

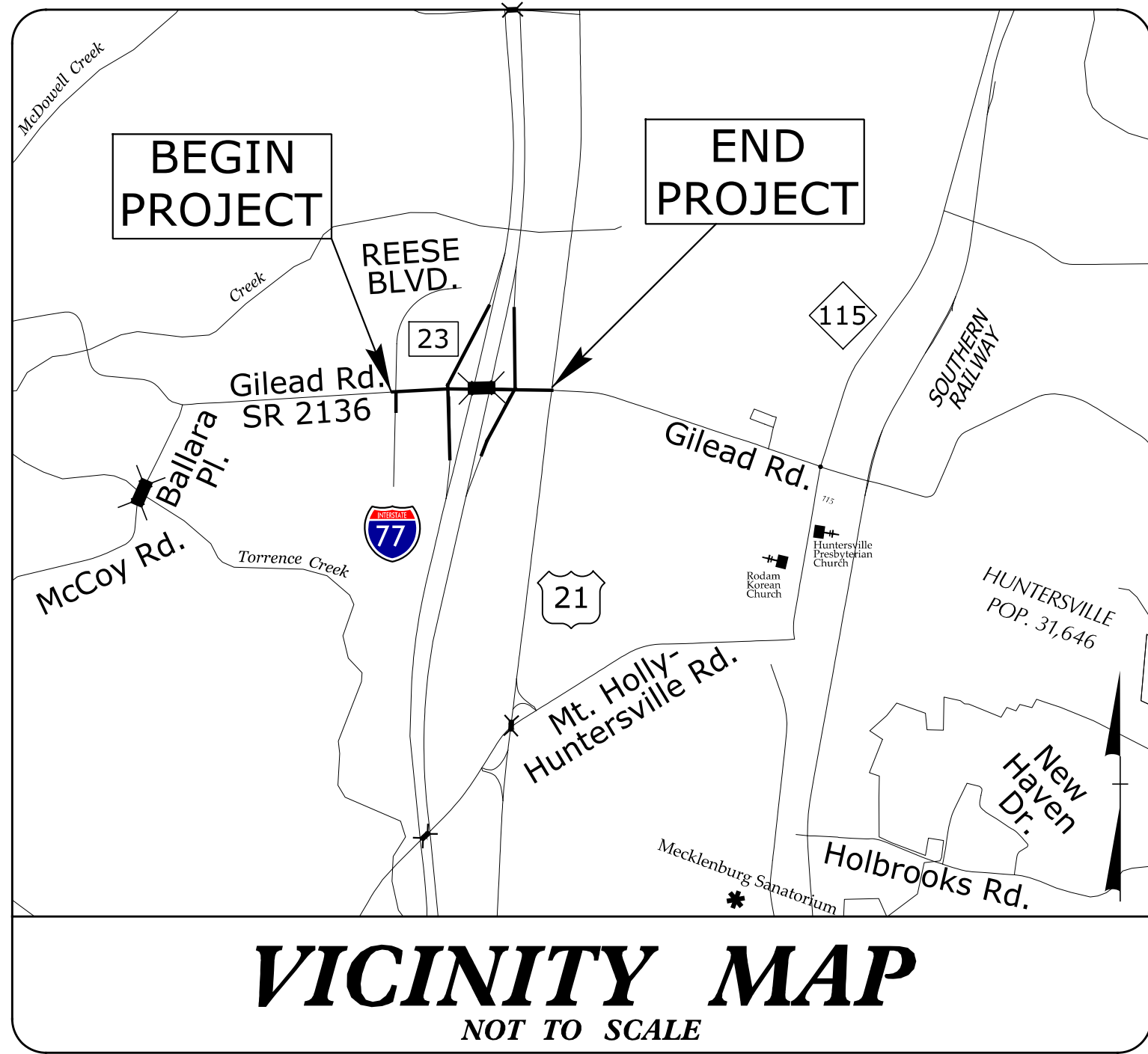
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TIP PROJECT: I-5714

CONTRACT: C203654



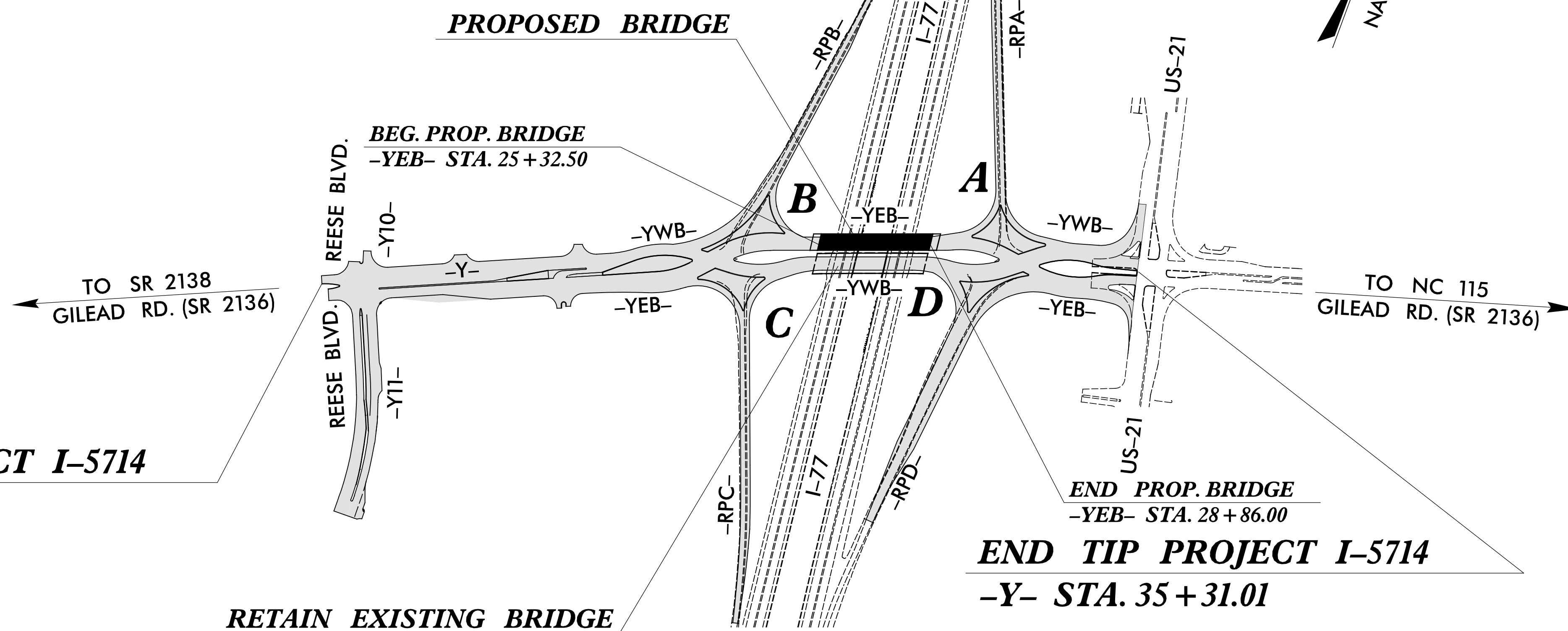
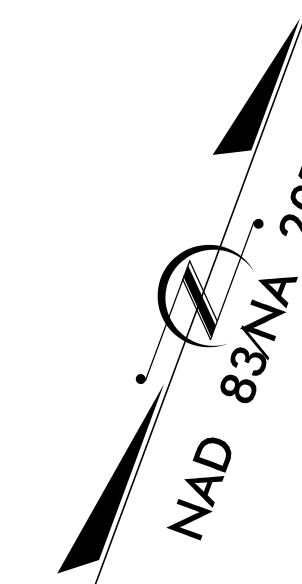
PLFI PLANS

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS
MECKLENBURG COUNTY

LOCATION: I-77 AT SR 2136 (GILEAD ROAD) INTER-CHANGE, UPGRADE EXISTING DIAMOND INTERCHANGE TO DIVERGING DIAMOND

TYPE OF WORK: GRADING, PAVING, DRAINAGE, STRUCTURE, SIGNALS & SIGNING

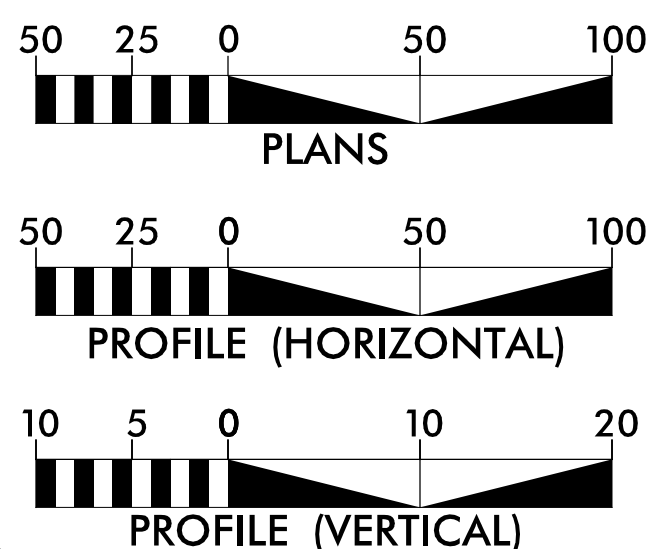
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	I-5714		
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
50127.1.FS1	NHPP-077-1(219)23	PE	
50127.2.1	NHPP-077-1(219)23	RW & UTILITIES	



STRUCTURES

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

GRAPHIC SCALES



DESIGN DATA

ADT 2018 = 40,300
ADT 2040 = 52,300
K = 8 %
D = 55 %
T = 4 % *
V = 40 MPH
& 30 MPH THRU DDI
* TTST = 1% DUAL 3%
FUNC CLASS = MINOR ARTERIAL

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT I-5714 = 0.425 MI.
LENGTH STRUCTURE TIP PROJECT I-5714 = 0.067 MI.
TOTAL LENGTH OF TIP PROJECT I-5714 = 0.492 MI.

Prepared for the North Carolina Department of Transportation
In the Office of:



ICE of Carolinas, PLLC
4505 Falls of Neuse Road, Suite 110
Raleigh, North Carolina 27609
Phone: 803-822-0333
License #: P-0999

LETTING DATE:
JULY 17, 2018

PAUL R. HOLSHOUSER, PE
PROJECT DESIGN ENGINEER

NCDOT CONTACT

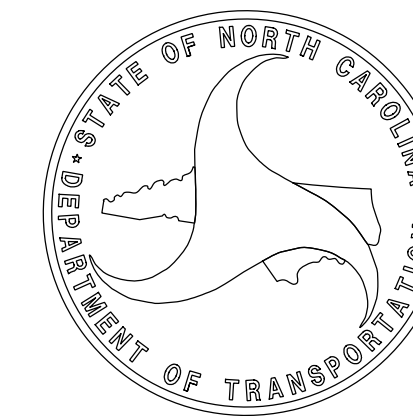
DAVID STUTTS, PE
PROJECT DESIGN ENGINEER-ROADWAY DESIGN

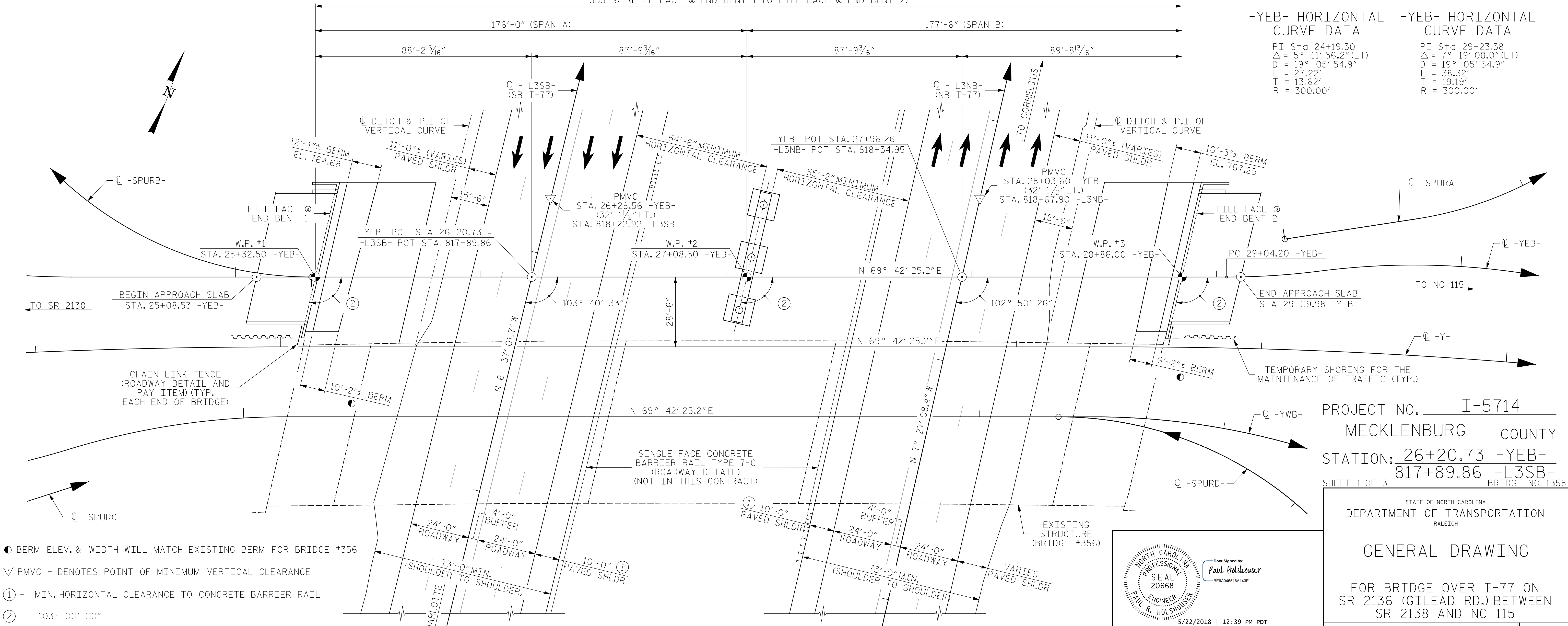
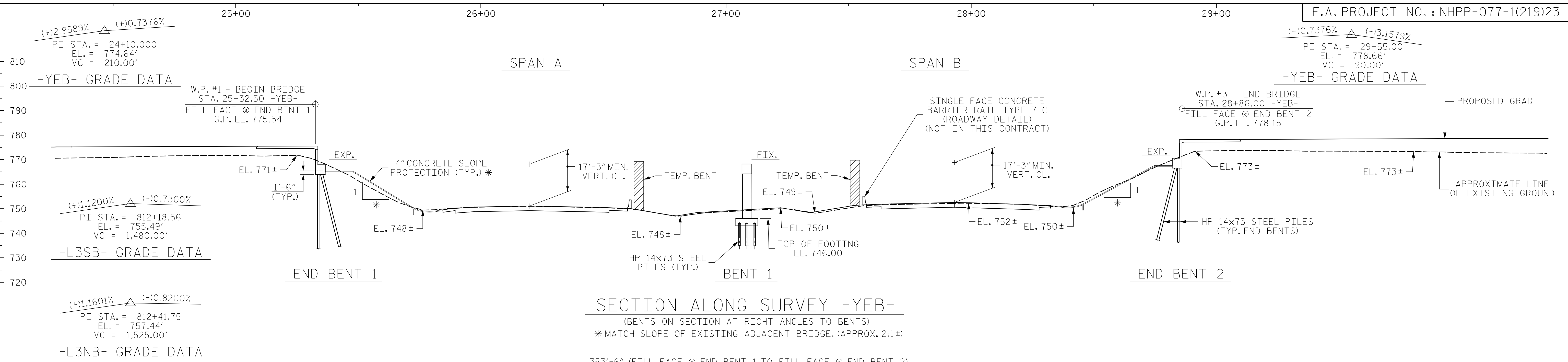
STRUCTURES MANAGEMENT UNIT



DocuSigned by:
Paul Holshouser
BEEA040516A143E

5/22/2018 | 12:39 PM PDT





● BERM ELEV. & WIDTH WILL MATCH EXISTING BERM FOR BRIDGE #356

▽ PMVC - DENOTES POINT OF MINIMUM VERTICAL CLEARANCE

① - MIN. HORIZONTAL CLEARANCE TO CONCRETE BARRIER RAIL

② - 103°-00'-00"

DRAWN BY : J. N. AUSTIN DATE : 8-9-17
CHECKED BY : P. R. HOLSHOUSER DATE : 9-1-17
DESIGN E.O.R. : P. R. HOLSHOUSER DATE : 5-8-18

Professional Engineer
PAUL R. HOLSHOUSER
SEAL 20668
5/22/2018 12:39 PM PDT

ICE of Carolinas, PLLC
4505 Falls of Neuse Road, Suite 110
Raleigh, North Carolina 27609
Phone: 919-422-0333
License #: P-0999

PROJECT NO. I-5714
MECKLENBURG COUNTY
STATION: 26+20.73 -YEB-
817+89.86 -L3SB-
BRIDGE NO. 1358

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

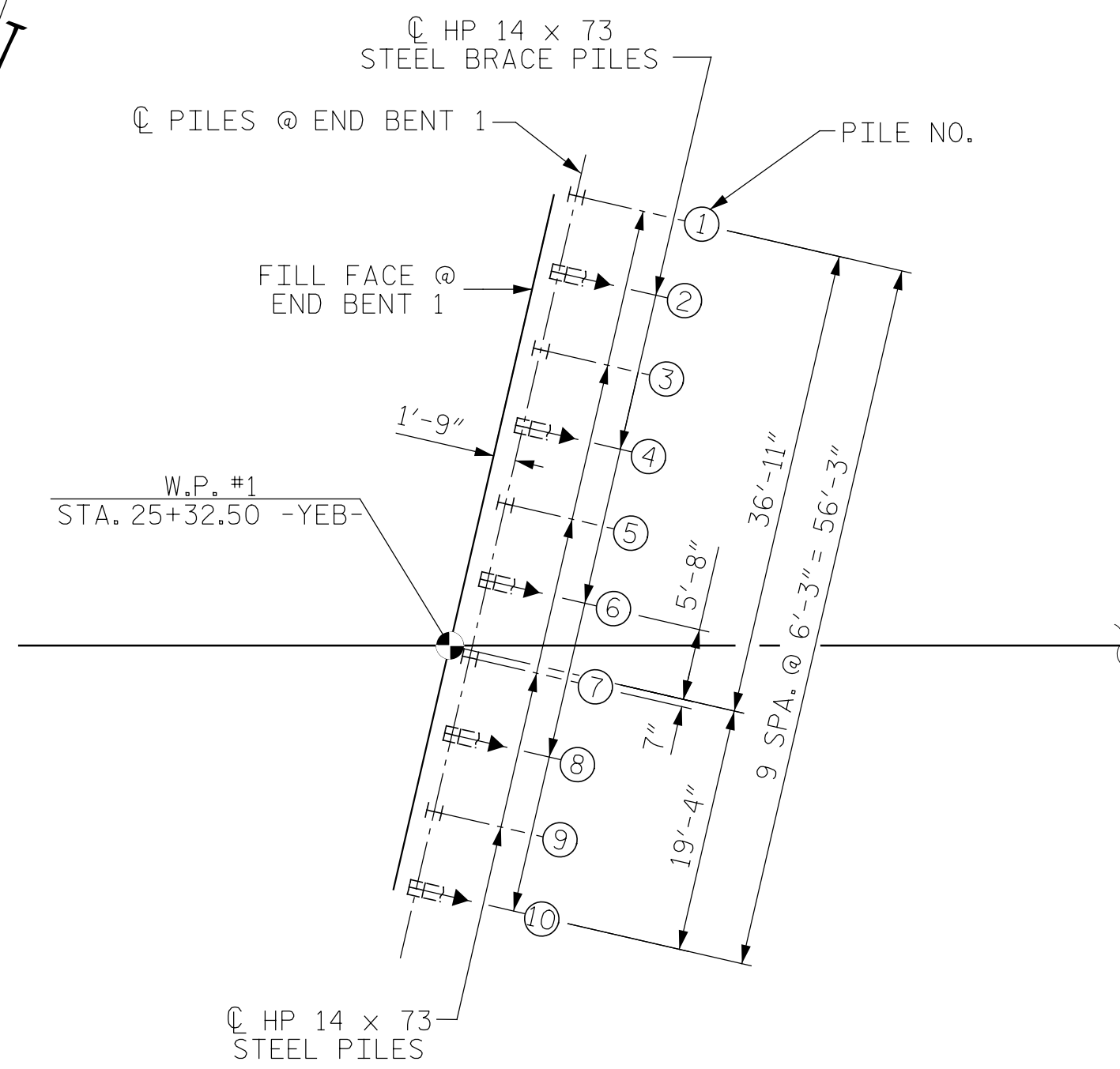
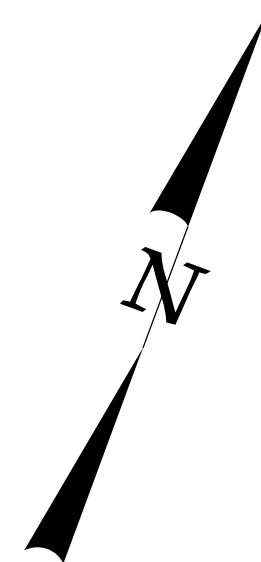
GENERAL DRAWING

FOR BRIDGE OVER I-77 ON
SR 2136 (GILEAD RD.) BETWEEN
SR 2138 AND NC 115

REVISIONS		
NO.	BY:	DATE:
①		
②		
③		
④		

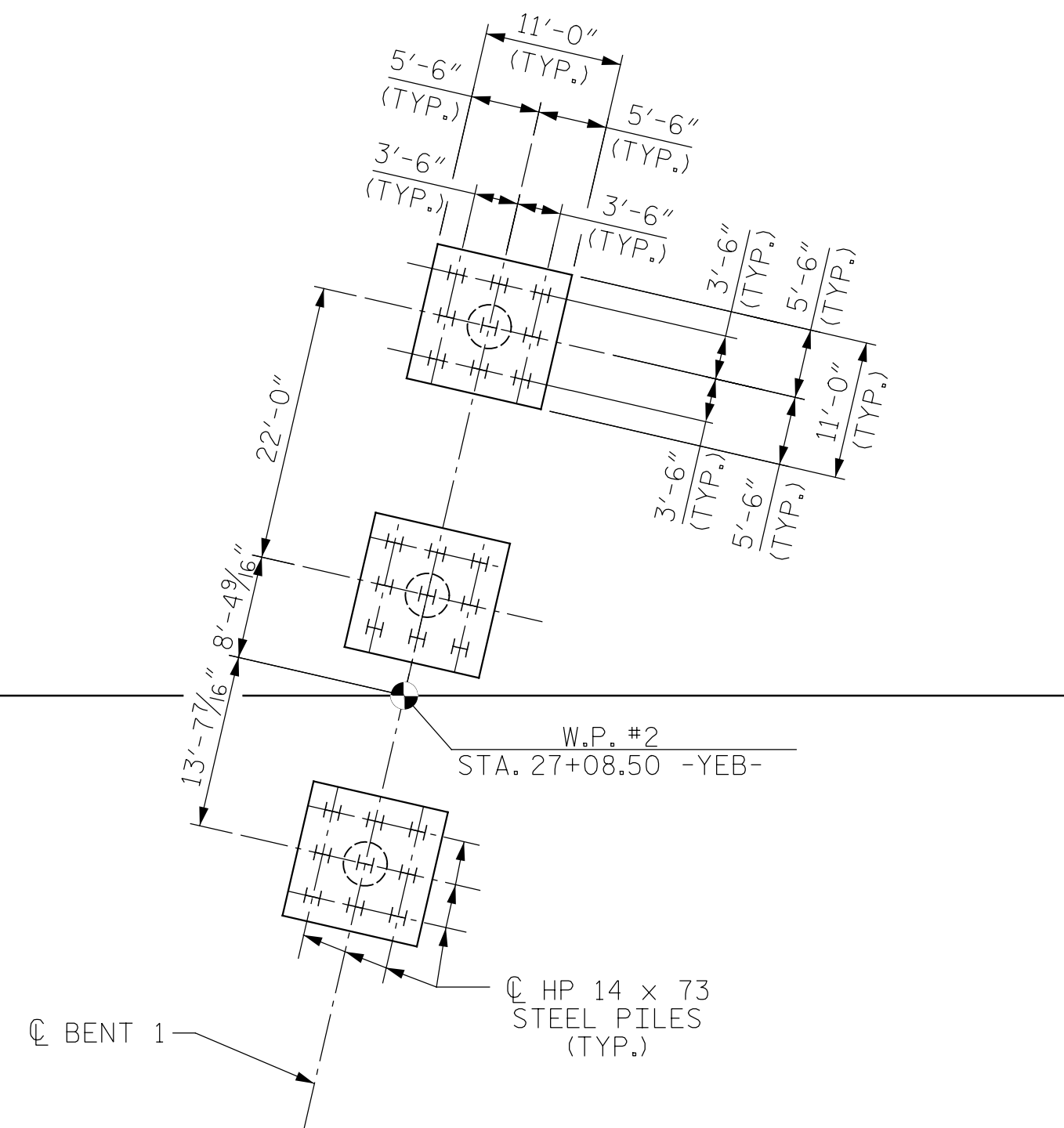
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TOTAL SHEETS **53**

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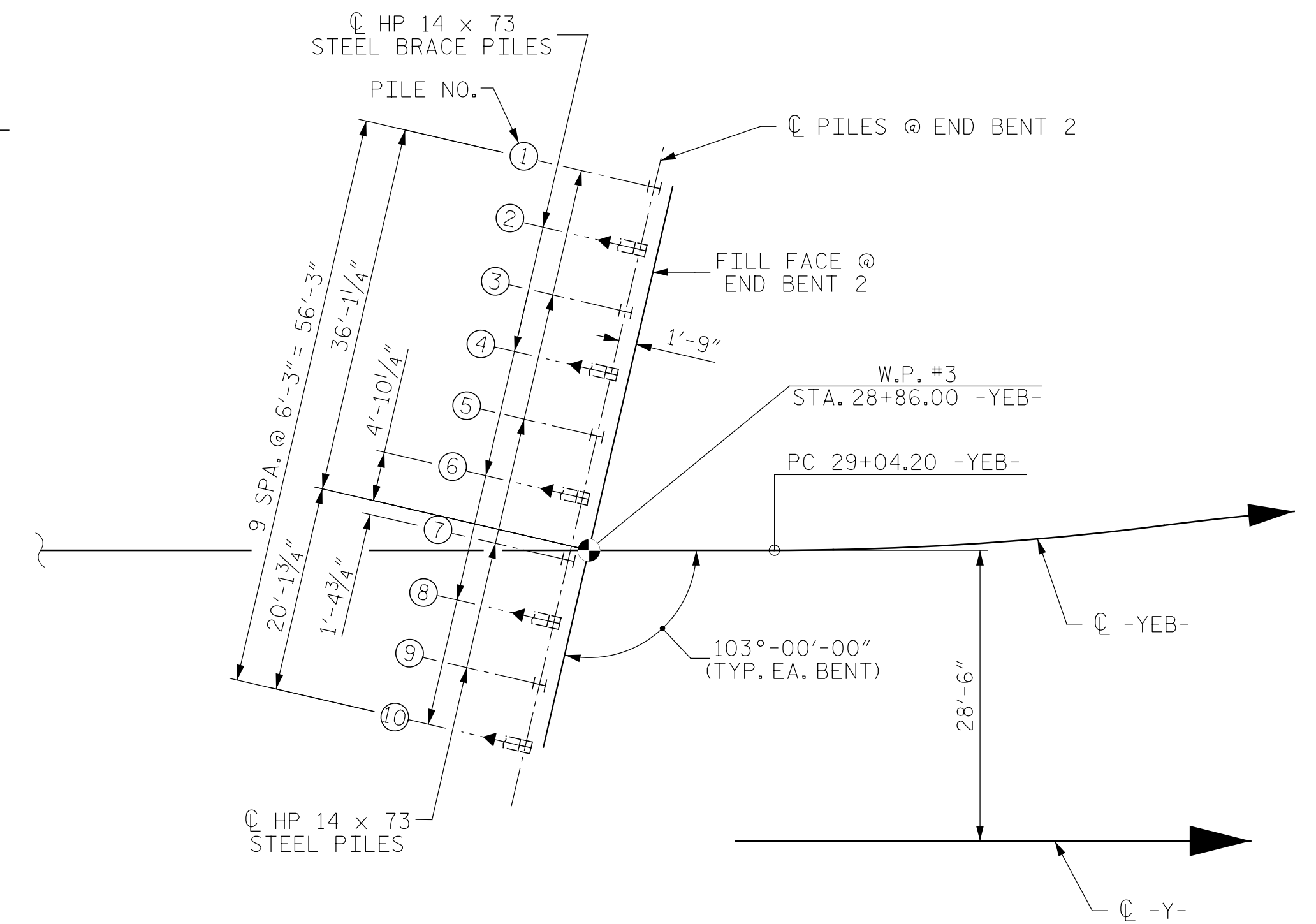
END BENT 1

SPAN A



BENT 1

SPAN B



END BENT 2

FOUNDATION LAYOUT
ALL BENTS ARE PARALLEL

FOUNDATION NOTES

- FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.
- PILES AT BENT 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 170 TONS PER PILE.
- DRIVE PILES AT BENT 1 TO A REQUIRED DRIVING RESISTANCE OF 283 TONS PER PILE.
- PILES AT END BENT 1 & 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 130 TONS PER PILE.
- DRIVE PILES AT END BENT 1 & 2 TO A REQUIRED DRIVING RESISTANCE OF 217 TONS PER PILE.

NOTES:

- ▲ INDICATES BATTER DIRECTION ON BATTERED PILES.
- ALL BATTERED PILES AT END BENT 1 & 2 SHALL BE BATTERED AT 3 (H) : 12 (V) RATIO.
- PILES ARE DIMENSIONED FROM WORK POINT TO C OF PILE AT BOTTOM OF FOOTING OR CAP.

PROJECT NO. I-5714
MECKLENBURG COUNTY
 STATION: 26+20.73 -YEB-
817+89.86 -L3SB-
 SHEET 2 OF 3

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

GENERAL DRAWING

FOR BRIDGE OVER I-77 ON
 SR 2136 (GILEAD RD.) BETWEEN
 SR 2138 AND NC 115

REVISIONS

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

SHEET NO.
S-02
TOTAL SHEETS
53

DocuSigned by:
Paul Holshouser
 BE6A048516A143E

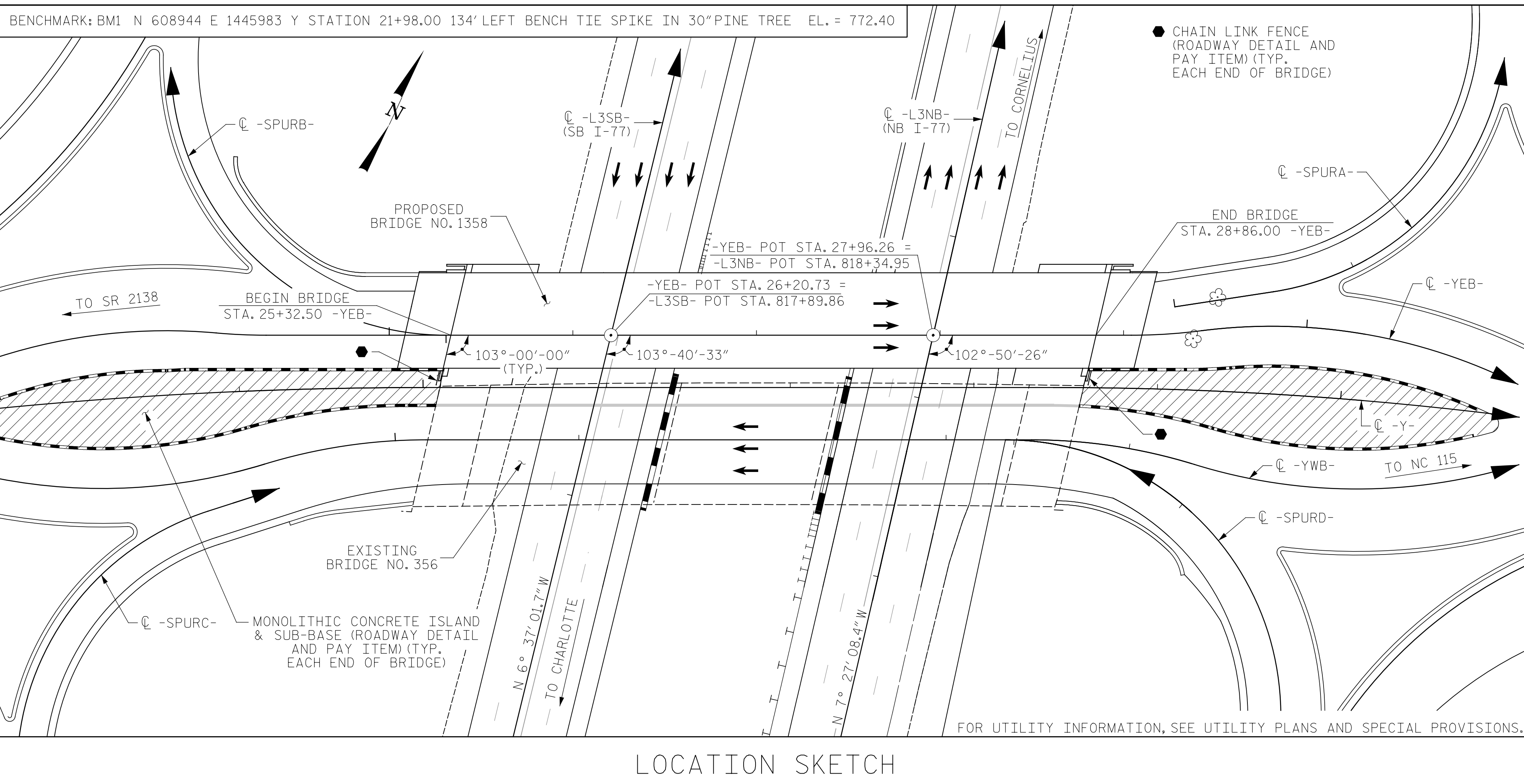
5/8/2018 | 10:27 AM PDT

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 4505 Falls of Neuse Road, Suite 110
 Raleigh, North Carolina 27609
 Phone: 919-422-0333
 License #: P-0999

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DRAWN BY : R.H. / J.N.A. DATE : 2-1-18
 CHECKED BY : P. R. HOLSHOUSER DATE : 2-5-18
 DESIGN E.O.R. : P. R. HOLSHOUSER DATE : 5-8-18

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 File name: R:\Projects\I-5714 Mecklenburg County NC DD\Structures\Gilead.Rd\Dwg\Final\401_002_I5714_SMJ_FL_01.dgn



LOCATION SKETCH

NOTES:

- ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.
- THIS BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.
- THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.
- FOR OTHER DESIGN DATA AND GENERAL NOTES, SEE SHEET SN.
- FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.
- FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.
- FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.
- FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.
- THE CONTRACTOR SHALL PROVIDE INDEPENDENT ASSURANCE SAMPLES OF REINFORCING STEEL AS FOLLOWS: FOR PROJECTS REQUIRING UP TO 400 TONS OF REINFORCING STEEL, ONE 30 INCH SAMPLE OF EACH SIZE BAR USED, AND FOR PROJECTS REQUIRING OVER 400 TONS OF REINFORCING STEEL, TWO 30 INCH SAMPLES OF EACH SIZE BAR USED. THE BARS FROM WHICH THE SAMPLES ARE TAKEN MUST THEN BE SPLICED WITH REPLACEMENT BARS OF THE SIZE AND LENGTH OF THE SAMPLE, PLUS A MINIMUM LAP SPLICE OF THIRTY BAR DIAMETERS. PAYMENT FOR THE SAMPLES OF REINFORCING STEEL SHALL BE CONSIDERED INCIDENTAL TO VARIOUS PAY ITEMS.
- THE ELEVATION(S) AND CLEARANCE(S) SHOWN ON THE PLANS AT THE POINT(S) OF MINIMUM VERTICAL CLEARANCE ARE FROM THE BEST INFORMATION AVAILABLE, PRIOR TO BEGINNING BRIDGE CONSTRUCTION, VERIFY THE ELEVATION(S) ON THE EXISTING PAVEMENT AND CHECK THE CLEARANCE. REPORT ANY VARIATIONS TO THE ENGINEER. ANY PLAN REVISIONS NECESSARY TO ACHIEVE THE REQUIRED MINIMUM VERTICAL CLEARANCE WILL BE PROVIDED BY THE DEPARTMENT.
- FOR MAINTENANCE AND PROTECTION OF TRAFFIC BENEATH PROPOSED STRUCTURE, SEE SPECIAL PROVISIONS.
- ALL PAVEMENT MARKING WILL BE IN ACCORDANCE WITH THE PAVEMENT MARKING PLANS AND SHALL PROVIDE FOR BICYCLES.
- THE CLASS AA CONCRETE IN THE BRIDGE DECK SHALL CONTAIN FLY ASH OR GROUND GRANULATED BLAST FURNACE SLAG AT THE SUBSTITUTION RATE SPECIFIED IN ARTICLE 1024-1 AND IN ACCORDANCE WITH ARTICLES 1024-5 AND 1024-6 OF THE STANDARD SPECIFICATIONS. NO PAYMENT WILL BE MADE FOR THIS SUBSTITUTION AS IT IS CONSIDERED INCIDENTAL TO THE COST OF THE REINFORCED CONCRETE DECK SLAB.
- REMOVABLE FORMS MAY BE USED IN LIEU OF METAL STAY-IN-PLACE FORMS IN ACCORDANCE WITH ARTICLE 420-3 OF THE STANDARD SPECIFICATIONS.
- NEEDLE BEAMS WILL NOT BE ALLOWED UNLESS OTHERWISE CALLED FOR ON THE PLANS OR APPROVED BY THE ENGINEER.
- FOR TEMPORARY BENTS, SEE SPECIAL PROVISION.
- FOR LIMITS OF TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC, SEE TRAFFIC CONTROL PLANS, FOR PAY ITEM FOR TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC, SEE ROADWAY PLANS.

FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

TOTAL BILL OF MATERIAL - BRIDGE NO. 1358																		
	FOUNDATION EXCAVATION FOR BENT 26+20.73-YEB-	REINFORCED CONCRETE DECK SLAB	GROOVING BRIDGE FLOORS	CLASS A CONCRETE	BRIDGE APPROACH SLABS STA. 26+20.73 -YEB-	REINFORCING STEEL	SPIRAL COLUMN REINFORCING STEEL	APPROX. 950,000 LBS. STRUCTURAL STEEL	PILE DRIVING EQUIPMENT SETUP FOR HP 14x73 STEEL PILES	HP 14 x 73 STEEL PILES	TWO BAR METAL RAIL	CONCRETE BARRIER RAIL	1'-2" x 2'-6" CONCRETE PARAPET	4" SLOPE PROTECTION	DISC BEARINGS	ELASTOMERIC BEARINGS	EXPANSION JOINT SEALS	
	LUMP SUM	SQ. FT.	SQ. FT.	CU. YDS.	LUMP SUM	LBS.	LBS.	LUMP SUM	EA.	NO.	LIN. FT.	LIN. FT.	LIN. FT.	LIN. FT.	SQ. YDS.	LUMP SUM	LUMP SUM	LUMP SUM
SUPERSTRUCTURE		19,292	19,495								393.95	371.30	401.45		LUMP SUM	LUMP SUM	LUMP SUM	
END BENT 1				100.4		9,189	1,426		10	10	375			321				
BENT 1				140.9		28,621	1,426		27	27	1,845							
END BENT 2				100.4		9,192			10	10	740			339				
TOTAL	LUMP SUM	19,292	19,495	341.7	LUMP SUM	47,002	1,426	LUMP SUM	47	47	2,960	393.95	371.30	401.45	660	LUMP SUM	LUMP SUM	LUMP SUM

TOTAL BILL OF MATERIAL - BRIDGE NO. 356					
	TWO BAR METAL RAIL	REMOVE EXISTING BRIDGE RAIL	ADHESIVELY ANCHORED 2'-6" CONCRETE PARAPET	ADHESIVELY ANCHORED 3'-6" CONCRETE VERTICAL RAIL	ADHESIVELY ANCHORED BARRIER RAIL
	LIN. FT.	LUMP SUM	LIN. FT.	LIN. FT.	LIN. FT.
SUPERSTRUCTURE	343.33	LUMP SUM	350.79	403.96	350.83
TOTAL	343.33	LUMP SUM	350.79	403.96	350.83

PROJECT NO. I-5714
MECKLENBURG COUNTY
 STATION: 26+20.73 -YEB-
817+89.86 -L3SB-
 SHEET 3 OF 3

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

GENERAL DRAWING

FOR BRIDGE OVER I-77 ON
 SR 2136 (GILEAD RD.) BETWEEN
 SR 2138 AND NC 115

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-03
1			3			TOTAL SHEETS
2			4			53

DocuSigned by:
Paul R. Holshouser
 BE6A048516A143E

5/22/2018 | 12:39 PM PDT

ICE of CAROLINAS, PLLC
 4505 Falls of Neuse Road, Suite 110
 Raleigh, North Carolina 27609
 Phone: 919-422-0333
 License #: P-0999

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DRAWN BY : J. N. AUSTIN DATE : 2-1-18
 CHECKED BY : P. R. HOLSHOUSER DATE : 2-5-18
 DESIGN E.O.R. : P. R. HOLSHOUSER DATE : 5-8-18

LOAD AND RESISTANCE FACTOR RATING (LRFR) SUMMARY FOR STEEL GIRDERS

LEVEL	VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING #	MINIMUM RATING FACTORS (RF)	TONS = W × RF	STRENGTH I LIMIT STATE										SERVICE II LIMIT STATE					COMMENT NUMBER			
						MOMENT					SHEAR					MOMENT								
						LIVE-LOAD FACTORS (γ _{LL})	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (FT)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (FT)	LIVE-LOAD FACTORS (γ _{LL})	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN		GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (FT)	
DESIGN LOAD RATING	HL-93 (INVENTORY)	N/A	①	1.67	--	1.75	0.62	1.67	A	I	174.00	0.92	1.78	A	I	174.00	1.30	0.62	1.80	A	I	174.00		
	HL-93 (OPERATING)	N/A		2.34	--	1.35	0.62	2.93	A	I	174.00	0.92	3.11	A	I	174.00	1.00	0.62	2.34	A	I	174.00		
	HS-20 (INVENTORY)	36.00	②	2.03	73.18	1.75	0.62	2.67	A	I	174.00	0.92	2.03	A	I	174.00	1.30	0.62	2.88	A	I	174.00		
	HS-20 (OPERATING)	36.00		3.55	127.85	1.35	0.62	4.68	A	I	174.00	0.92	3.55	A	I	174.00	1.00	0.62	3.74	A	I	174.00		
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH		9.26	125.01	1.40	0.62	12.75	B	I	105.30	0.92	10.44	A	I	156.60	1.00	0.62	9.26	B	I	105.30		
		SNGARBS2	20.000	6.66	133.20	1.40	0.62	9.17	B	I	105.30	0.92	8.88	A	I	156.60	1.00	0.62	6.66	B	I	105.30		
		SNAGRIS2	22.000	6.03	132.66	1.40	0.62	8.30	B	I	105.30	0.92	7.64	A	I	156.60	1.00	0.62	6.03	B	I	105.30		
		SNCOTTS3	27.250	4.61	125.62	1.40	0.62	6.34	B	I	105.30	0.92	7.29	B	I	0.00	1.00	0.62	4.61	B	I	105.30		
		SNAGGRS4	34.925	3.73	130.27	1.40	0.62	5.14	B	I	105.30	0.92	5.68	B	I	0.00	1.00	0.62	3.73	B	I	105.30		
		SNS5A	35.550	3.69	131.18	1.40	0.62	5.45	B	I	122.85	0.92	5.67	B	I	0.00	1.00	0.62	3.69	B	I	105.30		
		SNS6A	39.950	3.29	131.44	1.40	0.62	4.53	B	I	105.30	0.92	5.03	B	I	0.00	1.00	0.62	3.29	B	I	105.30		
	SNS7B	42.000	3.13	131.46	1.40	0.62	4.31	B	I	105.30	0.92	4.82	B	I	0.00	1.00	0.62	3.13	B	I	105.30			
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		4.00	132.00	1.40	0.62	5.50	B	I	105.30	0.92	6.06	B	I	0.00	1.00	0.62	4.00	B	I	105.30	
		TNT4A	33.075		3.99	131.97	1.40	0.62	5.49	B	I	105.30	0.92	6.09	B	I	0.00	1.00	0.62	3.99	B	I	105.30	
		TNT6A	41.600		3.23	134.37	1.40	0.62	4.45	B	I	105.30	0.92	4.91	B	I	0.00	1.00	0.62	3.23	B	I	105.30	
		TNT7A	42.000		3.21	134.82	1.40	0.62	4.42	B	I	105.30	0.92	4.85	B	I	0.00	1.00	0.62	3.21	B	I	105.30	
		TNT7B	42.000		3.24	136.08	1.40	0.62	4.47	B	I	105.30	0.92	4.79	B	I	0.00	1.00	0.62	3.24	B	I	105.30	
TNAGRIT4		43.000		3.13	134.59	1.40	0.62	4.31	B	I	105.30	0.92	4.70	B	I	0.00	1.00	0.62	3.13	B	I	105.30		
TNAGT5A	45.000		2.98	134.10	1.40	0.62	4.11	B	I	105.30	0.92	4.49	B	I	0.00	1.00	0.62	2.98	B	I	105.30			
TNAGT5B	45.000		2.98	134.10	1.40	0.62	4.10	B	I	105.30	0.92	4.45	B	I	0.00	1.00	0.62	2.98	B	I	105.30			
FATIGUE	HL-93 (INVENTORY)																							

LOAD FACTORS:

DESIGN LOAD RATING FACTORS	LIMIT STATE	γ _{DC}	γ _{DW}
	STRENGTH I	1.25	1.50
	SERVICE II	1.00	1.00

NOTES:

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

CONTROLLING LOAD RATING

① DESIGN LOAD RATING (HL-93) **

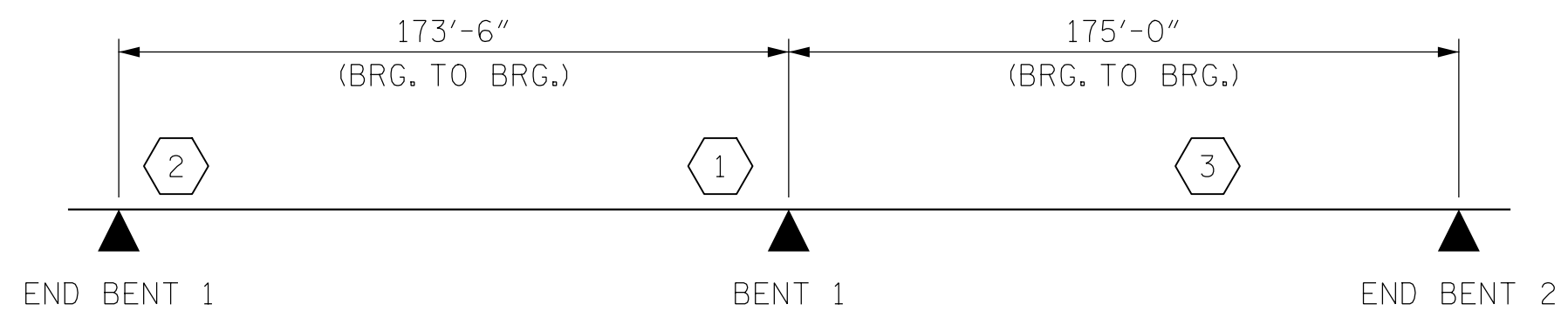
② DESIGN LOAD RATING (HS-20) **

③ LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

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



LRFR SUMMARY

PROJECT NO. I-5714
MECKLENBURG COUNTY
 STATION: 26+20.73 -YEB-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

LRFR SUMMARY FOR STEEL GIRDERS

(NON-INTERSTATE TRAFFIC)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-04
1			3			TOTAL SHEETS
2			4			53

DocuSigned by:
Paul Holshouser
BEG6A08516A143E

5/8/2018 | 10:27 AM PDT

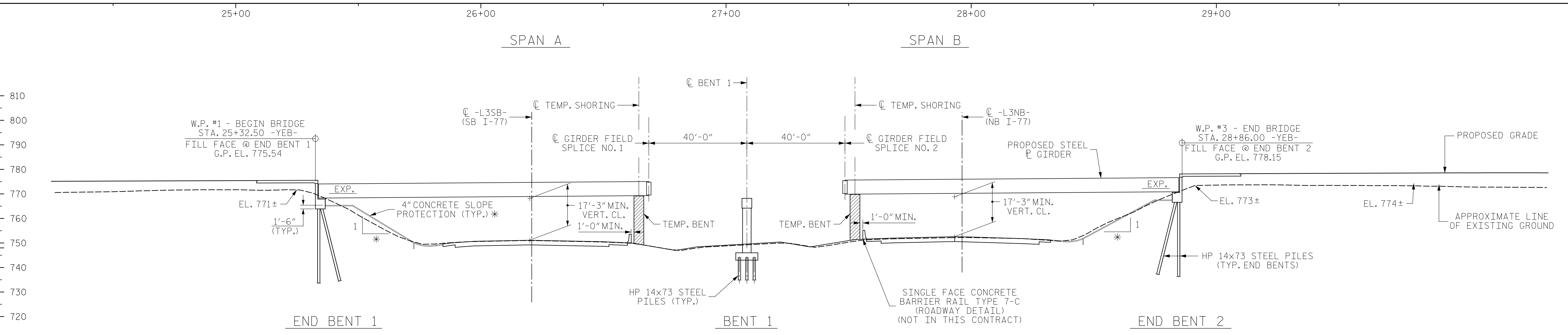
ICE of CAROLINAS, PLLC

4505 Falls of Neuse Road, Suite 110
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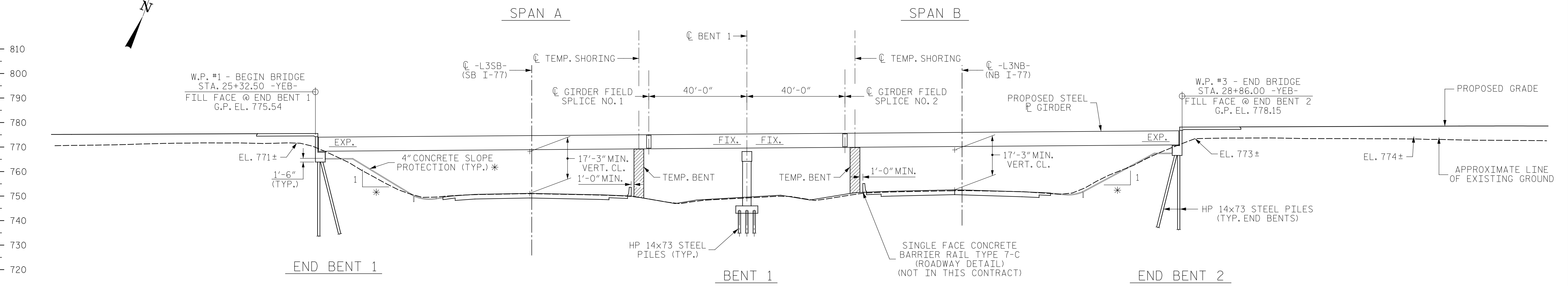
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DRAWN BY : J. N. AUSTIN DATE : 2-5-18
 CHECKED BY : S. N. AL-JAMAL DATE : 2-5-18
 DESIGN E.O.R. : P. R. HOLSHOUSE DATE : 5-8-18



PHASE I GIRDER ERECTION

(BENTS ON SECTION AT RIGHT ANGLES TO BENTS)
 *MATCH SLOPE OF EXISTING ADJACENT BRIDGE. (APPROX. 2:1±)



PHASE II GIRDER ERECTION

(BENTS ON SECTION AT RIGHT ANGLES TO BENTS)
 *MATCH SLOPE OF EXISTING ADJACENT BRIDGE. (APPROX. 2:1±)

GIRDER ERECTION NOTES

THE STRUCTURAL STEEL SHALL BE SUPPORTED DURING ERECTION IN ITS CAMBERED POSITION. ONE EXTERIOR GIRDER AND ITS ADJACENT INTERIOR GIRDER SHALL BE ERECTED WITH ALL DIAPHRAGMS AND LATERAL BRACING BETWEEN THE GIRDERS IN PLACE AND ALL BOLTS TIGHTENED PRIOR TO RELEASE OF THE GIRDERS FROM LIFTING CRANES. THE REMAINING GIRDERS SHALL THEN BE ERECTED WITH DIAPHRAGMS CONNECTING THE GIRDER TO THE ADJACENT ERECTED GIRDER AND ALL BOLTS TIGHTENED BEFORE RELEASING THE GIRDER.

A MINIMUM OF TWO TEMPORARY BENTS SHALL BE USED. TEMPORARY BENTS SHALL REMAIN IN PLACE UNTIL ALL CROSS FRAMES AND LATERAL BRACING ARE IN PLACE AND HIGH STRENGTH BOLTS ARE TIGHTENED.

THE LOCATION OF THE TEMPORARY BENTS SHOWN ON ARE APPROXIMATE LOCATIONS AND SHALL BE ADJUSTED BY THE CONTRACTOR AS NECESSARY.

PLANS FOR THE TEMPORARY BENTS, ERECTION SEQUENCE AND TEMPORARY BENT REMOVAL SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW.

THE TEMPORARY BENTS SHALL BE DESIGNED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF NORTH CAROLINA.

DURING THE ERECTION PROCEDURE, THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING TEMPORARY LATERAL BRACING AND OTHER MEANS OF SUPPORT, AS REQUIRED, TO ENSURE THE STABILITY OF THE GIRDERS, AVOID UPLIFT OF THE GIRDERS AT THE BENTS AND TEMPORARY ERECTION BENTS, AND MAINTAIN PLUMBNESS OF THE GIRDER WEBS IN THE FINAL CONDITION.

THE CONTRACTOR'S ERECTION PLAN SHALL INCLUDE A METHOD OF TEMPORARY BENT REMOVAL THAT WILL UNIFORMLY APPLY THE STRUCTURAL STEEL WEIGHT TO THE BRIDGE CROSS FRAMES.

THE CONTRACTOR'S SEALED ERECTION PLAN SHALL BE DEVELOPED TO BE CONSISTENT WITH PROJECT TRAFFIC CONTROL AND TRAFFIC MANAGEMENT PLANS, WHERE LESS THAN 4' OF HORIZONTAL CLEAR DISTANCE IS PROVIDED BETWEEN THE EXISTING TYPE 7-C BARRIER AND PROPOSED TEMPORARY BENTS, THE CONTRACTOR'S SEALED PLAN SHALL ADDITIONALLY INCLUDE MEANS AND METHODS TO SUPPORT THE TYPE 7-C BARRIER TO PREVENT ANY TRAFFIC IMPACT LOADS FROM BEING TRANSMITTED TO TEMPORARY BENTS OR GIRDERS.

THE CONTRACTOR MAY SUBMIT ALTERNATE ERECTION METHODS. PLANS FOR SUCH ERECTION METHODS SHALL BE APPROVED BY THE ENGINEER.

FOR TEMPORARY BENTS, SEE SPECIAL PROVISIONS.

PROJECT NO. I-5714
MECKLENBURG COUNTY
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 DEPARTMENT OF TRANSPORTATION
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GIRDER ERECTION SEQUENCE

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

SHEET NO. S-05
 TOTAL SHEETS 53

DRAWN BY: M. D. NIFONG DATE: 1-30-18
 CHECKED BY: P. R. HOLSHOUSER DATE: 2-5-18
 DESIGN E.O.R.: P. R. HOLSHOUSER DATE: 5-8-18

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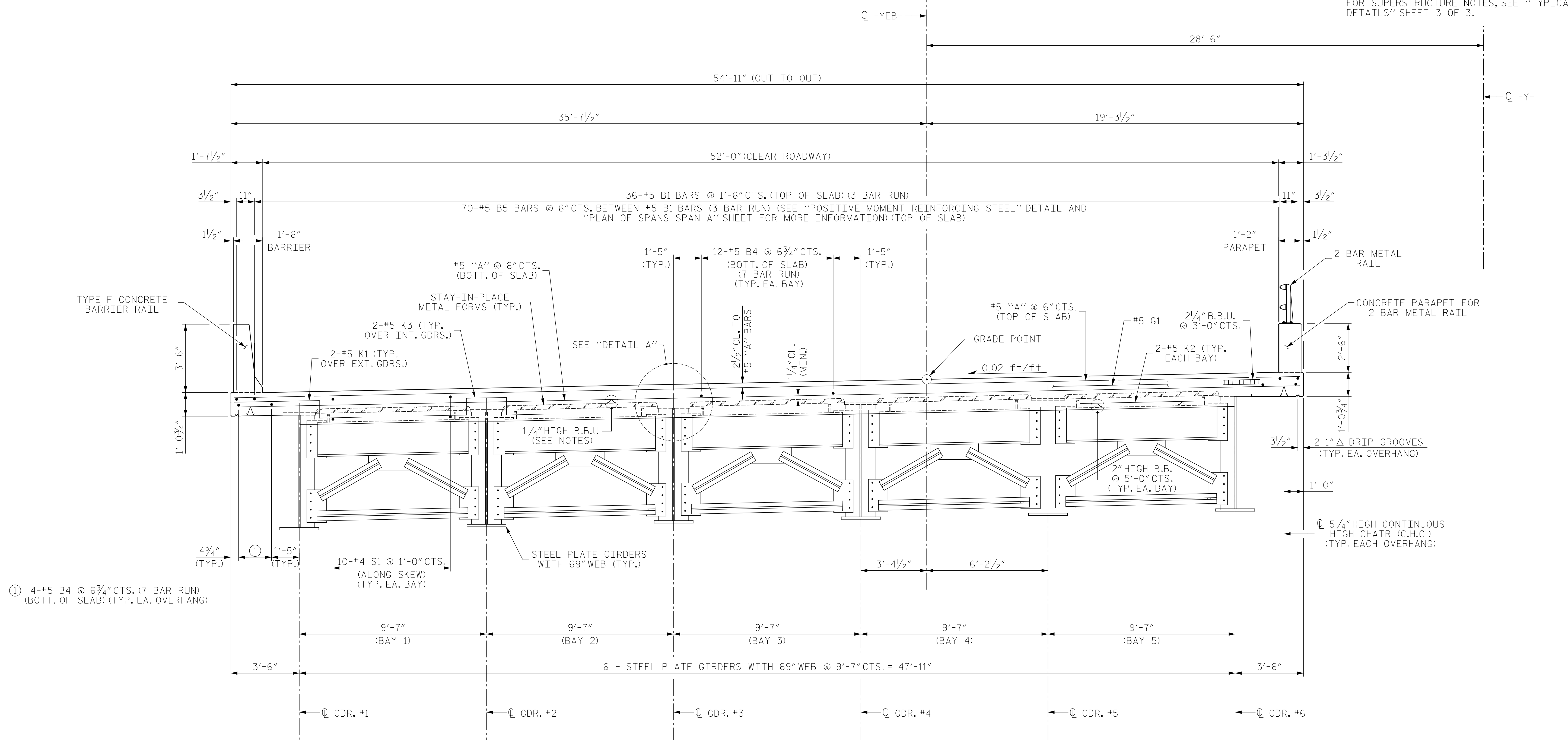
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5/8/2018 | 10:27 AM PDT

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NOTES:

FOR SUPERSTRUCTURE NOTES, SEE "TYPICAL SECTION DETAILS" SHEET 3 OF 3.

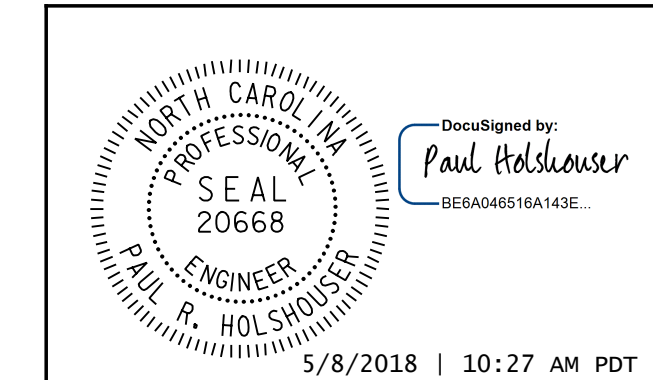


TYPICAL SECTION @ END BENT DIAPHRAGMS

PROJECT NO. I-5714
MECKLENBURG COUNTY
 STATION: 26+20.73 -YEB-

SHEET 1 OF 3

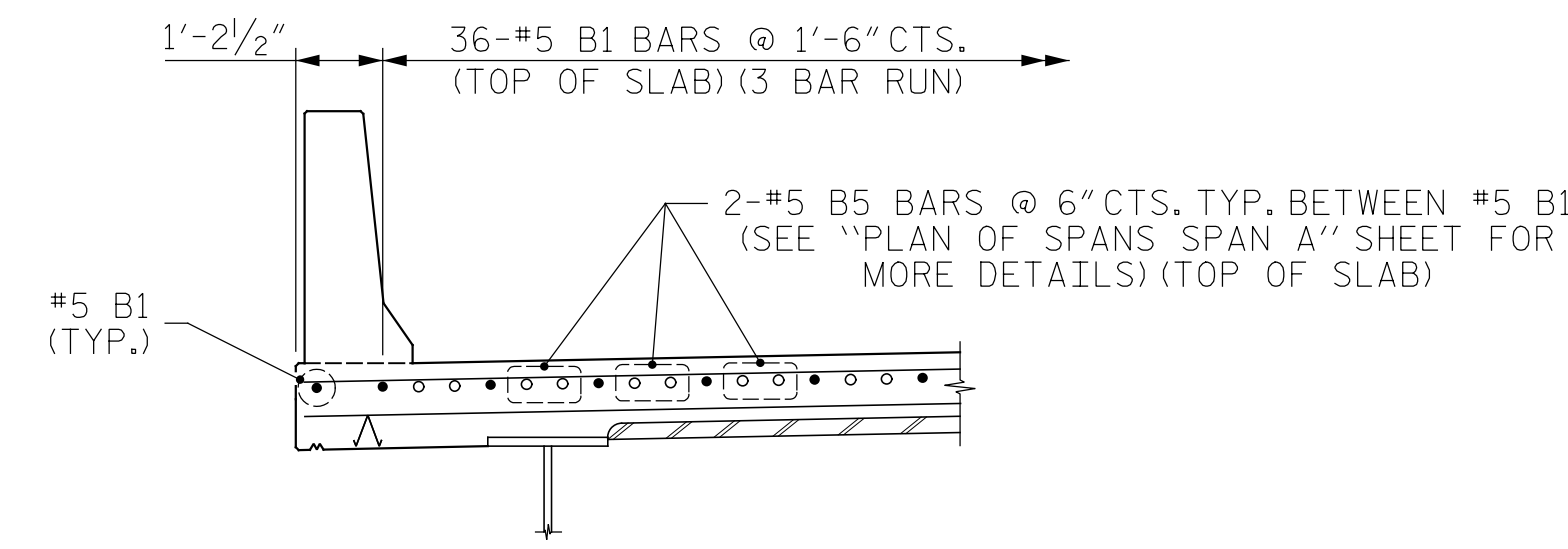
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 SUPERSTRUCTURE
 TYPICAL SECTION



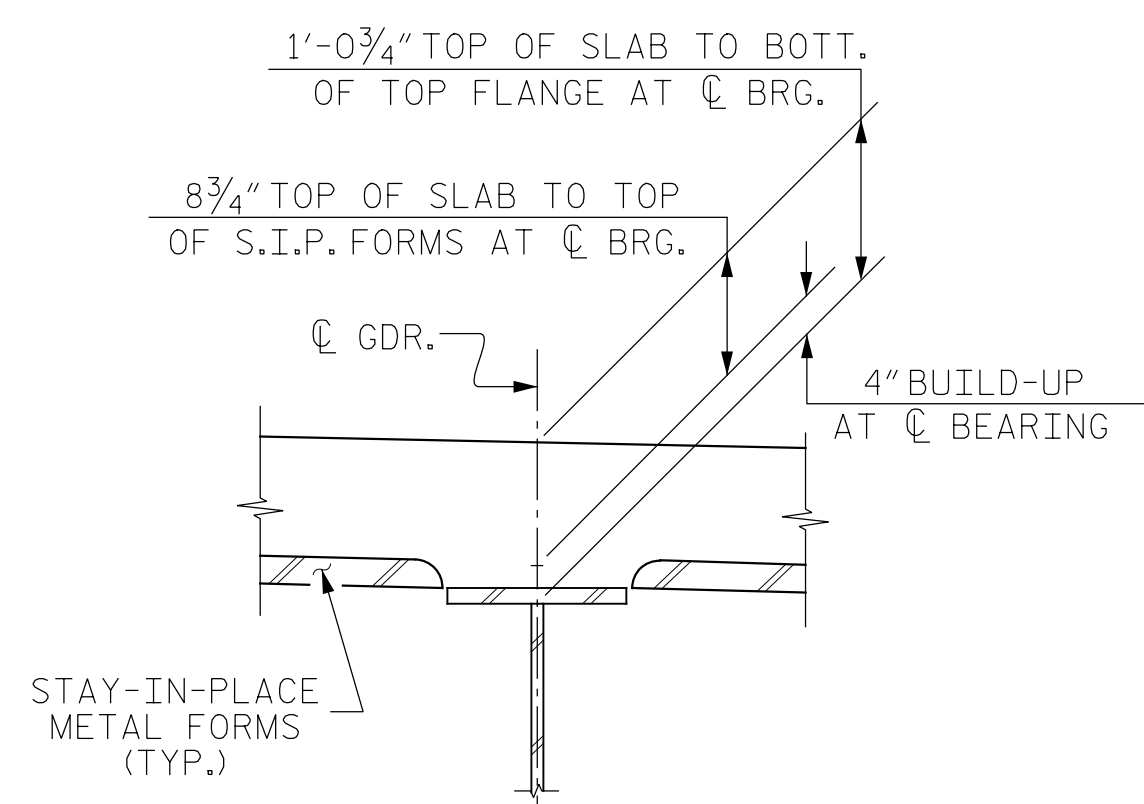
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POSITIVE MOMENT REINFORCING STEEL

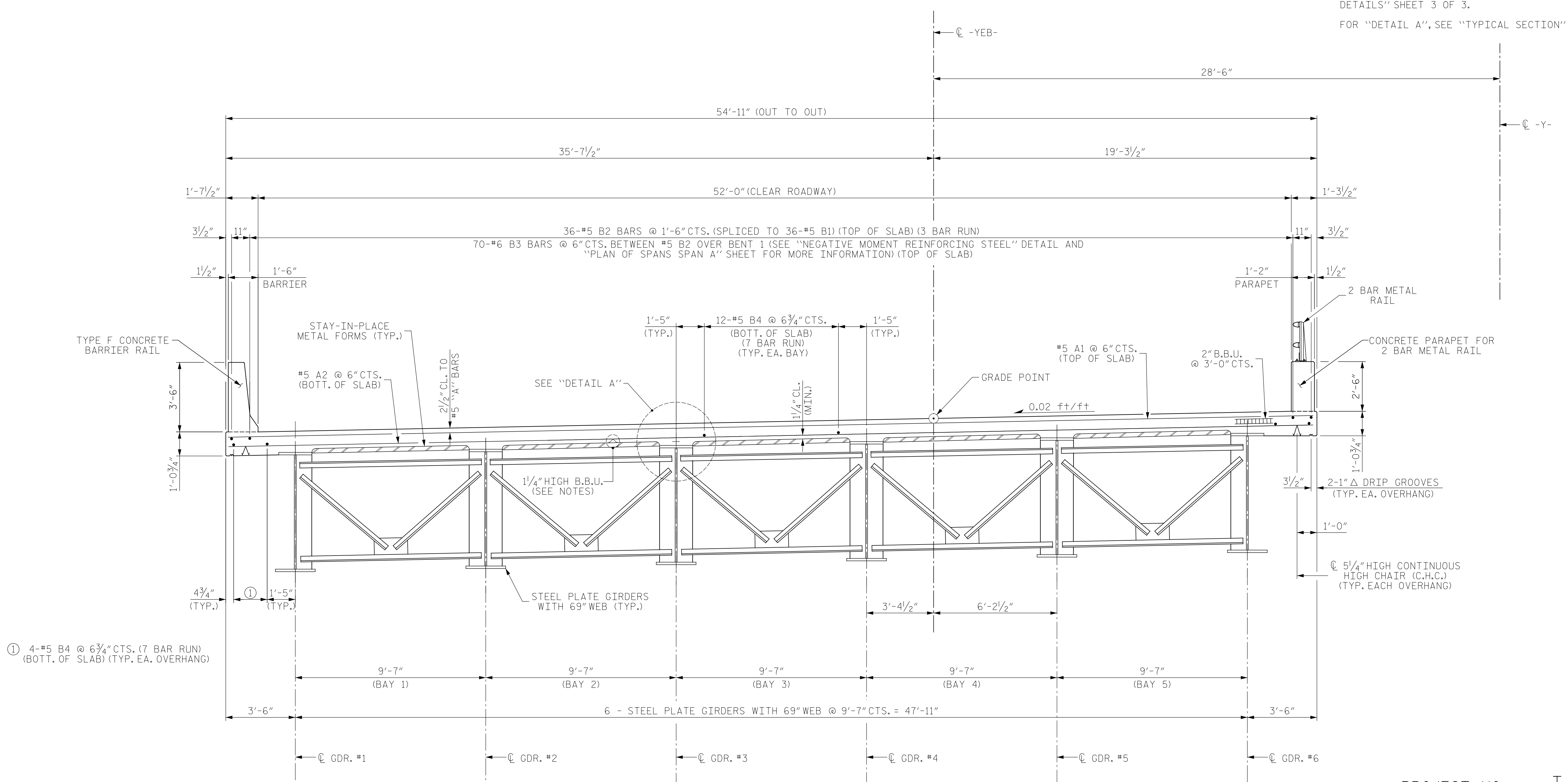


DETAIL A

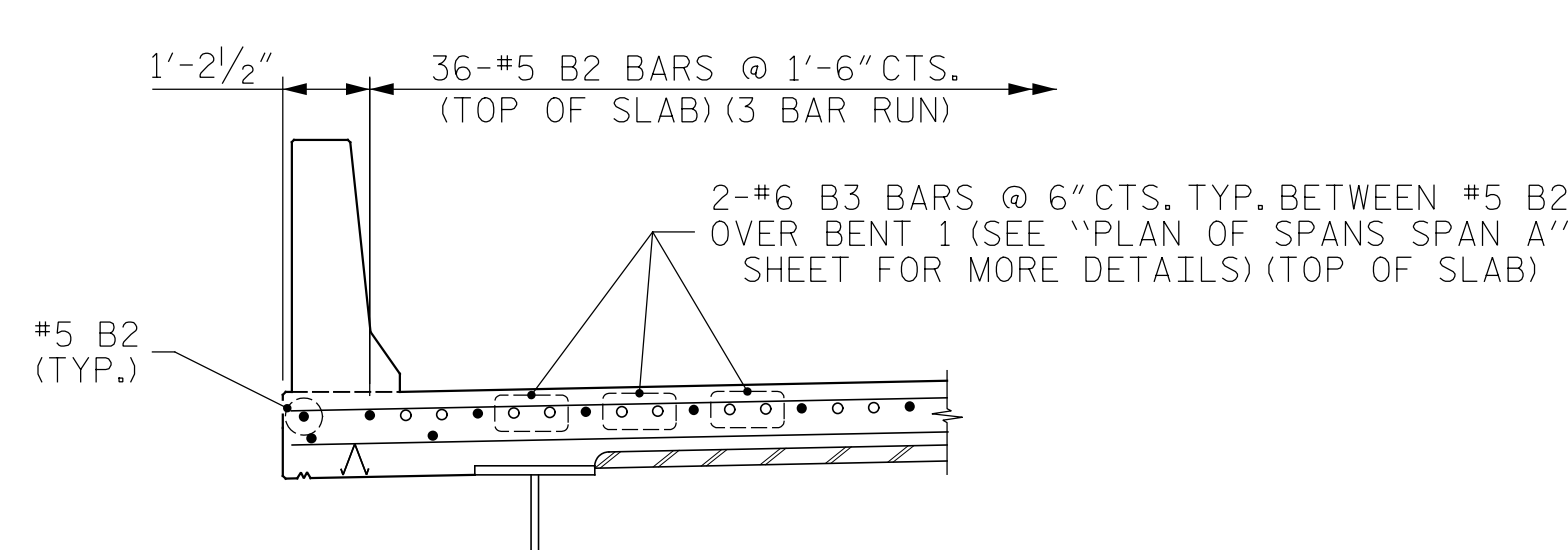
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NOTES:
FOR SUPERSTRUCTURE NOTES, SEE "TYPICAL SECTION DETAILS" SHEET 3 OF 3.
FOR "DETAIL A", SEE "TYPICAL SECTION" SHEET 1 OF 3.



TYPICAL SECTION @ BENT & INTERMEDIATE DIAPHRAGMS

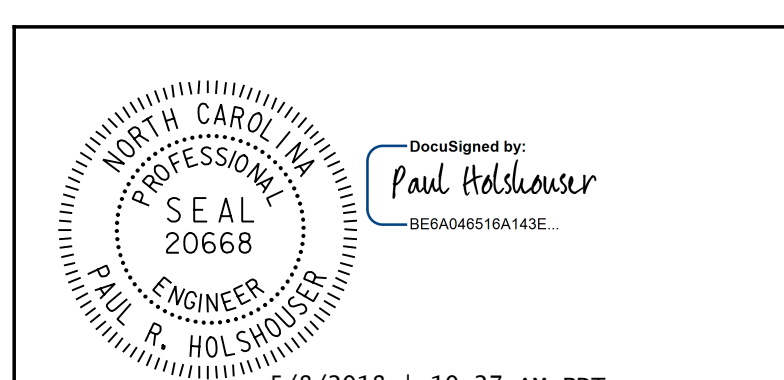


NEGATIVE MOMENT REINFORCING STEEL

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SHEET 2 OF 3

STATE OF NORTH CAROLINA
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SUPERSTRUCTURE
TYPICAL SECTION



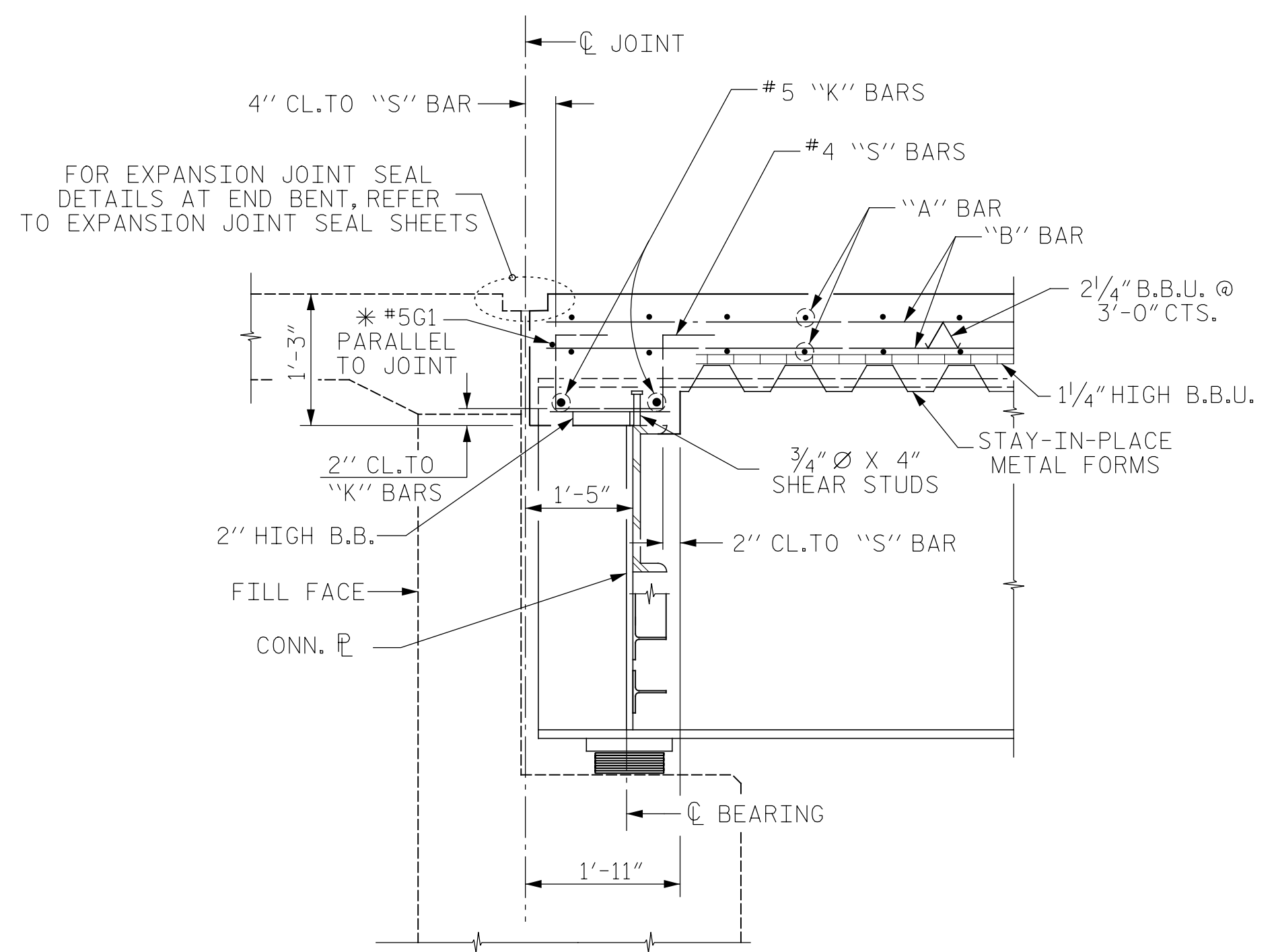
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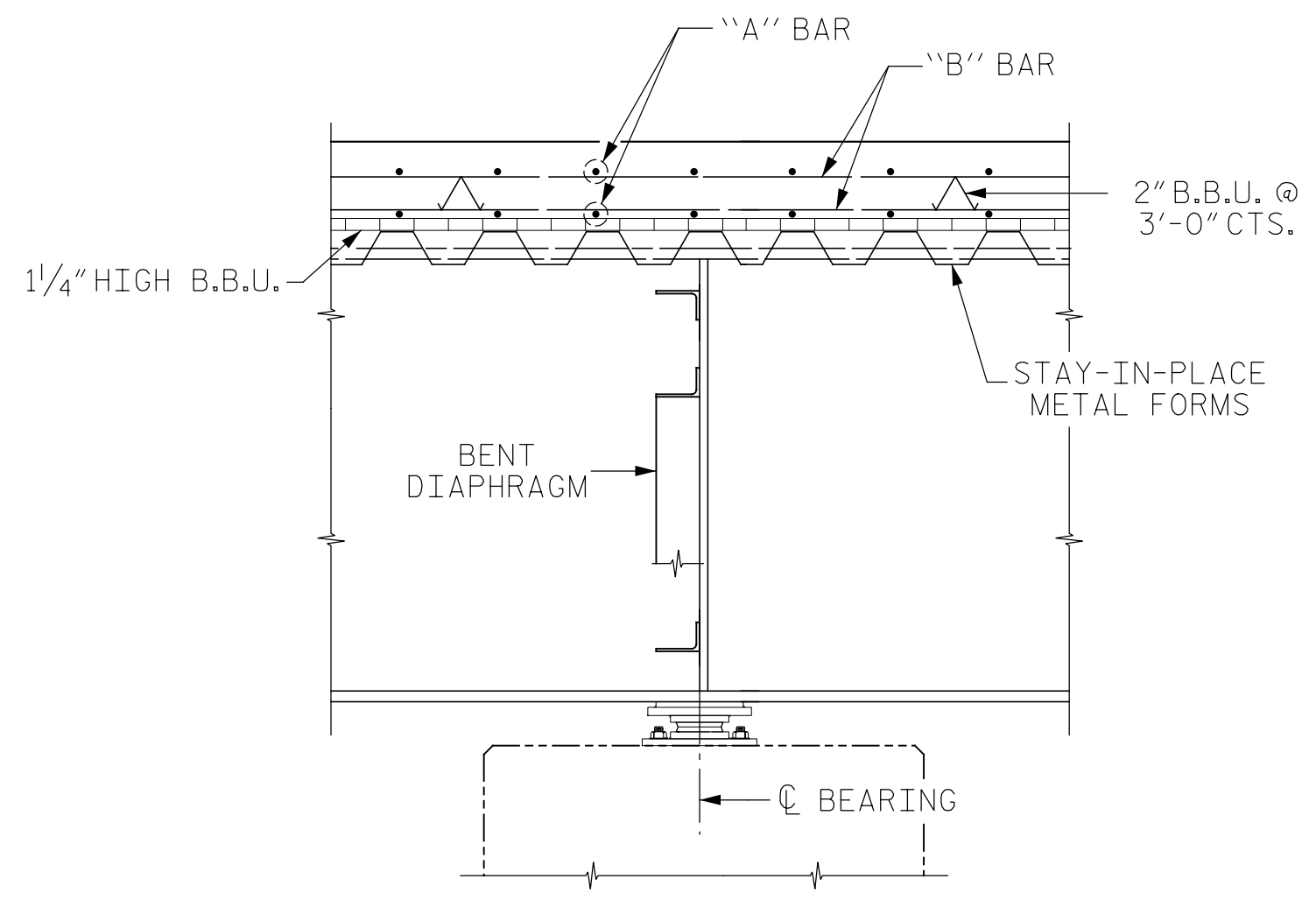
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SECTION THRU DIAPHRAGM AT END BENTS

* #5G1 BAR MAY BE SHIFTED SLIGHTLY, AS NECESSARY, TO CLEAR STIRRUP AND REINFORCING STEEL.



SECTION AT BENT

NOTES:

PROVIDE 1 1/4" HIGH BEAM BOLSTERS UPPER AT 4'-0" CTS. ATOP THE METAL STAY-IN-PLACE FORMS TO SUPPORT THE BOTTOM MAT OF 'A' BARS. WHEN USING REMOVABLE FORMS, PROVIDE CONTINUOUS HIGH CHAIRS FOR METAL DECK (C.H.C.M.) @ 4'-0" CTS. WITH A HEIGHT TO SUPPORT THE BOTTOM MAT OF 'A' BARS A CLEAR DISTANCE OF 2 1/2" ABOVE THE TOP OF THE REMOVABLE FORM.

METAL STAY-IN-PLACE FORMS SHALL NOT BE WELDED TO BEAM OR GIRDER FLANGES IN THE ZONES REQUIRING CHARPY V-NOTCH TEST. SEE STRUCTURAL STEEL DETAIL SHEETS.

PREVIOUSLY CAST CONCRETE IN A CONTINUOUS UNIT SHALL HAVE ATTAINED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI BEFORE ADDITIONAL CONCRETE IS CAST IN THE UNIT.

STRUCTURAL STEEL ERECTION IN A CONTINUOUS UNIT SHALL BE COMPLETE BEFORE FALSEWORK OR FORMS ARE PLACED ON THE UNIT.

#5 G1 BAR MAY BE SHIFTED SLIGHTLY, AS NECESSARY, TO CLEAR REINFORCING STEEL AND STIRRUPS.

THE CONTRACTOR MAY, WHEN NECESSARY, PROPOSE A SCHEME FOR AVOIDING INTERFERENCE BETWEEN METAL STAY-IN-PLACE FORM SUPPORTS OR FORMS AND BEAM/GIRDER STIFFENERS OR CONNECTOR PLATES. THE PROPOSAL SHALL BE INDICATED, AS APPROPRIATE, ON EITHER THE STEEL WORKING DRAWINGS OR THE METAL STAY-IN-PLACE FORM WORKING DRAWINGS.

FOR REINFORCING STEEL IN BARRIER RAIL AND CONCRETE PARAPET SEE "CONCRETE BARRIER RAIL AND PARAPET" SHEET.

FOR POUR SEQUENCE, SEE "BILL OF MATERIAL" SHEET.

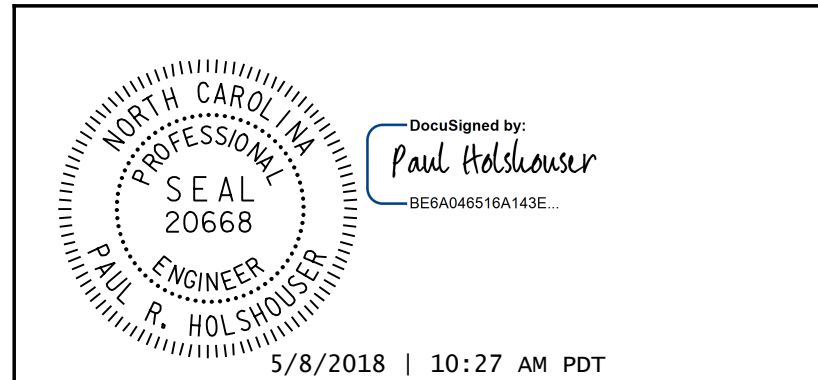
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PROJECT NO. I-5714
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 STATION: 26+20.73 -YEB-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
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 RALEIGH
 SUPERSTRUCTURE
 TYPICAL SECTION
 DETAILS

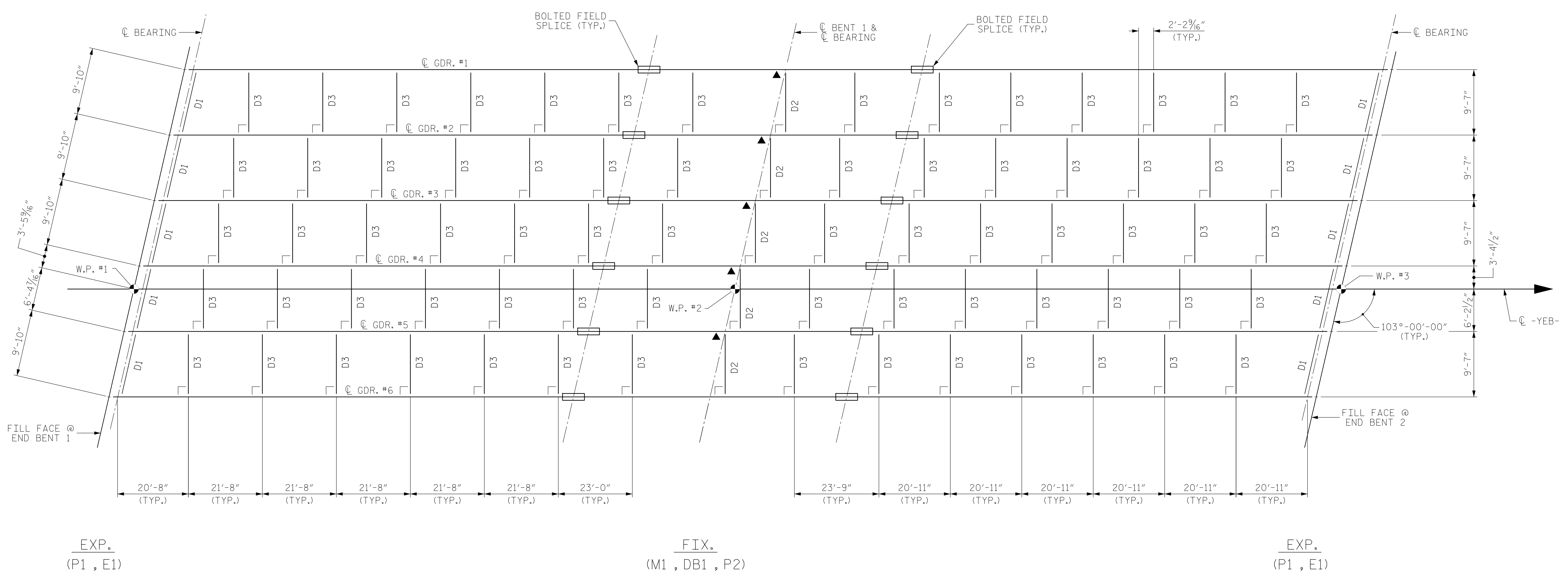


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▲ BEARING STIFFENER USED AS A CONNECTOR \bar{P} AT THIS LOCATION



EXP.
(P1 , E1)

FIX.
(M1 , DB1 , P2)

EXP.
(P1 , E1)

SPAN A

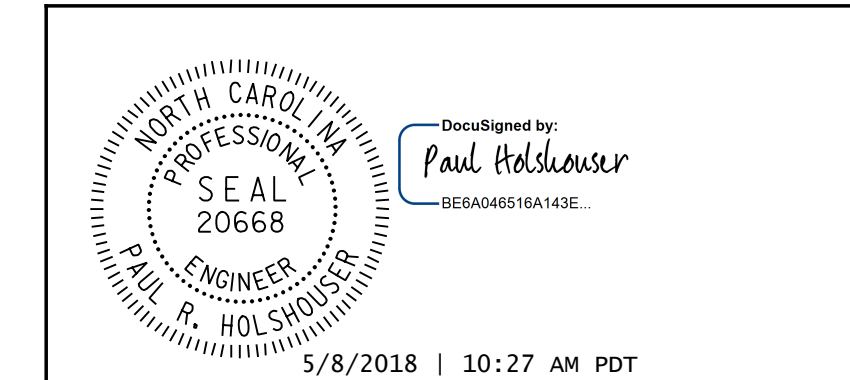
SPAN B

FRAMING PLAN

PROJECT NO. I-5714
MECKLENBURG COUNTY
 STATION: 26+20.73 -YEB-

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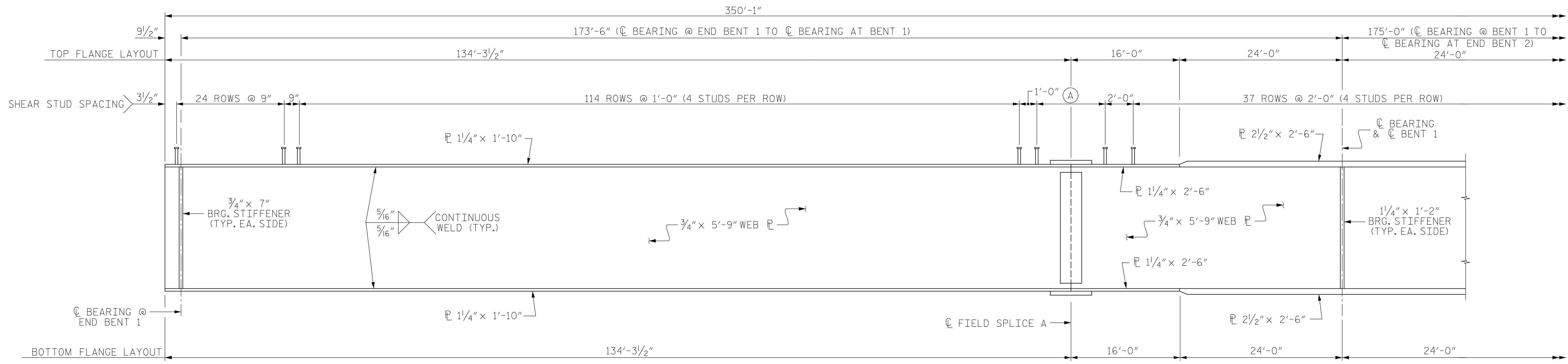
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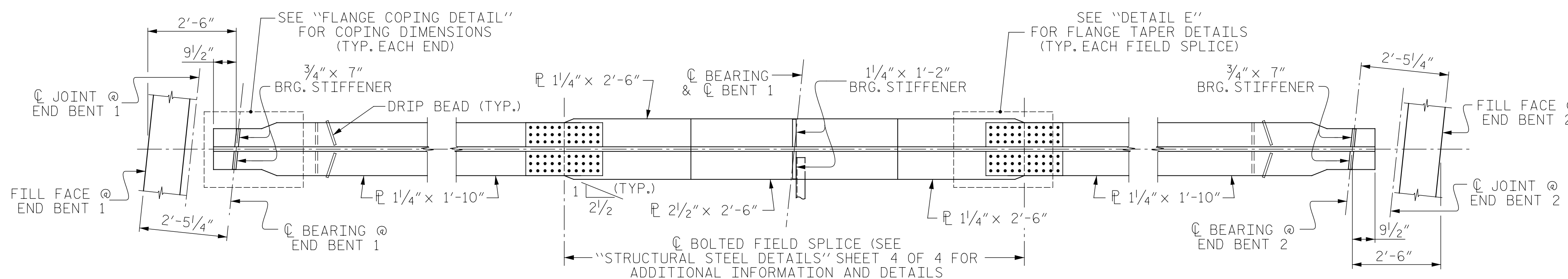
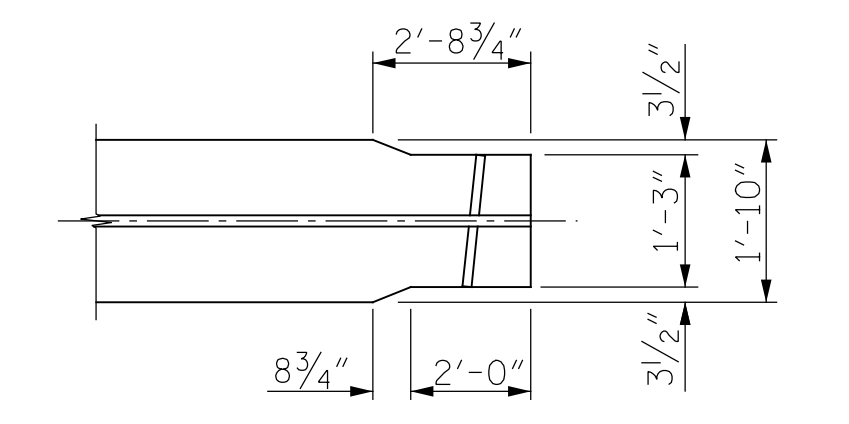
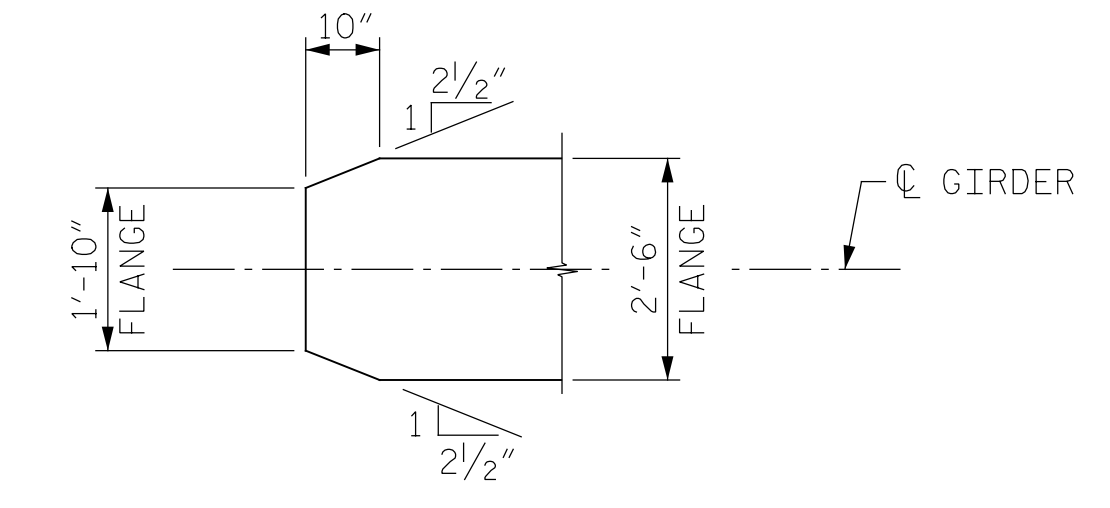
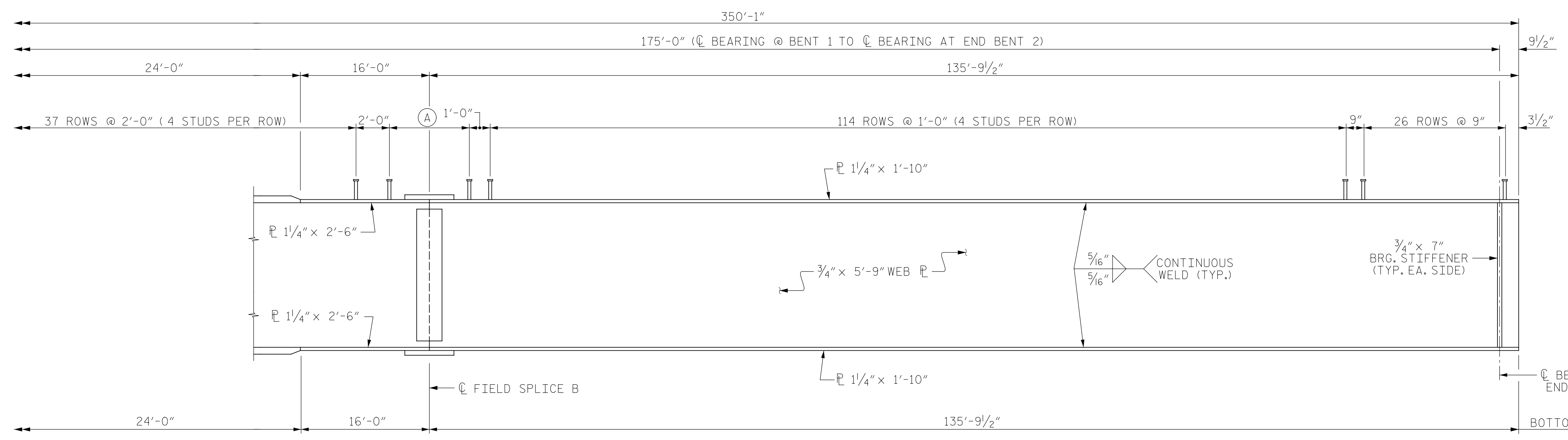
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STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH SUPERSTRUCTURE FRAMING PLAN					
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2			4		
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(A) FOR SHEAR STUDS IN THIS AREA SEE "STRUCTURAL STEEL DETAILS" SHEET 4 OF 4 (3 STUDS PER ROW)



PROJECT NO. I-5714
MECKLENBURG COUNTY
 STATION: 26+20.73 -YEB-
 SHEET 1 OF 4

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

**SUPERSTRUCTURE
 STRUCTURAL STEEL
 DETAILS**

DocuSigned by:
Paul Holshouser
 BE0408516A143E

5/8/2018 | 10:27 AM PDT

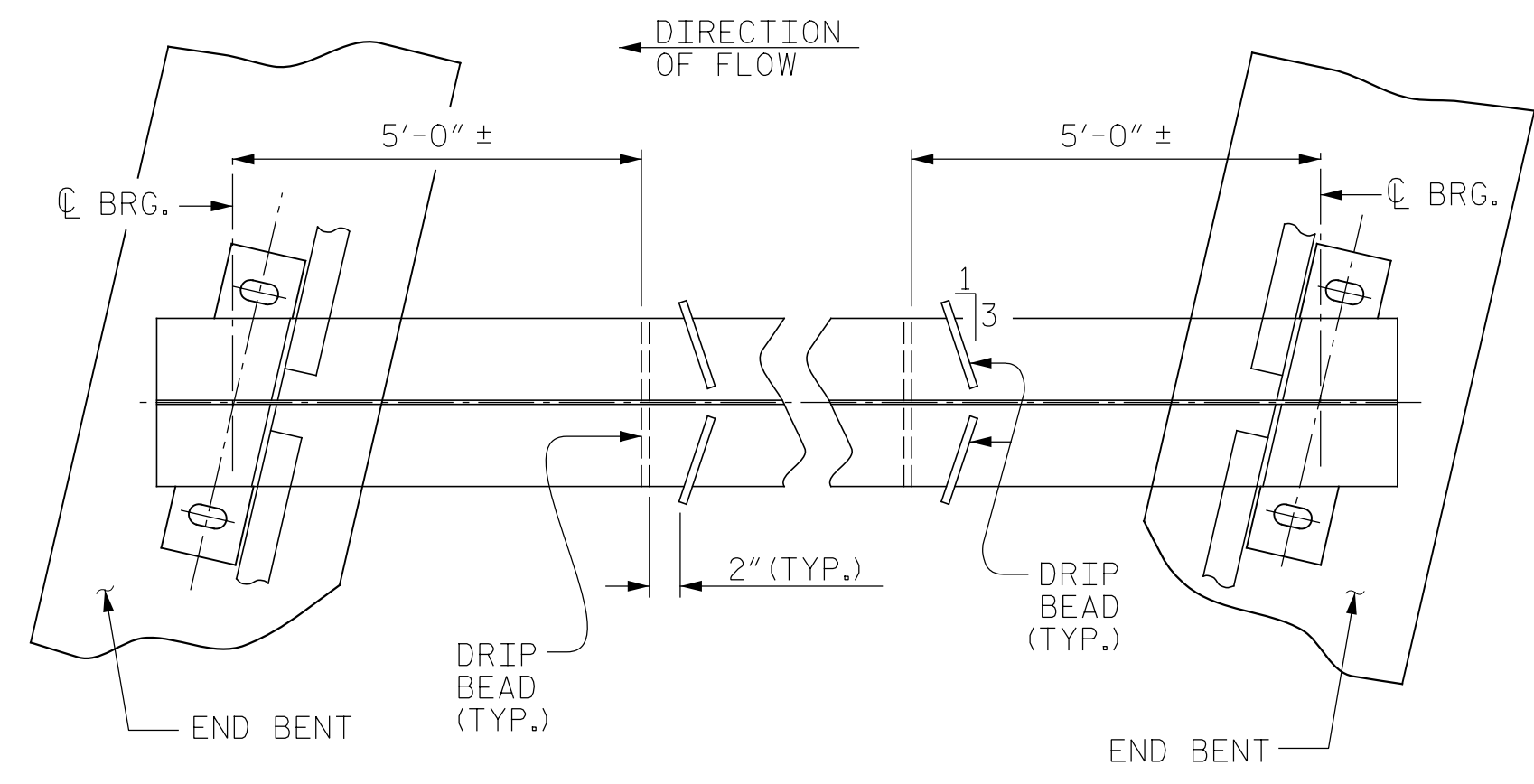
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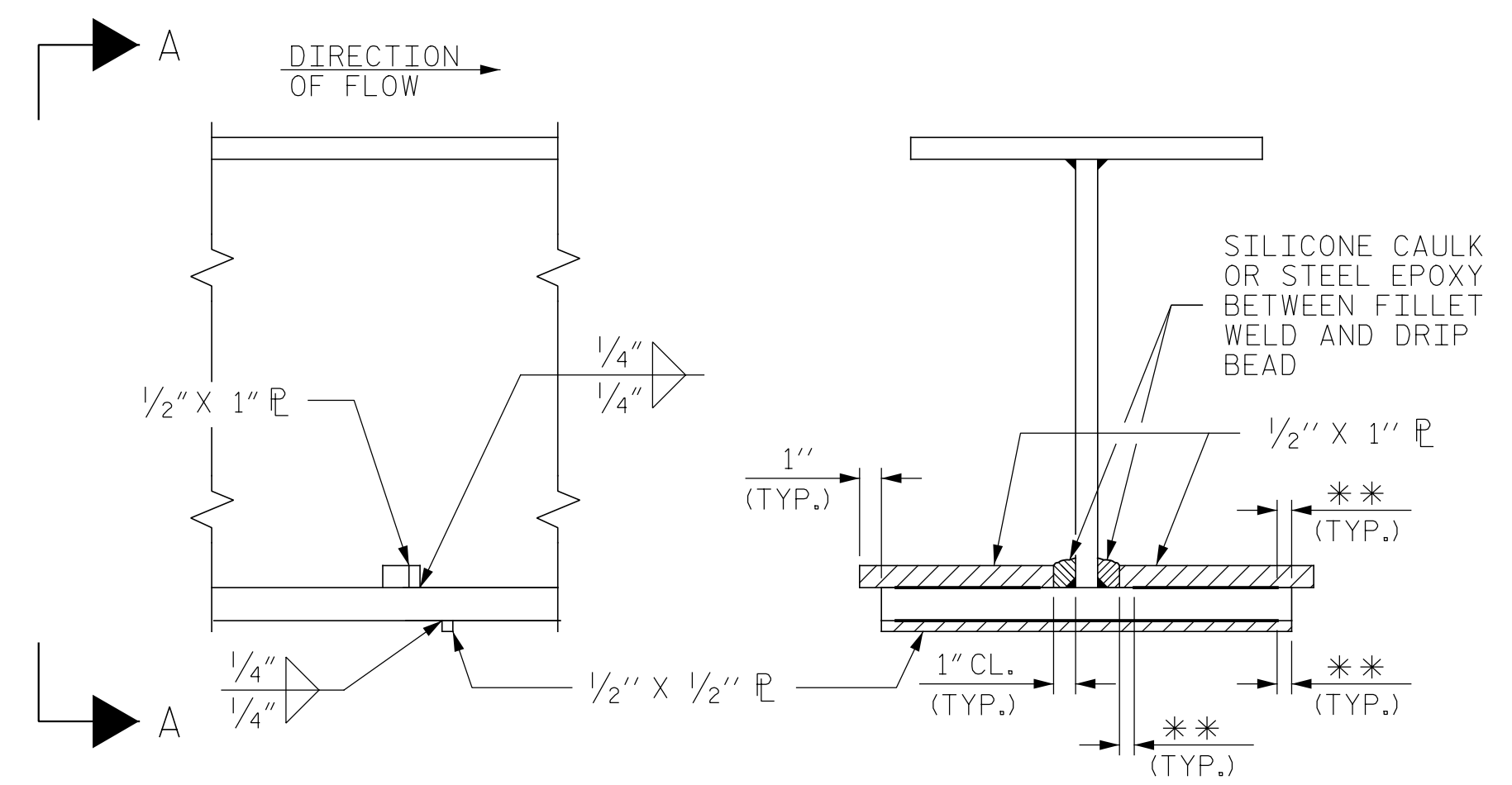
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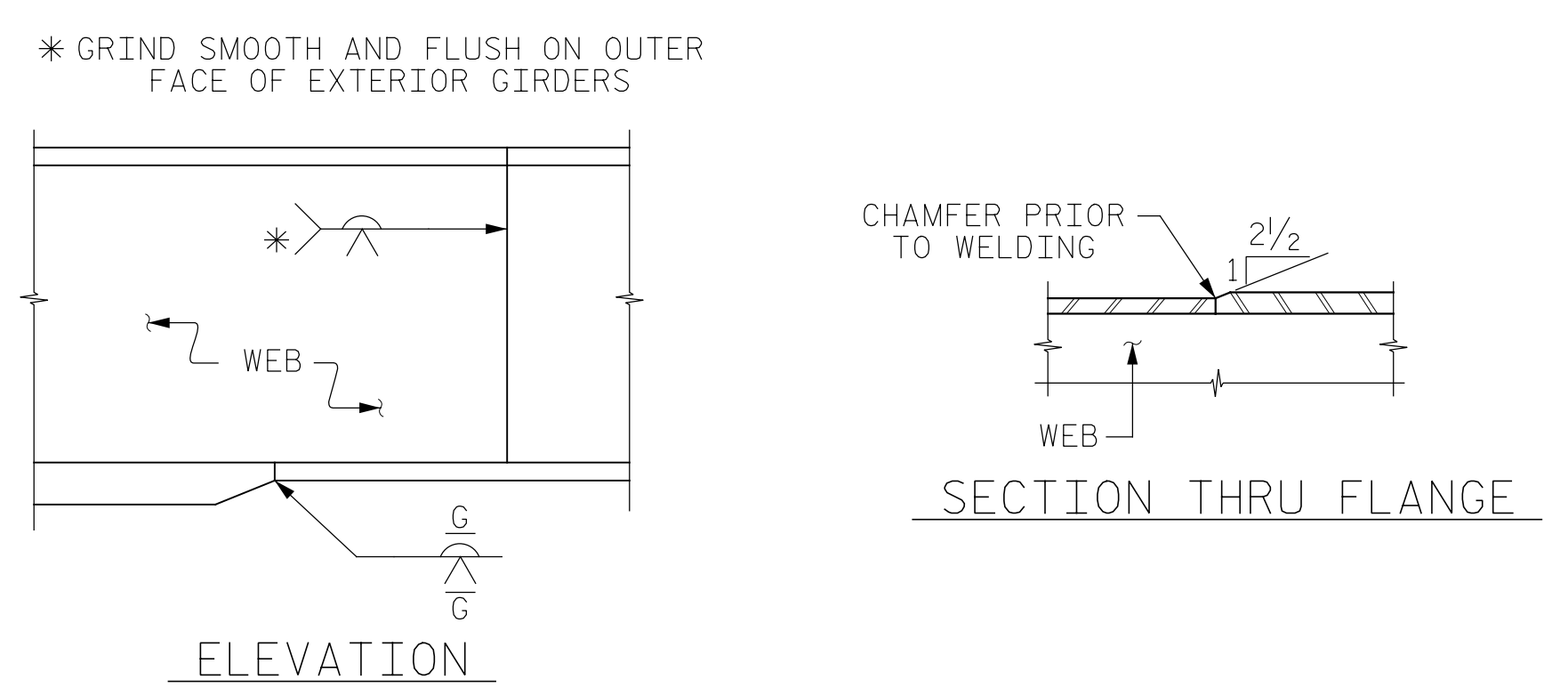
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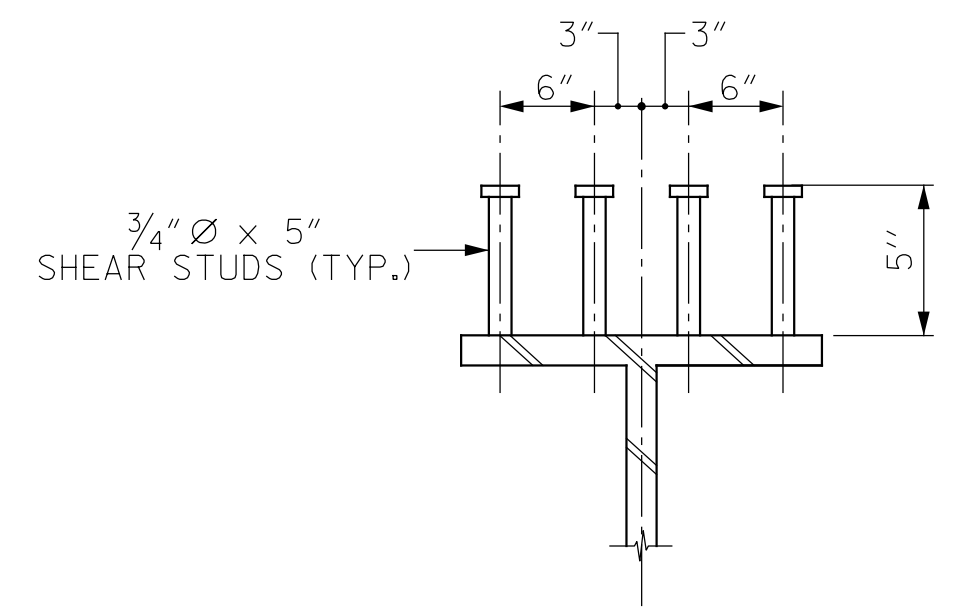
PART PLAN - BOTTOM FLANGE



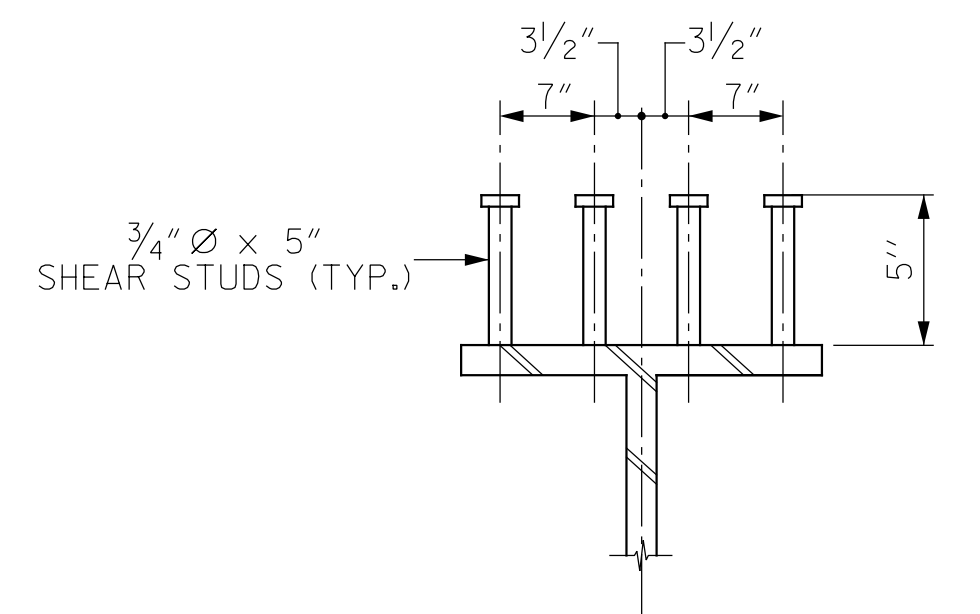
SECTION
VIEW A-A
DRIP BEAD DETAILS
** SEE "WELD TERMINATION DETAILS"



ELEVATION
SECTION THRU FLANGE
PERMISSIBLE SHOP FLANGE & WEB SPLICE

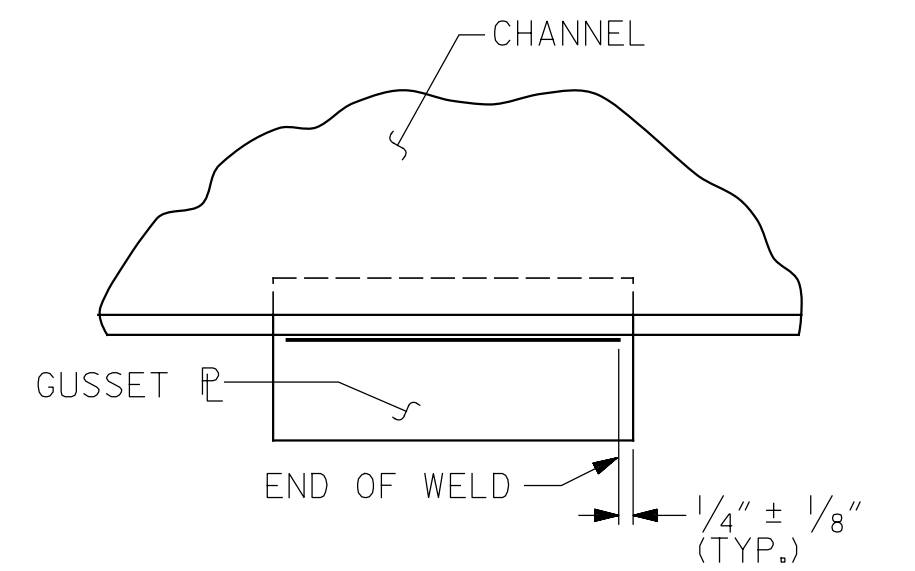


1'-10" FLANGE PLATE

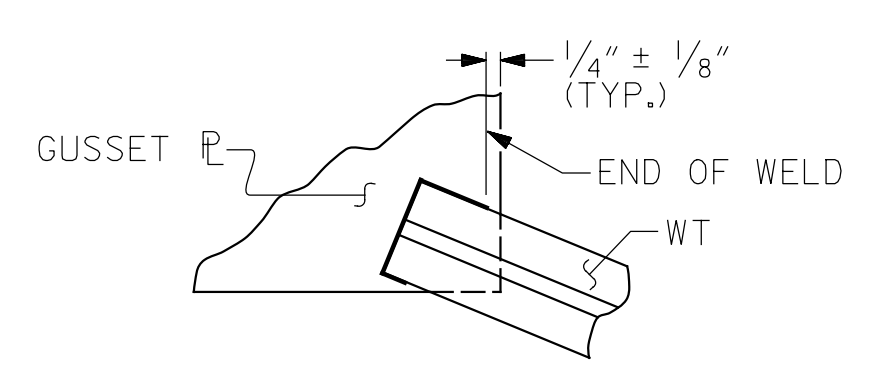


2'-6" FLANGE PLATE

SHEAR STUD DETAIL

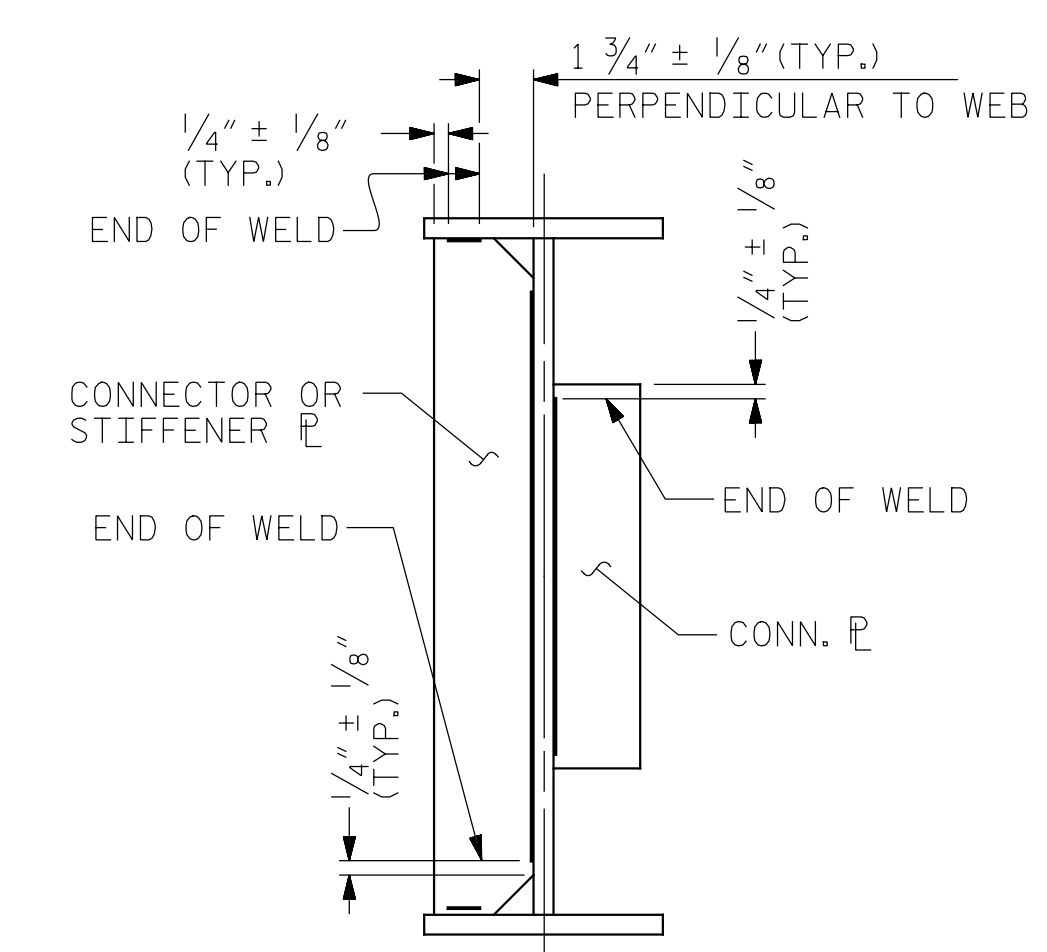


TYPICAL GUSSET PLATE CONNECTIONS



TYPICAL "TEE" TO GUSSET PLATE CONNECTIONS

WELD TERMINATION DETAILS



TYPICAL STIFFENER OR CONNECTOR PLATE CONNECTIONS

NOTES:

ALL STRUCTURAL STEEL SHALL BE AASHTO M270 GRADE 50W AND PAINTED IN ACCORDANCE WITH SYSTEM 5 OR SYSTEM 6 OF THE STRUCTURAL STEEL SHOP COATINGS PROGRAM AND SECTION 442-8 OF THE STANDARD SPECIFICATIONS UNLESS OTHERWISE NOTED ON THE PLANS.

ALL DIMENSIONS SHOWN ARE HORIZONTAL OR VERTICAL, UNLESS OTHERWISE NOTED.

ALL FIELD CONNECTIONS TO BE 7/8" DIA. HIGH STRENGTH BOLTS UNLESS OTHERWISE NOTED.

A CHARPY V-NOTCH TEST IS REQUIRED FOR WEB PLATES, BOTTOM FLANGE PLATES, BOTTOM FLANGE SPLICE PLATES AND WEB SPLICE PLATES (IF USED) FOR ALL GIRDERS AND IN ACCORDANCE WITH ARTICLE 1072-7 OF THE STANDARD SPECIFICATIONS. H 008

STUDS ON GIRDERS MAY BE SHIFTED UP TO 1" IF NECESSARY TO CLEAR FLANGE SPLICE WELD.

TENSION ON THE ASTM A325 BOLTS SHALL BE CALIBRATED USING DIRECT TENSION INDICATOR WASHERS IN ACCORDANCE WITH ARTICLE 440-8 OF THE STANDARD SPECIFICATIONS.

END OF BEAMS AND GIRDERS SHALL BE PLUMB.

BEARING STIFFENER MAY REQUIRE COPING IF WIDER THAN BOTTOM FLANGE.

AT THE CONTRACTOR'S OPTION, THE DIAPHRAGM WITH THE WELDED GUSSET PLATES MAY BE USED IN LIEU OF THE DIAPHRAGM WITH BOLTED ANGLES AT NO ADDITIONAL COST TO THE DEPARTMENT.

FABRICATORS SHALL DETAIL DIAPHRAGM MEMBERS AND CONNECTIONS FOR FULL DEAD LOAD FIT UP, GIRDERS SHALL BE PLUMB AFTER THE FULL AMOUNT OF DEAD LOAD IS APPLIED.

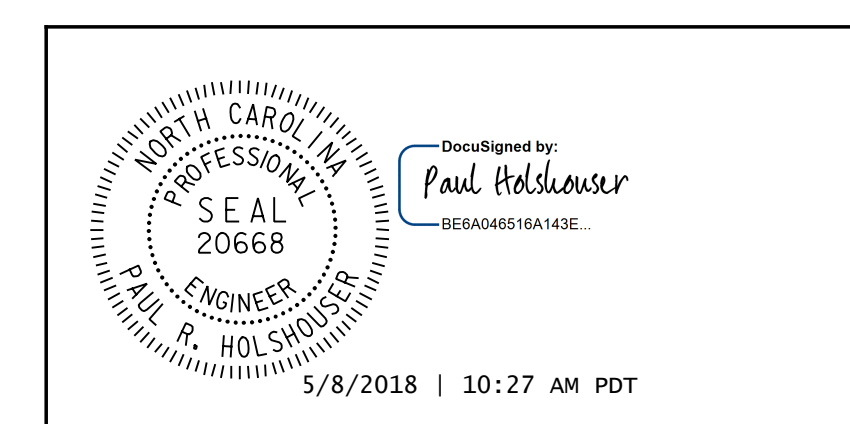
STRUCTURAL STEEL ERECTION IN A CONTINUOUS UNIT SHALL BE COMPLETE BEFORE FALSEWORK OR FORMS ARE PLACED ON THE UNIT.

PROJECT NO. I-5714
MECKLENBURG COUNTY
STATION: 26+20.73 -YEB-

SHEET 2 OF 4

STATE OF NORTH CAROLINA
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SUPERSTRUCTURE
STRUCTURAL STEEL
DETAILS

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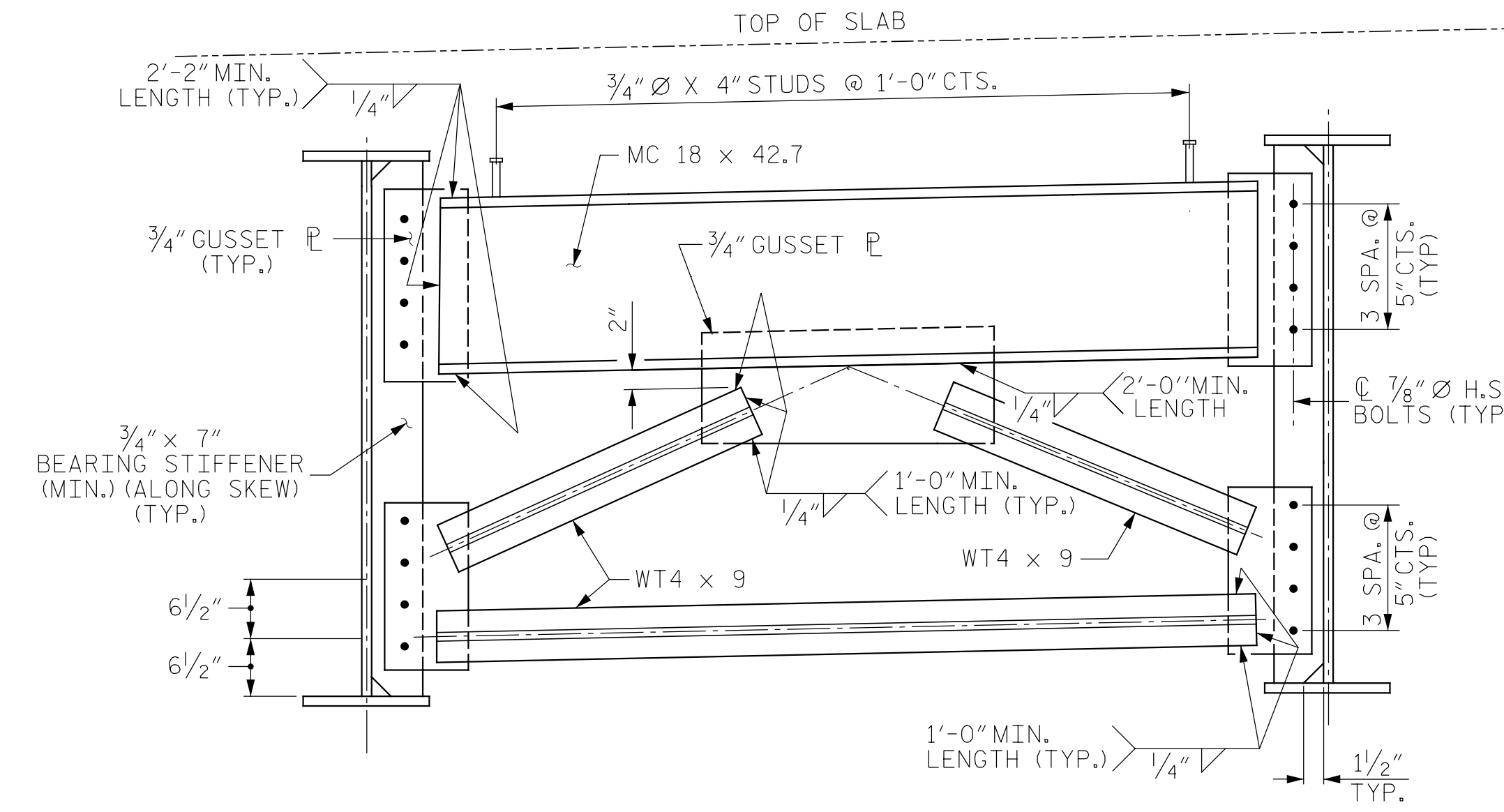


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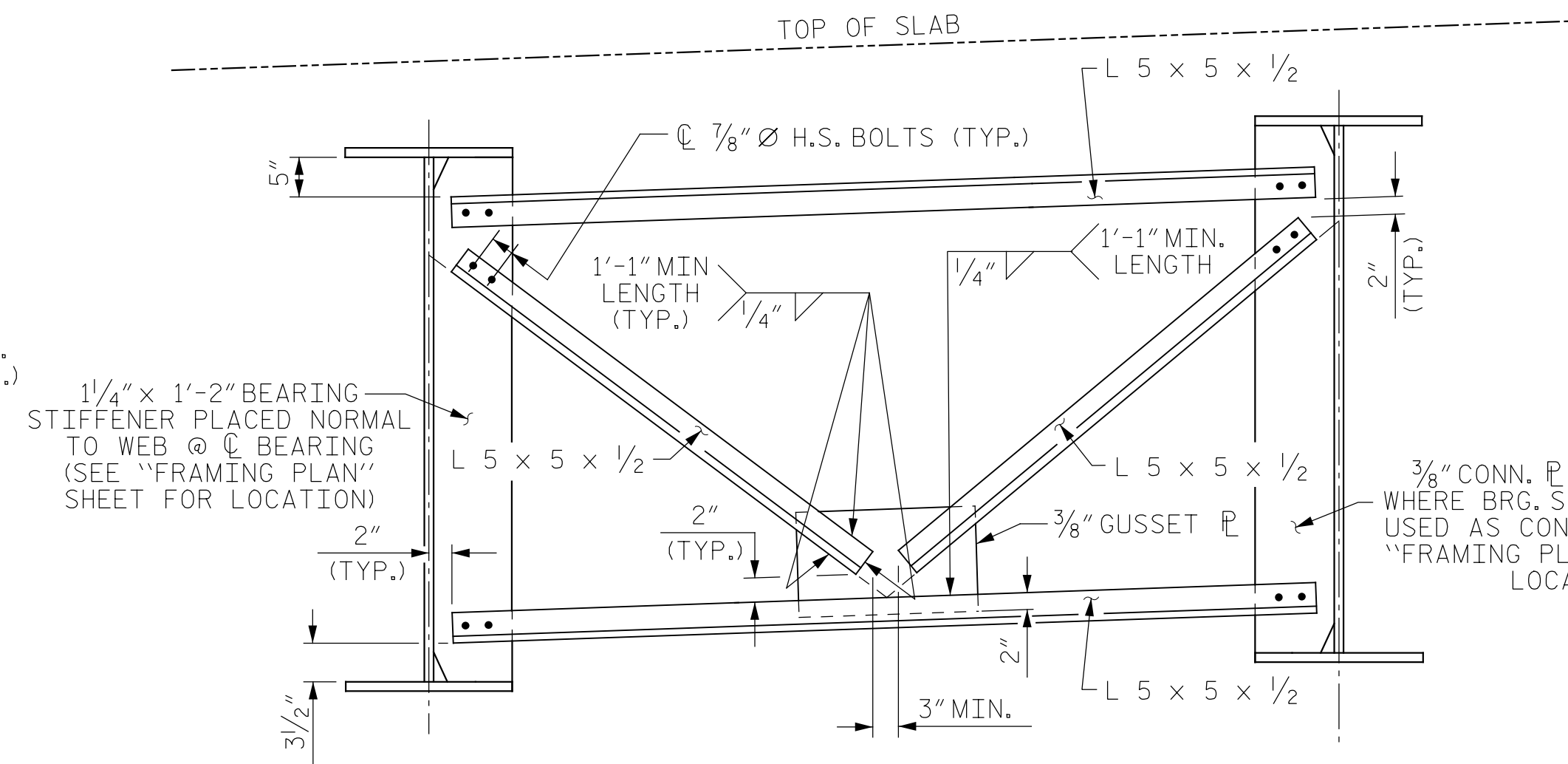
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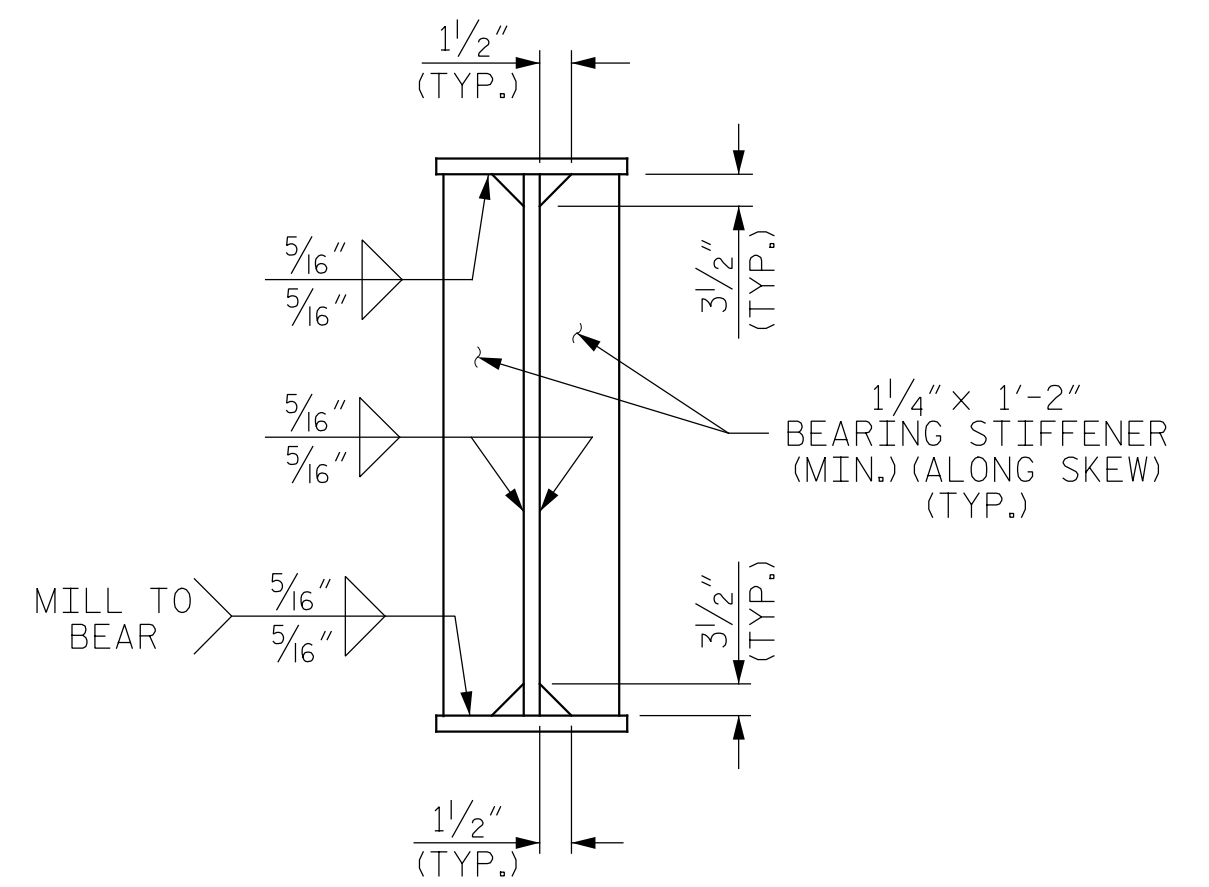
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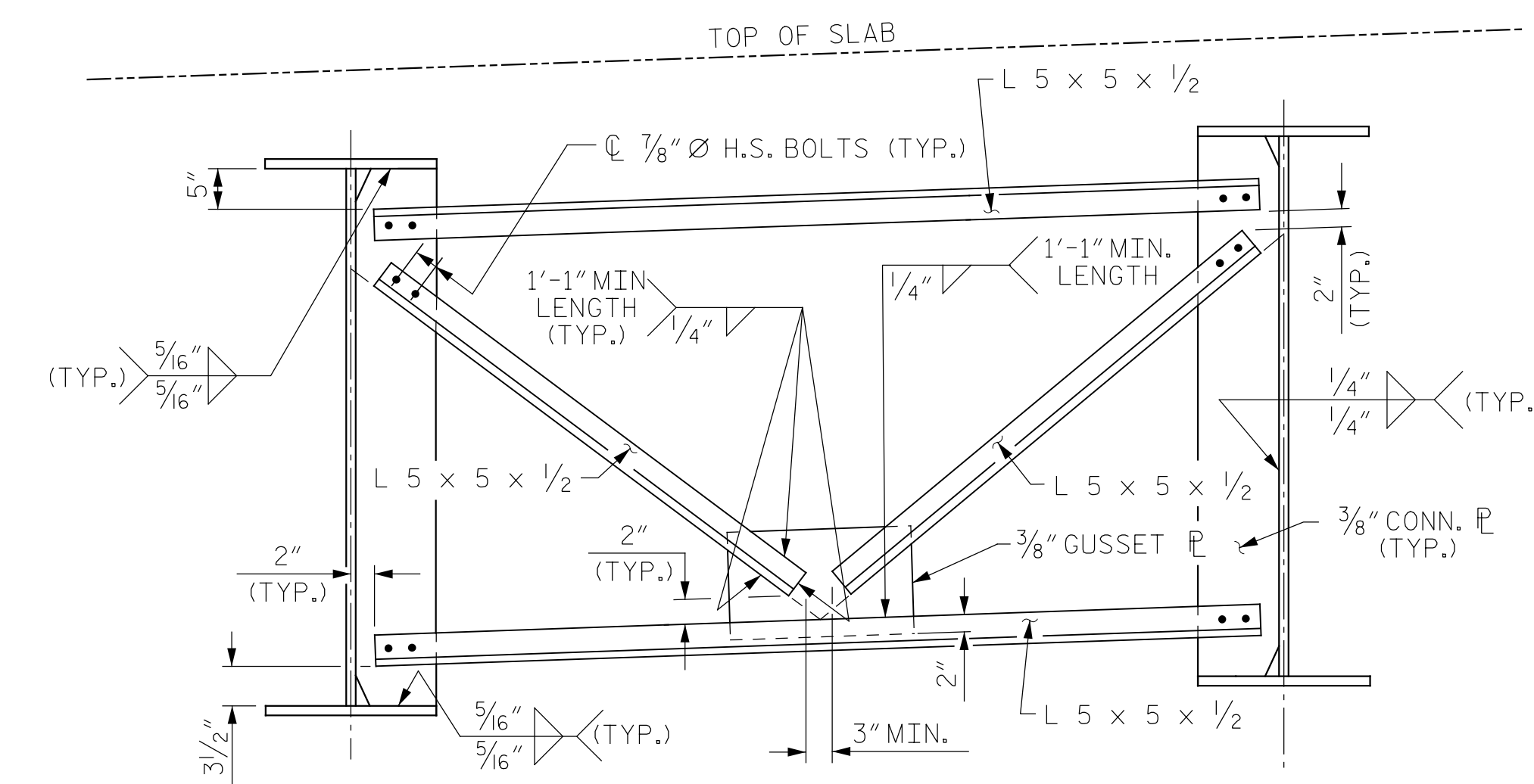
END BENT DIAPHRAGM - (D1)



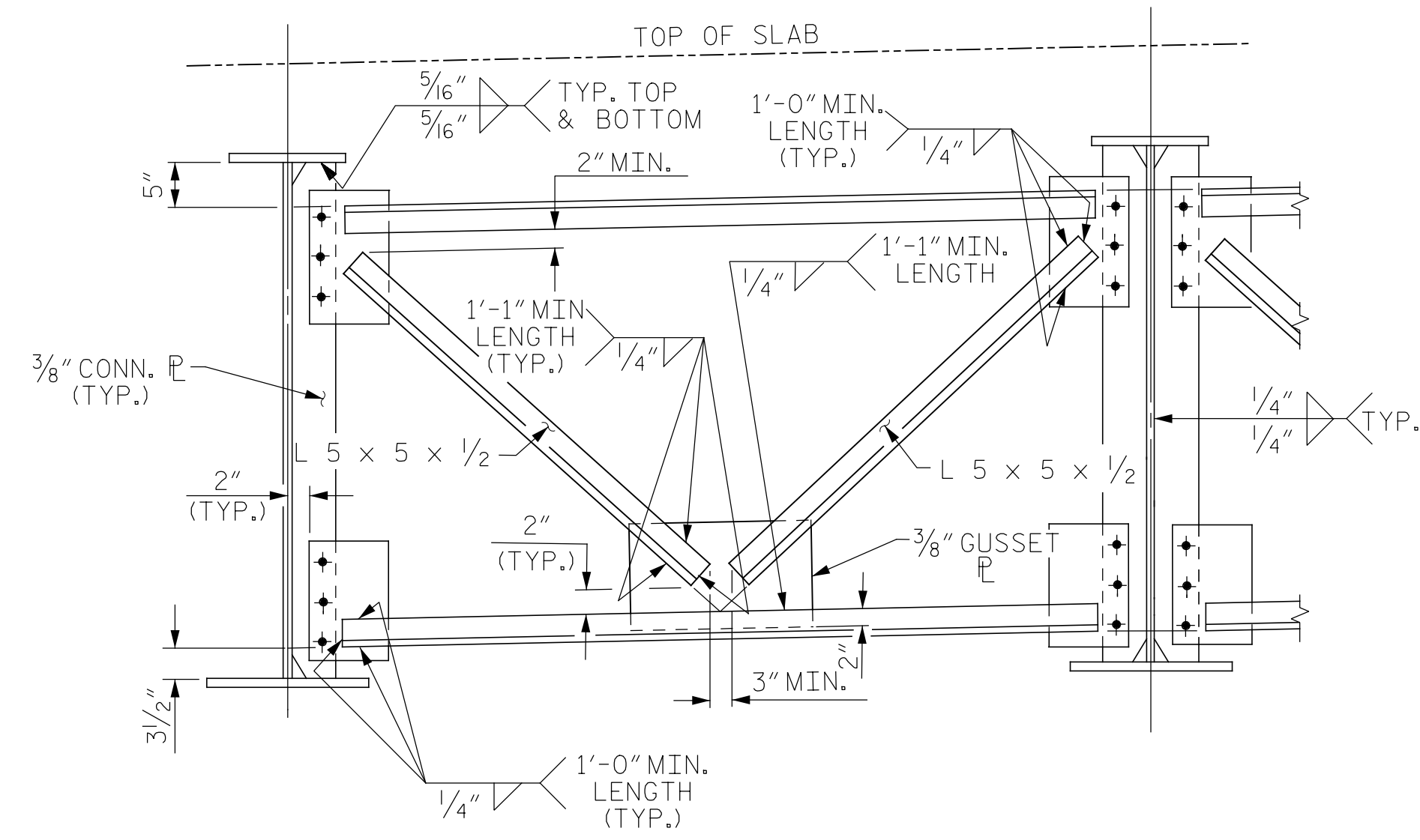
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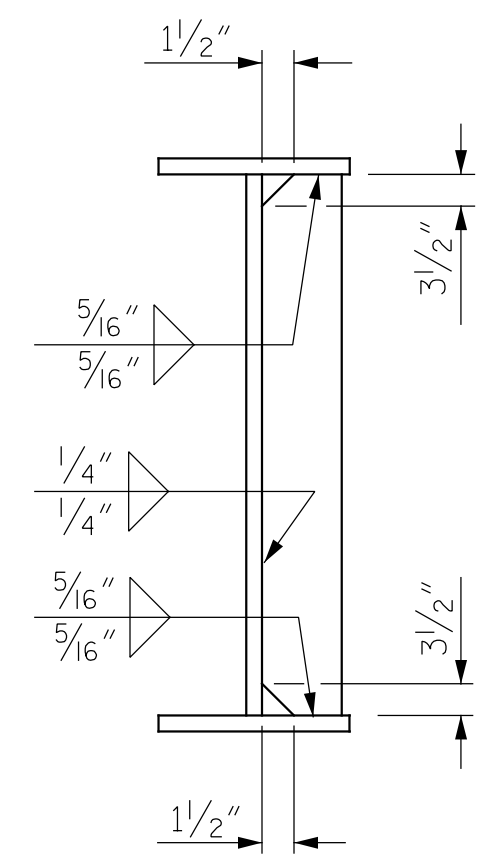
BEARING STIFFENER BENT DIAPHRAGM



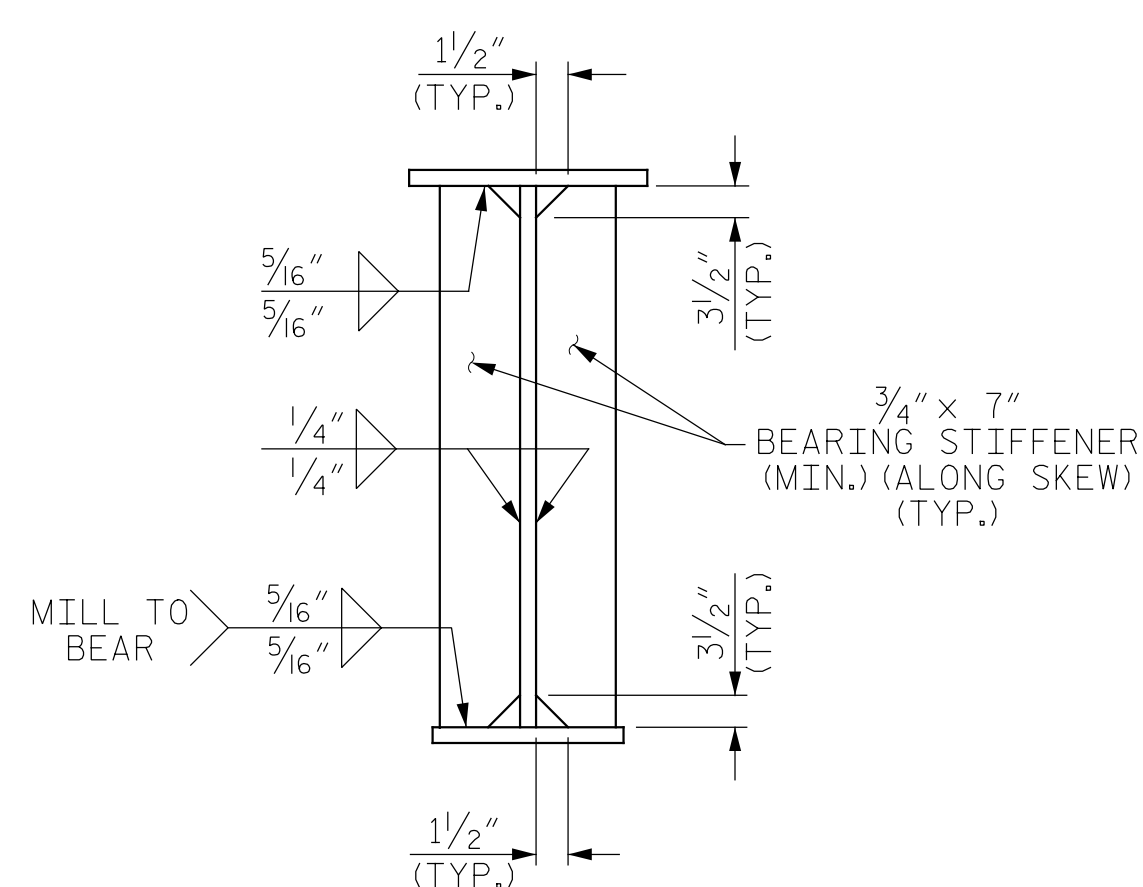
TYPICAL INTERMEDIATE DIAPHRAGM - (D3)



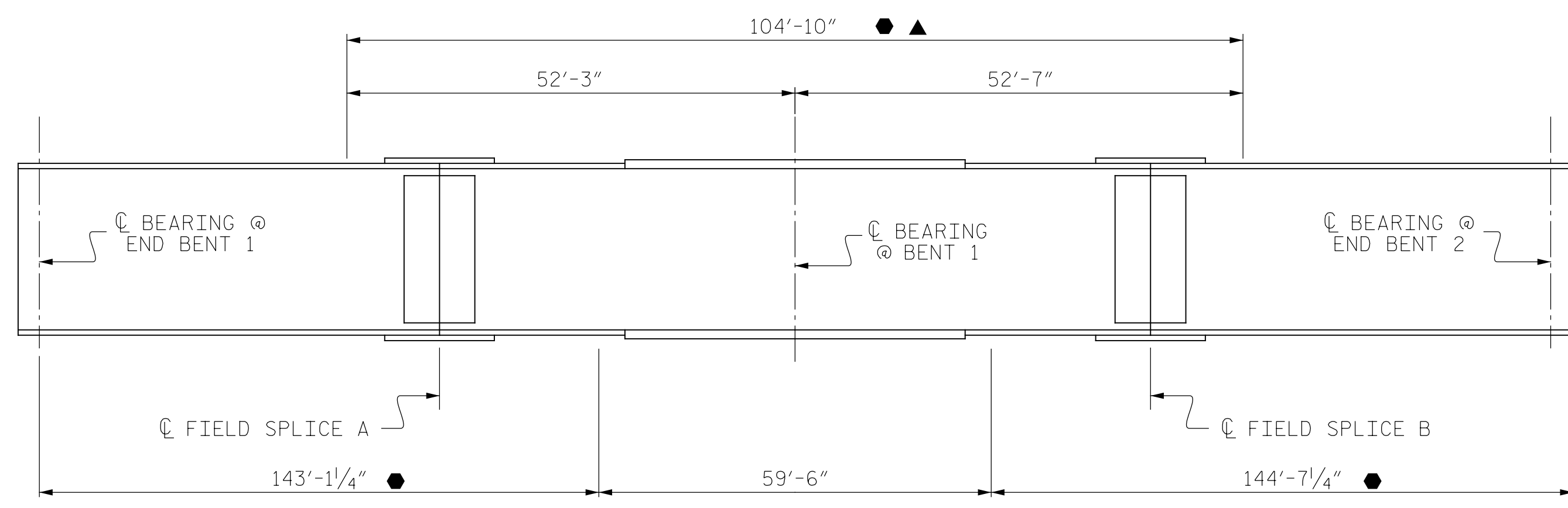
OPTIONAL TYPICAL INTERMEDIATE DIAPHRAGM - (D3)



CONNECTOR PLATE



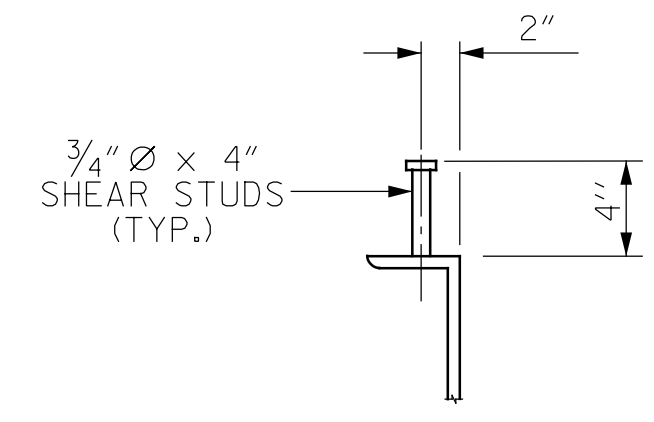
BEARING STIFFENER END BENT DIAPHRAGM



CHARPY V-NOTCH DETAIL

● CHARPY V-NOTCH TESTS WILL BE REQUIRED FOR TOP OR BOTTOM FLANGE PLATE WHICH FALLS WITHIN THESE LIMITS. ALSO, CHARPY V-NOTCH TESTS WILL BE REQUIRED FOR ALL WEB PLATES, WEB SPLICE PLATES AND FLANGE SPLICE PLATES. FOR CHARPY V-NOTCH TESTS, SEE SPECIAL PROVISIONS.

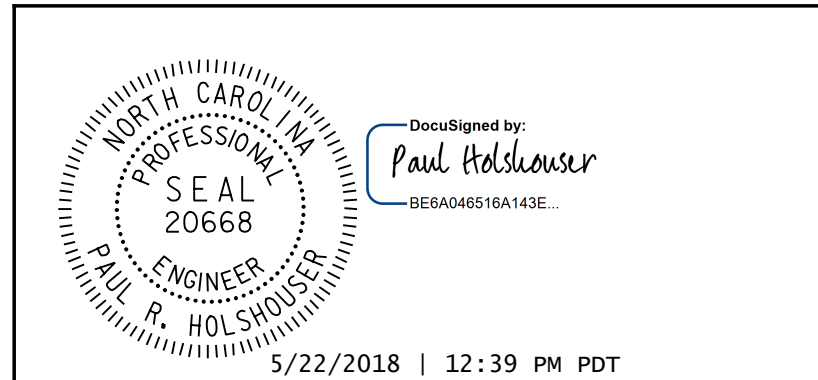
▲ NO WELDING OF FORMS OR FALSEWORK TO THE TOP FLANGE WILL BE PERMITTED IN THIS REGION.



SHEAR STUD DETAIL

PROJECT NO. I-5714
MECKLENBURG COUNTY
STATION: 26+20.73 -YEB-

SHEET 3 OF 4



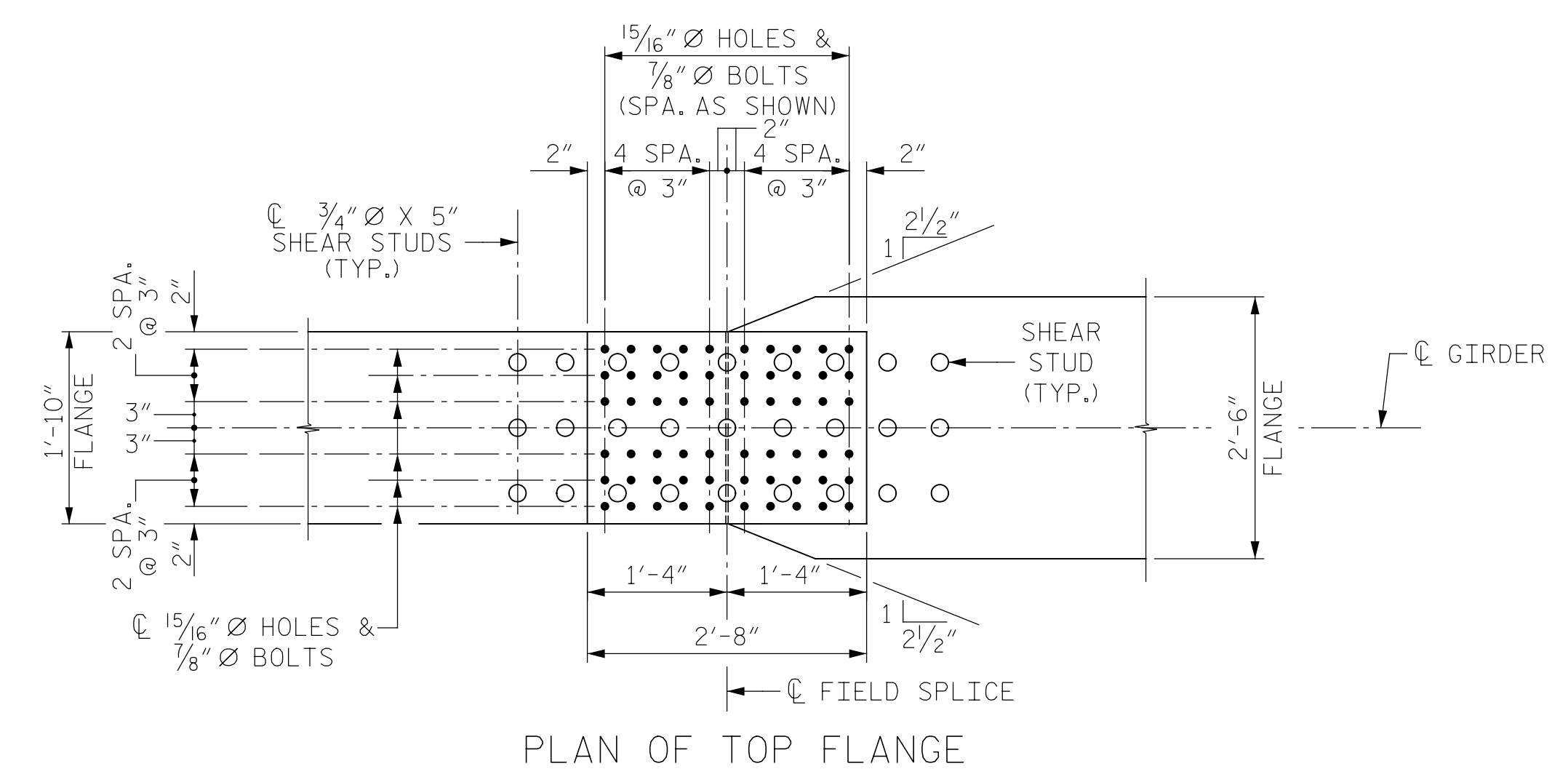
ICE of Carolinas, PLLC
4505 Falls of Neuse Road, Suite 110
Raleigh, North Carolina, 27609
Phone: 919-422-0333
License #: P-0999

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH SUPERSTRUCTURE					
STRUCTURAL STEEL DETAILS					
SHEET NO. S-14					
TOTAL SHEETS 53					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

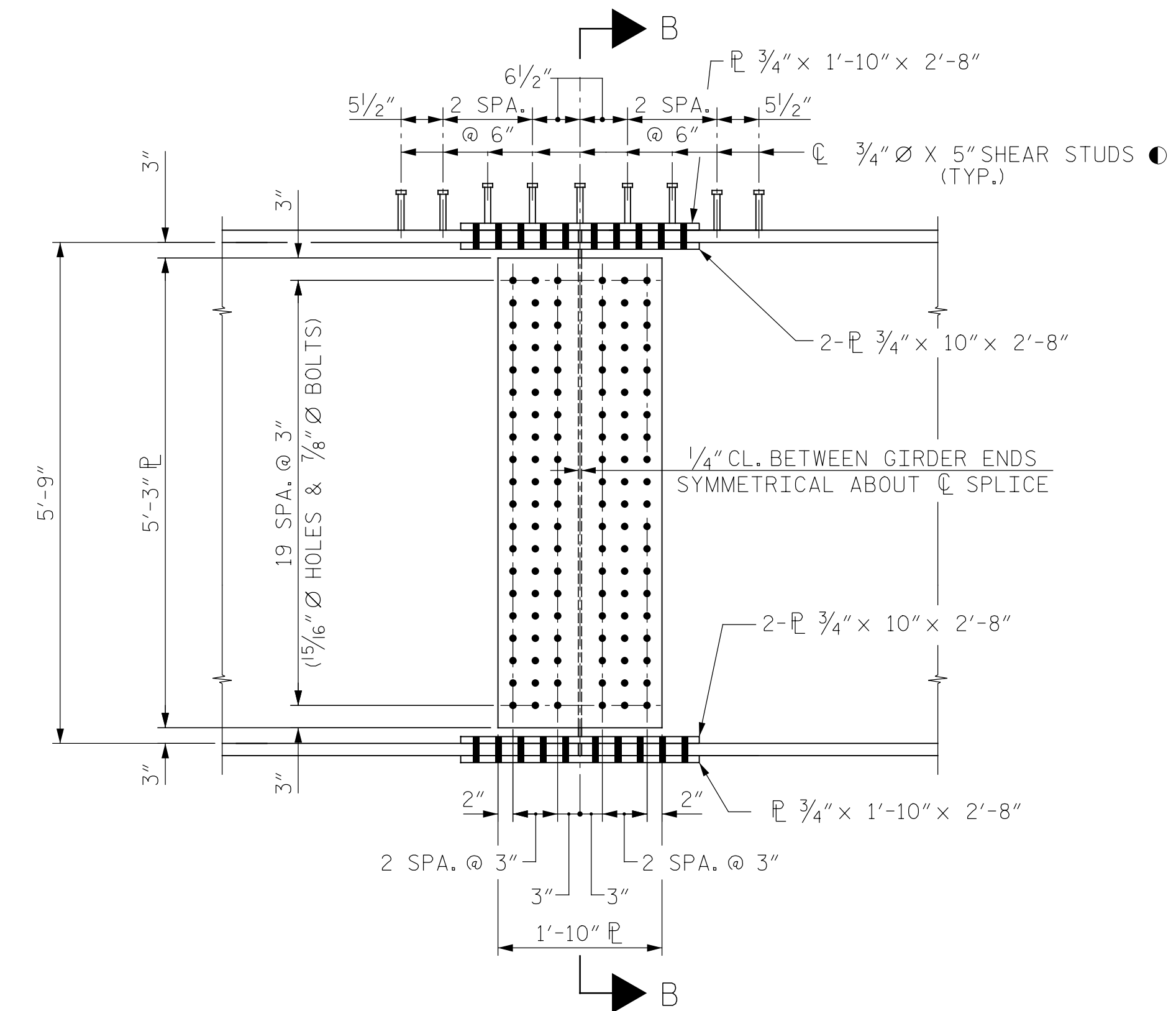
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DRAWN BY: J. N. AUSTIN DATE: 1-25-18
CHECKED BY: M. D. NIFONG DATE: 2-2-18
DESIGN E.O.R.: P. R. HOLSHOUSER DATE: 5-8-18

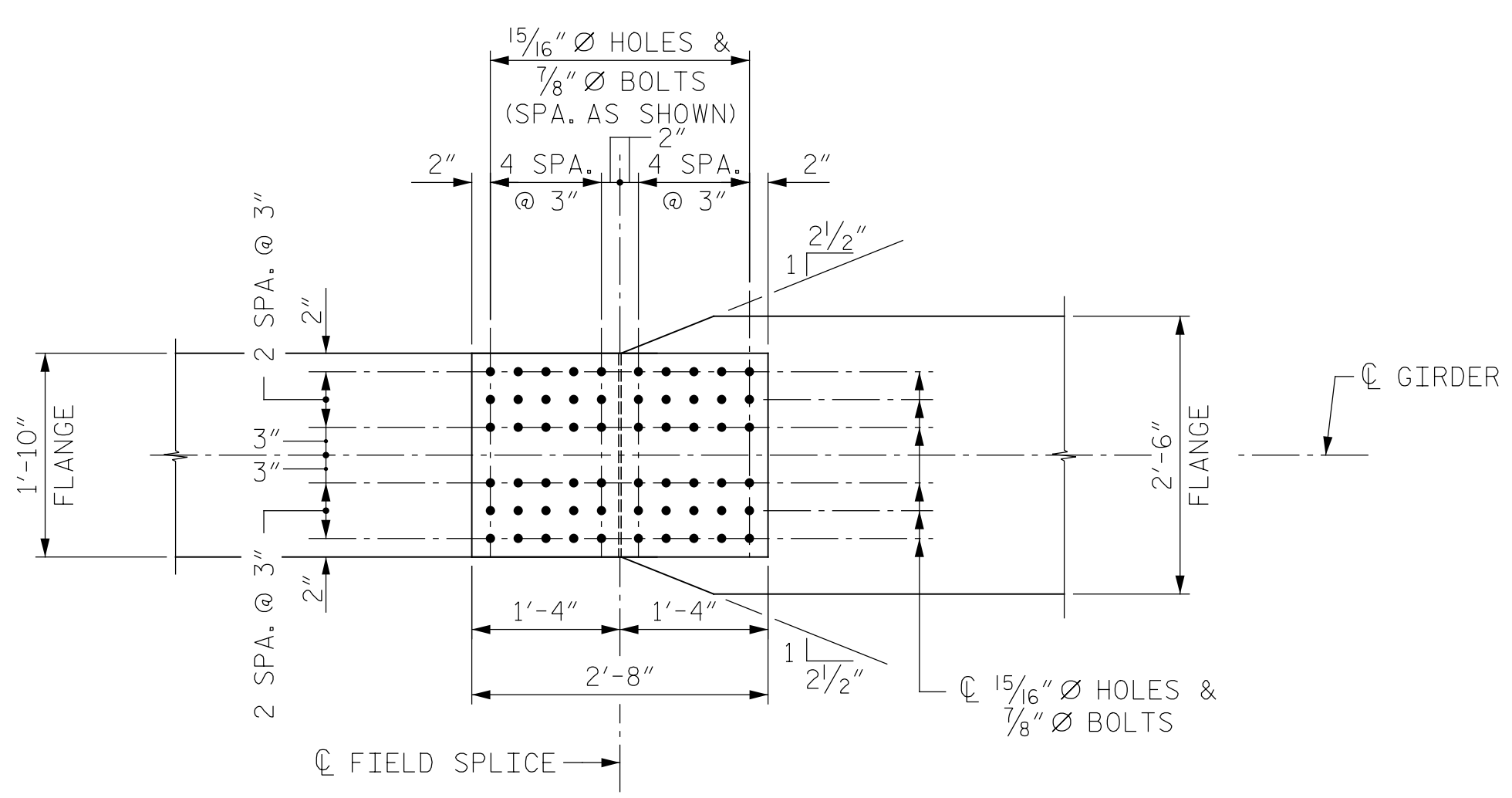
DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED



PLAN OF TOP FLANGE

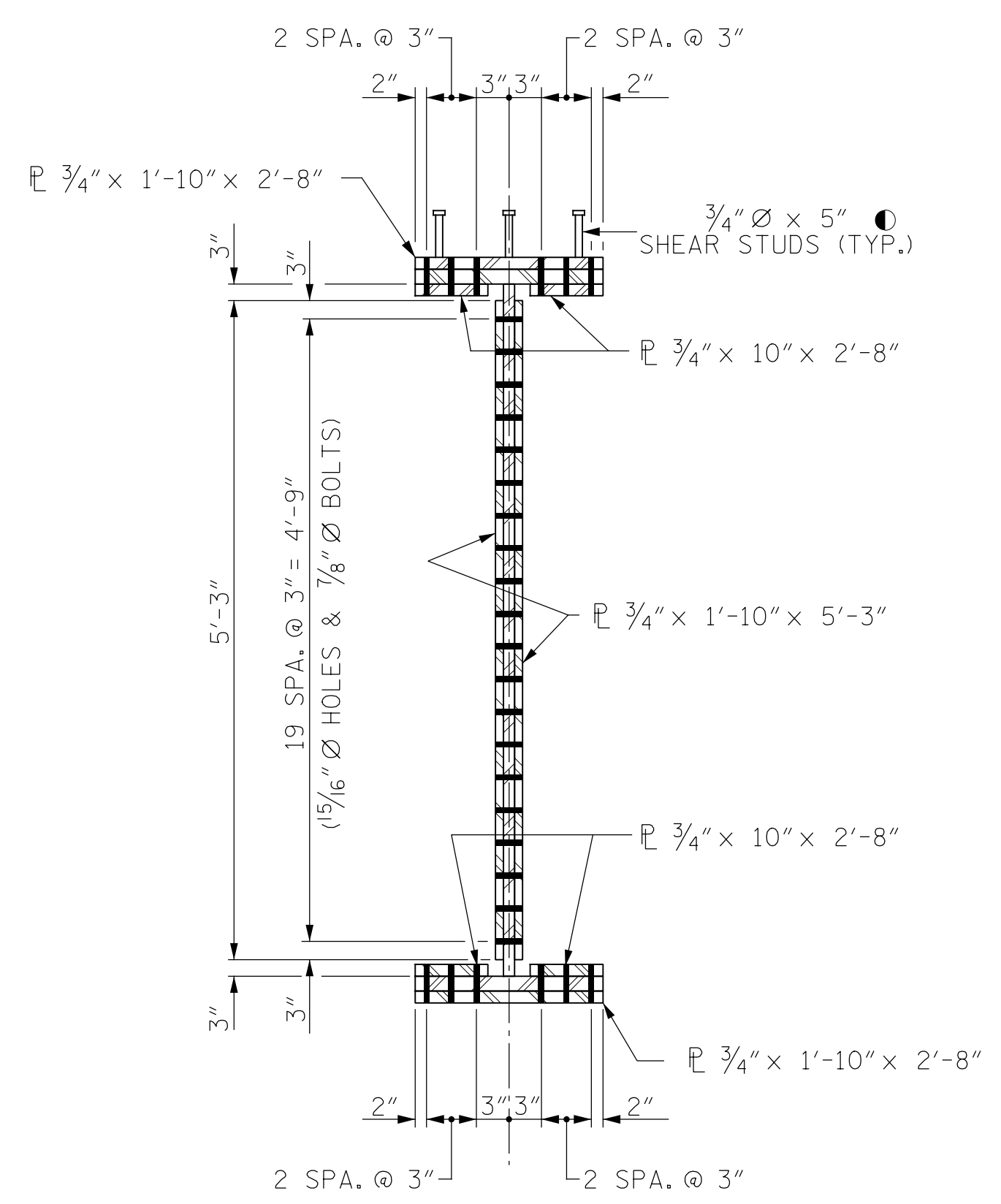


WEB



PLAN OF BOTTOM FLANGE

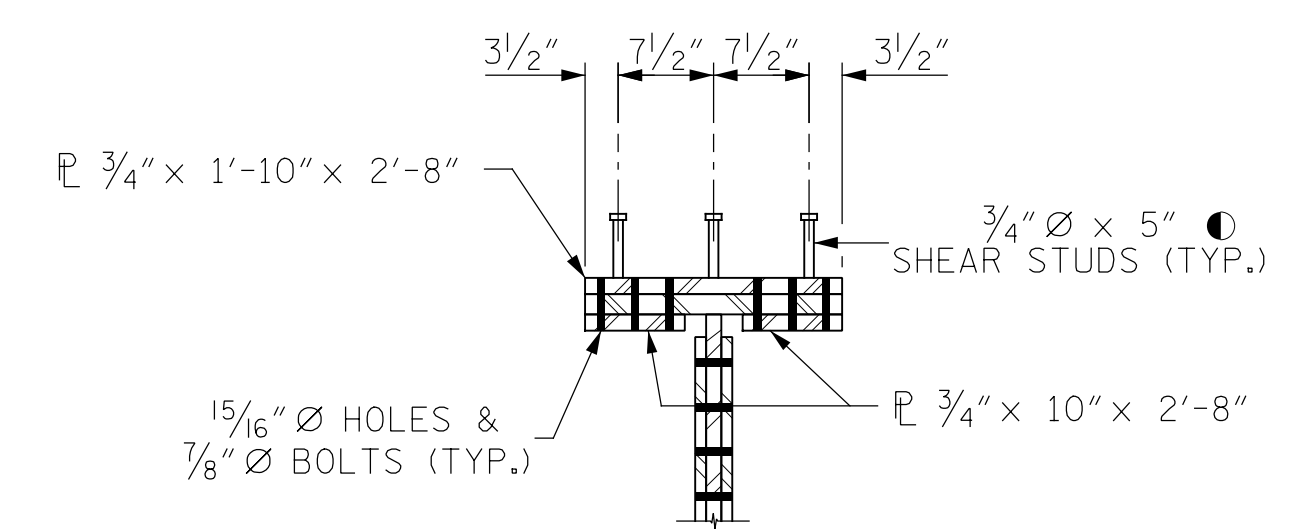
DETAIL OF FIELD SPLICE



SECTION B-B

NOTES:

- BOLTED FIELD SPLICE A SHOWN, BOLTED FIELD SPLICE B SIMILAR BY ROTATION.
- SHEAR STUDS IN THIS AREA ARE TO BE SHOP WELDED ON TOP PLATE BEFORE FIELD ASSEMBLY.



TOP FLANGE SHEAR STUDS
(FOR TOP FLANGE SPLICE PLATE)

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DRAWN BY : J. N. AUSTIN DATE : 1-25-18
 CHECKED BY : M. D. NIFONG DATE : 2-1-18
 DESIGN E.O.R. : P. R. HOLSHOUSER DATE : 5-8-18

ICE of Carolinas, PLLC
 4505 Falls of Neuse Road, Suite 110
 Raleigh, North Carolina 27609
 Phone: 919-422-0333
 License #: P-0999

DocuSigned by:
 Paul Holshouser
 BE6A048516A143E

5/8/2018 | 10:27 AM PDT

PROJECT NO. I-5714
 MECKLENBURG COUNTY
 STATION: 26+20.73 -YEB-
 SHEET 4 OF 4

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
SUPERSTRUCTURE					
STRUCTURAL STEEL DETAILS					
FIELD SPLICE DETAILS					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
SHEET NO.					S-15
TOTAL SHEETS					53

DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED

NOTES

AT ALL FIXED POINTS OF SUPPORT, NUTS FOR ANCHOR BOLTS ARE TO BE TIGHTENED FINGER TIGHT AND THEN BACKED OFF 1/2 TURN. THE THREAD OF THE NUT AND BOLT SHALL THEN BE BURRED WITH A SHARP POINTED TOOL.

THE 2" Ø PIPE SLEEVE SHALL BE CUT FROM SCHEDULE 40 PVC PLASTIC PIPE. THE PVC PLASTIC PIPE SHALL MEET THE REQUIREMENTS OF ASTM D1785.

THE PAYMENT FOR THE PIPE SLEEVES SHALL BE INCLUDED IN THE SEVERAL PAY ITEMS.

FOR AASHTO M270 GRADE 50W STRUCTURAL STEEL, SOLE PLATE SHALL BE AASHTO M270 GRADE 50W AND SHALL NOT BE GALVANIZED. ANCHOR BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

ANCHOR BOLTS SHALL MEET THE REQUIREMENTS OF ASTM A449. NUTS SHALL MEET THE REQUIREMENTS OF AASHTO M291-DH OR AASHTO M292-2H. WASHERS SHALL MEET THE REQUIREMENTS OF AASHTO M293. SHOP DRAWINGS ARE NOT REQUIRED FOR ANCHOR BOLTS, NUTS AND WASHERS. SHOP INSPECTION IS REQUIRED.

WHEN FIELD WELDING THE SOLE PLATE TO THE GIRDER FLANGE, USE TEMPERATURE INDICATING WAX PENS, OR OTHER SUITABLE MEANS, TO ENSURE THAT THE TEMPERATURE OF THE SOLE PLATE DOES NOT EXCEED 300°F. TEMPERATURES ABOVE THIS MAY DAMAGE THE ELASTOMER.

ALL SURFACES OF BEARING PLATES SHALL BE SMOOTH AND STRAIGHT.

THE ELASTOMER IN THE STEEL REINFORCED BEARINGS SHALL HAVE A SHEAR MODULUS OF 0.160 KSI, IN ACCORDANCE WITH AASHTO M251.

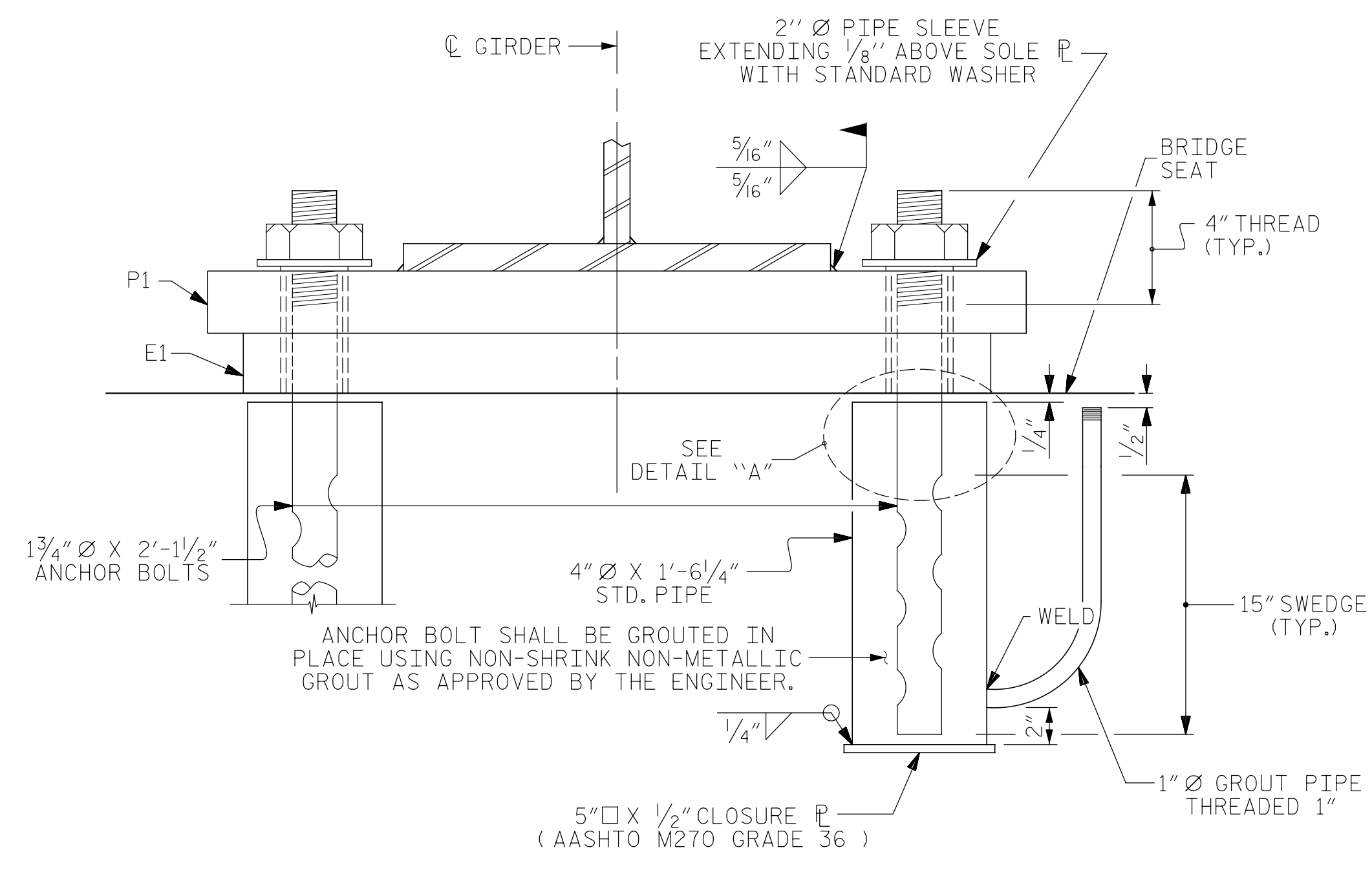
FOR STEEL REINFORCED ELASTOMERIC BEARINGS, SEE SPECIAL PROVISIONS.

THE CLOSURE PLATE, GROUT PIPE AND STANDARD PIPE FOR THE EXPANSION ASSEMBLY NEED NOT BE GALVANIZED.

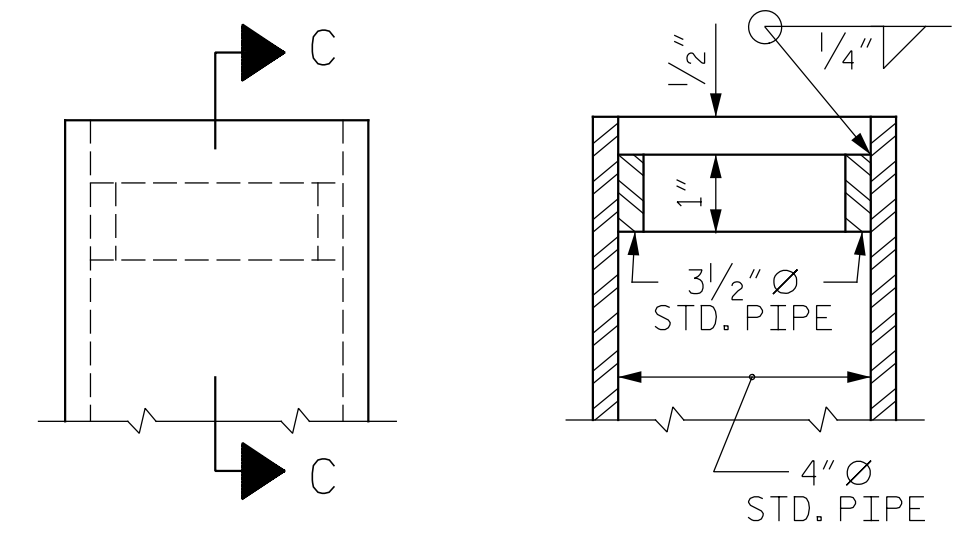
THE CONTRACTOR'S ATTENTION IS CALLED TO THE FOLLOWING PROCEDURE, WHICH MAY BE REQUIRED BY THE ENGINEER, TO RESET ELASTOMERIC BEARINGS DUE TO GIRDER TRANSLATION AND END ROTATION:

1. ONCE THE DECK HAS CURED, THE GIRDERS SHALL BE JACKED THEN THE ANCHOR BOLTS AND ELASTOMERIC BEARING SLOTS CENTERED AS NEARLY AS PRACTICAL ABOUT THE BEARING STIFFENER. THIS OPERATION SHALL BE PERFORMED AT APPROXIMATELY 60°F.
2. AFTER CENTERING THE ELASTOMERIC BEARING AND ANCHOR BOLTS, THE ANCHOR BOLTS SHALL BE GROUDED.

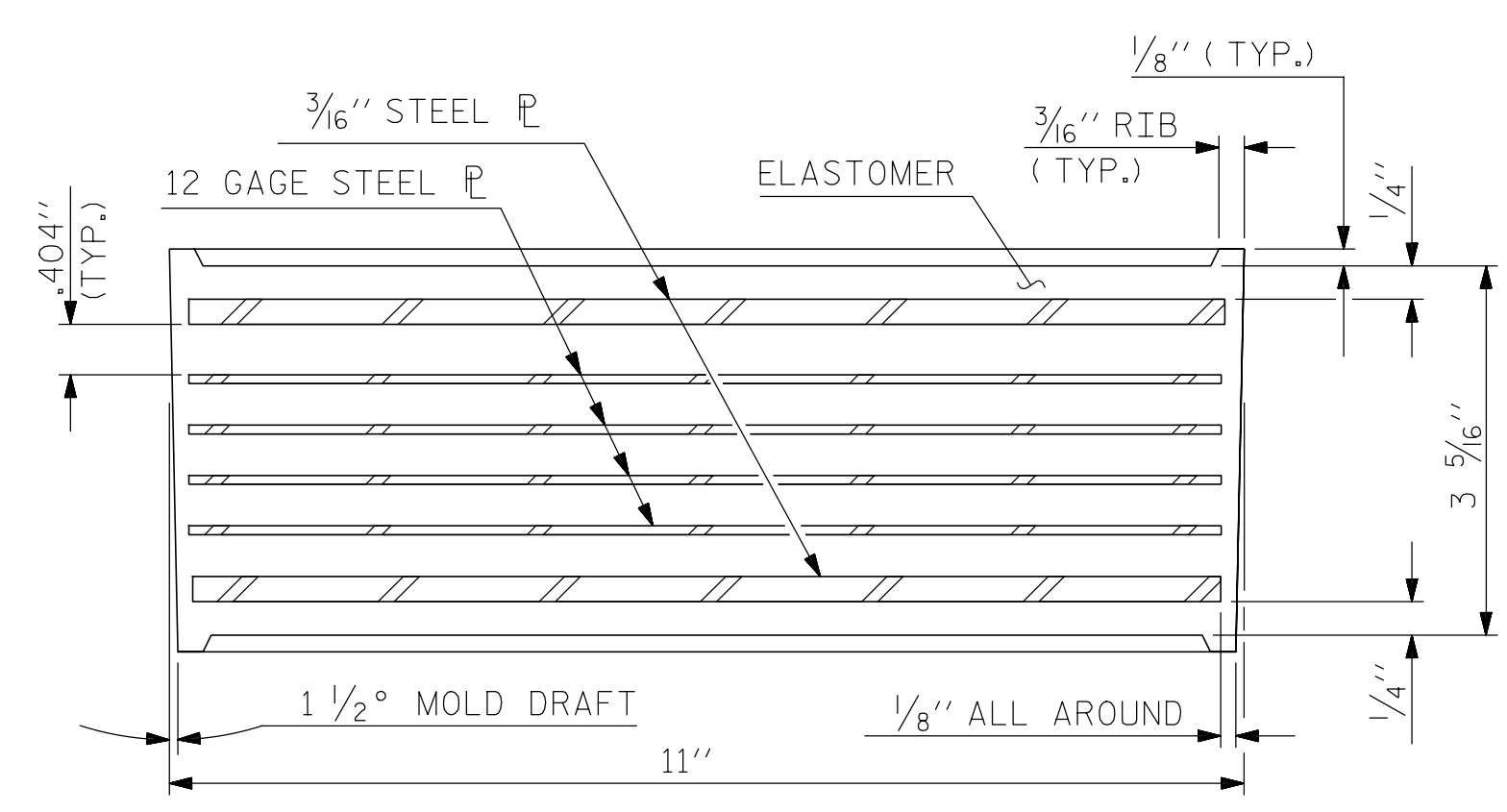
THE CONTRACTOR MAY PROPOSE ALTERNATE METHODS, PROVIDED DETAILS ARE SUBMITTED TO THE ENGINEER FOR REVIEW AND APPROVAL.



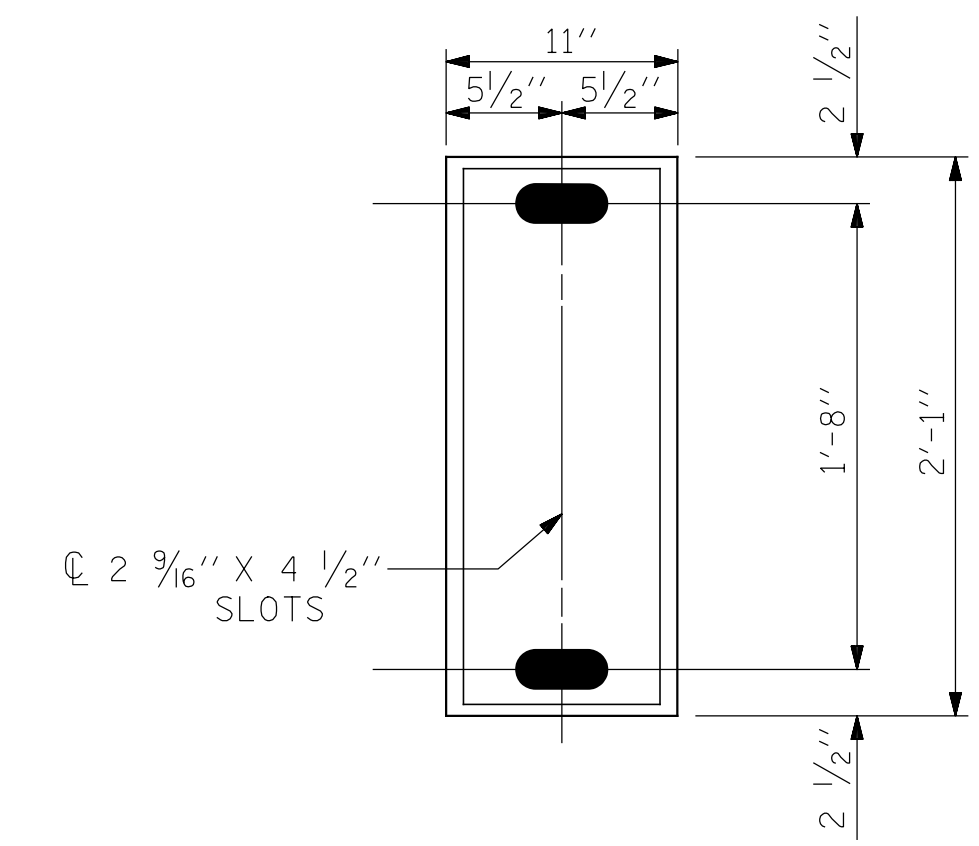
EXPANSION END VIEW



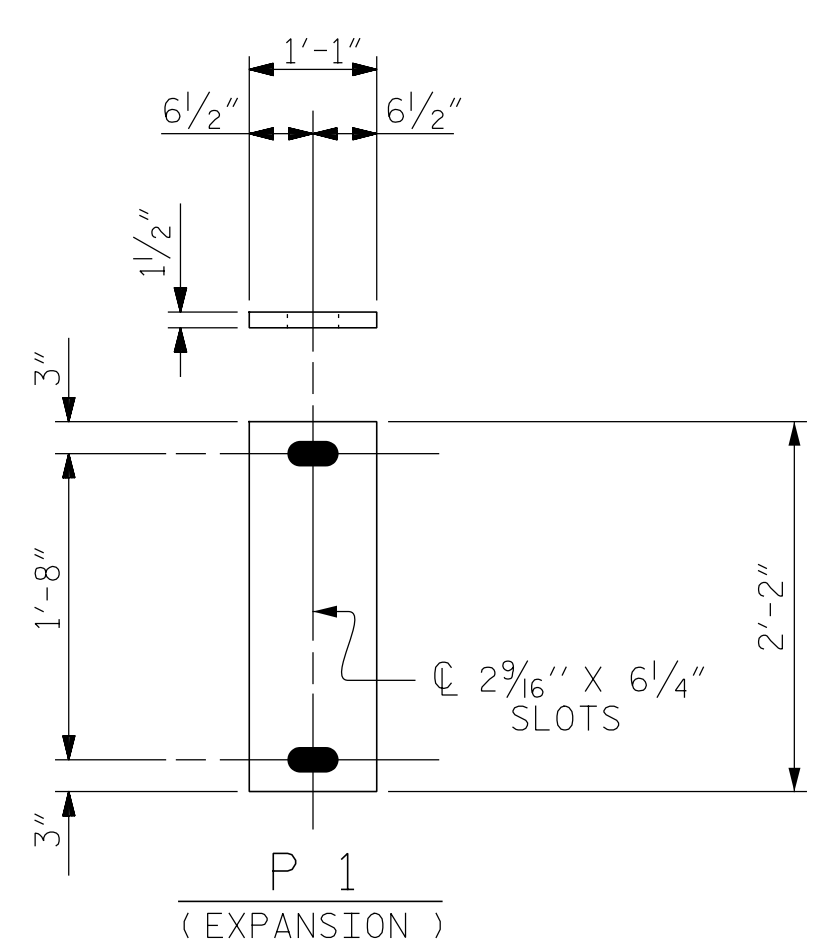
DETAIL A



TYPICAL SECTION OF ELASTOMERIC BEARING



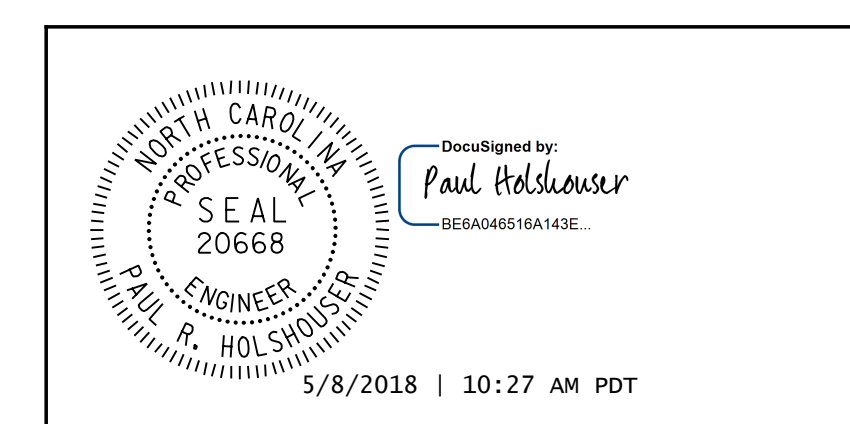
E1 (12 REQ'D)
PLAN VIEW OF ELASTOMERIC BEARING



P1 (12 REQ'D)
SOLE PLATE DETAILS ("P")

MAXIMUM ALLOWABLE SERVICE LOADS	
D.L.+L.L. (NO IMPACT)	
TYPE IV	270 k

PROJECT NO. I-5714
MECKLENBURG COUNTY
STATION: 26+20.73 -YEB-



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
ELASTOMERIC BEARING DETAILS
(STEEL SUPERSTRUCTURE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-16
1			3			TOTAL SHEETS
2			4			53

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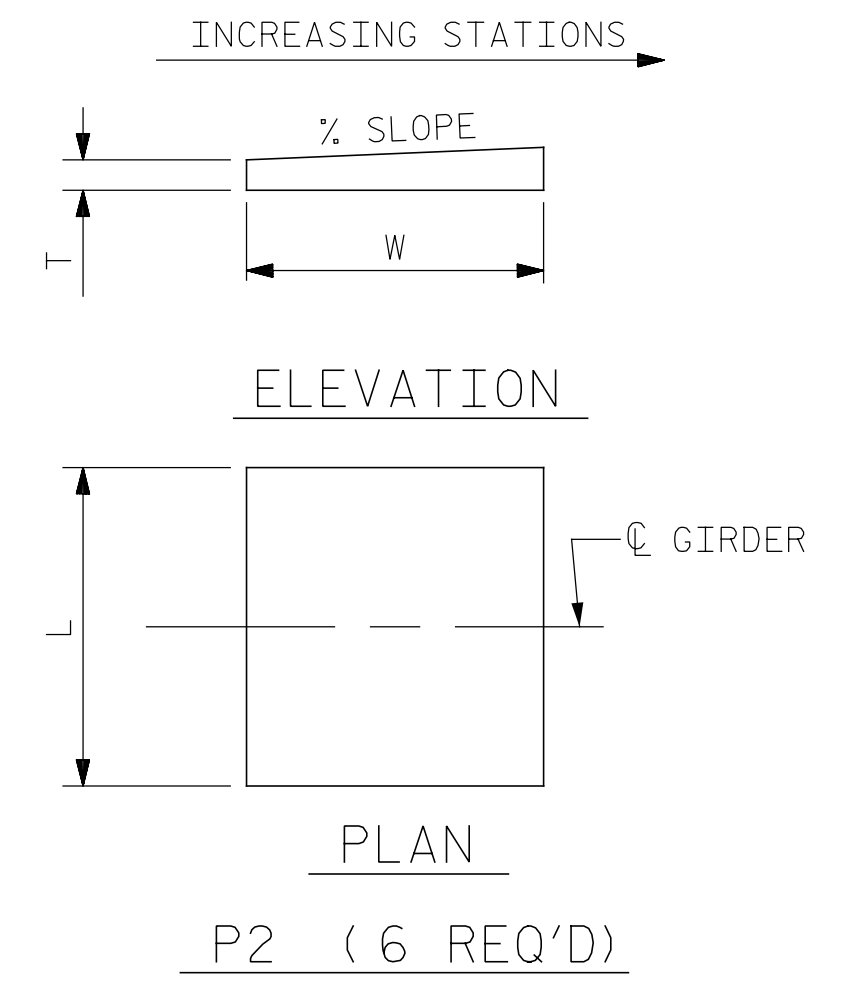
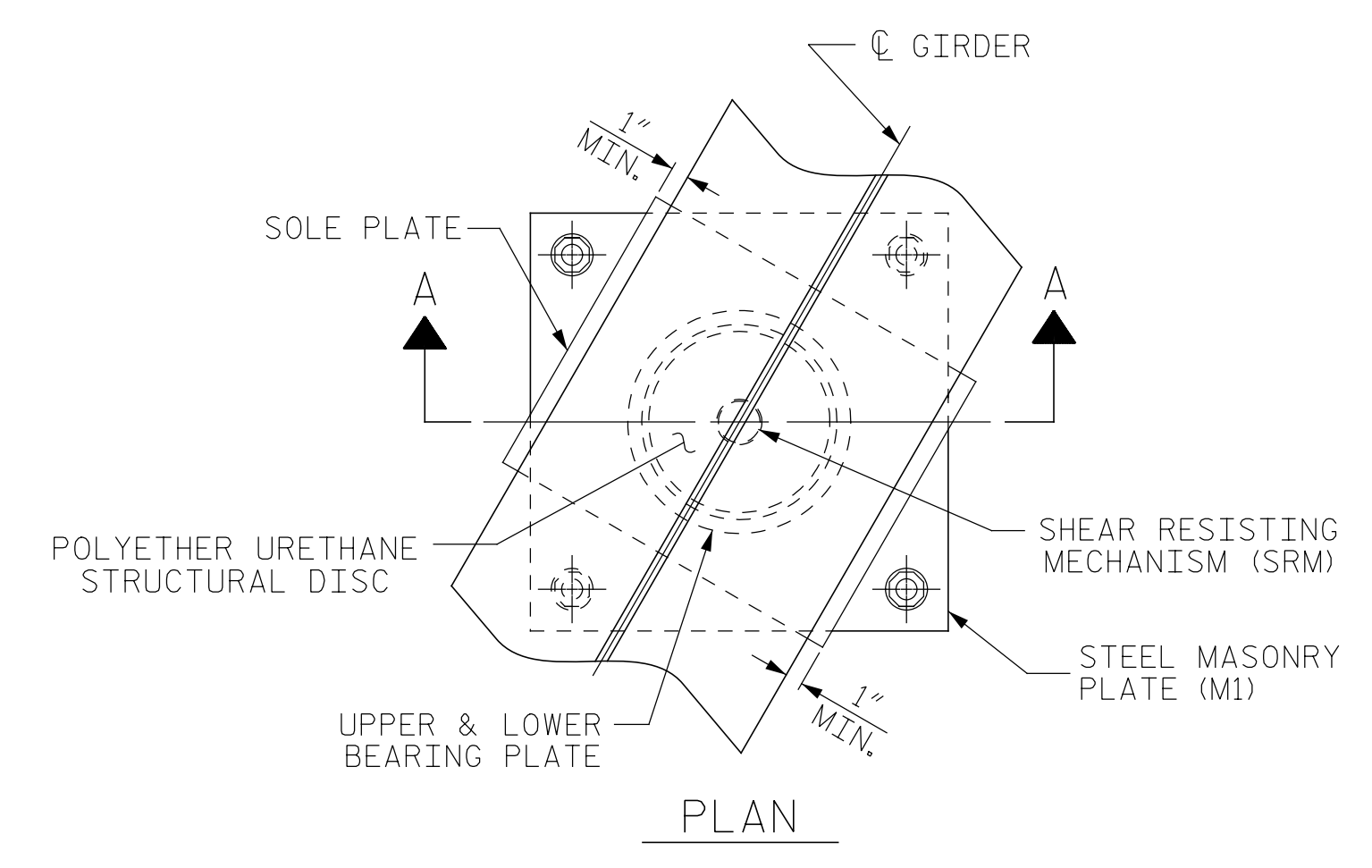


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DRAWN BY: J. N. AUSTIN DATE: 1-29-18
CHECKED BY: M. D. NIFONG DATE: 1-30-18
DESIGN E.O.R.: P. R. HOLSHOUSER DATE: 5-8-18

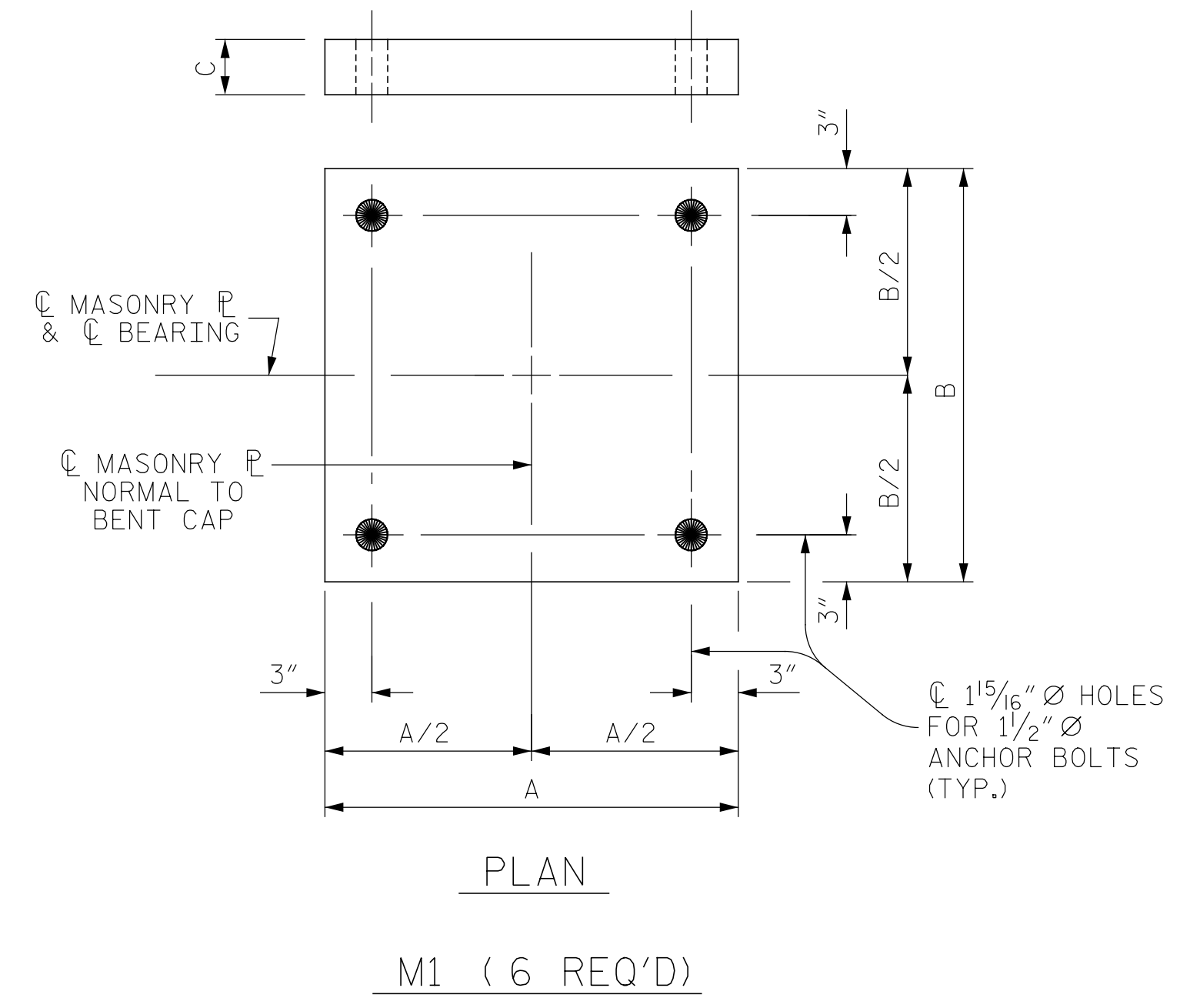
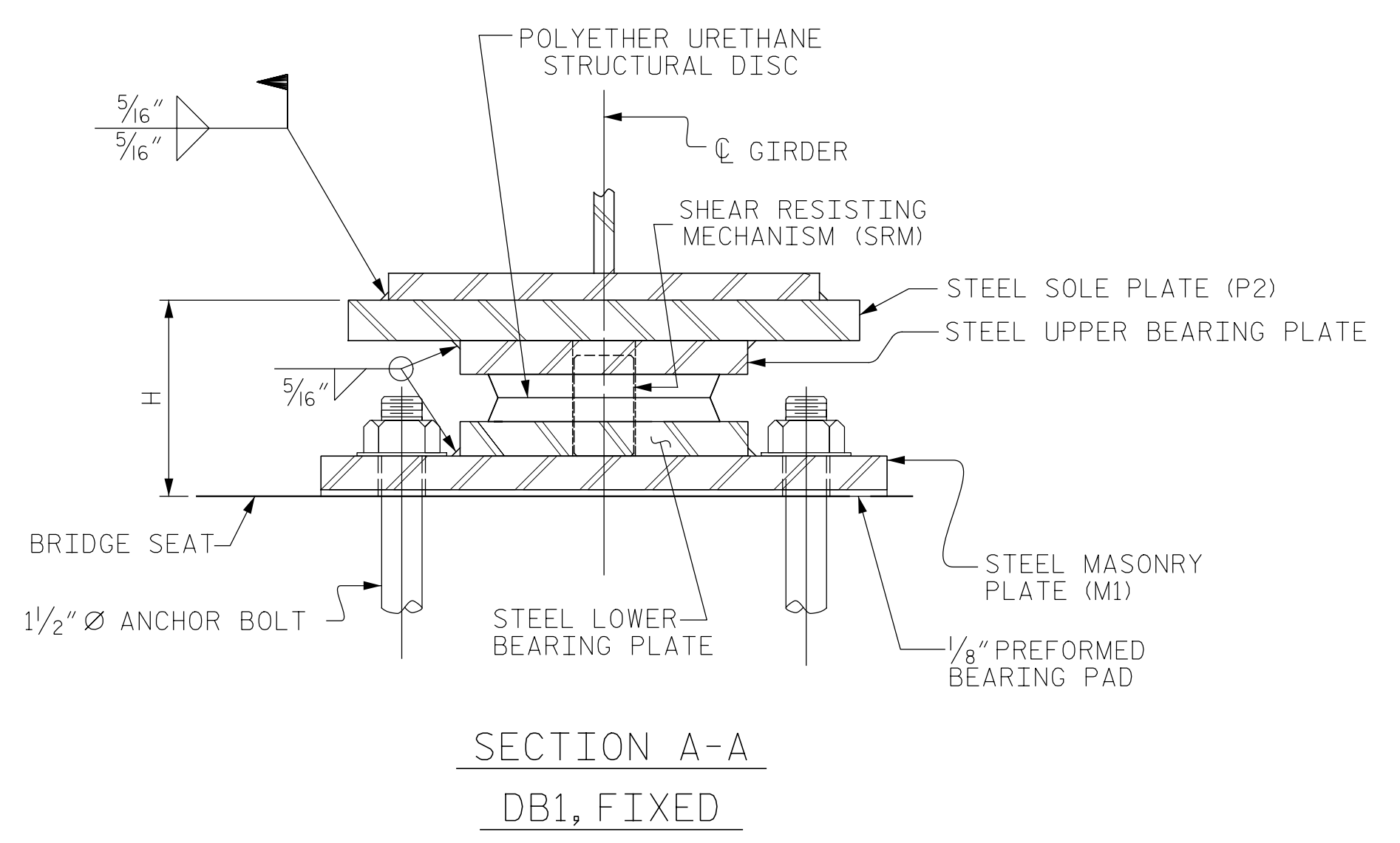
NOTES

- FOR DISC BEARINGS, SEE SPECIAL PROVISIONS.
- ALL BEARING PLATES SHALL BE AASHTO M270 GRADE 50W OR GRADE 50.
- AT ALL POINTS OF SUPPORT, NUTS FOR ANCHOR BOLTS SHALL BE FINGER-TIGHTENED PLUS AN ADDITIONAL 1/4 TURN. THE THREAD OF THE NUT AND BOLT SHALL THEN BE BURRED WITH A SHARP POINTED TOOL.
- WHEN WELDING THE SOLE PLATE TO THE GIRDER, USE TEMPERATURE INDICATING WAX PENS, OR OTHER SUITABLE MEANS, TO ENSURE THAT THE TEMPERATURE OF THE BEARING DOES NOT EXCEED 250°F. TEMPERATURES ABOVE THIS MAY DAMAGE THE TFE OR URETHANE DISC.
- AFTER BEARING ASSEMBLY IS IN PLACE AND ANCHOR BOLTS HAVE BEEN FINALLY POSITIONED, THEY SHALL BE GROUTED IN PLACE AS SHOWN.
- SOLE PLATES SHOULD BE WELDED TO GIRDER FLANGES AND ANCHOR BOLTS SHOULD BE GROUTED BEFORE FALSEWORK IS PLACED.
- ALL SURFACES OF BEARING PLATES SHALL BE SMOOTH AND STRAIGHT.
- FOR ATTACHMENT OF THE STAINLESS STEEL SHEETS TO THE STEEL SOLE PLATE AND GUIDE BARS, AS WELL AS THE TOP AND SIDE PTFE SHEETS TO THE STEEL UPPER BEARING PLATE, SEE SPECIAL PROVISIONS.
- FOR THERMAL SPRAYED COATINGS (METALLIZATION), SEE SPECIAL PROVISIONS.
- THE MINIMUM ROTATIONAL CAPACITY FOR ALL BEARINGS SHALL BE 0.02 RADIAN.



NOTE:
DIMENSIONS "W" AND "T" SHALL BE DETERMINED BY THE BEARING MANUFACTURER.

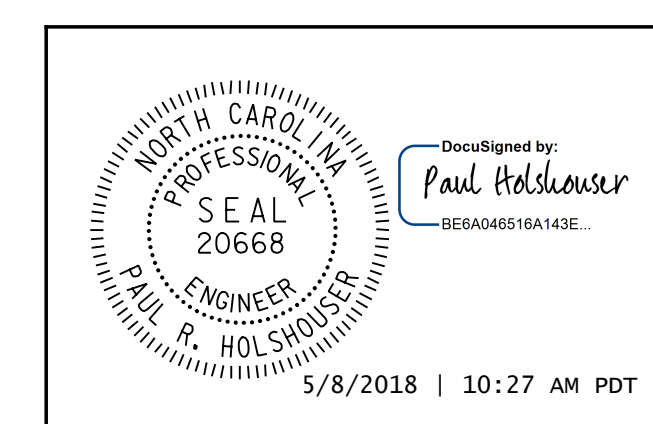
SOLE PLATE DETAILS



MASONRY PLATE DETAILS

PROJECT NO. I-5714
MECKLENBURG COUNTY
STATION: 26+20.73 -YEB-

DESIGNATIONS		LOCATION	NUMBER OF BEARINGS	DIMENSIONS				LOADS AND MOVEMENT					
BEARINGS	MASONRY PL			BEARING H (IN.)	MASONRY PLATE A (IN.)	MASONRY PLATE B (IN.)	MASONRY PLATE C (IN.)	SOLE PLATE TOP SLOPE (%)	SOLE PLATE L (IN.)	UNFACTORED VERTICAL LOAD (KIPS)		FACTORED HORIZONTAL LOAD (KIPS)	ONE-WAY MOVEMENT (IN.)
DB1 (FIXED)	M1	BENT 1	7	28 1/2	28 1/2	1	0.74	32	DC	DW	LL+IM		
			6						452	65	278	164	



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE
DISC BEARING
DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS
2			4			53

DRAWN BY : J. N. AUSTIN DATE : 1-29-18
CHECKED BY : M. D. NIFONG DATE : 1-30-18
DESIGN E.O.R. : P. R. HOLSHOUSER DATE : 5-8-18

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DEAD LOAD DEFLECTION TABLE FOR GIRDERS																					
TWENTIETH POINTS	SPAN A																				
	GIRDERS 1 & 6																				
	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
DEFLECTION DUE TO WEIGHT OF GIRDER	0.000	0.019	0.039	0.055	0.071	0.081	0.091	0.094	0.097	0.094	0.090	0.081	0.071	0.059	0.046	0.034	0.022	0.014	0.006	0.003	0.000
DEFLECTION DUE TO WEIGHT OF SLAB *	0.000	0.047	0.094	0.132	0.170	0.195	0.219	0.227	0.234	0.225	0.217	0.194	0.172	0.141	0.111	0.082	0.054	0.034	0.014	0.007	0.000
DEFLECTION DUE TO WEIGHT OF BARRIER RAIL	0.000	0.007	0.014	0.020	0.025	0.029	0.033	0.034	0.035	0.034	0.033	0.030	0.027	0.022	0.018	0.013	0.009	0.006	0.002	0.001	0.000
TOTAL DEAD LOAD DEFLECTION	0.000	0.073	0.146	0.206	0.267	0.305	0.343	0.355	0.367	0.353	0.340	0.304	0.269	0.222	0.175	0.130	0.084	0.053	0.023	0.011	0.000
VERTICAL CURVE ORDINATE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDINATE DUE TO SUPERELEVATION	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
REQUIRED CAMBER	0	7/8"	1 3/4"	2 1/2"	3 3/16"	3 11/16"	4 1/8"	4 1/4"	4 3/8"	4 1/4"	4 1/16"	3 5/8"	3 1/4"	2 11/16"	2 1/8"	1 9/16"	1"	5/8"	1/4"	1/8"	0

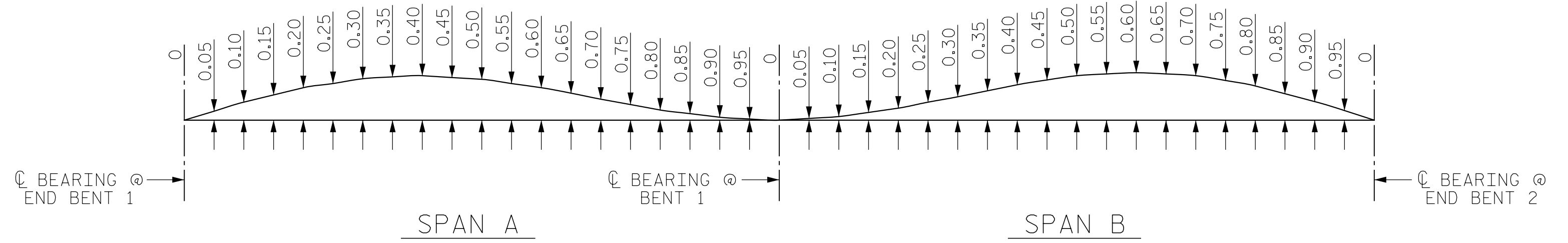
* INCLUDES SLAB, BUILDUPS & STAY-IN-PLACE FORMS.
ALL VALUES ARE SHOWN IN FEET (DECIMAL FORM), EXCEPT "FINAL CAMBER", WHICH IS GIVEN IN INCHES (FRACTION FORM).

DEAD LOAD DEFLECTION TABLE FOR GIRDERS																					
TWENTIETH POINTS	SPAN A																				
	GIRDERS 2 & 5																				
	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
DEFLECTION DUE TO WEIGHT OF GIRDER	0.000	0.019	0.039	0.055	0.071	0.081	0.091	0.094	0.097	0.094	0.090	0.081	0.071	0.059	0.046	0.034	0.022	0.014	0.006	0.003	0.000
DEFLECTION DUE TO WEIGHT OF SLAB *	0.000	0.052	0.105	0.148	0.191	0.218	0.246	0.254	0.263	0.253	0.243	0.217	0.192	0.159	0.125	0.092	0.060	0.038	0.016	0.008	0.000
DEFLECTION DUE TO WEIGHT OF BARRIER RAIL	0.000	0.005	0.010	0.014	0.018	0.021	0.024	0.025	0.026	0.025	0.024	0.022	0.019	0.016	0.013	0.010	0.006	0.004	0.002	0.001	0.000
TOTAL DEAD LOAD DEFLECTION	0.000	0.077	0.154	0.217	0.280	0.320	0.360	0.373	0.386	0.371	0.357	0.320	0.283	0.233	0.184	0.136	0.088	0.056	0.024	0.012	0.000
VERTICAL CURVE ORDINATE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDINATE DUE TO SUPERELEVATION	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
REQUIRED CAMBER	0	1 5/16"	1 7/8"	2 5/8"	3 3/8"	3 13/16"	4 5/16"	4 1/2"	4 5/8"	4 7/16"	4 1/4"	3 13/16"	3 3/8"	2 13/16"	2 3/16"	1 5/8"	1 1/16"	1 1/16"	5/16"	1/8"	0

* INCLUDES SLAB, BUILDUPS & STAY-IN-PLACE FORMS.
ALL VALUES ARE SHOWN IN FEET (DECIMAL FORM), EXCEPT "FINAL CAMBER", WHICH IS GIVEN IN INCHES (FRACTION FORM).

DEAD LOAD DEFLECTION TABLE FOR GIRDERS																					
TWENTIETH POINTS	SPAN A																				
	GIRDERS 3 & 4																				
	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
DEFLECTION DUE TO WEIGHT OF GIRDER	0.000	0.019	0.039	0.055	0.071	0.081	0.091	0.094	0.097	0.094	0.090	0.081	0.071	0.059	0.046	0.034	0.022	0.014	0.006	0.003	0.000
DEFLECTION DUE TO WEIGHT OF SLAB *	0.000	0.052	0.105	0.148	0.191	0.218	0.246	0.254	0.263	0.253	0.243	0.217	0.192	0.159	0.125	0.092	0.060	0.038	0.016	0.008	0.000
DEFLECTION DUE TO WEIGHT OF BARRIER RAIL	0.000	0.004	0.007	0.010	0.013	0.015	0.017	0.017	0.018	0.017	0.017	0.015	0.013	0.011	0.009	0.007	0.004	0.003	0.001	0.001	0.000
TOTAL DEAD LOAD DEFLECTION	0.000	0.075	0.151	0.213	0.275	0.314	0.353	0.366	0.378	0.364	0.349	0.313	0.277	0.229	0.180	0.133	0.086	0.055	0.023	0.012	0.000
VERTICAL CURVE ORDINATE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDINATE DUE TO SUPERELEVATION	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
REQUIRED CAMBER	0	7/8"	1 13/16"	2 9/16"	3 5/16"	3 3/4"	4 1/4"	4 3/8"	4 9/16"	4 3/8"	4 3/16"	3 3/4"	3 5/16"	2 3/4"	2 3/16"	1 5/8"	1 1/16"	1 1/16"	1/4"	1/8"	0

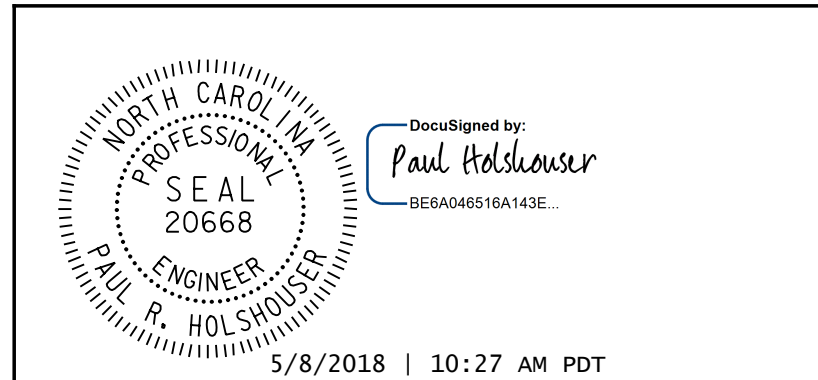
* INCLUDES SLAB, BUILDUPS & STAY-IN-PLACE FORMS.
ALL VALUES ARE SHOWN IN FEET (DECIMAL FORM), EXCEPT "FINAL CAMBER", WHICH IS GIVEN IN INCHES (FRACTION FORM).



SCHMATIC CAMBER ORDINATES FOR ALL GIRDERS
SLOPE FOR THE ZERO CAMBER BASE LINE VARIES

PROJECT NO. I-5714
MECKLENBURG COUNTY
STATION: 26+20.73 -YEB-

SHEET 1 OF 2



STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
SUPERSTRUCTURE					
DEAD LOAD DEFLECTIONS SPAN A					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		



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SHEET NO. S-18	
TOTAL SHEETS 53	

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DRAWN BY : <u>J. N. AUSTIN</u>	DATE : <u>1-29-18</u>
CHECKED BY : <u>M. D. NIFONG</u>	DATE : <u>1-30-18</u>
DESIGN E.O.R. : <u>P. R. HOLSHOUSE</u>	DATE : <u>5-8-18</u>

DEAD LOAD DEFLECTION TABLE FOR GIRDERS																					
TWENTIETH POINTS	SPAN B																				
	GIRDERS 1 & 6																				
	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
DEFLECTION DUE TO WEIGHT OF GIRDER	0.000	0.004	0.008	0.018	0.027	0.040	0.053	0.066	0.079	0.089	0.098	0.102	0.105	0.101	0.098	0.087	0.076	0.059	0.041	0.021	0.000
DEFLECTION DUE TO WEIGHT OF SLAB *	0.000	0.009	0.018	0.040	0.062	0.093	0.124	0.155	0.187	0.210	0.233	0.242	0.251	0.242	0.234	0.207	0.181	0.140	0.099	0.050	0.000
DEFLECTION DUE TO WEIGHT OF BARRIER RAIL	0.000	0.002	0.003	0.007	0.010	0.015	0.020	0.024	0.029	0.032	0.035	0.037	0.038	0.036	0.035	0.031	0.027	0.021	0.015	0.007	0.000
TOTAL DEAD LOAD DEFLECTION	0.000	0.015	0.030	0.064	0.099	0.147	0.196	0.245	0.295	0.331	0.367	0.380	0.394	0.380	0.366	0.325	0.284	0.220	0.155	0.078	0.000
VERTICAL CURVE ORDINATE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDINATE DUE TO SUPERELEVATION	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
REQUIRED CAMBER	0	3/16"	3/8"	3/4"	1 1/16"	1 3/4"	2 3/8"	2 5/16"	3 3/16"	3 5/16"	4 3/8"	4 9/16"	4 3/4"	4 9/16"	4 3/8"	3 7/8"	3 3/8"	2 5/8"	1 7/8"	1 5/16"	0

* INCLUDES SLAB, BUILDUPS & STAY-IN-PLACE FORMS.
 ALL VALUES ARE SHOWN IN FEET (DECIMAL FORM), EXCEPT "FINAL CAMBER", WHICH IS GIVEN IN INCHES (FRACTION FORM).

DEAD LOAD DEFLECTION TABLE FOR GIRDERS																					
TWENTIETH POINTS	SPAN B																				
	GIRDERS 2 & 5																				
	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
DEFLECTION DUE TO WEIGHT OF GIRDER	0.000	0.004	0.008	0.018	0.027	0.040	0.053	0.066	0.079	0.089	0.098	0.102	0.105	0.101	0.098	0.087	0.076	0.059	0.041	0.021	0.000
DEFLECTION DUE TO WEIGHT OF SLAB *	0.000	0.010	0.021	0.045	0.069	0.104	0.139	0.174	0.209	0.235	0.261	0.271	0.281	0.272	0.262	0.232	0.203	0.157	0.111	0.056	0.000
DEFLECTION DUE TO WEIGHT OF BARRIER RAIL	0.000	0.001	0.002	0.005	0.007	0.011	0.014	0.018	0.021	0.023	0.026	0.027	0.027	0.026	0.025	0.022	0.020	0.015	0.011	0.005	0.000
TOTAL DEAD LOAD DEFLECTION	0.000	0.016	0.031	0.067	0.104	0.155	0.206	0.257	0.309	0.347	0.385	0.399	0.414	0.399	0.385	0.341	0.298	0.231	0.163	0.082	0.000
VERTICAL CURVE ORDINATE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDINATE DUE TO SUPERELEVATION	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
REQUIRED CAMBER	0	3/16"	3/8"	1 3/16"	1 1/4"	1 7/8"	2 7/16"	3 1/16"	3 11/16"	4 3/16"	4 5/8"	4 13/16"	4 15/16"	4 13/16"	4 5/8"	4 1/8"	3 9/16"	2 3/4"	1 5/16"	1"	0

* INCLUDES SLAB, BUILDUPS & STAY-IN-PLACE FORMS.
 ALL VALUES ARE SHOWN IN FEET (DECIMAL FORM), EXCEPT "FINAL CAMBER", WHICH IS GIVEN IN INCHES (FRACTION FORM).

DEAD LOAD DEFLECTION TABLE FOR GIRDERS																					
TWENTIETH POINTS	SPAN B																				
	GIRDERS 3 & 4																				
	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
DEFLECTION DUE TO WEIGHT OF GIRDER	0.000	0.004	0.008	0.018	0.027	0.040	0.053	0.066	0.079	0.089	0.098	0.102	0.105	0.101	0.098	0.087	0.076	0.059	0.041	0.021	0.000
DEFLECTION DUE TO WEIGHT OF SLAB *	0.000	0.010	0.021	0.045	0.069	0.104	0.139	0.174	0.209	0.235	0.261	0.271	0.281	0.272	0.262	0.232	0.203	0.157	0.111	0.056	0.000
DEFLECTION DUE TO WEIGHT OF BARRIER RAIL	0.000	0.001	0.002	0.003	0.005	0.007	0.010	0.012	0.015	0.016	0.018	0.019	0.019	0.018	0.018	0.016	0.014	0.011	0.007	0.004	0.000
TOTAL DEAD LOAD DEFLECTION	0.000	0.015	0.030	0.066	0.101	0.151	0.201	0.252	0.303	0.340	0.377	0.391	0.406	0.391	0.377	0.335	0.292	0.226	0.160	0.080	0.000
VERTICAL CURVE ORDINATE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDINATE DUE TO SUPERELEVATION	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
REQUIRED CAMBER	0	3/16"	3/8"	1 3/16"	1 3/16"	1 13/16"	2 7/16"	3"	3 5/8"	4 1/16"	4 1/2"	4 11/16"	4 7/8"	4 11/16"	4 1/2"	4"	3 1/2"	2 11/16"	1 5/16"	1 5/16"	0

* INCLUDES SLAB, BUILDUPS & STAY-IN-PLACE FORMS.
 ALL VALUES ARE SHOWN IN FEET (DECIMAL FORM), EXCEPT "FINAL CAMBER", WHICH IS GIVEN IN INCHES (FRACTION FORM).

PROJECT NO. I-5714
MECKLENBURG COUNTY
 STATION: 26+20.73 -YEB-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 SUPERSTRUCTURE
 DEAD LOAD DEFLECTIONS
 SPAN B

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-19
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2			4			53

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Paul Holshouser
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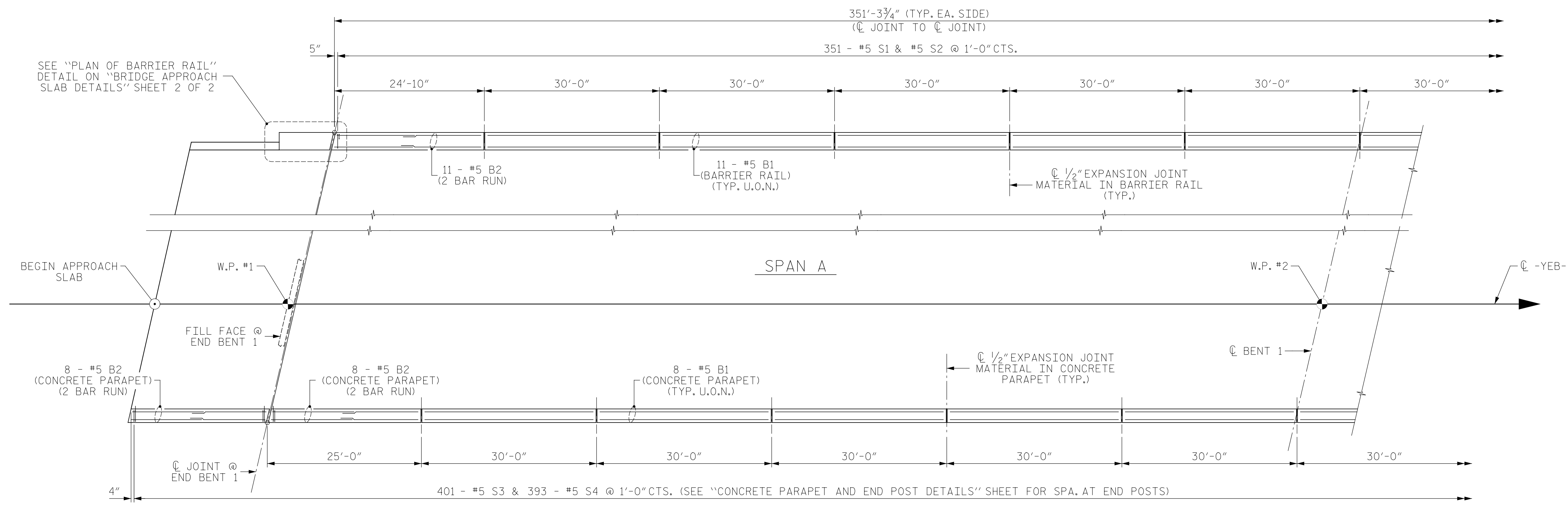
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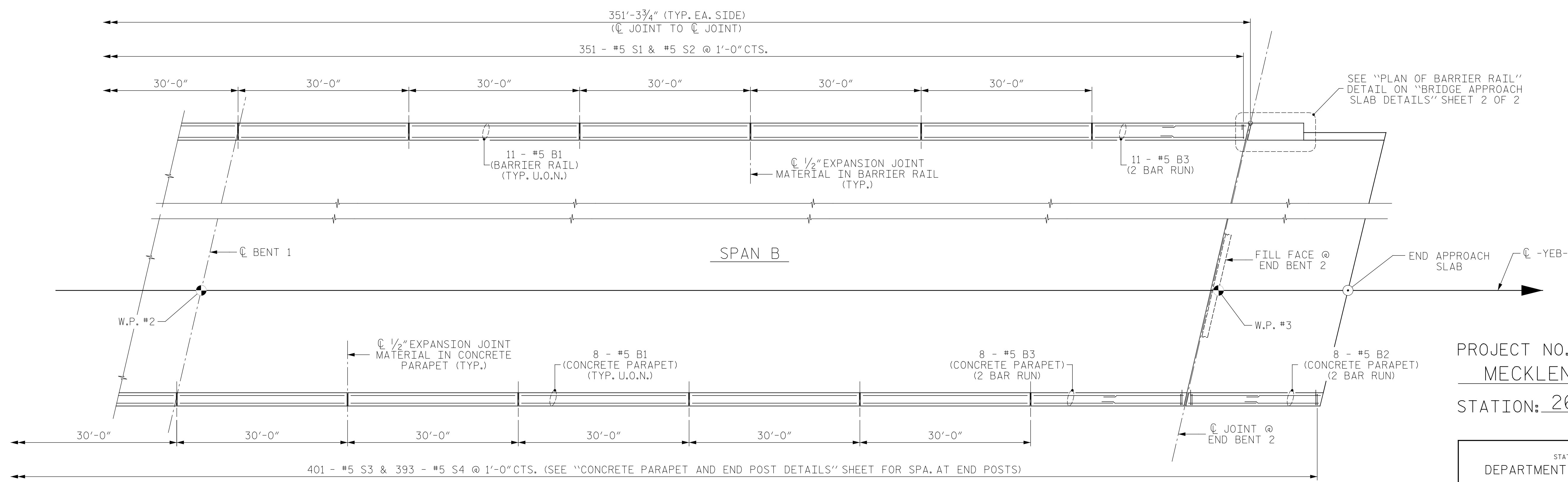
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DRAWN BY : J. N. AUSTIN DATE : 1-29-18
 CHECKED BY : M. D. NIFONG DATE : 1-30-18
 DESIGN E.O.R. : P. R. HOLSHOUSER DATE : 5-8-18



PLAN OF BARRIER RAIL & CONCRETE PARAPET - SPAN A



PLAN OF BARRIER RAIL & CONCRETE PARAPET - SPAN B

PROJECT NO. I-5714
MECKLENBURG COUNTY
STATION: 26+20.73 -YEB-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE
CONCRETE BARRIER RAIL
AND CONCRETE PARAPET

DocuSigned by:
Paul Holshouser
BEG048516A143E

5/8/2018 | 10:27 AM PDT

NOTES:
#5 "S" BARS MAY BE SHIFTED AS NECESSARY TO CLEAR EXPANSION JOINTS.
U.O.N. - DENOTES "UNLESS OTHERWISE NOTED"

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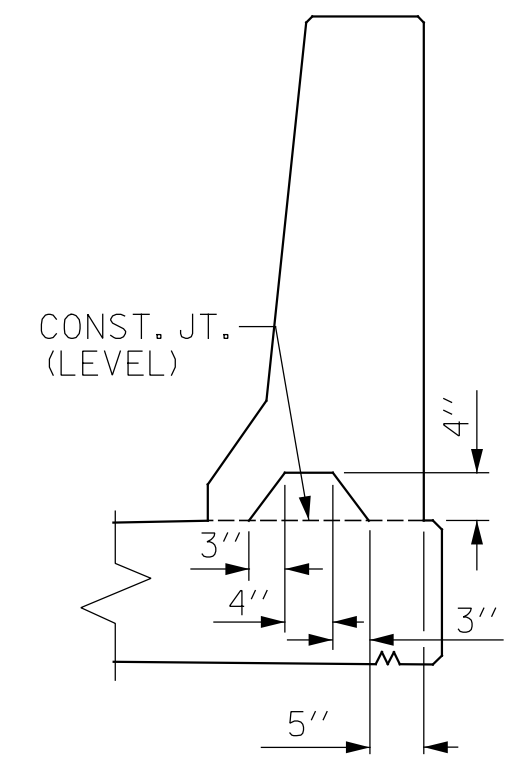
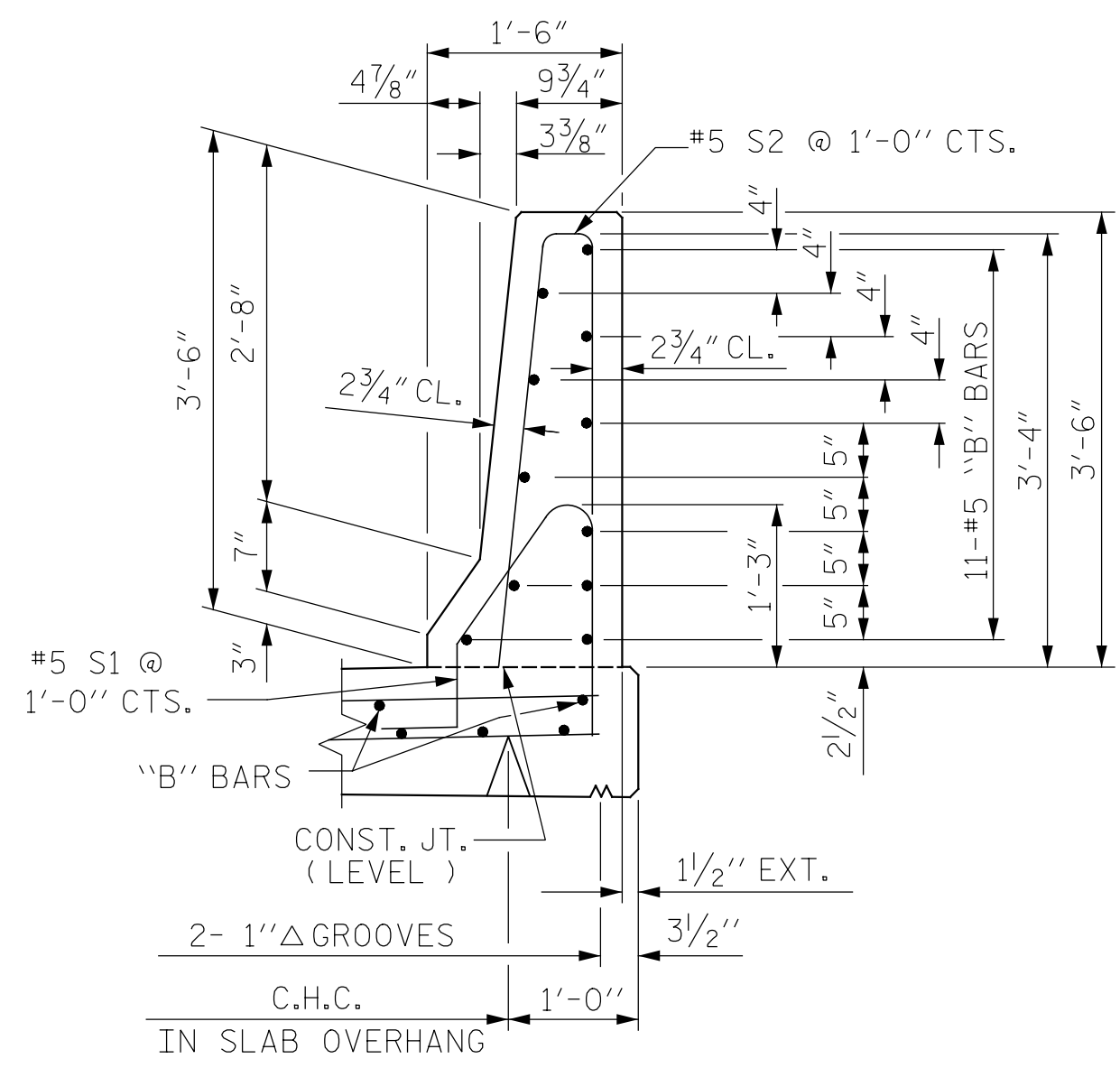
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2			4			53

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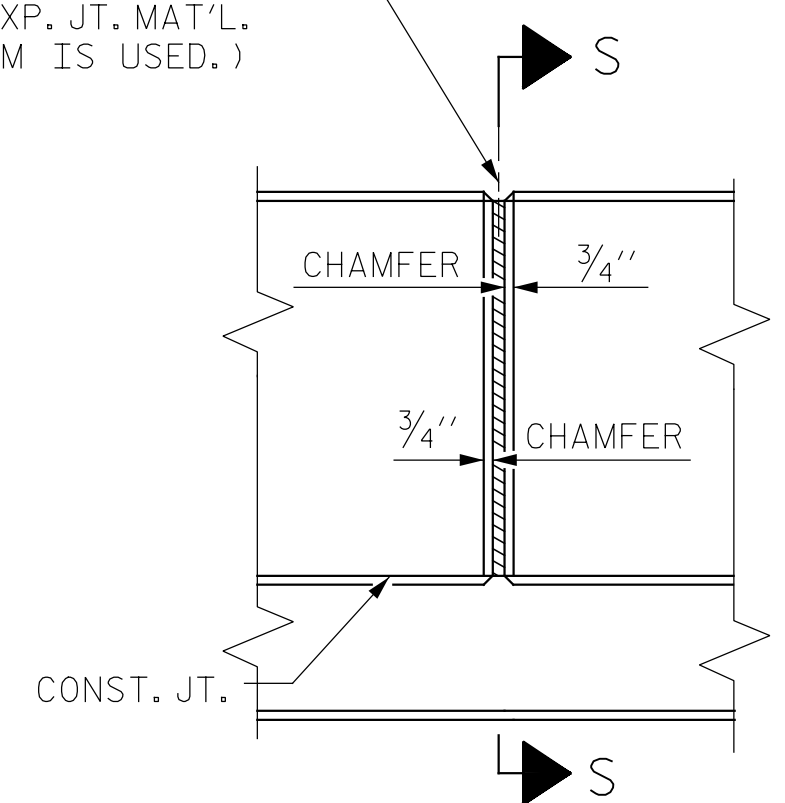
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CHECKED BY: M. D. NIFONG DATE: 1-30-18
DESIGN E.O.R.: P. R. HOLSHOUSER DATE: 5-8-18

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



ELEVATION AT EXPANSION JOINTS
 BARRIER RAIL DETAILS

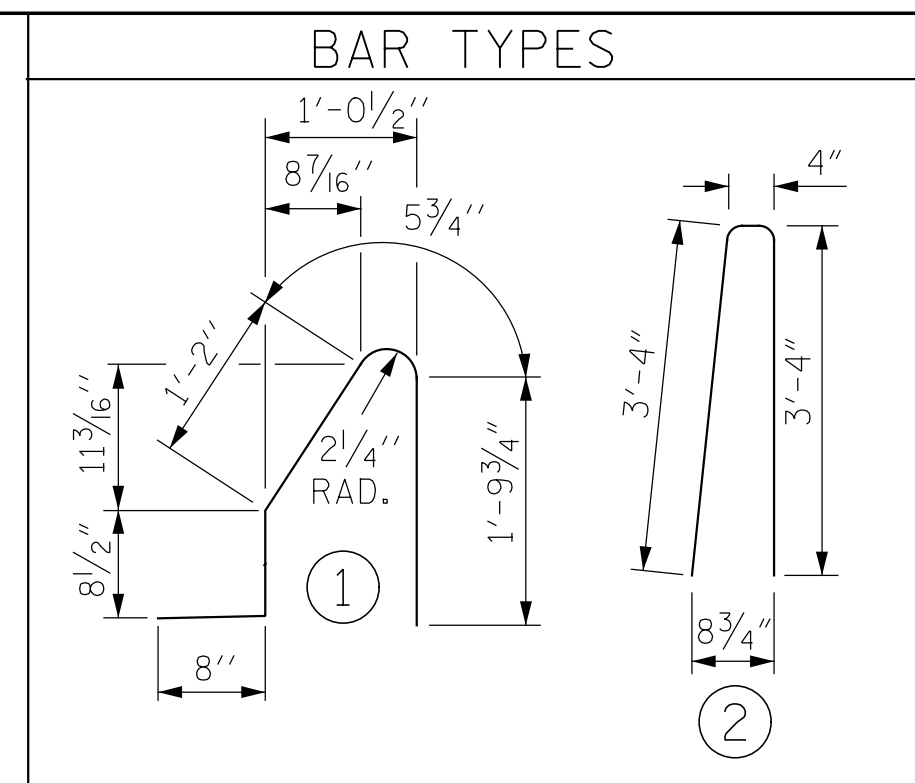
NOTES

THE BARRIER RAIL IN EACH SPAN SHALL NOT BE CAST UNTIL ALL SLAB CONCRETE IN THAT SPAN HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

GROOVED CONTRACTION JOINTS, 1/2" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE BARRIER RAIL AND IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. THE 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.

FOR GUARDRAIL ANCHOR ASSEMBLY, SEE "GUARDRAIL ANCHORAGE FOR BARRIER RAIL" SHEET.



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL
 FOR CONCRETE BARRIER RAIL ONLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	110	5	STR	29' - 6"	3,385
B2	22	5	STR	14' - 2"	325
B3	22	5	STR	15' - 0"	344
S1	351	5	1	4' - 10"	1,769
S2	351	5	2	7' - 0"	2,563
EPOXY COATED REINFORCING STEEL				LBS.	8,386
CLASS "AA" CONCRETE				C.Y.	47.8
CONCRETE BARRIER RAIL				LIN. FT.	351.30

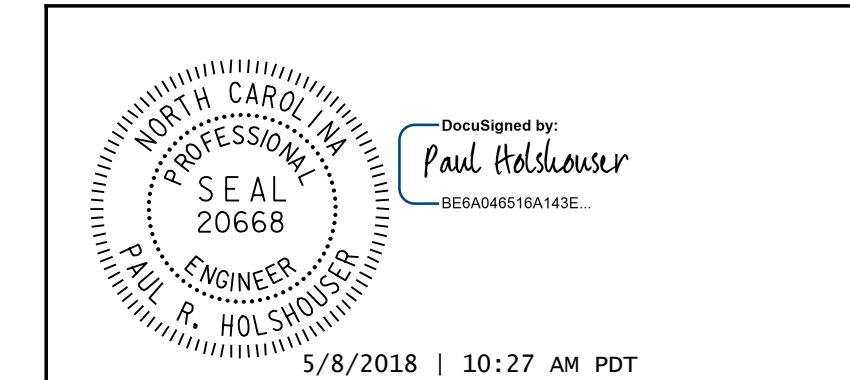
REINFORCING STEEL SPLICE LENGTHS

BAR SIZE	PARAPET AND BARRIER RAIL
#4	2'-9"
#5	3'-5"
#6	4'-4"

EPOXY COATED

PROJECT NO. I-5714
 MECKLENBURG COUNTY
 STATION: 26+20.73 -YEB-

DRAWN BY : J. N. AUSTIN DATE : 1-24-18
 CHECKED BY : M. D. NIFONG DATE : 1-30-18
 DESIGN E.O.R. : P. R. HOLSHOUSER DATE : 5-8-18

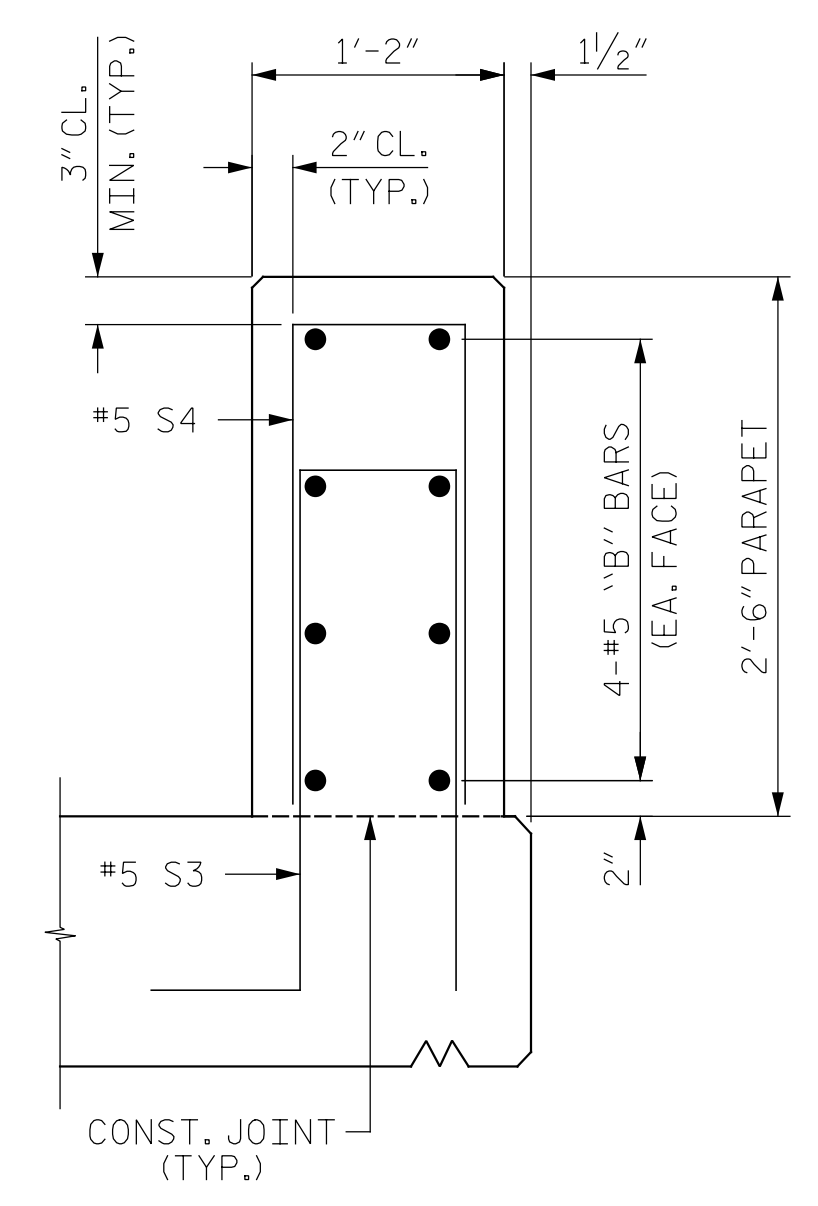


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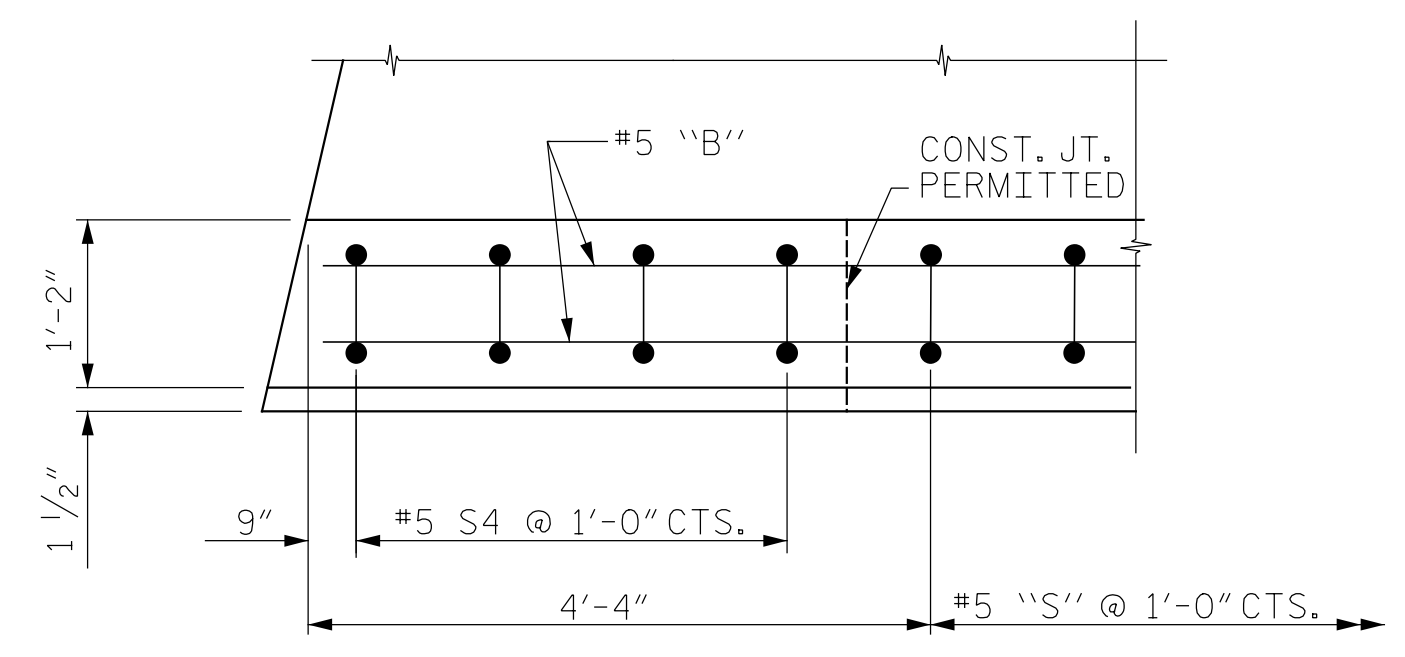
STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 SUPERSTRUCTURE
 CONCRETE BARRIER RAIL DETAILS

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1			3			TOTAL SHEETS
2			4			53

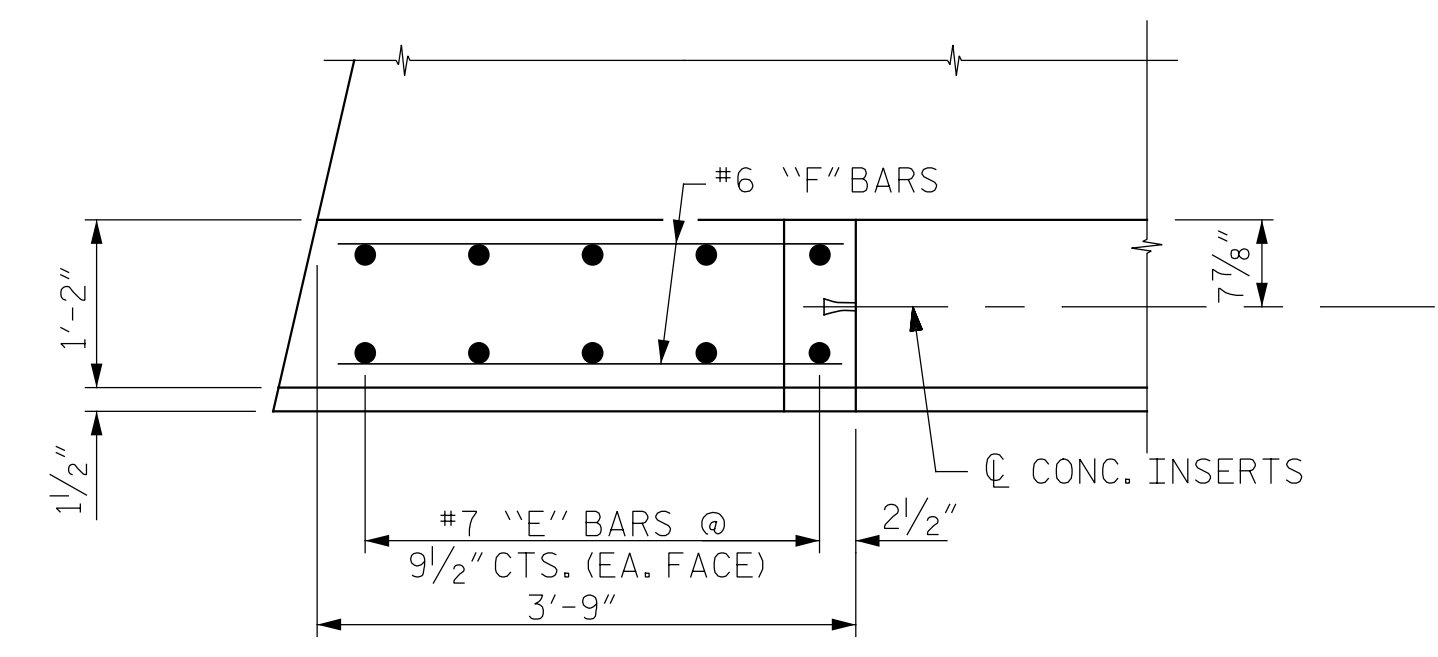
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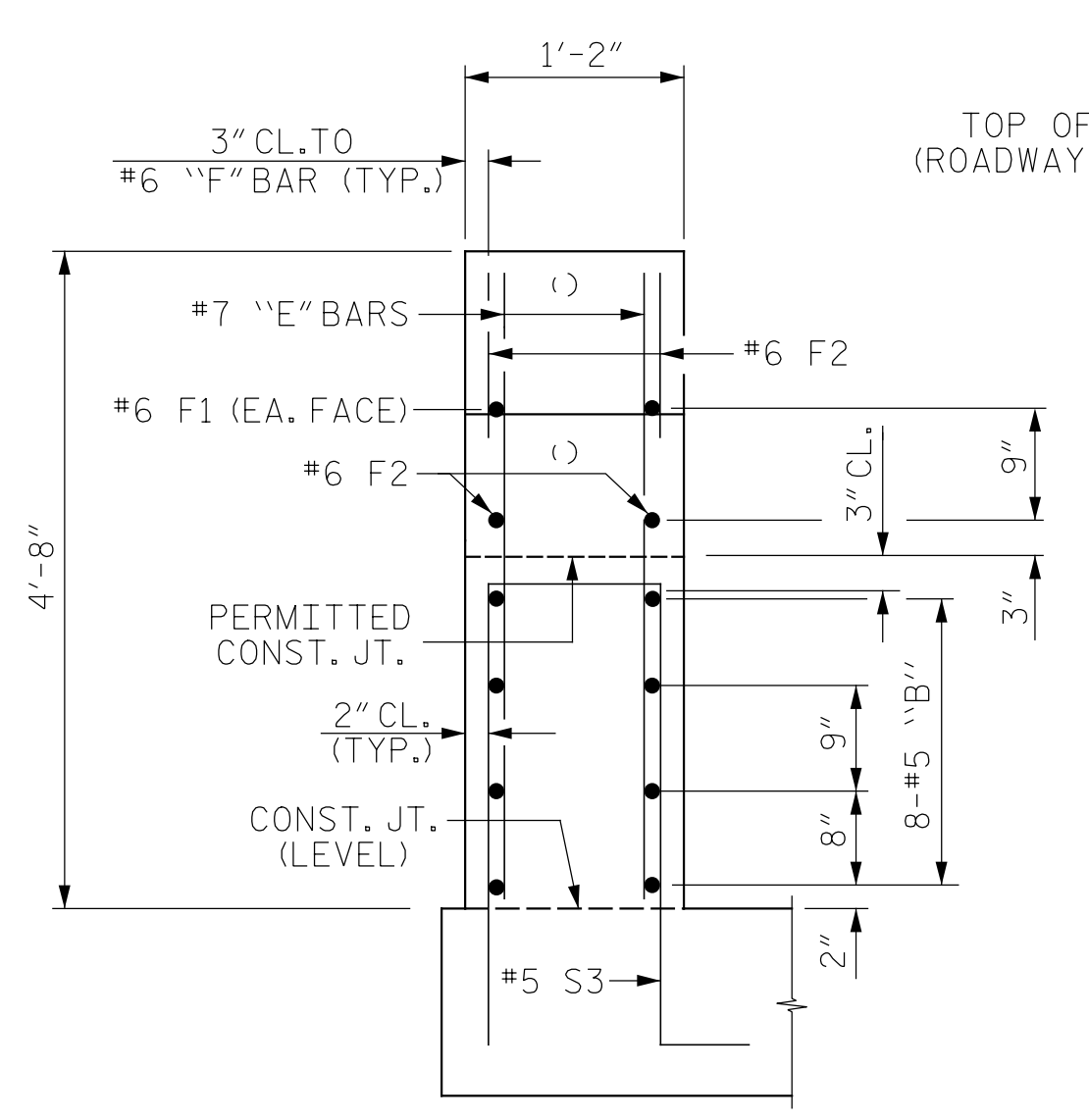
SECTION THRU PARAPET



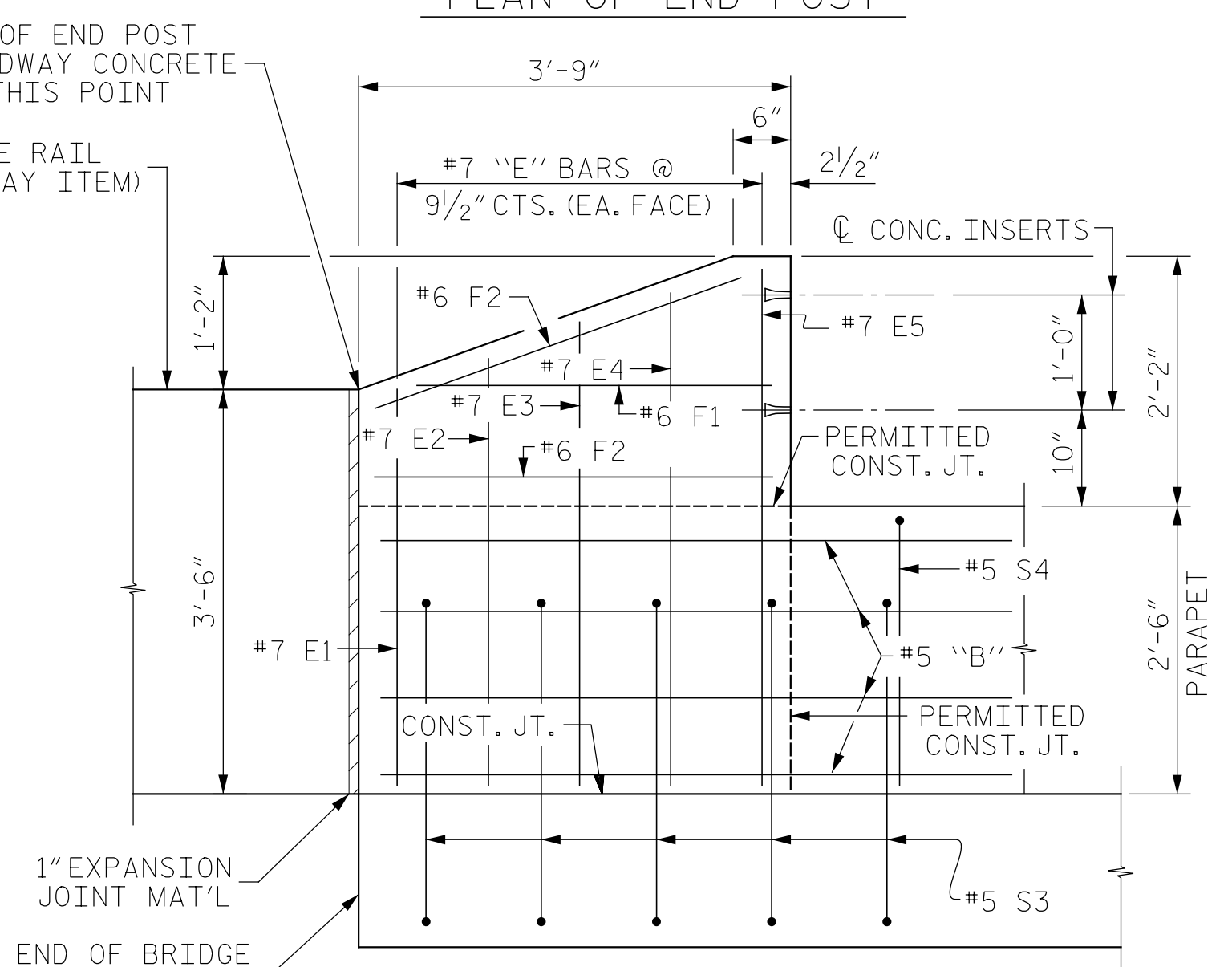
PLAN OF PARAPET



PLAN OF END POST



END VIEW



ELEVATION

PARAPET AND END POST FOR TWO BAR RAIL

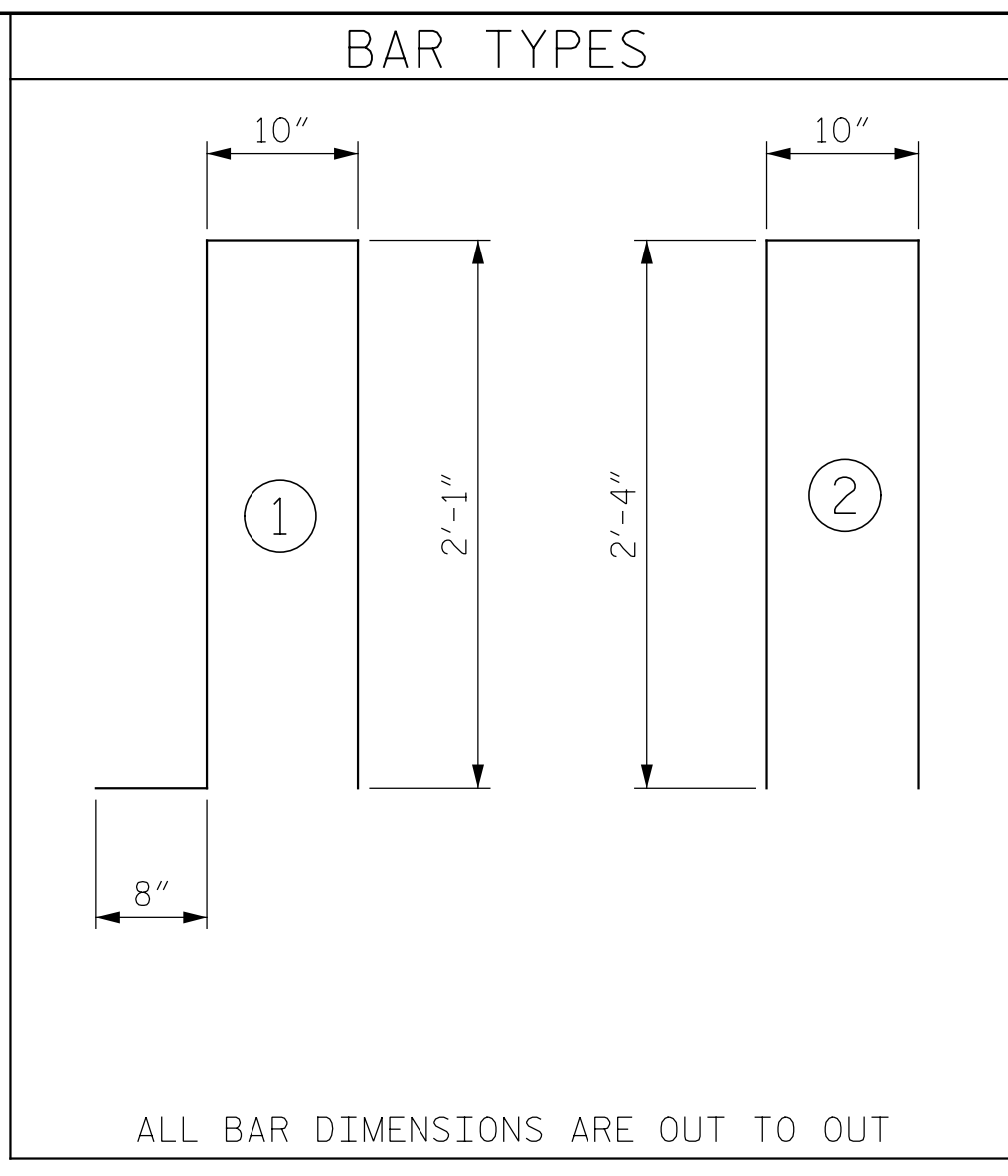
NOTES:

THE CONCRETE PARAPET SHALL NOT BE CAST UNTIL ALL SLAB CONCRETE FOR THAT UNIT SLAB HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

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

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. THE CONTRACTION JOINT SHALL BE LOCATED AT THIRD POINTS BETWEEN EXPANSION JOINTS. NO CONTRACTION JOINTS WILL BE REQUIRED FOR SEGMENTS LESS THAN 10 FEET IN LENGTH.

FOR DETAILS OF CONCRETE INSERTS, SEE "END OF RAIL DETAILS" SHEET.

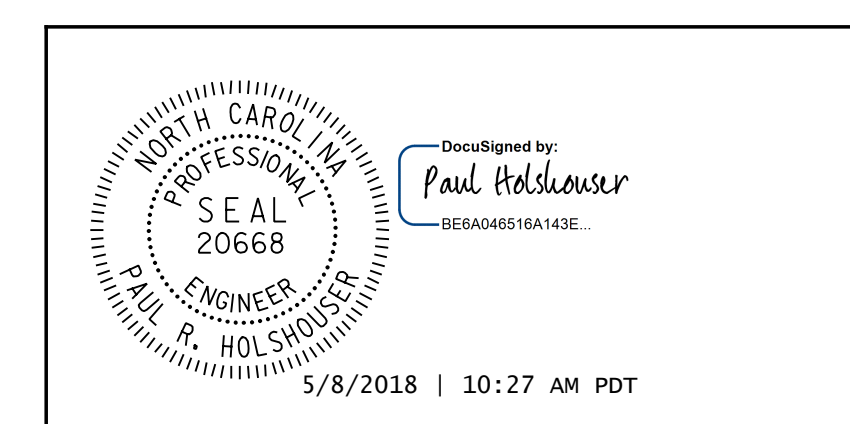


BAR TYPES				BILL OF MATERIAL		
BAR NO.	SIZE	TYPE	LENGTH	WEIGHT		
B1	80	5	STR	29' - 6"	2,461	
B2	48	5	STR	14' - 2"	709	
B3	16	5	STR	15' - 0"	250	
S3	401	5	1	5' - 8"	2,370	
S4	393	5	2	5' - 6"	2,254	
F1	4	6	STR	2' - 11"	18	
F2	8	6	STR	3' - 5"	41	
E1	4	7	STR	3' - 5"	28	
E2	4	7	STR	3' - 8"	30	
E3	4	7	STR	4' - 0"	33	
E4	4	7	STR	4' - 3"	35	
E5	4	7	STR	4' - 6"	37	
EPOXY COATED REINFORCING STEEL				LBS.	8,266	
CLASS "AA" CONCRETE				C.Y.	43.8	
1'-2" x 2'-6" CONCRETE PARAPET				LIN. FT.	401.45	

ALL BAR DIMENSIONS ARE OUT TO OUT

REINFORCING STEEL SPLICE LENGTHS	
BAR SIZE	PARAPET AND BARRIER RAIL
EPOXY COATED	
#4	2'-9"
#5	3'-5"
#6	4'-4"

PROJECT NO. I-5714
 MECKLENBURG COUNTY
 STATION: 26+20.73 -YEB-



STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 SUPERSTRUCTURE
 CONCRETE PARAPET AND
 END POST DETAILS

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1			3			TOTAL SHEETS
2			4			53

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DRAWN BY : J. N. AUSTIN DATE : 1-24-18
 CHECKED BY : M. D. NIFONG DATE : 1-30-18
 DESIGN E.O.R. : P. R. HOLSHOUSER DATE : 5-8-18

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 Phone: 919-422-0333
 License #: P-0999

NOTES

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

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

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

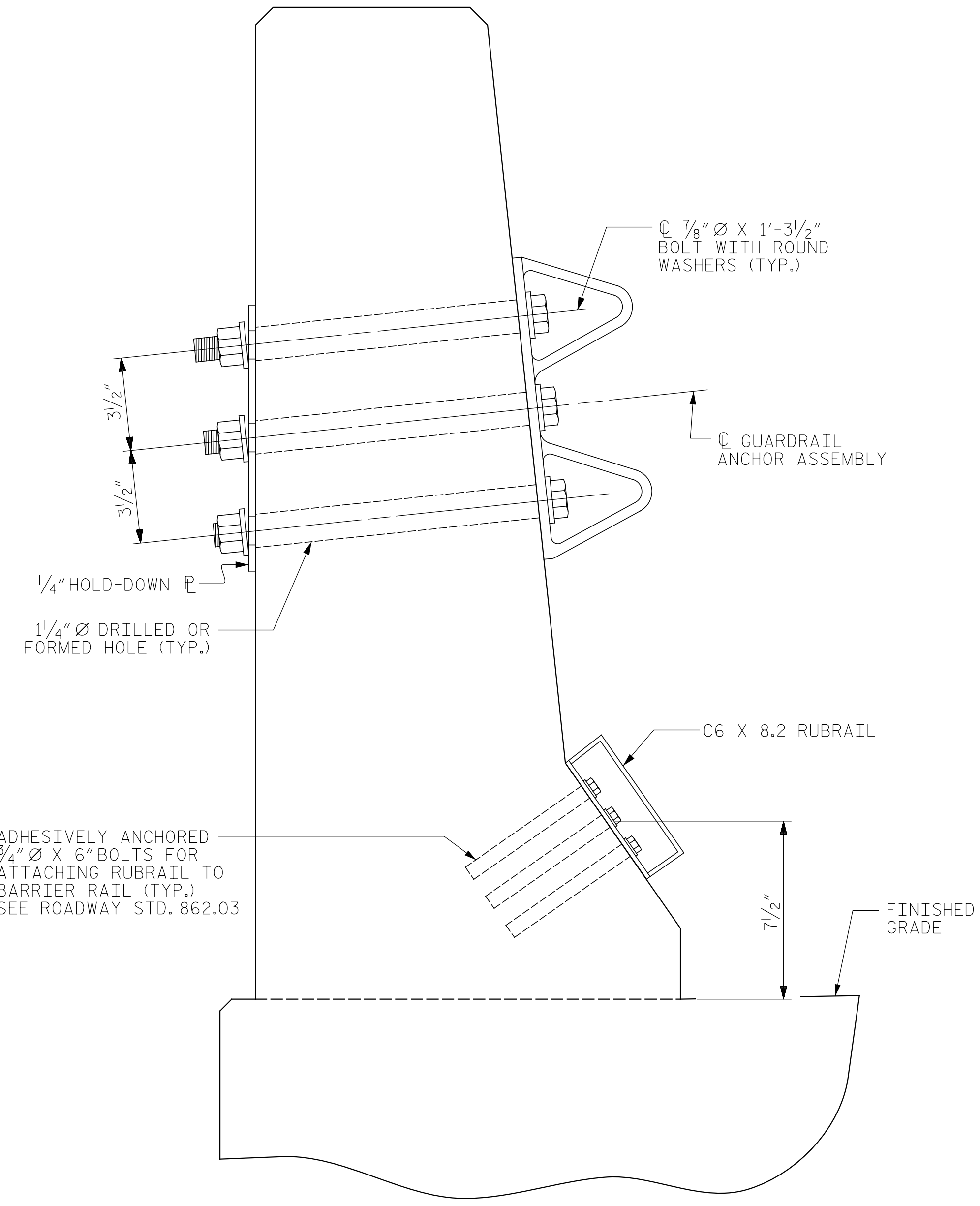
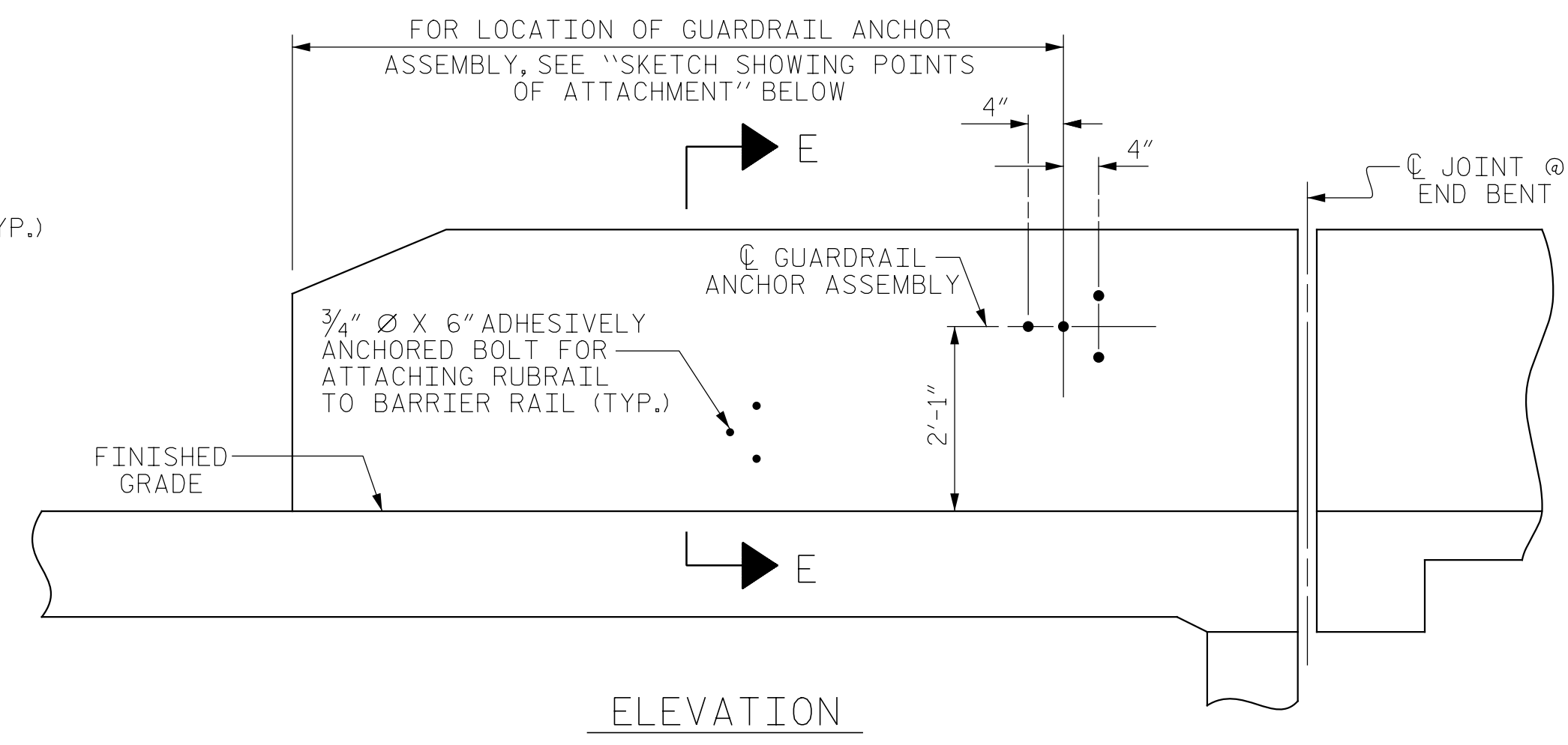
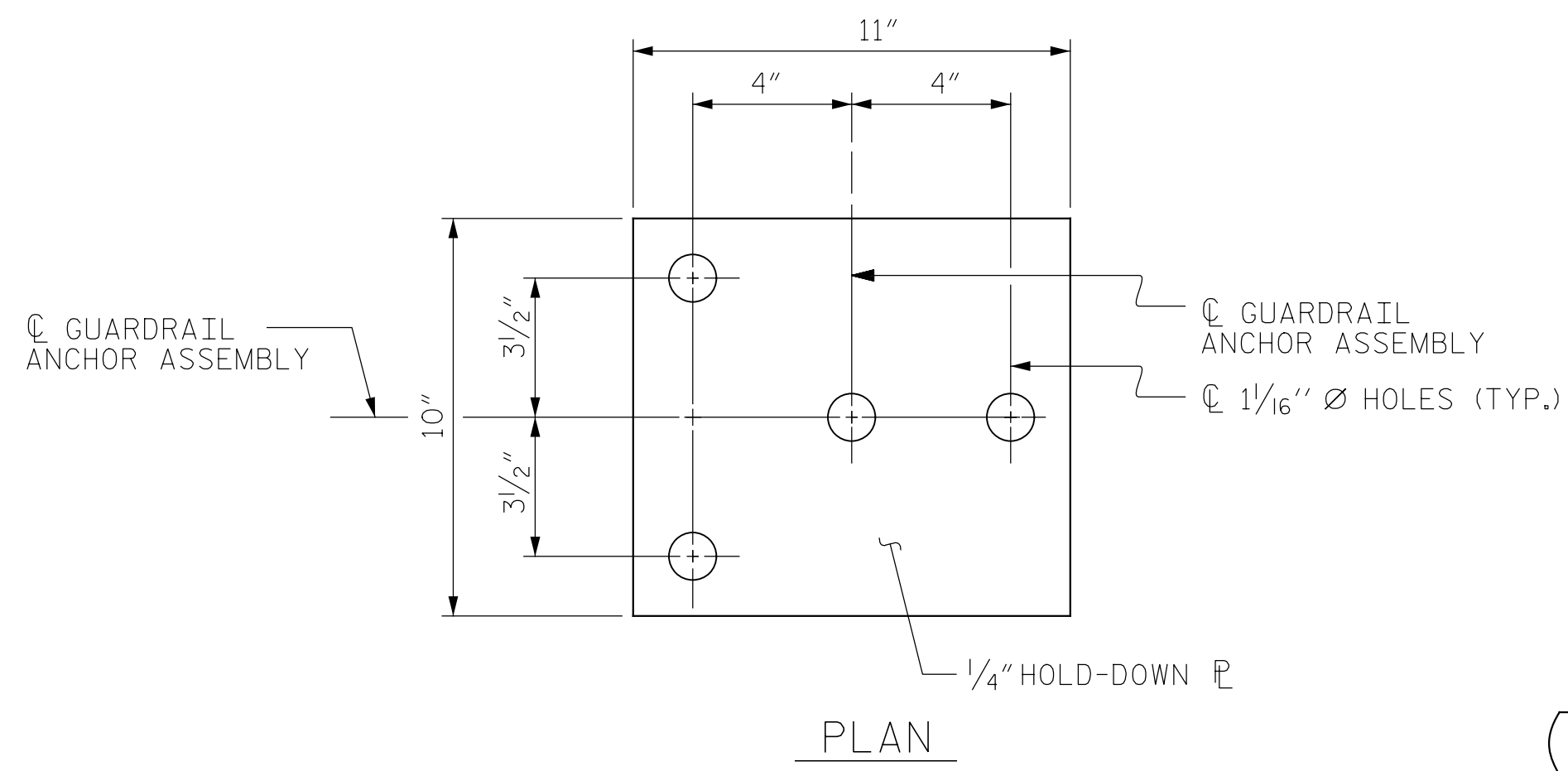
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF BARRIER RAIL. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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

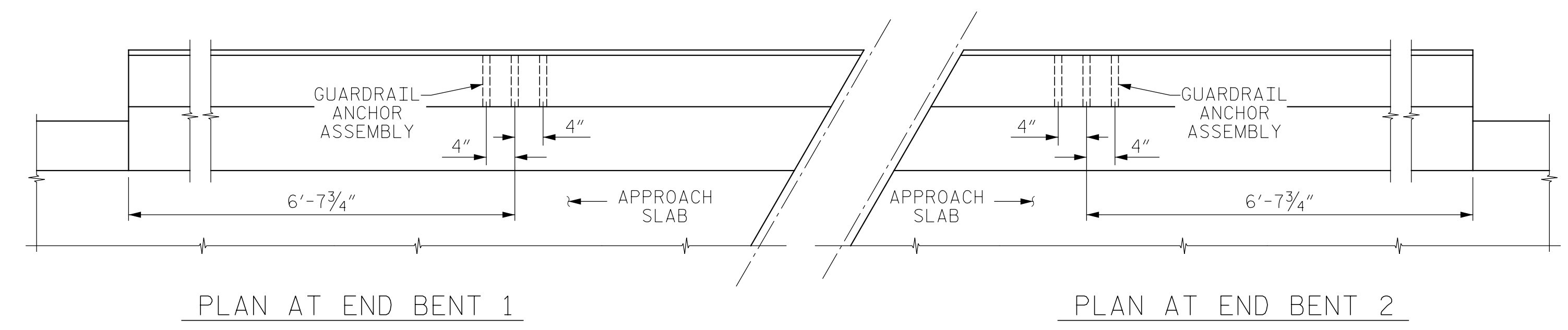
THE COST OF THE GUARDRAIL ANCHOR ASSEMBLY SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR CONCRETE BARRIER RAIL.

THE 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.

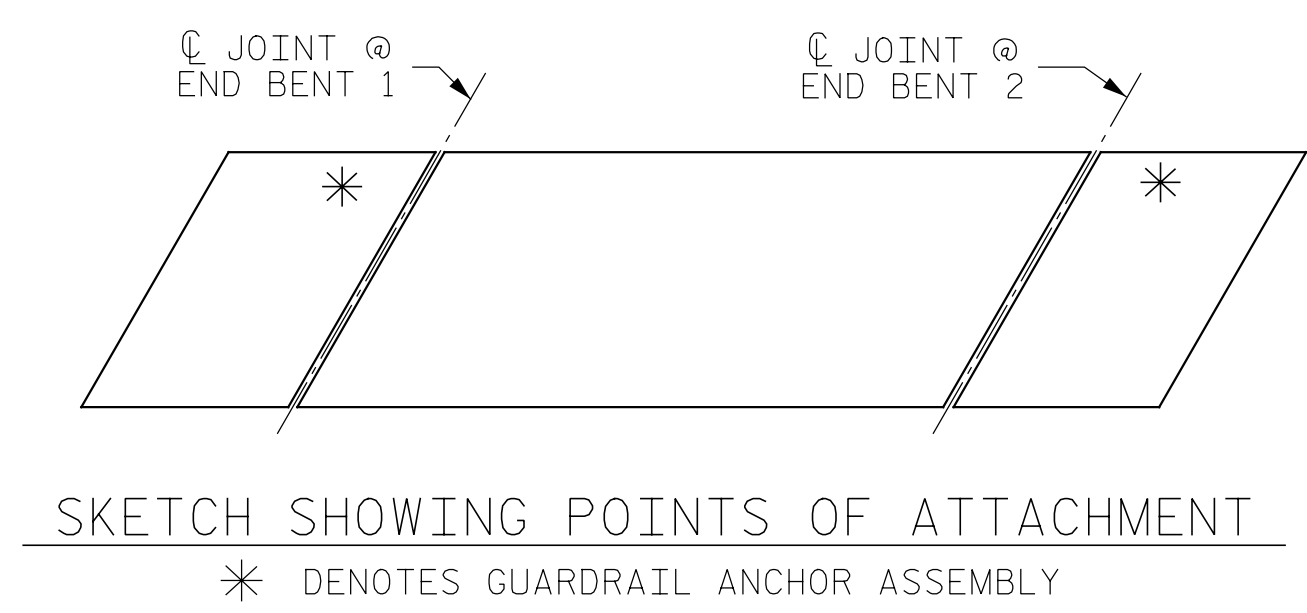
THE C6 X 8.2 RUBRAIL IS TO BE ADHESIVELY ANCHORED TO THE RAIL USING THREE 3/4" Ø X 6" BOLTS WITH WASHERS. LEVEL ONE FIELD TESTING IS REQUIRED, AND THE YIELD LOAD OF THE 3/4" Ø BOLT IS 12 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE STANDARD SPECIFICATIONS. SEE ROADWAY STANDARD 862.03 FOR DETAILS AND LOCATION OF THE RUBRAIL.



SECTION E-E
GUARDRAIL ANCHOR ASSEMBLY DETAILS

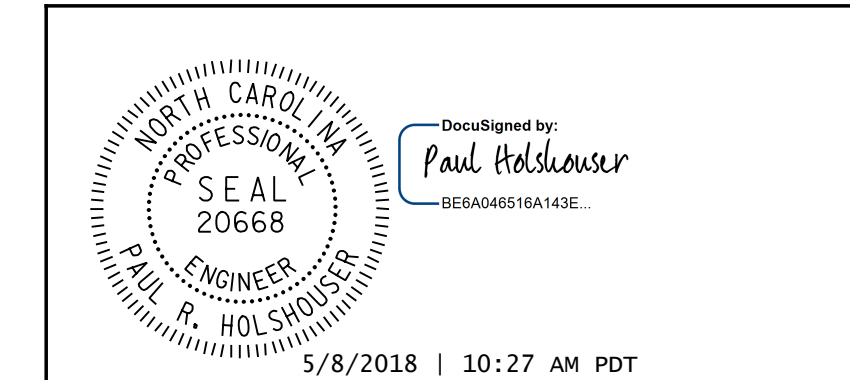


LOCATION OF ANCHORS FOR GUARDRAIL



PROJECT NO. I-5714
MECKLENBURG COUNTY
STATION: 26+20.73 -YEB-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE
GUARDRAIL ANCHORAGE
FOR BARRIER RAIL



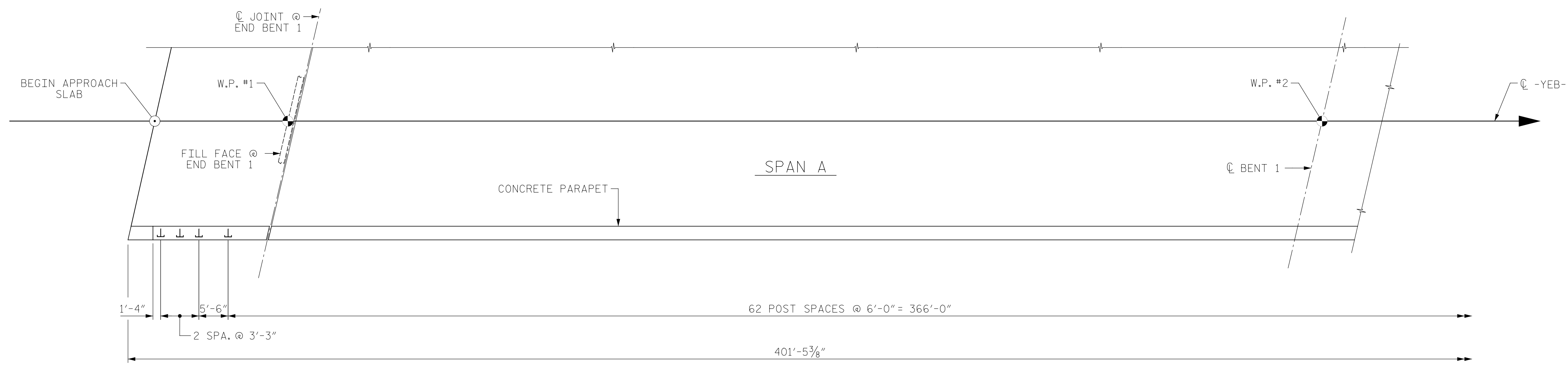
ICE of Carolinas, PLLC
4505 Falls of Neuse Road, Suite 110
Raleigh, North Carolina 27609
Phone: 919-422-0333
License #: P-0999

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS
2			4			53

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DRAWN BY: J. N. AUSTIN DATE: 1-29-18
CHECKED BY: M. D. NIFONG DATE: 1-30-18
DESIGN E.O.R.: P. R. HOLSHOUSER DATE: 5-8-18

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PLAN OF METAL RAIL POST SPACING - SPAN A



PLAN OF METAL RAIL POST SPACING - SPAN B

PROJECT NO. I-5714
MECKLENBURG COUNTY
 STATION: 26+20.73 -YEB-

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DRAWN BY : J. N. AUSTIN DATE : 1-29-18
 CHECKED BY : M. D. NIFONG DATE : 1-30-18
 DESIGN E.O.R. : P. R. HOLSHOUSER DATE : 5-8-18

DOCUMENT NOT CONSIDERED FINAL
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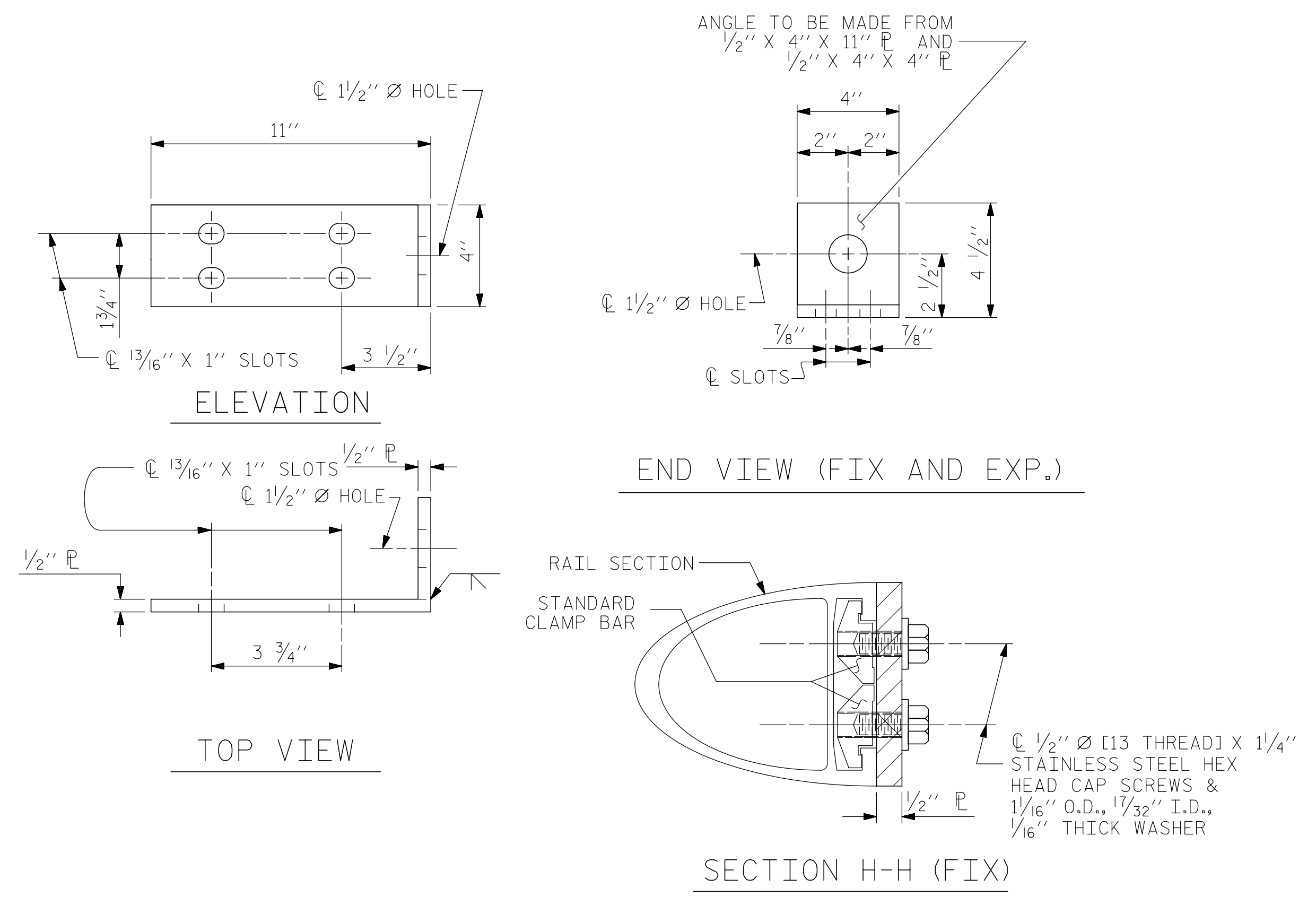
ICE of Carolinas, PLLC
 4505 Falls of Neuse Road, Suite 110
 Raleigh, North Carolina 27609
 Phone: 919-422-0333
 License #: P-0999

DocuSigned by:
 Paul Holshouser
 BE6A048516A143E

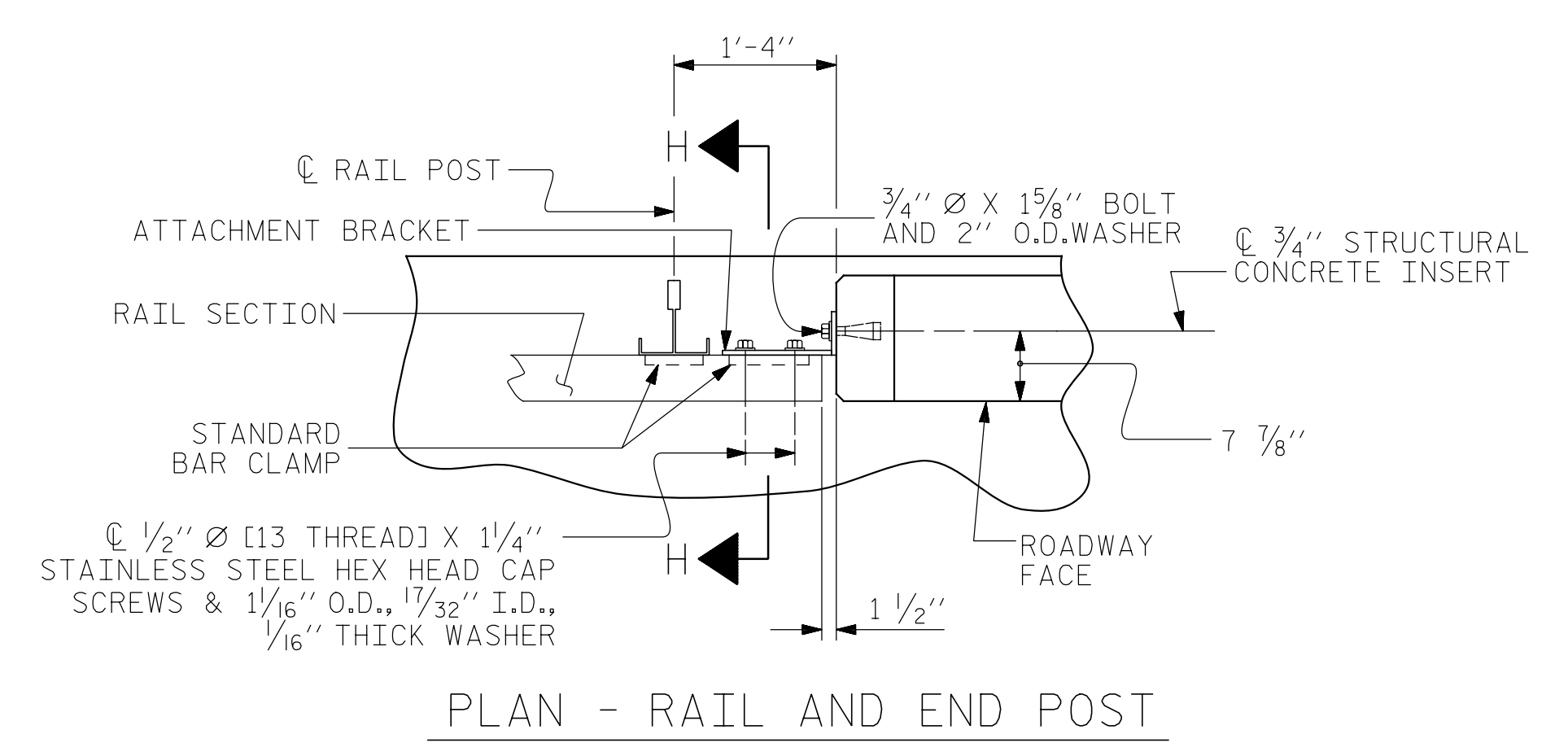
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STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
SUPERSTRUCTURE					
METAL RAIL POST SPACING					
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SHEET NO.					S-24
TOTAL SHEETS					53

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FIXED



DETAILS FOR ATTACHING METAL RAIL TO END POST

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

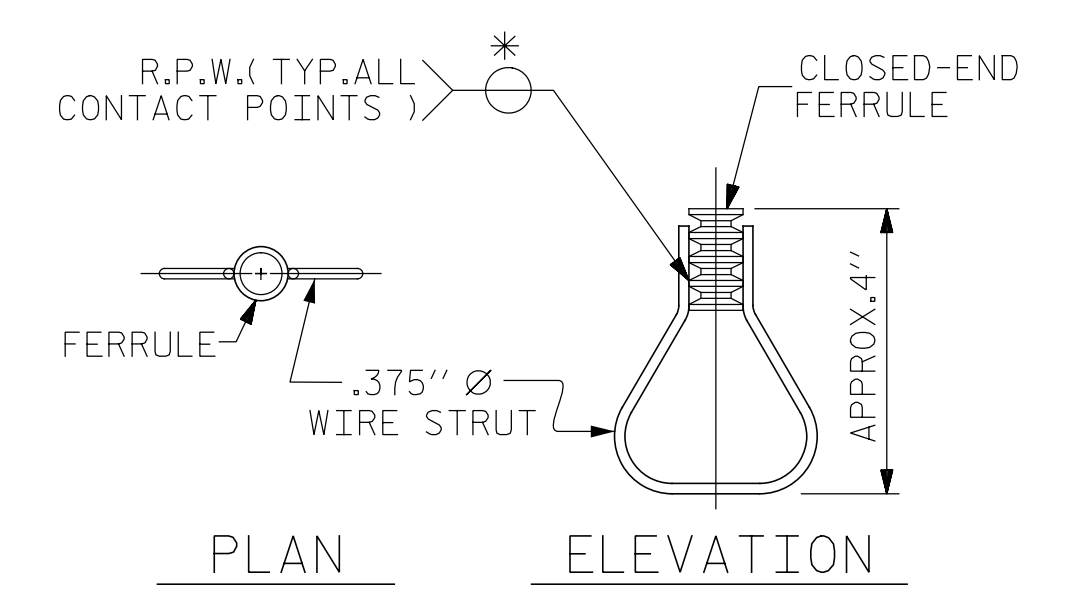
- THE METAL RAIL TO END POST CONNECTION SHALL CONSIST OF THE FOLLOWING COMPONENTS:
- A. 1/2" PLATES SHALL CONFORM TO AASHTO M270 GRADE 36 AND SHALL BE GALVANIZED AFTER FABRICATION.
 - B. 3/4" STRUCTURAL CONCRETE INSERT SHALL HAVE A WORKING LOAD SHEAR CAPACITY OF 4800 LBS. THE FERRULES SHALL ENGAGE A 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°.
 - 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.



STRUCTURAL CONCRETE INSERT

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

PROJECT NO. I-5714
 MECKLENBURG COUNTY
 STATION: 26+20.73 -YEB-

DRAWN BY: J. N. AUSTIN DATE: 1-29-18
 CHECKED BY: M. D. NIFONG DATE: 1-30-18
 DESIGN E.O.R.: P. R. HOLSHOUSER DATE: 5-8-18

Professional Engineer Seal for Paul R. Holshouser, License # BE04048516A143E, dated 5/8/2018 at 10:27 AM PDT.

ICE of Carolinas, PLLC
 4505 Falls of Neuse Road, Suite 110
 Raleigh, North Carolina, 27609
 Phone: 919-422-0333
 License #: P-0999

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH SUPERSTRUCTURE END OF RAIL DETAILS					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
SHEET NO. S-25					TOTAL SHEETS 53

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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 LRFB 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.

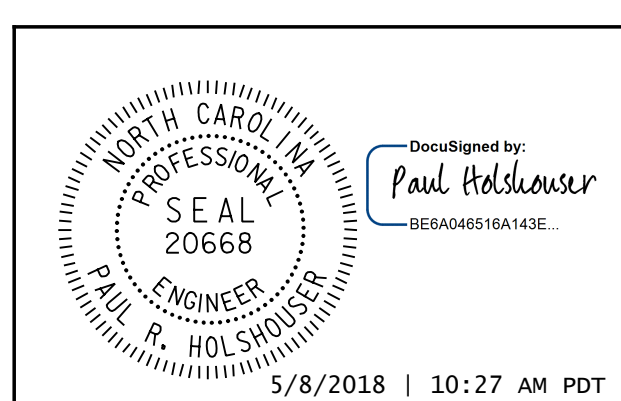
GROOVED CONTRACTION JOINTS, 1/2" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE PARAPET AND IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. A CONTRACTION JOINT SHALL BE LOCATED AT EACH THIRD POINT BETWEEN PARAPET EXPANSION JOINTS. ONLY ONE CONTRACTION JOINT IS REQUIRED AT 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 = 393.95 LIN. FT.

PROJECT NO. I-5714
MECKLENBURG COUNTY
 STATION: 26+20.73 -YEB-

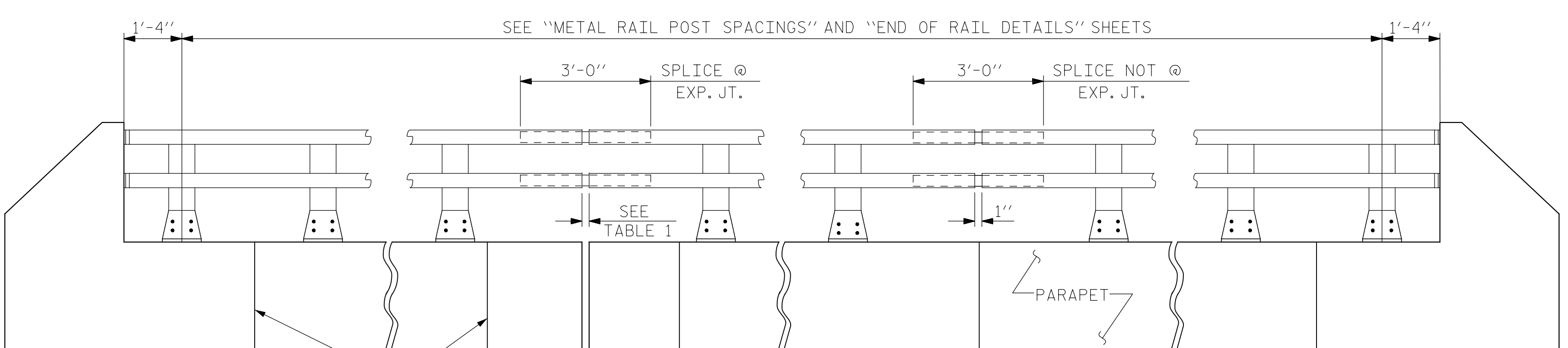
SHEET 1 OF 2

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



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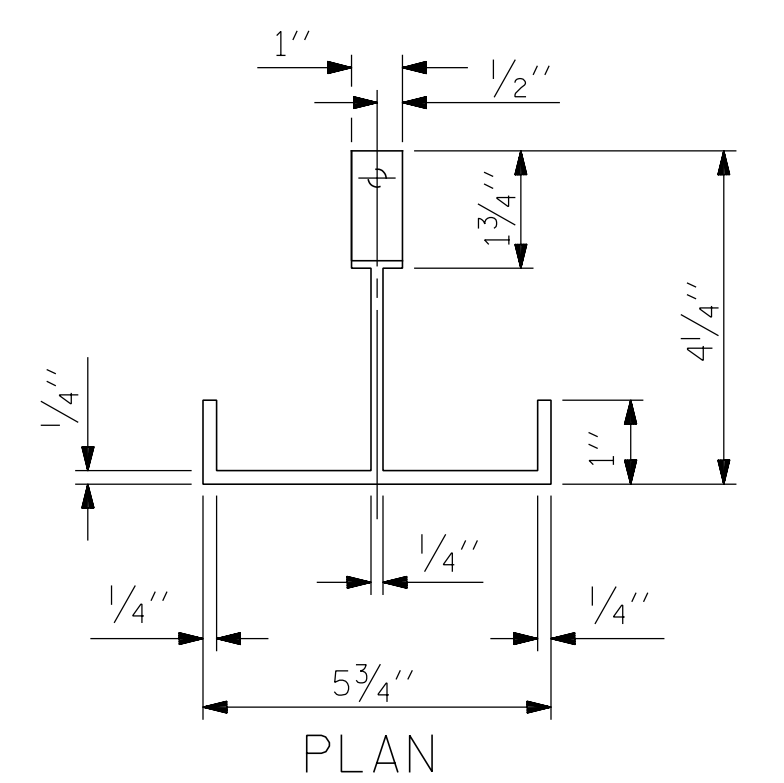
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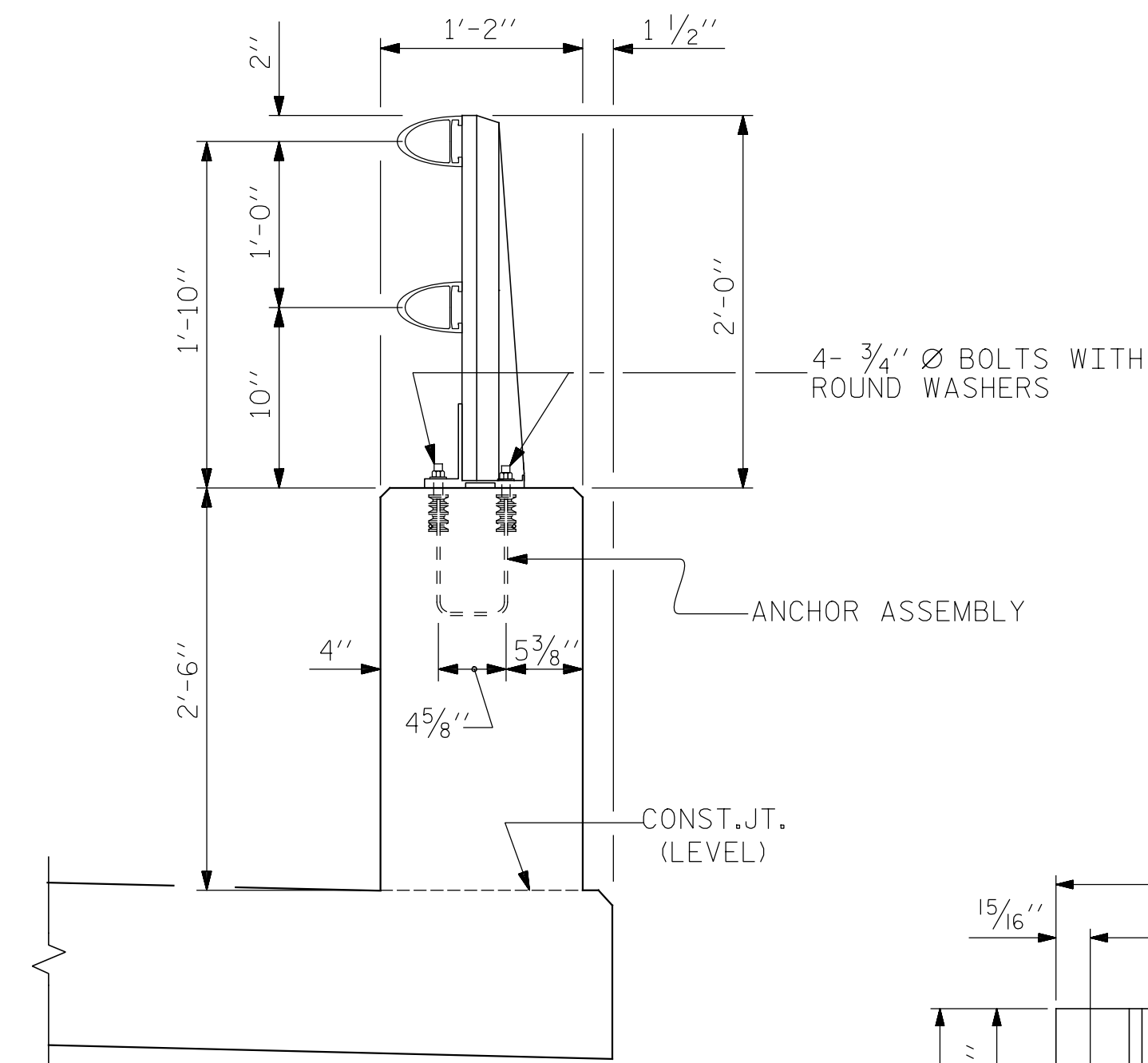
ELEVATION

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

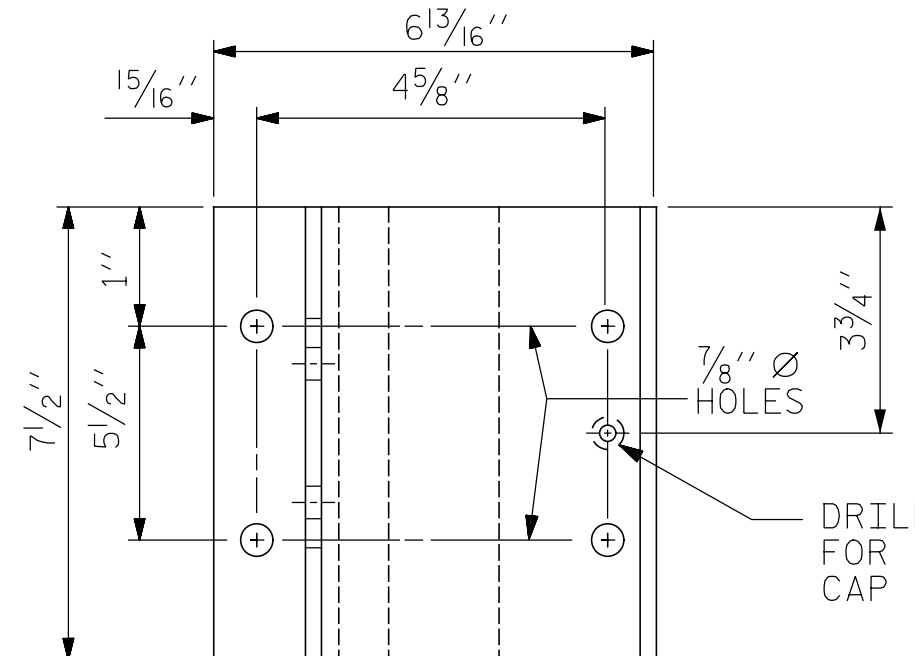
EXP. JT. @	RAIL OPENING
END BENT 1	1 5/8"
END BENT 2	1 5/8"



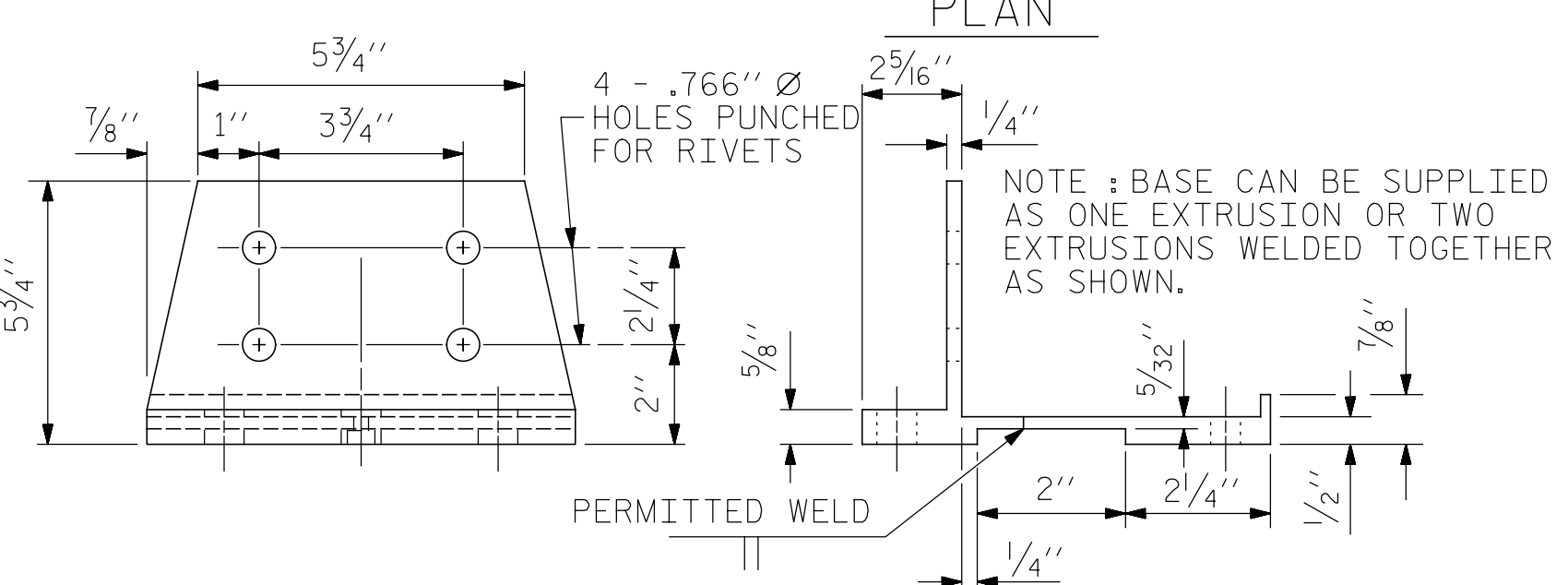
PLAN



SECTION THRU PARAPET AND RAIL



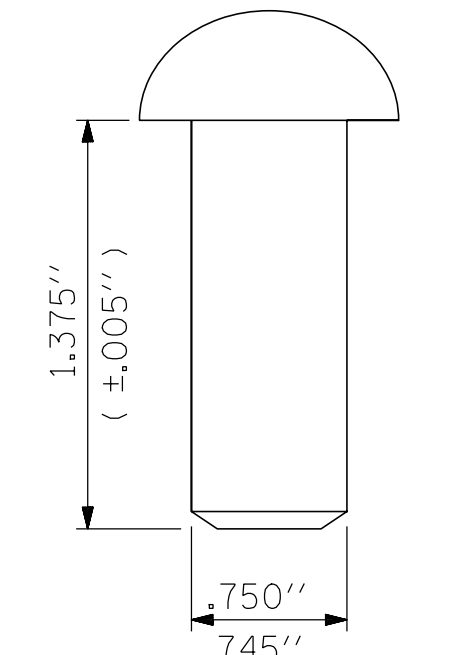
PLAN



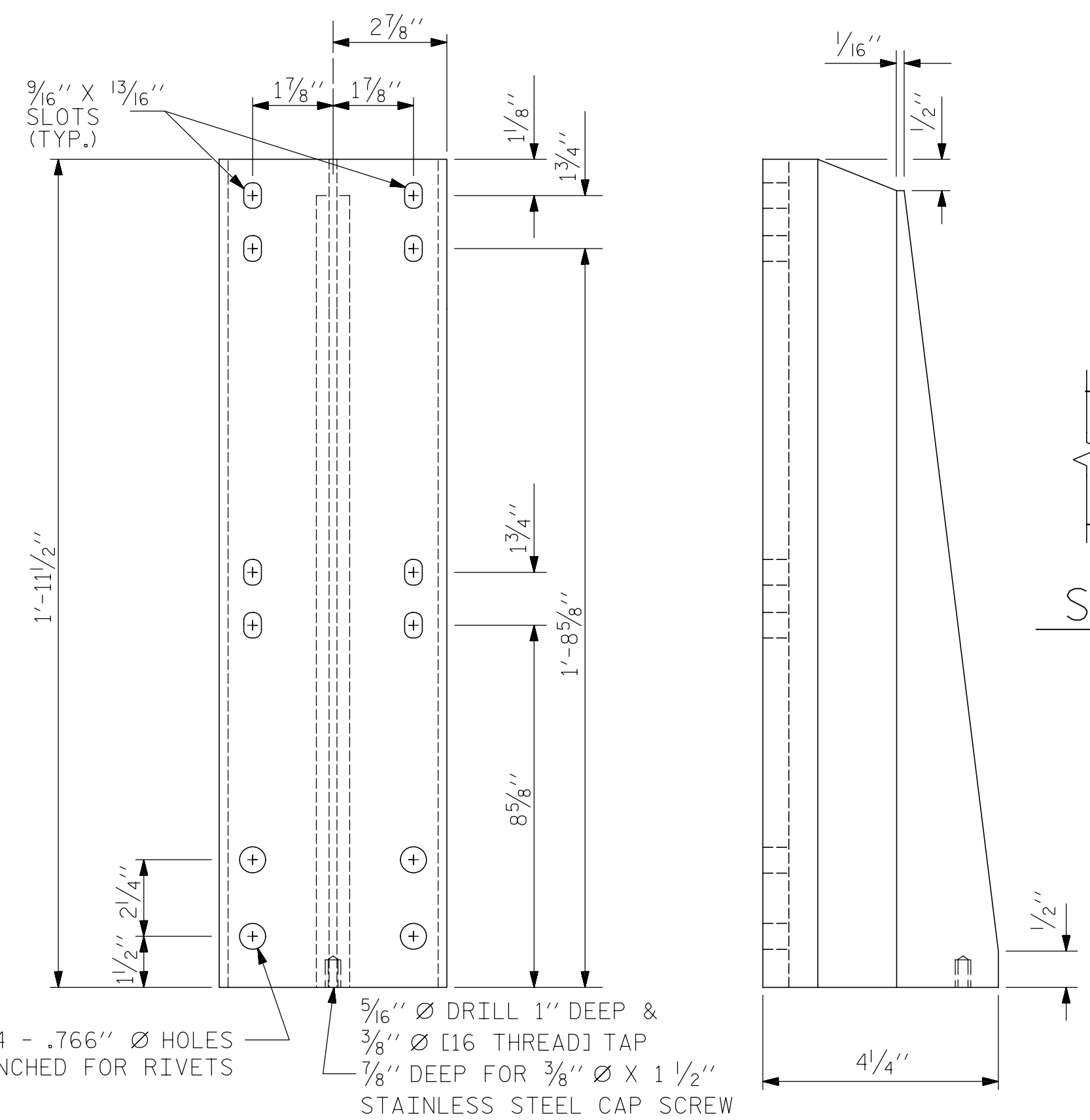
FRONT ELEVATION

SIDE ELEVATION

POST BASE DETAILS



RIVET DETAIL



FRONT ELEVATION

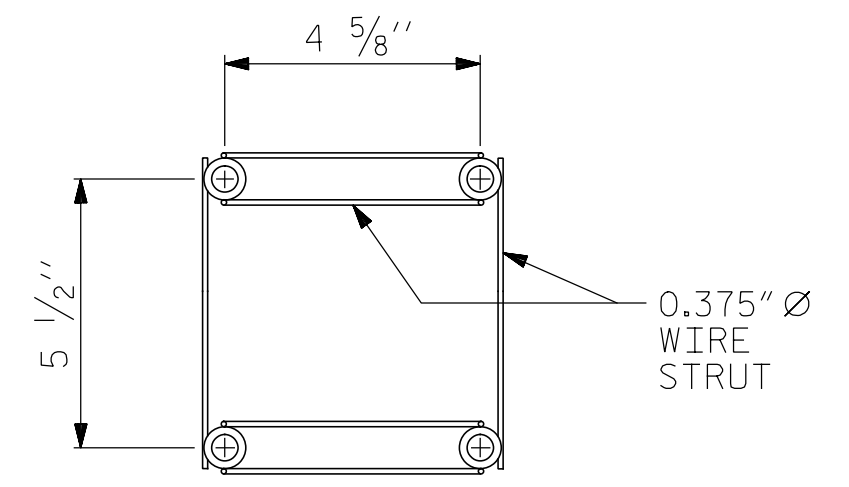
SIDE ELEVATION

DETAILS OF POST

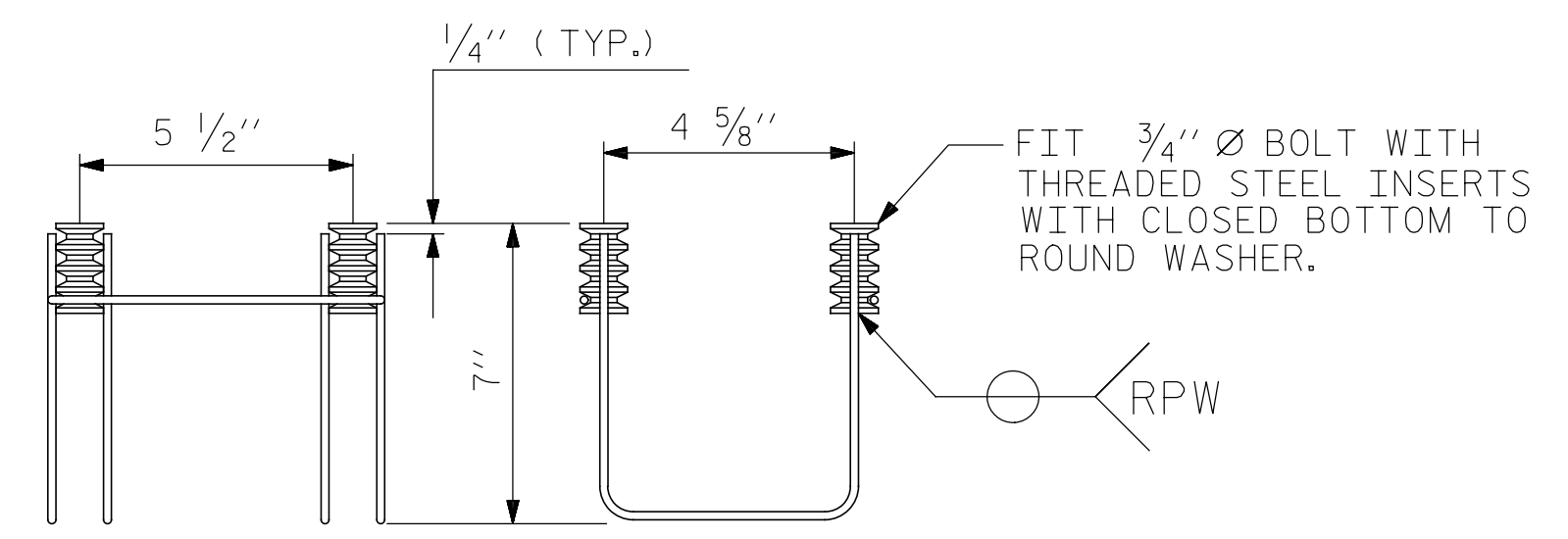
DRAWN BY : J. N. AUSTIN DATE : 1-29-18
 CHECKED BY : M. D. NIFONG DATE : 1-30-18
 DESIGN E.O.R. : P. R. HOLSHOUSER DATE : 5-8-18

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PLAN



SIDE VIEW ELEVATION

4-BOLT METAL RAIL ANCHOR ASSEMBLY

(69 ASSEMBLIES REQUIRED)

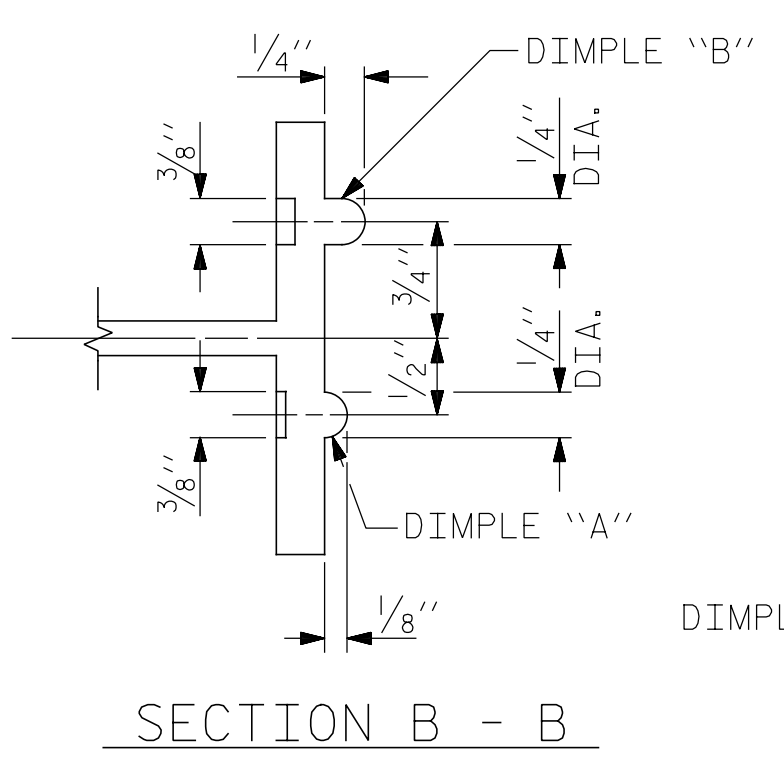
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STRUCTURAL CONCRETE ANCHOR ASSEMBLY
THE STRUCTURAL CONCRETE ANCHOR ASSEMBLY SHALL CONSIST OF THE FOLLOWING COMPONENTS :

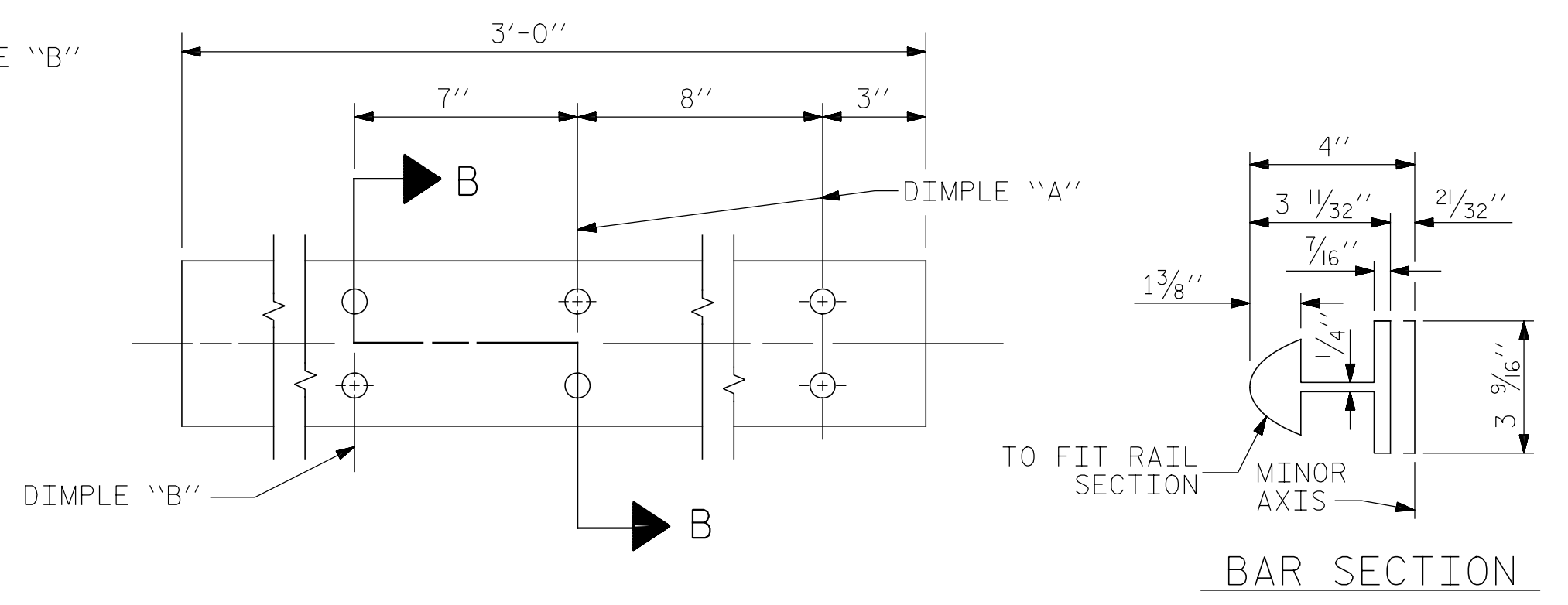
- A. FERRULES SHALL BE MADE FROM STEEL MEETING THE REQUIREMENTS OF AASHTO M169, GRADE 12L14 AND SHALL HAVE A MINIMUM LENGTH OF THREADS OF 2" FOR 3/4" FERRULES.
- B. 4 - 3/4" Ø X 2 1/2" BOLTS WITH WASHERS. BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307. BOLTS AND WASHERS SHALL BE GALVANIZED. AT 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.

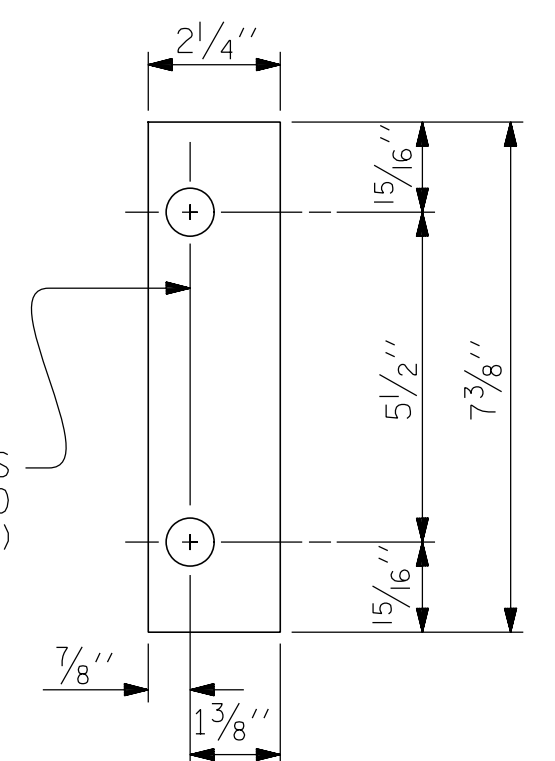
WHEN ADHESIVELY ANCHORED ANCHOR BOLTS ARE USED, BOLTS SHALL MEET THE REQUIREMENTS OF ASTM F593 ALLOY 304 STAINLESS STEEL WITH MINIMUM 75,000 PSI ULTIMATE STRENGTH. NUTS SHALL MEET THE REQUIREMENTS OF ASTM F594 ALLOY 304 STAINLESS STEEL AND WASHERS SHALL MEET THE REQUIREMENTS OF ASTM F844 EXCEPT THEY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



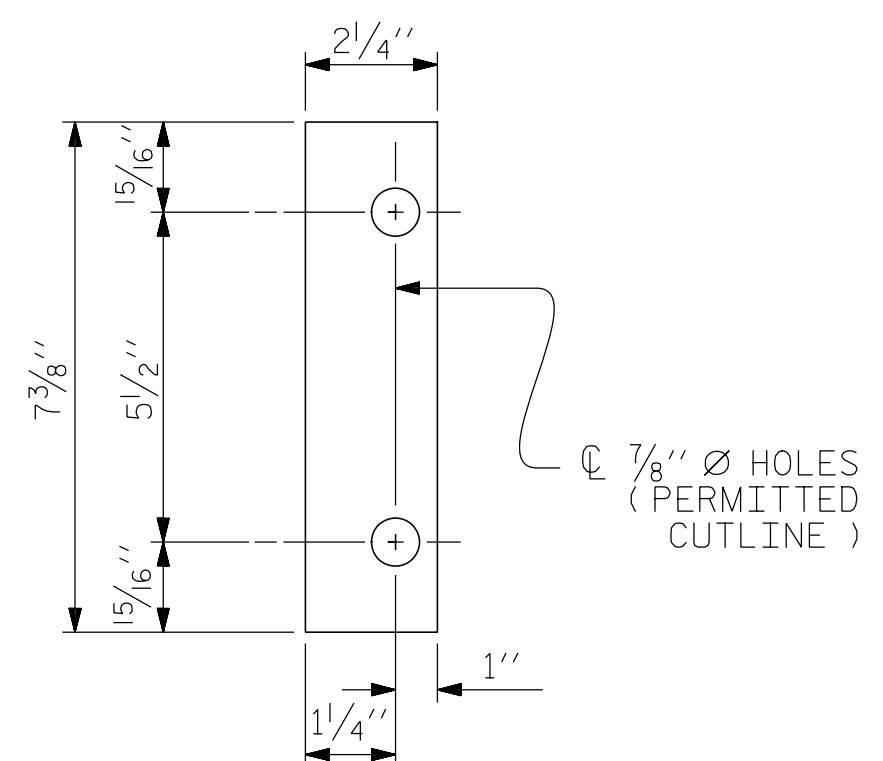
SECTION B - B



EXPANSION BAR DETAILS



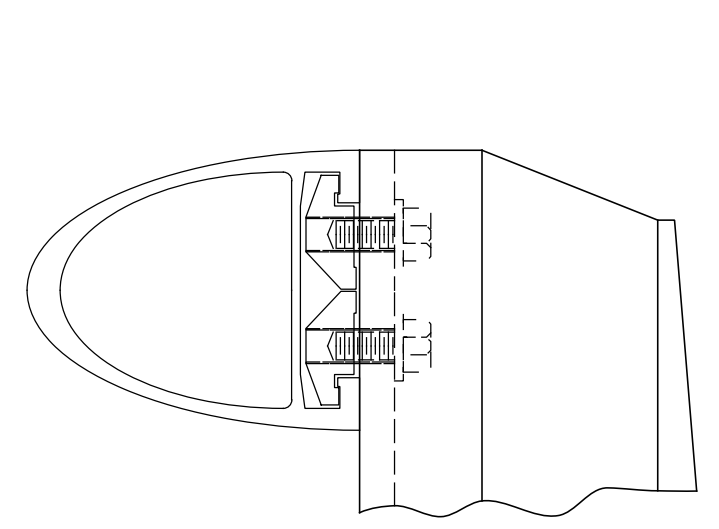
FRONT PLATE



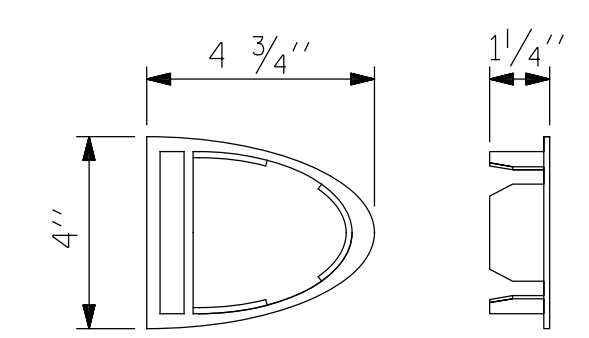
REAR PLATE

SHIM DETAILS

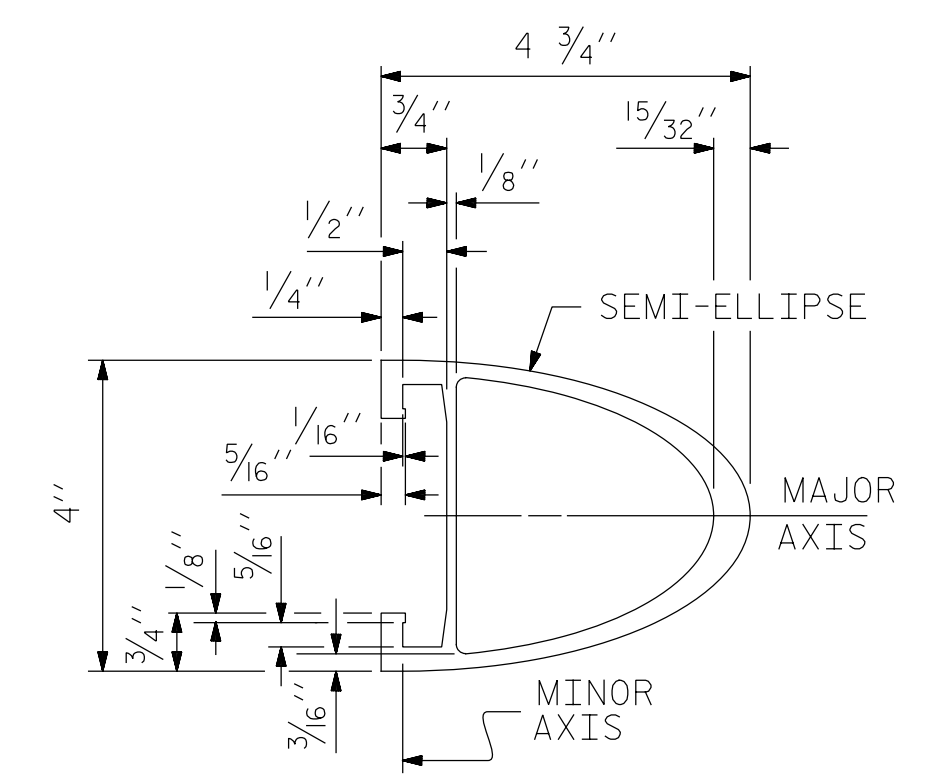
NOTE : SHIMS MAY BE CUT ALONG PERMITTED CUTLINE OR SLOTTED TO EDGE OF PLATE TO FACILITATE PLACEMENT.



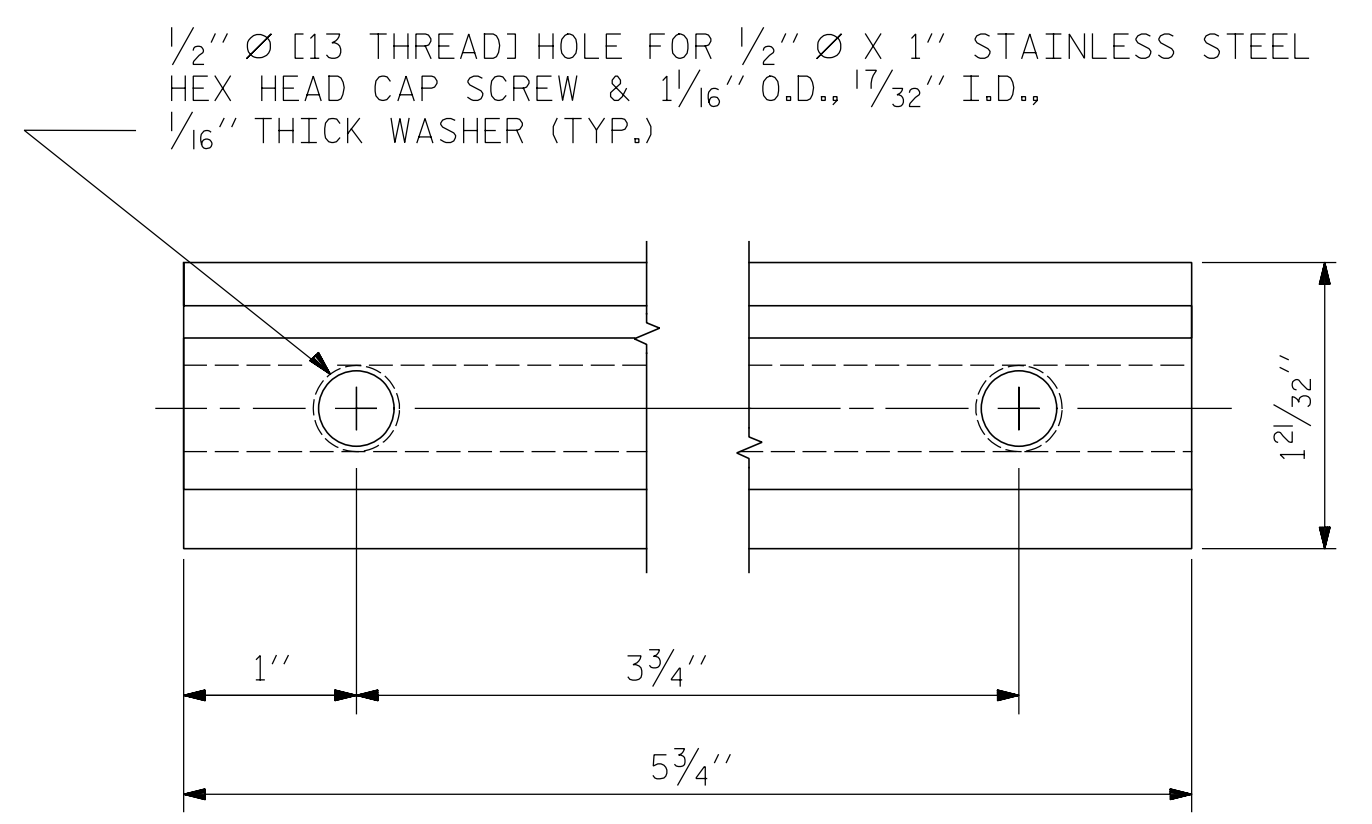
CLAMP ASSEMBLY



RAIL CAP



RAIL SECTION



CLAMP BAR DETAIL

(4 REQUIRED PER POST)

PROJECT NO. I-5714
MECKLENBURG COUNTY
STATION: 26+20.73 -YEB-

SHEET 2 OF 2
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE
2 BAR METAL RAIL

Professional Engineer Seal for Paul R. Holshouser, License No. 20668, State of North Carolina. Documented by Paul Holshouser, License No. BE06048516A143E. Date: 5/8/2018 | 10:27 AM PDT.

ICE of Carolinas, PLLC
4505 Falls of Neuse Road, Suite 110
Raleigh, North Carolina, 27609
Phone: 919-422-0333
License #: P-0999

REVISIONS				SHEET NO.			
NO.	BY:	DATE:	NO.	BY:	DATE:	S-27	
1			3			TOTAL SHEETS	
2			4			53	

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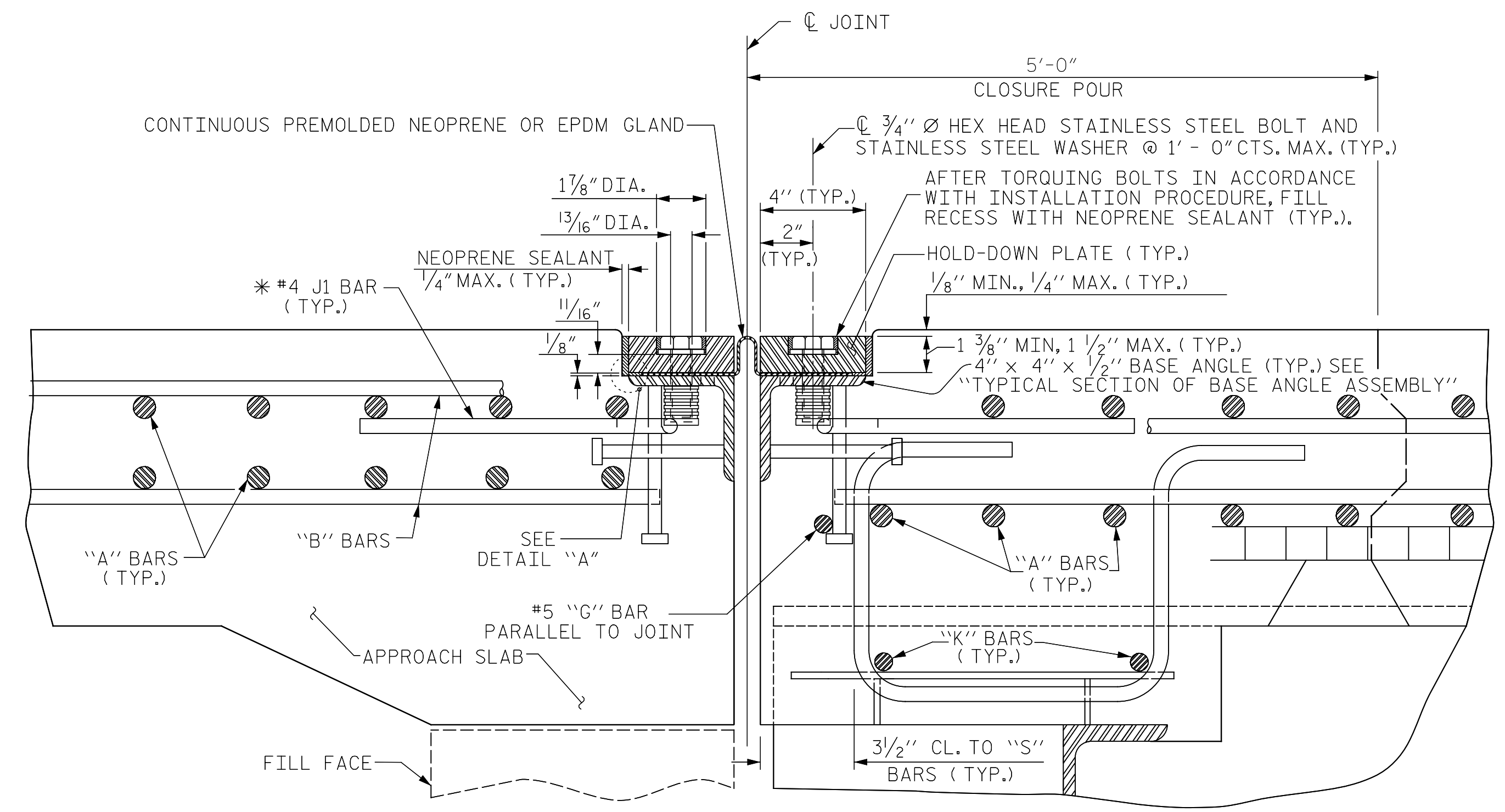
DRAWN BY : J. N. AUSTIN DATE : 1-29-18
CHECKED BY : M. D. NIFONG DATE : 1-30-18
DESIGN E.O.R. : P. R. HOLSHOUSER DATE : 5-8-18

INSTALLATION PROCEDURE

1. A TEMPLATE OR OTHER SUITABLE DEVICE SHALL BE USED TO FORM THE TOP OF THE EXPANSION JOINT SEAL BLOCKOUT TO THE PROPER DEPTH AND WIDTH. THE TEMPLATE SHALL BE 4/8" TO 4/4" WIDE AND OF SUCH THICKNESS AS TO PROVIDE FOR CORRECT FINAL ELEVATION OF TOP OF HOLD-DOWN PLATES. THE TEMPLATE SHALL BE ATTACHED TO THE BASE ANGLE ASSEMBLY WITH THE 3/4" Ø HEX HEAD BOLTS PROVIDED FOR THE HOLD-DOWN PLATES. A 1" Ø HOLE SHALL BE PROVIDED IN THE TEMPLATE CENTERED OVER EACH WEEP HOLE IN THE 4" X 4" X 1/2" BASE ANGLE. OTHER METHODS OF INSURING DRAINAGE THROUGH WEEP HOLES MAY BE EMPLOYED SUBJECT TO ENGINEER'S APPROVAL.
2. AFTER THE CONCRETE HAS BEEN CAST ON BOTH SIDES OF THE JOINT, REMOVE THE TEMPLATE. THOROUGHLY CLEAN THE BOLT HOLES AND THE ANGLE PLATE. REMOVE ANY EXCESS CONCRETE THAT COMES OUT OF THE WEEP HOLES. ANY DAMAGED STEEL SHALL BE COATED WITH A MINIMUM THICKNESS OF 4 DRY MILS OF ZINC-RICH PAINT IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.
3. LAY THE GLAND ON THE BASE ANGLE AND FIELD MARK THE GLAND FOR THE BOLT HOLES. HOLES IN THE GLAND SHALL BE PUNCHED 7/8" IN DIAMETER WITH A HAND PUNCH.
4. IN ORDER TO CHECK FOR PROPER ALIGNMENT, PLACE THE GLAND AND HOLD-DOWN PLATES ON THE BASE ANGLE. DO NOT APPLY NEOPRENE SEALANT. BOLT THE HOLD-DOWN PLATES TO THE BASE ANGLE BUT DO NOT TIGHTEN. THE ENGINEER SHALL INSPECT THE JOINT SEAL DEVICE FOR PROPER ALIGNMENT.
5. AFTER INSPECTION, REMOVE THE HOLD-DOWN PLATES AND GLAND. APPLY NEOPRENE SEALANT TO THE BASE ANGLE IN ACCORDANCE WITH THE "INSTALLATION SKETCH". PLACE GLAND AND HOLD-DOWN PLATES ON THE BASE ANGLE. BOLT THE HOLD-DOWN PLATES TO THE BASE ANGLE ASSEMBLY AND TORQUE THE BOLTS TO 88 FT-LBS WITH A TORQUE WRENCH. CHECK THE TORQUE AFTER THREE (3) HOURS AND, IF NECESSARY, RETIGHTEN TO 88 FT-LBS. A FINAL CHECK SHALL BE MADE AT SEVEN (7) DAYS. TORQUE SHALL NOT BE LESS THAN 80 FT-LBS AFTER SEVEN (7) DAYS.
6. AFTER PROPER TORQUING, CLEAN THE BOLT HOLE RECESSES AND THE RECESS BETWEEN THE JOINT SEAL DEVICE AND CONCRETE, COMPLETELY FILL THESE RECESSES WITH NEOPRENE SEALANT.

GENERAL NOTES

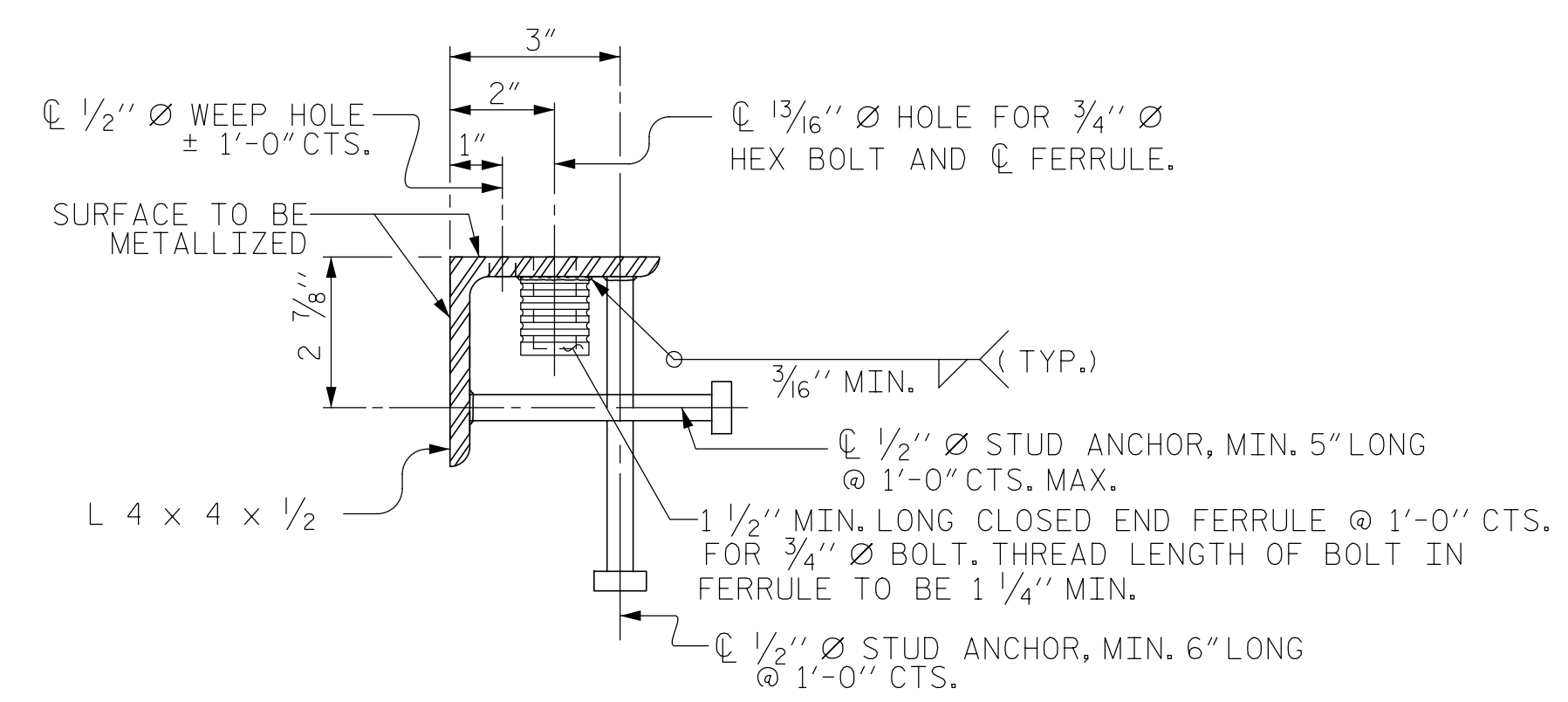
1. FOR EXPANSION JOINT SEALS, SEE SPECIAL PROVISIONS.
2. ALL PLATES AND ANGLES SHALL CONFORM TO AASHTO M270 GRADE 36 STEEL OR APPROVED EQUAL. ALL HOLD-DOWN BOLTS SHALL CONFORM TO ASTM F593 ALLOY 304 STAINLESS STEEL AND WASHERS SHALL CONFORM TO ASTM F844 EXCEPT THEY SHALL BE MADE FROM ALLOY 304 STAINLESS STEEL. ALL STUD ANCHORS SHALL CONFORM TO AASHTO M169, GRADES 1010 THRU 1020 OR APPROVED EQUAL. ALL CONCRETE INSERTS SHALL BE CLOSED END AND SHALL CONFORM TO AASHTO M169, GRADE 12L14. TENSILE CAPACITY SHALL BE 3000 LBS. MIN.
3. A PREMOLDED CORRUGATED OR NON-CORRUGATED GLAND SHALL BE USED FOR JOINTS SKEWED BETWEEN 50° THRU 130°. FOR JOINTS SKEWED LESS THAN 50° OR MORE THAN 130°, ONLY A CORRUGATED GLAND SHALL BE USED.
4. CLOSED END FERRULES AND STUD ANCHORS SHALL BE SHOP WELDED AND ALL HOLES SHALL BE SHOP DRILLED AS SHOWN ON PLANS. STUD ANCHORS SHALL BE ELECTRIC ARC END WELDED WITH COMPLETE FUSION.
5. SURFACES COMING IN CONTACT WITH NEOPRENE SHALL BE GROUND SMOOTH PRIOR TO METALLIZING.
6. UPON COMPLETION OF SHOP FABRICATION, THE HOLD DOWN PLATE AND BASE ANGLE ASSEMBLY, AS SHOWN IN THE "TYPICAL SECTION OF BASE ANGLE ASSEMBLY", SHALL BE METALLIZED. SEE SPECIAL PROVISION FOR THERMAL SPRAYED COATINGS (METALLIZATION).
7. BASE ANGLE ASSEMBLY SHALL BE CONTINUOUS FOR THE LENGTH OF THE JOINT. AT CROWN BREAKS, THE ENDS OF THE BASE ANGLE ASSEMBLY SHALL BE CUT PARALLEL TO THE BRIDGE CENTERLINE FOR SKEWS LESS THAN 80° AND GREATER THAN 100°. FINISHED WELD SHALL BE GROUND SMOOTH AND COATED WITH A MINIMUM THICKNESS OF 4 DRY MILS OF ZINC-RICH PAINT IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.
8. FIELD SPLICES OF HOLD-DOWN PLATES SHALL BE KEPT TO A MINIMUM. CONTRACTOR SHALL FURNISH DETAILED PLANS SHOWING PROPOSED SPLICE LOCATIONS FOR APPROVAL. HOLD-DOWN PLATES SHALL NOT EXCEED 20' LENGTHS UNLESS APPROVED BY THE ENGINEER.
9. NO ALTERNATE JOINT DETAILS SHALL BE PERMITTED IN LIEU OF THOSE SHOWN ON THESE PLANS.
10. THE CONTRACTOR MAY, AT HIS OPTION, USE ADHESIVELY ANCHORED ANCHOR BOLTS IN PLACE OF CONCRETE INSERTS FOR COVER PLATES. THE YIELD LOAD OF THE 3/4" Ø BOLT IS 10 KIPS. FIELD TESTING OF THE ADHESIVE BONDING SYSTEM IS NOT REQUIRED.



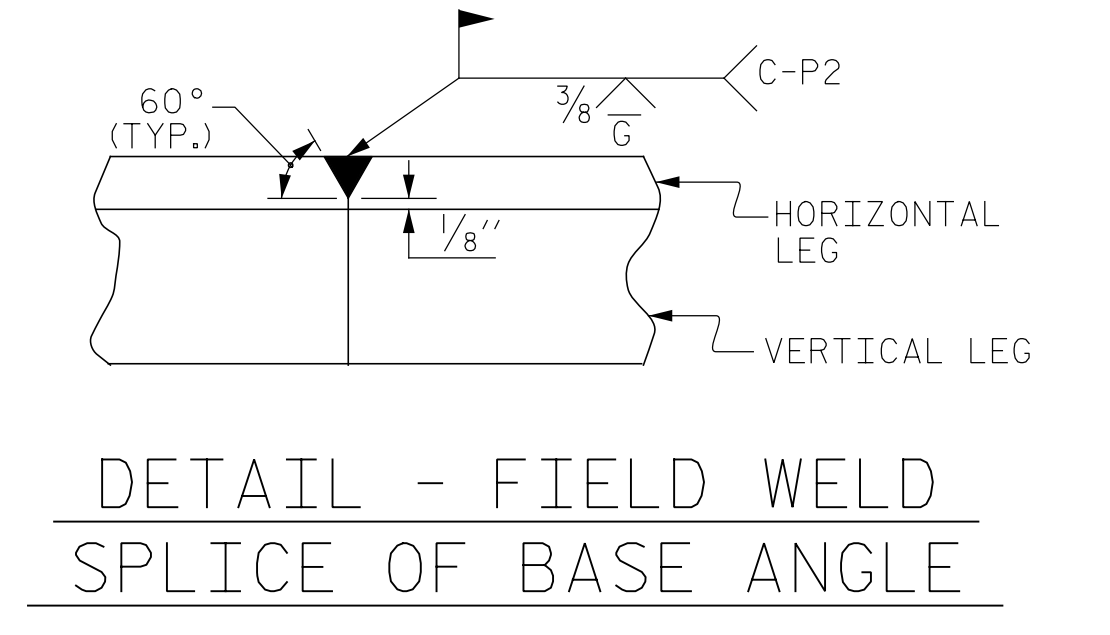
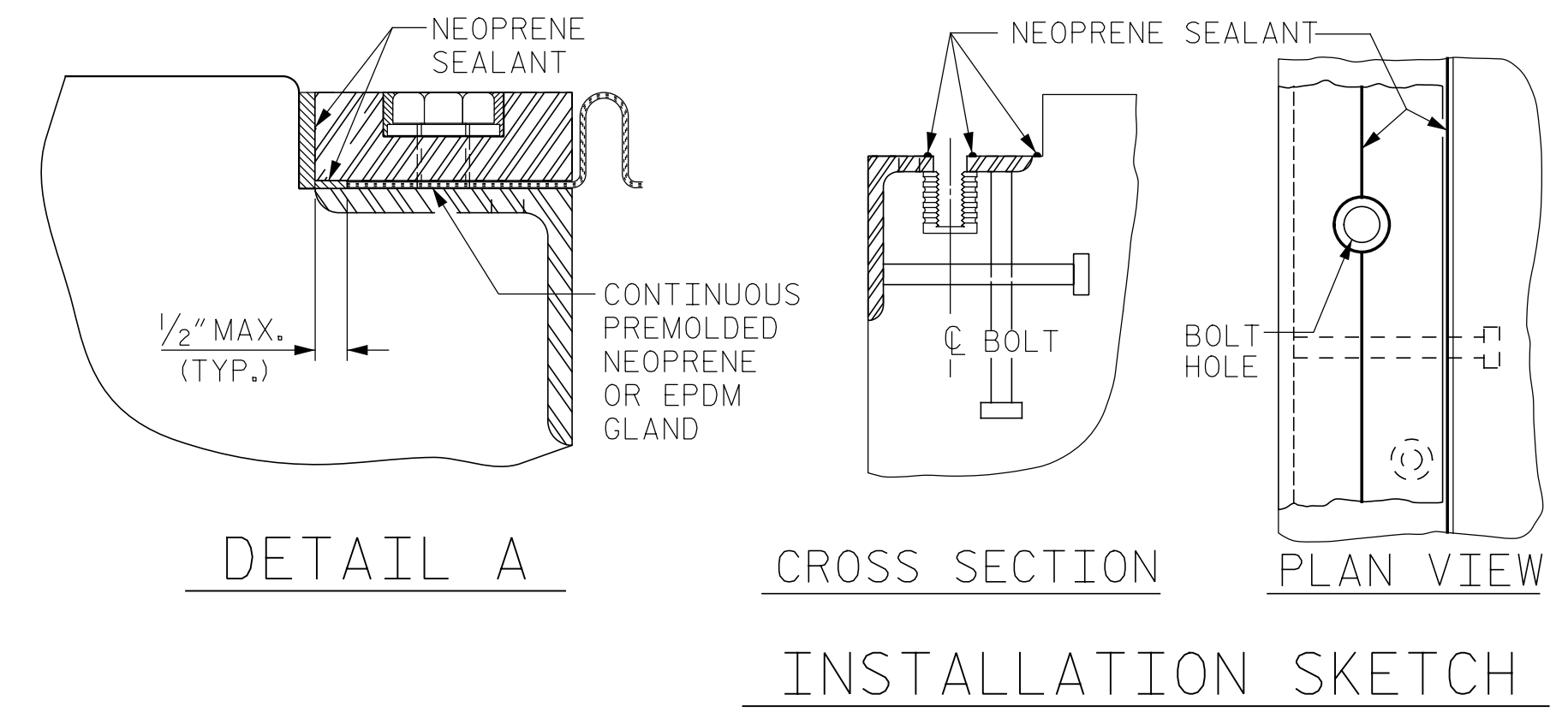
EXPANSION JOINT DETAILS

SECTION NORMAL TO JOINT -- STEEL SUPERSTRUCTURE

* THE QUANTITY OF #4 J1 BARS ON THE BILL OF MATERIAL IS BASED ON 1'-0" CENTERS. J1 BARS SHALL BE PLACED AT EACH VERTICAL STUD ANCHOR BOLT. IN THE EVENT THAT THE NUMBER OF VERTICAL STUD ANCHORS EXCEEDS THE NUMBER OF J1 BARS SPECIFIED, ADDITIONAL J1 BARS WILL NOT BE REQUIRED.

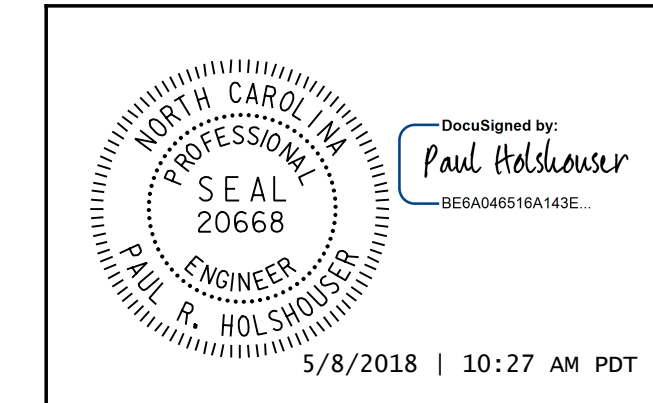


TYPICAL SECTION OF BASE ANGLE ASSEMBLY



DETAIL - FIELD WELD SPLICE OF BASE ANGLE

MOVEMENT AND SETTING AT JOINT					
BENT NO.	SKEW ANGLE	TOTAL MOVEMENT (ALONG CL RDWY)	PERPENDICULAR JOINT OPENING AT 45° F	PERPENDICULAR JOINT OPENING AT 60° F	PERPENDICULAR JOINT OPENING AT 90° F
EB1	103°-00'-00"	1 5/16"	1 13/16"	1 5/8"	1 1/4"
EB2	103°-00'-00"	1 3/8"	1 13/16"	1 5/8"	1 1/4"



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DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE
EXPANSION JOINT SEAL DETAILS

PROJECT NO. I-5714
MECKLENBURG COUNTY
STATION: 26+20.73 -YEB-

SHEET 1 OF 3

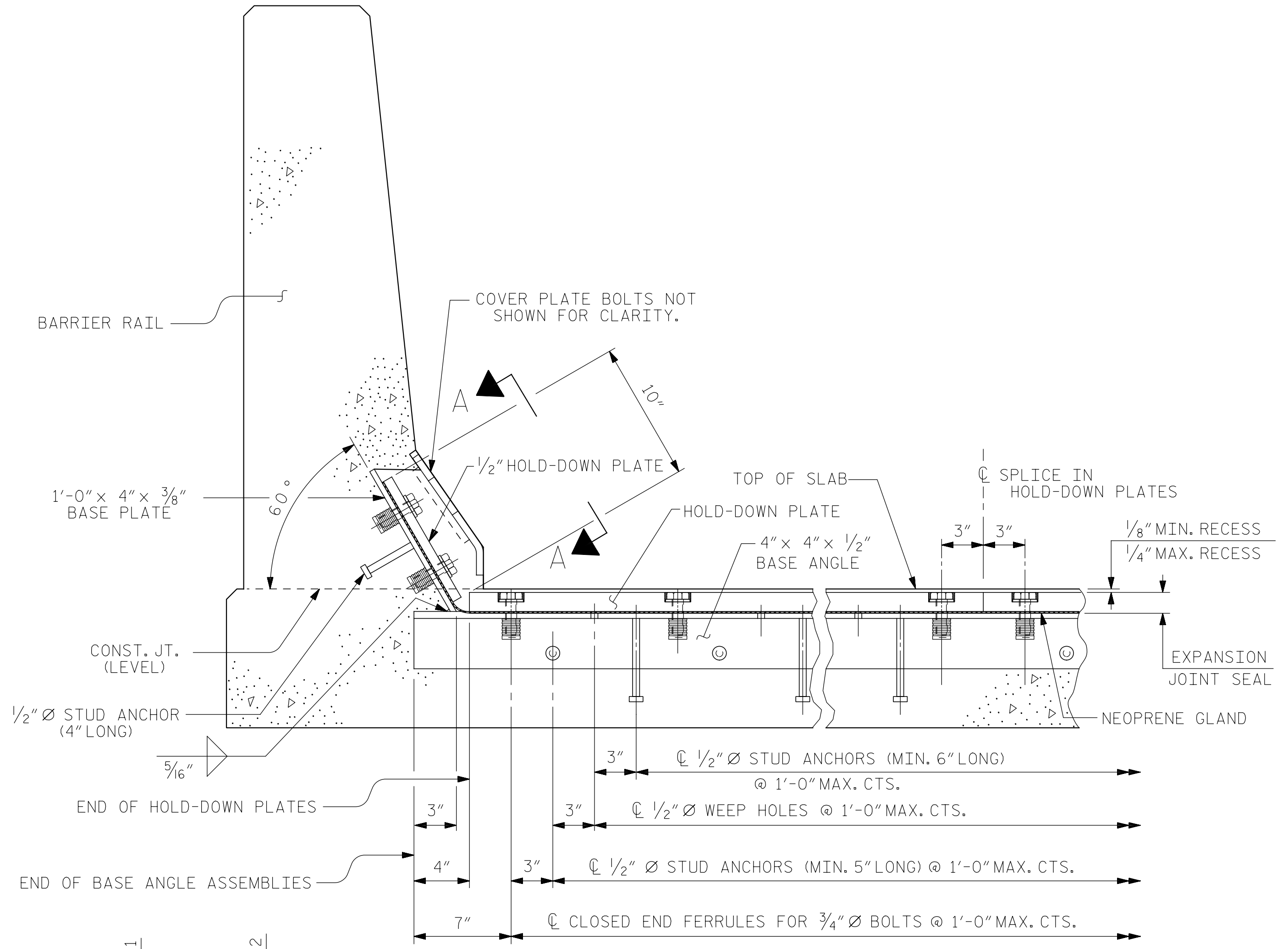
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NO.	BY:	DATE:	NO.	BY:	DATE:
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SHEET NO. S-28
TOTAL SHEETS 53

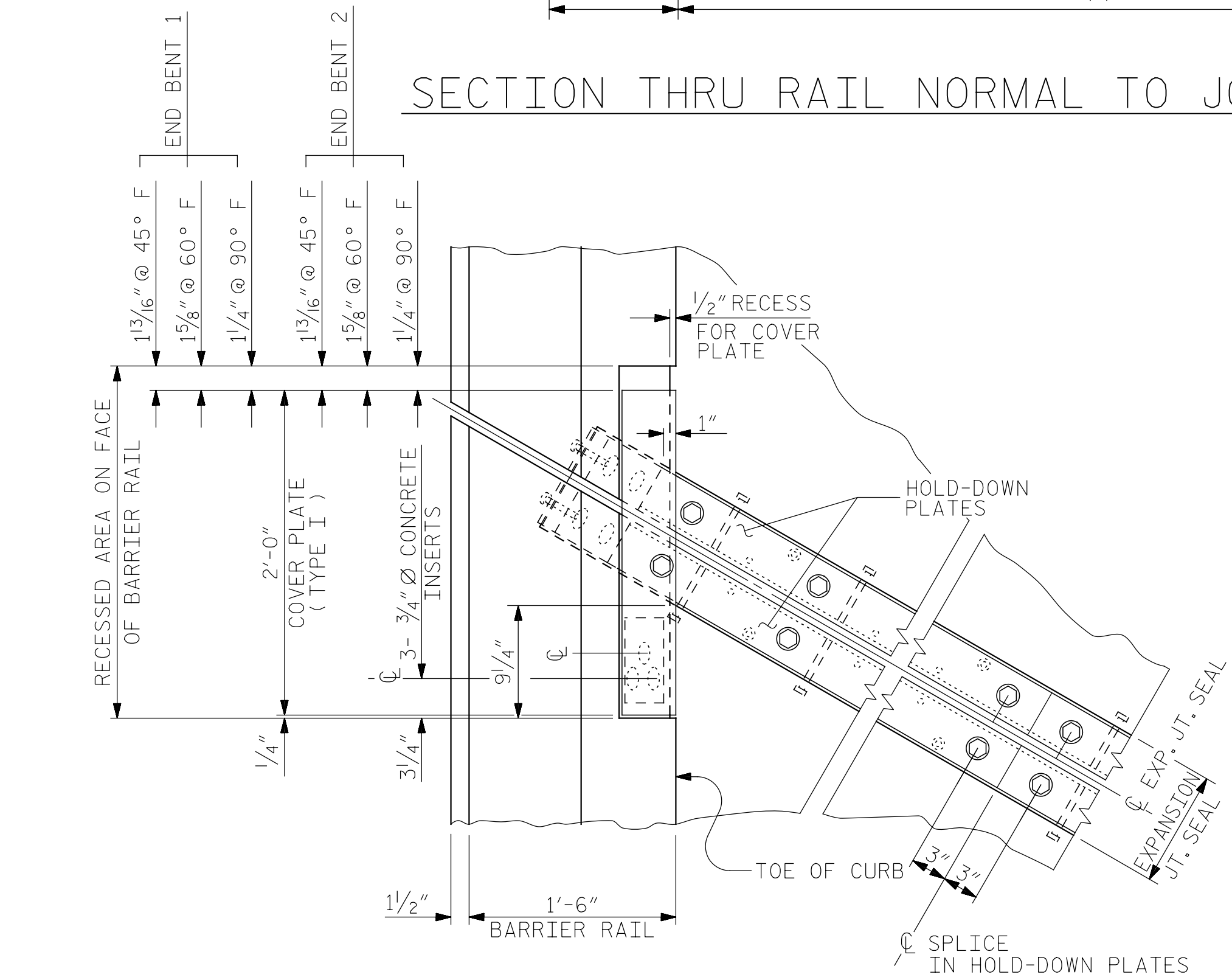
DRAWN BY: J. N. AUSTIN DATE: 1-29-18
CHECKED BY: M. D. NIFONG DATE: 1-30-18
DESIGN E.O.R.: P. R. HOLSHOUSE DATE: 5-8-18

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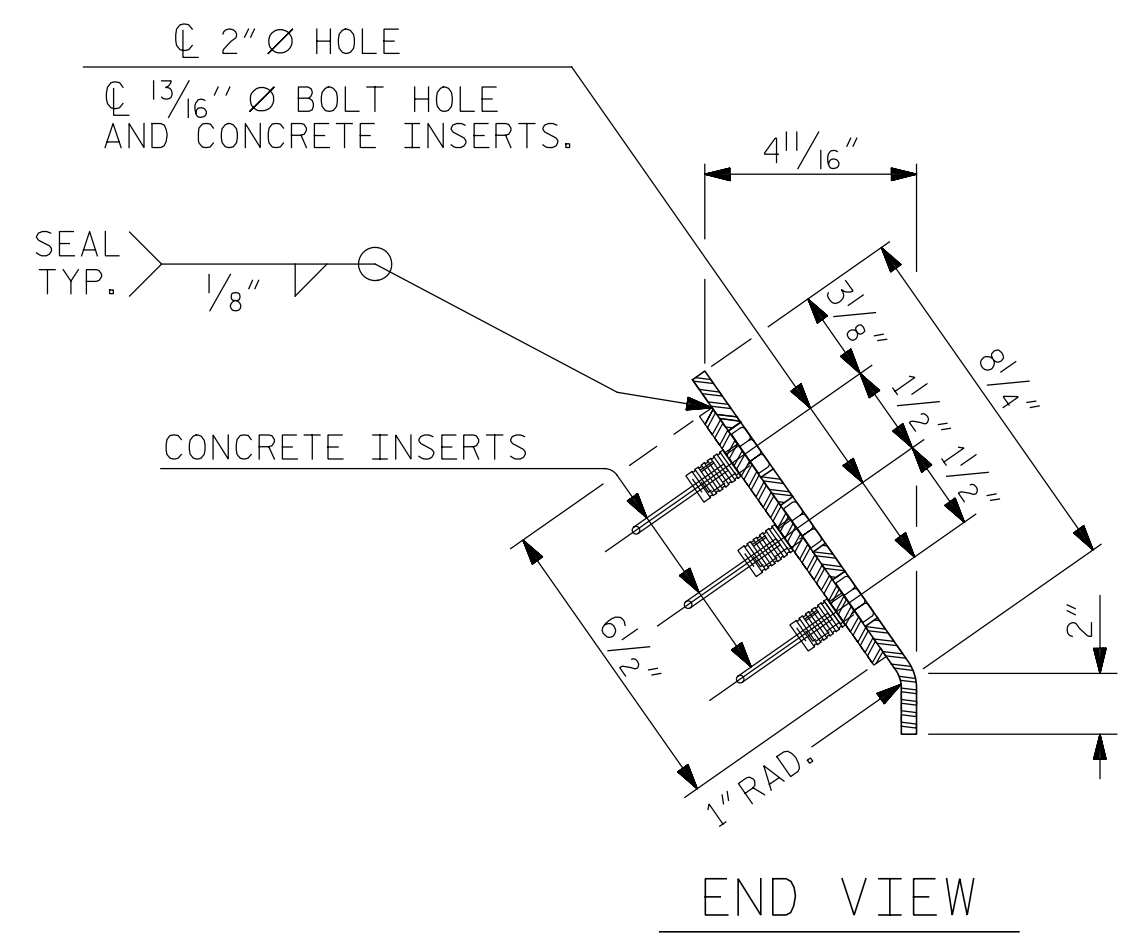


SECTION THRU RAIL NORMAL TO JOINT

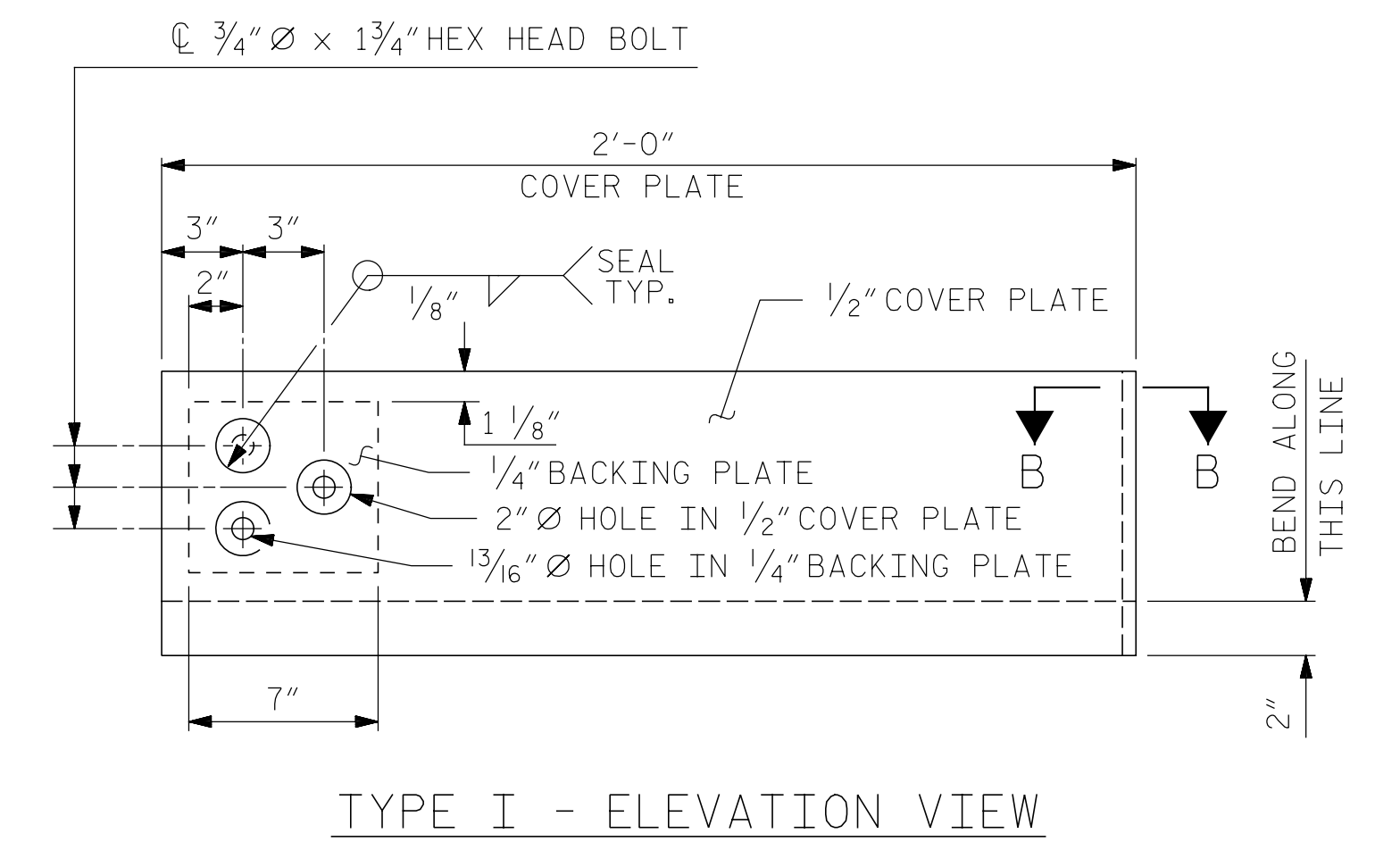


PLAN OF EXPANSION JOINT SEAL

FLOW OF TRAFFIC

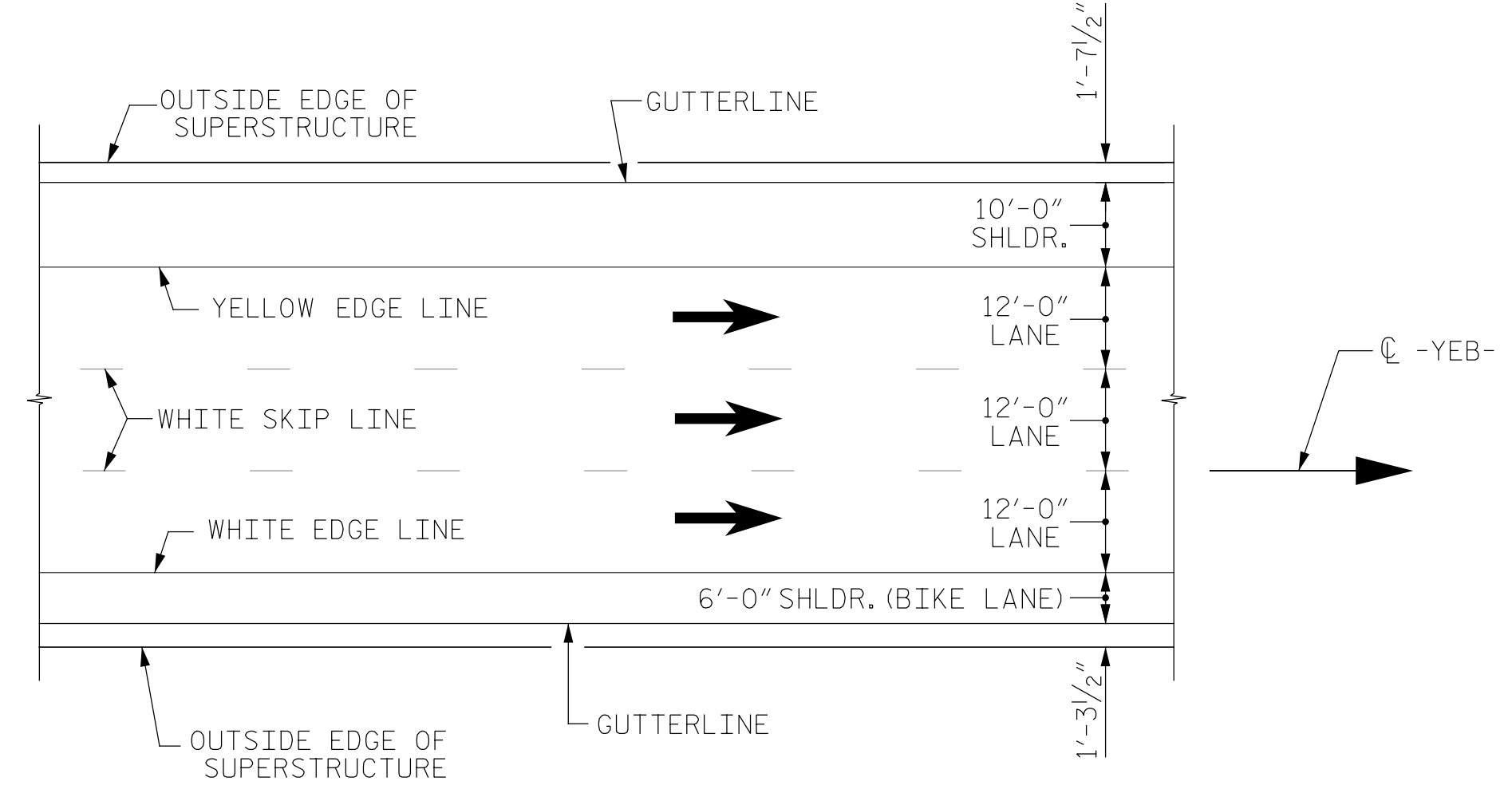


END VIEW

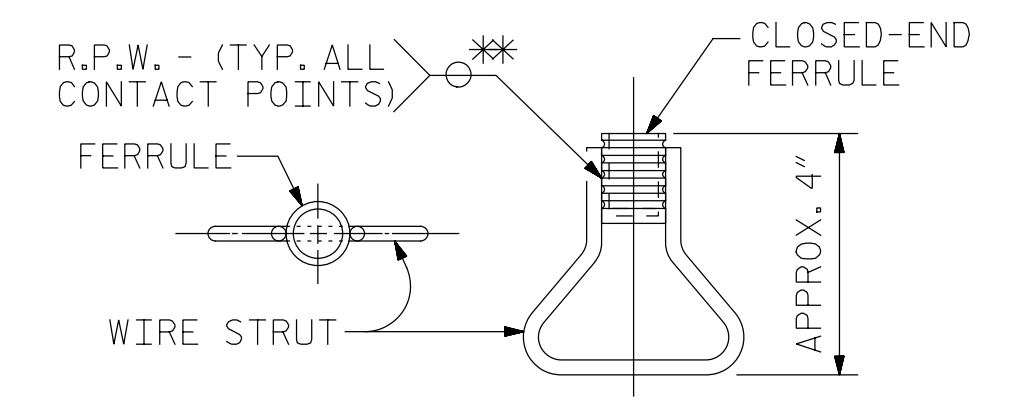


TYPE I - ELEVATION VIEW

COVER PLATE DETAILS

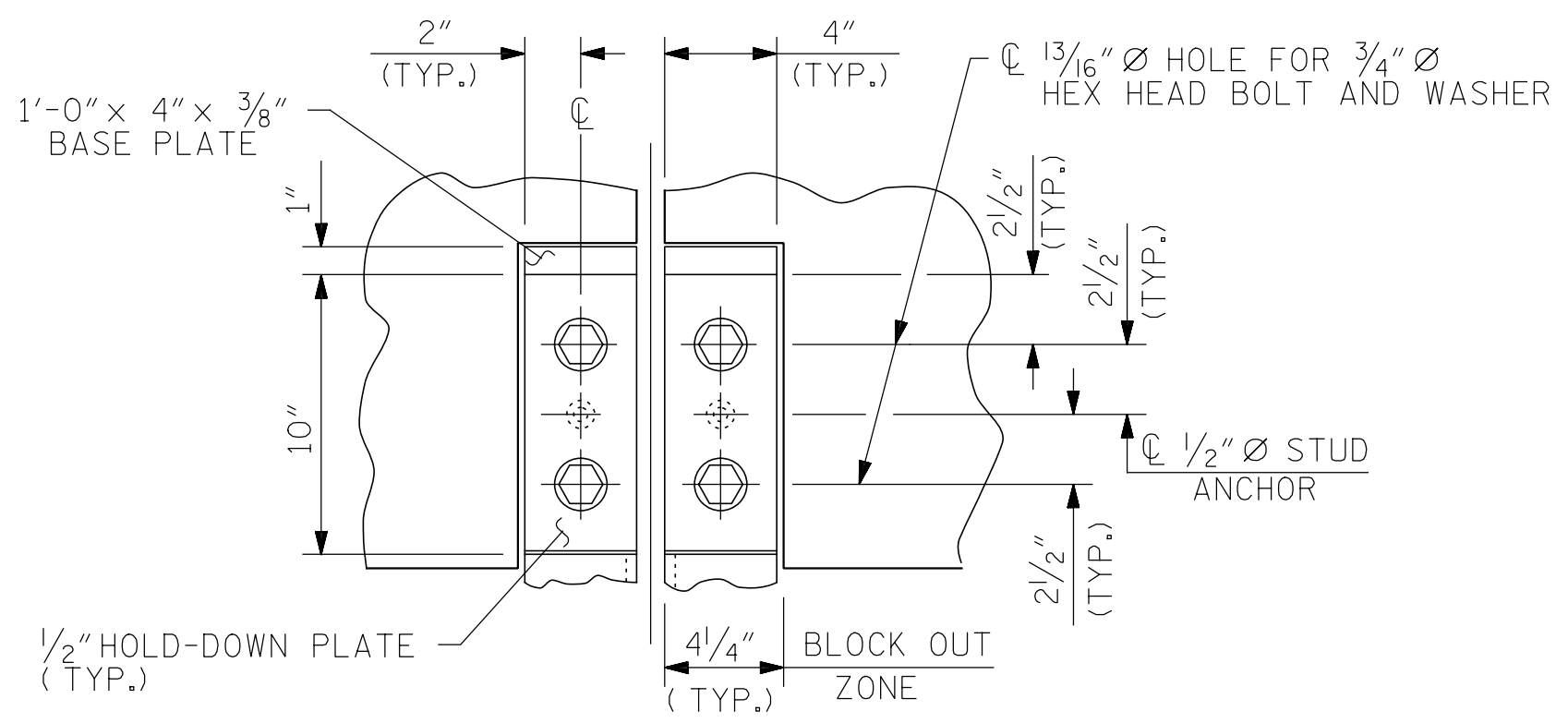


PAVEMENT MARKING ALIGNMENT

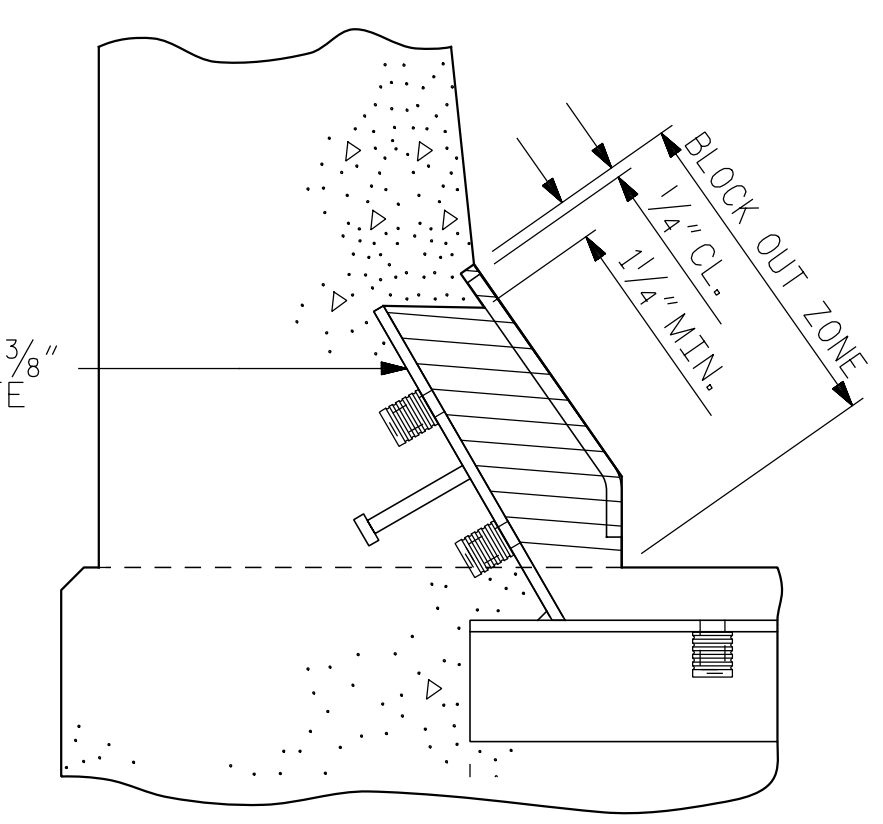


CONCRETE INSERT

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

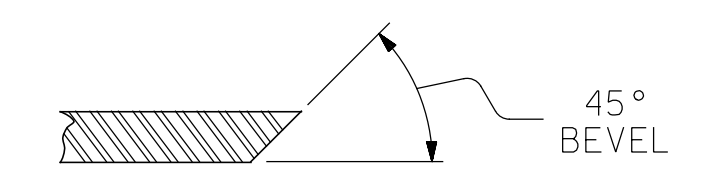


SECTION A - A



BLOCK OUT DETAIL

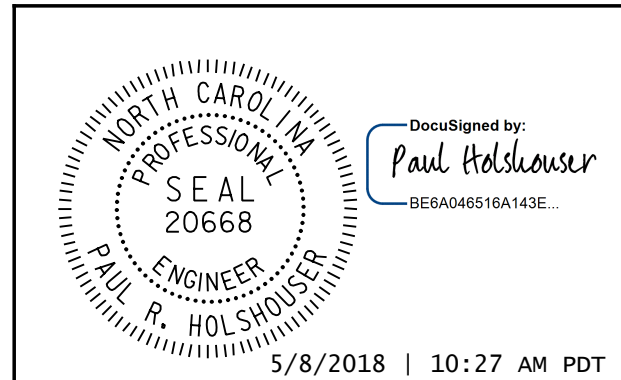
SEE "SECTION A-A" FOR OTHER DETAILS.



SECTION B - B

PROJECT NO. I-5714
 MECKLENBURG COUNTY
 STATION: 26+20.73 -YEB-

SHEET 2 OF 3



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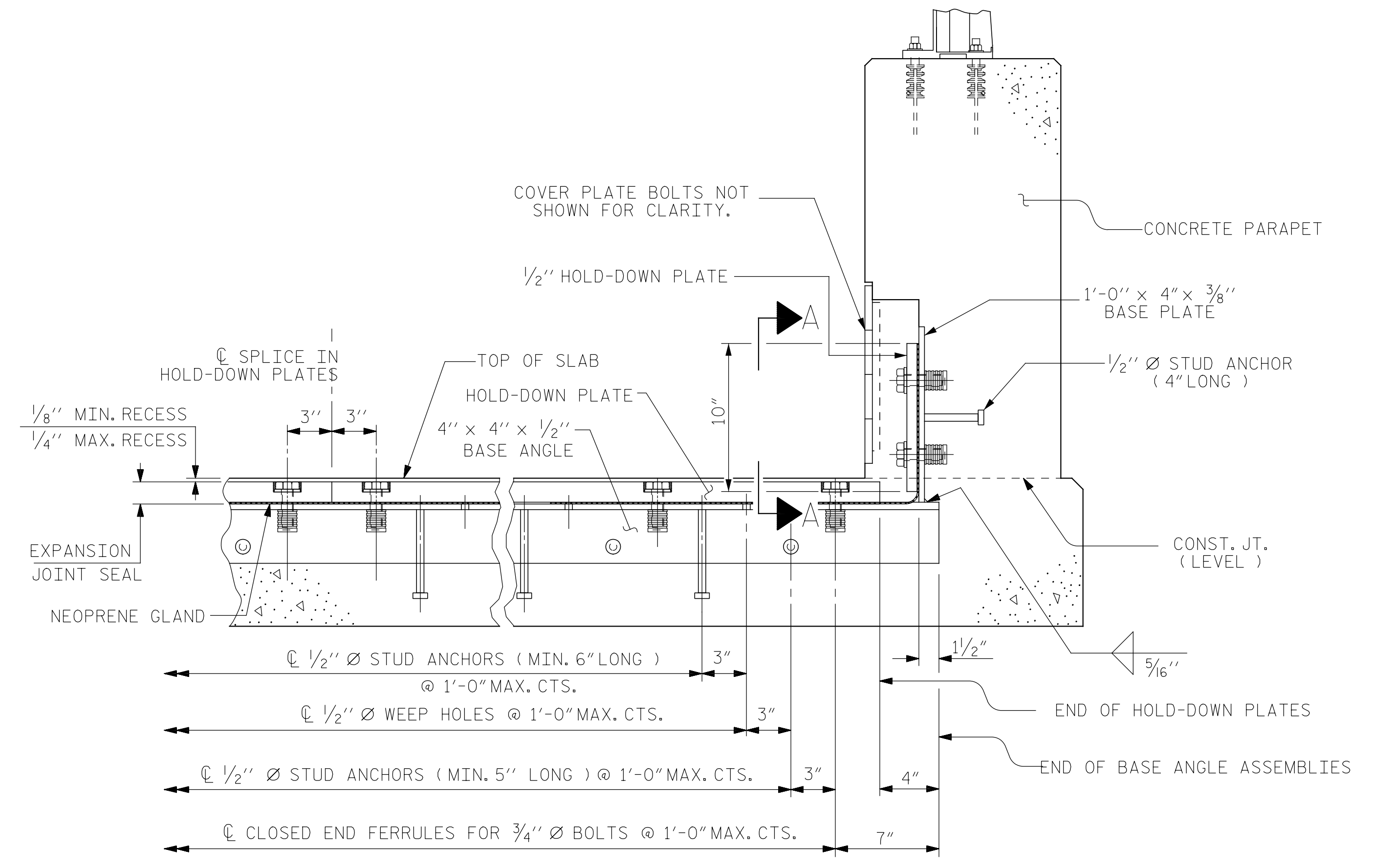
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
SUPERSTRUCTURE					
EXPANSION JOINT SEAL DETAILS					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

SHEET NO. S-29
 TOTAL SHEETS 53

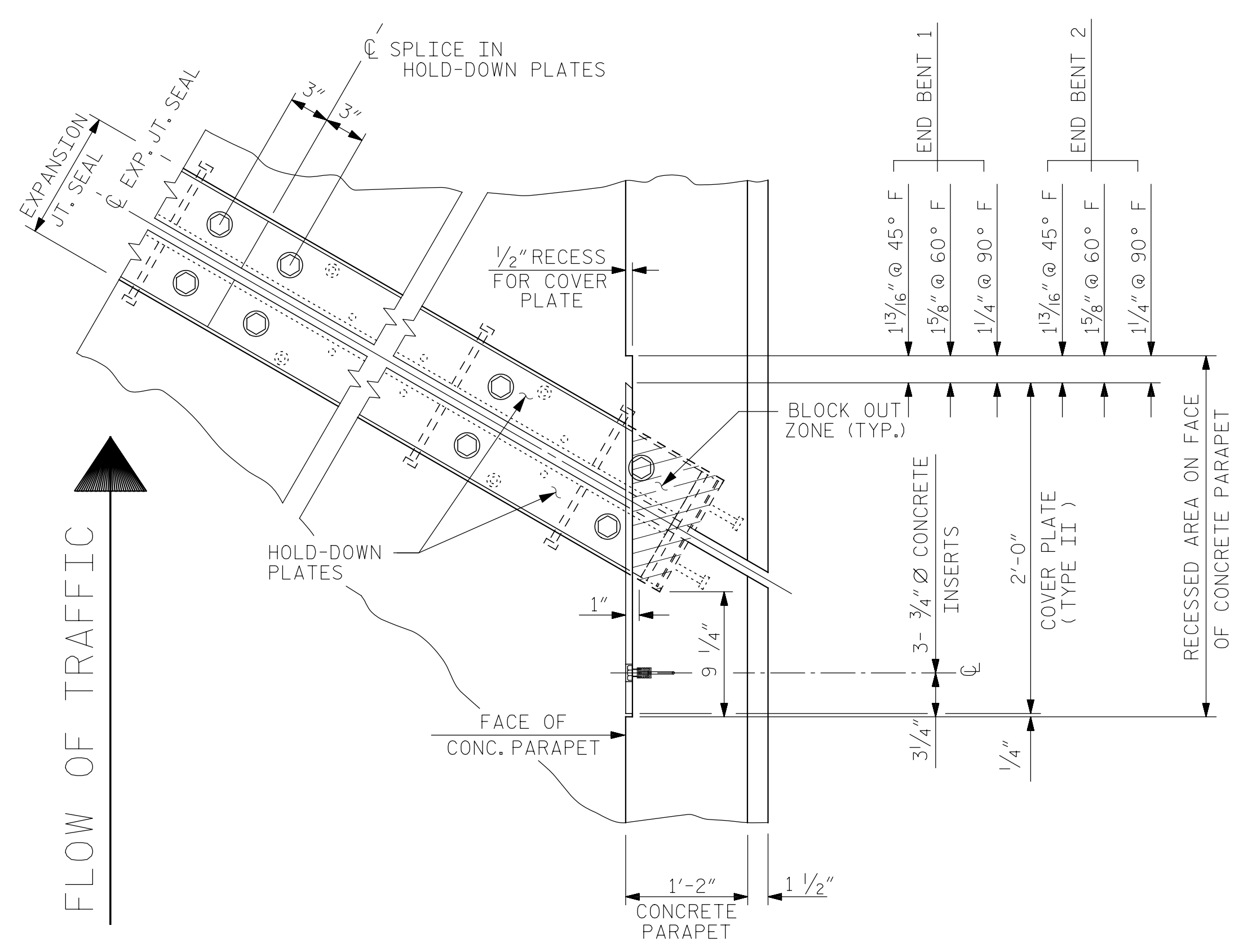
DRAWN BY: J. N. AUSTIN DATE: 1-29-18
 CHECKED BY: M. D. NIFONG DATE: 1-30-18
 DESIGN E.O.R.: P. R. HOLSHOUSER DATE: 5-8-18

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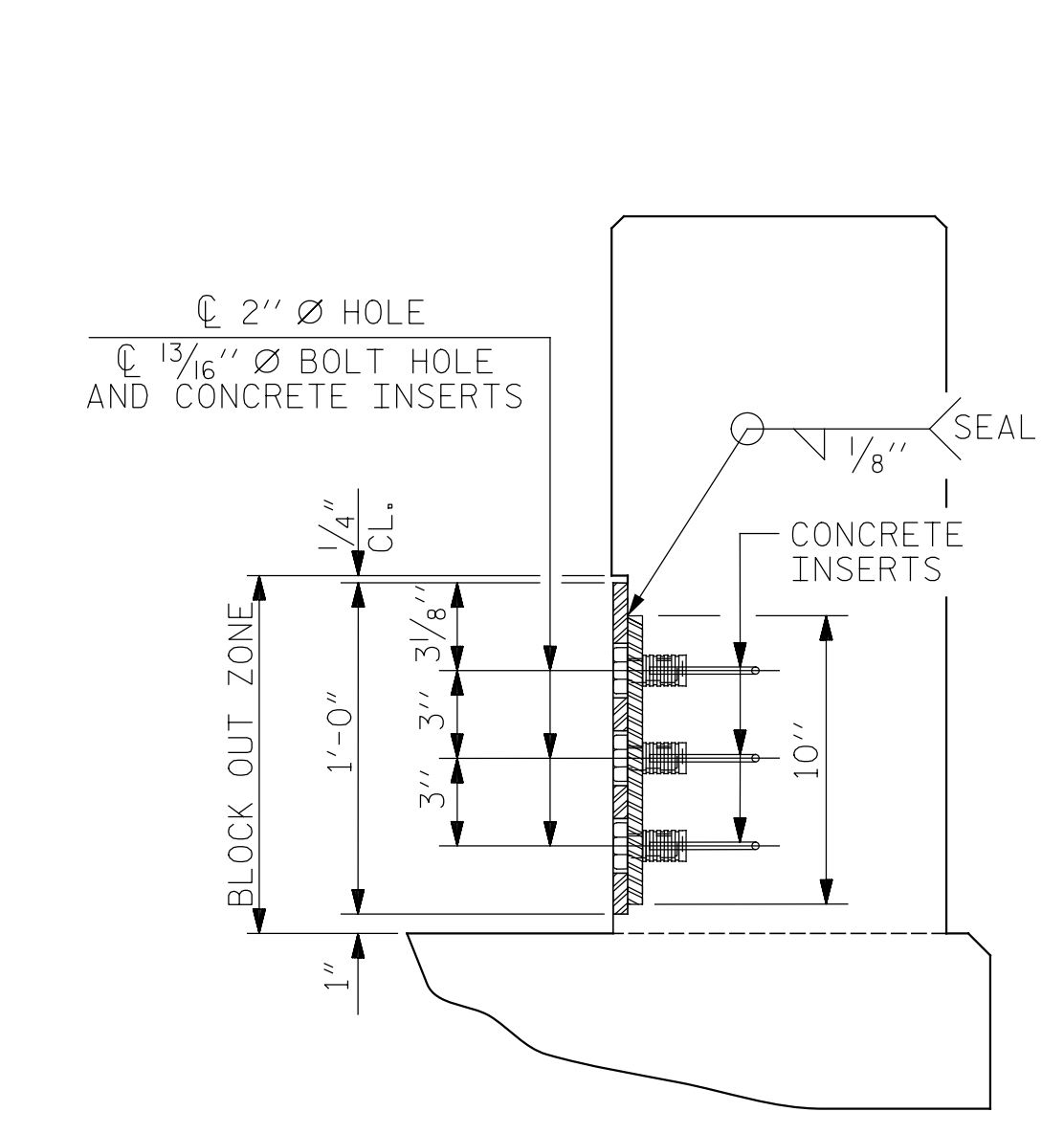
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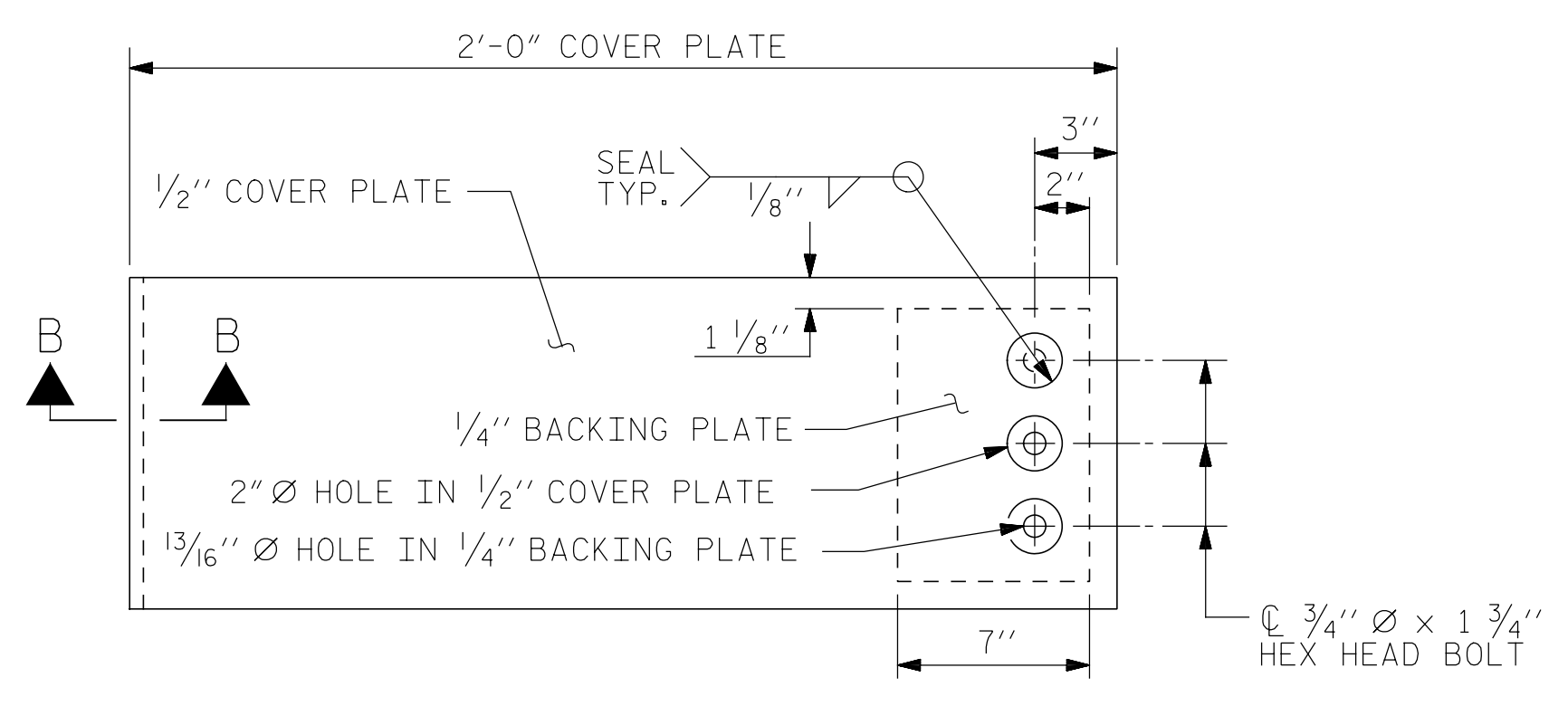
SECTION THRU PARAPET NORMAL TO JOINT



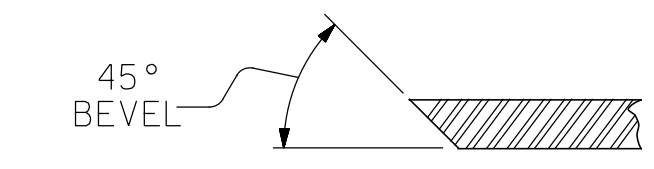
PLAN OF EXPANSION JOINT SEAL - RIGHT SIDE



END VIEW



TYPE II - ELEVATION VIEW



SECTION B-B

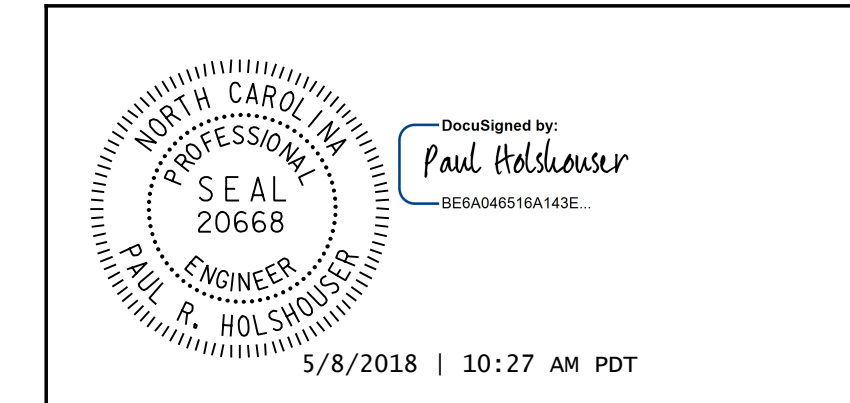
PARAPET COVER PLATE DETAILS

NOTE

FOR CONCRETE INSERT DETAILS, SEE "EXPANSION JOINT SEAL DETAILS" SHEET 2 OF 3.
 FOR "SECTION A-A", SEE "EXPANSION JOINT SEAL DETAILS" SHEET 2 OF 3.

PROJECT NO. I-5714
MECKLENBURG COUNTY
 STATION: 26+20.73 -YEB-
 SHEET 3 OF 3

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 SUPERSTRUCTURE
 EXPANSION JOINT
 SEAL DETAILS



5/8/2018 | 10:27 AM PDT
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 CHECKED BY : M. D. NIFONG DATE : 1-30-18
 DESIGN E.O.R. : P. R. HOLSHOUSER DATE : 5-8-18

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REINFORCING BAR SCHEDULE

SPANS A & B

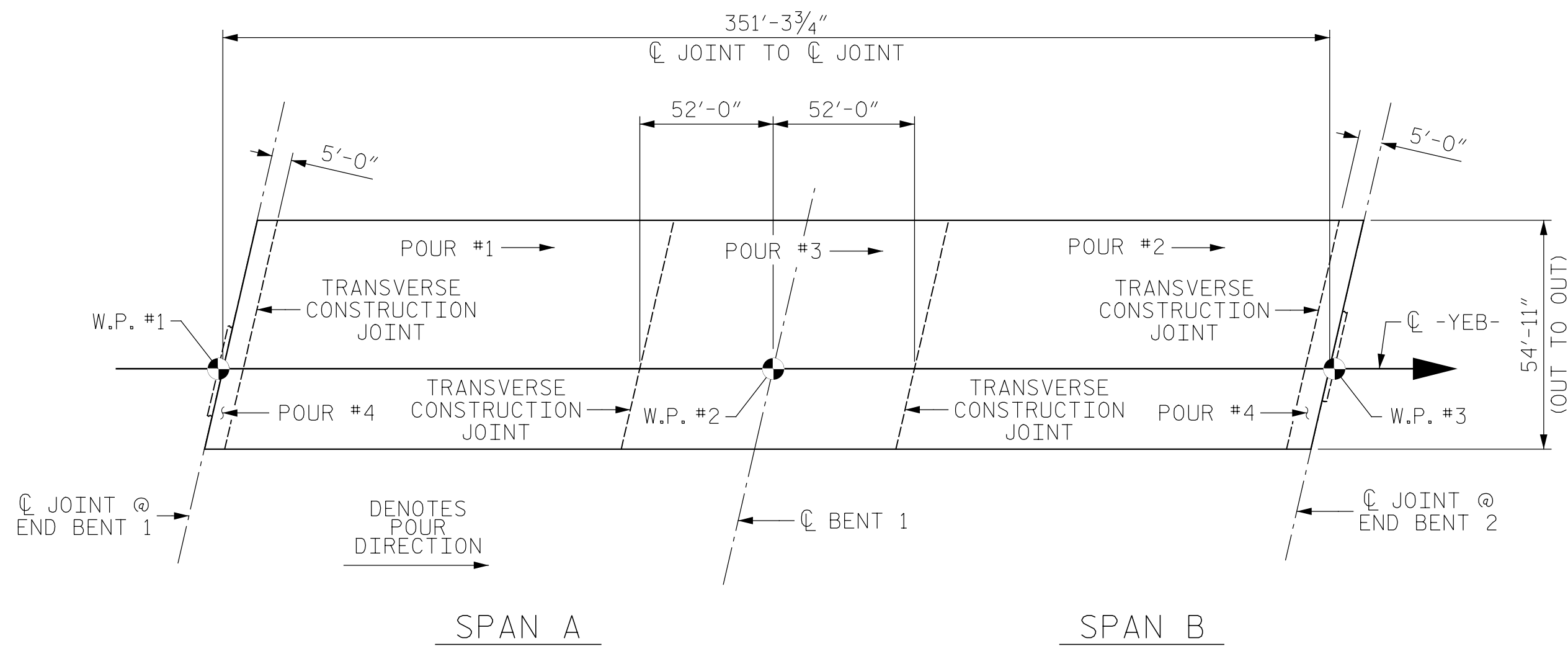
BAR NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR NO.	SIZE	TYPE	LENGTH	WEIGHT		
* A1	676	5	STR	54' - 7"	38,485	A215	2	5	STR	20' - 4"	42
* A100	2	5	STR	52' - 10"	110	A216	2	5	STR	18' - 2"	38
* A101	2	5	STR	50' - 8"	106	A217	2	5	STR	16' - 0"	33
* A102	2	5	STR	48' - 6"	101	A218	2	5	STR	13' - 10"	29
* A103	2	5	STR	46' - 4"	97	A219	2	5	STR	11' - 8"	24
* A104	2	5	STR	44' - 2"	92	A220	2	5	STR	9' - 6"	20
* A105	2	5	STR	42' - 0"	88	A221	2	5	STR	7' - 4"	15
* A106	2	5	STR	39' - 10"	83	A222	2	5	STR	5' - 2"	11
* A107	2	5	STR	37' - 8"	79	A223	2	5	STR	3' - 0"	6
* A108	2	5	STR	35' - 6"	74	A224	2	5	STR	2' - 0"	4
* A109	2	5	STR	33' - 4"	70	* B1	228	5	STR	41' - 3"	9,809
* A110	2	5	STR	31' - 2"	65	* B2	114	5	STR	40' - 4"	4,796
* A111	2	5	STR	29' - 0"	60	* B3	70	6	STR	60' - 0"	6,308
* A112	2	5	STR	26' - 10"	56	B4	476	5	STR	52' - 4"	25,982
* A113	2	5	STR	24' - 8"	51	* B5	420	5	STR	52' - 9"	23,108
* A114	2	5	STR	22' - 6"	47	* G1	2	5	STR	56' - 0"	117
* A115	2	5	STR	20' - 4"	42	* J1	108	5	4	1' - 5"	160
* A116	2	5	STR	18' - 2"	38	* K1	8	5	1	8' - 2"	68
* A117	2	5	STR	16' - 0"	33	* K2	20	5	STR	6' - 11"	144
* A118	2	5	STR	13' - 10"	29	* K3	16	5	2	9' - 6"	159
* A119	2	5	STR	11' - 8"	24	* S1	100	5	3	4' - 2"	435
* A120	2	5	STR	9' - 6"	20	* EPOXY COATED REINFORCING STEEL			LBS.	84,990	
* A121	2	5	STR	7' - 4"	15	REINFORCING STEEL			LBS.	65,868	
* A122	2	5	STR	5' - 2"	11	CONCRETE BREAKDOWN					
* A123	2	5	STR	3' - 0"	6						
* A124	2	5	STR	2' - 0"	4	CLASS AA CONCRETE					
A2	676	5	STR	54' - 7"	38,485	POUR #1	C.Y.	200.8			
A200	2	5	STR	52' - 10"	110	POUR #2	C.Y.	203.3			
A201	2	5	STR	50' - 8"	106	POUR #3	C.Y.	177.3			
A202	2	5	STR	48' - 6"	101	POUR #4	C.Y.	19.1			
A203	2	5	STR	46' - 4"	97	TOTAL	C.Y.	600.5			
A204	2	5	STR	44' - 2"	92						
A205	2	5	STR	42' - 0"	88						
A206	2	5	STR	39' - 10"	83						
A207	2	5	STR	37' - 8"	79						
A208	2	5	STR	35' - 6"	74						
A209	2	5	STR	33' - 4"	70						
A210	2	5	STR	31' - 2"	65						
A211	2	5	STR	29' - 0"	60						
A212	2	5	STR	26' - 10"	56						
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A214	2	5	STR	22' - 6"	47						

* - DENOTES EPOXY COATED REINFORCING STEEL

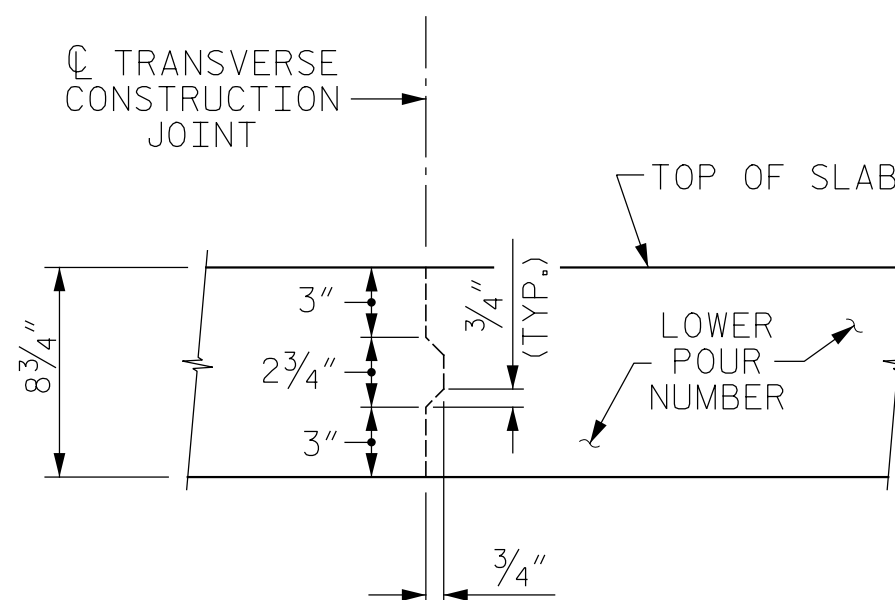
SUPERSTRUCTURE REINFORCING STEEL LENGTHS ARE BASED ON THE FOLLOWING MINIMUM SPLICE LENGTHS

BAR SIZE	SUPERSTRUCTURE EXCEPT APPROACH SLABS, PARAPET, AND BARRIER RAIL		APPROACH SLABS		PARAPET AND BARRIER RAIL
	EPOXY COATED	UNCOATED	EPOXY COATED	UNCOATED	
#4	2'-0"	1'-9"	2'-0"	1'-9"	2'-9"
#5	2'-6"	2'-2"	2'-6"	2'-2"	3'-5"
#6	3'-0"	2'-7"	3'-10"	2'-7"	4'-4"
#7	5'-3"	3'-6"			
#8	6'-10"	4'-7"			

DRAWN BY : J. N. AUSTIN DATE : 2-1-18
 CHECKED BY : M. D. NIFONG DATE : 2-5-18
 DESIGN E.O.R. : P. R. HOLSHOUSER DATE : 5-8-18



LAYOUT FOR COMPUTING AREA OF REINFORCED CONCRETE DECK SLAB AND POUR SEQUENCE
 (SQ. FT. = 19,292)



TRANSVERSE CONSTRUCTION JOINT IN DECK SLAB

REINFORCING STEEL IN SLAB NOT SHOWN. LONGITUDINAL REINFORCING STEEL SHALL BE CONTINUOUS THRU JOINT.

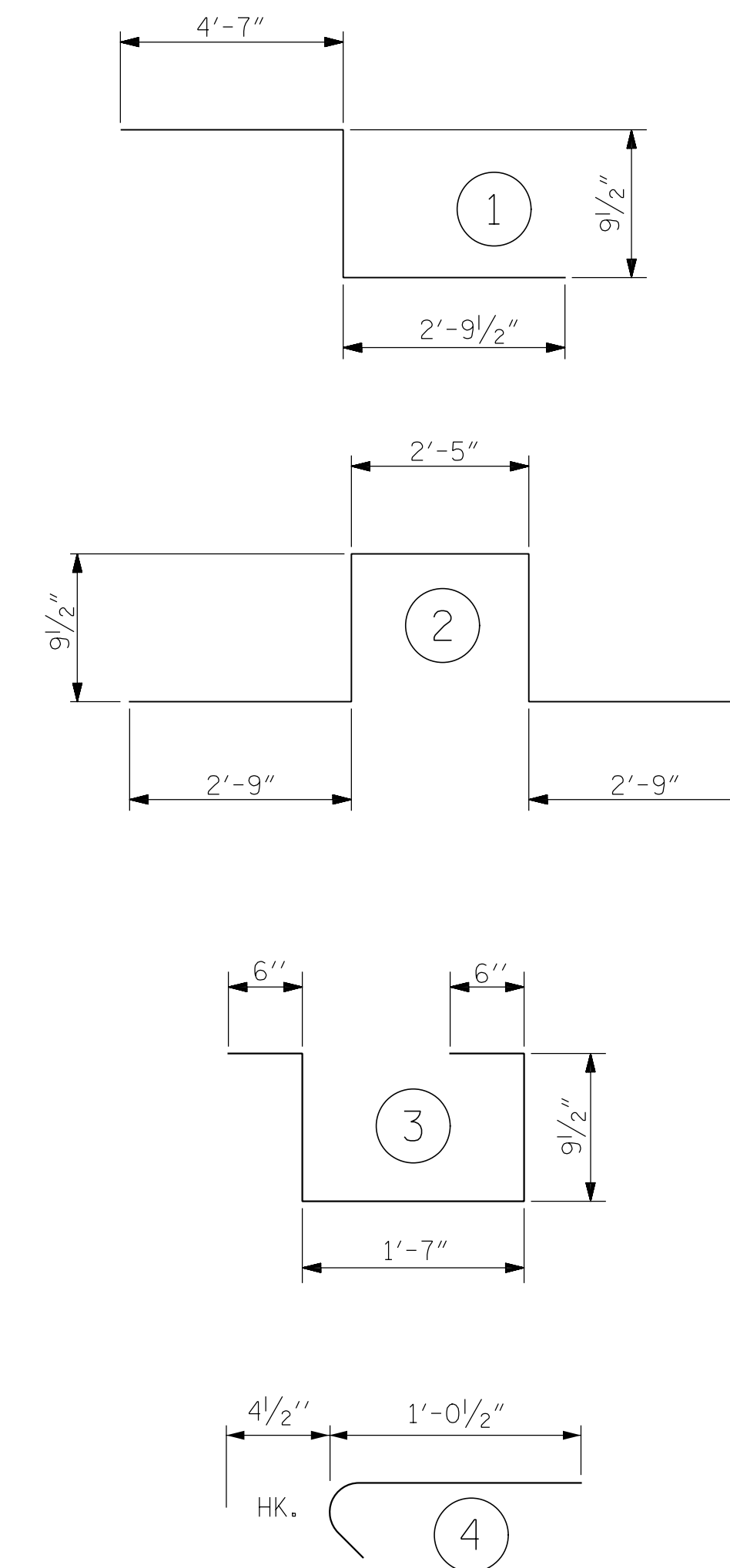
GROOVING BRIDGE FLOORS

APPROACH SLABS	2,338	SQ.FT.
BRIDGE DECK	17,157	SQ.FT.
TOTAL	19,495	SQ.FT.

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Professional Engineer Seal for Paul R. Holshouser, License # P-0999, dated 5/8/2018 at 10:27 AM PDT. The seal includes the text 'NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 20668' and 'ICE of Carolinas, PLLC'.

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

— SUPERSTRUCTURE BILL OF MATERIAL —

	CLASS AA CONCRETE (CU.YDS.)	REINFORCING STEEL (LBS.)	EPOXY COATED REINFORCING STEEL (LBS.)
POUR 1	200.8		
POUR 2	203.3		
POUR 3	177.3		
POUR 4	19.1		
TOTALS**	600.5	65,868	84,990

**QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED

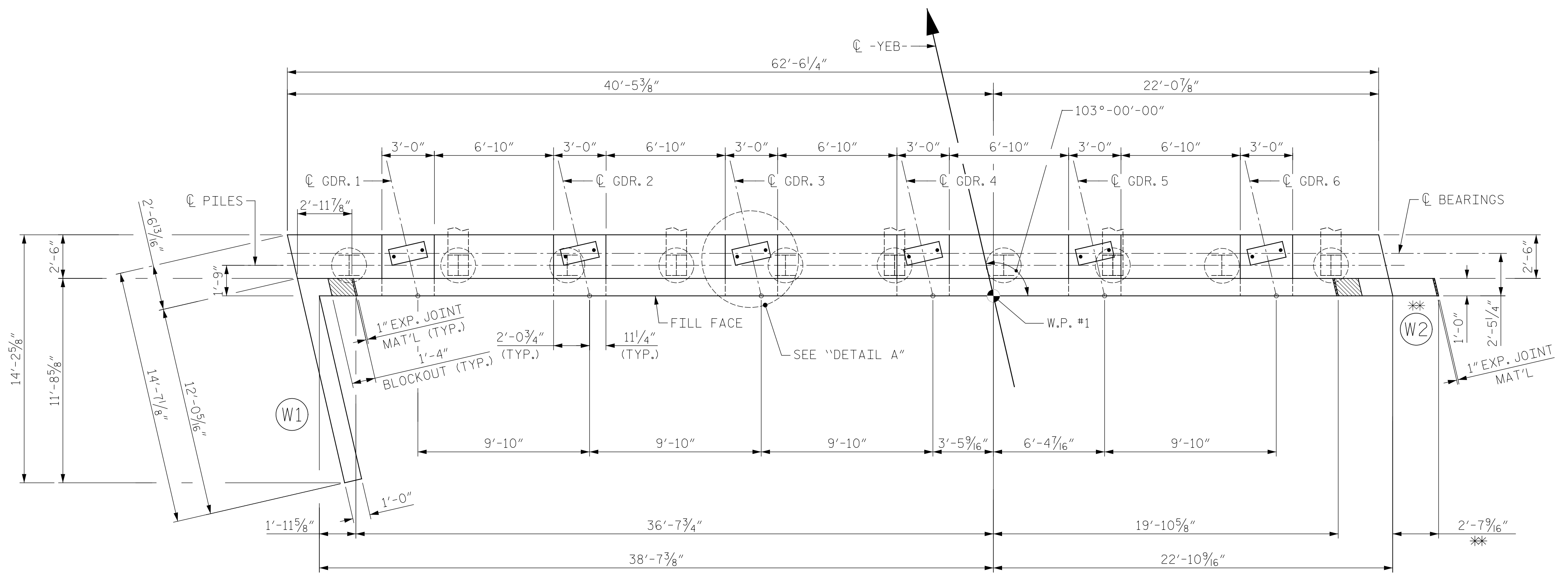
PROJECT NO. I-5714
 MECKLENBURG COUNTY
 STATION: 26+20.73 -YEB-

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 SUPERSTRUCTURE
 BILL OF MATERIAL

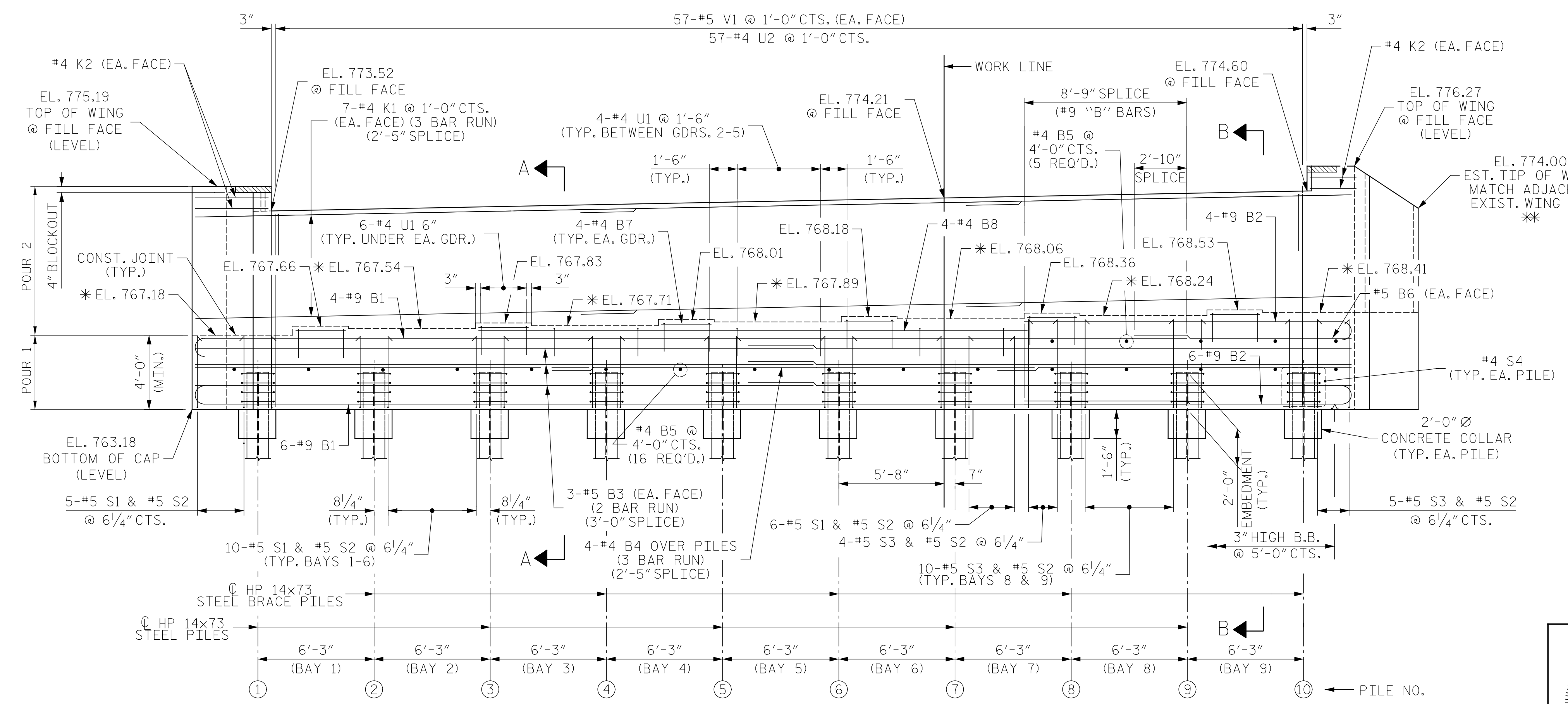
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SHEET NO. S-31
 TOTAL SHEETS 53



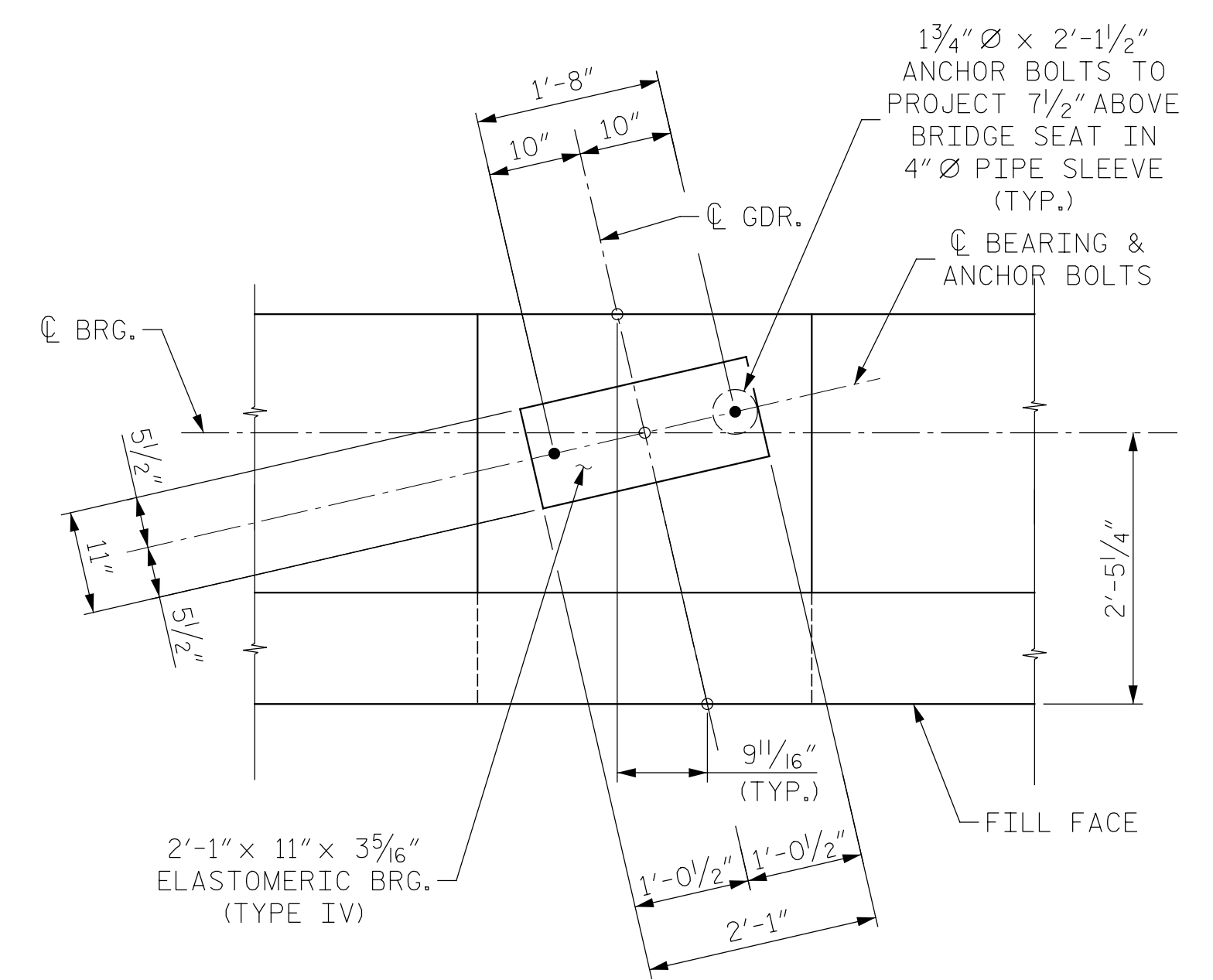
PLAN



ELEVATION

NOTES:

- STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.
- FOR PIPE INSERT DETAILS, SEE BEARING SHEET.
- EPOXY COAT THE END BENT CAP AFTER ADJUSTMENTS ARE MADE TO BEARINGS AND ANCHOR BOLTS ARE GROUTED.
- INSTALL THE 4" DIAMETER DRAIN PIPE THROUGH THE WING WALL AS REQUIRED FOR REINFORCED BRIDGE APPROACH FILLS, SEE THE ROADWAY PLANS. REINFORCING STEEL IN THE WING WALL MAY BE SHIFTED AS NECESSARY TO CLEAR THE DRAIN PIPE.
- BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.
- THE TOP SURFACE AREAS OF THE END BENT CAPS SHALL BE CURED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS EXCEPT THE MEMBRANE CURING COMPOUND METHOD SHALL NOT BE USED.
- THE TOP SURFACE OF THE END BENT CAP EXCEPT THE BRIDGE SEAT BUILDUPS SHALL BE SLOPED TRANSVERSELY FROM THE FILL FACE TO THE BACK FACE AT THE RATE OF 2%.
- * FOR LOCATION OF ELEVATION BETWEEN BRIDGE SEATS, SEE "SECTION A-A" ON SHEET 3 OF 3.
- FOR "SECTION A-A" AND "SECTION B-B", SEE SHEET 3 OF 3.
- FOR TEMPORARY DRAINAGE AT END BENT DETAIL, SEE SHEET 3 OF 3.
- FOR PILE SPLICE DETAILS, SEE SHEET 3 OF 3.
- FOR ADDITIONAL FOUNDATION NOTES, SEE "GENERAL DRAWING" SHEET 2 OF 3.
- ** END OF WING W2 MUST BE FIELD VERIFIED AND CONSTRUCTED SUCH THAT THE TOP OF WING W2 AT THE TIP MATCHES THE TOP OF WING FOR THE ADJACENT EXISTING BRIDGE. PLACE 1" EXPANSION JOINT MATERIAL BETWEEN TIP OF WING W2 AND ADJACENT EXISTING WING.

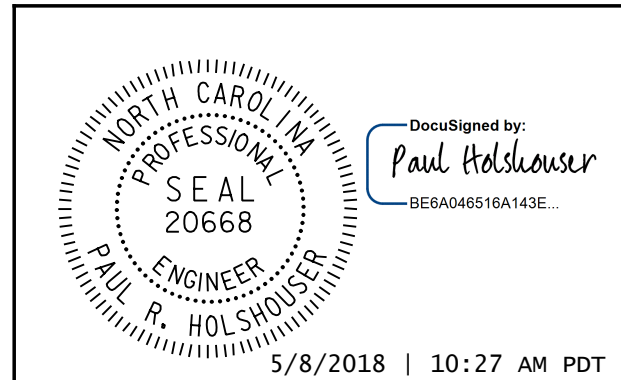


DETAIL A (TYP. EACH GIRDER)

PROJECT NO. I-5714
MECKLENBURG COUNTY
 STATION: 26+20.73 -YEB-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 SUBSTRUCTURE
 END BENT 1



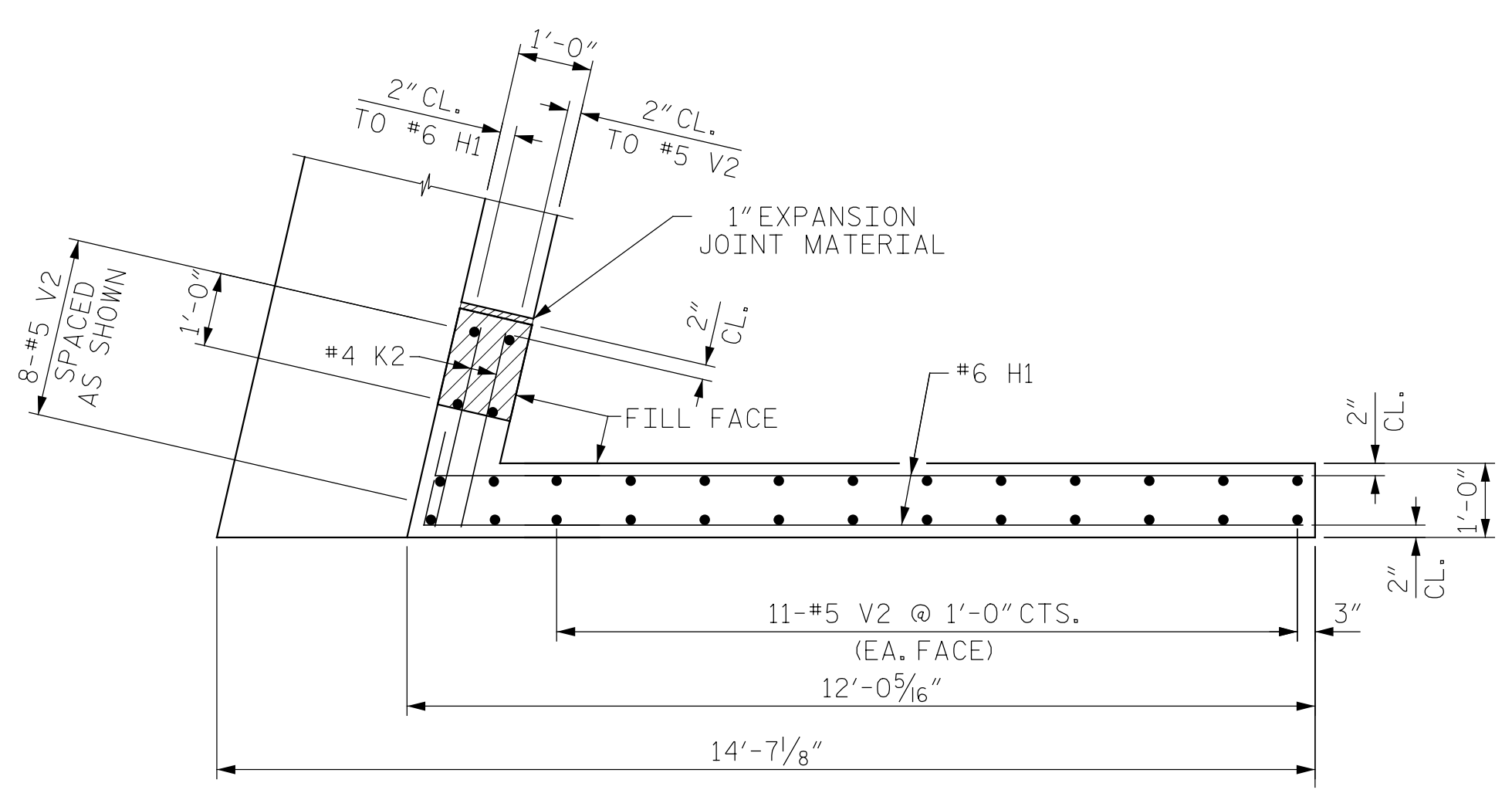
ICE of Carolinas, PLLC
 4505 Falls of Neuse Road, Suite 110
 Raleigh, North Carolina 27609
 Phone: 919-422-0333
 License #: P-0999

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1			3			TOTAL SHEETS	
2			4			53	

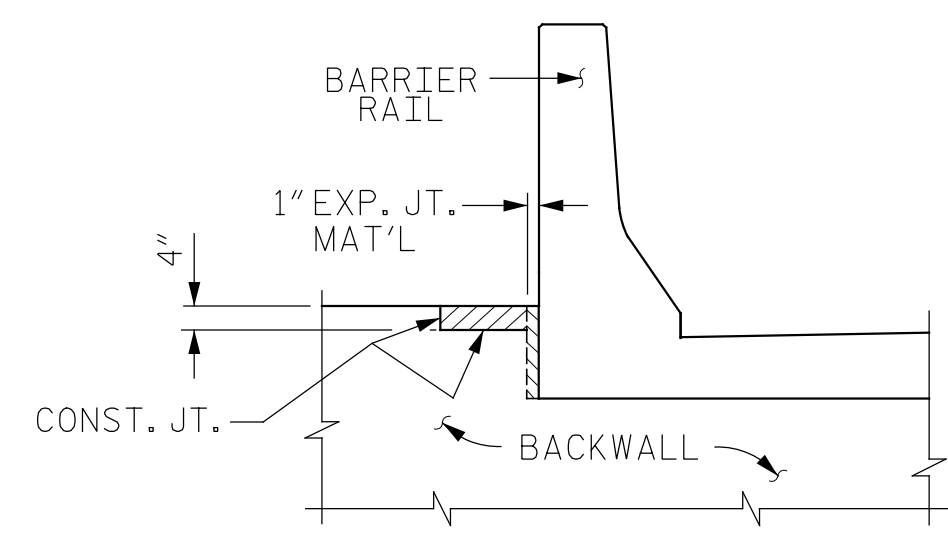
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 CHECKED BY: P. R. HOLSHOUSE DATE: 2-5-18
 DESIGN E.O.R.: P. R. HOLSHOUSE DATE: 5-8-18

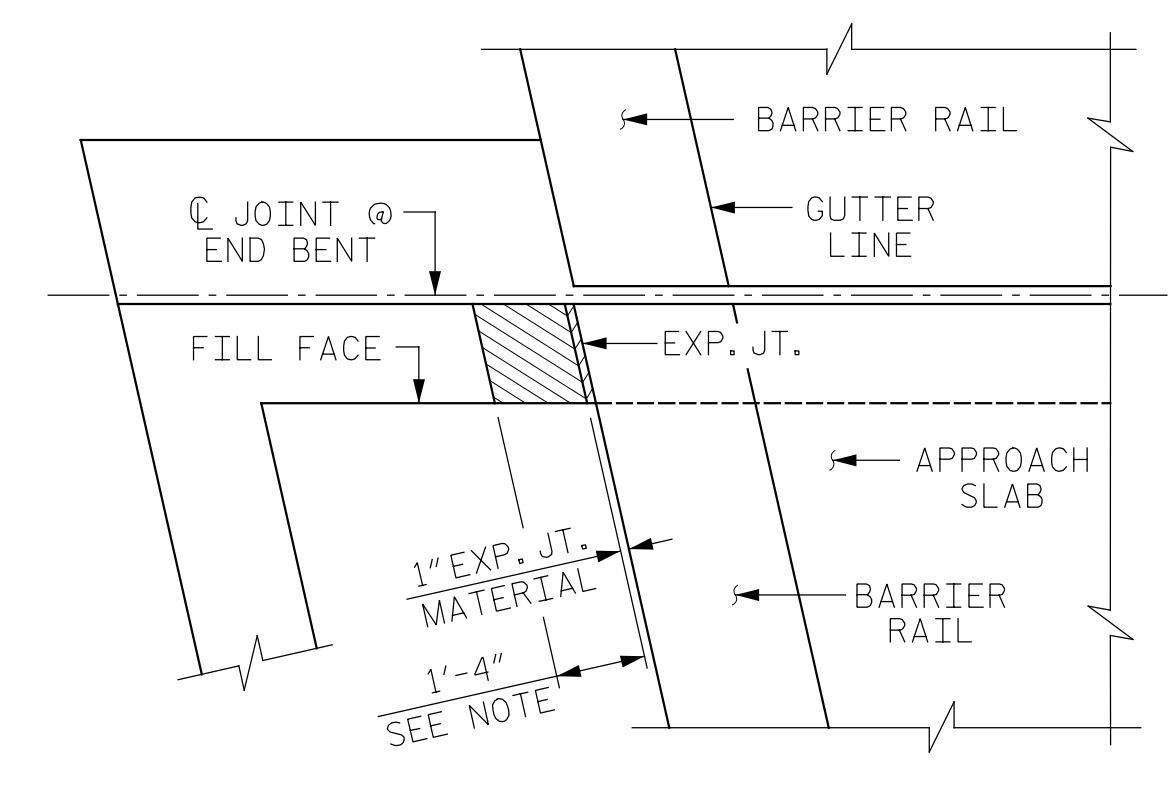
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



PLAN OF LEFT WING WALL (W1)

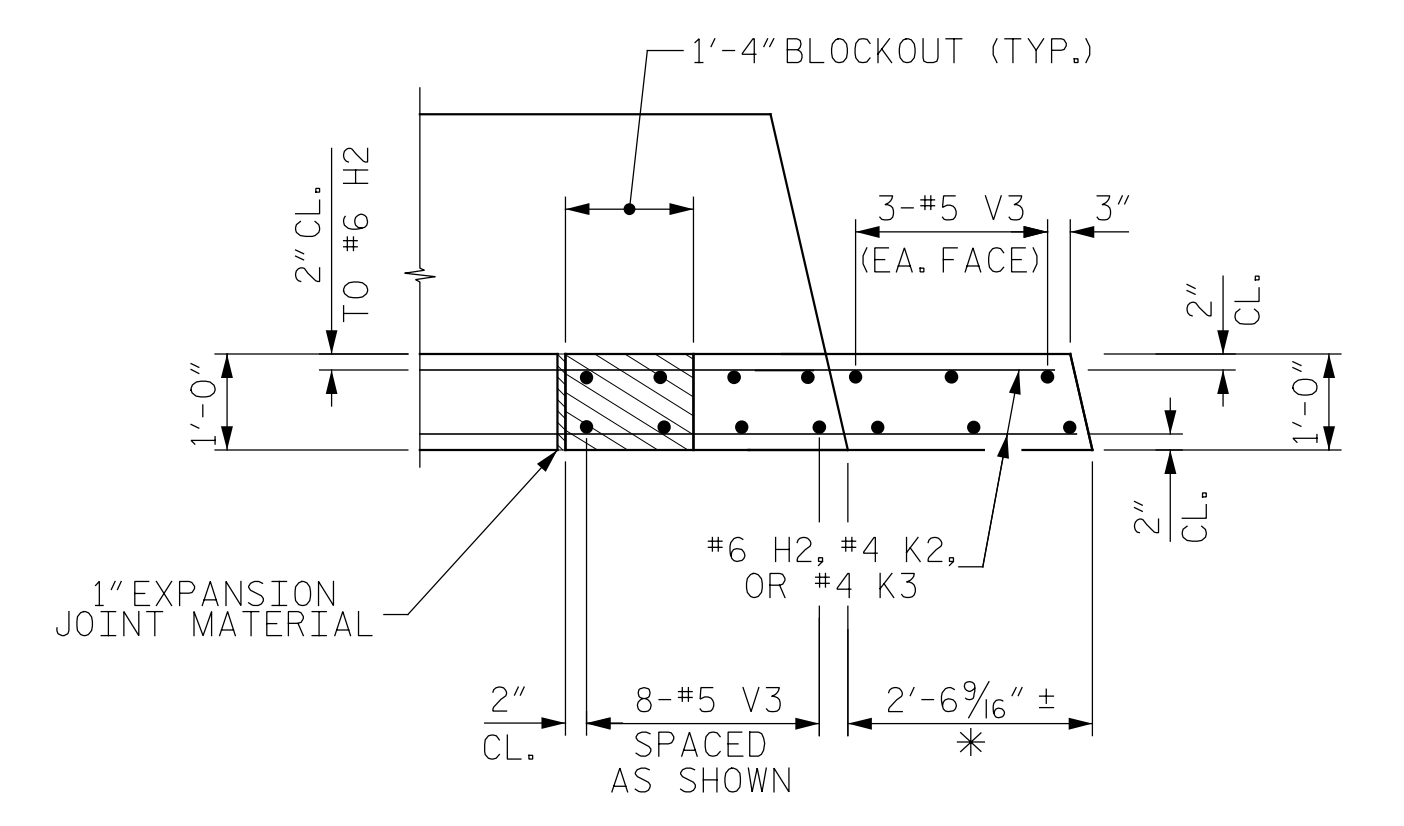


ELEVATION

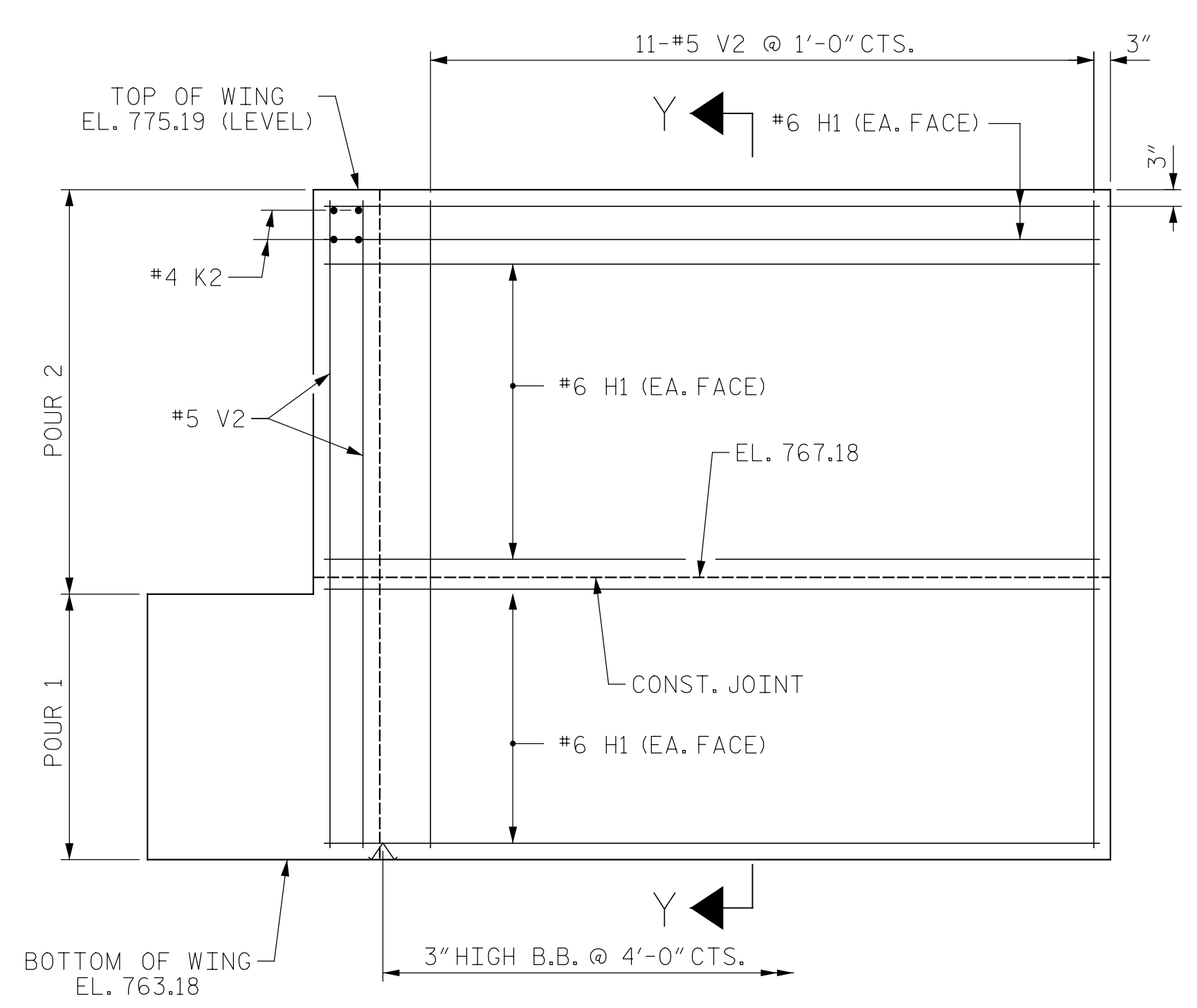


PLAN

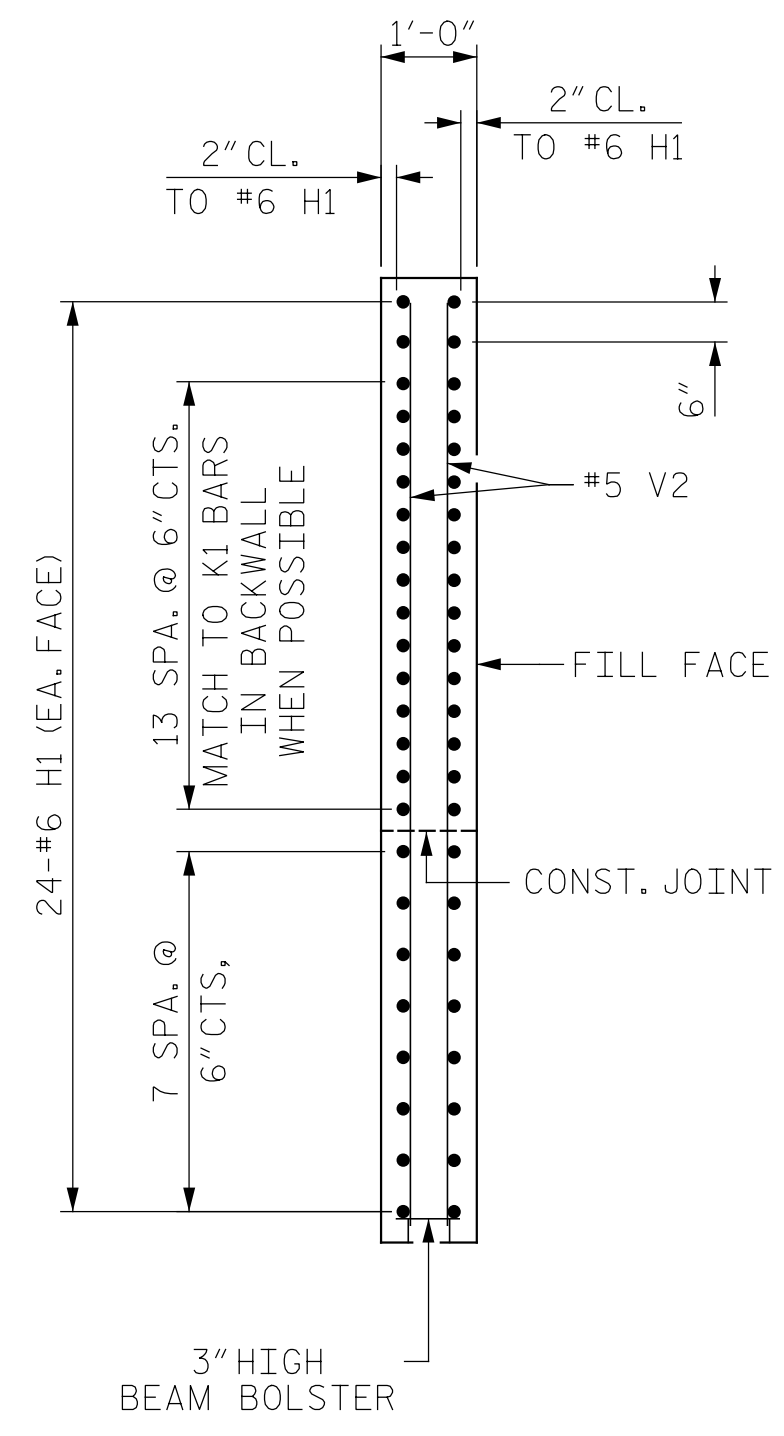
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THE CONCRETE IN SHADED AREA OF THE WINGWALL SHALL BE POURED AFTER THE BARRIER RAIL IS CAST, IF SLIP FORMING IS USED.



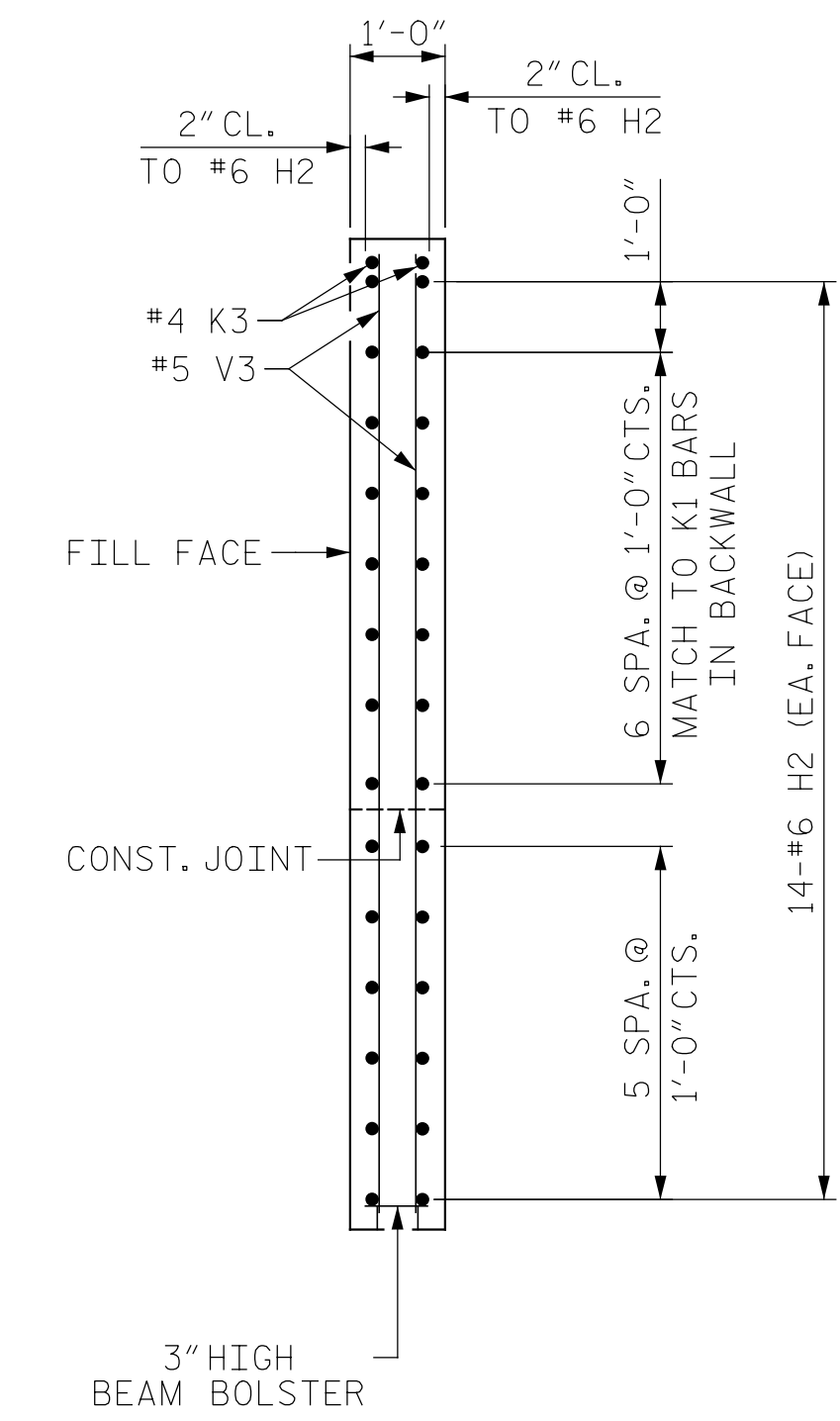
PLAN OF RIGHT WING WALL (W2) *



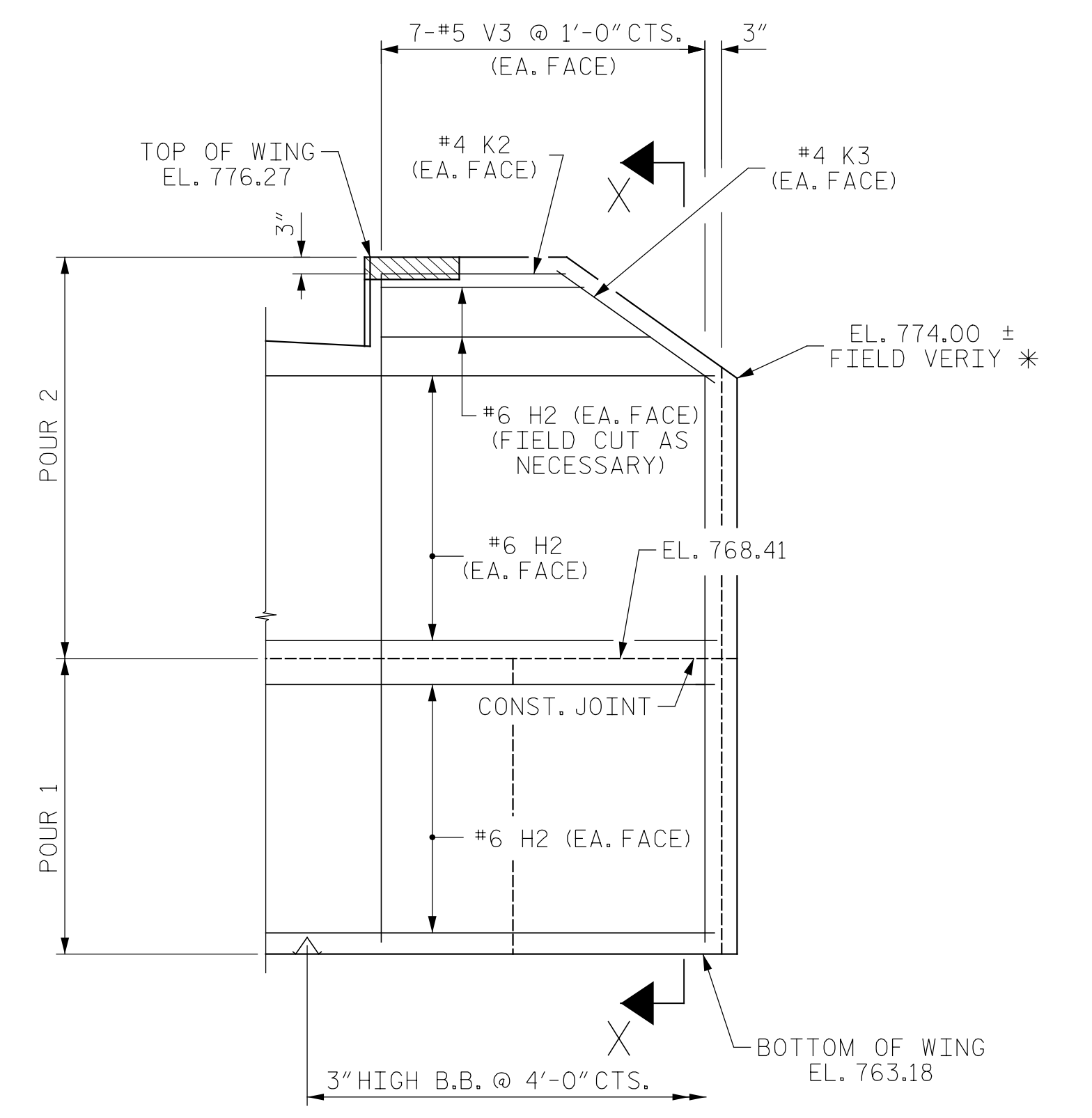
ELEVATION OF LEFT WING WALL (W1)



SECTION Y-Y



SECTION X-X



ELEVATION OF RIGHT WING WALL (W2) *

NOTE
* TIP OF WING W2 SHOULD EXTEND CO-LINEAR TO FILL FACE, WITH THE END AGAINST 1\"/>

PROJECT NO. I-5714
MECKLENBURG COUNTY
STATION: 26+20.73 -YEB-

SHEET 2 OF 3

DocuSigned by:
Paul Holshouser
BEG6A08516A143E

5/8/2018 | 10:27 AM PDT

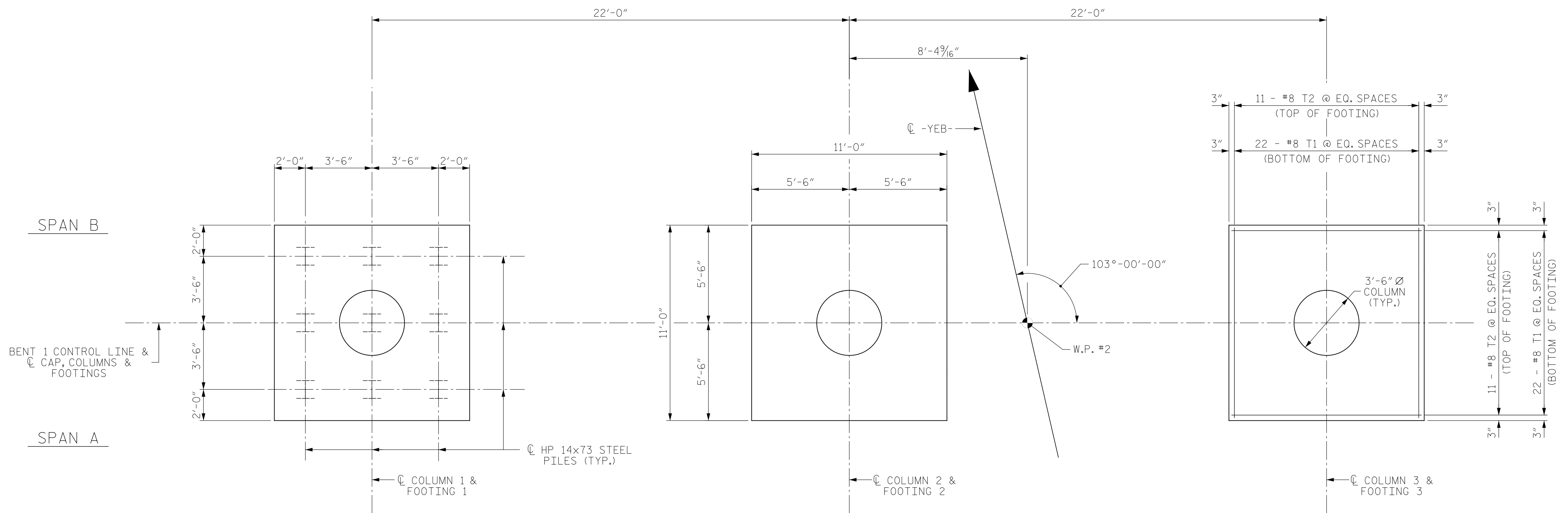
ICE of CAROLINAS, PLLC
4505 Falls of Neuse Road, Suite 110
Raleigh, North Carolina, 27609
Phone: 919-422-0333
License #: P-0999

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH SUPERSTRUCTURE END BENT 1					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
SHEET NO.					S-33
TOTAL SHEETS					53

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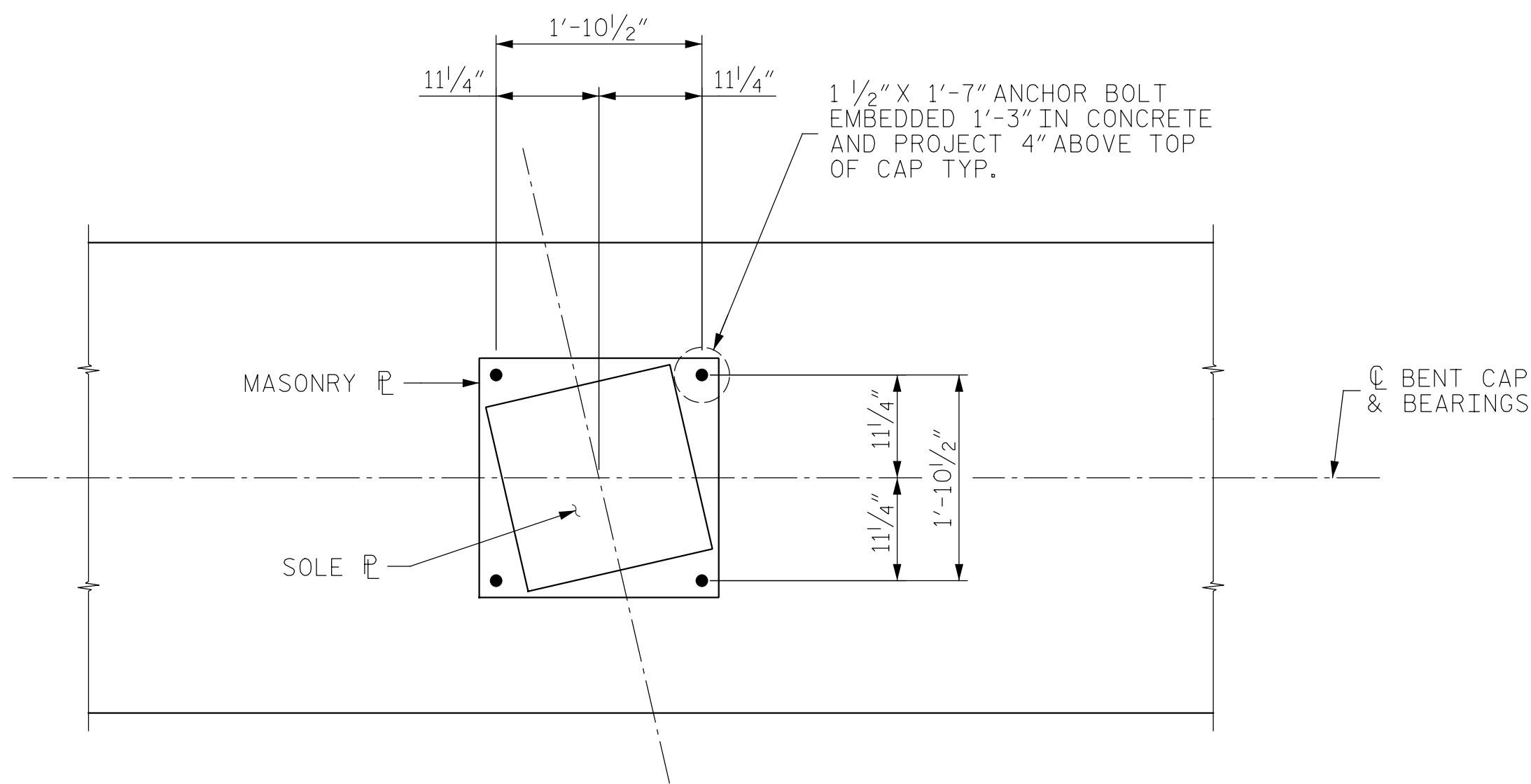
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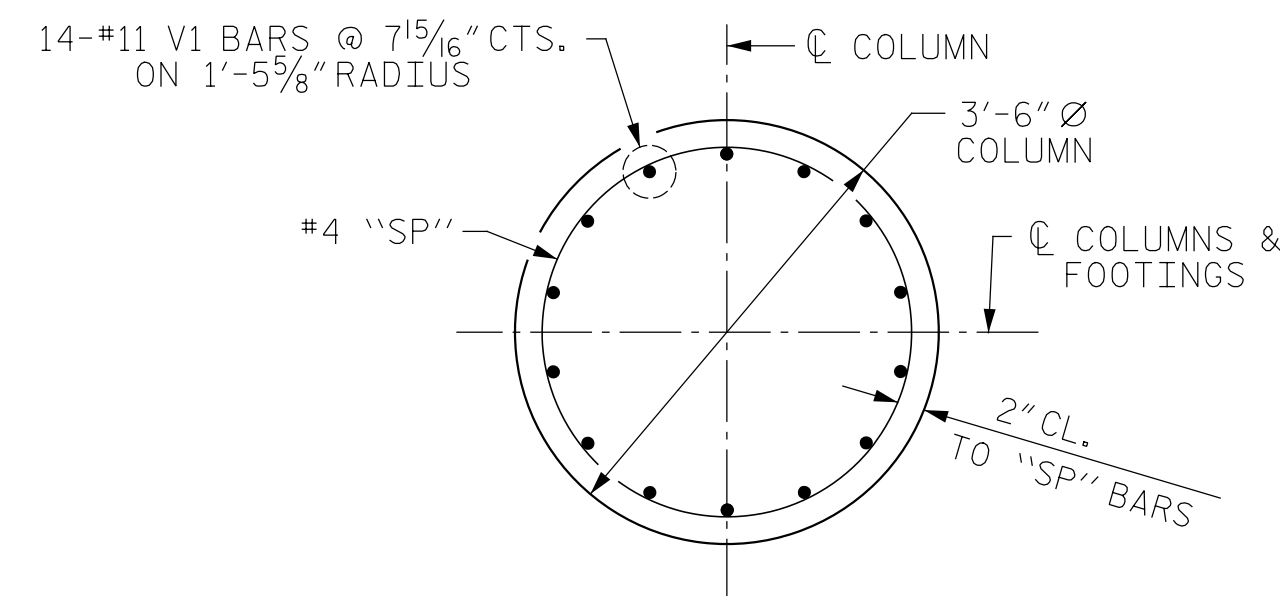
PLAN OF FOOTINGS

ALL DIMENSIONS AND DETAILS SHOWN FOR FOOTINGS ARE TYPICAL FOR EACH FOOTING UNLESS OTHERWISE NOTED.



PLAN OF BEARINGS

ALL DIMENSIONS AND DETAILS SHOWN ARE TYPICAL FOR ALL BEARINGS @ EACH BRIDGE SEAT LOCATION UNLESS OTHERWISE NOTED.



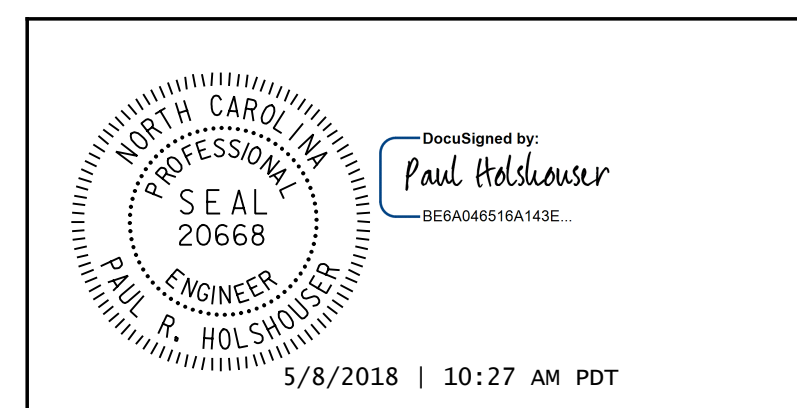
SECTION B-B

PROJECT NO. I-5714
MECKLENBURG COUNTY
 STATION: 26+20.73 -YEB-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 SUBSTRUCTURE

BENT 1 DETAILS



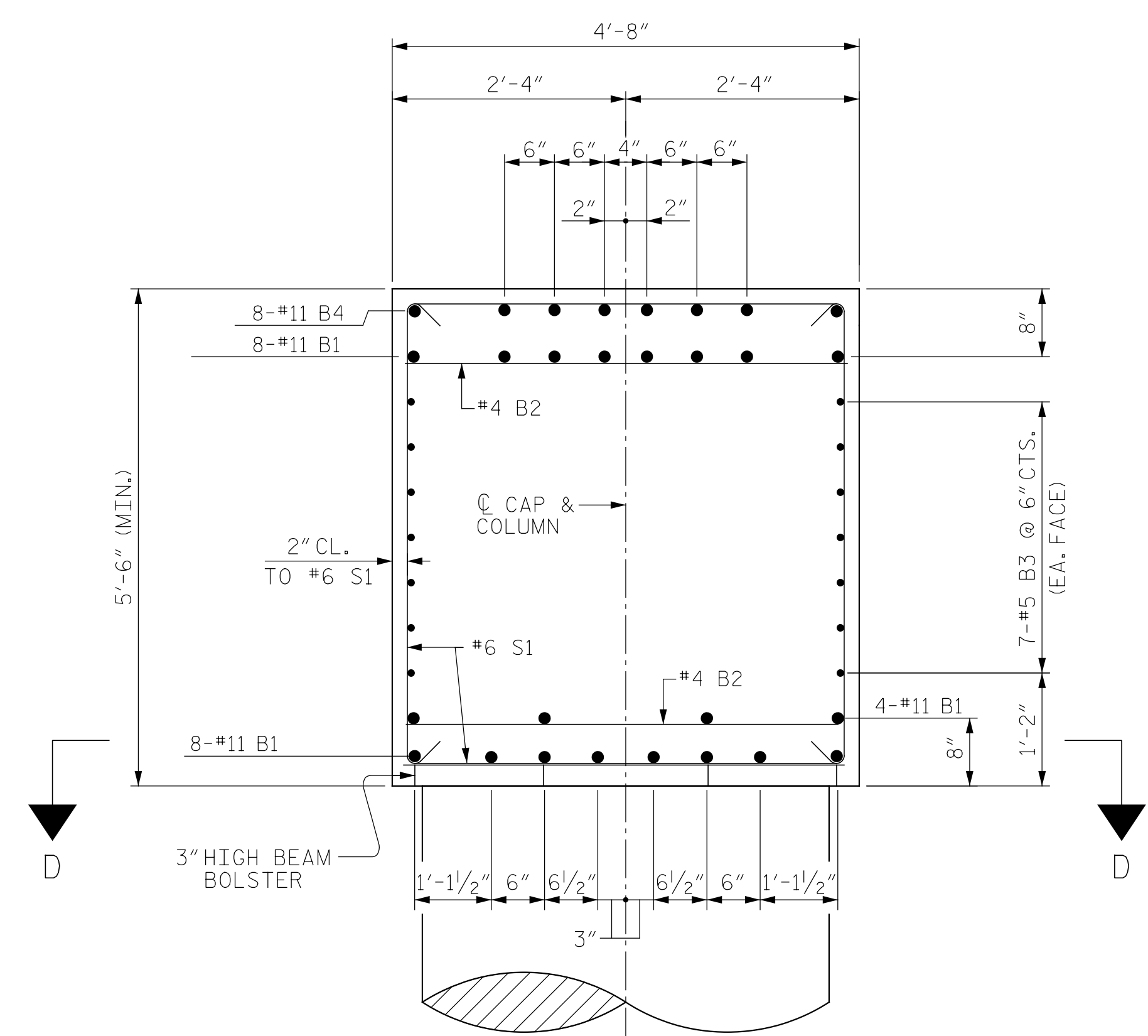
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 Raleigh, North Carolina 27609
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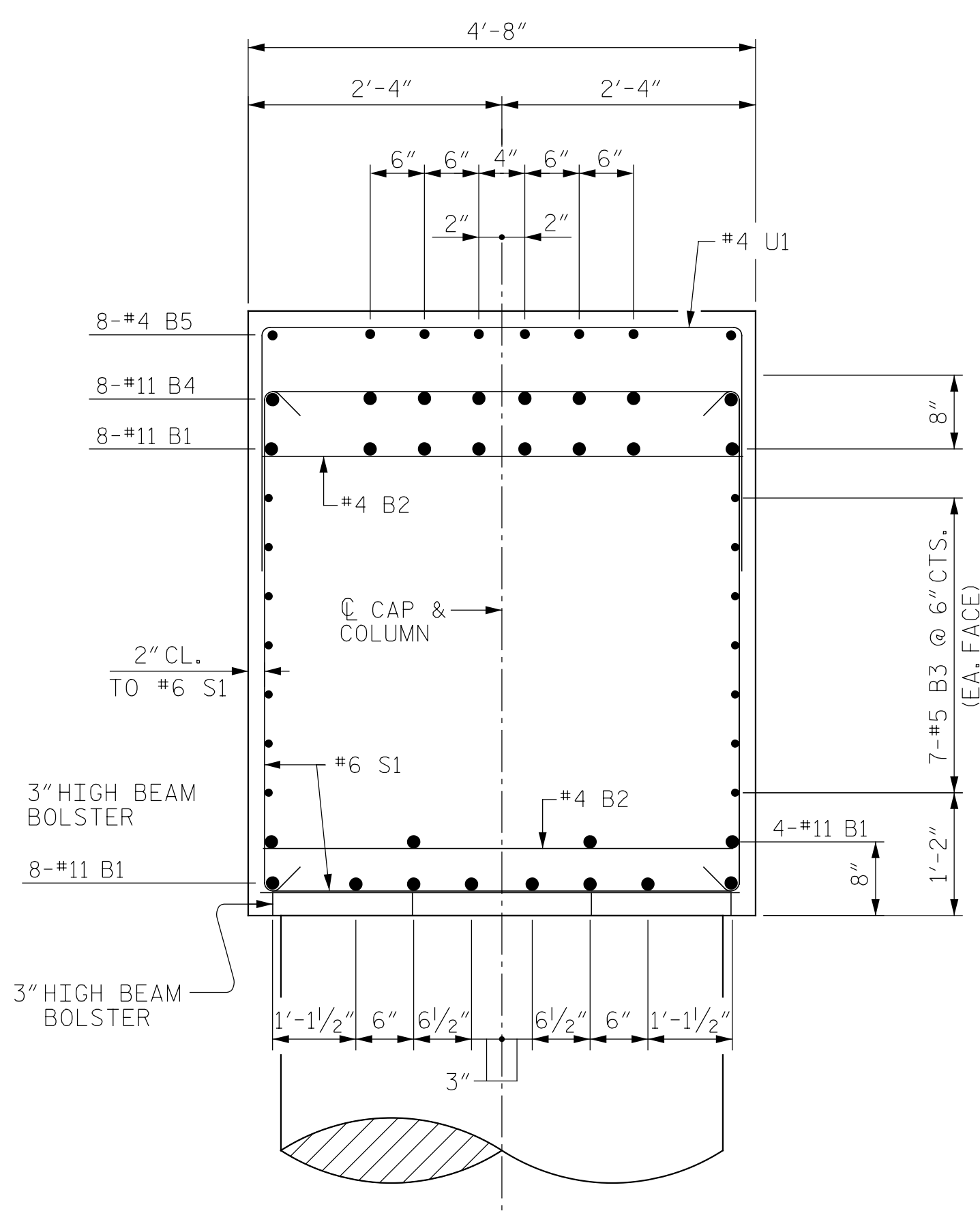
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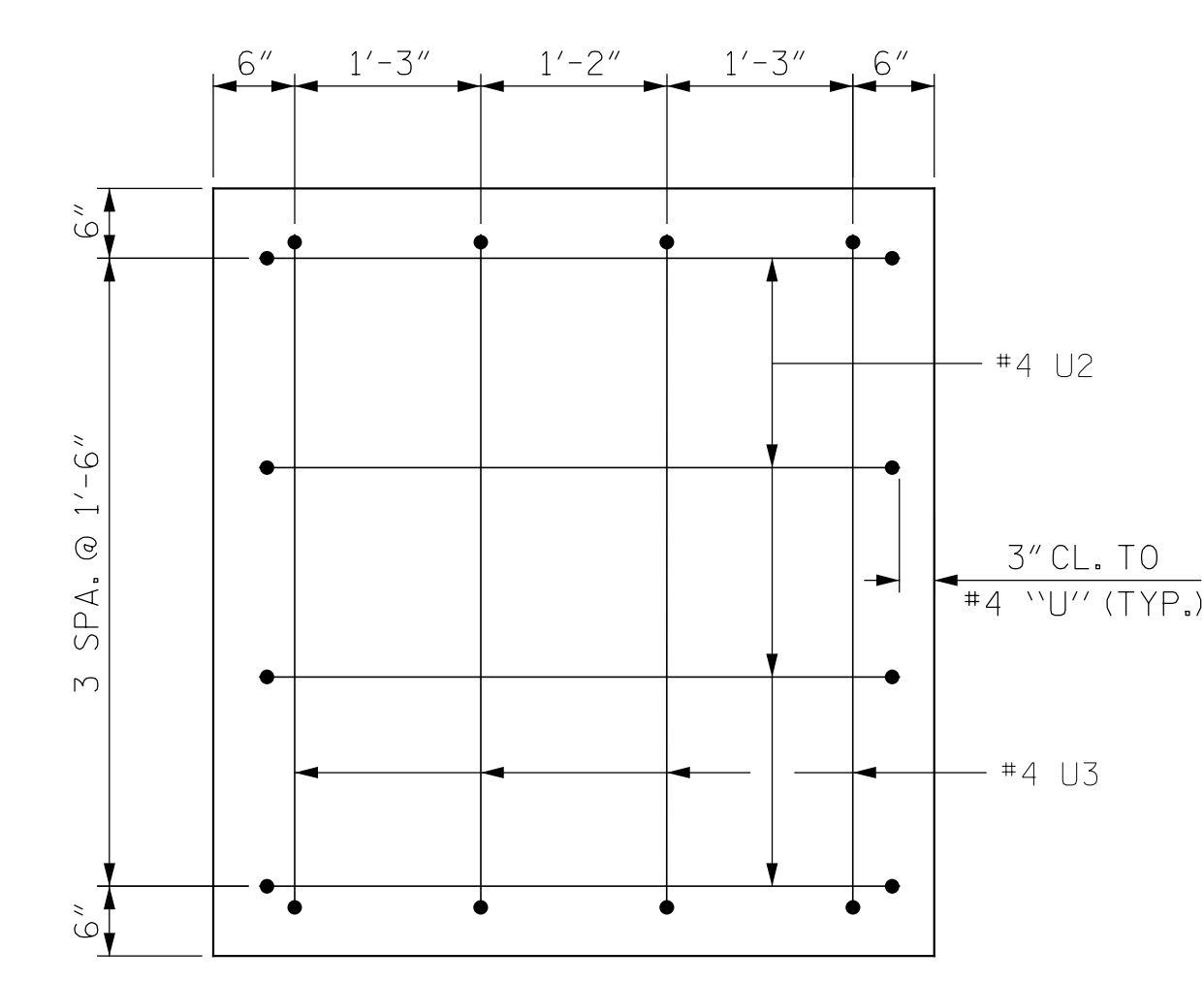
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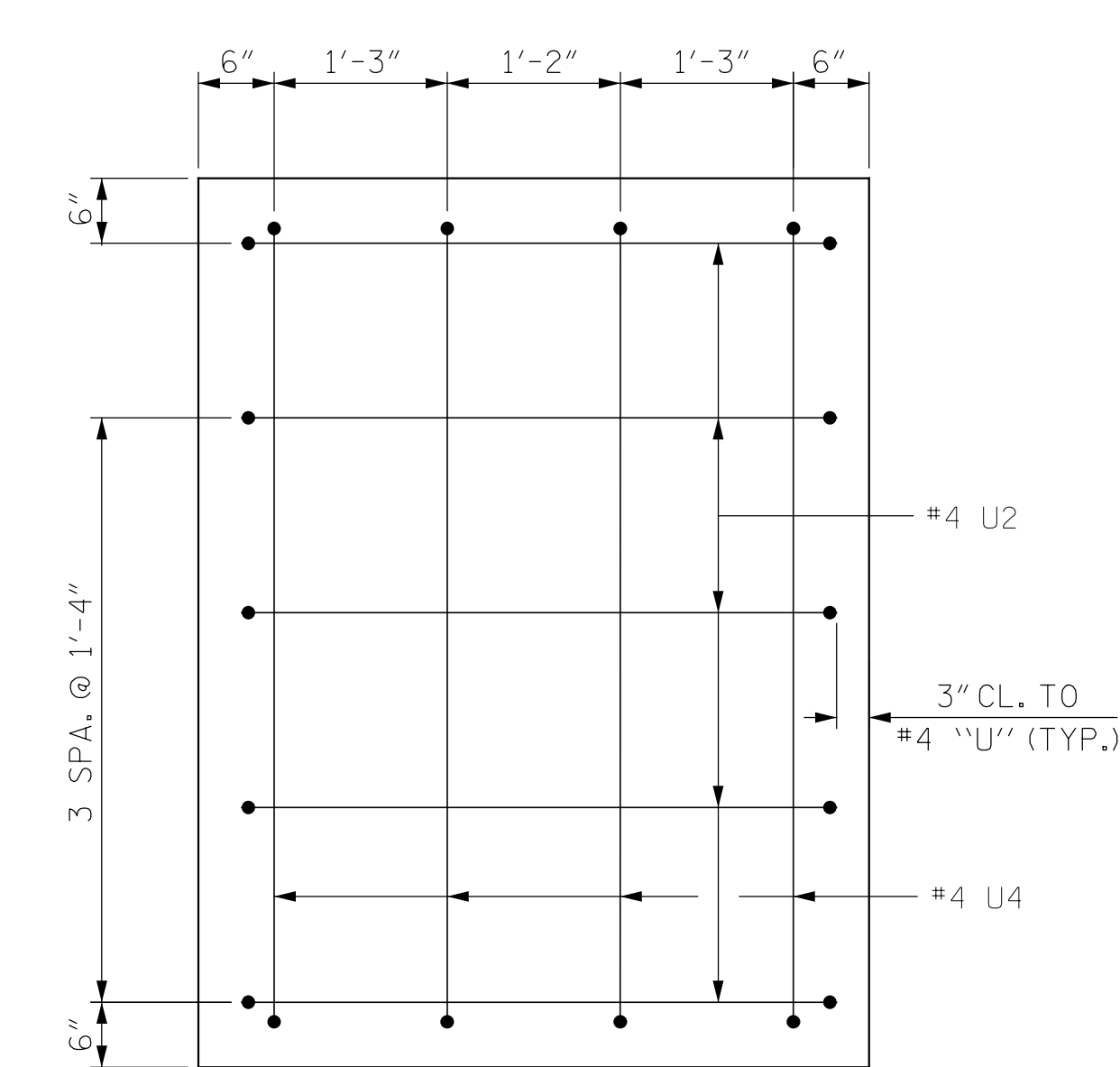
SECTION A-A



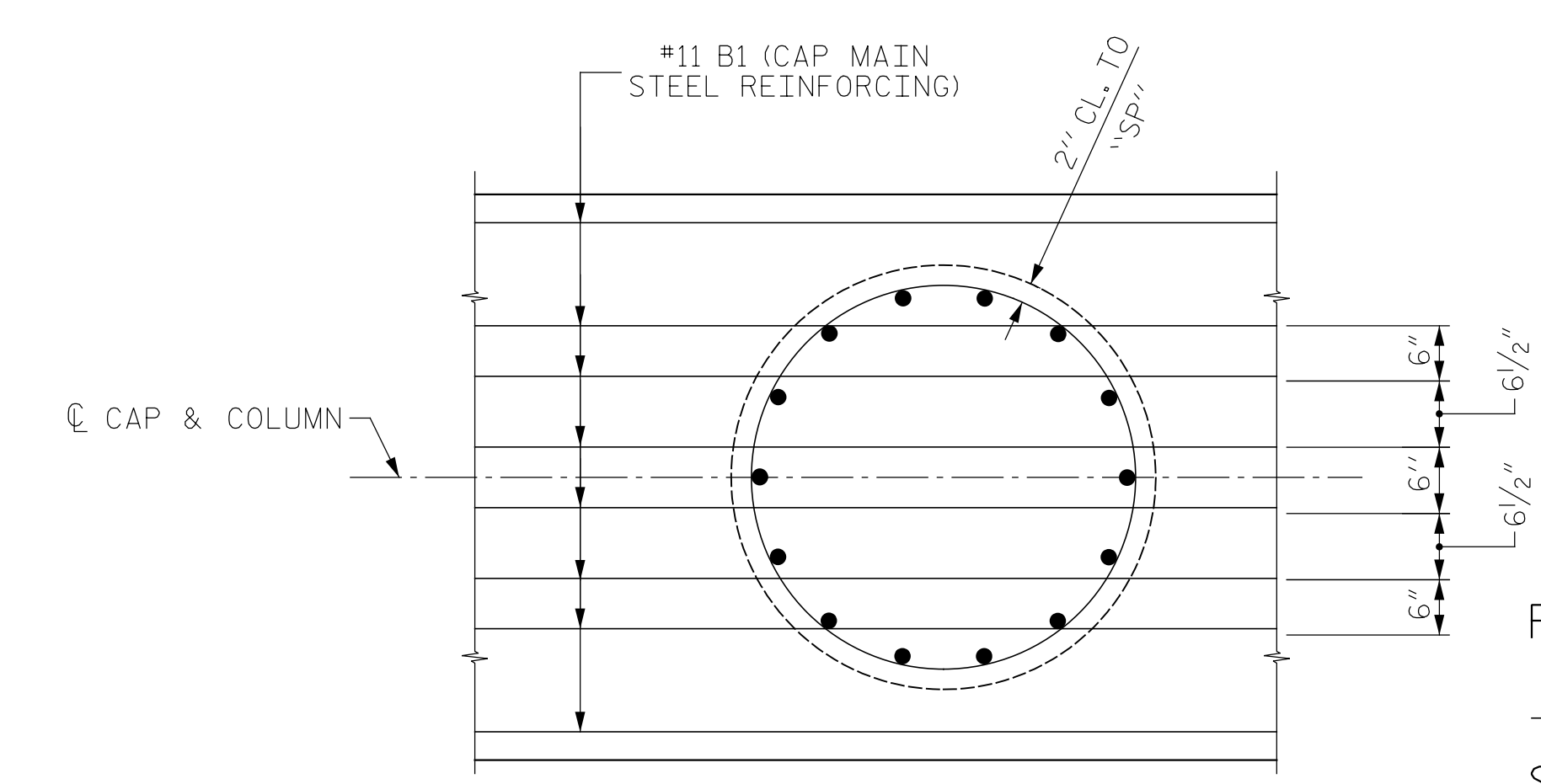
SECTION C-C



VIEW X-X

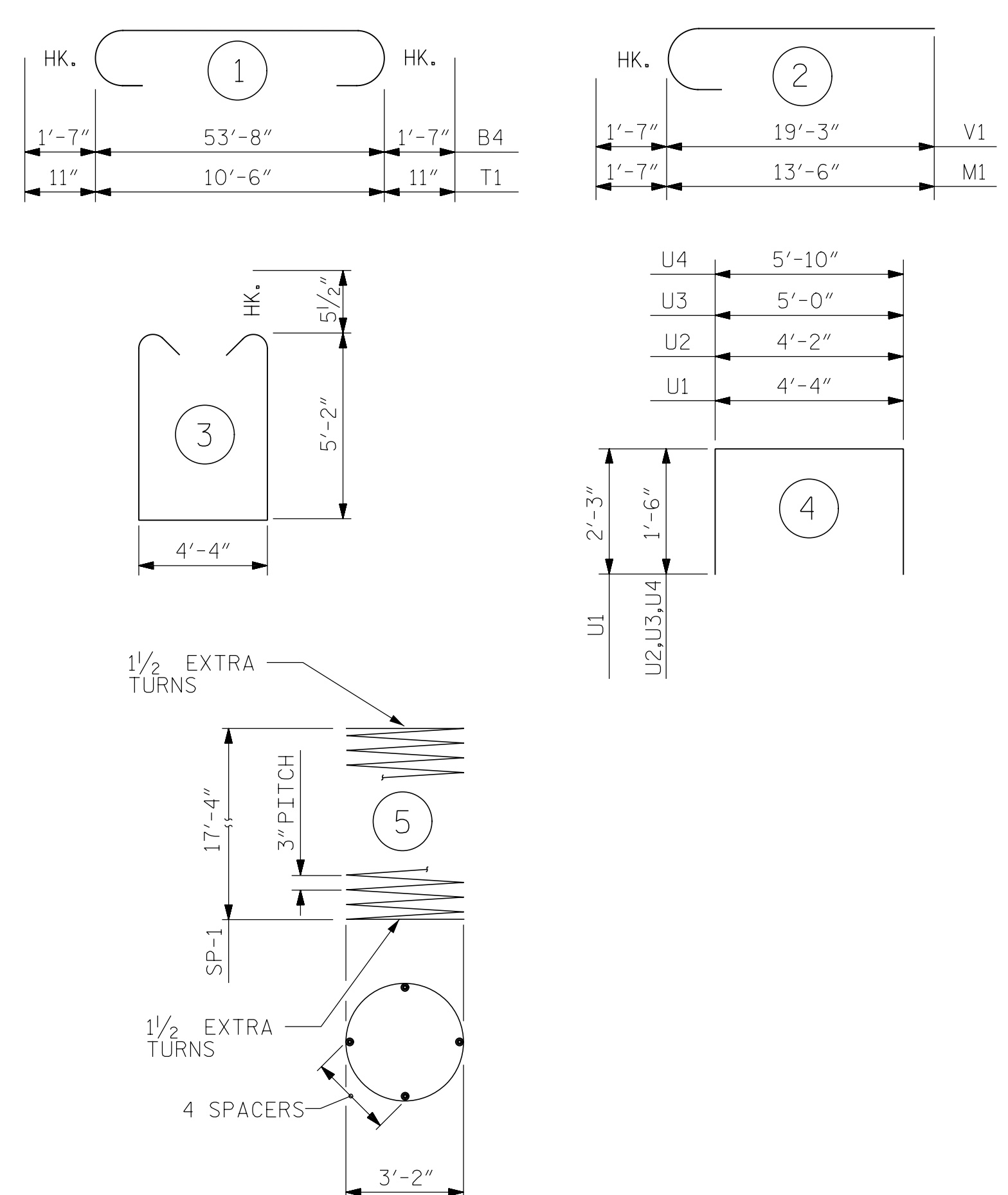


VIEW Y-Y



SECTION D-D

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

BENT 1						
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	
B1	20	11	STR	53' - 8"	5,703	
B2	28	4	STR	4' - 4"	81	
B3	14	5	STR	53' - 8"	784	
B4	8	11	1	56' - 10"	2,416	
B5	40	4	STR	8' - 8"	232	
M1	42	11	2	15' - 1"	3,366	
S1	204	6	3	15' - 7"	4,775	
T1	132	8	1	12' - 4"	4,347	
T2	66	8	STR	10' - 6"	1,850	
U1	56	4	4	8' - 10"	330	
U2	9	4	4	7' - 2"	43	
U3	4	4	4	8' - 0"	21	
U4	4	4	4	8' - 10"	24	
V1	42	11	2	20' - 10"	4,649	
SP-1	3	*	5	711' - 9"	1,426	
REINFORCING STEEL				LBS.	28,621	
SPIRAL COLUMN REINFORCING STEEL				LBS.	1,426	
CLASS "A" CONCRETE BREAKDOWN						
POUR #1 - FOOTINGS				C.Y.	67.2	
POUR #2 - COLUMNS				C.Y.	18.3	
POUR #3 - CAP				C.Y.	55.4	
TOTAL CLASS "A" CONCRETE				C.Y.	140.9	
HP 14 X 73 STEEL PILES				NO. 27	LIN. FT.	1,845

* THE SP-1 SPIRAL REINFORCING STEEL SHALL BE W20 OR D-20 COLD DRAWN WIRE OR #4 PLAIN OR DEFORMED BAR.

PROJECT NO. I-5714
MECKLENBURG COUNTY
 STATION: 26+20.73 -YEB-
 SHEET 3 OF 3

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 SUBSTRUCTURE
 BENT 1 DETAILS

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Paul Holshouser
 BE6A048516A143E
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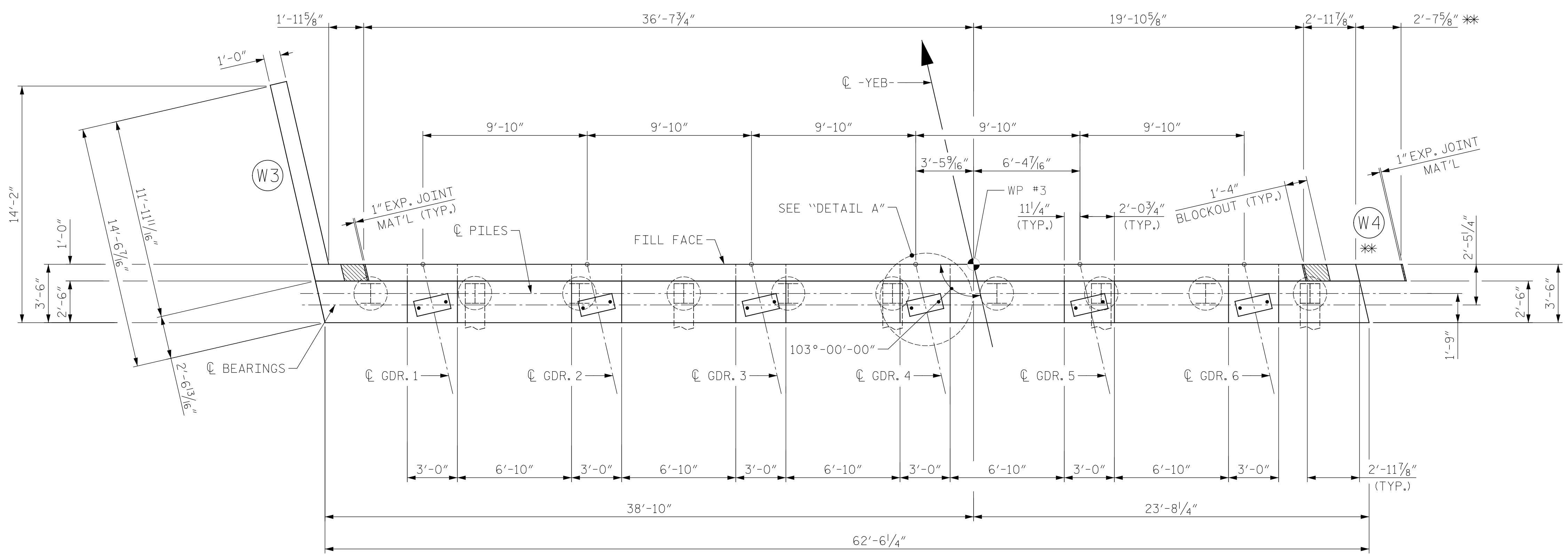
ICE of CAROLINAS, PLLC
 4505 Falls of Neuse Road, Suite 110
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 Phone: 919-422-0333
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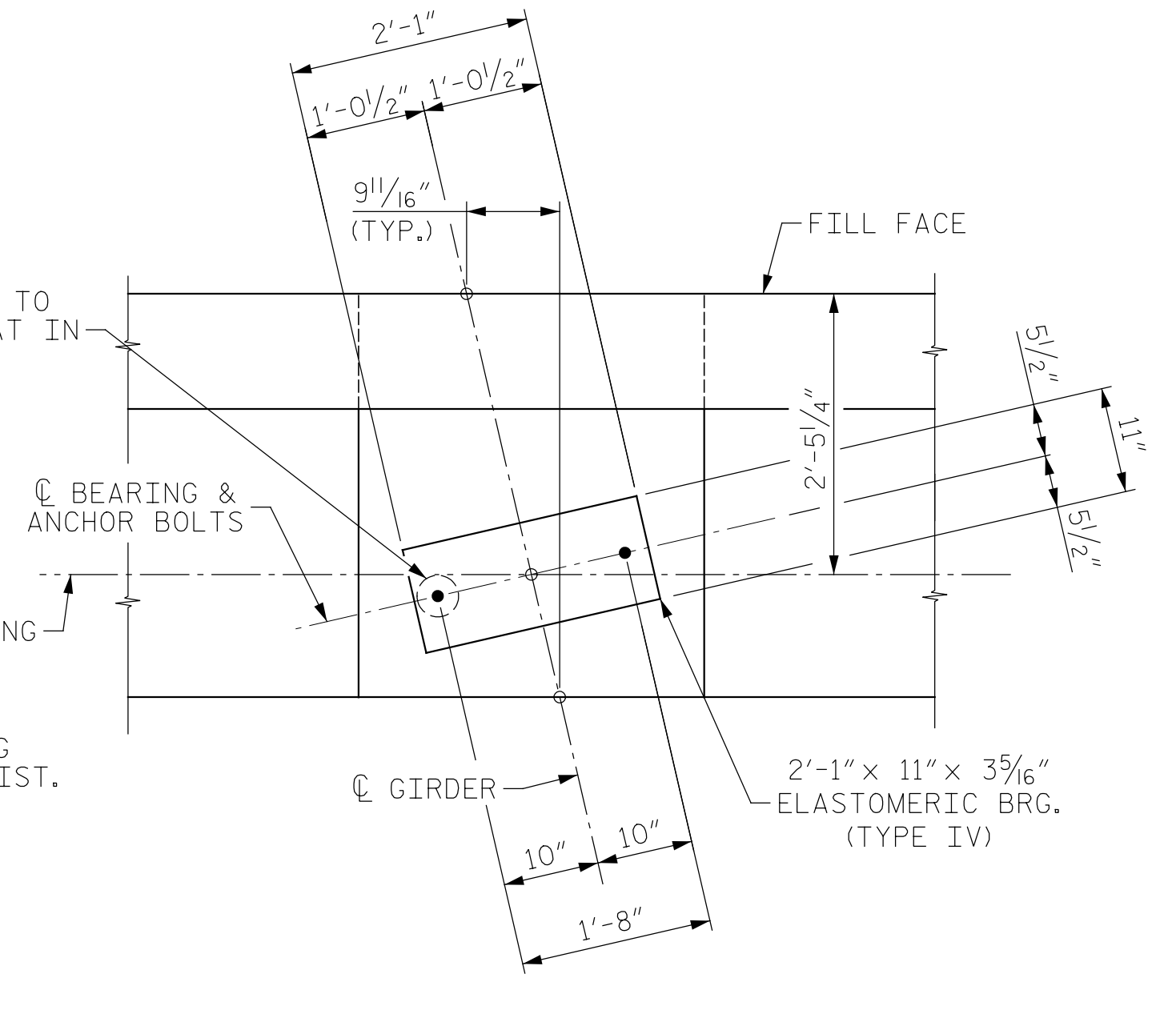
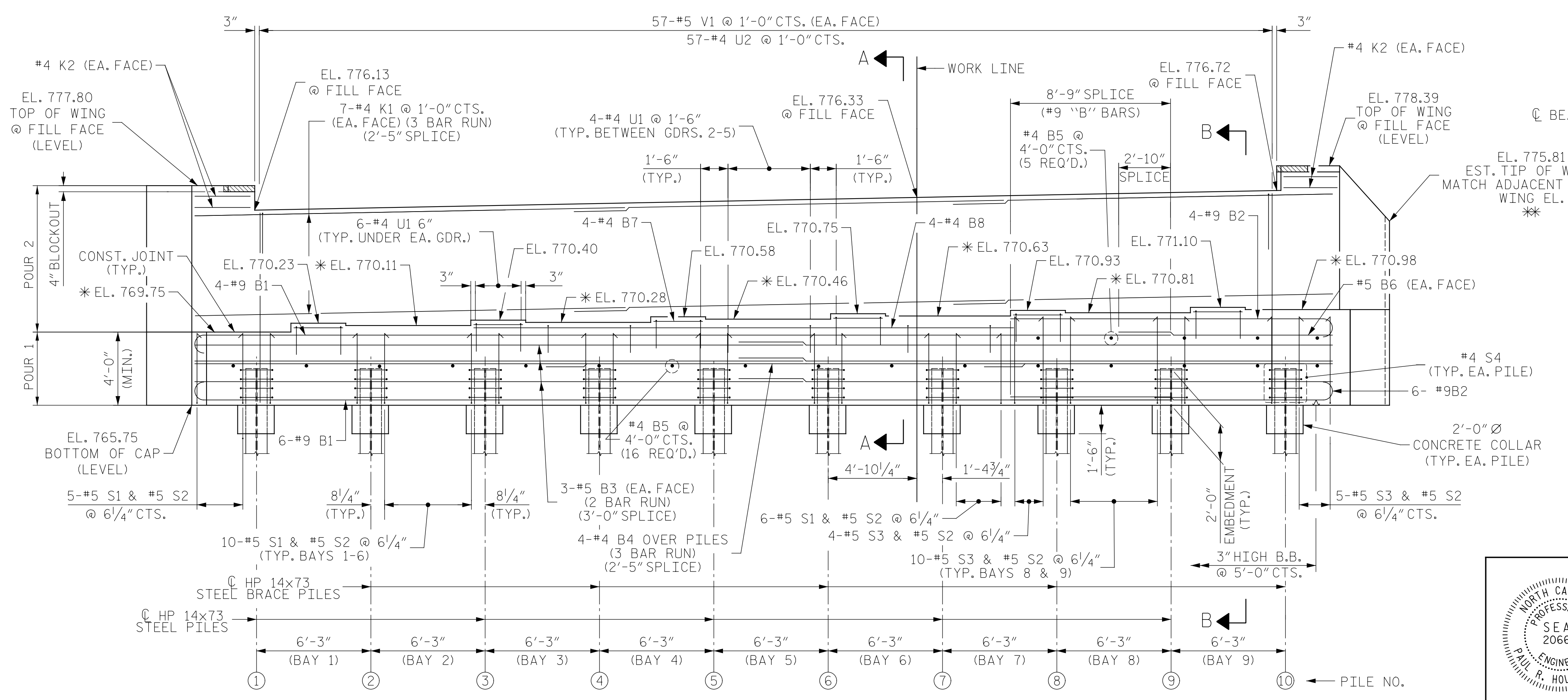
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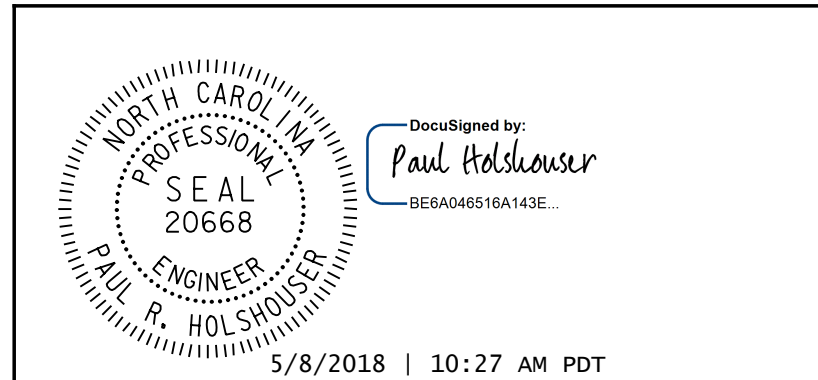


NOTES:

- STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.
- FOR PIPE INSERT DETAILS, SEE BEARING SHEET.
- EPOXY COAT THE END BENT CAP AFTER ADJUSTMENTS ARE MADE TO BEARINGS AND ANCHOR BOLTS ARE GROUTED.
- INSTALL THE 4" DIAMETER DRAIN PIPE THROUGH THE WING WALL AS REQUIRED FOR REINFORCED BRIDGE APPROACH FILLS, SEE THE ROADWAY PLANS. REINFORCING STEEL IN THE WING WALL MAY BE SHIFTED AS NECESSARY TO CLEAR THE DRAIN PIPE.
- BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.
- THE TOP SURFACE AREAS OF THE END BENT CAPS SHALL BE CURED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS EXCEPT THE MEMBRANE CURING COMPOUND METHOD SHALL NOT BE USED.
- THE TOP SURFACE OF THE END BENT CAP EXCEPT THE BRIDGE SEAT BUILDUPS SHALL BE SLOPED TRANSVERSELY FROM THE FILL FACE TO THE BACK FACE AT THE RATE OF 2%.
- * FOR LOCATION OF ELEVATION BETWEEN BRIDGE SEATS, SEE "SECTION A-A" ON SHEET 3 OF 3.
- FOR "SECTION A-A" AND "SECTION B-B", SEE SHEET 3 OF 3.
- FOR TEMPORARY DRAINAGE AT END BENT DETAIL, SEE SHEET 3 OF 3.
- FOR PILE SPLICE DETAILS, SEE SHEET 3 OF 3.
- FOR ADDITIONAL FOUNDATION NOTES, SEE "GENERAL DRAWING" SHEET 2 OF 3.
- ** END OF TOP W4 MUST BE FIELD VERIFIED AND CONSTRUCTED SUCH THAT THE TOP OF WING W4 AT THE TIP MATCHES THE TOP OF WING FOR THE ADJACENT EXISTING BRIDGE. PLACE 1" EXPANSION JOINT MATERIAL BETWEEN TIP OF WING 2 AND ADJACENT EXISTING WING.



PROJECT NO. I-5714
 MECKLENBURG COUNTY
 STATION: 26+20.73 -YEB-
 SHEET 1 OF 3



STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
SUBSTRUCTURE					
END BENT 2					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
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2			4		

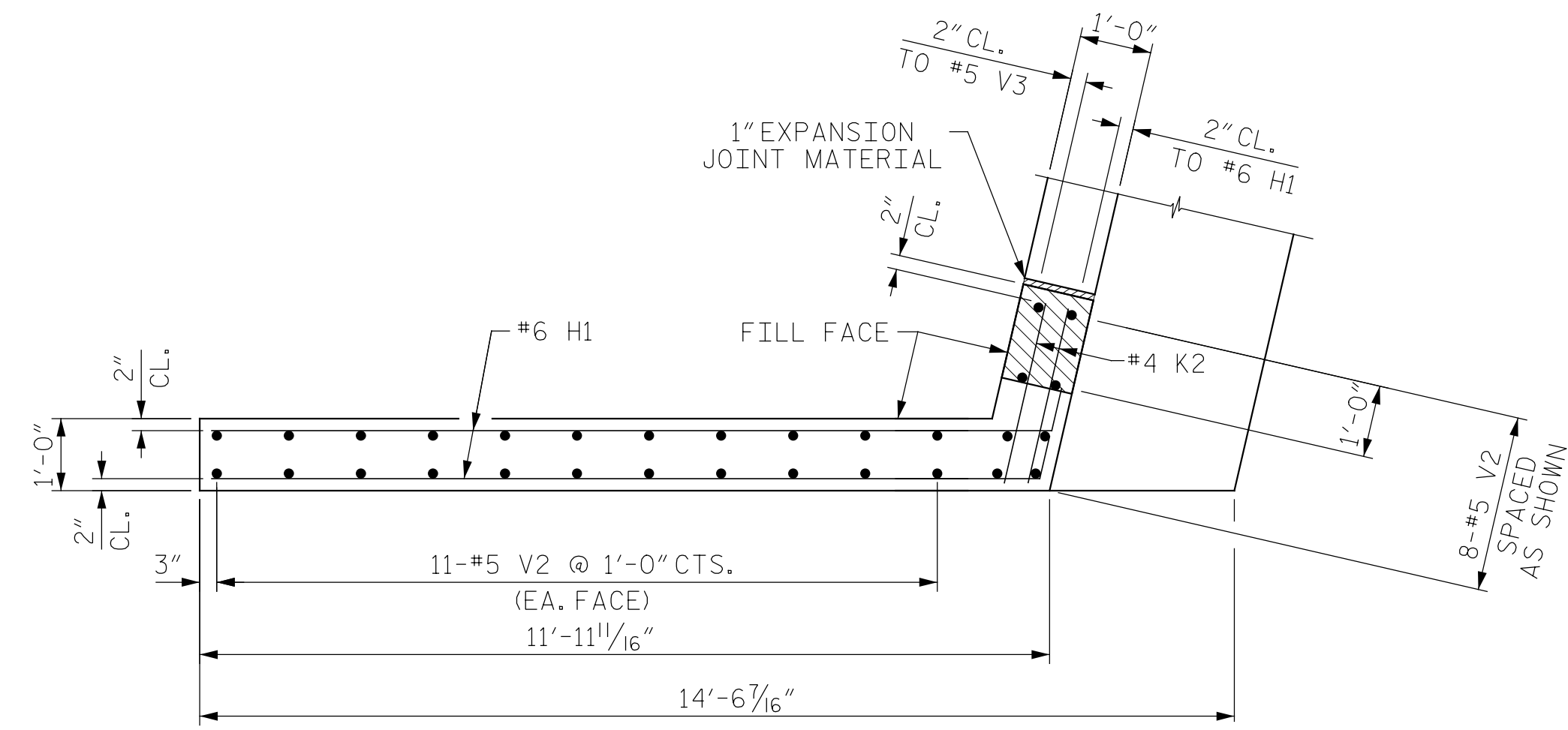
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 CHECKED BY: P. R. HOLSHOUSER DATE: 2-5-18
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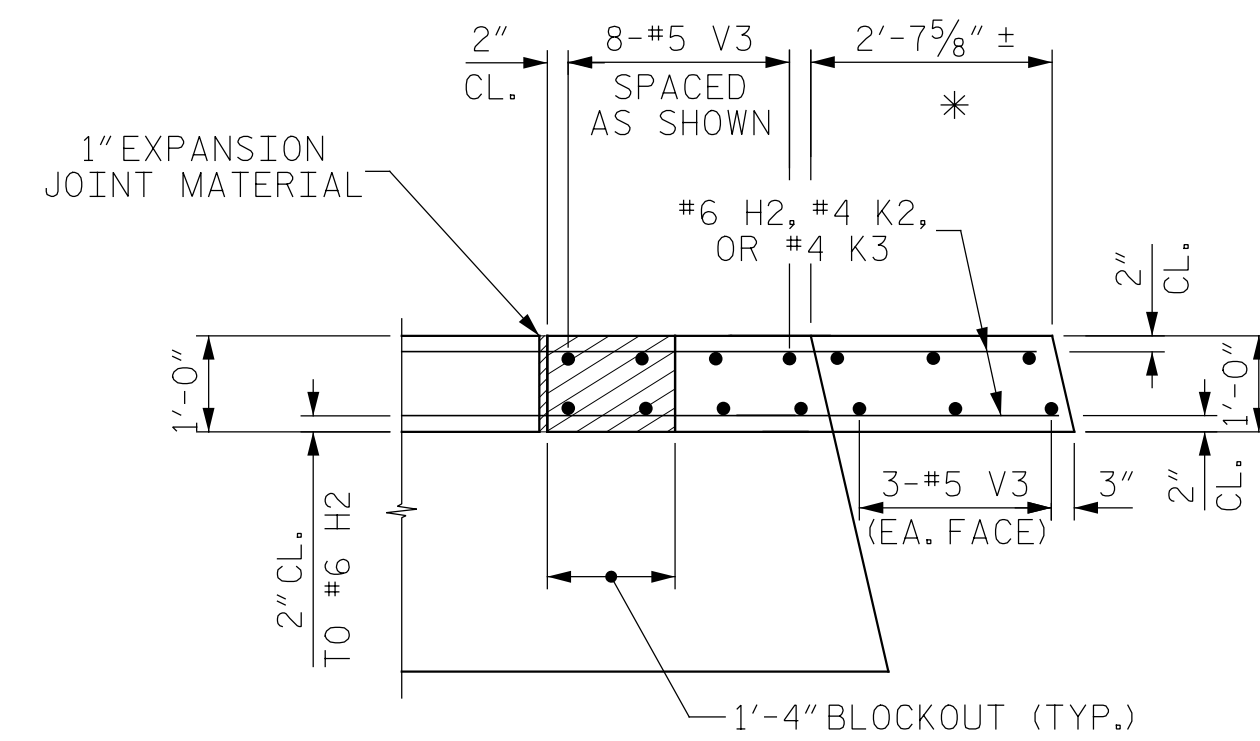
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 Phone: 919-422-0333
 License #: P-0999

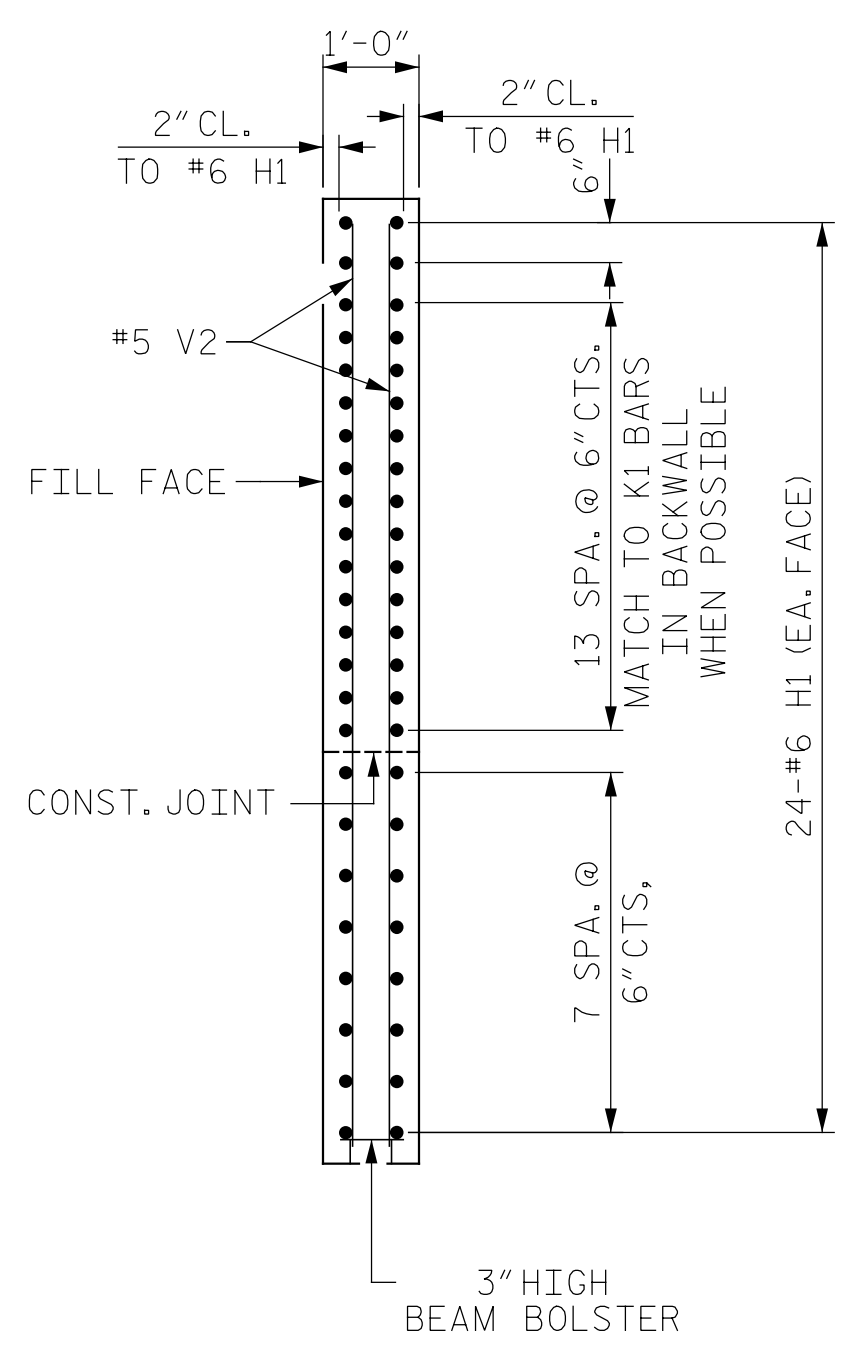
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 TOTAL SHEETS 53



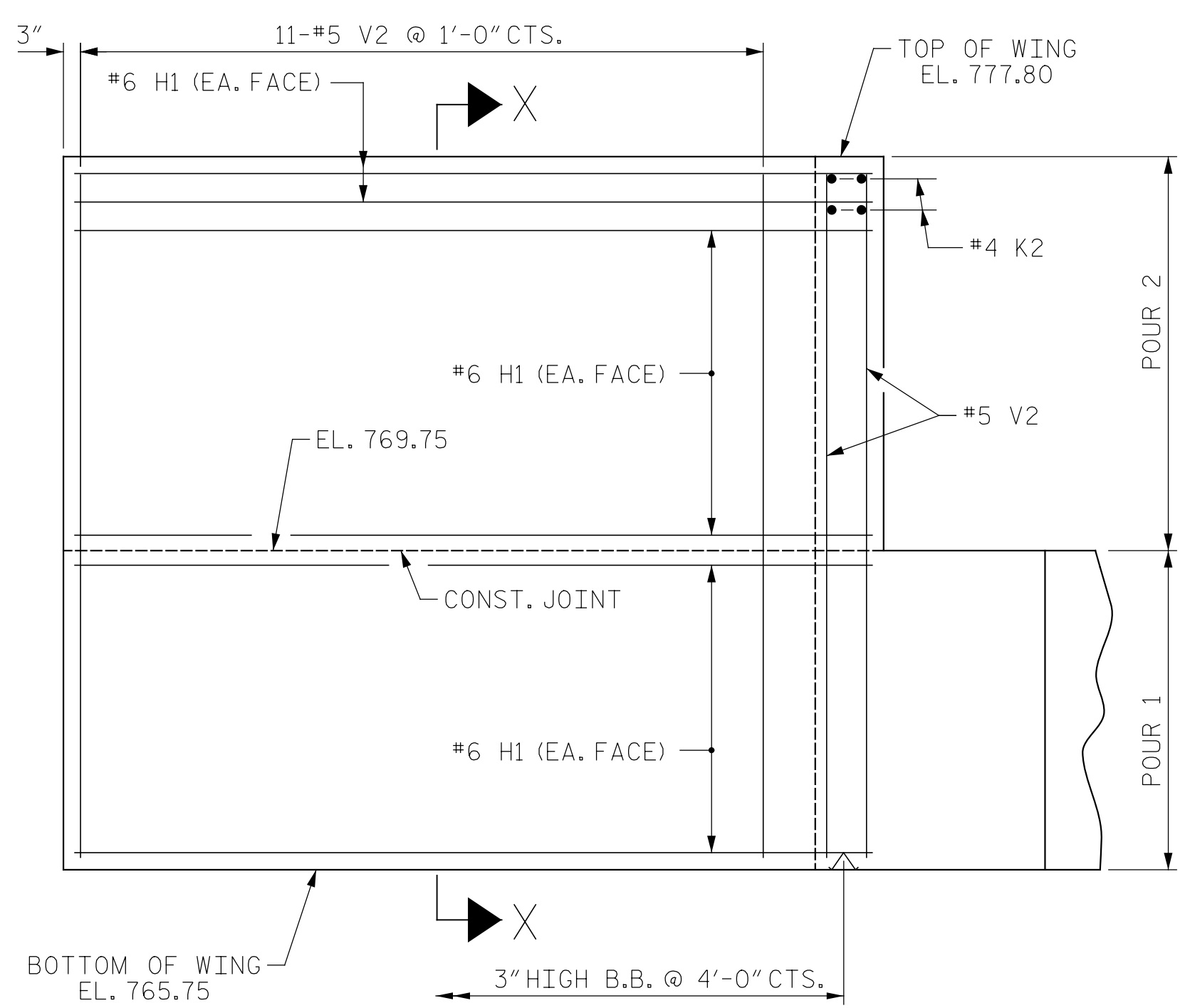
PLAN OF RIGHT WING WALL (W3)



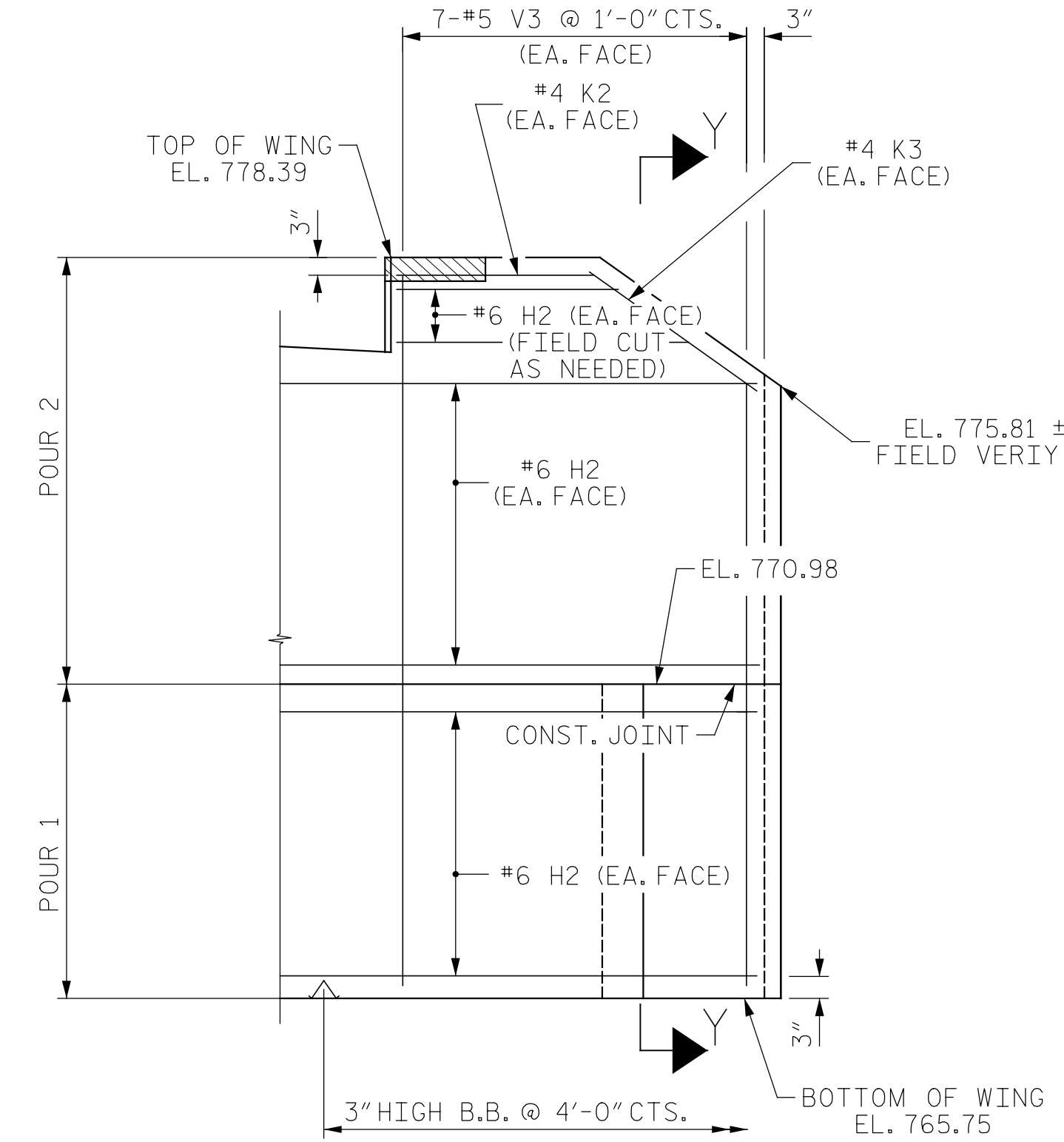
PLAN OF RIGHT WING WALL (W4) *



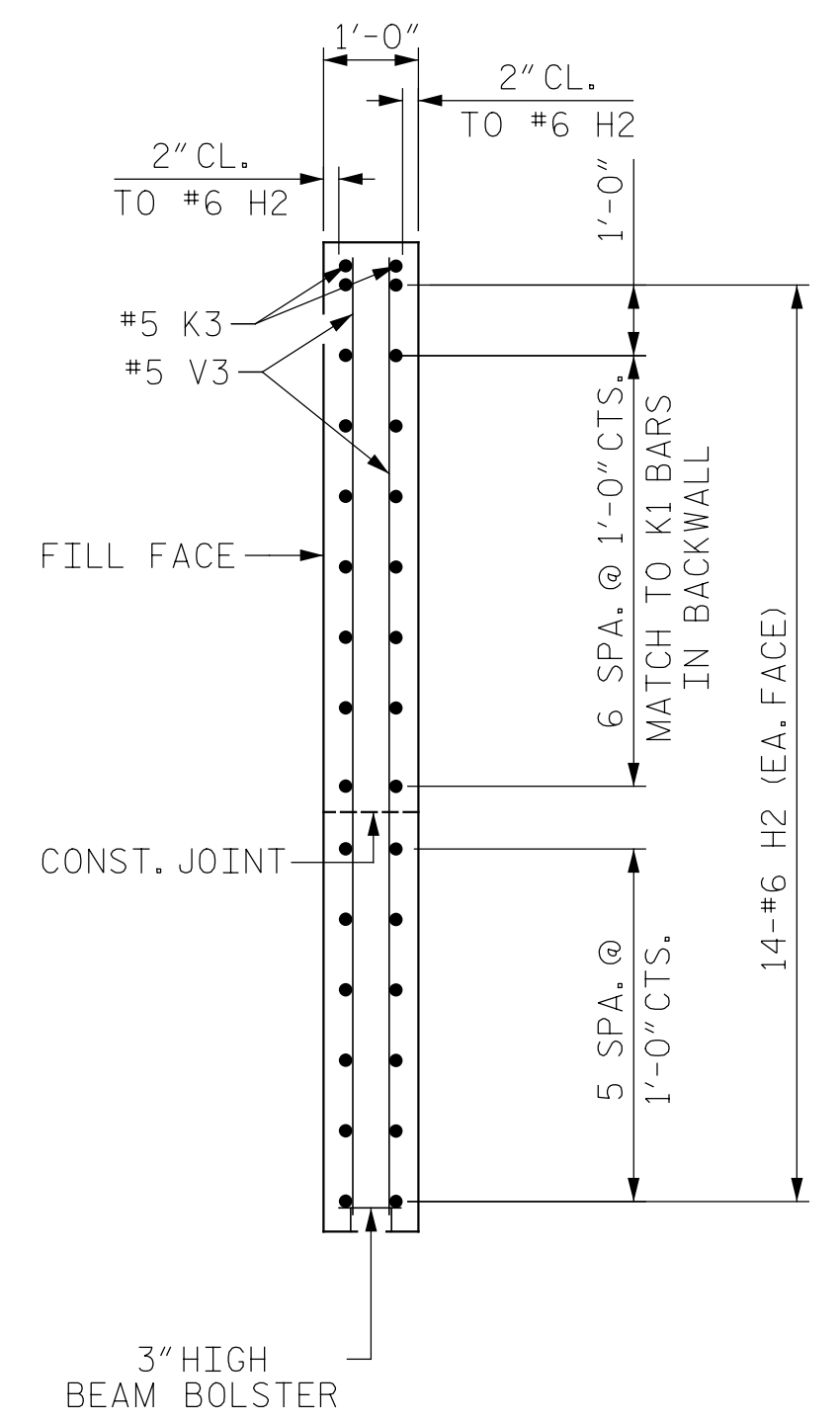
SECTION X-X



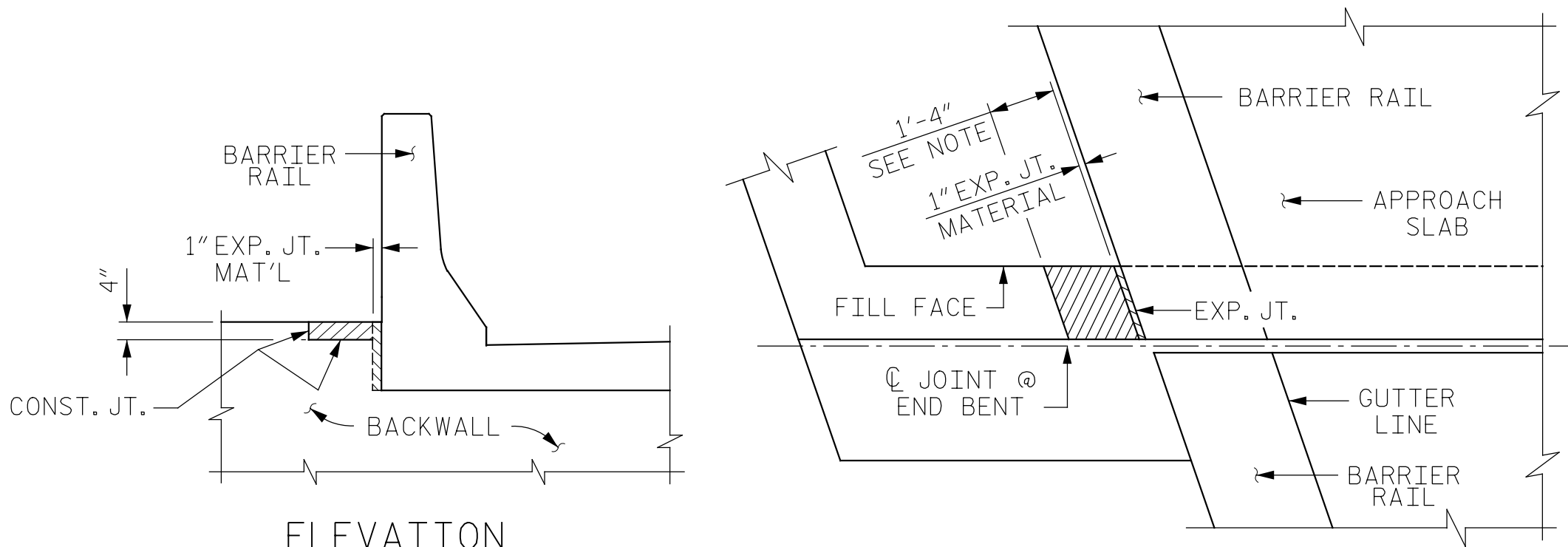
ELEVATION OF RIGHT WING WALL (W3)



ELEVATION OF LEFT WING WALL (W4) *



SECTION Y-Y



ELEVATION

PLAN

NOTE:
THE CONCRETE IN SHADED AREA OF THE WINGWALL SHALL BE POURED AFTER THE BARRIER RAIL IS CAST, IF SLIP FORMING IS USED.

WING WALL DETAIL

NOTE
* TIP OF WING W4 SHOULD EXTEND CO-LINEAR TO FILL FACE, WITH THE END AGAINST 1" EXPANSION JOINT MATERIAL ADJACENT TO EXISTING WING OF ADJACENT BRIDGE. HEIGHT AND LENGTH MUST BE FIELD VERIFIED WITH THE TOP OF THE WING TAPERED. REINFORCING OF STEEL WITHIN THE TOP 1'-3" MAY NEED TO BE FIELD ADJUSTED IN ORDER TO PROPERLY TAPER WING TIP AGAINST THE EXISTING WING.

PROJECT NO. I-5714
MECKLENBURG COUNTY
STATION: 26+20.73 -YEB-
SHEET 2 OF 3

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH SUPERSTRUCTURE END BENT 2					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
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SHEET NO. S-39					TOTAL SHEETS 53

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4505 Falls of Neuse Road, Suite 110
Raleigh, North Carolina, 27609
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License #: P-0999

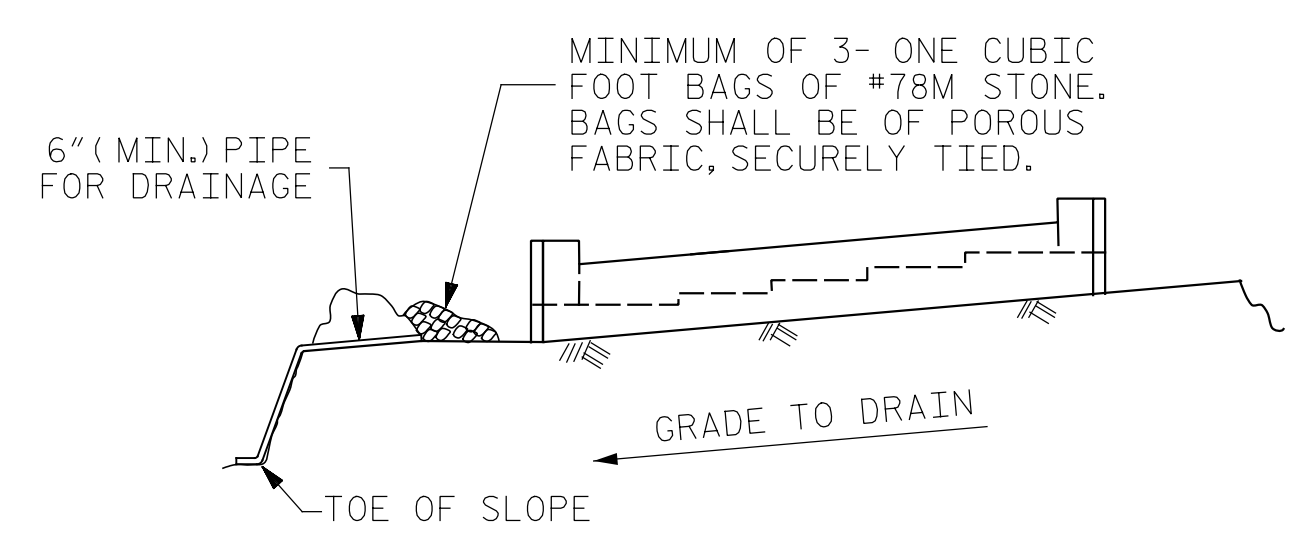
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DRAWN BY: M. D. NIFONG DATE: 1-25-18
CHECKED BY: P. R. HOLSHOUSER DATE: 2-5-18
DESIGN E.O.R.: P. R. HOLSHOUSER DATE: 5-8-18

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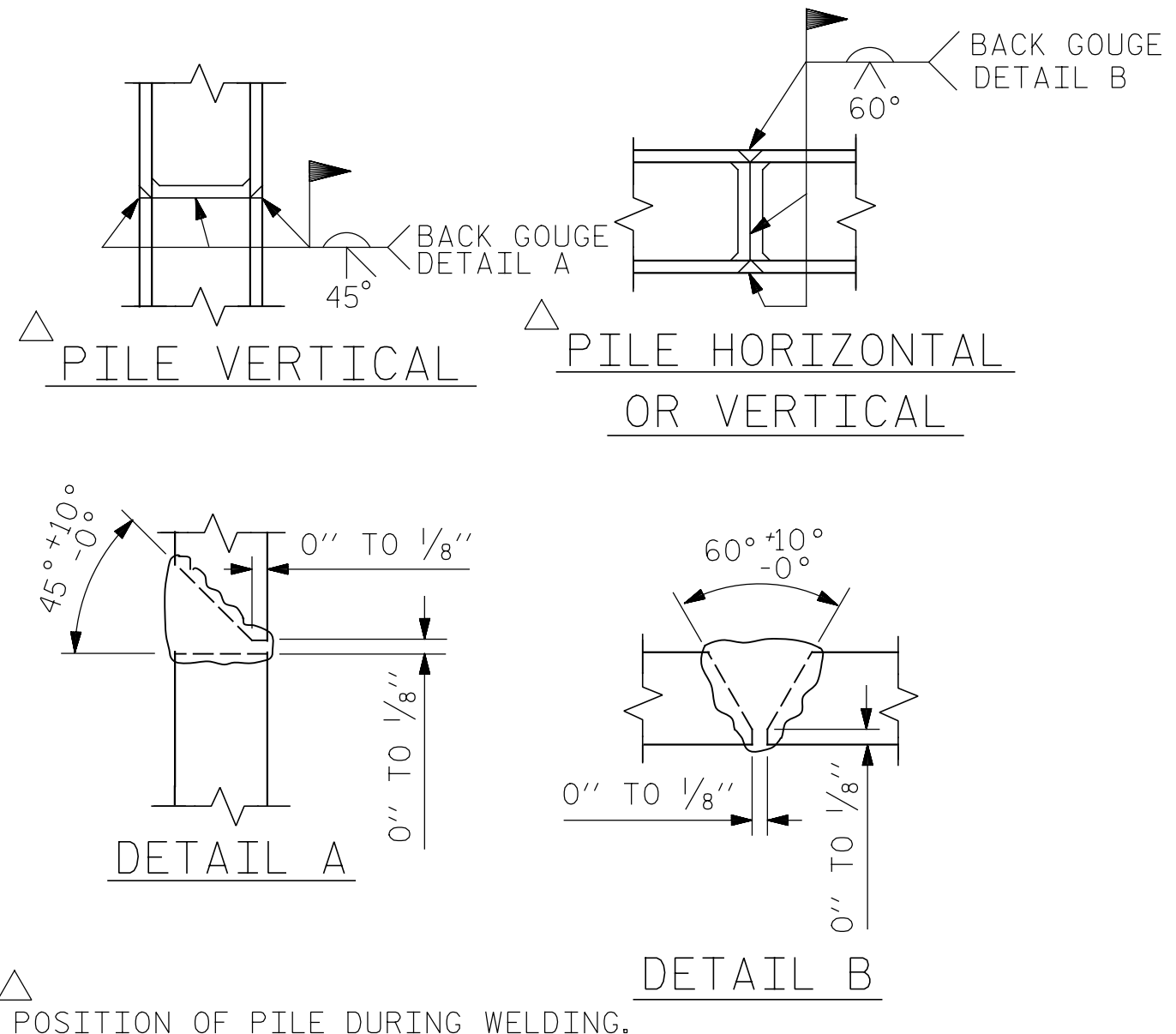
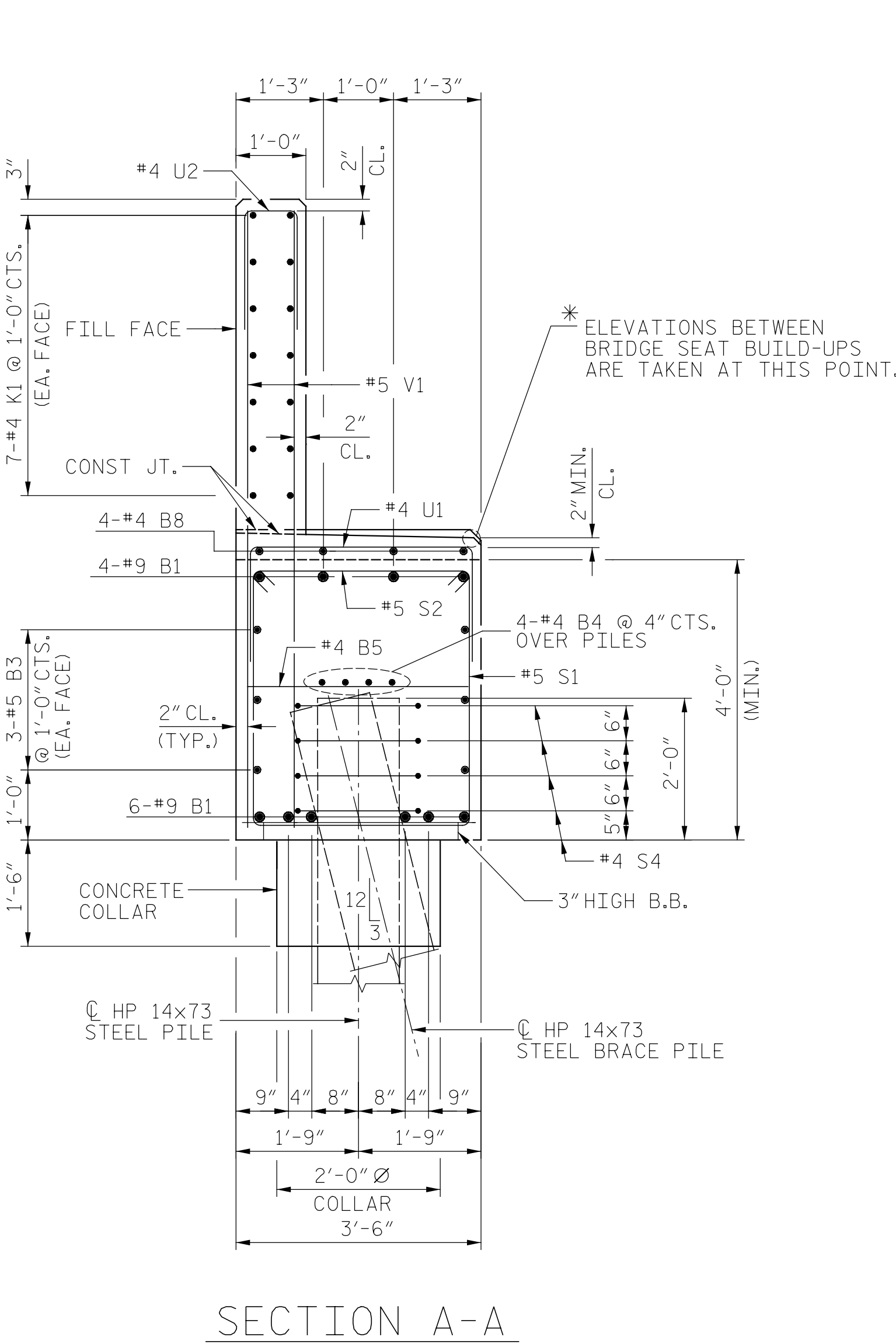


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

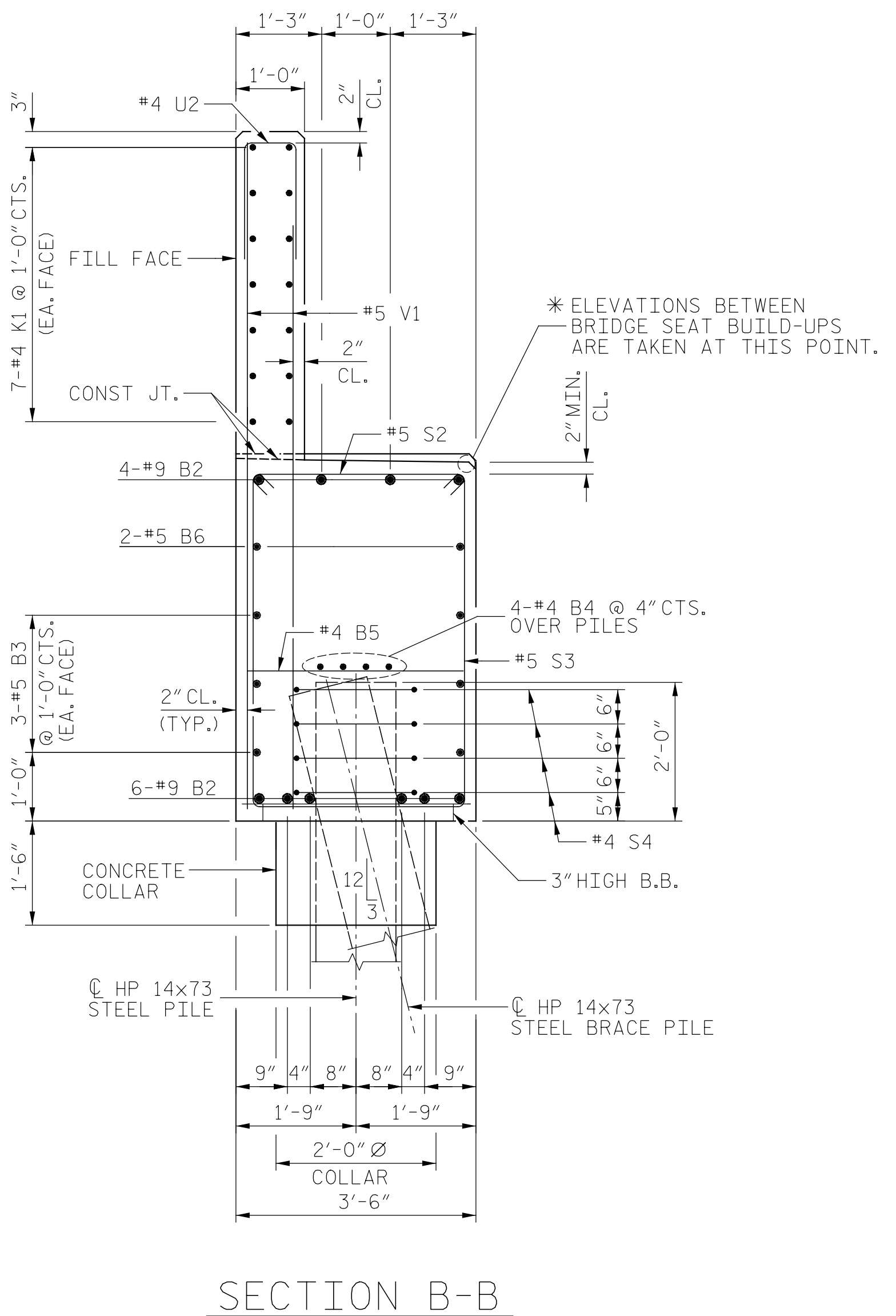
BAGGED STONE SHALL REMAIN IN PLACE UNTIL THE ENGINEER DIRECTS THAT IT BE REMOVED. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF SILT ACCUMULATIONS AT BAGGED STONE WHEN SO DIRECTED BY THE ENGINEER. BAGS SHALL BE REMOVED AND REPLACED WHENEVER THE ENGINEER DETERMINES THAT THEY HAVE DETERIORATED AND LOST THEIR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

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

TEMPORARY DRAINAGE AT END BENT



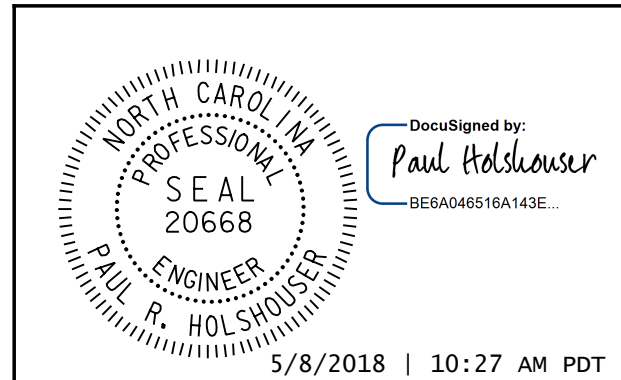
PILE SPLICE DETAILS



BAR TYPES		BILL OF MATERIAL FOR END BENT 2				
BAR NO.	SIZE	TYPE	LENGTH	WEIGHT		
B1	10	9	1	56' - 3"	1,913	
B2	10	9	1	17' - 5"	592	
B3	12	5	STR	33' - 0"	413	
B4	12	4	STR	22' - 5"	180	
B5	21	4	STR	3' - 4"	47	
B6	2	5	STR	11' - 9"	25	
B7	24	4	STR	2' - 6"	40	
B8	4	4	STR	29' - 6"	79	
H1	48	6	5	12' - 4"	889	
H2	28	6	STR	6' - 8"	280	
K1	42	4	STR	23' - 6"	659	
K2	6	4	STR	2' - 9"	11	
K3	2	4	STR	3' - 9"	5	
S1	71	5	2	11' - 4"	839	
S2	100	5	3	4' - 1"	426	
S3	29	5	2	13' - 4"	403	
S4	40	4	6	7' - 7"	203	
U1	48	4	4	6' - 2"	198	
U2	57	4	4	6' - 8"	254	
V1	114	5	STR	10' - 0"	1,189	
V2	30	5	STR	11' - 7"	362	
V3	14	5	STR	12' - 8"	185	
REINFORCING STEEL				LBS.	9,192	
CLASS "A" CONCRETE BREAKDOWN						
POUR #1 - CAP & LOWER WING WALLS				C.Y.	40.6	
POUR #2 - BACKWALL & UPPER WING WALLS				C.Y.	59.8	
TOTAL CLASS "A" CONCRETE				C.Y.	100.4	
HP 14 X 73 STEEL PILES NO. 10				LIN. FT.	740	

ALL BAR DIMENSIONS ARE OUT TO OUT.

PROJECT NO. I-5714
MECKLENBURG COUNTY
STATION: 26+20.73 -YEB-
SHEET 3 OF 3



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE
END BENT 2

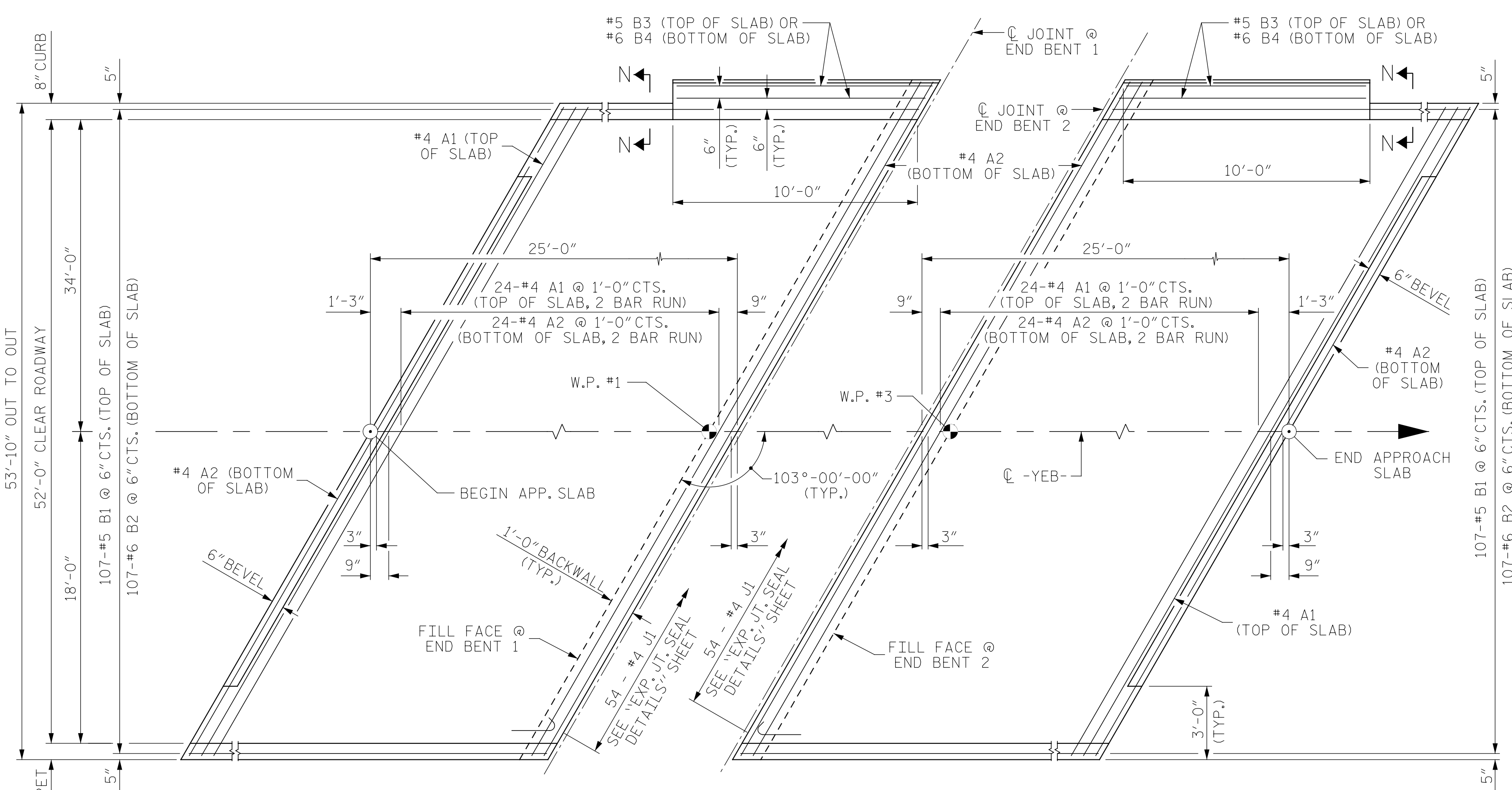
DRAWN BY: M. D. NIFONG DATE: 1-25-18
CHECKED BY: P. R. HOLSHOUSER DATE: 2-5-18
DESIGN E.O.R.: P. R. HOLSHOUSER DATE: 5-8-18

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

NOTES

FOR BRIDGE APPROACH FILL INCLUDING GEOTEXTILE, 6" Ø DRAINAGE PIPE, AND SELECT MATERIAL BACKFILL, SEE ROADWAY PLANS.

GEOTEXTILE SHALL BE TYPE 1 IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS SECTION 1056.

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

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

APPROACH SLAB SHALL NOT BE CONSTRUCTED PRIOR TO COMPLETION OF THE BRIDGE DECK.

FOR THE 6" 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.

FOR EXPANSION JOINT SEALS, SEE SPECIAL PROVISIONS.

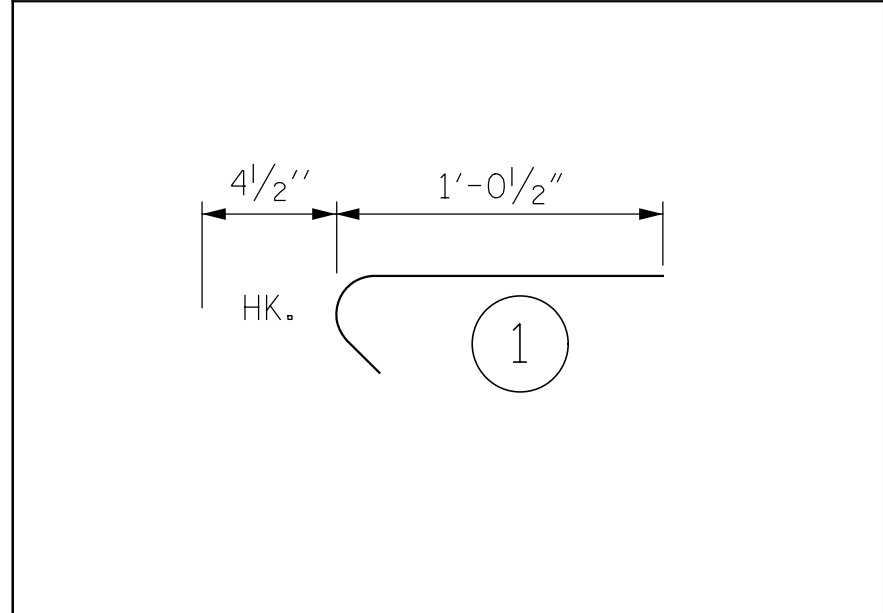
THE QUANTITY OF #4 J1 BARS ON THE BILL OF MATERIAL IS BASED ON 1'-0" CENTERS. J1 BARS SHALL BE PLACED AT EACH VERTICAL STUD ANCHOR BOLT. IN THE EVENT THAT THE NUMBER OF VERTICAL STUD ANCHORS EXCEEDS THE NUMBER OF J1 BARS SPECIFIED, ADDITIONAL J1 BARS WILL NOT BE REQUIRED.

▲ THE CONTRACTOR'S ATTENTION IS CALLED TO THE FACT THAT CONCRETE BARRIER RAIL IS UTILIZED FOR THE LEFT SIDE OF THE APPROACH SLABS AND 2 BAR METAL RAIL WITH CONCRETE PARAPET IS UTILIZED ON THE RIGHT SIDE OF THE APPROACH SLABS.

SEE "BRIDGE APPROACH SLAB DETAILS" SHEET 2 OF 2 FOR CONCRETE BARRIER RAIL DETAILS.

▲ FOR 2 BAR METAL RAIL, CONCRETE PARAPET AND END POST DETAILS, SEE "CONCRETE BARRIER RAIL AND CONCRETE PARAPET" AND "CONCRETE PARAPET AND END POST DETAILS" SHEETS FOR ADDITIONAL INFORMATION AND DETAILS.

BILL OF MATERIAL



APPROACH SLAB AT END BENT 1

BAR NO.	SIZE	TYPE	LENGTH	WEIGHT	
*A1	50	4	STR 29' - 2"	974	
A2	52	4	STR 29' - 0"	1,007	
*B1	107	5	STR 23' - 10"	2,660	
B2	107	6	STR 24' - 8"	3,964	
*B3	2	5	STR 9' - 8"	20	
B4	2	6	STR 9' - 8"	29	
*J1	54	4	1	1' - 5"	51
REINFORCING STEEL				LBS.	5,000
*EPOXY COATED REINFORCING STEEL				LBS.	3,705
CLASS "AA" CONCRETE				C.Y.	58.7

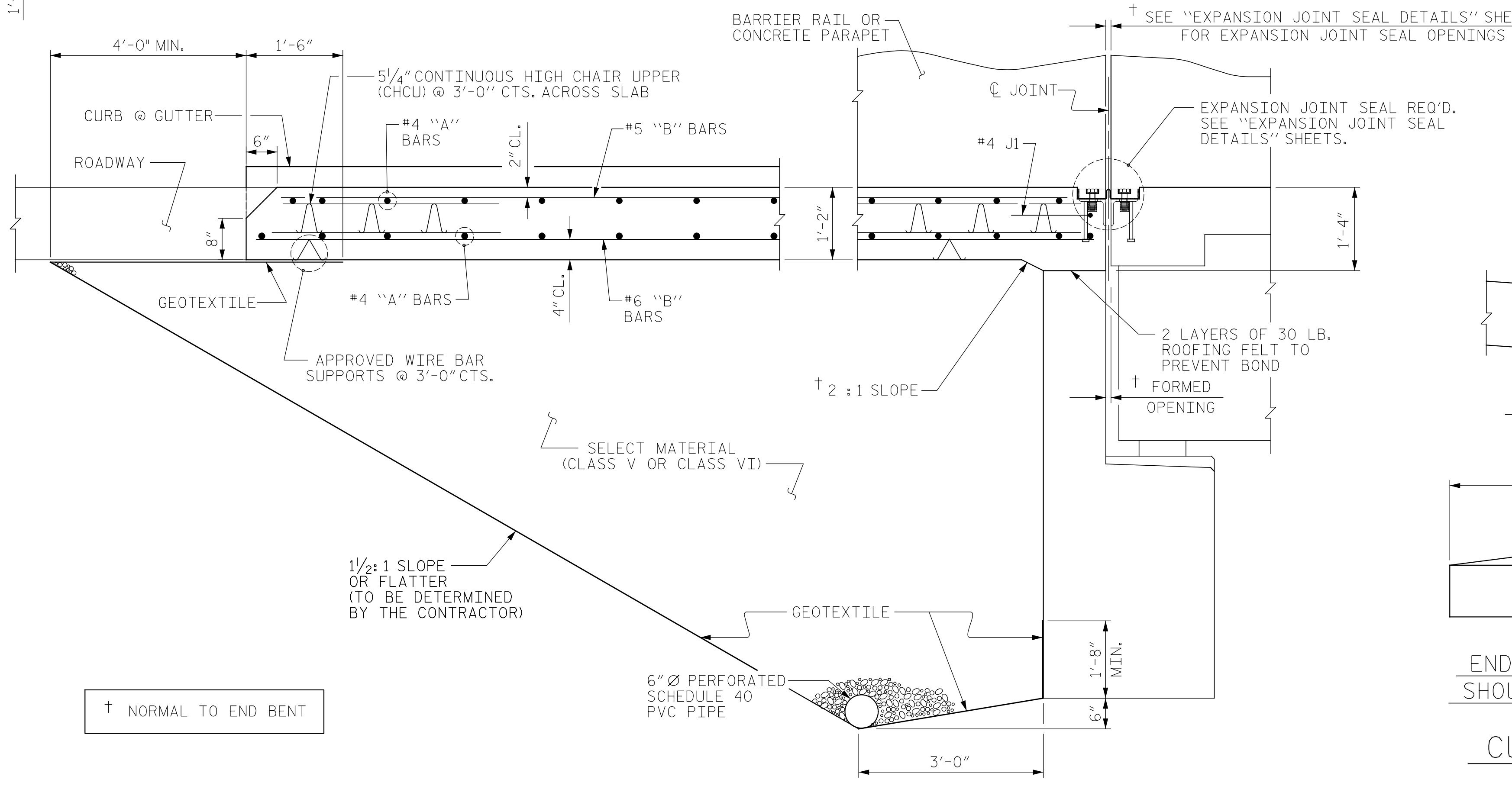
APPROACH SLAB AT END BENT 2

BAR NO.	SIZE	TYPE	LENGTH	WEIGHT	
*A1	50	4	STR 29' - 2"	974	
A2	52	4	STR 29' - 0"	1,007	
*B1	107	5	STR 23' - 10"	2,660	
B2	107	6	STR 24' - 8"	3,964	
*B3	2	5	STR 9' - 8"	20	
B4	2	6	STR 9' - 8"	29	
*J1	54	4	1	1' - 5"	51
REINFORCING STEEL				LBS.	5,000
*EPOXY COATED REINFORCING STEEL				LBS.	3,705
CLASS "AA" CONCRETE				C.Y.	58.7

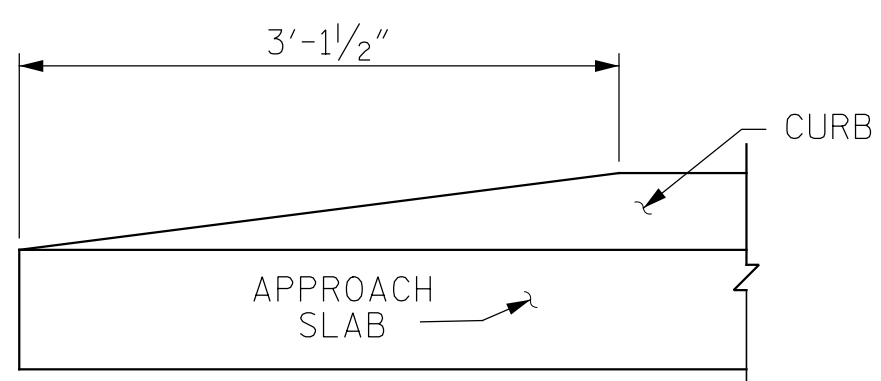
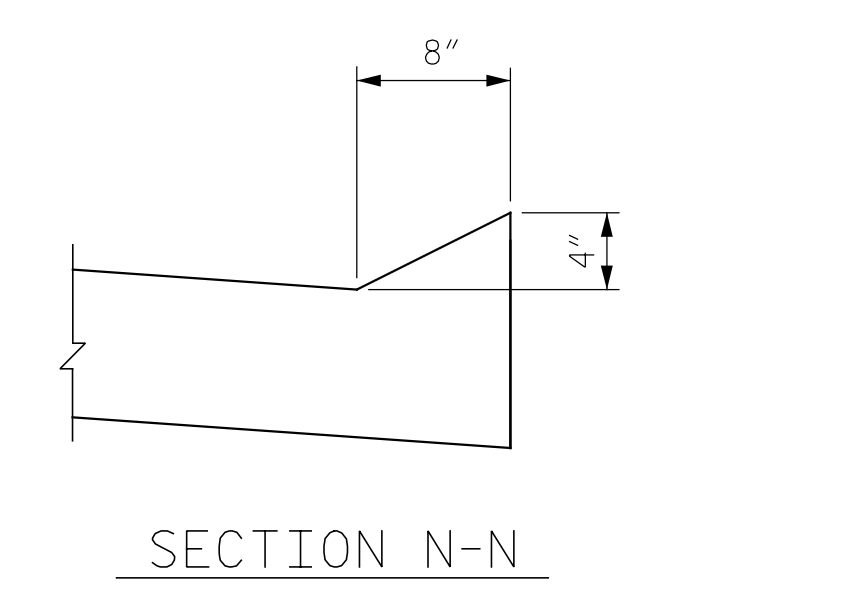
* - DENOTES EPOXY COATED REINFORCING STEEL
 QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED. SEE SHEET 2 OF 2.

SPLICE LENGTHS

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



SECTION THRU SLAB
 (TYPE I - STANDARD APPROACH FILL)



END OF CURB WITHOUT SHOULDER BERM GUTTER CURB DETAILS

PROJECT NO. I-5714
MECKLENBURG COUNTY
 STATION: 26+20.73 -YEB-
 SHEET 1 OF 2

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

BRIDGE APPROACH SLAB FOR FLEXIBLE PAVEMENT

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 Paul R. Holshouser
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DRAWN BY: J. N. AUSTIN DATE: 1-30-18
 CHECKED BY: M. D. NIFONG DATE: 1-31-18
 DESIGN E.O.R.: P. R. HOLSHOUSE DATE: 5-8-18

NOTES

THE COST OF THE BARRIER RAIL ON THE APPROACH SLAB SHALL BE INCLUDED IN THE LINEAR FOOT CONTRACT PRICE BID FOR "CONCRETE BARRIER RAIL".

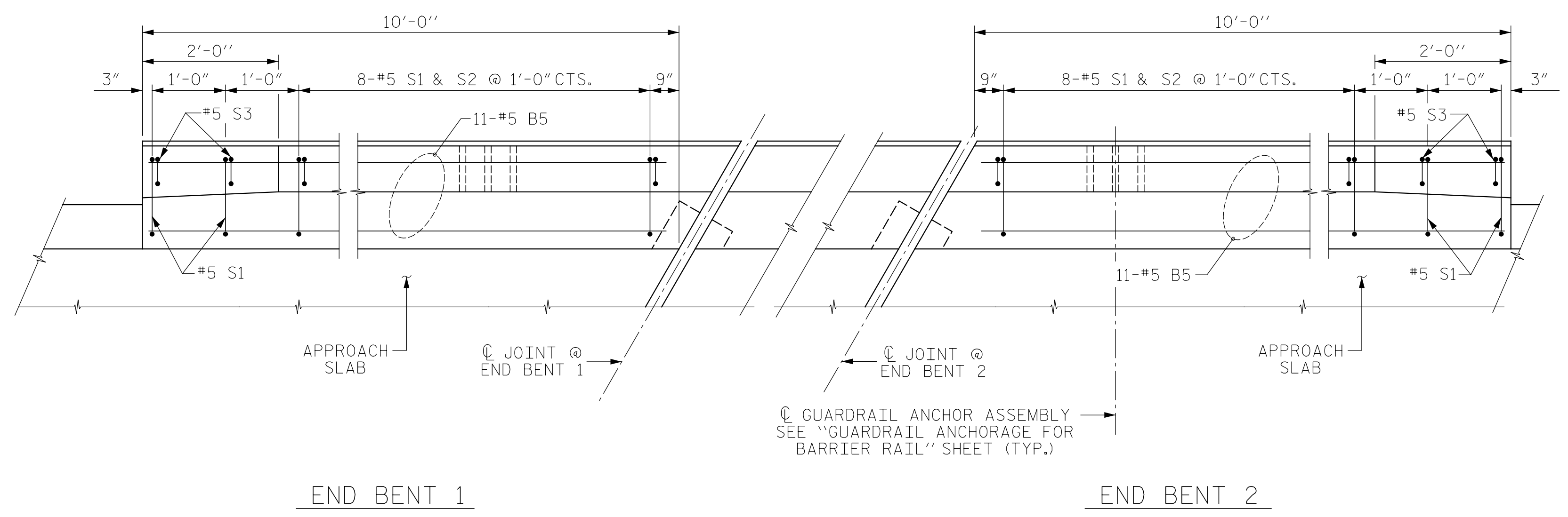
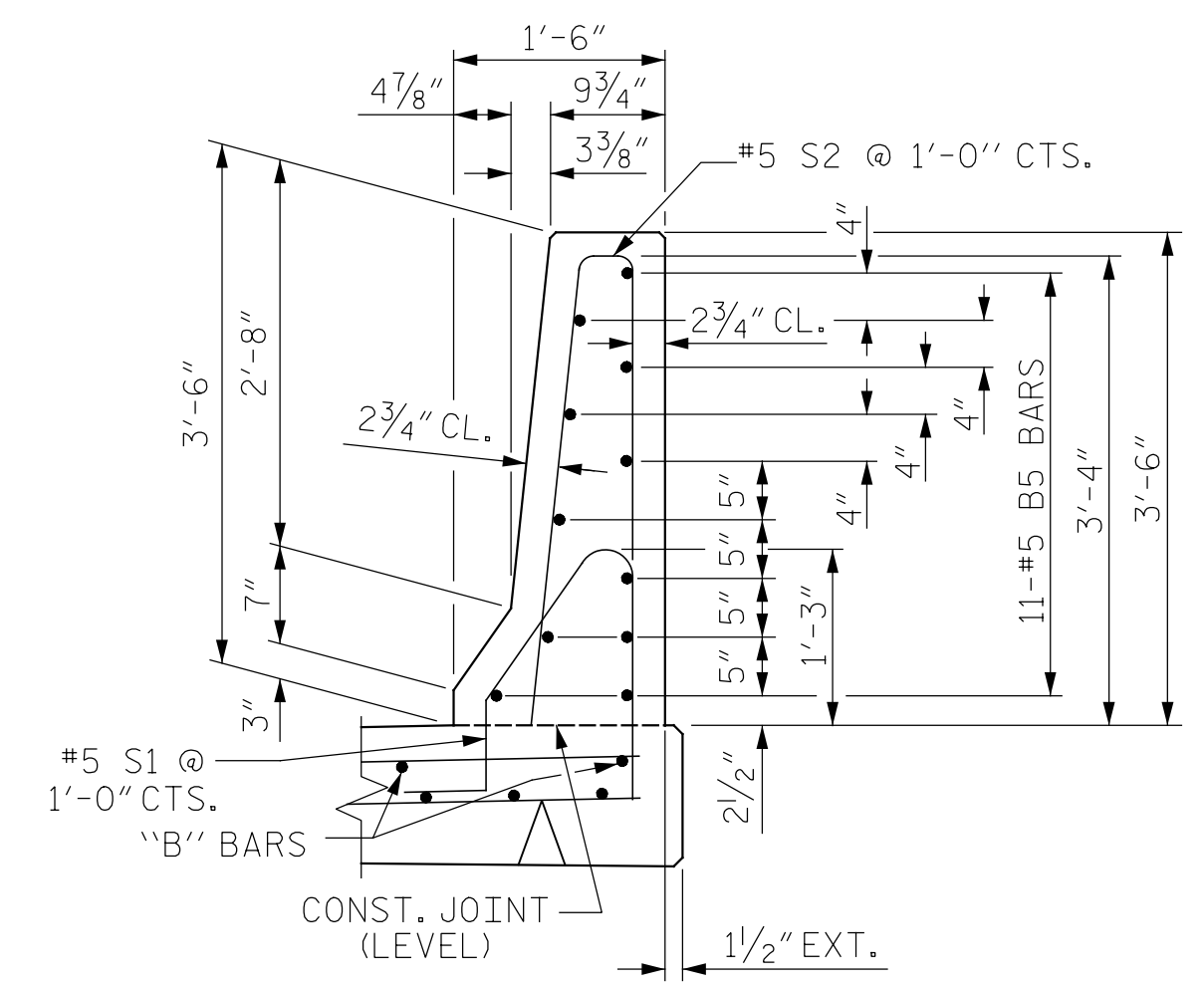
THE BARRIER RAIL ON EACH APPROACH SLAB SHALL NOT BE CAST UNTIL ALL APPROACH SLAB CONCRETE HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

BAR TYPES

ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL					
BARRIER RAIL ONLY					
BAR NO.	SIZE	TYPE	LENGTH	WEIGHT	
B5	22	5	STR	9' - 8"	222
S1	20	5	1	5' - 1"	106
S2	16	5	2	7' - 0"	117
S3	4	5	2	5' - 6"	23
EPOXY COATED REINFORCING STEEL				LBS.	468
CLASS "AA" CONCRETE				C.Y.	2.7
CONCRETE BARRIER RAIL				LIN. FT.	20.00

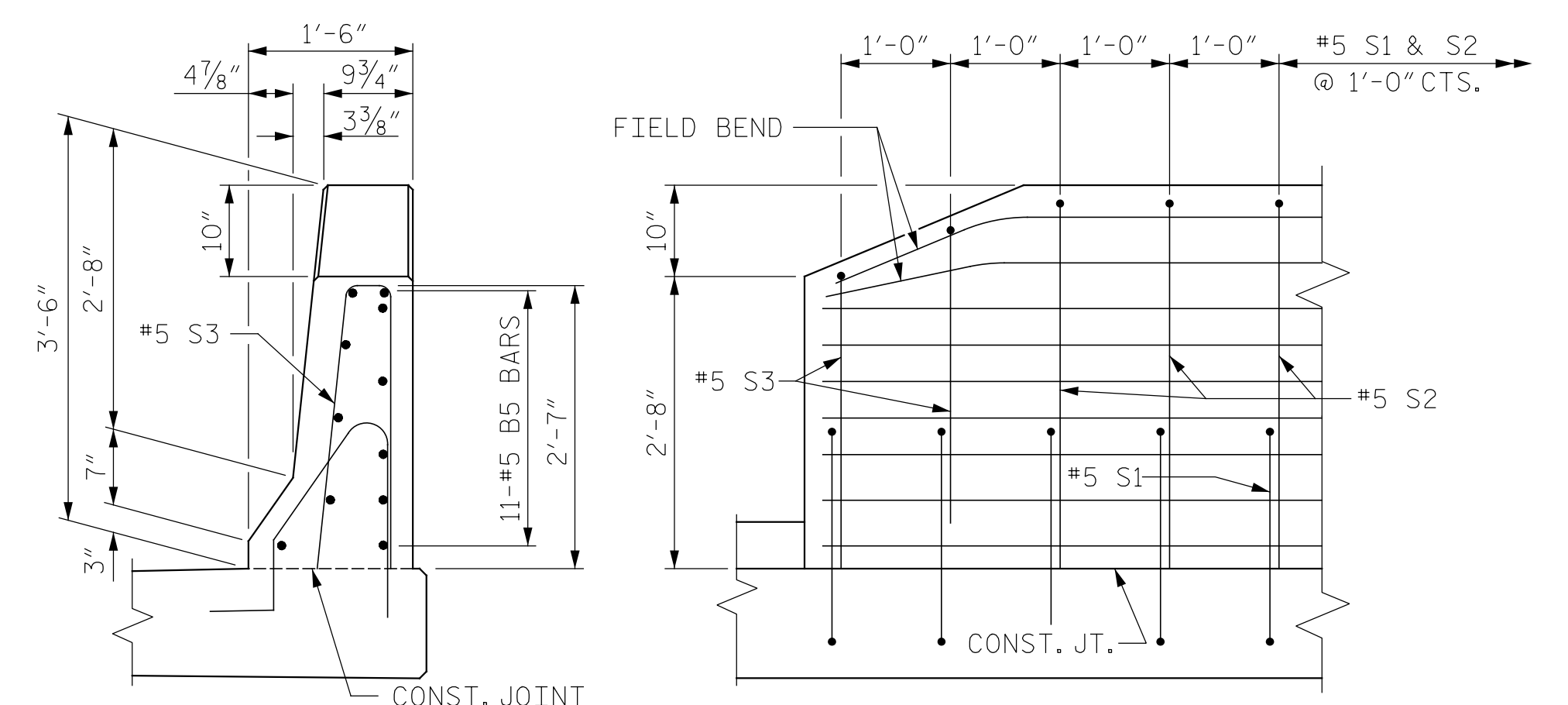


RIGHT SIDE CONCRETE BARRIER RAIL SHOWN FOR LEFT SIDE PARAPET, SEE "CONCRETE BARRIER RAIL AND CONCRETE PARAPET" SHEET FOR ADDITIONAL DETAILS

SECTION THRU RAIL

END BENT 1

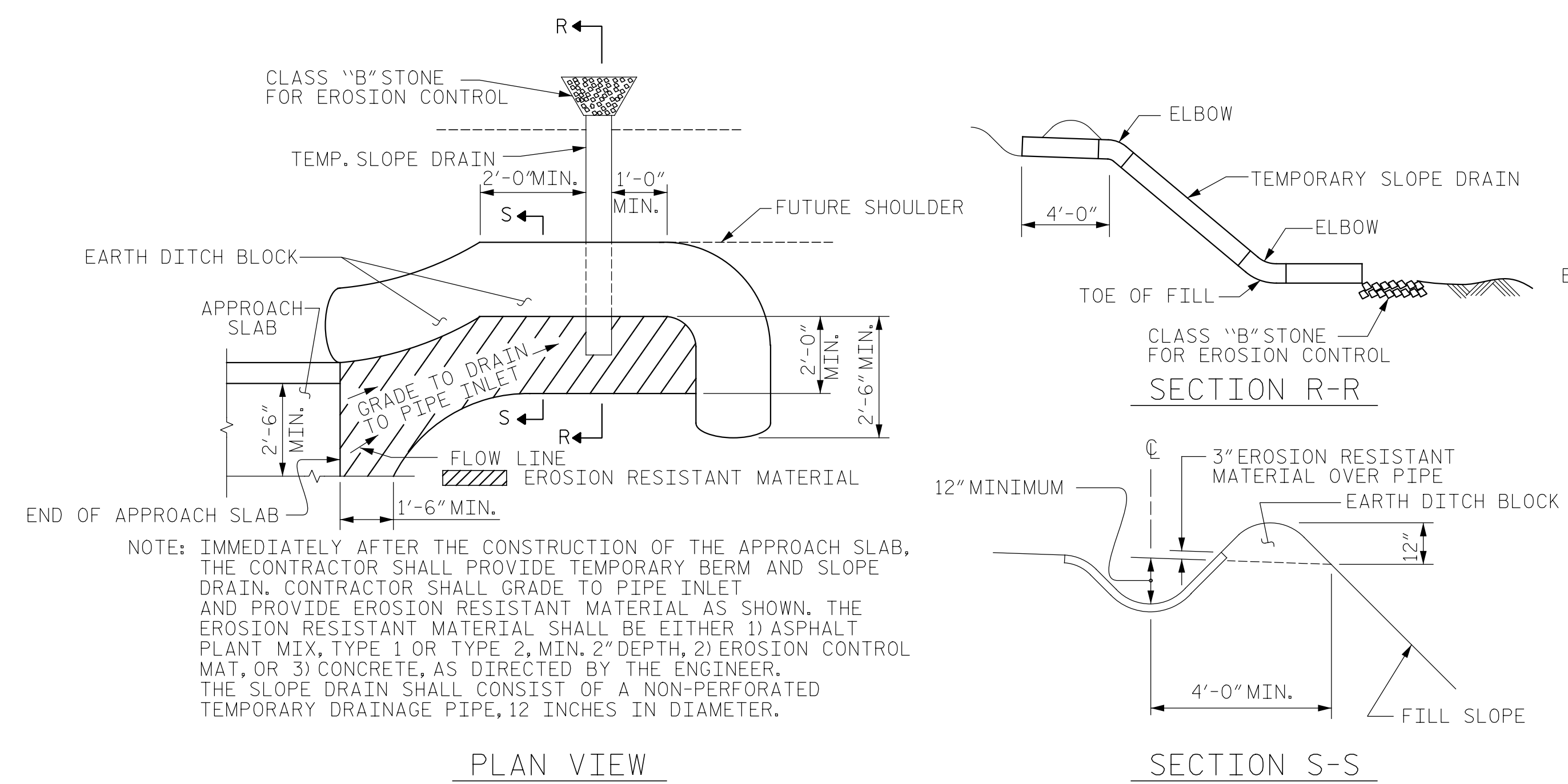
END BENT 2



END VIEW

SIDE VIEW

END OF RAIL DETAILS



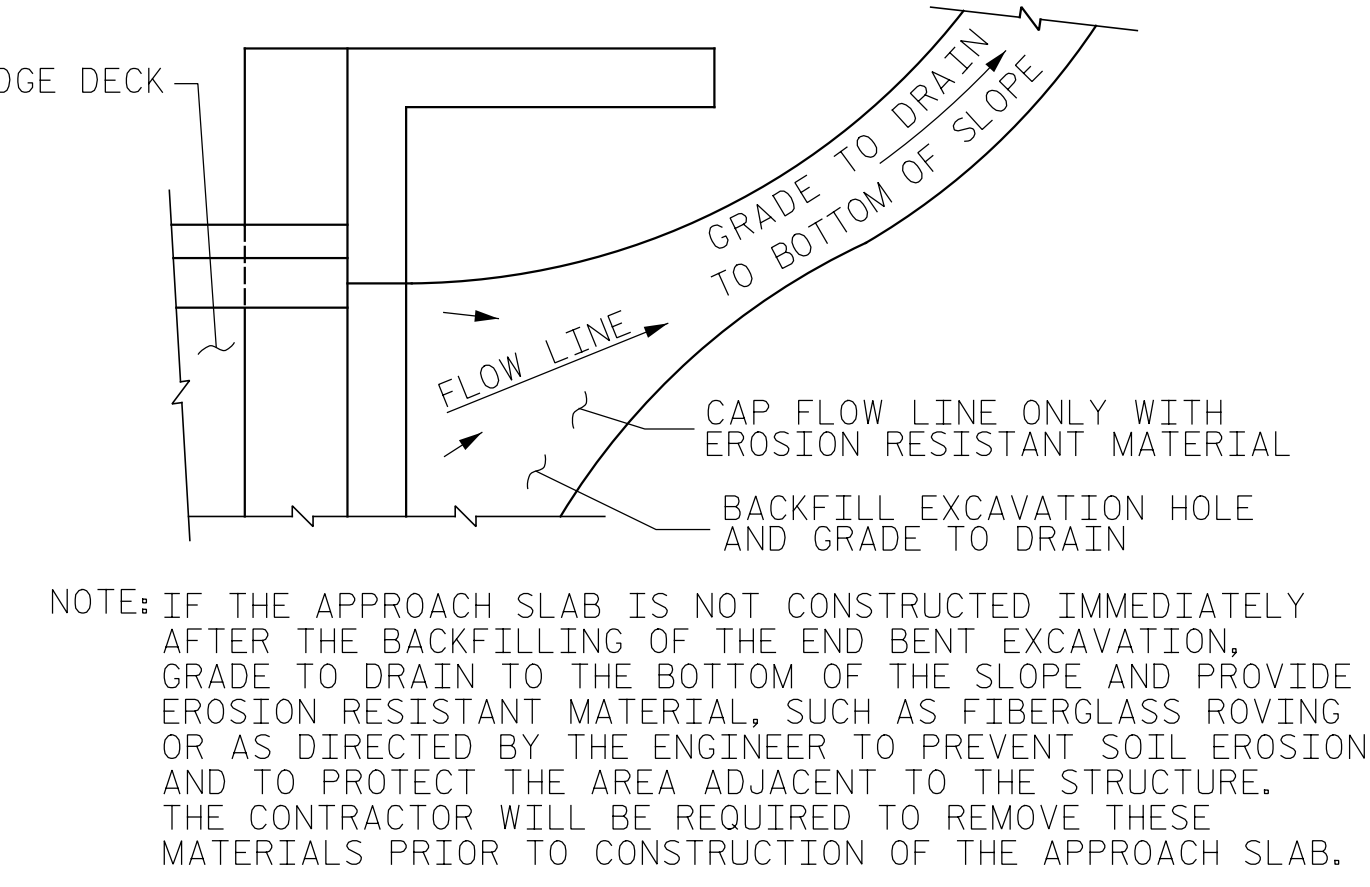
PLAN VIEW

SECTION S-S

TEMPORARY DRAINAGE DETAIL

DRAWN BY : J. N. AUSTIN DATE : 1-30-18
 CHECKED BY : M. D. NIFONG DATE : 2-1-18
 DESIGN E.O.R. : P. R. HOLSHOUSER DATE : 5-8-18

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

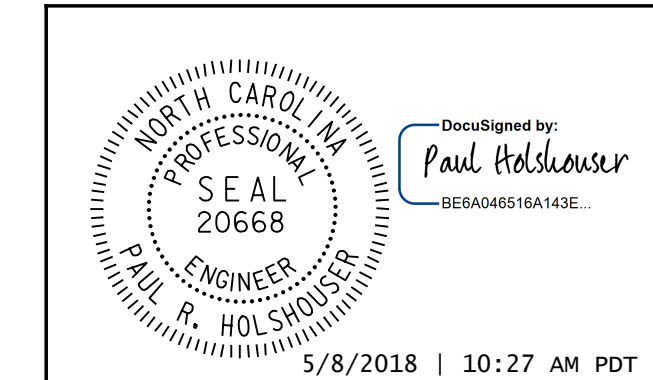
PROJECT NO. I-5714
 MECKLENBURG COUNTY
 STATION: 26+20.73 -YEB-
 SHEET 2 OF 2

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

BRIDGE APPROACH SLAB DETAILS

REVISIONS					
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2			4		

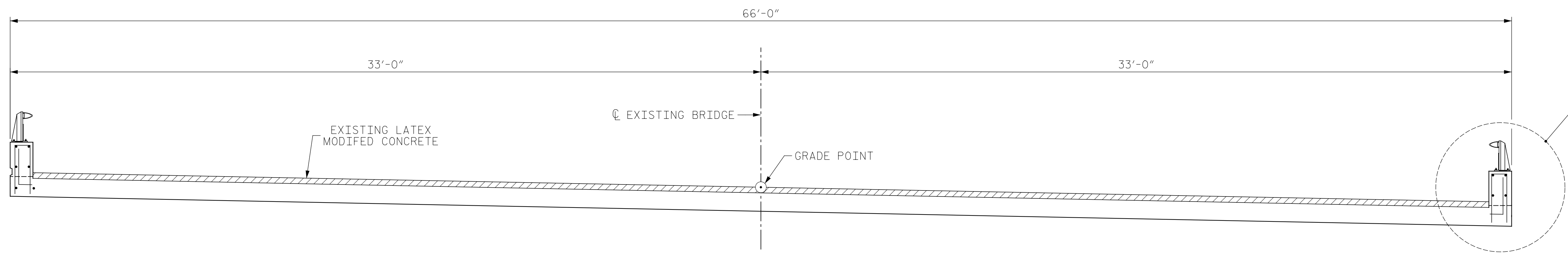
SHEET NO. S-43
 TOTAL SHEETS 53



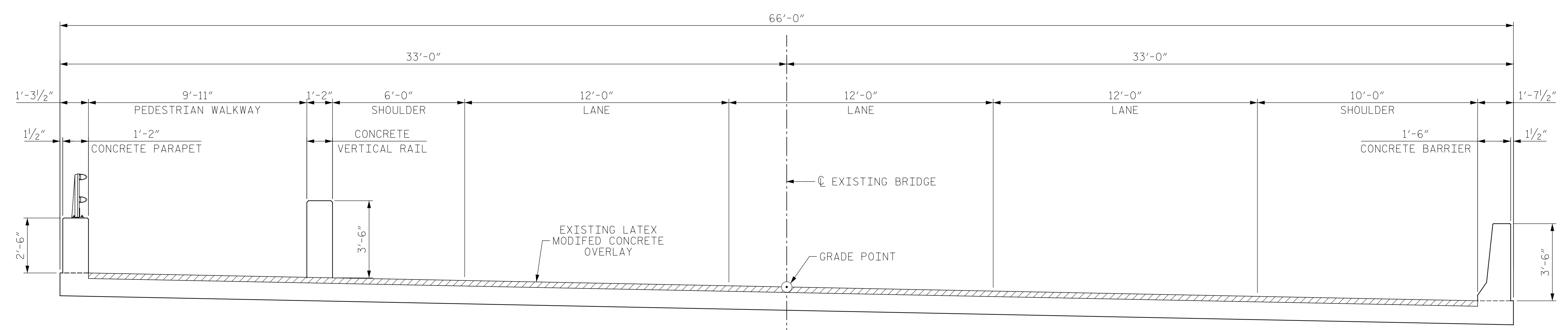
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 Phone: 919-422-0333
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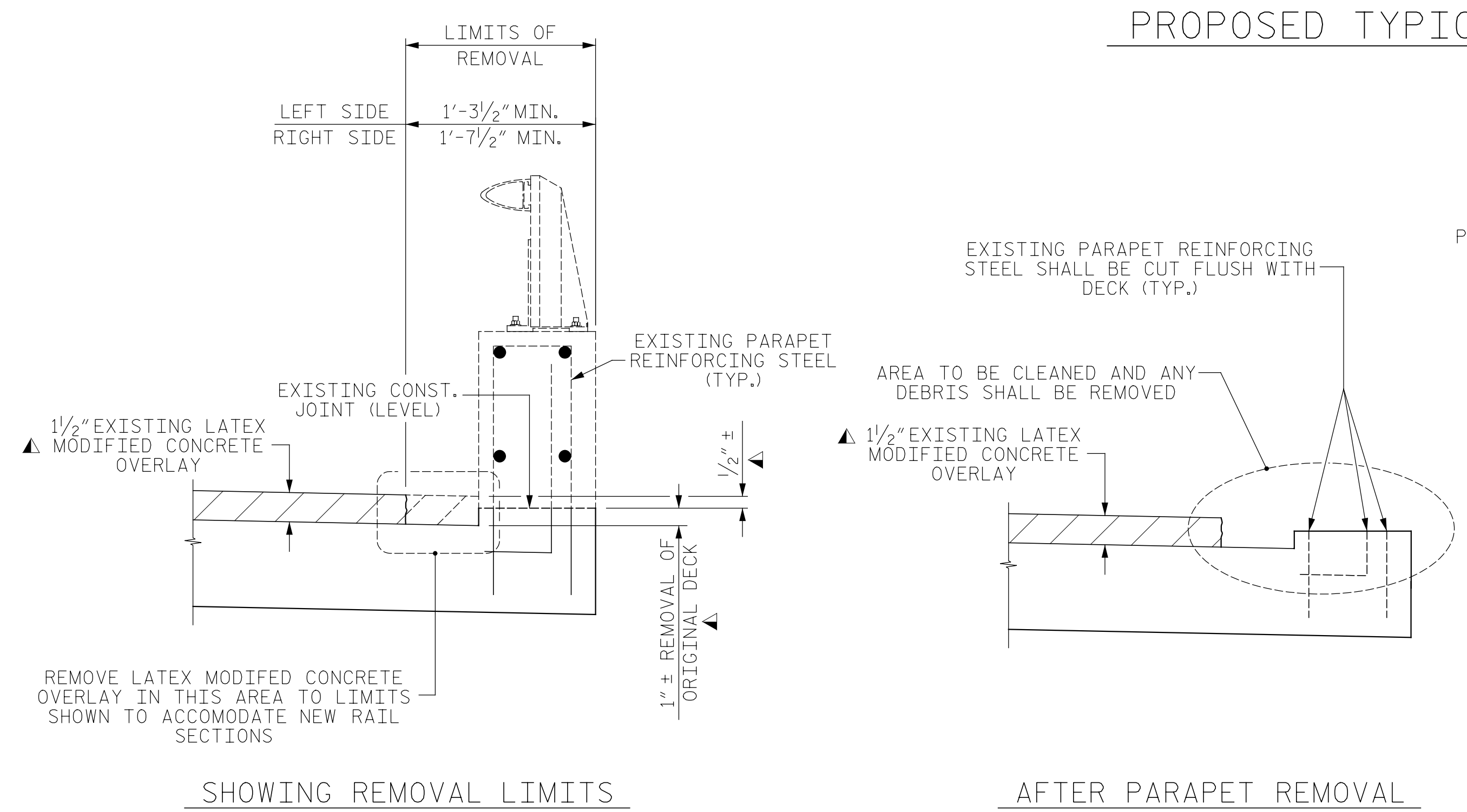
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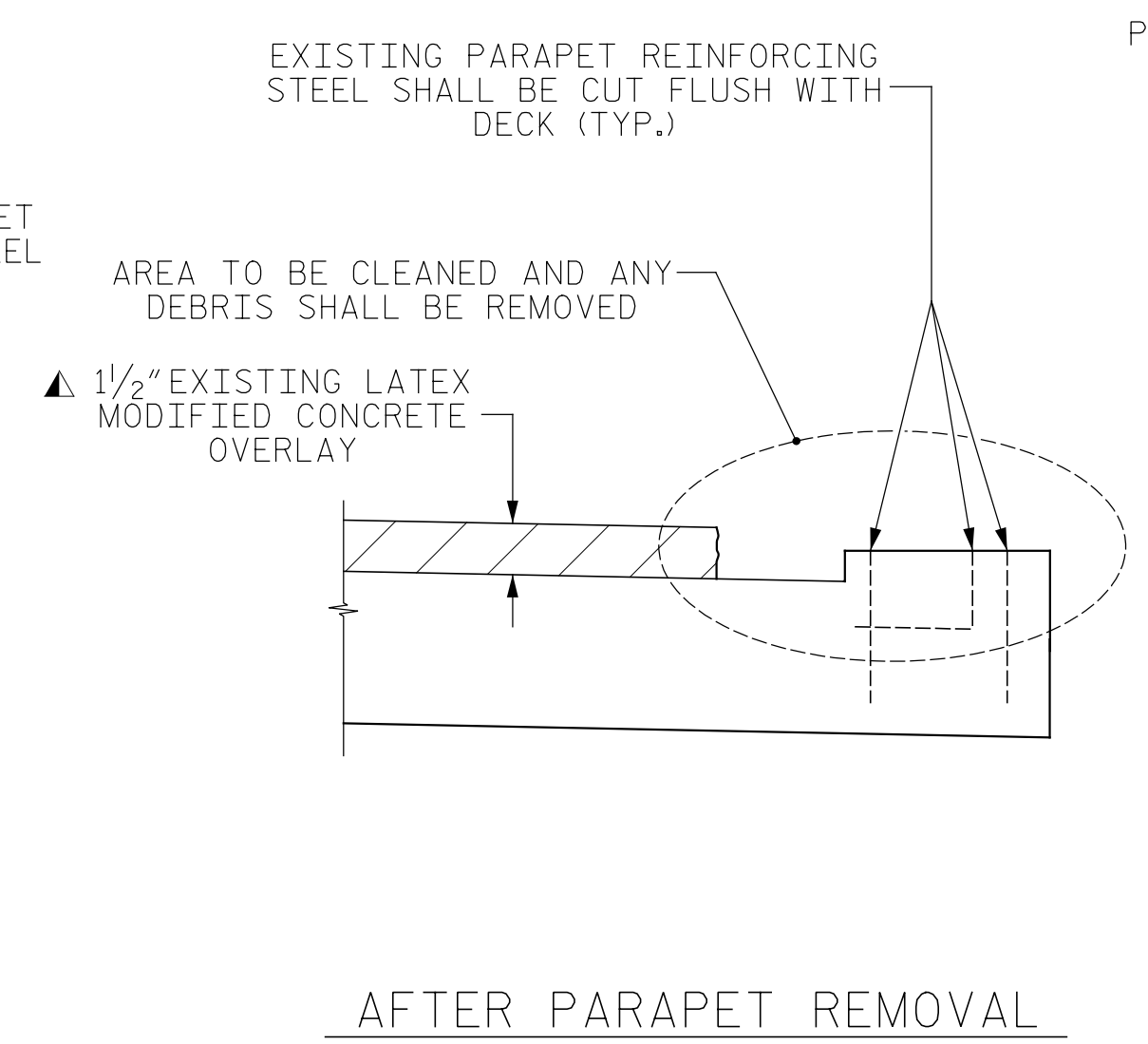
PROPOSED TYPICAL SECTION

NOTES:

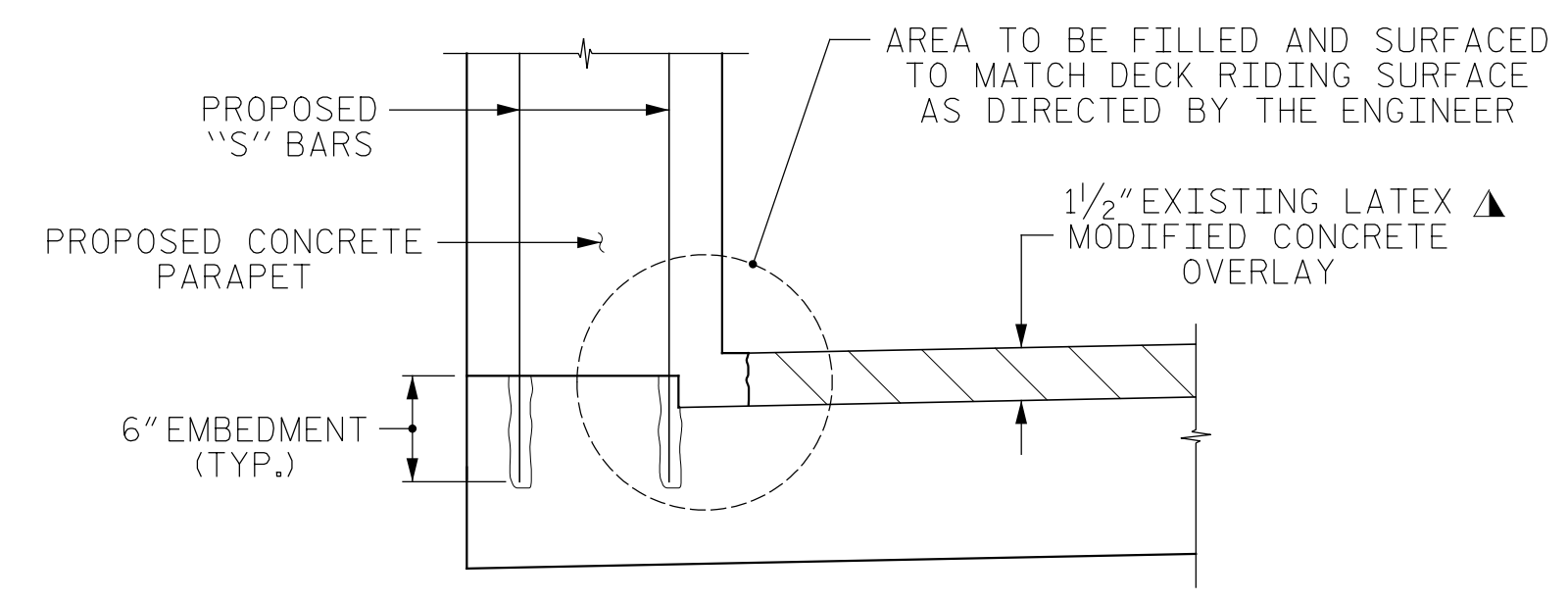
- THE PROPOSED "S" BARS SHALL BE INSTALLED USING AN ADHESIVE ANCHORING SYSTEM. THE TENSILE LOAD FOR THE "S" BARS IS 12.5 KIPS. LEVEL 2 FIELD TESTING FOR THE ADHESIVE BONDING SYSTEM IS REQUIRED.
- EXISTING BRIDGE DIMENSIONS AND DETAILS ARE BASED ON EXISTING AS-BUILT BRIDGE PRESERVATION PLANS.
- EXISTING PARAPETS AND METAL RAIL SHALL BE REMOVED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.
- THE COST OF REPLACING AND REPAIRING THE LATEX MODIFIED CONCRETE OVERLAY SHALL BE CONSIDERED INCIDENTAL TO THE COST OF THE REPLACEMENT OF THE EXISTING PARAPET AND RAIL.



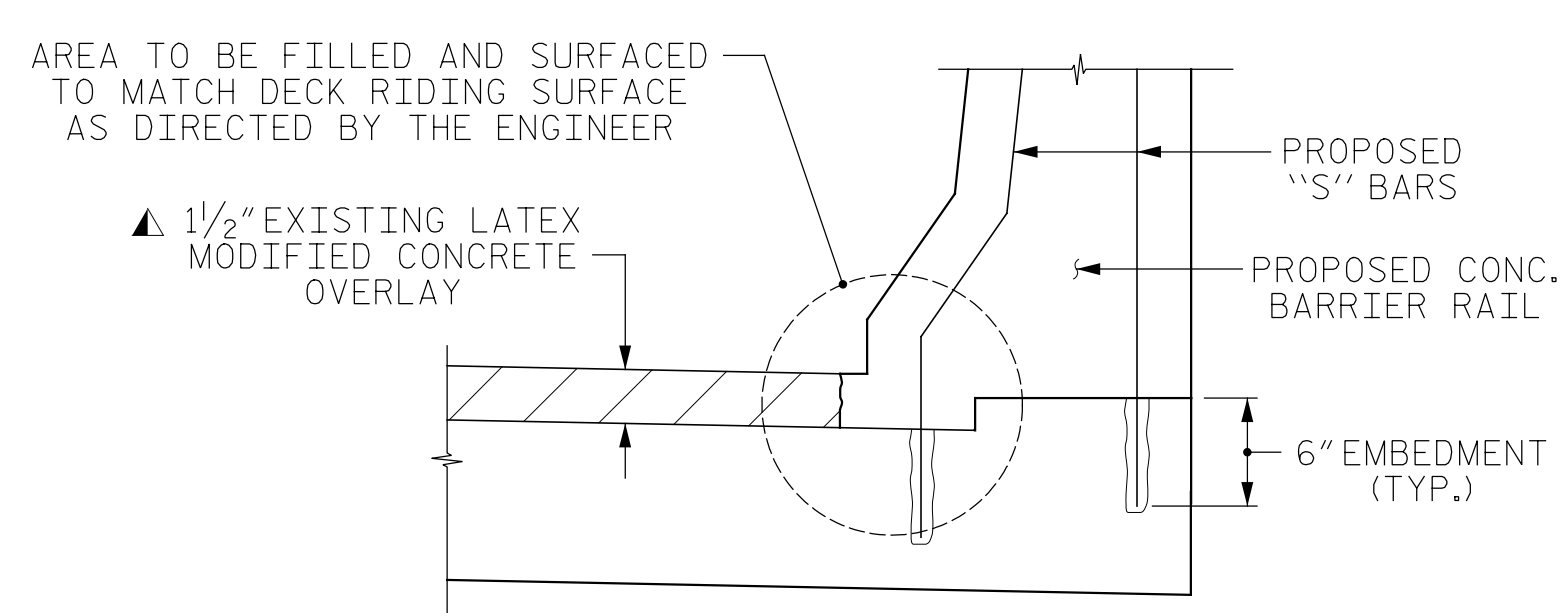
EXISTING PARAPET SECTION



AFTER PARAPET REMOVAL



PROPOSED PARAPET SECTION



PROPOSED BARRIER SECTION

PROJECT NO. I-5714
MECKLENBURG COUNTY
 STATION: 26+20.73 -YEB-

RAIL RETROFIT OF BRIDGE NO. 356

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 SUPERSTRUCTURE
 EXISTING BRIDGE RAIL
 RETROFIT DETAILS
 EXISTING BRIDGE RAIL RETROFIT

DocuSigned by:
Paul Holshouser
 BE6A048516A143E
 5/22/2018 | 12:39 PM PDT

PROFESSIONAL SEAL
 20668
 ENGINEER
 P. R. HOLSHOUSER

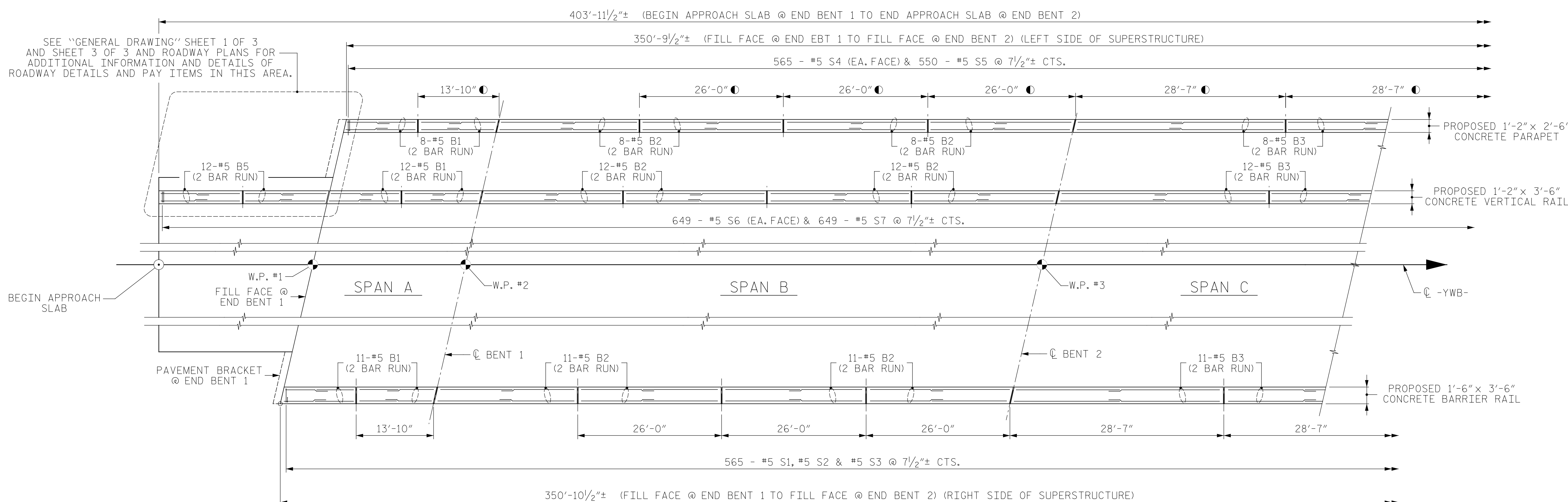
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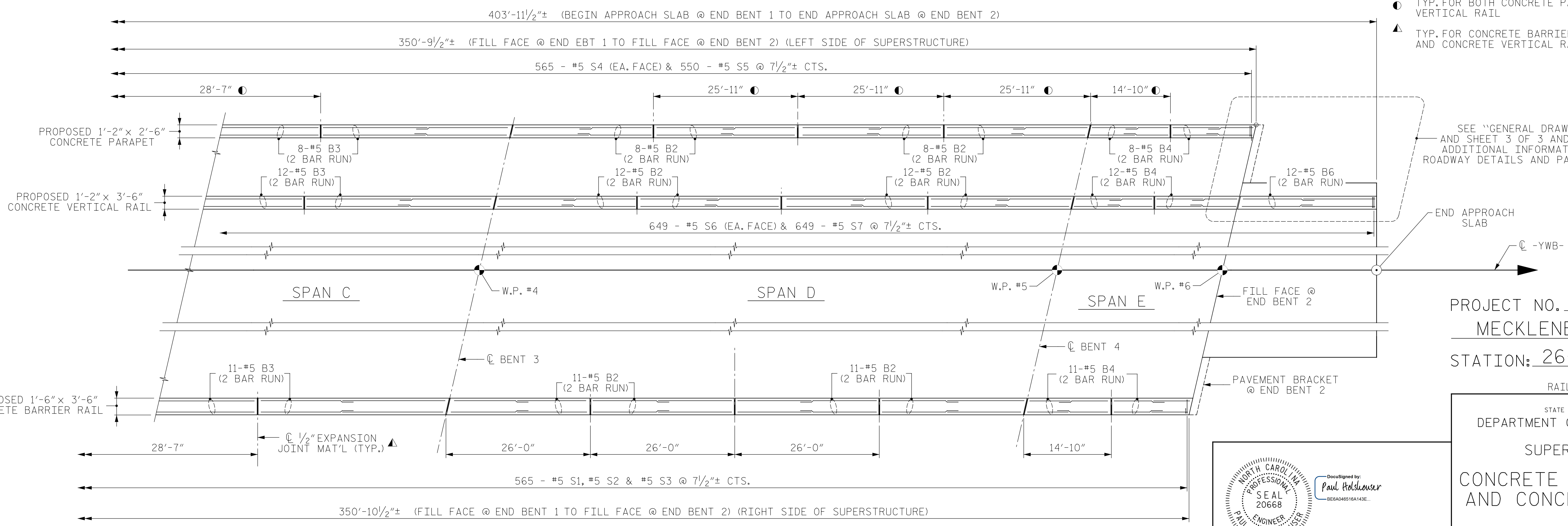
DRAWN BY: J. N. AUSTIN DATE: 2-6-18
 CHECKED BY: P. R. HOLSHOUSER DATE: 2-7-18
 DESIGN E.O.R.: P. R. HOLSHOUSER DATE: 5-8-18



PLAN OF BARRIER RAIL, VERTICAL RAIL & CONCRETE PARAPET

NOTES:

- TYP. FOR BOTH CONCRETE PARAPET AND CONCRETE VERTICAL RAIL
- ▲ TYP. FOR CONCRETE BARRIER RAIL, CONCRETE PARAPET AND CONCRETE VERTICAL RAIL

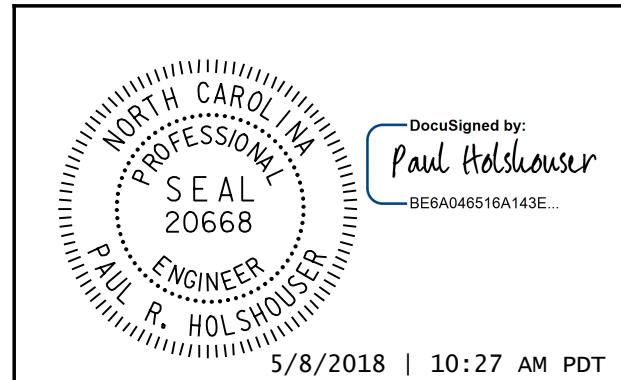


PLAN OF BARRIER RAIL, VERTICAL RAIL & CONCRETE PARAPET

PROJECT NO. I-5714
MECKLENBURG COUNTY
 STATION: 26+20.73 -YEB-

RAIL RETROFIT OF BRIDGE NO. 356

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 SUPERSTRUCTURE
 CONCRETE BARRIER RAIL
 AND CONCRETE PARAPET
 EXISTING BRIDGE RAIL RETROFIT



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1			3			TOTAL SHEETS	
2			4			53	

DRAWN BY : J.N. AUSTIN DATE : 2-6-18
 CHECKED BY : P. R. HOLSHOUSER DATE : 2-6-18
 DESIGN E.O.R. : P. R. HOLSHOUSER DATE : 5-8-18

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NOTES

ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

GROOVED CONTRACTION JOINTS, 1/2" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE BARRIER RAIL AND IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. THE 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.

FOR GUARDRAIL ANCHOR ASSEMBLY, SEE "GUARDRAIL ANCHORAGE FOR BARRIER RAIL" SHEET.

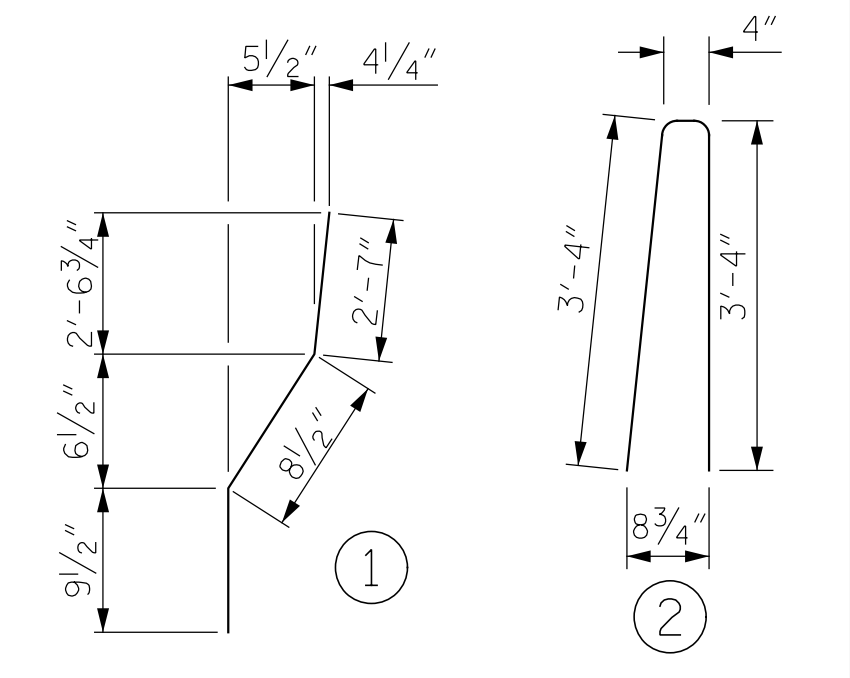
FOR REMOVAL OF EXISTING PARAPET AND METAL RAIL, SEE "EXISTING BRIDGE RAIL RETROFIT DETAILS" SHEET.

THE #5 S1 & #5 S2 BARS SHALL BE INSTALLED USING AN ADHESIVE ANCHORING SYSTEM. THE TENSILE LOAD FOR THE #5 S1 & #5 S2 BARS IS 12.5 KIPS. LEVEL 2 FIELD TESTING FOR THE ADHESIVE BONDING SYSTEM IS REQUIRED.

▲ BARRIER RAIL HEIGHT AT BACK FACE IS BASED ON EXISTING BRIDGE PRESERVATION PLANS INDICATING A 1 1/2" LATEX MODIFIED CONCRETE OVERLAY. ACTUAL HEIGHT OF BARRIER RAIL FROM TOP OF EXISTING DECK AFTER EXISTING PARAPET AND METAL RAIL HAS BEEN REMOVED MAY BE ADJUSTED TO ENSURE FINAL HEIGHT FROM BRIDGE DECK RIDING SURFACE AT GUTTERLINE IS 3'-6".

SPACING OF ADHESIVELY ANCHORED REINFORCING STEEL THAT IS TO BE INSTALLED IN BRIDGE DECK FOR THE PROPOSED RAILS AND PARAPETS WAS ESTABLISHED TO DECREASE THE CHANCES OF EXISTING DECK STEEL BEING DAMAGED OR BEING IN CONFLICT WITH PROPOSED REINFORCING STEEL. CARE SHALL BE TAKEN TO AVOID DAMAGING EXISTING REINFORCING STEEL WHENEVER POSSIBLE.

BAR TYPES

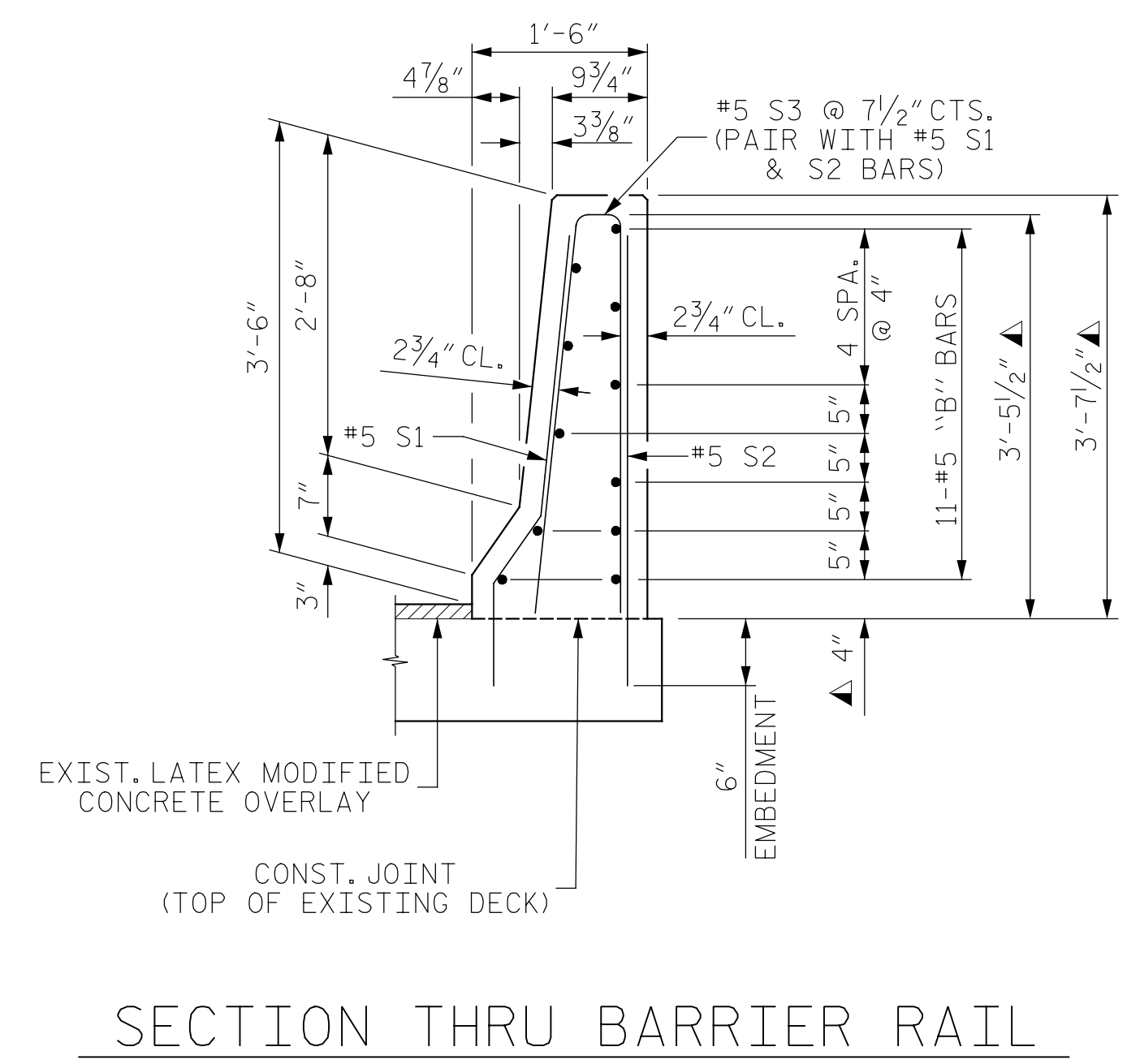


ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

FOR CONCRETE BARRIER RAIL ONLY

BAR NO.	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	44	5	STR	8' - 10"	405
B2	176	5	STR	14' - 11"	2,738
B3	66	5	STR	16' - 9"	1,153
B4	44	5	STR	9' - 4"	428
S1	565	5	1	4' - 1"	2,406
S2	565	5	STR	7' - 0"	4,125
S3	565	5	2	3' - 10"	2,259
EPOXY COATED REINFORCING STEEL				LBS.	13,514
CLASS "AA" CONCRETE				C.Y.	47.7
CONCRETE BARRIER RAIL				LIN. FT.	350.83

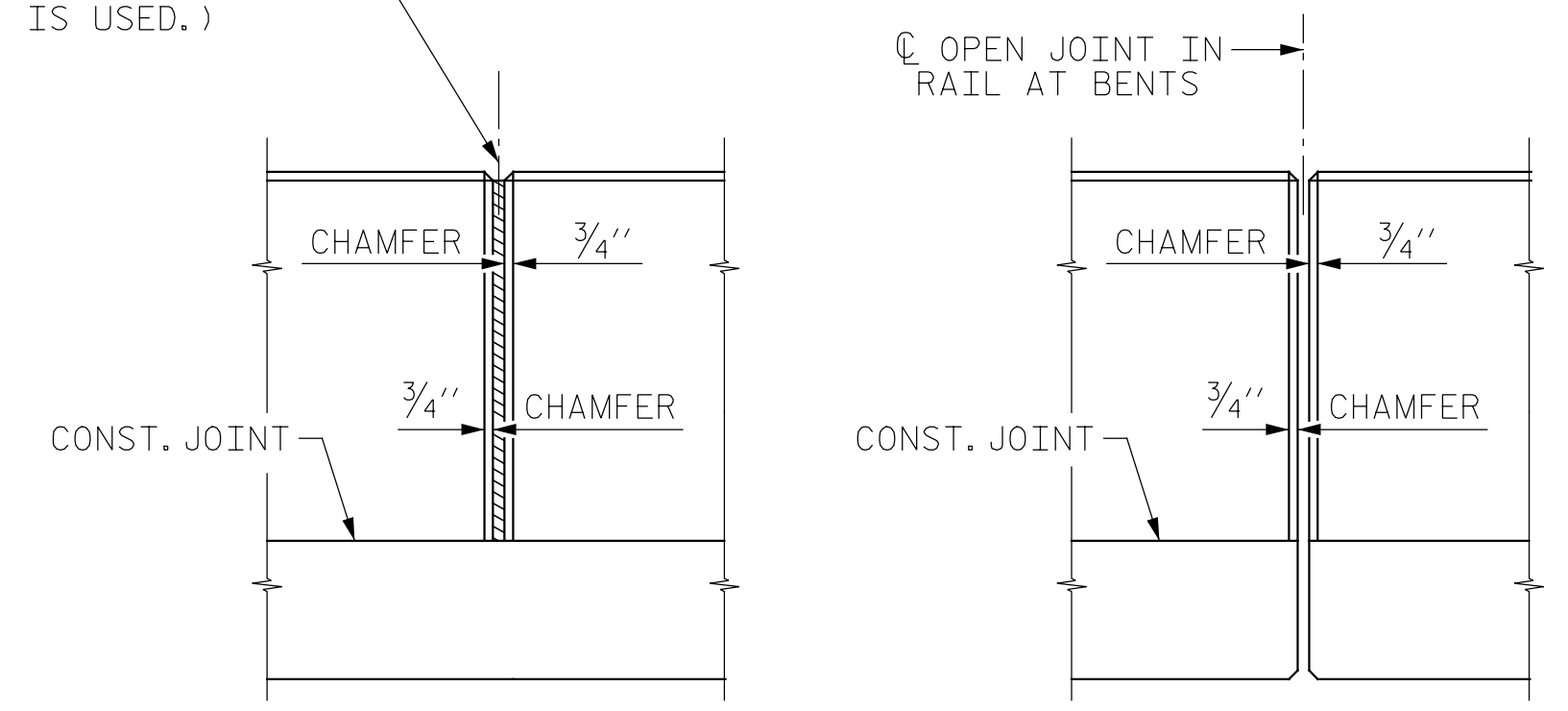


SECTION THRU BARRIER RAIL

REINFORCING STEEL SPLICE LENGTHS

BAR SIZE	PARAPET AND BARRIER RAIL
	EPOXY COATED
#4	2'-9"
#5	3'-5"
#6	4'-4"

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



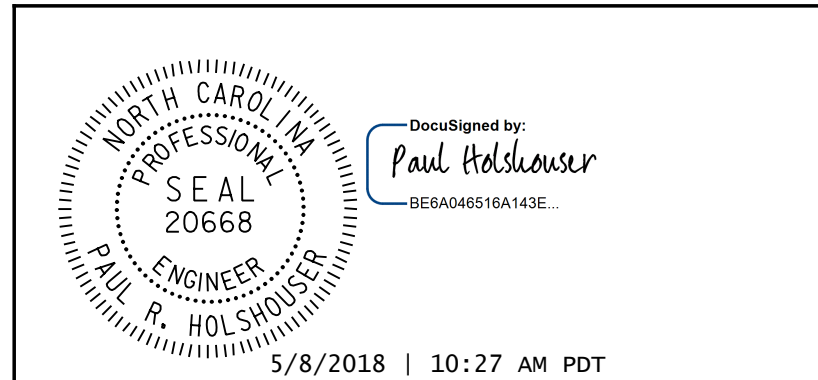
ELEVATION AT EXPANSION JOINTS

BARRIER RAIL DETAILS

PROJECT NO. I-5714
MECKLENBURG COUNTY
 STATION: 26+20.73 -YEB-

RAIL RETROFIT OF BRIDGE NO. 356

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 SUPERSTRUCTURE
 CONCRETE BARRIER RAIL DETAILS
 EXISTING BRIDGE RAIL RETROFIT



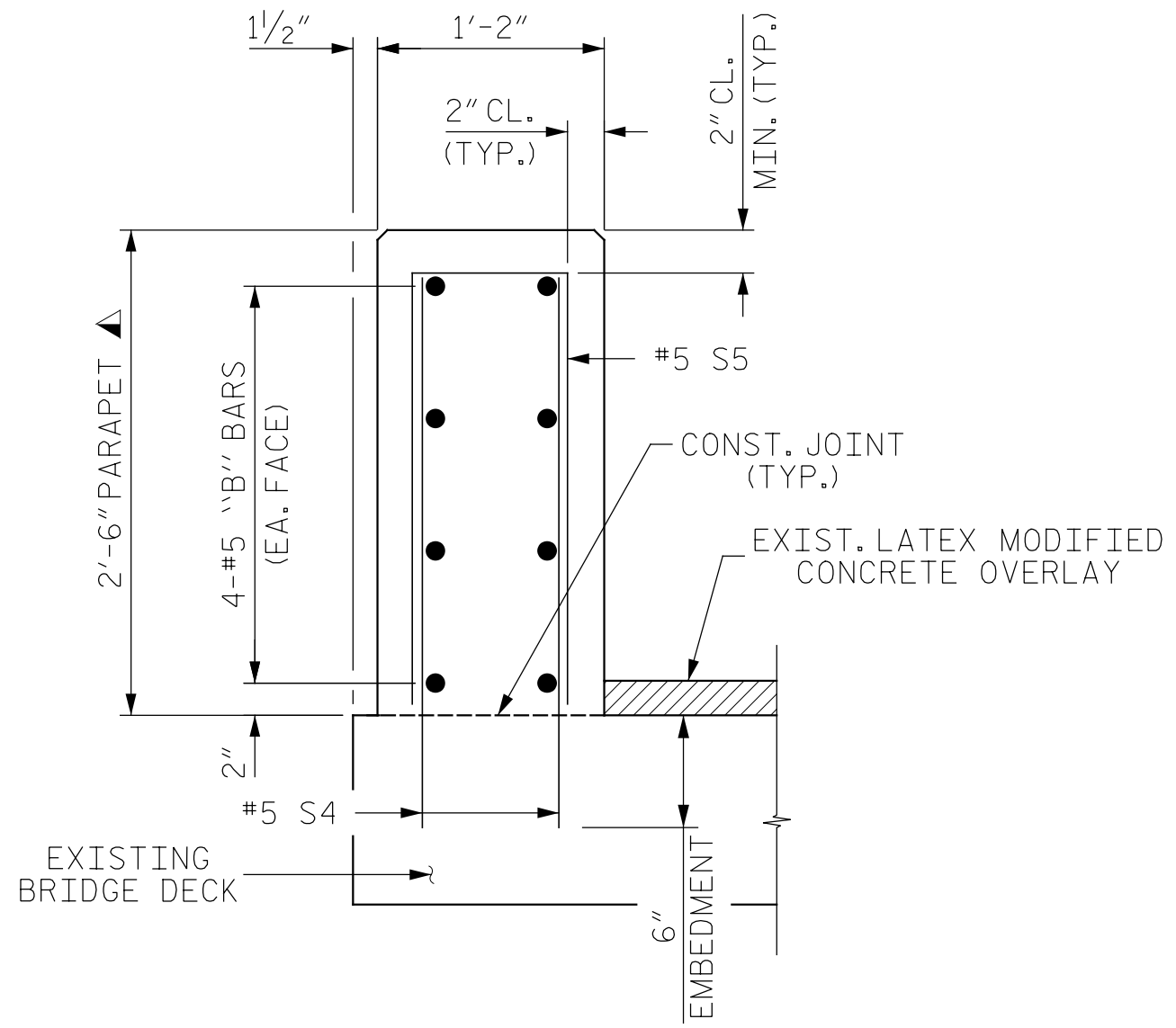
ICE of Carolinas, PLLC
 4505 Falls of Neuse Road, Suite 110
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 License #: P-0999

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2			4			53

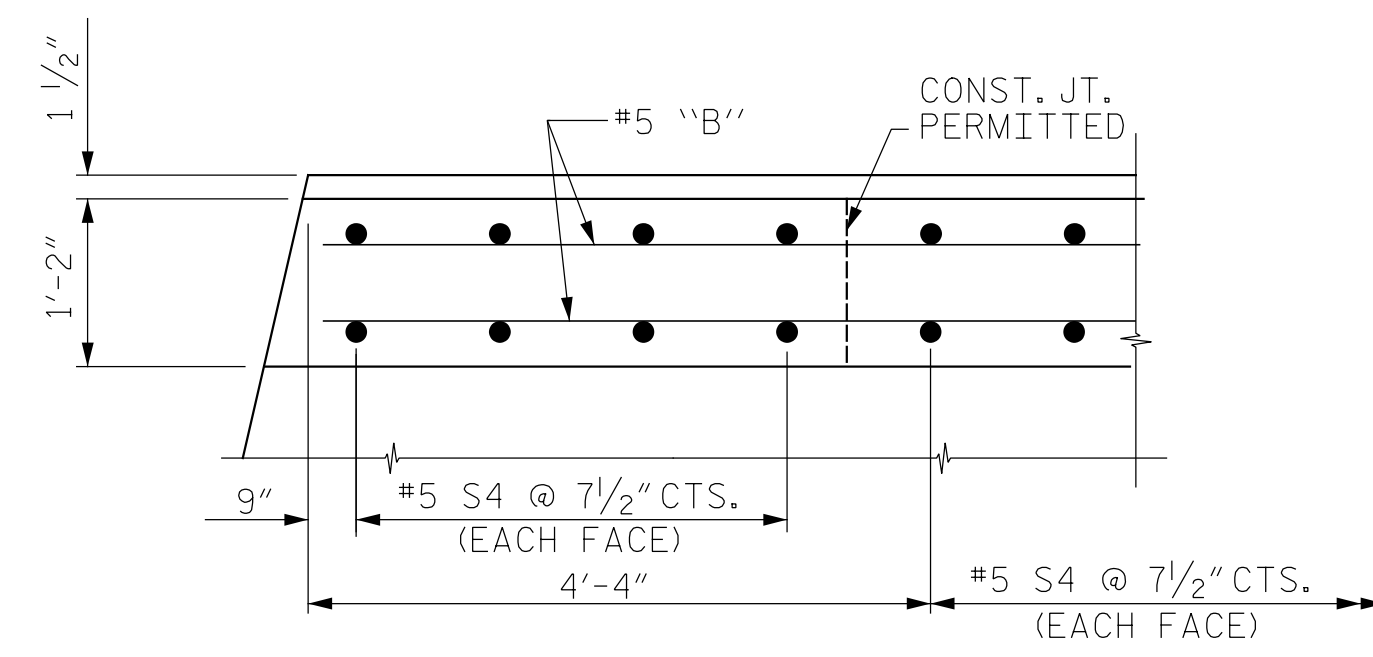
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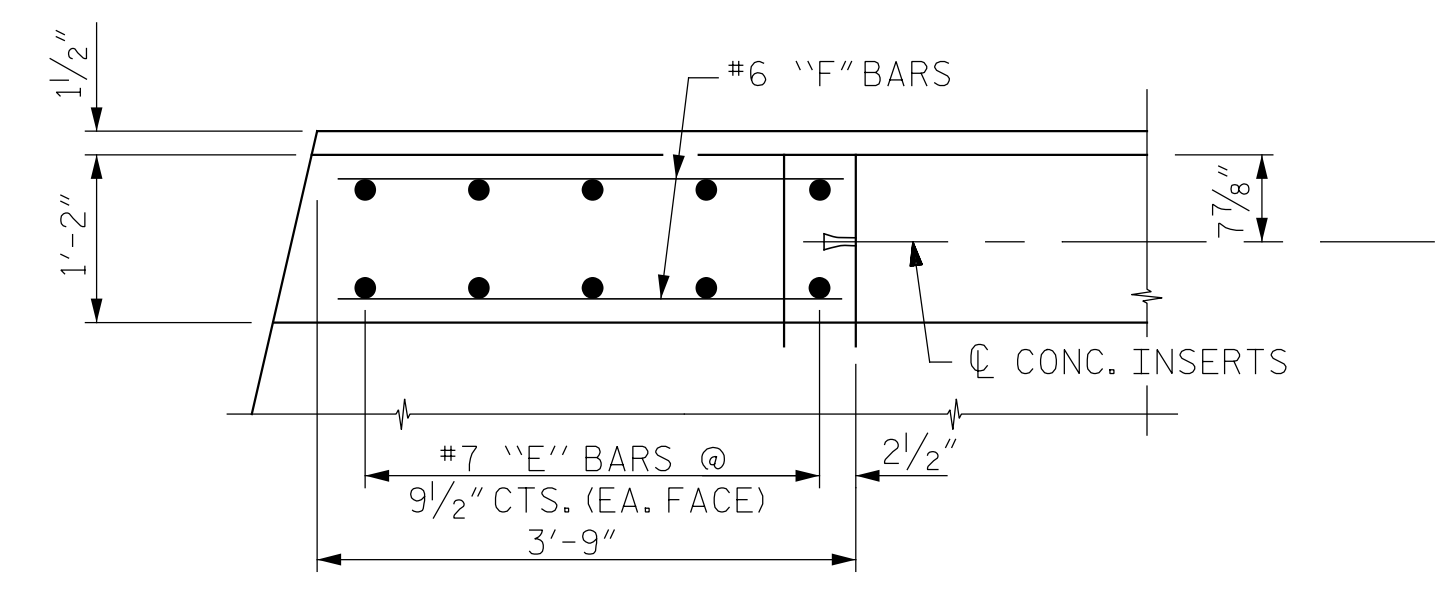
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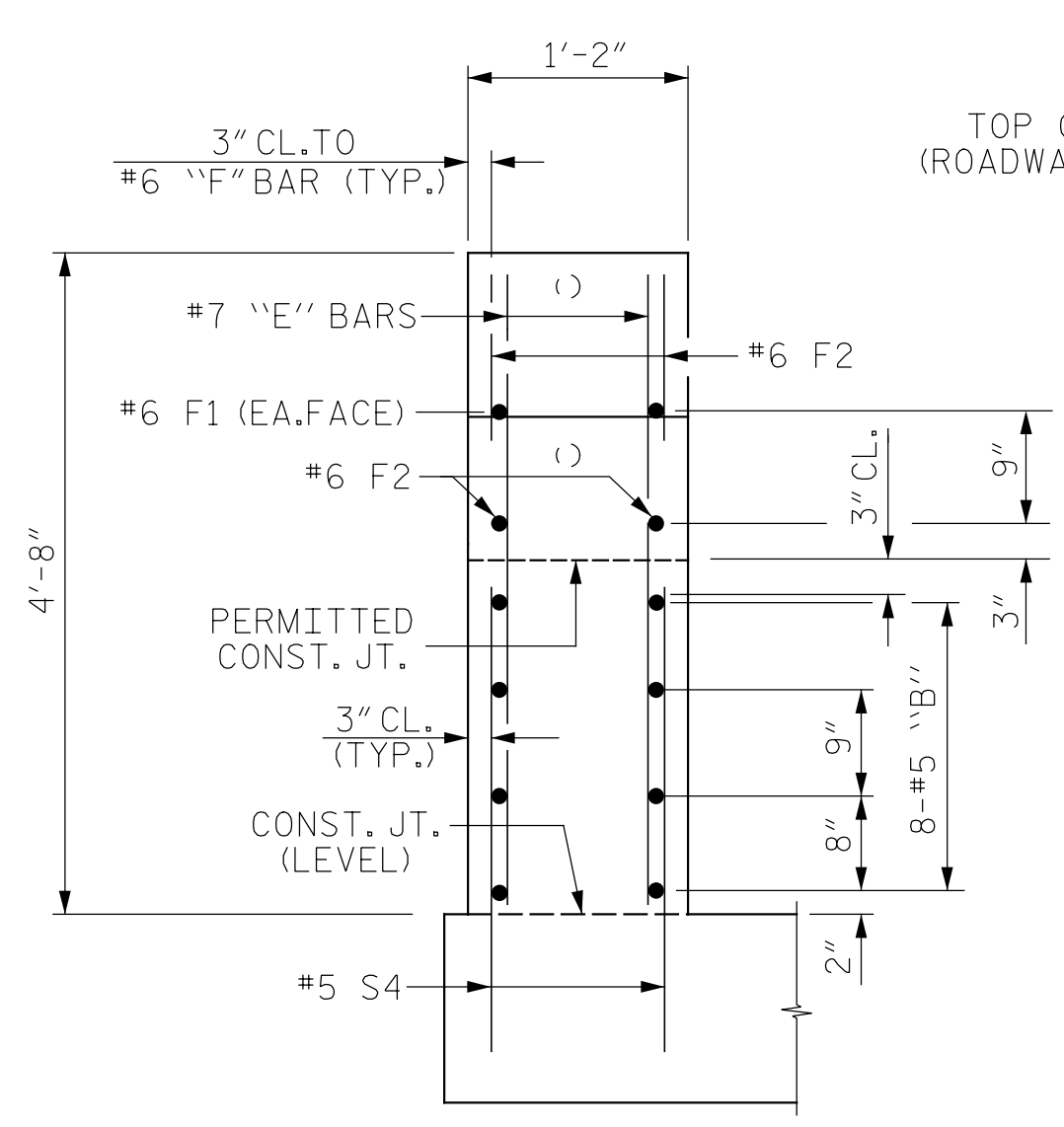
SECTION THRU PARAPET



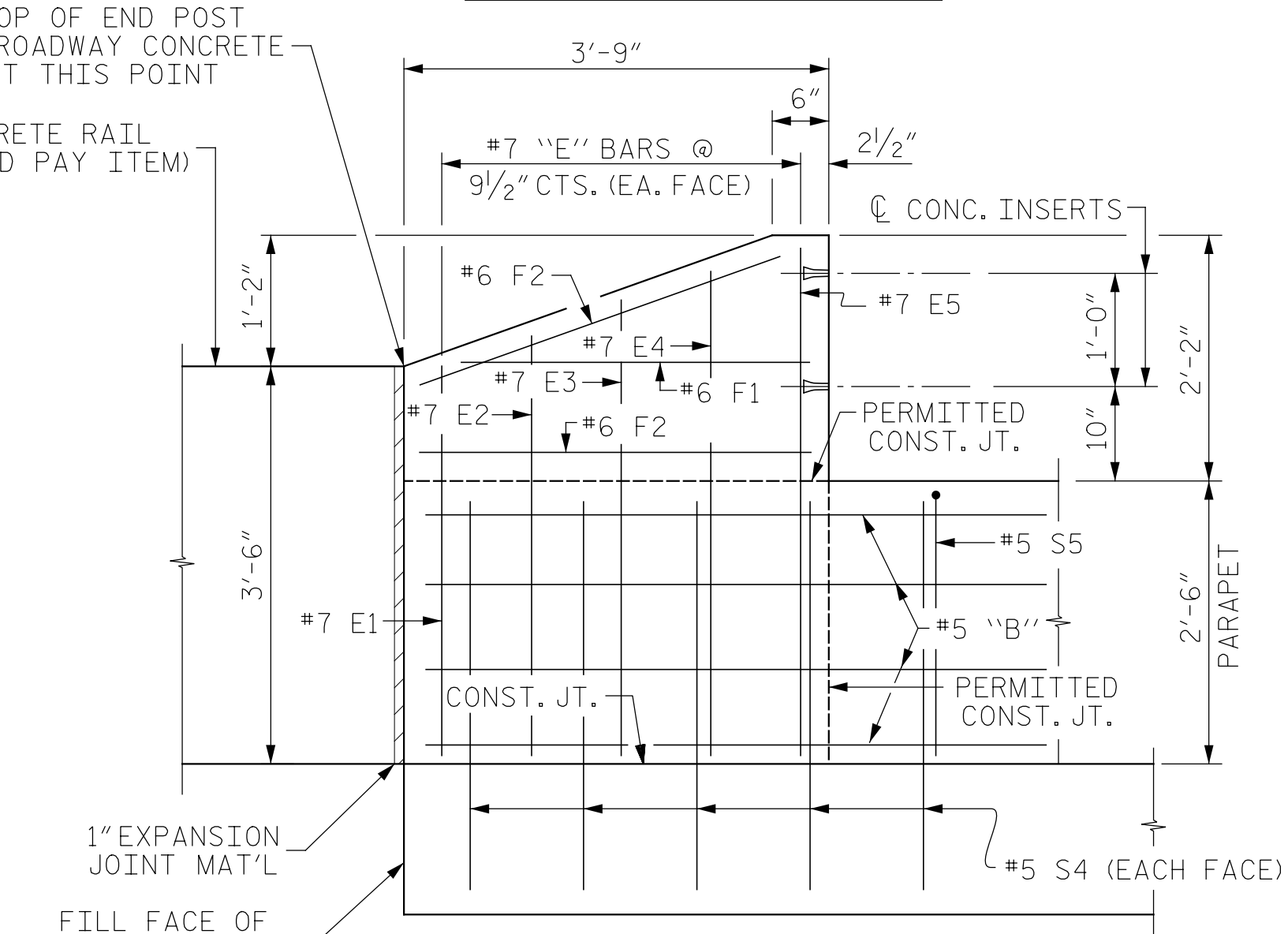
PLAN OF PARAPET



PLAN OF END POST



END VIEW



ELEVATION

PARAPET AND END POST FOR TWO BAR RAIL

NOTES:

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

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. THE CONTRACTION JOINT SHALL BE LOCATED AT THIRD POINTS BETWEEN EXPANSION JOINTS. NO CONTRACTION JOINTS WILL BE REQUIRED FOR SEGMENTS LESS THAN 10 FEET IN LENGTH.

FOR DETAILS OF CONCRETE INSERTS, SEE "END OF RAIL DETAILS" SHEET FOR EXISTING BRIDGE RAIL RETROFIT.

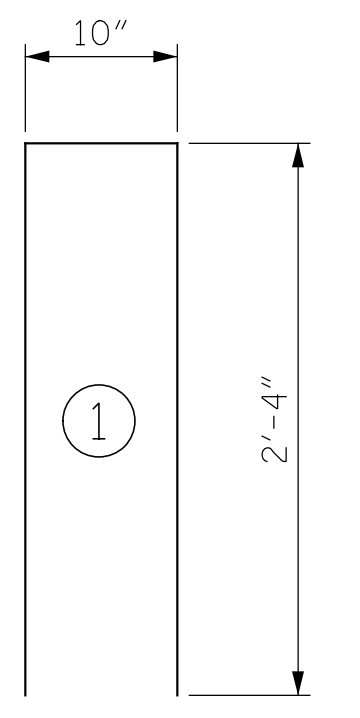
FOR REMOVAL OF EXISTING PARAPET AND METAL RAIL, SEE "EXISTING BRIDGE RAIL RETROFIT DETAILS" SHEET.

THE #5 S4 BARS SHALL BE INSTALLED USING AN ADHESIVE ANCHORING SYSTEM. THE TENSILE LOAD FOR THE #5 S4 BARS IS 12.5 KIPS. LEVEL 2 FIELD TESTING FOR THE ADHESIVE BONDING SYSTEM IS REQUIRED.

▲ CONCRETE PARAPET HEIGHT AT BACK FACE IS BASED ON EXISTING BRIDGE PRESERVATION PLANS INDICATING A 1/2" LATEX MODIFIED CONCRETE OVERLAY. ACTUAL HEIGHT OF CONCRETE PARAPET RAIL FROM TOP OF EXISTING DECK AFTER EXISTING PARAPET AND METAL RAIL HAS BEEN REMOVED MAY BE ADJUSTED TO ENSURE FINAL HEIGHT FROM BRIDGE DECK RIDING SURFACE AT GUTTERLINE IS 2'-6".

SPACING OF ADHESIVELY ANCHORED REINFORCING STEEL THAT IS TO BE INSTALLED IN BRIDGE DECK FOR THE PROPOSED RAILS AND PARAPETS WAS ESTABLISHED TO DECREASE THE CHANCES OF EXISTING DECK STEEL BEING DAMAGED OR BEING IN CONFLICT WITH PROPOSED REINFORCING STEEL. CARE SHALL BE TAKEN TO AVOID DAMAGING EXISTING REINFORCING STEEL WHENEVER POSSIBLE.

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

FOR CONCRETE PARAPET RAIL ONLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	80	5	STR	8' - 10"	737
B2	48	5	STR	14' - 11"	747
B3	16	5	STR	16' - 9"	280
B4	16	5	STR	9' - 4"	156
S4	1130	5	1	2' - 10"	3,339
S5	550	5	2	5' - 6"	3,155
F1	4	6	STR	2' - 11"	18
F2	8	6	STR	3' - 5"	41
E1	4	7	STR	3' - 5"	28
E2	4	7	STR	3' - 8"	30
E3	4	7	STR	4' - 0"	33
E4	4	7	STR	4' - 3"	35
E5	4	7	STR	4' - 6"	37

EPOXY COATED REINFORCING STEEL	LBS.	8,636
CLASS "AA" CONCRETE	C.Y.	47.7
1'-2" x 2'-6" CONCRETE PARAPET	LIN. FT.	350.79

REINFORCING STEEL SPLICE LENGTHS

BAR SIZE	PARAPET AND BARRIER RAIL
	EPOXY COATED
#4	2'-9"
#5	3'-5"
#6	4'-4"

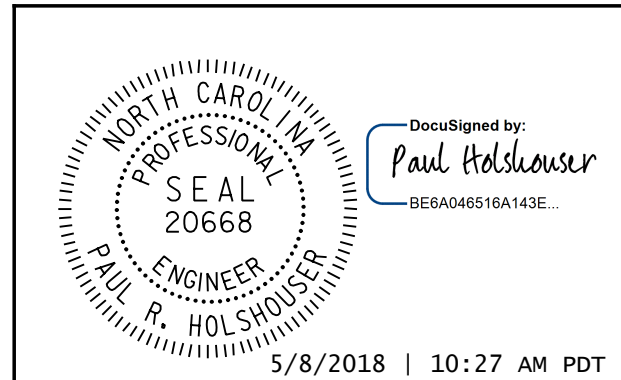
PROJECT NO. I-5714
MECKLENBURG COUNTY
STATION: 26+20.73 -YEB-

RAIL RETROFIT OF BRIDGE NO. 356

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE
CONCRETE PARAPET AND
END POST DETAILS

EXISTING BRIDGE RAIL RETROFIT

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2			4			53



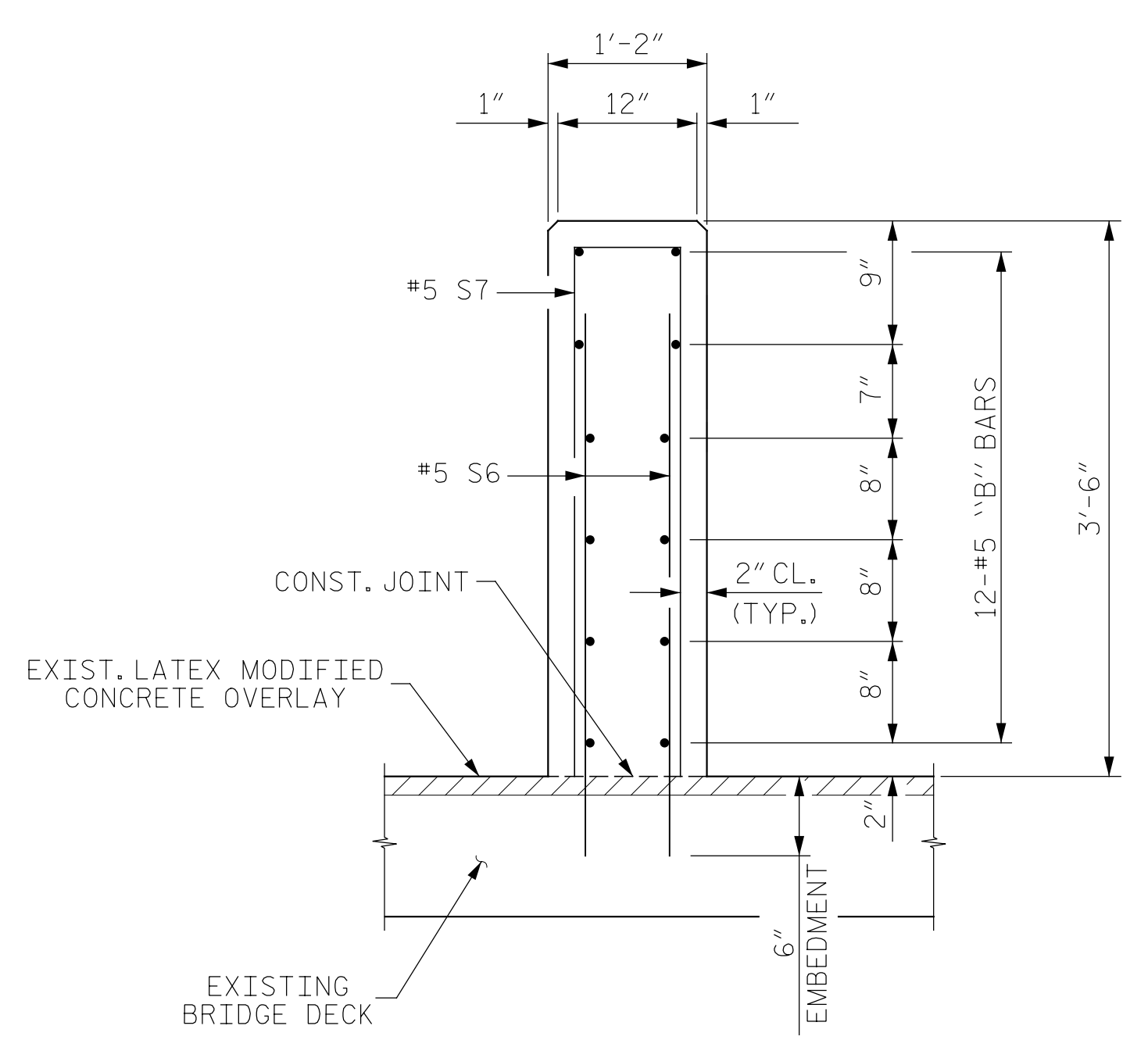
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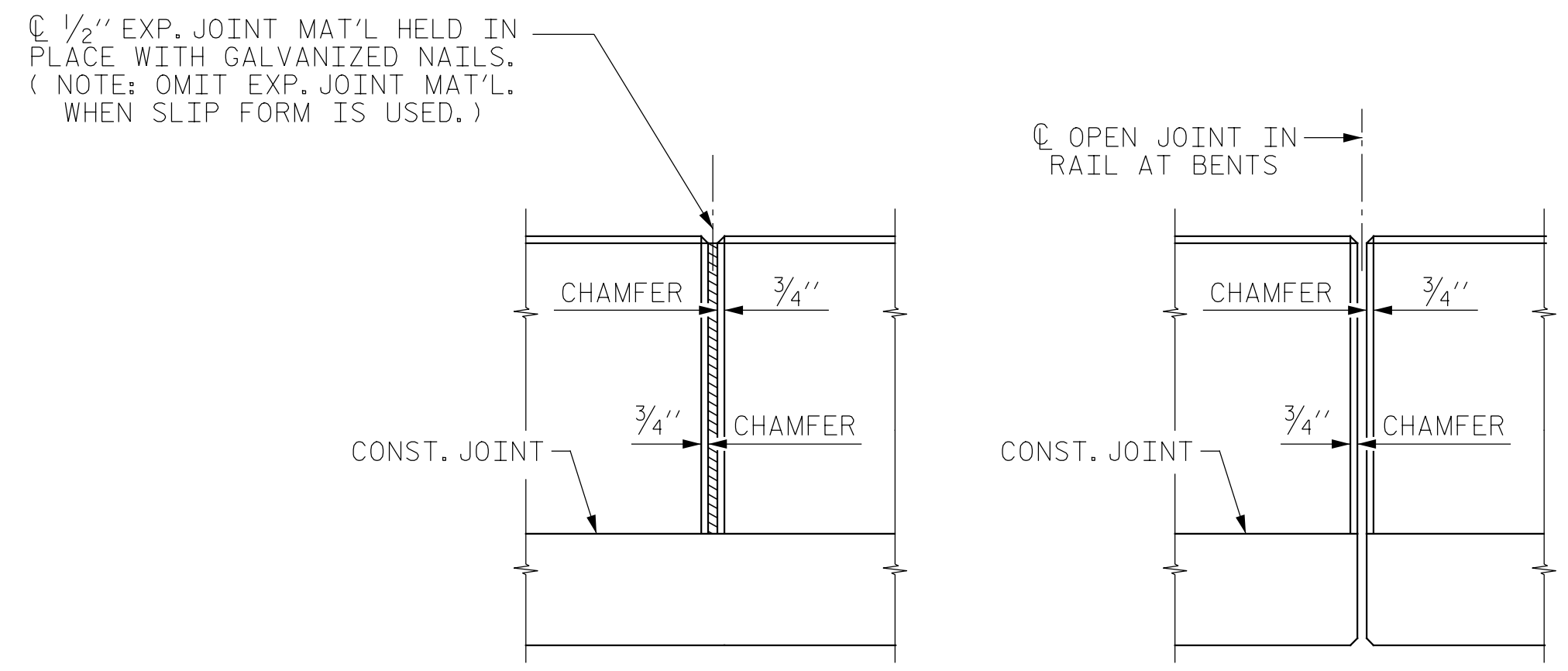
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CHECKED BY: P. R. HOLSHOUSER DATE: 2-7-18
DESIGN E.O.R.: P. R. HOLSHOUSER DATE: 5-8-18

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SECTION THRU VERTICAL RAIL



ELEVATION AT EXPANSION JOINTS

VERTICAL RAIL DETAILS

NOTES:

ALL REINFORCING STEEL IN CONCRETE VERTICAL RAIL SHALL BE EPOXY COATED.

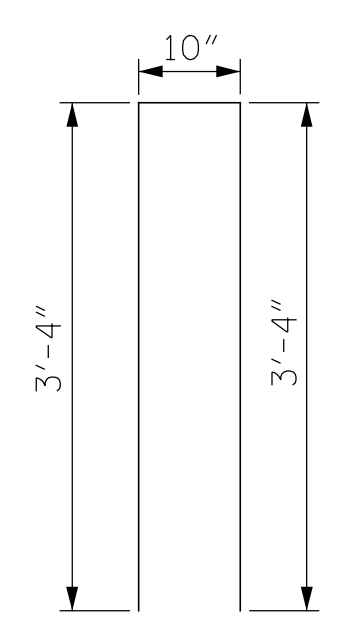
THE #5 S6 BARS SHALL BE INSTALLED, USING AN ADHESIVE ANCHORING SYSTEM. THE TENSILE LOAD FOR THE #5 S6 BARS IS 12.5 KIPS. LEVEL 2 FIELD TESTING FOR THE ADHESIVE BONDING SYSTEM IS REQUIRED.

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

SPACING OF ADHESIVELY ANCHORED REINFORCING STEEL THAT IS TO BE INSTALLED IN BRIDGE DECK FOR THE PROPOSED RAILS AND PARAPETS WAS ESTABLISHED TO DECREASE THE CHANCES OF EXISTING DECK STEEL BEING DAMAGED OR BEING IN CONFLICT WITH PROPOSED REINFORCING STEEL. CARE SHALL BE TAKEN TO AVOID DAMAGING EXISTING REINFORCING STEEL WHENEVER POSSIBLE.

REINFORCING STEEL SPLICE LENGTHS	
BAR SIZE	PARAPET AND BARRIER RAIL
	EPOXY COATED
#4	2'-9"
#5	3'-5"
#6	4'-4"

BAR TYPES



①

ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

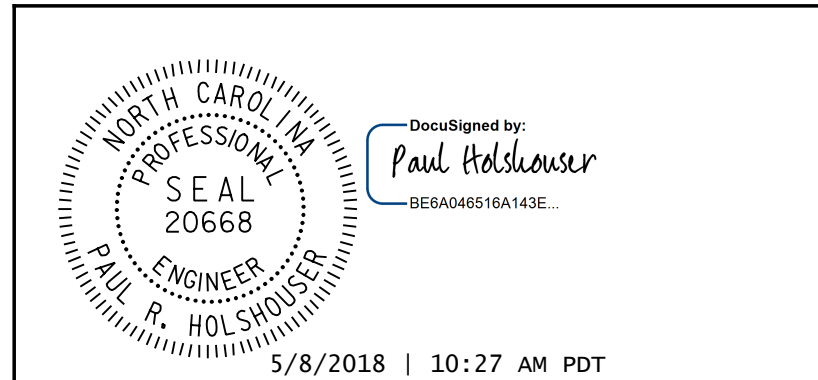
FOR VERTICAL CONCRETE RAIL ONLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	48	5	STR	8' - 10"	442
B2	72	5	STR	14' - 11"	1,120
B3	192	5	STR	16' - 9"	3,354
B4	48	5	STR	9' - 4"	467
B5	48	5	STR	10' - 0"	501
B6	24	5	STR	12' - 2"	305
S6	1298	5	STR	3' - 6"	4,738
S7	649	5	1	7' - 6"	5,077
EPOXY COATED REINFORCING STEEL				LBS.	16,004
CLASS "AA" CONCRETE				C.Y.	54.9
CONCRETE VERTICAL RAIL				LIN. FT.	403.96

PROJECT NO. I-5714
MECKLENBURG COUNTY
 STATION: 26+20.73 -YEB-

RAIL RETROFIT OF BRIDGE NO. 356

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 SUPERSTRUCTURE
 CONCRETE VERTICAL RAIL DETAILS
 EXISTING BRIDGE RAIL RETROFIT



ICE of Carolinas, PLLC
 4505 Falls of Neuse Road, Suite 110
 Raleigh, North Carolina 27609
 Phone: 919-422-0333
 License #: P-0999

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DRAWN BY : J. N. AUSTIN DATE : 2-5-18
 CHECKED BY : P. R. HOLSHOUSE DATE : 2-6-18
 DESIGN E.O.R. : P. R. HOLSHOUSE DATE : 5-8-18

NOTES

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

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

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

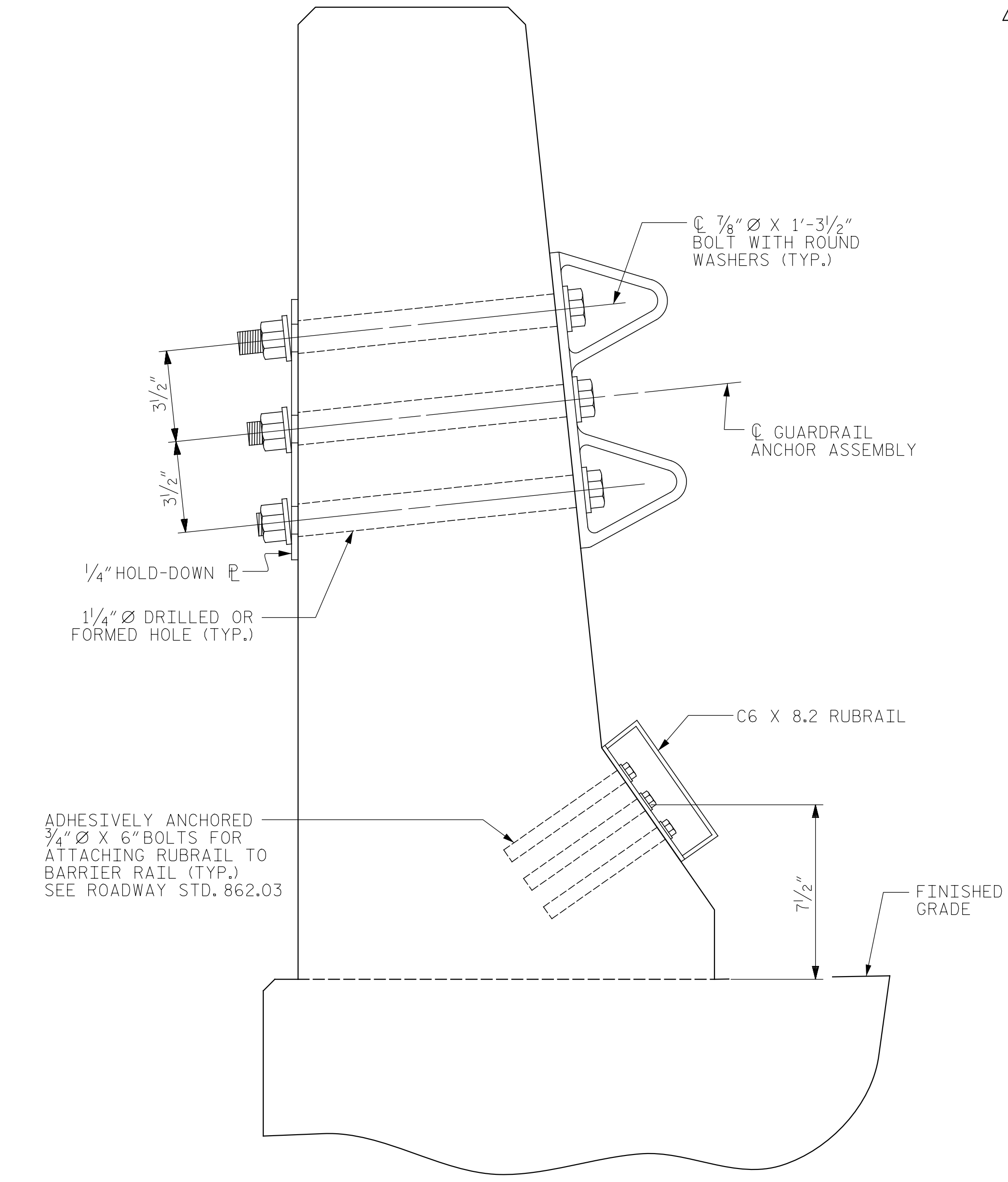
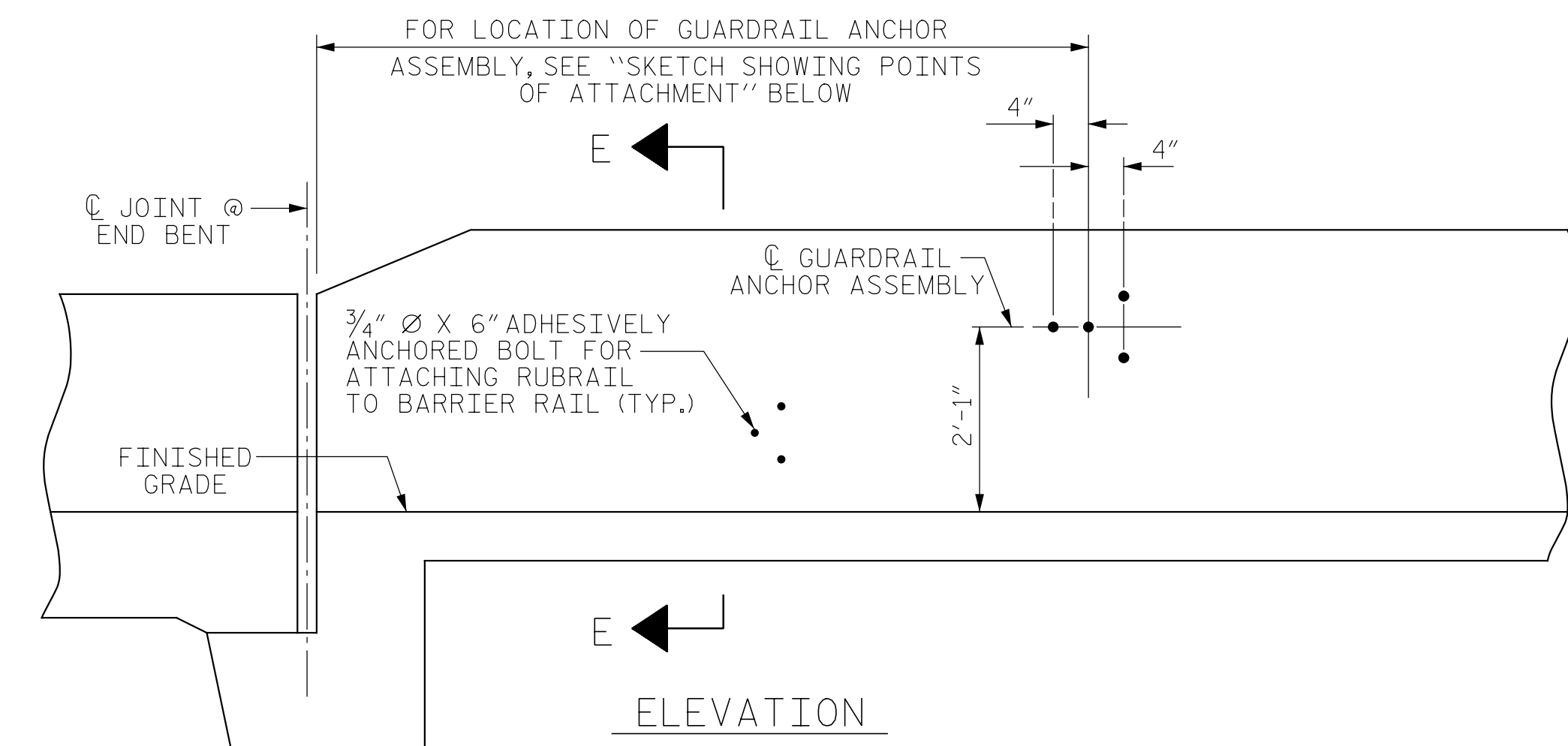
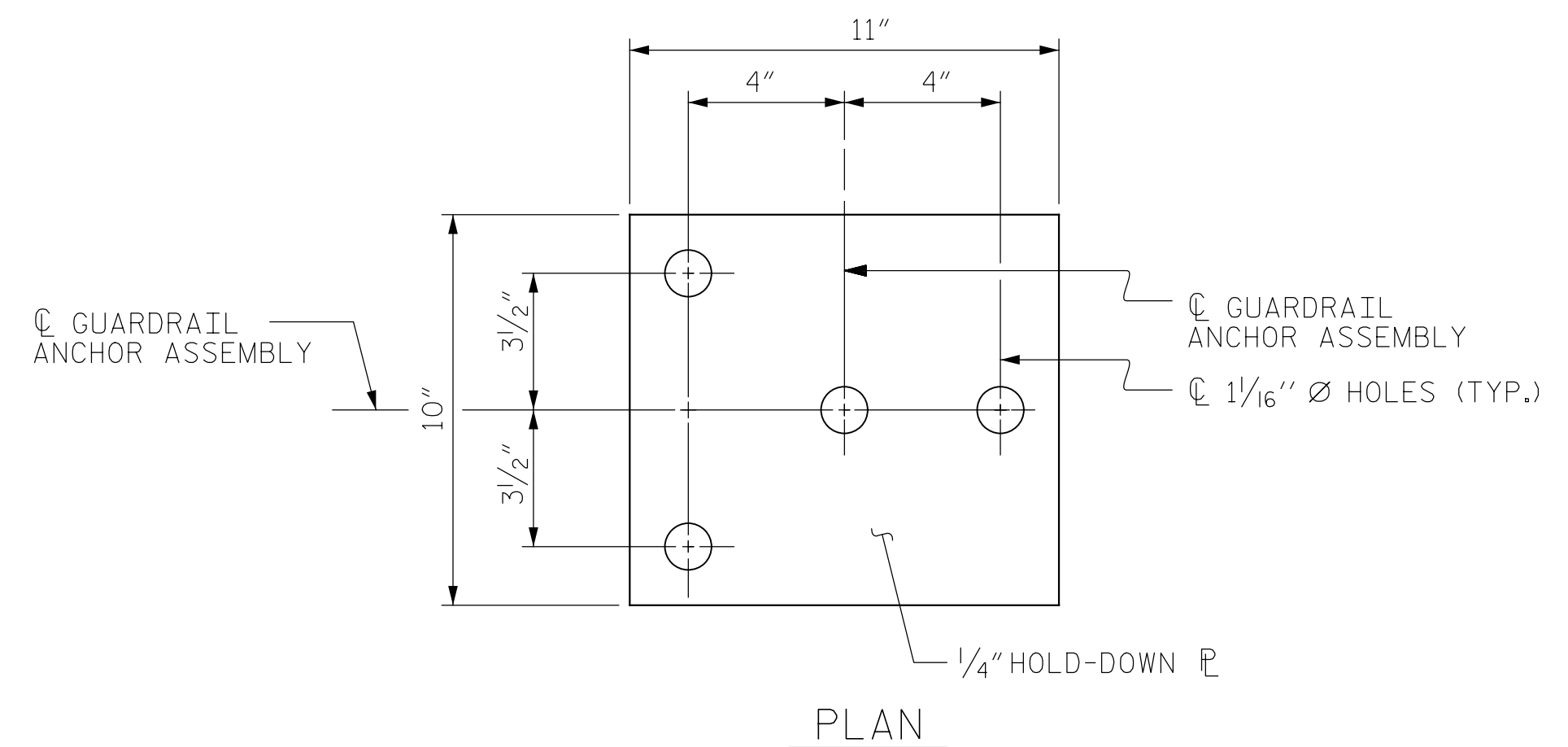
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF BARRIER RAIL. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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

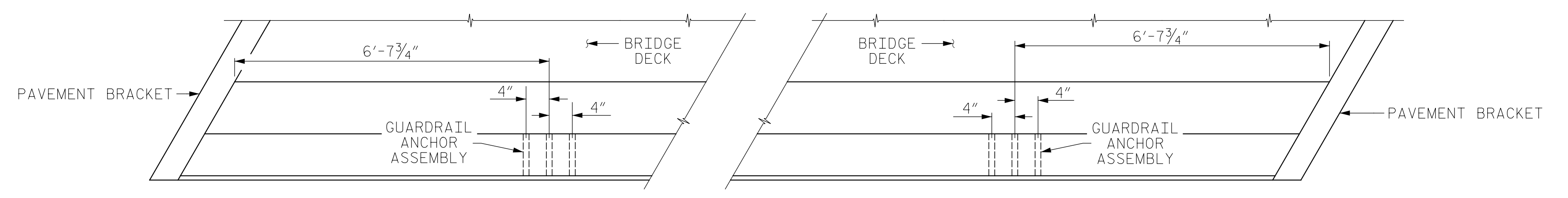
THE COST OF THE GUARDRAIL ANCHOR ASSEMBLY SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR CONCRETE BARRIER RAIL.

THE 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.

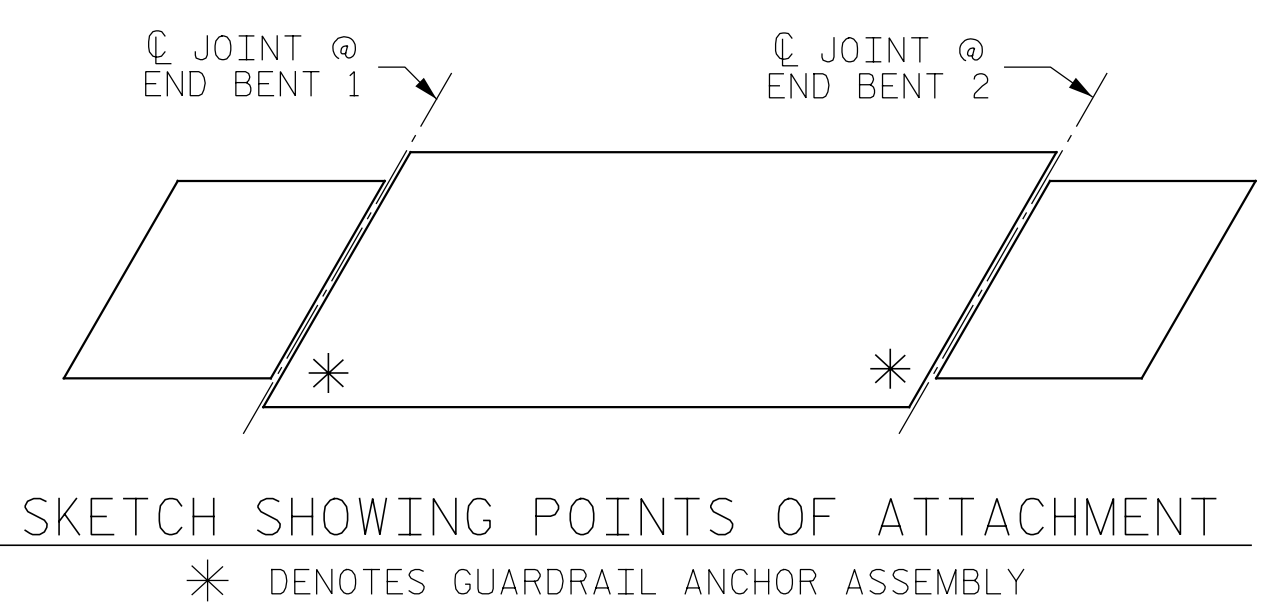
THE C6 X 8.2 RUBRAIL IS TO BE ADHESIVELY ANCHORED TO THE RAIL USING THREE 3/4" Ø X 6" BOLTS WITH WASHERS. LEVEL ONE FIELD TESTING IS REQUIRED, AND THE YIELD LOAD OF THE 3/4" Ø BOLT IS 12 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE STANDARD SPECIFICATIONS. SEE ROADWAY STANDARD 862.03 FOR DETAILS AND LOCATION OF THE RUBRAIL.



SECTION E-E
GUARDRAIL ANCHOR ASSEMBLY DETAILS



LOCATION OF ANCHORS FOR GUARDRAIL



SKETCH SHOWING POINTS OF ATTACHMENT
* DENOTES GUARDRAIL ANCHOR ASSEMBLY

PROJECT NO. I-5714
MECKLENBURG COUNTY
STATION: 26+20.73 -YEB-

RAIL RETROFIT OF BRIDGE NO. 356

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE
GUARDRAIL ANCHORAGE
FOR BARRIER RAIL
EXISTING BRIDGE RAIL RETROFIT

DocuSigned by:
Paul Holshouser
BEG0408516A143E
5/8/2018 | 10:27 AM PDT

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4505 Falls of Neuse Road, Suite 110
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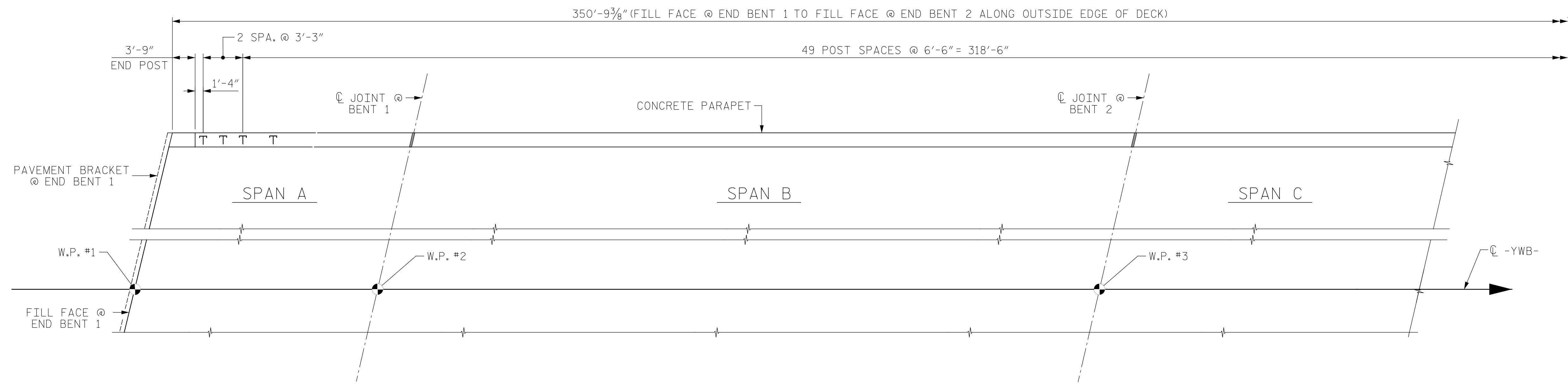
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DRAWN BY: J. N. AUSTIN DATE: 1-29-18
CHECKED BY: M. D. NIFONG DATE: 1-30-18
DESIGN E.O.R.: P. R. HOLSHOUSER DATE: 5-8-18

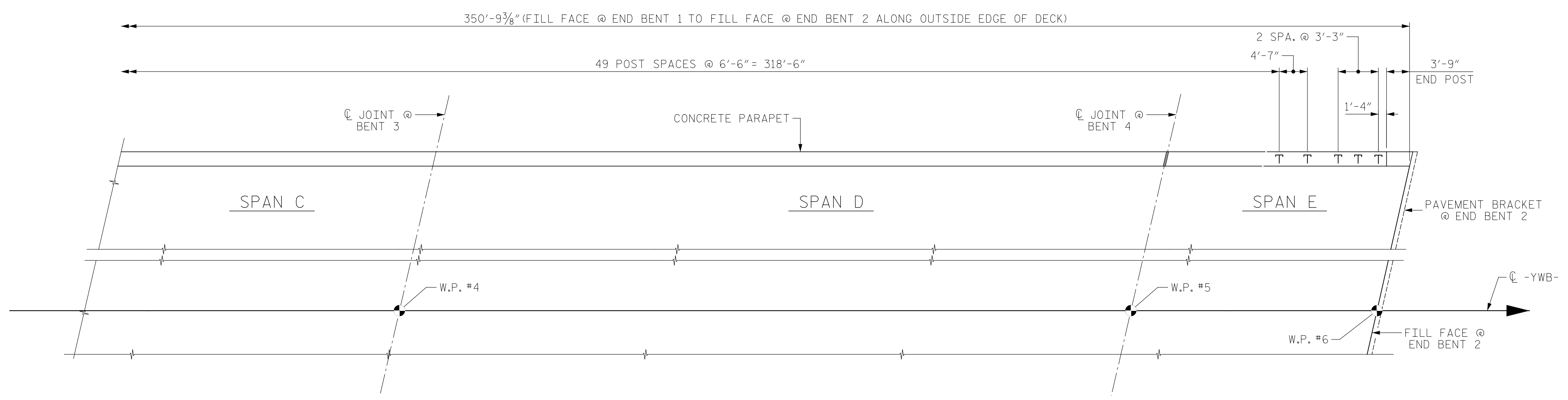
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NOTE:
CONCRETE VERTICAL RAIL NOT SHOWN FOR CLARITY.



PLAN OF METAL RAIL POST SPACING

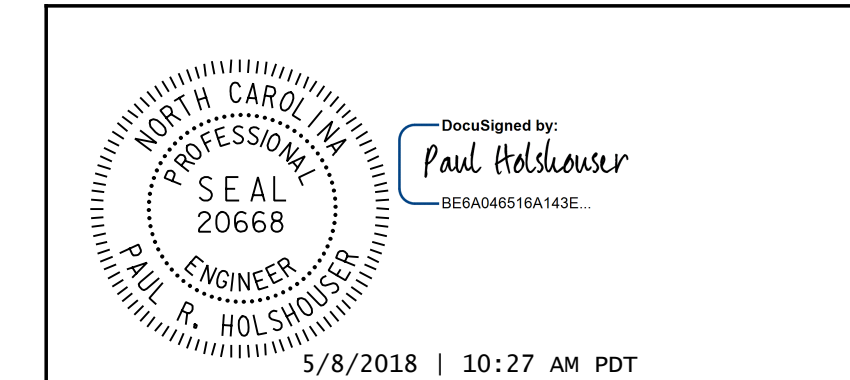


PLAN OF METAL RAIL POST SPACING

PROJECT NO. I-5714
MECKLENBURG COUNTY
STATION: 26+20.73 -YEB-

RAIL RETROFIT OF BRIDGE NO. 356

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE
METAL RAIL POST
SPACING
EXISTING BRIDGE RAIL RETROFIT



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Raleigh, North Carolina 27609
Phone: 919-422-0133
License #: P-0999

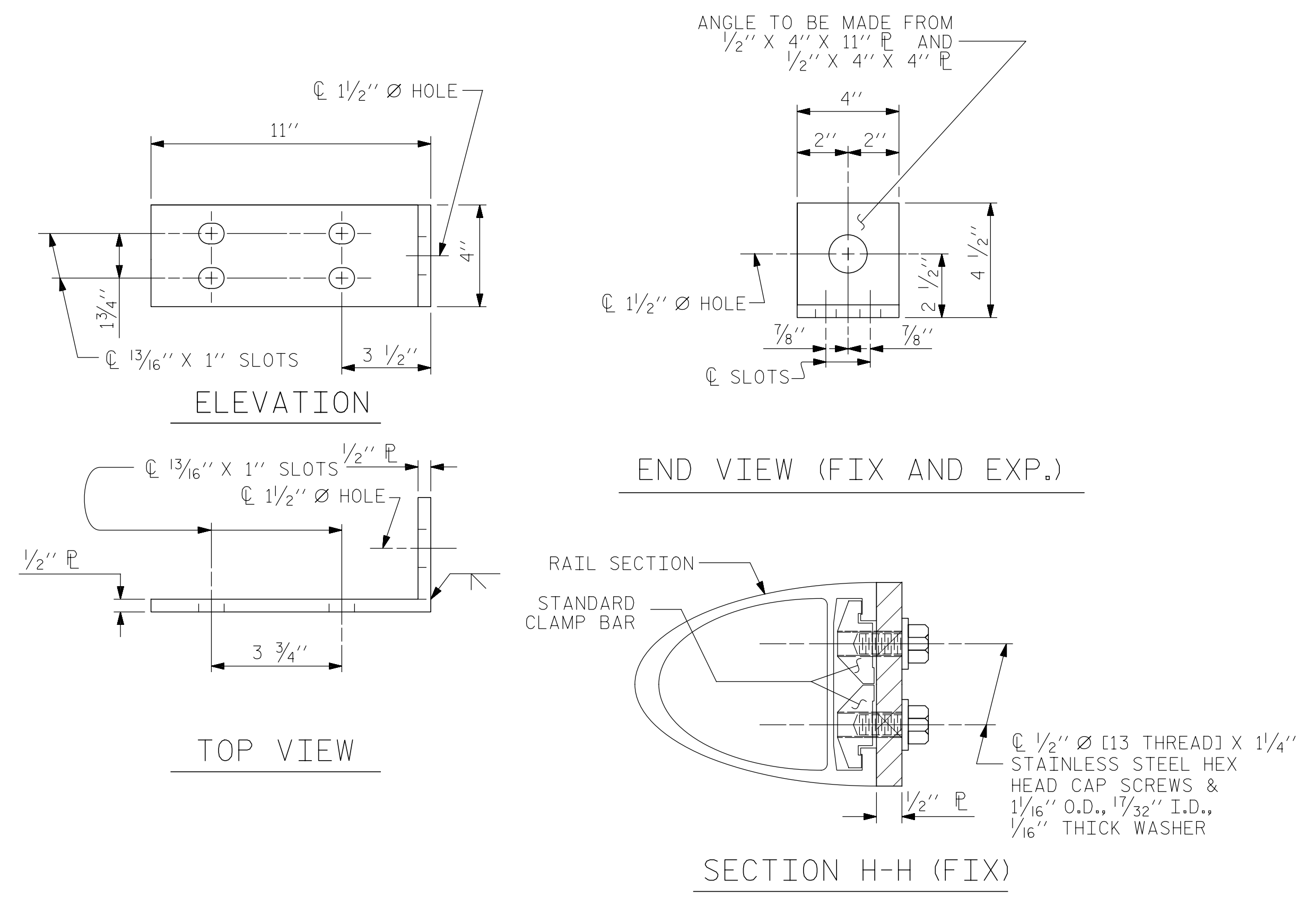
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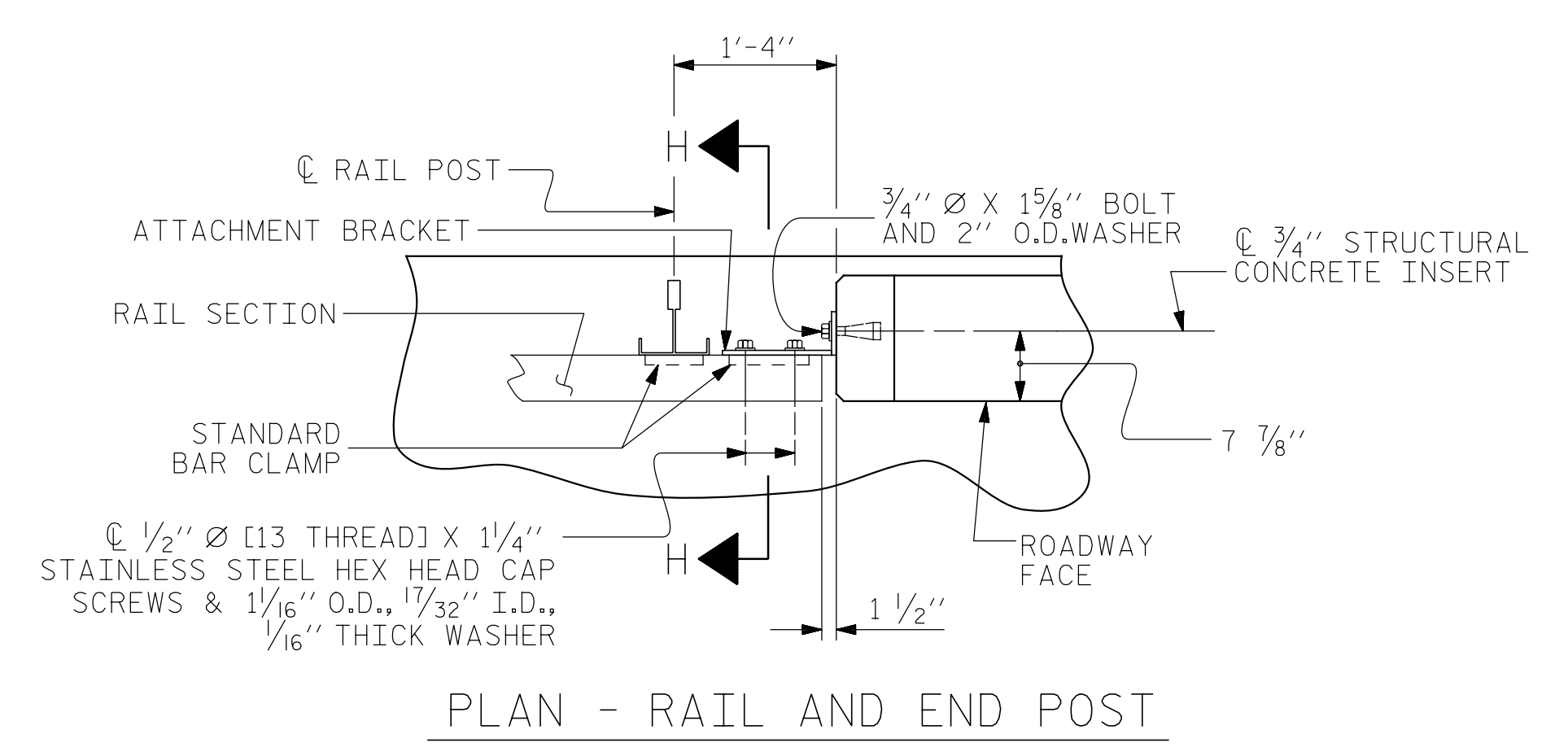
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DRAWN BY : J. N. AUSTIN DATE : 1-29-18
CHECKED BY : P. R. HOLSHOUSER DATE : 2-6-18
DESIGN E.O.R. : P. R. HOLSHOUSER DATE : 5-8-18

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FIXED



DETAILS FOR ATTACHING METAL RAIL TO END POST

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

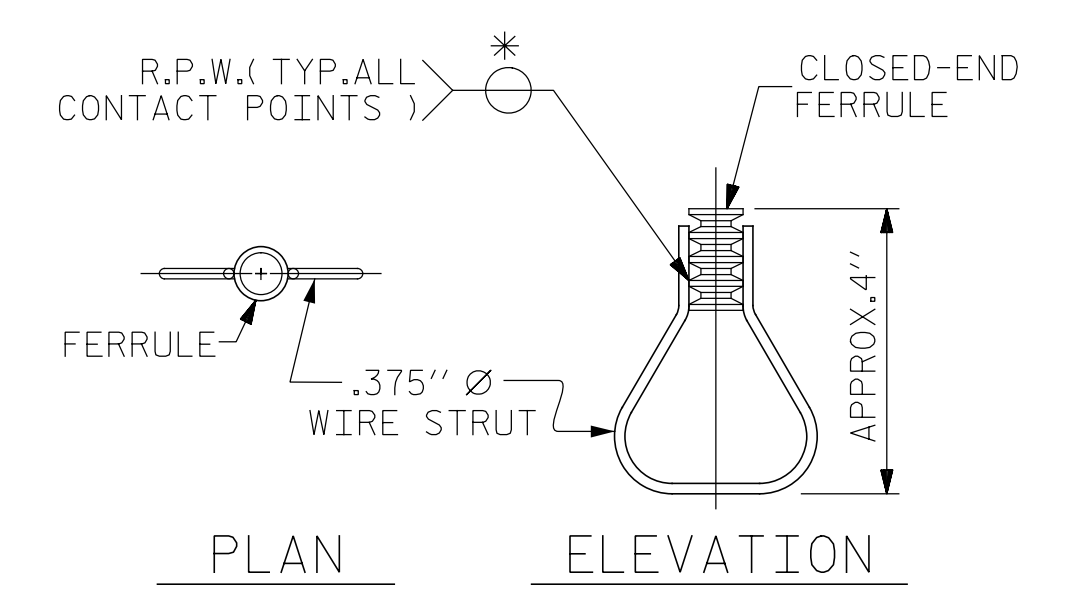
- THE METAL RAIL TO END POST CONNECTION SHALL CONSIST OF THE FOLLOWING COMPONENTS:
- A. 1/2" PLATES SHALL CONFORM TO AASHTO M270 GRADE 36 AND SHALL BE GALVANIZED AFTER FABRICATION.
 - B. 3/4" STRUCTURAL CONCRETE INSERT SHALL HAVE A WORKING LOAD SHEAR CAPACITY OF 4800 LBS. THE FERRULES SHALL ENGAGE A 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°.
 - 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.



STRUCTURAL CONCRETE INSERT

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

PROJECT NO. I-5714
MECKLENBURG COUNTY
 STATION: 26+20.73 -YEB-

RAIL RETROFIT OF BRIDGE NO. 356

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 SUPERSTRUCTURE
 END OF RAIL DETAILS
 EXISTING BRIDGE RAIL RETROFIT

DocuSigned by:
Paul Holshouser
 BE6A048516A143E
 5/8/2018 | 10:27 AM PDT

ICE of Carolinas, PLLC
 4505 Falls of Neuse Road, Suite 110
 Raleigh, North Carolina, 27609
 Phone: 919-422-0333
 License #: P-0999

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-51
1			3			TOTAL SHEETS
2			4			53

DRAWN BY : J. N. AUSTIN DATE : 2-5-18
 CHECKED BY : P. R. HOLSHOUSER DATE : 2-6-18
 DESIGN E.O.R. : P. R. HOLSHOUSER DATE : 5-8-18

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 UNLESS ALL SIGNATURES COMPLETED

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 LRFB 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

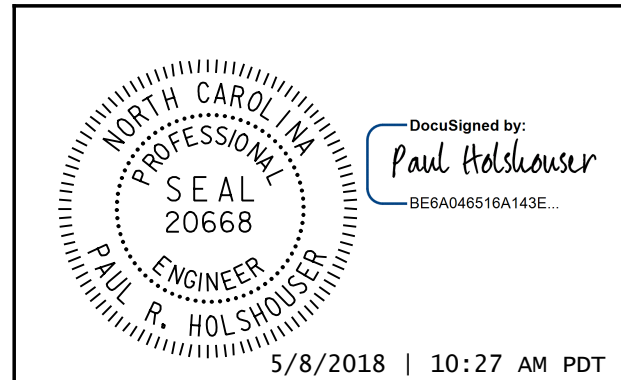
RAILING SHALL BE CONTINUOUS FROM END POST TO END POST OF BRIDGE. EACH JOINT IN RAIL LENGTH SHALL BE SPLICED AS DETAILED. PANEL LENGTHS OF RAIL SHALL BE ATTACHED TO A MINIMUM OF THREE POSTS.
 FOR END OF RAIL TO CLEAR FACE OF CONCRETE END POST DIMENSION, SEE STANDARD NO. BMR2.
 CAP SCREWS SHALL BE ASTM 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 = 343.33 LIN. FT.

PROJECT NO. I-5714
MECKLENBURG COUNTY
 STATION: 26+20.73 -YEB-

SHEET 1 OF 2 RAIL RETROFIT OF BRIDGE NO. 356

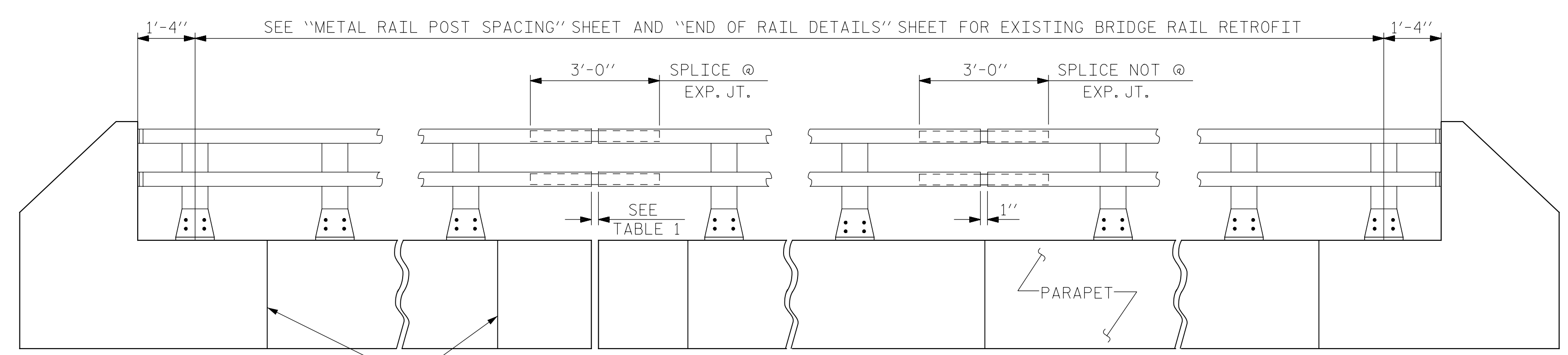
STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 SUPERSTRUCTURE
2 BAR METAL RAIL
 EXISTING BRIDGE RAIL RETROFIT



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REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	S-52	
1			3			TOTAL SHEETS	
2			4			53	

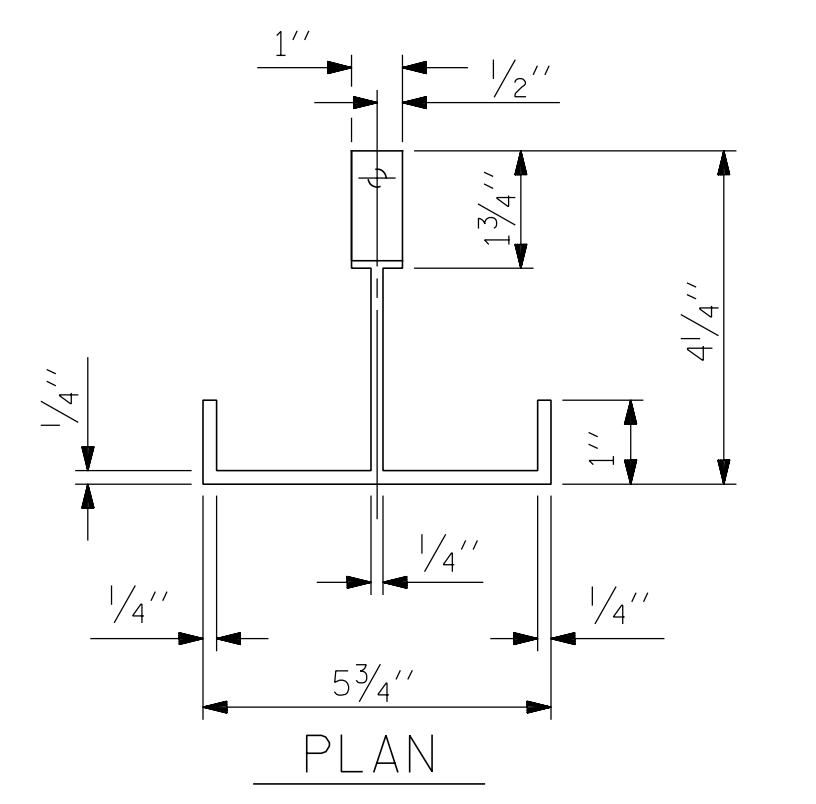
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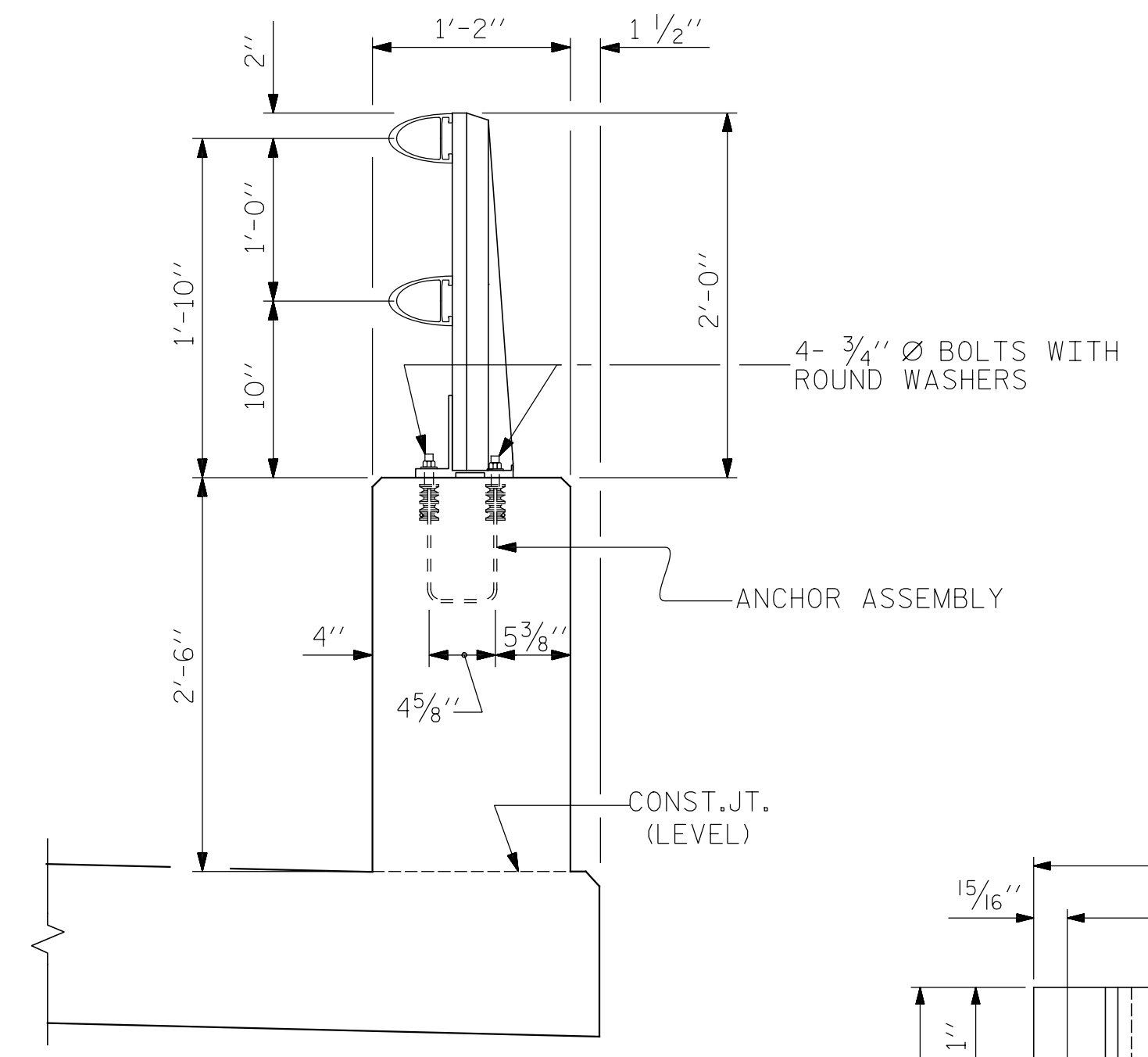
ELEVATION

NOTE: FOR ATTACHMENT OF METAL RAIL TO END POST, SEE "END OF RAIL DETAILS" SHEET FOR EXISTING BRIDGE RAIL RETROFIT

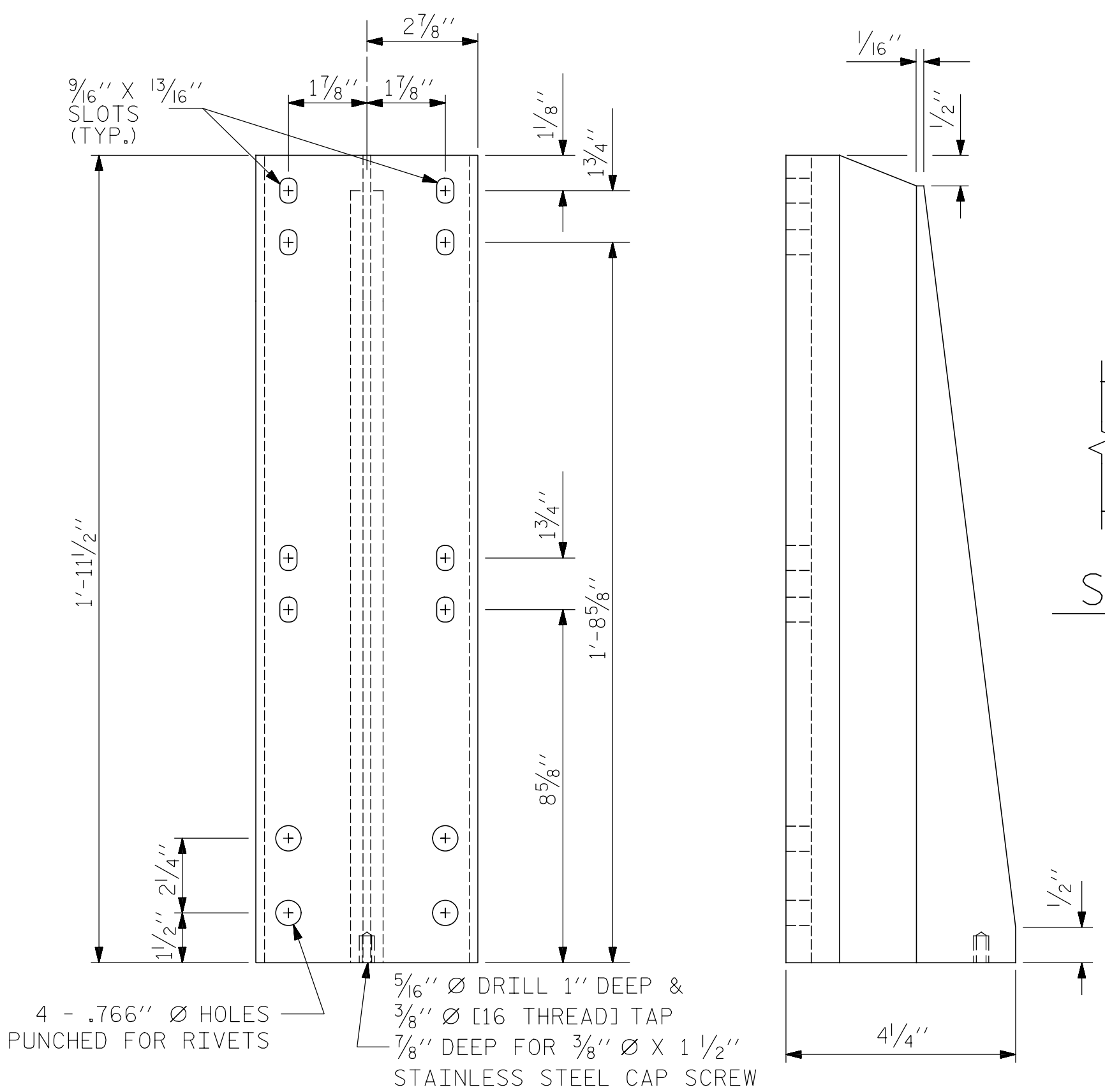
EXP. JT. @	RAIL OPENING
END BENT 1	1 3/8"
END BENT 2	1 3/8"



PLAN



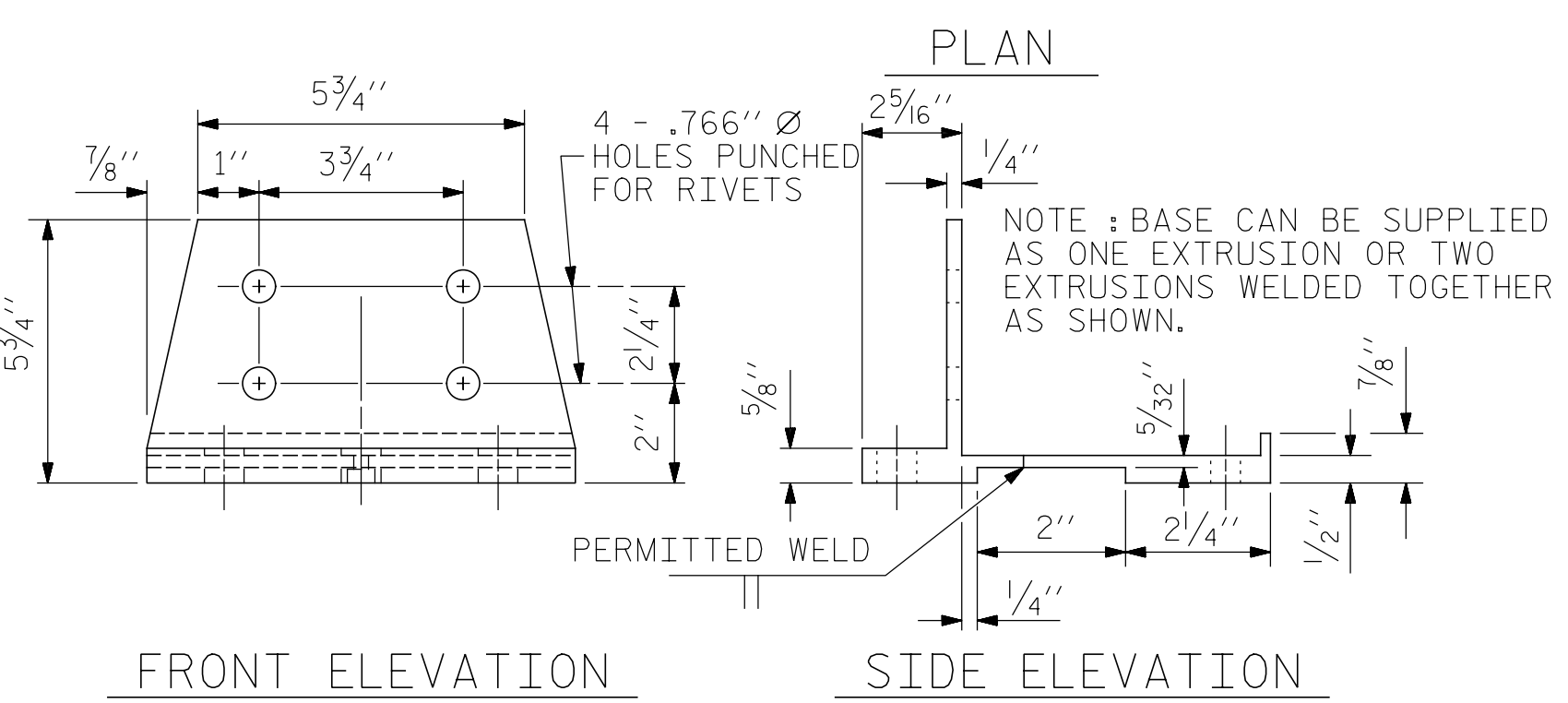
SECTION THRU PARAPET AND RAIL



FRONT ELEVATION

SIDE ELEVATION

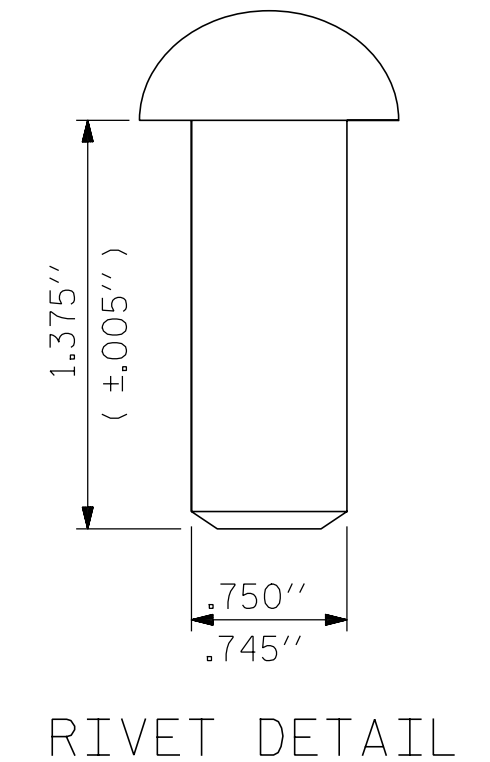
DETAILS OF POST



FRONT ELEVATION

SIDE ELEVATION

POST BASE DETAILS



RIVET DETAIL

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DRAWN BY: J. N. AUSTIN DATE: 2-5-18
 CHECKED BY: P. R. HOLSHOUSER DATE: 2-7-18
 DESIGN E.O.R.: P. R. HOLSHOUSER DATE: 5-8-18

NOTES

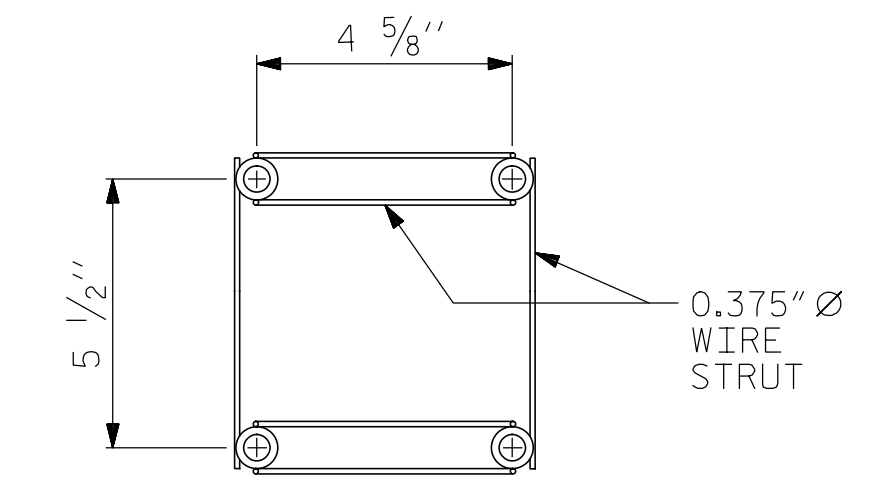
STRUCTURAL CONCRETE ANCHOR ASSEMBLY

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

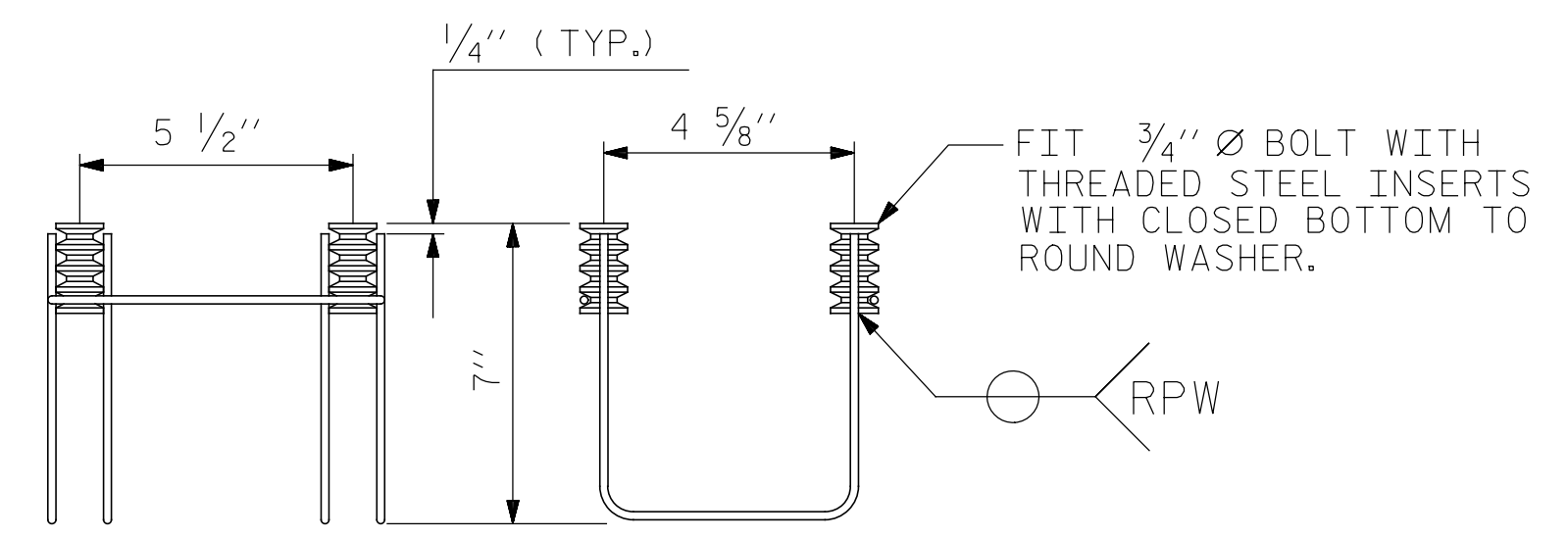
- A. FERRULES SHALL BE MADE FROM STEEL MEETING THE REQUIREMENTS OF AASHTO M169, GRADE 12L14 AND SHALL HAVE A MINIMUM LENGTH OF THREADS OF 2" FOR 3/4" FERRULES.
- B. 4 - 3/4" Ø X 2 1/2" BOLTS WITH WASHERS. BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307. BOLTS AND WASHERS SHALL BE GALVANIZED. AT 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.



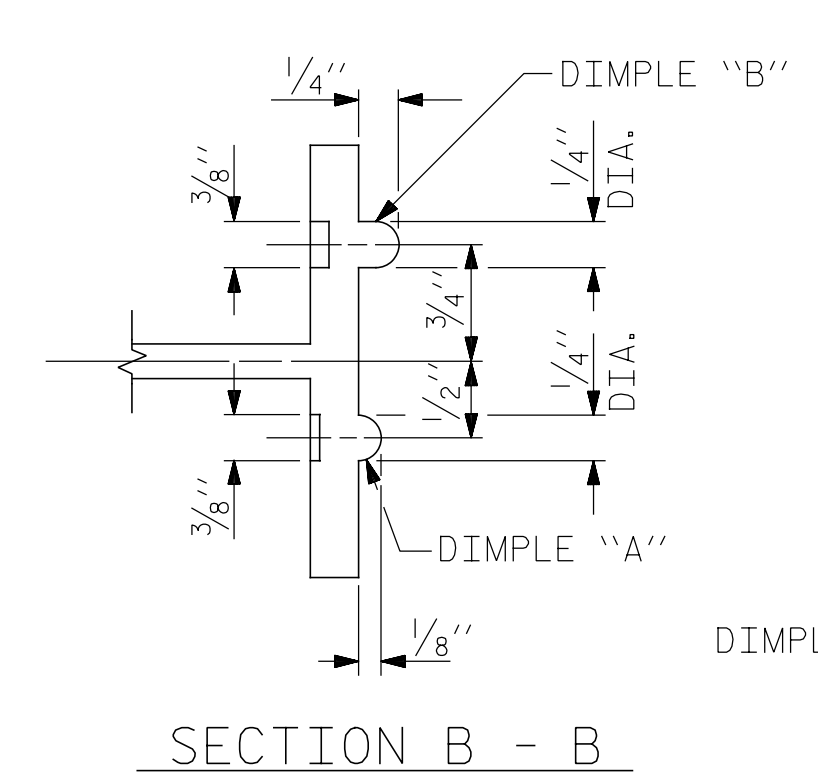
PLAN



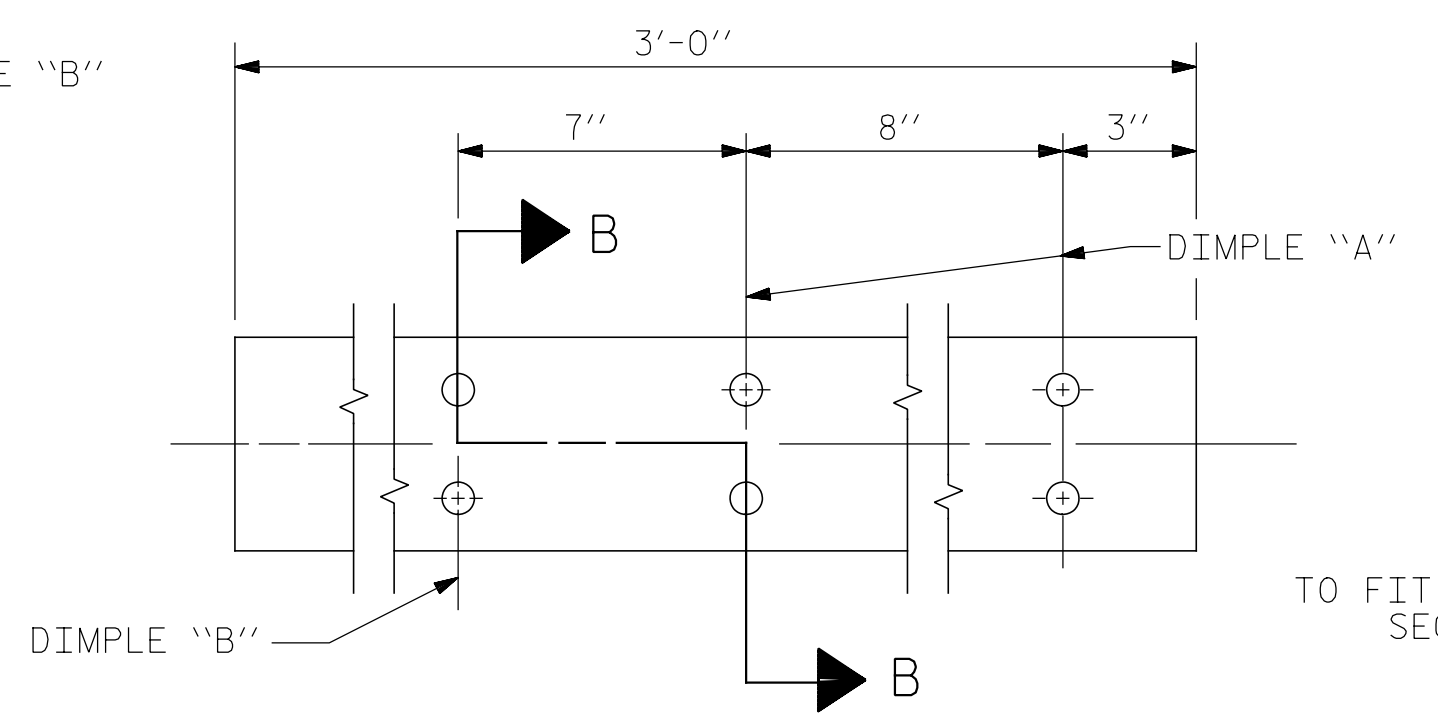
SIDE VIEW ELEVATION

4-BOLT METAL RAIL ANCHOR ASSEMBLY

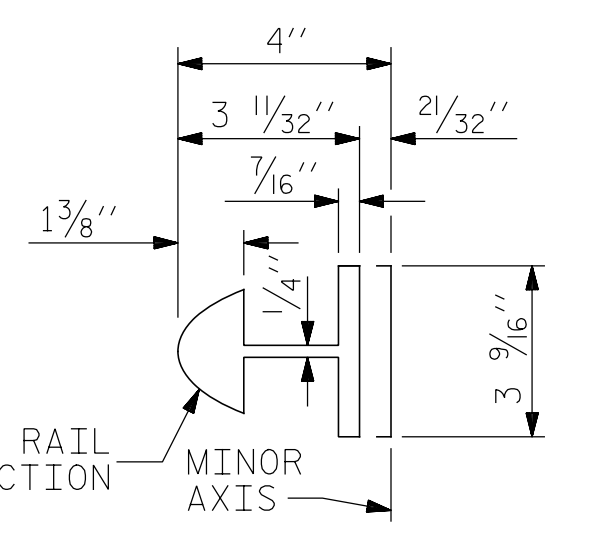
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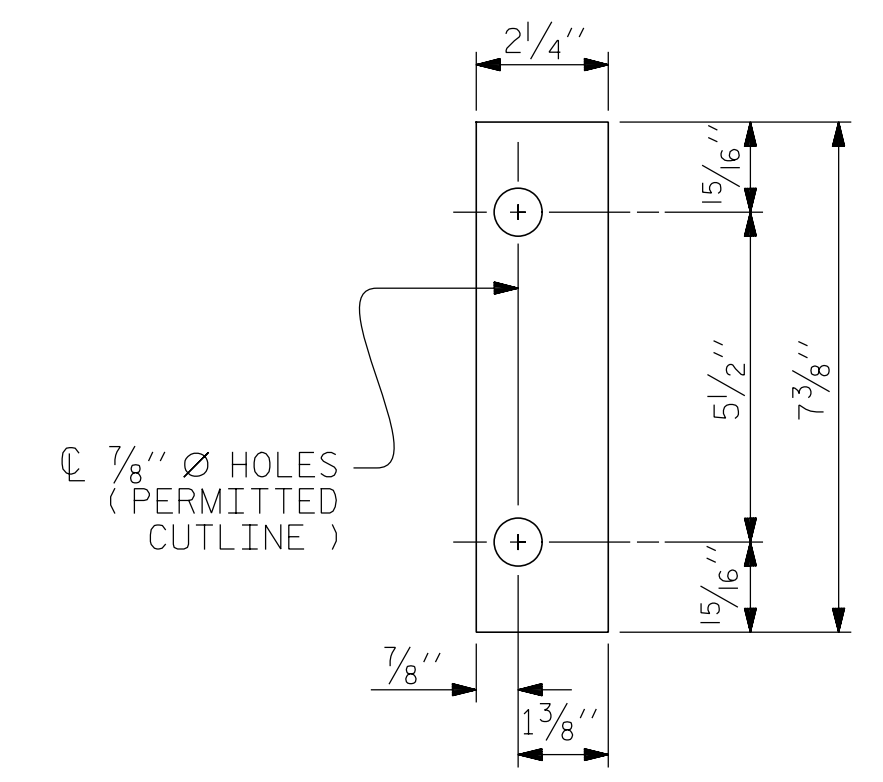
SECTION B - B



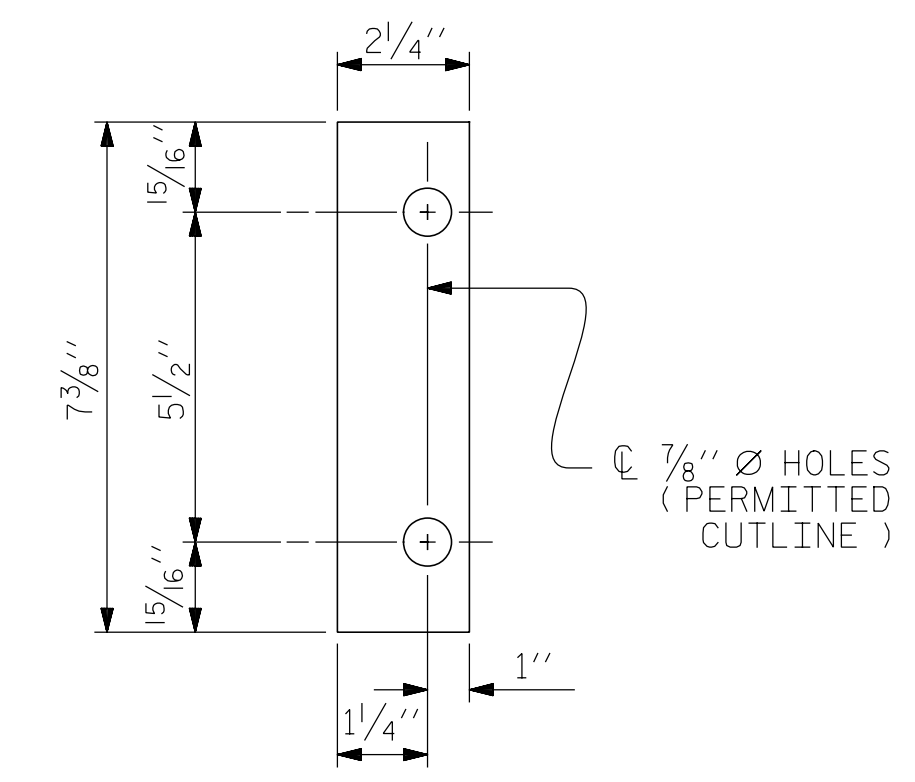
EXPANSION BAR DETAILS



BAR SECTION



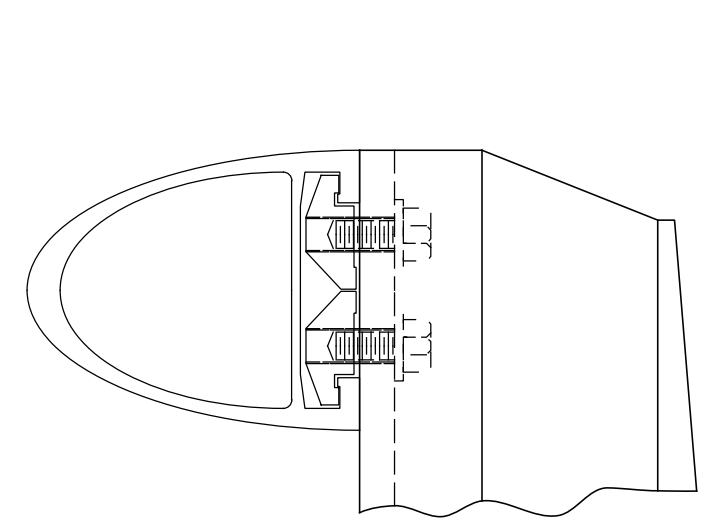
FRONT PLATE



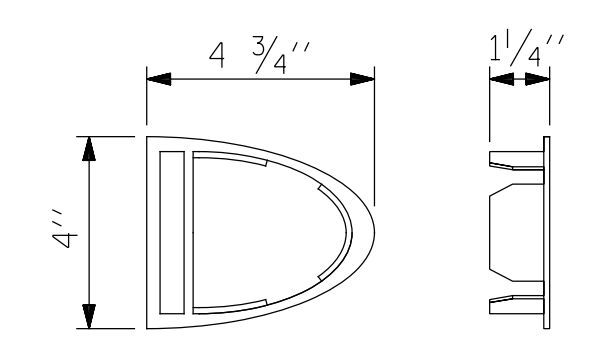
REAR PLATE

SHIM DETAILS

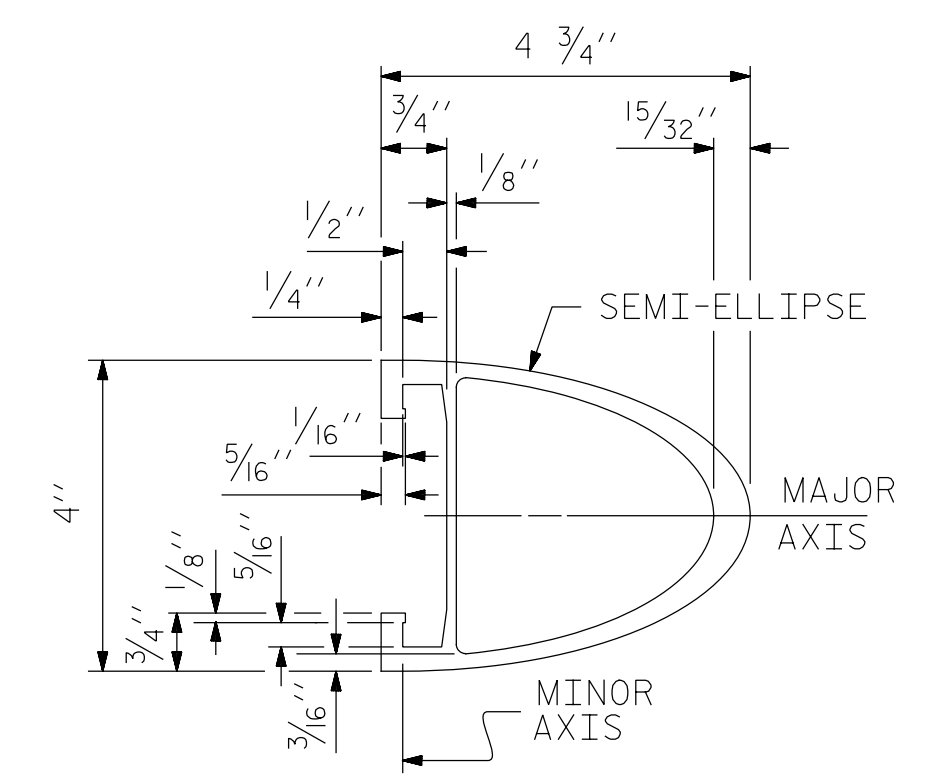
NOTE : SHIMS MAY BE CUT ALONG PERMITTED CUTLINE OR SLOTTED TO EDGE OF PLATE TO FACILITATE PLACEMENT.



CLAMP ASSEMBLY

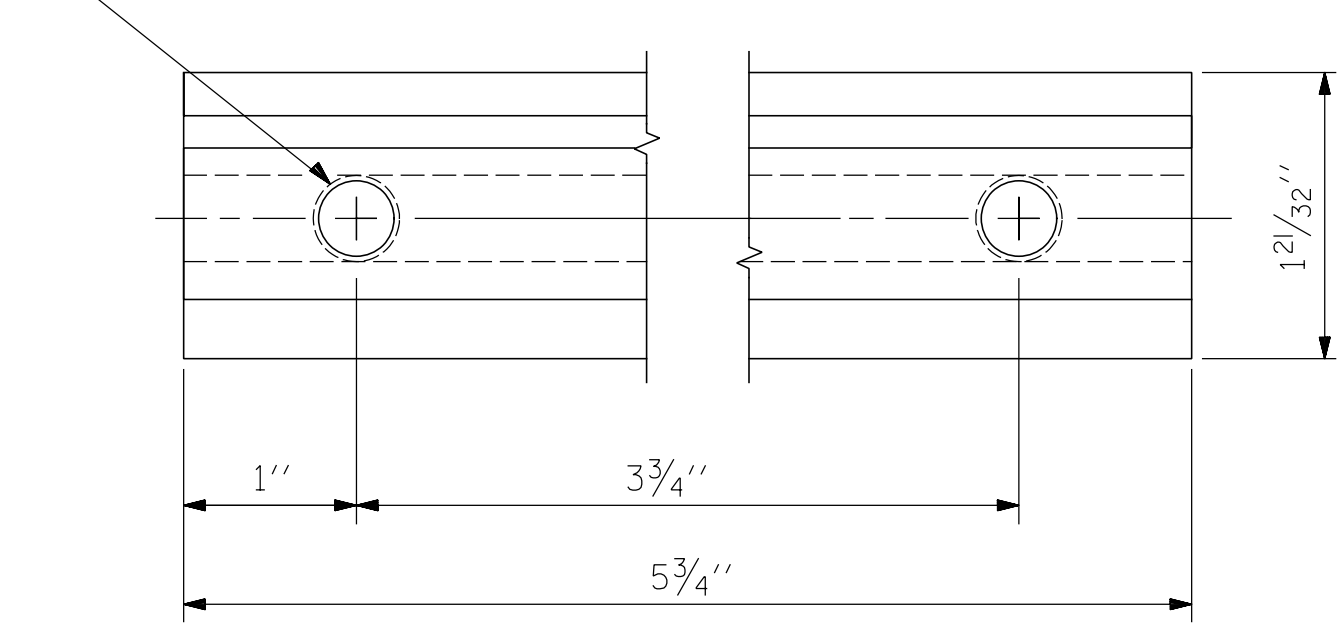


RAIL CAP



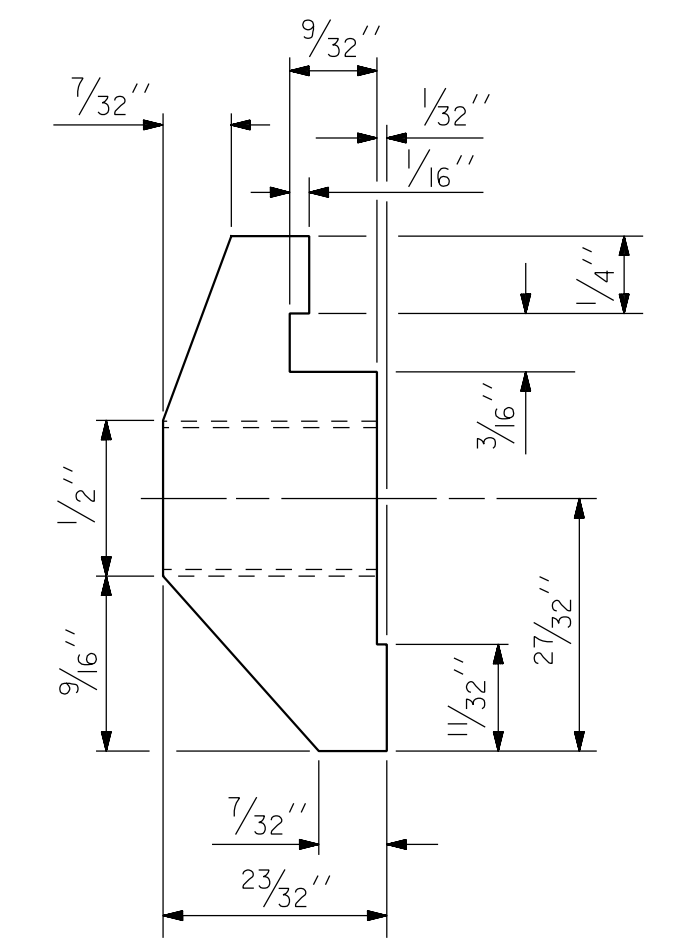
RAIL SECTION

1/2" Ø [13 THREAD] HOLE FOR 1/2" Ø X 1" STAINLESS STEEL HEX HEAD CAP SCREW & 1/16" O.D., 1 7/32" I.D., 1/16" THICK WASHER (TYP.)



CLAMP BAR DETAIL

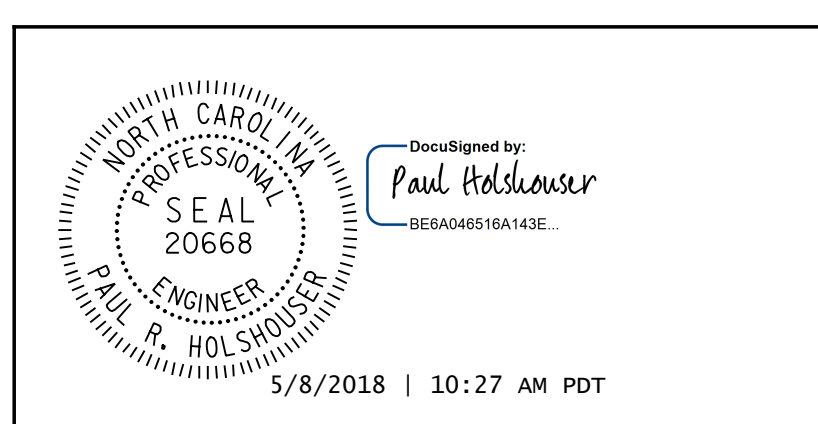
(4 REQUIRED PER POST)



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DRAWN BY : J. N. AUSTIN DATE : 2-5-18
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DESIGN E.O.R. : P. R. HOLSHOUSER DATE : 5-8-18

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PROJECT NO. I-5714
MECKLENBURG COUNTY
STATION: 26+20.73 -YEB-

SHEET 2 OF 2 RAIL RETROFIT OF BRIDGE NO. 356

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH SUPERSTRUCTURE 2 BAR METAL RAIL EXISTING BRIDGE RAIL RETROFIT					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
SHEET NO. S-53					TOTAL SHEETS 53

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.
	--	27,000 LBS. PER SQ. IN.
	--	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 $1\frac{1}{2}$ " 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 $\frac{3}{16}$ " 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. FINIS 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

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