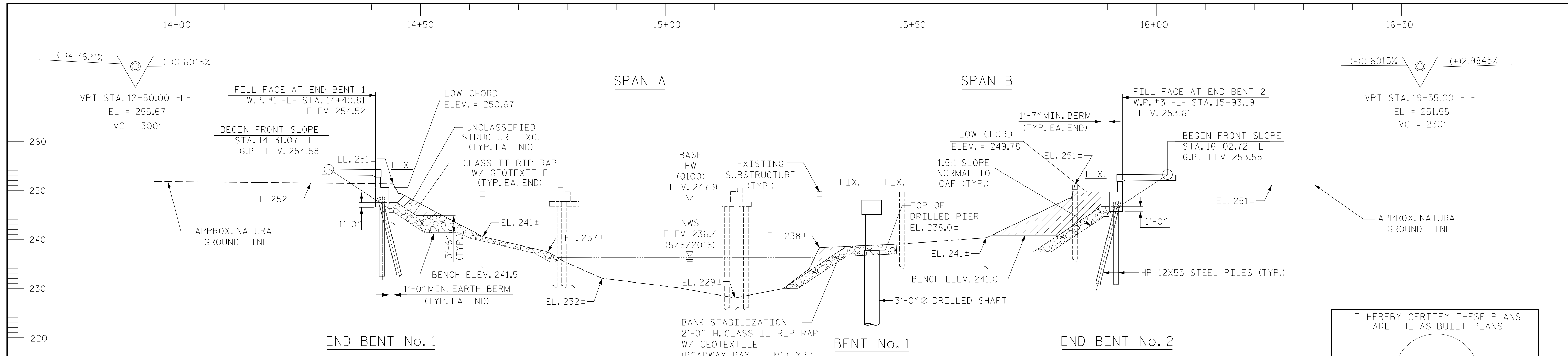


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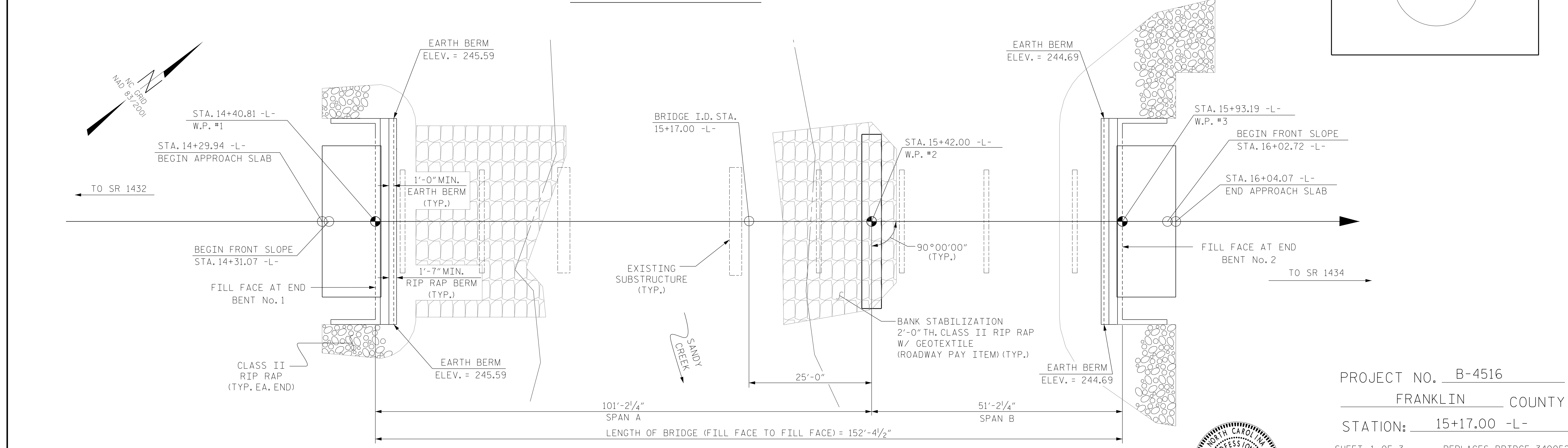
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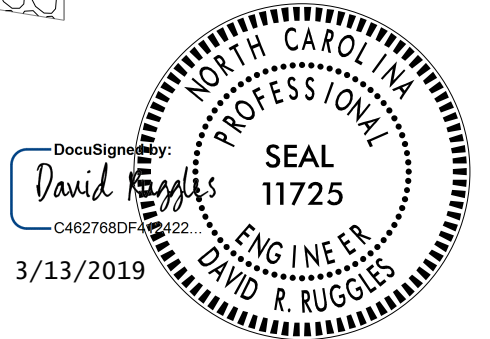
SECTION ALONG -L-

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS



PLAN
(PILES NOT SHOWN FOR CLARITY.)

PROJECT NO. B-4516
FRANKLIN COUNTY
STATION: 15+17.00 -L-
SHEET 1 OF 3 REPLACES BRIDGE 340052



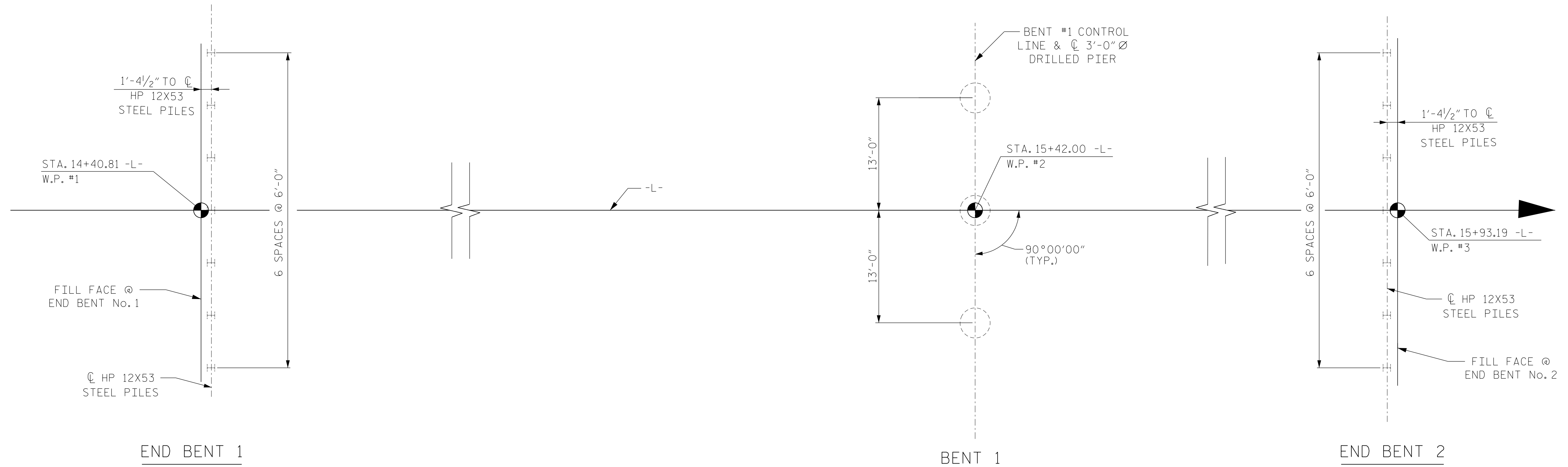
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STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
GENERAL DRAWING BRIDGE OVER SANDY CREEK ON SR 1433 BETWEEN SR 1432 AND SR 1434					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
SHEET NO. S-1					TOTAL SHEETS 22

DRAWN BY: V. CHUNG	DATE: 07-18
CHECKED BY: E. PHELPS	DATE: 08-18
DESIGN ENGINEER OF RECORD: D. RUGGLES	DATE: 03-19

B-4516
3/13/2019
\\400_001_B4516_SMU_001.dgn
USER:VCHUNG



FOUNDATION LAYOUT

ALL BENTS ARE PARALLEL

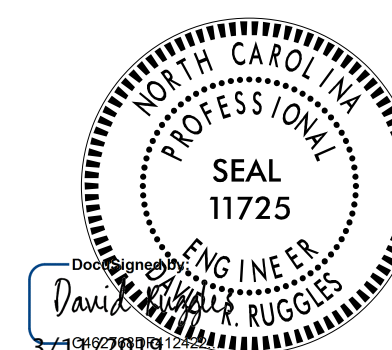
FOUNDATION NOTES

- FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.
- PILES AT END BENT NO.1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 115 TONS PER PILE.
- DRIVE PILES AT END BENT NO.1 TO A REQUIRED DRIVING RESISTANCE OF 195 TONS PER PILE.
- PILES AT END BENT NO.2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 65 TONS PER PILE.
- DRIVE PILES AT END BENT NO.2 TO A REQUIRED DRIVING RESISTANCE OF 110 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 405 TONS PER PIER. CHECK FIELD CONDITIONS FOR THE REQUIRED TIP RESISTANCE OF 135 TSF.
- INSTALL DRILLED PIERS AT BENT NO.1 TO A TIP ELEVATION NO HIGHER THAN 206 FT WITH THE REQUIRED TIP RESISTANCE.
- THE SCOUR CRITICAL ELEVATION FOR BENT NO.1 IS ELEVATION 232.0 FT. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.
- SID INSPECTIONS MAY BE REQUIRED FOR DRILLED PIERS. THE ENGINEER WILL DETERMINE THE NEED FOR SID INSPECTIONS. FOR SID INSPECTIONS, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.
- DO NOT USE SLURRY CONSTRUCTION FOR DRILLED PIERS AT BENT NO.1.

HYDRAULIC DATA	
DESIGN DISCHARGE	7300 CFS
FREQUENCY OF DESIGN FLOOD	25 YR.
DESIGN HIGHWATER ELEV.	245.9 FT.
DRAINAGE AREA	74.1 SQ. MI.
BASE DISCHARGE (Q100)	* 9870 CFS
BASE HIGHWATER ELEV.	* 247.9 FT.
* FEMA	
OVERTOPPING FLOOD DATA	
OVERTOPPING DISCHARGE	17389 CFS
FREQUENCY OF OVERTOPPING FLOOD	500+ YR.
OVERTOPPING FLOOD ELEV.	** 252.8 FT.
** OVERTOPPING AT STA. 18+28.00 -L-	

PROJECT NO. B-4516
FRANKLIN COUNTY
 STATION: 15+17.00 -L-

SHEET 2 OF 3



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 FINAL UNLESS ALL
 SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

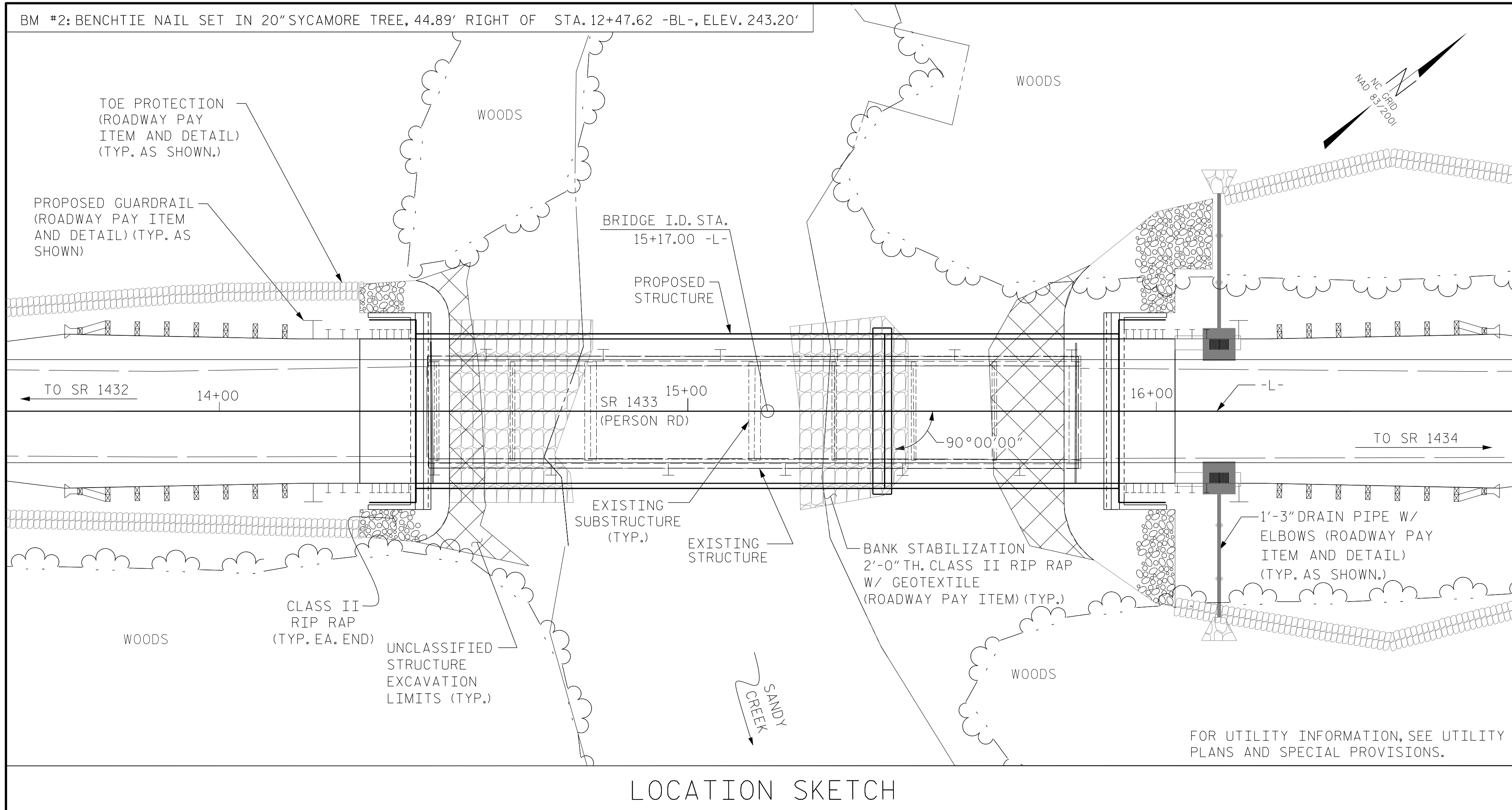
FOUNDATION LAYOUT

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

DRAWN BY: V. CHUNG DATE: 07-18
 CHECKED BY: E. PHELPS DATE: 08-18
 DESIGN ENGINEER OF RECORD: D. RUGGLES DATE: 03-19

B-4516
 3/11/2019
 \\400_002_B4516_SMU_FL02.dgn
 USER:ephelps



GENERAL NOTES:

1. ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.
2. THIS BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.
3. THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.
4. THIS STRUCTURE HAS BEEN DESIGNED IN ACCORDANCE WITH "HEC 18 - EVALUATING SCOUR AT BRIDGES."
5. THE SUBSTRUCTURE OF THE EXISTING BRIDGE INDICATED ON THE PLANS IS FROM THE BEST INFORMATION AVAILABLE. SINCE THIS INFORMATION IS SHOWN FOR THE CONVENIENCE OF THE CONTRACTOR, THE CONTRACTOR SHALL HAVE NO CLAIM WHATSOEVER AGAINST THE DEPARTMENT OF TRANSPORTATION FOR ANY DELAYS OR ADDITIONAL COST INCURRED BASED ON DIFFERENCE BETWEEN THE EXISTING BRIDGE SUBSTRUCTURE SHOWN ON THE PLANS AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.
6. REMOVAL OF THE EXISTING BRIDGE SHALL BE PERFORMED IN A MANNER THAT PREVENTS DEBRIS FROM FALLING INTO THE WATER. THE CONTRACTOR SHALL REMOVE THE BRIDGE AND SUBMIT DEMOLITION PLANS IN ACCORDANCE WITH ARTICLE 402-2 OF THE STANDARD SPECIFICATIONS.
7. FOR OTHER DESIGN DATA AND GENERAL NOTES, SEE SHEET SN.
8. FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.
9. FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.
10. FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.
11. FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.
12. FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.
13. ASPHALT WEARING SURFACE IS INCLUDED IN ROADWAY QUANTITY ON ROADWAY PLANS.
14. THE MATERIAL SHOWN IN THE CROSS-HATCHED AREA SHALL BE EXCAVATED FOR A DISTANCE OF 32'± LEFT SIDE AND 33'± RIGHT 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.
15. THE EXISTING STRUCTURE #340052 CONSISTING OF SEVEN (7) TOTAL SPANS @ 18'-1", 16'-9", 35'-2", 17'-1", 17'-1", 17'-1", AND 17'-9" (SPANS 1, 2, 4-7) TIMBER GIRDER SPANS AND (SPANS 3, 4) I-STEEL GIRDER SPANS (139'-3" TOTAL LENGTH), 19'-11" CLEAR ROADWAY WIDTH AND REINFORCED CONCRETE DECK WITH AN ASPHALT WEARING SURFACE ON TIMBER AND STEEL, AND REINFORCED CONCRETE ABUTMENTS & TIMBER PILE FOOTINGS AND LOCATED AT THE PROPOSED STRUCTURE SHALL BE REMOVED IN THEIR ENTIRETY. THE EXISTING BRIDGE IS PRESENTLY POSTED FOR A LOAD LIMIT. SHOULD THE STRUCTURAL INTEGRITY OF THE BRIDGE DETERIORATE DURING CONSTRUCTION OF THE PROPOSED BRIDGE, A LOAD LIMIT MAY BE POSTED AS FOUND NECESSARY DURING THE LIFE OF THE PROJECT.
16. FOR ASBESTOS ASSESSMENT FOR BRIDGE DEMOLITION AND RENOVATION ACTIVITIES, SEE SPECIAL PROVISIONS.

LOCATION SKETCH

TOTAL BILL OF MATERIAL

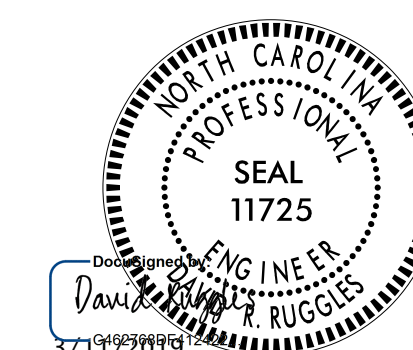
	REMOVAL OF EXISTING STRUCTURE	ASBESTOS ASSESSMENT	3'-0" DRILLED PIERS NOT IN SOIL	3'-0" DRILLED PIERS IN SOIL	SID INSPECTIONS	CSL TESTING	UNCLASSIFIED STRUCTURE EXCAVATION	CLASS A CONCRETE	BRIDGE APPROACH SLABS	REINFORCING STEEL	SPIRAL COLUMN REINFORCING STEEL	PILE DRIVING EQUIPMENT SETUP FOR HP 12X53 STEEL PILES	HP 12X53 STEEL PILES	VERTICAL CONCRETE BARRIER RAIL	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE	ELASTOMERIC BEARINGS	3'-0" x 3'-3" PRESTRESSED CONCRETE BOX BEAMS		
	LUMP SUM	LUMP SUM	LF	LF	EACH	EACH	LUMP SUM	CY	LUMP SUM	LBS	LBS	EACH	No.	LF	LF	TON	SY	LUMP SUM	No.	LF
SUPERSTRUCTURE									LUMP SUM						300.0			LUMP SUM	22	1,650
END BENT No. 1							LUMP SUM	29.0		4,610		7	7	315	70	75				
BENT No. 1			12	90	1	1		20.7		17,288	2,565									
END BENT No. 2							LUMP SUM	29.0		4,610		7	7	350	160	175				
TOTAL	LUMP SUM	LUMP SUM	12	90	1	1	LUMP SUM	78.7	LUMP SUM	26,508	2,565	14	14	665	300.0	230	250	LUMP SUM	22	1,650

GENERAL NOTES (CONTINUED):

17. BEST MANAGEMENT PRACTICES FOR BRIDGE DEMOLITION AND REMOVAL WILL BE IMPLEMENTED DURING THE REMOVAL OF THE EXISTING BRIDGE.
18. THE BRIDGE WILL BE REMOVED FROM THE TOP DOWN, FIRST REMOVING THE ASPHALT WITH CONTAINMENT MEASURES IN PLACE TO PREVENT COMPONENTS OF THE BRIDGE DECK FROM DROPPING INTO THE STREAM. THE METHOD OF CONTAINMENT WILL BE PROPOSED BY THE CONTRACTOR AND APPROVED BY THE ENGINEER. THIS WILL BE FOLLOWED BY REMOVAL OF THE DECKING, GIRDERS, ETC. THE CONTRACTOR WILL THEN COMPLETELY REMOVE THE EXISTING ABUTMENTS. ADDITIONAL CLASS II RIP RAP WILL BE INSTALLED ON BOTH STREAMBANKS TO SUPPLEMENT THE EXISTING CLASS II RIP RAP.
19. THE CONTRACTOR WILL INSTALL TURBIDITY CURTAINS IN SANDY CREEK DURING REMOVAL OF THE TIMBER PILES. AN ATTEMPT WILL BE MADE TO COMPLETELY REMOVE THE EXISTING TIMBER AND STEEL PILES; HOWEVER, IF THIS CANNOT BE ACCOMPLISHED WITH MINIMAL SUBSTRATE DISTURBANCE, THE PILES WILL BE PINCHED OFF ONE FOOT BELOW THE MUD LINE OR CUT FLUSH WITH EXISTING MUD LINE AS DIRECTED BY THE ENGINEER. THE CONTRACTOR WILL NOT BE ALLOWED TO DRAG REMOVED TIMBER PILES ON OR ACROSS THE STREAMBED.
20. NO EQUIPMENT OR COMPONENTS WILL BE PLACED/STAGED IN SANDY CREEK UNLESS NOTED IN THESE COMMITMENTS.
21. A NEW TWO-SPAN BRIDGE (1 @ 101 FT, 2.25 IN, 1 @ 51 FT, 2.25 IN) WILL BE CONSTRUCTED AT THE SITE THAT COMPLETELY SPANS SANDY CREEK.
22. DECK DRAINS WILL NOT BE ALLOWED TO DISCHARGE DIRECTLY INTO THE STREAM.

PROJECT NO. B-4516
FRANKLIN COUNTY
 STATION: 15+17.00 -L-

SHEET 3 OF 3



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STEWART

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 GENERAL DRAWING
 BRIDGE OVER SANDY CREEK
 ON SR 1433 BETWEEN
 SR 1432 AND SR 1434

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

B-4516

3/11/2019

\\400_003_B4516_SMLLS01.dgn
 USER:phelps

DRAWN BY: V. CHUNG DATE: 07-18
 CHECKED BY: E. PHELPS DATE: 08-18
 DESIGN ENGINEER OF RECORD: D. RUGGLES DATE: 03-19

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

LEVEL	VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING	MINIMUM RATING FACTORS (RF)	TONS = W X RF	STRENGTH I LIMIT STATE										SERVICE III LIMIT STATE					COMMENT NUMBER			
						LIVELOAD FACTORS	MOMENT					SHEAR					LIVELOAD FACTORS	MOMENT						
							DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)		DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN		GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING	HL-93(Inv)	N/A	1	1.035	--	1.75	0.272	1.26	A	EL	49.25	0.489	1.34	A	EL	4.925	0.80	0.272	1.04	A	EL	49.25		
	HL-93(Opr)	N/A	--	1.633	--	1.35	0.272	1.63	A	EL	49.25	0.489	1.73	A	EL	4.925	N/A	--	--	--	--	--		
	HS-20(Inv)	36.000	2	1.44	51.84	1.75	0.272	1.75	A	EL	49.25	0.489	1.81	A	EL	4.925	0.80	0.272	1.44	A	EL	49.25		
	HS-20(Opr)	36.000	--	2.271	81.756	1.35	0.272	2.27	A	EL	49.25	0.489	2.35	A	EL	4.925	N/A	--	--	--	--	--		
LEGAL LOAD RATING	SV	SNSH	13.500	--	3.413	46.079	1.4	0.272	5.19	A	EL	49.25	0.489	5.59	A	EL	4.925	0.80	0.272	3.41	A	EL	49.25	
		SNGARBS2	20.000	--	2.473	49.452	1.4	0.272	3.76	A	EL	49.25	0.489	3.91	A	EL	4.925	0.80	0.272	2.47	A	EL	49.25	
		SNAGRIS2	22.000	--	2.313	50.885	1.4	0.272	3.52	A	EL	49.25	0.489	3.6	A	EL	4.925	0.80	0.272	2.31	A	EL	49.25	
		SNCOTTS3	27.250	--	1.696	46.228	1.4	0.272	2.58	A	EL	49.25	0.489	2.78	A	EL	4.925	0.80	0.272	1.70	A	EL	49.25	
		SNAGGRS4	34.925	--	1.39	48.556	1.4	0.272	2.11	A	EL	49.25	0.489	2.26	A	EL	4.925	0.80	0.272	1.39	A	EL	49.25	
		SNS5A	35.550	--	1.361	48.398	1.4	0.272	2.07	A	EL	49.25	0.489	2.27	A	EL	4.925	0.80	0.272	1.36	A	EL	49.25	
		SNS6A	39.950	--	1.238	49.456	1.4	0.272	1.88	A	EL	49.25	0.489	2.05	A	EL	4.925	0.80	0.272	1.24	A	EL	49.25	
	SNS7B	42.000	--	1.178	49.496	1.4	0.272	1.79	A	EL	49.25	0.489	2	A	EL	4.925	0.80	0.272	1.18	A	EL	49.25		
	TTST	TNAGRIT3	33.000	--	1.506	49.709	1.4	0.272	2.29	A	EL	49.25	0.489	2.46	A	EL	4.925	0.80	0.272	1.51	A	EL	49.25	
		TNT4A	33.075	--	1.51	49.942	1.4	0.272	2.3	A	EL	49.25	0.489	2.41	A	EL	4.925	0.80	0.272	1.51	A	EL	49.25	
		TNT6A	41.600	--	1.224	50.926	1.4	0.272	1.86	A	EL	49.25	0.489	2.09	A	EL	4.925	0.80	0.272	1.22	A	EL	49.25	
		TNT7A	42.000	--	1.225	51.442	1.4	0.272	1.86	A	EL	49.25	0.489	2.05	A	EL	4.925	0.80	0.272	1.22	A	EL	49.25	
		TNT7B	42.000	--	1.254	52.657	1.4	0.272	1.91	A	EL	49.25	0.489	1.96	A	EL	4.925	0.80	0.272	1.25	A	EL	49.25	
		TNAGRIT4	43.000	--	1.203	51.711	1.4	0.272	1.83	A	EL	49.25	0.489	1.91	A	EL	4.925	0.80	0.272	1.20	A	EL	49.25	
TNAGT5A		45.000	--	1.139	51.236	1.4	0.272	1.73	A	EL	49.25	0.489	1.87	A	EL	4.925	0.80	0.272	1.14	A	EL	49.25		
TNAGT5B	45.000	3	1.129	50.805	1.4	0.272	1.72	A	EL	49.25	0.489	1.82	A	EL	4.925	0.80	0.272	1.13	A	EL	49.25			

LOAD FACTORS:

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

NOTES:

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

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

CONTROLLING LOAD RATING

1 DESIGN LOAD RATING (HL-93)

2 DESIGN LOAD RATING (HS-20)

3 LEGAL LOAD RATING **

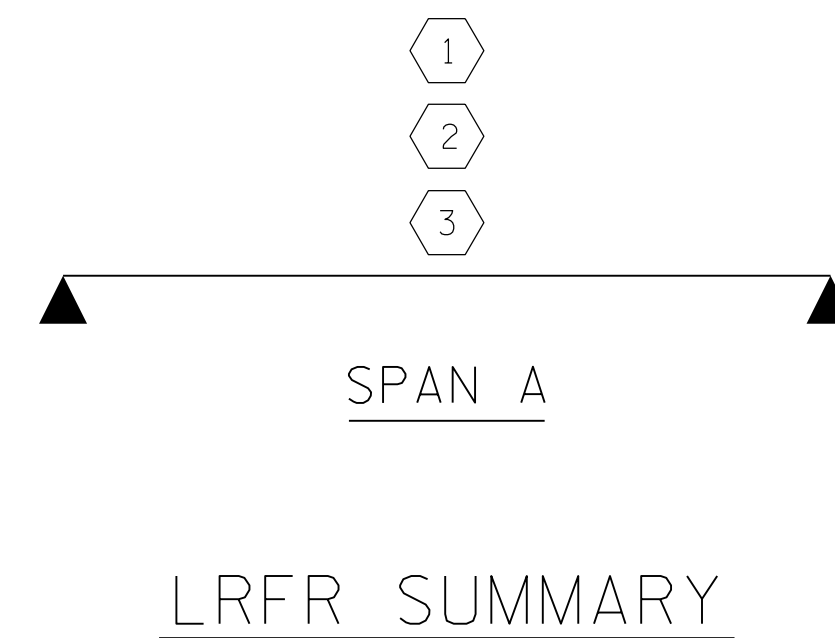
** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

I - INTERIOR GIRDER

EL - EXTERIOR LEFT GIRDER

ER - EXTERIOR RIGHT GIRDER



PROJECT NO. B-4516

FRANKLIN COUNTY

STATION: 15+17.00 -L-



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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
LRFR SUMMARY FOR
100' BOX BEAM UNIT
90° SKEW
(NON-INTERSTATE TRAFFIC)

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

DRAWN BY: V. CHUNG DATE: 07-18

CHECKED BY: E. PHELPS DATE: 08-18

DESIGN ENGINEER OF RECORD: D. RUGGLES DATE: 03-19

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

LEVEL	VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING	MINIMUM RATING FACTORS (RF)	TONS = W X RF	STRENGTH I LIMIT STATE										SERVICE III LIMIT STATE					COMMENT NUMBER			
						LIVELOAD FACTORS	MOMENT					SHEAR					LIVELOAD FACTORS	MOMENT						
							DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)		DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN		GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING	HL-93(Inv)	N/A	1	1.89	--	1.75	0.272	2.23	B	EL	24.3	0.489	1.89	B	EL	44.3	0.80	0.272	3.11	B	EL	24.3		
	HL-93(Opr)	N/A	--	2.46	--	1.35	0.272	2.89	B	EL	24.3	0.489	2.46	B	EL	44.3	N/A	--	--	--	--	--		
	HS-20(Inv)	36.000	2	2.25	81.000	1.75	0.272	2.77	B	EL	24.3	0.489	2.25	B	EL	44.3	0.80	0.272	3.86	B	EL	24.3		
	HS-20(Opr)	36.000	--	2.92	105.120	1.35	0.272	3.59	B	EL	24.3	0.489	2.92	B	EL	44.3	N/A	--	--	--	--	--		
LEGAL LOAD RATING	SV	SNSH	13.500	--	6.08	82.080	1.4	0.272	6.86	B	EL	24.3	0.489	6.08	B	EL	44.3	0.80	0.272	6.34	B	EL	24.3	
		SNGARBS2	20.000	--	4.44	88.800	1.4	0.272	5.39	B	EL	24.3	0.489	4.44	B	EL	44.3	0.80	0.272	4.98	B	EL	24.3	
		SNAGRIS2	22.000	--	4.17	91.740	1.4	0.272	5.20	B	EL	19.3	0.489	4.17	B	EL	44.3	0.80	0.272	4.81	B	EL	24.3	
		SNCOTTS3	27.250	--	3.05	83.113	1.4	0.272	3.41	B	EL	24.3	0.489	3.05	B	EL	44.3	0.80	0.272	3.15	B	EL	24.3	
		SNAGGRS4	34.925	--	2.61	91.154	1.4	0.272	2.96	B	EL	24.3	0.489	2.61	B	EL	44.3	0.80	0.272	2.73	B	EL	24.3	
		SNS5A	35.550	--	2.66	94.563	1.4	0.272	2.88	B	EL	24.3	0.489	2.69	B	EL	44.30	0.80	0.272	2.66	B	EL	24.3	
		SNS6A	39.950	--	2.49	99.476	1.4	0.272	2.70	B	EL	24.3	0.489	2.49	B	EL	44.3	0.80	0.272	2.49	B	EL	24.3	
	TTST	SNS7B	42.000	--	2.49	104.580	1.4	0.272	2.57	B	EL	24.3	0.489	2.49	B	EL	44.3	0.80	0.272	2.37	B	EL	24.3	
		TNAGRIT3	33.000	--	2.94	97.020	1.4	0.272	3.31	B	EL	24.3	0.489	2.94	B	EL	44.3	0.80	0.272	3.05	B	EL	24.3	
		TNT4A	33.075	--	2.82	93.272	1.4	0.272	3.33	B	EL	24.3	0.489	2.82	B	EL	44.3	0.80	0.272	3.07	B	EL	24.3	
		TNT6A	41.600	--	2.55	106.080	1.4	0.272	2.77	B	EL	24.3	0.489	2.74	B	EL	44.3	0.80	0.272	2.55	B	EL	24.3	
		TNT7A	42.000	--	2.53	106.260	1.4	0.272	2.81	B	EL	24.3	0.489	2.53	B	EL	44.3	0.80	0.272	2.60	B	EL	24.3	
		TNT7B	42.000	--	2.40	100.800	1.4	0.272	2.93	B	EL	24.3	0.489	2.40	B	EL	44.3	0.80	0.272	2.70	B	EL	24.3	
		TNAGRIT4	43.000	--	2.31	99.330	1.4	0.272	2.78	B	EL	24.3	0.489	2.31	B	EL	44.3	0.80	0.272	2.56	B	EL	24.3	
TNAGT5A	45.000	--	2.36	106.200	1.4	0.272	2.60	B	EL	24.3	0.489	2.36	B	EL	44.3	0.80	0.272	2.40	B	EL	24.3			
TNAGT5B	45.000	3	2.20	99.000	1.4	0.272	2.55	B	EL	24.3	0.489	2.20	B	EL	44.3	0.80	0.272	2.35	B	EL	24.3			

LOAD FACTORS:

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

NOTES:

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

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

CONTROLLING LOAD RATING

1 DESIGN LOAD RATING (HL-93)

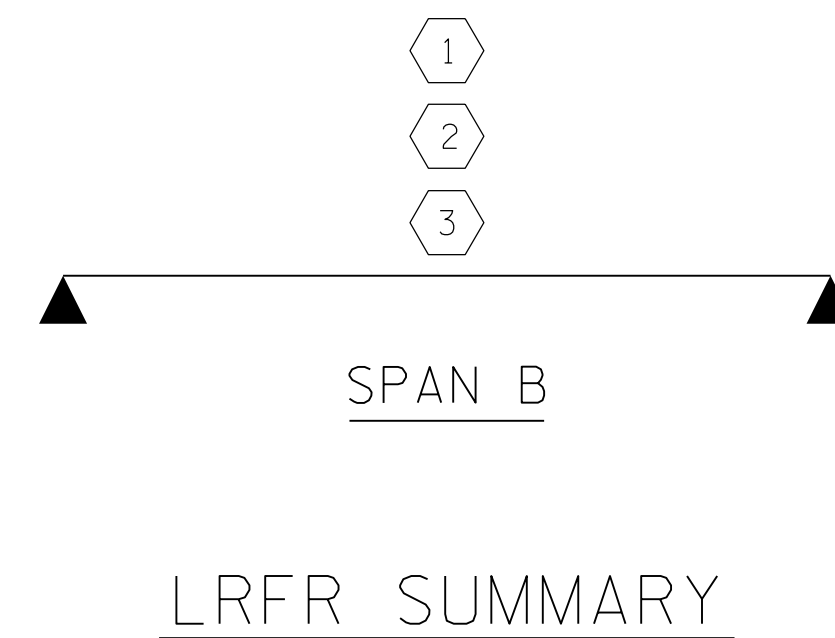
2 DESIGN LOAD RATING (HS-20)

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-4516
FRANKLIN COUNTY
 STATION: 15+17.00 -L-



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STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

LRFR SUMMARY FOR
 50' BOX BEAM UNIT
 90° SKEW
 (NON-INTERSTATE TRAFFIC)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-5
1			3			TOTAL SHEETS
2			4			22

DRAWN BY: V. CHUNG DATE: 07-18
 CHECKED BY: E. PHELPS DATE: 08-18
 DESIGN ENGINEER OF RECORD: D. RUGGLES DATE: 03-19

3/11/2019
 ...\\400_005_B4516_SMUL_LRFR02.dgn
 USER:ephelps

B-4516

NOTES

ALL PRESTRESSING STRANDS SHALL BE 7-WIRE LOW RELAXATION GRADE 270 STRANDS AND SHALL CONFORM TO AASHTO M203 EXCEPT FOR SAMPLING REQUIREMENTS WHICH SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

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

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

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

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

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

THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE BOX BEAM UNIT SHALL BE DONE WHEN THE CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN 5,500 PSI.

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

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

APPLY EPOXY PROTECTIVE COATING TO BOX BEAM UNIT ENDS.

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

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

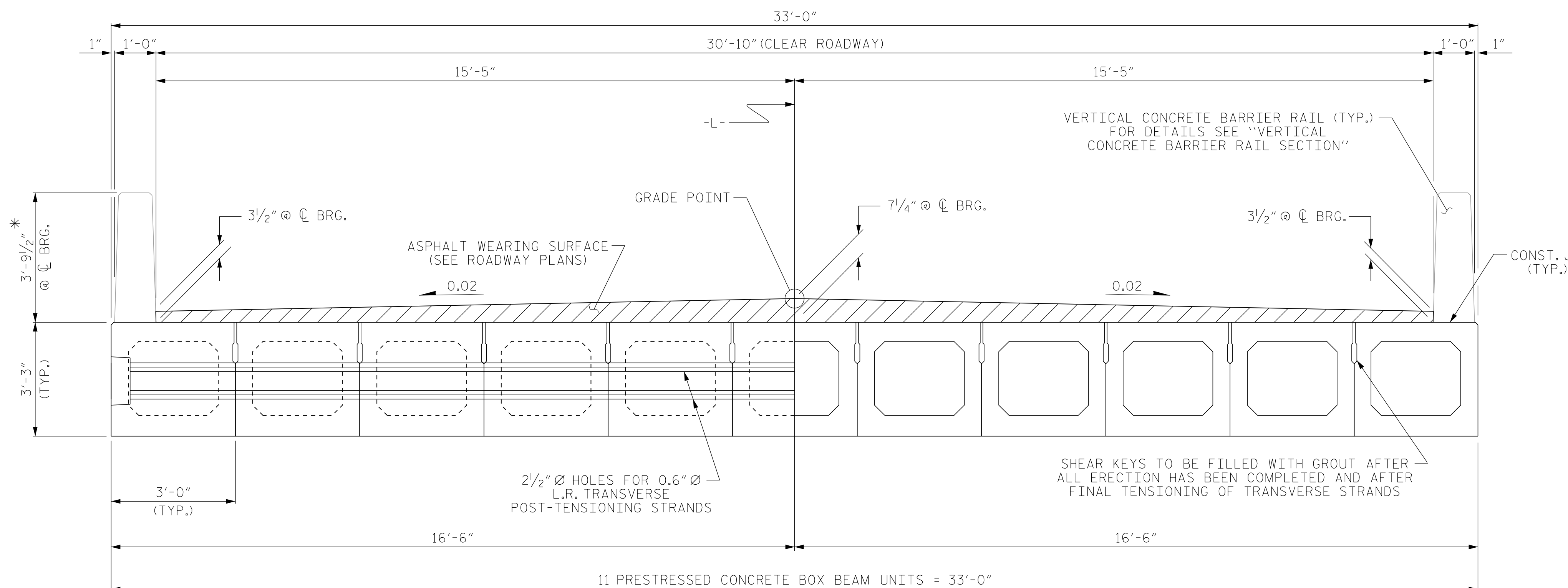
FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

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

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

THE PERMITTED THREADED INSERTS SHALL BE GROUTED 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.

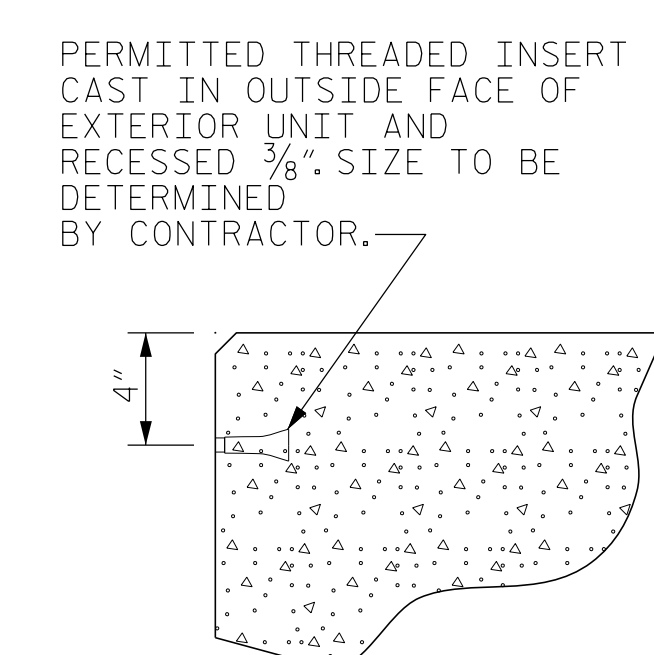


HALF SECTION
AT INTERMEDIATE DIAPHRAGMS

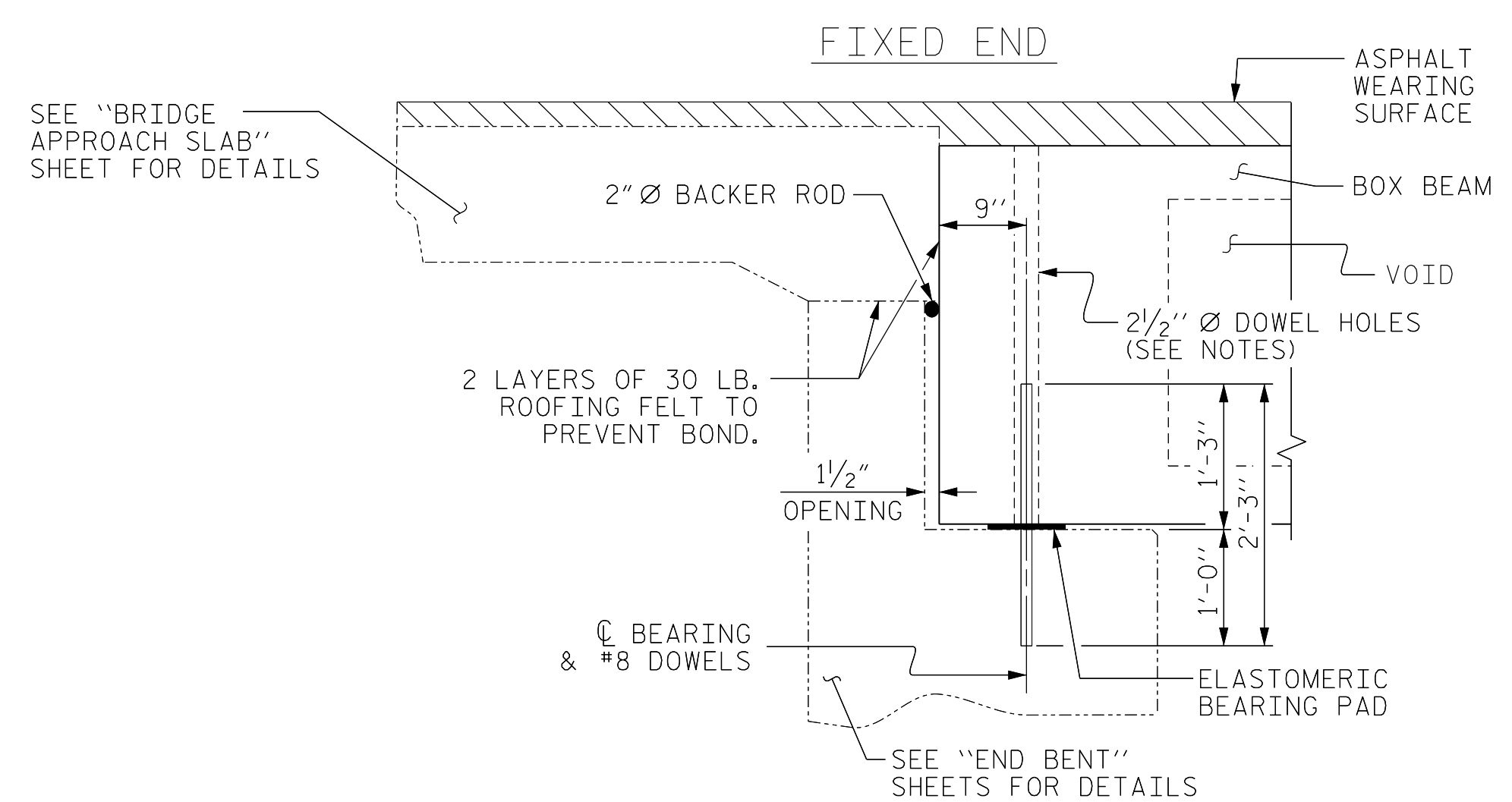
HALF SECTION
THROUGH VOIDS

TYPICAL SECTION

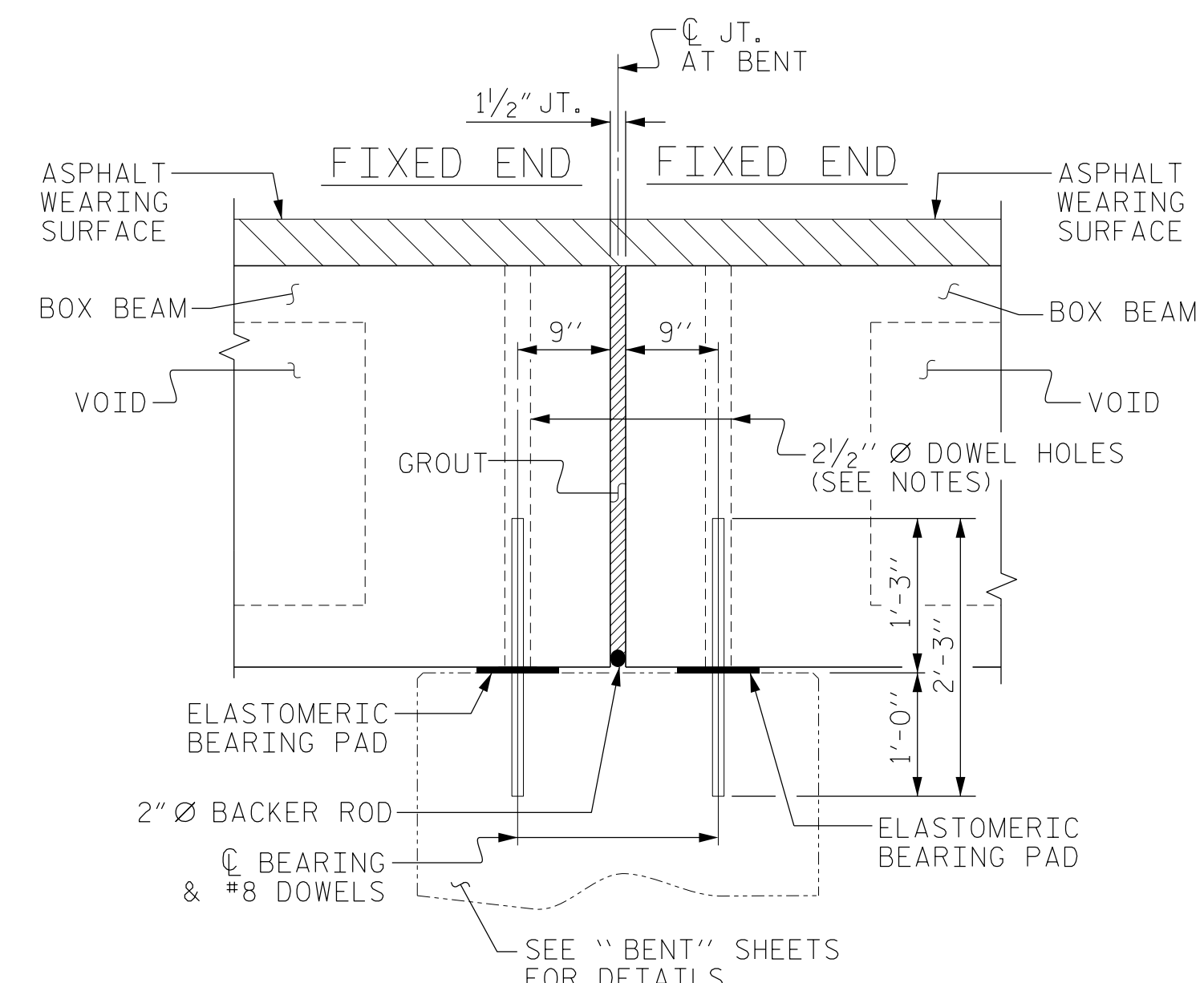
* THE MAXIMUM BARRIER RAIL HEIGHT AND ASPHALT THICKNESS IS SHOWN. THE HEIGHT OF THE BARRIER RAIL AND ASPHALT THICKNESS VARIES WHILE THE TOP OF THE BARRIER RAIL FOLLOWS THE PROFILE OF THE GUTTERLINE. FOR RAIL HEIGHT DETAILS AND ASPHALT THICKNESS, SEE THE "VERTICAL CONCRETE BARRIER RAIL SECTION" DETAIL.



THREADED INSERT DETAIL



SECTION AT END BENT



SECTION AT BENT



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FRANKLIN COUNTY
STATION: 15+17.00 -L-

SHEET 1 OF 7

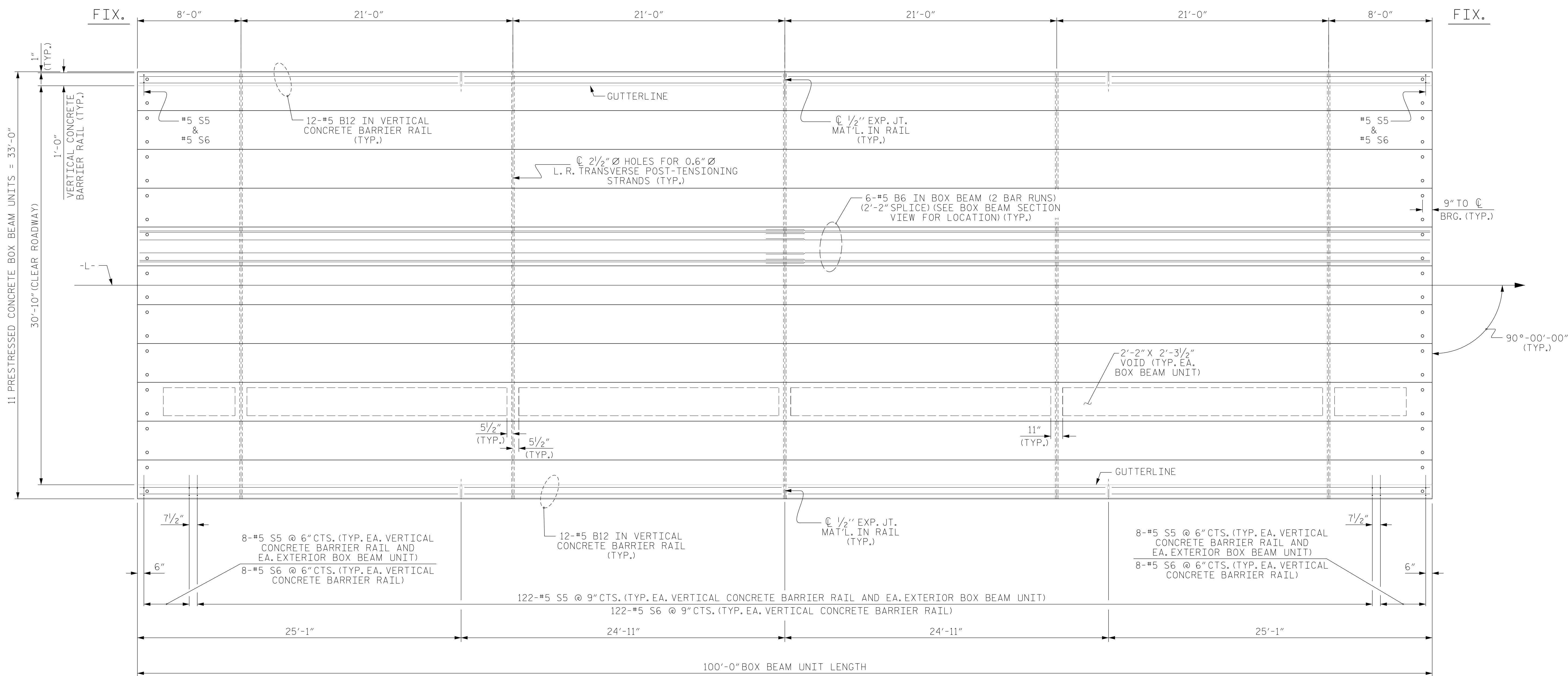
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD
3'-0" X 3'-3"
PRESTRESSED CONCRETE
BOX BEAM UNIT

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-6
1			3			TOTAL SHEETS
2			4			22

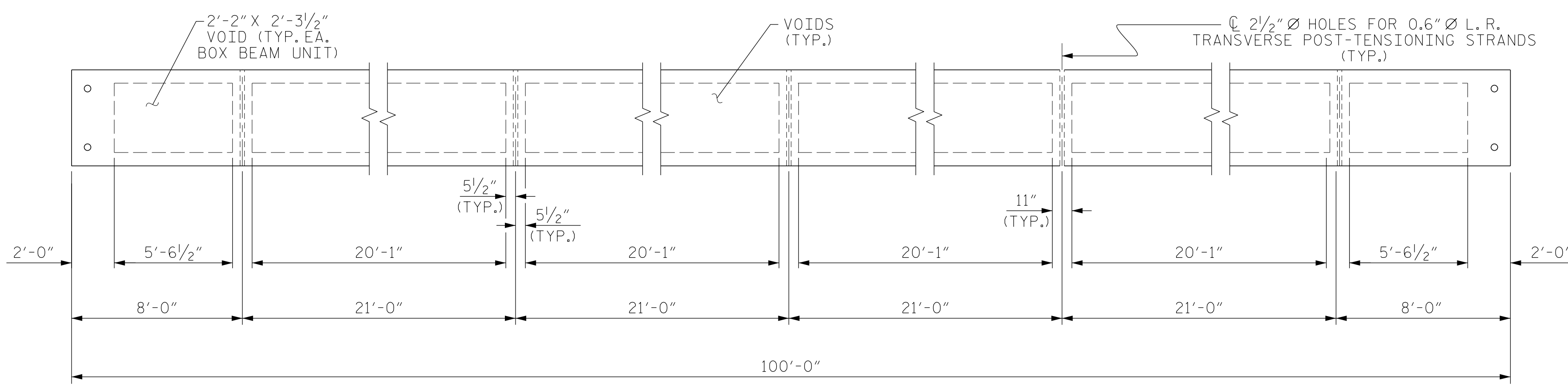
STD. NO. 39PCBB1_33

B-4516
3/11/2019
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USER:ephelps

DRAWN BY: <u>V. CHUNG</u>	DATE: <u>07-18</u>
CHECKED BY: <u>E. PHELPS</u>	DATE: <u>08-18</u>
DESIGN ENGINEER OF RECORD: <u>D. RUGGLES</u>	DATE: <u>03-19</u>

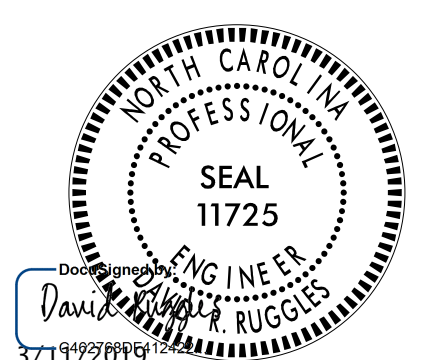


PLAN OF UNIT



DIAPHRAGM AND VOID LAYOUT

PROJECT NO. B-4516
FRANKLIN COUNTY
 STATION: 15+17.00 -L-
 SHEET 2 OF 7



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STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 PLAN OF 100' UNIT
 30'-10" CLEAR ROADWAY
 90° SKEW

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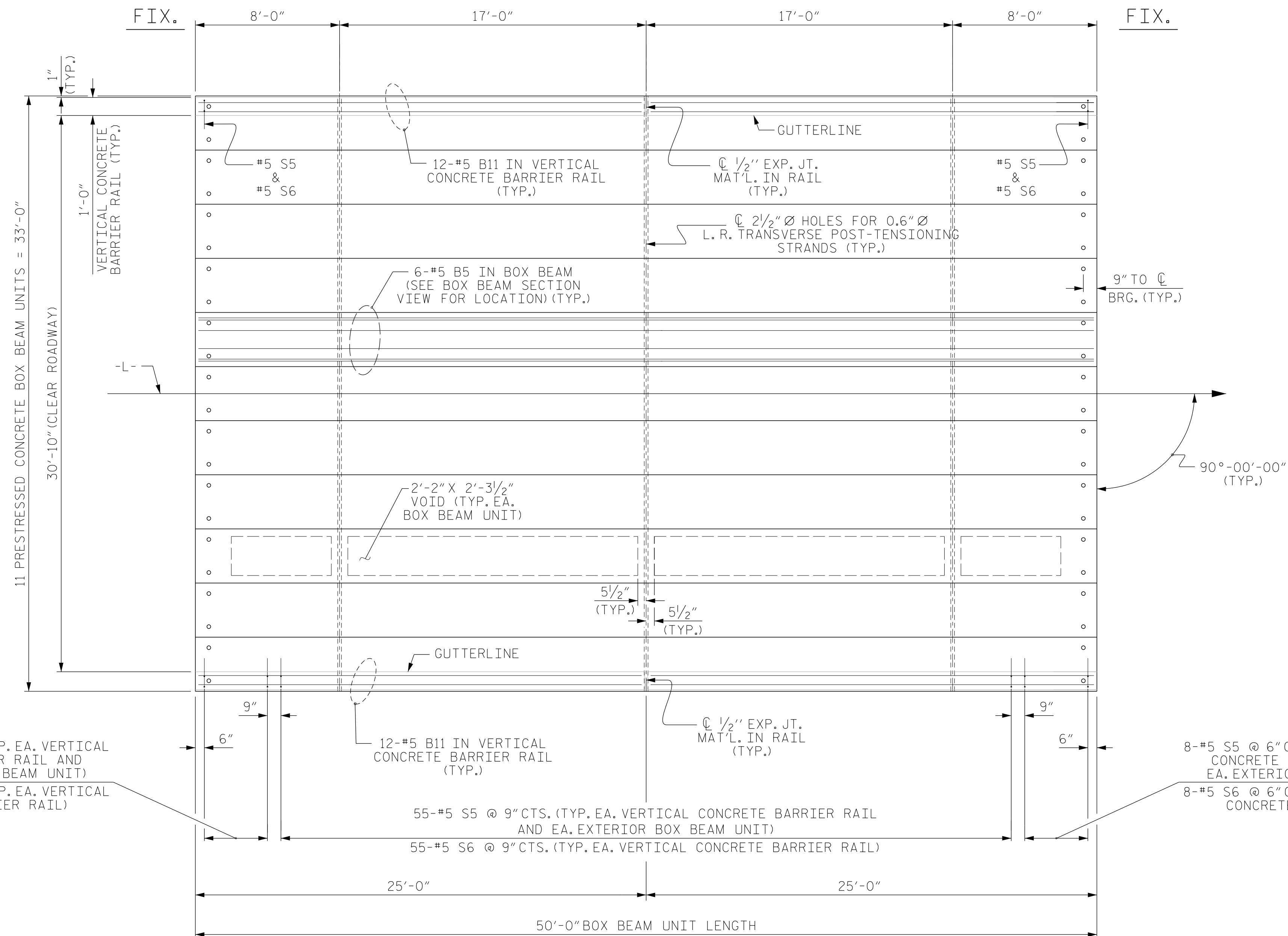
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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-7
1			3			TOTAL SHEETS
2			4			22

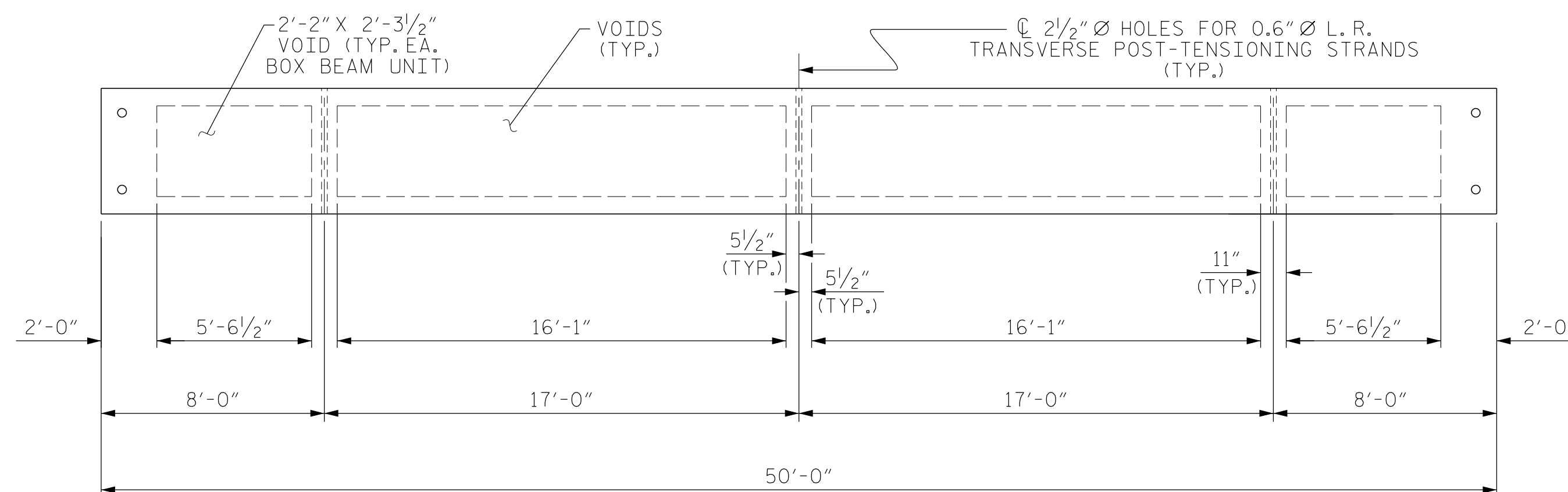
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DRAWN BY: V. CHUNG DATE: 07-18
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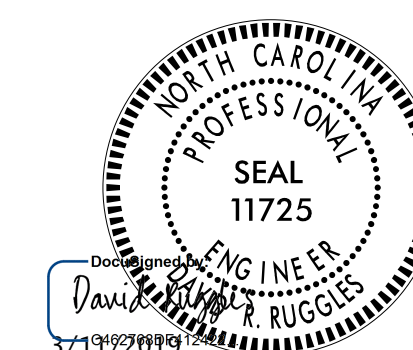


PLAN OF UNIT



DIAPHRAGM AND VOID LAYOUT

PROJECT NO. B-4516
FRANKLIN COUNTY
 STATION: 15+17.00 -L-
 SHEET 4 OF 7



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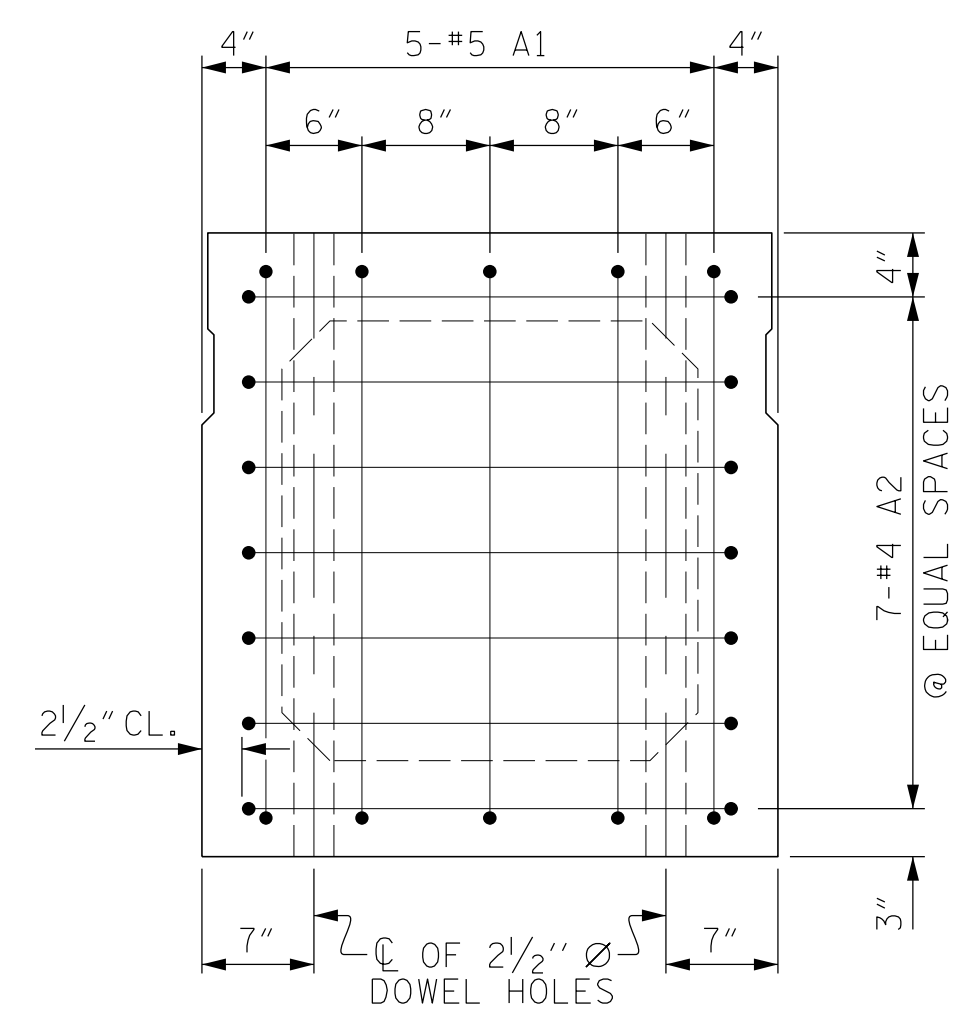
STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 PLAN OF 50' UNIT
 30'-10" CLEAR ROADWAY
 90° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-8
1			3			TOTAL SHEETS
2			4			22

DRAWN BY: V. CHUNG DATE: 07-18
 CHECKED BY: E. PHELPS DATE: 08-18
 DESIGN ENGINEER OF RECORD: D. RUGGLES DATE: 03-19

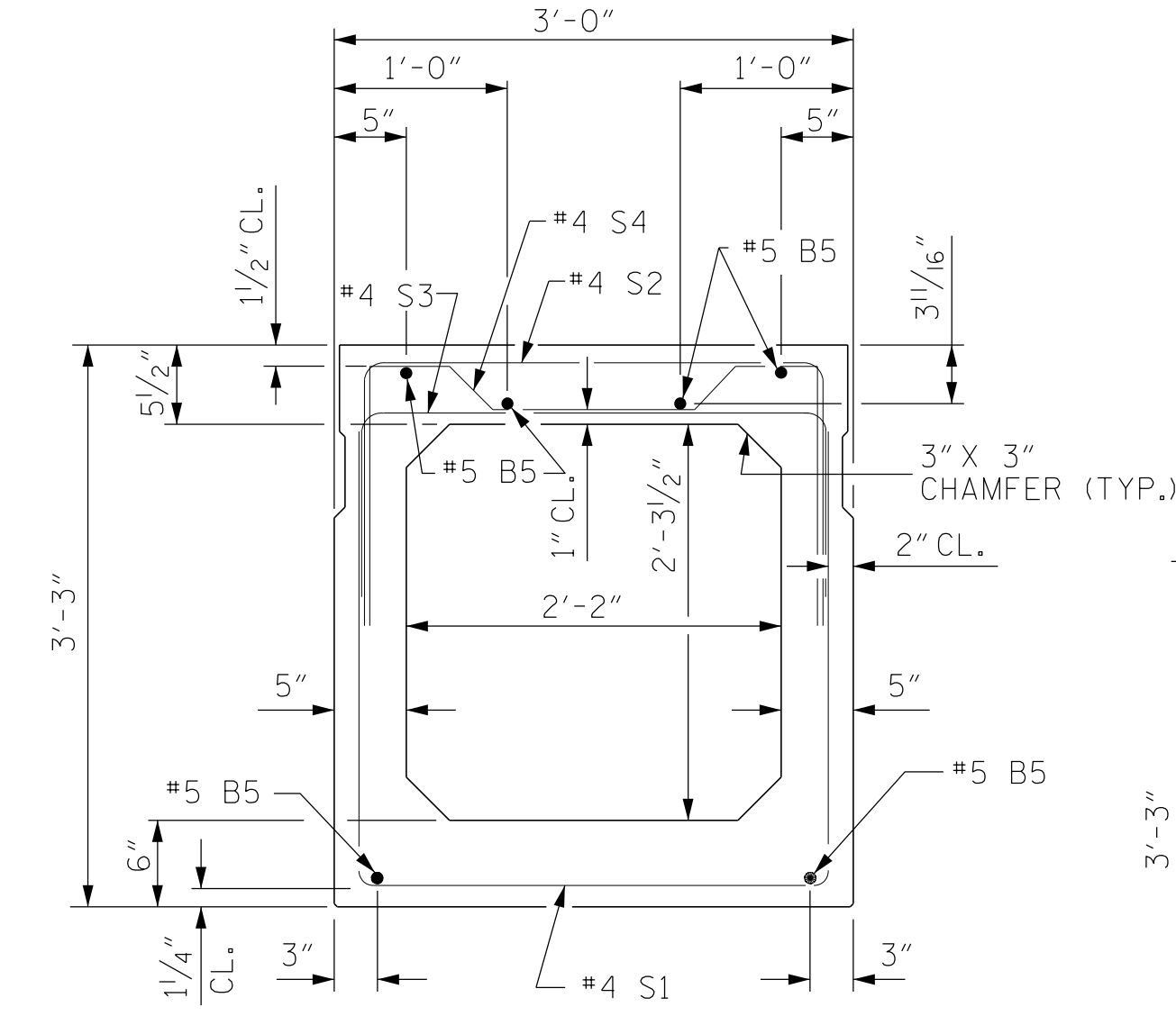
3/11/2019
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B-4516



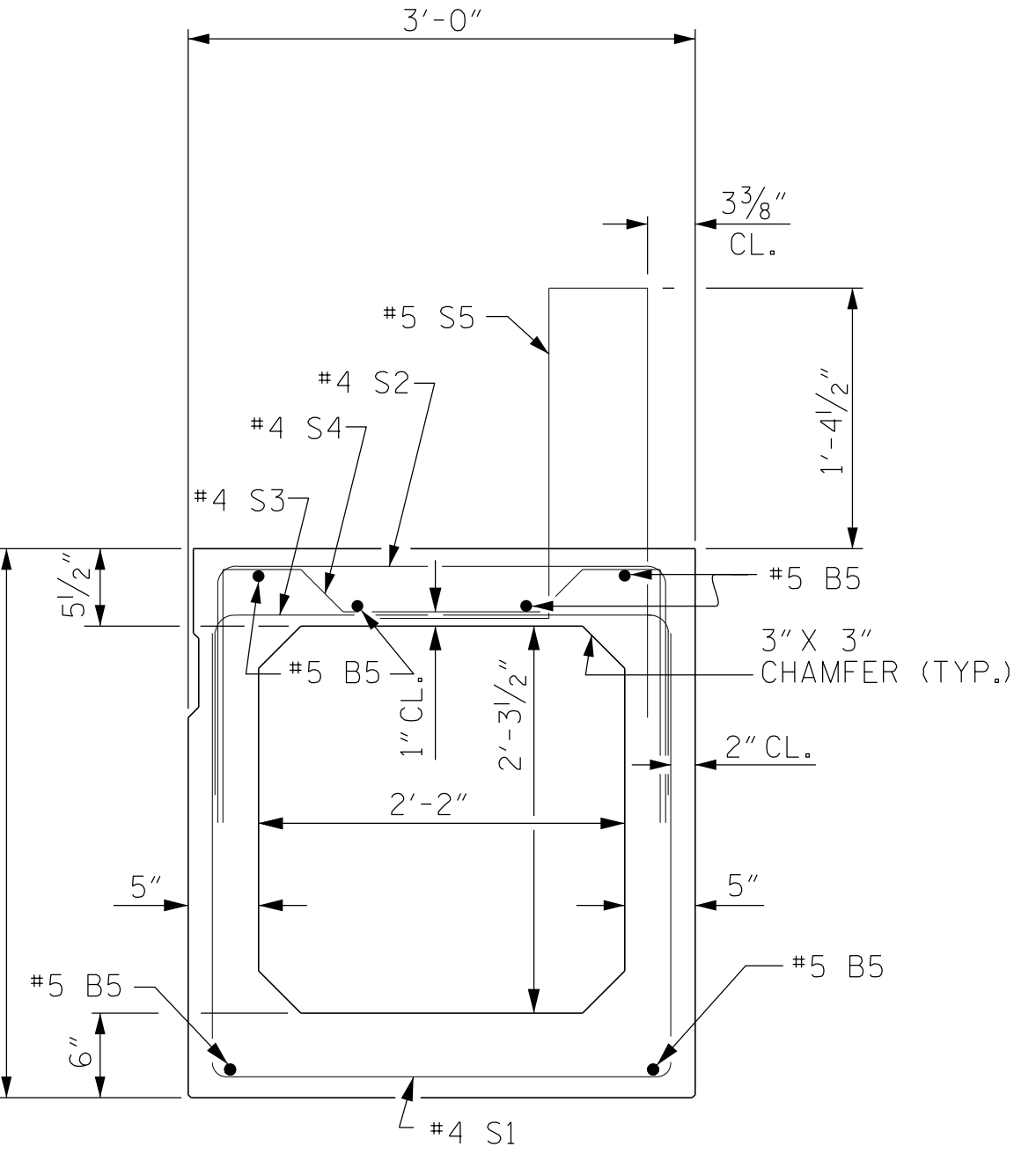
END ELEVATION

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



INTERIOR BOX BEAM SECTION

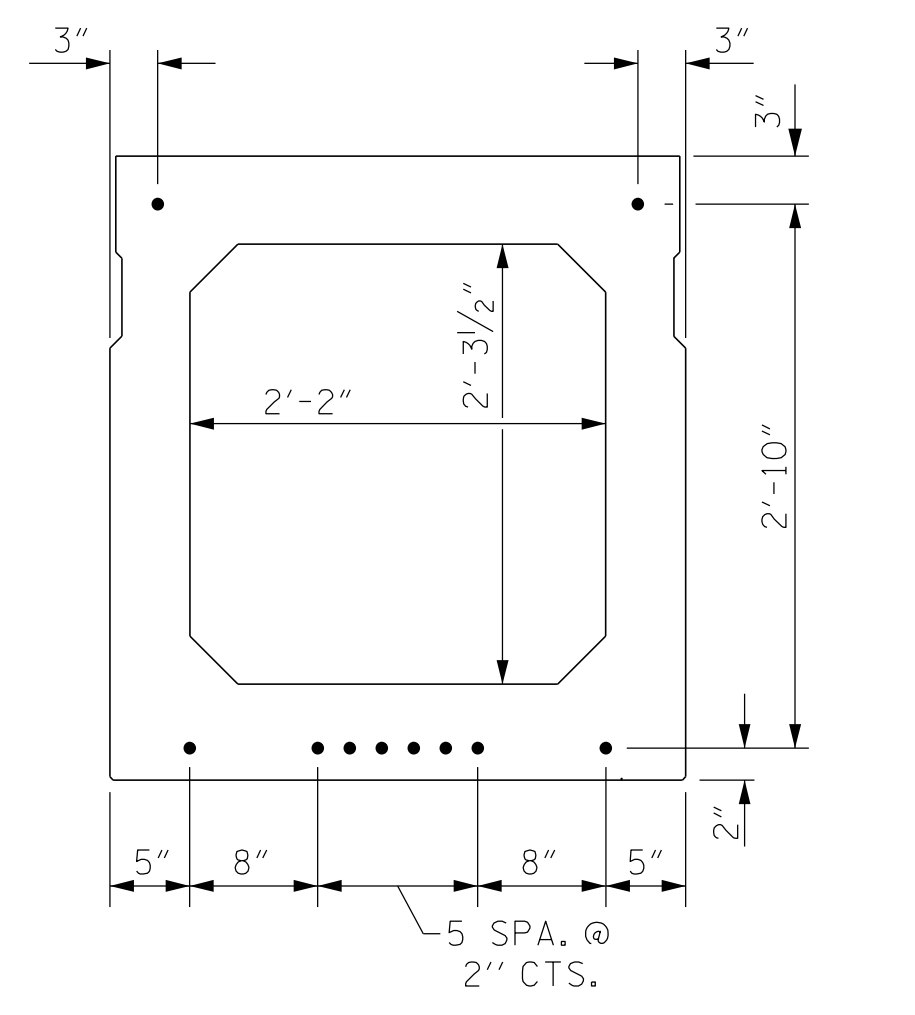
(STRAND LAYOUT NOT SHOWN)



EXTERIOR BOX BEAM SECTION

(STRAND LAYOUT NOT SHOWN)

0.6" Ø LOW RELAXATION STRAND LAYOUT

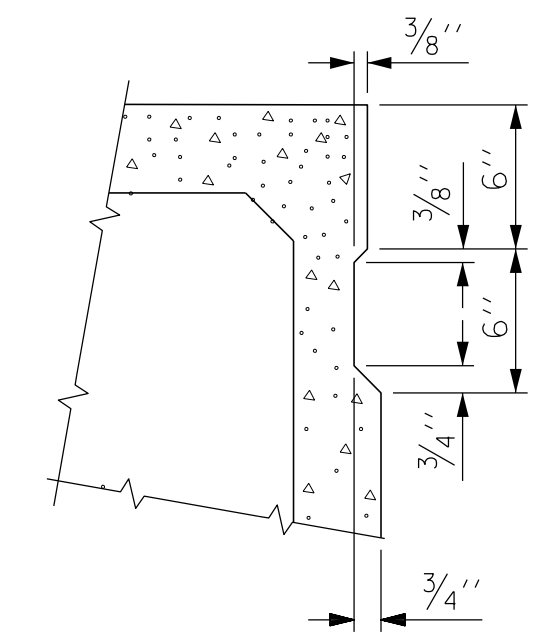


TYPICAL STRAND LOCATION

(10 STRANDS REQUIRED)

DEBONDING LEGEND

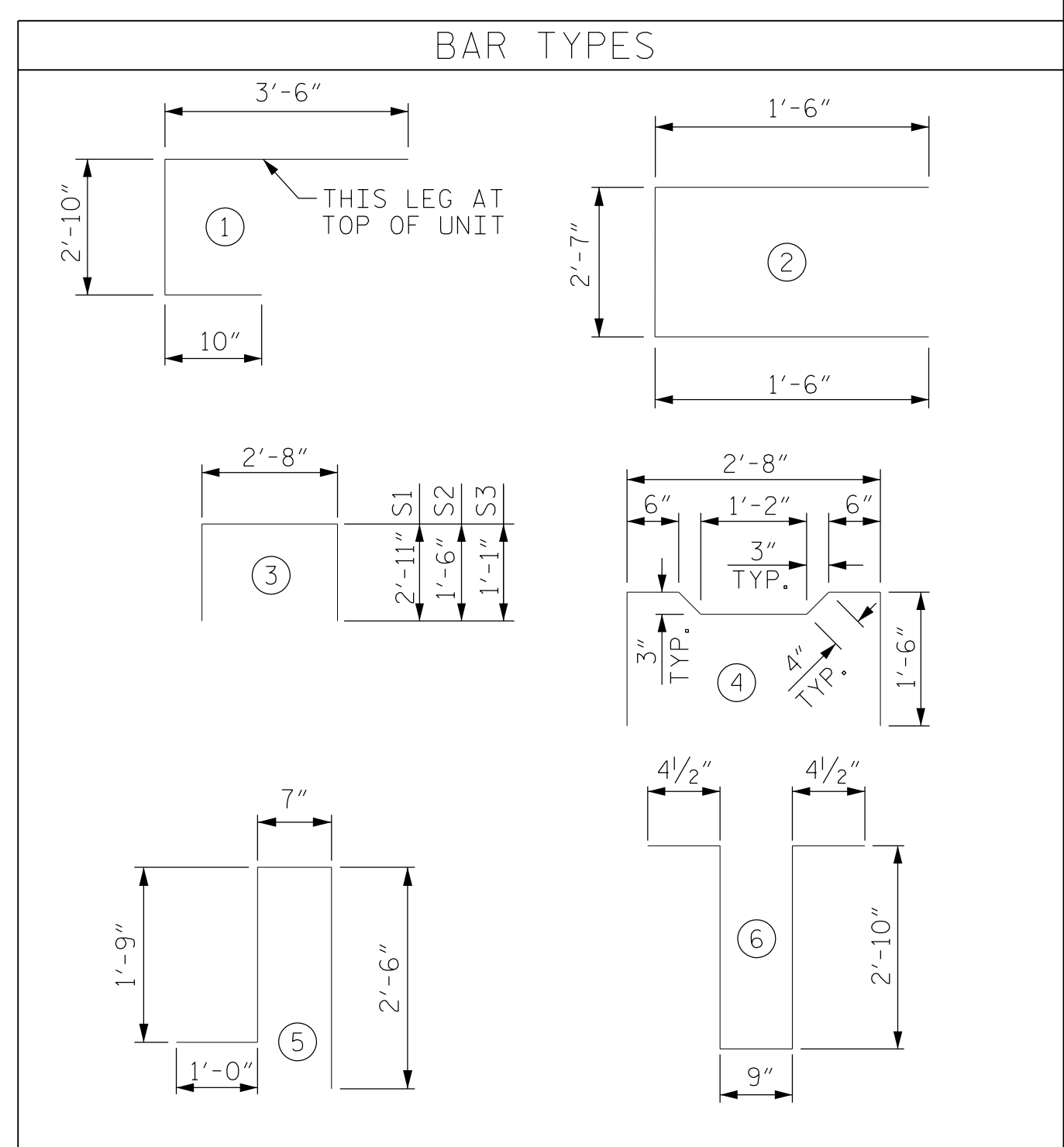
● FULLY BONDED STRANDS



SHEAR KEY DETAIL

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

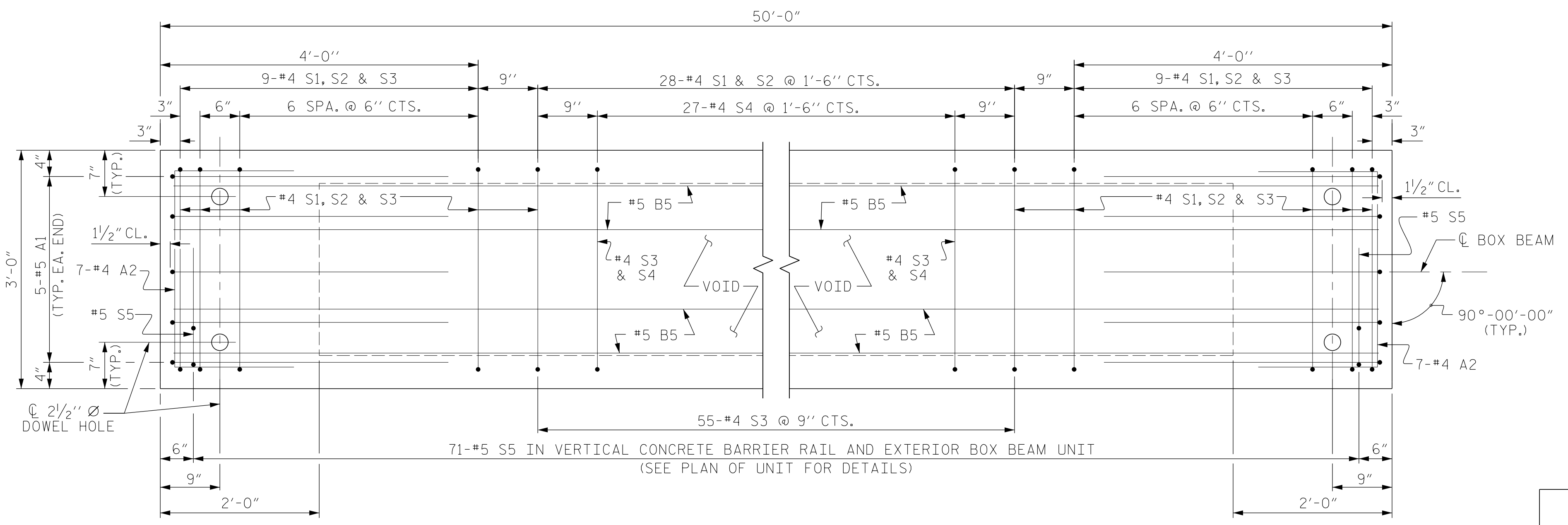
GRADE 270 STRANDS	
AREA (SQUARE INCHES)	0.217
ULTIMATE STRENGTH (LBS. PER STRAND)	58,600
APPLIED PRESTRESS (LBS. PER STRAND)	43,950
	0.6" Ø L.R.



ALL BAR DIMENSIONS ARE OUT TO OUT

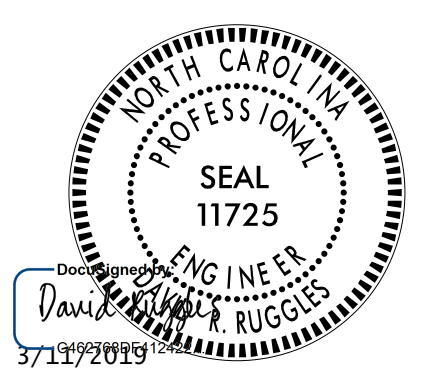
BILL OF MATERIAL FOR ONE BOX BEAM SECTION

BAR NUMBER	SIZE	TYPE	EXTERIOR UNIT		INTERIOR UNIT		
			LENGTH	WEIGHT	LENGTH	WEIGHT	
A1	10	#5	7'-2"	75	7'-2"	75	
A2	32	#4	5'-7"	119	5'-7"	119	
B5	6	#5	STR	49'-8"	311	49'-8"	311
K1	9	#4	6	7'-2"	43	7'-2"	43
K2	6	#4	STR	2'-7"	10	2'-7"	10
S1	46	#4	3	8'-6"	261	8'-6"	261
S2	46	#4	3	5'-8"	174	5'-8"	174
S3	73	#4	3	4'-10"	236	4'-10"	236
S4	27	#4	4	5'-10"	105	5'-10"	105
* S5	71	#5	5	5'-10"	432	--	--
REINFORCING STEEL				1334	LBS.	1334	LBS.
* EPOXY COATED REINF. STEEL				432	LBS.		
6000 P.S.I. CONCRETE				9.8	CU. YDS.	9.7	CU. YDS.
0.6" Ø L.R. STRANDS				No. 10		No. 10	

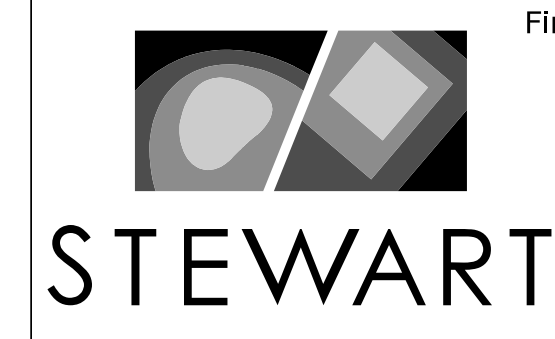


PLAN OF BOX BEAM - 50' SPAN

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



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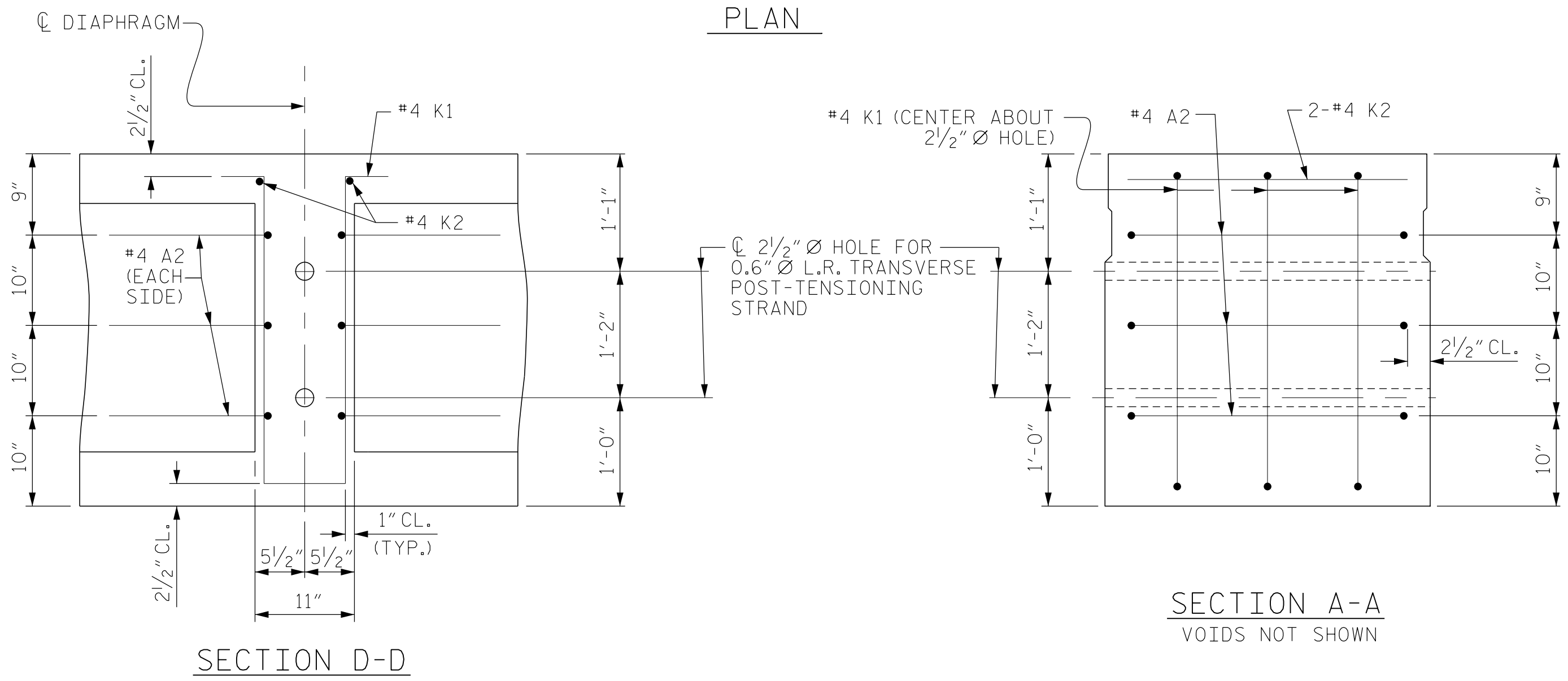
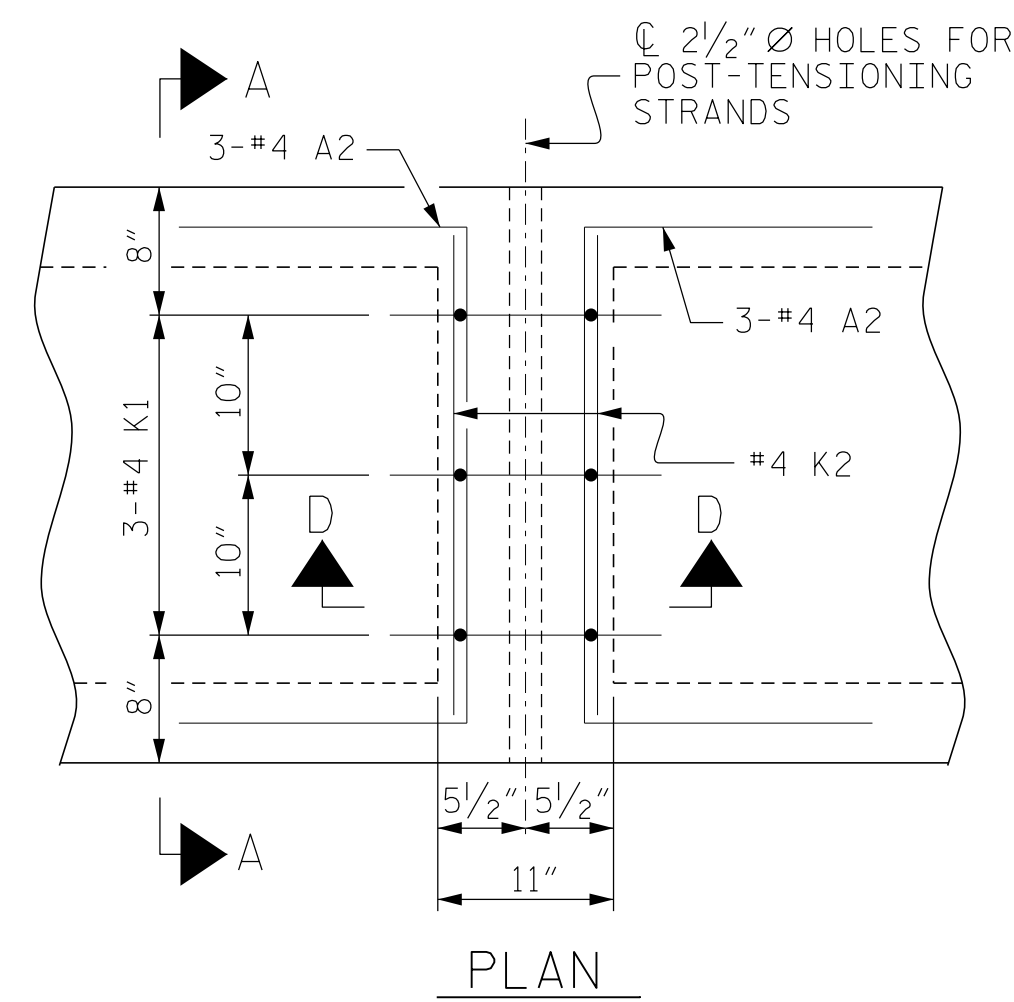
PROJECT NO. B-4516
FRANKLIN COUNTY
STATION: 15+17.00 -L-
SHEET 5 OF 7

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
3'-0" X 3'-3" PRESTRESSED CONCRETE 50'-0" BOX BEAM UNIT

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-10
1			3			TOTAL SHEETS 22
2			4			

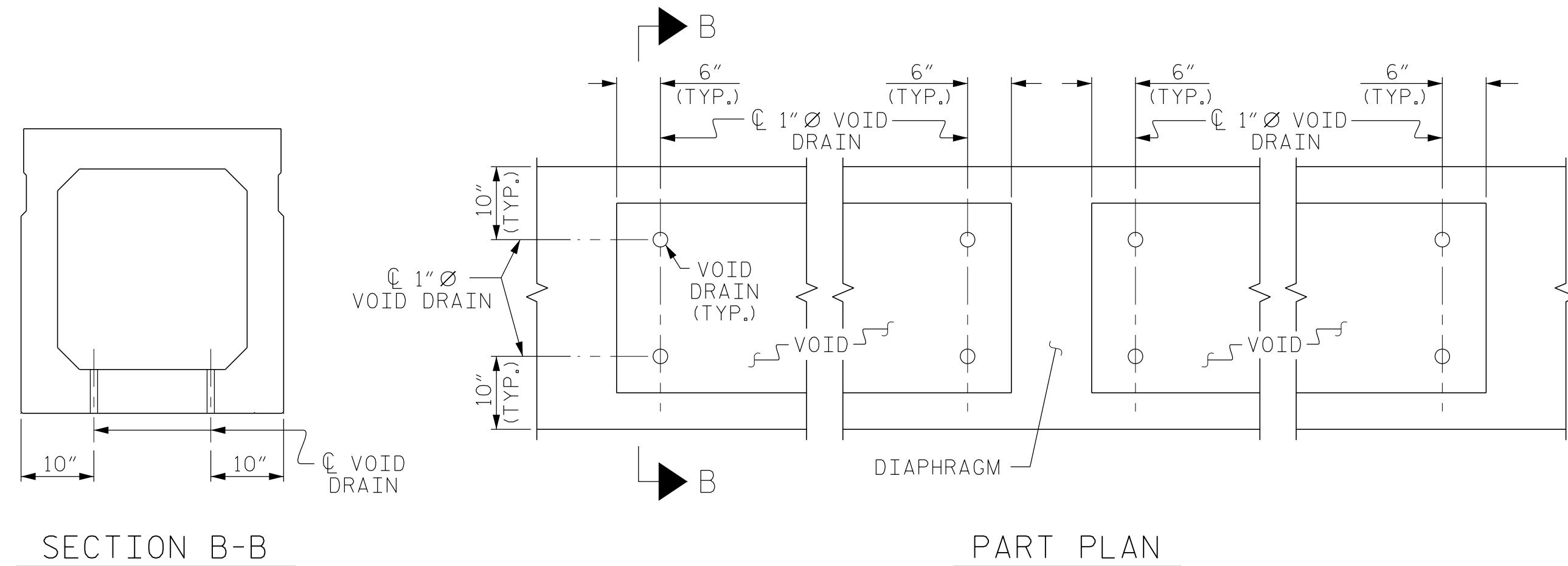
B-4516
 3/11/2019
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DRAWN BY: <u>V. CHUNG</u>	DATE: <u>07-18</u>
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DESIGN ENGINEER OF RECORD: <u>D. RUGGLES</u>	DATE: <u>03-19</u>



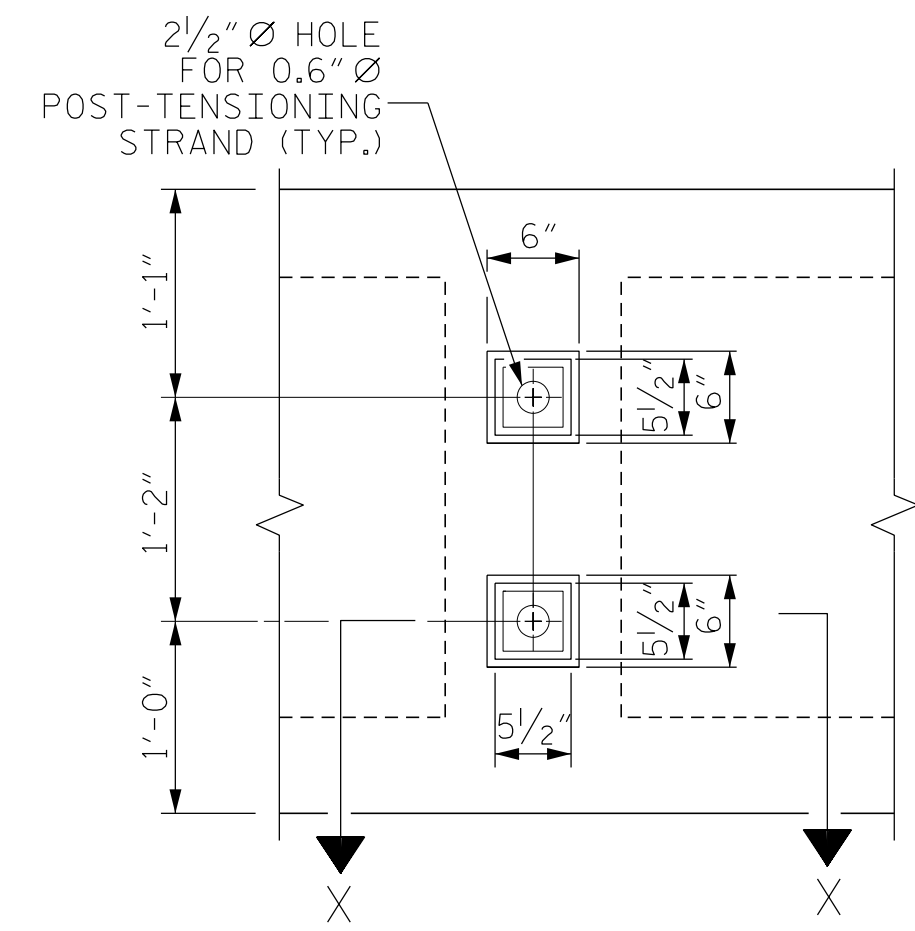
DOUBLE DIAPHRAGM DETAILS

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

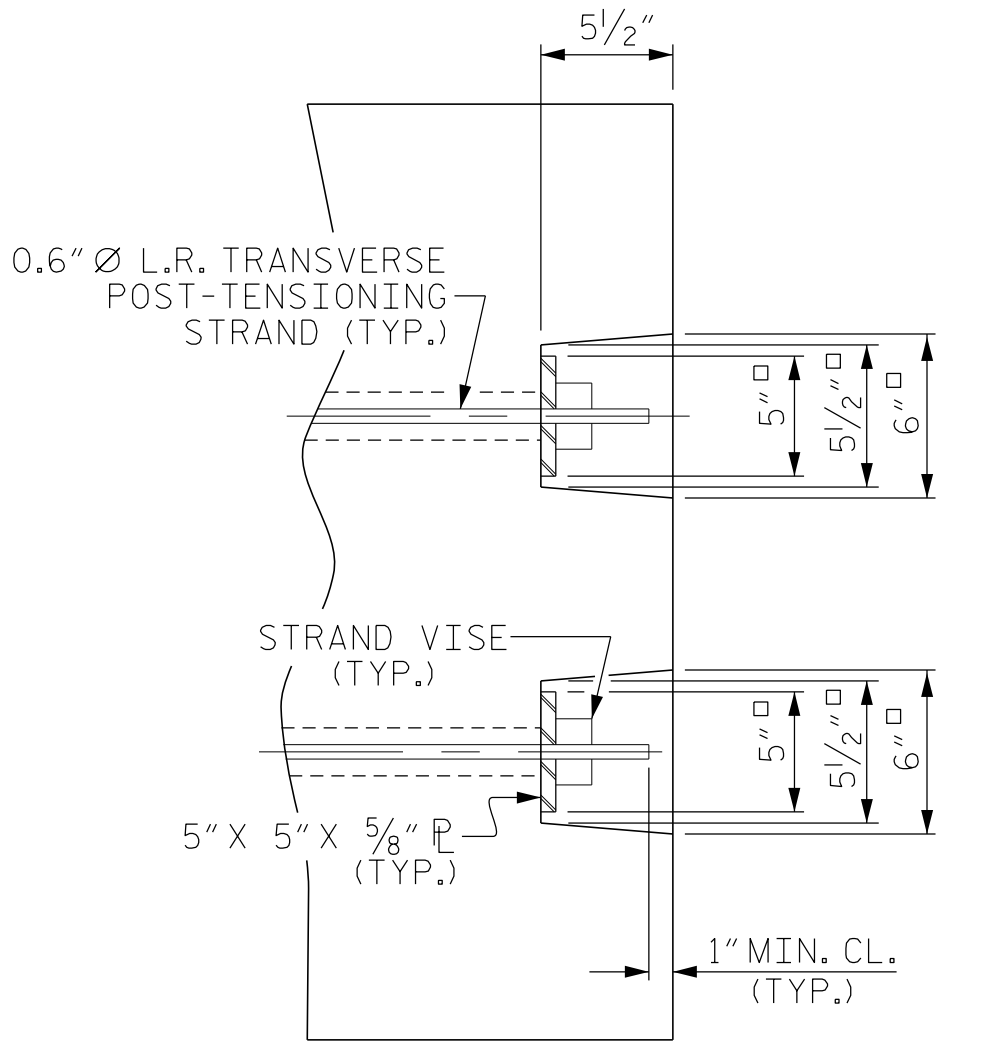


VOID DRAIN DETAILS

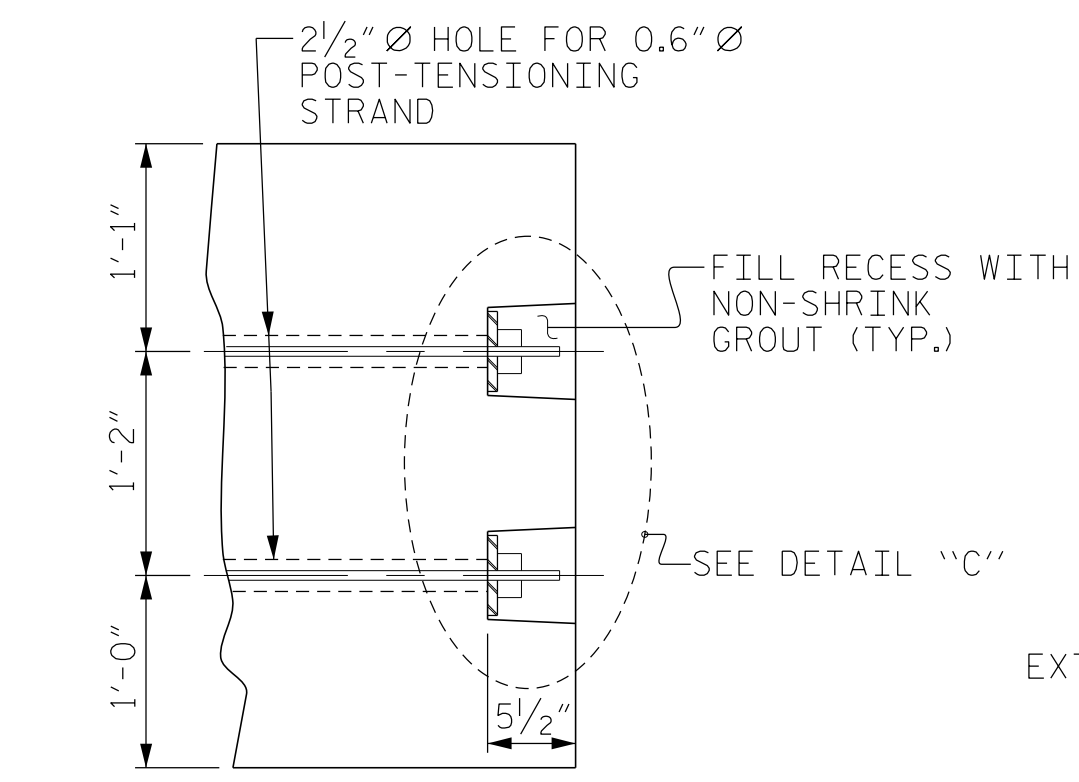
(DIMENSIONS SHOWN ARE TYPICAL FOR EACH VOID)



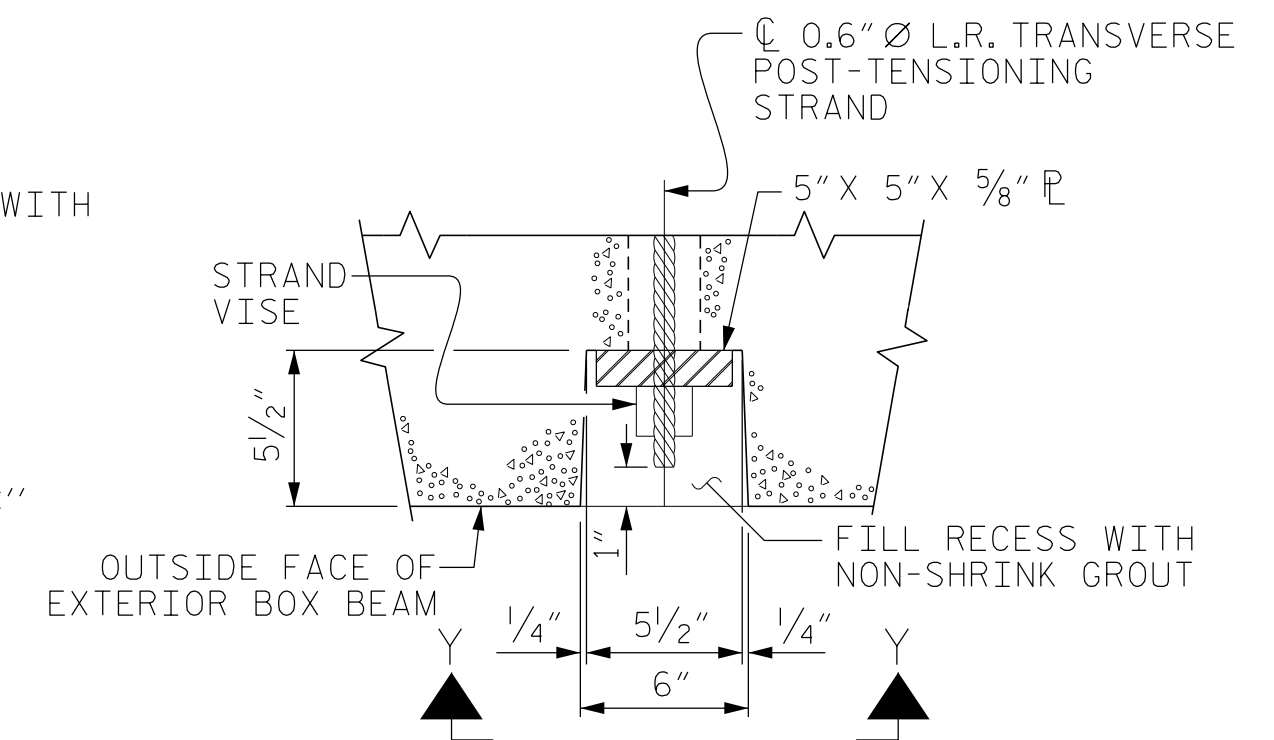
VIEW Y-Y
SHOWING ELEVATION VIEW OF GROUDED RECESS



DETAIL "C"



PART SECTION AT RECESS



SECTION X-X
SHOWING PLAN VIEW OF GROUDED RECESS

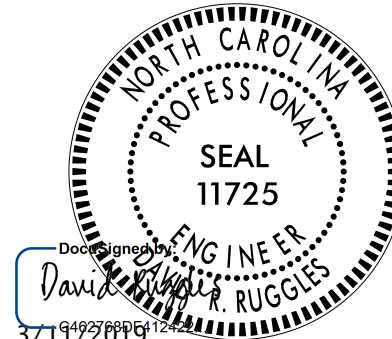
GROUDED RECESS DETAIL AT END OF POST-TENSIONED STRANDS OF EXTERIOR BOX BEAM

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

** INCLUDES FUTURE WEARING SURFACE

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

** INCLUDES FUTURE WEARING SURFACE



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PROJECT NO. B-4516

FRANKLIN COUNTY

STATION: 15+17.00 -L-

SHEET 6 OF 7

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

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

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-11
1			3			TOTAL SHEETS 22
2			4			

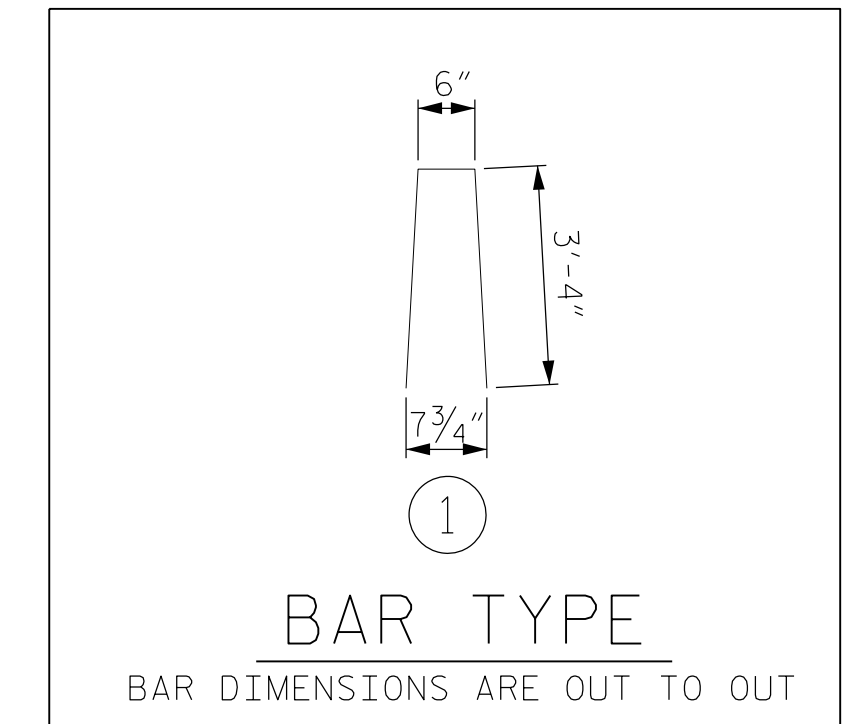
DRAWN BY: <u>V. CHUNG</u>	DATE: <u>07-18</u>
CHECKED BY: <u>E. PHELPS</u>	DATE: <u>08-18</u>
DESIGN ENGINEER OF RECORD: <u>D. RUGGLES</u>	DATE: <u>03-19</u>

B-4516
 3/11/2019
 \\400-011-B4516-SMU-SUP05.dgn
 USER:ephelps

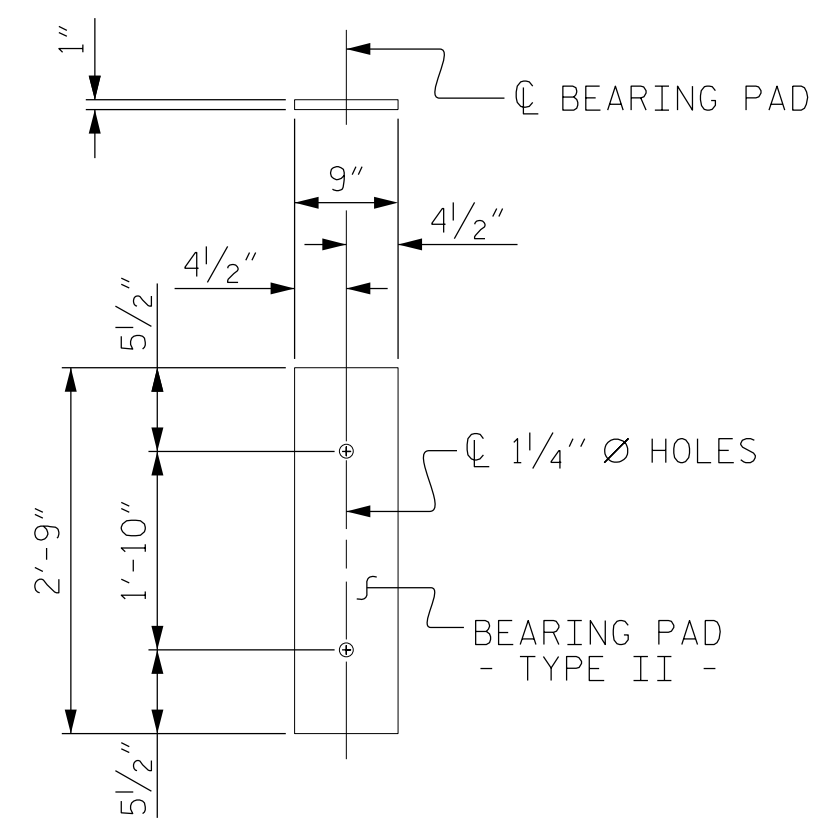
NOTES

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

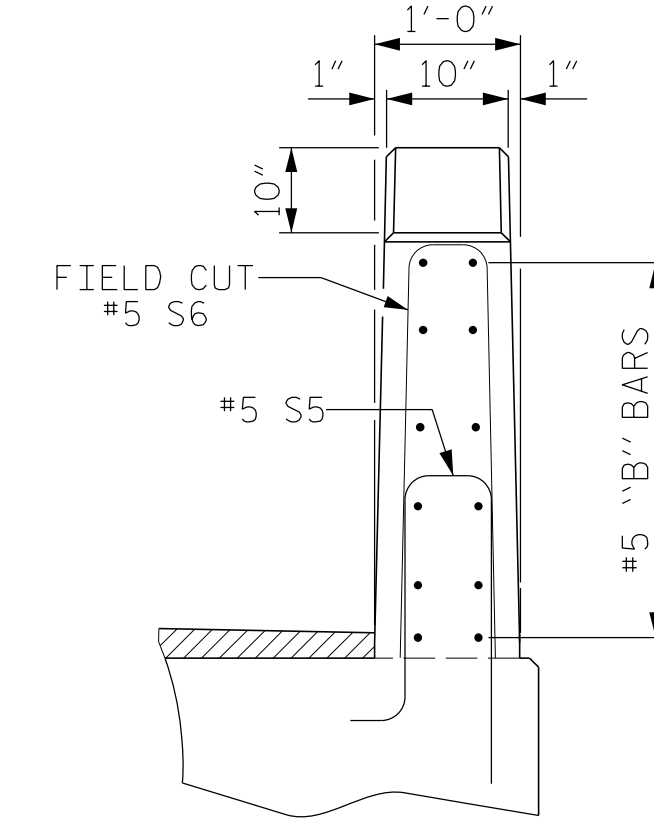
GROOVED CONTRACTION JOINTS, 1/2" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE BARRIER RAIL AND IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. A CONTRACTION JOINT SHALL BE LOCATED AT EACH THIRD POINT BETWEEN BARRIER RAIL EXPANSION JOINTS. ONLY ONE CONTRACTION JOINT IS REQUIRED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



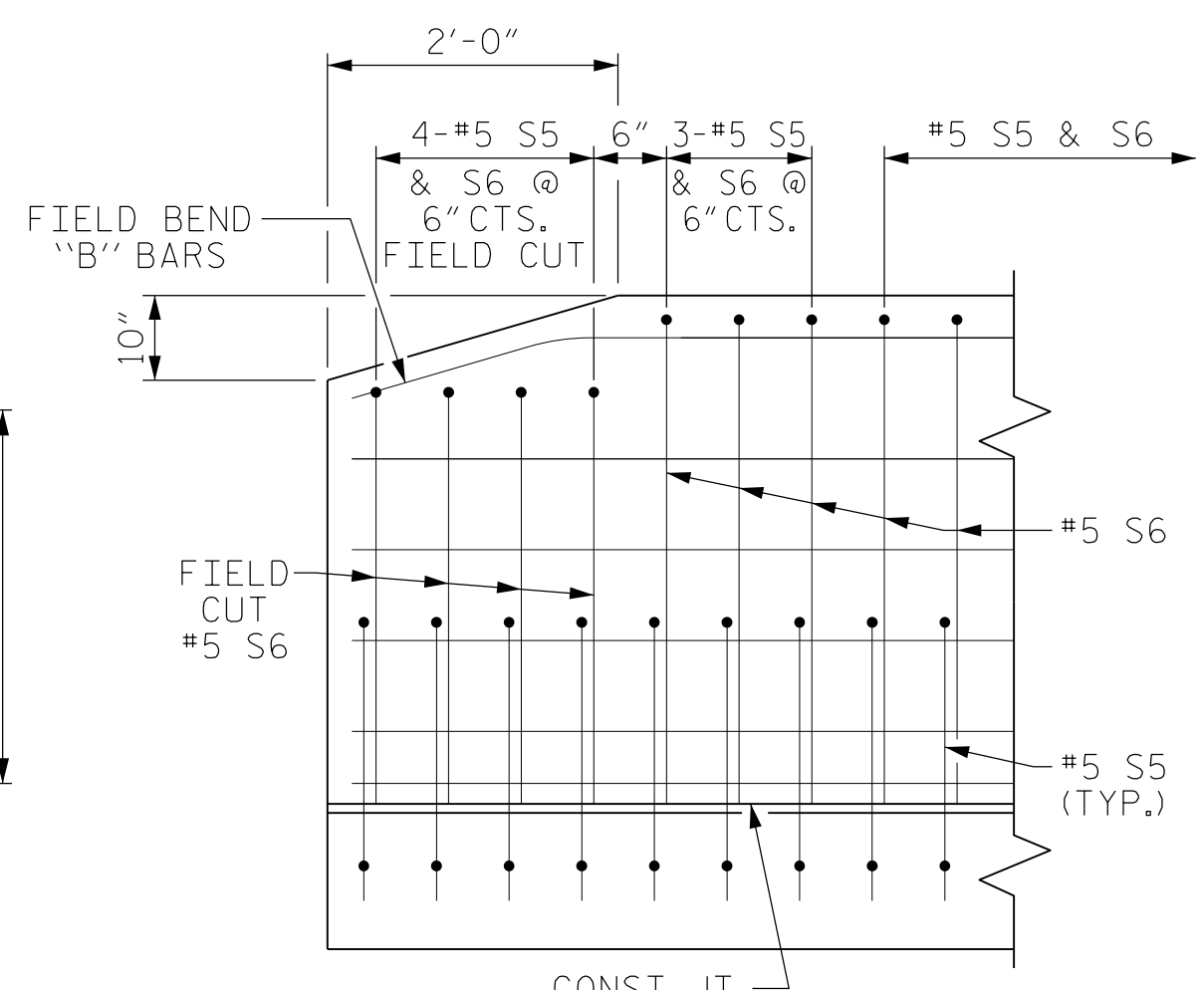
BAR TYPE
BAR DIMENSIONS ARE OUT TO OUT



FIXED END
(TYPE II - 44 REQ'D)



END VIEW



SIDE VIEW

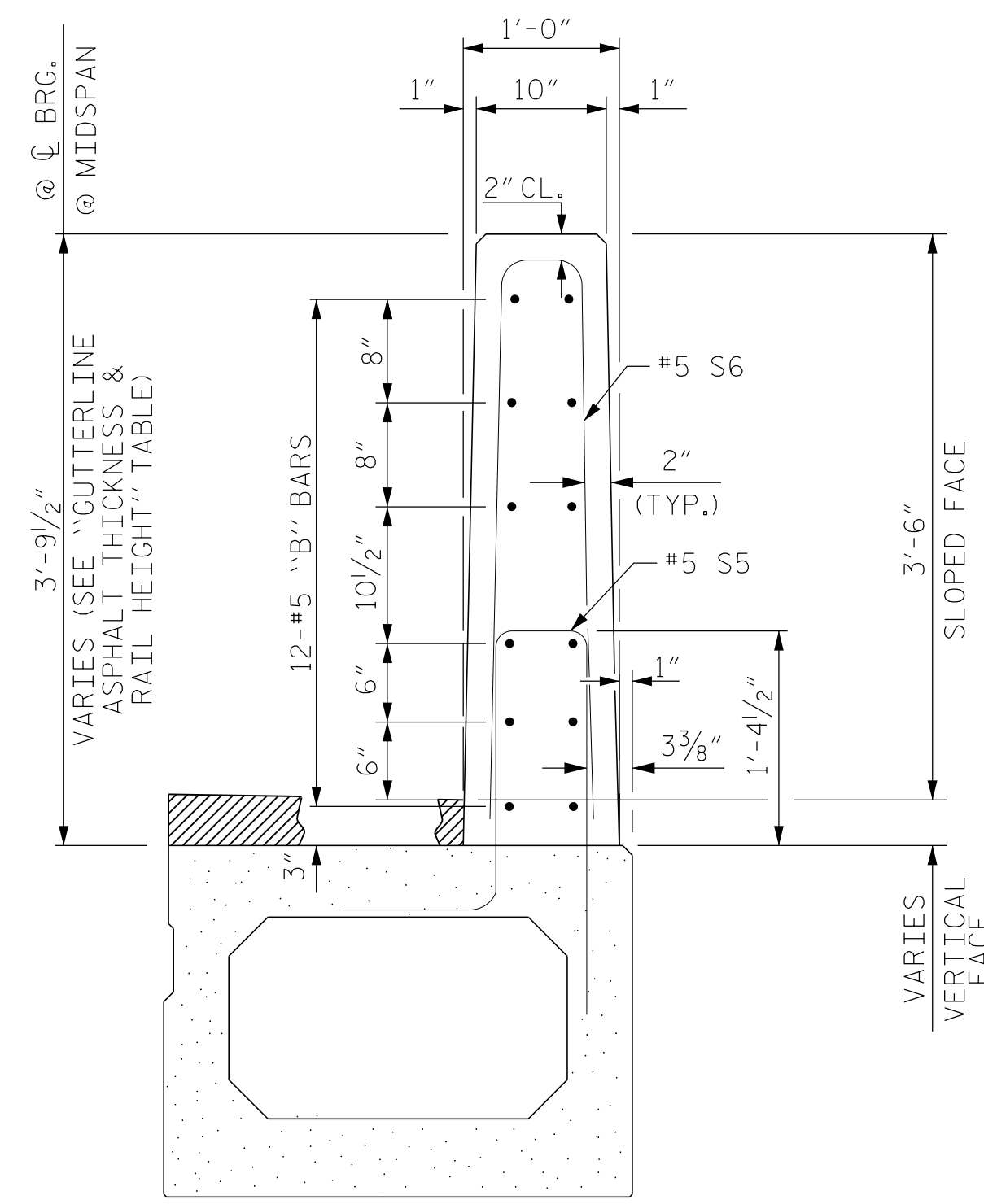
ELASTOMERIC BEARING DETAILS

ELASTOMER IN ALL BEARINGS SHALL BE 60 DUROMETER HARDNESS.

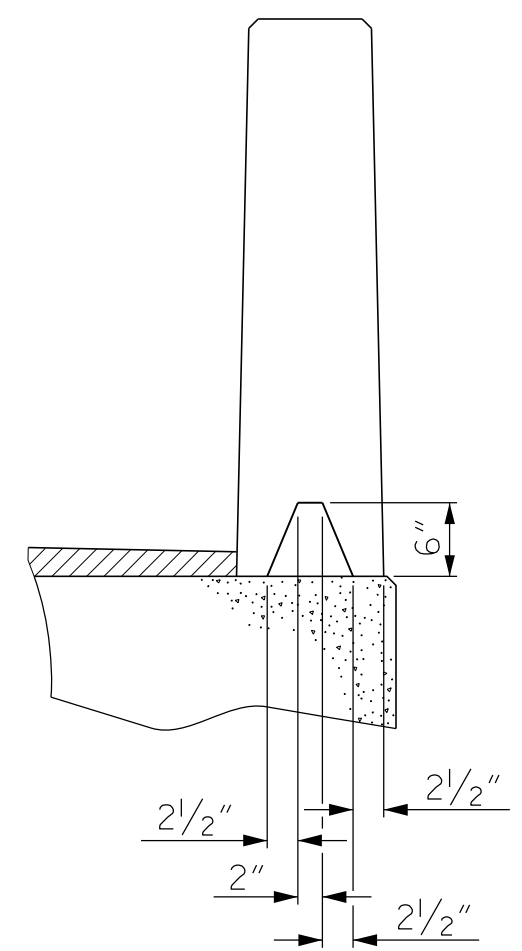
END OF RAIL DETAILS

BILL OF MATERIAL FOR VERTICAL CONCRETE BARRIER RAIL					
BAR	BARS PER PAIR OF EXTERIOR UNITS	SIZE	TYPE	LENGTH	WEIGHT
100' UNIT					
*B12	96	#5	STR	24'-7"	2461
*S6	276	#5	1	7'-2"	2063
* EPOXY COATED REINFORCING STEEL				LBS.	4524
CLASS AA CONCRETE				CU.YDS.	25.9
TOTAL VERTICAL CONCRETE BARRIER RAIL				LN. FT.	200.0

BILL OF MATERIAL FOR VERTICAL CONCRETE BARRIER RAIL					
BAR	BARS PER PAIR OF EXTERIOR UNITS	SIZE	TYPE	LENGTH	WEIGHT
50' UNIT					
*B11	48	#5	STR	24'-8"	1235
*S6	142	#5	1	7'-2"	1061
* EPOXY COATED REINFORCING STEEL				LBS.	2296
CLASS AA CONCRETE				CU.YDS.	13.0
TOTAL VERTICAL CONCRETE BARRIER RAIL				LN. FT.	100.0

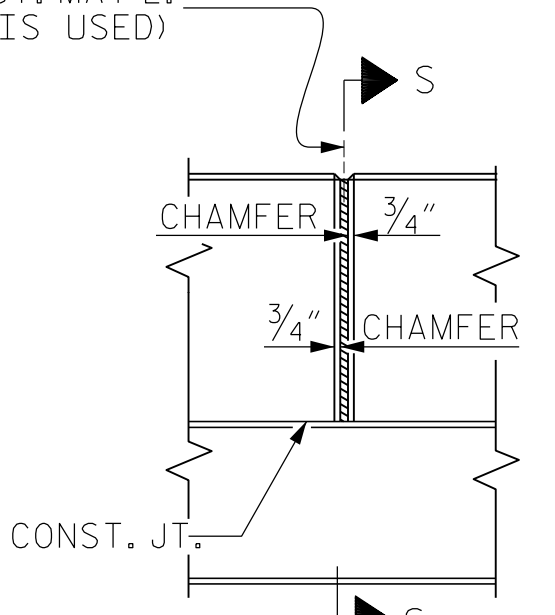


SECTION THRU RAIL



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

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



ELEVATION AT EXPANSION JOINTS

BOX BEAM UNITS REQUIRED

	NUMBER	LENGTH	TOTAL LENGTH
100' UNIT			
EXTERIOR B.B.	2	100'-0"	200'-0"
INTERIOR B.B.	9	100'-0"	900'-0"
TOTAL	11	—	1100'-0"
50' UNIT			
EXTERIOR B.B.	2	50'-0"	100'-0"
INTERIOR B.B.	9	50'-0"	450'-0"
TOTAL	11	—	550'-0"

GUTTERLINE ASPHALT THICKNESS & RAIL HEIGHT

	ASPHALT OVERLAY THICKNESS @ MID-SPAN	RAIL HEIGHT @ MID-SPAN
100' UNITS	2 3/8"	3'-8 3/8"
50' UNITS	3 3/8"	3'-9 3/8"



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PROJECT NO. B-4516
FRANKLIN COUNTY
STATION: 15+17.00 -L-
SHEET 7 OF 7

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

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

SHEET NO. S-12
TOTAL SHEETS 22

DRAWN BY: V. CHUNG DATE: 07-18
CHECKED BY: E. PHELPS DATE: 08-18
DESIGN ENGINEER OF RECORD: D. RUGGLES DATE: 03-19

B-4516
3/11/2019
\\400_012_B4516_SMU_SUP06.dgn
USER:ephelps

NOTES

THE GUARDRAIL ANCHOR ASSEMBLY SHALL CONSIST OF A 1/4" HOLD DOWN PLATE AND 7 - 7/8" Ø BOLTS WITH NUTS AND WASHERS.

THE HOLD-DOWN PLATE SHALL CONFORM TO AASHTO M270 GRADE 36. AFTER FABRICATION, THE HOLD-DOWN PLATE SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH AASHTO M111.

BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307 AND NUTS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M291. BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED. (AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLTS, NUTS AND WASHERS MAY BE USED AS AN ALTERNATE FOR THE 7/8" Ø GALVANIZED BOLTS, NUTS AND WASHERS. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.)

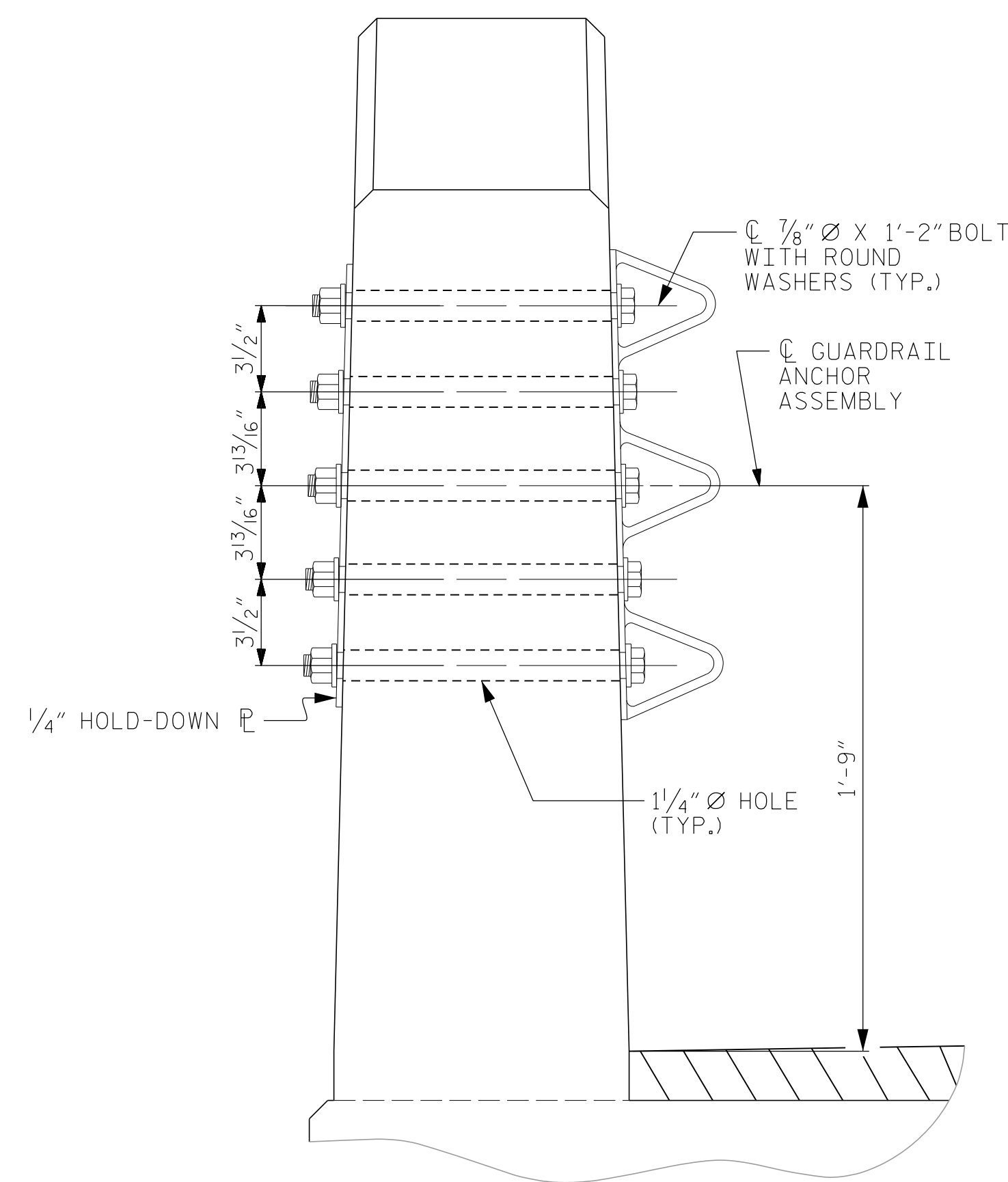
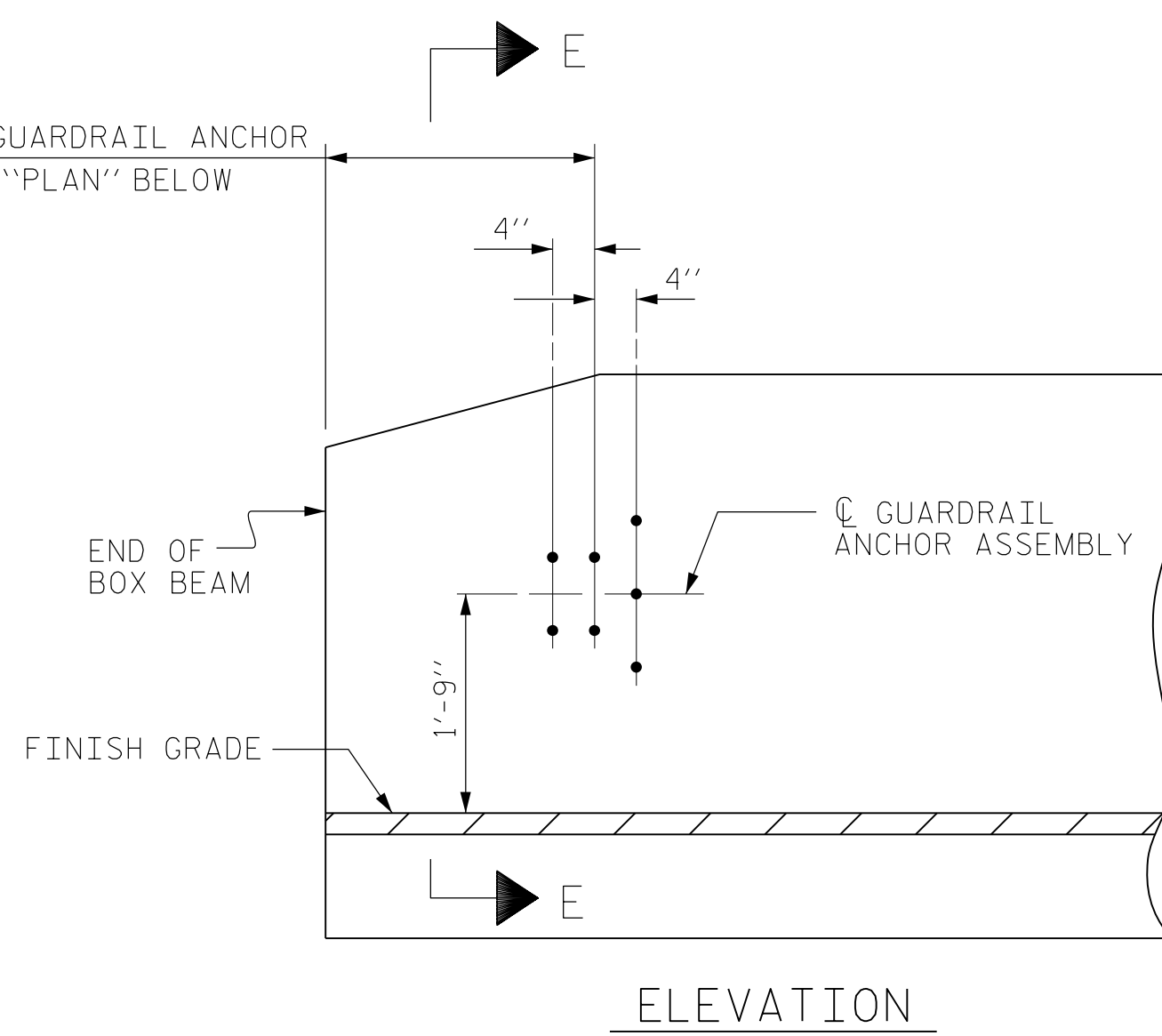
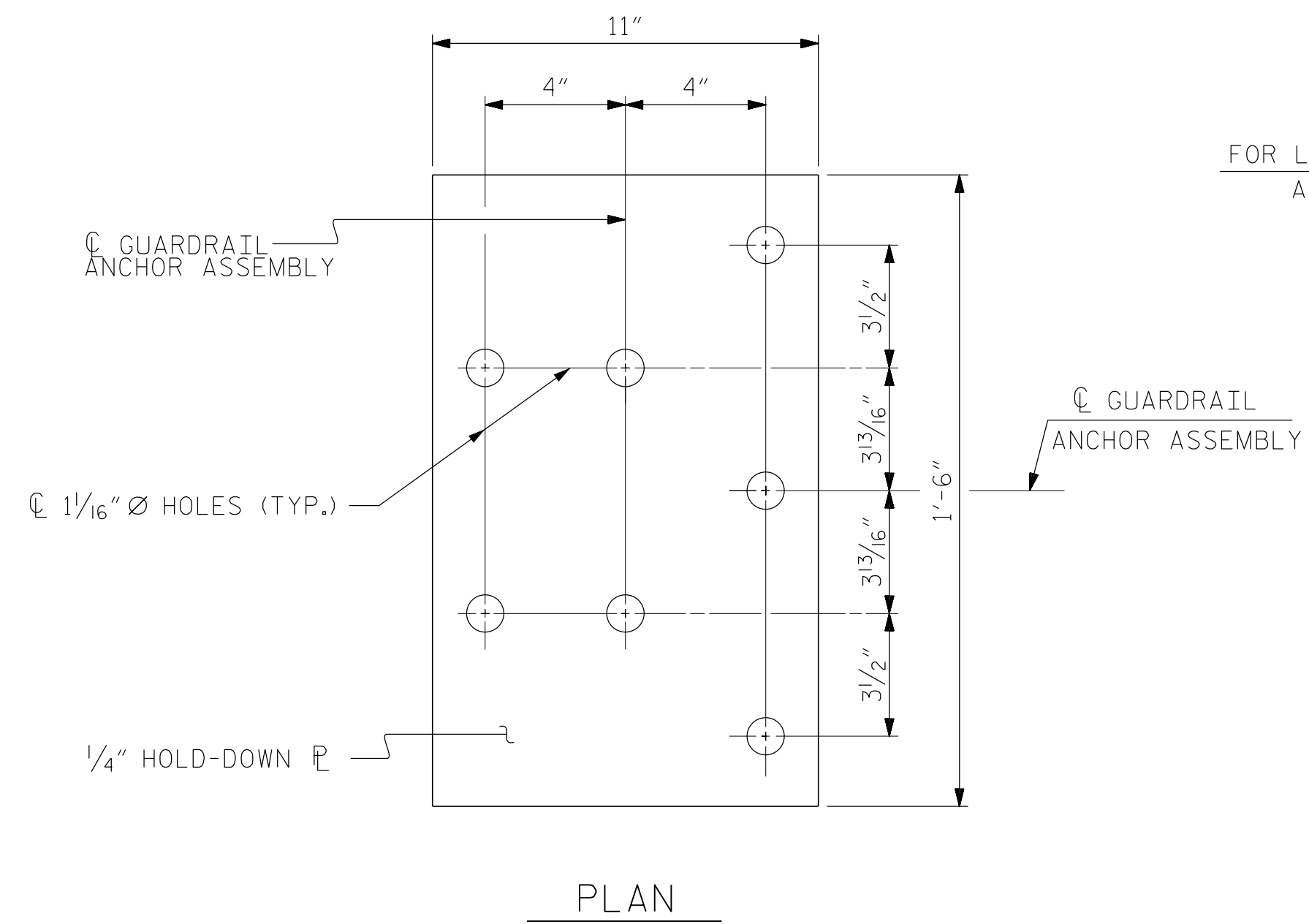
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF BARRIER RAIL. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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

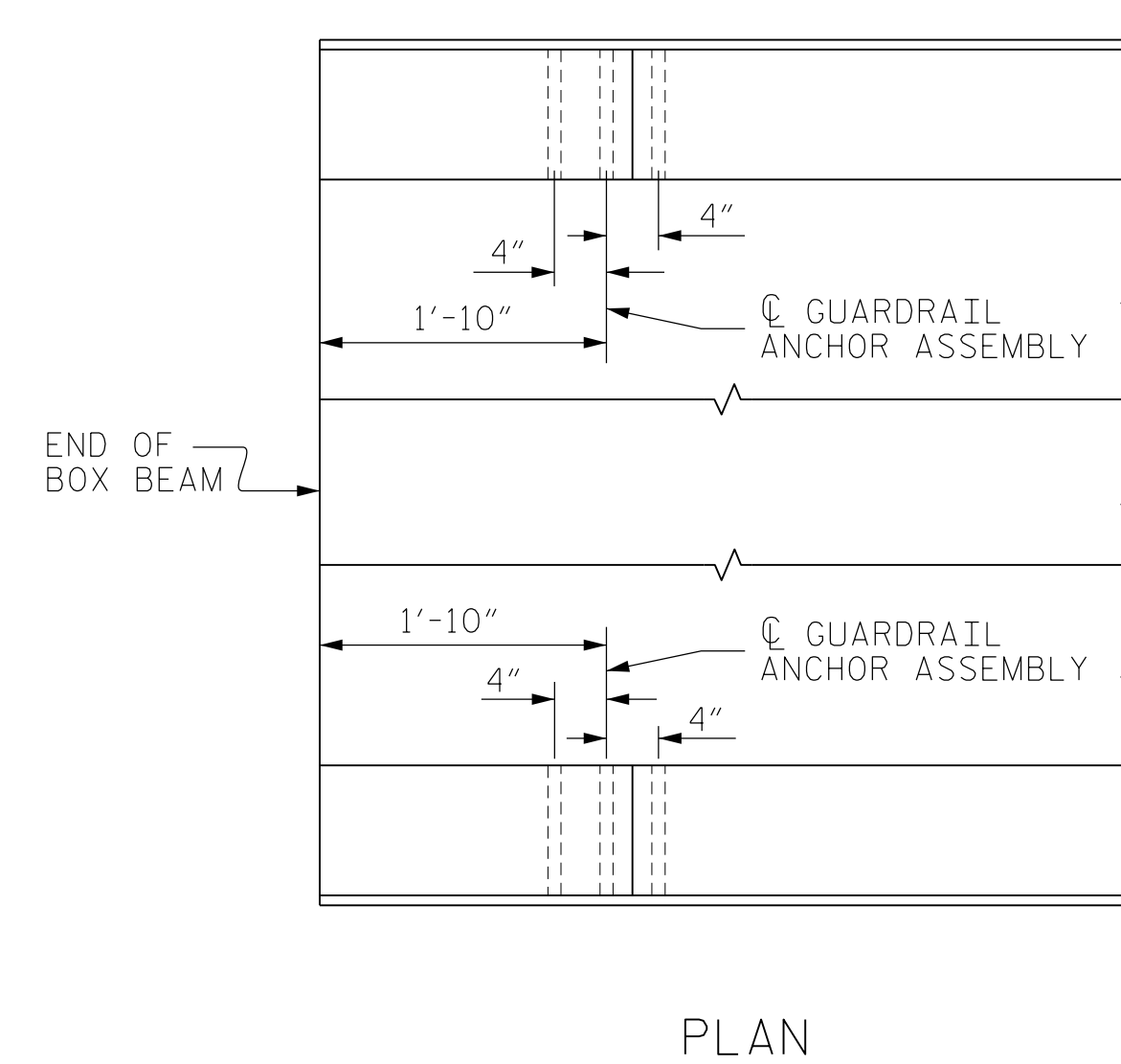
THE COST OF THE GUARDRAIL ANCHOR ASSEMBLY SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR VERTICAL CONCRETE BARRIER RAIL.

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

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



SECTION E-E
GUARDRAIL ANCHOR ASSEMBLY DETAILS



LOCATION OF ANCHORS FOR GUARDRAIL

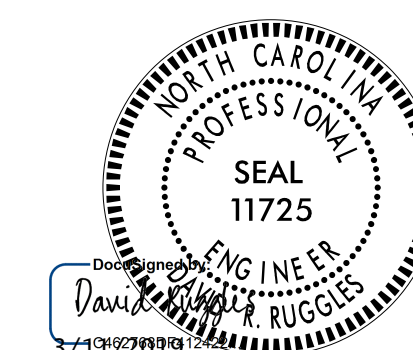
END BENT #1 SHOWN, END BENT #2 SIMILAR.



SKETCH SHOWING POINTS OF ATTACHMENT

* DENOTES GUARDRAIL ANCHOR ASSEMBLY

PROJECT NO. B-4516
FRANKLIN COUNTY
STATION: 15+17.00 -L-



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

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-13
1			3			TOTAL SHEETS
2			4			22

DRAWN BY: V. CHUNG DATE: 07-18
CHECKED BY: E. PHELPS DATE: 08-18
DESIGN ENGINEER OF RECORD: D. RUGGLES DATE: 03-19

3/11/2019
... \400_013_B4516_SMU_GRA01.dgn
USER:ephelps

B-4516

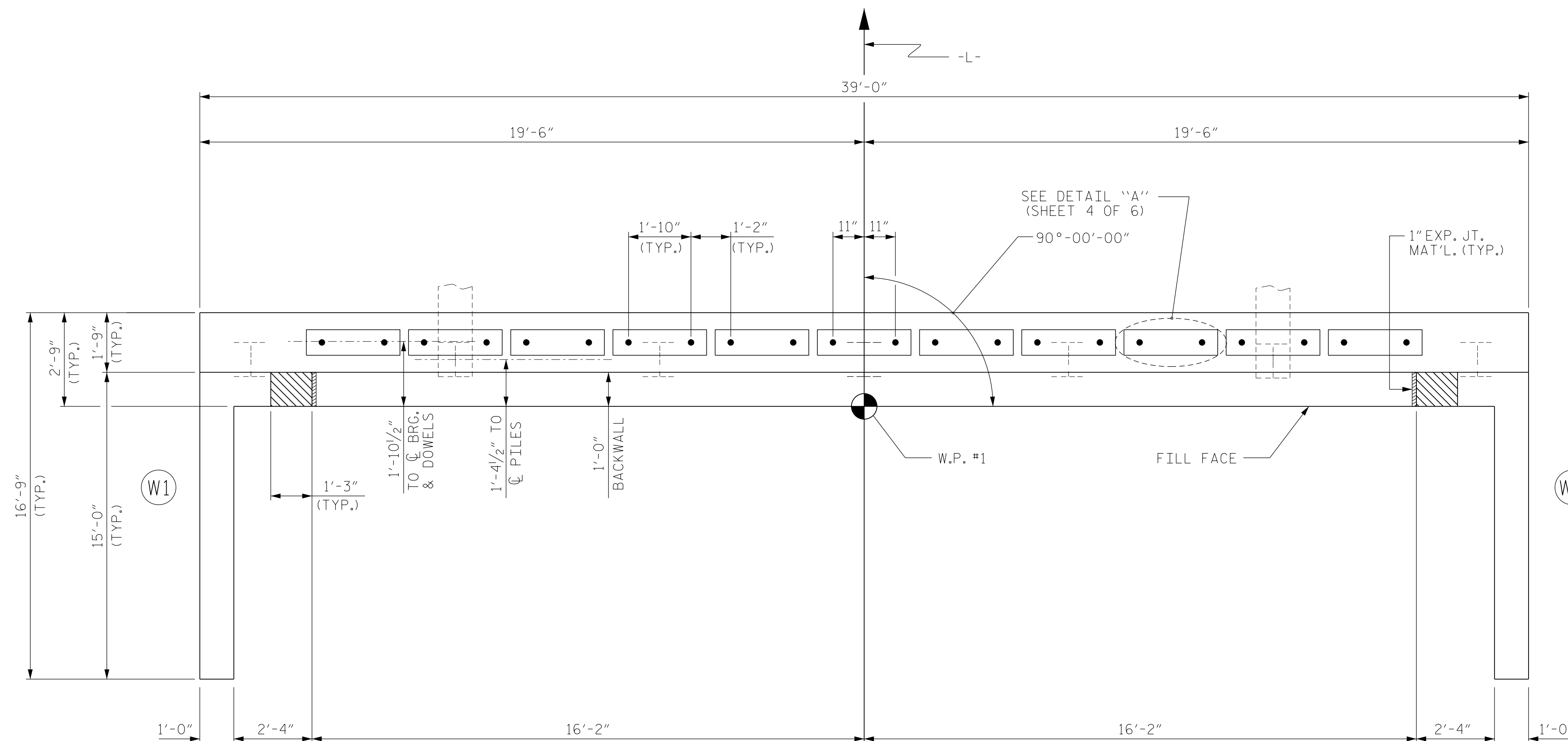
NOTES

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

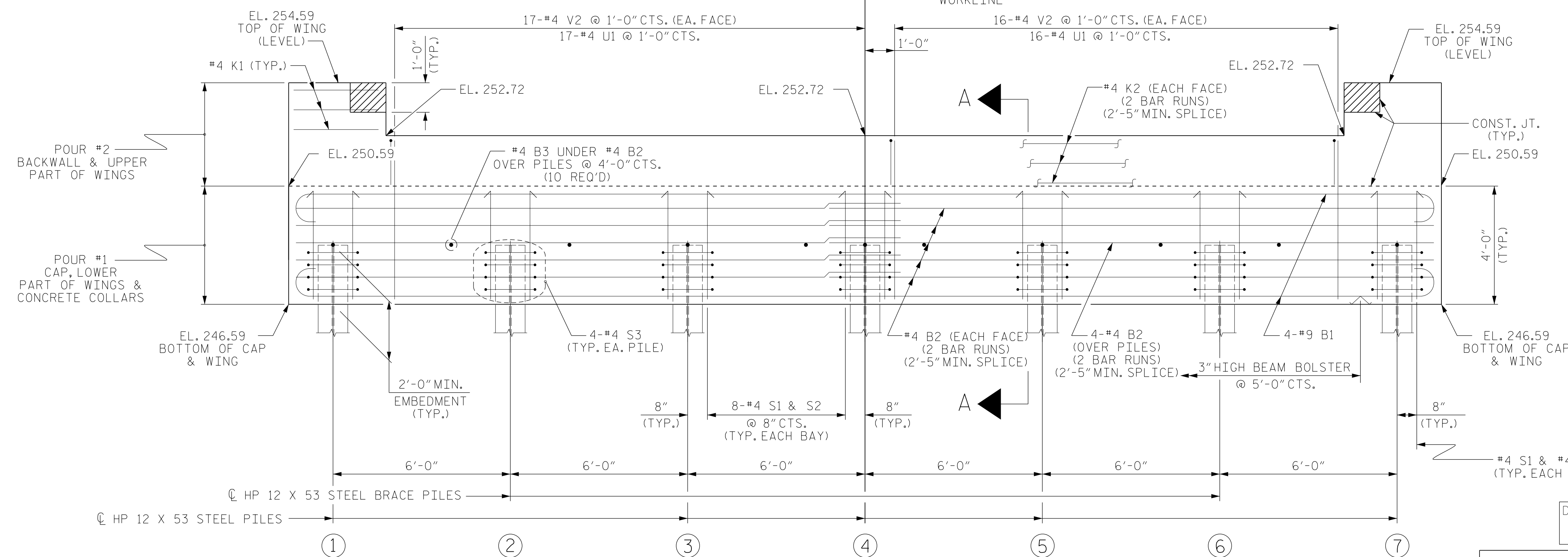
THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE VERTICAL CONCRETE BARRIER RAIL IS CAST IF SLIP FORMING IS USED.

FOR PILE SPLICE DETAILS, SEE SHEET S-17.

FOR WING DETAILS, SEE SHEET S-16.

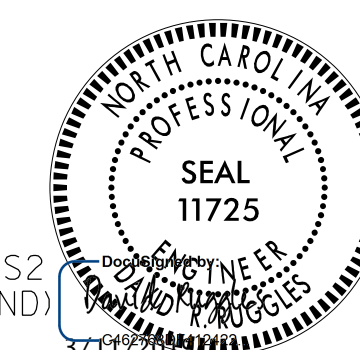


PLAN



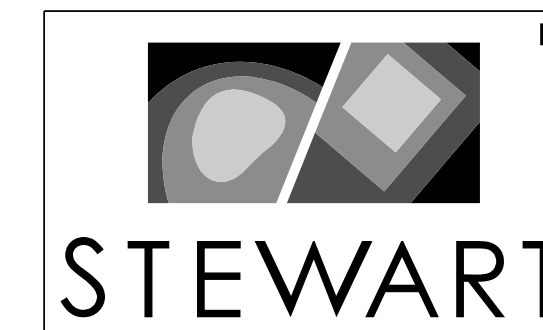
ELEVATION

WINGS NOT SHOWN FOR CLARITY.
FOR SECTION A-A, SEE SHEET 4 OF 6.
CONCRETE COLLARS FOR STEEL PILES NOT SHOWN IN PLAN AND ELEVATION VIEWS FOR CLARITY.
SEE "CORROSION PROTECTION FOR STEEL PILES DETAIL", SHEET 4 OF 6.



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PROJECT NO. B-4516

FRANKLIN COUNTY

STATION: 15+17.00 -L-

SHEET 1 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
END BENT No. 1

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-14
1			3			TOTAL SHEETS
2			4			22

STD. NO. EB_33_90S4_39BB

3/11/2019
DRAWN BY: V. CHUNG DATE: 07-18
CHECKED BY: E. PHELPS DATE: 08-18
DESIGN ENGINEER OF RECORD: D. RUGGLES DATE: 03-19

B-4516

3/11/2019
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USER:ephelps

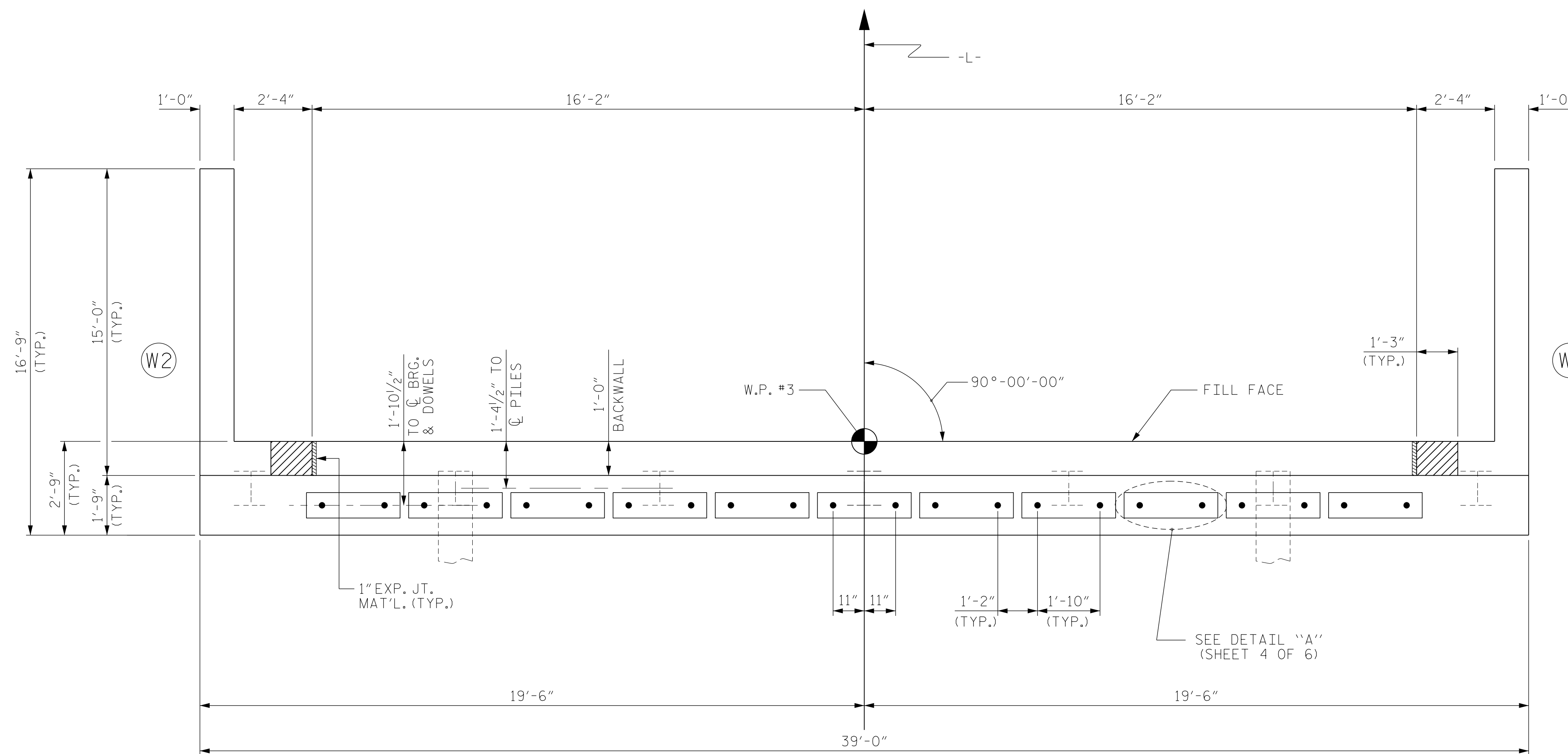
NOTES

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

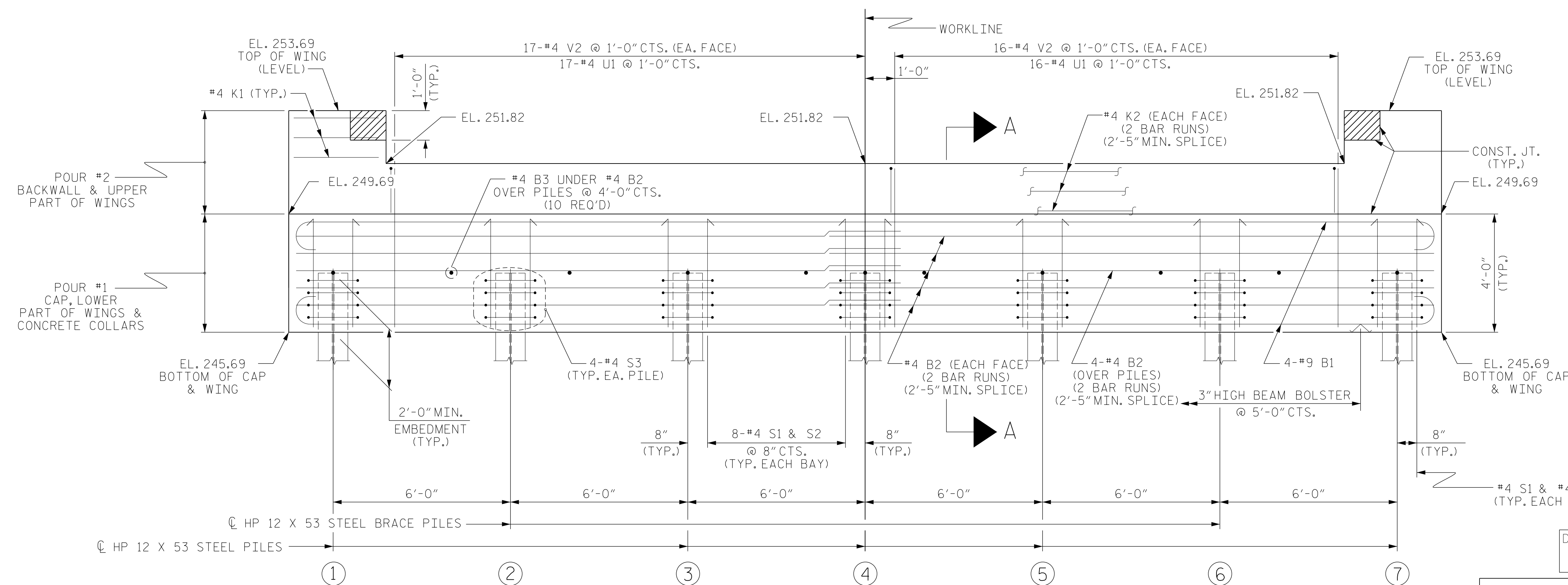
THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE VERTICAL CONCRETE BARRIER RAIL IS CAST IF SLIP FORMING IS USED.

FOR PILE SPlice DETAILS, SEE SHEET S-17.

FOR WING DETAILS, SEE SHEET S-16.

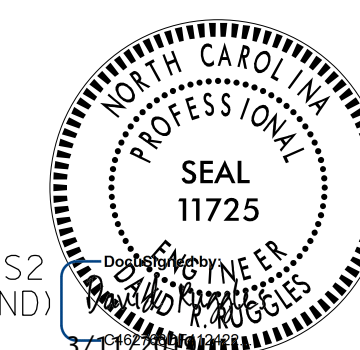


PLAN



ELEVATION

WINGS NOT SHOWN FOR CLARITY.
FOR SECTION A-A, SEE SHEET 4 OF 6.
CONCRETE COLLARS FOR STEEL PILES NOT SHOWN IN PLAN AND ELEVATION VIEWS FOR CLARITY.
SEE "CORROSION PROTECTION FOR STEEL PILES DETAIL", SHEET 4 OF 6.



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STATION: 15+17.00 -L-

SHEET 2 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

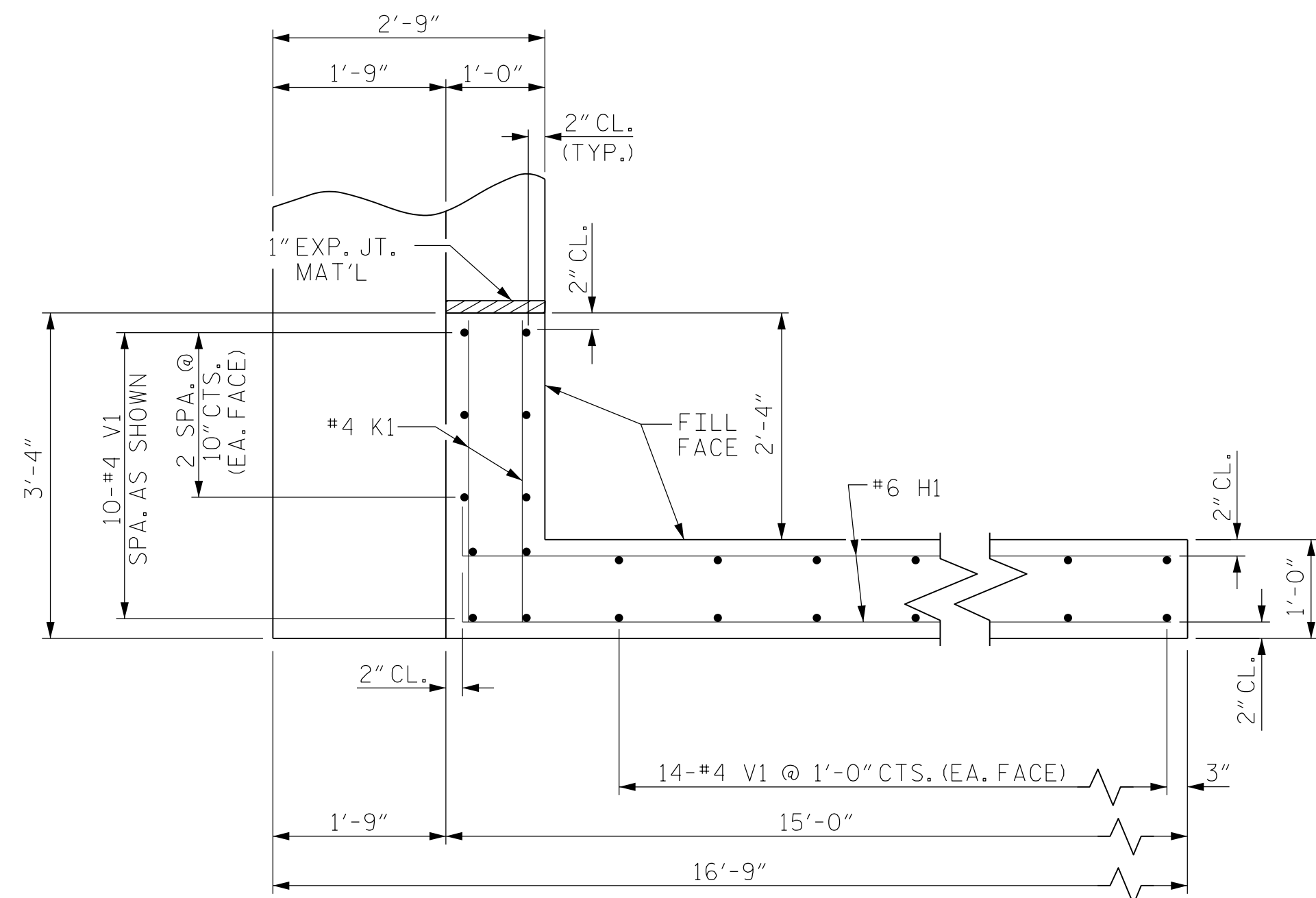
SUBSTRUCTURE
END BENT No. 2

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-15
1			3			TOTAL SHEETS 22
2			4			

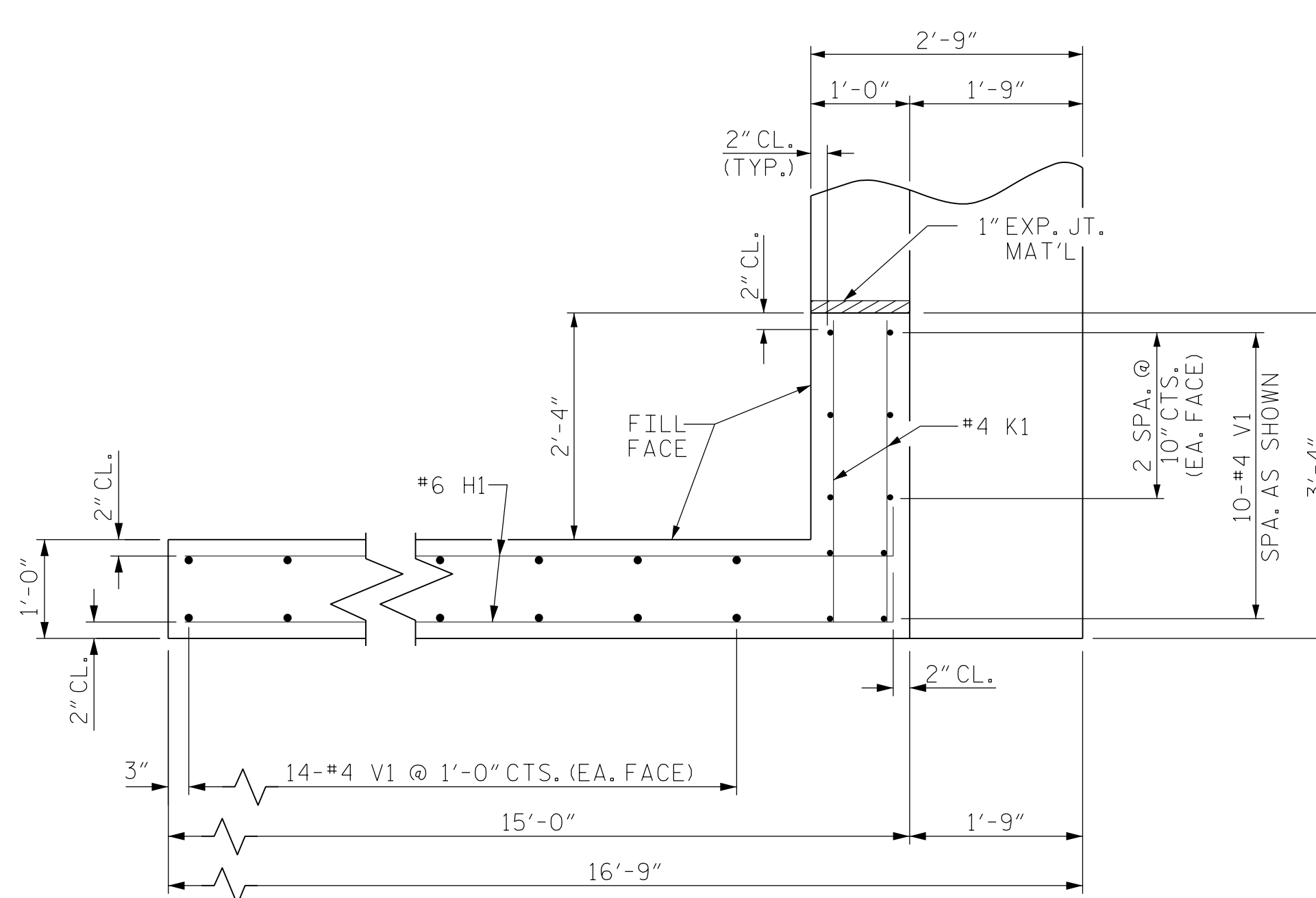
STD. NO. EB_33_90S4_39BB

3/11/2019
DRAWN BY: V. CHUNG DATE: 07-18
CHECKED BY: E. PHELPS DATE: 08-18
DESIGN ENGINEER OF RECORD: D. RUGGLES DATE: 03-19

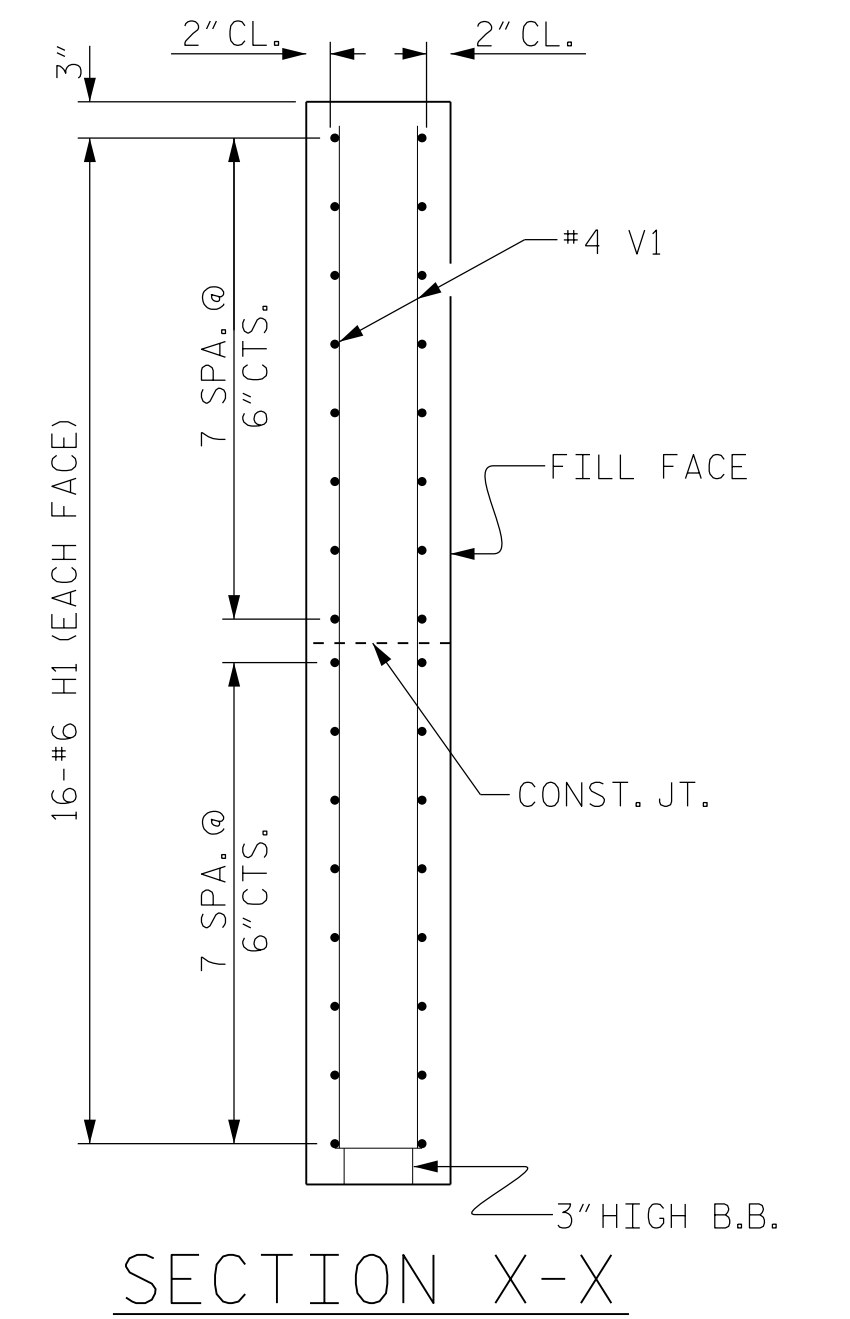
B-4516
\\400_015_B4516_SMU-SUB02.dgn
USER:ephelps



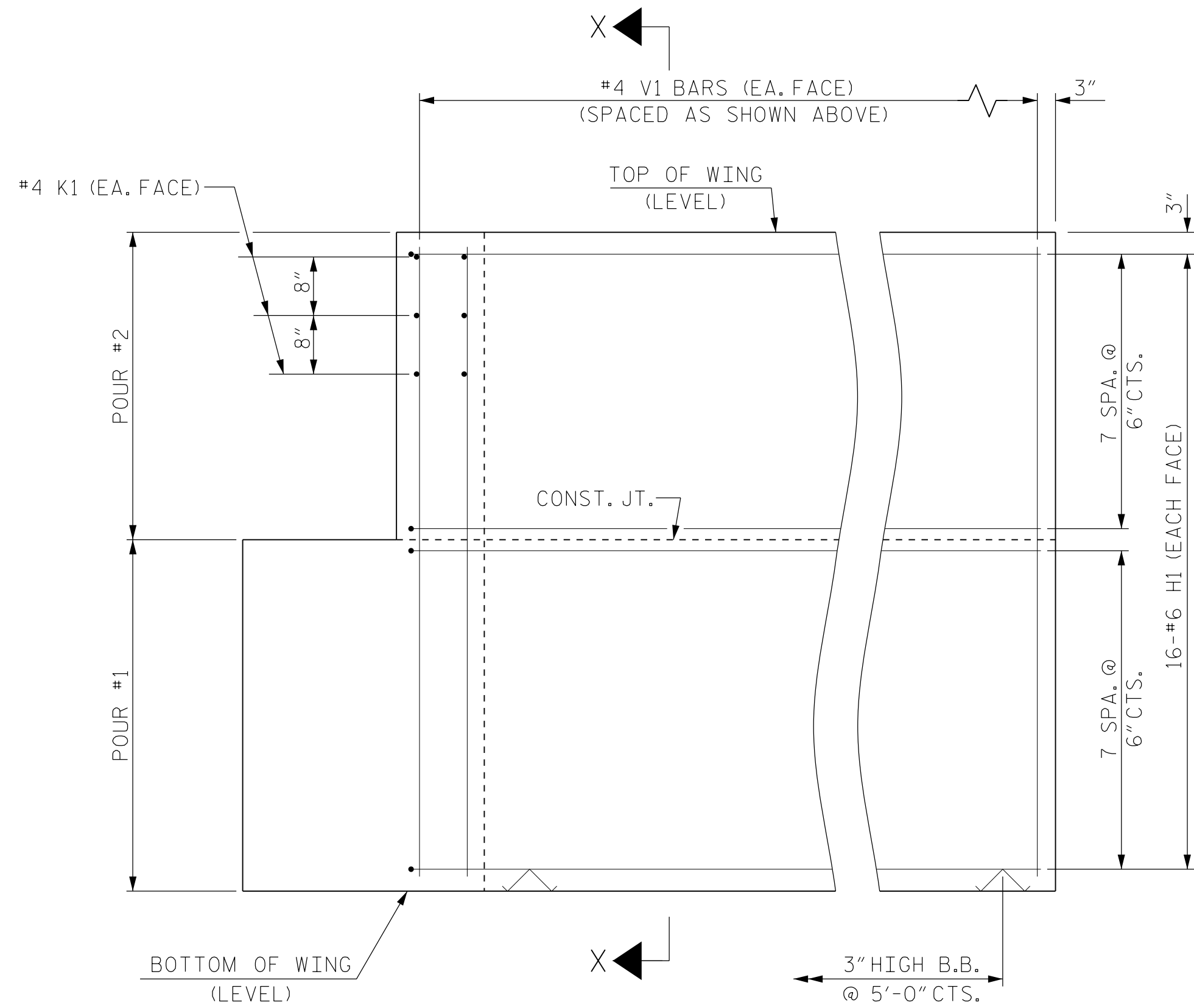
PLAN OF WING (W1)



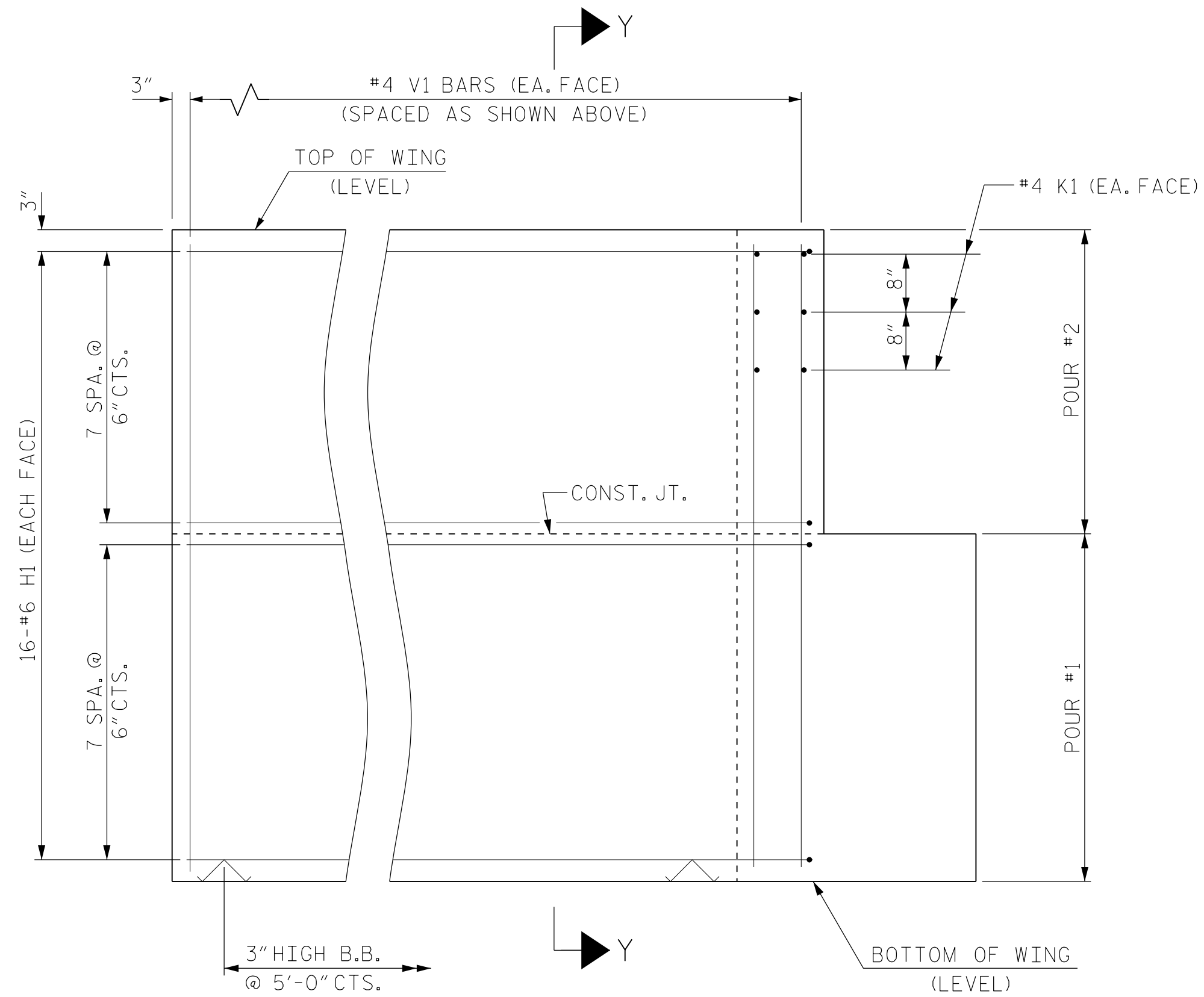
PLAN OF WING (W2)



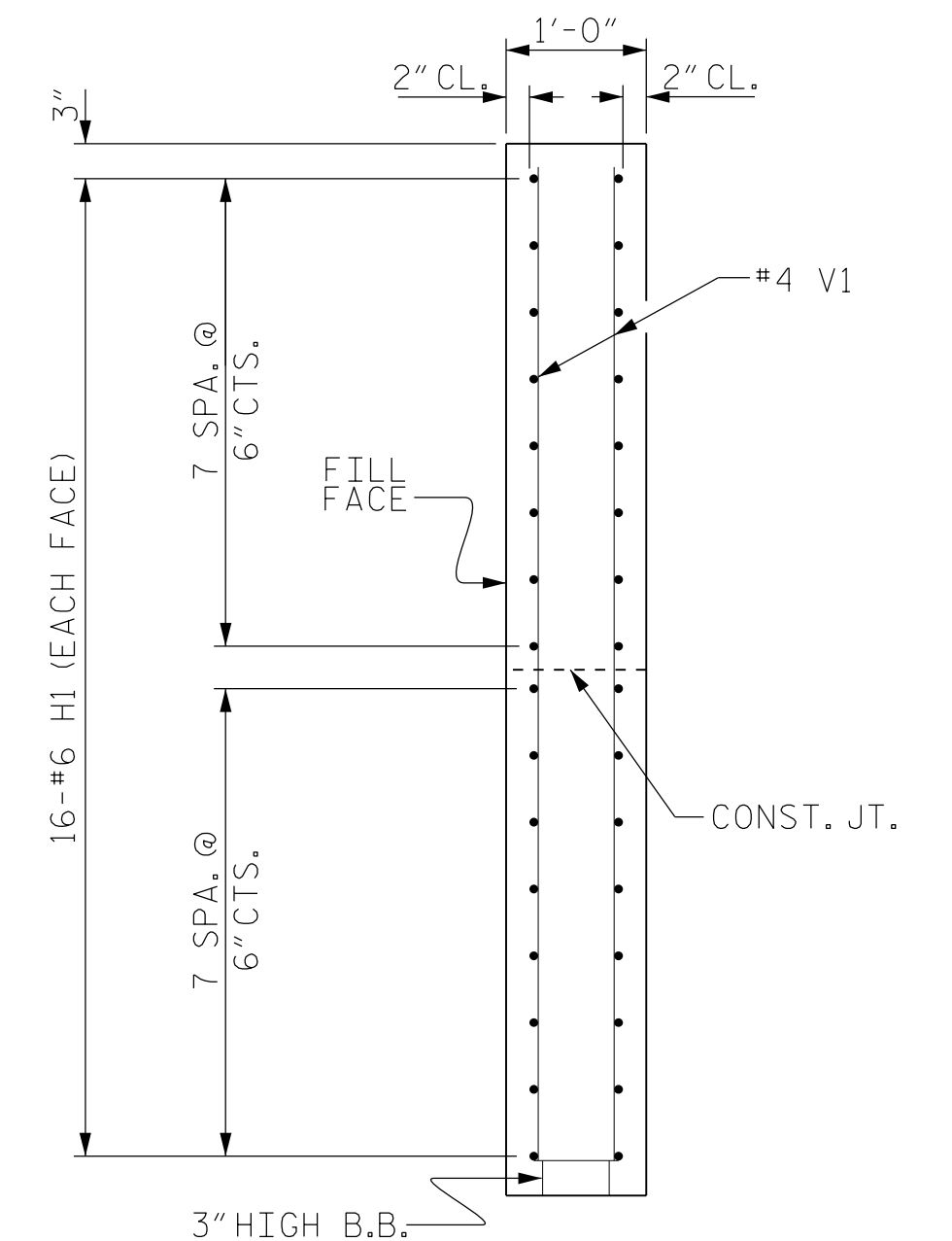
SECTION X-X



ELEVATION OF WING (W1)



ELEVATION OF WING (W2)

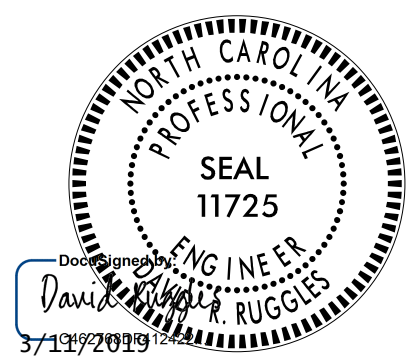


SECTION Y-Y

WING DETAILS

PROJECT NO. B-4516
 FRANKLIN COUNTY
 STATION: 15+17.00 -L-

SHEET 3 OF 6



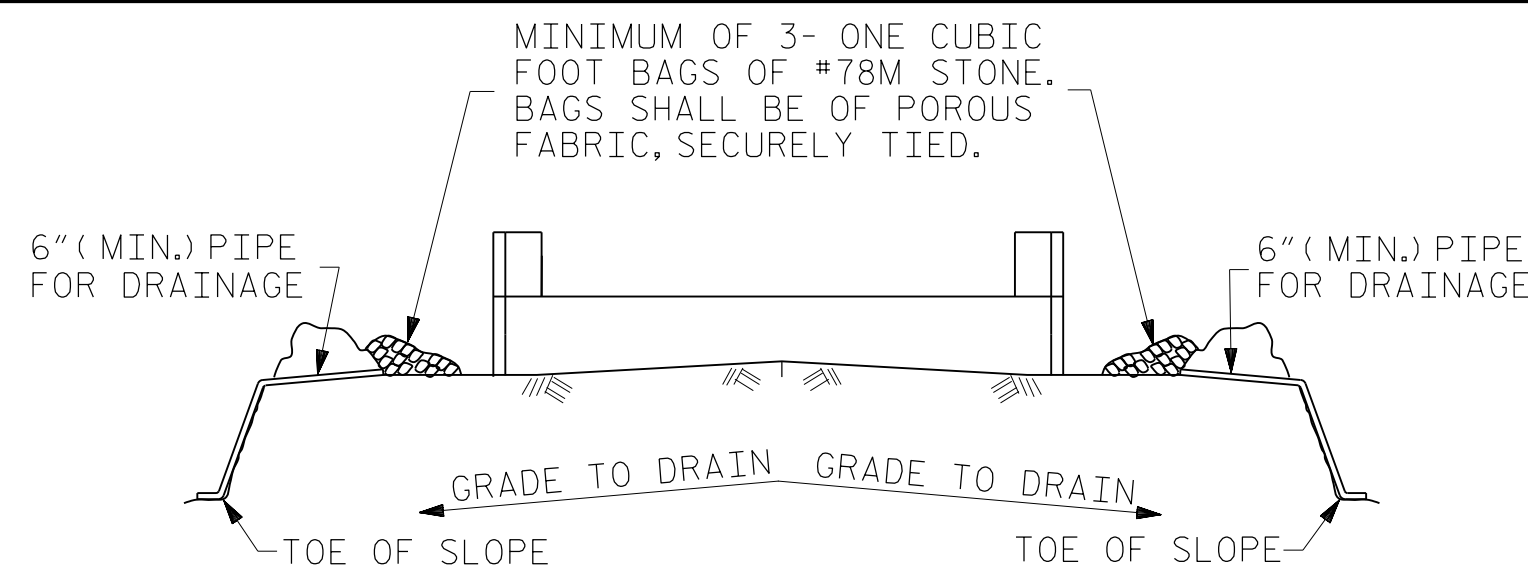
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STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
SUBSTRUCTURE END BENT WING DETAILS					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
SHEET NO. S-16					TOTAL SHEETS 22

B-4516
 3/11/2019
 \\400_016_B4516_SMU_SUB03.dgn
 USER:ephelps

DRAWN BY: V. CHUNG	DATE: 07-18
CHECKED BY: E. PHELPS	DATE: 08-18
DESIGN ENGINEER OF RECORD: D. RUGGLES	DATE: 03-19

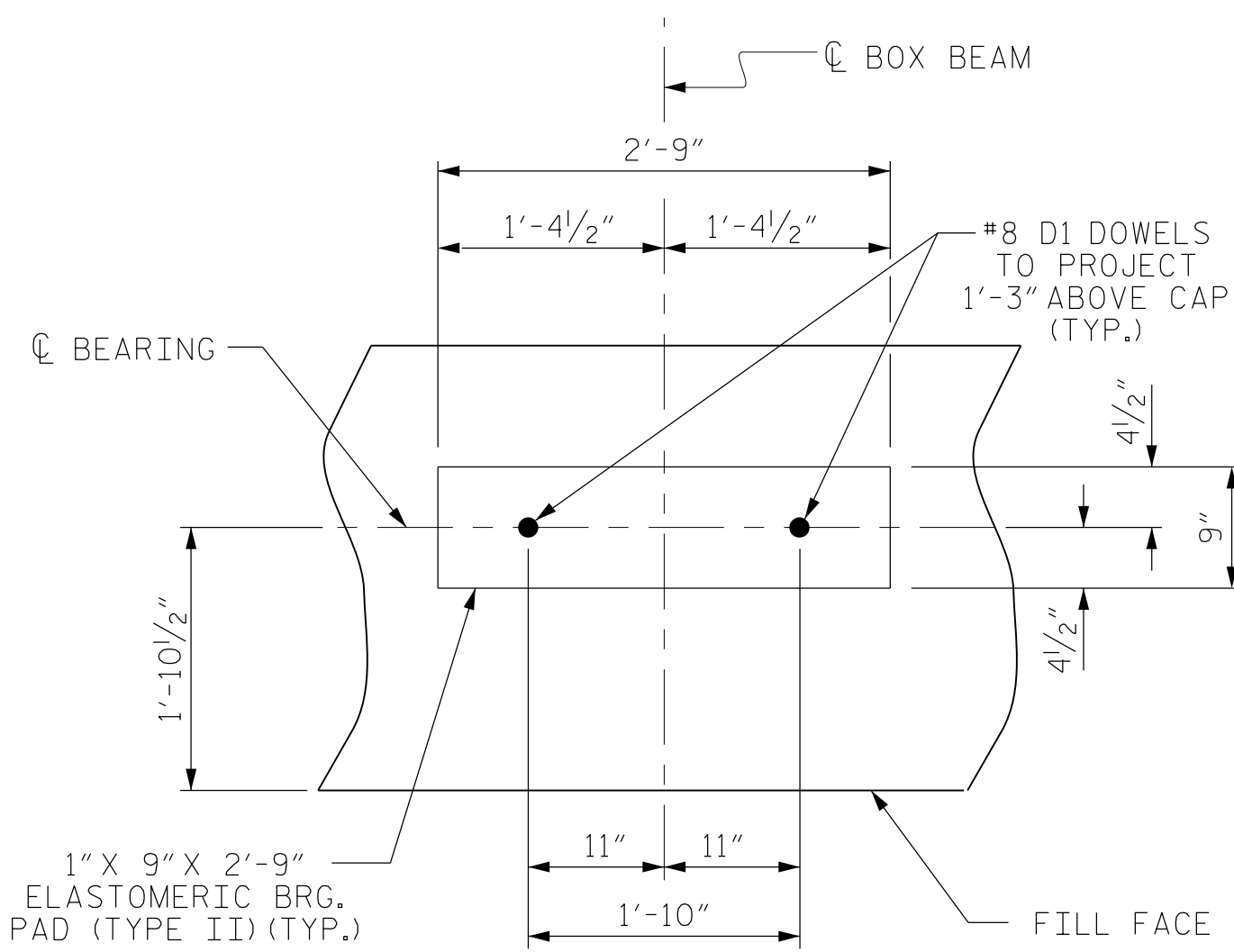


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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

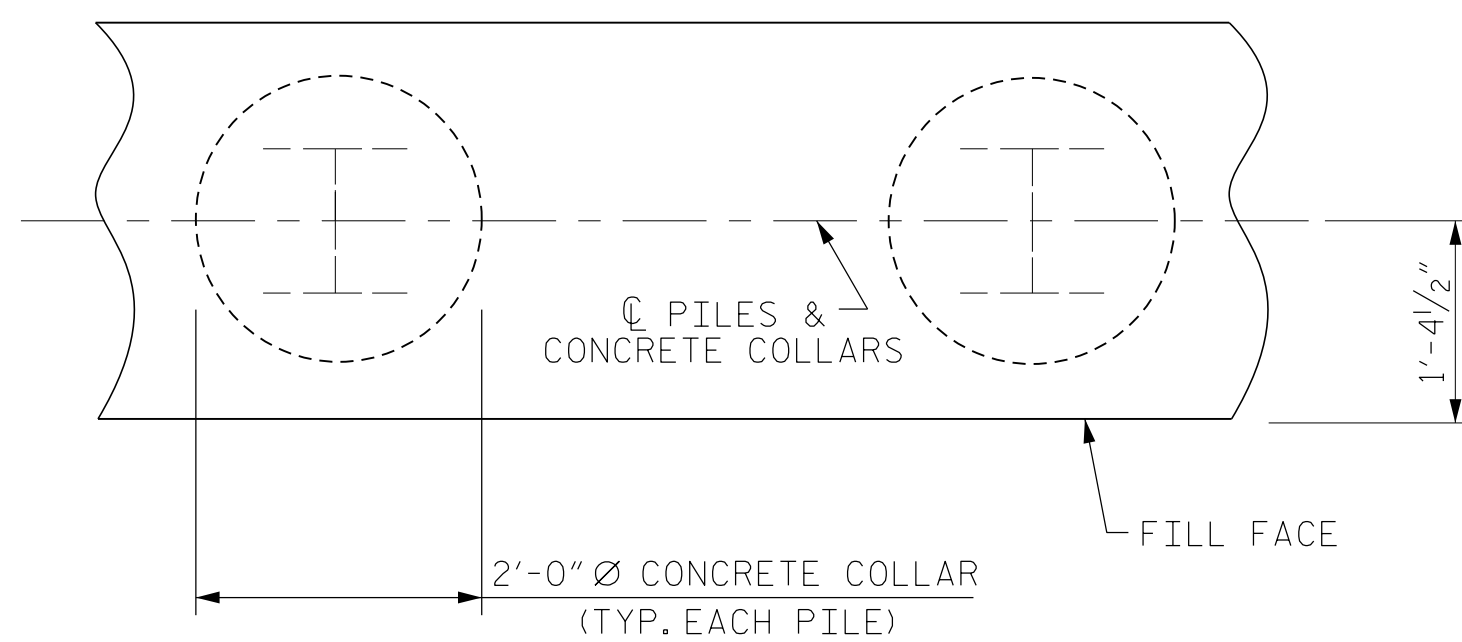
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

TEMPORARY DRAINAGE AT END BENT



DETAIL "A"

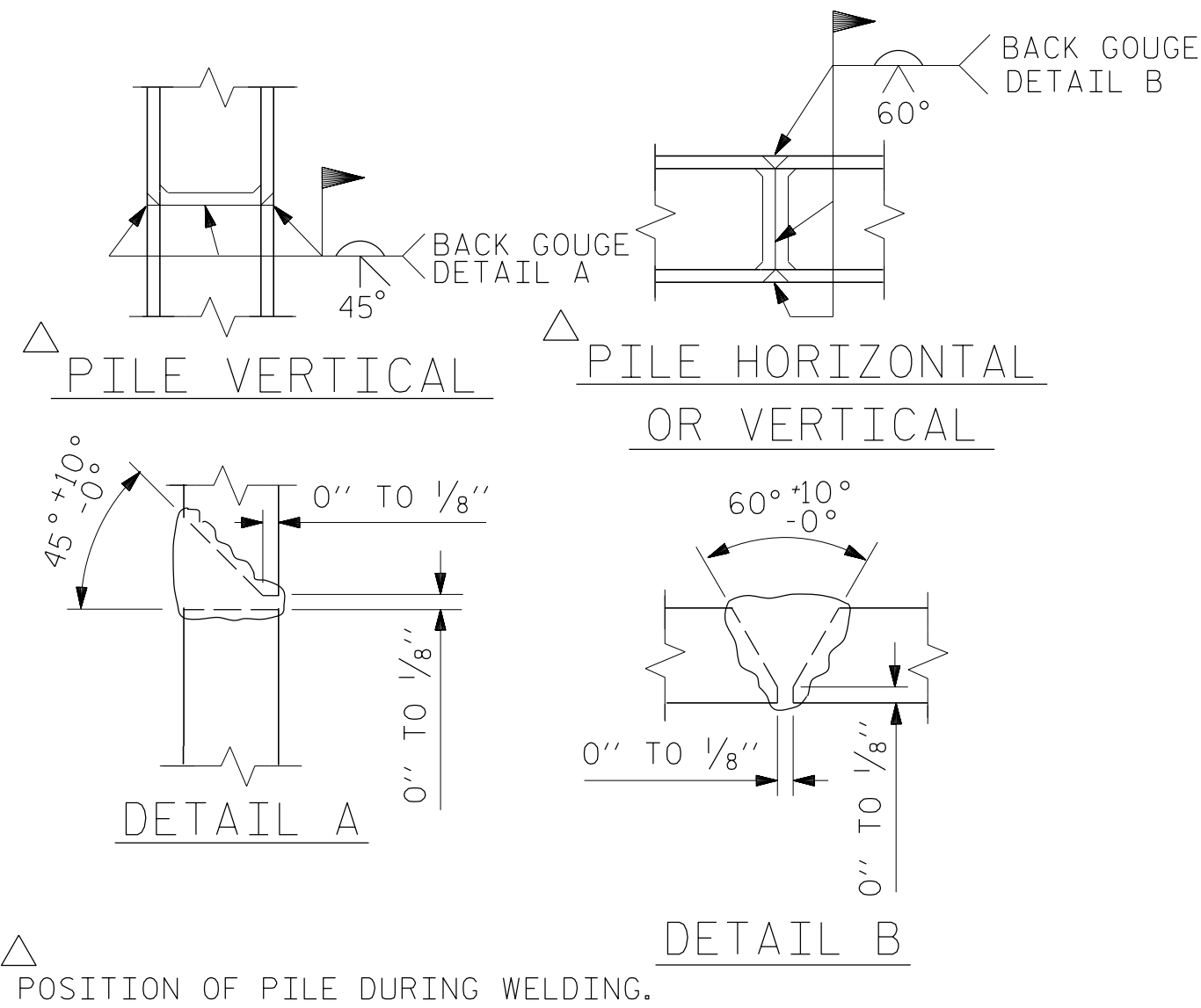
(END BENT No. 1 SHOWN, END BENT No. 2 SIMILAR BY ROTATION)



PLAN

CORROSION PROTECTION FOR STEEL PILES DETAIL

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



PILE SPLICE DETAILS

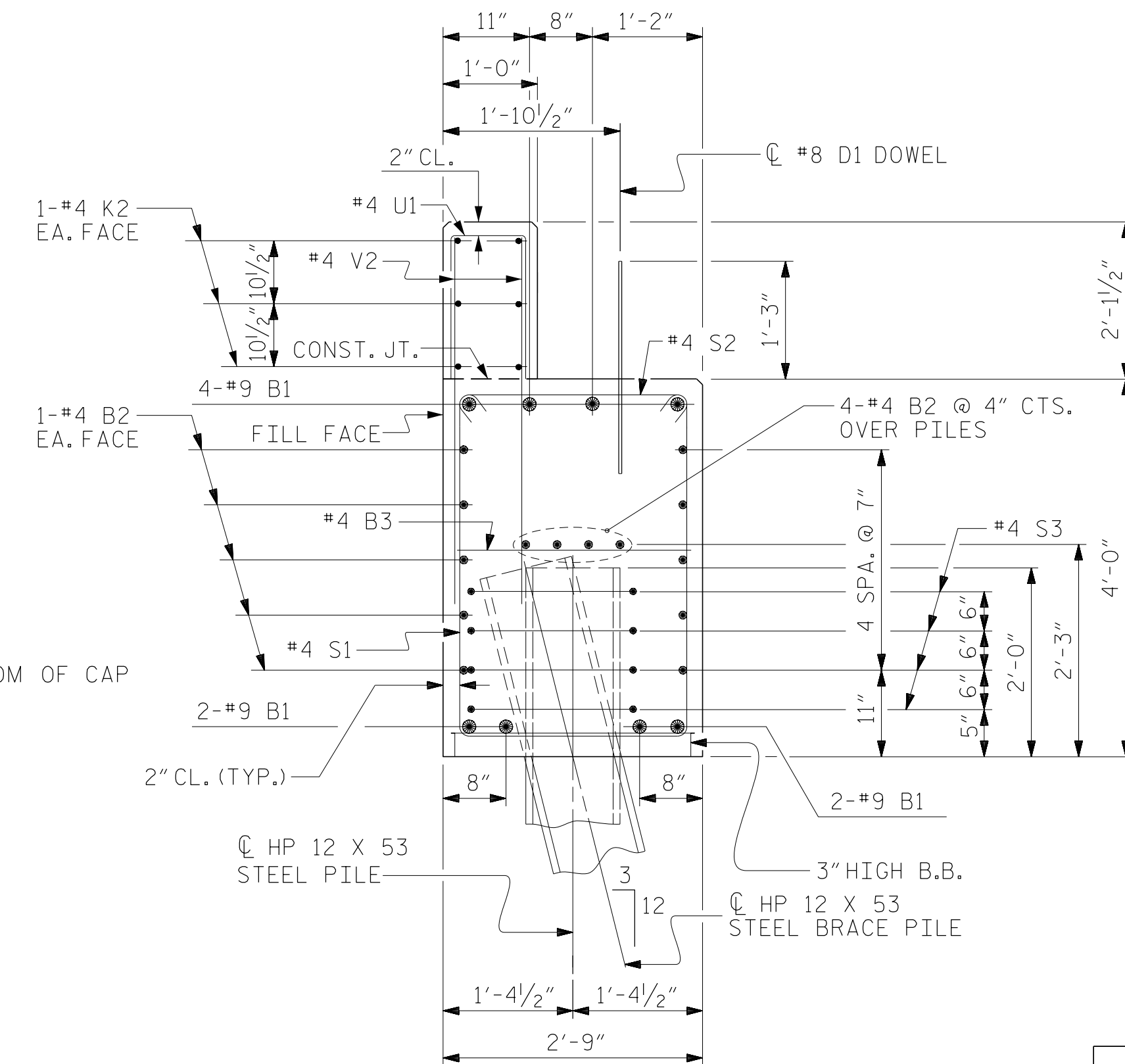
BILL OF MATERIAL FOR ONE END BENT					
BAR NO.	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#9	1	41'-0"	1115
B2	28	#4	STR	20'-7"	385
B3	10	#4	STR	2'-5"	16
D1	22	#8	STR	2'-3"	132
H1	64	#6	2	15'-4"	1474
K1	12	#4	STR	2'-11"	23
K2	12	#4	STR	20'-7"	165
S1	50	#4	3	10'-5"	348
S2	50	#4	4	3'-2"	106
S3	28	#4	5	6'-6"	122
U1	33	#4	6	3'-8"	81
V1	76	#4	STR	7'-8"	389
V2	66	#4	STR	5'-9"	254
REINFORCING STEEL (FOR ONE END BENT)					4610 LBS.
CLASS A CONCRETE BREAKDOWN (FOR ONE END BENT)					
POUR #1 CAP, LOWER PART OF WINGS & COLLARS					21.3 C.Y.
POUR #2 BACKWALL & UPPER PART OF WINGS					7.7 C.Y.
TOTAL CLASS A CONCRETE					29.0 C.Y.

BAR TYPES	

ALL BAR DIMENSIONS ARE OUT TO OUT.

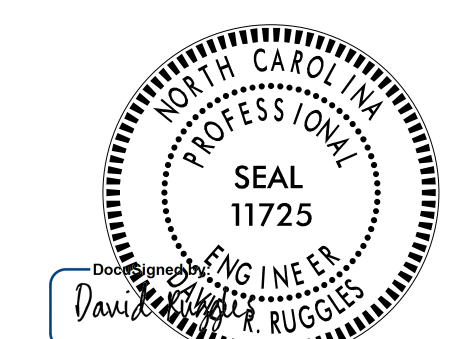
END BENT No. 1	END BENT No. 2
HP 12 X 53 STEEL PILES	HP 12 X 53 STEEL PILES
NO: 7	NO: 7
LIN. FT.= 315	LIN. FT.= 350

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



SECTION A-A

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



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FRANKLIN COUNTY
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SHEET 4 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
END BENT No. 1 & 2
DETAILS

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

SHEET NO. S-17
TOTAL SHEETS 22

STD. NO. EB_33_90S4_39BB

DRAWN BY: V. CHUNG DATE: 07-18
CHECKED BY: E. PHELPS DATE: 08-18
DESIGN ENGINEER OF RECORD: D. RUGGLES DATE: 03-19

B-4516
 3/11/2019
 \\400_017_B4516_SMU-SUB04.dgn
 USER:ephelps

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.

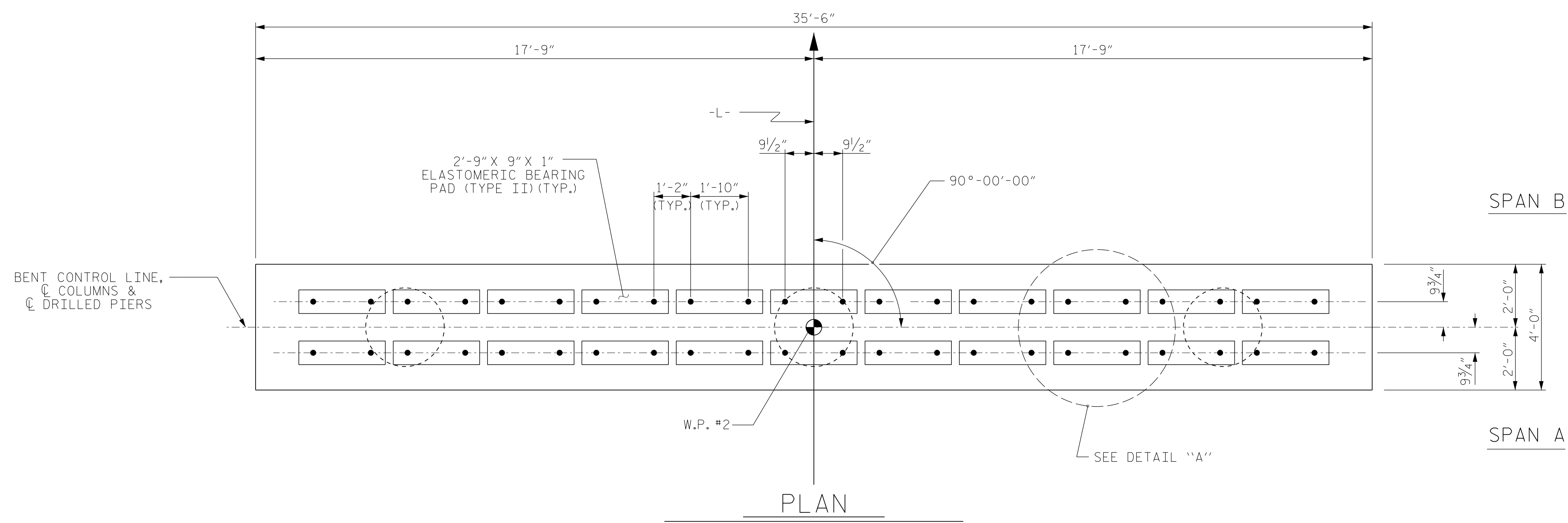
ALL STEEL IN THE DRILLED PIERS IS INCLUDED IN THE PAY ITEMS FOR "REINFORCING STEEL" AND "SPIRAL COLUMN REINFORCING STEEL."

★ INVERT ALTERNATE STIRRUPS.

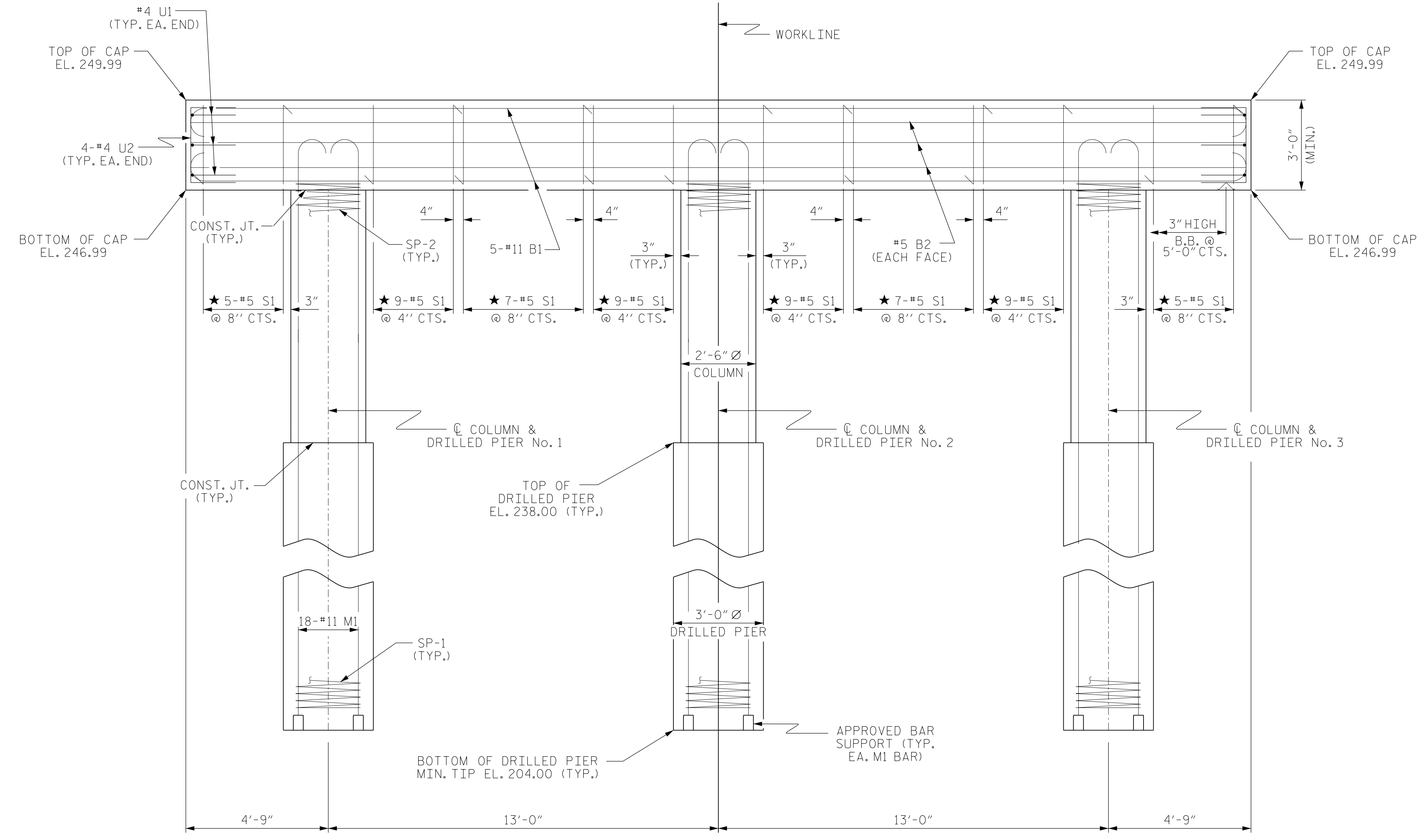
THE LOCATION OF THE CONSTRUCTION JOINT IN THE DRILLED PIERS IS BASED ON AN APPROXIMATE GROUND LINE ELEVATION. IF THE CONSTRUCTION JOINT IS ABOVE THE ACTUAL GROUND LINE ELEVATION, THE CONTRACTOR SHALL PLACE THE CONSTRUCTION JOINT ONE FOOT BELOW THE GROUND LINE.

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

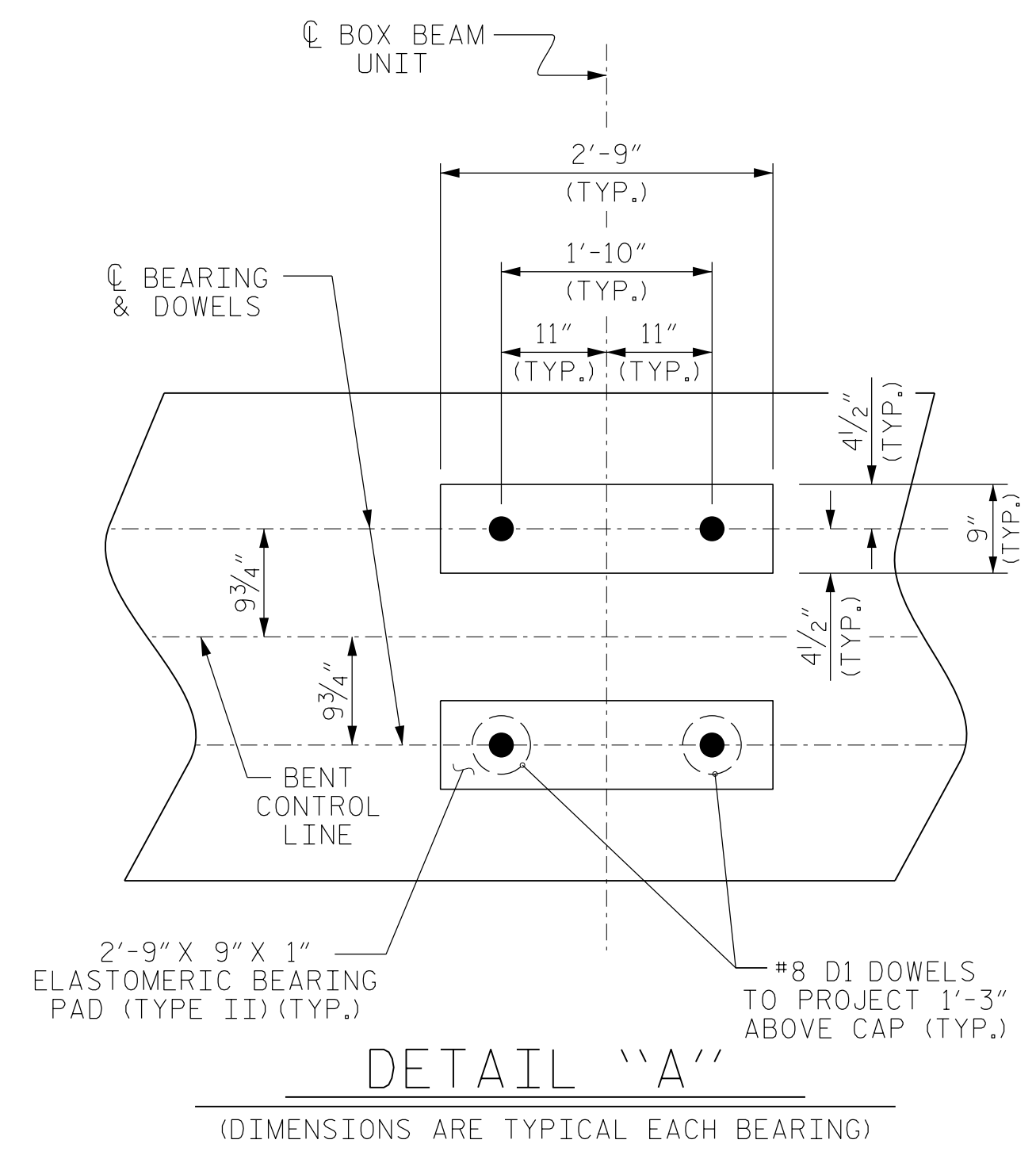
THE CONTRACTOR'S ATTENTION IS CALLED TO THE FACT THAT THE LONGITUDINAL REINFORCEMENT FOR DRILLED PIERS IS DETAILED WITH 3 FEET OF EXTRA LENGTH.



PLAN



ELEVATION



DETAIL "A"

PROJECT NO. B-4516
FRANKLIN COUNTY
 STATION: 15+17.00 -L-
 SHEET 5 OF 6



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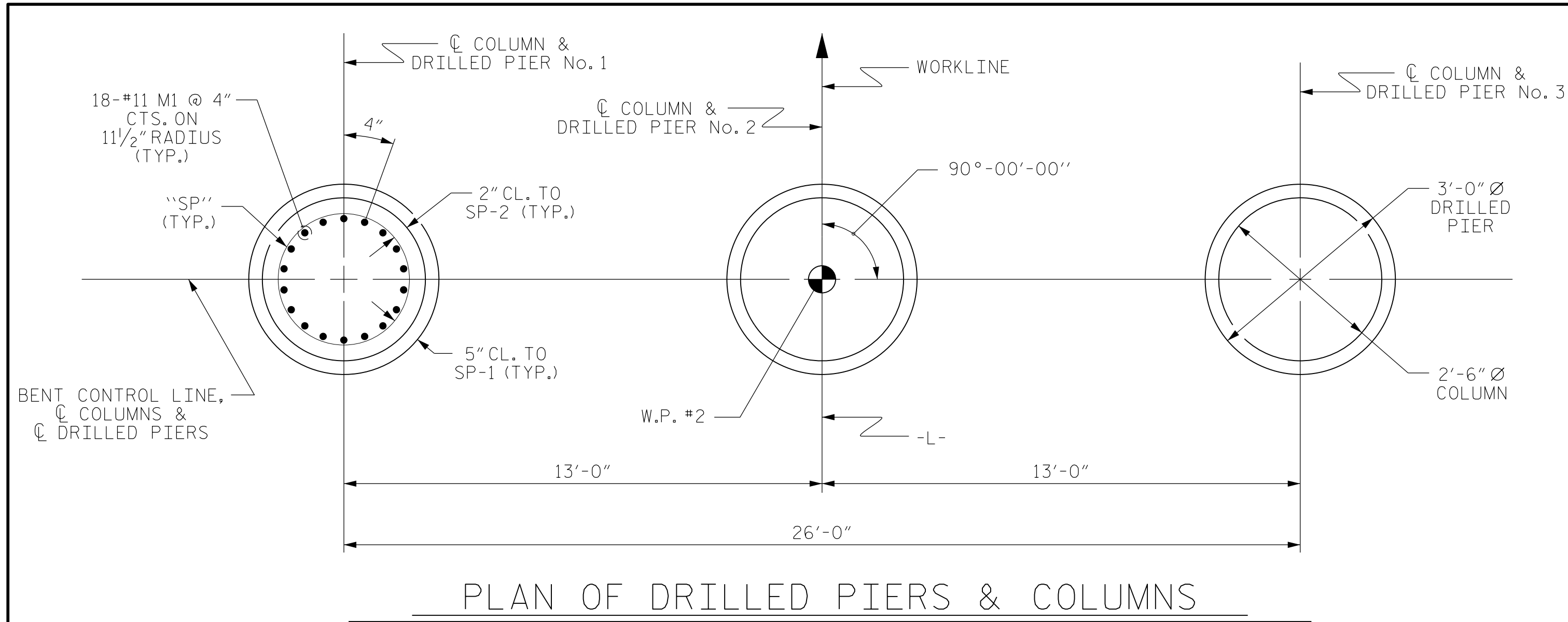
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STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
SUBSTRUCTURE BENT No. 1					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
					SHEET NO. S-18
					TOTAL SHEETS 22

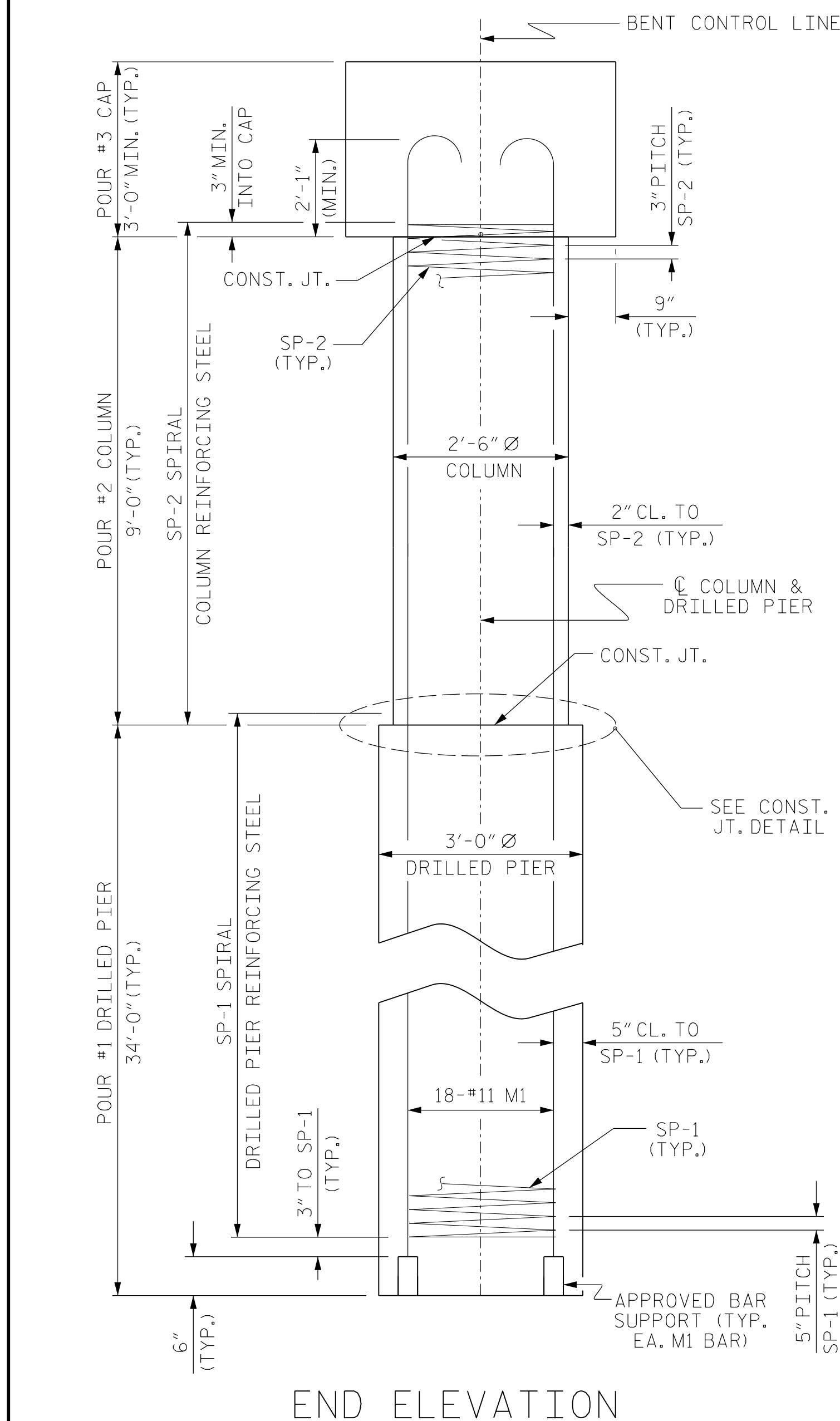
DRAWN BY: V. CHUNG DATE: 07-18
 CHECKED BY: E. PHELPS DATE: 08-18
 DESIGN ENGINEER OF RECORD: D. RUGGLES DATE: 03-19

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

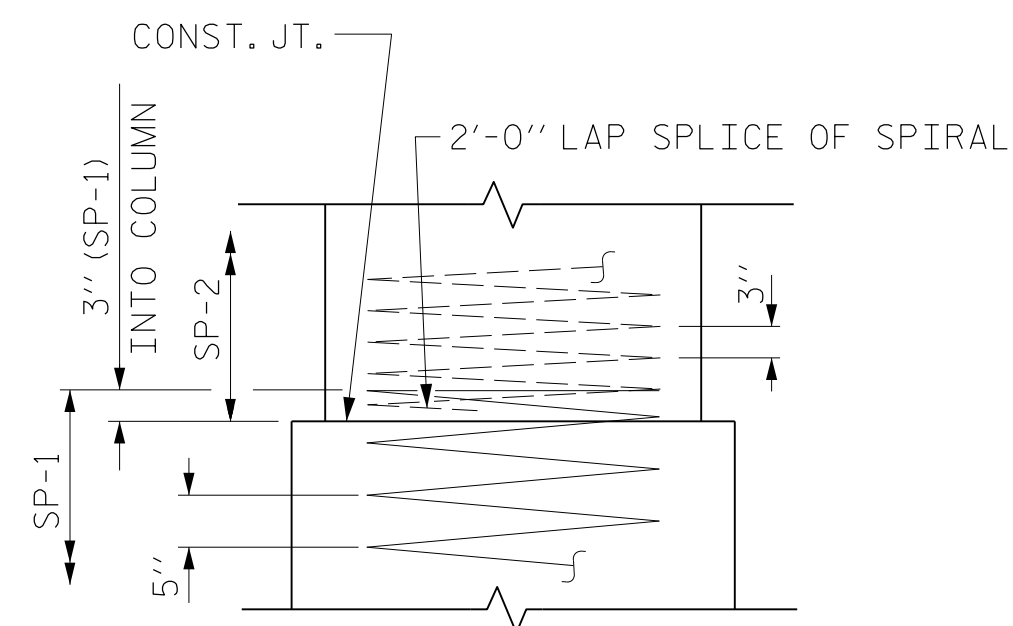
B-4516
 3/11/2019
 \\400_018_B4516_SMU-SUB05.dgn
 USER:ephelps



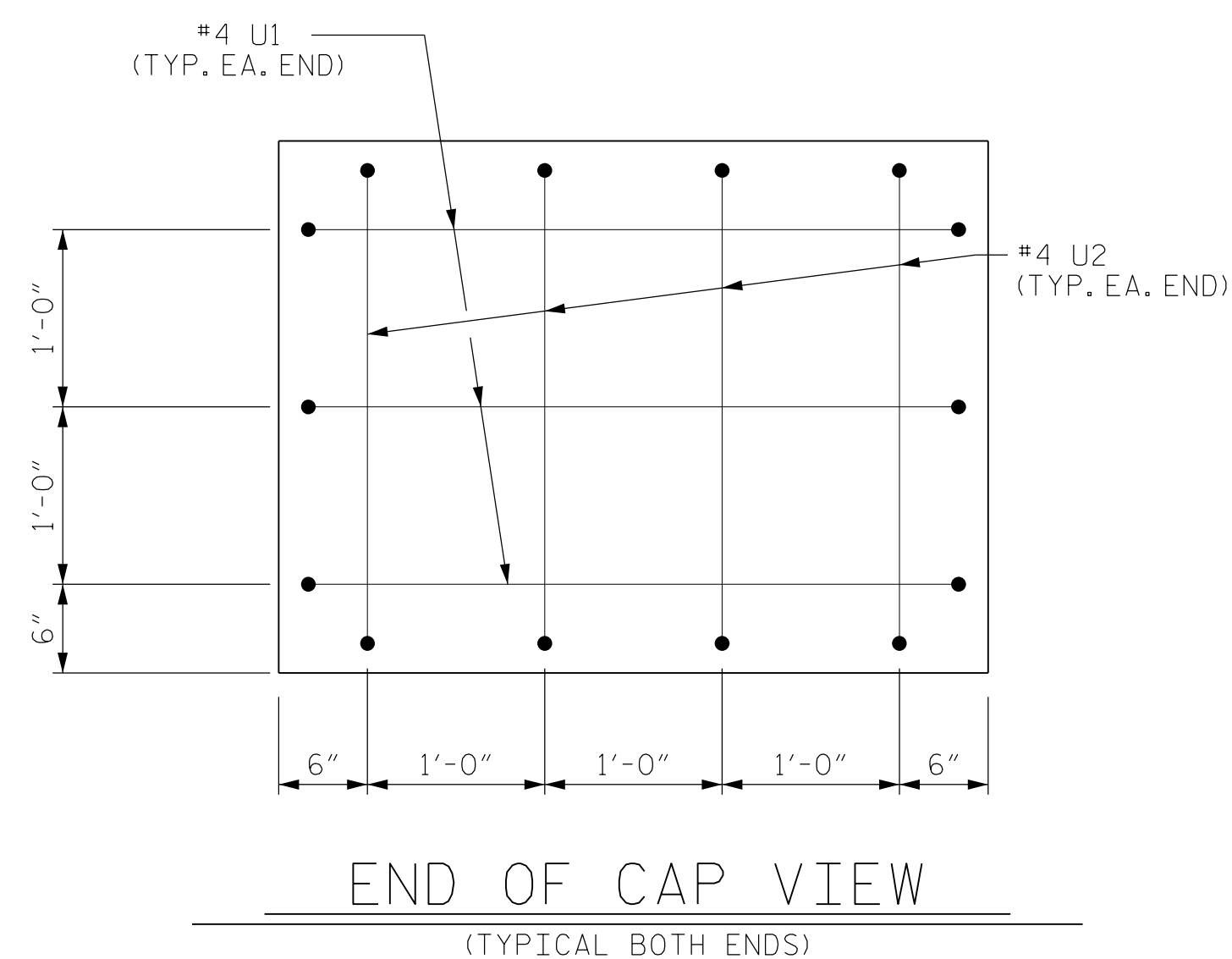
PLAN OF DRILLED PIERS & COLUMNS



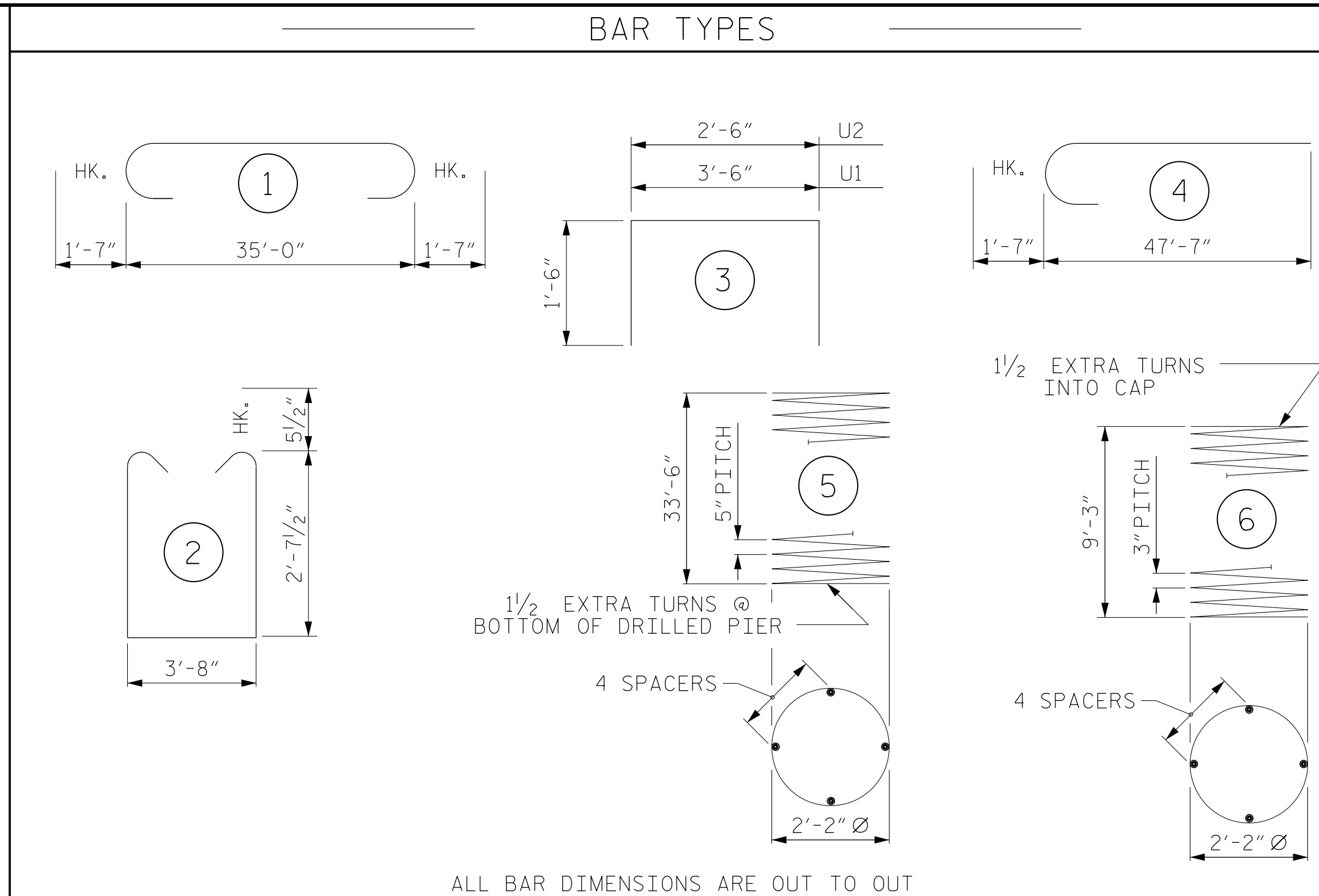
END ELEVATION



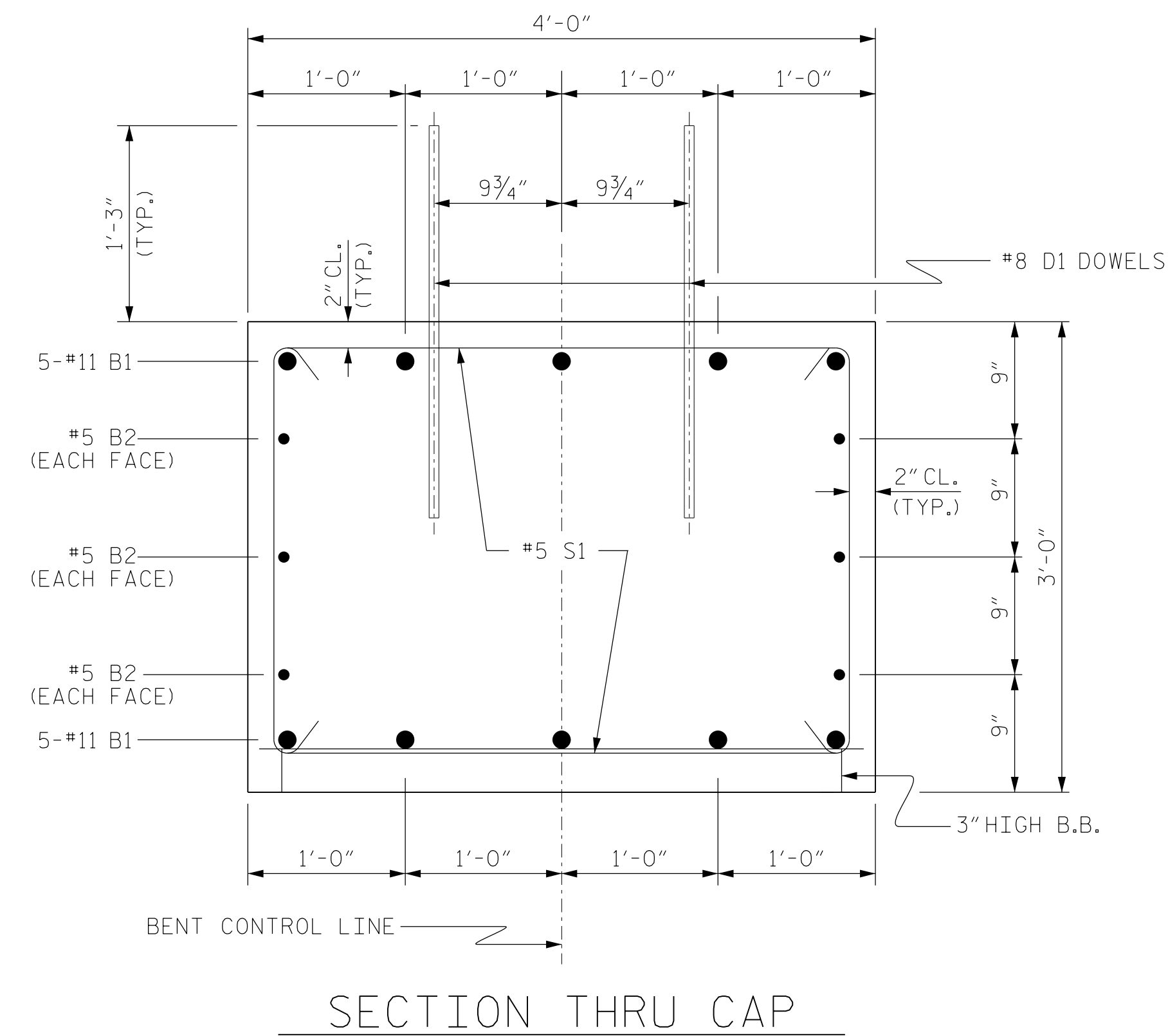
CONSTRUCTION JOINT DETAIL



END OF CAP VIEW
(TYPICAL BOTH ENDS)



ALL BAR DIMENSIONS ARE OUT TO OUT



SECTION THRU CAP

BILL OF MATERIAL FOR ONE BENT					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	10	#11	1	38'-2"	2028
B2	6	#5	STR	35'-2"	220
D1	44	#8	STR	2'-3"	264
M1	54	#11	4	49'-2"	14106
S1	60	#5	2	9'-10"	615
U1	6	#4	3	6'-6"	26
U2	8	#4	3	5'-6"	29
REINFORCING STEEL (FOR ONE BENT)					17288 LBS.
SP-1	3	*	5	545'-2"	1706
SP-2	3	**	6	257'-2"	515
SPIRAL COLUMN REINFORCING STEEL (FOR ONE BENT)					2565 LBS.
* THE SP-1 SPIRAL REINFORCING STEEL SHALL BE W31 OR D-31 COLD DRAWN WIRE OR #5 PLAIN OR DEFORMED BAR					
** THE SP-2 SPIRAL REINFORCING STEEL SHALL BE W20 OR D-20 COLD DRAWN WIRE OR #4 PLAIN OR DEFORMED BAR					
CLASS A CONCRETE BREAKDOWN (FOR ONE BENT)					
POUR #2 (COLUMNS)					4.9 C.Y.
POUR #3 (CAP)					15.8 C.Y.
TOTAL CLASS A CONCRETE					20.7 C.Y.
DRILLED PIERS: (FOR ONE BENT)					
DRILLED PIER CONCRETE POUR #1 (DRILLED PIERS)					26.7 C.Y.
3'-0" Ø DRILLED PIER NOT IN SOIL					12.0 LIN. FT.
3'-0" Ø DRILLED PIER IN SOIL					90.0 LIN. FT.
CSL TUBES					426.0 LIN. FT.

PROJECT NO. B-4516
FRANKLIN COUNTY
 STATION: 15+17.00 -L-
 SHEET 6 OF 6



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 T 919.380.8750
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STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
SUBSTRUCTURE BENT No. 1					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

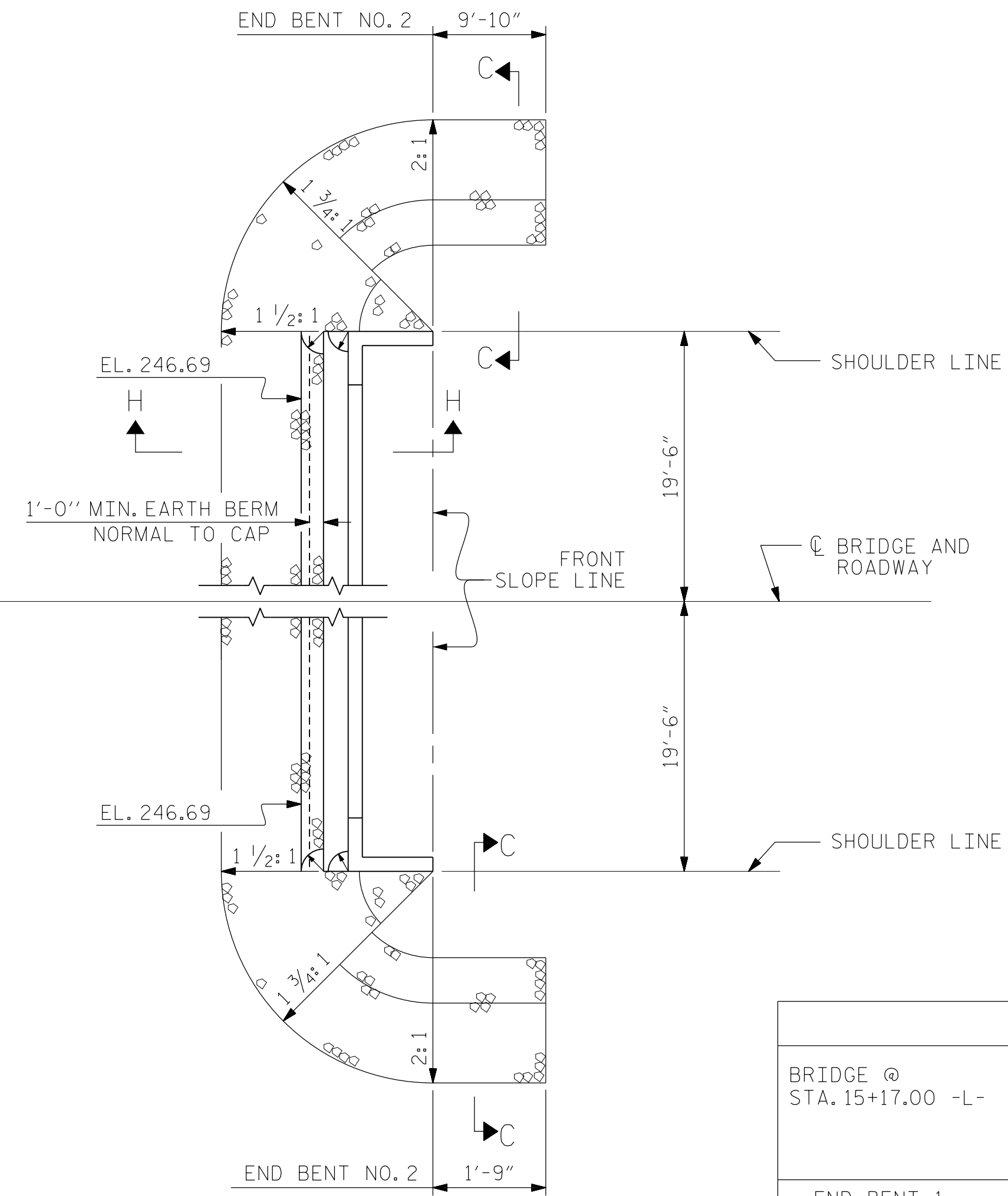
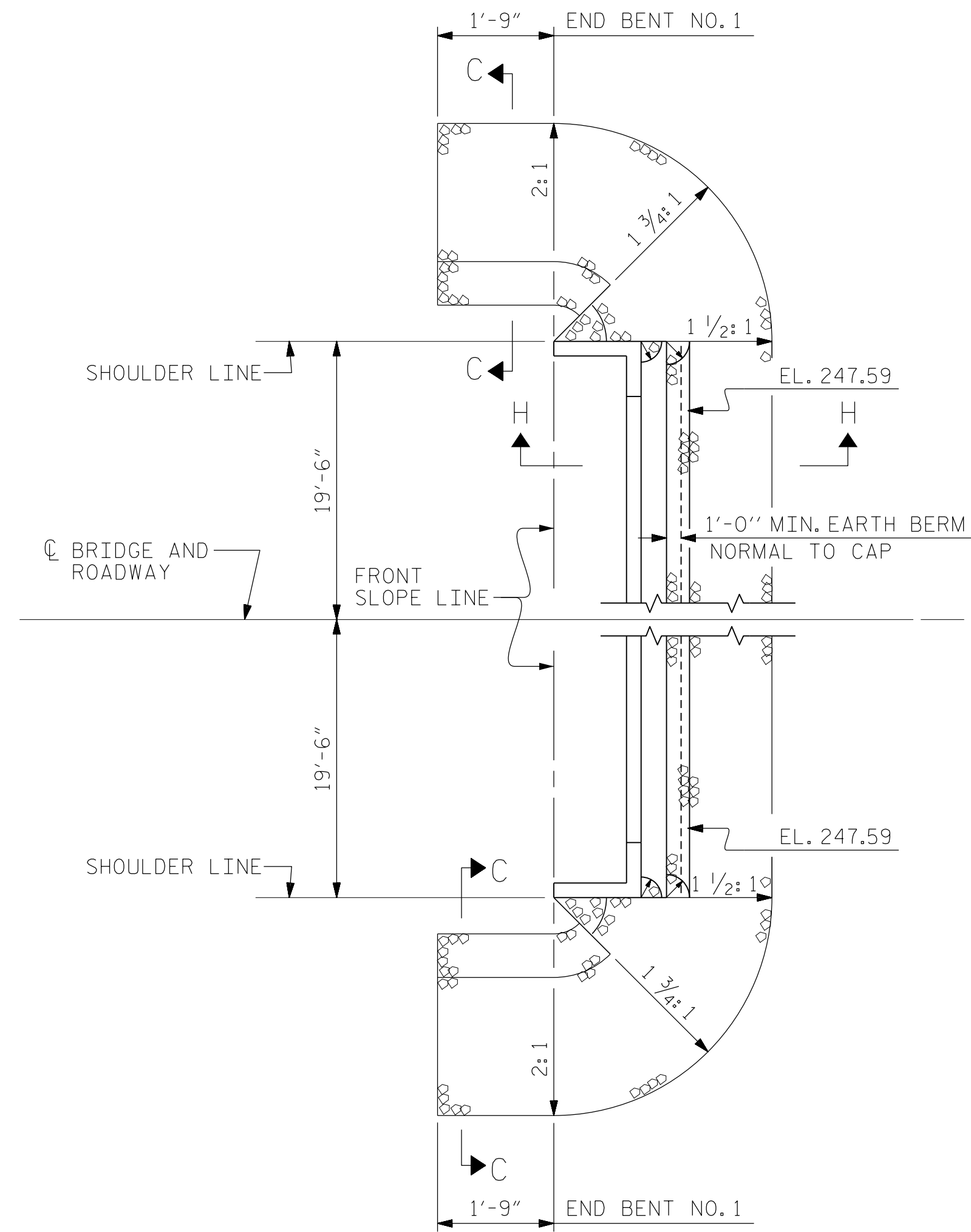
SHEET NO. S-19
 TOTAL SHEETS 22

3/11/2019
 V. CHUNG DATE: 07-18
 E. PHELPS DATE: 08-18
 D. RUGGLES DATE: 03-19

B-4516

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 USER:ephelps

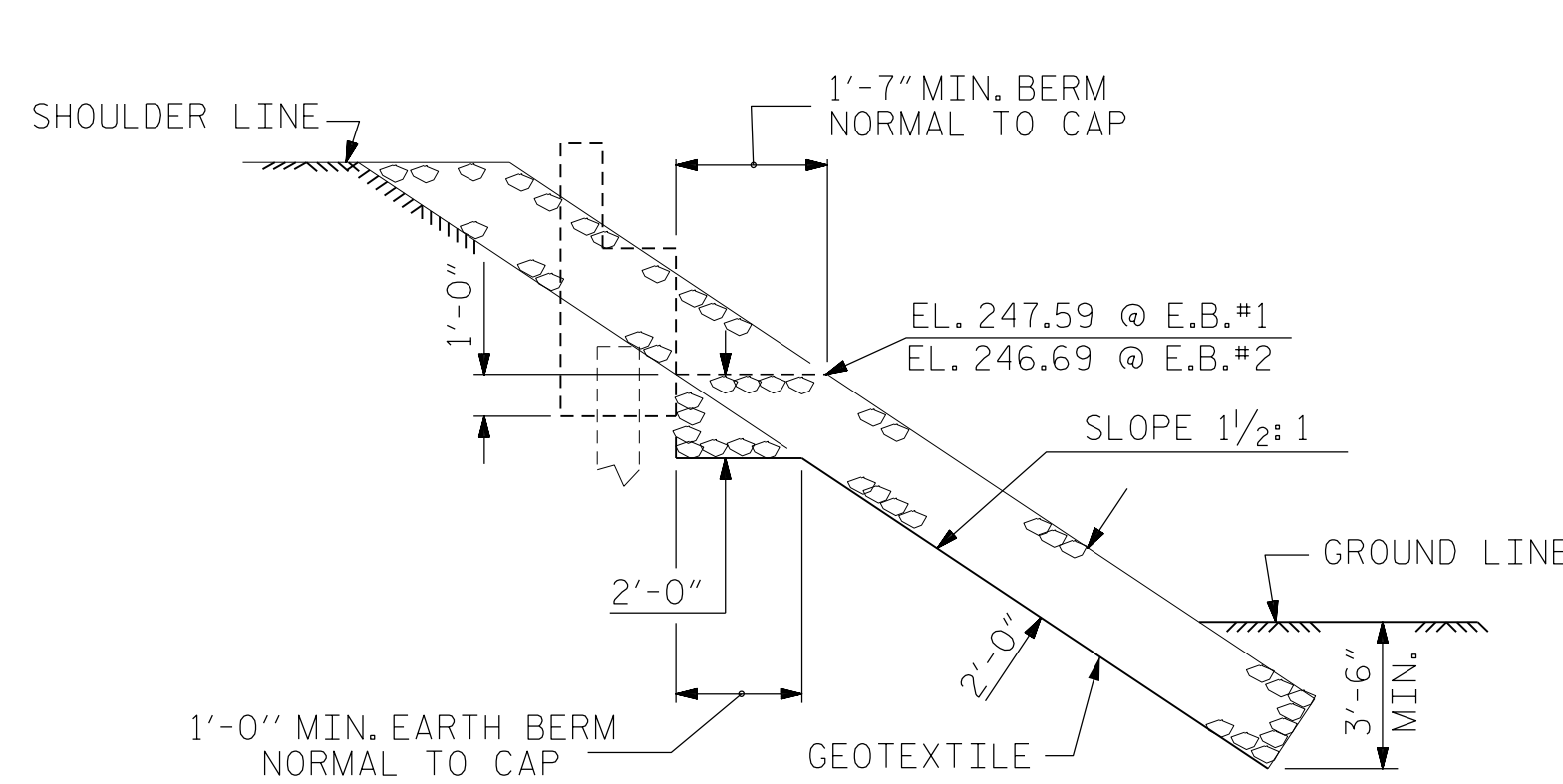
NOTES :
FOR BERM WIDTH DIMENSIONS, SEE GENERAL DRAWING.



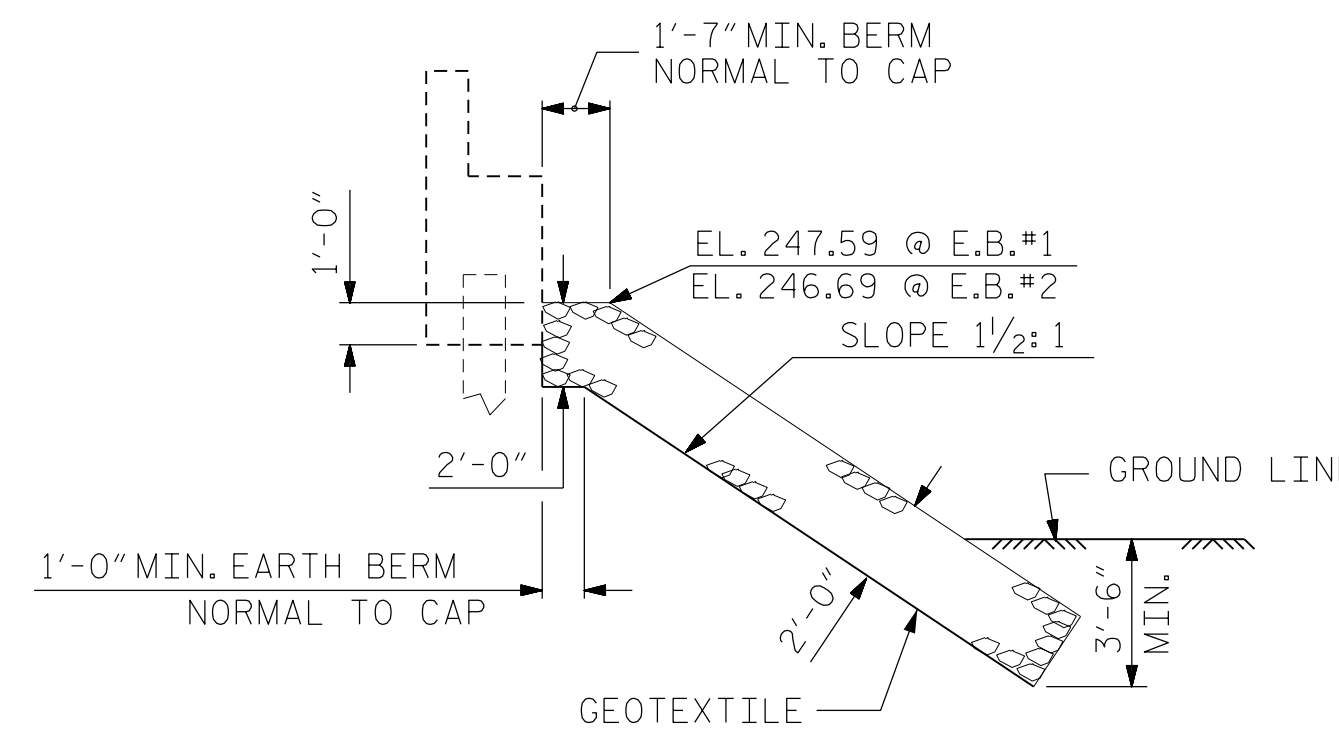
ESTIMATED QUANTITIES		
BRIDGE @ STA. 15+17.00 -L-	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE
	TONS	SQUARE YARDS
END BENT 1	70	75
END BENT 2	160	175

SHOULDER RIP RAP IS HIGHER THAN BERM RIP RAP

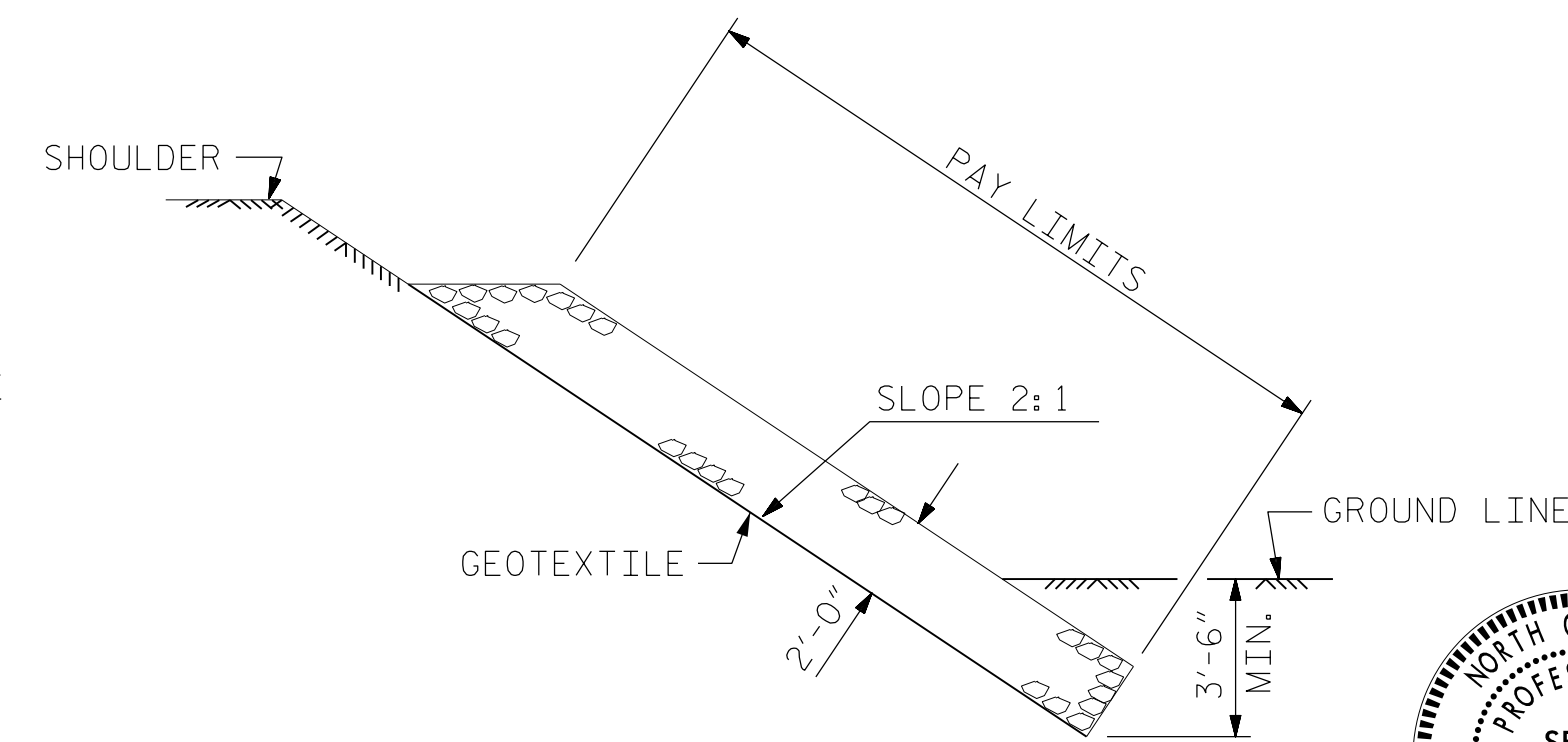
BERM RIP RAPPED



SECTION H-H



SECTION C-C
BERM RIP RAPPED



SECTION C-C



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PROJECT NO. B-4516
FRANKLIN COUNTY
STATION: 15+17.00 -L-

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

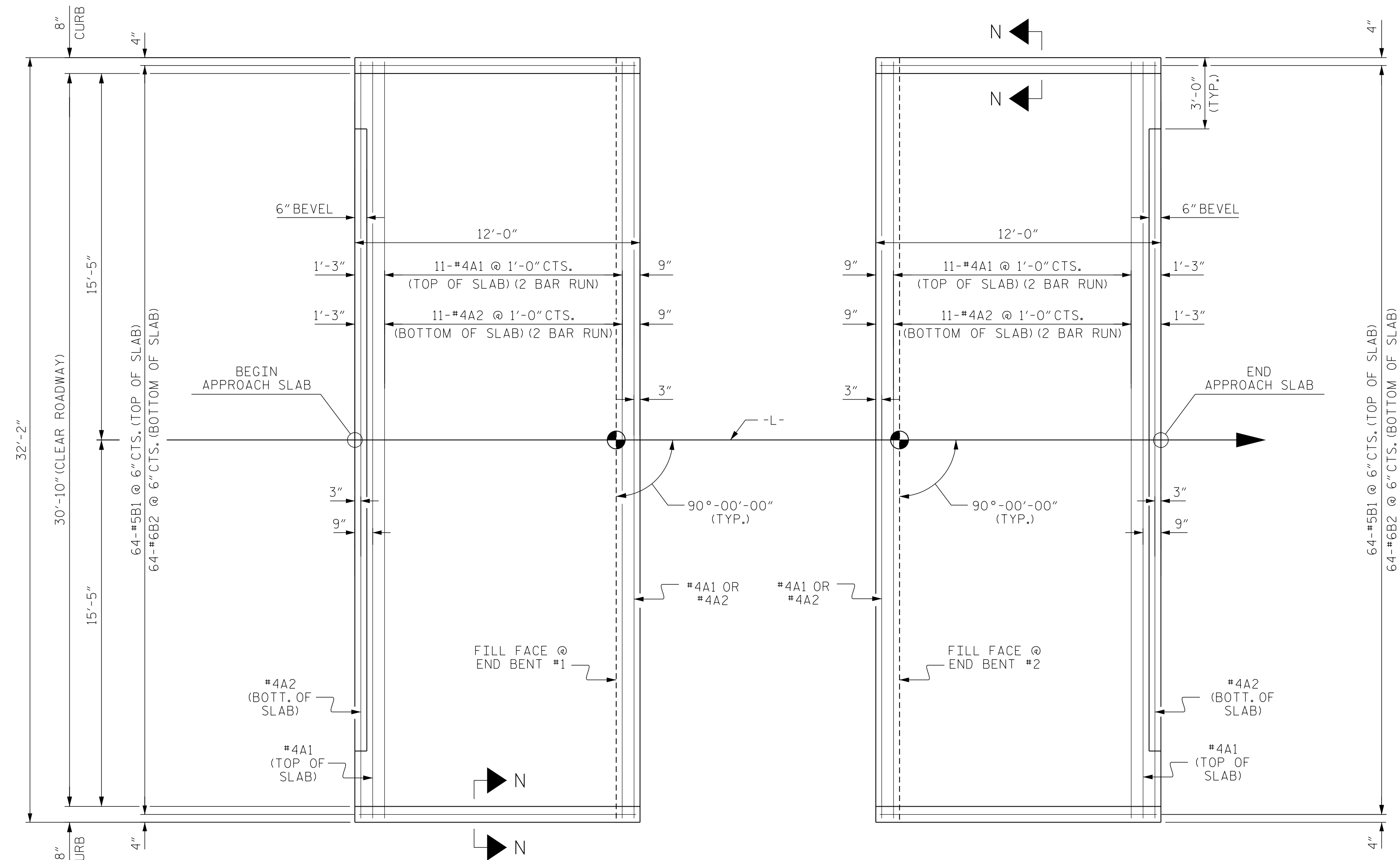
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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-20
1			3			TOTAL SHEETS 22
2			4			

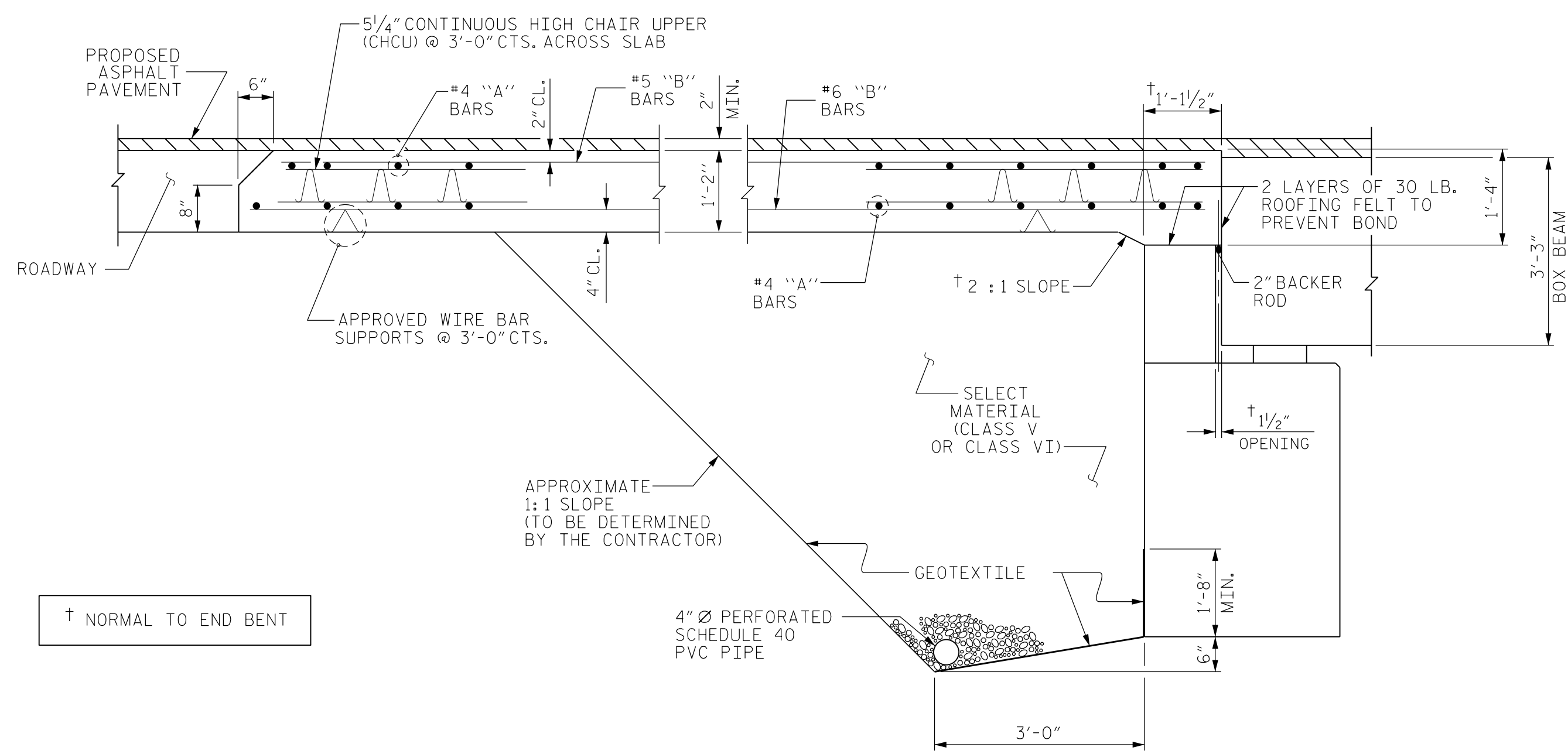
DRAWN BY: V. CHUNG DATE: 07-18
CHECKED BY: E. PHELPS DATE: 08-18
DESIGN ENGINEER OF RECORD: D. RUGGLES DATE: 03-19

3/11/2019
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USER:ephelps

B-4516



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



SECTION THRU SLAB
 (TYPE II - MODIFIED APPROACH FILL)

DRAWN BY: V. CHUNG DATE: 07-18
 CHECKED BY: E. PHELPS DATE: 08-18
 DESIGN ENGINEER OF RECORD: D. RUGGLES DATE: 03-19

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.

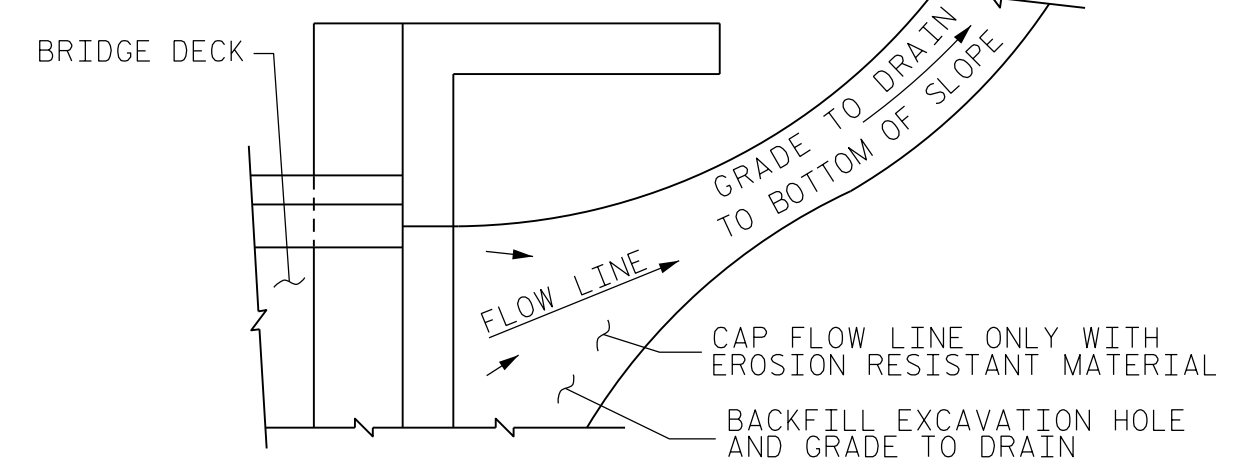
SELECT MATERIAL BACKFILL (CLASS V OR CLASS VI) SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATIONS SECTION 1016.

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

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

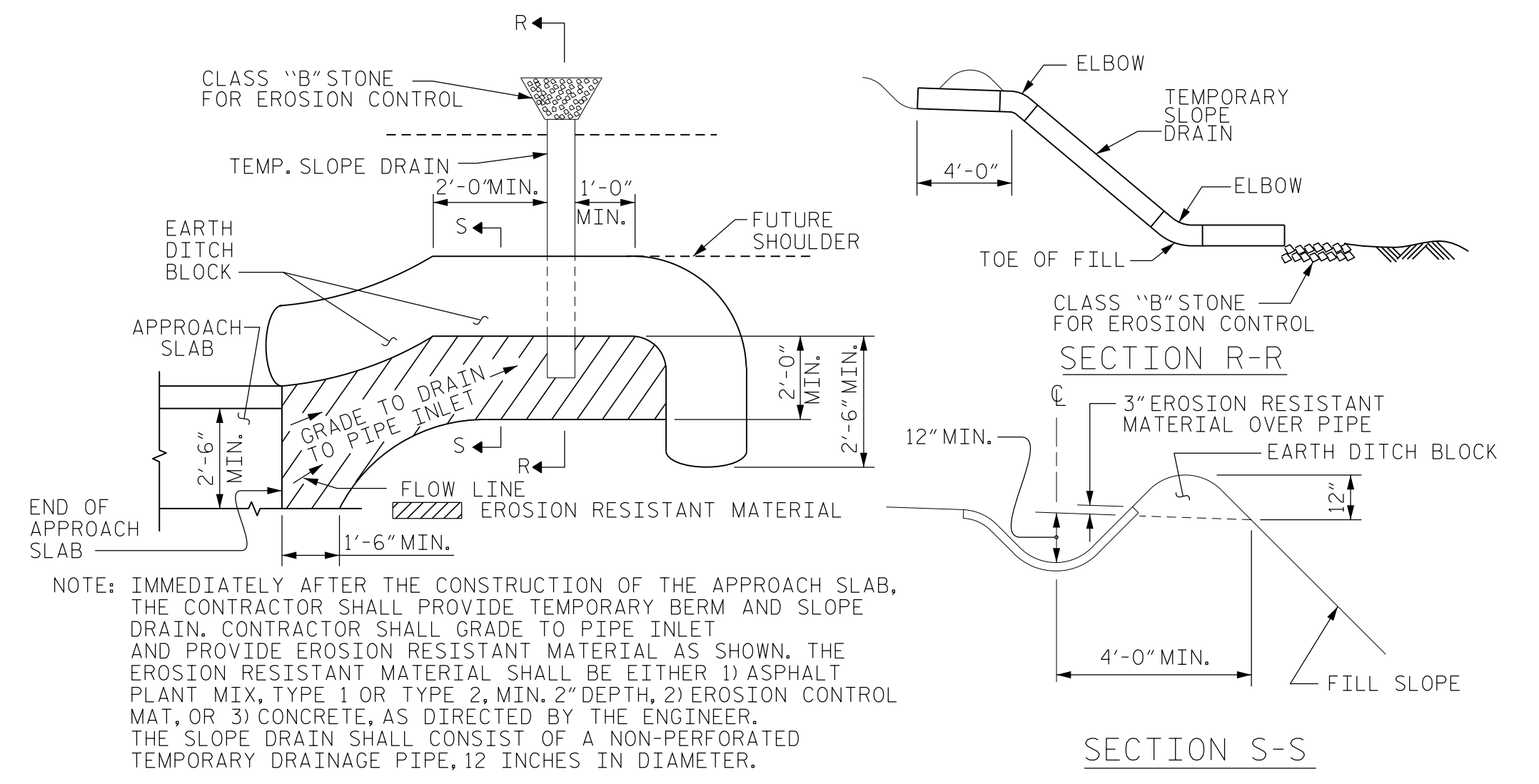
FOR THE 4" Ø DRAINAGE PIPE OUTLET(S), SEE ROADWAY STANDARD DRAWINGS.

APPROACH SLAB GROOVING IS NOT REQUIRED.



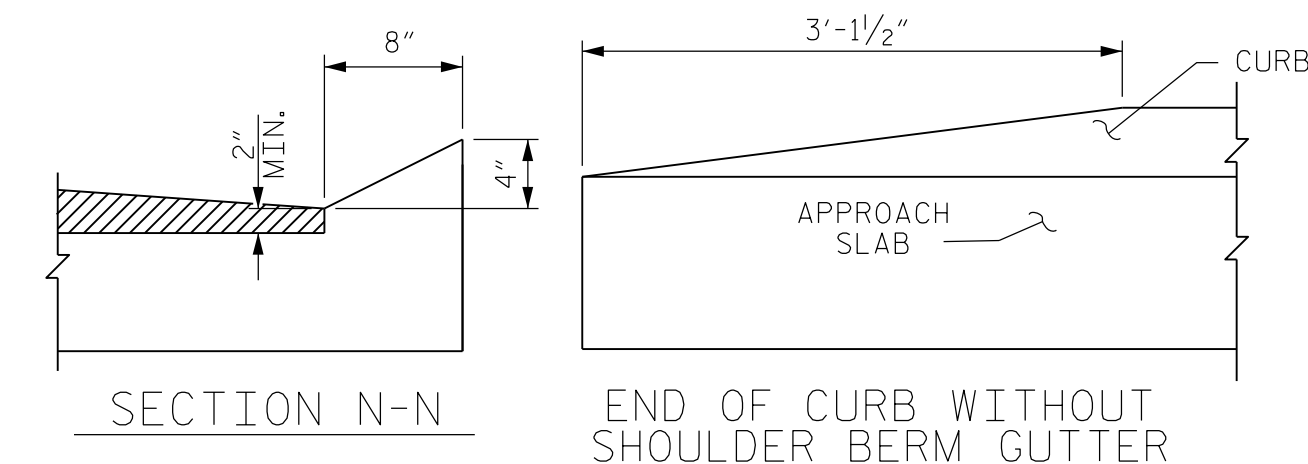
NOTE: IF THE APPROACH SLAB IS NOT CONSTRUCTED IMMEDIATELY AFTER THE BACKFILLING OF THE END BENT EXCAVATION, GRADE TO DRAIN TO THE BOTTOM OF THE SLOPE AND PROVIDE EROSION RESISTANT MATERIAL, SUCH AS FIBERGLASS ROVING OR AS DIRECTED BY THE ENGINEER TO PREVENT SOIL EROSION AND TO PROTECT THE AREA ADJACENT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

TEMPORARY DRAINAGE DETAIL



NOTE: IMMEDIATELY AFTER THE CONSTRUCTION OF THE APPROACH SLAB, THE CONTRACTOR SHALL PROVIDE TEMPORARY BERM AND SLOPE DRAIN. CONTRACTOR SHALL GRADE TO PIPE INLET AND PROVIDE EROSION RESISTANT MATERIAL AS SHOWN. THE EROSION RESISTANT MATERIAL SHALL BE EITHER 1) ASPHALT PLANT MIX, TYPE 1 OR TYPE 2, MIN. 2" DEPTH, 2) EROSION CONTROL MAT, OR 3) CONCRETE, AS DIRECTED BY THE ENGINEER. THE SLOPE DRAIN SHALL CONSIST OF A NON-PERFORATED TEMPORARY DRAINAGE PIPE, 12 INCHES IN DIAMETER.

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



CURB DETAILS

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



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BILL OF MATERIAL						
APPROACH SLAB AT EB #1						
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	
*A1	26	#4	STR	16'-11"	294	
A2	26	#4	STR	16'-9"	291	
*B1	64	#5	STR	11'-2"	745	
B2	64	#6	STR	11'-8"	1121	
REINFORCING STEEL					LBS.	1412
*EPOXY COATED REINFORCING STEEL					LBS.	1039
CLASS AA CONCRETE					C. Y.	17.0
APPROACH SLAB AT EB #2						
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	
*A1	26	#4	STR	16'-11"	294	
A2	26	#4	STR	16'-9"	291	
*B1	64	#5	STR	11'-2"	745	
B2	64	#6	STR	11'-8"	1121	
REINFORCING STEEL					LBS.	1412
*EPOXY COATED REINFORCING STEEL					LBS.	1039
CLASS AA CONCRETE					C. Y.	17.0

PROJECT NO. B-4516
 FRANKLIN COUNTY
 STATION: 15+17.00 -L-

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 STANDARD
 BRIDGE APPROACH SLAB
 FOR PRESTRESSED CONCRETE
 BOX BEAM UNIT
 (SUB-REGIONAL TIER)
 90° SKEW

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

TOTAL SHEETS: 22

