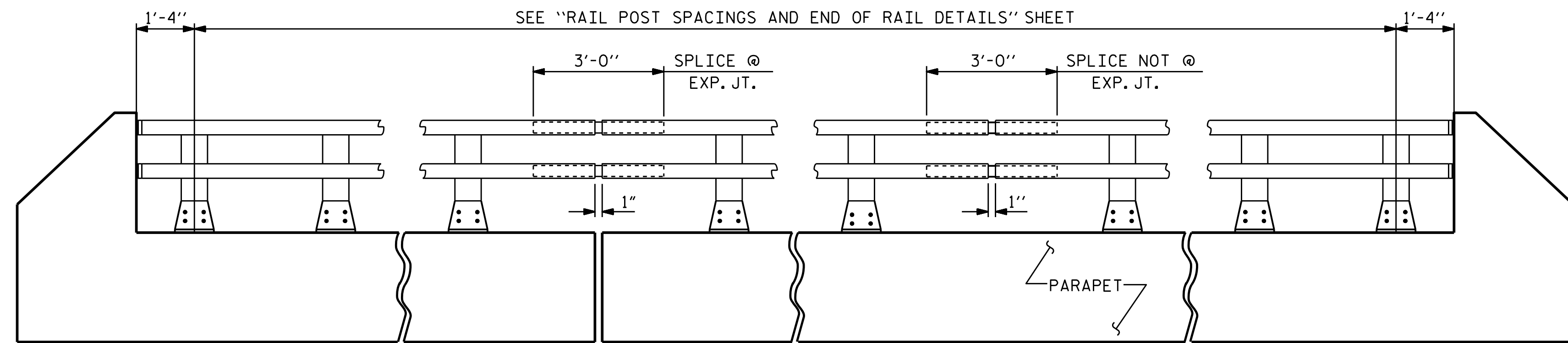
**DETAILS FOR ATTACHING METAL RAIL TO END POST**

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-14
1			3			TOTAL SHEETS
2			4			29

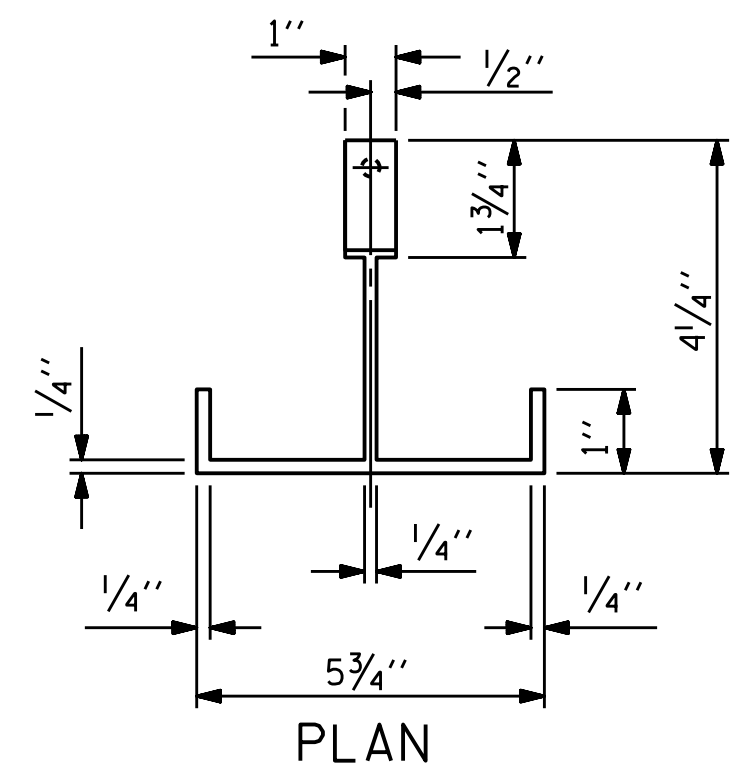
STD. NO. BMR2





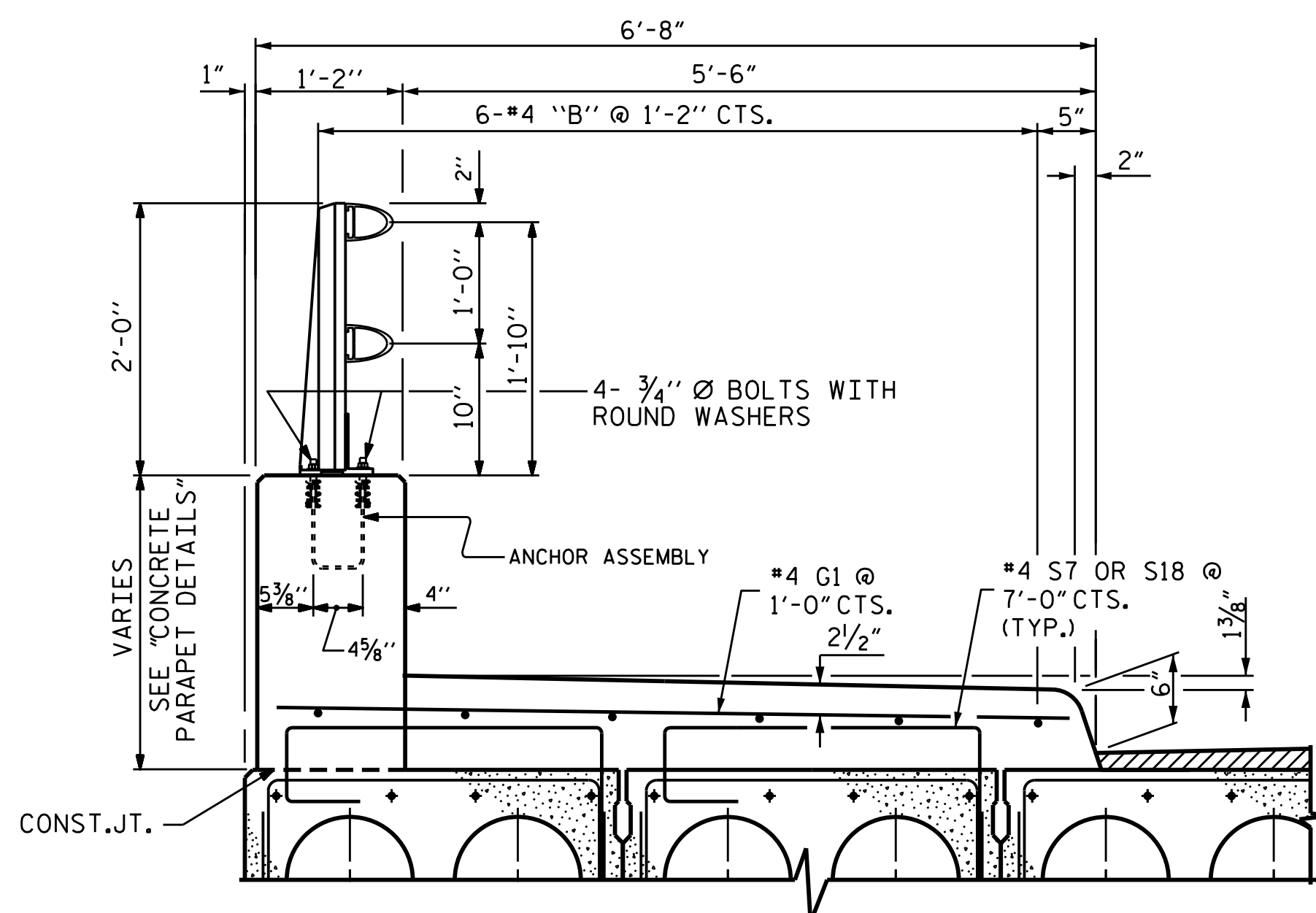
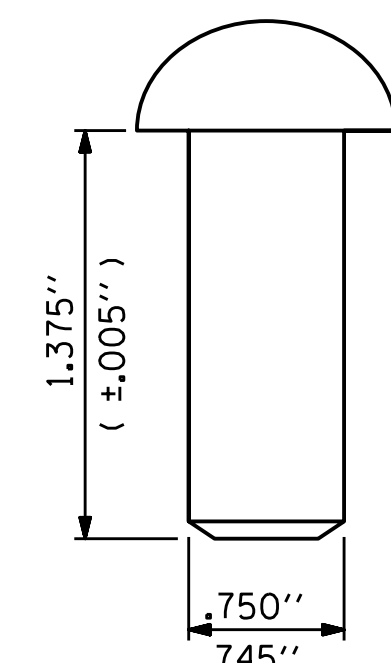
**ELEVATION**

NOTE : FOR ATTACHMENT OF METAL RAIL TO END POST, SEE SHEET 2 OF 4.

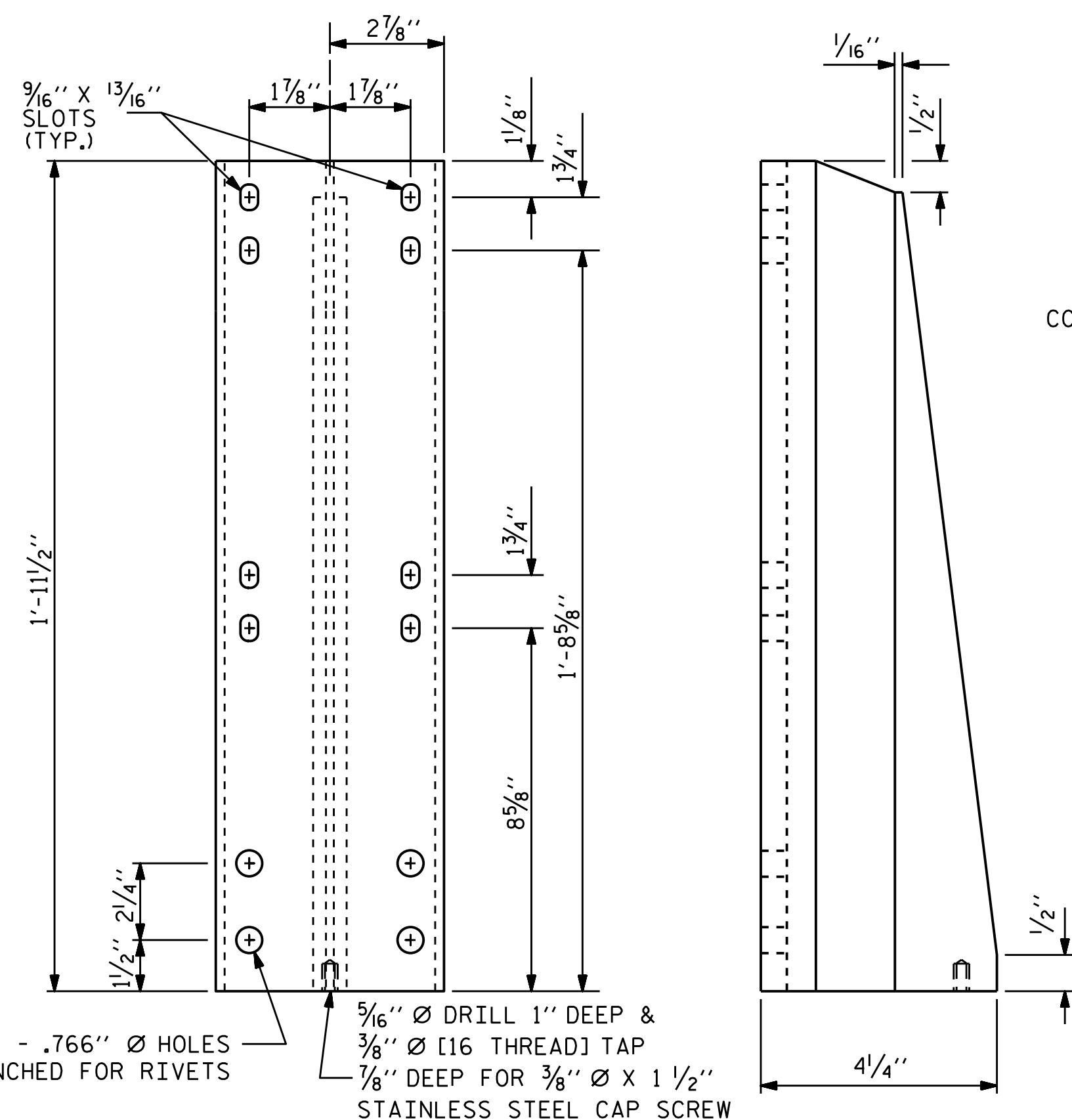


**PLAN**

**RIVET DETAIL**



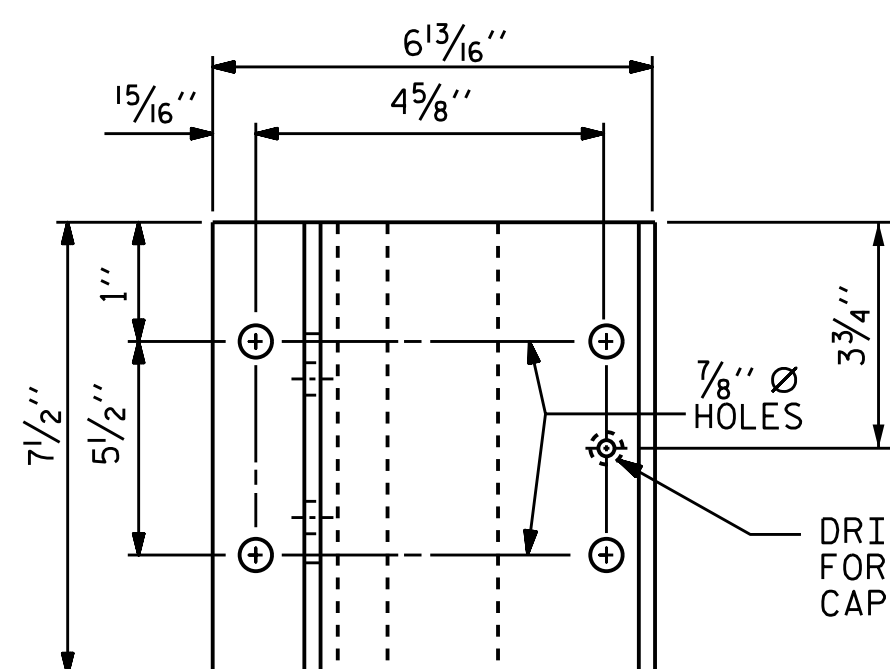
**SECTION THRU SIDEWALK AND RAIL**



**FRONT ELEVATION**

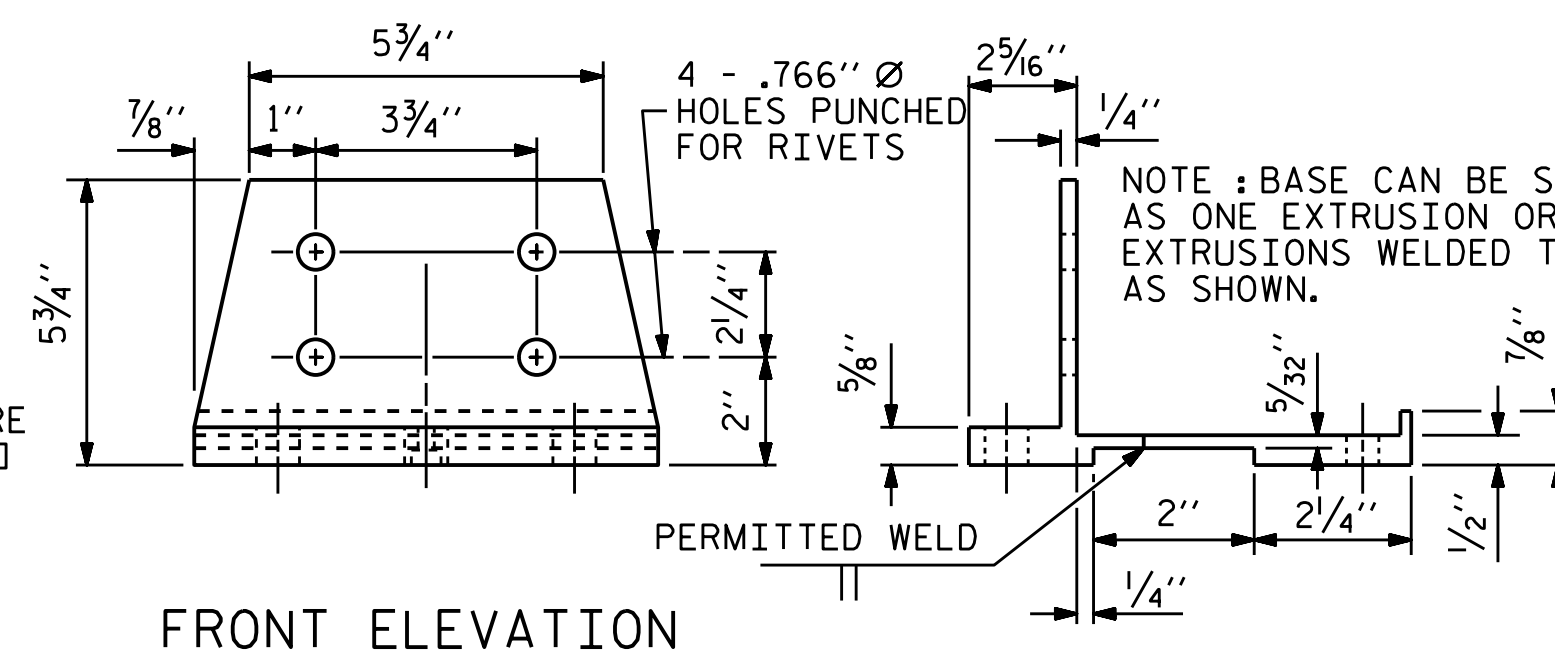
**SIDE ELEVATION**

**DETAILS OF POST**



**PLAN**

DRILL & COUNTER BORE FOR 3/8" Ø [16 THREAD] CAP SCREW



**FRONT ELEVATION**

**SIDE ELEVATION**

**POST BASE DETAILS**

PAY LENGTH = 142.75 LIN. FT.

**NOTES**

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

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

**ALUMINUM RAILS**

MATERIAL FOR POSTS, BASES AND RAILS, EXPANSION BARS AND CLAMP BARS SHALL BE ASTM B-221 ALLOY 6061-T6. MATERIAL FOR RIVETS SHALL BE ASTM B316 ALLOY 6061-T6. RIVETS SHALL BE STANDARD BUTTON HEAD AND CONE POINT COLD DRIVEN AS PER DRAWING.

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

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

**GALVANIZED STEEL RAILS**

MATERIAL AND GALVANIZING ARE TO CONFORM TO THE FOLLOWING SPECIFICATIONS:

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

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

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

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

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

**GENERAL NOTES**

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

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

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

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

METAL RAIL POSTS SHALL BE SET NORMAL TO CURB GRADE.

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

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

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

SHIMS SHALL BE USED AS NECESSARY FOR POST ALIGNMENT.

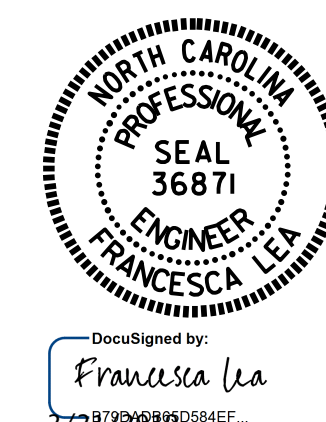
ALLOY 6351-T5 MAY BE SUBSTITUTED FOR ALLOY 6061-T6 WHERE APPLICABLE.

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

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

PROJECT NO. B-5326  
WAKE COUNTY  
 STATION: 17+70.00 -L-

SHEET 3 OF 4



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD  
**2 BAR METAL RAIL**

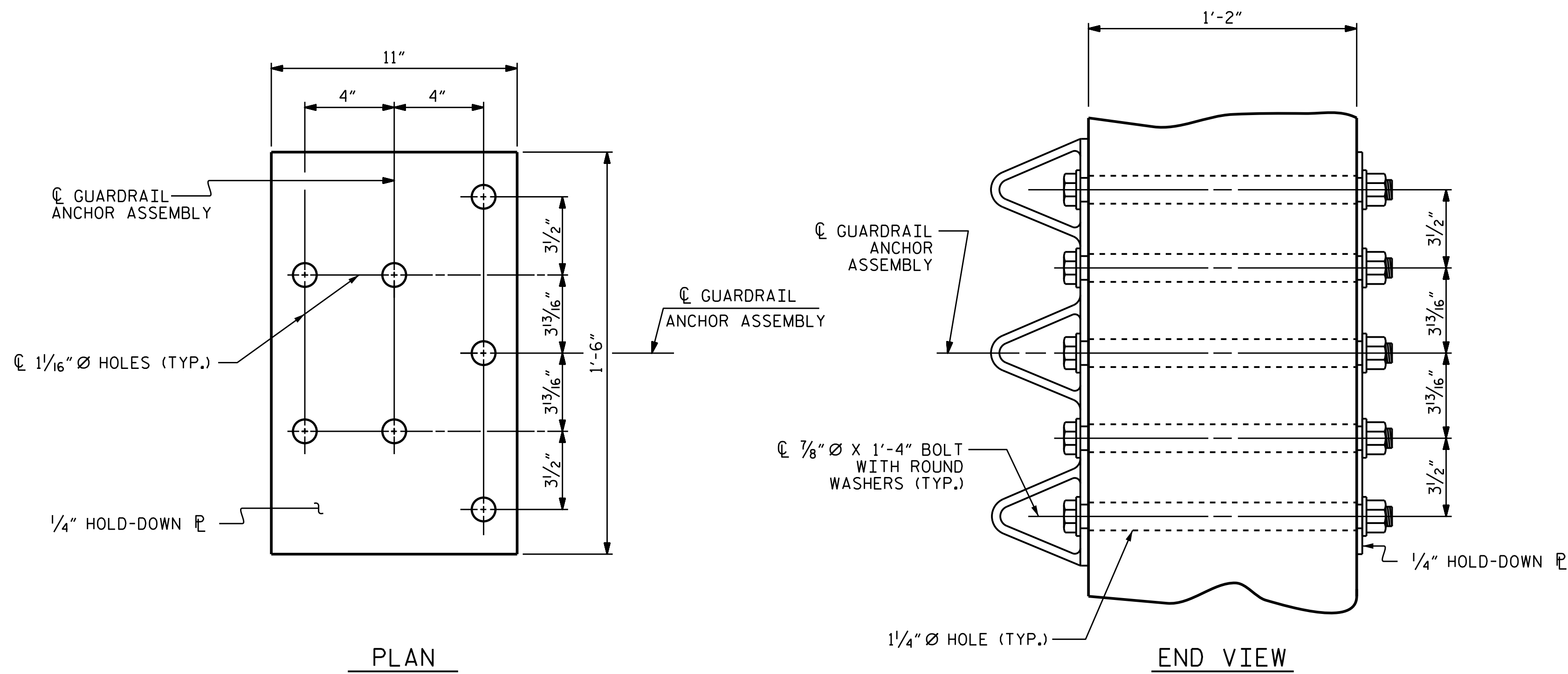
ASSEMBLED BY : S.N. MEGAHED	DATE : 01/2019
CHECKED BY : F. LEA	DATE : 01/2019
DRAWN BY : EEM	6/94
CHECKED BY : RGW	6/94
REV. 10/1/11	MAA/GM
REV. 6/13	MAA/GM
REV. 12/17	MAA/THC

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

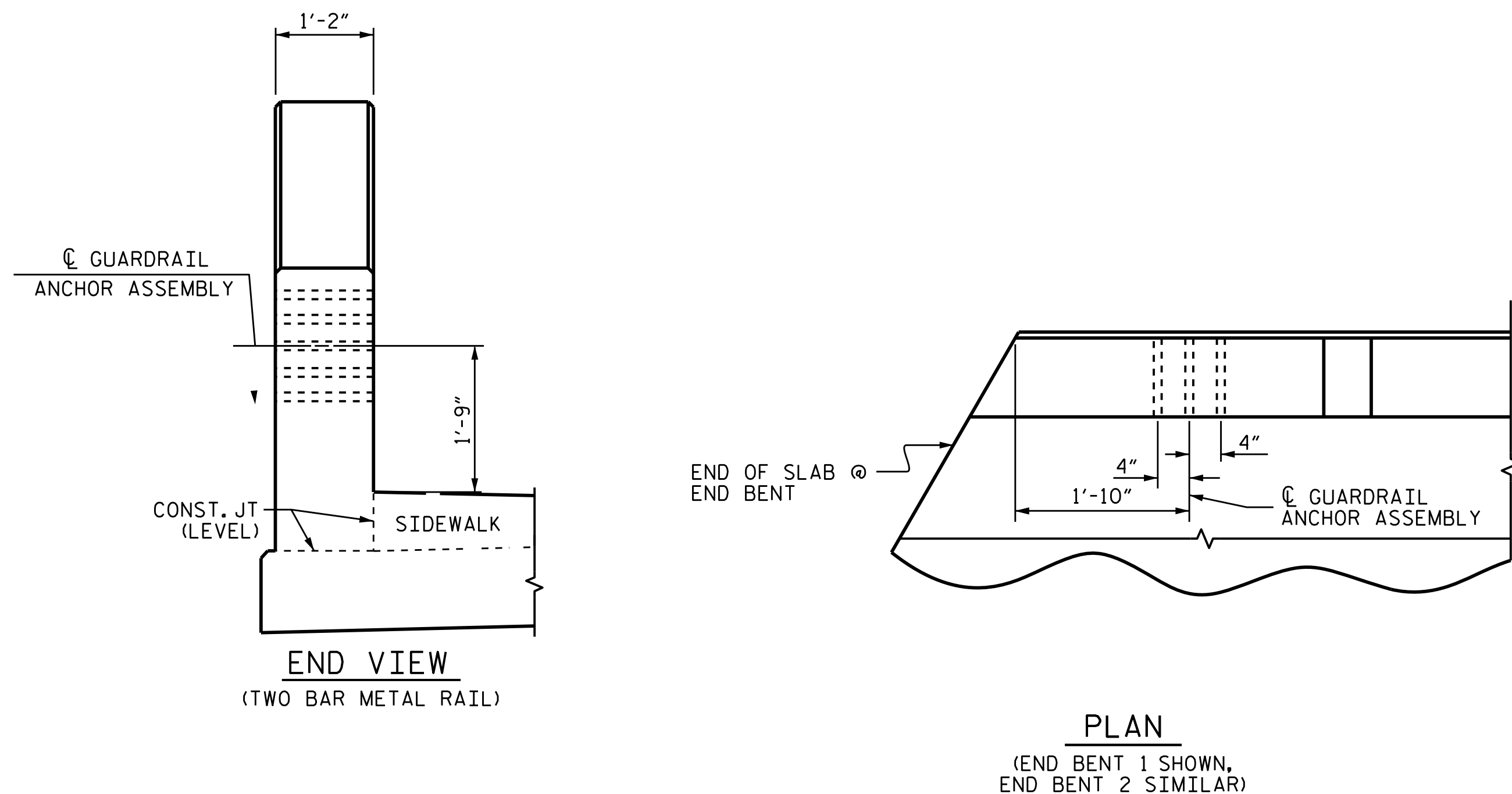
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-15
1			3			TOTAL SHEETS 29
2			4			







**GUARDRAIL ANCHOR ASSEMBLY DETAILS**

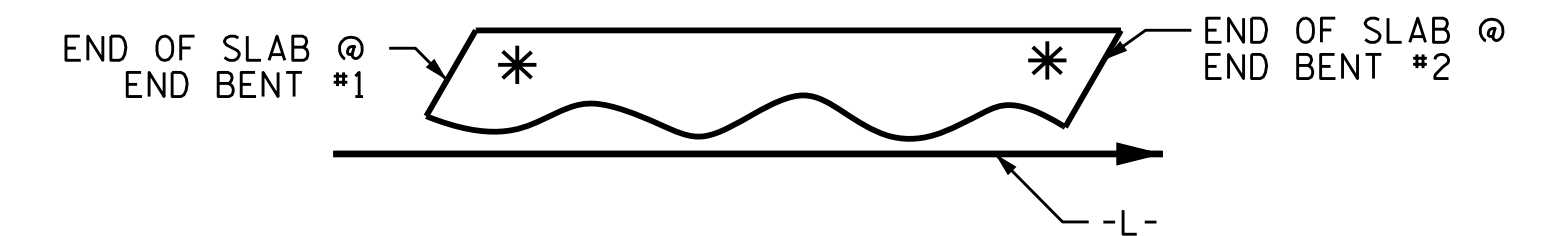


**LOCATION OF GUARDRAIL ANCHOR AT END POST**

(LEFT SIDE ONLY)

**NOTES**

- THE GUARDRAIL ANCHOR ASSEMBLY SHALL CONSIST OF A 1/4" HOLD DOWN PLATE AND 7 - 7/8" Ø BOLTS WITH NUTS AND WASHERS.
- THE HOLD-DOWN PLATE SHALL CONFORM TO AASHTO M270 GRADE 36. AFTER FABRICATION, THE HOLD-DOWN PLATE SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH AASHTO M111.
- BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307 AND NUTS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M291. BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED. AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLTS, NUTS AND WASHERS MAY BE USED AS AN ALTERNATE FOR THE 7/8" Ø GALVANIZED BOLTS, NUTS AND WASHERS. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.
- THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF THE PARAPET. FOR POINTS OF ATTACHMENT, SEE SKETCH.
- AFTER INSTALLATION, THE EXPOSED THREAD OF THE BOLT SHALL BE BURRED WITH A SHARP POINTED TOOL.
- THE COST OF THE GUARDRAIL ANCHOR ASSEMBLIES WITH BOLTS, NUTS AND WASHERS COMPLETE IN PLACE, SHALL BE INCLUDED IN THE VARIOUS PAY ITEMS.
- THE VERTICAL REINFORCING BARS MAY BE SHIFTED SLIGHTLY IN THE END POST TO CLEAR ASSEMBLY BOLTS.
- THE 1 1/4" Ø HOLES SHALL BE FORMED OR DRILLED WITH A CORE BIT. IMPACT TOOLS WILL NOT BE PERMITTED. ANY CONCRETE DAMAGED BY THIS WORK SHALL BE REPAIRED TO THE SATISFACTION OF THE ENGINEER.

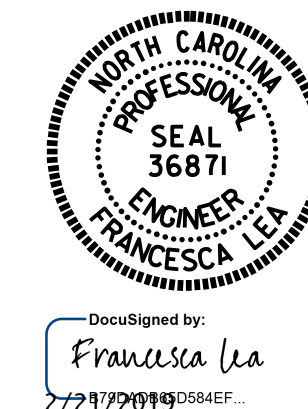


**SKETCH SHOWING POINTS OF ATTACHMENT**

\* LOCATION OF GUARDRAIL ATTACHMENT

PROJECT NO. B-5326  
WAKE COUNTY  
 STATION: 17+70.00 -L-

SHEET 1 OF 2



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

ASSEMBLED BY : F. LEA	DATE : 01/2019
CHECKED BY : S.N. MEGAHED	DATE : 01/2019
DRAWN BY : MAA 5/10	REV. 1/15 MAA/TMG
CHECKED BY : GM 5/10	REV. 12/17 MAA/THC
	REV. 5/18 MAA/THC

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	TOTAL SHEETS
1			3			S-17
2			4			29

(SHT 2a) STD. NO. GRA3

NOTES

THE GUARDRAIL ANCHOR ASSEMBLY SHALL CONSIST OF A 1/4" HOLD DOWN PLATE AND 7 - 3/8" 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 3/8" 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.)

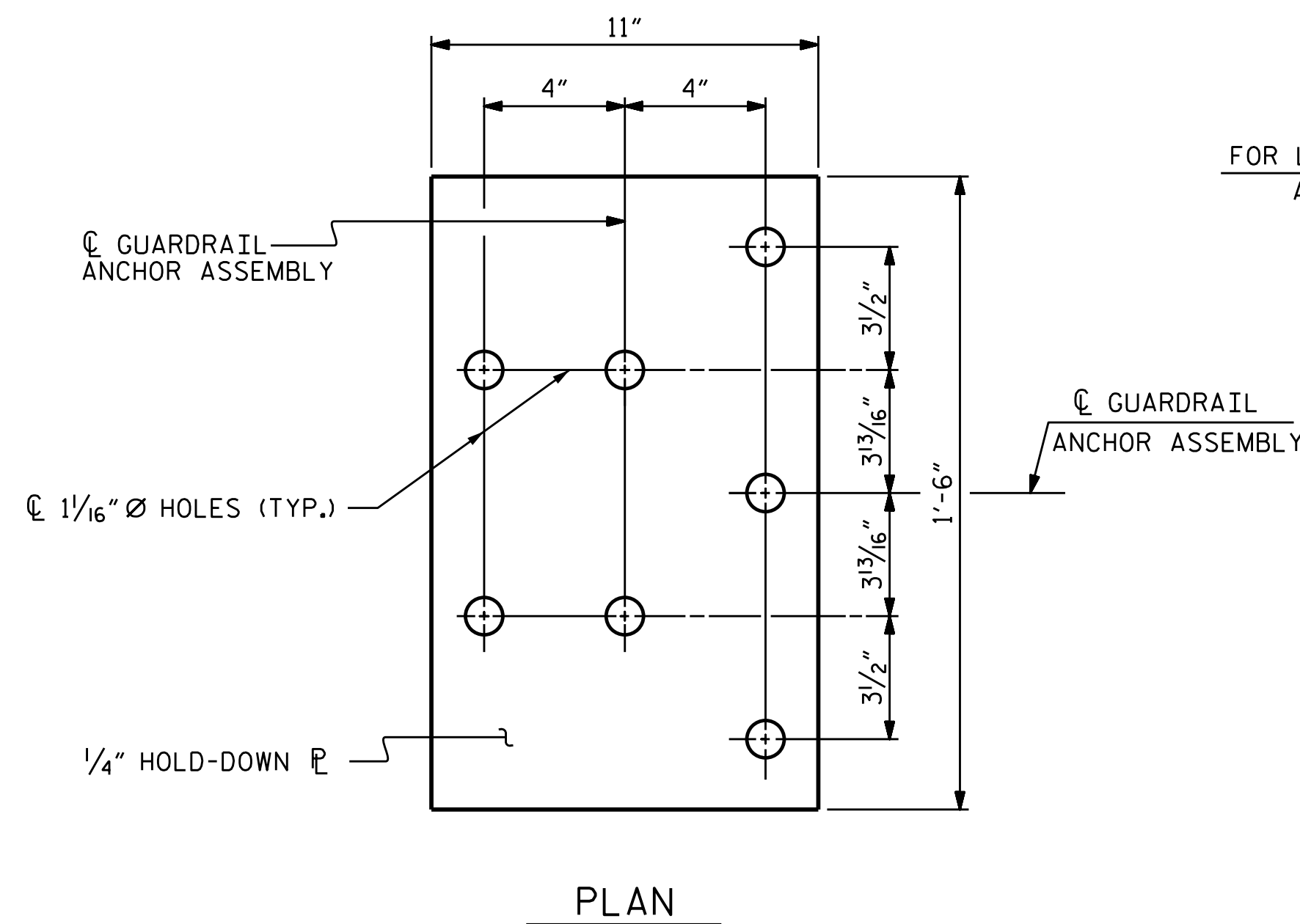
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF BARRIER RAIL. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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

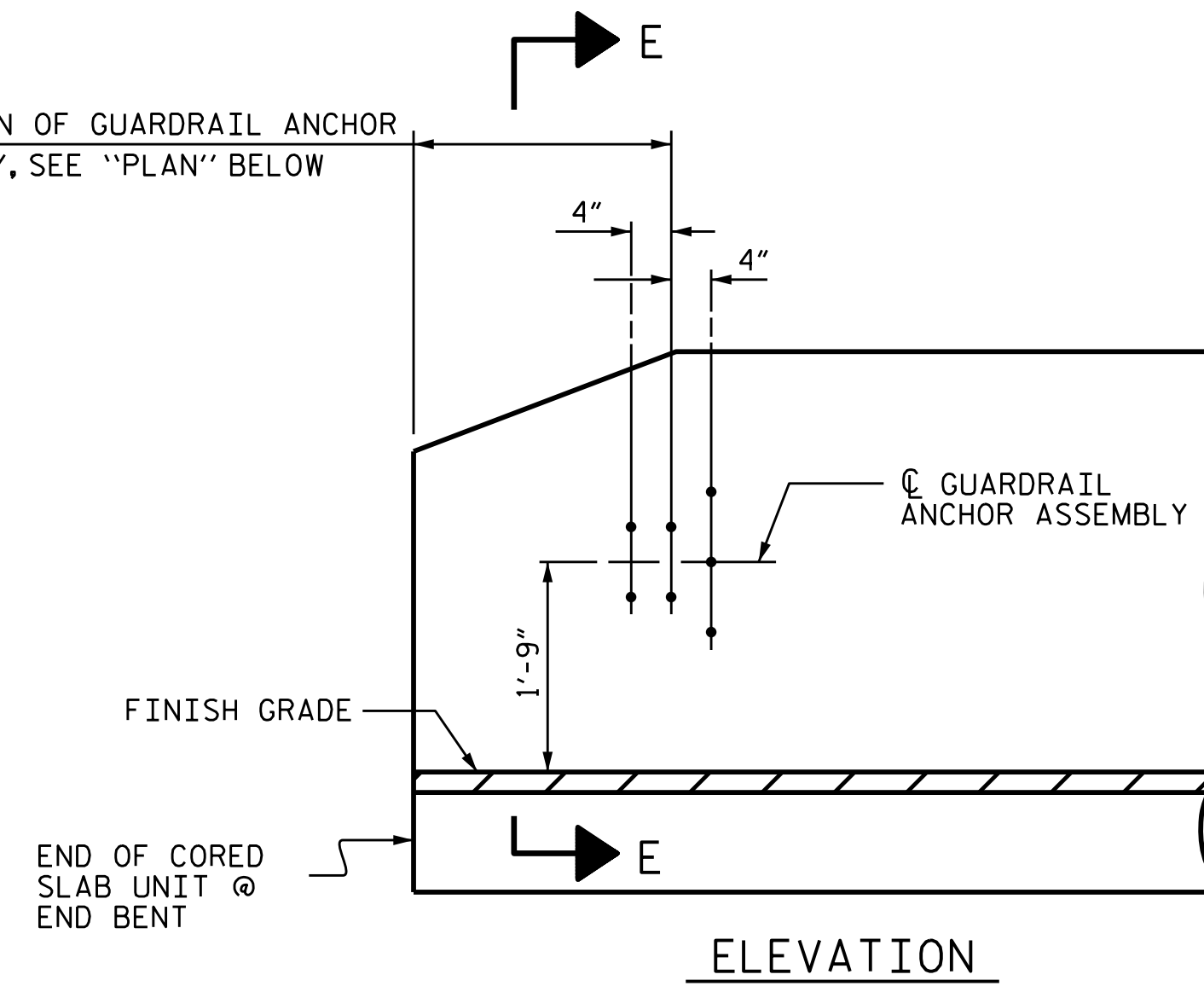
THE COST OF THE GUARDRAIL ANCHOR ASSEMBLY SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR VERTICAL CONCRETE BARRIER RAIL.

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.

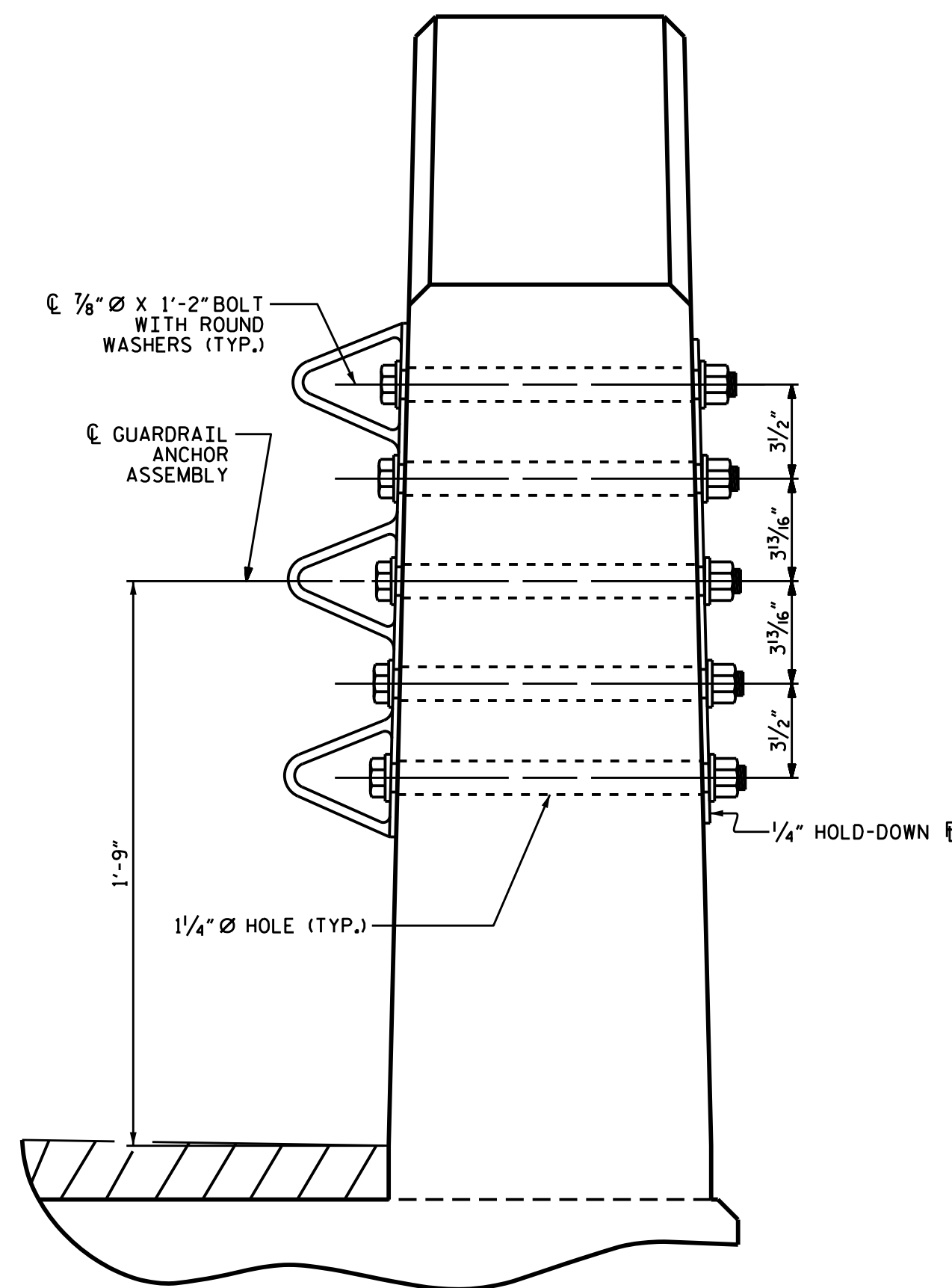


FOR LOCATION OF GUARDRAIL ANCHOR ASSEMBLY, SEE "PLAN" BELOW



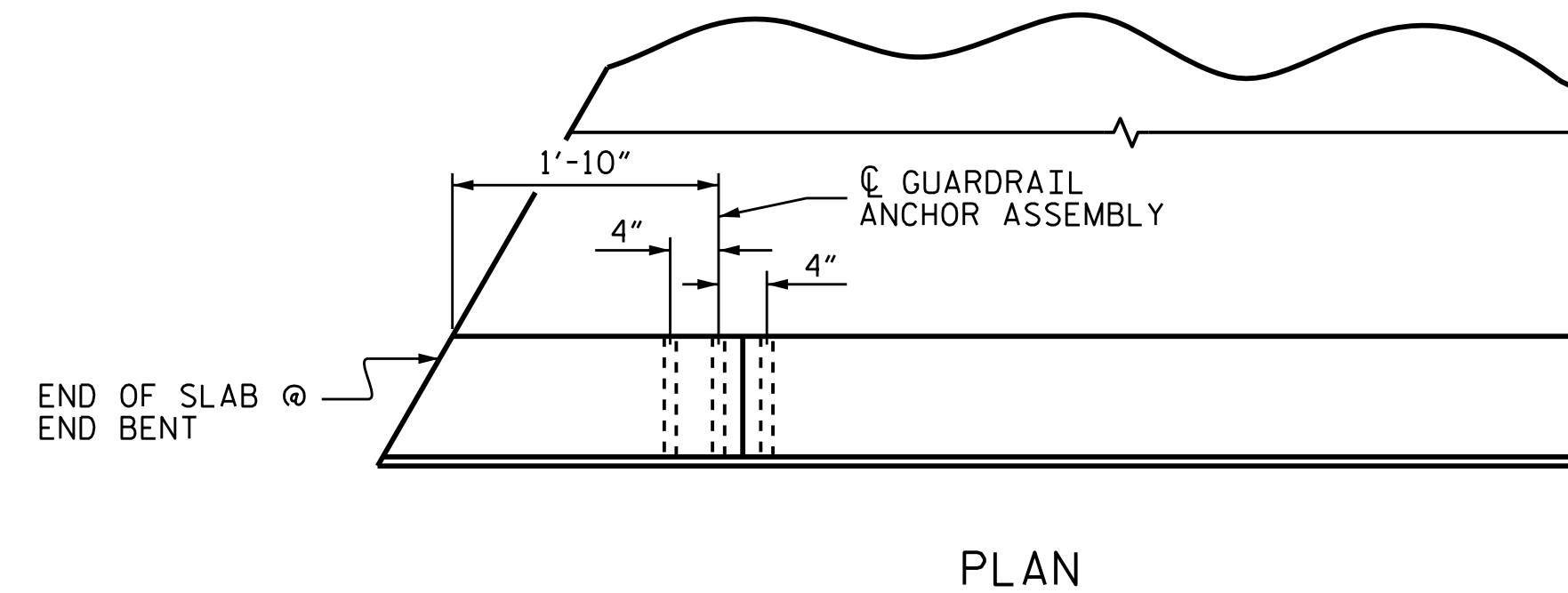
PLAN

ELEVATION



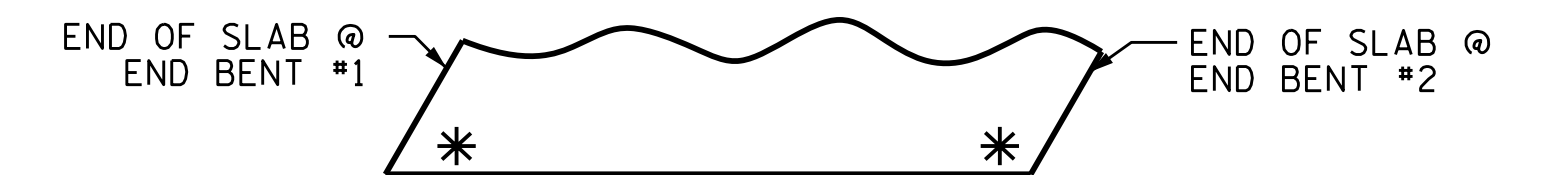
SECTION E-E

GUARDRAIL ANCHOR ASSEMBLY DETAILS



LOCATION OF ANCHORS FOR GUARDRAIL

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



SKETCH SHOWING POINTS OF ATTACHMENT

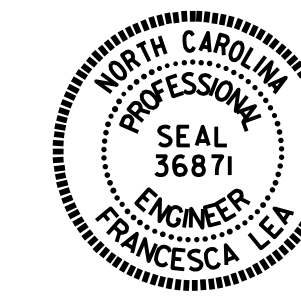
\* DENOTES GUARDRAIL ANCHOR ASSEMBLY

PROJECT NO. B-5326

WAKE COUNTY

STATION: 17+70.00 -L-

SHEET 2 OF 2



DocuSigned by:  
Francesca Lea  
2/21/2019 10:58:45 AM

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

ASSEMBLED BY : F. LEA	DATE : 01/2019
CHECKED BY : S.N. MEGAHED	DATE : 01/2019
DRAWN BY : MAA 5/10	REV. 1/15 MAA/TMG
CHECKED BY : GM 5/10	REV. 12/17 MAA/THC
	REV. 5/18 MAA/THC

DOCUMENT NOT CONSIDERED  
FINAL UNLESS ALL  
SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-18
1			3			TOTAL SHEETS 29
2			4			



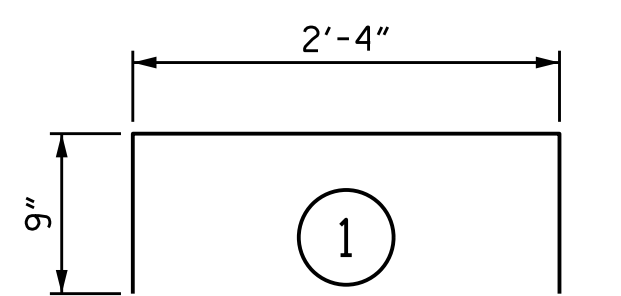
**BILL OF MATERIAL**

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
*B4	10	#4	STR	20'-9"	141
*B5	15	#4	STR	24'-6"	250
*B6	10	#4	STR	11'-10"	80
*G1	174	#4	STR	5'-2"	612
*U1	12	#4	1	3'-10"	31

\* EPOXY COATED REINFORCING STEEL 1114 LBS

CLASS AA CONCRETE 19.6 C. Y.

**BAR TYPE**



BAR DIMENSIONS ARE OUT TO OUT

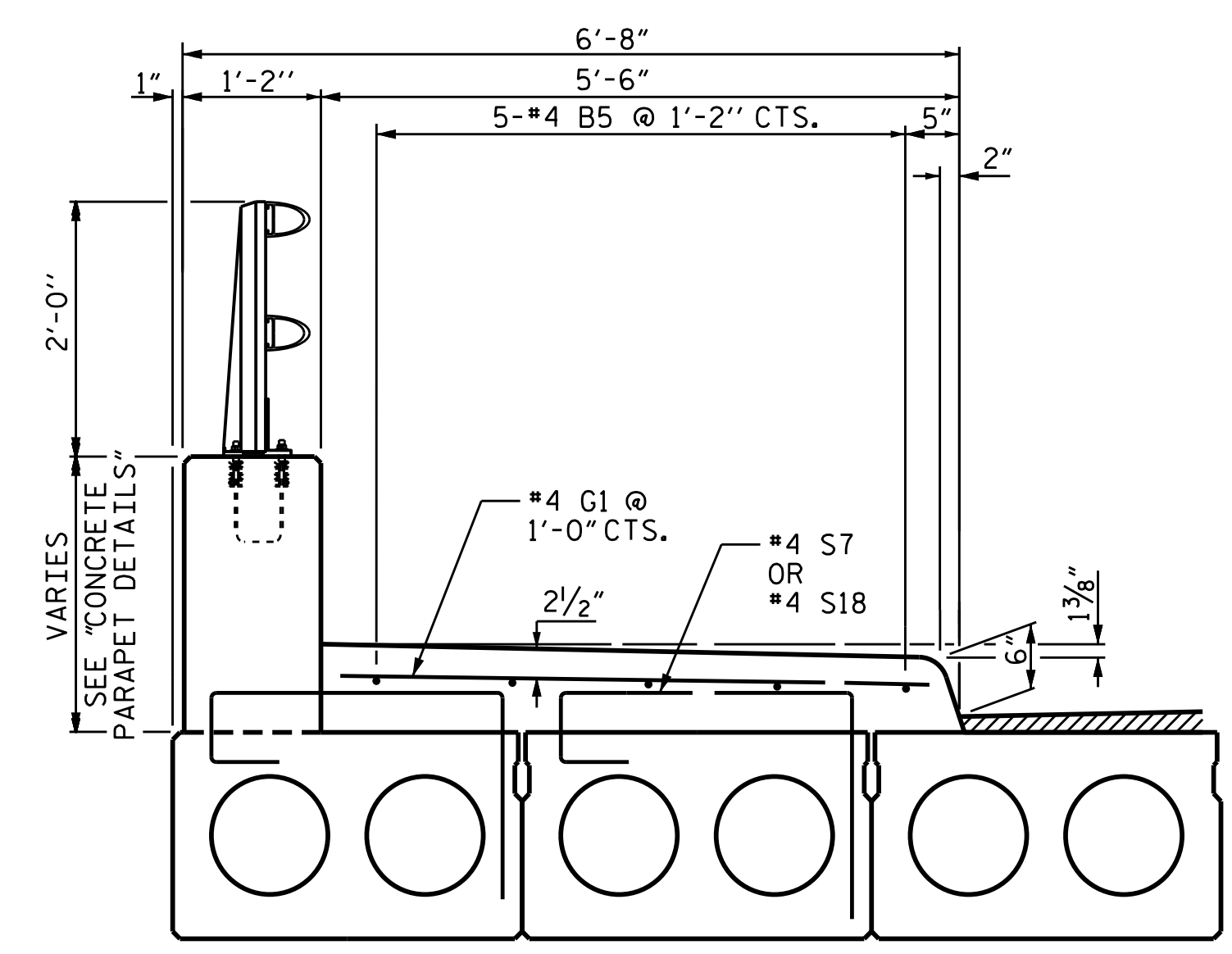
**NOTES:**

ALL REINFORCING STEEL IN THE SIDEWALKS SHALL BE EPOXY COATED.

GROOVED CONTRACTION JOINTS, 1/2" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE SIDEWALK IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS, EXCEPT THAT THE CONTRACTION JOINTS SHALL BE ORIENTED ALONG THE SKEW. THE CONTRACTION JOINTS SHALL BE LOCATED AT A SPACING OF 8 TO 10 FT. IN ADDITION, GROOVED CONTRACTION JOINTS SHALL BE LOCATED AT THE LOCATIONS OF THE SAWED CONTRACTION JOINTS AT THE END BENTS. NO CONTRACTION JOINT WILL BE REQUIRED FOR SEGMENTS LESS THAN 10 FEET IN LENGTH.

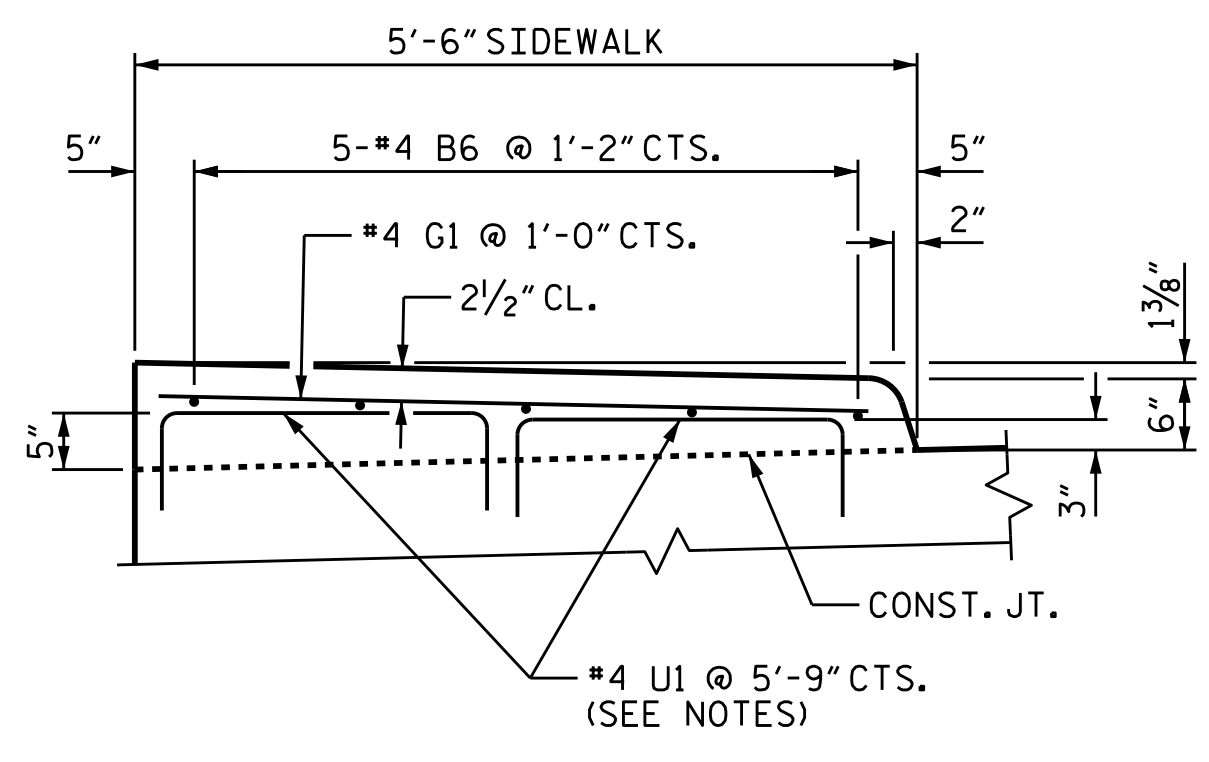
PAYMENT FOR SIDEWALKS SHALL BE INCLUDED IN THE PAY ITEMS IN THE "TOTAL OF BILL OF MATERIAL" FOR CLASS AA CONCRETE AND EPOXY COATED REINFORCING STEEL.

THE #4 U1 BARS MAY BE PUSHED INTO GREEN CONCRETE AFTER APPROACH SLAB HAS BEEN SCREEDED OFF.

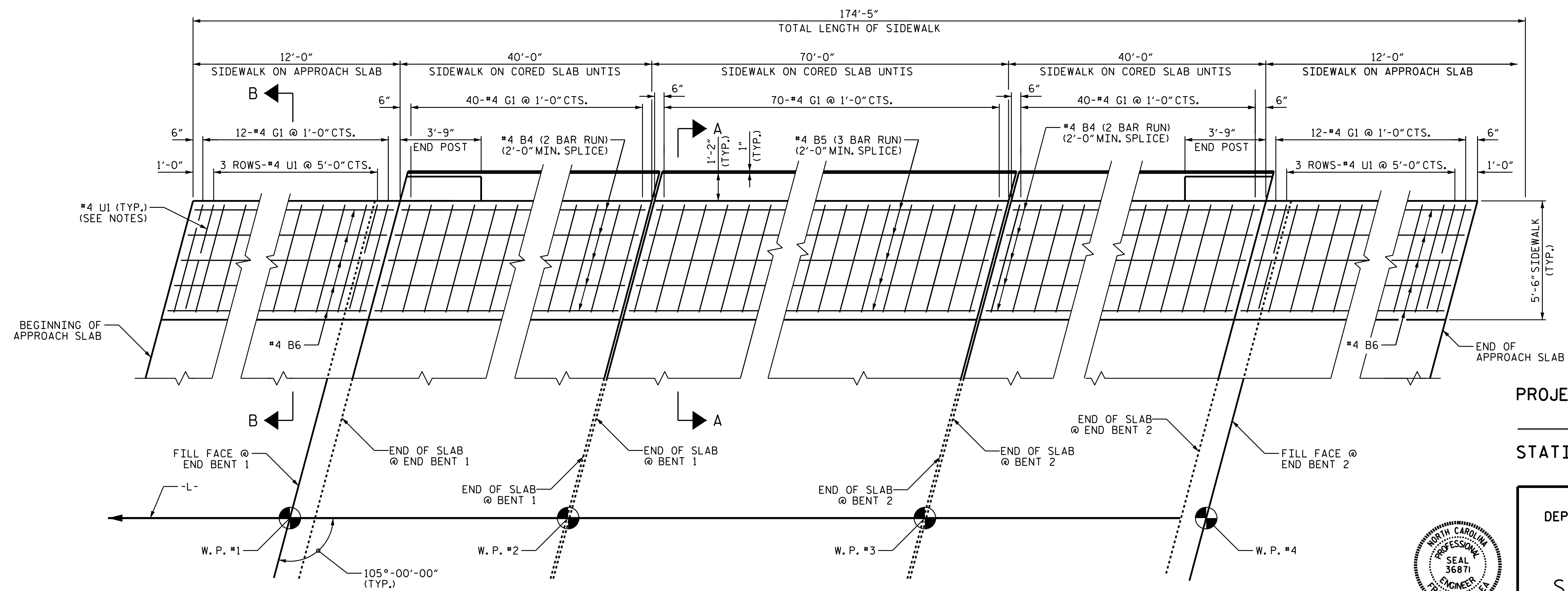


**SECTION A-A**

2 BAR METAL RAIL NOT SHOWN FOR CLARITY



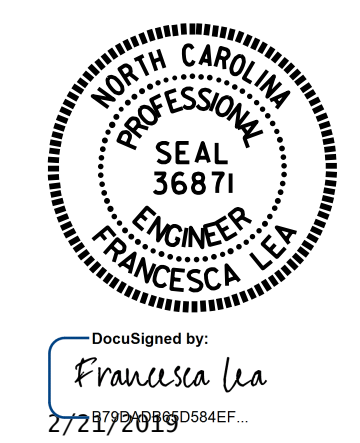
**SECTION B-B**



**PLAN**

SIDEWALK ON LEFT SIDE ONLY

PROJECT NO. B-5326  
 WAKE COUNTY  
 STATION: 17+70.00 -L-



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**SIDEWALK DETAILS**

DRAWN BY :	F. LEA	DATE :	01/21/19
CHECKED BY :	S.N. MEGAHED	DATE :	01/20/19
DESIGN ENGINEER OF RECORD :	S.N. MEGAHED	DATE :	01/20/19

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

S-19  
TOTAL SHEETS 29

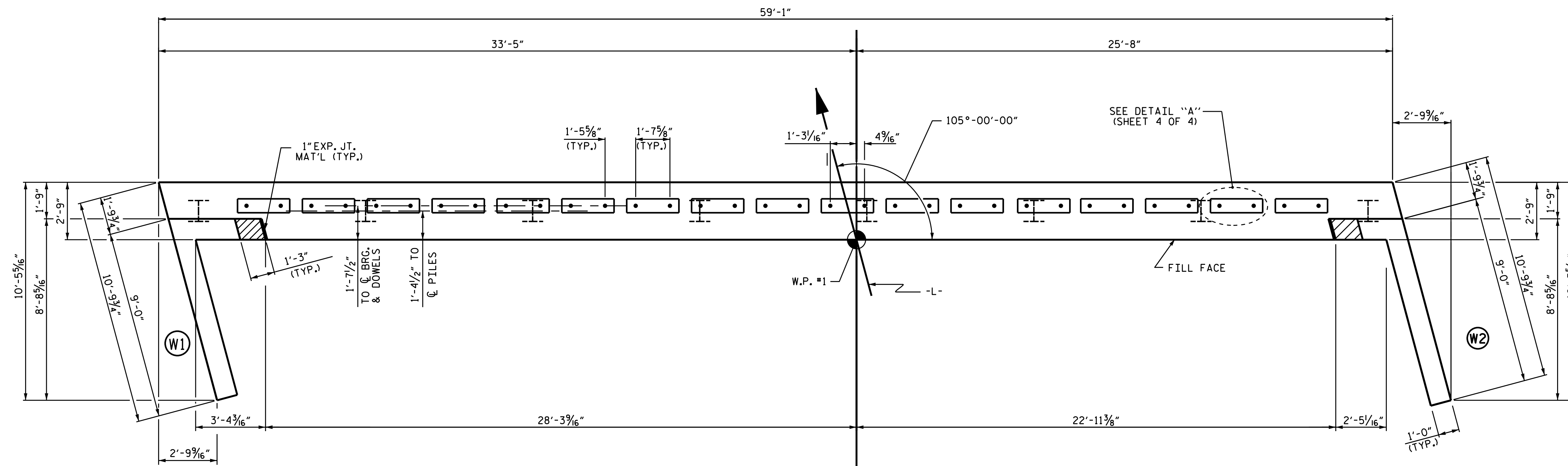
**NOTES**

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

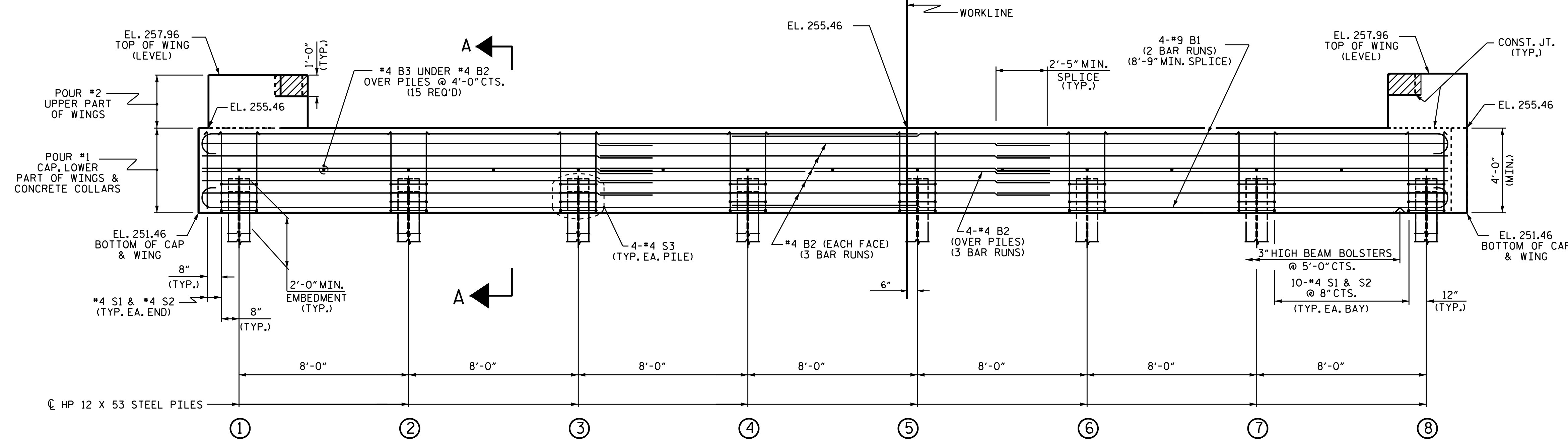
THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE VERTICAL CONCRETE BARRIER RAIL IS CAST IF SLIP FORMING IS USED.

FOR PILE SPLICE DETAILS, SEE SHEET 4 OF 4.

FOR WING DETAILS, SEE SHEET 3 OF 4.



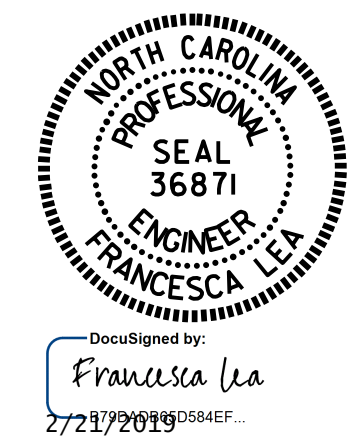
**PLAN**



**ELEVATION**

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

PROJECT NO. B-5326  
WAKE COUNTY  
 STATION: 17+70.00 -L-  
 SHEET 1 OF 4



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**SUBSTRUCTURE  
 END BENT 1**

DRAWN BY : S. N. MEGAHED DATE : 01/2019  
 CHECKED BY : F. LEA DATE : 01/2019  
 DESIGN ENGINEER OF RECORD: W.C. SMITH DATE : 11/2018

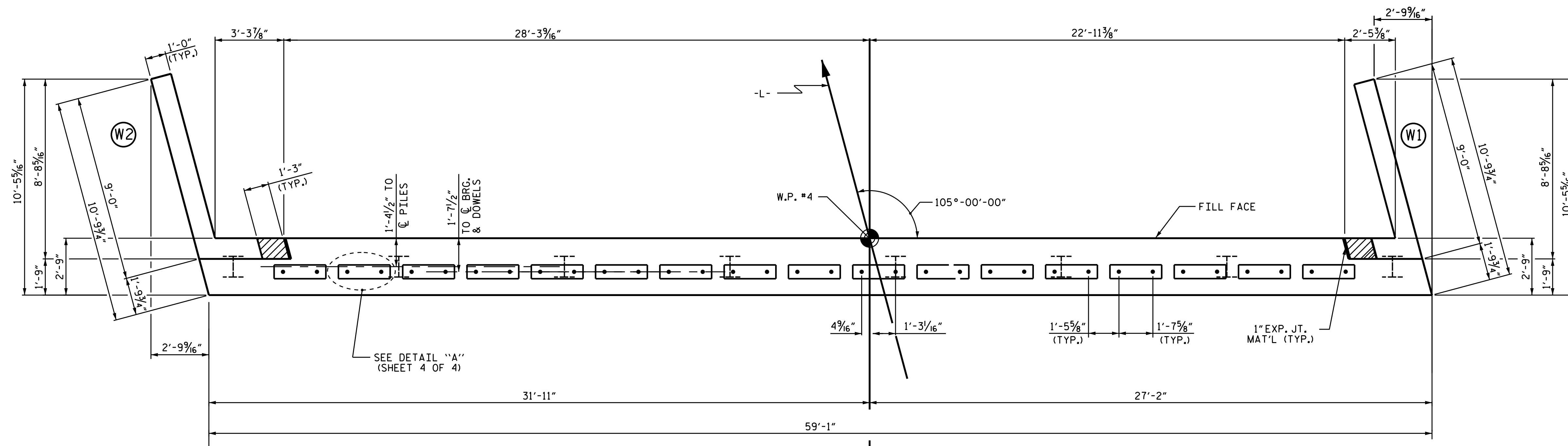
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 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-20
1			3			TOTAL SHEETS
2			4			29

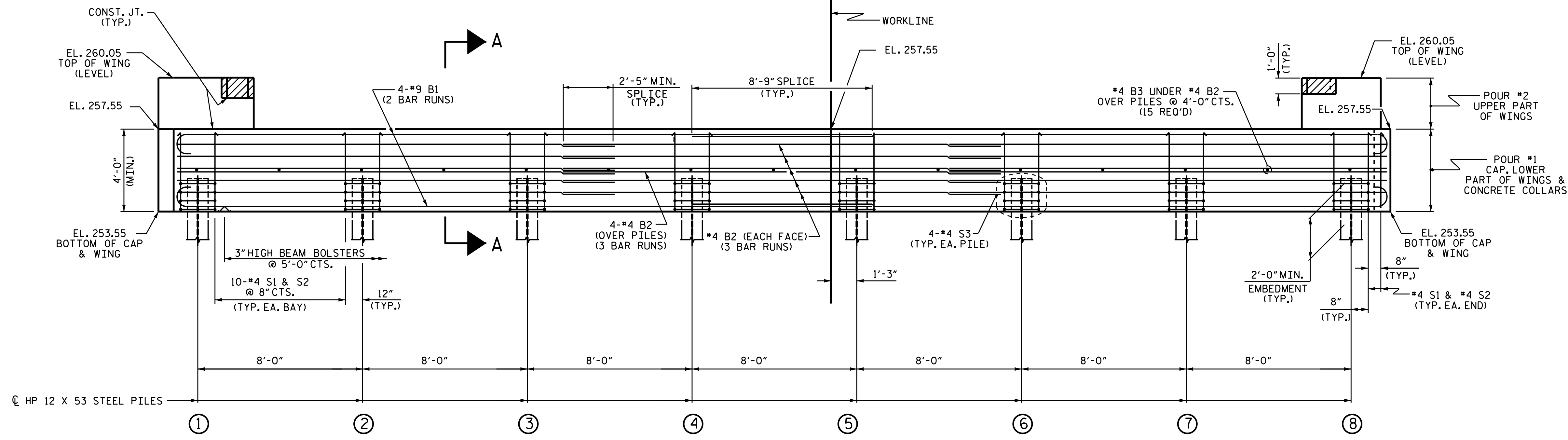


**NOTES**

STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR DOWELS.  
 THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE VERTICAL CONCRETE BARRIER RAIL IS CAST IF SLIP FORMING IS USED.  
 FOR PILE SPLICE DETAILS, SEE SHEET 4 OF 4.  
 FOR WING DETAILS, SEE SHEET 3 OF 4.



**PLAN**



**ELEVATION**

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

PROJECT NO. B-5326  
WAKE COUNTY  
 STATION: 17+70.00 -L-  
 SHEET 2 OF 4



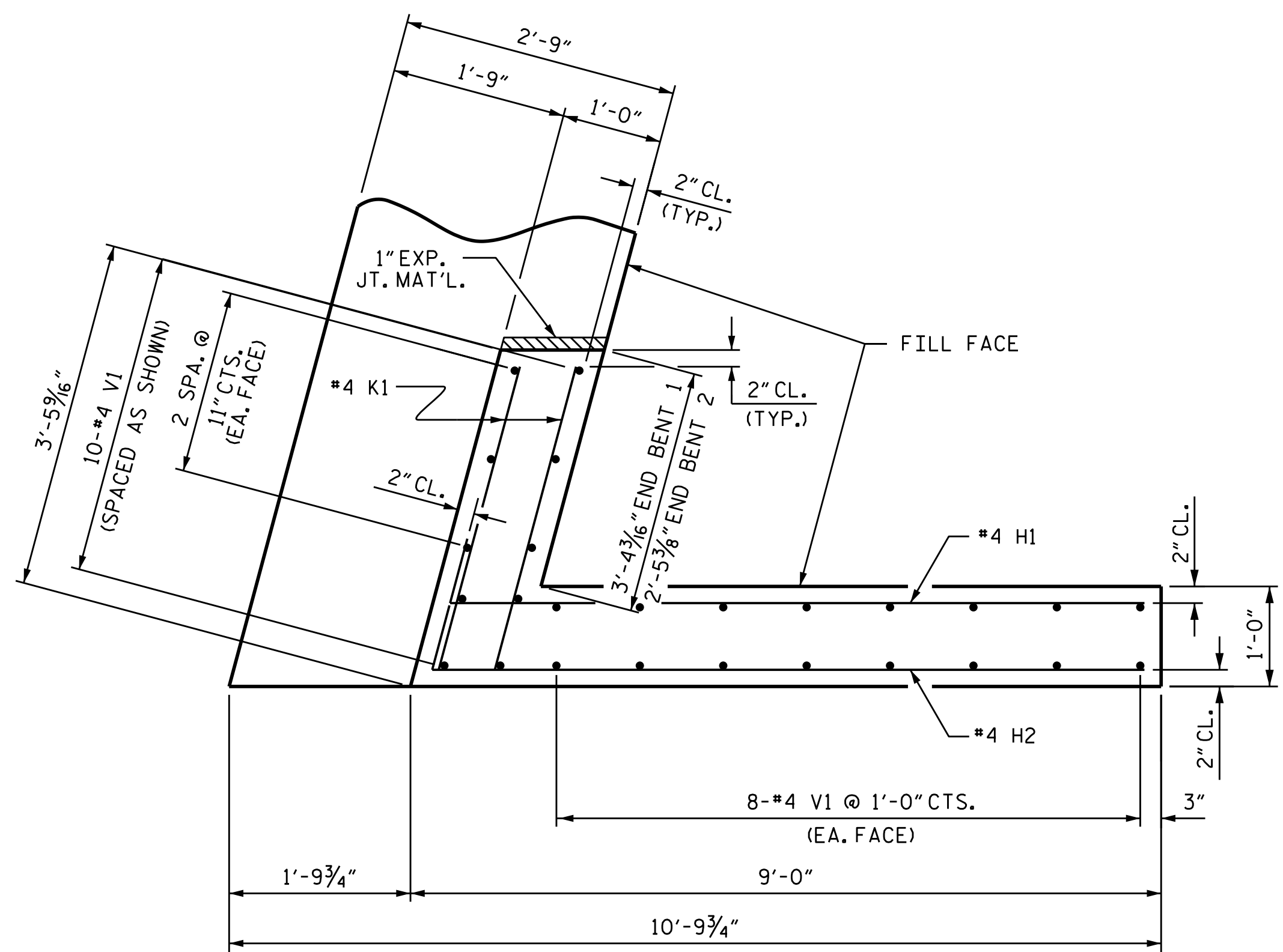
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**SUBSTRUCTURE  
 END BENT 2**

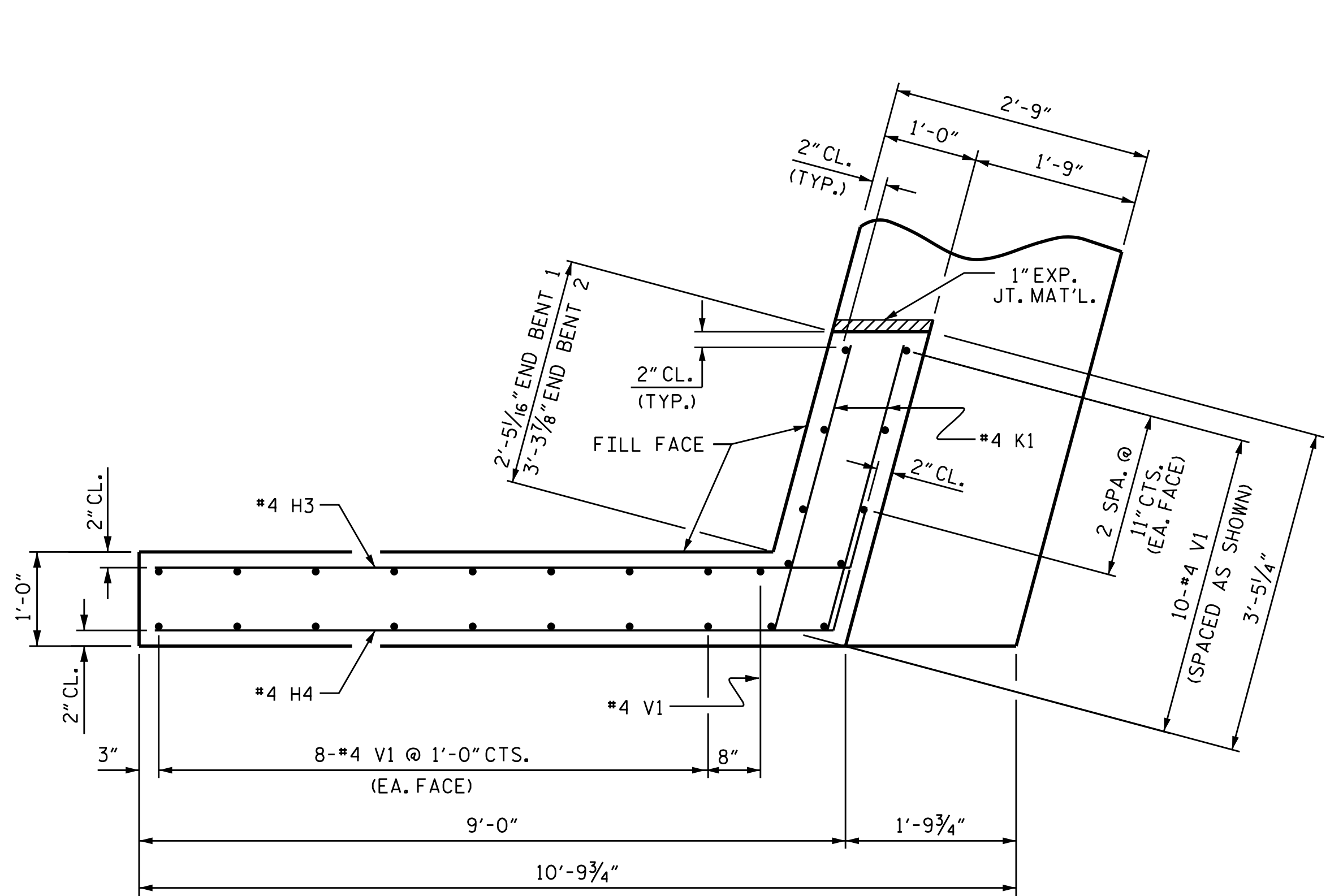
DRAWN BY: S. N. MEGAHED DATE: 01/2019  
 CHECKED BY: F. LEA DATE: 01/2019  
 DESIGN ENGINEER OF RECORD: W.C. SMITH DATE: 11/2018

DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

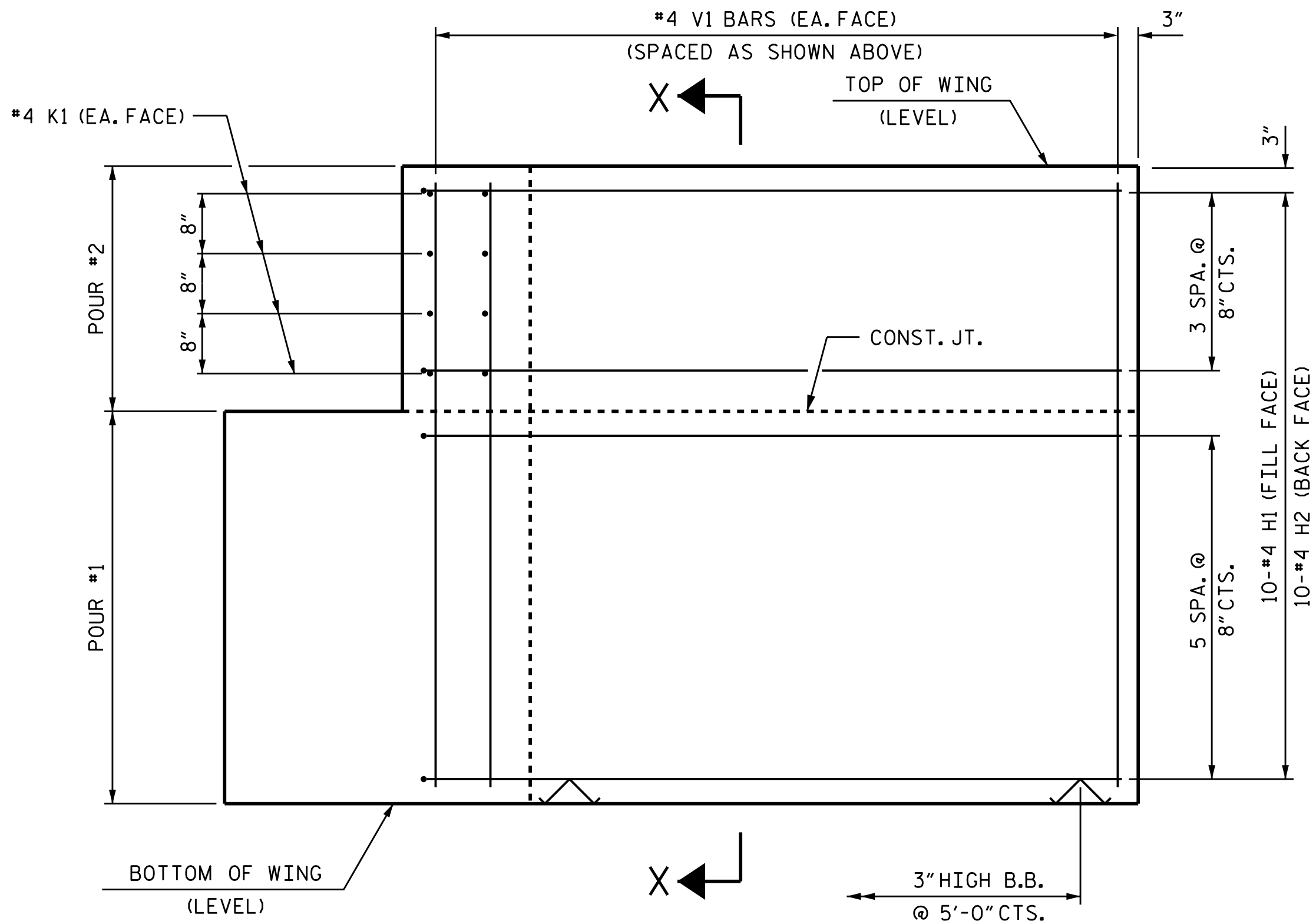
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NO.	BY:	DATE:	NO.	BY:	DATE:	S-21
1			3			TOTAL SHEETS
2			4			29



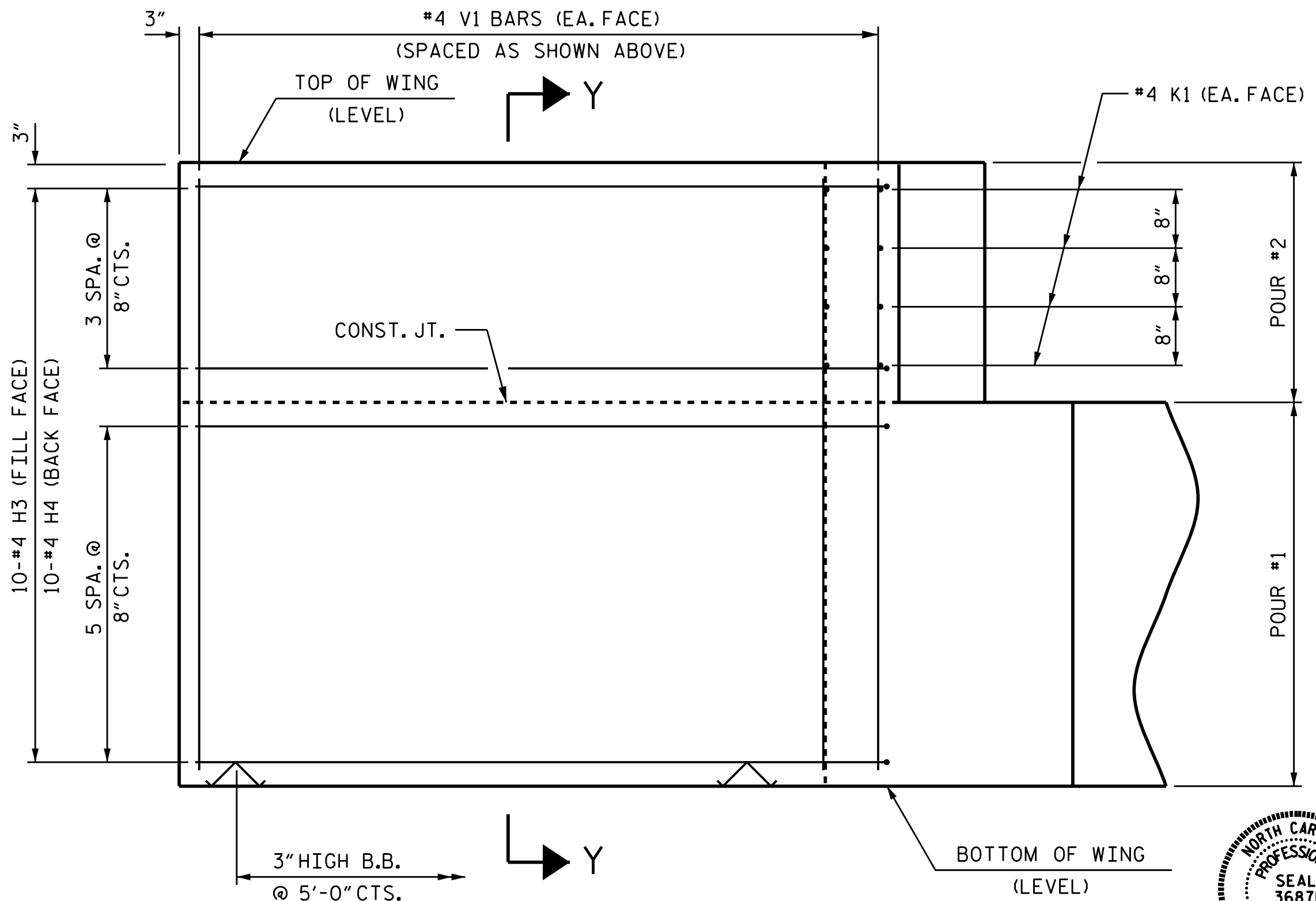
PLAN OF WING (W1)



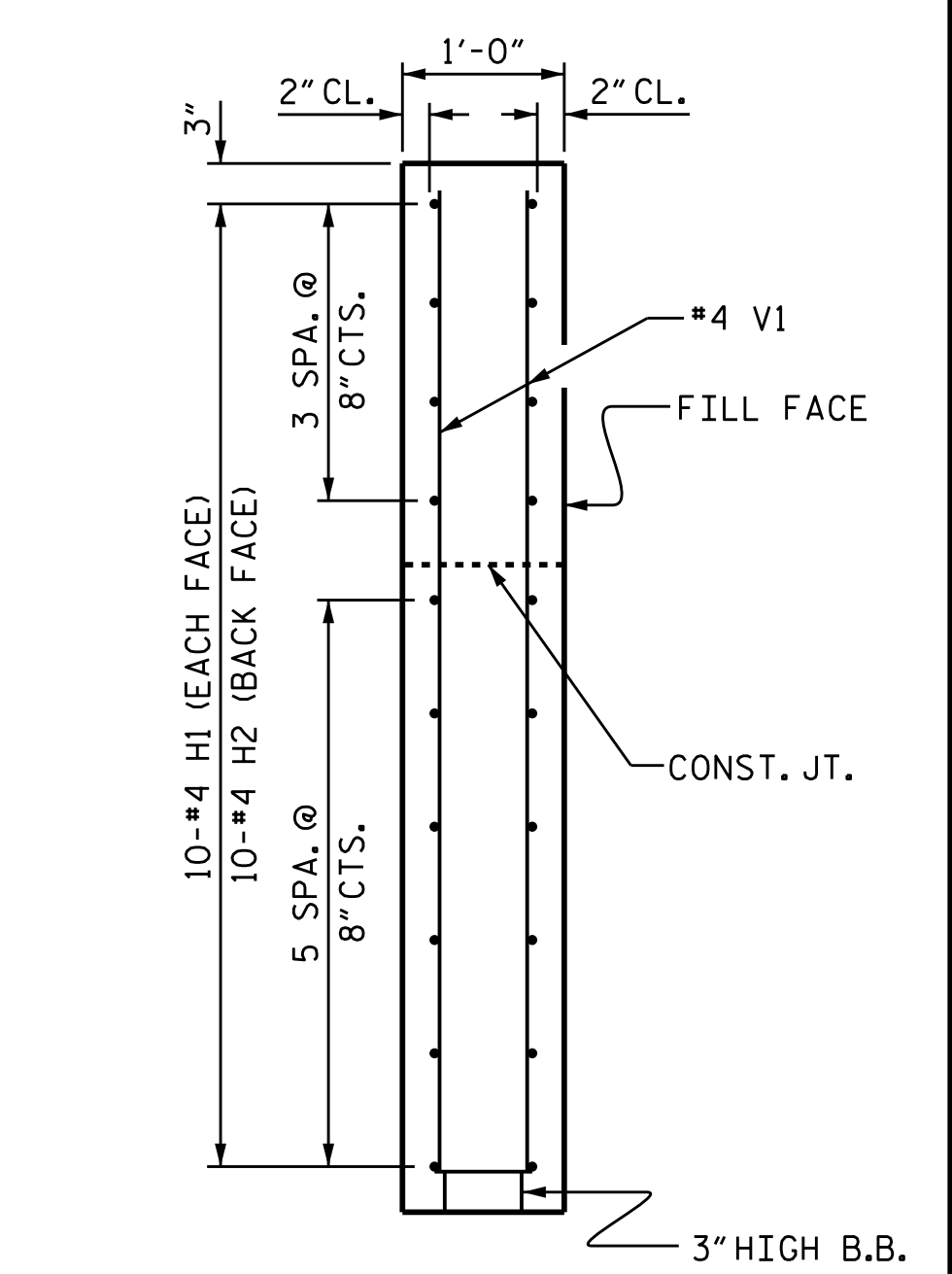
PLAN OF WING (W2)



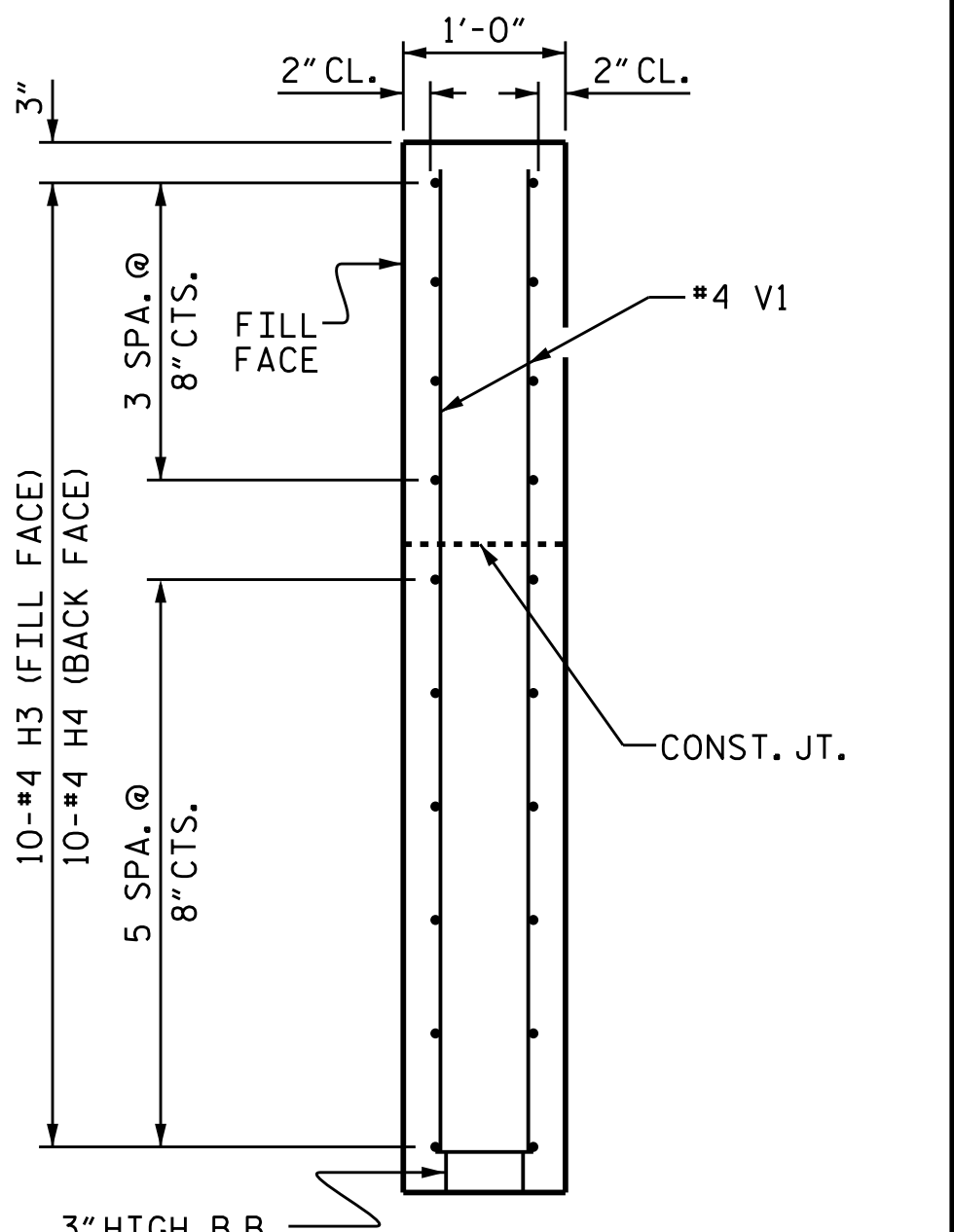
ELEVATION OF WING (W1)



ELEVATION OF WING (W2)



SECTION X-X



SECTION Y-Y

PROJECT NO. B-5326  
 WAKE COUNTY  
 STATION: 17+70.00 -L-  
 SHEET 3 OF 4

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



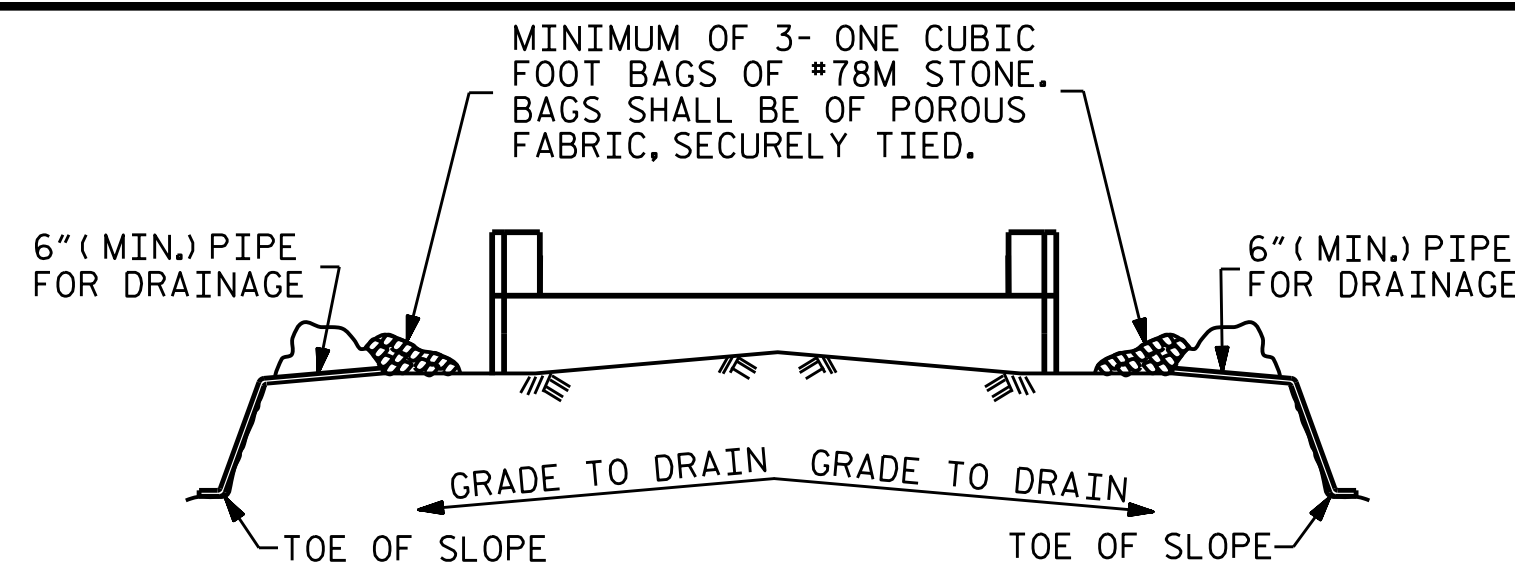
ASSEMBLED BY : S. N. MEGAHED	DATE : 01/2019
CHECKED BY : F. LEA	DATE : 01/2019
DRAWN BY : WJH	12/11
CHECKED BY : AAC	12/11
REV. 4/15	MAA/TMG

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REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	S-22	
1			3			TOTAL SHEETS 29	
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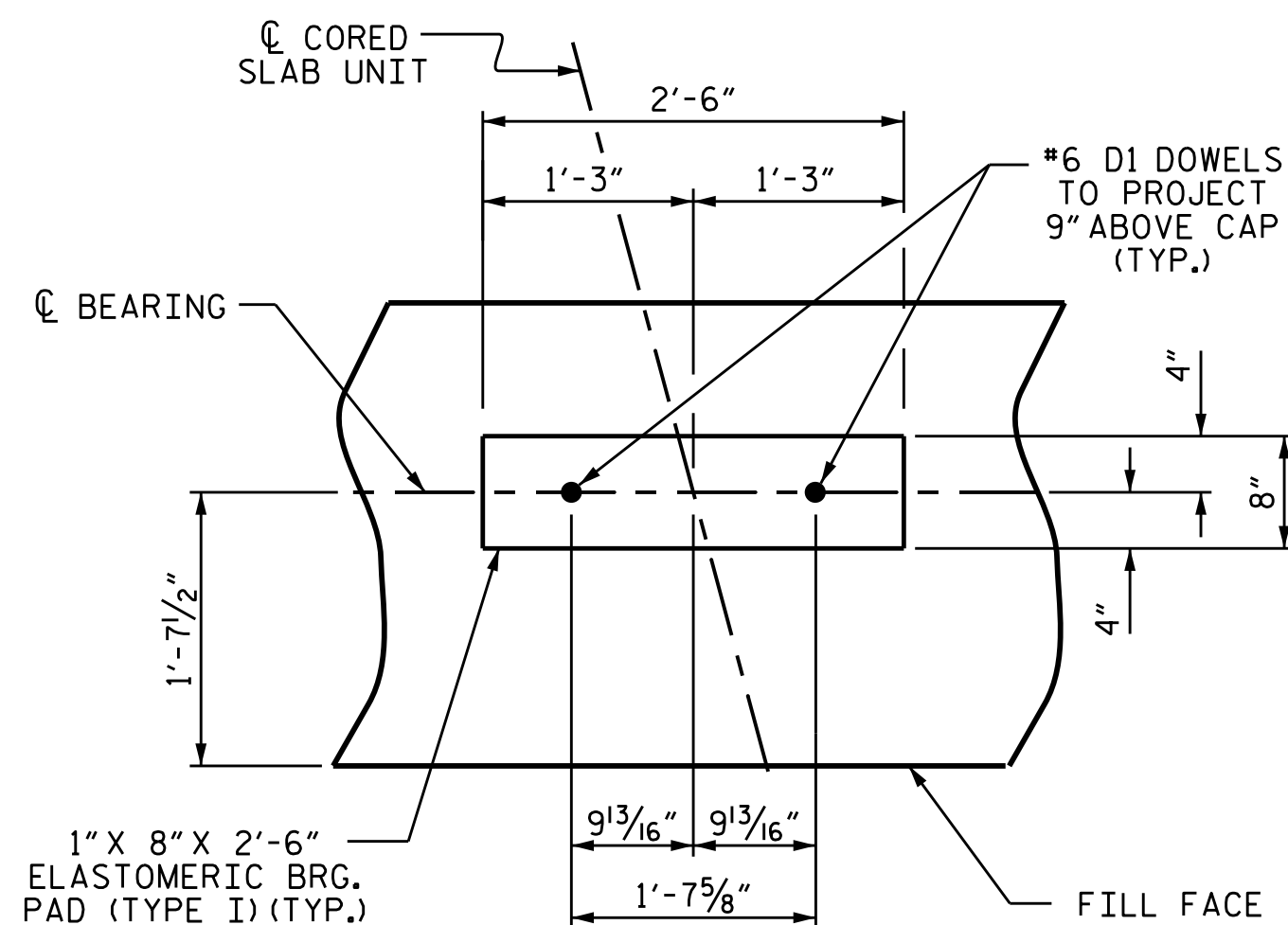


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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

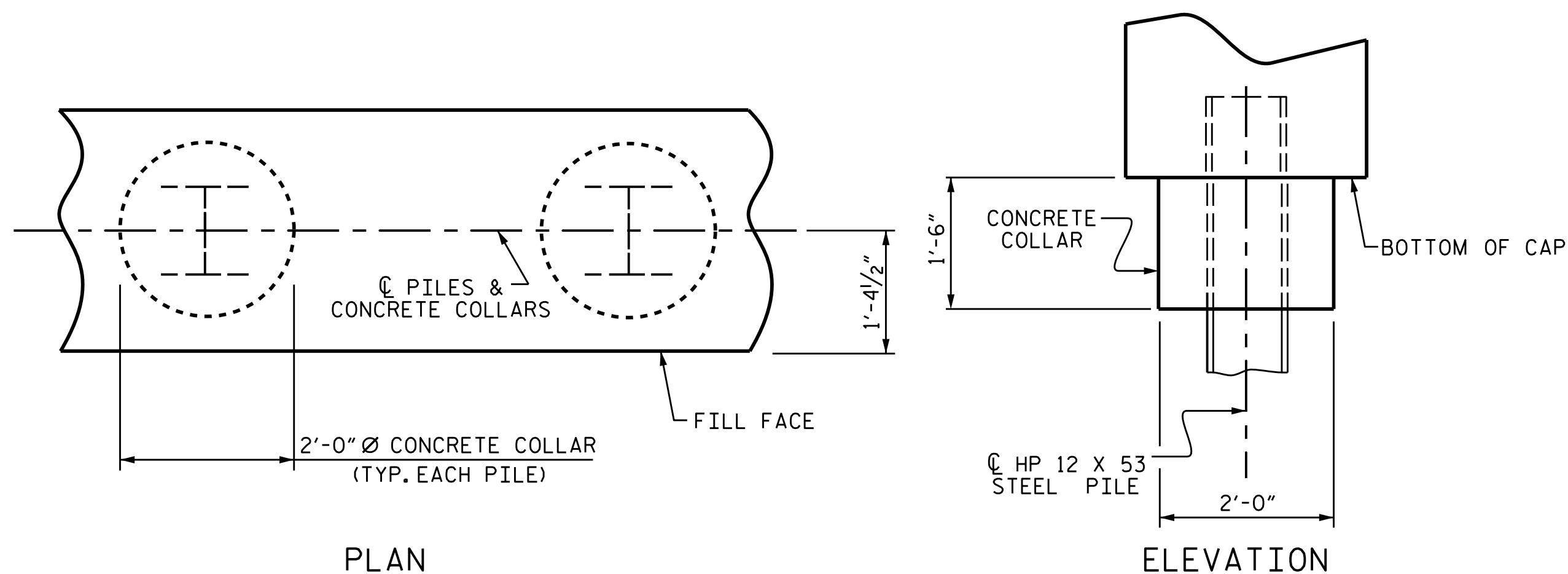
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

### TEMPORARY DRAINAGE AT END BENT



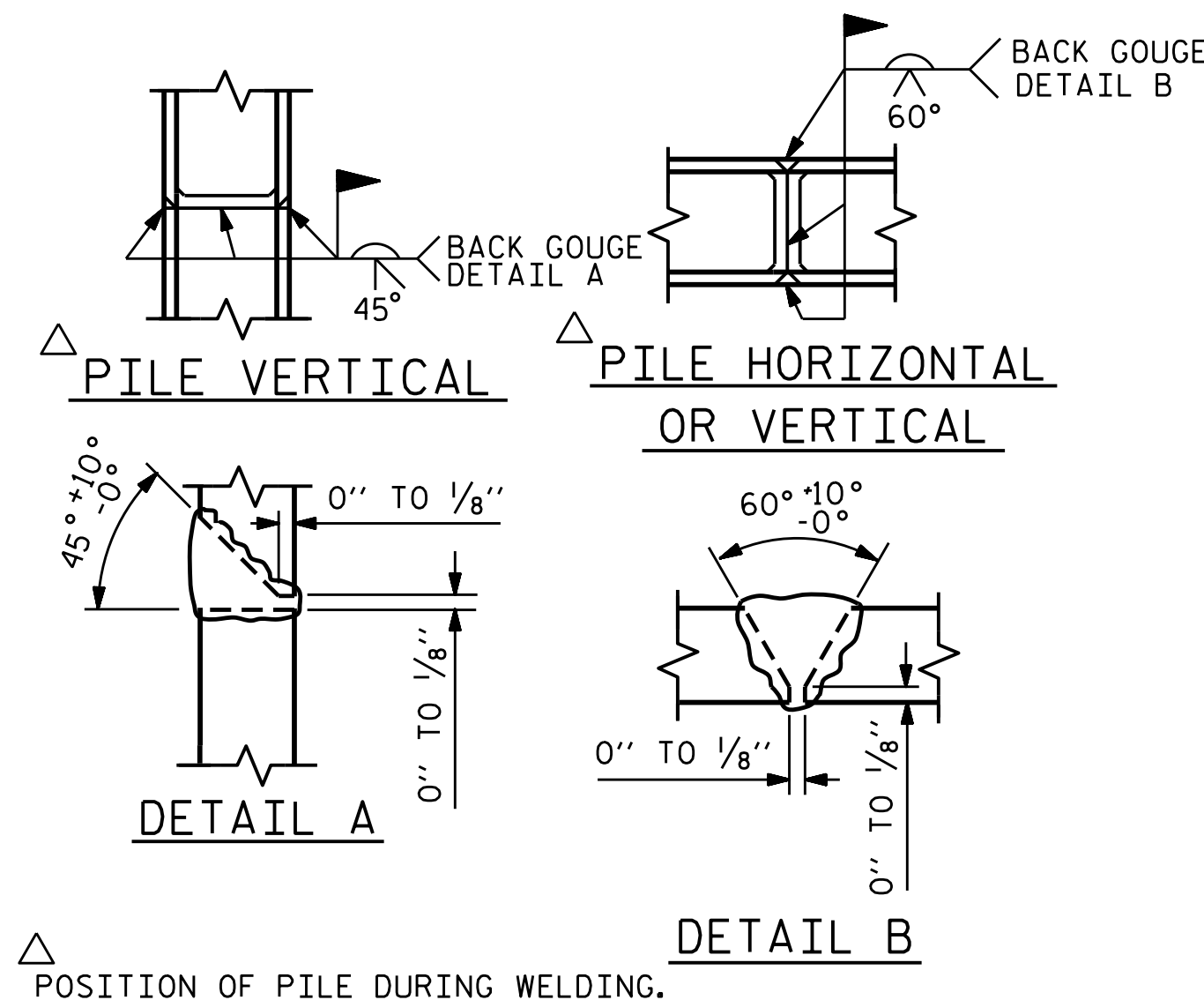
### DETAIL "A"

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



### CORROSION PROTECTION FOR STEEL PILES DETAIL

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



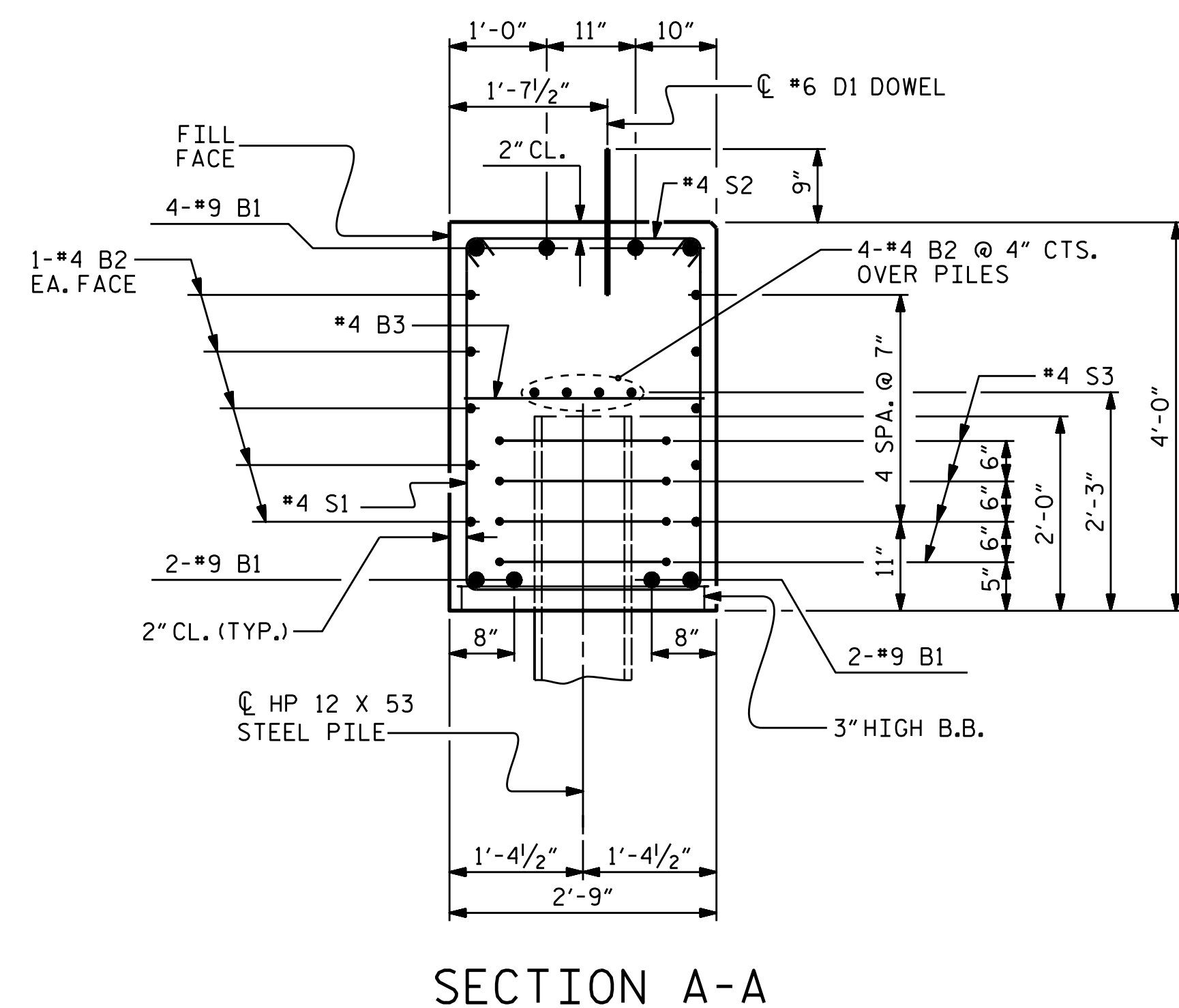
### PILE SPLICE DETAILS

BAR TYPES	
①	33'-9"
②	8'-5"
③	8'-10"
④	3'-7 1/2"
⑤	1'-3" LAP
⑥	1'-8" Ø

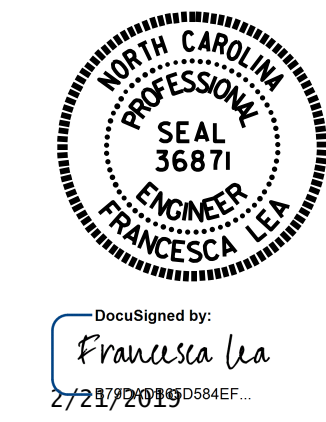
ALL BAR DIMENSIONS ARE OUT TO OUT.

END BENT No. 1	END BENT No. 2
HP 12 X 53 STEEL PILES NO: 8 LIN. FT.= 260	HP 12 X 53 STEEL PILES NO: 8 LIN. FT.= 340
PILE DRIVING EQUIPMENT SETUP FOR HP 12 X 53 STEEL PILES NO: 8	PILE DRIVING EQUIPMENT SETUP FOR HP 12 X 53 STEEL PILES NO: 8

BILL OF MATERIAL FOR ONE END BENT					
BAR NO.	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	16	#9	1	35'-0"	1905
B2	42	#4	STR	21'-3"	596
B3	15	#4	STR	2'-5"	24
D1	34	#6	STR	1'-6"	77
H1	10	#4	2	9'-1"	61
H2	10	#4	2	9'-3"	62
H3	10	#4	3	9'-6"	63
H4	10	#4	3	9'-4"	62
K1	16	#4	STR	3'-1"	33
S1	74	#4	4	10'-5"	524
S2	74	#4	5	3'-2"	159
S3	32	#4	6	6'-6"	141
V1	53	#4	STR	6'-2"	218
REINFORCING STEEL (FOR ONE END BENT)					3925 LBS.
CLASS A CONCRETE BREAKDOWN (FOR ONE END BENT)					
POUR #1 CAP, LOWER PART OF WINGS & COLLARS					27.8 C.Y.
POUR #2 UPPER PART OF WINGS					2.1 C.Y.
TOTAL CLASS A CONCRETE					29.9 C.Y.



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



PROJECT NO. B-5326  
WAKE COUNTY  
STATION: 17+70.00 -L-  
SHEET 4 OF 4

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

ASSEMBLED BY : S. N. MEGAHED	DATE : 01/2019
CHECKED BY : F. LEA	DATE : 01/2019
DRAWN BY : WJH	12/11
CHECKED BY : AAC	12/11
REV. 4/17	MAA/THC

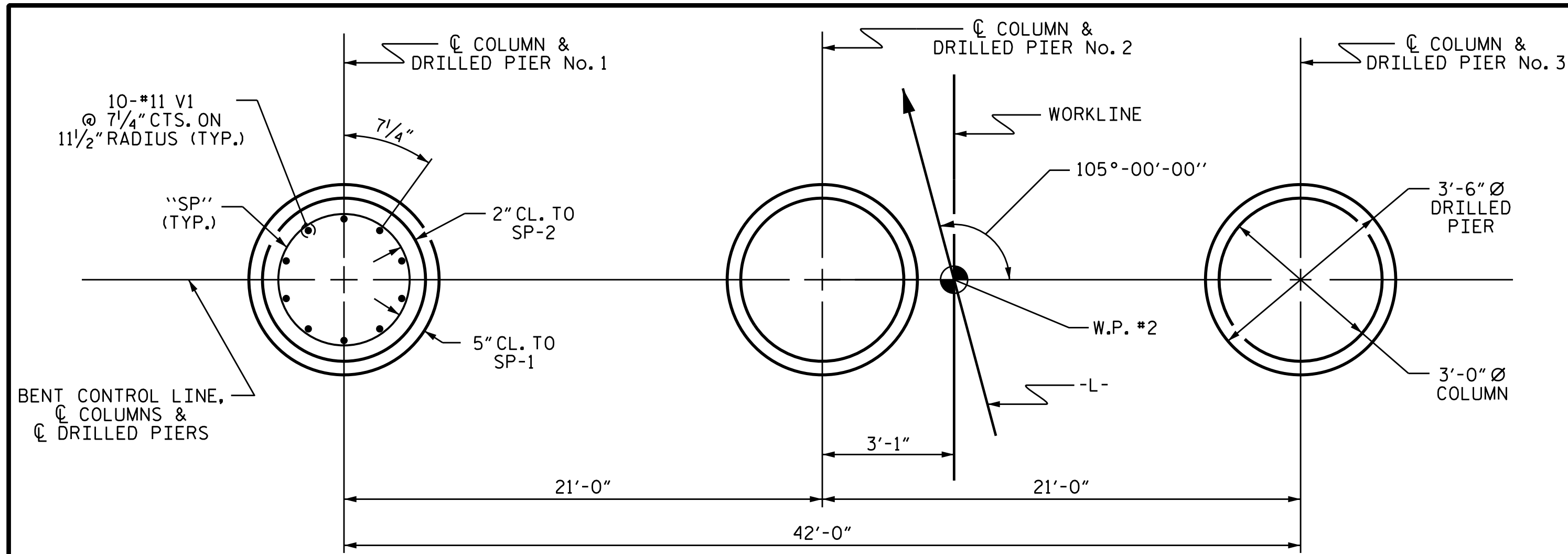
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DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

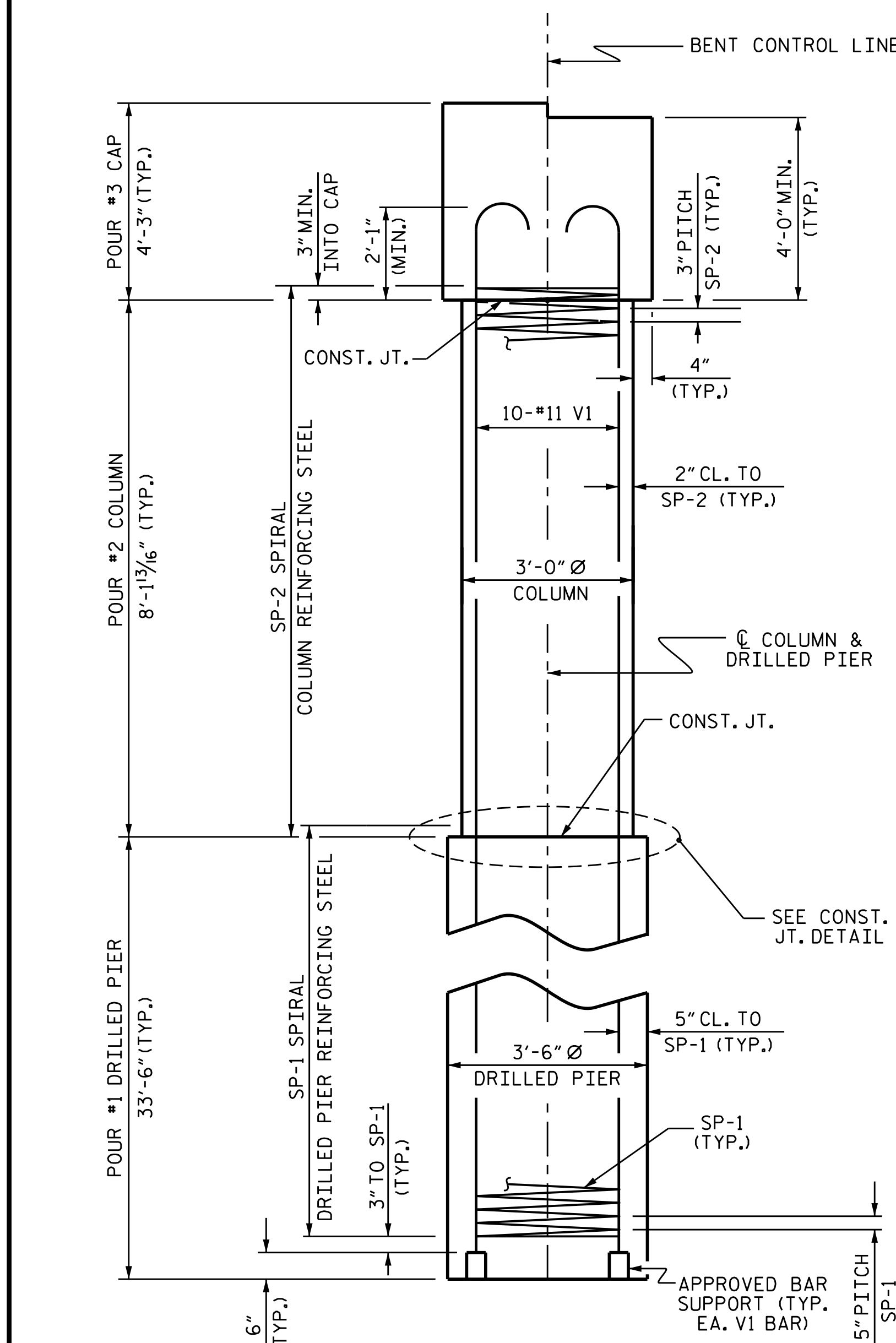
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-23
1			3			TOTAL SHEETS 29
2			4			



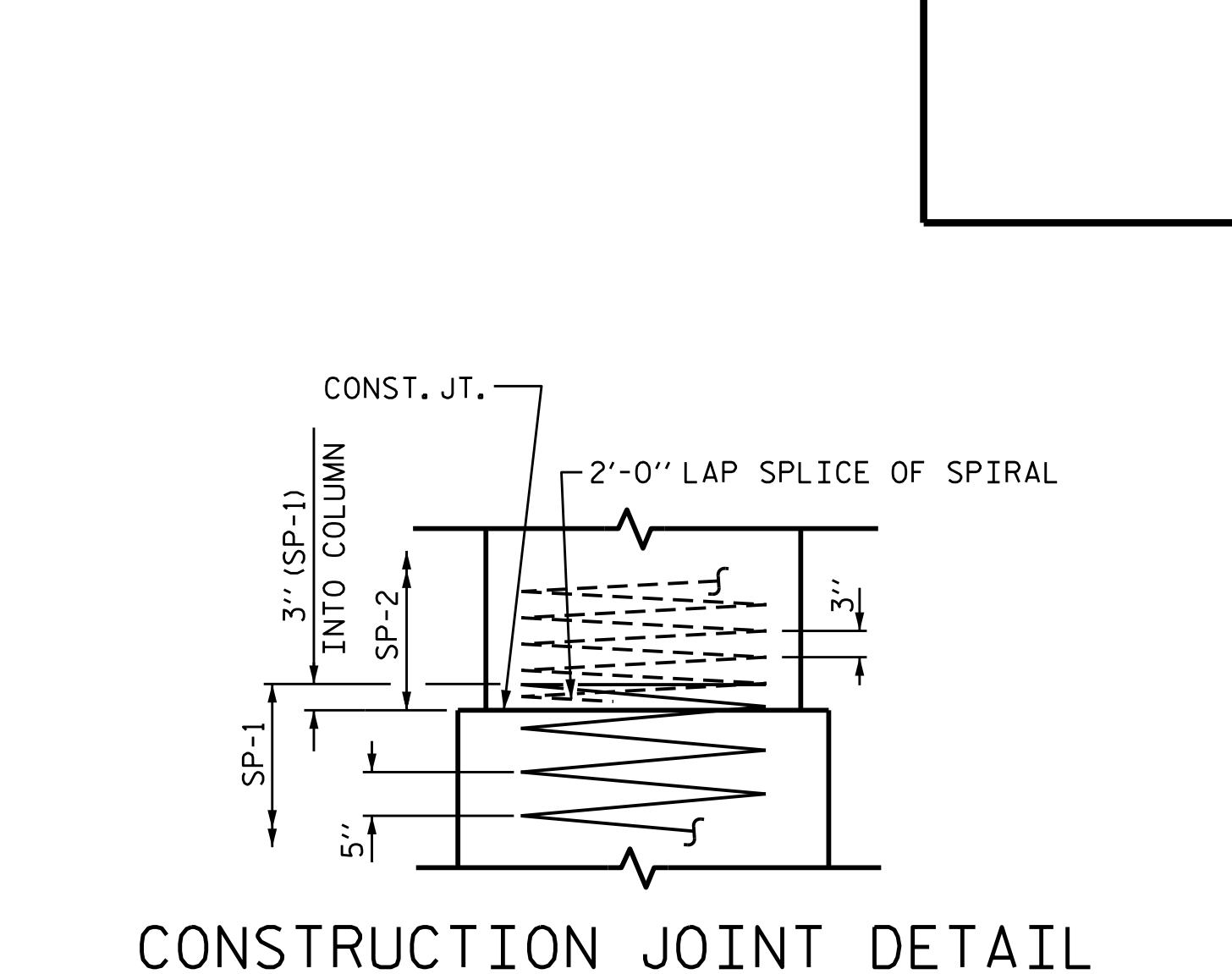




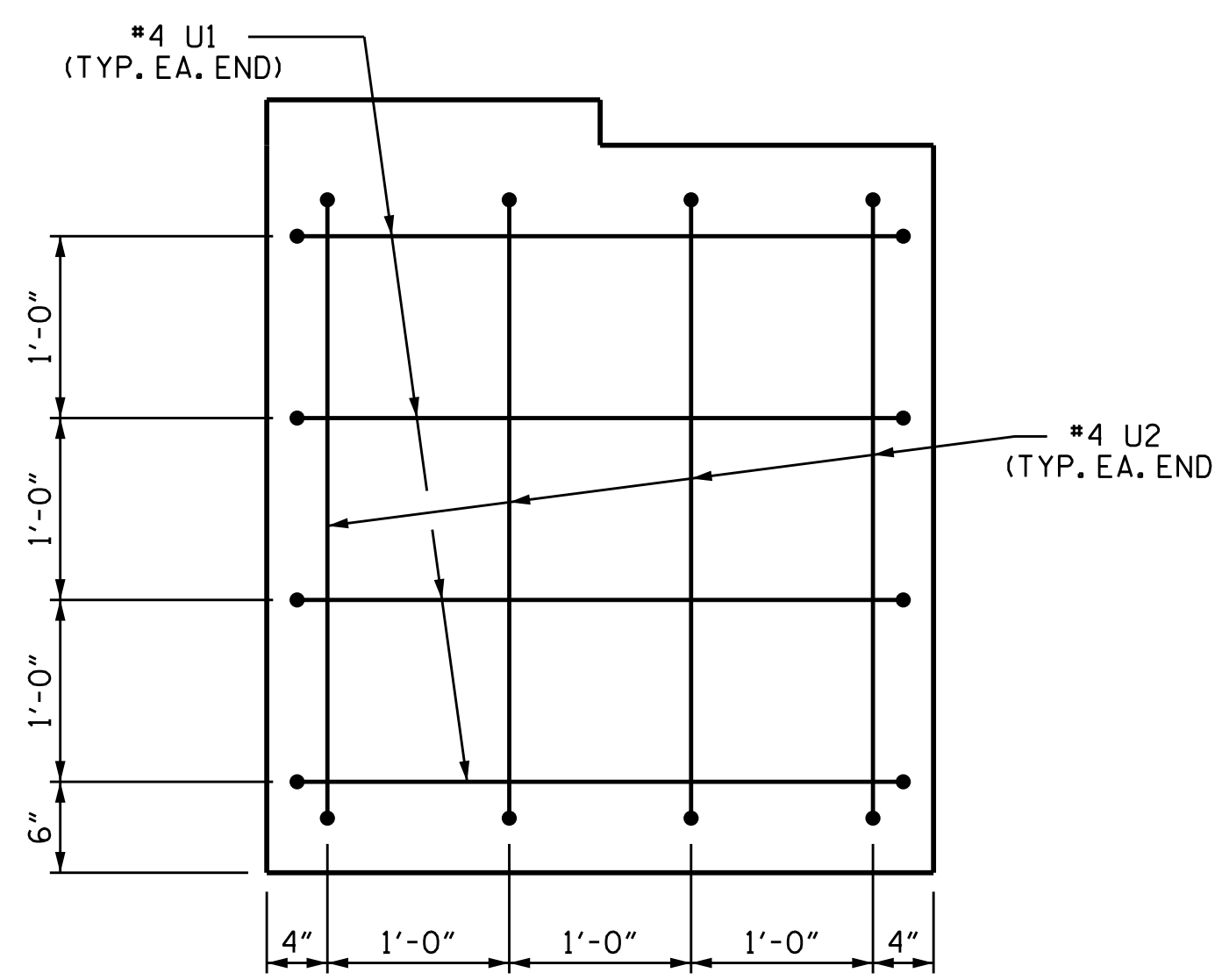
PLAN OF DRILLED PIERS & COLUMNS



END ELEVATION

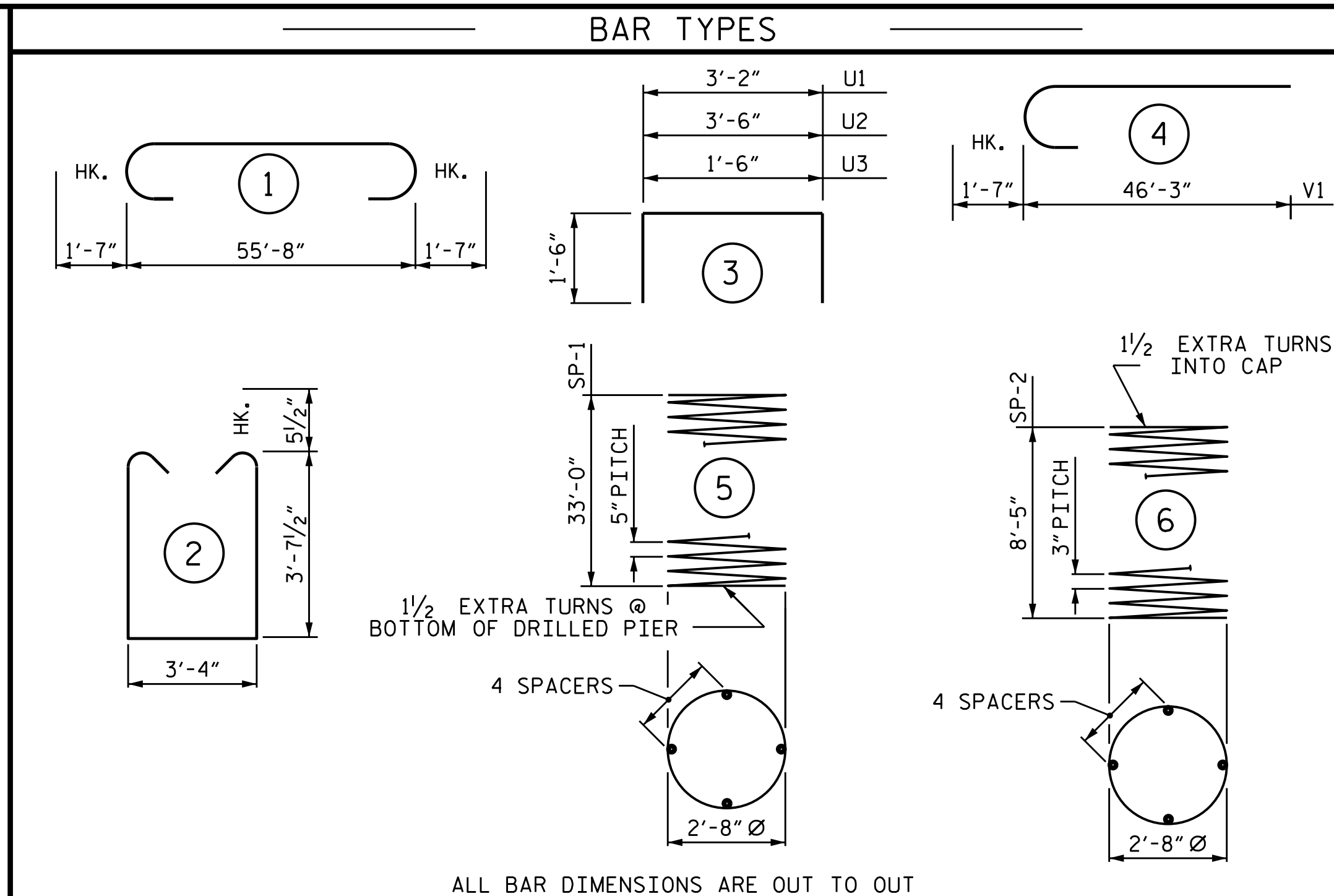


CONSTRUCTION JOINT DETAIL

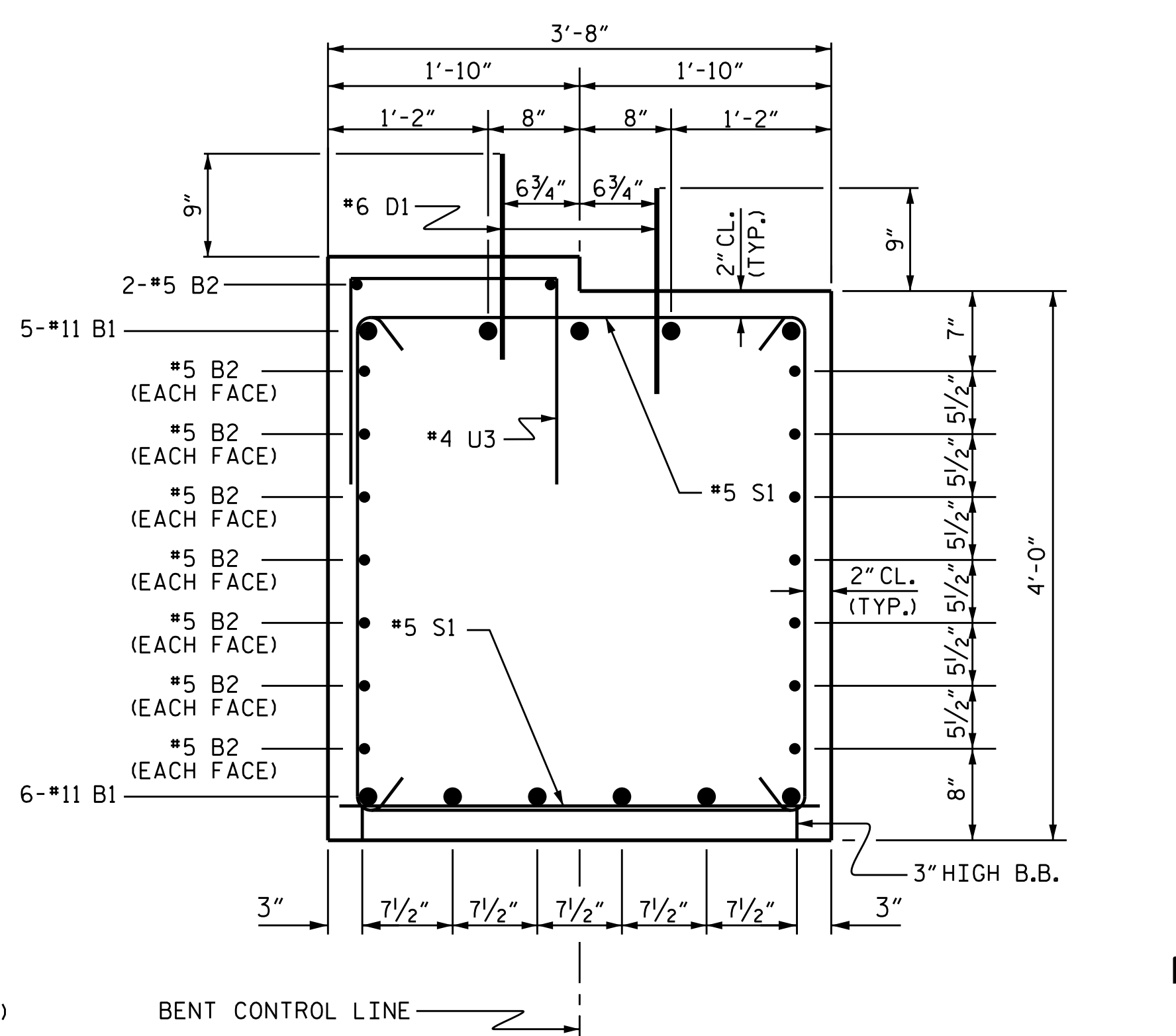


END OF CAP VIEW

(TYPICAL BOTH ENDS)



BILL OF MATERIAL FOR ONE BENT					
BAR NO.	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	11	#11	1	58'-10"	3438
B2	16	#5	STR	55'-10"	932
D1	68	#6	STR	1'-6"	153
S1	96	#5	2	11'-6"	1151
U1	8	#4	3	6'-2"	33
U2	8	#4	3	6'-6"	35
U3	56	#4	3	4'-6"	168
V1	30	#11	4	47'-10"	7624
REINFORCING STEEL (FOR ONE BENT)					13534 LBS.
SP-1	3	*	5	666'-2"	2084
SP-2	3	**	6	297'-0"	595
SPIRAL COLUMN REINFORCING STEEL (FOR ONE BENT)					2679 LBS.
* THE SP-1 SPIRAL REINFORCING STEEL SHALL BE W31 OR D-31 COLD DRAWN WIRE OR #5 PLAIN OR DEFORMED BAR					
** THE SP-2 SPIRAL REINFORCING STEEL SHALL BE W20 OR D-20 COLD DRAWN WIRE OR #4 PLAIN OR DEFORMED BAR					



SECTION THRU CAP

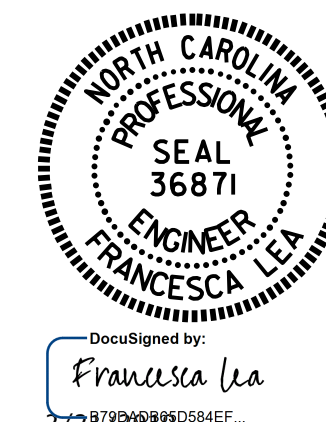
CLASS A CONCRETE BREAKDOWN (FOR ONE BENT)	
POUR #2 (COLUMNS)	6.4 C.Y.
POUR #3 (CAP)	31.5 C.Y.
TOTAL CLASS A CONCRETE	37.9 C.Y.
DRILLED PIERS: (FOR ONE BENT)	
DRILLED PIER CONCRETE POUR #1 (DRILLED PIERS)	35.8 C.Y.
3'-6" Ø DRILLED PIER NOT IN SOIL	17 LIN. FT.
3'-6" Ø DRILLED PIER IN SOIL	83.5 LIN. FT.
PERMANENT STEEL CASING FOR 3'-6" Ø DRILLED PIER	81 LIN. FT.
CSL TUBES	420 LIN. FT.

PROJECT NO. B-5326  
 WAKE COUNTY  
 STATION: 17+70.00 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

SUBSTRUCTURE  
 BENT No. 1



DRAWN BY: S. N. MEGAHED DATE: 12/2018  
 CHECKED BY: F. LEA DATE: 01/2019  
 DESIGN ENGINEER OF RECORD: S. N. MEGAHED DATE: 01/2019

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-25
1			3			TOTAL SHEETS 29
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.

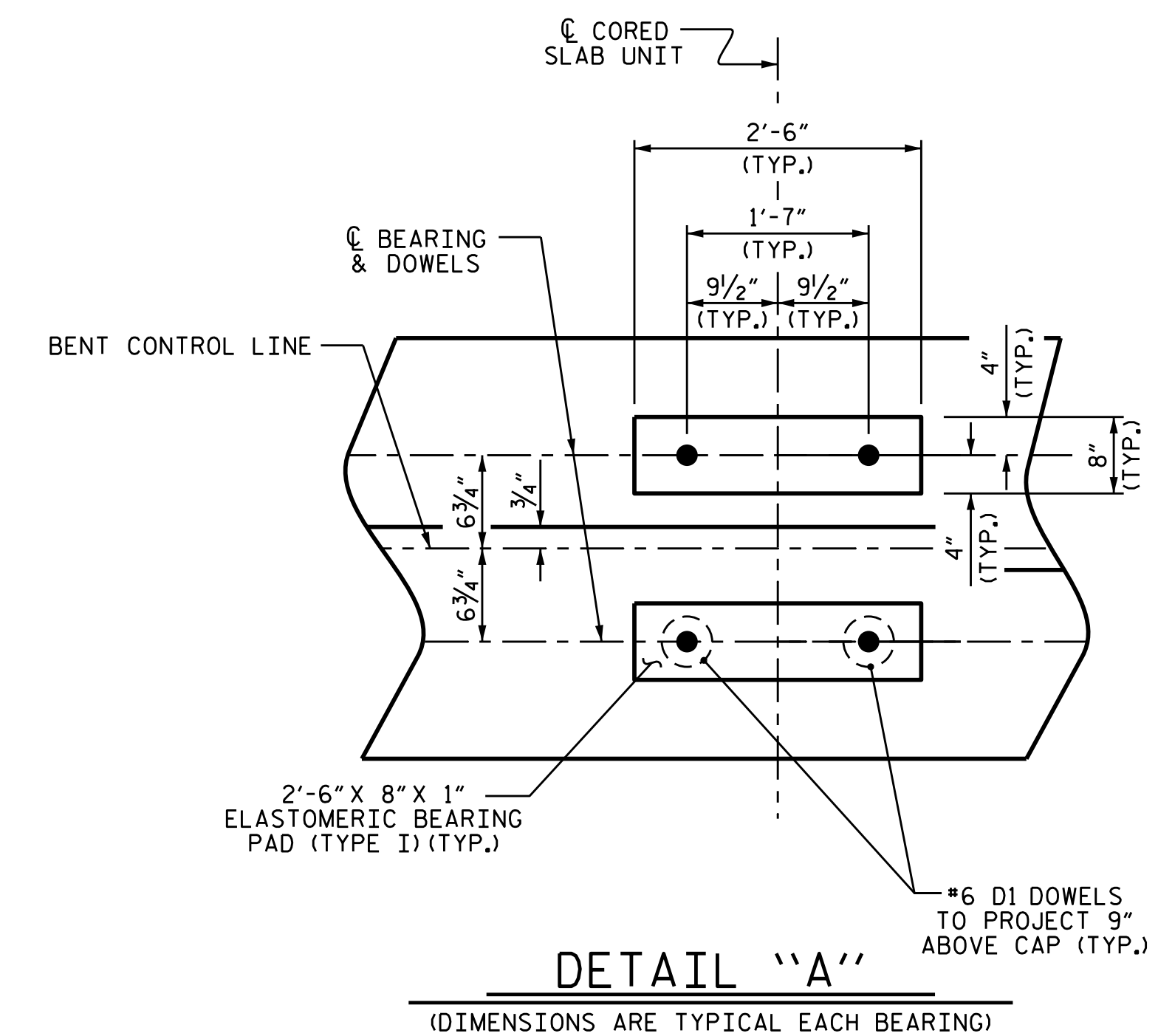
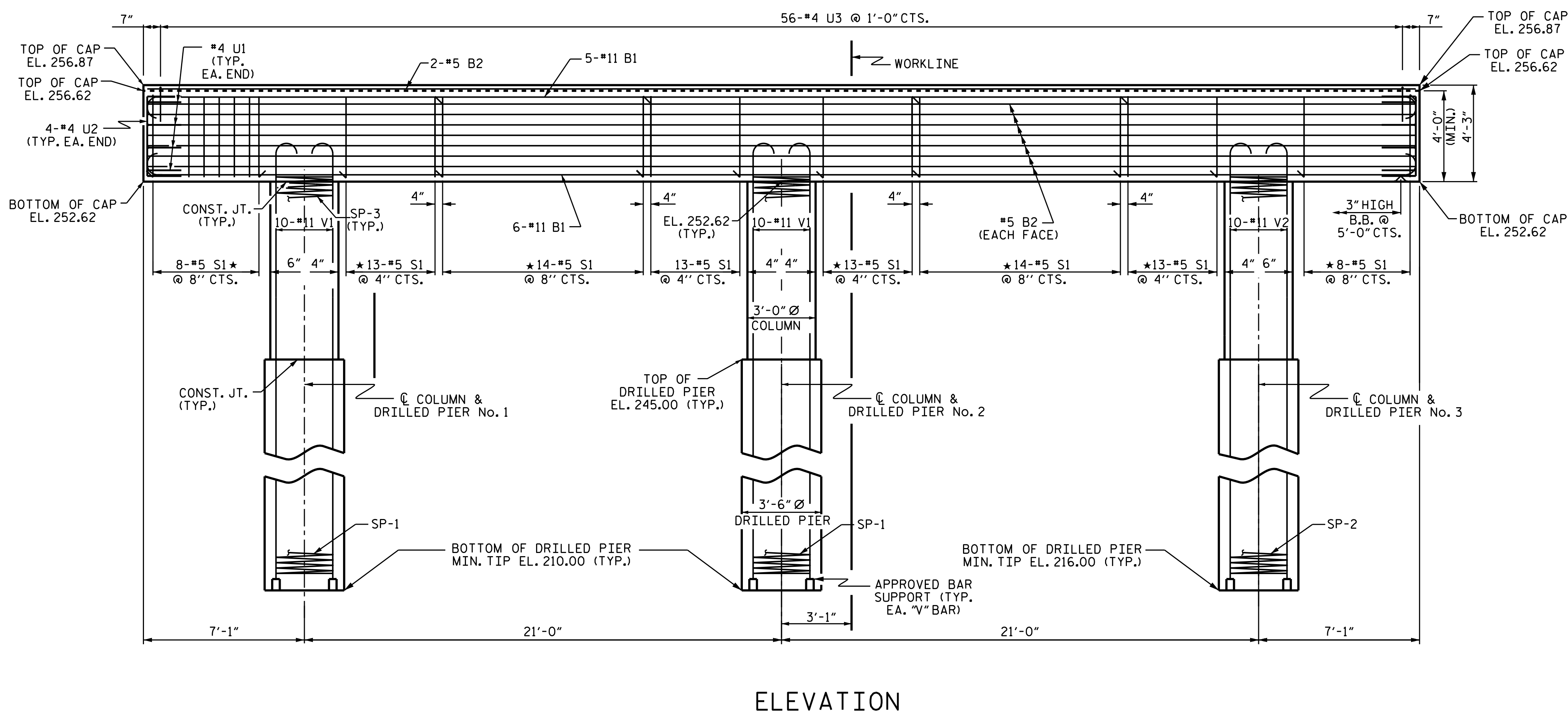
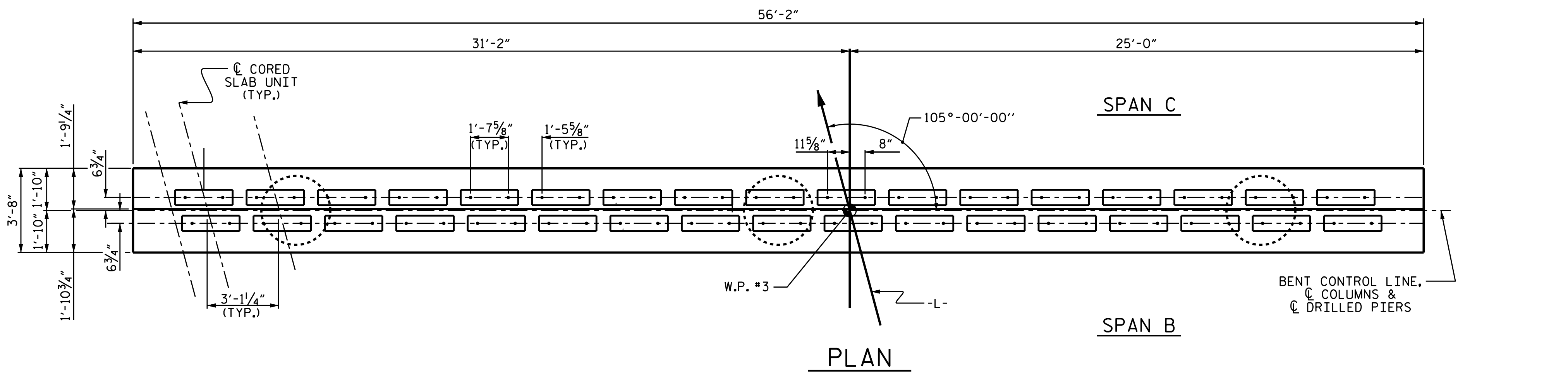
ALL STEEL IN THE DRILLED PIERS IS INCLUDED IN THE PAY ITEMS FOR "REINFORCING STEEL" AND "SPIRAL COLUMN REINFORCING STEEL."

★ INVERT ALTERNATE STIRRUPS.

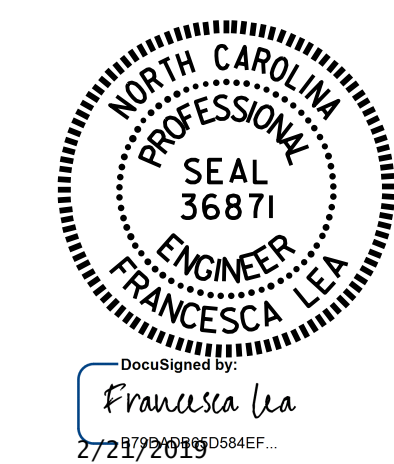
THE LOCATION OF THE CONSTRUCTION JOINT IN THE DRILLED PIERS IS BASED ON AN APPROXIMATE GROUND LINE ELEVATION. IF THE CONSTRUCTION JOINT IS ABOVE THE ACTUAL GROUND LINE ELEVATION, THE CONTRACTOR SHALL PLACE THE CONSTRUCTION JOINT ONE FOOT BELOW THE GROUND LINE.

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.



PROJECT NO. B-5326  
 WAKE COUNTY  
 STATION: 17+70.00 -L-  
 SHEET 1 OF 2



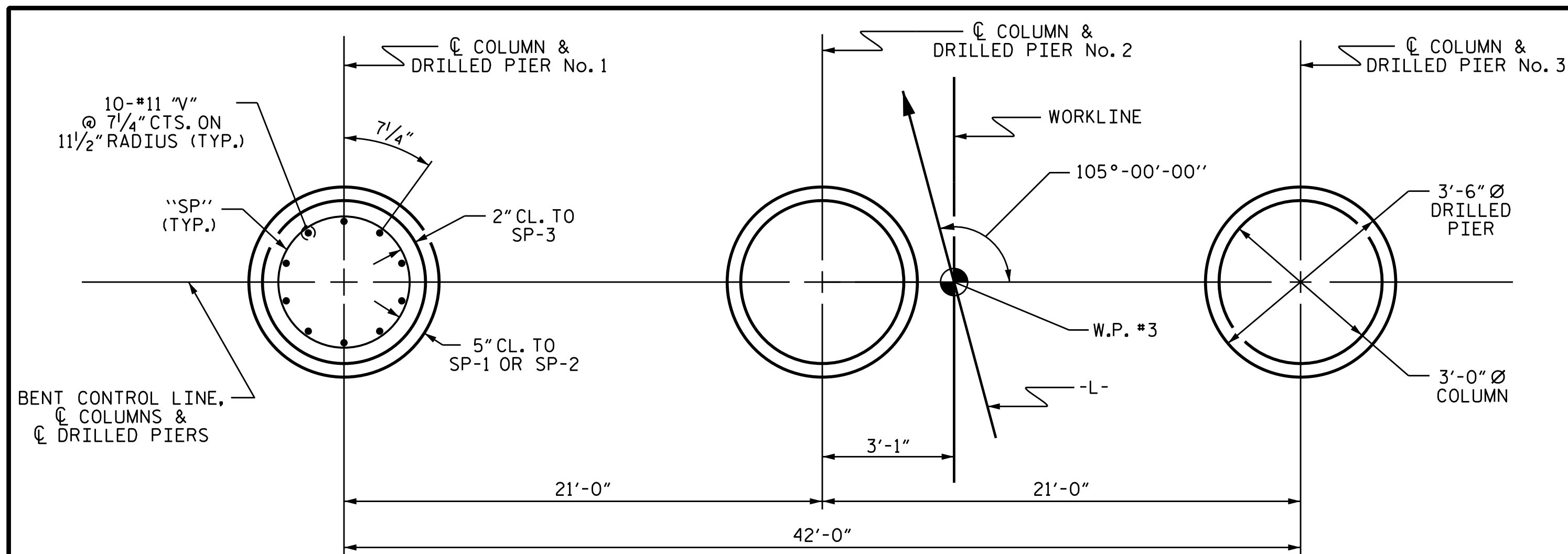
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**SUBSTRUCTURE BENT NO. 2**

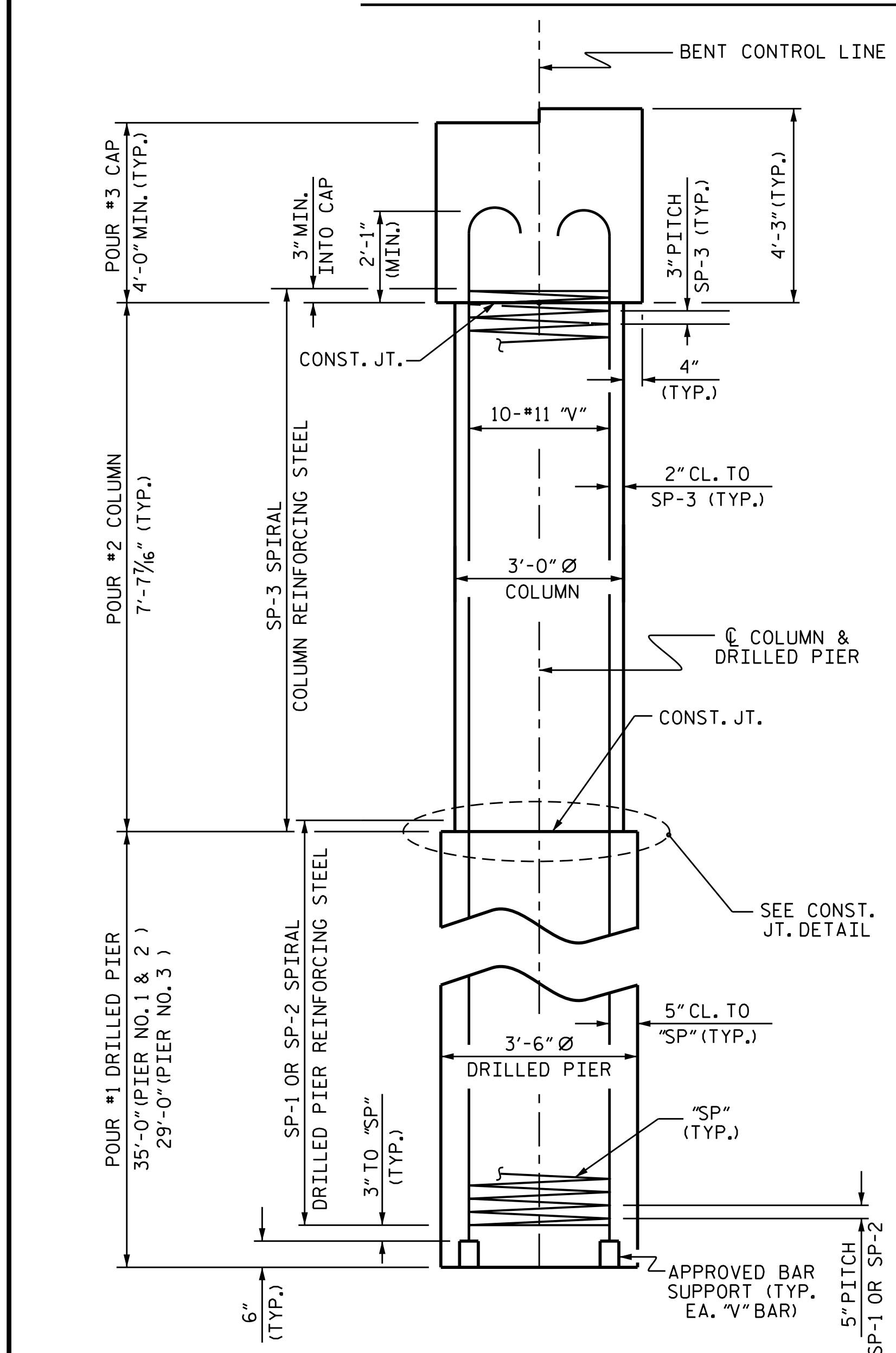
DRAWN BY: S.N. MEGAHED DATE: 12/2018  
 CHECKED BY: F. LEA DATE: 01/2019  
 DESIGN ENGINEER OF RECORD: S.N. MEGAHED DATE: 01/2019

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-26
1			3			TOTAL SHEETS
2			4			29

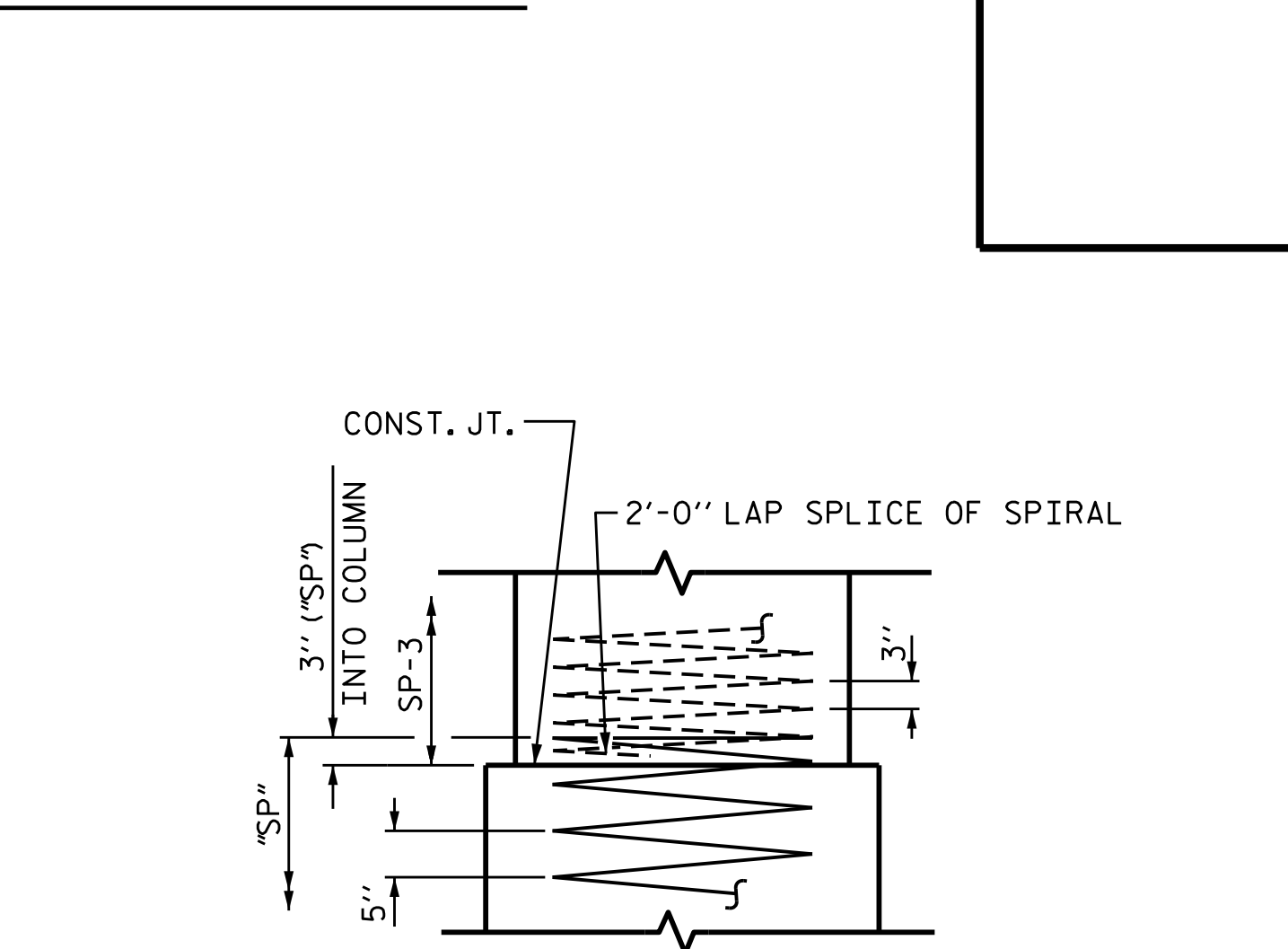




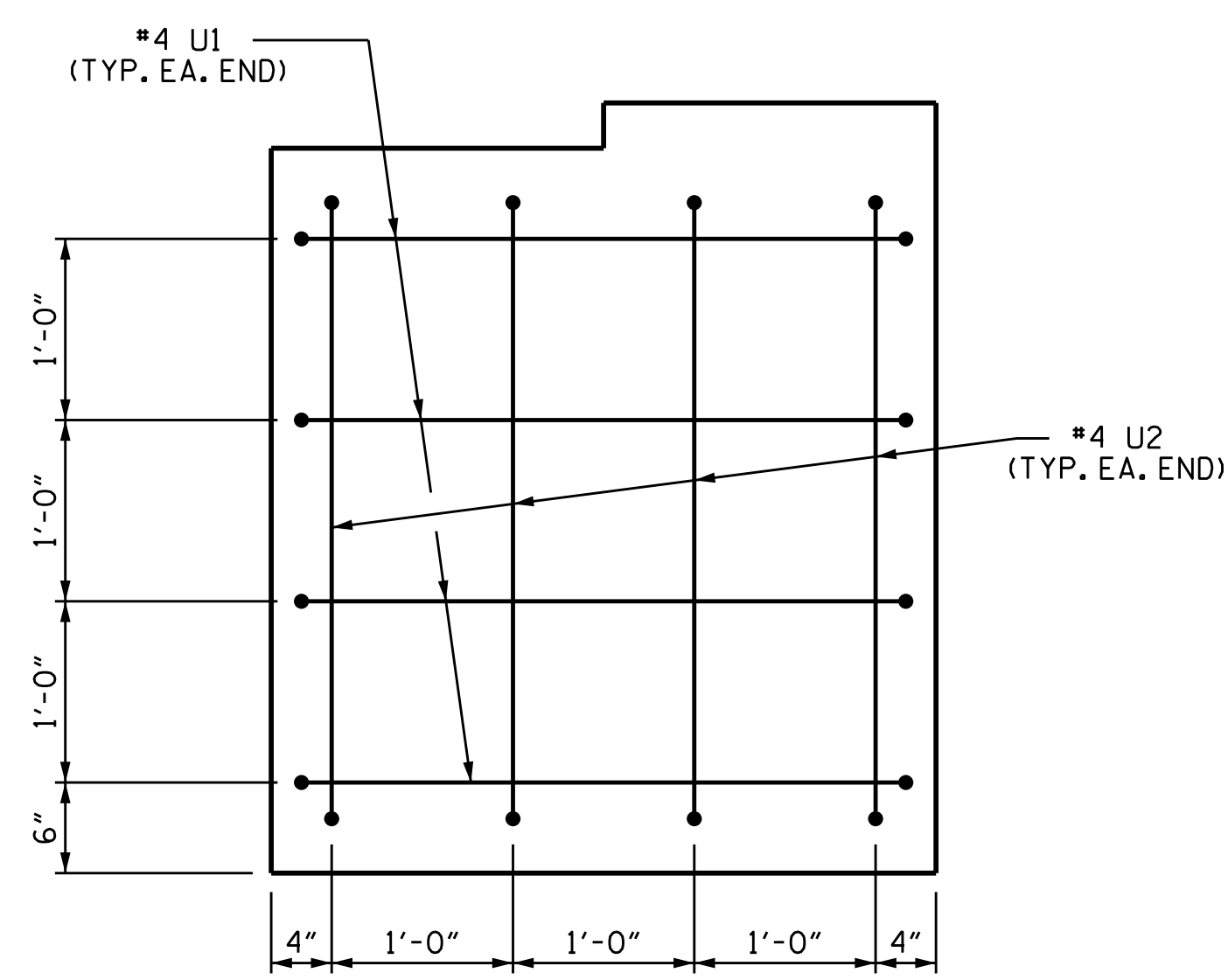
PLAN OF DRILLED PIERS & COLUMNS



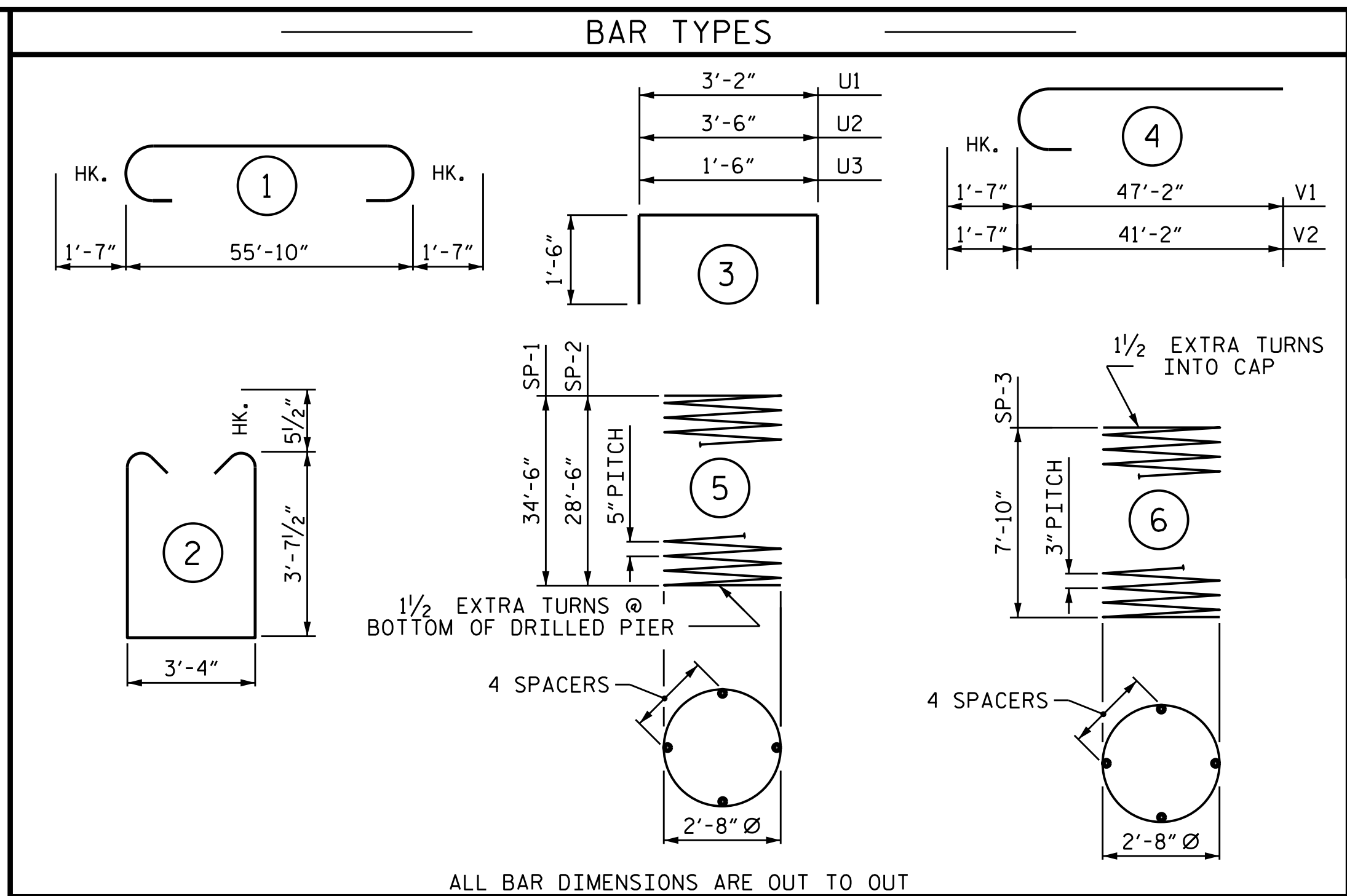
END ELEVATION



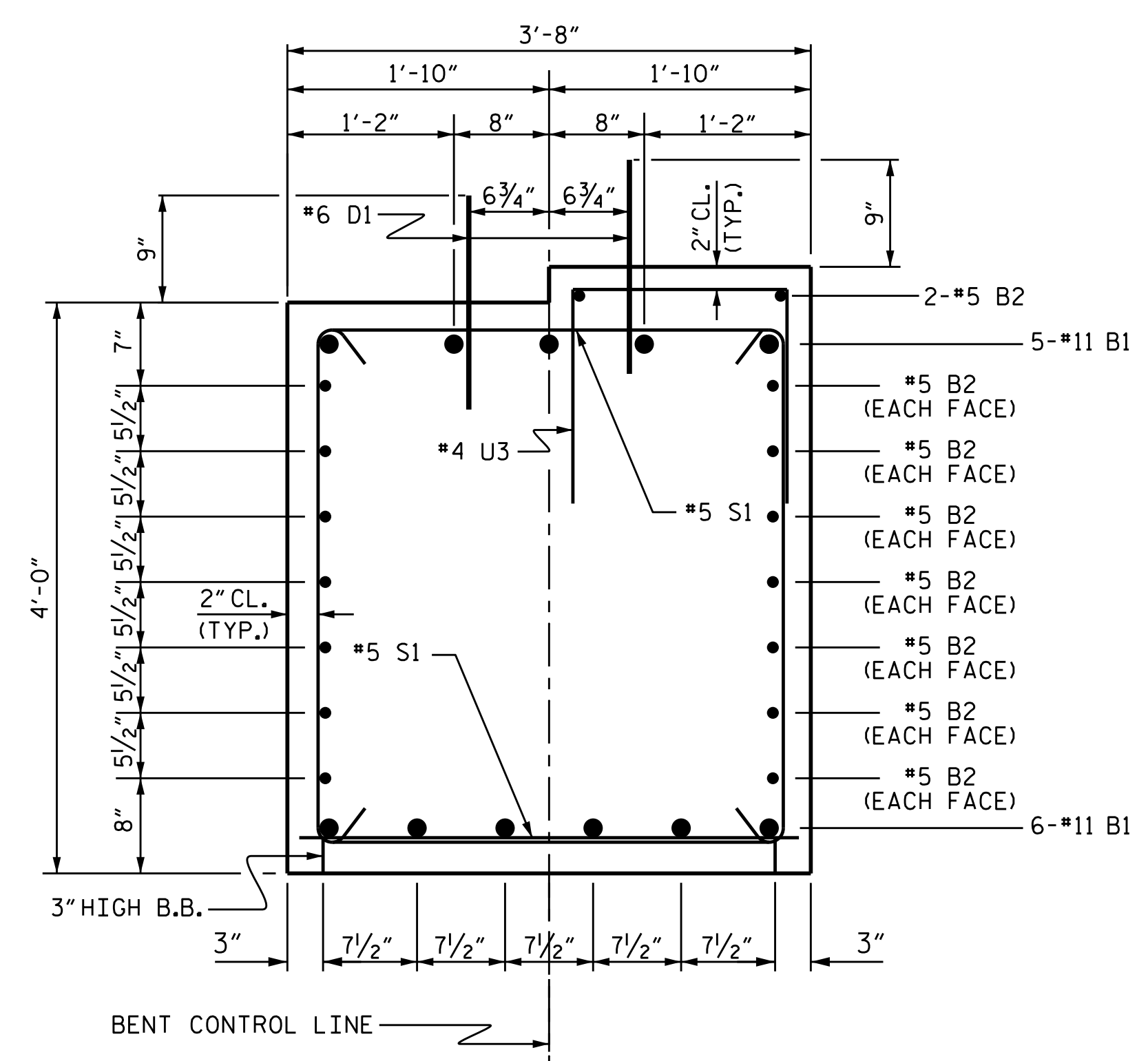
CONSTRUCTION JOINT DETAIL



END OF CAP VIEW  
(TYPICAL BOTH ENDS)



ALL BAR DIMENSIONS ARE OUT TO OUT



SECTION THRU CAP

BILL OF MATERIAL FOR BENT No. 2					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	11	#11	1	58'-10"	3438
B2	16	#5	STR	55'-10"	932
D1	68	#6	STR	1'-6"	153
S1	96	#5	2	11'-6"	1151
U1	8	#4	3	6'-2"	33
U2	8	#4	3	6'-6"	35
U3	56	#4	3	4'-6"	168
V1	20	#11	4	48'-9"	5180
V2	10	#11	4	42'-9"	2271
REINFORCING STEEL (FOR ONE BENT)					13361 LBS.
SP-1	2	*	5	699'-1"	1458
SP-2	1	*	5	575'-9"	601
SP-3	3	**	6	272'-3"	546
SPIRAL COLUMN REINFORCING STEEL (FOR ONE BENT)					2605 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 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)					6.0 C.Y.
POUR #3 (CAP)					31.5 C.Y.
TOTAL CLASS A CONCRETE					37.5 C.Y.
DRILLED PIERS: (FOR ONE BENT)					
DRILLED PIER CONCRETE					35.3 C.Y.
3'-6" Ø DRILLED PIER NOT IN SOIL					21 LIN. FT.
3'-6" Ø DRILLED PIER IN SOIL					78 LIN. FT.
PERMANENT STEEL CASING FOR 3'-6" Ø DRILLED PIER					82.5 LIN. FT.
CSL TUBES					414 LIN. FT.

PROJECT NO. B-5326  
WAKE COUNTY  
 STATION: 17+70.00 -L-

SHEET 2 OF 2



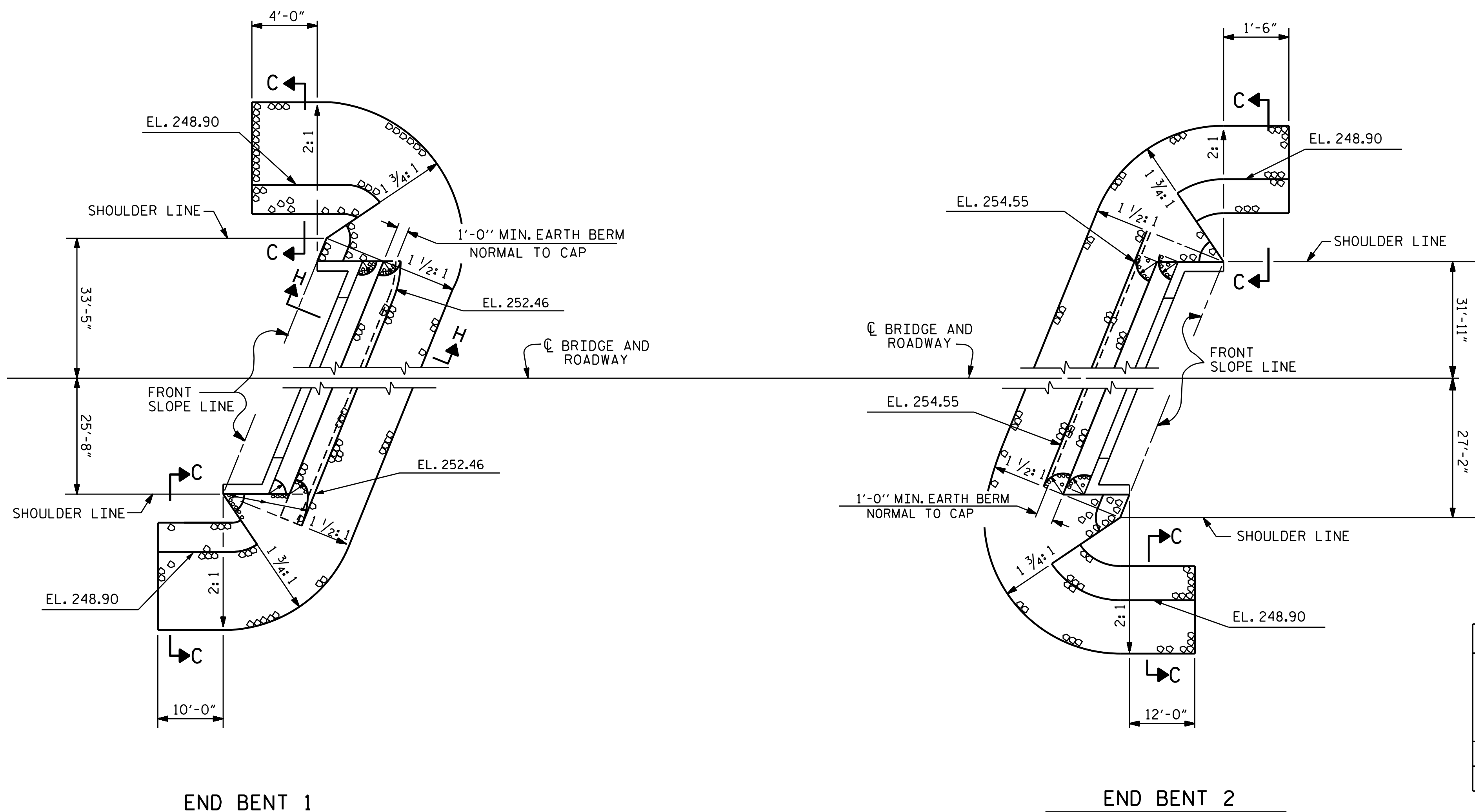
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 SUBSTRUCTURE  
 BENT No. 2

DRAWN BY: S. N. MEGAHED DATE: 12/2018  
 CHECKED BY: F. LEA DATE: 01/2019  
 DESIGN ENGINEER OF RECORD: S. N. MEGAHED DATE: 01/2019

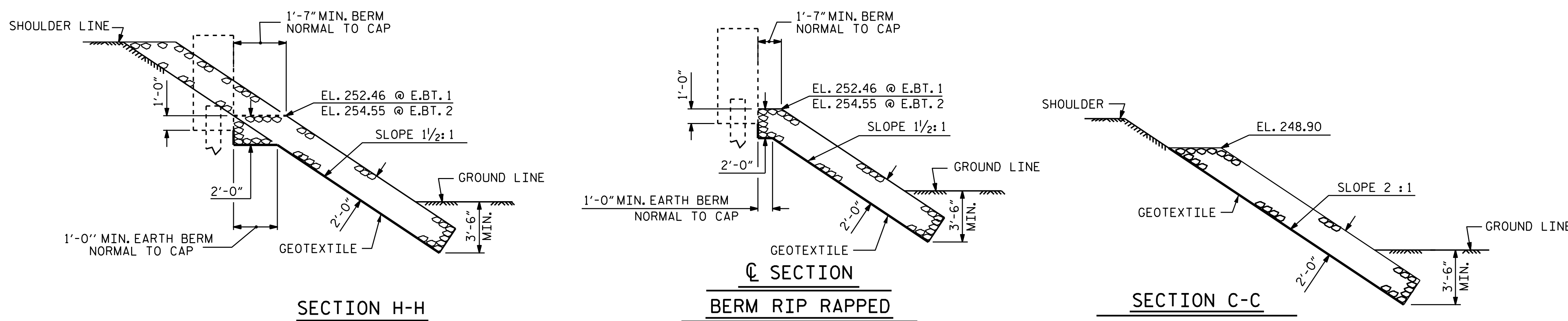
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-27
1			3			TOTAL SHEETS
2			4			29

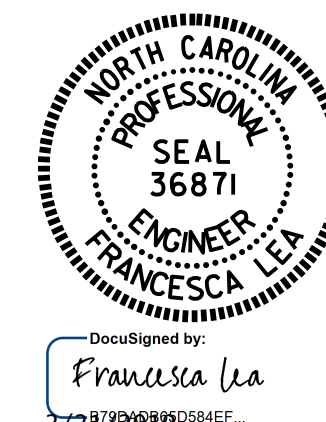
NOTES :  
FOR BERM WIDTH DIMENSIONS, SEE GENERAL DRAWING.



ESTIMATED QUANTITIES		
BRIDGE @ STA. 17+70.00 -L-	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE
	TONS	SQUARE YARDS
END BENT 1	245	270
END BENT 2	280	310



PROJECT NO. B-5326  
WAKE COUNTY  
 STATION: 17+70.00 -L-



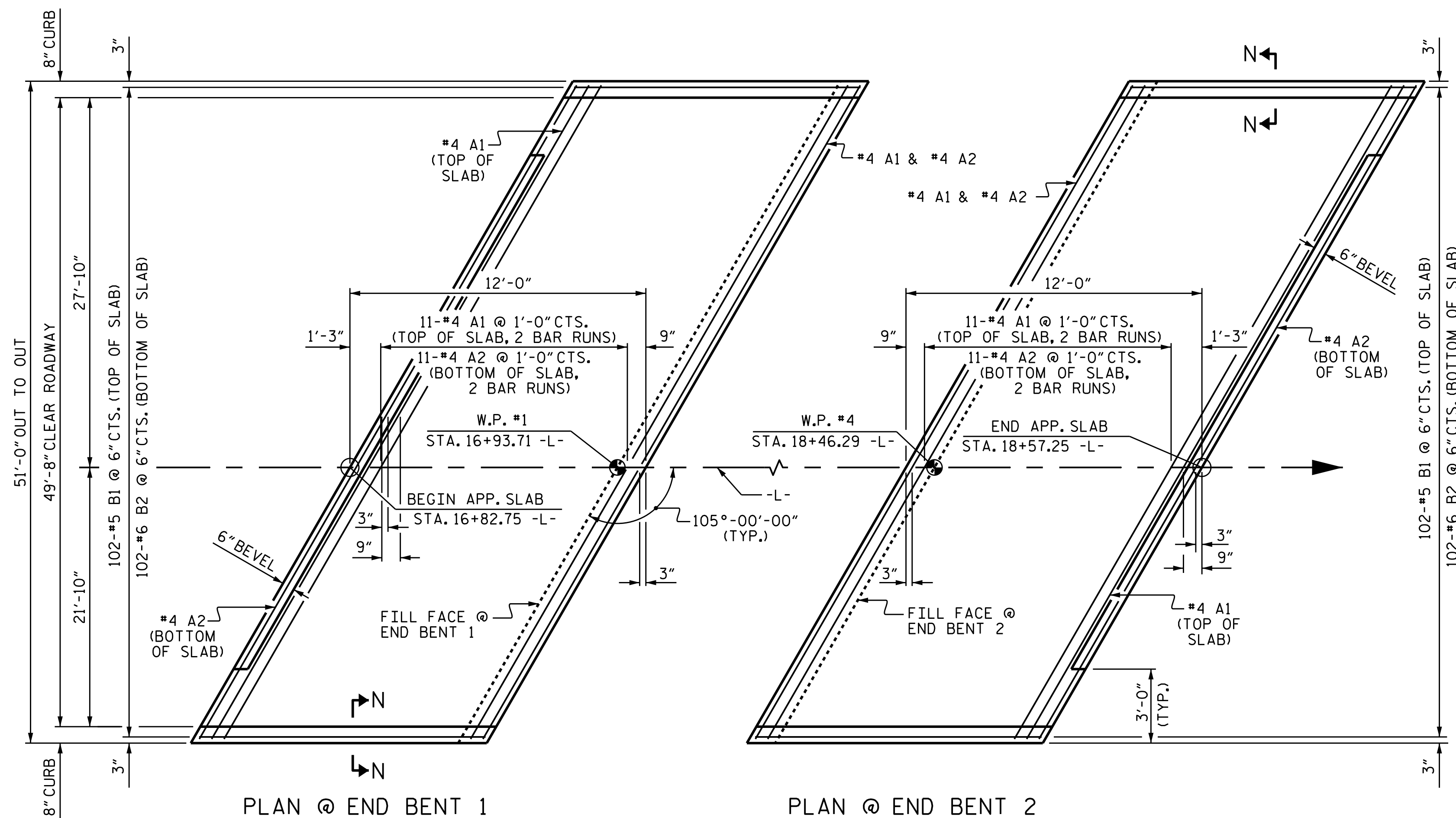
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD  
 = RIP RAP DETAILS =

ASSEMBLED BY : S. N. MEGAHED	DATE : 01/2019
CHECKED BY : F. LEA	DATE : 01/2019
DRAWN BY : REK 1/84	REV. 5/1/06R TLA/GM
CHECKED BY : ROU 1/84	REV. 10/1/11 MAA/GM
	REV. 12/21/11 MAA/GM

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 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-28
1			3			TOTAL SHEETS
2			4			29



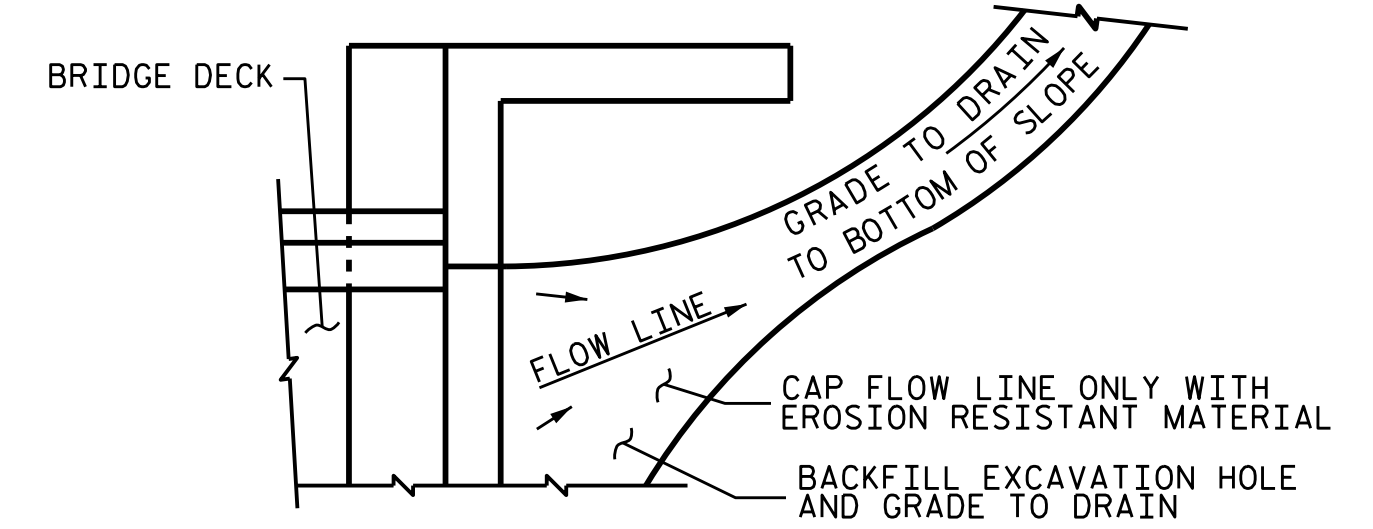


PLAN @ END BENT 1 PLAN @ END BENT 2

DIMENSIONS SHOWN ARE TYPICAL FOR BOTH APPROACH SLABS

NOTES

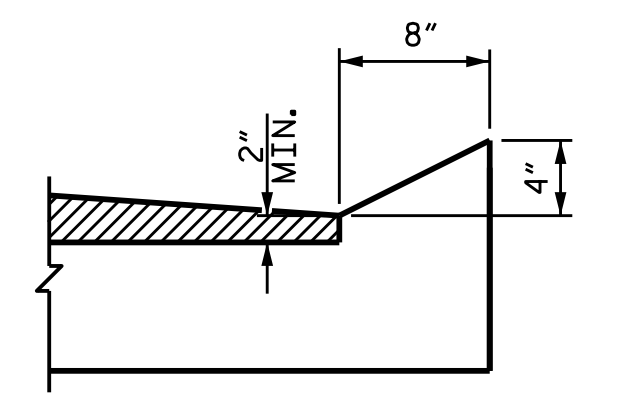
FOR BRIDGE APPROACH FILL INCLUDING GEOTEXTILE, 4" Ø DRAINAGE PIPE, AND SELECT MATERIAL BACKFILL, SEE ROADWAY PLANS.  
 GEOTEXTILE SHALL BE TYPE I IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS SECTION 1056.  
 SELECT MATERIAL BACKFILL (CLASS V OR CLASS VI) SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATIONS 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.



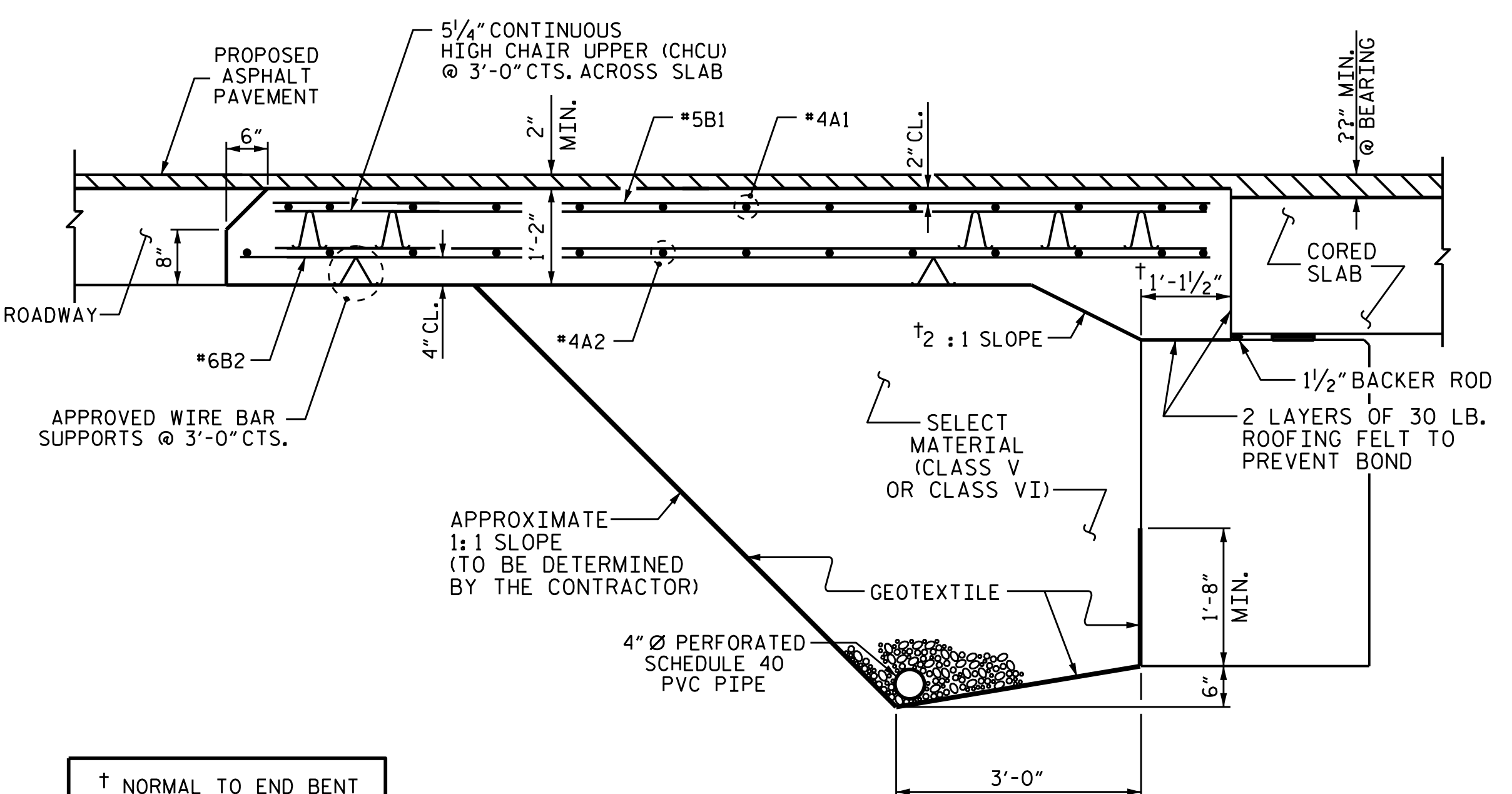
NOTE: IF THE APPROACH SLAB IS NOT CONSTRUCTED IMMEDIATELY AFTER THE BACKFILLING OF THE END BENT EXCAVATION, GRADE TO DRAIN TO THE BOTTOM OF THE SLOPE AND PROVIDE EROSION RESISTANT MATERIAL, SUCH AS FIBERGLASS ROVING OR AS DIRECTED BY THE ENGINEER TO PREVENT SOIL EROSION AND TO PROTECT THE AREA ADJACENT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

TEMPORARY DRAINAGE DETAIL

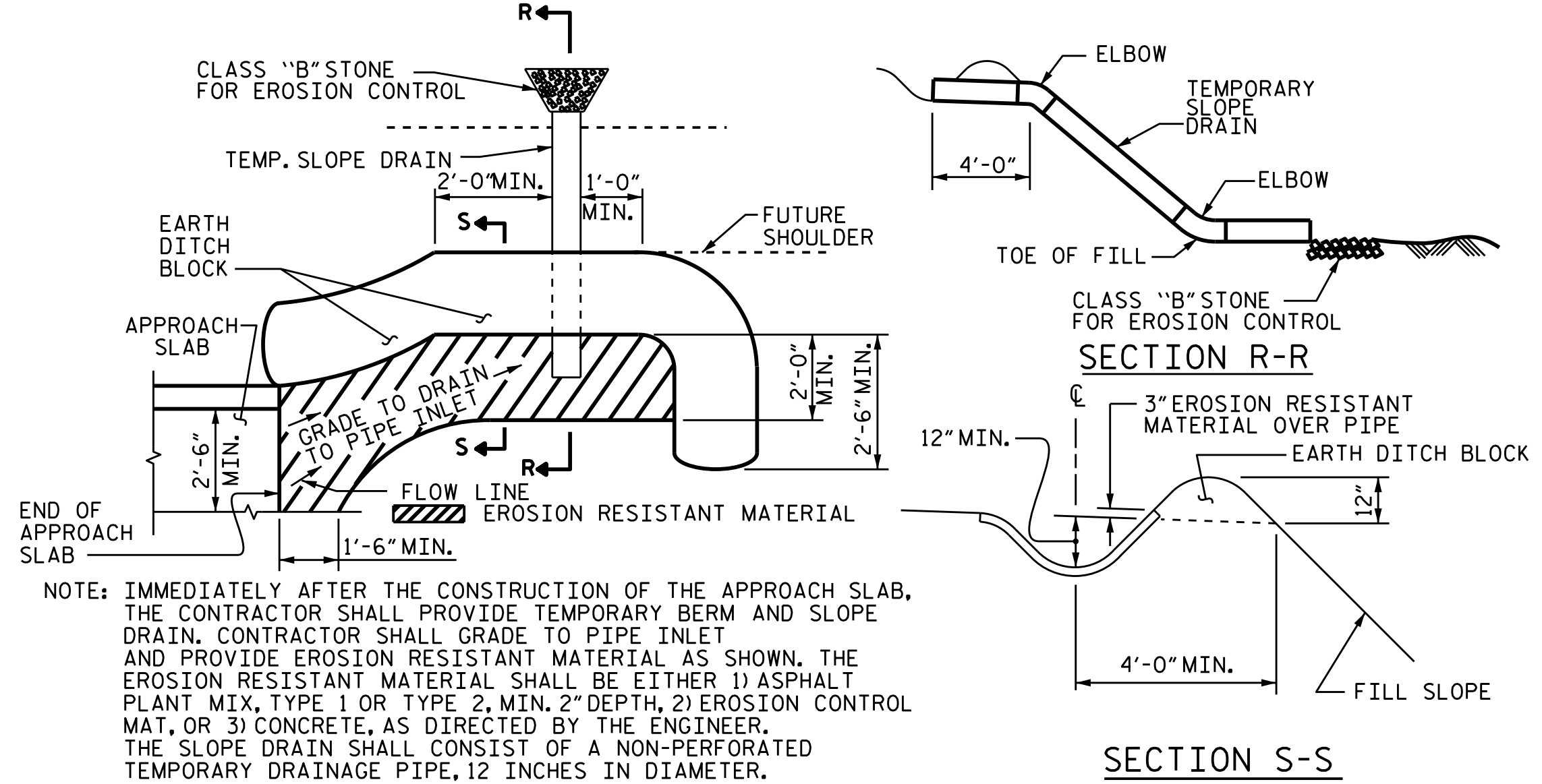
BILL OF MATERIAL						
APPROACH SLAB AT EB 1						
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	
*A1	26	#4	STR	27'-4"	483	
A2	26	#4	STR	27'-2"	480	
*B1	102	#5	STR	11'-1"	1179	
B2	102	#6	STR	11'-7"	1775	
REINFORCING STEEL					LBS.	2255
*EPOXY COATED REINFORCING STEEL					LBS.	1662
CLASS AA CONCRETE					C. Y.	26.8
APPROACH SLAB AT EB 2						
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	
*A1	26	#4	STR	19'-5"	483	
A2	26	#4	STR	19'-4"	480	
*B1	102	#5	STR	11'-1"	1179	
B2	102	#6	STR	11'-7"	1775	
REINFORCING STEEL					LBS.	2255
*EPOXY COATED REINFORCING STEEL					LBS.	1662
CLASS AA CONCRETE					C. Y.	26.8



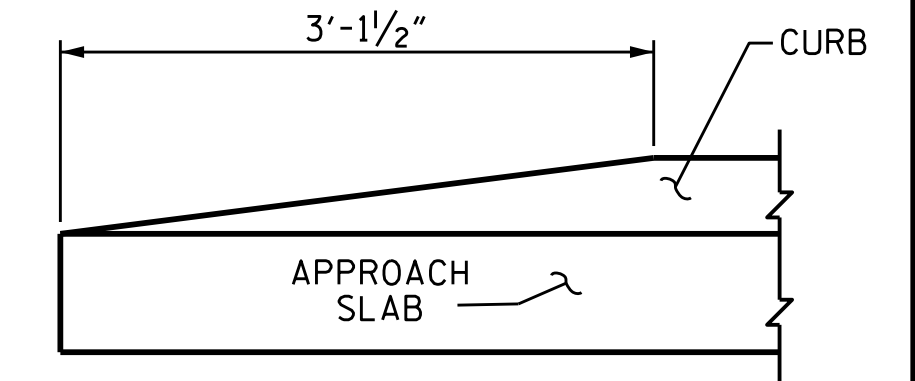
SECTION N-N



SECTION THRU SLAB (TYPE II - MODIFIED APPROACH FILL)



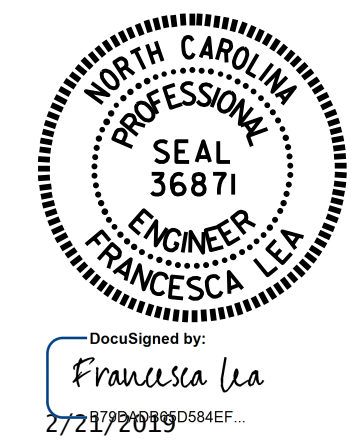
TEMPORARY BERM AND SLOPE DRAIN DETAILS (TO BE USED WHEN SHOULDER BERM GUTTER IS REQUIRED)



END OF CURB WITHOUT SHOULDER BERM GUTTER

CURB DETAILS

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



PROJECT NO. B-5326  
 WAKE COUNTY  
 STATION: 17+70.00 -L-

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

ASSEMBLED BY: S. N. MEGAHED	DATE: 01/2019
CHECKED BY: F. LEA	DATE: 01/2019
DRAWN BY: KMM	3-08
CHECKED BY: GM	3-08
REV. 12/21/11	MAA/GM
REV. 6/13	MAA/GM
REV. 12/17	MAA/THC

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

