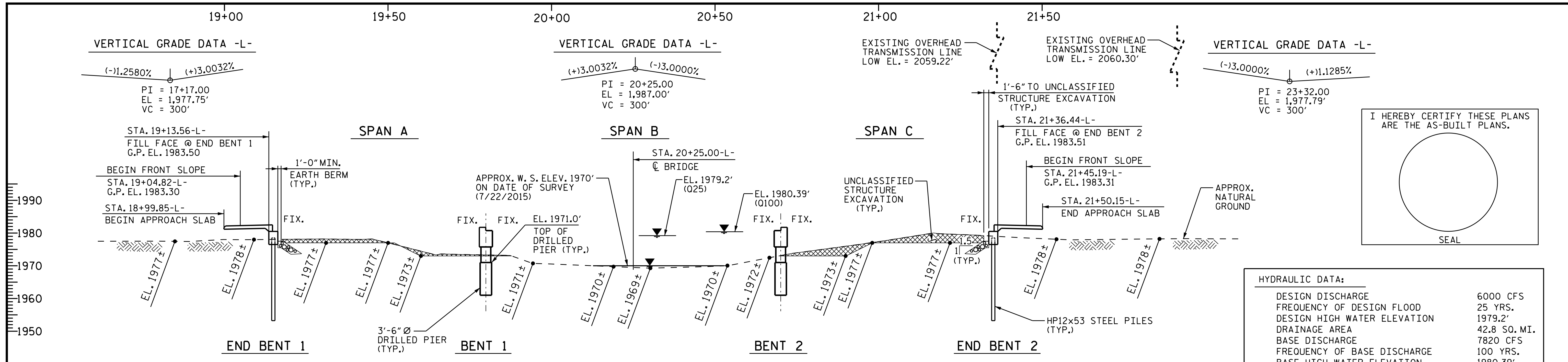


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shall not be considered a certified document.**



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

SEAL

HYDRAULIC DATA:

DESIGN DISCHARGE	6000 CFS
FREQUENCY OF DESIGN FLOOD	25 YRS.
DESIGN HIGH WATER ELEVATION	1979.2'
DRAINAGE AREA	42.8 SQ. MI.
BASE DISCHARGE	7820 CFS
FREQUENCY OF BASE DISCHARGE	100 YRS.
BASE HIGH WATER ELEVATION	1980.39'

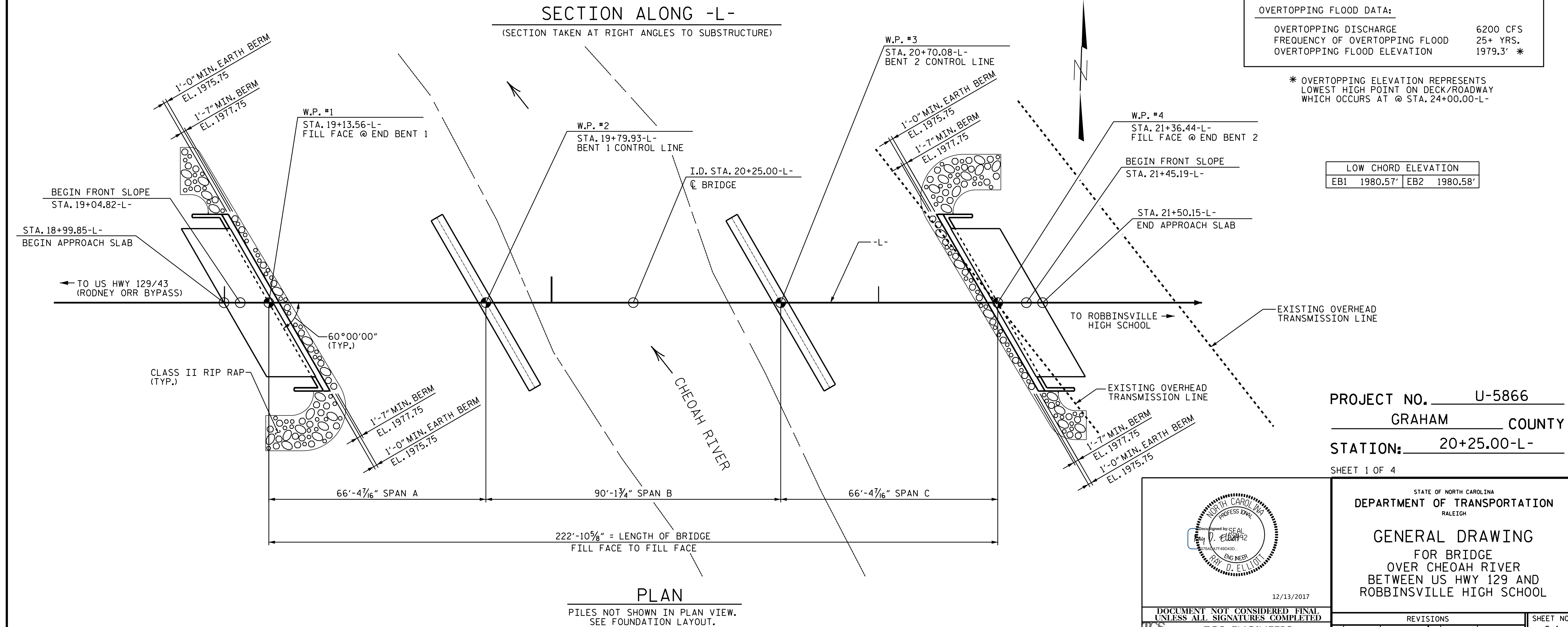
OVERTOPPING FLOOD DATA:

OVERTOPPING DISCHARGE	6200 CFS
FREQUENCY OF OVERTOPPING FLOOD	25+ YRS.
OVERTOPPING FLOOD ELEVATION	1979.3' *

* OVERTOPPING ELEVATION REPRESENTS LOWEST HIGH POINT ON DECK/ROADWAY WHICH OCCURS AT @ STA. 24+00.00-L-

LOW CHORD ELEVATION

EB1	1980.57'
EB2	1980.58'



DRAWN BY : NMW DATE : 8/16
 CHECKED BY : RAR DATE : 5/17
 DESIGN ENGINEER OF RECORD : RDE DATE : 5/17

12/13/2017

STATE OF NORTH CAROLINA
 PROFESSIONAL ENGINEER
 D. ELLIOTT
 ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

TGS ENGINEERS
 804-C N. LAFAYETTE ST
 SHELBY, NC 28150
 PH (704) 476-0003
 CORP. LICENSE NO.: C-0275

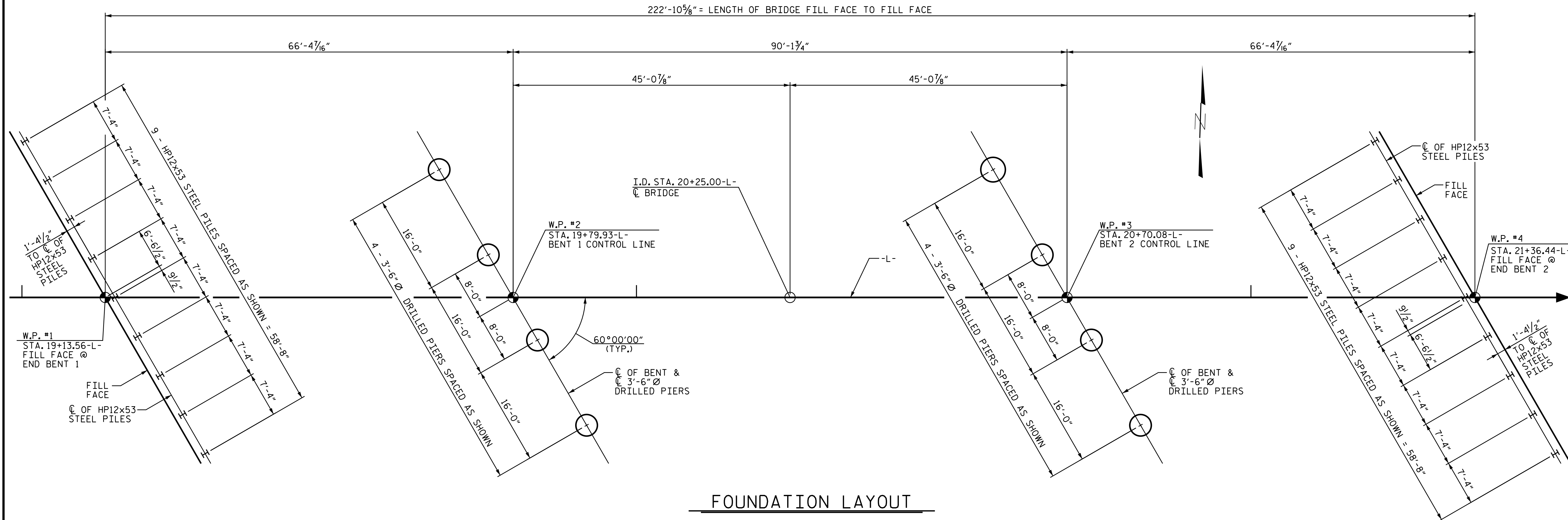
PROJECT NO. U-5866
 GRAHAM COUNTY
 STATION: 20+25.00-L-
 SHEET 1 OF 4

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

GENERAL DRAWING
 FOR BRIDGE
 OVER CHEOAH RIVER
 BETWEEN US HWY 129 AND
 ROBBINSONVILLE HIGH SCHOOL

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

SHEET NO. S-1
 TOTAL SHEETS 33



FOUNDATION LAYOUT

FOUNDATION RECOMMENDATION NOTES

FOR PILES, SEE GEOTECHNICAL SPECIAL PROVISIONS AND SECTION 450 OF THE STANDARD SPECIFICATIONS.

PILES AT END BENT NO.1 AND END BENT NO.2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 100 TONS PER PILE.

DRIVE PILES AT END BENT NO.1 AND END BENT NO.2 TO A REQUIRED DRIVING RESISTANCE OF 167 TONS PER PILE.

FOR DRILLED PIERS, SEE GEOTECHNICAL SPECIAL PROVISIONS AND SECTION 411 OF THE STANDARD SPECIFICATIONS.

DRILLED PIERS AT BENTS NO.1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 520 TONS PER PIER. CHECK FIELD CONDITIONS FOR THE REQUIRED TIP RESISTANCE OF 15 TSF.

PERMANENT STEEL CASING MAY BE REQUIRED FOR DRILLED PIERS AT BENTS NO 1 AND NO.2 IF REQUIRED, DO NOT EXTEND PERMANENT CASINGS BELOW ELEVATION 1959 FT. WITHOUT PRIOR APPROVAL FROM THE ENGINEER, THE ENGINEER WILL DETERMINE THE NEED FOR THE PERMANENT CASINGS.

INSTALL THE LEFT DRILLED PIER AT BENT NO.1 TO A TIP ELEVATION NO HIGHER THAN 1885 FT AND WITH THE REQUIRED TIP RESISTANCE.

INSTALL THE LEFT MIDDLE DRILLED PIER AT BENT NO.1 TO A TIP ELEVATION NO HIGHER THAN 1896 FT AND WITH THE REQUIRED TIP RESISTANCE.

INSTALL THE RIGHT MIDDLE DRILLED PIER AT BENT NO.1 TO A TIP ELEVATION NO HIGHER THAN 1904 FT AND WITH THE REQUIRED TIP RESISTANCE.

INSTALL THE RIGHT DRILLED PIER AT BENT NO.1 TO A TIP ELEVATION NO HIGHER THAN 1908 FT AND WITH THE REQUIRED TIP RESISTANCE.

LEFT DRILLED PIERS AT BENTS NO.2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 500 TONS PER PIER. CHECK FIELD CONDITIONS FOR THE REQUIRED TIP RESISTANCE OF 50 TSF.

RIGHT DRILLED PIERS AT BENTS NO.2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 505 TONS PER PIER. CHECK FIELD CONDITIONS FOR THE REQUIRED TIP RESISTANCE OF 15 TSF.

INSTALL THE LEFT DRILLED PIER AT BENT NO.2 TO A TIP ELEVATION NO HIGHER THAN 1920 FT AND WITH THE REQUIRED TIP RESISTANCE AND A PENETRATION OF AT LEAST 1 FT. INTO ROCK AS DEFINED BY ARTICLE 411-1 OF THE STANDARD SPECIFICATIONS.

INSTALL THE LEFT MIDDLE DRILLED PIER AT BENT NO.2 TO A TIP ELEVATION NO HIGHER THAN 1918 FT AND WITH THE REQUIRED TIP RESISTANCE AND PENETRATION OF AT LEAST 1 FT. INTO ROCK AS DEFINED BY ARTICLE 411-1 OF THE STANDARD SPECIFICATIONS.

INSTALL THE RIGHT MIDDLE DRILLED PIER AT BENT NO.2 TO A TIP ELEVATION NO HIGHER THAN 1912 FT AND WITH THE REQUIRED TIP RESISTANCE AND A PENETRATION OF AT LEAST 5 FT. INTO ROCK AS DEFINED BY ARTICLE 411-1 OF THE STANDARD SPECIFICATIONS.

INSTALL THE RIGHT DRILLED PIER AT BENT NO.2 TO A TIP ELEVATION NO HIGHER THAN 1910 FT AND WITH THE REQUIRED TIP RESISTANCE AND PENETRATION OF AT LEAST 5 FT. INTO ROCK AS DEFINED BY ARTICLE 411-1 OF THE STANDARD SPECIFICATIONS.

THE SCOUR CRITICAL ELEVATION FOR BENTS NO.1 AND NO.2 IS EL.1960 FT. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.

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

CSL TUBES ARE REQUIRED AND CSL TESTING MAY BE REQUIRED FOR DRILLED PIERS, OR ONE DRILED PIER PER BENT, WHICHEVER IS GREATER. THE ENGINEER WILL DETERMINE THE NEED FOR CSL TESTING. FOR CSL TESTING, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.

ALL END BENT PILES ARE HP12x53 STEEL PILES. DIMENSIONS LOCATING PILES ARE SHOWN TO THE CENTERLINE OF PILES. ORIENT PILES AS SHOWN. ALL BENT DRILLED PIERS ARE 3'-6" Ø. DIMENSIONS LOCATING DRILLED PIERS ARE SHOWN TO THE CENTERLINE OF THE DRILLED PIER.

PROJECT NO. U-5866

GRAHAM COUNTY

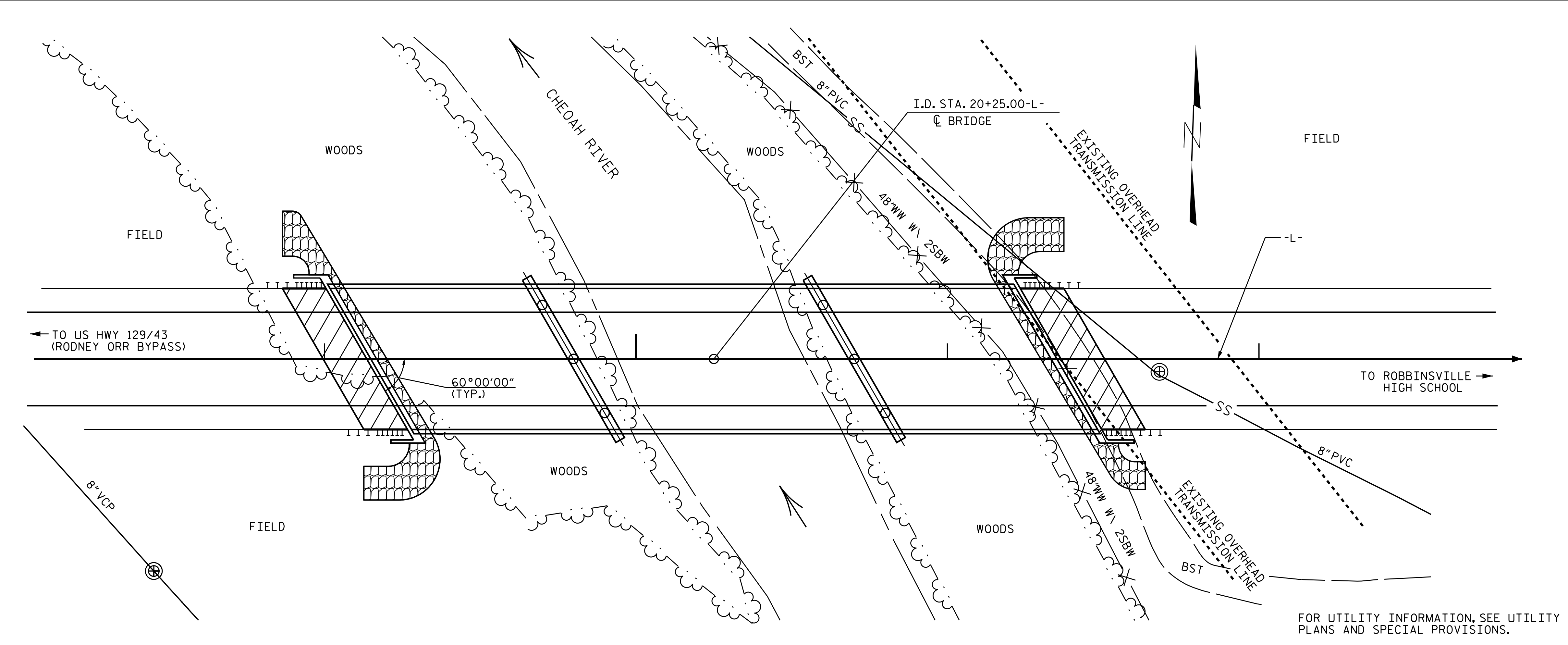
STATION: 20+25.00-L-

SHEET 2 OF 4

		STATE OF NORTH CAROLINA		SHEET NO. S-2	
		DEPARTMENT OF TRANSPORTATION RALEIGH			
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED		GENERAL DRAWING FOUNDATION LAYOUT FOR BRIDGE OVER CHEOAH RIVER BETWEEN US HWY 129 AND ROBBINSVILLE HIGH SCHOOL			
		TGS ENGINEERS 804-C N. LAFAYETTE ST SHELBY, NC 28150 PH (704) 476-0003 CORP. LICENSE NO.: C-0275			TOTAL SHEETS 33
12/13/2017		REVISIONS			
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

DRAWN BY : JLA DATE : 8/16
 CHECKED BY : RAR DATE : 5/17
 DESIGN ENGINEER OF RECORD : RDE DATE : 5/17

BENCHMARK: BM#1 - FLANGE BOLT ON FIRE HYDRANT NORTHWEST SIDE OF RODNEY ORR BYPASS & LAURA ST. INTERSECTION 145' RT. OF STA. -L-10+03.27 ELEV. = 1986.38'



LOCATION SKETCH

NOTES

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.
 FOR OTHER DESIGN DATA AND GENERAL NOTES, SEE SHEET SN (S-33).
 FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.
 THIS BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.

THE MATERIAL SHOWN IN THE CROSS-HATCHED AREA SHALL BE EXCAVATED FOR THE DISTANCE OF 20 FT. EACH SIDE OF THE CENTERLINE OF THE BRIDGE 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.

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

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

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.
 THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.
 FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.
 FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.
 FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.
 FOR BLACK ANODIZED 2-BAR METAL RAIL, SEE SPECIAL PROVISIONS.

PROJECT NO. U-5866
GRAHAM COUNTY
 STATION: 20+25.00-L-

SHEET 3 OF 4

STATE OF NORTH CAROLINA
 PROFESSIONAL ENGINEER
 D. ELLIOTT
 12/13/2017

DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED

TGS ENGINEERS
 804-C N. LAFAYETTE ST
 SHELBY, NC 28150
 PH (704) 476-0003
 CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

GENERAL DRAWING
 FOR BRIDGE
 OVER CHEOAH RIVER
 BETWEEN US HWY 129 AND
 ROBBINSVILLE HIGH SCHOOL

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-3
1			3			TOTAL SHEETS
2			4			33

DRAWN BY : NMW DATE : 7/16
 CHECKED BY : RAR DATE : 5/17
 DESIGN ENGINEER OF RECORD : RDE DATE : 5/17

TOTAL BILL OF MATERIAL											
ITEM	3'-6"Ø DRILLED PIERS IN SOIL	3'-6"Ø DRILLED PIERS NOT IN SOIL	PERMANENT STEEL CASING FOR 3'-6"Ø DRILLED PIERS	SID INSPECTIONS	CSL TESTING	UNCLASSIFIED STRUCTURE EXCAVATION	CLASS "AA" CONCRETE (BRIDGE)	CLASS "A" CONCRETE (BRIDGE)	BRIDGE APPROACH SLABS	REINFORCING STEEL (BRIDGE)	EPOXY COATED REINFORCING STEEL (BRIDGE)
	LIN. FT.	LIN. FT.	LIN. FT.	EA.	EA.	LUMP SUM	C.Y.	C.Y.	LUMP SUM	LBS.	LBS.
SUPERSTRUCTURE							99.2				3,754
END BENT 1								32.2		4,209	
BENT 1	155	136	56		1			49.8		27,746	
BENT 2	143	81	56		1			49.8		24,283	
END BENT 2								32.2		4,209	
TOTALS	298	217	112	1	2	LUMP SUM	99.2	164.0	LUMP SUM	60,447	3,754


TOTAL BILL OF MATERIAL													
ITEM	SPIRAL COLUMN REINFORCING STEEL (BRIDGE)	PILE DRIVING EQUIPMENT SETUP FOR HP12 x 53 STEEL PILES	HP12x53 STEEL PILES	ANODIZED TWO BAR METAL RAIL	1'-2" x 2'-6" CONCRETE PARAPET	RIP RAP, CLASS II (2'-0" THK.)	GEOTEXTILE FOR DRAINAGE	ELASTOMERIC BEARINGS	3'-0" x 2'-9" PRESTRESSED BOX BEAMS	3'-0" x 2'-0" PRESTRESSED CORED SLABS			
	LBS.	EA.	NO.	LIN. FT.	LIN. FT.	LIN. FT.	TON	S.Y.	LUMP SUM	NO.	LIN. FT.	NO.	LIN. FT.
SUPERSTRUCTURE					424.2	440.6			LUMP SUM	16	1,440	32	2,080
END BENT 1		9	9	495			132	120					
BENT 1	6,792												
BENT 2	5,413												
END BENT 2		9	9	405			132	120					
TOTALS	12,205	18	18	900	424.2	440.6	264	240	LUMP SUM	16	1,440	32	2,080

PROJECT NO. U-5866

GRAHAM COUNTY

STATION: 20+25.00-L-

SHEET 4 OF 4



12/13/2017

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
FOR BRIDGE
OVER CHEOAH RIVER
BETWEEN US HWY 129 AND
ROBBINSVILLE HIGH SCHOOL

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			S-4
2			4			TOTAL SHEETS 33

TGS ENGINEERS
804-C N. LAFAYETTE ST
SHELBY, NC 28150
PH (704) 476-0003
CORP. LICENSE NO.: C-0275

DRAWN BY : NMW DATE : 7/16
 CHECKED BY : RAR DATE : 5/17
 DESIGN ENGINEER OF RECORD : RDE DATE : 5/17

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	1.013	--	1.75	0.248	1.16	65'	EL	31.923	0.652	1.01	65'	EL	6.385	0.80	0.248	1.12	65'	EL	31.923		
	HL-93(0pr)	N/A	--	1.313	--	1.35	0.248	1.5	65'	EL	31.923	0.652	1.31	65'	EL	6.385	N/A	--	--	--	--	--		
	HS-20(Inv)	36.000	2	1.246	44.865	1.75	0.248	1.48	65'	EL	31.923	0.652	1.25	65'	EL	6.385	0.80	0.248	1.44	65'	EL	31.923		
	HS-20(0pr)	36.000	--	1.616	58.159	1.35	0.248	1.92	65'	EL	31.923	0.652	1.62	65'	EL	6.385	N/A	--	--	--	--	--		
LEGAL LOAD RATING	SV	SNSH	13.500	--	3.163	42.696	1.4	0.248	4.07	65'	EL	31.923	0.652	3.64	65'	EL	6.385	0.80	0.248	3.16	65'	EL	31.923	
		SNGARBS2	20.000	--	2.395	47.893	1.4	0.248	3.08	65'	EL	31.923	0.652	2.61	65'	EL	6.385	0.80	0.248	2.39	65'	EL	31.923	
		SNAGRIS2	22.000	--	2.284	50.247	1.4	0.248	2.94	65'	EL	31.923	0.652	2.43	65'	EL	6.385	0.80	0.248	2.28	65'	EL	31.923	
		SNCOTTS3	27.250	--	1.575	42.917	1.4	0.248	2.03	65'	EL	31.923	0.652	1.82	65'	EL	6.385	0.80	0.248	1.57	65'	EL	31.923	
		SNAGGRS4	34.925	--	1.331	46.469	1.4	0.248	1.71	65'	EL	31.923	0.652	1.53	65'	EL	6.385	0.80	0.248	1.33	65'	EL	31.923	
		SNS5A	35.550	--	1.3	46.22	1.4	0.248	1.67	65'	EL	31.923	0.652	1.55	65'	EL	6.385	0.80	0.248	1.30	65'	EL	31.923	
		SNS6A	39.950	--	1.199	47.899	1.4	0.248	1.54	65'	EL	31.923	0.652	1.42	65'	EL	6.385	0.80	0.248	1.20	65'	EL	31.923	
	SNS7B	42.000	--	1.142	47.965	1.4	0.248	1.47	65'	EL	31.923	0.652	1.4	65'	EL	6.385	0.80	0.248	1.14	65'	EL	31.923		
	TTST	TNAGRIT3	33.000	--	1.464	48.309	1.4	0.248	1.89	65'	EL	31.923	0.652	1.69	65'	EL	6.385	0.80	0.248	1.46	65'	EL	31.923	
		TNT4A	33.075	--	1.472	48.688	1.4	0.248	1.9	65'	EL	31.923	0.652	1.64	65'	EL	6.385	0.80	0.248	1.47	65'	EL	31.923	
		TNT6A	41.600	--	1.209	50.315	1.4	0.248	1.56	65'	EL	31.923	0.652	1.51	65'	EL	6.385	0.80	0.248	1.21	65'	EL	31.923	
		TNT7A	42.000	--	1.219	51.186	1.4	0.248	1.57	65'	EL	31.923	0.652	1.46	65'	EL	6.385	0.80	0.248	1.22	65'	EL	31.923	
		TNT7B	42.000	--	1.269	53.286	1.4	0.248	1.63	65'	EL	31.923	0.652	1.37	65'	EL	6.385	0.80	0.248	1.27	65'	EL	31.923	
		TNAGRIT4	43.000	--	1.201	51.645	1.4	0.248	1.55	65'	EL	31.923	0.652	1.32	65'	EL	6.385	0.80	0.248	1.20	65'	EL	31.923	
TNAGT5A		45.000	--	1.13	50.836	1.4	0.248	1.45	65'	EL	31.923	0.652	1.32	65'	EL	6.385	0.80	0.248	1.13	65'	EL	31.923		
TNAGT5B	45.000	3	1.114	50.113	1.4	0.248	1.43	65'	EL	31.923	0.652	1.25	65'	EL	6.385	0.80	0.248	1.11	65'	EL	31.923			

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.

COMMENTS:

- 1.
- 2.
- 3.
- 4.

CONTROLLING LOAD RATING

① DESIGN LOAD RATING (HL-93)

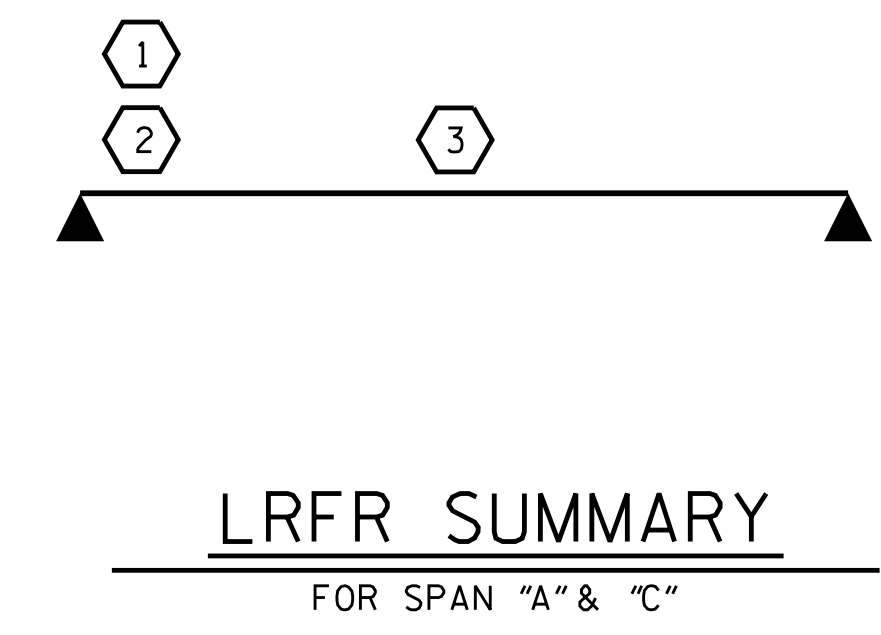
② DESIGN LOAD RATING (HS-20)

③ LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

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



PROJECT NO. U-5866
GRAHAM COUNTY
 STATION: 20+25.00-L-

ASSEMBLED BY : JLA DATE : 8/16
 CHECKED BY : RAR DATE : 5/17
 DESIGN ENGINEER OF RECORD : RDE DATE : 5/17

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

12/13/2017

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

STANDARD
 LRFR SUMMARY FOR
 65' CORED SLAB UNIT
 60° SKEW
 (NON-INTERSTATE TRAFFIC)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			S-5
2			4			TOTAL SHEETS 33

12/13/2017

TGS ENGINEERS
 804-C N. LAFAYETTE ST
 SHELBY, NC 28150
 PH (704) 476-0003
 CORP. LICENSE NO.: C-0275

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(Iny)	N/A	1	1.034	--	1.75	0.246	1.63	90'	ER	44.134	0.627	1.03	90'	ER	8.827	0.80	0.246	1.23	90'	ER	44.134		
	HL-93(OPr)	N/A	--	1.34	--	1.35	0.246	2.11	90'	ER	44.134	0.627	1.34	90'	ER	8.827	N/A	--	--	--	--	--		
	HS-20(Iny)	36.000	2	1.343	48.336	1.75	0.246	2.21	90'	ER	44.134	0.627	1.34	90'	ER	8.827	0.80	0.246	1.67	90'	ER	44.134		
	HS-20(OPr)	36.000	--	1.741	62.658	1.35	0.246	2.87	90'	ER	44.134	0.627	1.74	90'	ER	8.827	N/A	--	--	--	--	--		
LEGAL LOAD RATING	SV	SNSH	13,500	--	3.909	52.766	1.4	0.246	6.46	90'	ER	44.134	0.627	4.08	90'	ER	8.827	0.80	0.246	3.91	90'	ER	44.134	
		SNGARBS2	20,000	--	2.857	57.143	1.4	0.246	4.72	90'	ER	44.134	0.627	2.88	90'	ER	8.827	0.80	0.246	2.86	90'	ER	44.134	
		SNAGRIS2	22,000	--	2.658	58.474	1.4	0.246	4.44	90'	ER	44.134	0.627	2.66	90'	ER	8.827	0.80	0.246	2.68	90'	ER	44.134	
		SNCOTTS3	27,250	--	1.943	52.958	1.4	0.246	3.21	90'	ER	44.134	0.627	2.04	90'	ER	8.827	0.80	0.246	1.94	90'	ER	44.134	
		SNAGGRS4	34,925	--	1.603	55.974	1.4	0.246	2.65	90'	ER	44.134	0.627	1.67	90'	ER	8.827	0.80	0.246	1.60	90'	ER	44.134	
		SNS5A	35,550	--	1.569	55.767	1.4	0.246	2.59	90'	ER	44.134	0.627	1.68	90'	ER	8.827	0.80	0.246	1.57	90'	ER	44.134	
		SNS6A	39,950	--	1.431	57.149	1.4	0.246	2.36	90'	ER	44.134	0.627	1.53	90'	ER	8.827	0.80	0.246	1.43	90'	ER	44.134	
	TTST	SNS7B	42,000	--	1.362	57.202	1.4	0.246	2.25	90'	ER	44.134	0.627	1.49	90'	ER	8.827	0.80	0.246	1.36	90'	ER	44.134	
		TNAGRIT3	33,000	--	1.742	57.481	1.4	0.246	2.88	90'	ER	44.134	0.627	1.82	90'	ER	8.827	0.80	0.246	1.74	90'	ER	44.134	
		TNT4A	33,075	--	1.747	57.786	1.4	0.246	2.89	90'	ER	44.134	0.627	1.78	90'	ER	8.827	0.80	0.246	1.75	90'	ER	44.134	
		TNT6A	41,600	--	1.42	59.082	1.4	0.246	2.35	90'	ER	44.134	0.627	1.57	90'	ER	8.827	0.80	0.246	1.42	90'	ER	44.134	
		TNT7A	42,000	--	1.423	59.764	1.4	0.246	2.35	90'	ER	44.134	0.627	1.54	90'	ER	8.827	0.80	0.246	1.42	90'	ER	44.134	
		TNT7B	42,000	--	1.461	61.373	1.4	0.246	2.42	90'	ER	44.134	0.627	1.46	90'	ER	8.827	0.80	0.246	1.46	90'	ER	44.134	
		TNAGRIT4	43,000	--	1.398	60.12	1.4	0.246	2.31	90'	ER	44.134	0.627	1.42	90'	ER	8.827	0.80	0.246	1.40	90'	ER	44.134	
TNAGT5A	45,000	--	1.322	59.491	1.4	0.246	2.19	90'	ER	44.134	0.627	1.4	90'	ER	8.827	0.80	0.246	1.32	90'	ER	44.134			
TNAGT5B	45,000	3	1.309	58.923	1.4	0.246	2.16	90'	ER	44.134	0.627	1.35	90'	ER	8.827	0.80	0.246	1.31	90'	ER	44.134			

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.

COMMENTS:

- 1.
- 2.
- 3.
- 4.

CONTROLLING LOAD RATING

1 DESIGN LOAD RATING (HL-93)

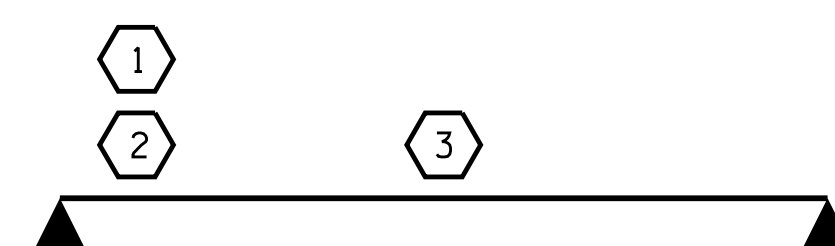
2 DESIGN LOAD RATING (HS-20)

3 LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

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



LRFR SUMMARY
FOR SPAN "B"

PROJECT NO. U-5866
GRAHAM COUNTY
STATION: 20+25.00-L-

ASSEMBLED BY : JLA DATE : 8/16
CHECKED BY : RAR DATE : 5/17
DESIGN ENGINEER OF RECORD : RDE DATE : 5/17

DRAWN BY : TMG II/II
CHECKED BY : AAC II/II

12/13/2017

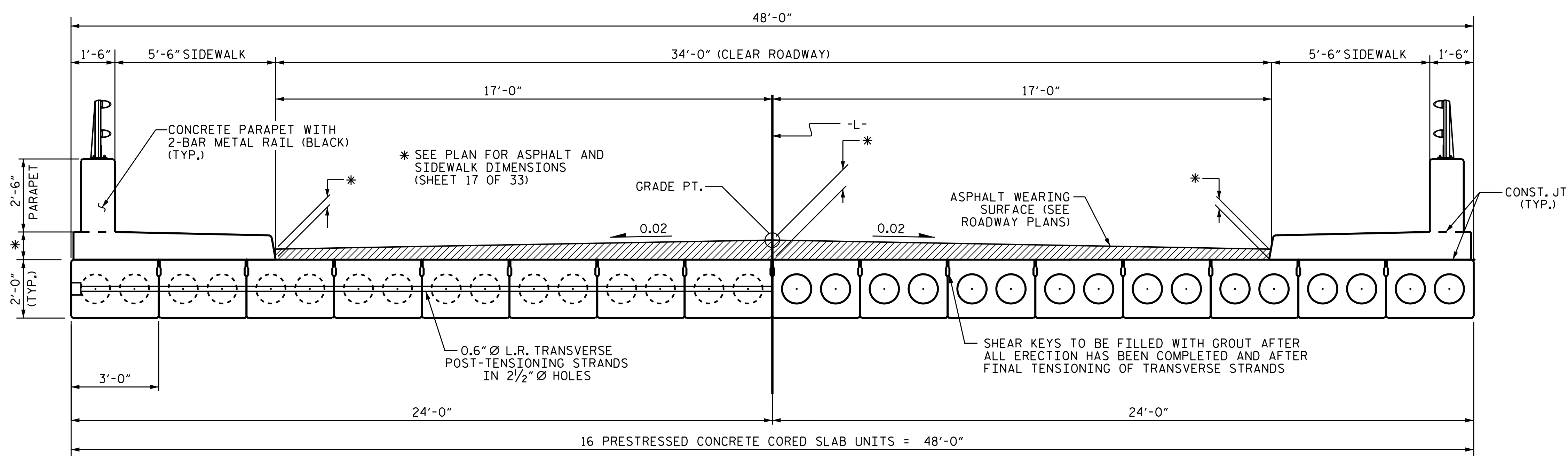
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
LRFR SUMMARY FOR
90' BOX BEAM UNIT
60° SKEW
(NON-INTERSTATE TRAFFIC)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

TGS ENGINEERS
804-C N. LAFAYETTE ST
SHELBY, NC 28150
PH (704) 476-0003
CORP. LICENSE NO.: C-0275

SHEET NO. S-6
TOTAL SHEETS 33

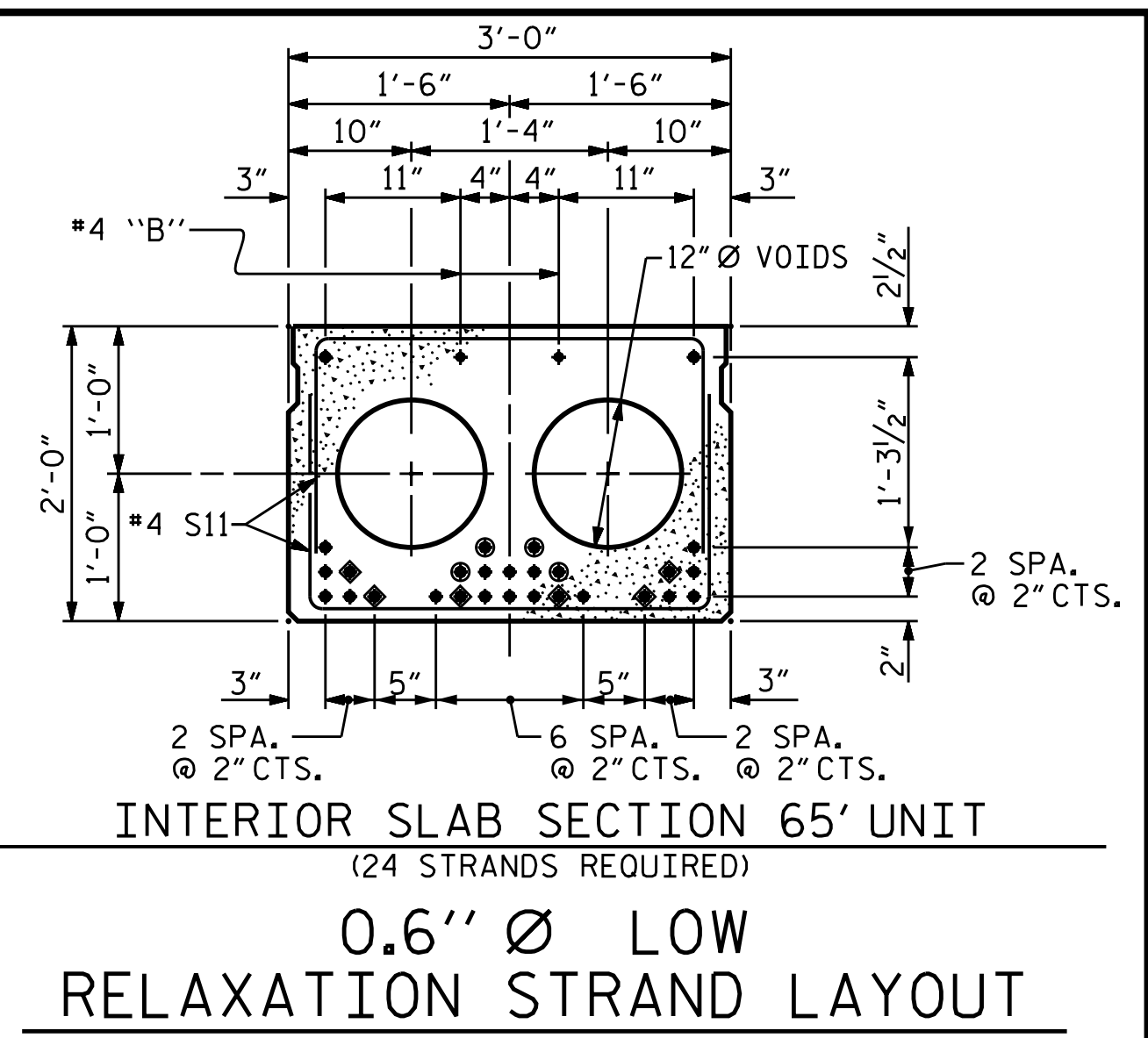


HALF SECTION AT INTERMEDIATE DIAPHRAGMS

HALF SECTION THROUGH VOIDS

TYPICAL SECTION

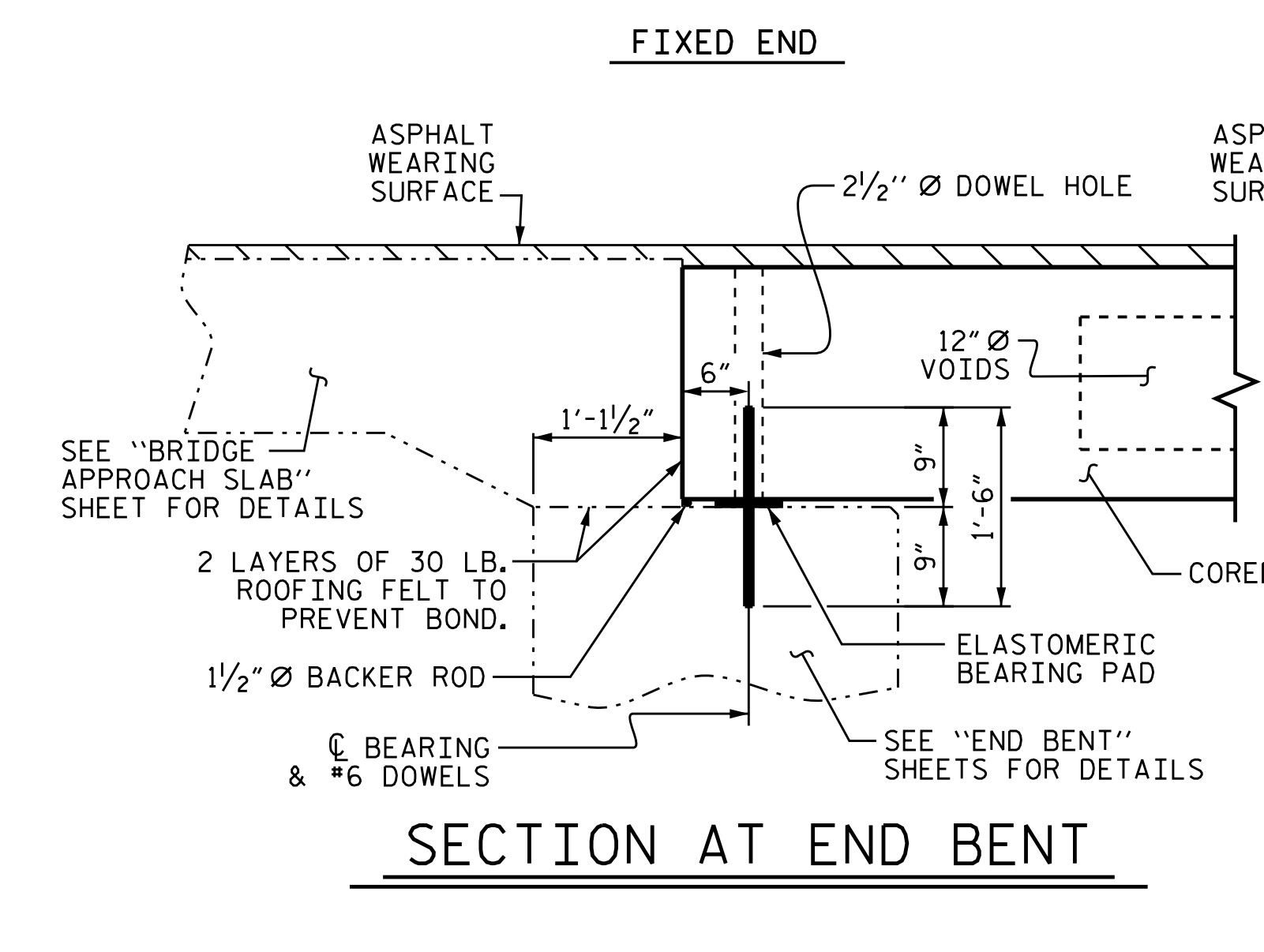
NOTE: SEE PLAN OF SPAN SHEETS FOR LOCATION OF 0.6" Ø H.S. TRANSVERSE STRANDS IN 2 1/2" Ø HOLES AND SPACING FOR #4 S3 BARS



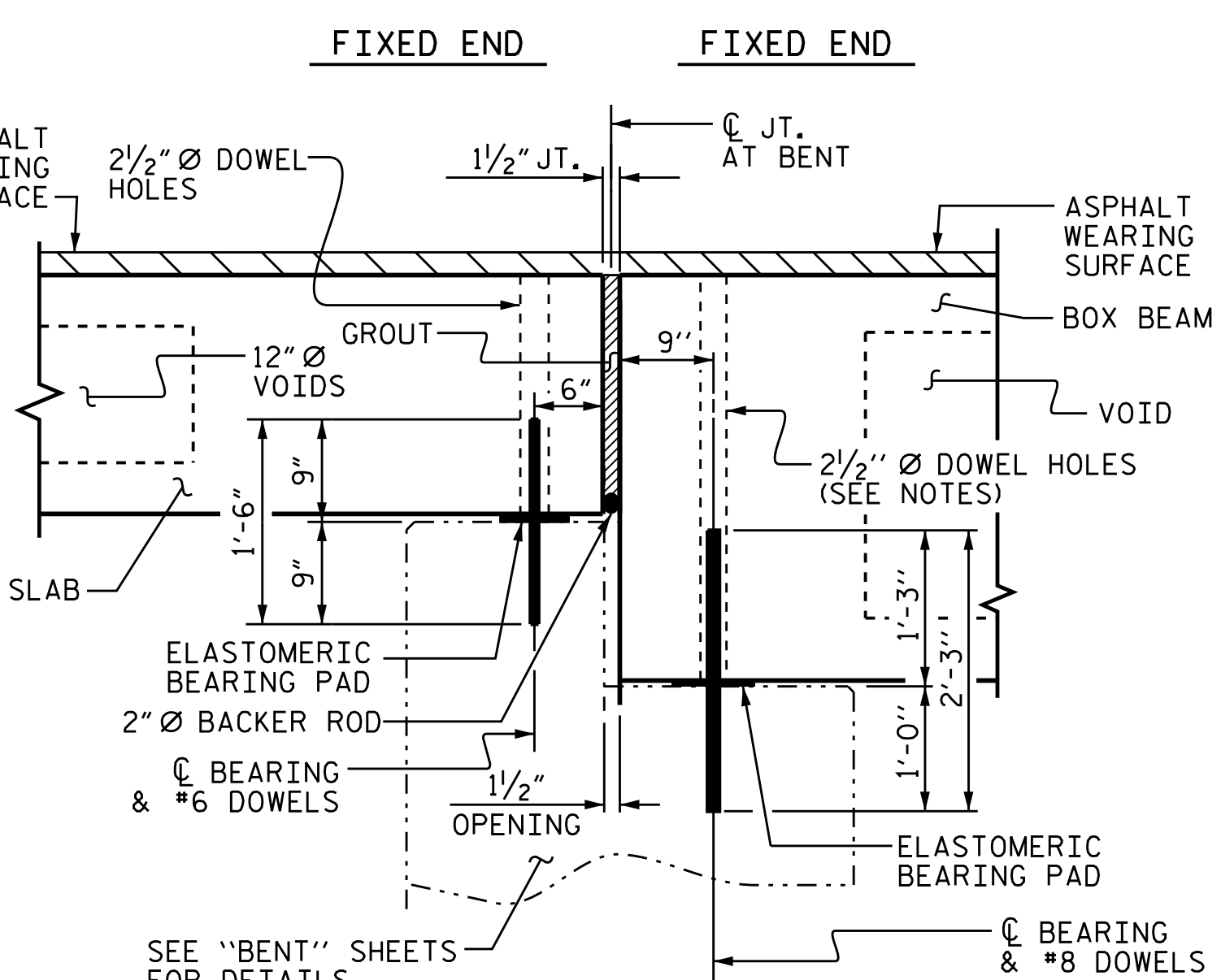
INTERIOR SLAB SECTION 65' UNIT (24 STRANDS REQUIRED)
0.6" Ø LOW RELAXATION STRAND LAYOUT

- ◆ BOND SHALL BE BROKEN ON THESE STRANDS FOR A DISTANCE OF 12'-0" FROM END OF CORED SLAB UNIT. SEE STANDARD SPECIFICATIONS, ARTICLE 1078-7.
- OPTIONAL FULL LENGTH DEBONDED STRANDS. THESE STRANDS ARE NOT REQUIRED. IF THE FABRICATOR CHOOSES TO INCLUDE THESE STRANDS IN THE CORED SLAB UNIT, THE STRANDS SHALL BE DEBONDED FOR THE FULL LENGTH OF THE UNIT AT NO ADDITIONAL COST. SEE STANDARD SPECIFICATIONS, ARTICLE 1078-7.

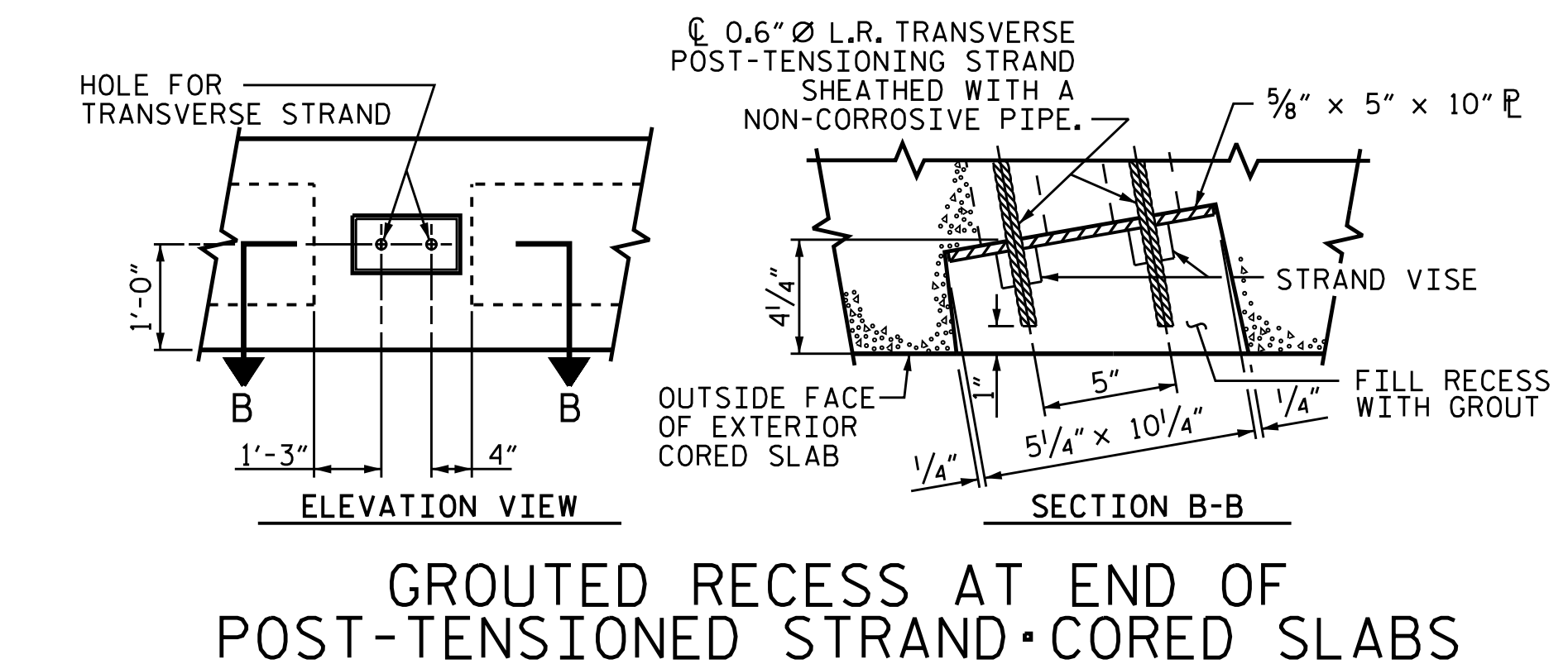
DEBONDING LEGEND



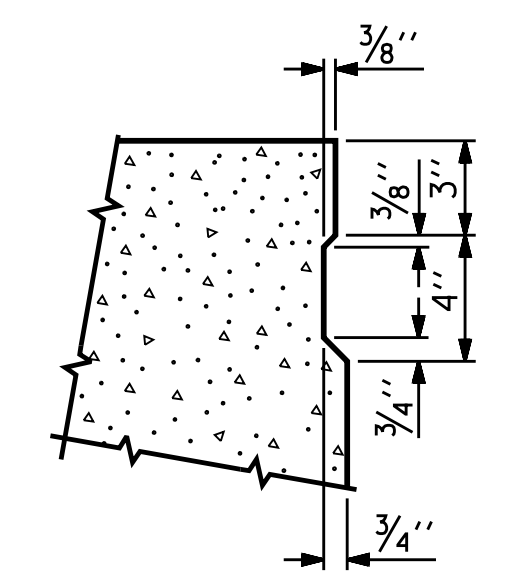
SECTION AT END BENT



SECTION AT BENT

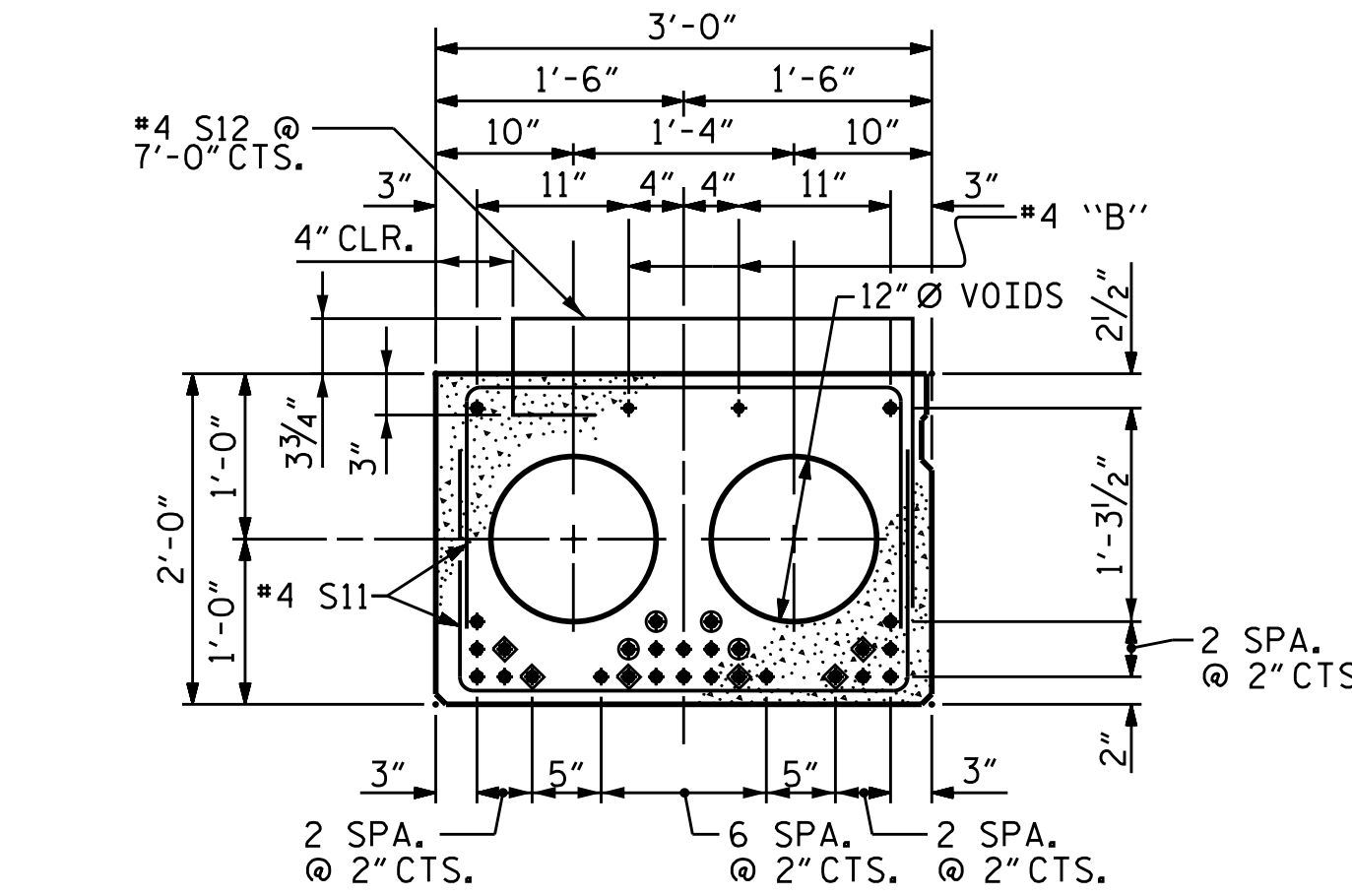


GROUTED RECESS AT END OF POST-TENSIONED STRAND-CORED SLABS

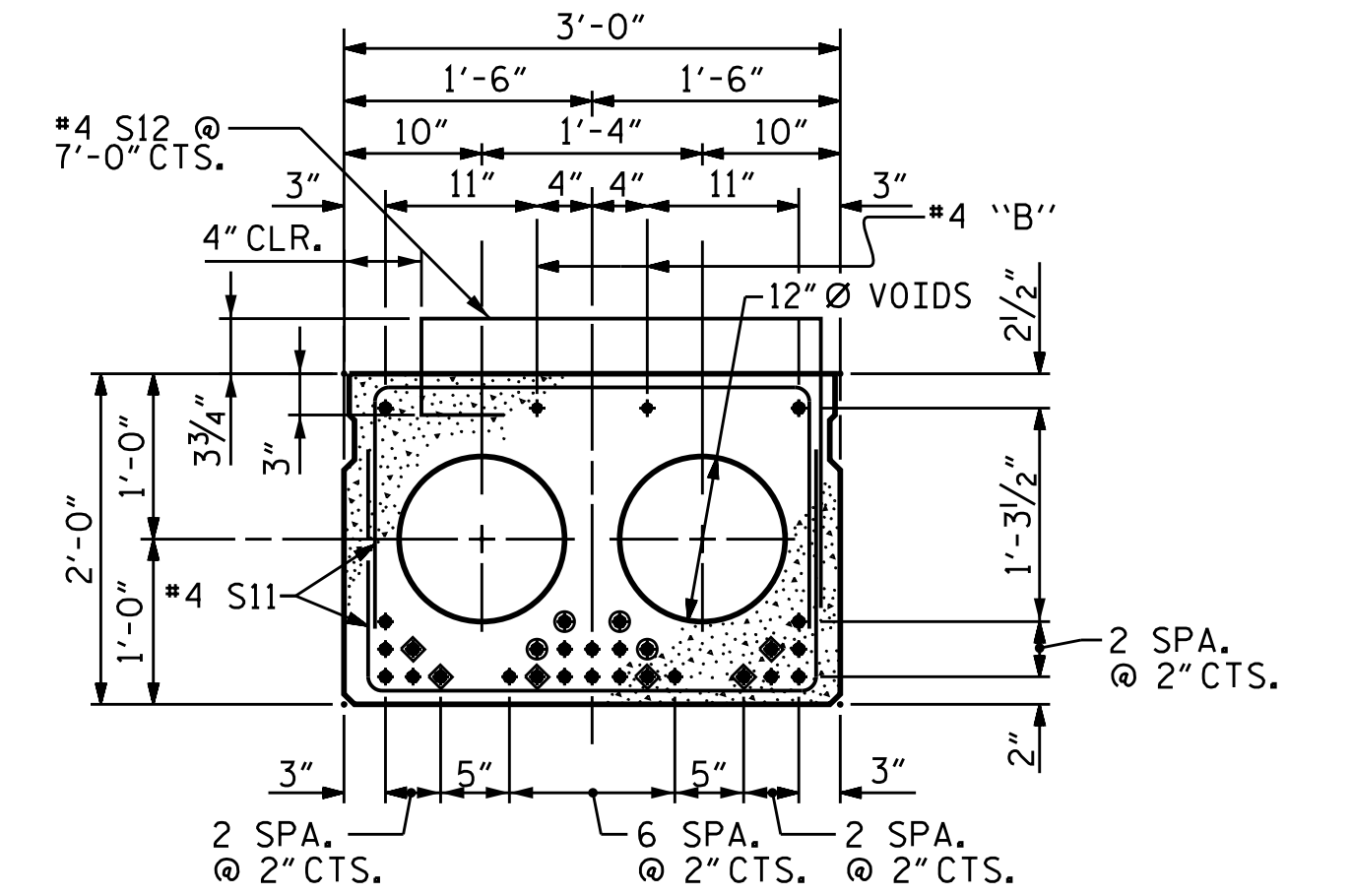


SHEAR KEY DETAIL

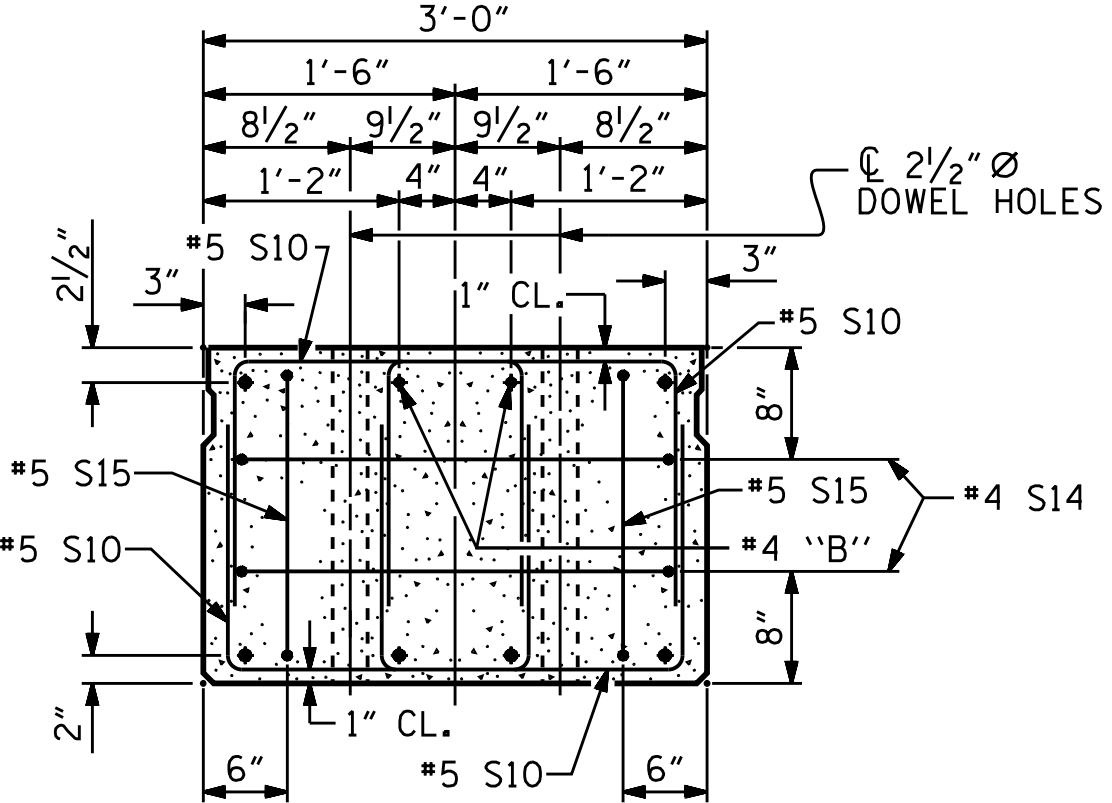
NOTE: OMIT SHEAR KEY ON OUTSIDE FACE OF EXTERIOR CORED SLABS.



EXTERIOR SLAB SECTION (24 STRANDS REQUIRED)



INTERIOR SLAB SECTION (ADJACENT TO EXTERIOR SLAB) (24 STRANDS REQUIRED)



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.

PROJECT NO. U-5866
GRAHAM COUNTY
STATION: 20+25.00-L-

SHEET 1 OF 3

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

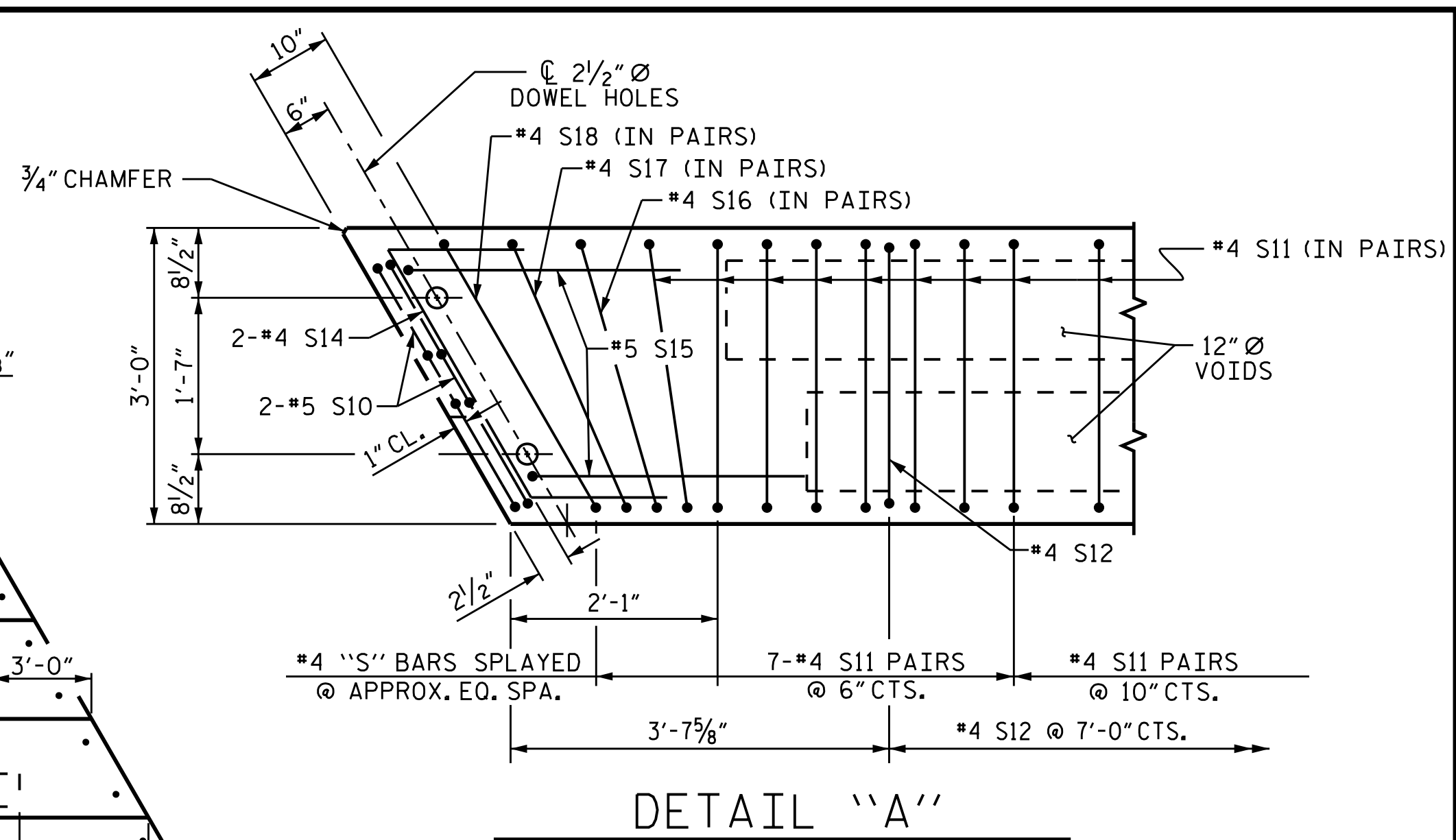
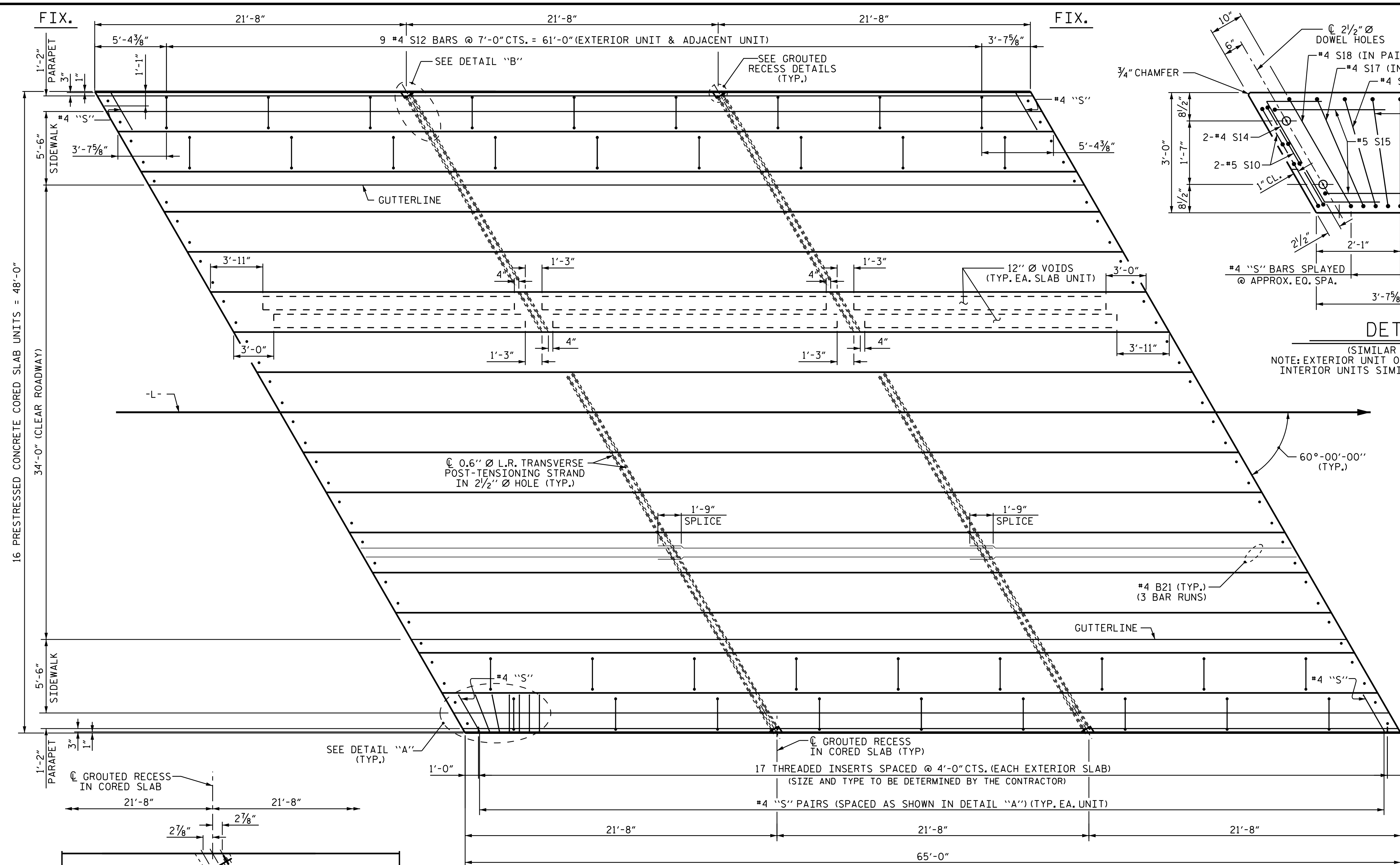
12/13/2017

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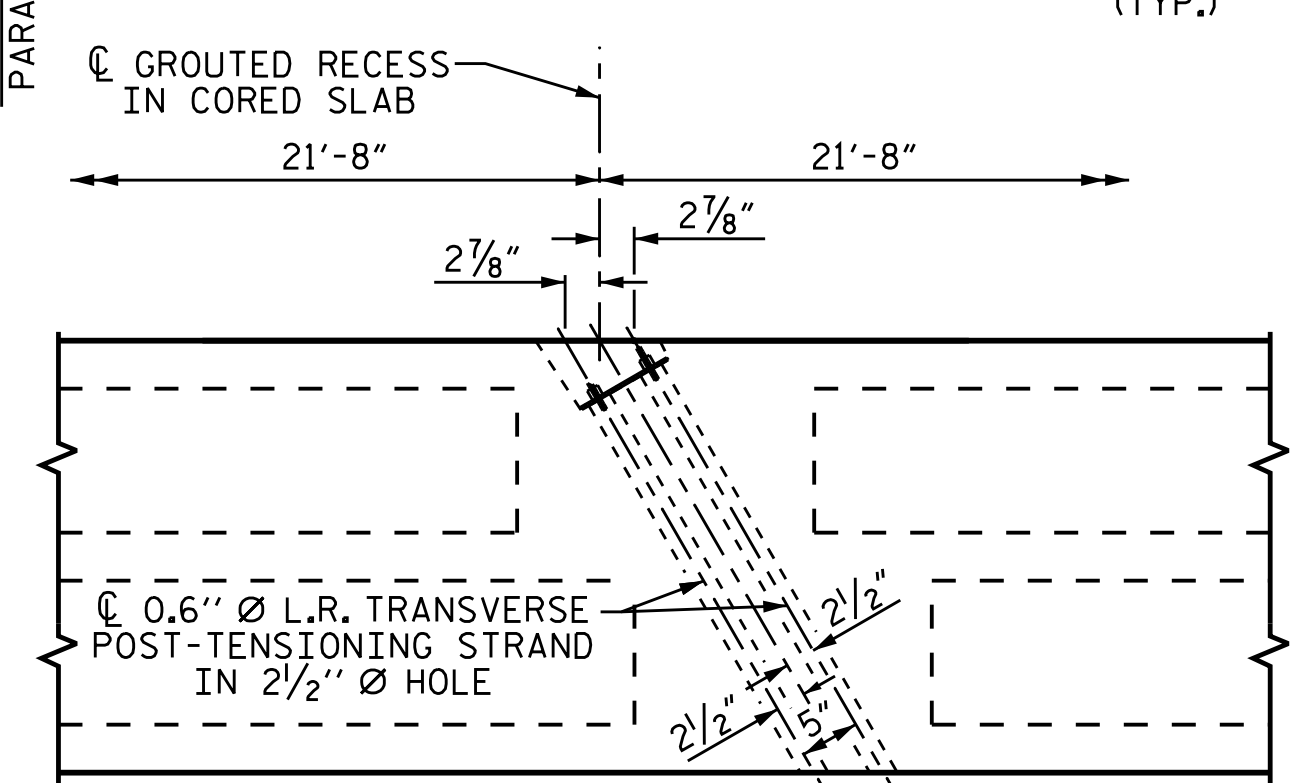
TGS ENGINEERS
804-C N. LAFAYETTE ST
SHELBY, NC 28150
PH (704) 476-0003
CORP. LICENSE NO.: C-0275

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-7
1			3			TOTAL SHEETS 33
2			4			

ASSEMBLED BY : NMW	DATE : 7/16
CHECKED BY : RAR	DATE : 5/17
DESIGN ENGINEER OF RECORD : RDE	DATE : 5/17
DRAWN BY : MAA 6/10	REV. 12/11
CHECKED BY : MKT 7/10	REV. 8/14
	MAA/TMG



DETAIL "A"
(SIMILAR EACH END OF UNIT)
NOTE: EXTERIOR UNIT OR ADJACENT UNIT SHOWN - OTHER INTERIOR UNITS SIMILAR EXCEPT OMIT #4 S12 BARS.



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

PLAN OF SPANS A & C
REINFORCING STEEL IN SIDEWALK, POST & PARAPET NOT SHOWN FOR CLARITY.

PROJECT NO. U-5866
GRAHAM COUNTY
STATION: 20+25.00-L-
SHEET 2 OF 3

12/13/2017

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

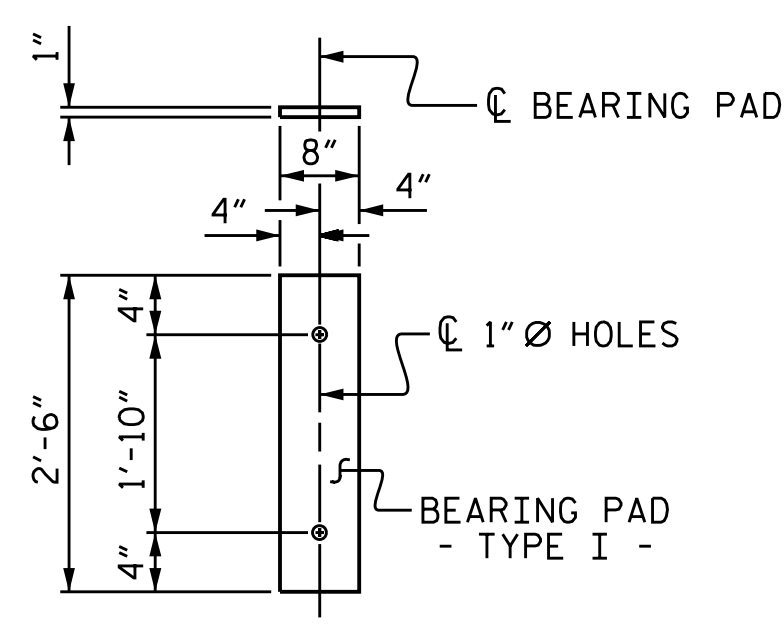
TGS ENGINEERS
804-C N. LAFAYETTE ST
SHELBY, NC 28150
PH (704) 476-0003
CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

PLAN OF 65' UNIT
36'-10" CLEAR ROADWAY
60° SKEW

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S-8
1			3			TOTAL SHEETS
2			4			33

ASSEMBLED BY : NMW	DATE : 7/16
CHECKED BY : RAR	DATE : 5/17
DESIGN ENGINEER OF RECORD : RDE	DATE : 5/17
DRAWN BY : MAA 6/10	REV. 12/5/11 MAA/AAC
CHECKED BY : MKT 7/10	REV. 8/14 MAA/TMG



FIXED END
(TYPE I - 64 REO'D)

ELASTOMERIC BEARING DETAILS

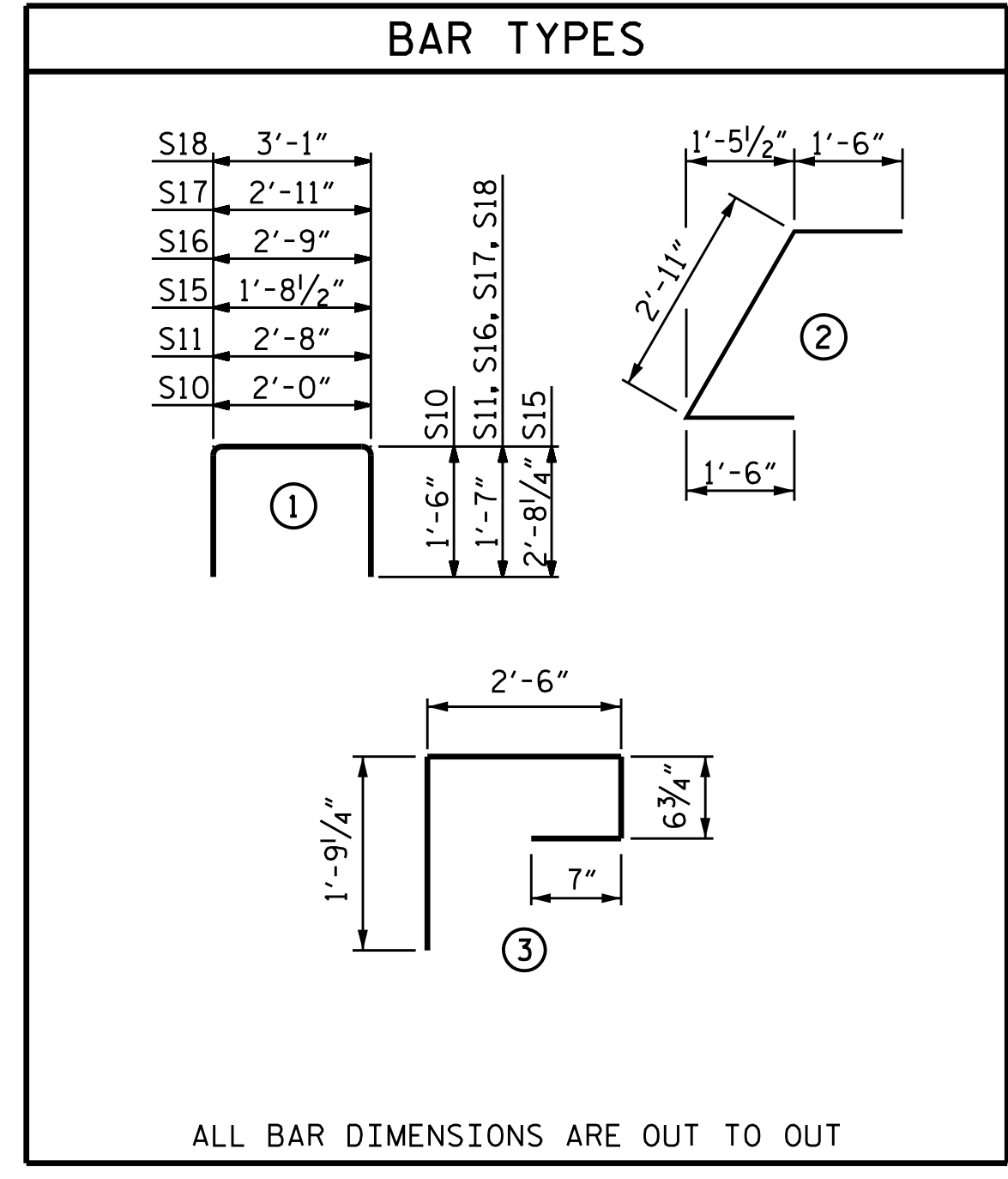
ELASTOMER IN ALL BEARINGS SHALL BE 60 DUROMETER HARDNESS.

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

** INCLUDES FUTURE WEARING SURFACE

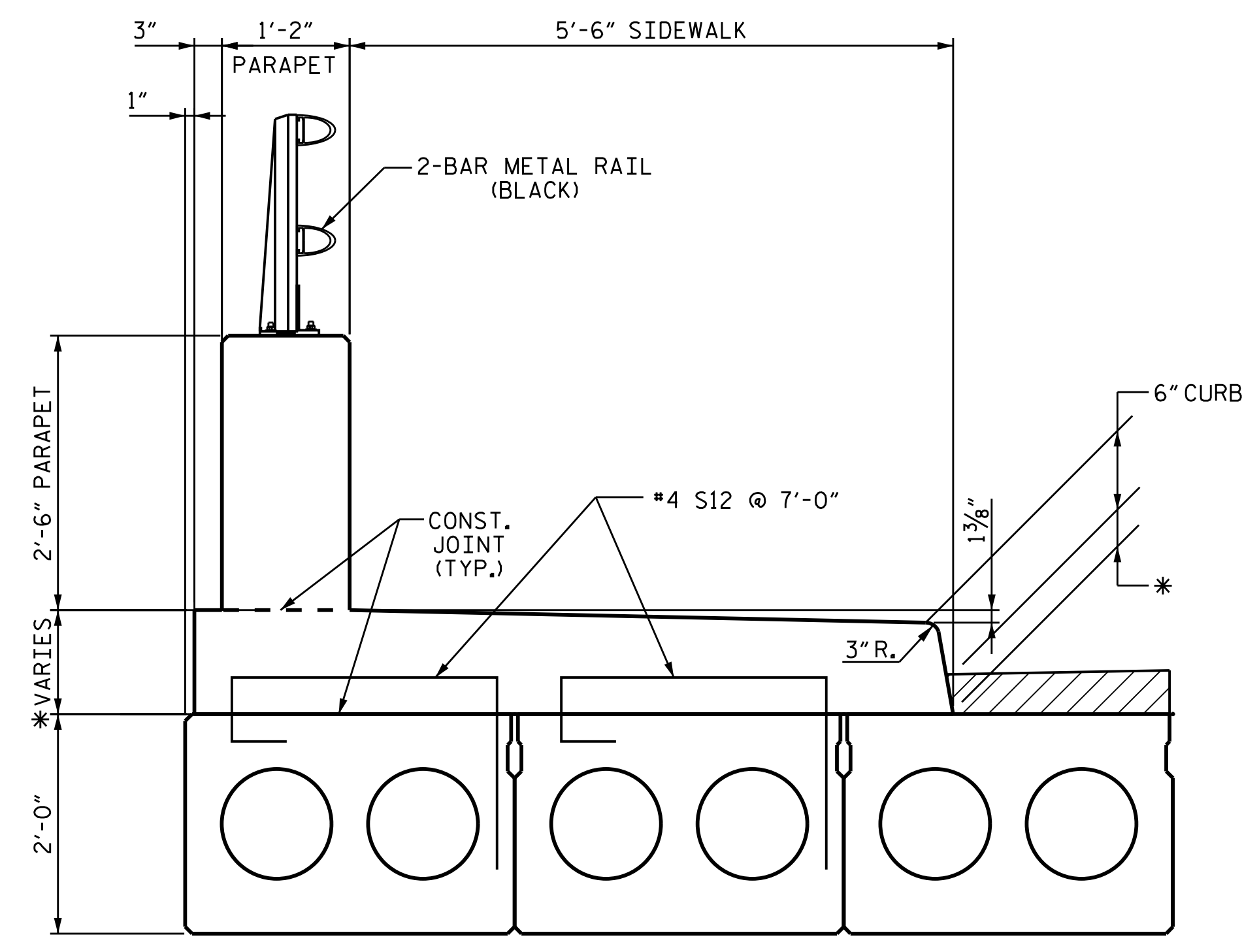
CORED SLABS REQUIRED			
	NUMBER	LENGTH	TOTAL LENGTH
65' UNIT			
EXTERIOR C.S.	4	65'-0"	260
INTERIOR C.S.	28	65'-0"	1,820
TOTAL	32		2,080

CONCRETE RELEASE STRENGTH	
UNIT	PSI
65' UNITS	4800



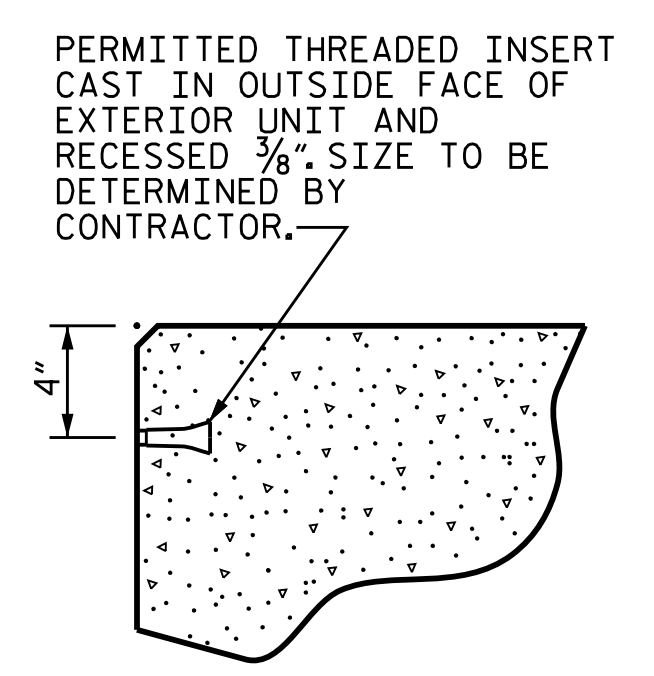
ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL FOR ONE 65' CORED SLAB UNIT											
				EXTERIOR UNIT		INTERIOR UNIT (ADJACENT TO EXTERIOR UNIT)		INTERIOR UNIT			
BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT	LENGTH	WEIGHT	LENGTH	WEIGHT		
B21	6	#4	STR	22'-10"	92	22'-10"	92	22'-10"	92		
S10	8	#5	1	5'-0"	42	5'-0"	42	5'-0"	42		
S11	158	#4	1	5'-10"	616	5'-10"	616	5'-10"	616		
*S12	9	#4	3	5'-5"	33	5'-5"	33				
S14	4	#4	2	5'-11"	16	5'-11"	16	5'-11"	16		
S15	4	#5	1	7'-1"	30	7'-1"	30	7'-1"	30		
S16	4	#4	1	5'-11"	16	5'-11"	16	5'-11"	16		
S17	4	#4	1	6'-1"	16	6'-1"	16	6'-1"	16		
S18	4	#4	1	6'-3"	17	6'-3"	17	6'-3"	17		
REINFORCING STEEL		LBS.			845		845		845		
* EPOXY COATED REINFORCING STEEL		LBS.			33		33				
6000 P.S.I. CONCRETE		CU. YDS.			11.2		11.2		11.2		
0.6" Ø L.R. STRANDS		No.			24		24		24		



SIDEWALK SECTION

* SEE PLAN FOR ASPHALT AND SIDEWALK DIMENSIONS (SHEET 17 OF 33)



THREADED INSERT DETAIL

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

NOTES

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

ALL REINFORCING STEEL CAST WITH THE CORED SLAB SECTIONS SHALL BE GRADE 60 AND SHALL BE INCLUDED IN THE UNIT PRICE BID FOR PRESTRESSED CONCRETE CORED SLABS.

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

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

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

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

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

ALL REINFORCING STEEL IN VERTICAL CONCRETE BARRIER RAILS 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 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.

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

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

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

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

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

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

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

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

PROJECT NO. U-5866
GRAHAM COUNTY
STATION: 20+25.00-L-

SHEET 3 OF 3

12/13/2017

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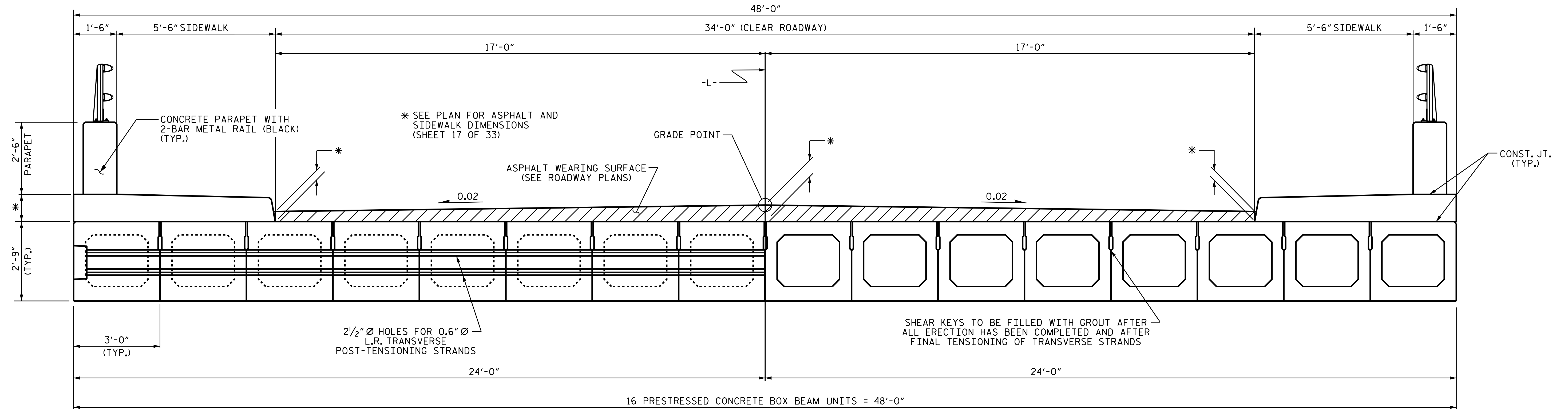
TGS ENGINEERS
804-C N. LAFAYETTE ST
SHELBY, NC 28150
PH (704) 476-0003
CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
3'-0" X 2'-0"
PRESTRESSED CONCRETE
CORED SLAB UNIT

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-9
1			3			TOTAL SHEETS
2			4			33

ASSEMBLED BY :	NMW	DATE :	7/16
CHECKED BY :	RAR	DATE :	5/17
DESIGN ENGINEER OF RECORD :	RDE	DATE :	5/17
DRAWN BY :	MAA 6/10	REV. 12/11	MAA/AAC
CHECKED BY :	MKT 7/10	REV. 8/14	MAA/TMG

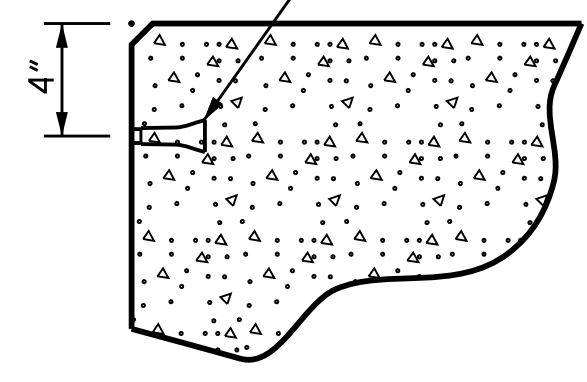


HALF SECTION
AT INTERMEDIATE DIAPHRAGMS

TYPICAL SECTION

HALF SECTION
THROUGH VOIDS

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



THREADED INSERT DETAIL

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 PARAPET 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 PARAPET 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 PARAPET RAIL EXPANSION JOINTS. ONLY ONE CONTRACTION JOINT IS REQUIRED AT MIDPOINT OF PARAPET 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.

PROJECT NO. U-5866
GRAHAM COUNTY
STATION: 20+25.00-L-
SHEET 1 OF 5

ASSEMBLED BY : NMW	DATE : 7/16
CHECKED BY : RAR	DATE : 5/17
DESIGN ENGINEER OF RECORD : RDE	DATE : 5/17
DRAWN BY : DGE 8/11	REV. 8/14
CHECKED BY : TMG 11/11	MAA/TMG

12/13/2017

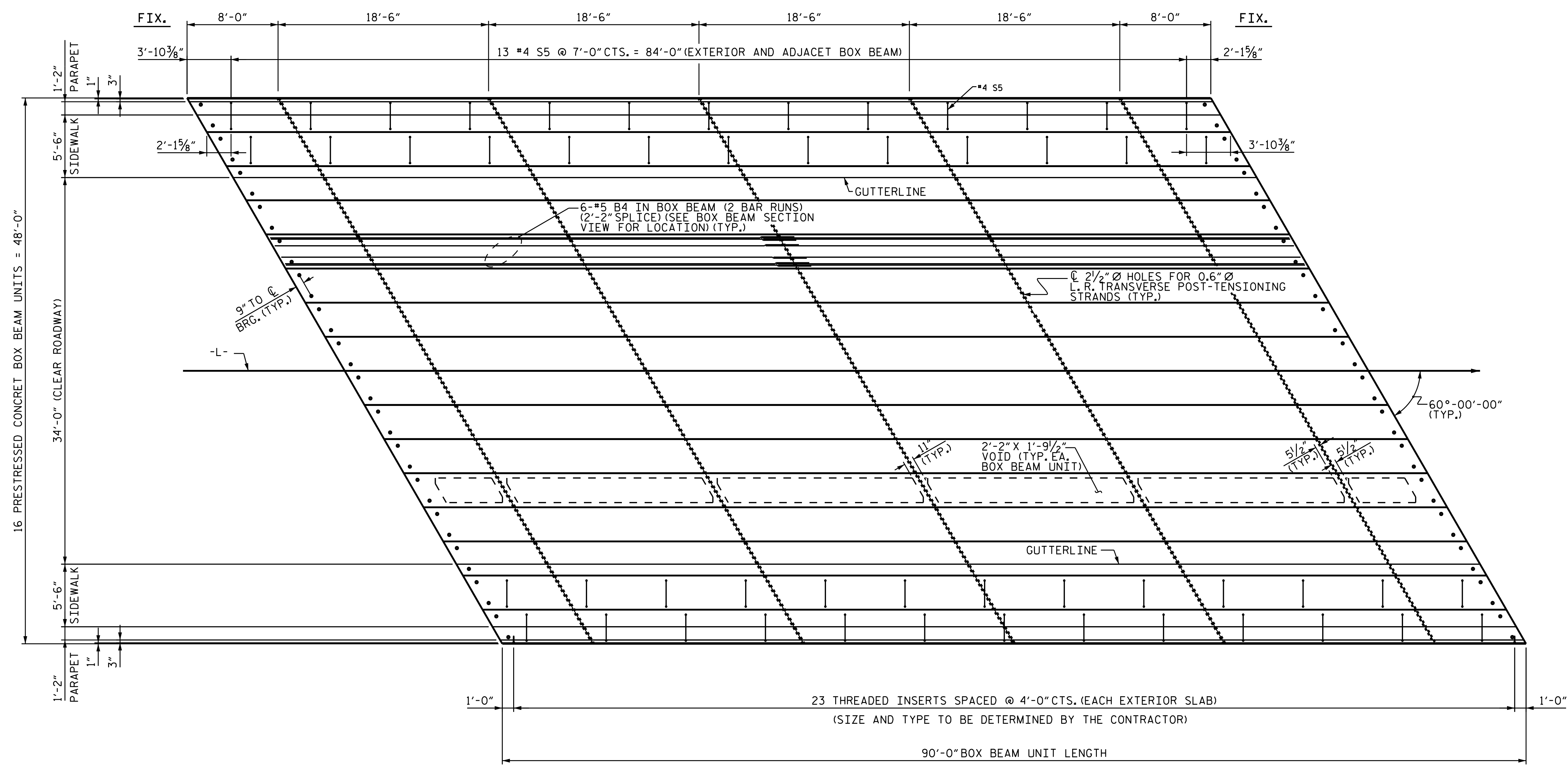
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TGS ENGINEERS
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CORP. LICENSE NO.: C-0275

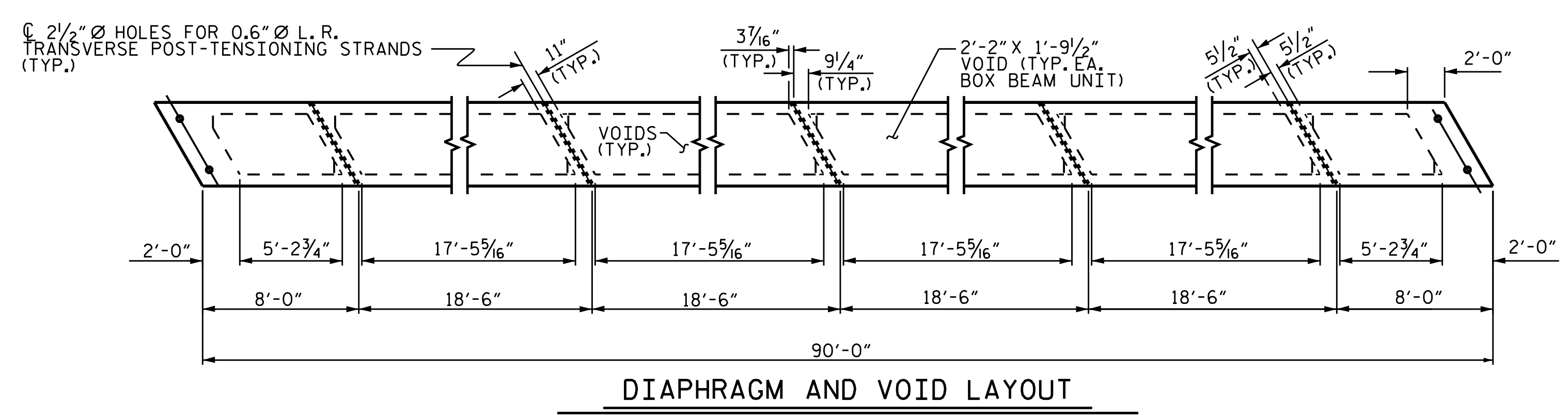
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

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

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	TOTAL SHEETS
1			3			33
2			4			



PLAN OF SPAN B



DIAPHRAGM AND VOID LAYOUT

PROJECT NO. U-5866
 GRAHAM COUNTY
 STATION: 20+25.00-L-
 SHEET 2 OF 5

12/13/2017

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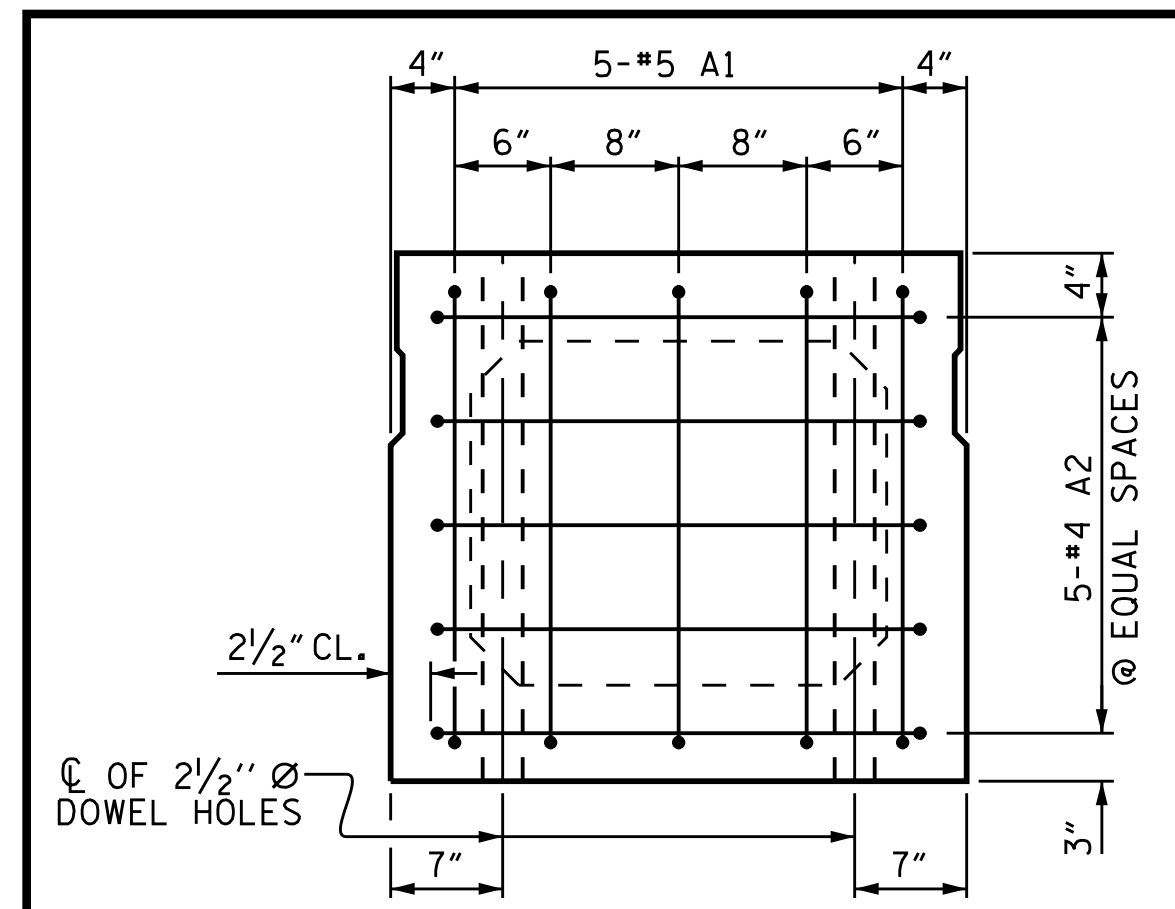
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 804-C N. LAFAYETTE ST
 SHELBY, NC 28150
 PH (704) 476-0003
 CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

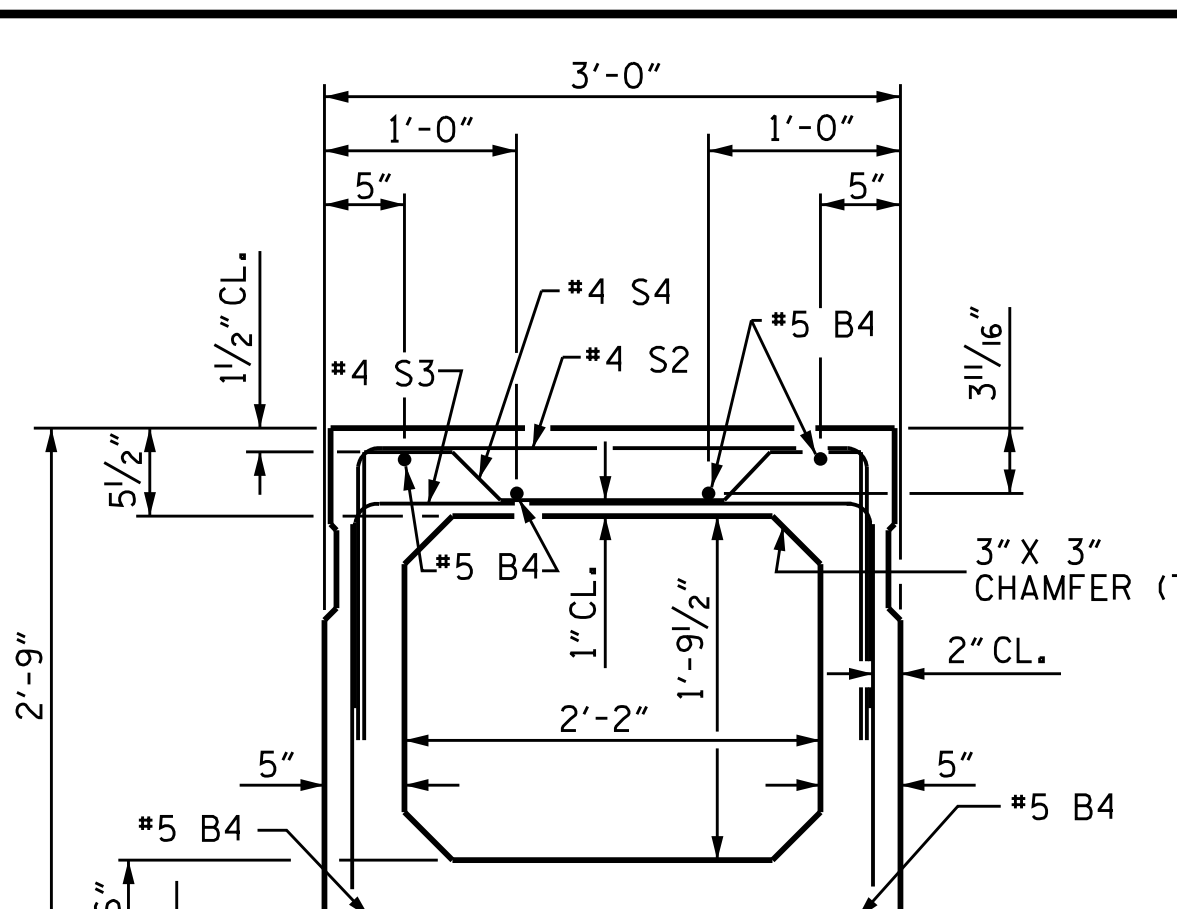
PLAN OF 90' UNIT
 36'-10" CLEAR ROADWAY
 60° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-11
1			3			TOTAL SHEETS
2			4			33

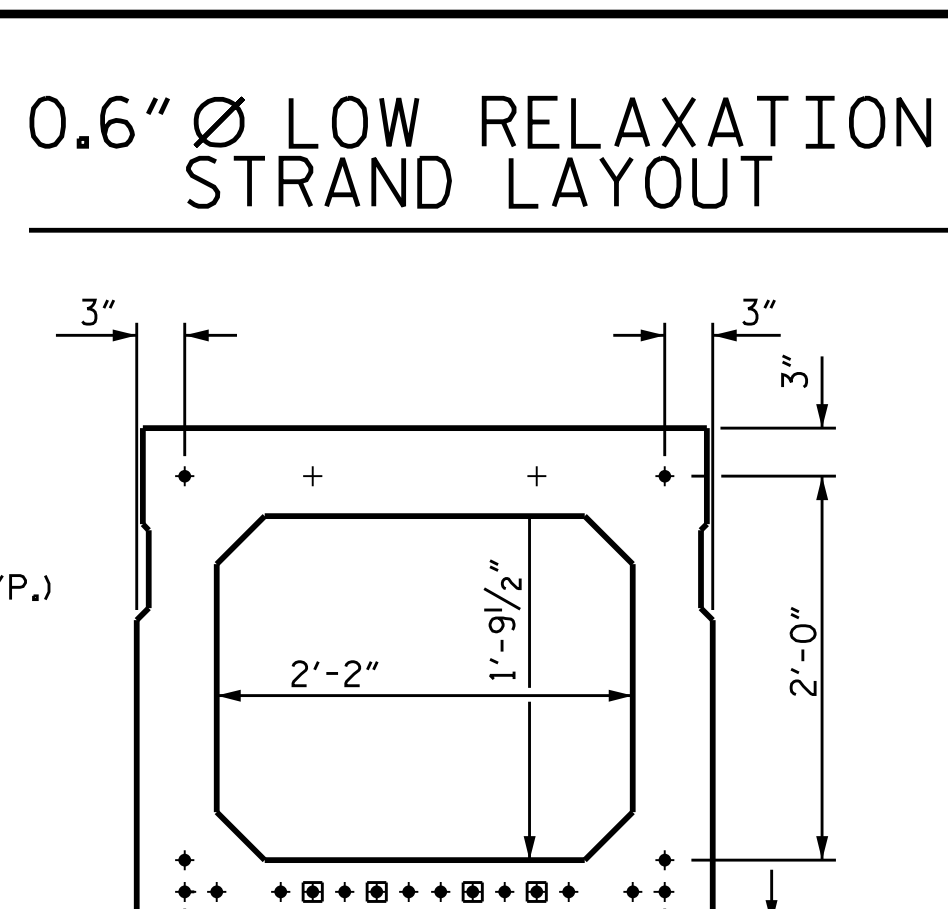
ASSEMBLED BY : NMW	DATE : 7/16
CHECKED BY : RAR	DATE : 5/17
DESIGN ENGINEER OF RECORD : RDE	DATE : 5/17
DRAWN BY : DGE 8/11	REV. 8/14
CHECKED BY : TMG 11/11	MAA/TMG



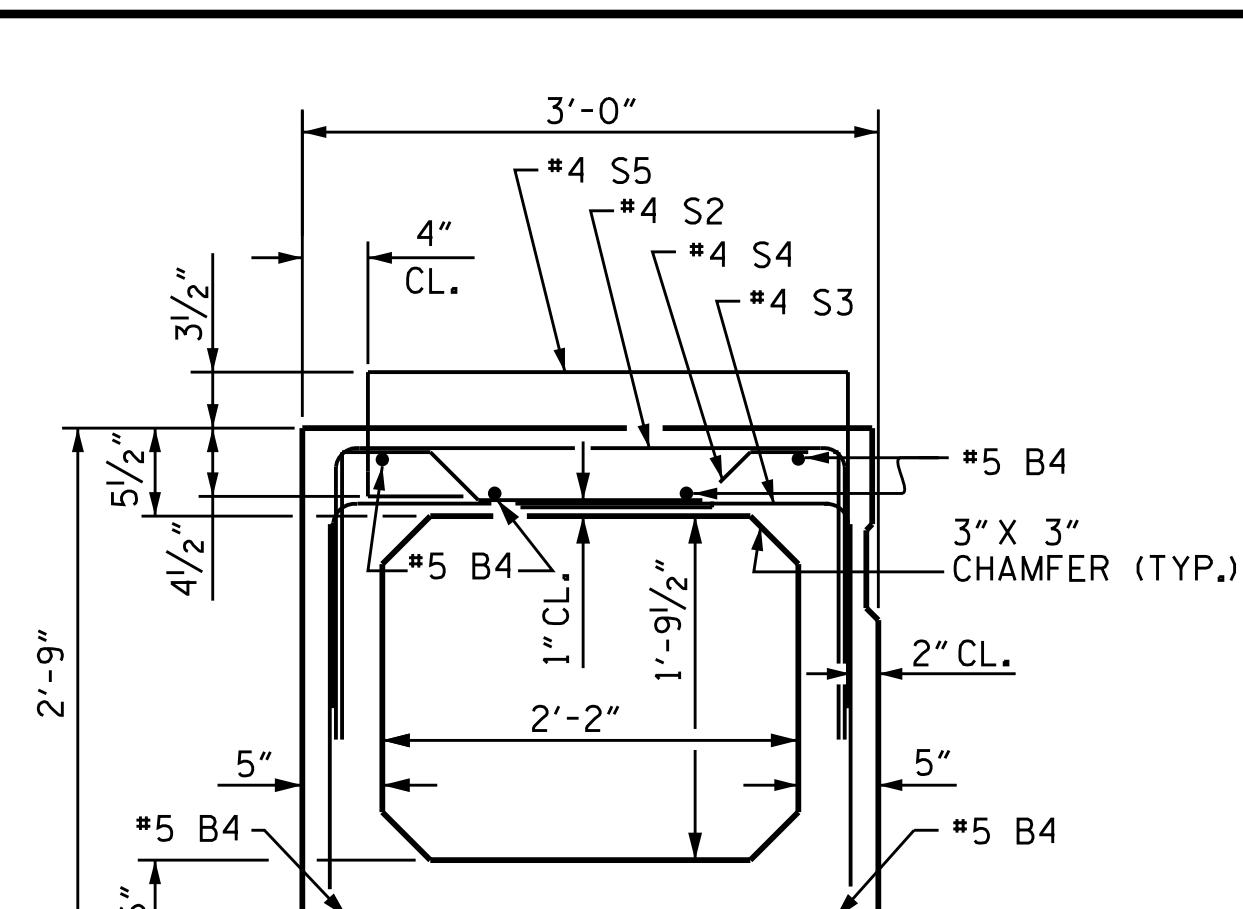
END ELEVATION
SHOWING LOCATION OF #5 & #4 "A" BARS AND LOCATION OF DOWEL HOLES. (INTERIOR BOX BEAM SECTION SHOWN-EXTERIOR SECTION SIMILAR EXCEPT SHEAR KEY LOCATION, STRAND LAYOUT NOT SHOWN.)



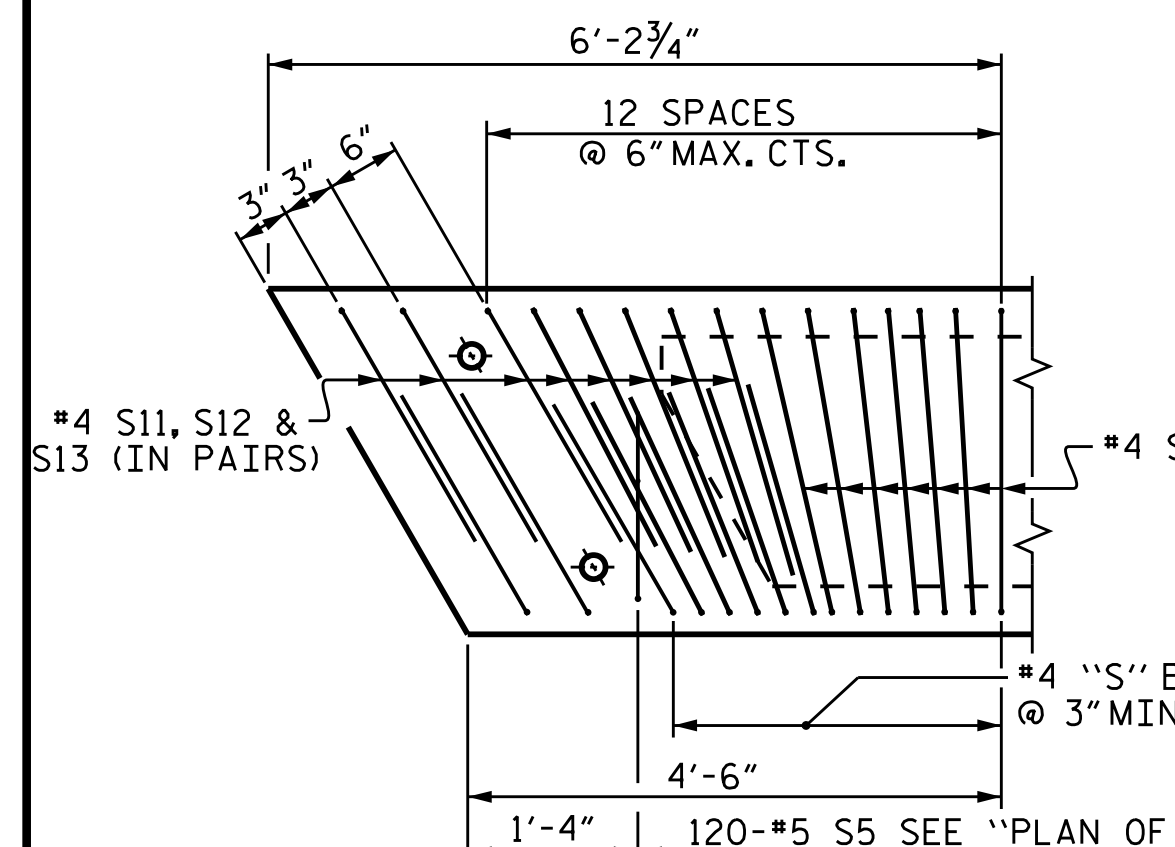
INTERIOR BOX BEAM SECTION
(STRAND LAYOUT NOT SHOWN)



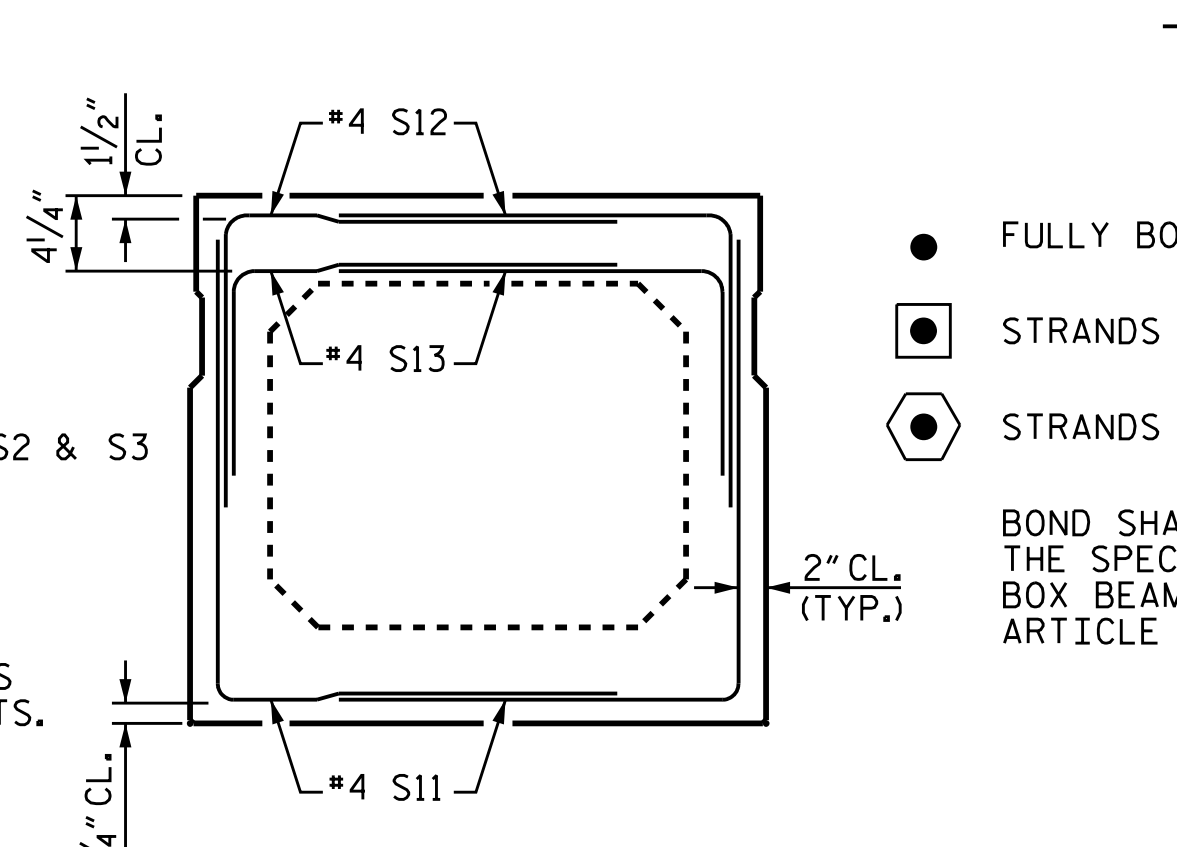
TYPICAL STRAND LOCATION
(30 STRANDS REQUIRED)



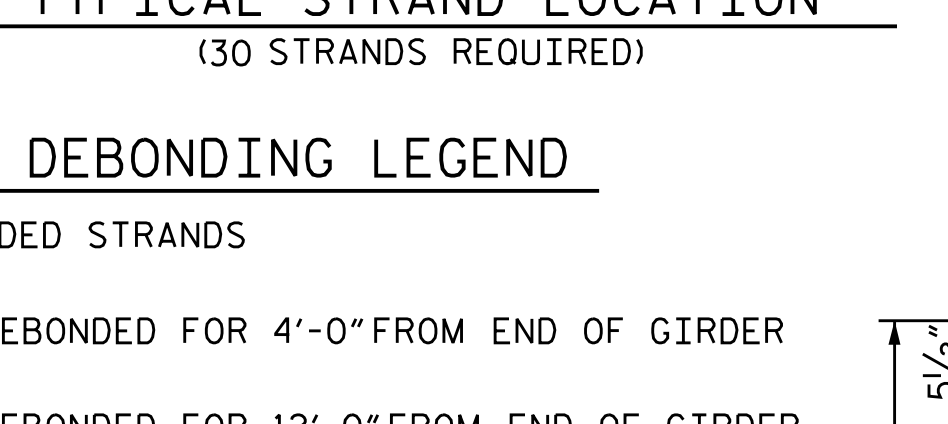
EXTERIOR BOX BEAM SECTION
(STRAND LAYOUT NOT SHOWN)



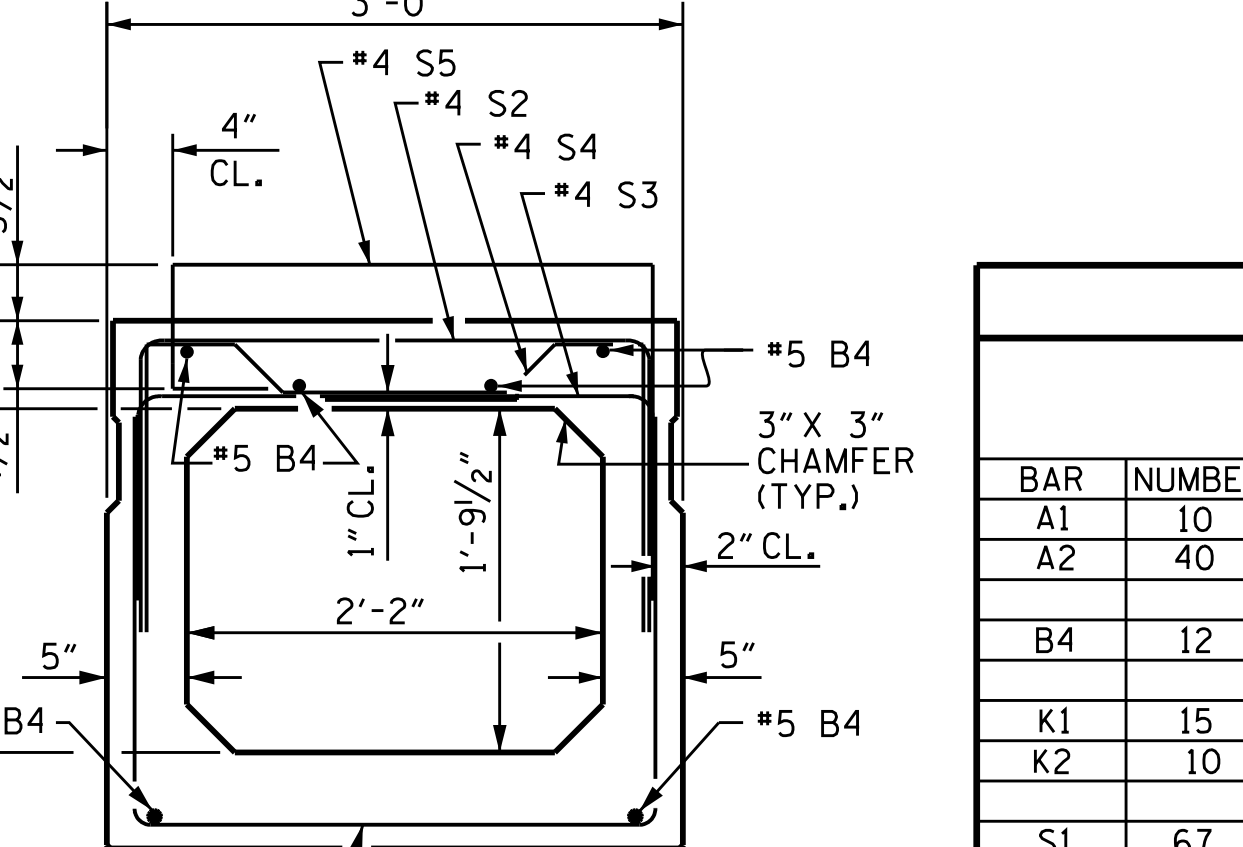
DETAIL "B"
EXTERIOR UNIT SHOWN, INTERIOR UNIT SIMILAR EXCEPT OMIT #5 S5 BARS, "B" BARS AND "A" BARS NOT SHOWN.



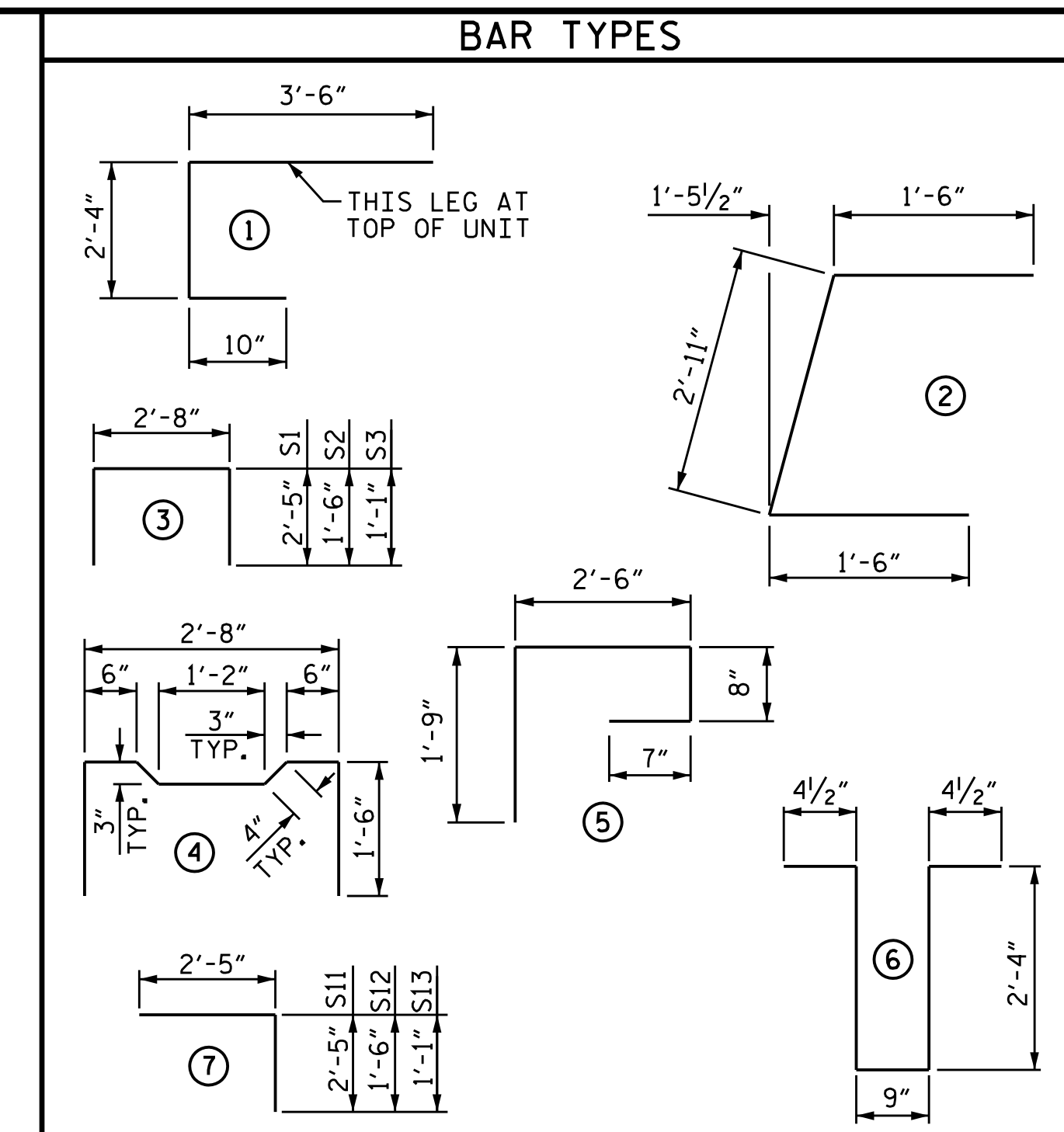
END VIEW
(SHOWING #4 "S" BARS IN END OF BEAM)



DEBONDING LEGEND



INTERIOR BOX BEAM SECTION (ADJACENT TO EXTERIOR BOX BEAM)
(STRAND LAYOUT NOT SHOWN)



ALL BAR DIMENSIONS ARE OUT TO OUT

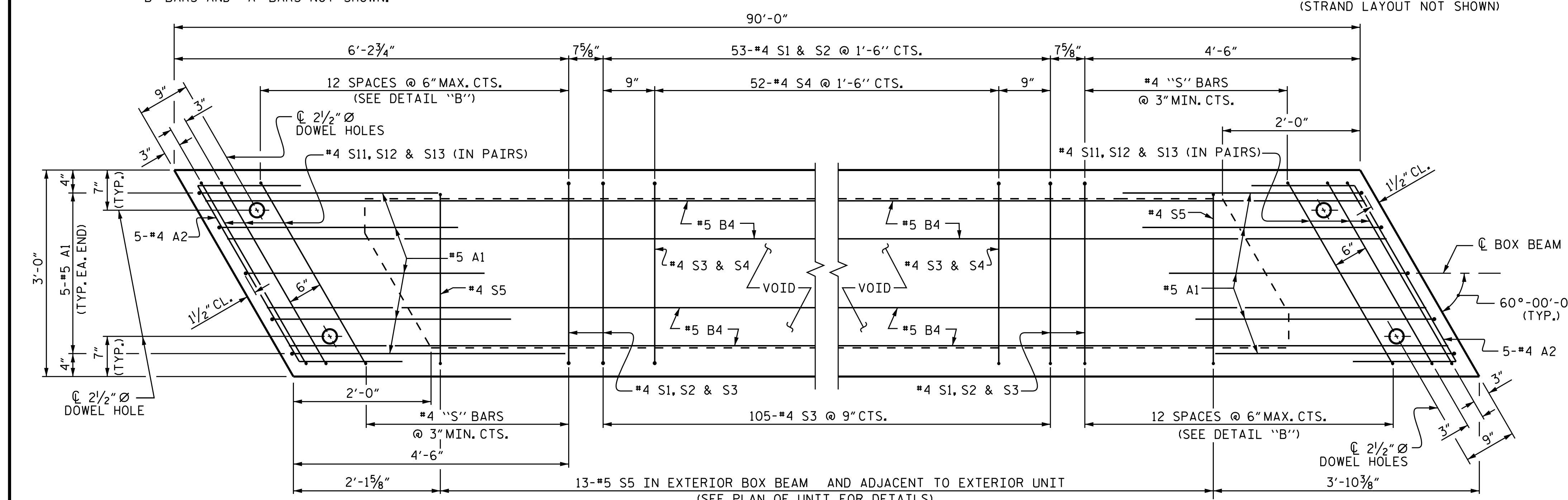
BILL OF MATERIAL FOR ONE BOX BEAM SECTION

		EXTERIOR UNIT		INTERIOR UNIT (ADJACENT TO EXTERIOR UNIT)		INTERIOR UNIT	
BAR NUMBER	SIZE	LENGTH	WEIGHT	LENGTH	WEIGHT	LENGTH	WEIGHT
A1	10 #5	6'-8"	70	6'-8"	70	6'-8"	70
A2	40 #4	5'-11"	158	5'-11"	158	5'-11"	158
B4	12 #5 STR	45'-11"	575	45'-11"	575	45'-11"	575
K1	15 #4	6'-2"	62	6'-2"	62	6'-2"	62
K2	10 #4 STR	2'-10"	19	2'-10"	19	2'-10"	19
S1	67 #4	7'-6"	336	7'-6"	336	7'-6"	336
S2	67 #4	5'-8"	254	5'-8"	254	5'-8"	254
S3	119 #4	4'-10"	384	4'-10"	384	4'-10"	384
S4	52 #4	5'-10"	203	5'-10"	203	5'-10"	203
S11	32 #4	4'-10"	103	4'-10"	103	4'-10"	103
S12	32 #4	3'-11"	84	3'-11"	84	3'-11"	84
S13	32 #4	3'-6"	75	3'-6"	75	3'-6"	75
* S5	13 #4	5'-6"	48	5'-6"	48	--	--
REINFORCING STEEL			2323 LBS.		2323 LBS.		2323 LBS.
* EPOXY COATED REINF. STEEL			48 LBS.		48 LBS.		
8000 P.S.I. CONCRETE		16.1 CU. YDS.		16.0 CU. YDS.		16.0 CU. YDS.	
0.6" Ø L.R. STRANDS		No. 30		No. 30		No. 30	

GRADE 270 STRANDS

AREA (SQUARE INCHES)	0.217
ULTIMATE STRENGTH (LBS. PER STRAND)	58,600
APPLIED PRESTRESS (LBS. PER STRAND)	43,950

PROJECT NO. U-5866
 GRAHAM COUNTY
 STATION: 20+25.00-L-
 SHEET 3 OF 5



PLAN OF BOX BEAM

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

ASSEMBLED BY : NMW DATE : 7/16
 CHECKED BY : RAR DATE : 5/17
 DESIGN ENGINEER OF RECORD : RDE DATE : 5/17

DRAWN BY : DGE 11/11 REV. 8/14 MAA/TMG
 CHECKED BY : TMG 11/11

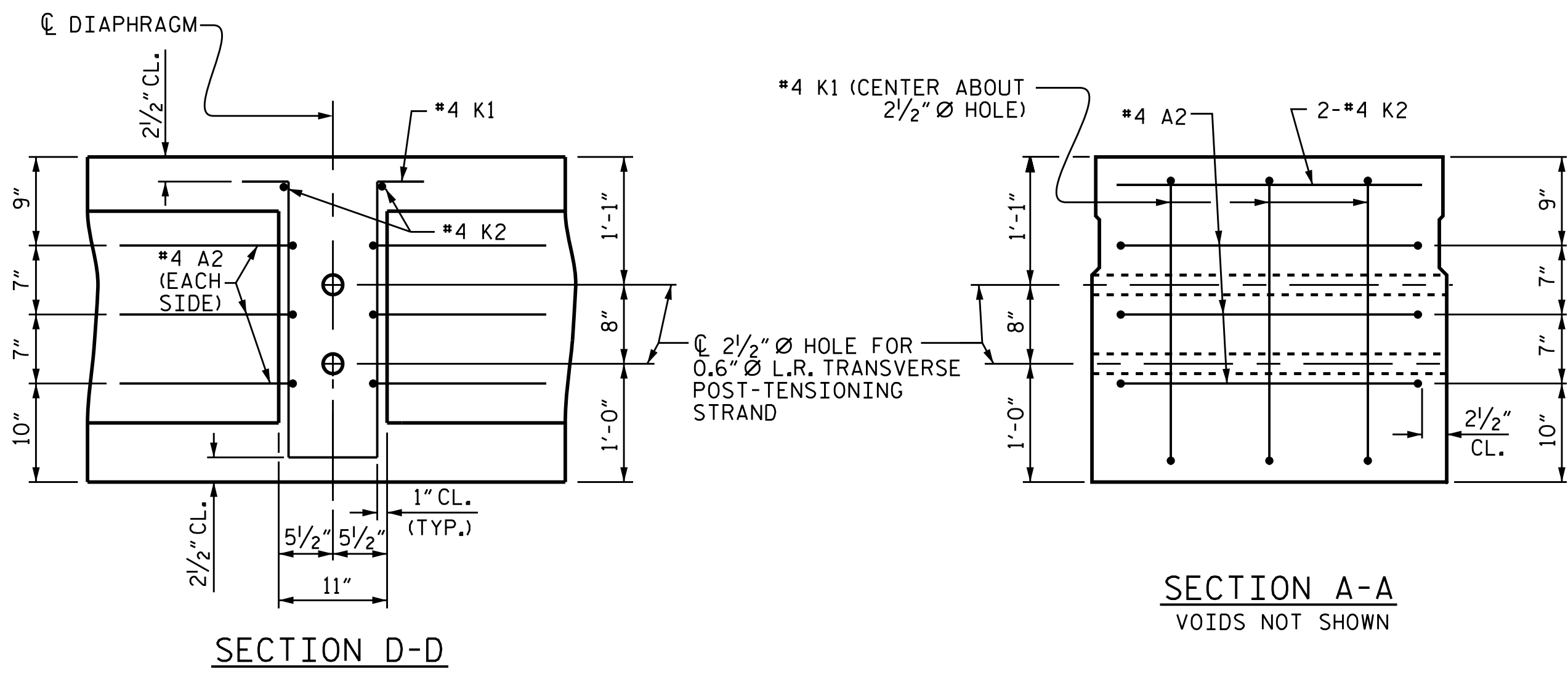
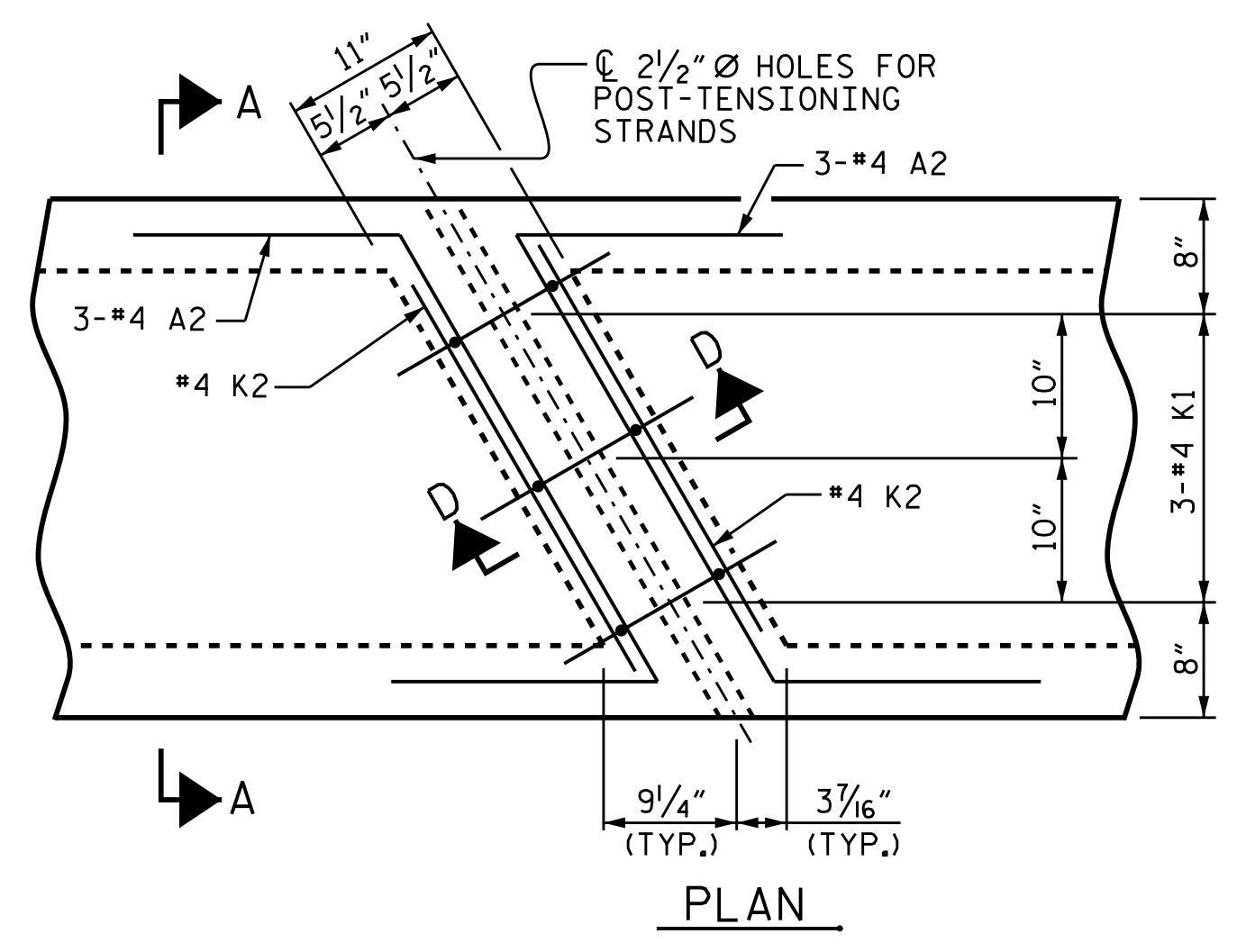
12/13/2017

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 SHELBY, NC 28150
 PH (704) 476-0003
 CORP. LICENSE NO.: C-0275

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

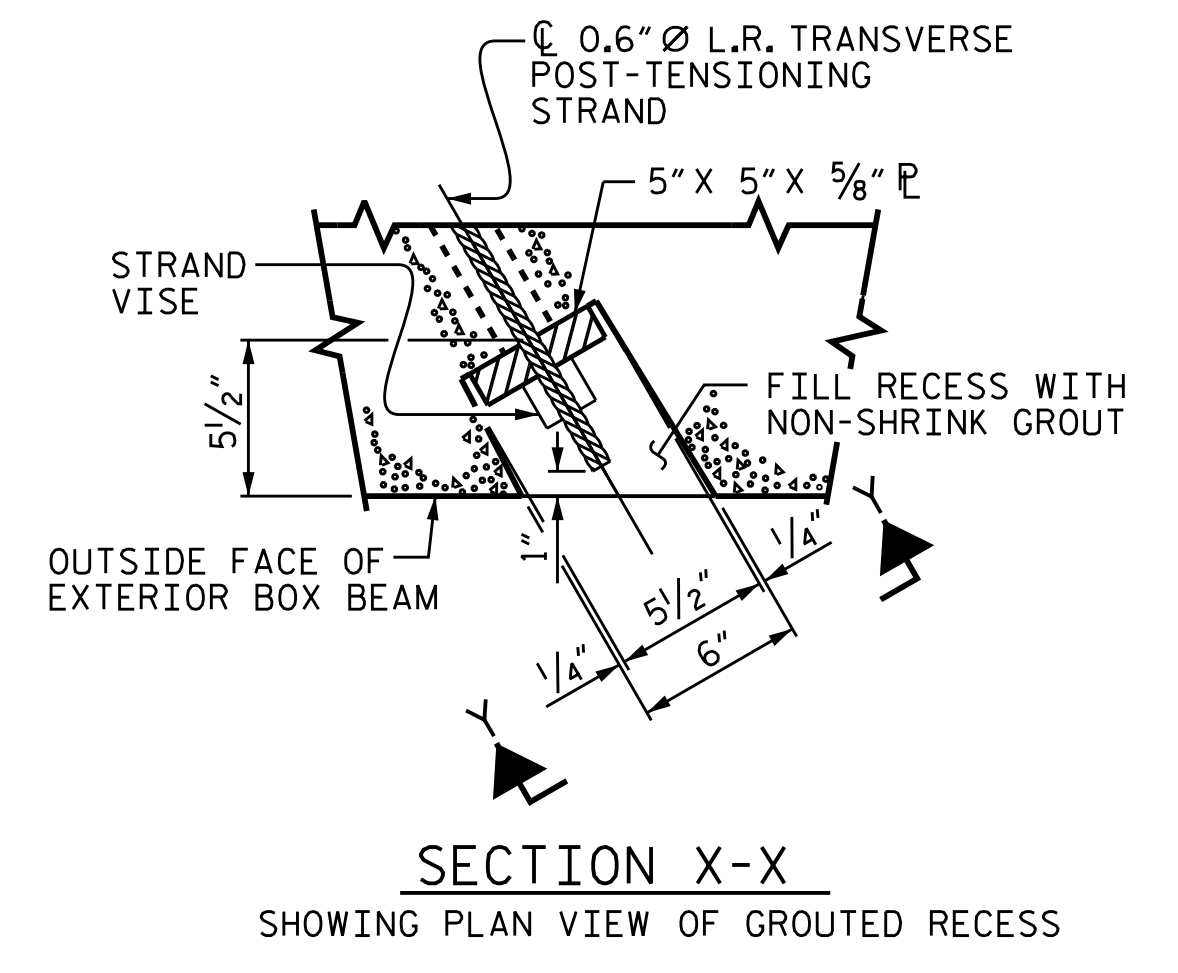
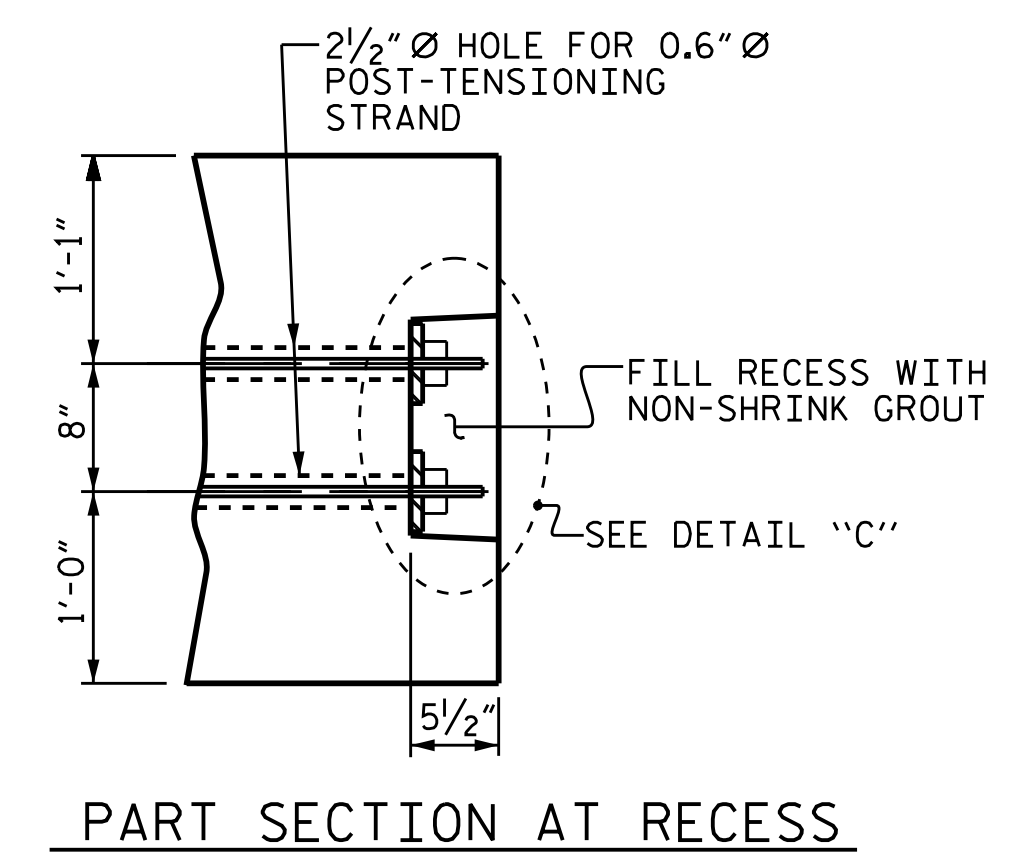
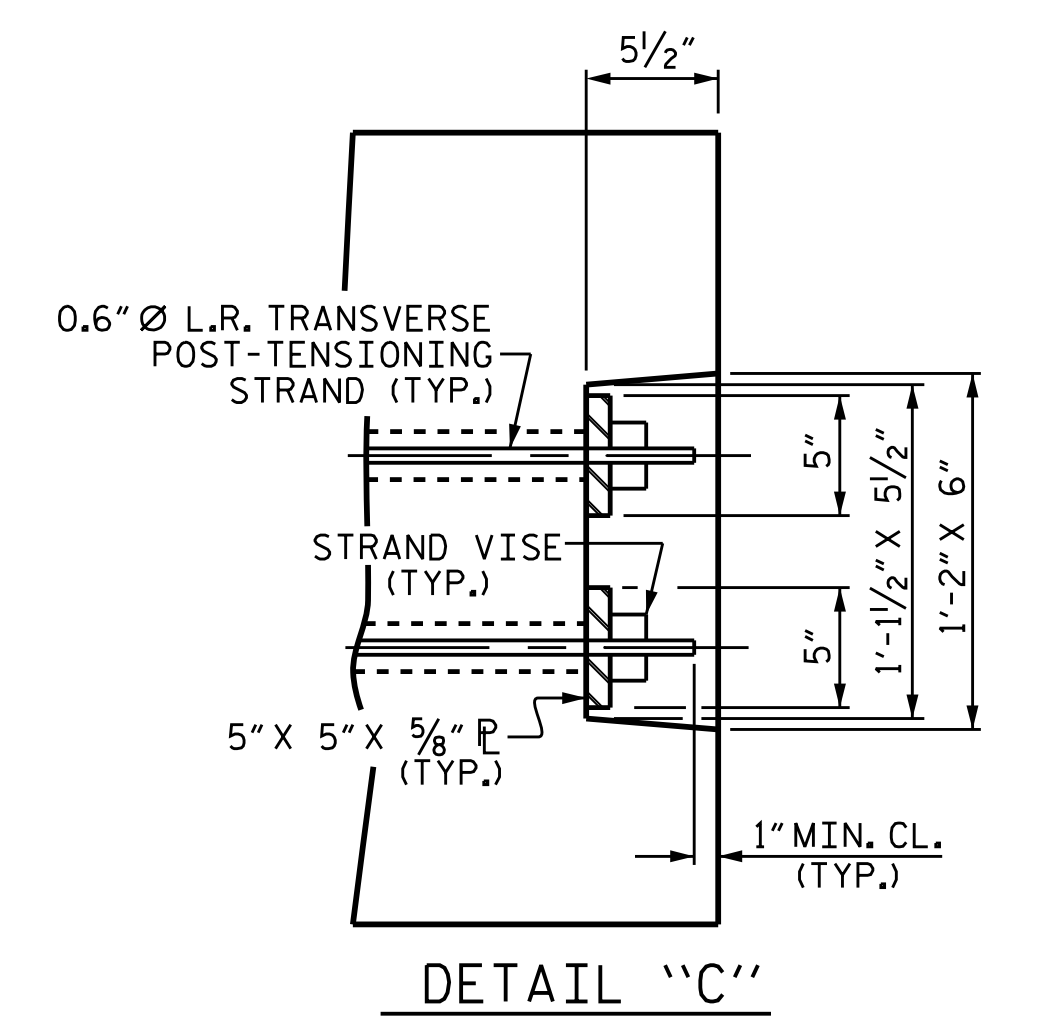
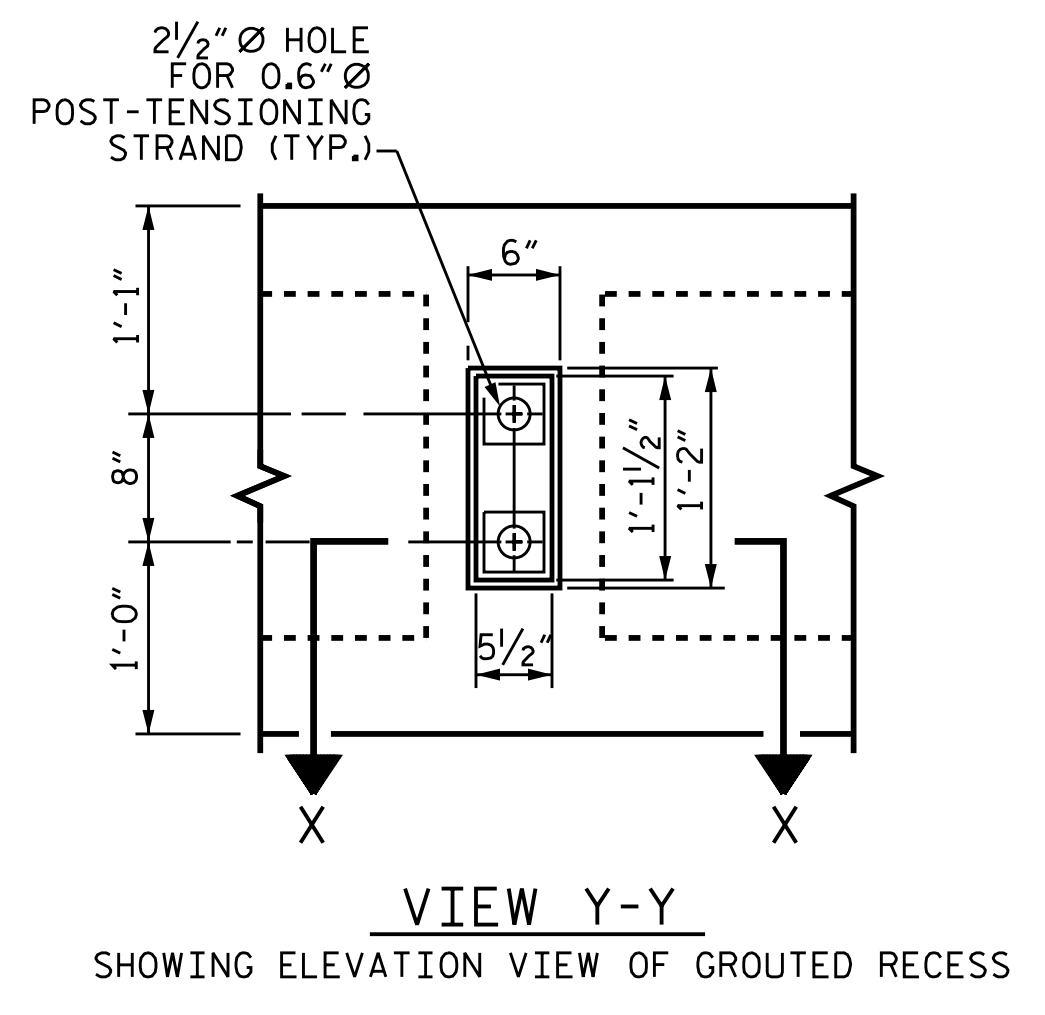
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			S-12
2			4			TOTAL SHEETS 33



SECTION D-D

DOUBLE DIAPHRAGM DETAILS

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

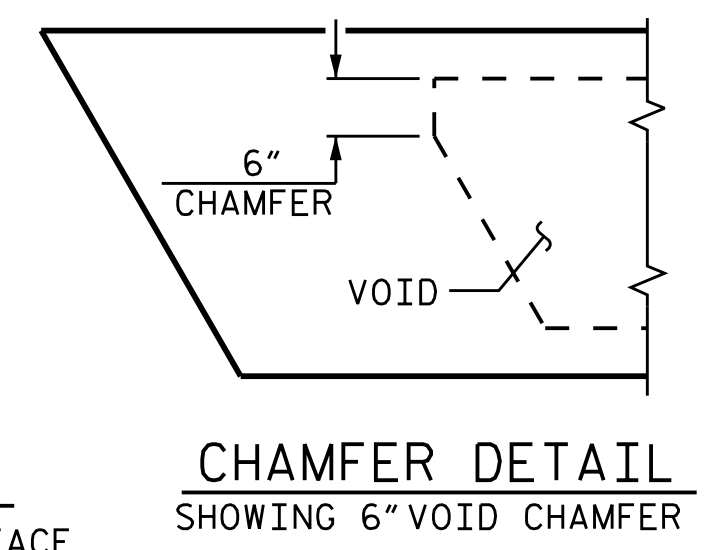
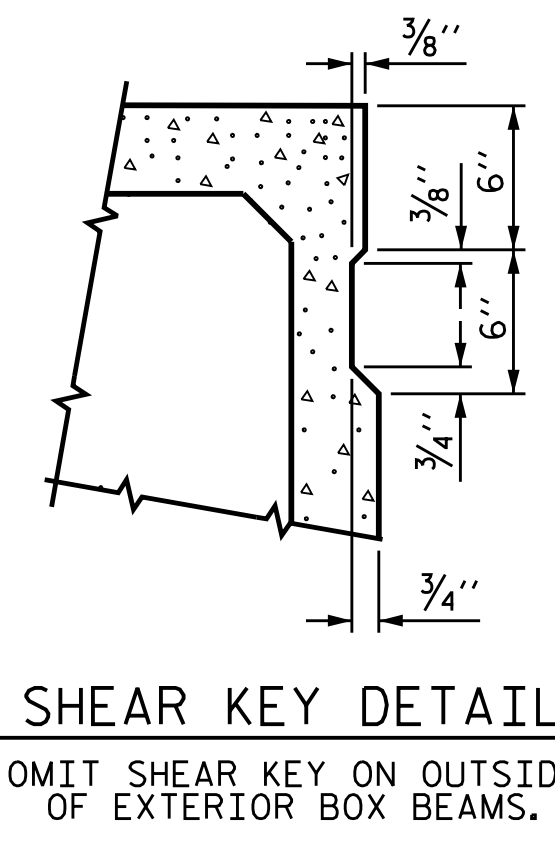
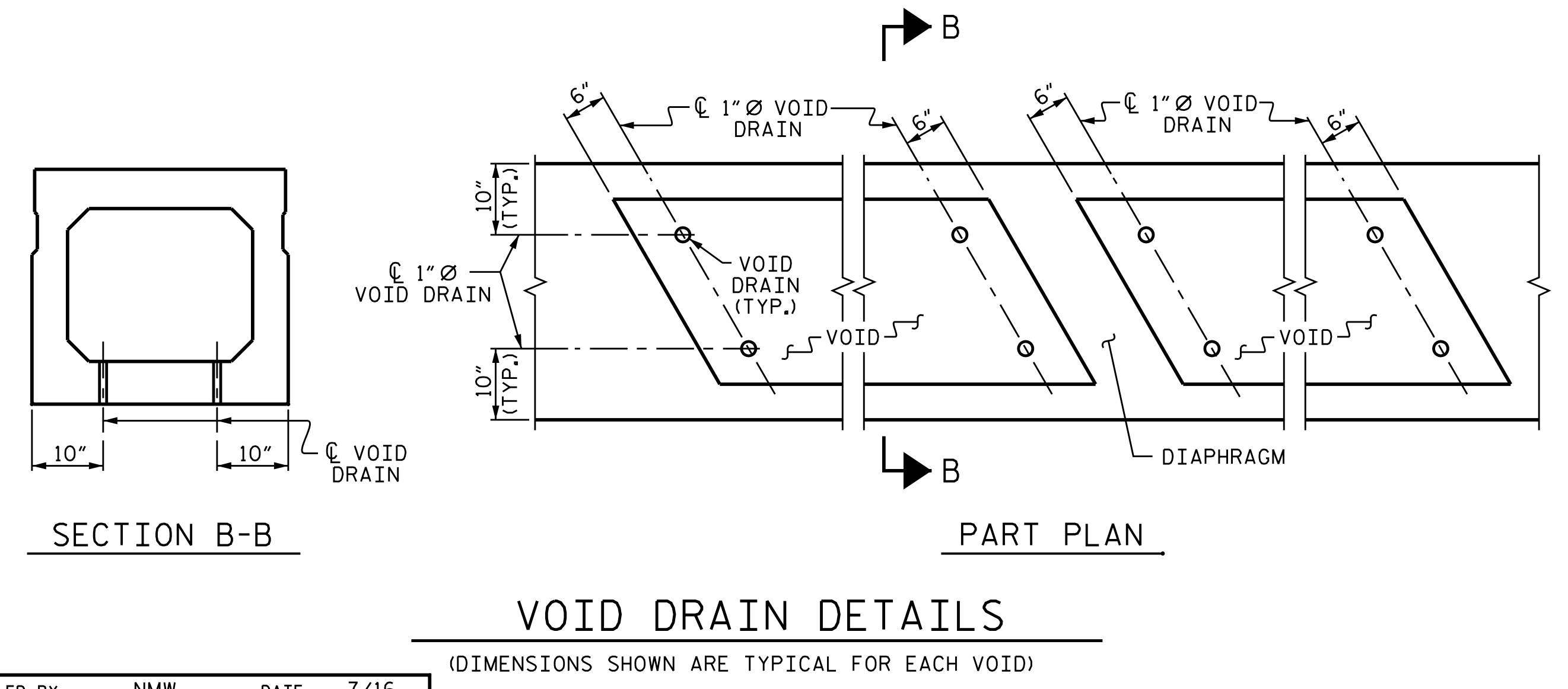


GROUDED RECESS DETAIL AT END OF POST-TENSIONED STRANDS OF EXTERIOR BOX BEAM

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

** INCLUDES FUTURE WEARING SURFACE

PROJECT NO. U-5866
GRAHAM COUNTY
STATION: 20+25.00-L-
SHEET 4 OF 5



12/13/2017

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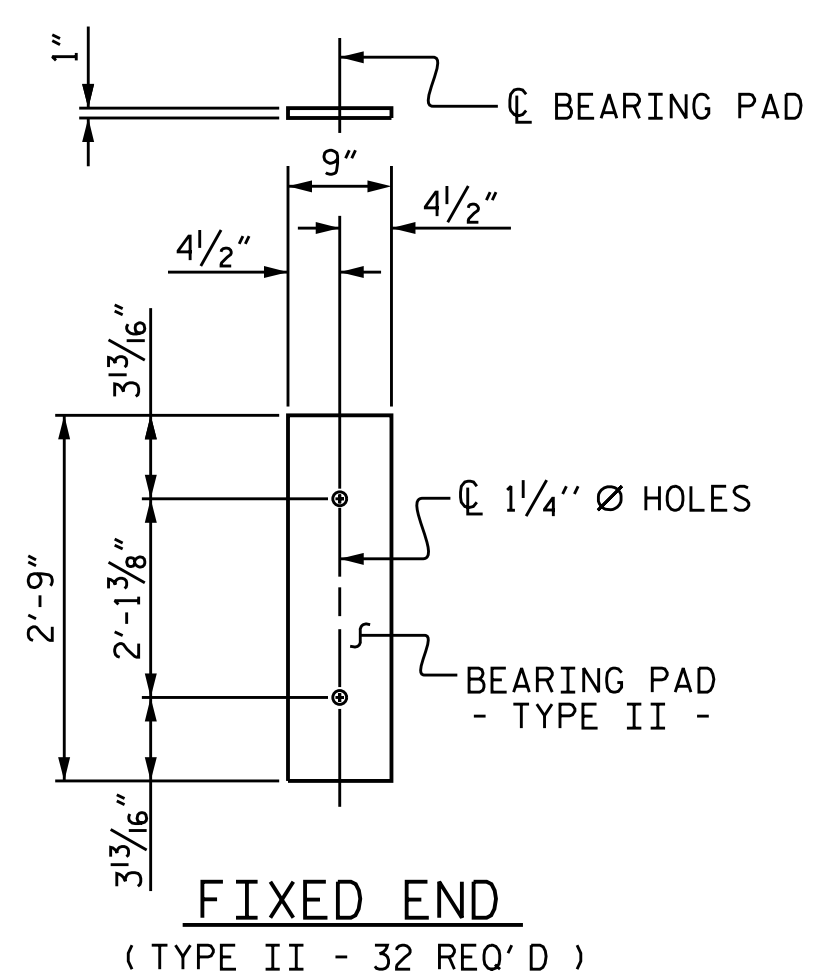
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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

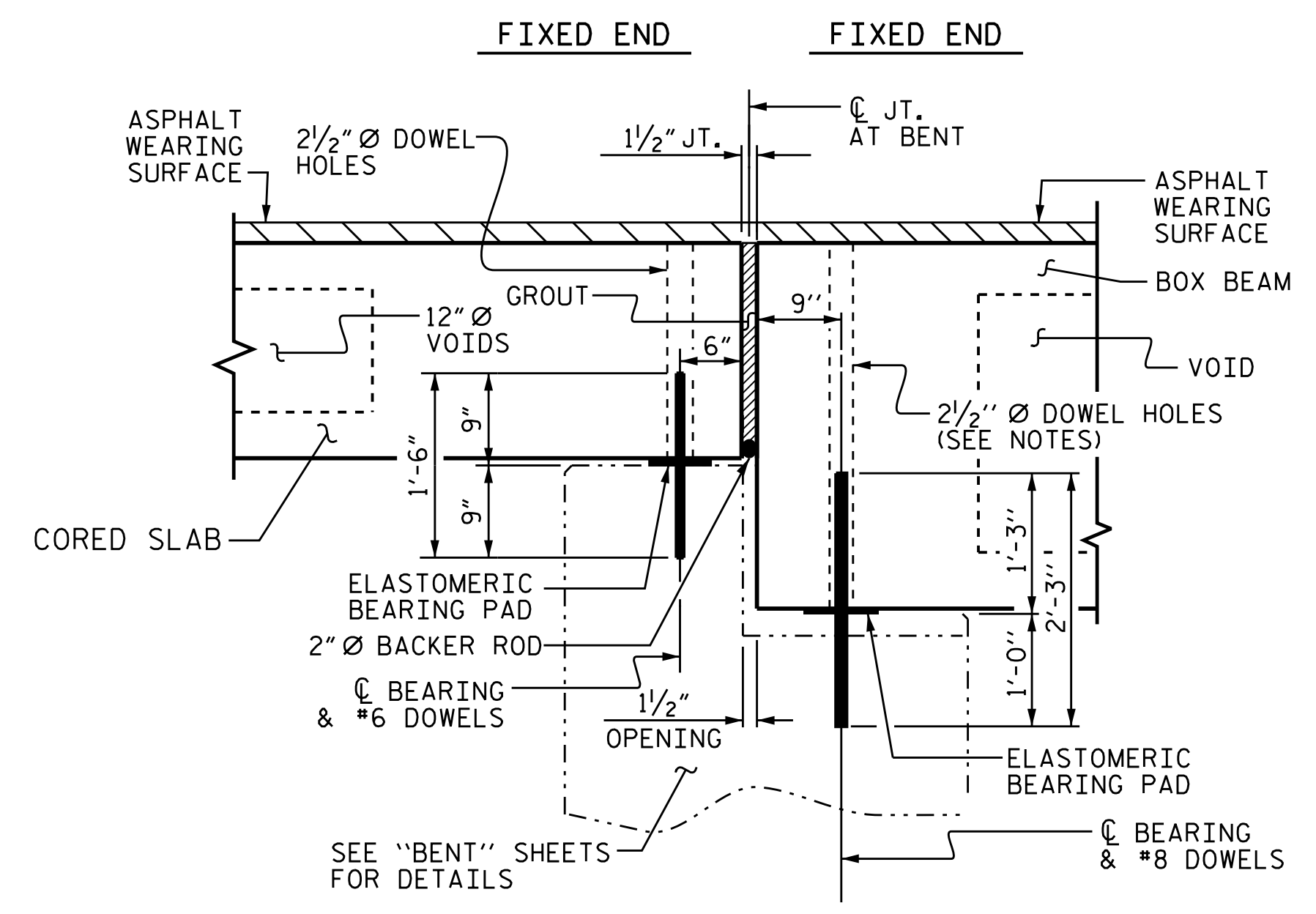
STANDARD
3'-0" X 2'-9"
PRESTRESSED CONCRETE
BOX BEAM UNIT

ASSEMBLED BY : NMW	DATE : 7/16
CHECKED BY : RAR	DATE : 5/17
DESIGN ENGINEER OF RECORD : RDE	DATE : 5/17
DRAWN BY : DGE	REV. 8/14
CHECKED BY : TMG	MAA/TMG

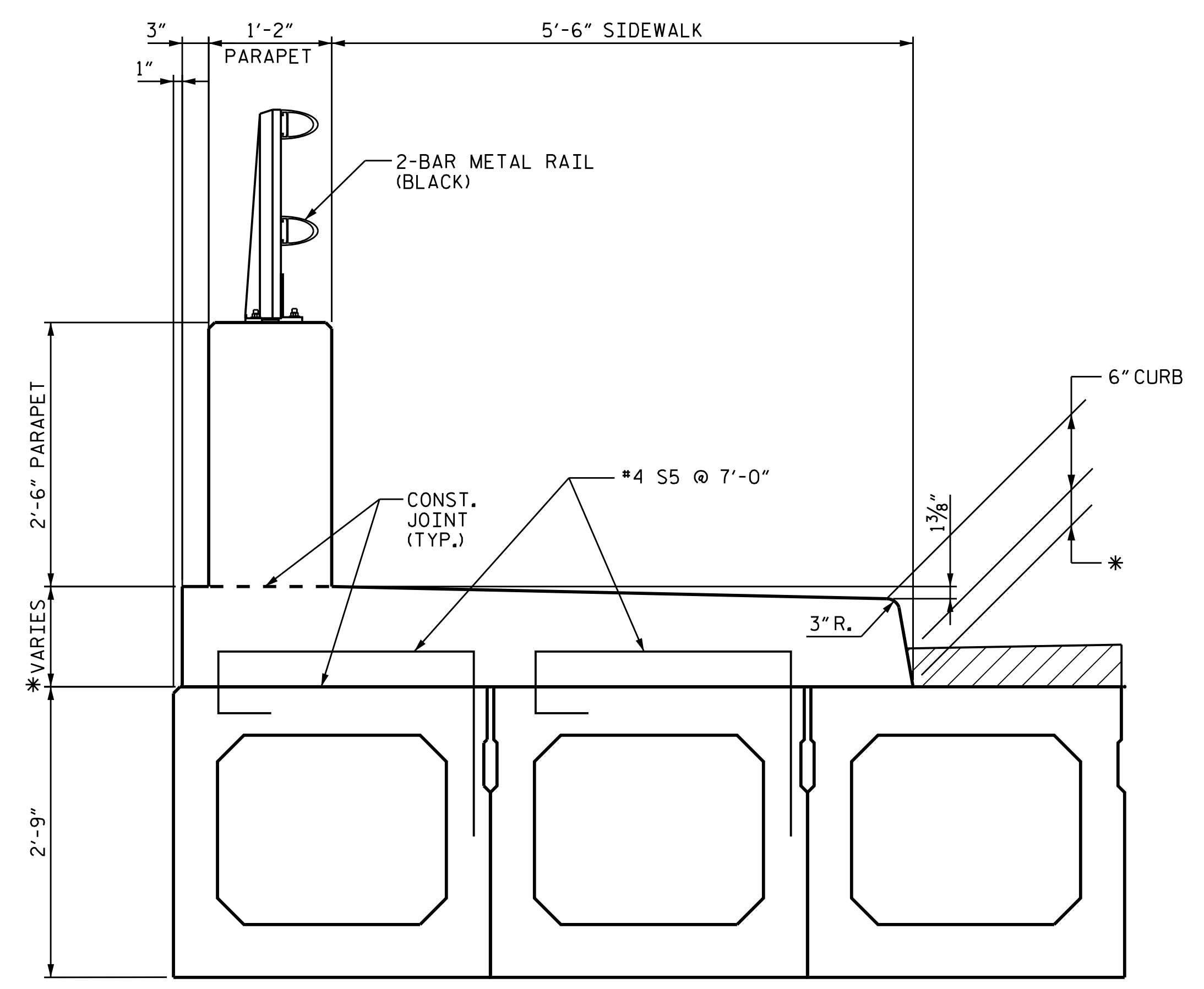
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-13
1			3			TOTAL SHEETS
2			4			33



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



SECTION AT BENT



SIDEWALK SECTION

* SEE PLAN FOR ASPHALT AND SIDEWALK DIMENSIONS (SHEET 17 OF 33)

BOX BEAM UNITS REQUIRED			
	NUMBER	LENGTH	TOTAL LENGTH
EXTERIOR B.B.	2	90'-0"	180'-0"
INTERIOR B.B.	14	90'-0"	1260'-0"
TOTAL	16		1440'-0"

PROJECT NO. U-5866
GRAHAM COUNTY
STATION: 20+25.00-L-

SHEET 5 OF 5

12/13/2017

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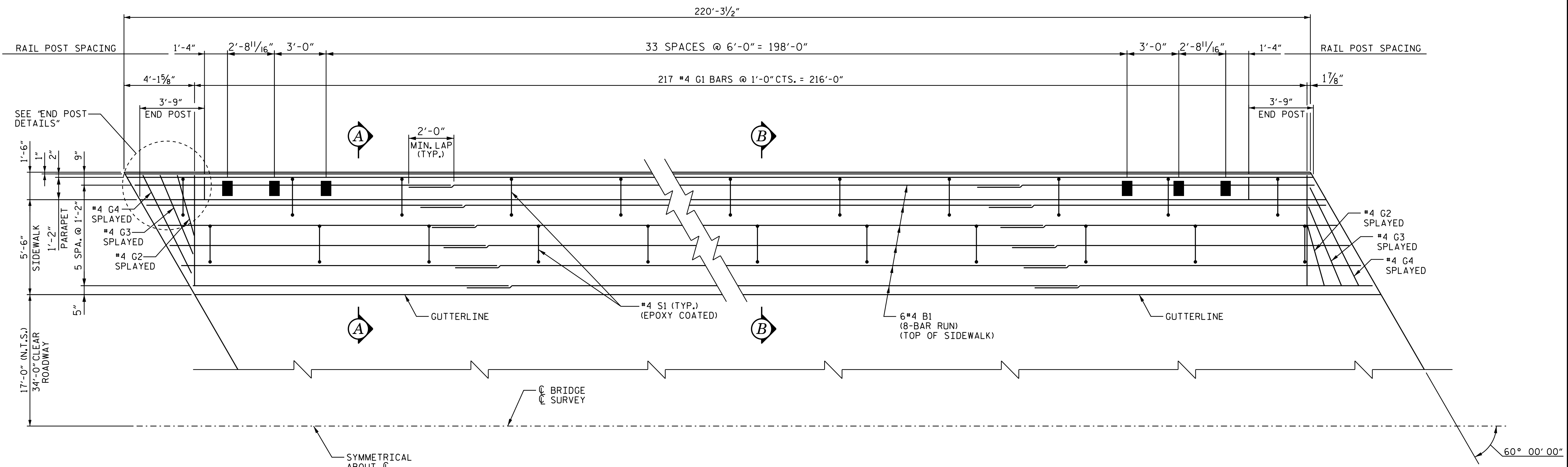
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DEPARTMENT OF TRANSPORTATION
RALEIGH

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

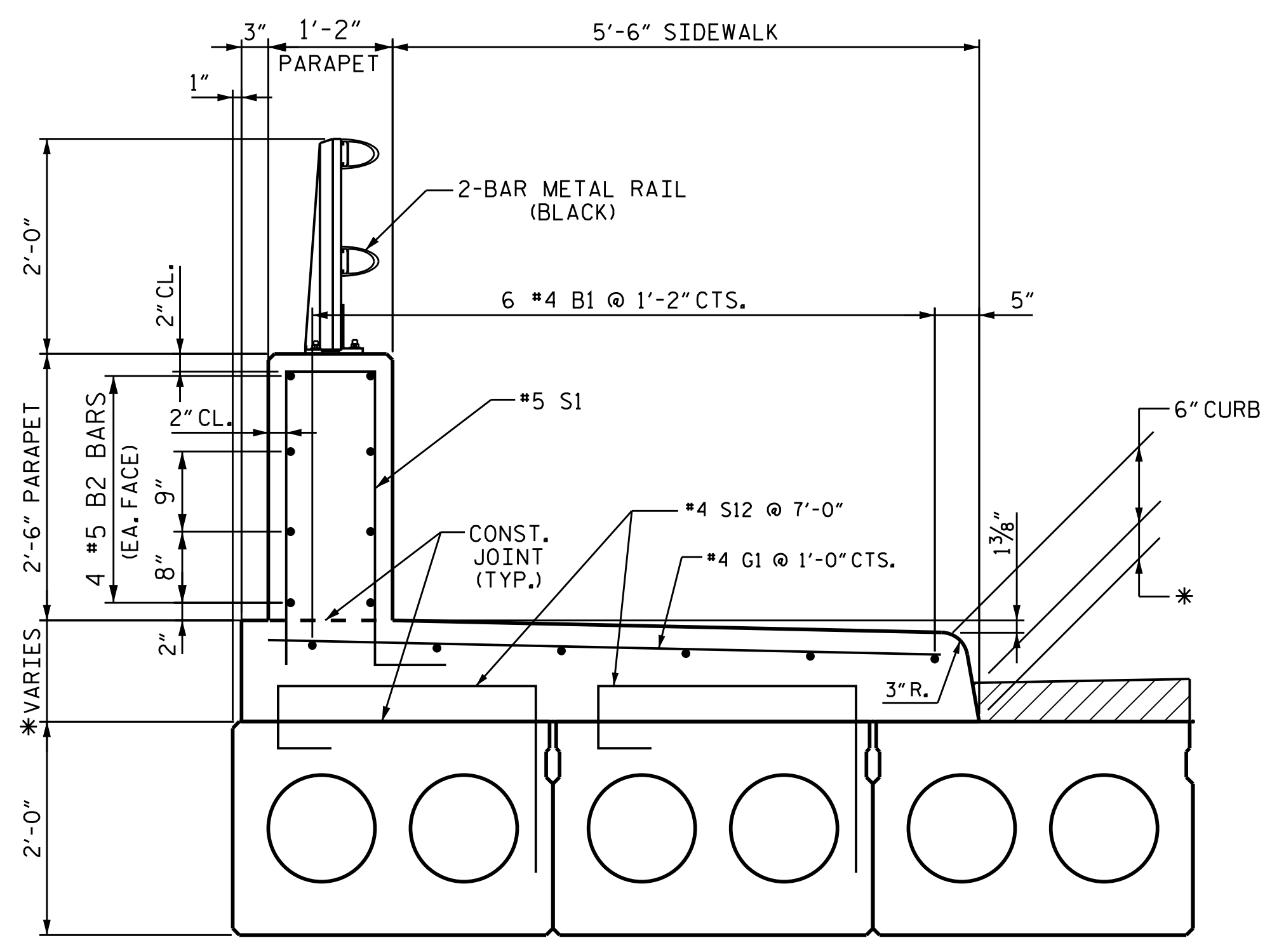
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-14
1			3			TOTAL SHEETS
2			4			33

ASSEMBLED BY : NMW	DATE : 7/16
CHECKED BY : RAR	DATE : 5/17
DESIGN ENGINEER OF RECORD : RDE	DATE : 5/17
DRAWN BY : DGE II/II	REV. 8/14
CHECKED BY : TMG II/II	MAA/TMG



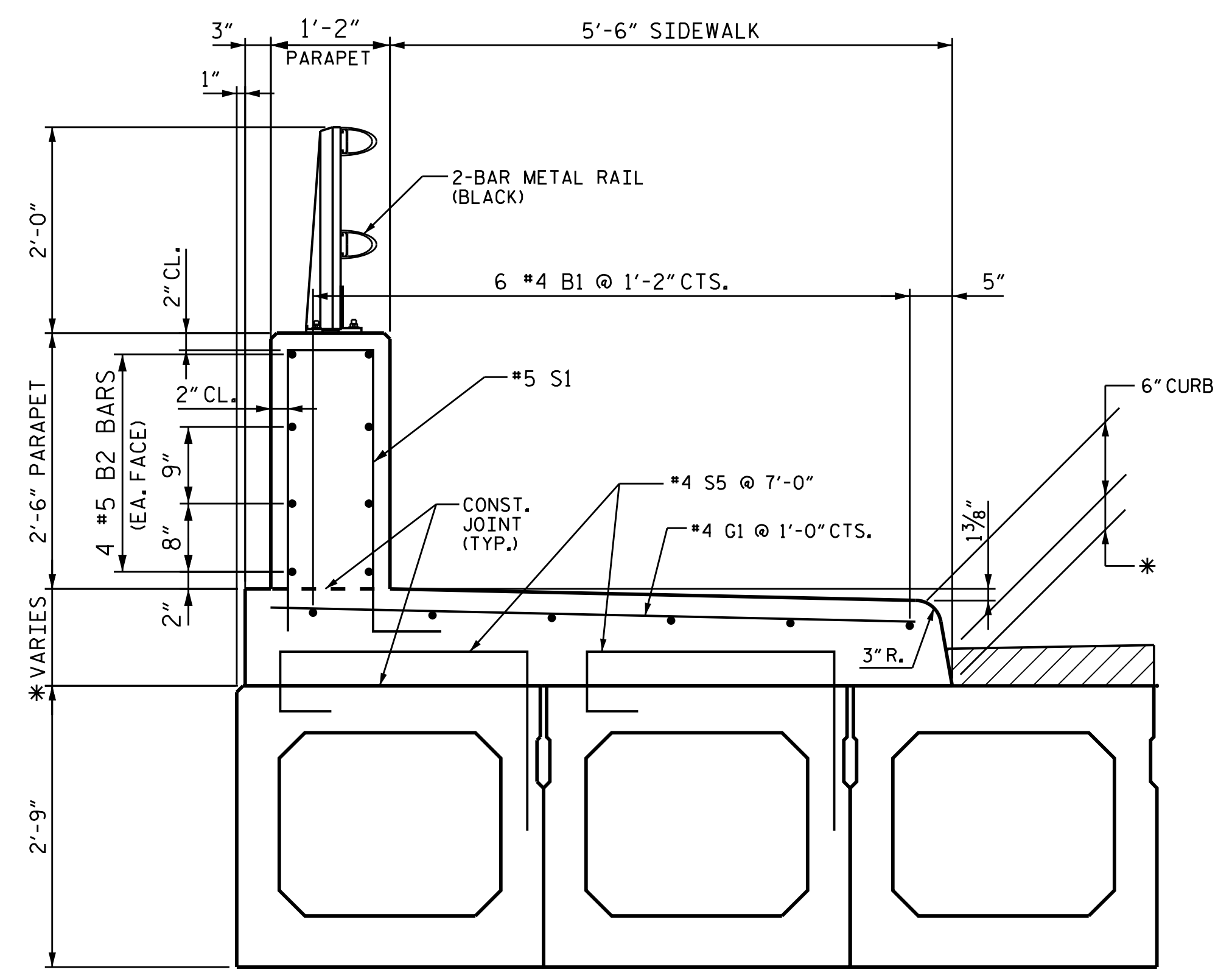
PLAN OF SIDEWALK AND RAIL POST SPACING LEFT SIDE

LEFT SIDE SHOWN, RIGHT SIDE SIMILAR.



SECTION A-A

* SEE PLAN FOR ASPHALT AND SIDEWALK DIMENSIONS (SHEET 17 OF 33)



SECTION B-B

* SEE PLAN FOR ASPHALT AND SIDEWALK DIMENSIONS (SHEET 17 OF 33)

BILL FOR ONE SIDEWALK - 2 REQUIRED					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
*B1	48	#4	STR.	29'-3"	938
*G1	217	#4	STR.	6'-4"	918
*G2	2	#4	STR.	3'-7"	5
*G3	2	#4	STR.	5'-0"	7
*G4	2	#4	STR.	6'-6"	9
*EPOXY-COATED REINF. STEEL - LBS.					1,877
CLASS AA CONCRETE					49.6 CU. YDS.

PROJECT NO. U-5866
 GRAHAM COUNTY
 STATION: 20+25.00-L-

12/13/2017

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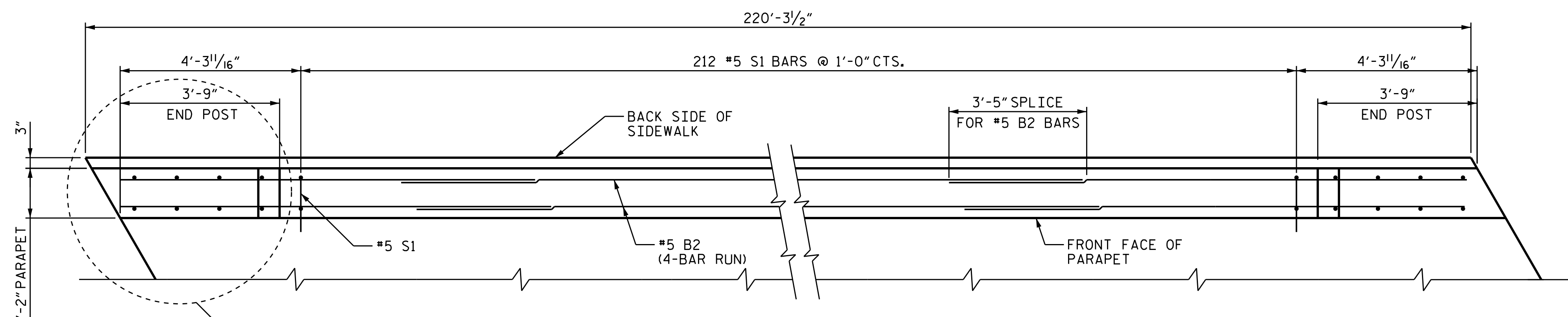
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 DEPARTMENT OF TRANSPORTATION
 RALEIGH

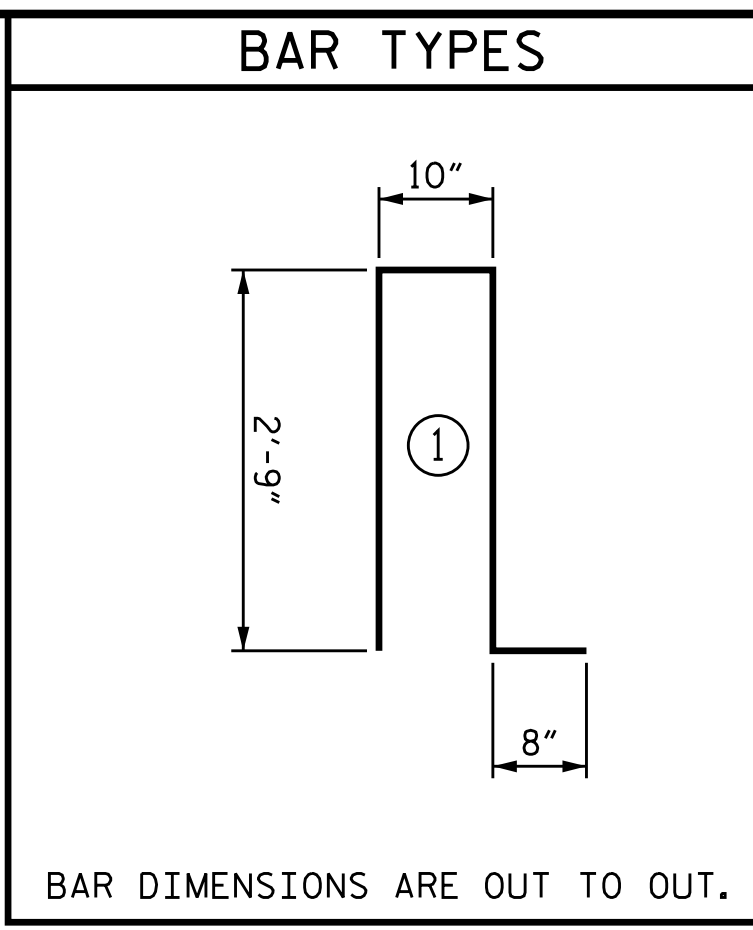
RAIL POST SPACING & SIDEWALK DETAILS
 SPANS A, B, & C
 34' CLEAR ROADWAY
 60° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	TOTAL SHEETS
1			3			S-15
2			4			33

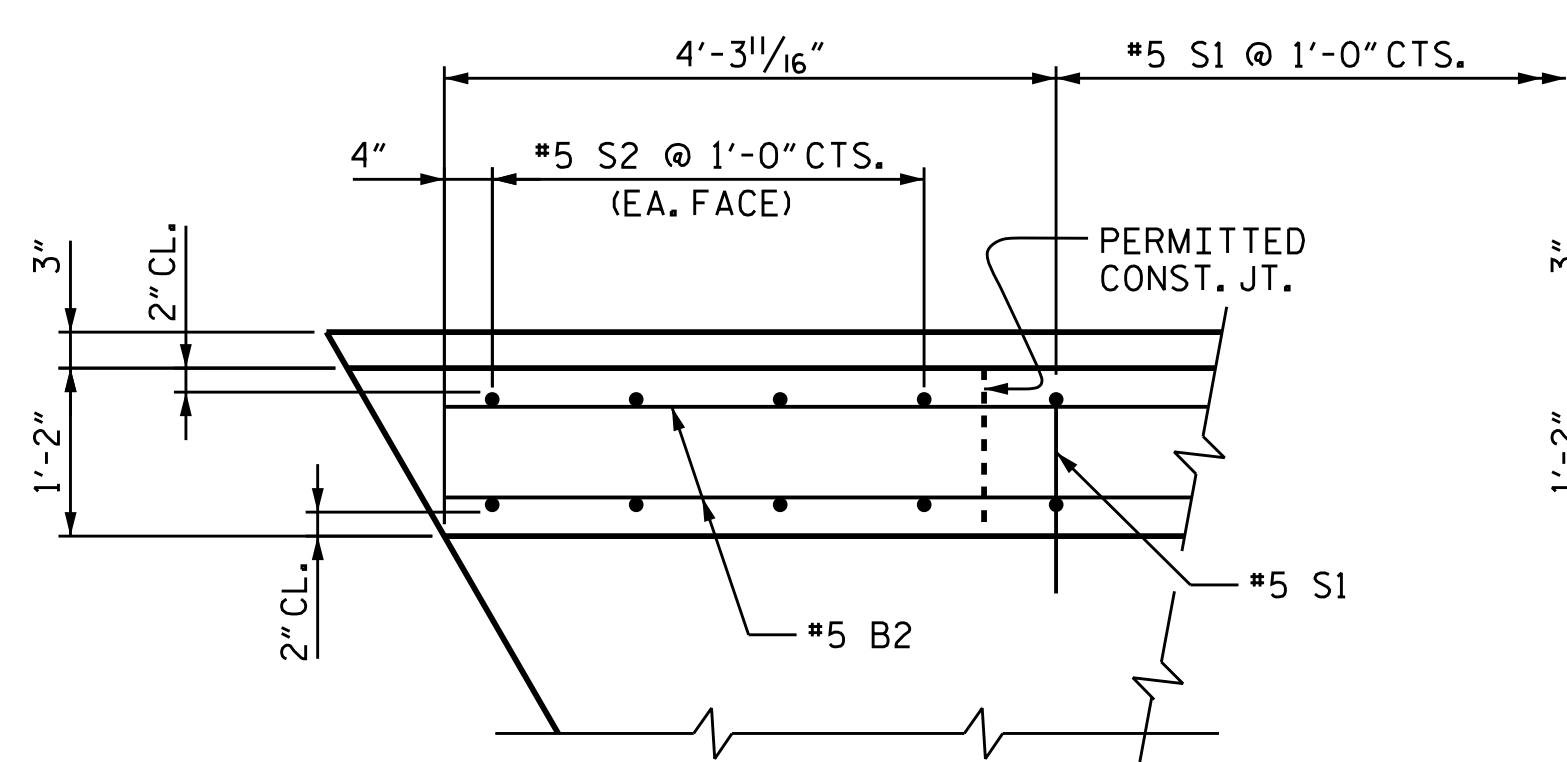
DRAWN BY : NMW DATE : 7/16
 CHECKED BY : RAR DATE : 5/17
 DESIGN ENGINEER OF RECORD : RDE DATE : 5/17



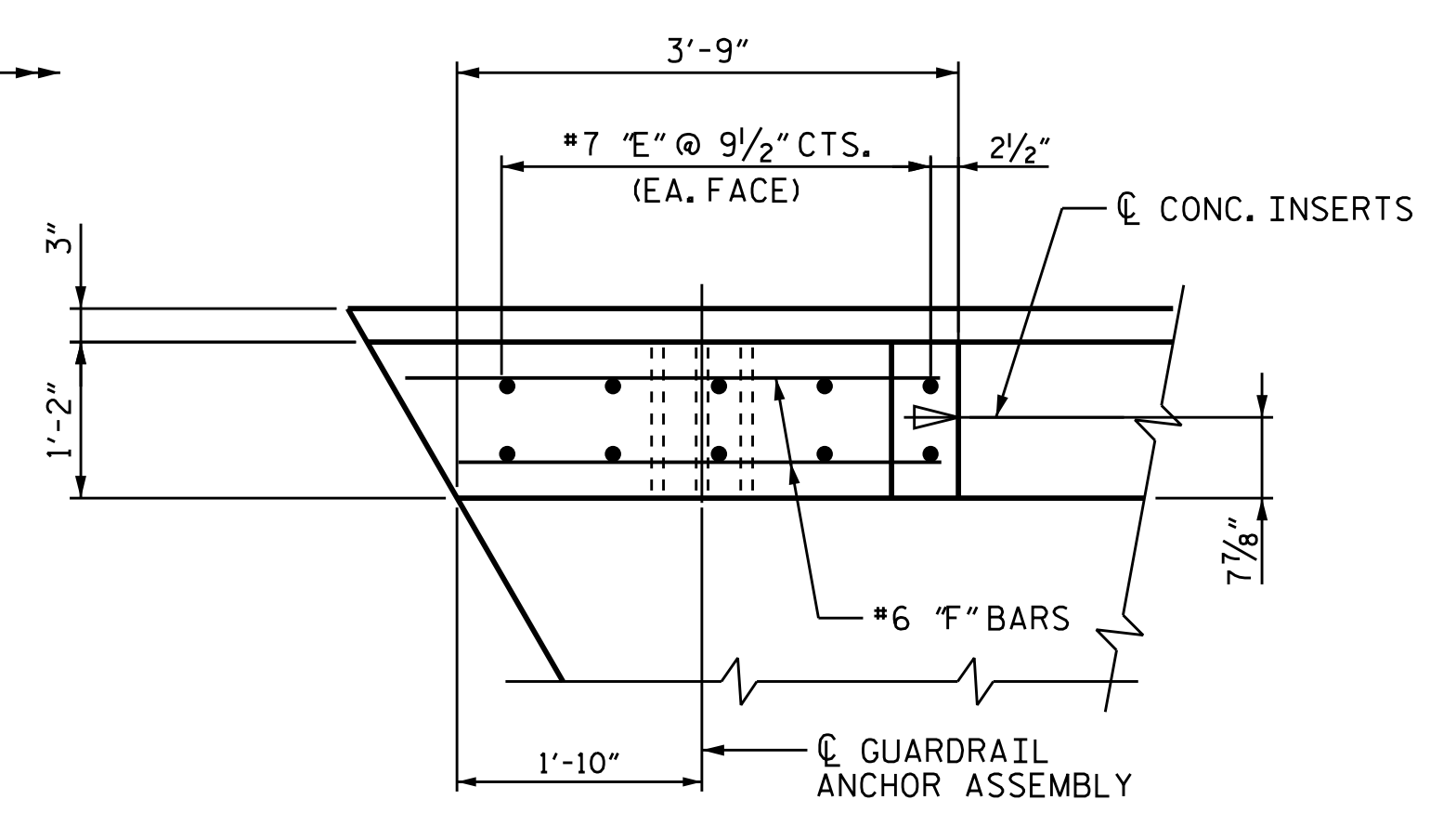
PLAN OF LEFT PARAPET
LEFT SIDE SHOWN RIGHT SIDE SIMILAR.



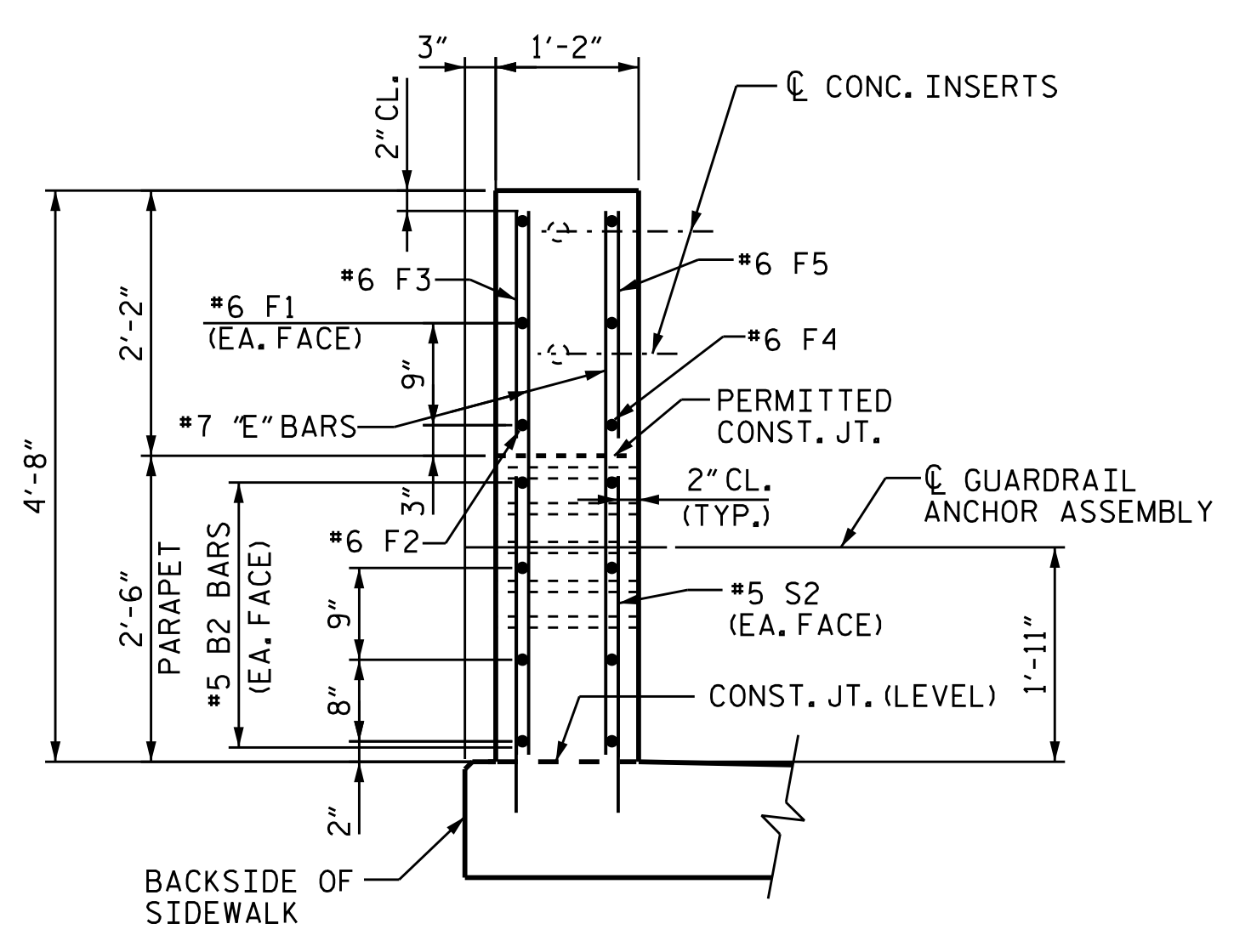
TWO BAR METAL RAIL					
BILL OF MATERIAL FOR PARAPET AND TWO END POSTS - 2 REQUIRED					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
*B2	32	#5	STR.	57'-9"	1,927
*E1	4	#7	STR.	2'-6"	20
*E2	4	#7	STR.	3'-0"	25
*E3	4	#7	STR.	3'-6"	29
*E4	4	#7	STR.	4'-0"	33
*E5	4	#7	STR.	4'-4"	35
*F1	4	#6	STR.	2'-0"	12
*F2	2	#6	STR.	3'-7"	11
*F3	2	#6	STR.	3'-9"	11
*F4	2	#6	STR.	4'-0"	12
*F5	2	#6	STR.	4'-4"	13
*S1	212	#5	1	7'-0"	1,548
*S2	16	#5	STR.	3'-0"	50
*EPOXY COATED REINFORCING STEEL					3,726 LBS.
CLASS "AA" CONCRETE					24.3 C.Y.
CONCRETE PARAPET					220.292 L.F.



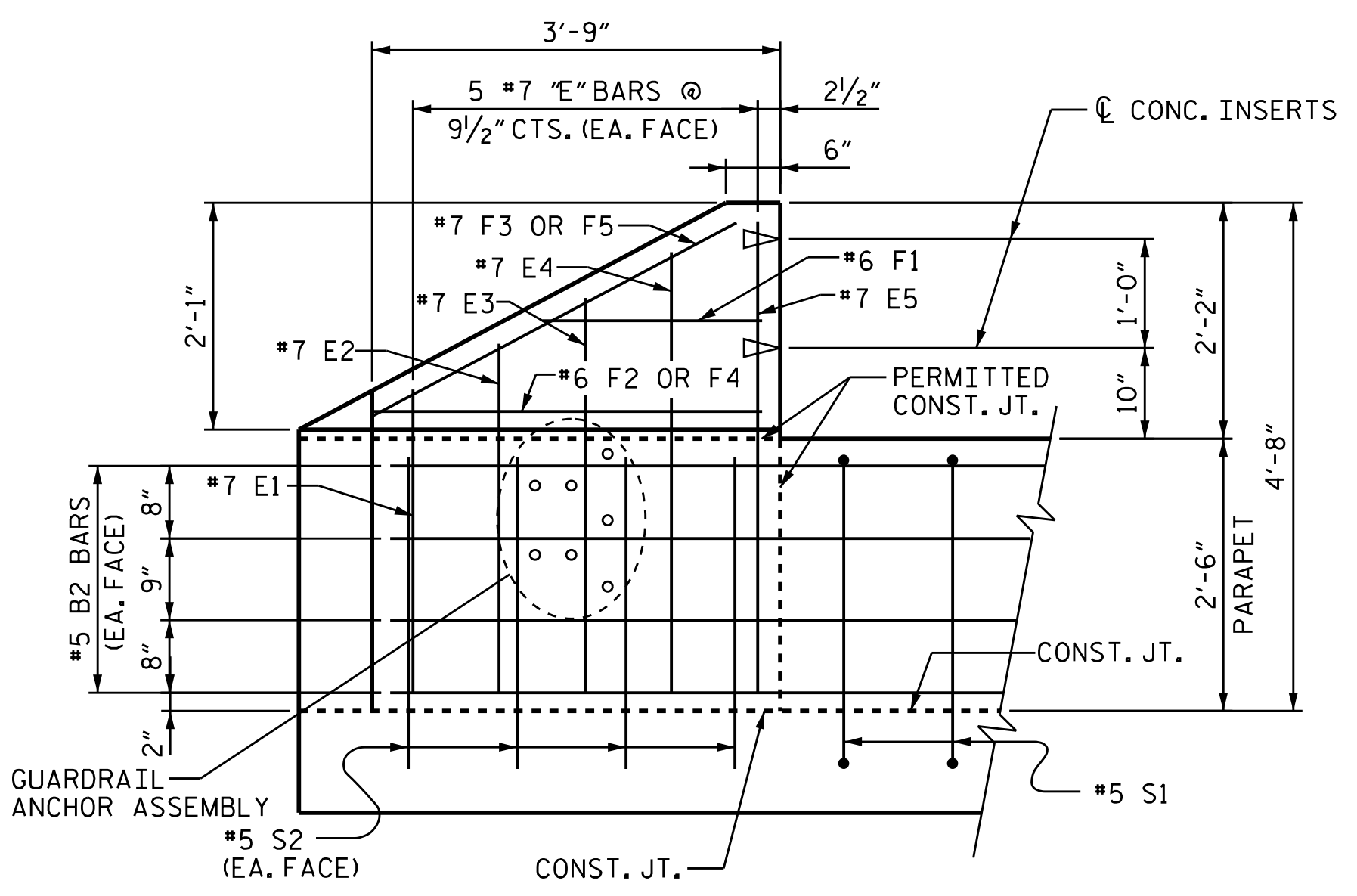
PLAN OF PARAPET



PLAN OF END POST



END VIEW



ELEVATION

PARAPET AND END POST FOR TWO BAR METAL RAIL

NOTES:
THE #5 S2 BARS SHALL BE INSTALLED USING AN ADHESIVE ANCHORING SYSTEM AFTER SAWING THE JOINT. FOR ADHESIVELY ANCHORED BOLTS OR DOWELS, SEE SPECIAL PROVISIONS. THE YIELD LOAD OF THE #5 S2 BARS IS 18.6 KIPS. FIELD TESTING OF THE ADHESIVE BONDING SYSTEM IS NOT REQUIRED.
QUANTITIES FOR FOUR (4) END POSTS AND TWO (2) PARAPETS ARE INCLUDED IN THE SUPERSTRUCTURE BILL OF MATERIAL.
ALL REINFORCING STEEL IN PARAPETS AND END POSTS SHALL BE EPOXY COATED.

PROJECT NO. U-5866
GRAHAM COUNTY
STATION: 20+25.00-L-

12/13/2017

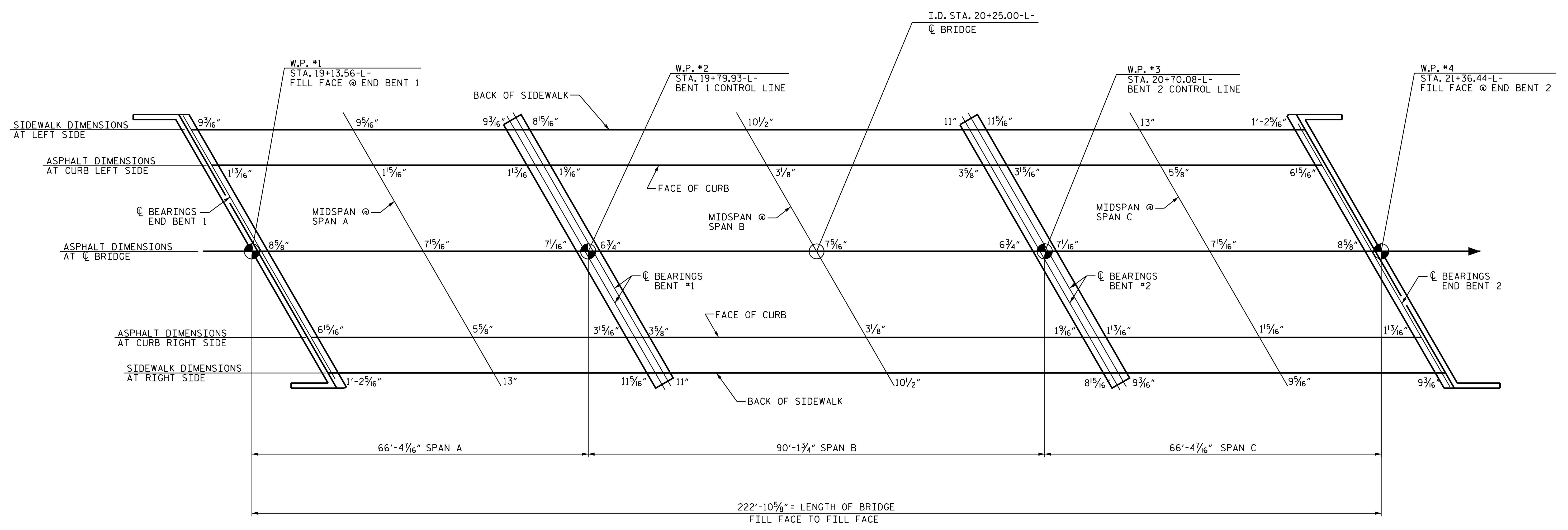
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CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
PARAPET DETAILS END POST DETAILS					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

SHEET NO.	S-16
TOTAL SHEETS	33

DRAWN BY : NMW DATE : 8/16
CHECKED BY : RAR DATE : 5/17
DESIGN ENGINEER OF RECORD : RDW DATE : 5/17

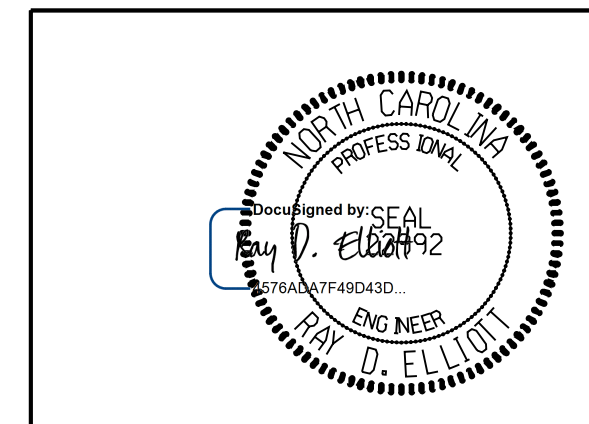


PLAN FOR ASPHALT AND SIDEWALK DIMENSIONS

PROJECT NO. U-5866
 GRAHAM COUNTY
 STATION: 20+25.00-L-

DRAWN BY : NMW DATE : 11/17
 CHECKED BY : RDE DATE : 11/17
 DESIGN ENGINEER OF RECORD : RDE DATE : 11/17

PREPARED BY
 TGS ENGINEERS
 107-A MICA AVENUE
 MORGANTON, NC 28655



12/13/2017

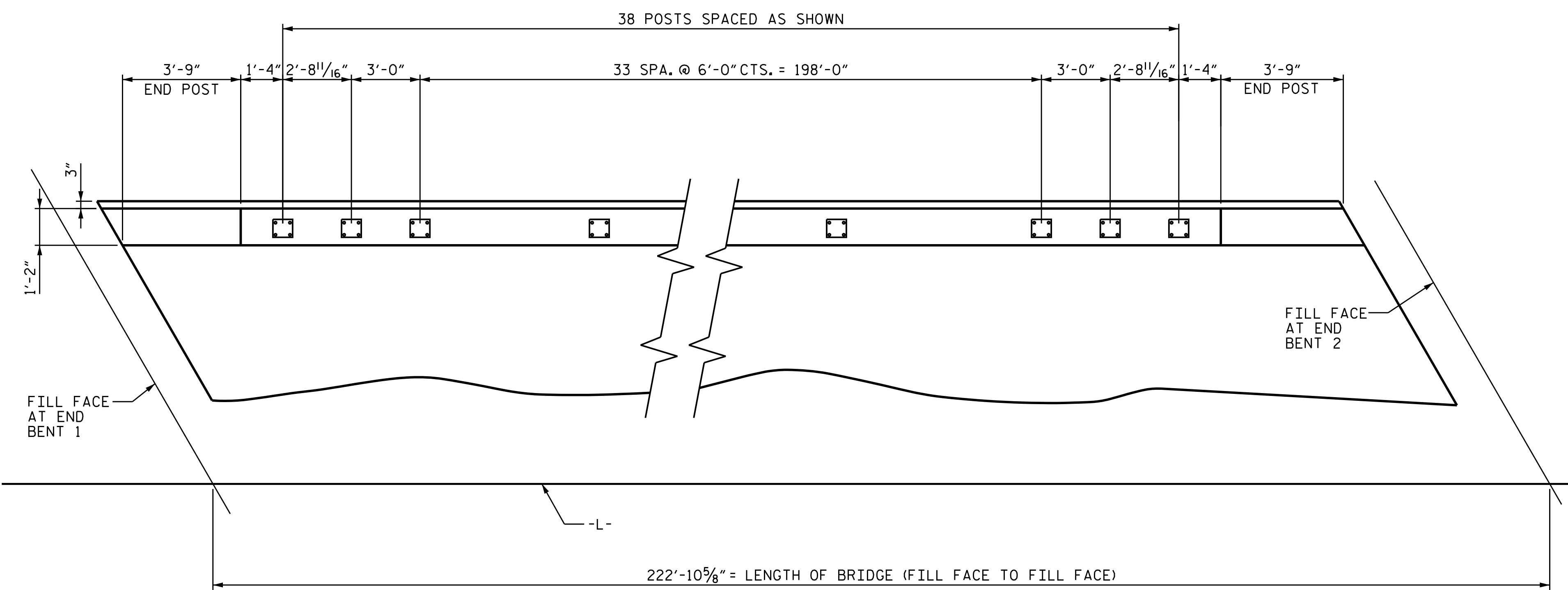
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STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

PLAN FOR
 ASPHALT AND SIDEWALK
 DIMENSIONS

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S-17
1			3			TOTAL SHEETS
2			4			33



PLAN OF RAIL POST SPACINGS

LEFT SIDE SHOWN; RIGHT SIDE SIMILAR.

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

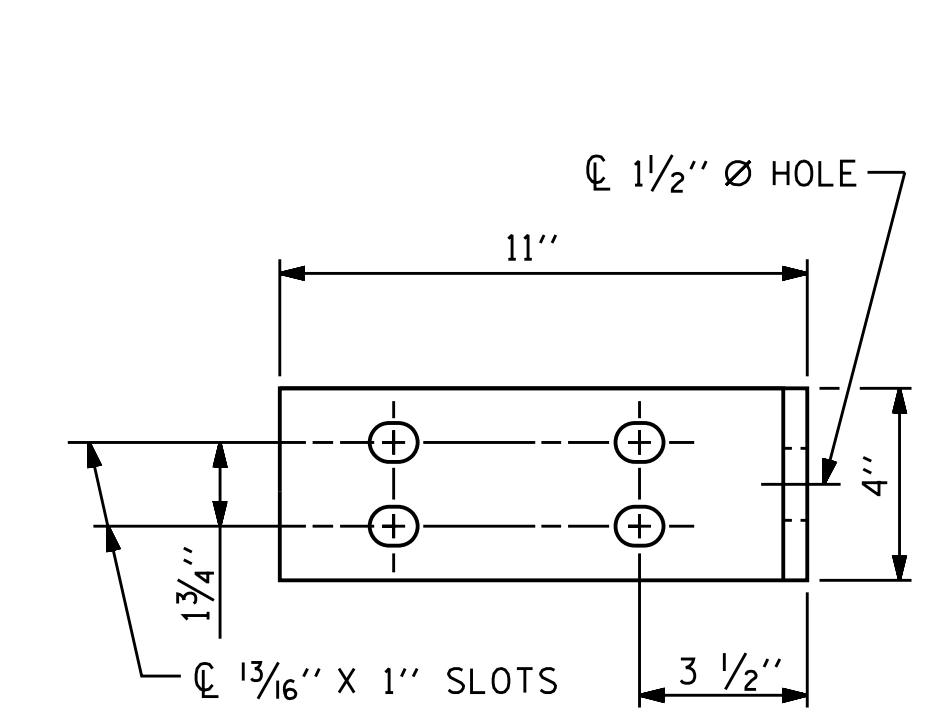
- THE METAL RAIL TO END POST CONNECTION SHALL CONSIST OF THE FOLLOWING COMPONENTS:
- A. 1/2" PLATES SHALL CONFORM TO AASHTO M270 GRADE 36 AND SHALL BE GALVANIZED AFTER FABRICATION.
 - B. 3/4" STRUCTURAL CONCRETE INSERT SHALL HAVE A WORKING LOAD SHEAR CAPACITY OF 4800 LBS. THE FERRULES SHALL ENGAGE A 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°.
 - D. STANDARD CLAMP BARS (SEE METAL RAIL SHEET).
 - E. 1/2" Ø PIPE SLEEVES (IF REQUIRED) TO BE GALVANIZED.

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

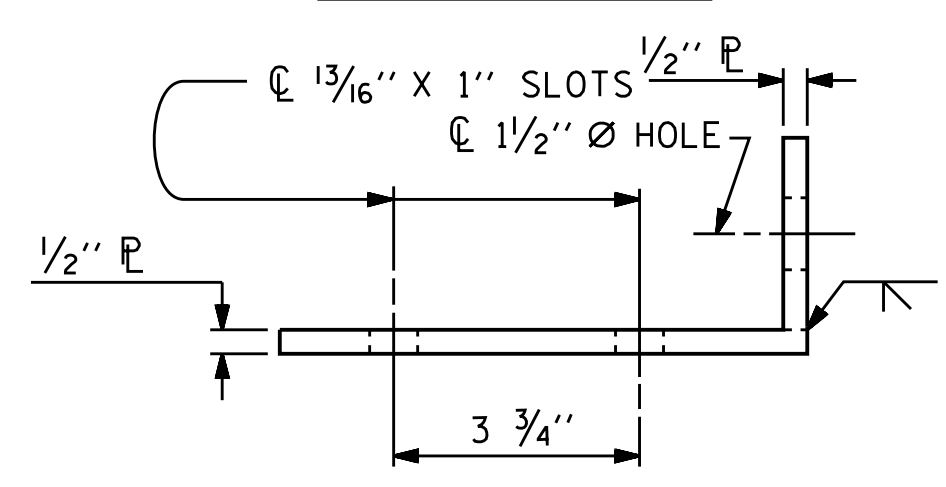
THE 3/4" STRUCTURAL CONCRETE INSERT WITH BOLT SHALL BE ASSEMBLED IN THE SHOP.

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

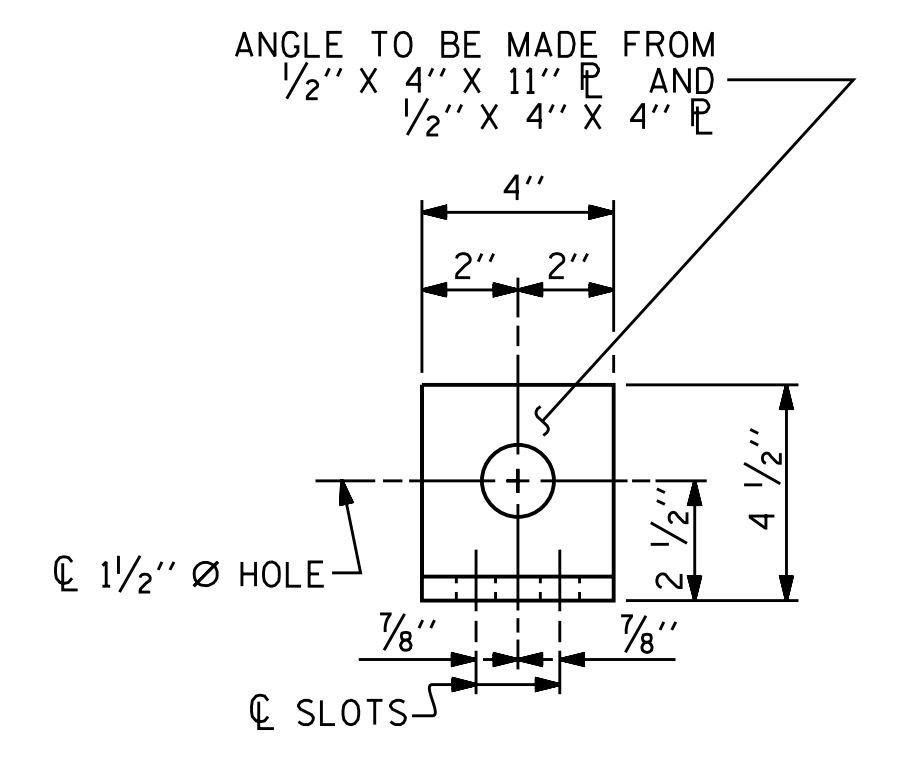
THE CONTRACTOR, AT HIS OPTION, MAY USE AN ADHESIVE BONDING SYSTEM IN LIEU OF THE STRUCTURAL CONCRETE INSERT EMBEDDED IN THE END POST. IF THE ADHESIVE BONDING SYSTEM IS USED, THE 3/4" Ø X 1 5/8" BOLT WITH WASHER SHALL BE REPLACED WITH A 3/4" Ø X 6 1/2" BOLT AND 2" O.D. WASHER. ALL SPECIFICATIONS THAT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



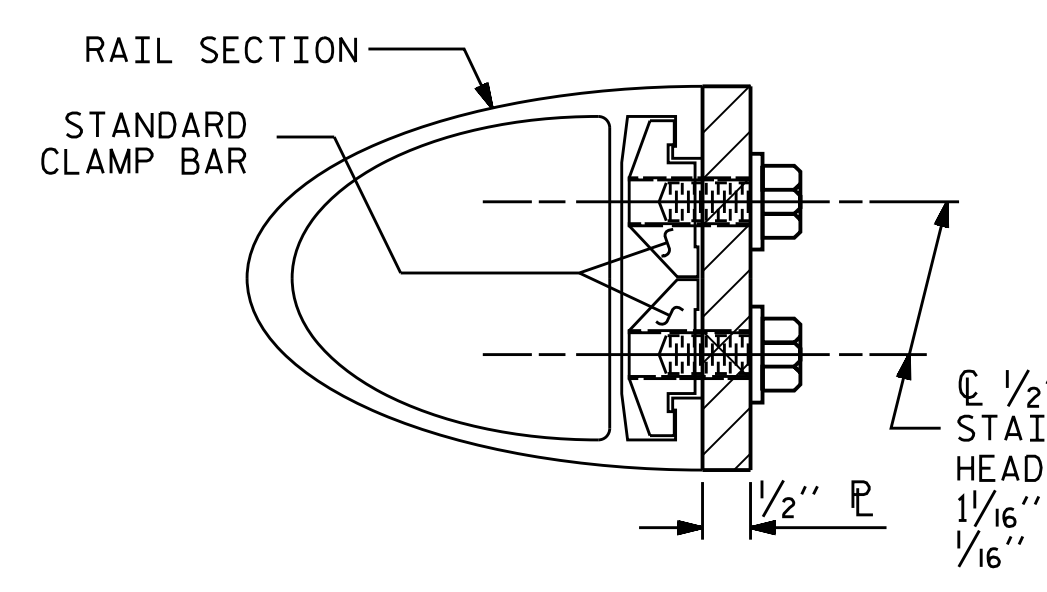
ELEVATION



TOP VIEW

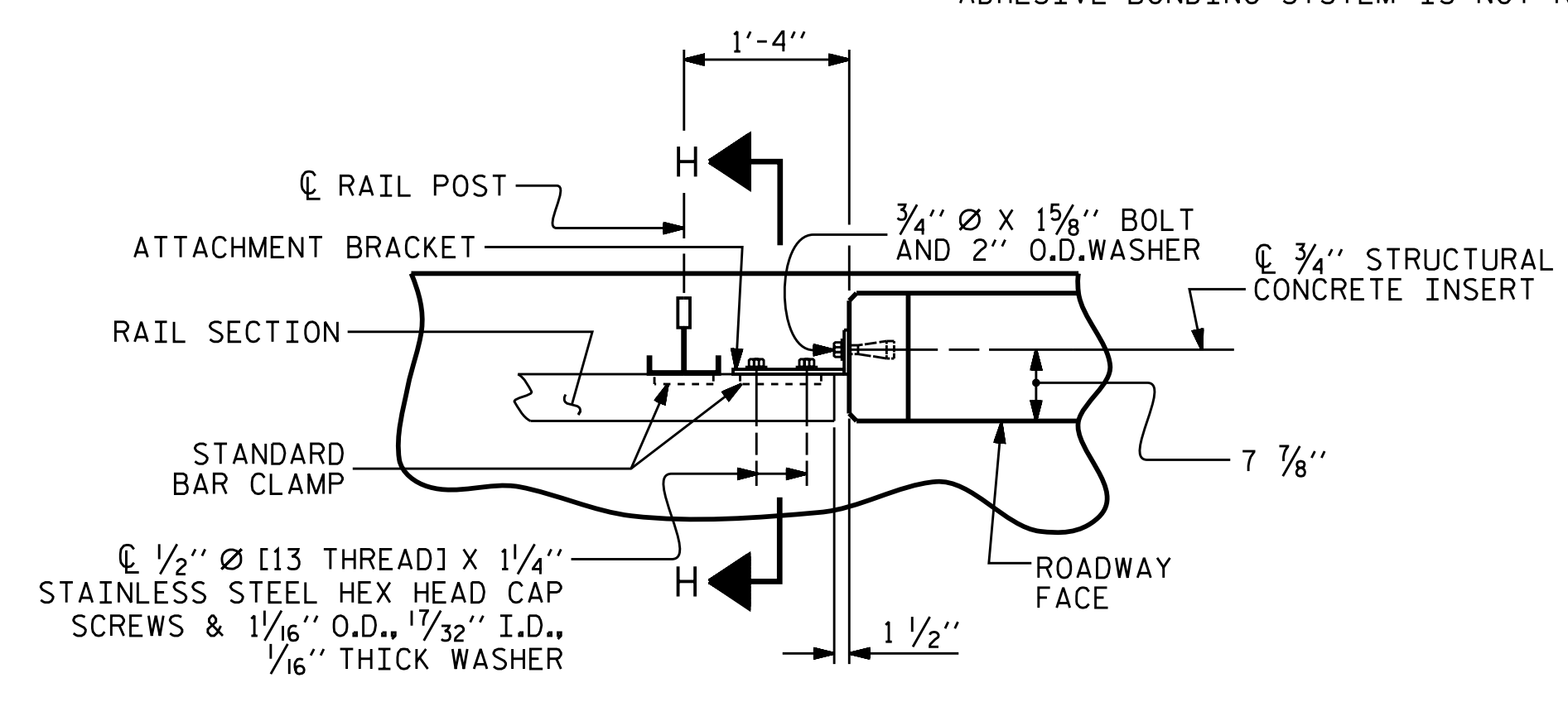


END VIEW (FIX AND EXP.)

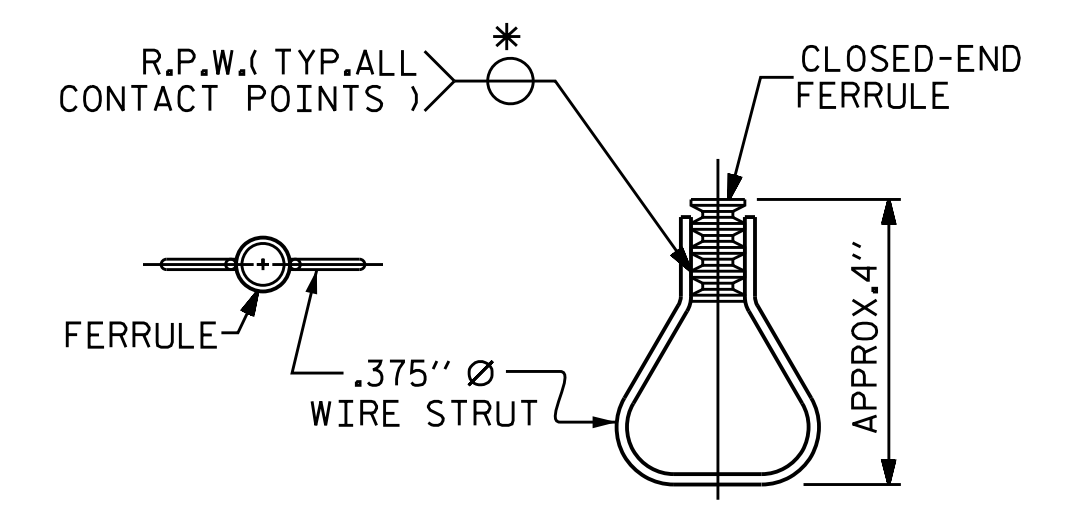


SECTION H-H (FIX)

FIXED



PLAN - RAIL AND END POST



PLAN ELEVATION

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

DRAWN BY : NMW DATE : 8/16
 CHECKED BY : RAR DATE : 5/17
 DESIGN ENGINEER OF RECORD : RDE DATE : 5/17

12/13/2017

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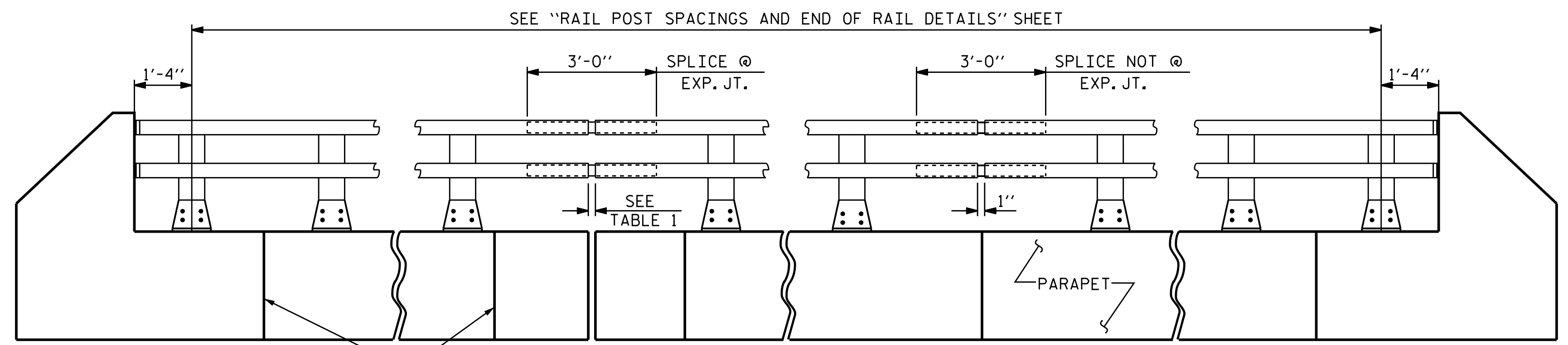
TGS ENGINEERS
 804-C N. LAFAYETTE ST
 SHELBY, NC 28150
 PH (704) 476-0003
 CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

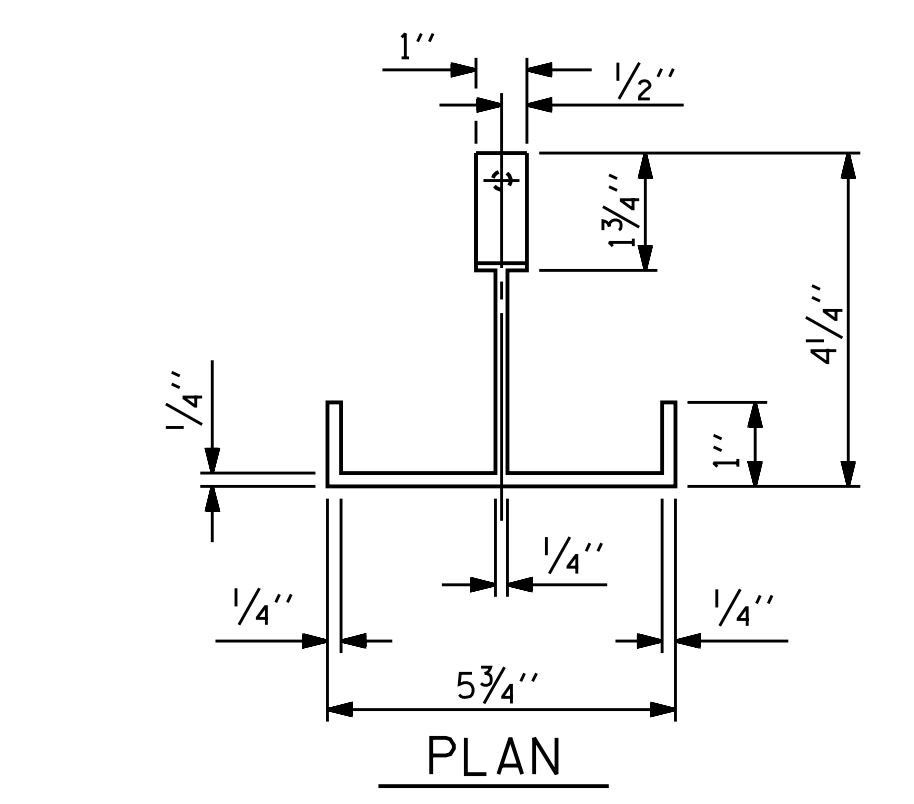
**RAIL POST SPACINGS
 AND
 END OF RAIL DETAILS**
 FOR ONE OR TWO BAR METAL RAILS

PROJECT NO. U-5866
 GRAHAM COUNTY
 STATION: 20+25.00-L-

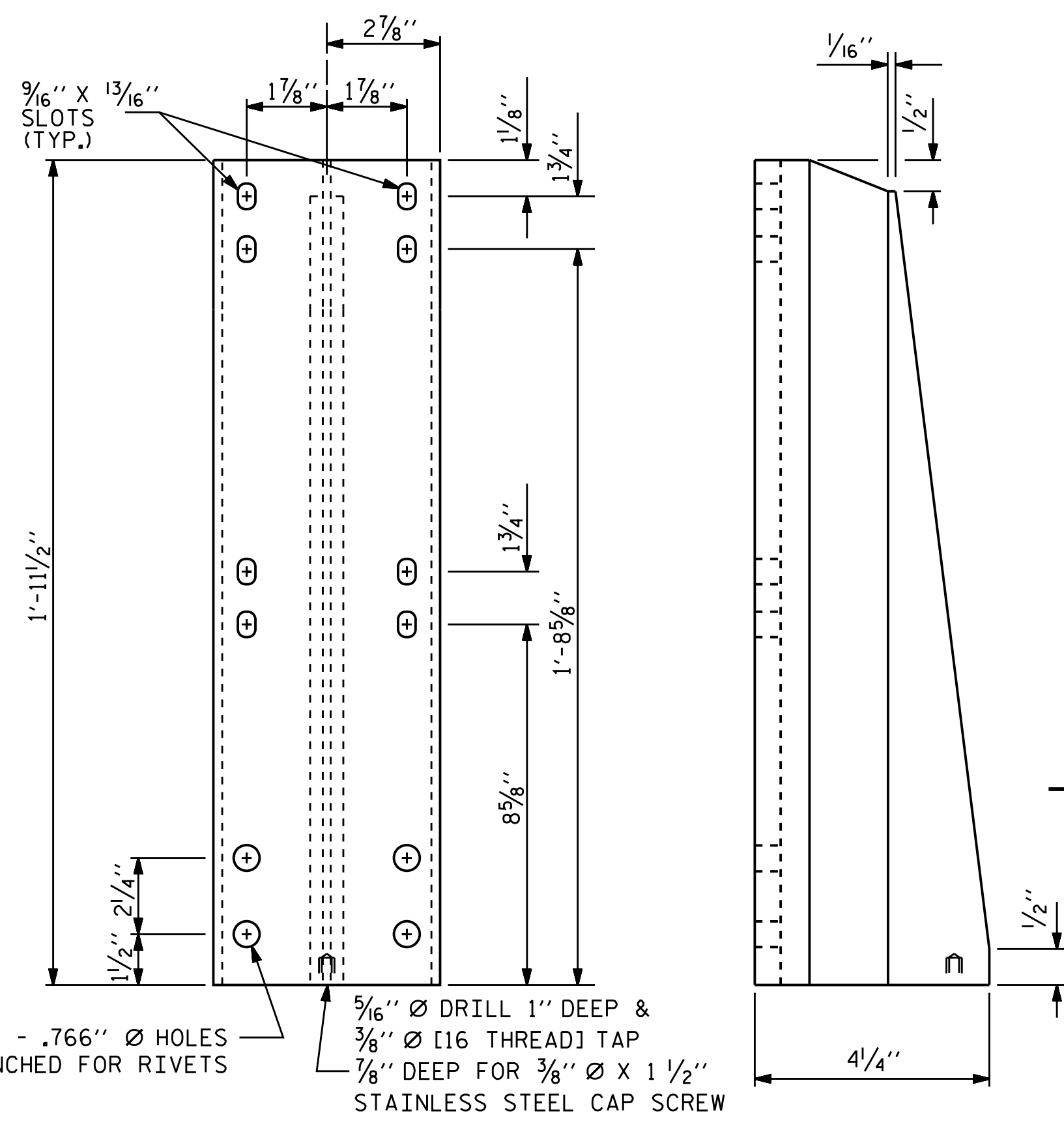
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	TOTAL SHEETS
1			3			S-18
2			4			33



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



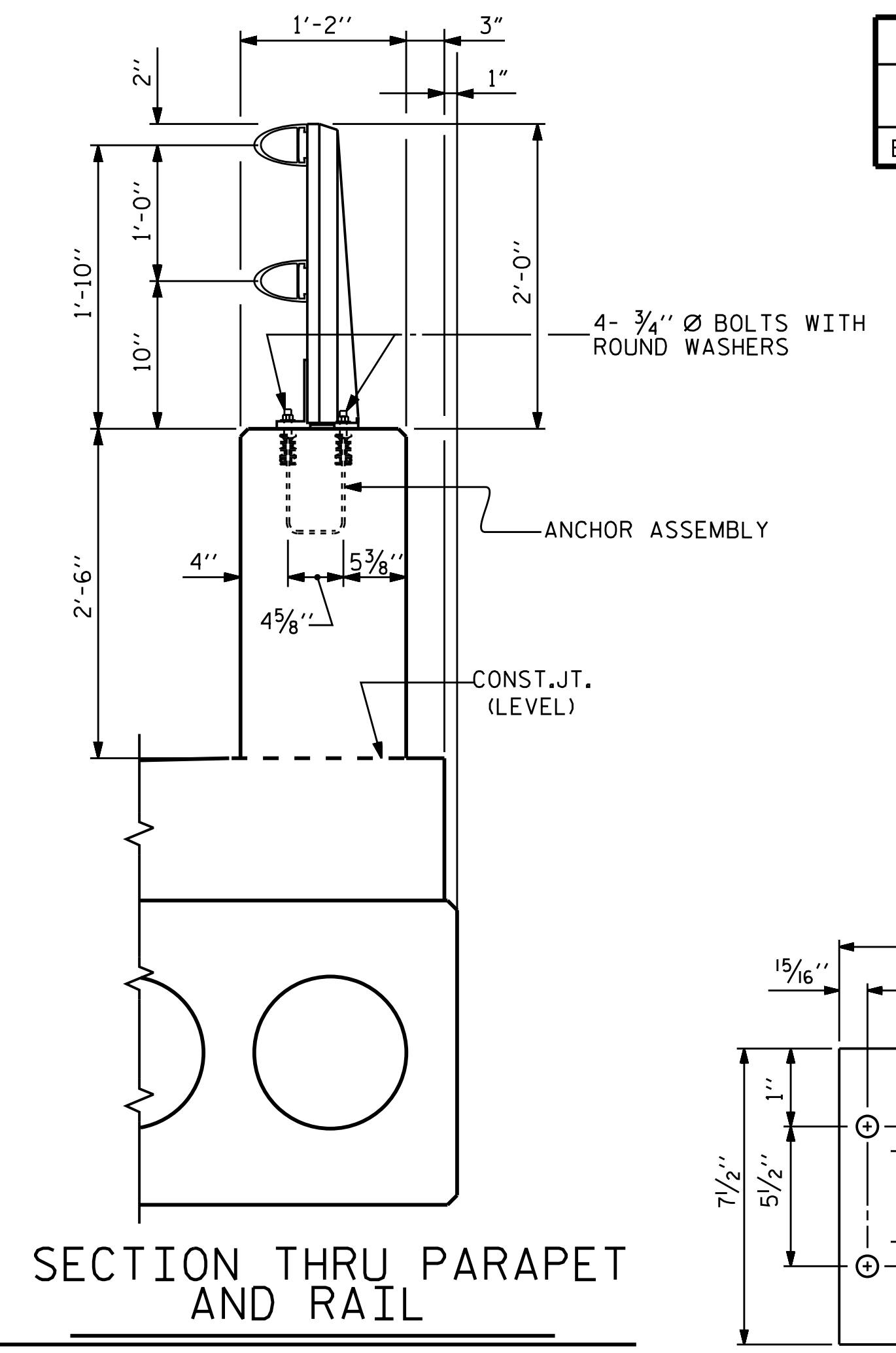
PLAN



FRONT ELEVATION

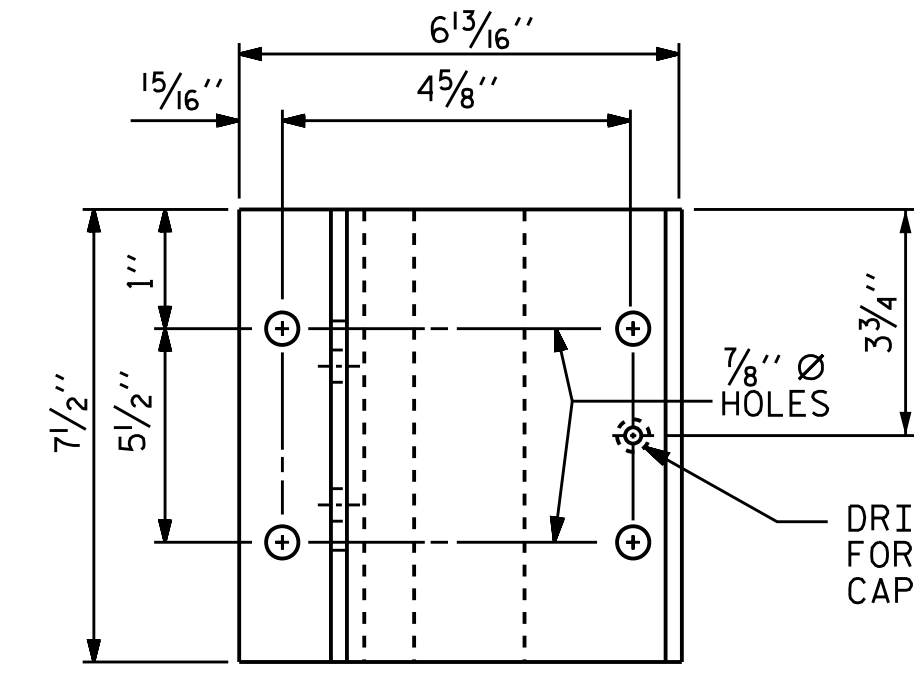
SIDE ELEVATION

DETAILS OF POST

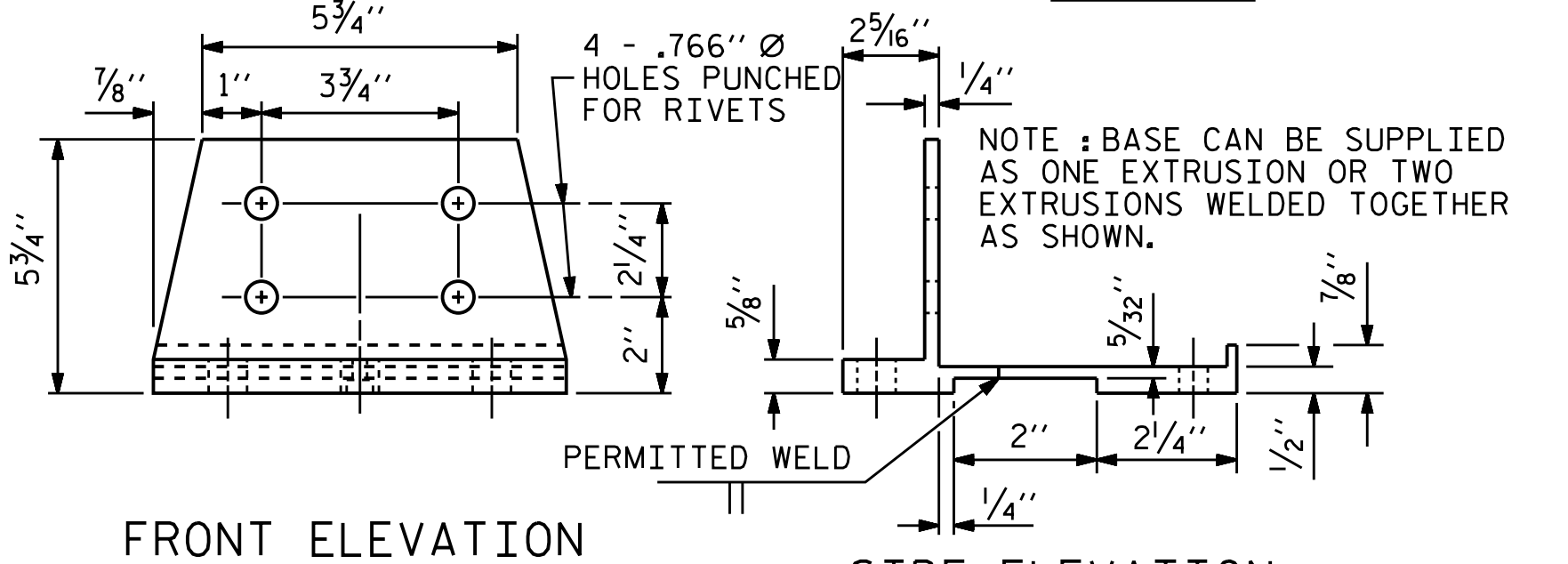


SECTION THRU PARAPET AND RAIL

TABLE 1	
EXP. JT. @	RAIL OPENING
BENT No. 1	1 1/2"



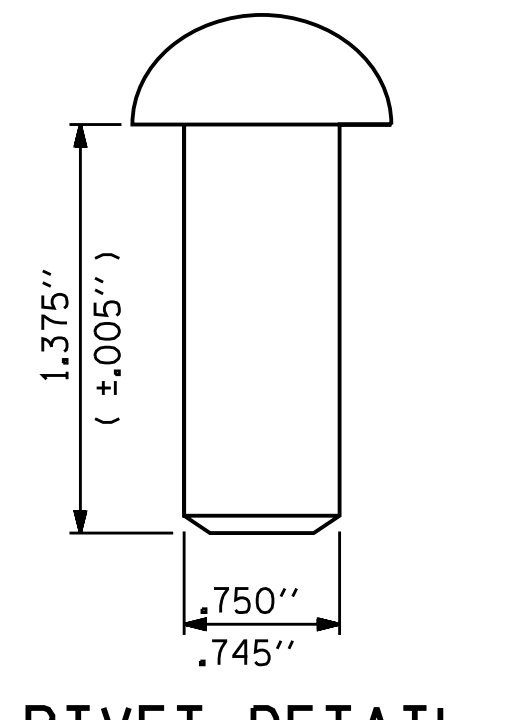
PLAN



FRONT ELEVATION

SIDE ELEVATION

POST BASE DETAILS



RIVET DETAIL

PAY LENGTH = 424.2 LIN. FT.

NOTES

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.

THE METAL RAILING SHALL BE ALUMINUM AND IN ACCORDANCE WITH THE REQUIREMENTS OF THE GENERAL NOTES AND THE FOLLOWING SPECIFICATIONS.

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.

ANODIZING

ALUMINUM FOR POSTS, BASES, AND RAILS, EXPANSION BARS AND CLAMP BARS, RIVETS, AND SHIMS SHALL BE ANODIZED BLACK. FOR ANODIZED 2 BAR METAL RAIL, SEE SPECIAL PROVISIONS.

ANY DAMAGE TO THE ANODIZED SURFACE OF THE RAIL OF COMPONENTS DURING THE CONSTRUCTION SHALL BE REPAIRED ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS AT THE DIRECTION OF THE ENGINEER AND AT THE CONTRACTOR'S EXPENSE.

AFTER A SHADE OF BLACK HAS BEEN SELECTED FOR THE RAILING, THE CONTRACTOR SHALL SUBMIT A SAMPLE OF THE COMPATIBLE EXTERIOR ACRYLIC HOUSE PAINT TO THE ENGINEER. THIS PAINT SHALL MATCH THE ANODIZED RAIL COLOR AS CLOSELY AS POSSIBLE. AFTER ERECTION OF THE ANODIZED ALUMINUM RAILING, ALL EXPOSED ANCHOR BOLTS, NUTS, WASHERS, MACHINE SCREWS, BOLTS, ATTACHMENT BRACKETS, HOLD DOWN PLATES, RAIL CAPS AND BUILD UP ANGLES SHALL BE COATED WITH TWO COATS OF THIS PAINT.

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.

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.

PROJECT NO. U-5866
GRAHAM COUNTY
STATION: 20+25.00-L-

SHEET 1 OF 2

12/13/2017

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TGS ENGINEERS
804-C N. LAFAYETTE ST
SHELBY, NC 28150
PH (704) 476-0003
CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
STANDARD ANODIZED 2 BAR METAL RAIL					
REVISIONS					
NO.	BY	DATE	NO.	BY	DATE
1			3		
2			4		

SHEET NO. S-19
TOTAL SHEETS 33

ASSEMBLED BY : NMW	DATE : 8/16
CHECKED BY : RAR	DATE : 5/17
DESIGN ENGINEER OF RECORD : RDE	DATE : 5/17
DRAWN BY : EEM 6/94	REV. 5/1/06 TLA/GM
CHECKED BY : RCW 6/94	REV. 10/1/11 MAA/GM
	REV. 6/1/11 MAA/GM

NOTES

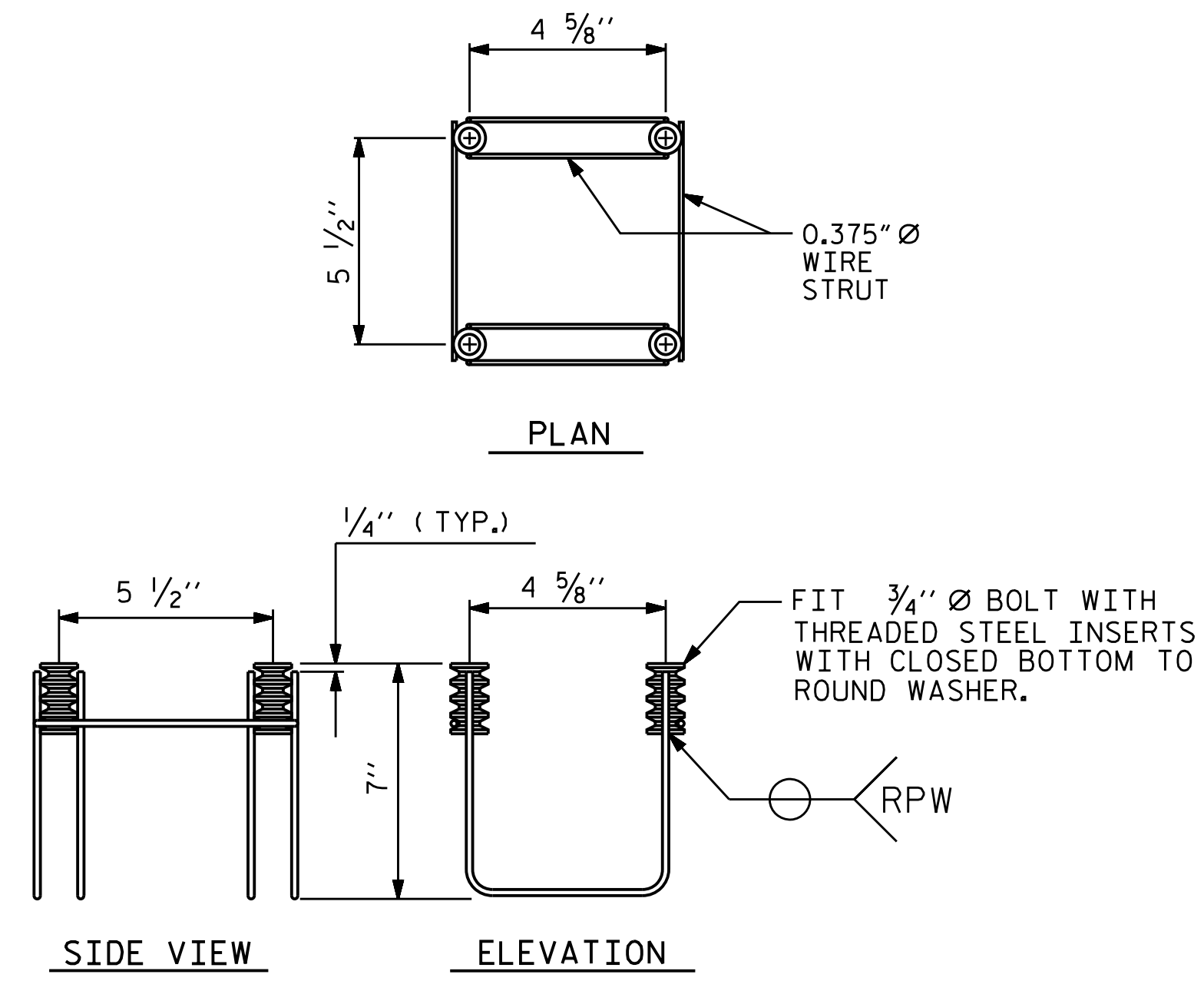
STRUCTURAL CONCRETE ANCHOR ASSEMBLY

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 1/16" 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.

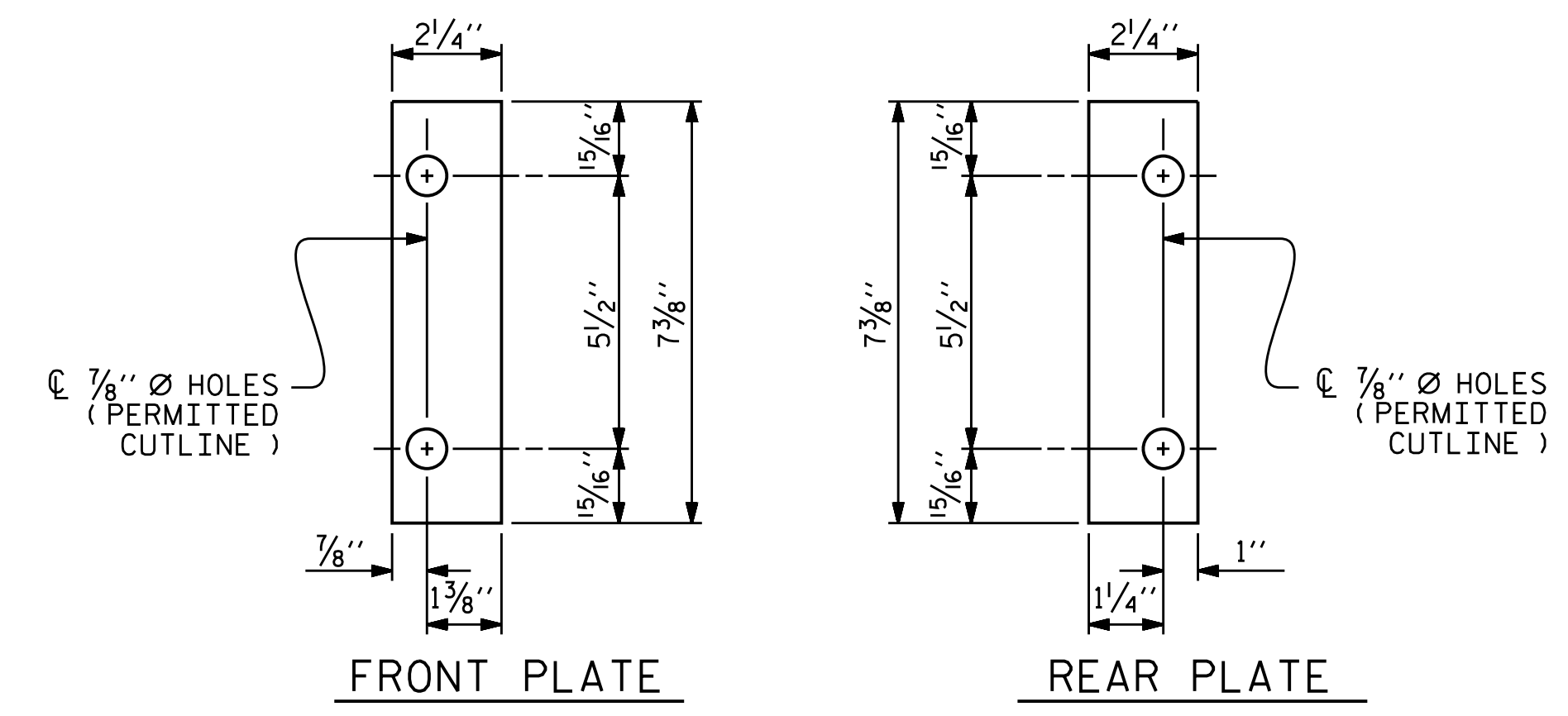
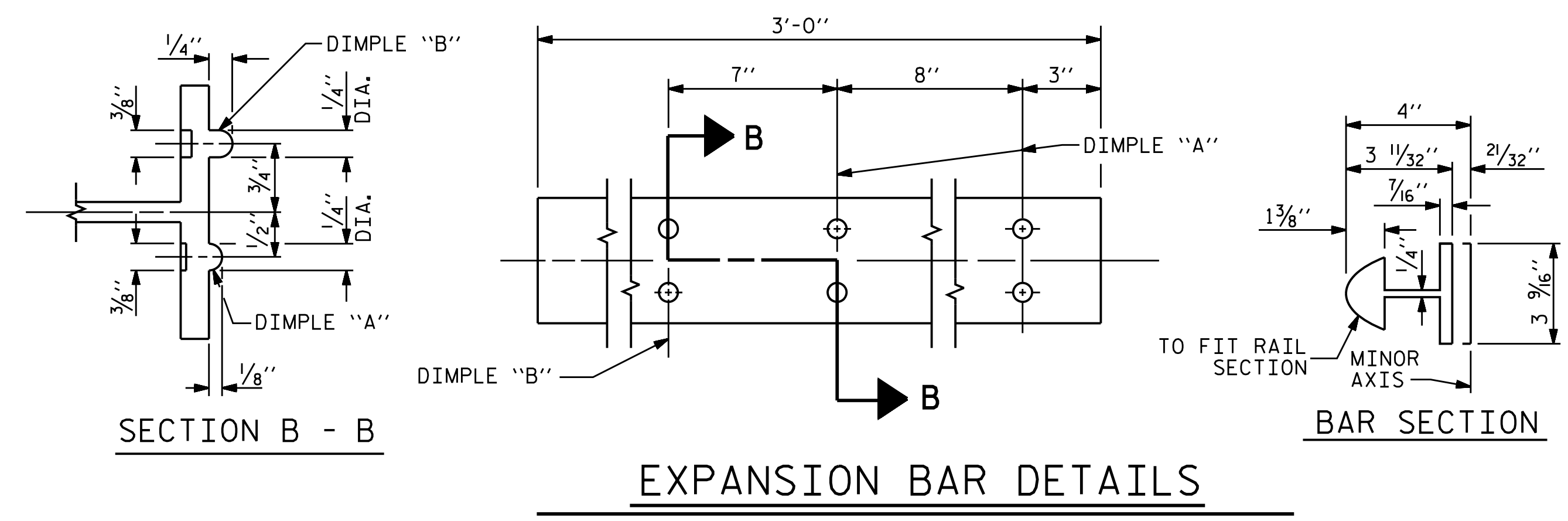
THE CONTRACTOR MAY USE ADHESIVELY ANCHORED ANCHOR BOLTS IN PLACE OF THE METAL RAIL ANCHOR ASSEMBLY. LEVEL ONE FIELD TESTING IS REQUIRED, AND THE YIELD LOAD OF THE 3/4" Ø BOLT IS 10 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE THE STANDARD SPECIFICATIONS.

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.



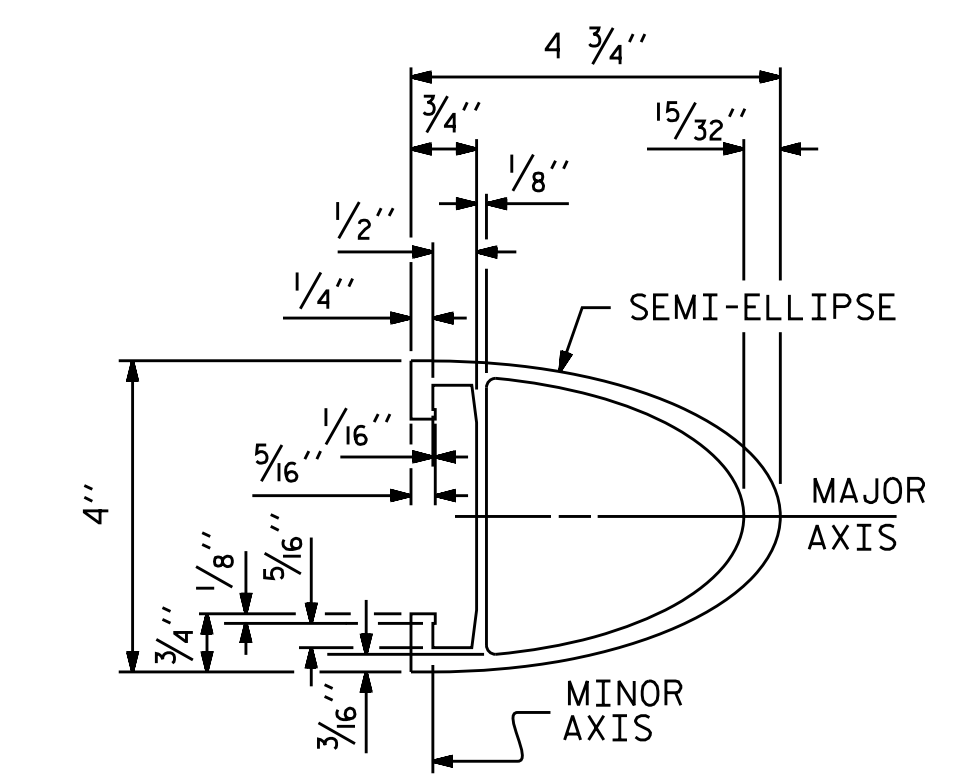
4-BOLT METAL RAIL ANCHOR ASSEMBLY

(76 ASSEMBLIES REQUIRED)

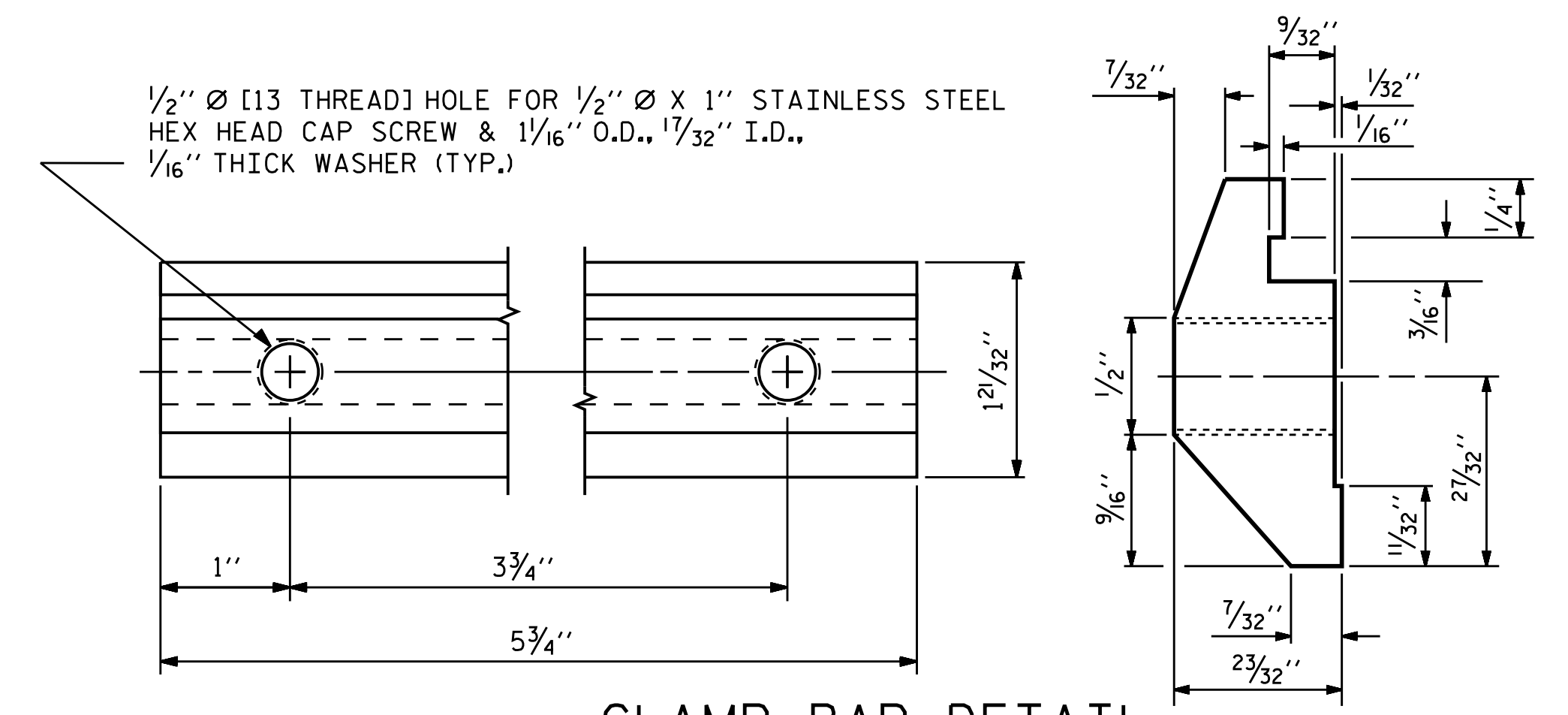


SHIM DETAILS

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

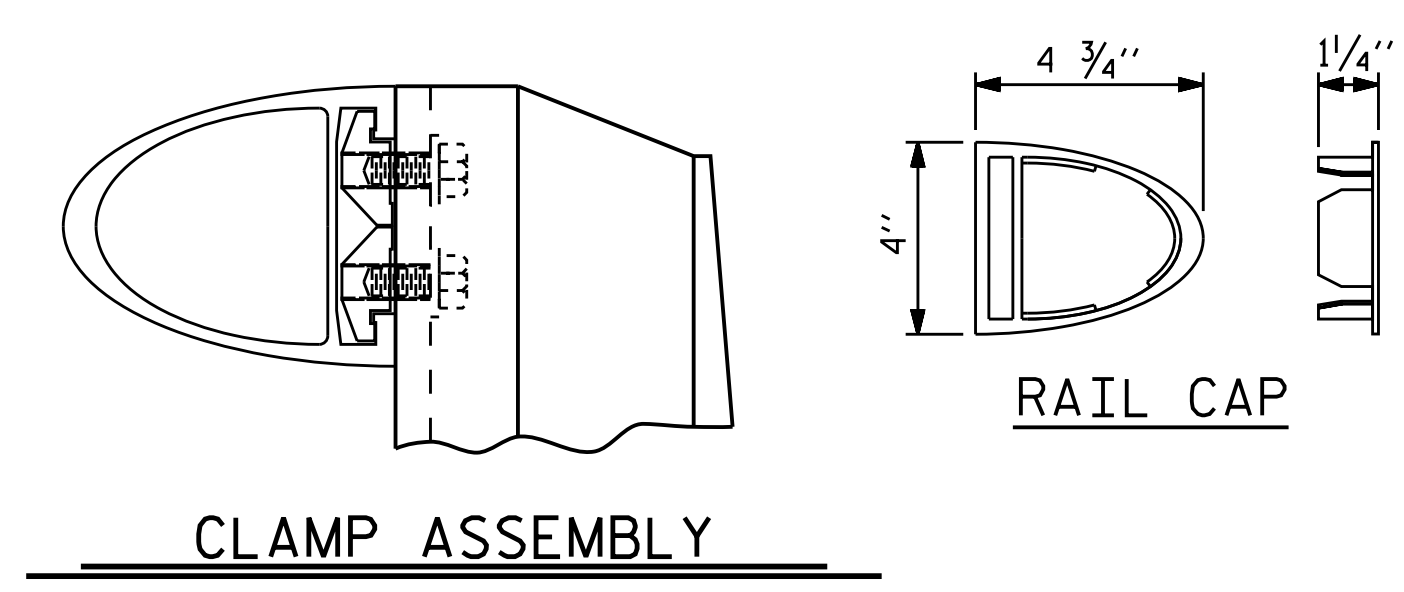


RAIL SECTION

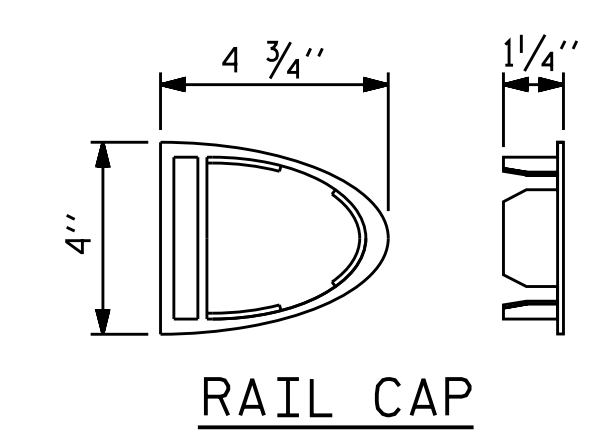


CLAMP BAR DETAIL

(4 REQUIRED PER POST)



CLAMP ASSEMBLY

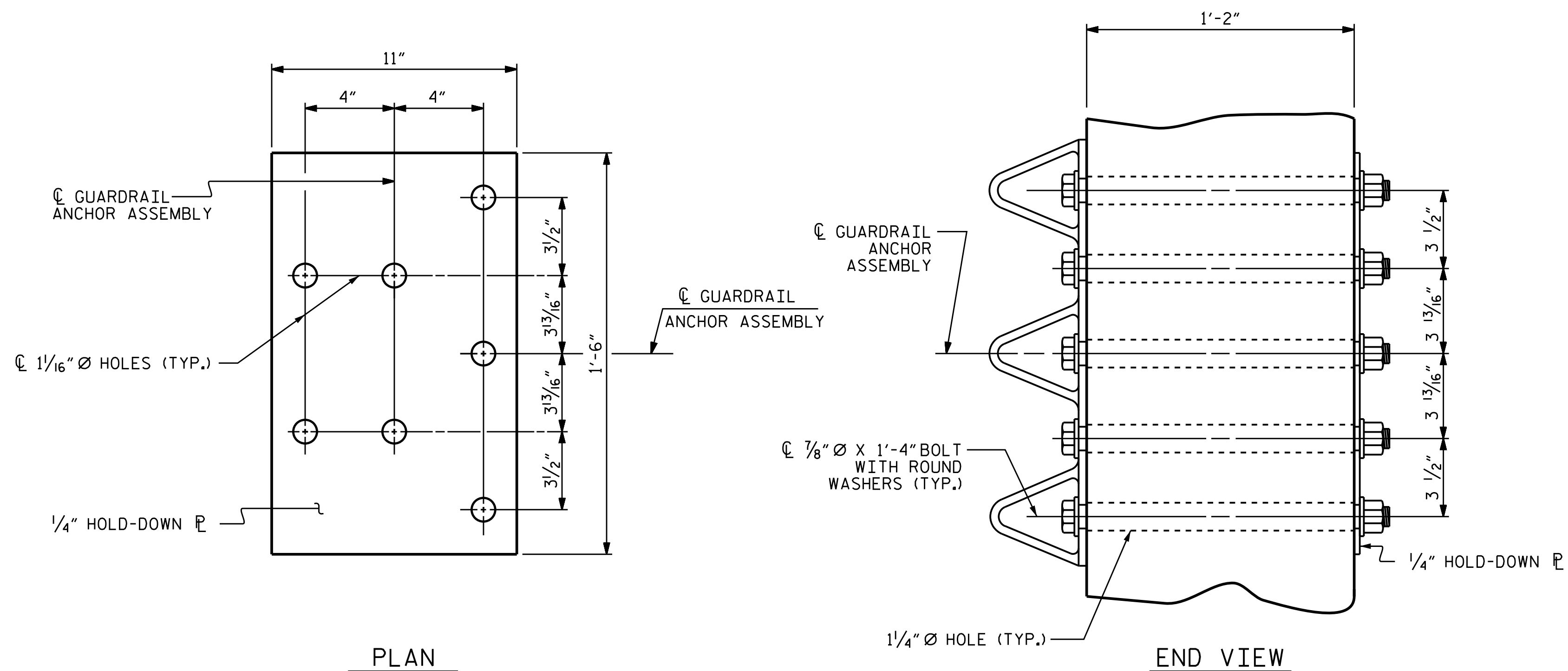


RAIL CAP

PROJECT NO. U-5866
 GRAHAM COUNTY
 STATION: 20+25.00-L-
 SHEET 2 OF 2

		STATE OF NORTH CAROLINA		SHEET NO. S-20
		DEPARTMENT OF TRANSPORTATION RALEIGH		
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED		STANDARD		TOTAL SHEETS 33
		2 BAR METAL RAIL		
TGS ENGINEERS 804-C N. LAFAYETTE ST SHELBY, NC 28150 PH (704) 476-0003 CORP. LICENSE NO.: C-0275		REVISIONS NO. BY DATE NO. BY DATE		1 2
12/13/2017		3 4		

ASSEMBLED BY : NMW	DATE : 8/16
CHECKED BY : RAR	DATE : 5/17
DESIGN ENGINEER OF RECORD : RDE	DATE : 5/17
DRAWN BY : EEM 6/94	REV. 8/16/99 TLA/GM
CHECKED BY : RCW 6/94	REV. 5/1/06R MAA/GM
	REV. 10/1/11 MAA/GM



GUARDRAIL ANCHOR ASSEMBLY DETAILS

NOTES (FOR METAL RAILS)

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

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

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

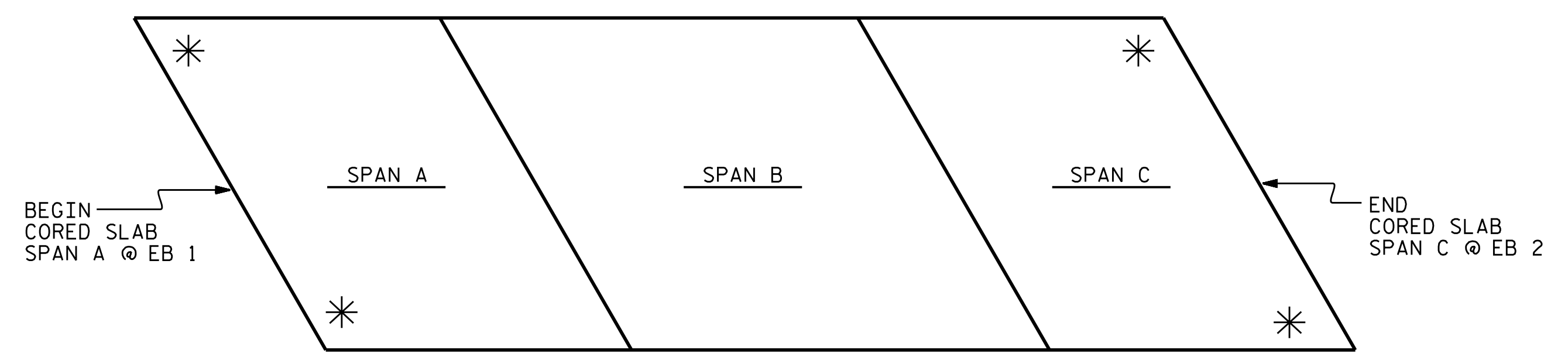
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF THE PARAPET. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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

THE COST OF THE GUARDRAIL ANCHOR ASSEMBLIES WITH BOLTS, NUTS AND WASHERS COMPLETE IN PLACE, SHALL BE INCLUDED IN THE VARIOUS PAY ITEMS.

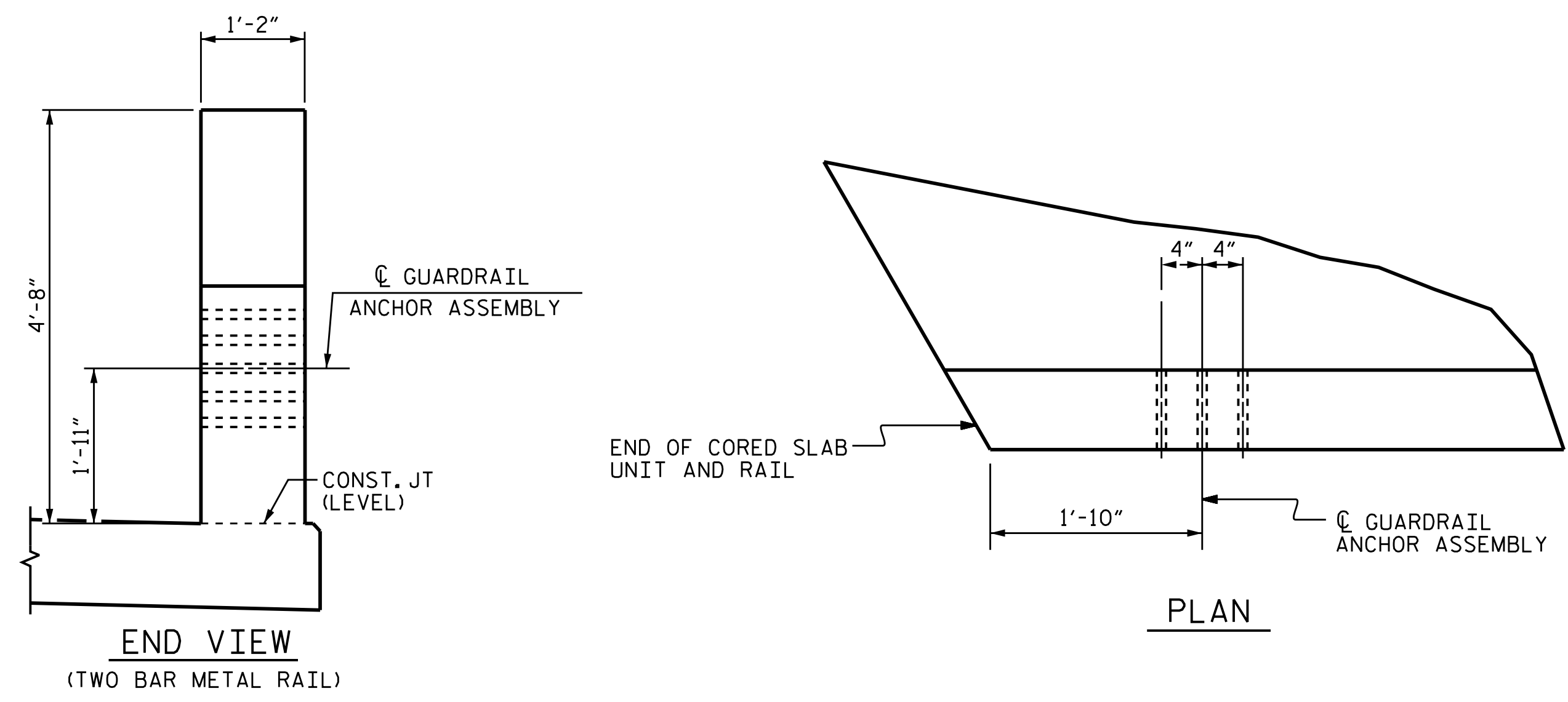
THE VERTICAL REINFORCING BARS MAY BE SHIFTED SLIGHTLY IN THE END POST TO CLEAR ASSEMBLY BOLTS.

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



SKETCH SHOWING POINTS OF ATTACHMENT

* LOCATION OF GUARDRAIL ATTACHMENT



LOCATION OF GUARDRAIL ANCHOR AT END POST

PROJECT NO. U-5866
GRAHAM COUNTY
 STATION: 20+25.00-L-

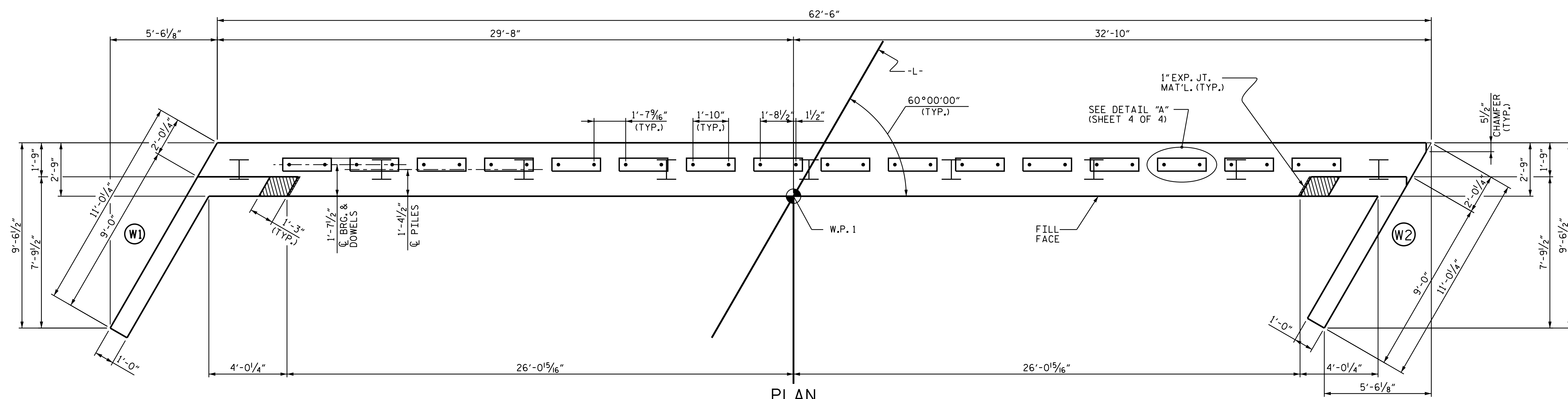
ASSEMBLED BY :	NMW	DATE :	8/16
CHECKED BY :	RAR	DATE :	5/17
DESIGN ENGINEER OF RECORD :	RDE	DATE :	5/17
DRAWN BY :	MAA 5/10	REV. 12/5/11	MAA/GM
CHECKED BY :	GM 5/10	REV. 6/13	MAA/GM
		REV. 1/15	MAA/TMG

12/13/2017

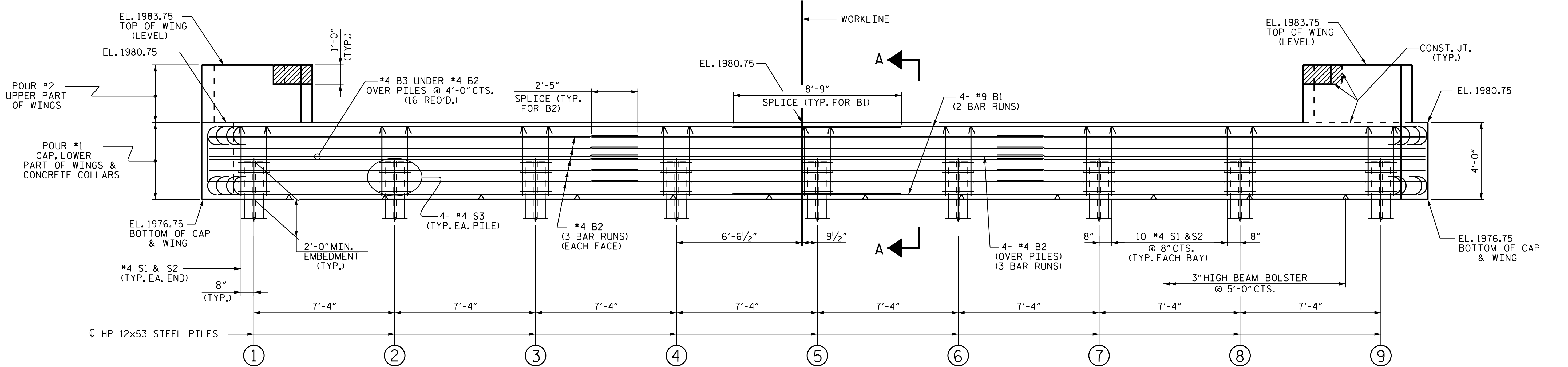
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CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH		STANDARD GUARDRAIL ANCHORAGE DETAILS FOR METAL RAILS & VERTICAL CONCRETE BARRIER RAIL	
REVISIONS			
NO.	BY:	DATE:	NO.
1			3
2			4
SHEET NO.			TOTAL SHEETS
S-21			33



PLAN



ELEVATION

PROJECT NO. U-5866
 GRAHAM COUNTY
 STATION: 20+25.00-L-

SHEET 1 OF 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.

12/13/2017

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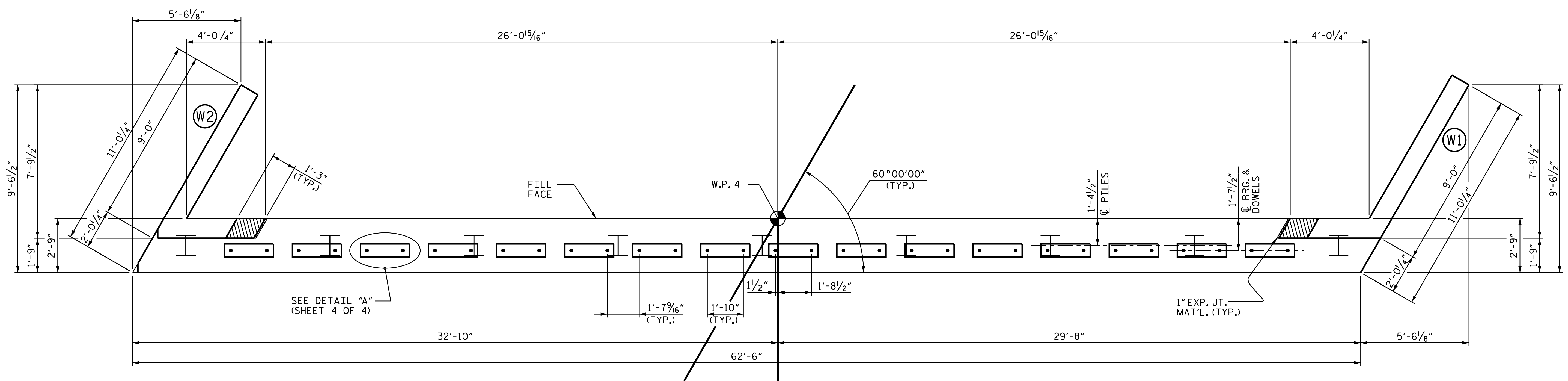
STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

SUBSTRUCTURE

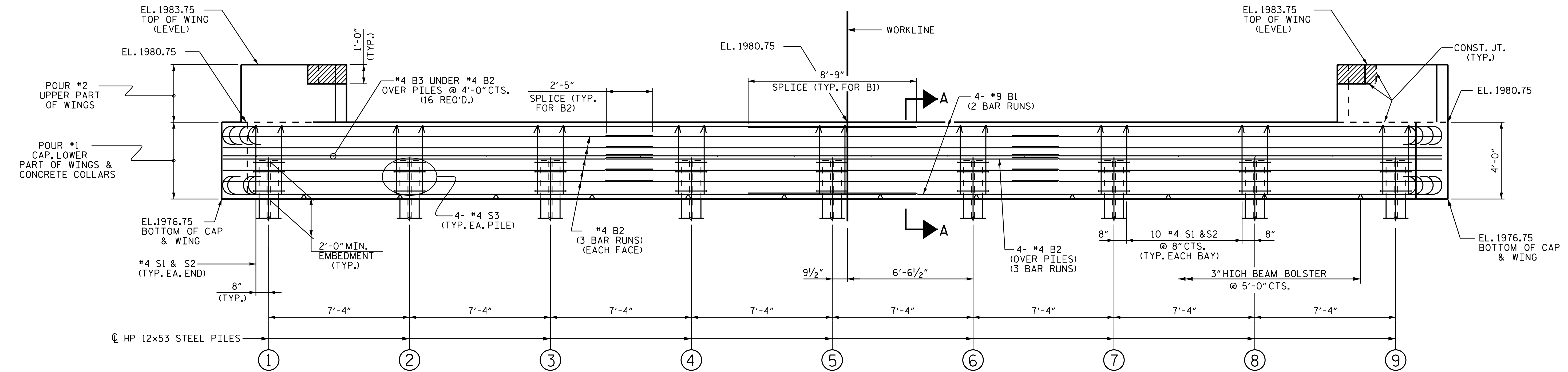
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REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S-22
1			3			TOTAL SHEETS
2			4			33

DRAWN BY : JLA DATE : 5/17
 CHECKED BY : RAR DATE : 5/17
 DESIGN ENGINEER OF RECORD : RDE DATE : 5/17



PLAN



ELEVATION

PROJECT NO. U-5866
 GRAHAM COUNTY
 STATION: 20+25.00-L-

SHEET 2 OF 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.

12/13/2017

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TGS ENGINEERS
 804-C N. LAFAYETTE ST
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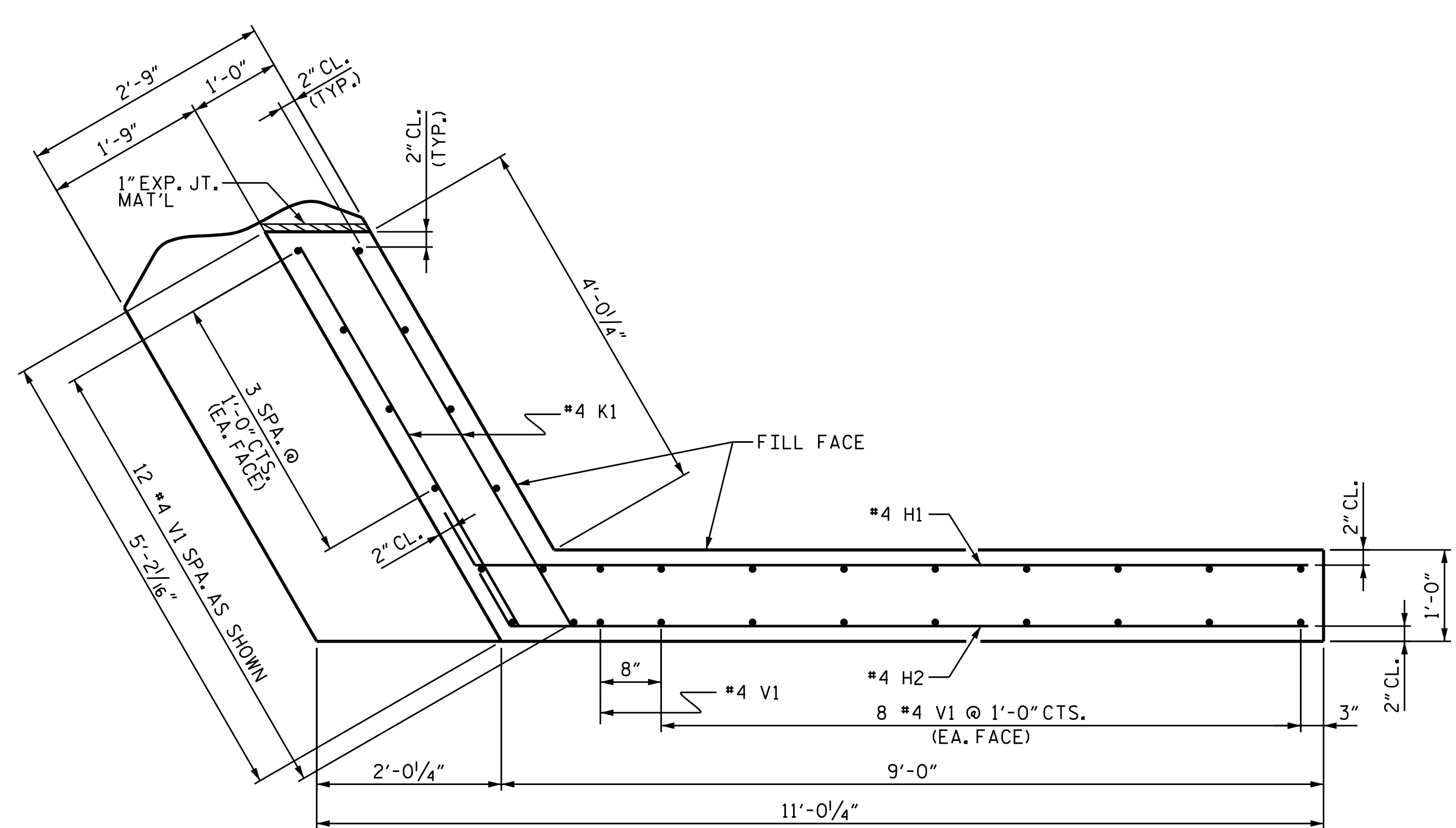
STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

SUBSTRUCTURE

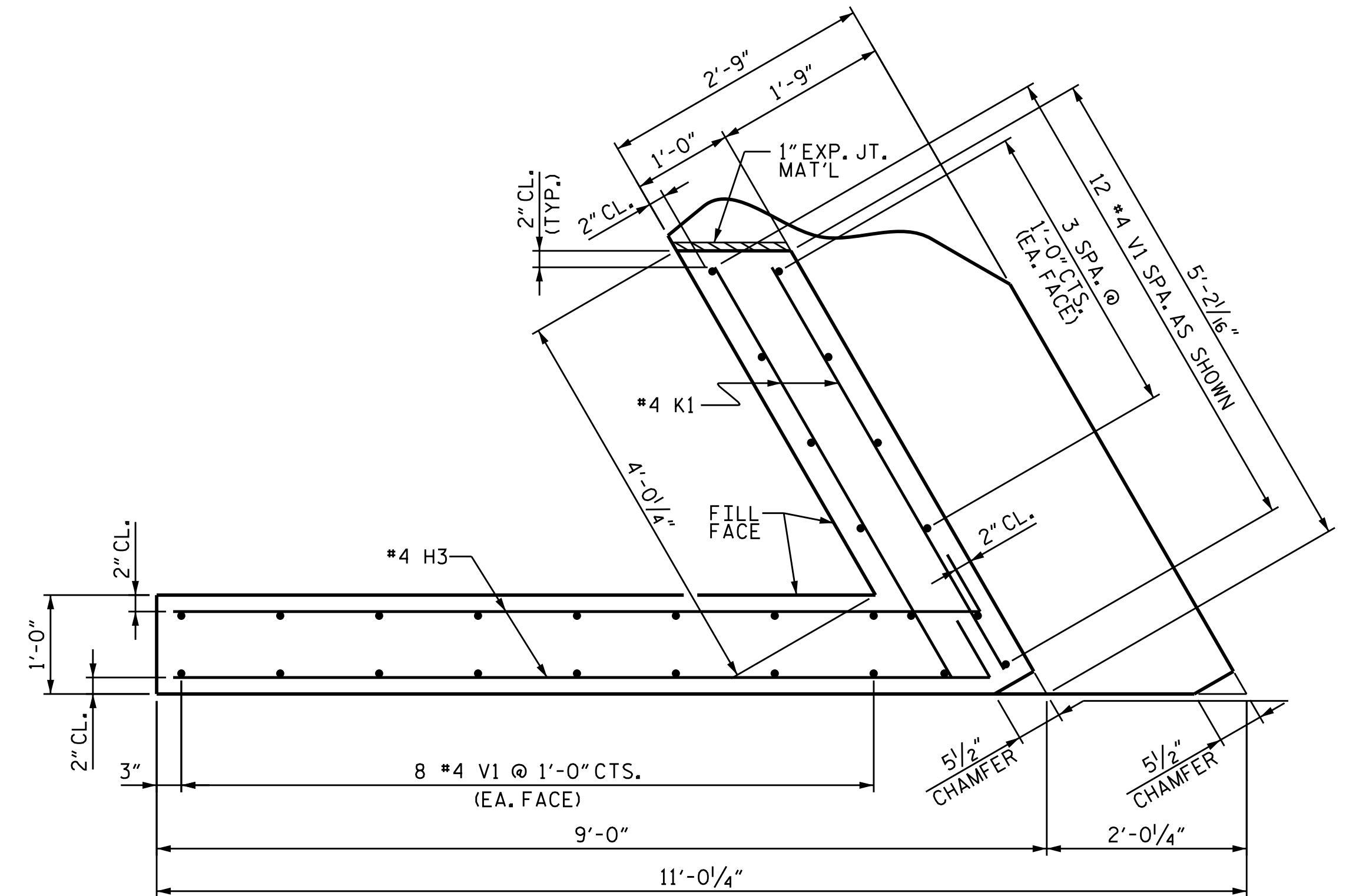
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REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S-23
1			3			TOTAL SHEETS
2			4			33

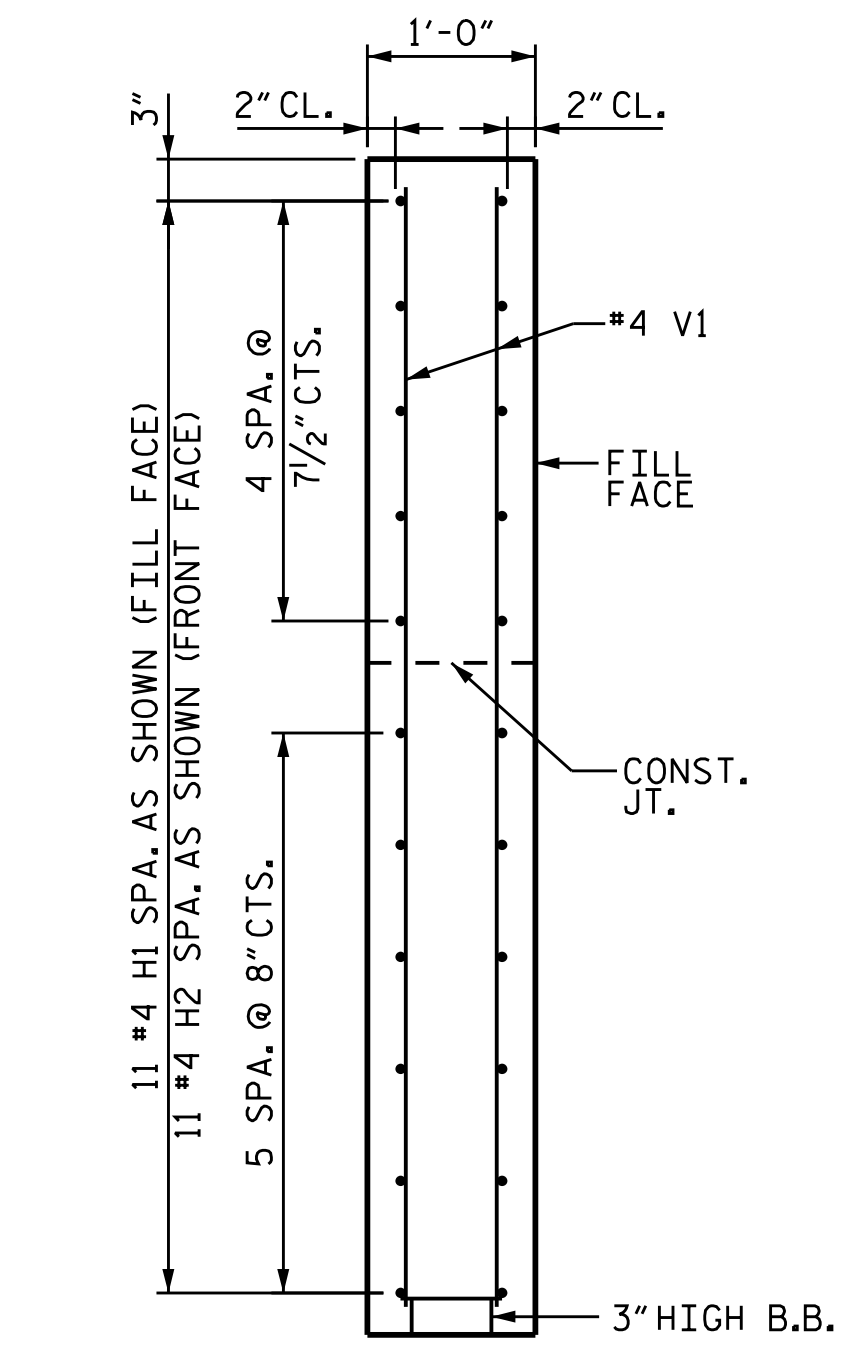
DRAWN BY : JLA DATE : 5/17
 CHECKED BY : RAR DATE : 5/17
 DESIGN ENGINEER OF RECORD : RDE DATE : 5/17



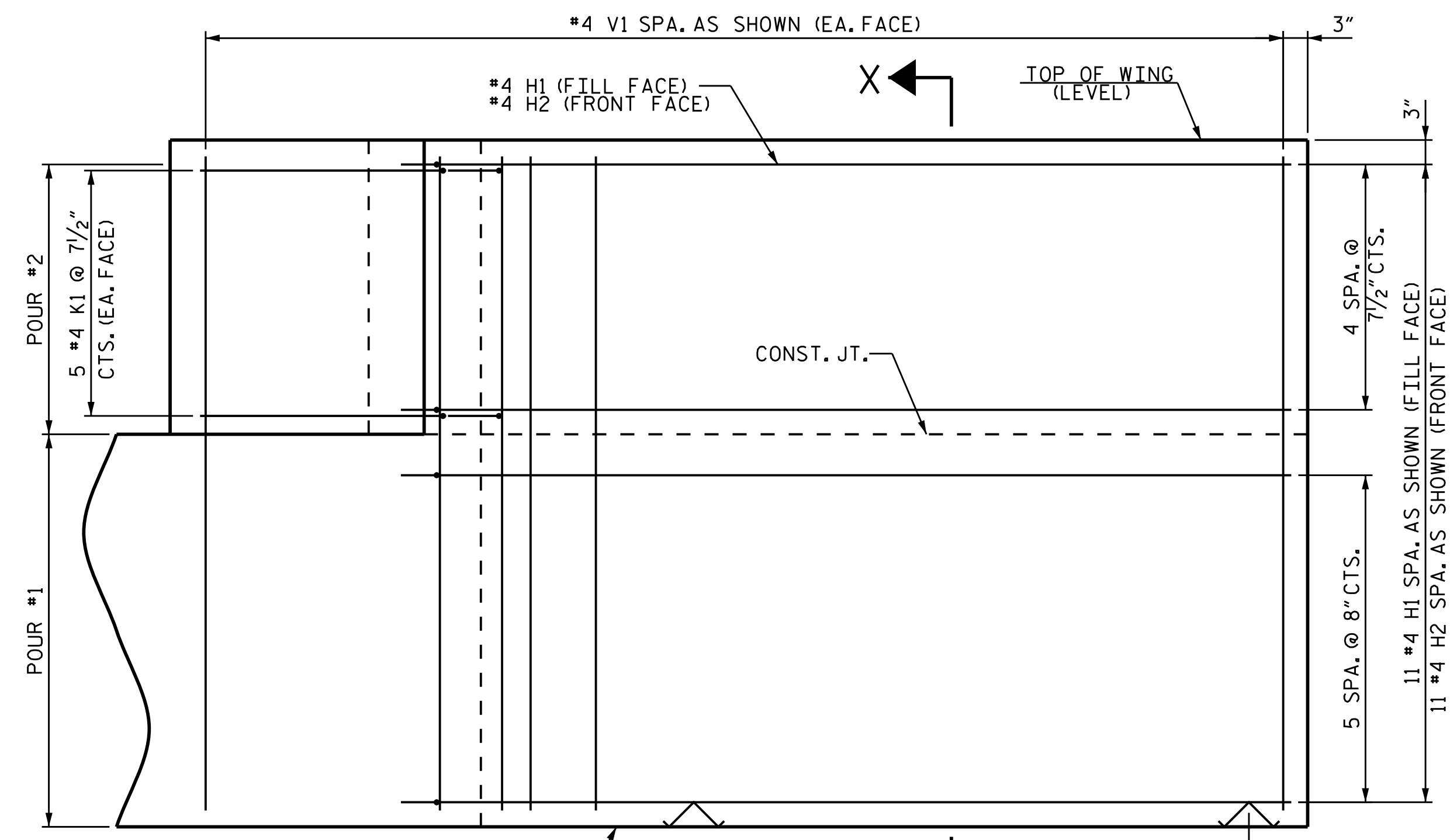
PLAN OF WING (W1)



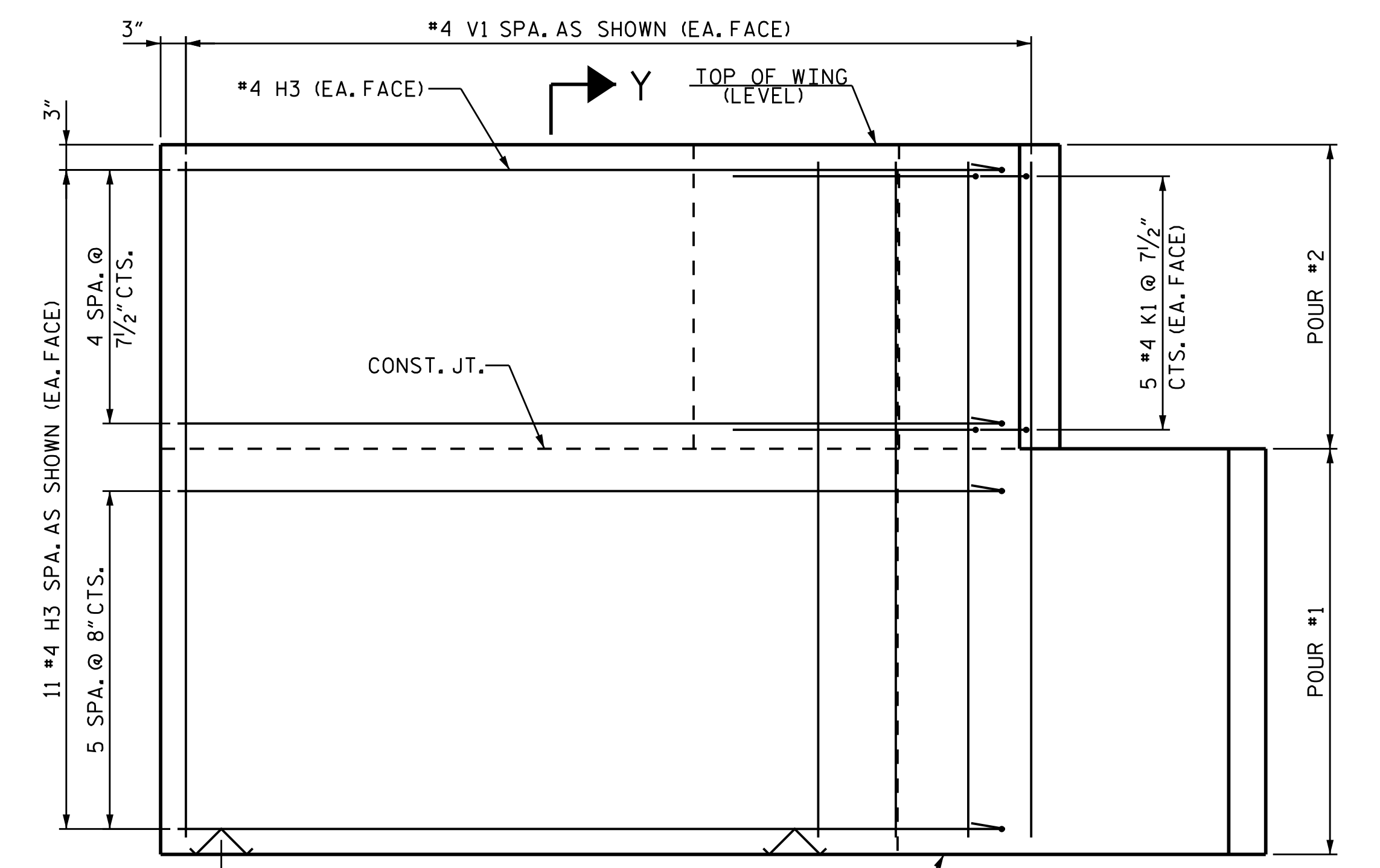
PLAN OF WING (W2)



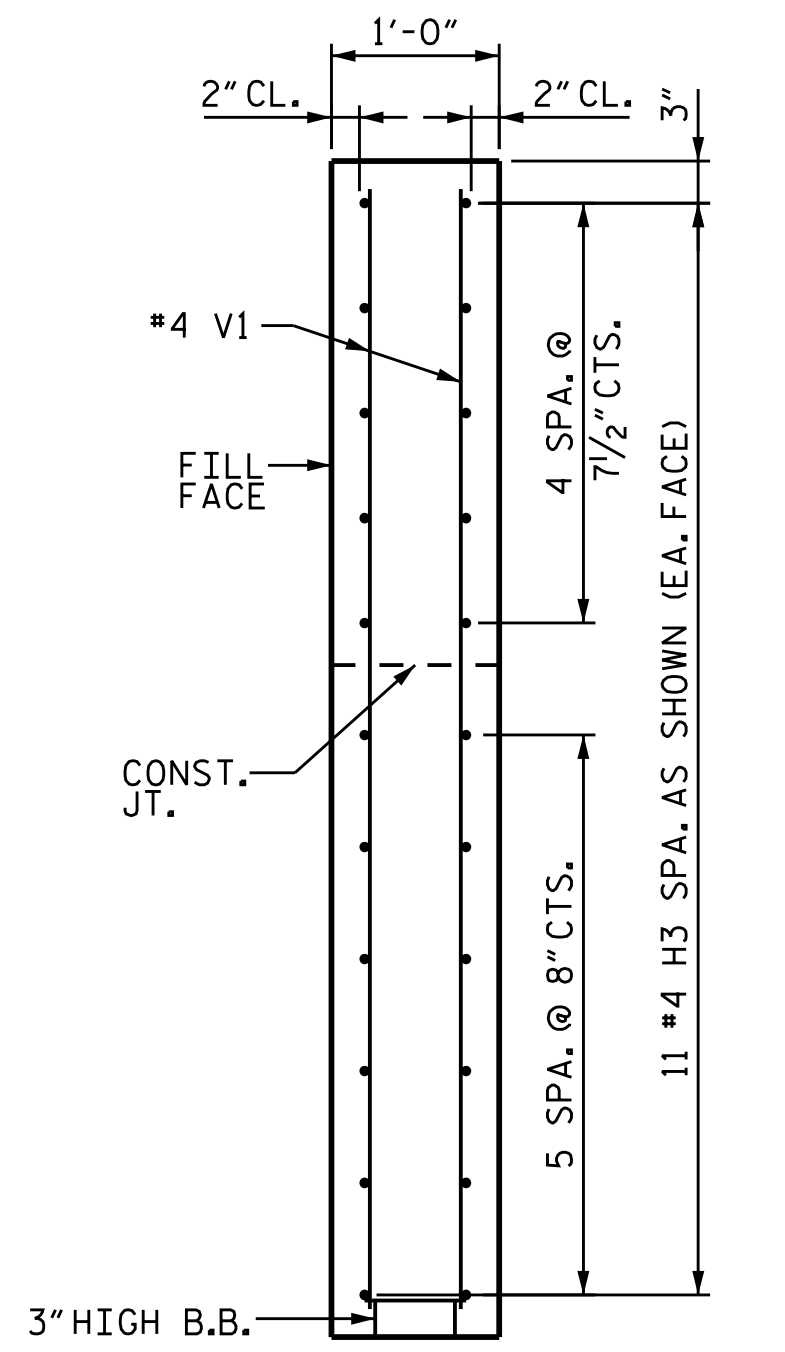
SECTION X-X



ELEVATION OF WING (W1)



ELEVATION OF WING (W2)



SECTION Y-Y

PROJECT NO. U-5866
GRAHAM COUNTY

STATION: 20+25.00-L-

SHEET 3 OF 4

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

12/13/2017

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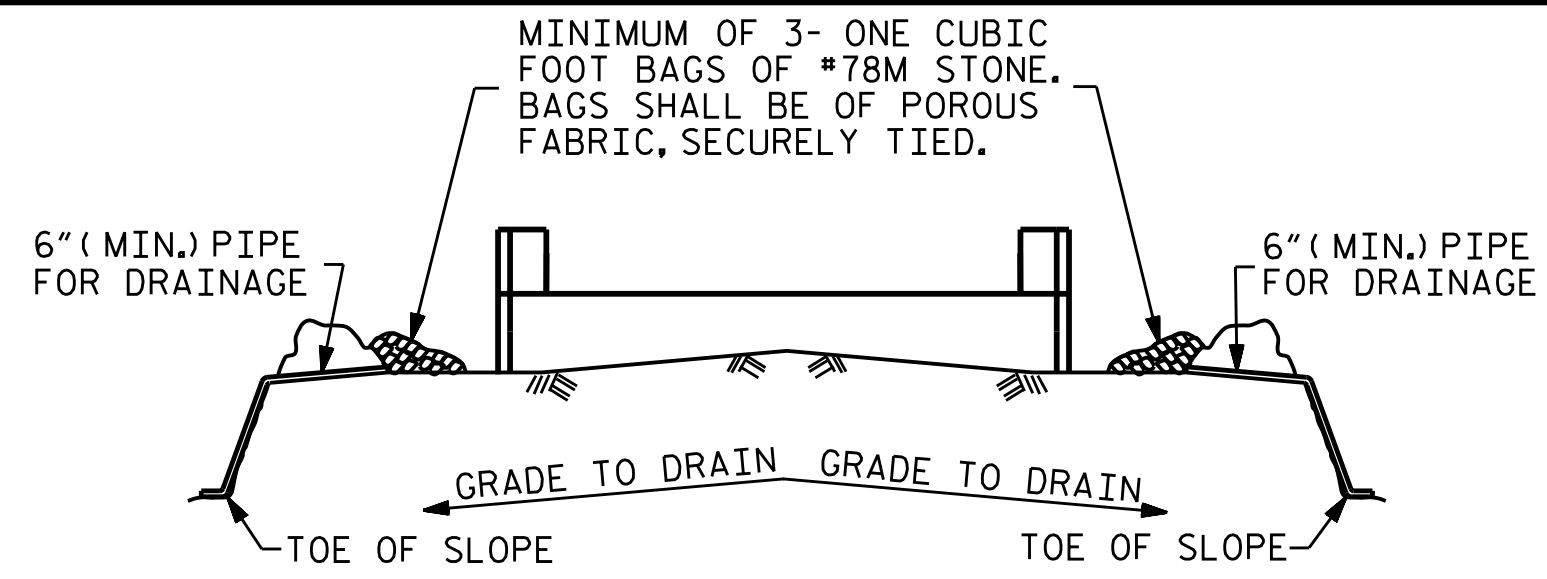
TGS ENGINEERS
804-C N. LAFAYETTE ST
SHELBY, NC 28150
PH (704) 476-0003
CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
END BENT
WING DETAILS

REVISIONS						SHEET NO. S-24
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 33
2			4			

DRAWN BY : JLA DATE : 5/17
CHECKED BY : RAR DATE : 5/17
DESIGN ENGINEER OF RECORD : RDE DATE : 5/17

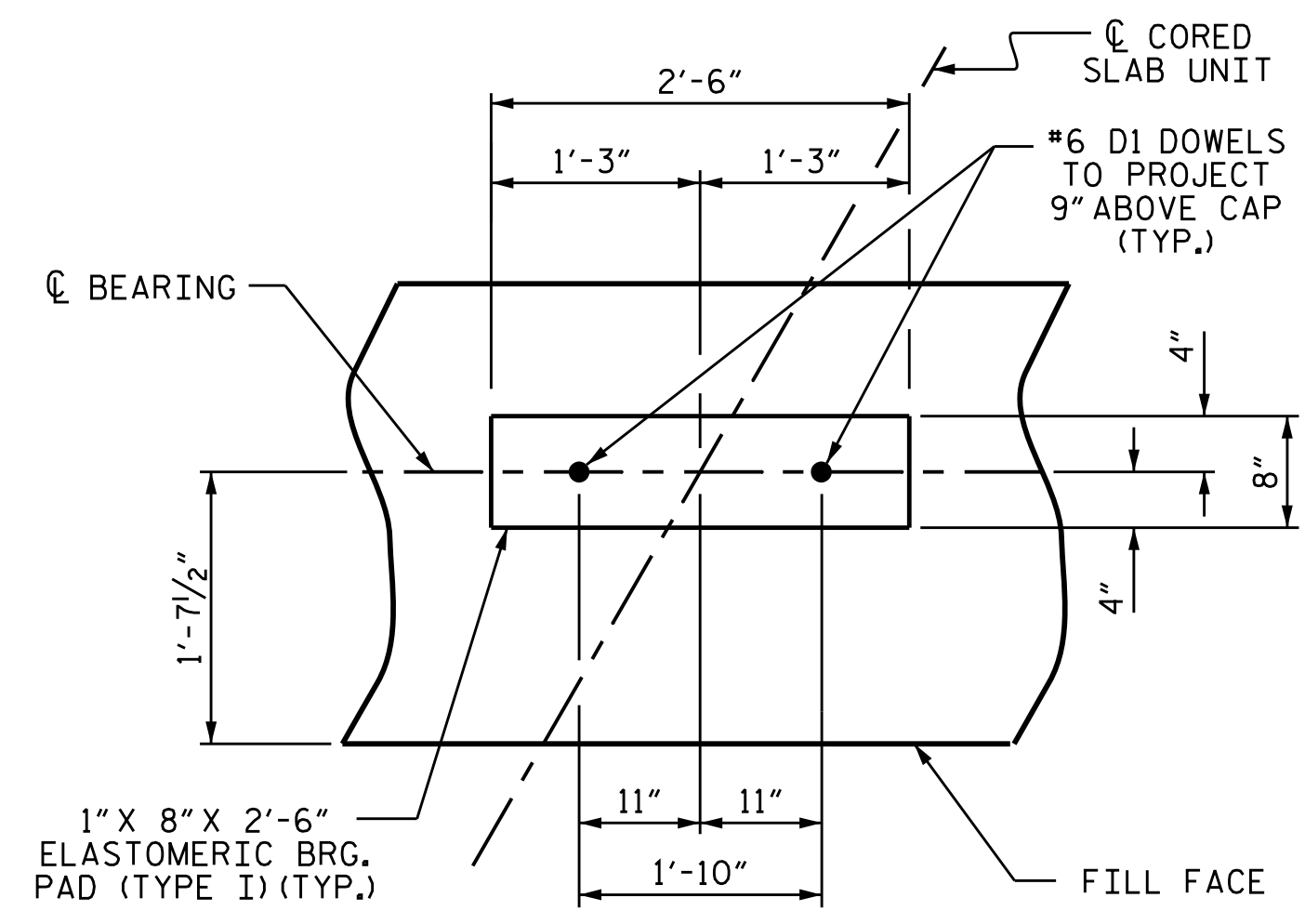


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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.

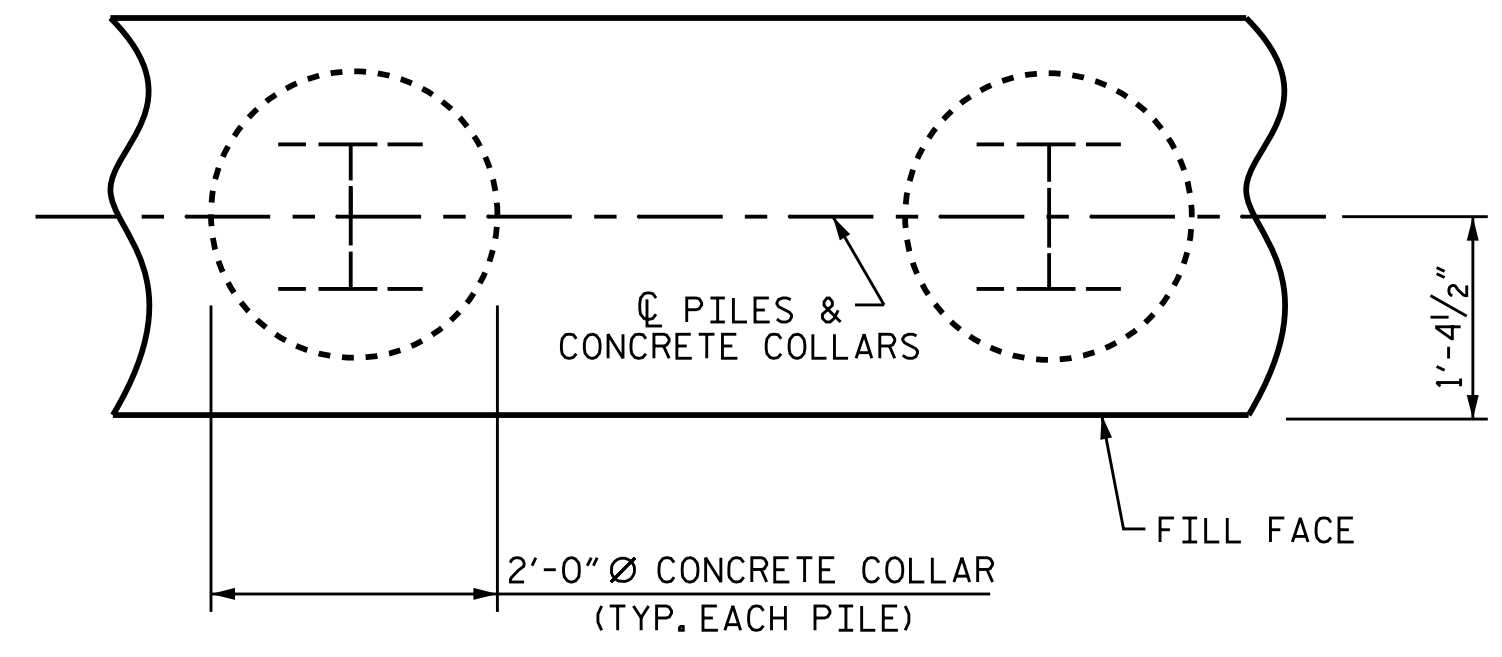
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

TEMPORARY DRAINAGE AT END BENT



DETAIL "A"

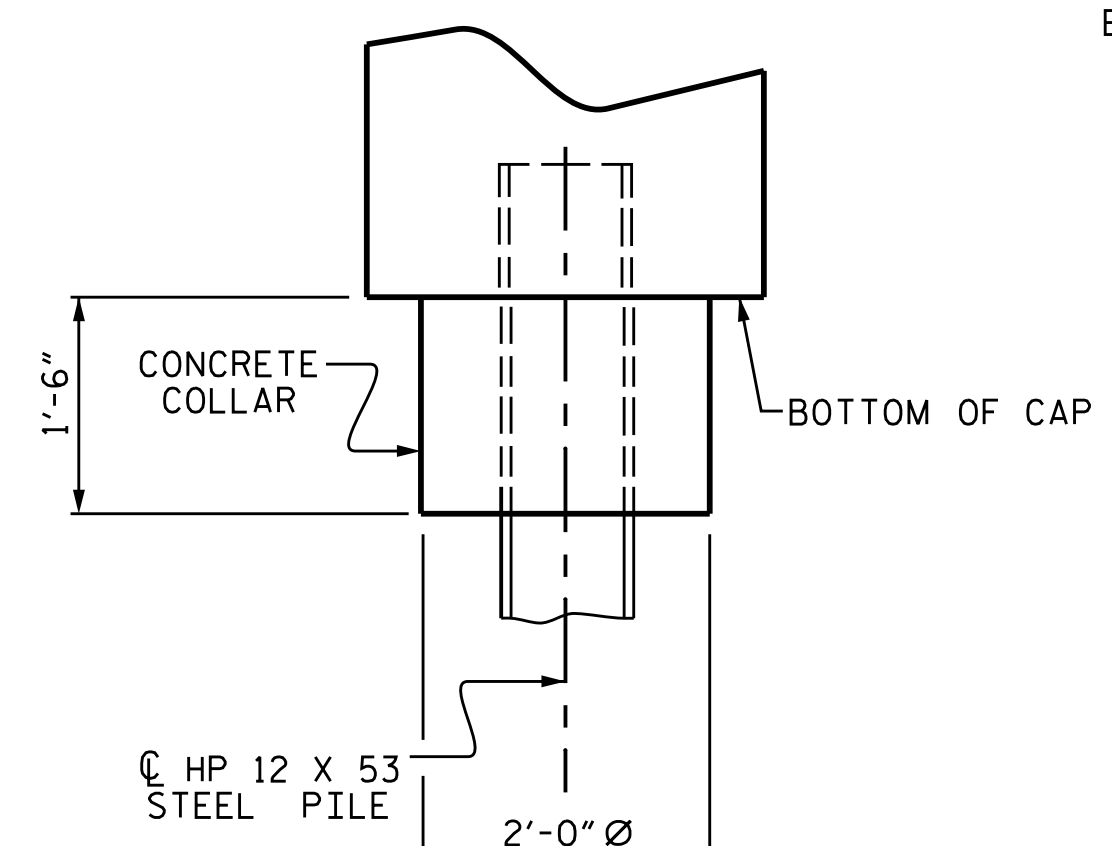
(END BENT No. 1 SHOWN, END BENT No. 2 SIMILAR BY ROTATION)



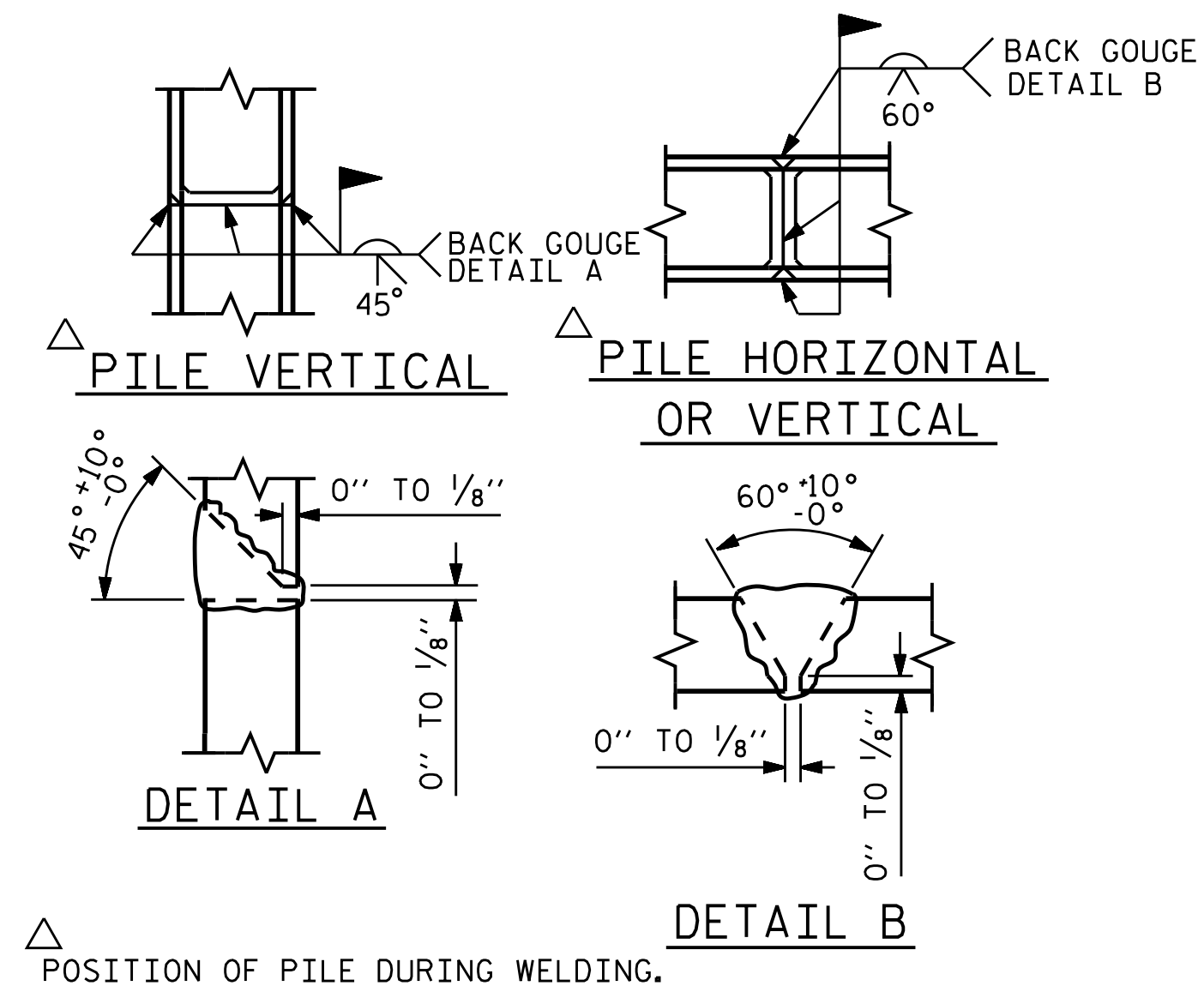
PLAN

CORROSION PROTECTION FOR STEEL PILES DETAIL

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



ELEVATION

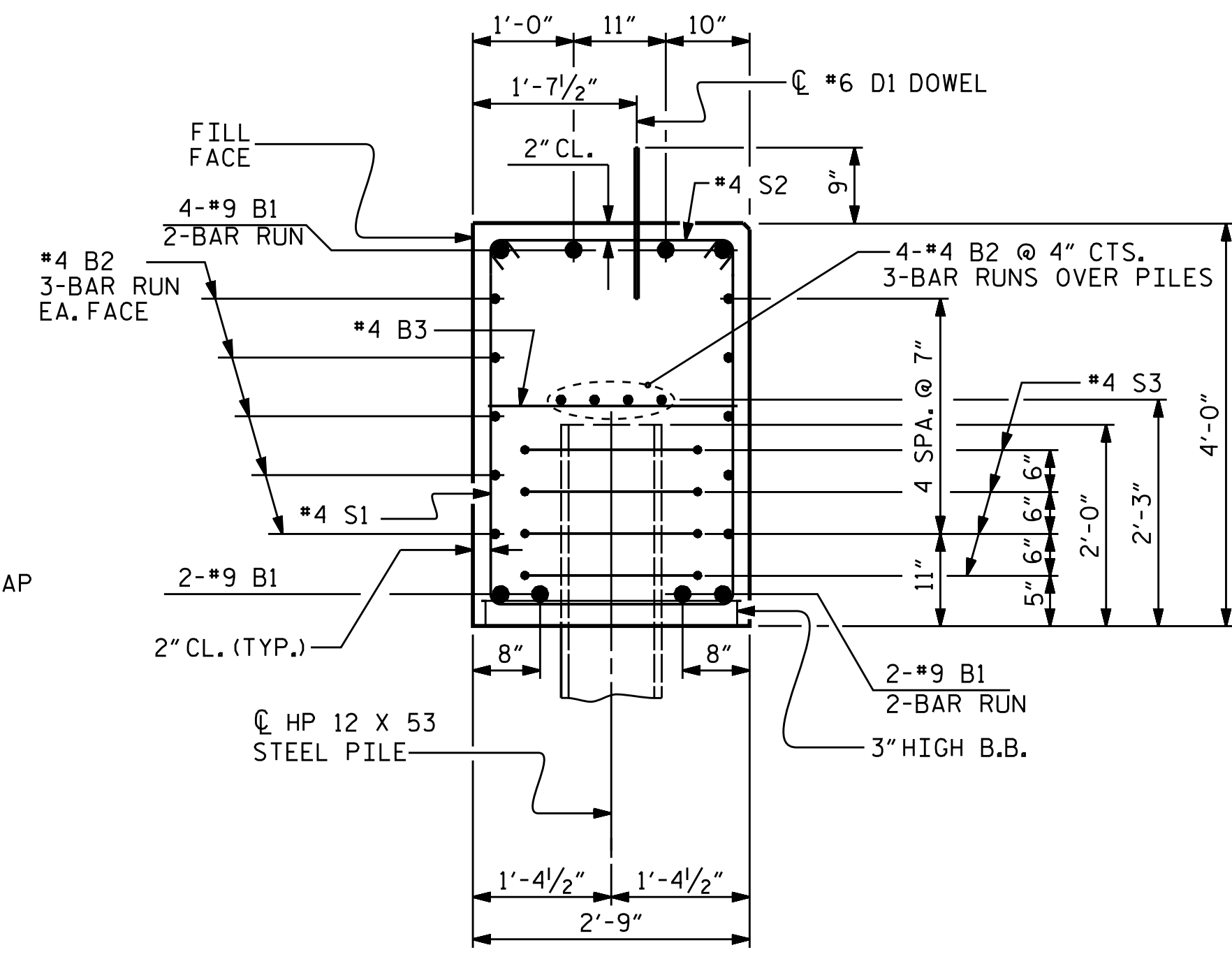


PILE SPLICE DETAILS

SCALE - 1/16" = 1'-0"

BAR TYPES	
<p>① 35'-6" 1'-3" HK.</p>	<p>② 9'-1" H1</p>
<p>③ 8'-2" H3</p>	<p>④ 3'-7 1/2" HK. 2'-5"</p>
<p>⑤ 2'-5" 4 1/2" HK.</p>	<p>⑥ 1'-8" Ø 1'-3" LAP</p>
ALL BAR DIMENSIONS ARE OUT TO OUT.	
<p>END BENT No. 1 HP 12 X 53 STEEL PILES NO: 9 LIN. FT. = 495</p>	<p>END BENT No. 2 HP 12 X 53 STEEL PILES NO: 9 LIN. FT. = 405</p>
<p>PILE DRIVING EQUIPMENT SETUP HP 12 X 53 STEEL PILES EACH = 9</p>	<p>PILE DRIVING EQUIPMENT SETUP HP 12 X 53 STEEL PILES EACH = 9</p>

BILL OF MATERIAL FOR ONE END BENT					
BAR NO.	SIZE	TYPE	LENGTH	WEIGHT	
B1	#9	1	36'-9"	1,999	
B2	#4	STR	22'-4"	627	
B3	#4	STR	2'-5"	26	
D1	#6	STR	1'-6"	72	
H1	#4	2	9'-9"	72	
H2	#4	2	9'-4"	69	
H3	#4	3	8'-10"	130	
K1	#4	STR	4'-8"	62	
S1	#4	4	10'-5"	571	
S2	#4	5	3'-2"	173	
S3	#4	6	6'-6"	156	
V1	#4	STR	6'-6"	252	
REINFORCING STEEL (FOR ONE END BENT)				4,209 LBS.	
CLASS A CONCRETE BREAKDOWN (FOR ONE END BENT)					
POUR #1 CAP, LOWER PART OF WINGS & COLLARS				29.3 C.Y.	
POUR #2 UPPER PART OF WINGS				2.9 C.Y.	
TOTAL CLASS A CONCRETE				32.2 C.Y.	



SECTION A-A

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

PROJECT NO. U-5866
GRAHAM COUNTY
STATION: 20+25.00-L-
SHEET 4 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

12/13/2017

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CORP. LICENSE NO.: C-0275

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-25
1			3			TOTAL SHEETS
2			4			33

DRAWN BY : JLA DATE : 5/17
CHECKED BY : RAR DATE : 5/17
DESIGN ENGINEER OF RECORD : RDE DATE : 5/17

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 SPECIAL PROVISIONS.

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

★ INVERT ALTERNATE STIRRUPS.

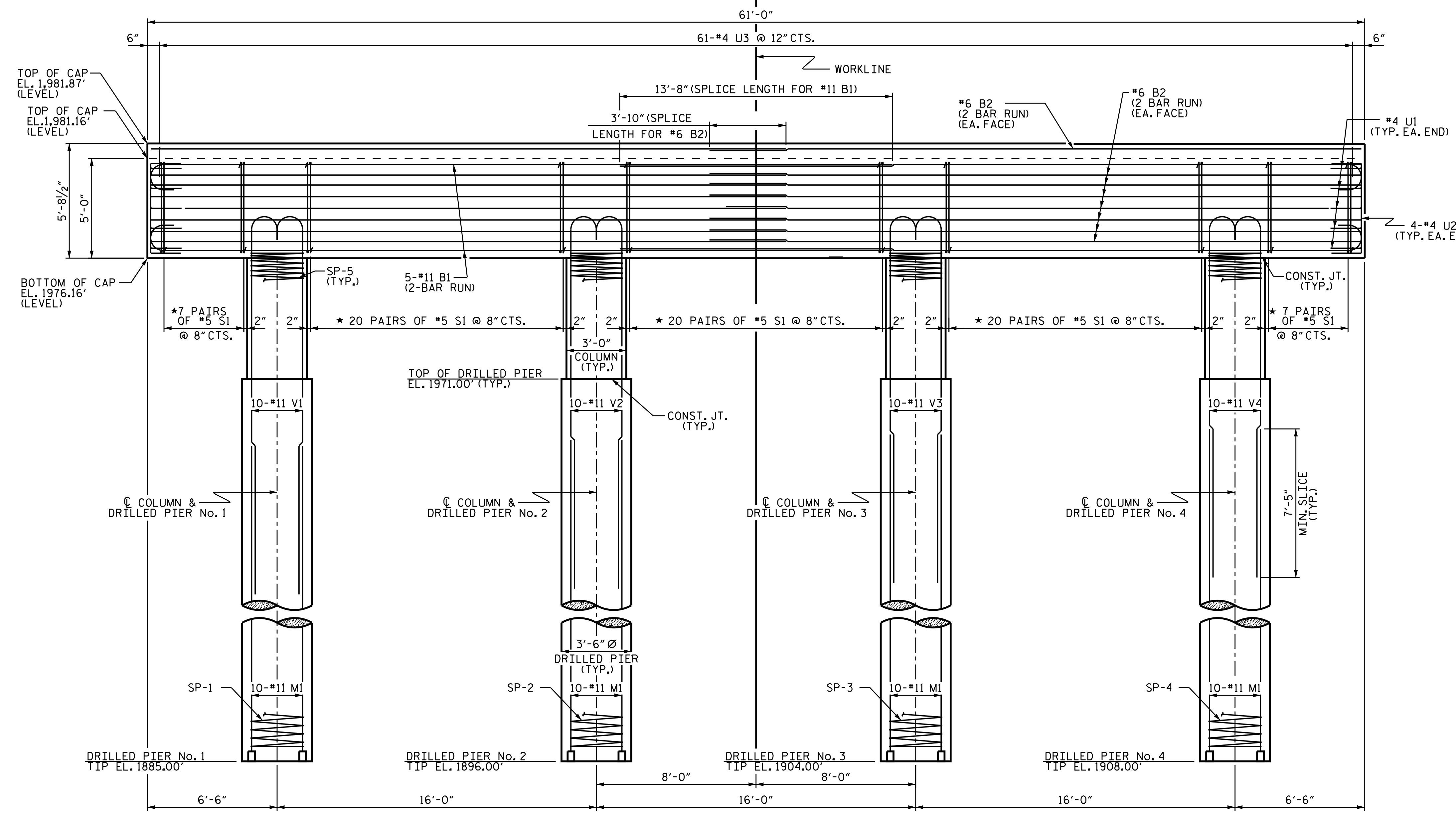
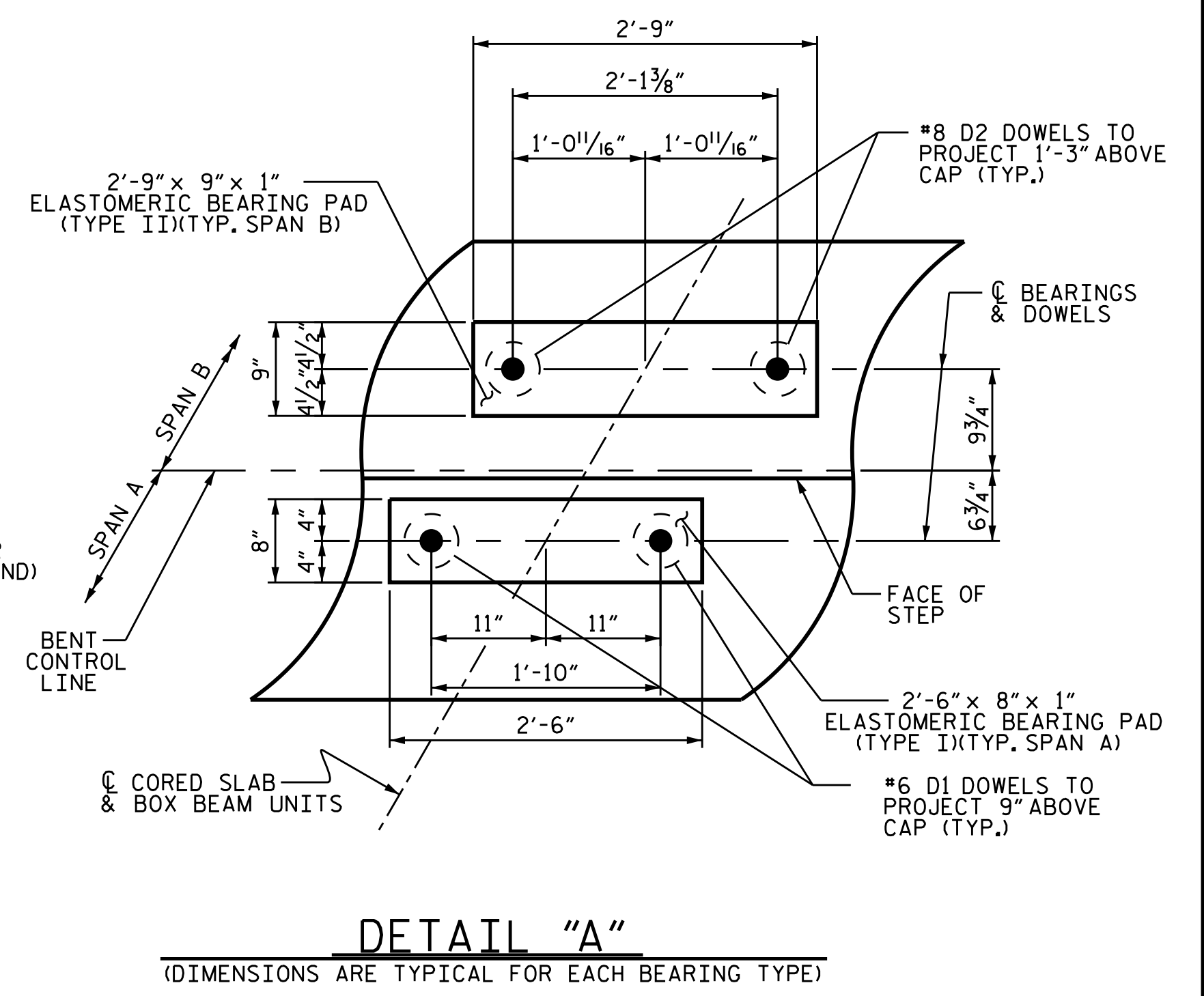
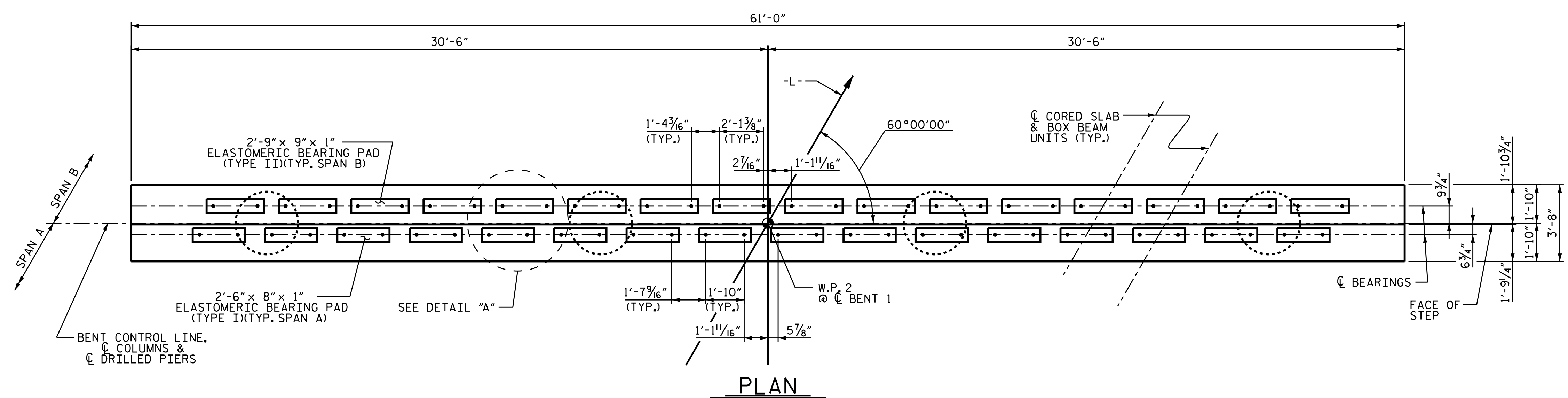
THE LOCATION OF THE CONSTRUCTION JOINT IN THE DRILLED PIERS IS BASED ON AN APPROXIMATE GROUND LINE ELEVATION. IF THE CONSTRUCTION JOINT IS ABOVE THE ACTUAL GROUND LINE ELEVATION, THE CONTRACTOR SHALL PLACE THE CONSTRUCTION JOINT ONE FOOT BELOW THE GROUND LINE.

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 COLUMNS IS DETAILED WITH 3 FEET OF EXTRA LENGTH.

FOR PERMANENT STEEL CASING, SEE SPECIAL PROVISIONS.

THE CONTRACTOR'S ATTENTION IS CALLED TO THE FACT THAT THE SPIRAL REINFORCEMENT AND THE CSL TUBES FOR DRILLED PIERS ARE DETAILED WITH 3 FEET OF EXTRA LENGTH.



PROJECT NO. U-5866
 GRAHAM COUNTY
 STATION: 20+25.00-L-
 SHEET 1 OF 2

FRANK D. ELLIOTT
 PROFESSIONAL ENGINEER
 STATE OF NORTH CAROLINA
 LICENSE NO. 774943D

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

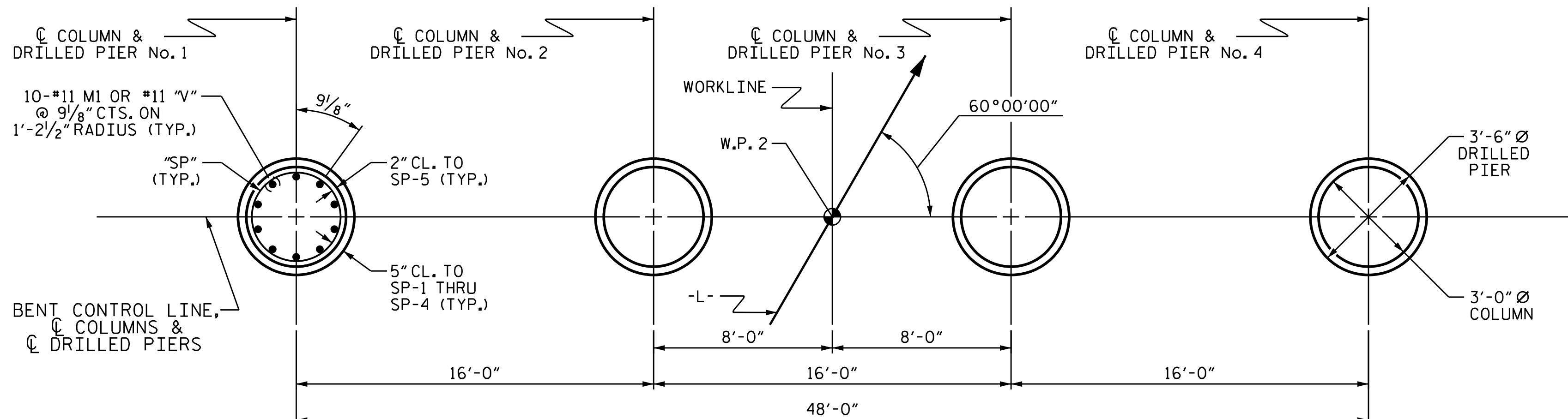
REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	TOTAL SHEETS
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2			4			33

12/13/2017

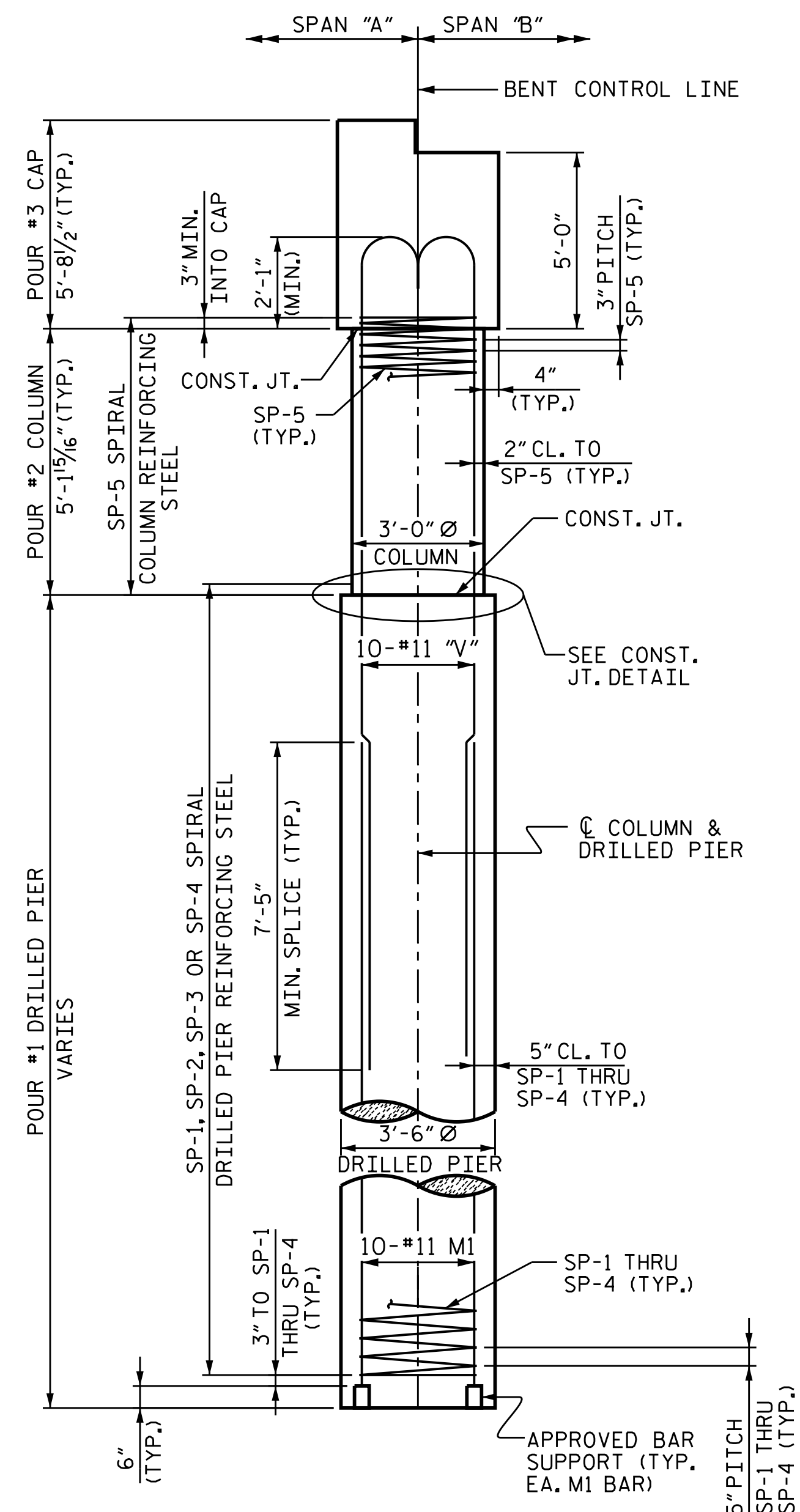
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 CORP. LICENSE NO.: C-0275

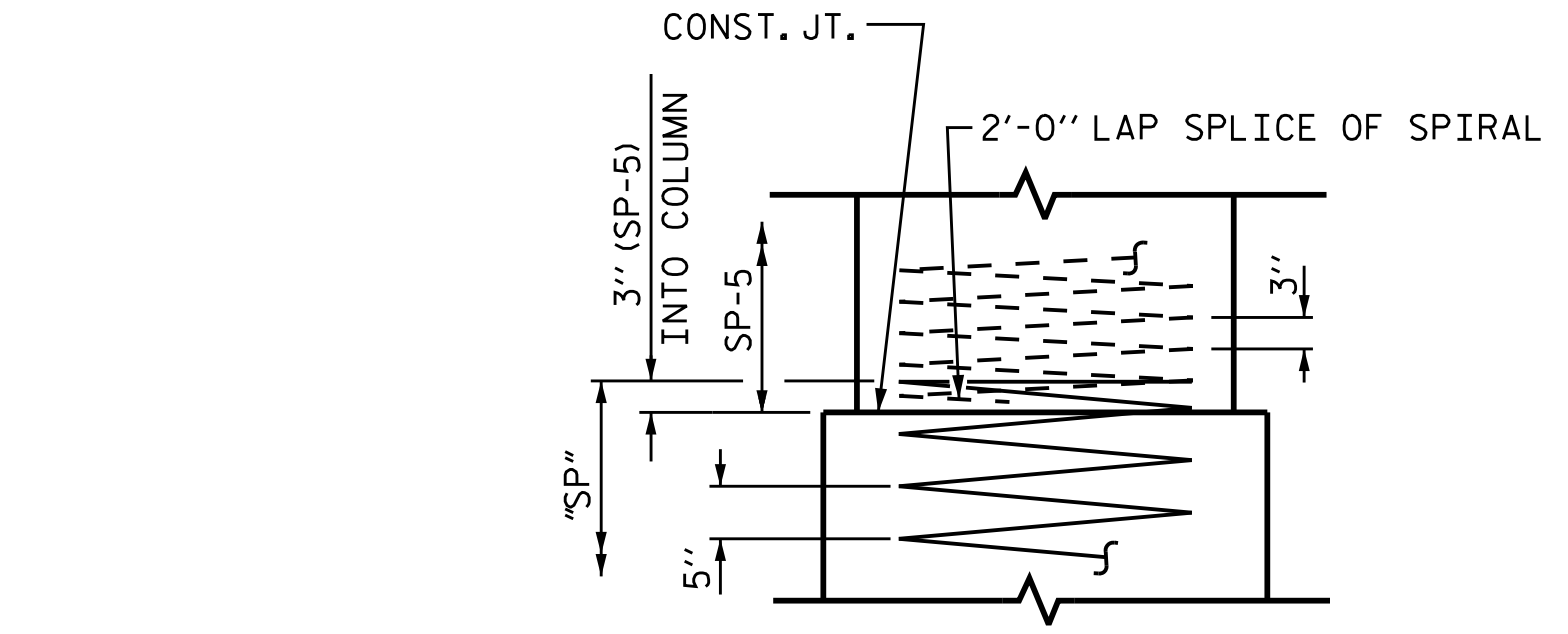
DRAWN BY : JLA DATE : 5/17
 CHECKED BY : RAR DATE : 5/17
 DESIGN ENGINEER OF RECORD : RDE DATE : 5/17



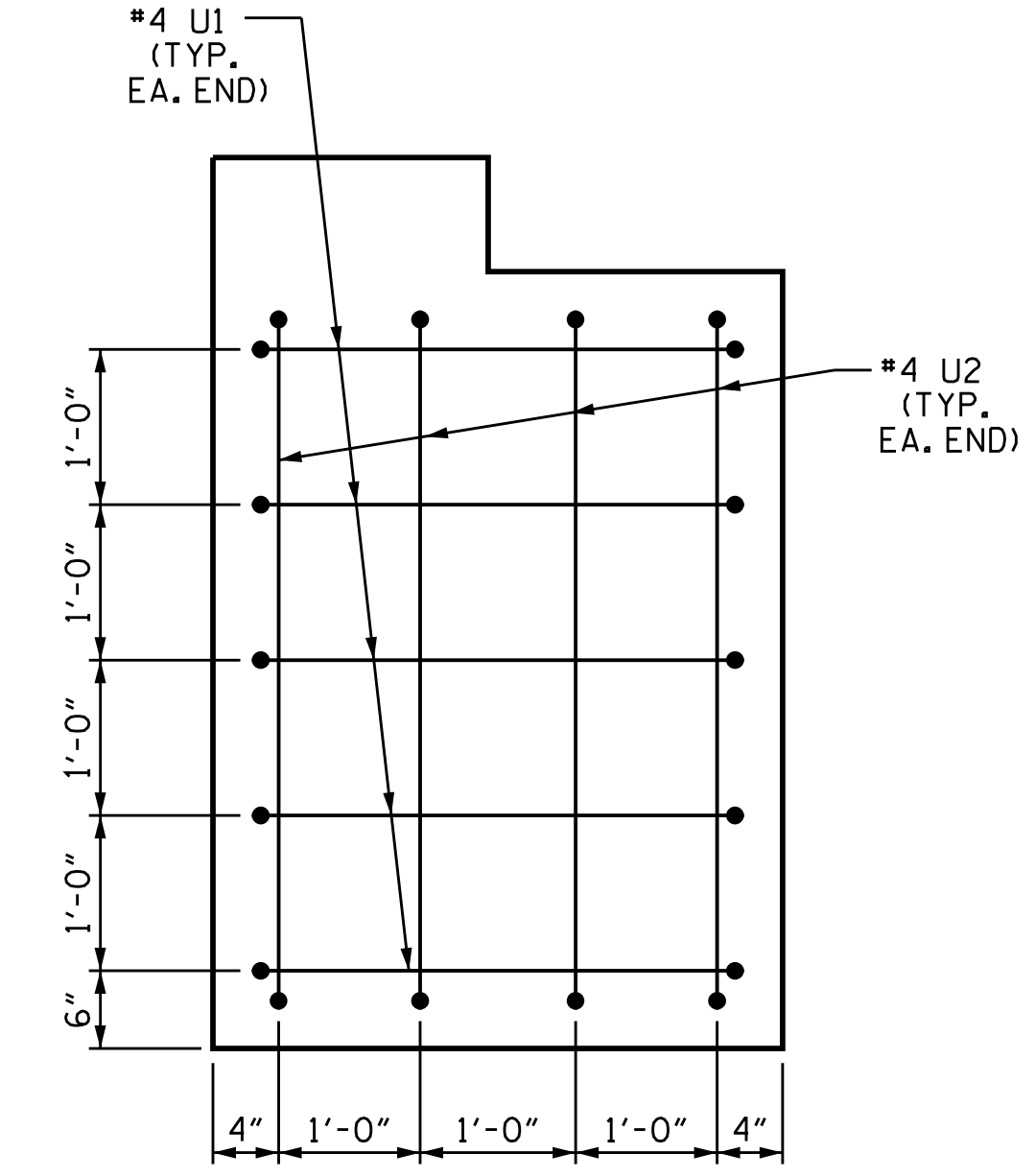
PLAN OF DRILLED PIERS & COLUMNS



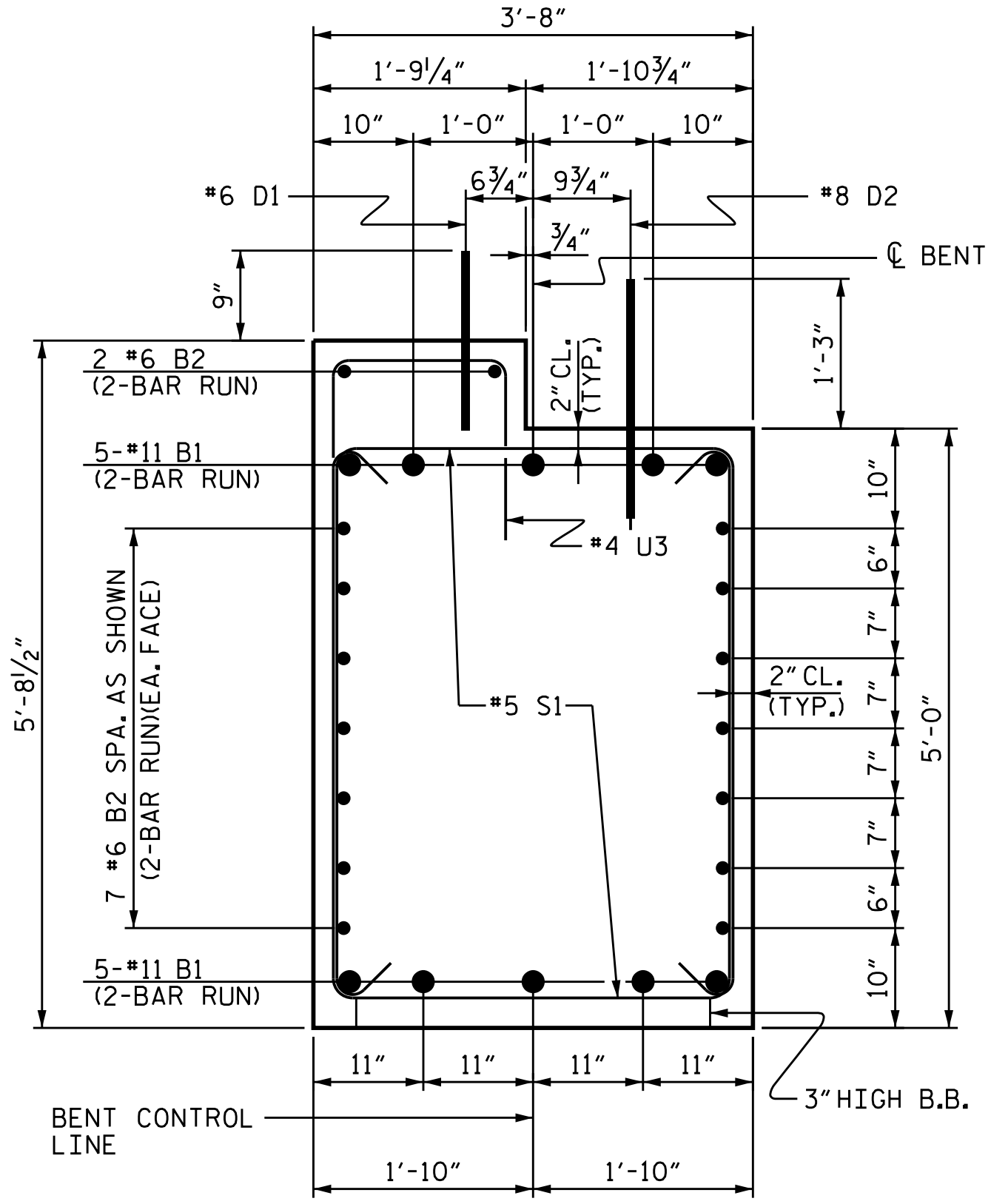
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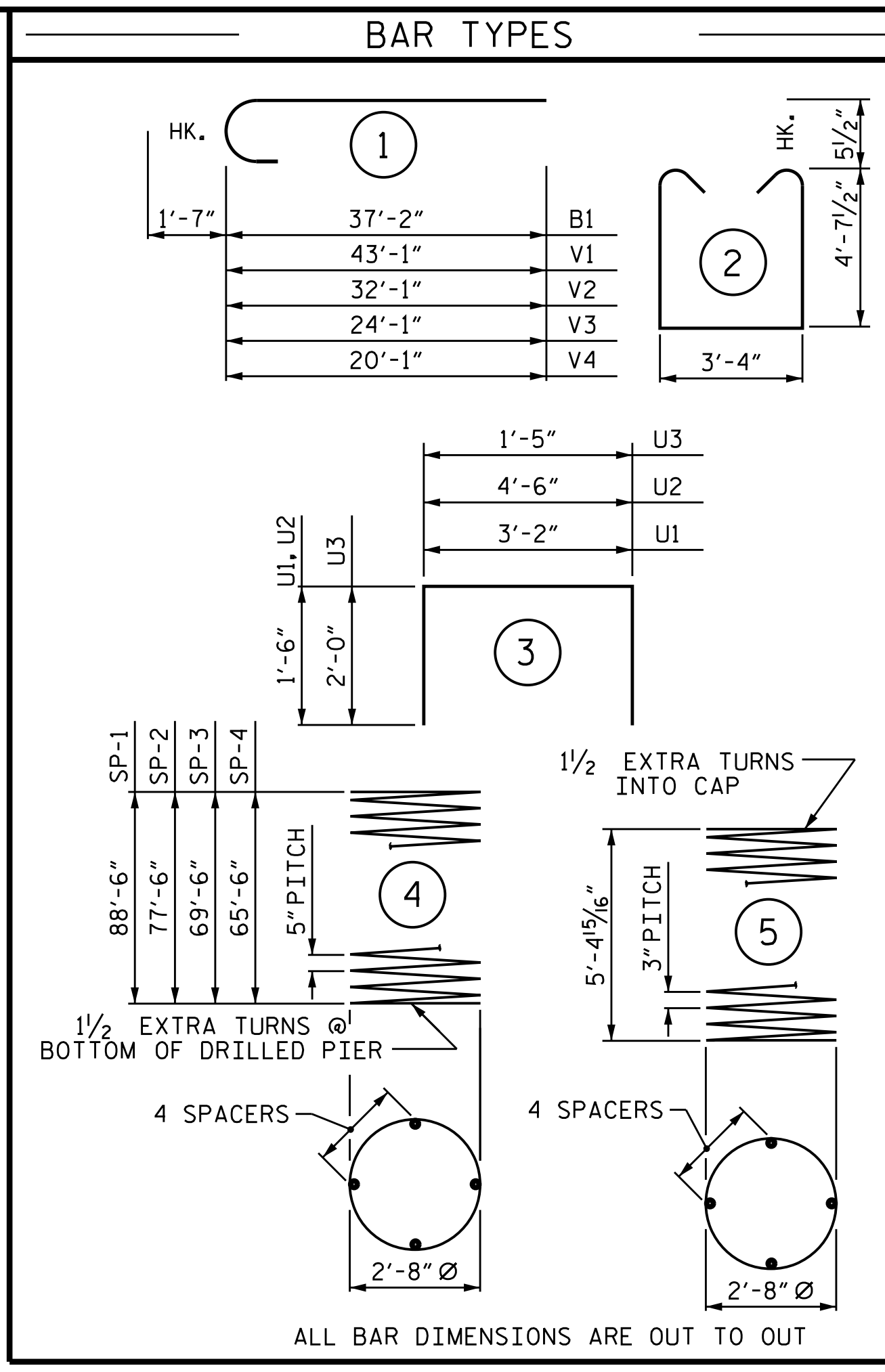
CONSTRUCTION JOINT DETAIL



END OF CAP VIEW



SECTION THRU CAP



BAR TYPES

BILL OF MATERIAL FOR BENT 1					
BAR NO.	SIZE	TYPE	LENGTH	WEIGHT	
B1	#11	1	38'-9"	4,118	
B2	#6	STR	32'-3"	1,550	
D1	#6	STR	1'-6"	72	
D2	#8	STR	2'-3"	192	
M1	#11	STR	60'-0"	12,751	
S1	#5	2	13'-6"	2,084	
U1	#4	3	6'-2"	41	
U2	#4	3	7'-6"	40	
U3	#4	3	5'-5"	221	
V1	#11	1	44'-8"	2,373	
V2	#11	1	33'-8"	1,789	
V3	#11	1	25'-8"	1,364	
V4	#11	1	21'-8"	1,151	
REINFORCING STEEL (FOR ONE BENT)				27,746	LBS.
SP-1	1	*	4	1,760'-1"	1,836
SP-2	1	*	4	1,546'-3"	1,613
SP-3	1	*	4	1,390'-0"	1,450
SP-4	1	*	4	1,307'-9"	1,364
SP-5	4	**	5	198'-1"	529
SPIRAL COLUMN REINFORCING STEEL (FOR ONE BENT)				6,792	LBS.
* THE SP-1 THRU SP-4 SPIRAL REINFORCING STEEL SHALL BE W31 OR D-31 COLD DRAWN WIRE OR #5 PLAIN OR DEFORMED BAR					
* THE SP-5 SPIRAL REINFORCING STEEL SHALL BE W20 OR D-20 COLD DRAWN WIRE OR #4 PLAIN OR DEFORMED BAR					
CLASS A CONCRETE BREAKDOWN (FOR ONE BENT)					
POUR #2 (COLUMNS)				5.4	C.Y.
POUR #3 (CAP)				44.4	C.Y.
TOTAL CLASS A CONCRETE				49.8	C.Y.
DRILLED PIERS: (FOR ONE BENT)					
DRILLED PIER CONCRETE				107.9	C.Y.
POUR #1 (DRILLED PIERS)				136	LIN. FT.
3'-6" Ø DRILLED PIER NOT IN SOIL				155	LIN. FT.
3'-6" Ø DRILLED PIER IN SOIL				56	LIN. FT.
PERMANENT STEEL CASING FOR 3'-6" Ø DRILLED PIER				1,236	LIN. FT.
CSL TUBES				1	EA.
CSL TESTING				1	EA.

PROJECT NO. U-5866
 GRAHAM COUNTY
 STATION: 20+25.00-L-

SHEET 2 OF 2

12/13/2017

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 CORP. LICENSE NO.: C-0275

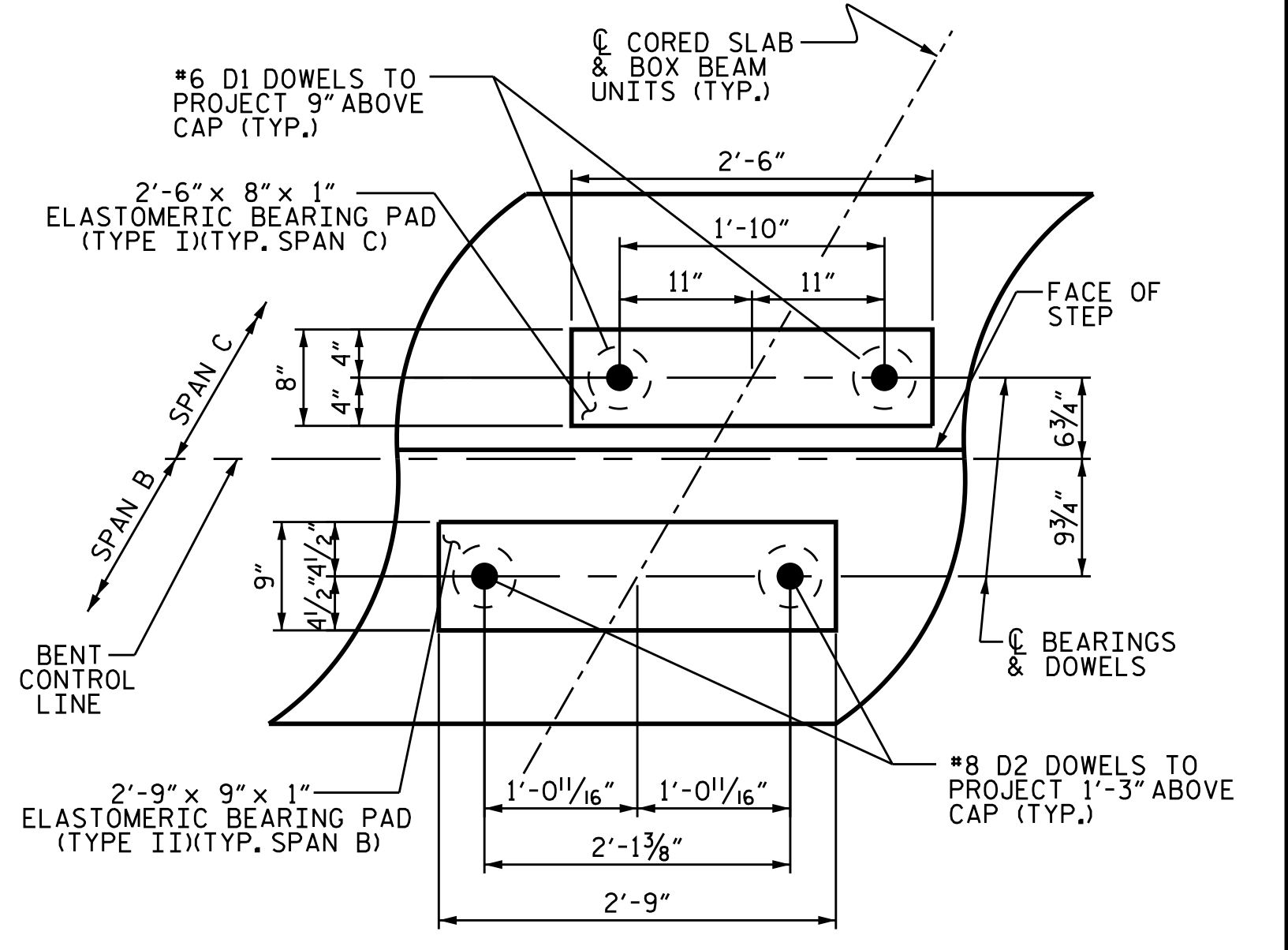
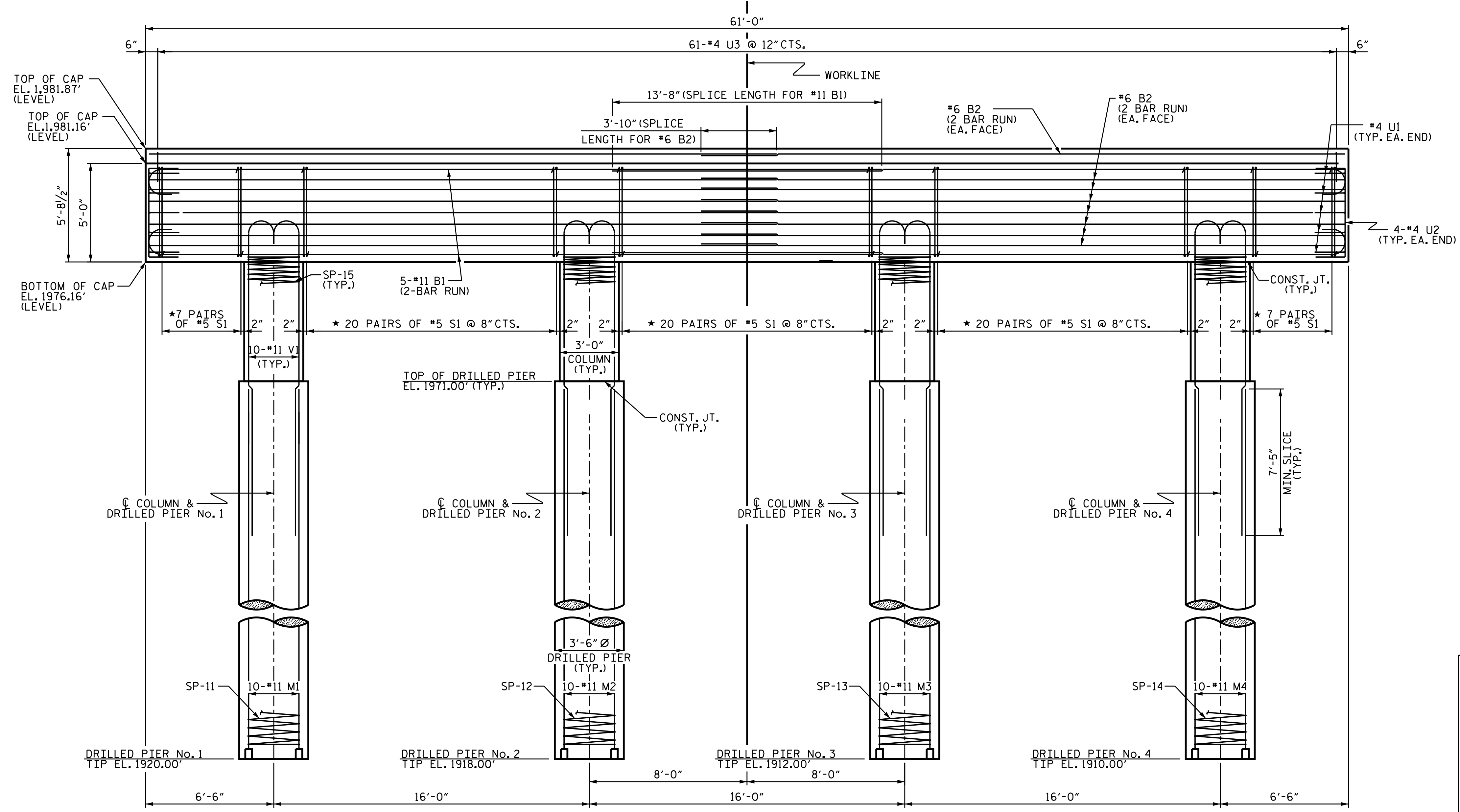
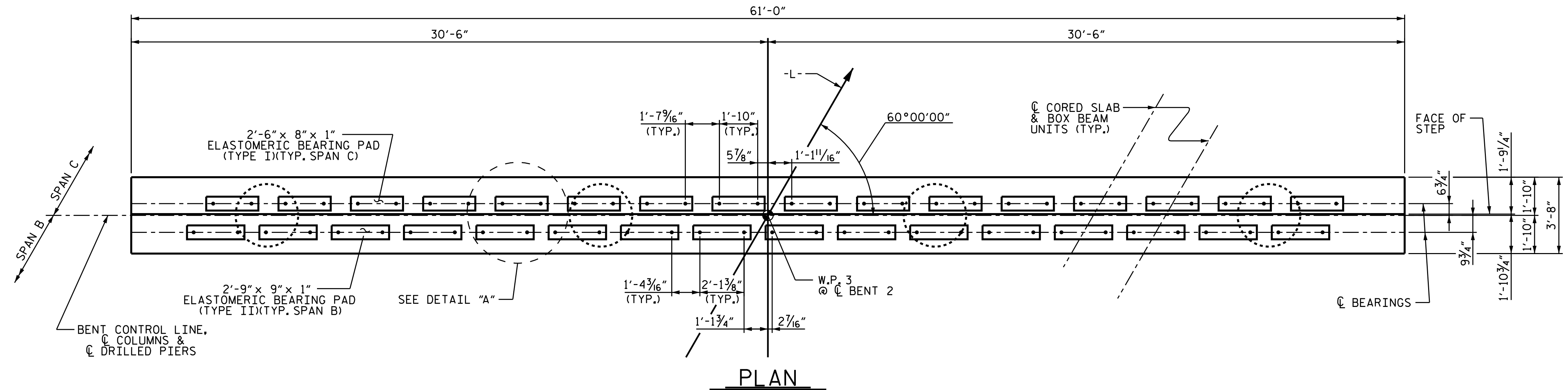
STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 SUBSTRUCTURE
 BENT No. 1

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	TOTAL SHEETS
1			3			S-27
2			4			33

DRAWN BY : JLA DATE : 5/17
 CHECKED BY : RAR DATE : 5/17
 DESIGN ENGINEER OF RECORD : RDE DATE : 5/17

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 SPECIAL PROVISIONS.
- 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 COLUMNS IS DETAILED WITH 3 FEET OF EXTRA LENGTH, AND DRILLED PIERS ARE DETAILED WITH 3 FEET OF EXTRA LENGTH OF SPIRAL STEEL AND CSL TUBES.
- FOR PERMANENT STEEL CASING, SEE SPECIAL PROVISIONS.



PROJECT NO. U-5866
 GRAHAM COUNTY
 STATION: 20+25.00-L-

SHEET 1 OF 2

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

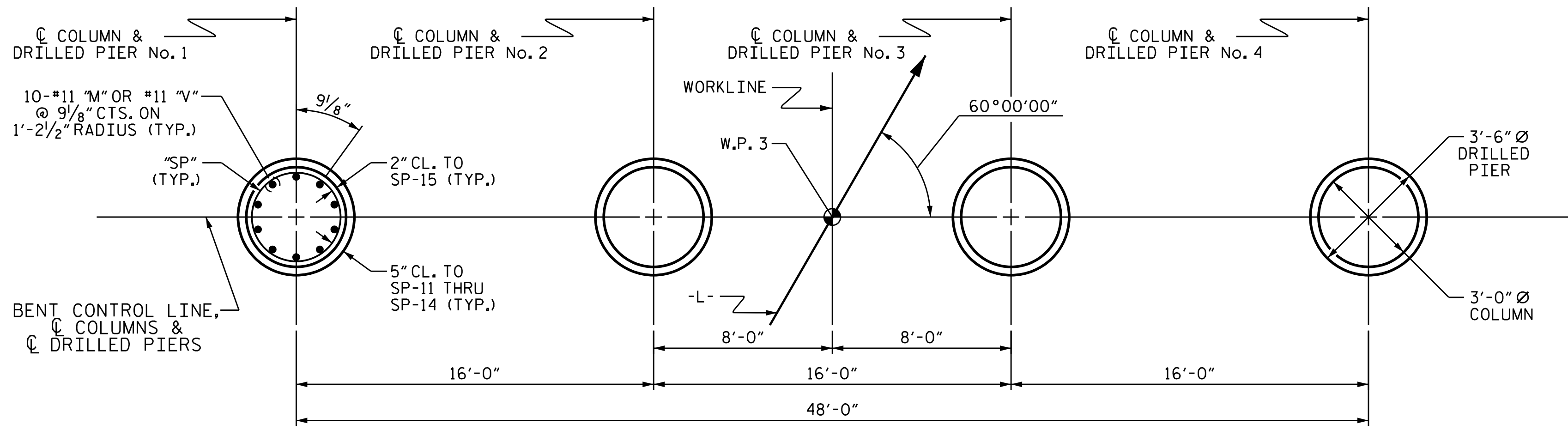
12/13/2017

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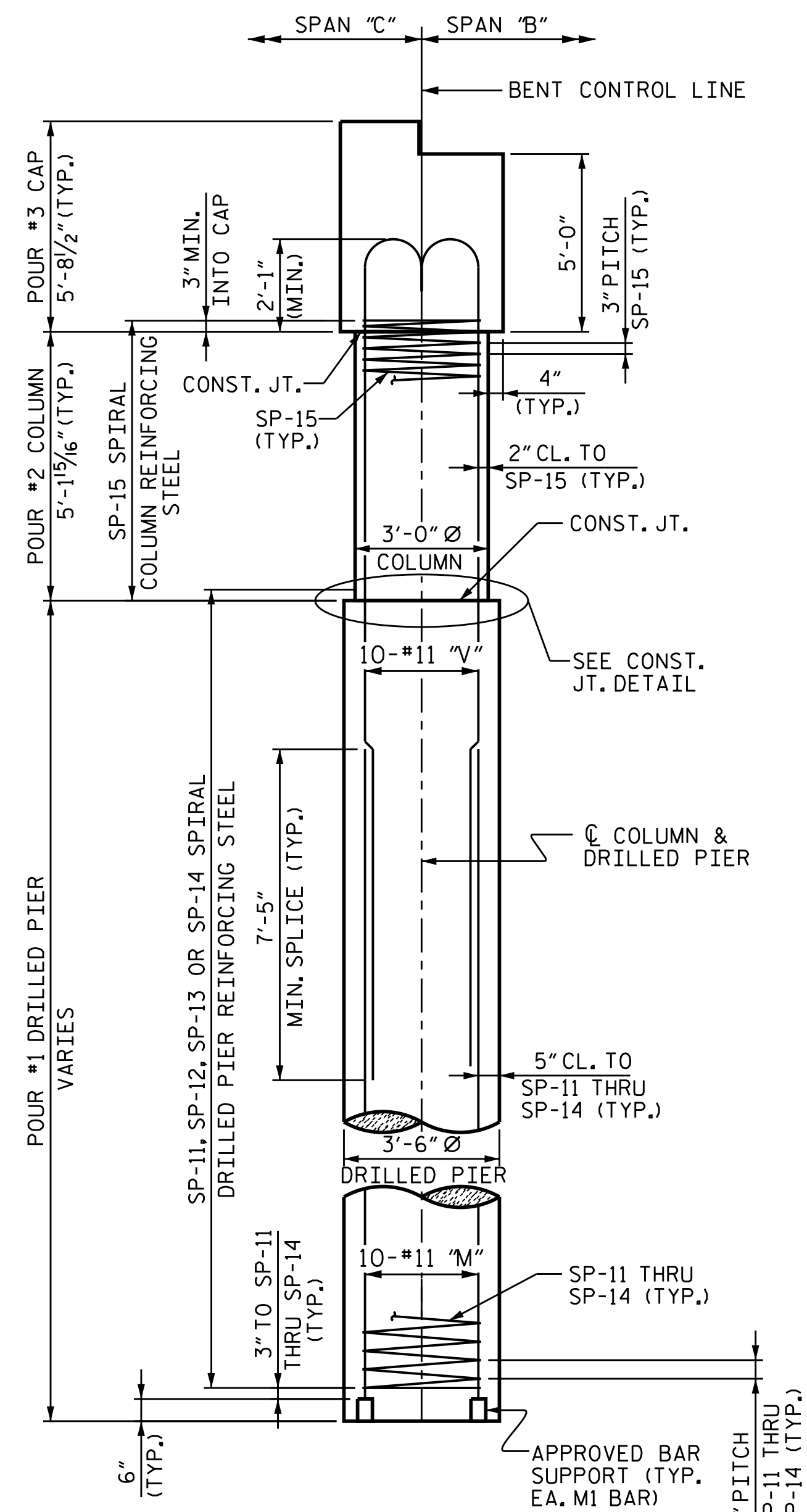
TGS ENGINEERS
 804-C N. LAFAYETTE ST
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 PH (704) 476-0003
 CORP. LICENSE NO.: C-0275

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-28
1			3			TOTAL SHEETS
2			4			33

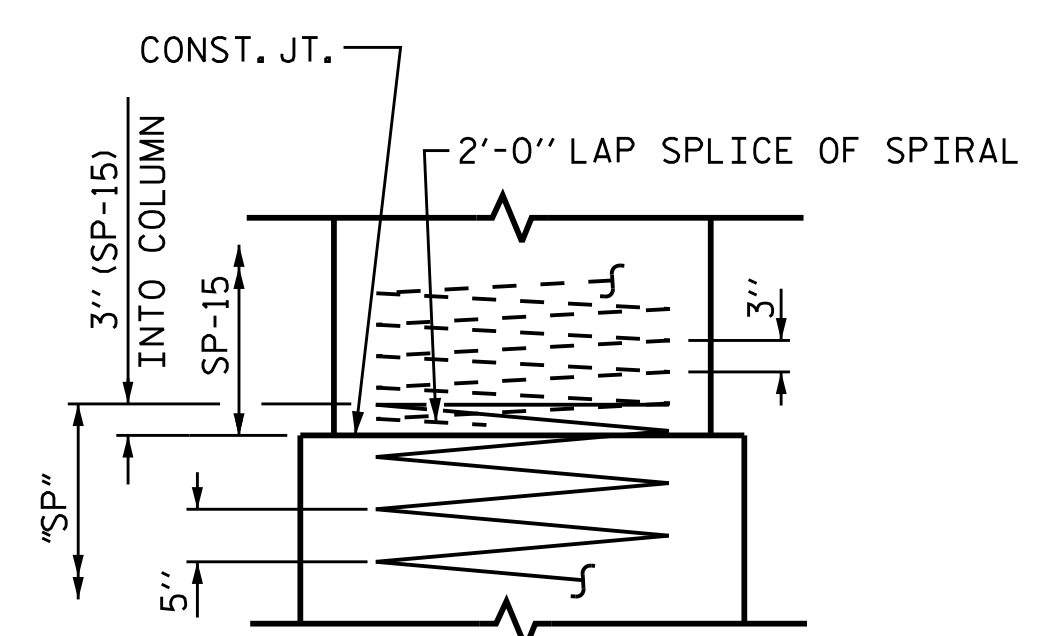
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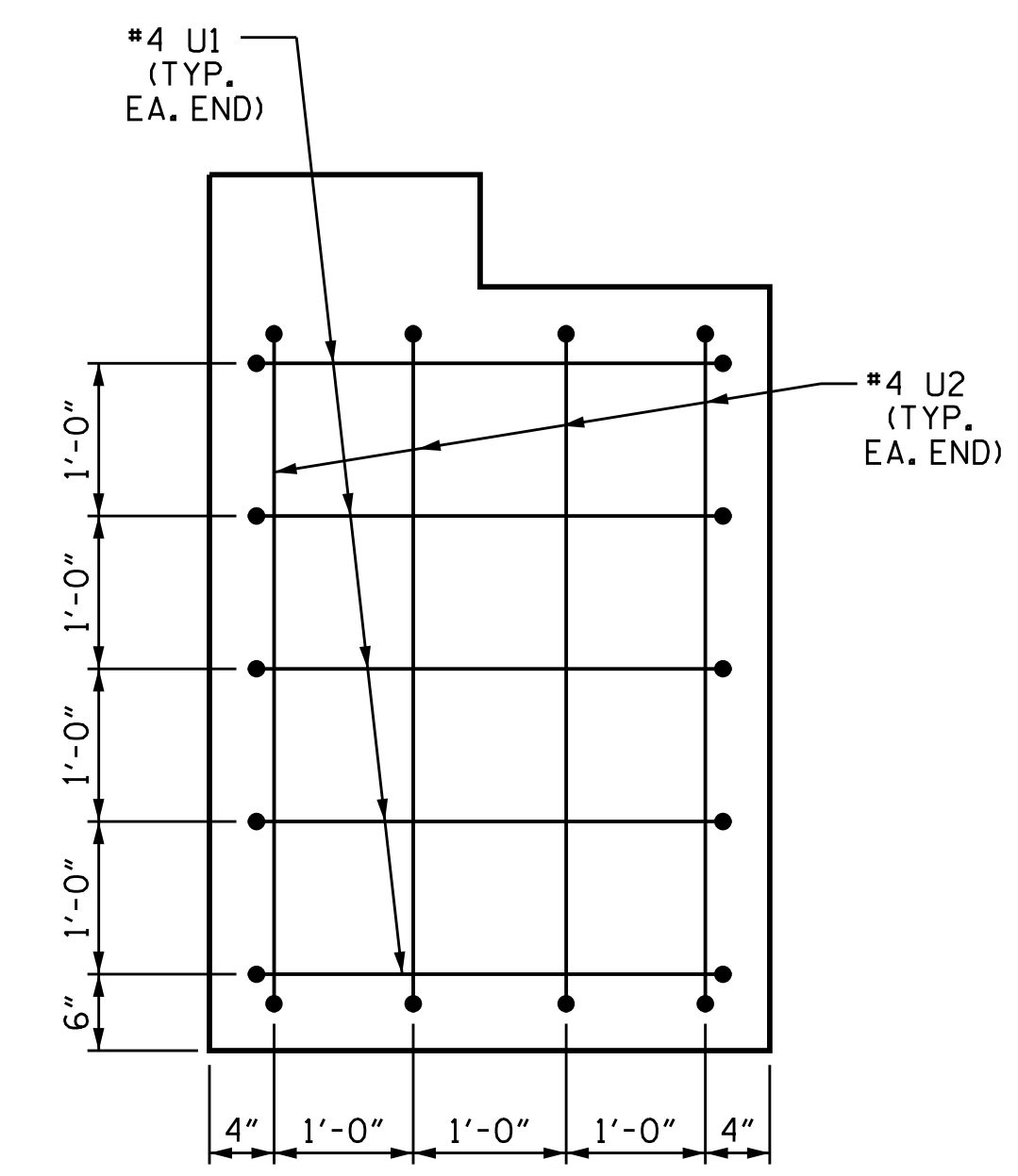
PLAN OF DRILLED PIERS & COLUMNS



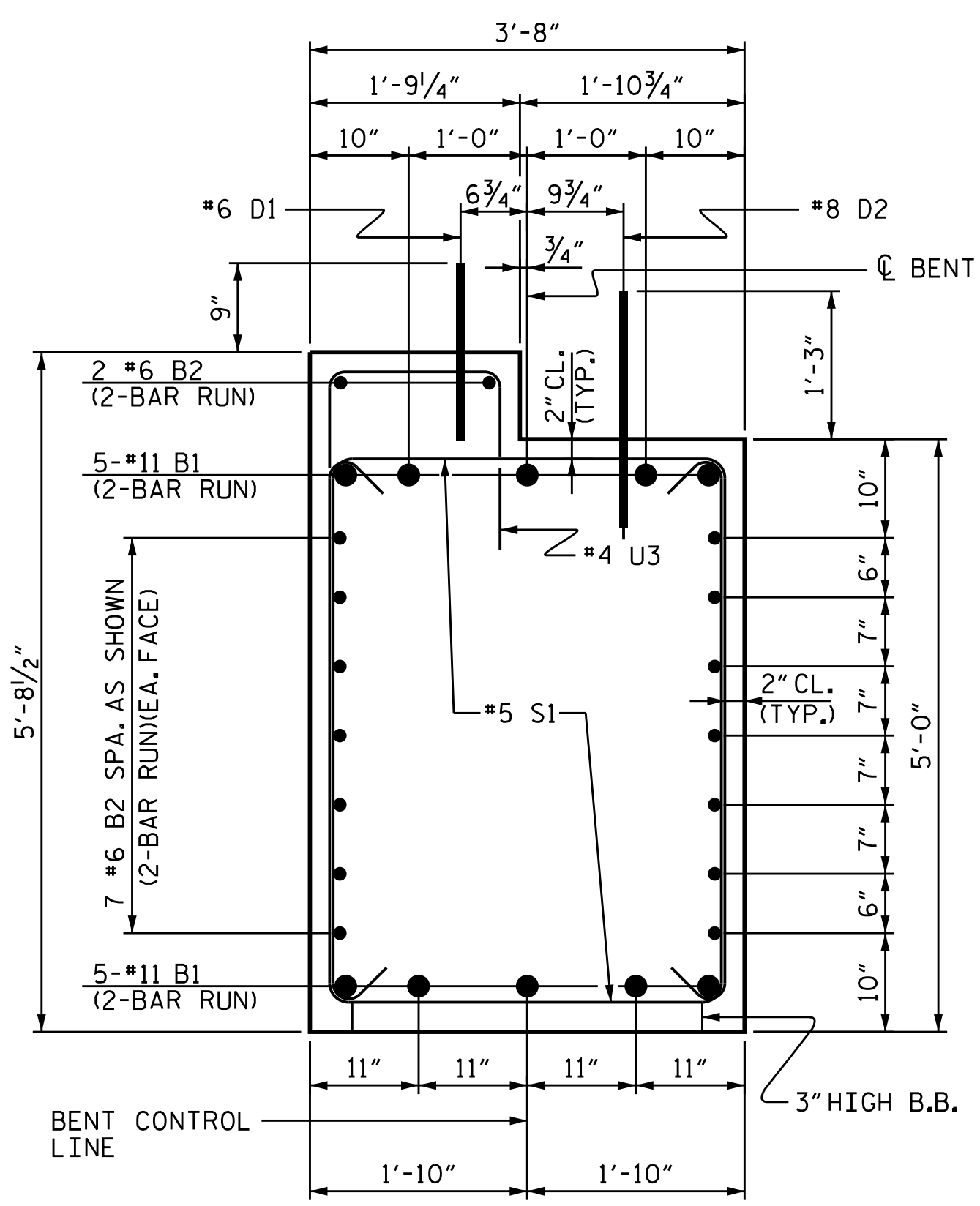
END ELEVATION



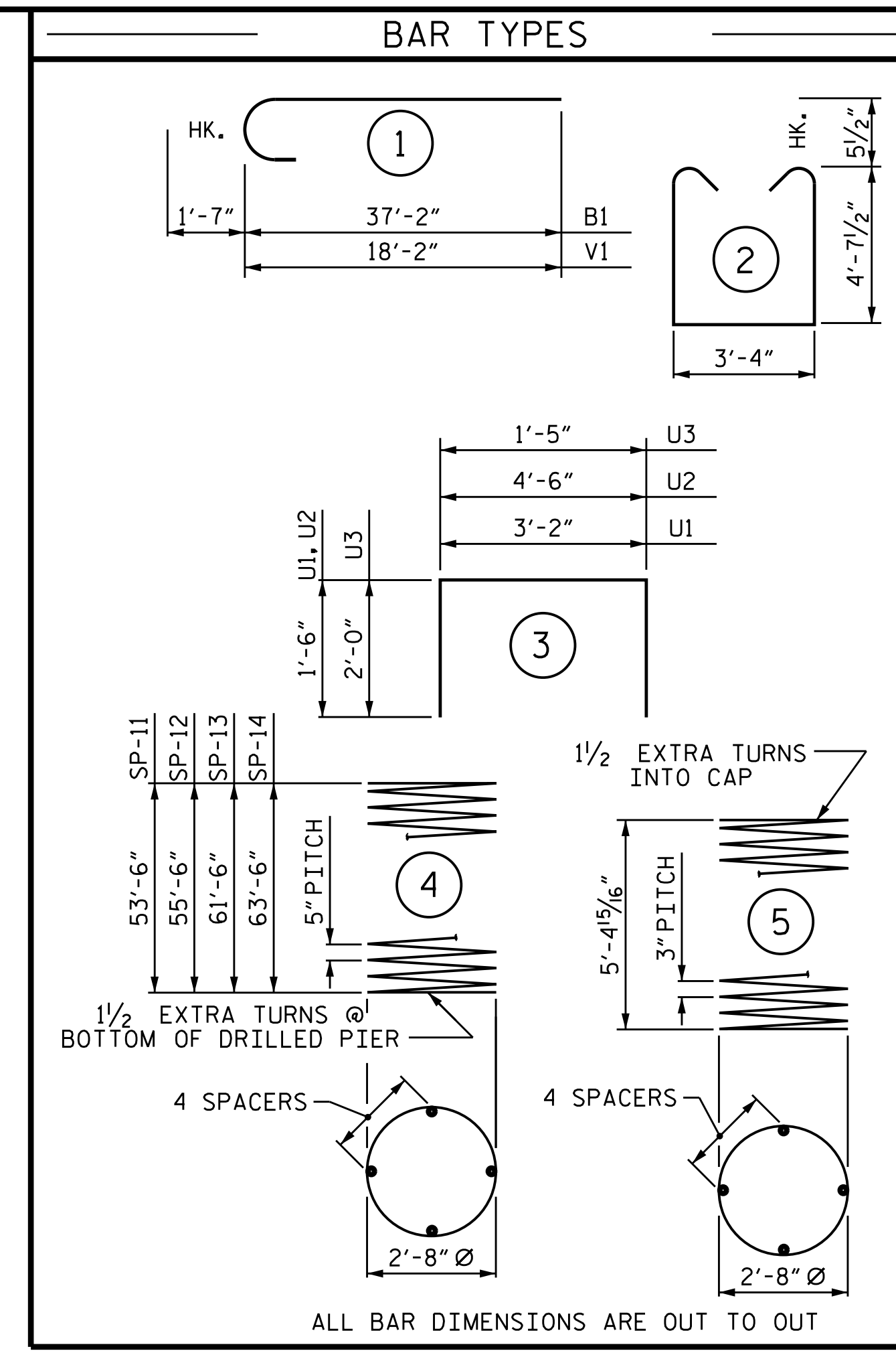
CONSTRUCTION JOINT DETAIL



END OF CAP VIEW



SECTION THRU CAP



BAR TYPES

BILL OF MATERIAL FOR BENT 2					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	20	#11	1	38'-9"	4,118
B2	32	#6	STR	32'-3"	1,550
D1	32	#6	STR	1'-6"	72
D2	32	#6	STR	2'-3"	192
M1	10	#11	STR	50'-6"	2,683
M2	10	#11	STR	52'-6"	2,789
M3	10	#11	STR	58'-6"	3,108
M4	10	#11	STR	60'-0"	3,188
S1	148	#5	2	13'-6"	2,084
U1	10	#4	3	6'-2"	41
U2	8	#4	3	7'-6"	40
U3	61	#4	3	5'-5"	221
V1	40	#11	1	19'-9"	4,197
REINFORCING STEEL (FOR ONE BENT)				24,283 LBS.	
SP-11	1	*	4	1,069'-3"	1,116
SP-12	1	*	4	1,110'-4"	1,159
SP-13	1	*	4	1,233'-9"	1,287
SP-14	1	*	4	1,266'-7"	1,322
SP-15	4	**	5	198'-1"	529
SPIRAL COLUMN REINFORCING STEEL (FOR ONE BENT)				5,413 LBS.	
* THE SP-11 THRU SP-14 SPIRAL REINFORCING STEEL SHALL BE W31 OR D-31 COLD DRAWN WIRE OR #5 PLAIN OR DEFORMED BAR					
** THE SP-15 SPIRAL REINFORCING STEEL SHALL BE W20 OR D-20 COLD DRAWN WIRE OR #4 PLAIN OR DEFORMED BAR					
CLASS A CONCRETE BREAKDOWN (FOR ONE BENT)					
POUR #2 (COLUMNS)				5.4 C.Y.	
POUR #3 (CAP)				44.4 C.Y.	
TOTAL CLASS A CONCRETE				49.8 C.Y.	
DRILLED PIERS: (FOR ONE BENT)					
DRILLED PIER CONCRETE POUR #1 (DRILLED PIERS)				84.1 C.Y.	
3'-6" Ø DRILLED PIER NOT IN SOIL				81 LIN. FT.	
3'-6" Ø DRILLED PIER IN SOIL				143 LIN. FT.	
PERMANENT STEEL CASING FOR 3'-6" Ø DRILLED PIER				56 LIN. FT.	
CSL TUBES				968 LIN. FT.	
CSL TESTING				1 EA.	

PROJECT NO. U-5866
 GRAHAM COUNTY
 STATION: 20+25.00-L-
 SHEET 2 OF 2

12/13/2017

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 SHELBY, NC 28150
 PH (704) 476-0003
 CORP. LICENSE NO.: C-0275

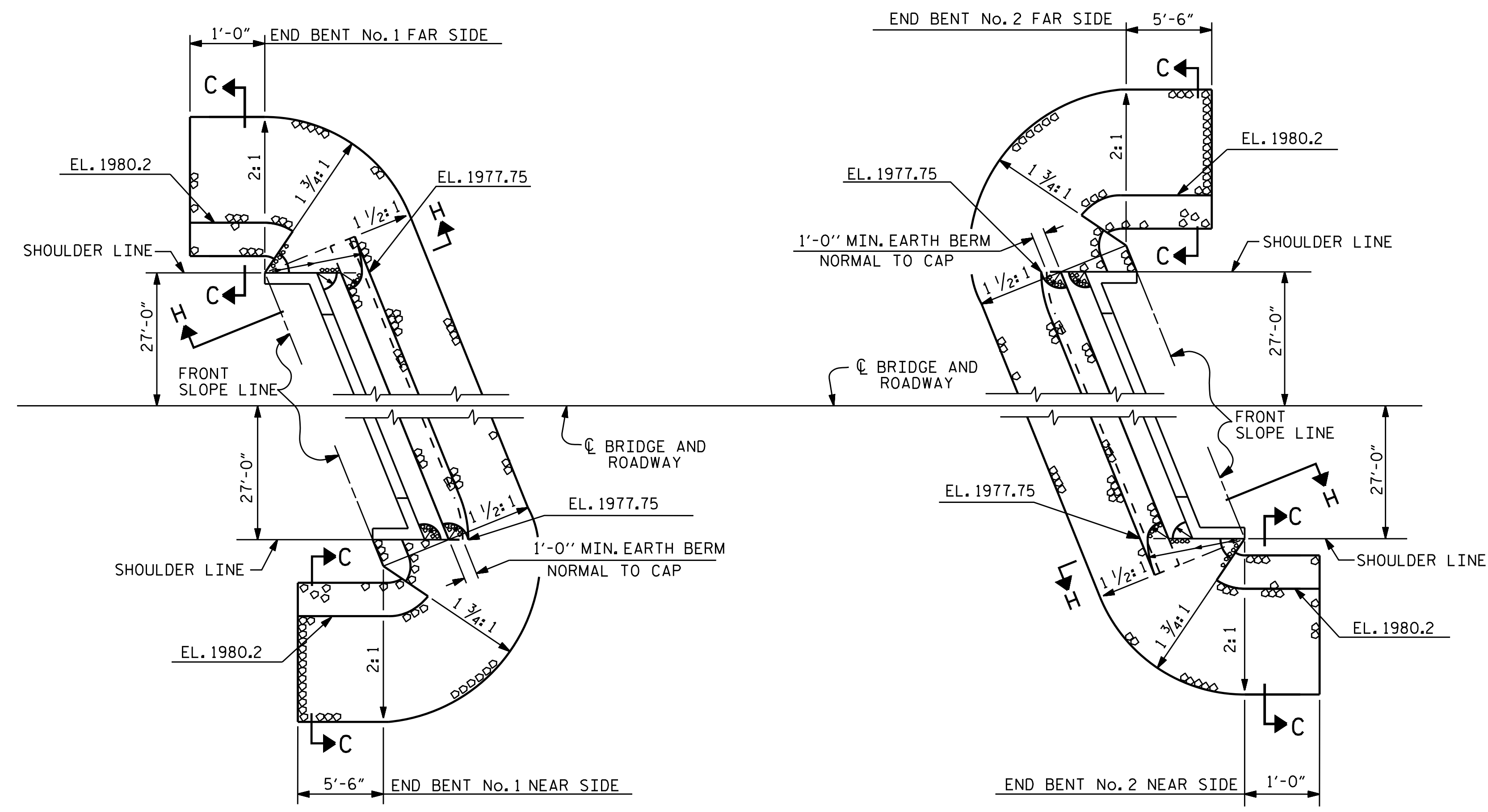
STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 SUBSTRUCTURE
 BENT No. 2

REVISIONS

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

SHEET NO. S-29
 TOTAL SHEETS 33

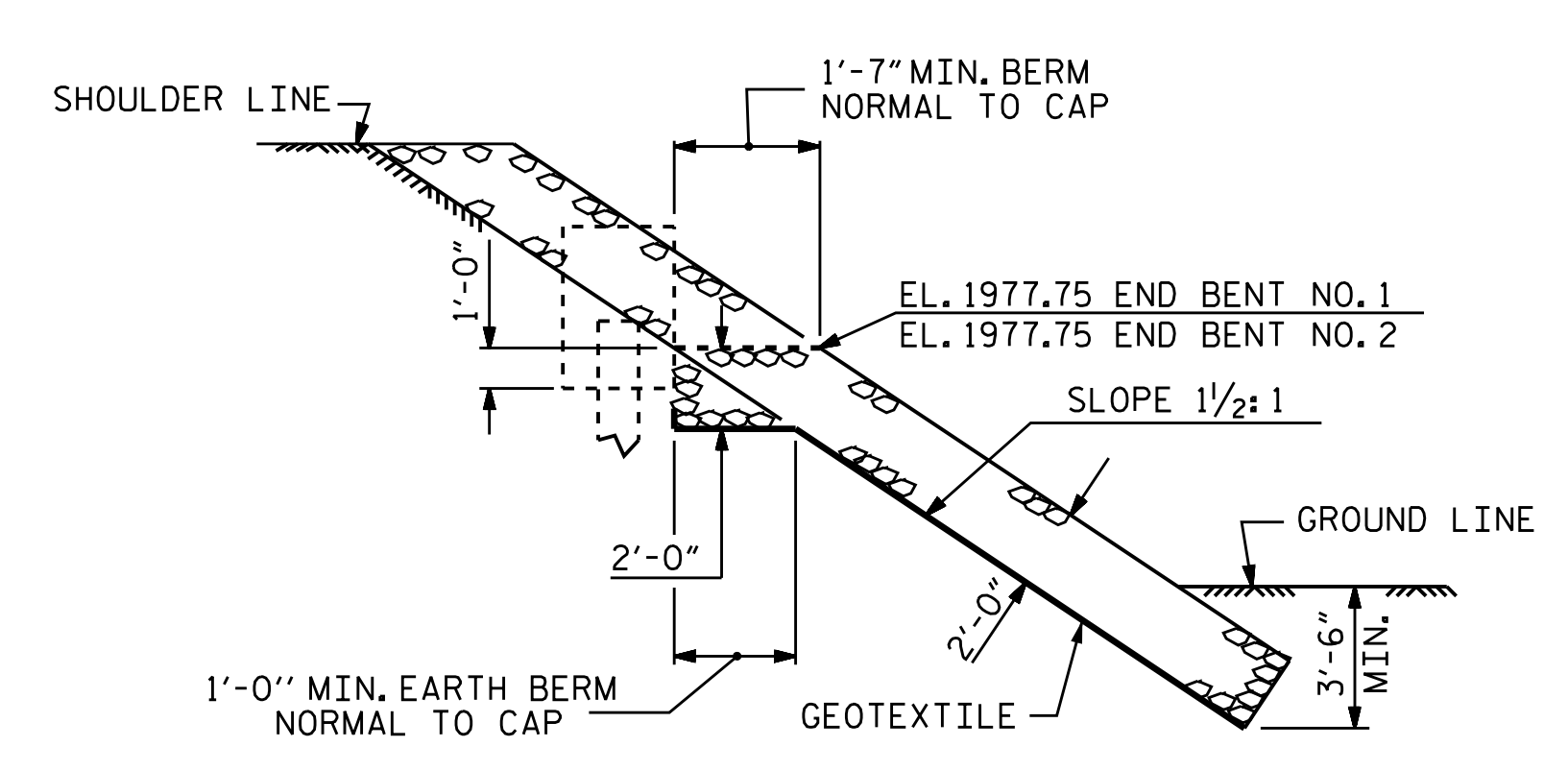
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 CHECKED BY: RAR DATE: 5/17
 DESIGN ENGINEER OF RECORD: RDE DATE: 5/17



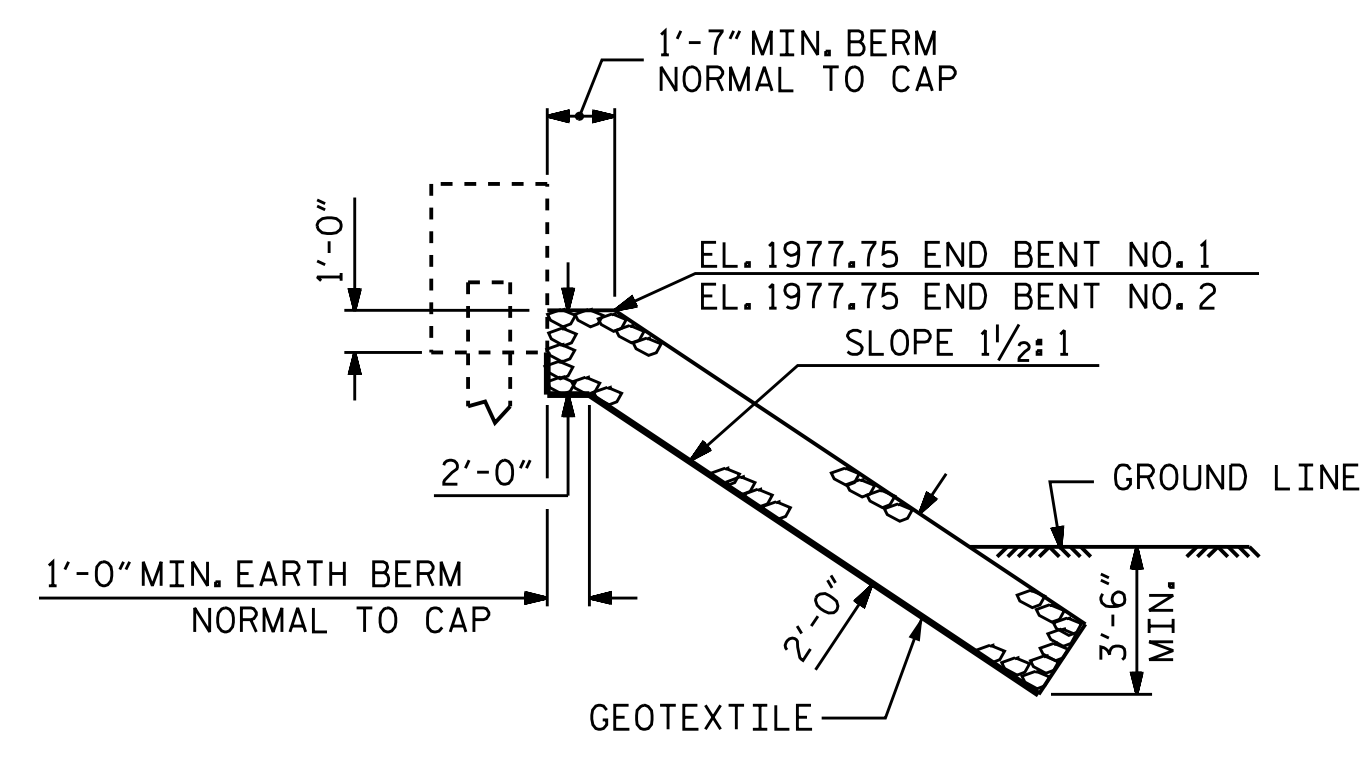
NOTES :
FOR BERM WIDTH DIMENSIONS, SEE GENERAL DRAWING.

SHOULDER RIP RAP IS HIGHER THAN BERM RIP RAP

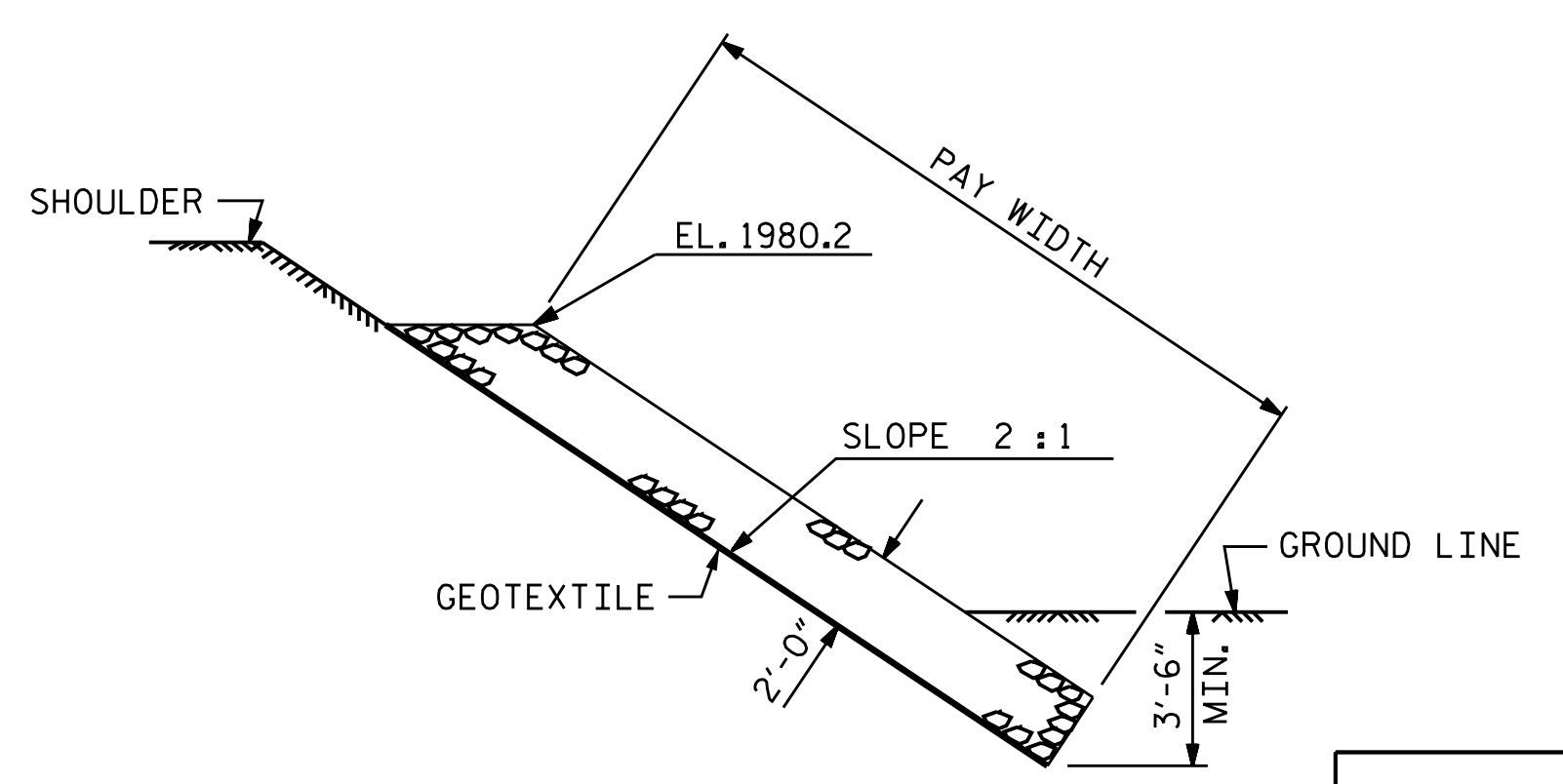
ESTIMATED QUANTITIES		
BRIDGE @ STA. 20+25.00-L-	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE
	TONS	SQUARE YARDS
END BENT 1	132	120
END BENT 2	132	120



SECTION H-H

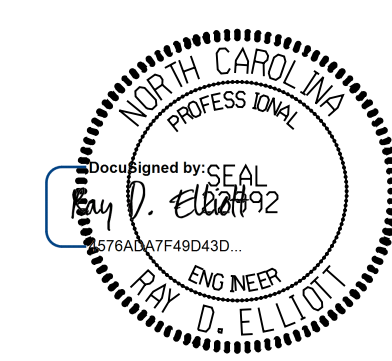


SECTION C-C
BERM RIP RAPPED



SECTION C-C

PROJECT NO. U-5866
GRAHAM COUNTY
STATION: 20+25.00-L-



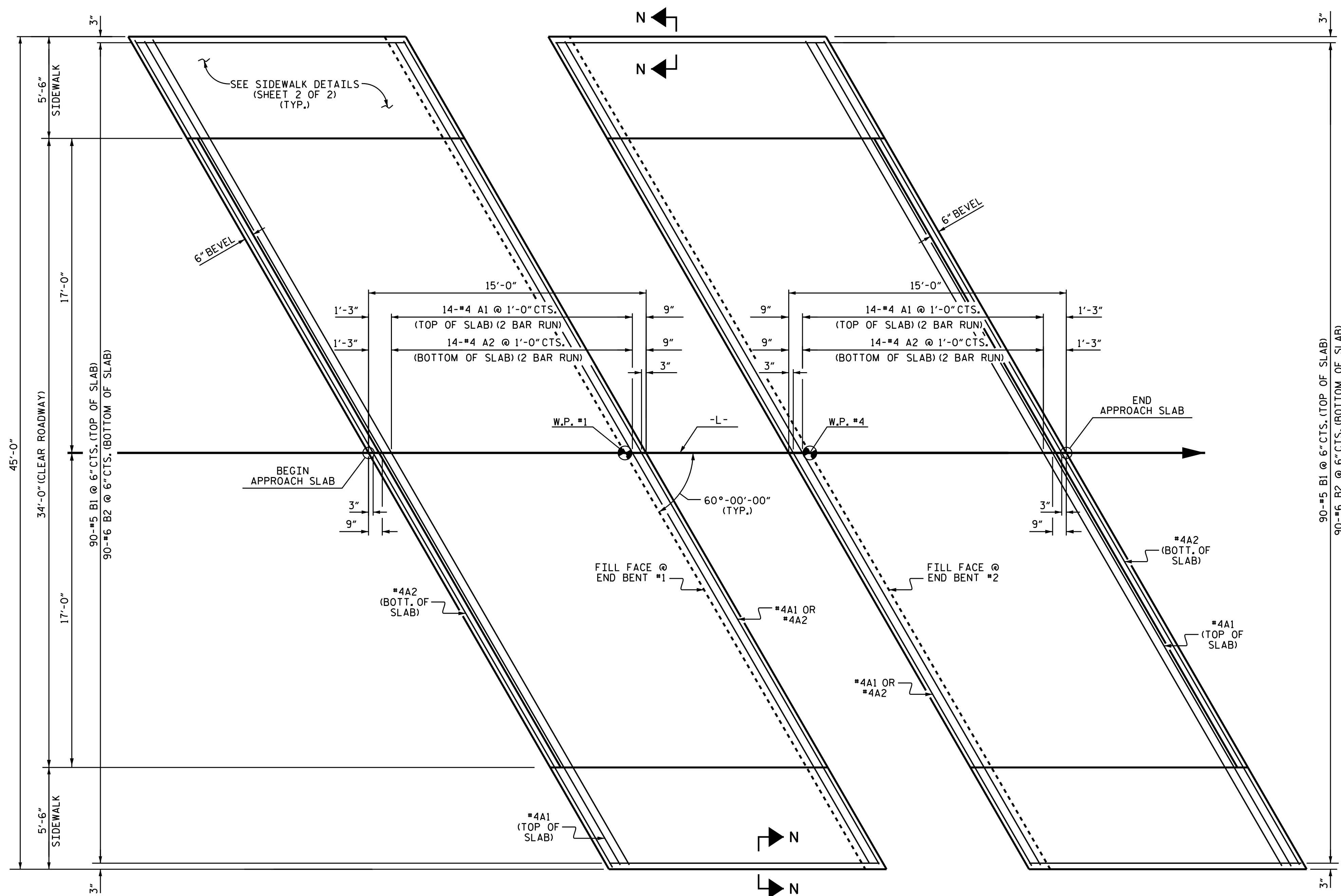
12/13/2017

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SHELBY, NC 28150
PH (704) 476-0003
CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH						SHEET NO.
STANDARD = RIP RAP DETAILS =						S-30
REVISIONS						TOTAL SHEETS
NO.	BY	DATE	NO.	BY	DATE	33
1			3			
2			4			

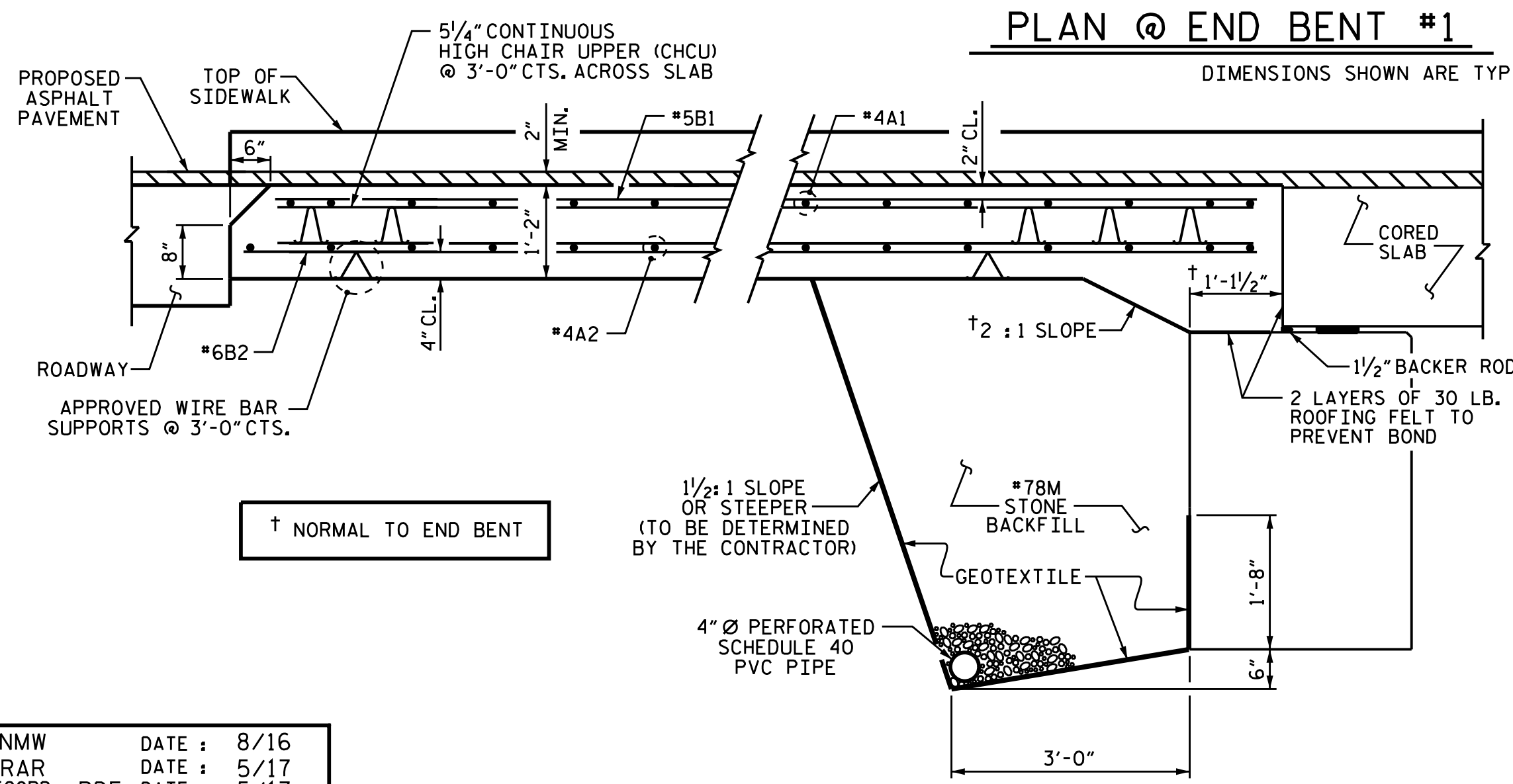
ASSEMBLED BY : NMW	DATE : 9/16
CHECKED BY : RAR	DATE : 5/17
DESIGN ENGINEER OF RECORD : RDE	DATE : 5/17
DRAWN BY : REK 1/84	REV. 5/1/06R TLA/GM
CHECKED BY : RDU 1/84	REV. 10/1/11 MAA/GM
	REV. 12/21/11 MAA/GM



PLAN @ END BENT #1

PLAN @ END BENT #2

DIMENSIONS SHOWN ARE TYPICAL FOR BOTH APPROACH SLABS

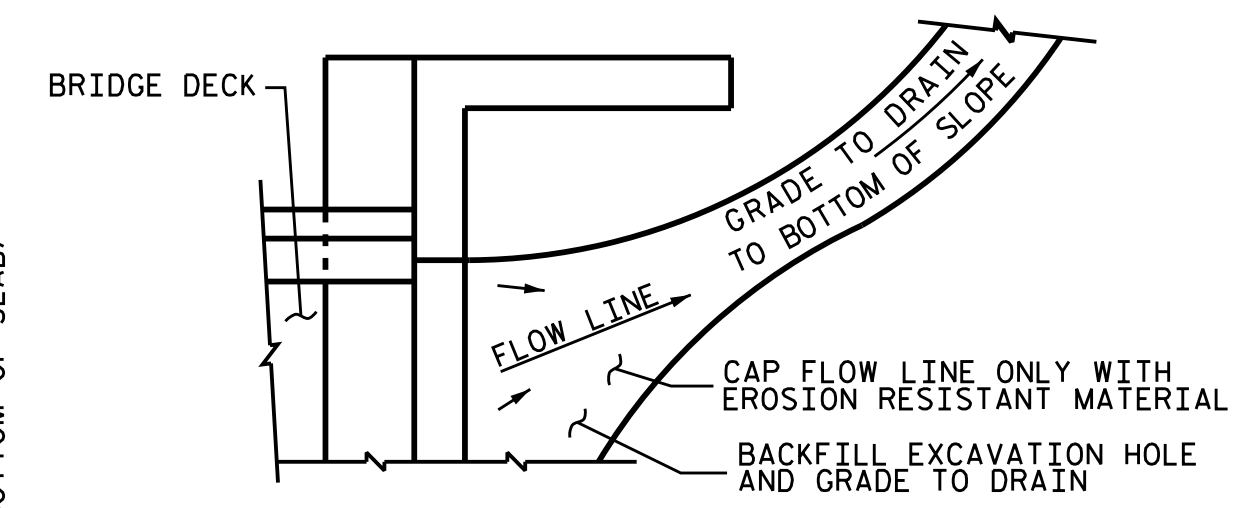


SECTION THRU SLAB

ASSEMBLED BY : NMW	DATE : 8/16
CHECKED BY : RAR	DATE : 5/17
DESIGN ENGINEER OF RECORD : RDE	DATE : 5/17
DRAWN BY : SHS/MAA	5/09
CHECKED BY : BCH	5/09
REV. 9/15	MAA/TMG

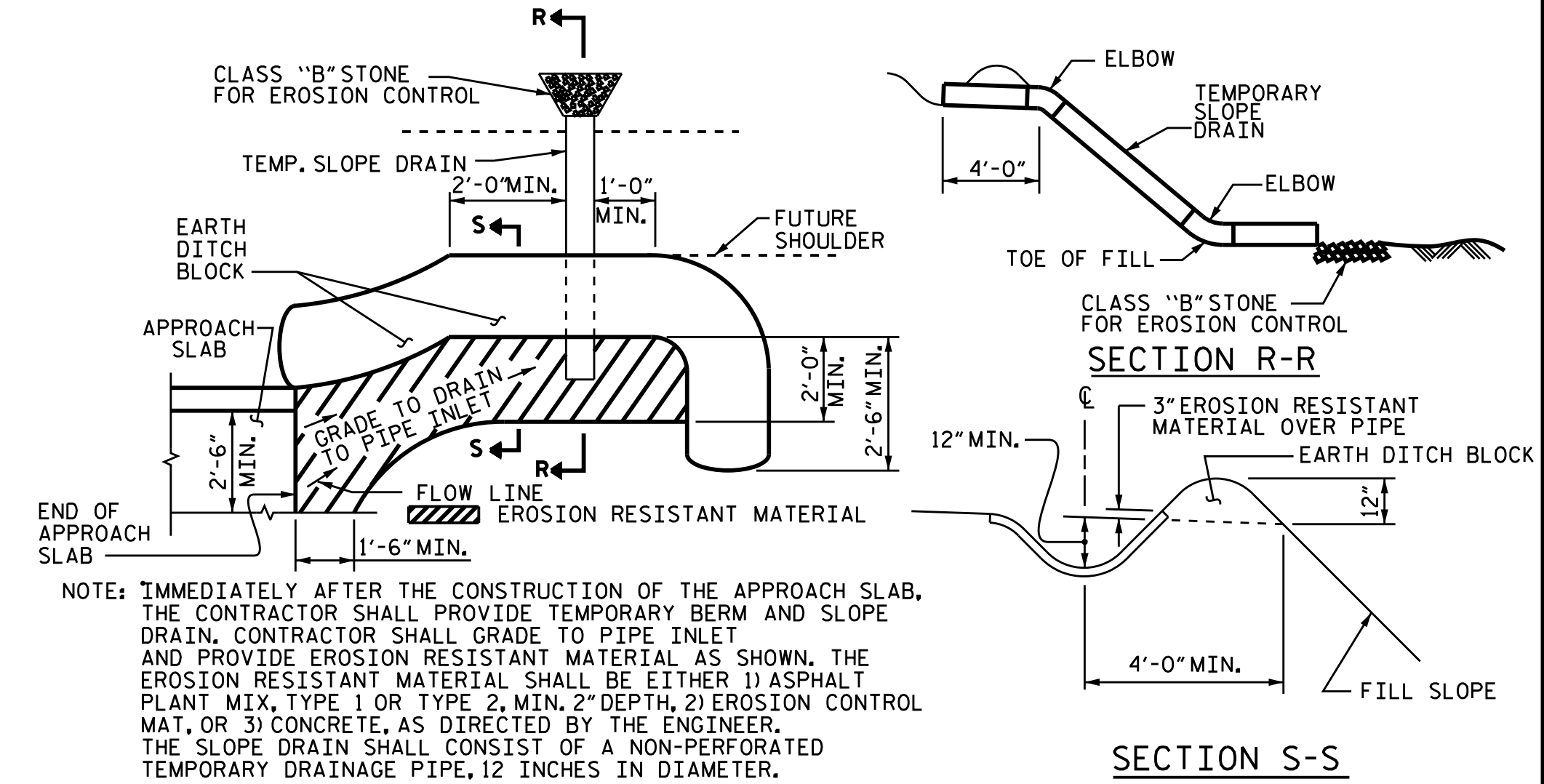
NOTES

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



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

TEMPORARY DRAINAGE DETAIL



TEMPORARY BERM AND SLOPE DRAIN DETAILS

(TO BE USED WHEN SHOULDER BERM GUTTER IS REQUIRED)

PROJECT NO. U-5866
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SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

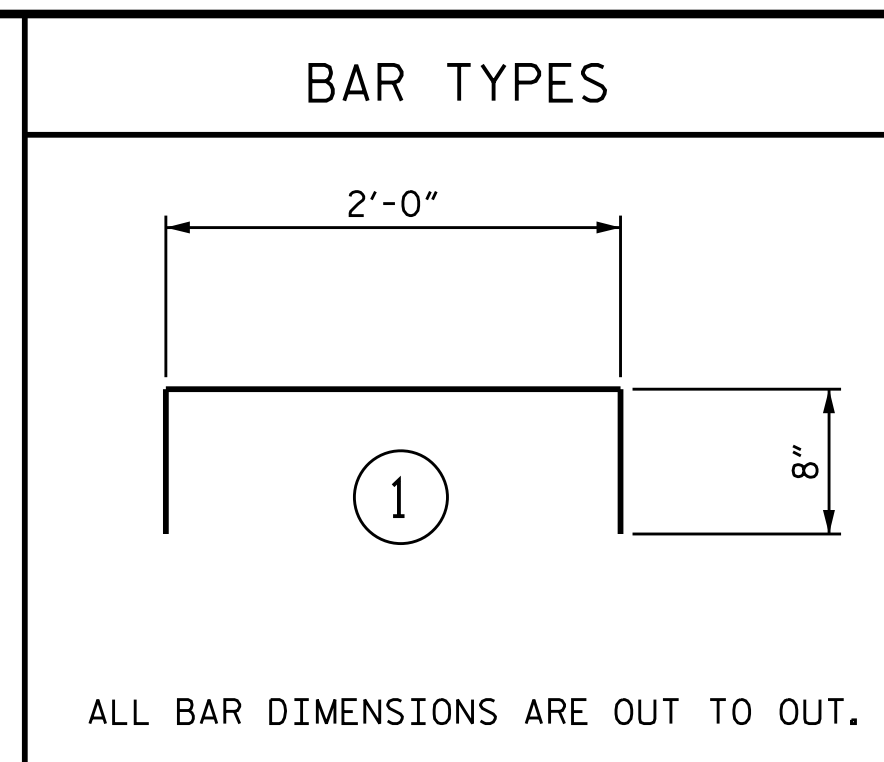
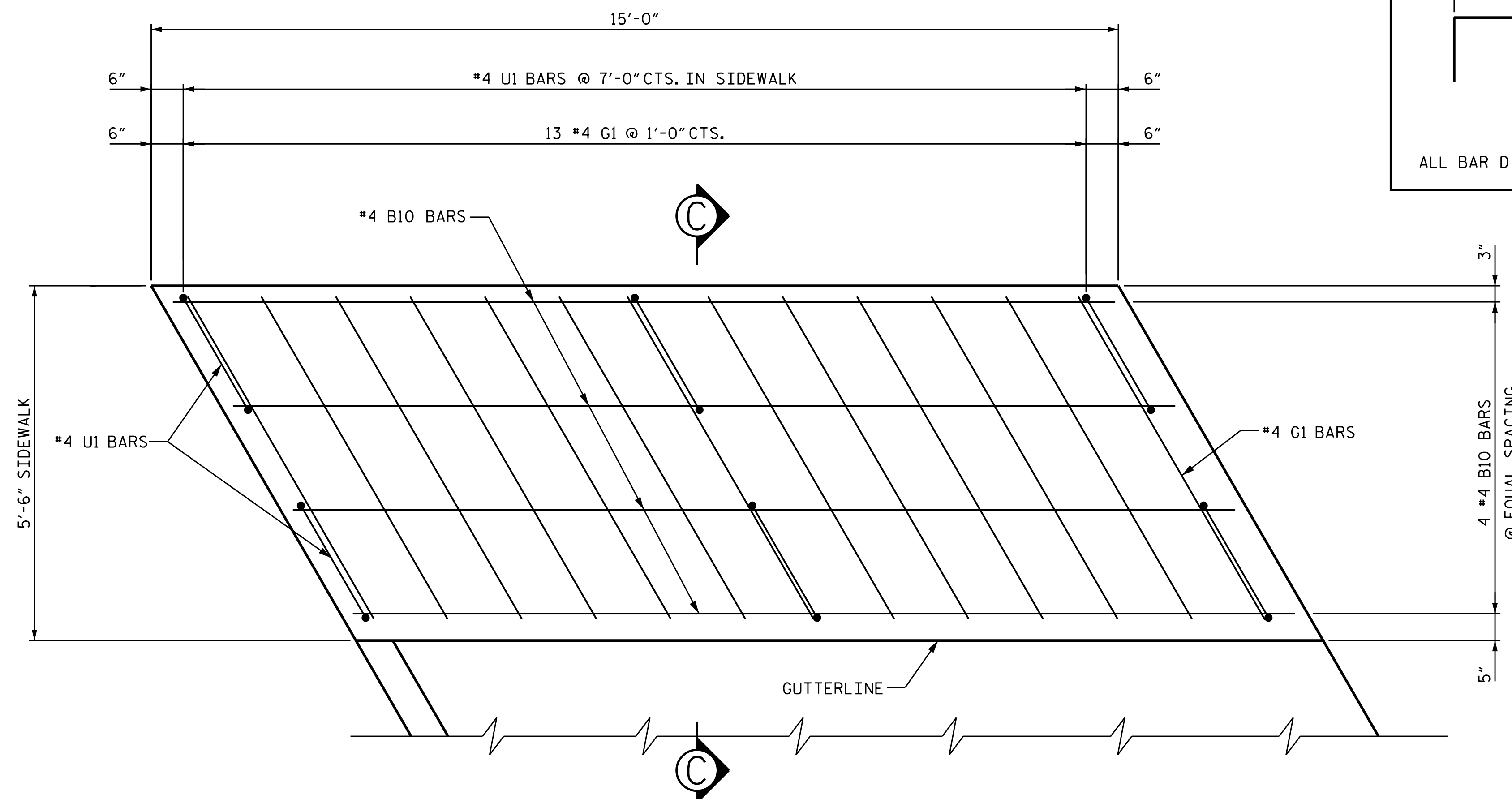
BRIDGE APPROACH SLAB FOR PRESTRESSED CONCRETE CORED SLAB UNIT

12/13/2017

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

TGS ENGINEERS
804-C N. LAFAYETTE ST
SHELBY, NC 28150
PH (704) 475-0003
CORP. LICENSE NO.: C-0275

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	TOTAL SHEETS
1			3			S-31
2			4			33

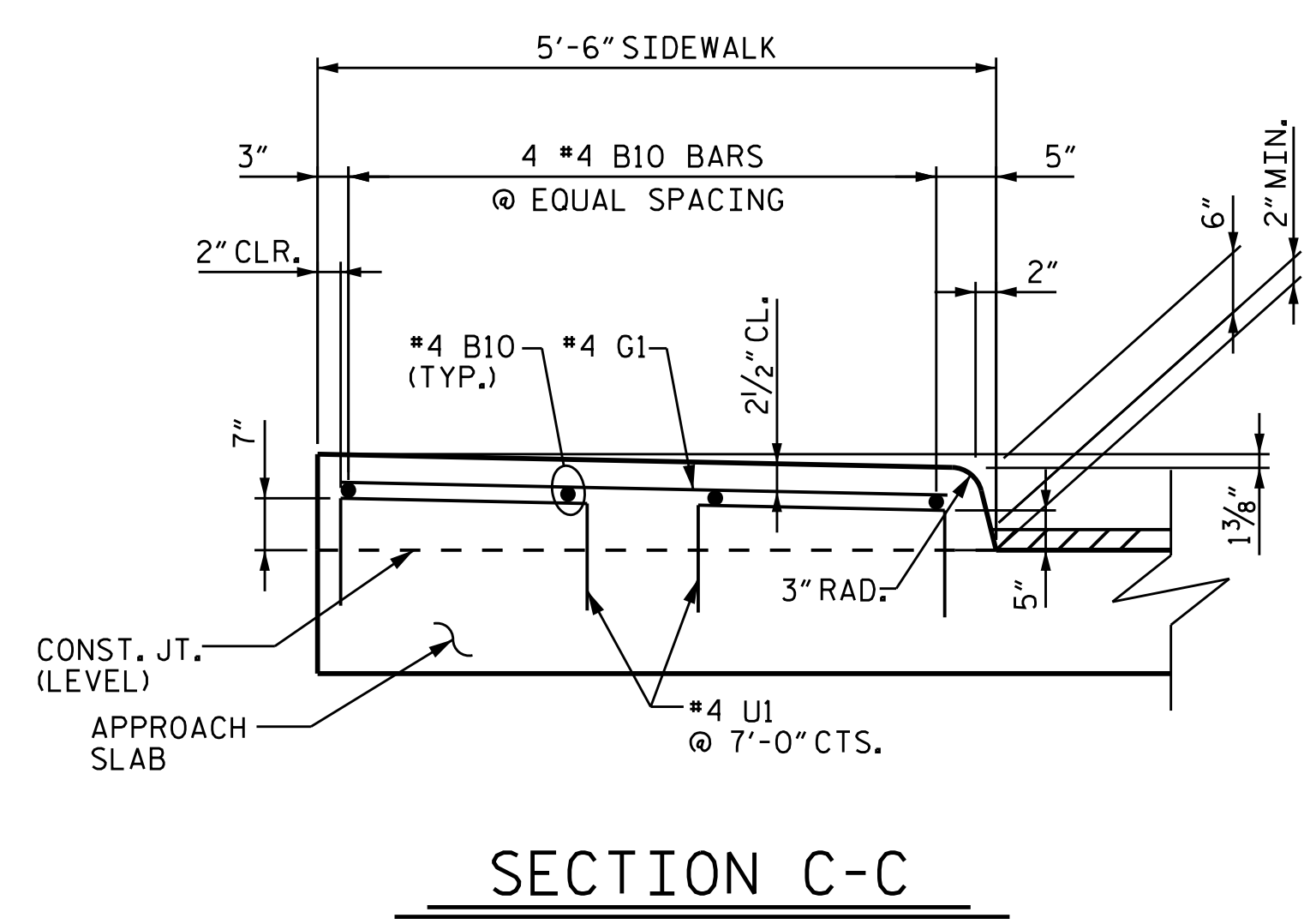


BILL OF MATERIAL FOR APPROACH SLAB AT END BENT 1					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
*A1	32	#4	STR	26'-10"	574
A2	32	#4	STR	26'-8"	570
*B1	90	#5	STR	14'-1"	1,322
B2	90	#6	STR	14'-7"	1,971
*B10	8	#4	STR	14'-8"	78
*G1	26	#4	STR.	5'-7"	97
*U1	12	#4	1	3'-4"	27
REINFORCING STEEL				2,541 LBS.	
* EPOXY COATED REINFORCING STEEL				2,098 LBS.	
CLASS AA CONCRETE BREAKDOWN					
POUR 1 SLAB				37.3 C. Y.	
POUR 2 SIDEWALKS				4.4 C. Y.	
CLASS AA CONCRETE				41.7 C. Y.	

BILL OF MATERIAL FOR APPROACH SLAB AT END BENT 2					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
*A1	32	#4	STR	26'-10"	574
A2	32	#4	STR	26'-8"	570
*B1	90	#5	STR	14'-1"	1,322
B2	90	#6	STR	14'-7"	1,971
*B10	8	#4	STR	14'-8"	78
*G1	26	#4	STR.	5'-7"	97
*U1	12	#4	1	3'-4"	27
REINFORCING STEEL				2,541 LBS.	
* EPOXY COATED REINFORCING STEEL				2,098 LBS.	
CLASS AA CONCRETE BREAKDOWN					
POUR 1 SLAB				37.3 C. Y.	
POUR 2 SIDEWALKS				4.4 C. Y.	
CLASS AA CONCRETE				41.7 C. Y.	

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

PLAN OF SIDEWALK
(SIDEWALK @ END BENT 1 LEFT SIDE SHOWN)
(OTHER LOCATIONS SIMILAR)



SECTION C-C

PROJECT NO. U-5866
GRAHAM COUNTY
STATION: 20+25.00-L-
SHEET 2 OF 2

12/13/2017

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TGS ENGINEERS
804-C N. LAFAYETTE ST
SHELBY, NC 28150
PH (704) 476-0003
CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

BRIDGE APPROACH SLAB FOR PRESTRESSED CONCRETE CORED SLAB UNIT

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			S-32
2			4			TOTAL SHEETS 33

DRAWN BY : NMW DATE : 8/16
CHECKED BY : RAR DATE : 5/17
DESIGN ENGINEER OF RECORD : RDE DATE : 5/17

STANDARD NOTES

DESIGN DATA:

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

MATERIAL AND WORKMANSHIP:

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

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

CONCRETE:

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

CONCRETE CHAMFERS:

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

DOWELS:

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

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

BRIDGES SHALL BE BUILT ON THE GRADE OR VERTICAL CURVE SHOWN ON PLANS. SLABS, CURBS AND PARAPETS SHALL CONFORM TO THE GRADE OR CURVE. ALL DIMENSIONS WHICH ARE GIVEN IN SECTION AND ARE AFFECTED BY DEAD LOAD DEFLECTIONS ARE DIMENSIONS AT CENTER LINE OF BEARING UNLESS OTHERWISE NOTED ON PLANS. IN SETTING FORMS FOR STEEL BEAM BRIDGES AND PRESTRESSED CONCRETE GIRDER BRIDGES, ADJUSTMENTS SHALL BE MADE DUE TO THE DEAD LOAD DEFLECTIONS FOR THE ELEVATIONS SHOWN. WHERE BLOCKS ARE SHOWN OVER BEAMS FOR BUILDING UP TO THE SLAB, THE VERTICAL DIMENSIONS OF THE BLOCKS SHALL BE ADJUSTED BETWEEN BEARINGS TO COMPENSATE FOR DEAD LOAD DEFLECTIONS, VERTICAL CURVE ORDINATE, AND ACTUAL BEAM CAMBER. WHERE BOTTOM OF SLAB IS IN LINE WITH BOTTOM OF TOP FLANGES, DEPTH OF SLAB BETWEEN BEARINGS SHALL BE ADJUSTED TO COMPENSATE FOR DEAD LOAD DEFLECTION, VERTICAL CURVE ORDINATE, AND ACTUAL BEAM CAMBER. IN SETTING FALSEWORK AND FORMS FOR REINFORCED CONCRETE SPANS, AN ALLOWANCE SHALL BE MADE FOR DEAD LOAD DEFLECTIONS, SETTLEMENT OF FALSEWORK, AND PERMANENT CAMBER WHICH SHALL BE PROVIDED FOR IN ADDITION TO THE ELEVATIONS SHOWN. AFTER REMOVAL OF THE FALSEWORK, THE FINISHED STRUCTURES SHALL CONFORM TO THE PROFILE AND ELEVATIONS SHOWN ON THE PLANS AND CONSTRUCTION ELEVATIONS FURNISHED BY THE ENGINEER. DETAILED DRAWINGS FOR FALSEWORK OR FORMS FOR BRIDGE SUPERSTRUCTURE AND ANY STRUCTURE OR PARTS OF A STRUCTURE AS NOTED ON THE PLANS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL BEFORE CONSTRUCTION OF THE FALSEWORK OR FORMS IS STARTED.

REINFORCING STEEL:

ALL REINFORCING STEEL SHALL BE DEFORMED. DIMENSIONS RELATIVE TO PLACEMENT OF REINFORCING ARE TO CENTERS OF BARS UNLESS OTHERWISE INDICATED IN THE PLANS. DIMENSIONS ON BAR DETAILS ARE TO CENTERS OF BARS OR ARE OUT TO OUT AS INDICATED ON PLANS. WIRE BAR SUPPORTS SHALL BE PROVIDED FOR REINFORCING STEEL WHERE INDICATED ON THE PLANS. WHEN BAR SUPPORT PIECES ARE PLACED IN CONTINUOUS LINES, THEY SHALL BE SO PLACED THAT THE ENDS OF THE SUPPORTING WIRES SHALL BE LAPPED TO LOCK LEGS ON ADJOINING PIECES.

STRUCTURAL STEEL:

AT THE CONTRACTOR'S OPTION, HE MAY SUBSTITUTE 7/8" Ø SHEAR STUDS FOR THE 3/4" Ø STUDS SPECIFIED ON THE PLANS. THIS SUBSTITUTION SHALL BE MADE AT THE RATE OF 3 - 7/8" Ø STUDS FOR 4 - 3/4" Ø STUDS, AND STUD SPACING CHANGES SHALL BE MADE AS NECESSARY TO PROVIDE THE SAME EQUIVALENT NUMBER OF 7/8" Ø STUDS ALONG THE BEAM AS SHOWN FOR 3/4" Ø STUDS BASED ON THE RATIO OF 3 - 7/8" Ø STUDS FOR 4 - 3/4" Ø STUDS. STUDS OF THE LENGTH SPECIFIED ON THE PLANS MUST BE PROVIDED. THE MAXIMUM SPACING SHALL BE 2'-0". EXCEPT AT THE INTERIOR SUPPORTS OF CONTINUOUS BEAMS WHERE THE COVER PLATE IS IN CONTACT WITH BEARING PLATE, THE CONTRACTOR MAY, AT HIS OPTION, SUBSTITUTE FOR THE COVER PLATES DESIGNATED ON THE PLANS, COVER PLATES OF THE EQUIVALENT AREA PROVIDED THESE PLATES ARE AT LEAST 5/16" IN THICKNESS AND DO NOT EXCEED A WIDTH EQUAL TO THE FLANGE WIDTH LESS 2" OR A THICKNESS EQUAL TO 2 TIMES THE FLANGE THICKNESS. THE SIZE OF FILLET WELDS SHALL CONFORM TO THE REQUIREMENTS OF THE CURRENT ANSI/AASHTO/AWS "BRIDGE WELDING CODE". ELECTROSLAG WELDING WILL NOT BE PERMITTED. WITH THE SOLE EXCEPTION OF EDGES AT SURFACES WHICH BEAR ON OTHER SURFACES, ALL SHARP EDGES AND ENDS OF SHAPES AND PLATES SHALL BE SLIGHTLY ROUNDED BY SUITABLE MEANS TO A RADIUS OF APPROXIMATELY 1/16 INCH OR EQUIVALENT FLAT SURFACE AT A SUITABLE ANGLE PRIOR TO PAINTING, GALVANIZING, OR METALLIZING.

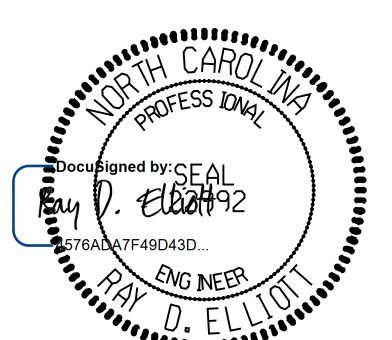
HANDRAILS AND POSTS:

METAL STANDARDS AND FACES OF THE CONCRETE END POSTS FOR THE METAL RAIL SHALL BE SET NORMAL TO THE GRADE OF THE CURB, UNLESS OTHERWISE SHOWN ON PLANS. THE METAL RAIL AND TOPS OF CONCRETE POSTS USED WITH THE ALUMINUM RAIL SHALL BE BUILT PARALLEL TO THE GRADE OF THE CURB. METAL HANDRAILS SHALL BE IN ACCORDANCE WITH THE PLANS. RAILS SHALL BE AS MANUFACTURED FOR BRIDGE RAILING. CASTINGS SHALL BE OF A UNIFORM APPEARANCE. FINIS AND OTHER DEFORMATIONS RESULTING FROM CASTING OR OTHERWISE SHALL BE BE OBTAINED. CASTINGS WITH DISCOLORATIONS OR OF NON-UNIFORM COLORING WILL NOT BE ACCEPTED. CERTIFIED MILL REPORTS ARE REQUIRED FOR METAL RAILS AND POSTS.

SPECIAL NOTES:

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

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		STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH				
12/13/2017		<h2 style="margin: 0;">STANDARD NOTES</h2>				
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED						
TGS ENGINEERS 804-C N. LAFAYETTE ST SHELBY, NC 28150 PH (704) 476-0003 CORP. LICENSE NO.: C-0275		REVISIONS				
NO.	BY:	DATE:	NO.	BY:	DATE:	SHEET NO.
1			3			S-33
2			4			TOTAL SHEETS 33

DRAWN BY :	NMW	DATE :	9/16
CHECKED BY :	RAR	DATE :	5/17
DESIGN ENGINEER OF RECORD :	RDE	DATE :	5/17