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09/20/18 09:56

TIP PROJECT: B-5161

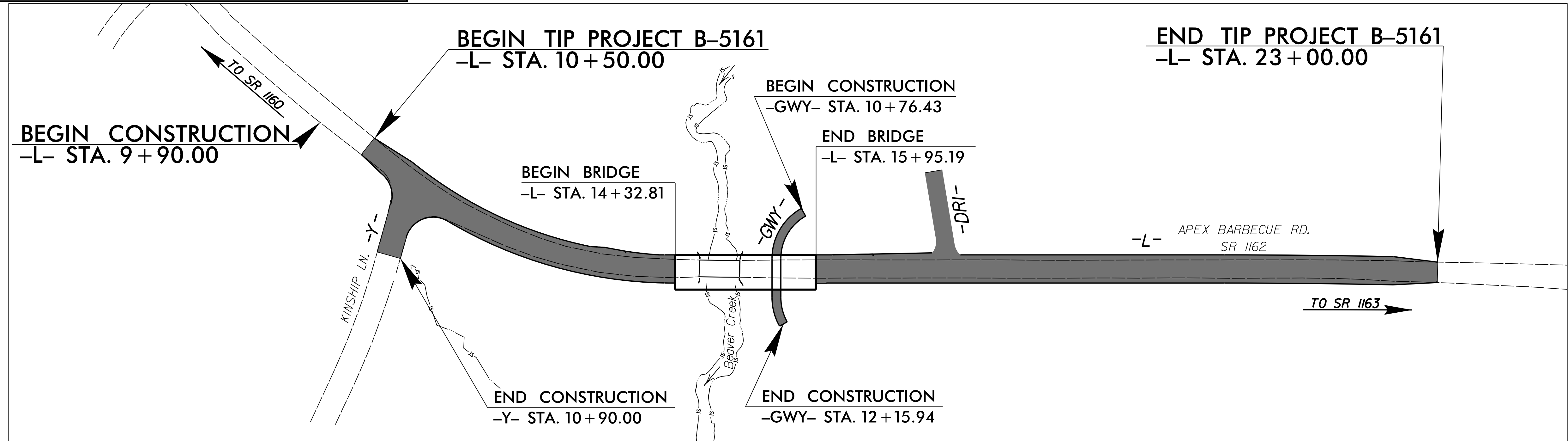
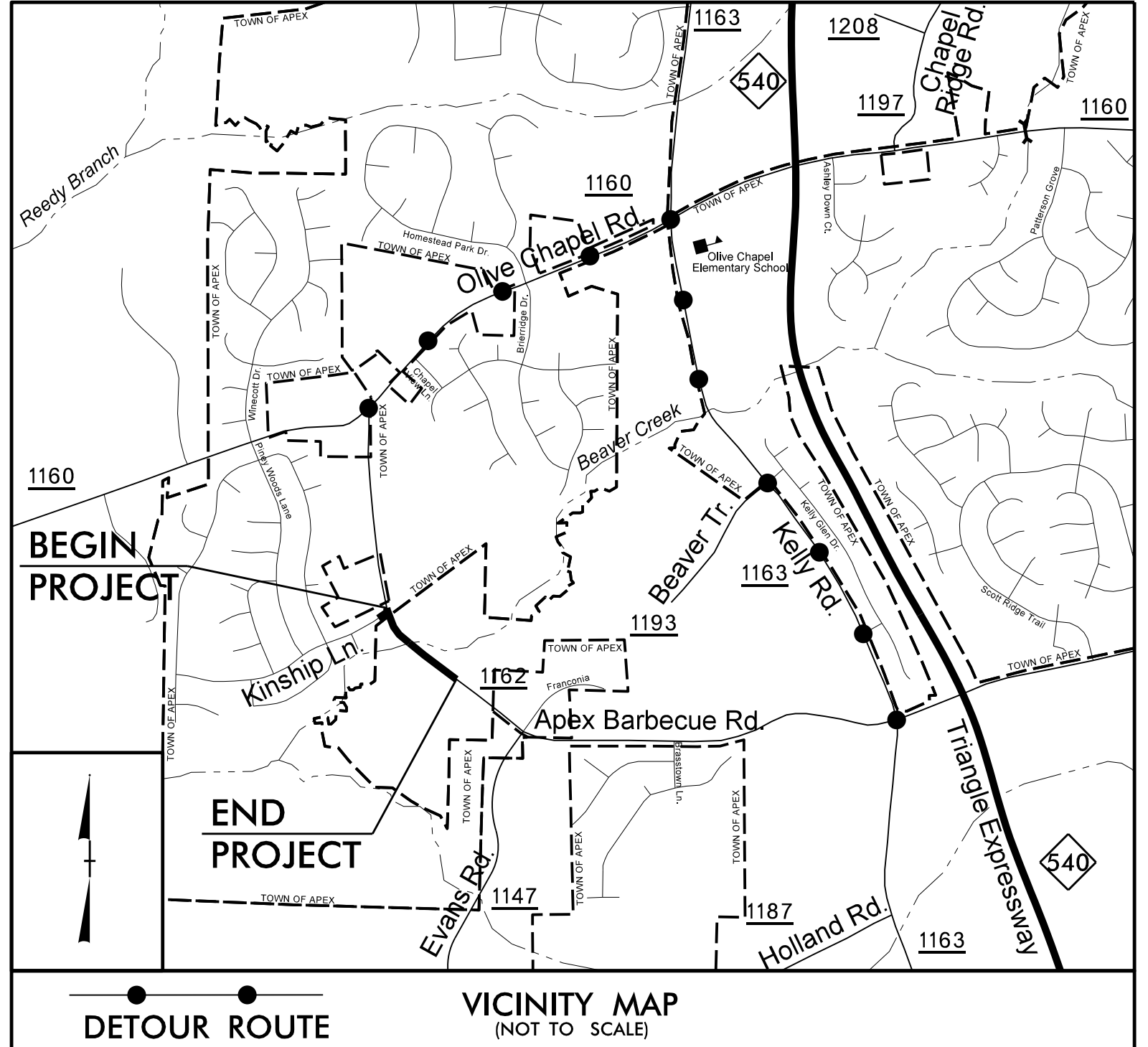
CONTRACT: C204098

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

WAKE COUNTY

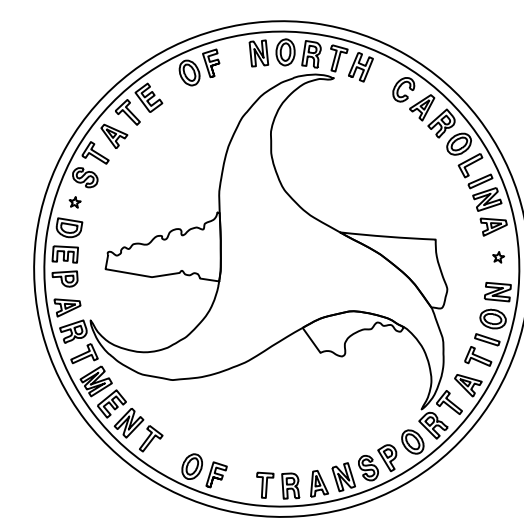
**LOCATION: BRIDGE NO. 362 OVER BEAVER CREEK
ON SR 1162 (APEX BARBECUE ROAD)
TYPE OF WORK: GRADING, DRAINAGE, PAVING, AND STRUCTURE**

STATE	TIP PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-5161		
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
42336.1.1	BRZ-1162(6)	P.E.	
42336.2.1		RW	
42336.3.1		CONST.	



STRUCTURES

**DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED**



DESIGN DATA

ADT 2018 =	3970
ADT 2038 =	10360
K =	10 %
D =	70 %
T =	5 %*
V =	40 MPH
*TTST =	1% DUAL = 4%
FUNC CLASS =	LOCAL RURAL
	SUBREGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT B-5161 =	0.207 MILES
LENGTH STRUCTURES TIP PROJECT B-5161 =	0.030 MILES
TOTAL LENGTH TIP PROJECT B-5161 =	0.237 MILES

Prepared In the Office of:
HDR HDR Engineering, Inc. of the Carolinas
555 Fayetteville St., Suite 900 Raleigh, NC 27601
N.C.B.E.L.S. License Number: F-0116

2018 STANDARD SPECIFICATIONS

KENT DICKENS, P.E.
PROJECT ENGINEER

GREG MYERS
PROJECT DESIGN ENGINEER

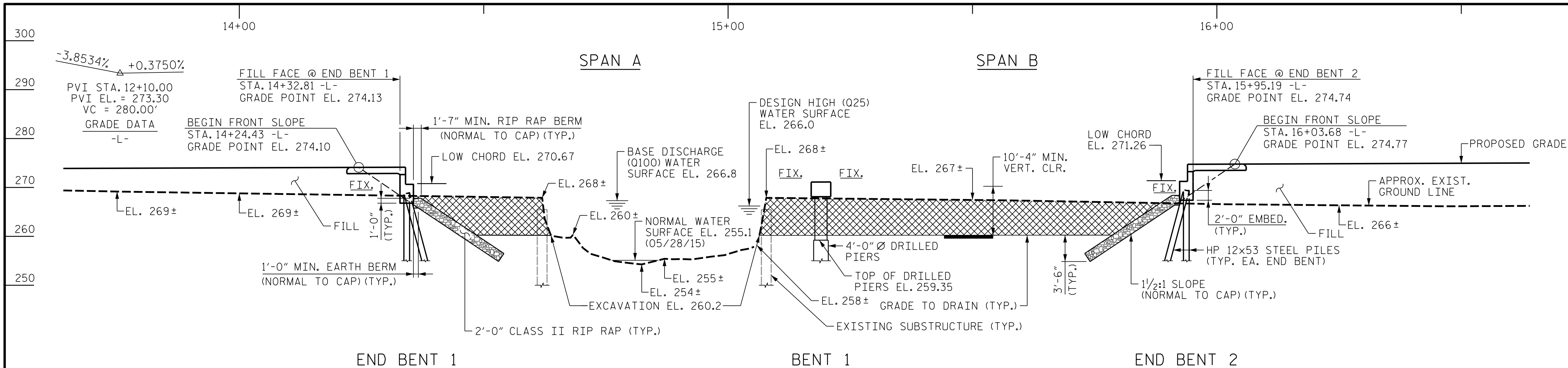
DAVID STUTTS, P.E.
NCDOT CONTACT

LETTING DATE:
MAY 15, 2018

NORTH CAROLINA PROFESSIONAL SEAL
040757
ENGINEER
KENT DICKENS

DocuSigned by:
Kent Dickens
2/13/2018

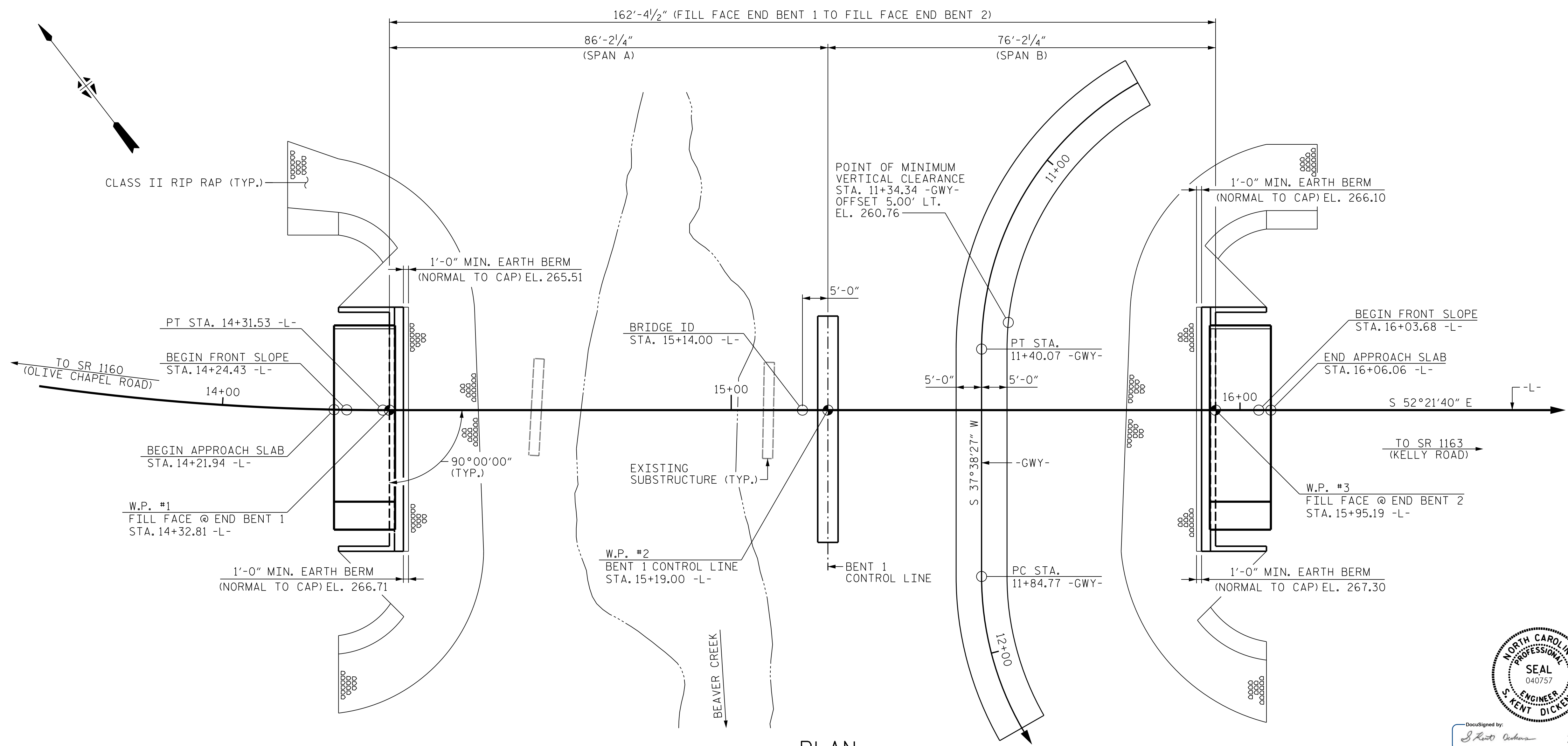
DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA



SECTION ALONG -L-

(SECTIONS AT END BENTS AND BENT ARE SHOWN AT RIGHT ANGLES TO END BENTS AND BENT)

UNCLASSIFIED STRUCTURE EXCAVATION



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

HORIZONTAL CURVE DATA -L-

PI STA. 12+75.03	PI STA. 12+44.77
Δ = 38°29'30.7" (LT)	Δ = 90°00'07.3" (LT)
D = 11°48'48.8"	D = 95°29'34.7"
L = 325.83'	L = 94.25'
T = 169.33'	T = 60.00'
R = 485.00'	R = 60.00'

HORIZONTAL CURVE DATA -GWY-

PI STA. 11+05.82	PI STA. 12+44.77
Δ = 89°59'52.7" (LT)	Δ = 90°00'07.3" (LT)
D = 95°29'34.7"	D = 95°29'34.7"
L = 94.25'	L = 94.25'
T = 60.00'	T = 60.00'
R = 60.00'	R = 60.00'

PROJECT NO. B-5161
 WAKE COUNTY
 STATION: 15+14.00 -L-
 SHEET 1 OF 3 REPLACES BRIDGE NO. 362



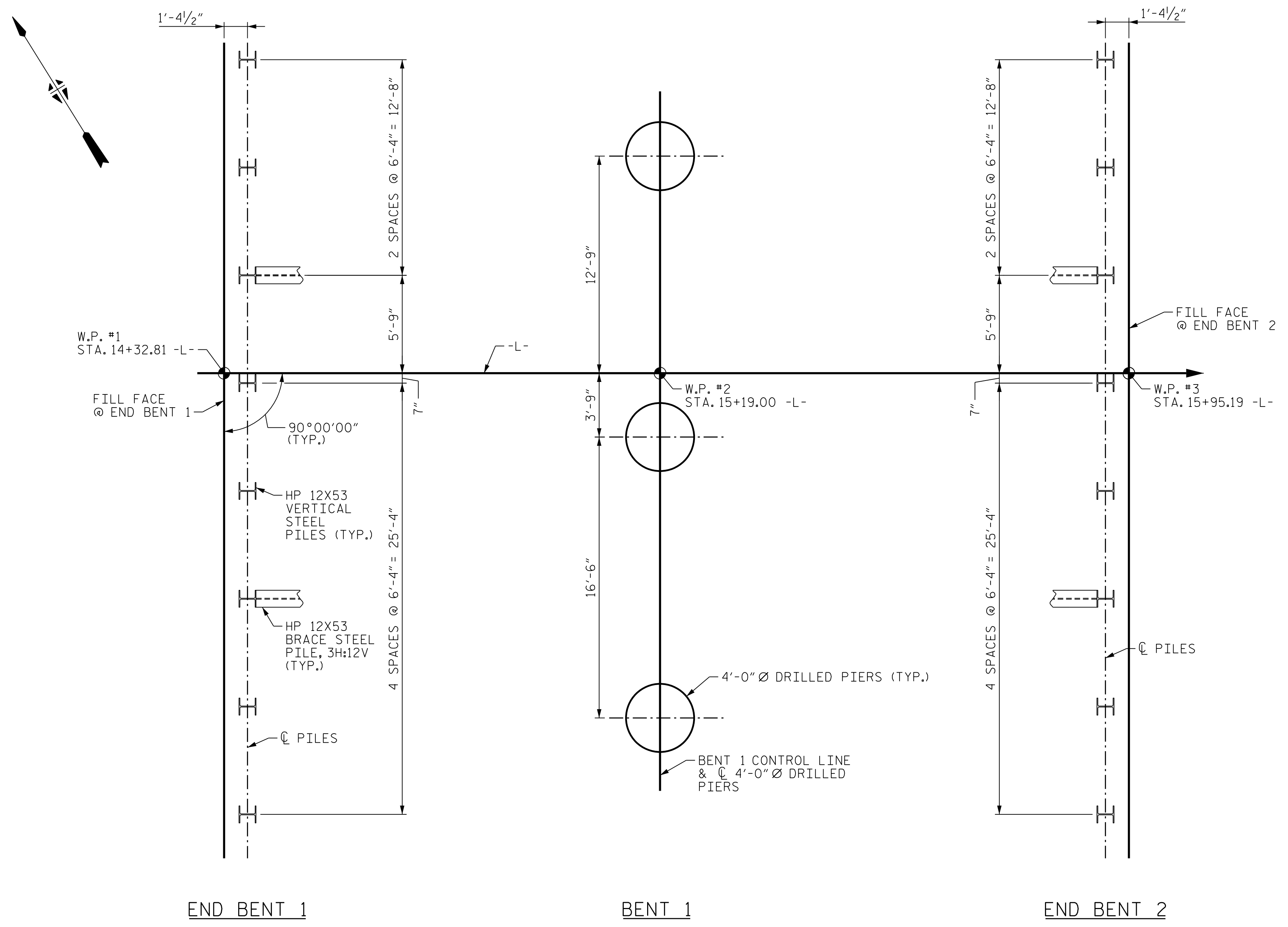
DocuSigned by: *Kent Dickens* 2/13/2018
 BDA22A65385A42E

DES BY: <u>K. DICKENS</u>	DATE: <u>10/17</u>	DWG BY: <u>S. TOWE</u>	DATE: <u>10/17</u>
DES CHK: <u>B. ROGERS</u>	DATE: <u>10/17</u>	CHK BY: <u>G. MYERS</u>	DATE: <u>12/17</u>

HDR HDR Engineering, Inc. of the Carolinas
 555 Fayetteville St., Suite 900 Raleigh, N.C. 27601
 N.C.B.E.L.S. License Number: F-0116

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REVISIONS						SHEET NO. S-01
NO.	BY:	DATE:	NO.	BY:	DATE:	
1	--	--	3	--	--	TOTAL SHEETS 25
2	--	--	4	--	--	



END BENT 1

BENT 1

END BENT 2

FOUNDATION LAYOUT

NOTES

FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

PILES AT END BENT NO.1 AND END BENT NO.2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 120 TONS PER PILE.

DRIVE PILES AT END BENT NO.1 AND END BENT NO.2 TO A REQUIRED DRIVING RESISTANCE OF 200 TONS PER PILE.

STEEL H-PILE POINTS ARE REQUIRED FOR STEEL H-PILES AT END BENT NO.1 AND END BENT NO.2. FOR STEEL PILE POINTS, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

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

DRILLED PIERS AT BENT NO.1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 640 TONS PER PIER. CHECK FIELD CONDITIONS FOR THE REQUIRED TIP RESISTANCE OF 50 TSF.

INSTALL DRILLED PIERS AT BENT NO.1 TO A TIP ELEVATION NO HIGHER THAN 240 FT. (LEFT), 234 FT. (CENTER), AND 234 FT. (RIGHT), RESPECTIVELY, WITH THE REQUIRED TIP RESISTANCE.

THE SCOUR CRITICAL ELEVATION FOR BENT NO.1 IS ELEVATION 248 FT. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.

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

DO NOT DEWATER DRILLED PIER EXCAVATIONS AT BENT NO.1. CLEAN THE BOTTOM OF EXCAVATIONS WITH A SUBMERSIBLE PUMP OR AN AIRLIFT. WET PLACEMENT OF CONCRETE IS REQUIRED.

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

DRILLED PIER EXCAVATIONS AT BENT NO.1 WILL EXTEND INTO MATERIAL THAT DETERIORATES WHEN EXPOSED TO THE ELEMENTS. CHECK FIELD CONDITIONS FOR REQUIRED TIP RESISTANCE AND PLACE CONCRETE IMMEDIATELY AFTER EXCAVATION IS COMPLETED.

PROJECT NO. B-5161
WAKE COUNTY
 STATION: 15+14.00 -L-
 SHEET 2 OF 3

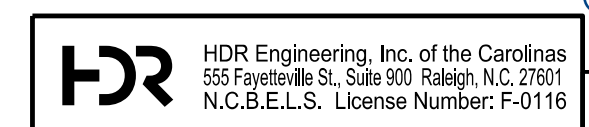


DocuSigned by:
Kent Dickens
 2/13/2018

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

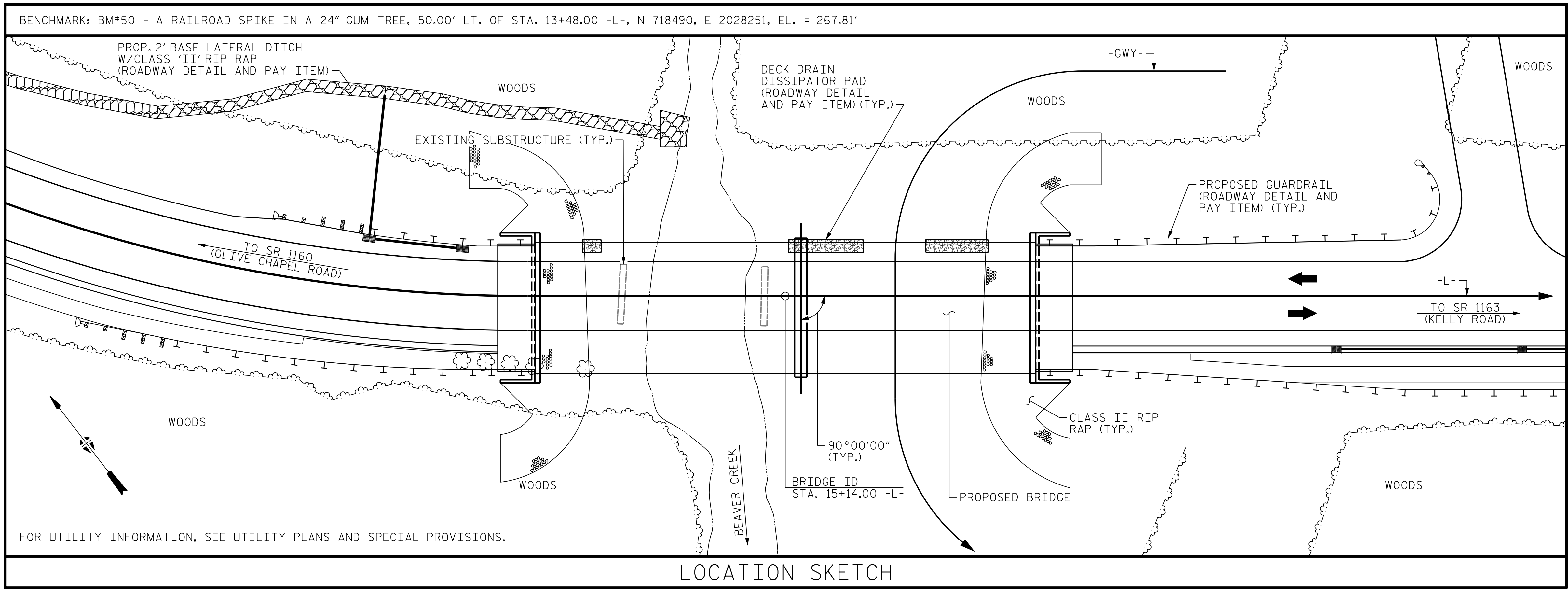
GENERAL DRAWING
 FOR BRIDGE ON SR 1162 (-L-)
 (APEX BARBECUE ROAD)
 OVER BEAVER CREEK
 BETWEEN SR 1160 & SR 1163

DES BY: G. MYERS	DATE: 10/17	DWG BY: M. SELLS	DATE: 11/17
DES CHK: K. DICKENS	DATE: 11/17	CHK BY: G. MYERS	DATE: 12/17



DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO. S-02 TOTAL SHEETS 25
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			
2			4			



NOTES

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.

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

THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.

FOR OTHER DESIGN DATA AND GENERAL NOTES, SEE "STANDARD NOTES" SHEET.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

ALL PAVEMENT MARKING WILL BE IN ACCORDANCE WITH THE PAVEMENT MARKING PLANS AND SHALL PROVIDE FOR BICYCLES.

INASMUCH AS THE PAINT SYSTEM ON THE EXISTING STRUCTURAL STEEL CONTAINS LEAD, THE CONTRACTOR'S ATTENTION IS DIRECTED TO ARTICLE 107-1 OF THE STANDARD SPECIFICATIONS. ANY COSTS RESULTING FROM COMPLIANCE WITH APPLICABLE STATE OR FEDERAL REGULATIONS PERTAINING TO HANDLING OF MATERIALS CONTAINING LEAD BASED PAINT SHALL BE INCLUDED IN THE BID PRICE FOR "REMOVAL OF EXISTING STRUCTURE AT STATION 15+14.00 -L-."

THE MATERIAL SHOWN IN THE CROSS-HATCHED AREA ON SHEET S-02 SHALL BE EXCAVATED FOR A DISTANCE OF 50FT EACH SIDE OF CENTERLINE ROADWAY AS DIRECTED BY THE ENGINEER. THIS WORK WILL BE PAID FOR AT THE CONTRACT LUMP SUM PRICE FOR UNCLASSIFIED STRUCTURE EXCAVATION. SEE SECTION 412 OF THE STANDARD SPECIFICATIONS.

LOCATION SKETCH

HYDRAULIC DATA

DESIGN DISCHARGE	= 3,100 CFS
FREQUENCY OF DESIGN FLOOD	= 25 YR.
DESIGN HIGH WATER ELEVATION	= 266.0
DRAINAGE AREA	= 6.35 SQ. MI.
BASE DISCHARGE (Q100)	= 4,020 CFS
BASE HIGH WATER ELEVATION	= 266.8

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE	= 19,000 CFS
FREQUENCY OF OVERTOPPING FLOOD	= + 500 YR.
OVERTOPPING FLOOD ELEVATION	= Δ 275.1

Δ OVERTOPPING OCCURS AT STA. 13+25.17 -L-

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

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

THE SCOUR CRITICAL ELEVATION FOR BENT NO.1 IS ELEVATION 248.00. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

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

THE SUBSTRUCTURE OF THE EXISTING BRIDGE INDICATED ON THE PLANS IS FROM THE BEST INFORMATION AVAILABLE. SINCE THIS INFORMATION IS SHOWN FOR THE CONVENIENCE OF THE CONTRACTOR, THE CONTRACTOR SHALL HAVE NO CLAIM WHATSOEVER AGAINST THE DEPARTMENT OF TRANSPORTATION FOR ANY DELAYS OR ADDITIONAL COST INCURRED BASED ON DIFFERENCES BETWEEN THE EXISTING BRIDGE SUBSTRUCTURE SHOWN ON THE PLANS AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

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

TOTAL BILL OF MATERIAL

	REMOVAL OF EXISTING STRUCTURE @ STA. 15+14.00 -L-	ASBESTOS ASSESSMENT	4'-0" DIA. DRILLED PIERS IN SOIL	4'-0" DIA. DRILLED PIERS NOT IN SOIL	SPT TESTING	CSL TESTING	UNCLASSIFIED STRUCTURE EXCAVATION @ STA. 15+14.00 -L-	CLASS AA CONCRETE	CLASS A CONCRETE	BRIDGE APPROACH SLABS @ STA. 15+14.00 -L-	REINFORCING STEEL	EPOXY COATED REINFORCING STEEL
	LUMP SUM	LUMP SUM	LIN. FT.	LIN. FT.	EA.	EA.	LUMP SUM	CU. YDS.	CU. YDS.	LUMP SUM	LBS.	LBS.
SUPERSTRUCTURE								28.8				1280
END BENT NO. 1									30.0		4197	
BENT NO. 1			41.1	29.0	1	1			25.3		9157	
END BENT NO. 2									30.0		4197	
TOTAL	LUMP SUM	LUMP SUM	41.1	29.0	1	1	LUMP SUM	28.8	85.3	LUMP SUM	17551	1280

TOTAL BILL OF MATERIAL

	SPIRAL COLUMN REINFORCING STEEL	PILE DRIVING EQUIPMENT SETUP FOR HP 12X53 STEEL PILES	HP 12X53 STEEL PILES	STEEL PILE POINTS	TWO BAR METAL RAIL	1'-2" X 2'-9 1/2" CONCRETE PARAPET	1'-2" X 3'-3 1/2" CONCRETE PARAPET	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE	ELASTOMERIC BEARINGS	3'-0" X 2'-9" PRESTRESSED CONCRETE BOX BEAMS		
	LBS.	EA.	NO.	LIN. FT.	EA.	LIN. FT.	LIN. FT.	LIN. FT.	TONS	SQ. YDS.	LUMP SUM	NO.	LIN. FT.
SUPERSTRUCTURE													
END BENT NO. 1		8	8	96	8				230	255		28	2240
BENT NO. 1	2278												
END BENT NO. 2		8	8	176	8				235	260			
TOTAL	2278	16	16	272	16	305.3	160.1	160.1	465	515	LUMP SUM	28	2240

PROJECT NO. B-5161

WAKE COUNTY

STATION: 15+14.00 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR BRIDGE ON SR 1162 (-L-)
(APEX BARBECUE ROAD)
OVER BEAVER CREEK
BETWEEN SR 1160 & SR 1163



Designed by G. Myer 2/13/2018

REVISIONS

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

SHEET NO. S-03
TOTAL SHEETS 25

DES BY: G. MYERS DATE: 10/17 DWG BY: W. TOWE DATE: 10/17
DES CHK: K. DICKENS DATE: 10/17 CHK BY: G. MYERS DATE: 12/17

HDR HDR Engineering, Inc. of the Carolinas
555 Fayetteville St., Suite 900 Raleigh, N.C. 27601
N.C.B.E.L.S. License Number: F-0116

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LOAD FACTORS:

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

LEVEL	VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING	MINIMUM RATING FACTORS (RF)	TONS = W X RF	STRENGTH I LIMIT STATE										SERVICE III LIMIT STATE					COMMENT NUMBER			
						LIVELOAD FACTORS	MOMENT					SHEAR					LIVELOAD FACTORS	MOMENT						
							DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)		DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN		GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING	HL-93(Inv)	N/A	1	1.03	--	1.75	0.21	2.15	A	ER	41.75	0.50	1.03	A	ER	0.00	0.80	0.22	2.00	B	ER	36.75	1,2	
	HL-93(Opr)	N/A	--	1.33	--	1.35	0.21	2.79	A	ER	41.75	0.50	1.33	A	ER	0.00	N/A	--	--	--	--	--	1,2	
	HS-20(Inv)	36.000	2	1.35	48.70	1.75	0.21	2.89	A	ER	41.75	0.50	1.35	A	ER	0.00	0.80	0.22	2.63	B	ER	36.75	1,2	
	HS-20(Opr)	36.000	--	1.74	62.61	1.35	0.21	3.74	A	ER	41.75	0.50	1.74	A	ER	0.00	N/A	--	--	--	--	--	1,2	
LEGAL LOAD RATING	SV	SNSH	13.500	--	4.37	58.95	1.40	0.21	8.35	A	ER	41.75	0.51	4.37	B	ER	0.00	0.80	0.22	5.94	B	ER	36.75	1,2
		SNGARBS2	20.000	--	2.88	57.55	1.40	0.21	6.13	A	ER	41.75	0.50	2.88	A	ER	0.00	0.80	0.22	4.42	B	ER	36.75	1,2
		SNAGRIS2	22.000	--	2.66	58.58	1.40	0.21	5.77	A	ER	41.75	0.50	2.66	A	ER	0.00	0.80	0.22	4.19	B	ER	36.75	1,2
		SNCOTTS3	27.250	--	2.04	55.59	1.40	0.21	4.15	A	ER	41.75	0.50	2.04	A	ER	0.00	0.80	0.22	2.96	B	ER	36.75	1,2
		SNAGGRS4	34.925	--	1.67	58.49	1.40	0.21	3.44	A	ER	41.75	0.50	1.67	A	ER	0.00	0.80	0.22	2.47	B	ER	36.75	1,2
		SNS5A	35.550	--	1.67	59.54	1.40	0.21	3.36	A	ER	41.75	0.50	1.67	A	ER	0.00	0.80	0.22	2.41	B	ER	36.75	1,2
		SNS6A	39.950	--	1.52	60.90	1.40	0.21	3.07	A	ER	41.75	0.50	1.52	A	ER	0.00	0.80	0.22	2.21	B	ER	36.75	1,2
	SNS7B	42.000	--	1.48	62.23	1.40	0.21	2.92	A	ER	41.75	0.50	1.48	A	ER	0.00	0.80	0.22	2.11	B	ER	36.75	1,2	
	TTST	TNAGRIT3	33.000	--	1.83	60.23	1.40	0.21	3.74	A	ER	41.75	0.50	1.83	A	ER	0.00	0.80	0.22	2.70	B	ER	36.75	1,2
		TNT4A	33.075	--	1.78	58.95	1.40	0.21	3.75	A	ER	41.75	0.50	1.78	A	ER	0.00	0.80	0.22	2.71	B	ER	36.75	1,2
		TNT6A	41.600	--	1.57	65.21	1.40	0.21	3.06	A	ER	41.75	0.50	1.57	A	ER	0.00	0.80	0.22	2.22	B	ER	36.75	1,2
		TNT7A	42.000	--	1.52	64.03	1.40	0.21	3.06	A	ER	41.75	0.50	1.52	A	ER	0.00	0.80	0.22	2.23	B	ER	36.75	1,2
		TNT7B	42.000	--	1.46	61.32	1.40	0.21	3.15	A	ER	41.75	0.50	1.46	A	ER	0.00	0.80	0.22	2.30	B	ER	36.75	1,2
		TNAGRIT4	43.000	--	1.42	60.94	1.40	0.21	3.01	A	ER	41.75	0.50	1.42	A	ER	0.00	0.80	0.22	2.19	B	ER	36.75	1,2
TNAGT5A		45.000	--	1.40	62.81	1.40	0.21	2.85	A	ER	41.75	0.50	1.40	A	ER	0.00	0.80	0.22	2.07	B	ER	36.75	1,2	
TNAGT5B	45.000	3	1.35	60.87	1.40	0.21	2.82	A	ER	41.75	0.50	1.35	A	ER	0.00	0.80	0.22	2.04	B	ER	36.75	1,2		

NOTES:

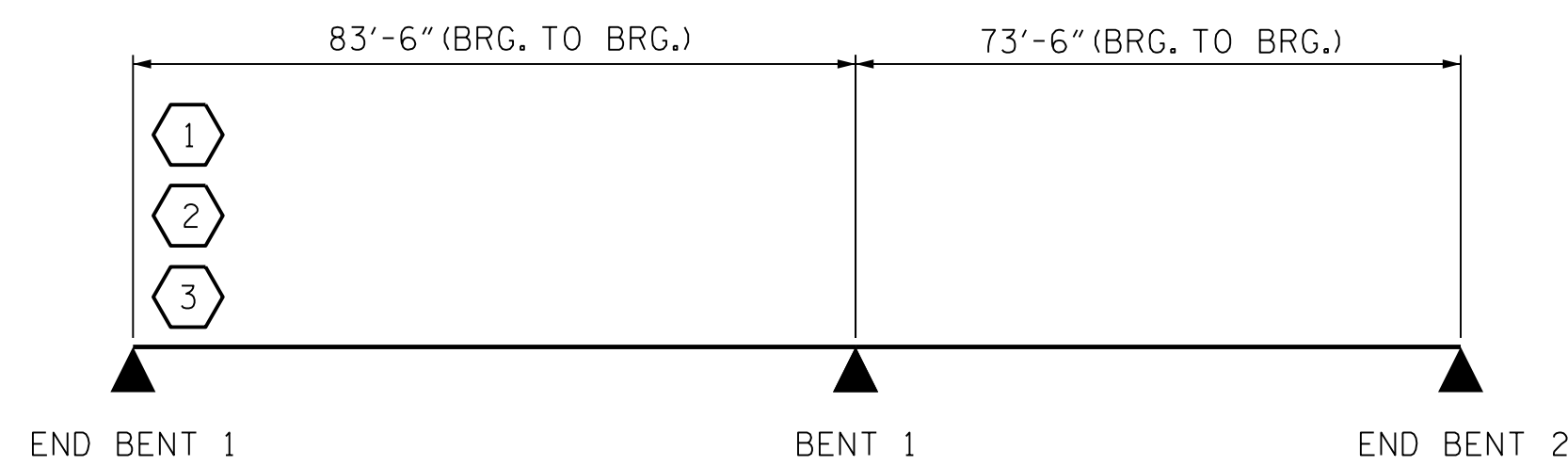
MINIMUM RATING FACTORS ARE BASED ON THE STRENGTH I AND SERVICE III LIMIT STATES.

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

COMMENTS:

- LIVE LOAD DISTRIBUTION FACTORS CALCULATED PER AASHTO LRFD 7TH EDITION WITH INTERM REVISIONS THROUGH 2016.
- DISTANCE FROM LEFT END OF SPAN IS GIVEN WITH RESPECT TO CENTERLINE OF BEARING AND IS MEASURED ALONG THE CONTROLLING BOX BEAM UNIT.

#	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	



SPAN A SPAN B
LRFR SUMMARY

PROJECT NO. B-5161
WAKE COUNTY
 STATION: 15+14.00 -L-



DocuSigned by:
Kent Dickens
 BDA22A65385A426 2/13/2018

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

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

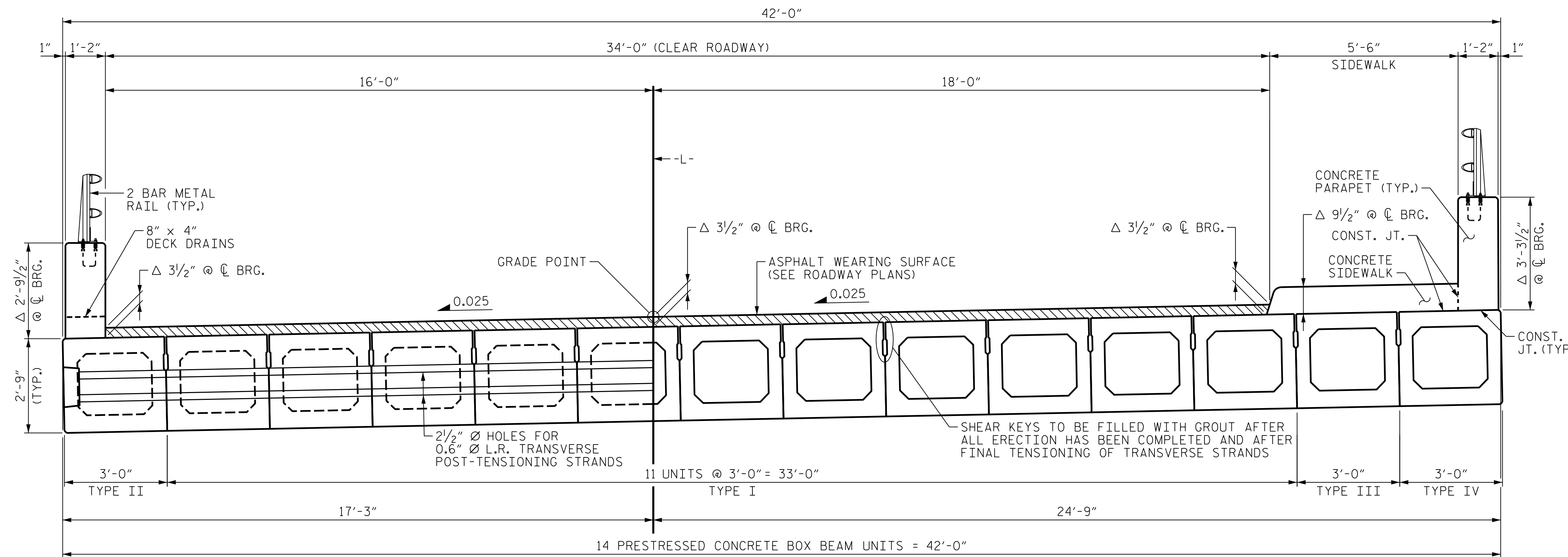
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1	--	--	3	--	--
2	--	--	4	--	--

SHEET NO. S-04
TOTAL SHEETS 25

DES BY: G. MYERS DATE : 11/17 DWG BY: M. SELLS DATE : 11/17
 DES CHK: K. DICKENS DATE : 11/17 CHK BY: G. MYERS DATE : 12/17

HDR HDR Engineering, Inc. of the Carolinas
 555 Fayetteville St., Suite 900 Raleigh, N.C. 27601
 N.C.B.E.L.S. License Number: F-0116

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PARTIAL SECTION
AT INTERMEDIATE DIAPHRAGMS

PARTIAL SECTION
THROUGH VOIDS

TYPICAL SECTION

Δ THE MAXIMUM BARRIER RAIL HEIGHT, SIDEWALK THICKNESS AND ASPHALT THICKNESS IS SHOWN. THE BARRIER RAIL HEIGHT, SIDEWALK THICKNESS AND ASPHALT THICKNESS VARIES WHILE THE TOP OF THE BARRIER RAIL AND SIDEWALK FOLLOWS THE PROFILE OF THE GUTTERLINE. FOR RAIL HEIGHT DETAILS AND ASPHALT THICKNESS, SEE "CONCRETE PARAPET DETAILS" SHEET 1 OF 2. FOR SIDEWALK THICKNESS DETAILS, SEE THE "SIDEWALK PLAN AND SECTION" SHEET.

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 CONCRETE PARAPETS AND SIDEWALK 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 CONCRETE PARAPET AND IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. A VERTICAL CONTRACTION JOINT SHALL BE LOCATED AT EACH THIRD POINT BETWEEN CONCRETE PARAPET EXPANSION JOINTS. ONLY ONE CONTRACTION JOINT IS REQUIRED AT MIDPOINT OF CONCRETE PARAPET SEGMENTS LESS THAN 20 FEET IN LENGTH AND NO CONTRACTION JOINTS ARE REQUIRED FOR THOSE SEGMENTS LESS THAN 10 FEET IN LENGTH.

GROOVED CONTRACTION JOINTS, 1/2" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF SIDEWALK IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. THE CONTRACTION JOINTS SHALL BE LOCATED AT A SPACING OF 8 FEET TO 10 FEET BETWEEN 1/2" OPENINGS. NO CONTRACTION JOINTS WILL BE REQUIRED FOR 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.

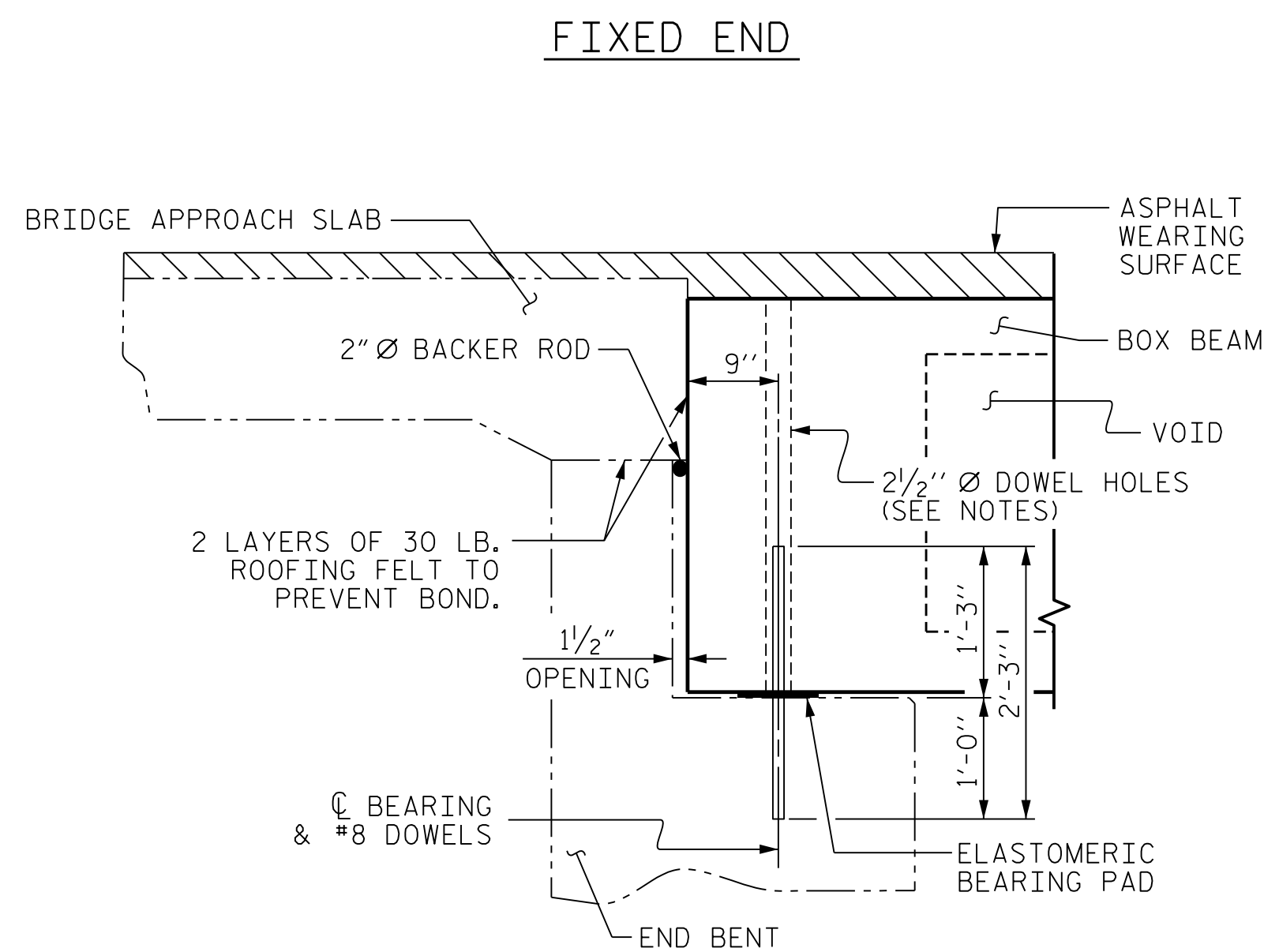
THE PERMITTED THREADED INSERTS IN THE EXTERIOR UNITS SHALL BE SIZED BY THE CONTRACTOR, SPACED AT 4'-0" CENTERS AND GALVANIZED IN ACCORDANCE WITH SECTION 1076 OF THE STANDARD SPECIFICATIONS. STAINLESS STEEL THREADED INSERTS MAY BE USED AS AN ALTERNATE.

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

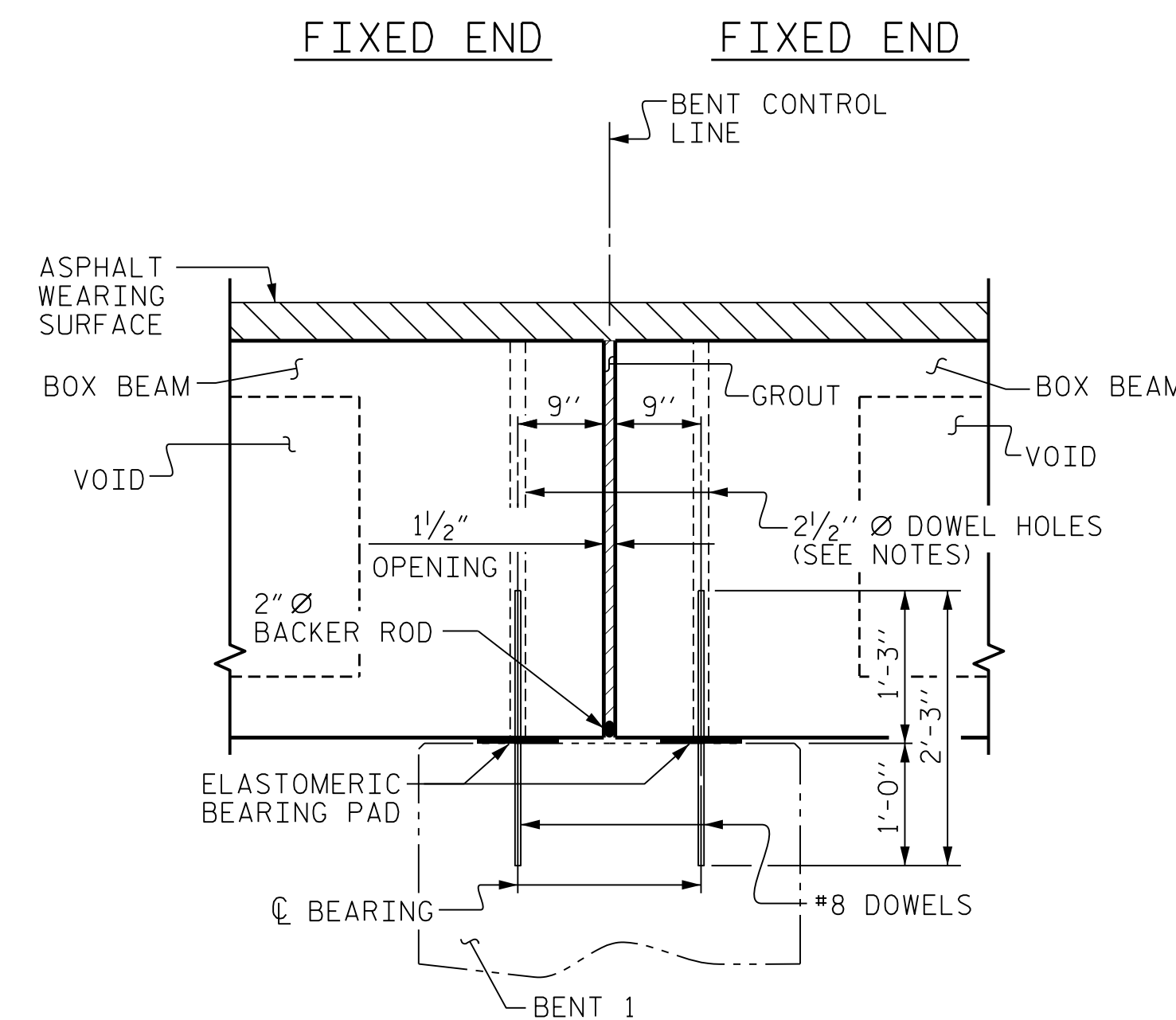
THE COST OF THE PERMITTED THREADED INSERTS SHALL BE INCLUDED IN THE PRICE BID FOR THE PRECAST UNITS.

THE DRAIN OPENING AT THE GUTTERLINE SHALL BE 4" X 8". THE HEIGHT OF THE BLOCKOUT IN THE CONCRETE PARAPET SHALL EXTEND FROM THE TOP OF THE BOX BEAM UNIT TO THE TOP OF THE DRAIN OPENING.

APPLY EPOXY PROTECTIVE COATING TO EXTERIOR FACE OF THE EXTERIOR BOX BEAM UNITS THAT REQUIRE DRAINS IN THE CONCRETE PARAPET.

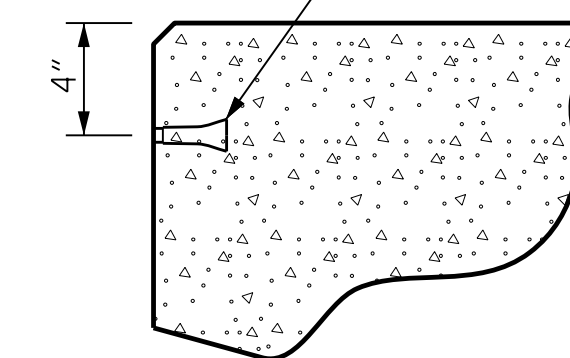


SECTION AT END BENT



SECTION AT BENT

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



THREADED INSERT DETAIL

PROJECT NO. B-5161
WAKE COUNTY
STATION: 15+14.00 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
TYPICAL SECTION



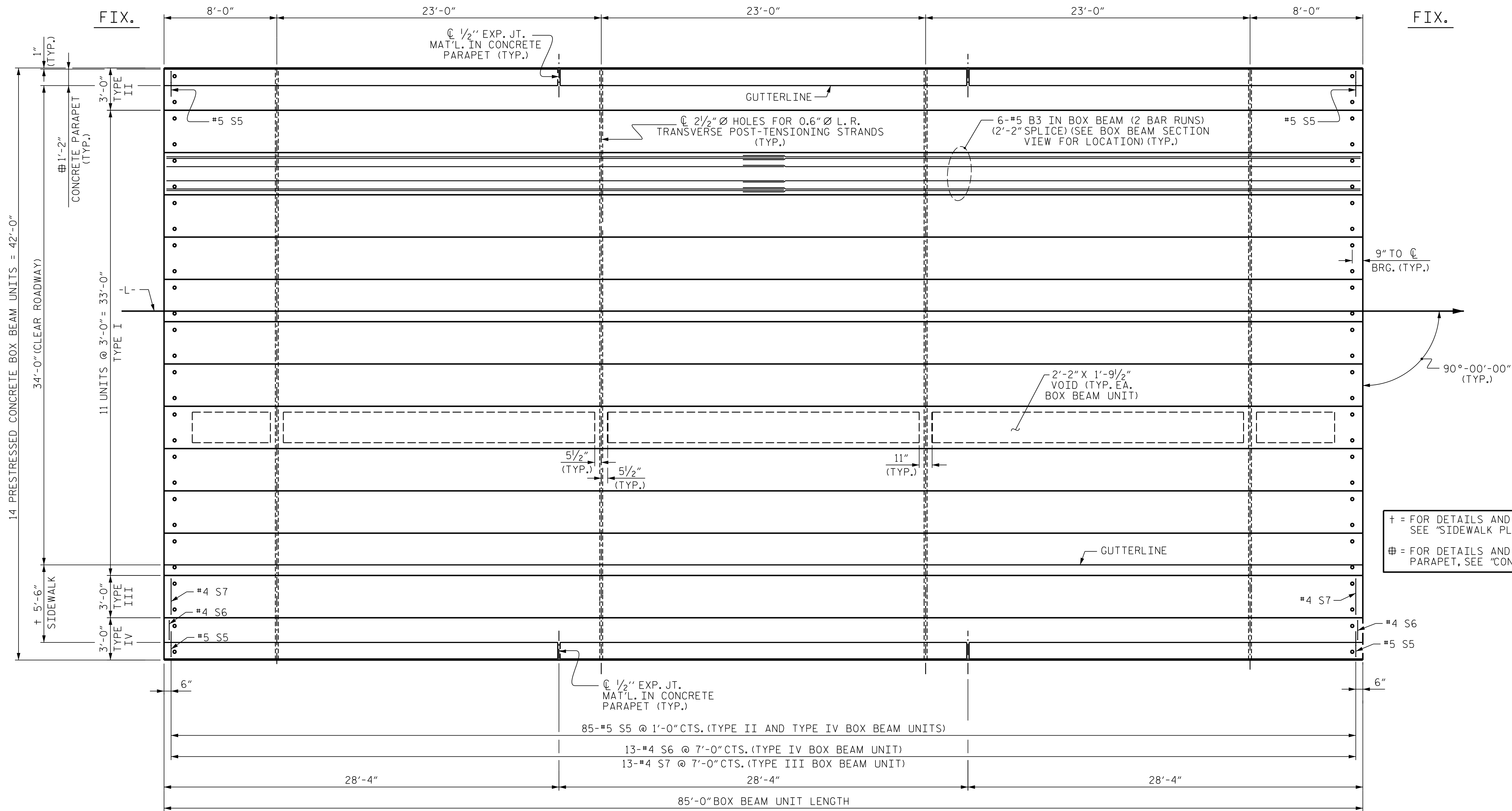
DocuSigned by:
K. Dickens
2/13/2018

DES BY: K. DICKENS DATE: 11/17 DWG BY: M. SELLS DATE: 11/17
DES CHK: G. MYERS DATE: 11/17 CHK BY: K. DICKENS DATE: 11/17

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N.C.B.E.L.S. License Number: F-0116

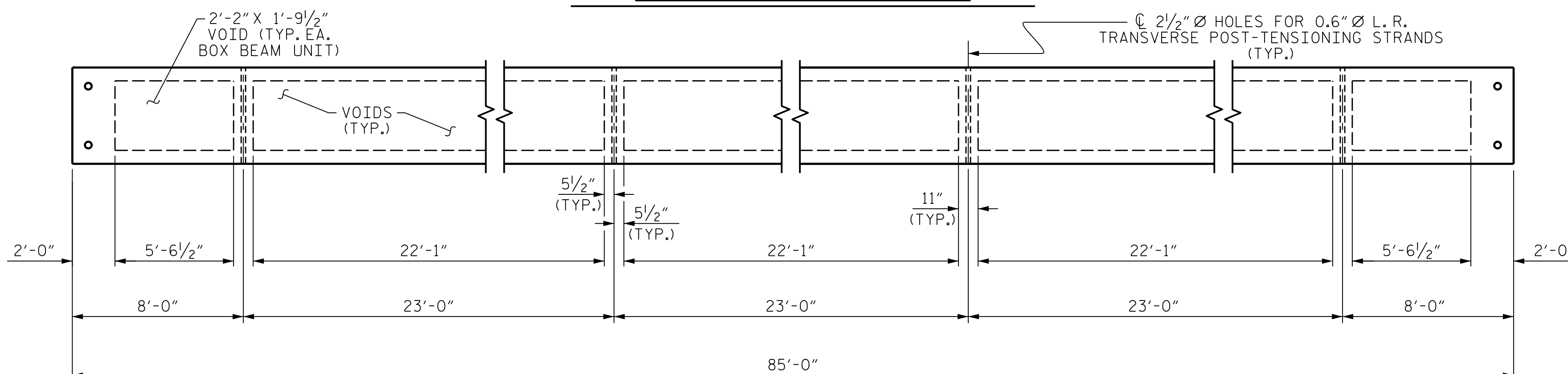
DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO. S-05
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 25
2			4			



† = FOR DETAILS AND REINFORCING STEEL IN SIDEWALK, SEE "SIDEWALK PLAN AND SECTION" SHEET.
 ⊕ = FOR DETAILS AND REINFORCING STEEL IN CONCRETE PARAPET, SEE "CONCRETE PARAPET DETAILS" SHEETS.

PLAN OF UNIT



DIAPHRAGM AND VOID LAYOUT

PROJECT NO. B-5161

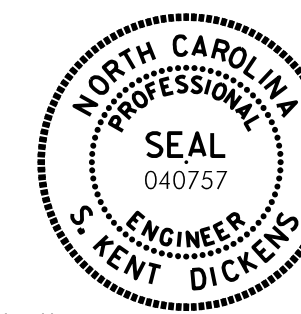
WAKE COUNTY

STATION: 15+14.00 -L-

SHEET 1 OF 5

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

SUPERSTRUCTURE
 PLAN OF SPAN A



DocuSigned by: *Kent Dickens* 2/13/2018
 BDA22A65385A426

REVISIONS

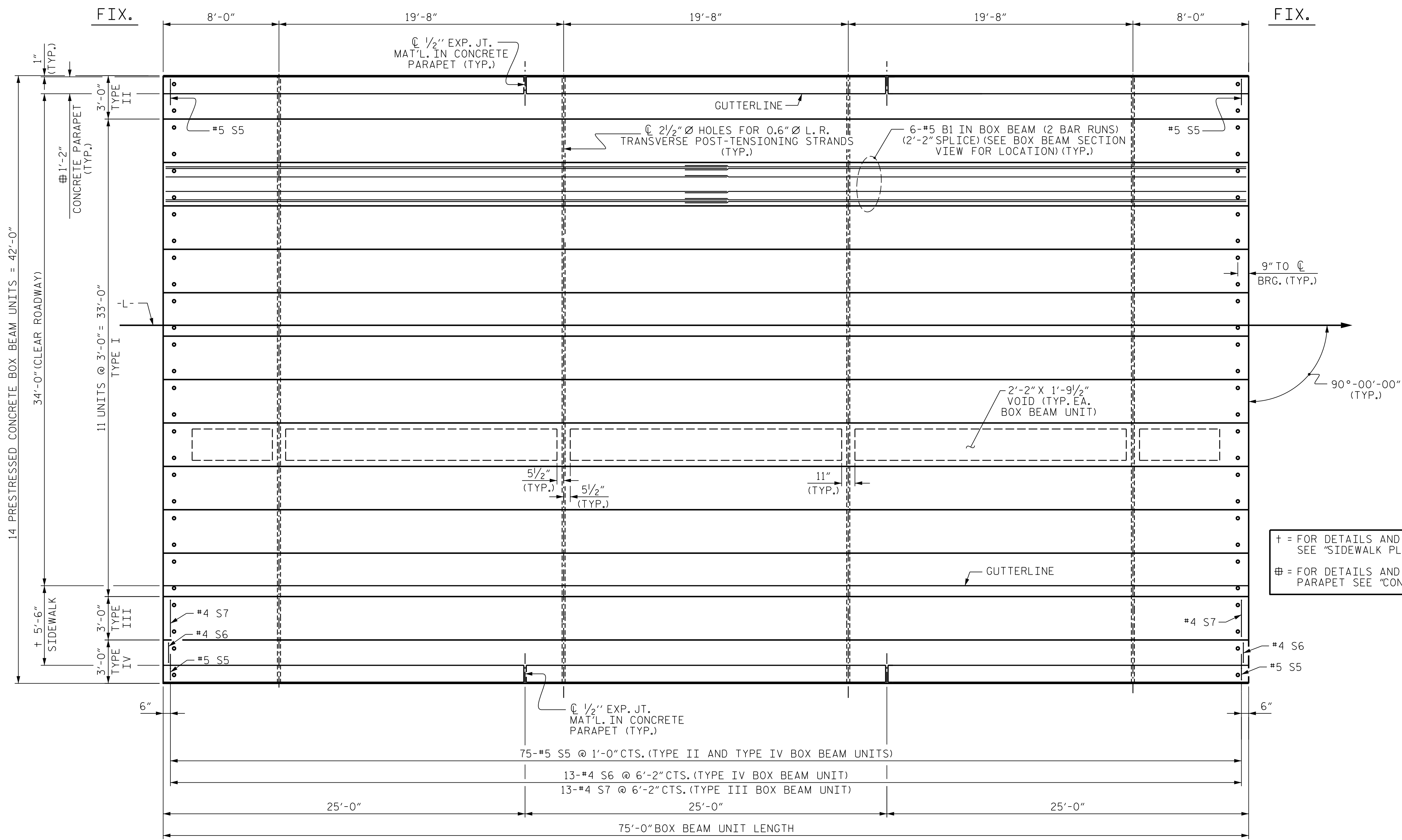
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

DES BY: G. MYERS DATE: 11/17
 DES CHK: K. DICKENS DATE: 11/17
 DWG BY: M. SELLS DATE: 11/17
 CHK BY: K. DICKENS DATE: 11/17

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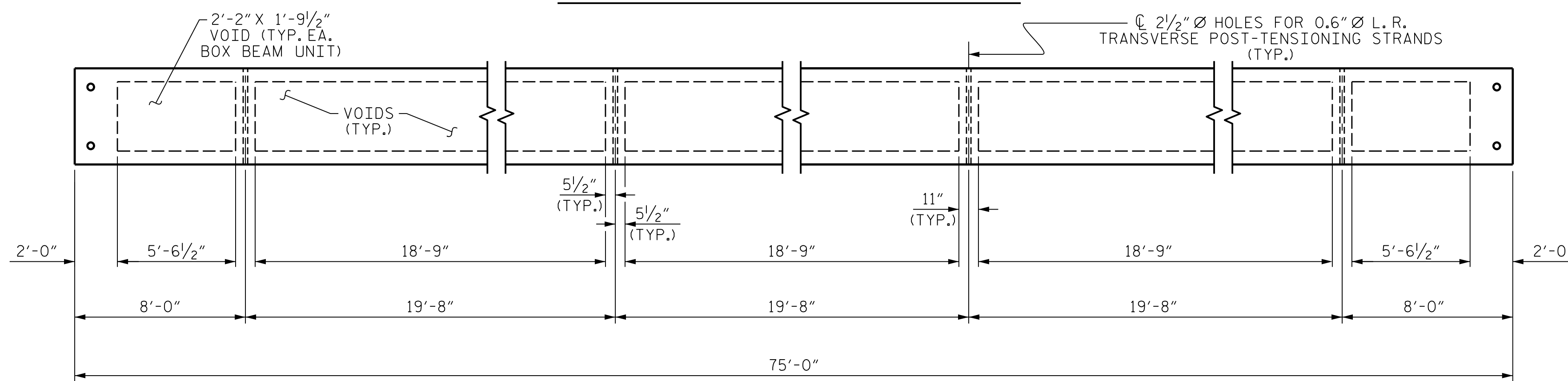
DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED

SHEET NO. 5-06
 TOTAL SHEETS 25



† = FOR DETAILS AND REINFORCING STEEL IN SIDEWALK, SEE "SIDEWALK PLAN AND SECTION" SHEET.
 # = FOR DETAILS AND REINFORCING STEEL IN CONCRETE PARAPET SEE "CONCRETE PARAPET DETAILS" SHEETS.

PLAN OF UNIT

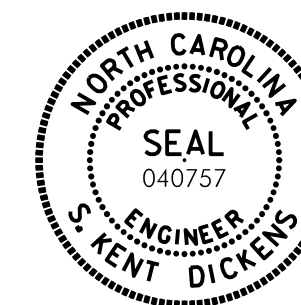


DIAPHRAGM AND VOID LAYOUT

PROJECT NO. B-5161
WAKE COUNTY
 STATION: 15+14.00 -L-
 SHEET 2 OF 5

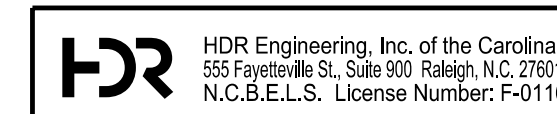
STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

SUPERSTRUCTURE
 PLAN OF SPAN B



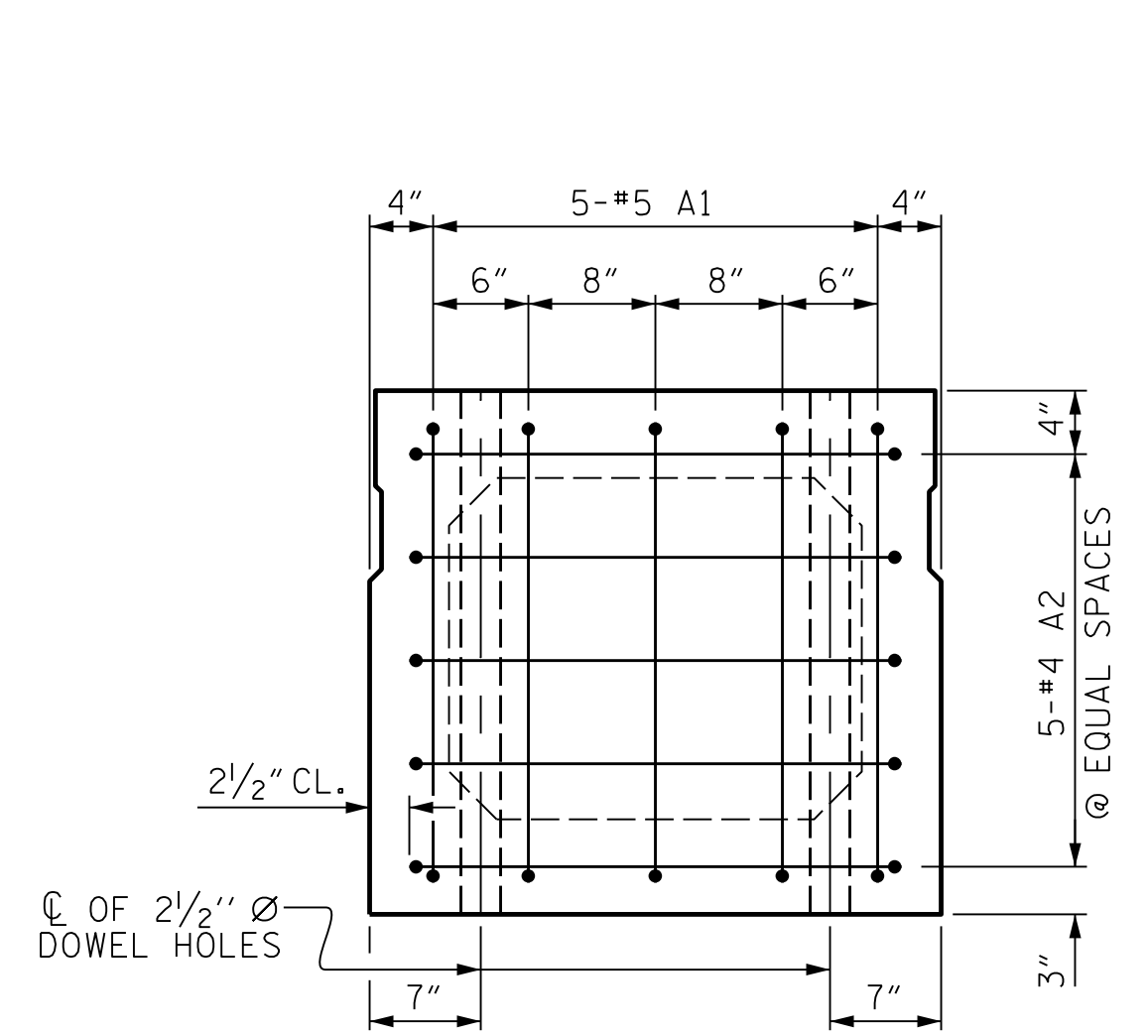
DocuSigned by:
 Kent Dickens
 BDA22A65385A426
 2/13/2018

DES BY: G. MYERS DATE: 11/17
 DES CHK: K. DICKENS DATE: 11/17
 DWG BY: M. SELLS DATE: 11/17
 CHK BY: K. DICKENS DATE: 11/17

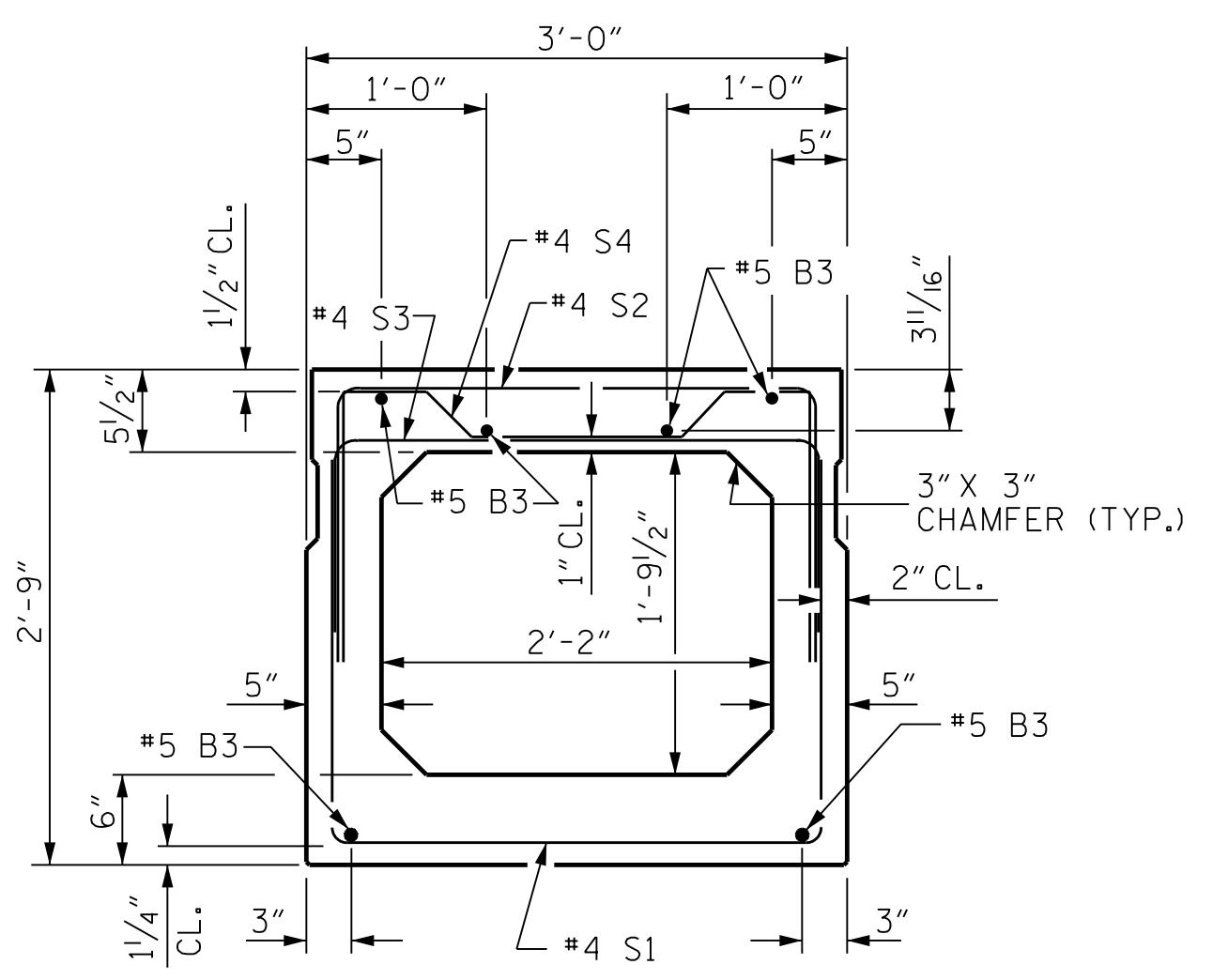


DOCUMENT NOT CONSIDERED FINAL
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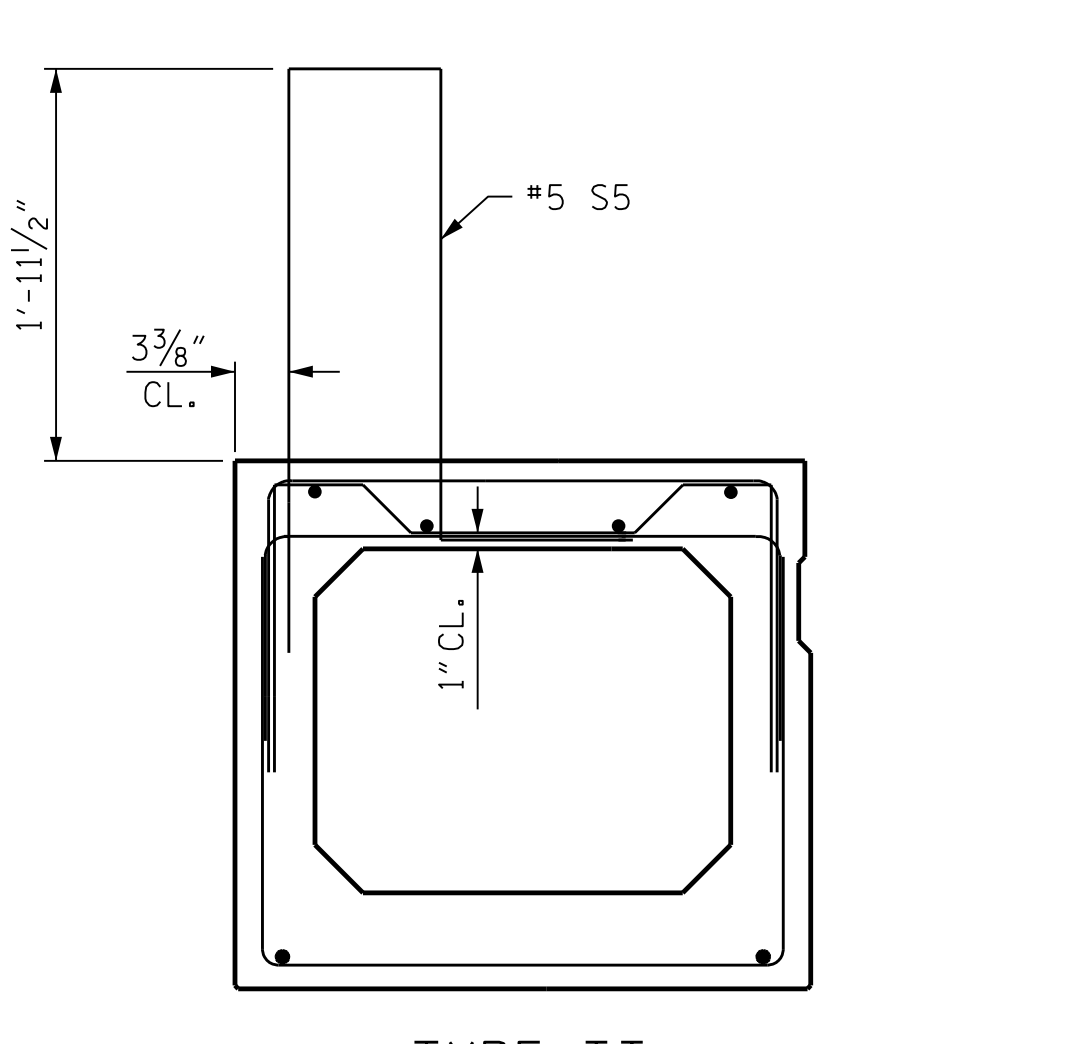
REVISIONS						SHEET NO. 5-07
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 25
2			4			



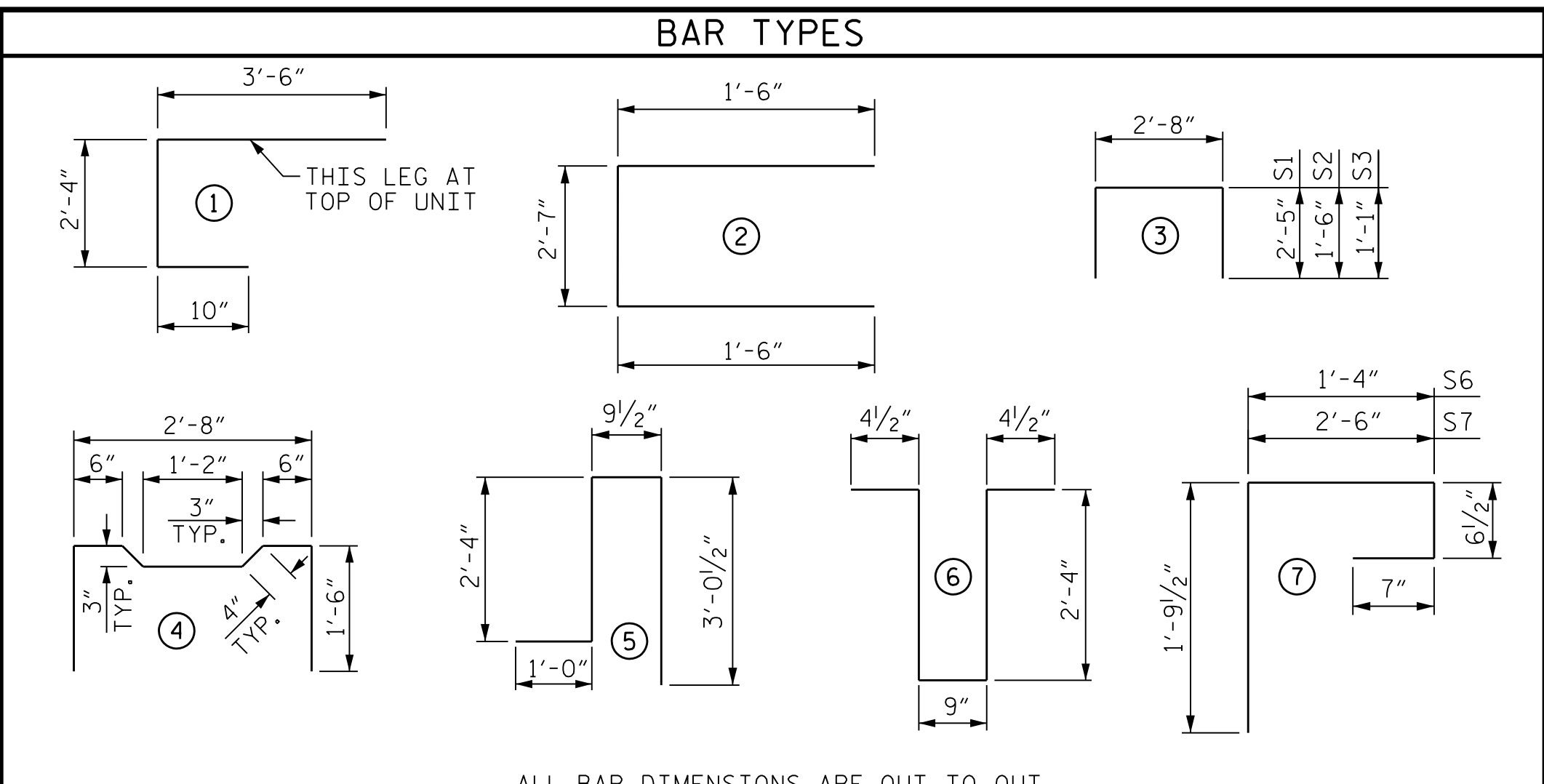
END ELEVATION
SHOWING PLACEMENT OF #5 & #4 "A" BARS AND LOCATION OF DOWEL HOLES. (INTERIOR BOX BEAM SECTION SHOWN-EXTERIOR SECTION SIMILAR EXCEPT SHEAR KEY LOCATION. STRAND LAYOUT NOT SHOWN.)



TYPE I
INTERIOR BOX BEAM SECTION (STRAND LAYOUT NOT SHOWN)



TYPE II
LEFT EXTERIOR BOX BEAM SECTION (SEE TYPE I FOR GENERAL DIMENSIONS AND BAR MARKS NOT SHOWN) (STRAND LAYOUT NOT SHOWN)



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL FOR ONE BOX BEAM SECTION

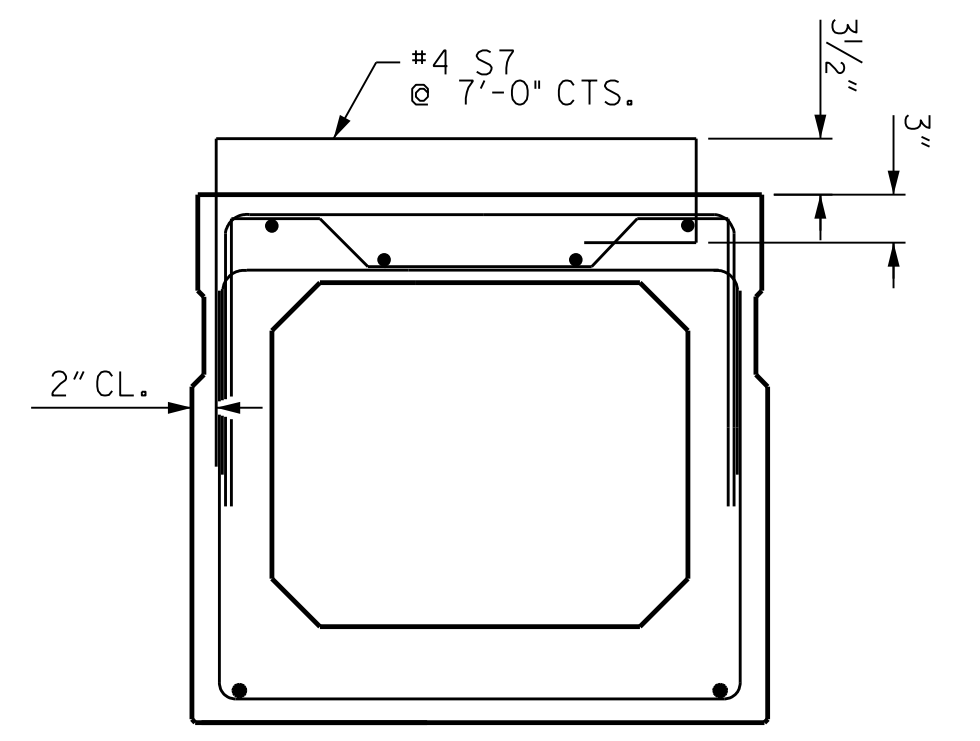
BAR NUMBER	SIZE	TYPE	TYPE I		TYPE II		TYPE III		TYPE IV	
			LENGTH	WEIGHT	LENGTH	WEIGHT	LENGTH	WEIGHT	LENGTH	WEIGHT
A1	10	#5	6'-8"	70	6'-8"	70	6'-8"	70	6'-8"	70
A2	34	#4	5'-7"	127	5'-7"	127	5'-7"	127	5'-7"	127
B3	12	#5	STR	43'-5"	543	43'-5"	543	43'-5"	543	543
K1	12	#4	6	6'-2"	49	6'-2"	49	6'-2"	49	49
K2	8	#4	STR	2'-7"	14	2'-7"	14	2'-7"	14	14
S1	71	#4	3	7'-6"	356	7'-6"	356	7'-6"	356	356
S2	71	#4	3	5'-8"	269	5'-8"	269	5'-8"	269	269
S3	121	#4	3	4'-10"	391	4'-10"	391	4'-10"	391	391
S4	50	#4	4	5'-10"	195	5'-10"	195	5'-10"	195	195
*S5	85	#5	5	--	--	7'-2"	636	--	--	636
*S6	13	#4	7	--	--	--	--	--	--	37
*S7	13	#4	7	--	--	--	--	5'-5"	48	--
REINFORCING STEEL			2014	LBS.	2014	LBS.	2014	LBS.	2014	LBS.
*EPOXY COATED REINF. STEEL			--	LBS.	636	LBS.	48	LBS.	673	LBS.
8000 P.S.I. CONCRETE			15.0	CU. YDS.	15.1	CU. YDS.	15.0	CU. YDS.	15.1	CU. YDS.
0.6" Ø L.R. STRANDS			No. 30		No. 30		No. 30		No. 30	

NOTES

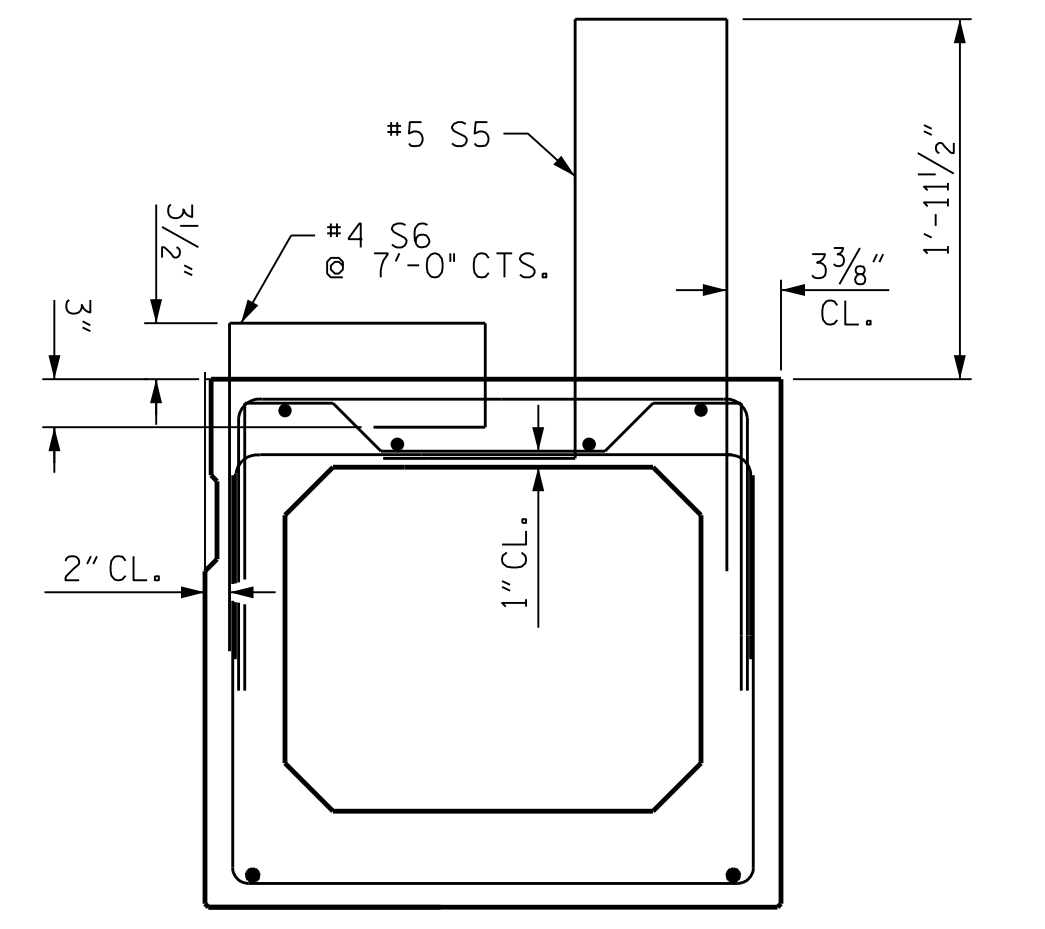
- FOR LOCATION OF DIAPHRAGMS, SEE "PLAN OF UNIT".
- FOR THREADED INSERTS, SEE "TYPICAL SECTION" SHEET.
- FOR REINFORCING STEEL IN DIAPHRAGMS, SEE "DOUBLE DIAPHRAGM DETAILS".
- FOR SHEAR KEY DIMENSIONS, SEE "SHEAR KEY DETAIL".

GRADE 270 STRANDS

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

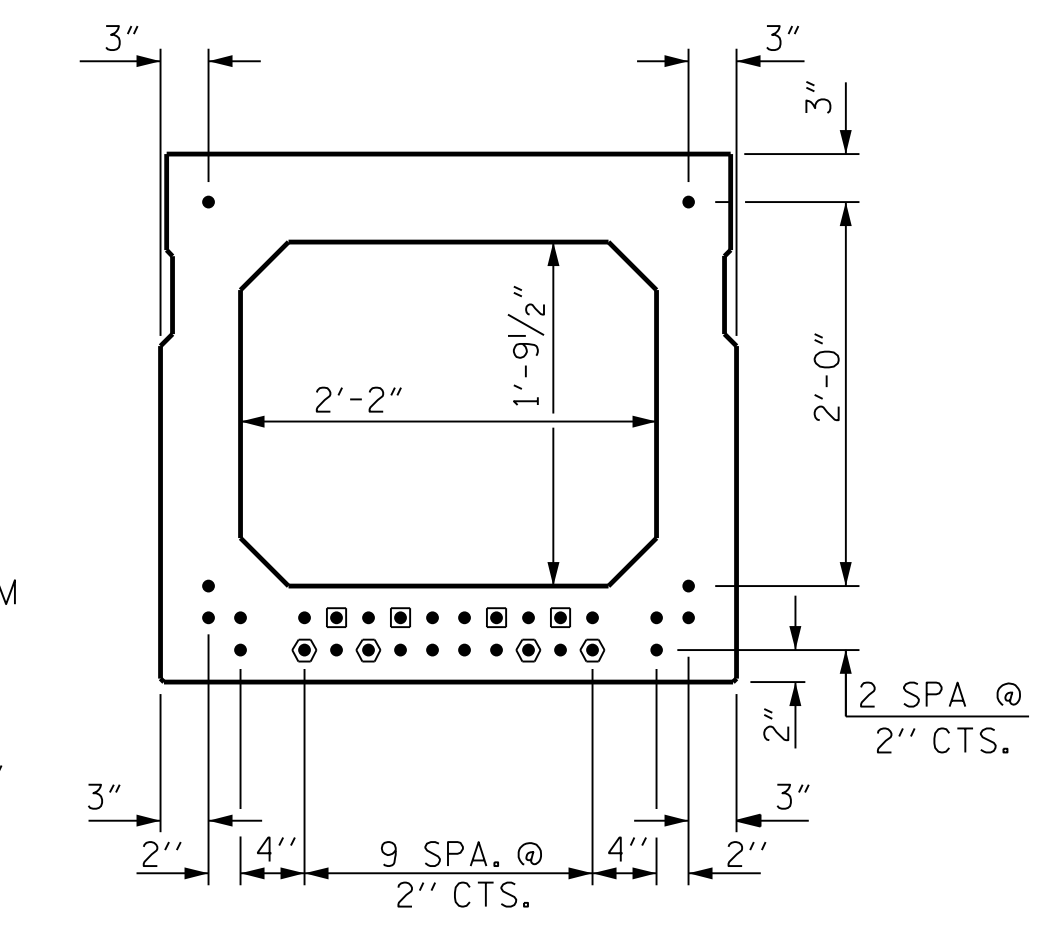


TYPE III
ADJACENT TO RIGHT EXTERIOR BOX BEAM SECTION (SEE TYPE I FOR GENERAL DIMENSIONS AND BAR MARKS NOT SHOWN) (STRAND LAYOUT NOT SHOWN)



TYPE IV
RIGHT EXTERIOR BOX BEAM SECTION (SEE TYPE I FOR GENERAL DIMENSIONS AND BAR MARKS NOT SHOWN) (STRAND LAYOUT NOT SHOWN)

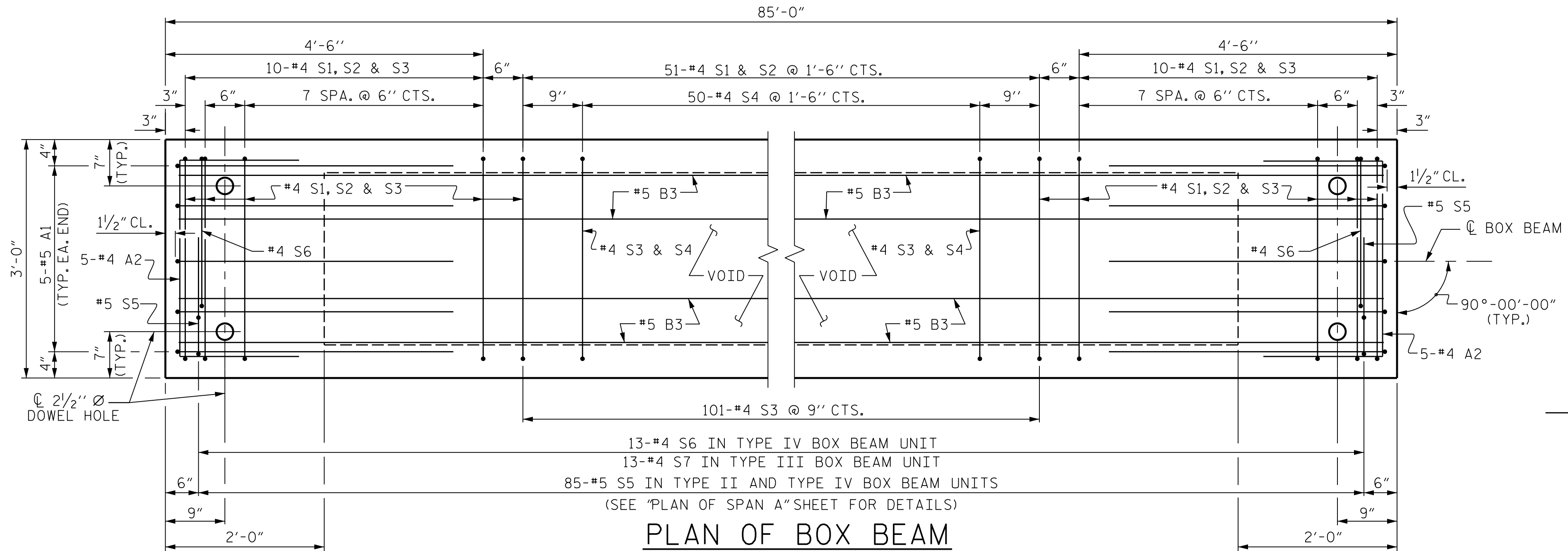
0.6" Ø LOW RELAXATION STRAND LAYOUT



TYPICAL STRAND LOCATION
(30 STRANDS REQUIRED)

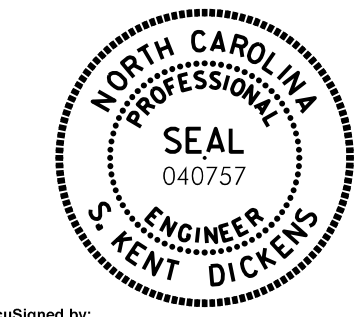
DEBONDING LEGEND

- FULLY BONDED STRANDS
 - ◻ STRANDS DEBONDED FOR 4'-0" FROM END OF GIRDER
 - ◻ STRANDS DEBONDED FOR 12'-0" FROM END OF GIRDER
- BOND SHALL BE BROKEN ON STRANDS AS SHOWN FOR THE SPECIFIED LENGTH FROM EACH END OF THE BOX BEAM. SEE STANDARD SPECIFICATIONS ARTICLE 1078-7.



PLAN OF BOX BEAM
TYPE IV UNIT SHOWN
TYPE I UNIT SIMILAR EXCEPT OMIT #5 S5 AND #4 S6 BARS.
TYPE II UNIT SIMILAR EXCEPT OMIT #4 S6 BARS.
TYPE III UNIT SIMILAR EXCEPT OMIT #5 S5 BARS AND REPLACE #4 S6 BARS WITH #4 S7 BARS

PROJECT NO. B-5161
WAKE COUNTY
STATION: 15+14.00 -L-
SHEET 3 OF 5



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE
3'-0" X 2'-9"
PRESTRESSED CONCRETE
BOX BEAM UNIT
(SPAN A)

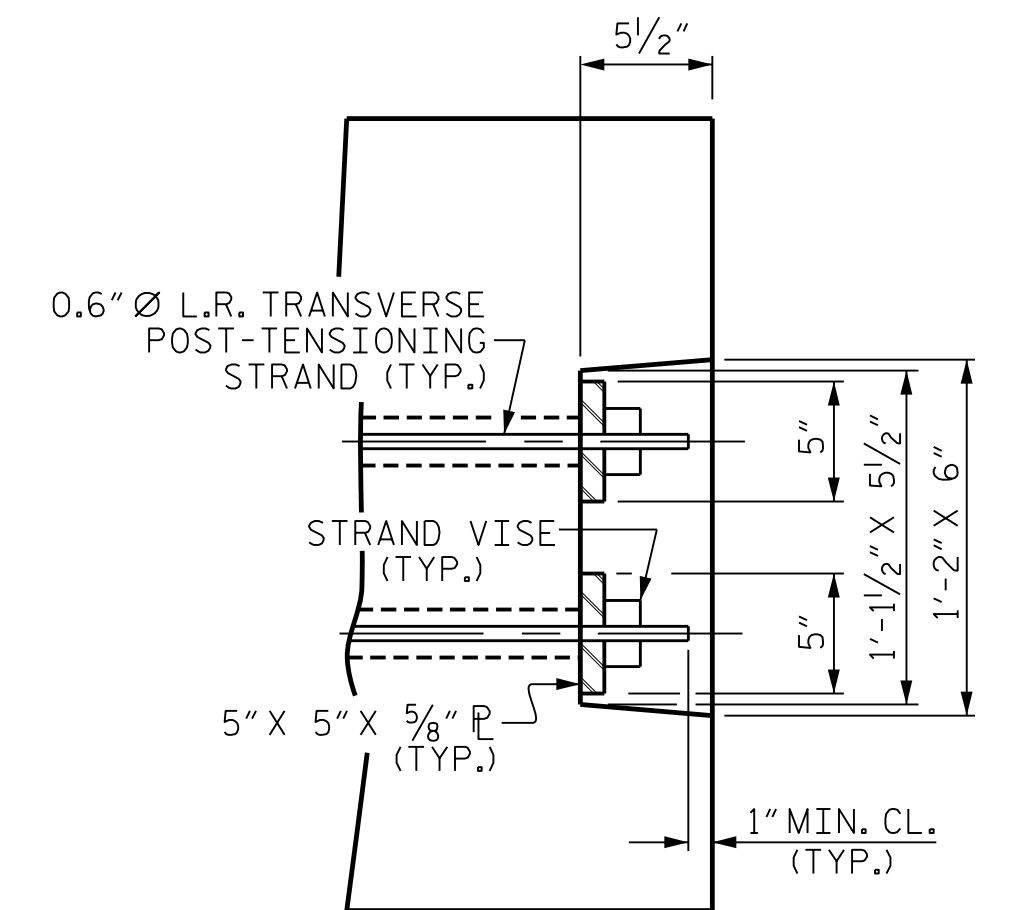
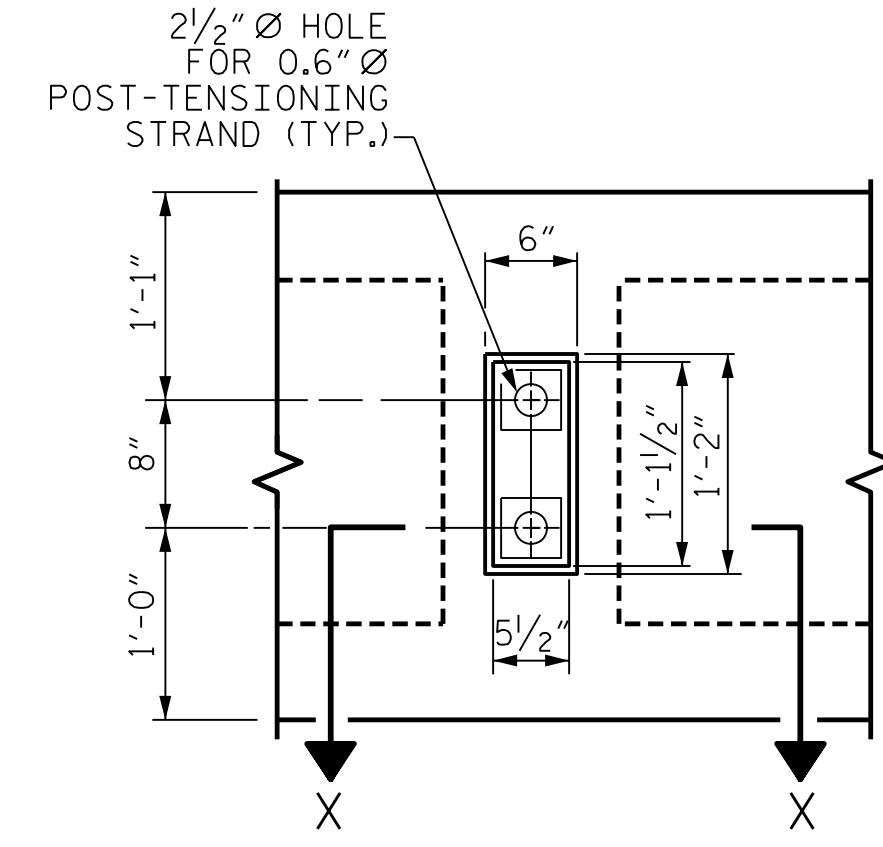
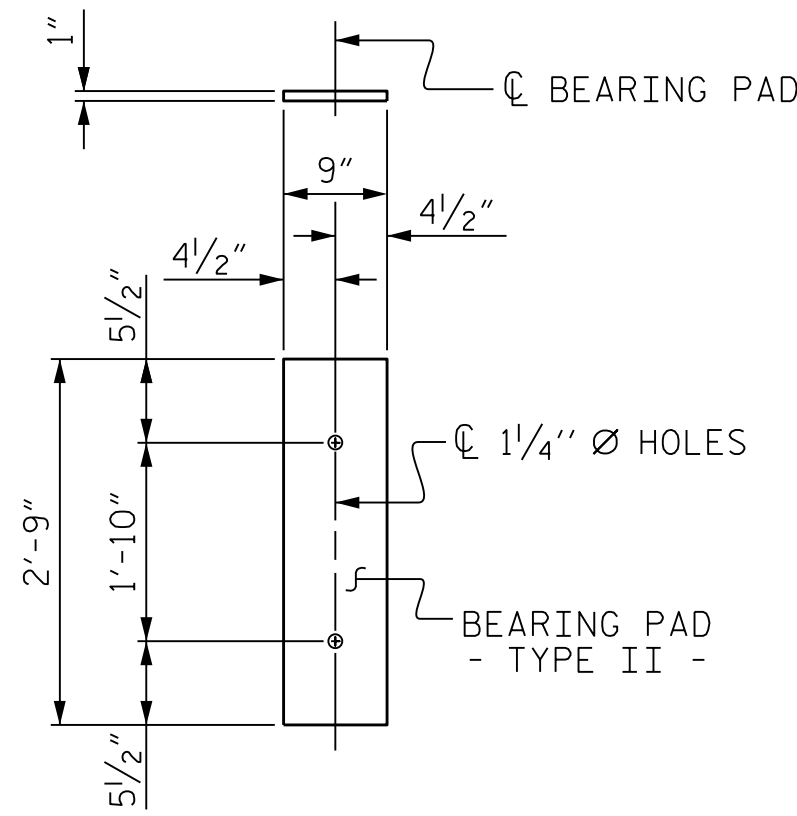
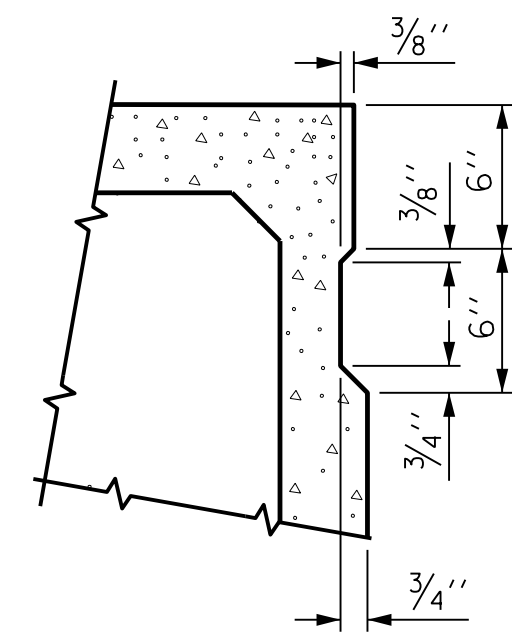
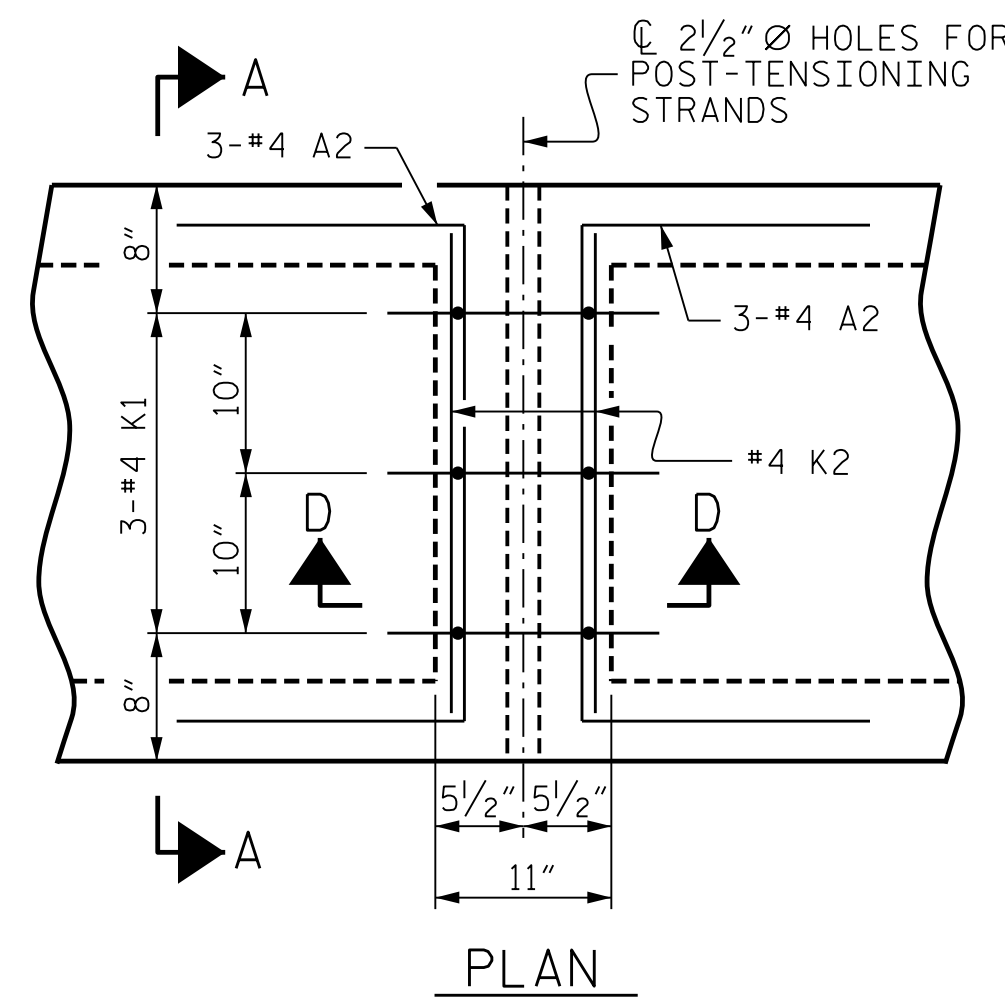
DES BY: G. MYERS DATE: 11/17 DWG BY: M. SELLS DATE: 11/17
DES CHK: K. DICKENS DATE: 11/17 CHK BY: K. DICKENS DATE: 11/17

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S. Kist
BDA22A68385A426 2/13/2018

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2			4			

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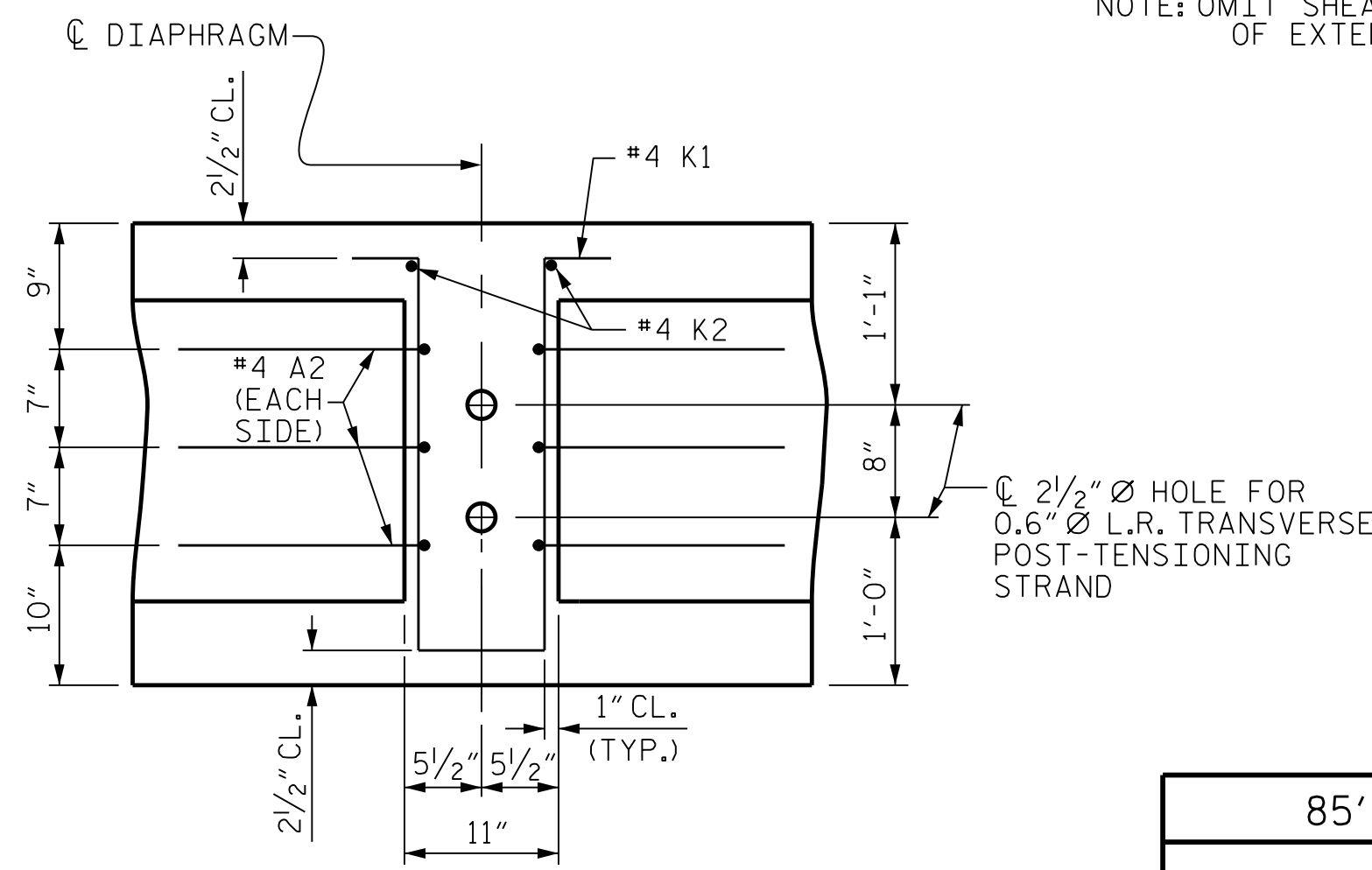


SHEAR KEY DETAIL
NOTE: OMIT SHEAR KEY ON OUTSIDE FACE OF EXTERIOR BOX BEAMS.

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

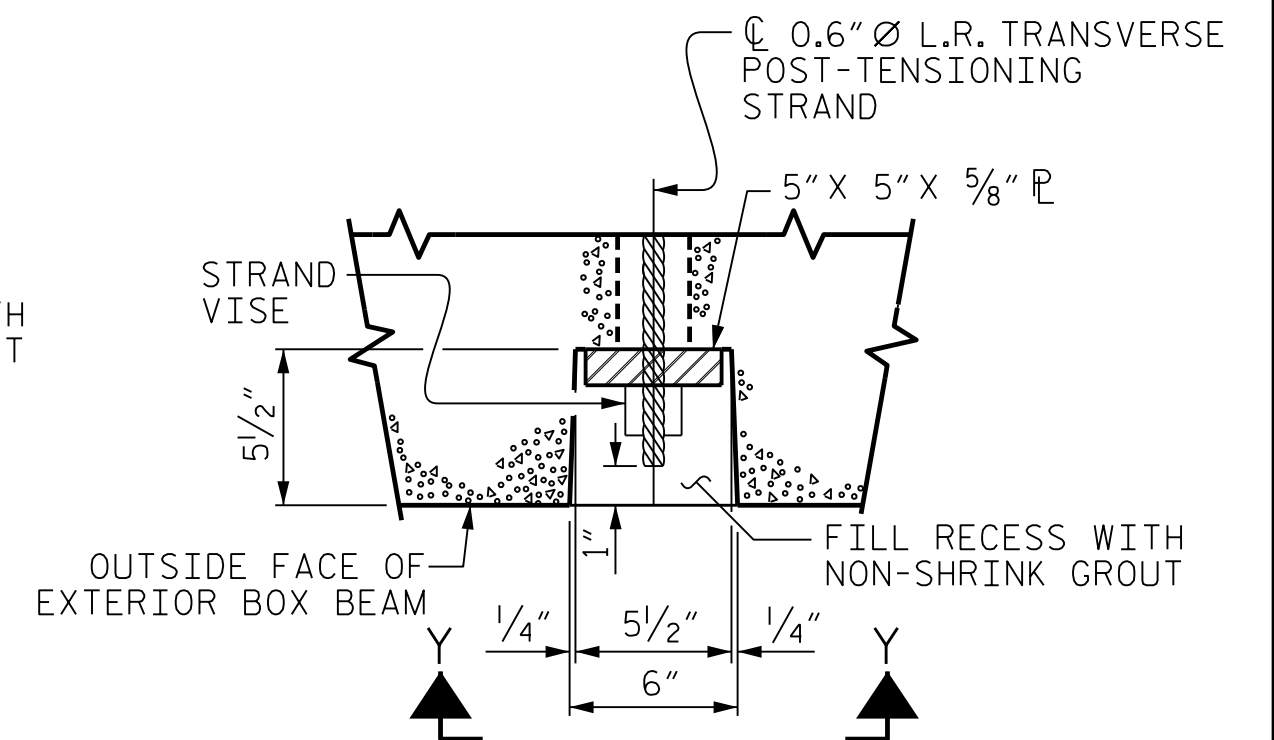
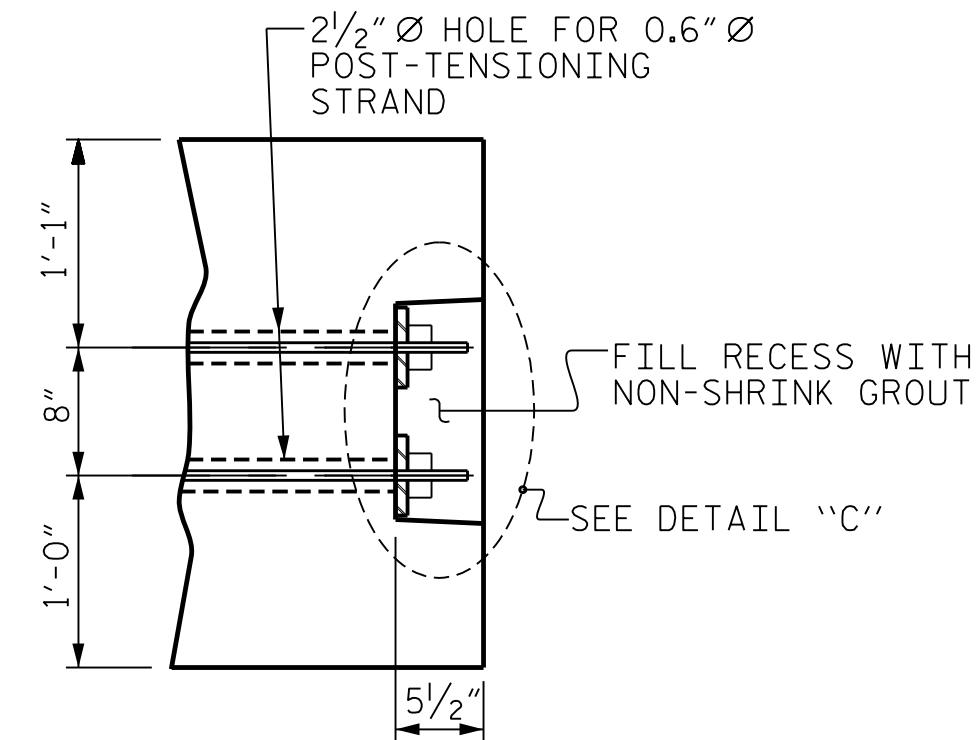
VIEW Y-Y
SHOWING ELEVATION VIEW OF GROUDED RECESS

DETAIL "C"



DEAD LOAD DEFLECTION AND CAMBER			
	3'-0" x 2'-9"	3'-0" x 2'-9"	
0.6" Ø L.R. STRAND	85' BOX BEAM UNIT	75' BOX BEAM UNIT	
CAMBER (BEAM ALONE IN PLACE)	2 3/4" ↑	1 3/4" ↑	
DEFLECTION DUE TO SUPERIMPOSED DEAD LOAD **	3/4" ↓	1/2" ↓	
FINAL CAMBER	2" ↑	1 1/4" ↑	

** INCLUDES FUTURE WEARING SURFACE



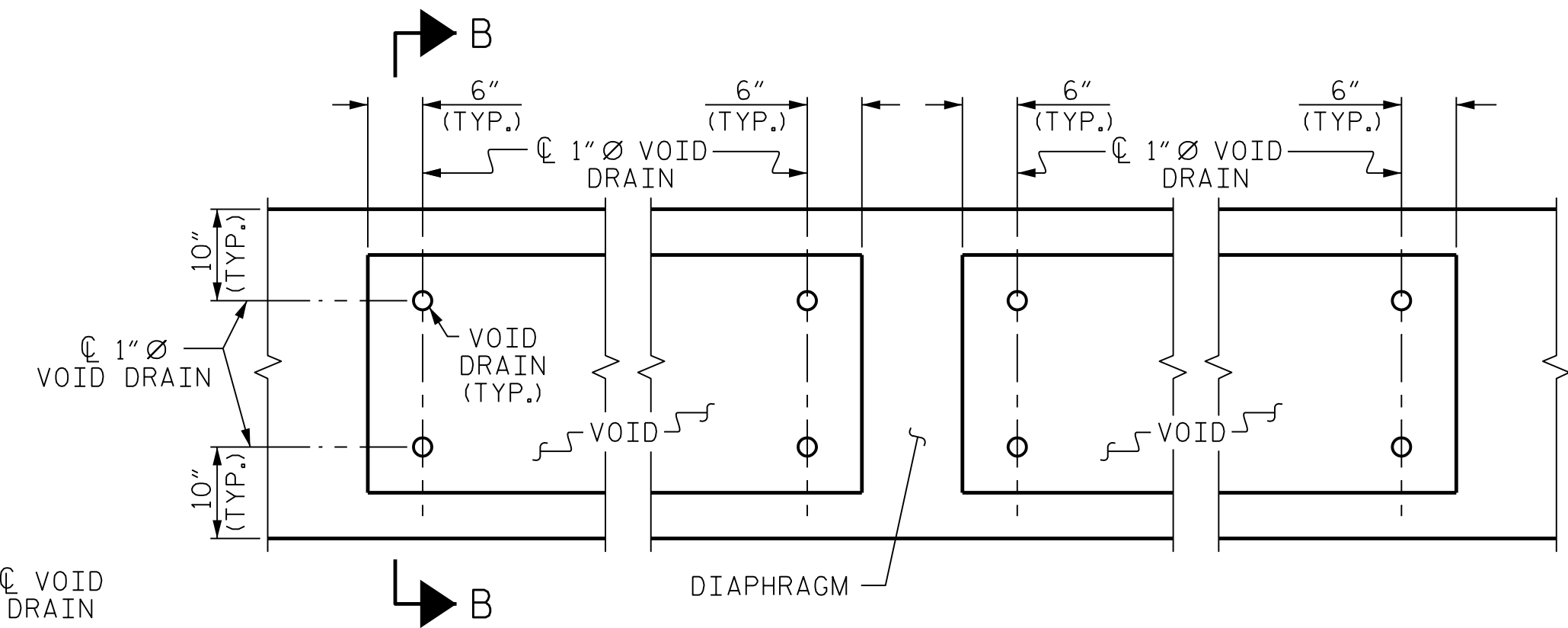
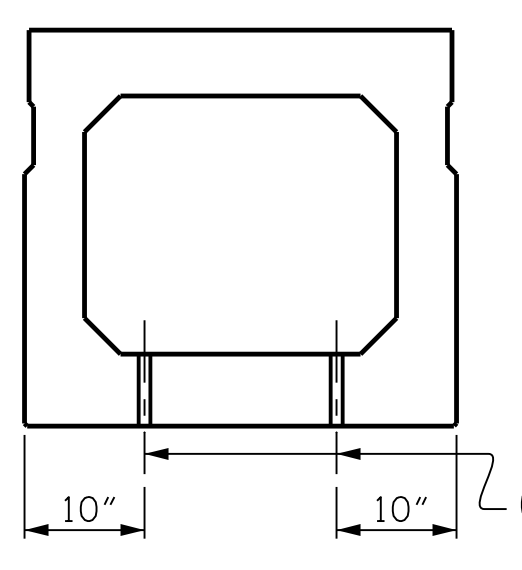
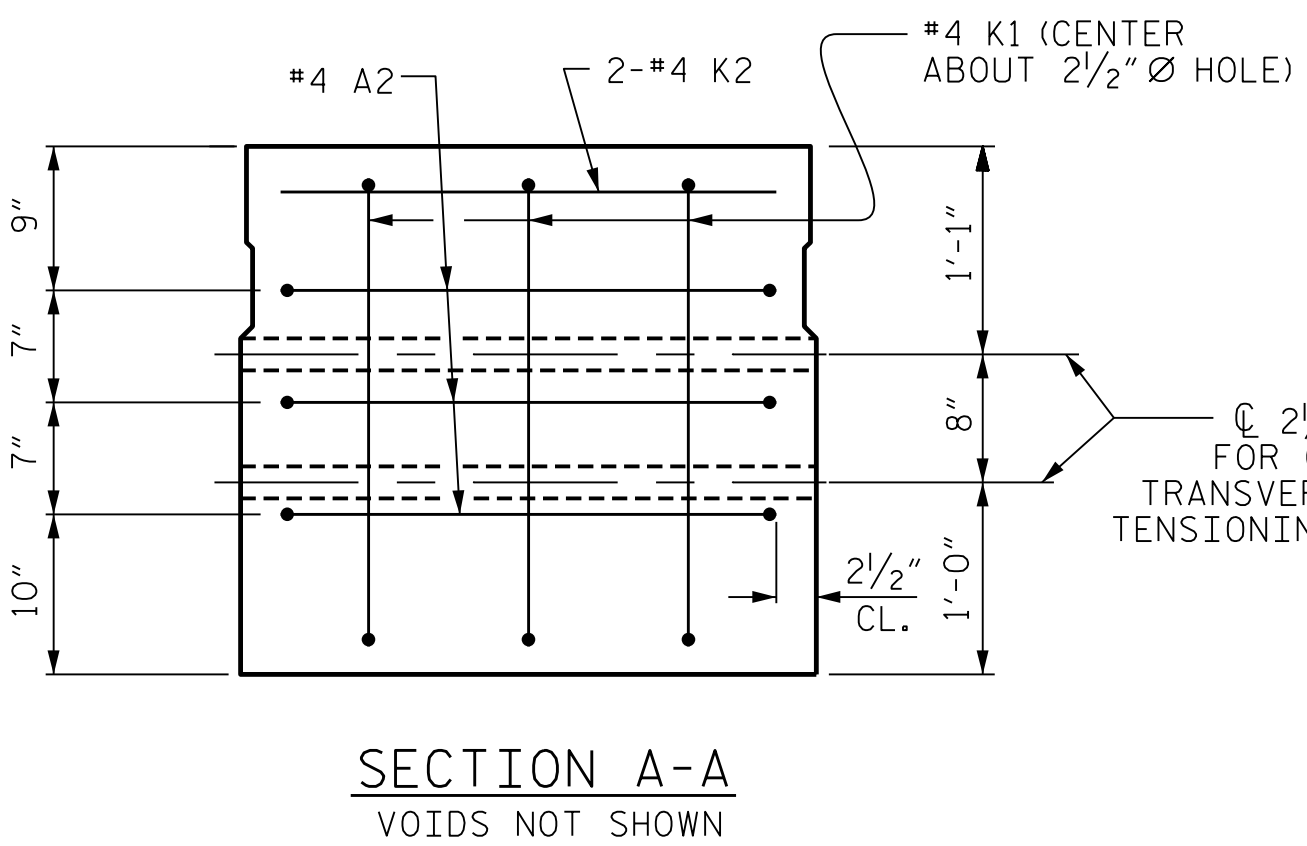
PART SECTION AT RECESS

SECTION X-X
SHOWING PLAN VIEW OF GROUDED RECESS

85' BOX BEAM UNITS REQUIRED			
	NUMBER	LENGTH	TOTAL LENGTH
TYPE I	11	85'-0"	935'-0"
TYPE II	1	85'-0"	85'-0"
TYPE III	1	85'-0"	85'-0"
TYPE IV	1	85'-0"	85'-0"
TOTAL	14		1190'-0"

75' BOX BEAM UNITS REQUIRED			
	NUMBER	LENGTH	TOTAL LENGTH
TYPE I	11	75'-0"	825'-0"
TYPE II	1	75'-0"	75'-0"
TYPE III	1	75'-0"	75'-0"
TYPE IV	1	75'-0"	75'-0"
TOTAL	14		1050'-0"

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



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

SECTION B-B

VOID DRAIN DETAILS
(DIMENSIONS SHOWN ARE TYPICAL FOR EACH VOID)

PART PLAN

PROJECT NO. B-5161
WAKE COUNTY
STATION: 15+14.00 -L-
SHEET 5 OF 5



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2/13/2018

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

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

DES BY: G. MYERS DATE: 11/17
DES CHK: K. DICKENS DATE: 11/17
DWG BY: M. SELLS DATE: 11/17
CHK BY: K. DICKENS DATE: 11/17

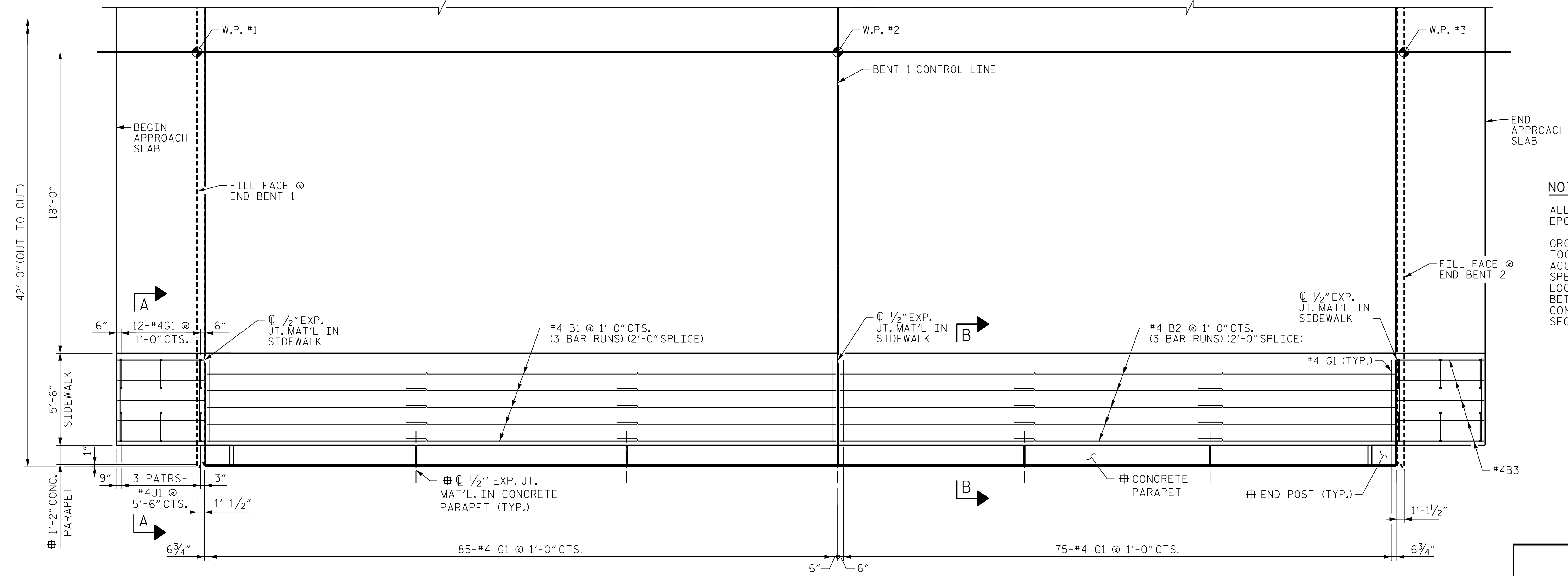
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SHEET NO. S-10
TOTAL SHEETS 25

*****SYSTEM*****
*****DCN*****
*****USER*****

BILL OF MATERIAL					
BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
* B1	15	#4	STR	29'-8"	298
* B2	15	#4	STR	26'-4"	264
* B3	10	#4	STR	11'-8"	78
* G1	184	#4	STR	5'-0"	615
* U1	12	#4	1	3'-0"	25
* EPOXY COATED REINF. STEEL				1280	LBS.
CLASS AA CONCRETE				28.8	CU. YDS.



NOTES

ALL REINFORCING STEEL IN SIDEWALK SHALL BE EPOXY COATED.

GROOVED CONTRACTION JOINTS, 1/2" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE SIDEWALK IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. THE CONTRACTION JOINTS SHALL BE LOCATED AT A SPACING OF 8 FEET TO 10 FEET BETWEEN 1/2" EXPANSION JOINT MATERIAL. NO CONTRACTION JOINTS WILL BE REQUIRED FOR SEGMENTS LESS THAN 10 FEET IN LENGTH.

PLAN OF SIDEWALK
 REINFORCING STEEL IN APPROACH SLAB SIDEWALK IS TYPICAL FOR EACH APPROACH SLAB

SIDEWALK THICKNESS		
33" BOX BEAM UNIT	SIDEWALK THICKNESS	
	@ CL BEARING	@ MID-SPAN
85' UNITS	9 1/2"	7 1/2" *
75' UNITS	9 1/2"	8 1/4" *

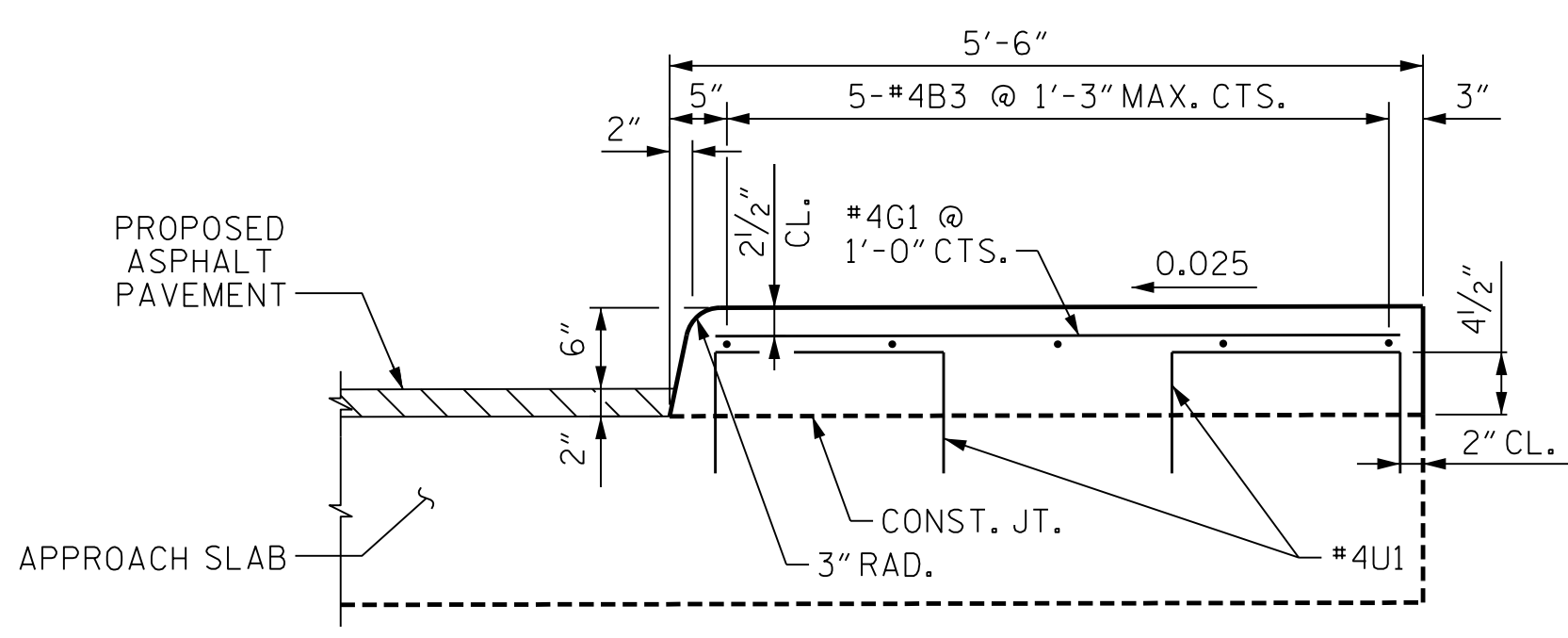
† = FOR #5 S5, #4 S6 & #4 S7 BARS IN BOX BEAM UNITS, SEE "PRESTRESSED CONCRETE BOX BEAM UNIT" SHEETS.

⊕ = FOR DETAILS AND REINFORCING STEEL IN CONCRETE PARAPET AND END POSTS, SEE "CONCRETE PARAPET DETAILS" SHEETS.

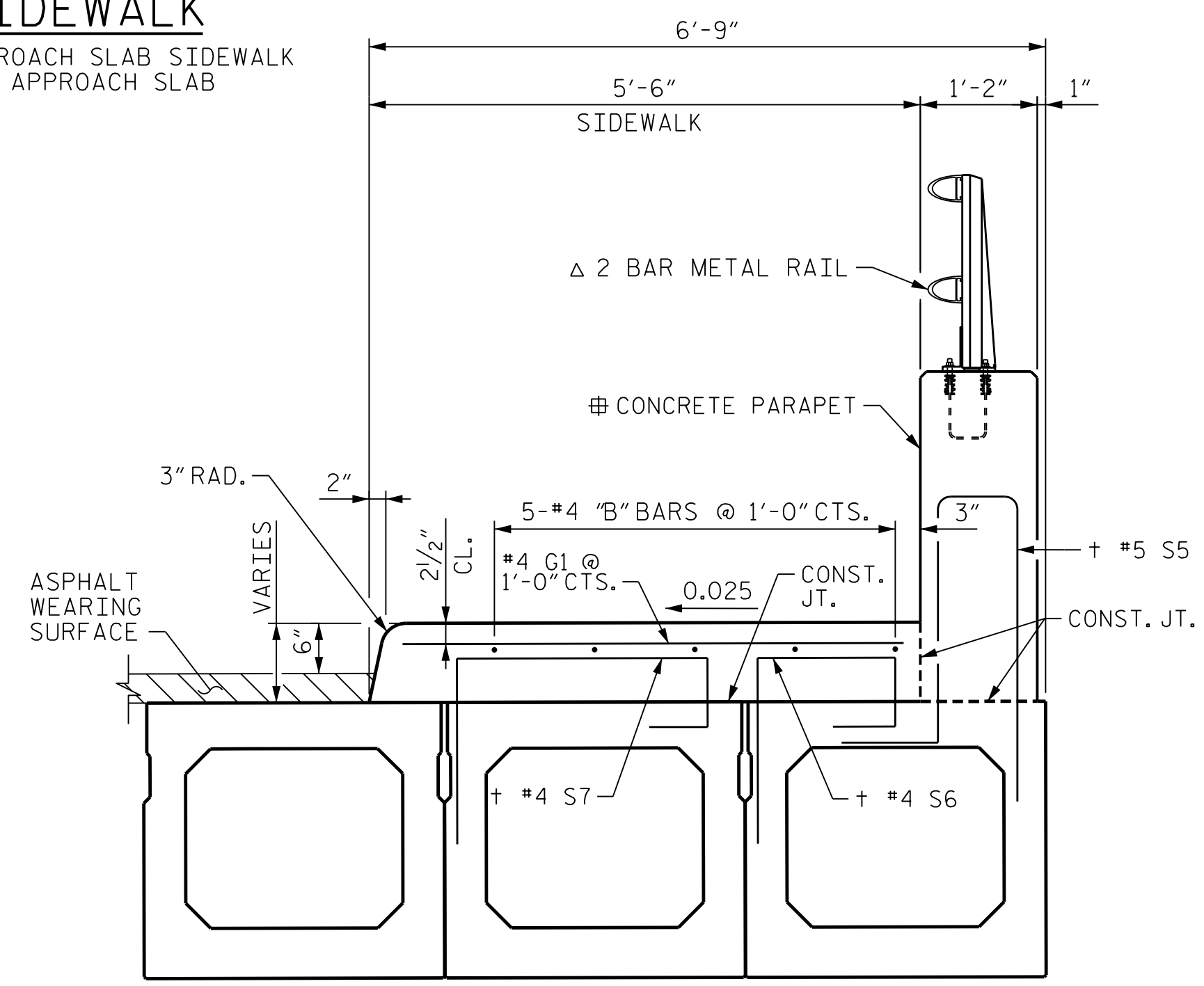
Δ = FOR 2 BAR METAL RAIL DETAILS, SEE "2 BAR METAL RAIL" SHEETS.

* = BASED ON THEORETICAL ANTICIPATED CAMBER. ADJUST AS NECESSARY BASED ON ACTUAL MEASURED CAMBER.

PROJECT NO. B-5161
WAKE COUNTY
 STATION: 15+14.00 -L-

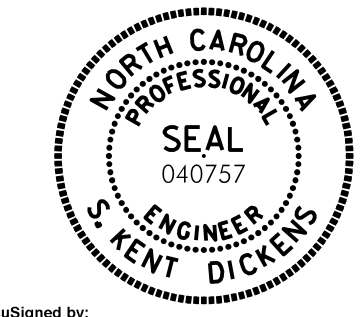


SECTION A-A



SECTION B-B

SECTION THRU SIDEWALK



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 Kent Dickens
 2/13/2018

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

**SUPERSTRUCTURE
 SIDEWALK
 PLAN AND SECTION**

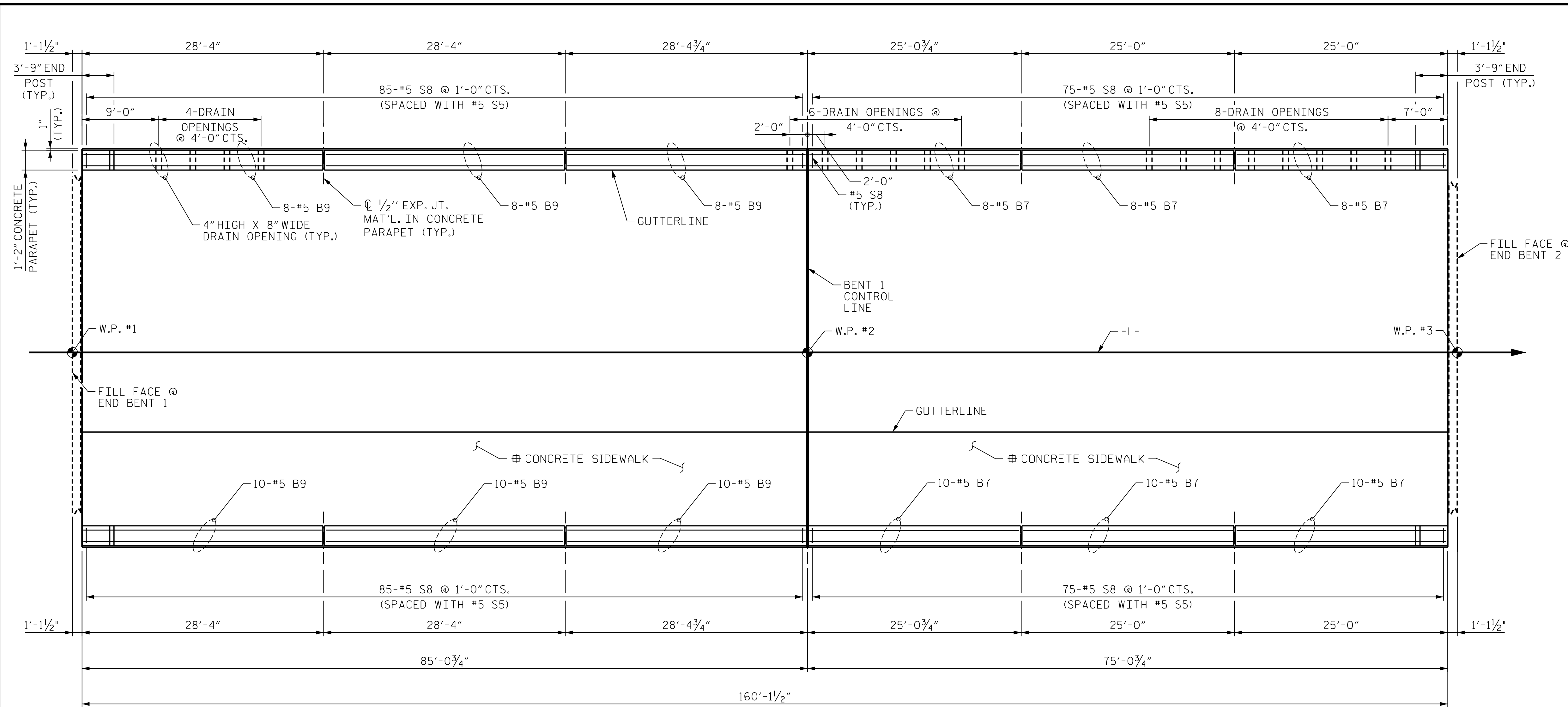
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SHEET NO. S-11
 TOTAL SHEETS 25

DES BY: G. MYERS DATE: 11/17 DWG BY: M. SELLS DATE: 11/17
 DES CHK: K. DICKENS DATE: 11/17 CHK BY: K. DICKENS DATE: 11/17

HDR HDR Engineering, Inc. of the Carolinas
 555 Fayetteville St., Suite 900 Raleigh, N.C. 27601
 N.C.B.E.L.S. License Number: F-0116

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BILL OF MATERIAL					
BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
* B7	54	#5	STR.	24'-7"	1385
* B9	54	#5	STR.	27'-11"	1573
* E1	8	#7	STR.	2'-9"	45
* E2	8	#7	STR.	3'-3"	54
* E3	8	#7	STR.	3'-9"	62
* E4	8	#7	STR.	4'-3"	70
* E5	8	#7	STR.	4'-7"	75
* F1	8	#6	STR.	1'-10"	23
* F2	8	#6	STR.	3'-0"	37
* F3	8	#6	STR.	3'-8"	45
* S8	320	#5	1	5'-8"	1892
* EPOXY COATED REINF. STEEL					5261 LBS.
CLASS AA CONCRETE					41.8 CU. YDS.
1'-2" X 2'-9 1/2" CONCRETE PARAPET					160.1 LN. FT.
1'-2" X 3'-3 1/2" CONCRETE PARAPET					160.1 LN. FT.

NOTES

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

THE #5 "S" BARS MAY BE SHIFTED SLIGHTLY IN ORDER TO MAINTAIN A 2" MINIMUM CLEARANCE TO THE 1/2" EXPANSION JOINT MATERIAL IN THE CONCRETE PARAPET.

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

FOR DETAILS OF CONCRETE INSERTS, SEE "2 BAR METAL RAIL POST SPACING AND END OF RAIL DETAILS" SHEET.

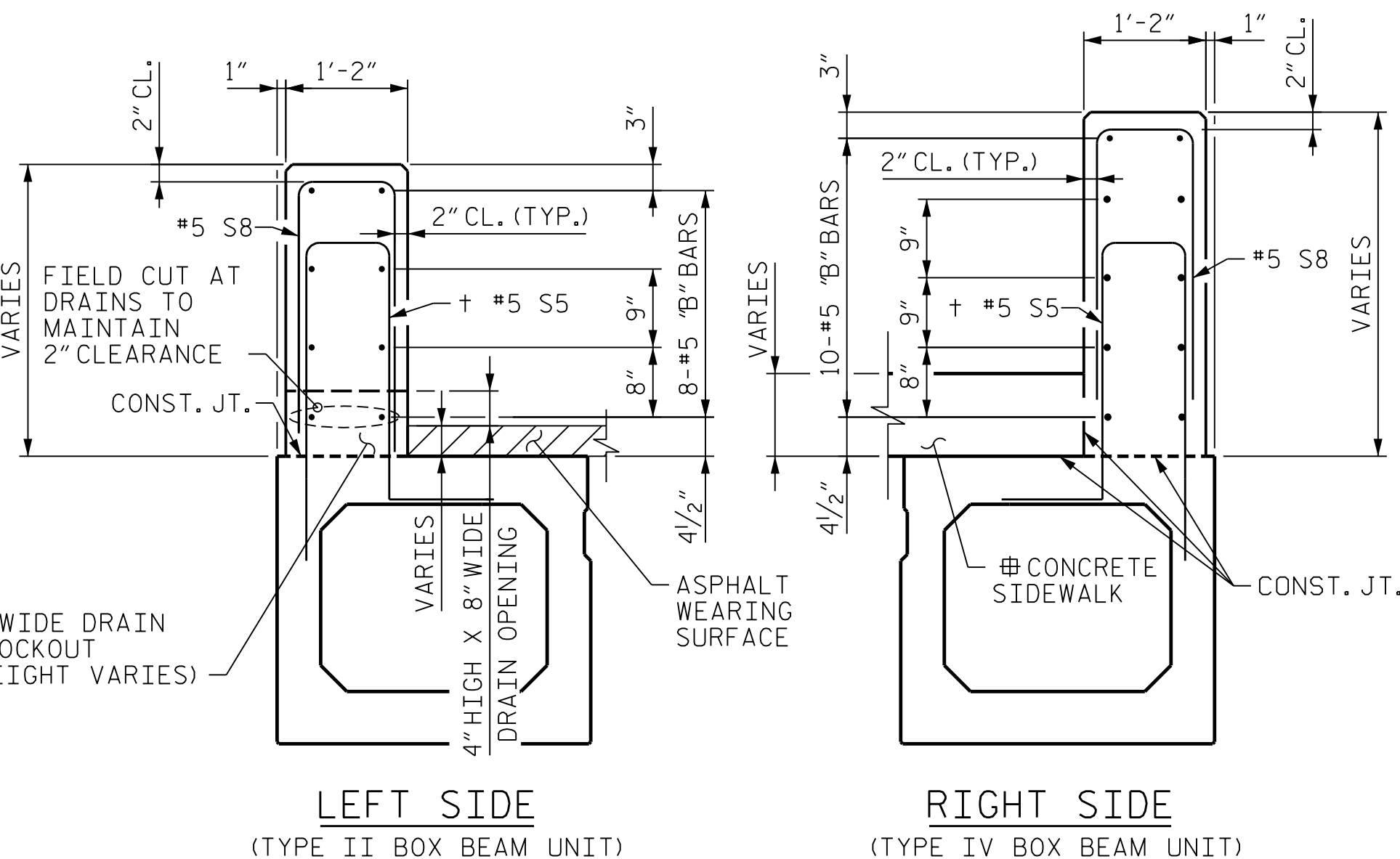
FOR GUARDRAIL ANCHOR ASSEMBLY, SEE "GUARDRAIL ANCHORAGE DETAILS FOR METAL RAILS" SHEET.

= FOR DETAILS AND REINFORCING STEEL IN SIDEWALK, SEE "SIDEWALK PLAN AND SECTION" SHEET. * = BASED ON THEORETICAL ANTICIPATED CAMBER. ADJUST AS NECESSARY BASED ON ACTUAL MEASURED CAMBER.

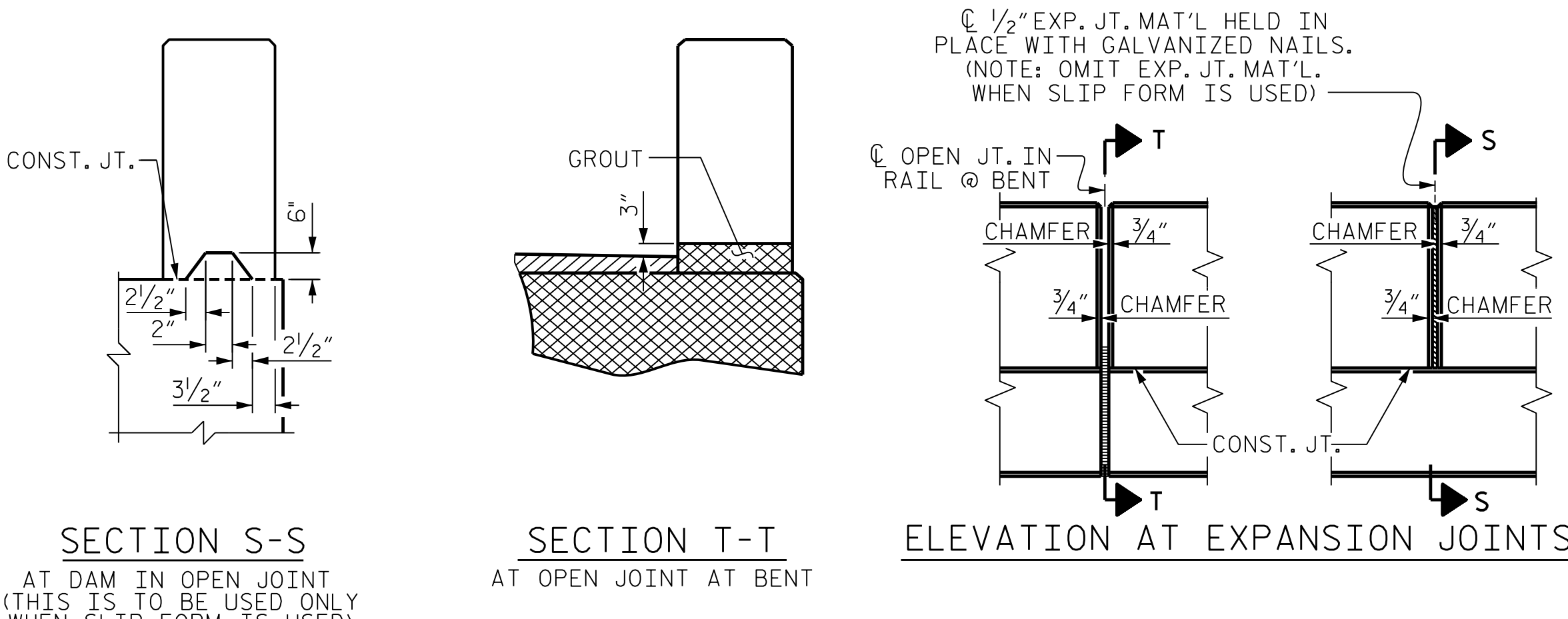
+ = FOR #5 S5 BARS IN BOX BEAM UNITS, SEE "PRESTRESSED CONCRETE BOX BEAM UNIT" SHEETS.

PLAN OF PARAPET

33" BOX BEAM UNIT	ASPHALT OVERLAY THICKNESS		LEFT CONCRETE PARAPET HEIGHT		RIGHT CONCRETE PARAPET HEIGHT	
	@ CL BEARING	@ MID-SPAN	@ CL BEARING	@ MID-SPAN	@ CL BEARING	@ MID-SPAN
85' UNITS	3 1/2"	1 1/2" *	2'-9 1/2"	2'-7 1/2" *	3'-3 1/2"	3'-1 1/2" *
75' UNITS	3 1/2"	2 1/4" *	2'-9 1/2"	2'-8 1/4" *	3'-3 1/2"	3'-2 1/4" *



SECTIONS THRU PARAPETS



PARAPET RAIL DETAILS

PROJECT NO. B-5161
WAKE COUNTY
 STATION: 15+14.00 -L-
 SHEET 1 OF 2

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

**SUPERSTRUCTURE
 CONCRETE PARAPET
 DETAILS**



DES BY: G. MYERS DATE: 11/17 DWG BY: M. SELLS DATE: 11/17
 DES CHK: K. DICKENS DATE: 11/17 CHK BY: K. DICKENS DATE: 12/17

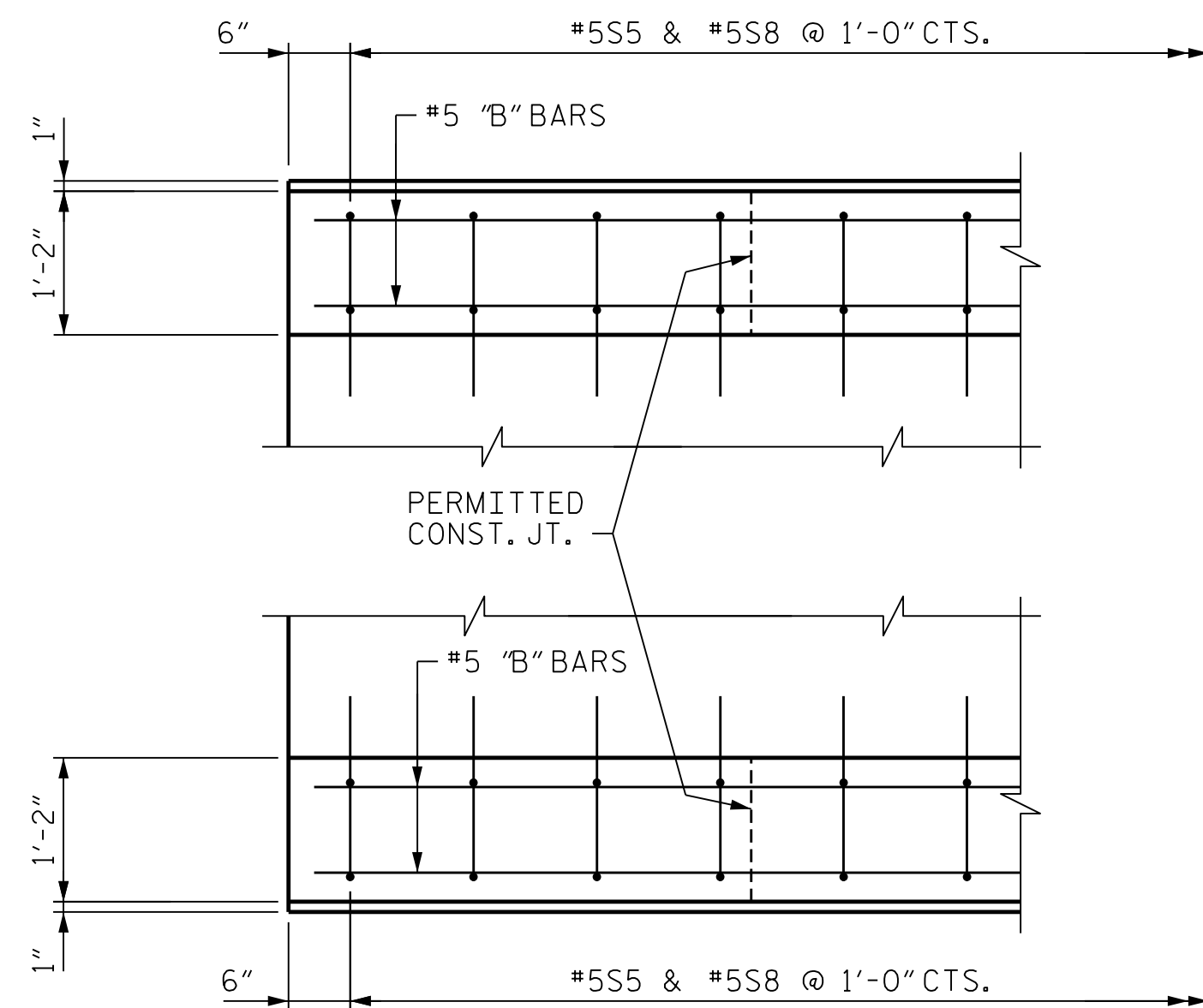
HDR HDR Engineering, Inc. of the Carolinas
 555 Fayetteville St., Suite 900 Raleigh, N.C. 27601
 N.C.B.E.L.S. License Number: F-0116

DocuSigned by:
 S. Kent Dickens
 BDA22A65385A26
 2/13/2018

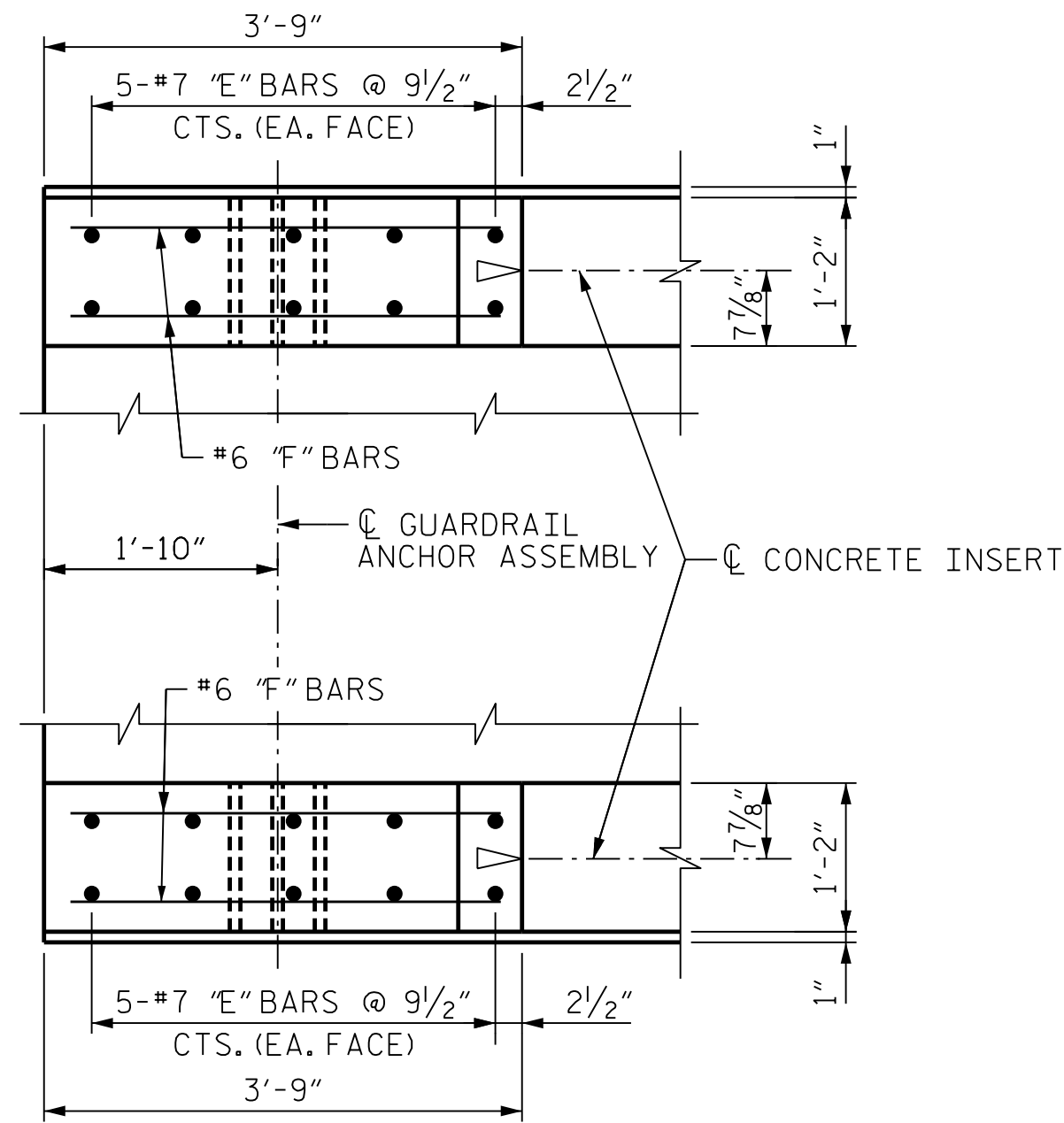
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SHEET NO. 5-12
 TOTAL SHEETS 25

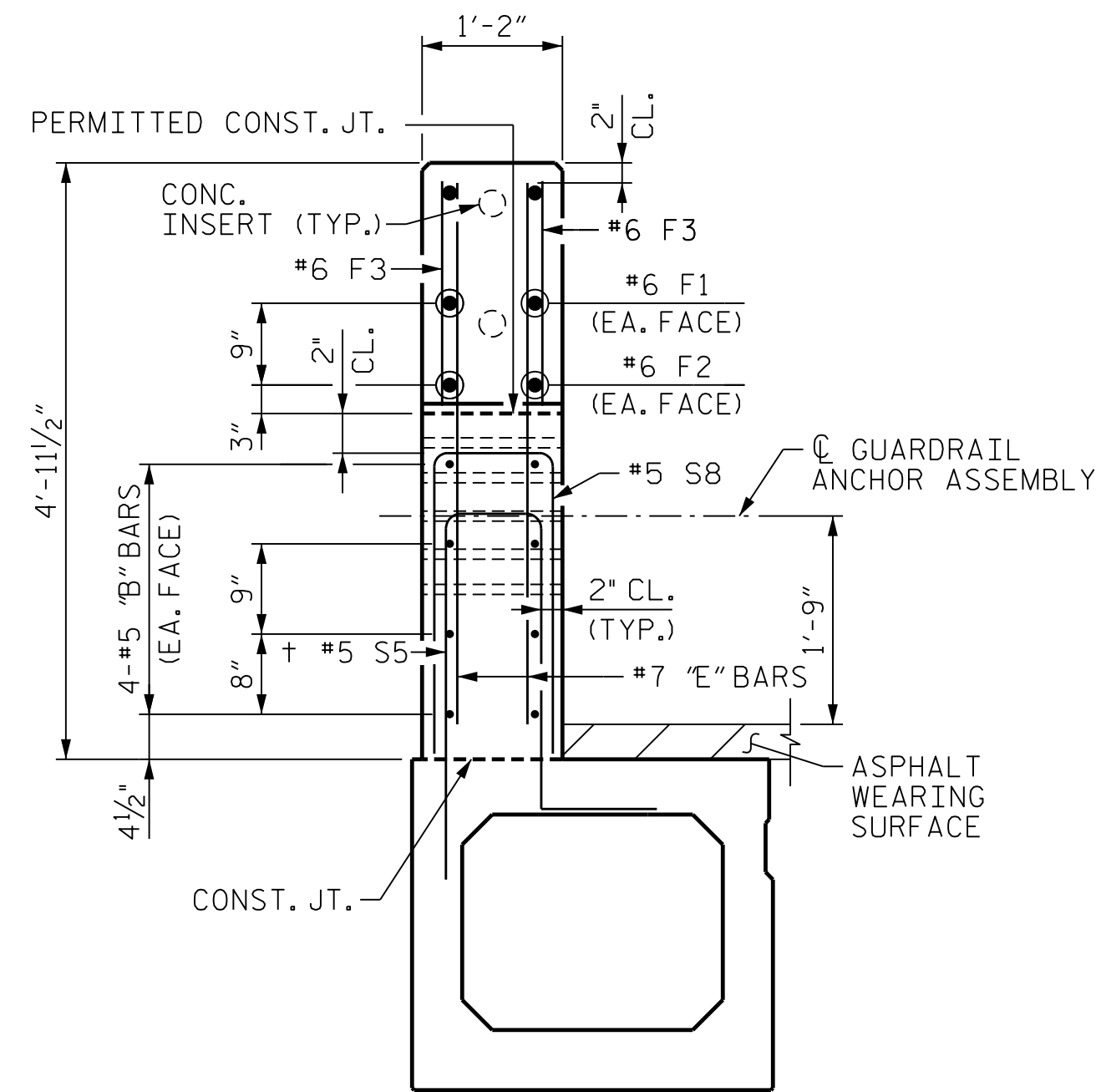
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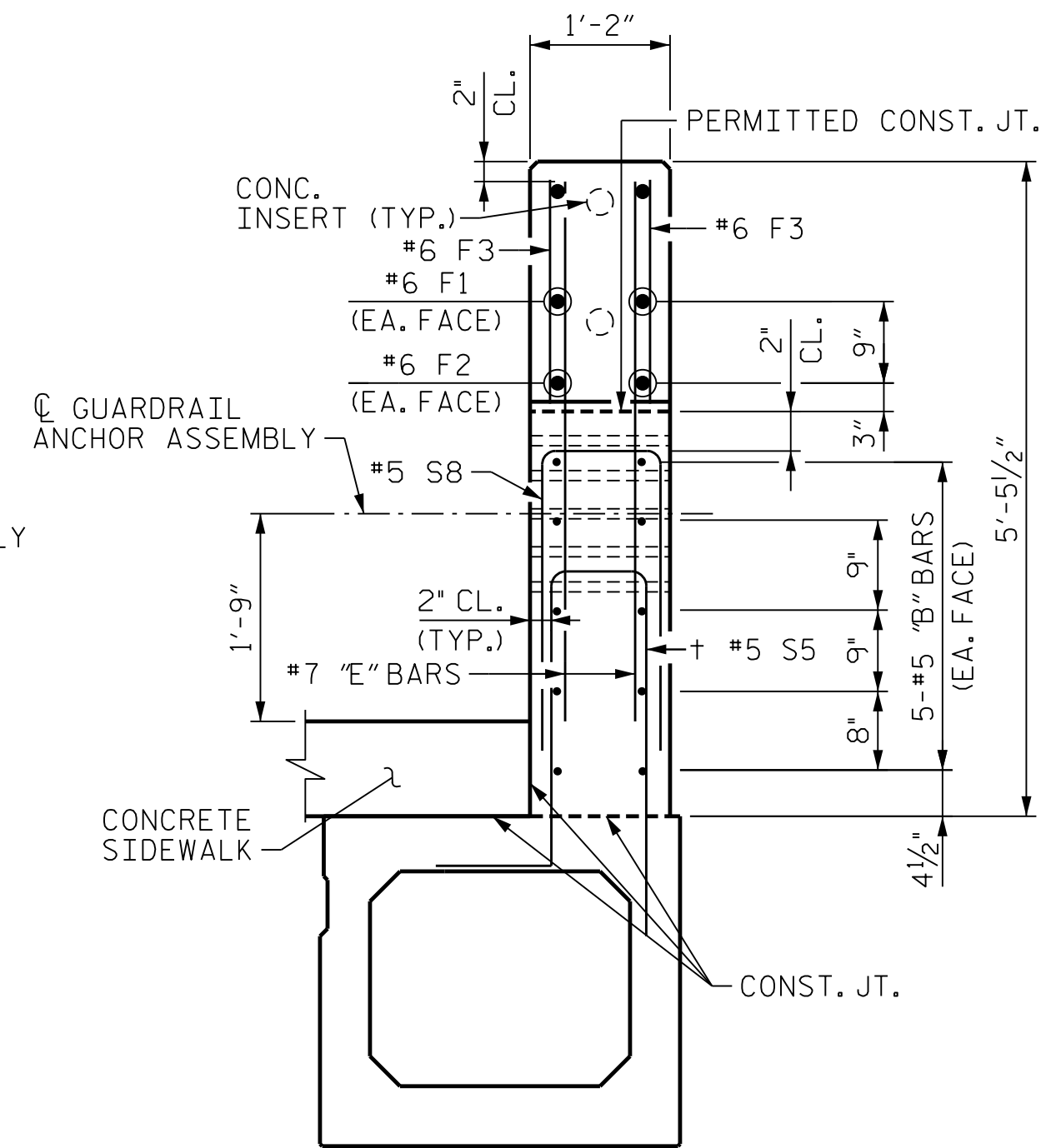
PLAN OF PARAPET
(END BENT 1 SHOWN, END BENT 2 SIMILAR)



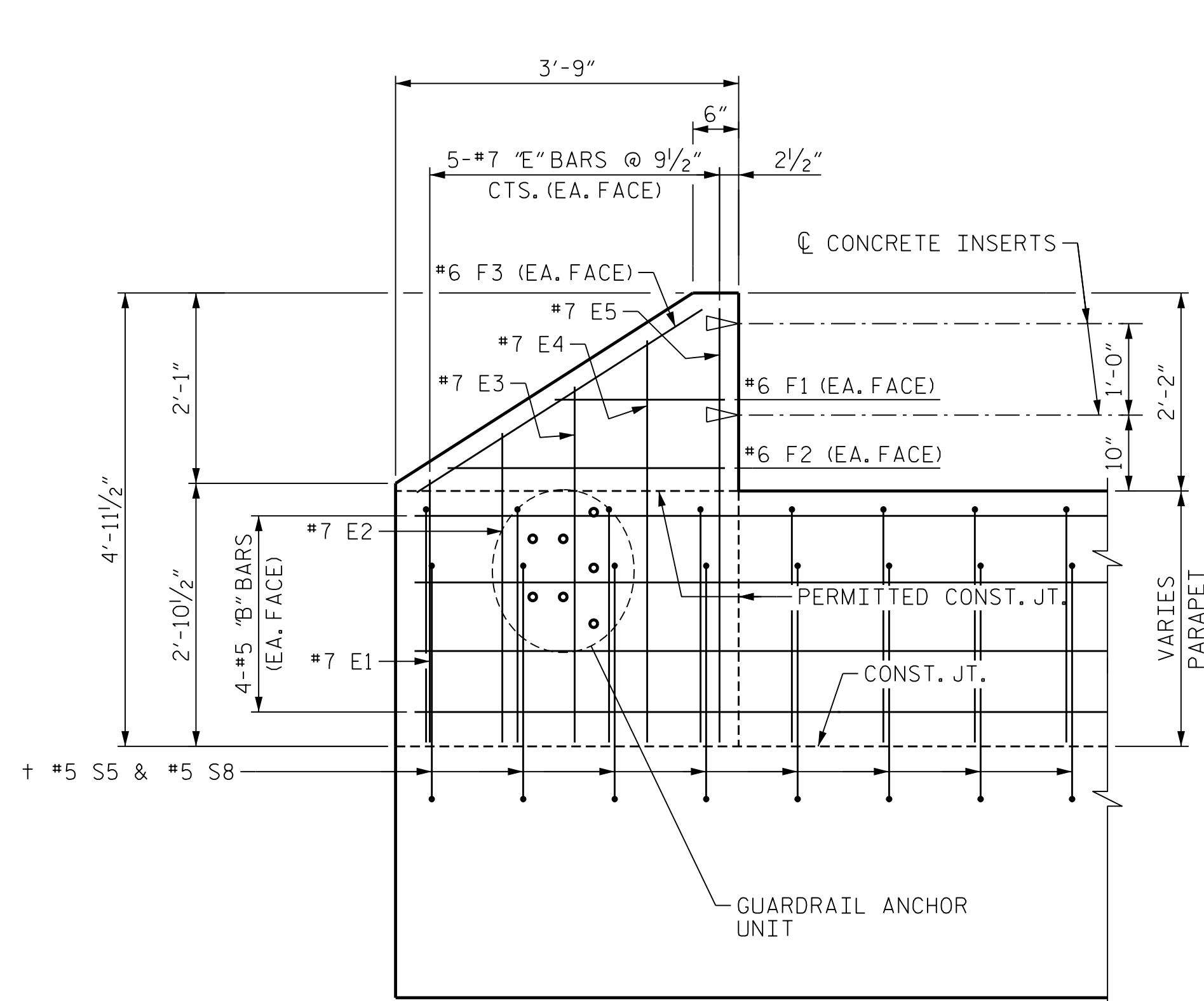
PLAN OF END POST
(END BENT 1 SHOWN, END BENT 2 SIMILAR)



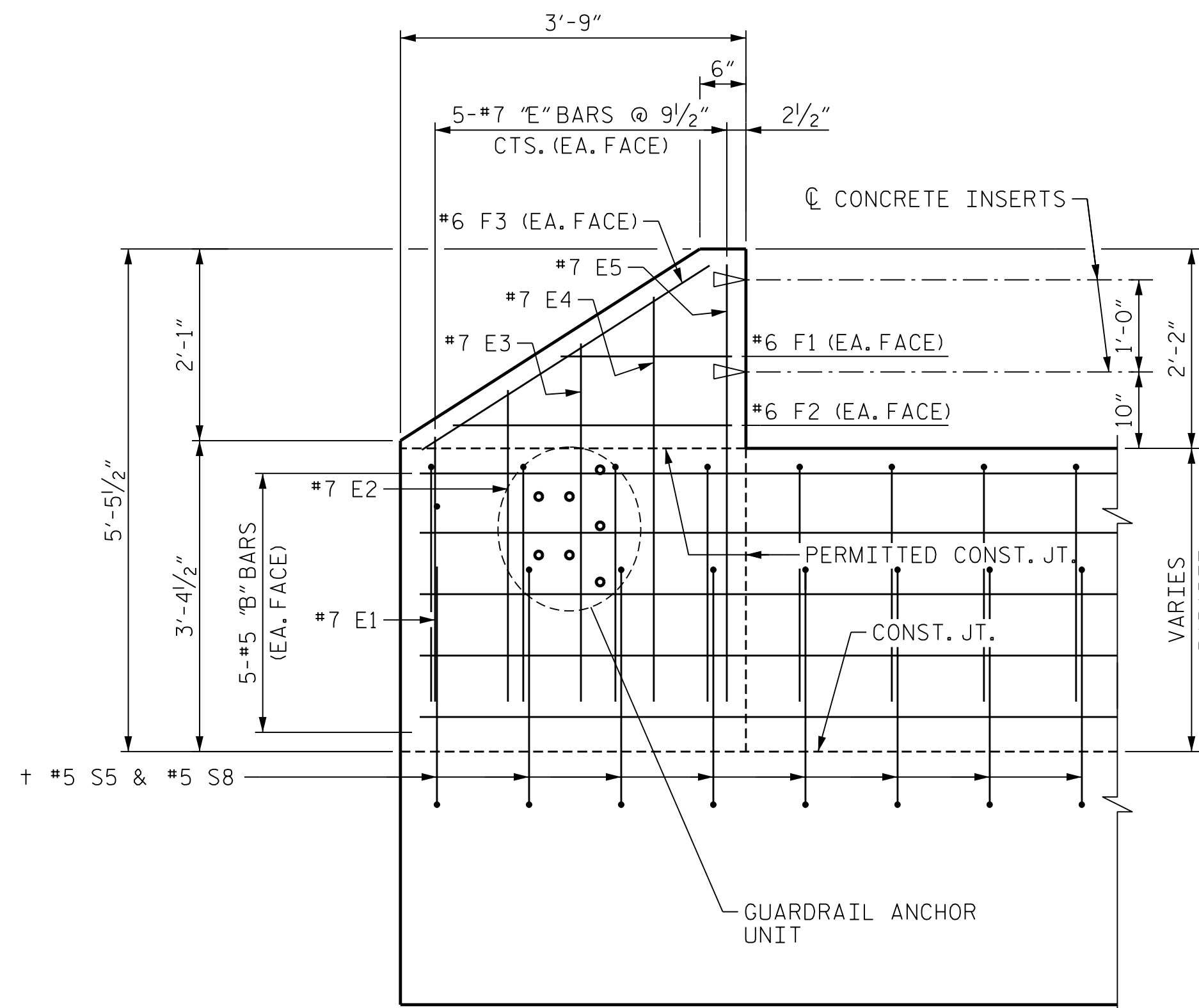
LEFT SIDE END VIEW
(TYPE II BOX BEAM UNIT)



RIGHT SIDE END VIEW
(TYPE IV BOX BEAM UNIT)



LEFT SIDE ELEVATION
(TYPE II BOX BEAM UNIT)
(SHOWN AT END BENT 1 - SIMILAR AT END BENT 2)



RIGHT SIDE ELEVATION
(TYPE IV BOX BEAM UNIT)
(SHOWN AT END BENT 1 - SIMILAR AT END BENT 2)

† = FOR #5 S5 BARS IN BOX BEAM UNITS, SEE PRESTRESSED CONCRETE BOX BEAM UNIT SHEETS.

PROJECT NO. B-5161

WAKE COUNTY

STATION: 15+14.00 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

**SUPERSTRUCTURE
CONCRETE PARAPET
DETAILS**



DocuSigned by:
Kent Dickens
2/13/2018

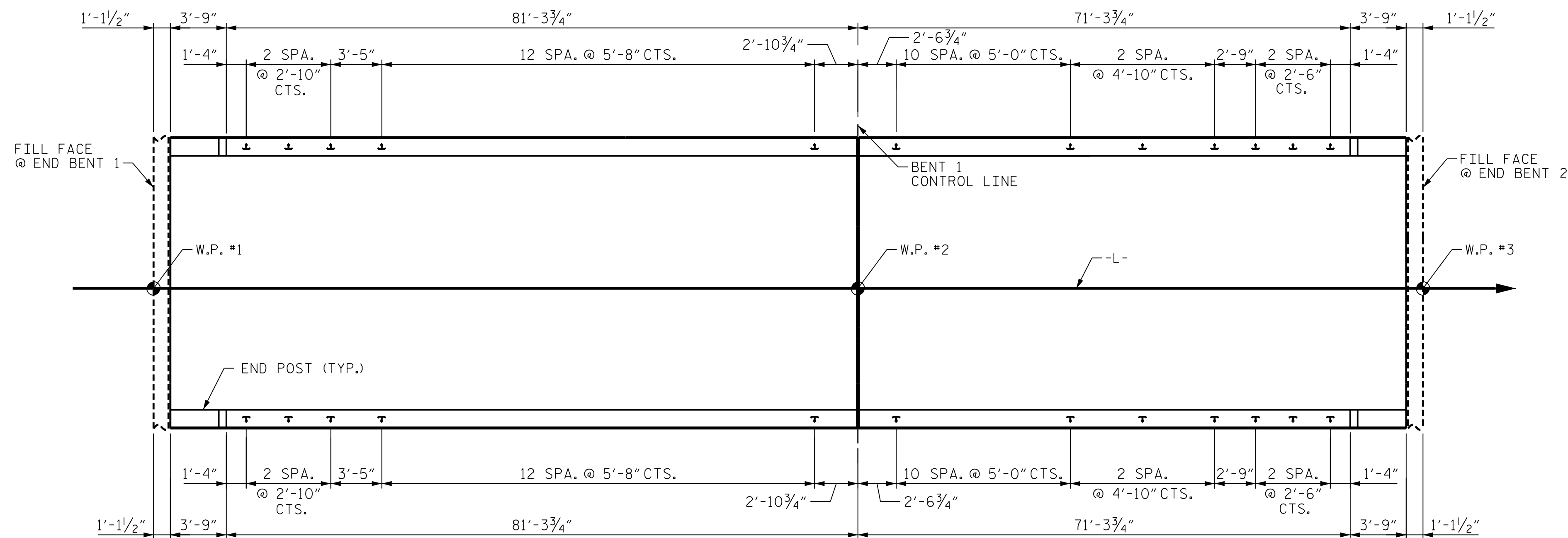
DES BY: G. MYERS	DATE: 11/17	DWG BY: M. SELLS	DATE: 11/17
DES CHK: K. DICKENS	DATE: 11/17	CHK BY: K. DICKENS	DATE: 12/17



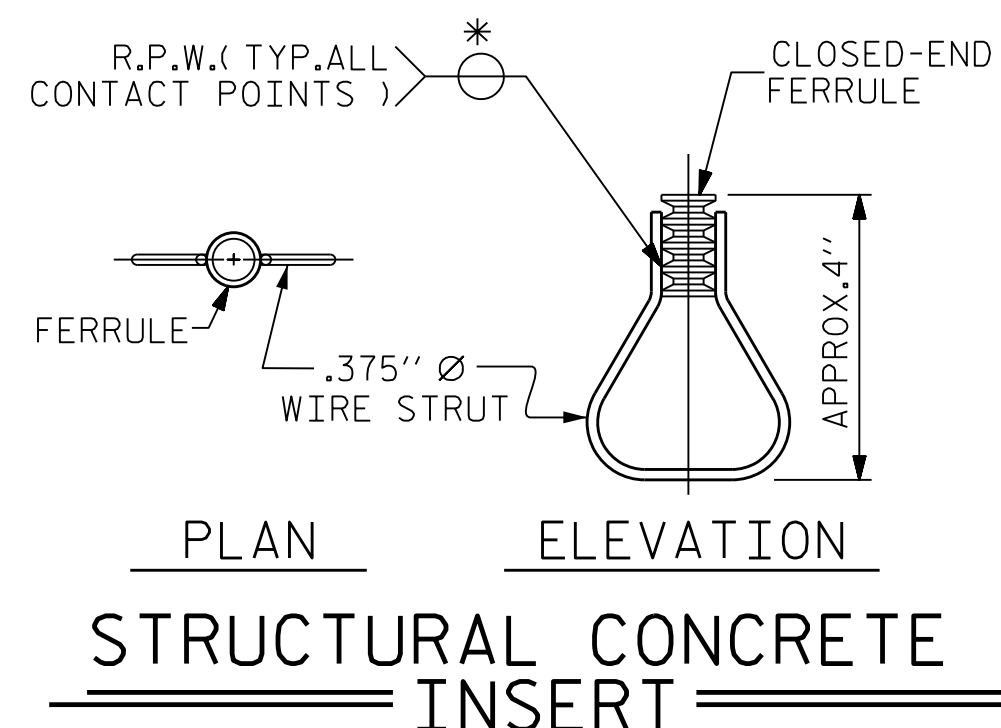
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TOTAL SHEETS: 25

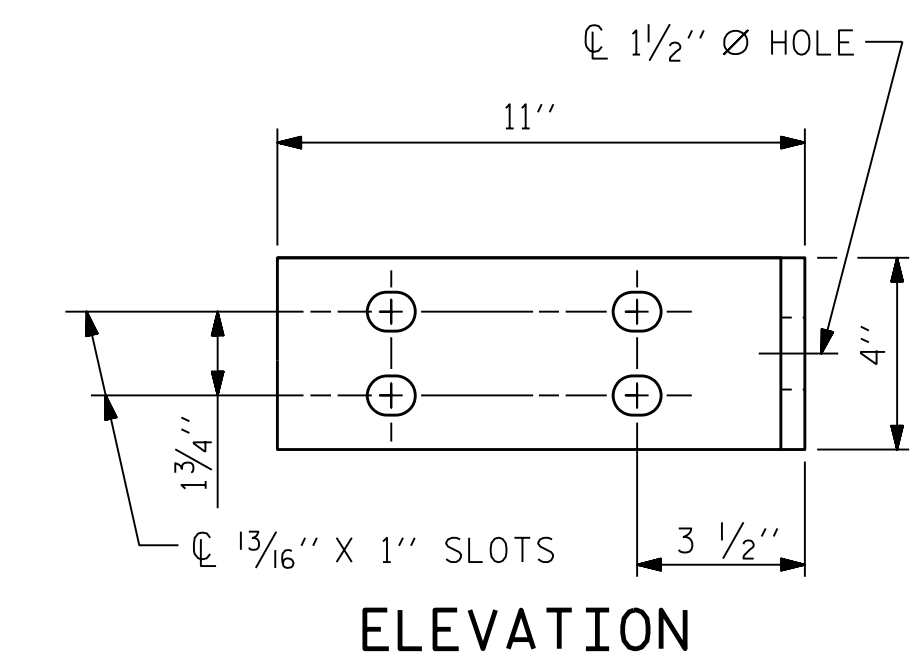


PLAN OF RAIL POST SPACINGS

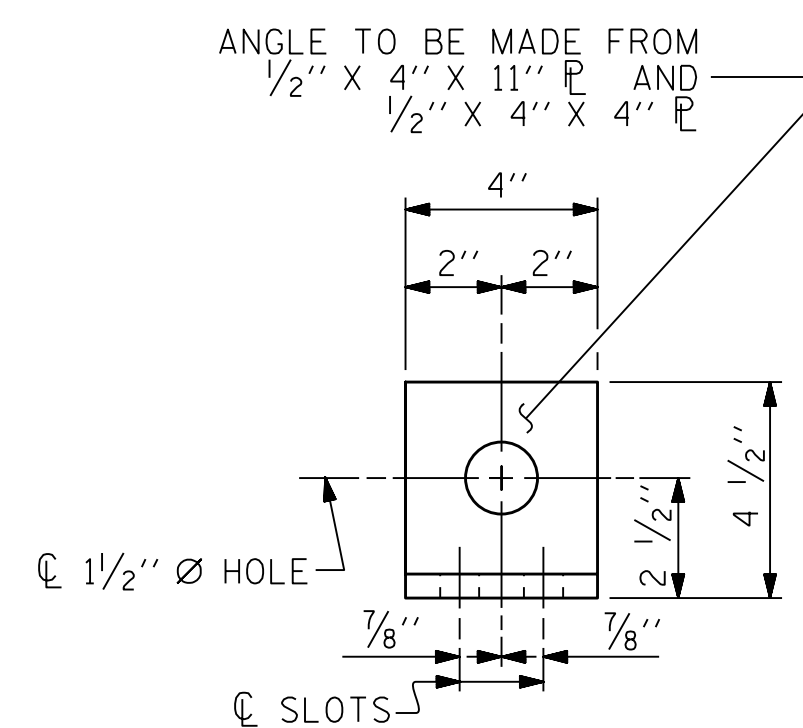


STRUCTURAL CONCRETE INSERT

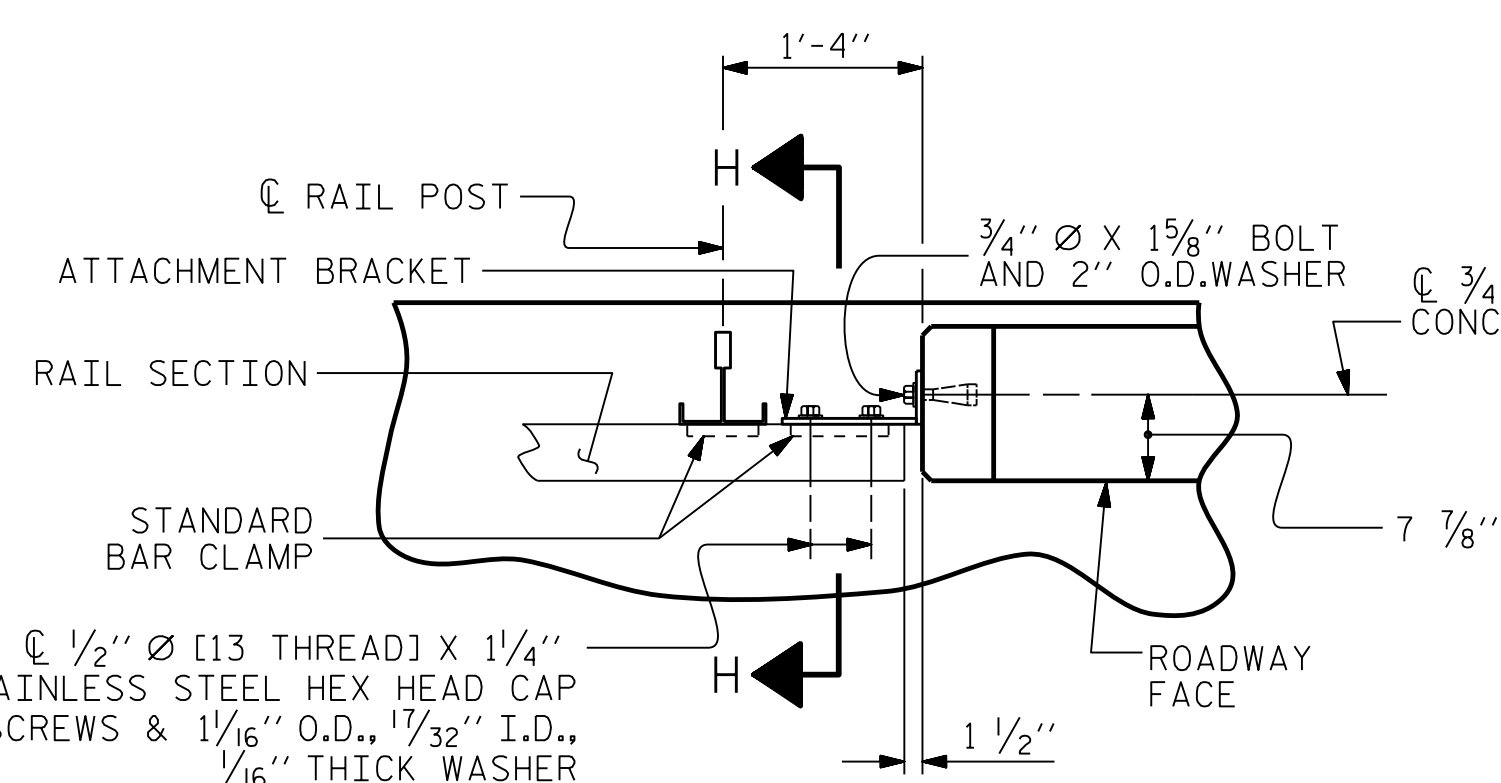
* EACH WELDED ATTACHMENT OF WIRE TO FERRULE SHALL DEVELOP THE TENSILE STRENGTH OF THE WIRE.



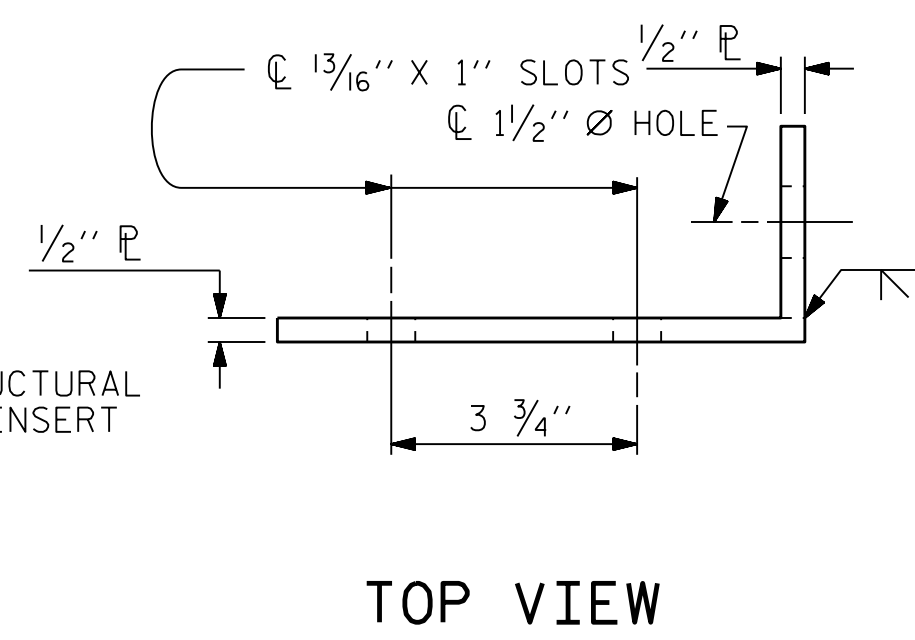
ELEVATION



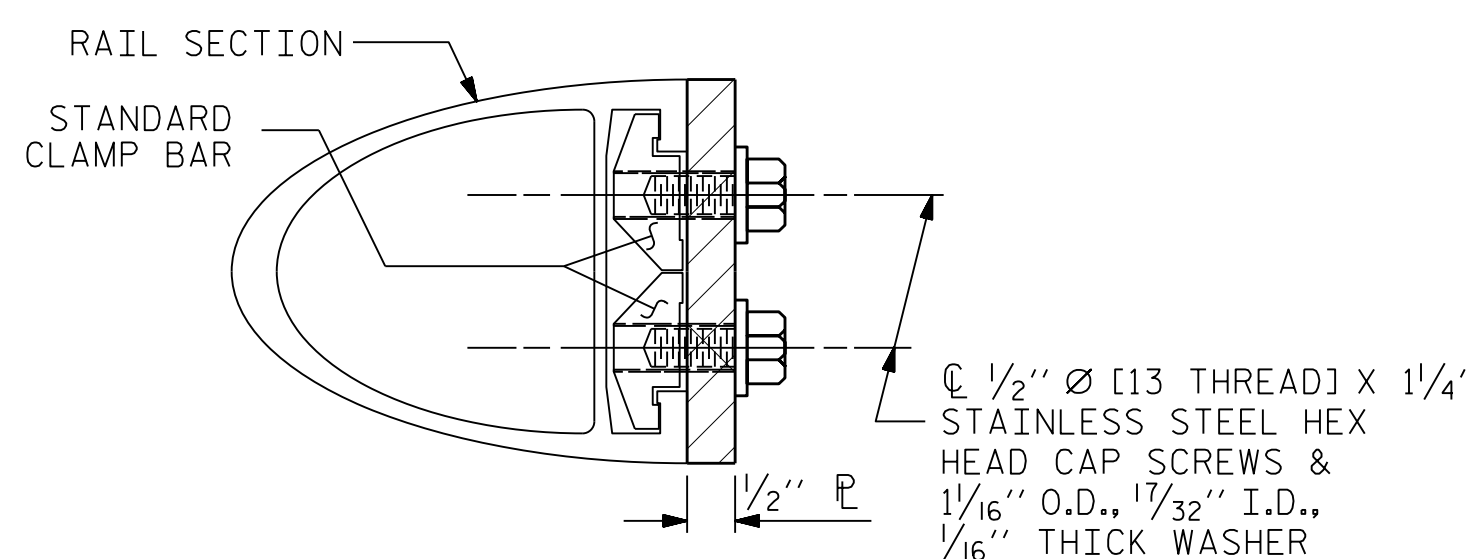
END VIEW



PLAN - RAIL AND END POST



TOP VIEW



SECTION H-H

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

NOTES

METAL RAIL TO END POST CONNECTION

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

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

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

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

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

PROJECT NO. B-5161
 WAKE COUNTY
 STATION: 15+14.00 -L-

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



DocuSigned by:
 Kent Dickens
 BDA22A65385A426
 2/13/2018

REVISIONS

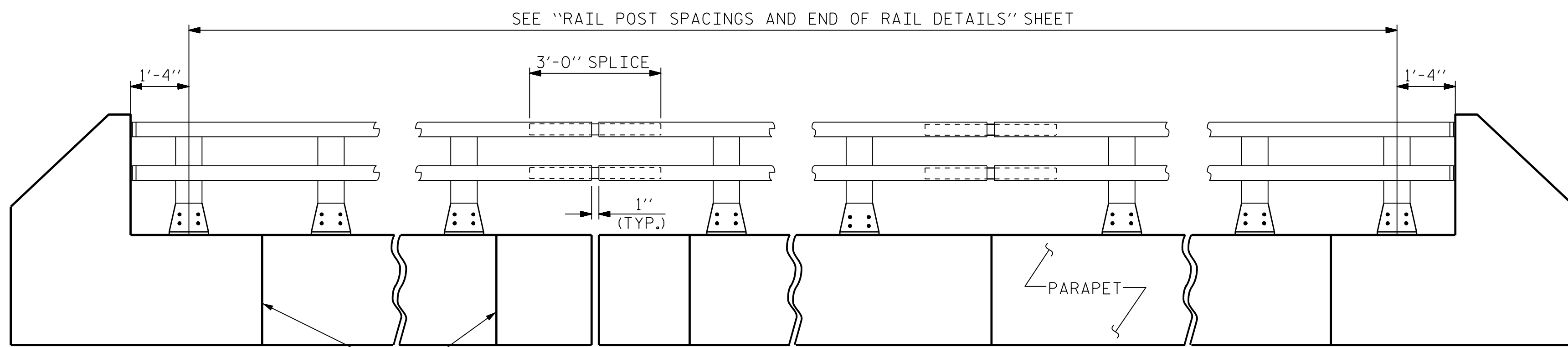
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SHEET NO. 5-14
 TOTAL SHEETS 25

DES BY: G. MYERS DATE: 11/17
 DES CHK: K. DICKENS DATE: 11/17
 DWG BY: M. SELLS DATE: 11/17
 CHK BY: K. DICKENS DATE: 12/17

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TOOLED CONTRACTION JT.
(SEE NOTES)

ELEVATION

NOTE : FOR ATTACHMENT OF METAL RAIL TO END POST, SEE "RAIL POST SPACINGS AND END OF RAIL DETAILS" SHEET.

NOTES

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

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

ALUMINUM RAILS

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

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

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

GALVANIZED STEEL RAILS

MATERIAL AND GALVANIZING ARE TO CONFORM TO THE FOLLOWING SPECIFICATIONS:

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

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

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

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

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

GENERAL NOTES

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

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

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

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

METAL RAIL POSTS SHALL BE SET NORMAL TO CURB GRADE.

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

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

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

SHIMS SHALL BE USED AS NECESSARY FOR POST ALIGNMENT.

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

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

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

PAY LENGTH = 305.3 LIN. FT.

PROJECT NO. B-5161

WAKE COUNTY

STATION: 15+14.00 -L-

SHEET 1 OF 2

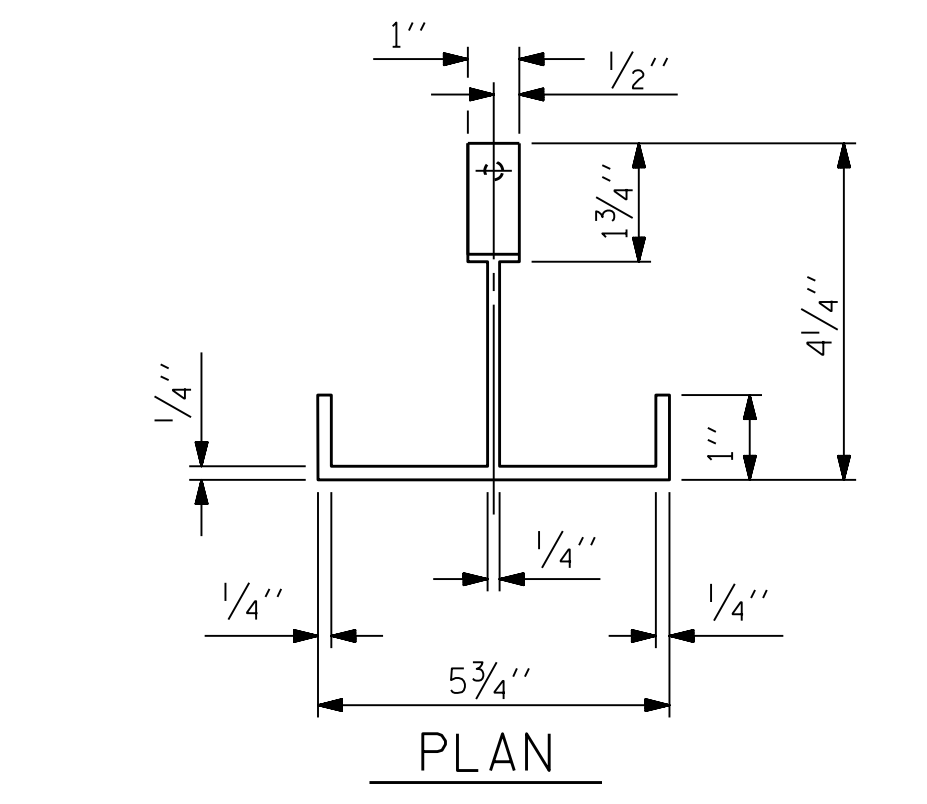
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD
2 BAR METAL RAIL



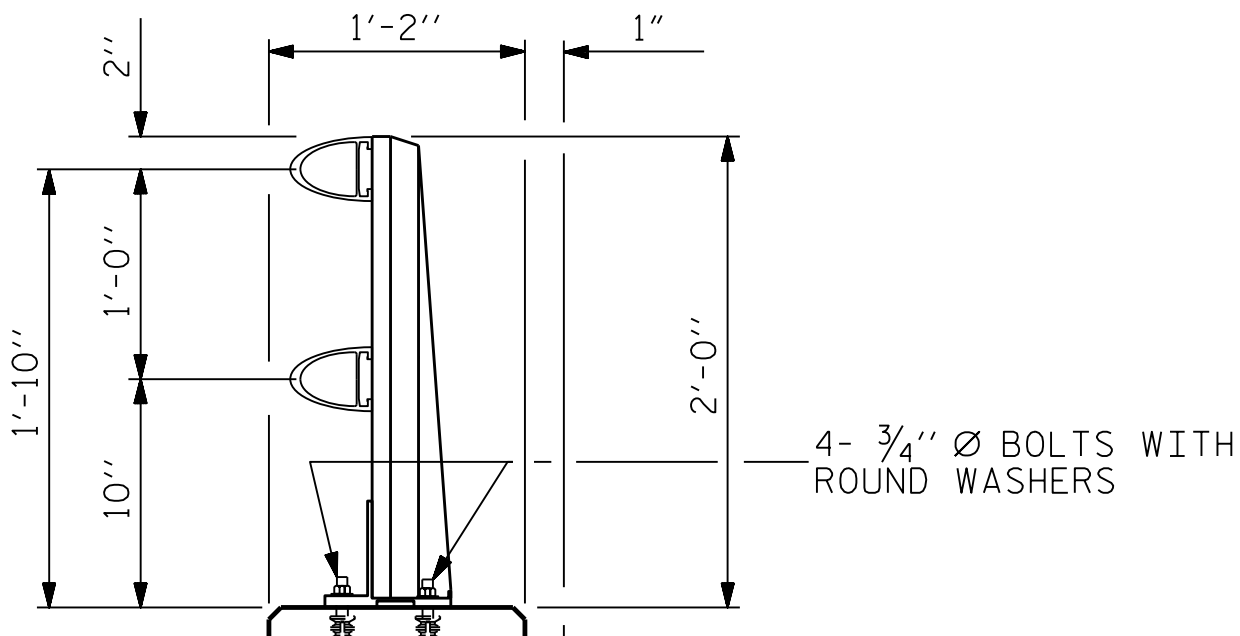
Designed by: *Kent Dickens* 2/13/2018
BDA22A65385A42E

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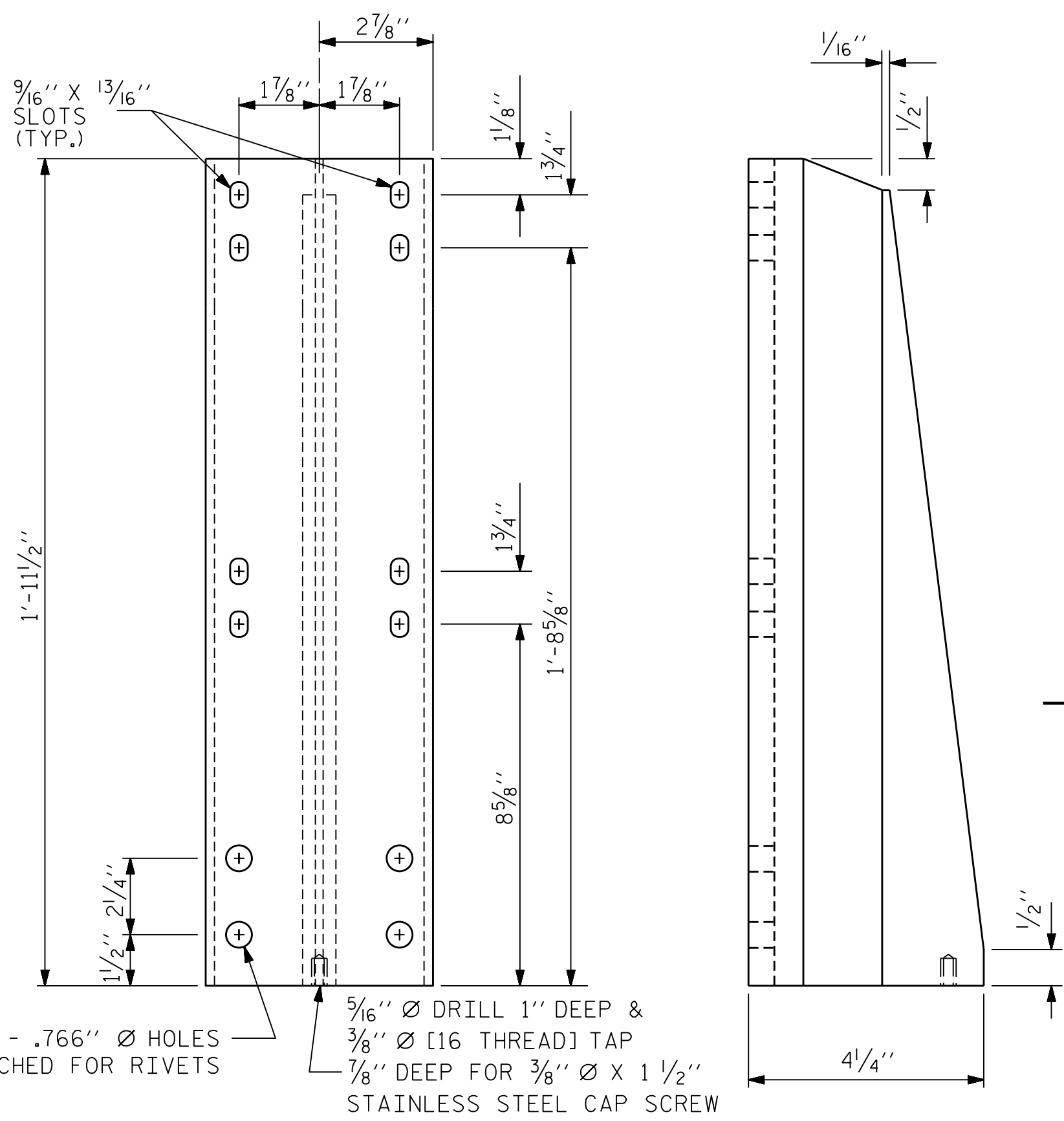


PLAN



4 - 3/4" Ø BOLTS WITH ROUND WASHERS

SECTION THRU PARAPET AND RAIL

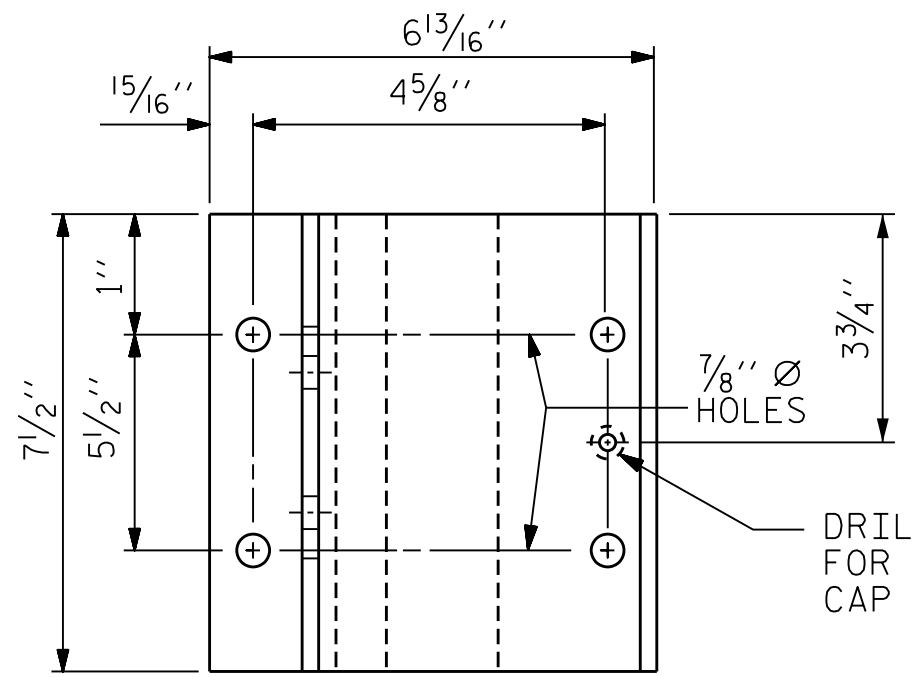


FRONT ELEVATION

SIDE ELEVATION

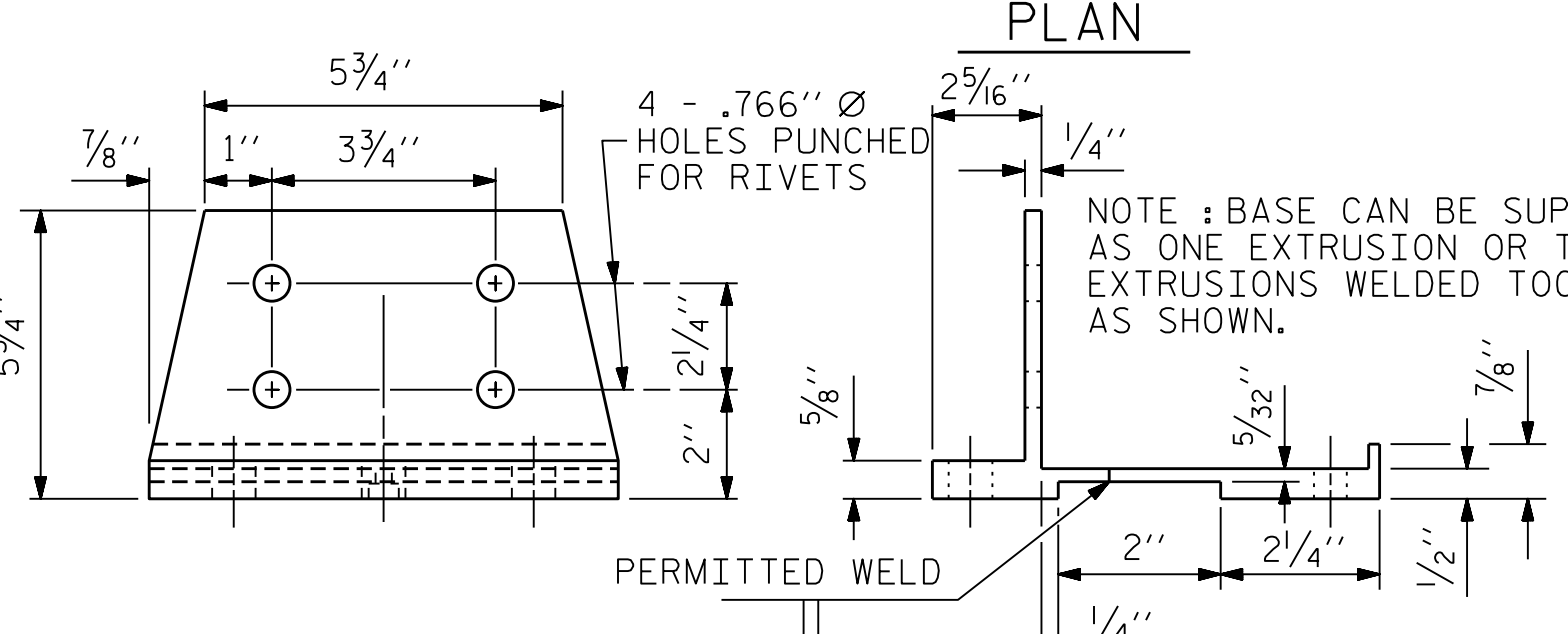
DETAILS OF POST

4 - .766" Ø HOLES PUNCHED FOR RIVETS
5/16" Ø DRILL 1" DEEP & 3/8" Ø [16 THREAD] TAP
7/8" DEEP FOR 3/8" Ø X 1 1/2" STAINLESS STEEL CAP SCREW



PLAN

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



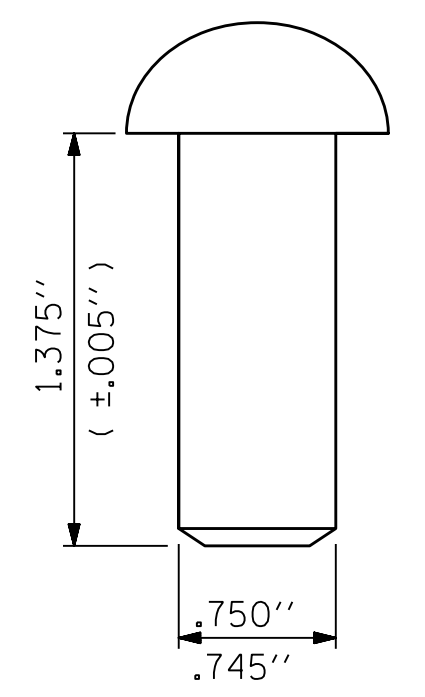
FRONT ELEVATION

SIDE ELEVATION

POST BASE DETAILS

NOTE : BASE CAN BE SUPPLIED AS ONE EXTRUSION OR TWO EXTRUSIONS WELDED TOGETHER AS SHOWN.

PERMITTED WELD



RIVET DETAIL

DES BY: G. MYERS	DATE: 11/17	DWG BY: M. SELLS	DATE: 10/17
DES CHK: K. DICKENS	DATE: 11/17	CHK BY: K. DICKENS	DATE: 12/17

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555 Fayetteville St., Suite 900 Raleigh, N.C. 27601
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NOTES

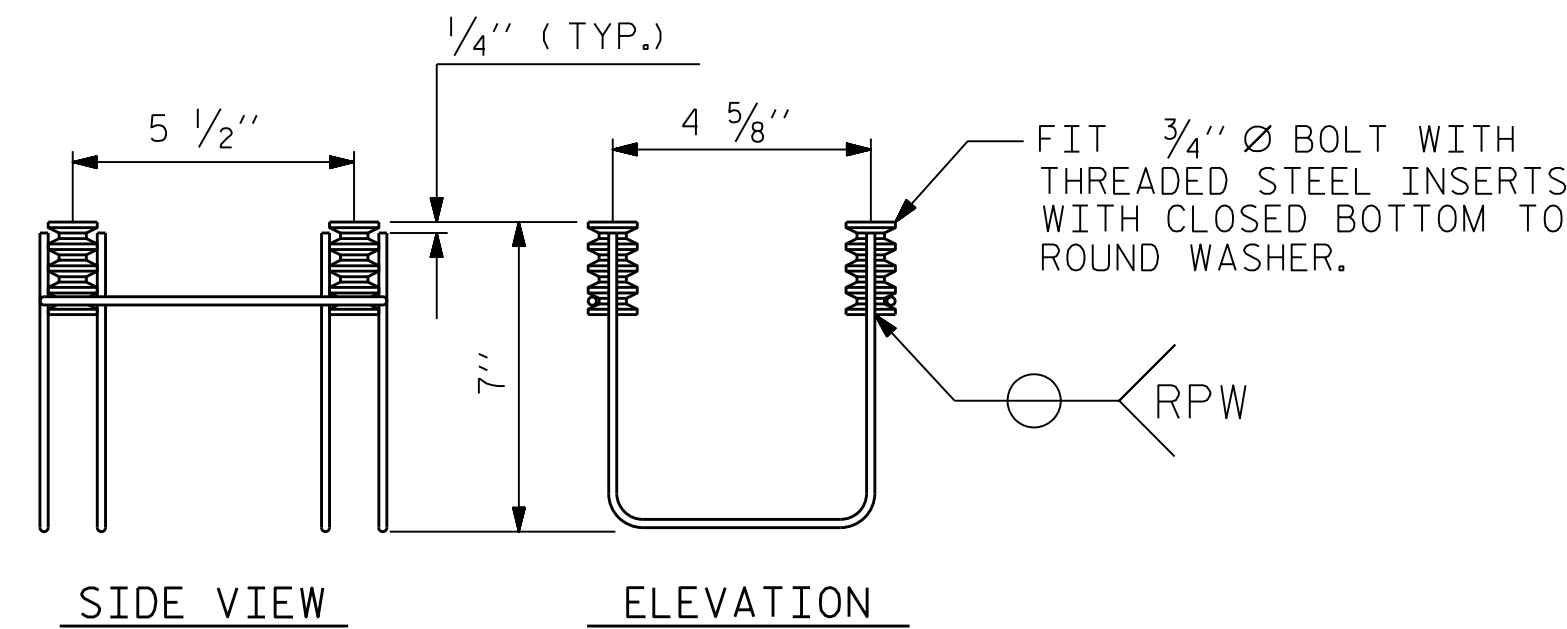
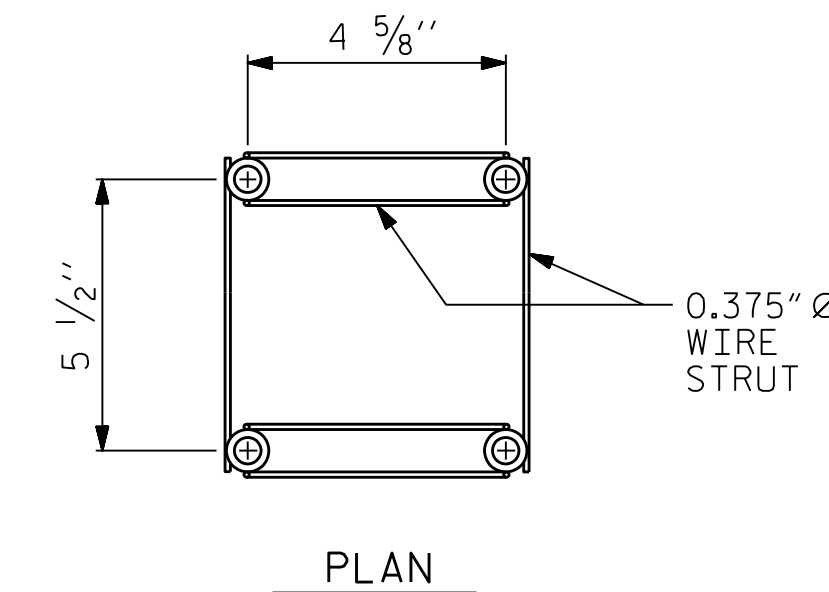
STRUCTURAL CONCRETE ANCHOR ASSEMBLY

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

- A. FERRULES SHALL BE MADE FROM STEEL MEETING THE REQUIREMENTS OF AASHTO M169, GRADE 12L14 AND SHALL HAVE A MINIMUM LENGTH OF THREADS OF 2" FOR 3/4" FERRULES.
- B. 4 - 3/4" Ø X 2 1/2" BOLTS WITH WASHERS. BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307. BOLTS AND WASHERS SHALL BE GALVANIZED. AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLTS AND WASHERS MAY BE USED AS AN ALTERNATE FOR THE 3/4" Ø X 2 1/2" GALVANIZED BOLTS AND WASHERS. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.
- C. WIRE STRUT SHOWN IN THE CONCRETE ANCHOR ASSEMBLY DETAIL IS THE MINIMUM ALLOWABLE SIZE AND SHALL HAVE A MINIMUM TENSILE STRENGTH OF 100,000 PSI. AS AN OPTION, A 1/6" 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.

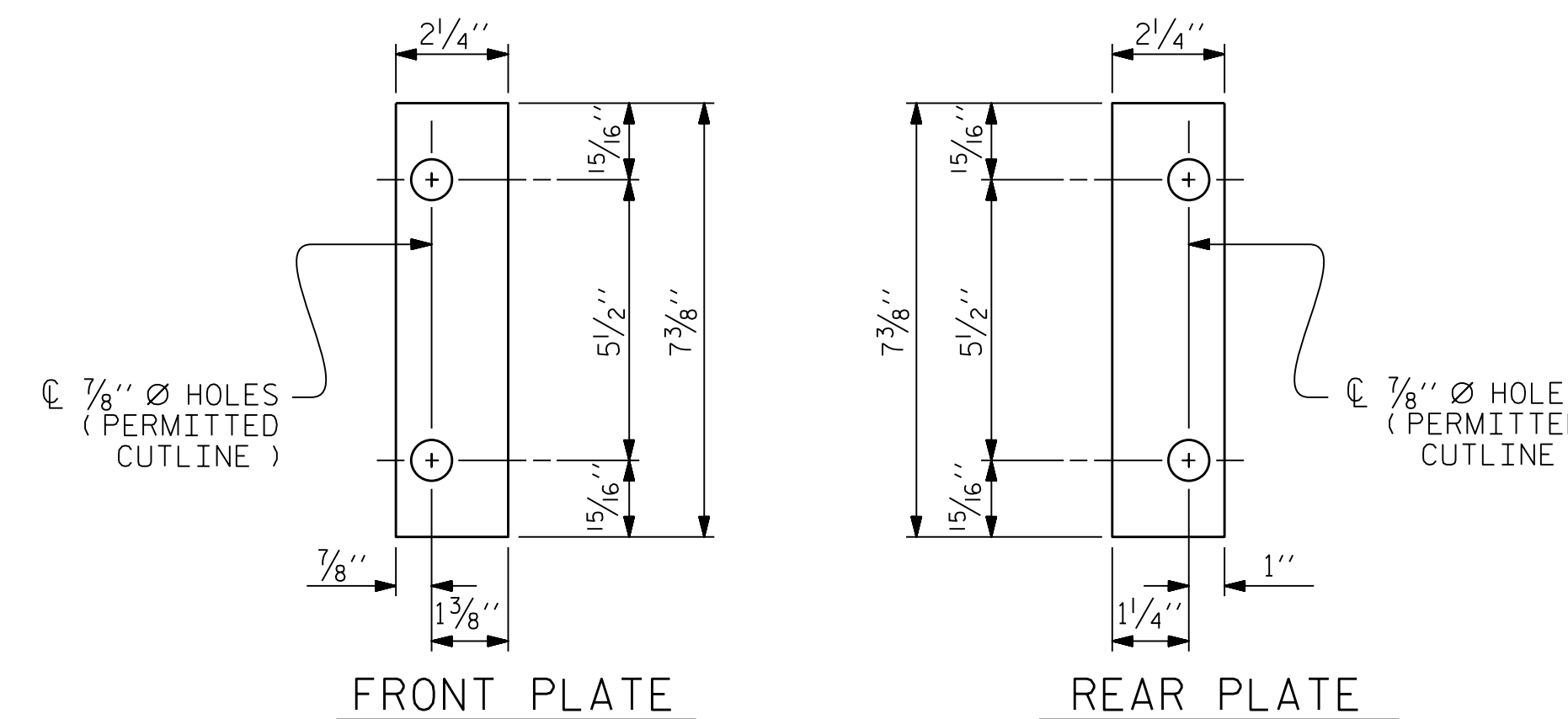
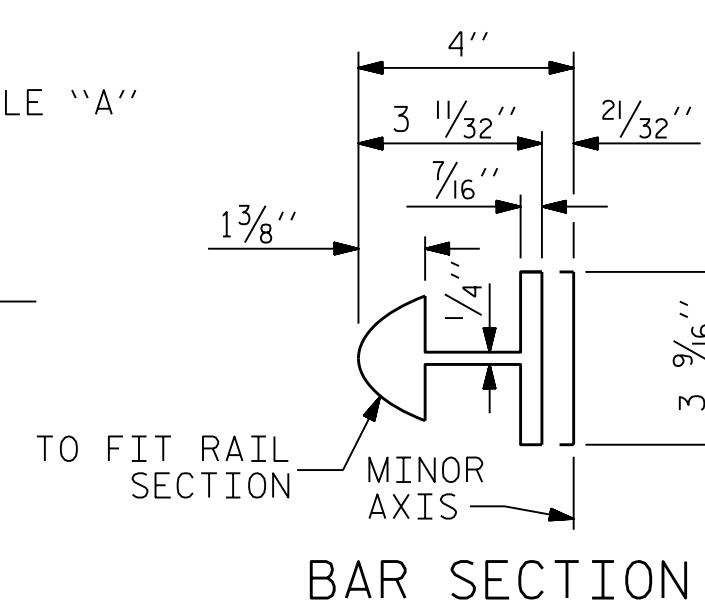
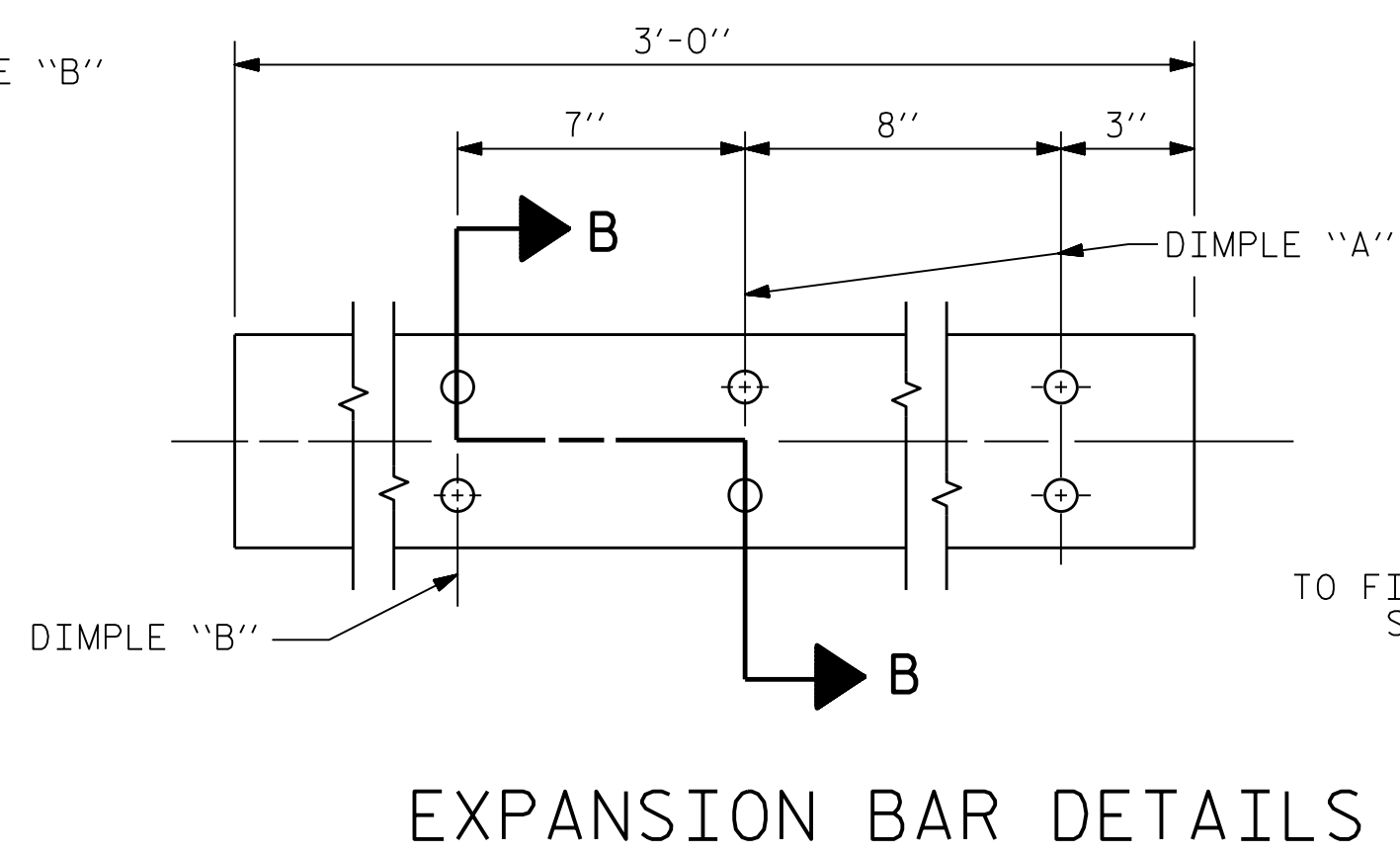
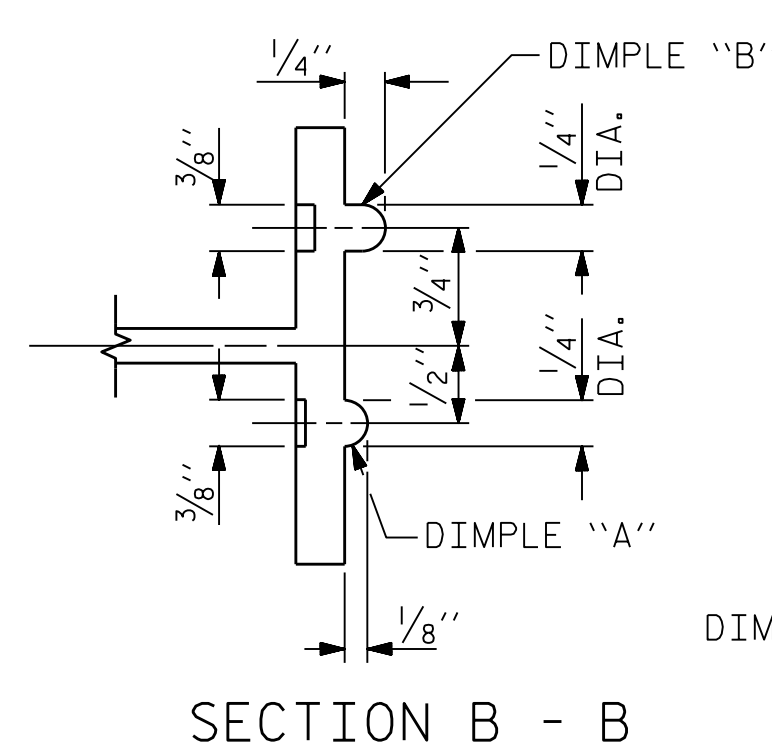
THE CONTRACTOR MAY USE ADHESIVELY ANCHORED ANCHOR BOLTS IN PLACE OF THE METAL RAIL ANCHOR ASSEMBLY. LEVEL ONE FIELD TESTING IS REQUIRED, AND THE YIELD LOAD OF THE 3/4" Ø BOLT IS 10 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE THE STANDARD SPECIFICATIONS.

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.

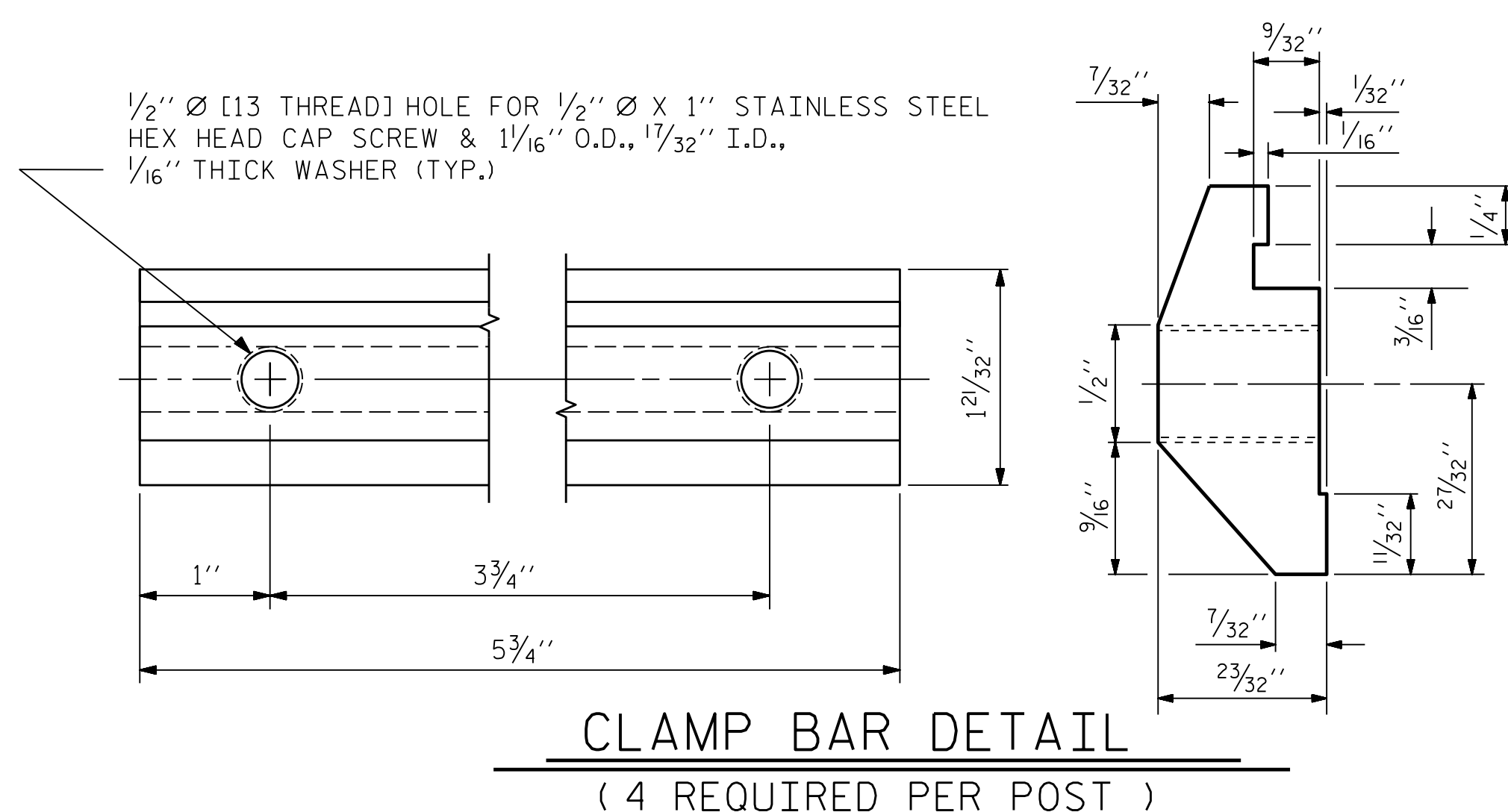
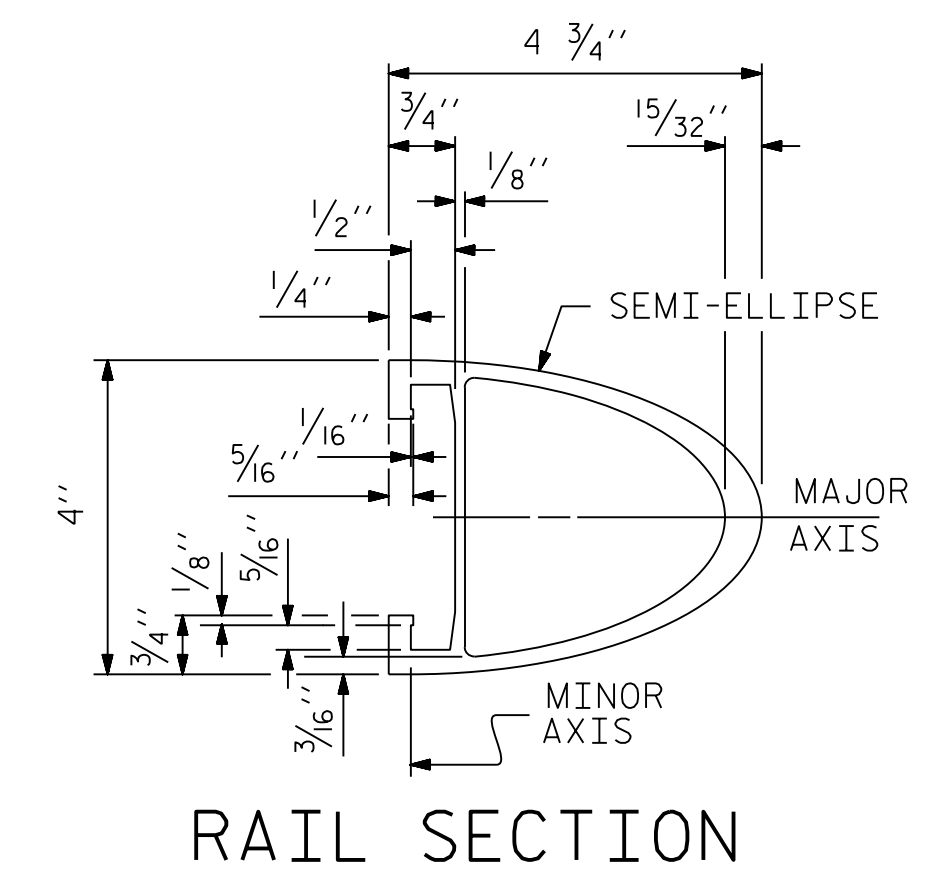


4-BOLT METAL RAIL ANCHOR ASSEMBLY

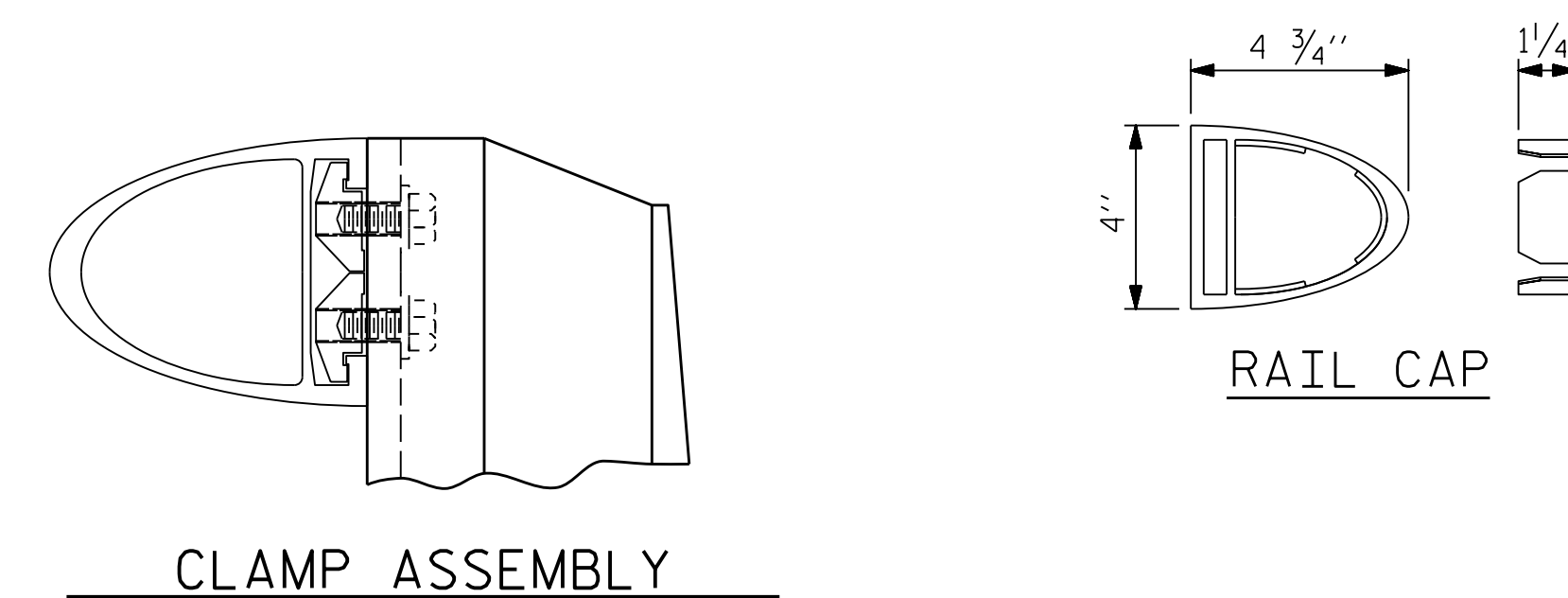
(64 ASSEMBLIES REQUIRED)



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



CLAMP BAR DETAIL
(4 REQUIRED PER POST)



PROJECT NO. B-5161
WAKE COUNTY
STATION: 15+14.00 -L-
SHEET 2 OF 2

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



DocuSigned by:
Kent Dickens
2/13/2018

DES BY: G. MYERS	DATE: 11/17	DWG BY: M. SELLS	DATE: 10/17
DES CHK: K. DICKENS	DATE: 11/17	CHK BY: K. DICKENS	DATE: 12/17



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

TOTAL SHEETS 25

NOTES

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

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

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

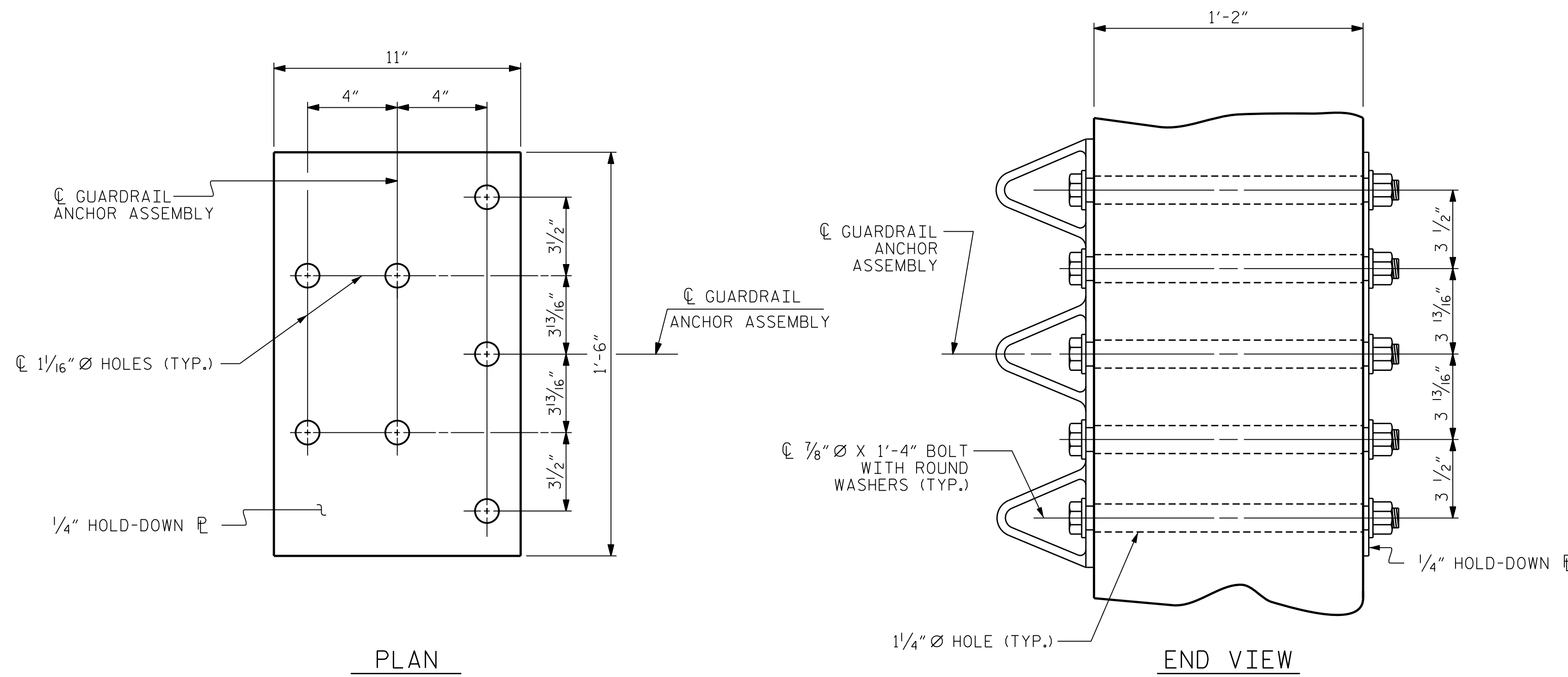
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF THE PARAPET. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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

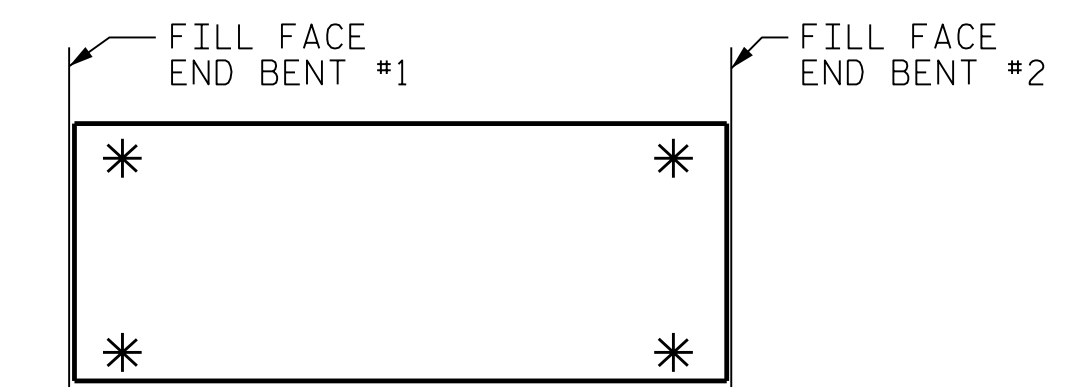
THE COST OF THE GUARDRAIL ANCHOR ASSEMBLIES WITH BOLTS, NUTS AND WASHERS COMPLETE IN PLACE, SHALL BE INCLUDED IN THE VARIOUS PAY ITEMS.

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

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

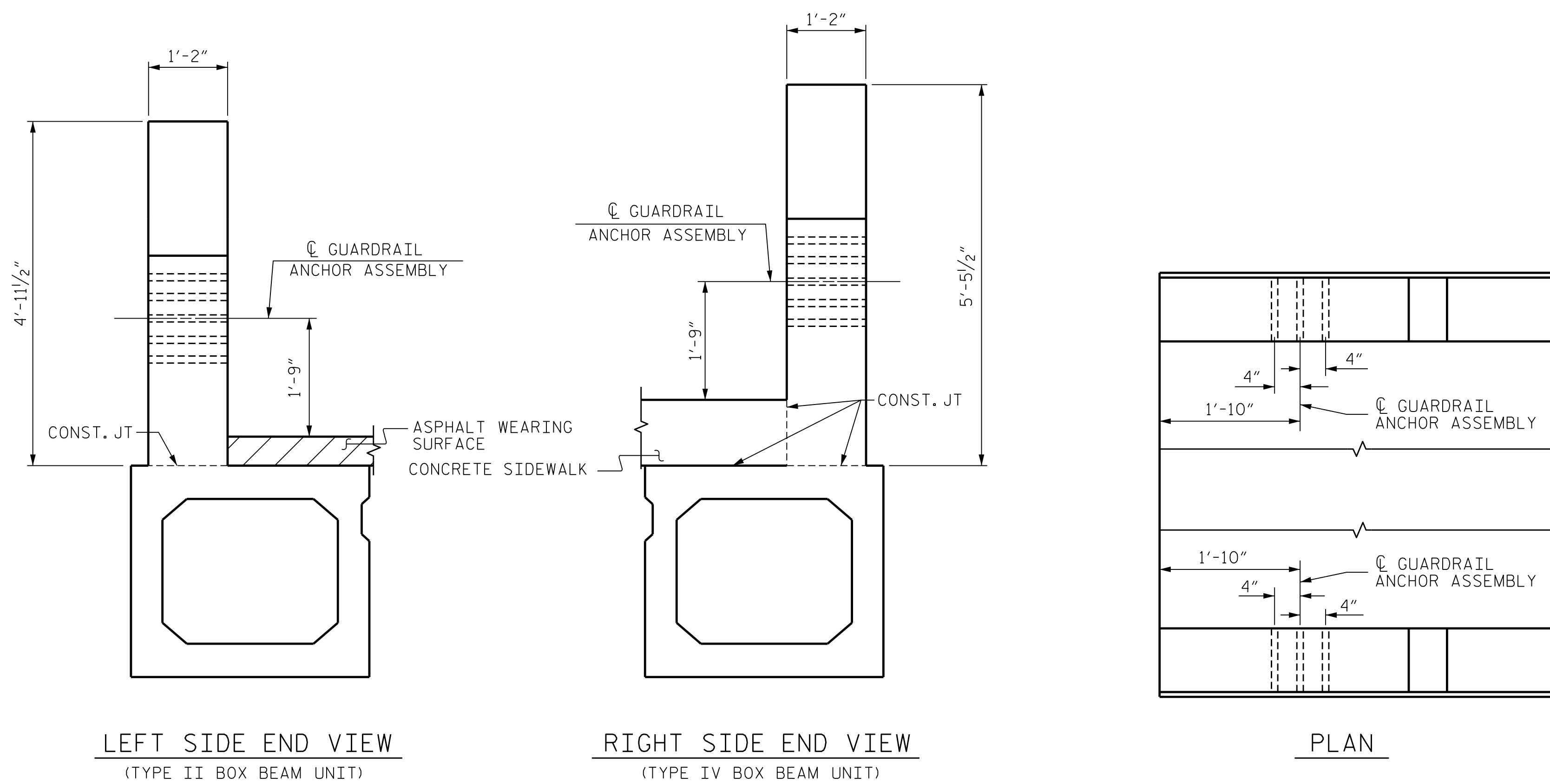


GUARDRAIL ANCHOR ASSEMBLY DETAILS



SKETCH SHOWING POINTS OF ATTACHMENT

* LOCATION OF GUARDRAIL ATTACHMENT



LOCATION OF GUARDRAIL ANCHOR AT END POST

PROJECT NO. B-5161
WAKE COUNTY
 STATION: 15+14.00 -L-



DocuSigned by: *Kent Dickens* 2/13/2018
 BDA22A65385A426

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

REVISIONS						SHEET NO. 5-17 TOTAL SHEETS 25
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			
2			4			

DES BY: G. MYERS DATE: 11/17
 DES CHK: K. DICKENS DATE: 11/17
 DWG BY: M. SELLS DATE: 11/17
 CHK BY: K. DICKENS DATE: 12/17



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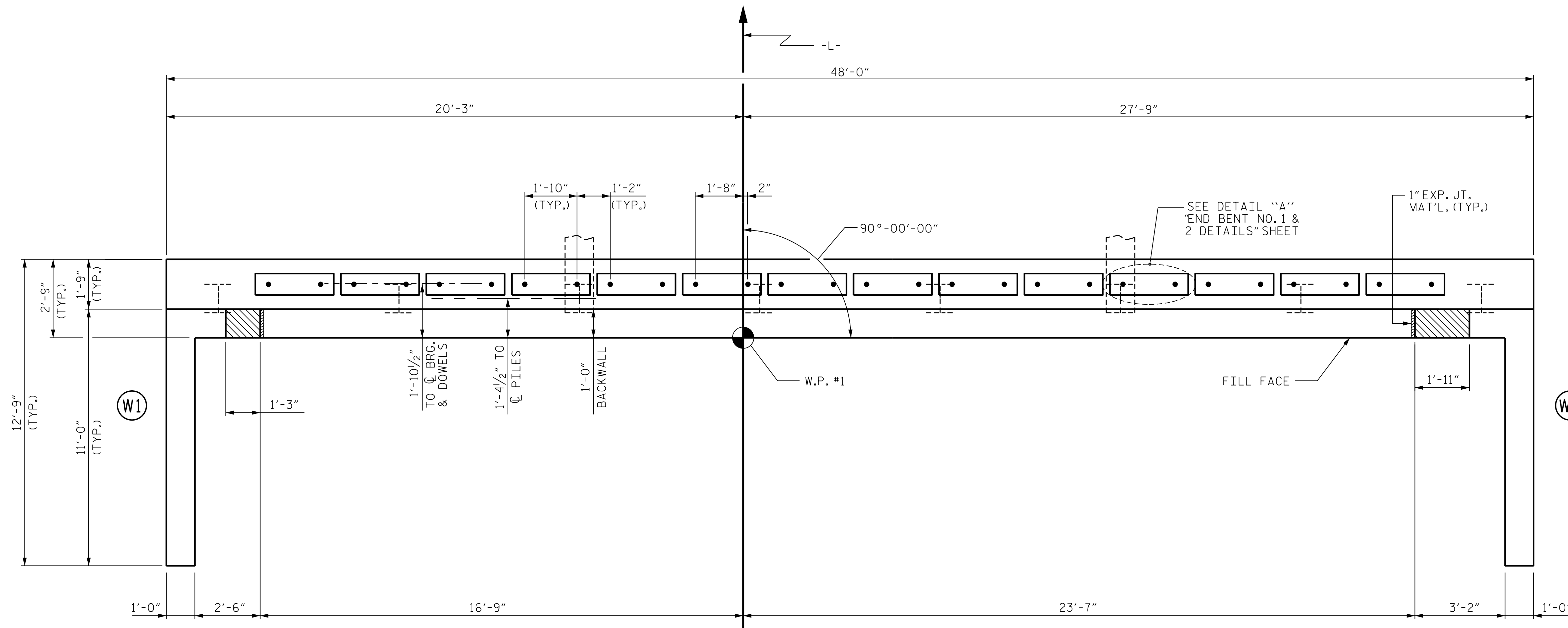
NOTES

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

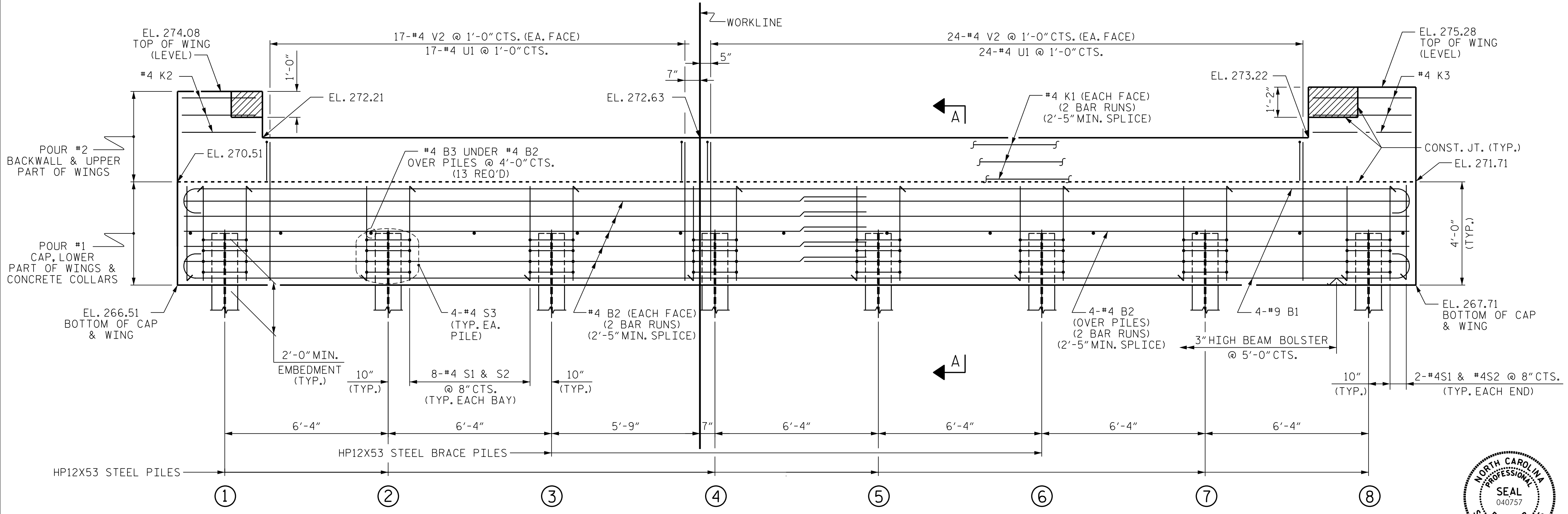
THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE CONCRETE PARAPET IS CAST IF SLIP FORMING IS USED.

FOR PILE SPlice DETAILS, SEE "END BENT NO. 1 & 2 DETAILS" SHEET.

FOR WING DETAILS, SEE "END BENT WING DETAILS" SHEET.



PLAN



ELEVATION

TOP OF PILE ELEVATIONS	
①	268.55
②	268.71
③	268.87
④	269.03
⑤	269.19
⑥	269.35
⑦	269.50
⑧	269.66

0.025 SLOPE

PROJECT NO. B-5161
 WAKE COUNTY
 STATION: 15+14.00 -L-

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

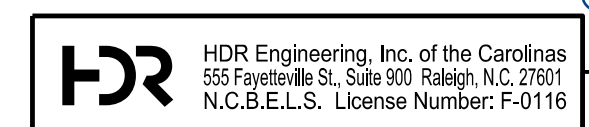
SUBSTRUCTURE
 END BENT No. 1



DocuSigned by: *Kent Dickens* 2/13/2018

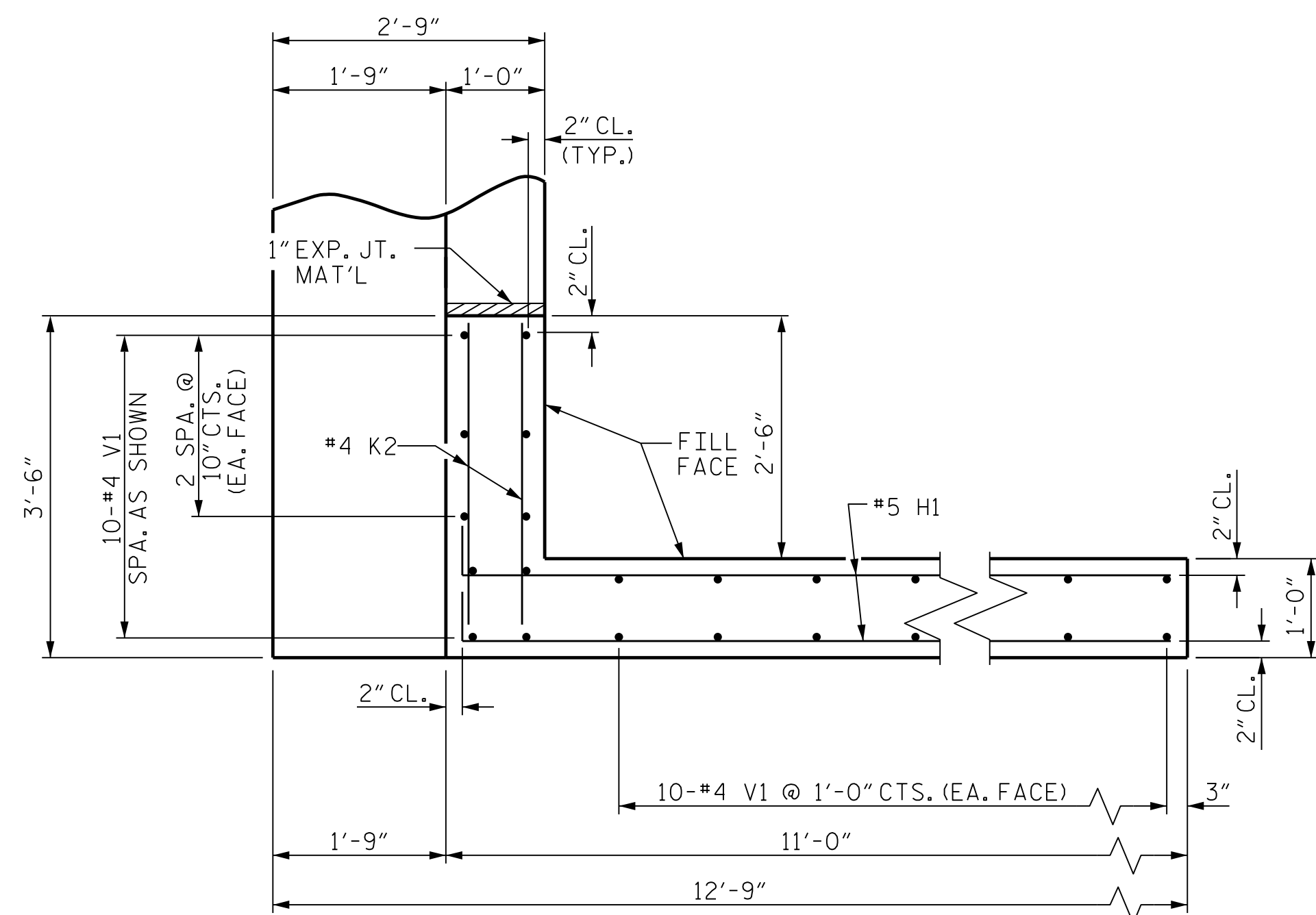
DES BY: G. MYERS DATE: 11/17
 DES CHK: K. DICKENS DATE: 11/17
 DWG BY: M. SELLS DATE: 11/17
 CHK BY: K. DICKENS DATE: 11/17

WINGS NOT SHOWN FOR CLARITY.
 FOR SECTION A-A, SEE "END BENT NO. 1 & 2 DETAILS" SHEET.
 CONCRETE COLLARS FOR STEEL PILES NOT SHOWN IN PLAN AND ELEVATION VIEWS FOR CLARITY.
 SEE "CORROSION PROTECTION FOR STEEL PILES DETAIL", "END BENT NO. 1 & 2 DETAILS" SHEET.



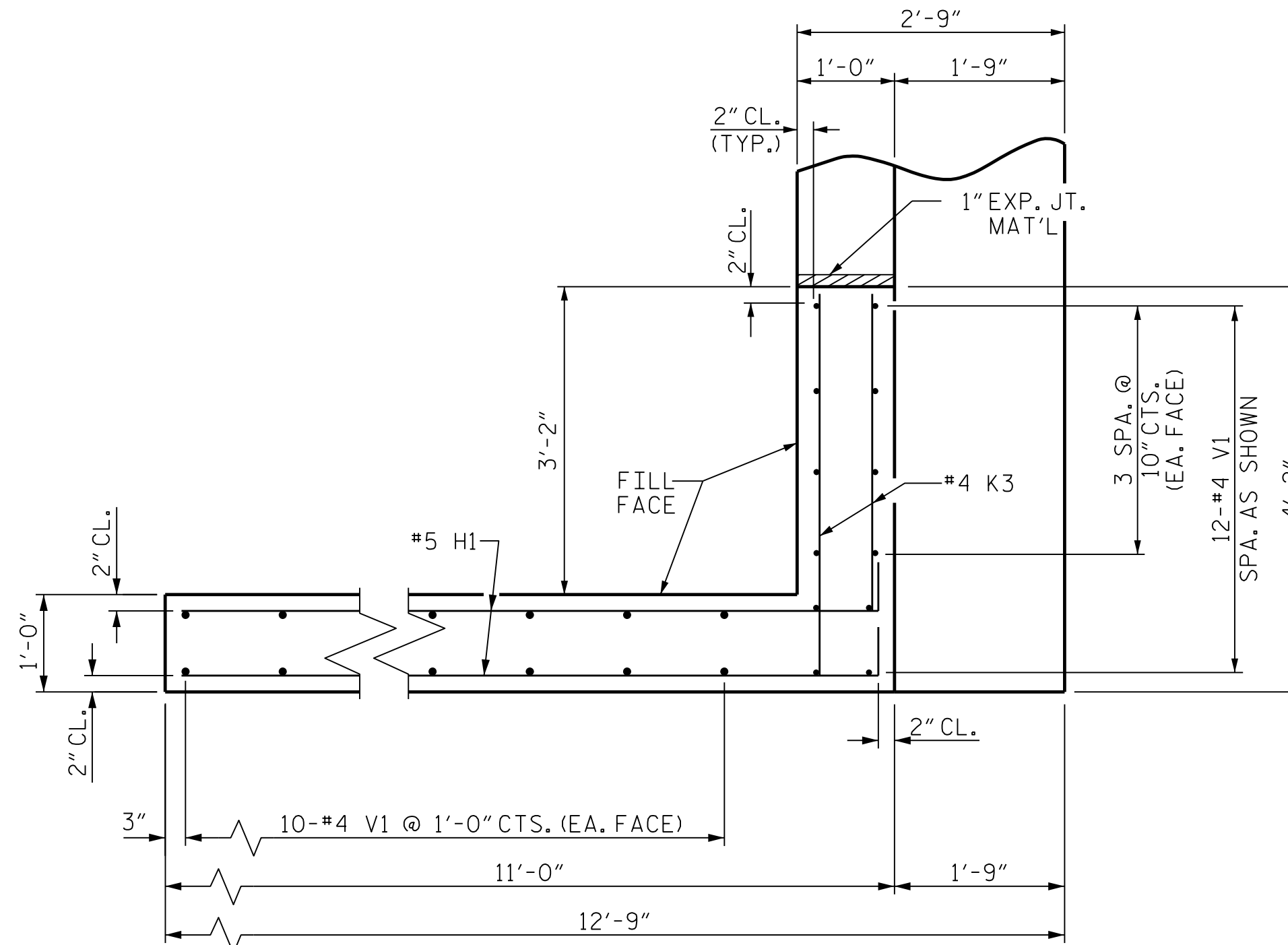
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REVISIONS						SHEET NO. 5-18 TOTAL SHEETS 25
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			
2			4			



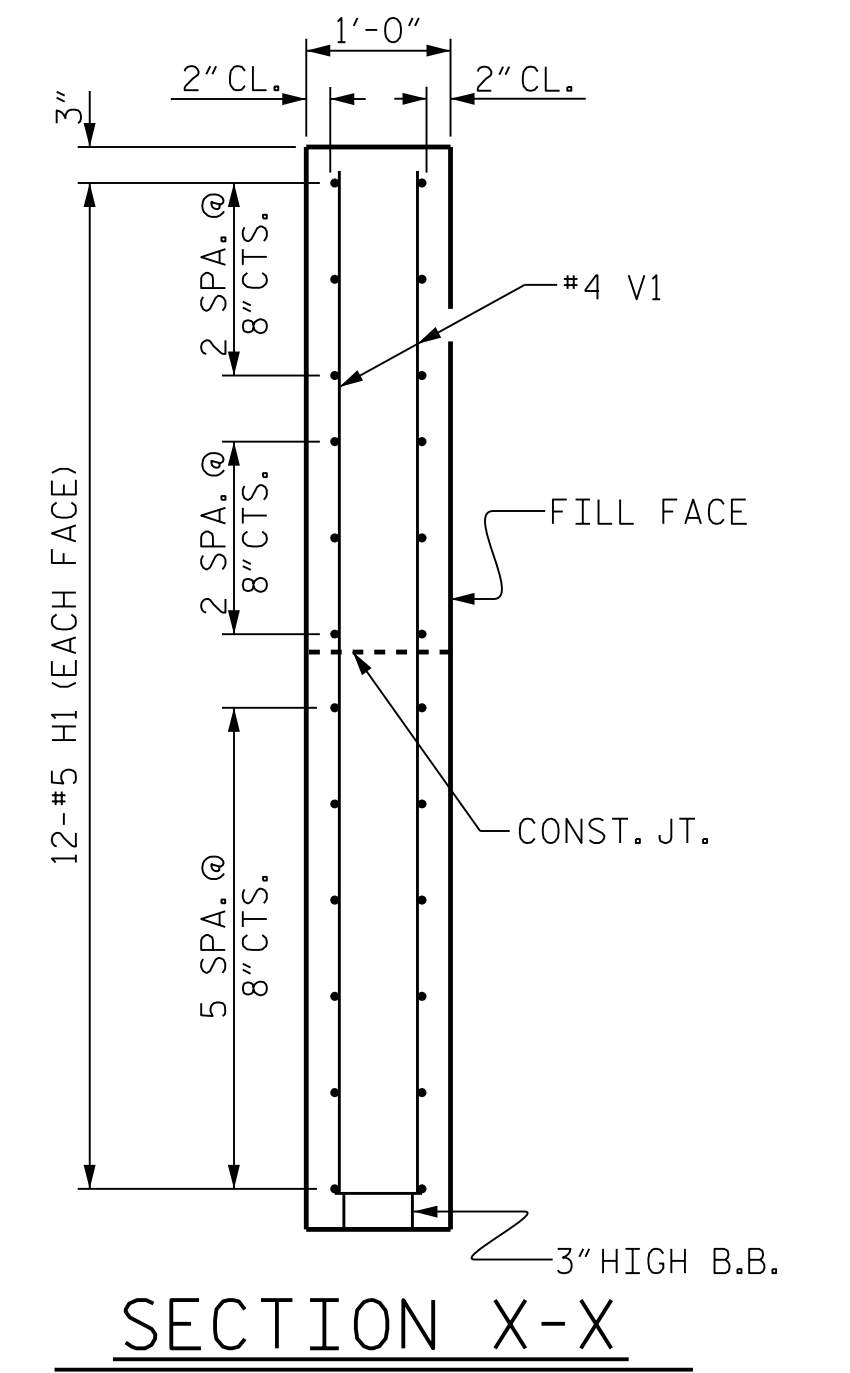
PLAN OF WING (W1)

WING 1 AT END BENT 1 SHOWN. WING 1 AT END BENT 2 SIMILAR.

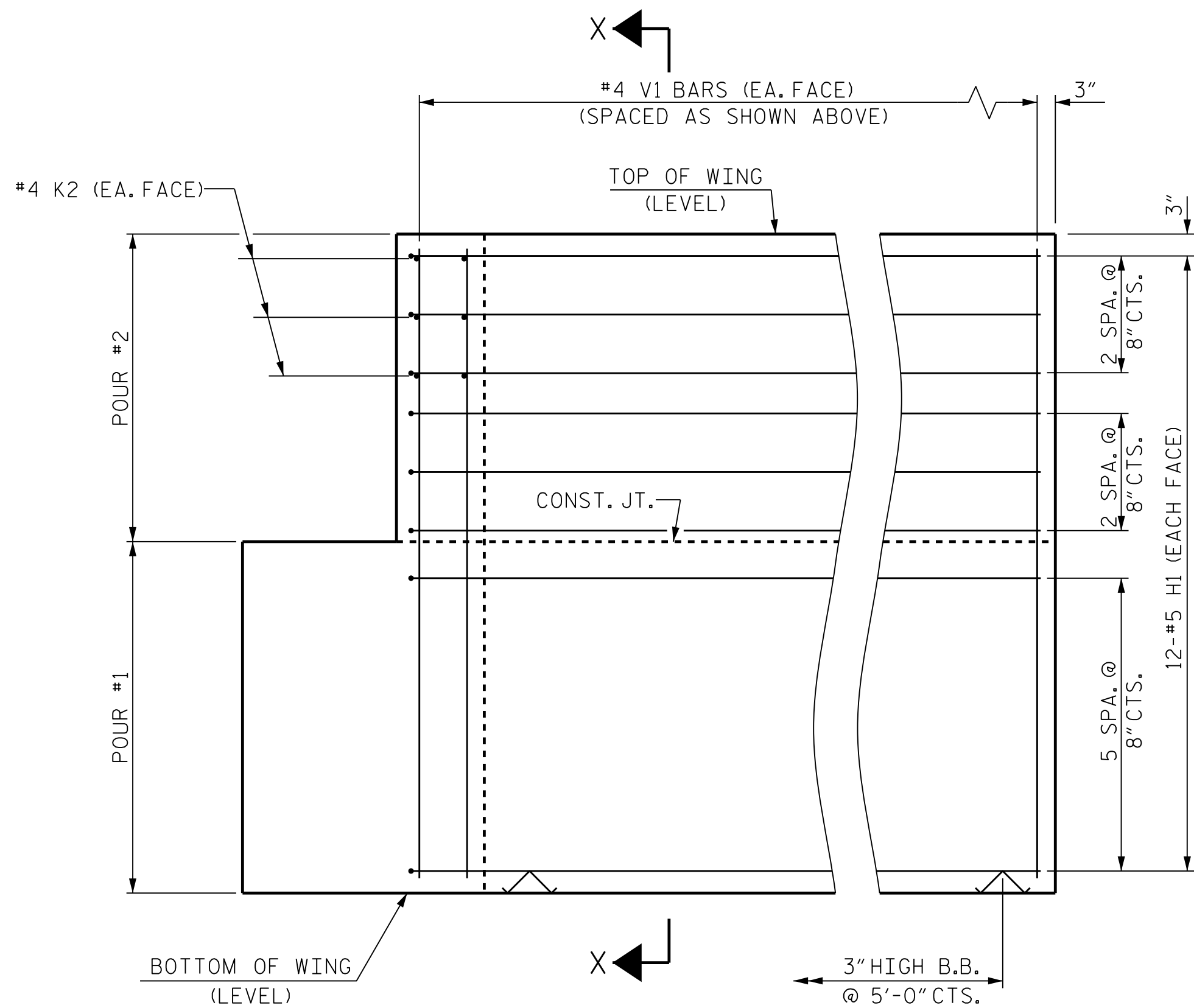


PLAN OF WING (W2)

WING 2 AT END BENT 1 SHOWN. WING 2 AT END BENT 2 SIMILAR.

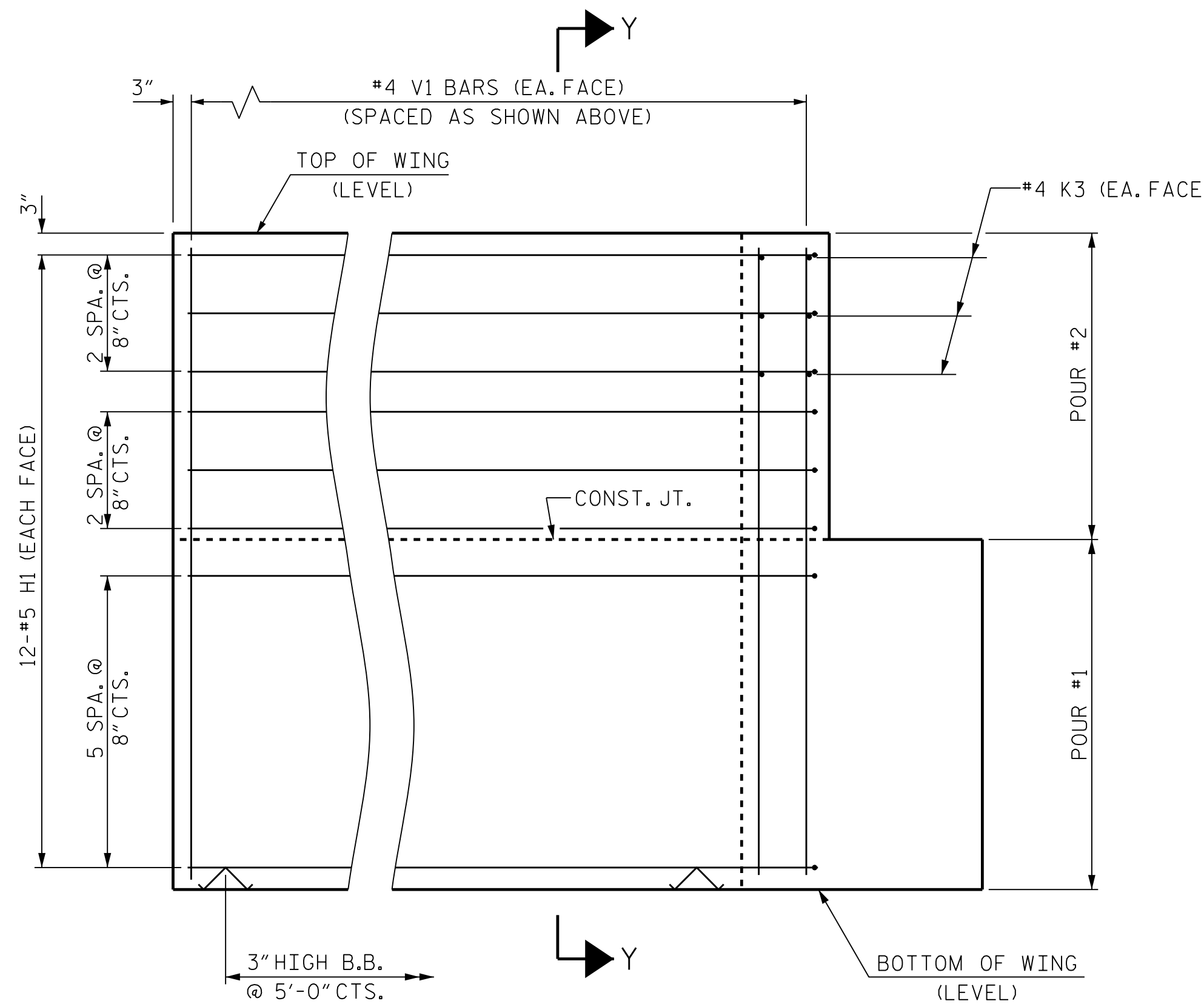


SECTION X-X



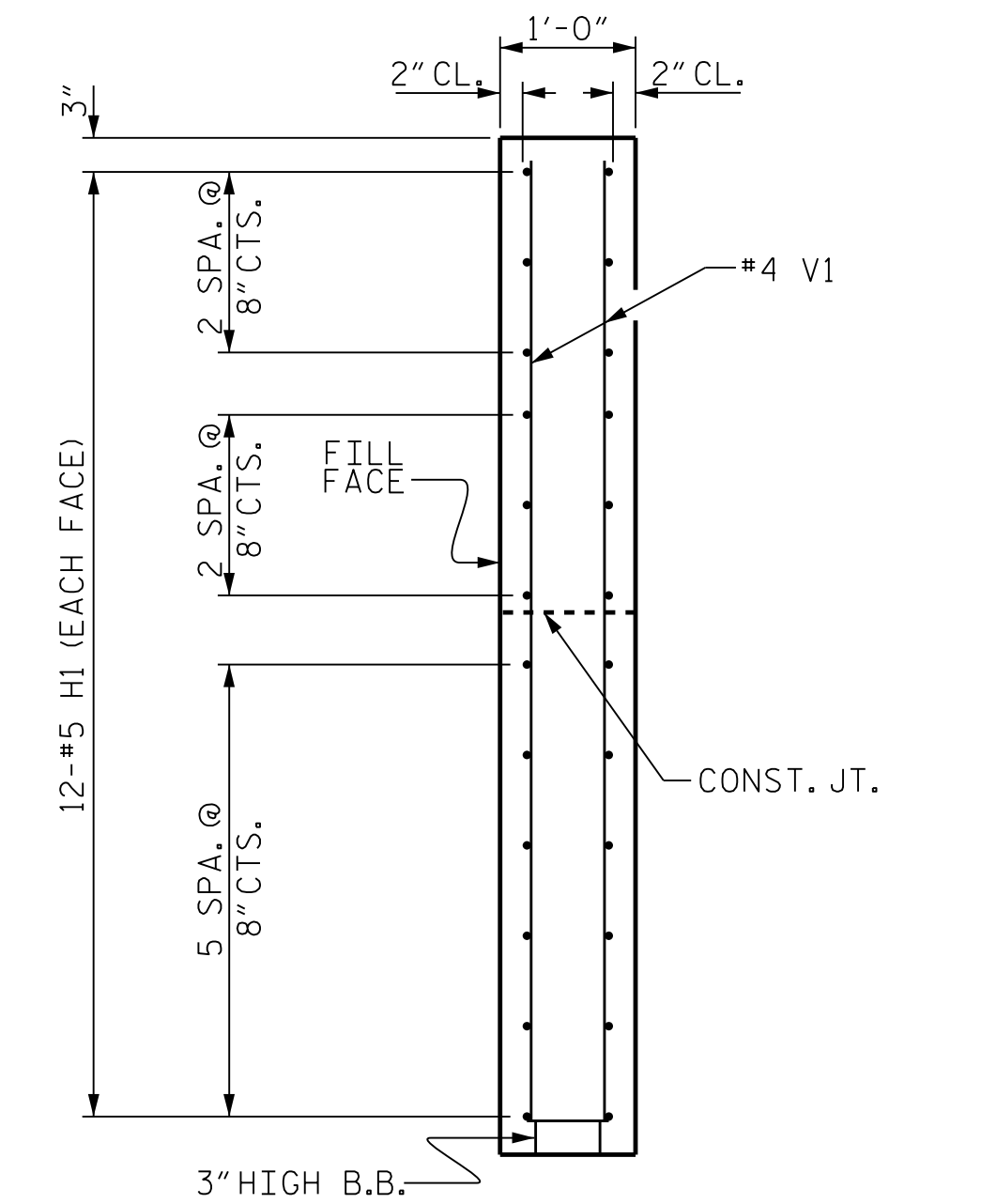
ELEVATION OF WING (W1)

WING 1 AT END BENT 1 SHOWN. WING 1 AT END BENT 2 SIMILAR.



ELEVATION OF WING (W2)

WING 2 AT END BENT 1 SHOWN. WING 2 AT END BENT 2 SIMILAR.



SECTION Y-Y

PROJECT NO. B-5161
WAKE COUNTY
 STATION: 15+14.00 -L-



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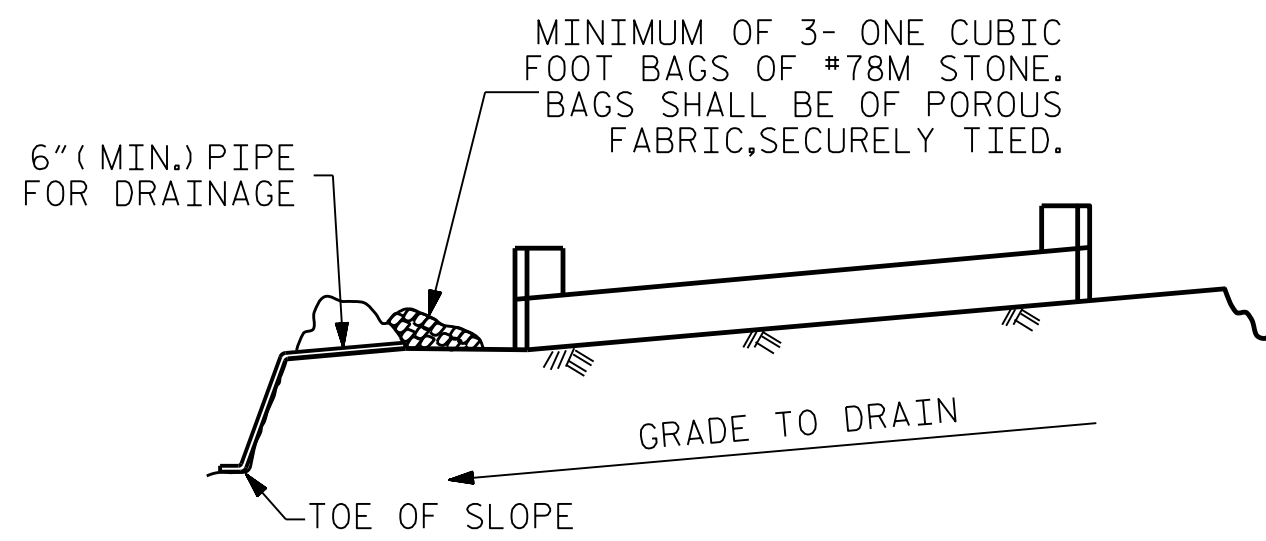
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
SUBSTRUCTURE END BENT WING DETAILS					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
					SHEET NO. 5-19 TOTAL SHEETS 25

DES BY: <u>G. MYERS</u>	DATE: <u>11/17</u>	DWG BY: <u>M. SELLS</u>	DATE: <u>11/17</u>
DES CHK: <u>K. DICKENS</u>	DATE: <u>11/17</u>	CHK BY: <u>K. DICKENS</u>	DATE: <u>11/17</u>

HDR HDR Engineering, Inc. of the Carolinas
 555 Fayetteville St., Suite 900 Raleigh, N.C. 27601
 N.C.B.E.L.S. License Number: F-0116

**DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED**

*****SYSTEMS*****
 *****DCN*****
 *****USERNAME*****

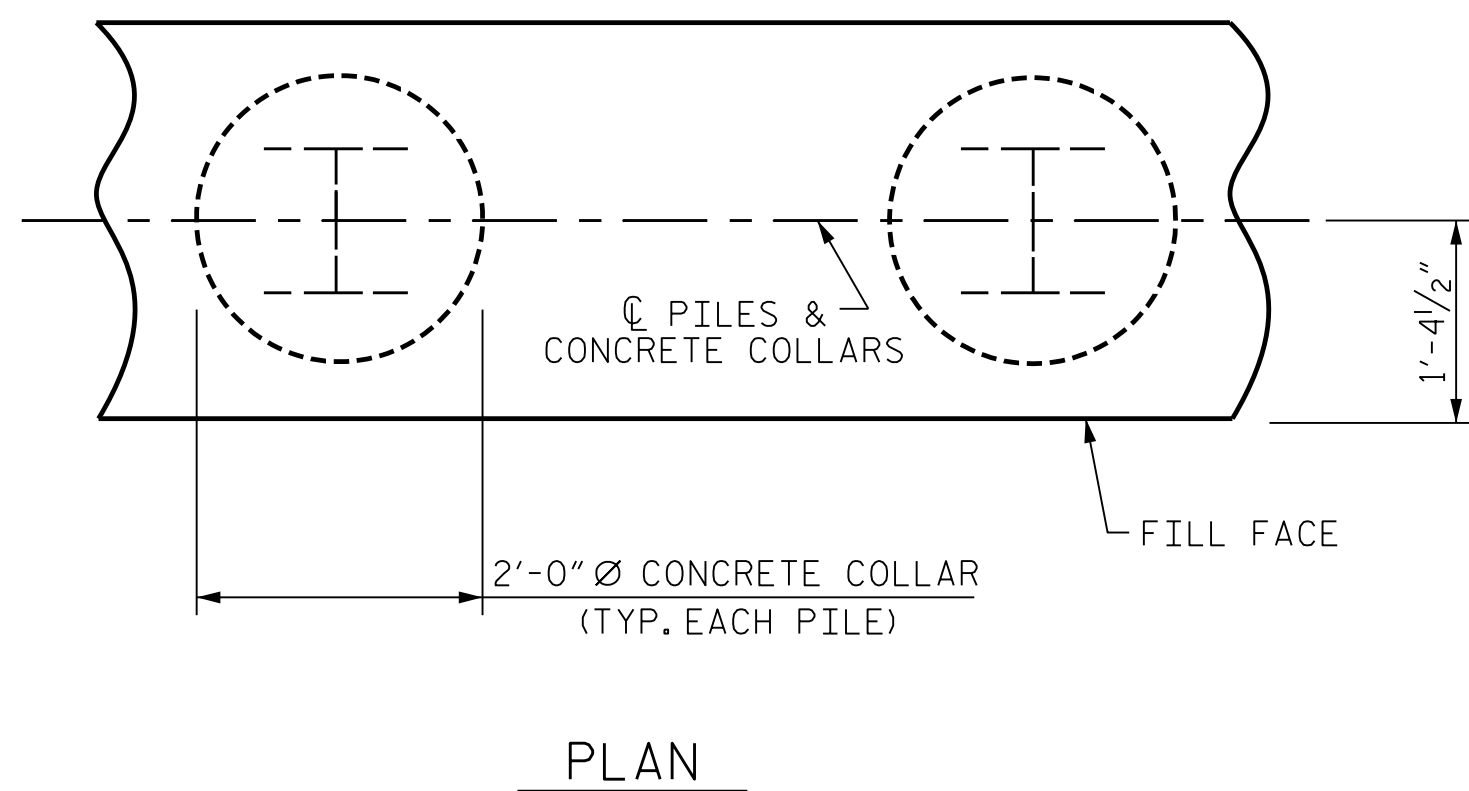
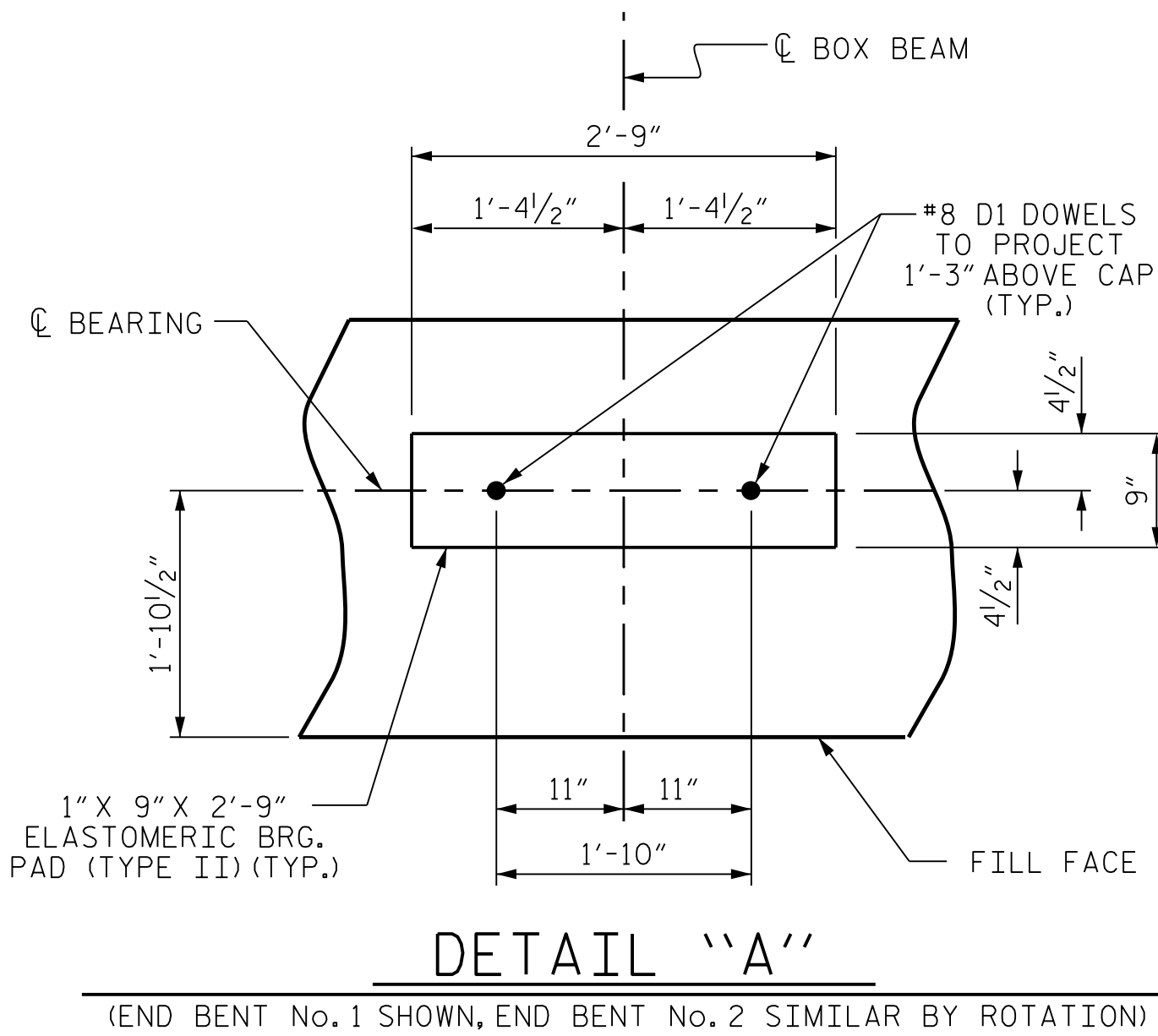


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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.

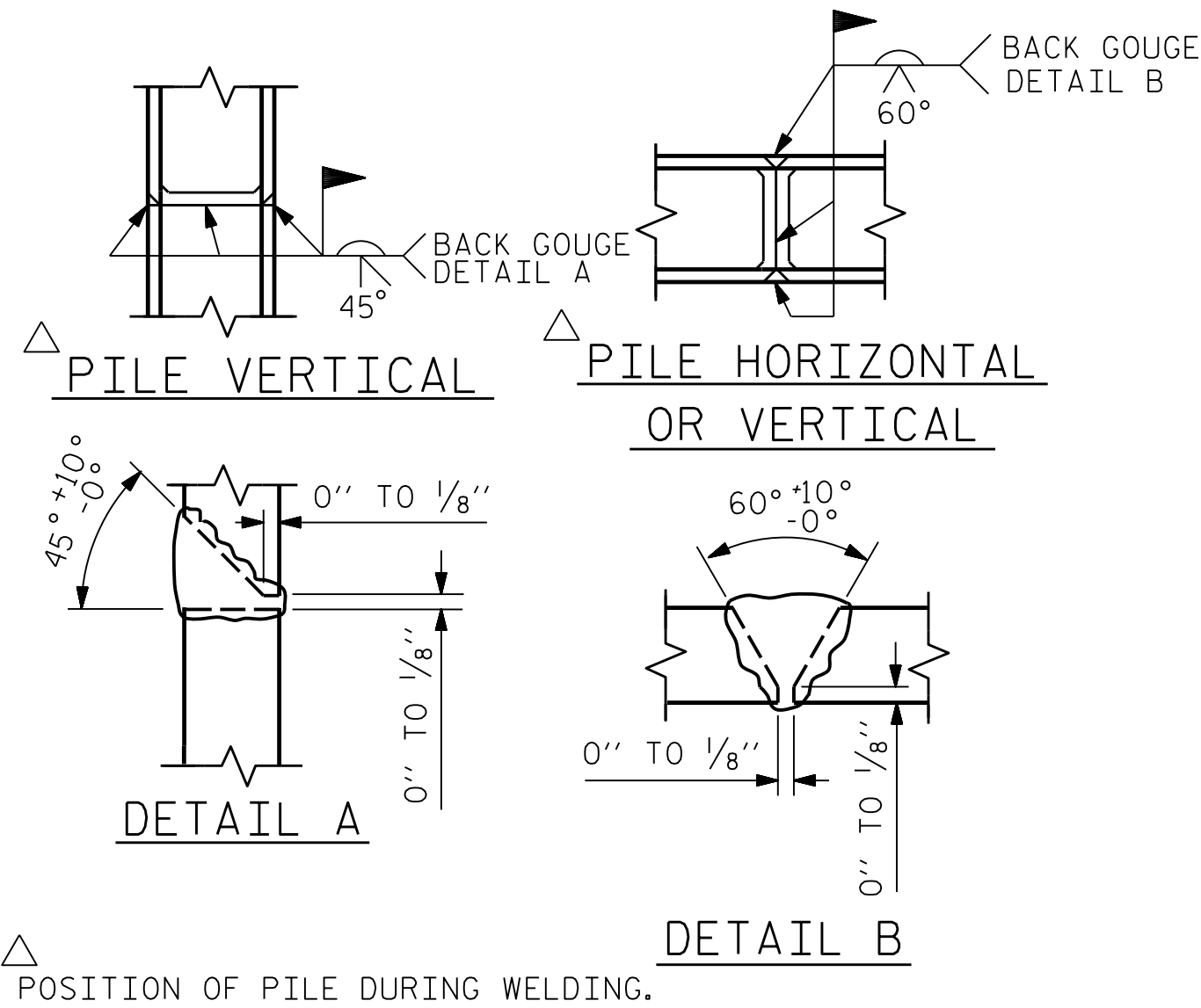
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

TEMPORARY DRAINAGE AT END BENT

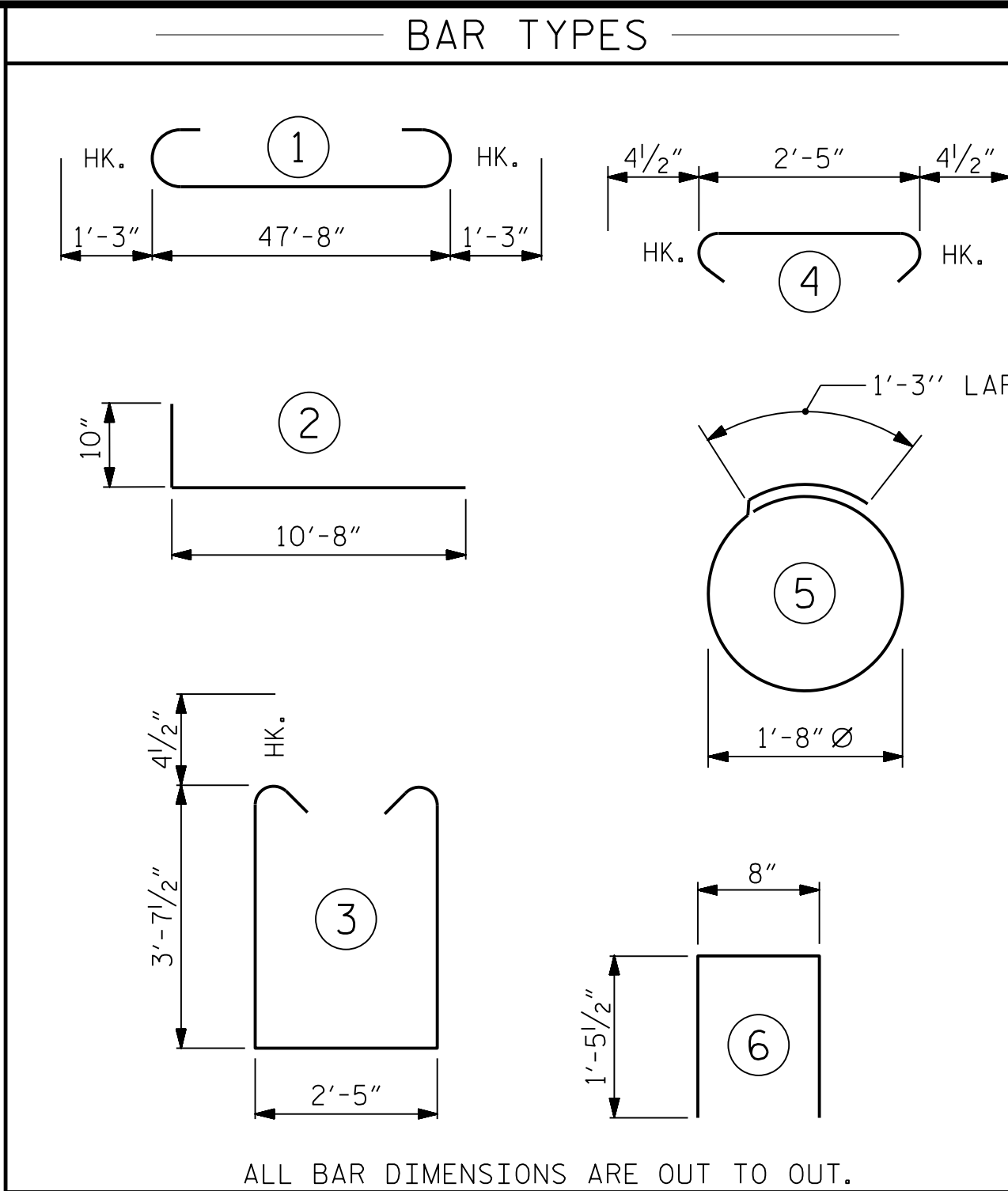


CORROSION PROTECTION FOR STEEL PILES DETAIL

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



PILE SPLICE DETAILS



END BENT No. 1 HP 12 X 53 STEEL PILES NO: 8 LIN. FT.= 96.0	END BENT No. 2 HP 12 X 53 STEEL PILES NO: 8 LIN. FT.= 176.0
PILE DRIVING EQUIPMENT SETUP FOR HP 12 X 53 STEEL PILES NO: 8	PILE DRIVING EQUIPMENT SETUP FOR HP 12 X 53 STEEL PILES NO: 8
STEEL PILE POINTS NO: 8	STEEL PILE POINTS NO: 8

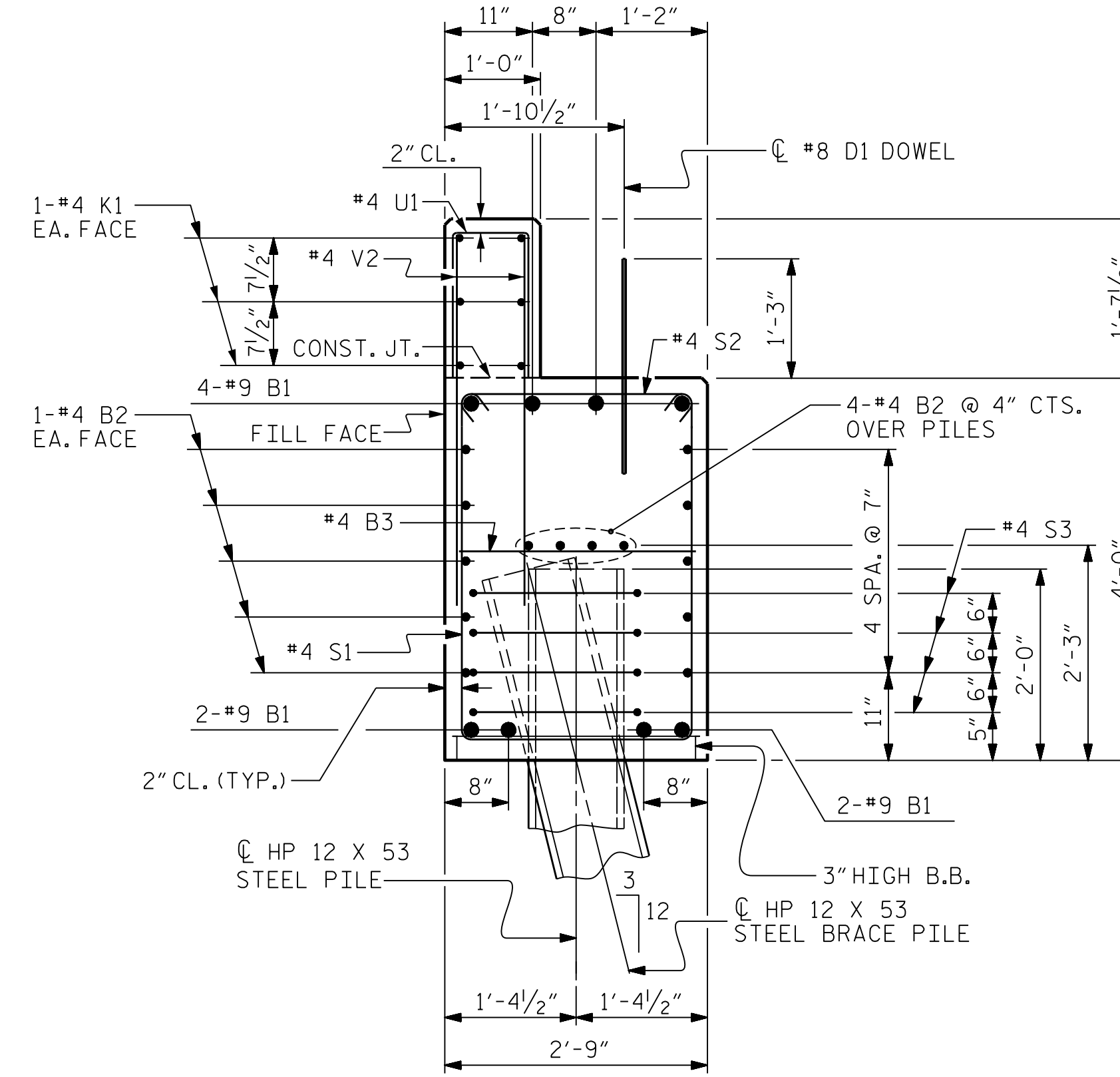
BILL OF MATERIAL FOR ONE END BENT

BAR NO.	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#9	1	50'-2"	1365
B2	28	#4	STR	25'-1"	470
B3	13	#4	STR	2'-5"	21
D1	28	#8	STR	2'-3"	169
H1	48	#5	2	11'-6"	576
K1	12	#4	STR	25'-1"	202
K2	6	#4	STR	3'-2"	13
K3	6	#4	STR	3'-10"	16
S1	60	#4	3	10'-5"	418
S2	60	#4	4	3'-2"	127
S3	32	#4	5	6'-6"	139
U1	41	#4	6	3'-7"	99
V1	62	#4	STR	7'-1"	294
V2	82	#4	STR	5'-3"	288

REINFORCING STEEL (FOR ONE END BENT) LBS. 4197

CLASS A CONCRETE BREAKDOWN (FOR ONE END BENT)

POUR #1 CAP, LOWER PART OF WINGS & COLLARS	C.Y. 23.9
POUR #2 BACKWALL & UPPER PART OF WINGS	C.Y. 6.1
TOTAL CLASS A CONCRETE	C.Y. 30.0



SECTION A-A

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

PROJECT NO. B-5161
 WAKE COUNTY
 STATION: 15+14.00 -L-



DocuSigned by: Kent Dickens 2/13/2018

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

SUBSTRUCTURE

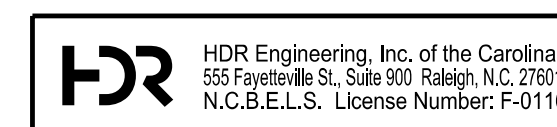
END BENT No. 1 & 2

DETAILS

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

SHEET NO. S-20
 TOTAL SHEETS 25

DES BY: G. MYERS DATE: 11/17
 DES CHK: K. DICKENS DATE: 11/17
 DWG BY: M. SELLS DATE: 11/17
 CHK BY: K. DICKENS DATE: 11/17



DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

*****SYSTEMS*****
 *****DGN*****
 *****USERNAME*****

NOTES

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

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

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

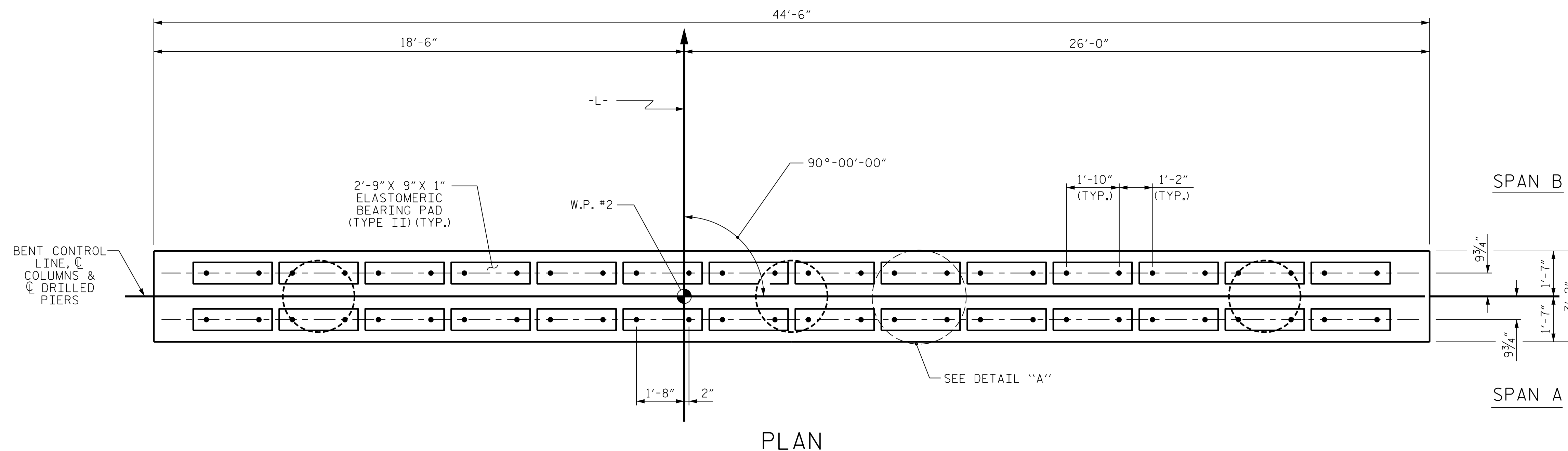
ALL STEEL IN THE DRILLED PIERS IS INCLUDED IN THE PAY ITEMS FOR "REINFORCING STEEL" AND "SPIRAL COLUMN REINFORCING STEEL."

▲ INVERT ALTERNATE STIRRUPS.

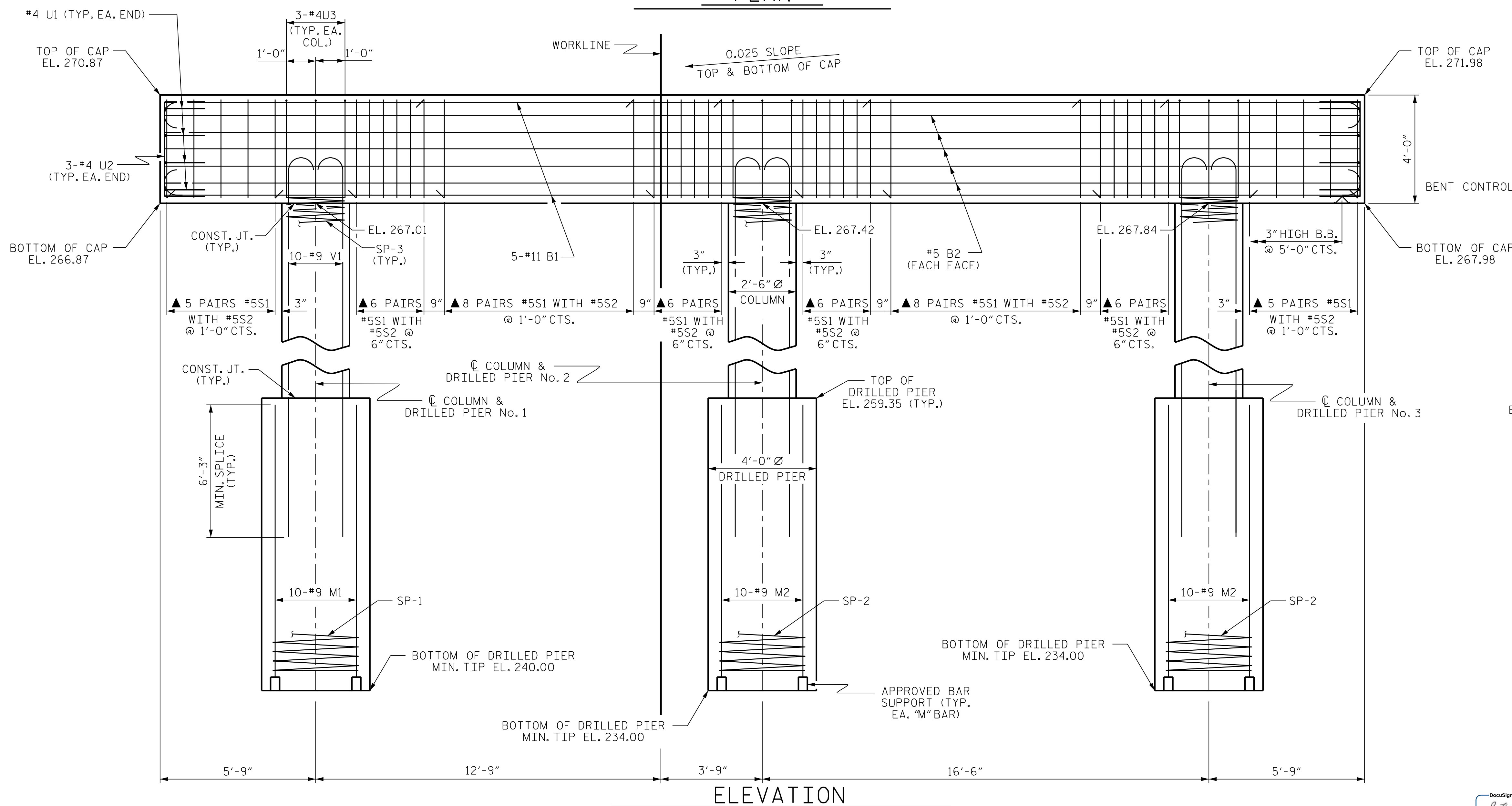
THE LOCATION OF THE CONSTRUCTION JOINT IN THE DRILLED PIERS IS BASED ON AN APPROXIMATE GROUND LINE ELEVATION. IF THE CONSTRUCTION JOINT IS ABOVE THE ACTUAL GROUND LINE ELEVATION, THE CONTRACTOR SHALL PLACE THE CONSTRUCTION JOINT ONE FOOT BELOW THE GROUND LINE.

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

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

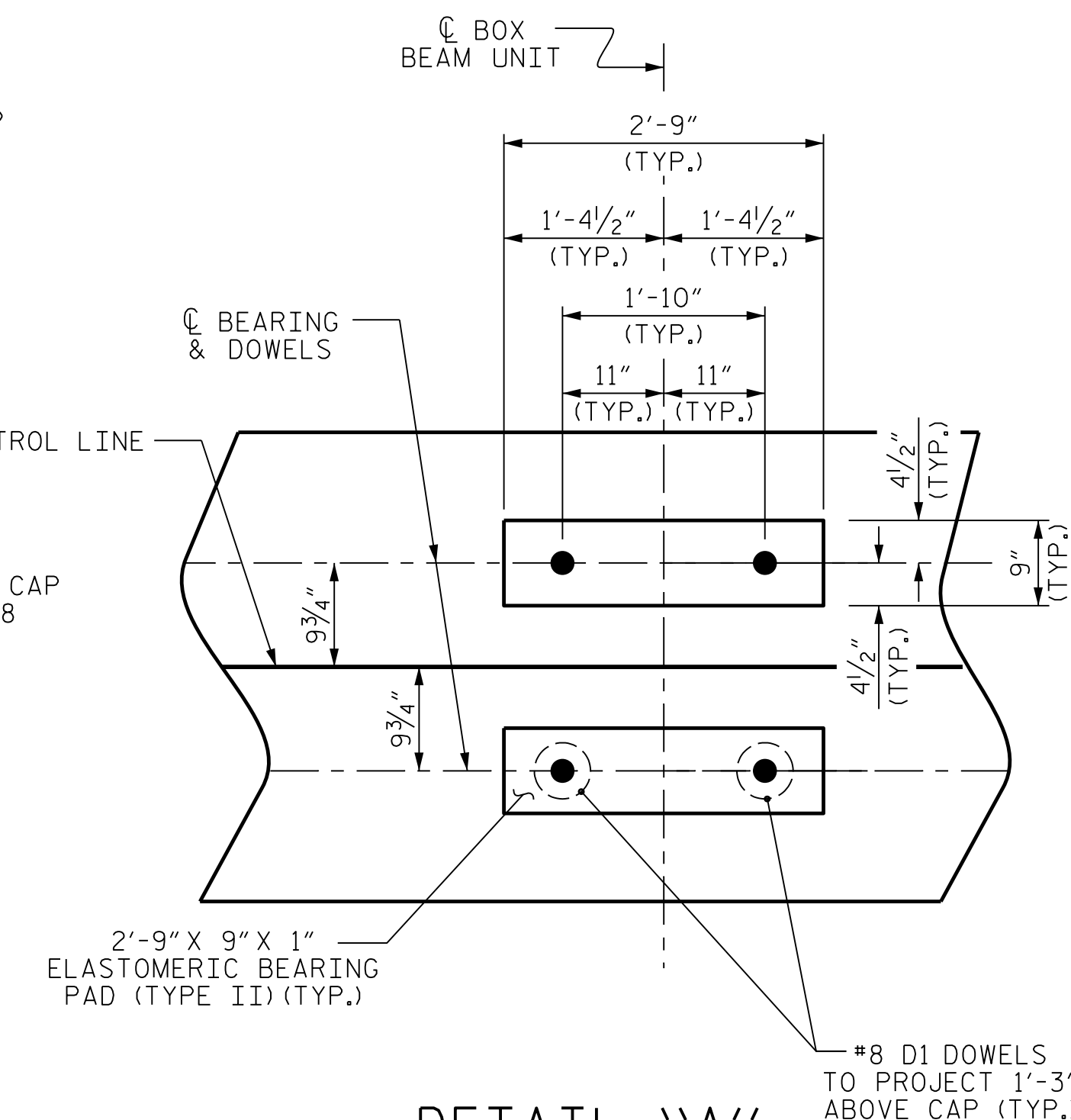


PLAN



ELEVATION

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



DETAIL "A"

(DIMENSIONS ARE TYPICAL EACH BEARING)

PROJECT NO. B-5161

WAKE COUNTY

STATION: 15+14.00 -L-

SHEET 1 OF 2

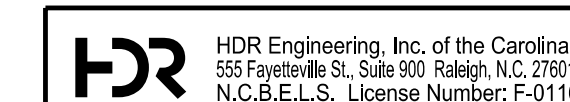


DocuSigned by: *Kent Dickens* 2/13/2018

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
BENT No. 1

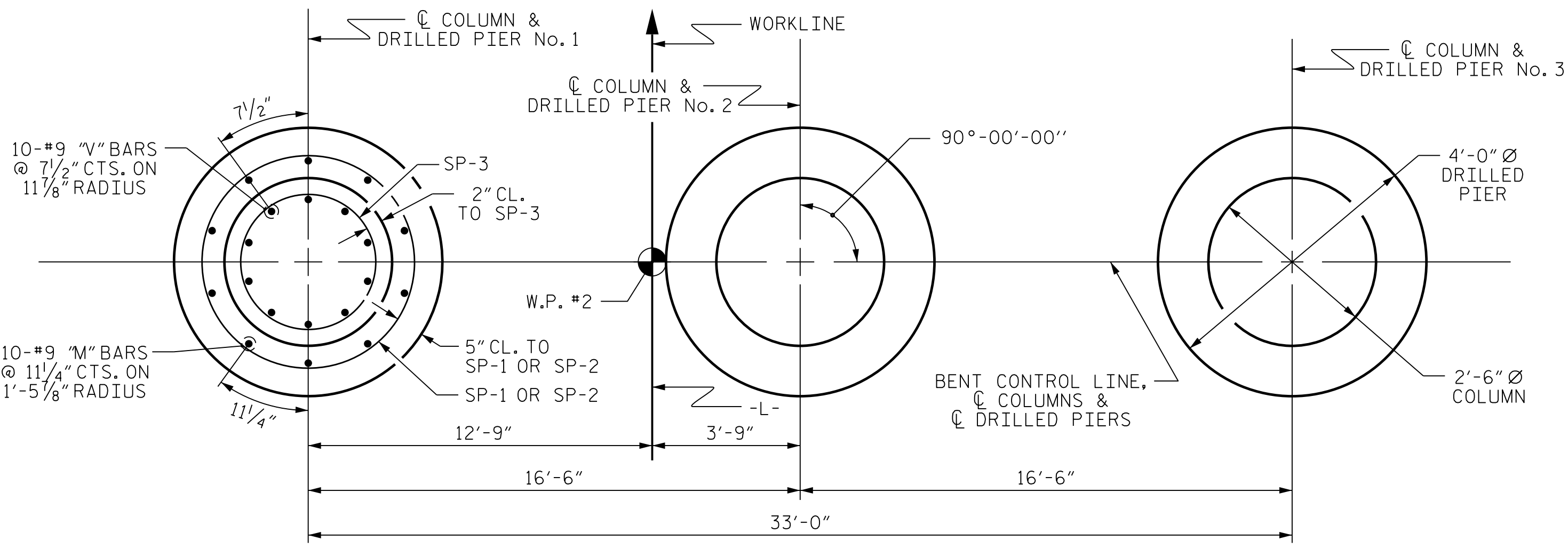
DES BY: G. MYERS	DATE: 10/17	DWG BY: M. SELLS	DATE: 11/17
DES CHK: K. DICKENS	DATE: 11/17	CHK BY: K. DICKENS	DATE: 11/17



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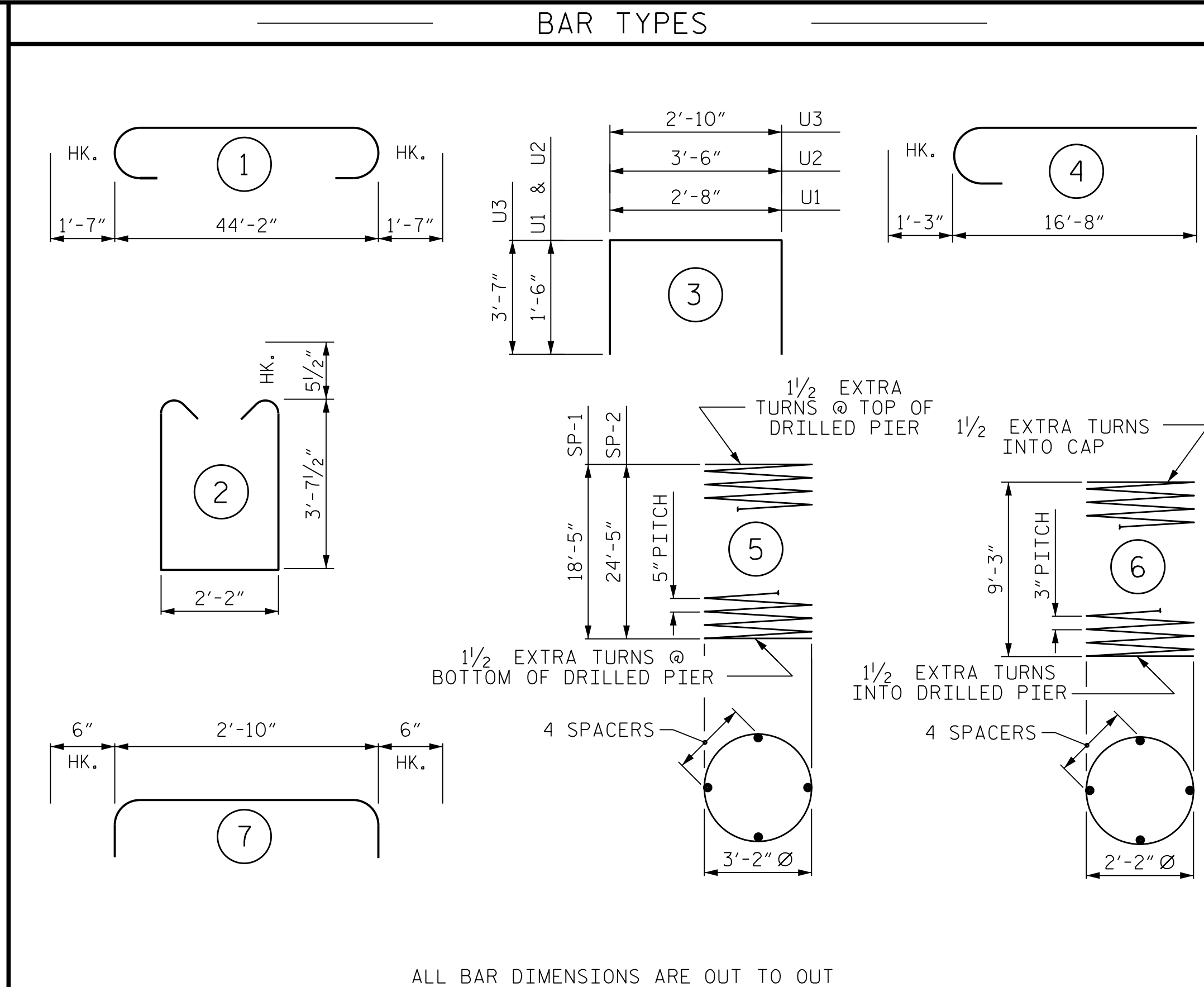
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

SHEET NO. 5-21
TOTAL SHEETS 25



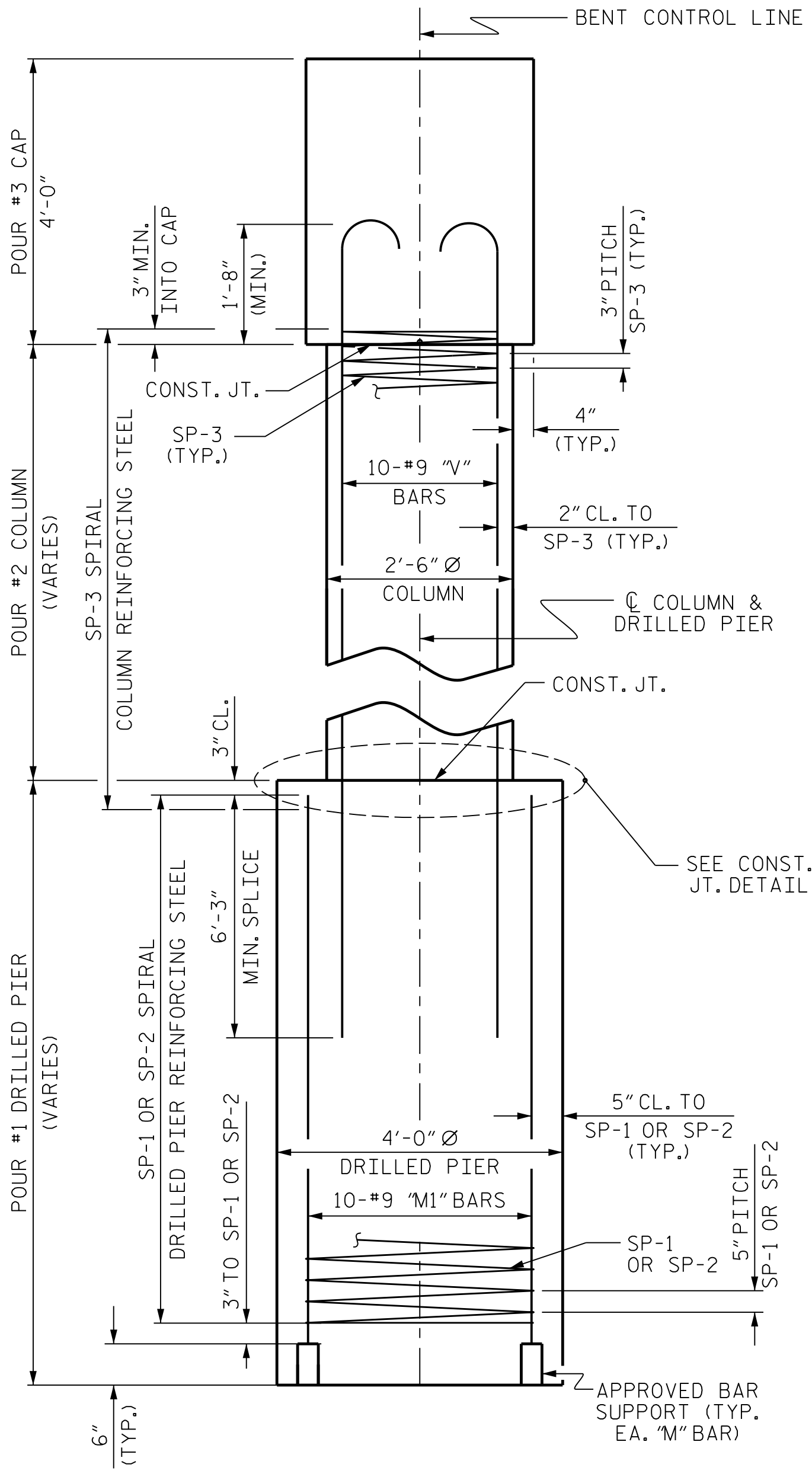
PLAN OF DRILLED PIERS & COLUMNS

DIMENSIONS, REINFORCING, AND CALLOUTS ARE TYPICAL FOR EACH COLUMN & DRILLED PIER UNLESS OTHERWISE NOTED.

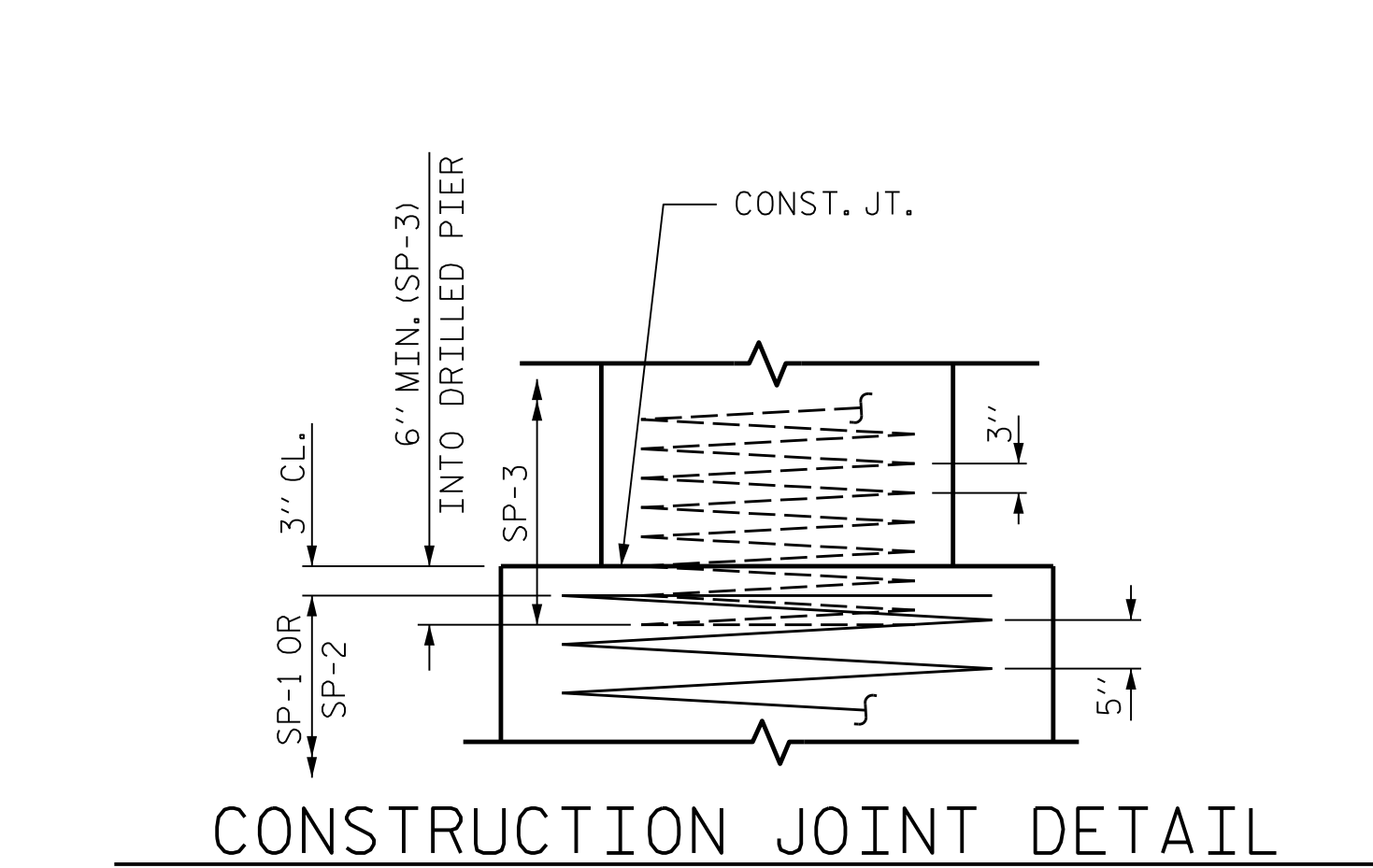


ALL BAR DIMENSIONS ARE OUT TO OUT

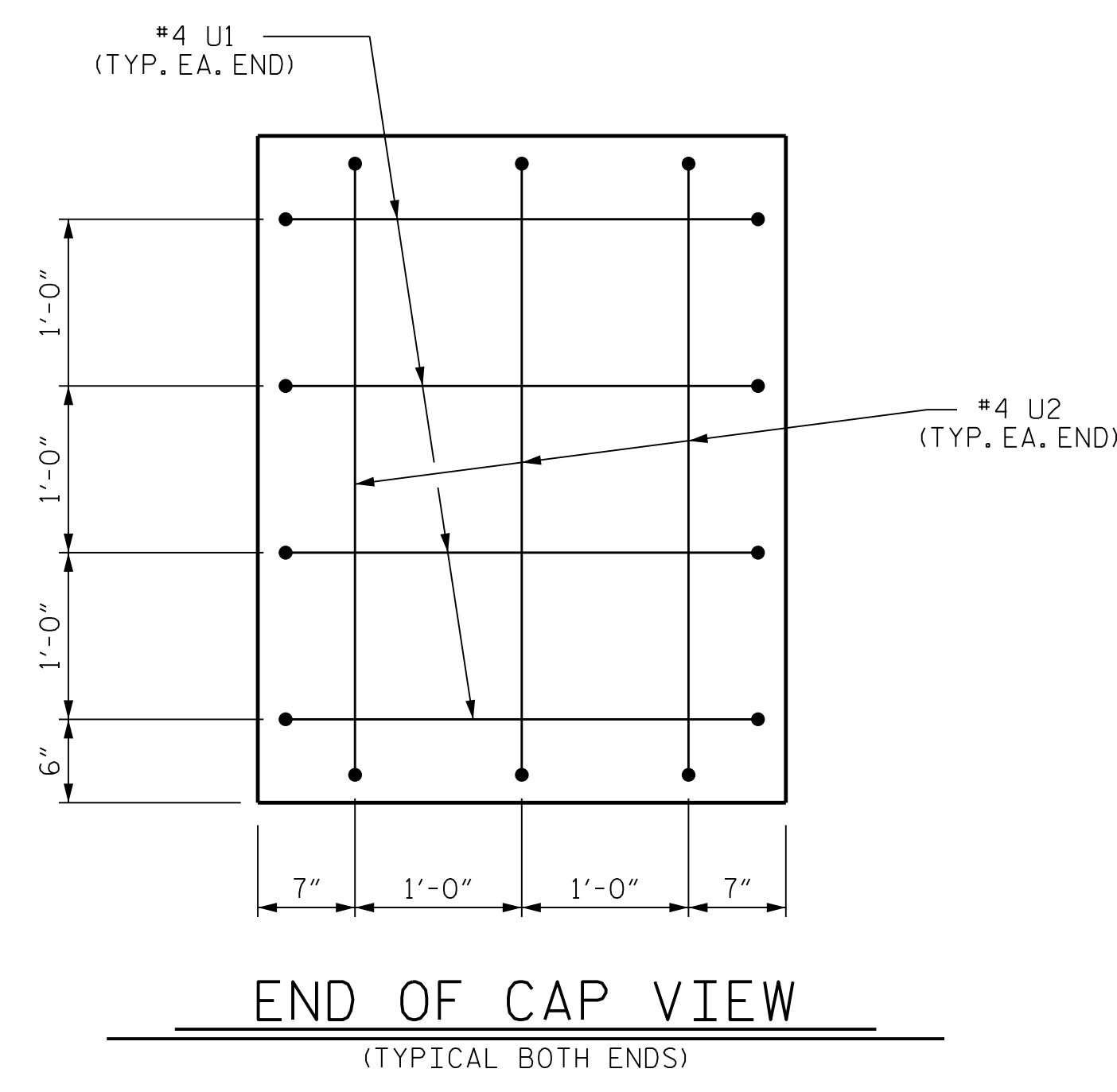
BILL OF MATERIAL					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	10	#11	1	47'-4"	2515
B2	10	#5	STR	44'-2"	461
D1	56	#8	STR	2'-3"	337
M1	10	#9	STR	21'-8"	737
M2	20	#9	STR	27'-8"	1882
S1	100	#5	2	10'-4"	1078
S2	50	#5	7	3'-10"	200
U1	8	#4	3	5'-8"	31
U2	6	#4	3	6'-6"	27
U3	9	#4	3	10'-0"	61
V1	30	#9	4	17'-11"	1828
REINFORCING STEEL					9157 LBS.
SPIRAL COLUMN REINFORCING STEEL					2278 LBS.
SP-1	1	*	5	462'-4"	483
SP-2	2	*	5	603'-4"	1259
SP-3	3	**	6	267'-3"	536
CLASS A CONCRETE BREAKDOWN					
POUR #2 (COLUMNS)					4.4 C.Y.
POUR #3 (CAP)					20.9 C.Y.
TOTAL CLASS A CONCRETE					25.3 C.Y.
DRILLED PIERS:					
DRILLED PIER CONCRETE					
POUR #1 (DRILLED PIERS)					32.6 C.Y.
4'-0" Ø DRILLED PIER NOT IN SOIL					29.0 LIN. FT.
4'-0" Ø DRILLED PIER IN SOIL					41.1 LIN. FT.
CSL TUBES					298.2 LIN. FT.



END ELEVATION

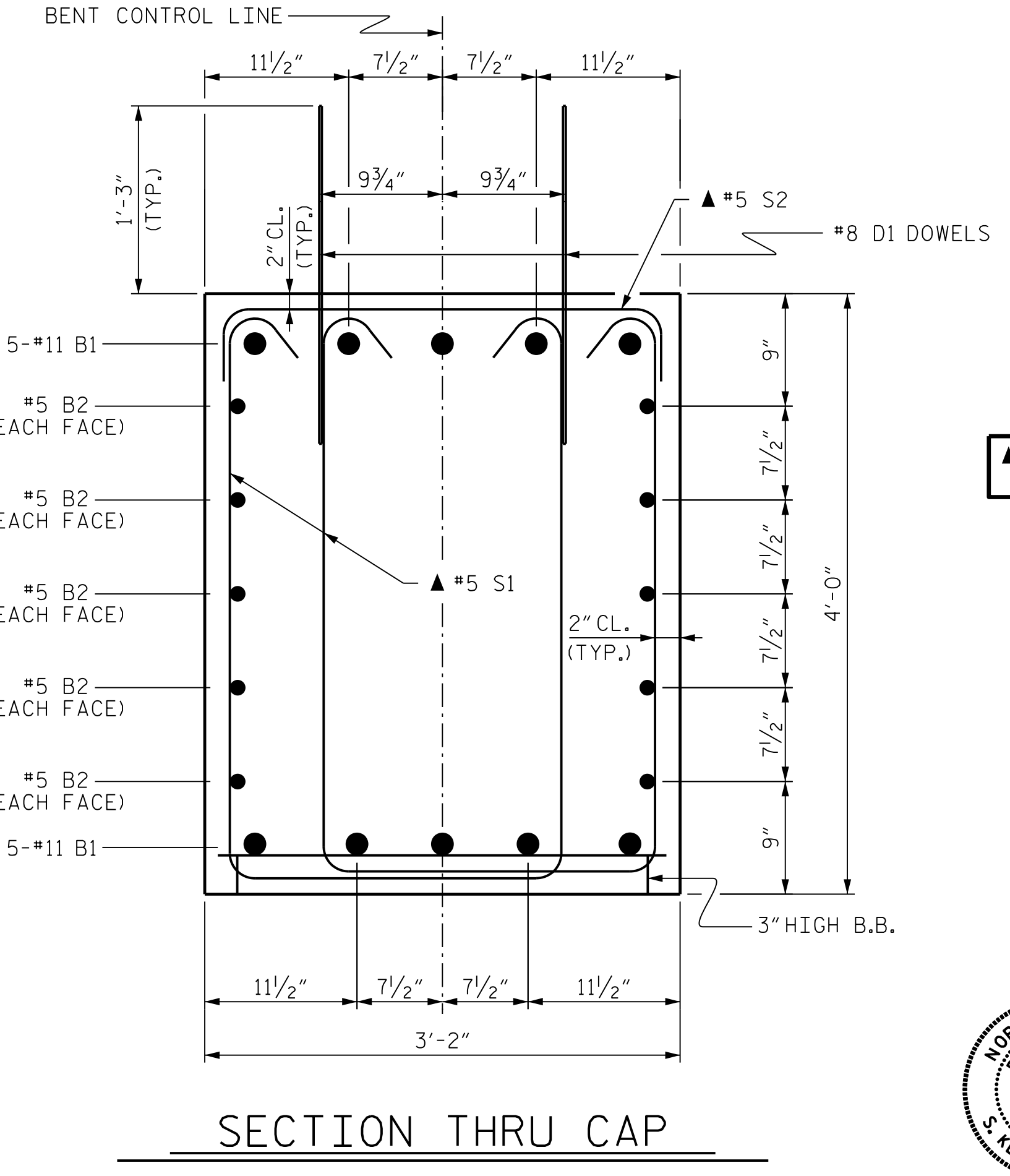


CONSTRUCTION JOINT DETAIL



END OF CAP VIEW

(TYPICAL BOTH ENDS)



SECTION THRU CAP

▲ INVERT ALTERNATE SETS OF STIRRUPS

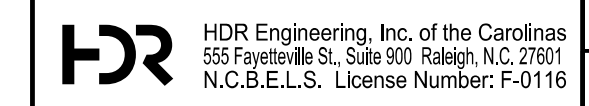


PROJECT NO. B-5161
WAKE COUNTY
 STATION: 15+14.00 -L-
 SHEET 2 OF 2

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

**SUBSTRUCTURE
 BENT No. 1**

DES BY: G. MYERS	DATE: 11/17	DWG BY: M. SELLS	DATE: 11/17
DES CHK: K. DICKENS	DATE: 11/17	CHK BY: K. DICKENS	DATE: 11/17



DocuSigned by: J. Kent Dickens
 BDA22A65385A426
 2/13/2018

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

SHEET NO. 5-22
 TOTAL SHEETS 25

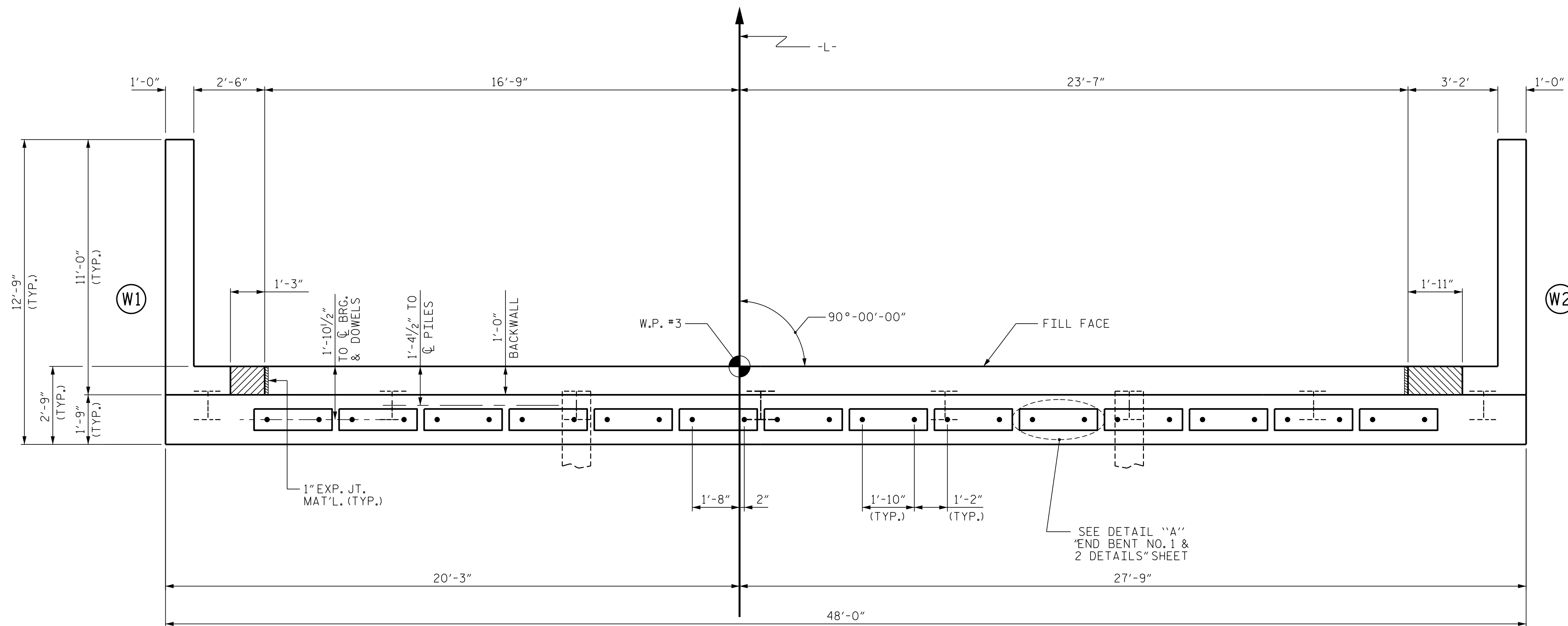
NOTES

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

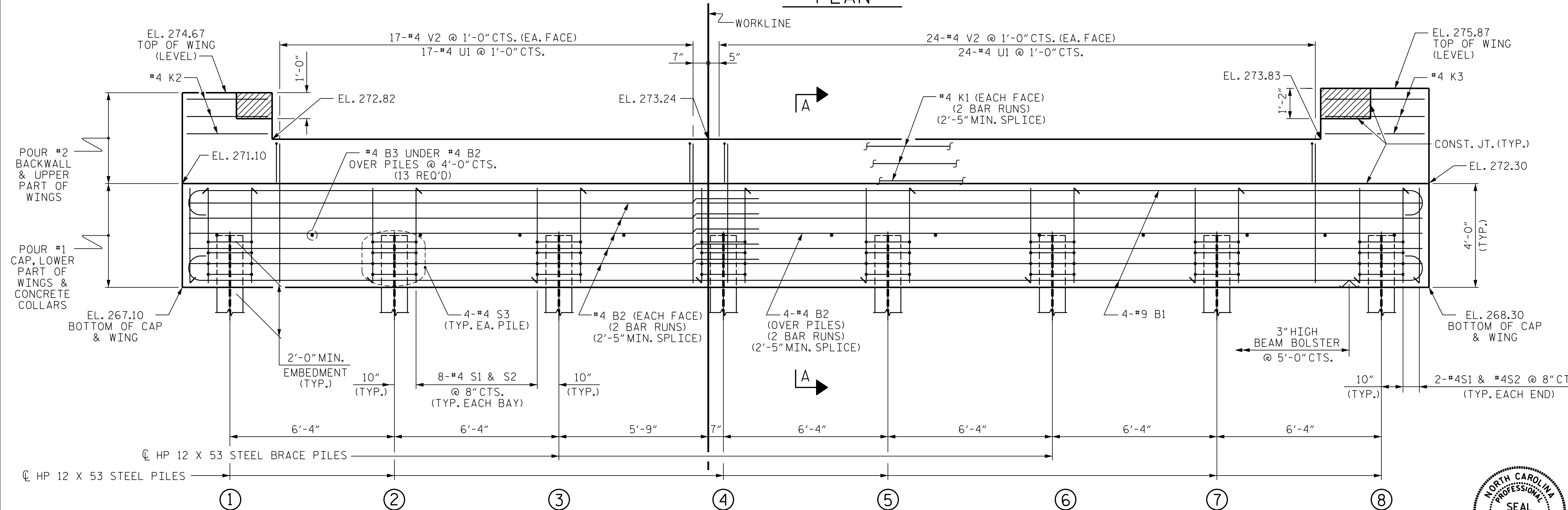
THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE CONCRETE PARAPET IS CAST IF SLIP FORMING IS USED.

FOR PILE SPLICE DETAILS, SEE 'END BENT NO. 1 & 2 DETAILS' SHEET.

FOR WING DETAILS, SEE 'END BENT WING DETAILS' SHEET.



PLAN



ELEVATION

TOP OF PILE ELEVATIONS	
①	269.15
②	269.31
③	269.46
④	269.62
⑤	269.78
⑥	269.94
⑦	270.10
⑧	270.26

← 0.025 SLOPE

PROJECT NO. B-5161
 WAKE COUNTY
 STATION: 15+14.00 -L-

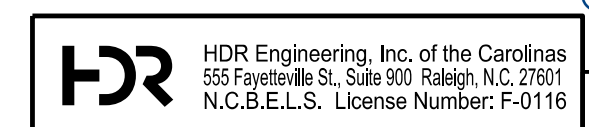


STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

SUBSTRUCTURE
 END BENT No. 2

WINGS NOT SHOWN FOR CLARITY.
 FOR SECTION A-A, SEE 'END BENT NO. 1 & 2 DETAILS' SHEET.
 CONCRETE COLLARS FOR STEEL PILES NOT SHOWN IN PLAN AND ELEVATION VIEWS FOR CLARITY.
 SEE 'CORROSION PROTECTION FOR STEEL PILES DETAIL', 'END BENT NO. 1 & 2 DETAILS' SHEET.

DES BY: G. MYERS	DATE: 11/17	DWG BY: M. SELLS	DATE: 11/17
DES CHK: K. DICKENS	DATE: 11/17	CHK BY: K. DICKENS	DATE: 11/17

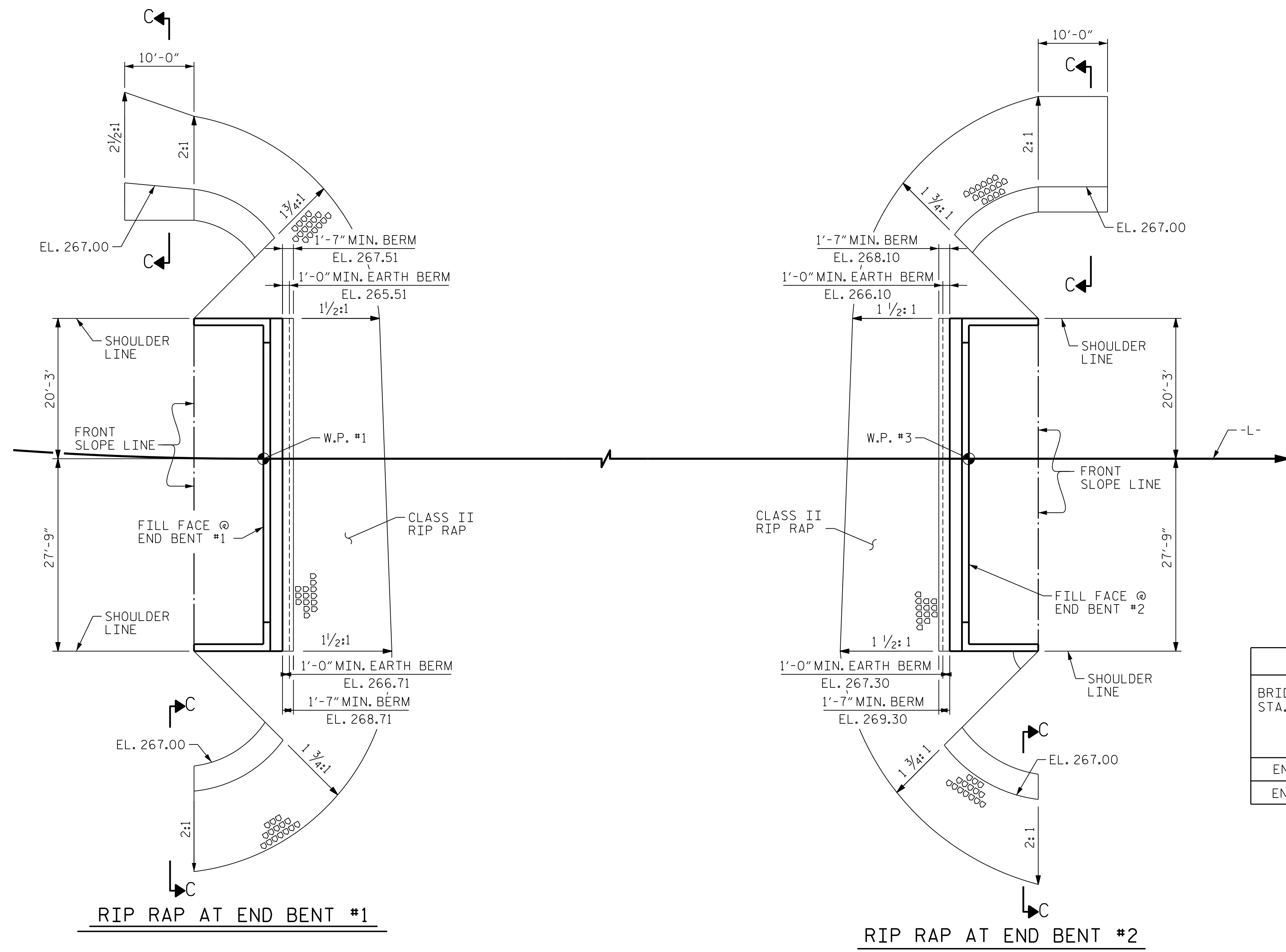


2/13/2018

REVISIONS					
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1			3		
2			4		

SHEET NO. S-23
 TOTAL SHEETS 25

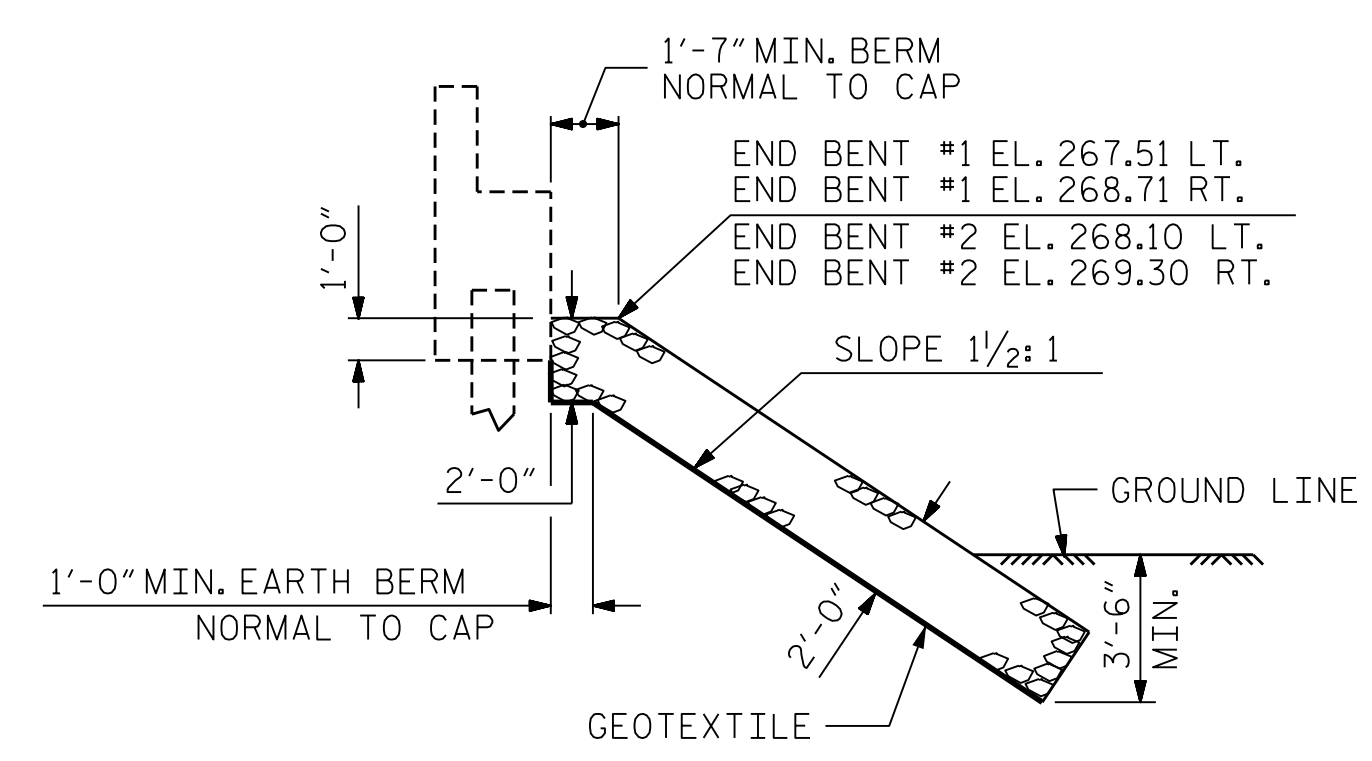
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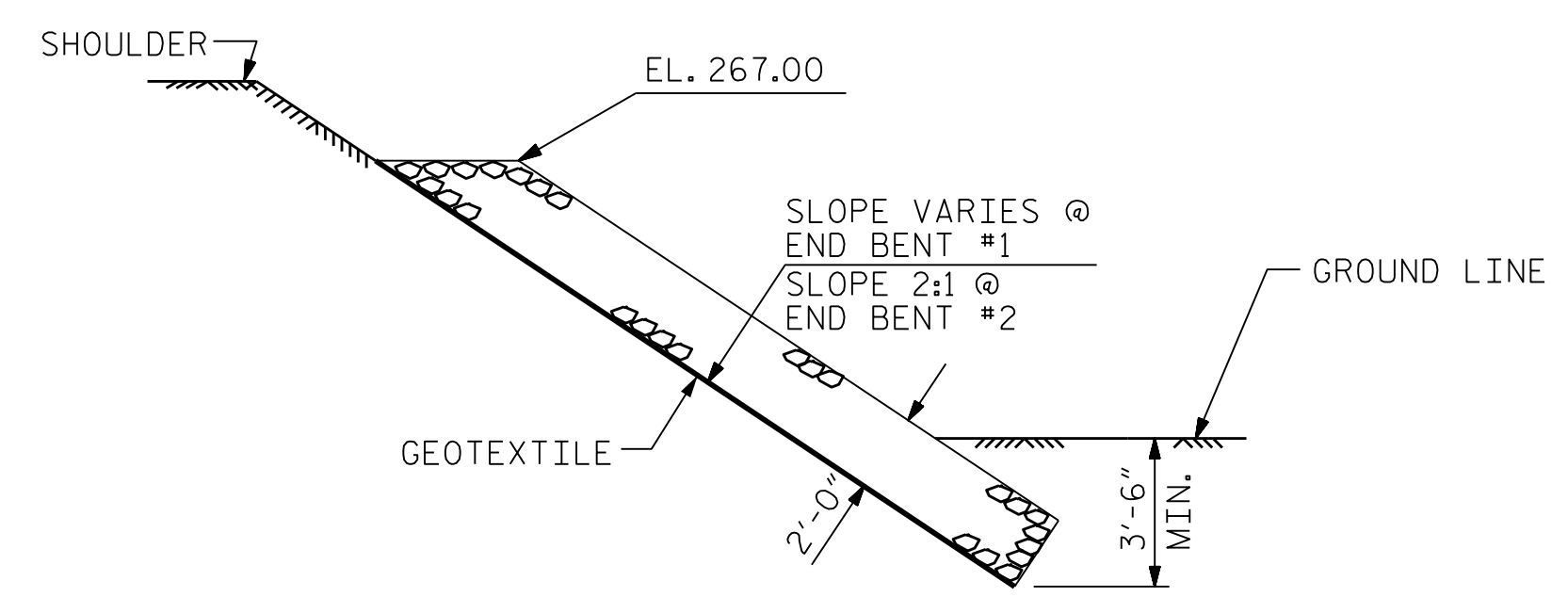
ESTIMATED QUANTITIES		
BRIDGE @ STA. 15+14.00 -L-	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE
	TONS	SQUARE YARDS
END BENT 1	230	255
END BENT 2	235	260

RIP RAP AT END BENT #1

RIP RAP AT END BENT #2



SECTION
BERM RIP RAPPED



SECTION C-C

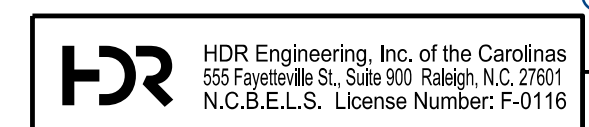
PROJECT NO. B-5161
WAKE COUNTY
 STATION: 15+14.00 -L-



DocuSigned by:
Kent Dickens
 BDA22A65385A426 2/13/2018

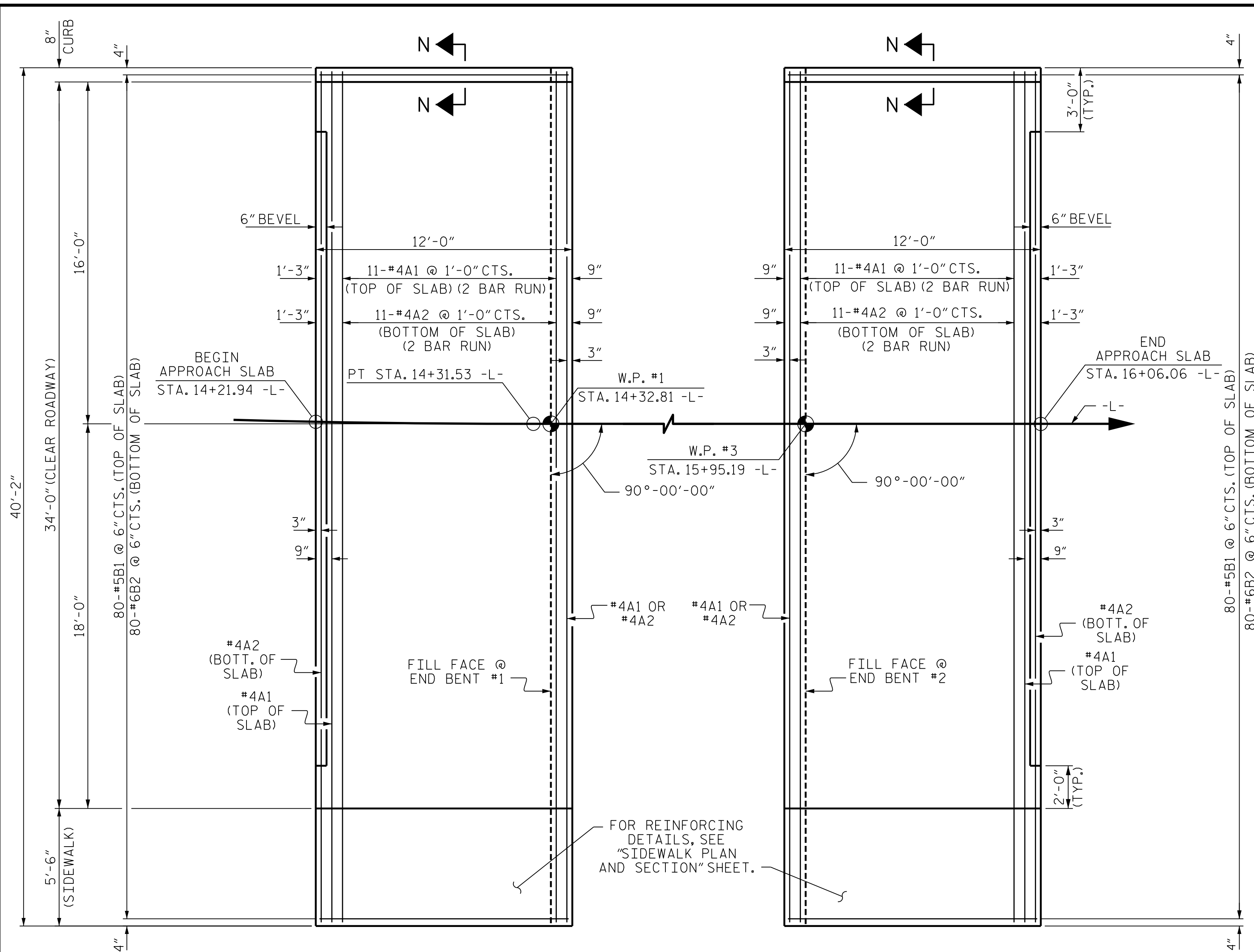
STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 STANDARD
 RIP RAP DETAILS

DES BY: G. MYERS DATE: 12/17 DWG BY: M. SELLS DATE: 12/17
 DES CHK: K. DICKENS DATE: 12/17 CHK BY: K. DICKENS DATE: 12/17

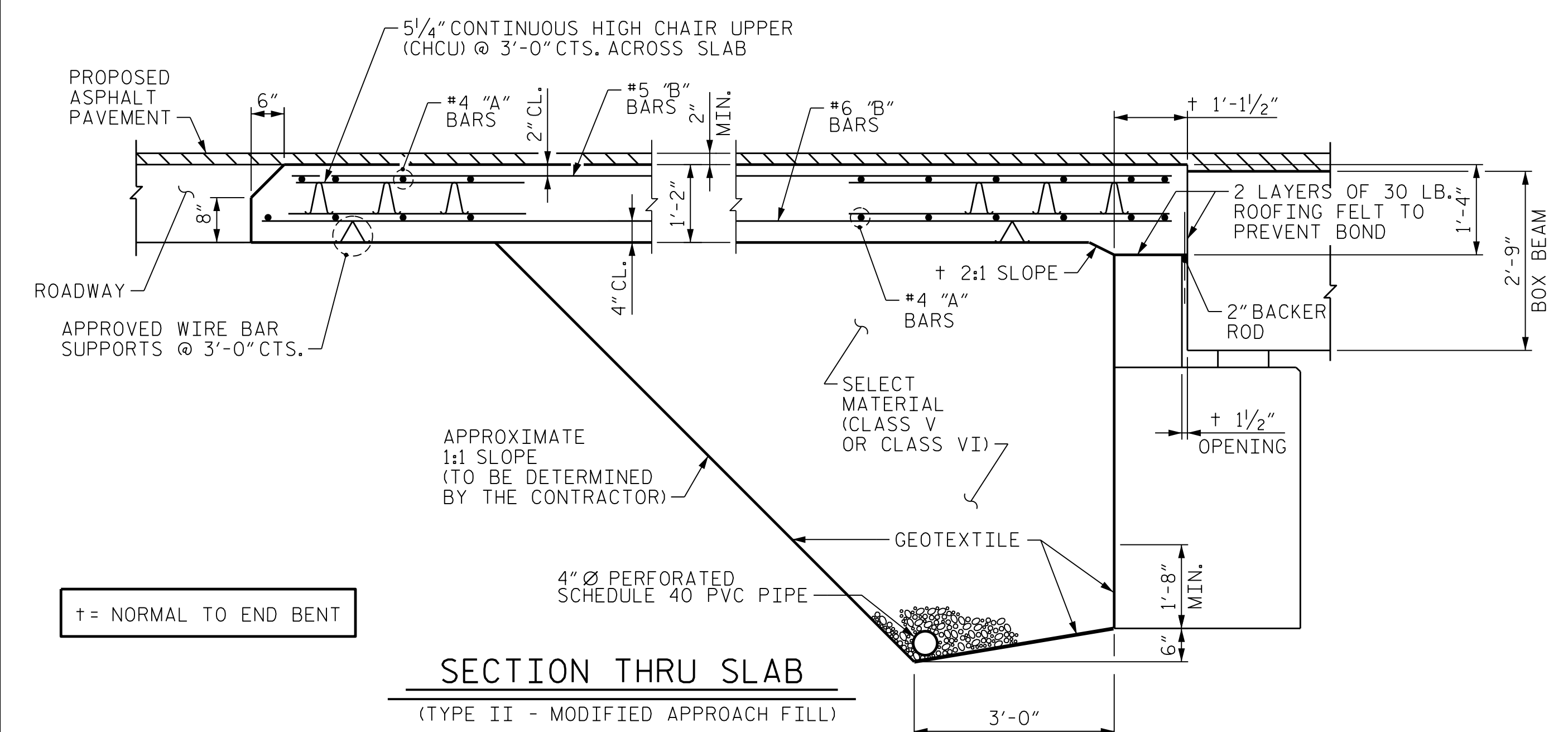


REVISIONS						SHEET NO. S-24 TOTAL SHEETS 25
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 25
2			4			

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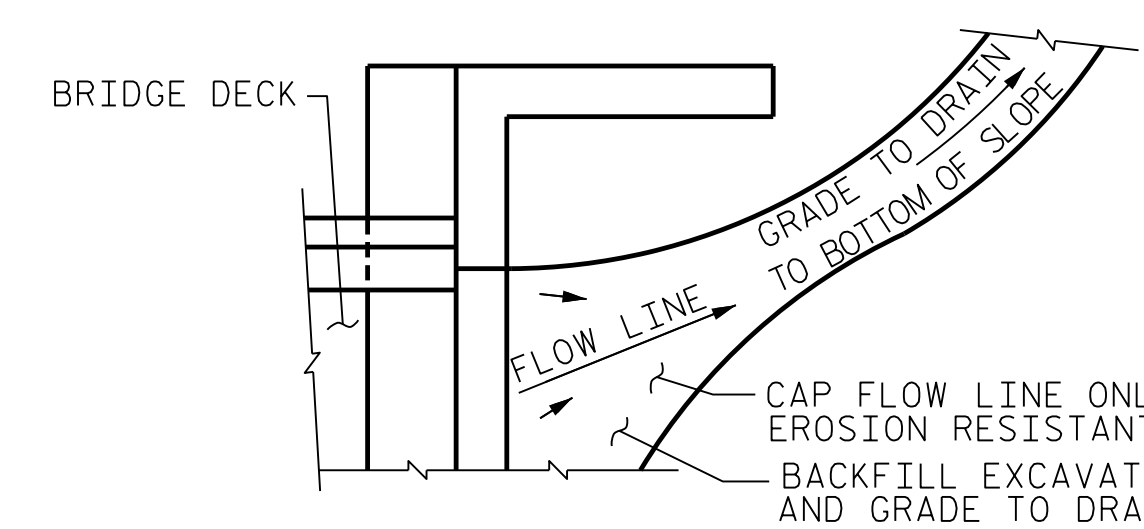


PLAN @ END BENT #1 **PLAN @ END BENT #2**
 DIMENSIONS SHOWN ARE TYPICAL FOR BOTH APPROACH SLABS



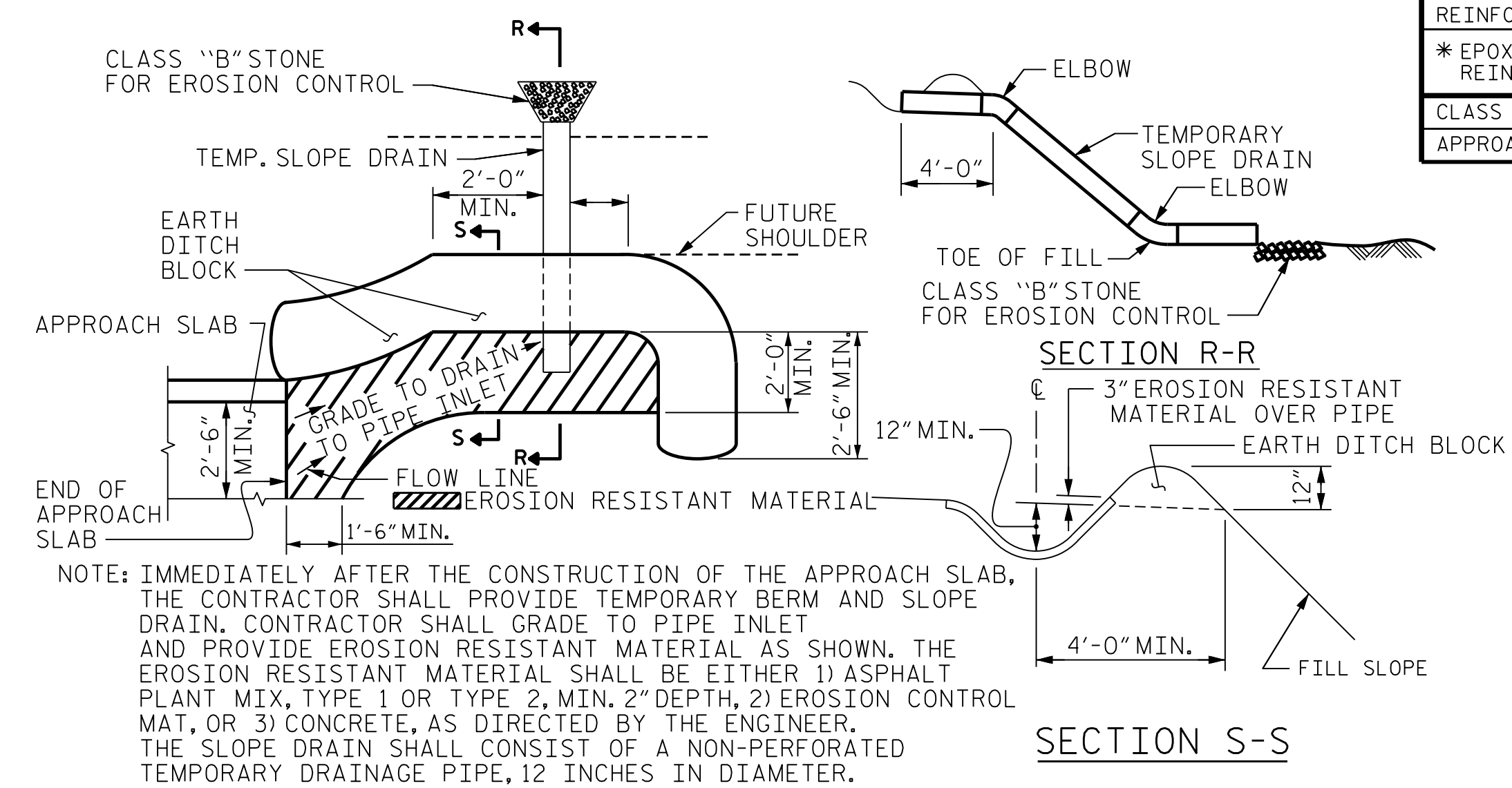
SECTION THRU SLAB
 (TYPE II - MODIFIED APPROACH FILL)

DES BY: K. DICKENS	DATE: 11/17	DWG BY: M. SELLS	DATE: 11/17
DES CHK: G. MYERS	DATE: 11/17	CHK BY: G. MYERS	DATE: 12/17

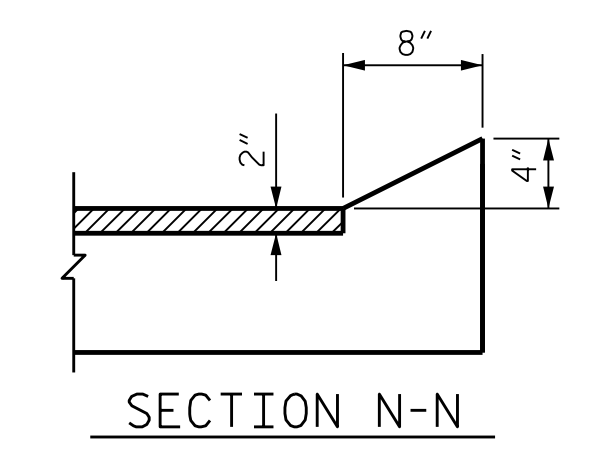


NOTE: IF THE APPROACH SLAB IS NOT CONSTRUCTED IMMEDIATELY AFTER THE BACKFILLING OF THE END BENT EXCAVATION, GRADE TO DRAIN TO THE BOTTOM OF THE SLOPE AND PROVIDE EROSION RESISTANT MATERIAL, SUCH AS FIBERGLASS ROVING OR AS DIRECTED BY THE ENGINEER TO PREVENT SOIL EROSION AND TO PROTECT THE AREA ADJACENT 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)



CURB DETAILS

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

NOTES

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

GEOTEXTILE SHALL BE TYPE I IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS SECTION 1056.

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

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

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.



DocuSigned by:
 J. Kent Dickens
 BDA22A65385A426
 2/13/2018

BILL OF MATERIAL						
APPROACH SLAB AT EB #1						
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	
*A1	26	#4	STR	20'-11"	364	
A2	26	#4	STR	20'-10"	362	
*B1	80	#5	STR	11'-2"	932	
B2	80	#6	STR	11'-8"	1402	
REINFORCING STEEL					LBS.	1764
* EPOXY COATED REINFORCING STEEL					LBS.	1296
CLASS AA CONCRETE						
APPROACH SLAB					CU. YDS.	21.2
APPROACH SLAB AT EB #2						
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	
*A1	26	#4	STR	20'-11"	364	
A2	26	#4	STR	20'-10"	362	
*B1	80	#5	STR	11'-2"	932	
B2	80	#6	STR	11'-8"	1402	
REINFORCING STEEL					LBS.	1764
* EPOXY COATED REINFORCING STEEL					LBS.	1296
CLASS AA CONCRETE						
APPROACH SLAB					CU. YDS.	21.2

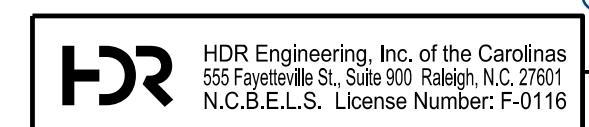
PROJECT NO. B-5161
WAKE COUNTY
 STATION: 15+14.00 -L-

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

BRIDGE APPROACH SLAB FOR PRESTRESSED CONCRETE BOX BEAM UNIT (SUB-REGIONAL TIER) 90° SKEW

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

SHEET NO. S-25
 TOTAL SHEETS 25



DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED

STANDARD NOTES

DESIGN DATA:

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

MATERIAL AND WORKMANSHIP:

EXCEPT AS MAY OTHERWISE BE SPECIFIED ON PLANS OR IN THE SPECIAL PROVISIONS, ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE 2018 "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES" OF THE N. C. DEPARTMENT OF TRANSPORTATION.

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

CONCRETE:

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

CONCRETE CHAMFERS:

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

DOWELS:

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

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

BRIDGES SHALL BE BUILT ON THE GRADE OR VERTICAL CURVE SHOWN ON PLANS. SLABS, CURBS AND PARAPETS SHALL CONFORM TO THE GRADE OR CURVE.

ALL DIMENSIONS WHICH ARE GIVEN IN SECTION AND ARE AFFECTED BY DEAD LOAD DEFLECTIONS ARE DIMENSIONS AT CENTER LINE OF BEARING UNLESS OTHERWISE NOTED ON PLANS. IN SETTING FORMS FOR STEEL BEAM BRIDGES AND PRESTRESSED CONCRETE GIRDER BRIDGES, ADJUSTMENTS SHALL BE MADE DUE TO THE DEAD LOAD DEFLECTIONS FOR THE ELEVATIONS SHOWN. WHERE BLOCKS ARE SHOWN OVER BEAMS FOR BUILDING UP TO THE SLAB, THE VERTICAL DIMENSIONS OF THE BLOCKS SHALL BE ADJUSTED BETWEEN BEARINGS TO COMPENSATE FOR DEAD LOAD DEFLECTIONS, VERTICAL CURVE ORDINATE, AND ACTUAL BEAM CAMBER. WHERE BOTTOM OF SLAB IS IN LINE WITH BOTTOM OF TOP FLANGES, DEPTH OF SLAB BETWEEN BEARINGS SHALL BE ADJUSTED TO COMPENSATE FOR DEAD LOAD DEFLECTION, VERTICAL CURVE ORDINATE, AND ACTUAL BEAM CAMBER.

IN SETTING FALSEWORK AND FORMS FOR REINFORCED CONCRETE SPANS, AN ALLOWANCE SHALL BE MADE FOR DEAD LOAD DEFLECTIONS, SETTLEMENT OF FALSEWORK, AND PERMANENT CAMBER WHICH SHALL BE PROVIDED FOR IN ADDITION TO THE ELEVATIONS SHOWN. AFTER REMOVAL OF THE FALSEWORK, THE FINISHED STRUCTURES SHALL CONFORM TO THE PROFILE AND ELEVATIONS SHOWN ON THE PLANS AND CONSTRUCTION ELEVATIONS FURNISHED BY THE ENGINEER.

DETAILED DRAWINGS FOR FALSEWORK OR FORMS FOR BRIDGE SUPERSTRUCTURE AND ANY STRUCTURE OR PARTS OF A STRUCTURE AS NOTED ON THE PLANS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL BEFORE CONSTRUCTION OF THE FALSEWORK OR FORMS IS STARTED.

REINFORCING STEEL:

ALL REINFORCING STEEL SHALL BE DEFORMED. DIMENSIONS RELATIVE TO PLACEMENT OF REINFORCING ARE TO CENTERS OF BARS UNLESS OTHERWISE INDICATED IN THE PLANS. DIMENSIONS ON BAR DETAILS ARE TO CENTERS OF BARS OR ARE OUT TO OUT AS INDICATED ON PLANS.

WIRE BAR SUPPORTS SHALL BE PROVIDED FOR REINFORCING STEEL WHERE INDICATED ON THE PLANS. WHEN BAR SUPPORT PIECES ARE PLACED IN CONTINUOUS LINES, THEY SHALL BE SO PLACED THAT THE ENDS OF THE SUPPORTING WIRES SHALL BE LAPPED TO LOCK LEGS ON ADJOINING PIECES.

STRUCTURAL STEEL:

AT THE CONTRACTOR'S OPTION, HE MAY SUBSTITUTE $\frac{7}{8}$ " \emptyset SHEAR STUDS FOR THE $\frac{3}{4}$ " \emptyset STUDS SPECIFIED ON THE PLANS. THIS SUBSTITUTION SHALL BE MADE AT THE RATE OF 3 - $\frac{7}{8}$ " \emptyset STUDS FOR 4 - $\frac{3}{4}$ " \emptyset STUDS, AND STUD SPACING CHANGES SHALL BE MADE AS NECESSARY TO PROVIDE THE SAME EQUIVALENT NUMBER OF $\frac{7}{8}$ " \emptyset STUDS ALONG THE BEAM AS SHOWN FOR $\frac{3}{4}$ " \emptyset STUDS BASED ON THE RATIO OF 3 - $\frac{7}{8}$ " \emptyset STUDS FOR 4 - $\frac{3}{4}$ " \emptyset STUDS. STUDS OF THE LENGTH SPECIFIED ON THE PLANS MUST BE PROVIDED. THE MAXIMUM SPACING SHALL BE 2'-0".

EXCEPT AT THE INTERIOR SUPPORTS OF CONTINUOUS BEAMS WHERE THE COVER PLATE IS IN CONTACT WITH BEARING PLATE, THE CONTRACTOR MAY, AT HIS OPTION, SUBSTITUTE FOR THE COVER PLATES DESIGNATED ON THE PLANS COVER PLATES OF THE EQUIVALENT AREA PROVIDED THESE PLATES ARE AT LEAST $\frac{5}{16}$ " 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 $\frac{1}{16}$ " INCH OR EQUIVALENT FLAT SURFACE AT A SUITABLE ANGLE PRIOR TO PAINTING, GALVANIZING, OR METALLIZING.

HANDRAILS AND POSTS:

METAL STANDARDS AND FACES OF THE CONCRETE END POSTS FOR THE METAL RAIL SHALL BE SET NORMAL TO THE GRADE OF THE CURB, UNLESS OTHERWISE SHOWN ON PLANS. THE METAL RAIL AND TOPS OF CONCRETE POSTS USED WITH THE ALUMINUM RAIL SHALL BE BUILT PARALLEL TO THE GRADE OF THE CURB.

METAL HANDRAILS SHALL BE IN ACCORDANCE WITH THE PLANS. RAILS SHALL BE AS MANUFACTURED FOR BRIDGE RAILING. CASTINGS SHALL BE OF A UNIFORM APPEARANCE. FINISHES AND OTHER DEFORMATIONS RESULTING FROM CASTING OR OTHERWISE SHALL BE REMOVED IN A MANNER SO THAT A UNIFORM COLORING OF THE COMPLETED CASTING SHALL BE OBTAINED. CASTINGS WITH DISCOLORATIONS OR OF NON-UNIFORM COLORING WILL NOT BE ACCEPTED. CERTIFIED MILL REPORTS ARE REQUIRED FOR METAL RAILS AND POSTS.

SPECIAL NOTES:

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

ENGLISH

JANUARY, 1990

STD. NO. SN