


STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	<b>BR-0014</b>		
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
49072.1.1		PE	
49072.2.1		RW, UTIL.	
49072.3.1		CONST.	
		1223 Jones Franklin Rd. Raleigh, N.C. 27606 License No. F-0377 Bus: 919 851 8077 Fax: 919 851 8107	
TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION			

**BRIDGE #250025**

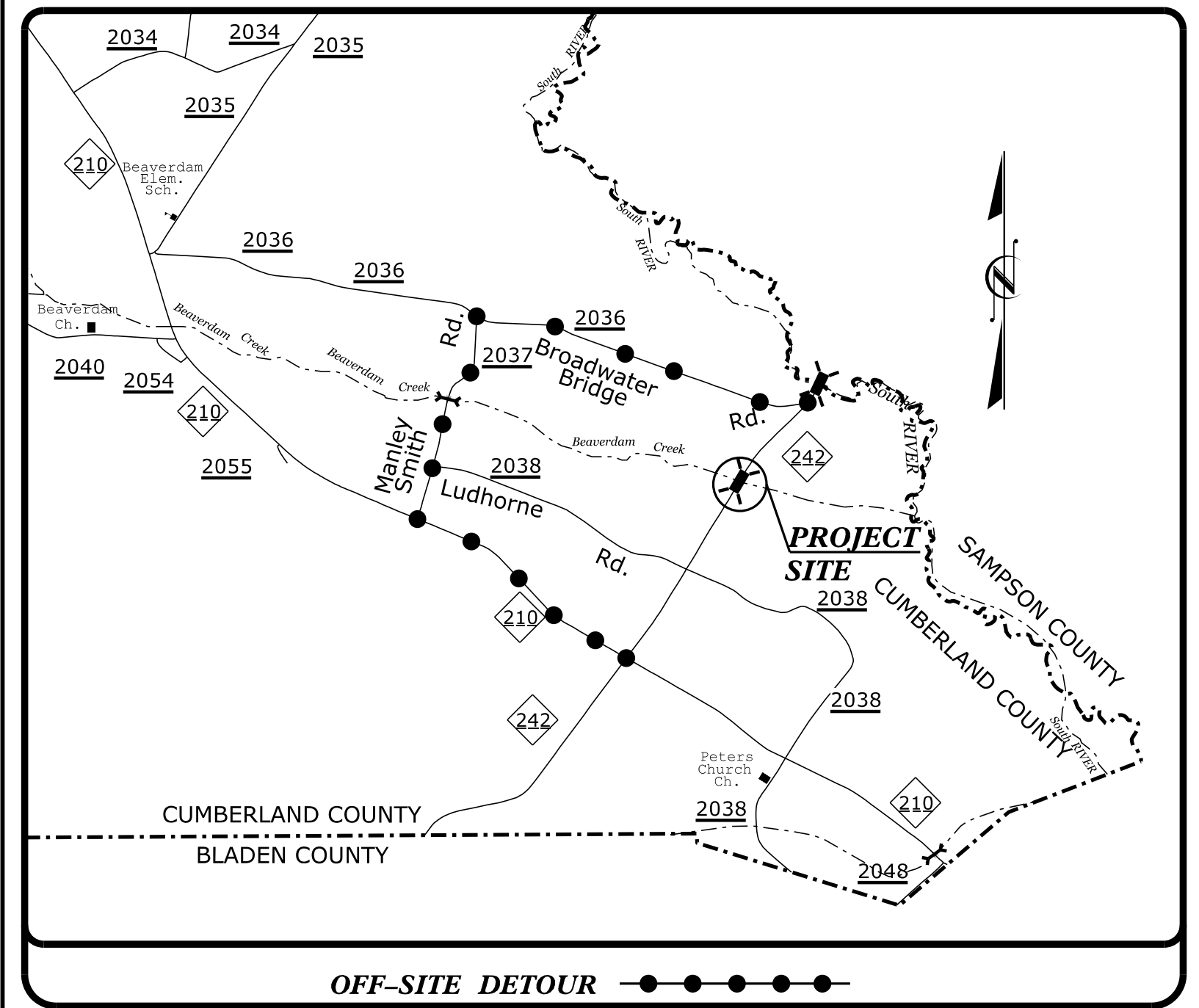
STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

**CUMBERLAND COUNTY**

LOCATION: **BRIDGE NO. 250025 OVER BEAVER DAM CREEK  
ON NC 242**

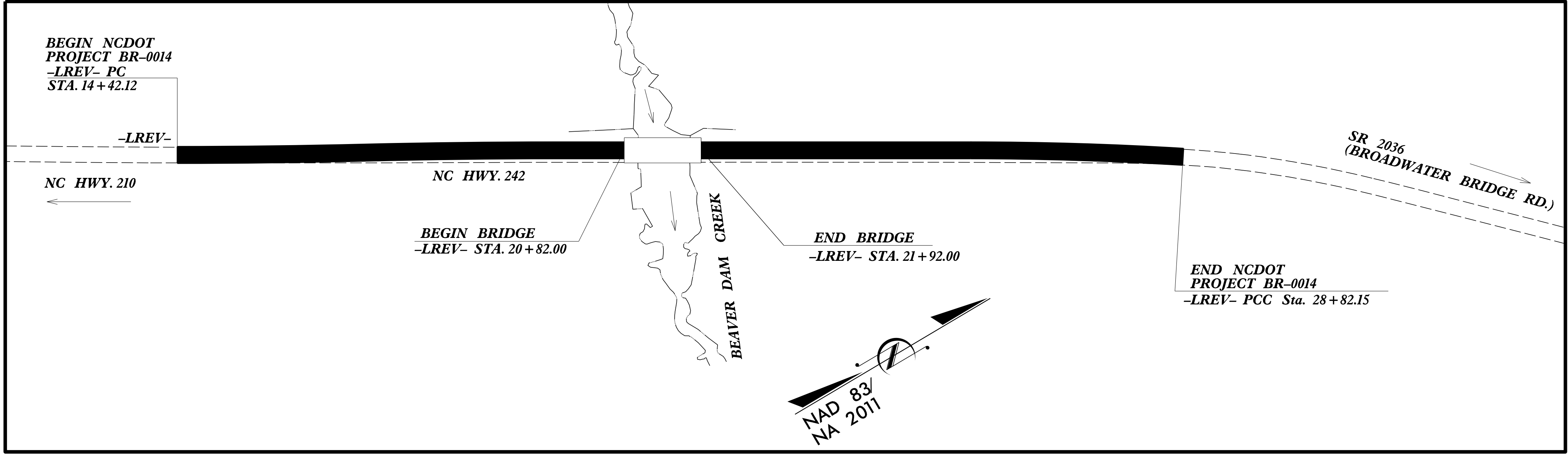
TYPE OF WORK: **GRADING, DRAINAGE, PAVING & STRUCTURE**

**STRUCTURE PLANS**



**PROJECT: BR-0014**

**CONTRACT: C204483**



DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED

**DESIGN DATA**

ADT 2020 =	1,530
ADT 2040 =	2,200
K =	12 %
D =	55 %
T =	12 % *
V =	60 MPH


\* (TTST = 8% +  
DUAL = 4%)  
FUNC CLASS =  
MAJOR COLLECTOR  
REGIONAL TIER

**PROJECT LENGTH**

LENGTH ROADWAY PROJECT BR-0014 =	0.252 MILES
LENGTH STRUCTURE PROJECT BR-0014 =	0.021 MILES
<b>TOTAL LENGTH PROJECT BR-0014 =</b>	<b>0.273 MILES</b>

NCDOT CONTACT: **DAVID STUTTS, PE**  
PROJECT ENGINEER - PEP/PROGRAM MGT.

Prepared in the Office of:

  
**WETHERILL ENGINEERING**  
 1223 Jones Franklin Rd. Raleigh, N.C. 27606  
 License No. F-0377  
 Bus: 919.851.8077 Fax: 919.851.8107  
 2018 STANDARD SPECIFICATIONS

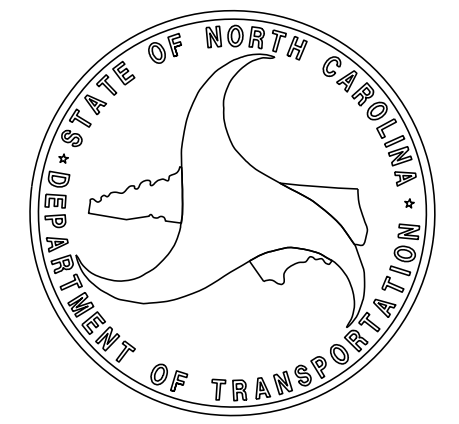
Prepared for:

**DIVISION OF HIGHWAYS**  
 1000 Birch Ridge Dr.,  
 Raleigh NC, 27610

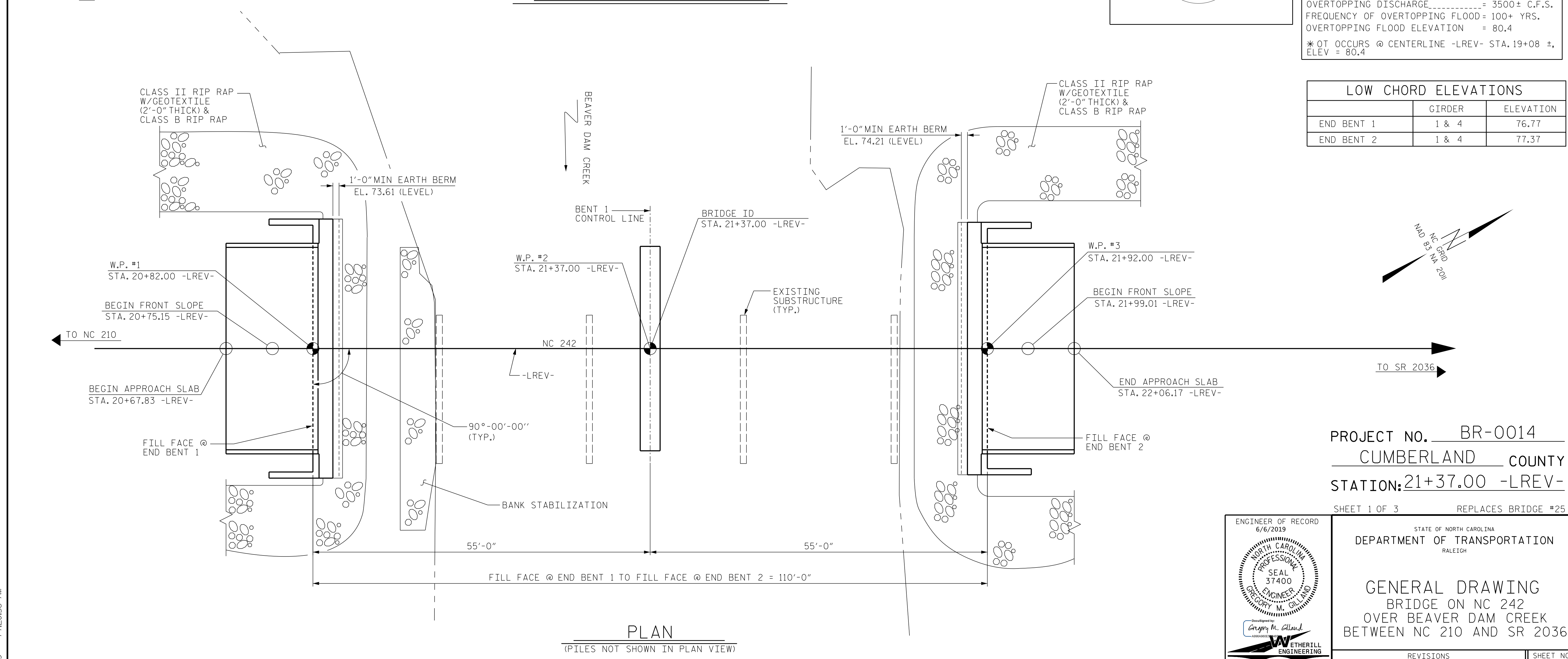
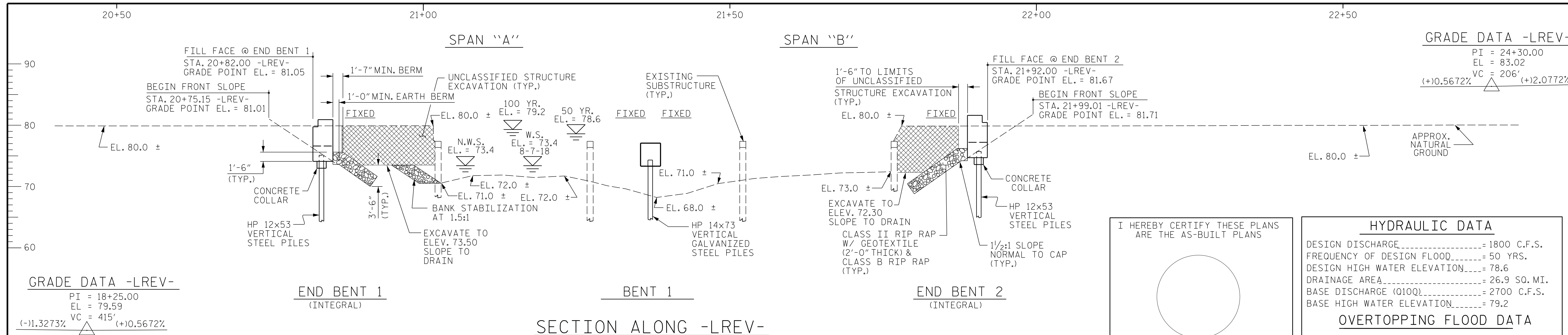
**EDWARD G. WETHERILL, PE**  
PROJECT ENGINEER

**LETTING DATE:**  
APRIL 20, 2021

**JOHN, A. DILWORTH, PE**  
PROJECT DESIGN ENGINEER



2/8/2021 8:55:58 AM P:\2018\SMU Bridge Replacement Program\BR-0014\Structures\DCN\BR0014\_SMU\_TSH.dgn



P:\2018\SMU Bridge Replacement Program\BR-0014\Structures\Drawings\BR0014\_SMU\_GD.dgn  
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DRAWN BY: D. HODGE      DATE: 4/19  
 CHECKED BY: G. GILLAND      DATE: 4/19

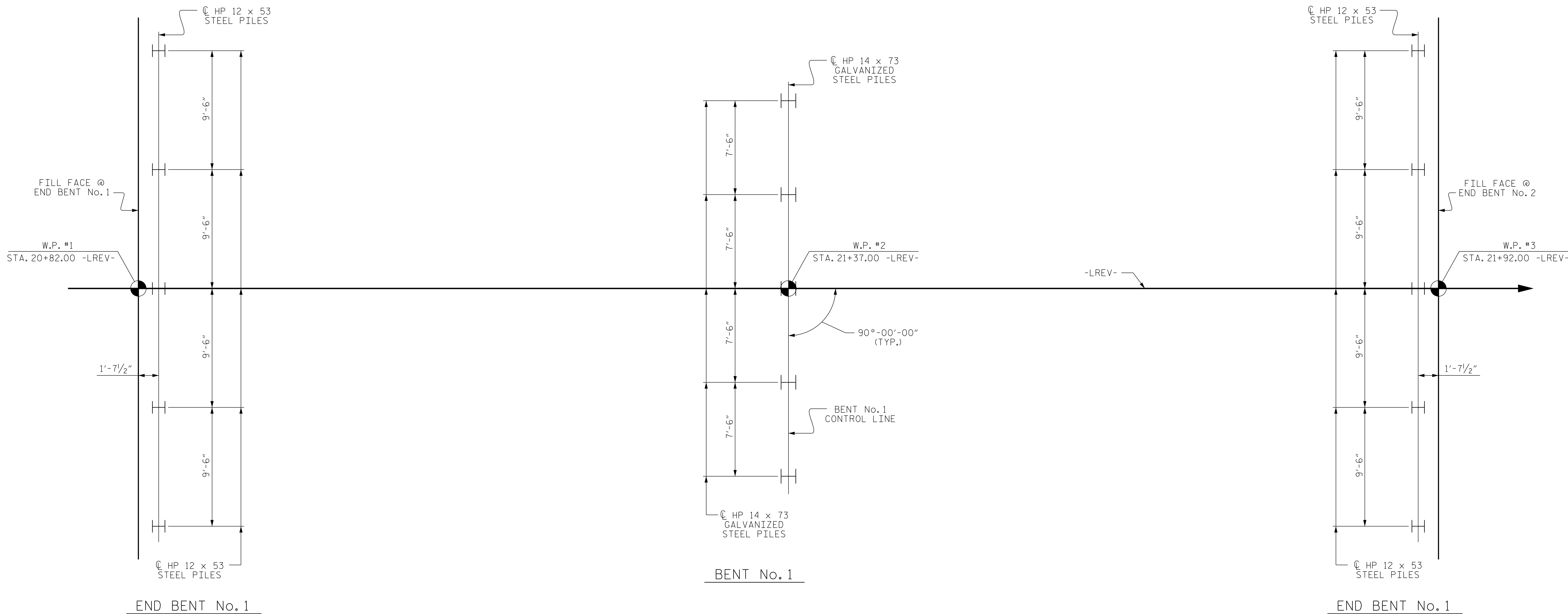
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ENGINEER OF RECORD  
 6/6/2019  
  
 Gregory M. Gilland  
 WETHERILL ENGINEERING  
 1223 Jones Franklin Rd.  
 Raleigh, N.C. 27606  
 Bus: 919 851 8077  
 Fax: 919 851 8107  
 LICENSE NO. F-0377

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**GENERAL DRAWING**  
 BRIDGE ON NC 242  
 OVER BEAVER DAM CREEK  
 BETWEEN NC 210 AND SR 2036

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



**FOUNDATION LAYOUT**

DIMENSIONS LOCATING PILES ARE SHOWN TO THEIR CENTERLINE

**FOUNDATION NOTES:**

- FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.
- PILES AT END BENT No.1 AND END BENT No.2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 95 TONS PER PILE.
- DRIVE PILES AT END BENT No.1 AND END BENT No.2 TO A REQUIRED DRIVING RESISTANCE OF 160 TONS PER PILE.
- PILES AT BENT No.1 ARE DESIGNED FOR A FACTOR RESISTANCE OF 110 TONS PER PILE.
- DRIVE PILES AT BENT No.1 TO A REQUIRED DRIVING RESISTANCE OF 210 TONS PER PILE. THIS REQUIRED DRIVING RESISTANCE INCLUDES ADDITIONAL RESISTANCE FOR DOWNDRAW OR SCOUR.
- INSTALL PILES AT BENT No.1 TO A TIP ELEVATION NO HIGHER THAN 35 FT.
- THE SCOUR CRITICAL ELEVATION FOR BENT No.1 IS ELEVATION 53 FT. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.
- TESTING PILES WITH THE PDA DURING DRIVING, RESTRIKING OR REDRIVING MAY BE REQUIRED. THE ENGINEER WILL DETERMINE THE NEED FOR PDA TESTING. FOR PDA TESTING, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

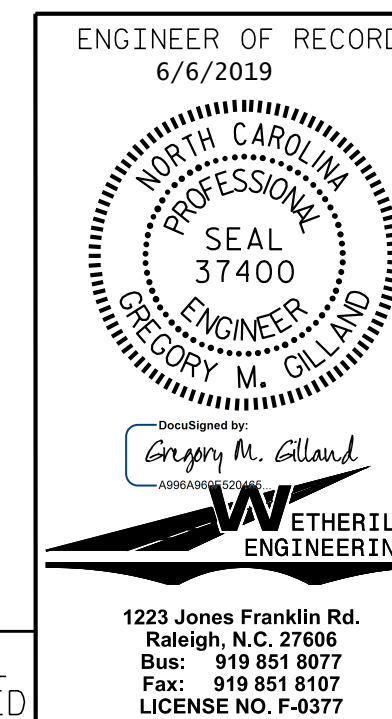
PROJECT NO. BR-0014  
CUMBERLAND COUNTY  
 STATION: 21+37.00 -LREV-

SHEET 2 OF 3

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 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

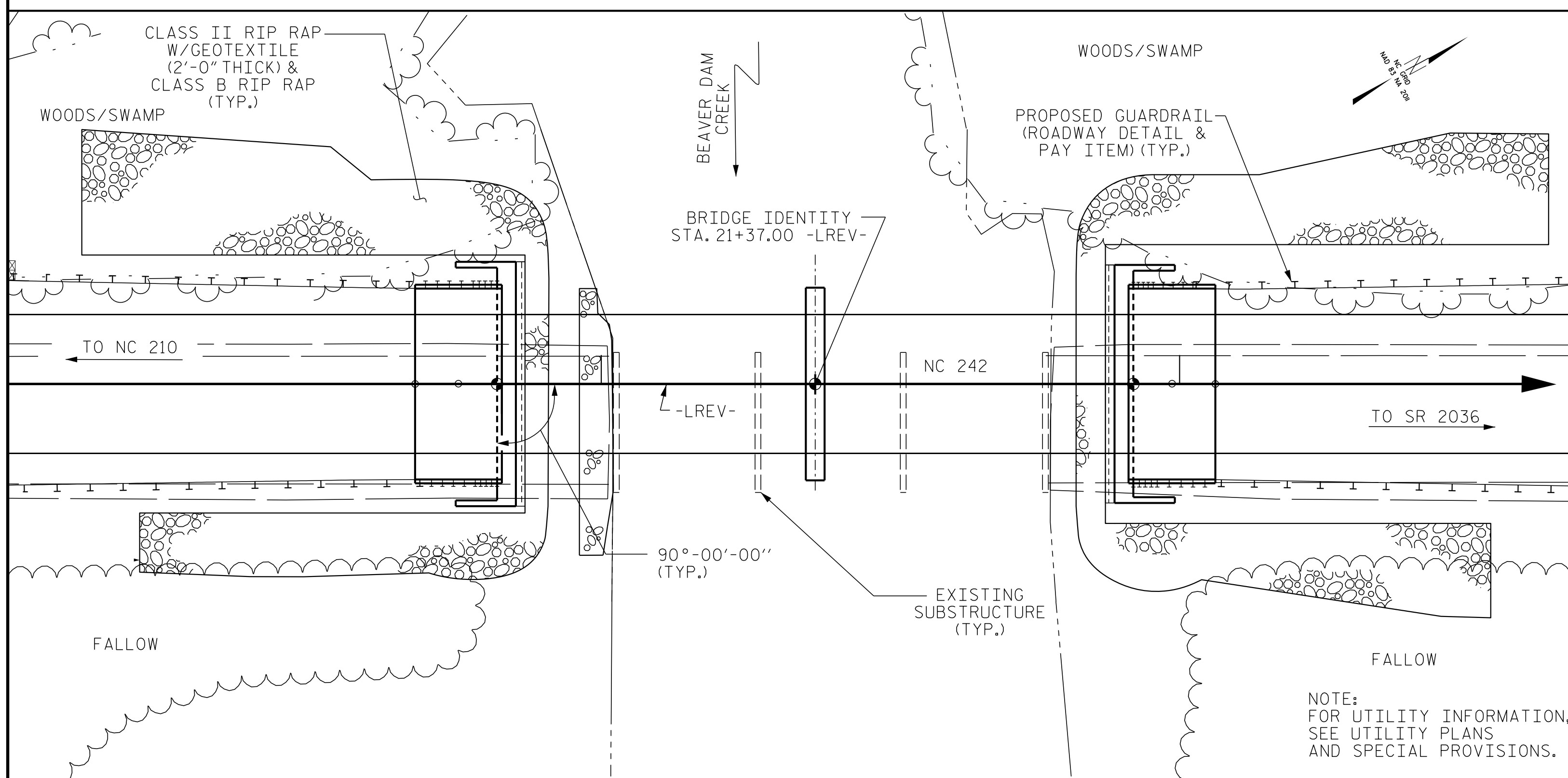
**GENERAL DRAWING**  
 BRIDGE ON NC 242  
 OVER BEAVER DAM CREEK  
 BETWEEN NC 210 AND SR 2036

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-2
1			3			TOTAL SHEETS
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1223 Jones Franklin Rd.  
 Raleigh, N.C. 27606  
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 Fax: 919 851 8107  
 LICENSE NO. F-0377



BM-1 (RR SPIKE IN BASE OF 30" POPLAR) 26.83' RT OF -LREV- STA 17+59.83 EL. 77.50; N 410020, E 2140821



LOCATION SKETCH

NOTES:

- ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.
- THIS BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.
- THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.
- FOR OTHER DESIGN DATA AND GENERAL NOTES, SEE SHEET SN.
- FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.
- FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.
- FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.
- FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.
- PRESTRESSED CONCRETE DECK PANELS MAY BE USED IN LIEU OF METAL STAY-IN-PLACE FORMS IN ACCORDANCE WITH ARTICLE 420-3 OF THE STANDARD SPECIFICATIONS.
- REMOVABLE FORMS MAY BE USED IN LIEU OF METAL STAY-IN-PLACE FORMS IN ACCORDANCE WITH ARTICLE 420-3 OF THE STANDARD SPECIFICATIONS.
- NEEDLE BEAMS WILL NOT BE ALLOWED UNLESS OTHERWISE CALLED FOR ON THE PLANS OR APPROVED BY THE ENGINEER.
- INASMUCH AS THE PAINT SYSTEM ON THE EXISTING STRUCTURAL STEEL CONTAINS LEAD, THE CONTRACTOR'S ATTENTION IS DIRECTED TO ARTICLE 107-1 OF THE STANDARD SPECIFICATIONS. ANY COSTS RESULTING FROM COMPLIANCE WITH APPLICABLE STATE OR FEDERAL REGULATIONS PERTAINING TO HANDLING OF MATERIALS CONTAINING LEAD BASED PAINT SHALL BE INCLUDED IN THE BID PRICE FOR "REMOVAL OF EXISTING STRUCTURE."
- THE MATERIAL SHOWN IN THE CROSS-HATCHED AREA SHALL BE EXCAVATED FOR A DISTANCE OF 40 FT EACH SIDE OF CENTERLINE ROADWAY AS DIRECTED BY THE ENGINEER. THIS WORK WILL BE PAID FOR AT THE CONTRACT LUMP SUM PRICE FOR UNCLASSIFIED STRUCTURE EXCAVATION. SEE SECTION 412 OF THE STANDARD SPECIFICATIONS.

- THE EXISTING STRUCTURE CONSISTING OF THE FOLLOWING: 3 SPANS OF REINFORCED CONCRETE SLAB ON STEEL I-BEAMS (1 @ 25.7', 1 @ 25.0' AND 1 @ 25.7') WITH A CLEAR ROADWAY WIDTH OF 24'-0" ON END BENTS AND BENTS OF REINFORCED CONCRETE CAPS WITH TIMBER PILES AND LOCATED AT THE PROPOSED STRUCTURE SHALL BE REMOVED. THE EXISTING BRIDGE IS PRESENTLY NOT POSTED FOR LOAD LIMIT. SHOULD THE STRUCTURAL INTEGRITY OF THE BRIDGE DETERIORATE DURING CONSTRUCTION OF THE PROPOSED BRIDGE, A LOAD LIMIT MAY BE POSTED AND MAY BE REDUCED AS FOUND NECESSARY DURING THE LIFE OF THE PROJECT.
- THE SUBSTRUCTURE OF THE EXISTING BRIDGE INDICATED ON THE PLANS IS FROM THE BEST INFORMATION AVAILABLE. SINCE THIS INFORMATION IS SHOWN FOR THE CONVENIENCE OF THE CONTRACTOR, THE CONTRACTOR SHALL HAVE NO CLAIM WHATSOEVER AGAINST THE DEPARTMENT OF TRANSPORTATION FOR ANY DELAYS OR ADDITIONAL COST INCURRED BASED ON DIFFERENCES BETWEEN THE EXISTING BRIDGE SUBSTRUCTURE SHOWN ON THE PLANS AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.
- REMOVAL OF THE EXISTING BRIDGE SHALL BE PERFORMED IN A MANNER THAT PREVENTS DEBRIS FROM FALLING INTO THE WATER. THE CONTRACTOR SHALL SUBMIT DEMOLITION PLANS FOR REVIEW AND REMOVE THE BRIDGE IN ACCORDANCE WITH ARTICLE 402-2 OF THE STANDARD SPECIFICATIONS.
- THIS STRUCTURE HAS BEEN DESIGNED IN ACCORDANCE WITH "HEC 18-EVALUATING SCOUR AT BRIDGES."
- FOR INTERIOR BENT, ONLY PARTIAL GALVANIZING OF THE PILES IS REQUIRED. SEE INTERIOR BENT SHEETS FOR REQUIRED GALVANIZED LENGTHS. PAYMENT FOR PARTIALLY GALVANIZED PILES WILL BE MADE UNDER THE CONTRACT UNIT PRICE FOR GALVANIZED STEEL PILES.
- FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.
- FOR ASBESTOS ASSESSMENT FOR BRIDGE DEMOLITION AND RENOVATION ACTIVITIES, SEE SPECIAL PROVISIONS.
- FOR REMOVAL OF EXISTING STRUCTURE, SEE SPECIAL PROVISIONS.

TOTAL BILL OF MATERIAL

	REMOVAL OF EXISTING STRUCTURE	ASBESTOS ASSESSMENT	PDA TESTING	UNCLASSIFIED STRUCTURE EXCAVATION	REINFORCED CONCRETE DECK SLAB	GROOVING BRIDGE FLOORS	CLASS A CONCRETE	BRIDGE APPROACH SLABS	REINFORCING STEEL	36" PRESTRESSED CONCRETE GIRDERS	PILE DRIVING EQUIPMENT SETUP FOR HP 12 x 53 STEEL PILES	PILE DRIVING EQUIPMENT SETUP FOR HP 14 x 73 GALVANIZED STEEL PILES	HP 12 x 53 STEEL PILES	HP 14 x 73 GALVANIZED STEEL PILES	PILE REDRIVES	CONCRETE BARRIER RAIL	RIP RAP CLASS B (1'-0" THICK)	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE	ELASTOMERIC BEARINGS			
	LUMP SUM	LUMP SUM	EA.	LUMP SUM	SQ. FT.	SQ. FT.	CU. YDS.	LUMP SUM	LBS.	NO.	LIN. FT.	EACH	EACH	NO.	LIN. FT.	NO.	LIN. FT.	EACH	LIN. FT.	TONS	TONS	SQ. YD.	LUMP SUM
SUPERSTRUCTURE					3,988	4,110				8	429.00					216.67							
END BENT 1									18.7		2,602	5		5	330			3		15	280	308	
BENT 1									12.5		1,784	5		5	330			3					
END BENT 2									18.7		2,602	5		5	355			3		20	260	285	
TOTAL	LUMP SUM	LUMP SUM	1	LUMP SUM	3,988	4,110	49.9	LUMP SUM	6,988	8	429.00	10	5	10	685	5	330	9	216.67	35	540	593	LUMP SUM

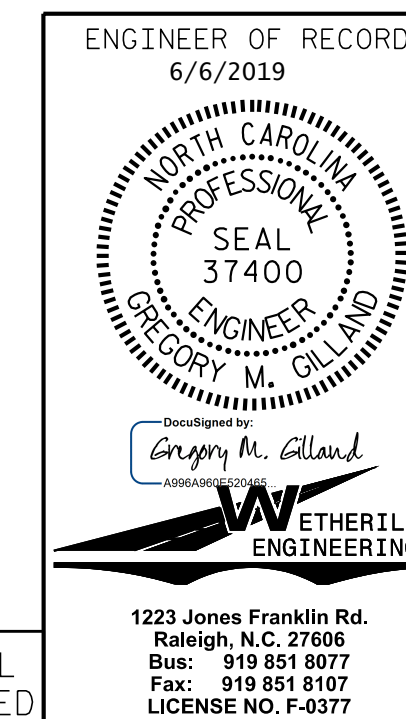
PROJECT NO. BR-0014  
 CUMBERLAND COUNTY  
 STATION: 21+37.00 -LREV-

SHEET 3 OF 3

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DRAWN BY: D. HODGE DATE: 4/19  
 CHECKED BY: G. GILLAND DATE: 4/19

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STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

GENERAL DRAWING  
 BRIDGE ON NC 242  
 OVER BEAVER DAM CREEK  
 BETWEEN NC 210 AND SR 2036

REVISIONS

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

SHEET NO. S-3  
 TOTAL SHEETS 28

1223 Jones Franklin Rd.  
 Raleigh, N.C. 27606  
 Bus: 919 851 8077  
 Fax: 919 851 8107  
 LICENSE NO. F-0377

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

LEVEL	VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING #	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE										SERVICE III LIMIT STATE					COMMENT NUMBER			
						MOMENT					SHEAR					MOMENT								
						LIVE-LOAD FACTORS (γ <sub>LL</sub> )	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	LIVE-LOAD FACTORS (γ <sub>LL</sub> )	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN		GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING	HL-93 (INVENTORY)	N/A	①	1.20	---	1.75	0.830	1.410	A	EL	26.150	0.960	1.350	A	I	36.870	0.80	0.790	1.200	A	I	26.150		
	HL-93 (OPERATING)	N/A		1.83	---	1.35	0.830	1.830	A	EL	26.150	0.960	1.890	A	I	42.230	N/A	--	--	--	--	--		
	HS-20 (INVENTORY)	36.000	②	1.50	54.000	1.75	0.830	1.770	A	EL	26.150	0.960	1.710	A	I	42.230	0.80	0.790	1.500	A	I	26.150		
	HS-20 (OPERATING)	36.000		2.24	80.640	1.35	0.830	2.290	A	EL	26.150	0.960	2.240	A	I	42.230	N/A	--	--	--	--	--		
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		3.13	42.255	1.40	0.830	4.590	A	EL	26.150	0.960	4.890	A	I	42.230	0.80	0.790	3.130	A	I	26.150	
		SNGARBS2	20.000		2.44	48.800	1.40	0.830	3.580	A	EL	26.150	0.960	3.570	A	I	42.230	0.80	0.790	2.440	A	I	26.150	
		SNAGRIS2	22.000		2.36	51.920	1.40	0.830	3.460	A	EL	26.150	0.960	3.350	A	I	42.230	0.80	0.790	2.360	A	I	26.150	
		SNCOTTS3	27.250		1.56	42.510	1.40	0.830	2.290	A	EL	26.150	0.960	2.400	A	I	42.230	0.80	0.790	1.560	A	I	26.150	
		SNAGGRS4	34.925		1.35	47.149	1.40	0.830	1.970	A	EL	26.150	0.960	2.060	A	I	42.230	0.80	0.790	1.350	A	I	26.150	
		SNS5A	35.550		1.31	46.571	1.40	0.830	1.930	A	EL	26.150	0.960	2.130	A	I	42.230	0.80	0.790	1.310	A	I	26.150	
		SNS6A	39.950		1.22	48.739	1.40	0.830	1.790	A	EL	26.150	0.960	1.960	A	I	42.230	0.80	0.790	1.220	A	I	26.150	
		SNS7B	42.000		1.17	49.140	1.40	0.830	1.710	A	EL	26.150	0.960	1.970	A	I	42.230	0.80	0.790	1.170	A	I	26.150	
	TRUCK TRACTOR SEMI-TRAILER (TTS)	TNAGRIT3	33.000		1.50	49.500	1.40	0.830	2.190	A	EL	26.150	0.960	2.340	A	I	42.230	0.80	0.790	1.500	A	I	26.150	
		TNT4A	33.075		1.51	49.943	1.40	0.830	2.210	A	EL	26.150	0.960	2.240	A	I	42.230	0.80	0.790	1.510	A	I	26.150	
		TNT6A	41.600		1.25	52.000	1.40	0.830	1.840	A	EL	26.150	0.960	2.170	A	I	42.230	0.80	0.790	1.250	A	I	26.150	
		TNT7A	42.000		1.27	53.340	1.40	0.830	1.860	A	EL	26.150	0.960	2.000	A	I	42.230	0.80	0.790	1.270	A	I	26.150	
		TNT7B	42.000		1.32	55.440	1.40	0.830	1.940	A	EL	26.150	0.960	1.900	A	I	42.230	0.80	0.790	1.320	A	I	26.150	
		TNAGRIT4	43.000		1.25	53.750	1.40	0.830	1.840	A	EL	26.150	0.960	1.830	A	I	42.230	0.80	0.790	1.250	A	I	26.150	
TNAGT5A	45.000		1.17	52.650	1.40	0.830	1.720	A	EL	26.150	0.960	1.880	A	I	42.230	0.80	0.790	1.170	A	I	26.150			
TNAGT5B	45.000		③	1.15	51.750	1.40	0.830	1.690	A	EL	26.150	0.960	1.730	A	I	42.230	0.80	0.790	1.150	A	I	26.150		

**LOAD FACTORS:**

DESIGN LOAD RATING FACTORS	LIMIT STATE	γ <sub>DC</sub>	γ <sub>DW</sub>
	STRENGTH I	1.25	1.50
	SERVICE III	1.00	1.00

**NOTES:**

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

**COMMENTS:**

1. SPAN A IS THE SAME AS SPAN B
- 2.
- 3.
- 4.

# CONTROLLING LOAD RATING

① DESIGN LOAD RATING (HL-93)

② DESIGN LOAD RATING (HS-20)

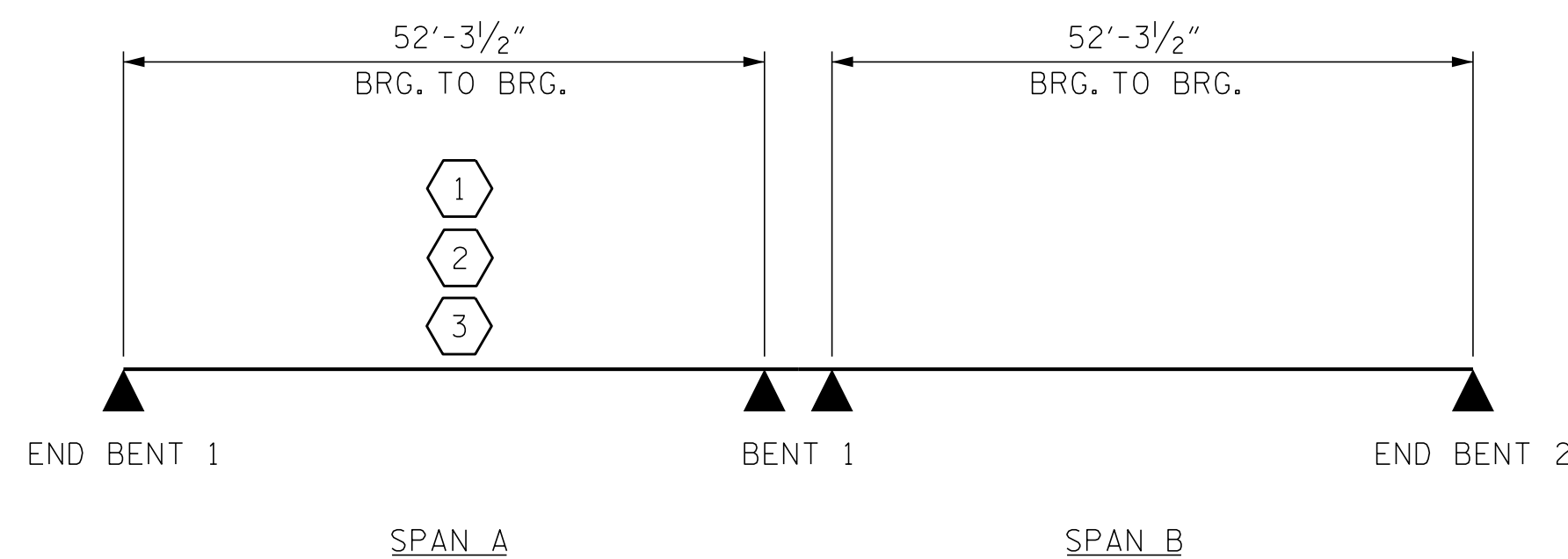
③ LEGAL LOAD RATING \*\*\*

\*\*\* SEE CHART FOR VEHICLE TYPE

---

GIRDER LOCATION

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



LRFR SUMMARY

PROJECT NO. BR-0014  
CUMBERLAND COUNTY  
STATION: 21+37.00 -LREV-

P:\2018\SMU Bridge Replacement Program\BR-0014\Structures\DGN\BR0014\_SMU\_LRFR.dgn 6/6/2019 11:32:16 AM

ASSEMBLED BY : D. HODGE	DATE : 4/19
CHECKED BY : G.M. GILLAND	DATE : 4/19
DRAWN BY : MAA 1/08	REV. 11/2/08RR MAA/GM
CHECKED BY : GM/DI 2/08	REV. 10/1/11 MAA/GM
	REV. 12/17 MAA/THC

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ENGINEER OF RECORD  
6/6/2019

Gregory M. Gilland  
REGISTERED PROFESSIONAL ENGINEER  
LICENSE NO. F-0377

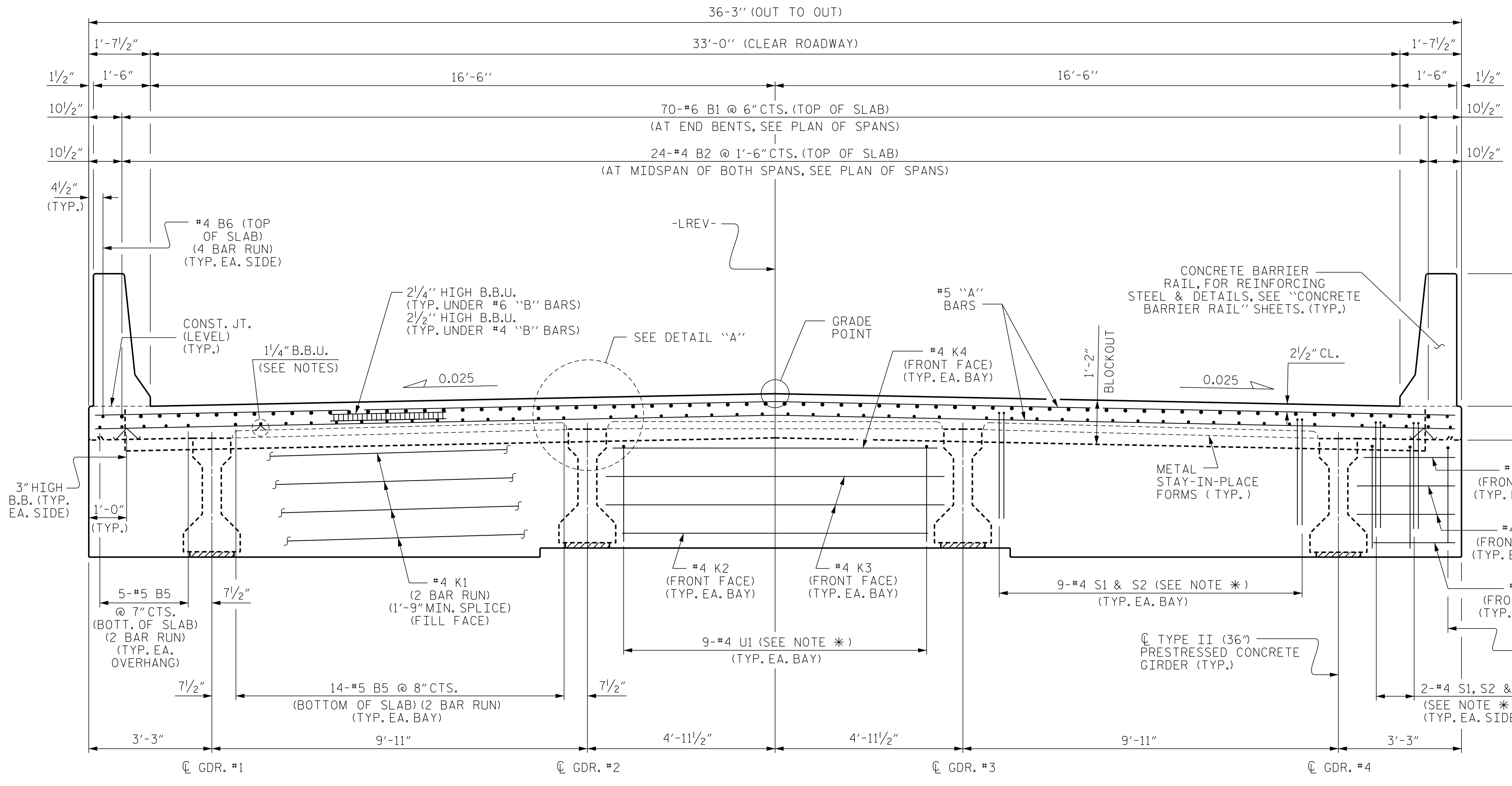
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RALEIGH

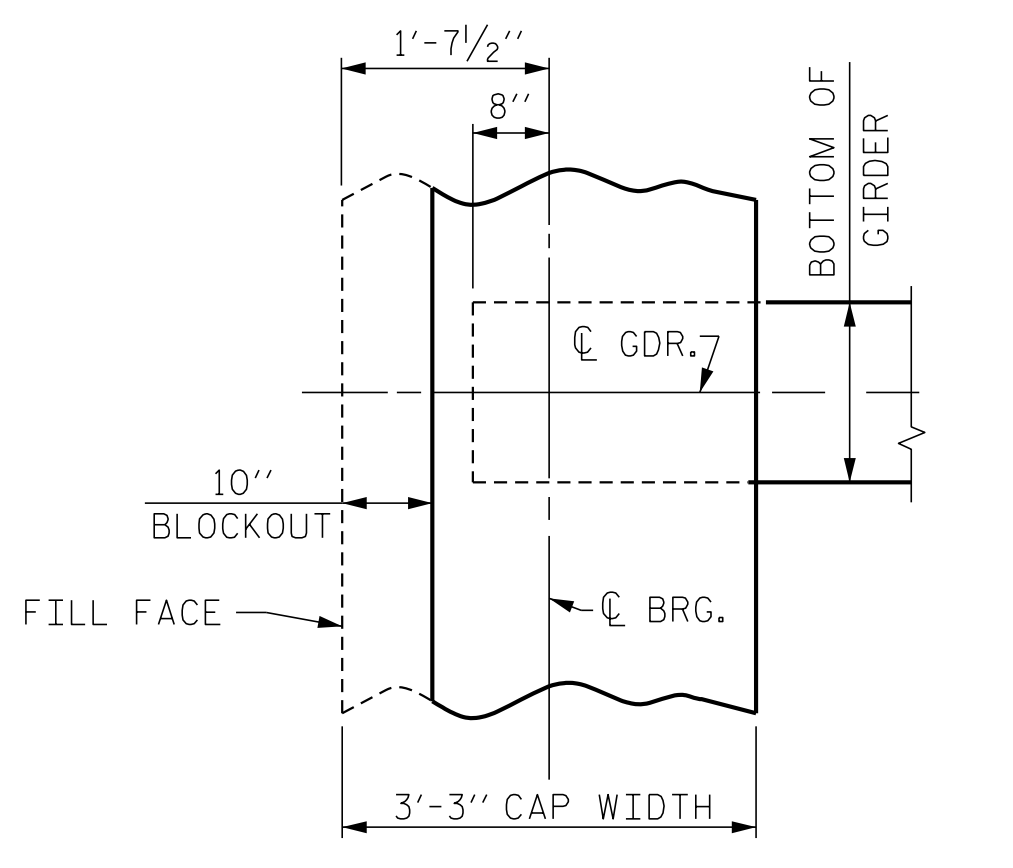
STANDARD  
LRFR SUMMARY FOR  
PRESTRESSED  
CONCRETE GIRDERS  
(NON-INTERSTATE TRAFFIC)

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





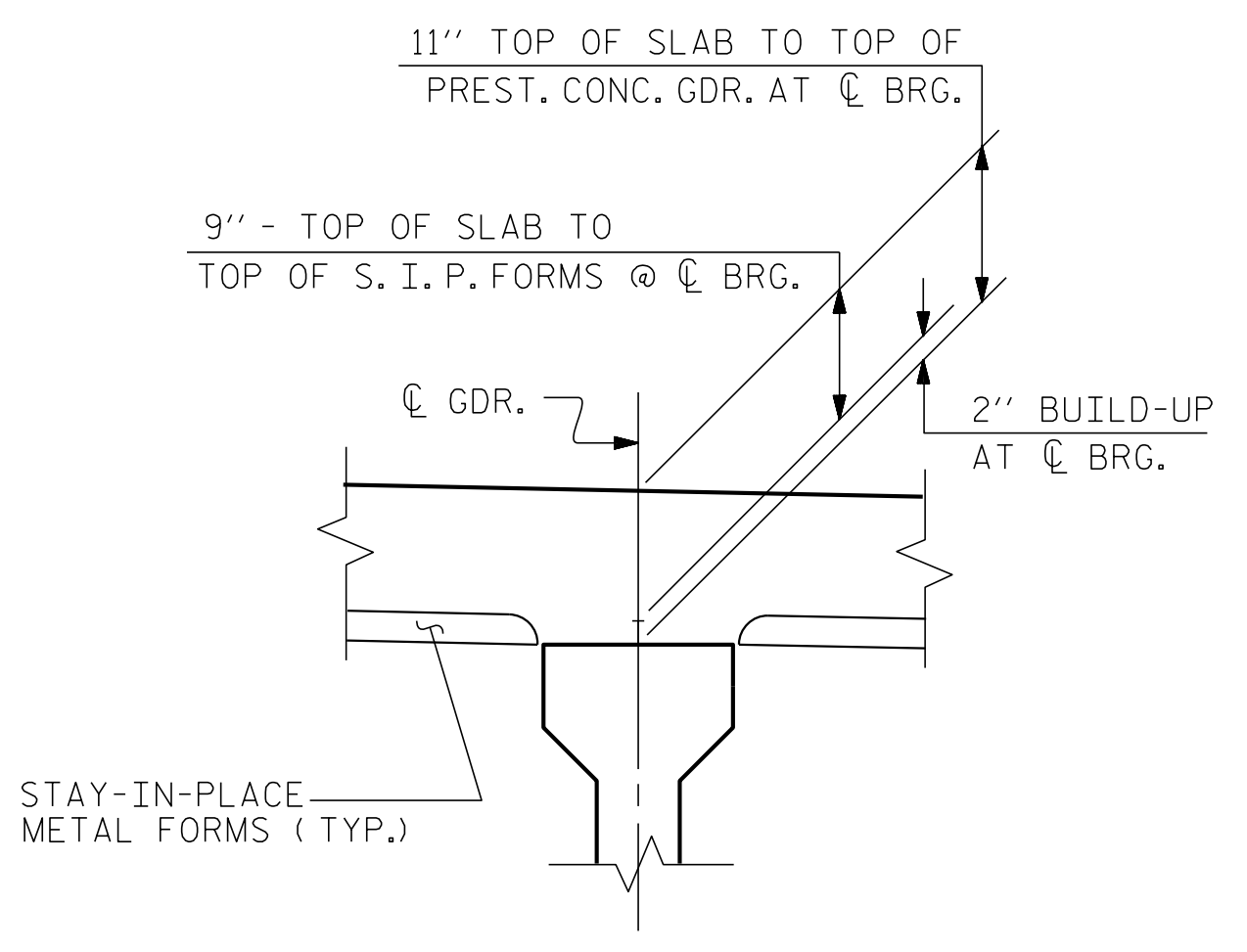
**NOTES:**  
 PROVIDE 1/4" HIGH BEAM BOLSTERS UPPER AT 4'-0" CTS. ATOP THE METAL STAY-IN-PLACE FORMS TO SUPPORT THE BOTTOM MAT OF 'A' BARS. WHEN USING REMOVABLE FORMS, PROVIDE CONTINUOUS HIGH CHAIRS FOR METAL DECK (C.H.C.M.) @ 4'-0" CTS. WITH A HEIGHT TO SUPPORT THE BOTTOM MAT OF 'A' BARS A CLEAR DISTANCE 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.  
 CONCRETE BARRIER RAIL IN A CONTINUOUS UNIT SHALL NOT BE CAST UNTIL ALL SLAB CONCRETE IN THE UNIT HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.



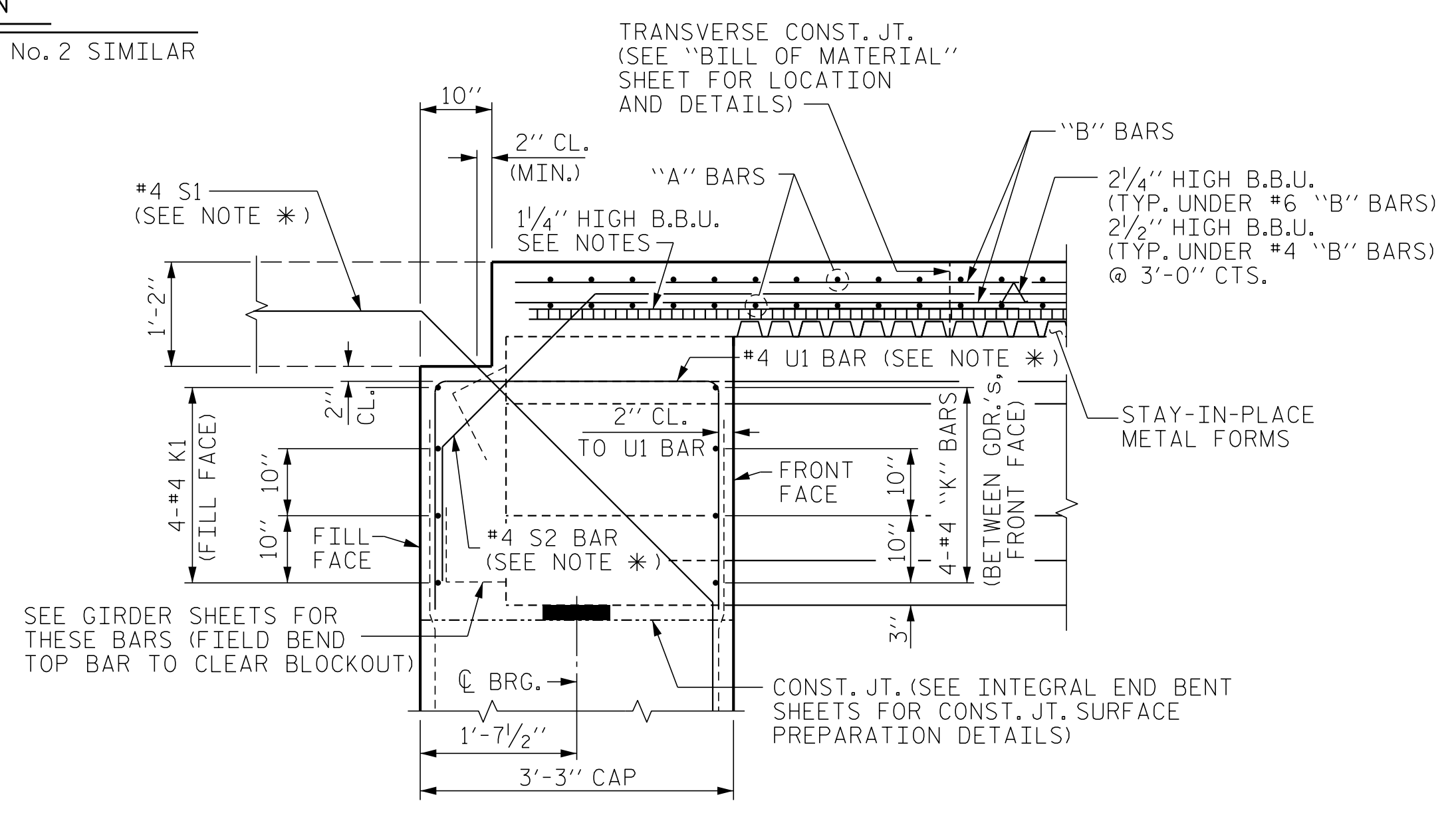
NOTE \*  
 THESE BARS ARE TO MATCH #4 'V' BARS IN END BENT

**TYPICAL SECTION**

END BENT No. 1 DIAPHRAGM SHOWN, END BENT No. 2 SIMILAR

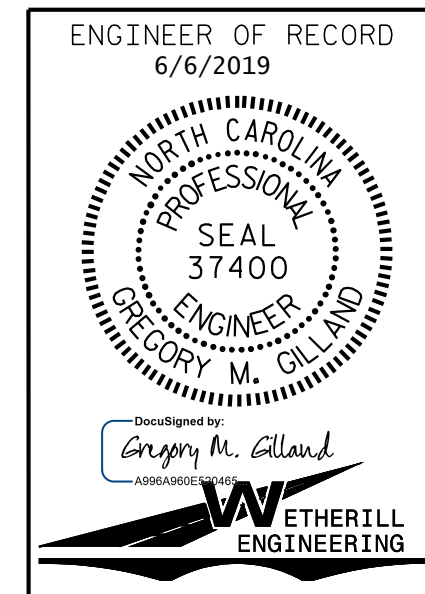


**DETAIL "A"**



**SECTION THRU INTEGRAL END BENT**

PROJECT NO. BR-0014  
CUMBERLAND COUNTY  
 STATION: 21+37.00 -LREV-  
 SHEET 1 OF 2



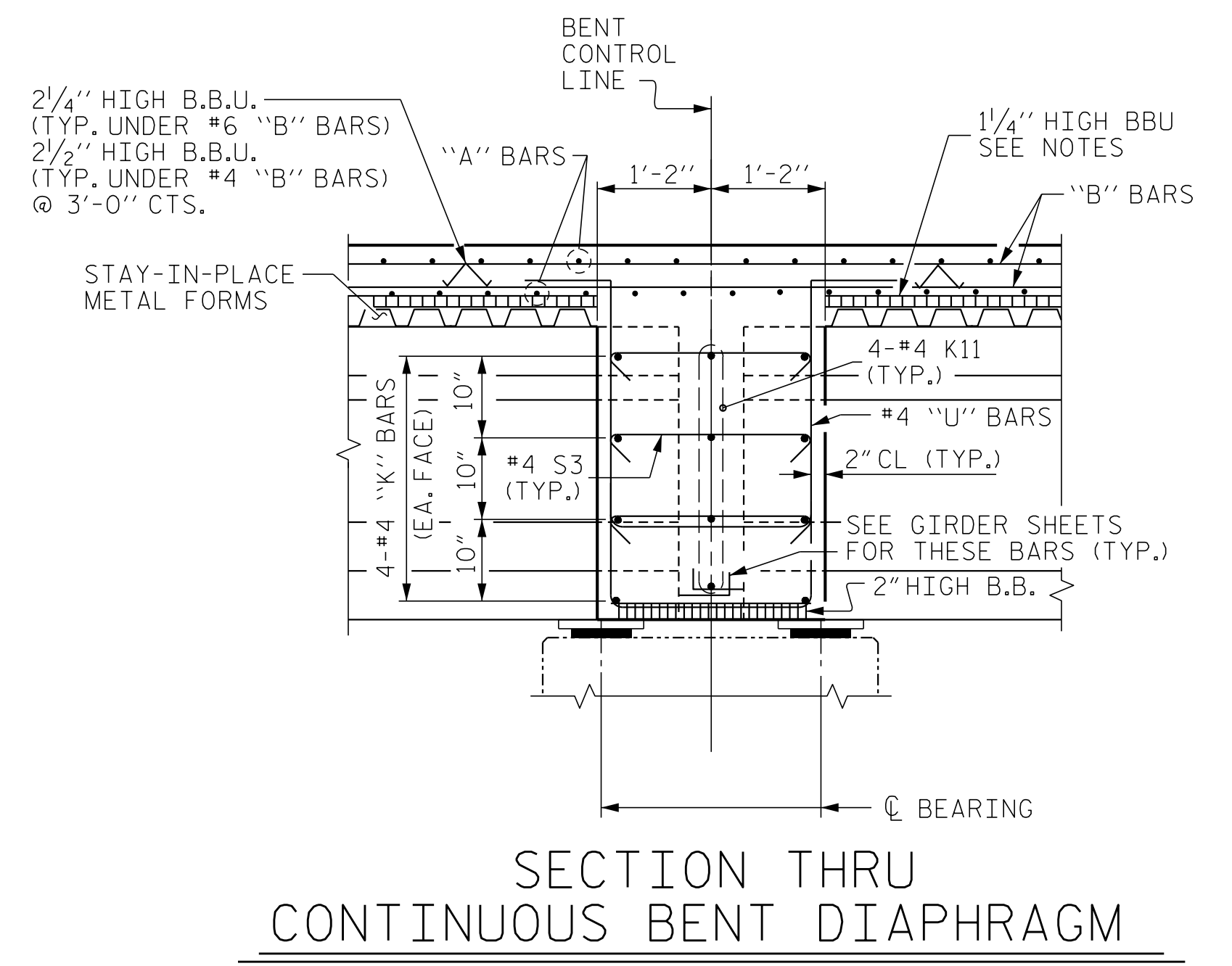
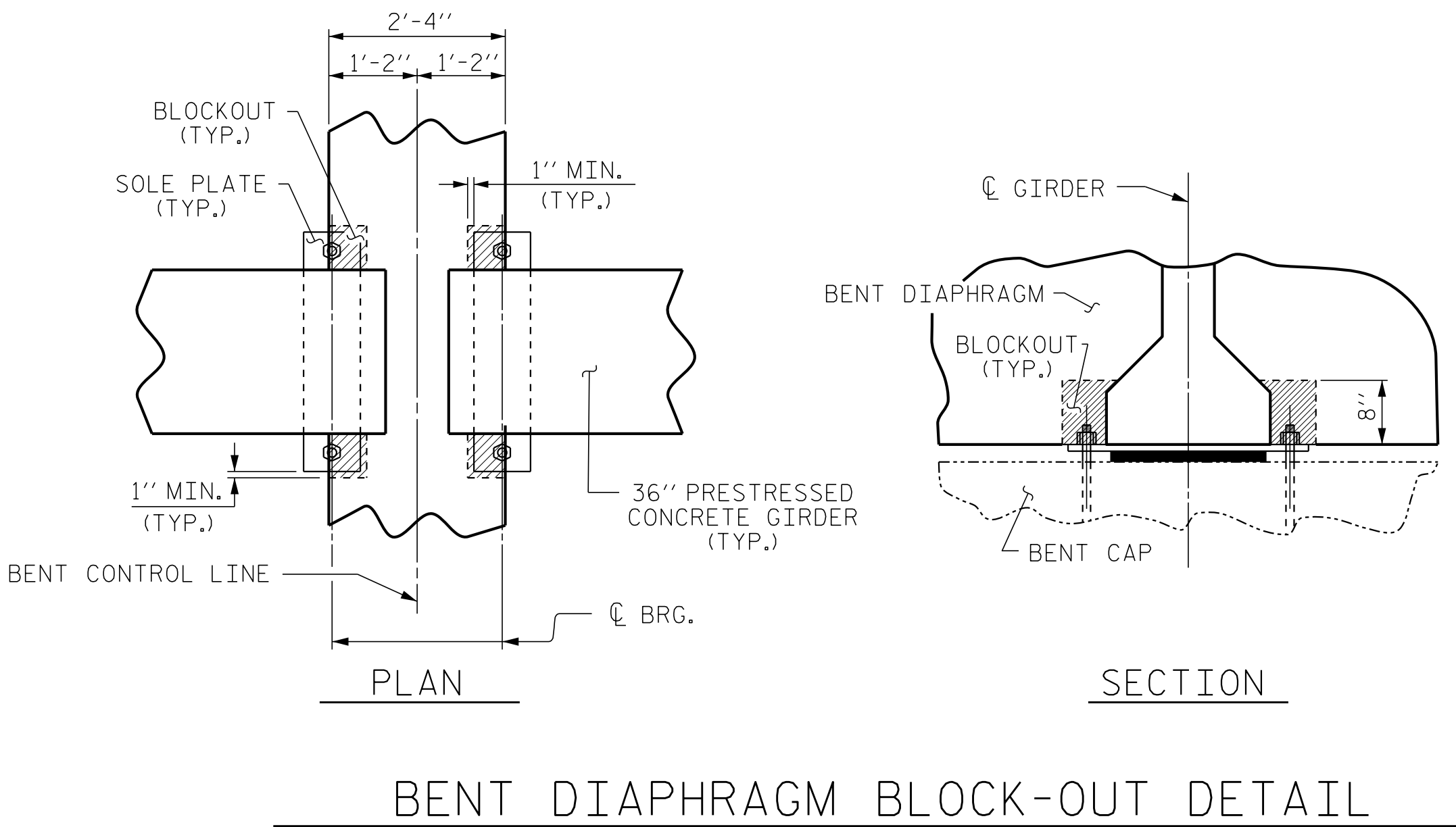
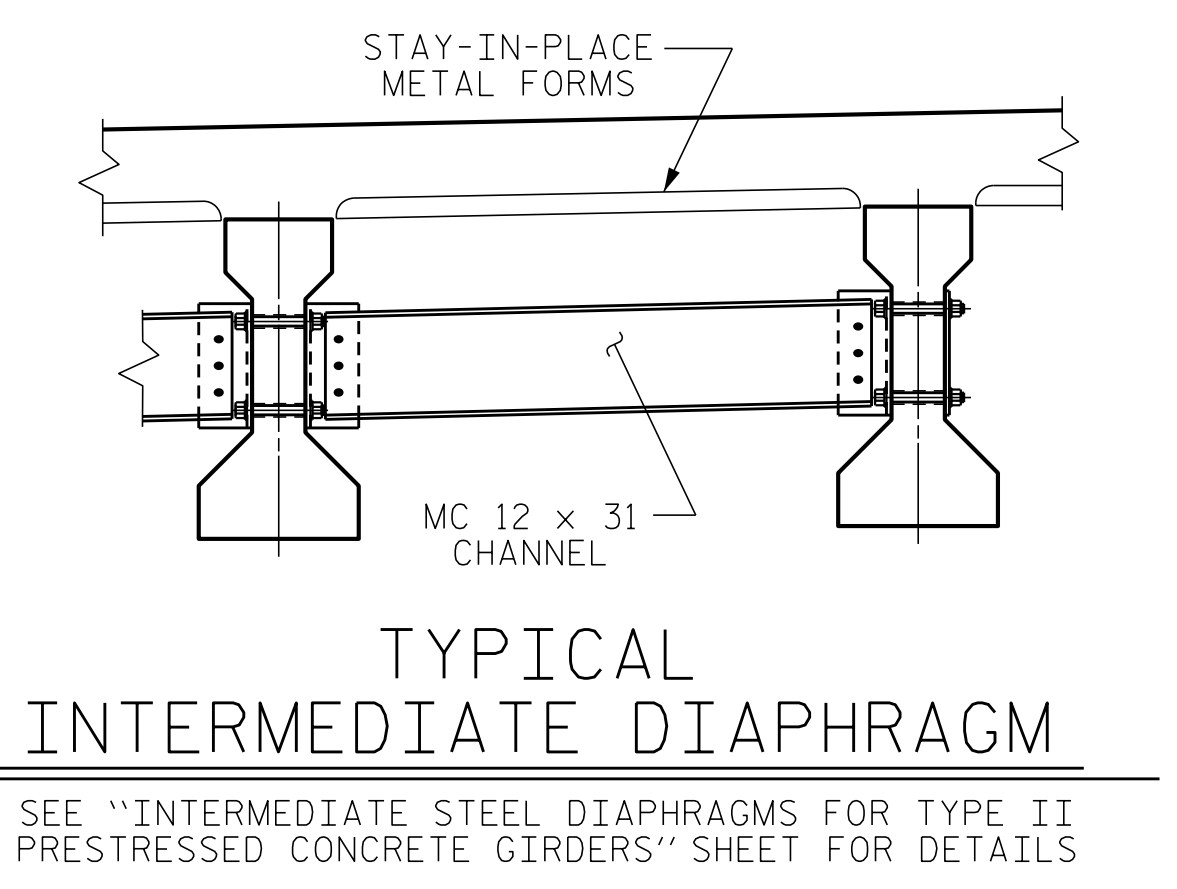
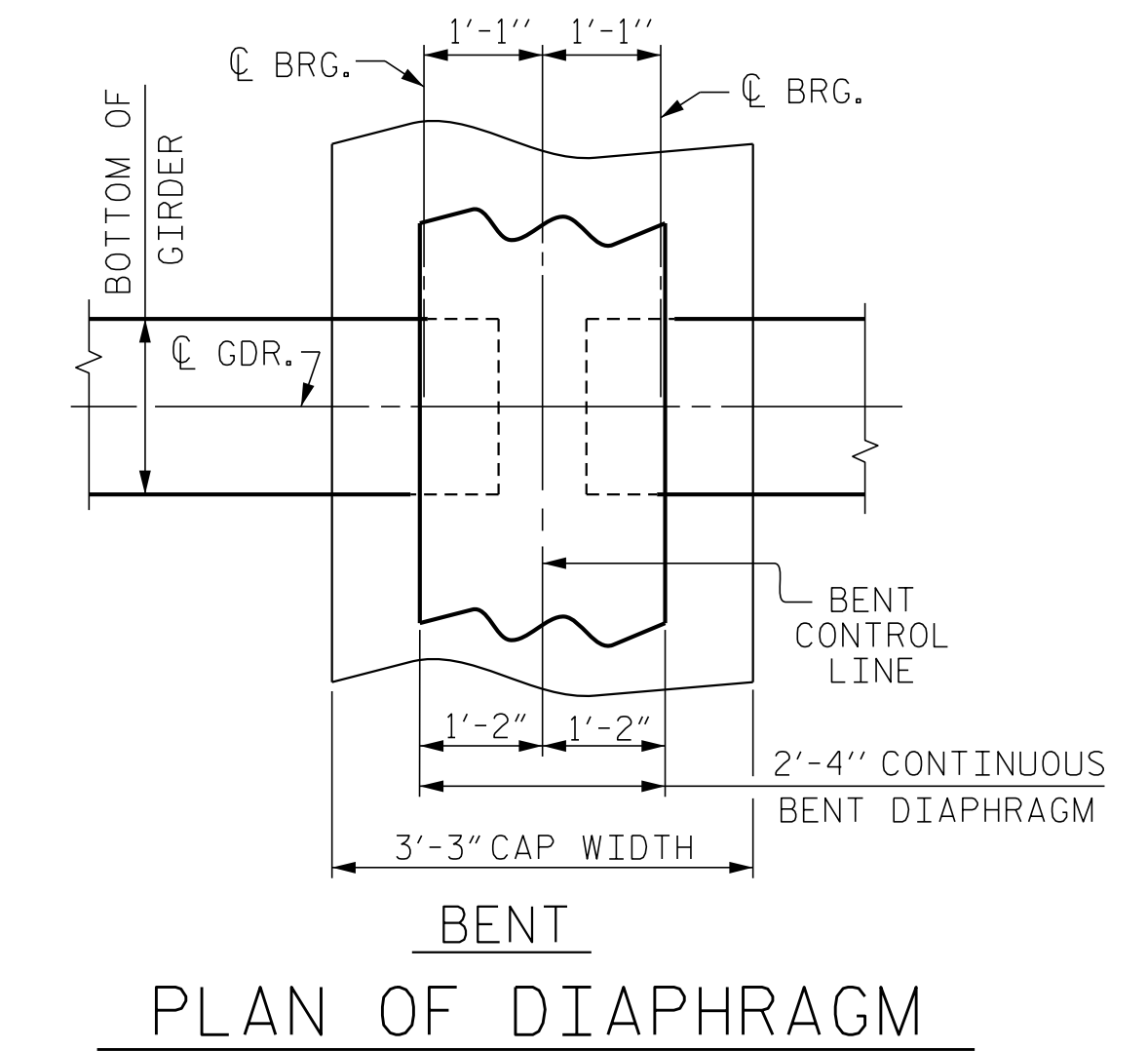
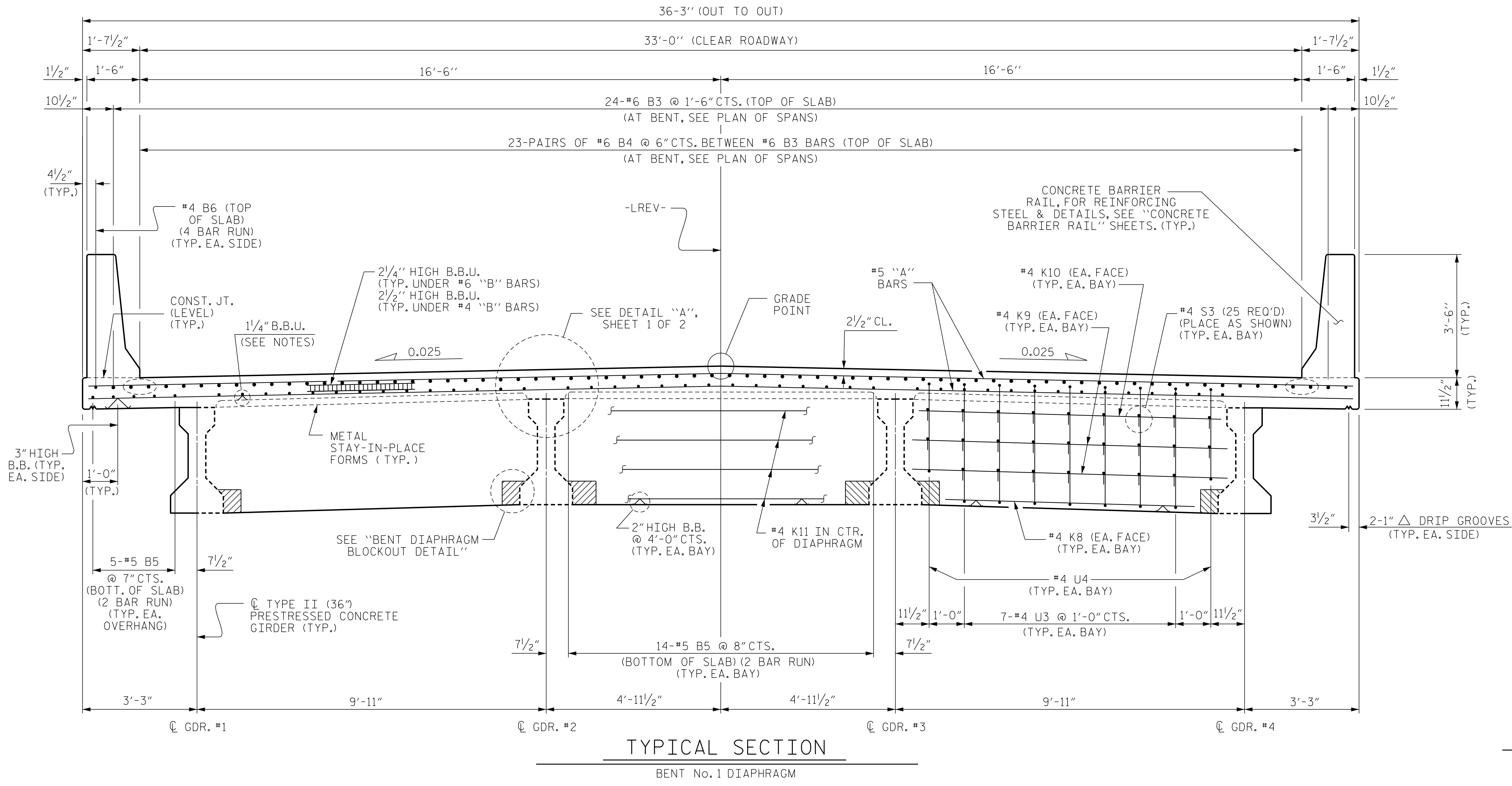
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REVISIONS			
NO.	BY:	DATE:	SHEET NO.
1			S-5
2			TOTAL SHEETS
			28

DRAWN BY: D. HODGE DATE: 3/19  
 CHECKED BY: B.C. HUNT DATE: 3/19

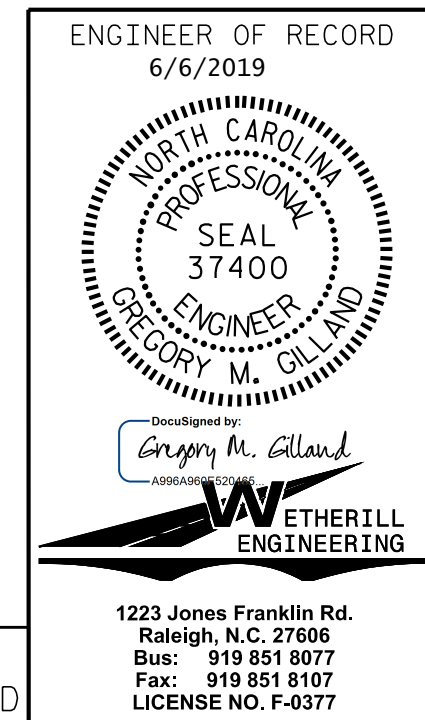
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PROJECT NO. BR-0014  
CUMBERLAND COUNTY  
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SHEET 2 OF 2



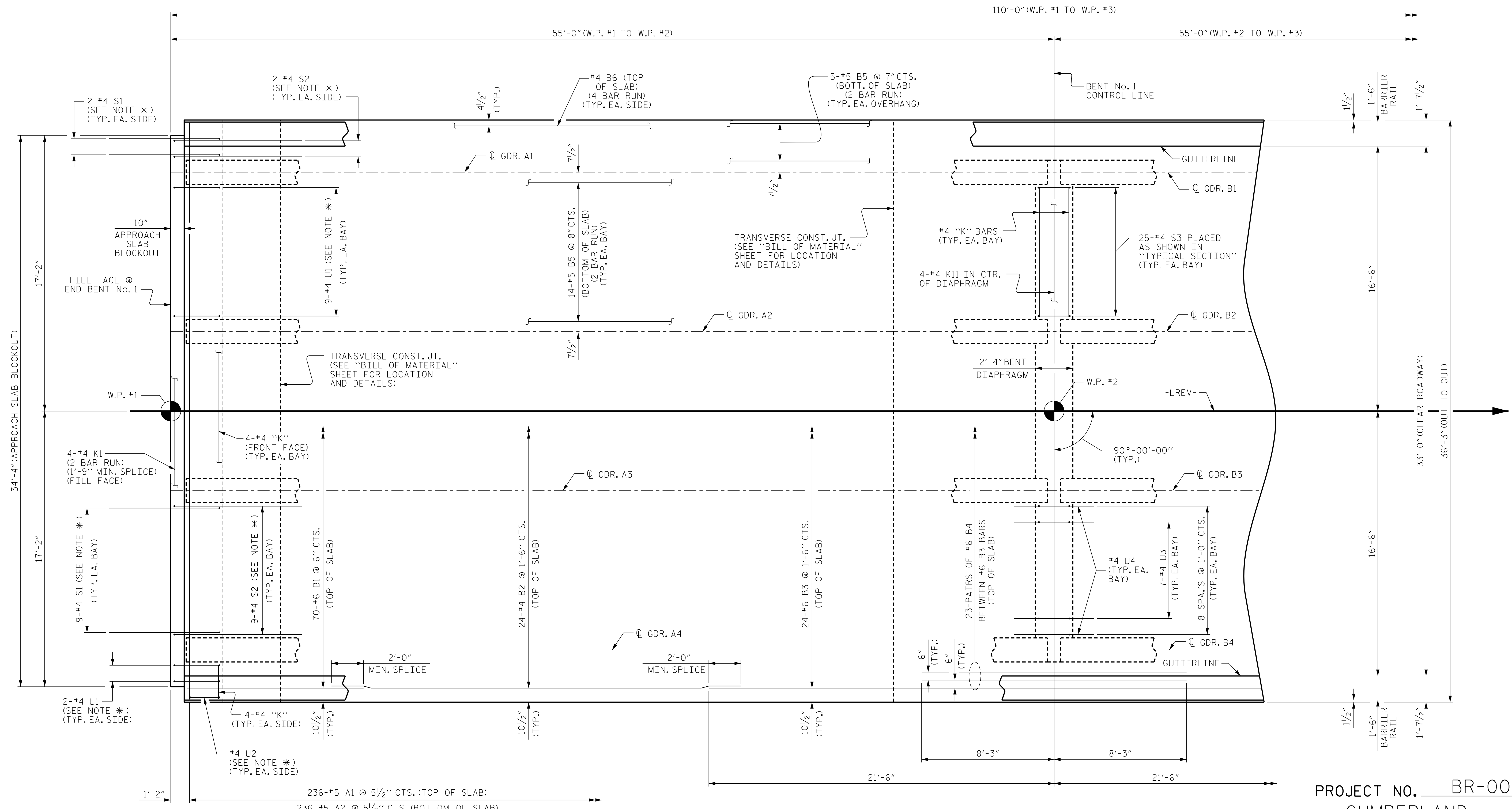
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REVISIONS			
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2			TOTAL SHEETS 28

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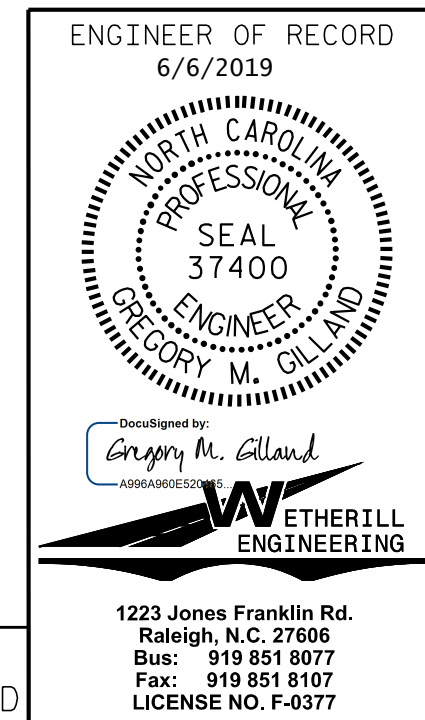


PROJECT NO. BR-0014  
 CUMBERLAND COUNTY  
 STATION: 21+37.00 -LREV-

SPAN "A"  
 SPAN "B"

PARTIAL PLAN OF SPAN

NOTES :  
 FOR CONCRETE BARRIER RAIL DETAILS AND REINFORCING STEEL, SEE "CONCRETE BARRIER RAIL" SHEETS.  
 \* THESE BARS ARE TO MATCH SPACING OF THE #4 "V" BARS IN END BENT.  
 FOR LOCATIONS OF INTERMEDIATE STEEL DIAPHRAGMS, SEE "GIRDER LAYOUT" SHEET.



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

SUPERSTRUCTURE  
 PLAN OF SPAN

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

SHEET NO. S-7  
 TOTAL SHEETS 28

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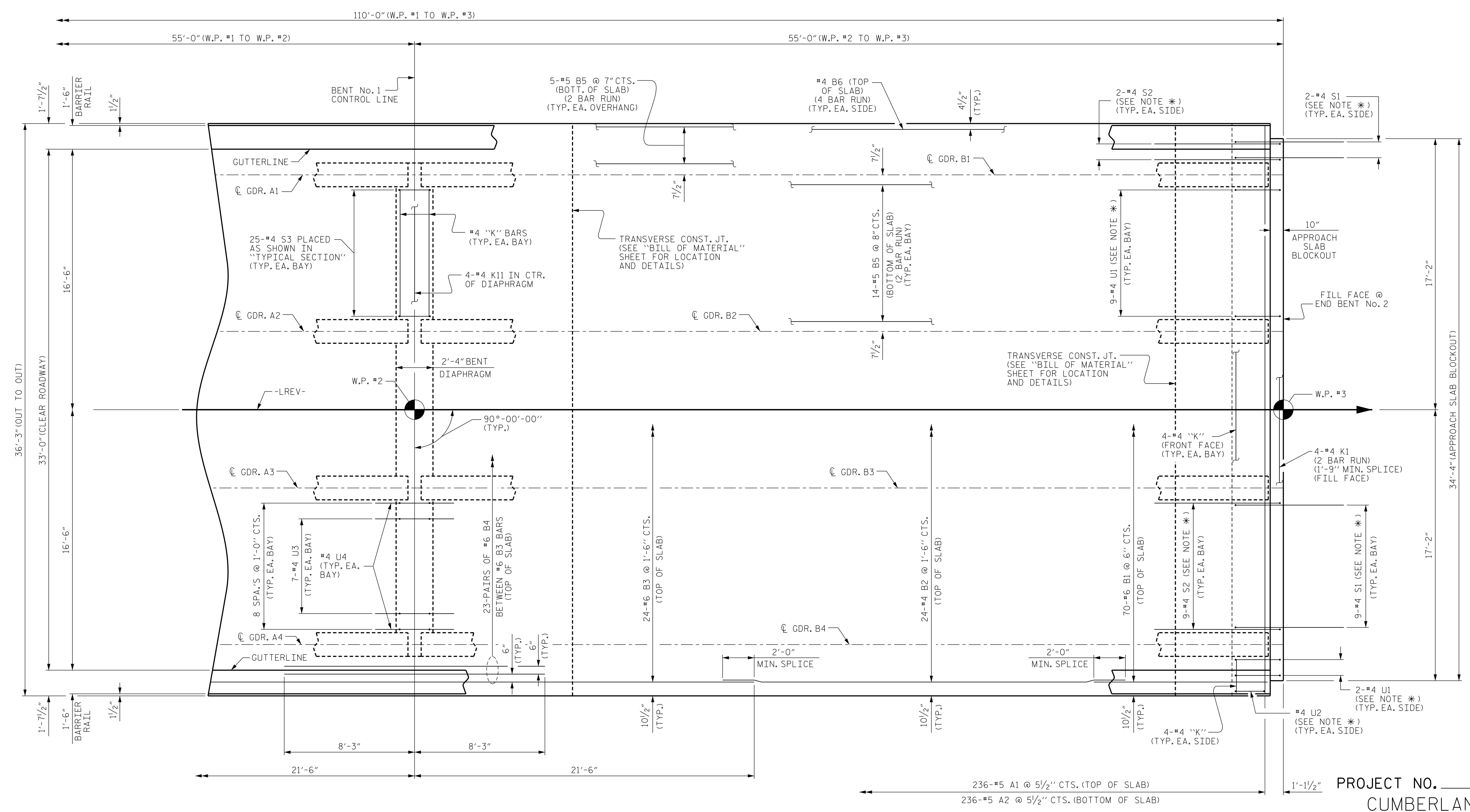
DRAWN BY : D. HODGE DATE : 3/19  
 CHECKED BY : B.C. HUNT DATE : 3/19

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SPAN "A"

SPAN "B"

### PARTIAL PLAN OF SPAN

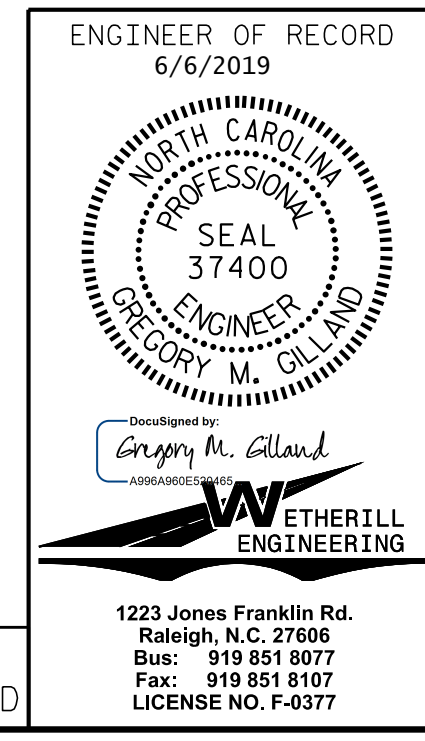
**NOTES :**  
 FOR CONCRETE BARRIER RAIL DETAILS AND REINFORCING STEEL, SEE "CONCRETE BARRIER RAIL" SHEETS.  
 \* THESE BARS ARE TO MATCH SPACING OF THE #4 "K" BARS IN END BENT.  
 FOR LOCATIONS OF INTERMEDIATE STEEL DIAPHRAGMS, SEE "GIRDER LAYOUT" SHEET.

PROJECT NO. BR-0014  
CUMBERLAND COUNTY  
 STATION: 21+37.00 -LREV-

SHEET 2 OF 2

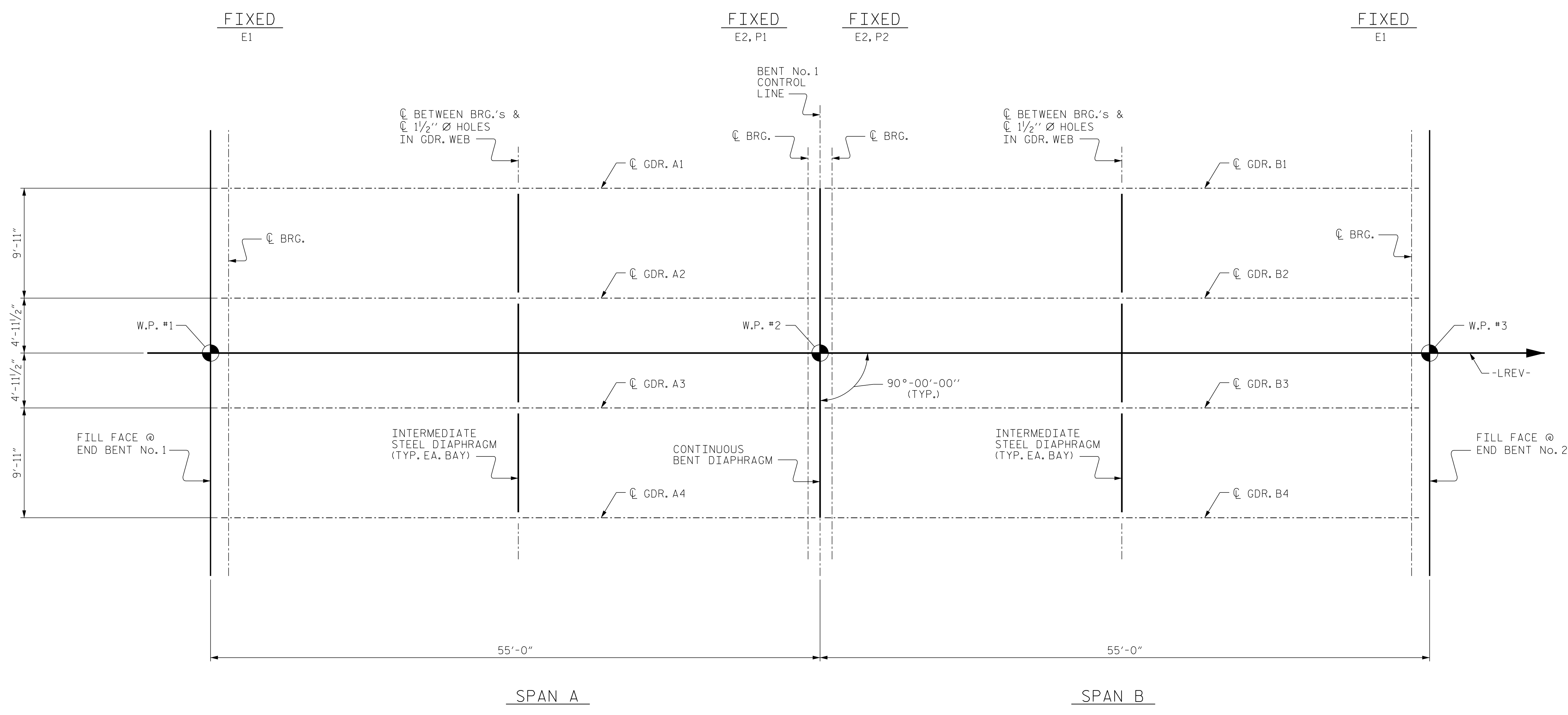
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STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
SUPERSTRUCTURE PLAN OF SPAN					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
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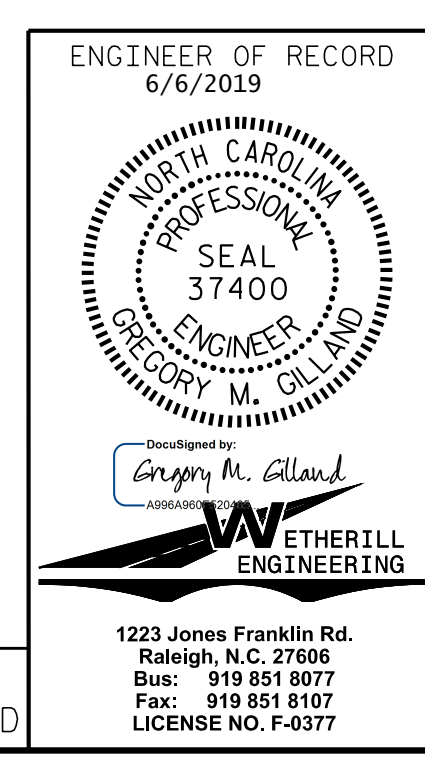


### GIRDER LAYOUT

PROJECT NO. BR-0014  
CUMBERLAND COUNTY  
 STATION: 21+37.00 -LREV-

DRAWN BY : D. HODGE DATE : 3/19  
 CHECKED BY : B.C. HUNT DATE : 3/19

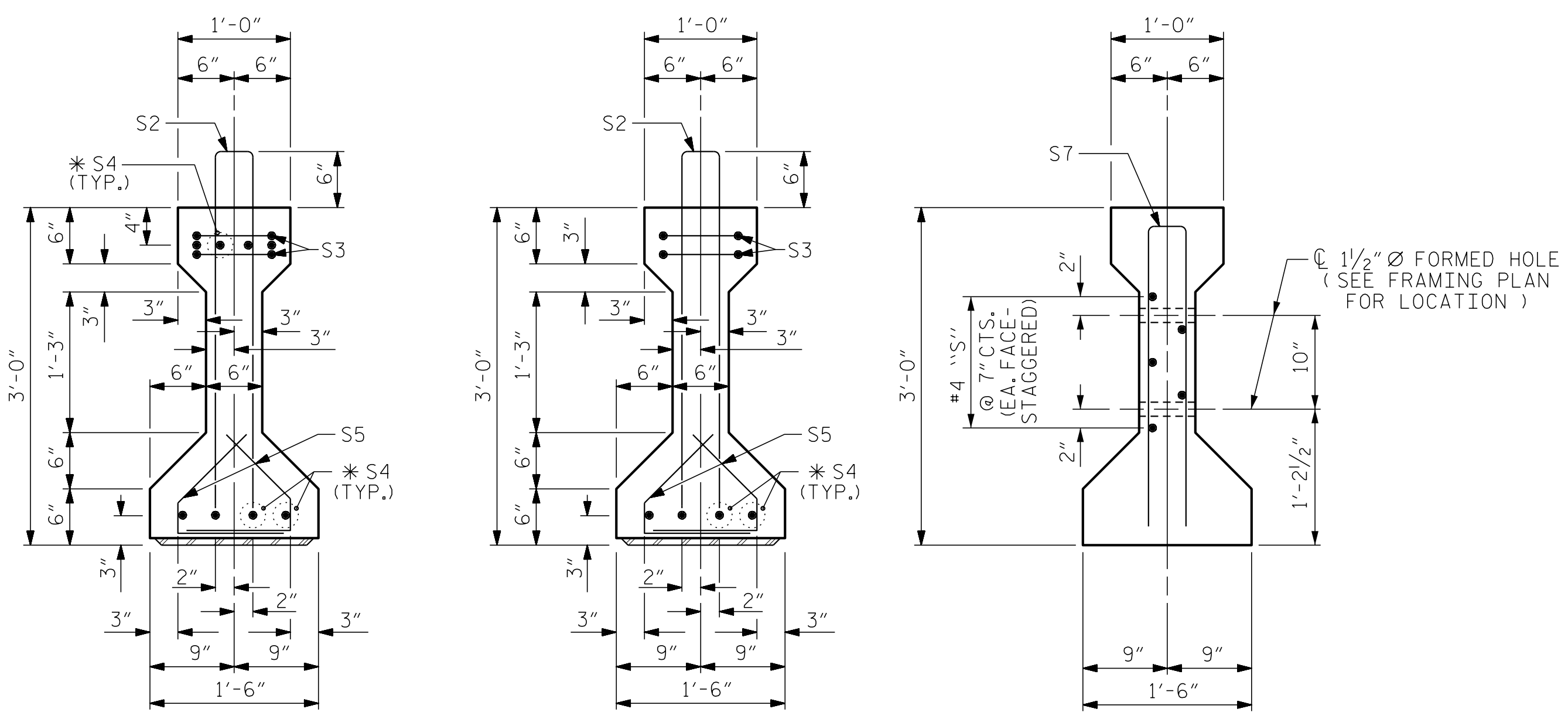
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STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
SUPERSTRUCTURE GIRDER LAYOUT					
REVISIONS					SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
					TOTAL SHEETS
					28

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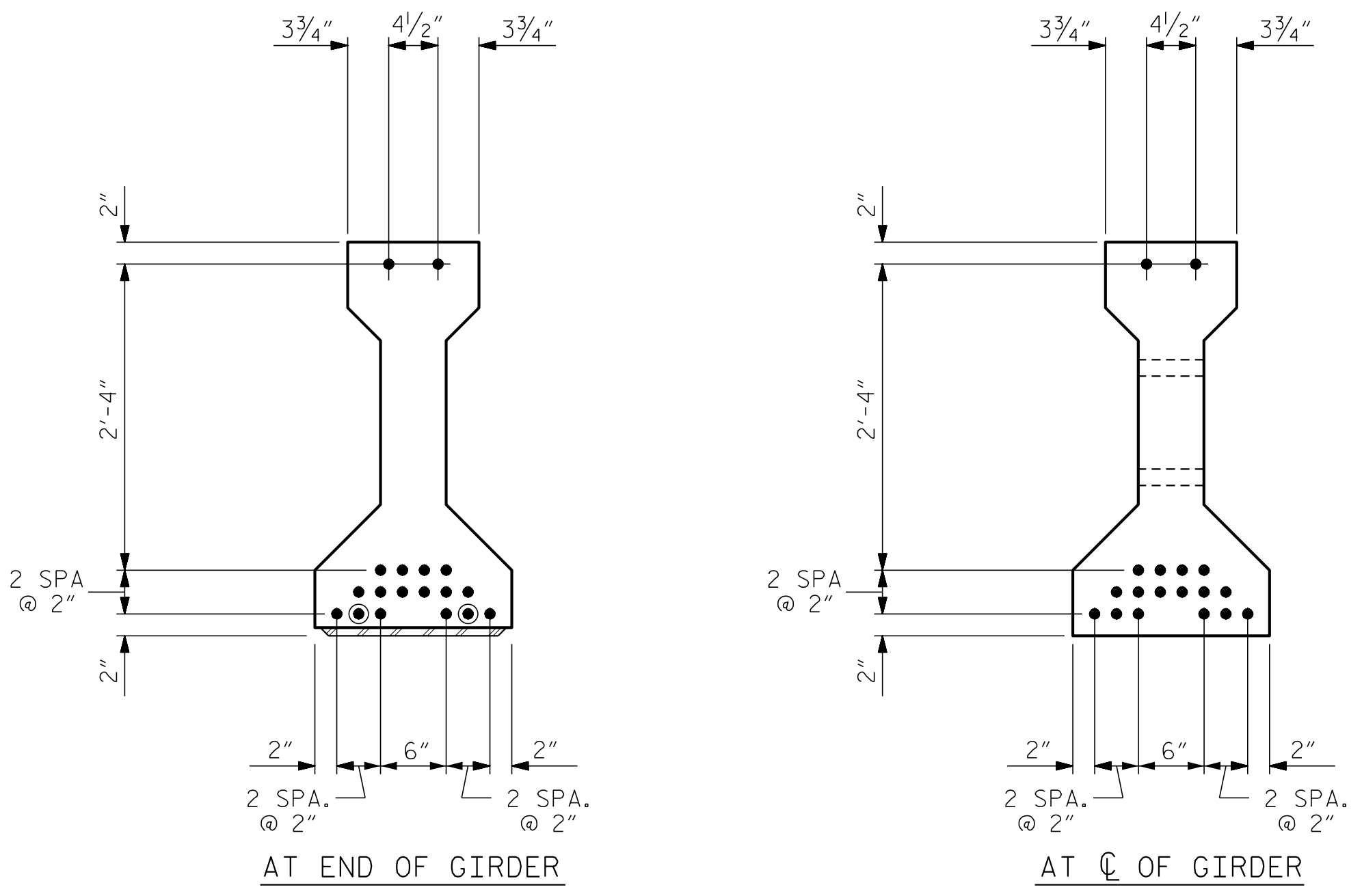




SECTION A-A

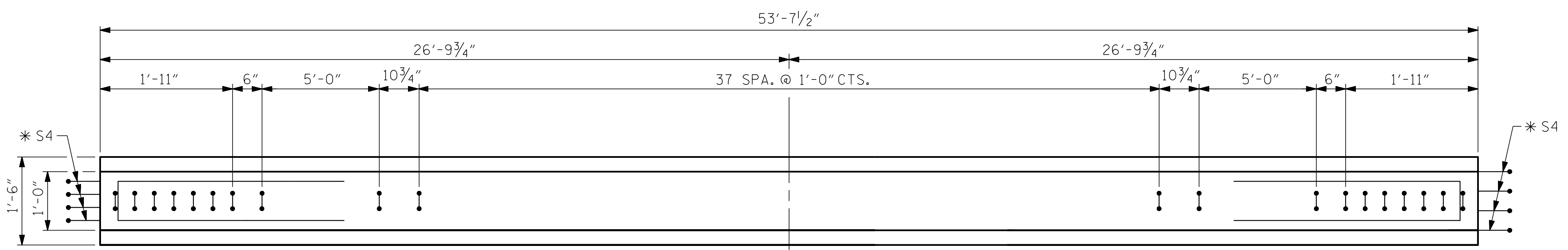
SECTION B-B

SECTION C-C  
(S1 BARS NOT SHOWN)

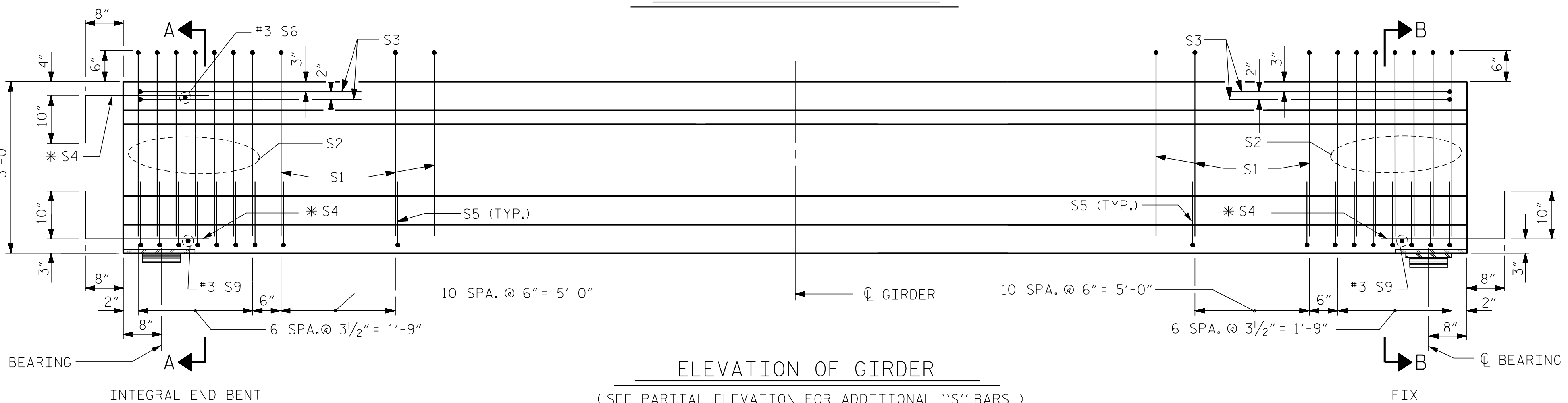


0.6" Ø LOW RELAXATION STRAND LAYOUT

● DEBONDING LENGTH = 4'-0"

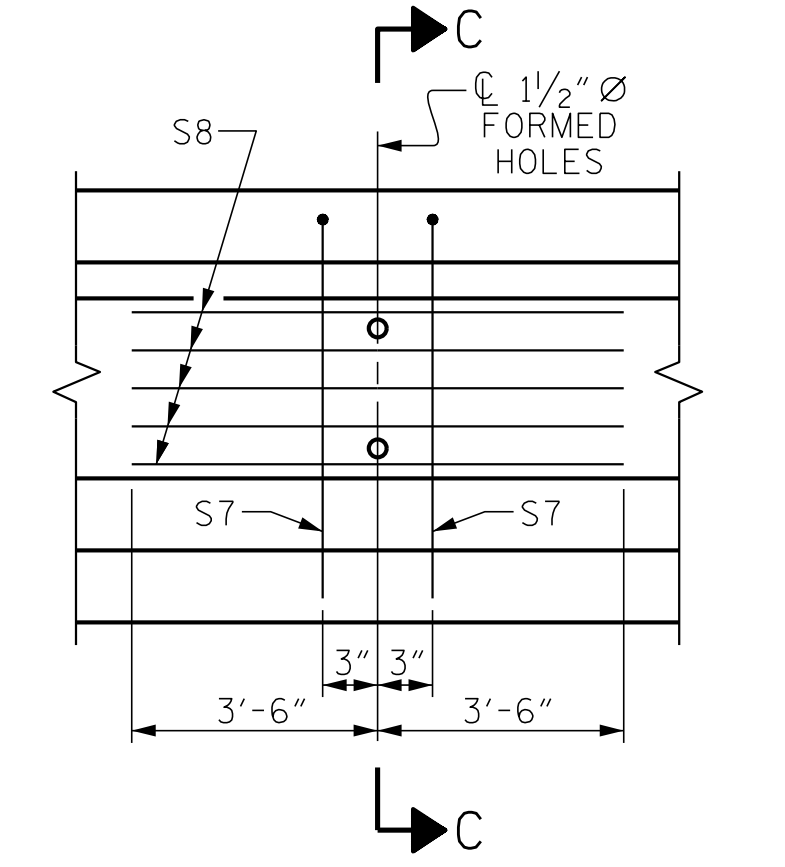


PLAN OF GIRDER



ELEVATION OF GIRDER

(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS)



PARTIAL ELEVATION

SHOWING INTERMEDIATE DIAPHRAGM REINFORCING STEEL

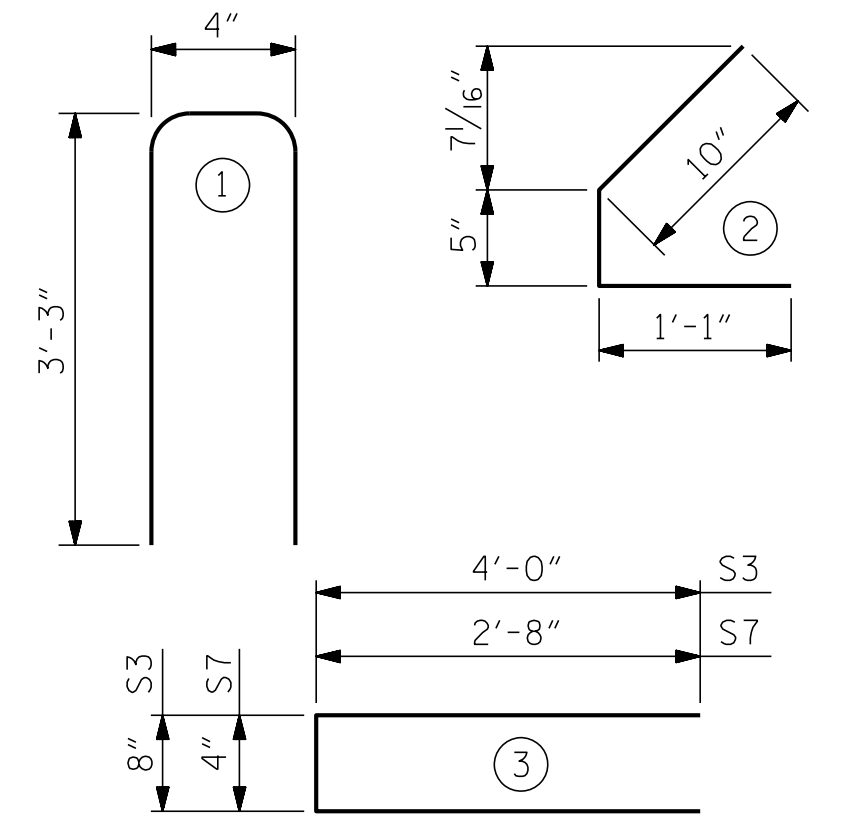
0.6" Ø L. R. GRADE 270 STRANDS		
AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

REINFORCING STEEL FOR ONE GIRDER					
BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	60	#4	1	6'-10"	274
S2	14	#5	1	6'-10"	100
S3	4	#4	3	8'-8"	23
*S4	12	#5	STR	3'-8"	46
S5	72	#4	2	2'-4"	112
S6	1	#3	STR	8"	1
S7	2	#5	3	5'-8"	12
S8	5	#4	STR	7'-0"	23
S9	2	#3	STR	1'-2"	1

\* NOTE: S4 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	7,000 PSI CONCRETE	0.6" Ø L. R. STRANDS
LB.	C.Y.	No.
592	5.1	18

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
8	53'-7 1/2"	429'-0"

PROJECT NO. BR-0014  
CUMBERLAND COUNTY  
STATION: 21+37.00 -LREV-

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ASSEMBLED BY : D. HODGE	DATE : 3/19
CHECKED BY : B.C. HUNT	DATE : 3/19
DRAWN BY : ELR 8/91	REV. 10/1/11 MAA/GM
CHECKED BY : GRP 8/91	REV. 1/15 MAA/TMG
	REV. 12/17 MAA/THC

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ENGINEER OF RECORD  
6/6/2019

Gregory M. Gulland  
ASSOCIATE ENGINEER  
ETHERILL ENGINEERING

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LICENSE NO. F-0377

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
STANDARD AASHTO TYPE II PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

SHEET NO. S-10	
TOTAL SHEETS 28	

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.

APPLY EPOXY PROTECTIVE COATING TO END OF GIRDER SURFACES INDICATED IN ELEVATION VIEW.

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.

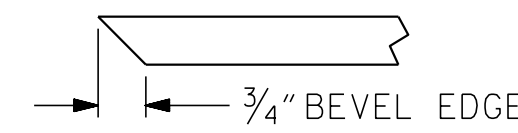
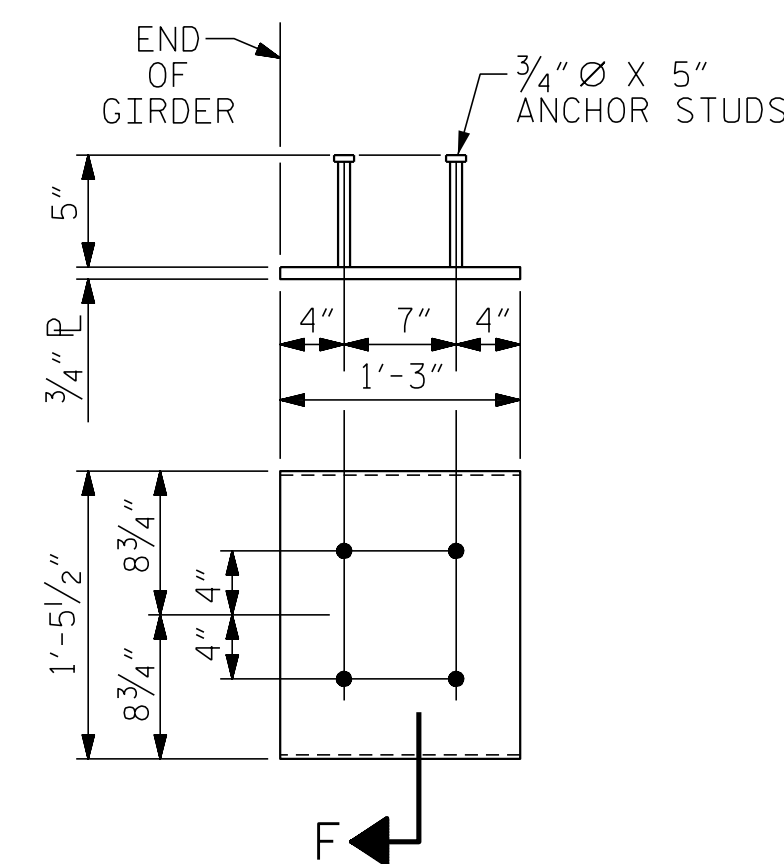
THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE GIRDER SHALL BE DONE WHEN CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN 5,600 PSI.

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.



SECTION "F"

(SEE NOTES)

EMBEDDED PLATE "B-1" DETAILS FOR AASHTO TYPE II GIRDER

(2 REQ'D PER GIRDER)

— DEAD LOAD DEFLECTION TABLE FOR GIRDERS OF SPANS A & B —

0.6" Ø LOW RELAXATION	GIRDERS 1 & 4											
	TENTH POINTS	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	0
CAMBER ( GIRDER ALONE IN PLACE )	↑	0	0.041	0.077	0.105	0.123	0.130	0.123	0.105	0.077	0.041	0
* DEFLECTION DUE TO SUPERIMPOSED D.L.	↓	0	0.019	0.039	0.054	0.064	0.067	0.064	0.054	0.039	0.019	0
FINAL CAMBER	↑	0	1/4"	7/16"	5/8"	11/16"	3/4"	11/16"	5/8"	7/16"	1/4"	0

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

— DEAD LOAD DEFLECTION TABLE FOR GIRDERS OF SPANS A & B —

0.6" Ø LOW RELAXATION	GIRDERS 2 & 3											
	TENTH POINTS	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	0
CAMBER ( GIRDER ALONE IN PLACE )	↑	0	0.041	0.077	0.105	0.123	0.130	0.123	0.105	0.077	0.041	0
* DEFLECTION DUE TO SUPERIMPOSED D.L.	↓	0	0.022	0.046	0.064	0.075	0.079	0.075	0.064	0.046	0.022	0
FINAL CAMBER	↑	0	1/4"	3/8"	1/2"	9/16"	5/8"	9/16"	1/2"	3/8"	1/4"	0

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

PROJECT NO. BR-0014  
CUMBERLAND COUNTY  
 STATION: 21+37.00 -LREV-

ASSEMBLED BY : D. HODGE	DATE : 4/19
CHECKED BY : G.M. GILLAND	DATE : 4/19
DRAWN BY : ELR 11/91	REV. 1/15 MAA/TMG
CHECKED BY : GRP 11/91	REV. 2/15 MAA/TMG
	REV. 12/17 MAA/THC

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ENGINEER OF RECORD  
8/22/2019

Gregory M. Gilland  
ETHERILL ENGINEERING

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Raleigh, N.C. 27606  
Bus: 919 851 8077  
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LICENSE NO. F-0377

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

STANDARD  
PRESTRESSED CONCRETE GIRDER  
CONTINUOUS FOR LIVE LOAD  
DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-11
1			3			TOTAL SHEETS
2			4			28



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 (METALLIZATION) PROGRAM, 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.

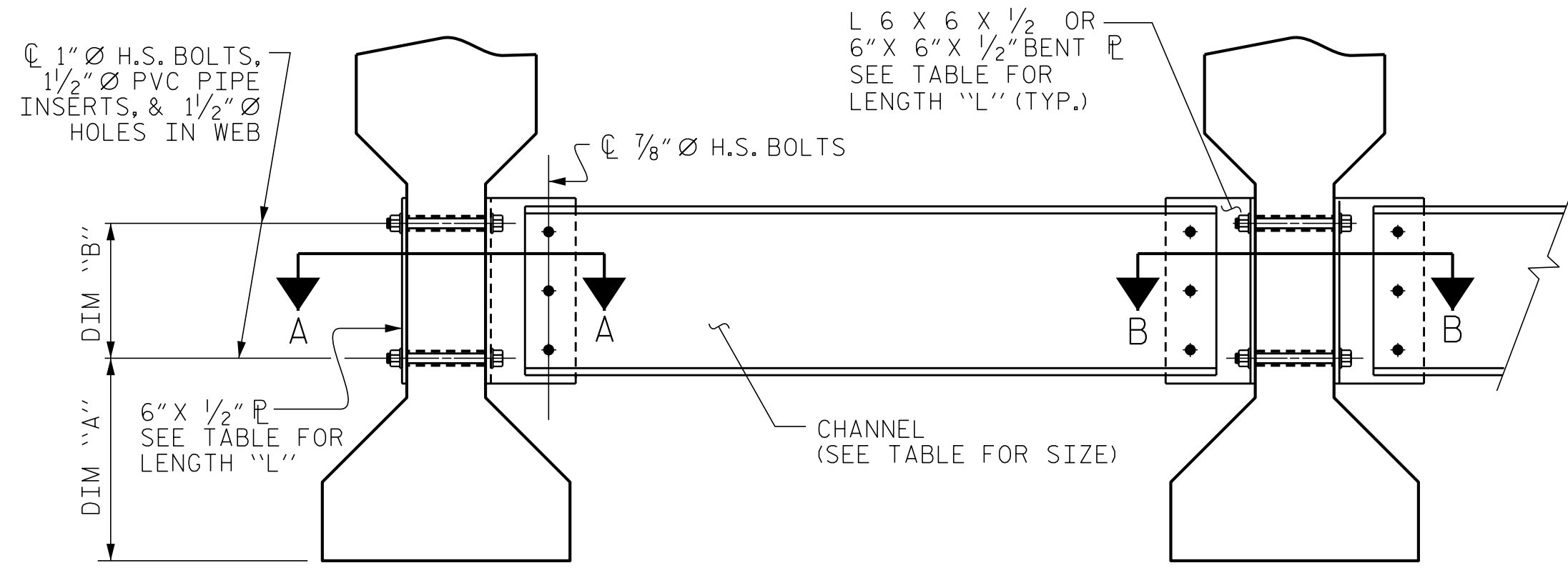
FOR BOLTS THROUGH THE GIRDER WEB, PROVIDE SUFFICIENT LENGTH OF THREADS ON ALL BOLTS TO ACCOMMODATE WASHERS AND THE THICKNESS OF CONNECTING MEMBER PLUS AT LEAST 1/4" PROJECTION BEYOND THE NUT.

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

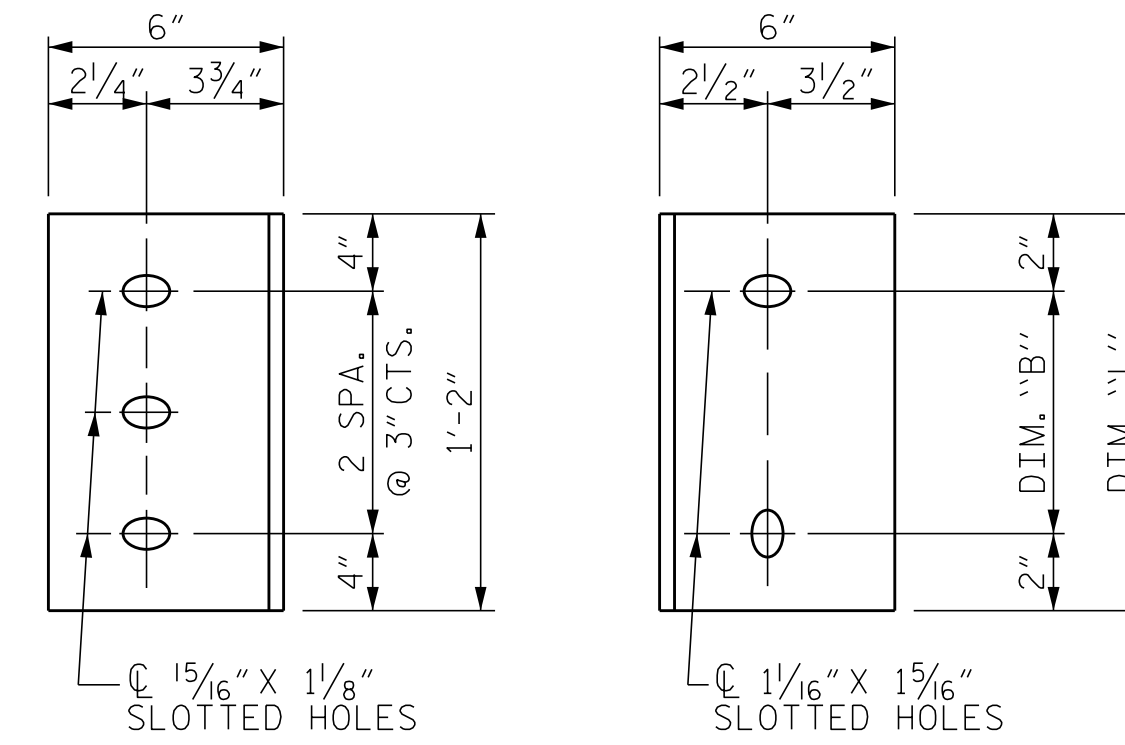
SUBMIT TWO SETS OF WORKING DRAWINGS FOR THE INTERMEDIATE DIAPHRAGM ASSEMBLY FOR REVIEW, COMMENTS AND ACCEPTANCE. AFTER REVIEW, COMMENTS, AND ACCEPTANCE, SUBMIT SEVEN SETS FOR DISTRIBUTION.

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.



EXTERIOR GIRDER  
INTERIOR GIRDER  
PART SECTION AT INTERMEDIATE DIAPHRAGM



DIAPHRAGM FACE  
WEB FACE  
(TYPE II GDR.)  
CONNECTOR PLATE DETAILS

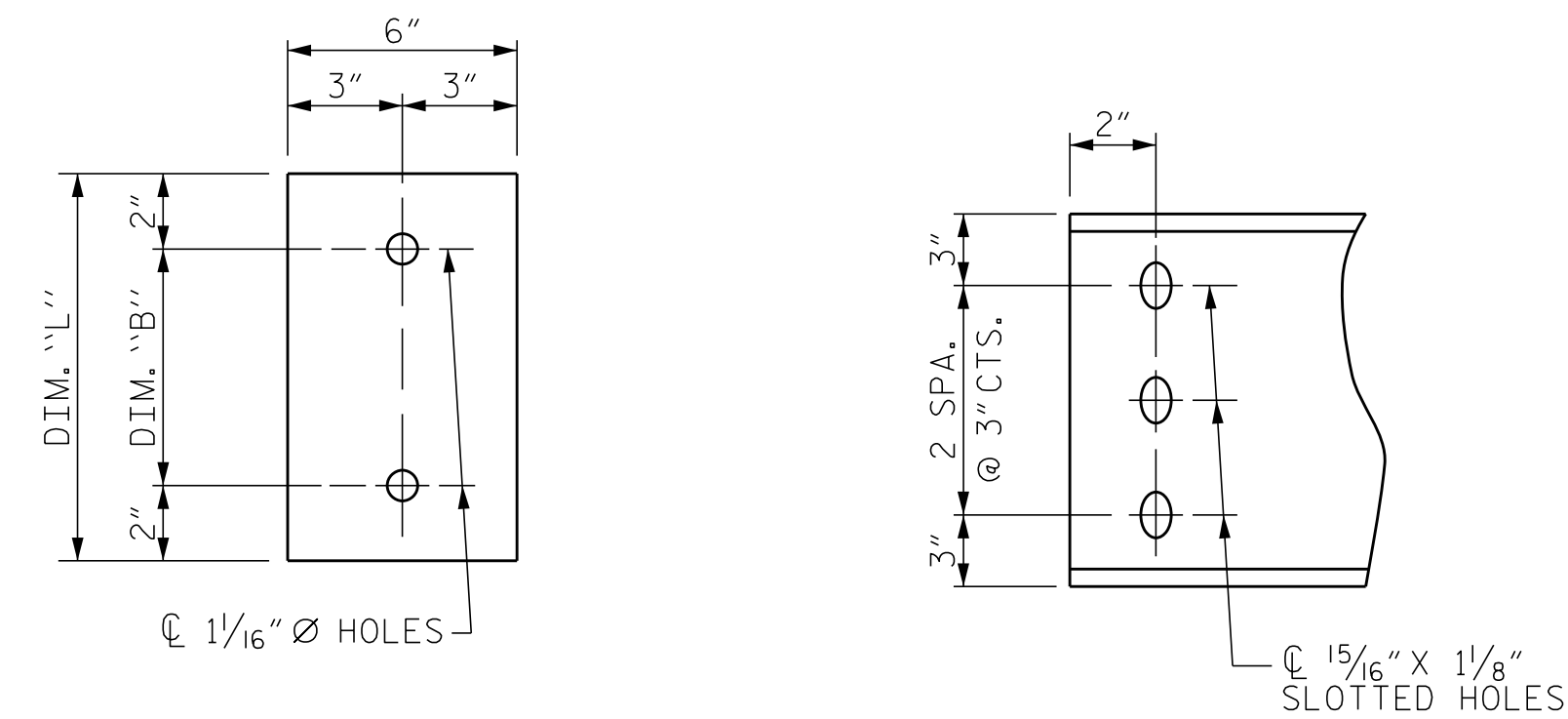
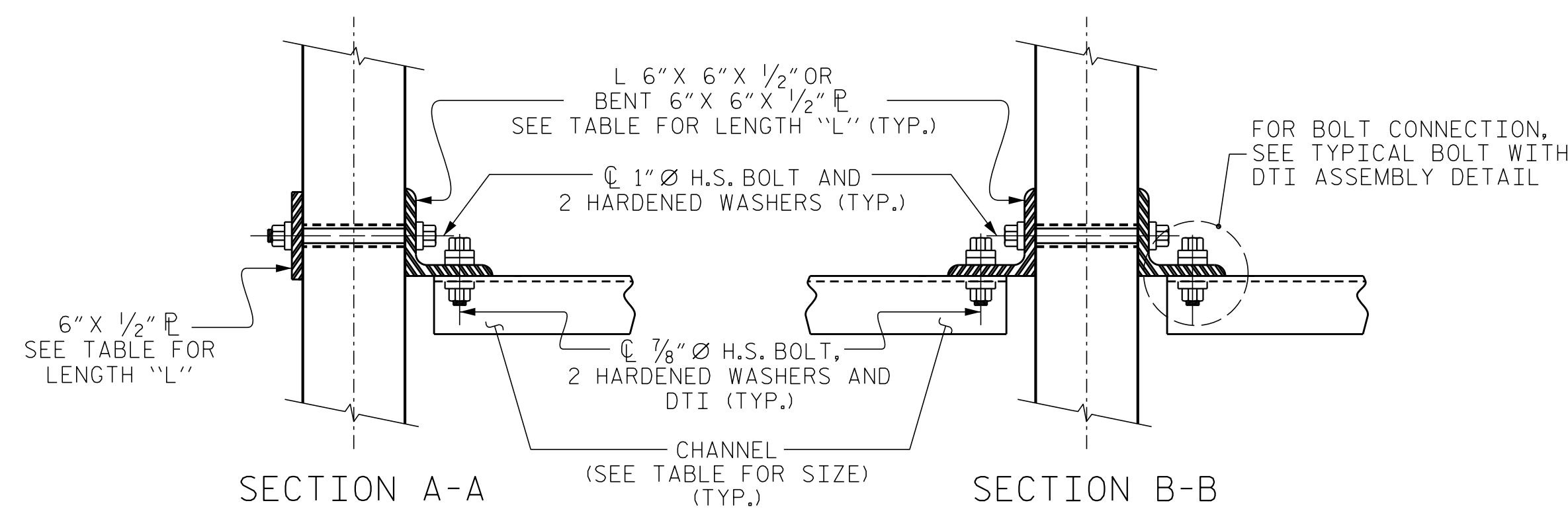


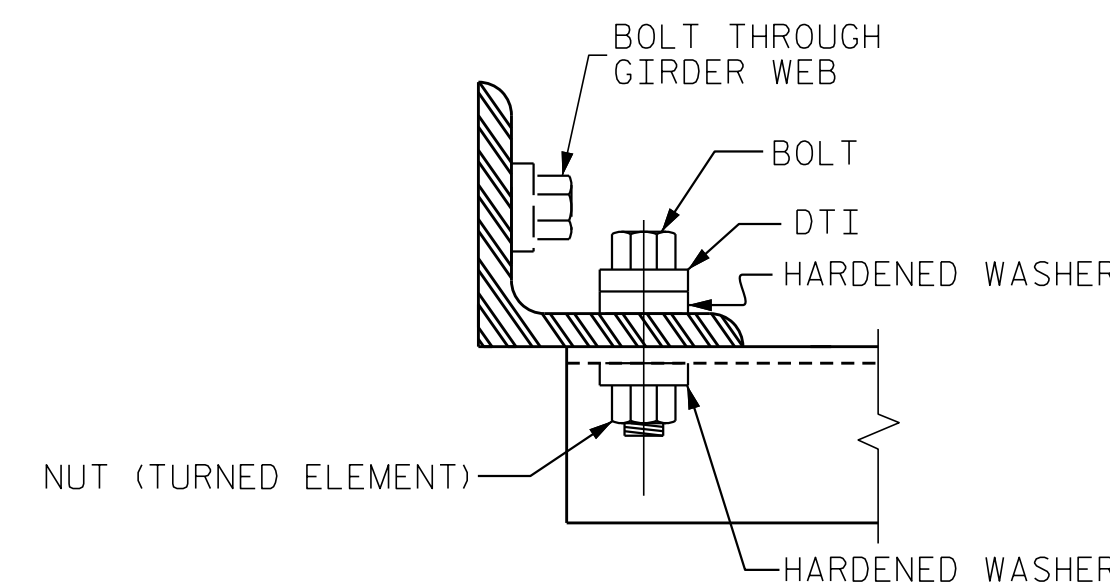
PLATE DETAILS  
CHANNEL END  
(TYPE II GDR.)

TABLE

GIRDER TYPE	CHANNEL SIZE	DIM "A"	DIM "B"	DIM "L"
II	MC 12 x 31	1'-2 1/2"	10"	1'-2"



CONNECTION DETAILS



BOLT WITH DTI ASSEMBLY DETAIL

PROJECT NO. BR-0014  
CUMBERLAND COUNTY  
STATION: 21+37.00 -LREV-

ENGINEER OF RECORD  
6/6/2019  
NORTH CAROLINA PROFESSIONAL SEAL 37400  
ENGINEER  
GREGORY M. GILLAND  
Gregory M. Gilland  
ETHERILL ENGINEERING  
1223 Jones Franklin Rd.  
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LICENSE NO. F-0377

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
STANDARD  
INTERMEDIATE  
STEEL DIAPHRAGMS  
FOR TYPE II  
PRESTRESSED CONCRETE  
GIRDERS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-12
1			3			TOTAL SHEETS
2			4			28

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ASSEMBLED BY : D. HODGE	DATE : 3/19
CHECKED BY : B.C. HUNT	DATE : 3/19
DRAWN BY : TLA 6/05	REV. 5/1/06RRR KMM/GM
CHECKED BY : VC 6/05	REV. 10/1/11 MAA/GM
	REV. 12/17 MAA/THC

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.

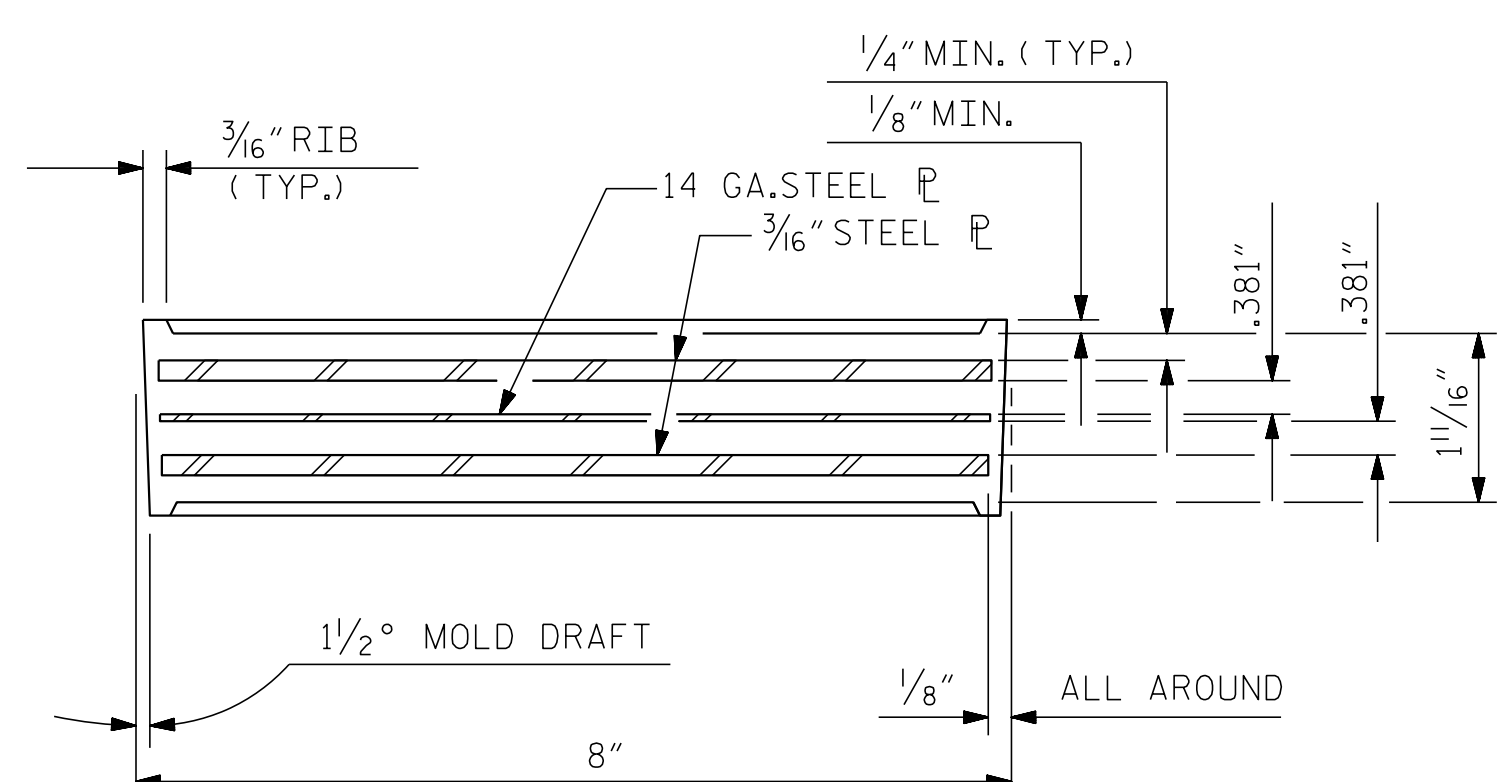
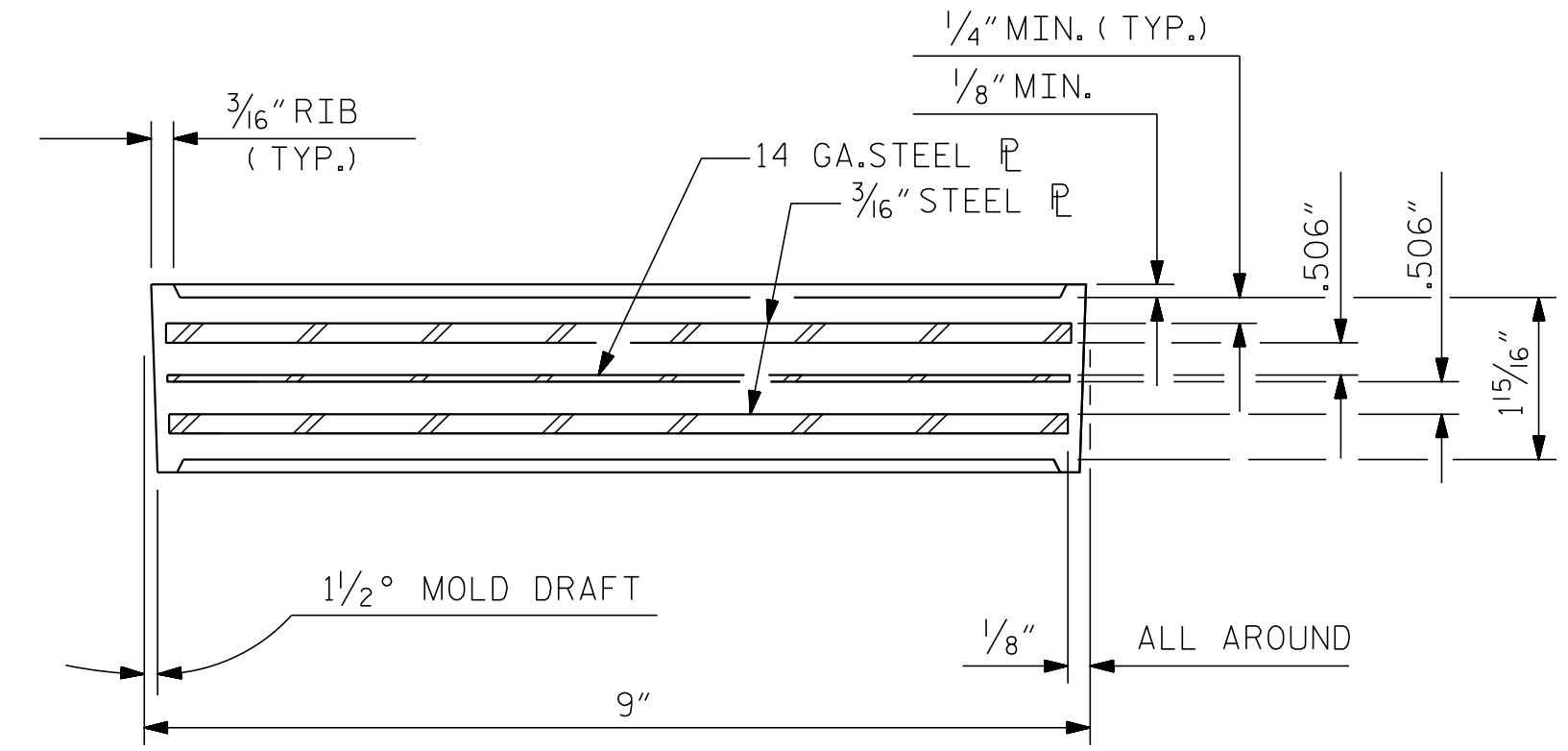
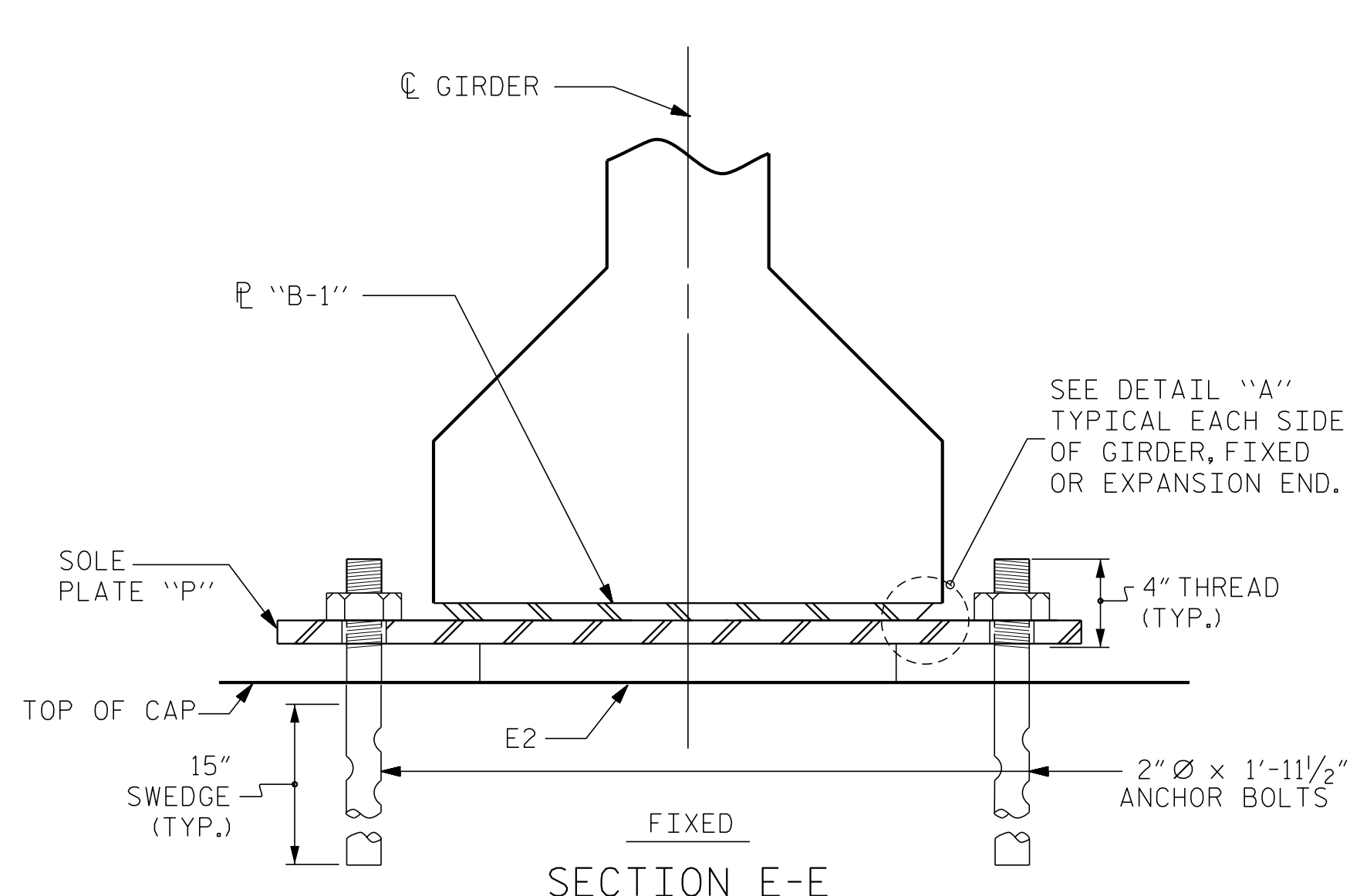
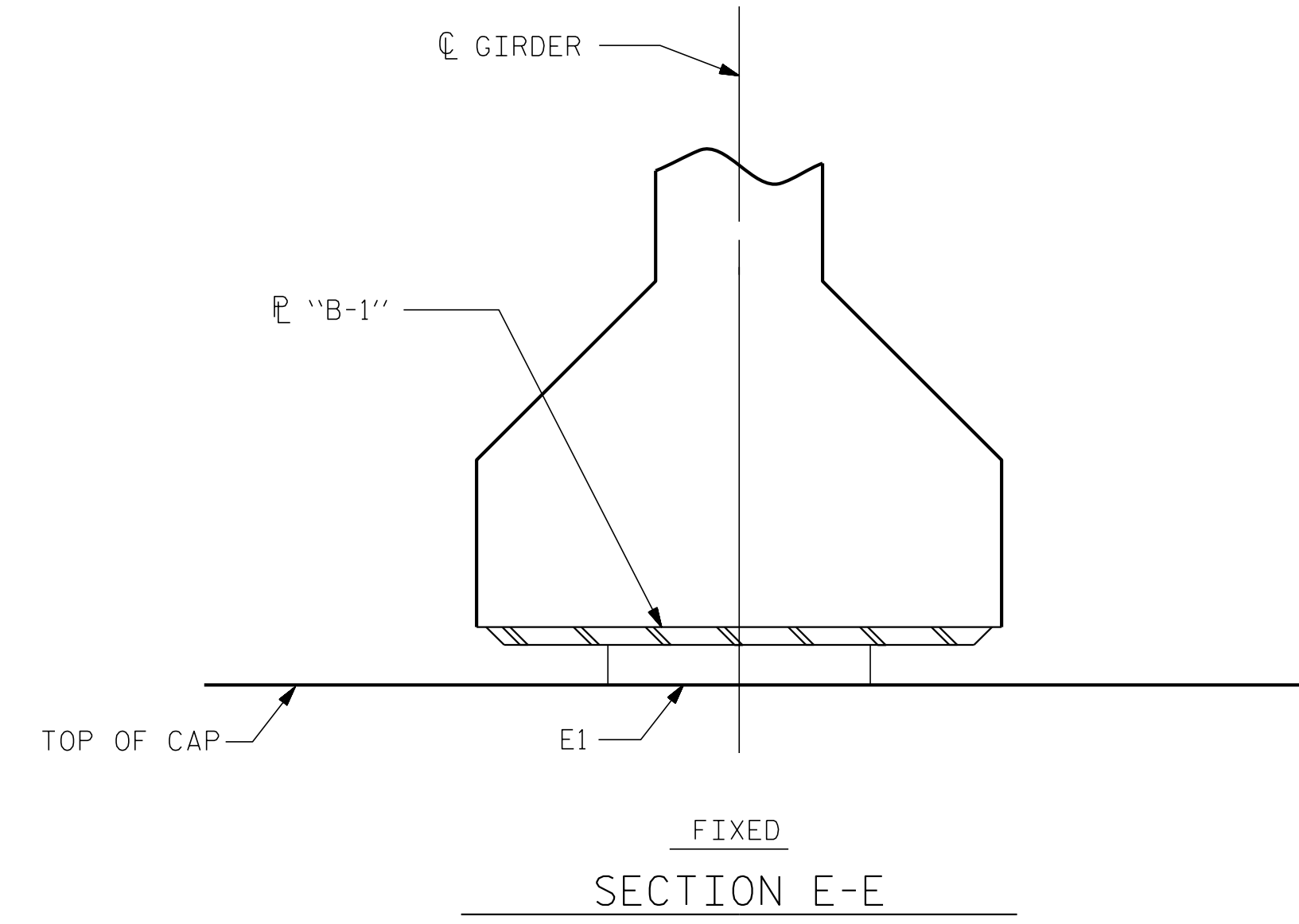
ANCHOR BOLTS SHALL MEET THE REQUIREMENTS OF ASTM A449. NUTS SHALL MEET THE REQUIREMENTS OF AASHTO M291-DH OR AASHTO M292-2H. WASHERS SHALL MEET THE REQUIREMENTS OF AASHTO M293. SHOP DRAWINGS ARE NOT REQUIRED FOR ANCHOR BOLT, NUTS AND WASHERS. SHOP INSPECTION IS REQUIRED.

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.

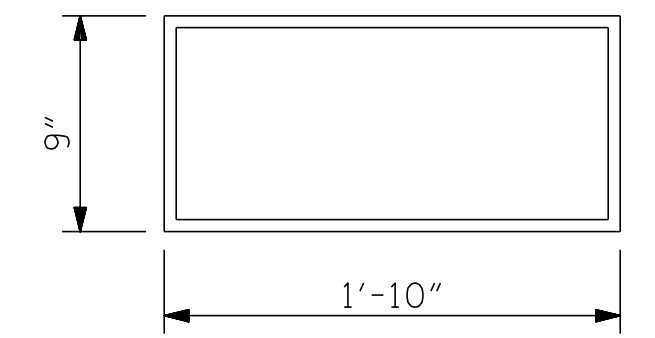
FOR STEEL REINFORCED ELASTOMERIC BEARINGS, SEE SPECIAL PROVISIONS.

ALL SOLE PLATES SHALL BE AASHTO M270 GRADE 36.



TYPICAL SECTION OF ELASTOMERIC BEARINGS

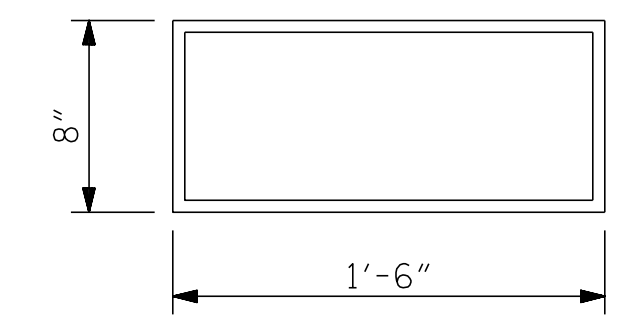
TYPICAL SECTION OF ELASTOMERIC BEARINGS



E1 (8 REQ'D)

PLAN VIEW OF ELASTOMERIC BEARING

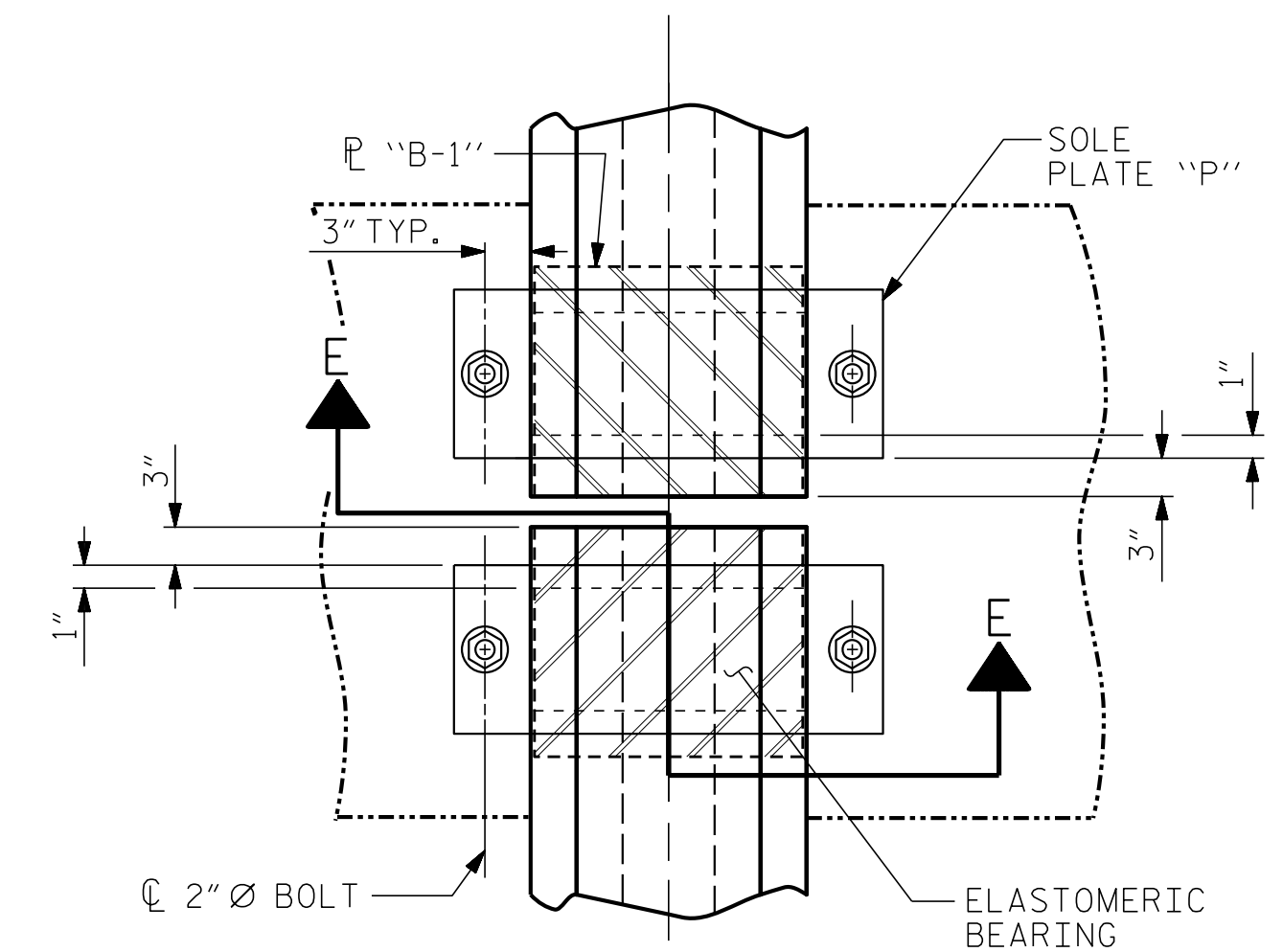
TYPE IV



E2 (8 REQ'D)

PLAN VIEW OF ELASTOMERIC BEARING

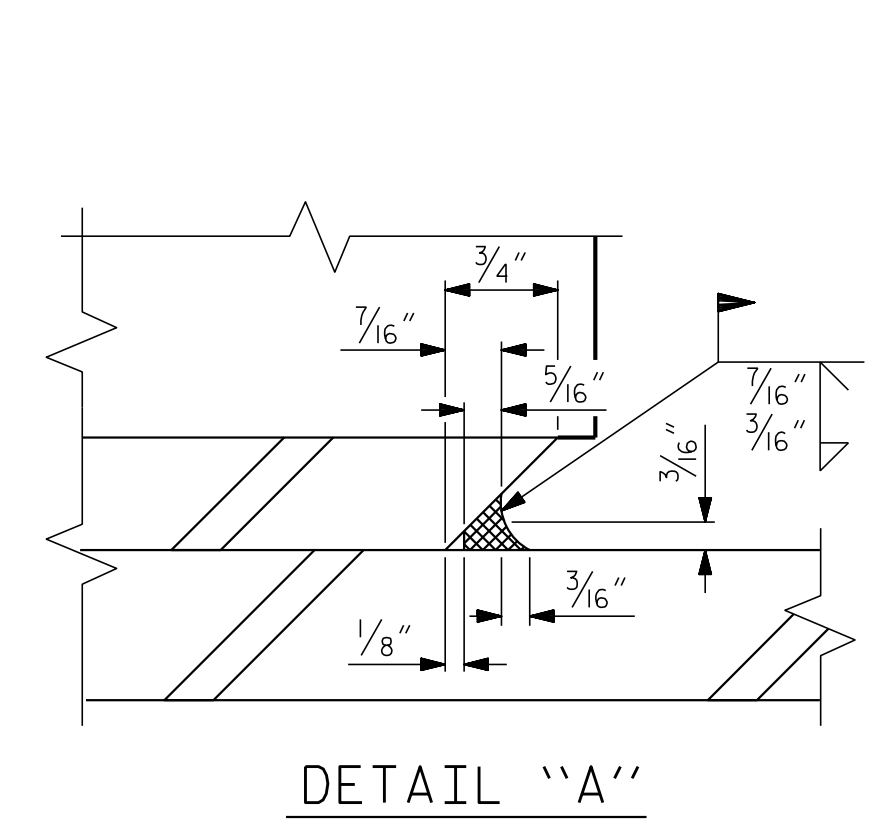
TYPE III



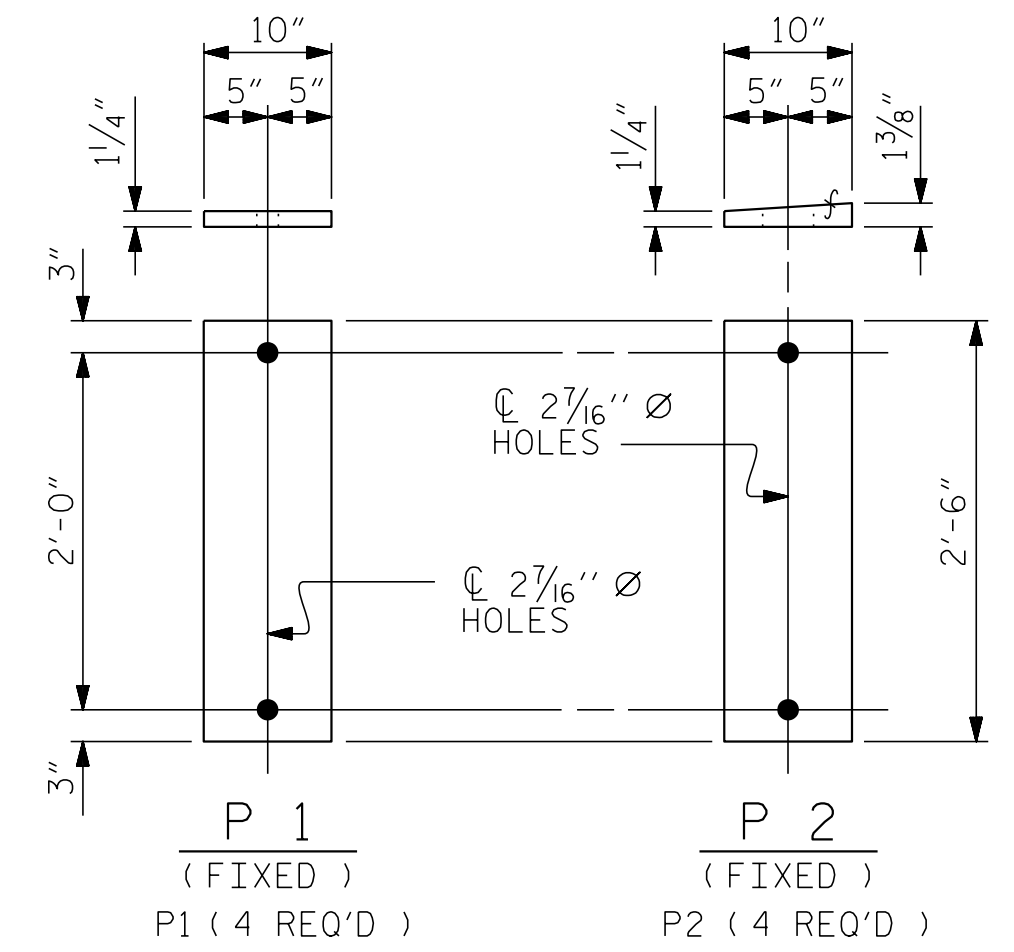
TYPICAL PLAN (SHOWING CONTINUOUS BENT)

MAXIMUM ALLOWABLE SERVICE LOADS	
D.L.+L.L. (NO IMPACT)	
TYPE III	205 k
TYPE IV	225 k

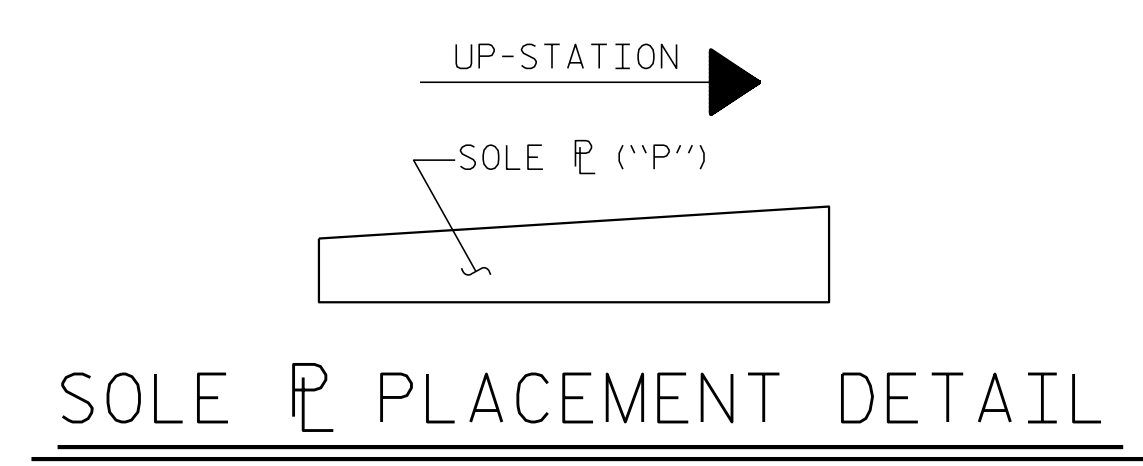
PROJECT NO. BR-0014  
 CUMBERLAND COUNTY  
 STATION: 21+37.00 -LREV-



DETAIL "A"



SOLE PLATE DETAILS ("P")



SOLE PLATE PLACEMENT DETAIL

ASSEMBLED BY : D. HODGE	DATE : 3/19
CHECKED BY : B.C. HUNT	DATE : 3/19
DRAWN BY : WJH 8/89	REV. 6/13 AAC/MAA
CHECKED BY : CRK 8/89	REV. 1/15 MAA/TMG
	REV. 12/17 MAA/THC

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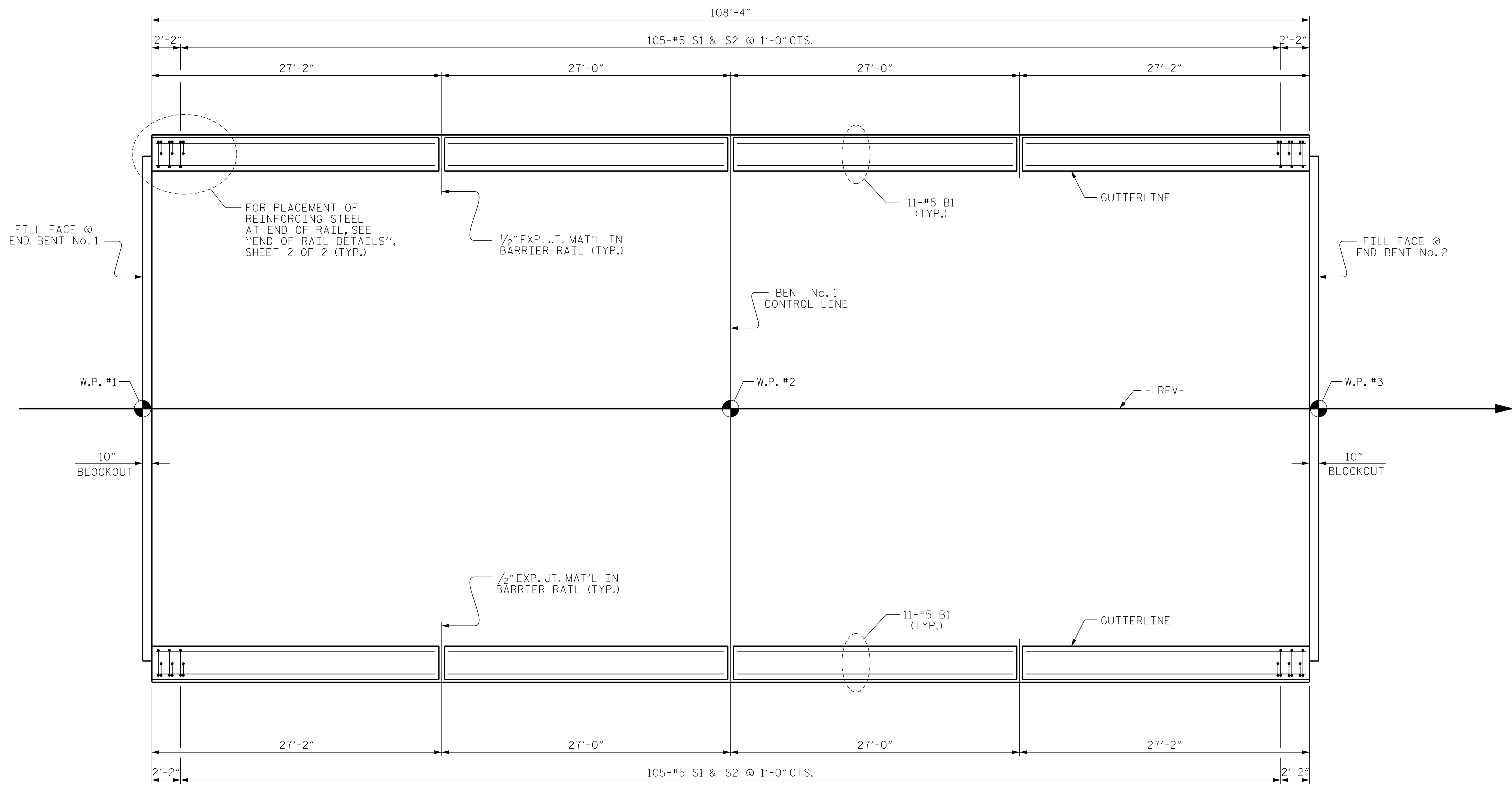
ENGINEER OF RECORD  
 6/6/2019  
  
 Gregory M. Golland  
 WETHERILL ENGINEERING  
 1223 Jones Franklin Rd.  
 Raleigh, N.C. 27606  
 Bus: 919 851 8077  
 Fax: 919 851 8107  
 LICENSE NO. F-0377

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

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-13
1			3			TOTAL SHEETS
2			4			28

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SPAN A

SPAN B

PLAN OF CONCRETE BARRIER RAIL

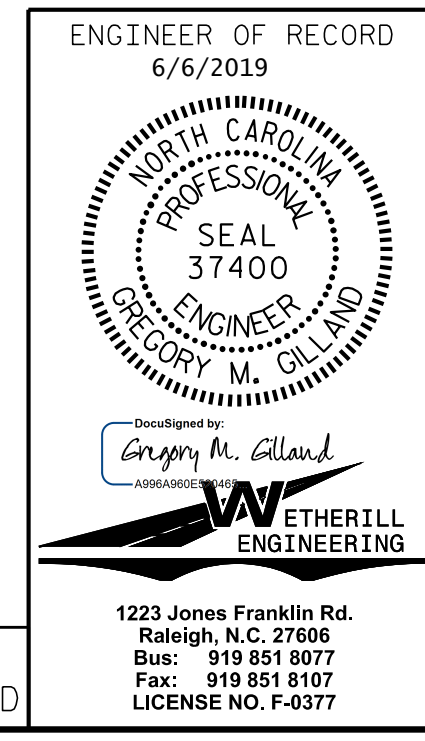
PROJECT NO. BR-0014  
CUMBERLAND COUNTY  
 STATION: 21+37.00 -LREV-

SHEET 1 OF 2

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DRAWN BY : D. HODGE DATE : 3/19  
 CHECKED BY : B.C. HUNT DATE : 3/19

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UNLESS ALL SIGNATURES COMPLETED



STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
CONCRETE BARRIER RAIL					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
SHEET NO.					S-14
TOTAL SHEETS					28

### NOTES

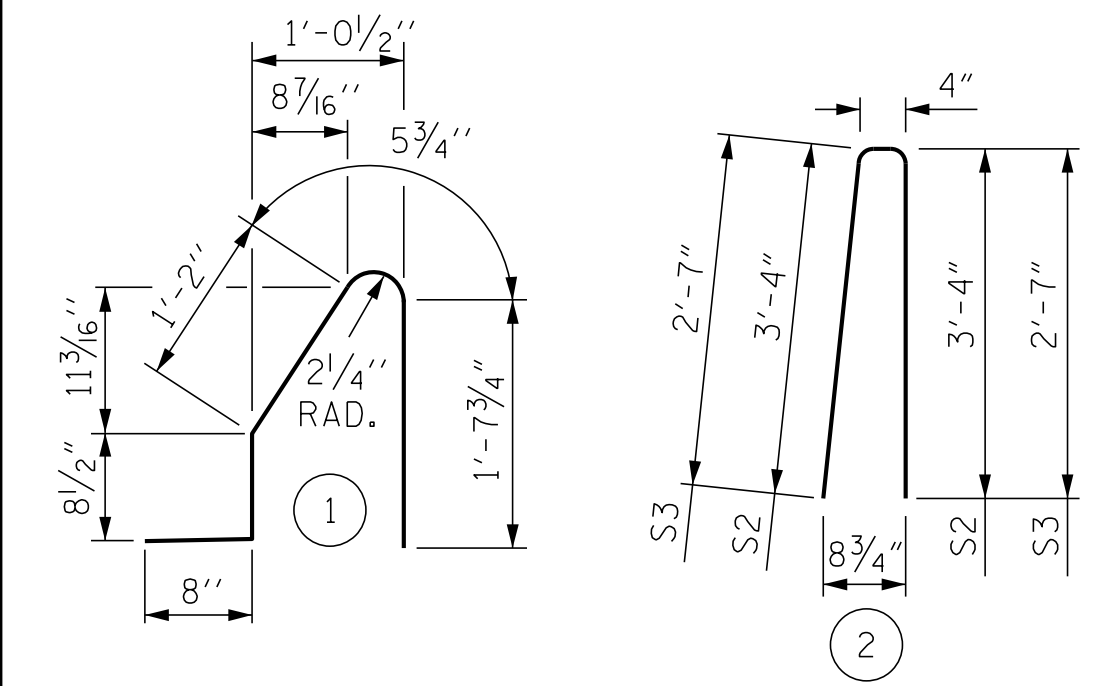
THE BARRIER RAIL IN A CONTINUOUS UNIT SHALL NOT BE CAST UNTIL ALL SLAB CONCRETE IN THAT UNIT HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

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

THE #5 S1 & S2 BARS MAY BE SHIFTED SLIGHTLY IN ORDER TO MAINTAIN A 2" MINIMUM CLEARANCE TO THE 1/2" EXPANSION JOINT MATERIAL IN THE BARRIER RAIL.

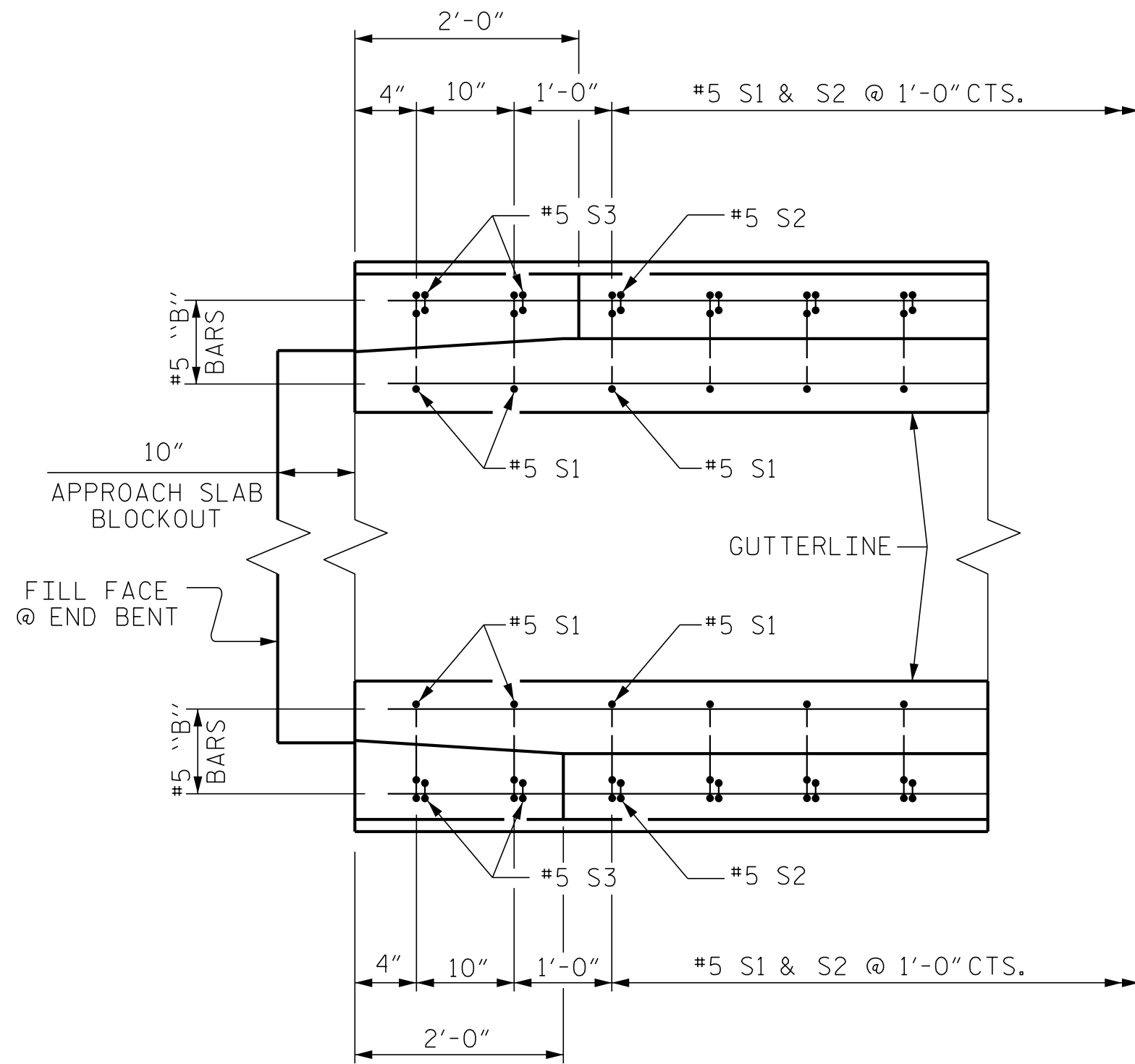
### BAR TYPES



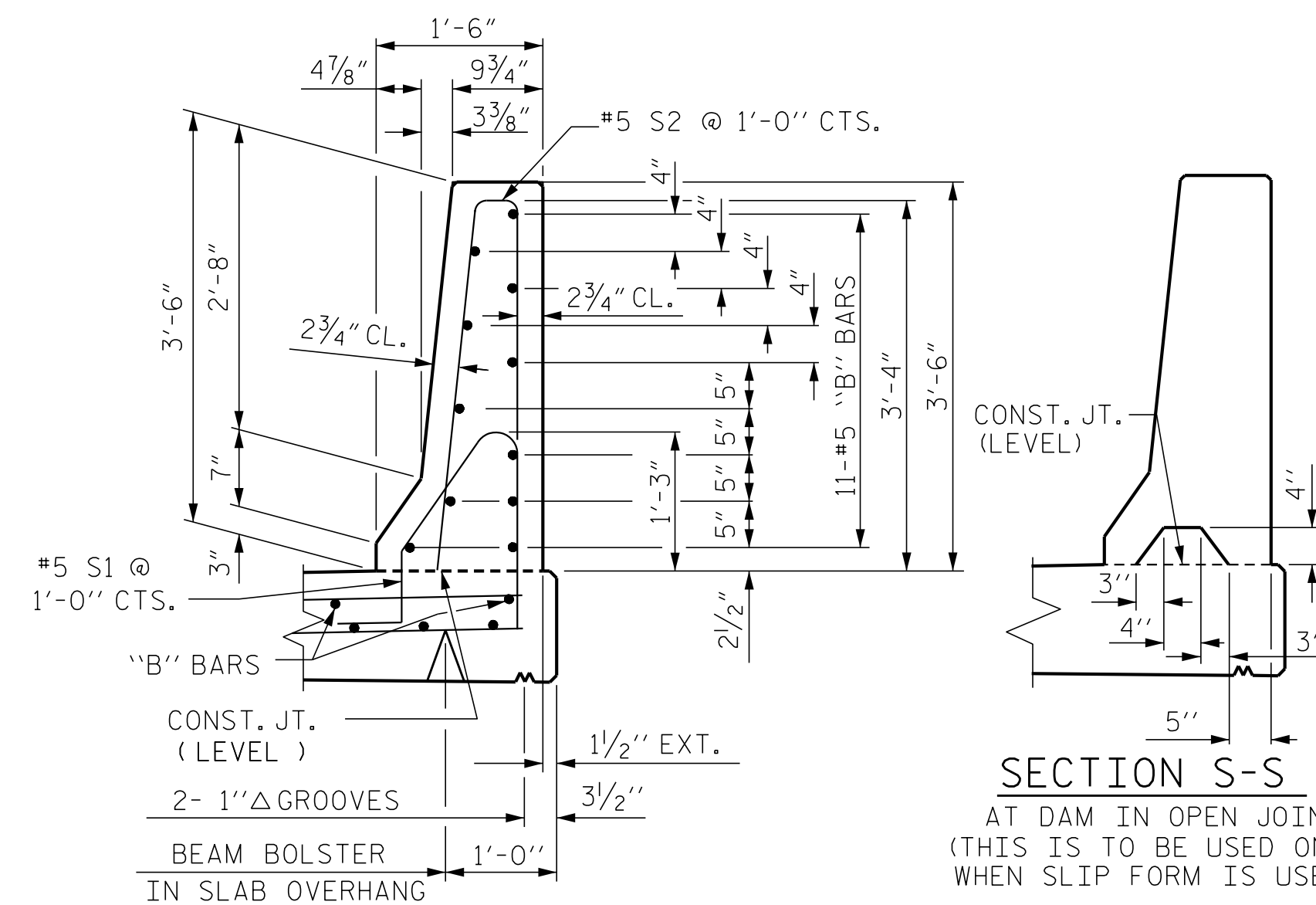
ALL BAR DIMENSIONS ARE OUT TO OUT

### BILL OF MATERIAL

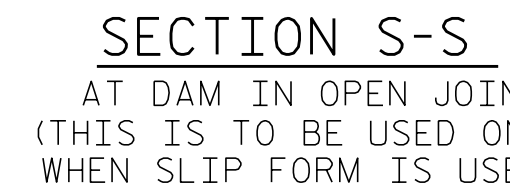
FOR CONCRETE BARRIER RAIL ONLY					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* S1	218	#5	1	4'-8"	1061
* S2	210	#5	2	7'-0"	1533
* S3	8	#5	2	5'-6"	46
* B1	88	#5	STR	26'-7"	2440
* EPOXY COATED REINFORCING STEEL					5,080 LBS.
CLASS AA CONCRETE					29.5 CU. YDS.
CONCRETE BARRIER RAIL					216.67 LIN. FT.



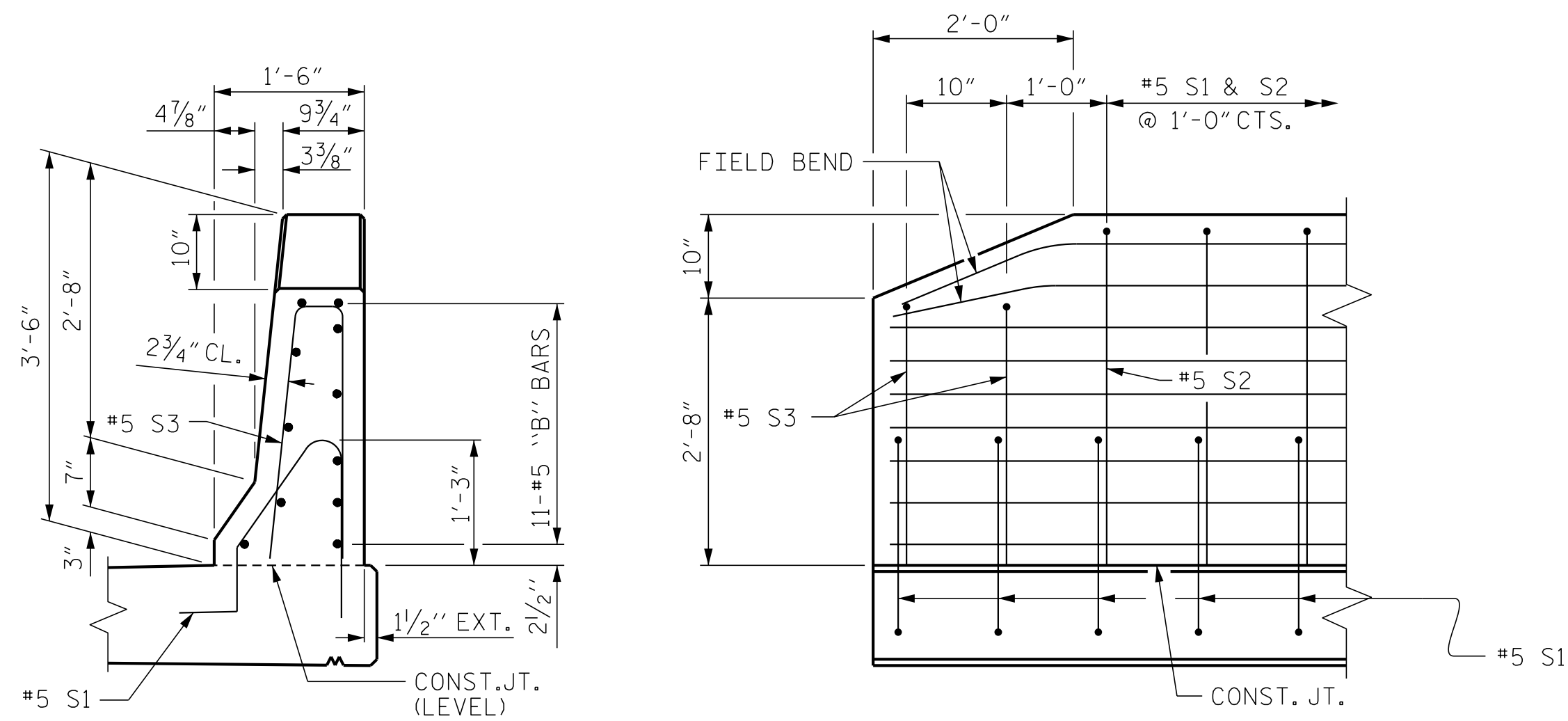
PLAN



SECTION THRU RAIL

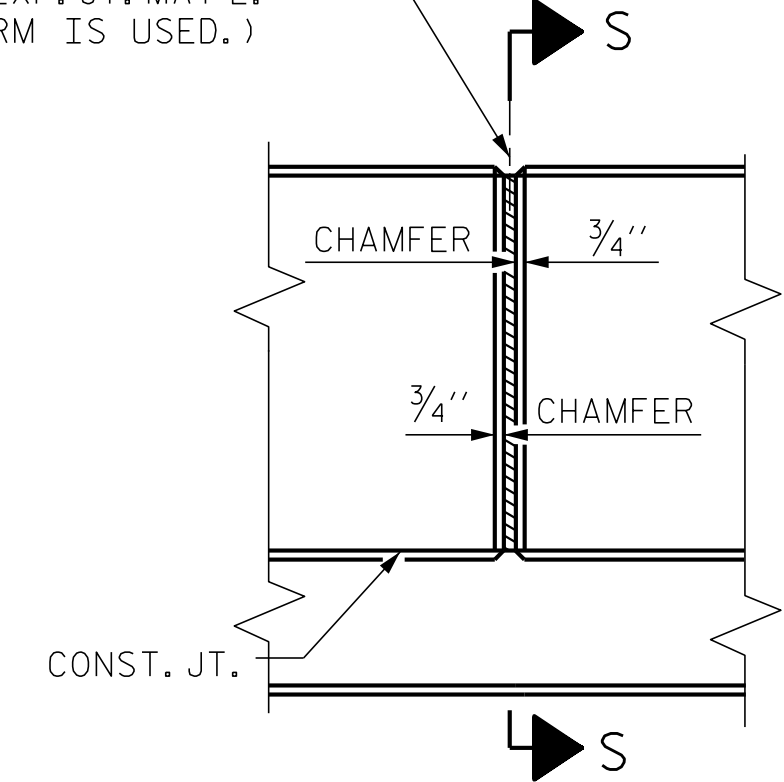


SECTION S-S  
AT DAM IN OPEN JOINT  
(THIS IS TO BE USED ONLY  
WHEN SLIP FORM IS USED)



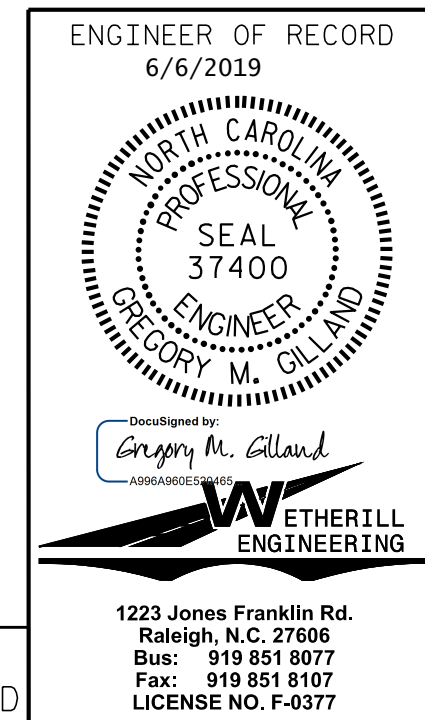
END OF RAIL DETAILS

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



ELEVATION AT EXPANSION JOINTS  
BARRIER RAIL DETAILS

PROJECT NO. BR-0014  
CUMBERLAND COUNTY  
STATION: 21+37.00 -LREV-  
SHEET 2 OF 2



STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
STANDARD CONCRETE BARRIER RAIL					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

ASSEMBLED BY : D. HODGE	DATE : 3/19
CHECKED BY : B.C. HUNT	DATE : 3/19
DRAWN BY : ARB 5/87	REV. 7/12 MAA/GM
CHECKED BY : SJD 9/87	REV. 6/13 MAA/GM
	REV. 12/17 MAA/THC

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NOTES

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

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

BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307 AND NUTS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M291. BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED. (AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLTS, NUTS AND WASHERS MAY BE USED AS AN ALTERNATE FOR THE 1/8" Ø GALVANIZED BOLTS, NUTS AND WASHERS. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.)

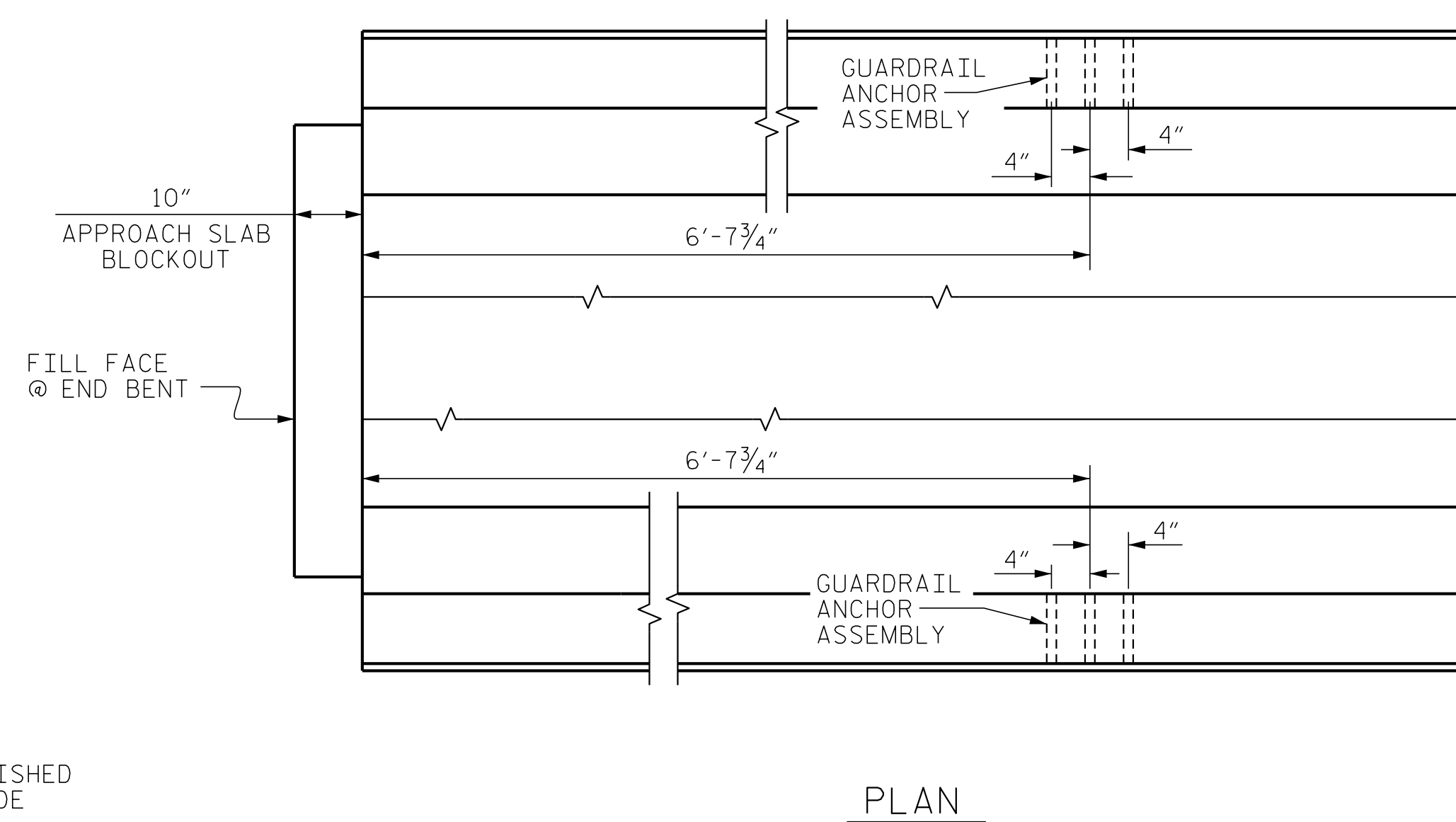
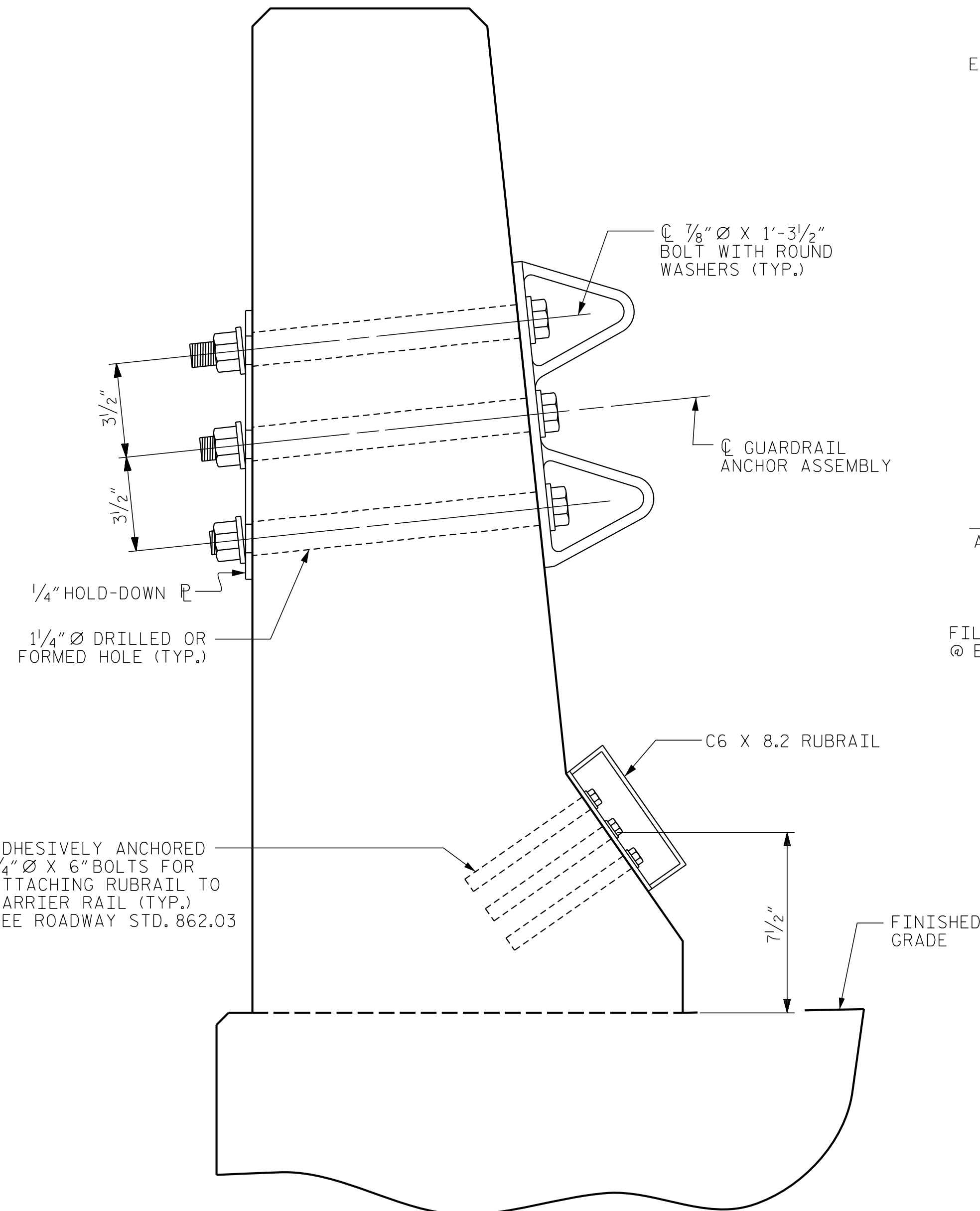
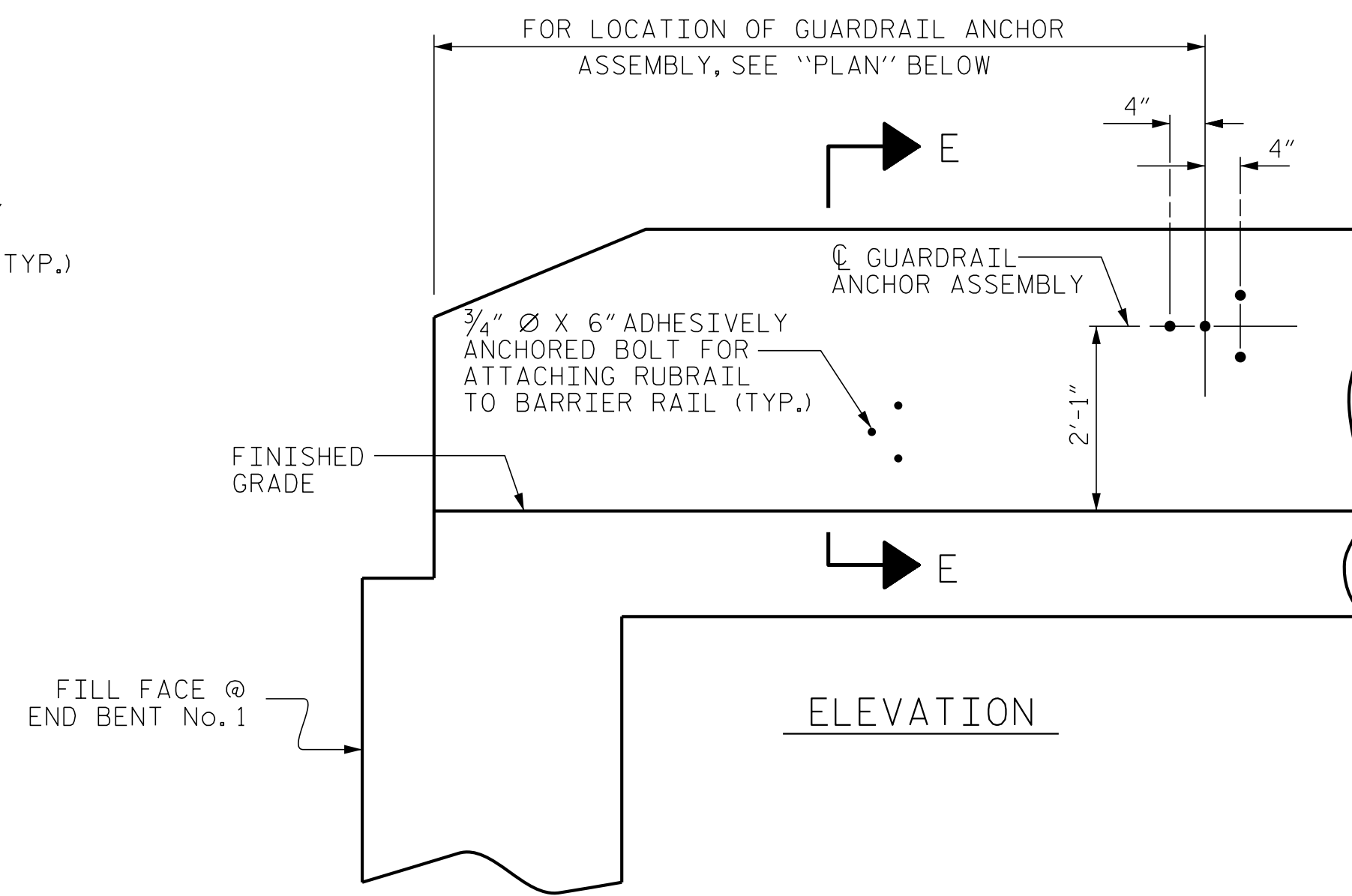
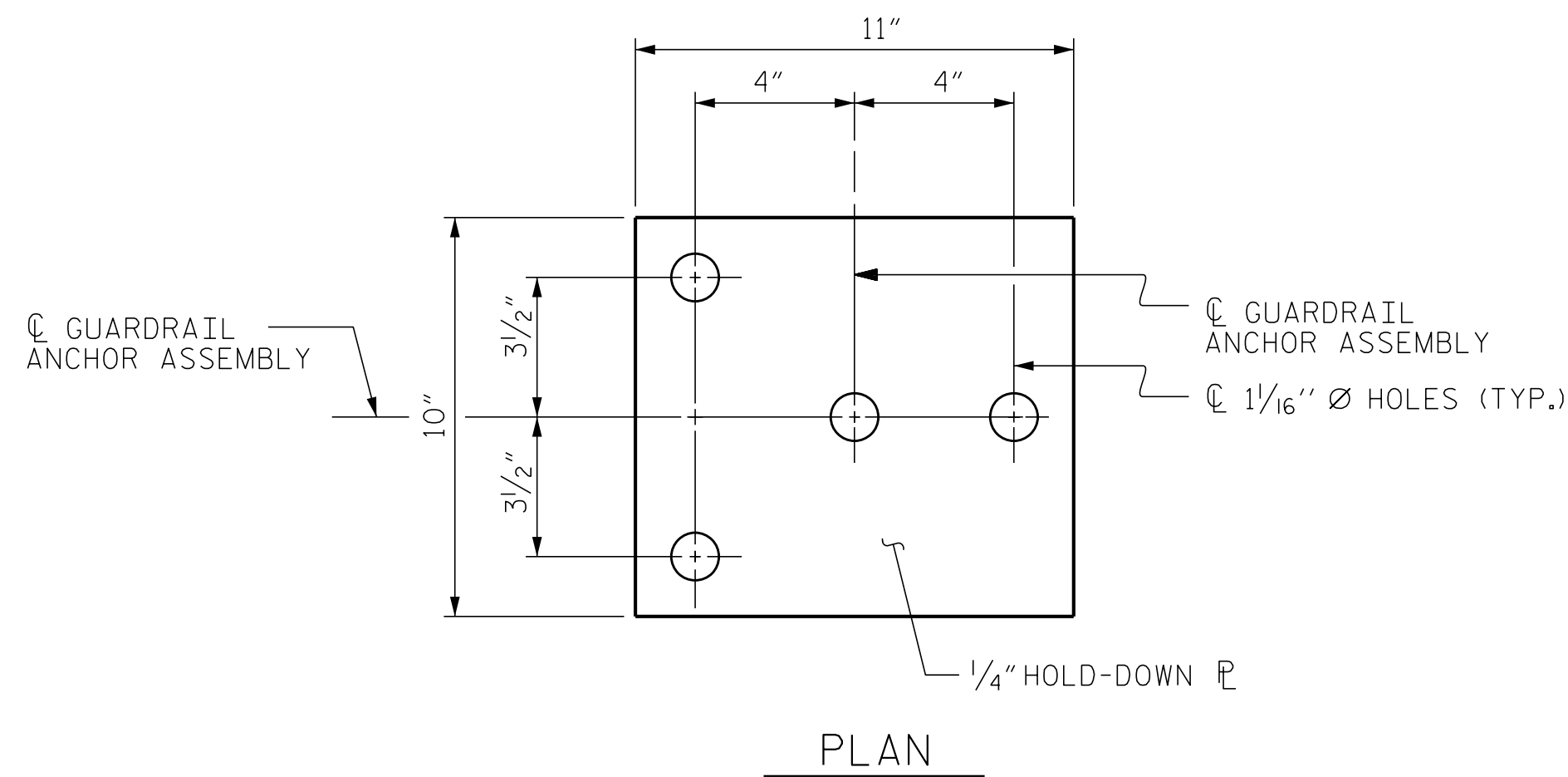
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF BARRIER RAIL. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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

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

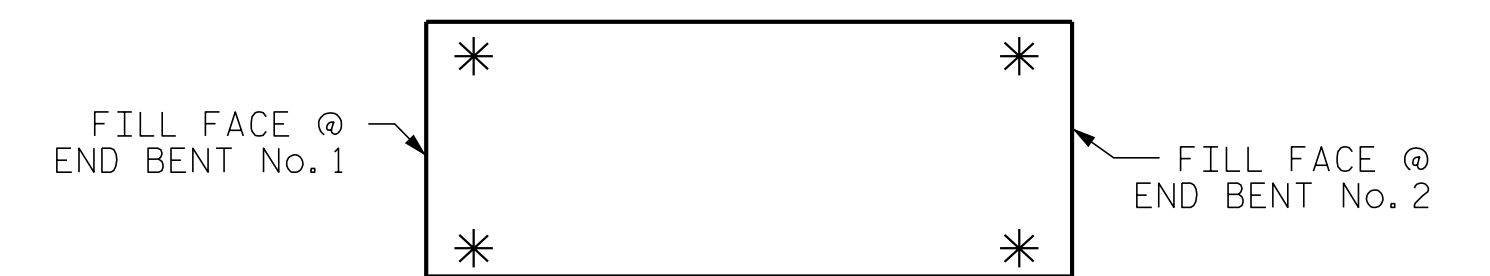
THE 1 1/4" Ø HOLES SHALL BE FORMED OR DRILLED WITH A CORE BIT. IMPACT TOOLS WILL NOT BE PERMITTED. ANY CONCRETE DAMAGED BY THIS WORK SHALL BE REPAIRED TO THE SATISFACTION OF THE ENGINEER.

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



LOCATION OF ANCHORS FOR GUARDRAIL

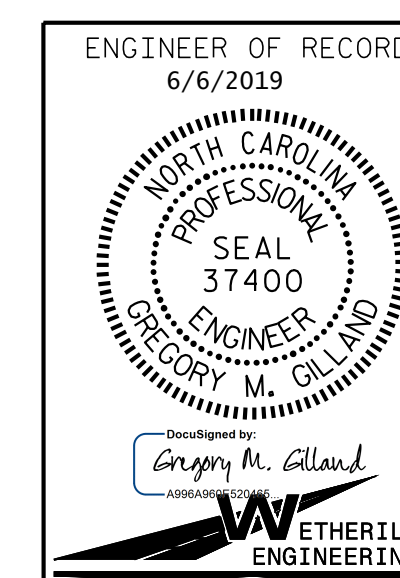
END BENT #1 SHOWN, END BENT #2 SIMILAR.



SKETCH SHOWING POINTS OF ATTACHMENTS

\* DENOTES GUARDRAIL ANCHOR ASSEMBLY

PROJECT NO. BR-0014  
 CUMBERLAND COUNTY  
 STATION: 21+37.00 -LREV-



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

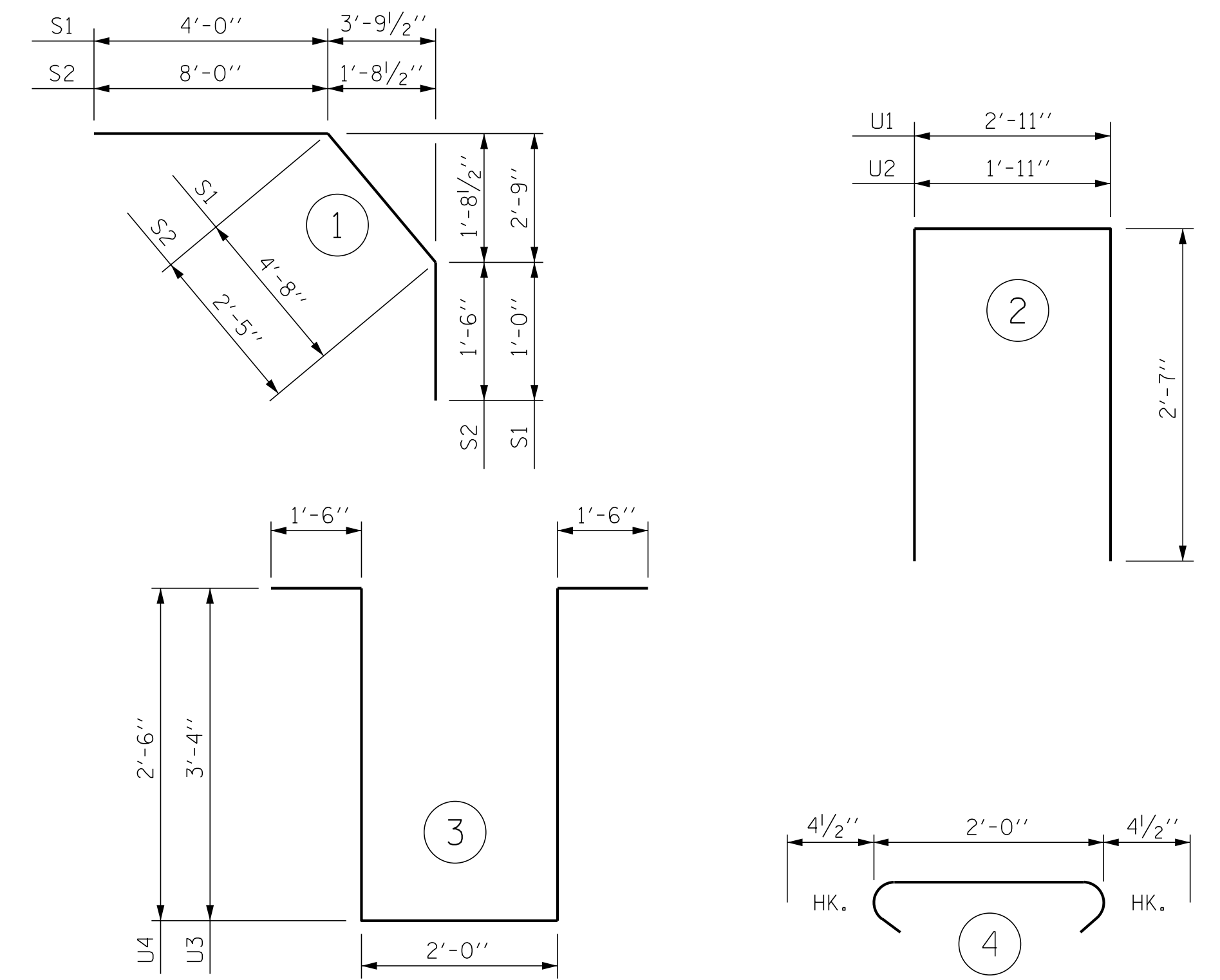
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	TOTAL SHEETS
1			3			28
2			4			

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1223 Jones Franklin Rd.  
 Raleigh, N.C. 27606  
 Bus: 919 851 8077  
 Fax: 919 851 8107  
 LICENSE NO. F-0377

ASSEMBLED BY : D. HODGE	DATE : 3/19
CHECKED BY : B.C. HUNT	DATE : 3/19
DRAWN BY : TLA 5/06	REV. 7/12 MAA/GM
CHECKED BY : GM 5/06	REV. 6/13 MAA/GM
	REV. 12/17 MAA/THC

BAR TYPES



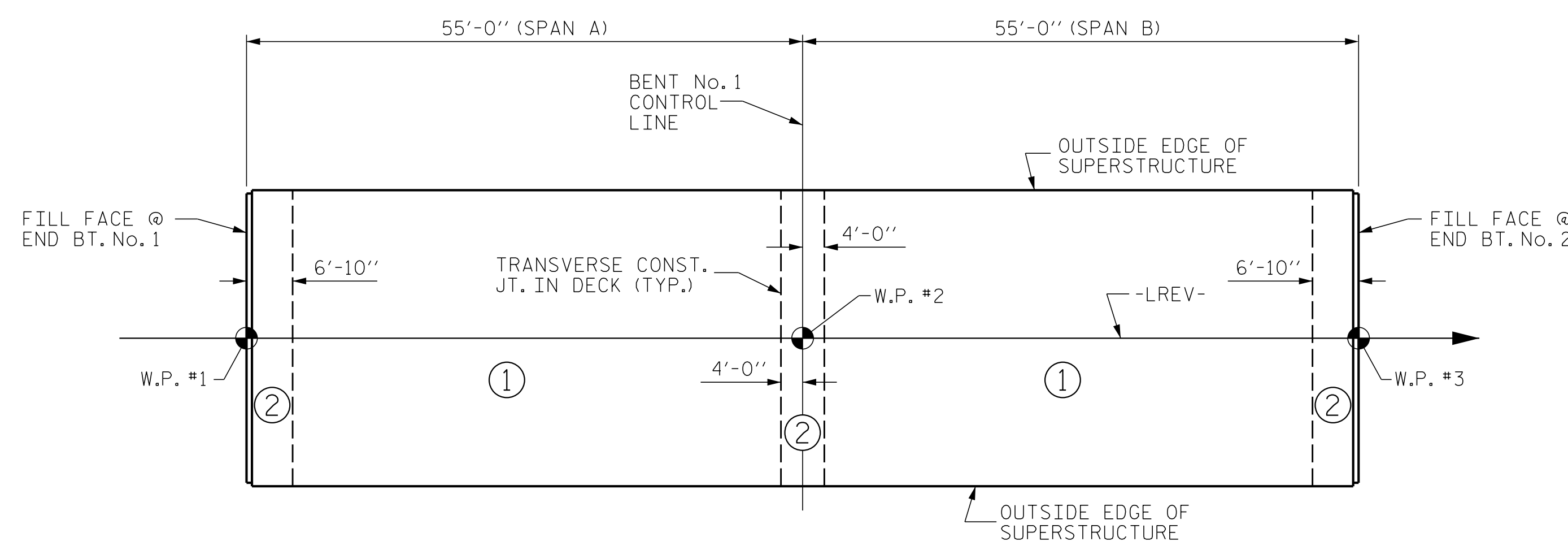
ALL BAR DIMENSIONS ARE OUT TO OUT

SUPERSTRUCTURE BILL OF MATERIAL			
	CLASS AA CONCRETE (CU. YDS.)	REINFORCING STEEL (LBS.)	* EPOXY COATED REINFORCING STEEL (LBS.)
TOTALS **	161.1	16,091	15,708

\*\* QUANTITIES FOR CONCRETE BARRIER RAILS ARE NOT INCLUDED

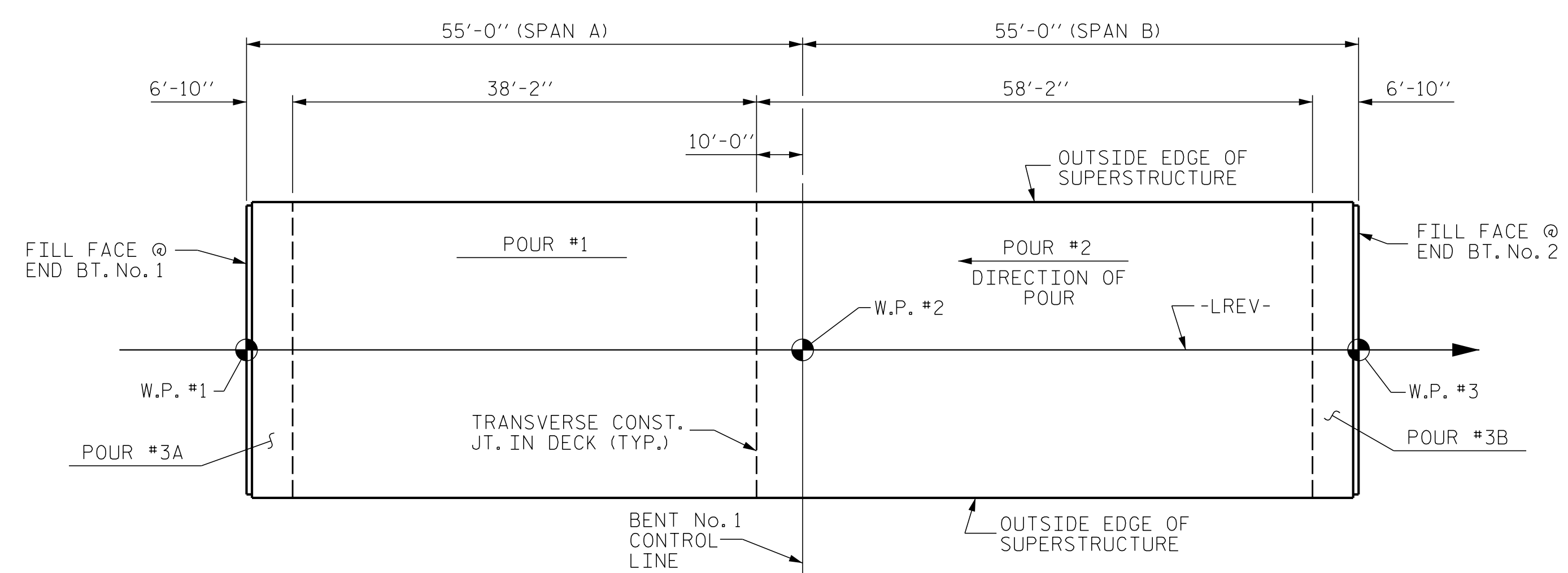
REINFORCING BAR SCHEDULE					
SPAN "A-B"					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	236	#5	STR	35'-11"	8,841
A2	236	#5	STR	35'-11"	8,841
* B1	140	#6	STR	11'-0"	2,313
* B2	48	#4	STR	25'-6"	818
* B3	24	#6	STR	43'-0"	1,550
* B4	46	#6	STR	16'-6"	1,140
B5	104	#5	STR	55'-1"	5,975
* B6	8	#4	STR	28'-6"	152
K1	16	#4	STR	18'-10"	201
K2	6	#4	STR	8'-1"	32
K3	12	#4	STR	9'-1"	73
K4	6	#4	STR	8'-7"	34
K5	4	#4	STR	2'-2"	6
K6	8	#4	STR	2'-8"	14
K7	4	#4	STR	2'-5"	6
K8	6	#4	STR	6'-11"	28
K9	12	#4	STR	8'-11"	71
K10	6	#4	STR	8'-7"	34
K11	4	#4	STR	29'-11"	80
* S1	62	#4	1	9'-8"	400
* S2	62	#4	1	11'-11"	494
S3	75	#4	4	2'-9"	138
U1	62	#4	2	8'-1"	335
U2	4	#4	2	7'-1"	19
U3	21	#4	3	11'-8"	164
U4	6	#4	3	10'-0"	40
REINFORCING STEEL				16,091 LBS.	
* EPOXY COATED REINFORCING STEEL				15,708 LBS.	

\* THESE BARS ARE EPOXY COATED.



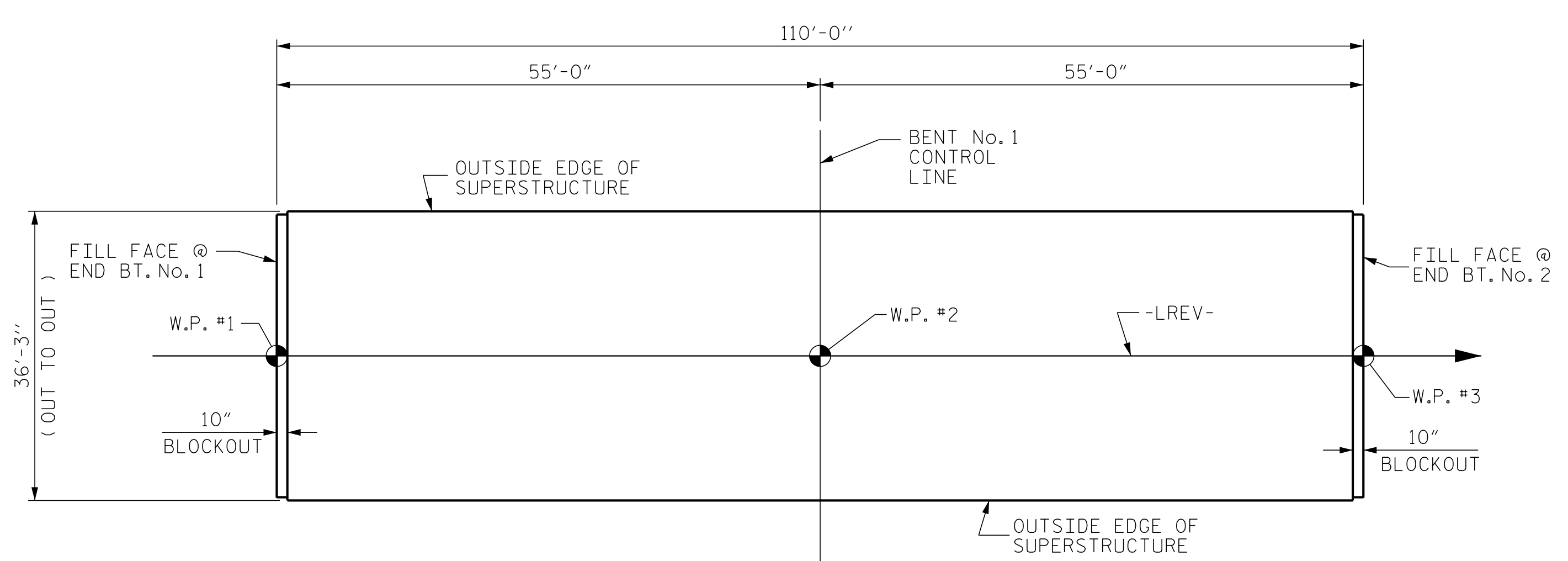
OPTIONAL DECK POUR DETAIL

POUR ② SHALL NOT BE STARTED UNTIL BOTH ADJACENT POUR ① REACH A MINIMUM OF 3,000 PSI

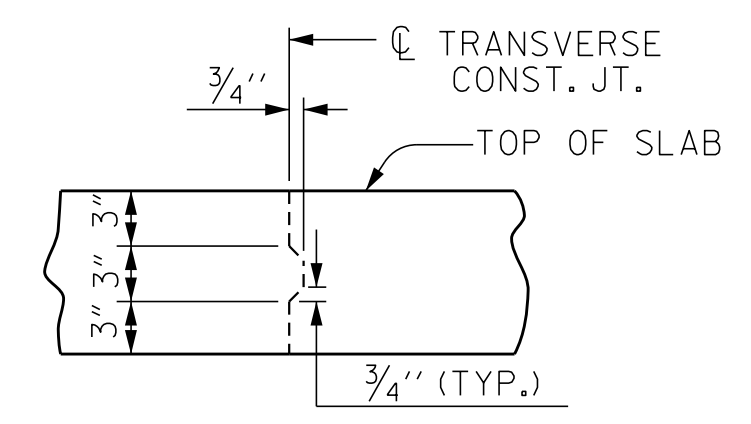


CONCRETE DECK POUR DETAIL

NOTE: EACH POUR #3 INCLUDES UPPER PART OF THE INTEGRAL END BENT.



LAYOUT FOR COMPUTING AREA REINFORCED CONCRETE DECK SLAB (SQ. FT. = 3,988)



TRANSVERSE CONST. JOINT DETAIL

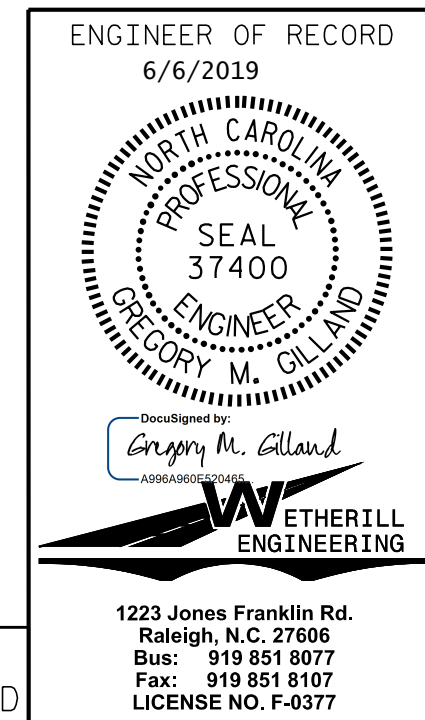
NOTE: SLAB REINFORCING STEEL SHALL BE CONTINUOUS THRU JOINT

GROOVING BRIDGE FLOORS	
APPROACH SLABS	860 SQ.FT.
BRIDGE DECK	3,250 SQ.FT.
TOTAL	4,110 SQ.FT.

CLASS AA CONCRETE BREAKDOWN	
POUR #1	44.4 CY
POUR #2	75.5 CY
POUR #3A	20.6 CY
POUR #3B	20.6 CY
CLASS AA CONCRETE BREAKDOWN TOTAL	161.1 CY

BAR SIZE	SUPERSTRUCTURE REINFORCING STEEL LENGTHS ARE BASED ON THE FOLLOWING MINIMUM SPLICE LENGTHS				PARAPET AND BARRIER RAIL
	SUPERSTRUCTURE EXCEPT APPROACH SLABS, PARAPET, AND BARRIER RAIL	APPROACH SLABS			
	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"			

PROJECT NO. BR-0014  
 CUMBERLAND COUNTY  
 STATION: 21+37.00 -LREV-



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

SUPERSTRUCTURE  
 BILL OF MATERIAL

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

SHEET NO. S-17  
 TOTAL SHEETS 28

DRAWN BY: D. HODGE DATE: 3/19  
 CHECKED BY: B.C. HUNT DATE: 3/19

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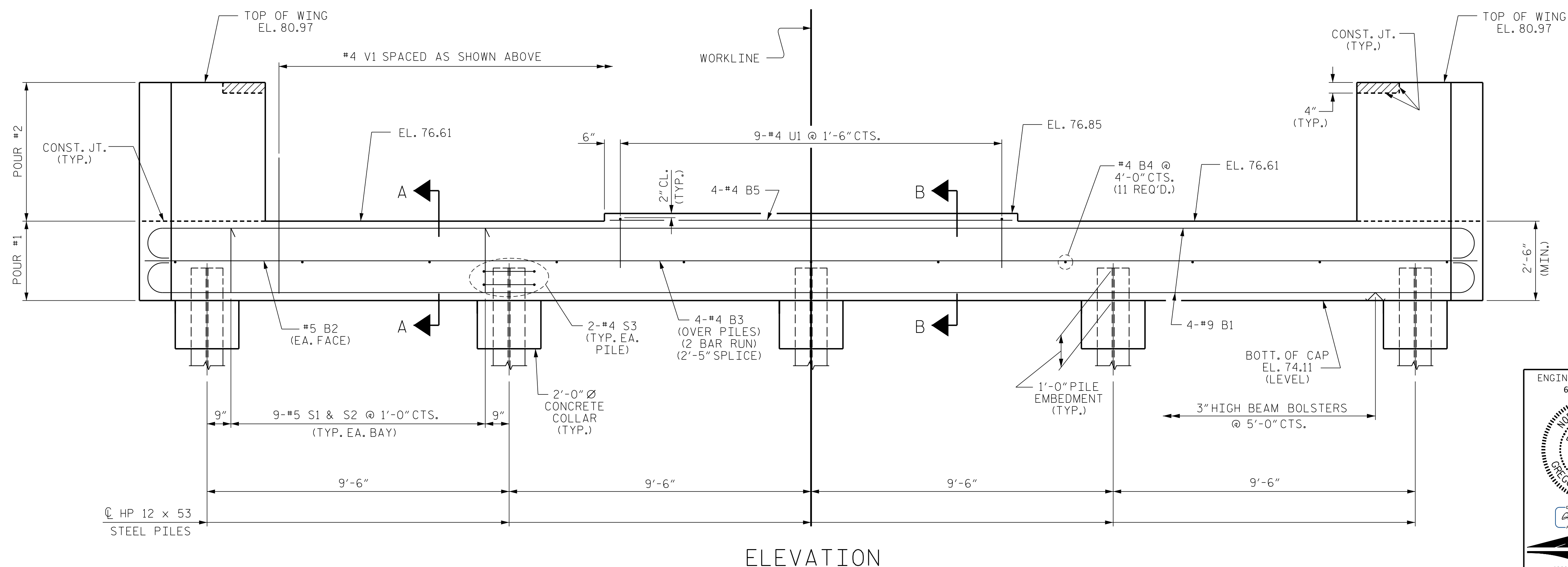
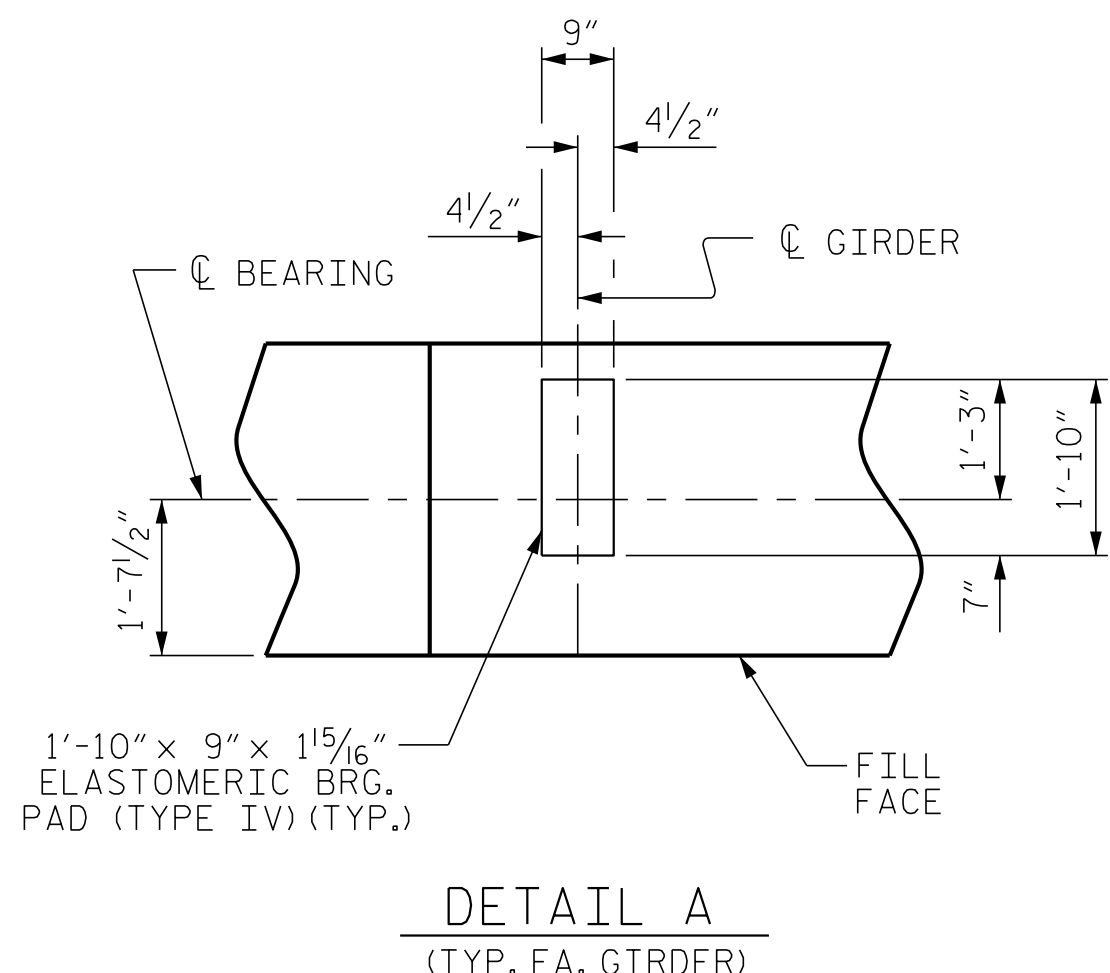
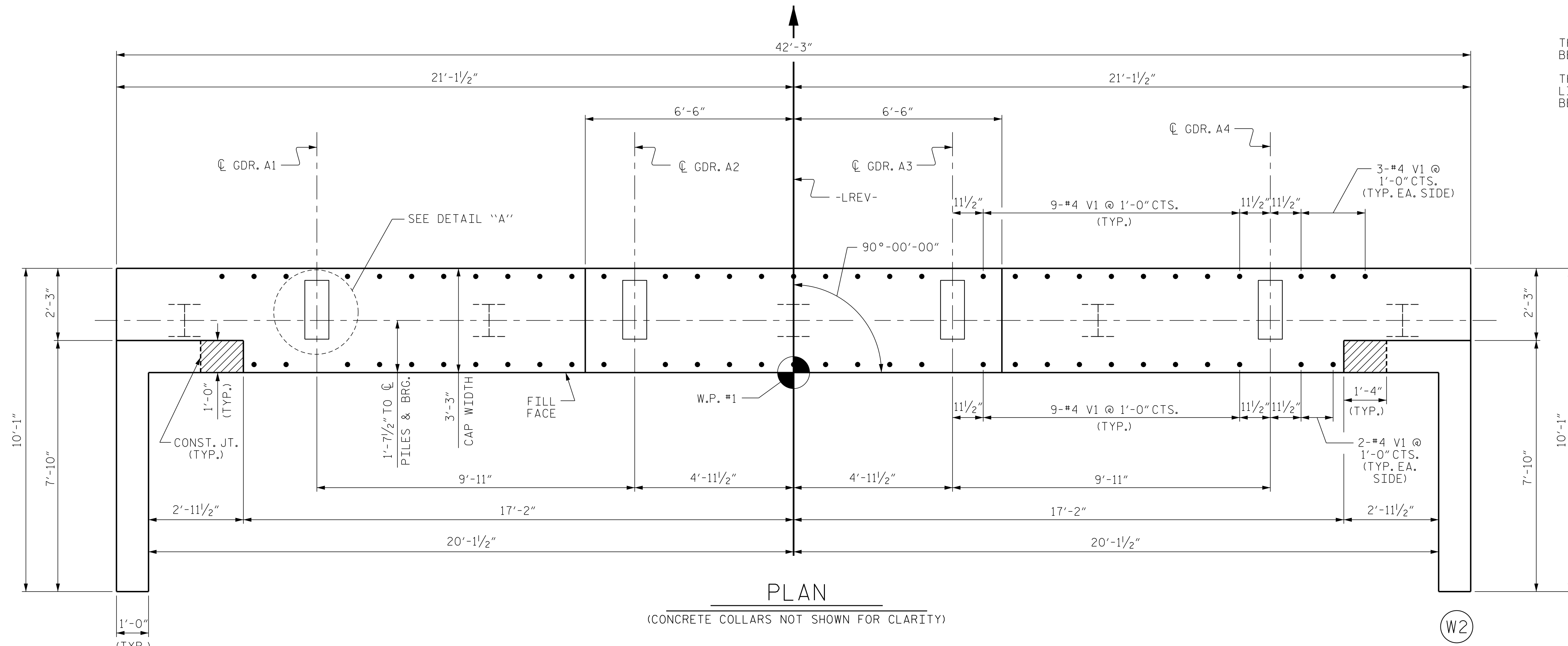
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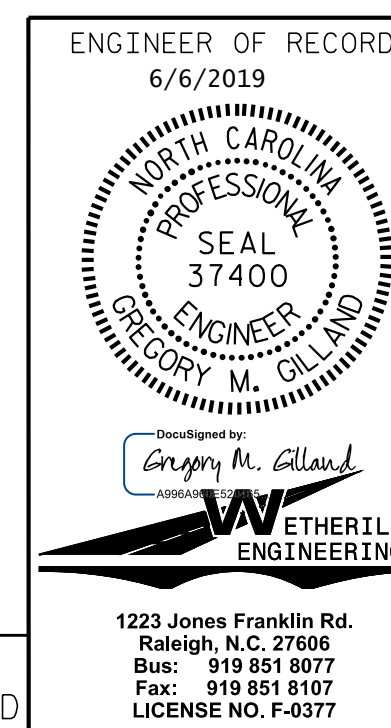
**NOTES:**

THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE BARRIER RAILS ARE CAST.

THE TOP SURFACE OF THE END BENT CAP WITHIN THE LIMITS OF THE INTEGRAL ABUTMENT, EXCEPT THE BEARING AREA, SHALL BE RAKED TO A DEPTH OF 1/4".



PROJECT NO. BR-0014  
CUMBERLAND COUNTY  
 STATION: 21+37.00 -LREV-  
 SHEET 1 OF 3

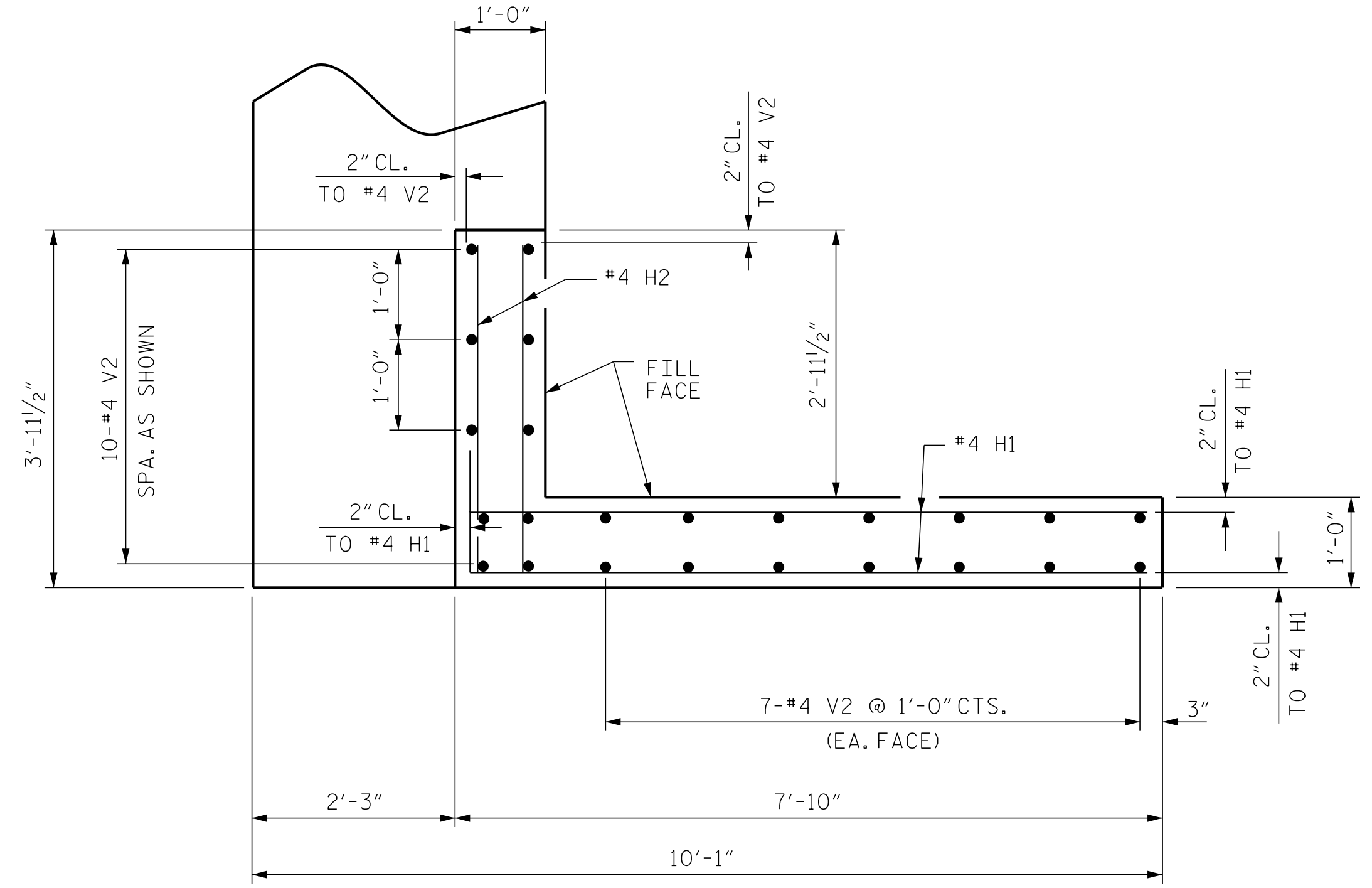


STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH		SUBSTRUCTURE END BENT No. 1	
REVISIONS			
NO.	BY:	DATE:	SHEET NO.
1			S-18
2			TOTAL SHEETS 28

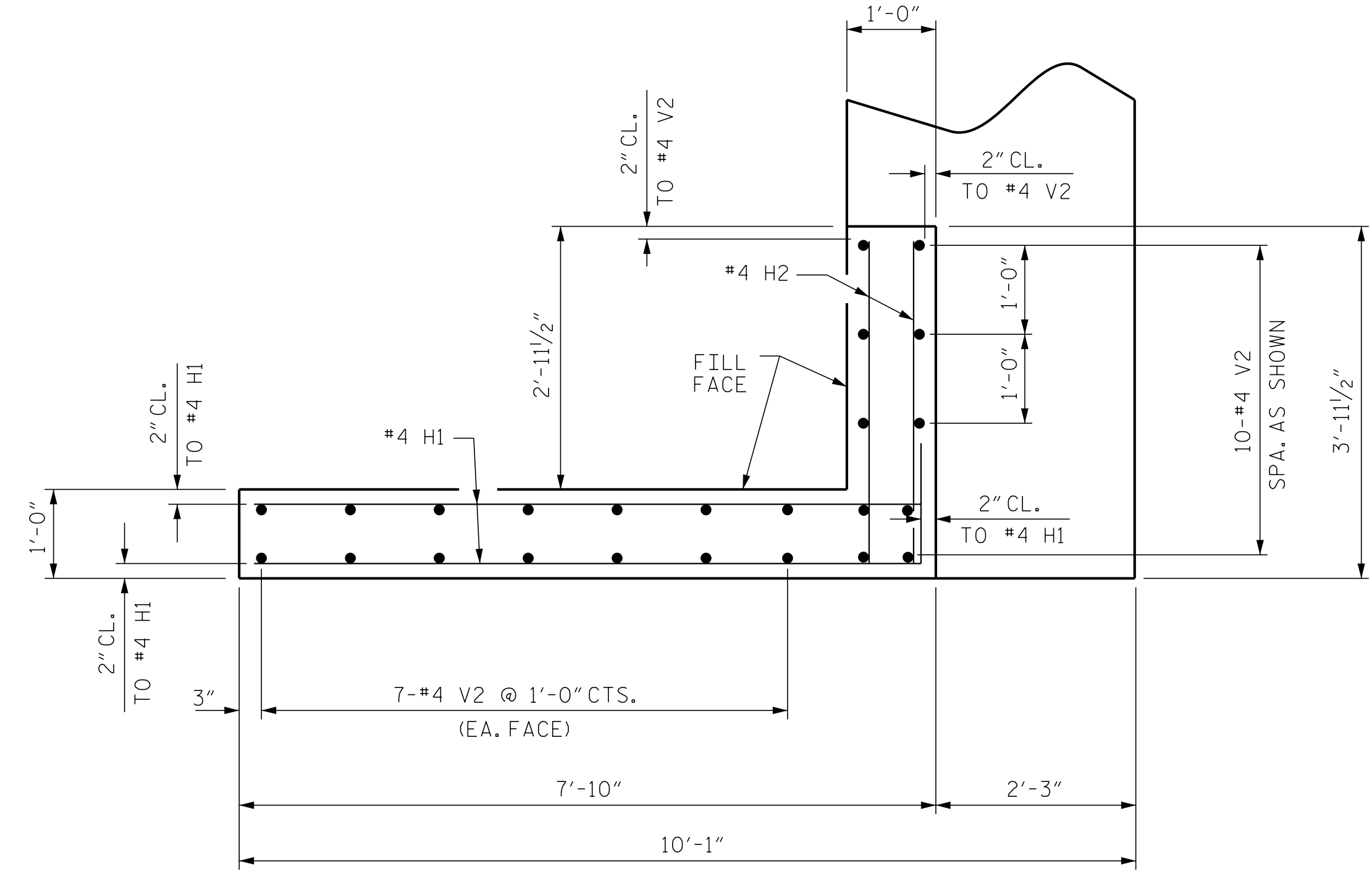
DRAWN BY: D. HODGE DATE: 3/19  
 CHECKED BY: G.M. GILLAND DATE: 4/19

DOCUMENT NOT CONSIDERED FINAL  
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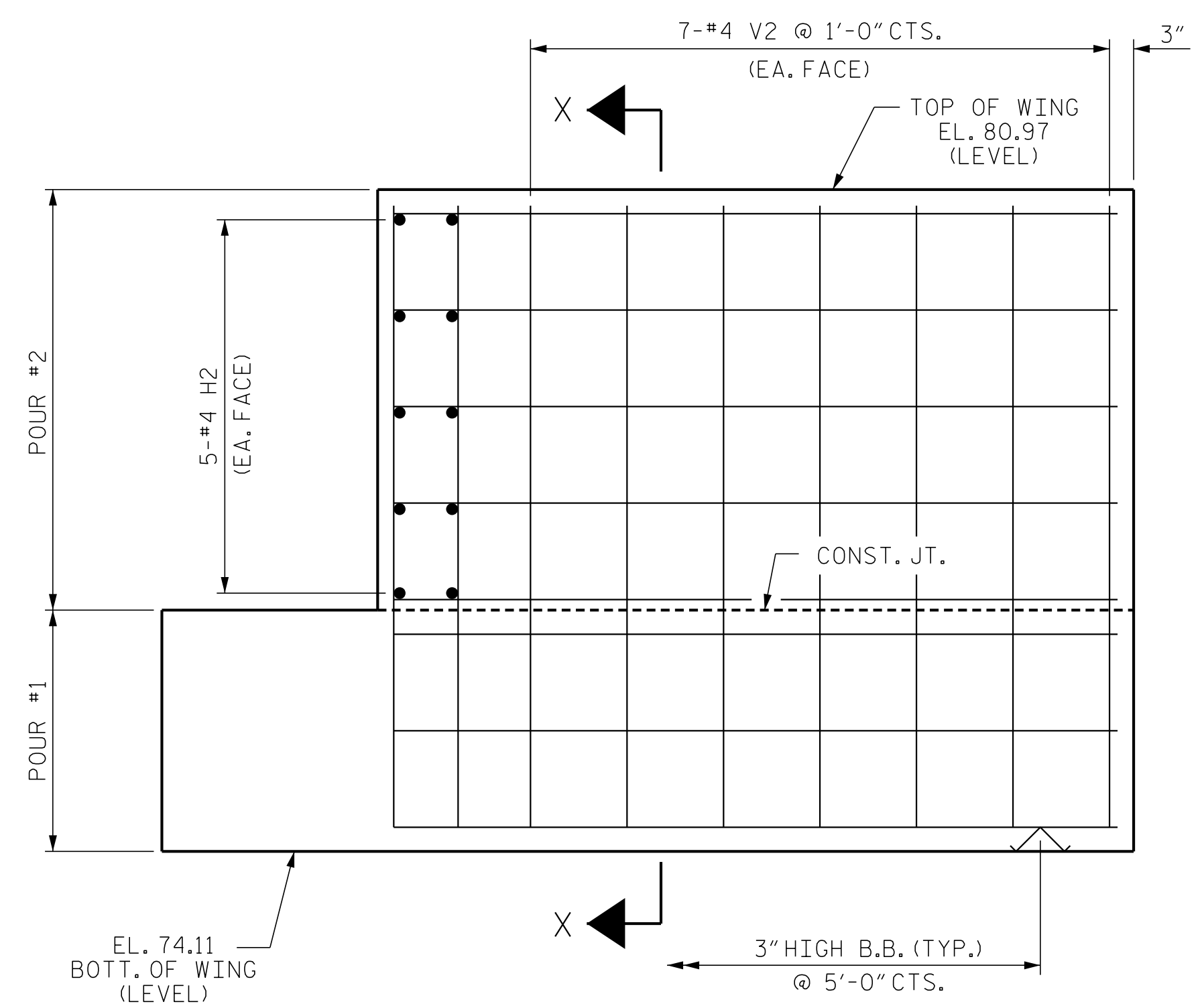
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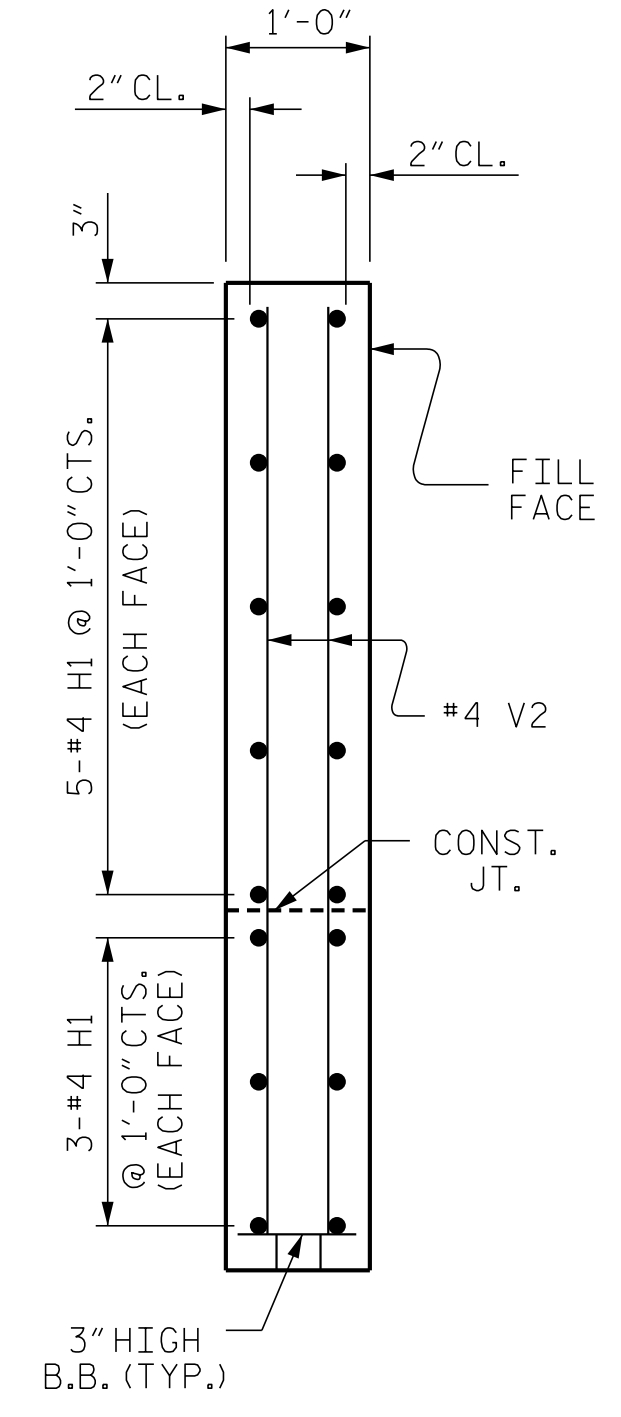
PLAN OF WING - W1



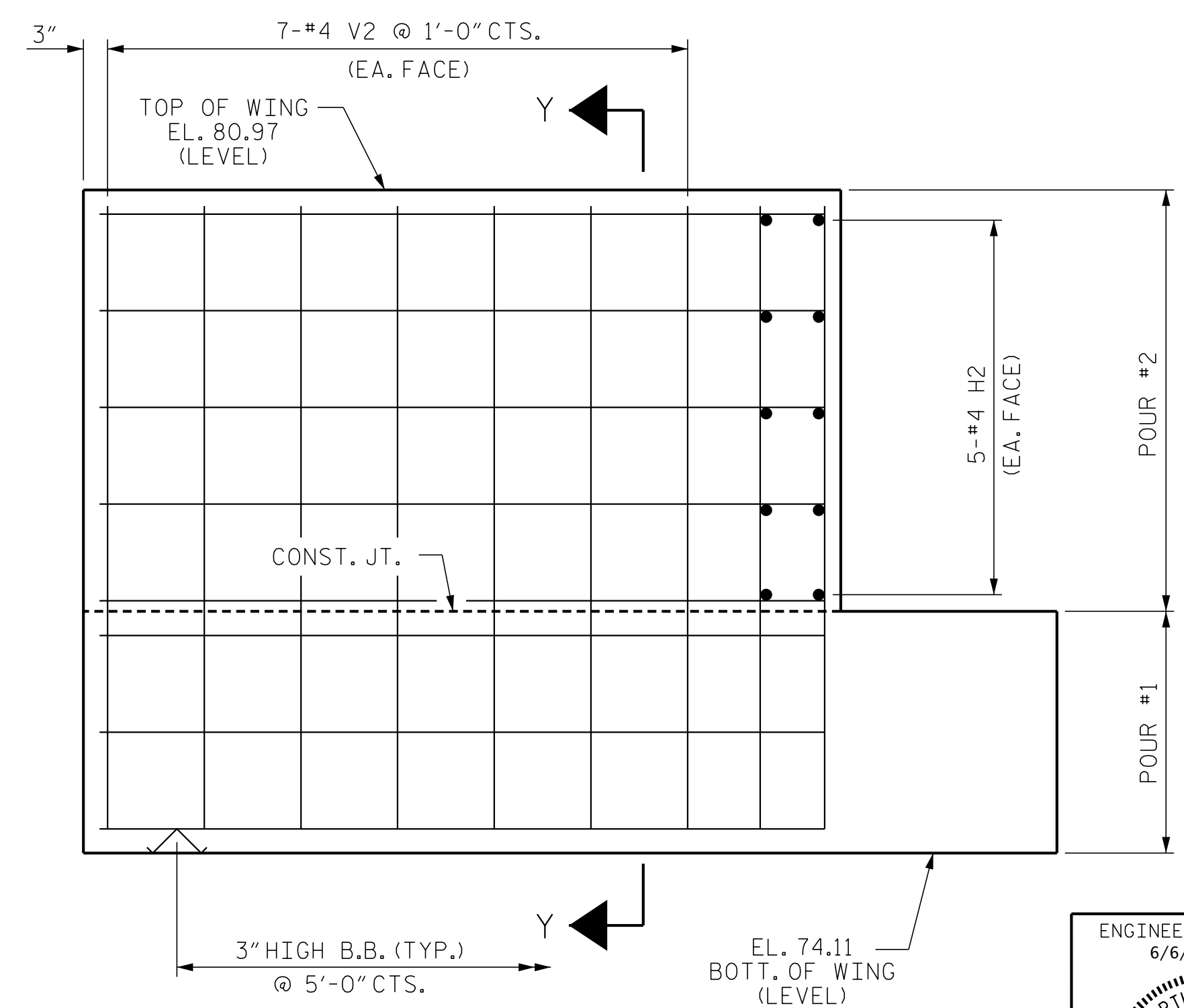
PLAN OF WING - W2



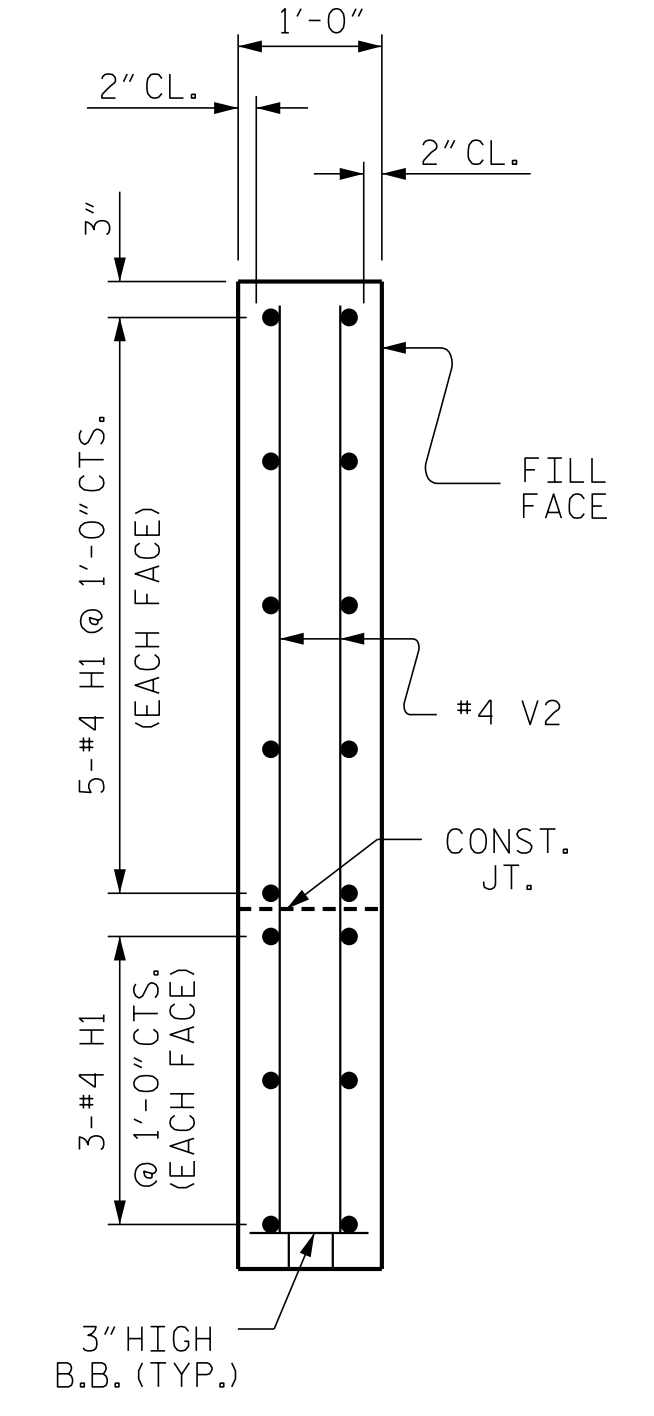
ELEVATION OF WING - W1



SECTION X-X

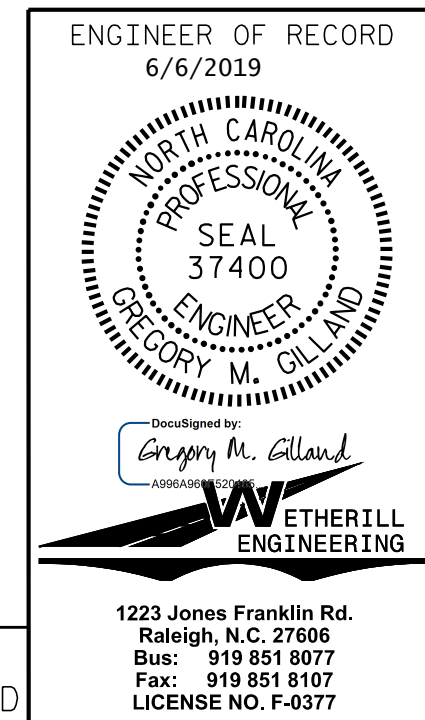


ELEVATION OF WING - W2



SECTION Y-Y

PROJECT NO. BR-0014  
 CUMBERLAND COUNTY  
 STATION: 21+37.00 -LREV-  
 SHEET 2 OF 3



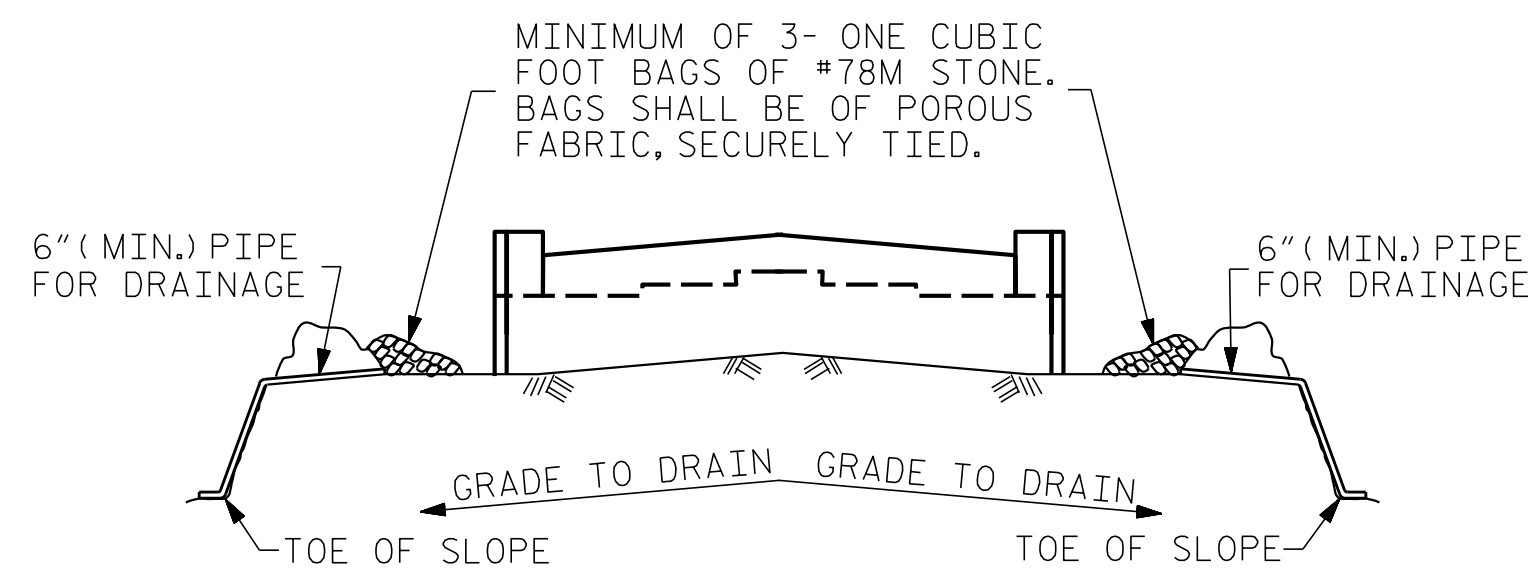
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SUBSTRUCTURE END BENT No. 1					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
SHEET NO.					S-19
TOTAL SHEETS					28

DRAWN BY: D. HODGE DATE: 3/19  
 CHECKED BY: G.M. GILLAND DATE: 4/19

DOCUMENT NOT CONSIDERED FINAL  
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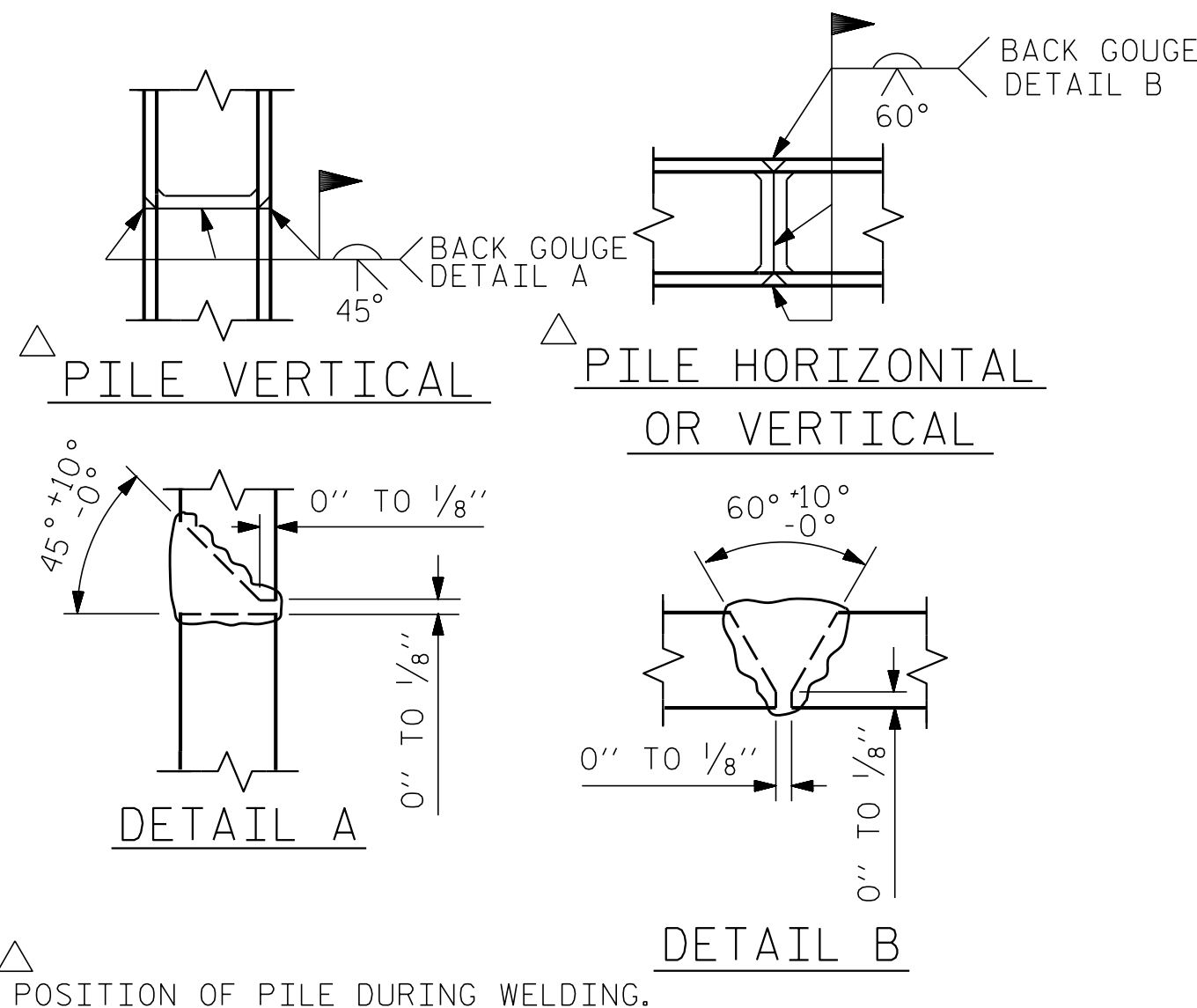


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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

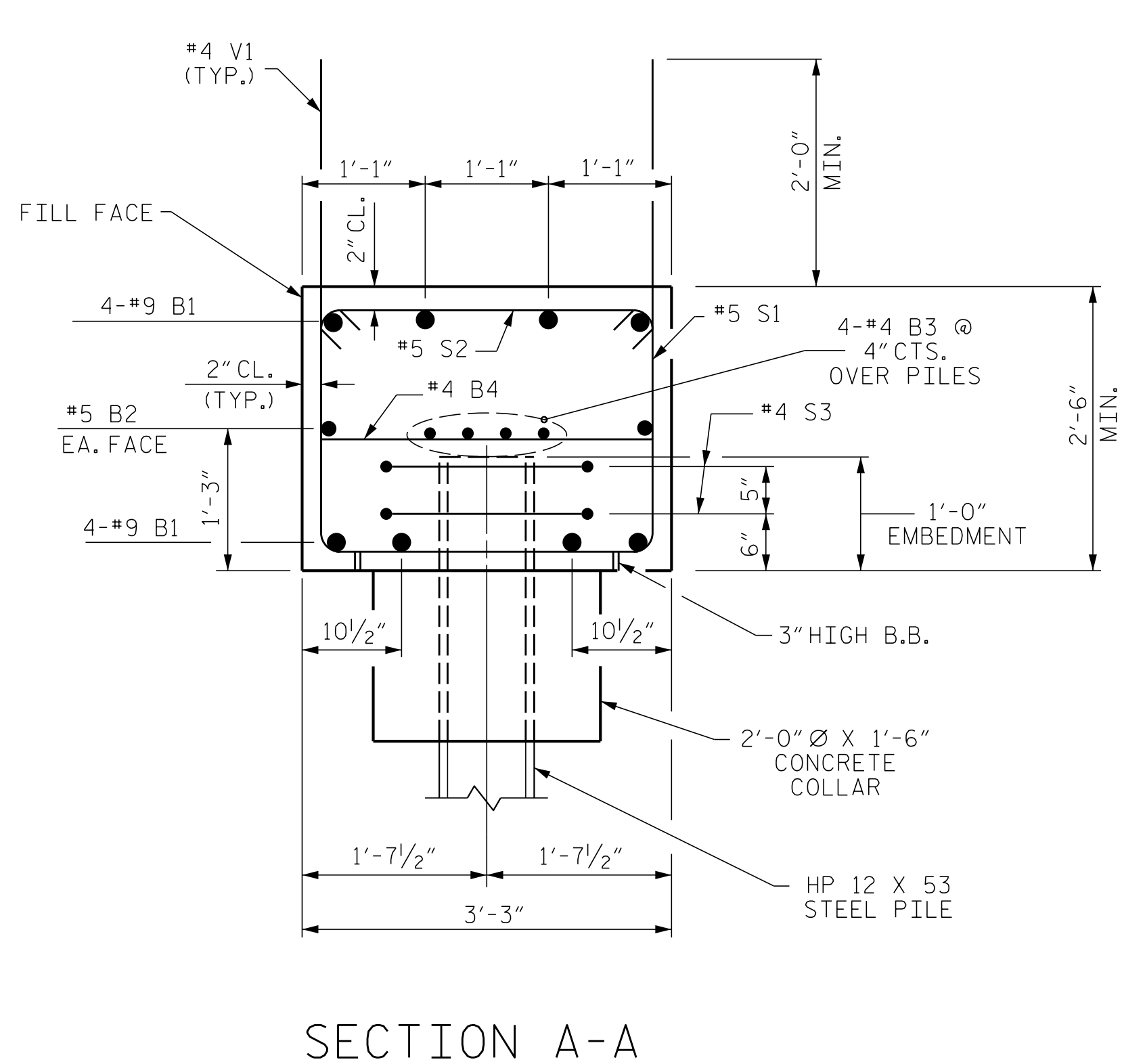
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

### TEMPORARY DRAINAGE AT END BENT

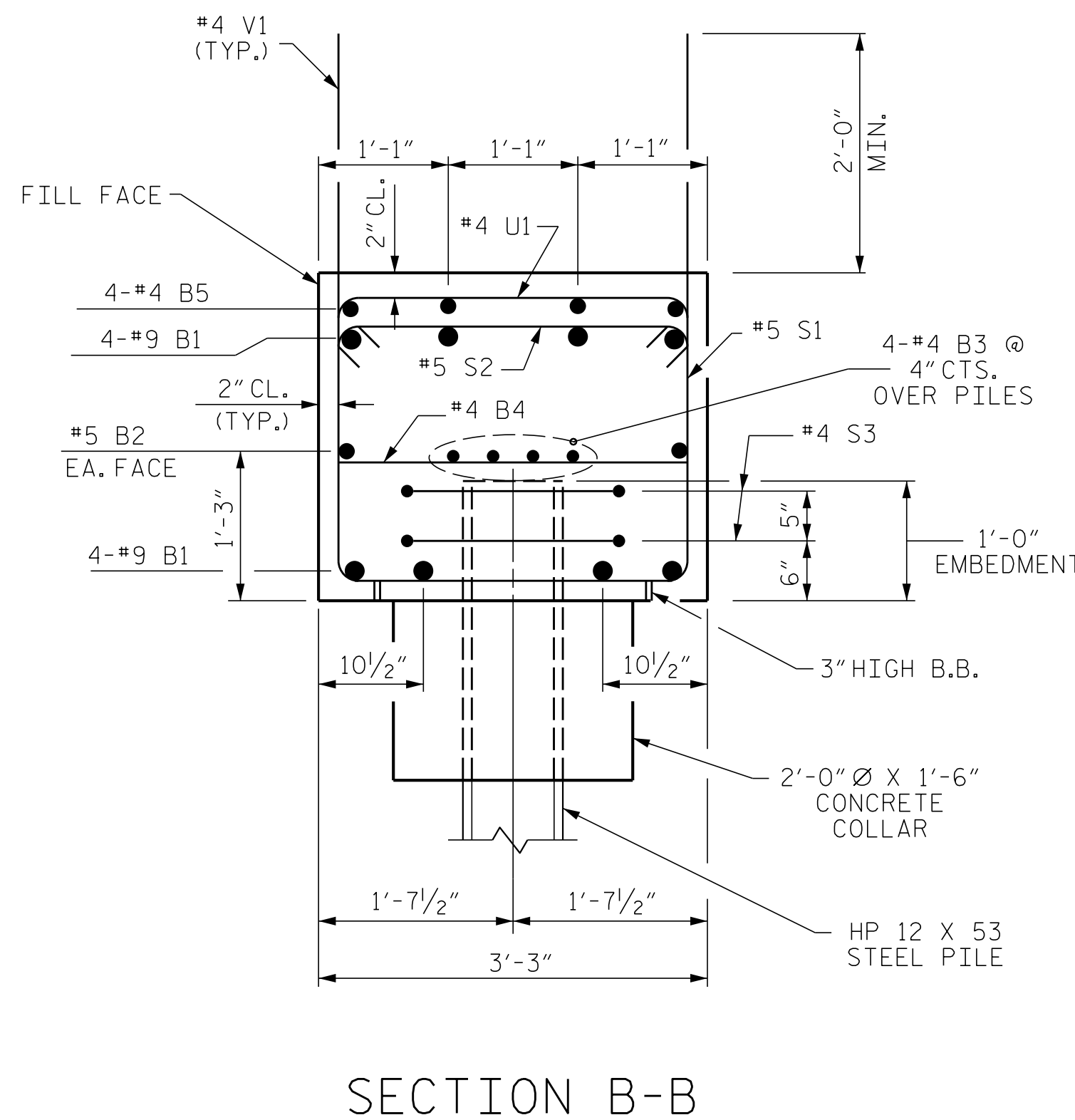


### PILE SPLICE DETAILS

BAR TYPES					BILL OF MATERIAL				
					END BENT No. 1				
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT				
B1	8	#9		44'-3"	1,204				
B2	2	#5	STR	41'-11"	87				
B3	8	#4	STR	22'-2"	118				
B4	11	#4	STR	2'-11"	21				
B5	4	#4	STR	12'-8"	34				
H1	32	#4		8'-2"	175				
H2	20	#4	STR	3'-7"	48				
S1	36	#5		8'-1"	304				
S2	36	#5		3'-10"	144				
S3	10	#4		6'-6"	43				
U1	9	#4		5'-11"	36				
V1	64	#4	STR	4'-3"	182				
V2	48	#4	STR	6'-5"	206				
REINFORCING STEEL					2,602 LBS.				
CLASS A CONCRETE BREAKDOWN									
POUR #1	CAP, CONC, COLLARS & LOWER PART OF WINGS			15.2 C.Y.					
POUR #2	UPPER PART OF WINGS			3.5 C.Y.					
TOTAL CLASS A CONCRETE				18.7 C.Y.					
HP 12 X 53 STEEL PILES									
NO: 5				LIN. FT.= 330					
PILE REDRIVES				3 EA.					
PILE DRIVING EQUIPMENT SETUP FOR HP 12 X 53 STEEL PILES				5 EA.					



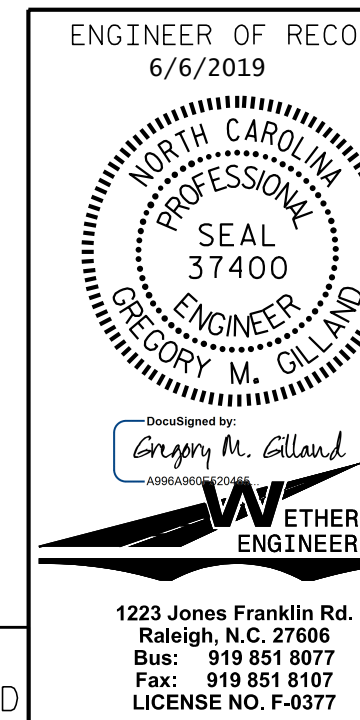
SECTION A-A



SECTION B-B

PROJECT NO. BR-0014  
 CUMBERLAND COUNTY  
 STATION: 21+37.00 -LREV-

SHEET 3 OF 3



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

### SUBSTRUCTURE END BENT No. 1

REVISIONS

NO.	BY:	DATE:	NO.	BY:	DATE:	SHEET NO.
1			3			S-20
2			4			TOTAL SHEETS 28

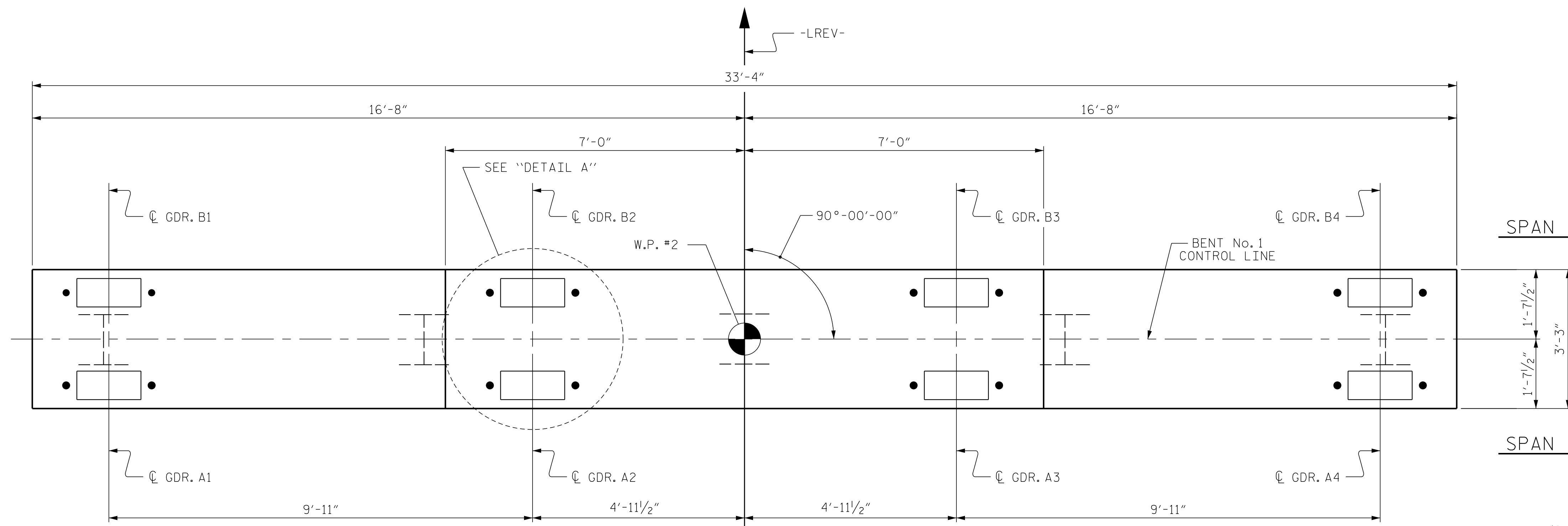
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 Raleigh, N.C. 27606  
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 LICENSE NO. F-0377

**NOTES:**

STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

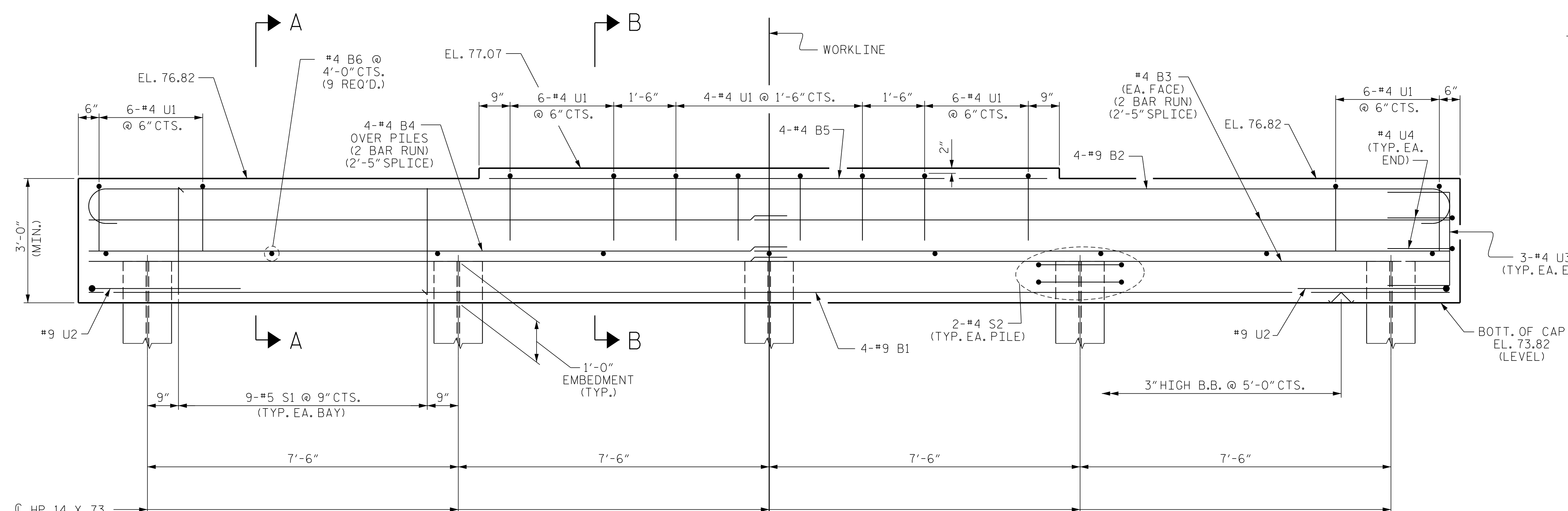
GALVANIZE THE TOP 30 FEET OF EACH INTERIOR BENT PILE IN ACCORDANCE WITH SECTION 1076 OF THE STANDARD SPECIFICATIONS.



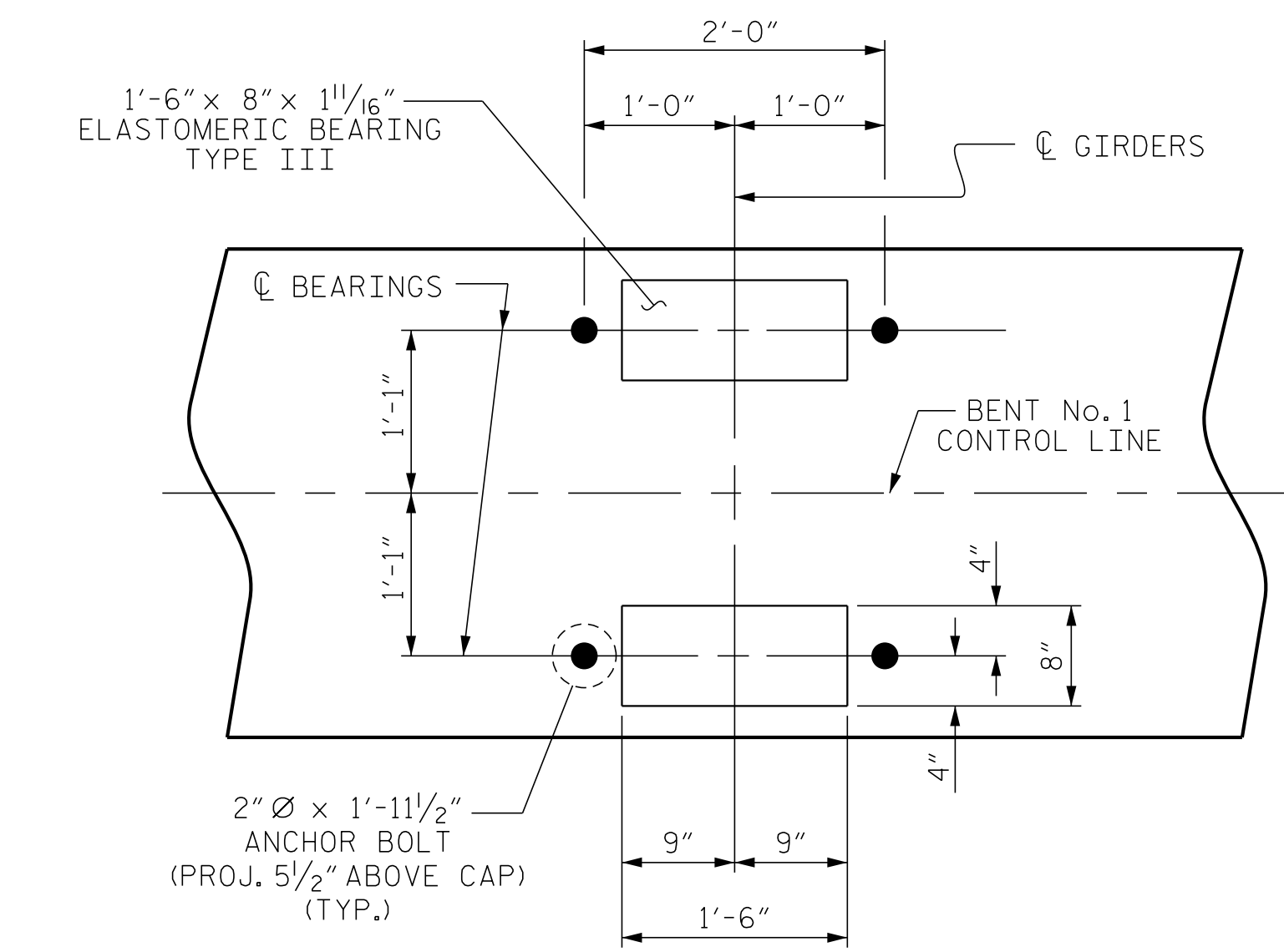
**PLAN**

SPAN B

SPAN A



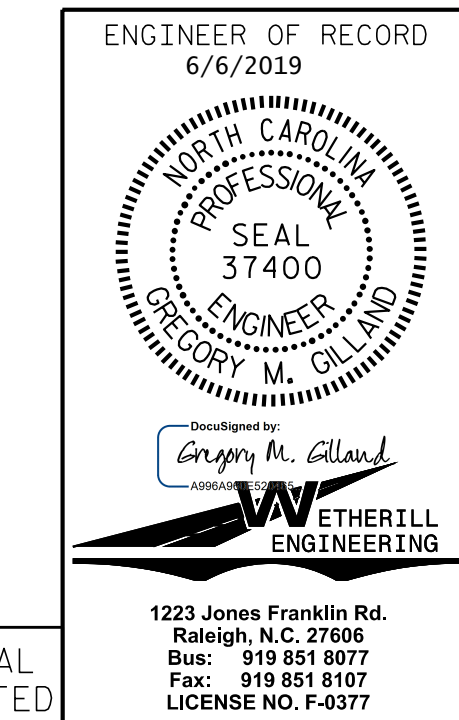
**ELEVATION**



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

NOTE:  
INVERT ALTERNATE  
STIRRUPS AS SHOWN

PROJECT NO. BR-0014  
CUMBERLAND COUNTY  
 STATION: 21+37.00 -LREV-  
 SHEET 1 OF 2



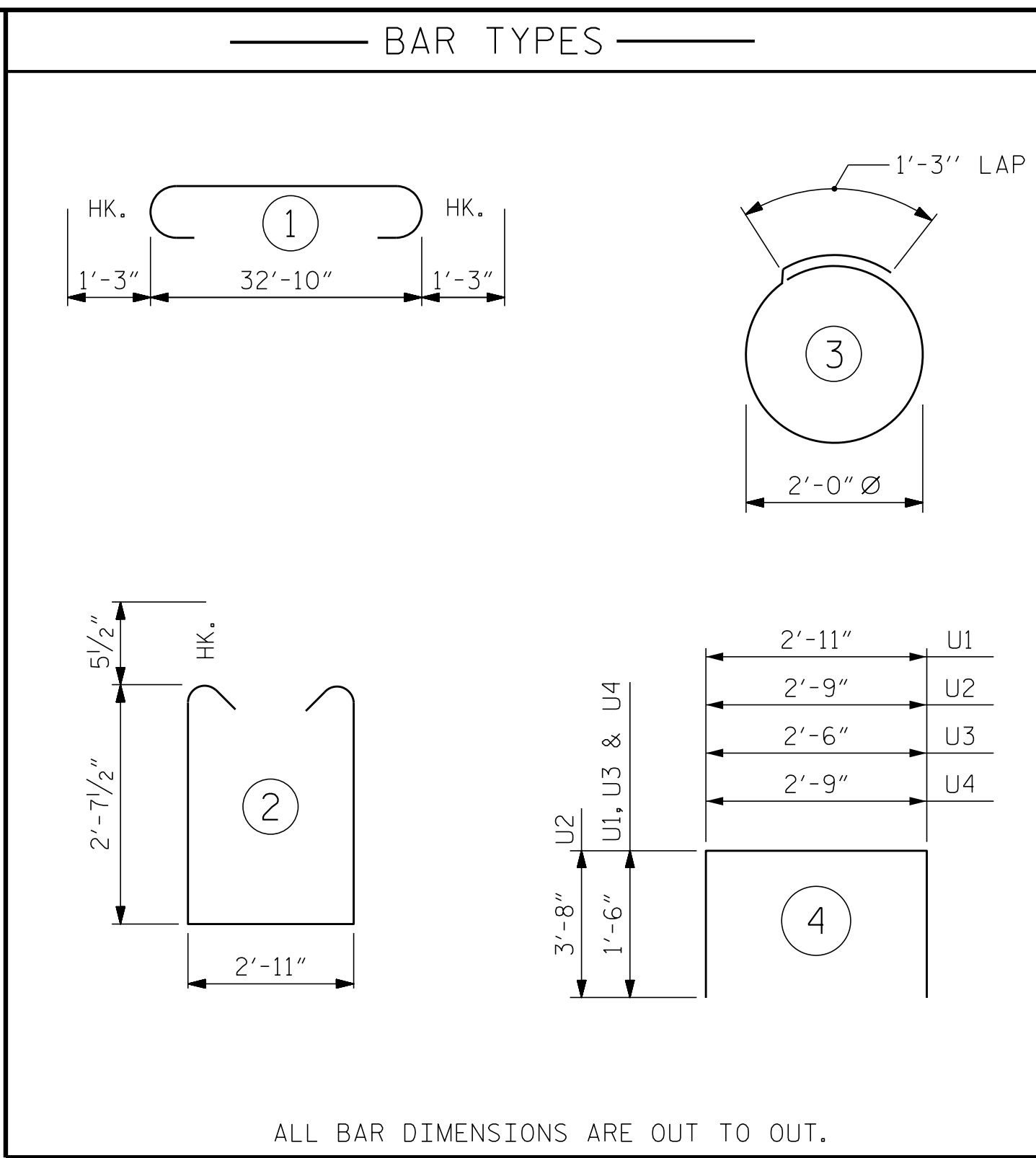
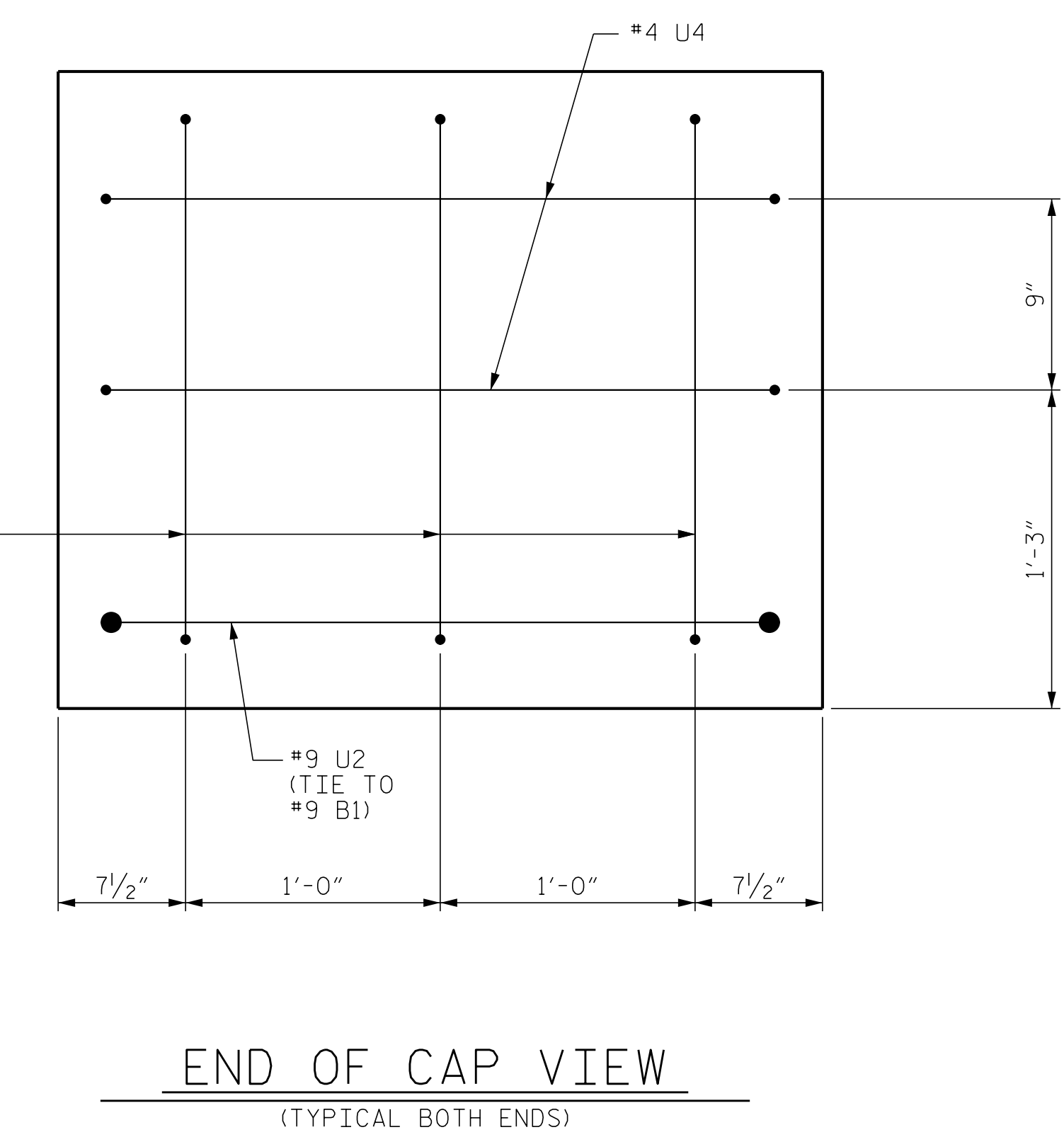
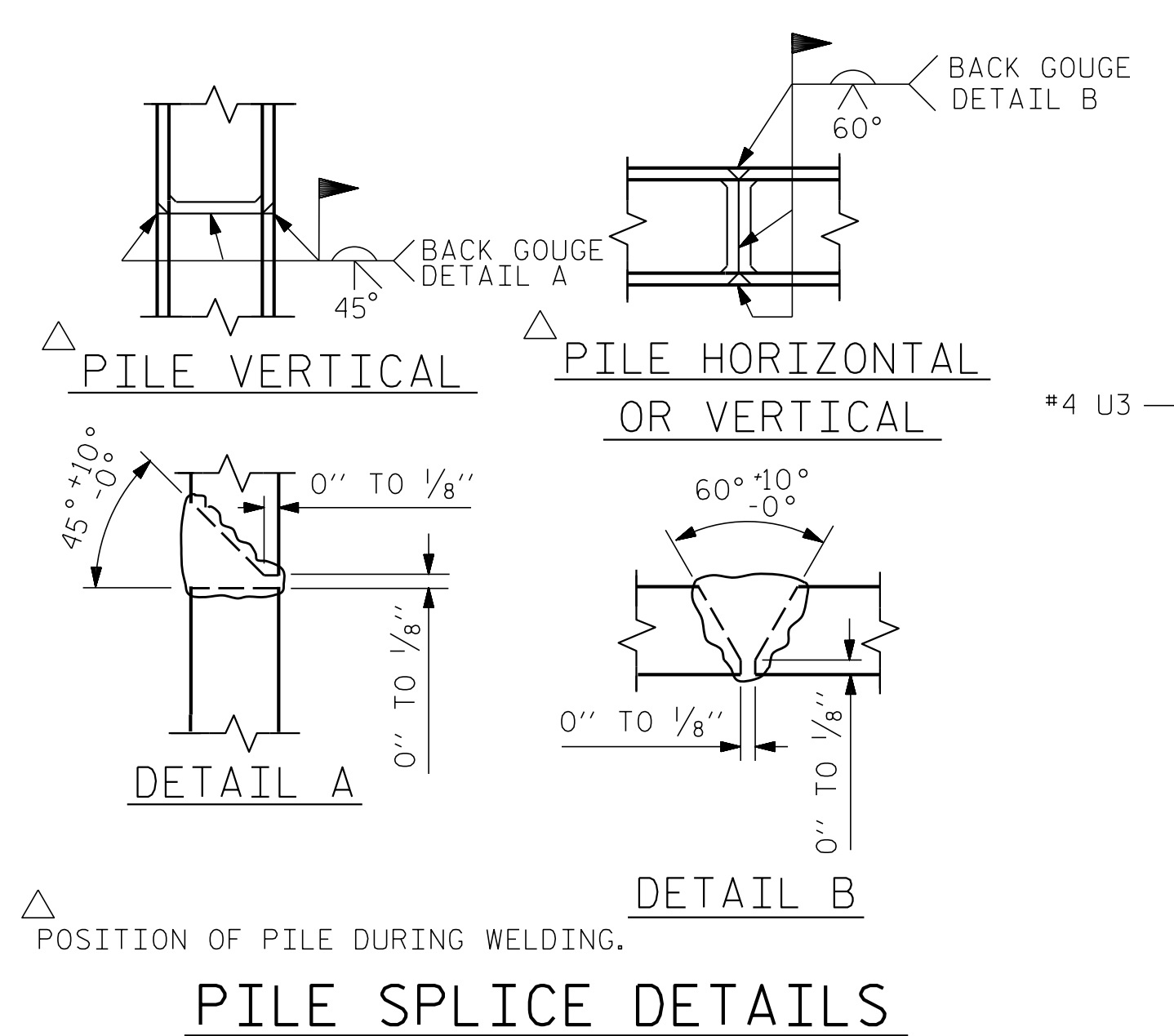
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REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
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DRAWN BY : D. HODGE DATE : 4/19  
 CHECKED BY : G.M. GILLAND DATE : 4/19

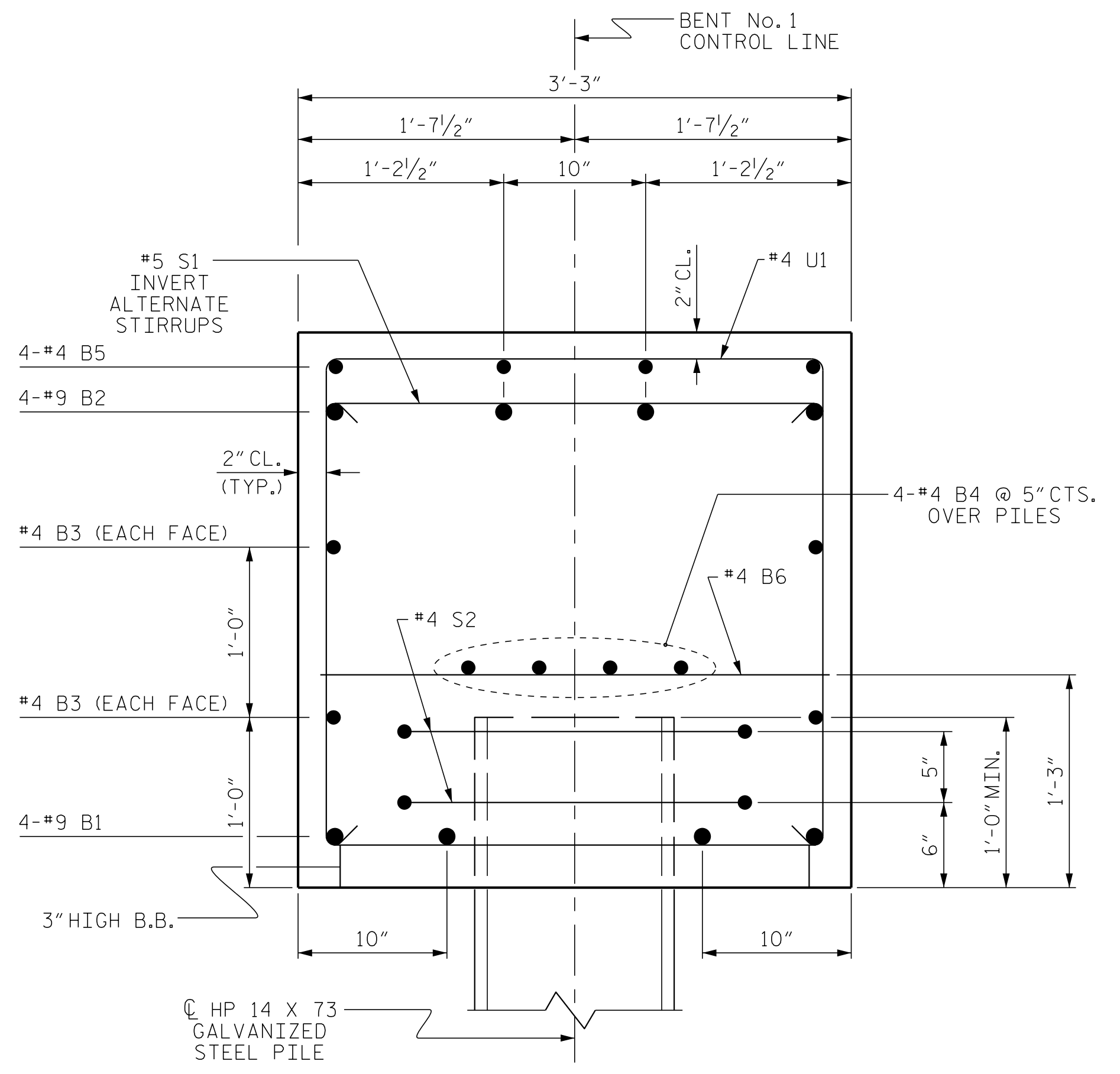
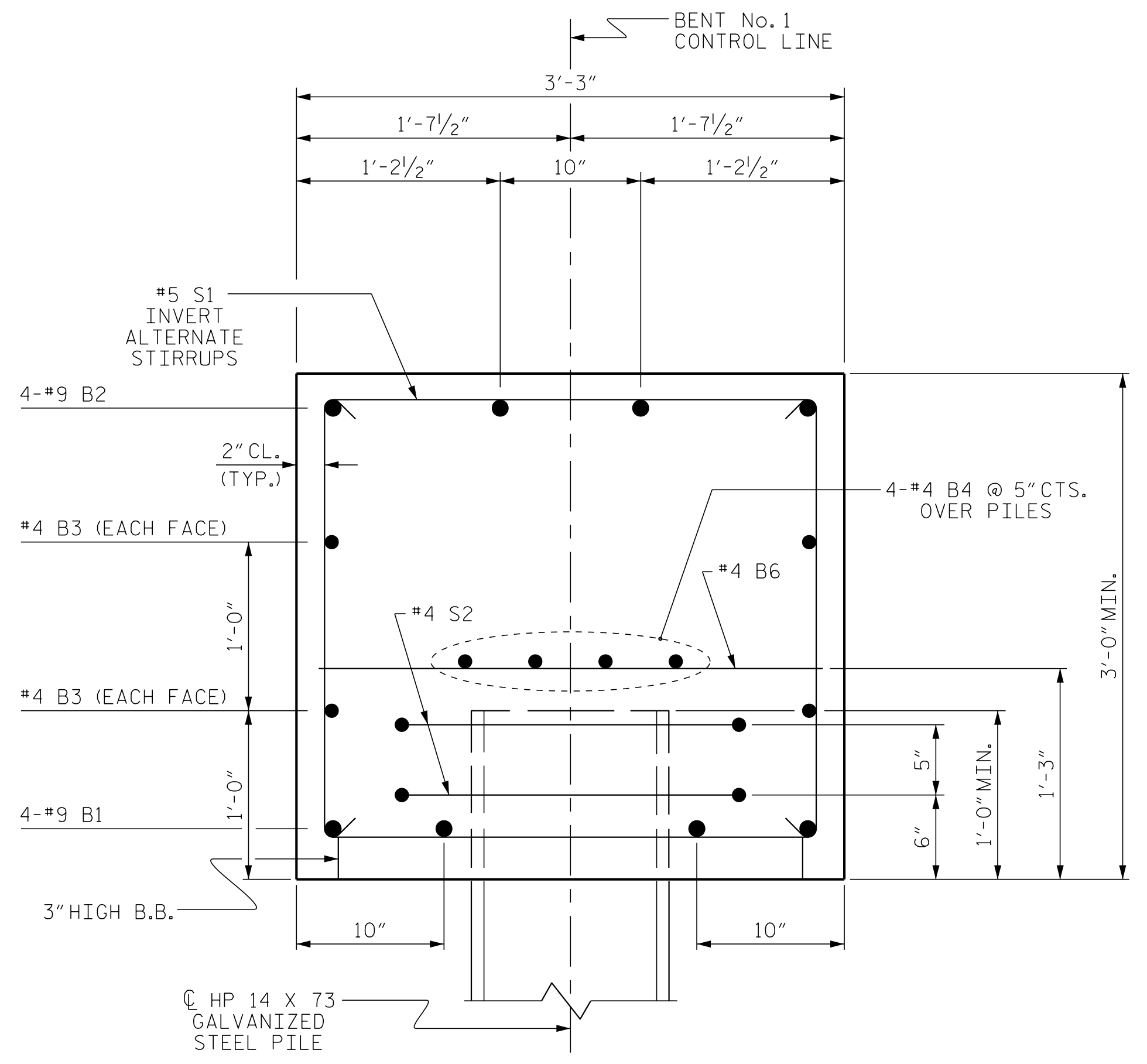
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UNLESS ALL SIGNATURES COMPLETED

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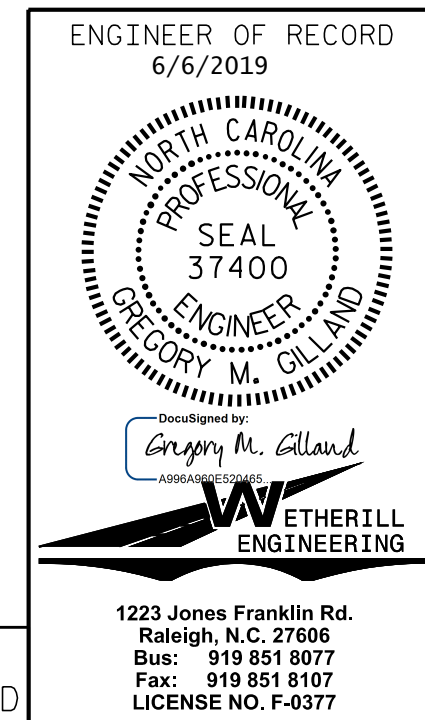




BILL OF MATERIAL					
BENT No. 1					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	4	#9	STR	33'-0"	449
B2	4	#9	1	35'-4"	481
B3	8	#4	STR	17'-9"	95
B4	8	#4	STR	17'-9"	95
B5	4	#4	STR	13'-8"	37
B6	9	#4	STR	2'-11"	18
S1	36	#5	2	9'-1"	341
S2	10	#4	3	7'-7"	51
U1	28	#4	4	5'-11"	111
U2	2	#9	4	10'-1"	69
U3	6	#4	4	5'-6"	22
U4	4	#4	4	5'-9"	15
REINFORCING STEEL				1,784 LBS	
CLASS A CONCRETE BREAKDOWN					
TOTAL CLASS A CONCRETE				12.5 C.Y.	
HP 14 X 73 GALVANIZED STEEL PILES					
No. 5				LIN. FT. 330	
PILE DRIVING EQUIPMENT SETUP FOR HP 14 X 73 GALVANIZED STEEL PILES					
				5 EA.	
PILE REDRIVES				3 EA.	



PROJECT NO. BR-0014  
CUMBERLAND COUNTY  
STATION: 21+37.00 -LREV-  
SHEET 2 OF 2



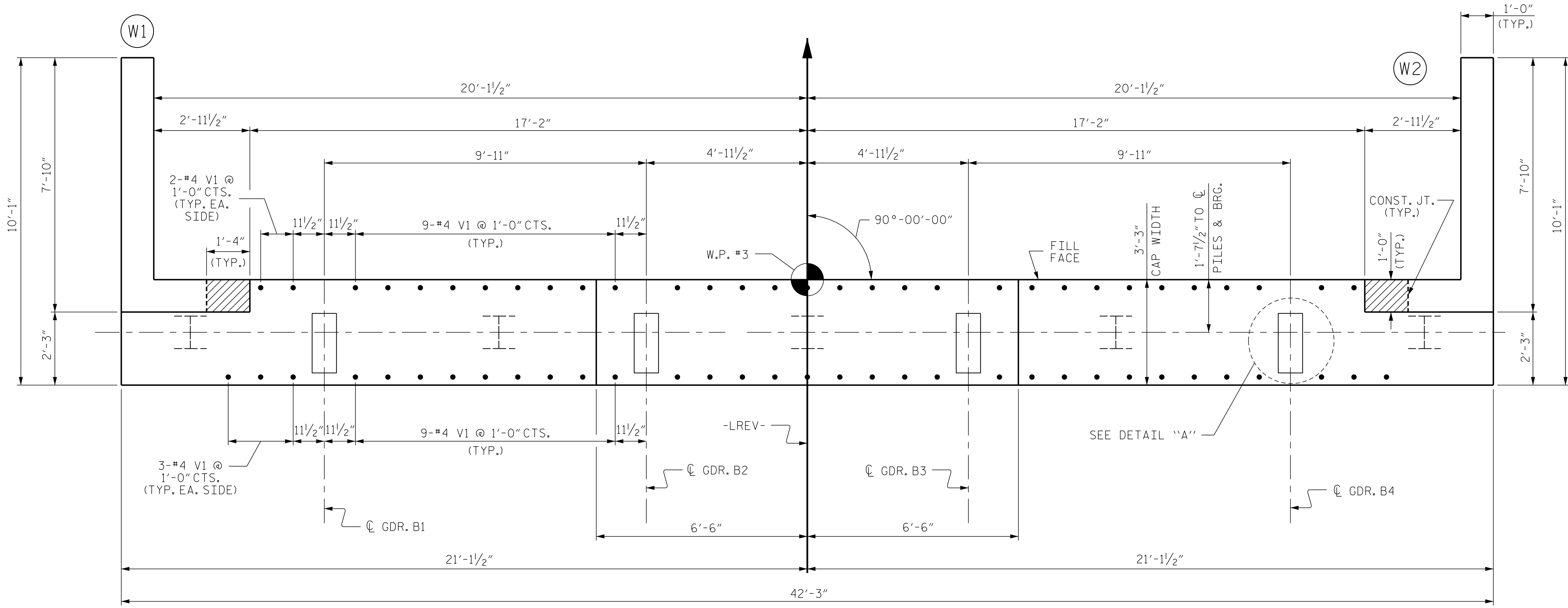
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
SUBSTRUCTURE BENT No. 1					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
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2			4		

SHEET NO. S-22				
TOTAL SHEETS 28				

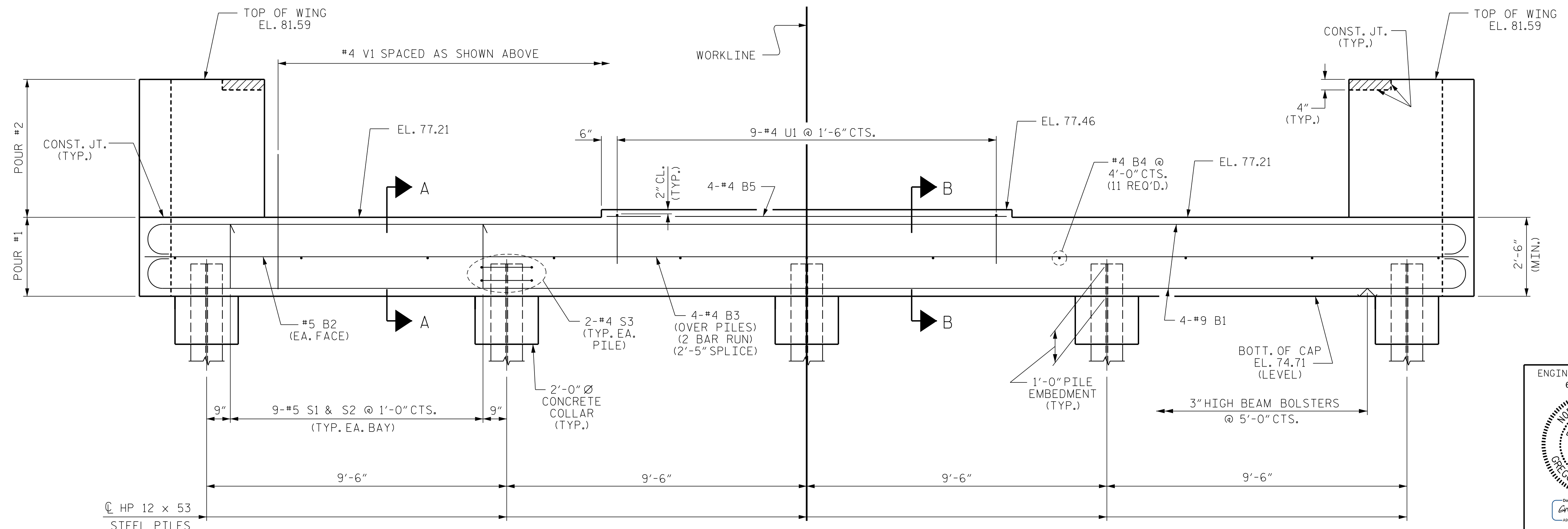
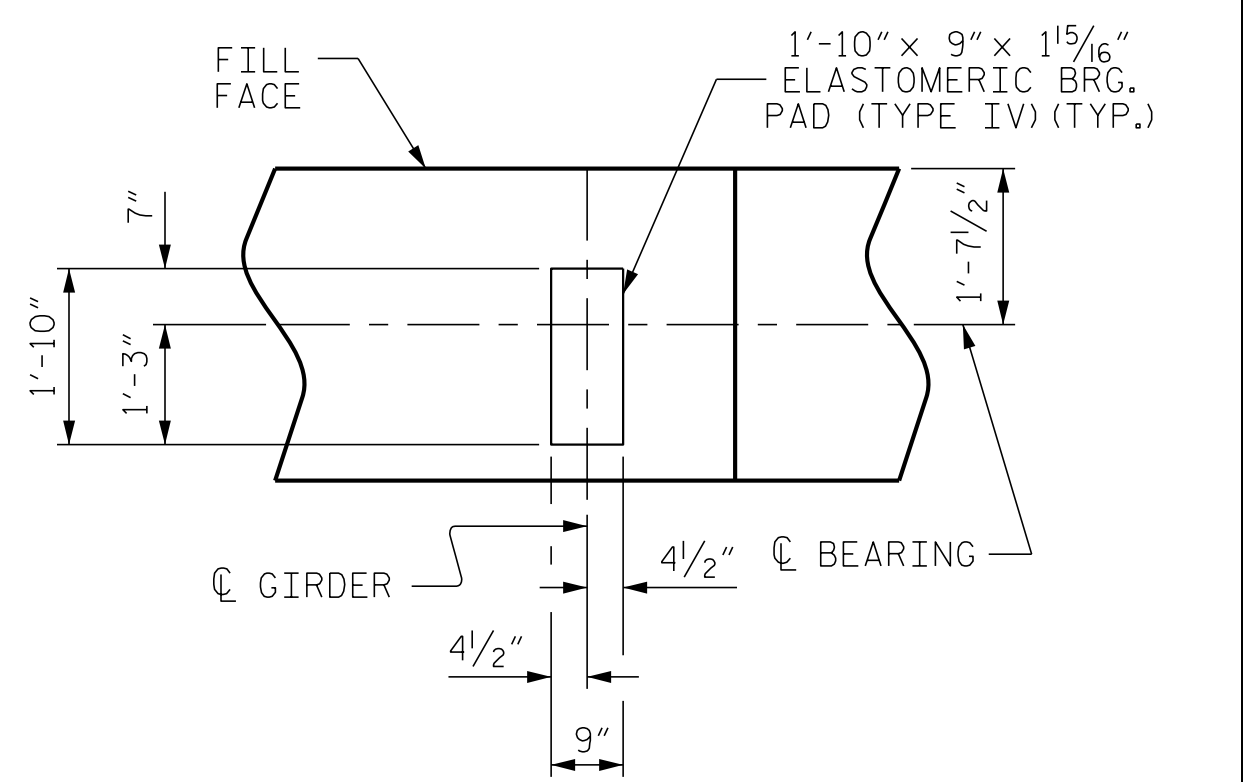
DRAWN BY: D. HODGE DATE: 4/19  
CHECKED BY: G.M. GILLAND DATE: 4/19

DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED

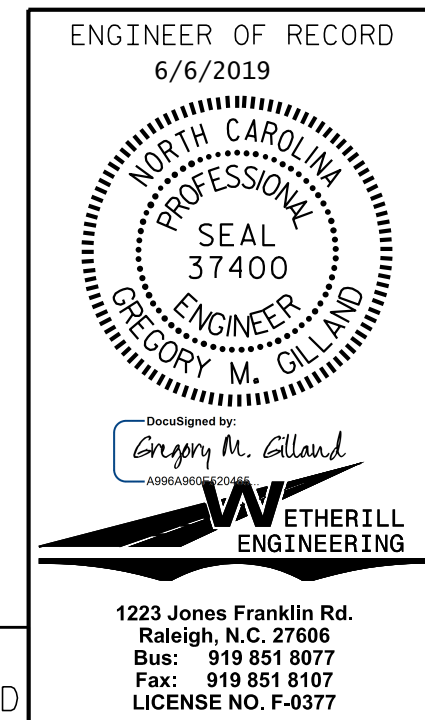
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**NOTES:**  
 THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE BARRIER RAILS ARE CAST.  
 THE TOP SURFACE OF THE END BENT CAP WITHIN THE LIMITS OF THE INTEGRAL ABUTMENT, EXCEPT THE BEARING AREA, SHALL BE RAKED TO A DEPTH OF 1/4".



PROJECT NO. BR-0014  
 CUMBERLAND COUNTY  
 STATION: 21+37.00 -LREV-  
 SHEET 1 OF 3



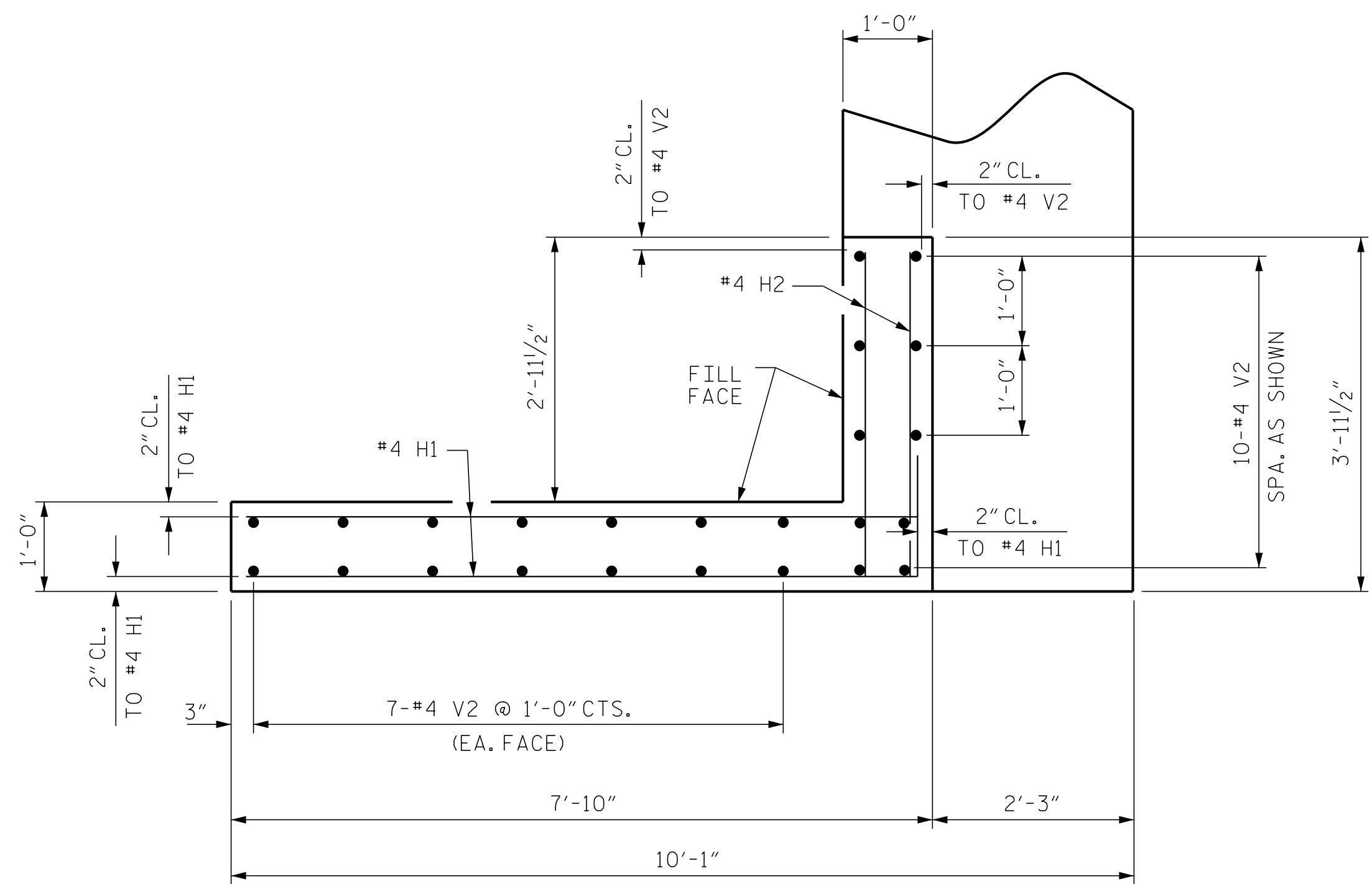
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH		SUBSTRUCTURE END BENT No. 2	
REVISIONS			
NO.	BY:	DATE:	NO.
1			3
2			4
SHEET NO. S-23			TOTAL SHEETS 28

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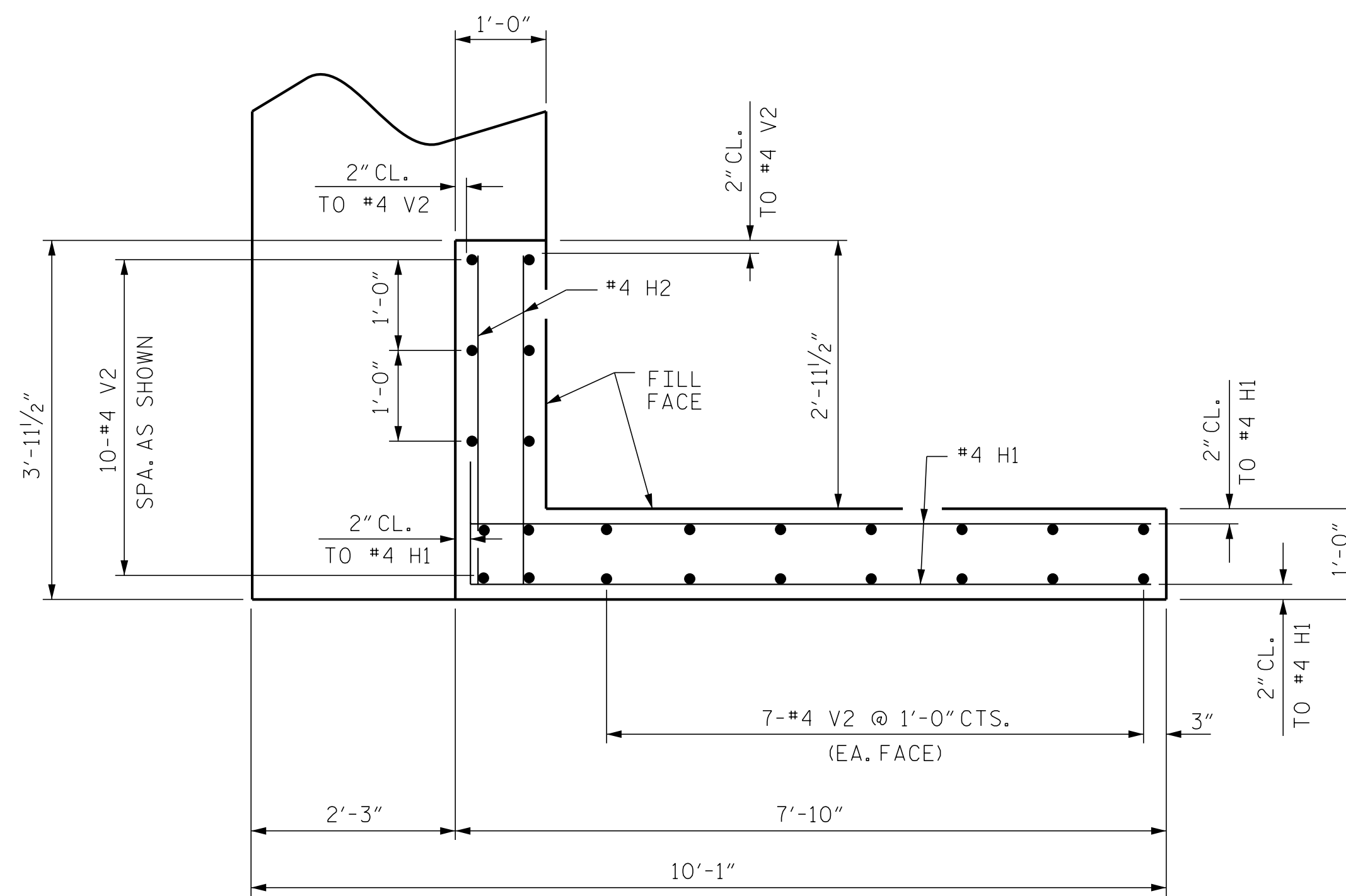
DRAWN BY: D. HODGE DATE: 3/19  
 CHECKED BY: G.M. GILLAND DATE: 4/19

DOCUMENT NOT CONSIDERED FINAL  
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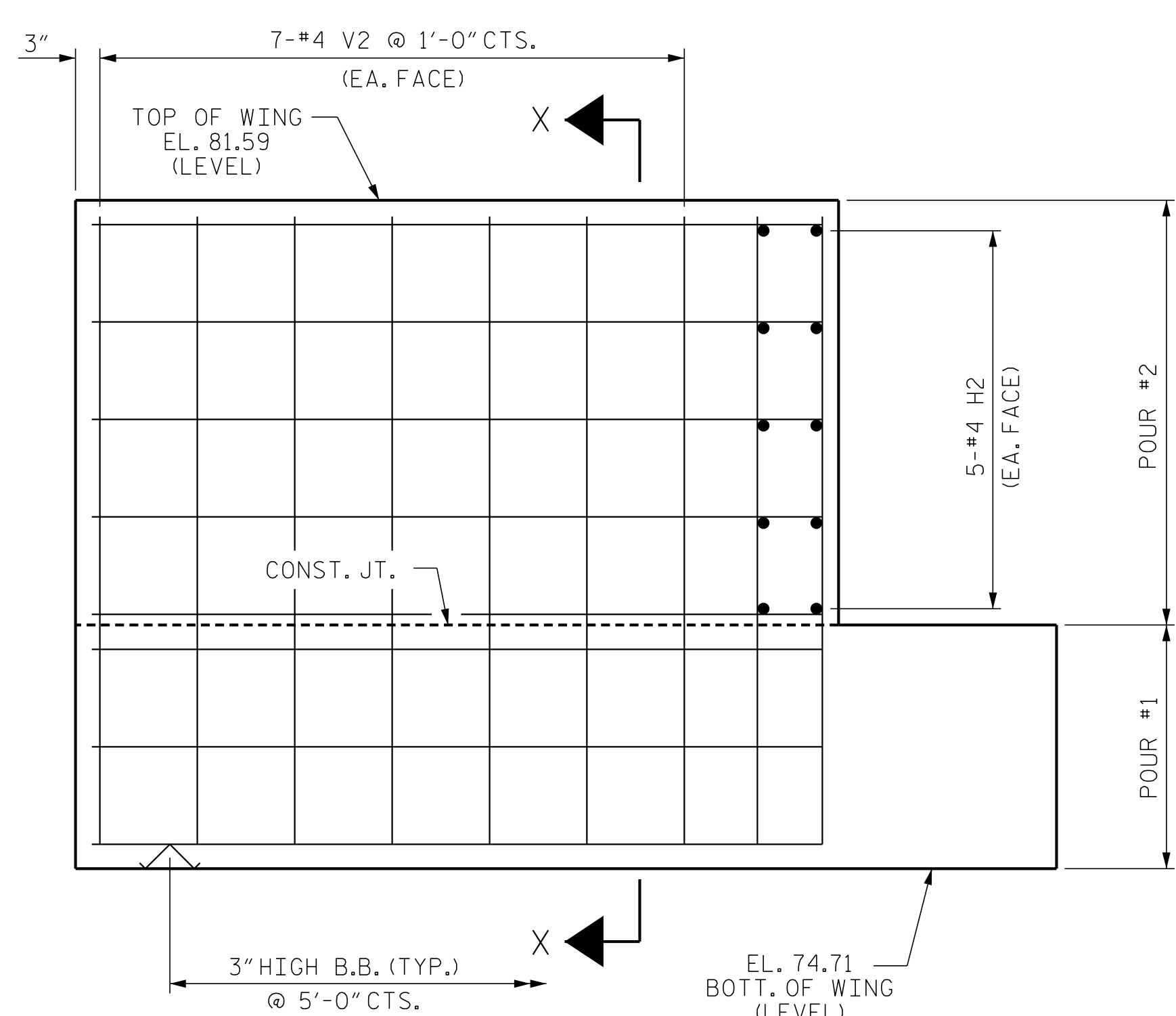
1223 Jones Franklin Rd.  
 Raleigh, N.C. 27606  
 Bus: 919 851 8077  
 Fax: 919 851 8107  
 LICENSE NO. F-0377



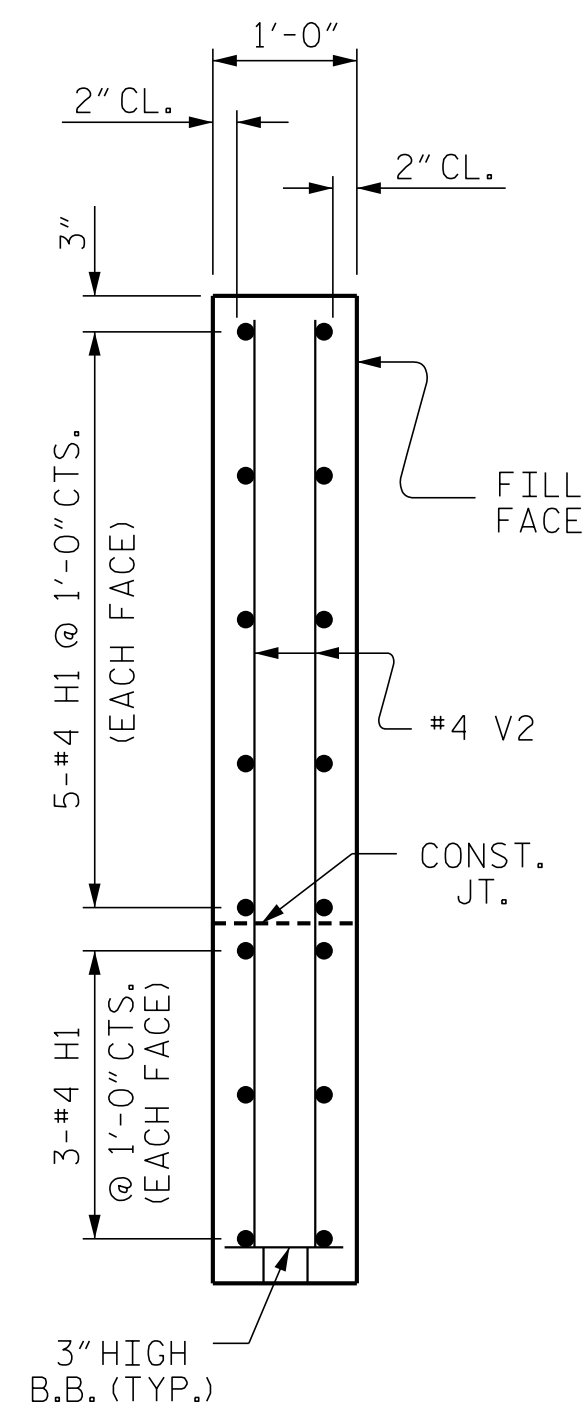
PLAN OF WING - W1



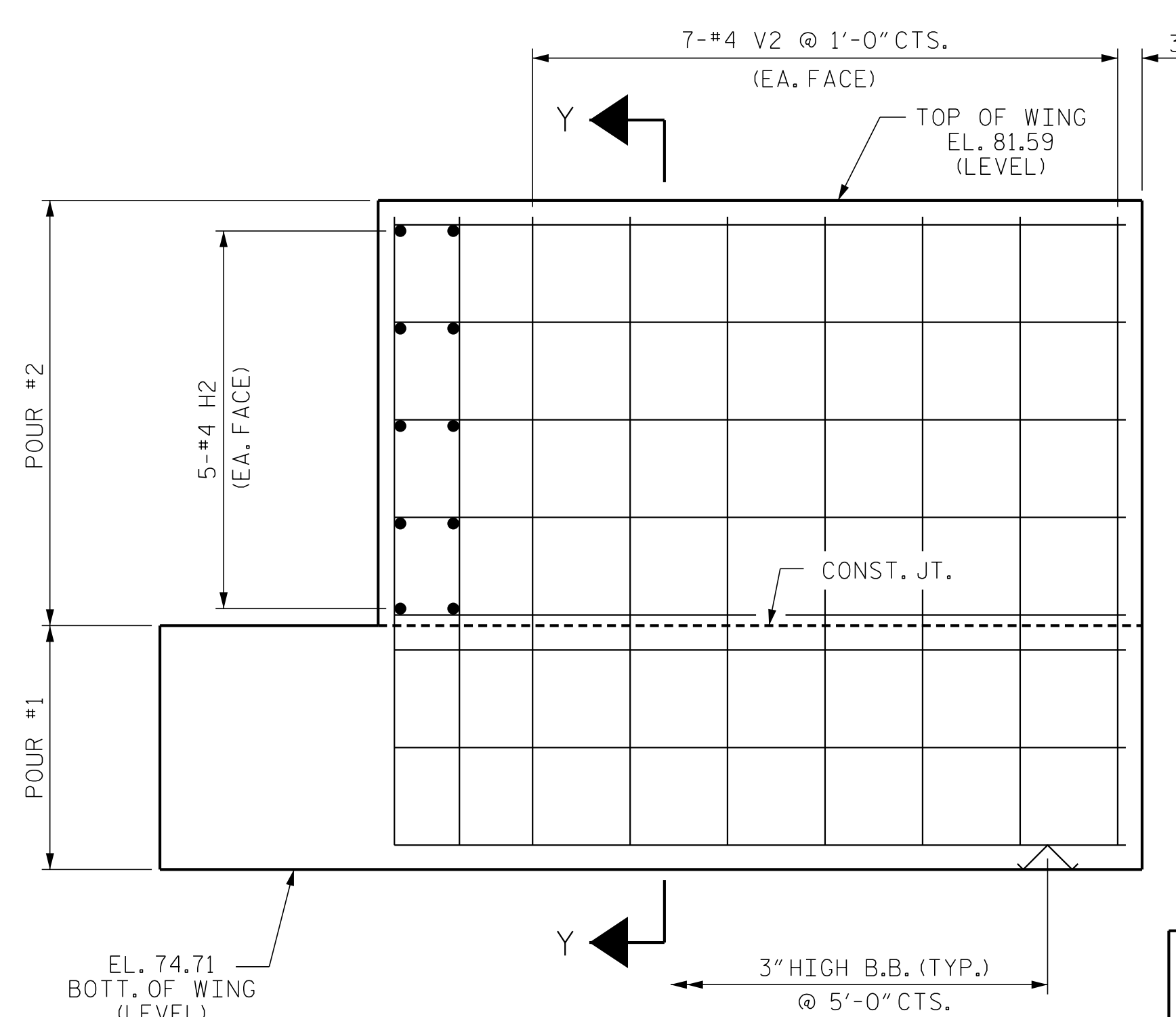
PLAN OF WING - W2



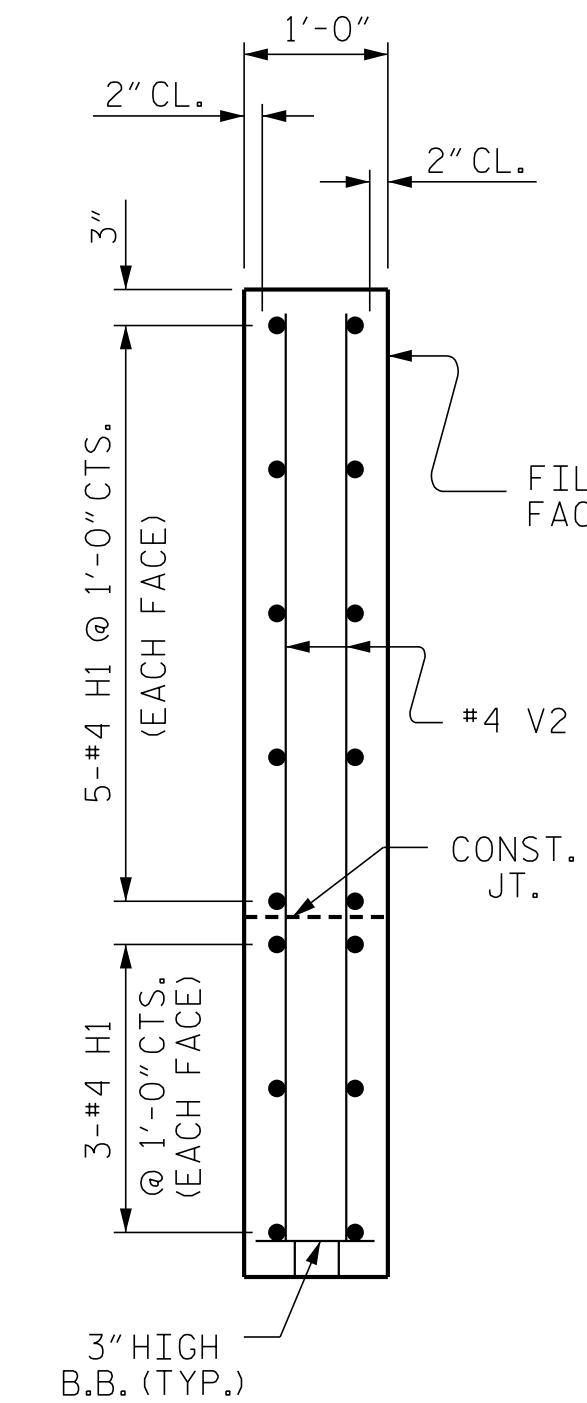
ELEVATION OF WING - W1



SECTION X-X



ELEVATION OF WING - W2

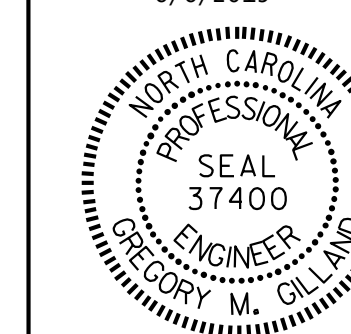


SECTION Y-Y

PROJECT NO. BR-0014  
 CUMBERLAND COUNTY  
 STATION: 21+37.00 -LREV-

SHEET 2 OF 3

ENGINEER OF RECORD  
 6/6/2019



Gregory M. Gilland  
 WETHERILL ENGINEERING

1223 Jones Franklin Rd.  
 Raleigh, N.C. 27606  
 Bus: 919 851 8077  
 Fax: 919 851 8107  
 LICENSE NO. F-0377

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

SUBSTRUCTURE  
 END BENT No. 2

REVISIONS

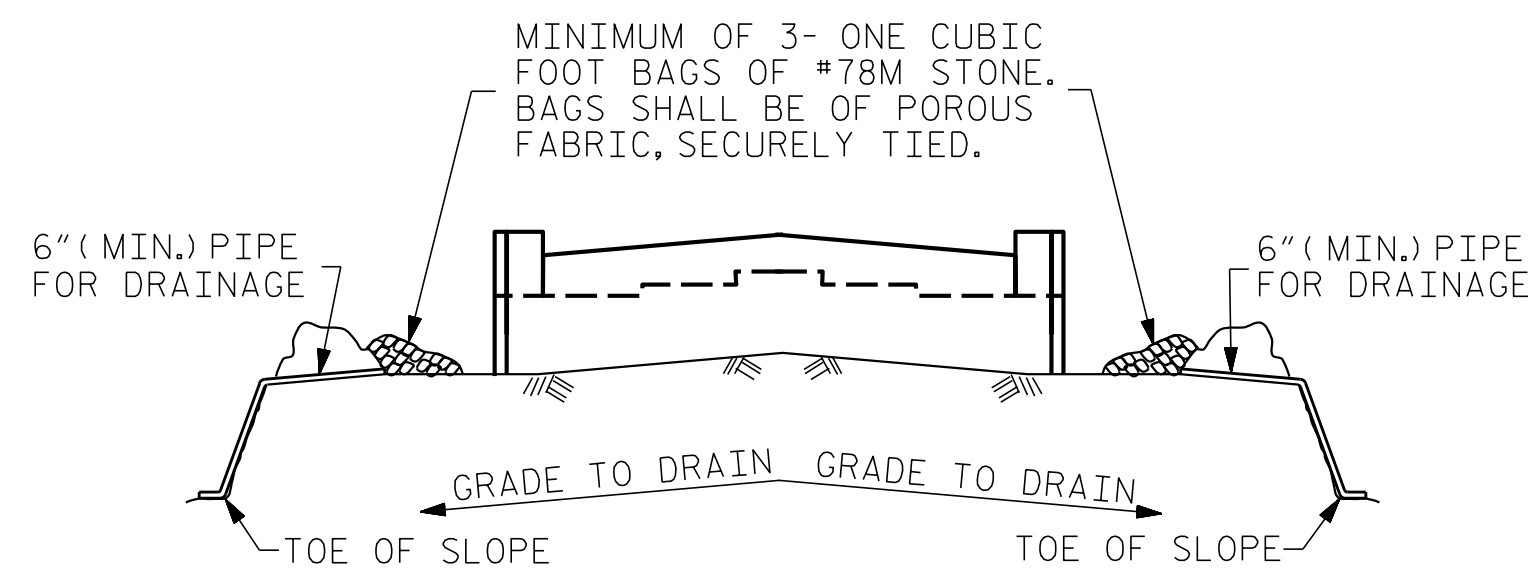
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2			4		

SHEET NO.  
 S-24  
 TOTAL SHEETS  
 28

DRAWN BY: D. HODGE DATE: 3/19  
 CHECKED BY: G.M. GILLAND DATE: 4/19

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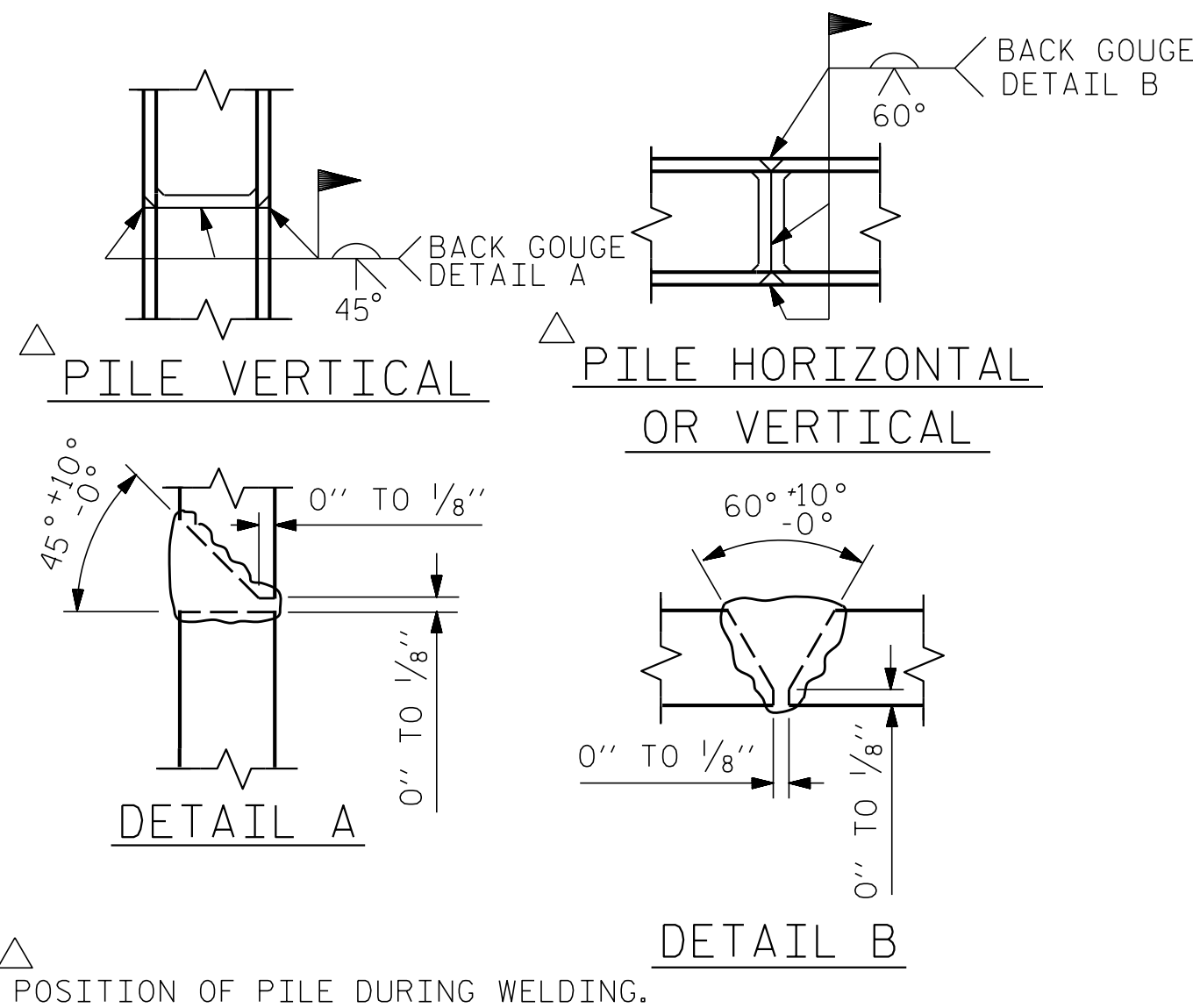


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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

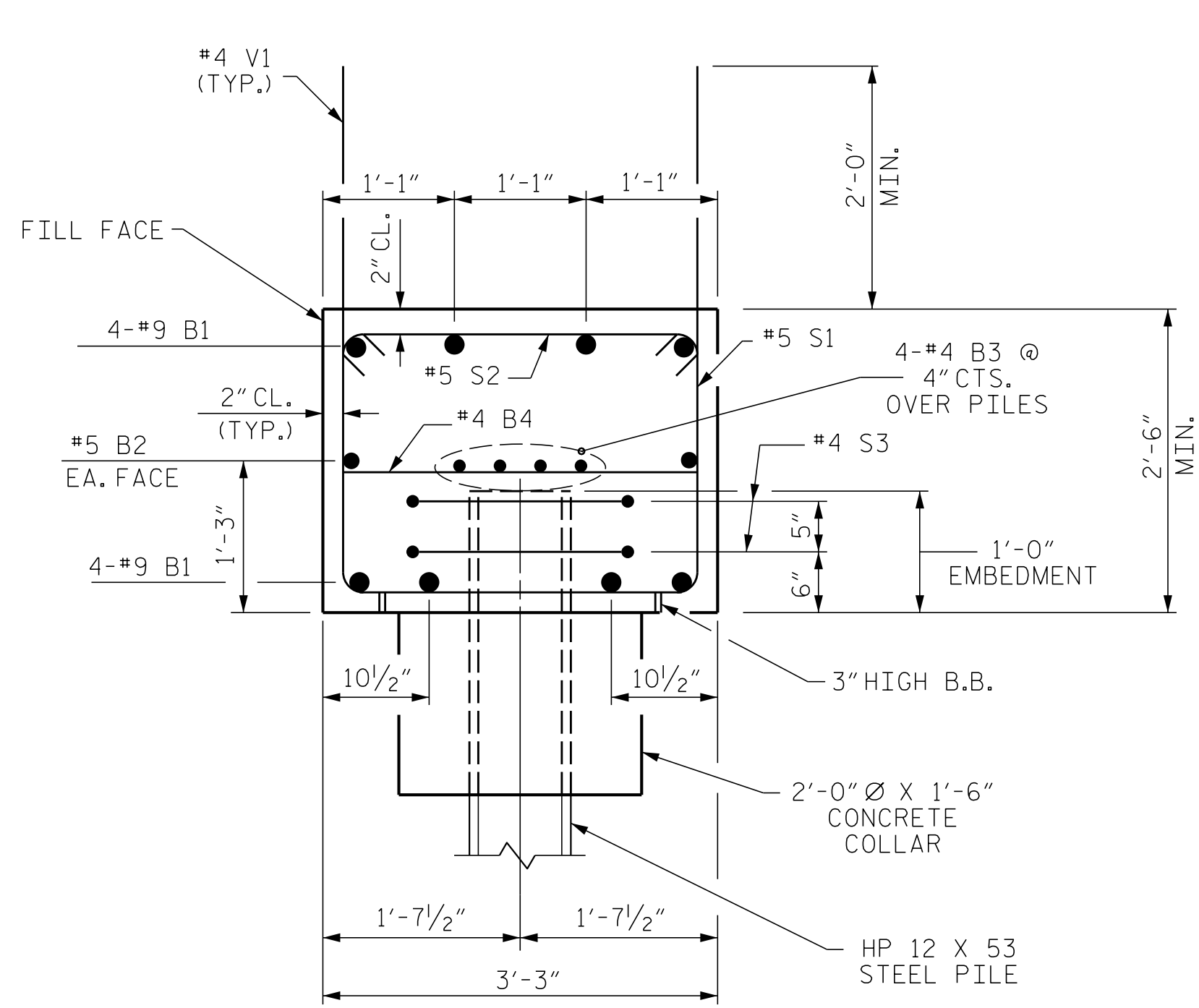
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

### TEMPORARY DRAINAGE AT END BENT

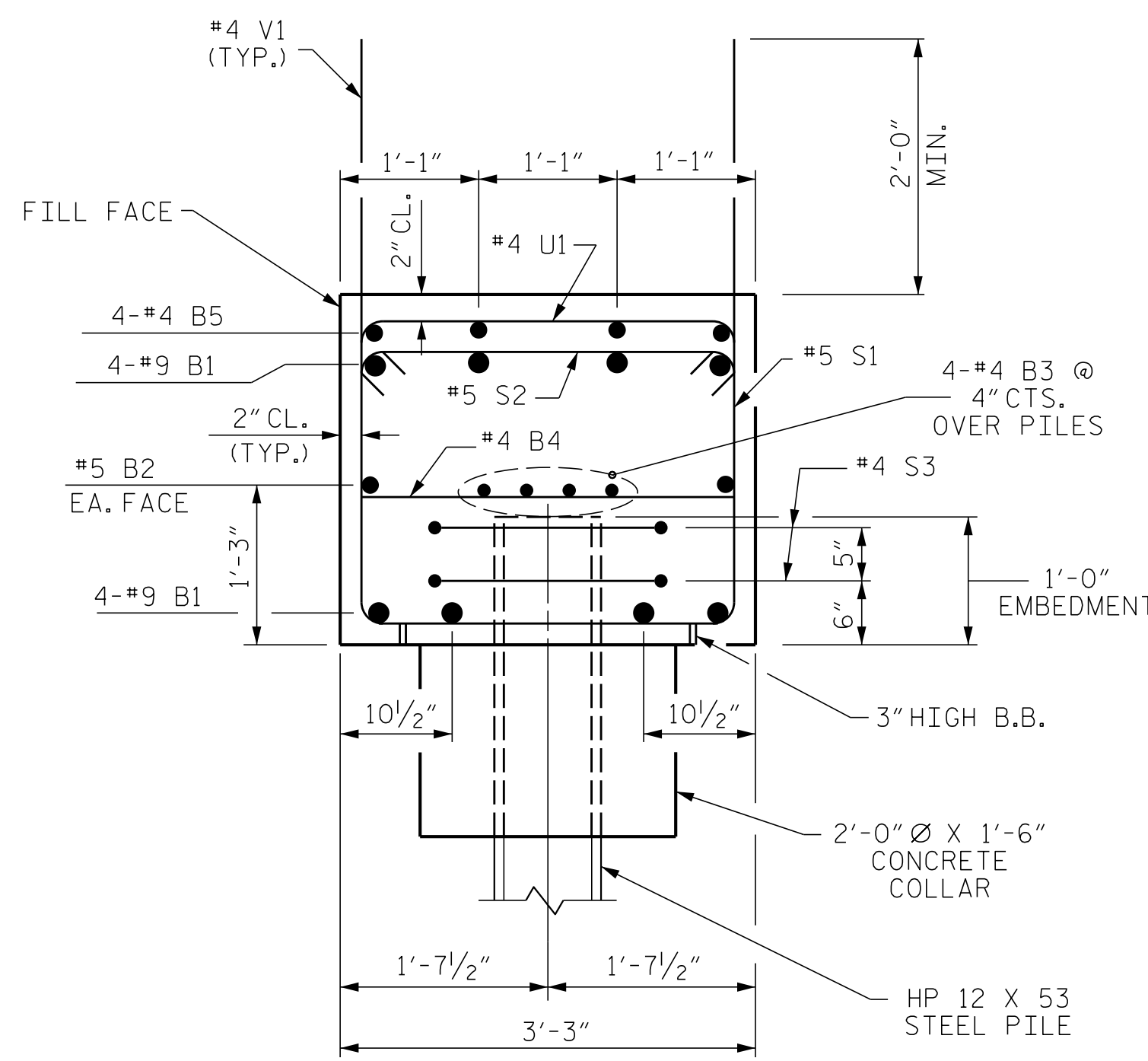


### PILE SPLICE DETAILS

BAR TYPES					BILL OF MATERIAL				
					END BENT No. 2				
BAR NO.	NO.	SIZE	TYPE	LENGTH	WEIGHT				
B1	8	#9		44'-3"	1,204				
B2	2	#5	STR	41'-11"	87				
B3	8	#4	STR	22'-2"	118				
B4	11	#4	STR	2'-11"	21				
B5	4	#4	STR	12'-8"	34				
H1	32	#4		8'-2"	175				
H2	20	#4	STR	3'-7"	48				
S1	36	#5		8'-1"	304				
S2	36	#5		3'-10"	144				
S3	10	#4		6'-6"	43				
U1	9	#4		5'-11"	36				
V1	64	#4	STR	4'-3"	182				
V2	48	#4	STR	6'-5"	206				
REINFORCING STEEL					2,602 LBS.				
CLASS A CONCRETE BREAKDOWN									
POUR #1	CAP, CONC, COLLARS & LOWER PART OF WINGS				15.2 C.Y.				
POUR #2	UPPER PART OF WINGS				3.5 C.Y.				
TOTAL CLASS A CONCRETE					18.7 C.Y.				
HP 12 X 53 STEEL PILES									
NO: 5					LIN. FT.= 355				
PILE REDRIVES					3 EA.				
PILE DRIVING EQUIPMENT SETUP FOR HP 12 X 53 STEEL PILES					5 EA.				



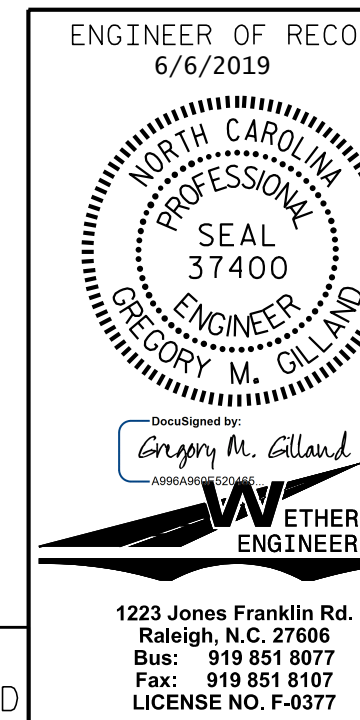
SECTION A-A



SECTION B-B

PROJECT NO. BR-0014  
 CUMBERLAND COUNTY  
 STATION: 21+37.00 -LREV-

SHEET 3 OF 3



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

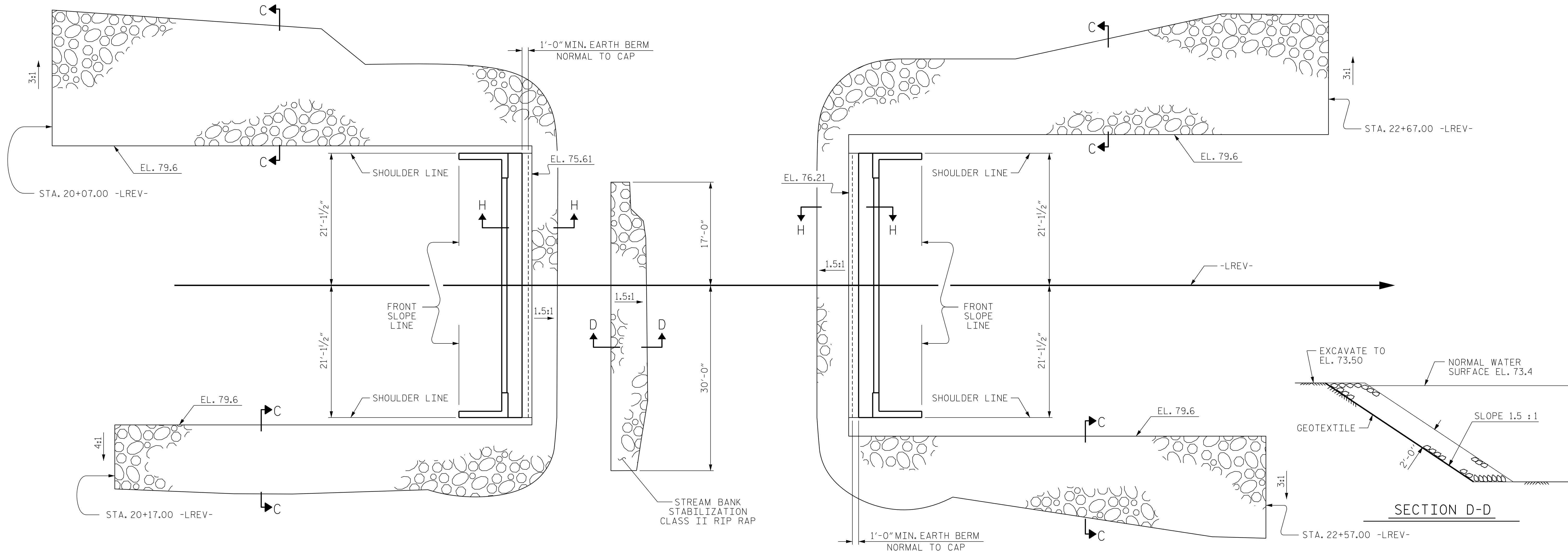
### SUBSTRUCTURE END BENT No. 2

REVISIONS

NO.	BY:	DATE:	NO.	BY:	DATE:	SHEET NO.
1			3			S-25
2			4			TOTAL SHEETS 28

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 CHECKED BY: G.M. GILLAND DATE: 4/19

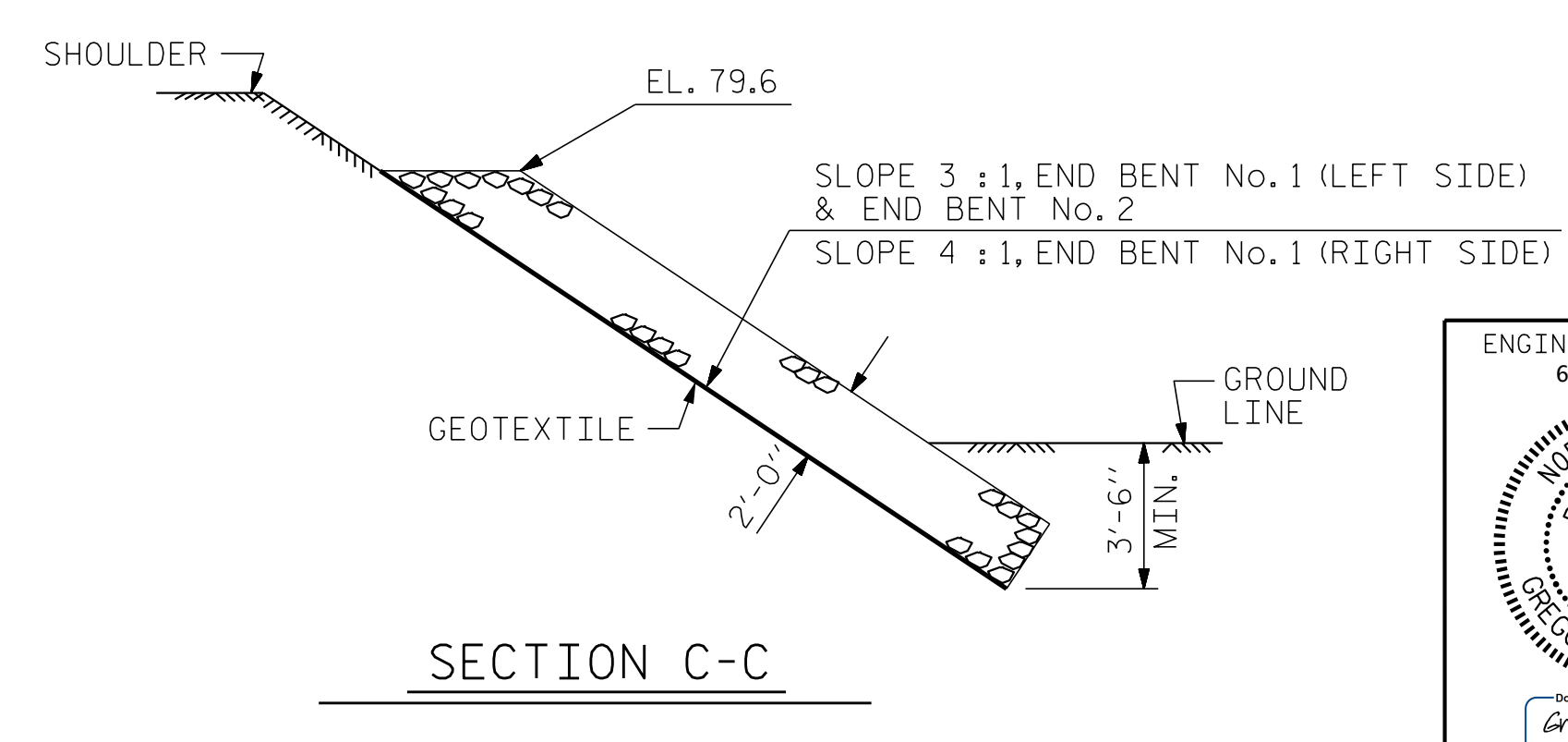
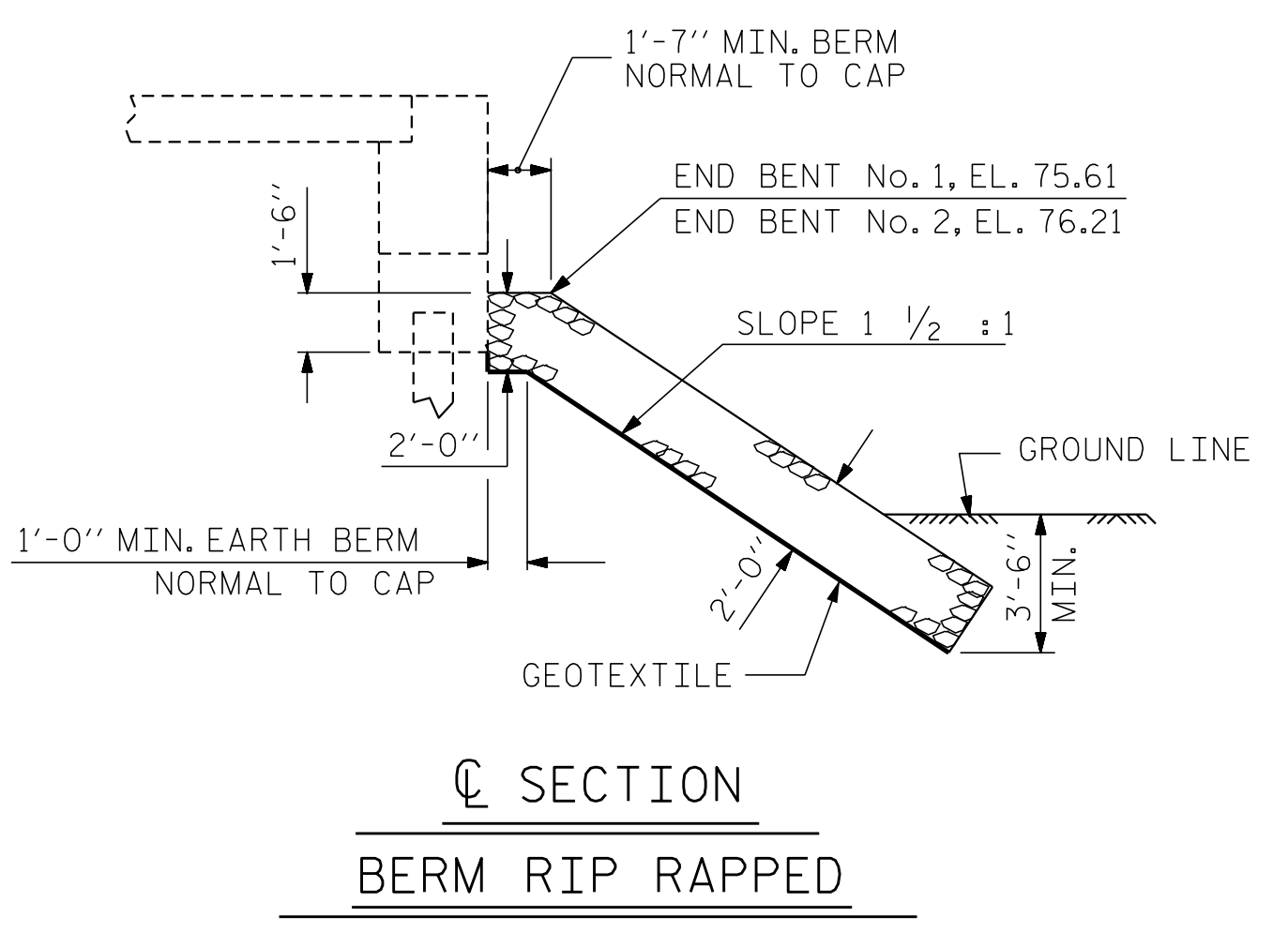
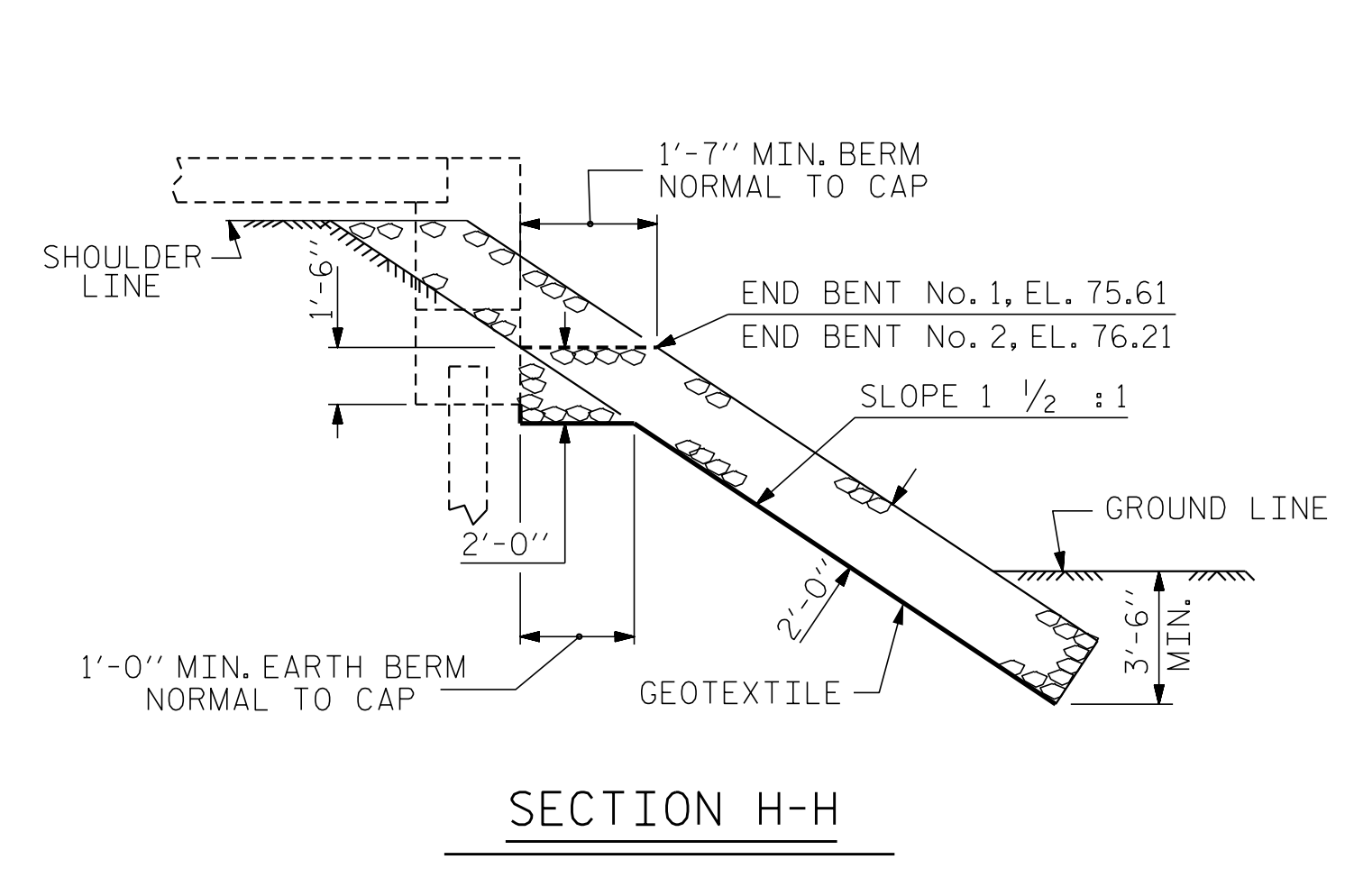


AT END BENT No. 1  
 AT END BENT No. 2  
**PLAN OF RIP RAP**

ESTIMATED QUANTITIES			
BRIDGE @ STA. 21+37.00 -LREV-	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE	RIP RAP CLASS B (1'-0" THICK)
	TONS	SQUARE YARDS	TONS
END BENT 1	280	308	15
END BENT 2	260	285	20

NOTE: CLASS B RIP RAP IS TO BE PLACED DIRECTLY ON TOP OF THE CLASS II RIP RAP IN THE AREA IN FRONT OF END BENTS BENEATH THE SUPERSTRUCTURE AS DIRECTED BY THE ENGINEER.  
 STREAM BANK STABILIZATION QUANTITY IS INCLUDED IN END BENT No.1 QUANTITIES.

PROJECT NO. BR-0014  
CUMBERLAND COUNTY  
 STATION: 21+37.00 -LREV-



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

STANDARD  
 RIP RAP DETAILS

REVISIONS

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

SHEET NO. S-26  
 TOTAL SHEETS 28

ENGINEER OF RECORD  
 6/6/2019

NORTH CAROLINA  
 PROFESSIONAL  
 SEAL  
 37400  
 ENGINEER  
 GREGORY M. GILLAND

Gregory M. Gilland  
 REGISTERED PROFESSIONAL ENGINEER

ETHERILL  
 ENGINEERING

1223 Jones Franklin Rd.  
 Raleigh, N.C. 27606  
 Bus: 919 851 8077  
 Fax: 919 851 8107  
 LICENSE NO. F-0377

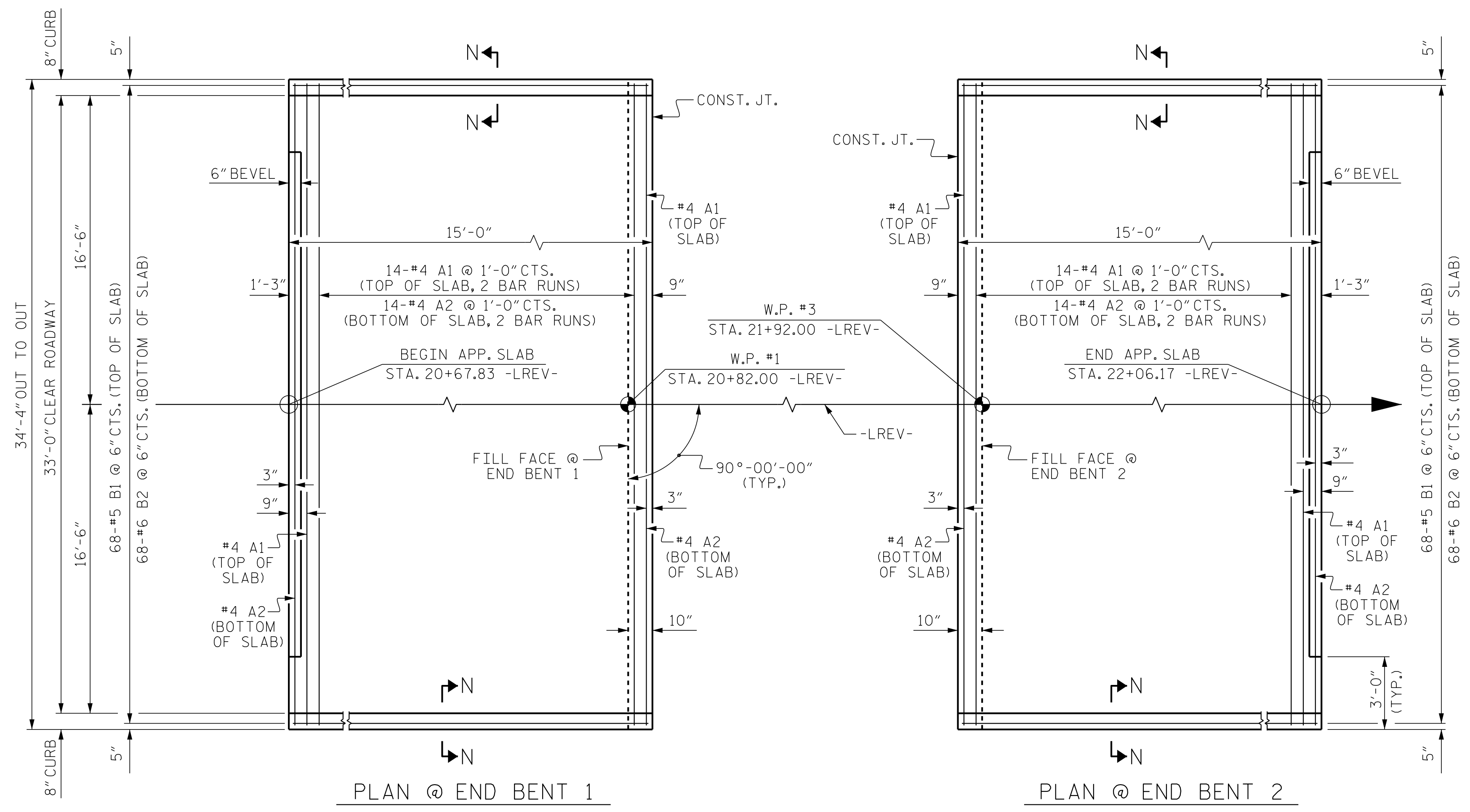
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 UNLESS ALL SIGNATURES COMPLETED

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ASSEMBLED BY : D. HODGE DATE : 4/19  
 CHECKED BY : G.M. GILLAND DATE : 4/19

DRAWN BY : REK 1/84 REV. 10/1/11 MAA/GM  
 CHECKED BY : RDU 1/84 REV. 12/21/11 MAA/GM  
 REV. 12/17 MAA/THC





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 SAWS 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 2 FOR DETAILS AND NOTES.

BILL OF MATERIAL

FOR ONE APPROACH SLAB (2 REQ'D)

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	32	#4	STR	18'-0"	385
A2	32	#4	STR	17'-11"	383
* B1	68	#5	STR	14'-2"	1005
B2	68	#6	STR	14'-8"	1498

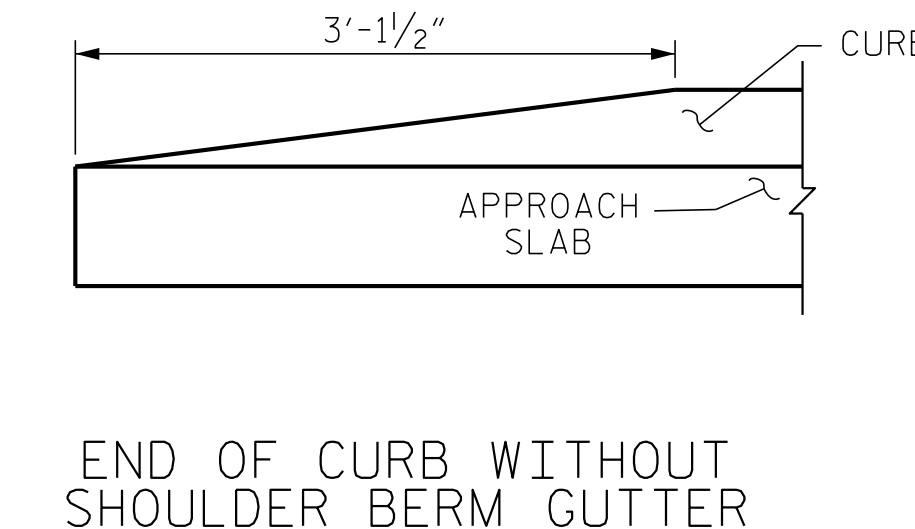
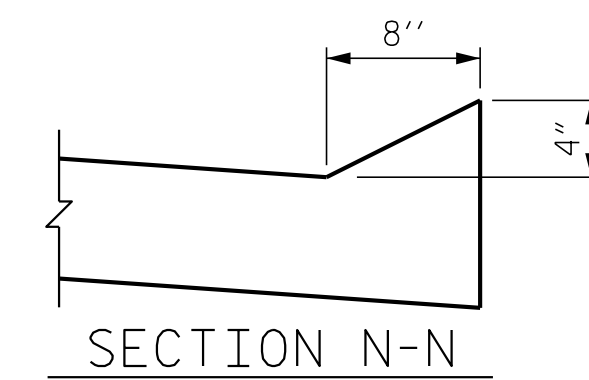
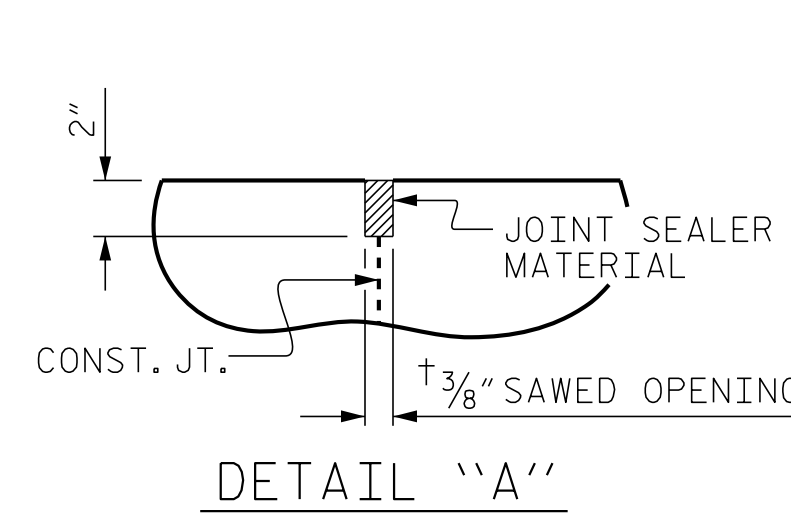
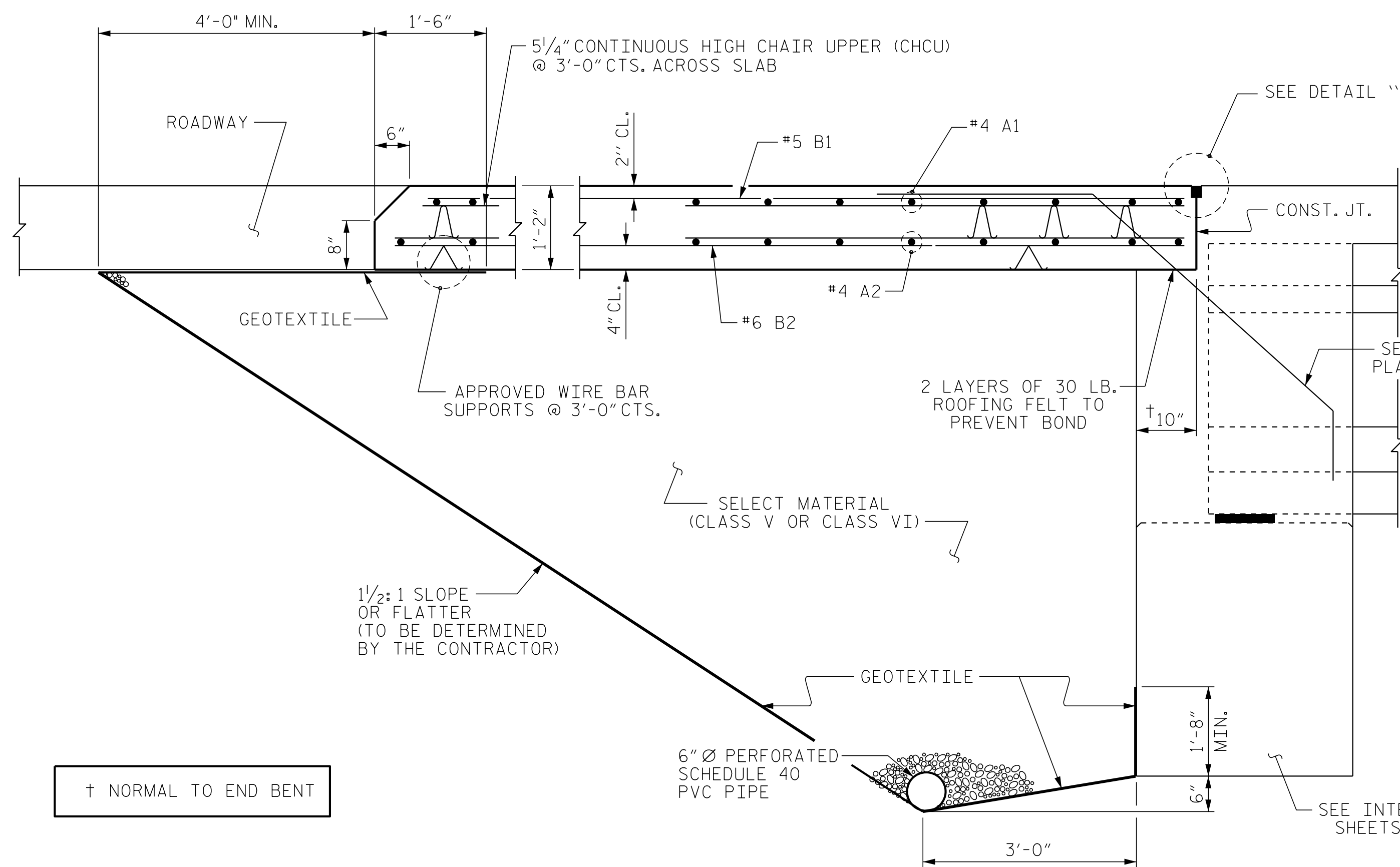
REINFORCING STEEL 1881 LBS.

\* EPOXY COATED REINFORCING STEEL 1390 LBS.

CLASS AA CONCRETE 22.2 C.Y.

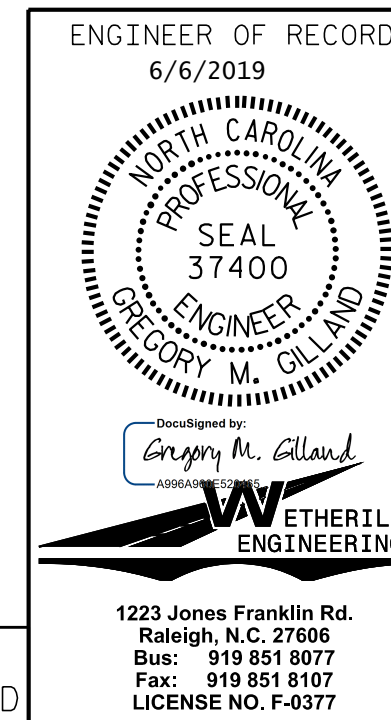
SPLICE LENGTHS

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



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 CUMBERLAND COUNTY  
 STATION: 21+37.00 -LREV-

SHEET 1 OF 2



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD  
 BRIDGE APPROACH SLAB FOR INTEGRAL ABUTMENT WITH FLEXIBLE PAVEMENT

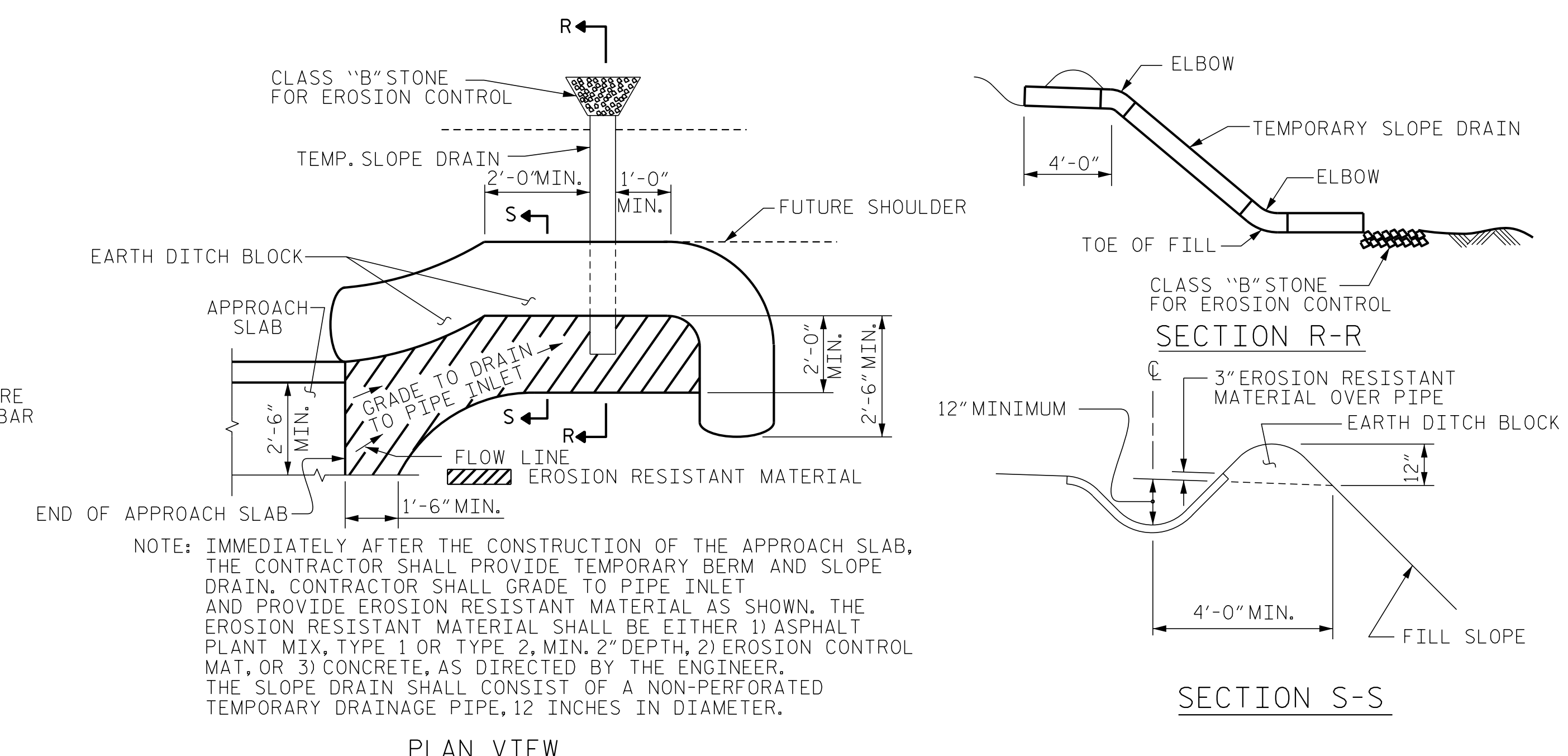
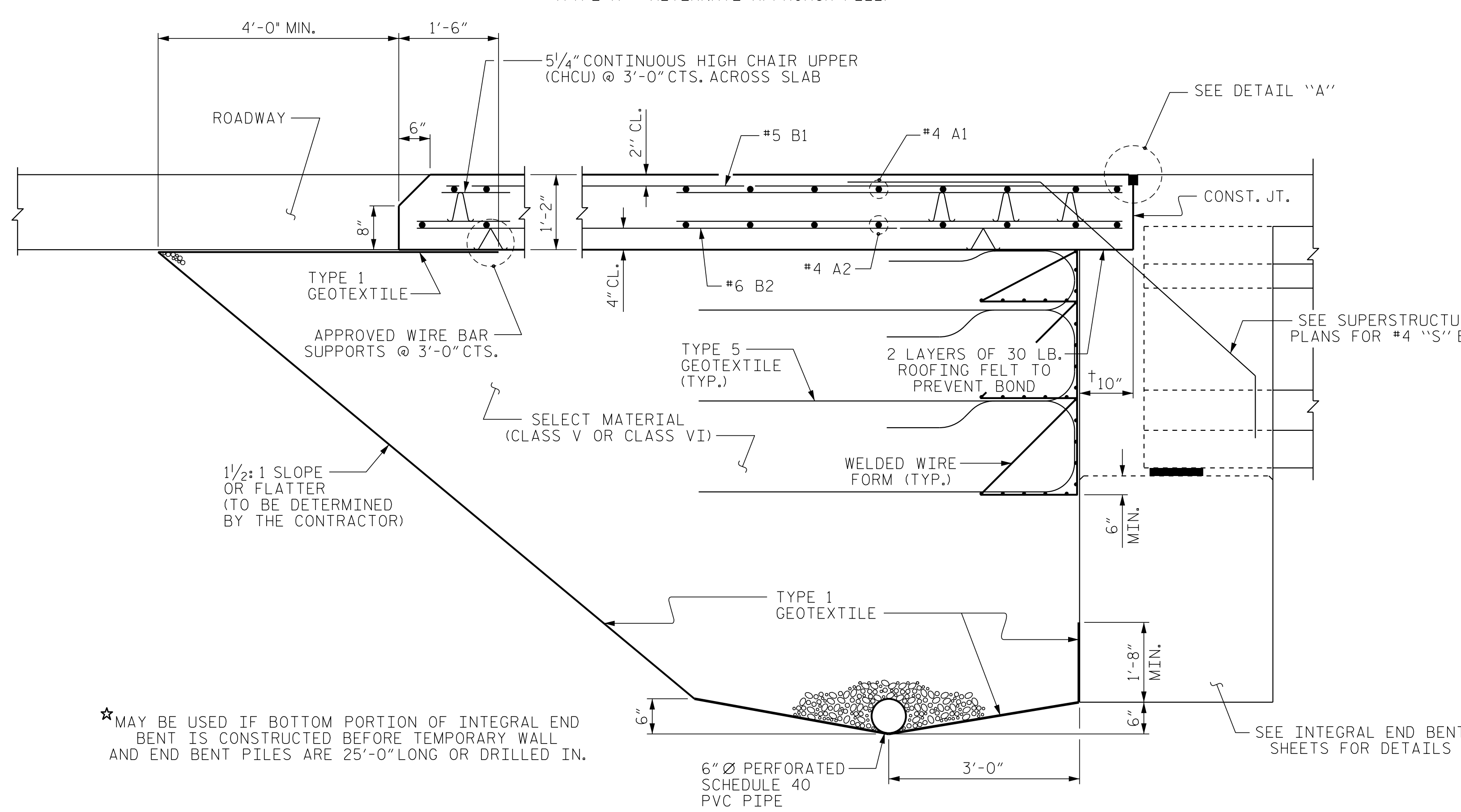
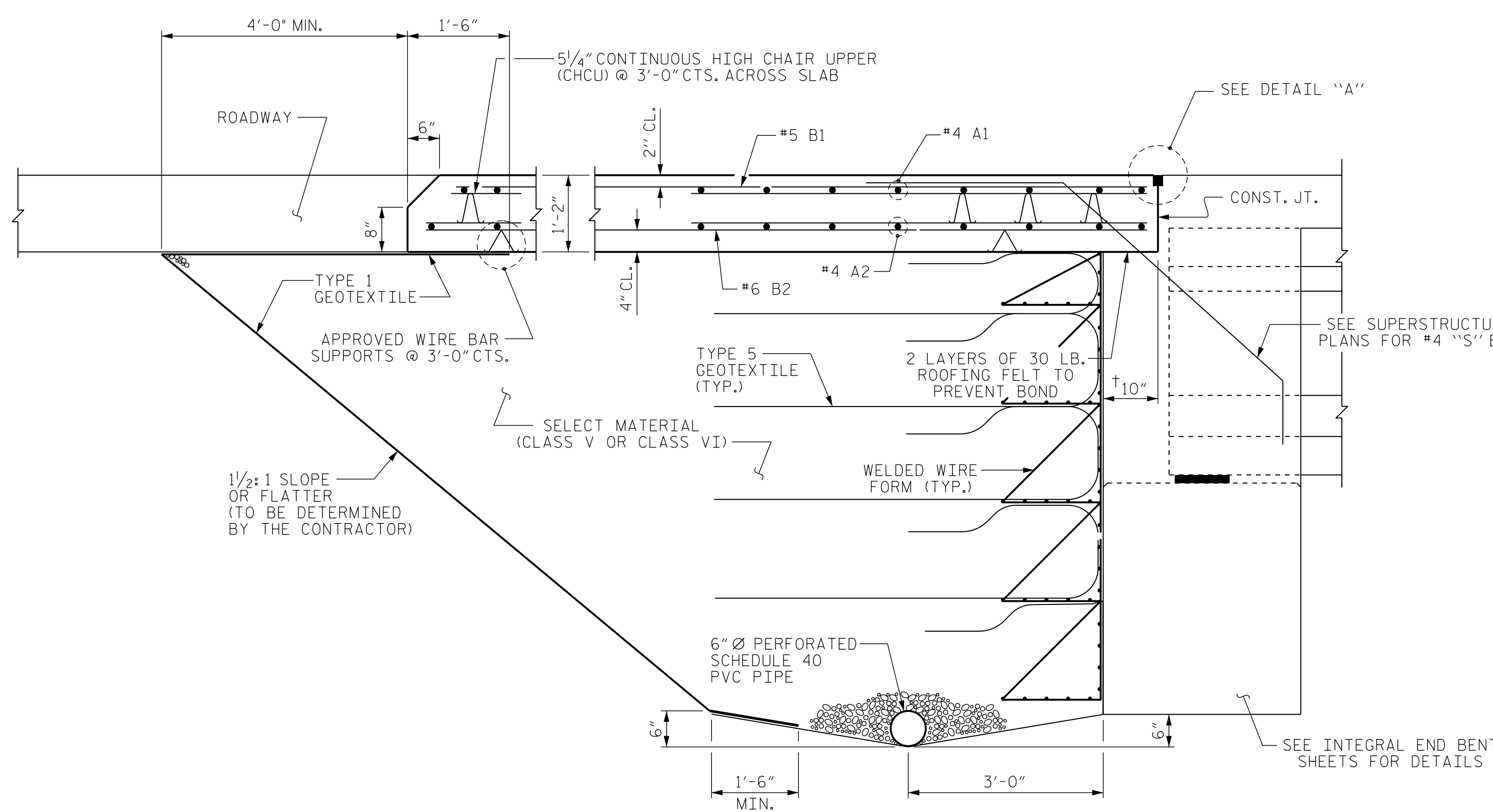
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-27
1			3			TOTAL SHEETS
2			4			28

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

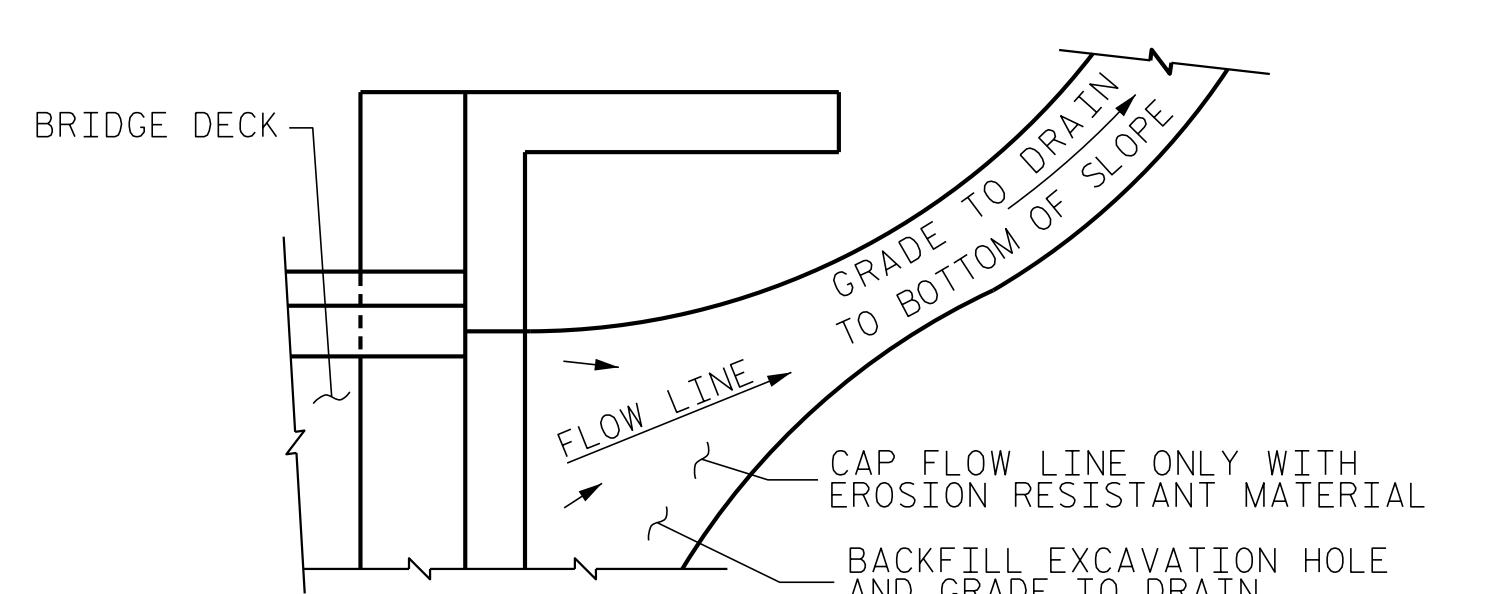
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ASSEMBLED BY : G. GILLAND	DATE : 4-19
CHECKED BY : D. HODGE	DATE : 4-19
DRAWN BY : TLA 10/05	REV. 12/21/11 MAA/GM
CHECKED BY : GM 5/06	REV. 6/13 MAA/GM
	REV. 12/17 MAA/THC





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

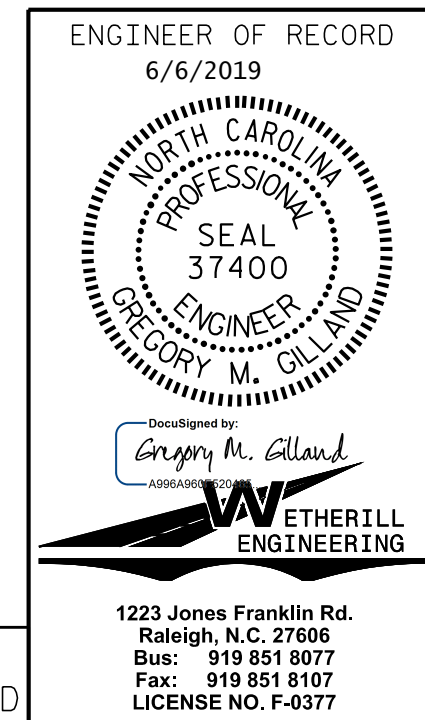


NOTE: IF THE APPROACH SLAB IS NOT CONSTRUCTED IMMEDIATELY AFTER THE BACKFILLING OF THE END BENT EXCAVATION, GRADE TO DRAIN TO THE BOTTOM OF THE SLOPE AND PROVIDE EROSION RESISTANT MATERIAL, SUCH AS FIBERGLASS ROVING OR AS DIRECTED BY THE ENGINEER TO PREVENT SOIL EROSION AND TO PROTECT THE AREA ADJACENT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

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. BR-0014  
CUMBERLAND COUNTY  
STATION: 21+37.00 -LREV-  
SHEET 2 OF 2



STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH		STANDARD BRIDGE APPROACH SLAB DETAILS	
REVISIONS			
NO.	BY:	DATE:	SHEET NO.
1			S-28
2			TOTAL SHEETS 28

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UNLESS ALL SIGNATURES COMPLETED

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ASSEMBLED BY : G. GILLAND	DATE : 4-19
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DRAWN BY : TLA 10/05	REV. 12/21/11 MAA/GM
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	REV. 12/17 MAA/THC

SECTION THRU SLAB  
(TYPE A - ALTERNATE APPROACH FILL)

## STANDARD NOTES

### DESIGN DATA:

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

### MATERIAL AND WORKMANSHIP:

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

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

### CONCRETE:

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

### CONCRETE CHAMFERS:

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

### DOWELS:

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

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

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

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

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

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

### REINFORCING STEEL:

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

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

### STRUCTURAL STEEL:

AT THE CONTRACTOR'S OPTION, HE MAY SUBSTITUTE  $\frac{1}{8}$ "  $\emptyset$  SHEAR STUDS FOR THE  $\frac{3}{4}$ "  $\emptyset$  STUDS SPECIFIED ON THE PLANS. THIS SUBSTITUTION SHALL BE MADE AT THE RATE OF 3 -  $\frac{1}{8}$ "  $\emptyset$  STUDS FOR 4 -  $\frac{3}{4}$ "  $\emptyset$  STUDS, AND STUD SPACING CHANGES SHALL BE MADE AS NECESSARY TO PROVIDE THE SAME EQUIVALENT NUMBER OF  $\frac{1}{8}$ "  $\emptyset$  STUDS ALONG THE BEAM AS SHOWN FOR  $\frac{3}{4}$ "  $\emptyset$  STUDS BASED ON THE RATIO OF 3 -  $\frac{1}{8}$ "  $\emptyset$  STUDS FOR 4 -  $\frac{3}{4}$ "  $\emptyset$  STUDS. STUDS OF THE LENGTH SPECIFIED ON THE PLANS MUST BE PROVIDED. THE MAXIMUM SPACING SHALL BE 2'-0".

EXCEPT AT THE INTERIOR SUPPORTS OF CONTINUOUS BEAMS WHERE THE COVER PLATE IS IN CONTACT WITH BEARING PLATE, THE CONTRACTOR MAY, AT HIS OPTION, SUBSTITUTE FOR THE COVER PLATES DESIGNATED ON THE PLANS COVER PLATES OF THE EQUIVALENT AREA PROVIDED THESE PLATES ARE AT LEAST  $\frac{3}{16}$ " IN THICKNESS AND DO NOT EXCEED A WIDTH EQUAL TO THE FLANGE WIDTH LESS 2" OR A THICKNESS EQUAL TO 2 TIMES THE FLANGE THICKNESS. THE SIZE OF FILLET WELDS SHALL CONFORM TO THE REQUIREMENTS OF THE CURRENT ANSI/AASHTO/AWS "BRIDGE WELDING CODE". ELECTROSLAG WELDING WILL NOT BE PERMITTED.

WITH THE SOLE EXCEPTION OF EDGES AT SURFACES WHICH BEAR ON OTHER SURFACES, ALL SHARP EDGES AND ENDS OF SHAPES AND PLATES SHALL BE SLIGHTLY ROUNDED BY SUITABLE MEANS TO A RADIUS OF APPROXIMATELY  $\frac{1}{16}$ " INCH OR EQUIVALENT FLAT SURFACE AT A SUITABLE ANGLE PRIOR TO PAINTING, GALVANIZING, OR METALLIZING.

### HANDRAILS AND POSTS:

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

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

### SPECIAL NOTES:

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

# ENGLISH

JANUARY, 1990

STD. NO. SN