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09/08/19

spoodle

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TIP PROJECT: B-4571

CONTRACT: C204361

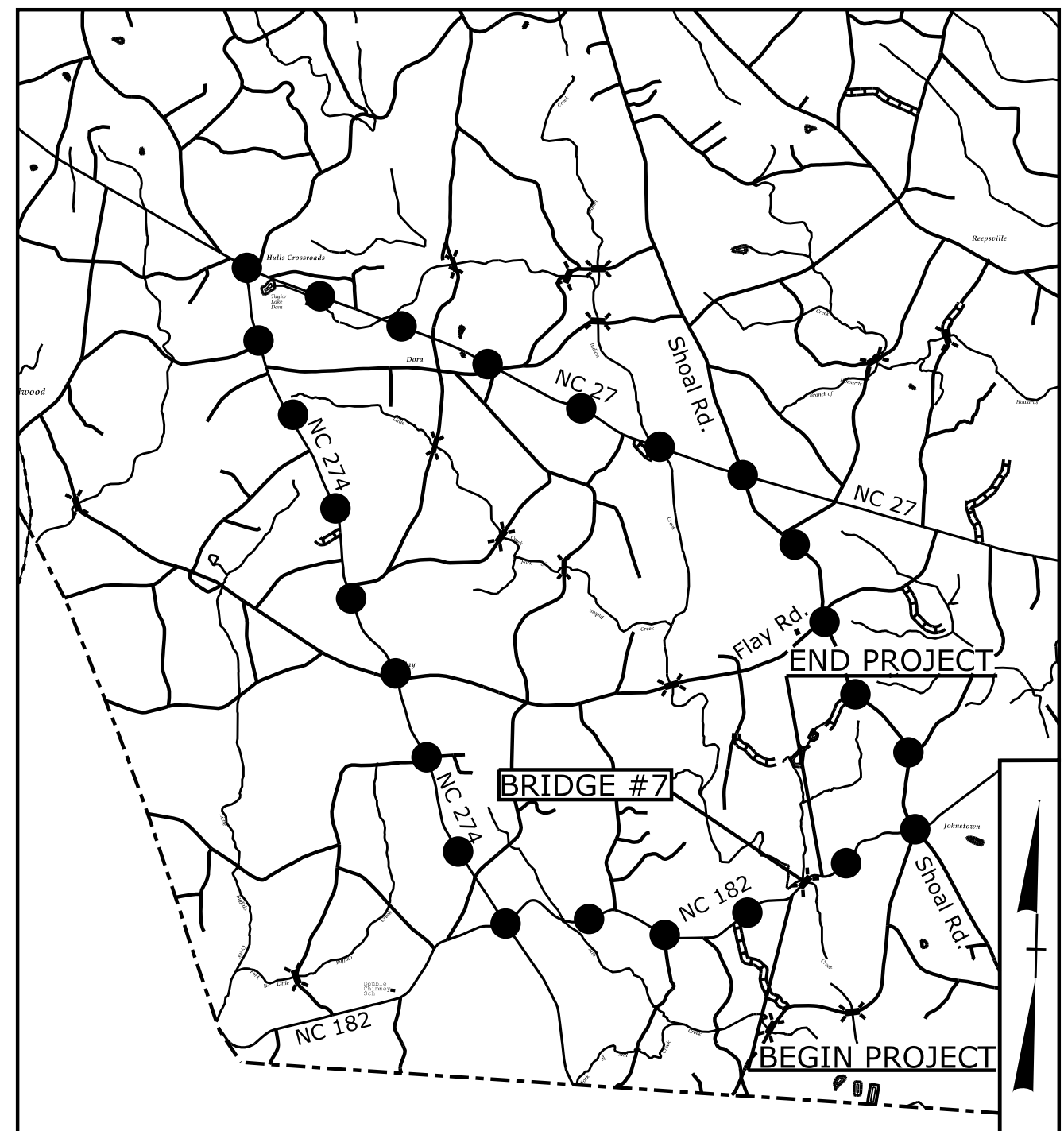
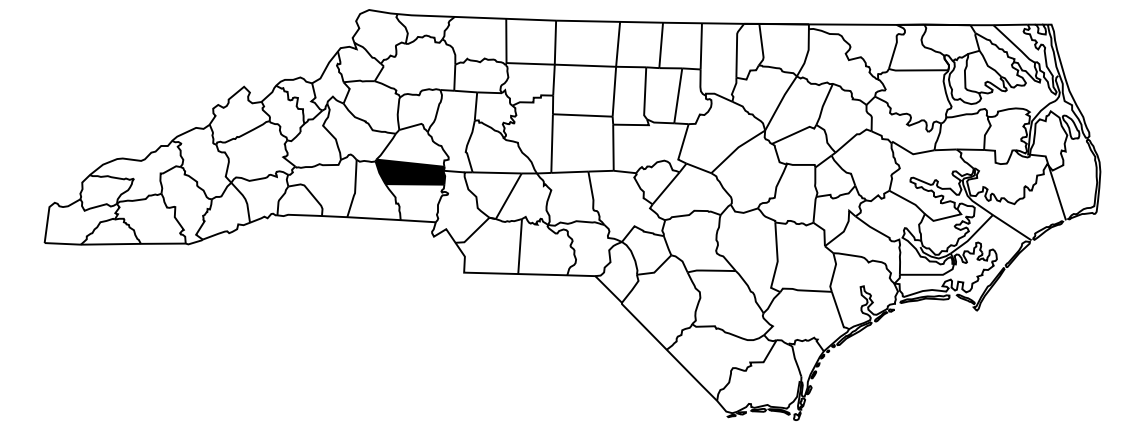
STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

**LINCOLN COUNTY**

LOCATION: BRIDGE NO. 7 OVER INDIAN CREEK ON NC 182

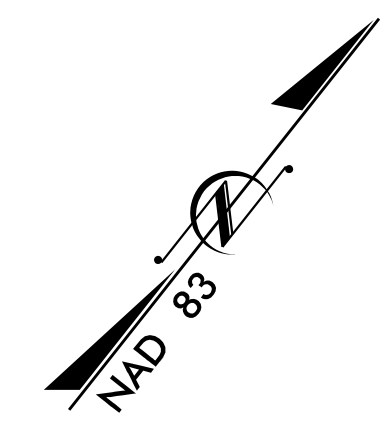
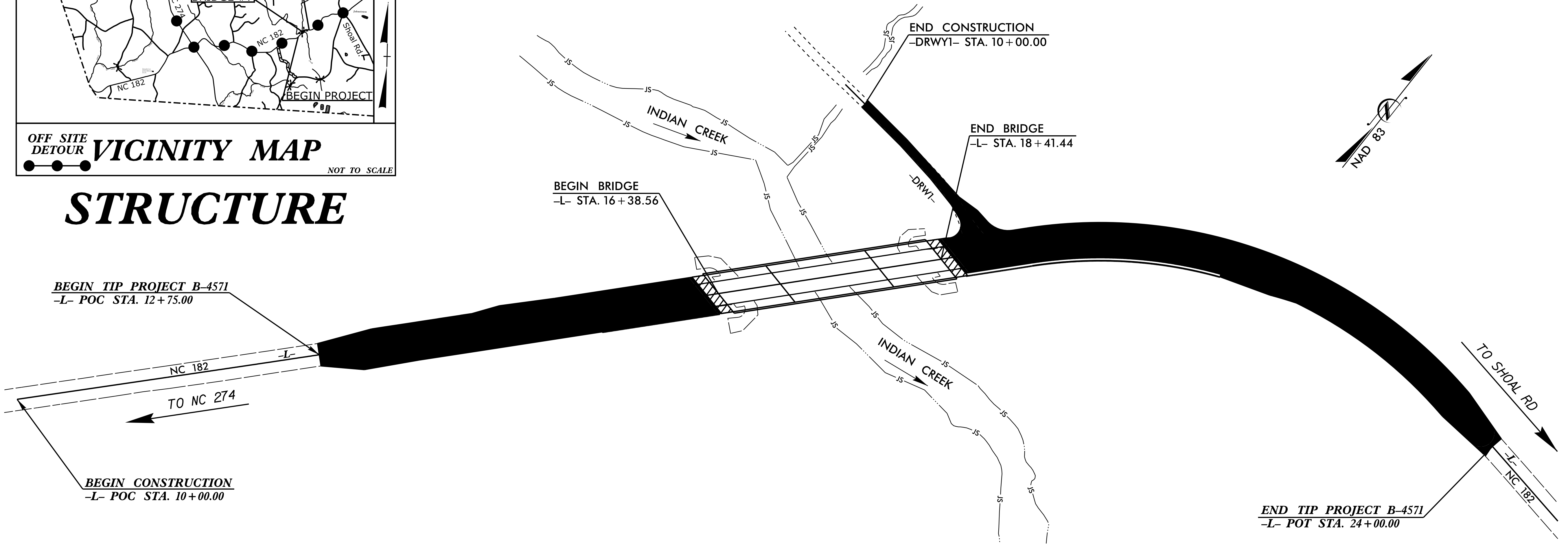
TYPE OF WORK: GRADING, DRAINAGE, PAVING, AND STRUCTURE

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4571	1	
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
38414.1.2	N/A	PE	
38414.2.1	N/A	RW /UTIL.	
38414.3.1	N/A	CONSTR.	



OFF SITE DETOUR VICINITY MAP  
NOT TO SCALE

**STRUCTURE**



\*\*DESIGN EXCEPTION REQUIRED FOR DESIGN SPEED

DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED

DESIGN DATA	
ADT 2019	= 1148
ADT 2040	= 1400
K	= 12%
D	= 75%
T	= 6%*
**V	= 30 MPH
*(TTST 2%+DUALS 4%)	
FUNC CLASS = RURAL MAJOR COLLECTOR SUB-REGIONAL TIER	

PROJECT LENGTH	
LENGTH OF ROADWAY T.I.P. PROJECT B-4571	= 0.175 MI.
LENGTH OF STRUCTURE T.I.P. PROJECT B-4571	= 0.038 MI.
TOTAL LENGTH OF T.I.P. PROJECT B-4571	= 0.213 MI.
NCDOT CONTACT: DAVID STUTTS, PE STRUCTURES MANAGEMENT UNIT	

PREPARED IN THE OFFICE OF:  
**Stantec** STANTEC CONSULTING  
 801 Jones Franklin Road | Suite 300  
 Raleigh, NC 27606  
 Tel. (919) 851-6866 | Fax. (919) 851-7024  
 www.stantec.com  
 License No. P-06572

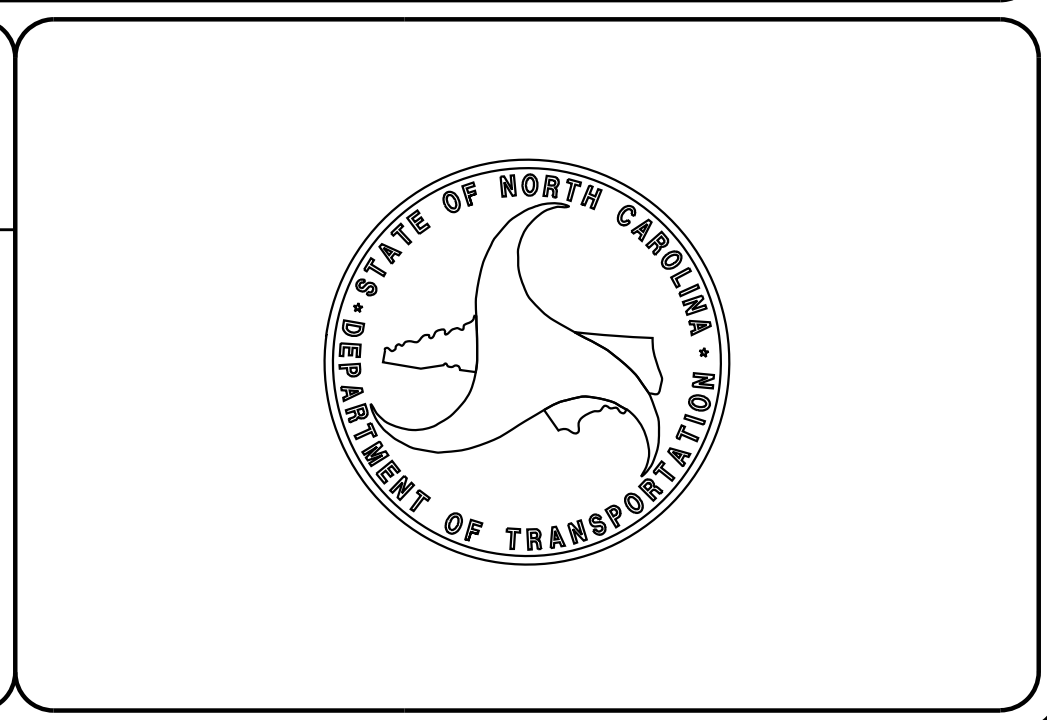
FOR THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
 2018 STANDARD SPECIFICATIONS

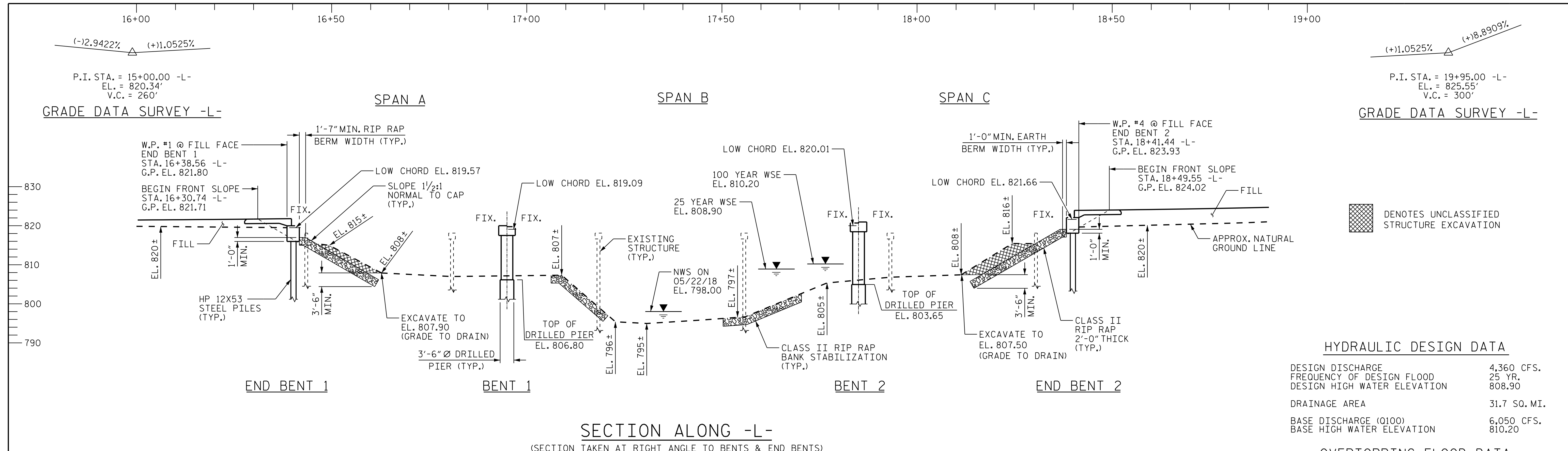
RIGHT OF WAY DATE:  
JANUARY 4, 2019

LETTING DATE:  
DECEMBER 20, 2022

JOSEPH KELVINGTON, PE  
PROJECT ENGINEER

VICTOR FRAGA, PE  
PROJECT DESIGN ENGINEER





GRADE DATA SURVEY -L-  
 P.I. STA. = 19+95.00 -L-  
 EL. = 825.55'  
 V.C. = 300'

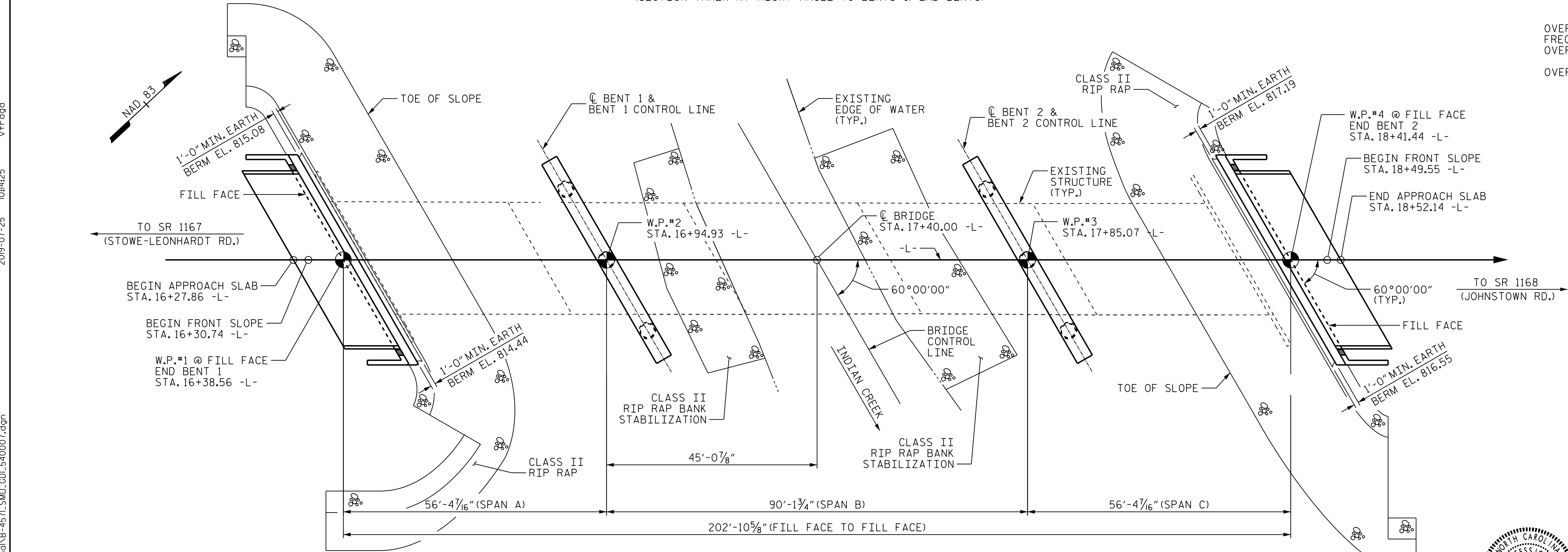
**HYDRAULIC DESIGN DATA**

DESIGN DISCHARGE	4,360 CFS.
FREQUENCY OF DESIGN FLOOD	25 YR.
DESIGN HIGH WATER ELEVATION	808.90
DRAINAGE AREA	31.7 SQ. MI.
BASE DISCHARGE (Q100)	6,050 CFS.
BASE HIGH WATER ELEVATION	810.20

**OVERTOPPING FLOOD DATA**

OVERTOPPING DISCHARGE	34,000 CFS.
FREQUENCY OF OVERTOPPING FLOOD	+500 YR.
OVERTOPPING FLOOD ELEVATION	821.60
OVERTOPPING IS EP AT SAG STATION	15+61.00 -L-

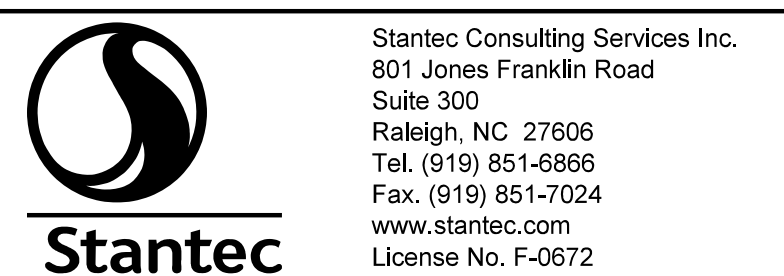
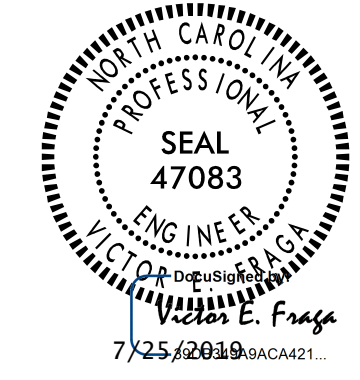
**I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS**



PROJECT NO. B-4571  
LINCOLN COUNTY  
 STATION: 17+40.00 -L-

SHEET 1 OF 5 BRIDGE 540007

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**GENERAL DRAWING**  
 FOR BRIDGE OVER INDIAN CREEK  
 ON HWY NC 182 (-L-)  
 BETWEEN SR 1167 (STOWE-LEONHARDT RD.)  
 AND SR 1168 (JOHNSTOWN RD.)

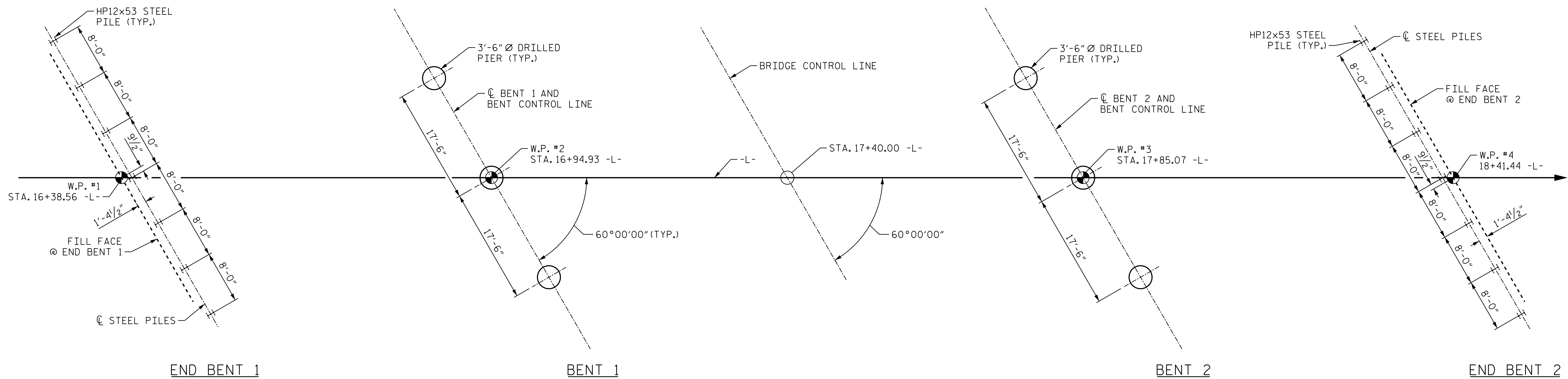


DRAWN BY: T. N. ENNIS DATE: 08/28/18  
 CHECKED BY: N. D'AIUTO DATE: 09/05/18  
 DESIGN ENGINEER OF RECORD: V. E. FRAGA DATE: 07/24/19

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-01
1			3			TOTAL SHEETS
2			4			29





### FOUNDATION LAYOUT

**NOTES:**

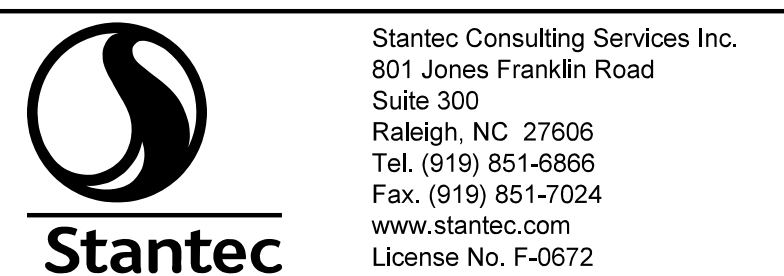
- FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.
- PILES AT END BENT NO.1 IS DESIGNED FOR A FACTORED RESISTANCE OF 80 TONS PER PILE.
- DRIVE PILES AT END BENT NO.1 TO A REQUIRED DRIVING RESISTANCE OF 133 TONS PER PILE.
- FOR DRILLED PIERS, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.
- DRILLED PIERS AT BENT NO.1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 385 TONS PER PIER. CHECK FIELD CONDITIONS FOR A REQUIRED TIP RESISTANCE OF 30 TSF.
- INSTALL DRILLED PIERS AT BENT NO.1 TO A TIP ELEVATION NO HIGHER THEN 751 FT. (LT.), 750 FT (CT.), AND 750 FT (RT.) WITH THE REQUIRED TIP RESISTANCE AND HAVE A PENETRATION OF AT LEAST 4 FT. INTO ROCK AS DEFINED BY ARTICLE 411 OF STANDARD SPECIFICATIONS.
- PERMANENT STEEL CASINGS ARE REQUIRED FOR DRILLED PIERS AT BENT NO.1. DO NOT EXTEND PERMANENT CASINGS BELOW ELEVATION 790 FT. WITHOUT PRIOR APPROVAL FROM THE ENGINEER.
- THE SCOUR CRITICAL ELEVATION FOR BENT NO.1 IS ELEVATION 780 FT. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.
- DRILLED PIERS AT BENT NO.2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 385 TONS PER PIER. CHECK FIELD CONDITIONS FOR A REQUIRED TIP RESISTANCE OF 30 TSF.
- INSTALL DRILLED PIERS AT BENT NO.2 TO A TIP ELEVATION NO HIGHER THEN 745 FT. (LT.), 745 FT (CT.), AND 753 FT (RT.) WITH THE REQUIRED TIP RESISTANCE AND HAVE A PENETRATION OF AT LEAST 4 FT. INTO ROCK AS DEFINED BY ARTICLE 411 OF STANDARD SPECIFICATIONS.
- PERMANENT STEEL CASINGS ARE REQUIRED FOR DRILLED PIERS AT BENT NO.2. DO NOT EXTEND PERMANENT CASINGS BELOW ELEVATION 790 FT. WITHOUT PRIOR APPROVAL FROM THE ENGINEER.
- THE SCOUR CRITICAL ELEVATION FOR BENT NO.2 IS ELEVATION 780 FT. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.
- 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.
- PILES AT END BENT NO.2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 80 TONS PER PILE.
- DRIVE PILES AT END BENT NO.2 TO A REQUIRED DRIVING RESISTANCE OF 133 TONS PER PILE.

PROJECT NO. B-4571  
LINCOLN COUNTY  
 STATION: 17+40.00 -L-

SHEET 2 OF 5



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**GENERAL DRAWING**  
 FOR BRIDGE OVER INDIAN CREEK  
 ON HWY NC 182 (-L-)  
 BETWEEN SR 1167 (STOWE-LEONHARDT RD.)  
 AND SR 1168 (JOHNSTOWN RD.)



DRAWN BY : V. E. FRAGA DATE : 03/14/19  
 CHECKED BY : T. R. DUDECK DATE : 04/05/19  
 DESIGN ENGINEER OF RECORD: V. E. FRAGA DATE : 07/24/19

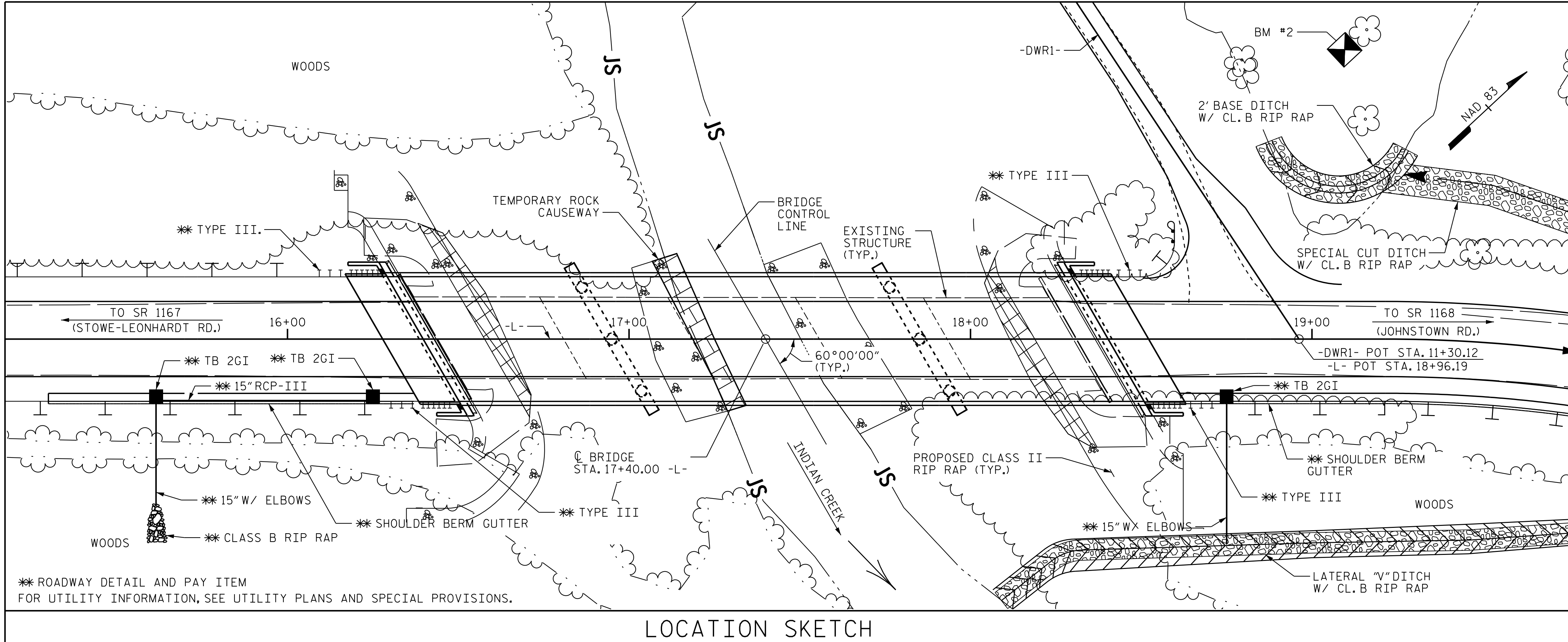
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-02
1			3			TOTAL SHEETS
2			4			29

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BM#2: RAILROAD SPIKE SET IN 24" OAK TREE. STA. 19+10.00 -L-, 85' LT. EL. 814.74', N624339 E1291651



**NOTES:**

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.  
 THIS BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF 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 EXISTING STRUCTURE CONSISTING OF 5 SPANS (1 @ 38'-0" @ 37'-6", 1 @ 38'-0" CONCRETE DECK ON STEEL I BEAMS; CLEAR ROADWAY WIDTH OF 24'-0" ON CONCRETE CAP WITH TIMBER PILES AT END BENTS AND CONCRETE CAP ON TIMBER PILES AT BENTS AND LOCATED AT THE PROPOSED STRUCTURE SHALL BE REMOVED.  
 THE SUBSTRUCTURE OF THE EXISTING BRIDGE INDICATED ON THE PLANS IS FROM THE BEST INFORMATION AVAILABLE. 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.  
 FOR ASBESTOS ASSESSMENT FOR BRIDGE DEMOLITION AND REMOVAL ACTIVITIES, SEE SPECIAL PROVISIONS.  
 THIS STRUCTURE HAS BEEN DESIGNED IN ACCORDANCE WITH "HEC 18 - EVALUATING SCOUR AT BRIDGES."  
 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 COST 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+40.00 -L-".  
 FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.  
 ASPHALT WEARING SURFACE IS INCLUDED IN ROADWAY QUANTITY ON ROADWAY PLANS.  
 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. SEE SPECIAL PROVISIONS FOR CONSTRUCTION, MAINTENANCE AND REMOVAL OF TEMPORARY ACCESS AT STATION 17+40.00 -L-.

**LOCATION SKETCH**

**TOTAL BILL OF MATERIAL**

	CONSTRUCTION, MAINTENANCE, & REMOVAL OF TEMP ACCESS AT STA 17+40.00 -L-	REMOVAL OF EXISTING STRUCTURE AT STATION 17+40.00 -L-	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	SPT TESTING	CSL TESTING	UNCLASSIFIED STRUCTURE EXCAVATION @ STA. 17+40.00 -L-	CLASS A CONCRETE	BRIDGE APPROACH SLABS	REINFORCING STEEL	SPIRAL COLUMN REINFORCING STEEL	PILE DRIVING EQUIPMENT SETUP FOR HP 12X53 STEEL PILES	HP12X53 STEEL PILES	
	LUMP SUM	LUMP SUM	LUMP SUM	L.F.	L.F.	LIN. FT.	EA.	EA.	LUMP SUM	C.Y.	LUMP SUM	LBS.	LBS.	EA.	NO.	L.F.
SUPERSTRUCTURE											LUMP SUM					
END BENT 1									LUMP SUM	26.9		3,293		7	7	298
BENT 1				153	20	53				30.9		13,772	4,285			
BENT 2				158	14	44.5				33.2		14,141	4,528			
END BENT 2									LUMP SUM	26.9		3,293		7	7	403
TOTAL	LUMP SUM	LUMP SUM	LUMP SUM	311	34	97.5	1	1	LUMP SUM	117.90	LUMP SUM	34,499	8,813	14	14	701

**TOTAL BILL OF MATERIAL CONT'D**

TWO BAR METAL RAIL	1'-2" X 2'-6" CONCRETE PARAPET	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE	ELASTOMERIC BEARINGS	3'-0" x 2'-9" PRESTRESSED CONC. BOX BEAMS	3'-0" x 1'-9" PRESTRESSED CONC. CORED SLABS		
L.F.	L.F.	TON	S.Y.	LUMP SUM	NO.	L.F.	NO.	L.F.
384.2	400			LUMP SUM	13	1,170	26	1,430
		197	219					
		177	197					
		203	226					
384.2	400	577	642	LUMP SUM	13	1,170	26	1,430

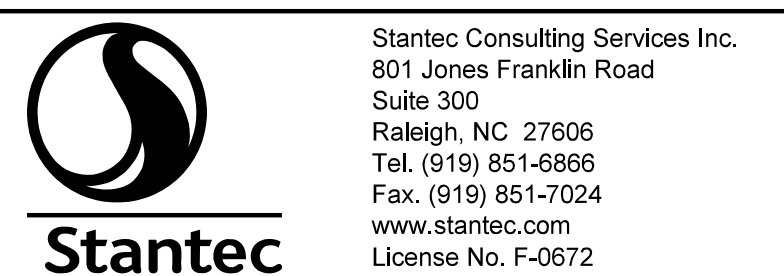
**NOTES (CONT'D):**

THE MATERIAL SHOWN IN THE CROSS-HATCHED AREA SHALL BE EXCAVATED FOR A DISTANCE OF 30 FT EACH SIDE OF THE 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.

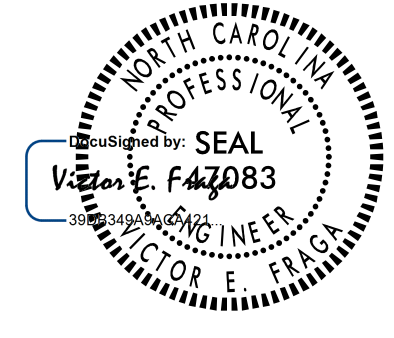
STREAM BANK STABILIZATION WITH CLASS II RIP RAP SHALL BE IN ACCORDANCE WITH DETAIL 7 IN THE ROADWAY PLANS.

THE EXISTING PAVEMENT WITHIN THE AREA OF THE END BENT PILES SHALL BE REMOVED AND THE ROADBED SCARIFIED TO A MINIMUM DEPTH OF 2'-0".

PROJECT NO. B-4571  
 \_\_\_\_\_  
 LINCOLN COUNTY  
 STATION: 17+40.00 -L-



DRAWN BY : V. E. FRAGA DATE : 03/18/19  
 CHECKED BY : T. R. DUDECK DATE : 04/05/19  
 DESIGN ENGINEER OF RECORD: V. E. FRAGA DATE : 07/24/19



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**GENERAL DRAWING**  
 FOR BRIDGE OVER INDIAN CREEK  
 ON HWY NC 182 (-L-)  
 BETWEEN SR 1167 (STOWE-LEONHARDT RD.)  
 AND SR 1168 (JOHNSTOWN RD.)

REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	S-03	
1			3			TOTAL SHEETS	
2			4			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 (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	1.69	--	1.75	0.216	1.69	A or C	EL	26.923	0.332	3.15	A or C	EL	1.400	0.80	0.216	2.24	A or C	EL	26.923		
	HL-93(0pr)	N/A	--	2.19	--	1.35	0.216	2.19	A or C	EL	26.923	0.332	4.12	A or C	EL	1.400	N/A	--	--	--	--	--		
	HS-20(Inv)	36.000	2	2.13	76.68	1.75	0.216	2.13	A or C	EL	26.923	0.332	3.85	A or C	EL	1.400	0.80	0.216	2.7	A or C	EL	26.923		
	HS-20(0pr)	36.000	--	2.76	99.36	1.35	0.216	2.76	A or C	EL	26.923	0.332	5.03	A or C	EL	1.400	N/A	--	--	--	--	--		
LEGAL LOAD RATING	SV	SNSH	13.500	--	5.62	75.87	1.4	0.216	5.62	A or C	EL	26.923	0.332	11.36	A or C	EL	1.400	0.80	0.216	5.96	A or C	EL	26.923	
		SNGARBS2	20.000	--	4.34	86.80	1.4	0.216	4.34	A or C	EL	26.923	0.332	8.15	A or C	EL	1.400	0.80	0.216	4.60	A or C	EL	26.923	
		SNAGRIS2	22.000	--	4.17	91.74	1.4	0.216	4.17	A or C	EL	26.923	0.332	7.60	A or C	EL	1.400	0.80	0.216	4.42	A or C	EL	26.923	
		SNCOTTS3	27.250	--	2.79	76.03	1.4	0.216	2.79	A or C	EL	26.923	0.332	5.62	A or C	EL	1.400	0.80	0.216	2.95	A or C	EL	26.923	
		SNAGGRS4	34.925	--	2.39	83.47	1.4	0.216	2.39	A or C	EL	26.923	0.332	4.72	A or C	EL	1.400	0.80	0.216	2.54	A or C	EL	26.923	
		SNS5A	35.550	--	2.34	83.19	1.4	0.216	2.34	A or C	EL	26.923	0.332	4.82	A or C	EL	1.400	0.80	0.216	2.48	A or C	EL	26.923	
		SNS6A	39.950	--	2.17	86.69	1.4	0.216	2.17	A or C	EL	26.923	0.332	4.42	A or C	EL	1.400	0.80	0.216	2.30	A or C	EL	26.923	
	TTST	SNS7B	42.000	--	2.07	86.94	1.4	0.216	2.07	A or C	EL	26.923	0.332	4.38	A or C	EL	1.400	0.80	0.216	2.19	A or C	EL	26.923	
		TNAGRIT3	33.000	--	2.66	87.78	1.4	0.216	2.66	A or C	EL	26.923	0.332	5.26	A or C	EL	1.400	0.80	0.216	2.82	A or C	EL	26.923	
		TNT4A	33.075	--	2.68	88.64	1.4	0.216	2.68	A or C	EL	26.923	0.332	5.08	A or C	EL	1.400	0.80	0.216	2.84	A or C	EL	26.923	
		TNT6A	41.600	--	2.21	91.94	1.4	0.216	2.21	A or C	EL	26.923	0.332	4.76	A or C	EL	1.400	0.80	0.216	2.34	A or C	EL	26.923	
		TNT7A	42.000	--	2.24	94.08	1.4	0.216	2.24	A or C	EL	26.923	0.332	4.52	A or C	EL	1.400	0.80	0.216	2.37	A or C	EL	26.923	
		TNT7B	42.000	--	2.33	97.86	1.4	0.216	2.33	A or C	EL	26.923	0.332	4.24	A or C	EL	1.400	0.80	0.216	2.47	A or C	EL	26.923	
		TNAGRIT4	43.000	--	2.21	95.03	1.4	0.216	2.21	A or C	EL	26.923	0.332	4.09	A or C	EL	1.400	0.80	0.216	2.34	A or C	EL	26.923	
TNAGT5A	45.000	--	2.07	93.15	1.4	0.216	2.07	A or C	EL	26.923	0.332	4.11	A or C	EL	1.400	0.80	0.216	2.19	A or C	EL	26.923			
TNAGT5B	45.000	3	2.04	91.80	1.4	0.216	2.04	A or C	EL	26.923	0.332	3.88	A or C	EL	1.400	0.80	0.216	2.16	A or C	EL	26.923			

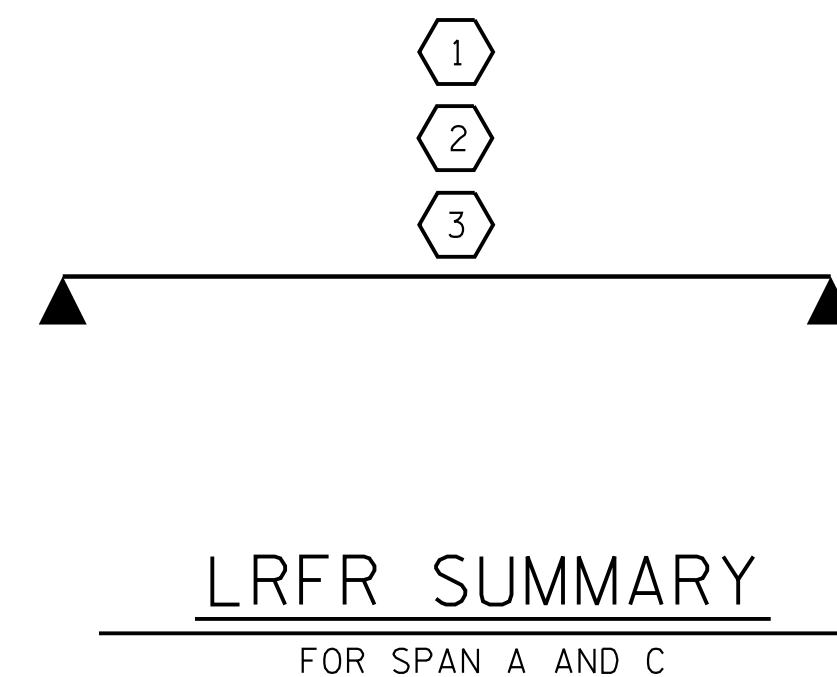
NOTES:

MINIMUM RATING FACTORS ARE BASED ON THE STRENGTH I AND SERVICE III LIMIT STATES.  
ALLOWABLE STRESSES FOR SERVICE III LIMIT STATE ARE AS REQUIRED FOR DESIGN.

COMMENTS:

1. SIMPLE SPAN ANALYSIS.
2. TYPE (g) SUPERSTRUCTURE ASSUMED FOR LIVE LOAD DISTRIBUTION.
3. DISTANCE FROM LEFT END OF GIRDER IS FROM LEFT BEARING.

#	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-4571  
LINCOLN COUNTY  
STATION: 17+40.00 -L-  
SHEET 4 OF 5

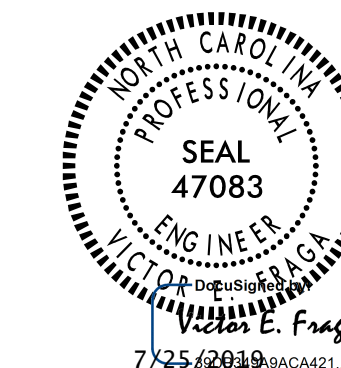


Stantec Consulting Services Inc.  
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License No. F-0672

DESIGN ENGINEER OF RECORD: V. E. FRAGA DATE : 07/24/19

ASSEMBLED BY : V. E. FRAGA DATE : 02/20/19  
CHECKED BY : T. R. DUDECK DATE : 04/05/19

DRAWN BY : CVC 6/10  
CHECKED BY : DNS 6/10



STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
**LRFR SUMMARY FOR  
55' CORED SLAB UNIT  
60° SKEW & 120° SKEW  
(NON-INTERSTATE TRAFFIC)**

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	REVISIONS						SHEET NO. S-04 TOTAL SHEETS 29
	NO.	BY:	DATE:	NO.	BY:	DATE:	
	1			3			
	2			4			

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## 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(In)	N/A	1	1.39	--	1.75	0.188	2.25	B	ER	44.134	0.629	1.39	B	ER	8.100	0.80	0.188	2.69	B	ER	44.134		
	HL-93(Op)	N/A	--	1.85	--	1.35	0.188	2.92	B	ER	44.134	0.629	1.85	B	ER	8.100	N/A	--	--	--	--	--		
	HS-20(In)	36.000	2	1.88	67.68	1.75	0.188	3.07	B	ER	44.134	0.629	1.88	B	ER	8.100	0.80	0.188	3.08	B	ER	44.134		
	HS-20(Op)	36.000	--	2.49	89.64	1.35	0.188	3.98	B	ER	44.134	0.629	2.49	B	ER	8.100	N/A	--	--	--	--	--		
LEGAL LOAD RATING	SV	SNSH	13.500	--	6.15	83.025	1.4	0.188	8.98	B	ER	44.134	0.629	6.15	B	ER	8.100	0.80	0.188	10.31	B	ER	44.134	
		SNGARBS2	20.000	--	4.28	85.60	1.4	0.188	6.56	B	ER	44.134	0.629	4.28	B	ER	8.100	0.80	0.188	7.52	B	ER	44.134	
		SNAGRIS2	22.000	--	3.95	86.90	1.4	0.188	6.15	B	ER	44.134	0.629	3.95	B	ER	8.100	0.80	0.188	7.06	B	ER	44.134	
		SNCOTTS3	27.250	--	2.93	79.84	1.4	0.188	4.47	B	ER	44.134	0.629	2.93	B	ER	8.100	0.80	0.188	5.13	B	ER	44.134	
		SNAGGRS4	34.925	--	2.31	80.68	1.4	0.188	3.68	B	ER	44.134	0.629	2.31	B	ER	8.100	0.80	0.188	4.22	B	ER	44.134	
		SNS5A	35.550	--	2.32	82.48	1.4	0.188	3.60	B	ER	44.134	0.629	2.32	B	ER	8.100	0.80	0.188	4.13	B	ER	44.134	
		SNS6A	39.950	--	2.09	83.50	1.4	0.188	3.28	B	ER	44.134	0.629	2.09	B	ER	8.100	0.80	0.188	3.77	B	ER	44.134	
	TTST	SNS7B	42.000	--	2.04	85.68	1.4	0.188	3.12	B	ER	44.134	0.629	2.04	B	ER	8.100	0.80	0.188	3.59	B	ER	44.134	
		TNAGRIT3	33.000	--	2.88	95.04	1.4	0.188	4.00	B	ER	44.134	0.629	2.88	B	ER	8.100	0.80	0.188	4.59	B	ER	44.134	
		TNT4A	33.075	--	2.63	86.99	1.4	0.188	4.01	B	ER	44.134	0.629	2.63	B	ER	8.100	0.80	0.188	4.60	B	ER	44.134	
		TNT6A	41.600	--	2.15	89.44	1.4	0.188	3.26	B	ER	44.134	0.629	2.15	B	ER	8.100	0.80	0.188	3.74	B	ER	44.134	
		TNT7A	42.000	--	2.11	88.62	1.4	0.188	3.26	B	ER	44.134	0.629	2.11	B	ER	8.100	0.80	0.188	3.74	B	ER	44.134	
		TNT7B	42.000	--	2.00	84.00	1.4	0.188	3.35	B	ER	44.134	0.629	2.00	B	ER	8.100	0.80	0.188	3.84	B	ER	44.134	
		TNAGRIT4	43.000	--	2.06	88.58	1.4	0.188	3.20	B	ER	44.134	0.629	2.06	B	ER	8.100	0.80	0.188	3.68	B	ER	44.134	
TNAGT5A	45.000	--	1.90	85.50	1.4	0.188	3.03	B	ER	44.134	0.629	1.90	B	ER	8.100	0.80	0.188	3.48	B	ER	44.134			
TNAGT5B	45.000	3	1.83	82.35	1.4	0.188	3.00	B	ER	44.134	0.629	1.83	B	ER	8.100	0.80	0.188	3.45	B	ER	44.134			

**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.

**COMMENTS:**

1. SIMPLE SPAN ANALYSIS.
2. TYPE (g) SUPERSTRUCTURE ASSUMED FOR LIVE LOAD DISTRIBUTION.
3. DISTANCE FROM LEFT END OF SPAN IS FROM LEFT BEARING.

**# CONTROLLING LOAD RATING**

1 DESIGN LOAD RATING (HL-93)

2 DESIGN LOAD RATING (HS-20)

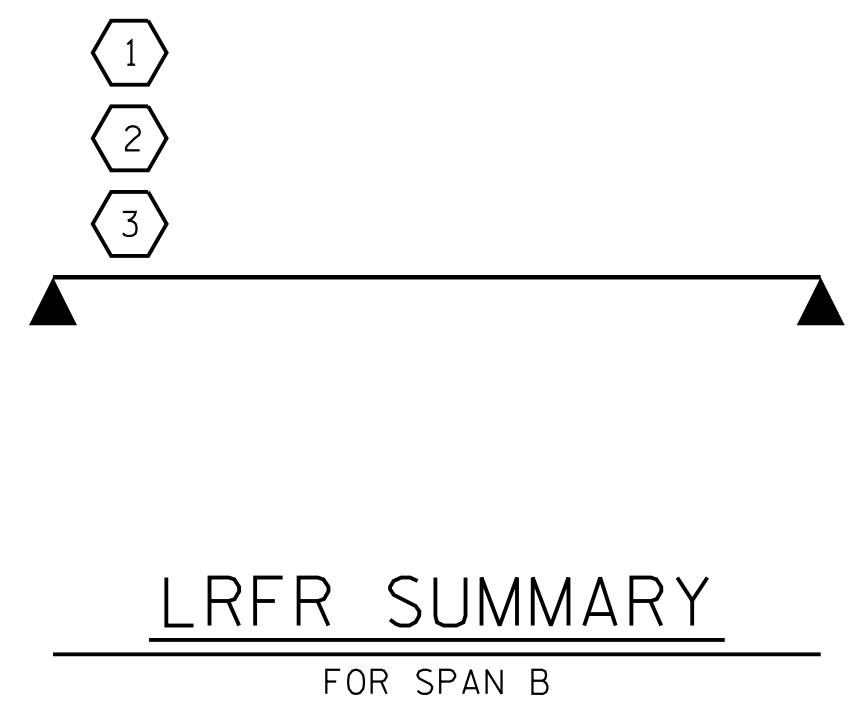
3 LEGAL LOAD RATING \*\*

\*\* SEE CHART FOR VEHICLE TYPE

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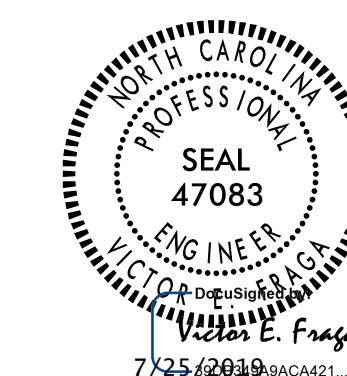
**GIRDER LOCATION**

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



PROJECT NO. B-4571  
LINCOLN COUNTY  
STATION: 17+40.00 -L-

SHEET 5 OF 5



STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
STANDARD  
LRFR SUMMARY FOR  
90' BOX BEAM UNIT  
60° SKEW & 120° SKEW  
(NON-INTERSTATE TRAFFIC)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-05
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2			4			29

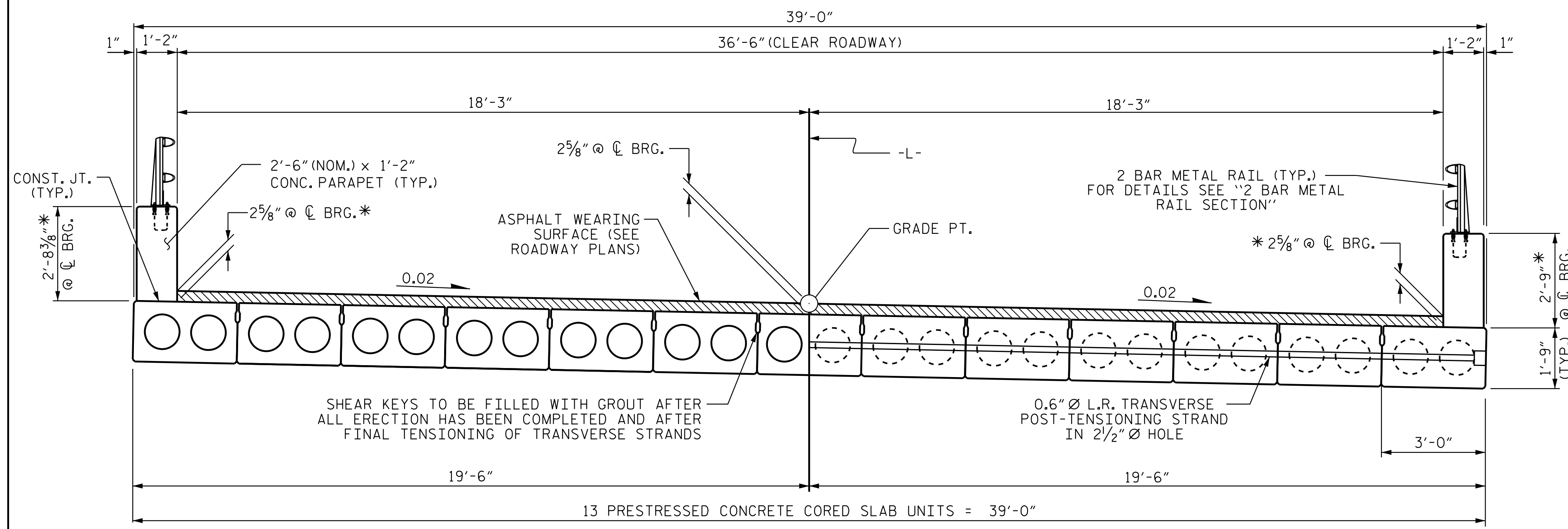
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DESIGN ENGINEER OF RECORD: V. E. FRAGA DATE: 07/24/19  
ASSEMBLED BY: V. E. FRAGA DATE: 02/20/19  
CHECKED BY: T. R. DUDECK DATE: 04/05/19  
DRAWN BY: TMG //II  
CHECKED BY: AAC //II



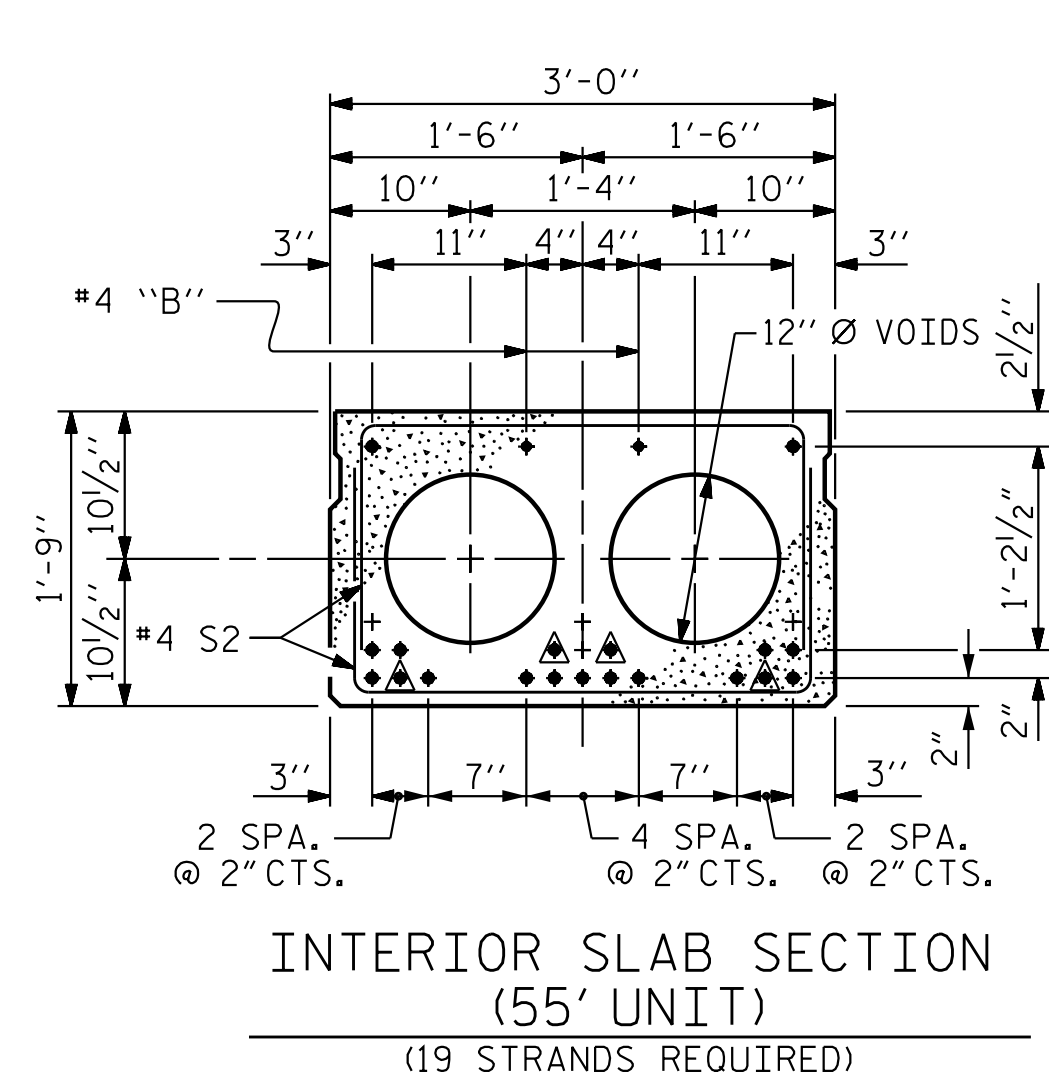


HALF SECTION THROUGH VOIDS

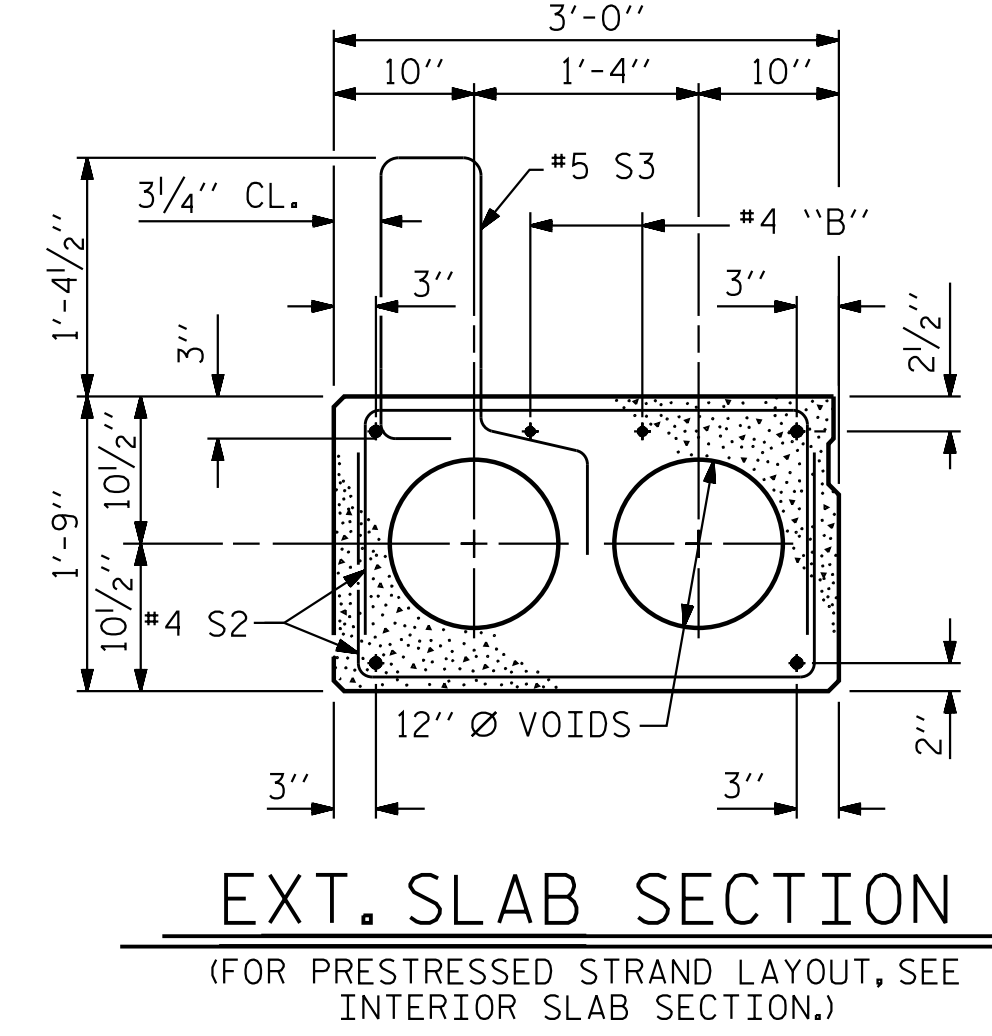
HALF SECTION AT INTERMEDIATE DIAPHRAGMS

TYPICAL SECTION

\* - THE MAXIMUM BARRIER RAIL HEIGHT AND ASPHALT THICKNESS IS SHOWN. THE HEIGHT OF THE PARAPET AND ASPHALT THICKNESS VARIES WHILE THE TOP OF THE PARAPET FOLLOWS THE PROFILE OF THE GUTTERLINE. FOR RAIL HEIGHT DETAILS AND ASPHALT THICKNESS SEE THE "2 BAR METAL RAIL SECTION" DETAIL.



0.6" Ø LOW RELAXATION STRAND LAYOUT



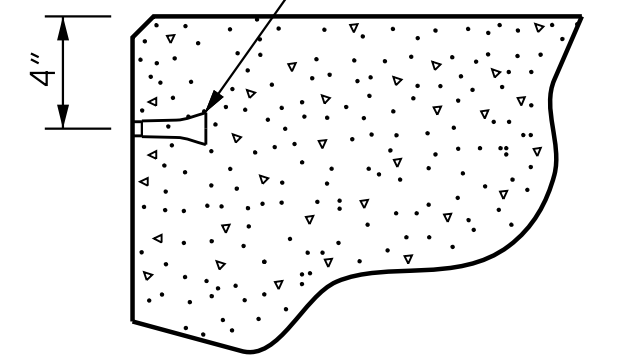
EXT. SLAB SECTION

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

▲ BOND SHALL BE BROKEN ON THESE STRANDS FOR A DISTANCE OF 6'-0" FROM END OF CORED SLAB UNIT. SEE STANDARD SPECIFICATIONS, ARTICLE 1078-7.

DEBONDING LEGEND

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



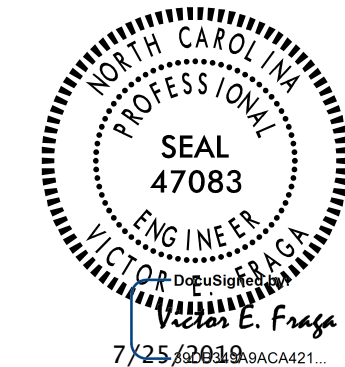
THREADED INSERT DETAIL

PROJECT NO. B-4571  
LINCOLN COUNTY  
STATION: 17+40.00 -L-

SHEET 1 OF 10

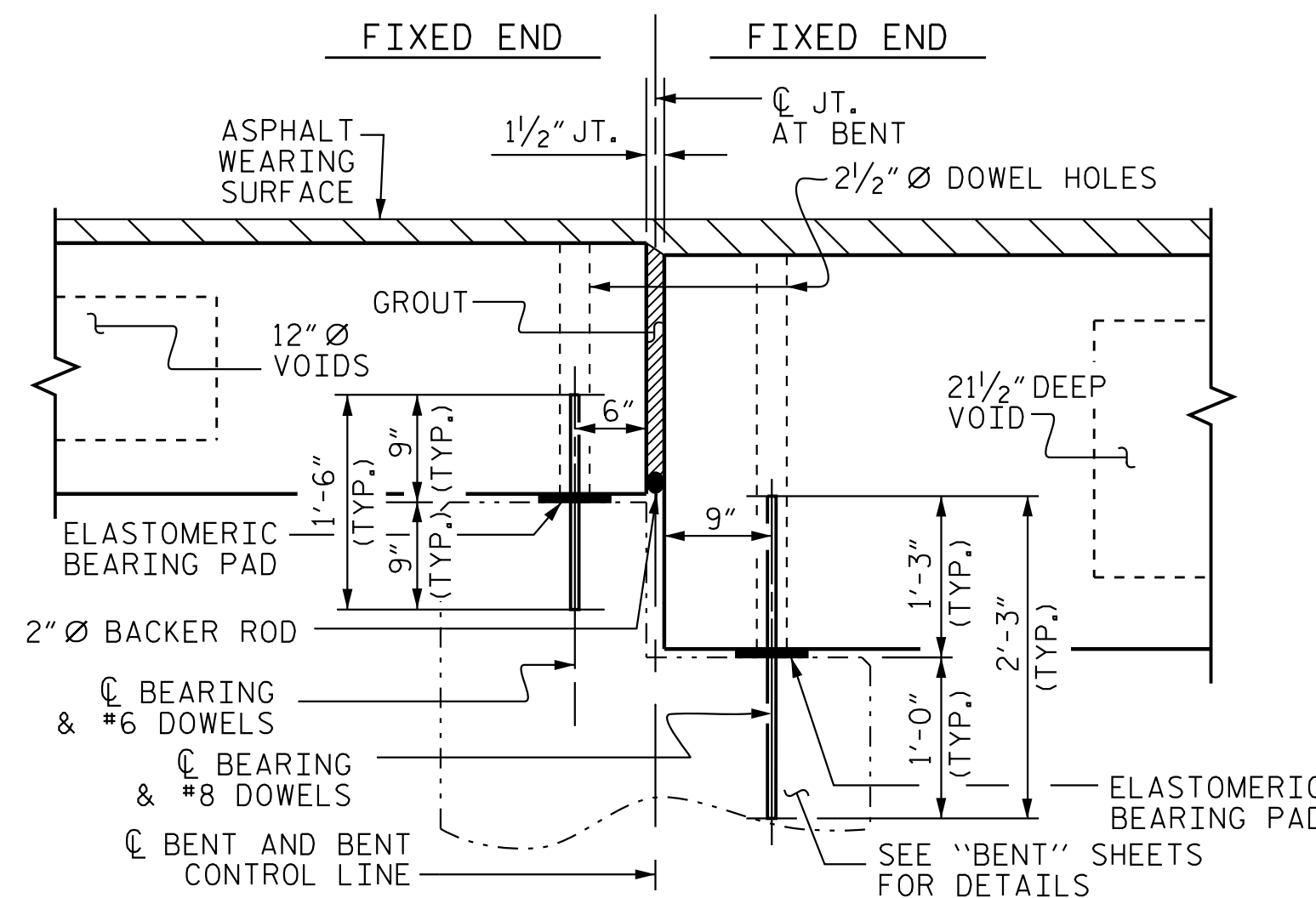
STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

3'-0" X 1'-9"  
PRESTRESSED CONCRETE  
CORED SLAB UNIT  
60° SKEW



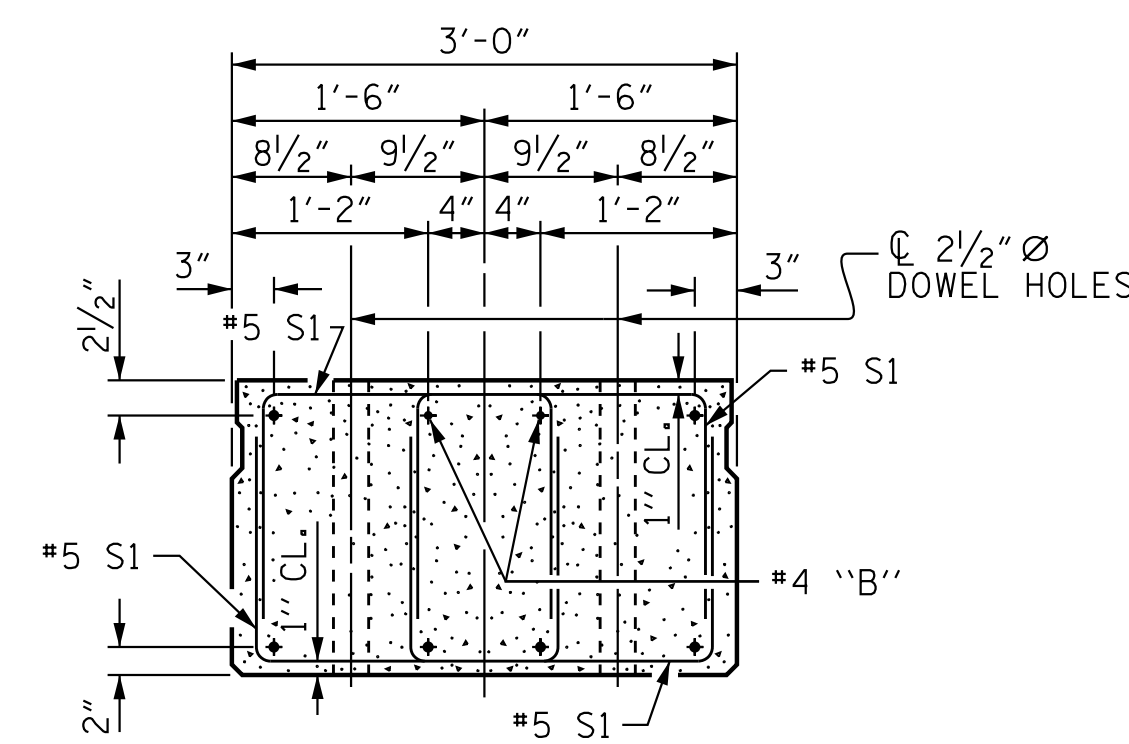
REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	S-06	
1			3			TOTAL SHEETS	29
2			4				

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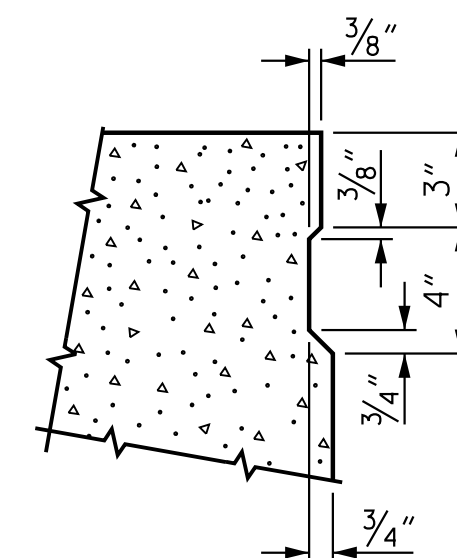
SECTION AT BENT No. 1

(BENT No. 2 SIM.)



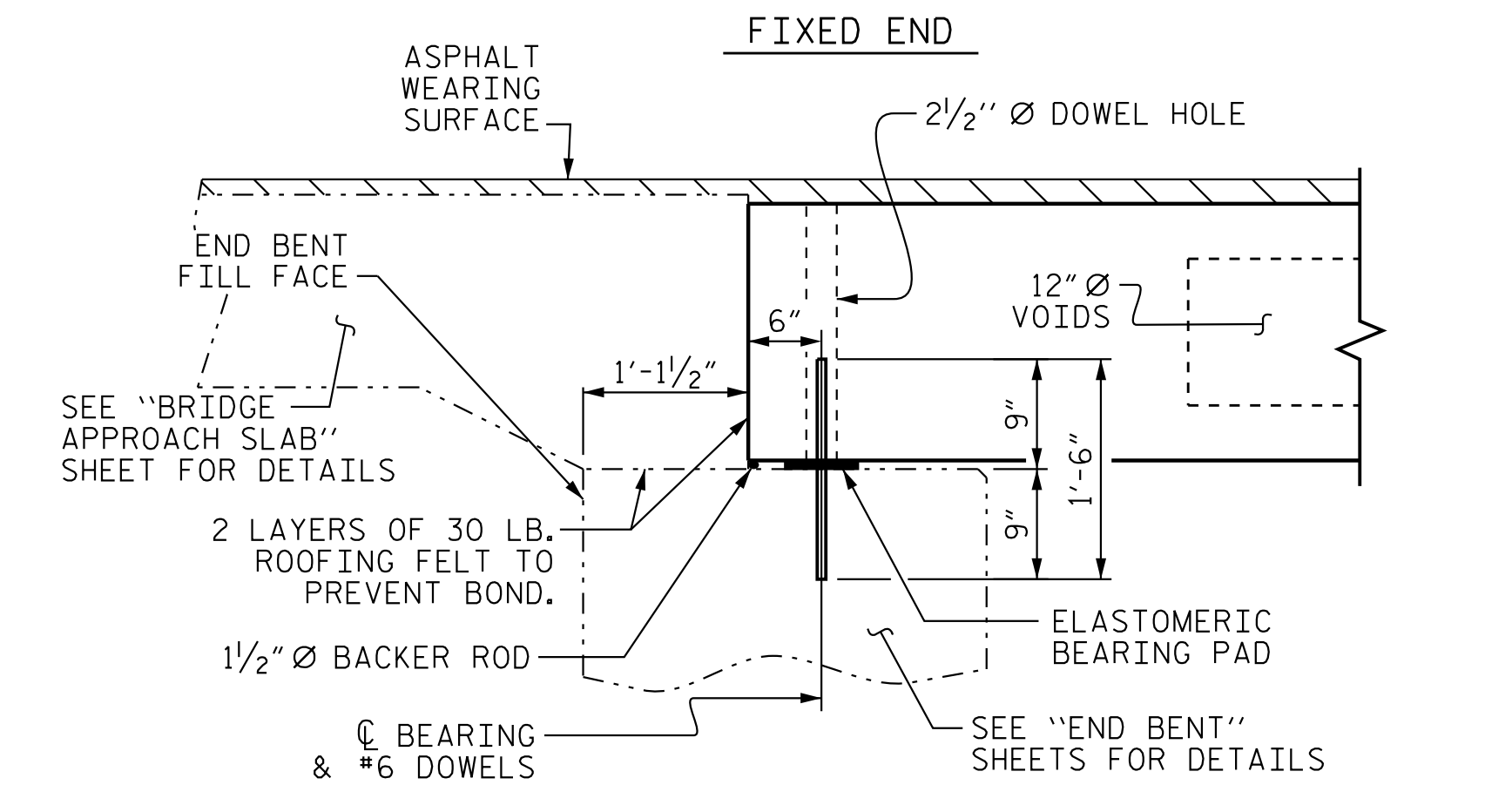
END ELEVATION

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.

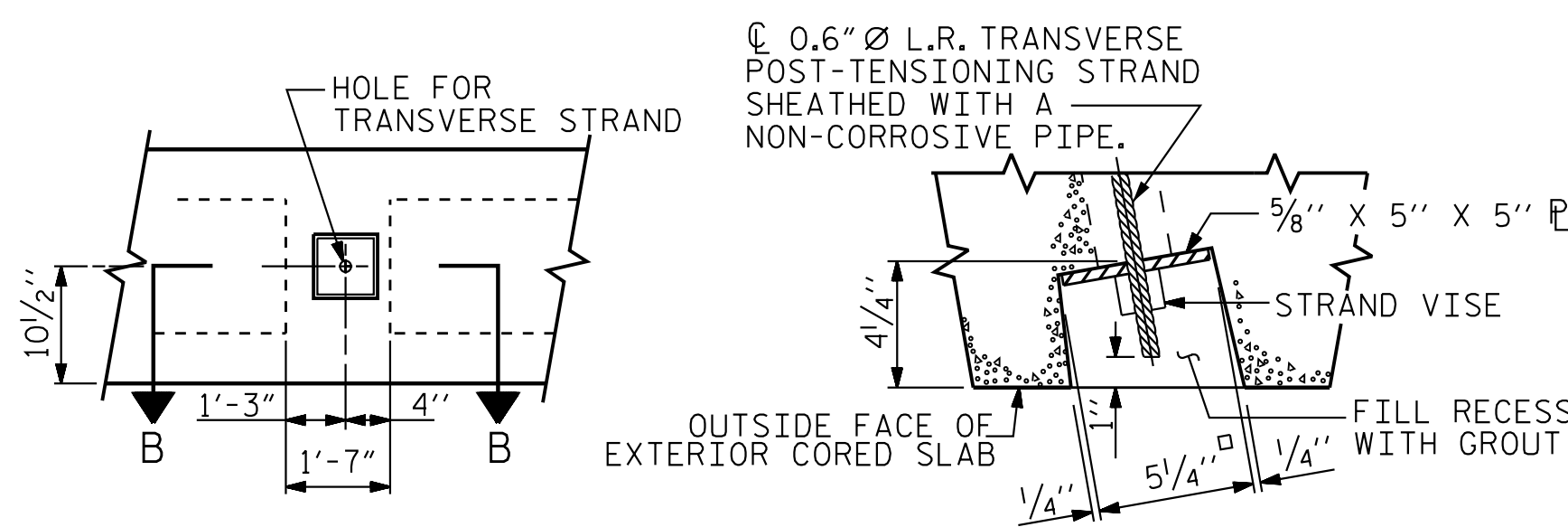


SHEAR KEY DETAIL

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



SECTION AT END BENT



ELEVATION VIEW

SECTION B-B

GRADED RECESS AT END OF POST-TENSIONED STRAND OF CORED SLABS

DESIGN ENGINEER OF RECORD: V. E. FRAGA	DATE: 07/24/19
ASSEMBLED BY: V. E. FRAGA	DATE: 02/25/19
CHECKED BY: T. R. DUDECK	DATE: 04/05/19
DRAWN BY: DGE 5/09	REV. 9/14
CHECKED BY: BCH 6/09	MAA/TMG



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**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 6000 PSI.

ALL REINFORCING STEEL IN VERTICAL CONCRETE PARAPET 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 PARAPET AND IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. A VERTICAL 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.

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

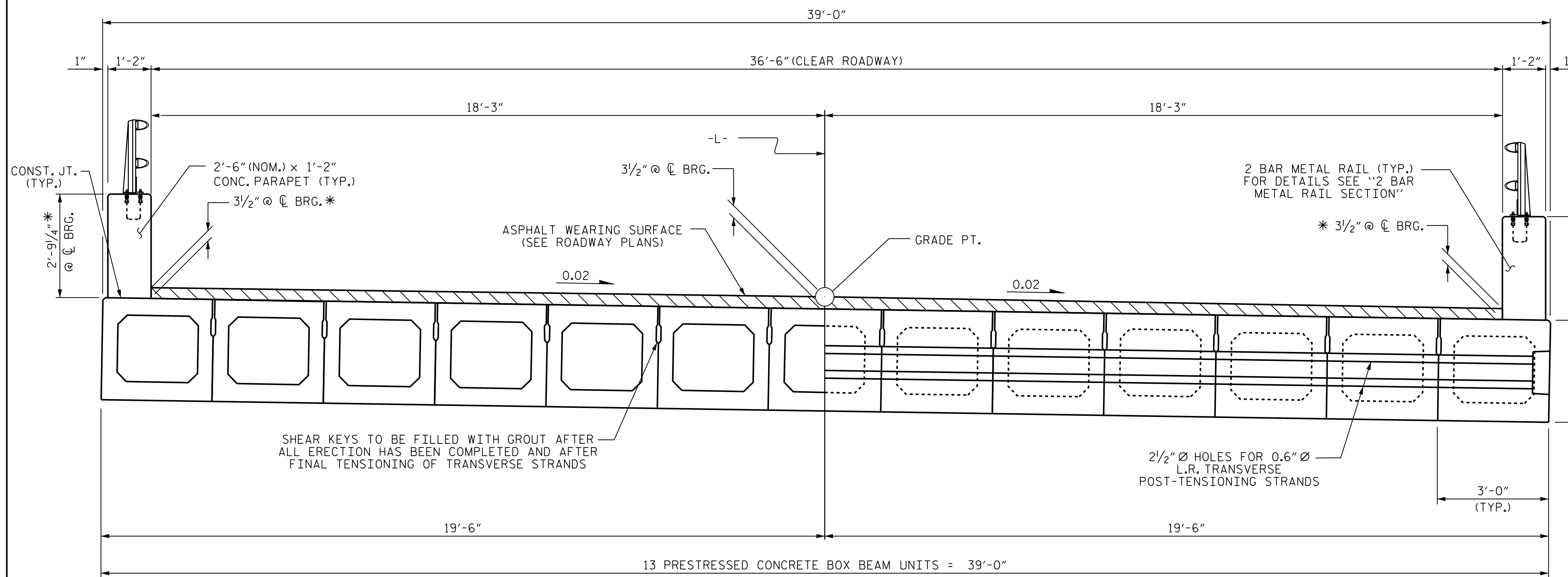
FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

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 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.



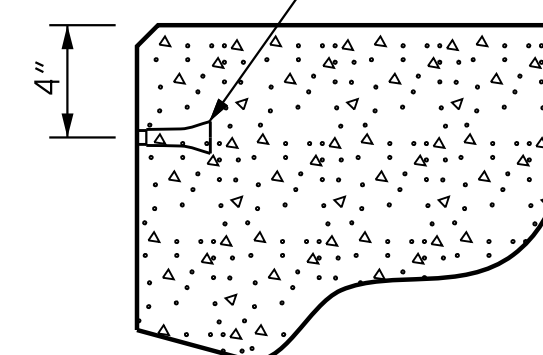
HALF SECTION  
THROUGH VOIDS

HALF SECTION  
AT INTERMEDIATE DIAPHRAGMS

**TYPICAL SECTION**

\* THE MAXIMUM BARRIER RAIL HEIGHT AND ASPHALT THICKNESS IS SHOWN. THE HEIGHT OF THE PARAPET AND ASPHALT THICKNESS VARIES WHILE THE TOP OF THE PARAPET FOLLOWS THE PROFILE OF THE GUTTERLINE. FOR RAIL HEIGHT DETAILS AND ASPHALT THICKNESS, SEE THE "2 BAR METAL 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**

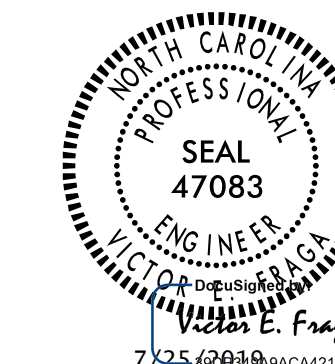
PROJECT NO. B-4571  
LINCOLN COUNTY  
STATION: 17+40.00 -L-

SHEET 2 OF 10

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

STANDARD

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



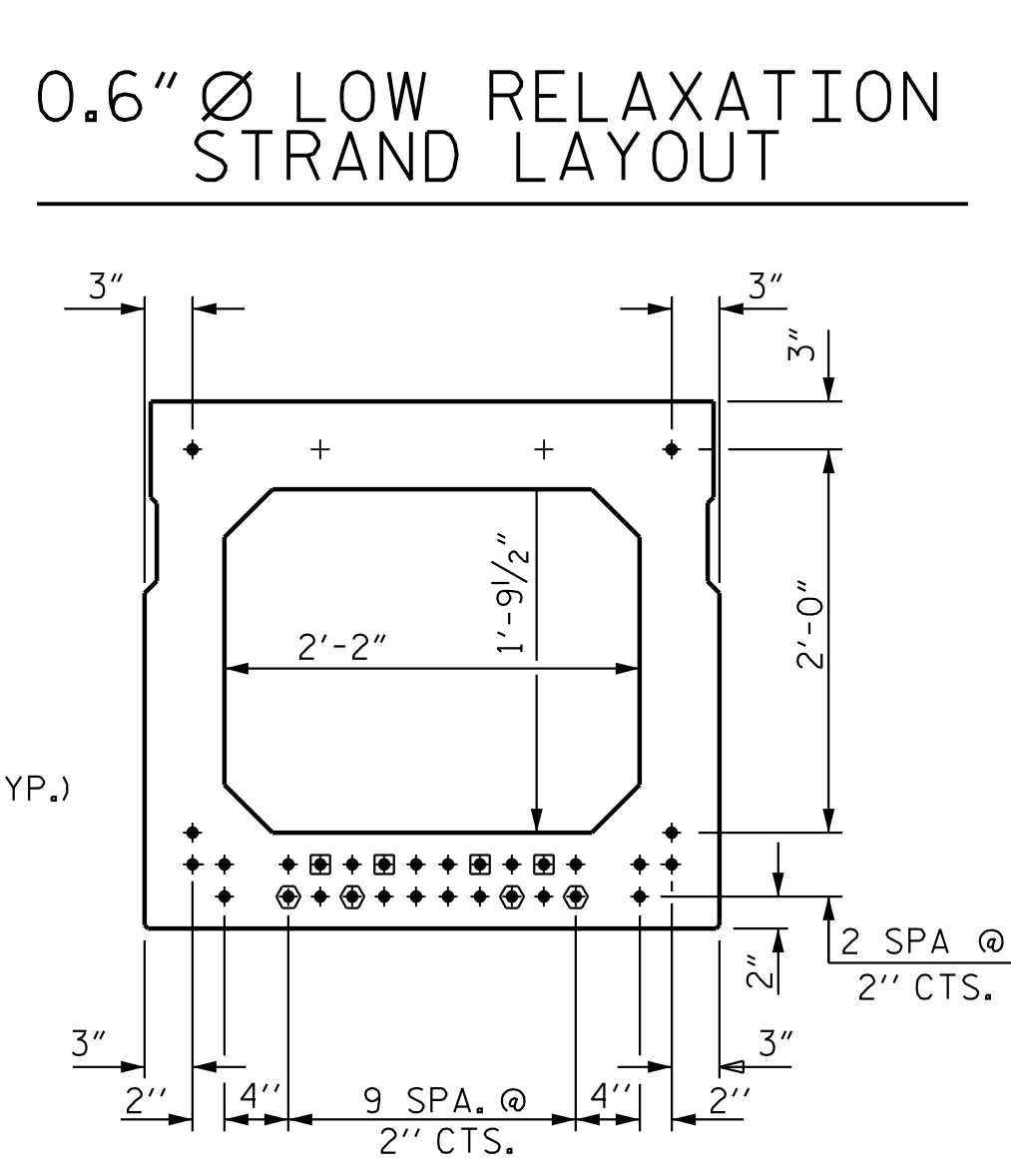
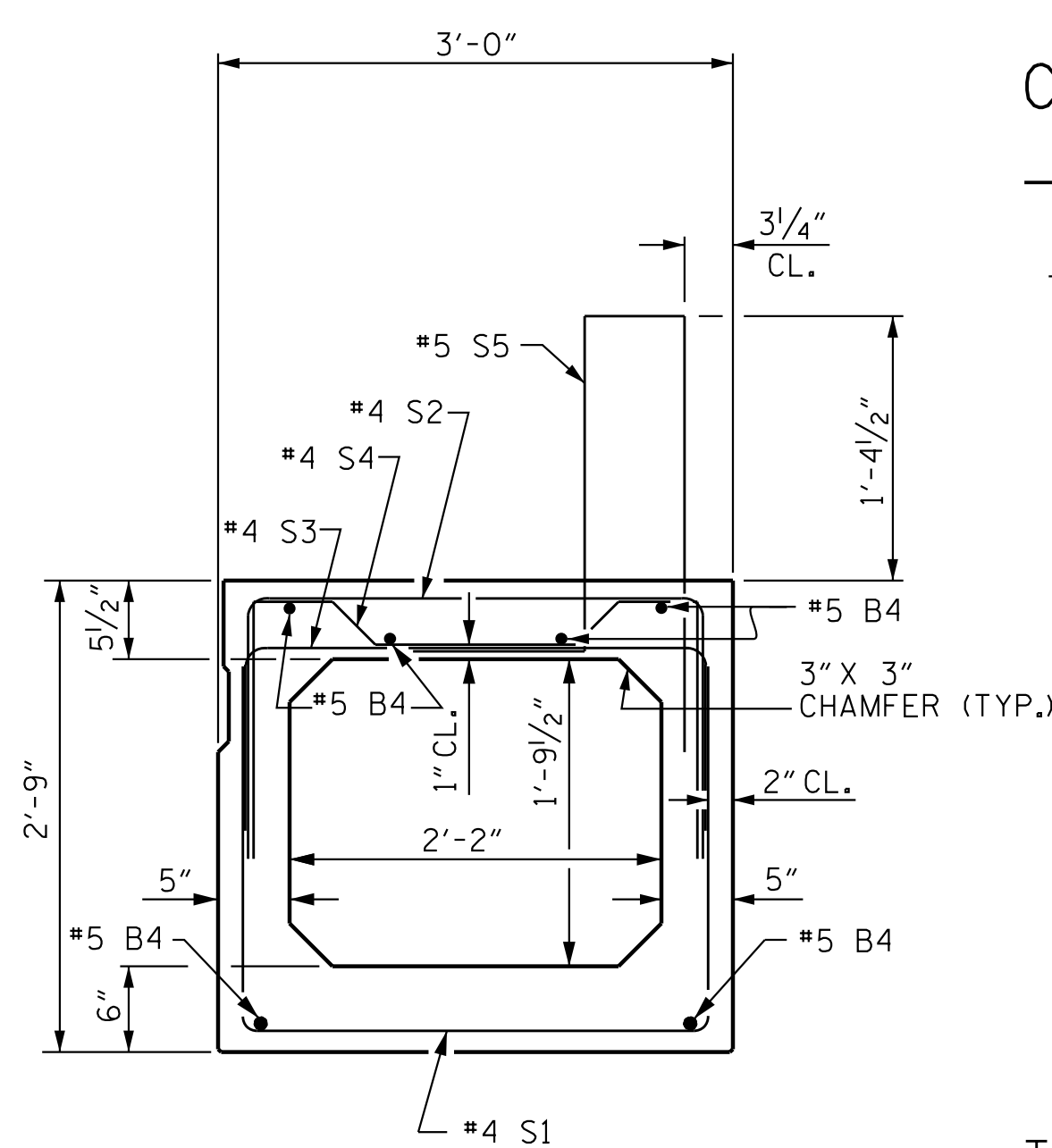
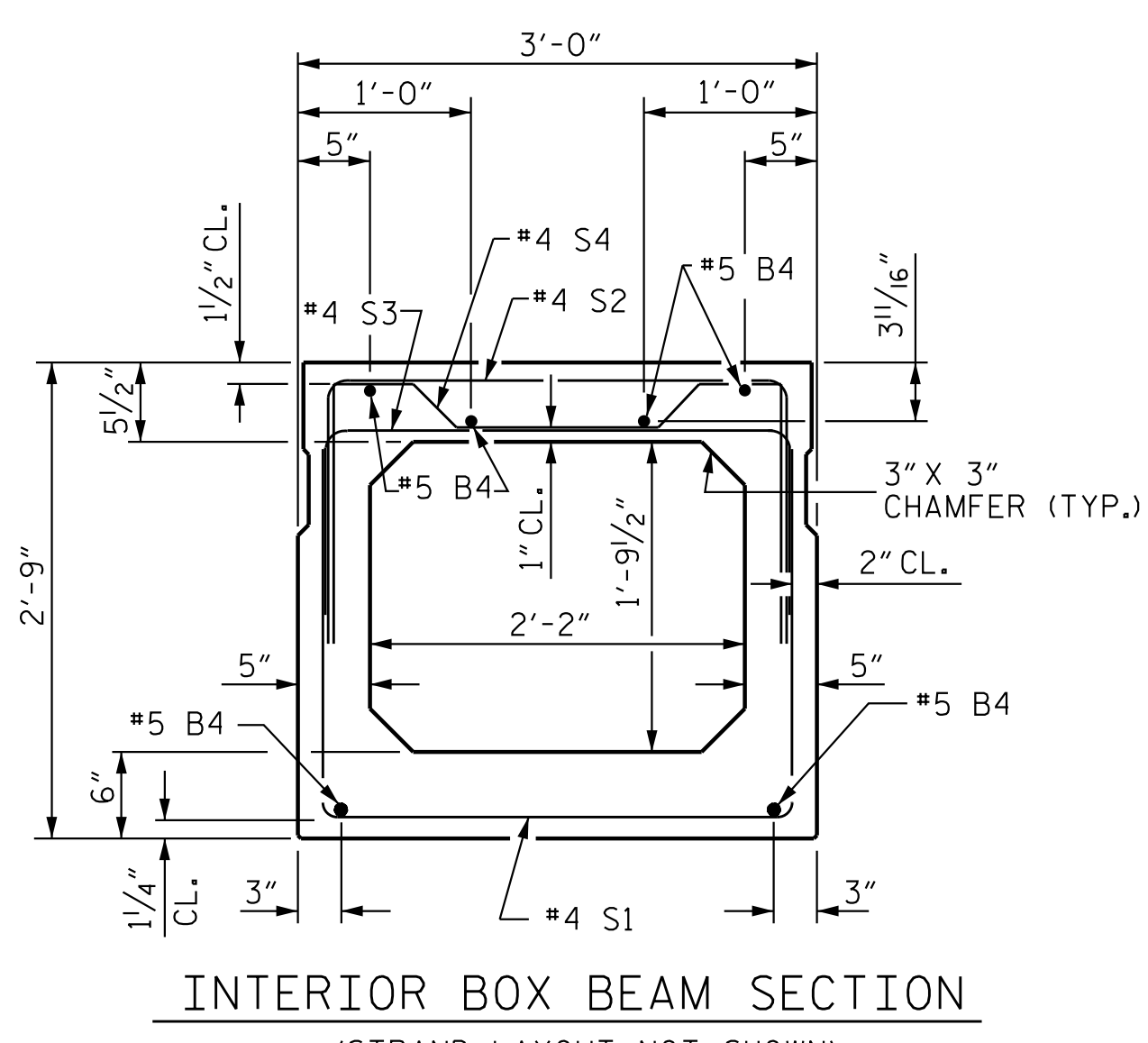
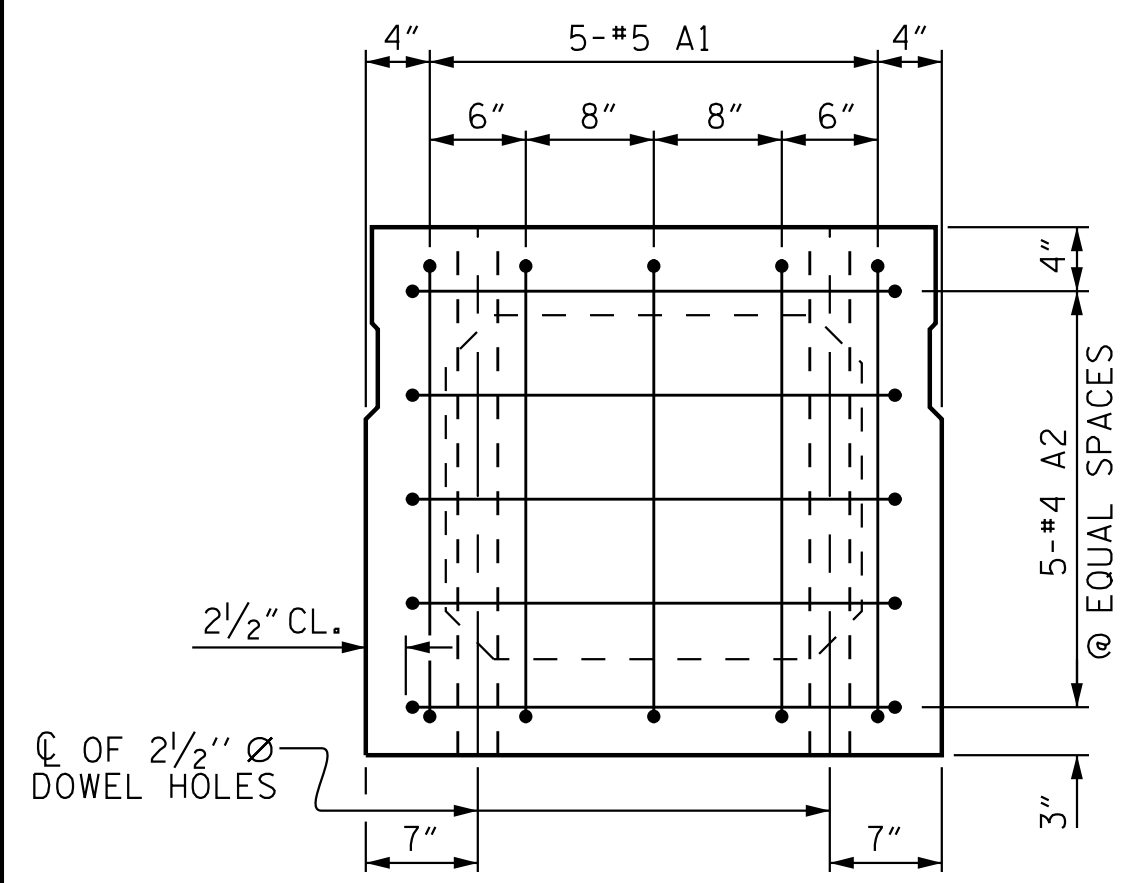
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-07
1			3			TOTAL SHEETS
2			4			29

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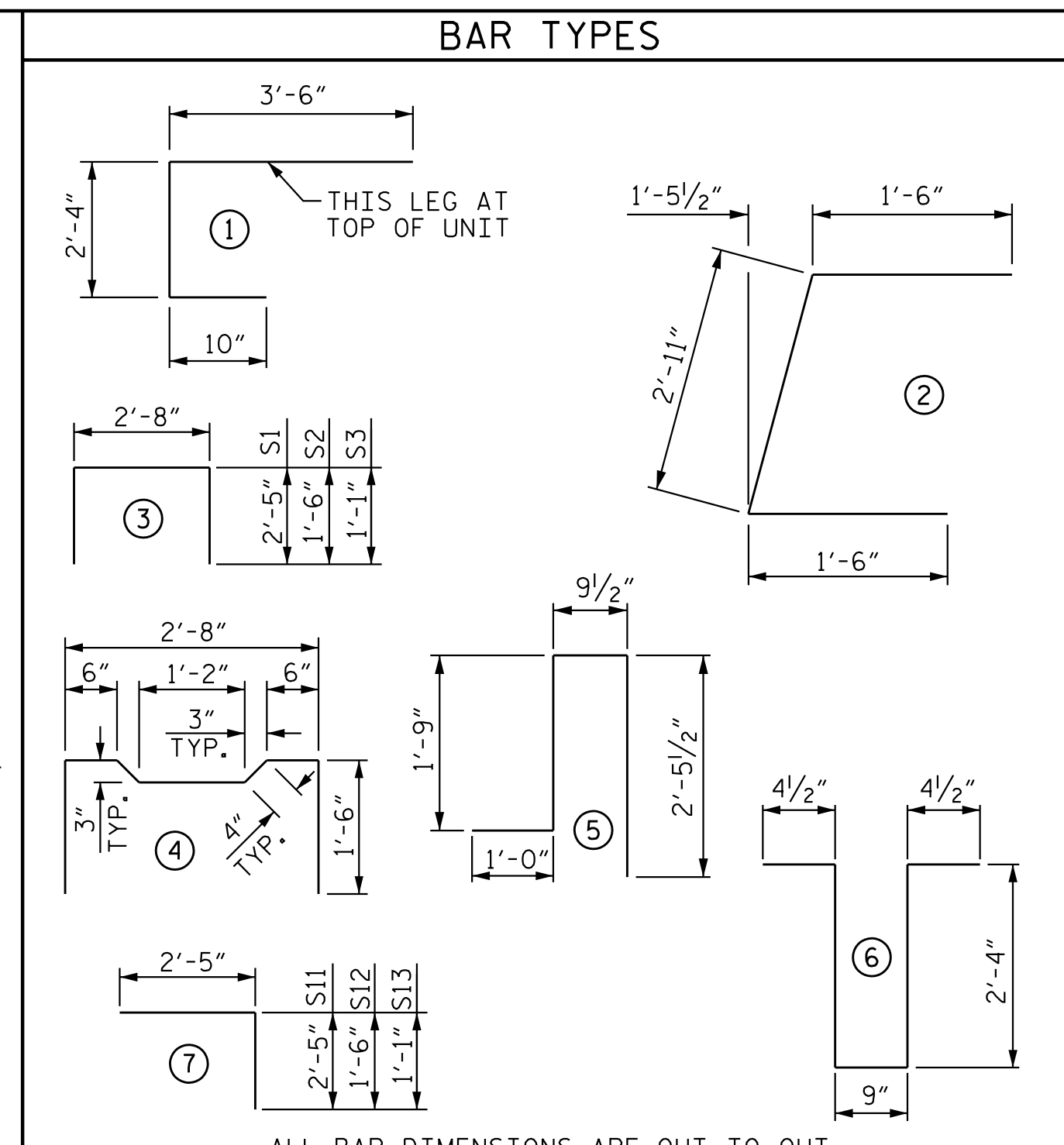
DESIGN ENGINEER OF RECORD: <u>V. E. FRAGA</u>	DATE: <u>07/24/19</u>
ASSEMBLED BY: <u>V. E. FRAGA</u>	DATE: <u>02/25/19</u>
CHECKED BY: <u>T. R. DUDECK</u>	DATE: <u>04/05/19</u>
DRAWN BY: <u>DGE 8/11</u>	REV. <u>8/14</u> MAA/TMG
CHECKED BY: <u>TMG 11/11</u>	

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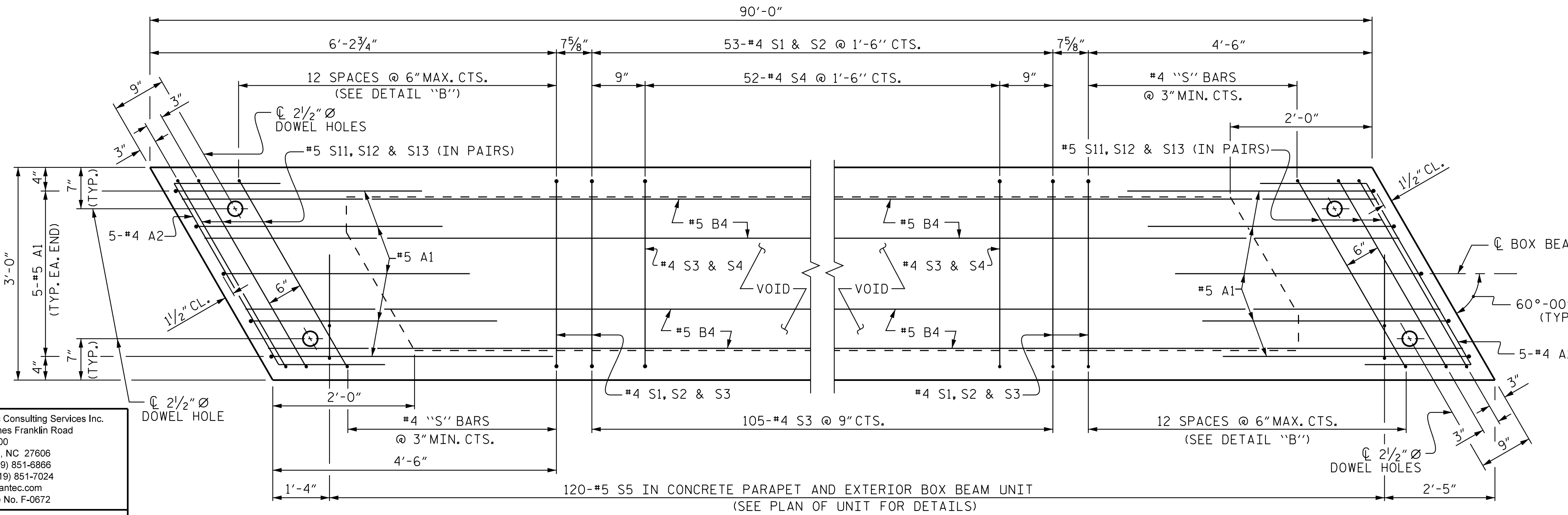
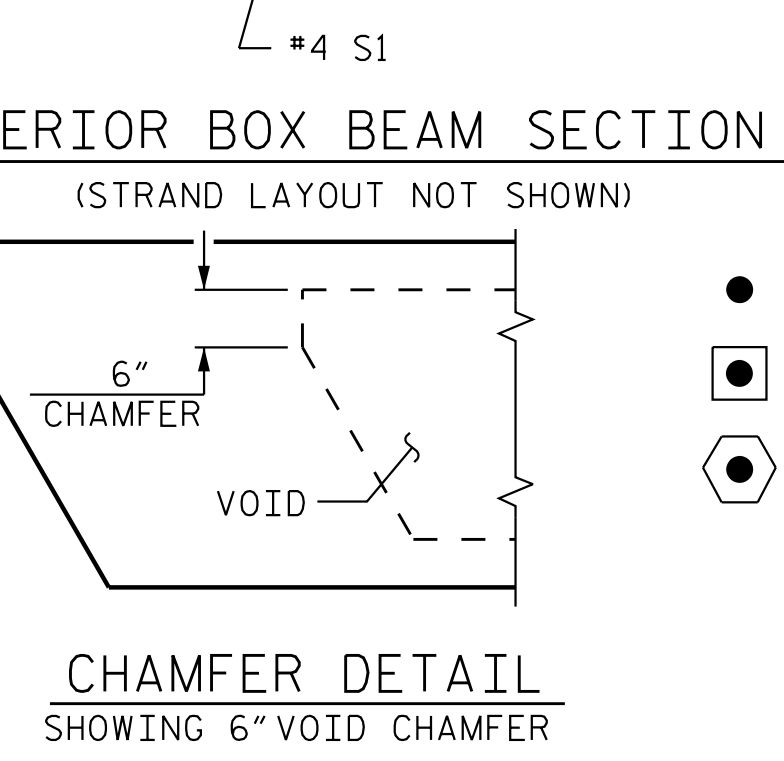
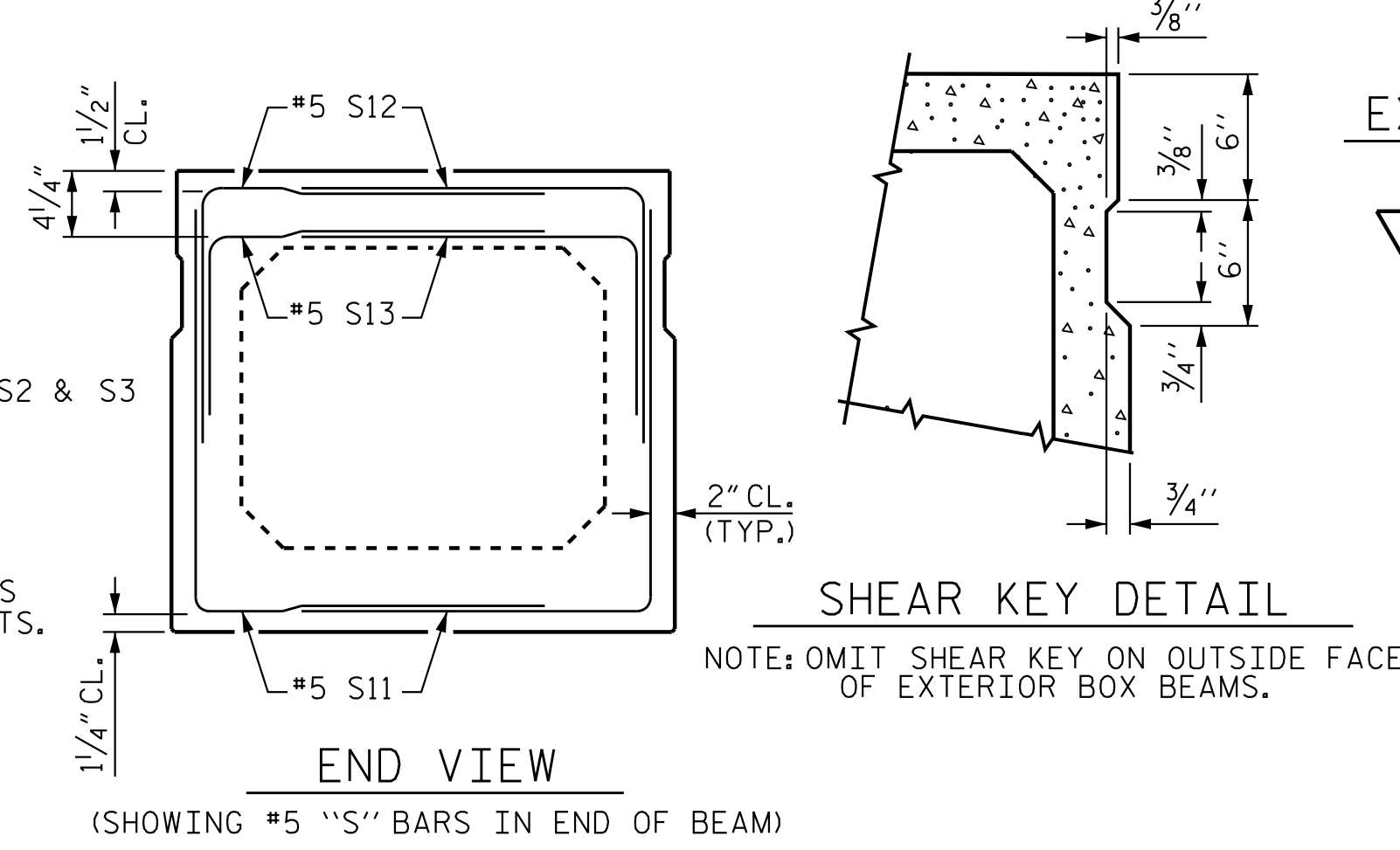
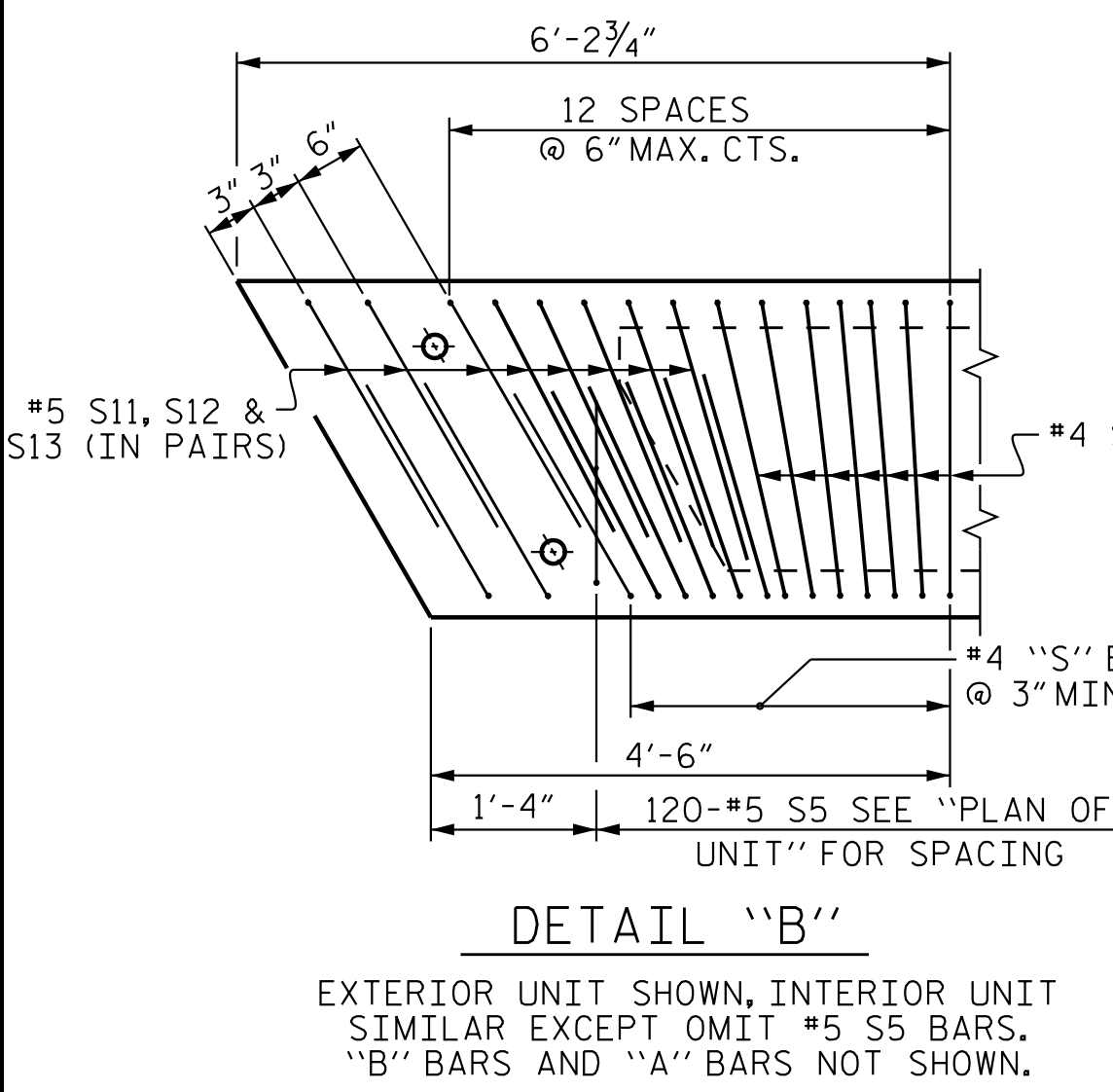
BOND SHALL BE BROKEN ON STRANDS AS SHOWN FOR THE SPECIFIED LENGTH FROM EACH END OF THE BOX BEAM. SEE STANDARD SPECIFICATIONS ARTICLE 1078-7.

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



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

BAR	NUMBER	SIZE	TYPE	EXTERIOR UNIT		INTERIOR UNIT	
				LENGTH	WEIGHT	LENGTH	WEIGHT
A1	10	#5	1	6'-8"	70	6'-8"	70
A2	40	#4	2	5'-11"	158	5'-11"	158
B4	12	#5	STR	45'-11"	575	45'-11"	575
K1	15	#4	6	6'-2"	62	6'-2"	62
K2	10	#4	STR	2'-10"	19	2'-10"	19
S1	67	#4	3	7'-6"	336	7'-6"	336
S2	67	#4	3	5'-8"	254	5'-8"	254
S3	119	#4	3	4'-10"	384	4'-10"	384
S4	52	#4	4	5'-10"	203	5'-10"	203
S11	32	#5	7	4'-10"	161	4'-10"	161
S12	32	#5	7	3'-11"	131	3'-11"	131
S13	32	#5	7	3'-6"	116	3'-6"	116
* S5	120	#5	5	6'-0"	750	--	--
REINFORCING STEEL					2469 LBS.		2469 LBS.
* EPOXY COATED REINF. STEEL					750 LBS.		
8000 P.S.I. CONCRETE					16.1 CU. YDS.		16.0 CU. YDS.
0.6" Ø L.R. STRANDS					No. 30		No. 30



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CHECKED BY: TMG II/II



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LINCOLN COUNTY  
STATION: 17+40.00 -L-  
SHEET 3 OF 10

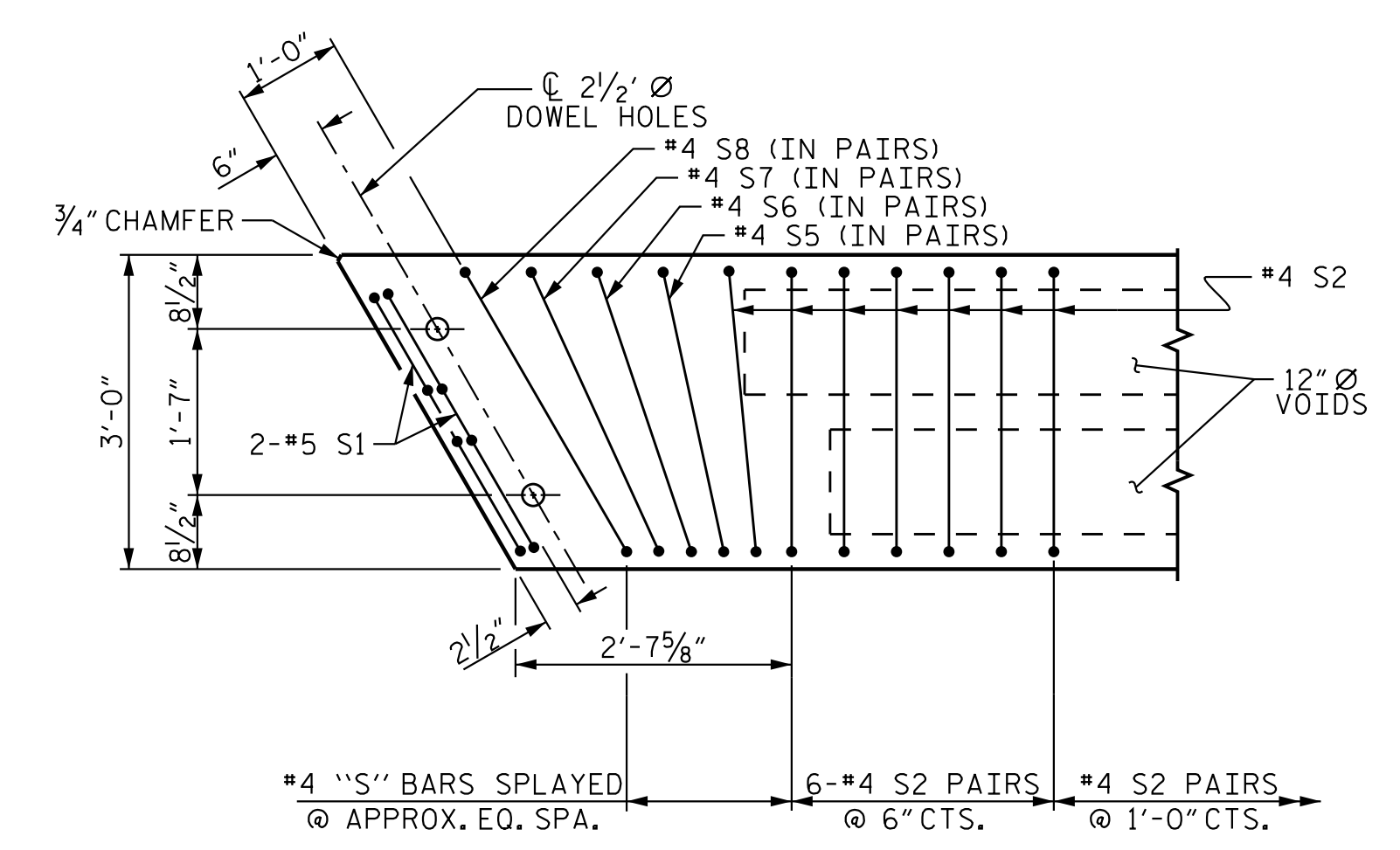
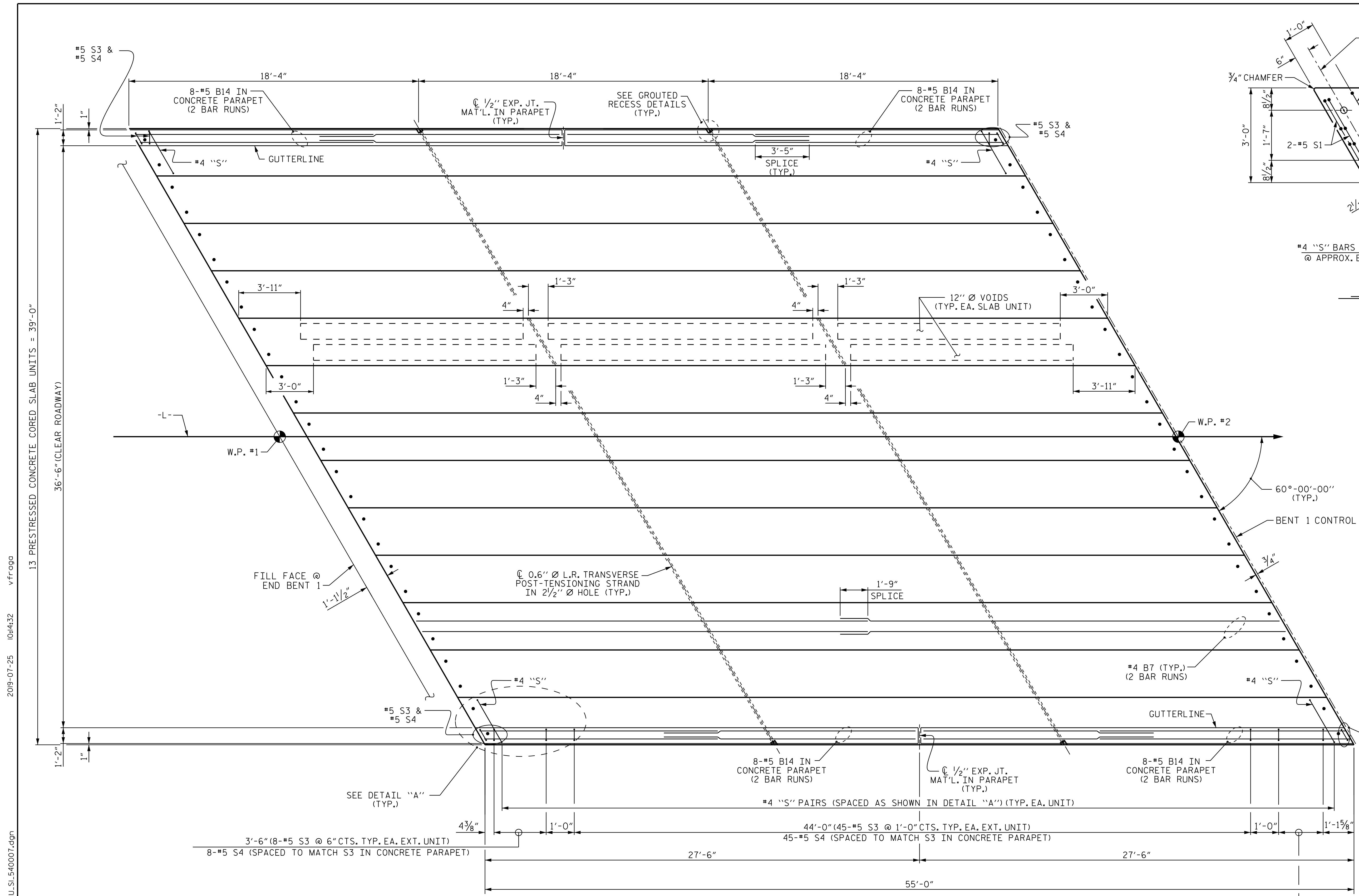
STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
STANDARD  
3'-0" X 2'-9"  
PRESTRESSED CONCRETE  
BOX BEAM UNIT

REVISIONS						SHEET NO. S-08
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2			4			

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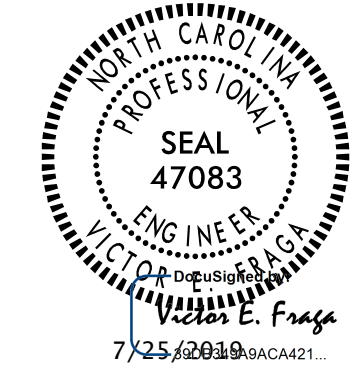


DETAIL "A"  
(SIMILAR EACH END OF UNIT)

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**PLAN OF SPAN A**  
 NOTE: S3 & S4 BAR LAYOUT SHOWN ON RIGHT EXTERIOR SLAB. LEFT EXTERIOR SLAB SIMILAR BY ROTATION.

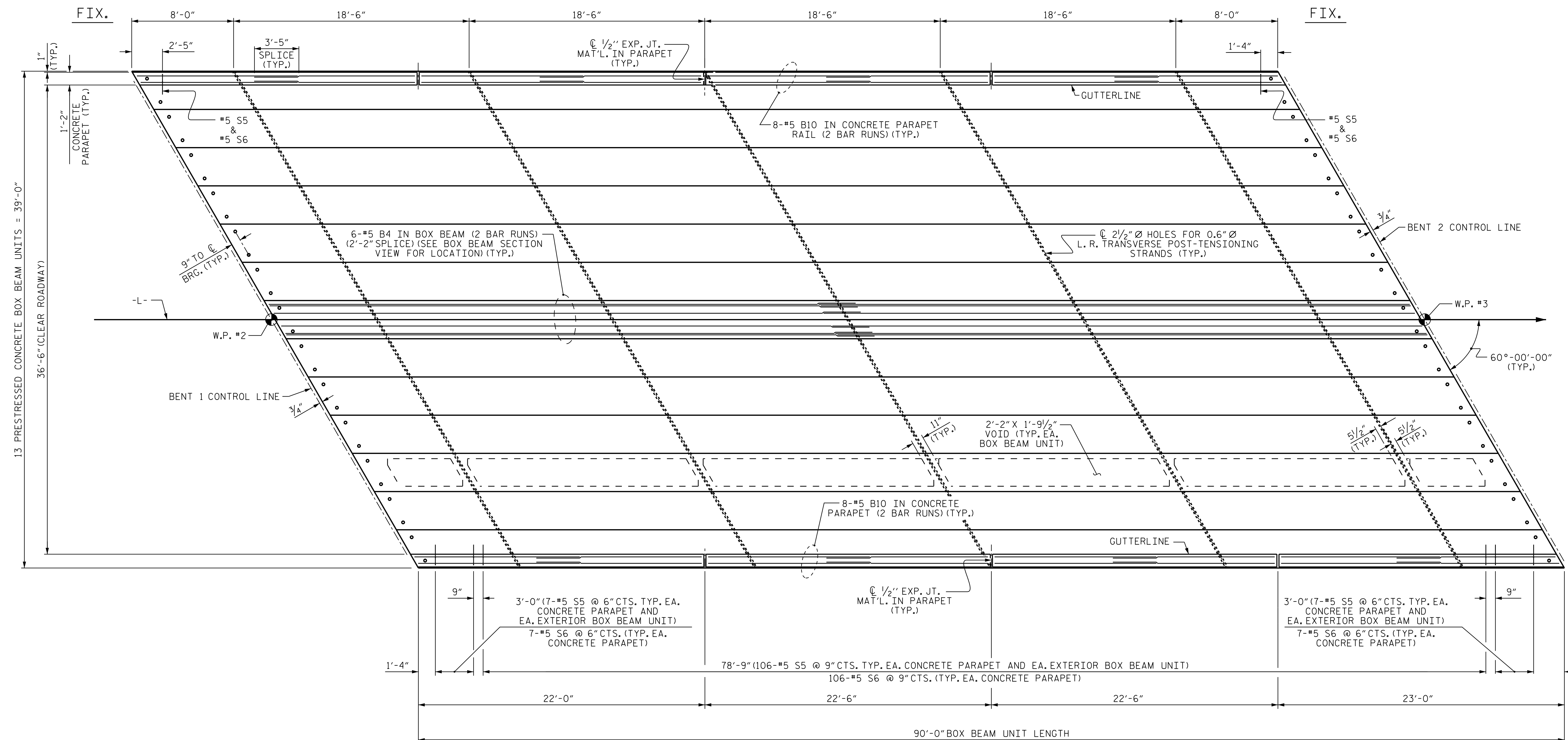


PROJECT NO. B-4571  
LINCOLN COUNTY  
 STATION: 17+40.00 -L-  
 SHEET 4 OF 10

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
PLAN OF 55' UNIT 36'-6" CLEAR ROADWAY 60° SKEW					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
SHEET NO. S-09					TOTAL SHEETS 29

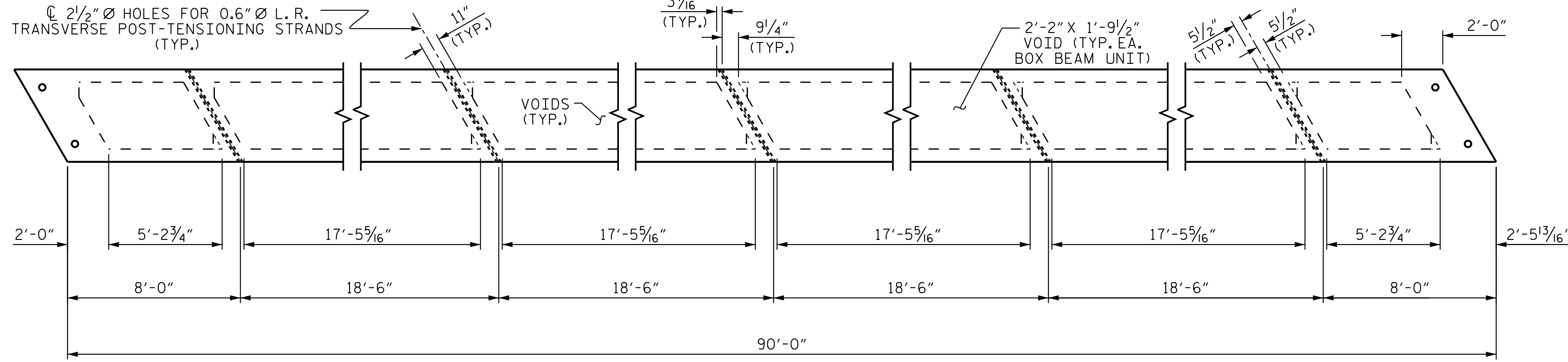
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PLAN OF UNIT

NOTE: S5 & S6 BAR LAYOUT AND BARRIER EXPANSION JOINT SPACING SHOWN ON RIGHT EXTERIOR BEAM. LEFT EXTERIOR BEAM SIMILAR BY ROTATION.



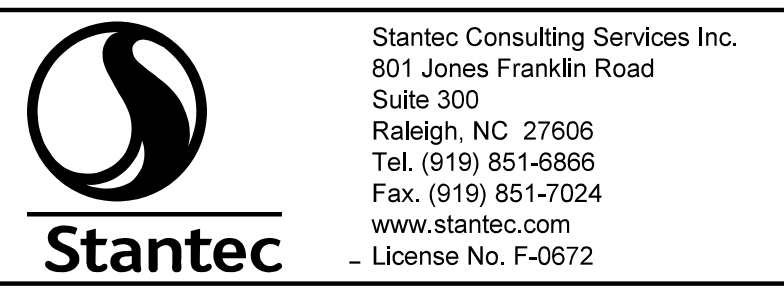
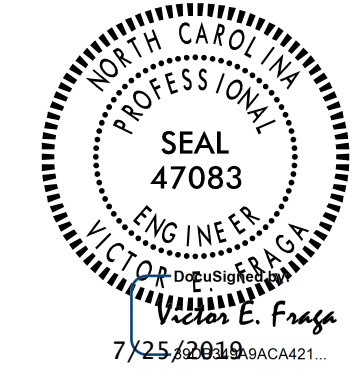
DIAPHRAGM AND VOID LAYOUT

PROJECT NO. B-4571  
LINCOLN COUNTY  
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SHEET 5 OF 10

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

PLAN OF 90' UNIT  
 36'-6" CLEAR ROADWAY  
 60° SKEW



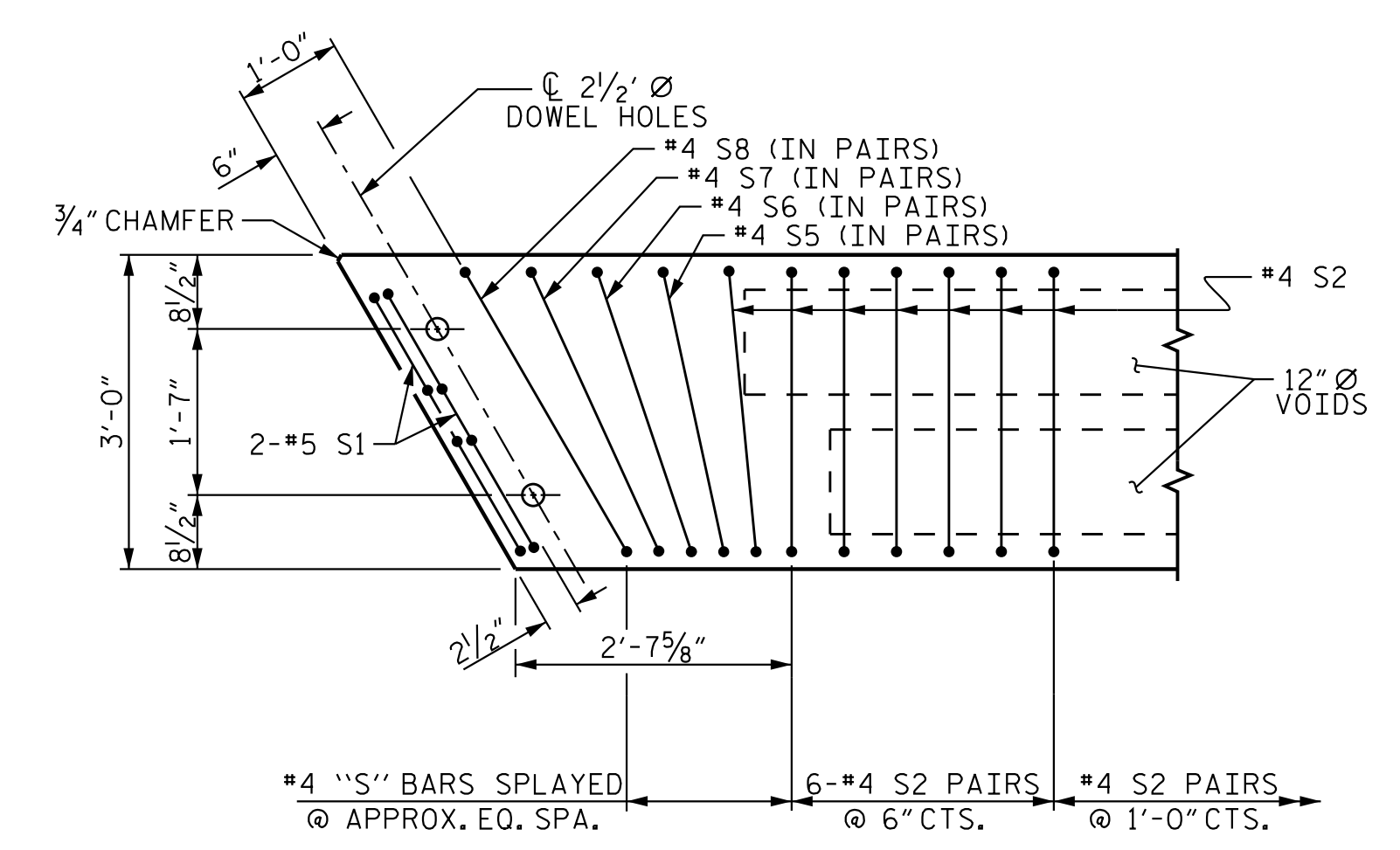
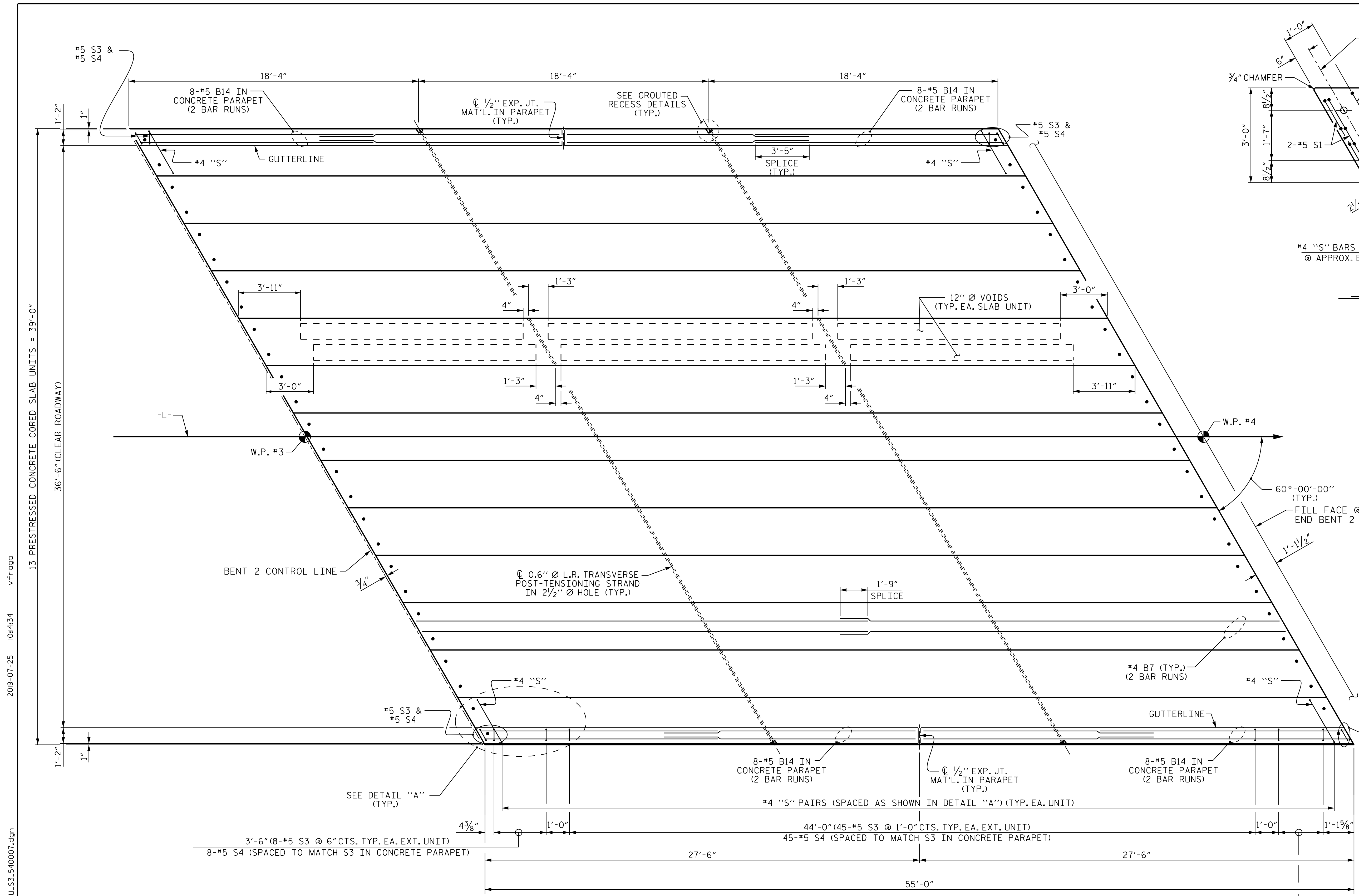
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DETAIL "A"  
(SIMILAR EACH END OF UNIT)

13 PRESTRESSED CONCRETE CORED SLAB UNITS = 39'-0"

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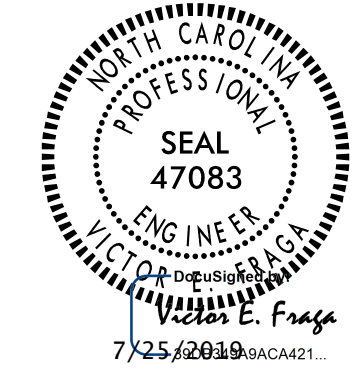
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LINCOLN COUNTY  
 STATION: 17+40.00 -L-

SHEET 6 OF 10

STATE OF NORTH CAROLINA  
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PLAN OF 55' UNIT  
 36'-10" CLEAR ROADWAY  
 60° SKEW



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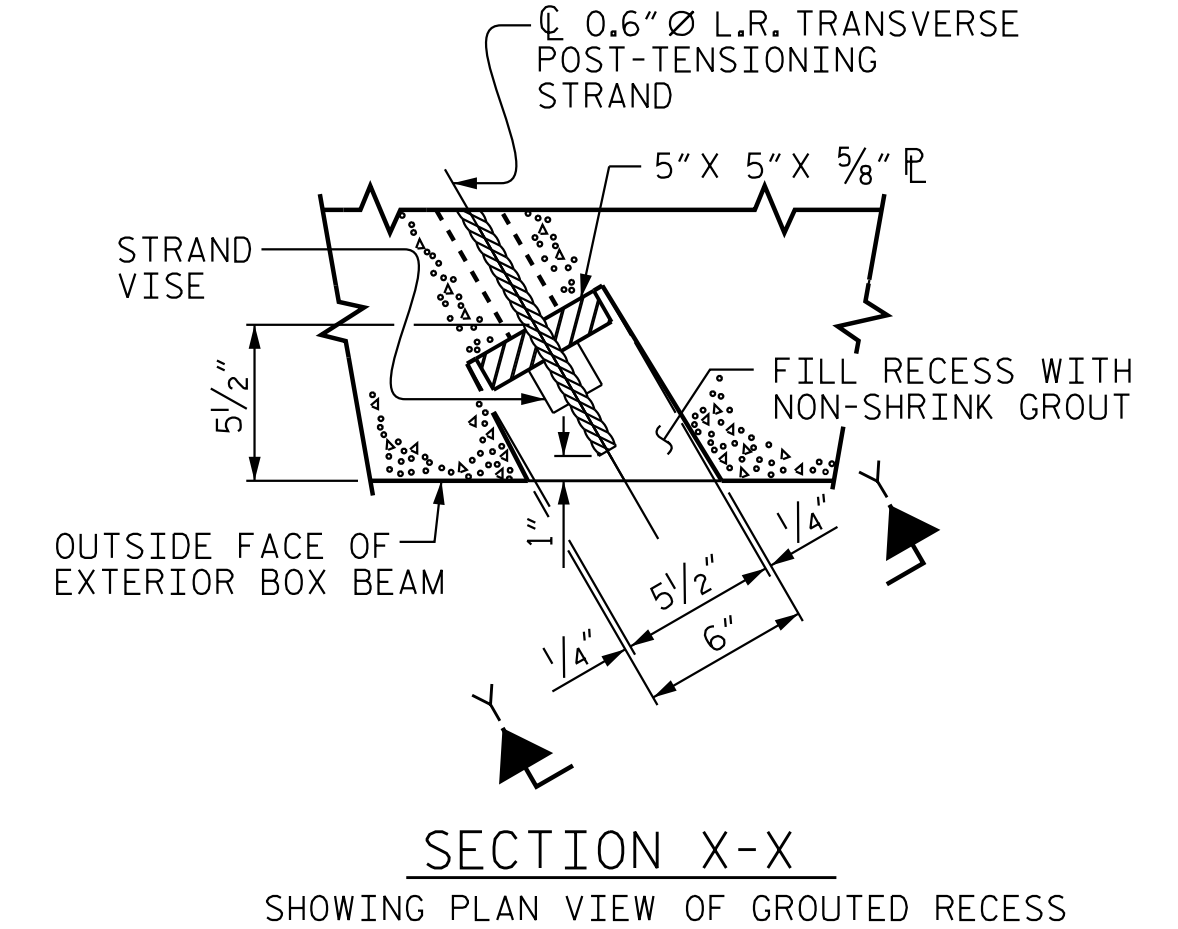
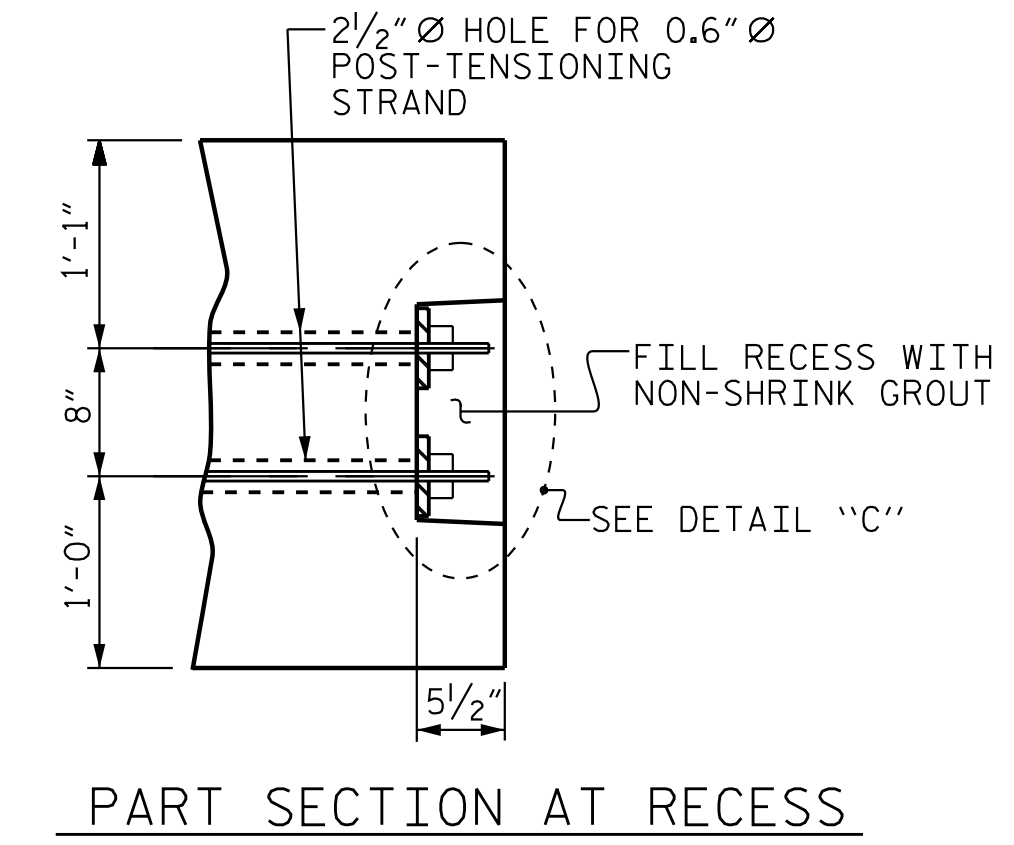
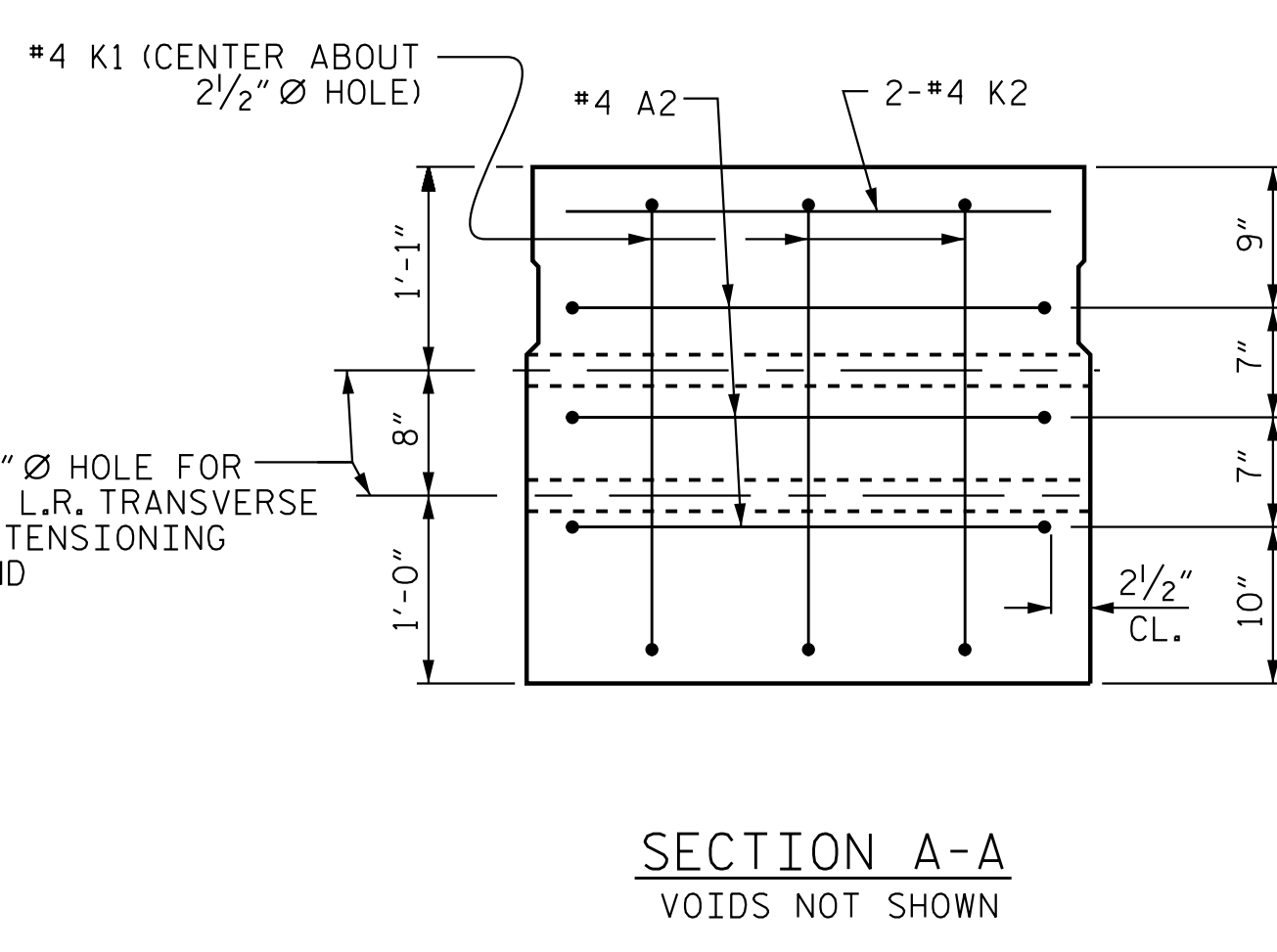
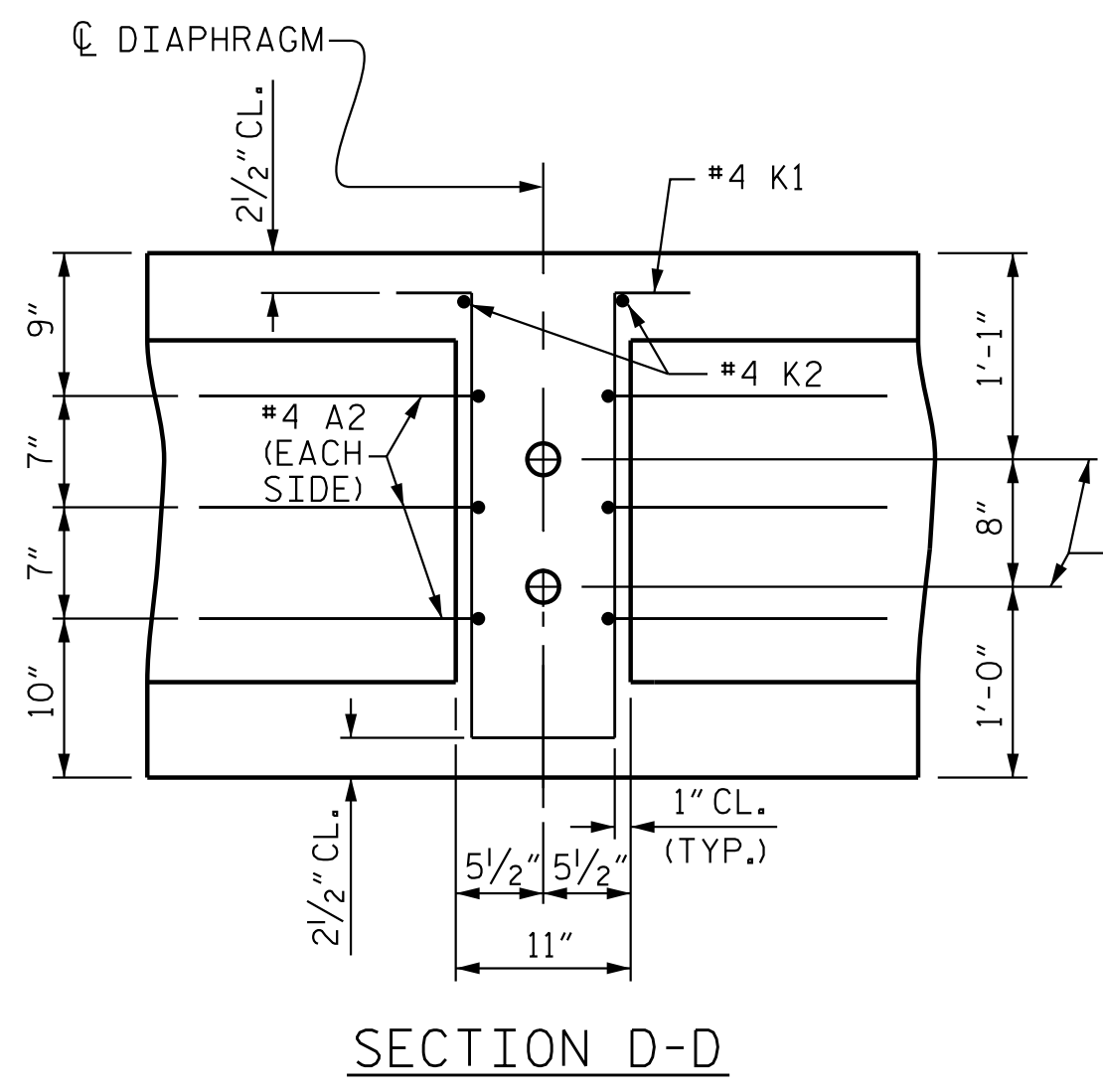
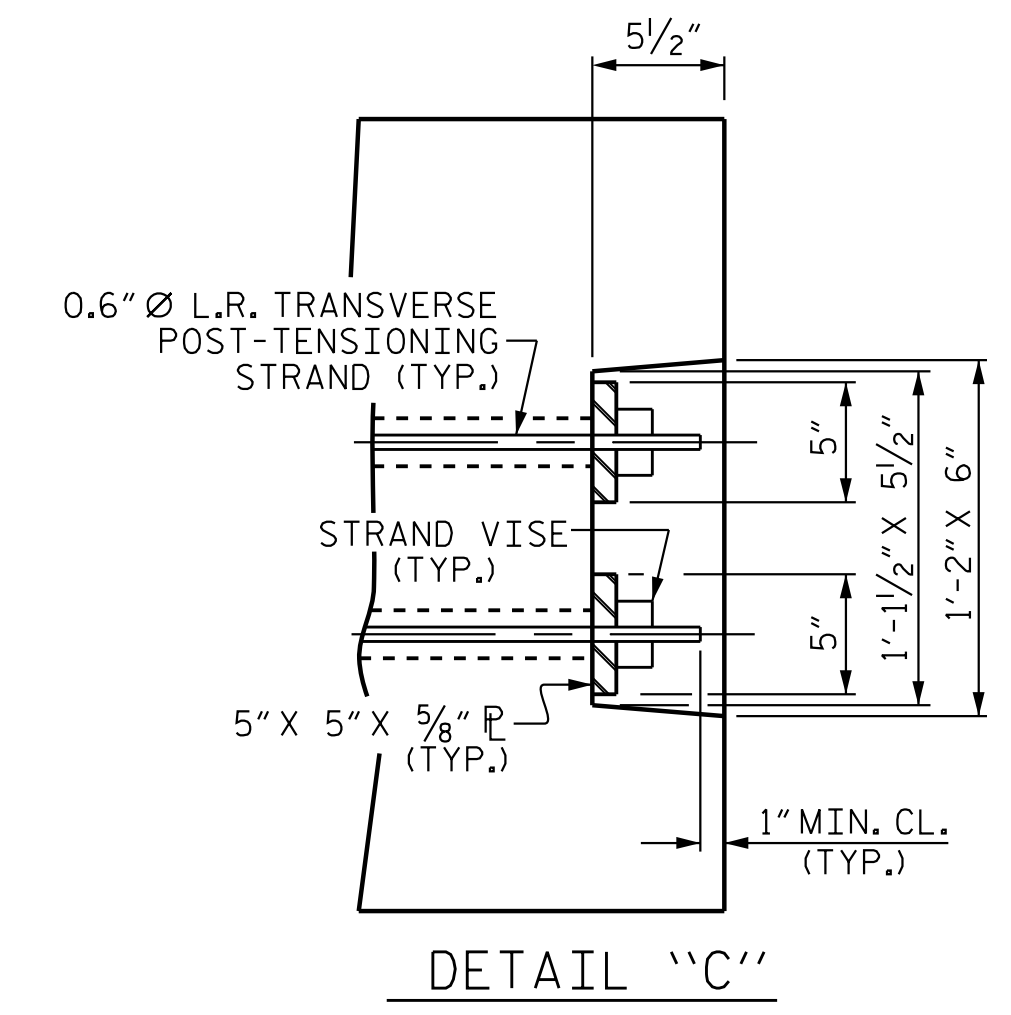
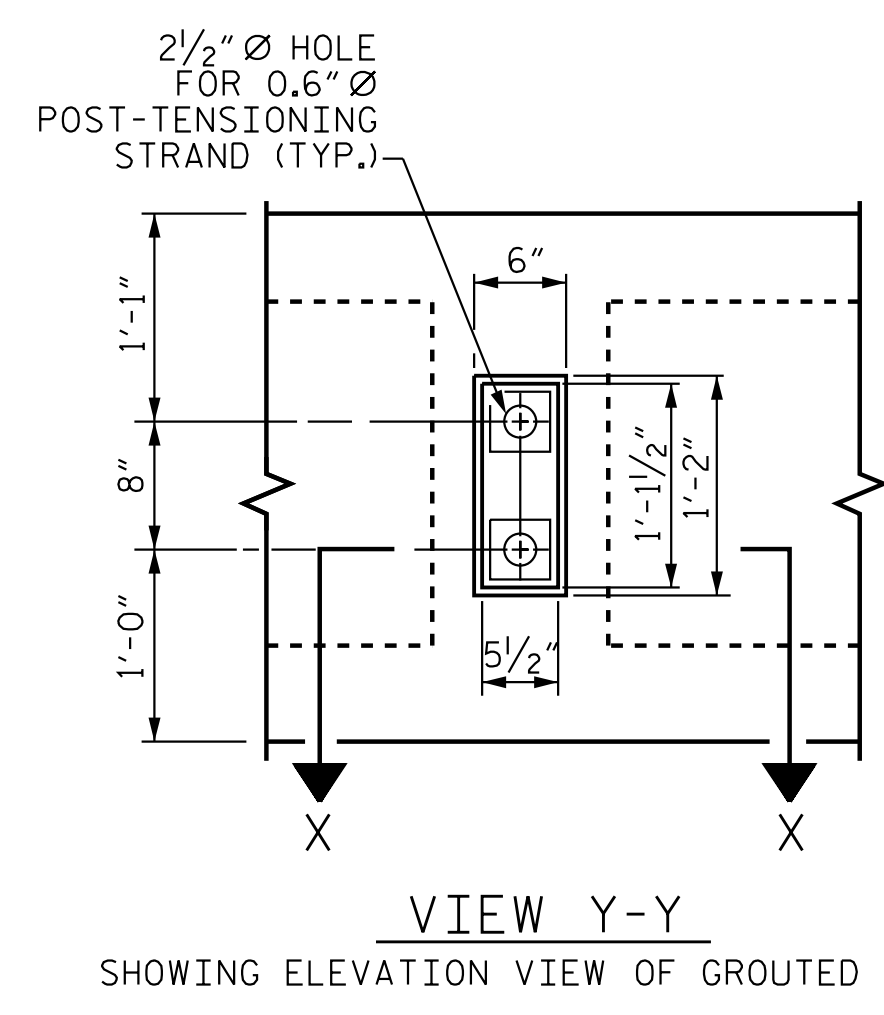
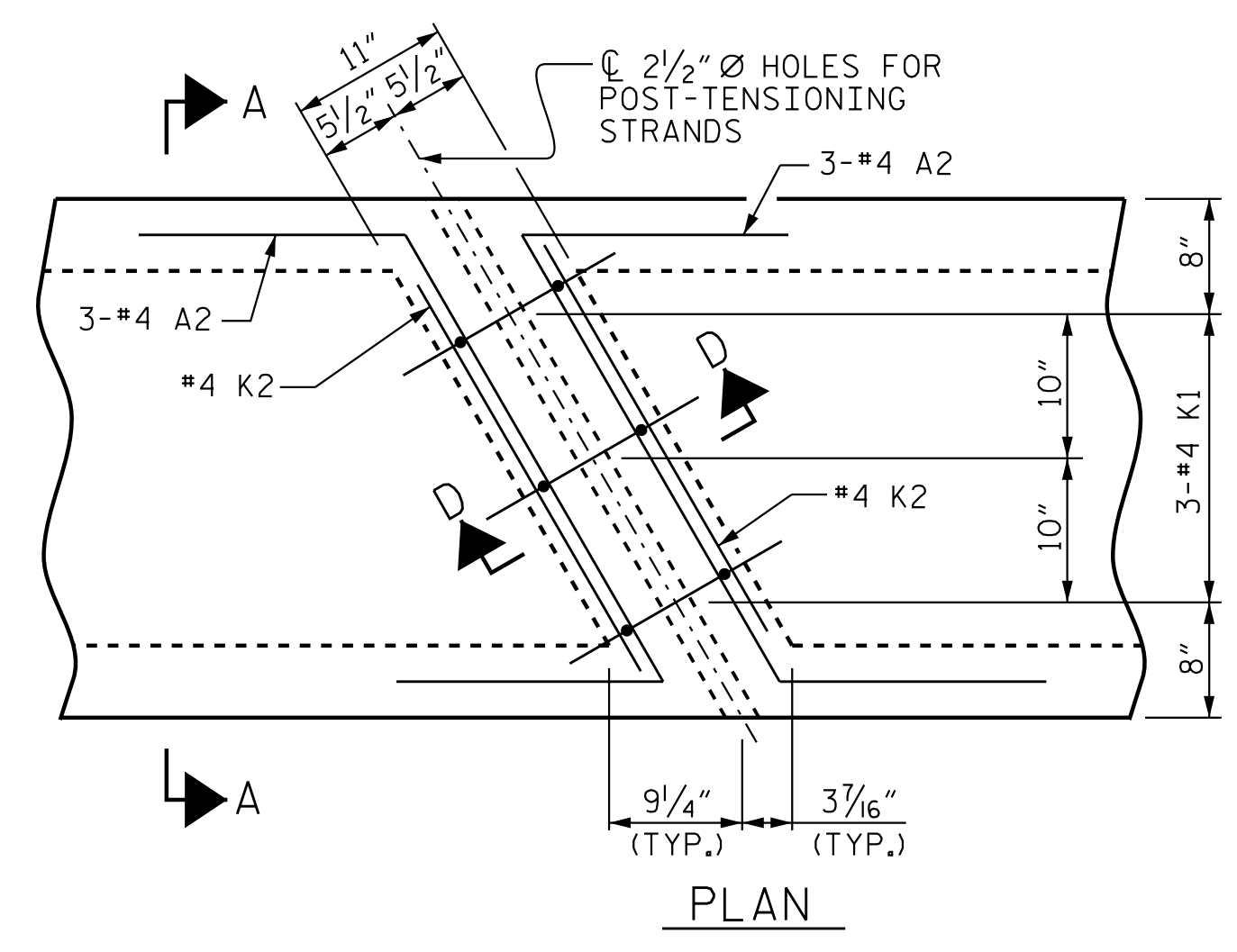
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**PLAN OF SPAN A**

NOTE: S3 & S4 BAR LAYOUT SHOWN ON RIGHT EXTERIOR SLAB. LEFT EXTERIOR SLAB SIMILAR BY ROTATION.

REVISIONS						SHEET NO. S-11
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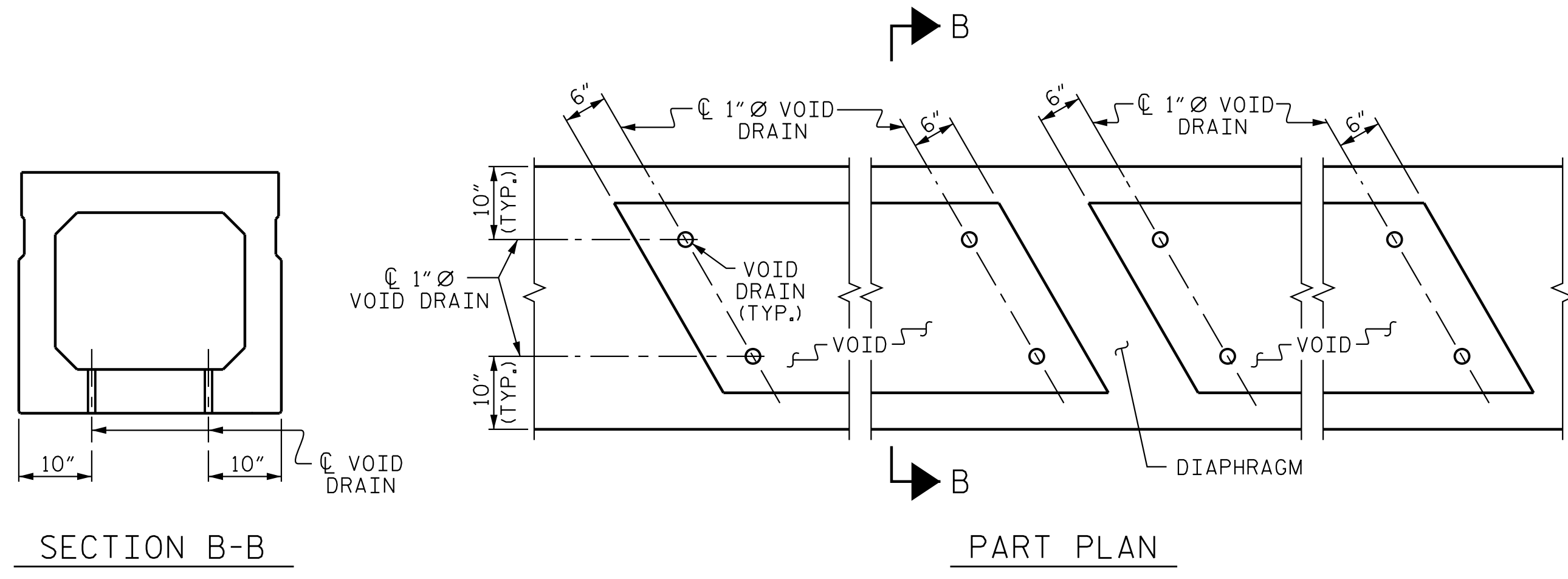
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**DOUBLE DIAPHRAGM DETAILS**

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

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



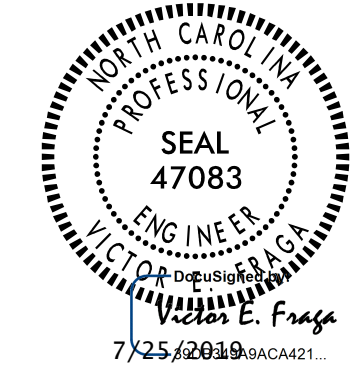
DEAD LOAD DEFLECTION AND CAMBER	
90' BOX BEAM UNIT (NC & SE)	3'-0" x 2'-9" 0.6" Ø L.R. STRAND
CAMBER (SLAB ALONE IN PLACE)	2 3/4" ↑
DEFLECTION DUE TO SUPERIMPOSED DEAD LOAD**	3/4" ↓
FINAL CAMBER	2" ↑

\*\* INCLUDES FUTURE WEARING SURFACE

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 SHEET 7 OF 10

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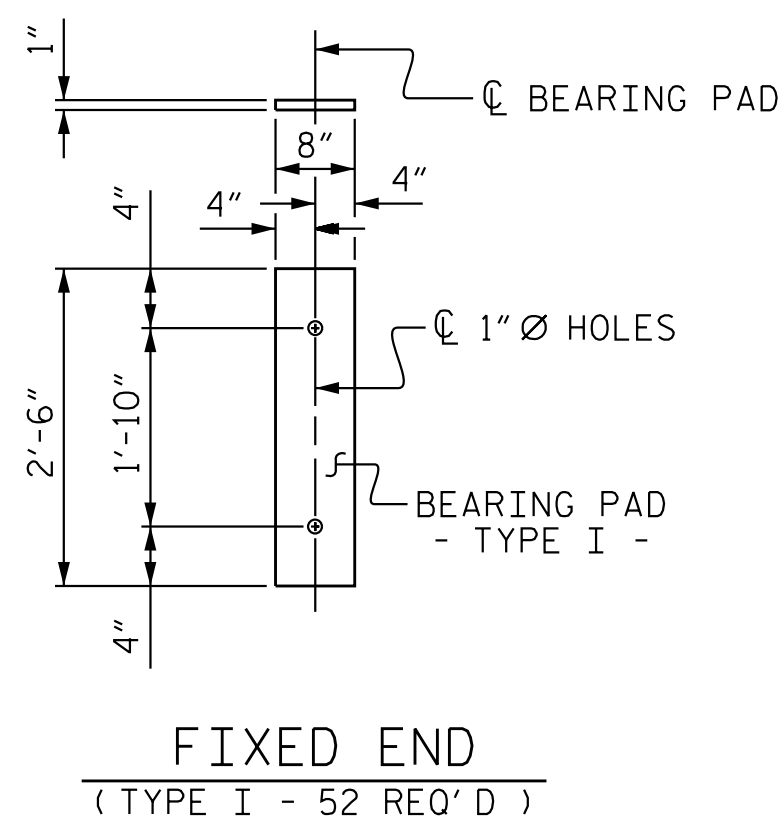
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD  
 3'-0" X 2'-9"  
 PRESTRESSED CONCRETE  
 BOX BEAM UNIT

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### ELASTOMERIC BEARING DETAILS

ELASTOMER IN ALL BEARINGS SHALL BE 60 DUROMETER HARDNESS.

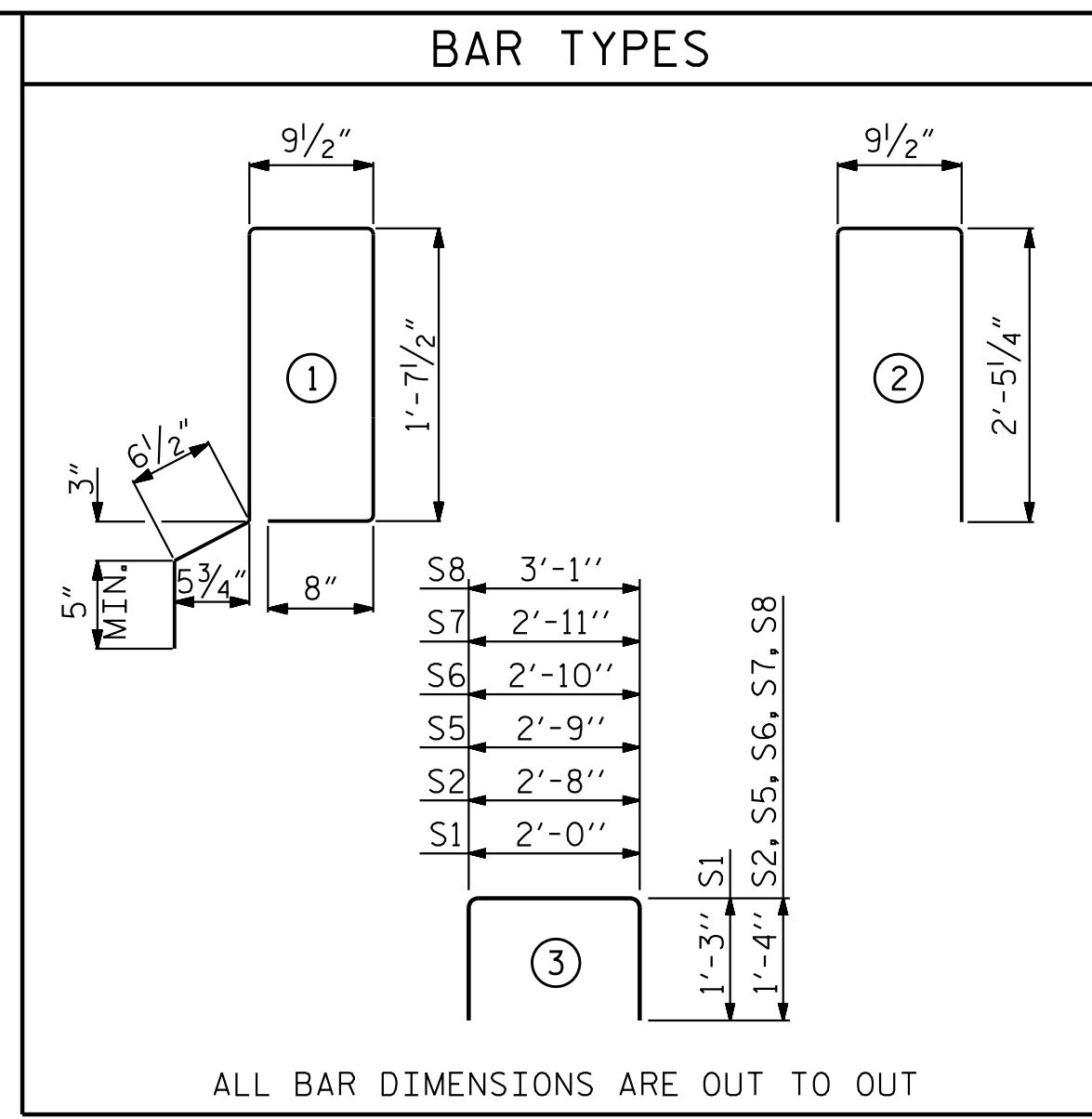
CONCRETE RELEASE STRENGTH	
UNIT	PSI
55' UNITS	4900

CORED SLABS REQUIRED			
	NUMBER	LENGTH	TOTAL LENGTH
55' UNIT			
EXTERIOR C.S.	4	55'-0"	220'-0"
INTERIOR C.S.	22	55'-0"	1210'-0"
TOTAL	26		1430'-0"

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

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

\*\* INCLUDES FUTURE WEARING SURFACE



ALL BAR DIMENSIONS ARE OUT TO OUT

### 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.

ALL REINFORCING STEEL IN THE CONCRETE PARAPET SHALL BE EPOXY COATED.

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

APPLY EPOXY PROTECTIVE COATING TO CORED SLAB UNIT ENDS.

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.

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

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.

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.

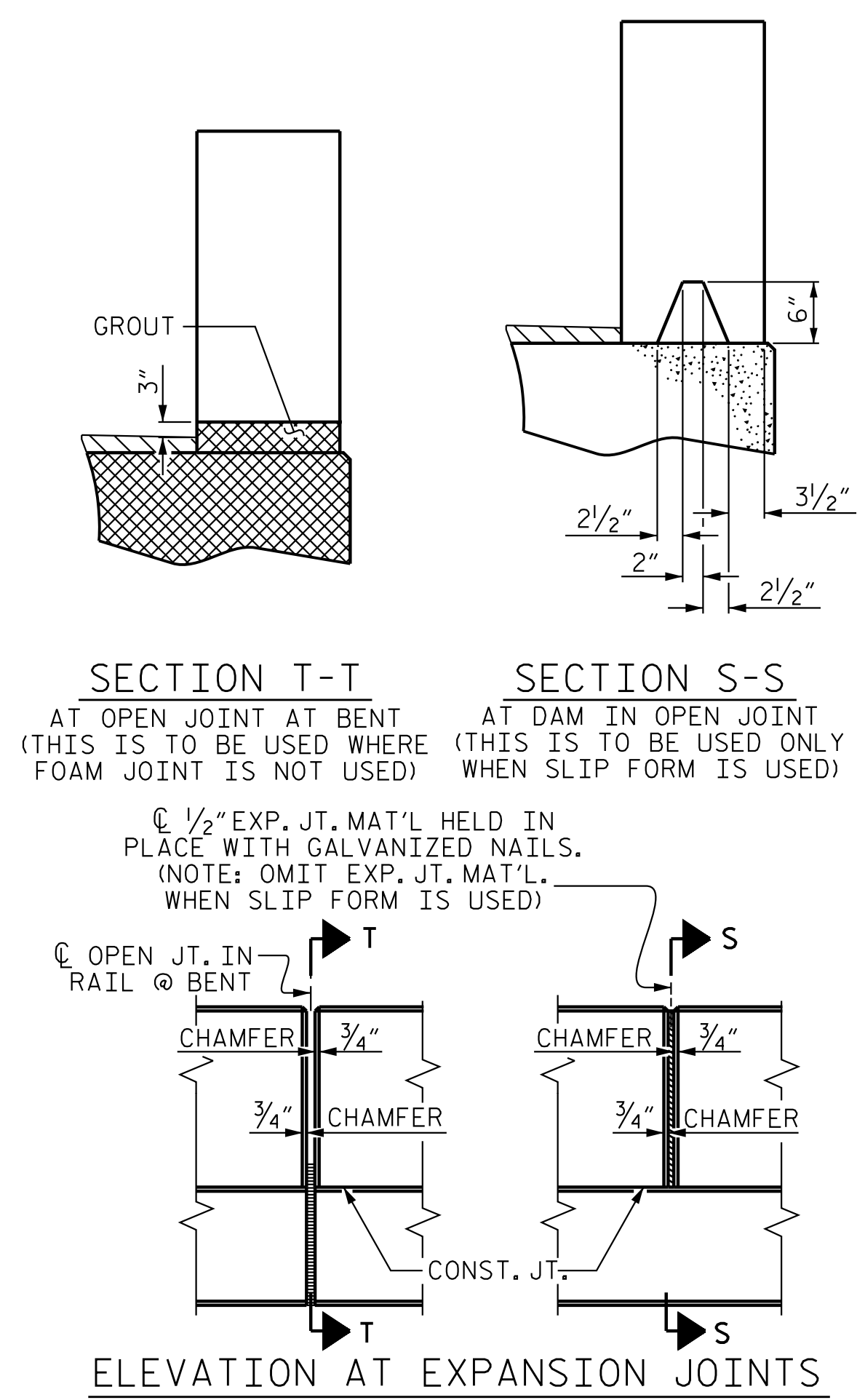
THE PERMITTED THREADED INSERTS SHALL BE GROUTED BY THE CONTRACTOR IMMEDIATELY FOLLOWING REMOVAL OF THE FALSEWORK.

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

BILL OF MATERIAL FOR ONE 55' CORED SLAB UNIT							
BAR	NUMBER	SIZE	TYPE	EXTERIOR UNIT		INTERIOR UNIT	
				LENGTH	WEIGHT	LENGTH	WEIGHT
B7	4	#4	STR	28'-3"	75	28'-3"	75
S1	8	#5	3	4'-6"	38	4'-6"	38
S2	112	#4	3	5'-4"	399	5'-4"	399
*S3	64	#5	1	5'-8"	378		
S5	4	#4	3	5'-5"	14	5'-5"	14
S6	4	#4	3	5'-6"	15	5'-6"	15
S7	4	#4	3	5'-7"	15	5'-7"	15
S8	4	#4	3	5'-9"	15	5'-9"	15
REINFORCING STEEL				LBS.	571		571
* EPOXY COATED REINFORCING STEEL				LBS.	378		
6500 P.S.I. CONCRETE				CU. YDS.	8.0		8.0
0.6" Ø L.R. STRANDS				No.	19		19

BILL OF MATERIAL FOR CONCRETE PARAPET (SPANS A & C)						
BAR	BARS PER PAIR OF EXTERIOR UNITS	TOTAL NO.	SIZE	TYPE	LENGTH	WEIGHT
55' UNIT						
*B14	64	128	#5	STR	15'-7"	2018
*S4	128	256	#5	2	5'-8"	1513
* EPOXY COATED REINFORCING STEEL				LBS.		3593
CLASS AA CONCRETE				CU. YDS.		25.4
TOTAL CONCRETE PARAPET				LN. FT.		220

TABLE 1: PARAPET HEIGHT @ OUTSIDE EDGE OF SUPERSTRUCTURE				
SPAN	LEFT EDGE OF SUPERSTRUCTURE		RIGHT EDGE OF SUPERSTRUCTURE	
	@ CL BEARING	@ MID-SPAN	@ CL BEARING	@ MID-SPAN
SPAN A	2'-8 3/8"	2'-7 1/4"	2'-9"	2'-7 7/8"
SPAN B	2'-9 1/4"	2'-7 1/4"	2'-9 3/4"	2'-7 3/4"
SPAN C	2'-8 3/8"	2'-7 1/4"	2'-9"	2'-7 7/8"

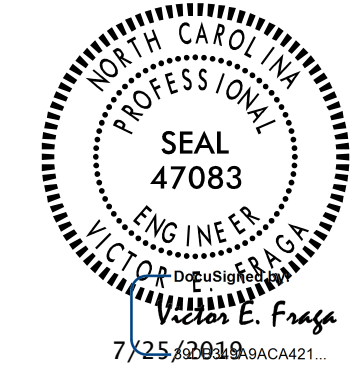


### CONCRETE PARAPET SECTION

GUTTERLINE ASPHALT THICKNESS & RAIL HEIGHT		
	ASPHALT OVERLAY THICKNESS	RAIL HEIGHT
55' UNITS	@ MID-SPAN 1 1/2"	@ MID-SPAN SEE TABLE 1

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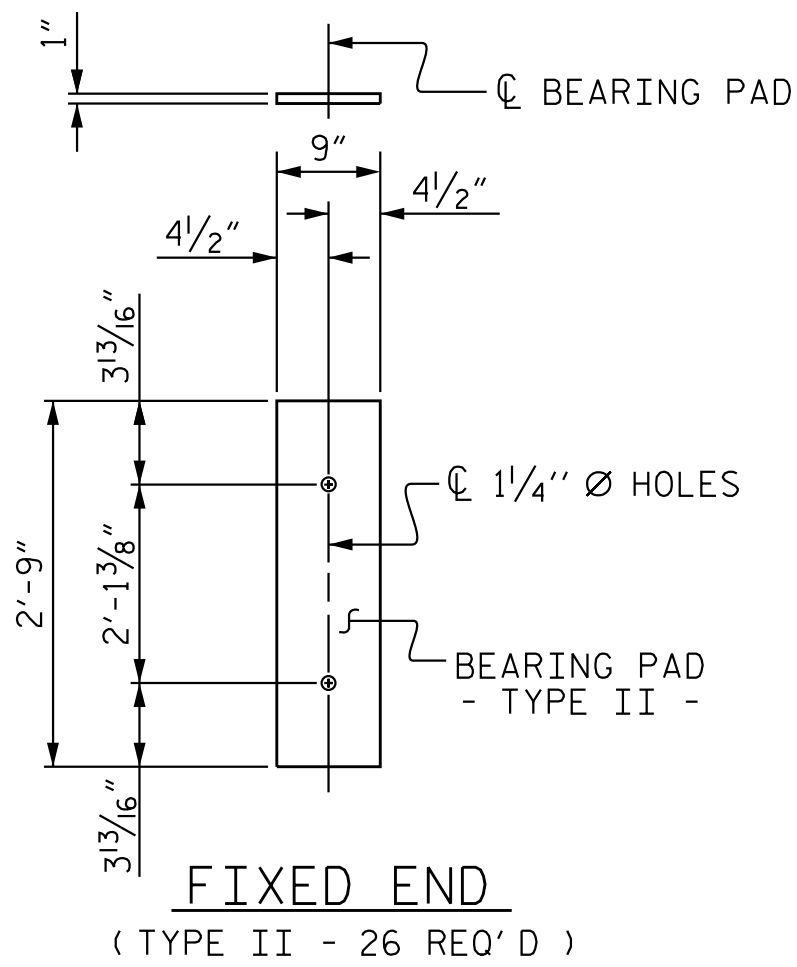
SHEET 8 OF 10

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD  
 3'-0" X 1'-9"  
 PRESTRESSED CONCRETE  
 CORED SLAB UNIT  
 60° SKEW

REVISIONS						SHEET NO.
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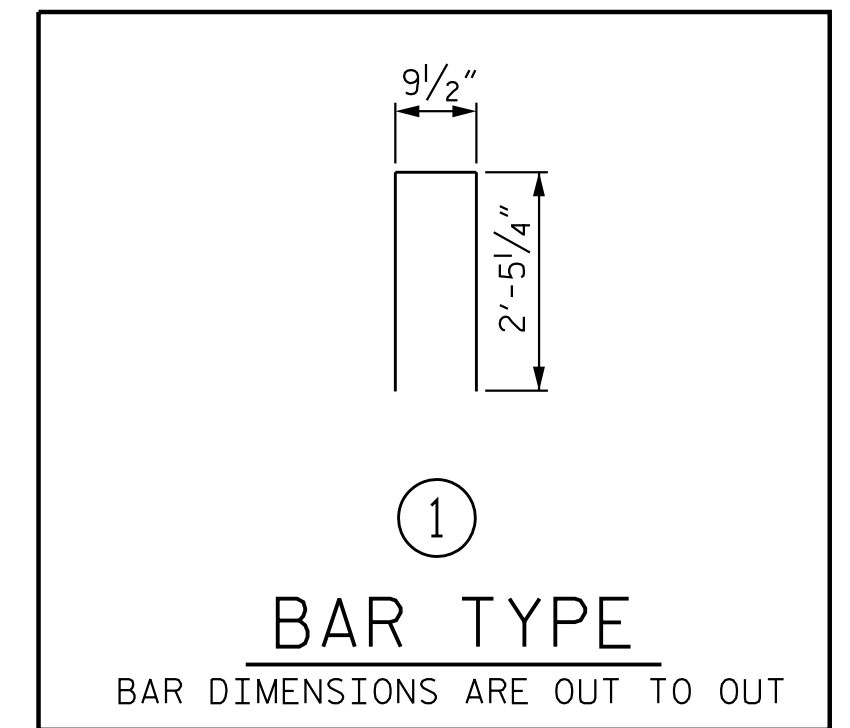
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**ELASTOMERIC BEARING DETAILS**

ELASTOMER IN ALL BEARINGS SHALL BE 60 DUROMETER HARDNESS.

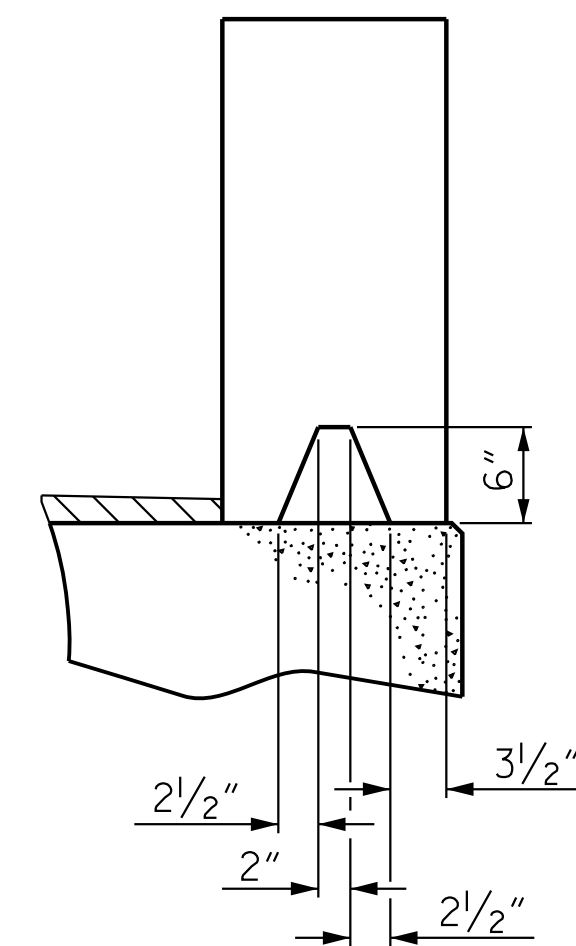


BILL OF MATERIAL FOR CONCRETE PARAPET (SPAN B)					
BAR	BARS PER PAIR OF EXTERIOR UNITS	SIZE	TYPE	LENGTH	WEIGHT
90' UNIT					
*B10	128	#5	STR	13'-0"	1736
*S6	240	#5	1	5'-8"	1418
* EPOXY COATED REINFORCING STEEL				LBS.	3154
CLASS AA CONCRETE				CU.YDS.	21.1
TOTAL CONCRETE PARAPET				LN. FT.	180.0

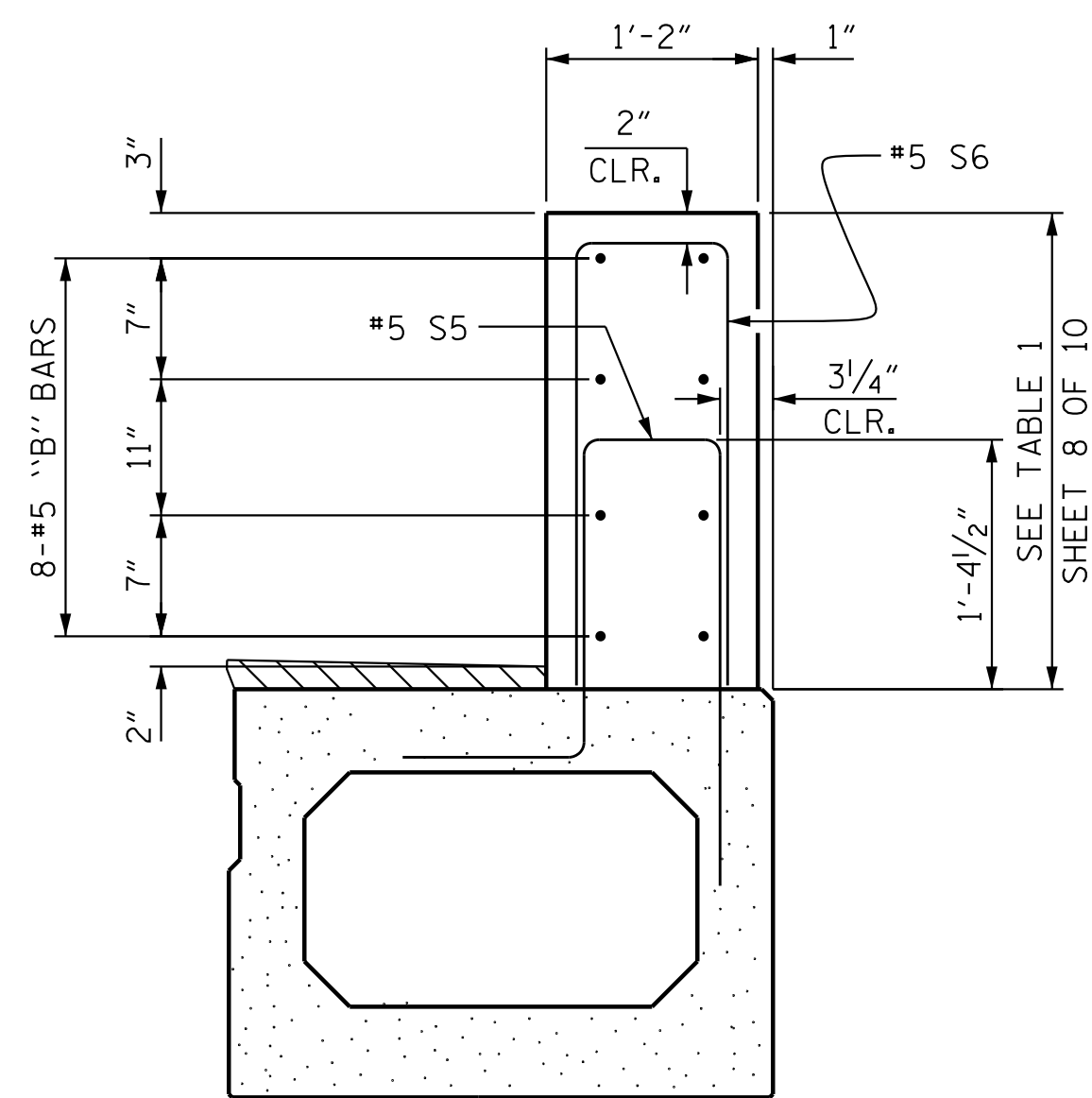
**GUTTERLINE ASPHALT THICKNESS & RAIL HEIGHT**

	ASPHALT OVERLAY THICKNESS @ MID-SPAN	RAIL HEIGHT @ MID-SPAN
90' UNITS	1 1/2"	**

\*\* SEE TABLE 1, SHT 8 OF 10.

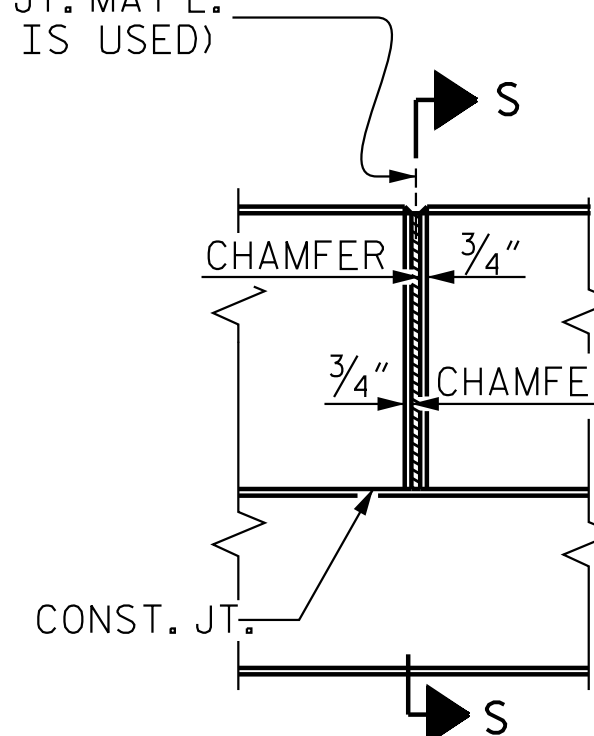


**SECTION S-S**  
AT DAM IN OPEN JOINT  
(THIS IS TO BE USED ONLY WHEN SLIP FORM IS USED)



**SECTION THRU RAIL**

1/2" EXP. JT. MAT'L HELD IN PLACE WITH GALVANIZED NAILS.  
(NOTE: OMIT EXP. JT. MAT'L WHEN SLIP FORM IS USED)



**ELEVATION AT EXPANSION JOINTS**

**BOX BEAM UNITS REQUIRED**

	NUMBER	LENGTH	TOTAL LENGTH
EXTERIOR B.B.	2	90'-0"	180'-0"
INTERIOR B.B.	11	90'-0"	990'-0"
TOTAL	13		1170'-0"

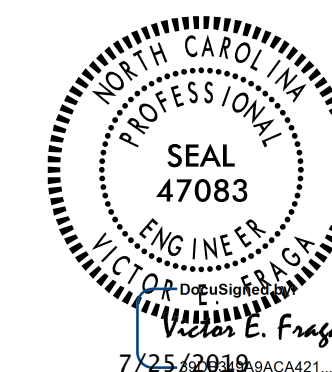
**CONCRETE PARAPET DETAILS**

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LINCOLN COUNTY  
STATION: 17+40.00 -L-

SHEET 9 OF 10

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

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



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DRAWN BY: <u>DCE 10/11</u>	REV. <u>5/18</u>
CHECKED BY: <u>TMG 11/11</u>	MAA/THC

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10/4/37

2019-07-25

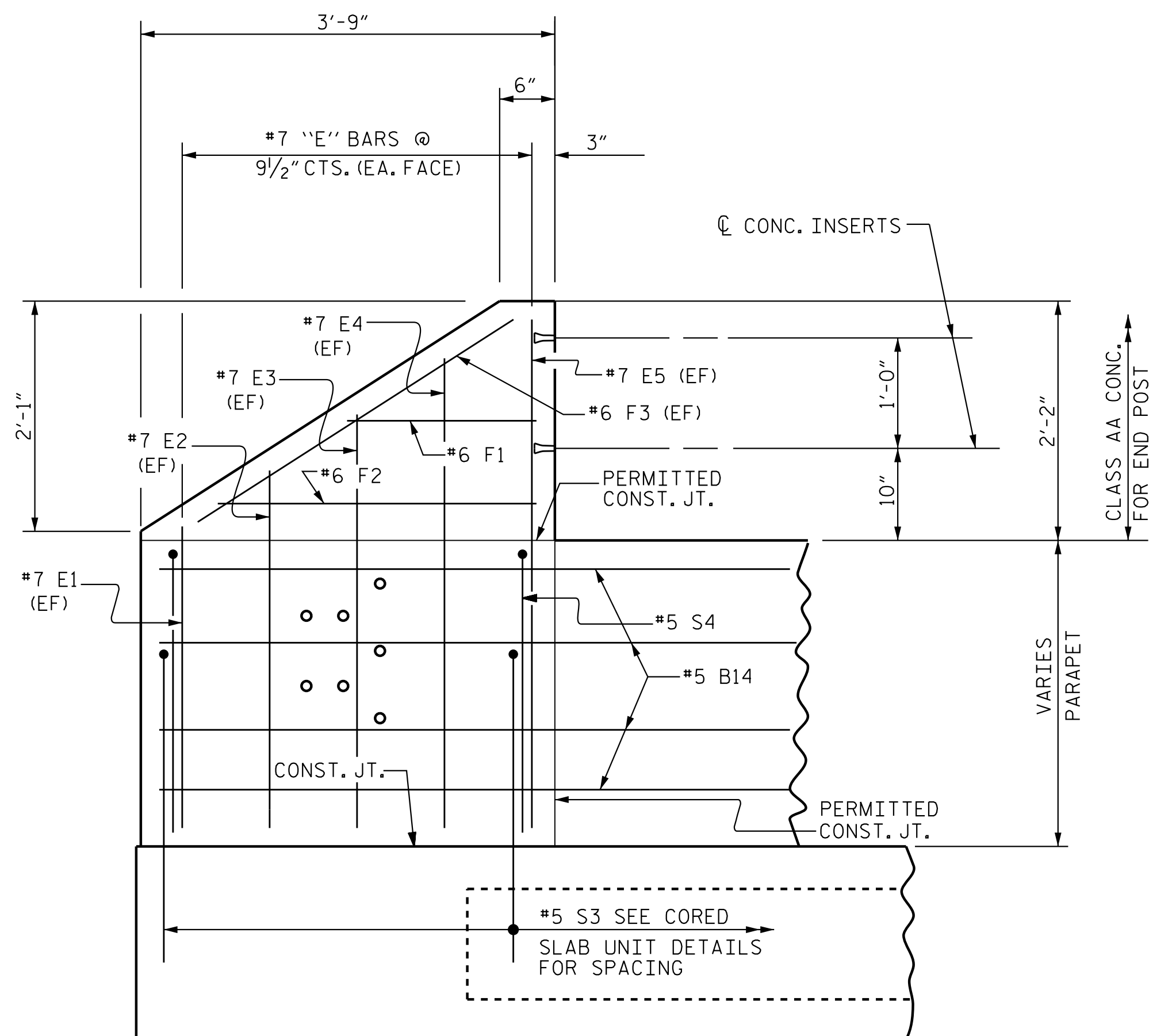
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### NOTES

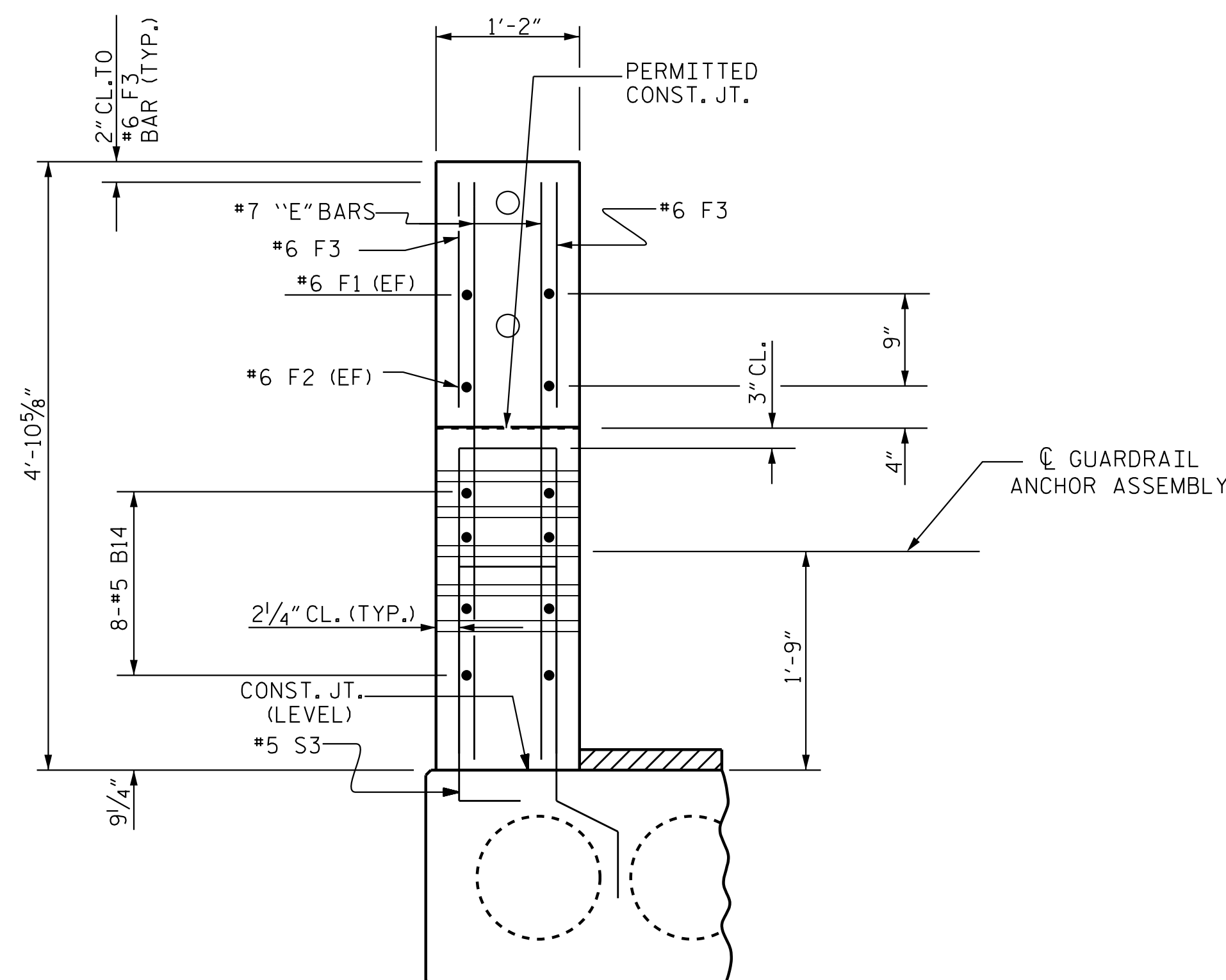
ALL REINFORCING STEEL IN PARAPETS AND END POSTS SHALL BE EPOXY COATED.

BILL OF MATERIAL					
FOUR END POSTS					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
*E1	8	#7	STR	2'-8"	44
*E2	8	#7	STR	3'-2"	52
*E3	8	#7	STR	3'-8"	60
*E4	8	#7	STR	4'-3"	69
*E5	8	#7	STR	4'-7"	75
*F1	8	#6	STR	1'-8"	20
*F2	8	#6	STR	2'-10"	34
*F3	8	#6	STR	3'-4"	40
* EPOXY COATED REINFORCING STEEL				LBS.	394
CLASS AA CONCRETE				C. Y.	0.8
* DENOTES EPOXY COATED REINFORCING					



### ELEVATION

(EF) DENOTES BAR IN EA. FACE



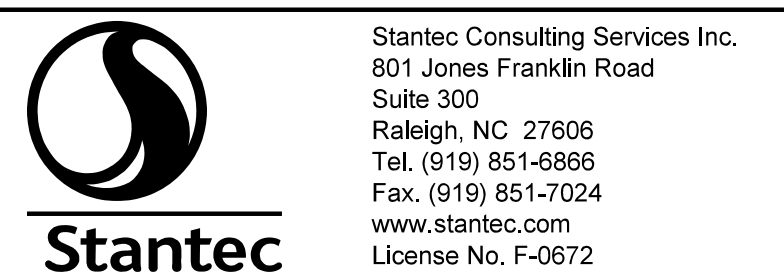
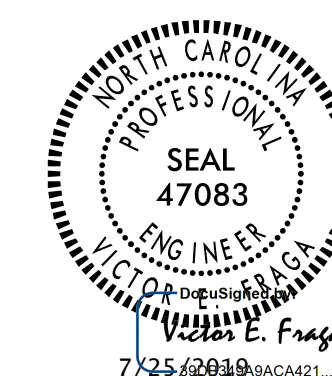
### END VIEW

PROJECT NO. B-4571  
LINCOLN COUNTY  
 STATION: 17+40.00 -L-

SHEET 10 OF 10

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

### CONCRETE PARAPET AND END POST DETAILS



DESIGN ENGINEER OF RECORD: V. E. FRAGA DATE: 07/24/19  
 ASSEMBLED BY: V. E. FRAGA DATE: 03/15/19  
 CHECKED BY: T. R. DUDECK DATE: 04/05/19  
 DRAWN BY: DGE 5/09 REV. 5/18 MAA/THC  
 CHECKED BY: BCH 6/09

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 SIGNATURES COMPLETED

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

2019-07-25 10:44:38 vfraga  
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NOTES

STRUCTURAL CONCRETE INSERT

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

- A. FERRULES SHALL BE MADE FROM STEEL MEETING THE REQUIREMENTS OF AASHTO M169, GRADE 12L14 AND SHALL HAVE A MINIMUM LENGTH OF THREADS OF 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 7/16" Ø WIRE STRUT WITH A MINIMUM TENSILE STRENGTH OF 90,000 PSI IS ACCEPTABLE.

NOTES

METAL RAIL TO END POST CONNECTION

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

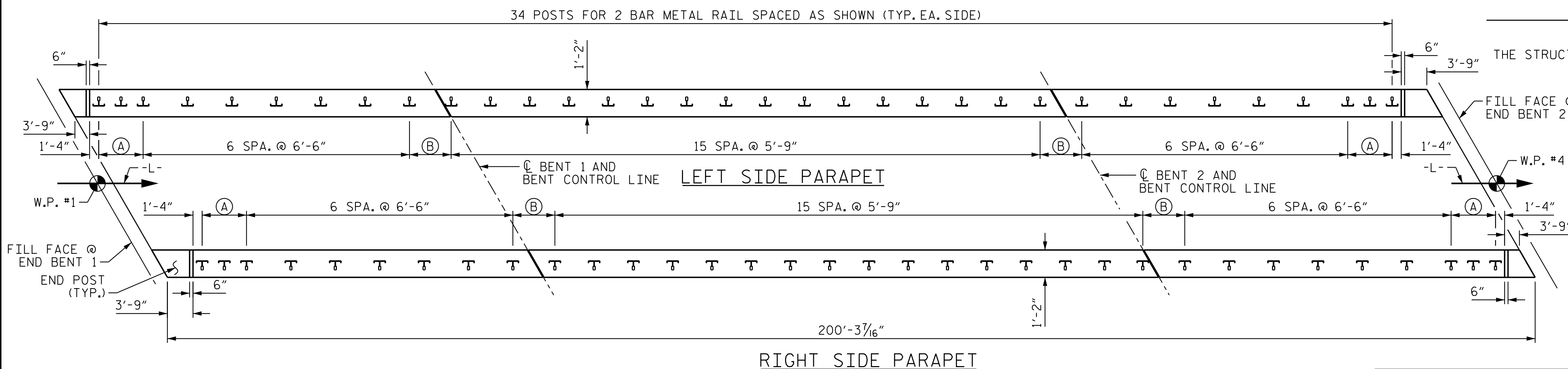
- A. 1/2" PLATES SHALL CONFORM TO AASHTO M270 GRADE 36 AND SHALL BE GALVANIZED AFTER FABRICATION.
- B. 3/4" STRUCTURAL CONCRETE INSERT SHALL HAVE A WORKING LOAD SHEAR CAPACITY OF 4800 LBS. THE FERRULES SHALL ENGAGE A 3/4" Ø X 1 5/8" BOLT WITH 2" O.D. WASHER IN PLACE. THE 3/4" Ø X 1 5/8" BOLT SHALL HAVE 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.

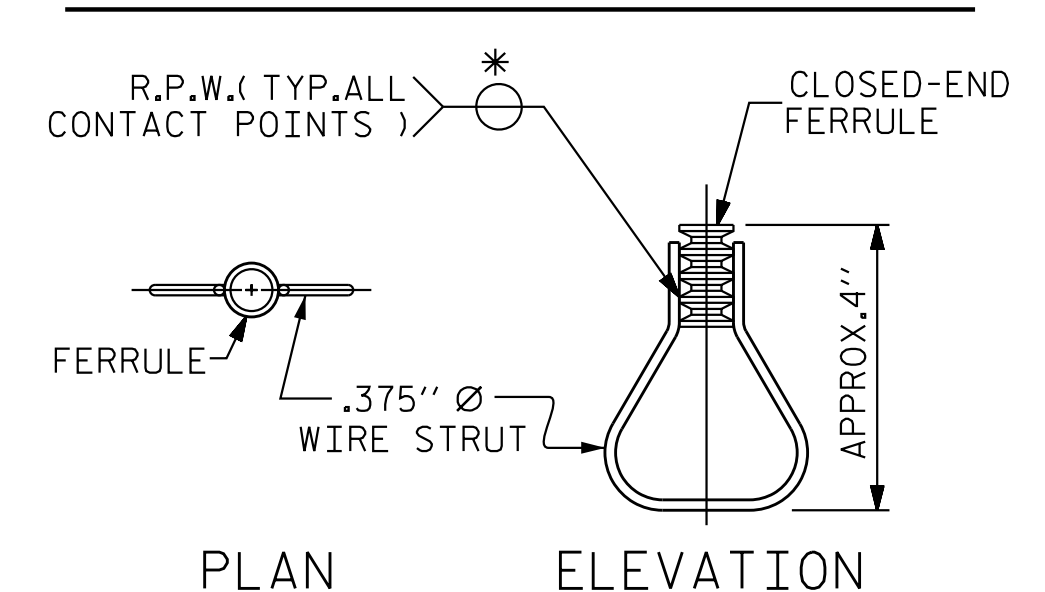
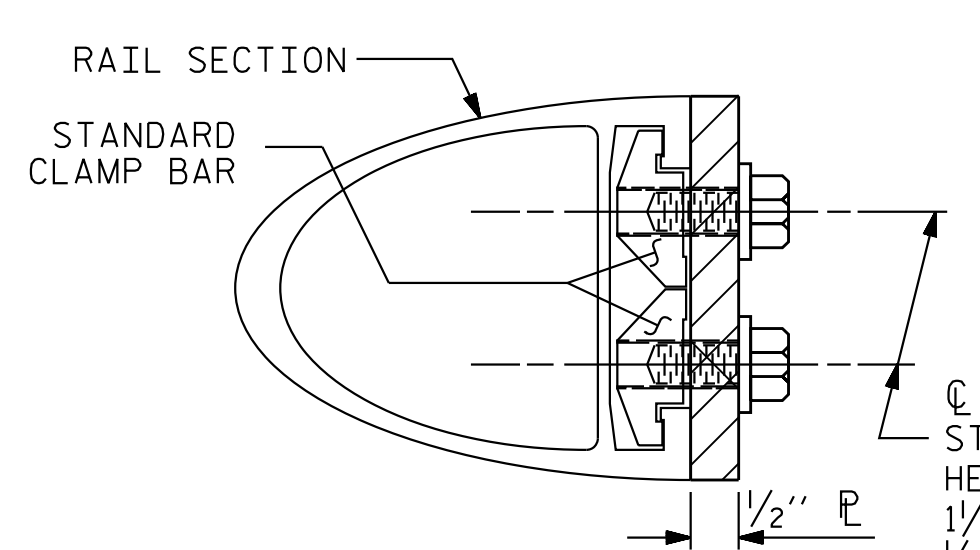
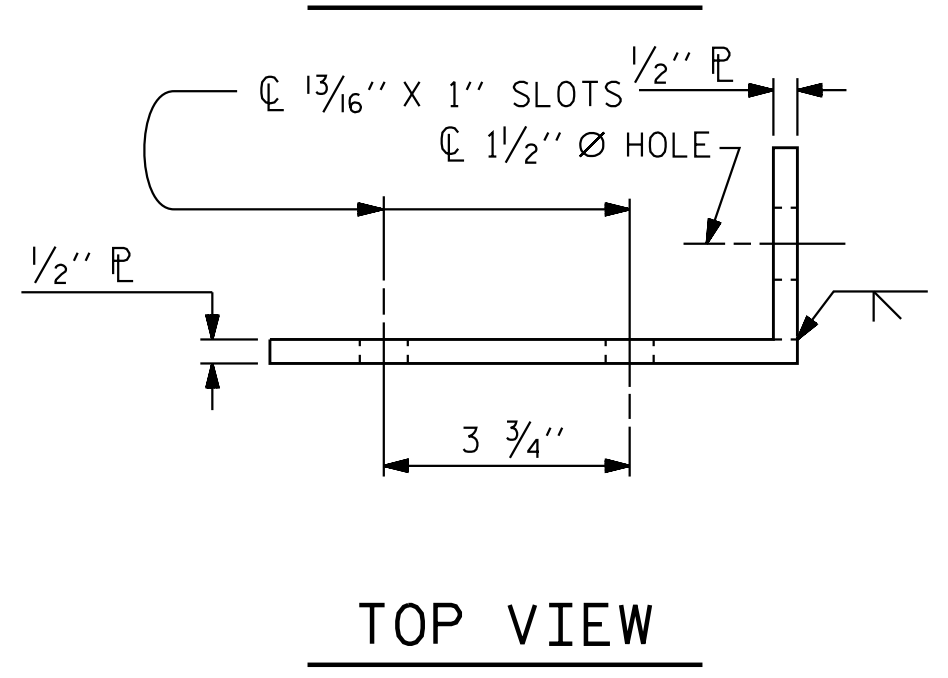
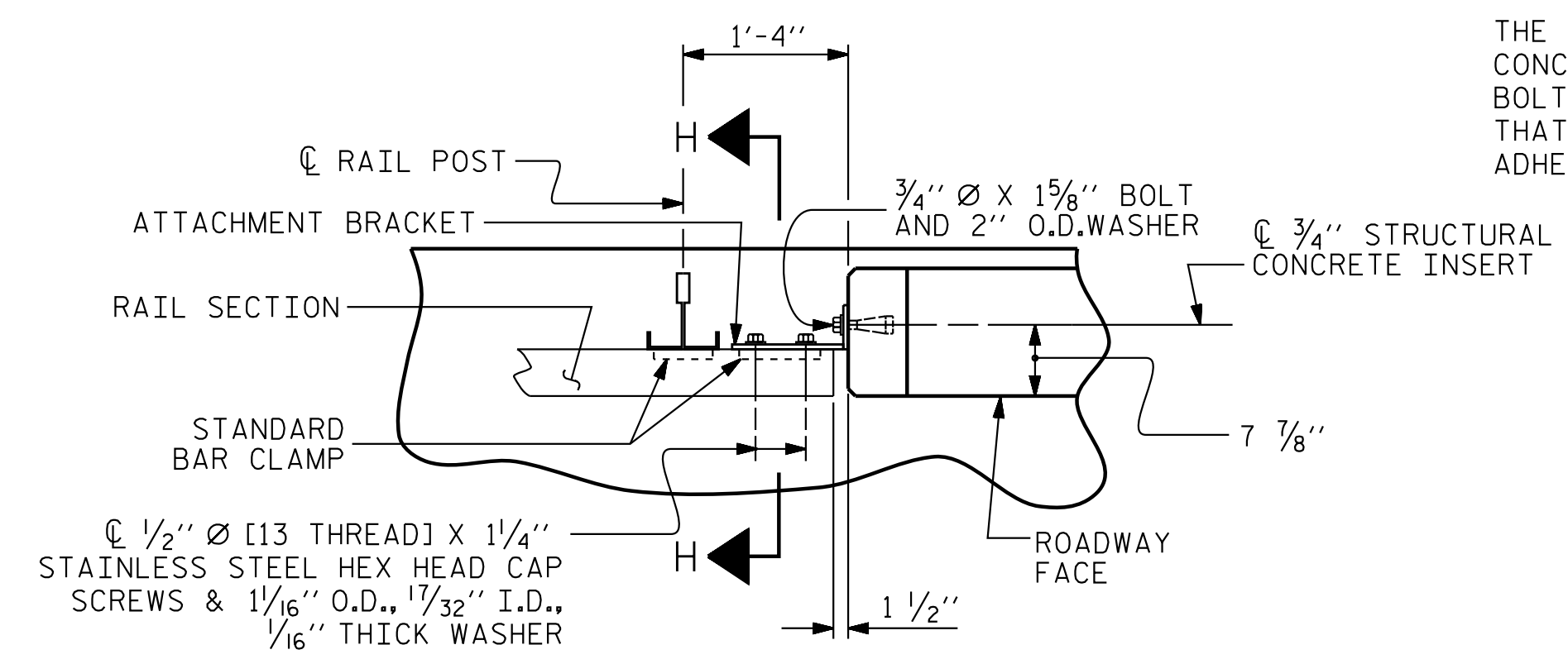
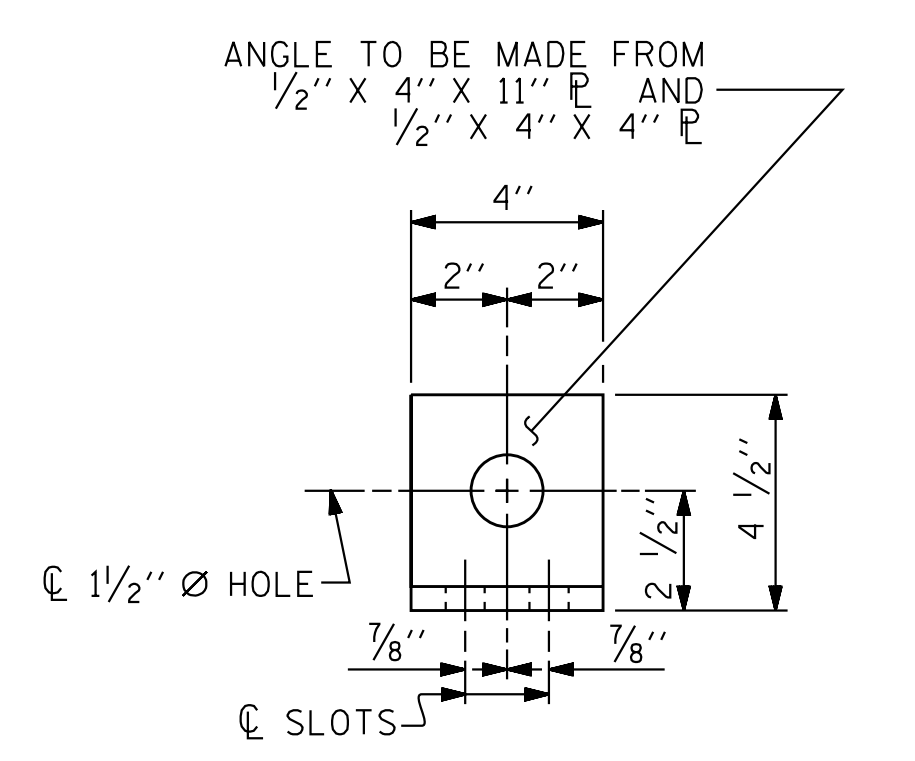
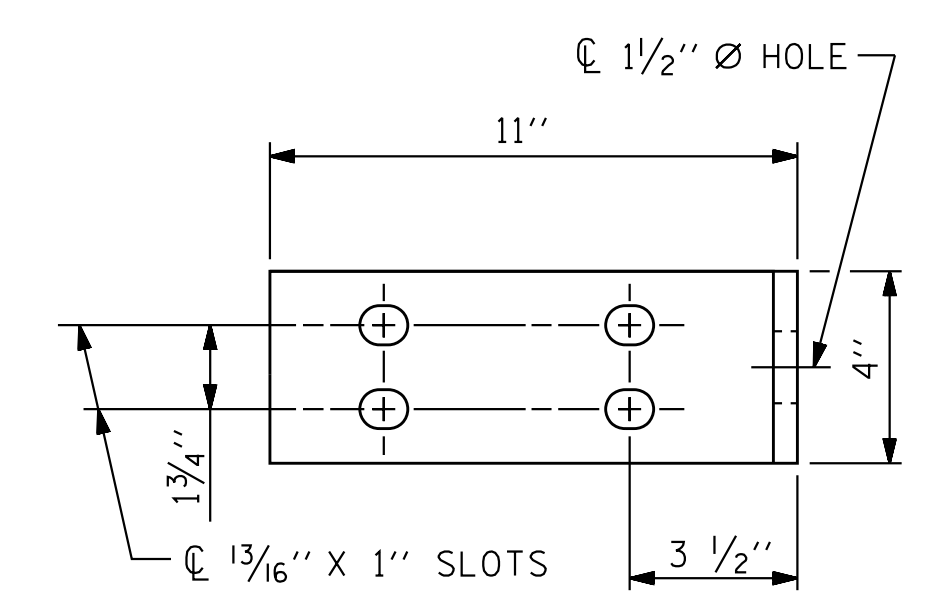
THE COST OF THE 3/4" STRUCTURAL CONCRETE INSERT ASSEMBLY, AND THE 1/2" PLATES COMPLETE IN PLACE SHALL BE INCLUDED IN THE VARIOUS PAY ITEMS.

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.



- (A) 2 SPA. @ 3'-3"
- (B) 1 SPA. @ 6'-1 3/16"

PLAN OF RAIL POST SPACINGS



STRUCTURAL CONCRETE INSERT

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

DETAILS FOR ATTACHING METAL RAIL TO END POST

PROJECT NO. B-4571

LINCOLN COUNTY

STATION: 17+40.00 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

RALEIGH

STANDARD

RAIL POST SPACINGS AND END OF RAIL DETAILS

FOR ONE OR TWO BAR METAL RAILS



REVISIONS						SHEET NO.	
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1			3			TOTAL SHEETS	
2			4			29	

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2019-07-25 10:44:39 vfr:090

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www.stantec.com  
License No. F-0672

DESIGN ENGINEER OF RECORD: V. E. FRAGA DATE: 07/24/19

ASSEMBLED BY: V. E. FRAGA DATE: 03/15/19  
CHECKED BY: T. R. DUDECK DATE: 04/05/19

DRAWN BY: FCJ 1/88  
CHECKED BY: CRK 3/89

REV. 5/1/06 TLA/GM  
REV. 10/1/11 MAA/GM  
REV. 12/17 MAA/THC



**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.

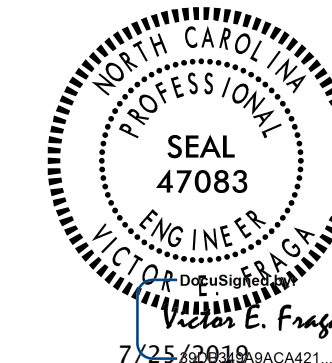
PAY LENGTH = 384.2 LIN. FT.

PROJECT NO. B-4571  
LINCOLN COUNTY  
 STATION: 17+40.00 -L-

SHEET 2 OF 3

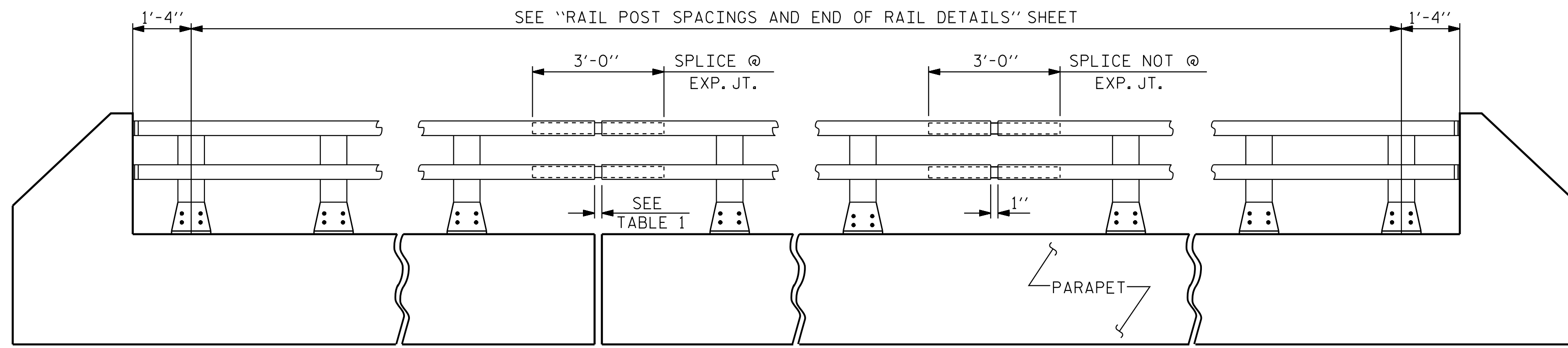
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

STANDARD  
 2 BAR METAL RAIL



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

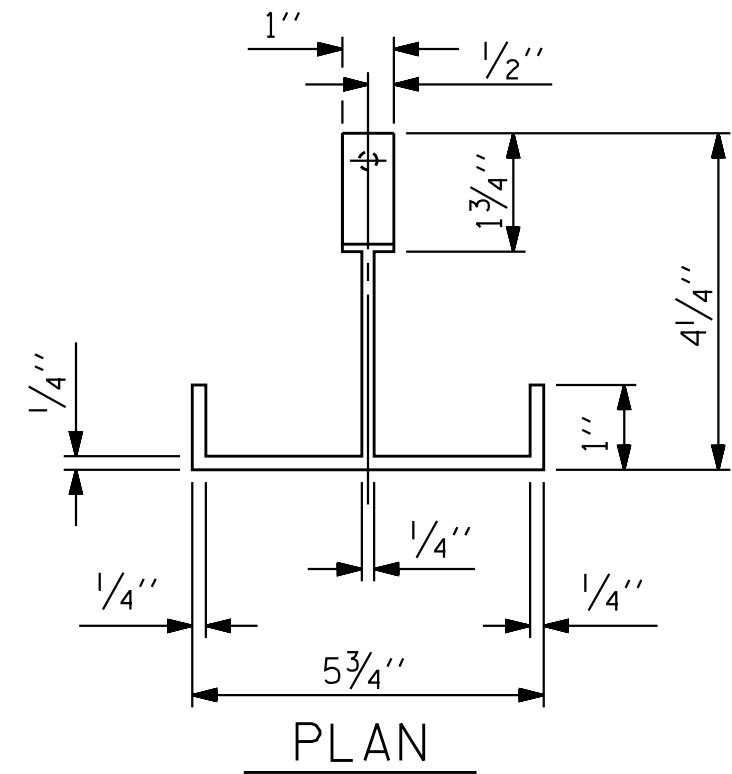
STD. NO. BMR3



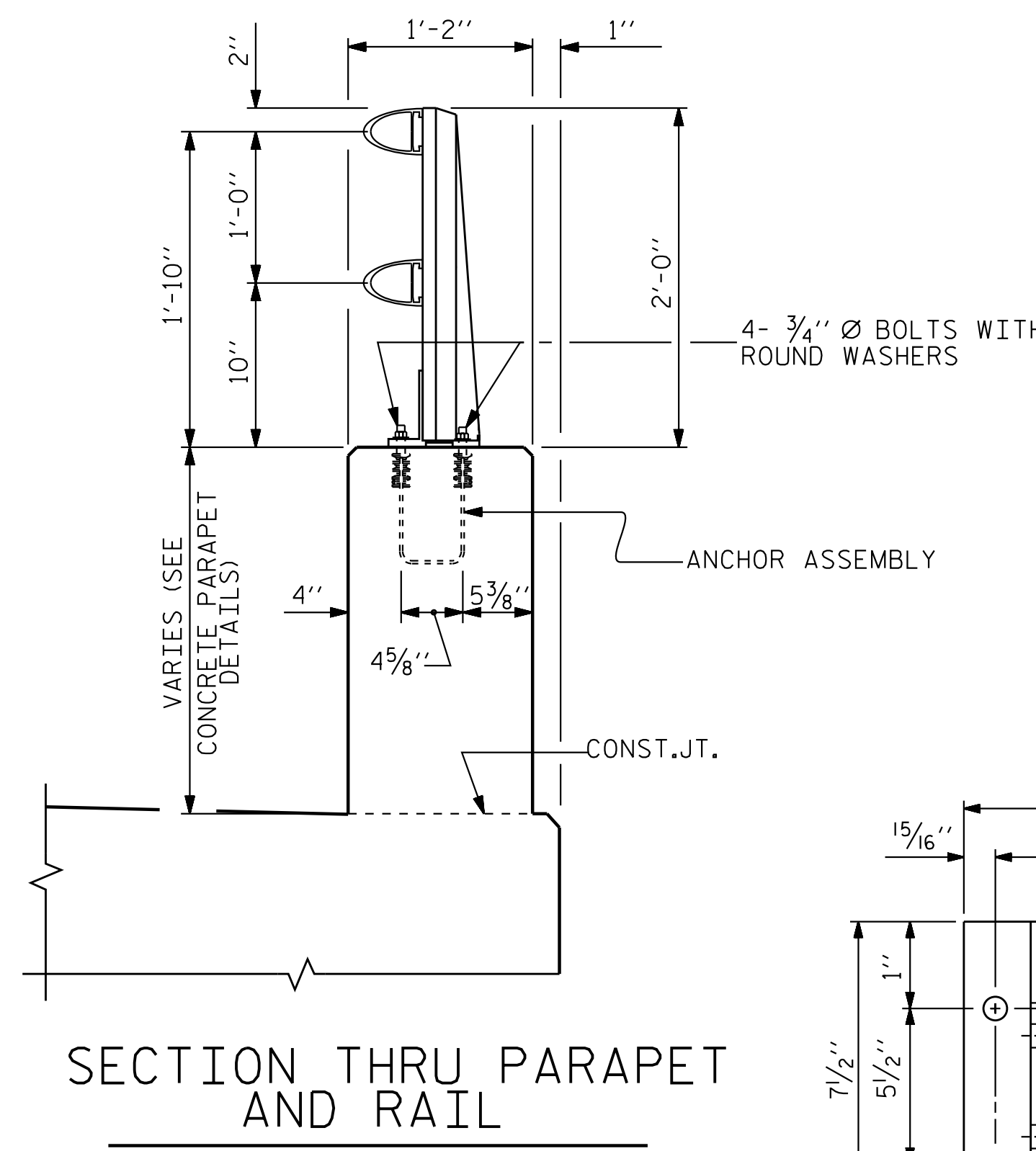
**ELEVATION**

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

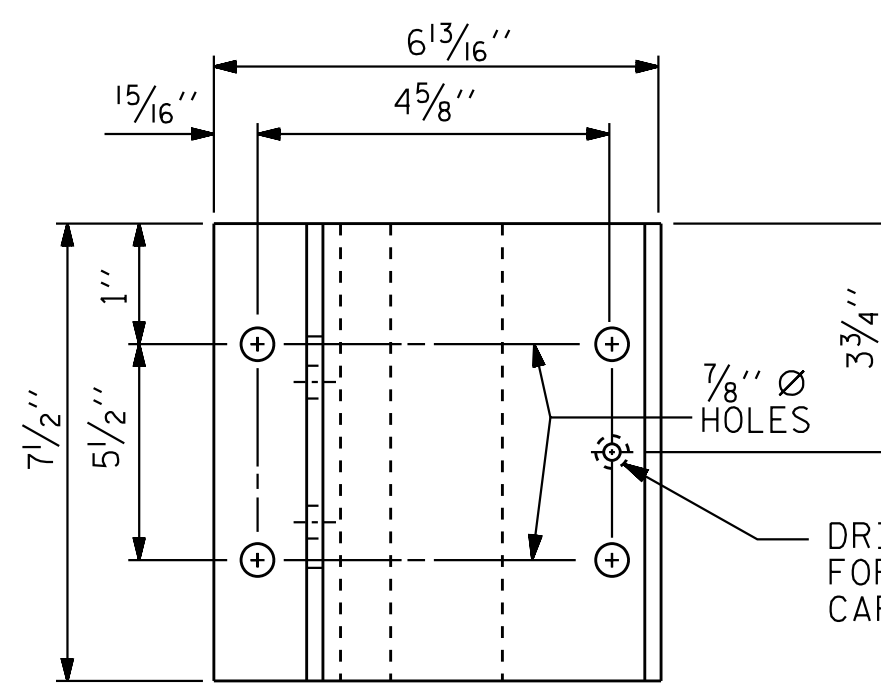
EXP. JT. @	RAIL OPENING
BENT 1	1.541"
BENT 2	1.541"



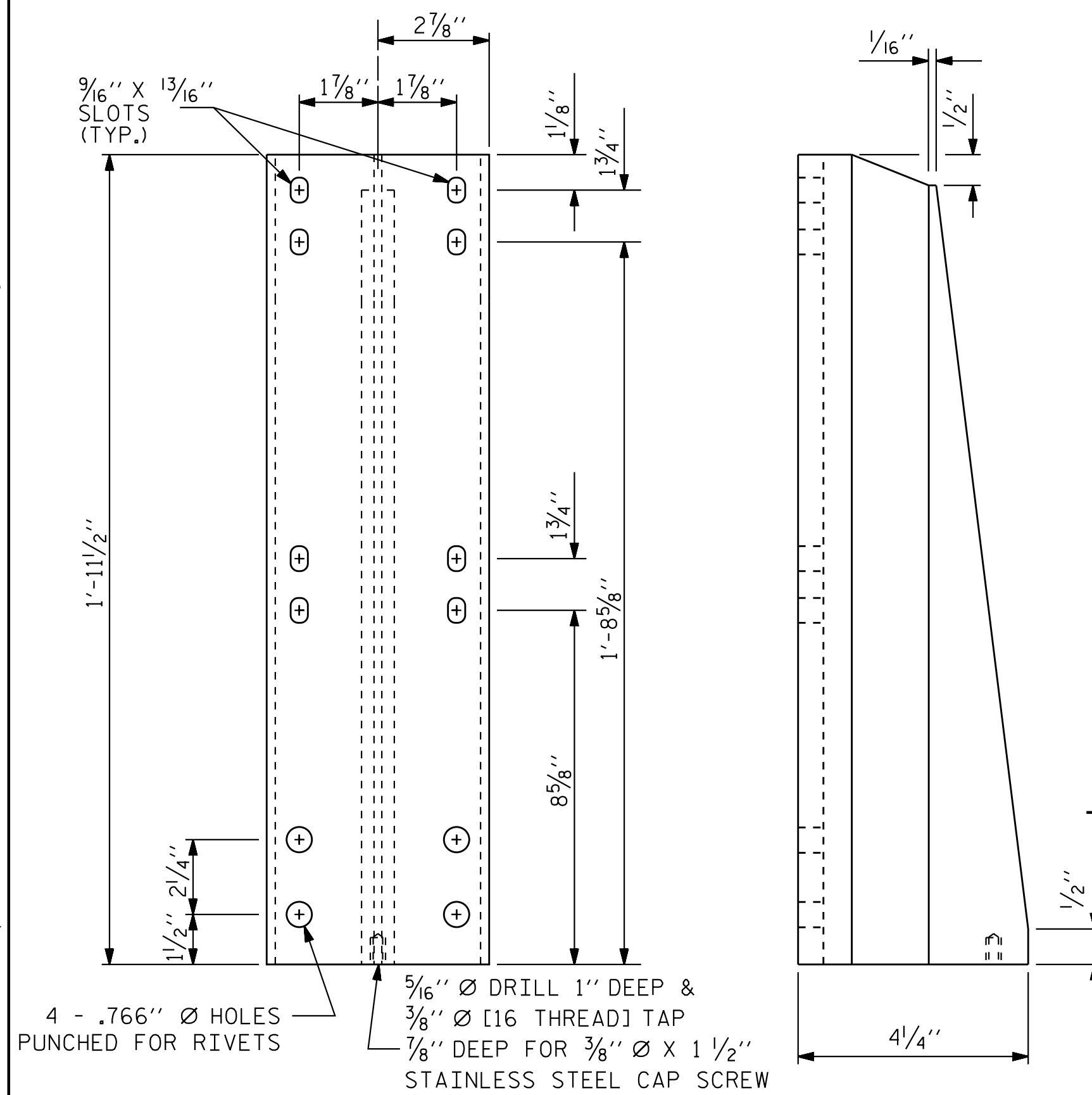
**PLAN**



**SECTION THRU PARAPET AND RAIL**



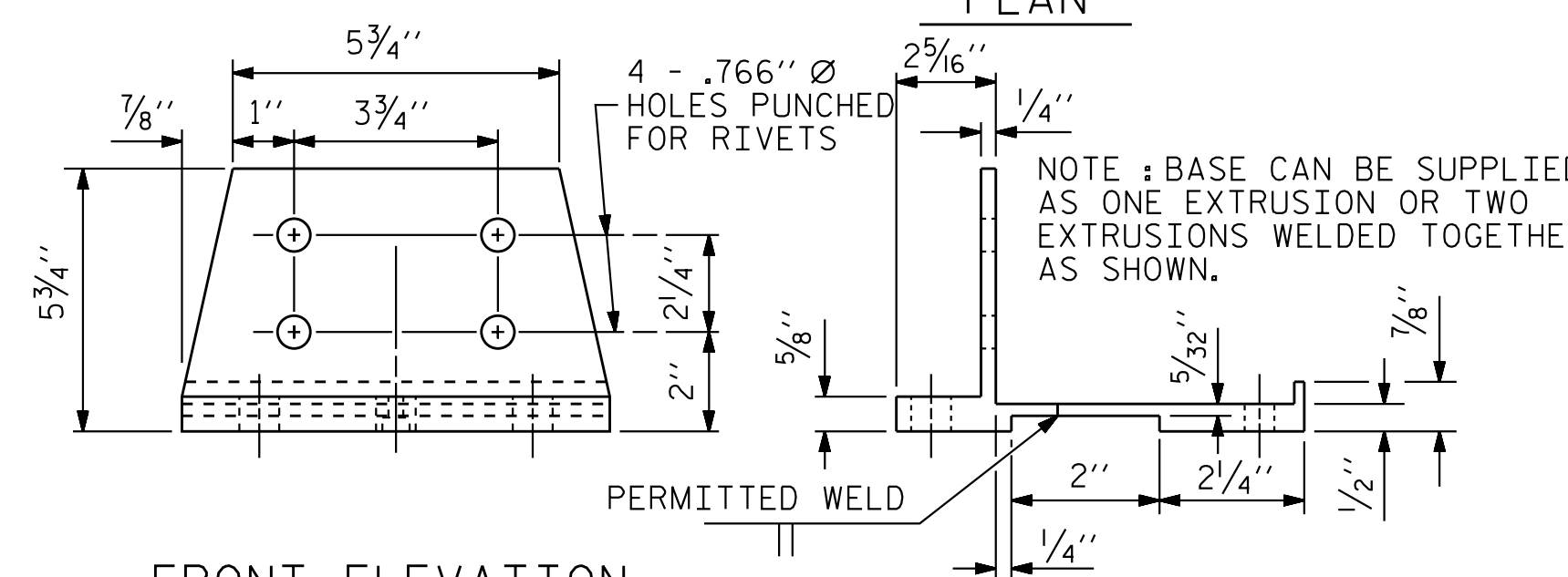
**PLAN**



**FRONT ELEVATION**

**SIDE ELEVATION**

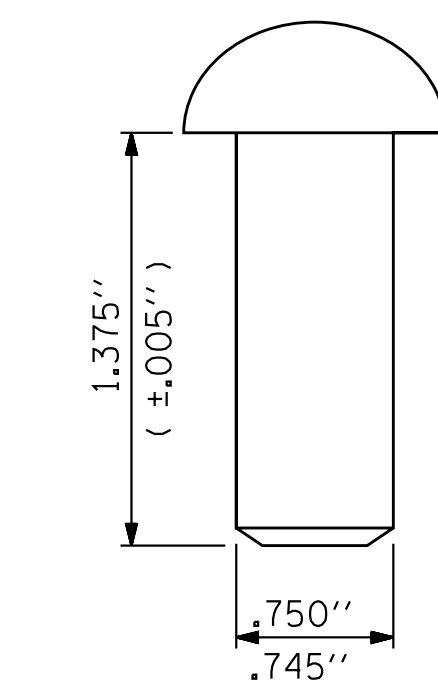
**DETAILS OF POST**



**FRONT ELEVATION**

**SIDE ELEVATION**

**POST BASE DETAILS**



**RIVET DETAIL**

DESIGN ENGINEER OF RECORD: <u>V. E. FRAGA</u> DATE : <u>07/24/19</u>	<p>Stantec Consulting Services Inc.                  801 Jones Franklin Road                  Suite 300                  Raleigh, NC 27606                  Tel. (919) 851-6866                  Fax. (919) 851-7024                  www.stantec.com                  License No. F-0672</p>
ASSEMBLED BY : <u>V. E. FRAGA</u> DATE : <u>03/15/19</u>	
CHECKED BY : <u>T. R. DUDECK</u> DATE : <u>04/05/19</u>	
DRAWN BY : <u>EEM</u> 6/94 REV. 10/11 MAA/GM CHECKED BY : <u>RCW</u> 6/94 REV. 6/13 MAA/GM REV. 12/17 MAA/THC	

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NOTES

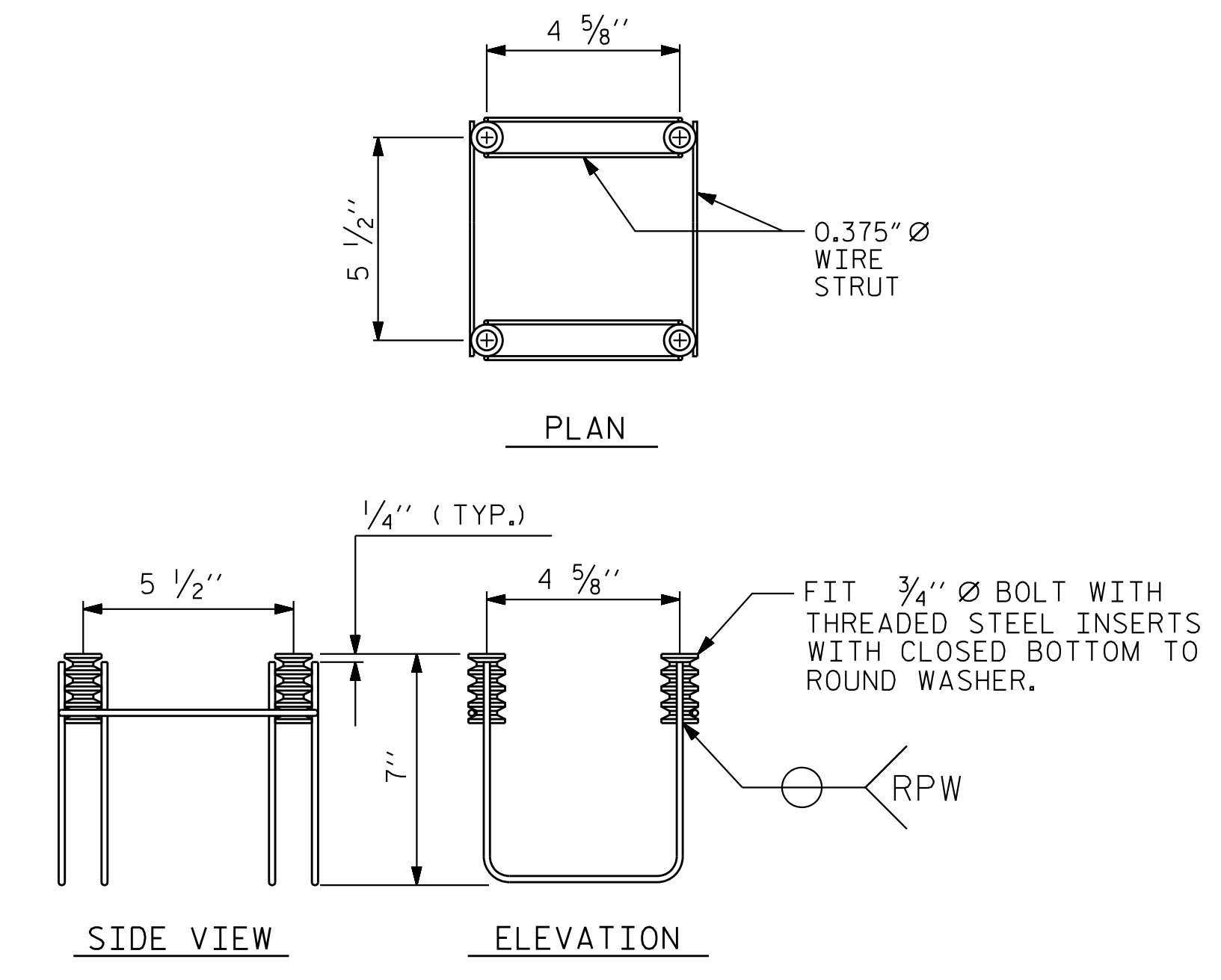
STRUCTURAL CONCRETE ANCHOR ASSEMBLY

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

- A. FERRULES SHALL BE MADE FROM STEEL MEETING THE REQUIREMENTS OF AASHTO M169, GRADE 12L14 AND SHALL HAVE A MINIMUM LENGTH OF THREADS OF 2" FOR 3/4" FERRULES.
- B. 4 - 3/4" Ø X 2 1/2" BOLTS WITH WASHERS. BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307. BOLTS AND WASHERS SHALL BE GALVANIZED. AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLTS AND WASHERS MAY BE USED AS AN ALTERNATE FOR THE 3/4" Ø X 2 1/2" GALVANIZED BOLTS AND WASHERS. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.
- C. WIRE STRUT SHOWN IN THE CONCRETE ANCHOR ASSEMBLY DETAIL IS THE MINIMUM ALLOWABLE SIZE AND SHALL HAVE A MINIMUM TENSILE STRENGTH OF 100,000 PSI. AS AN OPTION, A 7/16" Ø WIRE STRUT WITH A MINIMUM TENSILE STRENGTH OF 90,000 PSI IS ACCEPTABLE.
- D. THE METAL RAIL ANCHOR ASSEMBLIES TO BE HOT DIPPED GALVANIZED TO CONFORM TO REQUIREMENTS OF AASHTO M111.
- E. THE COST OF THE METAL RAIL ANCHOR ASSEMBLY WITH BOLTS AND WASHERS COMPLETE IN PLACE SHALL BE INCLUDED IN THE PRICE BID FOR LINEAR FEET OF METAL RAIL.
- F. BOLTS TO BE TIGHTENED ONE-HALF TURN WITH A WRENCH FROM A FINGER-TIGHT POSITION.

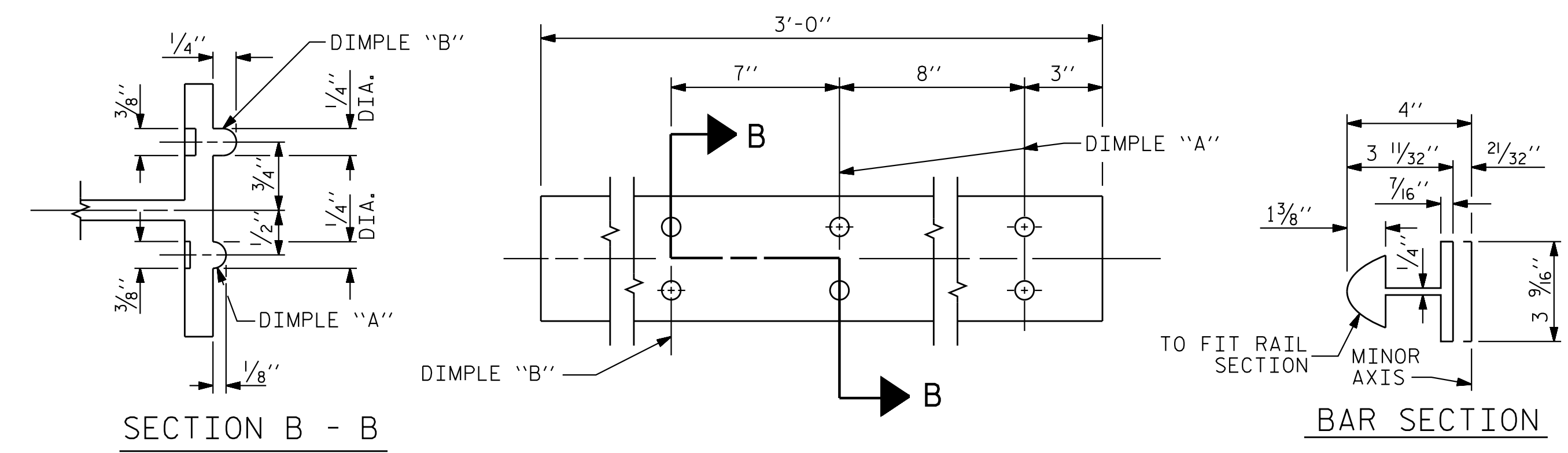
THE CONTRACTOR MAY USE ADHESIVELY ANCHORED ANCHOR BOLTS IN PLACE OF THE METAL RAIL ANCHOR ASSEMBLY. LEVEL ONE FIELD TESTING IS REQUIRED, AND THE YIELD LOAD OF THE 3/4" Ø BOLT IS 10 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE THE STANDARD SPECIFICATIONS.

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

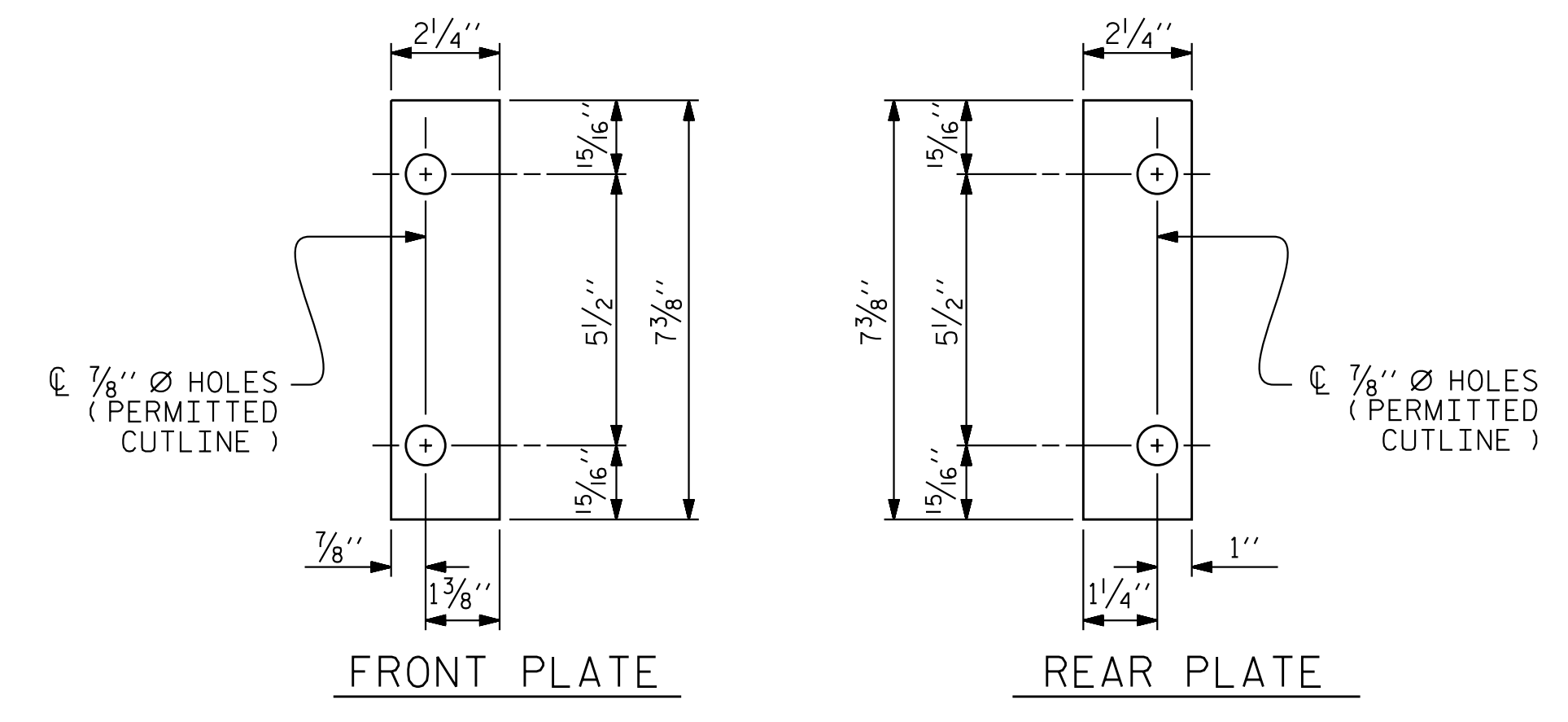


4-BOLT METAL RAIL ANCHOR ASSEMBLY

( 68 ASSEMBLIES REQUIRED )

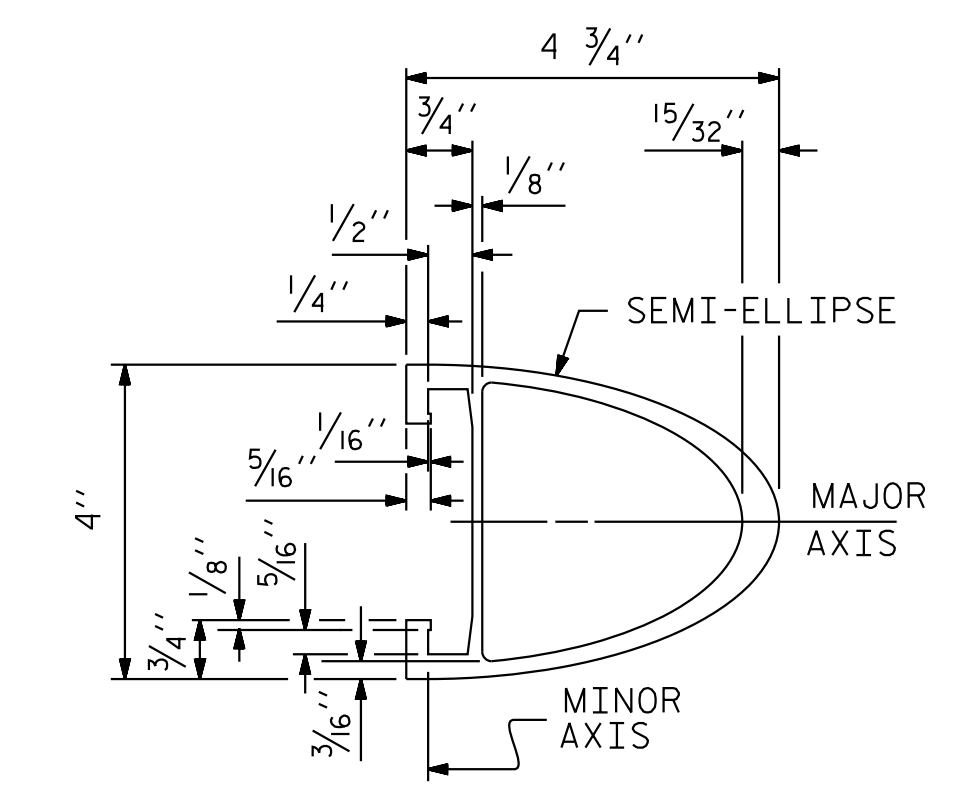


EXPANSION BAR DETAILS

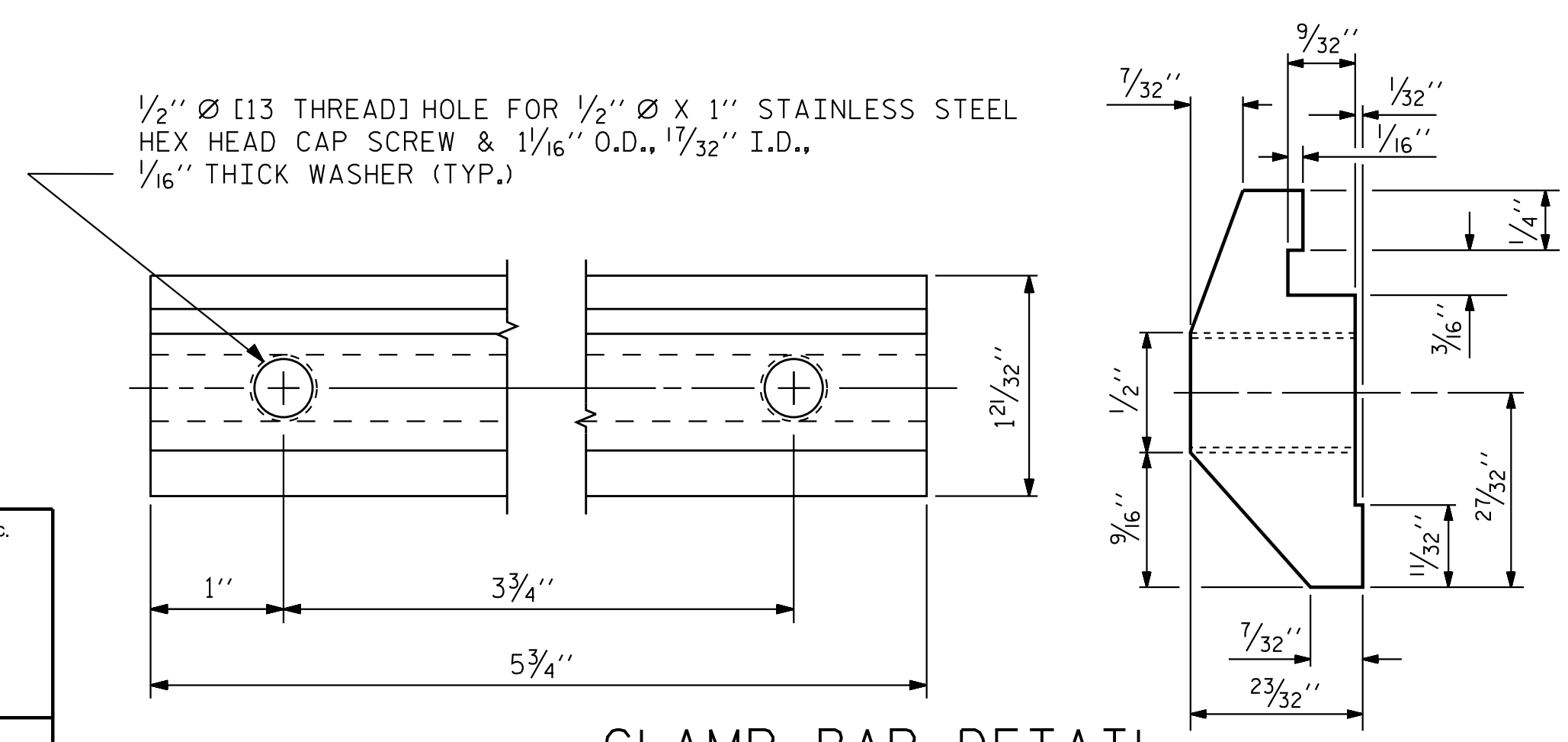


SHIM DETAILS

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

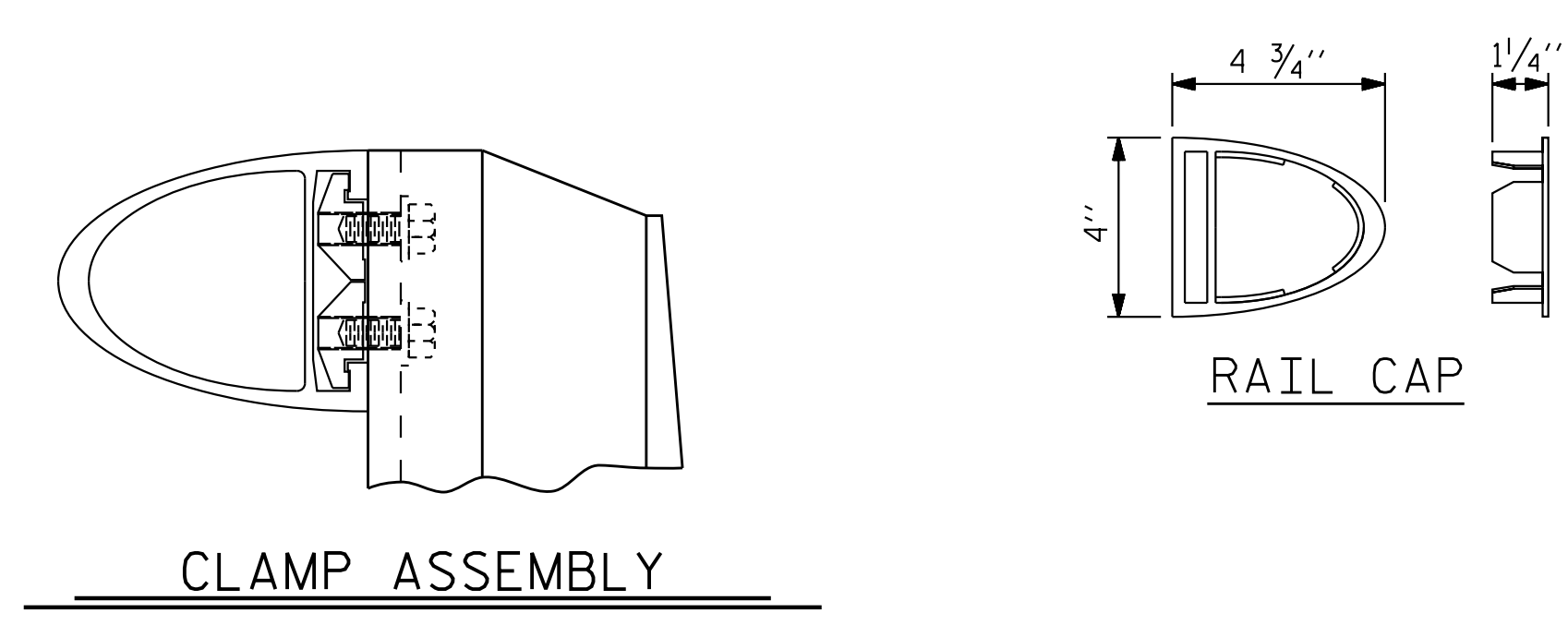


RAIL SECTION



CLAMP BAR DETAIL

( 4 REQUIRED PER POST )



CLAMP ASSEMBLY

PROJECT NO. B-4571  
 LINCOLN COUNTY  
 STATION: 17+40.00 -L-

SHEET 3 OF 3

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



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

STD. NO. BMR4

2019-07-25 10:44:41 vfr:aga U:\Structures\Dr\offring\Final\B-4571\_SML\BR6-540007.dgn

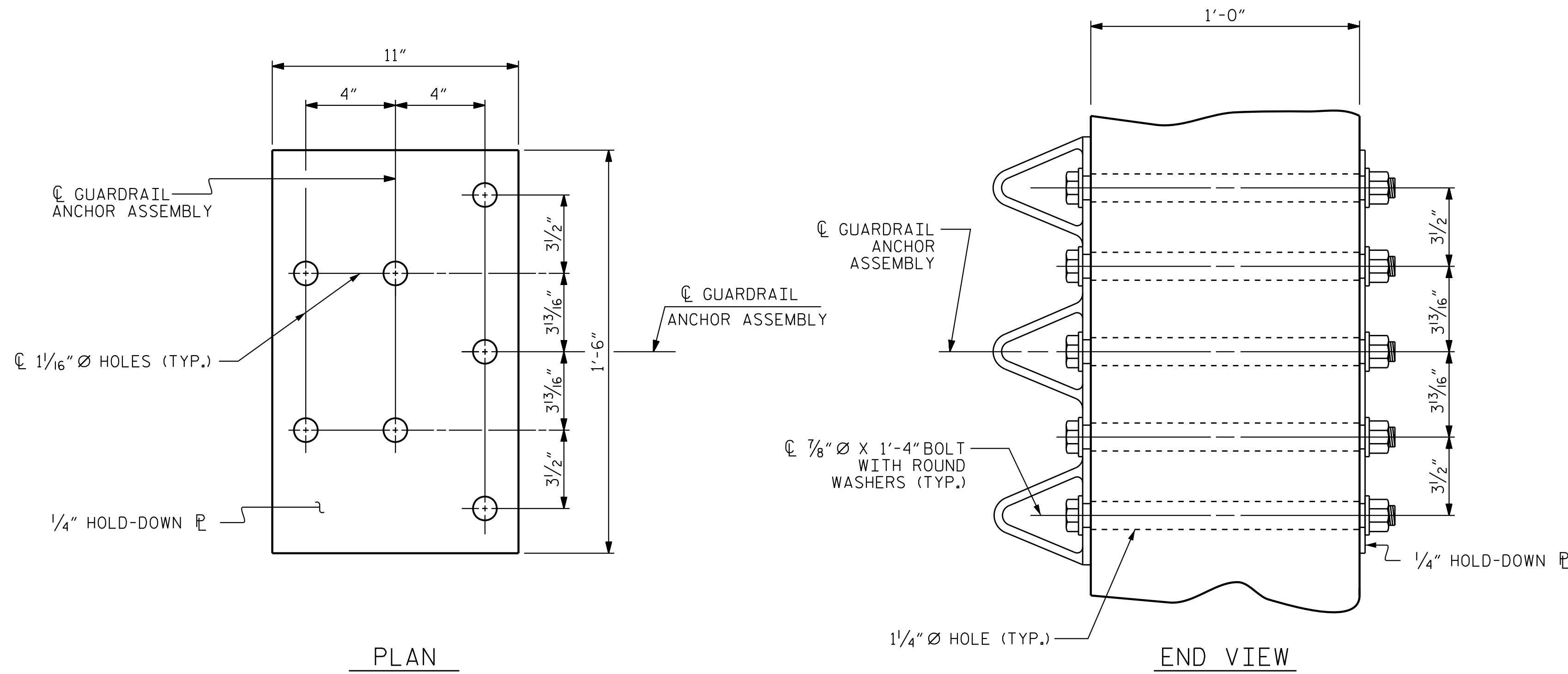
Stantec Consulting Services Inc.  
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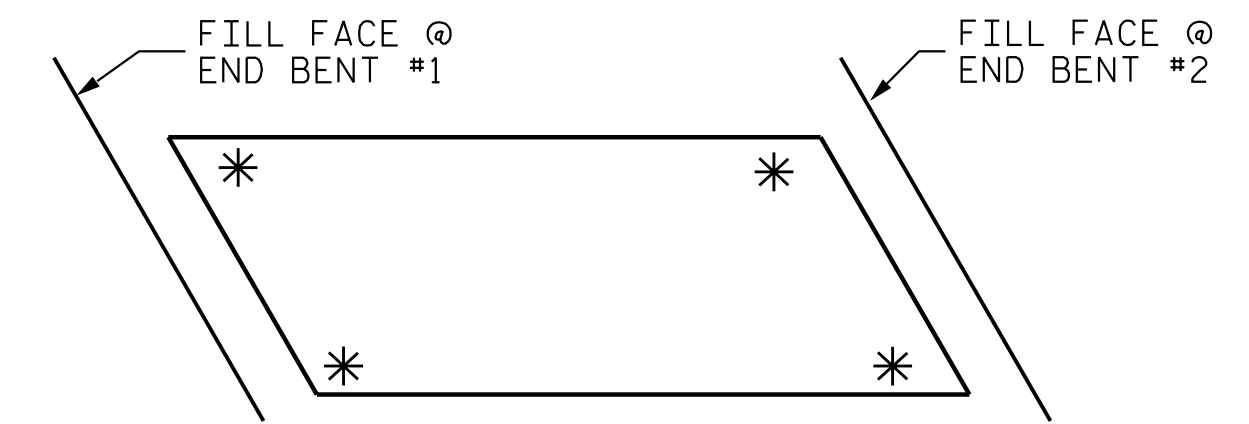
ASSEMBLED BY : V. E. FRAGA DATE : 03/15/19  
 CHECKED BY : T. R. DUDECK DATE : 04/05/19

DRAWN BY : EEM 6/94 REV. 5/1/06R KMM/GM  
 CHECKED BY : RCW 6/94 REV. 10/1/11 MAA/GM  
 REV. 12/17 MAA/THC



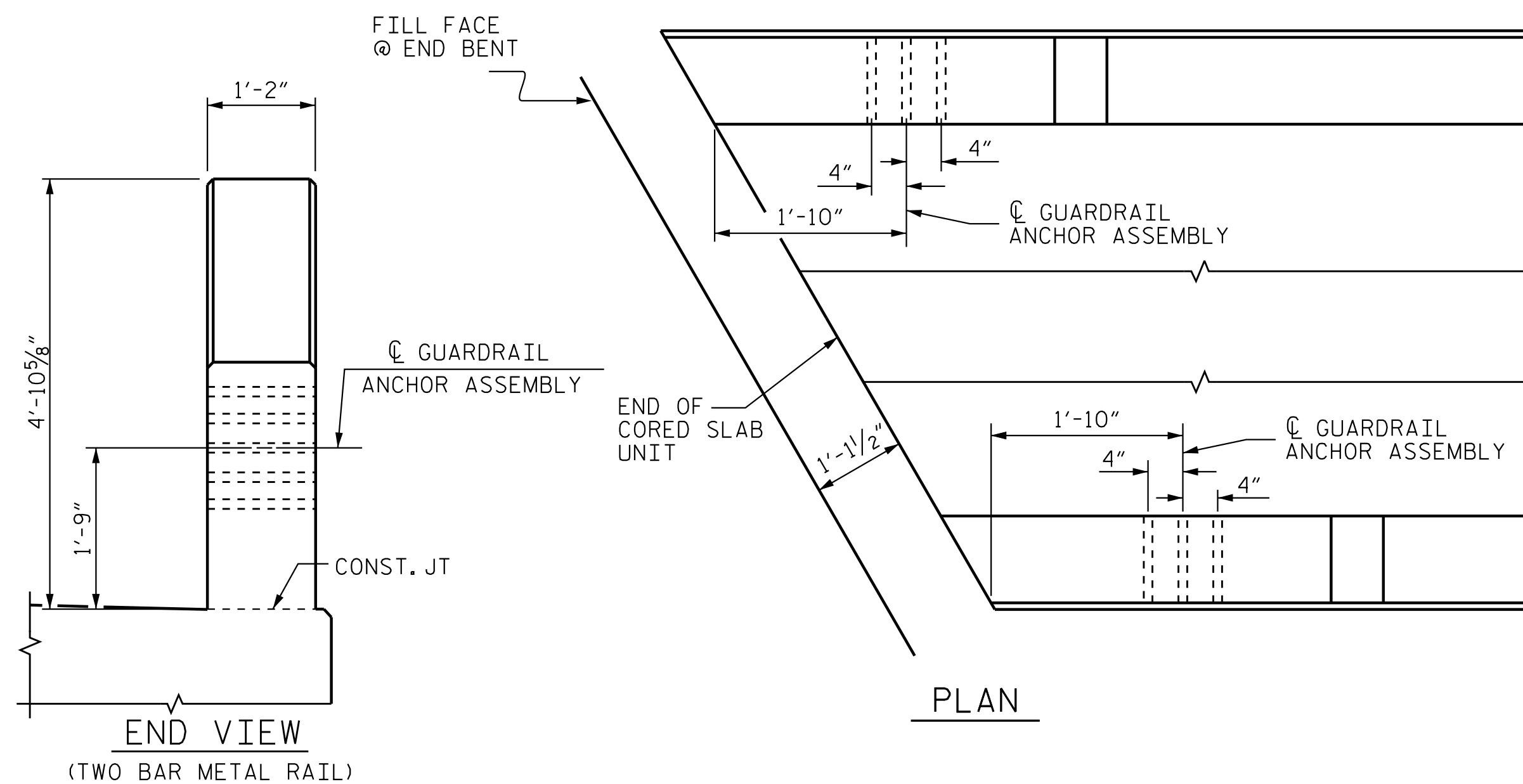


**GUARDRAIL ANCHOR ASSEMBLY DETAILS**



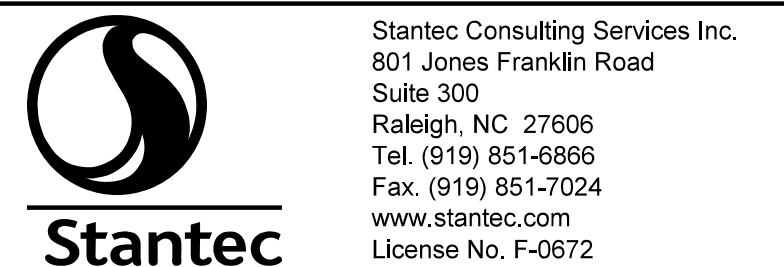
**SKETCH SHOWING POINTS OF ATTACHMENT**

\* LOCATION OF GUARDRAIL ATTACHMENT

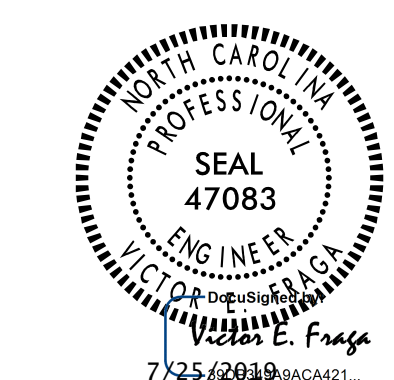


**LOCATION OF GUARDRAIL ANCHOR AT END POST**

2019-07-25 10:44:41 vfraga  
 2019-07-25 10:44:41 vfraga  
 2019-07-25 10:44:41 vfraga



DESIGN ENGINEER OF RECORD:	V. E. FRAGA	DATE :	07/24/19
ASSEMBLED BY :	V. E. FRAGA	DATE :	02/25/19
CHECKED BY :	T. R. DUDECK	DATE :	04/05/19
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



PROJECT NO. B-4571  
LINCOLN COUNTY  
 STATION: 17+40.00 -L-

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

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

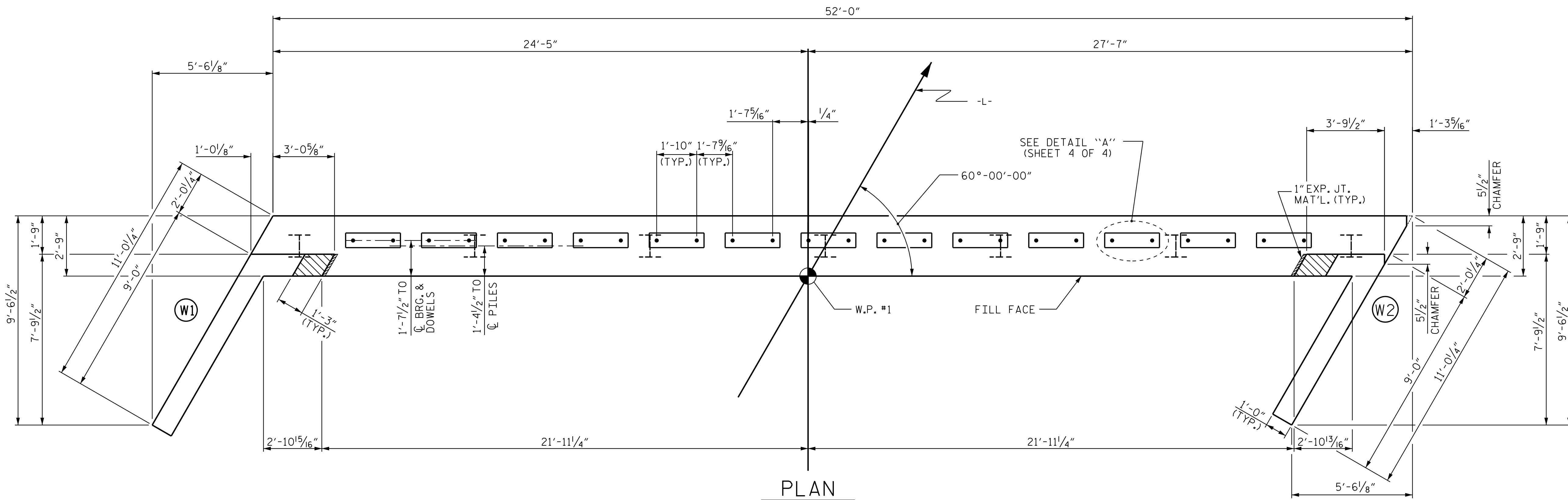
NOTES

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.

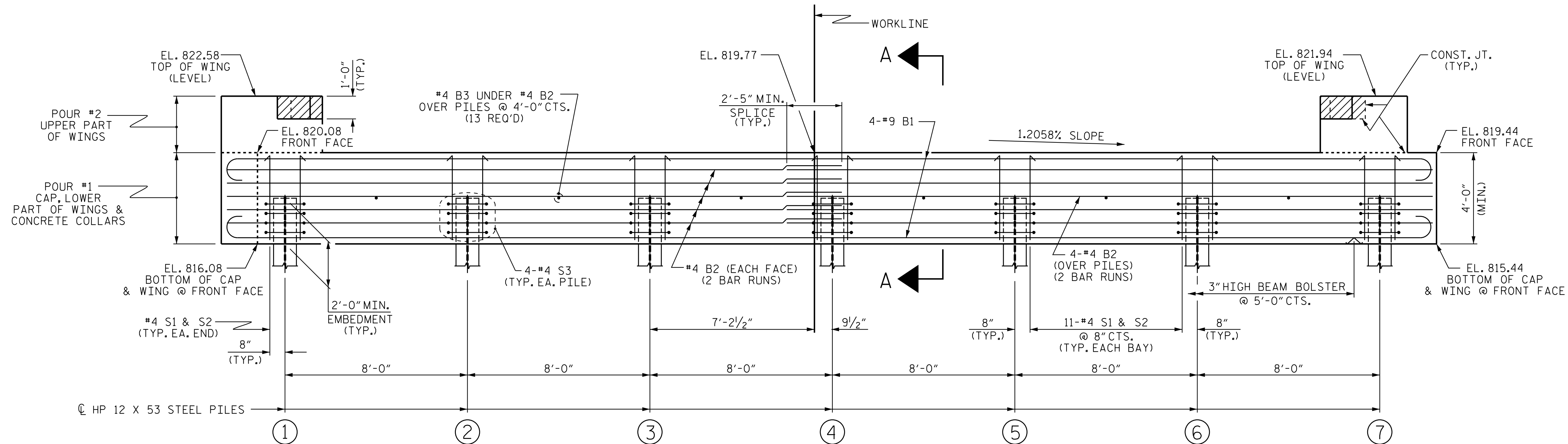
FOR PILE SPLICE DETAILS, SEE SHEET 4 OF 4.

FOR WING DETAILS, SEE SHEET 3 OF 4.



PLAN

TOP OF PILE ELEVATIONS	
①	818.13
②	818.03
③	817.94
④	817.84
⑤	817.74
⑥	817.65
⑦	817.55



ELEVATION

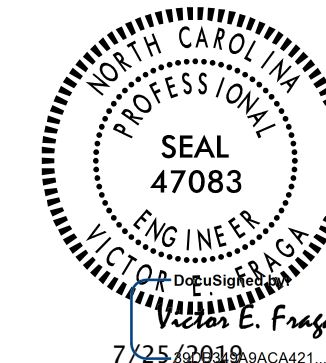
WINGS NOT SHOWN FOR CLARITY.  
FOR SECTION A-A, SEE SHEET 4 OF 4.  
CONCRETE COLLARS FOR STEEL PILES NOT SHOWN IN PLAN AND ELEVATION VIEWS FOR CLARITY.  
SEE "CORROSION PROTECTION FOR STEEL PILES DETAIL", SHEET 4 OF 4.

PROJECT NO. B-4571  
LINCOLN COUNTY  
STATION: 17+40.00 -L-

SHEET 1 OF 4

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DESIGN ENGINEER OF RECORD: V. E. FRAGA DATE: 07/24/19  
ASSEMBLED BY: V. E. FRAGA DATE: 02/25/19  
CHECKED BY: T. R. DUDECK DATE: 04/05/19  
DRAWN BY: WJH 12/11  
CHECKED BY: AAC 12/11  
REV. 4/15 MAA/TMG



STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

SUBSTRUCTURE  
END BENT No. 1

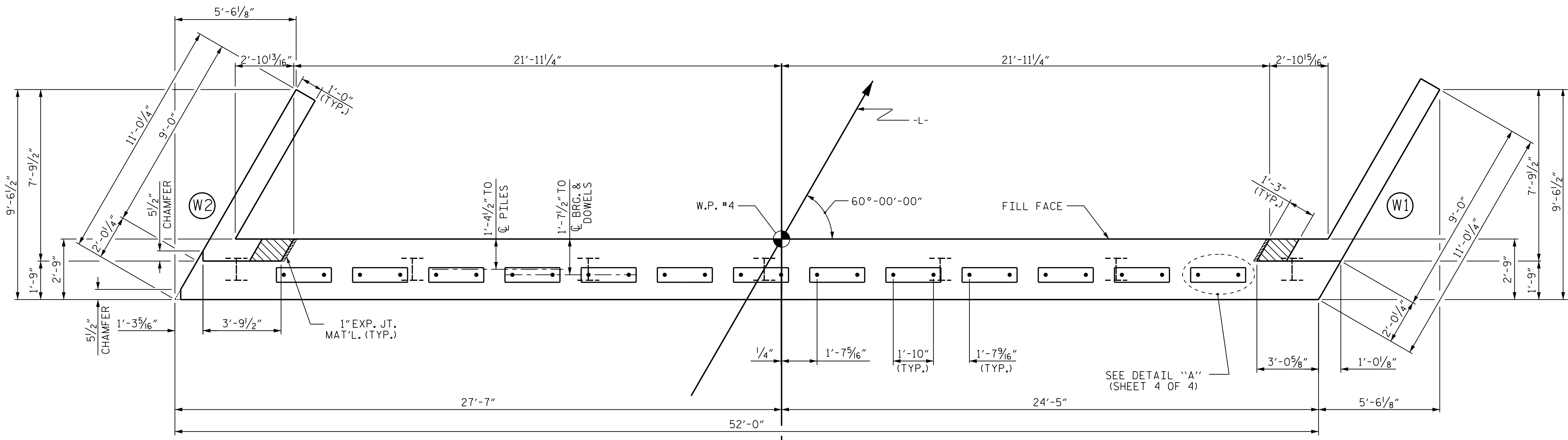
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-20
1			3			TOTAL SHEETS 29
2			4			

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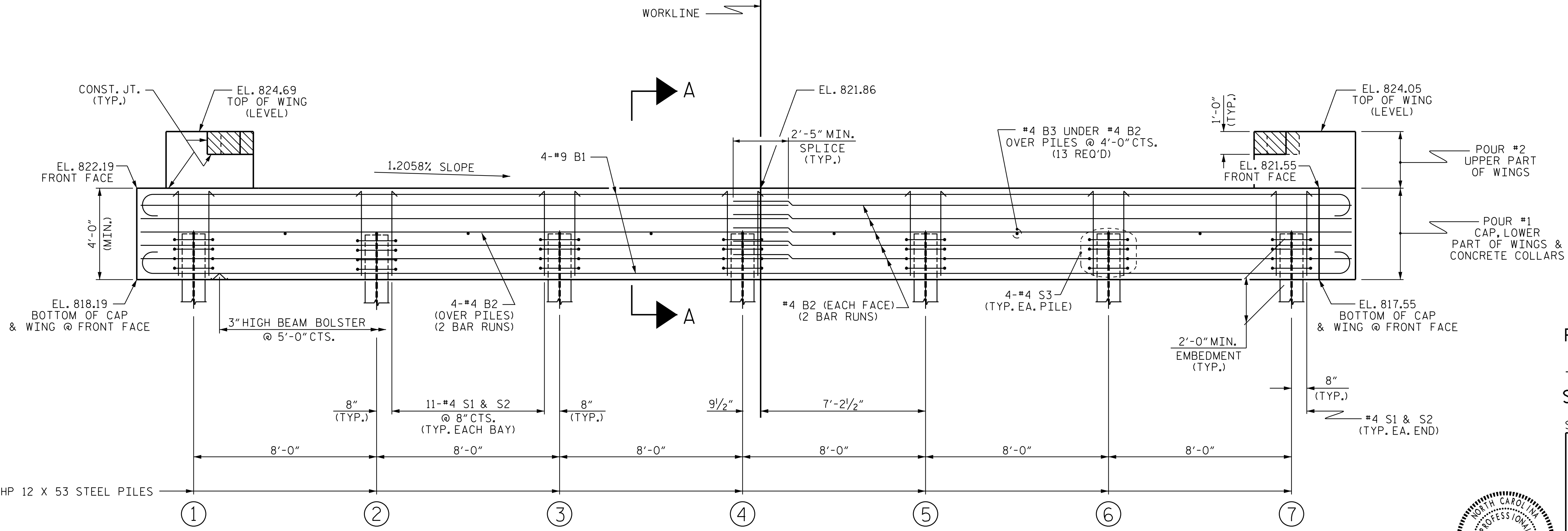


NOTES

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

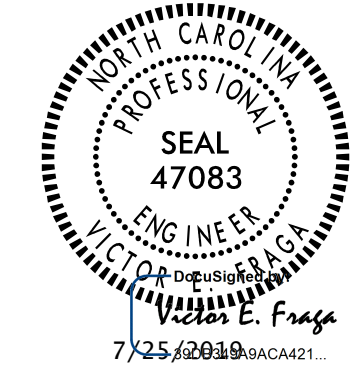
TOP OF PILE ELEVATIONS	
①	820.24
②	820.15
③	820.05
④	819.95
⑤	819.86
⑥	819.76
⑦	819.67

PROJECT NO. B-4571  
LINCOLN COUNTY  
 STATION: 17+40.00 -L-  
 SHEET 2 OF 4

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

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



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.

DESIGN ENGINEER OF RECORD: V. E. FRAGA DATE: 07/24/19

ASSEMBLED BY: V. E. FRAGA DATE: 03/14/19  
 CHECKED BY: T. R. DUDECK DATE: 04/05/19

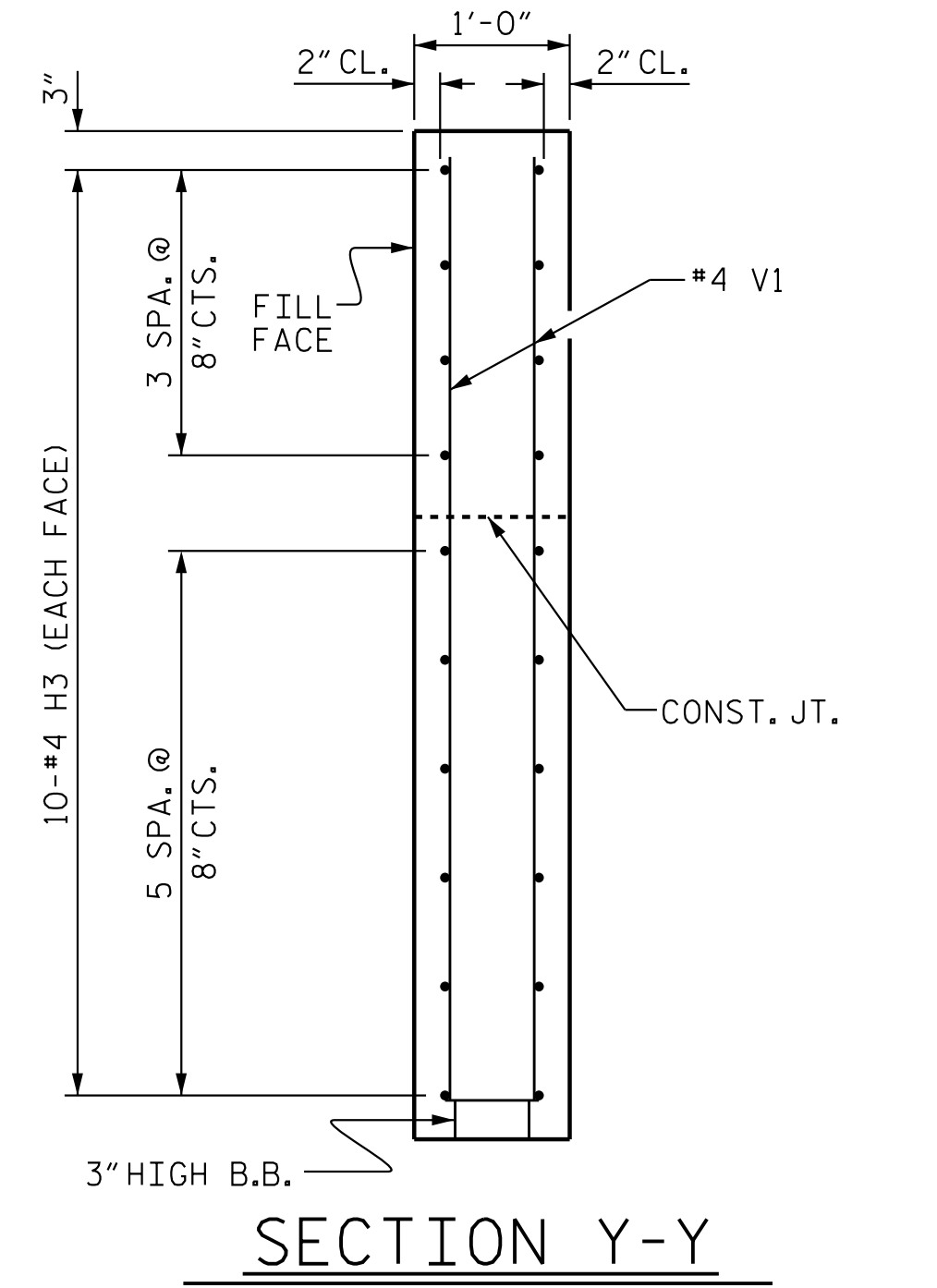
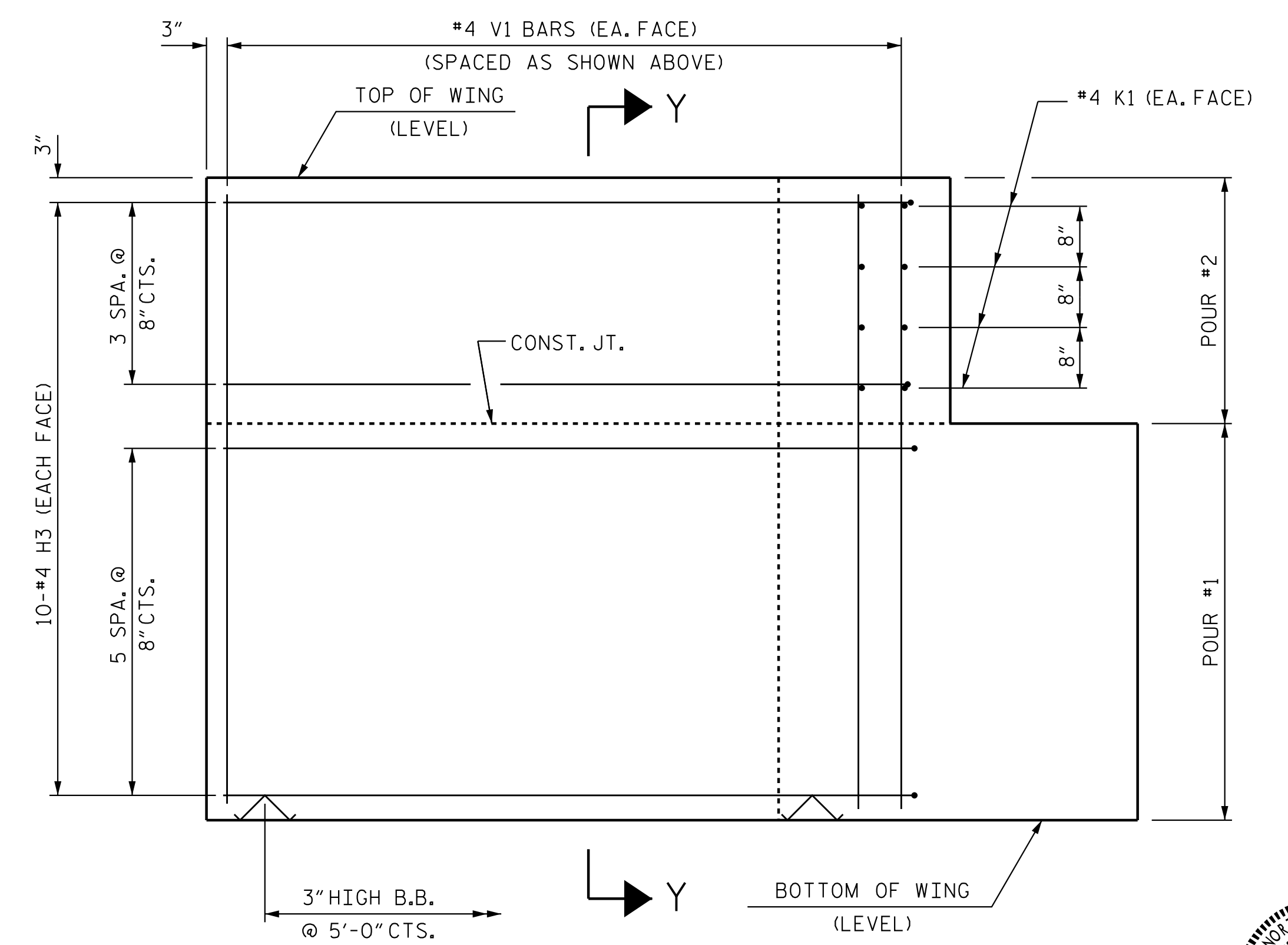
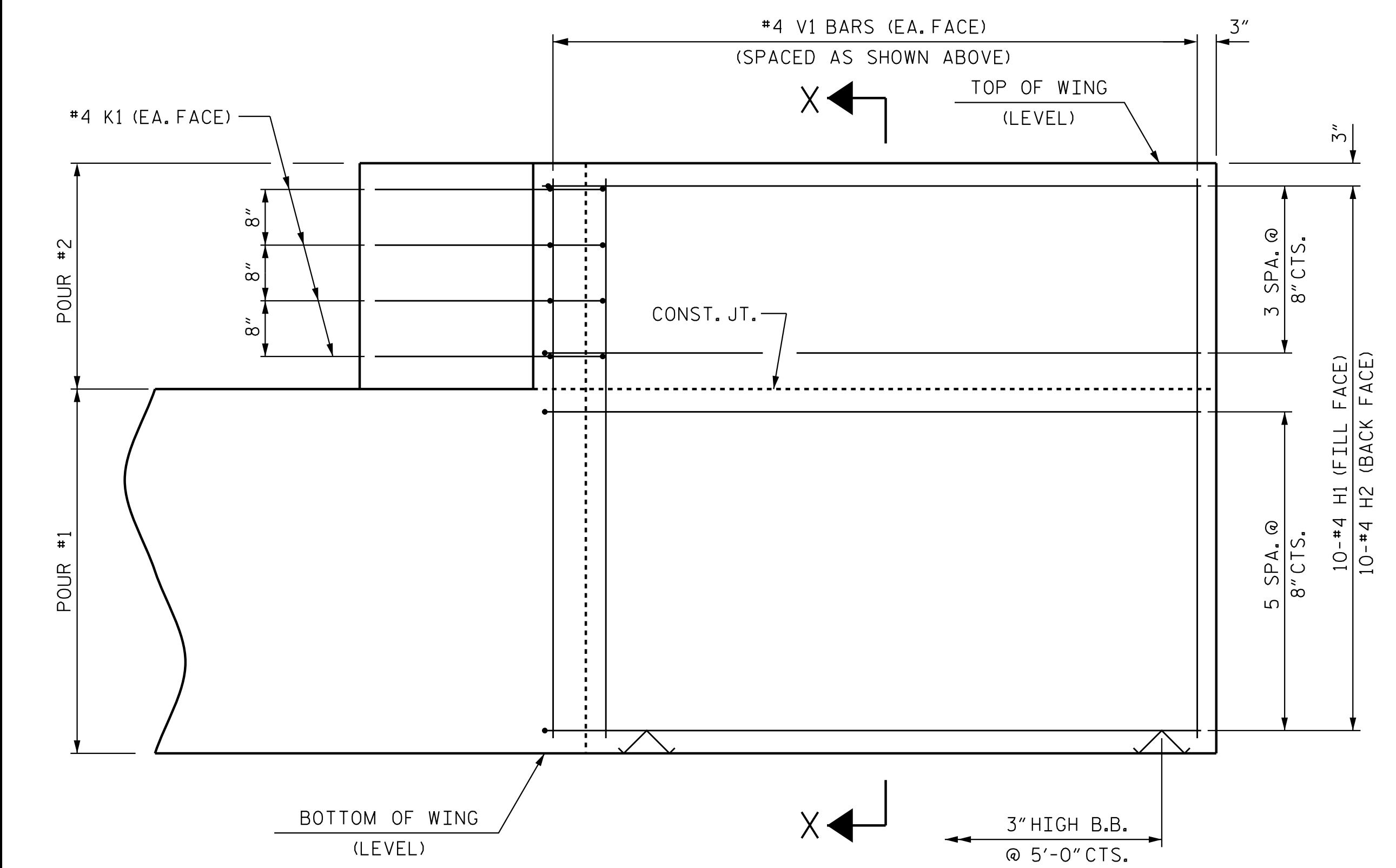
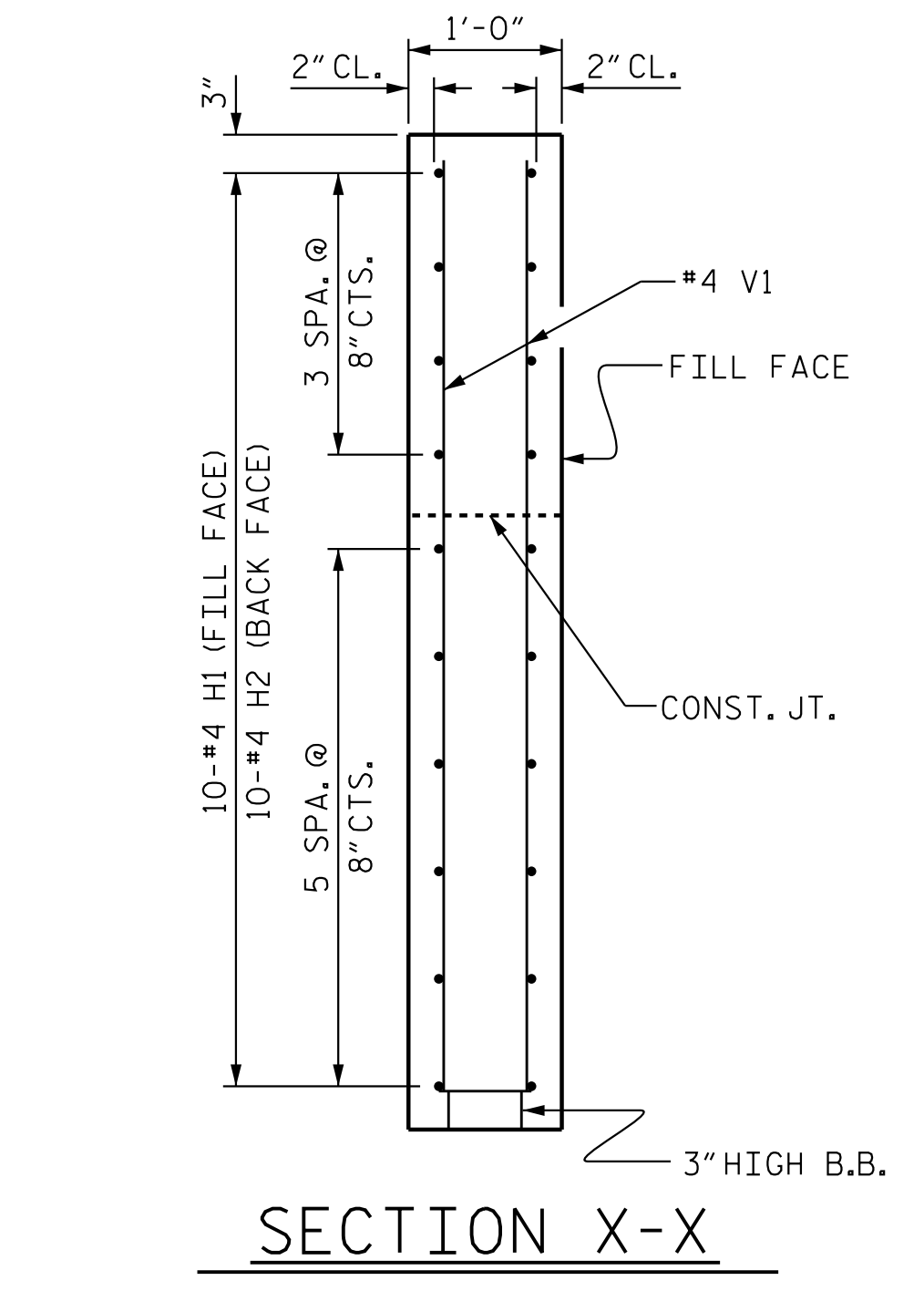
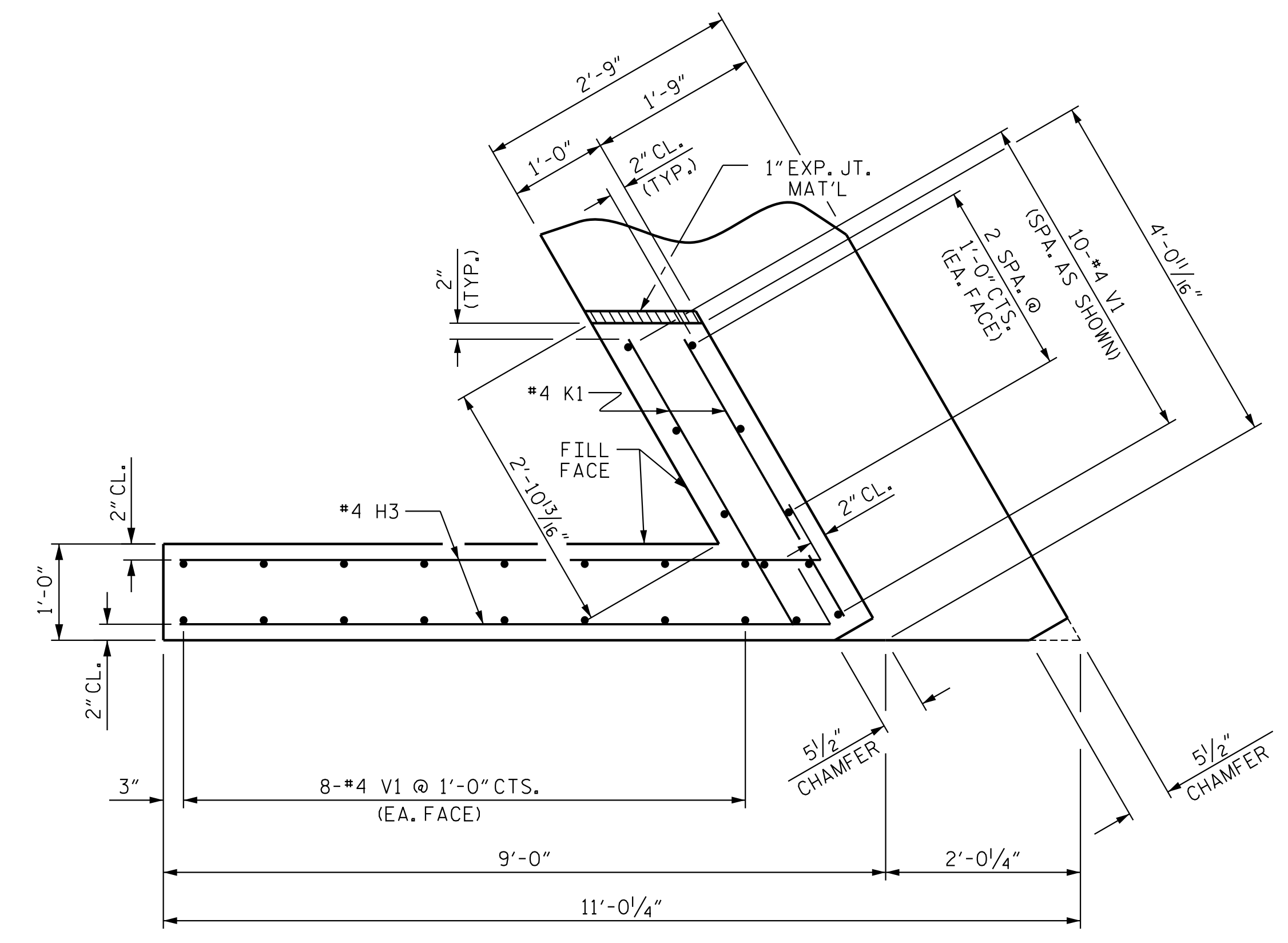
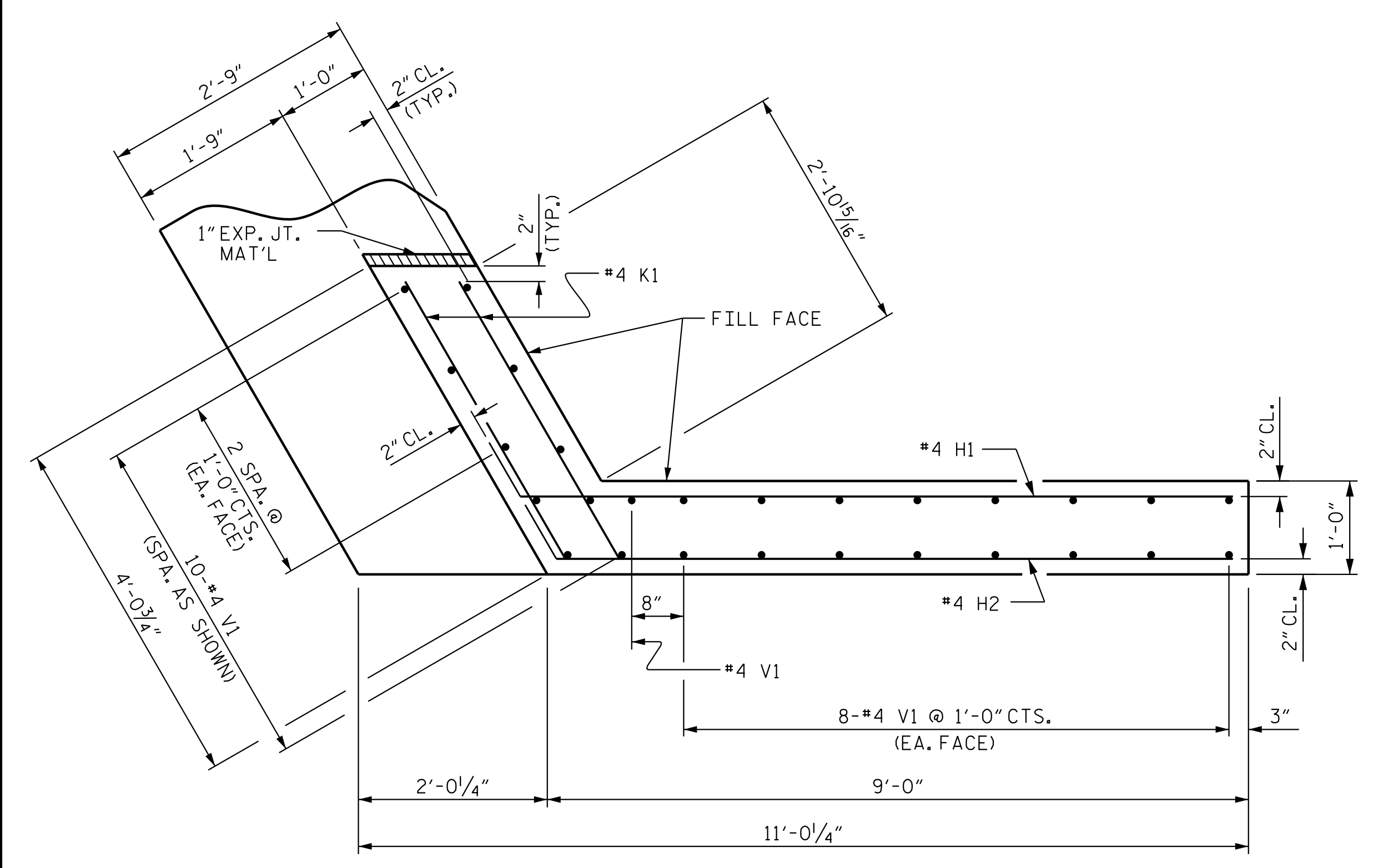
DRAWN BY: WJH 12/11  
 CHECKED BY: AAC 12/11

REV. 4/15 MAA/TMG

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ELEVATION OF WING (W1)

ELEVATION OF WING (W2)

PROJECT NO. B-4571  
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 SHEET 3 OF 4

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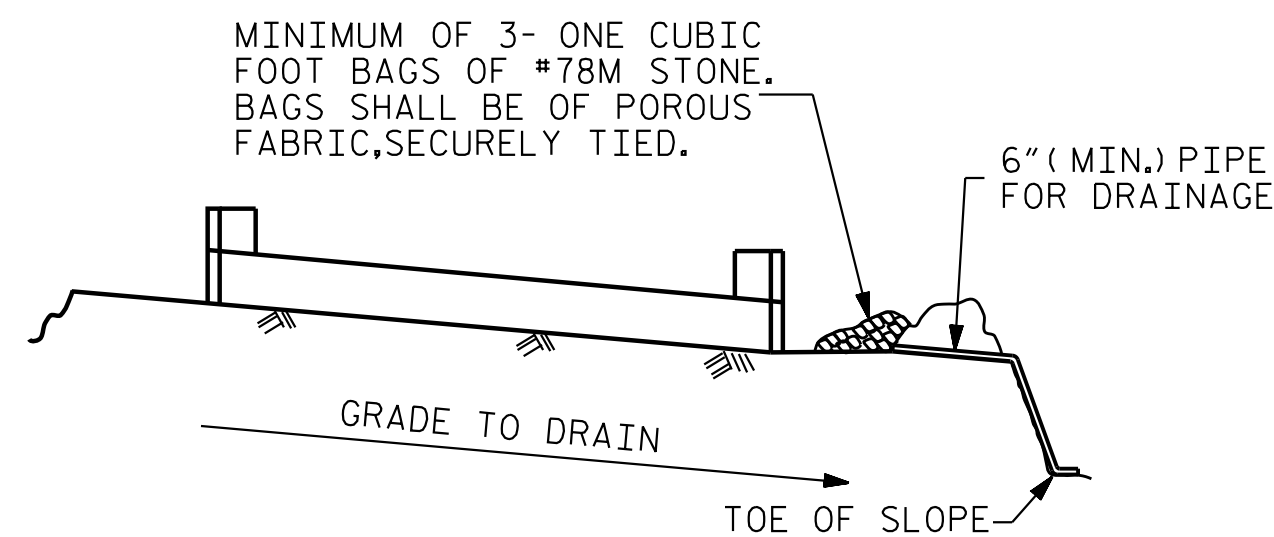
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WING DETAILS

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STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
SUBSTRUCTURE END BENT WING DETAILS					
REVISIONS					
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2			4		
SHEET NO. S-22					TOTAL SHEETS 29



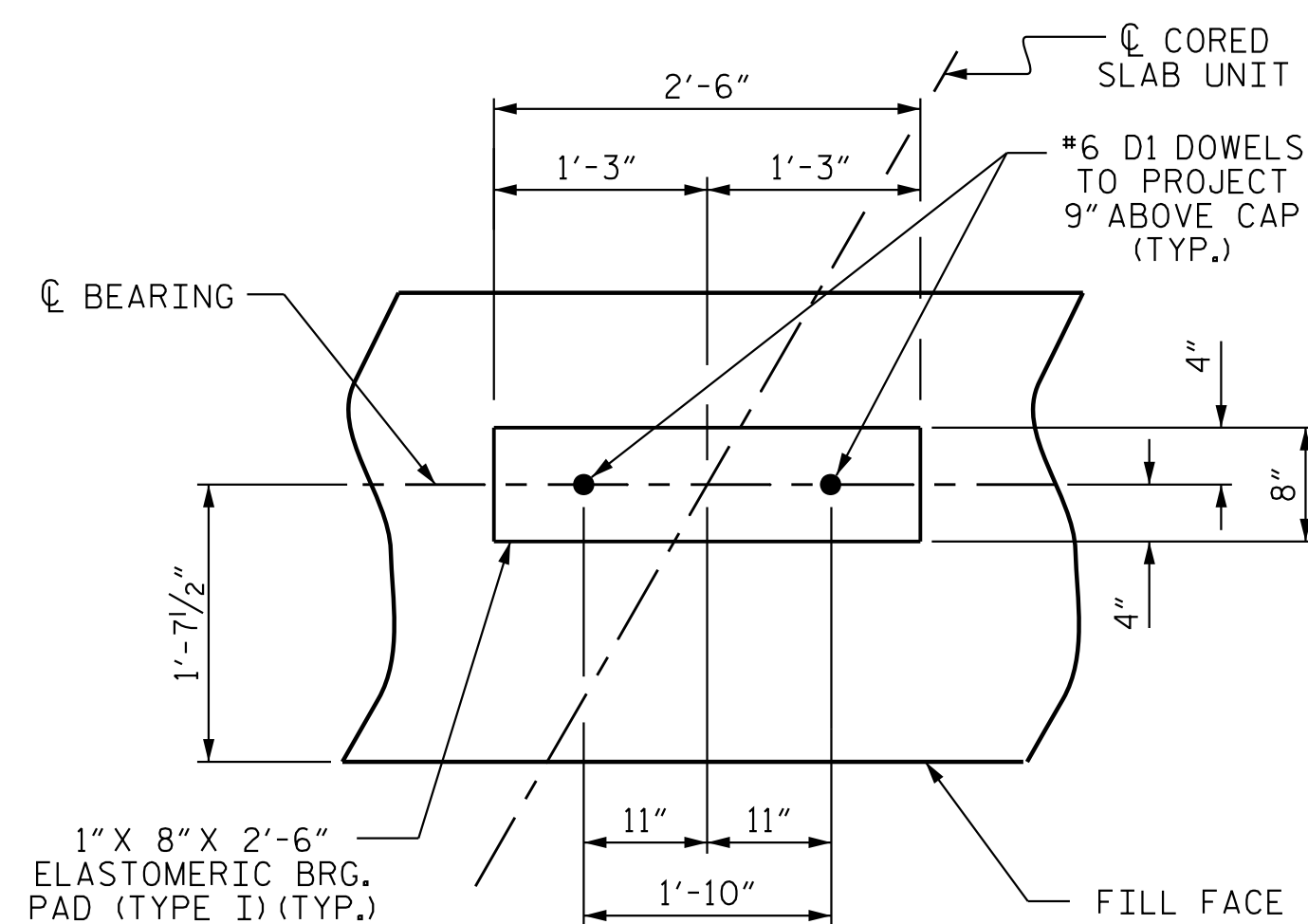


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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.

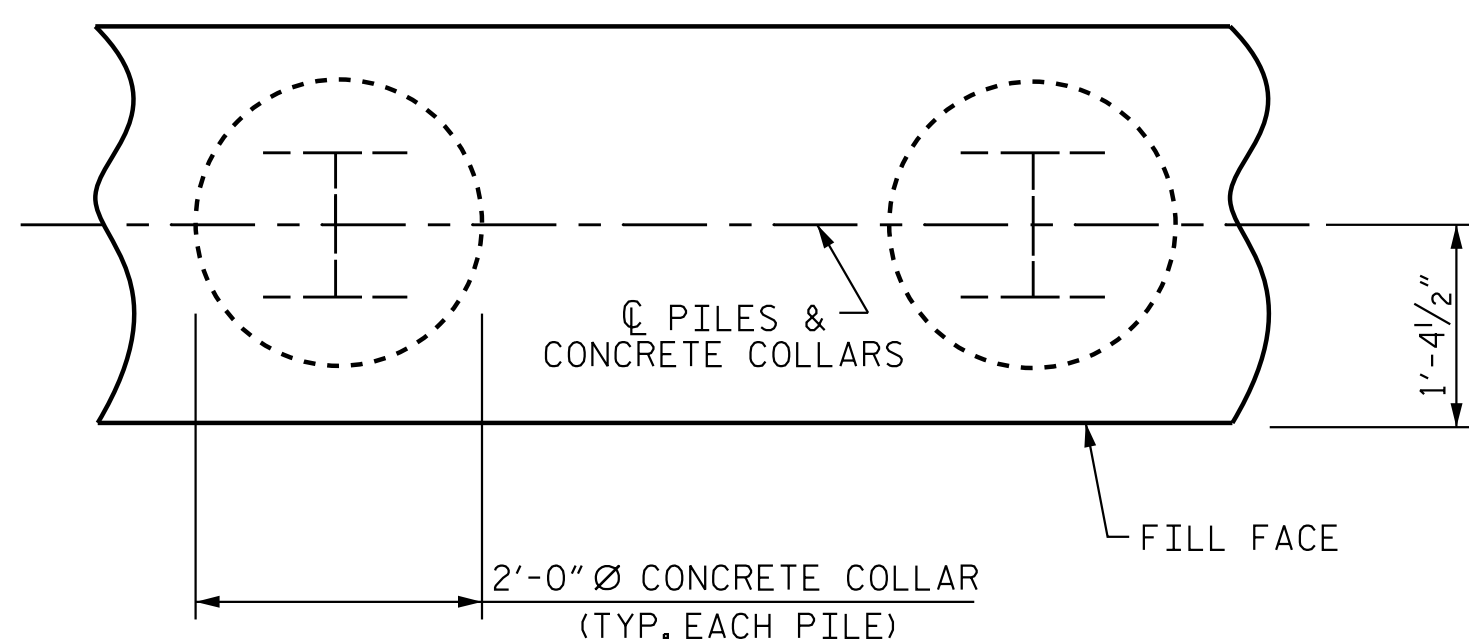
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

### TEMPORARY DRAINAGE AT END BENT

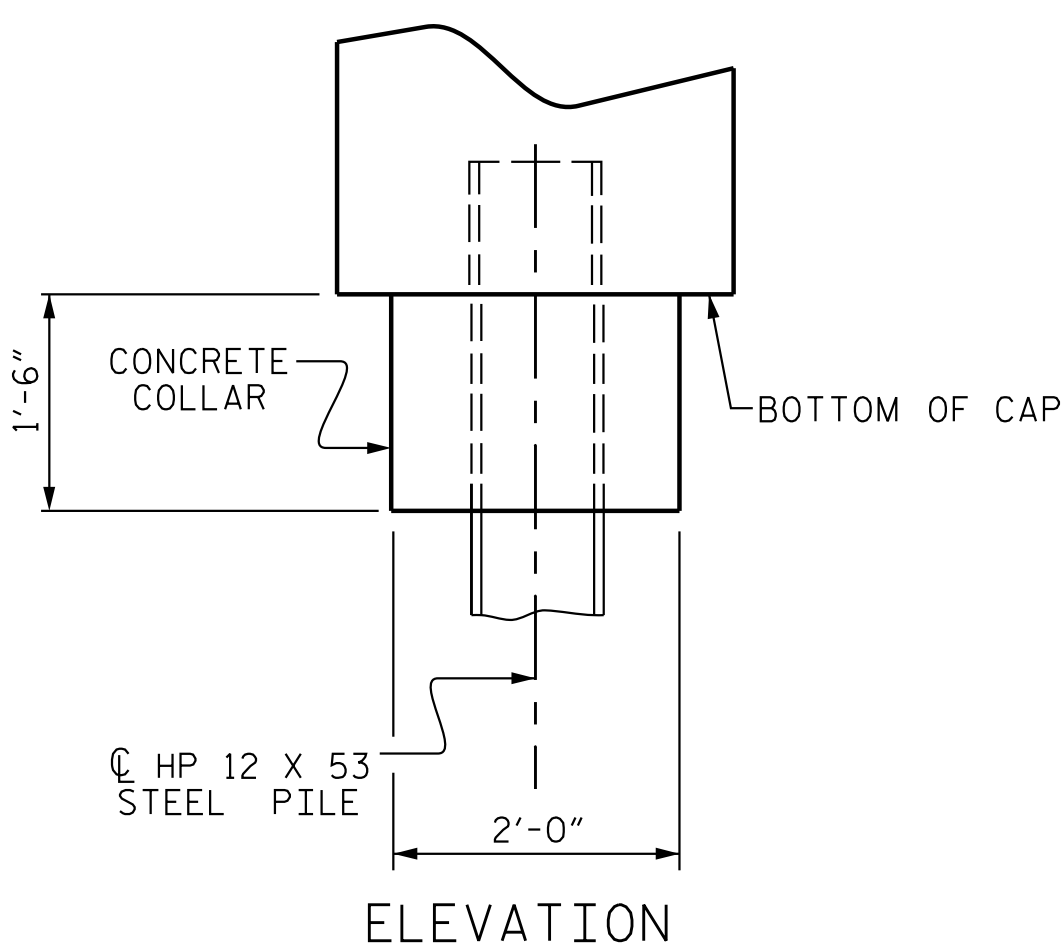


### DETAIL "A"

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



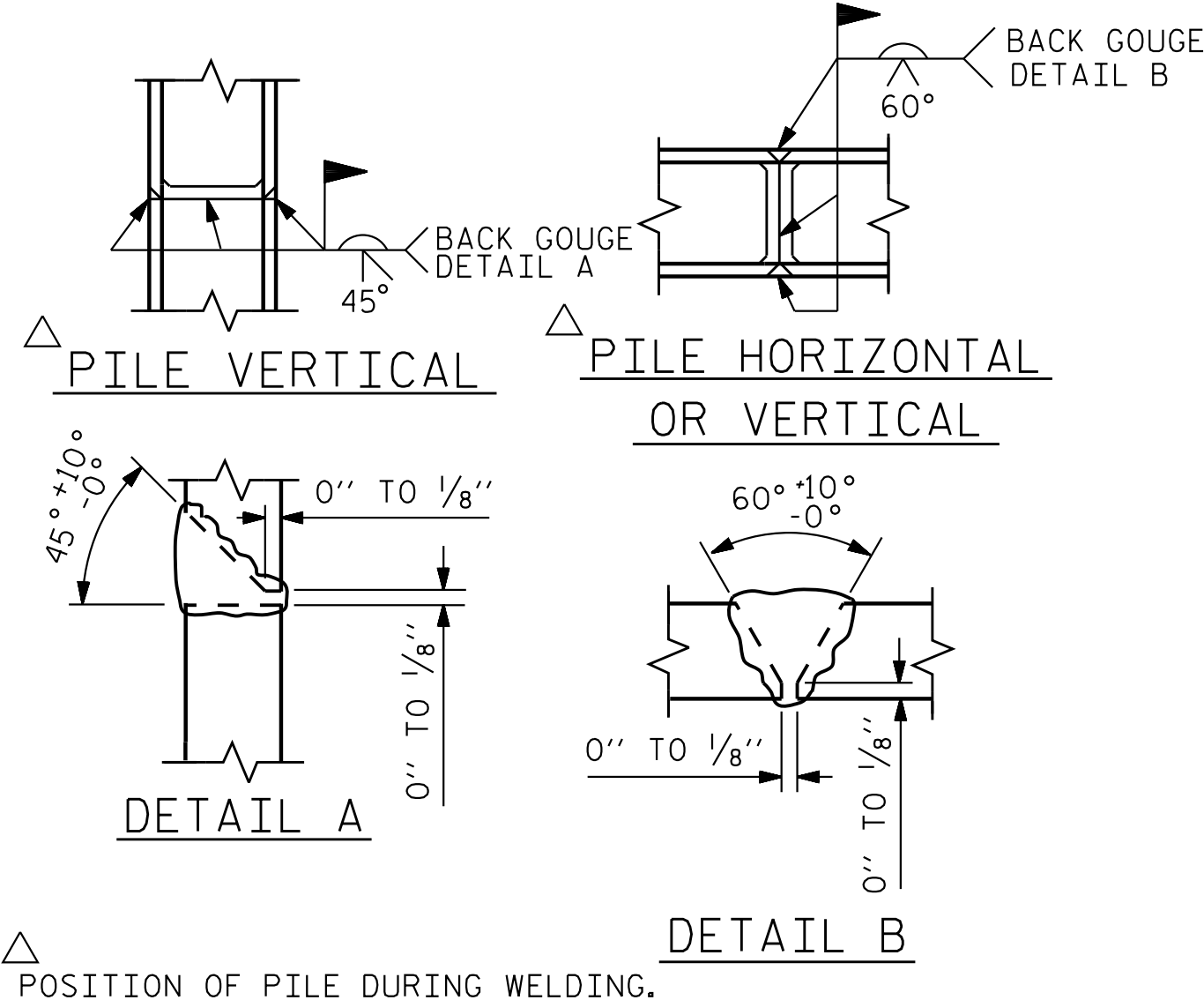
### PLAN



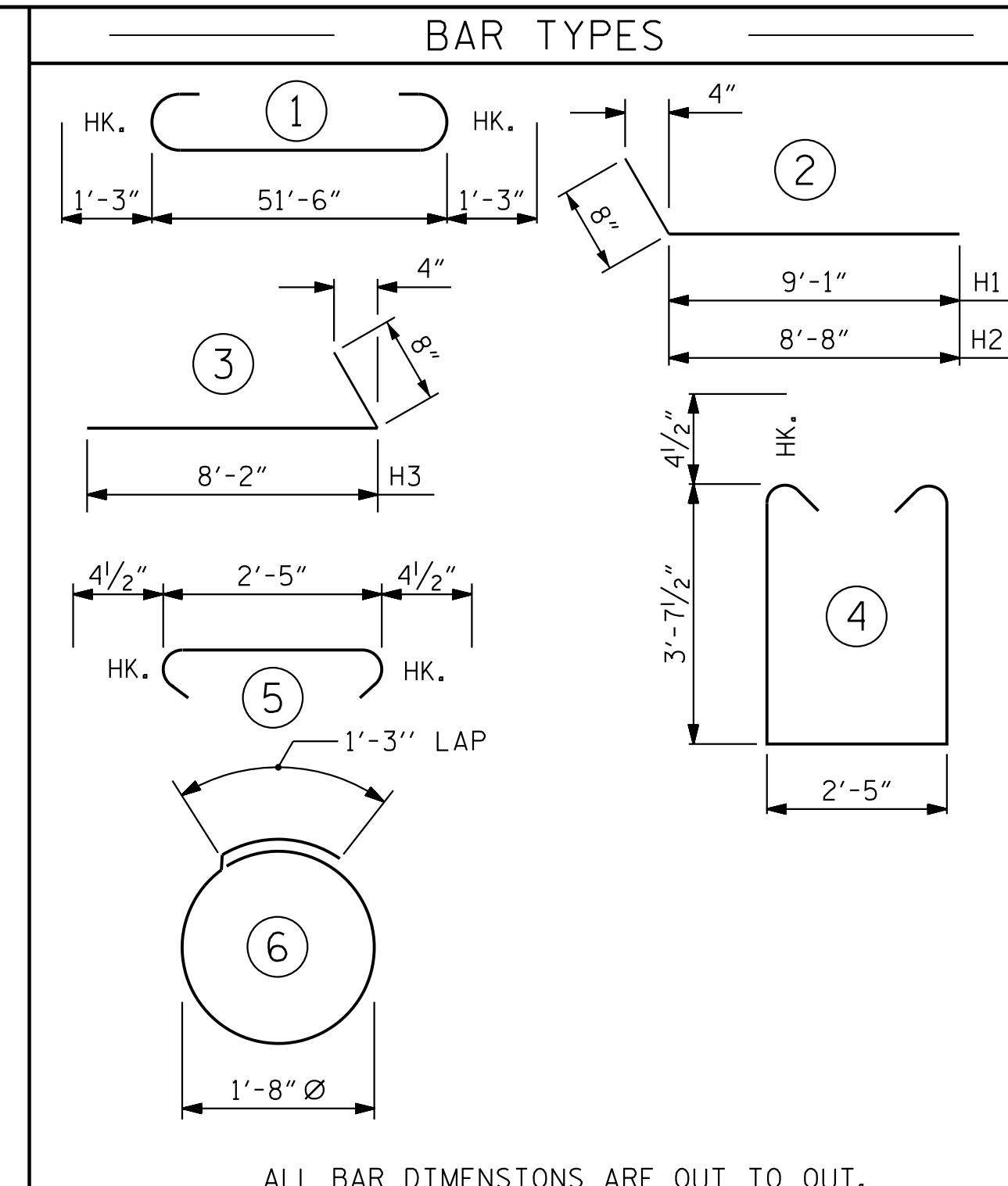
### ELEVATION

### CORROSION PROTECTION FOR STEEL PILES DETAIL

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



### PILE SPLICE DETAILS

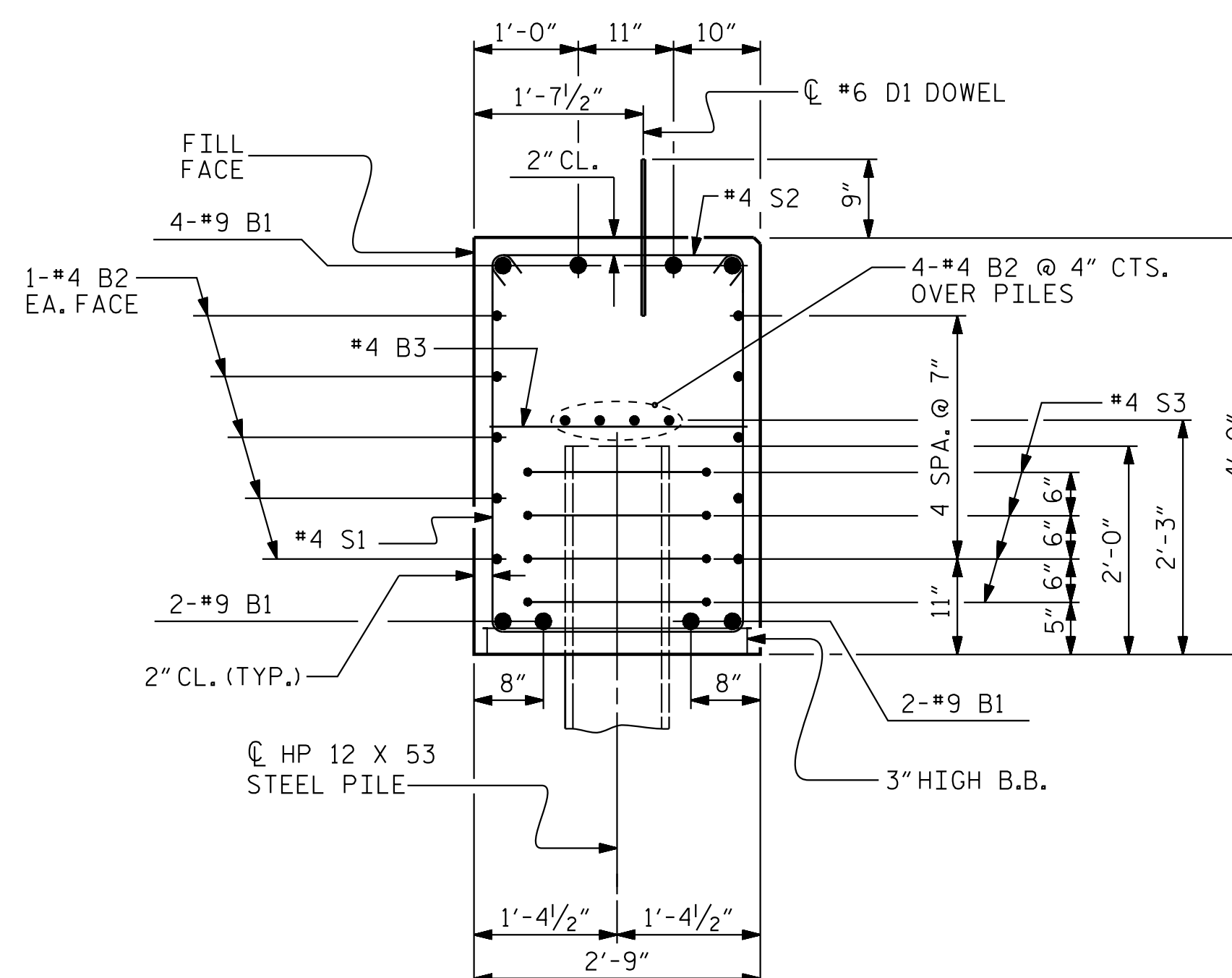


END BENT No. 1	END BENT No. 2
HP 12 X 53 STEEL PILES NO: 7 LIN. FT. = 298	HP 12 X 53 STEEL PILES NO: 7 LIN. FT. = 403
PILE DRIVING EQUIPMENT SETUP FOR HP 12 X 53 STEEL PILES NO: 7	PILE DRIVING EQUIPMENT SETUP FOR HP 12 X 53 STEEL PILES NO: 7

### BILL OF MATERIAL FOR ONE END BENT

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#9		54'-0"	1469
B2	28	#4	STR	27'-1"	507
B3	13	#4	STR	2'-5"	21
D1	26	#6	STR	1'-6"	59
H1	10	#4		9'-9"	65
H2	10	#4		9'-4"	62
H3	20	#4		8'-10"	118
K1	16	#4	STR	3'-3"	35
S1	68	#4		10'-5"	473
S2	68	#4		3'-2"	144
S3	28	#4		6'-6"	122
V1	53	#4	STR	6'-2"	218

REINFORCING STEEL (FOR ONE END BENT)	3293 LBS.
CLASS A CONCRETE BREAKDOWN (FOR ONE END BENT)	
POUR #1 CAP, LOWER PART OF WINGS & COLLARS	24.7 C.Y.
POUR #2 UPPER PART OF WINGS	2.2 C.Y.
TOTAL CLASS A CONCRETE	26.9 C.Y.



### SECTION A-A

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

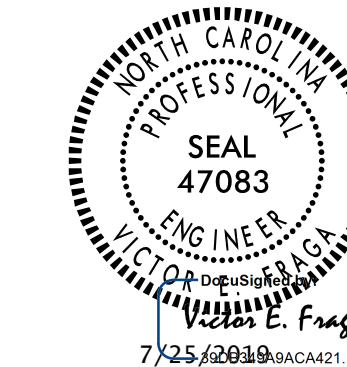
PROJECT NO. B-4571  
LINCOLN COUNTY  
STATION: 17+40.00 -L-

SHEET 4 OF 4

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

SUBSTRUCTURE

END BENT No. 1 & 2  
DETAILS



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DESIGN ENGINEER OF RECORD: V. E. FRAGA	DATE: 07/24/19
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DRAWN BY: WJH 12/11	REV. 4/17 MAA/THC
CHECKED BY: AAC 12/11	



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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.

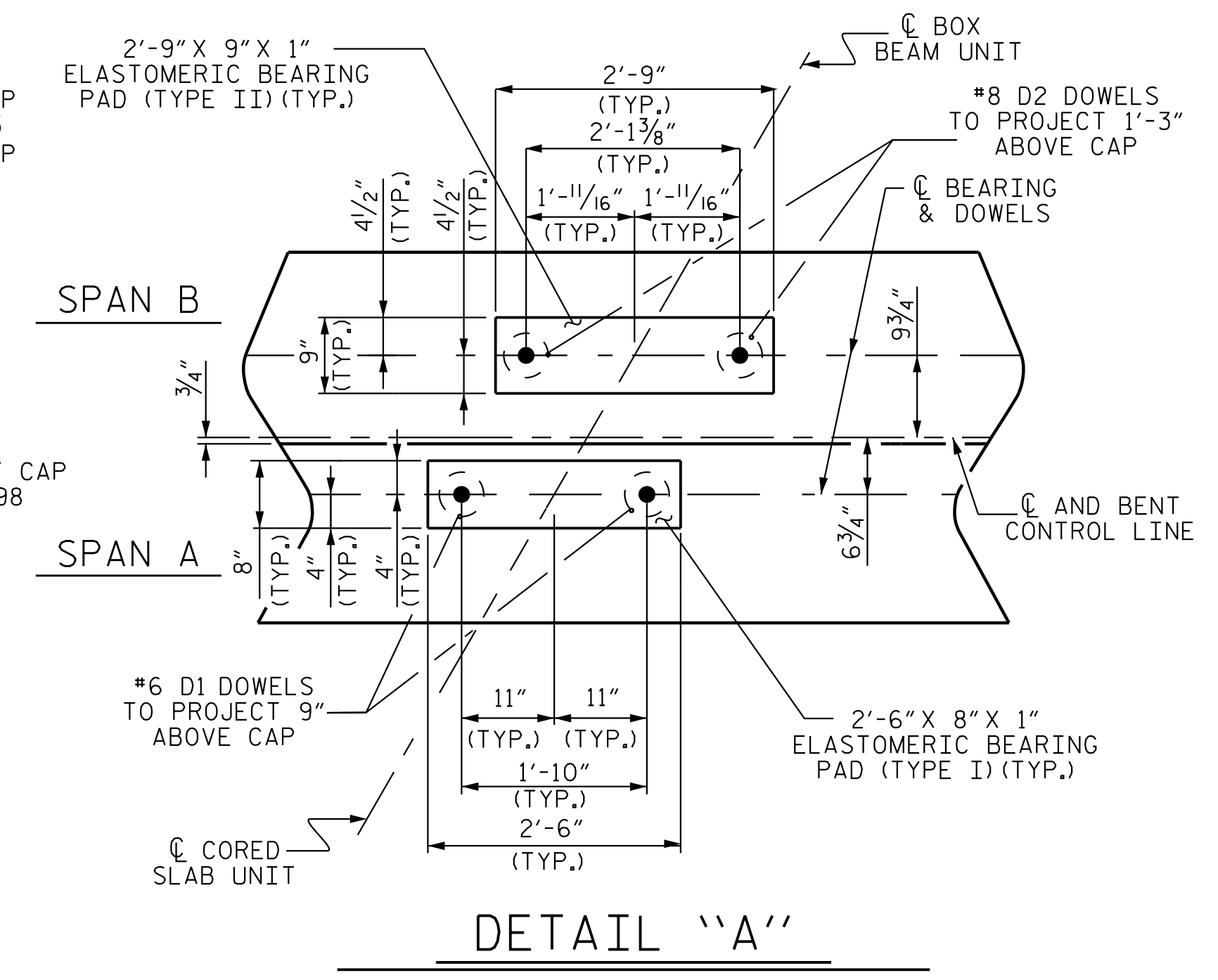
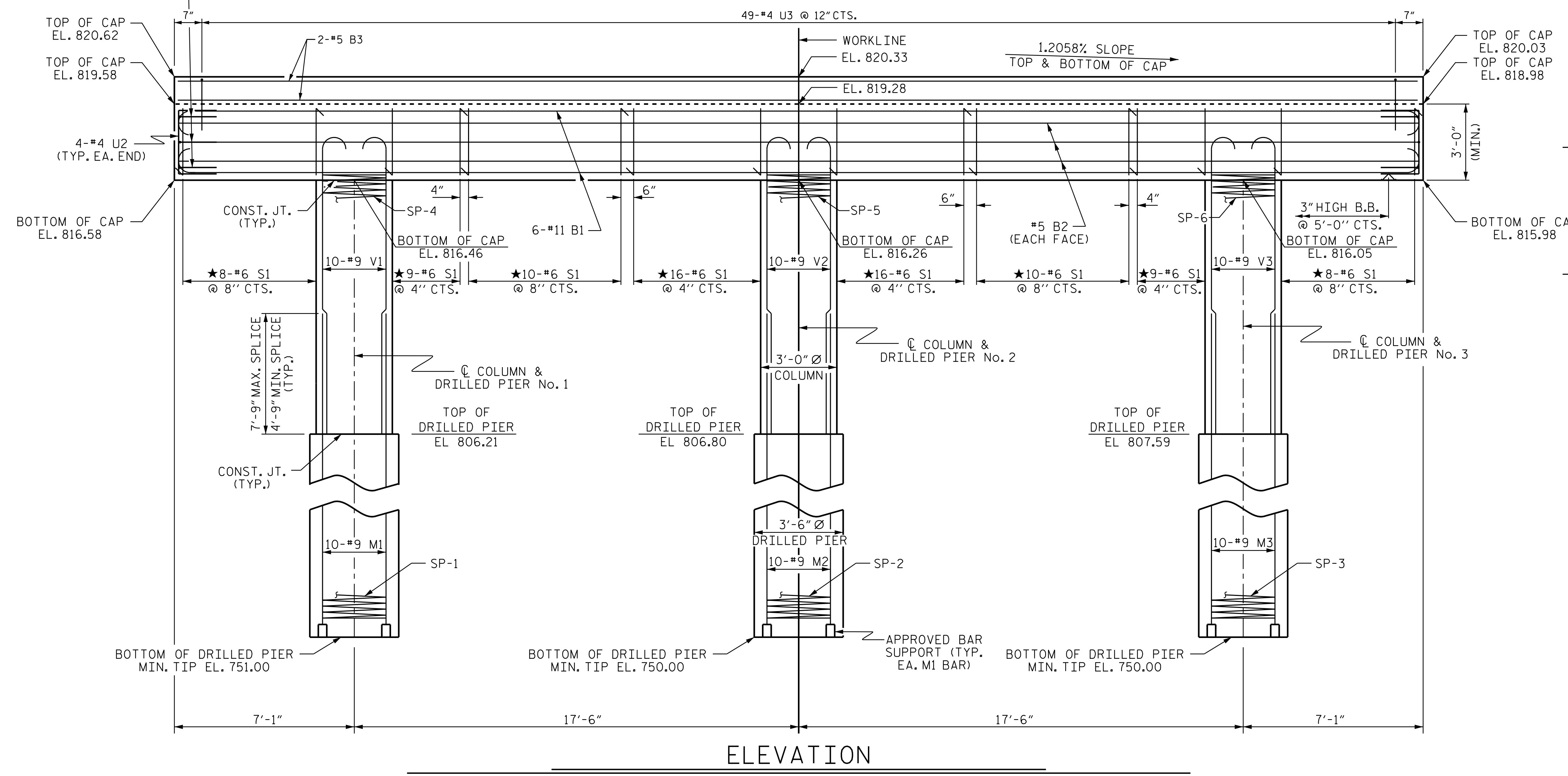
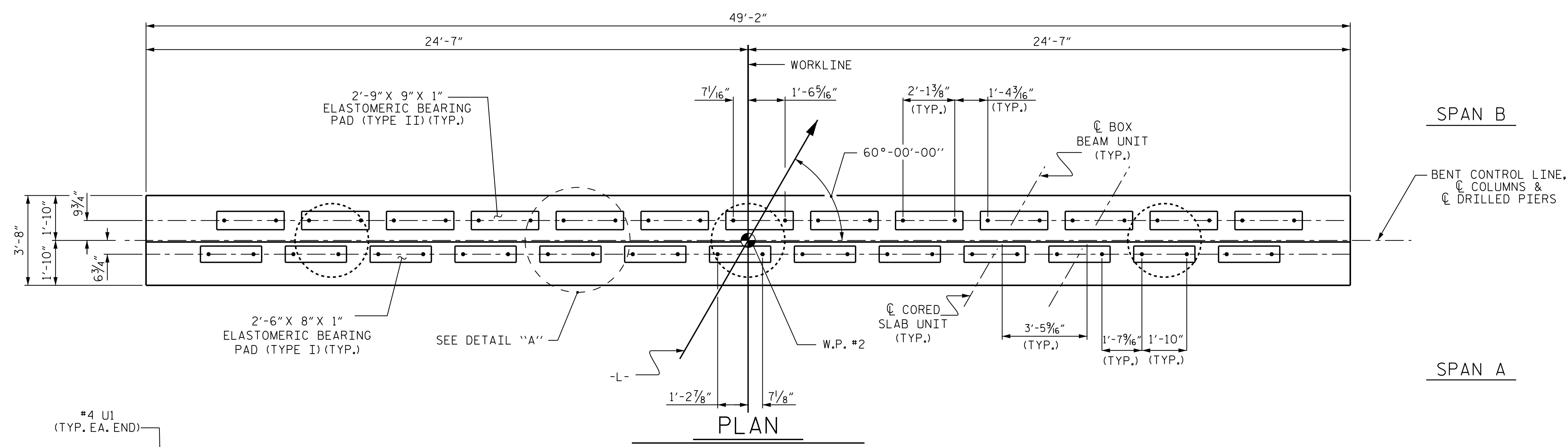
ALL STEEL IN THE DRILLED PIERS IS INCLUDED IN THE PAY ITEMS FOR "REINFORCING STEEL" AND "SPIRAL COLUMN REINFORCING STEEL."

★ 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-4571

LINCOLN COUNTY

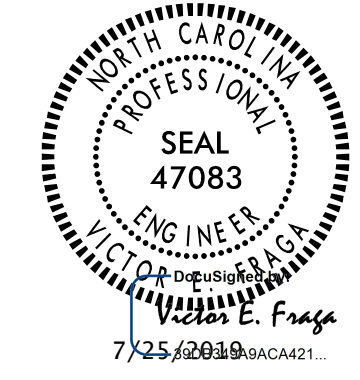
STATION: 17+40.00 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

SUBSTRUCTURE  
BENT No. 1

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2			4			



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

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DESIGN ENGINEER OF RECORD: V. E. FRAGA DATE: 07/24/19

ASSEMBLED BY: V. E. FRAGA DATE: 03/14/19

CHECKED BY: T. R. DUDECK DATE: 04/05/19

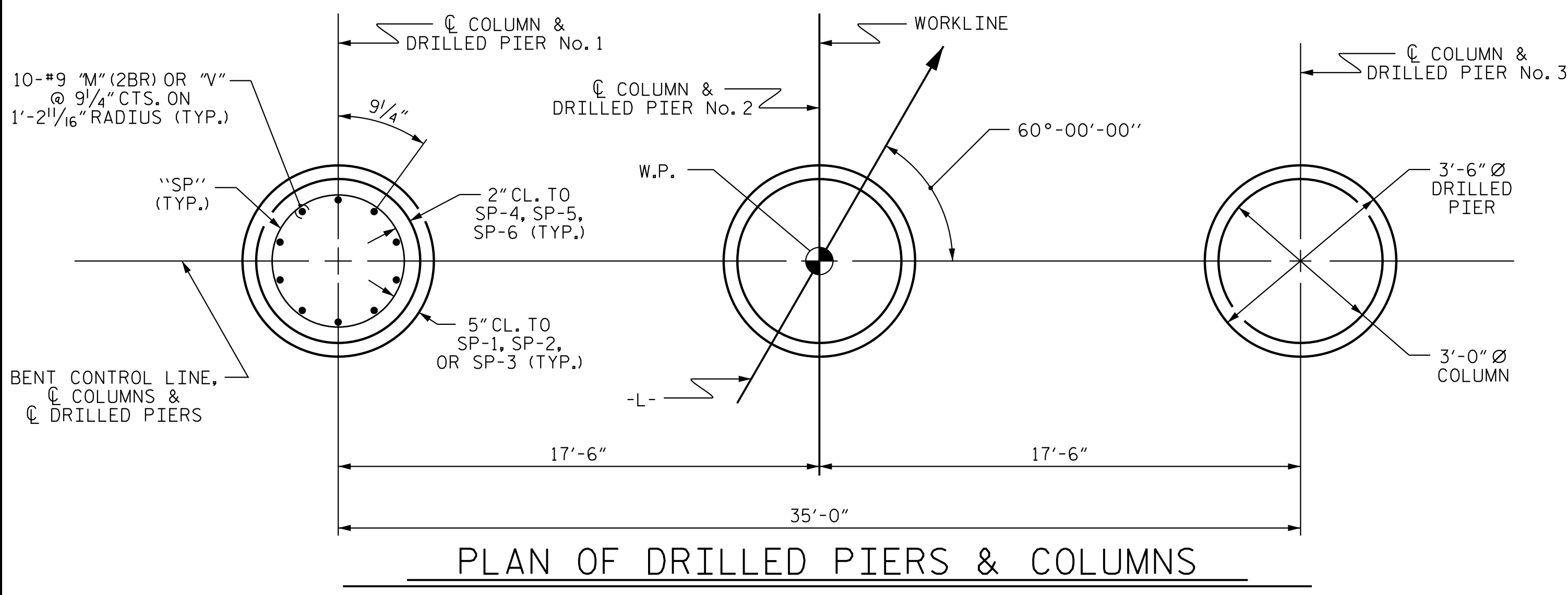
DRAWN BY: DGE 4/10

CHECKED BY: MKT 4/10

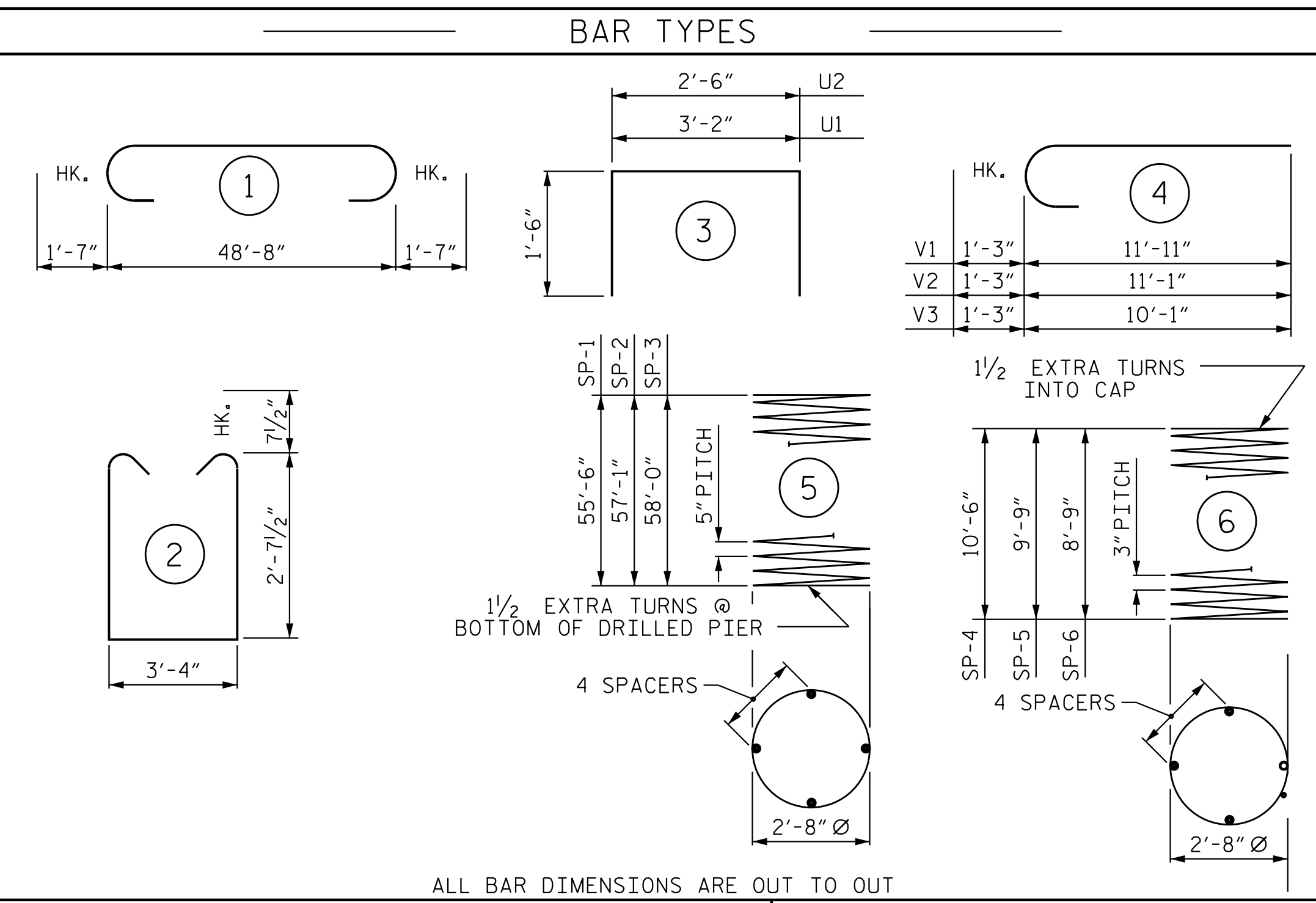
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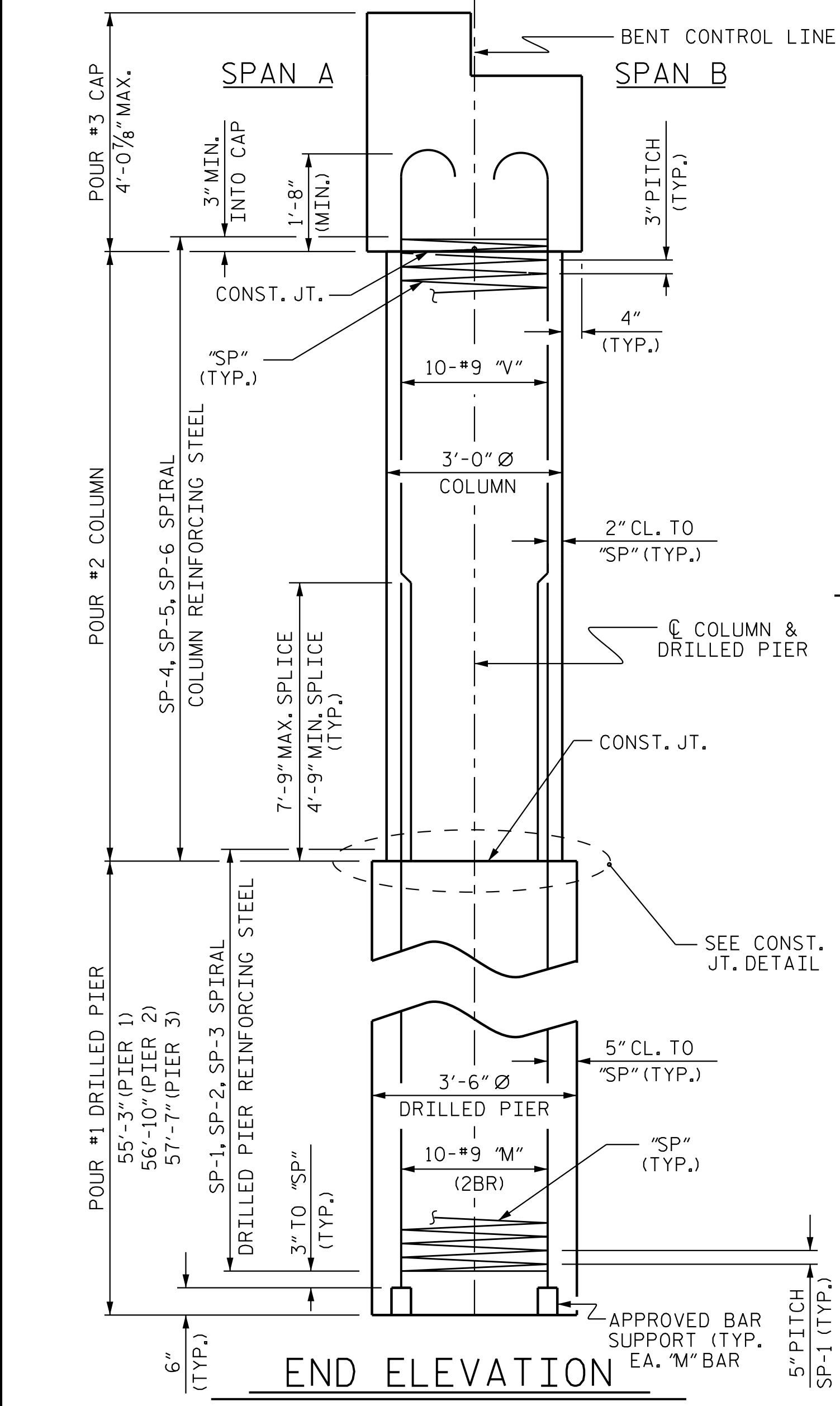


PLAN OF DRILLED PIERS & COLUMNS

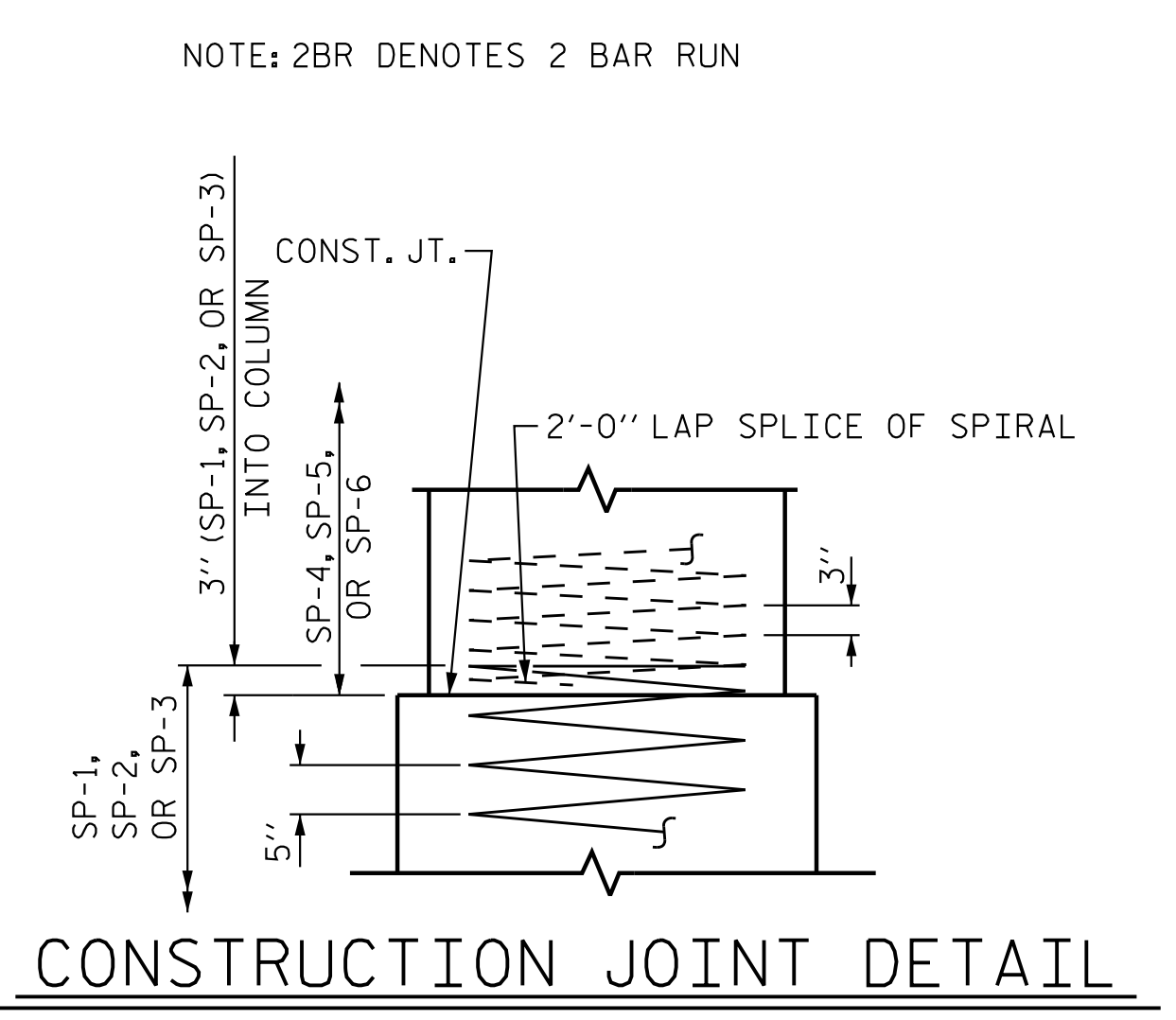


ALL BAR DIMENSIONS ARE OUT TO OUT

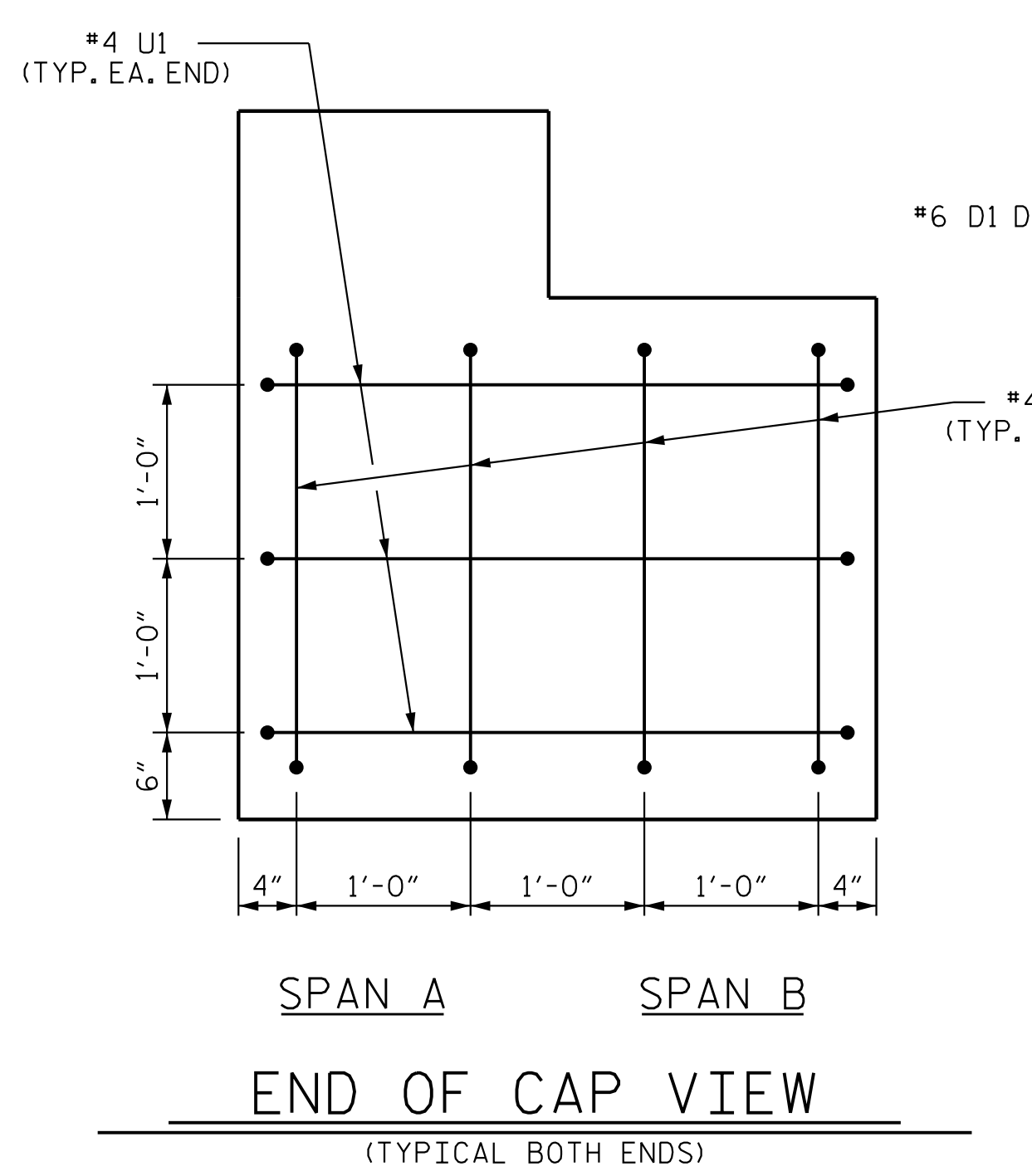
BILL OF MATERIAL FOR ONE BENT					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	12	#11	1	51'-10"	3305
B2	6	#5	STR	48'-11"	307
B3	4	#5	STR	48'-11"	205
D1	26	#6	STR	1'-6"	59
D2	26	#8	STR	2'-3"	156
M1	20	#9	STR	33'-7"	2284
M2	20	#9	STR	34'-4"	2335
M3	20	#9	STR	34'-9"	2363
S1	86	#6	2	9'-10"	1271
U1	6	#4	3	6'-2"	25
U2	8	#4	3	5'-6"	30
U3	49	#4	3	5'-5"	178
V1	10	#9	4	13'-2"	448
V2	10	#9	4	12'-4"	420
V3	10	#9	4	11'-4"	386
REINFORCING STEEL (FOR ONE BENT)					13,772 LBS.
SP-1	1	*	5	1124'-6"	1173
SP-2	1	*	5	1149'-1"	1199
SP-3	1	*	5	1173'-9"	1225
SP-4	1	**	6	370'-6"	248
SP-5	1	**	6	345'-9"	231
SP-6	1	**	6	312'-10"	209



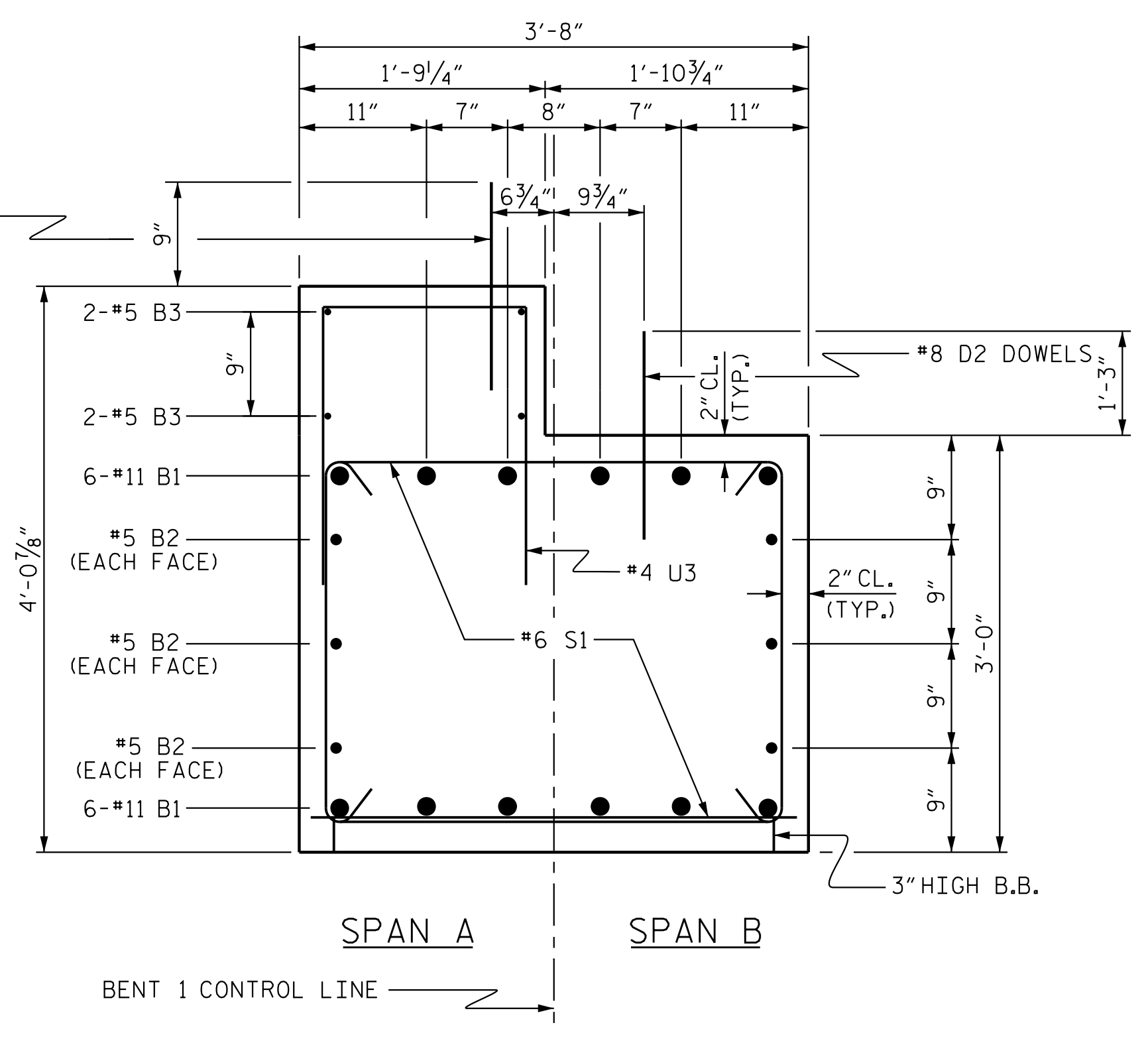
END ELEVATION



CONSTRUCTION JOINT DETAIL



END OF CAP VIEW (TYPICAL BOTH ENDS)



SECTION THRU CAP

DRILLED PIERS: (FOR ONE BENT)	
DRILLED PIER CONCRETE	60.5 C.Y.
POUR #1 (DRILLED PIERS)	60.5 C.Y.
3'-6" Ø DRILLED PIER NOT IN SOIL	20 LIN. FT.
3'-6" Ø DRILLED PIER IN SOIL	150 LIN. FT.
PERMANENT STEEL CASING FOR 3'-6" Ø DRILLED PIER	51 LIN. FT.
CSL TUBES	698 LIN. FT.

SPIRAL COLUMN REINFORCING STEEL (FOR ONE BENT)	
* THE SP-1, SP-2, SP-3 SPIRAL REINFORCING STEEL SHALL BE W31 OR D-31 COLD DRAWN WIRE OR #5 PLAIN OR DEFORMED BAR	4,285 LBS.
** THE SP-4, SP-5, SP-6 SPIRAL REINF. STEEL SHALL BE W20 OR D-20 COLD DRAWN WIRE OR #4 PLAIN OR DEFORMED BAR	

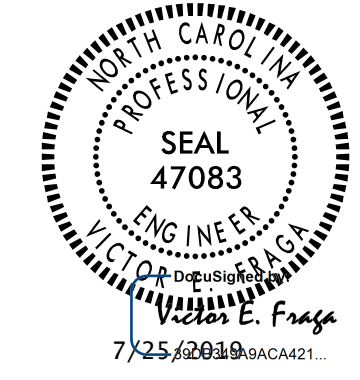
CLASS A CONCRETE BREAKDOWN (FOR ONE BENT)	
POUR #2 (COLUMNS)	7.4 C.Y.
POUR #3 (CAP)	23.5 C.Y.
<b>TOTAL CLASS A CONCRETE</b>	<b>30.9 C.Y.</b>

PROJECT NO. B-4571  
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 STATION: 17+40.00 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA  
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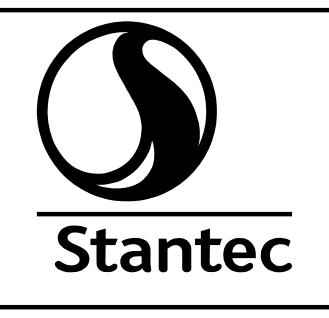
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NOTES

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

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

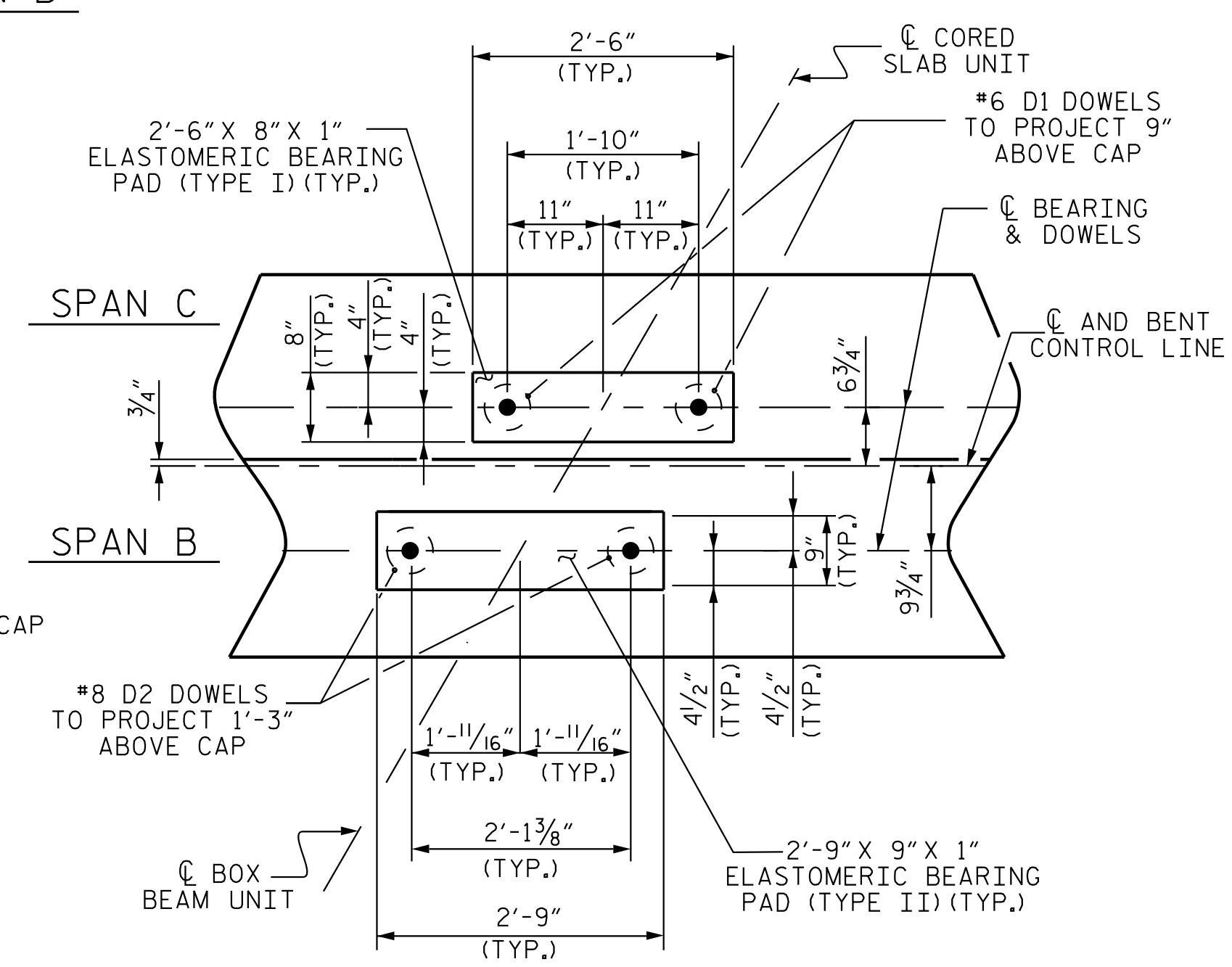
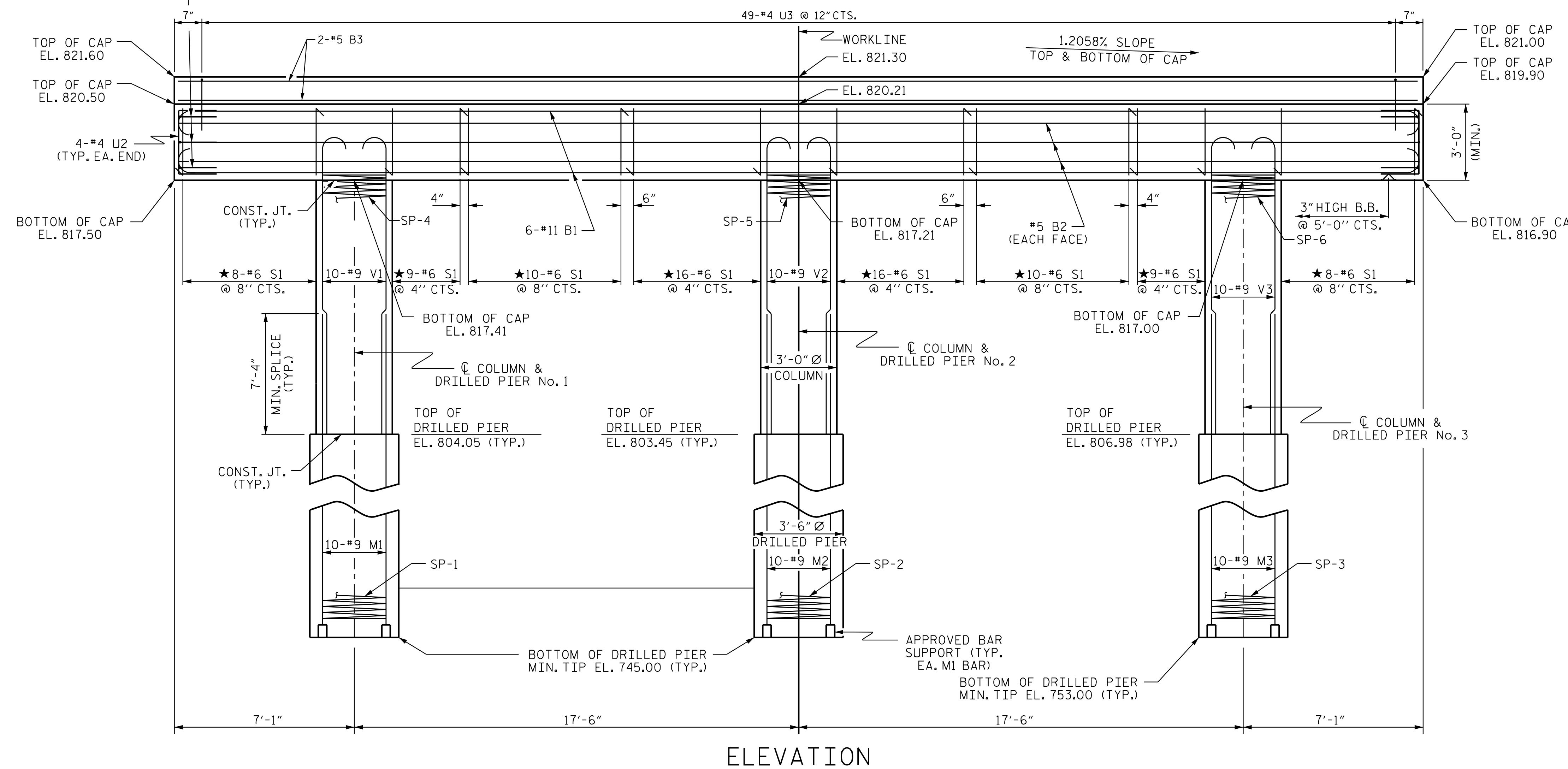
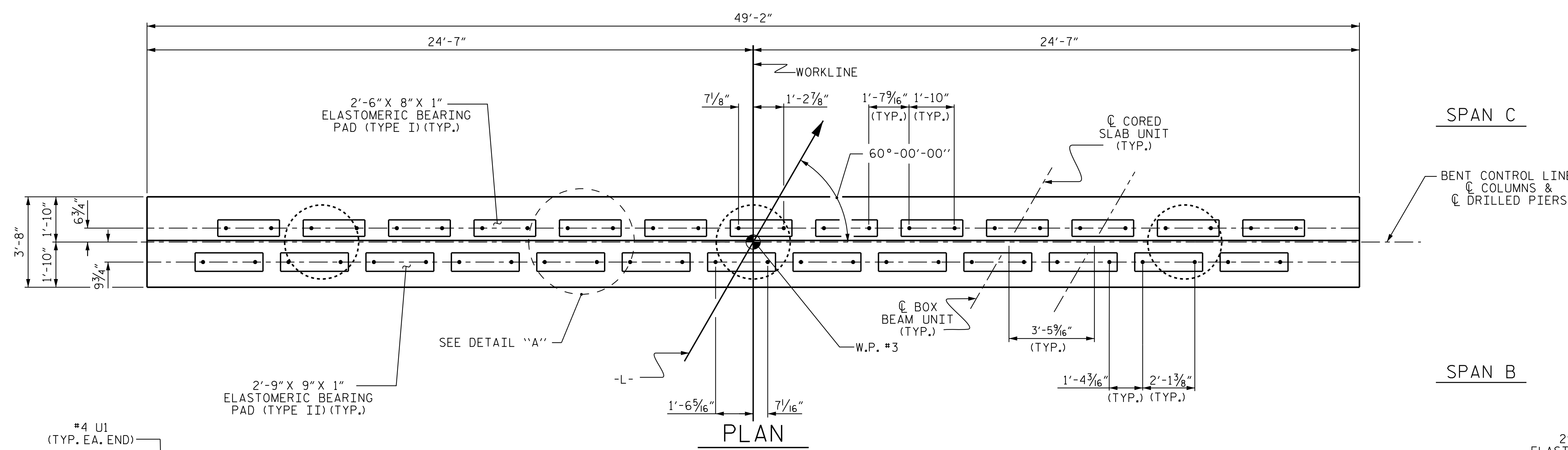
ALL STEEL IN THE DRILLED PIERS IS INCLUDED IN THE PAY ITEMS FOR "REINFORCING STEEL" AND "SPIRAL COLUMN REINFORCING STEEL."

★ 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-4571  
 LINCOLN COUNTY  
 STATION: 17+40.00 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA  
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 RALEIGH

SUBSTRUCTURE  
 BENT No. 2



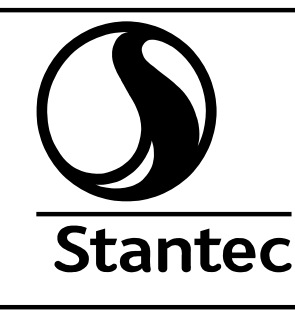
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NO.	BY:	DATE:	NO.	BY:	DATE:	S-26
1			3			TOTAL SHEETS 29
2			4			

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

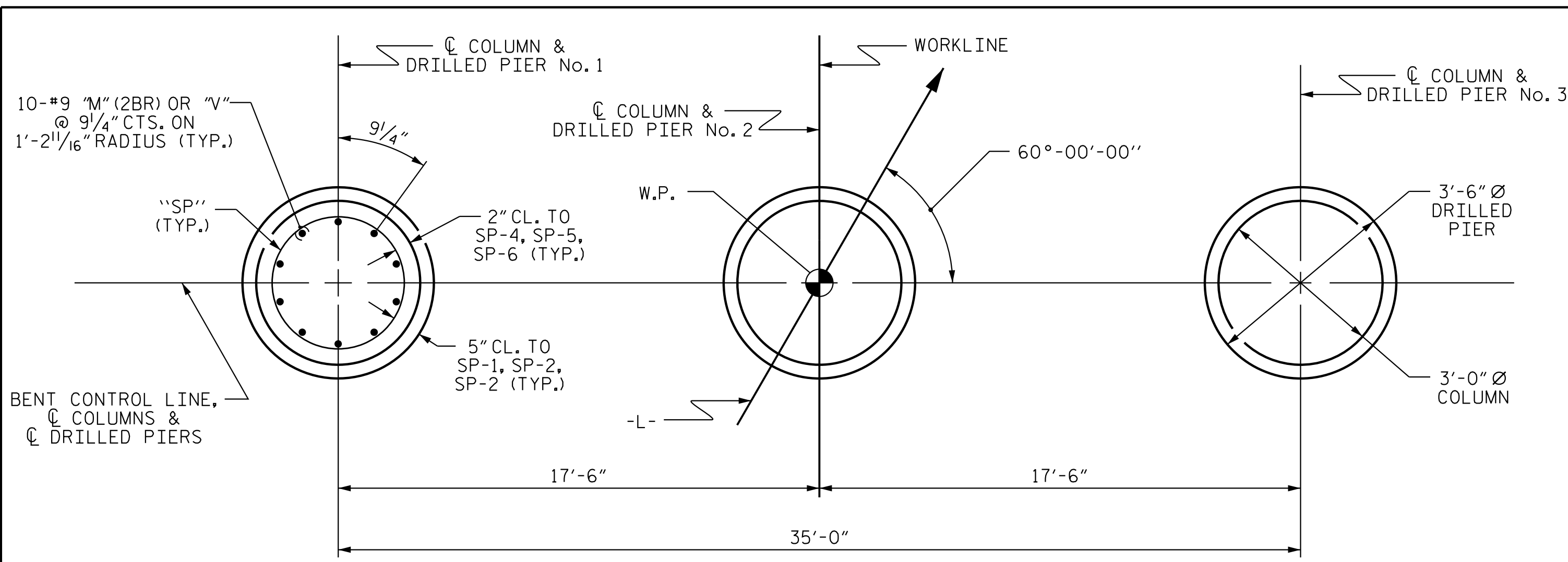
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DESIGN ENGINEER OF RECORD: V. E. FRAGA DATE: 07/24/19  
 ASSEMBLED BY: V. E. FRAGA DATE: 03/14/19  
 CHECKED BY: T. R. DUDECK DATE: 04/05/19  
 DRAWN BY: DGE 4/10  
 CHECKED BY: MKT 4/10  
 REV. 11/14 MAA/TMG

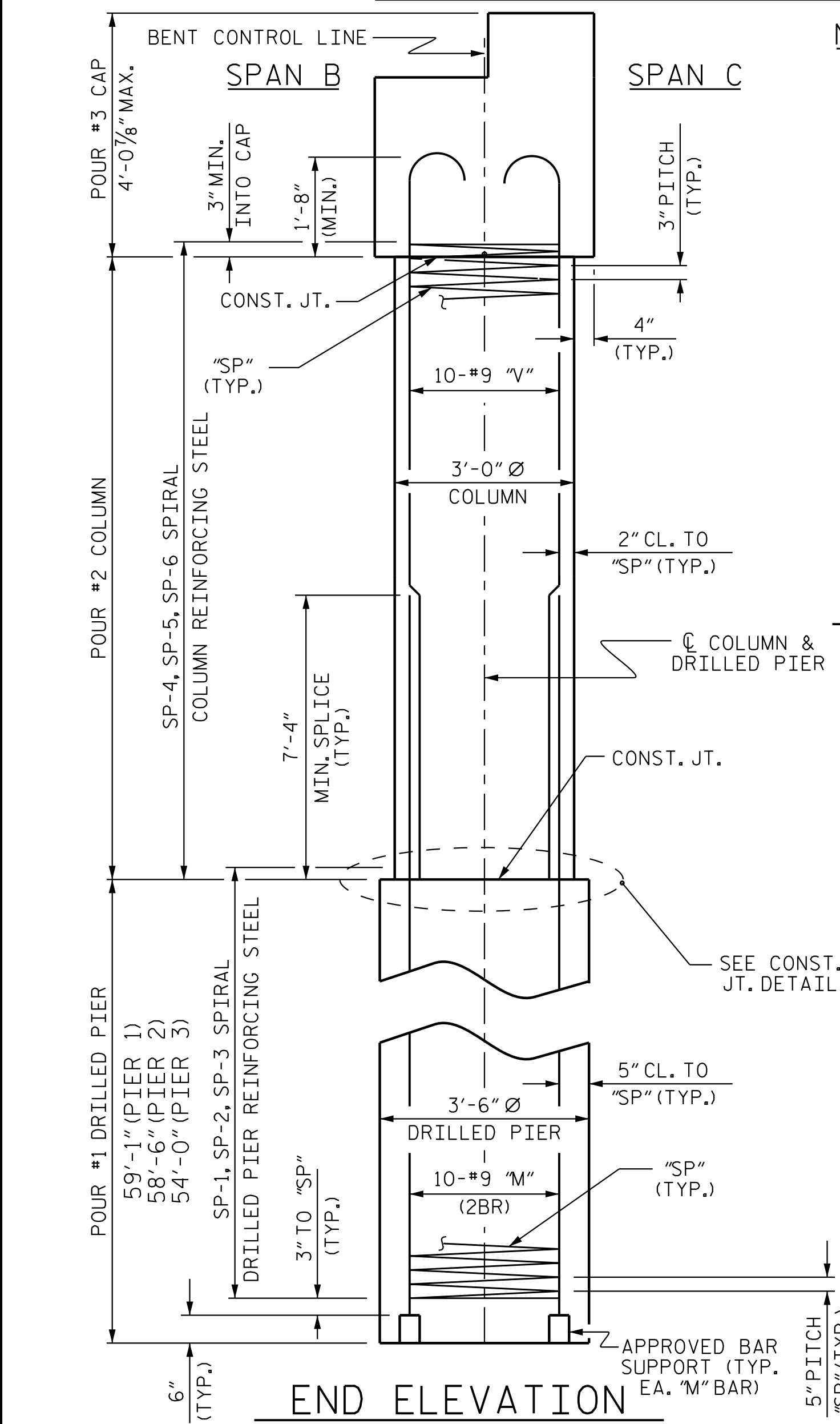


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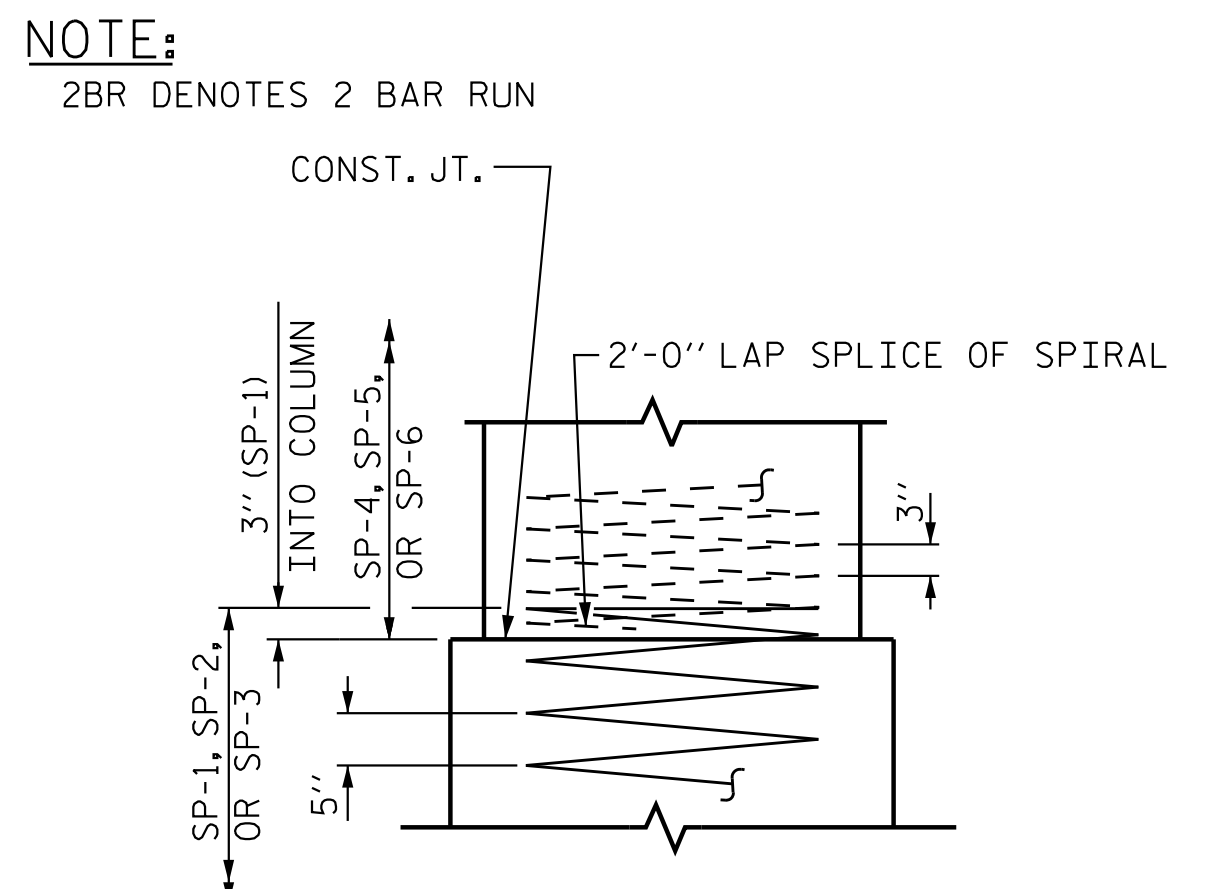




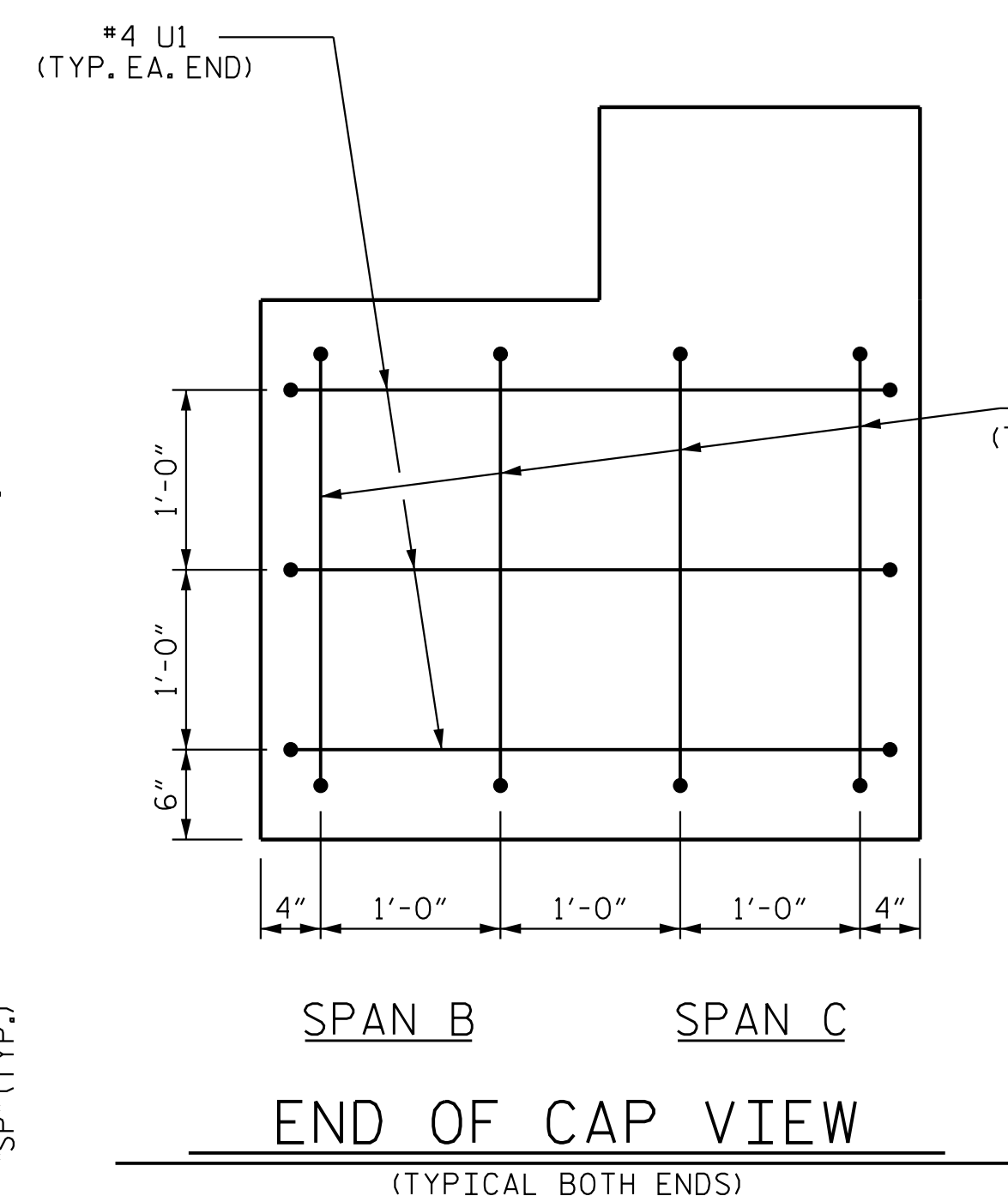
PLAN OF DRILLED PIERS & COLUMNS



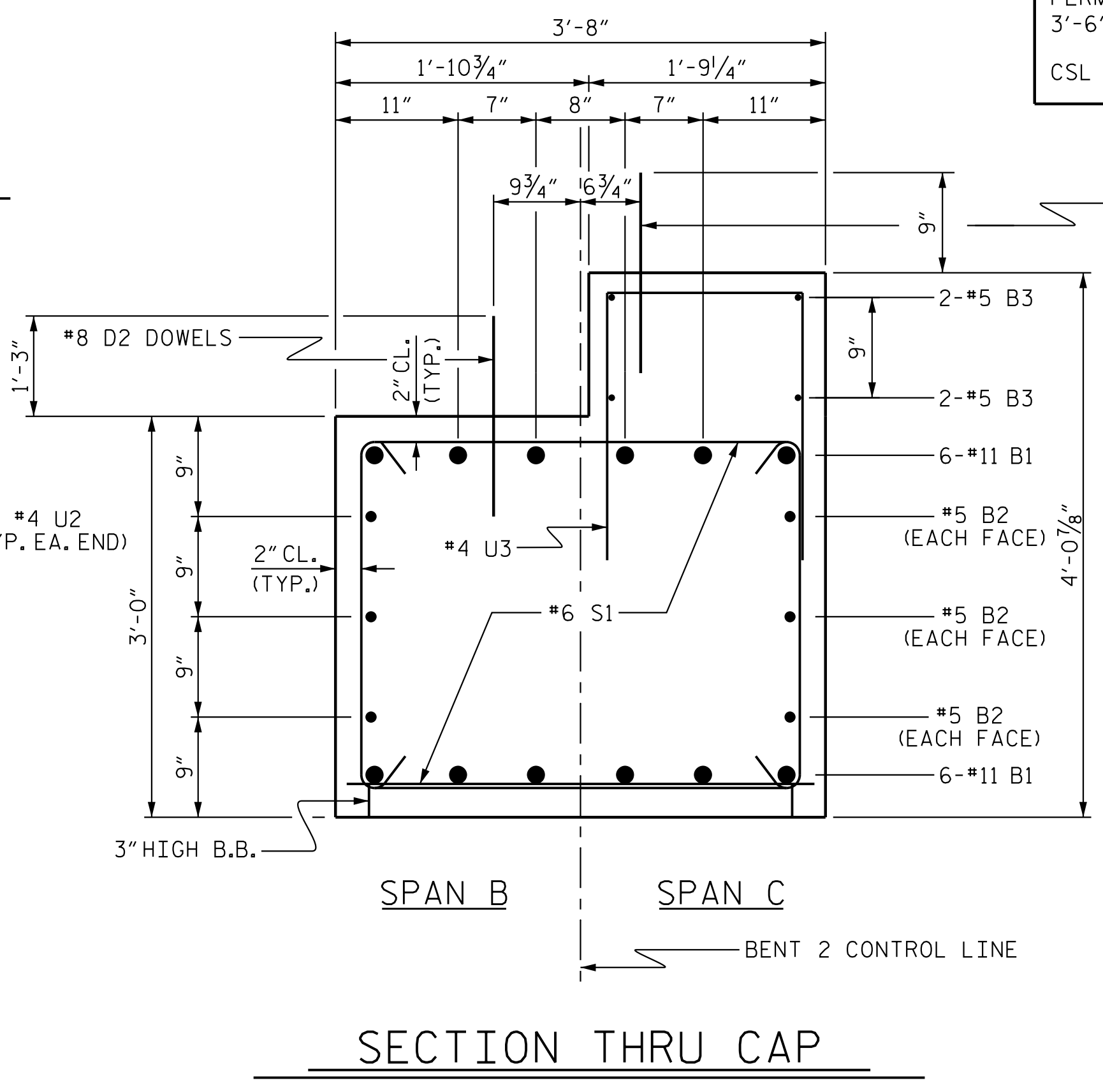
END ELEVATION



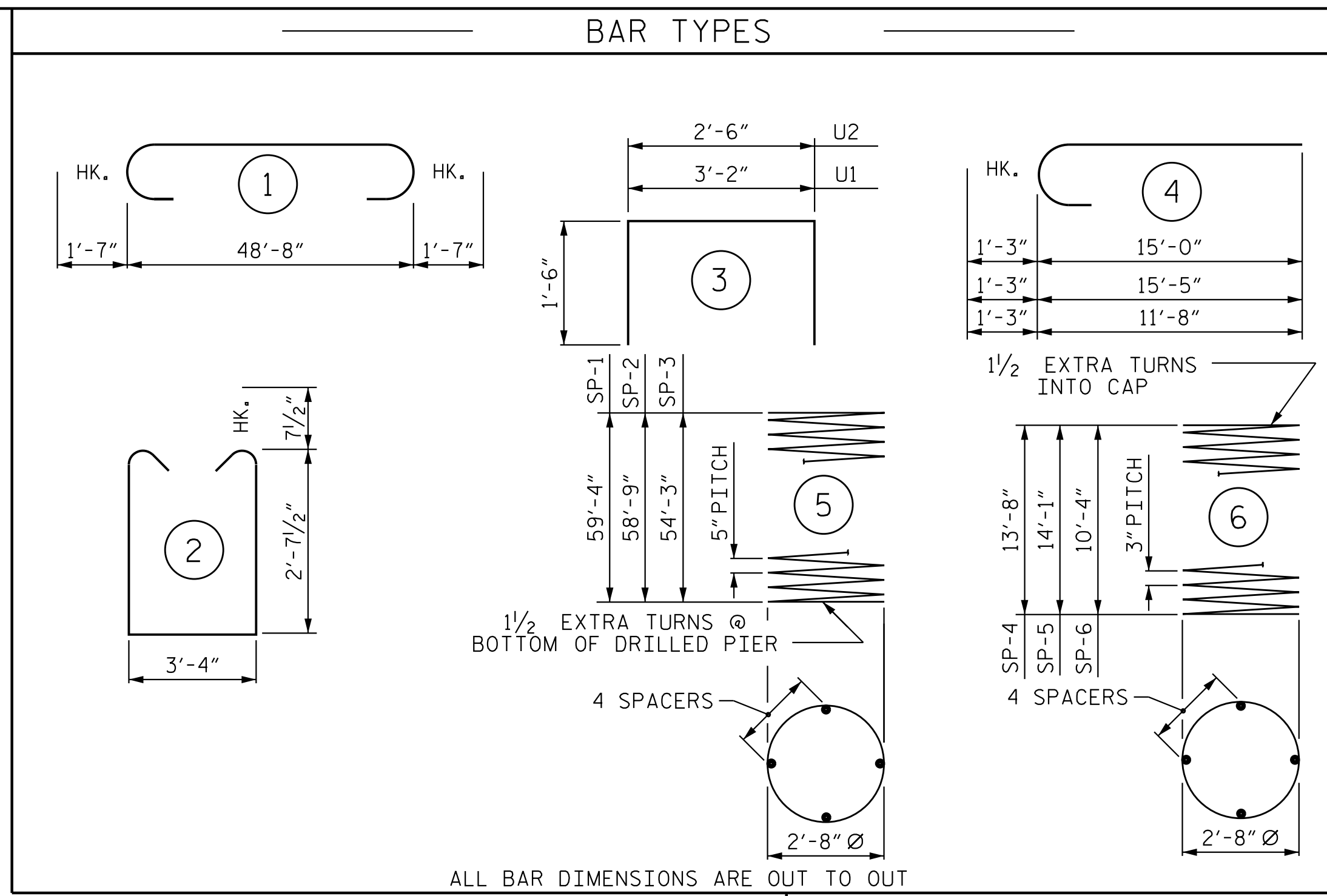
CONSTRUCTION JOINT DETAIL



END OF CAP VIEW (TYPICAL BOTH ENDS)



SECTION THRU CAP



ALL BAR DIMENSIONS ARE OUT TO OUT

DRILLED PIERS: (FOR ONE BENT)	
DRILLED PIER CONCRETE POUR #1 (DRILLED PIERS)	61.1 C.Y.
3'-6" Ø DRILLED PIER NOT IN SOIL	14 LIN. FT.
3'-6" Ø DRILLED PIER IN SOIL	158 LIN. FT.
PERMANENT STEEL CASING FOR 3'-6" Ø DRILLED PIER	44.5 LIN. FT.
CSL TUBES	706 LIN. FT.

BILL OF MATERIAL FOR ONE BENT					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	12	#11	1	51'-10"	3305
B2	6	#5	STR	48'-11"	307
B3	4	#5	STR	48'-11"	205
D1	26	#6	STR	1'-6"	59
D2	26	#8	STR	2'-3"	156
M1	20	#9	STR	35'-6"	2414
M2	20	#9	STR	35'-2"	2392
M3	20	#9	STR	32'-11"	2239
S1	86	#6	2	9'-10"	1271
U1	6	#4	3	6'-2"	25
U2	8	#4	3	5'-6"	30
U3	49	#4	3	5'-5"	178
V1	10	#9	4	16'-3"	553
V2	10	#9	4	16'-2"	567
V3	10	#9	4	12'-11"	440
REINFORCING STEEL (FOR ONE BENT)					14,141 LBS.
SP-1	1	*	5	1198'-4"	1250
SP-2	1	*	5	1181'-11"	1233
SP-3	1	*	5	1099'-10"	1148
SP-4	1	**	6	477'-6"	319
SP-5	1	**	6	494'-0"	330
SP-6	1	**	6	370'-6"	248
SPIRAL COLUMN REINFORCING STEEL (FOR ONE BENT)					4,528 LBS.
* THE SP-1, SP-2, SP-3 SPIRAL REINFORCING STEEL SHALL BE W31 OR D-31 COLD DRAWN WIRE OR #5 PLAIN OR DEFORMED BAR					
** THE SP-4, SP-5, SP-6 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)					9.7 C.Y.
POUR #3 (CAP)					23.5 C.Y.
TOTAL CLASS A CONCRETE					33.2 C.Y.

PROJECT NO. B-4571  
 LINCOLN COUNTY  
 STATION: 17+40.00 -L-

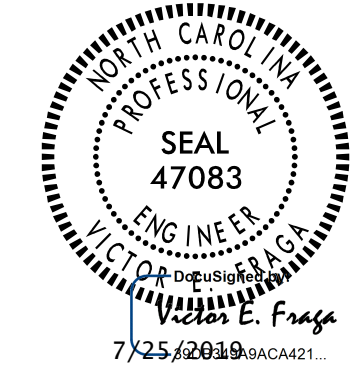
SHEET 2 OF 2

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

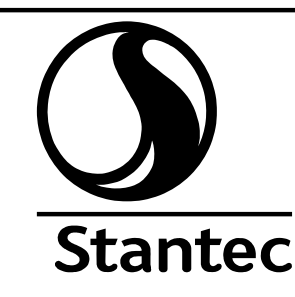
SUBSTRUCTURE  
 BENT No. 2

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

SHEET NO. S-27  
 TOTAL SHEETS 29



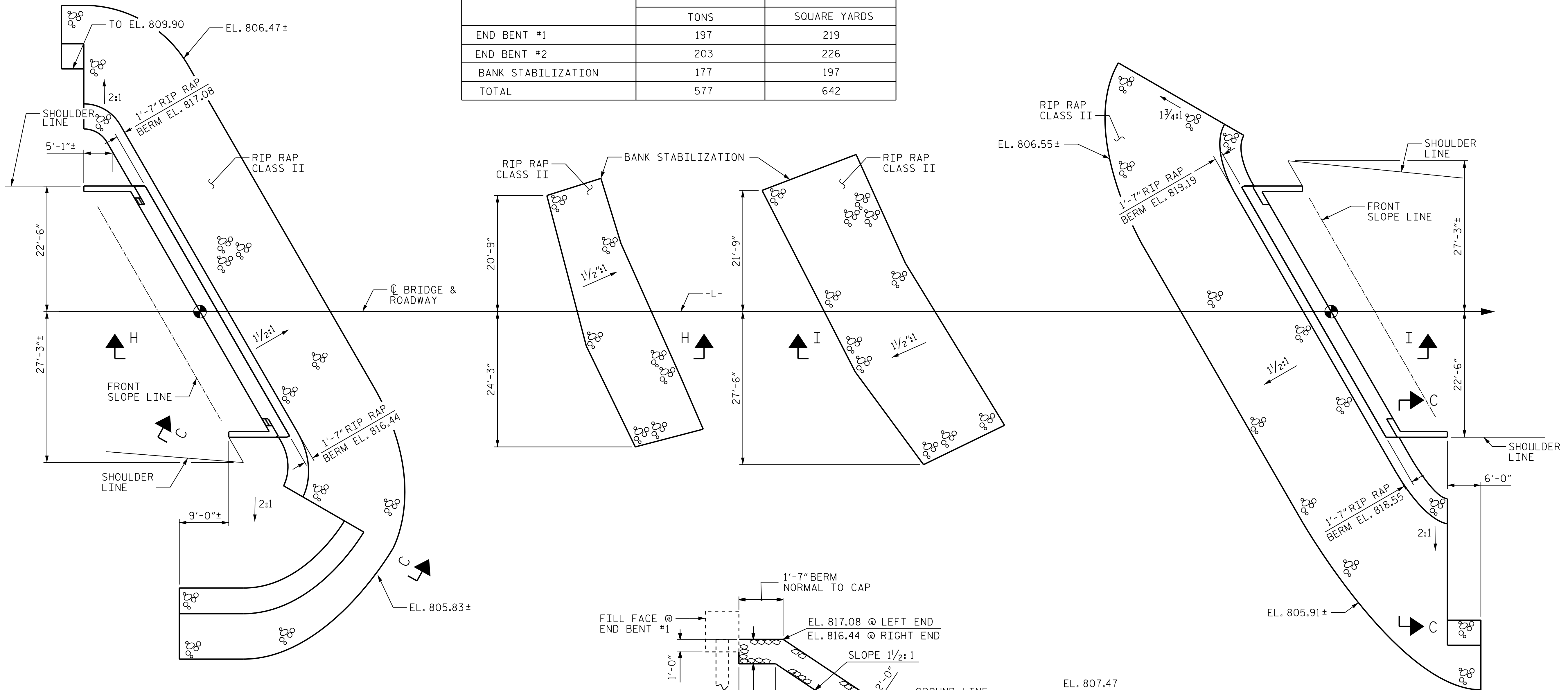
DESIGN ENGINEER OF RECORD: V. E. FRAGA DATE: 07/24/19  
 ASSEMBLED BY: V. E. FRAGA DATE: 03/14/19  
 CHECKED BY: T. R. DUDECK DATE: 04/05/19  
 DRAWN BY: DGE 3/10  
 CHECKED BY: MKT 3/10  
 REV. 11/14 MAA/TMG



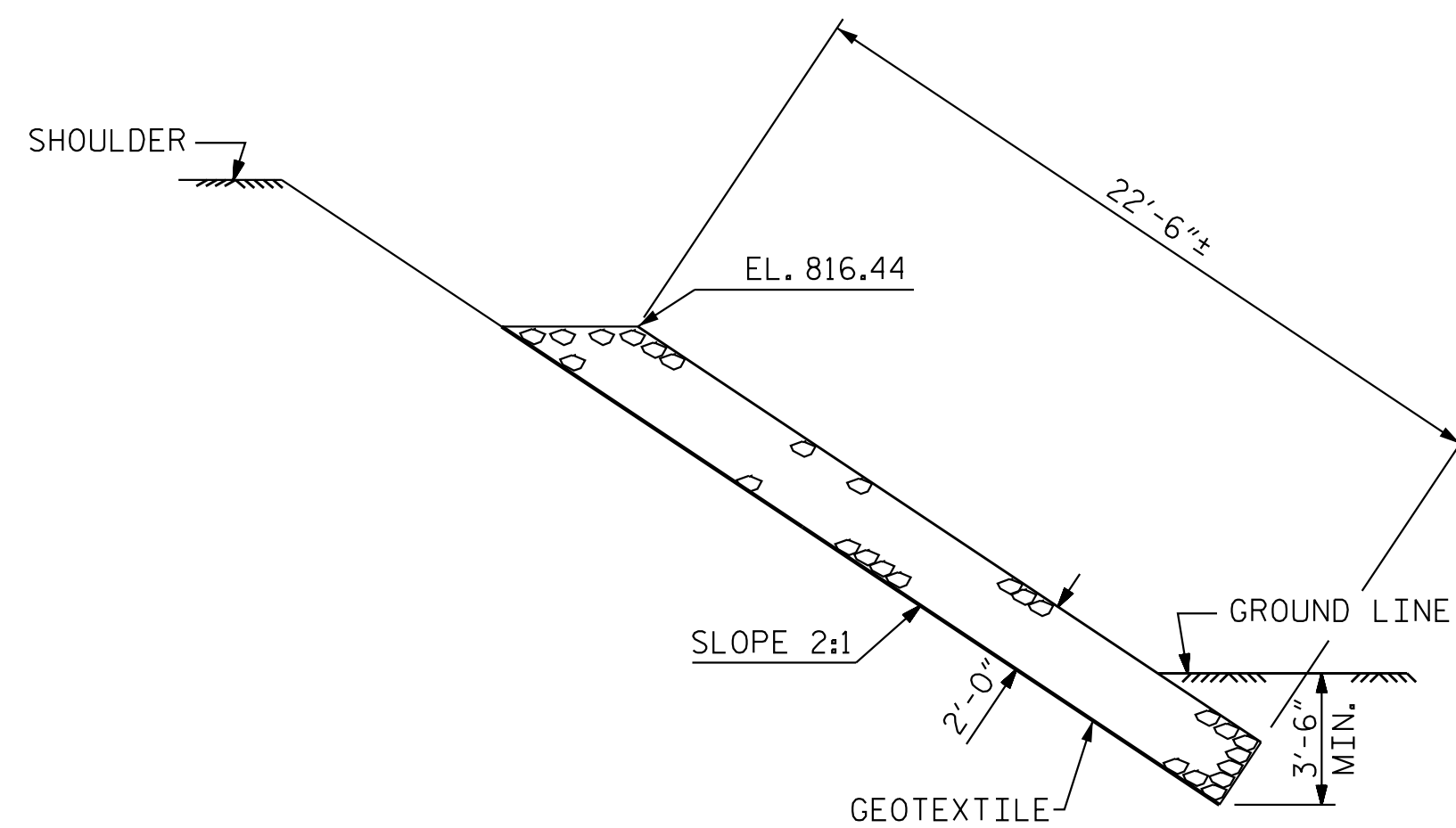
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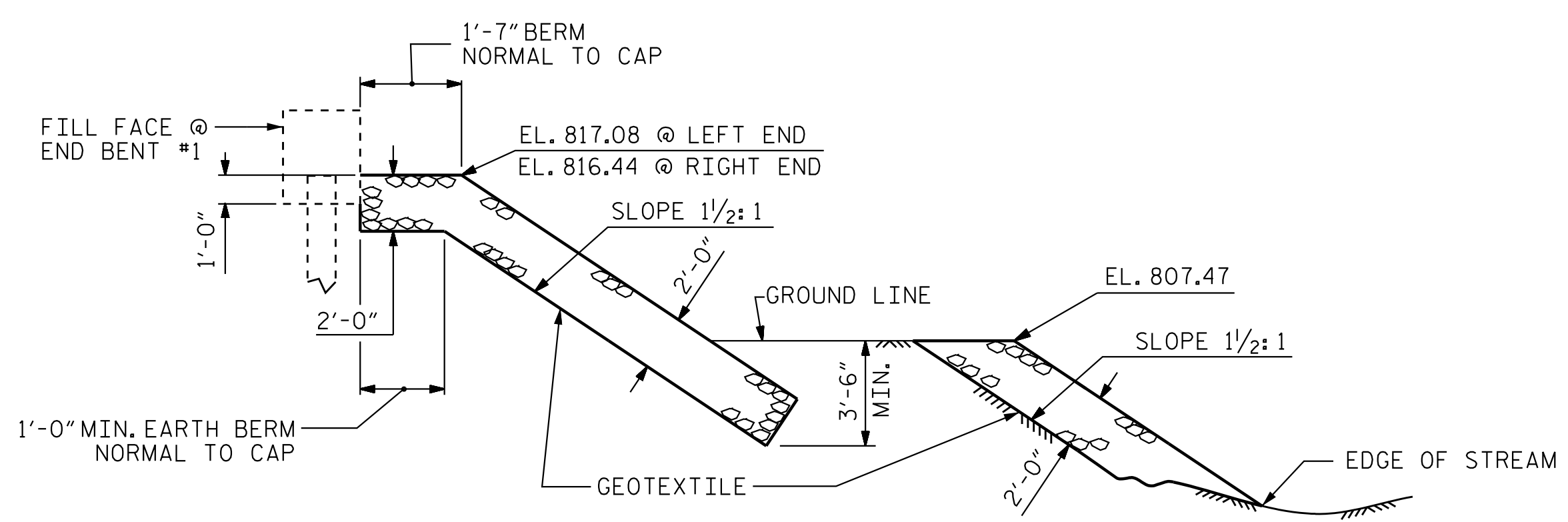
ESTIMATED QUANTITIES		
BRIDGE @ STA. 17+40.00 -L-	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE
	TONS	SQUARE YARDS
END BENT #1	197	219
END BENT #2	203	226
BANK STABILIZATION	177	197
TOTAL	577	642



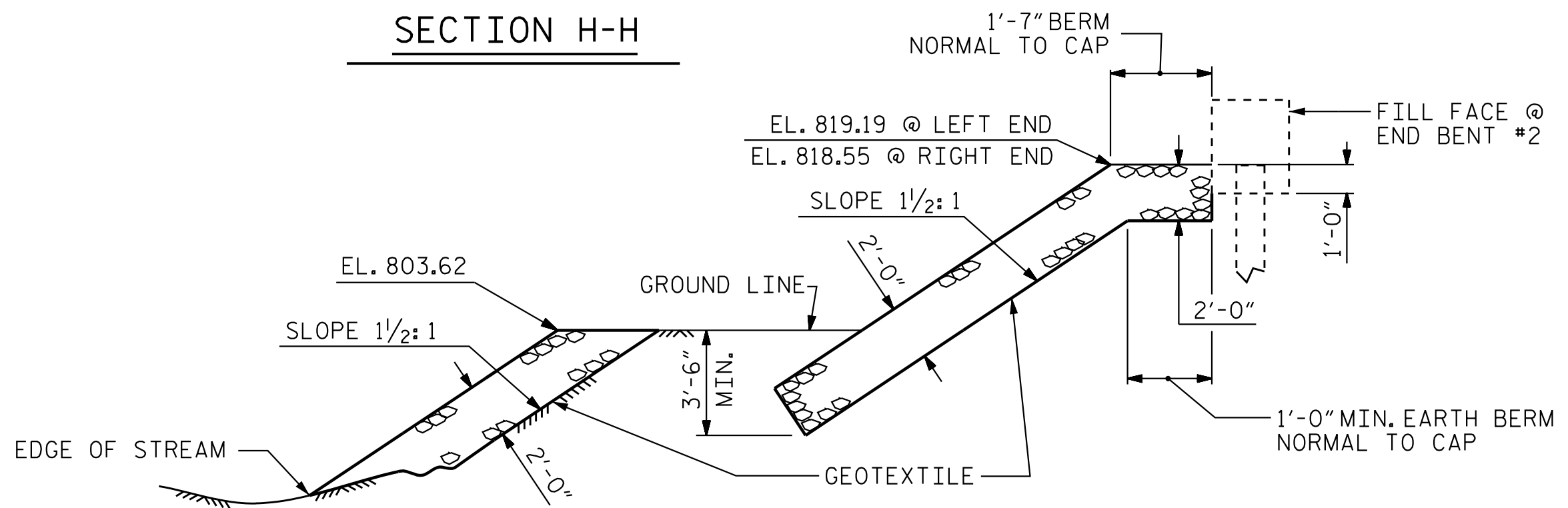
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SECTION C-C



SECTION H-H

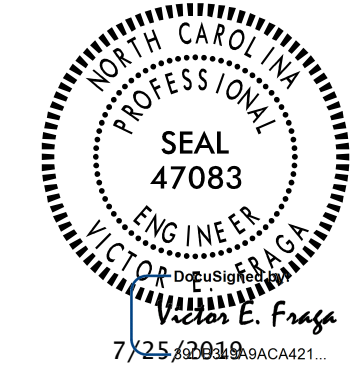


SECTION I-I

PROJECT NO. B-4571  
LINCOLN COUNTY  
 STATION: 17+40.00 -L-

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

SLOPE PROTECTION  
 RIP RAP



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

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DRAWN BY: V. E. FRAGA DATE: 03/15/19  
 CHECKED BY: T. R. DUDECK DATE: 04/05/19  
 DESIGN ENGINEER OF RECORD: V. E. FRAGA DATE: 07/24/19



**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.

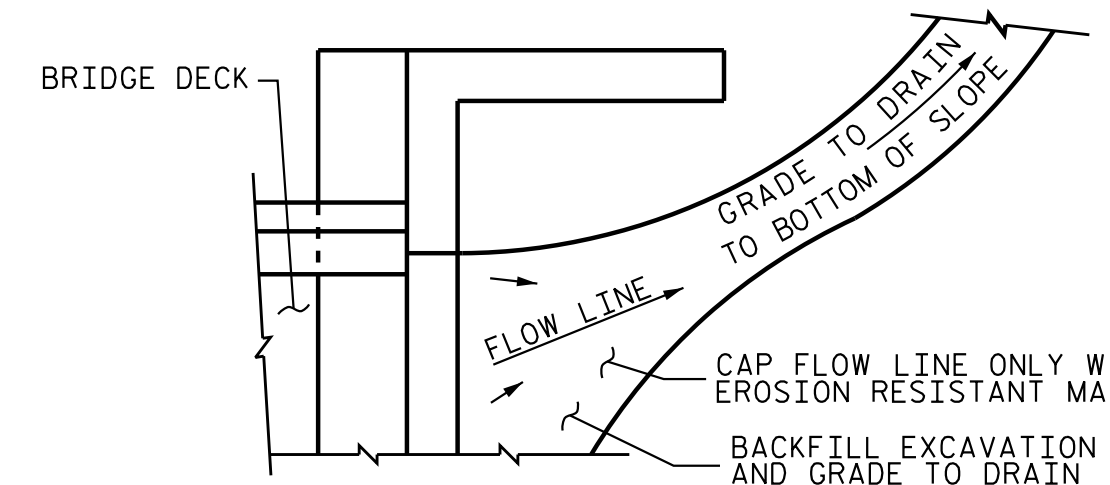
SELECT MATERIAL BACKFILL IS TO BE CONTINUOUS ALONG FILL FACE OF BACKWALL FROM OUTSIDE EDGE TO OUTSIDE EDGE OF APPROACH SLAB.

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

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

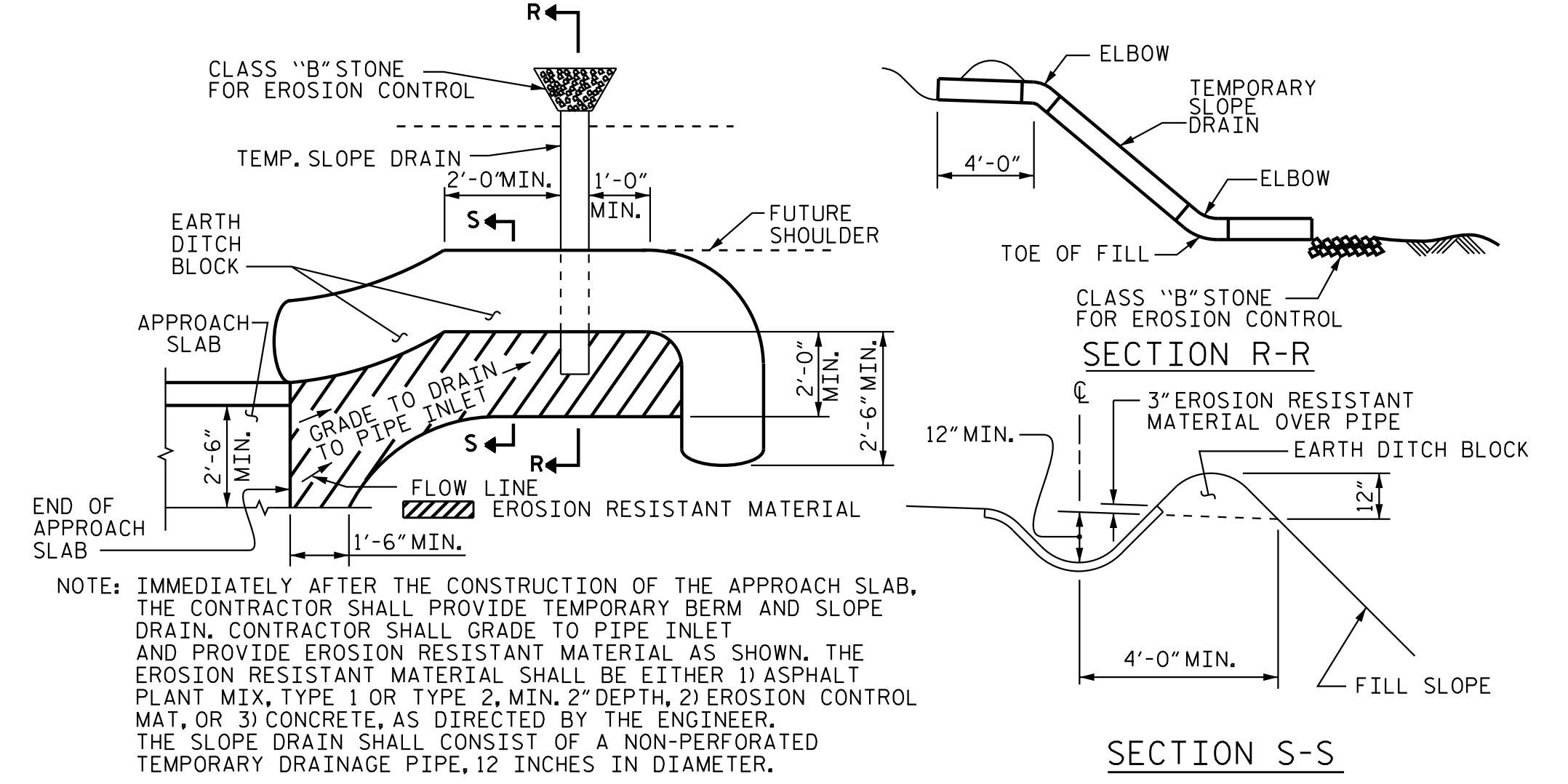
APPROACH SLAB GROOVING IS NOT REQUIRED.

BILL OF MATERIAL					
APPROACH SLAB AT EB #1					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
*A1	26	#4	STR	22'-8"	394
A2	26	#4	STR	22'-6"	391
*B1	75	#5	STR	11'-1"	867
B2	75	#6	STR	11'-7"	1305
REINFORCING STEEL					LBS. 1696
* EPOXY COATED REINFORCING STEEL					LBS. 1261
CLASS AA CONCRETE					C. Y. 22.0
APPROACH SLAB AT EB #2					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
*A1	26	#4	STR	22'-8"	394
A2	26	#4	STR	22'-6"	391
B1	75	#5	STR	11'-1"	867
B2	75	#6	STR	11'-7"	1305
REINFORCING STEEL					LBS. 1696
* EPOXY COATED REINFORCING STEEL					LBS. 1261
CLASS AA CONCRETE					C. Y. 21.8



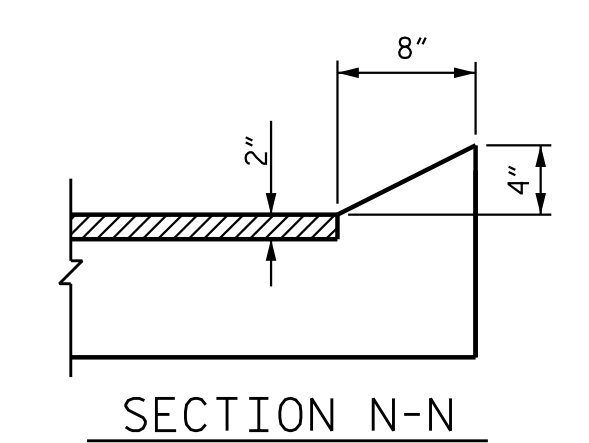
NOTE: IF THE APPROACH SLAB IS NOT CONSTRUCTED IMMEDIATELY AFTER THE BACKFILLING OF THE END BENT EXCAVATION, GRADE TO DRAIN TO THE BOTTOM OF THE SLOPE AND PROVIDE EROSION RESISTANT MATERIAL, SUCH AS FIBERGLASS ROVING OR AS DIRECTED BY THE ENGINEER TO PREVENT SOIL EROSION AND TO PROTECT THE AREA ADJACENT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

**TEMPORARY DRAINAGE DETAIL**



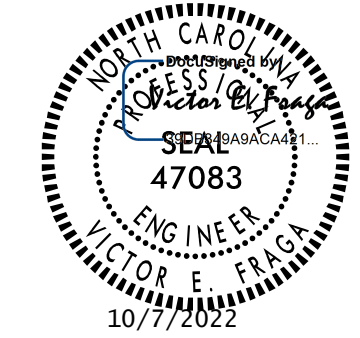
NOTE: IMMEDIATELY AFTER THE CONSTRUCTION OF THE APPROACH SLAB, THE CONTRACTOR SHALL PROVIDE TEMPORARY BERM AND SLOPE DRAIN. CONTRACTOR SHALL GRADE TO PIPE INLET AND PROVIDE EROSION RESISTANT MATERIAL AS SHOWN. THE EROSION RESISTANT MATERIAL SHALL BE EITHER 1) ASPHALT PLANT MIX, TYPE 1 OR TYPE 2, MIN.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

**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"

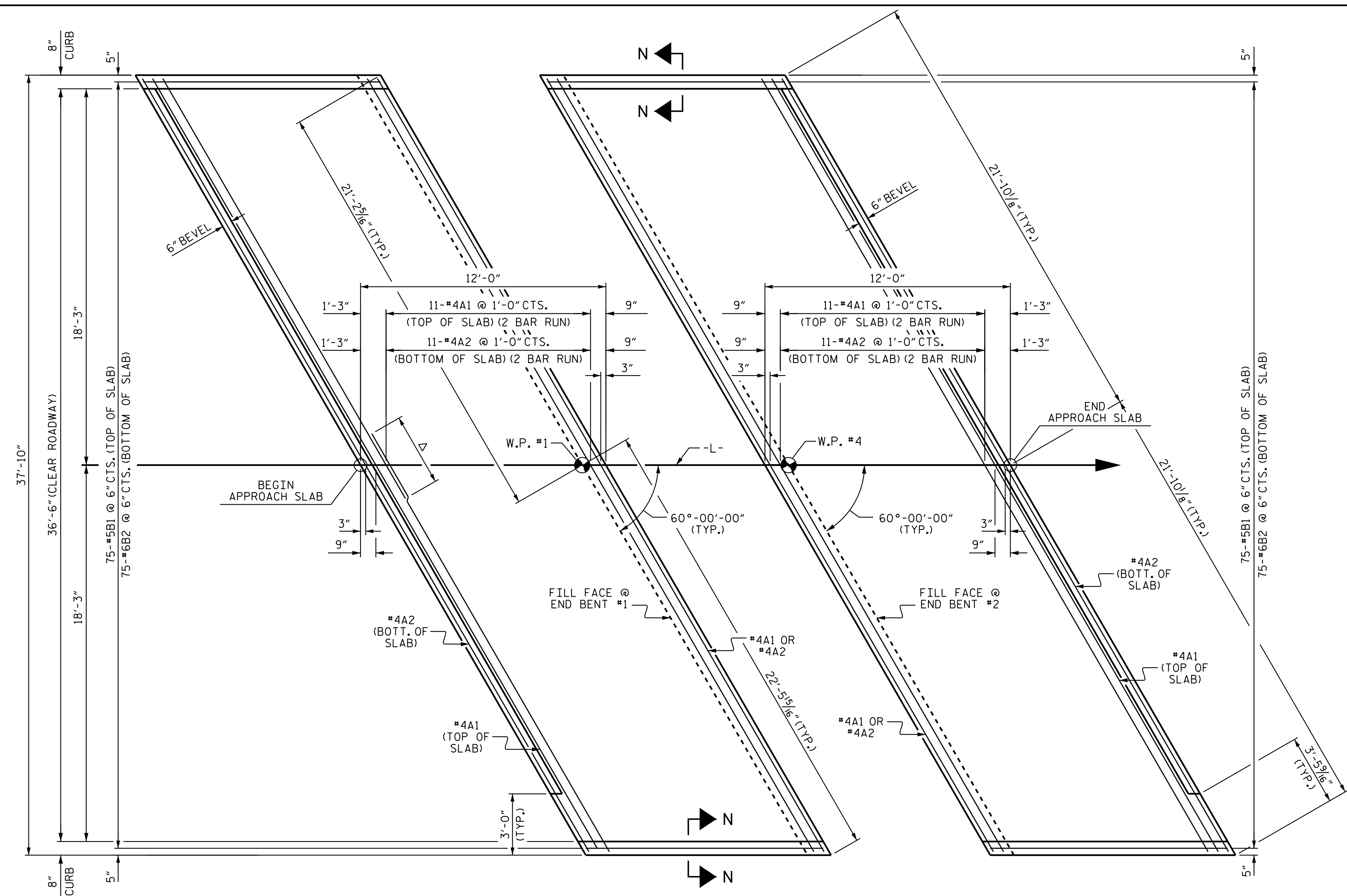


PROJECT NO. B-4571  
LINCOLN COUNTY  
 STATION: 17+40.00 -L-

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
STANDARD BRIDGE APPROACH SLAB FOR PRESTRESSED CONCRETE CORED SLAB UNIT					
60° SKEW					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

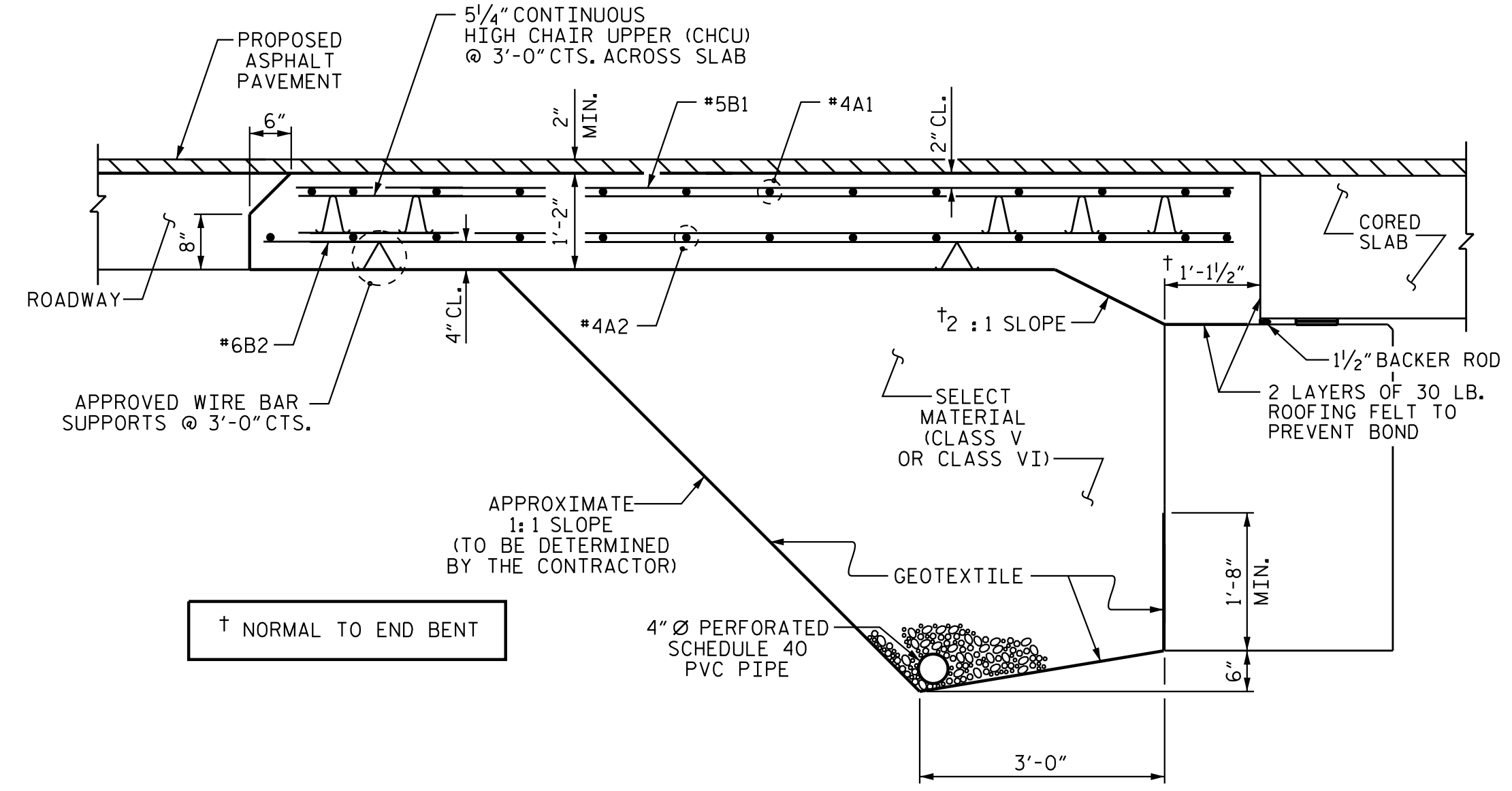
SHEET NO. S-29				
TOTAL SHEETS 29				

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**PLAN @ END BENT #1**      **PLAN @ END BENT #2**

DIMENSIONS SHOWN ARE TYPICAL FOR BOTH APPROACH SLABS  
 Δ MIN. LAP SPLICE FOR #4 "A" BAR, SEE CHART (TYP. BOTH SLABS)



**SECTION THRU SLAB**  
(TYPE II - MODIFIED APPROACH FILL)

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DESIGN ENGINEER OF RECORD: V. E. FRAGA DATE: 07/24/19  
 ASSEMBLED BY: V. E. FRAGA DATE: 03/14/19  
 CHECKED BY: T. R. DUDECK DATE: 04/05/19  
 DRAWN BY: SHS/MAA 5-09 REV. 12-17 MAA/THC  
 CHECKED BY: BCH 5-09

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