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numbers appear on each page, on the dates appearing  
with their signature on that page.**

**This file or an individual page  
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**TIP PROJECT: U-4734**

**CONTRACT: C204124**

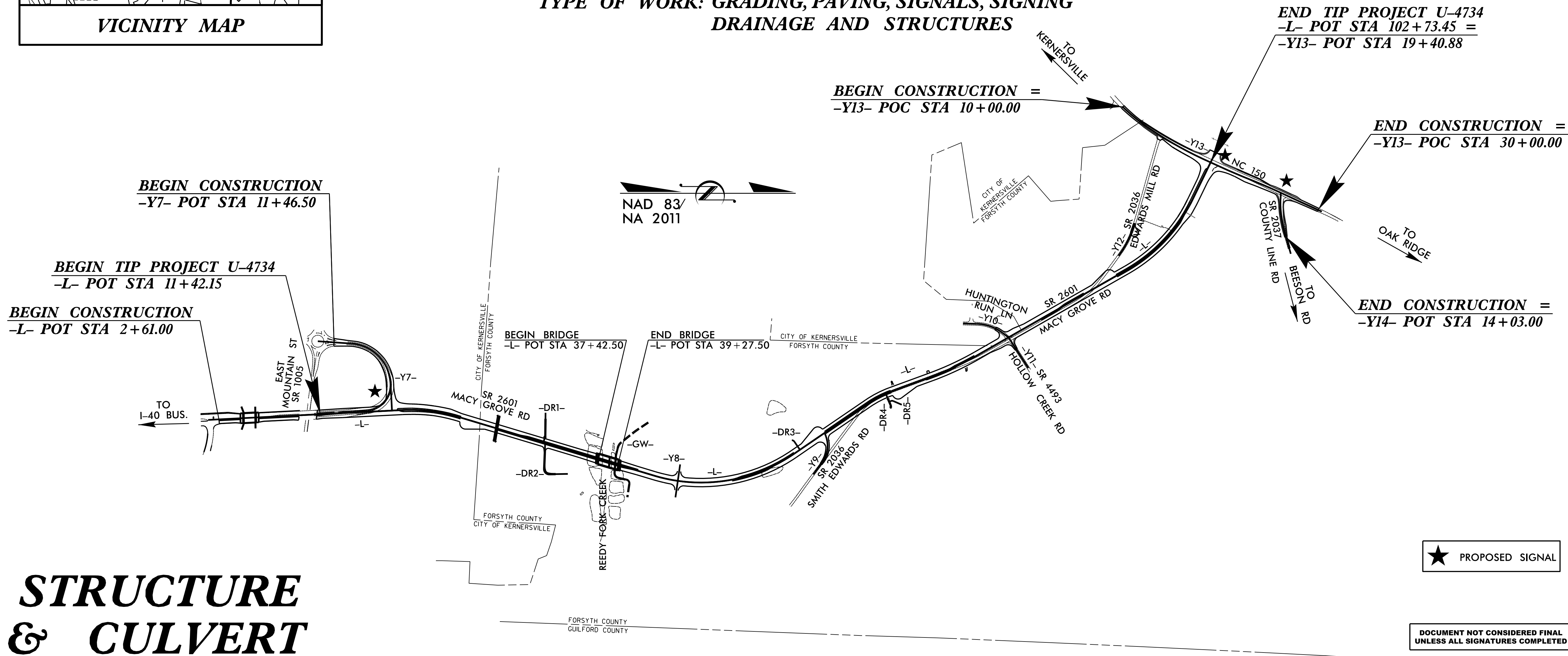
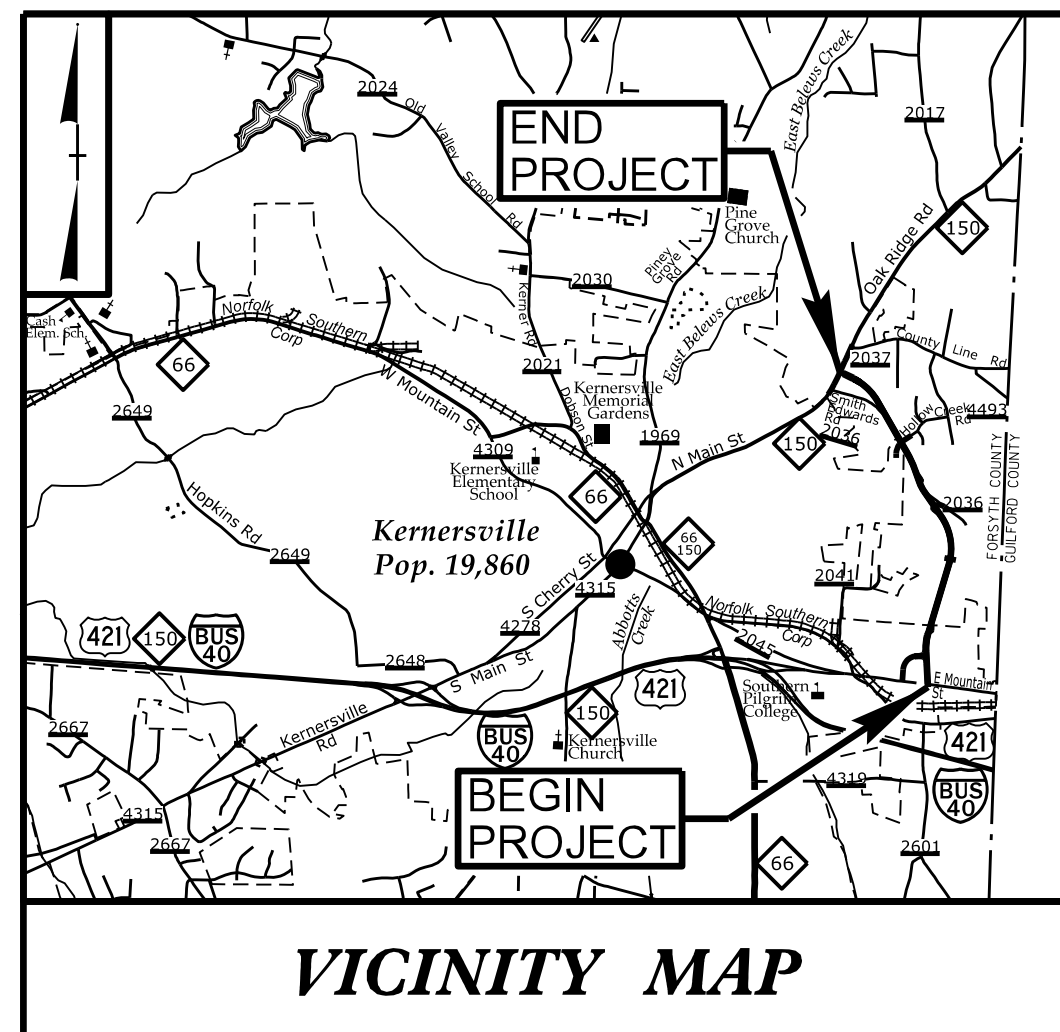
STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

**FORSYTH COUNTY**

**LOCATION: KERNERSVILLE - SR 2601 (MACY GROVE RD) EXTENSION  
FROM NORTH OF SR 1005 (EAST MOUNTAIN ST) TO NC 150  
(NORTH MAIN ST)**

**TYPE OF WORK: GRADING, PAVING, SIGNALS, SIGNING  
DRAINAGE AND STRUCTURES**

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-4734		
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
36600.1.2	STP-2601(3)	PE	
36600.2.1		RW	
36600.2.2		UTIL	
36600.3.1		CONST	



**STRUCTURE  
& CULVERT**

**DESIGN DATA**

ADT (2018) =	7,400
ADT (2038) =	10,300
K =	11 %
D =	55 %
T =	6 % *
V =	50 MPH
* TTST =	2% DUAL 4%
FUNC CLASS =	COLLECTOR
REGIONAL TIER	

**PROJECT LENGTH**

LENGTH ROADWAY TIP PROJECT U-4734 =	1.694 MILES
LENGTH STRUCTURES TIP PROJECT U-4734 =	0.035 MILES
TOTAL LENGTH TIP PROJECT U-4734 =	1.729 MILES

Prepared for the  
North Carolina Department  
of Transportation  
in the office of:

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

2018 STANDARD SPECIFICATIONS

LETTING DATE:  
JUNE 19, 2018

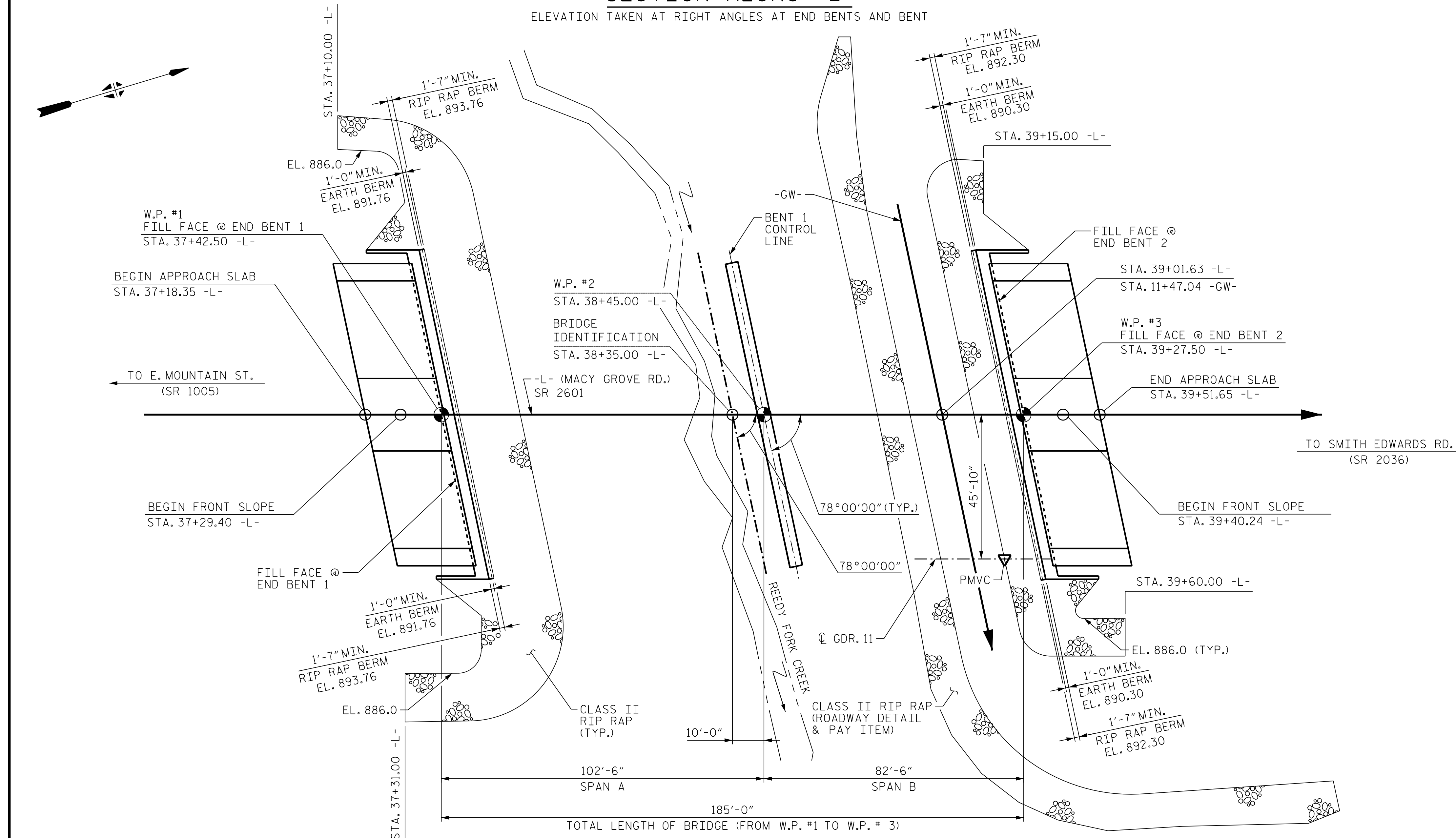
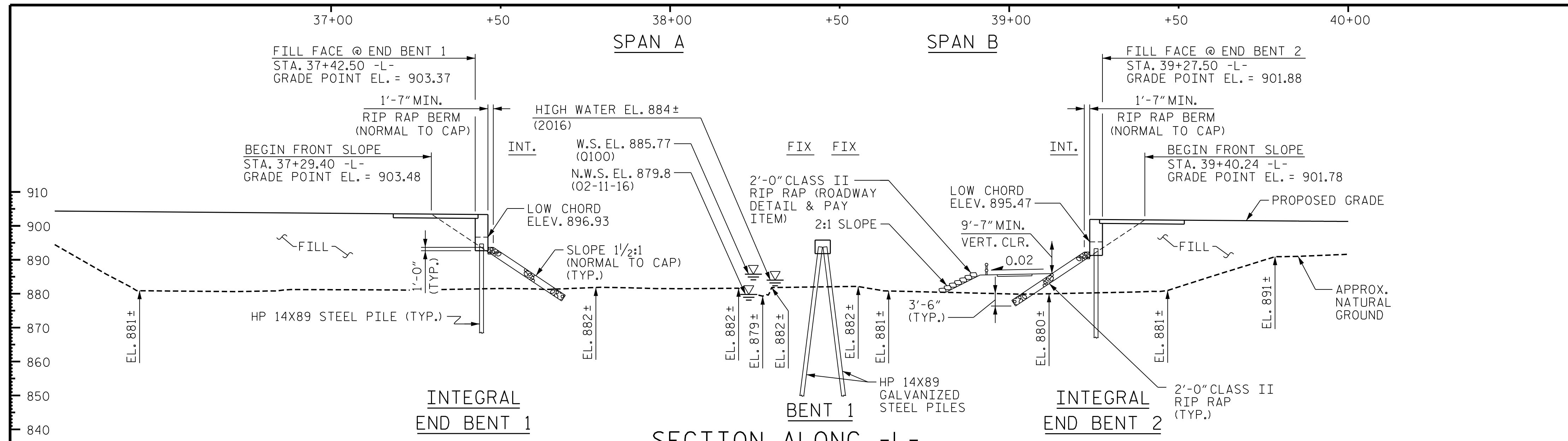
PROFESSIONAL ENGINEER  
SEAL 43031  
MATTHEW T. NEHRIS

4/9/2018  
4/9/2018

DIVISION OF HIGHWAYS

STATE OF NORTH CAROLINA





**VERTICAL GRADE DATA -L-**

(-)0.8055% (+)3.3900%  
 P.I. = 41+90.00 -L-  
 ELEV. = 899.77  
 VC = 410.00'

**VERTICAL GRADE DATA -GW-**

(-)5.7256% 0.0000%  
 P.I. = 10+75.00 -GW-  
 ELEV. = 885.70  
 VC = 30.00'

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS

**PMVC**

STA. 39+21.59 -L-  
 OFFSET = 45.83' RT.

STA. 11+96.02 -GW-  
 OFFSET = 10.00' LT.  
 EL. = 885.90

**LEGEND**

PMVC = POINT OF MINIMUM VERTICAL CLEARANCE

PROJECT NO. U-4734

FORSYTH COUNTY

STATION: 38+35.00 -L-

SHEET 1 OF 4 BRIDGE NO. 709

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**GENERAL DRAWING**

FOR BRIDGE OVER REEDY FORK CREEK AND GREENWAY ON SR 2601 BETWEEN SR 1005 AND SR 2036

**REVISIONS**

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

DATE: 10/2018

DRAWN BY : D. H. CARTER DATE : APR 2018

CHECKED BY : M. T. NEIHEISEL DATE : APR 2018

DESIGN ENGINEER OF RECORD : M. T. NEIHEISEL DATE : APR 2018

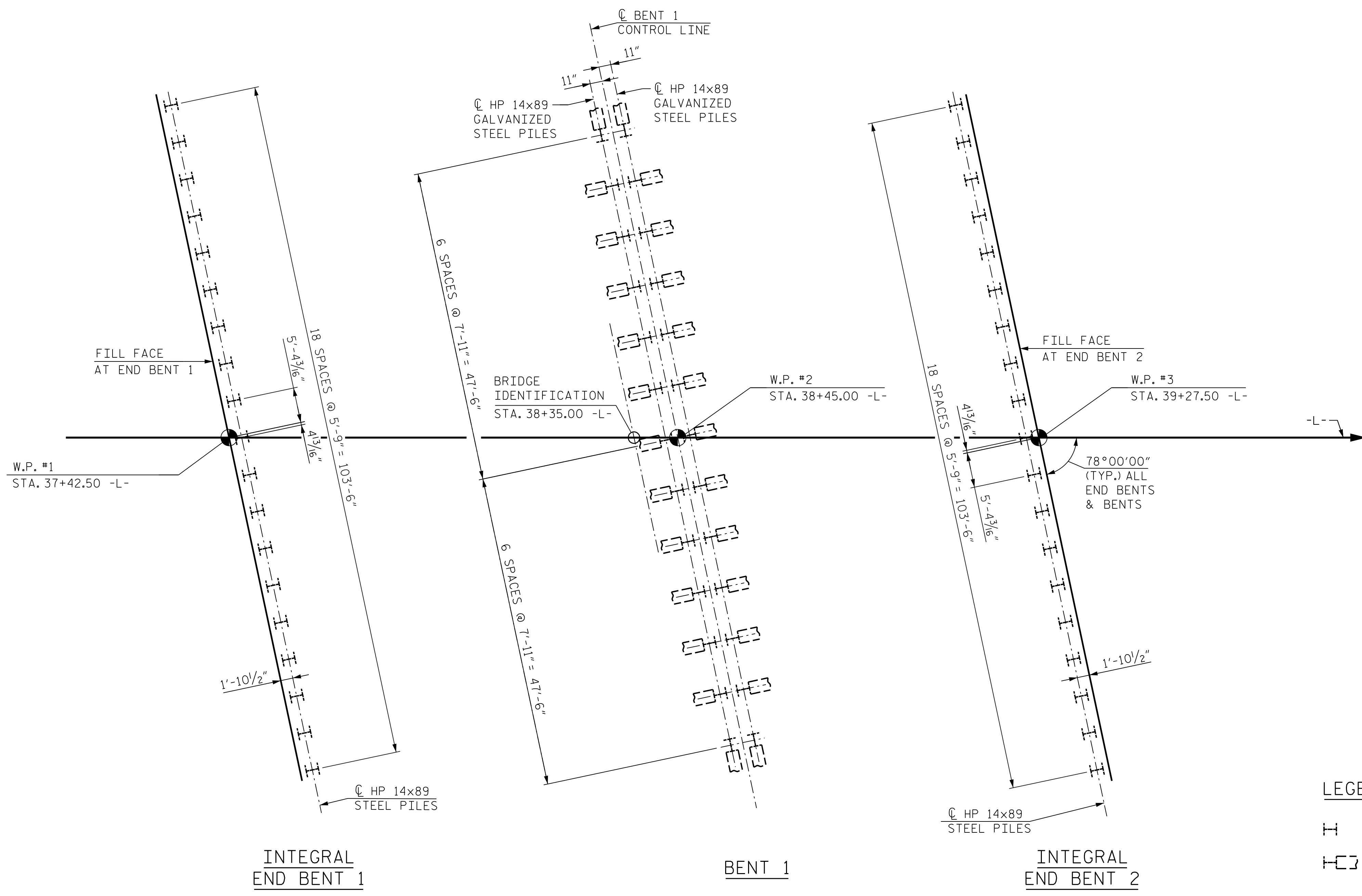
PILES NOT SHOWN FOR CLARITY  
 END BENTS AND BENT ARE PARALLEL

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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SHEET NO. S-1  
 TOTAL SHEETS 42



PLOT DRIVER: NCDOT\_STRUCTURES\_DEFAULT\_PLOTTER.plt  
 PENTABLE: NCDOT\_STRUCTURES\_DEFAULT\_PEN.tbl  
 USER: dcarter DATE: 4/9/2018 TIME: 3:19:08 PM  
 FILE: ... \NCAD\0300\_U4737\_SML\_CD.dgn



**FOUNDATION LAYOUT**

ALL PILES ARE HP 14x89 STEEL PILES.  
DIMENSIONS LOCATING PILES ARE SHOWN TO THE CENTERLINE OF PILES.

**LEGEND**

-  VERTICAL HP 14x89 STEEL PILE
-  BATTERED HP 14x89 GALVANIZED STEEL PILE (1.5:12 BATTER)

**FOUNDATION NOTES**

FOR PILES, SEE SECTION 450 OF STANDARD SPECIFICATIONS.

PILES AT END BENT NO.1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 115 TONS PER PILE.

DRIVE PILES AT END BENT NO.1 TO A REQUIRED DRIVING RESISTANCE OF 305 TONS PER PILE. THIS REQUIRED DRIVING RESISTANCE INCLUDES ADDITIONAL RESISTANCE FOR DOWNDRAG.

PILES AT BENT NO.1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 155 TONS PER PILE.

DRIVE PILES AT BENT NO.1 TO A REQUIRED DRIVING RESISTANCE OF 255 TONS PER PILE. THIS REQUIRED DRIVING RESISTANCE INCLUDES ADDITIONAL RESISTANCE FOR SCOUR.

THE SCOUR CRITICAL ELEVATION FOR BENT NO.1 IS 873.0 FEET. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.

PILES AT END BENT NO.2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 115 TONS PER PILE.

DRIVE PILES AT END BENT NO.2 TO A REQUIRED DRIVING RESISTANCE OF 295 TONS PER PILE. THIS REQUIRED DRIVING RESISTANCE INCLUDES ADDITIONAL RESISTANCE FOR DOWNDRAG.

SEE ROADWAY PLANS AND SECTION 235 OF THE STANDARD SPECIFICATIONS FOR THE SETTLEMENT GAUGES REQUIRED AT END BENT NO.1 AND END BENT NO.2.

OBSERVE A 2 MONTH WAITING PERIOD AFTER CONSTRUCTING THE EMBANKMENT TO WITHIN 2 FT OF FINISHED GRADE BEFORE BEGINNING END BENT CAP CONSTRUCTION AT END BENT NOS.1 AND 2. THEN AN ADDITIONAL 2 MONTHS WAITING PERIOD PRIOR TO APPROACH SLAB CONSTRUCTION FOR A TOTAL OF 4 MONTHS PENDING THE RESULTS OF SETTLEMENT MONITORING. FOR BRIDGE WAITING PERIODS, SEE ROADWAY PLANS AND SECTION 235 OF THE STANDARD SPECIFICATIONS.

IT HAS BEEN ESTIMATED THAT A HAMMER WITH AN EQUIVALENT RATED ENERGY IN THE RANGE OF 48,000 TO 70,000 FT-LBS PER BLOW WILL BE REQUIRED TO DRIVE PILES AT END BENT NOS.1 AND 2 AND BENT NO.1. THIS ESTIMATED ENERGY RANGE DOES NOT RELEASE THE CONTRACTOR FROM PROVIDING DRIVING EQUIPMENT IN ACCORDANCE WITH SUBARTICLE 450-3(D)(2) OF THE STANDARD SPECIFICATIONS.

BRIDGE WAITING PERIODS MAY BE TERMINATED OR EXTENDED AS DETERMINED BY THE ENGINEER.

PROJECT NO. U-4734

FORSYTH COUNTY

STATION: 38+35.00 -L-

SHEET 2 OF 4

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

**GENERAL DRAWING**  
FOUNDATION LAYOUT



*Matthew T. Neiheisel* 8/15/2018

DRAWN BY : D. H. CARTER DATE : MAY 2018  
 CHECKED BY : M. T. NEIHEISEL DATE : MAY 2018  
 DESIGN ENGINEER OF RECORD: M. T. NEIHEISEL DATE : MAY 2018

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

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-2
1			3			TOTAL SHEETS
2			4			42

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PLOT DRIVER: NCDOT STRUCTURES DEFAULT PLOTTER.PH  
 USER: MNEIHEIS  
 DATE: 5/14/2018  
 TIME: 4:07:13 PM  
 FILE: ... \CAD\0310-144737-SMU-FL.dgn



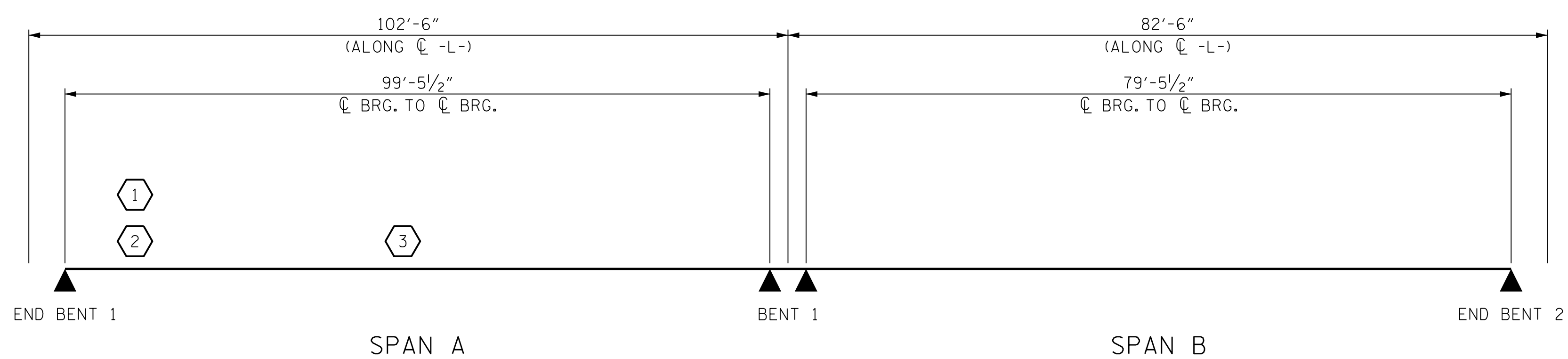


LOAD FACTORS:

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

**NOTES:**  
 MINIMUM RATING FACTORS ARE BASED ON THE STRENGTH I AND SERVICE III LIMIT STATES.  
 ALLOWABLE STRESSES FOR SERVICE III LIMIT STATE ARE AS REQUIRED FOR DESIGN.  
 DISTANCE FROM LEFT END OF SPAN IS GIVEN WITH RESPECT TO THE CENTERLINE OF BEARING AND IS MEASURED ALONG THE CONTROLLING GIRDER.

LEVEL	VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING #	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE						SERVICE III LIMIT STATE						COMMENT NUMBER						
						LIVE-LOAD FACTORS ( $\gamma_{LL}$ )	MOMENT			SHEAR			LIVE-LOAD FACTORS ( $\gamma_{LL}$ )	MOMENT										
							DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (FT)	DISTRIBUTION FACTORS (DF)		RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (FT)							
DESIGN LOAD RATING	HL-93 (INVENTORY)	N/A	①	1.19	--	1.75	0.780	1.43	B	I	39.729	0.938	1.19	A	I	9.946	0.80	0.734	1.20	A	I	49.729		
	HL-93 (OPERATING)	N/A		1.58	--	1.35	0.780	1.85	B	I	39.729	0.938	1.58	A	I	9.946	N/A	--	--	--	--	--		
	HS-20 (INVENTORY)	36.000	②	1.63	58.680	1.75	0.780	1.90	B	I	39.729	0.938	1.63	A	I	9.946	0.80	0.734	1.67	A	I	49.729		
	HS-20 (OPERATING)	36.000		2.15	77.400	1.35	0.780	2.47	B	I	39.729	0.938	2.15	A	I	9.946	N/A	--	--	--	--	--		
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		3.96	53.460	1.40	0.780	5.46	B	I	39.729	0.938	5.27	A	I	9.946	0.80	0.734	3.96	A	I	49.729	
		SNGARBS2	20.000		2.87	57.400	1.40	0.780	4.03	B	I	39.729	0.938	3.65	A	I	9.946	0.80	0.734	2.87	A	I	49.729	
		SNAGRIS2	22.000		2.68	58.960	1.40	0.780	3.80	B	I	39.729	0.938	3.36	A	I	9.946	0.80	0.734	2.68	A	I	49.729	
		SNCOTTS3	27.250		1.97	53.683	1.40	0.780	2.71	B	I	39.729	0.938	2.56	A	I	9.946	0.80	0.734	1.97	A	I	49.729	
		SNAGGRS4	34.925		1.61	56.229	1.40	0.780	2.25	B	I	39.729	0.938	2.06	A	I	9.946	0.80	0.734	1.61	A	I	49.729	
		SNS5A	35.550		1.58	56.169	1.40	0.780	2.20	B	I	39.729	0.938	2.07	A	I	9.946	0.80	0.734	1.58	A	I	49.729	
		SNS6A	39.950		1.43	57.129	1.40	0.780	2.02	B	I	39.729	0.938	1.86	A	I	9.946	0.80	0.734	1.43	A	I	49.729	
		SNS7B	42.000		1.37	57.540	1.40	0.780	1.92	B	I	39.729	0.938	1.81	A	I	9.946	0.80	0.734	1.37	A	I	49.729	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.75	57.750	1.40	0.780	2.46	B	I	39.729	0.938	2.25	A	I	9.946	0.80	0.734	1.75	A	I	49.729	
		TNT4A	33.075		1.75	57.881	1.40	0.780	2.47	B	I	39.729	0.938	2.21	A	I	9.946	0.80	0.734	1.75	A	I	49.729	
		TNT6A	41.600		1.42	59.072	1.40	0.780	2.01	B	I	39.729	0.938	1.90	A	I	9.946	0.80	0.734	1.42	A	I	49.729	
		TNT7A	42.000		1.42	59.640	1.40	0.780	2.02	B	I	39.729	0.938	1.87	A	I	9.946	0.80	0.734	1.42	A	I	49.729	
		TNT7B	42.000		1.45	60.900	1.40	0.780	2.08	B	I	39.729	0.938	1.78	A	I	9.946	0.80	0.734	1.45	A	I	49.729	
		TNAGRIT4	43.000		1.39	59.770	1.40	0.780	1.98	B	I	39.729	0.938	1.72	A	I	9.946	0.80	0.734	1.39	A	I	49.729	
TNAGT5A	45.000		1.32	59.400	1.40	0.780	1.87	B	I	39.729	0.938	1.69	A	I	9.946	0.80	0.734	1.32	A	I	49.729			
TNAGT5B	45.000	③	1.31	58.950	1.40	0.780	1.85	B	I	39.729	0.938	1.64	A	I	9.946	0.80	0.734	1.31	A	I	49.729			



③ CONTROLLING LOAD RATING

① DESIGN LOAD RATING (HL-93)

② DESIGN LOAD RATING (HS-20)

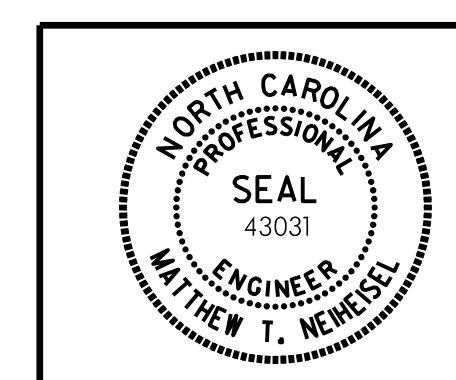
③ LEGAL LOAD RATING \*\*

\*\* SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

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

PROJECT NO. U-4734  
 FORSYTH COUNTY  
 STATION: 38+35.00 -L-  
 SHEET 4 OF 4



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**GENERAL DRAWING**  
 LRFR SUMMARY FOR  
 PRESTRESSED  
 CONCRETE GIRDERS  
 (NON-INTERSTATE TRAFFIC)

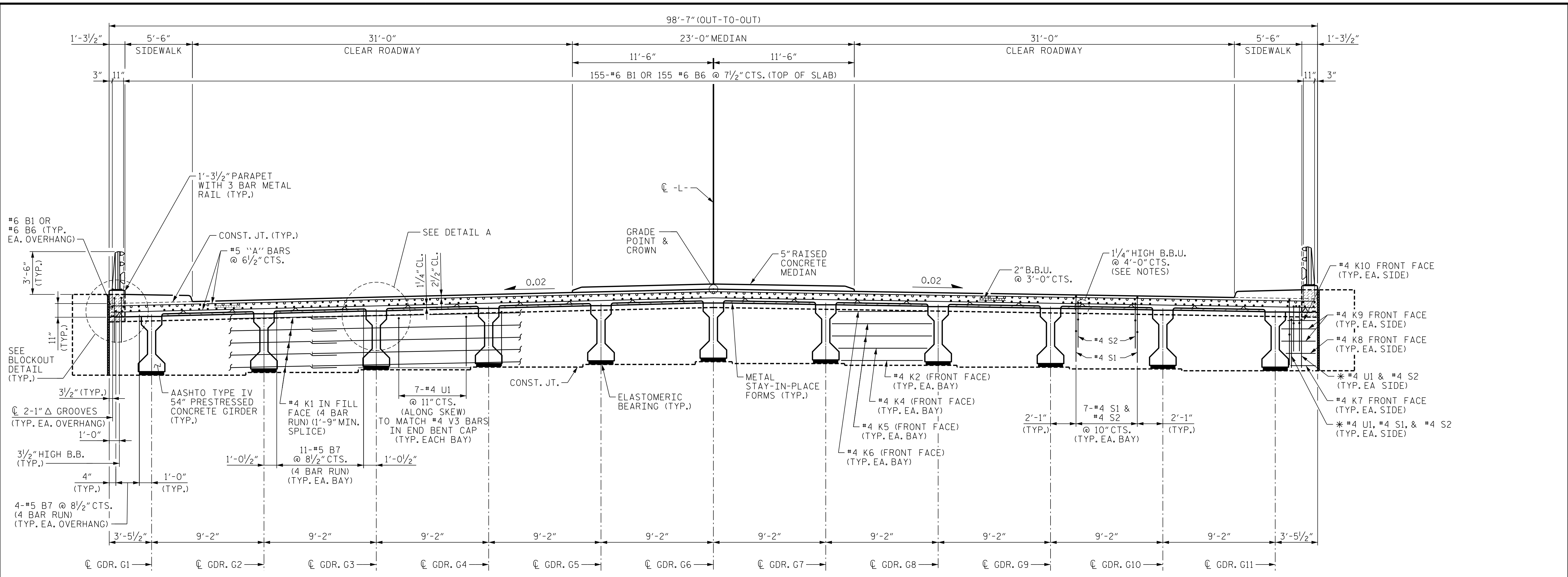
DRAWN BY: D. H. CARTER DATE: APR 2018  
 CHECKED BY: M. T. NEIHEISEL DATE: APR 2018  
 DESIGN ENGINEER OF RECORD: M. T. NEIHEISEL DATE: APR 2018

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

REVISIONS				SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
					TOTAL SHEETS: 42

PLOT DRIVER: NCDOT\_STRUCTURES\_DEFAULT\_PLOTTER.plt  
 PENTABLE: NCDOT\_STRUCTURES\_DEFAULT\_PEN.tbl  
 USER: dcarte  
 DATE: 4/9/2018  
 TIME: 3:19:15 PM  
 FILE: ... \CAD\0340\_U4737\_SWU\_LR.dgn





**TYPICAL SECTION AT INTEGRAL END BENTS**  
 \* TO MATCH #4 V3 BARS IN END BENT CAP

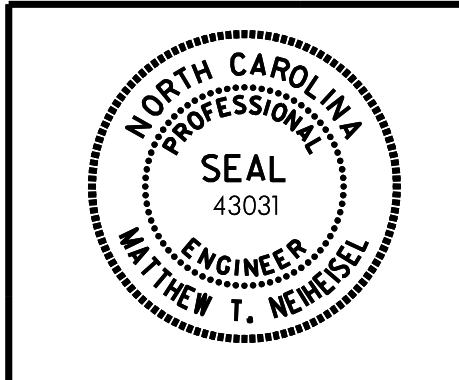
**NOTES:**

- PROVIDE 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.
- LONGITUDINAL STEEL MAY BE SHIFTED SLIGHTLY, AS NECESSARY, TO AVOID INTERFERENCE WITH STIRRUPS IN PRESTRESSED CONCRETE GIRDERS.
- 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.
- SIDEWALK AND CONCRETE MEDIAN SHALL NOT BE CAST UNTIL ALL SLAB CONCRETE HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

PROJECT NO. U-4734  
 FORSYTH COUNTY  
 STATION: 38+35.00 -L-  
 SHEET 1 OF 4

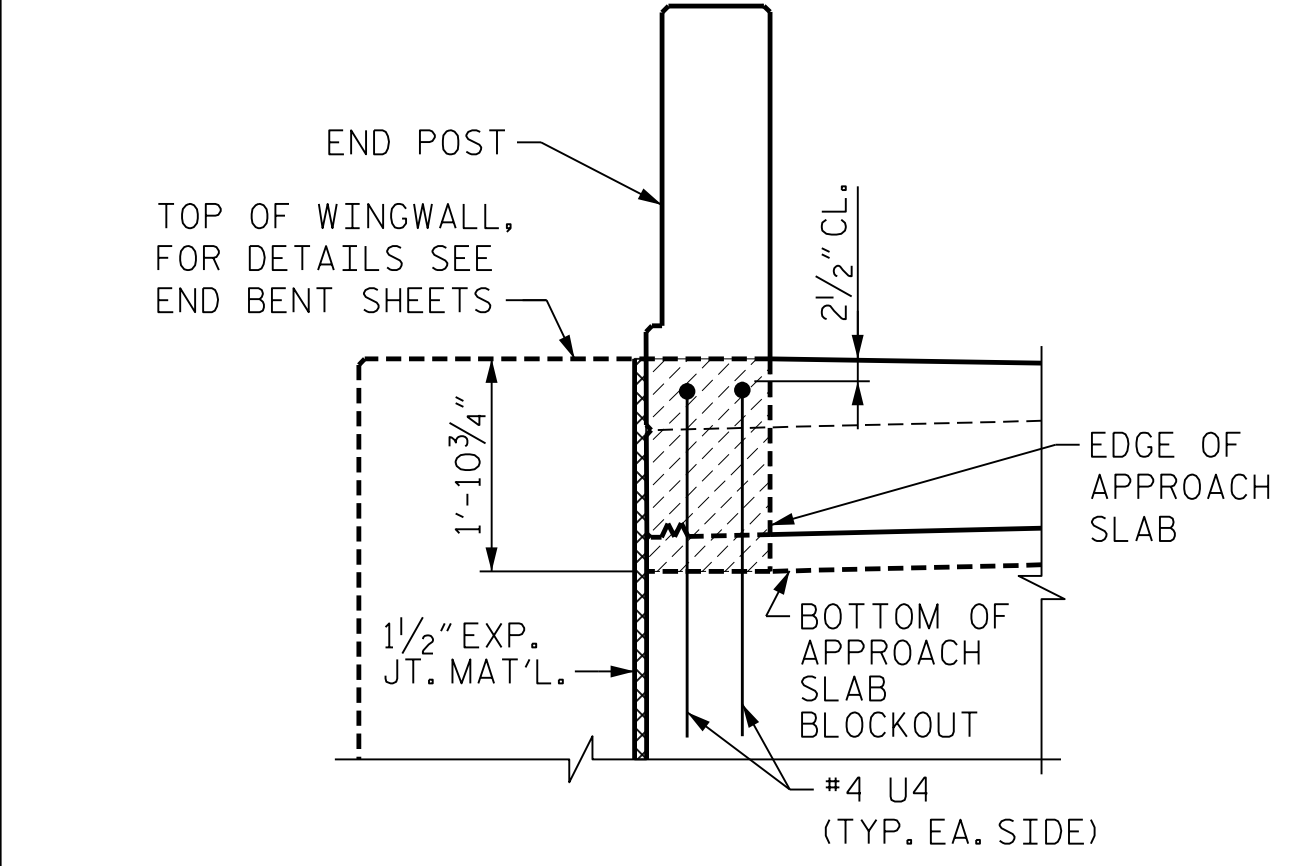
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**SUPERSTRUCTURE**  
 TYPICAL SECTION

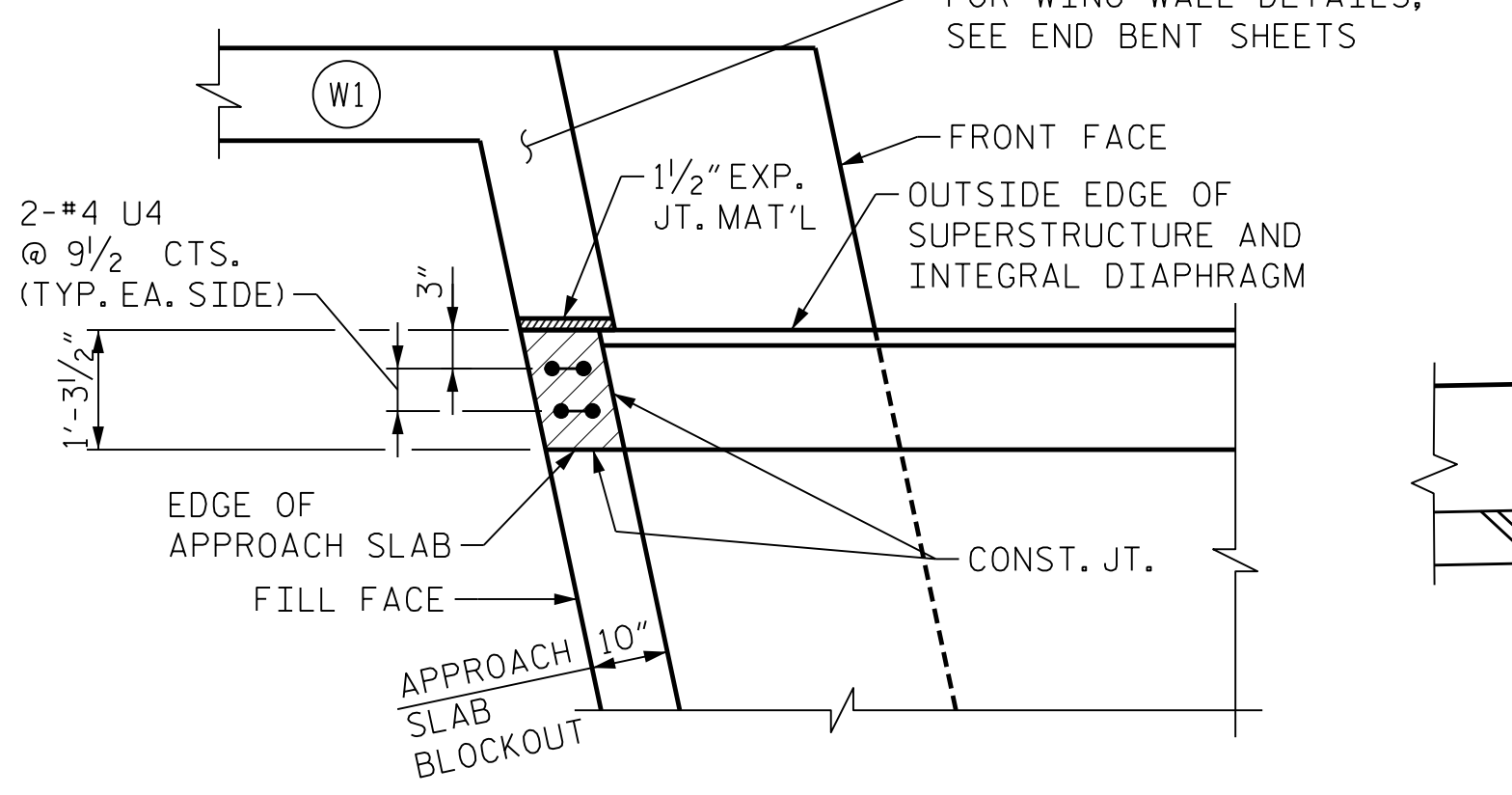


REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-5
1			3			TOTAL SHEETS 42
2			4			

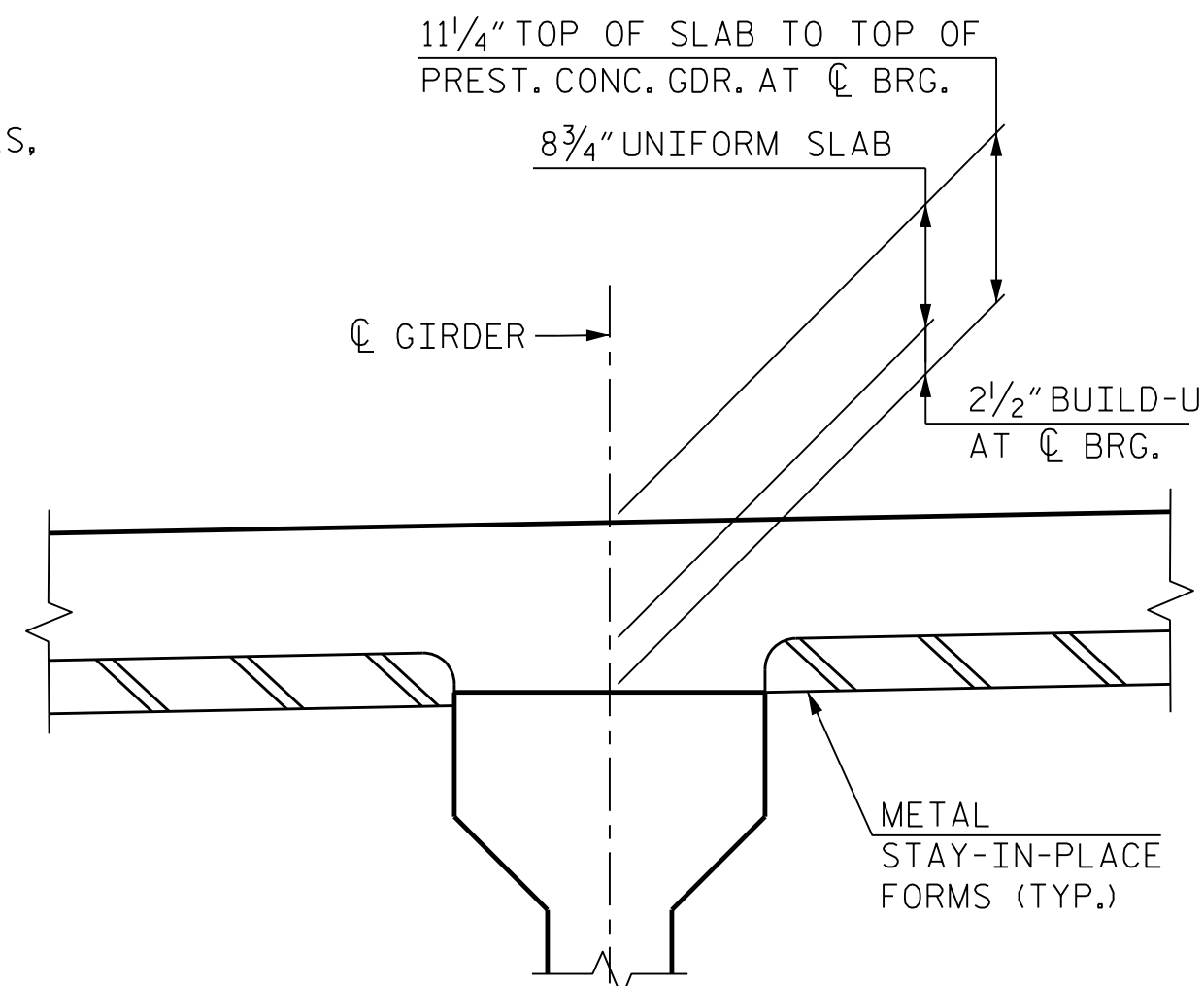
**HDR** HDR Engineering, Inc. of the Carolinas  
 555 Fayetteville St. Suite 900 Raleigh, N.C. 27601  
 N.C.B.E.L.S. License Number: F-0116



**BLOCKOUT DETAIL - ELEVATION VIEW**



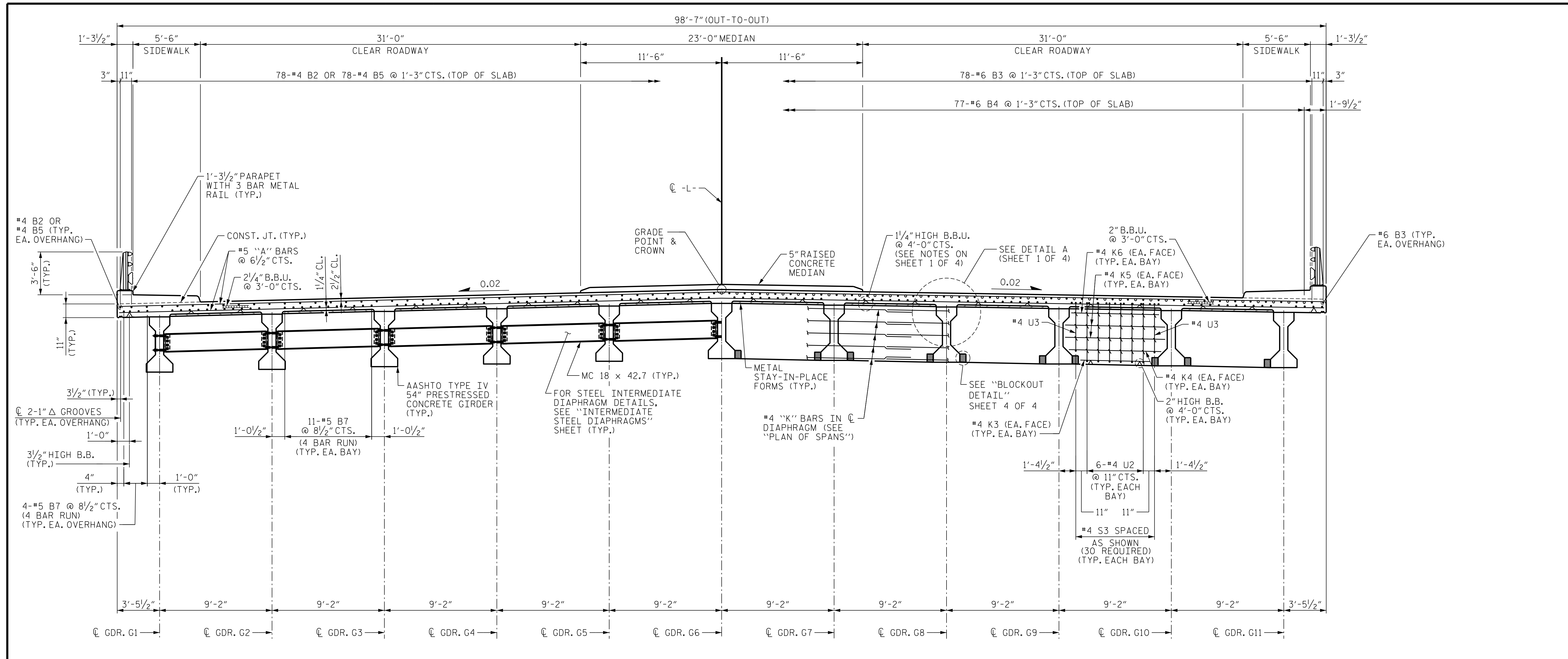
**BLOCKOUT DETAIL - PLAN VIEW**  
 END BENT 1 SHOWN, END BENT 2 SIMILAR.



**DETAIL "A"**  
 (TYPICAL EACH GIRDER)

DRAWN BY: D. H. CARTER DATE: APR 2018  
 CHECKED BY: M. T. NEIHEISEL DATE: APR 2018  
 DESIGN ENGINEER OF RECORD: M. T. NEIHEISEL DATE: APR 2018

PLOT DRIVER: NCDOT STRUCTURES DEFAULT PLOTTER.PH  
 USER: dcarte  
 DATE: 4/9/2018  
 TIME: 3:19:17 PM  
 FILE: ... \CAD\0500\_U4737-SMUL-TS.dgn



PARTIAL TYPICAL SECTION  
(SHOWING INTERMEDIATE DIAPHRAGMS)

PARTIAL TYPICAL SECTION  
(SHOWING BENT DIAPHRAGMS)

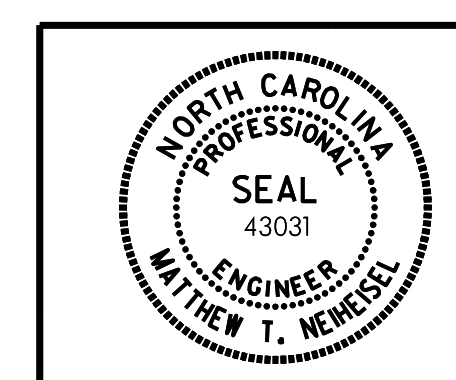
TYPICAL SECTION

PROJECT NO. U-4734  
 FORSYTH COUNTY  
 STATION: 38+35.00 -L-

SHEET 2 OF 4

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

SUPERSTRUCTURE  
 TYPICAL SECTION



Matthew T. Neiheisel / 10/2018

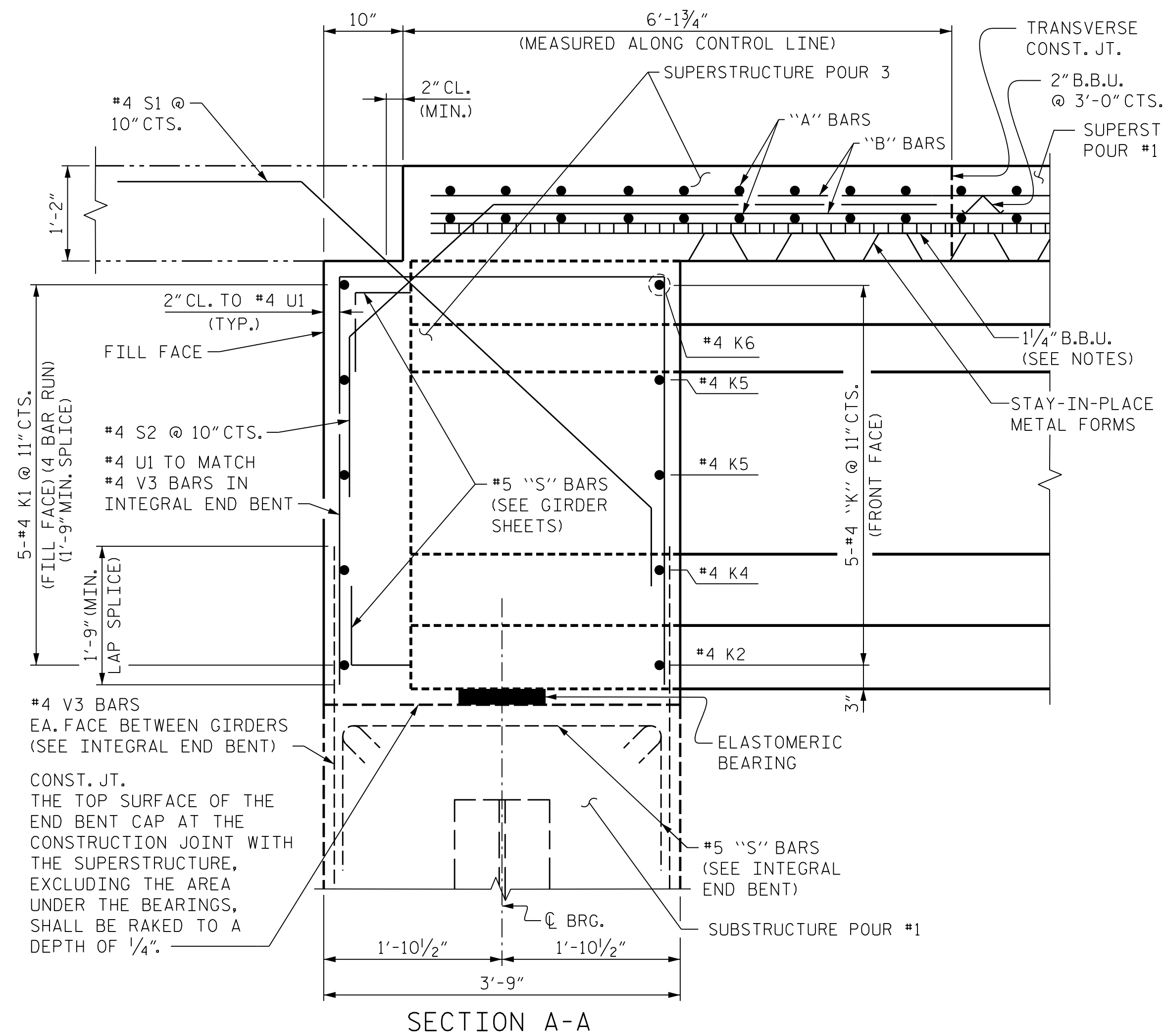
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-6
1			3			TOTAL SHEETS
2			4			42

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

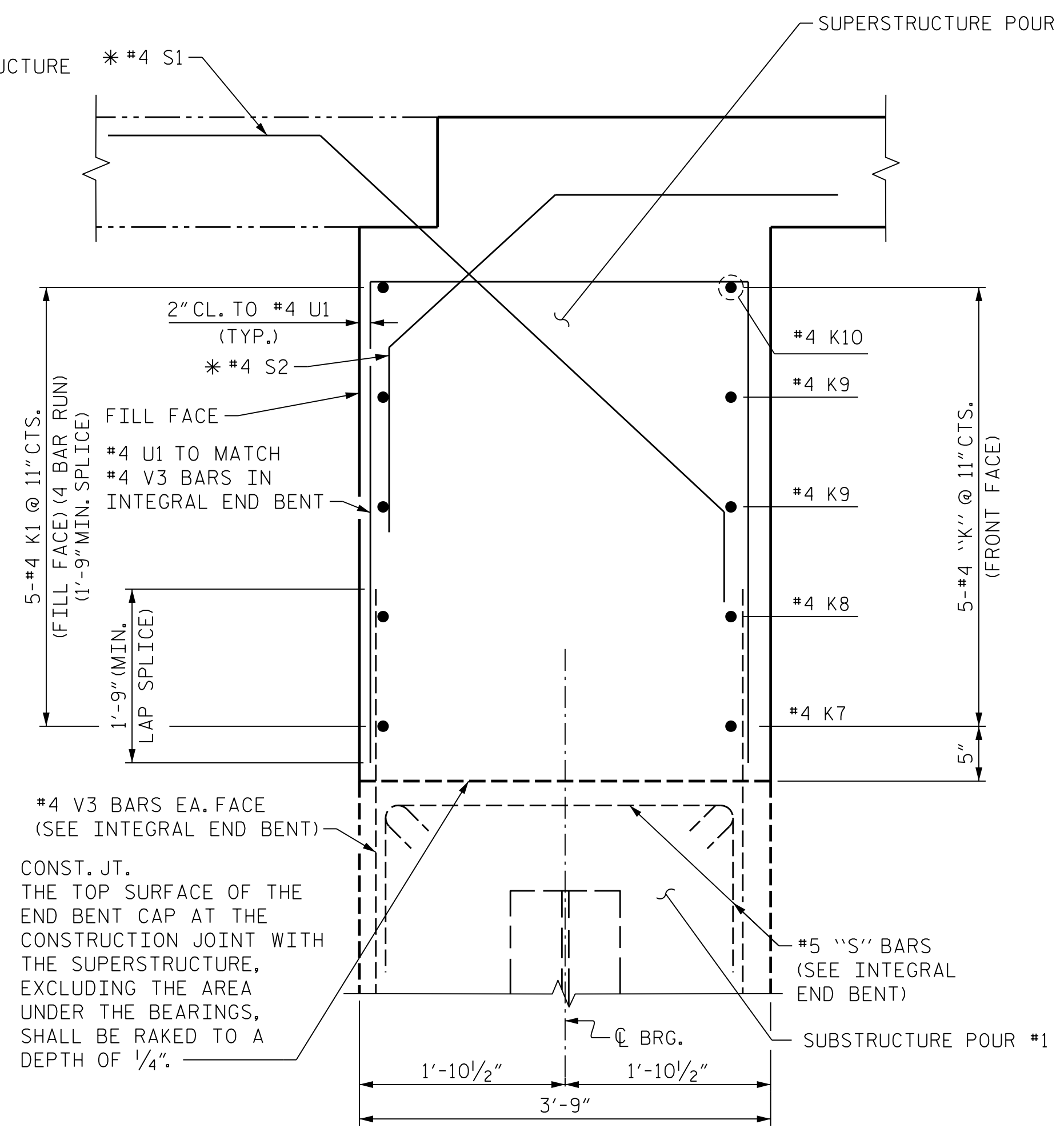
DRAWN BY: D. H. CARTER DATE: APR 2018  
 CHECKED BY: M. T. NEIHEISEL DATE: APR 2018  
 DESIGN ENGINEER OF RECORD: M. T. NEIHEISEL DATE: APR 2018

PLOT DRIVER: NCDOT\_STRUCTURES\_DEFAULT\_PLOTTER.plt PENTABLE: NCDOT\_STRUCTURES\_DEFAULT\_PEN.tbl  
 USER: dcarter DATE: 4/9/2018 TIME: 3:19:19 PM  
 FILE: ... \CAD\0501-U4737-SMU-TS.dgn

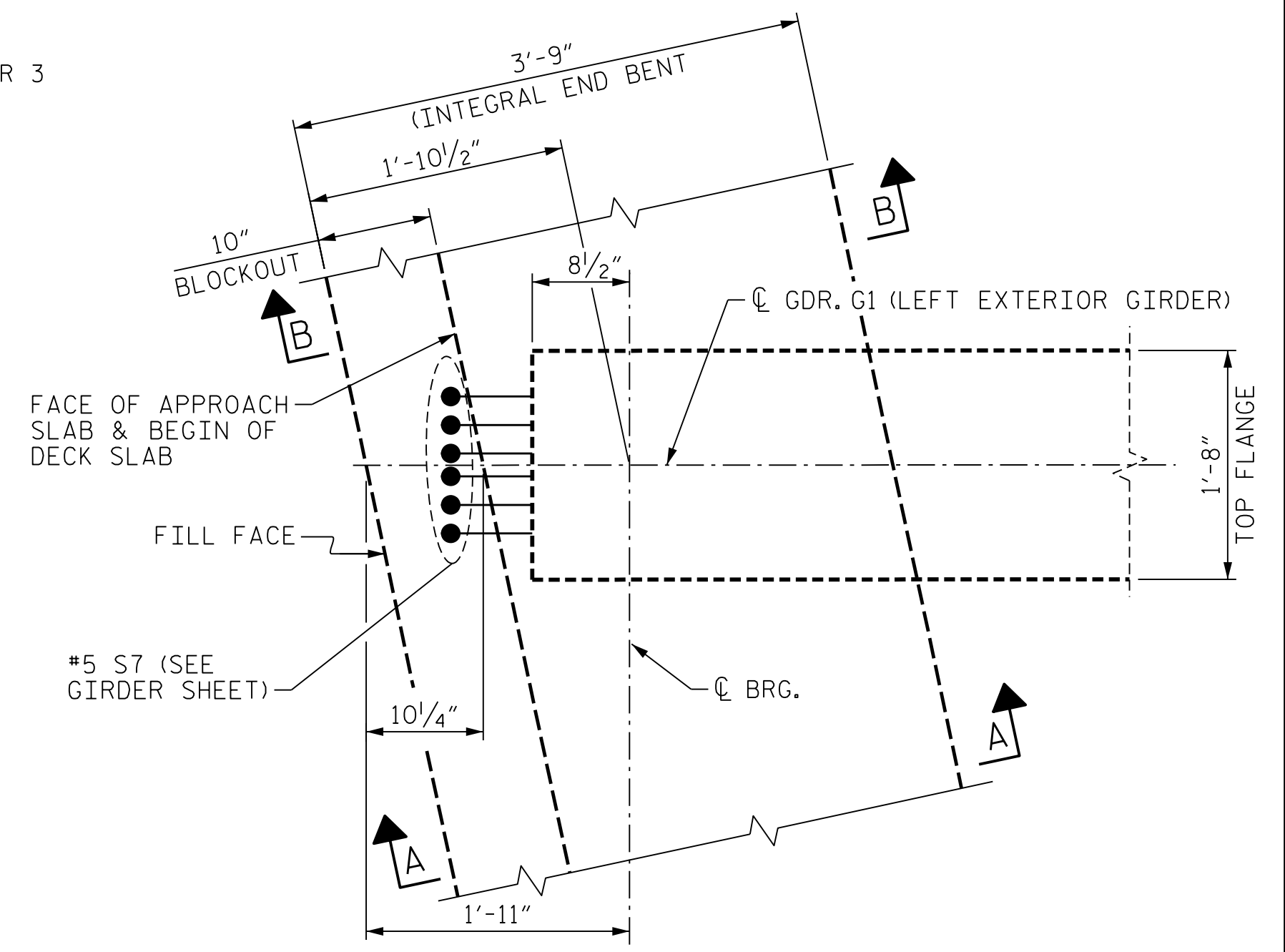




**SECTION A-A**  
**SECTION THROUGH INTEGRAL END BENT**  
 (DIMENSIONS ARE PERPENDICULAR TO CAP UNLESS NOTED OTHERWISE)  
 END BENT 1 SHOWN, END BENT 2 SIMILAR



**SECTION B-B**  
**SECTION THROUGH INTEGRAL END BENT**  
 (DIMENSIONS ARE PERPENDICULAR TO CAP UNLESS NOTED OTHERWISE)  
 END BENT 1 SHOWN, END BENT 2 SIMILAR  
 \* TO MATCH V3 BARS IN END BENT CAP



**PLAN OF GIRDER AT INTEGRAL END BENT**  
 END BENT 1 SHOWN, END BENT 2 SIMILAR

PROJECT NO. U-4734  
 FORSYTH COUNTY  
 STATION: 38+35.00 -L-

SHEET 3 OF 4



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**SUPERSTRUCTURE**  
 TYPICAL SECTION DETAILS

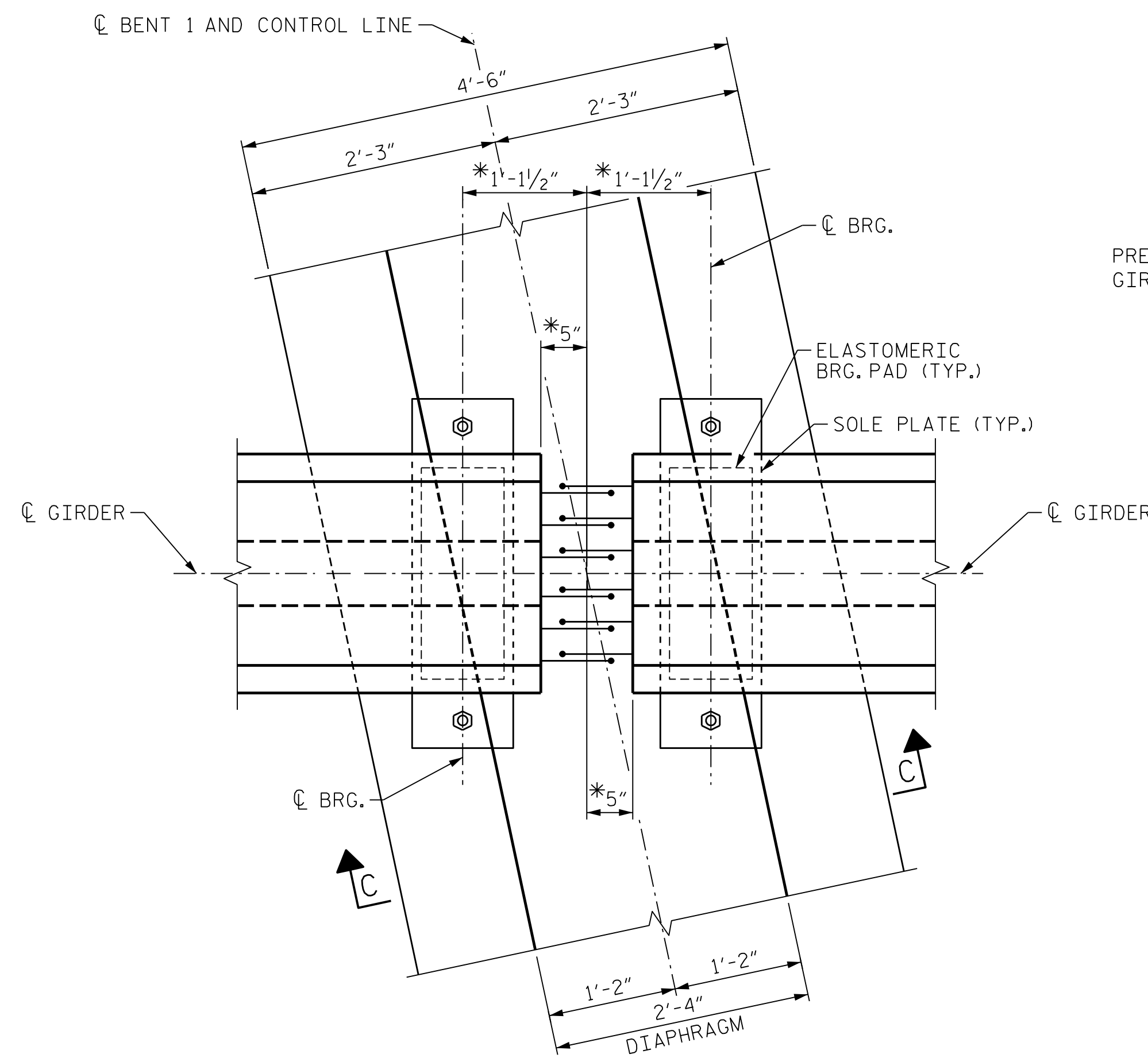
DRAWN BY : D. H. CARTER DATE : APR 2018  
 CHECKED BY : M. T. NEIHEISEL DATE : APR 2018  
 DESIGN ENGINEER OF RECORD : M. T. NEIHEISEL DATE : APR 2018

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

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-7
1			3			TOTAL SHEETS
2			4			42

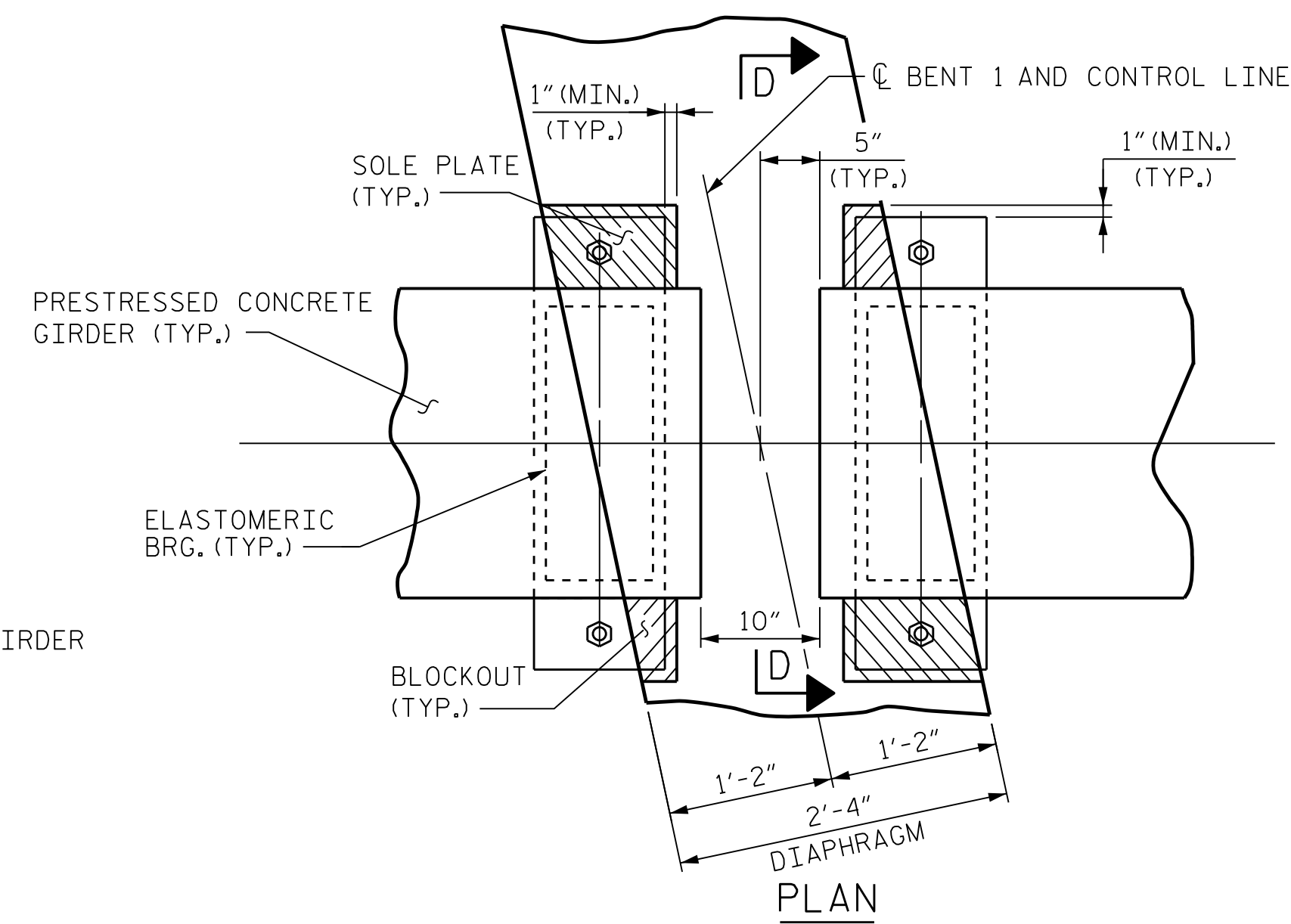
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PLOT DRIVER: NCDOT\_STRUCTURES\_DEFAULT\_PLOTTER.plt  
 USER: dcarter DATE: 4/9/2018 TIME: 3:19:21 PM  
 FILE: ... \CAD\0502\_U4737\_SWUL\_TS.dgn

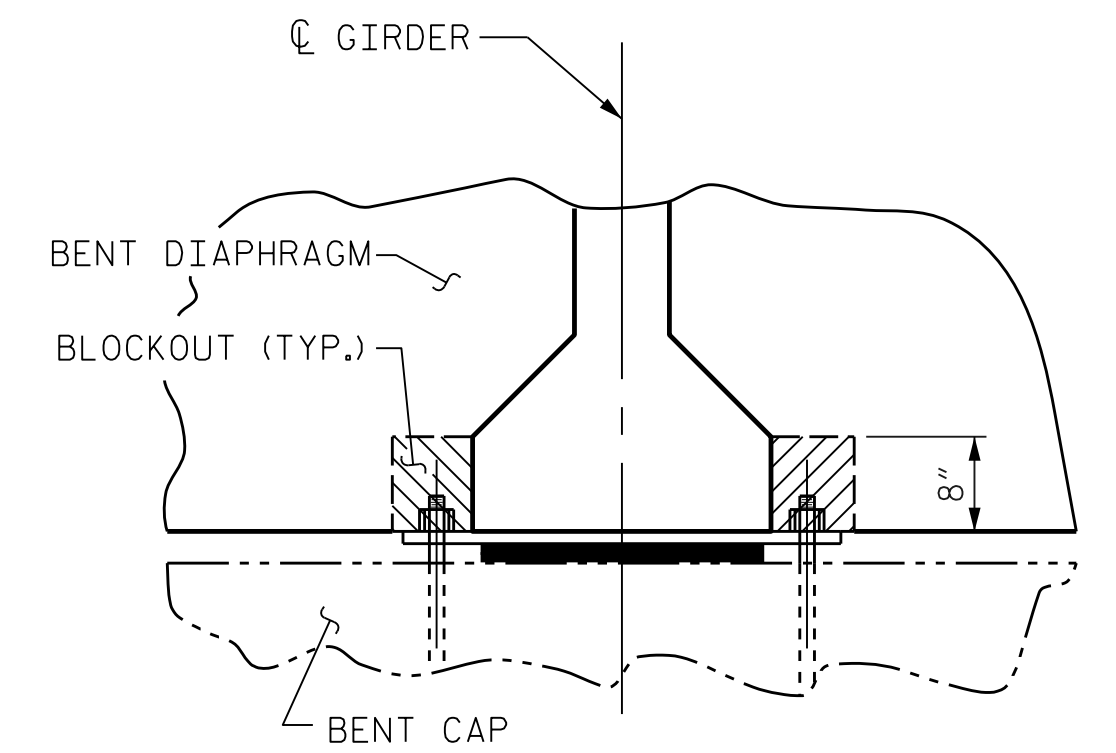


**PLAN DETAIL OF BENT 1 DIAPHRAGM**

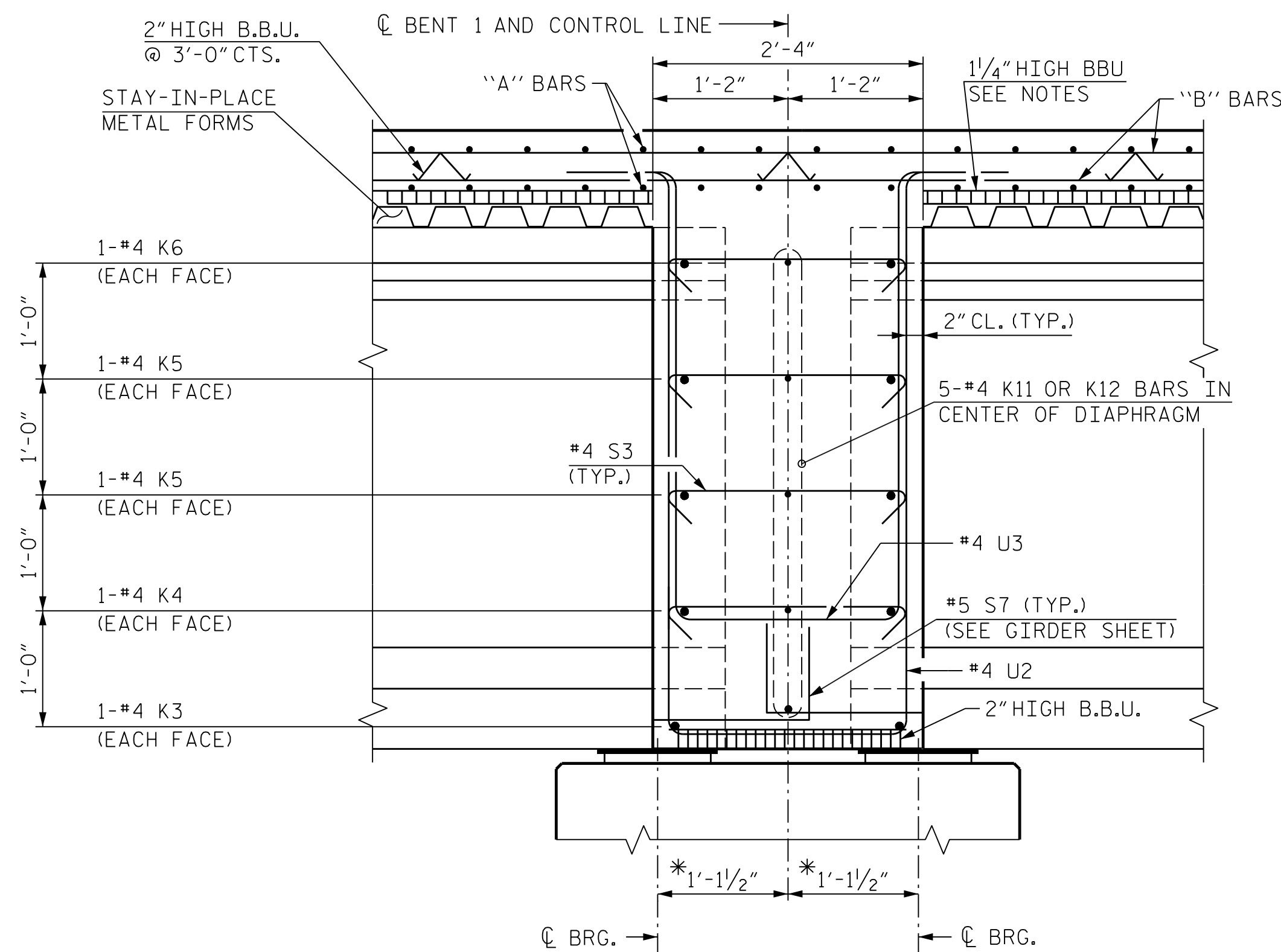
(CONTINUOUS DECK SLAB NOT SHOWN FOR CLARITY)  
\* MEASURED ALONG C GIRDER



**BENT DIAPHRAGM BLOCKOUT DETAIL**



**SECTION D-D**



**SECTION C-C**

**SECTION THRU BENT 1 DIAPHRAGM**

(DIMENSIONS SHOWN ARE NORMAL TO THE BENT EXCEPT AS NOTED)  
\* MEASURED ALONG C GIRDER

PROJECT NO. U-4734

FORSYTH COUNTY

STATION: 38+35.00 -L-

SHEET 4 OF 4



STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
**SUPERSTRUCTURE**  
TYPICAL SECTION DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-8
1			3			TOTAL SHEETS 42
2			4			

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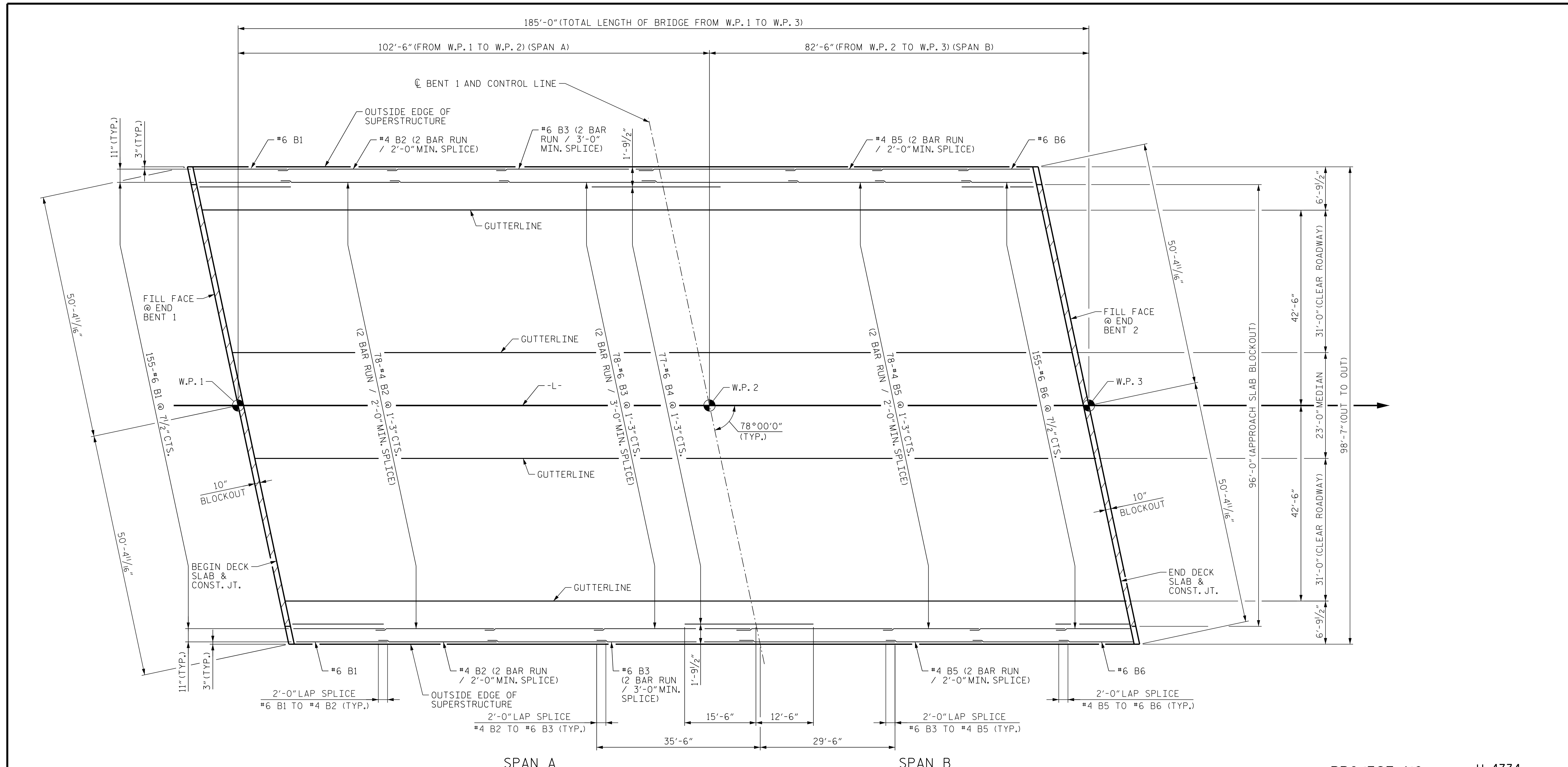
Matthew Neiheisel/10/2018  
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UNLESS ALL SIGNATURES COMPLETED

PLOT DRIVER: NCDOT\_STRUCTURES\_DEFAULT\_PLOTTER.plt PENTABLE: NCDOT\_STRUCTURES\_DEFAULT\_PEN.tbl  
USER: dcorTer DATE: 4/9/2018 TIME: 3:19:23 PM  
FILE: ... \CAD\0503\_104737\_SWU\_TS.dgn

DRAWN BY : D. H. CARTER DATE : APR 2018  
CHECKED BY : M. T. NEIHEISEL DATE : APR 2018  
DESIGN ENGINEER OF RECORD: M. T. NEIHEISEL DATE : APR 2018







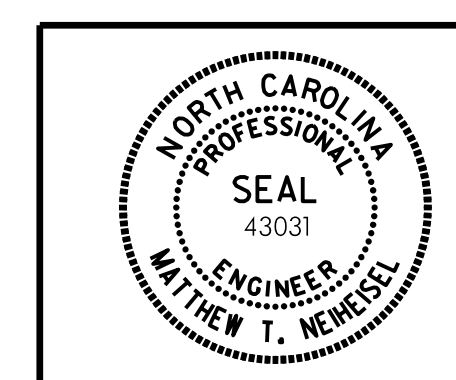
PLAN OF TOP OF SLAB "B" BAR LAYOUT

PROJECT NO. U-4734  
 FORSYTH COUNTY  
 STATION: 38+35.00 -L-  
 SHEET 2 OF 3

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

SUPERSTRUCTURE  
 PLAN OF SPANS  
 "B" BAR LAYOUT

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-10
1			3			TOTAL SHEETS 42
2			4			



Matthew T. Neiheisel / 10/2018

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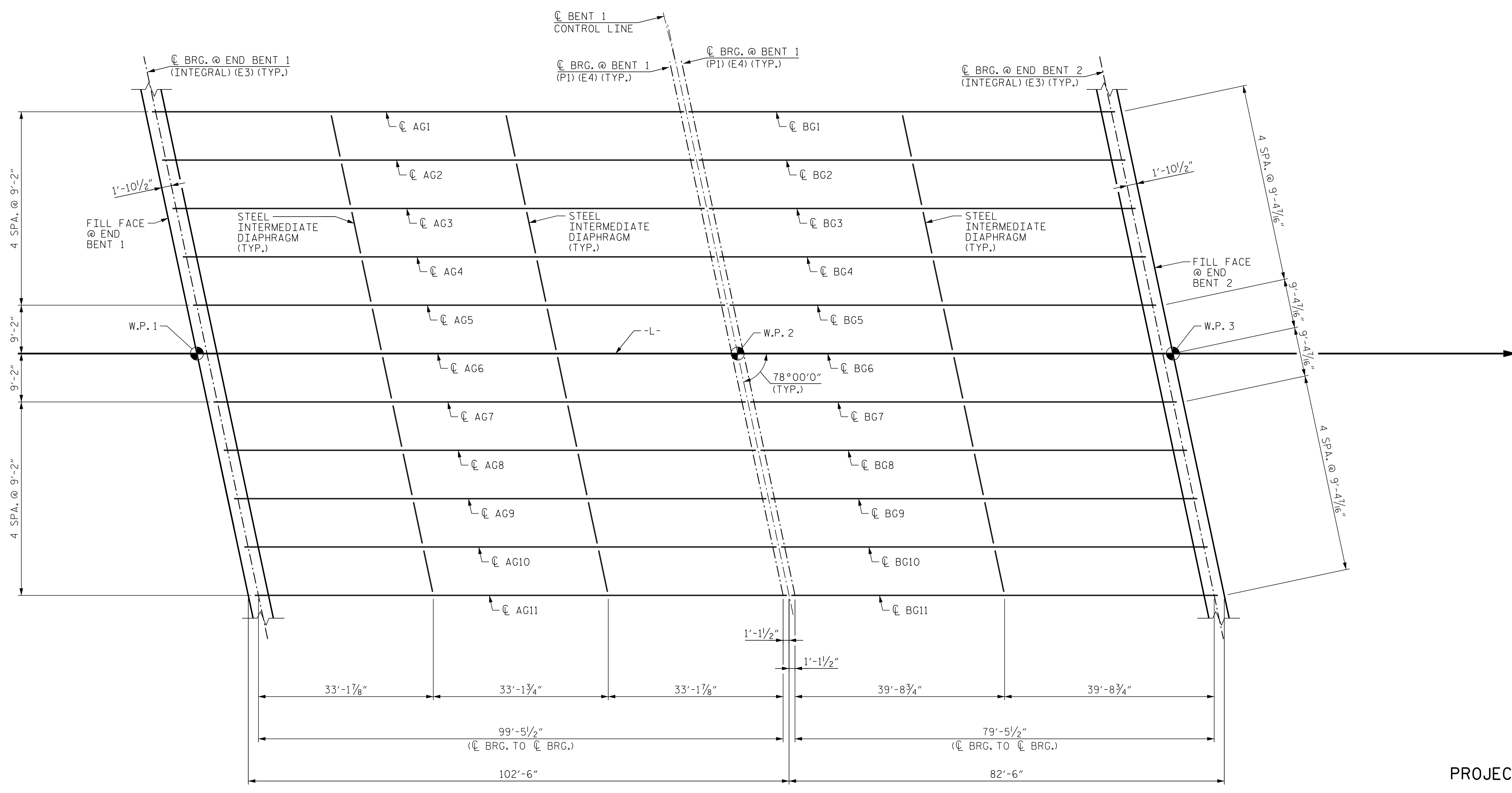
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DRAWN BY: D. H. CARTER DATE: APR 2018  
 CHECKED BY: M. T. NEIHEISEL DATE: APR 2018  
 DESIGN ENGINEER OF RECORD: M. T. NEIHEISEL DATE: APR 2018





PLOT DRIVER: NCDOT\_STRUCTURES\_DEFAULT\_PLOTTER.plt  
 PENTABLE: NCDOT\_STRUCTURES\_DEFAULT\_PEN.tbl  
 USER: dcof-ter DATE: 4/9/2018 TIME: 3:19:32 PM  
 FILE: ... \CAD\0540\_U4737\_SWU\_FP.dgn



SPAN A

SPAN B

**FRAMING PLAN**

END BENT 1, BENT 1, AND END BENT 2 ARE PARALLEL

PROJECT NO. U-4734  
 FORSYTH COUNTY  
 STATION: 38+35.00 -L-



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**SUPERSTRUCTURE**  
 FRAMING PLAN

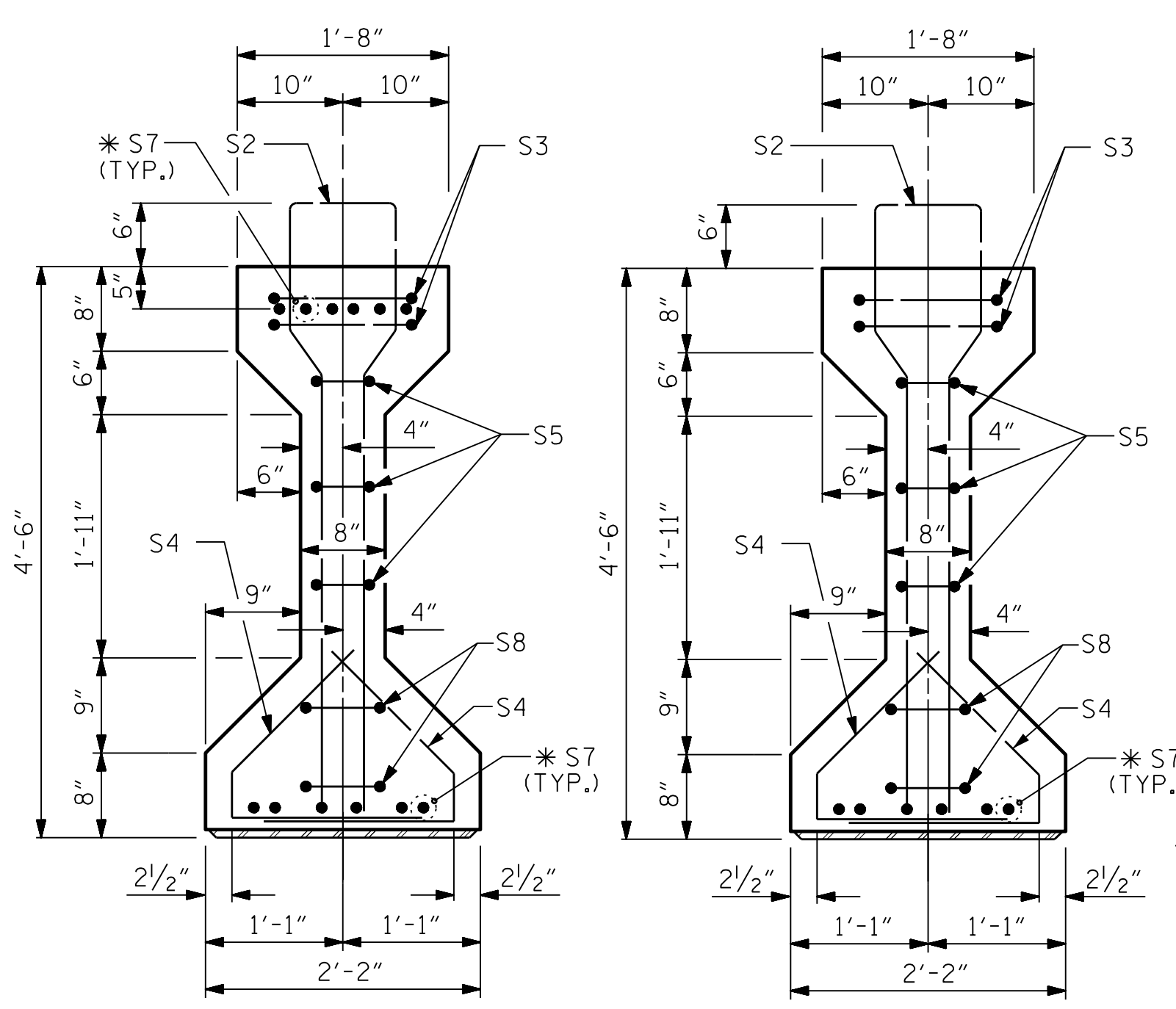
DRAWN BY : D. H. CARTER DATE : APR 2018  
 CHECKED BY : M. T. NEIHEISEL DATE : APR 2018  
 DESIGN ENGINEER OF RECORD: M. T. NEIHEISEL DATE : APR 2018

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-12
1			3			TOTAL SHEETS
2			4			42

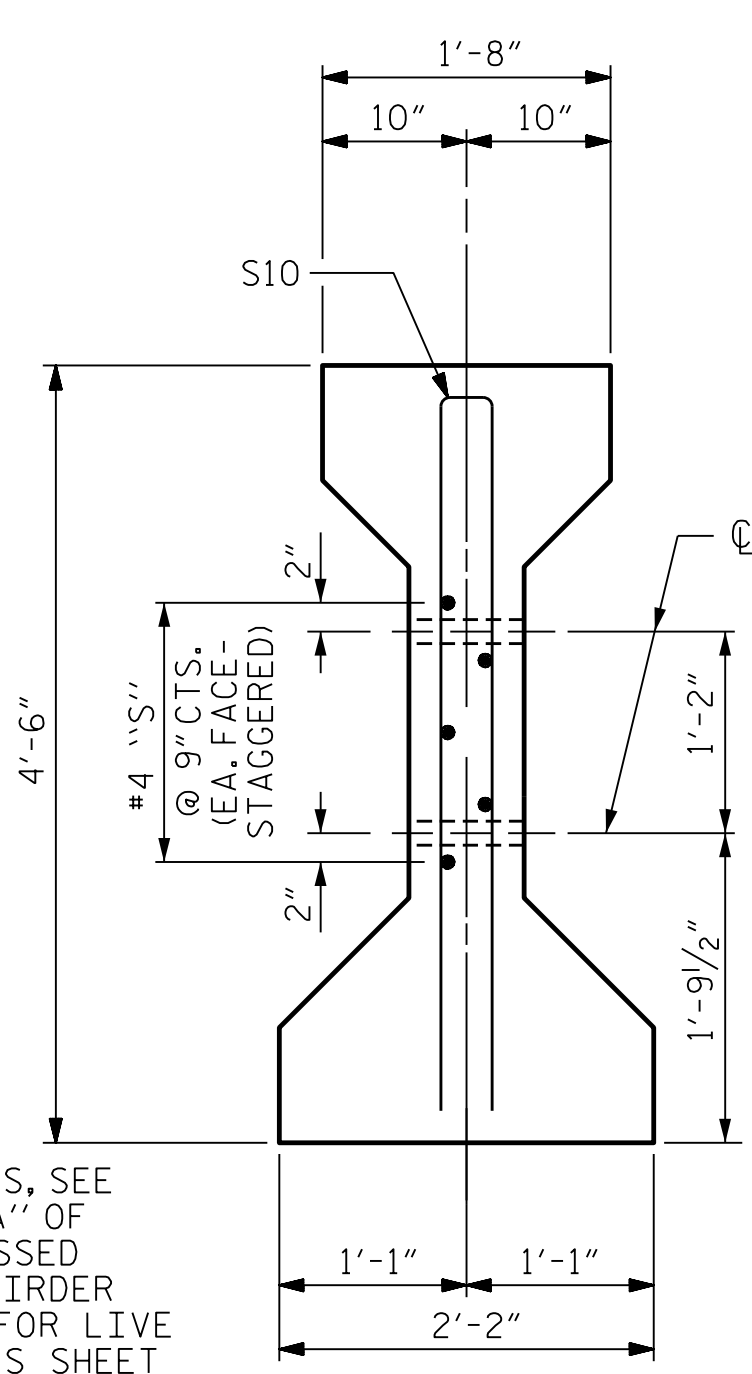
Matthew Neiheisel / 10/2018  
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SECTION A-A

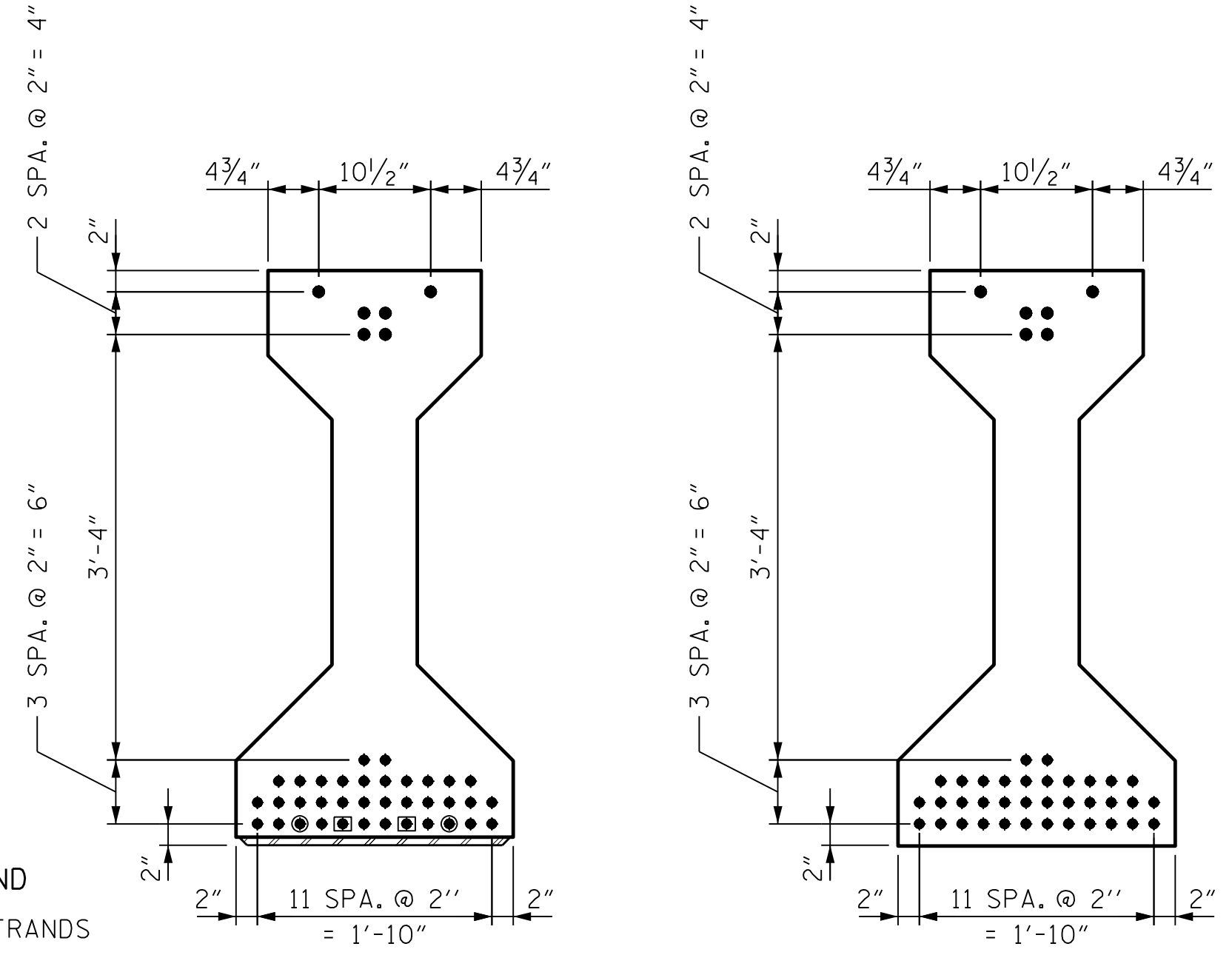
SECTION B-B



SECTION C-C  
(S1 BARS NOT SHOWN)

\* FOR S7 BARS, SEE  
DETAIL "A" OF  
PRESTRESSED  
CONCRETE GIRDER  
CONTINUOUS FOR LIVE  
LOAD DETAILS SHEET

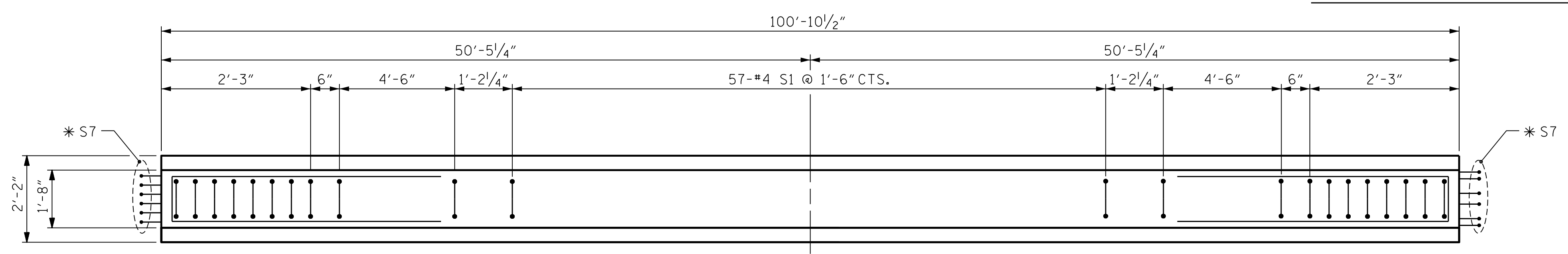
- DEBONDING LEGEND**
- FULLY BONDED STRANDS
  - STRANDS DEBONDED FOR 4'-0" FROM END OF GIRDER
  - ⊙ STRANDS DEBONDED FOR 8'-0" FROM END OF GIRDER



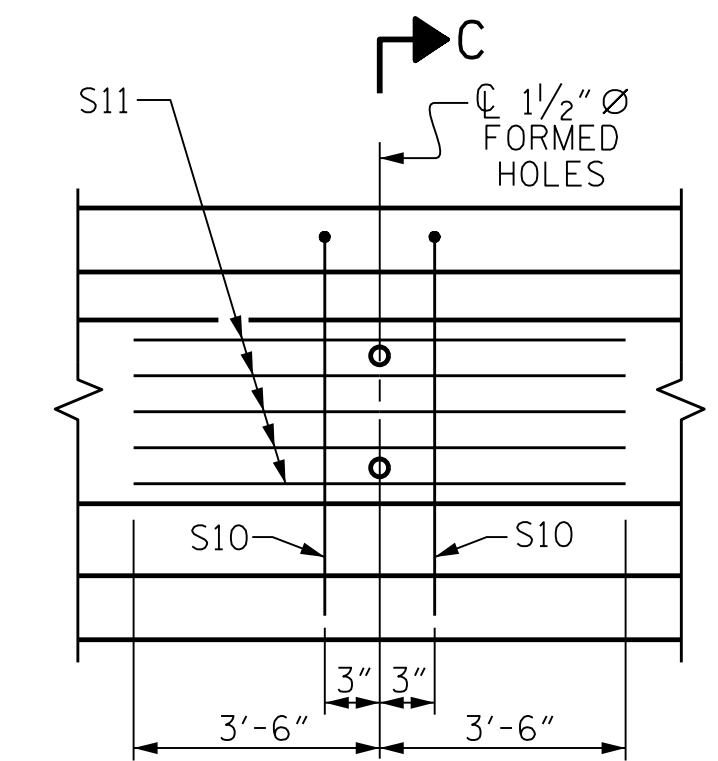
AT END OF GIRDER

AT C OF GIRDER

0.6" Ø LOW RELAXATION STRAND LAYOUT

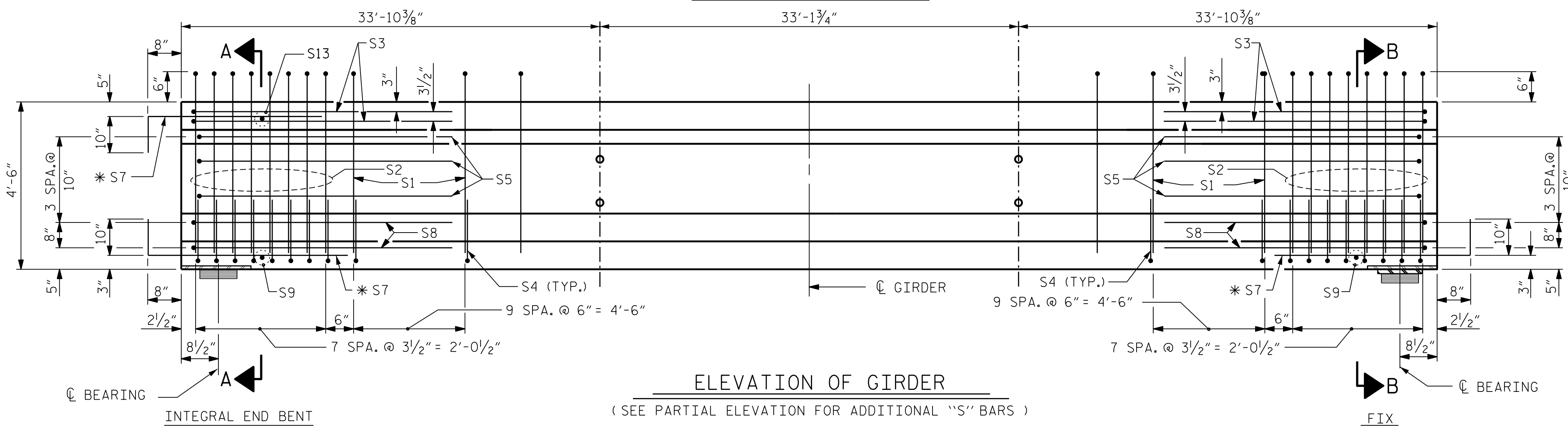


PLAN OF GIRDER



PARTIAL ELEVATION

SHOWING INTERMEDIATE DIAPHRAGM  
REINFORCING STEEL FOR GIRDER Nos. AG1 THRU AG11



ELEVATION OF GIRDER

(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS)

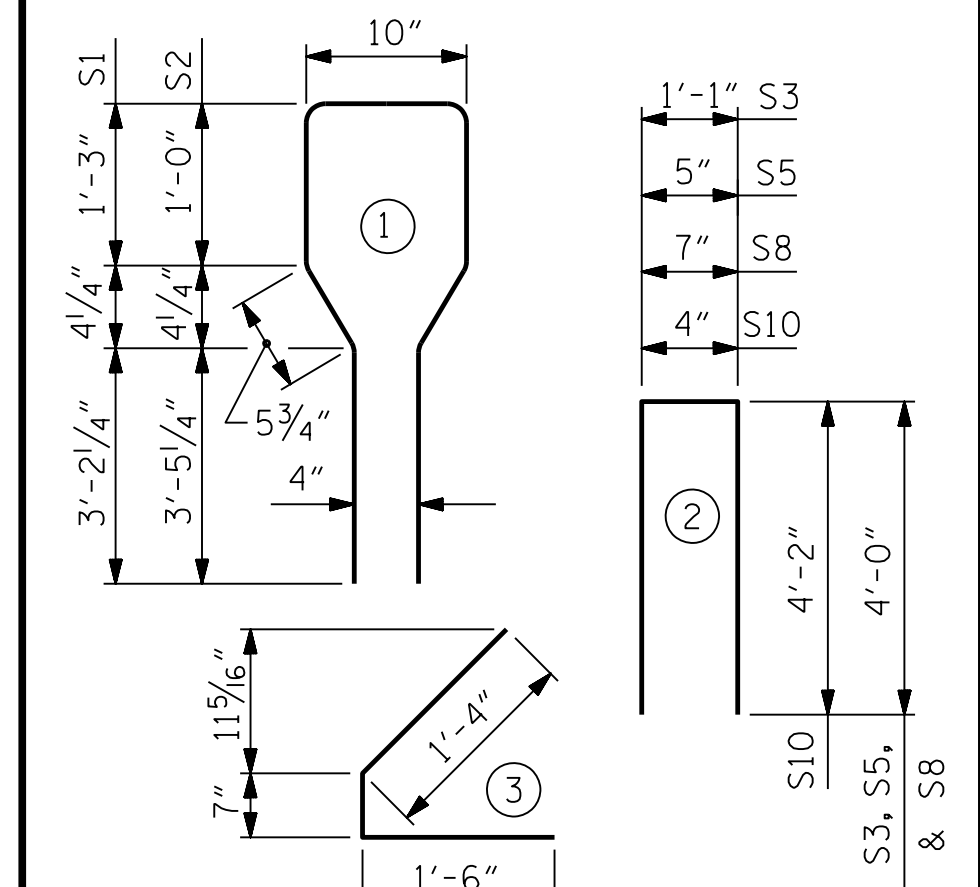
0.6" Ø L. R. GRADE 270 STRANDS		
AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

REINFORCING STEEL FOR ONE GIRDER					
BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	77	#4	1	10'-8"	549
S2	16	#6	1	10'-8"	256
S3	4	#4	2	9'-1"	24
S4	72	#4	3	3'-5"	164
S5	6	#4	2	8'-5"	34
* S7	18	#5	STR	3'-8"	69
S8	4	#4	2	8'-7"	23
S9	2	#3	STR	1'-10"	1
S10	4	#5	2	8'-8"	36
S11	10	#4	STR	7'-0"	47
S13	1	#3	STR	1'-4"	1

\* NOTE: S7 BARS SHALL BE BENT BEFORE SHIPMENT. HEAT BENDING SHALL NOT BE ALLOWED.

**BAR TYPES**

ALL BAR DIMENSIONS ARE OUT-TO-OUT



**QUANTITIES FOR ONE GIRDER**

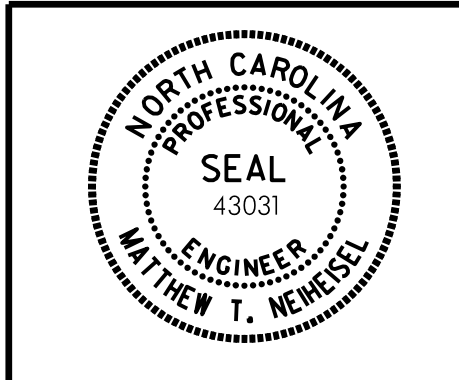
REINFORCING STEEL LB.	8500 PSI CONCRETE C.Y.	0.6" Ø L. R. STRANDS No.

GIRDERS REQUIRED		
NUMBER	LENGTH	TOTAL LENGTH
11	100'-10 1/2"	1,109'-7 1/2"

PROJECT NO. U-4734  
 FORSYTH COUNTY  
 STATION: 38+35.00 -L-

SHEET 1 OF 4



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**SUPERSTRUCTURE**  
 AASHTO TYPE IV  
 PRESTRESSED CONCRETE GIRDER  
 CONTINUOUS FOR LIVE LOAD  
 SPAN A

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

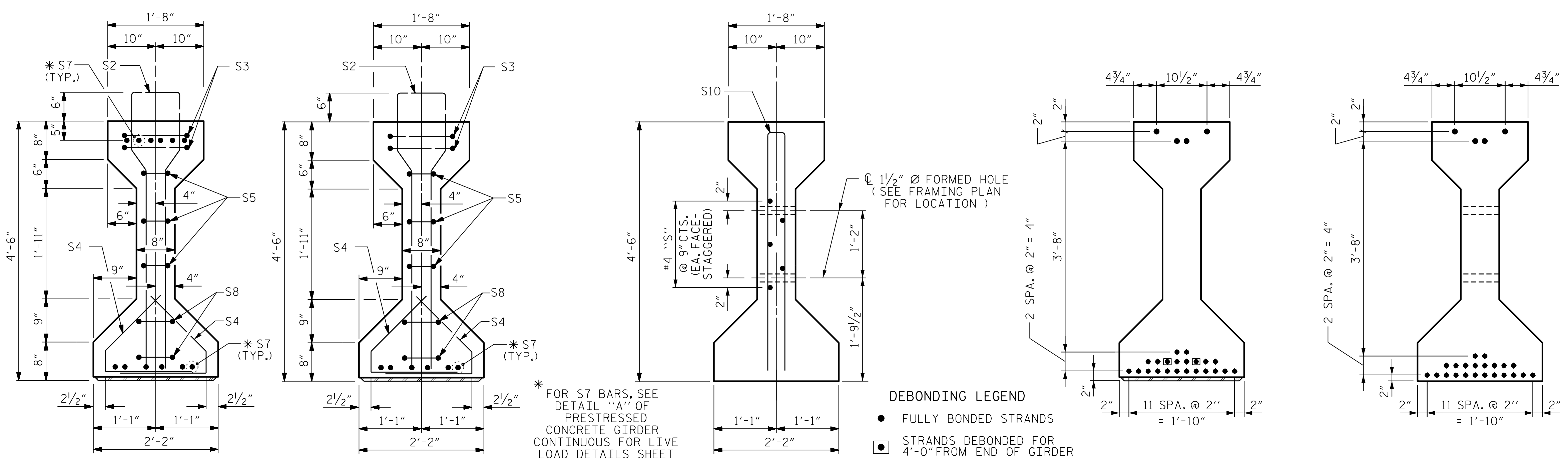
10/2018  
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DRAWN BY: D. H. CARTER DATE: APR 2018  
 CHECKED BY: M. T. NEIHEISEL DATE: APR 2018  
 DESIGN ENGINEER OF RECORD: M. T. NEIHEISEL DATE: APR 2018

PLOT DRIVER: NCDOT STRUCTURES DEFAULT PLOTTER.PH  
 USER: dcarter DATE: 4/9/2018 TIME: 3:51:34 PM  
 FILE: ... \NCAD\0550-14737-SWU-G1.dgn

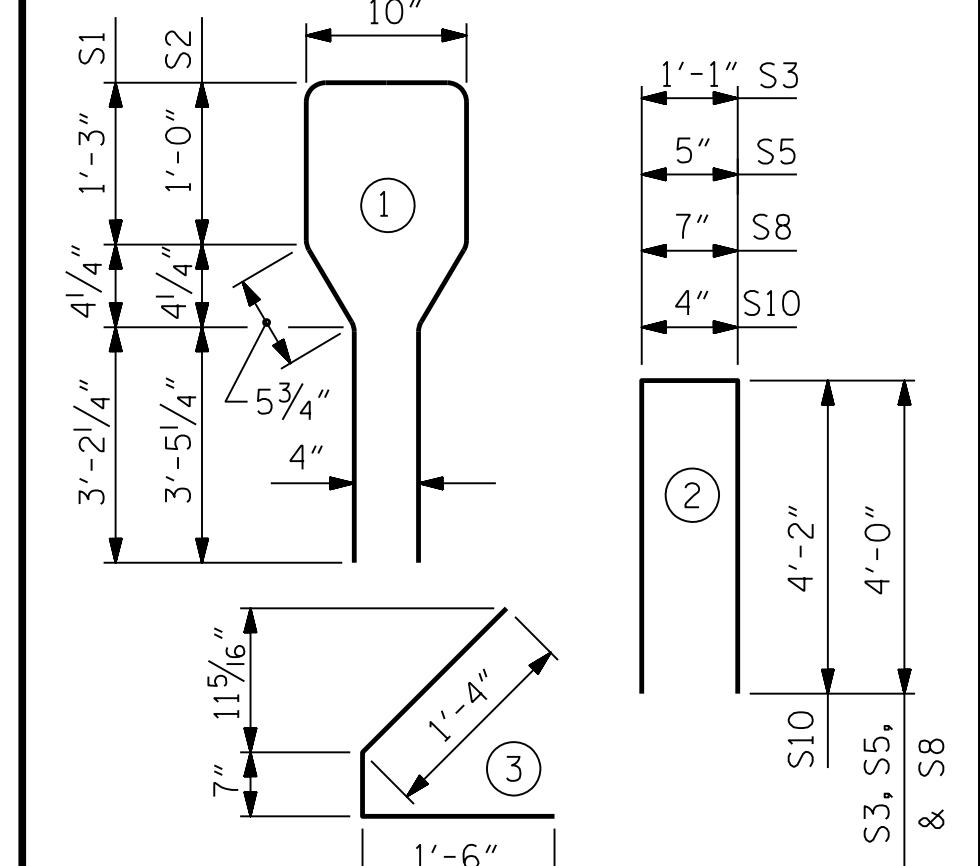


**DEBONDING LEGEND**  
 ● FULLY BONDED STRANDS  
 ◻ STRANDS DEBONDED FOR 4'-0" FROM END OF GIRDER

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

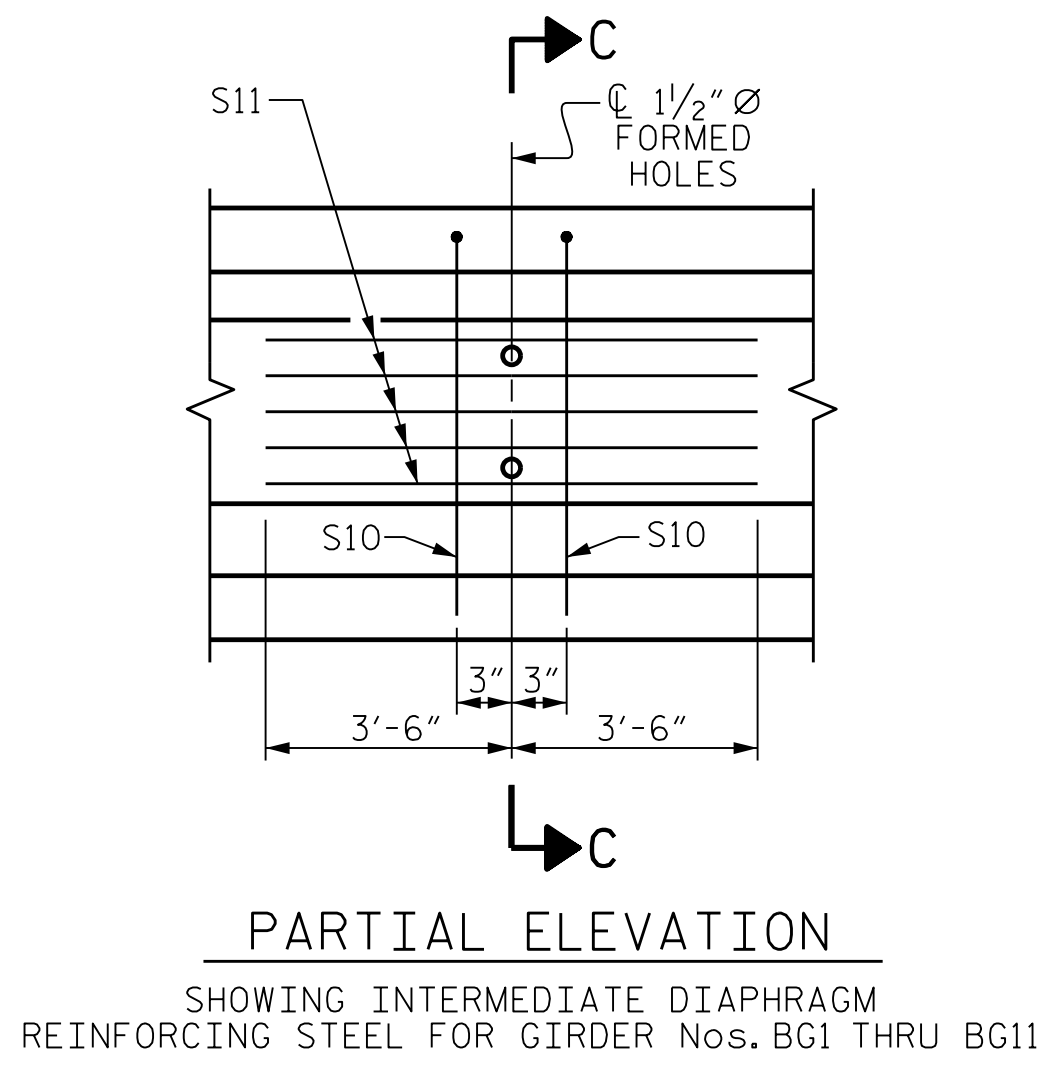
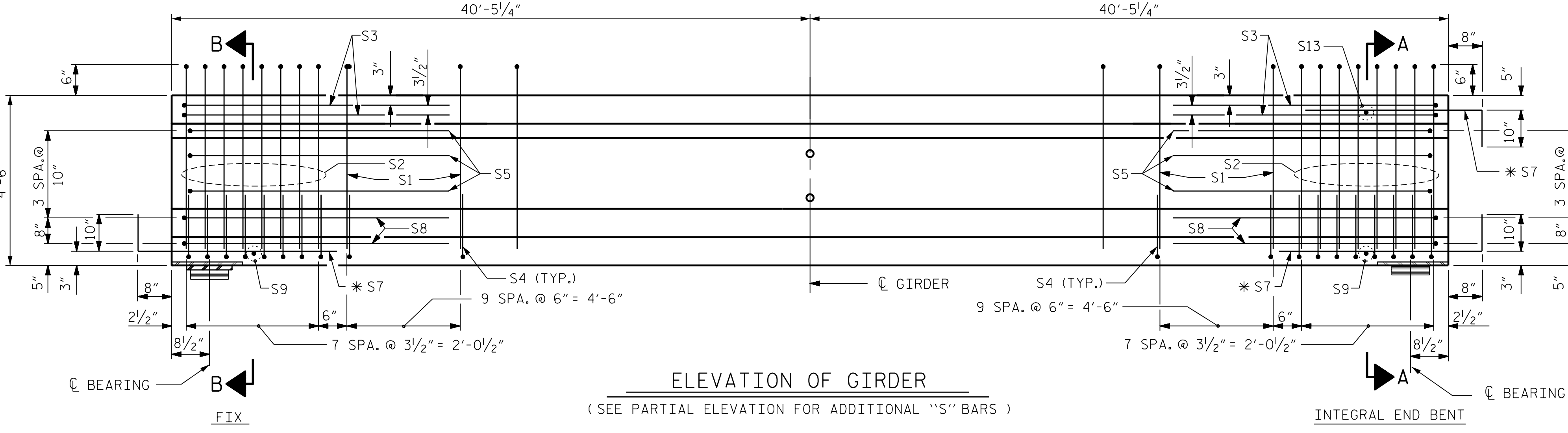
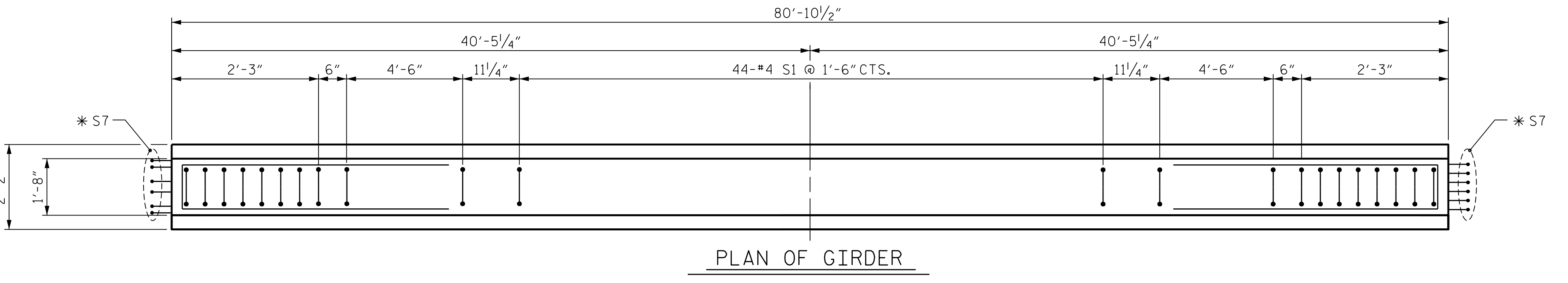
REINFORCING STEEL FOR ONE GIRDER					
BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	64	#4	1	10'-8"	456
S2	16	#6	1	10'-8"	256
S3	4	#4	2	9'-1"	24
S4	72	#4	3	3'-5"	164
S5	6	#4	2	8'-5"	34
* S7	18	#5	STR	3'-8"	69
S8	4	#4	2	8'-7"	23
S9	2	#3	STR	1'-10"	1
S10	2	#5	2	8'-8"	18
S11	5	#4	STR	7'-0"	23
S13	1	#3	STR	1'-4"	1

\* NOTE: S7 BARS SHALL BE BENT BEFORE SHIPMENT. HEAT BENDING SHALL NOT BE ALLOWED.  
**BAR TYPES**  
 ALL BAR DIMENSIONS ARE OUT-TO-OUT

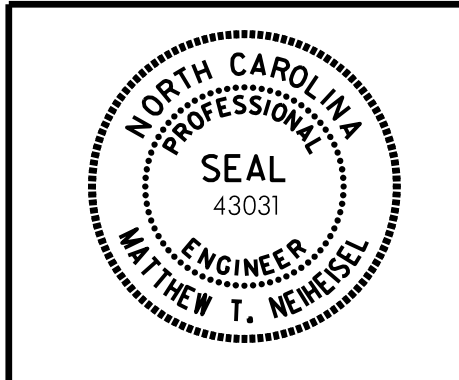


QUANTITIES FOR ONE GIRDER			
REINFORCING STEEL LB.	8500 PSI CONCRETE C.Y.	0.6" Ø L. R. STRANDS No.	
1,069	16.4	26	

GIRDERS REQUIRED		
NUMBER	LENGTH	TOTAL LENGTH
11	80'-10 1/2"	889'-7 1/2"



PROJECT NO. U-4734  
 FORSYTH COUNTY  
 STATION: 38+35.00 -L-  
 SHEET 2 OF 4



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**SUPERSTRUCTURE**  
 AASHTO TYPE IV  
 PRESTRESSED CONCRETE GIRDER  
 CONTINUOUS FOR LIVE LOAD  
 SPAN B

DRAWN BY: D. H. CARTER DATE: APR 2018  
 CHECKED BY: M. T. NEIHEISEL DATE: APR 2018  
 DESIGN ENGINEER OF RECORD: M. T. NEIHEISEL DATE: APR 2018

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

SHEET NO. S-14  
 TOTAL SHEETS 42

PLOT DRIVER: NCDOT STRUCTURES DEFAULT PLOTTER.PHT  
 USER: dcarter DATE: 4/9/2018  
 FILE: ... \NCAD\0551-14737-SMU-G2.dgn  
 PENTABLE: NCDOT STRUCTURES DEFAULT PEN.tbl  
 TIME: 3:54:36 PM



NOTES

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

ALL REINFORCING STEEL SHALL BE GRADE 60.

EMBEDDED PLATE "B-1" SHALL BE GALVANIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

ANCHOR STUDS SHALL CONFORM TO AASHTO M169 GRADES 1010 THROUGH 1020 OR APPROVED EQUAL, AND SHALL MEET THE TYPE "B" REQUIREMENTS OF SUBSECTION 7.3 OF THE ANSI/AASHTO/AWS D1.5 BRIDGE WELDING CODE.

AT ENDS OF GIRDERS TO BE EMBEDDED IN CONCRETE DIAPHRAGMS OR END WALLS, PRESTRESSING STRANDS MAY EXTEND A MAXIMUM OF 2" BEYOND THE GIRDER ENDS. OTHERWISE, PRESTRESSING STRANDS SHALL BE CUT FLUSH WITH THE GIRDER ENDS.

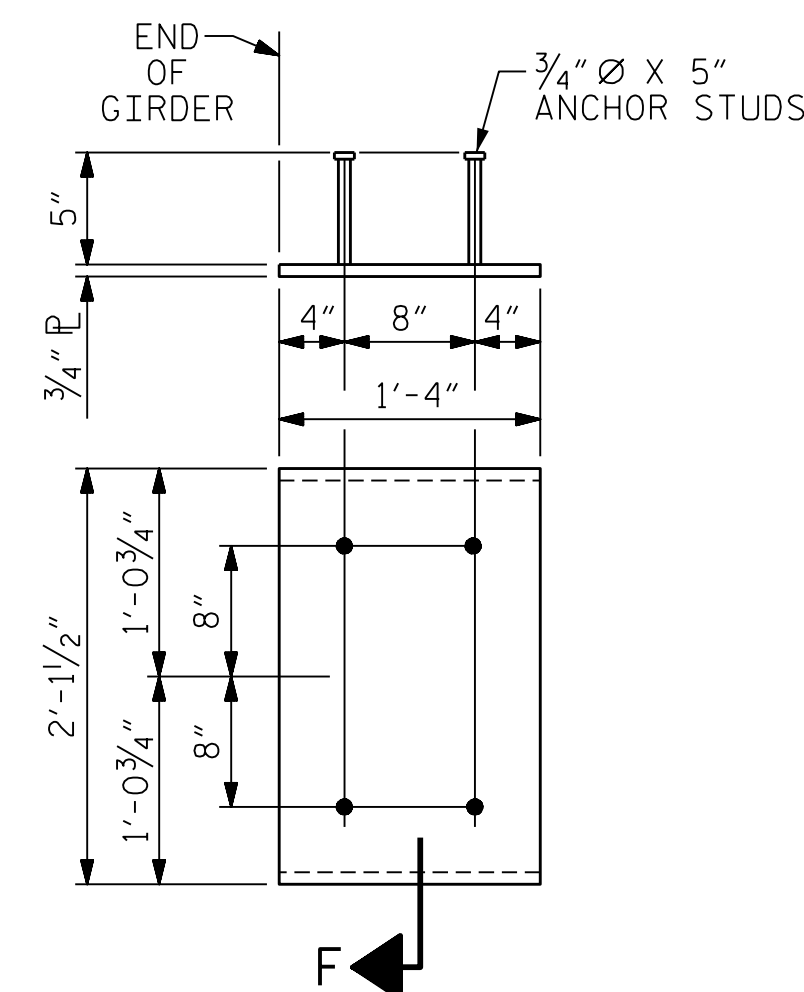
THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE GIRDER SHALL BE DONE WHEN CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN 6,600 PSI.

DEPENDING ON THE TYPE OF SYSTEM USED TO SUPPORT THE DECK SLAB FORMS, PRESET ANCHORS MAY BE NECESSARY IN THE PRESTRESSED CONCRETE GIRDER.

THE TOP SURFACE OF THE GIRDER, EXCLUDING THE OUTSIDE 4", SHALL BE RAKED TO A DEPTH OF 1/4".

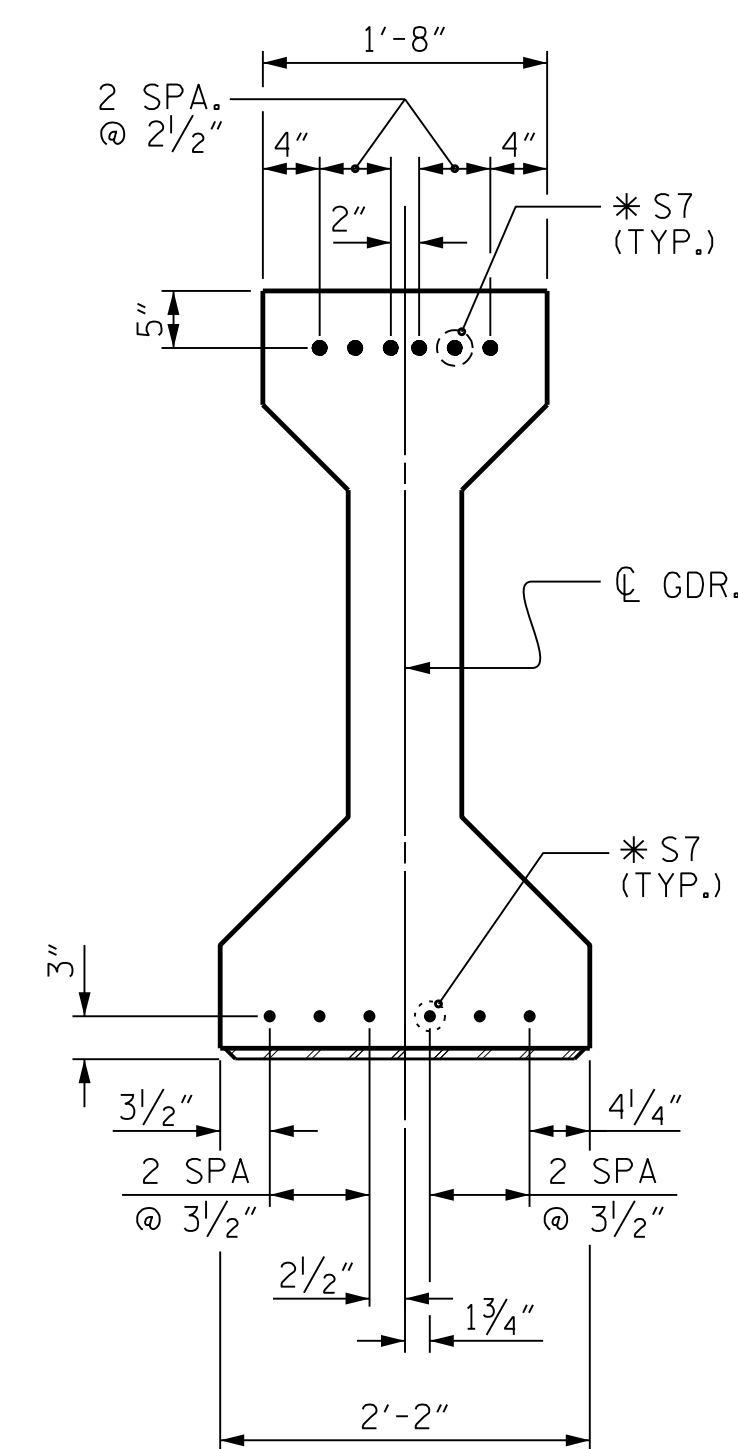
WHEN DRAPED STRANDS ARE DETAILED, THE LONGITUDINAL LOCATION OF THE HOLD DOWN DEVICES SHALL BE WITHIN 6" OF THE LOCATION SHOWN AND THE CENTER OF GRAVITY OF THE GROUP OF DRAPED STRANDS SHALL BE LOCATED WITHIN 1/2" OF THE THEORETICAL LOCATION SHOWN.

THE CONTRACTOR HAS THE OPTION TO PROVIDE, AT NO ADDITIONAL COST TO THE DEPARTMENT, 2 ADDITIONAL STRANDS AT THE TOP OF THE GIRDER TO FACILITATE TYING OF THE REINFORCING STEEL. THESE STRANDS SHALL BE PULLED TO A LOAD OF 4500 lbs.



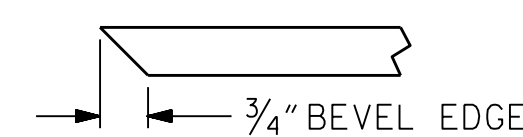
EMBEDDED PLATE "B-1" DETAILS FOR AASHTO TYPE IV GIRDERS

(2 REQ'D PER GIRDER)



DETAIL "A"

(FOR AASHTO TYPE IV GIRDERS)



SECTION "F"

(SEE NOTES)

PROJECT NO. U-4734

FORSYTH COUNTY

STATION: 38+35.00 -L-

SHEET 3 OF 4

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
SUPERSTRUCTURE  
PRESTRESSED CONCRETE GIRDER  
CONTINUOUS FOR LIVE LOAD  
DETAILS



Matthew Neiheisel / 10/2018

REVISIONS

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

SHEET NO. S-15  
TOTAL SHEETS 42

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DRAWN BY : D. H. CARTER DATE : APR 2018  
CHECKED BY : M. T. NEIHEISEL DATE : APR 2018  
DESIGN ENGINEER OF RECORD: M. T. NEIHEISEL DATE : APR 2018

PLOT DRIVER: NCDOT STRUCTURES DEFAULT PLOTTER.plt PENTABLE: NCDOT STRUCTURES DEFAULT PEN.tbl  
USER: dcar-ter DATE: 4/9/2018 TIME: 3:19:38 PM  
FILE: ... \CAD\0552-14737-SMU\_L3.dgn

DEAD LOAD DEFLECTION AND CAMBER TABLE FOR GIRDERS - SPAN "A"																						
		GIRDERS AG1 & AG11																				
TWENTIETH POINTS		0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	1.0
CAMBER ( GIRDER ALONE IN PLACE )	↑	0	0.033	0.065	0.095	0.123	0.147	0.168	0.184	0.196	0.204	0.206	0.204	0.196	0.184	0.168	0.147	0.123	0.095	0.065	0.033	0
DEFLECTION DUE TO SUPERIMPOSED D.L. *	↓	0	0.025	0.050	0.074	0.098	0.117	0.136	0.148	0.160	0.164	0.168	0.164	0.160	0.148	0.136	0.117	0.098	0.074	0.050	0.025	0
FINAL CAMBER	↑	0"	1/8"	3/16"	1/4"	5/16"	3/8"	3/8"	7/16"	7/16"	1/2"	7/16"	7/16"	7/16"	7/16"	3/8"	3/8"	5/16"	1/4"	3/16"	1/8"	0"

		GIRDERS AG2, AG3, AG9, & AG10																				
TWENTIETH POINTS		0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	1.0
CAMBER ( GIRDER ALONE IN PLACE )	↑	0	0.033	0.065	0.095	0.123	0.147	0.168	0.184	0.196	0.204	0.206	0.204	0.196	0.184	0.168	0.147	0.123	0.095	0.065	0.033	0
DEFLECTION DUE TO SUPERIMPOSED D.L. *	↓	0	0.026	0.053	0.078	0.103	0.123	0.143	0.156	0.168	0.173	0.177	0.173	0.168	0.156	0.143	0.123	0.103	0.078	0.053	0.026	0
FINAL CAMBER	↑	0"	1/16"	1/8"	3/16"	1/4"	5/16"	5/16"	3/8"	5/16"	3/8"	3/8"	3/8"	5/16"	3/8"	5/16"	5/16"	1/4"	3/16"	1/8"	1/16"	0"

		GIRDERS AG4, AG5, AG6, AG7, & AG8																				
TWENTIETH POINTS		0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	1.0
CAMBER ( GIRDER ALONE IN PLACE )	↑	0	0.033	0.065	0.095	0.123	0.147	0.168	0.184	0.196	0.204	0.206	0.204	0.196	0.184	0.168	0.147	0.123	0.095	0.065	0.033	0
DEFLECTION DUE TO SUPERIMPOSED D.L. *	↓	0	0.024	0.049	0.072	0.096	0.114	0.133	0.145	0.156	0.160	0.164	0.160	0.156	0.145	0.133	0.114	0.096	0.072	0.049	0.024	0
FINAL CAMBER	↑	0"	1/8"	3/16"	1/4"	5/16"	3/8"	7/16"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	7/16"	3/8"	5/16"	1/4"	3/16"	1/8"	0"

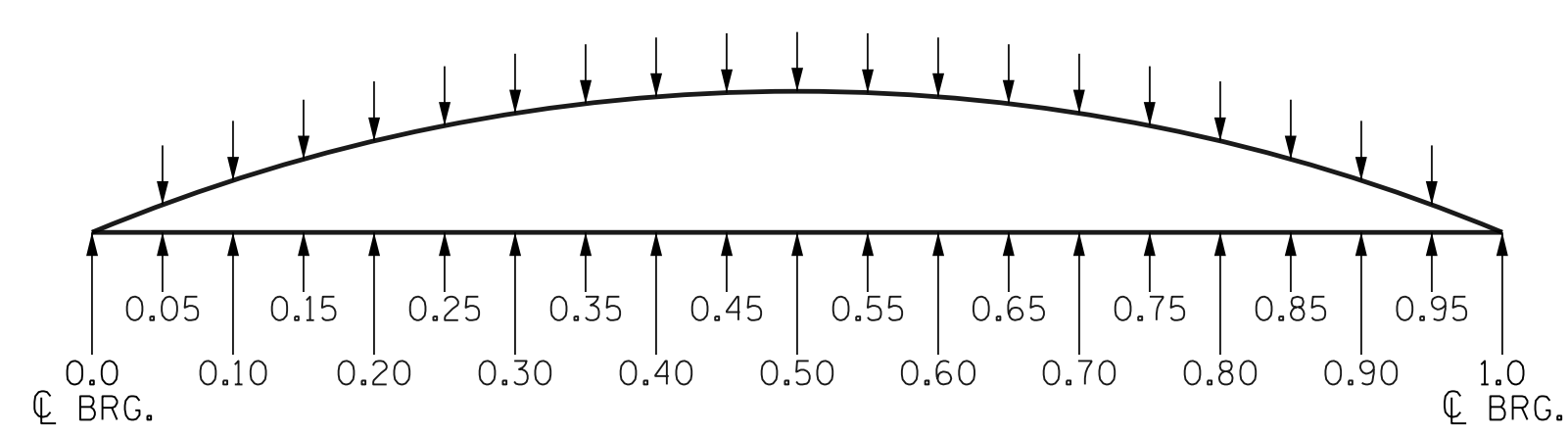
\* INCLUDES FUTURE WEARING SURFACE IN SUPER IMPOSED DEAD LOAD.  
ALL VALUES ARE SHOWN IN FEET (DECIMAL FORM), EXCEPT "FINAL CAMBER", WHICH IS GIVEN IN INCHES (FRACTION FORM).

DEAD LOAD DEFLECTION AND CAMBER TABLE FOR GIRDERS - SPAN "B"												
		GIRDERS BG1, BG2, BG3, BG9, BG10, & BG11										
TENTH POINTS		0	.10	.20	.30	.40	.50	.60	.70	.80	.90	1.0
CAMBER ( GIRDER ALONE IN PLACE )	↑	0	0.029	0.054	0.074	0.087	0.091	0.087	0.074	0.054	0.029	0
DEFLECTION DUE TO SUPERIMPOSED D.L. *	↓	0	0.021	0.042	0.058	0.068	0.072	0.068	0.058	0.042	0.021	0
FINAL CAMBER	↑	0"	1/16"	1/8"	3/16"	1/4"	1/4"	1/4"	3/16"	1/8"	1/16"	0"

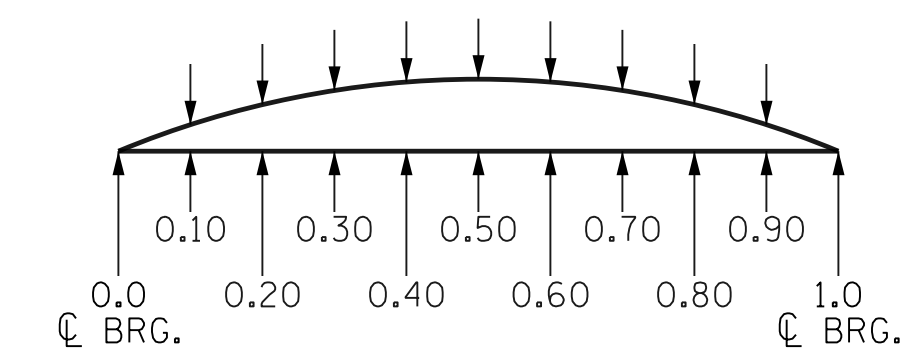
  

		GIRDERS BG4, BG5, BG6, BG7, & BG8										
TENTH POINTS		0	.10	.20	.30	.40	.50	.60	.70	.80	.90	1.0
CAMBER ( GIRDER ALONE IN PLACE )	↑	0	0.029	0.054	0.074	0.087	0.091	0.087	0.074	0.054	0.029	0
DEFLECTION DUE TO SUPERIMPOSED D.L. *	↓	0	0.020	0.039	0.054	0.063	0.067	0.063	0.054	0.039	0.020	0
FINAL CAMBER	↑	0"	1/8"	3/16"	1/4"	5/16"	5/16"	5/16"	1/4"	3/16"	1/8"	0"

\* INCLUDES FUTURE WEARING SURFACE IN SUPER IMPOSED DEAD LOAD.  
ALL VALUES ARE SHOWN IN FEET (DECIMAL FORM), EXCEPT "FINAL CAMBER", WHICH IS GIVEN IN INCHES (FRACTION FORM).



SPAN "A"  
SCHEMATIC CAMBER ORDINATES  
AT GIRDER TWENTIETH POINTS



SPAN "B"  
SCHEMATIC CAMBER ORDINATES  
AT GIRDER TENTH POINTS

PROJECT NO. U-4734  
FORSYTH COUNTY  
STATION: 38+35.00 -L-  
SHEET 4 OF 4



STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

**SUPERSTRUCTURE**

GIRDER  
CAMBER AND DEFLECTION  
TABLES

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-16
1			3			TOTAL SHEETS
2			4			42

DRAWN BY : D. H. CARTER DATE : APR 2018  
CHECKED BY : M. T. NEIHEISEL DATE : APR 2018  
DESIGN ENGINEER OF RECORD: M. T. NEIHEISEL DATE : APR 2018

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

*Matthew T. Neiheisel* / 10/2018  
DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED

PLOT DRIVER: NCDOT\_STRUCTURES\_DEFAULT\_PLOTTER.plt  
 PENTABLE: NCDOT\_STRUCTURES\_DEFAULT\_PEN.tbl  
 USER: dcarte  
 DATE: 4/9/2018  
 TIME: 3:19:40 PM  
 FILE: ... \CAD\0553-14737-SMU-DL.dgn



**STRUCTURAL STEEL NOTES**

ALL INTERMEDIATE DIAPHRAGM STEEL AND CONNECTOR PLATES SHALL BE AASHTO M270 GRADE 50 OR APPROVED EQUAL.

TENSION ON THE ASTM A325 BOLTS THROUGH THE CHANNEL MEMBER SHALL BE CALIBRATED USING DIRECT TENSION INDICATOR WASHERS IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

TENSION ON THE ASTM A449 BOLTS THROUGH THE GIRDER WEB SHALL BE SNUG TIGHTENED FOLLOWED BY AN ADDITIONAL 1/4 TURN.

THE PLATES, BENT PLATES, CHANNELS, AND ANGLES SHALL BE GALVANIZED OR METALLIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS. FOR THERMAL SPRAYED COATINGS (METALLIZATION), SEE SPECIAL PROVISIONS.

FOR METALLIZATION, APPLY A THERMAL SPRAYED COATING WITH A SEAL COAT TO ALL STEEL DIAPHRAGM SURFACES IN ACCORDANCE WITH THE DEPARTMENTS THERMAL SPRAYED COATINGS SPECIAL PROVISION AND SECTION 442 OF THE STANDARD SPECIFICATIONS.

GALVANIZE THE HIGH STRENGTH BOLTS, NUTS, WASHERS AND DIRECT TENSION INDICATORS IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

USE AN ASTM F436 HARDENED WASHER WITH STANDARD AND SLOTTED HOLES UNDER EACH BOLT HEAD AND NUT.

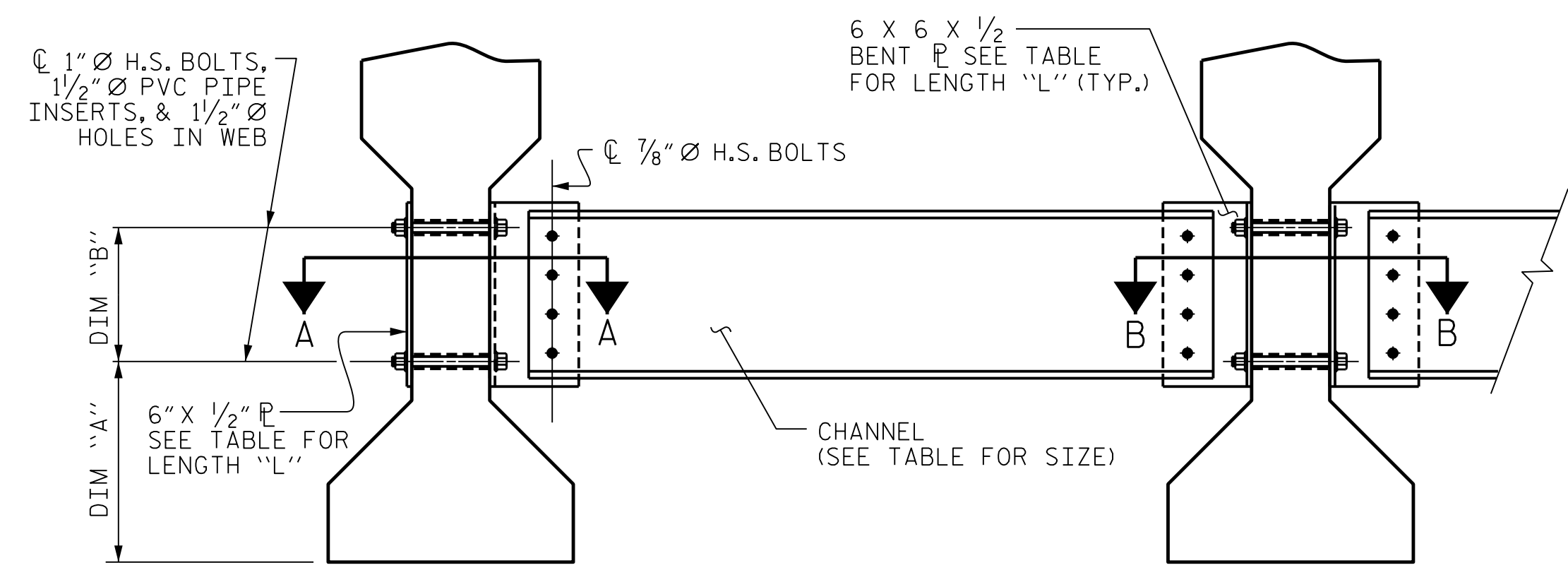
FOR BOLTS THROUGH THE GIRDER WEB, PROVIDE SUFFICIENT LENGTH OF THREADS ON ALL BOLTS TO ACCOMMODATE WASHERS AND THE THICKNESS OF CONNECTING MEMBER PLUS AT LEAST 1/4" PROJECTION BEYOND THE NUT.

INTERMEDIATE DIAPHRAGM ASSEMBLY SHALL COMPLY WITH SECTION 1072 OF THE STANDARD SPECIFICATIONS.

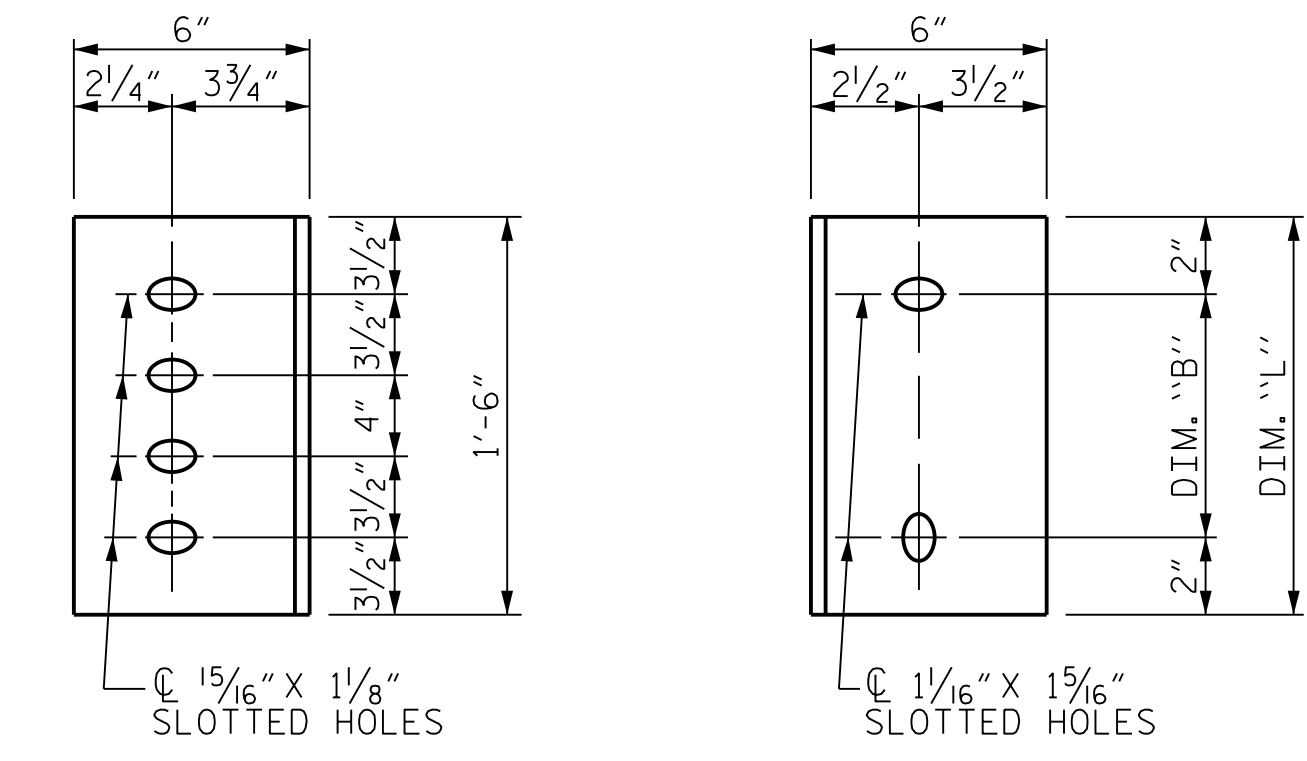
SUBMIT TWO SETS OF WORKING DRAWINGS FOR THE INTERMEDIATE DIAPHRAGM ASSEMBLY FOR REVIEW, COMMENTS AND ACCEPTANCE. AFTER REVIEW, COMMENTS, AND ACCEPTANCE, SUBMIT SEVEN SETS FOR DISTRIBUTION.

IN THE EXTERIOR BAYS, PLACE TEMPORARY STRUTS BETWEEN PRESTRESSED GIRDERS ADJACENT TO THE STEEL DIAPHRAGMS. STRUTS SHALL REMAIN IN PLACE 3 DAYS AFTER CONCRETE IS PLACED.

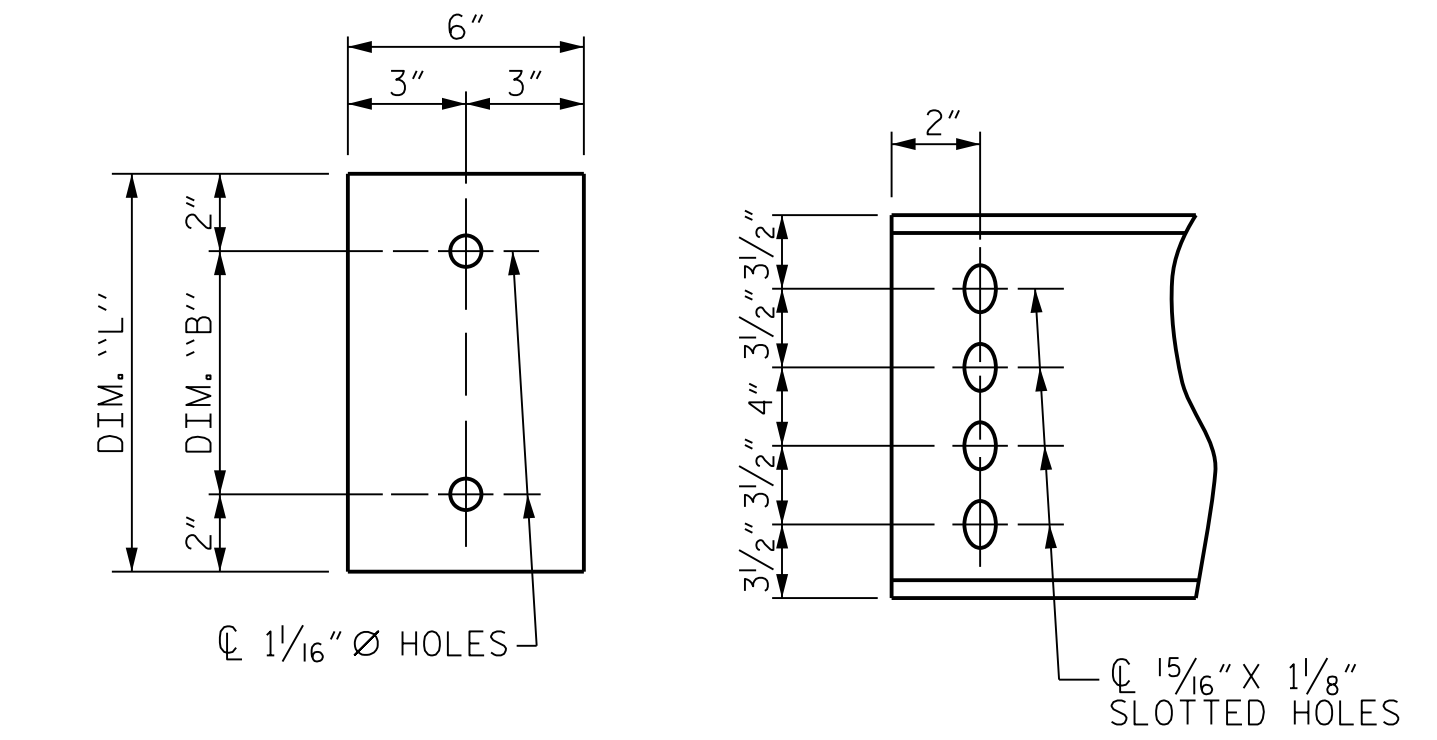
THE COST OF THE STEEL DIAPHRAGMS AND ASSEMBLIES SHALL BE INCLUDED IN THE UNIT PRICE BID FOR PRESTRESSED CONCRETE GIRDERS.



**PART SECTION AT INTERMEDIATE DIAPHRAGM**  
 EXTERIOR GIRDER  
 INTERIOR GIRDER



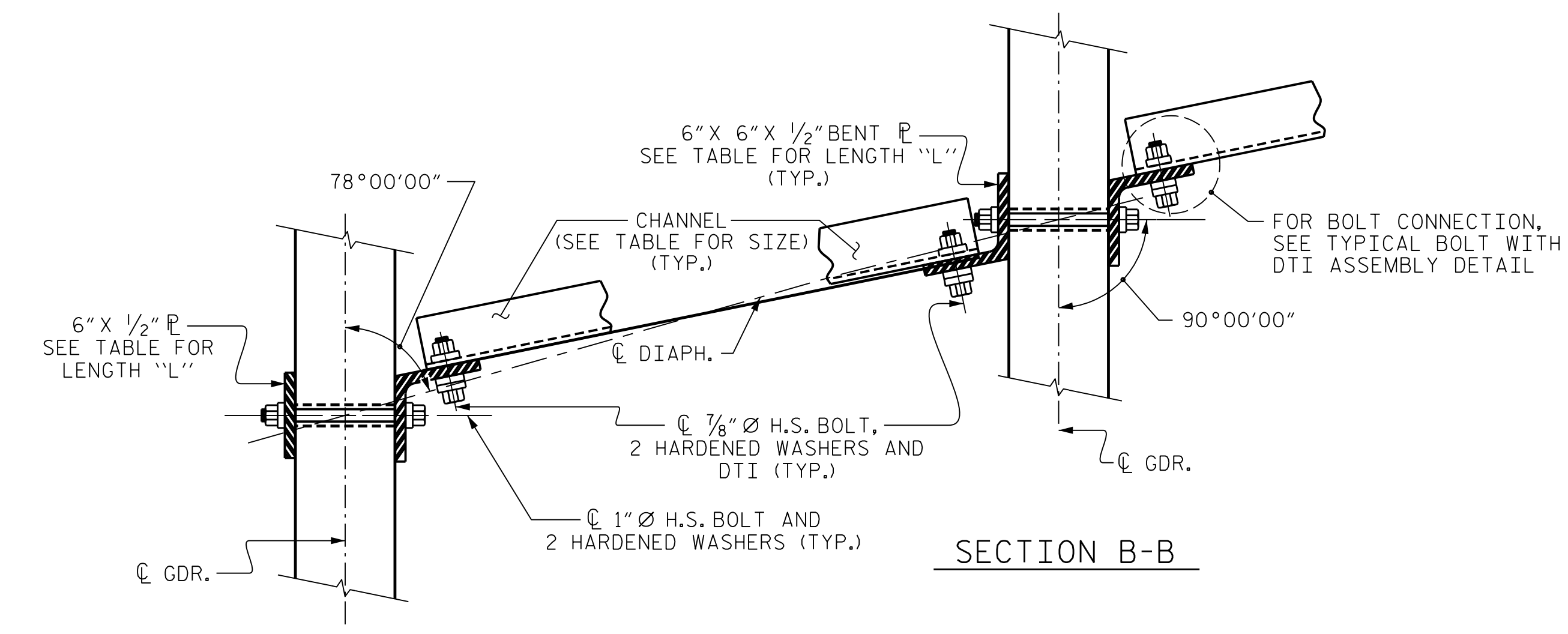
**CONNECTOR PLATE DETAILS**  
 DIAPHRAGM FACE  
 WEB FACE



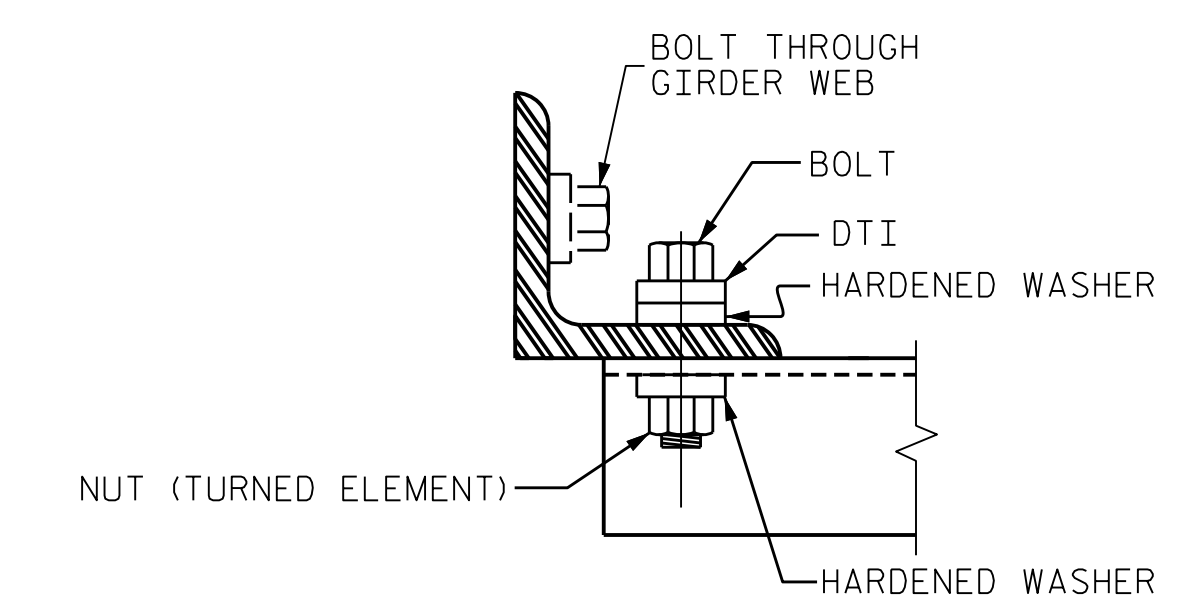
**PLATE DETAILS**      **CHANNEL END**

**TABLE**

GIRDER TYPE	CHANNEL SIZE	DIM "A"	DIM "B"	DIM "L"
IV	MC 18 x 42.7	1'-9 1/2"	1'-2"	1'-6"



**CONNECTION DETAILS**  
 SECTION A-A  
 SECTION B-B



**BOLT WITH DTI ASSEMBLY DETAIL**

PROJECT NO. U-4734  
 FORSYTH COUNTY  
 STATION: 38+35.00 -L-



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**SUPERSTRUCTURE INTERMEDIATE STEEL DIAPHRAGMS FOR TYPE IV PRESTRESSED CONCRETE GIRDERS**

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-17
1			3			TOTAL SHEETS 42
2			4			

**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.

STEEL SOLE PLATES, ANCHOR BOLTS, NUTS, AND WASHERS SHALL BE GALVANIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

PRIOR TO WELDING, GRIND THE GALVANIZED SURFACE OF THE PORTION OF THE EMBEDDED PLATE AND SOLE PLATE THAT ARE TO BE WELDED. AFTER WELDING, DAMAGED GALVANIZED SURFACES SHALL BE REPAIRED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

WHEN WELDING THE SOLE PLATE TO THE EMBEDDED PLATE IN THE GIRDER, 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.

SOLE PLATE "P", BOLTS, NUTS AND WASHERS SHALL BE INCLUDED IN THE PAY ITEM FOR PRESTRESSED CONCRETE GIRDERS.

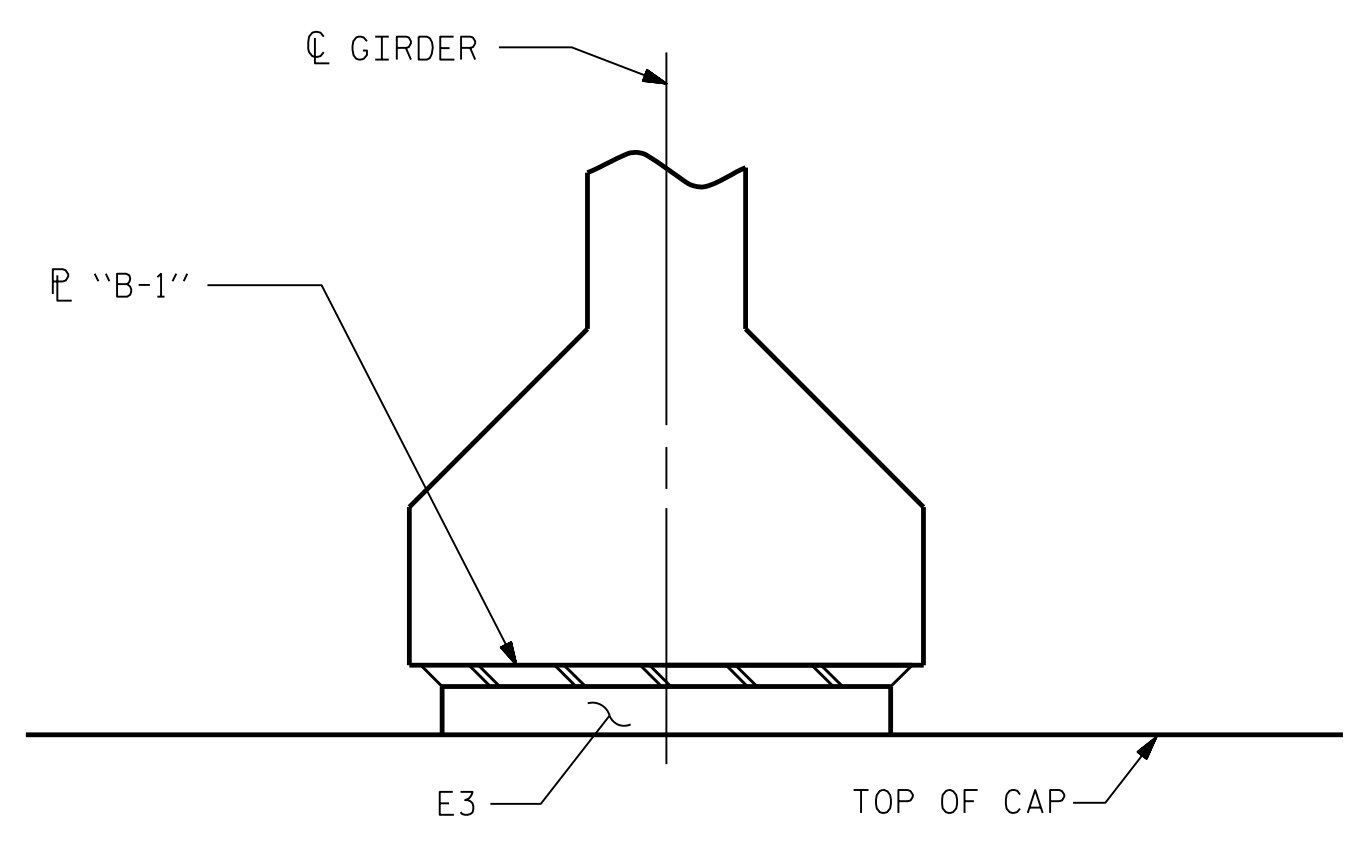
ANCHOR BOLTS SHALL MEET THE REQUIREMENTS OF ASTM A449. NUTS SHALL MEET THE REQUIREMENTS OF AASHTO M291-DH OR AASHTO M292-2H. WASHERS SHALL MEET THE REQUIREMENTS OF AASHTO M293. NO SHOP DRAWINGS ARE REQUIRED FOR ANCHOR BOLTS, NUTS AND WASHERS. SHOP INSPECTION IS REQUIRED.

ALL SURFACES OF BEARING PLATES SHALL BE SMOOTH AND STRAIGHT.

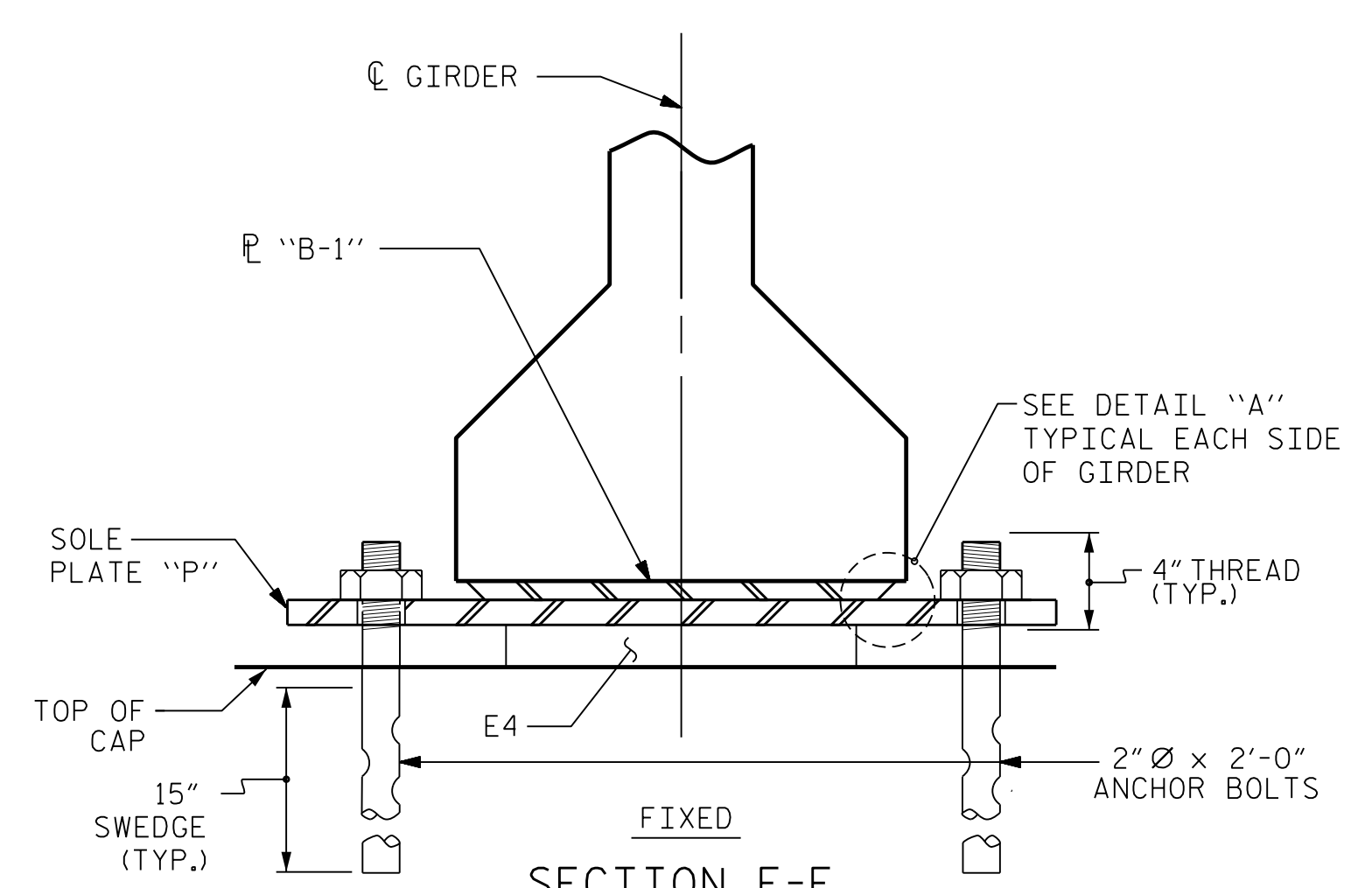
THE ELASTOMER IN THE STEEL REINFORCED BEARINGS SHALL HAVE A SHEAR MODULUS OF 0.160 KSI, IN ACCORDANCE WITH AASHTO M251.

FOR STEEL REINFORCED ELASTOMERIC BEARINGS, SEE SPECIAL PROVISIONS.

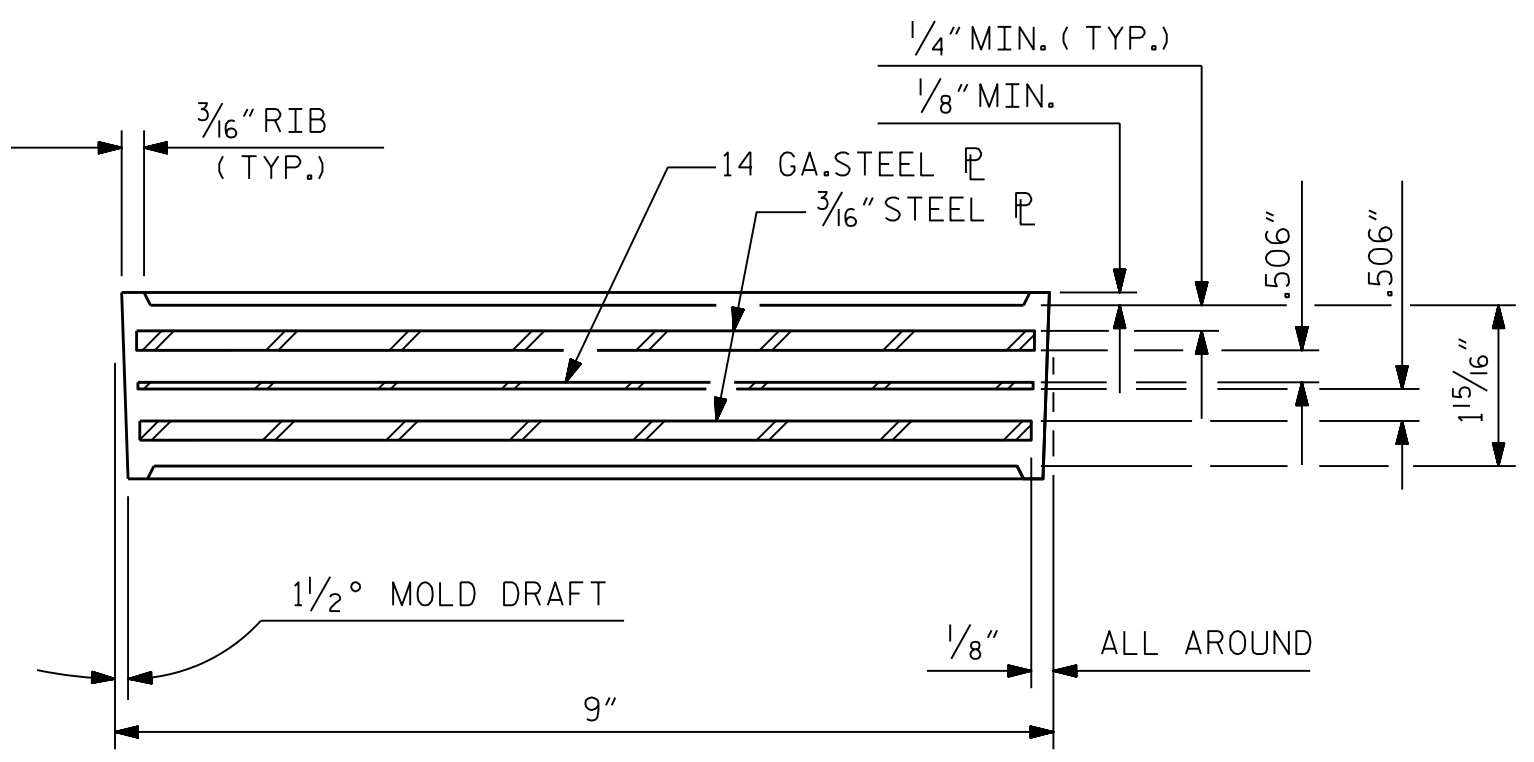
ALL SOLE PLATES SHALL BE AASHTO M270 GRADE 36.



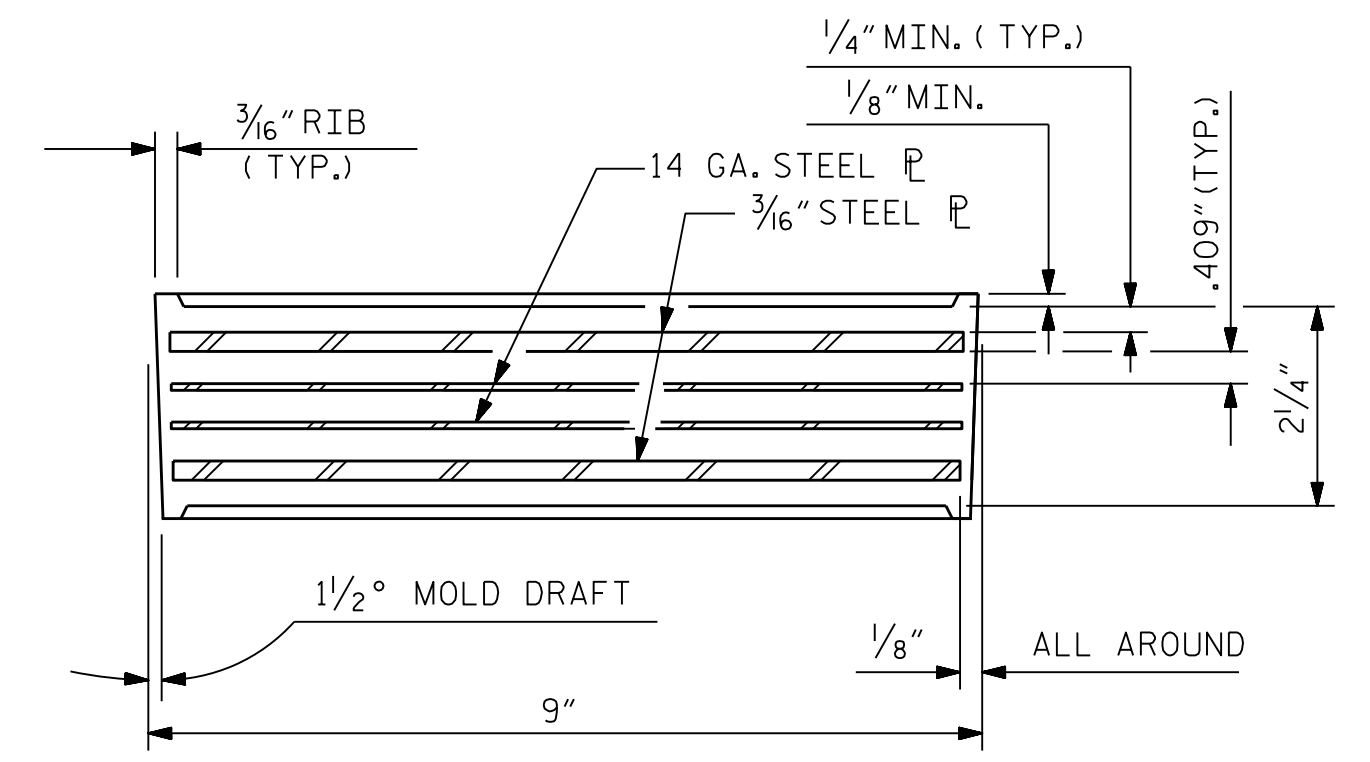
SECTION B-B



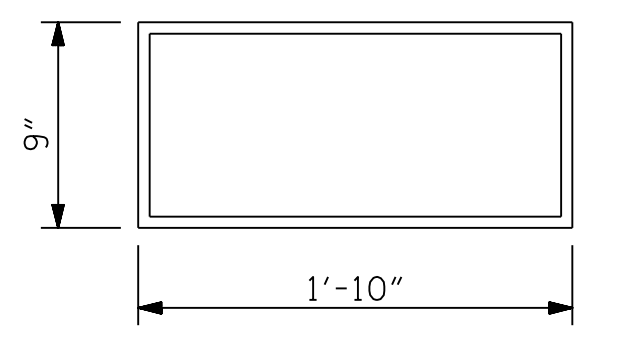
SECTION E-E



TYPICAL SECTION OF ELASTOMERIC BEARINGS



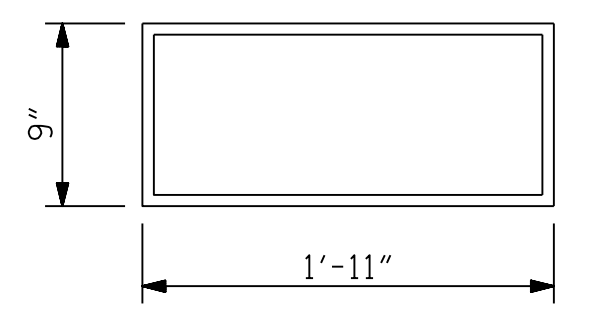
TYPICAL SECTION OF ELASTOMERIC BEARINGS



E3 (22 REQ'D)

PLAN VIEW OF ELASTOMERIC BEARINGS

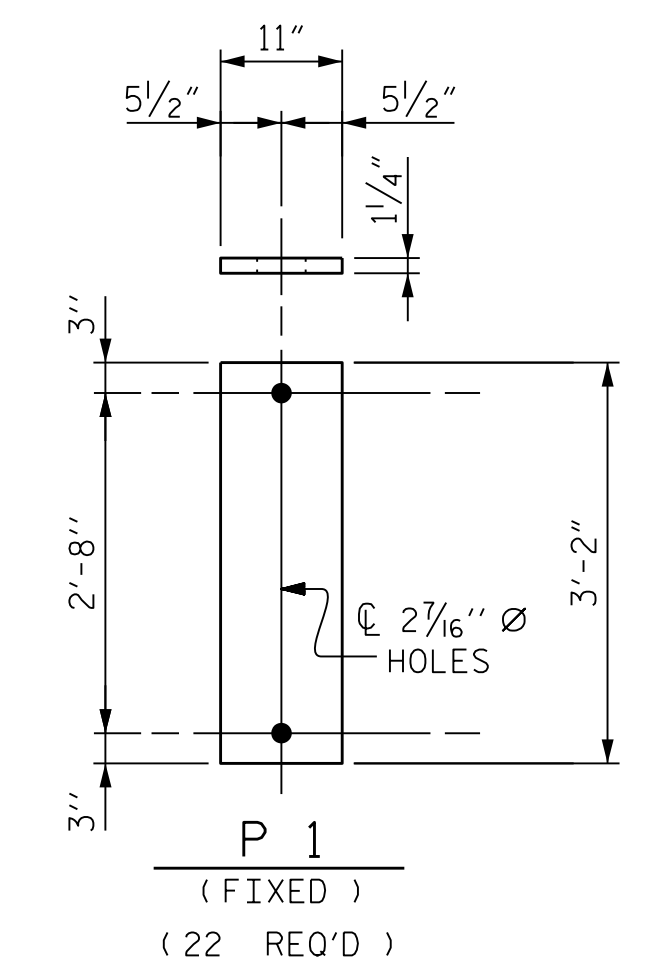
TYPE IV



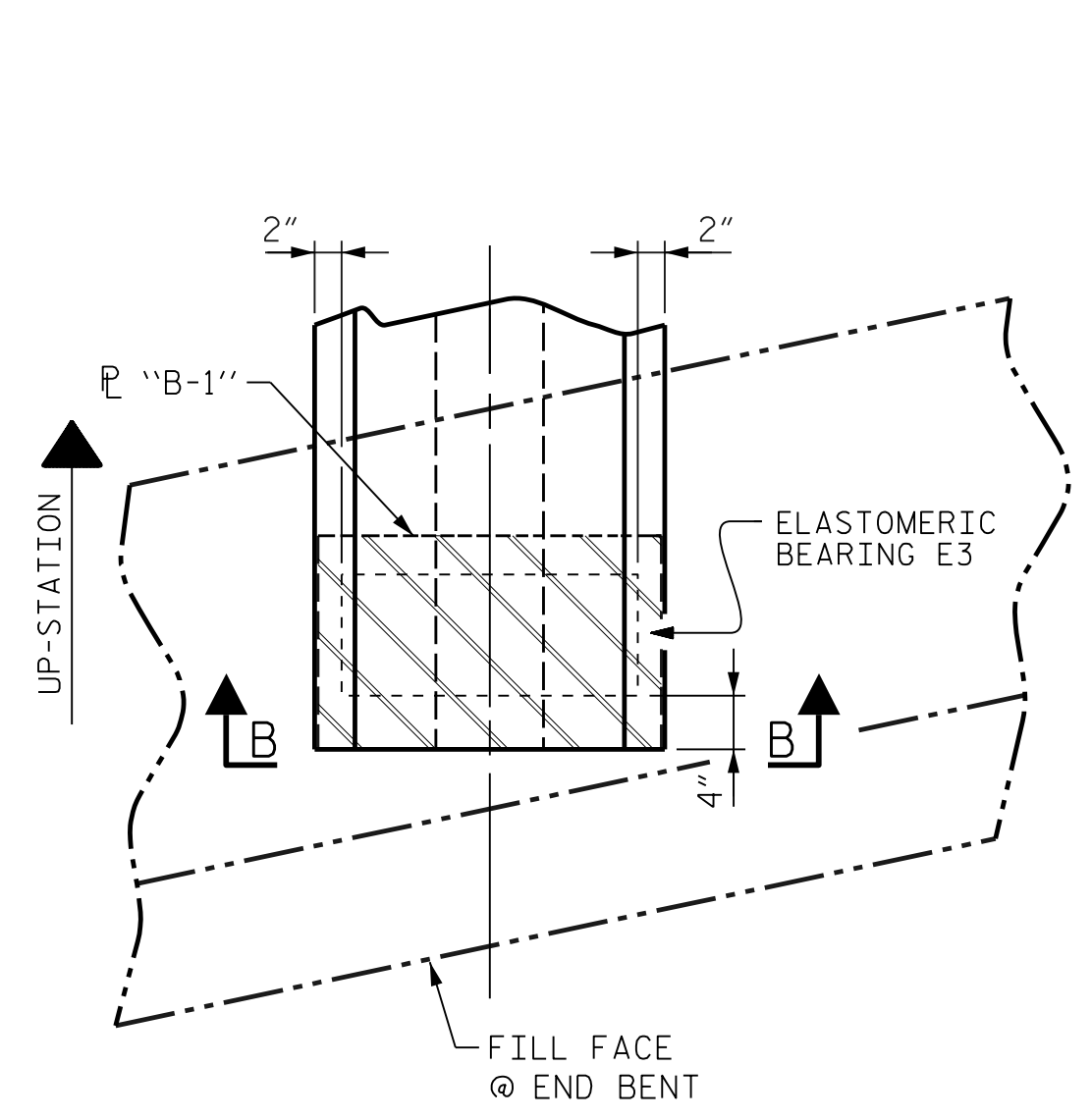
E4 (22 REQ'D)

PLAN VIEW OF ELASTOMERIC BEARING

TYPE V

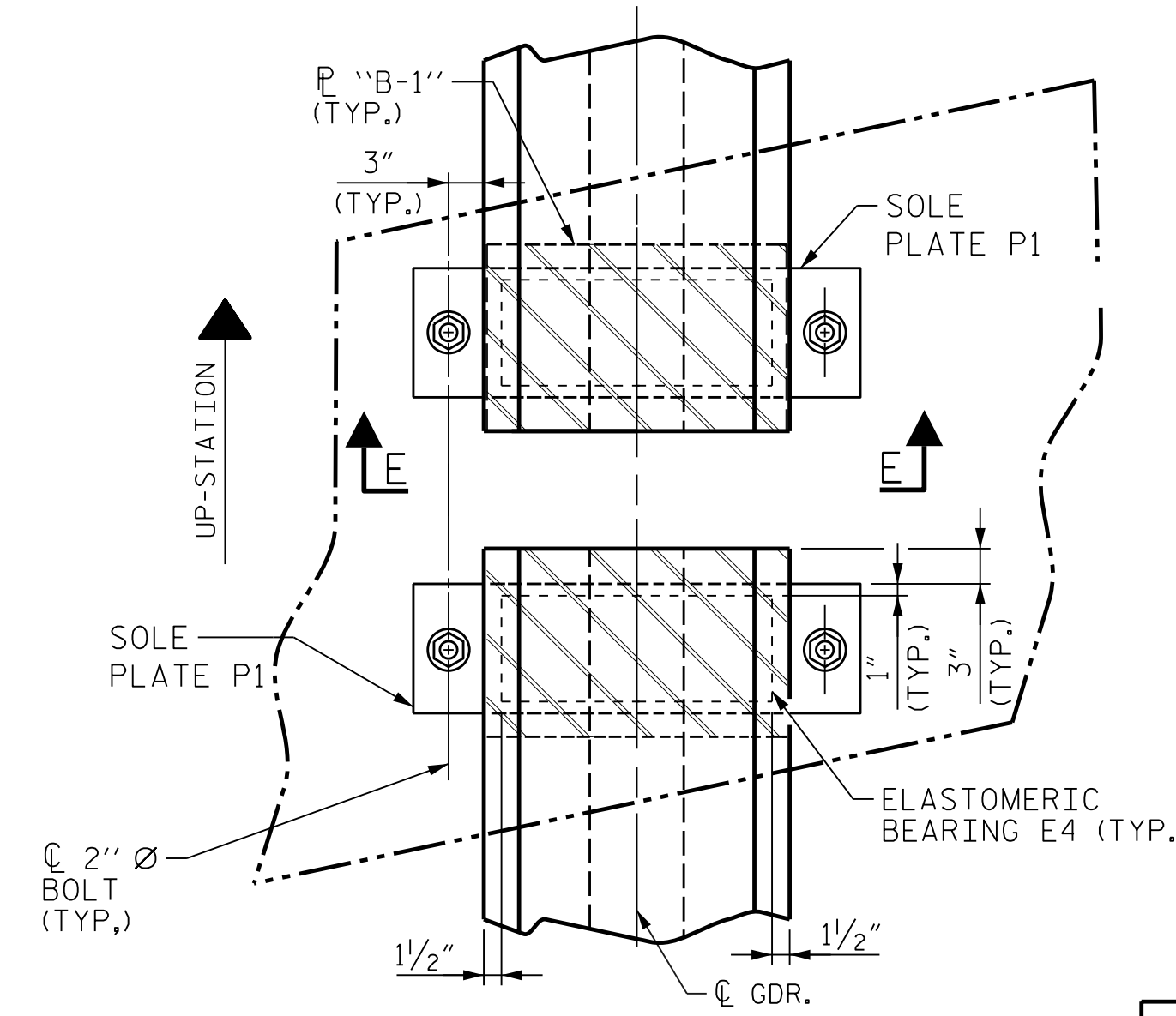


SOLE PLATE DETAILS ("P")

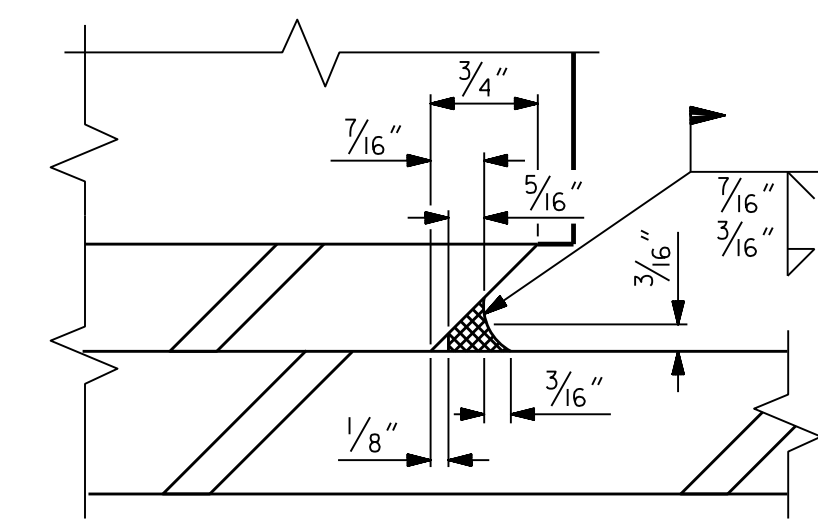


PLAN AT END BENT

(END BENT 1 SHOWN, END BENT 2 SIMILAR)

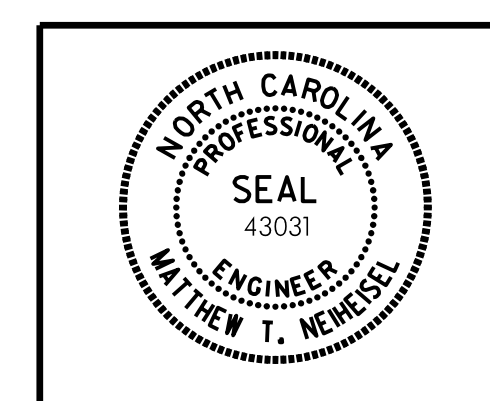


PLAN VIEW AT BENT



DETAIL "A"

PROJECT NO. U-4734  
 FORSYTH COUNTY  
 STATION: 38+35.00 -L-



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**SUPERSTRUCTURE**  
 ELASTOMERIC BEARING  
 DETAILS  
 PRESTRESSED CONCRETE GIRDER  
 SUPERSTRUCTURE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-18
1			3			TOTAL SHEETS
2			4			42

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

PLOT DRIVER: NCDOT STRUCTURES DEFAULT PLOTTER.PH  
 PENTABLE: NCDOT STRUCTURES DEFAULT PEN.FBI  
 USER: dcorfer DATE: 4/9/2018 TIME: 3:19:46 PM  
 FILE: ... \CAD\0570-14737-SWU.BG.dgn

DRAWN BY: D. H. CARTER DATE: APR 2018  
 CHECKED BY: M. T. NEIHEISEL DATE: APR 2018  
 DESIGN ENGINEER OF RECORD: M. T. NEIHEISEL DATE: APR 2018



**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.

**ALUMINUM RAILS**

MATERIAL FOR POSTS, BASES AND RAILS, EXPANSION BARS AND CLAMP BARS SHALL BE ASTM B221 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. PLACE ONE JOINT SPLICE JUST BEYOND THE 3RD RAIL POST FROM EACH END, TYPICALLY 14' FROM THE END. PLACE OTHER JOINTS AS NEEDED.

FOR END OF RAIL TO CLEAR FACE OF CONCRETE END POST DIMENSION, SEE SHEET 3 OF 3.

CAP SCREWS SHALL BE ASTM F593 ALLOY 305 STAINLESS STEEL. WASHERS FOR RAIL ATTACHMENT 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.

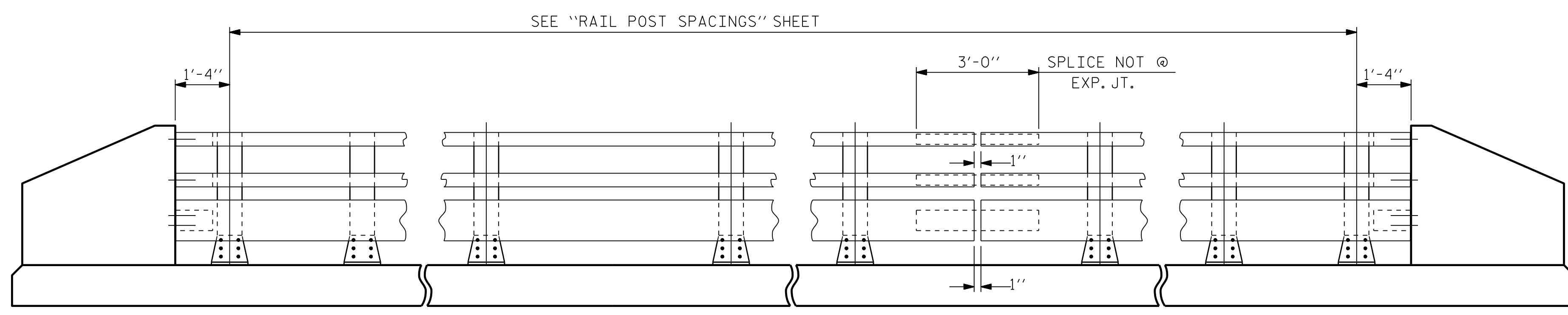
TO INSURE FUTURE IDENTIFICATION OF THE FABRICATOR, A PERMANENT IDENTIFYING MARK SHALL BE PLACED ON EACH POST. THE METHOD OF MARKING AND LOCATION SHALL BE SUCH THAT IT DOES NOT DETRACT FROM THE APPEARANCE OF THE POST, BUT REMAIN VISIBLE AFTER RAIL PLACEMENT.

SHIMS SHALL BE USED AS NECESSARY FOR POST ALIGNMENT.

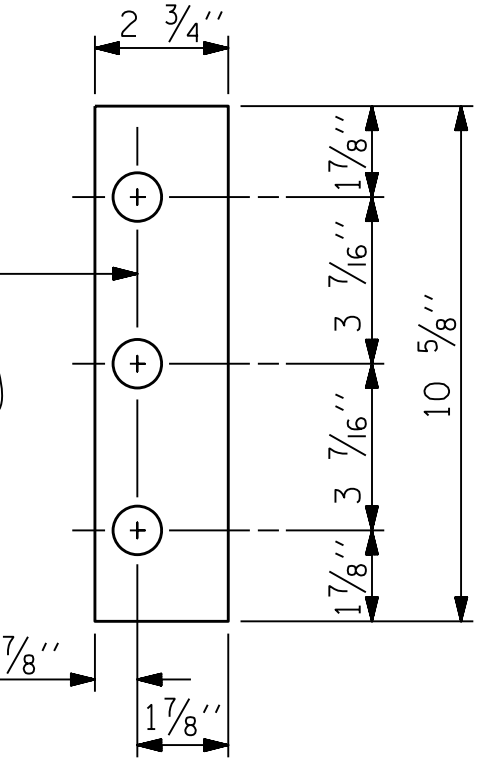
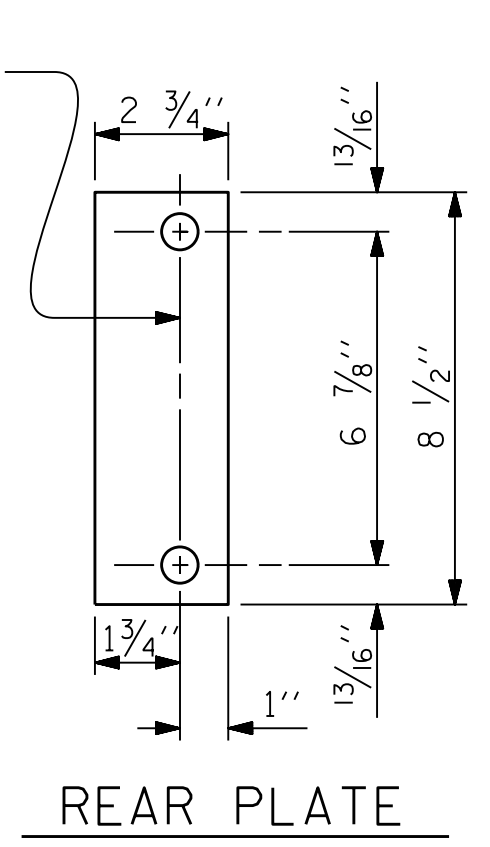
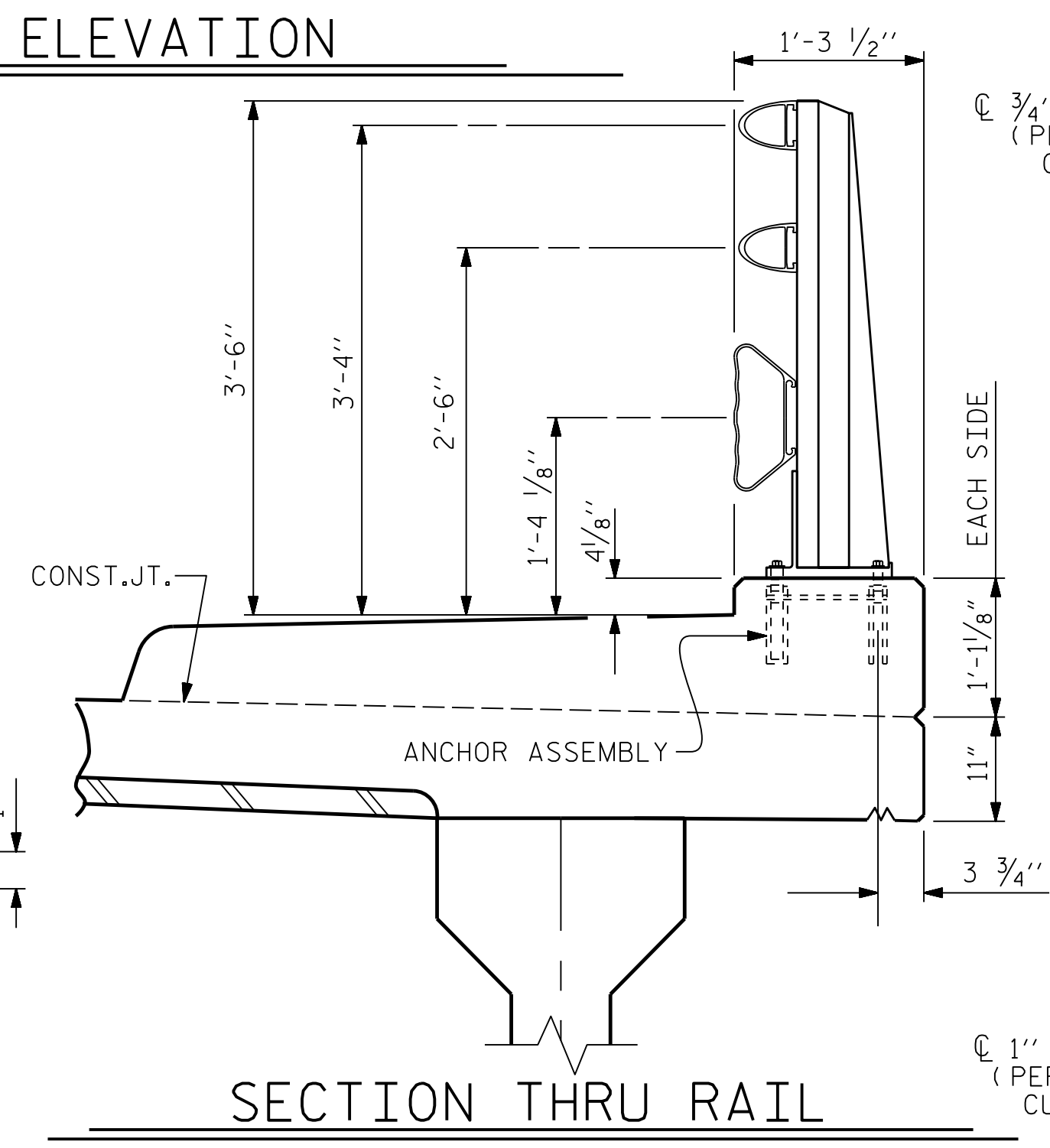
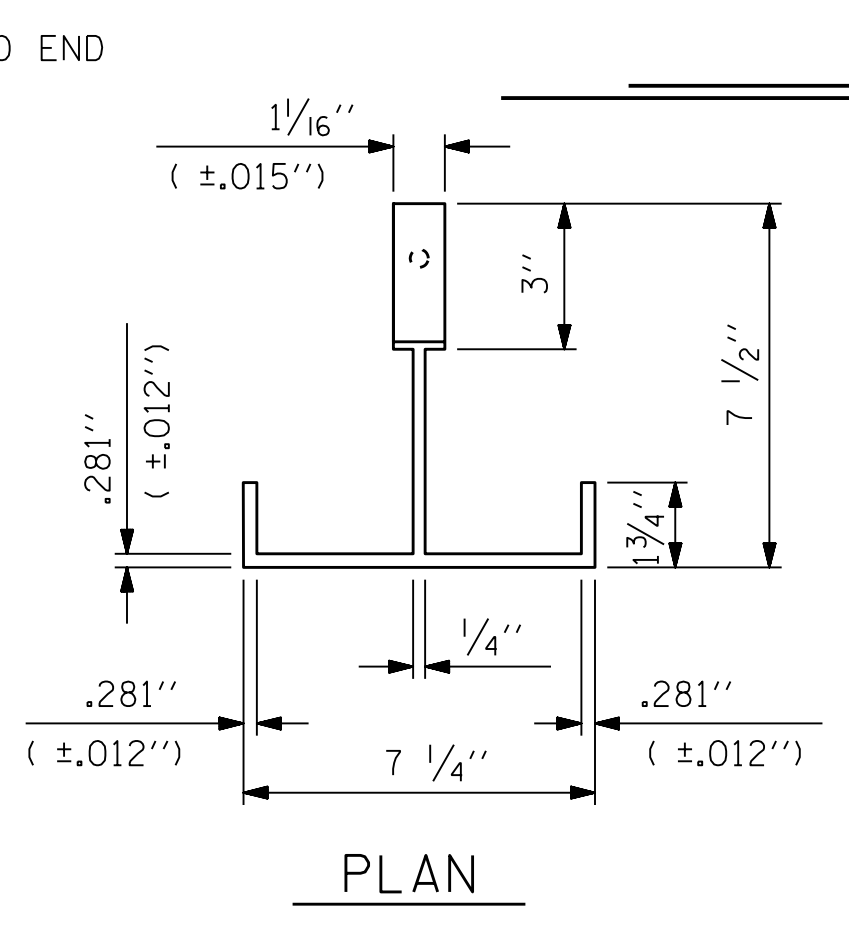
ALLOY 6351-T5 MAY BE SUBSTITUTED FOR ALLOY 6061-T6 WHERE APPLICABLE.

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

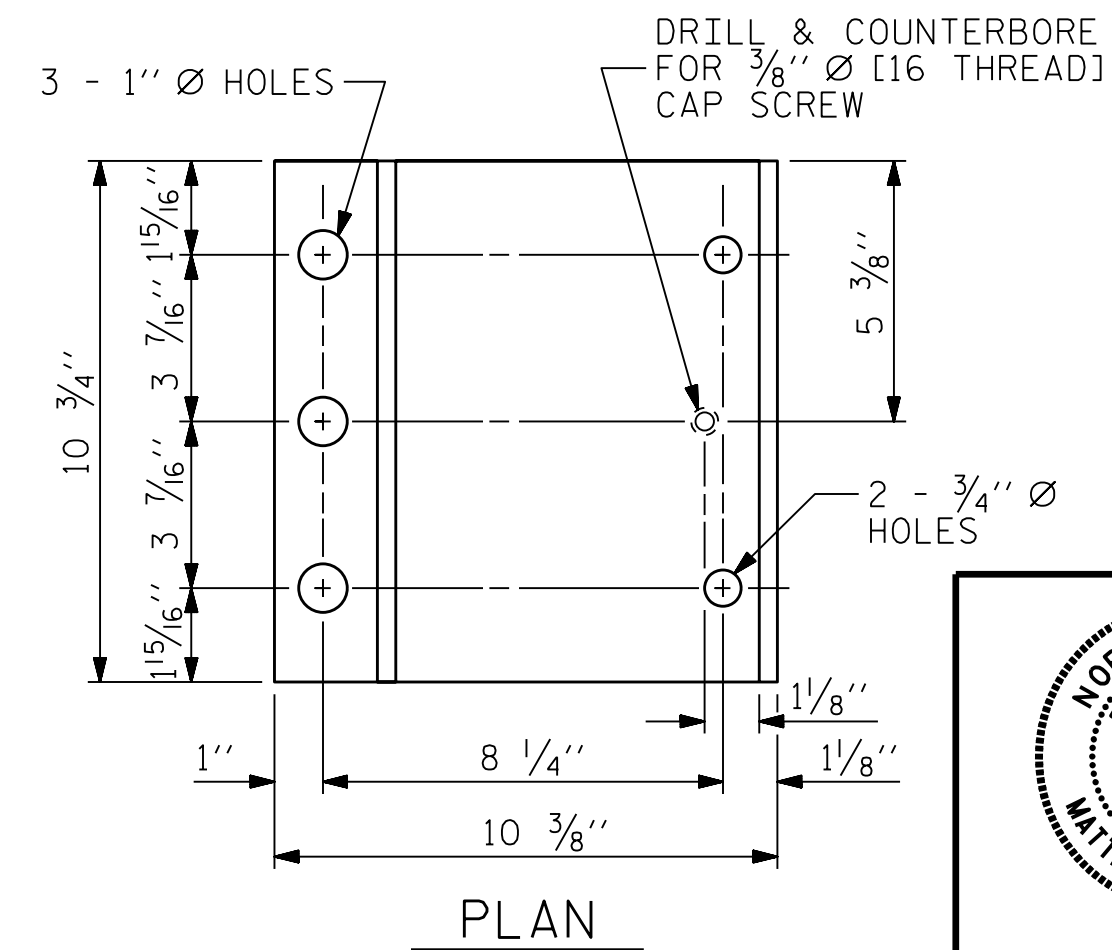
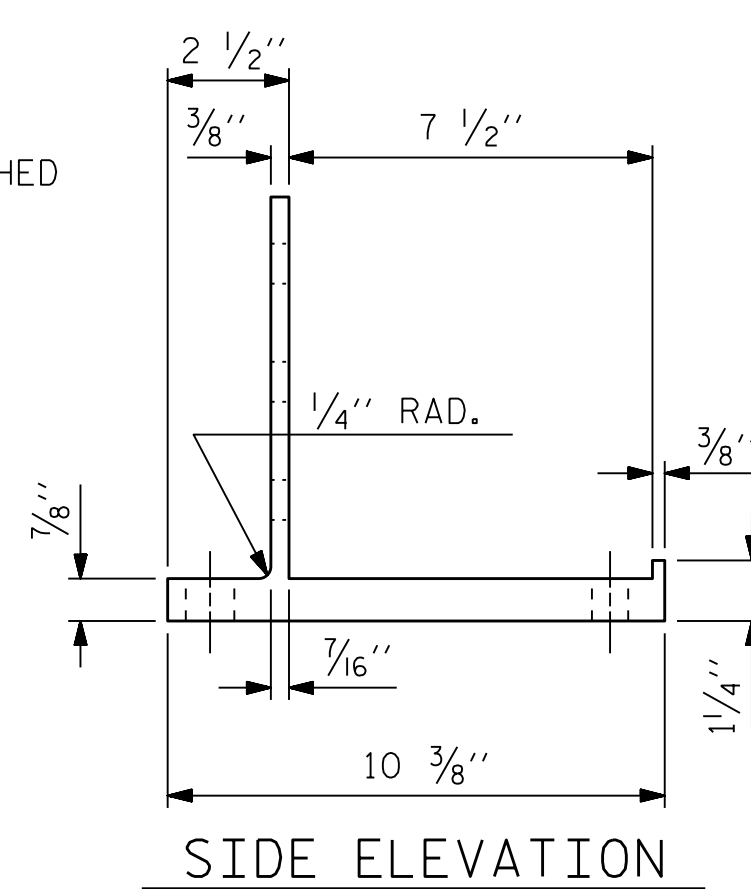
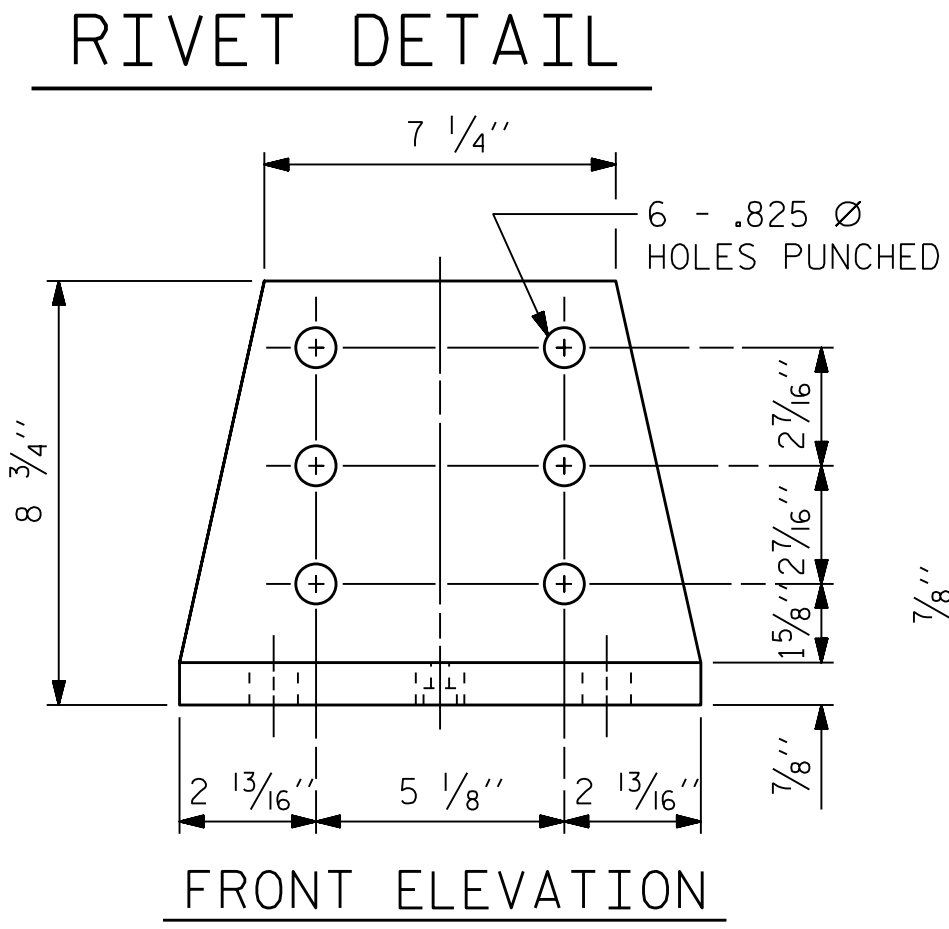
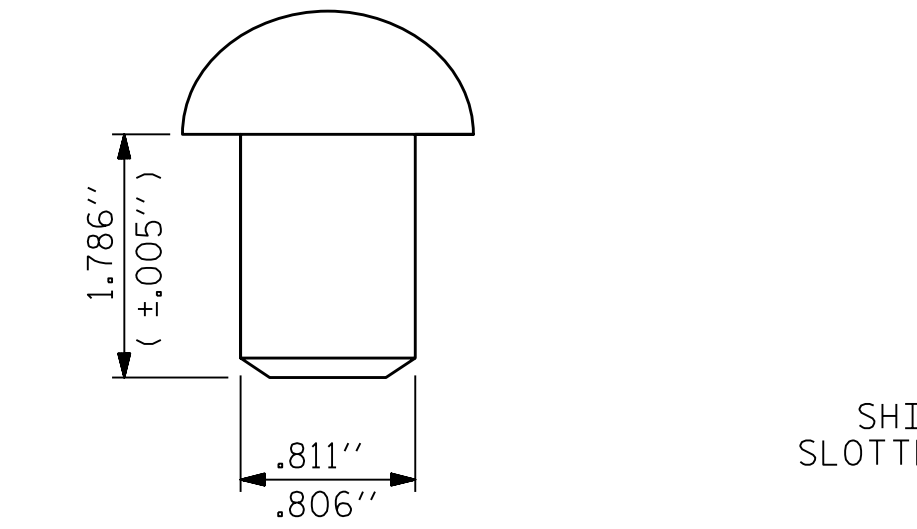
PAY LENGTH = 351.11 LIN. FT.



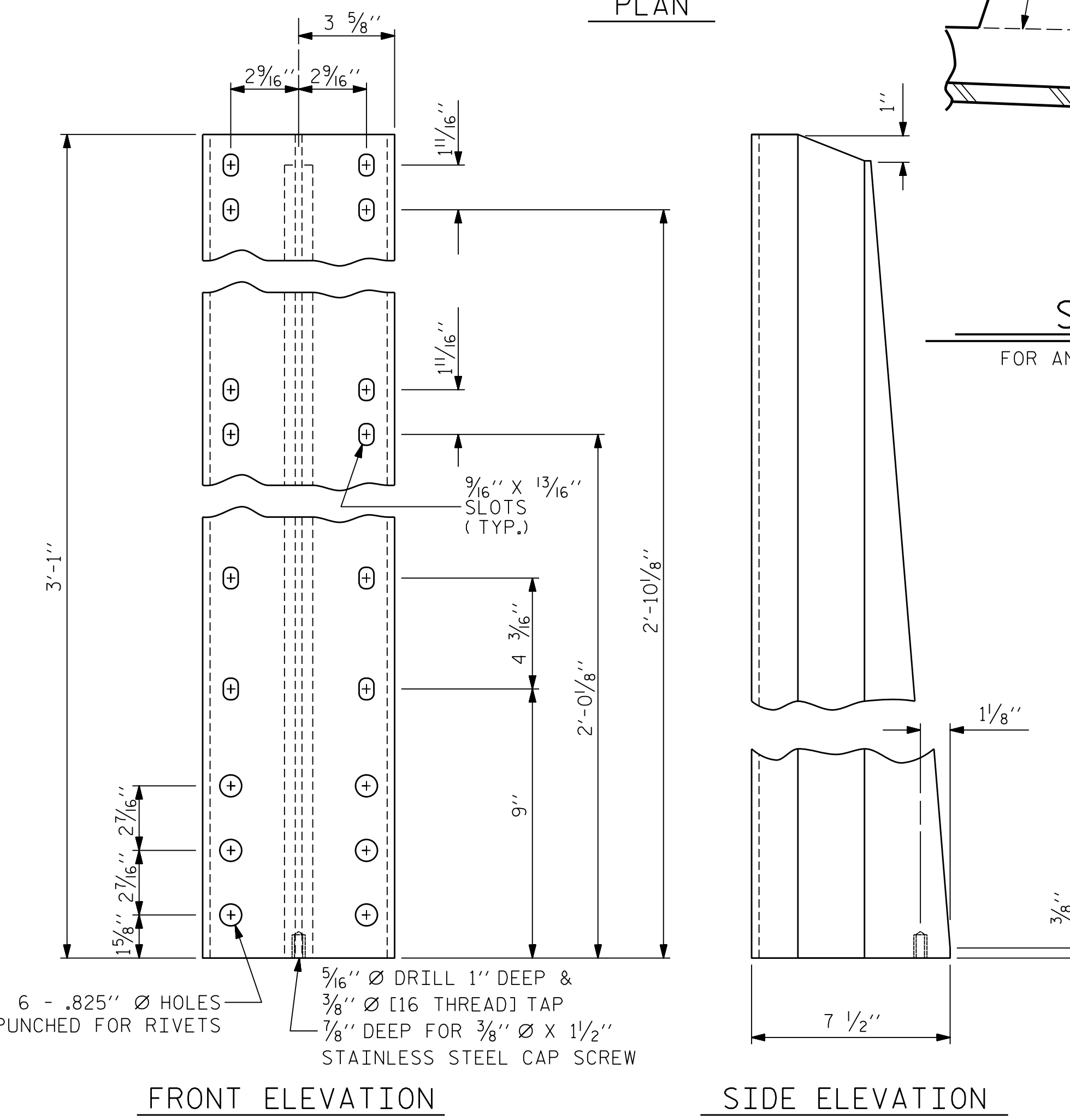
NOTE:  
FOR ATTACHMENT OF METAL RAIL TO END POST, SEE SHEET 3 OF 3.



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



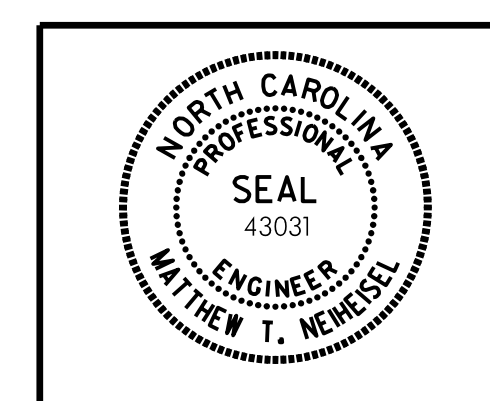
**POST BASE DETAILS**



**DETAILS OF POST**

DRAWN BY : D. H. CARTER DATE : APR 2018  
 CHECKED BY : M. T. NEIHEISEL DATE : APR 2018  
 DESIGN ENGINEER OF RECORD : M. T. NEIHEISEL DATE : APR 2018

PROJECT NO. U-4734  
 FORSYTH COUNTY  
 STATION: 38+35.00 -L-  
 SHEET 1 OF 3



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**STANDARD**  
 3 BAR METAL RAIL

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-19
1			3			TOTAL SHEETS 42
2			4			

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

PLOT DRIVER: NCDOT STRUCTURES DEFAULT PLOTTER.plt PENTABLE: NCDOT STRUCTURES DEFAULT PEN.tbl  
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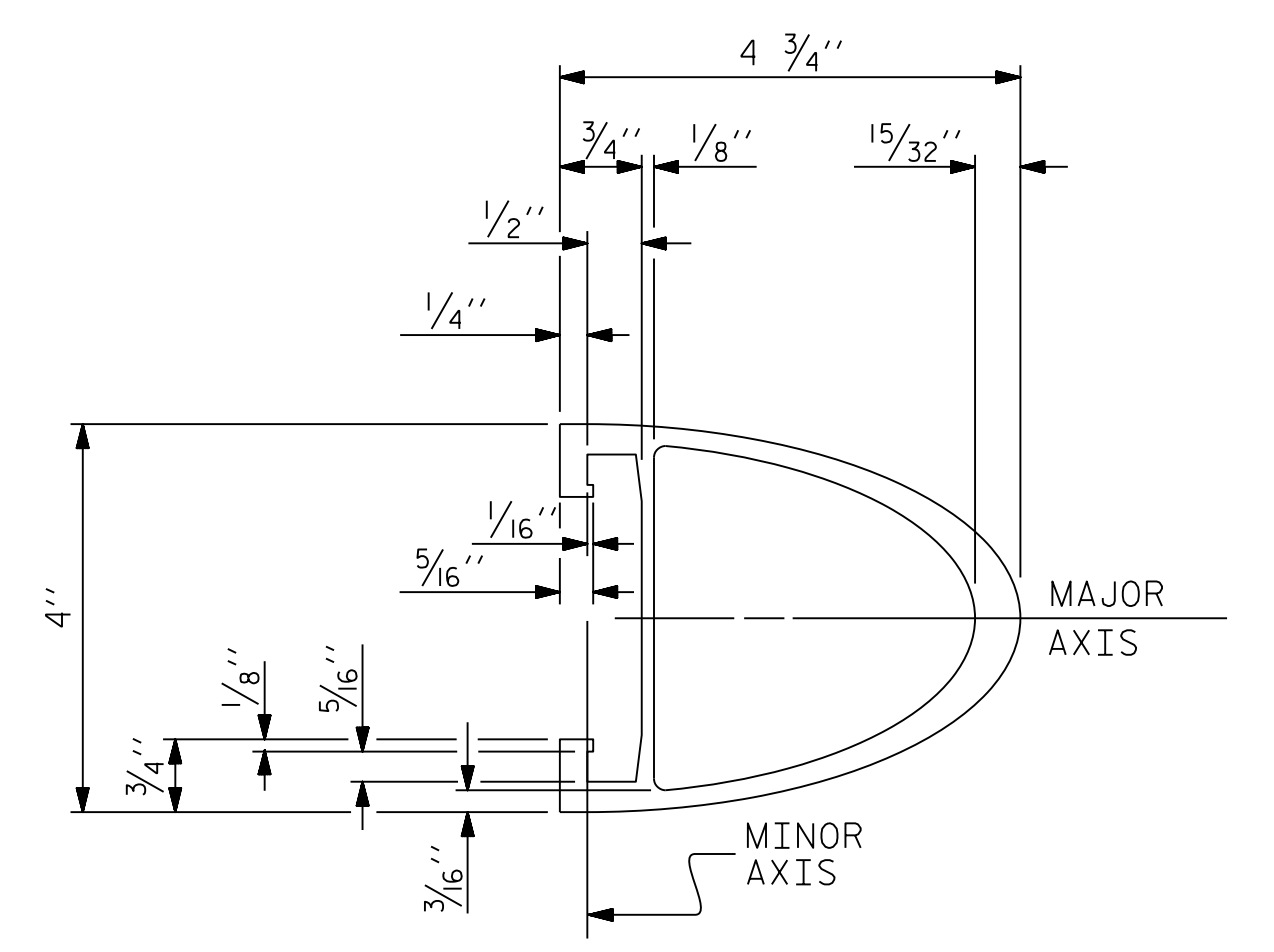


**NOTES**

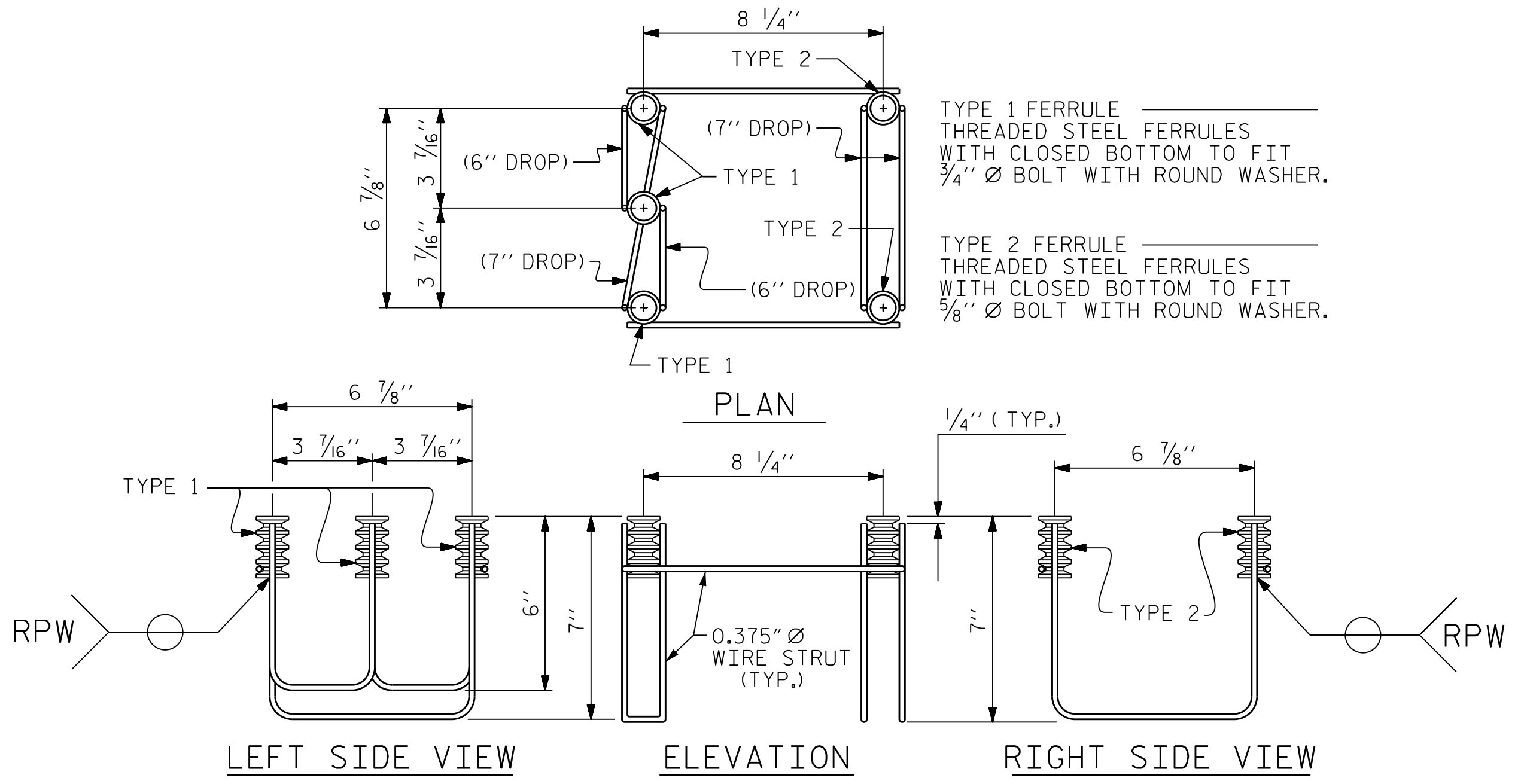
**STRUCTURAL CONCRETE ANCHOR ASSEMBLY**

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

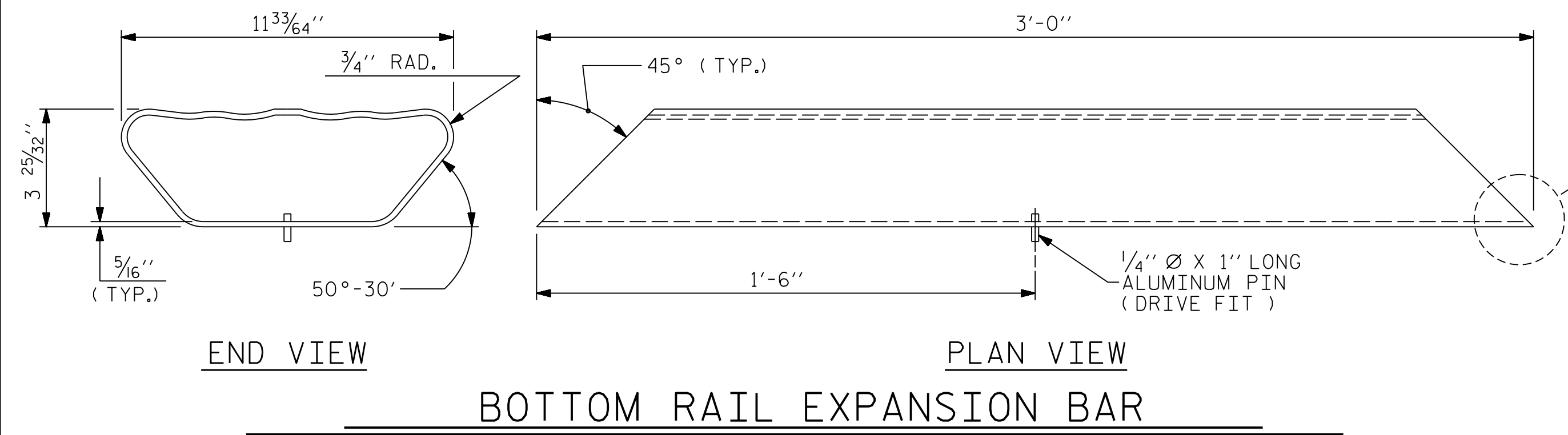
- A. FERRULES SHALL BE MADE FROM STEEL MEETING THE REQUIREMENTS OF AASHTO M169, GRADE 12L14 AND SHALL HAVE A MINIMUM LENGTH OF THREADS OF 2" FOR 3/4" FERRULES AND 1 3/4" FOR 5/8" FERRULES.
- B. 3 - 3/4" Ø X 2 1/2" BOLTS WITH WASHERS. BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307. BOLTS AND WASHERS 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. 2 - 5/8" Ø X 2 1/4" 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 5/8" Ø X 2 1/4" 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.
- D. 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.
- E. THE METAL RAIL ANCHOR ASSEMBLIES TO BE HOT DIPPED GALVANIZED TO CONFORM TO REQUIREMENTS OF AASHTO M111.
- F. 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.
- G. BOLTS TO BE TIGHTENED ONE-HALF TURN WITH A WRENCH FROM A FINGER-TIGHT POSITION.



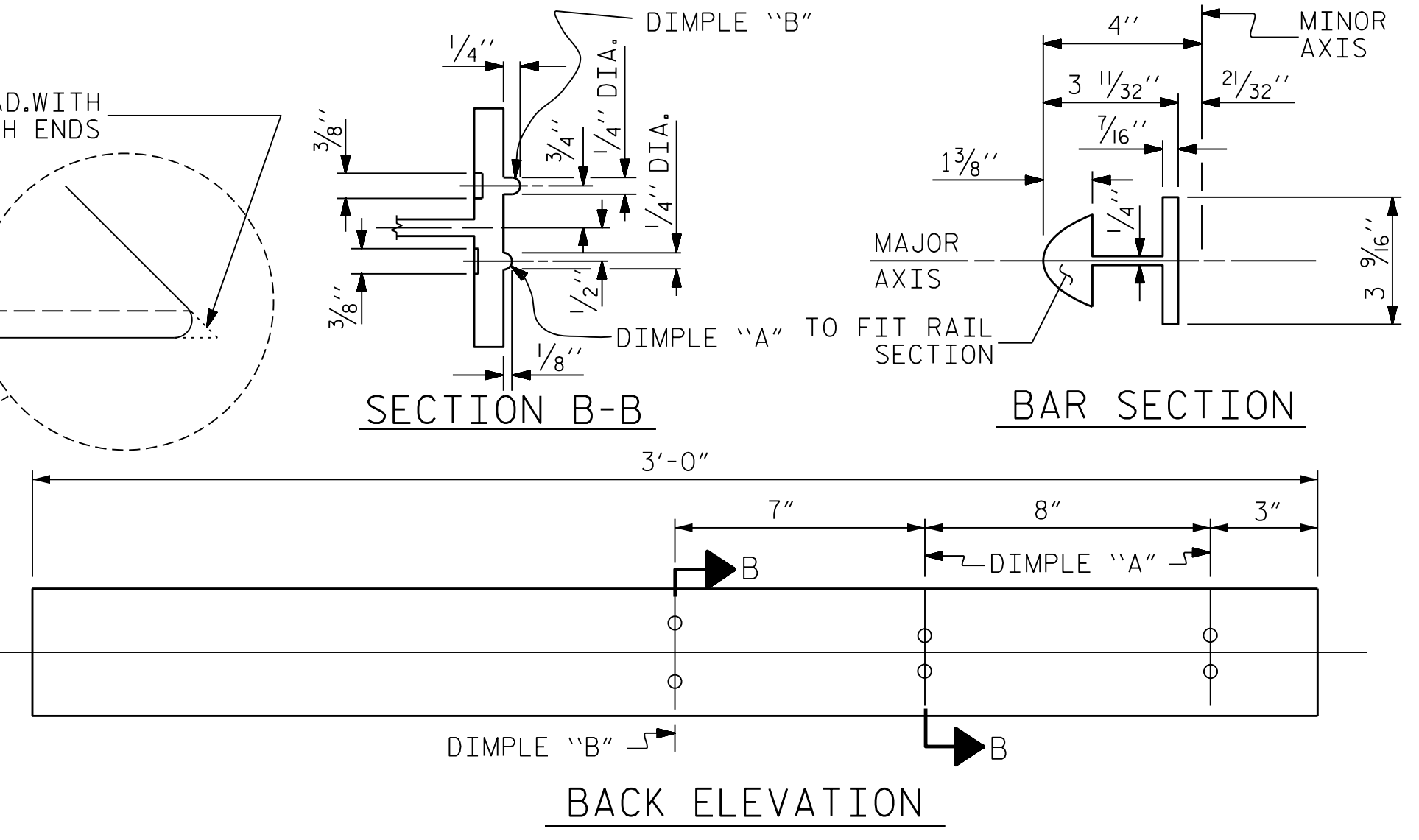
**TOP & MIDDLE RAIL SECTION**



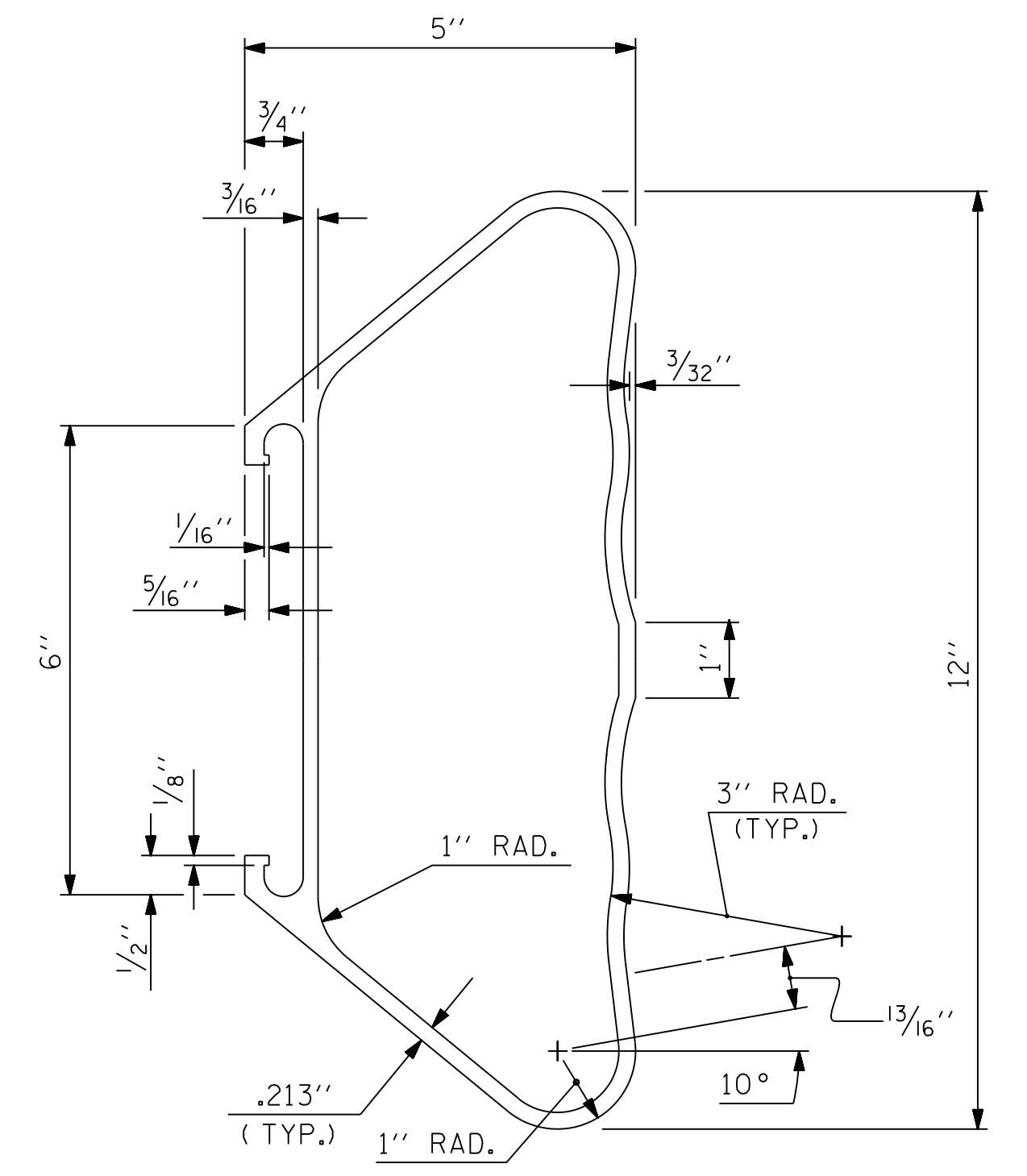
**5-BOLT METAL RAIL ANCHOR ASSEMBLY**  
( 60 ASSEMBLIES REQUIRED )



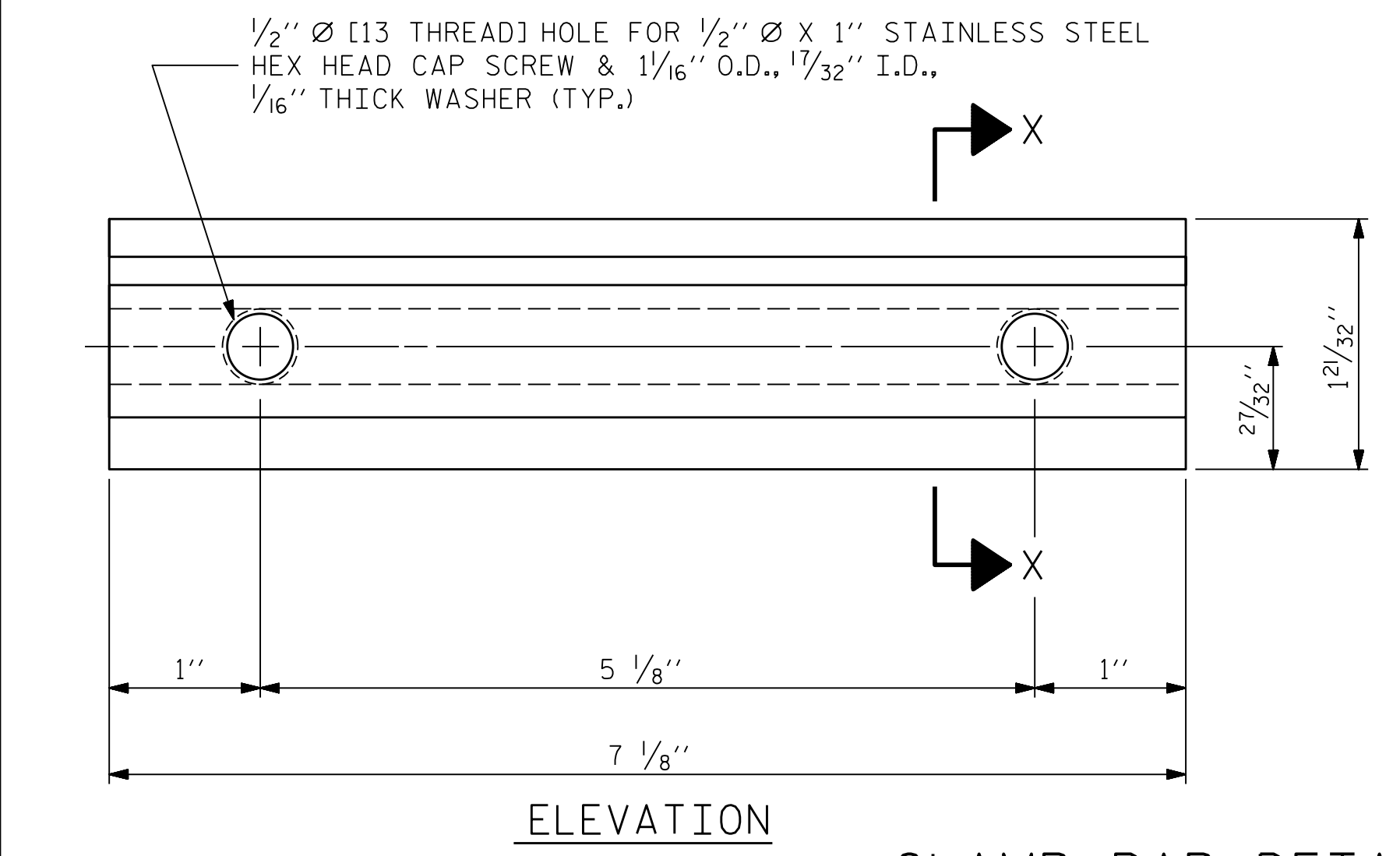
**BOTTOM RAIL EXPANSION BAR**



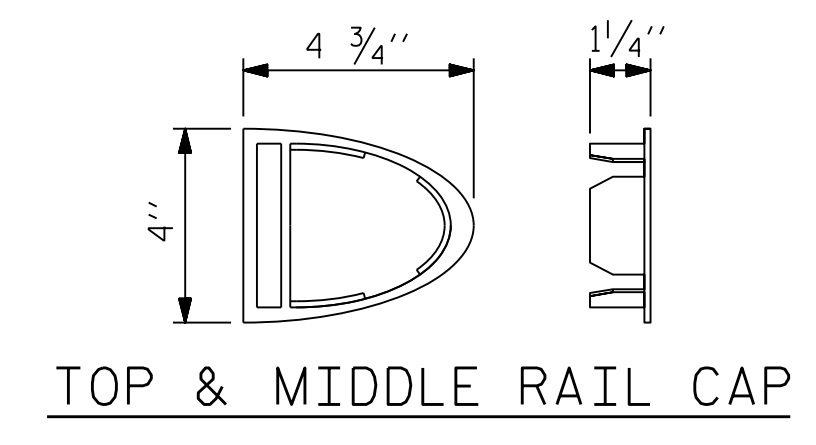
**TOP & MIDDLE RAIL EXPANSION BAR**



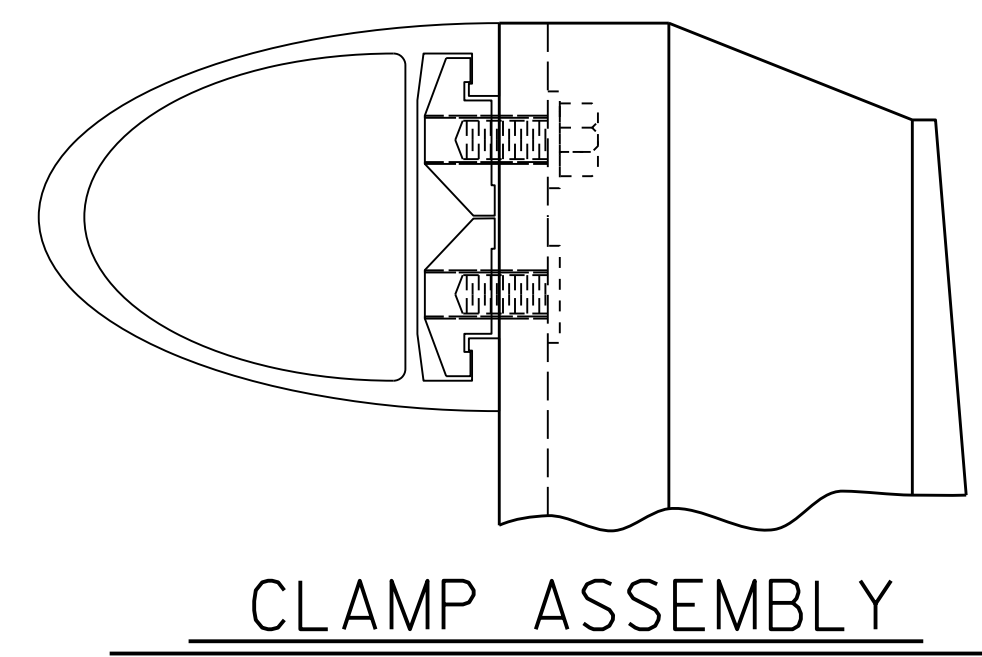
**BOTTOM RAIL SECTION**



**CLAMP BAR DETAIL**  
( 6 REQUIRED PER POST )

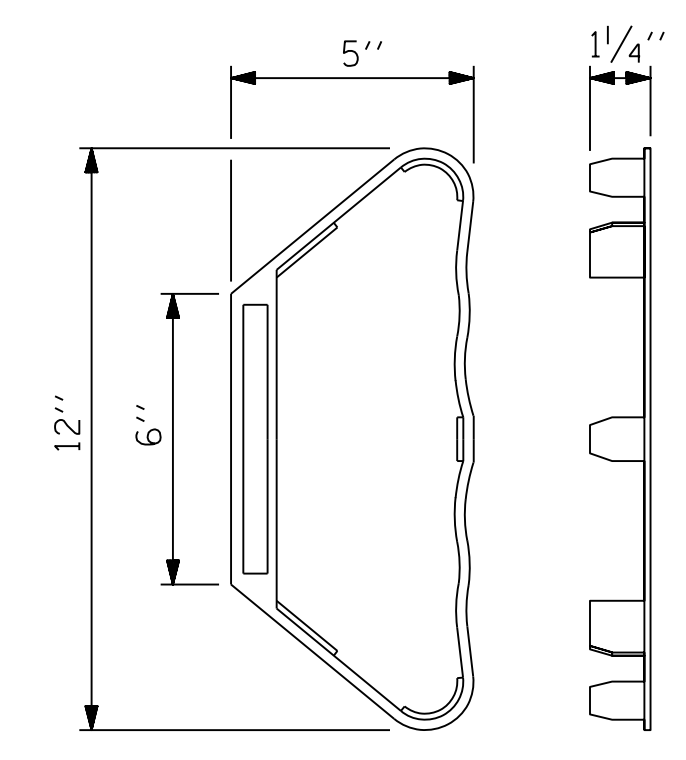


**TOP & MIDDLE RAIL CAP**



**CLAMP ASSEMBLY**

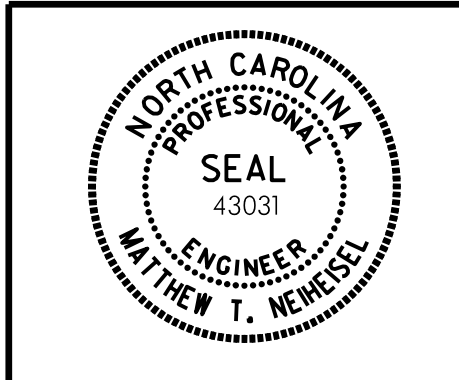
TOP RAIL SHOWN  
( MIDDLE & BOTTOM RAIL ARE SIMILAR )



**BOTTOM RAIL CAP**

PROJECT NO. U-4734  
FORSYTH COUNTY  
STATION: 38+35.00 -L-  
SHEET 2 OF 3

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
**STANDARD**  
3 BAR METAL RAIL

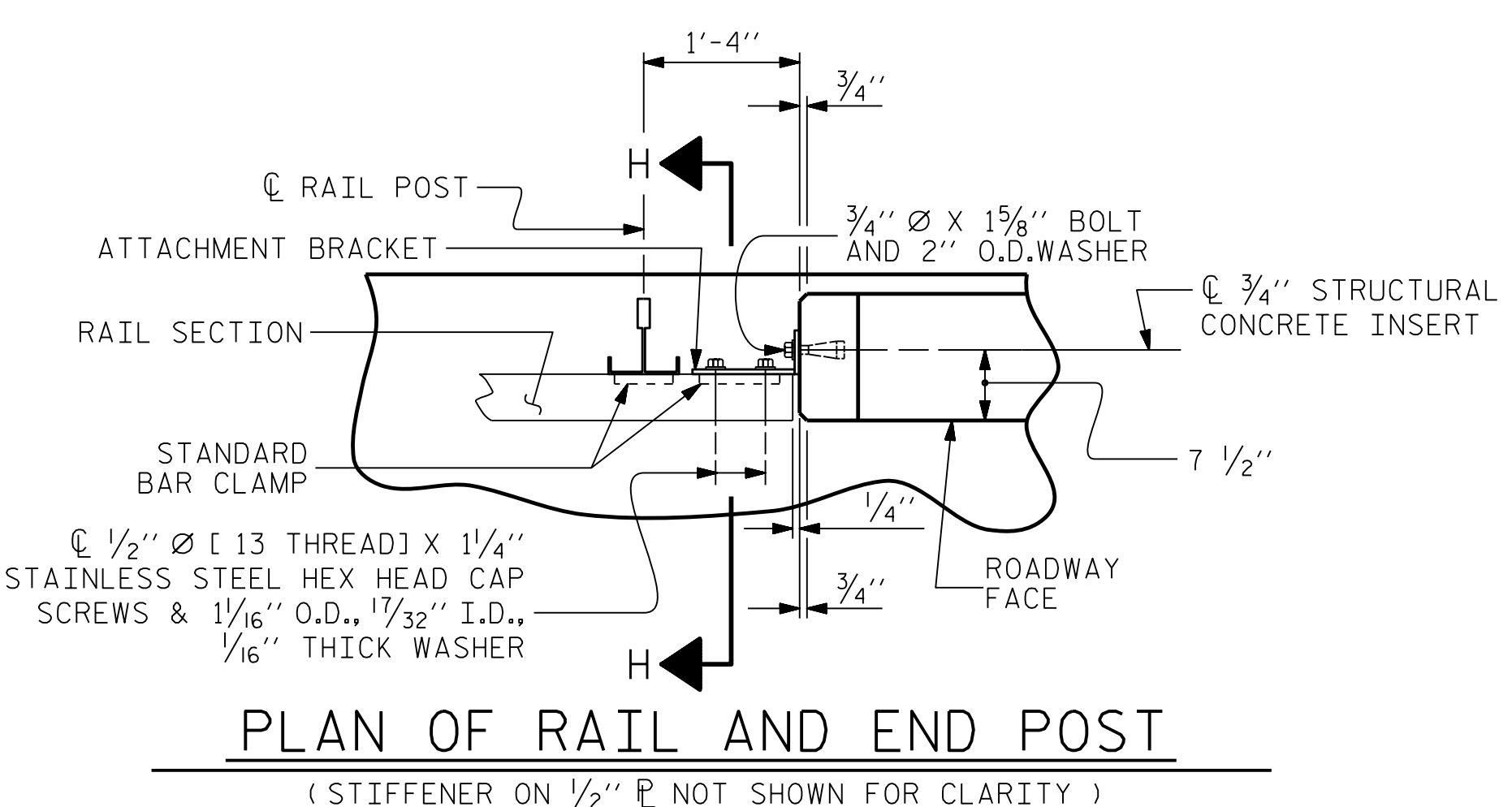


REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-20
1			3			TOTAL SHEETS
2			4			42

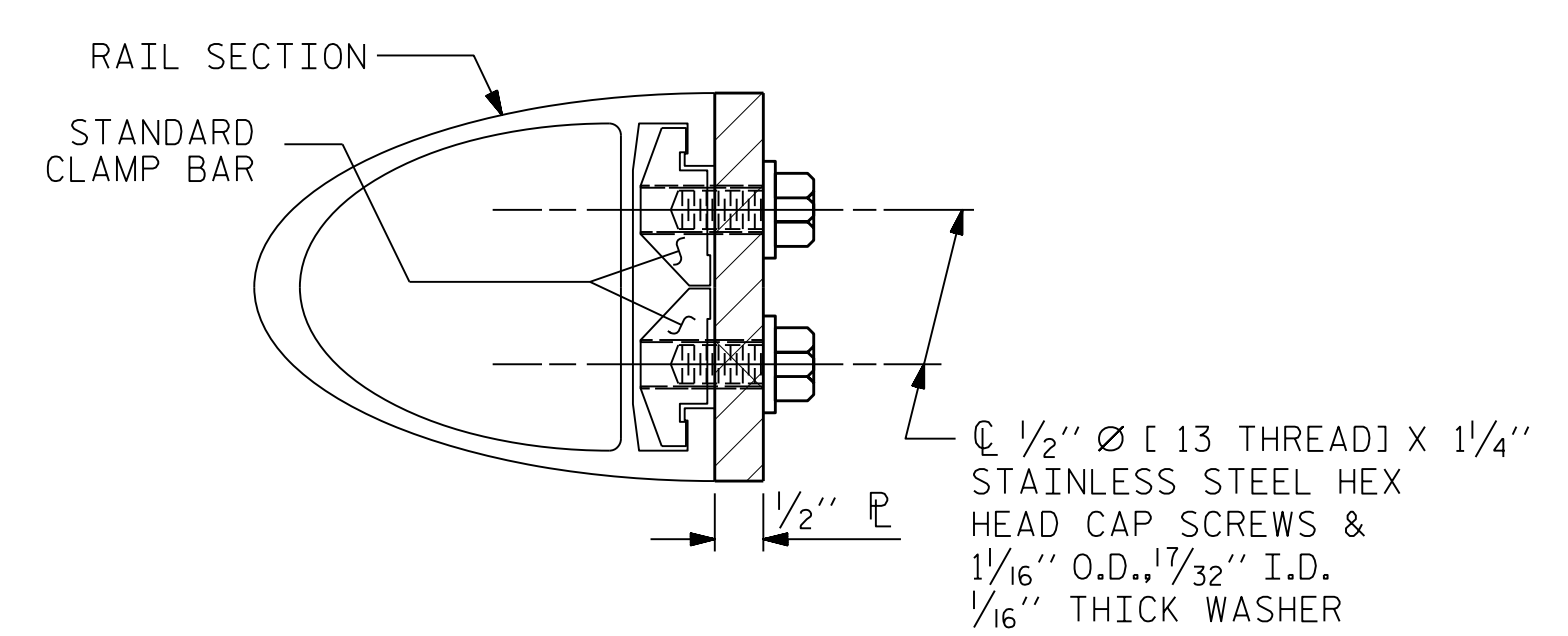
**HR** HDR Engineering, Inc. of the Carolinas  
555 Fayetteville St. Suite 900 Raleigh, N.C. 27601  
N.C.B.E.L.S. License Number: F-0116

Matthew T. Neiheisel / 10/2018  
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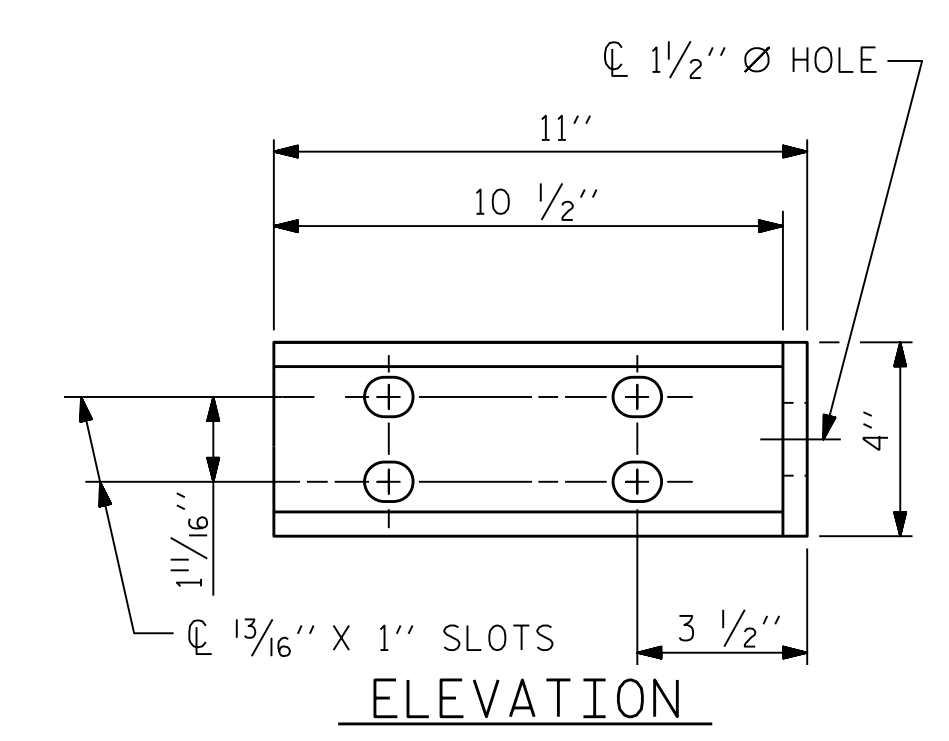




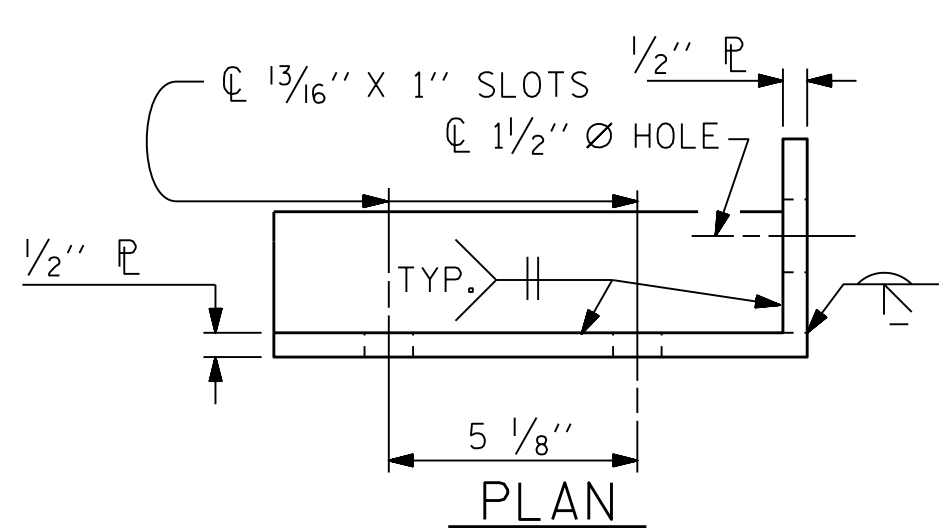
**PLAN OF RAIL AND END POST**  
(STIFFENER ON 1/2" P NOT SHOWN FOR CLARITY)



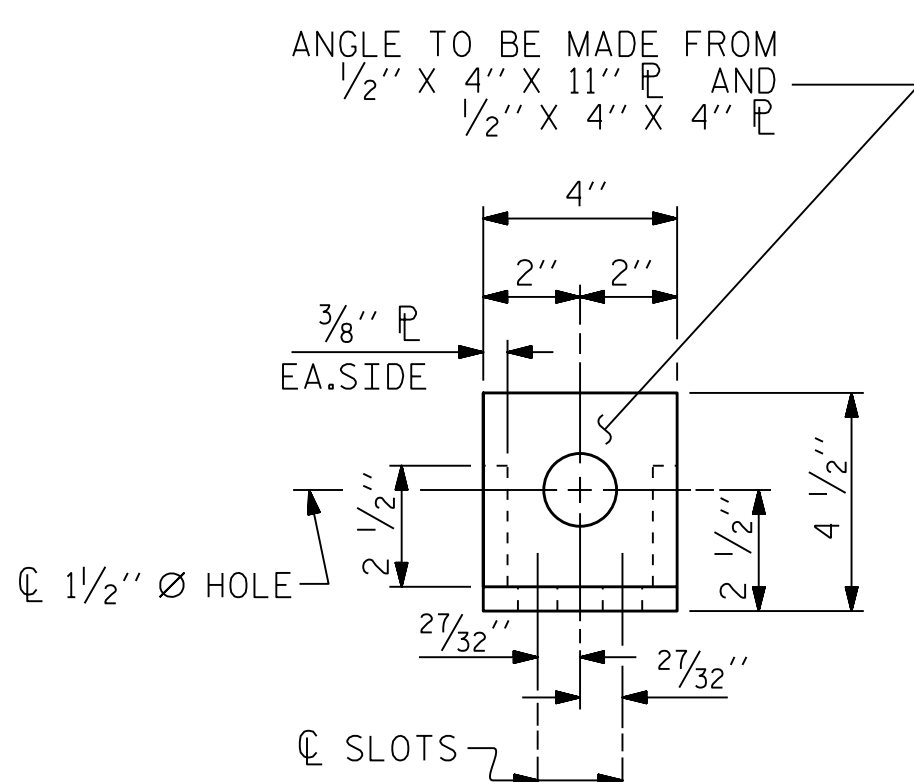
**SECTION H-H**  
(FOR TOP & MIDDLE RAIL)



**ELEVATION**

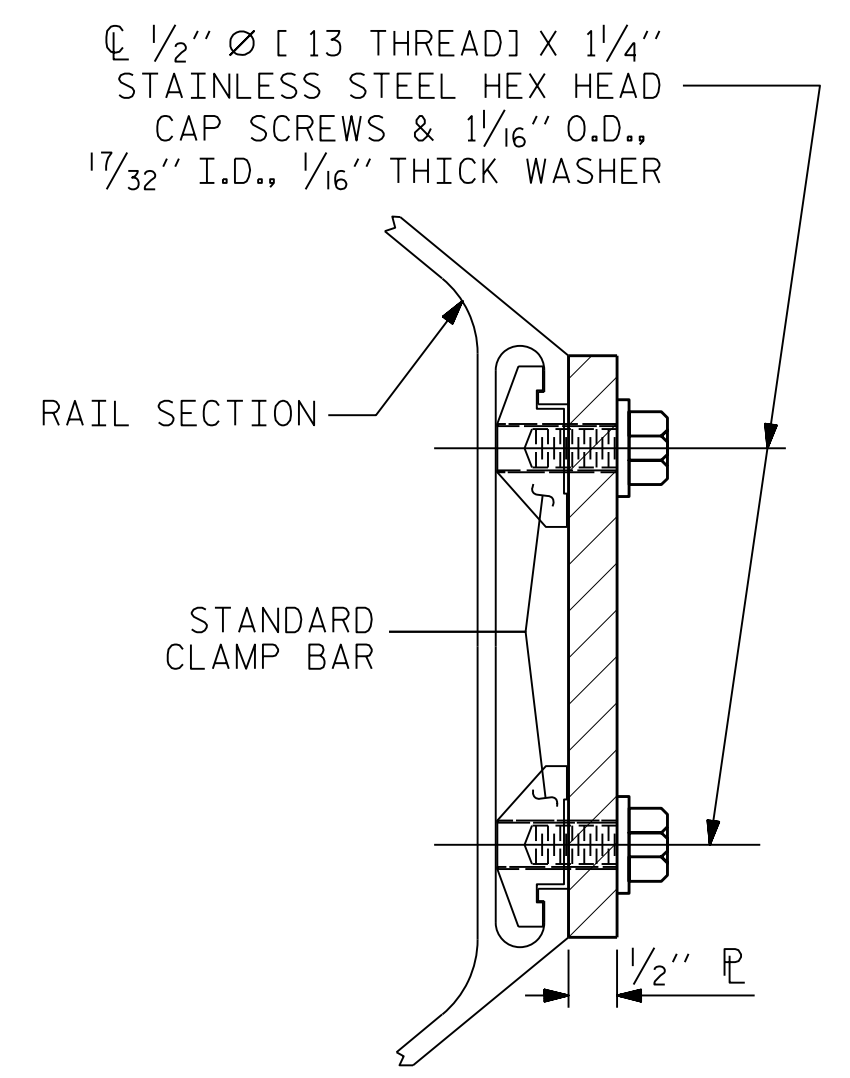


**PLAN**

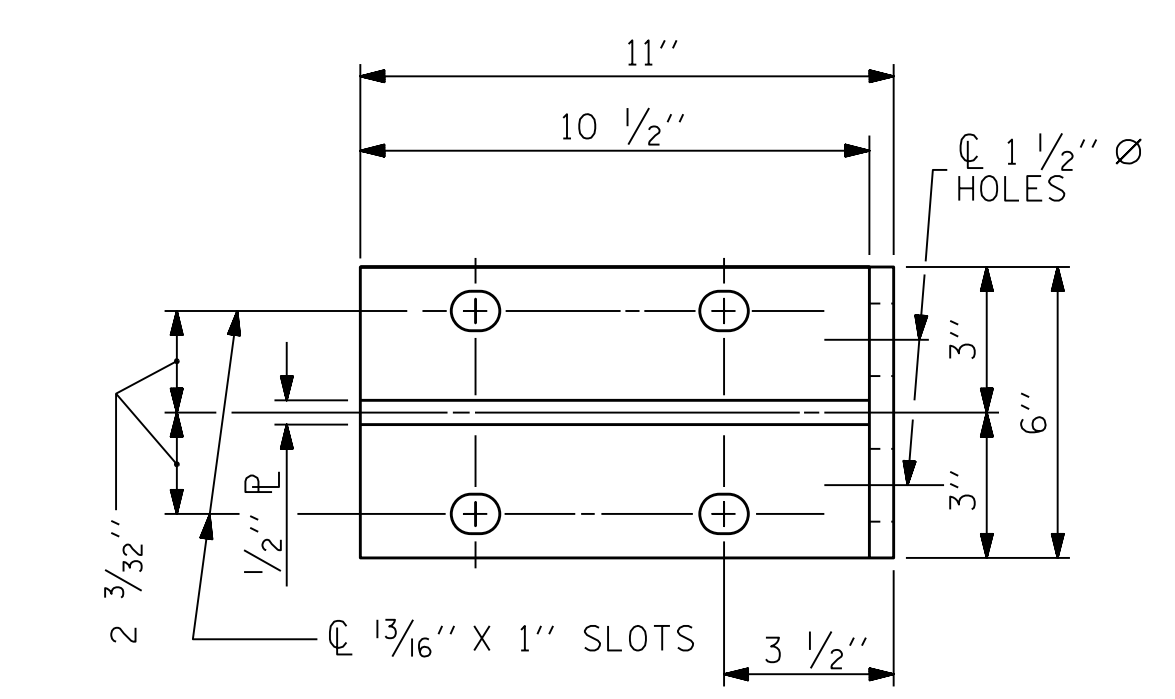


**END VIEW**  
(FIX. AND EXP.)

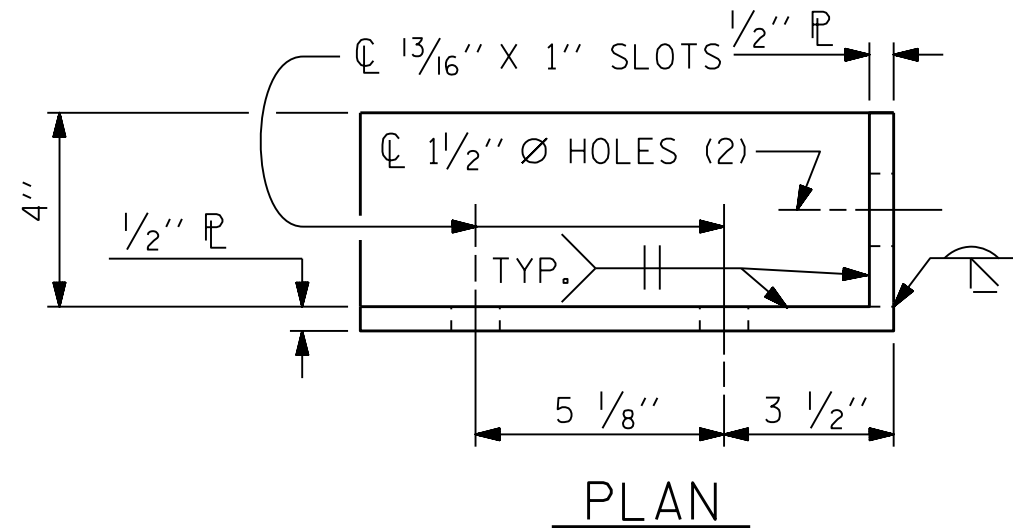
**DETAILS FOR ATTACHMENT BRACKET**  
(TOP & MIDDLE RAIL ONLY)



**SECTION H-H**  
(FOR BOTTOM RAIL)



**ELEVATION**



**PLAN**

**DETAILS FOR ATTACHMENT BRACKET**  
(BOTTOM RAIL ONLY)

**NOTES**

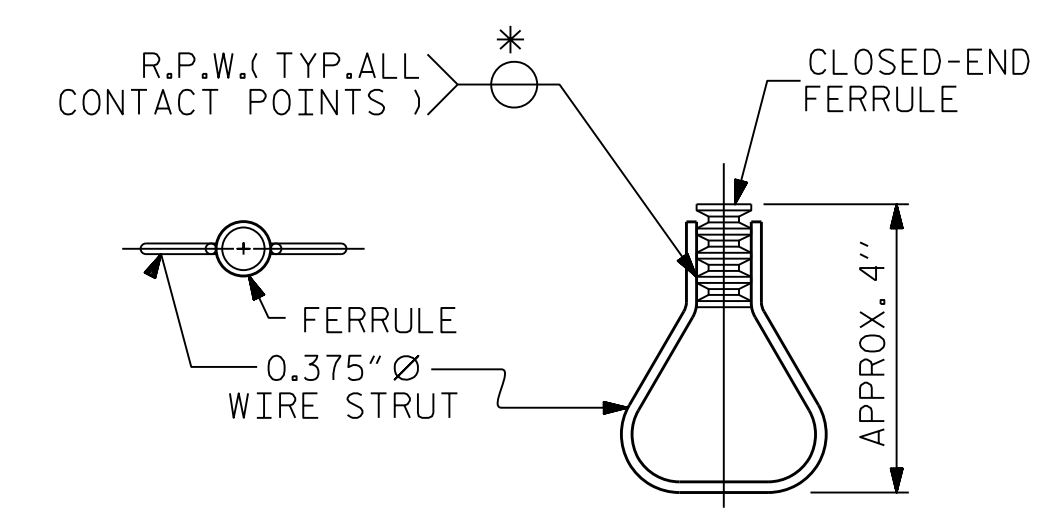
**METAL RAIL TO END POST CONNECTION**

- THE METAL RAIL TO END POST CONNECTION SHALL CONSIST OF THE FOLLOWING COMPONENTS:
- A. 1/2" PLATES SHALL CONFORM TO AASHTO M270 GRADE 36 AND SHALL BE GALVANIZED AFTER FABRICATION.
  - B. 3/4" STRUCTURAL CONCRETE INSERT SHALL HAVE A WORKING LOAD SHEAR CAPACITY OF 4800 LBS. THE FERRULES SHALL ENGAGE A 3/4" Ø X 1 5/8" BOLT WITH 2" O.D. WASHER IN PLACE. THE 3/4" Ø X 1 5/8" BOLT SHALL HAVE N.C. THREADS.
  - C. CAP SCREWS FOR RAIL ATTACHMENT TO ANGLE SHALL CONFORM TO THE REQUIREMENTS OF ASTM F593 ALLOY 305 STAINLESS STEEL. CAP SCREWS TO BE CENTERED IN SLOTS AT 60°F. WASHERS FOR RAIL ATTACHMENT SHALL MEET THE REQUIREMENTS OF ASTM F844 EXCEPT THEY SHALL BE MADE FROM ALLOY 304 STAINLESS STEEL.
  - D. STANDARD CLAMP BARS (SHEET 2 OF 3).
- 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 3 BAR METAL RAIL.
- 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.

**NOTES**

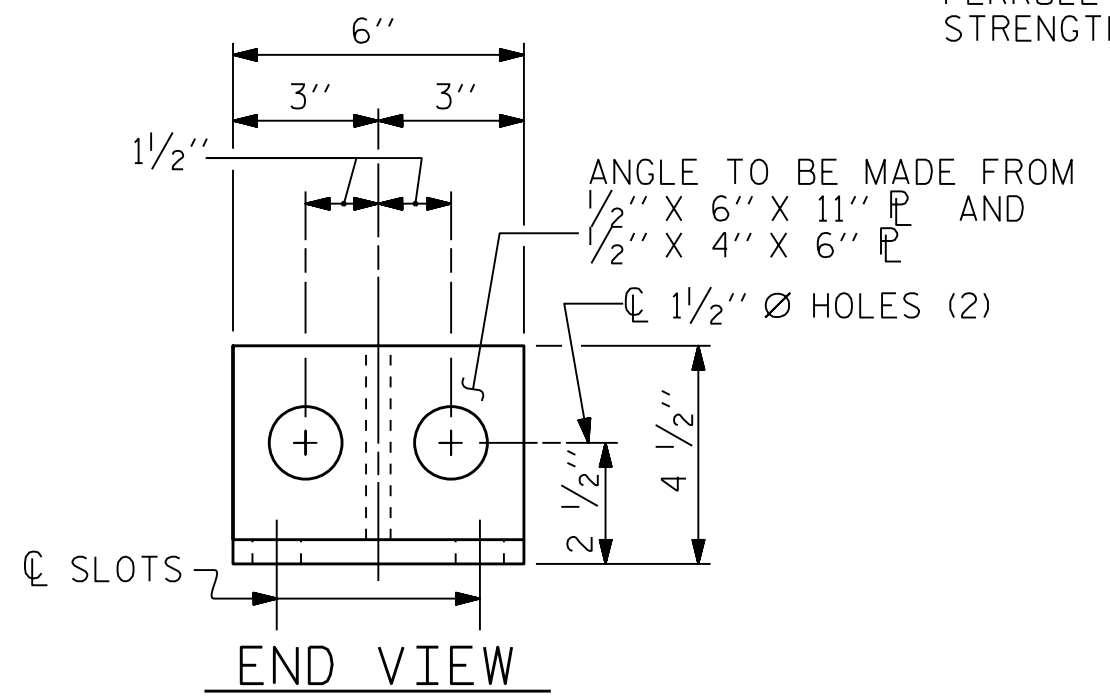
**STRUCTURAL CONCRETE INSERT**

- 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.



**STRUCTURAL CONCRETE INSERT**

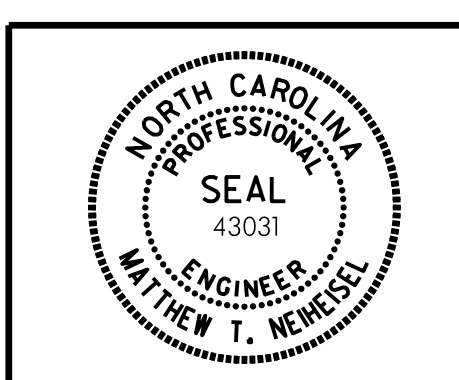
\* EACH WELDED ATTACHMENT OF WIRE TO FERRULE SHALL DEVELOP THE TENSILE STRENGTH OF THE WIRE.



**END VIEW**

PROJECT NO. U-4734  
 FORSYTH COUNTY  
 STATION: 38+35.00 -L-

SHEET 3 OF 3



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

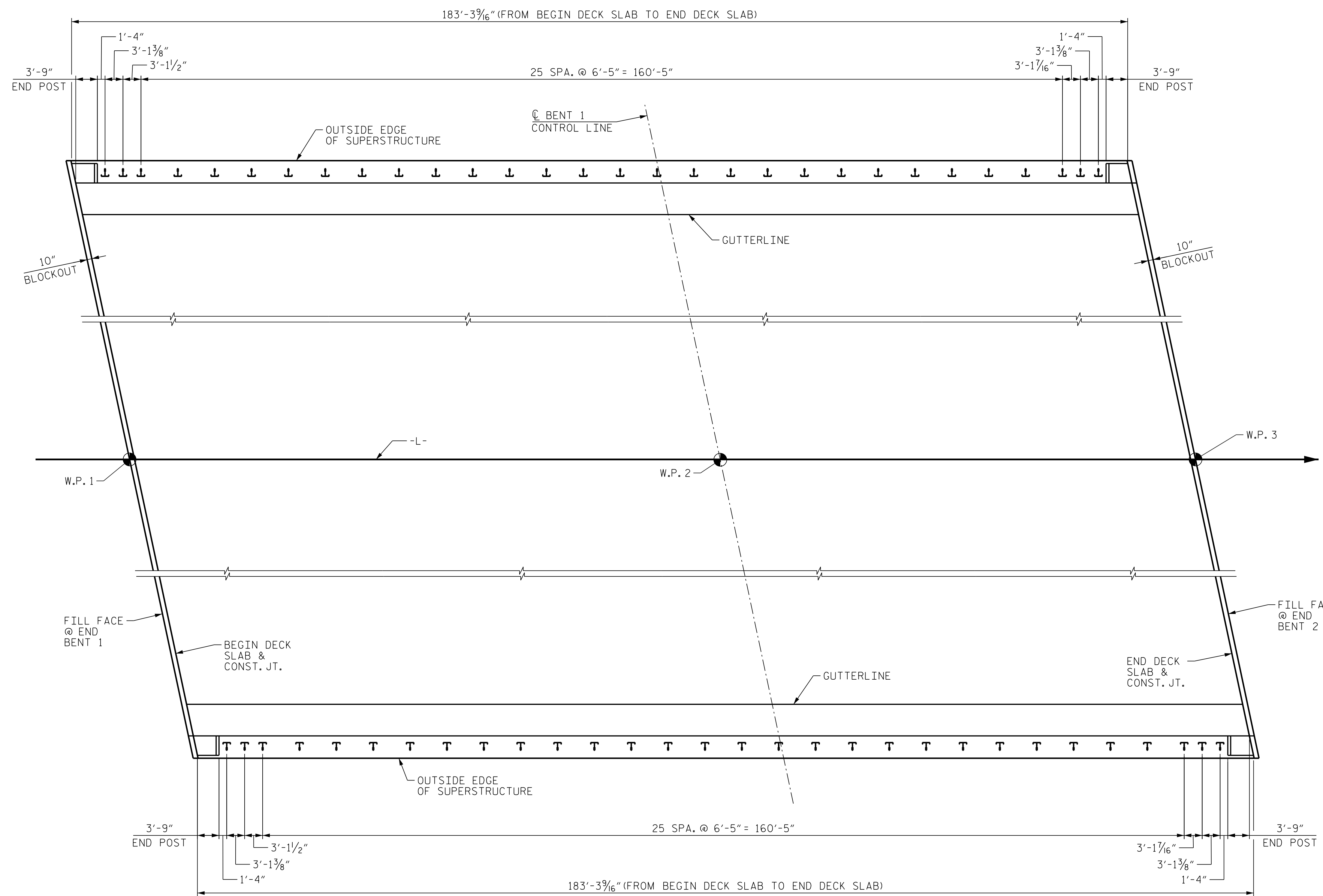
**STANDARD**  
 3 BAR METAL RAIL

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-21
1			3			TOTAL SHEETS
2			4			42

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

PLOT DRIVER: NCDOT\_STRUCTURES\_DEFAULT\_PLOTTER.plt  
 PENTABLE: NCDOT\_STRUCTURES\_DEFAULT\_PEN.tbl  
 USER: dcarter  
 DATE: 4/9/2018  
 FILE: ... \CAD\0602\_U4737\_SMU\_3MR.dgn

DRAWN BY: D. H. CARTER DATE: APR 2018  
 CHECKED BY: M. T. NEIHEISEL DATE: APR 2018  
 DESIGN ENGINEER OF RECORD: M. T. NEIHEISEL DATE: APR 2018



PLAN OF RAIL POST SPACING

PROJECT NO. U-4734  
 FORSYTH COUNTY  
 STATION: 38+35.00 -L-



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

SUPERSTRUCTURE  
 RAIL POST SPACINGS

PLOT DRIVER: NCDOT\_STRUCTURES\_DEFAULT\_PLOTTER.plt  
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DRAWN BY : D. H. CARTER DATE : APR 2018  
 CHECKED BY : M. T. NEIHEISEL DATE : APR 2018  
 DESIGN ENGINEER OF RECORD: M. T. NEIHEISEL DATE : APR 2018

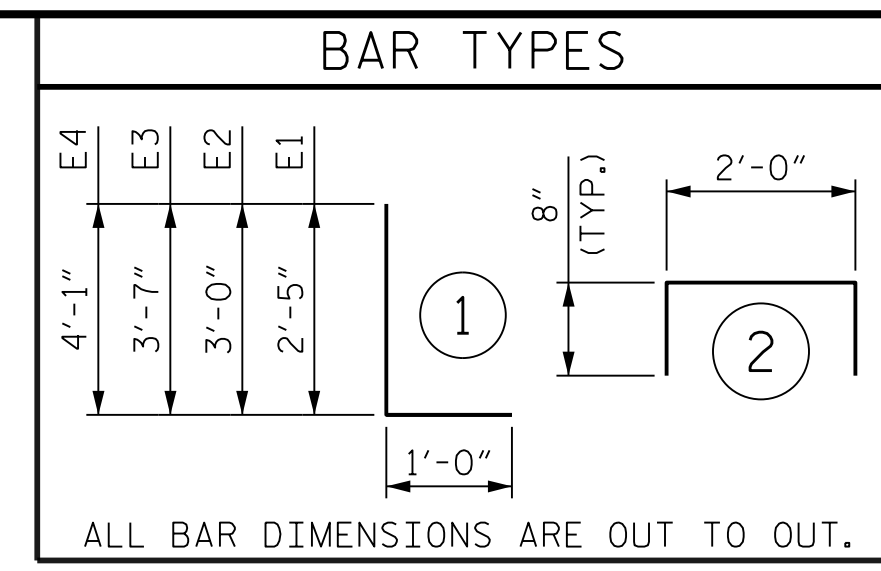
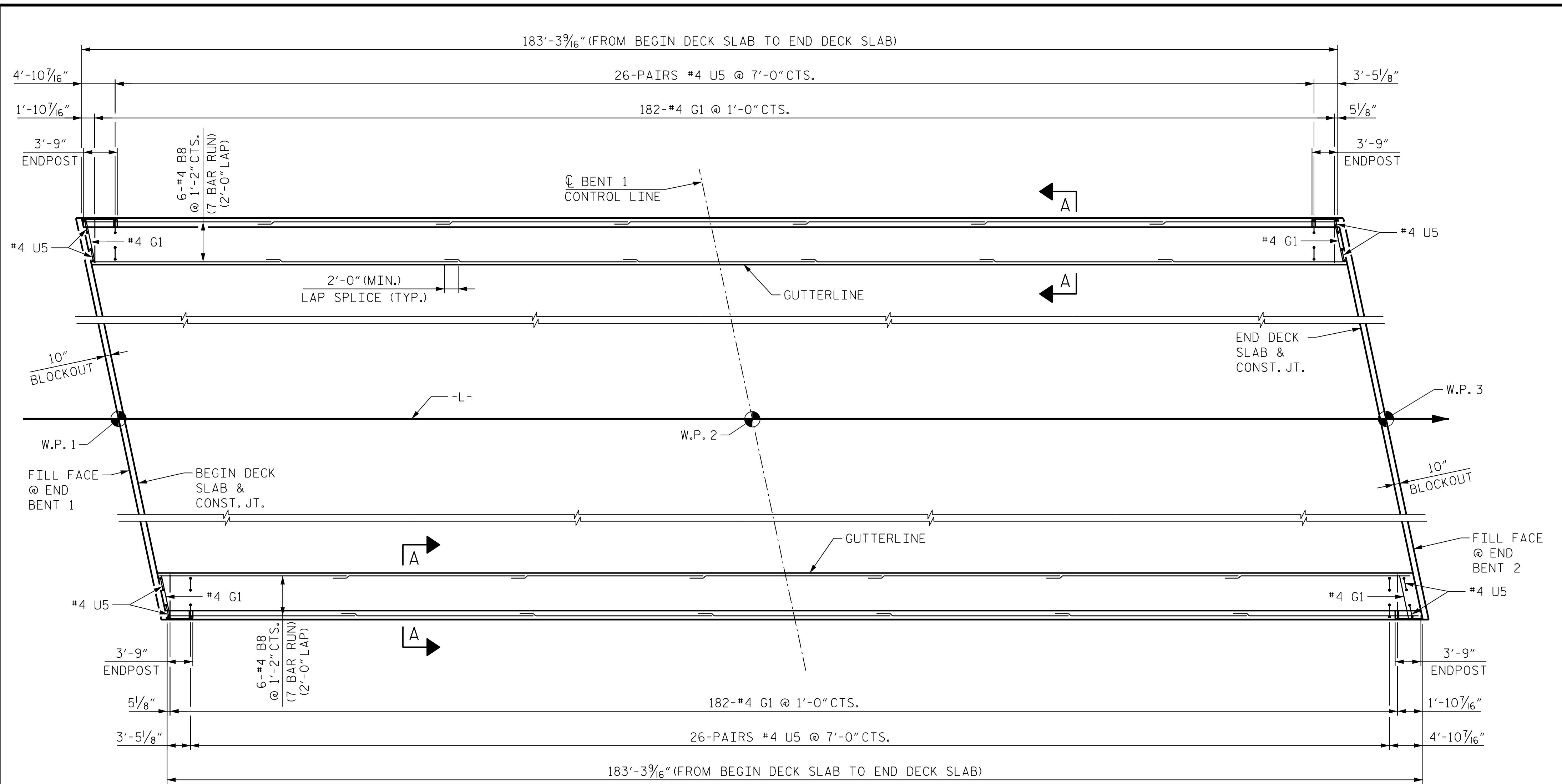
**HDR** HDR Engineering, Inc. of the Carolinas  
 555 Fayetteville St. Suite 900 Raleigh, N.C. 27601  
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*Matthew Neiheisel* / 10/2018

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-22
1			3			TOTAL SHEETS 42
2			4			

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 UNLESS ALL SIGNATURES COMPLETED





BILL OF MATERIAL					
CONCRETE SIDEWALK					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
*B8	84	#4	STR	27'-11"	1,566
*E1	8	#7	1	3'-5"	56
*E2	8	#7	1	4'-0"	65
*E3	8	#7	1	4'-7"	75
*E4	8	#7	1	5'-1"	83
*F1	8	#6	STR	3'-4"	40
*F2	8	#6	STR	3'-8"	44
*F3	4	#6	STR	3'-11"	24
*F4	4	#6	STR	3'-6"	42
*F5	4	#6	STR	3'-9"	23
*G1	368	#4	STR	6'-3"	1,536
*U5	112	#4	2	3'-4"	249
*EPOXY COATED REINFORCING STEEL					3,803 LBS.
CLASS AA CONCRETE					
SIDEWALK					63.7 C.Y.
END POSTS					1.7 C.Y.
TOTAL					65.4 C.Y.

**NOTES:**

THE SIDEWALK ON A CONTINUOUS UNIT SHALL NOT BE CAST UNTIL ALL CONCRETE IN THE UNIT HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

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

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

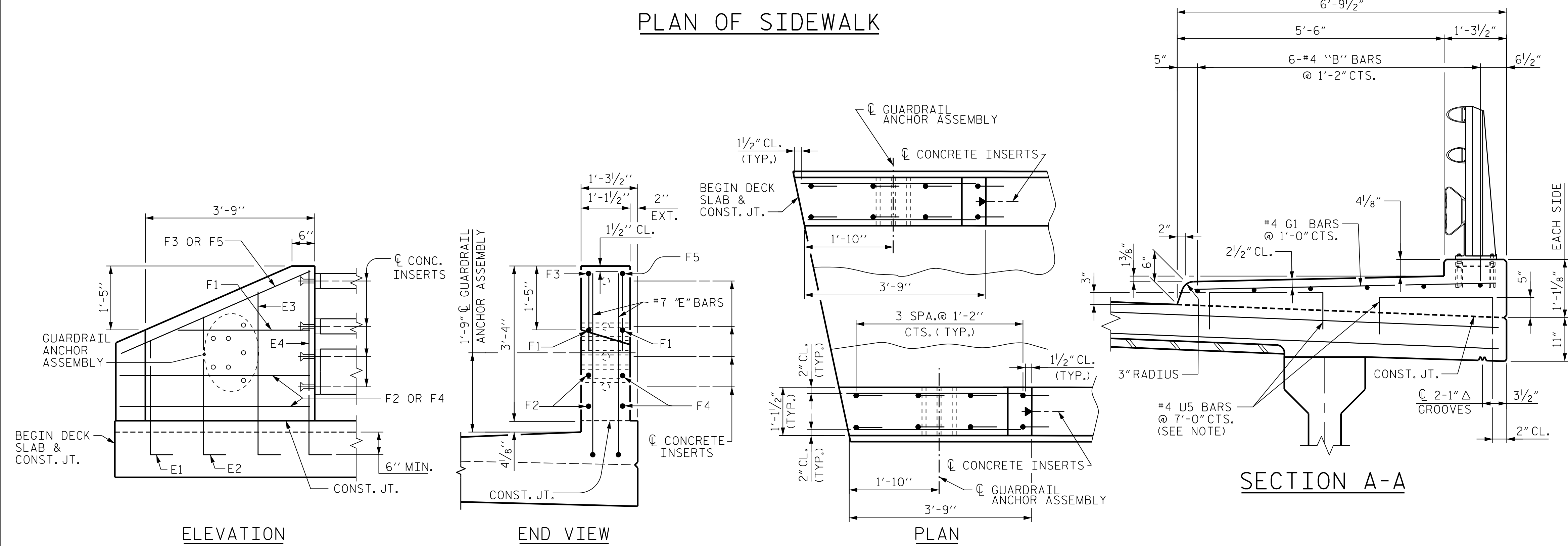
THE CONTRACTION JOINT SHALL BE LOCATED AT A SPACING OF 8FT. TO 10FT. BETWEEN EXPANSION JOINTS. NO CONTRACTION JOINTS WILL BE REQUIRED FOR SEGMENTS LESS THAN 10 FEET IN LENGTH.

THE #4 U5 DOWELS MAY BE PUSHED INTO GREEN CONCRETE AFTER DECK SLAB HAS BEEN SCREEDED OFF.

FOR DETAILS OF CONCRETE INSERTS IN END POST, SEE "3 BAR METAL RAIL" SHEET 3 OF 3.

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

THE SIDEWALK ON THE APPROACH SLABS IS INCLUDED WITH THE APPROACH SLAB BILL OF MATERIAL AND PAID FOR WITH THE APPROACH SLAB PAY ITEM.



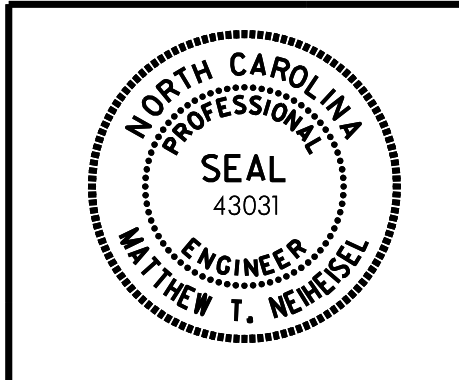
DRAWN BY: D. H. CARTER DATE: APR 2018

CHECKED BY: M. T. NEIHEISEL DATE: APR 2018

DESIGN ENGINEER OF RECORD: M. T. NEIHEISEL DATE: APR 2018

**END POST DETAILS**

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



Matthew Neiheisel/10/2018

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PROJECT NO. U-4734

FORSYTH COUNTY

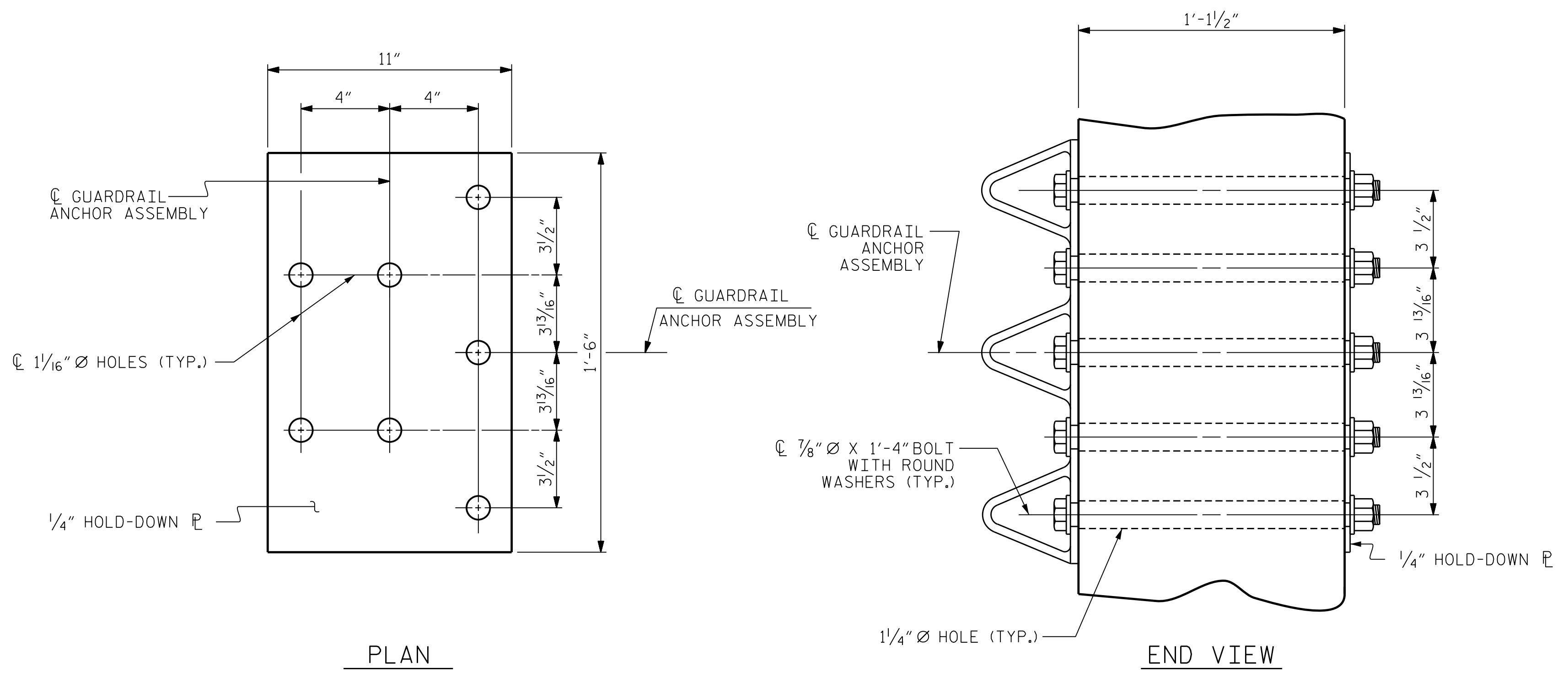
STATION: 38+35.00 -L-

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

SHEET NO. S-23

TOTAL SHEETS 42

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 FILE: ... \CAD\0604\_104737\_SMU\_SW.dgn



**GUARDRAIL ANCHOR ASSEMBLY DETAILS**

**NOTES**

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

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

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

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

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

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

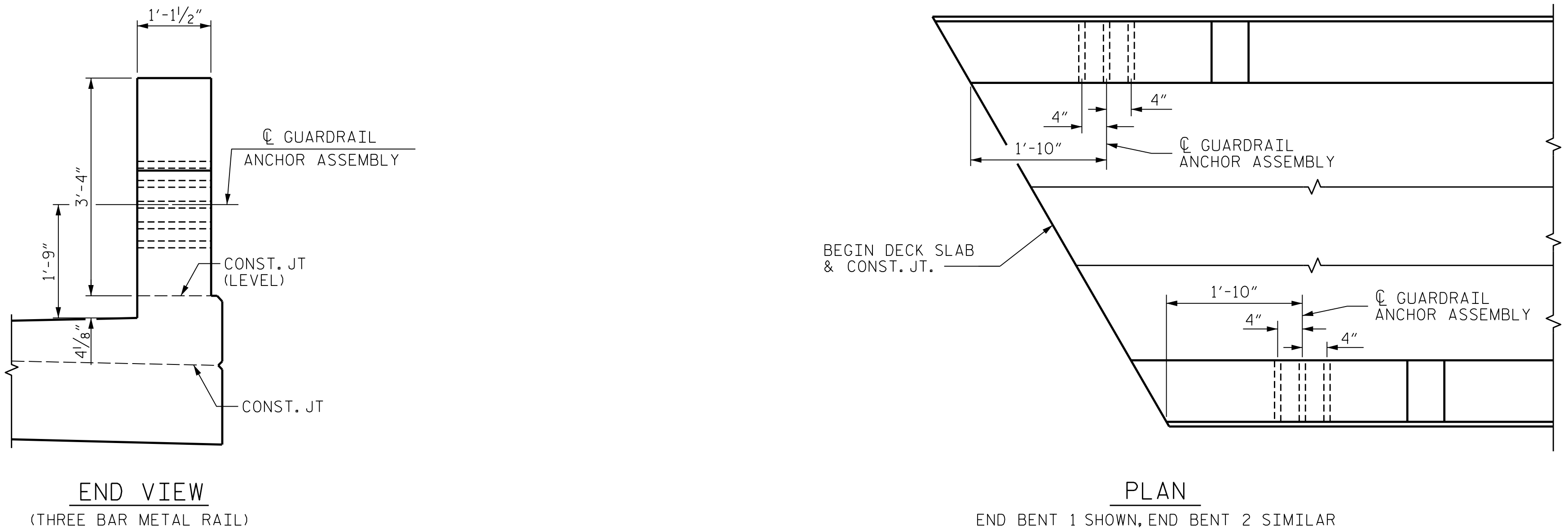
THE VERTICAL REINFORCING BARS MAY BE SHIFTED SLIGHTLY IN THE END POST TO CLEAR ASSEMBLY BOLTS.

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



**SKETCH SHOWING POINTS OF ATTACHMENT**

\* LOCATION OF GUARDRAIL ATTACHMENT



**LOCATION OF GUARDRAIL ANCHOR AT END POST**

PROJECT NO. U-4734  
 FORSYTH COUNTY  
 STATION: 38+35.00 -L-



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

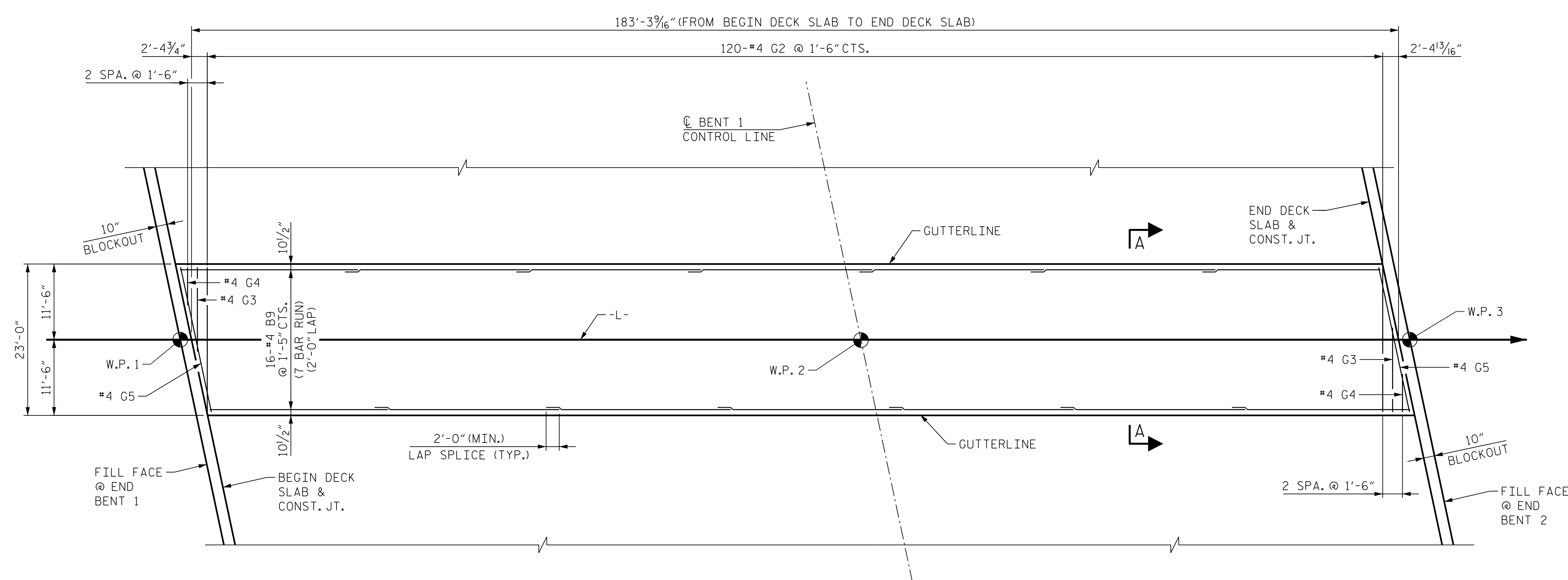
DRAWN BY : D. H. CARTER DATE : APR 2018  
 CHECKED BY : M. T. NEIHEISEL DATE : APR 2018  
 DESIGN ENGINEER OF RECORD: M. T. NEIHEISEL DATE : APR 2018

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-24
1			3			TOTAL SHEETS
2			4			42

PLOT DRIVER: NCDOT STRUCTURES DEFAULT PLOTTER.PH  
 PENTABLE: NCDOT STRUCTURES DEFAULT PEN.tbl  
 USER: dcarter DATE: 4/9/2018 TIME: 3:20:06 PM  
 FILE: ... \CAD\0605\_U4737\_SML\_GR.dgn





BILL OF MATERIAL					
CONCRETE MEDIAN					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* B9	112	#4	STR	27'-11"	2,089
* G2	120	#4	STR	21'-8"	1,737
* G3	2	#4	STR	14'-3"	19
* G4	2	#4	STR	7'-2"	10
* G5	2	#4	STR	22'-1"	30
* EPOXY COATED REINFORCING STEEL					3,885 LBS.
CLASS AA CONCRETE					63.8 C.Y.

PLAN OF CONCRETE MEDIAN

GENERAL NOTES:

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

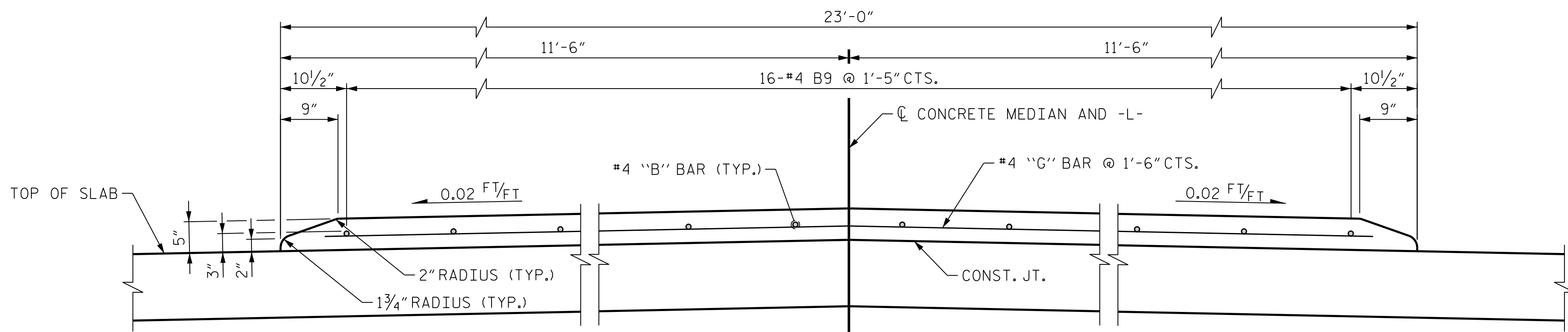
THE CONCRETE MEDIAN ON A CONTINUOUS UNIT SHALL NOT BE CAST UNTIL ALL CONCRETE IN THE UNIT HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

THE CONCRETE MEDIAN ON THE APPROACH SLAB IS INCLUDED IN THE APPROACH SLAB BILL OF MATERIAL AND PAID FOR AS PART OF THE APPROACH SLAB PAY ITEM.

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

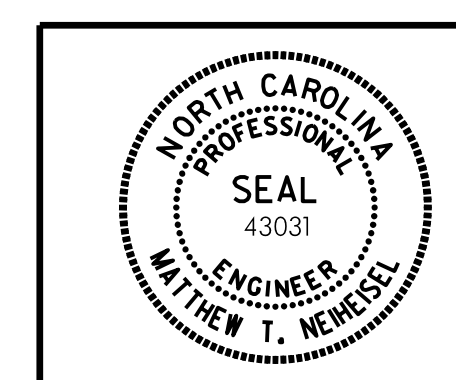
FOR DETAIL AT JOINT BETWEEN APPROACH SLAB AND CONCRETE DECK, SEE APPROACH SLAB DETAILS SHEET.

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 USER: dcor-ter  
 DATE: 4/9/2018  
 TIME: 3:20:08 PM  
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SECTION A-A

PROJECT NO. U-4734  
 FORSYTH COUNTY  
 STATION: 38+35.00 -L-



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

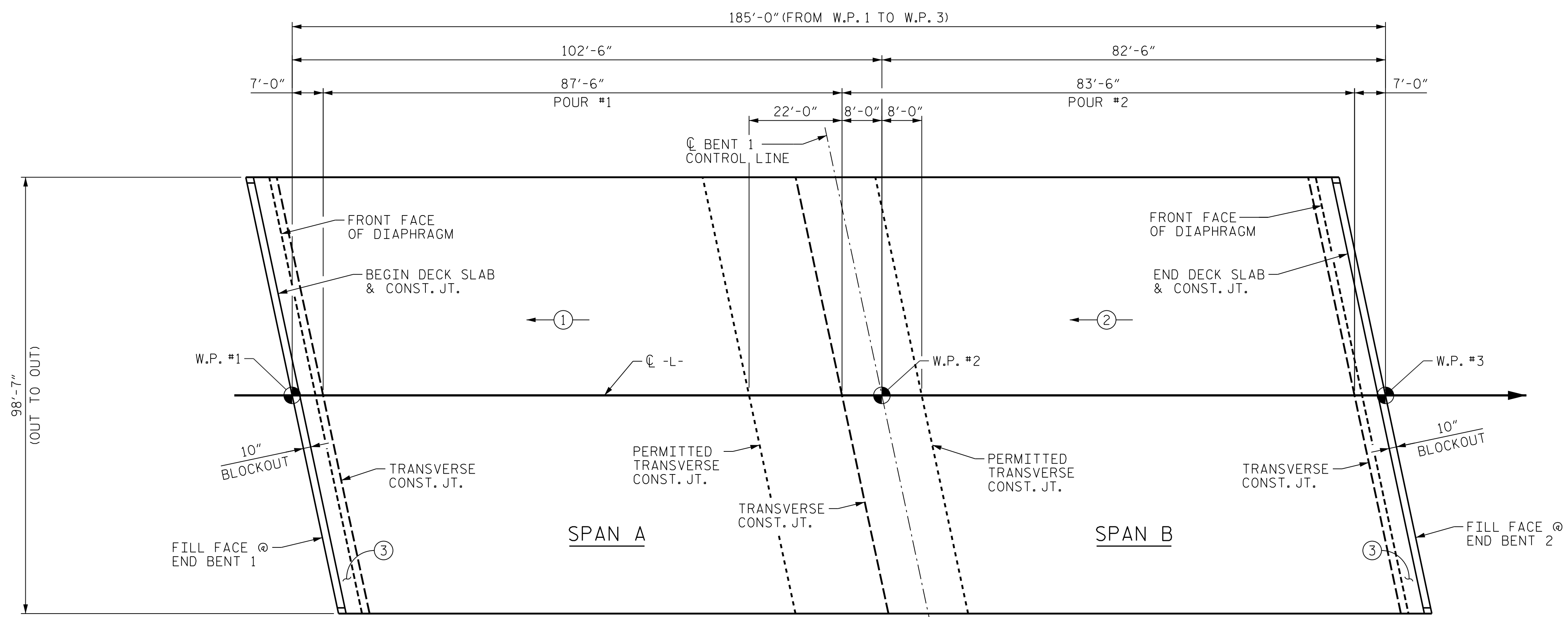
SUPERSTRUCTURE  
 CONCRETE MEDIAN

DRAWN BY: D. H. CARTER DATE: APR 2018  
 CHECKED BY: M. T. NEIHEISEL DATE: APR 2018  
 DESIGN ENGINEER OF RECORD: M. T. NEIHEISEL DATE: APR 2018

HDR  
 HDR Engineering, Inc. of the Carolinas  
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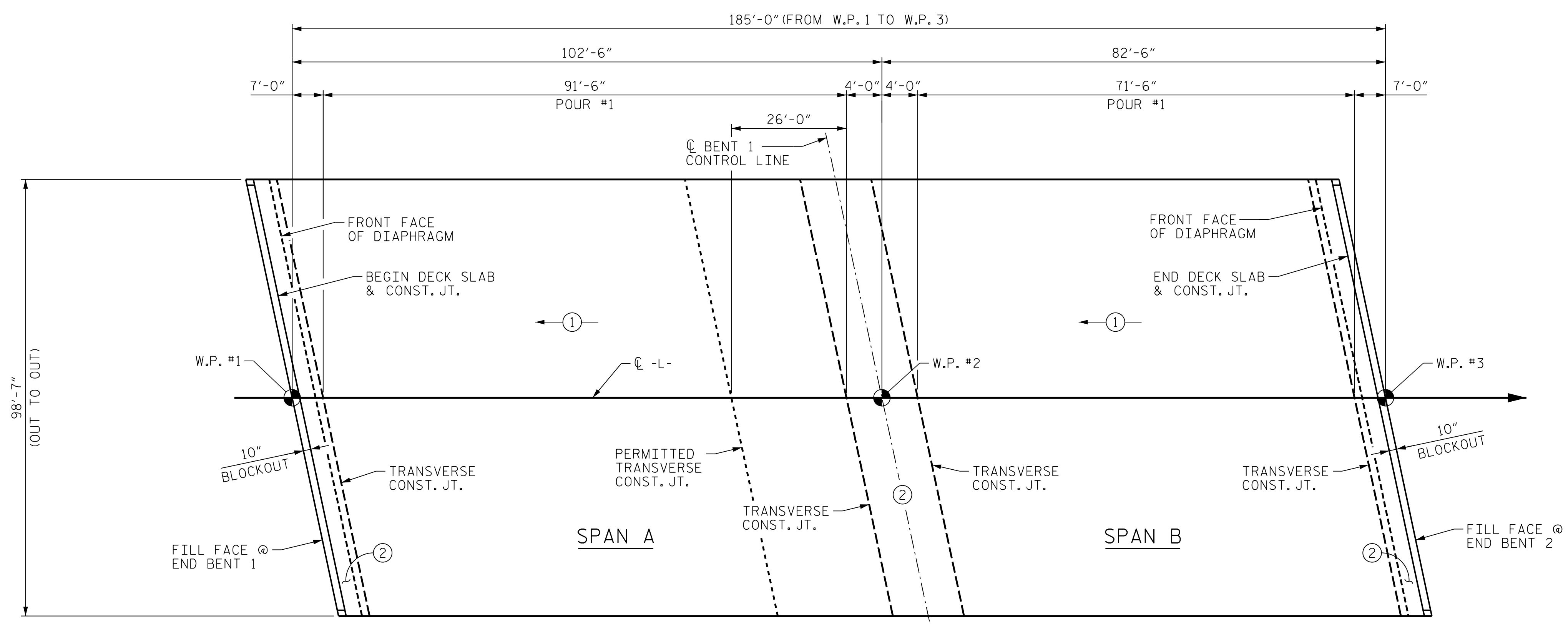
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-25
1			3			TOTAL SHEETS 42
2			4			

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**POURING SEQUENCE**

⊕ → DENOTES POUR NUMBER AND DIRECTION



**OPTIONAL POURING SEQUENCE**

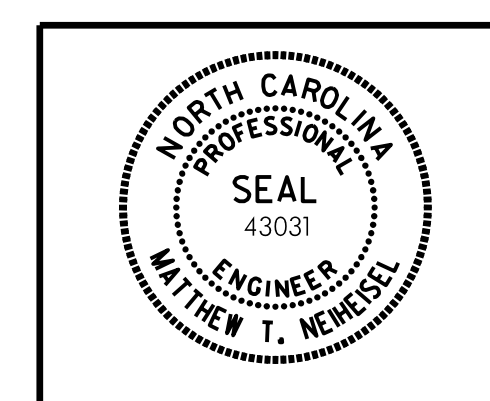
⊕ → DENOTES POUR NUMBER AND DIRECTION

POUR ② CANNOT BE STARTED UNTIL BOTH ADJACENT ① POURS REACH A MINIMUM OF 3000 PSI.

PROJECT NO. U-4734  
 FORSYTH COUNTY  
 STATION: 38+35.00 -L-  
 SHEET 1 OF 2

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**SUPERSTRUCTURE**  
**BILL OF MATERIAL**



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

TOTAL SHEETS: 42

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PLOT DRIVER: NCDOT\_STRUCTURES\_DEFAULT\_PLOTTER.plt PENTABLE: NCDOT\_STRUCTURES\_DEFAULT\_PEN.tbl  
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 FILE: ... \CAD\1000-14737-SMU-BM.dgn

DRAWN BY : D. H. CARTER DATE : APR 2018  
 CHECKED BY : M. T. NEIHEISEL DATE : APR 2018  
 DESIGN ENGINEER OF RECORD: M. T. NEIHEISEL DATE : APR 2018



SUPERSTRUCTURE BILL OF MATERIAL			
	CLASS AA CONCRETE	REINFORCING STEEL	EPOXY COATED REINFORCING STEEL
	( CU. YDS. )	( LBS. )	( LBS. )
POUR 1	269.1		
POUR 2	291.6		
POUR 3	157.7		
TOTALS**	718.4	63,412	62,854

\*\* QUANTITIES FOR CONCRETE SIDEWALK, CONCRETE END POSTS AND CONCRETE MEDIAN NOT INCLUDED

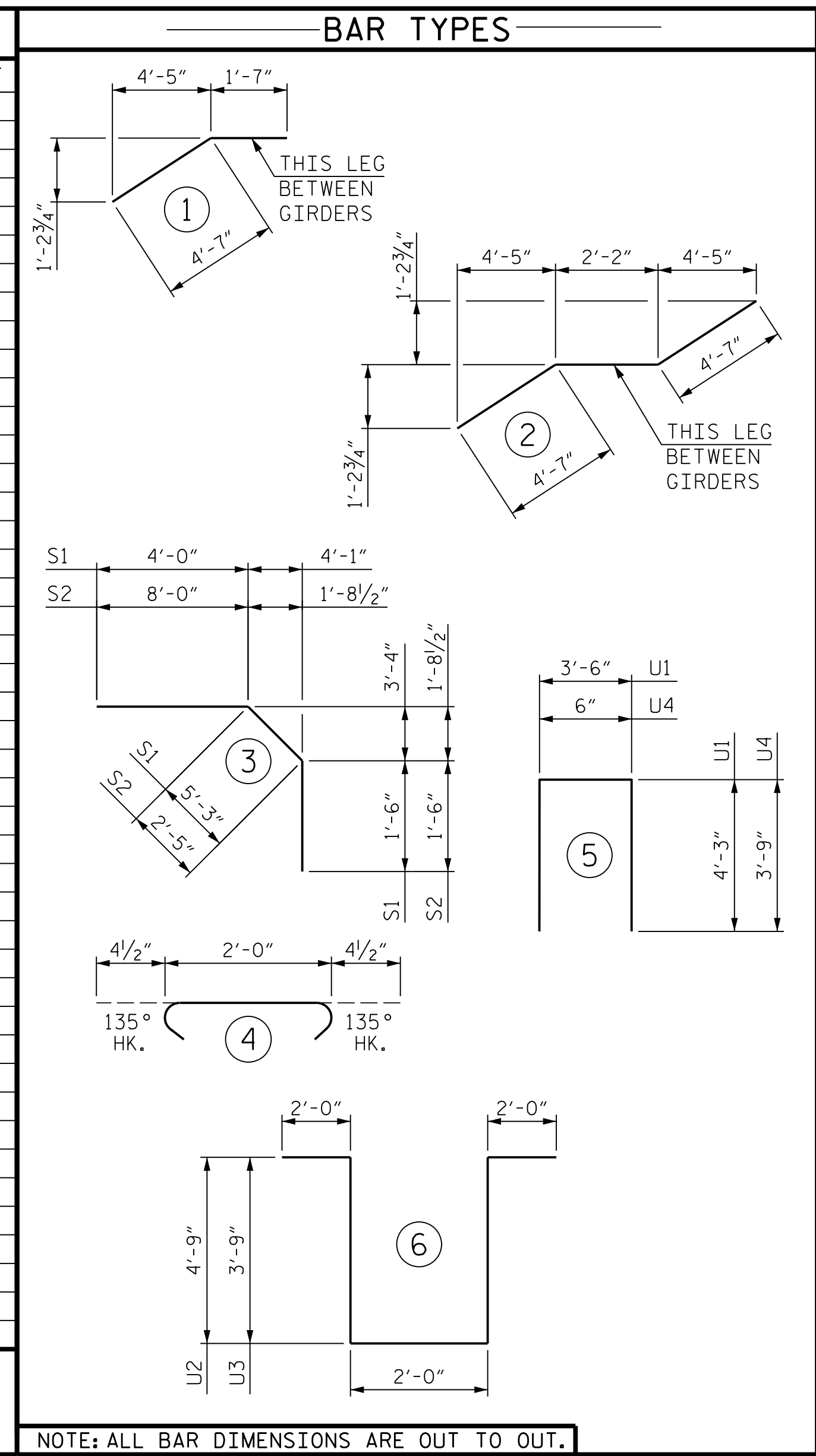
SUPERSTRUCTURE REINFORCING STEEL LENGTHS ARE BASED ON THE FOLLOWING MINIMUM SPLICE LENGTHS

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"			

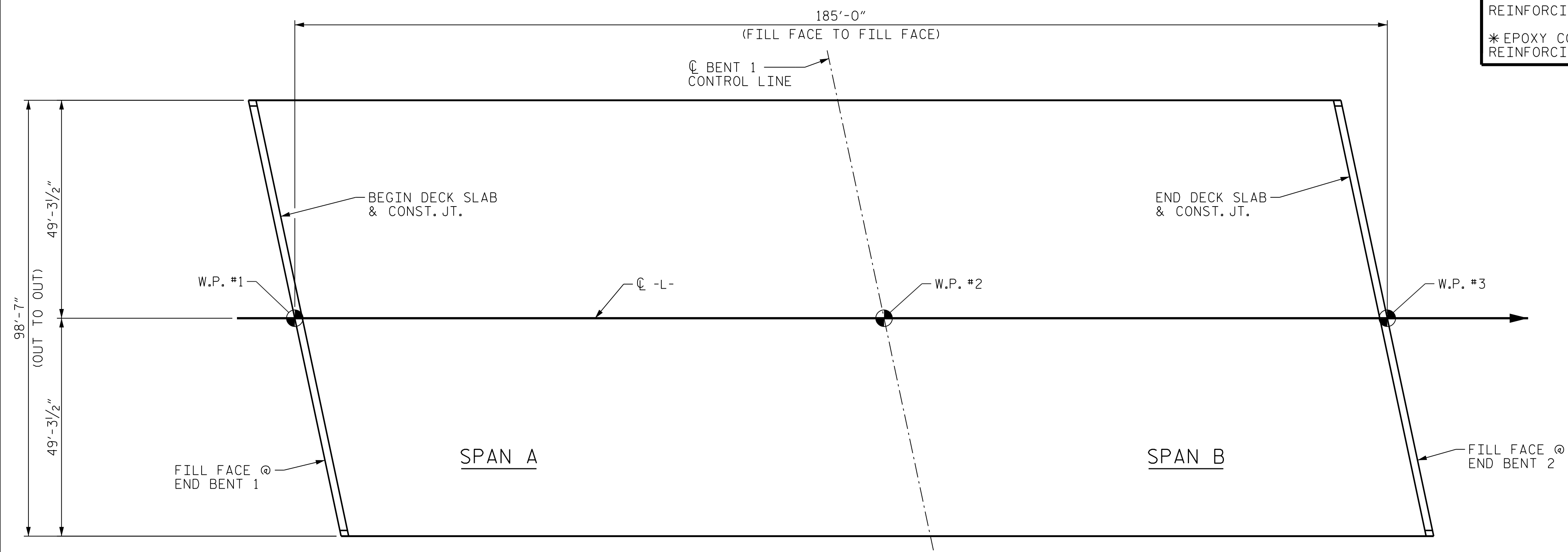
GROOVING BRIDGE FLOORS	
APPROACH SLABS	2,707 SQ.FT.
BRIDGE DECK	10,246 SQ.FT.
TOTAL	12,953 SQ.FT.

REINFORCING BAR SCHEDULE						REINFORCING BAR SCHEDULE						REINFORCING BAR SCHEDULE					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	600	#5	STR	50'-5"	31,551	A201	4	#5	STR	49'-1"	205	* B1	157	#6	STR	20'-6"	4,834
A2	600	#5	STR	50'-3"	31,446	A202	4	#5	STR	47'-10"	200	* B2	160	#4	STR	25'-9"	2,752
* A101	4	#5	STR	49'-3"	205	A203	4	#5	STR	46'-6"	194	* B3	160	#6	STR	34'-0"	8,171
* A102	4	#5	STR	48'-0"	200	A204	4	#5	STR	45'-3"	189	* B4	77	#6	STR	28'-0"	3,238
* A103	4	#5	STR	46'-8"	195	A205	4	#5	STR	44'-0"	184	* B5	160	#4	STR	20'-9"	2,218
* A104	4	#5	STR	45'-5"	189	A206	4	#5	STR	42'-8"	178	* B6	157	#6	STR	16'-6"	3,891
* A105	4	#5	STR	44'-2"	184	A207	4	#5	STR	41'-5"	173	B7	472	#5	STR	47'-5"	23,343
* A106	4	#5	STR	42'-10"	179	A208	4	#5	STR	40'-2"	168	K1	40	#4	STR	26'-7"	710
* A107	4	#5	STR	41'-7"	173	A209	4	#5	STR	38'-10"	162	K2	20	#4	STR	6'-9"	90
* A108	4	#5	STR	40'-4"	168	A210	4	#5	STR	37'-7"	157	K3	20	#4	STR	5'-8"	76
* A109	4	#5	STR	39'-0"	163	A211	4	#5	STR	36'-4"	152	K4	40	#4	STR	8'-0"	214
* A110	4	#5	STR	37'-9"	157	A212	4	#5	STR	35'-1"	146	K5	80	#4	STR	8'-4"	445
* A111	4	#5	STR	36'-6"	152	A213	4	#5	STR	33'-9"	141	K6	40	#4	STR	7'-4"	196
* A112	4	#5	STR	35'-3"	147	A214	4	#5	STR	32'-6"	136	K7	4	#4	STR	2'-1"	6
* A113	4	#5	STR	33'-11"	142	A215	4	#5	STR	31'-3"	130	K8	4	#4	STR	2'-8"	7
* A114	4	#5	STR	32'-8"	136	A216	2	#5	STR	57'-9"	120	K9	8	#4	STR	2'-10"	15
* A115	4	#5	STR	31'-5"	131	A217	2	#5	STR	55'-2"	115	K10	4	#4	STR	2'-4"	6
* A116	2	#5	STR	57'-9"	120	A218	2	#5	STR	52'-8"	110	* K11	10	#4	1	6'-2"	41
* A117	2	#5	STR	55'-2"	115	A219	2	#5	STR	50'-1"	104	K12	45	#4	2	11'-4"	341
* A118	2	#5	STR	52'-8"	110	A220	2	#5	STR	47'-7"	99	* S1	144	#4	3	10'-9"	1,034
* A119	2	#5	STR	50'-1"	104	A221	2	#5	STR	42'-5"	88	* S2	148	#4	3	11'-11"	1,178
* A120	2	#5	STR	47'-7"	99	A222	2	#5	STR	39'-11"	83	S3	300	#4	4	2'-9"	551
* A121	2	#5	STR	45'-0"	94	A223	2	#5	STR	37'-4"	78	U1	148	#4	5	12'-0"	1,186
* A122	2	#5	STR	42'-5"	88	A224	2	#5	STR	34'-10"	73	U2	60	#4	6	15'-6"	621
* A123	2	#5	STR	39'-11"	83	A225	2	#5	STR	32'-3"	67	U3	20	#4	6	13'-6"	180
* A124	2	#5	STR	37'-4"	78	A226	2	#5	STR	30'-9"	62	* U4	8	#4	5	8'-0"	43
* A125	2	#5	STR	34'-10"	73	A227	2	#5	STR	29'-9"	62						
* A126	2	#5	STR	32'-3"	67	A228	2	#5	STR	27'-2"	57						
* A127	2	#5	STR	29'-9"	62	A229	2	#5	STR	24'-7"	51						
* A128	2	#5	STR	27'-2"	57	A230	2	#5	STR	22'-1"	46						
* A129	2	#5	STR	24'-7"	51	A231	2	#5	STR	19'-6"	41						
* A130	2	#5	STR	22'-1"	46	A232	2	#5	STR	17'-0"	35						
* A131	2	#5	STR	19'-6"	41	A233	2	#5	STR	14'-5"	30						
* A132	2	#5	STR	17'-0"	35	A234	2	#5	STR	11'-10"	25						
* A133	2	#5	STR	14'-5"	30	A235	2	#5	STR	9'-4"	19						
* A134	2	#5	STR	11'-10"	25	A236	2	#5	STR	6'-9"	14						
* A135	2	#5	STR	9'-4"	19	A237	2	#5	STR	4'-3"	9						
* A136	2	#5	STR	6'-9"	14	A238	2	#5	STR	1'-8"	3						
* A137	2	#5	STR	4'-3"	9												
* A138	2	#5	STR	1'-8"	3												

REINFORCING STEEL 63,412 LBS.  
 \* EPOXY COATED REINFORCING STEEL 62,854 LBS.

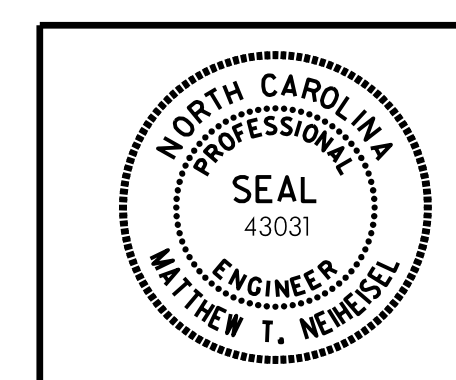


NOTE: ALL BAR DIMENSIONS ARE OUT TO OUT.



LAYOUT FOR COMPUTING AREA REINFORCED CONCRETE DECK SLAB  
 ( SQ. FT. = 18,238 )

PROJECT NO. U-4734  
 FORSYTH COUNTY  
 STATION: 38+35.00 -L-  
 SHEET 2 OF 2



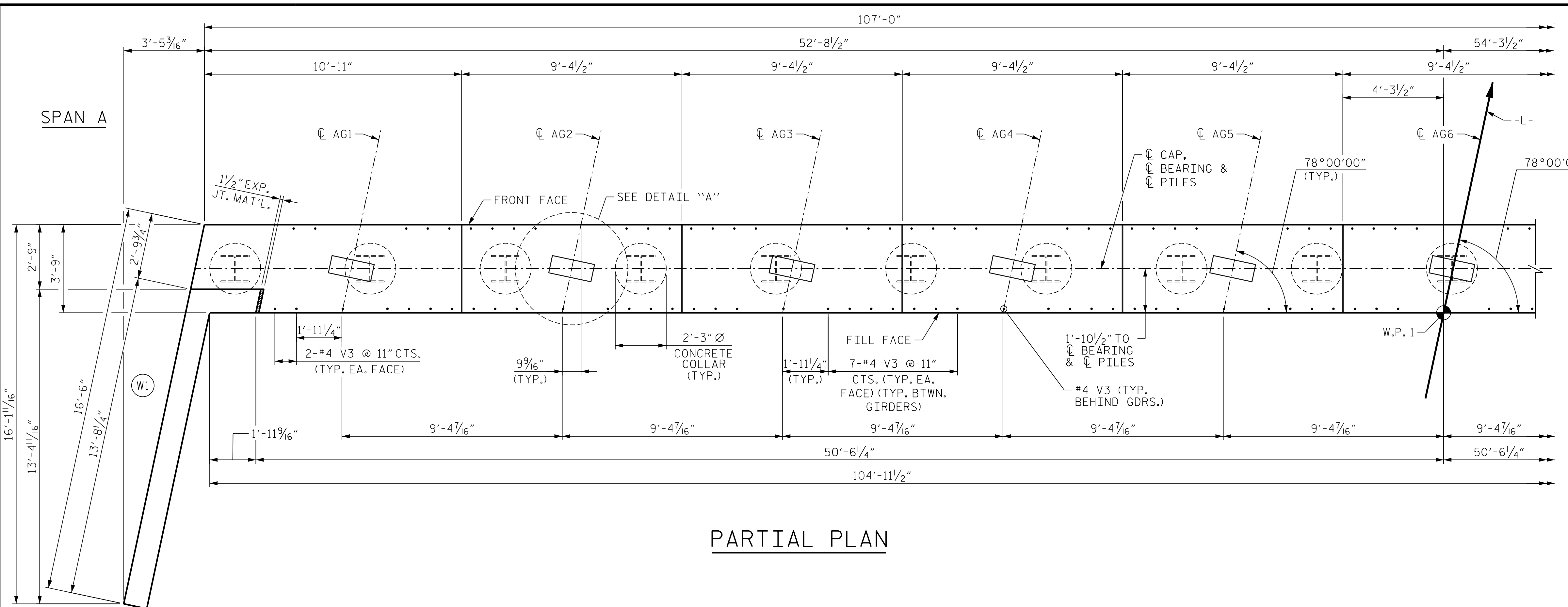
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 SUPERSTRUCTURE  
 BILL OF MATERIAL

REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	S-27	
1			3			TOTAL SHEETS 42	
2			4				

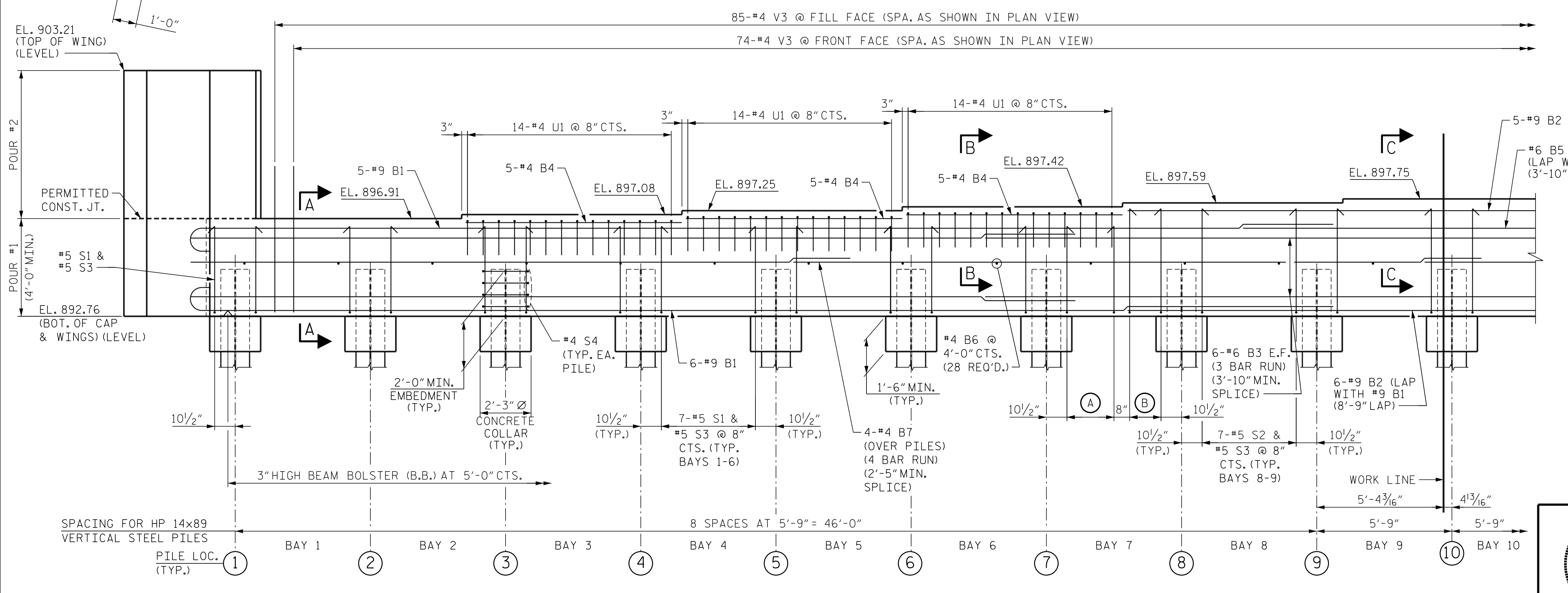
HDR Engineering, Inc. of the Carolinas  
 555 Fayetteville St. Suite 900 Raleigh, N.C. 27601  
 N.C.B.E.L.S. License Number: F-0116

PLOT DRIVER: NCDOT STRUCTURES DEFAULT PLOTTER.pht  
 USER: dcarTer  
 DATE: 4/9/2018  
 TIME: 3:20:14 PM  
 FILE: ... \NCAD\1001-U4737-SMU-BM.dgn

DRAWN BY: D. H. CARTER DATE: APR 2018  
 CHECKED BY: M. T. NEIHEISEL DATE: APR 2018  
 DESIGN ENGINEER OF RECORD: M. T. NEIHEISEL DATE: APR 2018



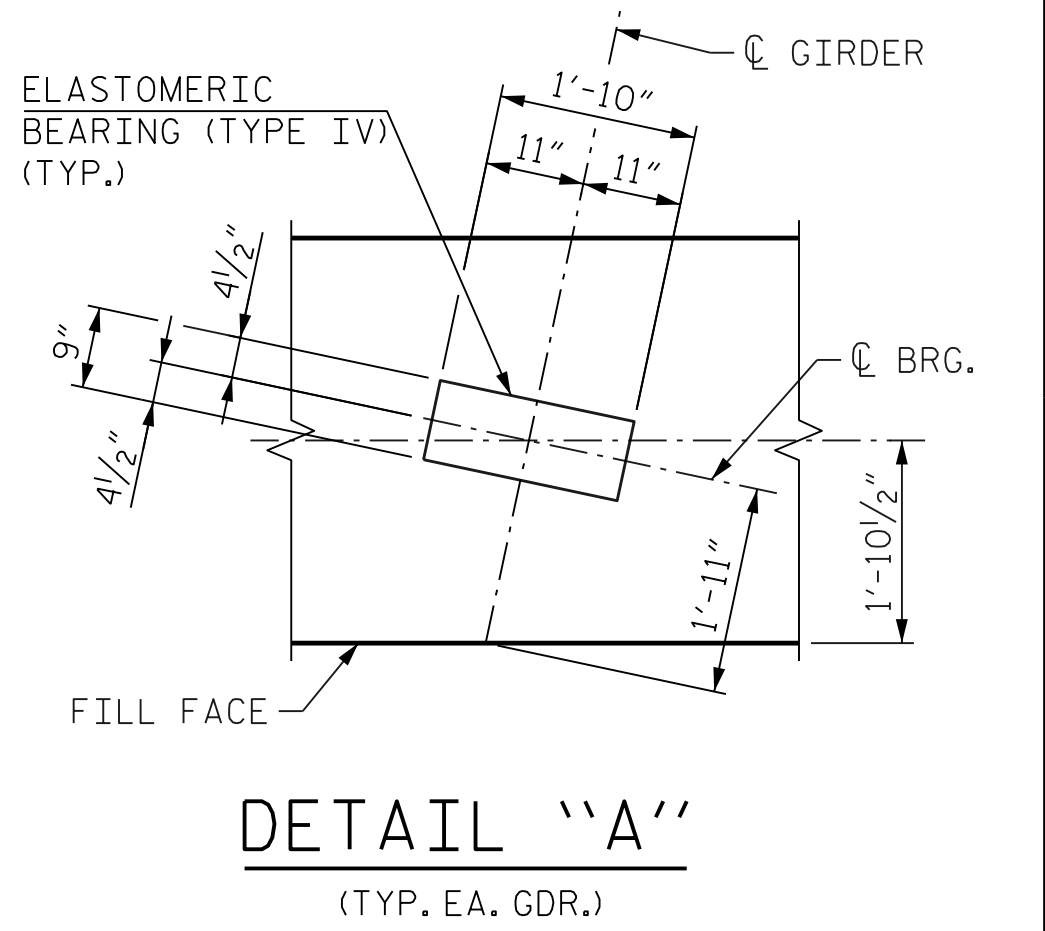
PARTIAL PLAN



PARTIAL ELEVATION

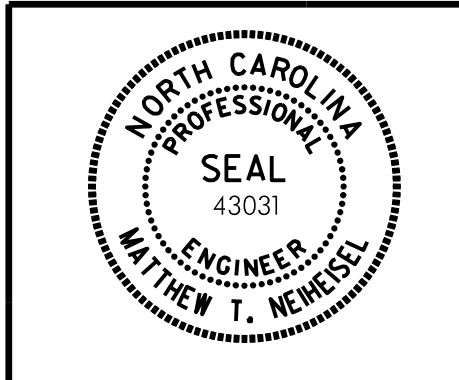
- (A) 4-#5 S1 & #5 S3 @ 8\"/>

**NOTES:**  
 THE TOP SURFACE OF THE END BENT CAP AT THE CONSTRUCTION JOINT WITH THE SUPERSTRUCTURE, EXCLUDING THE AREA UNDER THE BEARINGS, SHALL BE RAKED TO A DEPTH OF 1/4\"/>



DETAIL "A"  
(TYP. EA. GDR.)

PROJECT NO. U-4734  
 FORSYTH COUNTY  
 STATION: 38+35.00 -L-  
 SHEET 1 OF 4



STATE OF NORTH CAROLINA		DEPARTMENT OF TRANSPORTATION		RALEIGH	
<b>SUBSTRUCTURE</b>					
END BENT 1 PARTIAL PLAN AND ELEVATION					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
					SHEET NO. S-28
					TOTAL SHEETS 42

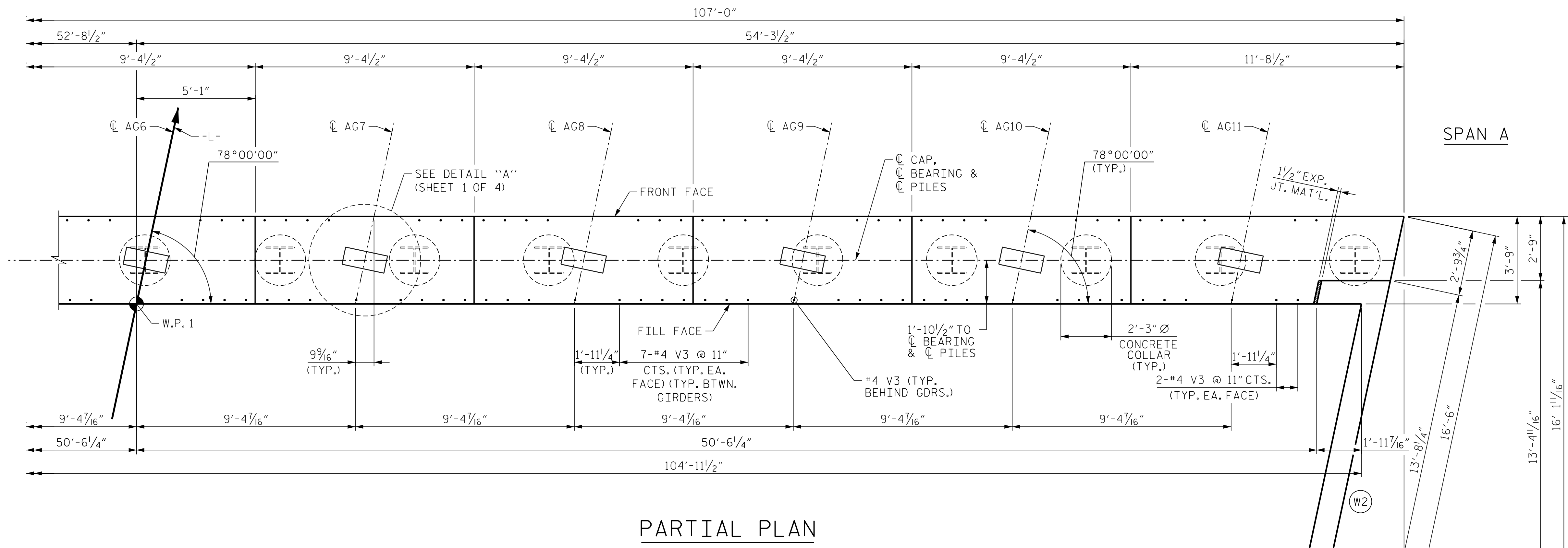
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 USER: dcarter  
 DATE: 4/9/2018  
 TIME: 3:20:17 PM  
 FILE: ... \NCAD\1100.04737.SMU-E101.dgn

DRAWN BY: D. H. CARTER DATE: APR 2018  
 CHECKED BY: M. T. NEIHEISEL DATE: APR 2018  
 DESIGN ENGINEER OF RECORD: M. T. NEIHEISEL DATE: APR 2018

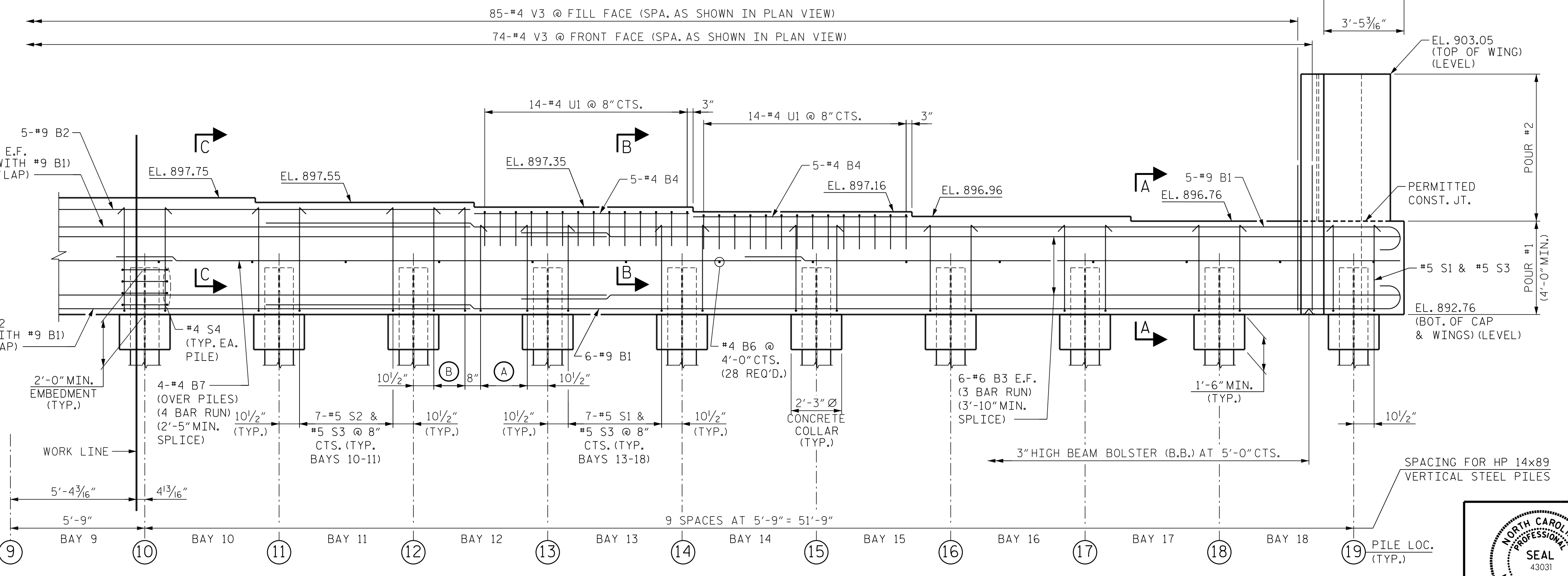
**HDR** HDR Engineering, Inc. of the Carolinas  
 555 Fayetteville St. Suite 900 Raleigh, N.C. 27601  
 N.C.B.E.L.S. License Number: F-0116

Matthew T. Neiheisel / 10/2018  
 DOCUMENT NOT CONSIDERED FINAL  
 UNLESS ALL SIGNATURES COMPLETED





**PARTIAL PLAN**

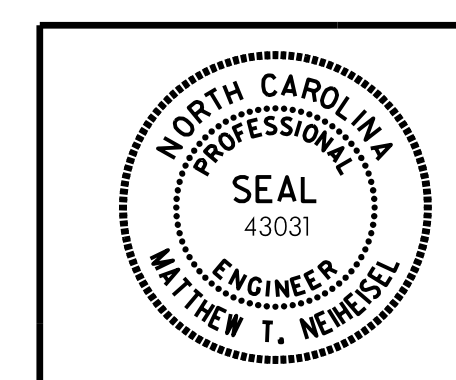


**PARTIAL ELEVATION**

E.F. = EACH FACE

- (A) 4-#5 S1 & #5 S3 @ 8" CTS.
- (B) 3-#5 S2 & #5 S3 @ 8" CTS.

PROJECT NO. U-4734  
 FORSYTH COUNTY  
 STATION: 38+35.00 -L-  
 SHEET 2 OF 4



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**SUBSTRUCTURE**  
 END BENT 1  
 PARTIAL  
 PLAN AND ELEVATION

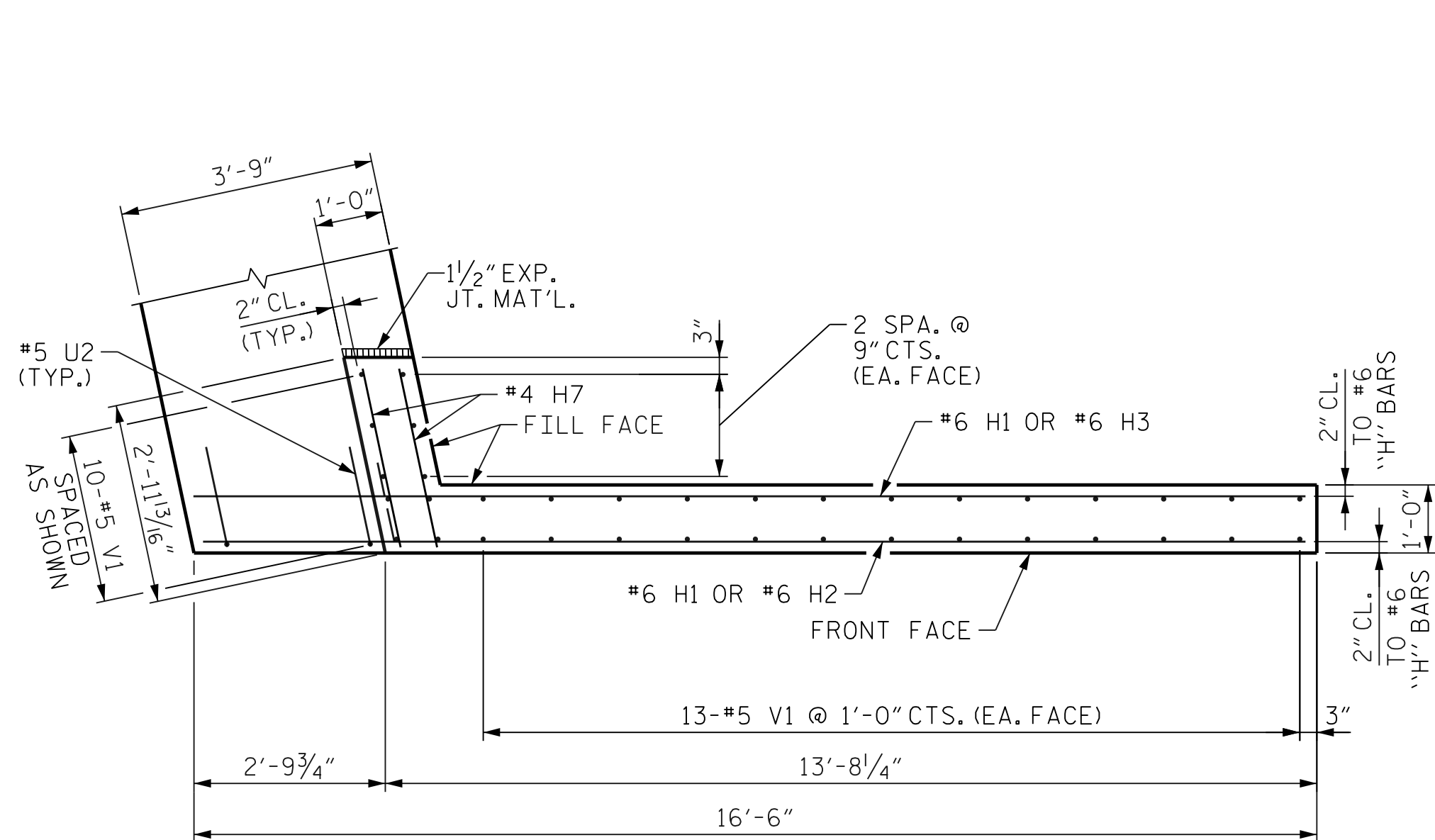
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-29
1			3			TOTAL SHEETS 42
2			4			

PLOT DRIVER: NCDOT STRUCTURES DEFAULT PLOTTER.PHT  
 USER: dcorTer DATE: 4/9/2018  
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 PENTABLE: NCDOT STRUCTURES DEFAULT PEN.tbl  
 TIME: 3:20:19 PM

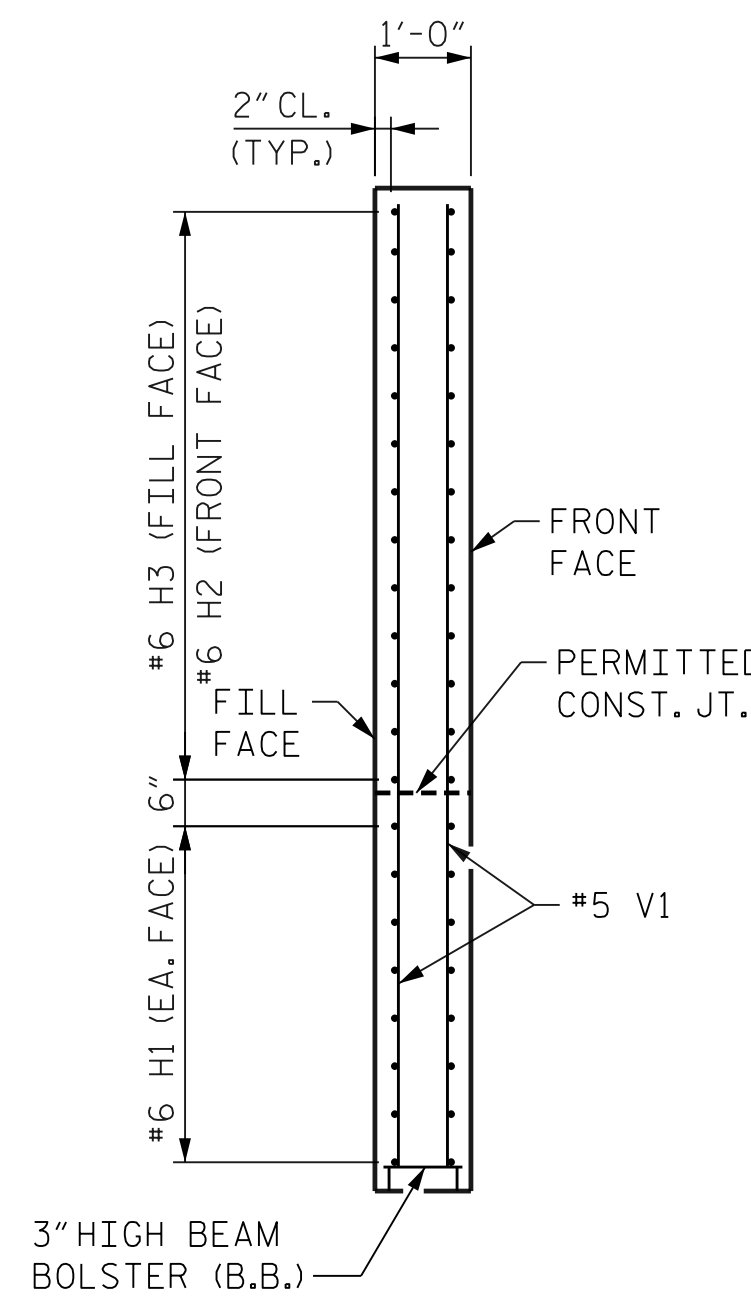
DRAWN BY: D. H. CARTER DATE: APR 2018  
 CHECKED BY: M. T. NEIHEISEL DATE: APR 2018  
 DESIGN ENGINEER OF RECORD: M. T. NEIHEISEL DATE: APR 2018

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

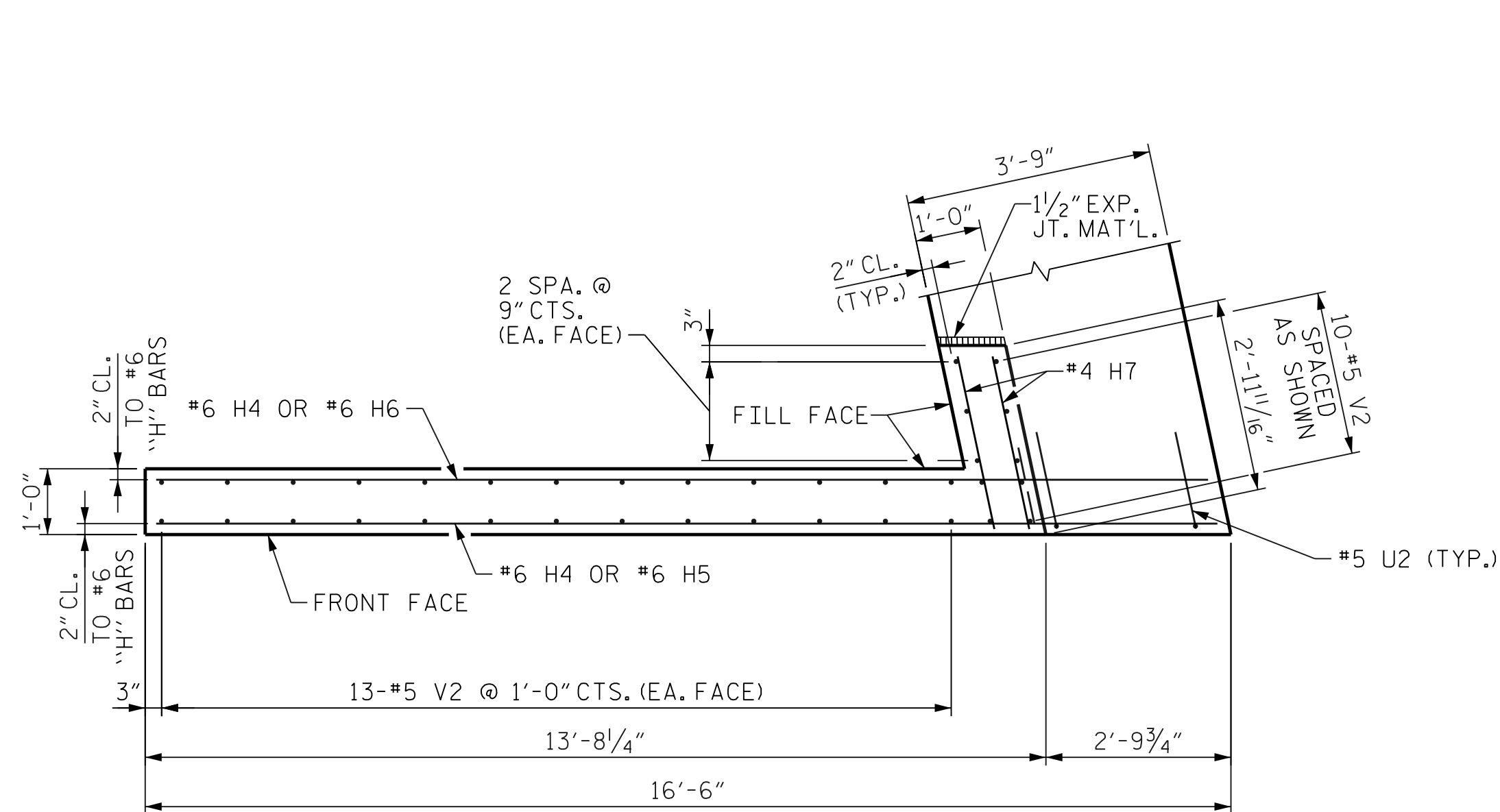
Matthew T. Neiheisel / 10/2018  
 DOCUMENT NOT CONSIDERED FINAL  
 UNLESS ALL SIGNATURES COMPLETED



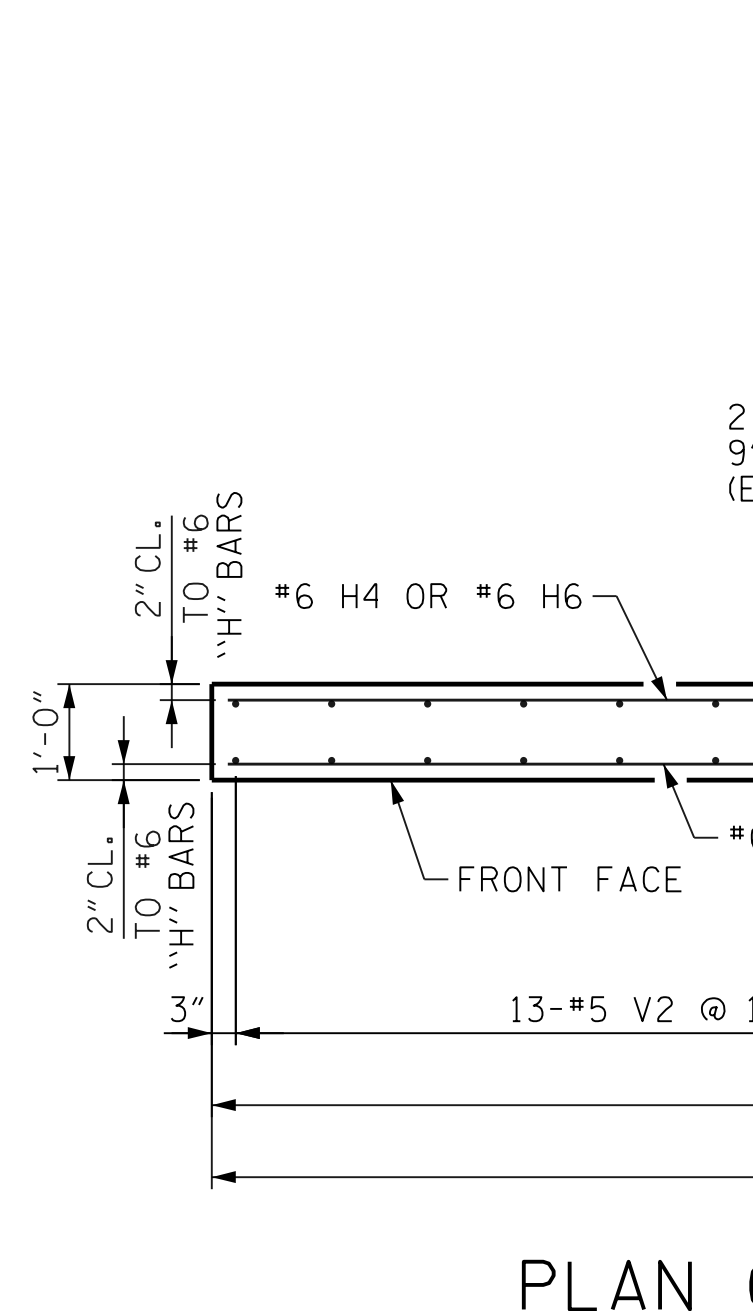
PLAN OF WING (W1)



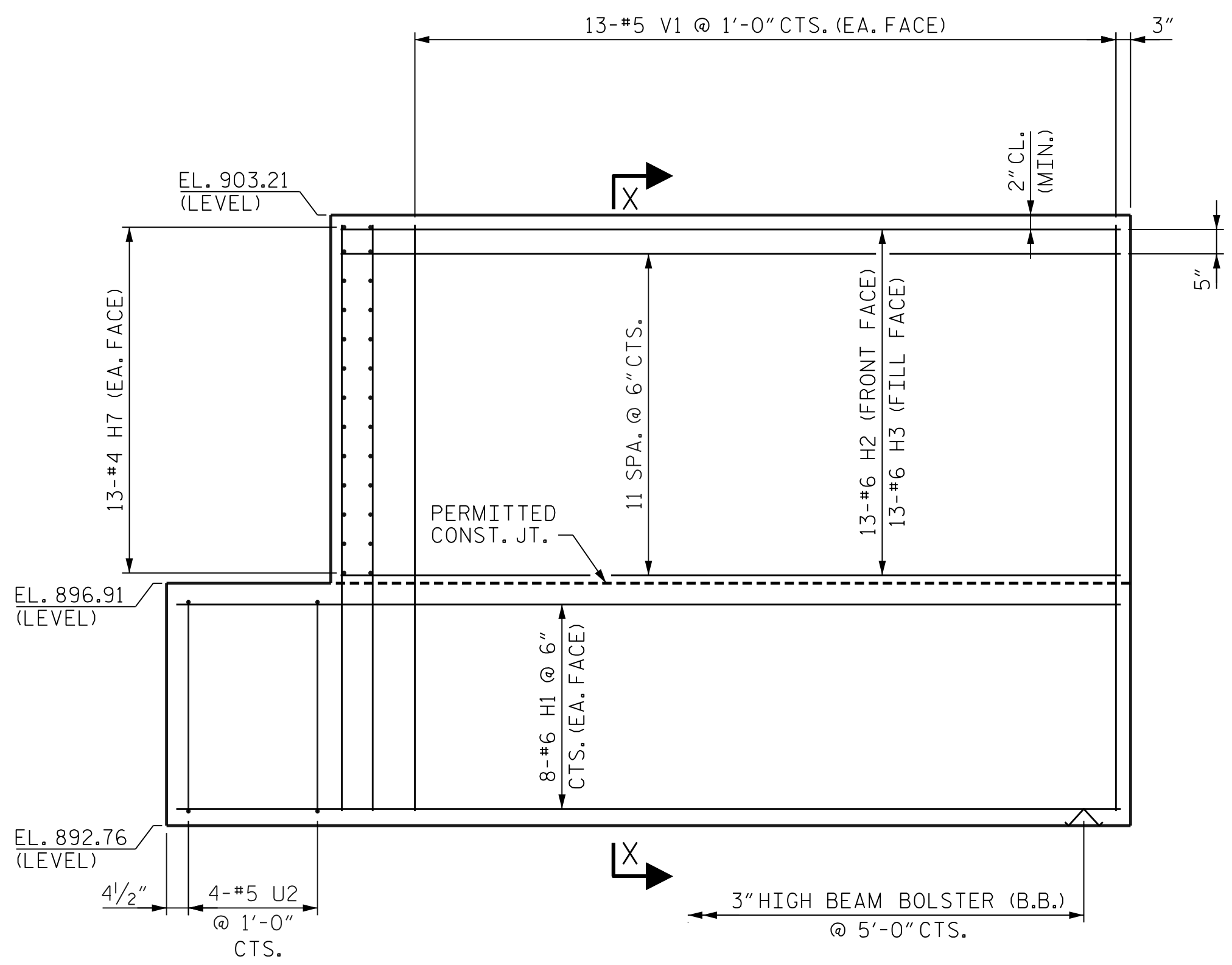
SECTION X-X



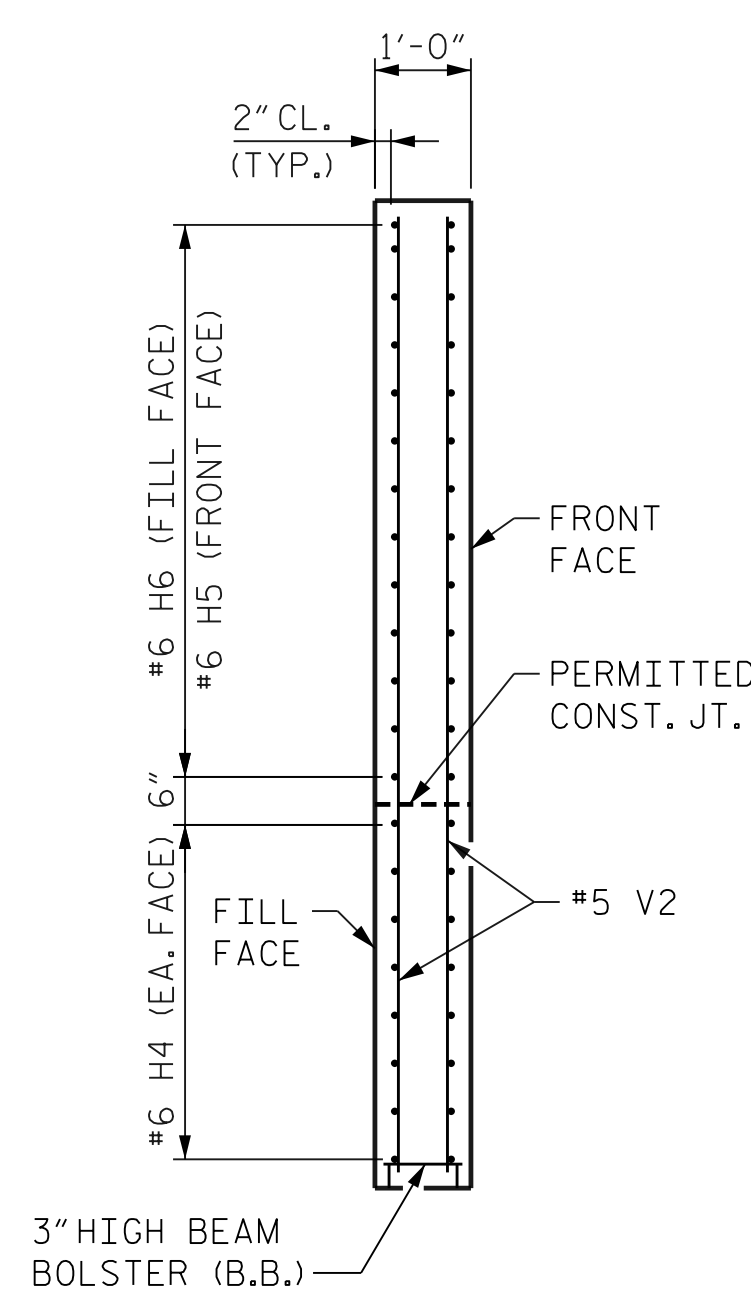
PLAN OF WING (W2)



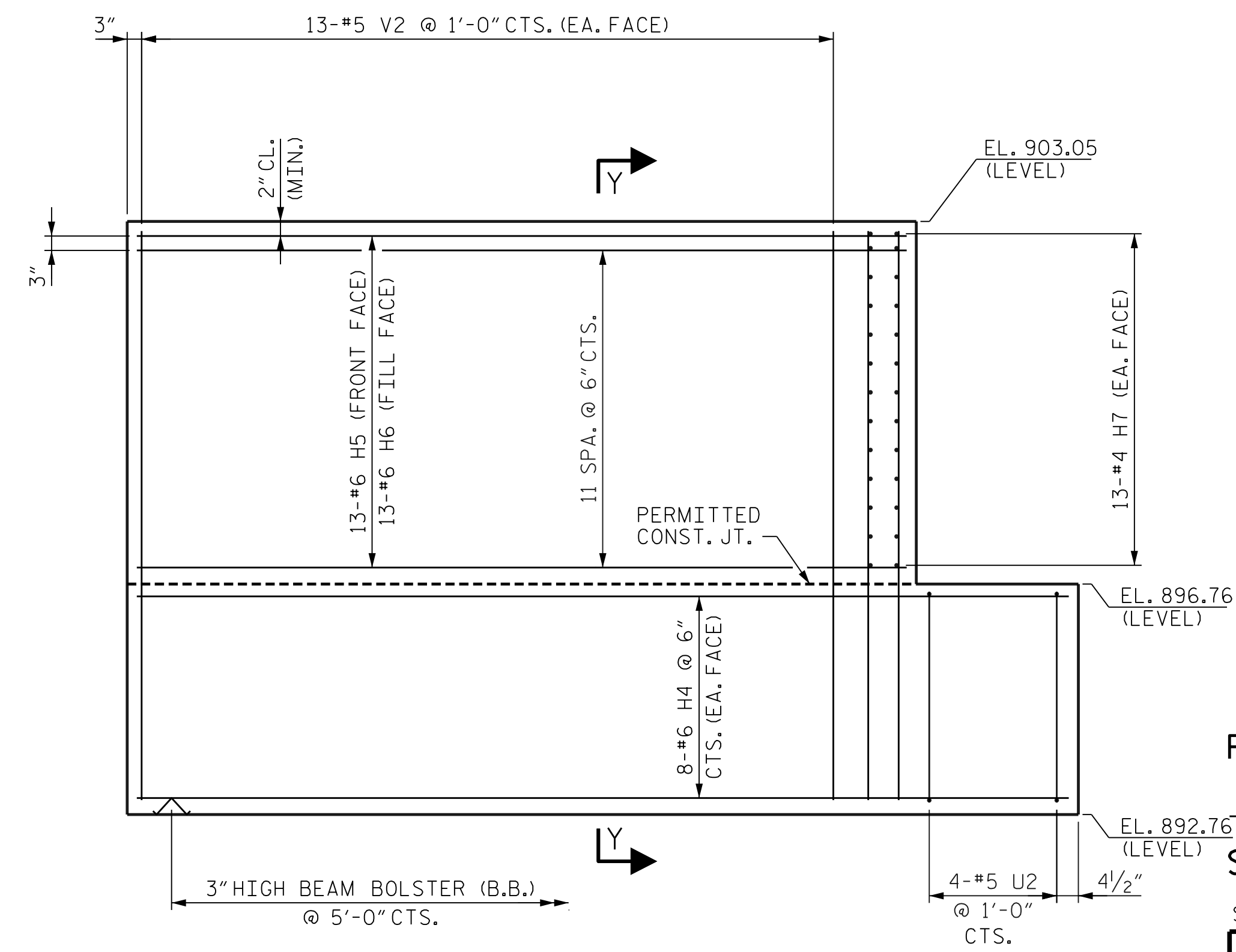
SECTION X-X



ELEVATION OF WING (W1)



SECTION Y-Y



ELEVATION OF WING (W2)

PROJECT NO. U-4734  
 FORSYTH COUNTY  
 STATION: 38+35.00 -L-  
 SHEET 3 OF 4



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**SUBSTRUCTURE**  
 END BENT 1  
 WING WALL DETAILS

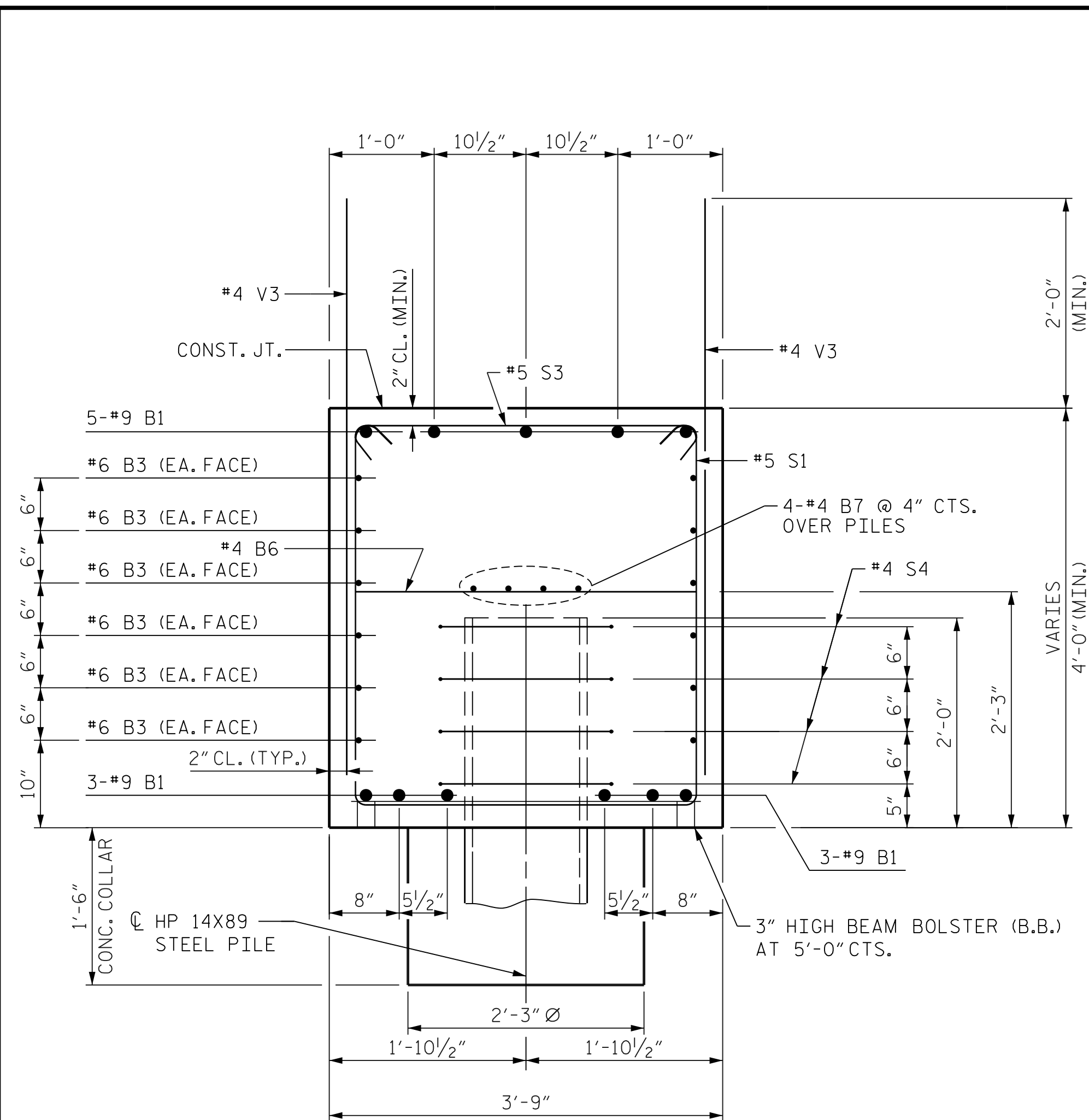
DRAWN BY: D. H. CARTER DATE: APR 2018  
 CHECKED BY: M. T. NEIHEISEL DATE: APR 2018  
 DESIGN ENGINEER OF RECORD: M. T. NEIHEISEL DATE: APR 2018

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

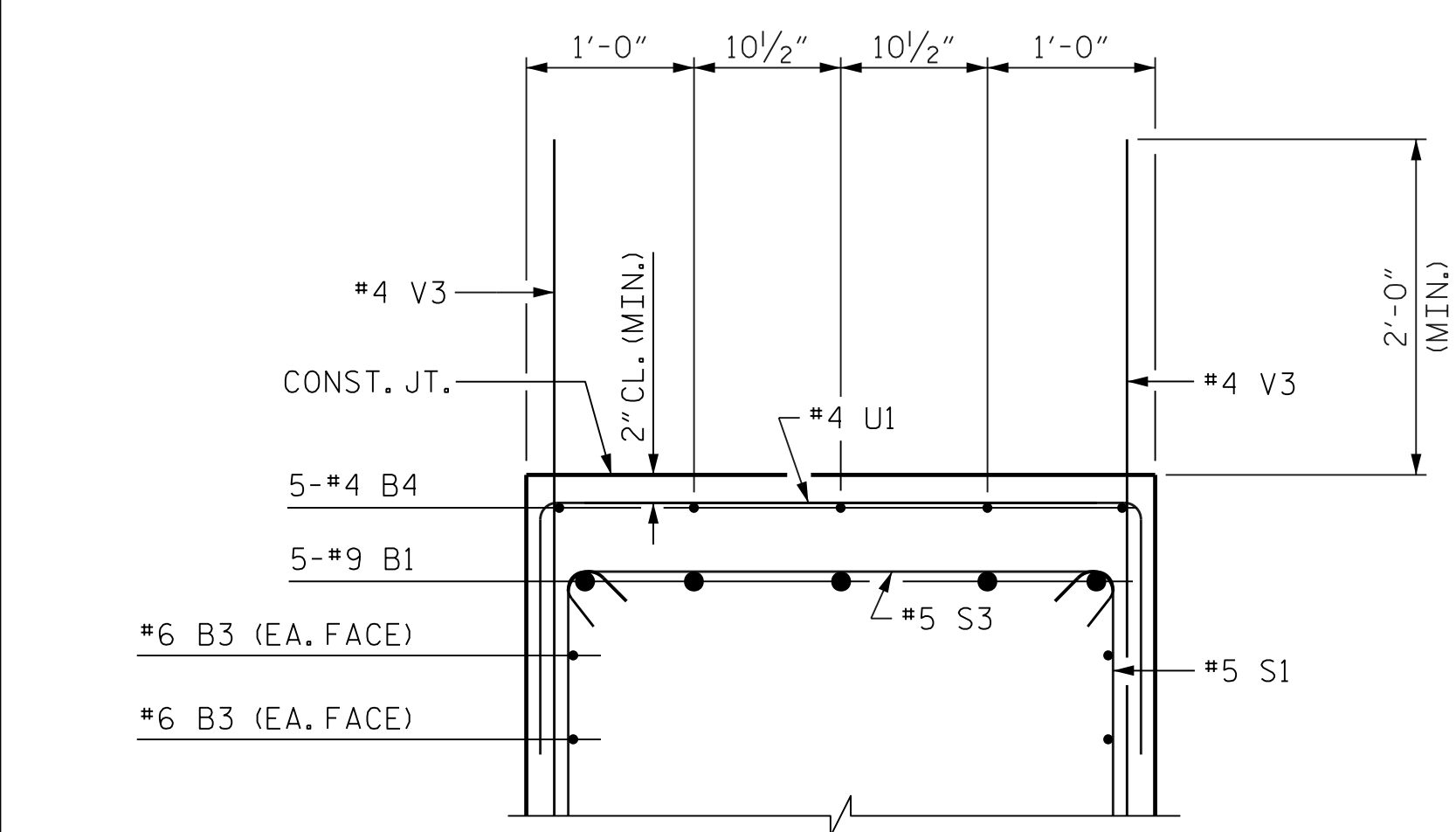
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-30
1			3			TOTAL SHEETS 42
2			4			

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 USER: dcarter DATE: 4/9/2018 TIME: 3:20:21 PM  
 FILE: ... \NCAD\1102.04737.SMU-E103.dgn

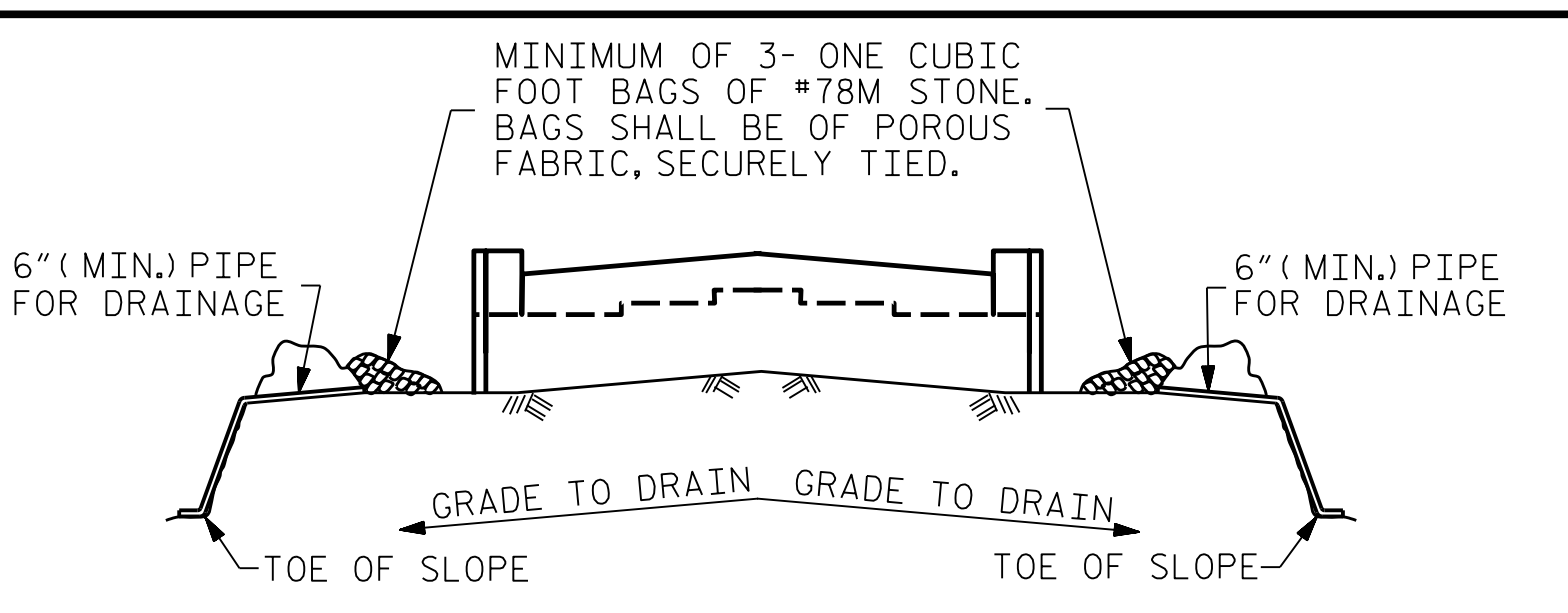




SECTION A-A



SECTION B-B



MINIMUM OF 3- ONE CUBIC FOOT BAGS OF #78M STONE. BAGS SHALL BE OF POROUS FABRIC, SECURELY TIED.

6" (MIN.) PIPE FOR DRAINAGE

6" (MIN.) PIPE FOR DRAINAGE

GRADE TO DRAIN

GRADE TO DRAIN

TOE OF SLOPE

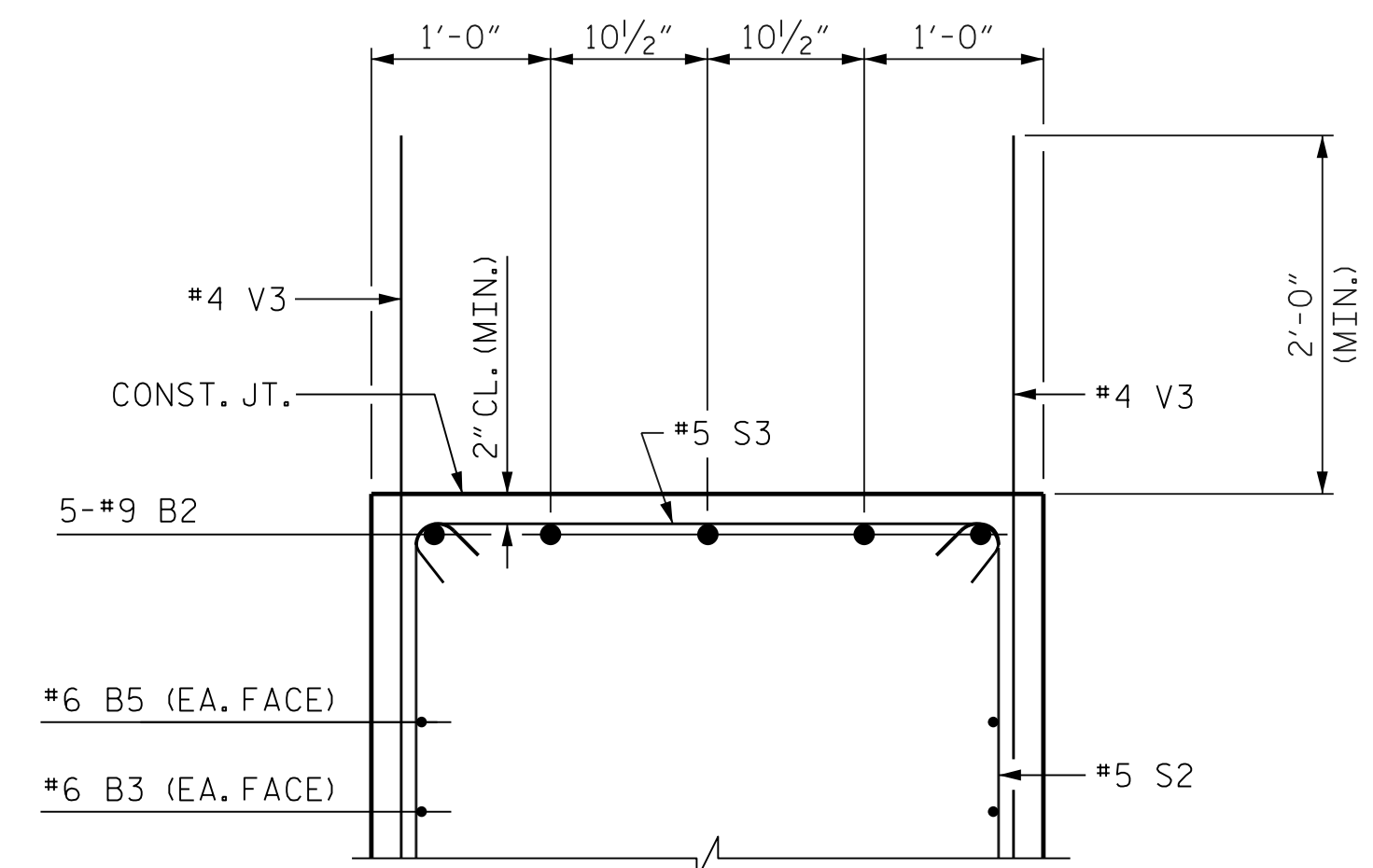
TOE OF SLOPE

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.

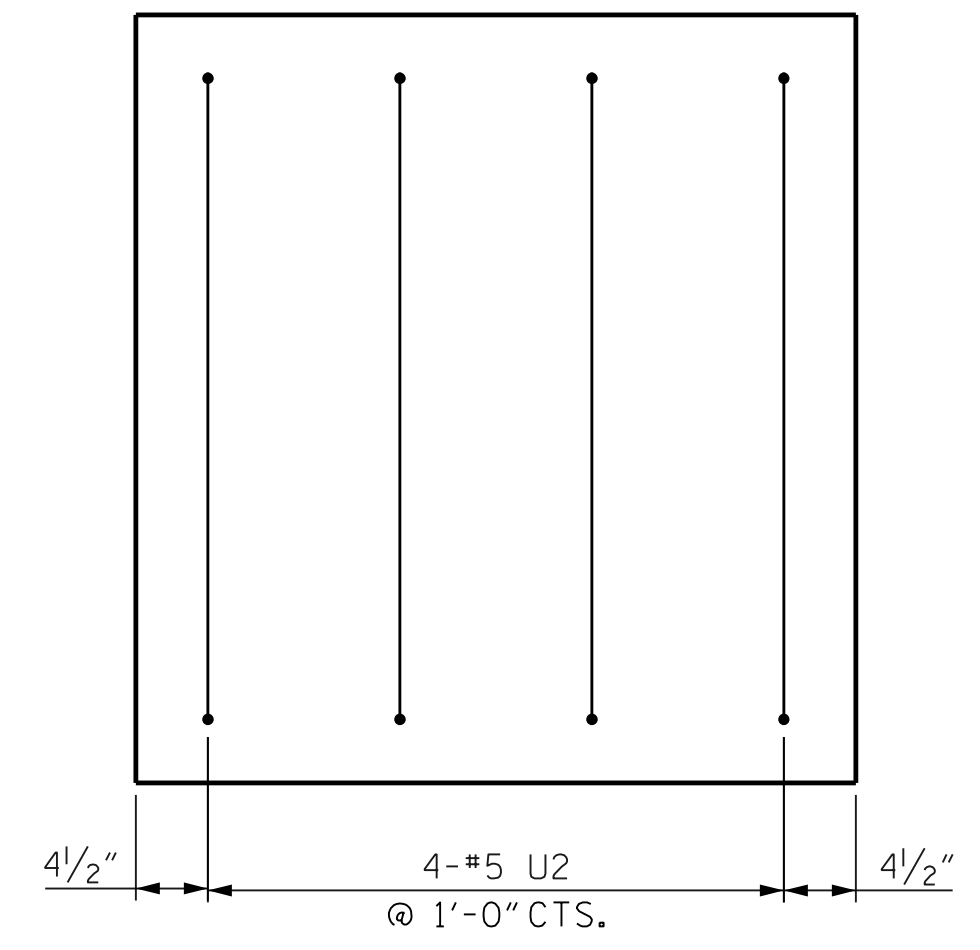
BAGGED STONE SHALL REMAIN IN PLACE UNTIL THE ENGINEER DIRECTS THAT IT BE REMOVED. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF SILT ACCUMULATIONS AT BAGGED STONE WHEN SO DIRECTED BY THE ENGINEER. BAGS SHALL BE REMOVED AND REPLACED WHENEVER THE ENGINEER DETERMINES THAT THEY HAVE DETERIORATED AND LOST THEIR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

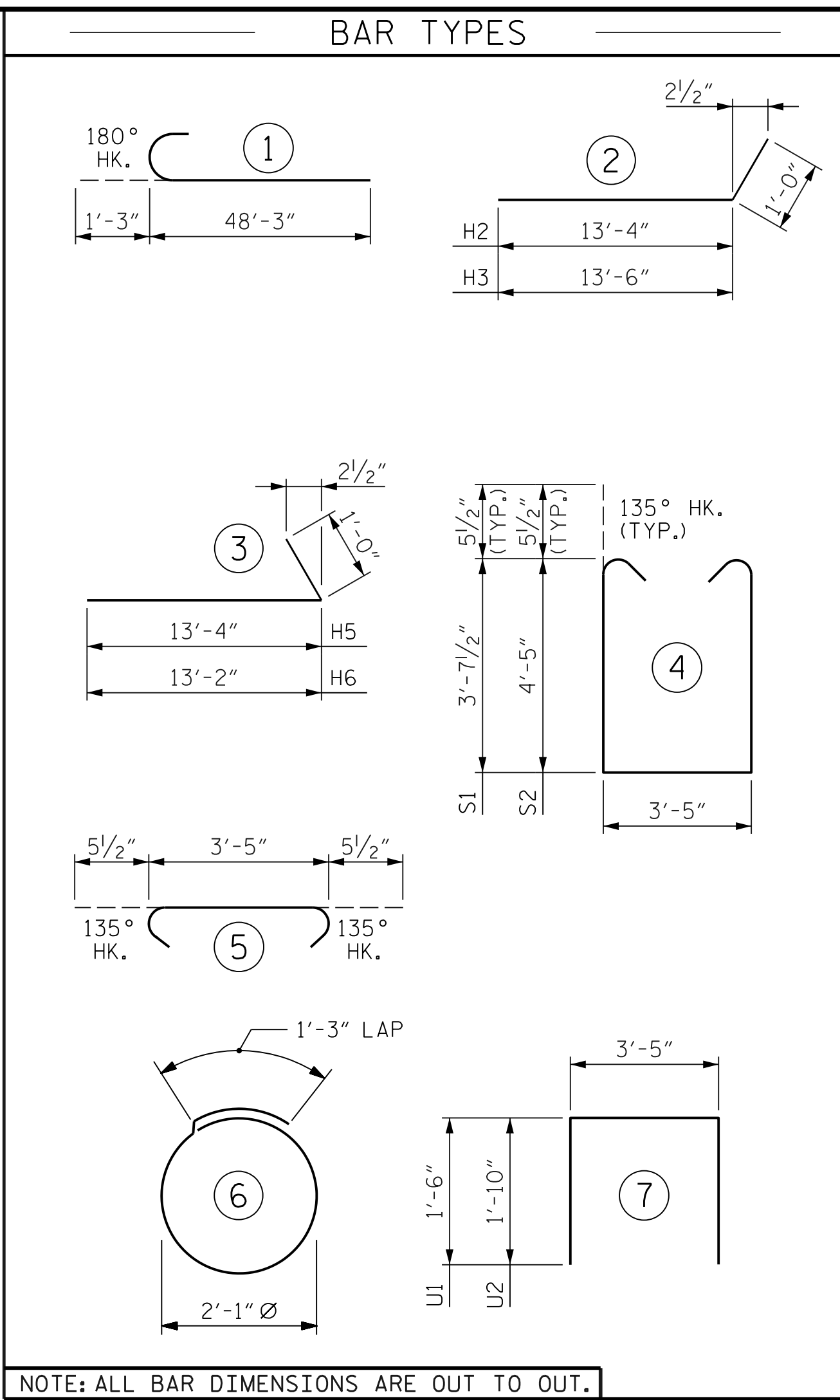
TEMPORARY DRAINAGE AT END BENT



SECTION C-C

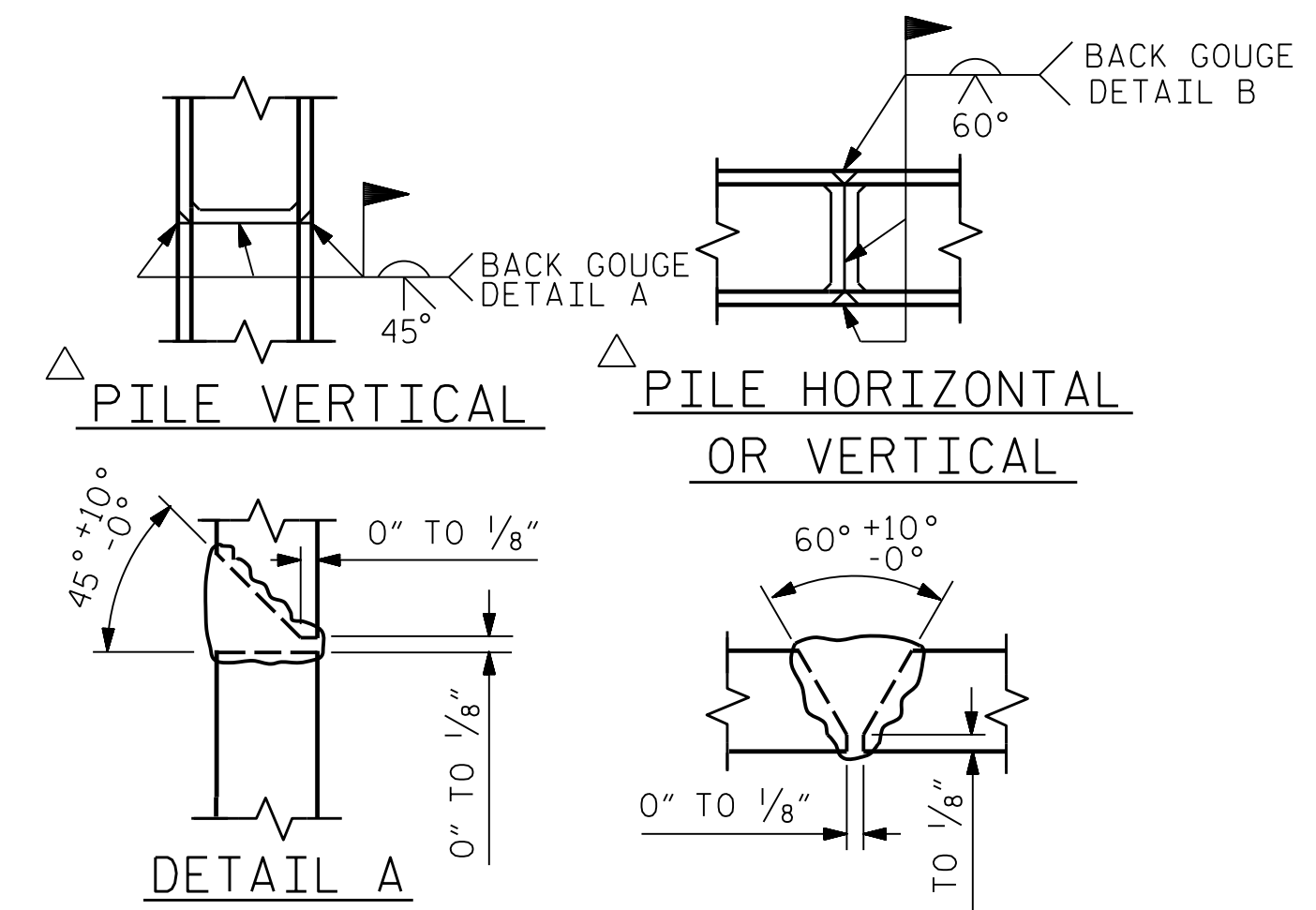


END VIEW



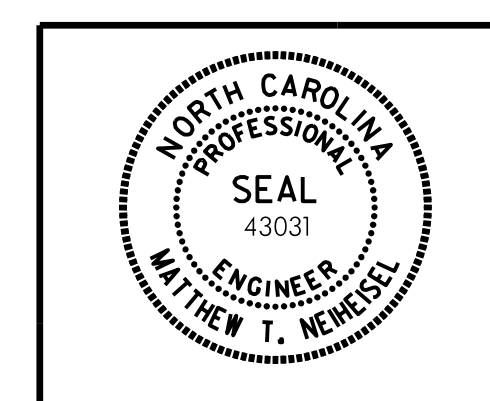
NOTE: ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL					
END BENT 1					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	22	#9	1	49'-6"	3703
B2	11	#9	STR	27'-9"	1038
B3	36	#6	STR	38'-2"	2064
B4	25	#4	STR	9'-0"	151
B5	2	#6	STR	18'-0"	55
B6	28	#4	STR	3'-5"	64
B7	16	#4	STR	28'-6"	305
H1	16	#6	STR	16'-2"	389
H2	13	#6	2	14'-4"	280
H3	13	#6	2	14'-6"	284
H4	16	#6	STR	16'-0"	385
H5	13	#6	3	14'-4"	280
H6	13	#6	3	14'-2"	277
H7	52	#4	STR	2'-4"	82
S1	94	#5	4	11'-7"	1136
S2	34	#5	4	13'-2"	467
S3	128	#5	5	4'-4"	579
S4	76	#4	6	7'-10"	398
U1	70	#4	7	6'-5"	301
U2	8	#5	7	7'-1"	60
V1	36	#5	STR	10'-0"	376
V2	36	#5	STR	9'-10"	370
V3	159	#4	STR	5'-9"	611
REINFORCING STEEL					13,655 LBS.
CLASS A CONCRETE					
POUR 1 (CAP, LOWER WINGS & COLLARS)					74.6 C.Y.
POUR 2 (UPPER WINGS)					7.2 C.Y.
TOTAL CONCRETE					81.8 C.Y.
HP 14 x 89 STEEL PILES					
					NO. 19
					L.F. 950
PILE DRIVING EQUIPMENT SETUP FOR HP 14 X 89 STEEL PILES					19 EA.



PILE SPLICE DETAILS

PROJECT NO. U-4734  
 FORSYTH COUNTY  
 STATION: 38+35.00 -L-  
 SHEET 4 OF 4



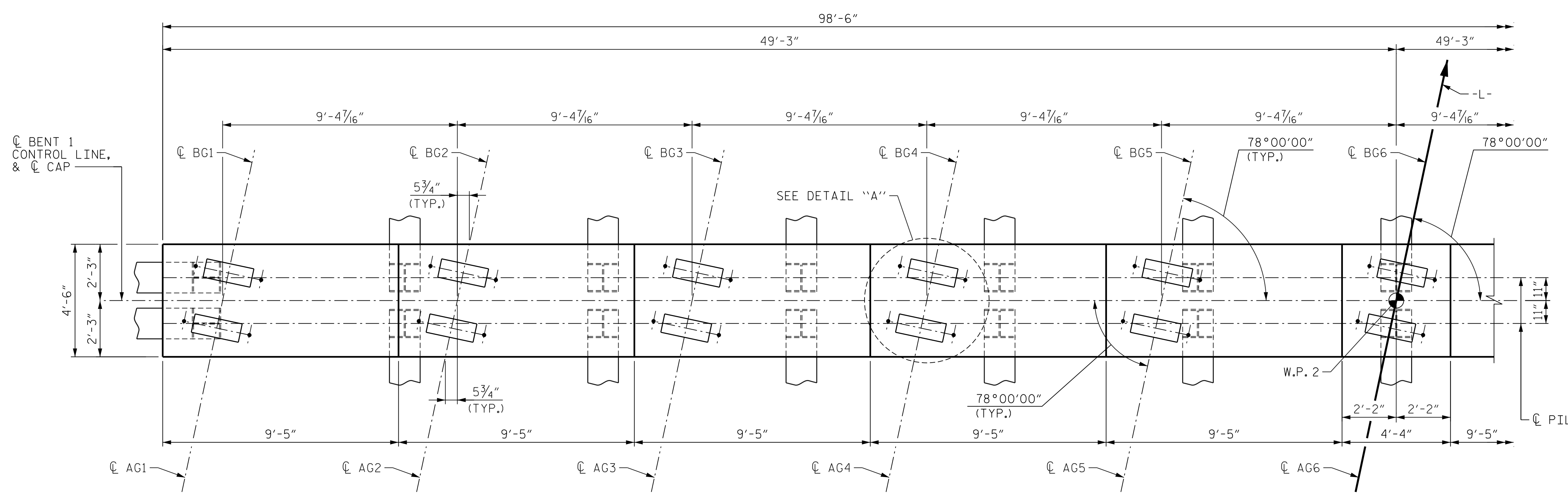
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 SUBSTRUCTURE  
 END BENT 1  
 MISCELLANEOUS DETAILS  
 AND BILL OF MATERIAL

DRAWN BY: D. H. CARTER DATE: APR 2018  
 CHECKED BY: M. T. NEIHEISEL DATE: APR 2018  
 DESIGN ENGINEER OF RECORD: M. T. NEIHEISEL DATE: APR 2018

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

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-31
1			3			TOTAL SHEETS 42
2			4			

PLOT DRIVER: NCDOT STRUCTURES DEFAULT PLOTTER.PH  
 PENTABLE: NCDOT STRUCTURES DEFAULT PEN.HBI  
 USER: dcarter DATE: 4/9/2018 TIME: 3:20:23 PM  
 FILE: ... \NCAD\1103.04737.SMU-E104.dgn

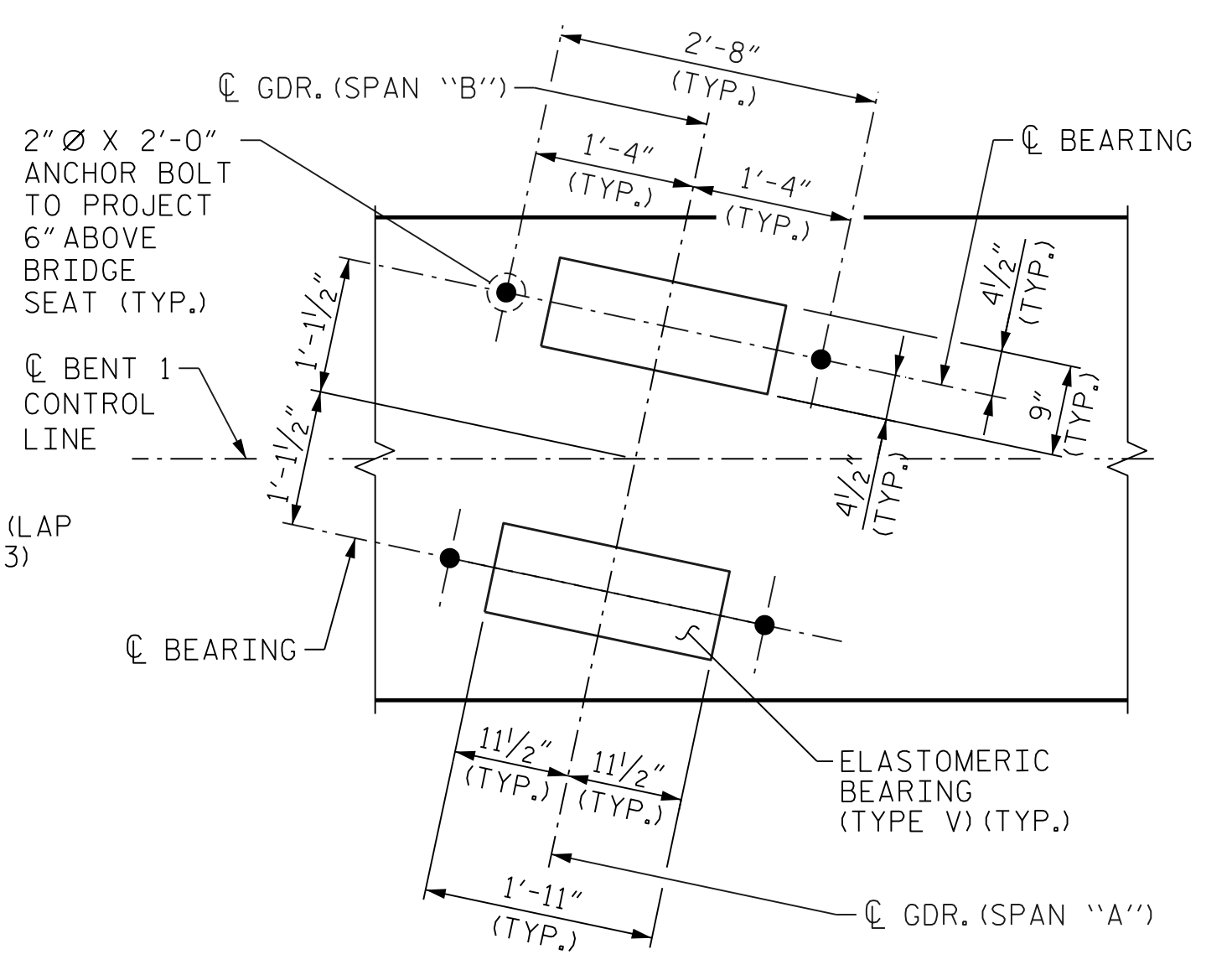


**PARTIAL PLAN**

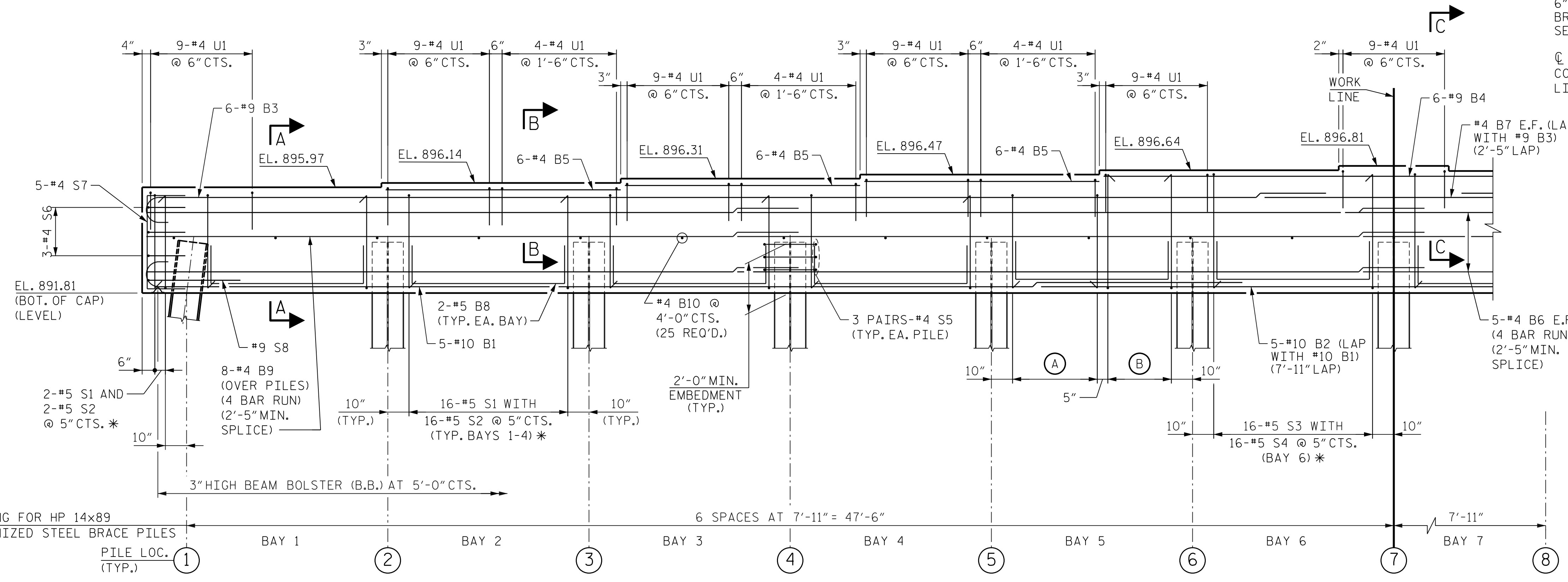
**NOTES:**  
 STIRRUPS AND "U" BARS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.  
 FOR SECTIONS A-A, B-B, AND C-C, SEE SHEET 3 OF 3.  
 GALVANIZE THE TOP OF EACH INTERIOR BENT PILE A MINIMUM OF 33 FEET. GALVANIZE IN ACCORDANCE WITH SECTION 1076 OF THE STANDARD SPECIFICATIONS.

SPAN B

SPAN A



**DETAIL "A"**  
(TYP. EA. GDR.)



**PARTIAL ELEVATION**  
E.F. = EACH FACE

\* = INVERT ALTERNATE SETS OF STIRRUPS

- (A) 9-#5 S1 WITH 9-#5 S2 @ 5" CTS. \*
- (B) 7-#5 S3 WITH 7-#5 S4 @ 5" CTS. \*

PROJECT NO. U-4734  
 FORSYTH COUNTY  
 STATION: 38+35.00 -L-

SHEET 1 OF 3



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**SUBSTRUCTURE**

BENT 1  
 PARTIAL  
 PLAN AND ELEVATION

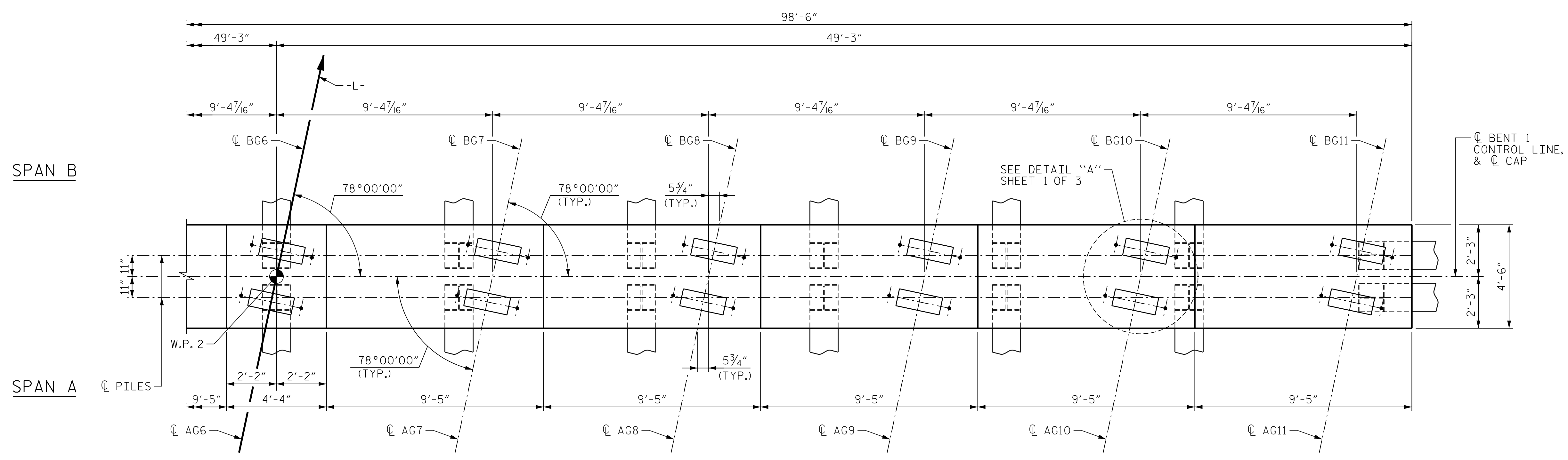
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-32
1			3			TOTAL SHEETS 42
2			4			

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

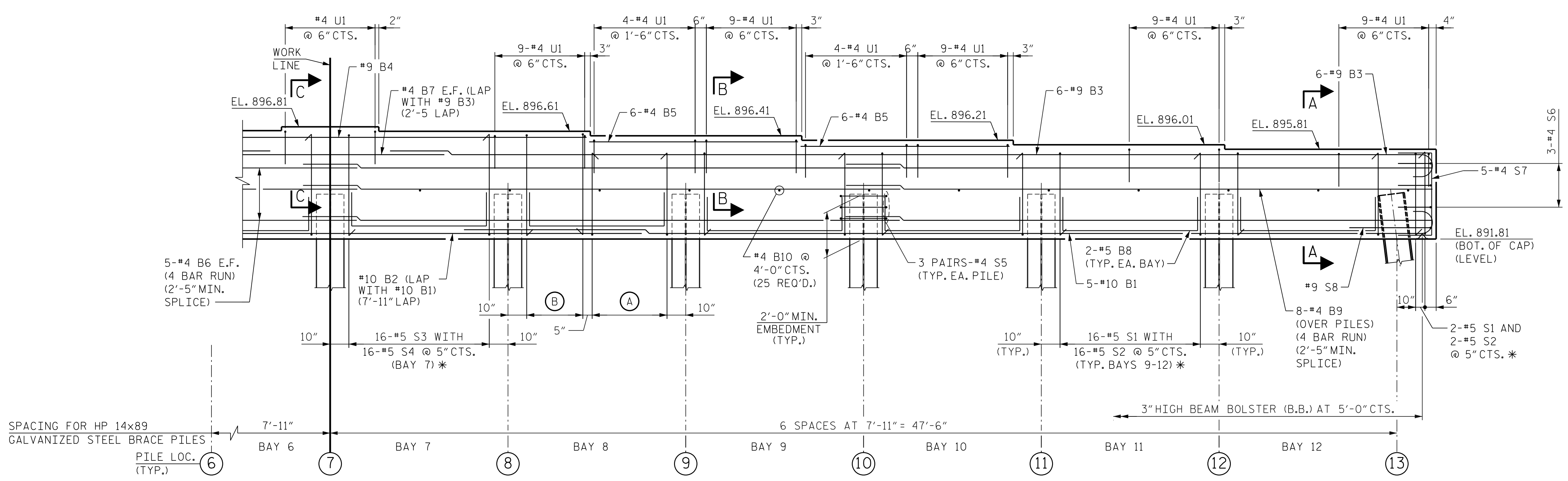
PLOT DRIVER: NCDOT\_STRUCTURES\_DEFAULT\_PLOTTER.PH  
 USER: dcarter DATE: 4/9/2018  
 FILE: ... \NCAD\1100\U4737.SMU.B101.dgn  
 PENTABLE: NCDOT\_STRUCTURES\_DEFAULT\_PEN.FBI  
 TIME: 3:20:26 PM

DRAWN BY: D. H. CARTER DATE: APR 2018  
 CHECKED BY: M. T. NEIHEISEL DATE: APR 2018  
 DESIGN ENGINEER OF RECORD: M. T. NEIHEISEL DATE: APR 2018





**PARTIAL PLAN**



**PARTIAL ELEVATION**  
E.F. = EACH FACE

\* = INVERT ALTERNATE SETS OF STIRRUPS

- (A) 9-#5 S1 WITH 9-#5 S2 @ 5"CTS. \*
- (B) 7-#5 S3 WITH 7-#5 S4 @ 5"CTS. \*

PROJECT NO. U-4734  
 FORSYTH COUNTY  
 STATION: 38+35.00 -L-  
 SHEET 2 OF 3



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**SUBSTRUCTURE**

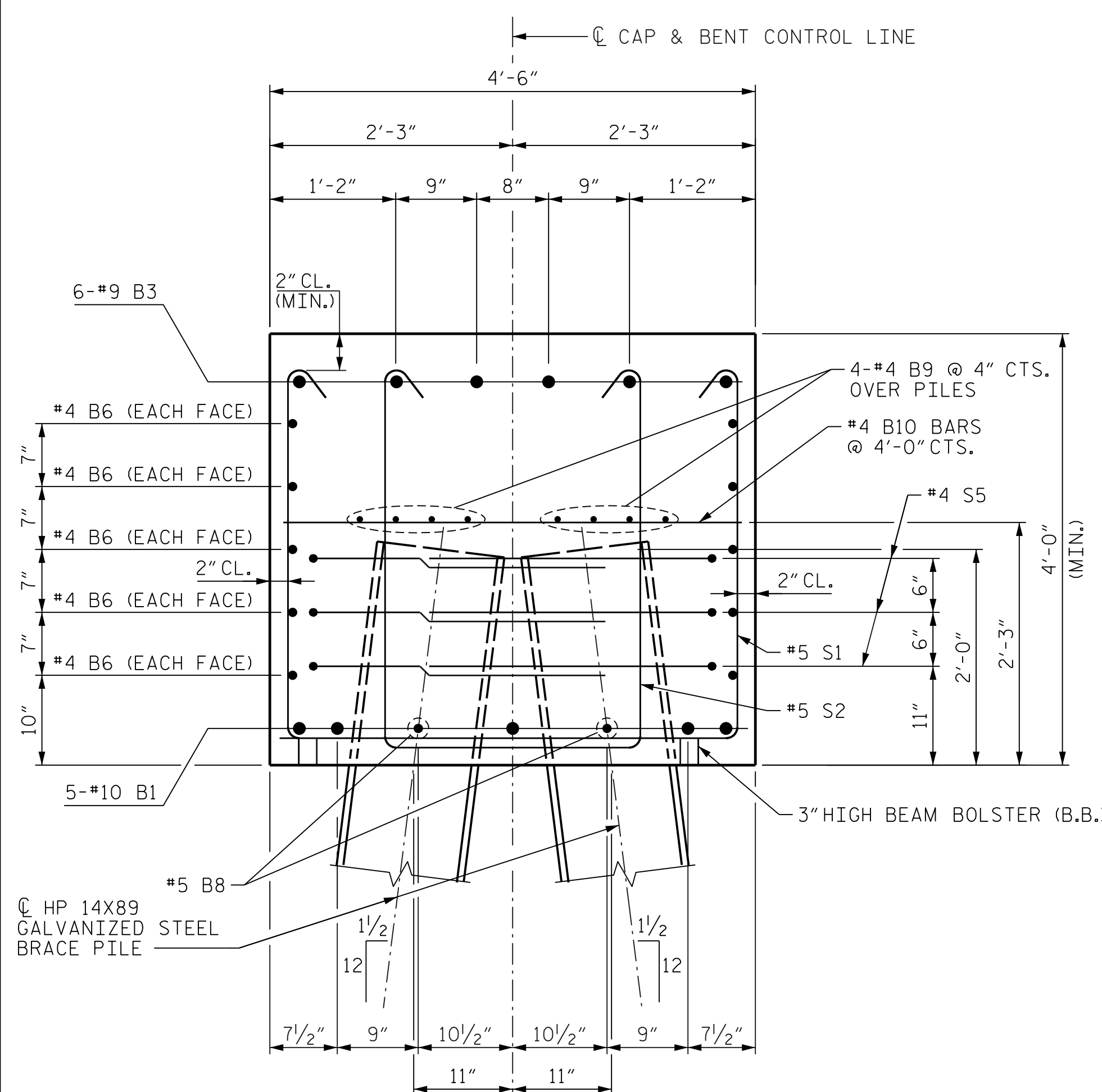
BENT 1  
 PARTIAL  
 PLAN AND ELEVATION

DRAWN BY : D. H. CARTER DATE : APR 2018  
 CHECKED BY : M. T. NEIHEISEL DATE : APR 2018  
 DESIGN ENGINEER OF RECORD : M. T. NEIHEISEL DATE : APR 2018

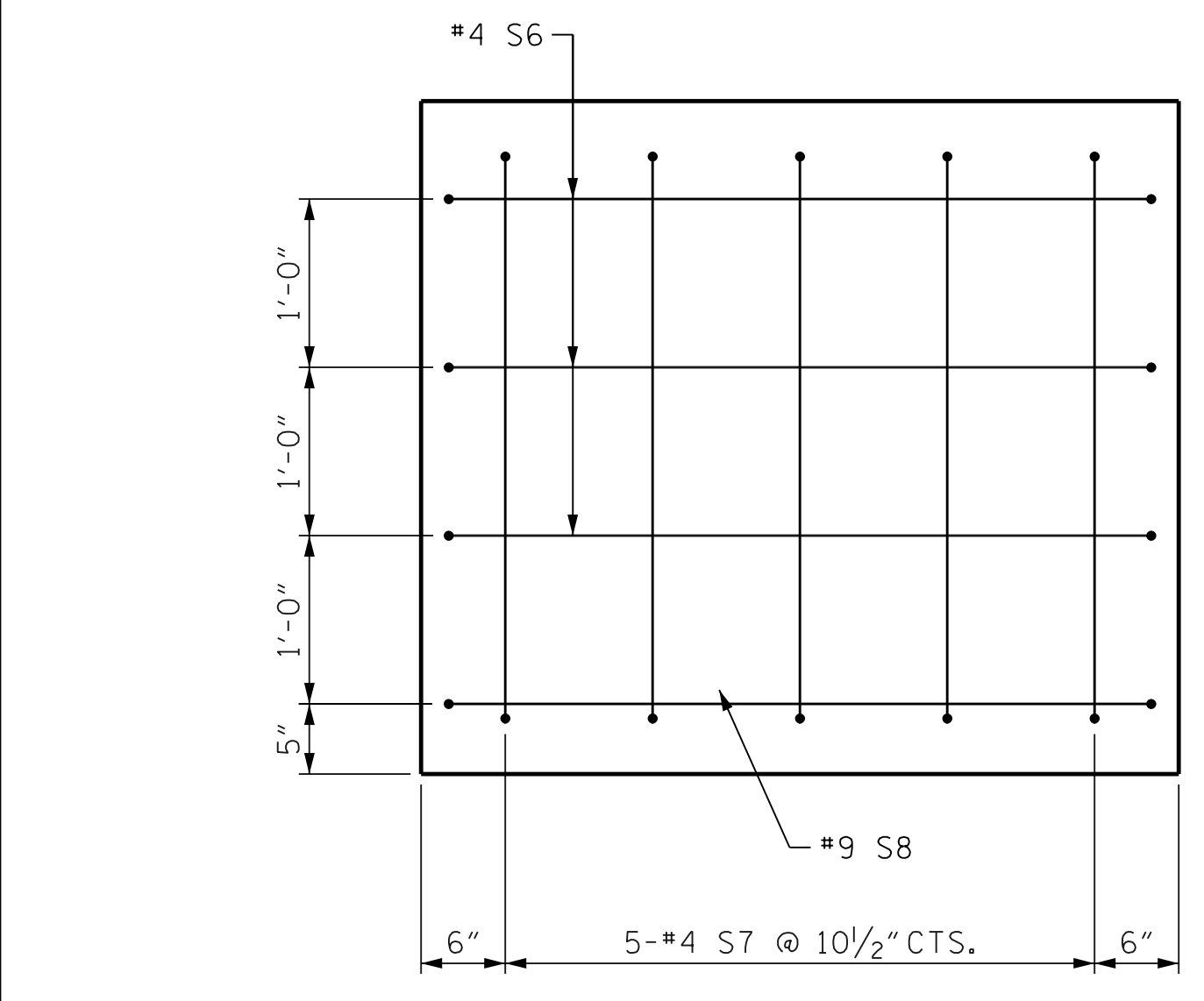
**HDR** HDR Engineering, Inc. of the Carolinas  
 555 Fayetteville St., Suite 900 Raleigh, N.C. 27601  
 N.C.B.E.L.S. License Number: F-0116

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-33
1			3			TOTAL SHEETS 42
2			4			

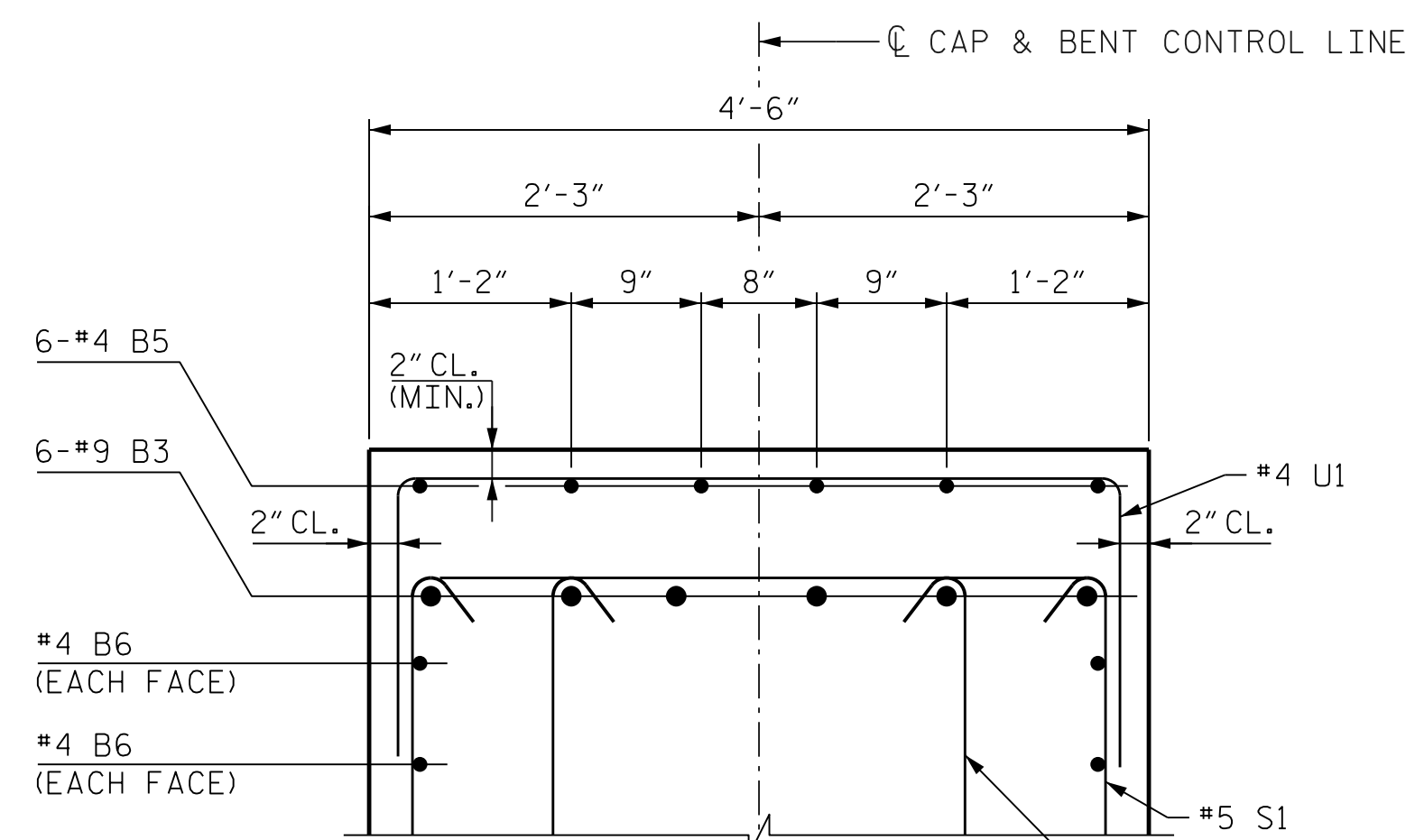
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 PENTABLE: NCDOT STRUCTURES DEFAULT PEN.tbl  
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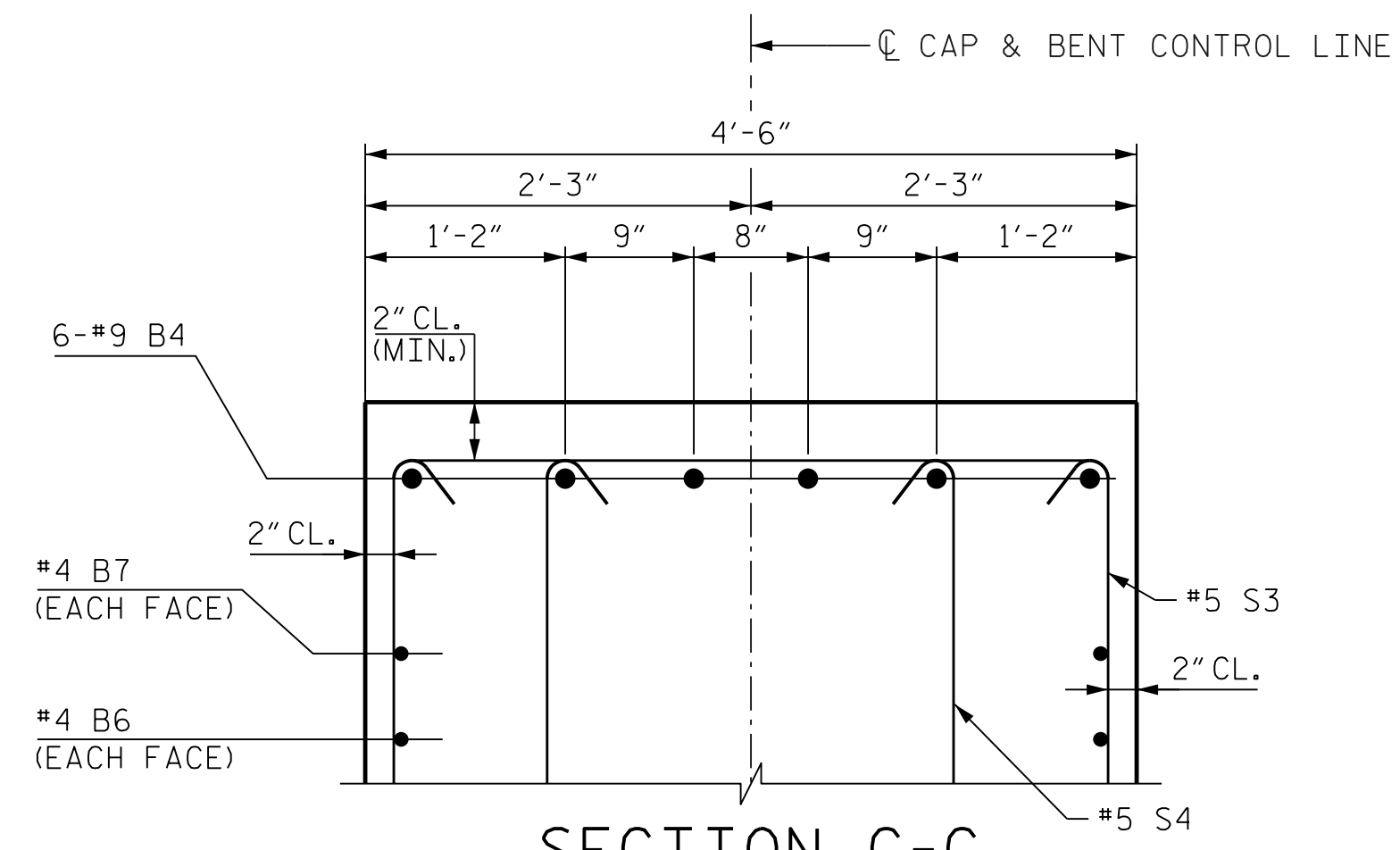
SECTION A-A



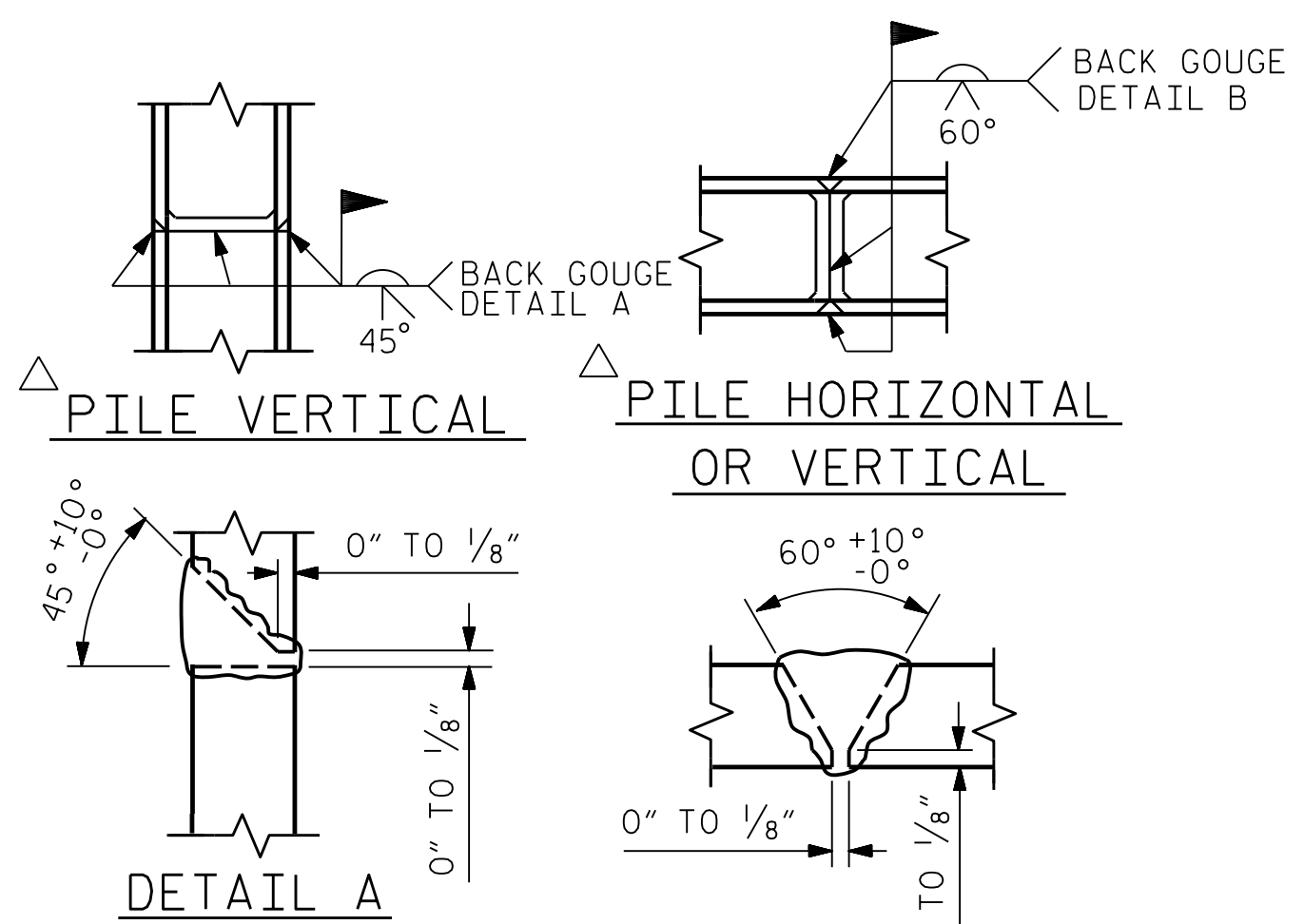
END VIEW  
(TYPICAL BOTH ENDS)



SECTION B-B



SECTION C-C



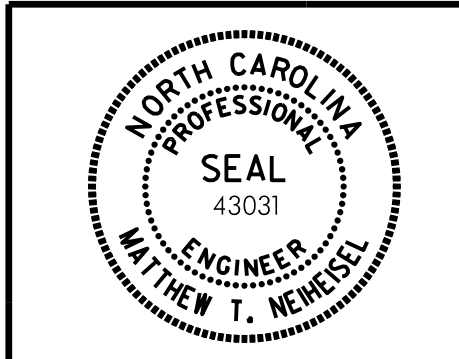
PILE SPLICE DETAILS  
POSITION OF PILE DURING WELDING.

BAR TYPES	
180° HK. (1)	6'-5" B8
1'-5" 43'-2" B1	1'-8" S5
1'-3" 46'-5" B3	4'-0" S6
	3'-6" S7
	4'-0" S8
	4'-2" U1
1'-8" B8	
2'-10" S5	
10" S6	
10" S7	
3'-8" S8	
1'-6" U1	
5/2" (TYP.)	
135° HK. (TYP.) (3)	
3'-7 1/2" S1	4'-2" S1
3'-7 1/2" S2	2'-6" S2
4'-5" S3	4'-2" S3
4'-5" S4	2'-6" S4

NOTE: ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL					
BENT 1					
BAR NO.	SIZE	TYPE	LENGTH	WEIGHT	
B1	10	# 10	1	44'-7"	1919
B2	5	# 10	STR	27'-9"	598
B3	12	# 9	1	47'-8"	1945
B4	6	# 9	STR	22'-10"	466
B5	30	# 4	STR	9'-1"	183
B6	40	# 4	STR	26'-5"	706
B7	2	# 4	STR	10'-2"	14
B8	24	# 5	2	9'-9"	245
B9	32	# 4	STR	26'-5"	565
B10	25	# 4	STR	4'-2"	69
S1	150	# 5	3	12'-4"	1930
S2	150	# 5	3	10'-8"	1669
S3	46	# 5	3	13'-11"	668
S4	46	# 5	3	12'-3"	588
S5	78	# 4	2	7'-4"	383
S6	6	# 4	2	5'-8"	23
S7	10	# 4	2	5'-2"	35
S8	2	# 9	2	11'-4"	78
U1	119	# 4	2	7'-2"	570
REINFORCING STEEL				12,654 LBS.	
CLASS A CONCRETE				73.4 C.Y.	
HP 14 X 89 GALVANIZED STEEL PILES				NO. 26	
				L.F. 1,560	
PILE DRIVING EQUIPMENT				26 EA.	
SETUP FOR HP 14 X 89 GALVANIZED STEEL PILES					

PROJECT NO. U-4734  
 FORSYTH COUNTY  
 STATION: 38+35.00 -L-  
 SHEET 3 OF 3



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**SUBSTRUCTURE**  
 BENT 1  
 DETAILS AND  
 BILL OF MATERIAL

DRAWN BY: D. H. CARTER DATE: APR 2018  
 CHECKED BY: M. T. NEIHEISEL DATE: APR 2018  
 DESIGN ENGINEER OF RECORD: M. T. NEIHEISEL DATE: APR 2018

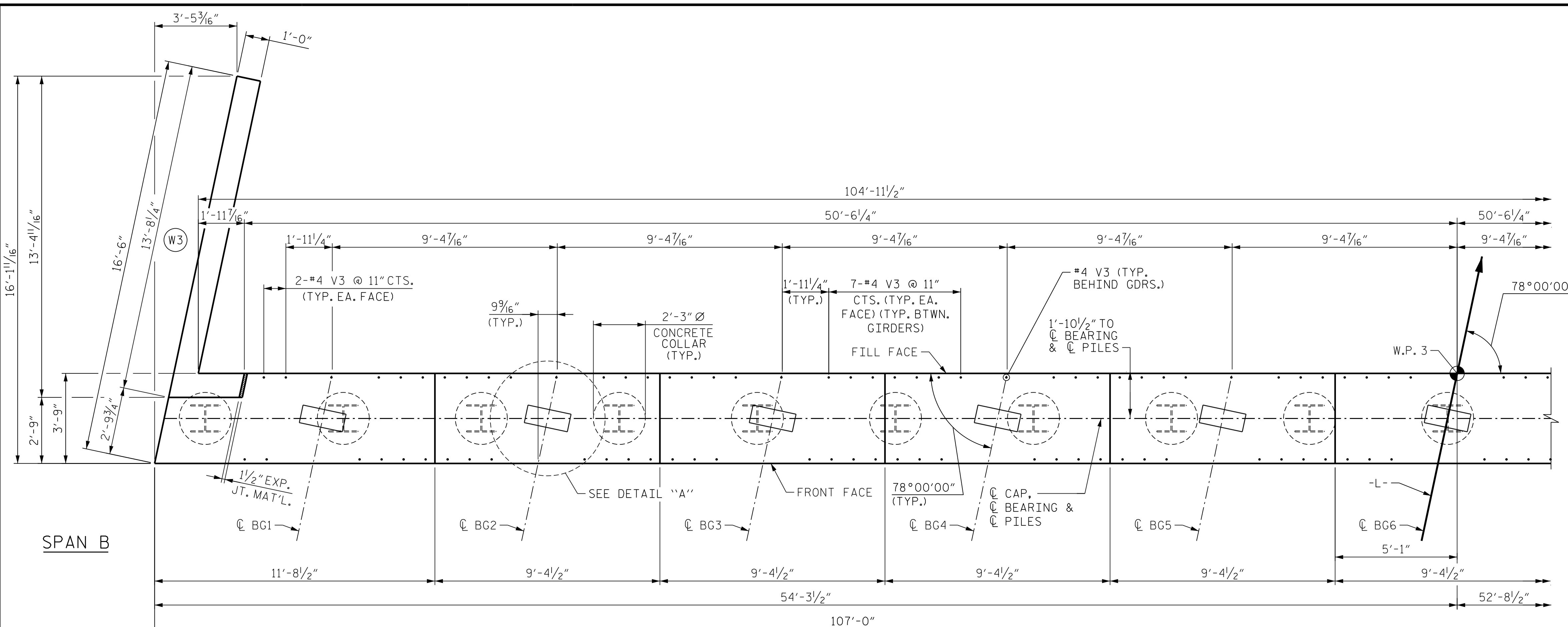
HDR Engineering, Inc. of the Carolinas  
 555 Fayetteville St., Suite 900 Raleigh, N.C. 27601  
 N.C.B.E.L.S. License Number: F-0116

Matthew Neiheisel / 10/2018  
 DOCUMENT NOT CONSIDERED FINAL  
 UNLESS ALL SIGNATURES COMPLETED

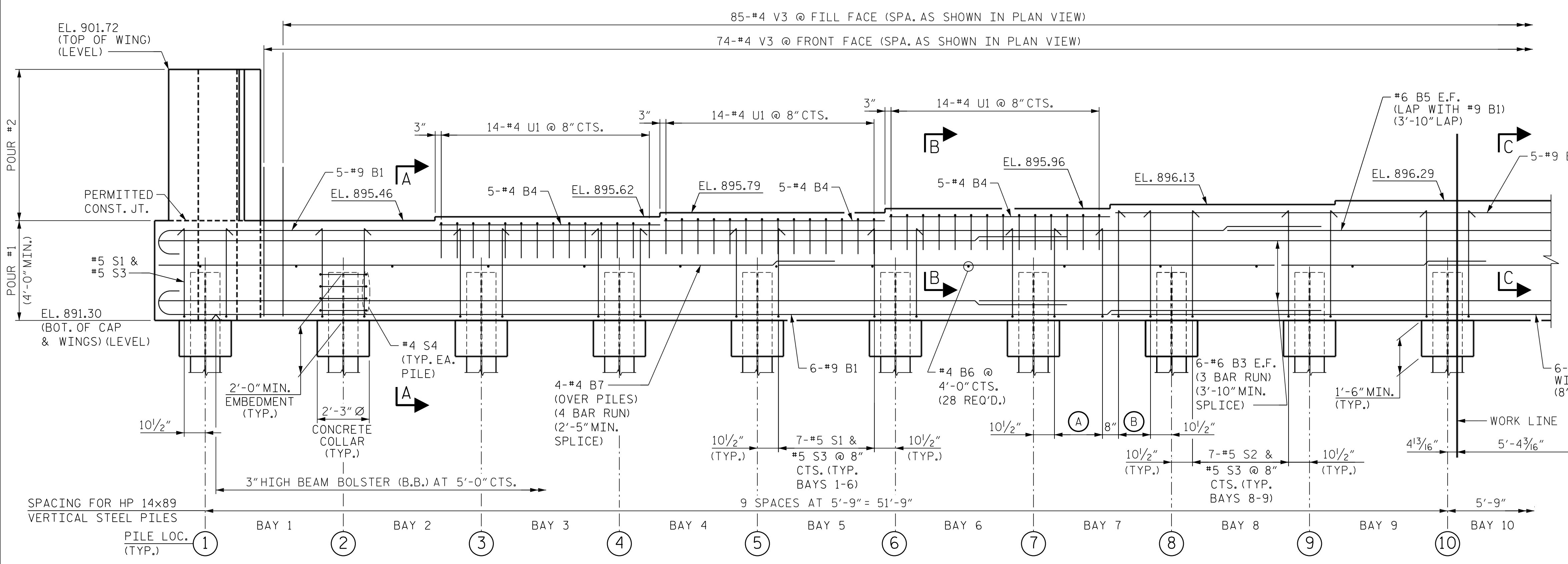
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-34
1			3			TOTAL SHEETS 42
2			4			

PLOT DRIVER: NCDOT STRUCTURES DEFAULT PLOTTER.PHT PENTABLE: NCDOT STRUCTURES DEFAULT PEN.tbl  
 USER: dcorfer DATE: 4/9/2018 TIME: 3:20:30 PM  
 FILE: ... \CAD\112.04737.SMU.B103.dgn



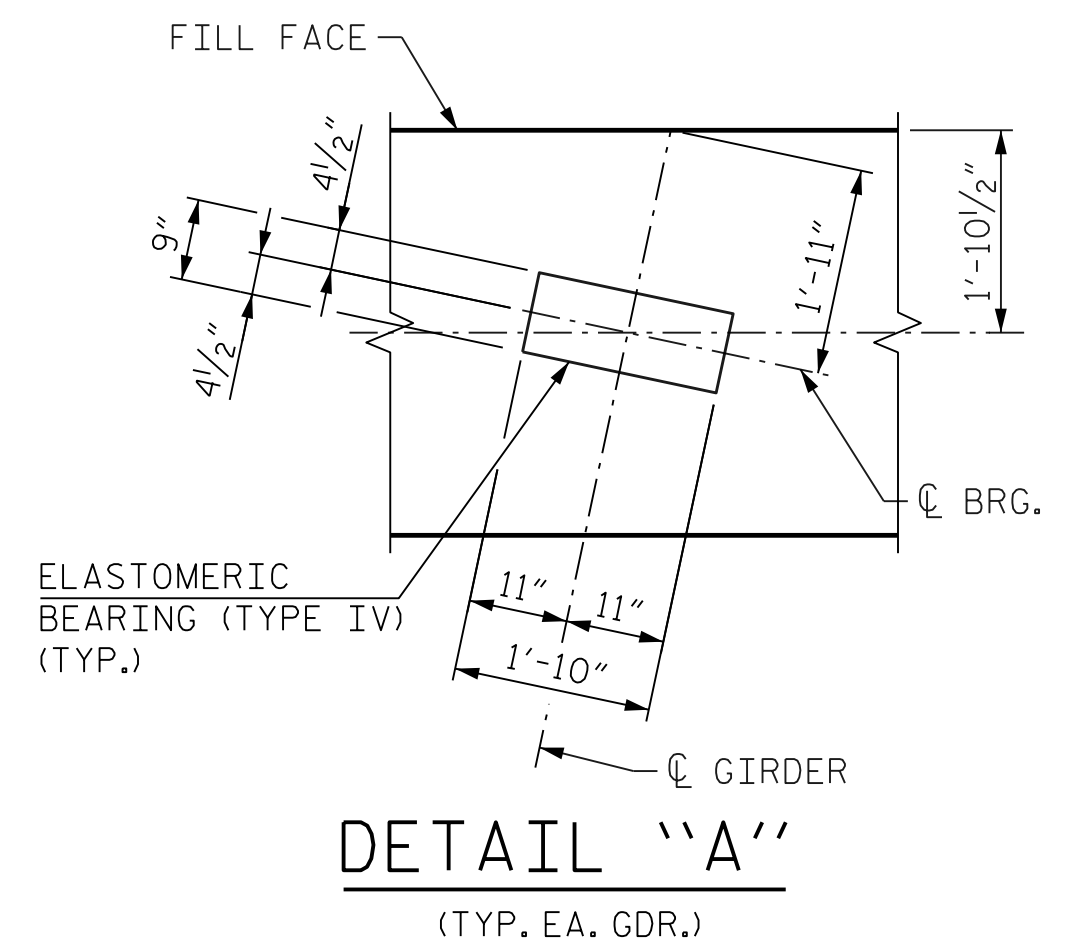


**PARTIAL PLAN**



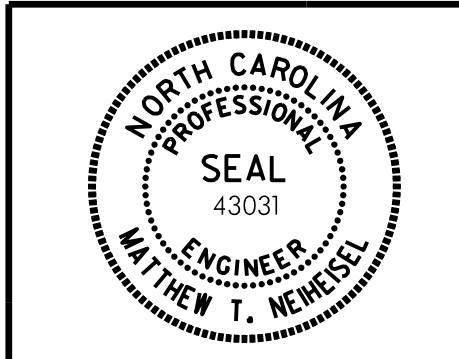
**PARTIAL ELEVATION**

**NOTES:**  
 THE TOP SURFACE OF THE END BENT CAP AT THE CONSTRUCTION JOINT WITH THE SUPERSTRUCTURE, EXCLUDING THE AREA UNDER THE BEARINGS, SHALL BE RAKED TO A DEPTH OF 1/4".  
 FOR PILE SPLICE DETAILS AND TEMPORARY DRAINAGE DETAILS, SEE SHEET 4 OF 4.  
 FOR SECTION A-A, B-B, AND SECTION C-C, SEE SHEET 4 OF 4.



**DETAIL "A"**  
(TYP. EA. GDR.)

PROJECT NO. U-4734  
 FORSYTH COUNTY  
 STATION: 38+35.00 -L-  
 SHEET 1 OF 4



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**SUBSTRUCTURE**  
 END BENT 2  
 PARTIAL  
 PLAN AND ELEVATION

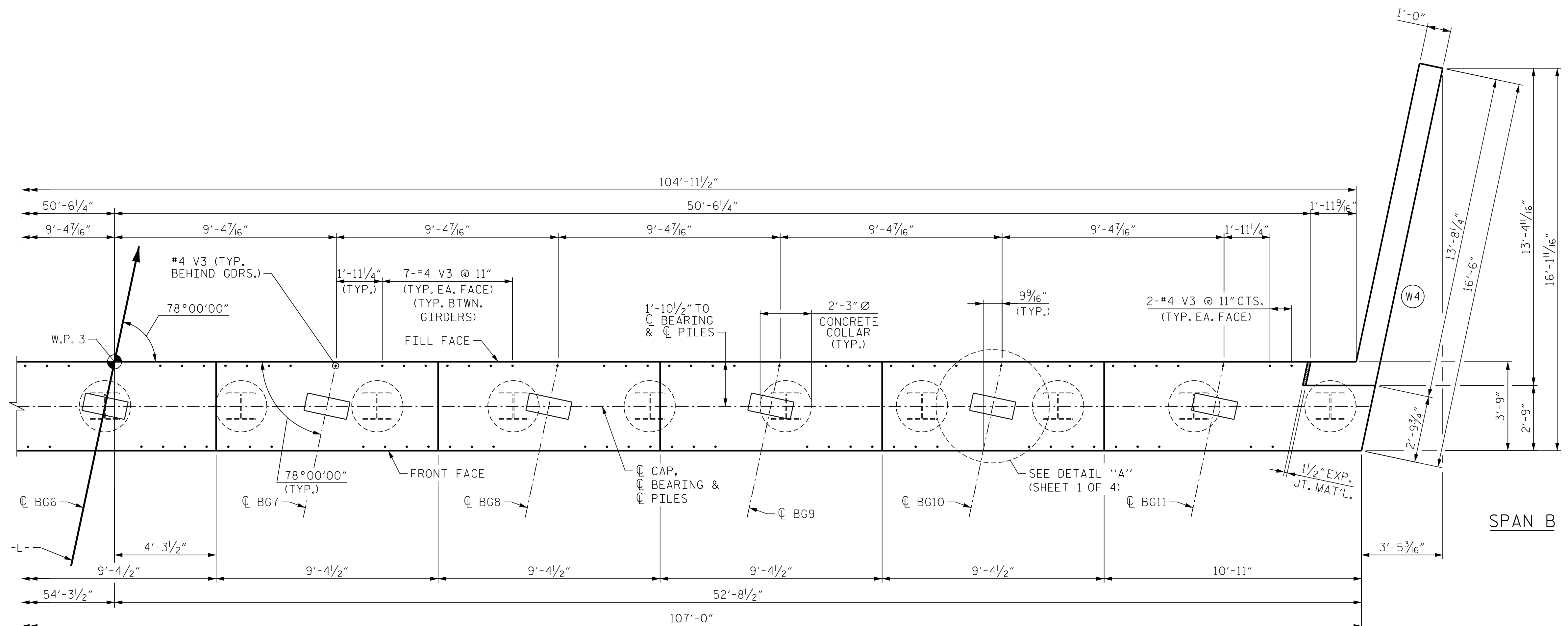
DRAWN BY: D. H. CARTER DATE: APR 2018  
 CHECKED BY: M. T. NEIHEISEL DATE: APR 2018  
 DESIGN ENGINEER OF RECORD: M. T. NEIHEISEL DATE: APR 2018

- (A) 4-#5 S1 & #5 S3 @ 8" CTS.
- (B) 3-#5 S2 & #5 S3 @ 8" CTS.

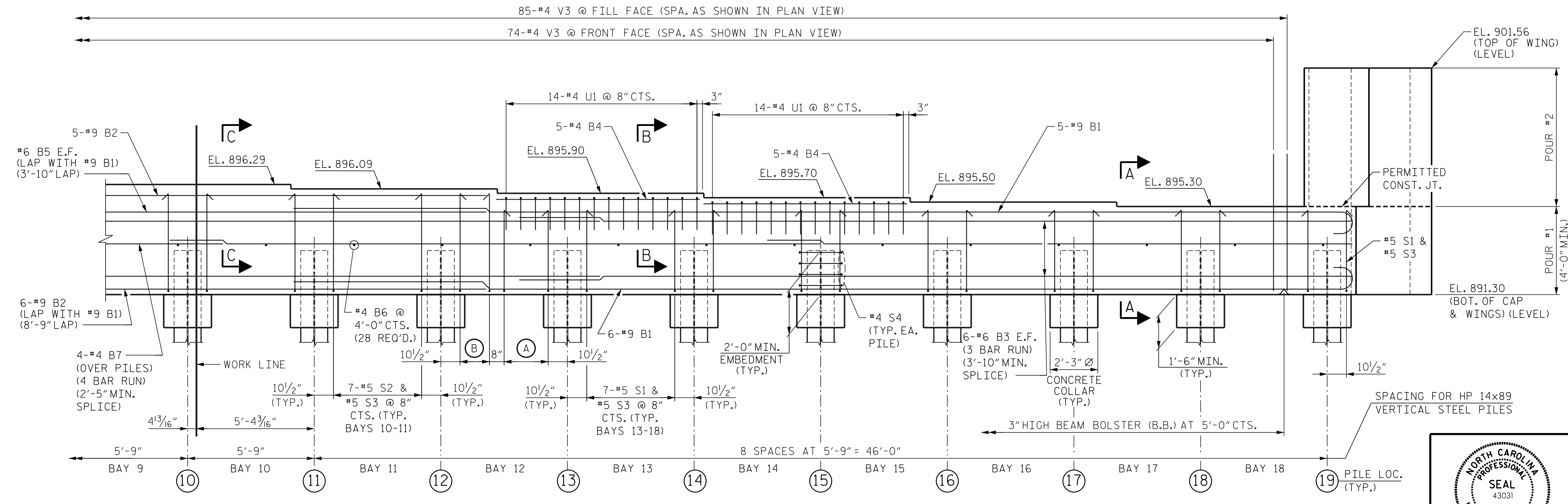
**HDR** HDR Engineering, Inc. of the Carolinas  
 555 Fayetteville St., Suite 900 Raleigh, N.C. 27601  
 N.C.B.E.L.S. License Number: F-0116

REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	S-35	
1			3			TOTAL SHEETS 42	
2			4				

PLOT DRIVER: NCDOT STRUCTURES DEFAULT PLOTTER.PH  
 USER: dcarter DATE: 4/9/2018 TIME: 3:20:32 PM  
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**PARTIAL PLAN**

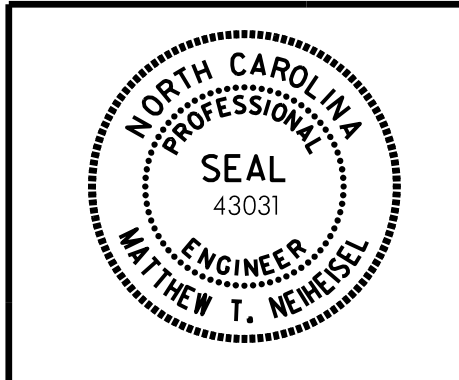


**PARTIAL ELEVATION**

E.F. = EACH FACE

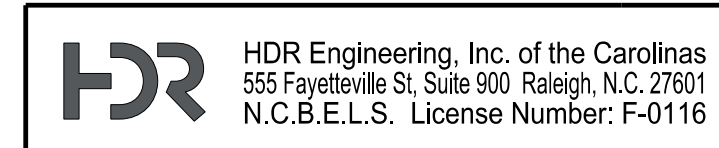
- (A) 4-#5 S1 & #5 S3 @ 8" CTS.
- (B) 3-#5 S2 & #5 S3 @ 8" CTS.

PROJECT NO. U-4734  
 FORSYTH COUNTY  
 STATION: 38+35.00 -L-  
 SHEET 2 OF 4



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**SUBSTRUCTURE**  
 END BENT 2  
 PARTIAL  
 PLAN AND ELEVATION

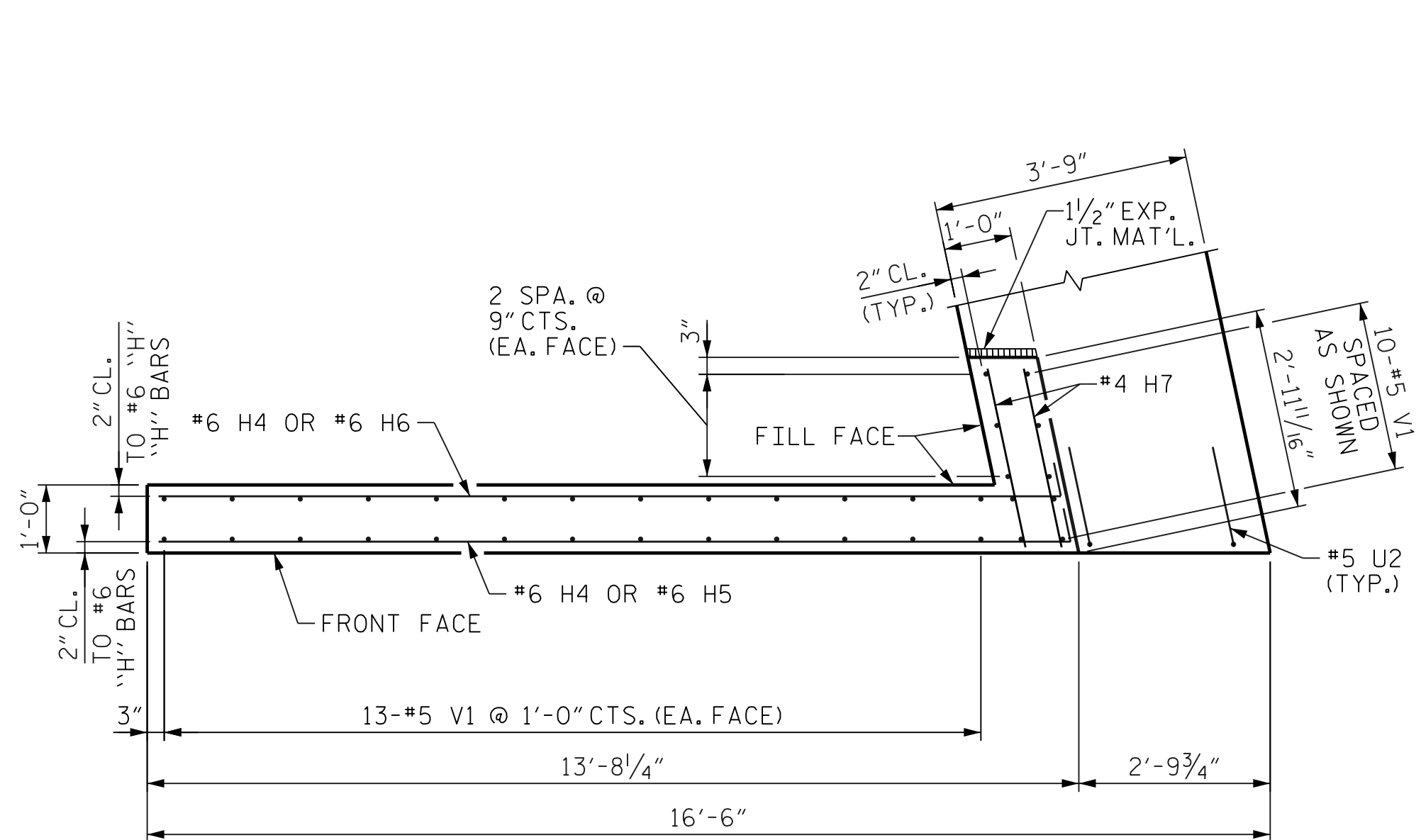
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NO.	BY:	DATE:	NO.	BY:	DATE:	S-36
1			3			TOTAL SHEETS 42
2			4			



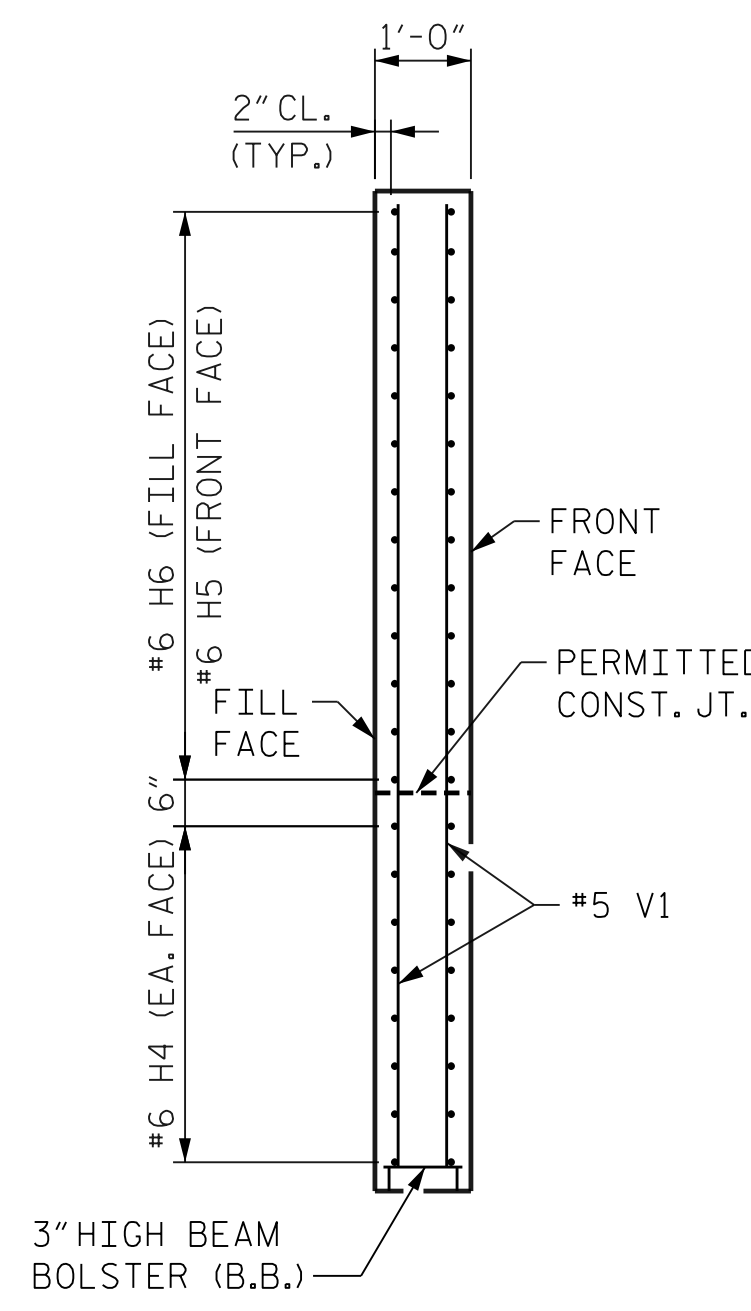
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 USER: dcarter  
 DATE: 4/9/2018  
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 TIME: 3:20:34 PM

DRAWN BY: D. H. CARTER DATE: APR 2018  
 CHECKED BY: M. T. NEIHEISEL DATE: APR 2018  
 DESIGN ENGINEER OF RECORD: M. T. NEIHEISEL DATE: APR 2018

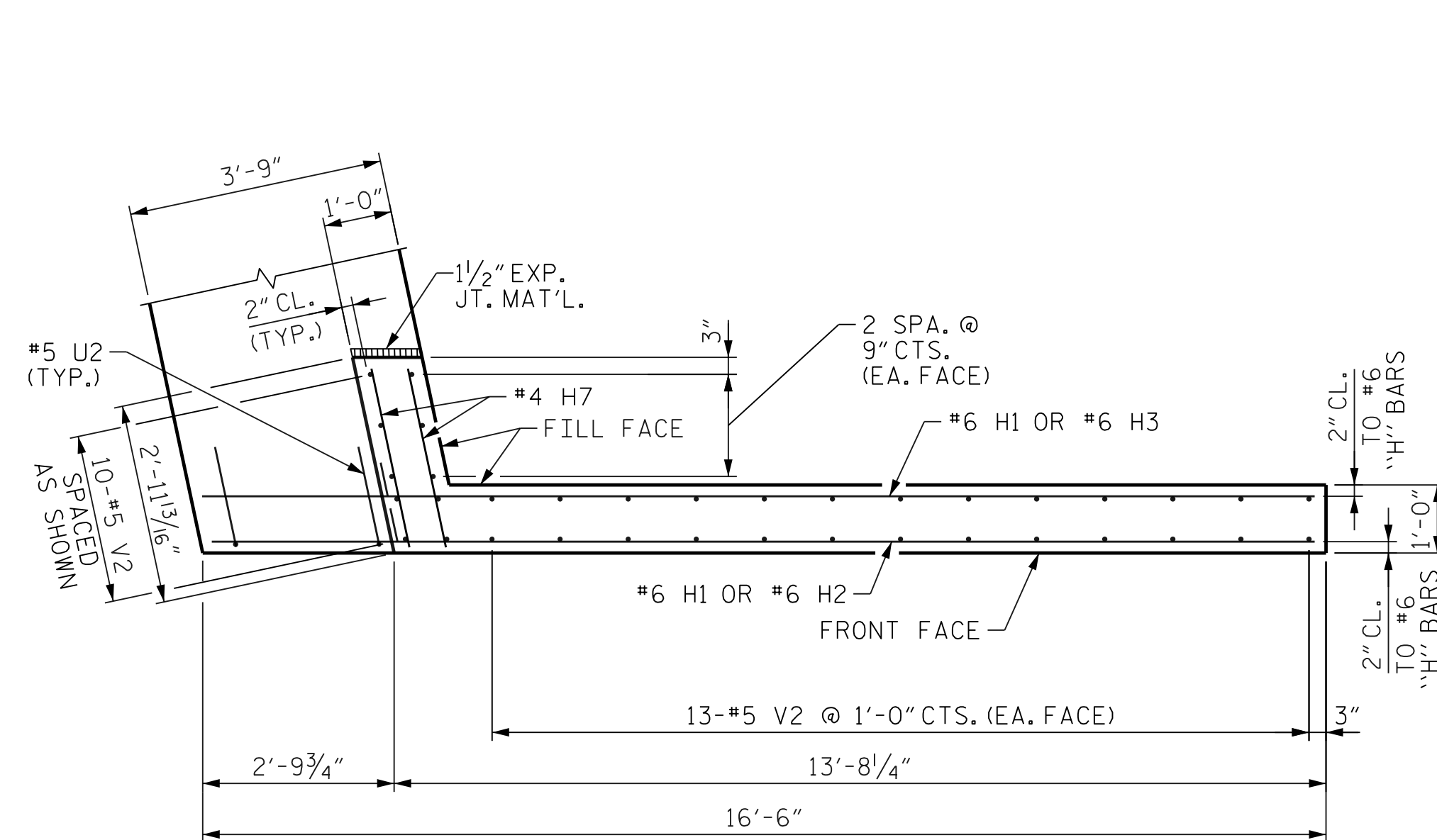




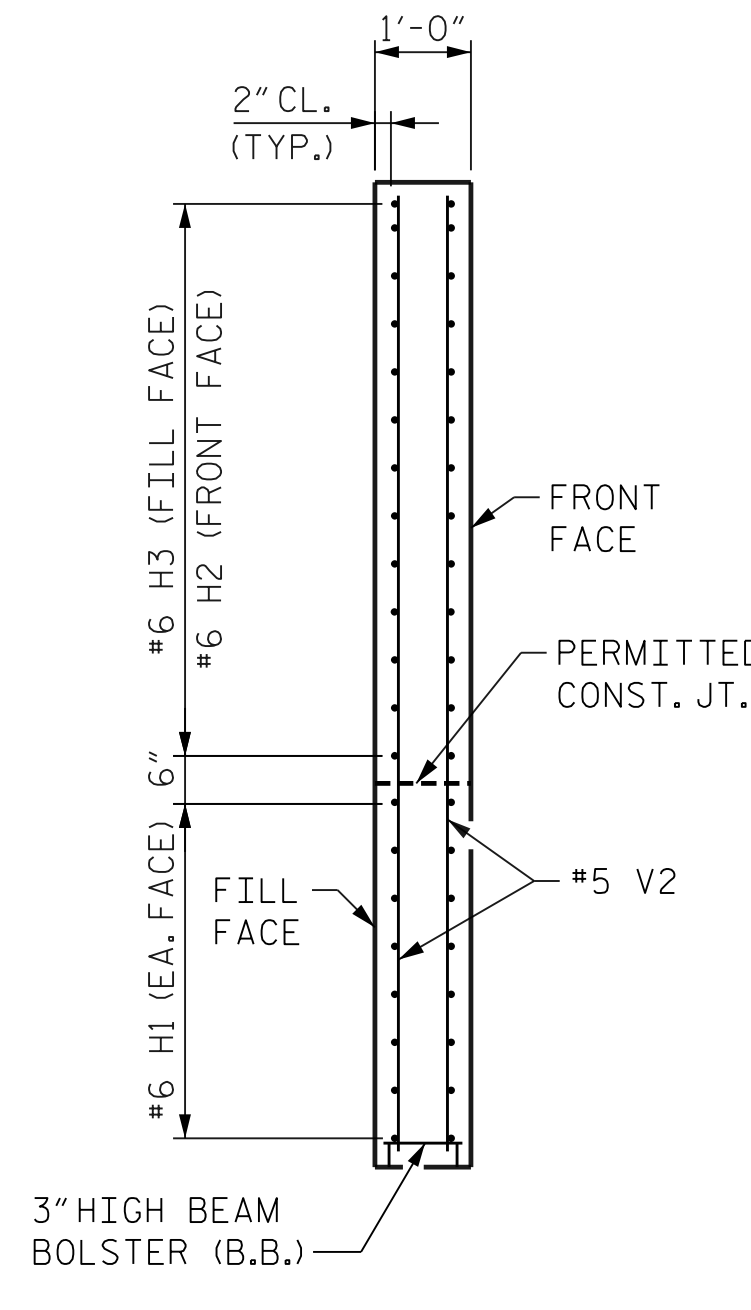
PLAN OF WING (W3)



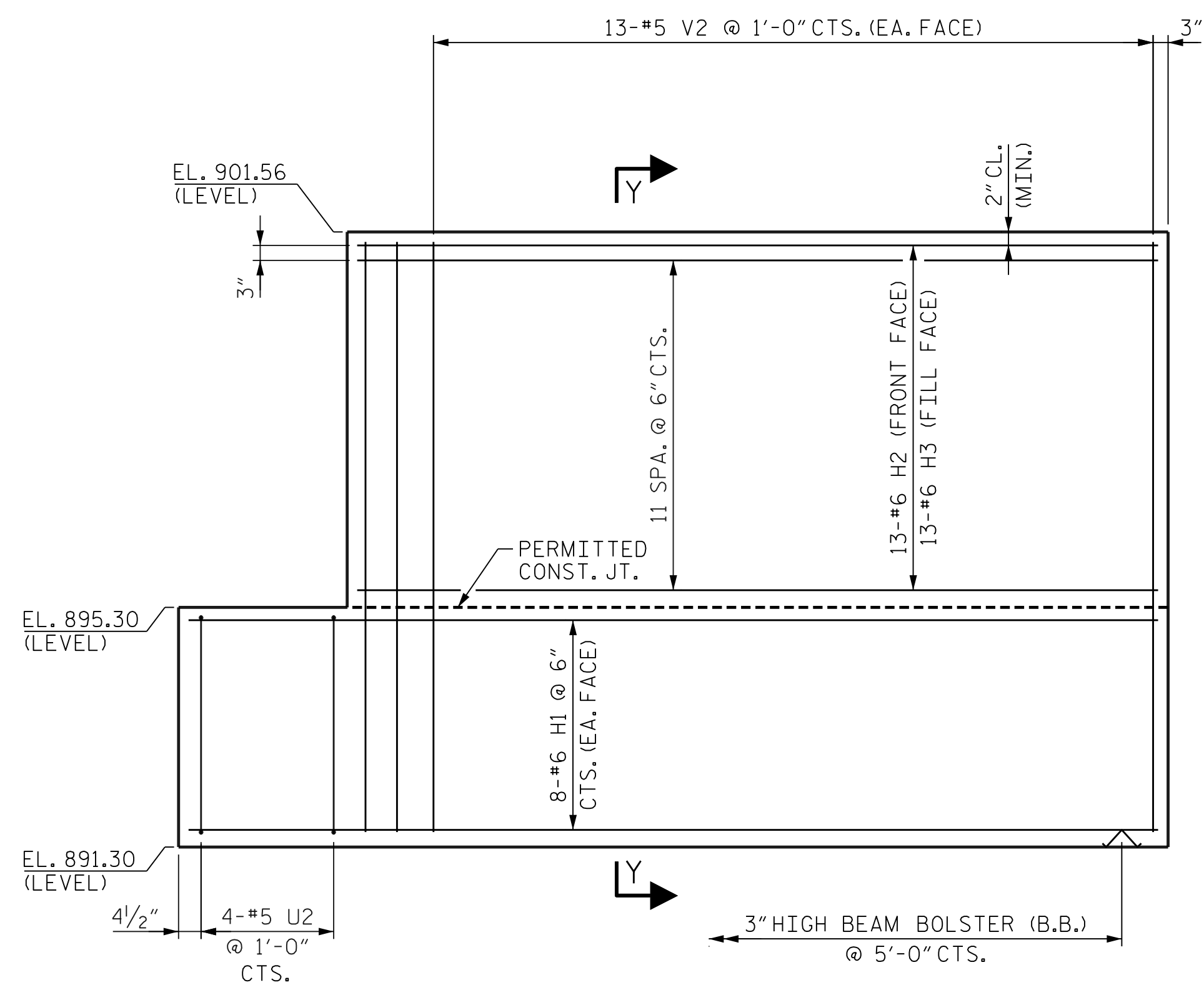
SECTION X-X



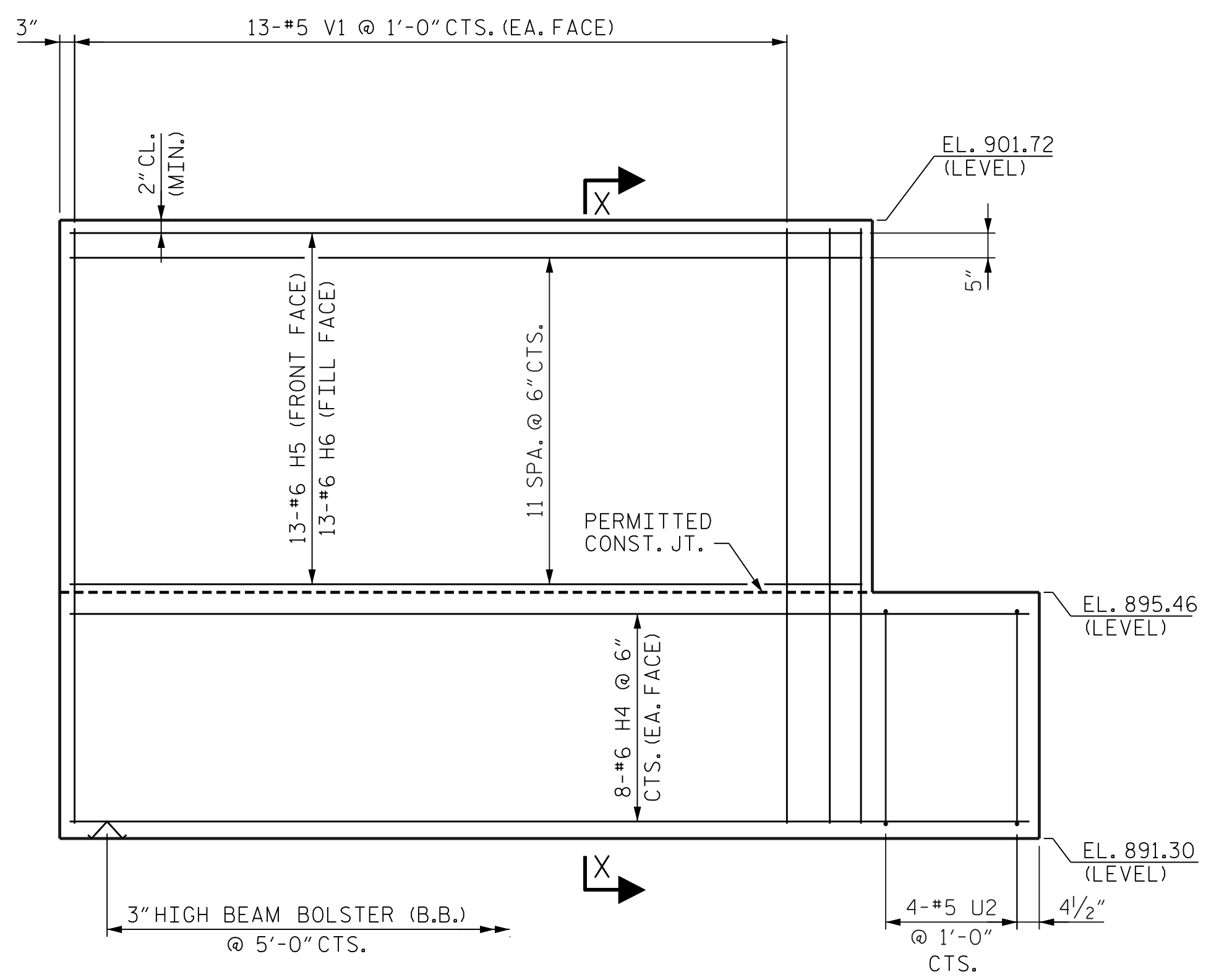
PLAN OF WING (W4)



SECTION Y-Y

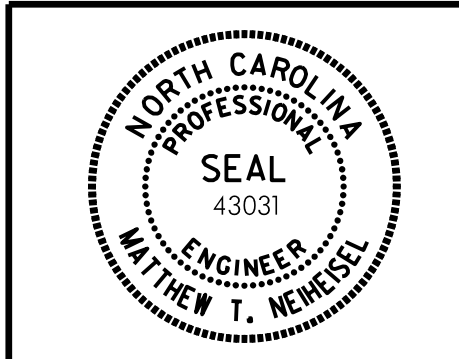


ELEVATION OF WING (W4)



ELEVATION OF WING (W3)

PROJECT NO. U-4734  
 FORSYTH COUNTY  
 STATION: 38+35.00 -L-  
 SHEET 3 OF 4



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**SUBSTRUCTURE**

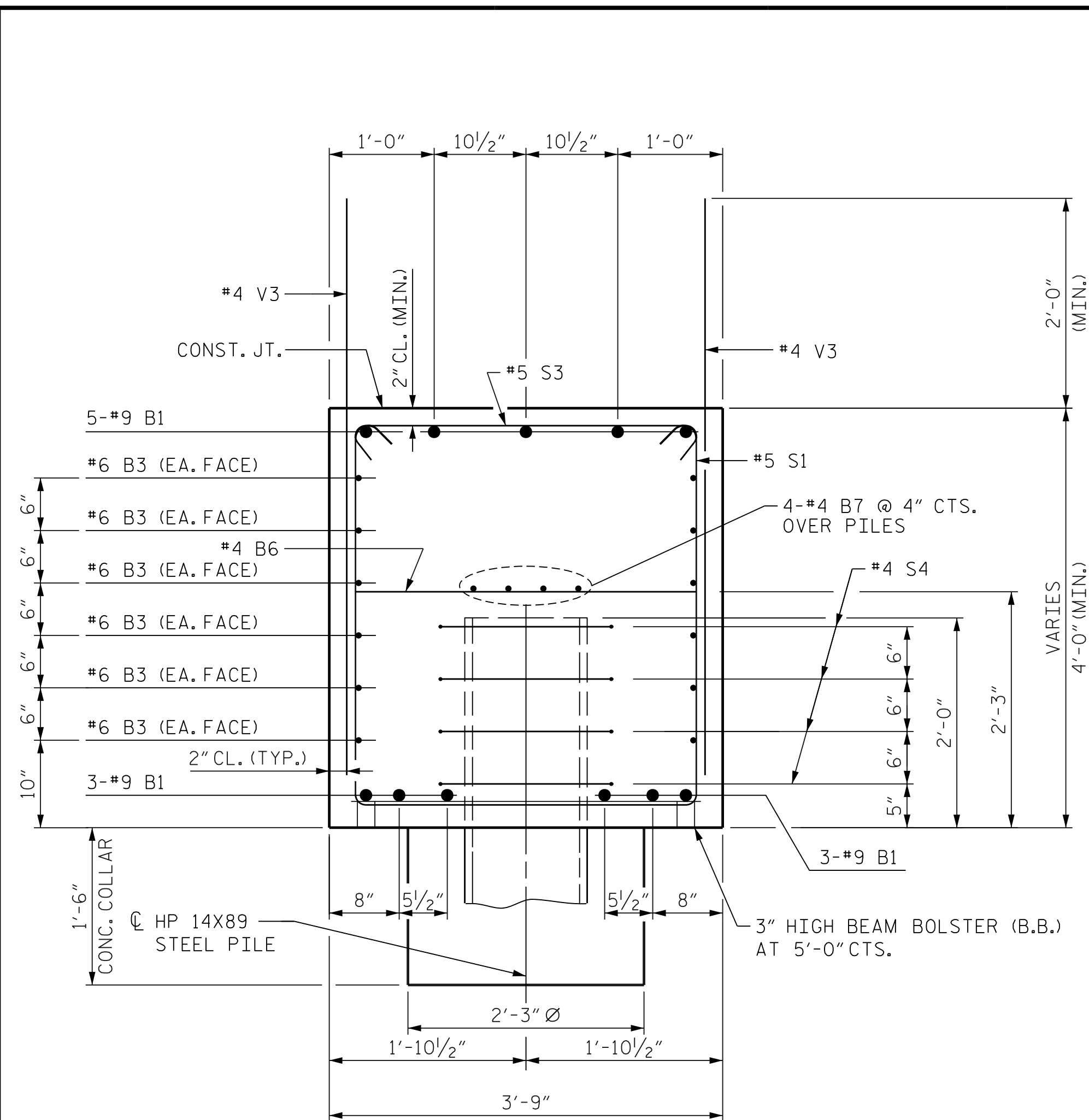
END BENT 2  
 WING WALL DETAILS

DRAWN BY: D. H. CARTER DATE: APR 2018  
 CHECKED BY: M. T. NEIHEISEL DATE: APR 2018  
 DESIGN ENGINEER OF RECORD: M. T. NEIHEISEL DATE: APR 2018

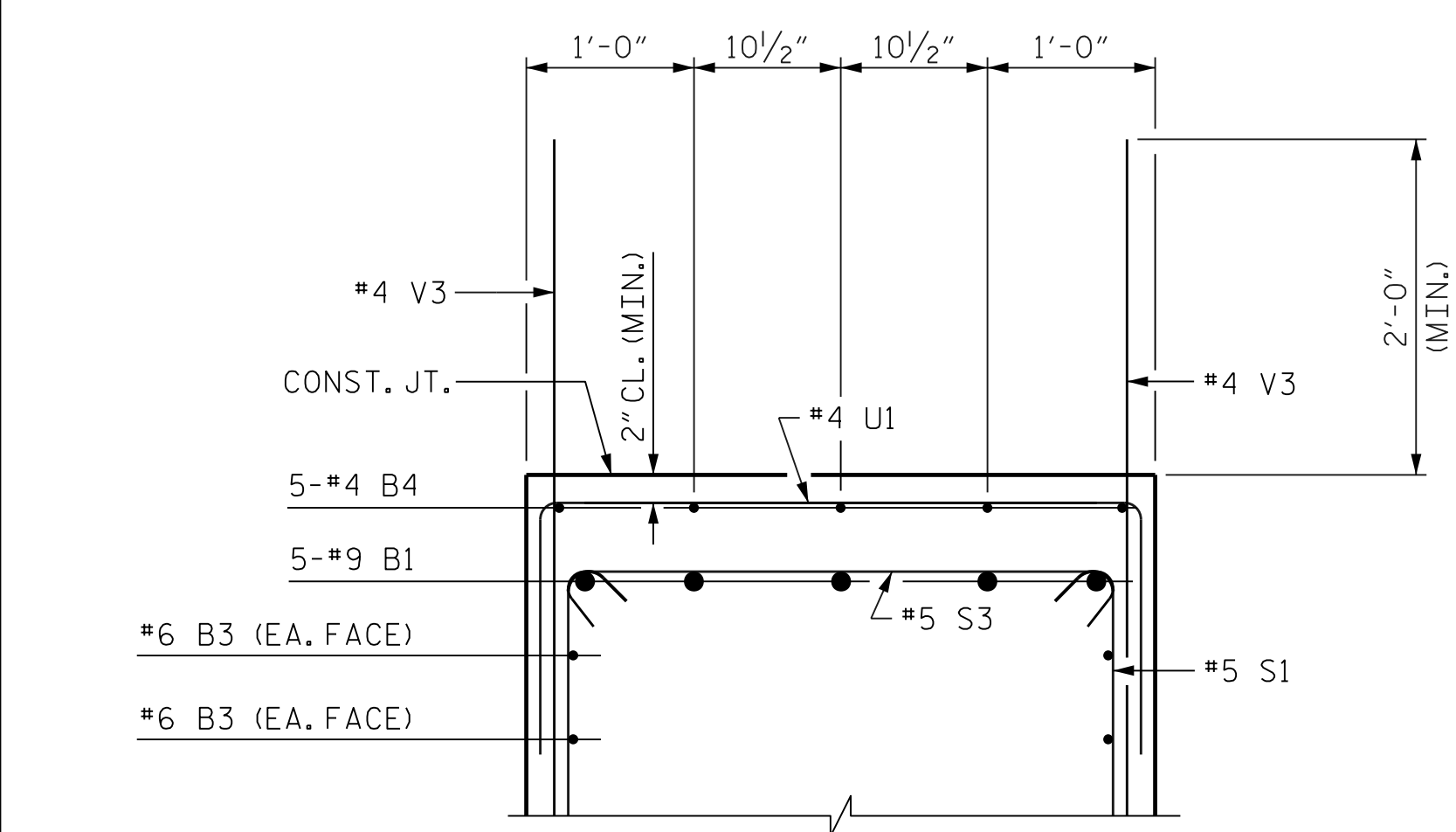
HDR Engineering, Inc. of the Carolinas  
 555 Fayetteville St. Suite 900 Raleigh, N.C. 27601  
 N.C.B.E.L.S. License Number: F-0116

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-37
1			3			TOTAL SHEETS 42
2			4			

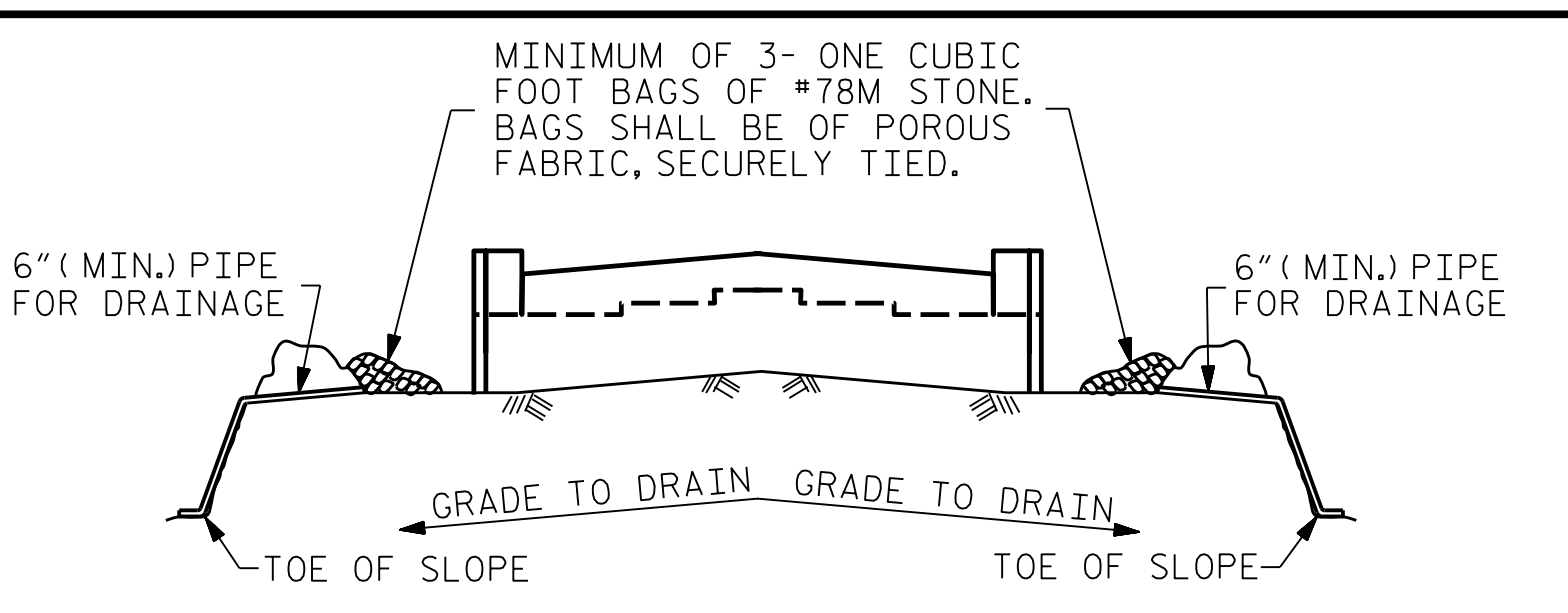
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SECTION A-A



SECTION B-B

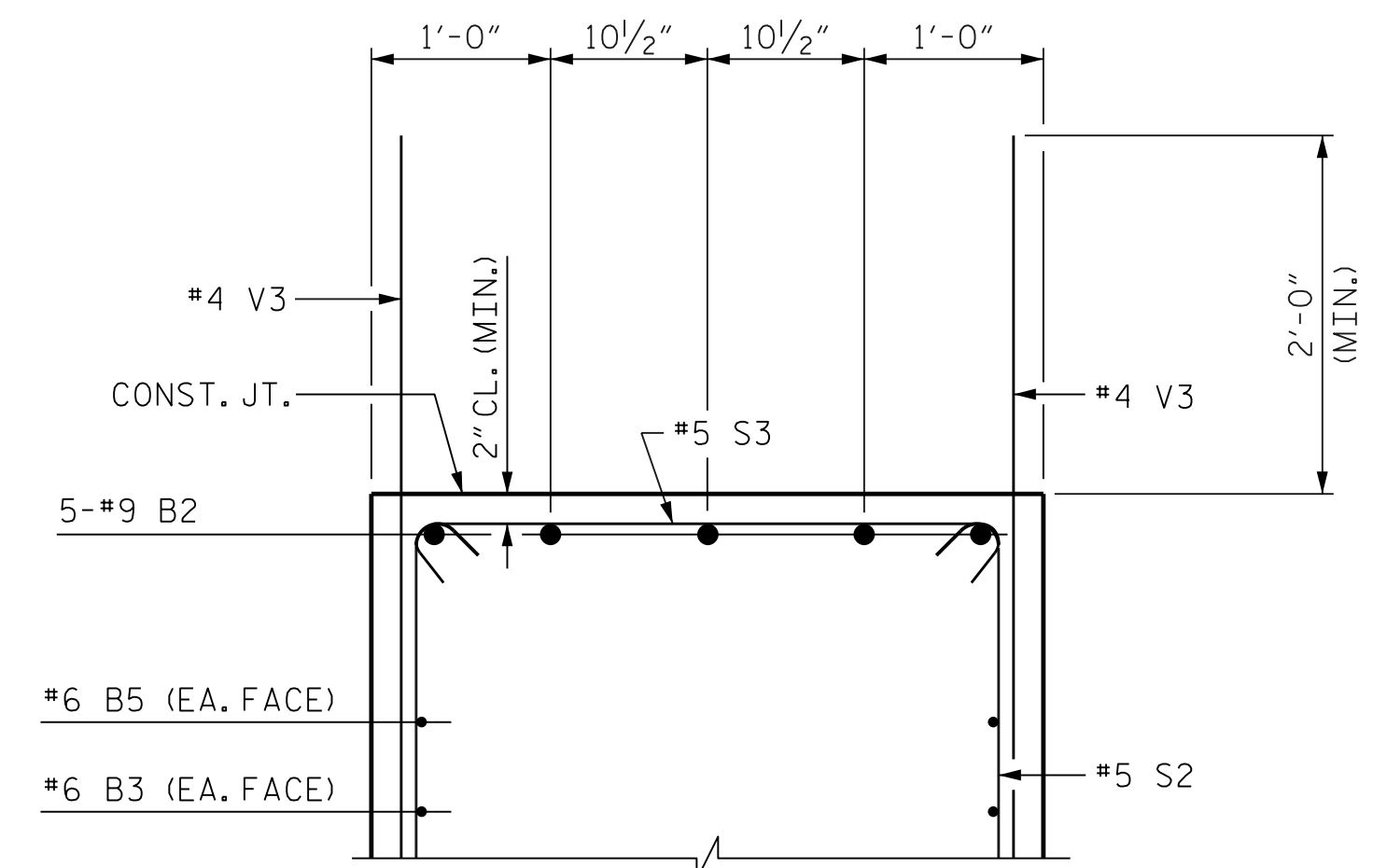


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

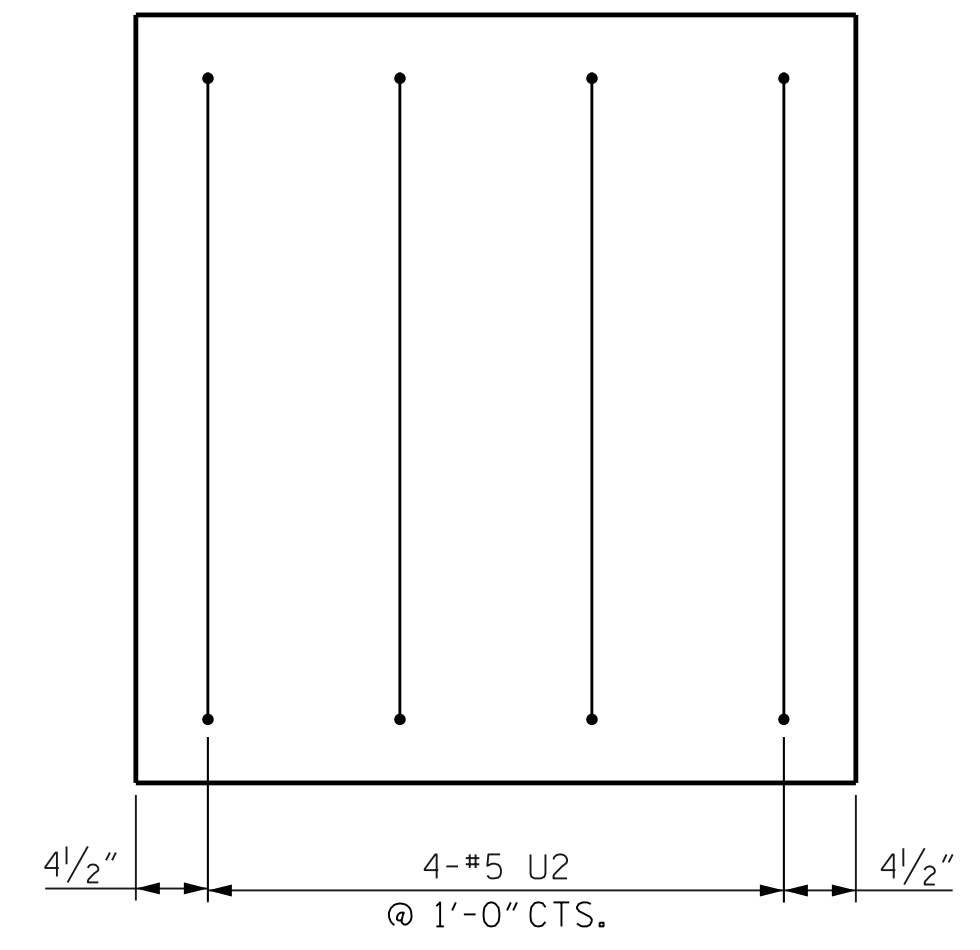
BAGGED STONE SHALL REMAIN IN PLACE UNTIL THE ENGINEER DIRECTS THAT IT BE REMOVED. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF SILT ACCUMULATIONS AT BAGGED STONE WHEN SO DIRECTED BY THE ENGINEER. BAGS SHALL BE REMOVED AND REPLACED WHENEVER THE ENGINEER DETERMINES THAT THEY HAVE DETERIORATED AND LOST THEIR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

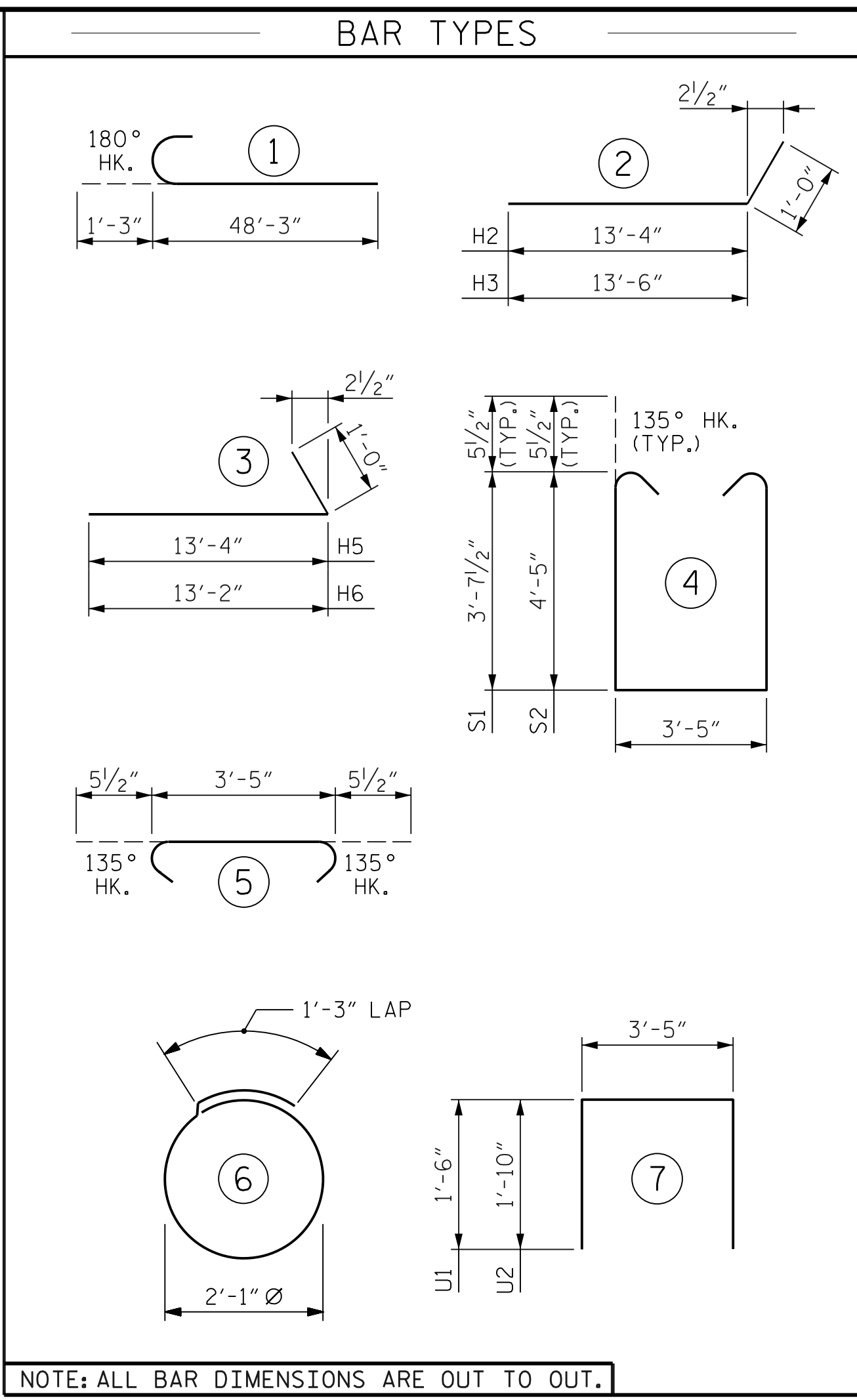
TEMPORARY DRAINAGE AT END BENT



SECTION C-C

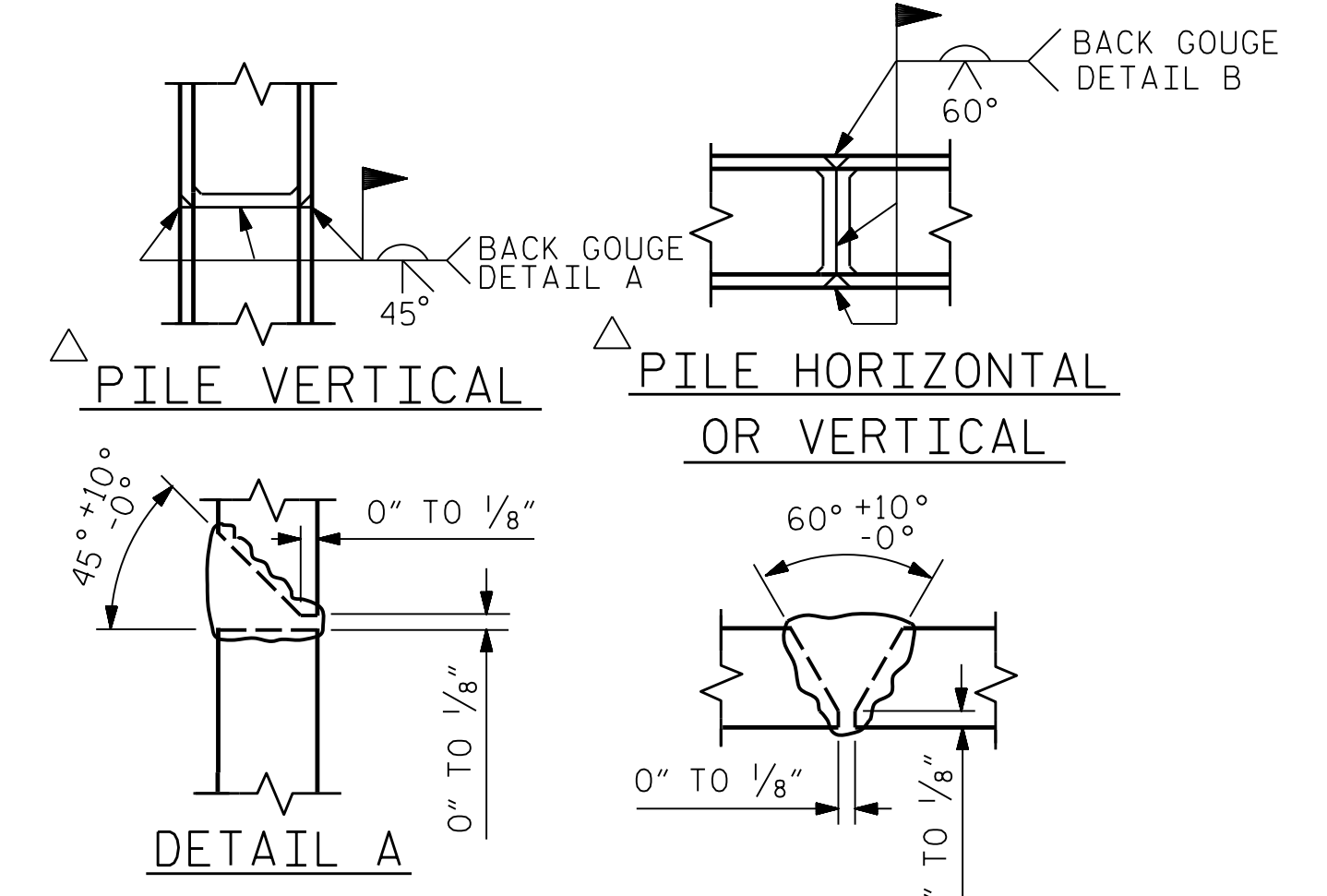


END VIEW



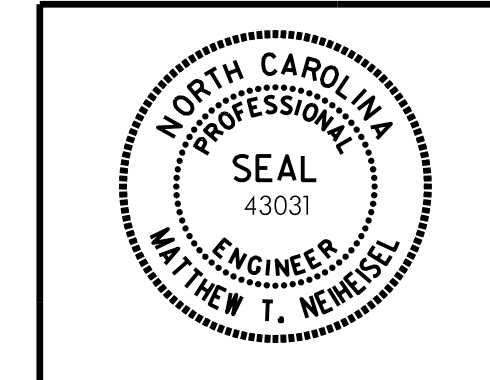
NOTE: ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL					
END BENT 2					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	22	#9	1	49'-6"	3703
B2	11	#9	STR	27'-9"	1038
B3	36	#6	STR	38'-2"	2064
B4	25	#4	STR	9'-0"	151
B5	2	#6	STR	18'-0"	55
B6	28	#4	STR	3'-5"	64
B7	16	#4	STR	28'-6"	305
H1	16	#6	STR	16'-2"	389
H2	13	#6	2	14'-4"	280
H3	13	#6	2	14'-6"	284
H4	16	#6	STR	16'-0"	385
H5	13	#6	3	14'-4"	280
H6	13	#6	3	14'-2"	277
H7	52	#4	STR	2'-4"	82
S1	94	#5	4	11'-7"	1136
S2	34	#5	4	13'-2"	467
S3	128	#5	5	4'-4"	579
S4	76	#4	6	7'-10"	398
U1	70	#4	7	6'-5"	301
U2	8	#5	7	7'-1"	60
V1	36	#5	STR	10'-0"	376
V2	36	#5	STR	9'-10"	370
V3	159	#4	STR	5'-9"	611
REINFORCING STEEL					13,655 LBS.
CLASS A CONCRETE					
POUR 1 (CAP, LOWER WINGS & COLLARS)					74.6 C.Y.
POUR 2 (UPPER WINGS)					7.2 C.Y.
TOTAL CONCRETE					81.8 C.Y.
HP 14 x 89 STEEL PILES					
					NO. 19
					L.F. 1140
PILE DRIVING EQUIPMENT SETUP FOR HP 14 X 89 STEEL PILES					19 EA.



PILE SPLICE DETAILS

PROJECT NO. U-4734  
 FORSYTH COUNTY  
 STATION: 38+35.00 -L-  
 SHEET 4 OF 4



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 SUBSTRUCTURE  
 END BENT 2  
 MISCELLANEOUS DETAILS  
 AND BILL OF MATERIAL

DRAWN BY: D. H. CARTER DATE: APR 2018  
 CHECKED BY: M. T. NEIHEISEL DATE: APR 2018  
 DESIGN ENGINEER OF RECORD: M. T. NEIHEISEL DATE: APR 2018

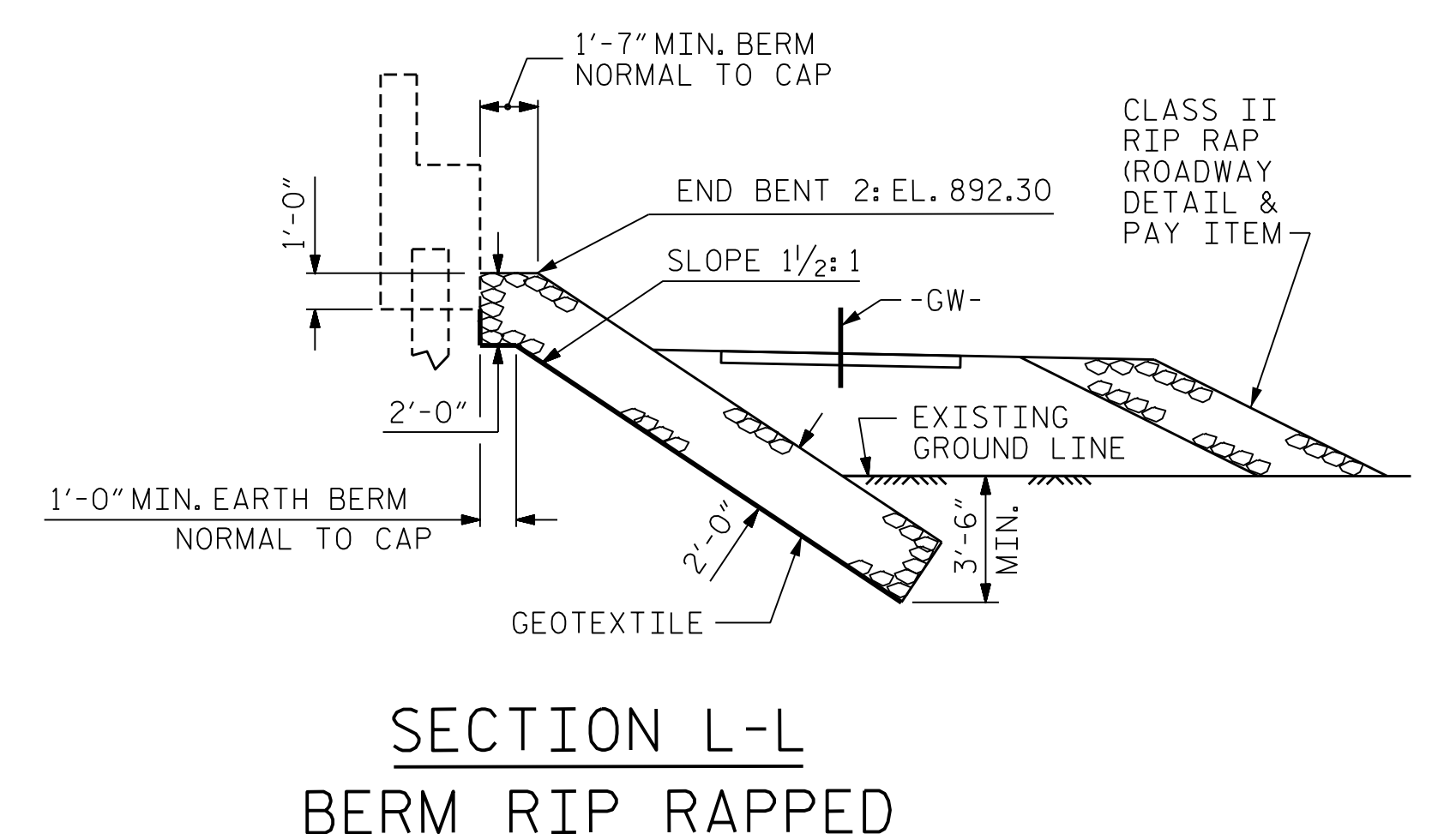
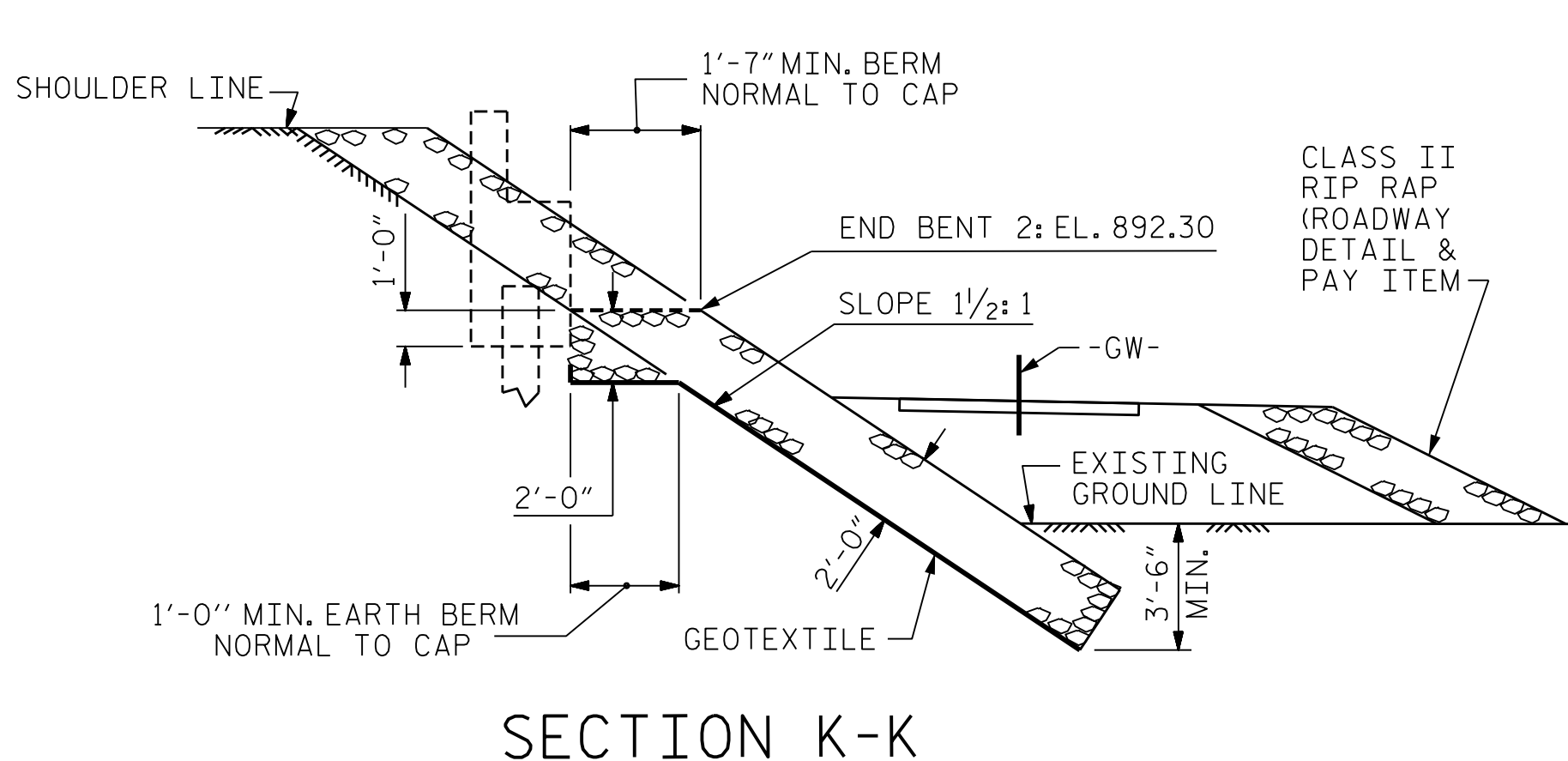
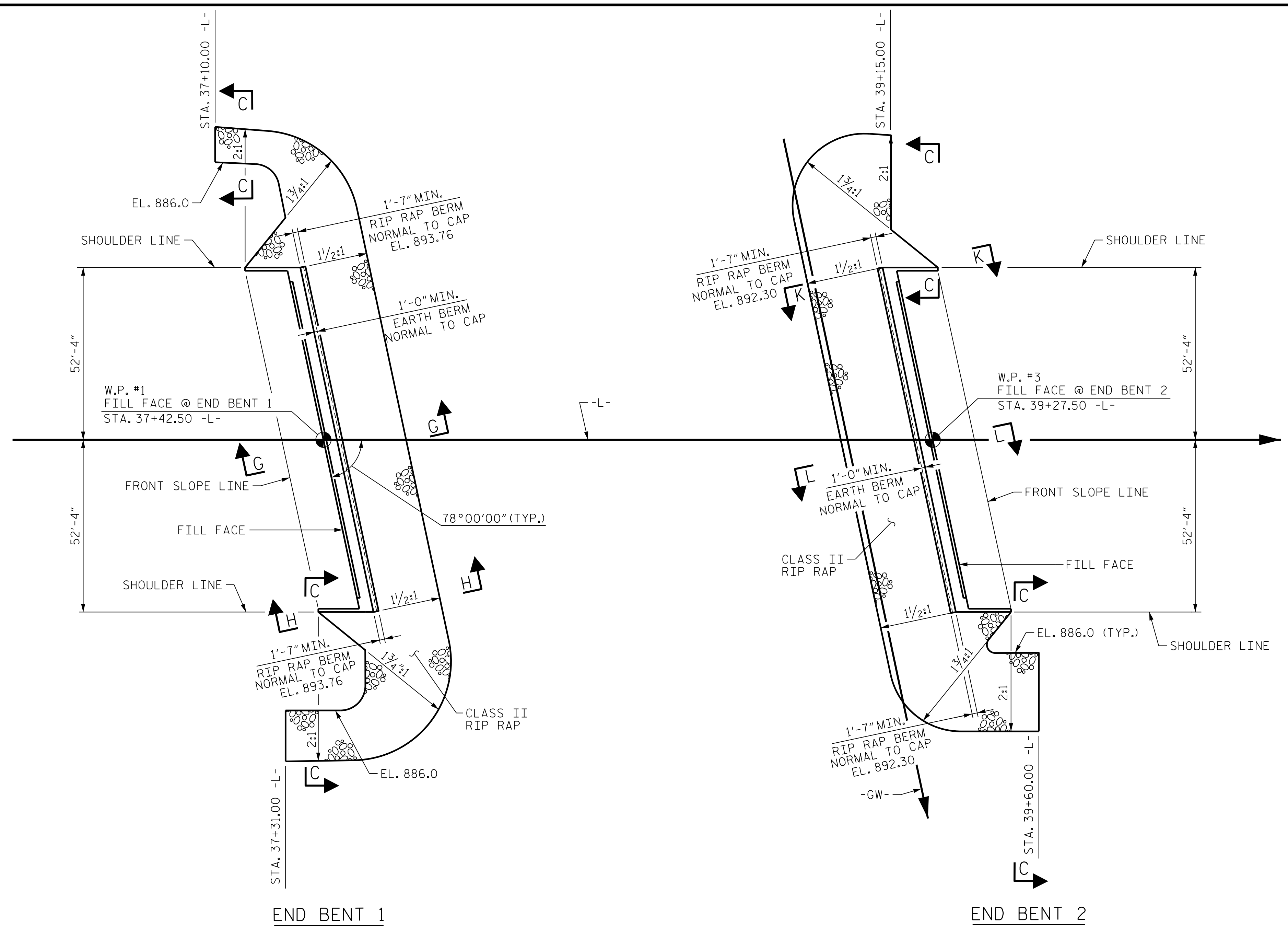
HDR Engineering, Inc. of the Carolinas  
 555 Fayetteville St. Suite 900 Raleigh, N.C. 27601  
 N.C.B.E.L.S. License Number: F-0116

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

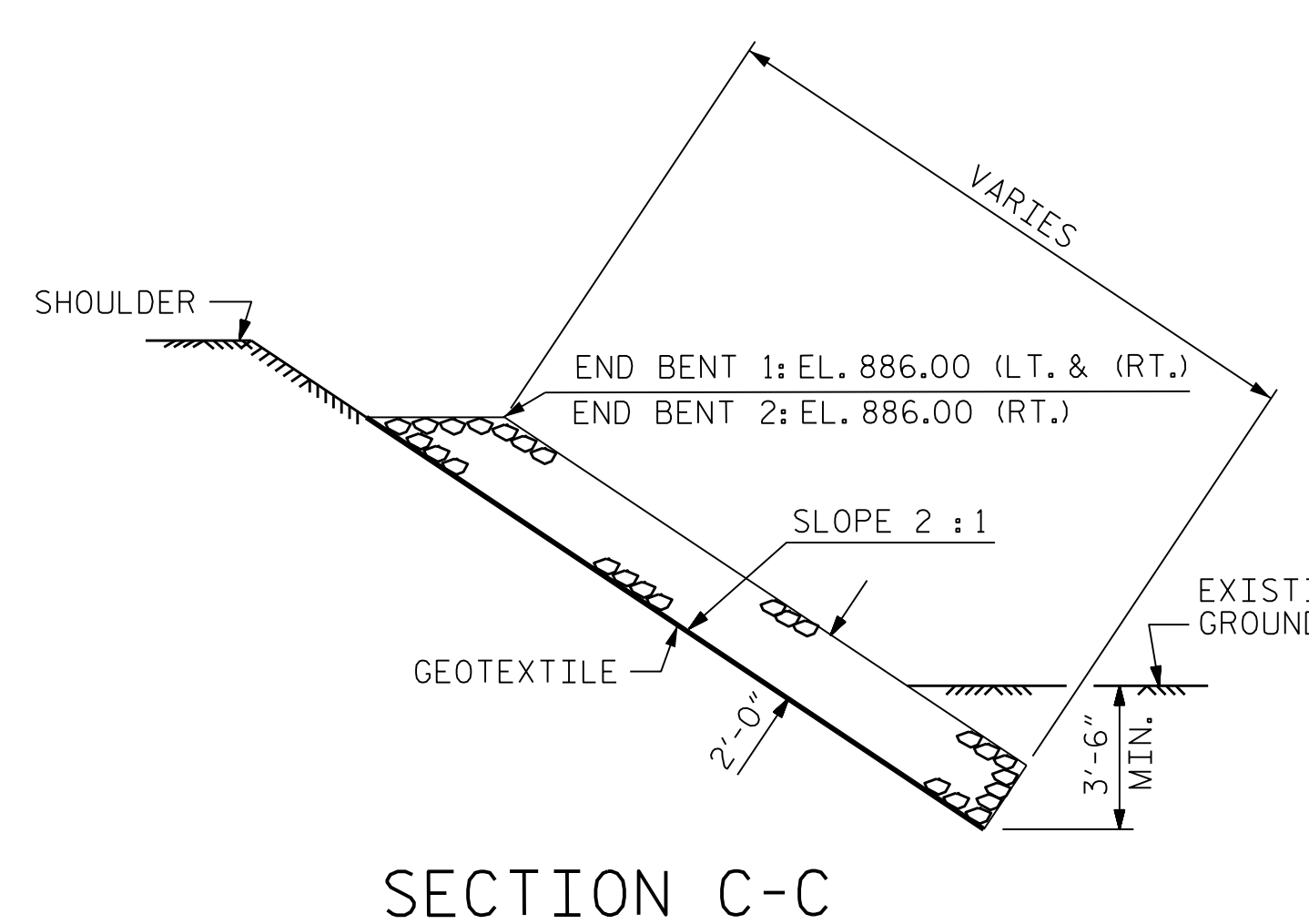
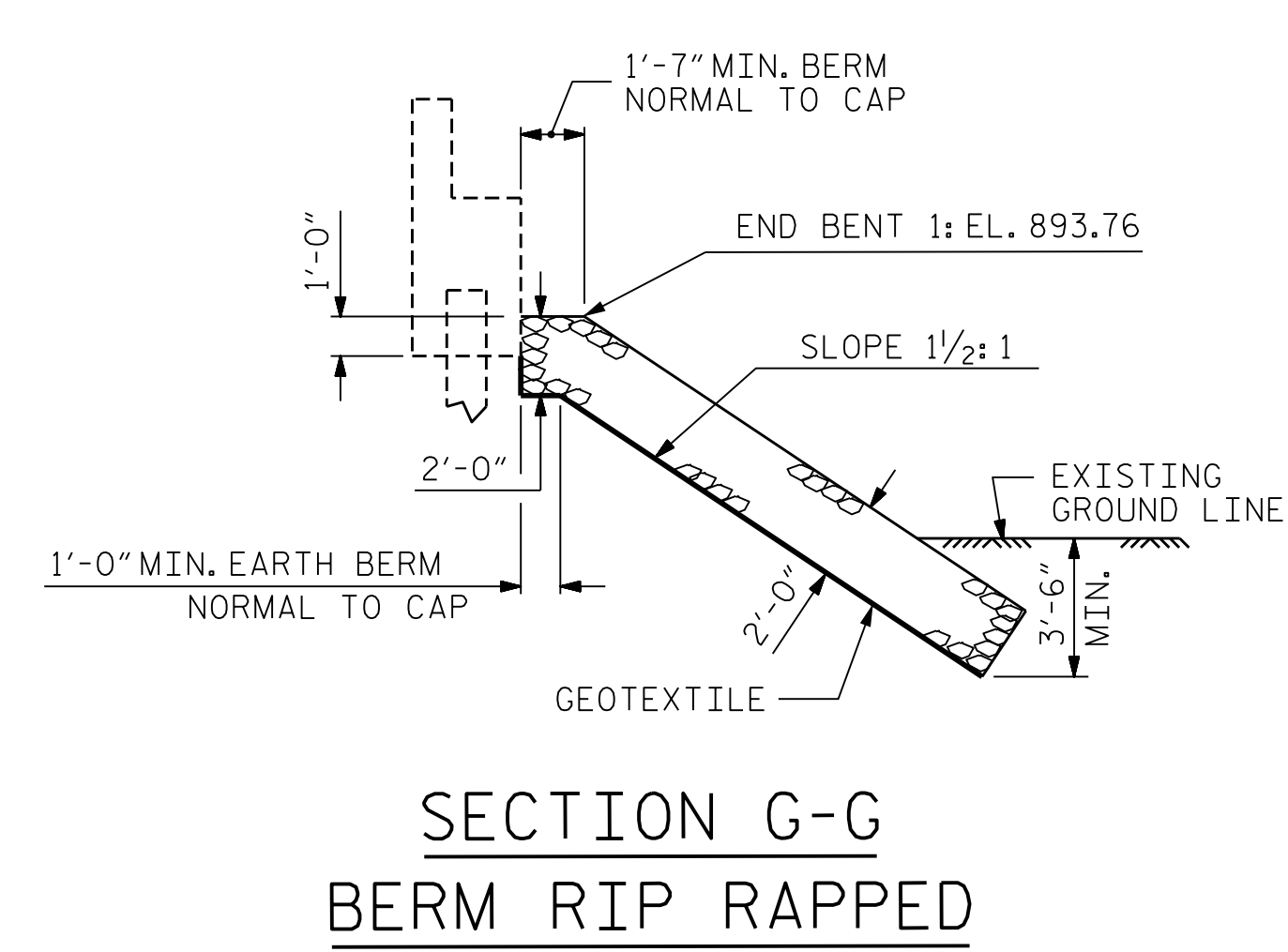
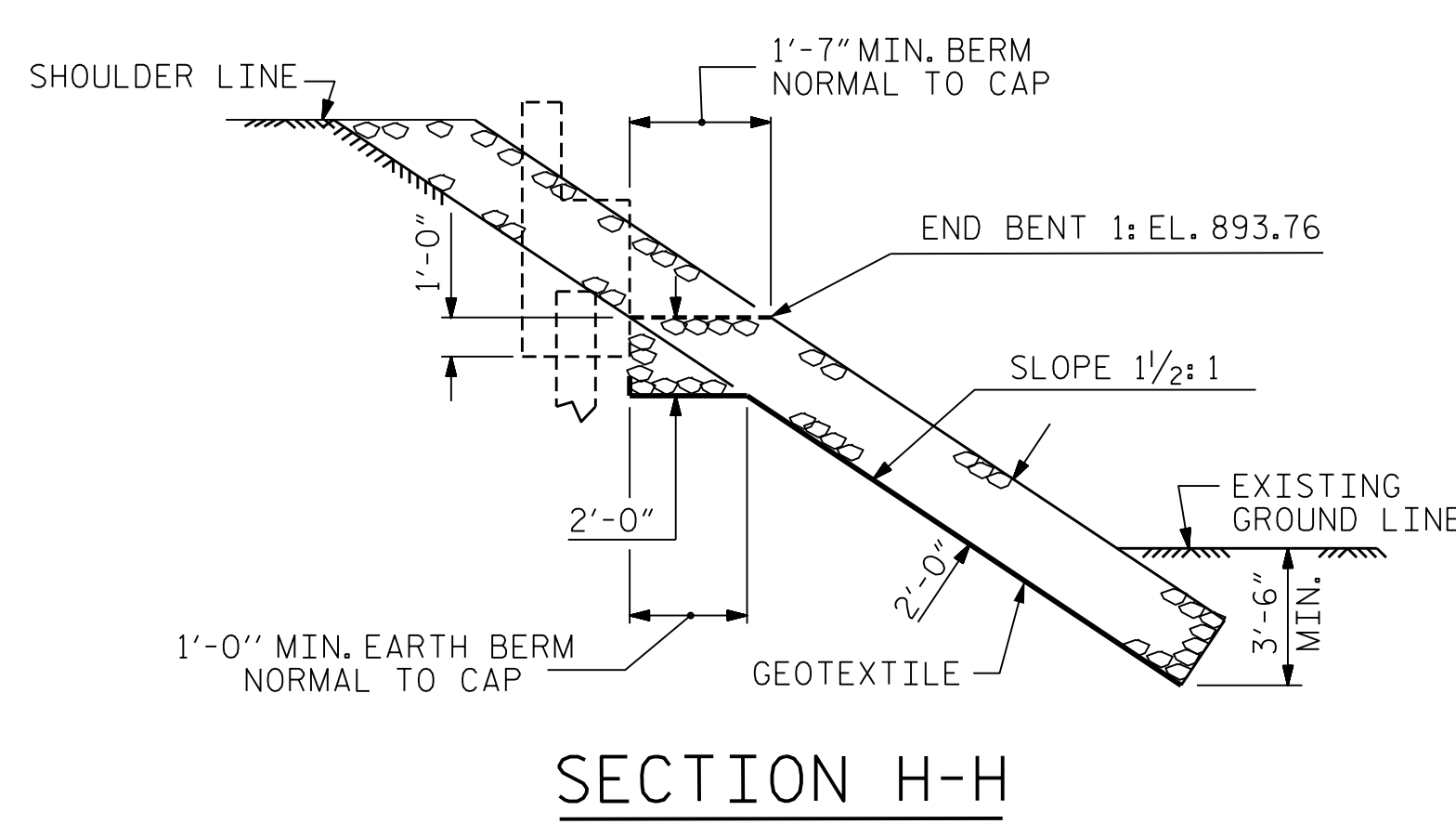
4/10/2018  
 DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PLOT DRIVER: NCDOT\_STRUCTURES\_DEFAULT\_PLOTTER.plt PENTABLE: NCDOT\_STRUCTURES\_DEFAULT\_PEN.tbl  
 USER: dcarter DATE: 4/9/2018 TIME: 3:20:39 PM  
 FILE: ... \ACAD\1193.04737.SMU.E204.dgn

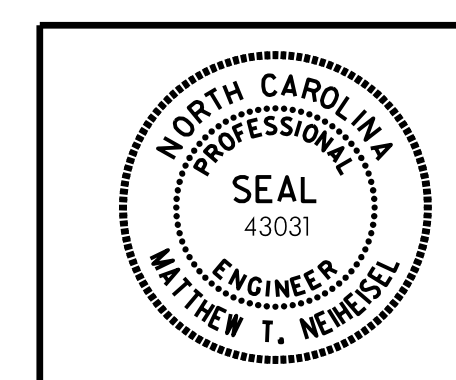




ESTIMATED QUANTITIES		
BRIDGE @ STA. 38+35.00 -L-	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE
	TONS	SQUARE YARDS
END BENT 1	656	728
END BENT 2	599	665



PROJECT NO. U-4734  
 FORSYTH COUNTY  
 STATION: 38+35.00 -L-



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**STANDARD  
RIP RAP DETAILS**

DRAWN BY: D. H. CARTER DATE: APR 2018  
 CHECKED BY: M. T. NEIHEISEL DATE: APR 2018  
 DESIGN ENGINEER OF RECORD: M. T. NEIHEISEL DATE: APR 2018

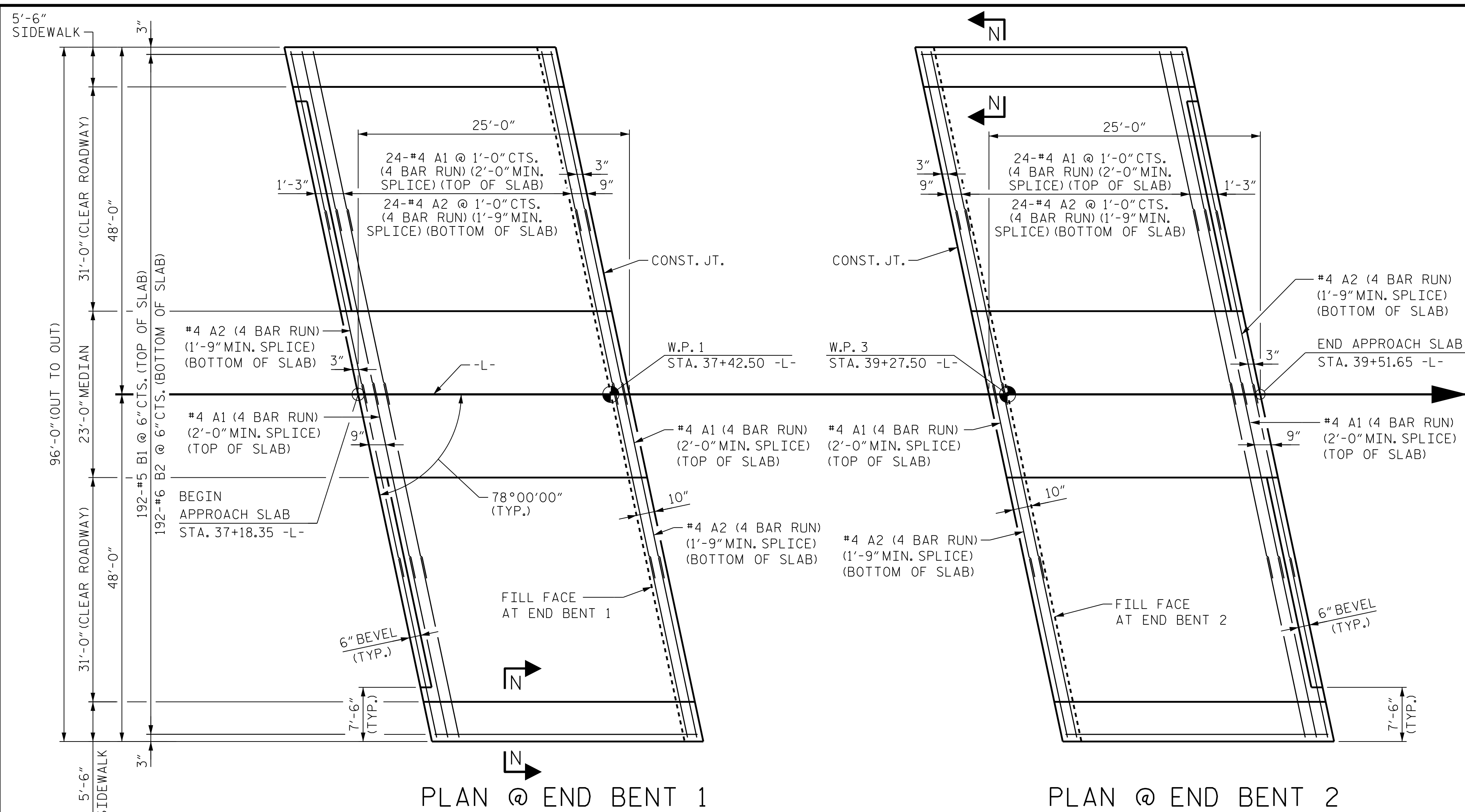
**HDR** HDR Engineering, Inc. of the Carolinas  
 555 Fayetteville St. Suite 900 Raleigh, N.C. 27601  
 N.C.B.E.L.S. License Number: F-0116

REVISIONS						SHEET NO. S-39
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 42
2			4			

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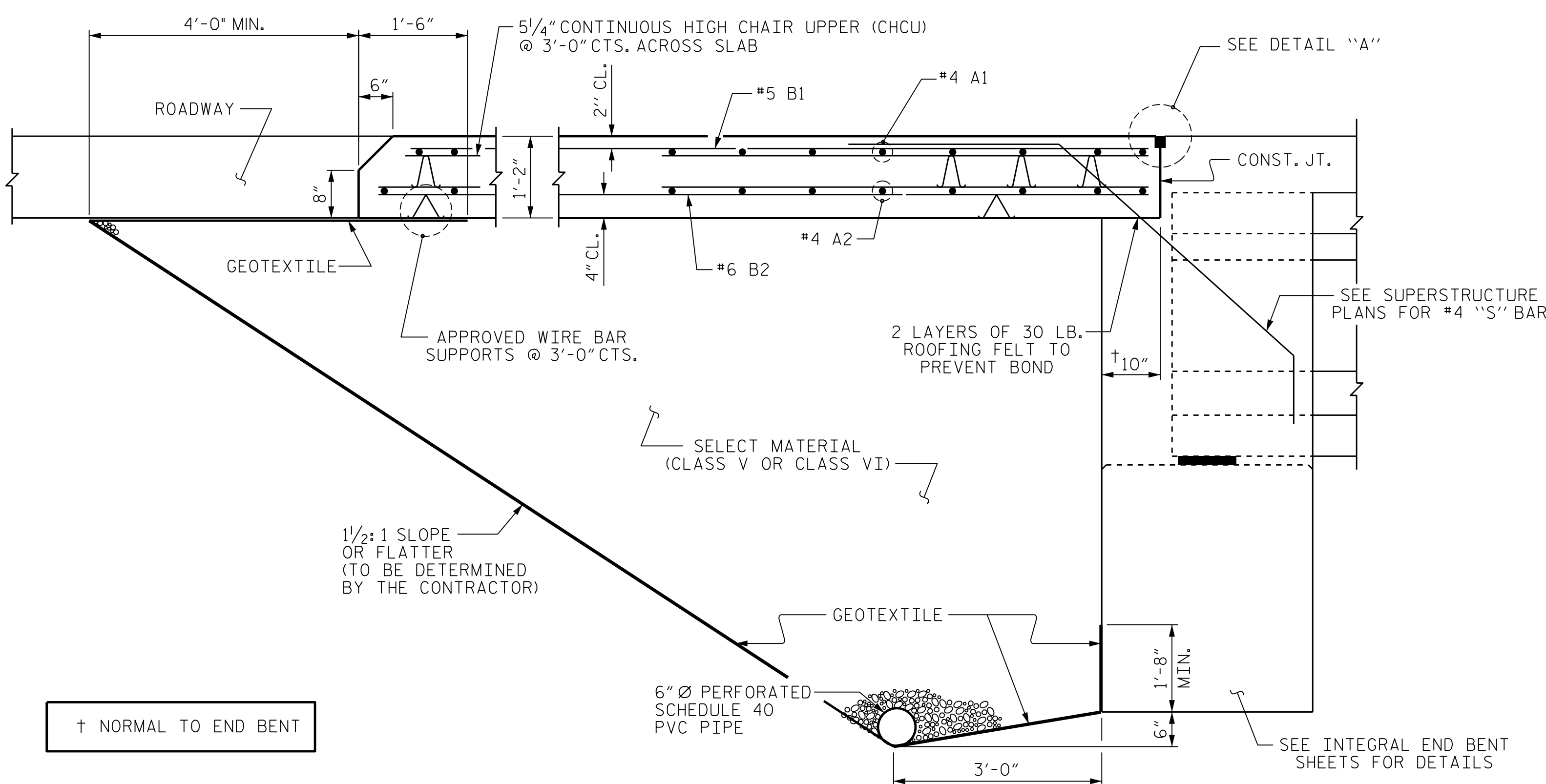




PLAN @ END BENT 1

PLAN @ END BENT 2

DIMENSIONS SHOWN ARE TYPICAL FOR BOTH APPROACH SLABS

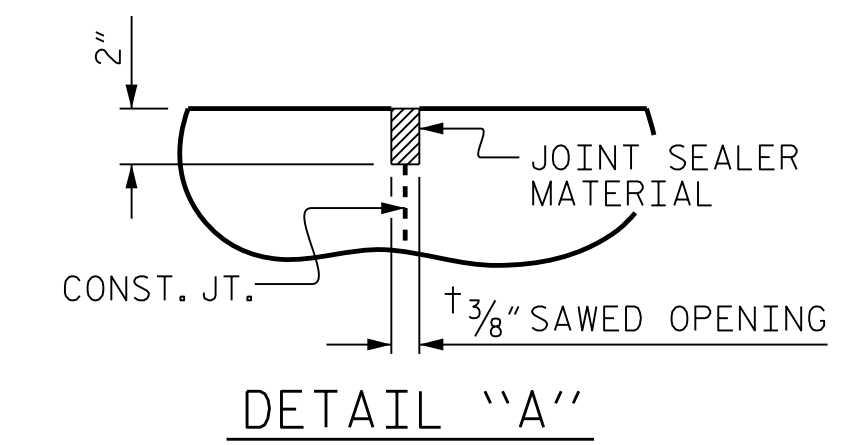


SECTION THRU SLAB

(TYPE I - STANDARD APPROACH FILL)

NOTES

- APPROACH SLAB SHALL NOT BE CONSTRUCTED PRIOR TO COMPLETION OF THE BRIDGE DECK.
- FOR BRIDGE APPROACH FILL INCLUDING GEOTEXTILE, 6" Ø DRAINAGE PIPE, AND SELECT MATERIAL, SEE ROADWAY PLANS.
- GEOTEXTILE SHALL BE TYPE 1 IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS SECTION 1056.
- SELECT MATERIAL BACKFILL (CLASS V OR CLASS VI) SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATIONS SECTION 1016.
- SELECT MATERIAL BACKFILL IS TO BE CONTINUOUS ALONG FILL FACE OF BACKWALL FROM OUTSIDE EDGE TO OUTSIDE EDGE OF APPROACH SLAB.
- FOR THE 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.
- THE JOINT OPENING AT THE APPROACH SLAB/DECK INTERFACE SHALL BE SAWED NO MORE THAN 12 HOURS AFTER THE APPROACH SLAB IS CAST. THE JOINT SHALL BE CLEANED OF ALL DEBRIS BEFORE THE SEALANT IS APPLIED. THE JOINT SEALER MATERIAL SHALL CONFORM TO THE REQUIREMENTS OF SECTION 1028-3 OF THE STANDARD SPECIFICATIONS.
- AT THE CONTRACTORS OPTION, "TYPE A - ALTERNATE APPROACH FILL" IN LIEU OF "TYPE I - STANDARD APPROACH FILL" MAY BE CONSTRUCTED AT NO ADDITIONAL COST TO THE DEPARTMENT. SEE SHEET 2 OF 3 FOR DETAILS AND NOTES.
- FOR SECTION N-N, SEE SHEET 3 OF 3.



DETAIL "A"

BILL OF MATERIAL

FOR ONE APPROACH SLAB (2 REQ'D)

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	104	#4	STR	26'-0"	1,806
A2	104	#4	STR	25'-10"	1,795
* B1	192	#5	STR	24'-2"	4,840
B2	192	#6	STR	24'-8"	7,113
* B3	10	#4	STR	24'-8"	165
* B4	16	#4	STR	24'-2"	258
* G1	50	#4	STR	5'-0"	167
* G2	17	#4	STR	22'-1"	251
* U1	16	#4	1	3'-4"	36
REINFORCING STEEL					8,908 LBS.
* EPOXY COATED REINFORCING STEEL					7,523 LBS.

BAR TYPES

ALL BAR DIMENSIONS ARE OUT TO OUT.  
CLASS AA CONCRETE

SLAB	QUANTITY
SLAB	103.7 C.Y.
SIDEWALK	6.1 C.Y.
MEDIAN	8.7 C.Y.
TOTAL	118.5 C.Y.

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DRAWN BY: D. H. CARTER DATE: APR 2018  
 CHECKED BY: M. T. NEIHEISEL DATE: APR 2018  
 DESIGN ENGINEER OF RECORD: M. T. NEIHEISEL DATE: APR 2018

PROJECT NO. U-4734  
 FORSYTH COUNTY  
 STATION: 38+35.00 -L-  
 SHEET 1 OF 3

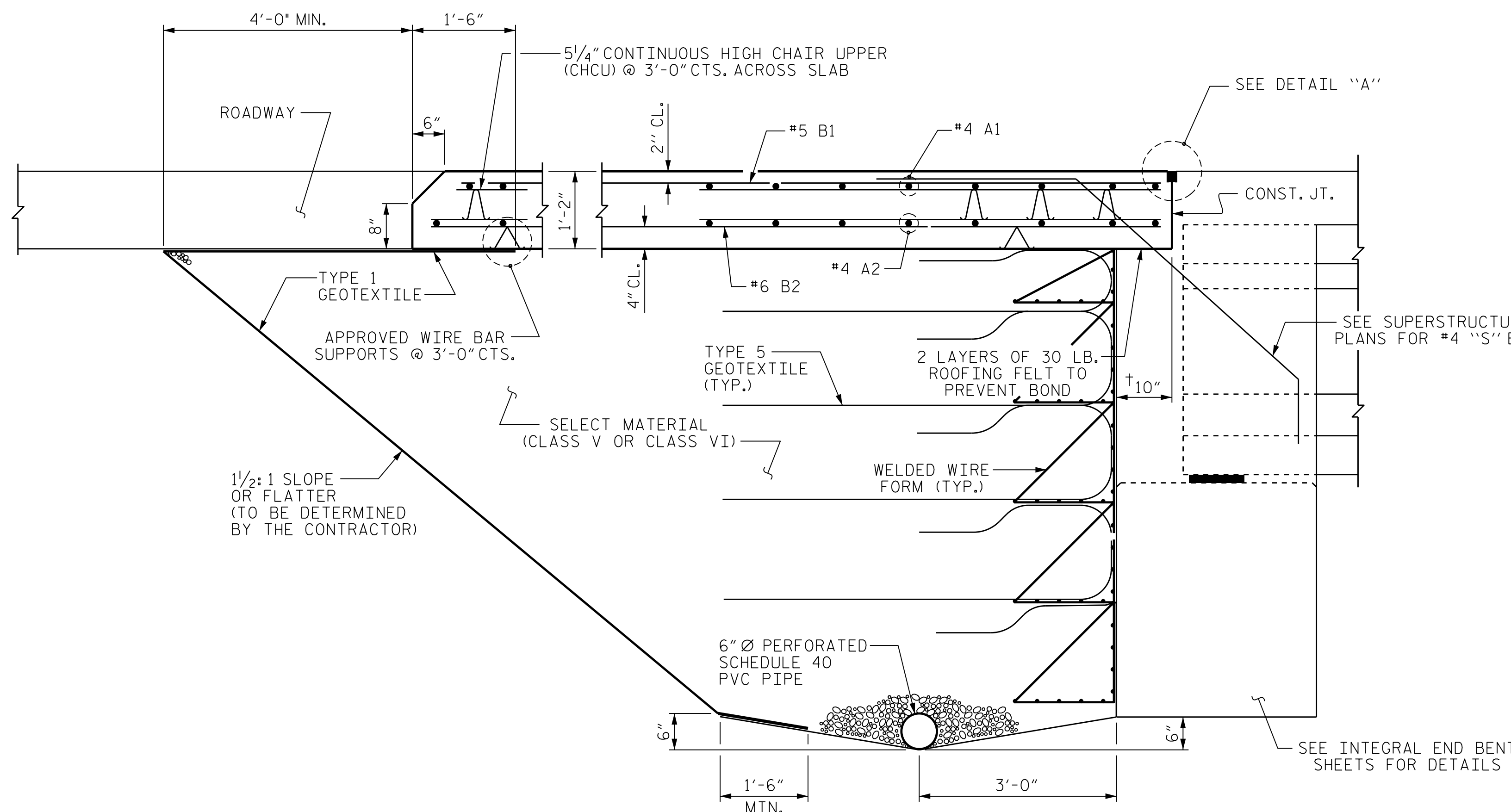


STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**STANDARD**  
 BRIDGE APPROACH SLAB  
 FOR INTEGRAL ABUTMENT

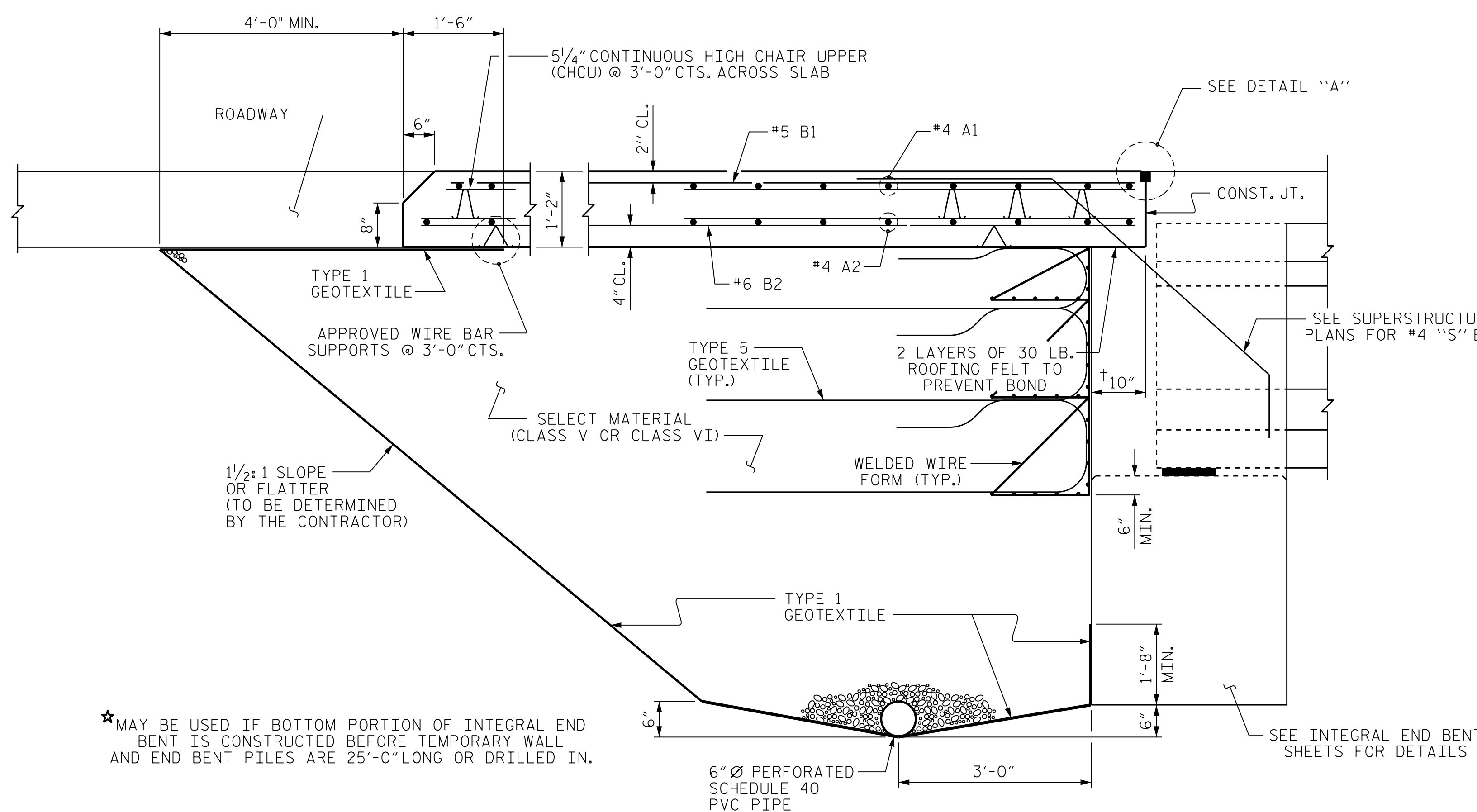
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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-40
1			3			TOTAL SHEETS 42
2			4			

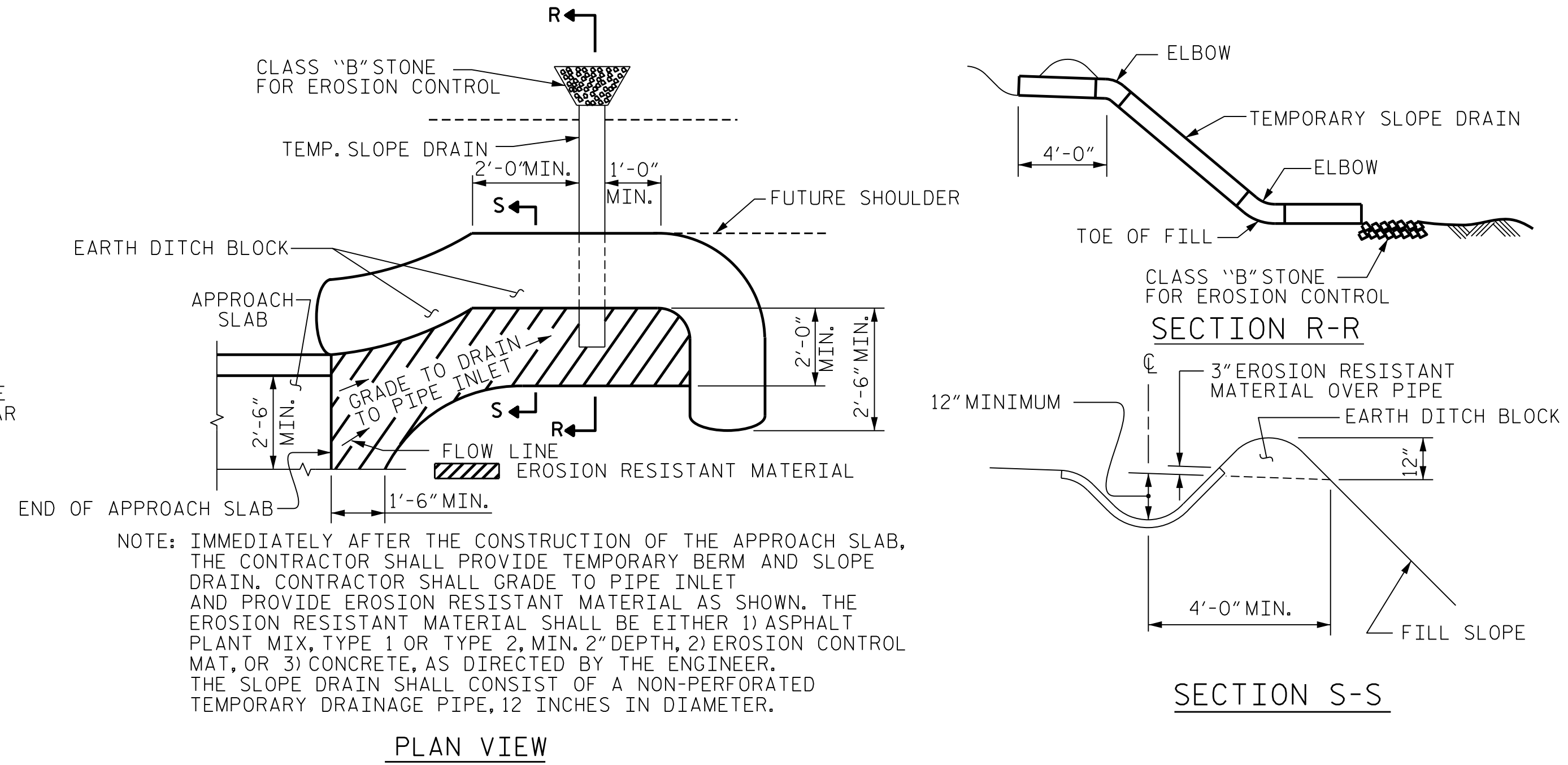




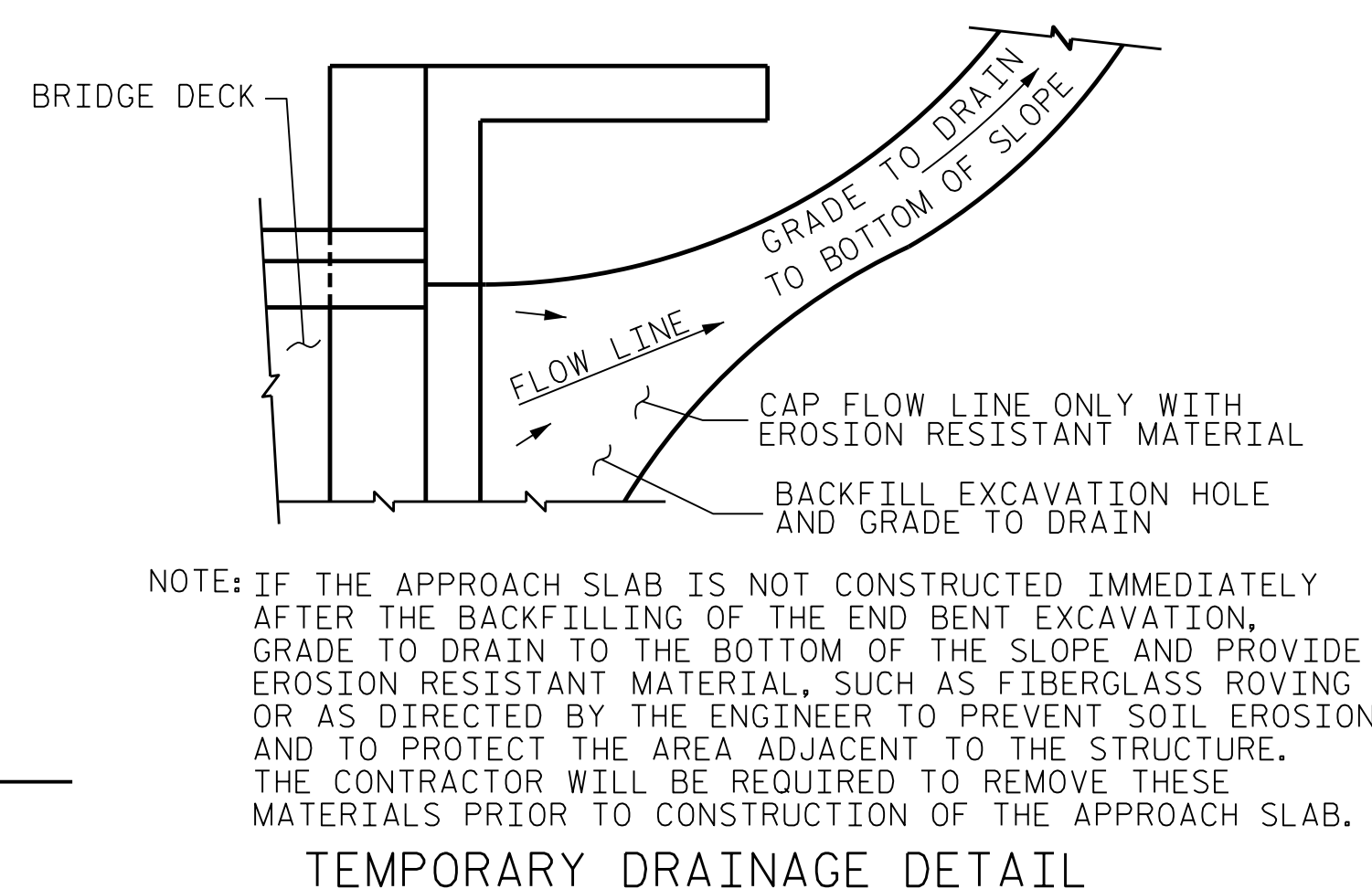
SECTION THRU SLAB  
(TYPE A - ALTERNATE APPROACH FILL)



SECTION THRU SLAB  
(TYPE A - ALTERNATE APPROACH FILL)



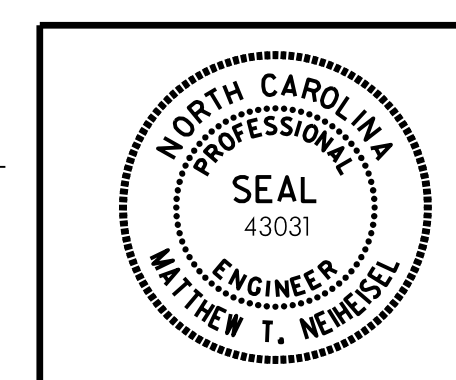
TEMPORARY BERM AND SLOPE DRAIN DETAILS  
(TO BE USED WHEN SHOULDER BERM GUTTER IS REQUIRED)



NOTES

- APPROACH SLAB SHALL NOT BE CONSTRUCTED PRIOR TO COMPLETION OF THE BRIDGE DECK.
- FOR TEMPORARY GEOTEXTILE WALL INCLUDING GEOTEXTILE, 6" Ø DRAINAGE PIPE, WELDED WIRE FORM, AND SELECT MATERIAL, SEE ROADWAY PLANS.
- GEOTEXTILE (TYPE 1 OR TYPE 5) SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS SECTION 1056.
- SELECT MATERIAL BACKFILL (CLASS V OR CLASS VI) SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATIONS SECTION 1016.
- SELECT MATERIAL BACKFILL IS TO BE CONTINUOUS ALONG FILL FACE OF BACKWALL FROM OUTSIDE EDGE TO OUTSIDE EDGE OF APPROACH SLAB.
- FOR THE 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.
- THE JOINT OPENING AT THE APPROACH SLAB/DECK INTERFACE SHALL BE SAWED NO MORE THAN 12 HOURS AFTER THE APPROACH SLAB IS CAST. THE JOINT SHALL BE CLEANED OF ALL DEBRIS BEFORE THE SEALANT IS APPLIED. THE JOINT SEALER MATERIAL SHALL CONFORM TO THE REQUIREMENTS OF SECTION 1028-3 OF THE STANDARD SPECIFICATIONS.

PROJECT NO. U-4734  
 FORSYTH COUNTY  
 STATION: 38+35.00 -L-  
 SHEET 2 OF 3



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

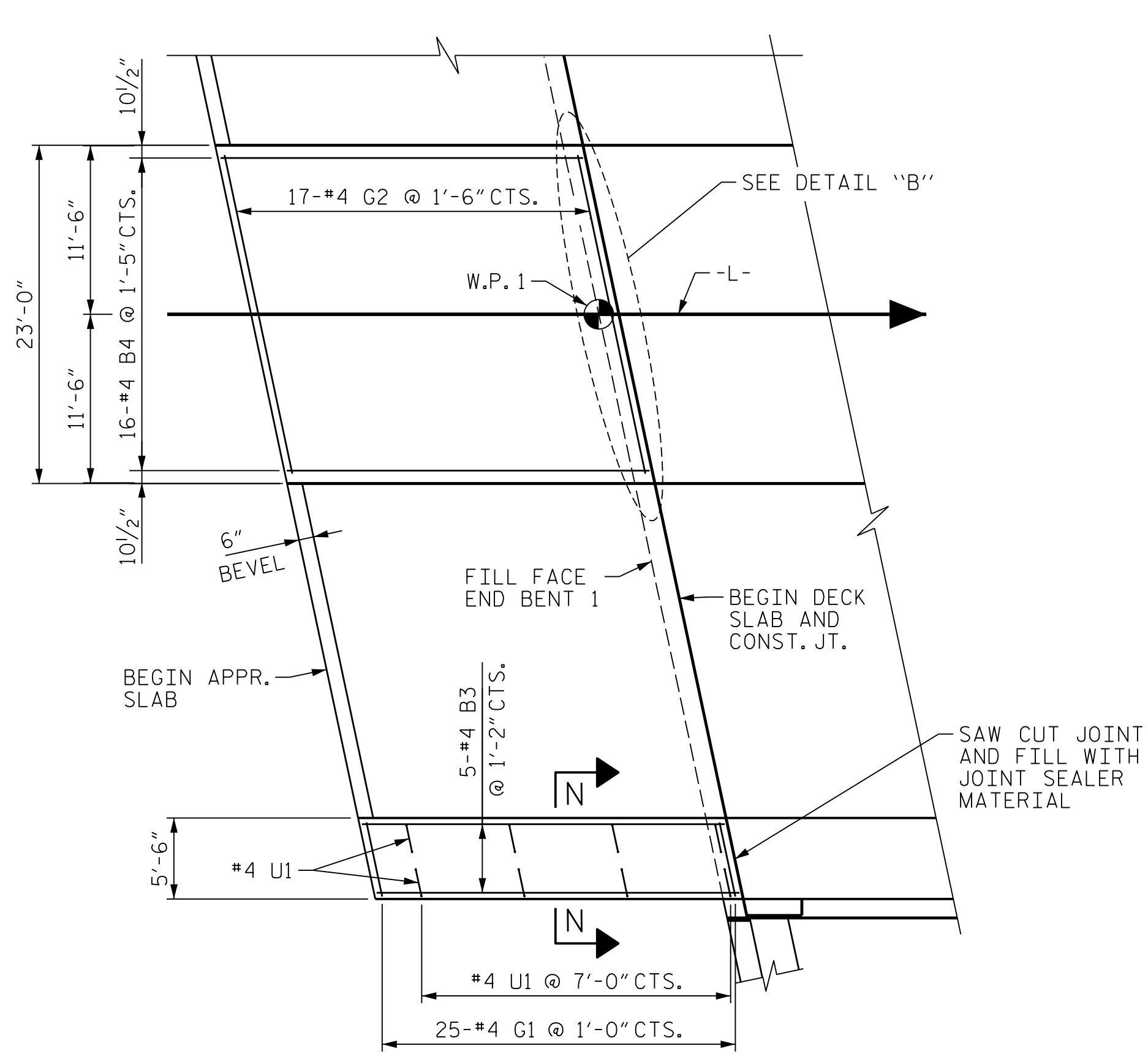
STANDARD  
 BRIDGE APPROACH  
 SLAB DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-41
1			3			TOTAL SHEETS 42
2			4			

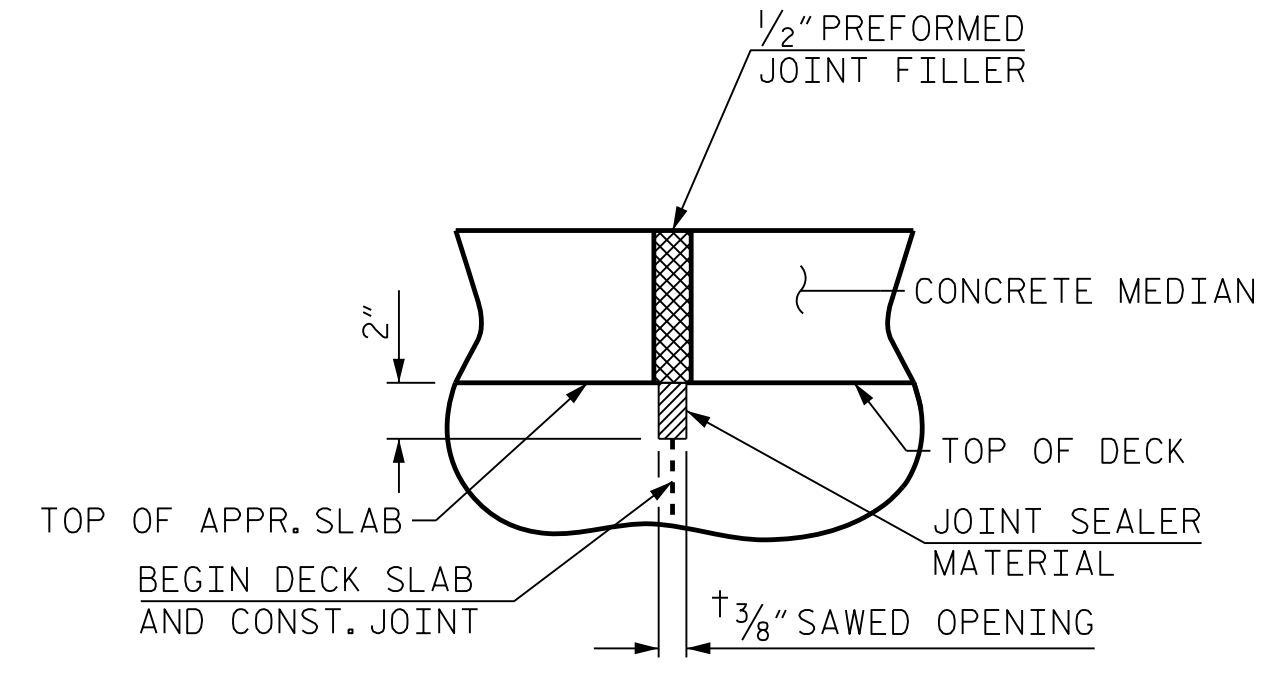
HDR Engineering, Inc. of the Carolinas  
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 N.C.B.E.L.S. License Number: F-0116

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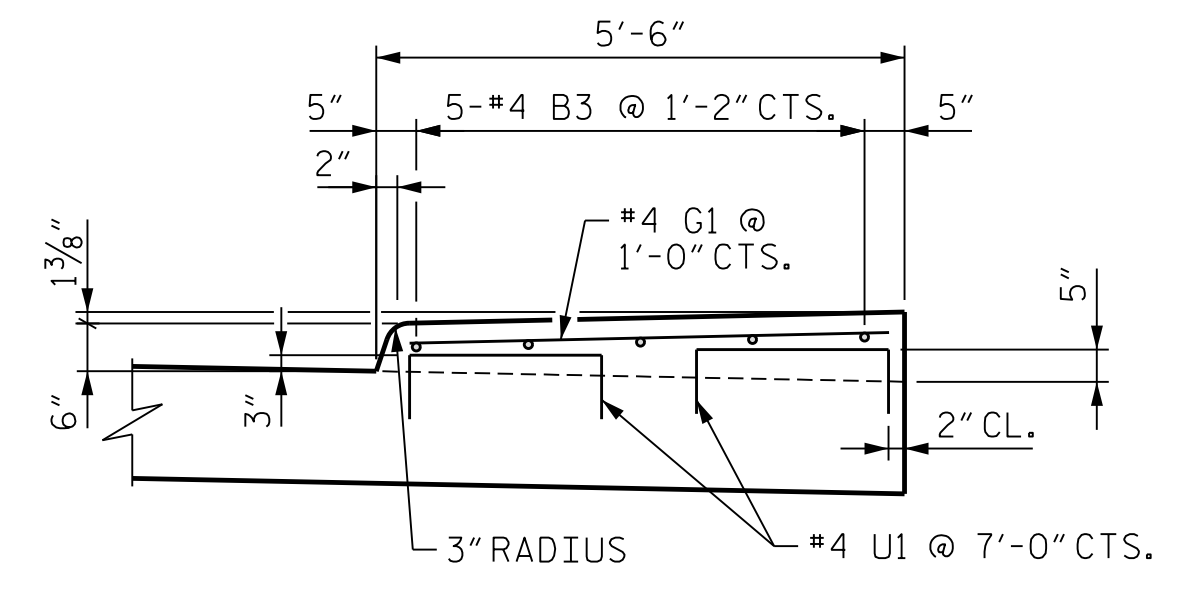
DRAWN BY: D. H. CARTER DATE: APR 2018  
 CHECKED BY: M. T. NEIHEISEL DATE: APR 2018  
 DESIGN ENGINEER OF RECORD: M. T. NEIHEISEL DATE: APR 2018



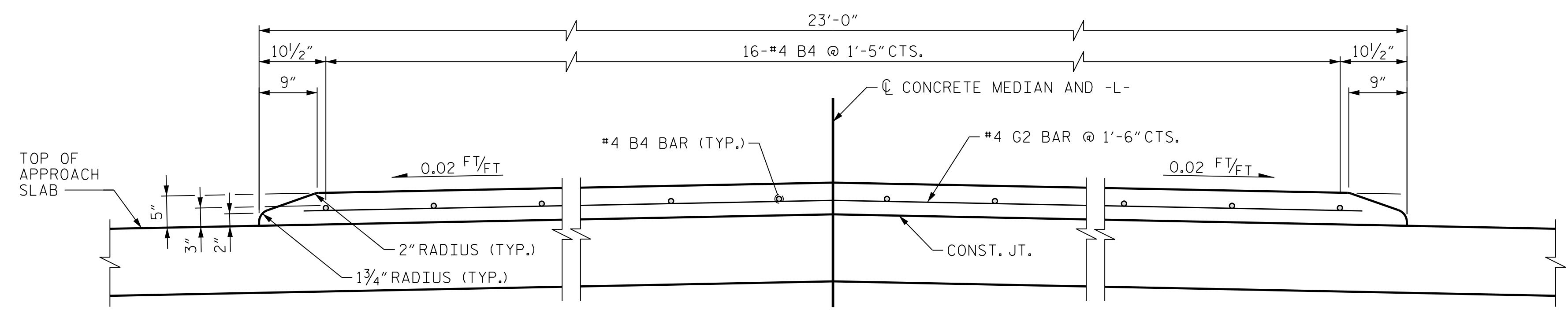
**PLAN OF SIDEWALK AND MEDIAN ON APPROACH SLAB**  
(TYPICAL EACH SIDEWALK AND APPROACH SLAB)  
END BENT 1 SHOWN, END BENT 2 SIMILAR.



**DETAIL "B"**  
END BENT 1 SHOWN, END BENT 2 SIMILAR.



**SECTION N-N**  
(TYPICAL EACH SIDEWALK)



**SECTION THRU CONCRETE MEDIAN**  
(TYPICAL EACH APPROACH SLAB)

NOTE: NO SEPARATE MEASUREMENT OR PAYMENT WILL BE MADE FOR MATERIALS OR LABOR REQUIRED TO CONSTRUCT THE CONCRETE MEDIAN. THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE LUMP SUM PRICE BID FOR THE BRIDGE APPROACH SLAB.

PROJECT NO. U-4734  
FORSYTH COUNTY  
STATION: 38+35.00 -L-  
SHEET 3 OF 3



STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
**STANDARD**  
BRIDGE APPROACH  
SLAB DETAILS

DRAWN BY : D. H. CARTER DATE : APR 2018  
CHECKED BY : M. T. NEIHEISEL DATE : APR 2018  
DESIGN ENGINEER OF RECORD: M. T. NEIHEISEL DATE : APR 2018

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*Matthew Neiheisel* / 10/2018  
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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-42
1			3			TOTAL SHEETS
2			4			42

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