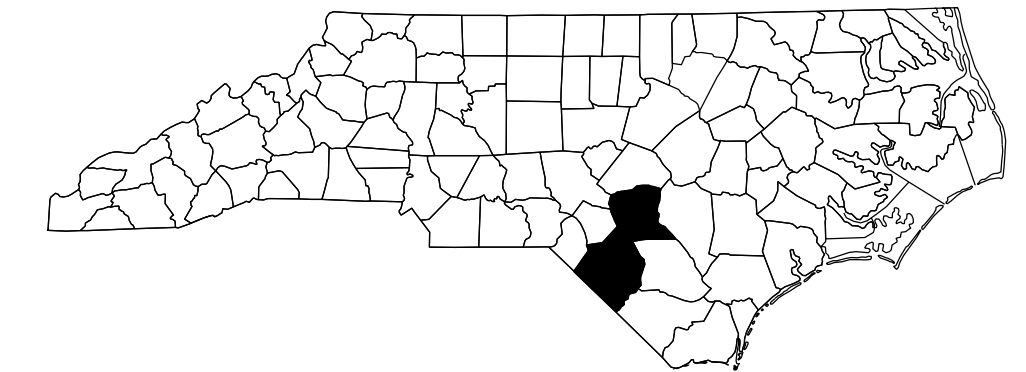


STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2519AA&AB		
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
34817.3.4	NHP-1118(11)	P.E., ROW, UTILITIES & CONSTRUCTION	



**STR 1
RFC BRIDGE
PLANS**

SUBMITTAL #S-056R3

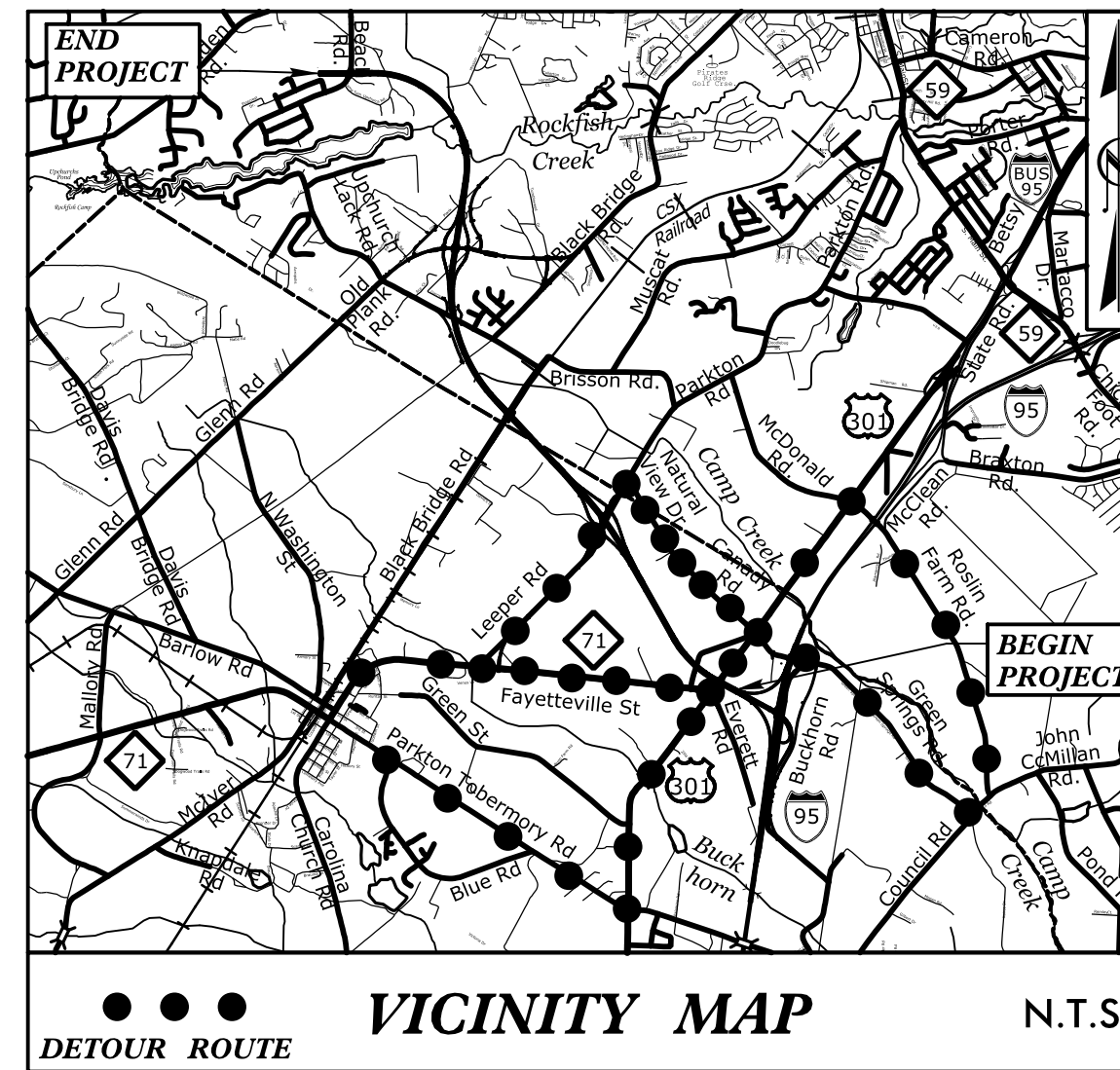
**END
TIP PROJECT U-2519AA&AB**
-L- POT STA. 312 + 61.97

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

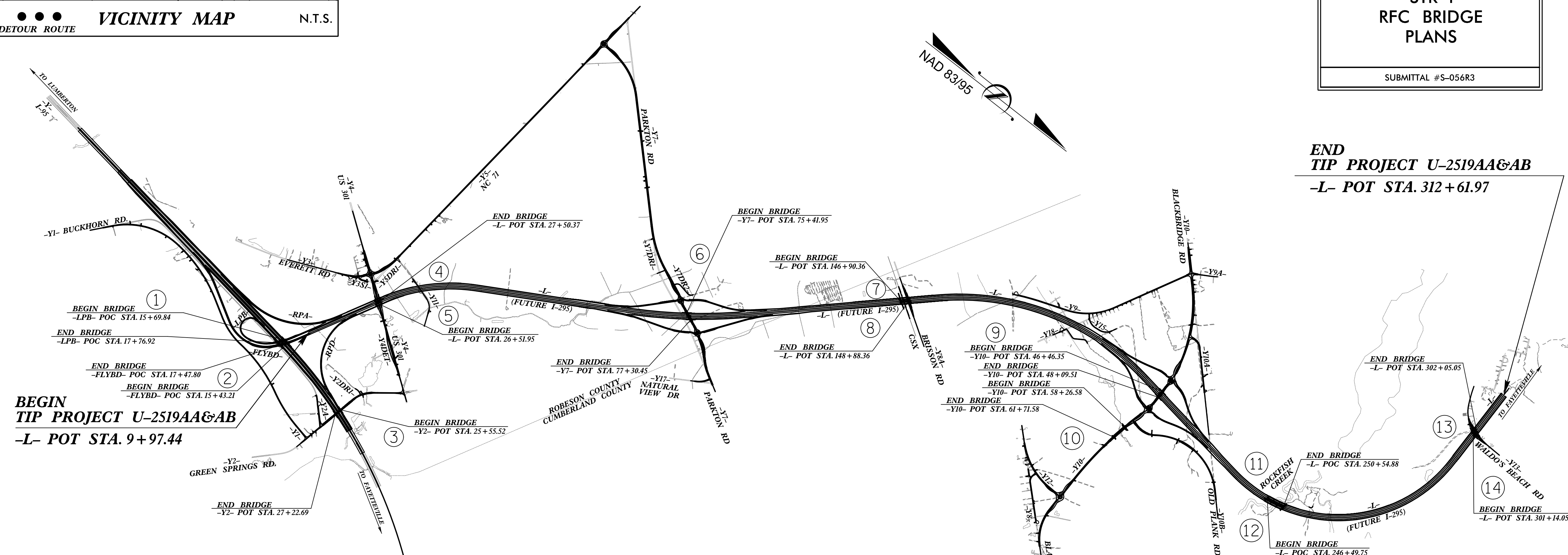
CUMBERLAND COUNTY /ROBESON COUNTY

**LOCATION: FUTURE I-295 - FAYETTEVILLE OUTER LOOP FROM I-95 IN
ROBESON COUNTY TO SOUTH OF SR 1003 (CAMDEN ROAD)
IN CUMBERLAND COUNTY**

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



● ● ● ● VICINITY MAP N.T.S.
DETOUR ROUTE



STRUCTURE

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

CONTRACT: C204043 TIP PROJECT: U-2519AA&AB

DESIGN DATA

ADT 2015 =	25,000
ADT 2040 =	33,100
K =	8%
D =	55%
T =	12%*
V =	70 MPH

* (TTST = 4% + DUAL 8%)
FUNC. CLASSIFICATION = INTERSTATE STATEWIDE TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT U-2519AA & AB =	5.582 MILES
LENGTH STRUCTURE TIP PROJECT U-2519AA & AB =	0.150 MILES *
TOTAL LENGTH OF TIP PROJECT U-2519AA & AB =	5.732 MILES

* LENGTH BASED OFF NB BRIDGES

NCDOT CONTACT: **K. ZAK HAMIDI, PE**
PROJECT ENGINEER - DESIGN BUILD UNIT

PLANS PREPARED FOR THE NCDOT BY:
Balfour Beatty Infrastructure Inc. CIVIL **STV** 100 Years

A Joint Venture
2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: **NOVEMBER 21, 2017**

LETTING DATE: **NOVEMBER 21, 2017**

JOSEPH A. FREEMAN, PE
DESIGN PROJECT MANAGER

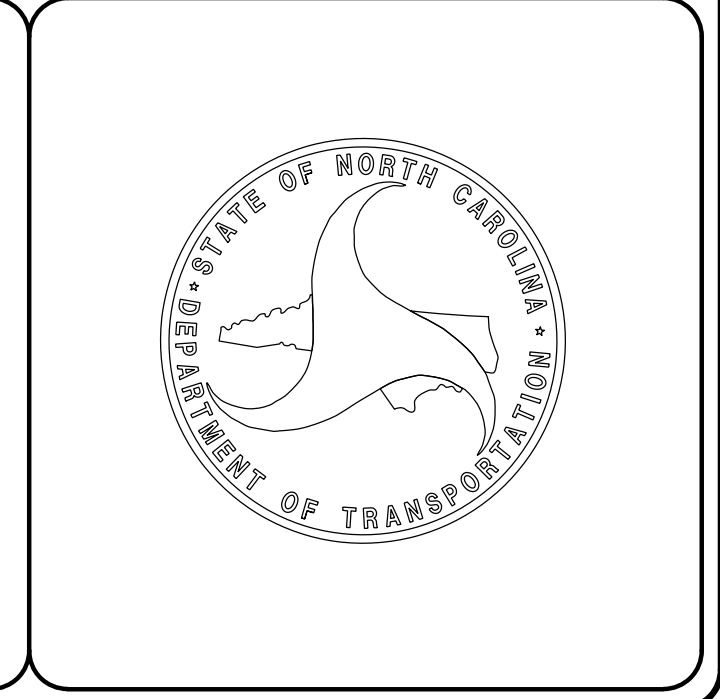
KEVIN G. BAILEY, PE
PROJECT DESIGN ENGINEER

STRUCTURAL ENGINEER

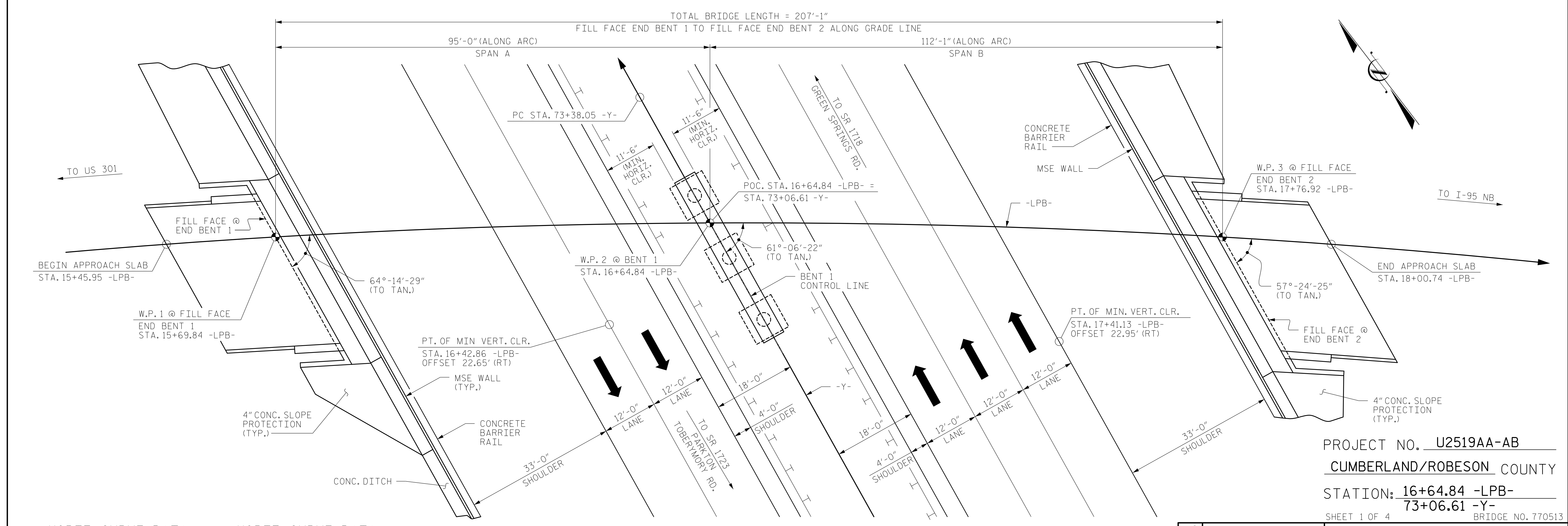
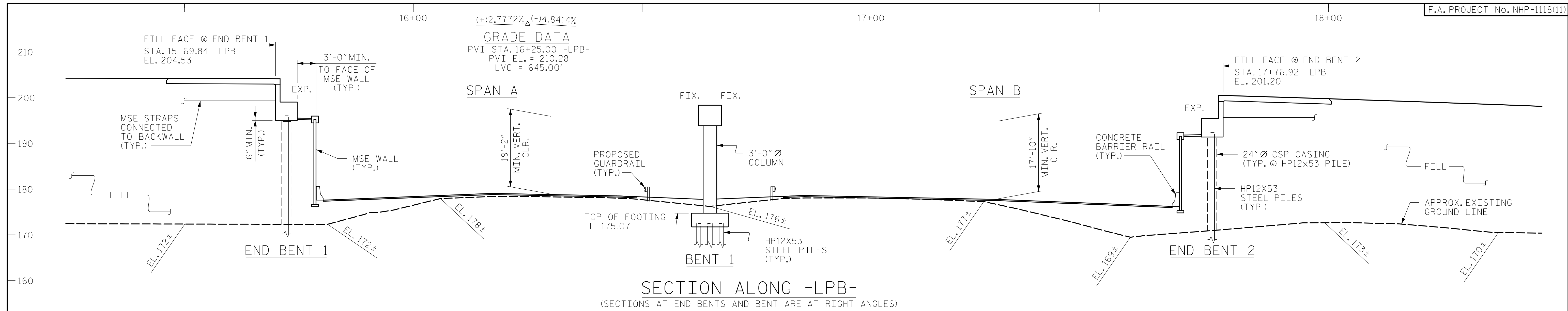
SEAL
40317
11/29/2018

DocuSigned by:
Tony R. Laws, Jr.
CA0CE0F6B784F7... P.E.

SIGNATURE:



11/29/2018
I:\Projects\4019135\4019135_000\50_Deliverables & Submittals\U2519AA-AB\Structures\Str 1\LPB over Y\Station\RFC R3\401_000_U2519_SMU_TSH_000_770513.dgn
Glover Jim



HORIZ. CURVE DATA -LPB-

PI STA. = 16+60.15 -LPB-
 $\Delta = 10^{\circ}33'10.1''$ (RT)
 D = 3'18" 01.6"
 L = 319.74'
 T = 160.32'
 R = 1,736.00'

HORIZ. CURVE DATA -Y-

PI STA. = 107+61.69 -Y-
 $\Delta = 33^{\circ}16'00.0''$ (RT)
 D = 0'29" 59.9"
 L = 6,653.82'
 T = 3,423.64'
 R = 11,460.00'

PROJECT NO. U2519AA-AB
 CUMBERLAND/ROBESON COUNTY
 STATION: 16+64.84 -LPB-
73+06.61 -Y-
 SHEET 1 OF 4 BRIDGE NO. 770513

DRAWN BY : <u>MBC</u>	DATE : <u>3-18</u>	DESIGN ENGINEER OF RECORD : <u>T. LAWS</u>	DATE : <u>8-18</u>
CHECKED BY : <u>TRL</u>	DATE : <u>3-18</u>		

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STV ENGINEERS, INC.
 900 West Trade St., Suite 715
 Charlotte, NC 28202
 NC License Number F-0991

SEAL 40317
 TONY R. LAWS
 ENGINEER
 11/29/2018

STV 100 years
 STV ENGINEERS, INC.
 900 West Trade St., Suite 715
 Charlotte, NC 28202
 NC License Number F-0991

Balfour Beatty Infrastructure Inc.
 CIVIL
 A Joint Venture

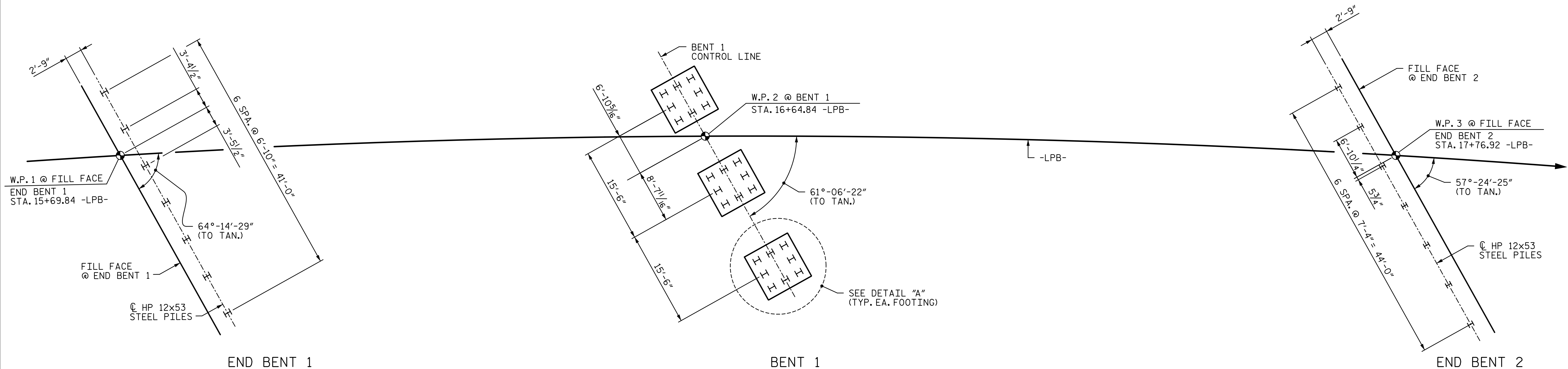
STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

GENERAL DRAWING
 BRIDGE ON -LPB- OVER -Y- (I-95)

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

SHEET NO. S1-1
 TOTAL SHEETS 42

DATE: 11/29/2018
 TIME: 9:42:00 AM
 FILE: I:\Projects\4019135\4019135-0001\50-Deliverables & Submittals\U2519AA-AB\Structures\Str 1 LPB over Y\Station\RFC R3\401.001_U2519_SMU_GD01.001_770513.dgn

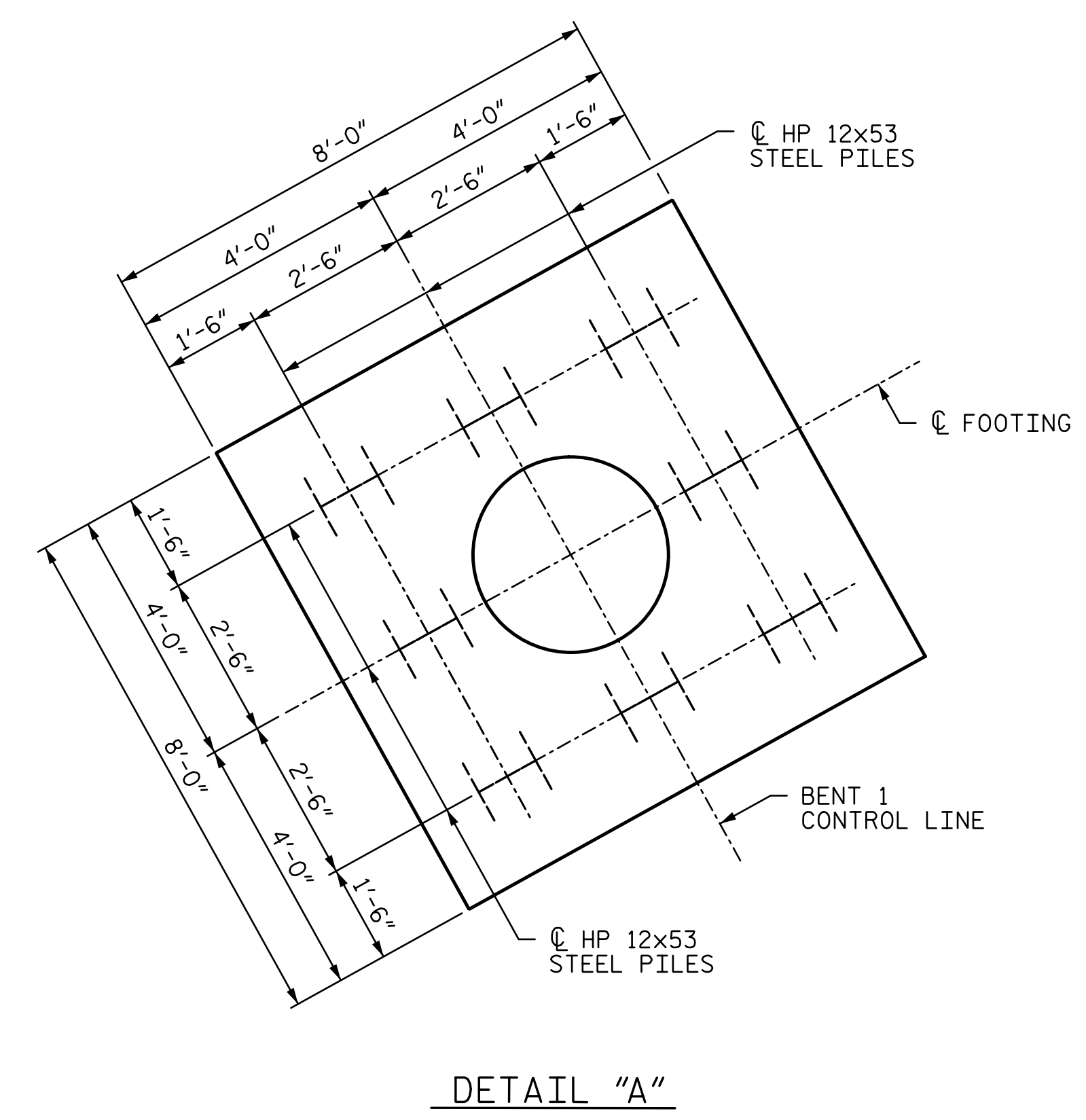


FOUNDATION LAYOUT

(DIMENSIONS LOCATING PILES ARE SHOWN TO THE PILE CENTERLINE AT THE BOTTOM OF CAP/FOOTING)

FOUNDATION NOTES:

- FOR PILES, SEE SPECIAL PROVISIONS AND SECTION 450 OF THE STANDARD SPECIFICATIONS.
- PILES AT END BENT NO.1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 105 TONS PER PILE.
- PILES AT END BENT NO.2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 105 TONS PER PILE.
- PILES AT BENT NO.1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 90 TONS PER PILE.
- DRIVE PILES AT END BENT NO.1 TO A REQUIRED DRIVING RESISTANCE OF 140 TONS PER PILE.
- DRIVE PILES AT END BENT NO.2 TO A REQUIRED DRIVING RESISTANCE OF 195 TONS PER PILE. THIS REQUIRED DRIVING RESISTANCE INCLUDES ADDITIONAL RESISTANCE FOR DOWNDRAG.
- DRIVE PILES AT BENT NO.1 TO A REQUIRED DRIVING RESISTANCE OF 120 TONS PER PILE.
- IT HAS BEEN ESTIMATED THAT A HAMMER WITH AN EQUIVALENT RATED ENERGY IN THE RANGE OF 50 FT-KIPS PER BLOW WILL BE REQUIRED TO DRIVE PILES AT END BENT NO.1, END BENT NO.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.
- TESTING THE FIRST PRODUCTION PILE AT THE FIRST TWO BENTS THE CONTRACTOR ELECTS TO DRIVE AT WITH THE PDA DURING DRIVING IS REQUIRED AT END BENT NO.1, END BENT NO.2, OR BENT NO.1. FOR PDA TESTING, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS AND FOR PILE DRIVING CRITERIA, SEE PILE DRIVING CRITERIA PROVISION.
- PILE RESTRIKES AT END BENT 1 WILL BE REQUIRED TO RELEASE DOWNDRAG LOADS AFTER OBSERVING A WAITING PERIOD OF 3 MONTHS AFTER EMBANKMENT FILL PLACEMENT TO WITHIN 1 FT OF THE BOTTOM OF CAP ELEVATION.
- PDA TESTING AT THE END BENTS SHOULD BE PERFORMED ON THE FIRST PRODUCTION PILE DRIVEN AT EACH SPECIFIED END BENT. THIS PDA TESTING SHOULD OCCUR PRIOR TO EMBANKMENT CONSTRUCTION. THE PDA TEST PILE SHOULD BE DRIVEN TO ACHIEVE THE REQUIRED DRIVING RESISTANCE FOR THE SPECIFIED END BENT. DRIVE CRITERIA SHOULD BE PROVIDED BASED ON THE PDA TESTING AND ALL REMAINING PRODUCTION PILES SHOULD BE DRIVEN TO THE REQUIRED DRIVING RESISTANCE PRIOR TO EMBANKMENT CONSTRUCTION.
- WHERE RESTRIKES ARE NECESSARY TO ACHIEVE THE REQUIRED DRIVING RESISTANCE, THIS SHALL BE PERFORMED PRIOR TO EMBANKMENT CONSTRUCTION.
- PILE RESTRIKES WILL REQUIRE A MINIMUM OF 25 HAMMER BLOWS OR 1 INCH OF PILE TOP MOVEMENT (WHICHEVER OCCURS FIRST).
- PILES DRIVEN PRIOR TO REQUIRED WAITING PERIOD SHOULD NOT BE INSTALLED TO CUTOFF ELEVATIONS TO ALLOW FOR RESTIKES TO RELEASE DOWN DRAG LOAD AFTER EMBANKMENT FILL PLACEMENT. FOR PILE ORDERING LENGTHS, PILES SHOULD BE LEFT A MINIMUM OF 1 FOOT ABOVE OF CUTOFF ELEVATION TO ACCOMMODATE RESTRIKES.
- AVERAGE ESTIMATED PILE LENGTHS BASED ON STATIC ANALYSIS USING SECTION 3.1.1 AND 5.2.2 OF NCDOT LRPD DRIVEN PILE FOUNDATION DESIGN POLICY AND USING A RESISTANCE FACTOR OF 0.7. ESTIMATED PILE LENGTH INCLUDES 2 FEET FOR CAP/FOOTING EMBEDMENT.



LEGEND

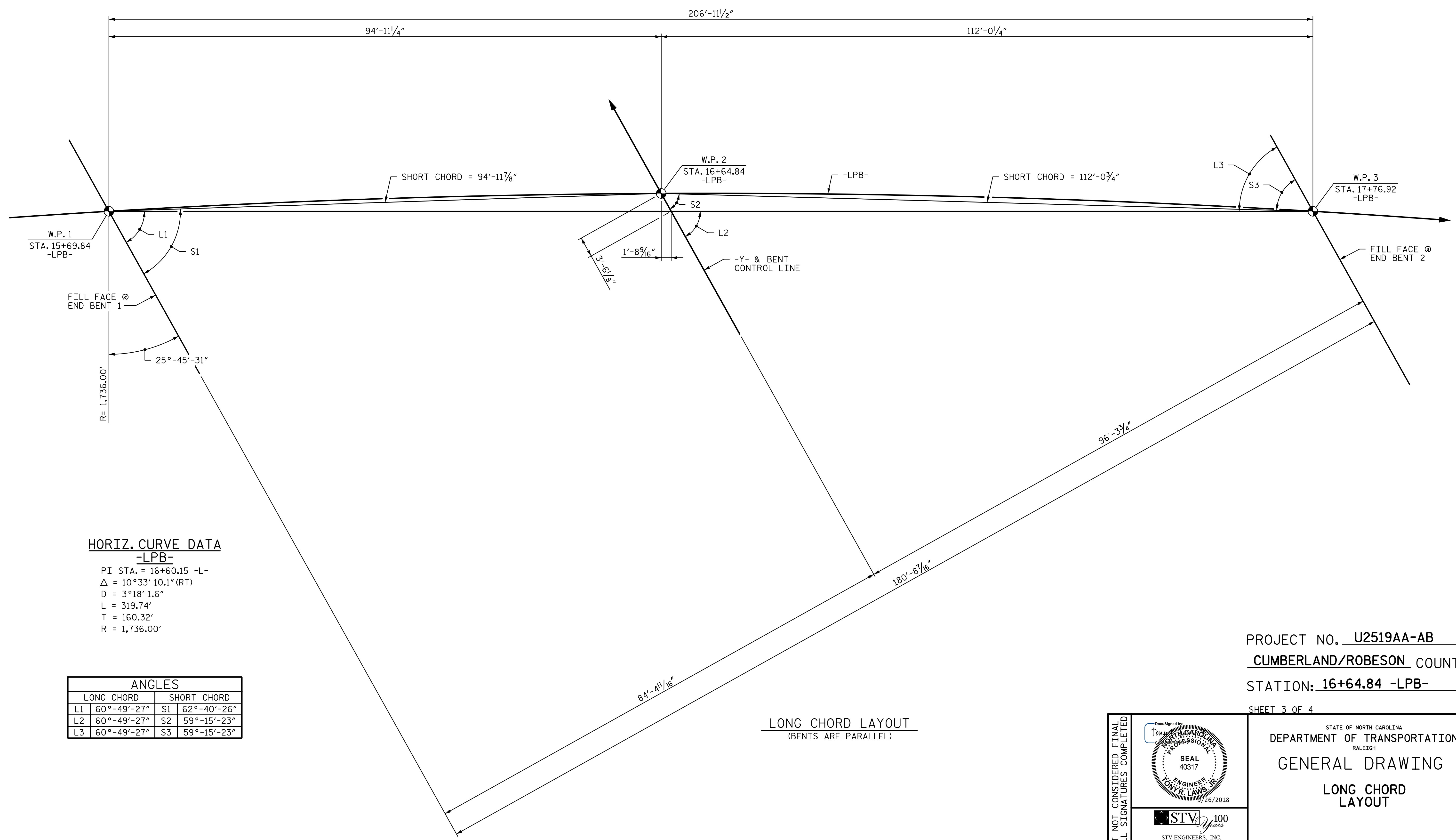
H HP 12x53 VERTICAL PILE @ END BENTS & INTERIOR BENT

PROJECT NO. U2519AA-AB
CUMBERLAND/ROBESON COUNTY
 STATION: 16+64.84 -LPB-
 SHEET 2 OF 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED			STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH GENERAL DRAWING FOUNDATION LAYOUT		SHEET NO. S1-2 TOTAL SHEETS 42	
			REVISIONS			
	STV ENGINEERS, INC. 900 West Trade St., Suite 715 Charlotte, NC 28202 NC License Number F-0991		NO.	BY:		DATE:
			1			

DRAWN BY : <u>VKS</u>	DATE : <u>6-18</u>	DESIGN ENGINEER OF RECORD: <u>T. LAWS</u>	DATE : <u>8-18</u>
CHECKED BY : <u>TRL</u>	DATE : <u>7-18</u>		

DATE: 9/25/2018 TIME: 2:33:14 PM
 FILE: R:\Structure\Str 1 LPB over Y\Illustration\RFCV401.003.LU2519.SMUJ_FL_002_770513.dgn



HORIZ. CURVE DATA
-LPB-

PI STA. = 16+60.15 -L-
 Δ = 10°33' 10.1" (RT)
 D = 3°18' 1.6"
 L = 319.74'
 T = 160.32'
 R = 1,736.00'

ANGLES			
	LONG CHORD		SHORT CHORD
L1	60°-49'-27"	S1	62°-40'-26"
L2	60°-49'-27"	S2	59°-15'-23"
L3	60°-49'-27"	S3	59°-15'-23"

LONG CHORD LAYOUT
(BENTS ARE PARALLEL)

PROJECT NO. U2519AA-AB
CUMBERLAND/ROBESON COUNTY
 STATION: 16+64.84 -LPB-
 SHEET 3 OF 4

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
GENERAL DRAWING
 LONG CHORD
 LAYOUT

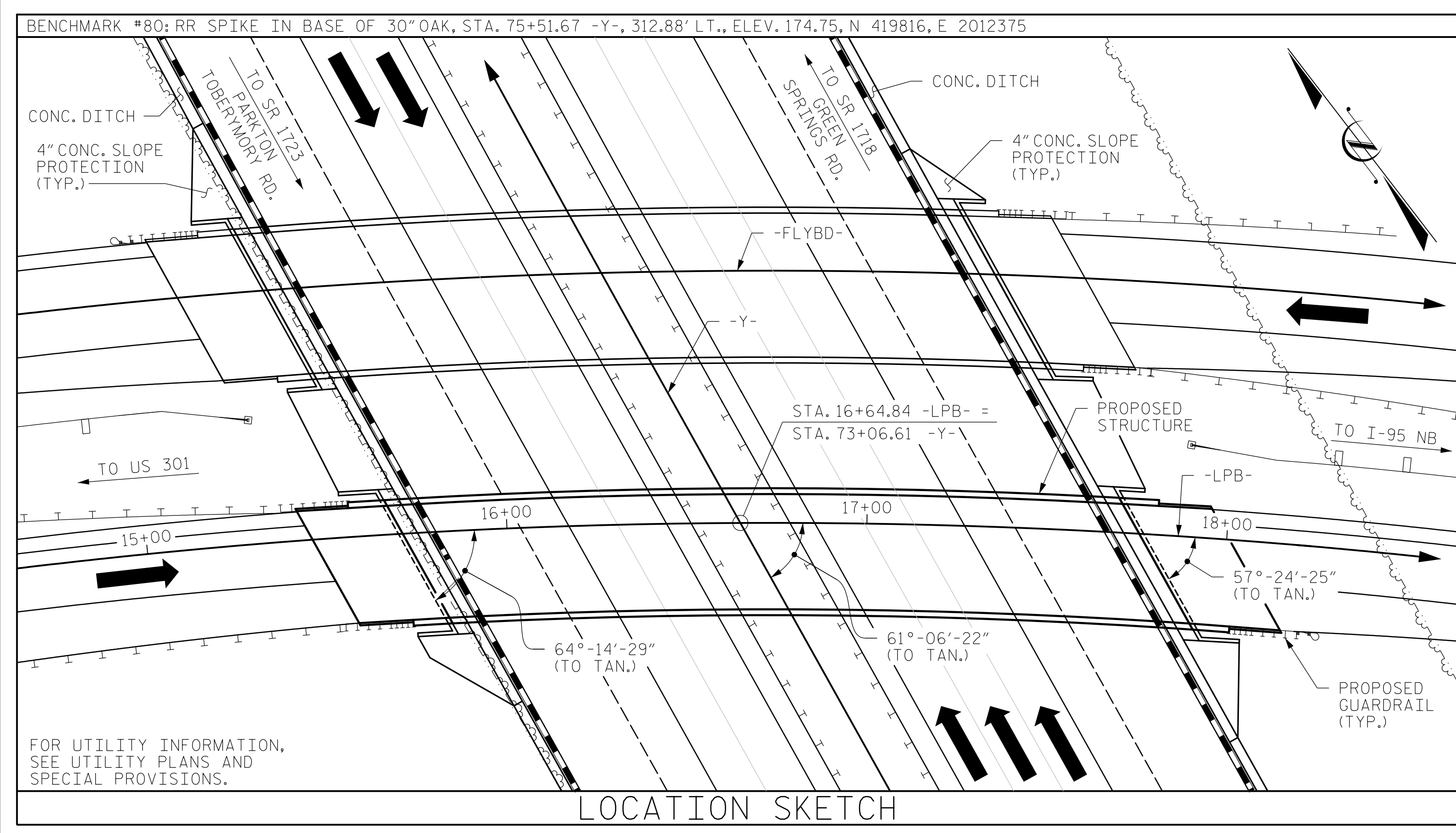
STV ENGINEERS, INC.
 900 West Trade St., Suite 715
 Charlotte, NC 28202
 NC License Number F-0991

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

SHEET NO.
S1-3
TOTAL SHEETS
42

DATE: 9/25/2018 TIME: 2:33:16 PM
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DRAWN BY : MBC DATE : 2-18 DESIGN ENGINEER OF RECORD : T. LAWS DATE : 8-18
 CHECKED BY : TRL DATE : 6-18



LOCATION SKETCH

NOTES:

- ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.
- THIS BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.
- THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.
- FOR OTHER DESIGN DATA AND GENERAL NOTES, SEE SHEET SN.
- FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.
- FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.
- FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.
- FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.
- THE CONTRACTOR SHALL PROVIDE INDEPENDENT ASSURANCE SAMPLES OF REINFORCING STEEL AS FOLLOWS: FOR PROJECTS REQUIRING UP TO 400 TONS OF REINFORCING STEEL, ONE 30 INCH SAMPLE OF EACH SIZE BAR USED, AND FOR PROJECTS REQUIRING OVER 400 TONS OF REINFORCING STEEL, TWO 30 INCH SAMPLES OF EACH SIZE BAR USED. THE SAMPLE BARS SHOULD COME FROM STEEL ACTUALLY USED IN THE PROJECT AND THE SAMPLE BARS SHOULD BE REPLACED BY SPLICED BARS AS SPECIFIED IN THE SAMPLE BAR REPLACEMENT CHART. PAYMENT FOR THE SAMPLE BARS AND REPLACEMENT REINFORCING STEEL SHALL BE CONSIDERED INCIDENTAL TO VARIOUS PAY ITEMS.
- FOR MAINTENANCE AND PROTECTION OF TRAFFIC BENEATH PROPOSED STRUCTURE, SEE SPECIAL PROVISIONS.
- NEEDLE BEAMS WILL NOT BE ALLOWED UNLESS OTHERWISE CALLED FOR ON THE PLANS OR APPROVED BY THE ENGINEER.
- FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.
- FOR F.I.B. 45" PRESTRESSED GIRDERS, SEE SPECIAL PROVISIONS.
- FOR FOUNDATION NOTES, SEE FOUNDATION LAYOUT.
- FOR PLACING LOAD ON STRUCTURAL MEMBERS, SEE SPECIAL PROVISIONS.

SAMPLE BAR REPLACEMENT

SCALE	LENGTH
#3	6'-2"
#4	7'-4"
#5	8'-6"
#6	9'-8"
#7	10'-10"
#8	12'-0"
#9	13'-2"
#10	14'-6"
#11	15'-10"

TOTAL BILL OF MATERIAL

	FOUNDATION EXCAVATION FOR BENT	PDA TESTING	REINFORCED CONCRETE DECK SLAB	GROOVING BRIDGE FLOORS	CLASS A CONCRETE	BRIDGE APPROACH SLABS	REINFORCING STEEL	SPIRAL COLUMN REINFORCING STEEL	F.I.B 45" PRESTRESSED CONCRETE GIRDERS	PILE DRIVING EQUIP. SETUP FOR HP 12x53 STEEL PILES	HP 12x53 STEEL PILES	PILE REDRIVES	CONCRETE BARRIER RAIL	4" SLOPE PROTECTION	ELASTOMERIC BEARINGS	EXPANSION JOINT SEALS	MSE RETAINING WALL
	LUMP SUM	EA.	SQ. FT.	SQ. FT.	CU. YD.	LUMP SUM	LBS.	LBS.	NO. LIN. FT.	EA.	NO. LIN. FT.	EA.	LIN. FT.	SQ. YD.	LUMP SUM	LUMP SUM	SO. FT.
SUPERSTRUCTURE			7,221	7,319		LUMP SUM			8 804.7				451.81		LUMP SUM	LUMP SUM	
END BENT 1					47.2		6,075			7	7 630	7		91.3			2,120
BENT 1	LUMP SUM				67.9		9,623	1,303		24	24 1,200	12					
END BENT 2					49.7		6,470			7	7 595	4		83.5			1,730
TOTAL	LUMP SUM	2	7,221	7,319	164.8	LUMP SUM	21,940	1,303	8 804.7	38	38 2,425	23	451.81	174.8	LUMP SUM	LUMP SUM	3,850

PROJECT NO. U2519AA-AB
CUMBERLAND/ROBESON COUNTY
 STATION: 16+64.84 -LPB-
73+06.61 -Y-
 SHEET 4 OF 4 BRIDGE NO. 770513

DATE: 11/8/2018 TIME: 9:03:26 AM
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DRAWN BY: JMG DATE: 8-18
 CHECKED BY: TRL DATE: 8-18
 DESIGN ENGINEER OF RECORD: T. LAWS DATE: 8-18

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STV ENGINEERS, INC.
 900 West Trade St., Suite 715
 Charlotte, NC 28202
 NC License Number F-0991

Balfour Beatty Infrastructure Inc.

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

GENERAL DRAWING

LOCATION SKETCH, GENERAL NOTES AND TOTAL BILL OF MATERIAL

REVISIONS

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

SHEET NO.
S1-4
TOTAL SHEETS
42

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

LEVEL	VEHICLE	WEIGHT (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 (LL)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	LIVE-LOAD FACTORS (LL)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN		GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING	HL-93 (INVENTORY)	N/A	①	1.19	--	1.75	0.80	1.19	B	ER	53.93	1.03	1.63	B	I	86.73	0.80	0.82	1.42	B	EL	53.93		
	HL-93 (OPERATING)	N/A		1.55	--	1.35	0.80	1.55	B	ER	53.93	1.03	2.32	B	I	86.73	N/A	--	--	--	--	--		
	HS-20 (INVENTORY)	36.000	②	1.26	45.36	1.75	0.80	1.60	B	ER	53.93	1.03	1.26	B	I	21.12	0.80	0.82	1.85	B	EL	53.93		
	HS-20 (OPERATING)	36.000		1.81	65.16	1.35	0.80	2.07	B	ER	53.93	1.03	1.81	B	I	21.12	N/A	--	--	--	--	--		
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SH	12.500		5.28	66.00	1.40	0.80	5.57	B	ER	53.93	1.03	8.23	B	I	21.12	0.80	0.82	5.28	B	ER	53.93	
		S3C	21.500		3.07	66.01	1.40	0.80	3.23	B	ER	53.93	1.03	4.67	B	I	21.12	0.80	0.82	3.07	B	ER	53.93	
		S3A	22.750		2.91	66.20	1.40	0.80	3.06	B	ER	53.93	1.03	4.42	B	I	21.12	0.80	0.82	2.91	B	ER	53.93	
		S4A	26.750		2.54	67.95	1.40	0.80	2.68	B	ER	53.93	1.03	3.63	B	I	21.12	0.80	0.82	2.54	B	ER	53.93	
		S5A	30.500		2.24	68.32	1.40	0.80	2.36	B	ER	53.93	1.03	3.17	B	I	21.12	0.80	0.82	2.24	B	EL	53.93	
		S6A	34.500		2.02	69.69	1.40	0.80	2.13	B	ER	53.93	1.03	2.84	B	I	21.12	0.80	0.82	2.02	B	EL	53.93	
		S7B	38.500		1.83	70.46	1.40	0.80	1.93	B	ER	53.93	1.03	2.51	B	I	21.12	0.80	0.82	1.83	B	EL	53.93	
		S7A	40.000	③	1.80	72.00	1.40	0.80	1.89	B	ER	53.93	1.03	2.50	B	I	21.12	0.80	0.82	1.80	B	EL	53.93	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	T4A	28.250		2.48	70.06	1.40	0.80	2.62	B	ER	53.93	1.03	3.66	B	I	21.12	0.80	0.82	2.48	B	EL	53.93	
		T5B	32.000		2.18	69.76	1.40	0.80	2.30	B	ER	53.93	1.03	3.26	B	I	21.12	0.80	0.82	2.18	B	EL	53.93	
		T6A	36.000		1.98	71.28	1.40	0.80	2.09	B	ER	53.93	1.03	2.77	B	I	21.12	0.80	0.82	1.98	B	I	53.93	
		T7A	40.000		1.83	73.20	1.40	0.80	1.93	B	ER	53.93	1.03	2.50	B	I	21.12	0.80	0.82	1.83	B	I	53.93	
	T7B	40.000		1.92	76.80	1.40	0.80	2.02	B	ER	53.93	1.03	2.36	B	I	21.12	0.80	0.82	1.92	B	I	53.93		

LOAD FACTORS:

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

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

COMMENTS:
 1.
 2.
 3.
 4.

CONTROLLING LOAD RATING

① DESIGN LOAD RATING (HL-93)

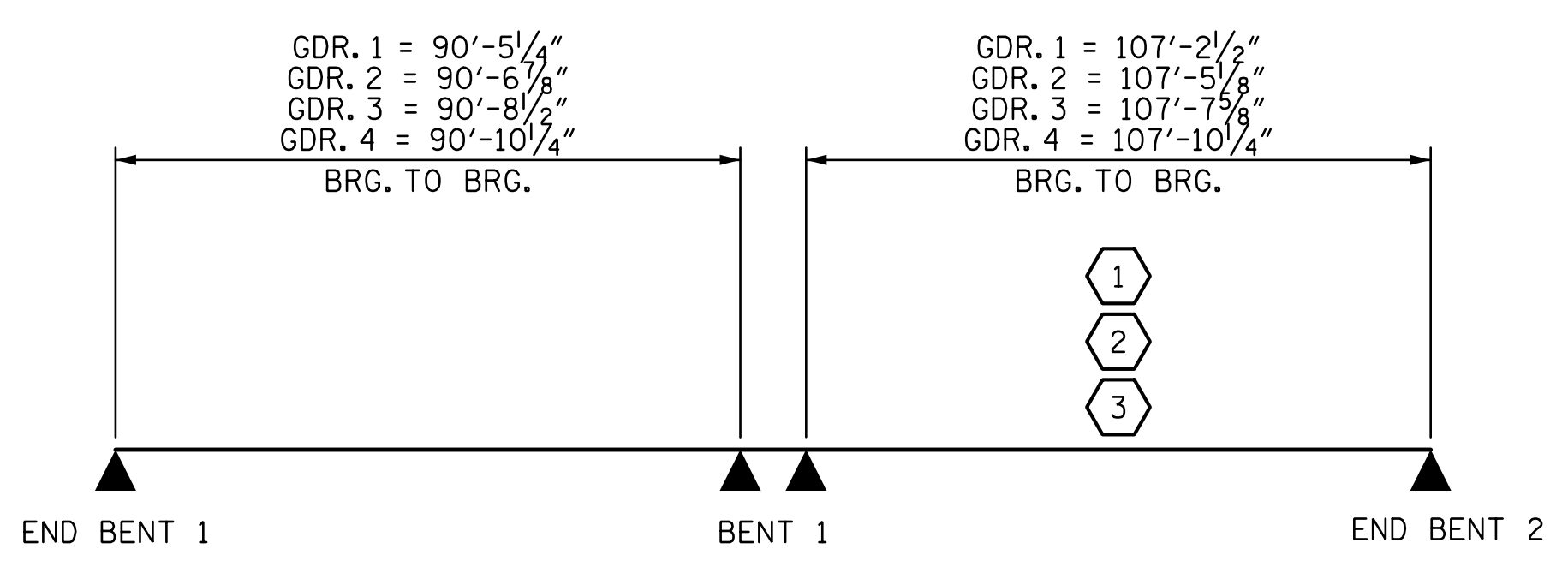
② DESIGN LOAD RATING (HS-20)

③ LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

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



PROJECT NO. U2519AA-AB
CUMBERLAND/ROBESON COUNTY
 STATION: 16+64.84 -LPB-

DATE: 9/25/2018 TIME: 2:33:20 PM FILE: R:\Structures\Str 1 LPB over Y\Station\RFC\401_009_U2519_SMLLRFR_005_770513.dgn

DRAWN BY : MBC DATE : 8-18
 CHECKED BY : TRL DATE : 8-18
 DESIGN ENGINEER OF RECORD: T. LAWS DATE : 8-18

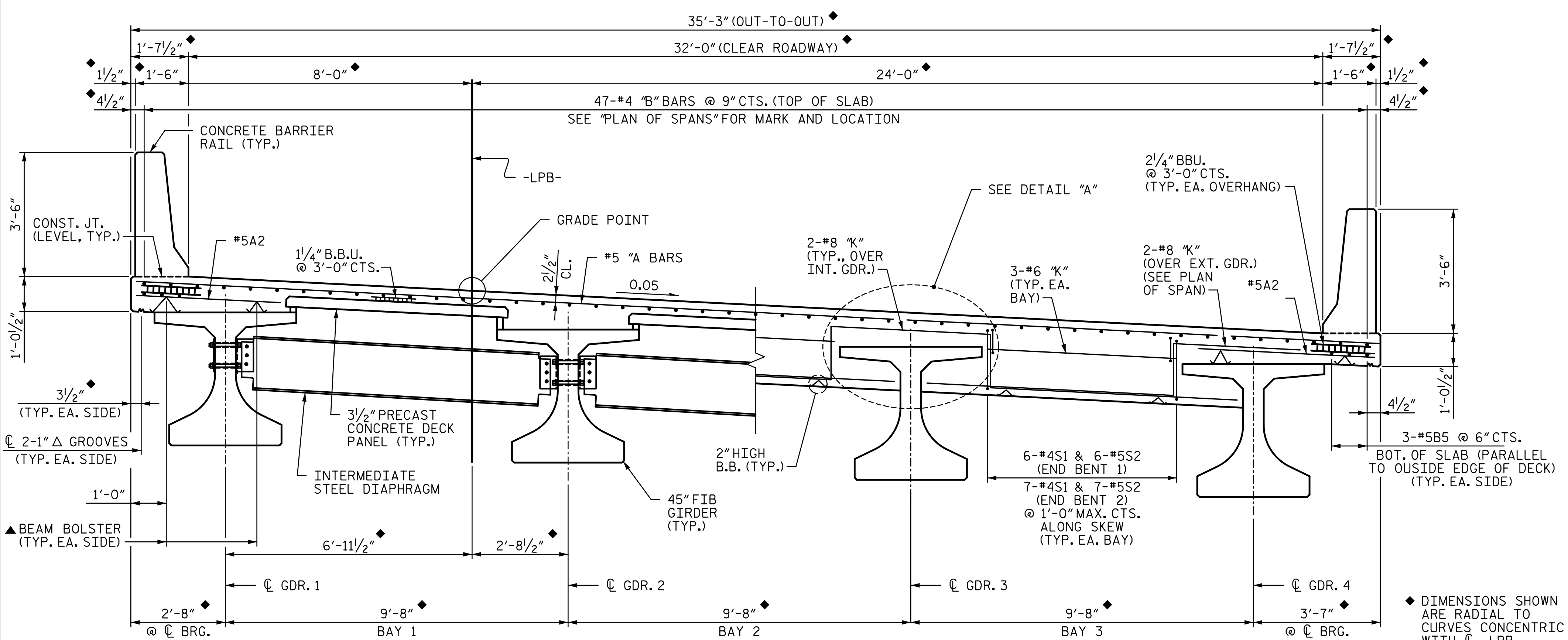
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STV 100 years
 STV ENGINEERS, INC.
 900 West Trade St., Suite 715
 Charlotte, NC 28202
 NC License Number F-0991

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

STANDARD
 LRFR SUMMARY FOR
 PRESTRESSED
 CONCRETE GIRDERS
 (INTERSTATE TRAFFIC)

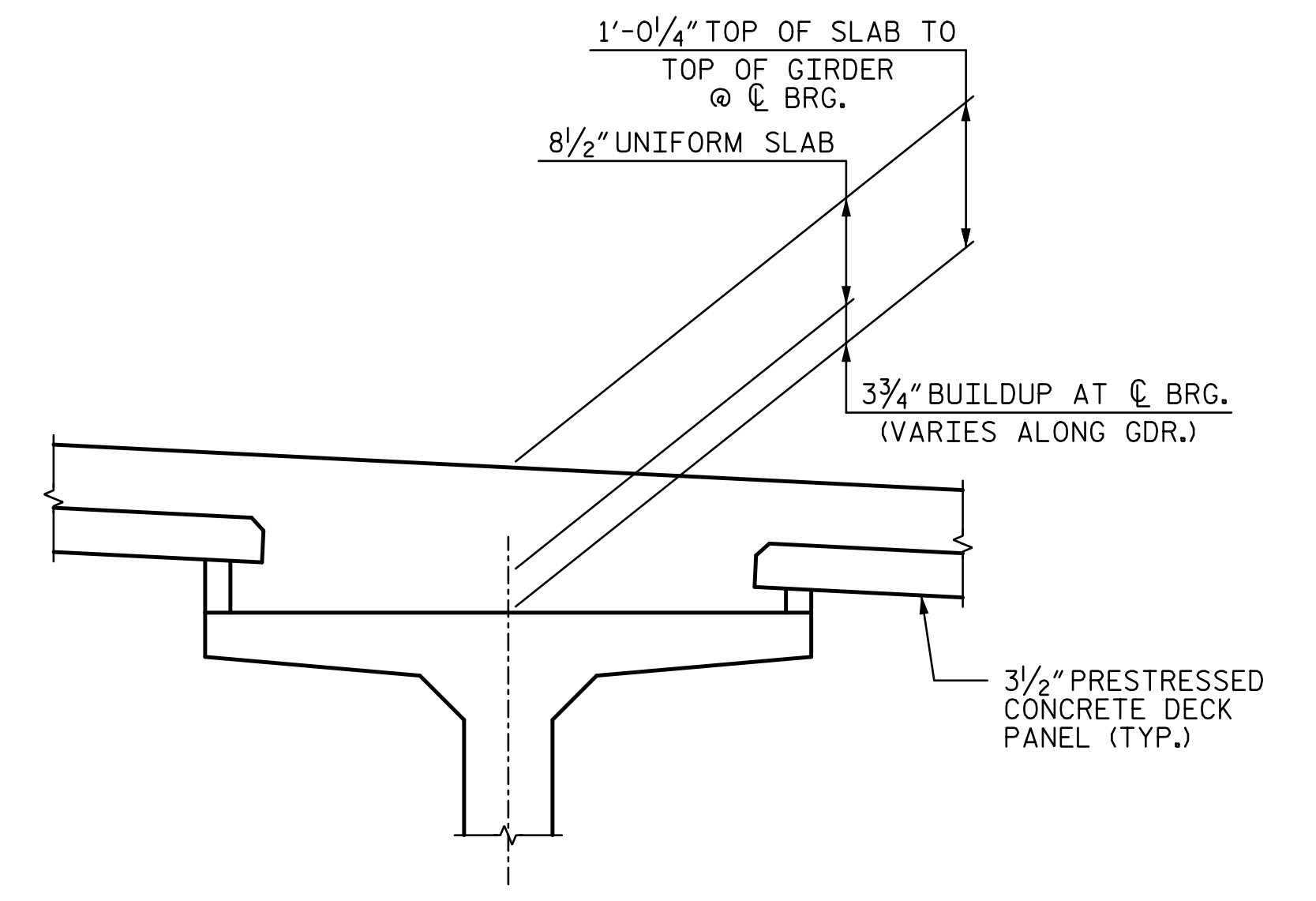
REVISIONS						SHEET NO. S1-5
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 42
2			4			



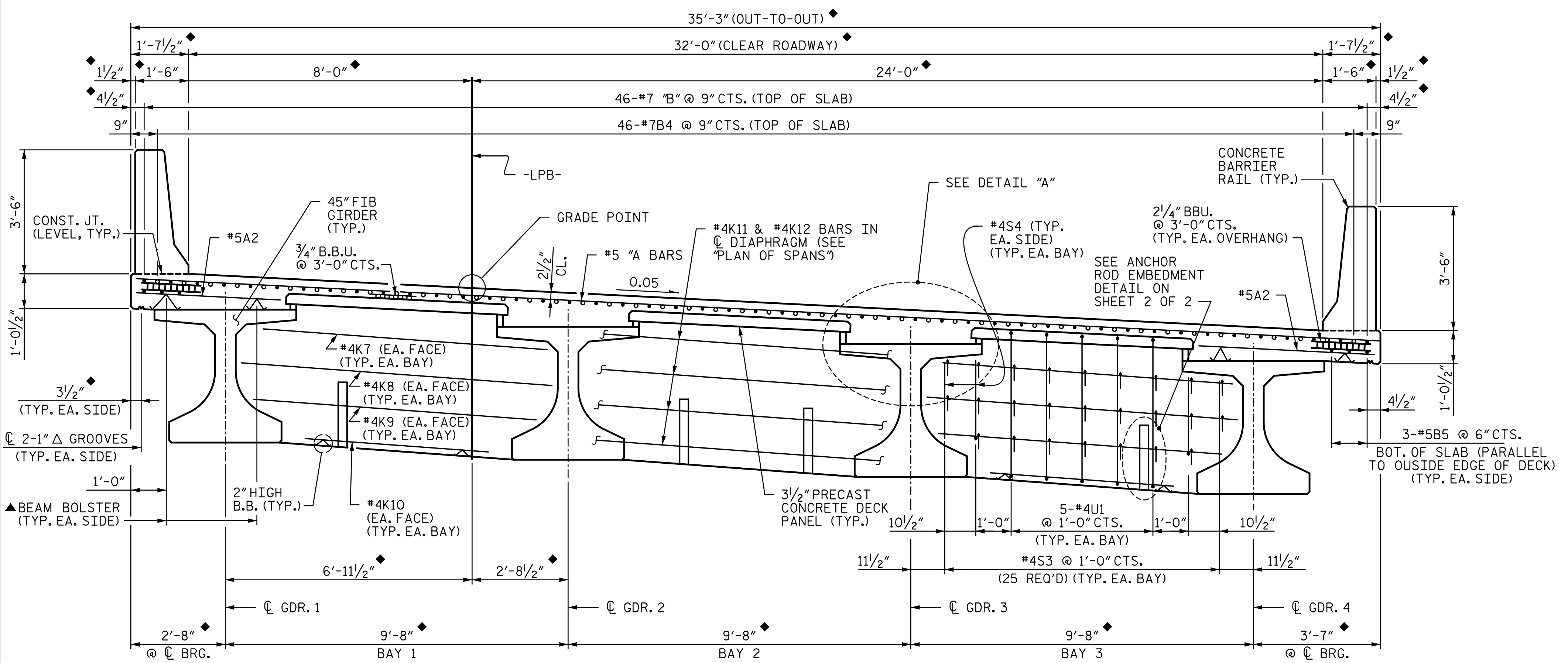
PARTIAL TYPICAL SECTION AT INTERMEDIATE DIAPHRAGM

PARTIAL TYPICAL SECTION AT END DIAPHRAGM

NOTES:
 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.
 FOR INTERMEDIATE STEEL DIAPHRAGM DETAILS, SEE "INTERMEDIATE STEEL DIAPHRAGMS FOR 45' FIB PRESTRESSED CONCRETE GIRDERS".
 FOR BARRIER RAIL DETAILS, SEE "CONCRETE BARRIER RAIL SHEET". FOR PRECAST PRESTRESSED CONCRETE DECK PANEL AND POLYSTYRENE DETAILS AND NOTES, SEE "PRECAST PRESTRESSED CONCRETE DECK PANEL" SHEET.
 FOR EXPANSION JOINT SEALS, SEE SPECIAL PROVISIONS.
 ▲ BEAM BOLSTER HEIGHTS WILL VARY ALONG THE SPANS WITH THE BUILDUPS. HEIGHTS SHALL BE SET AND ADJUSTED AS NECESSARY TO MAINTAIN 2 1/2" CLEAR TO THE TOP & BOTTOM OF THE SLAB.
 SEE "BENT 1" SHEET 1 OF 2 FOR ANCHOR ROD LOCATIONS.



DETAIL "A"



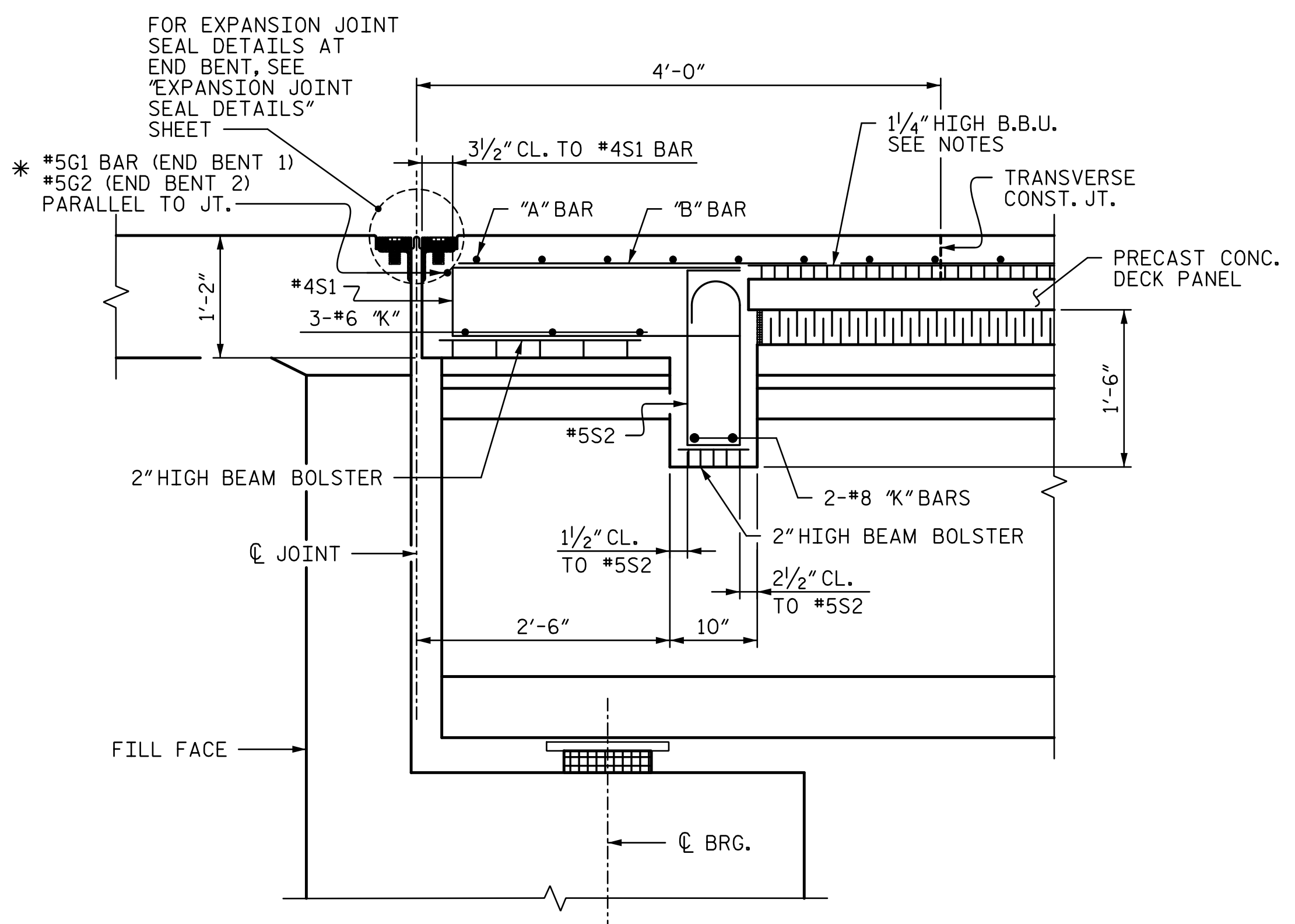
TYPICAL SECTION @ BENT DIAPHRAGM

PROJECT NO. U2519AA-AB
CUMBERLAND/ROBESON COUNTY
 STATION: 16+64.84 -LPB-
 SHEET 1 OF 2

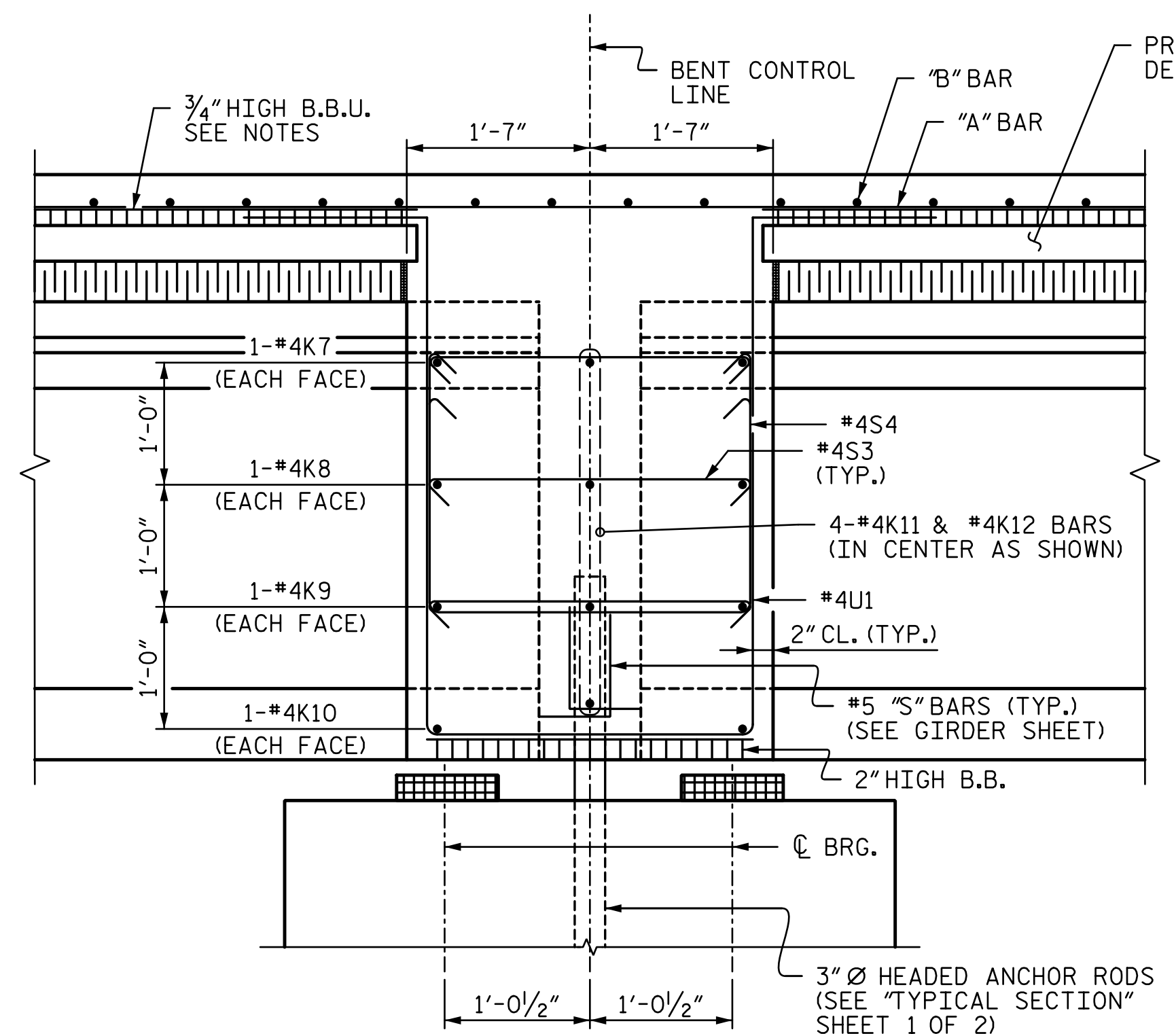
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED		STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH SUPERSTRUCTURE TYPICAL SECTION		SHEET NO. S1-6	
		REVISIONS		TOTAL SHEETS 42	
	STV ENGINEERS, INC. 900 West Trade St., Suite 715 Charlotte, NC 28202 NC License Number F-0991	NO. 1 BY: TRL DATE: 7-18	NO. 2 BY: TRL DATE: 7-18	NO. 3 BY: TRL DATE: 7-18	NO. 4 BY: TRL DATE: 7-18
	Balfour Beatty Infrastructure Inc.		BRANCH CIVIL		

DRAWN BY : MBC DATE : 6-18
 CHECKED BY : TRL DATE : 7-18
 DESIGN ENGINEER OF RECORD : T. LAWS DATE : 8-18

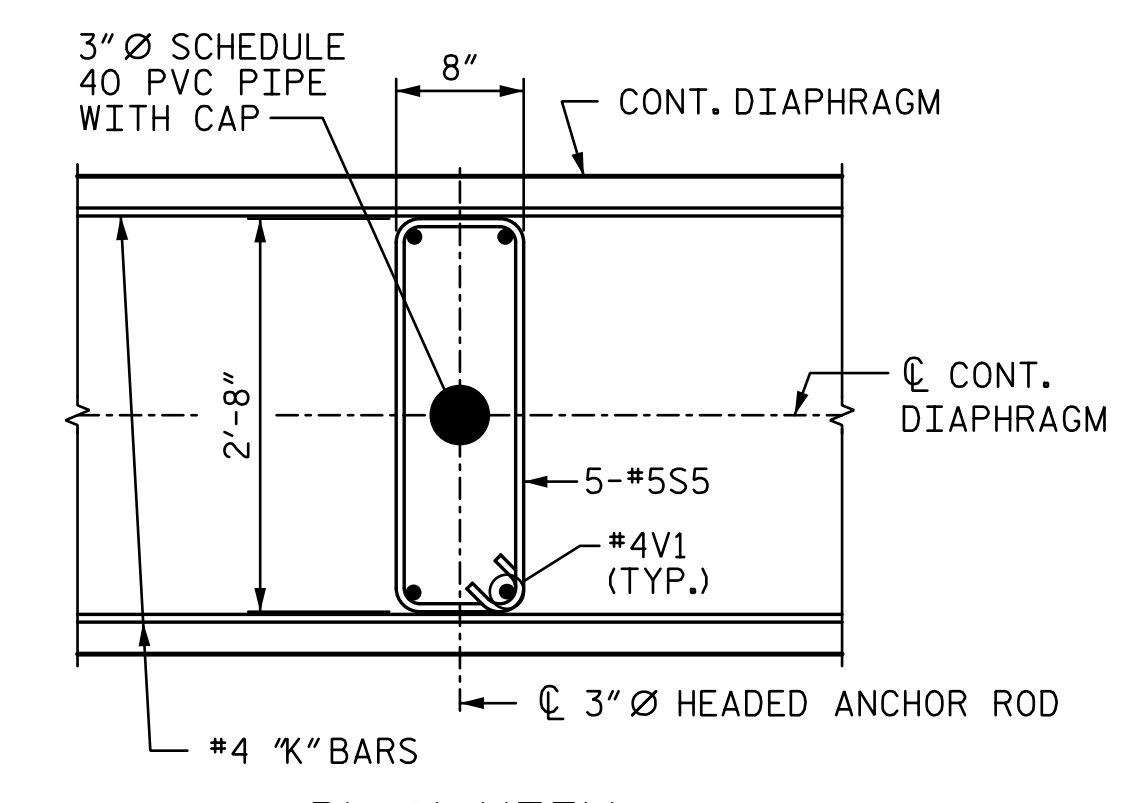
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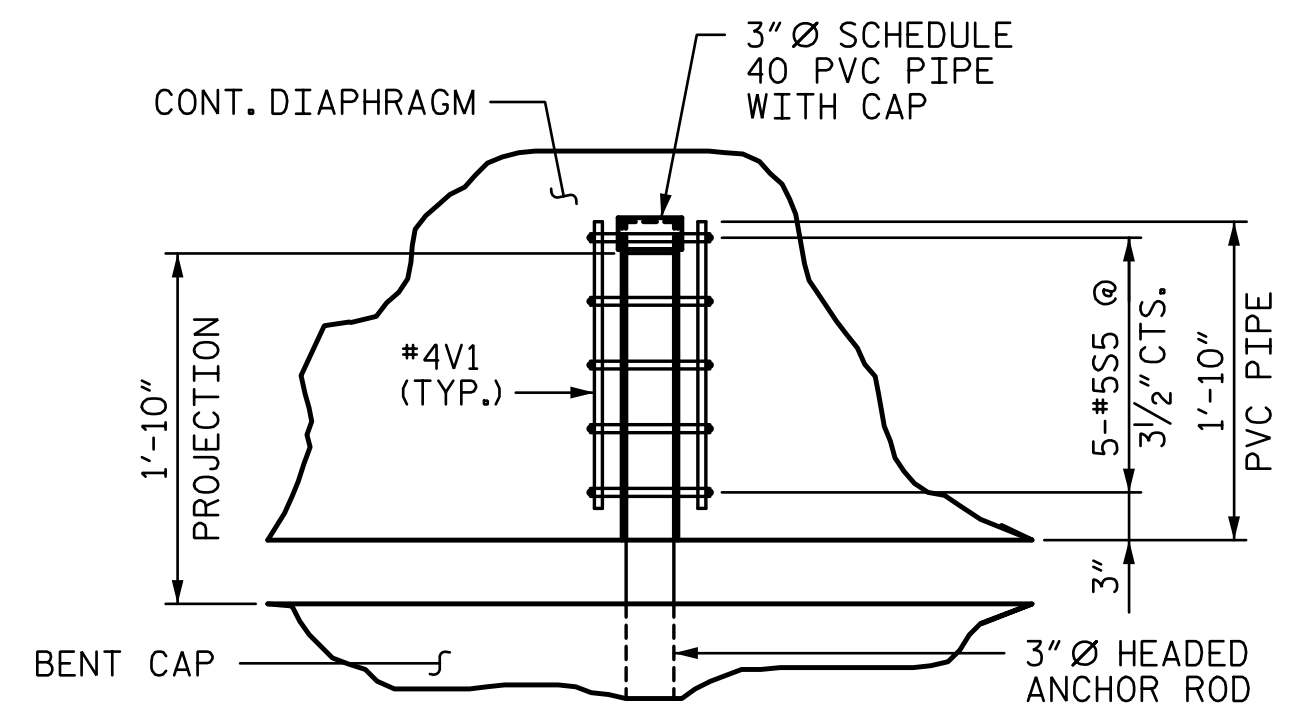
SECTION THRU END DIAPHRAGM
 * #5G BAR MAY BE SHIFTED SLIGHTLY, AS NECESSARY, TO CLEAR REINFORCING STEEL AND STIRRUPS.



SECTION THRU BENT DIAPHRAGM
 (REINF. STEEL @ ANCHOR ROD NOT SHOWN FOR CLARITY, SEE 'ANCHOR ROD EMBEDMENT DETAIL')



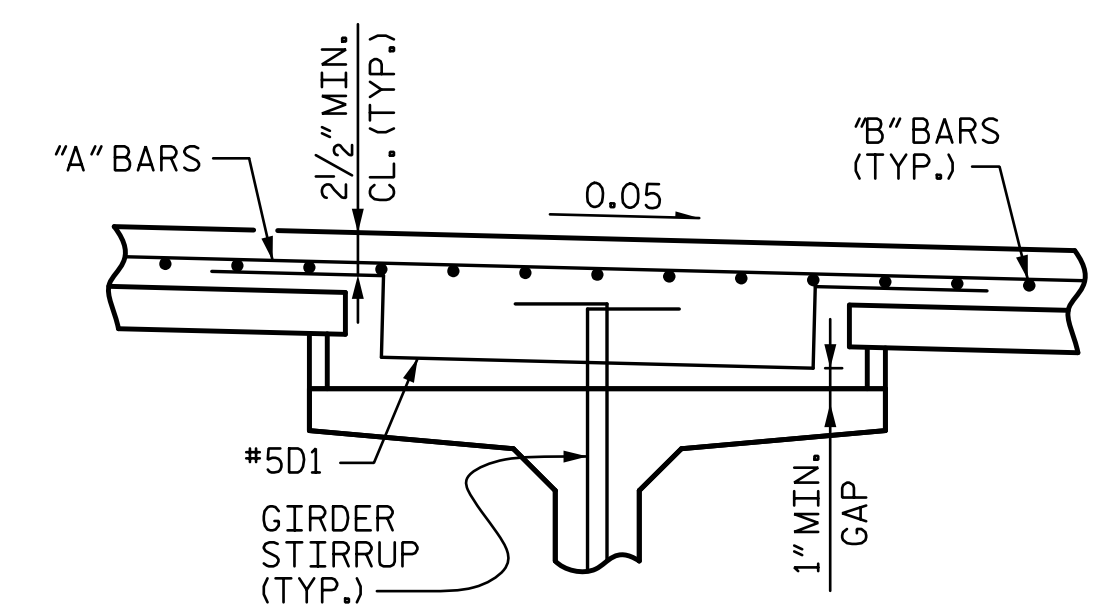
PLAN VIEW



PARTIAL ELEVATION

(DIAPHRAGM REINFORCEMENT NOT SHOWN FOR CLARITY)

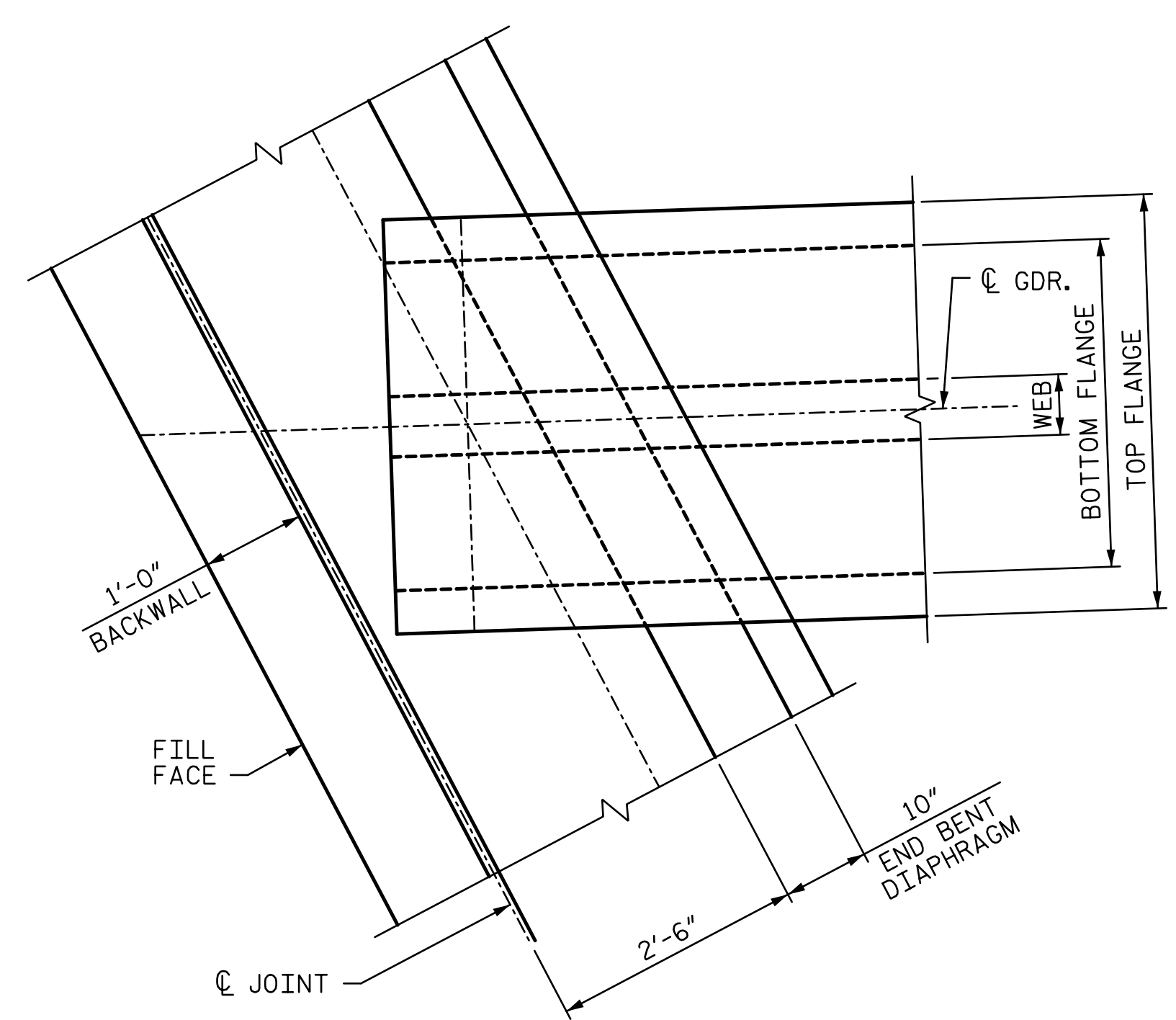
ANCHOR ROD EMBEDMENT DETAIL



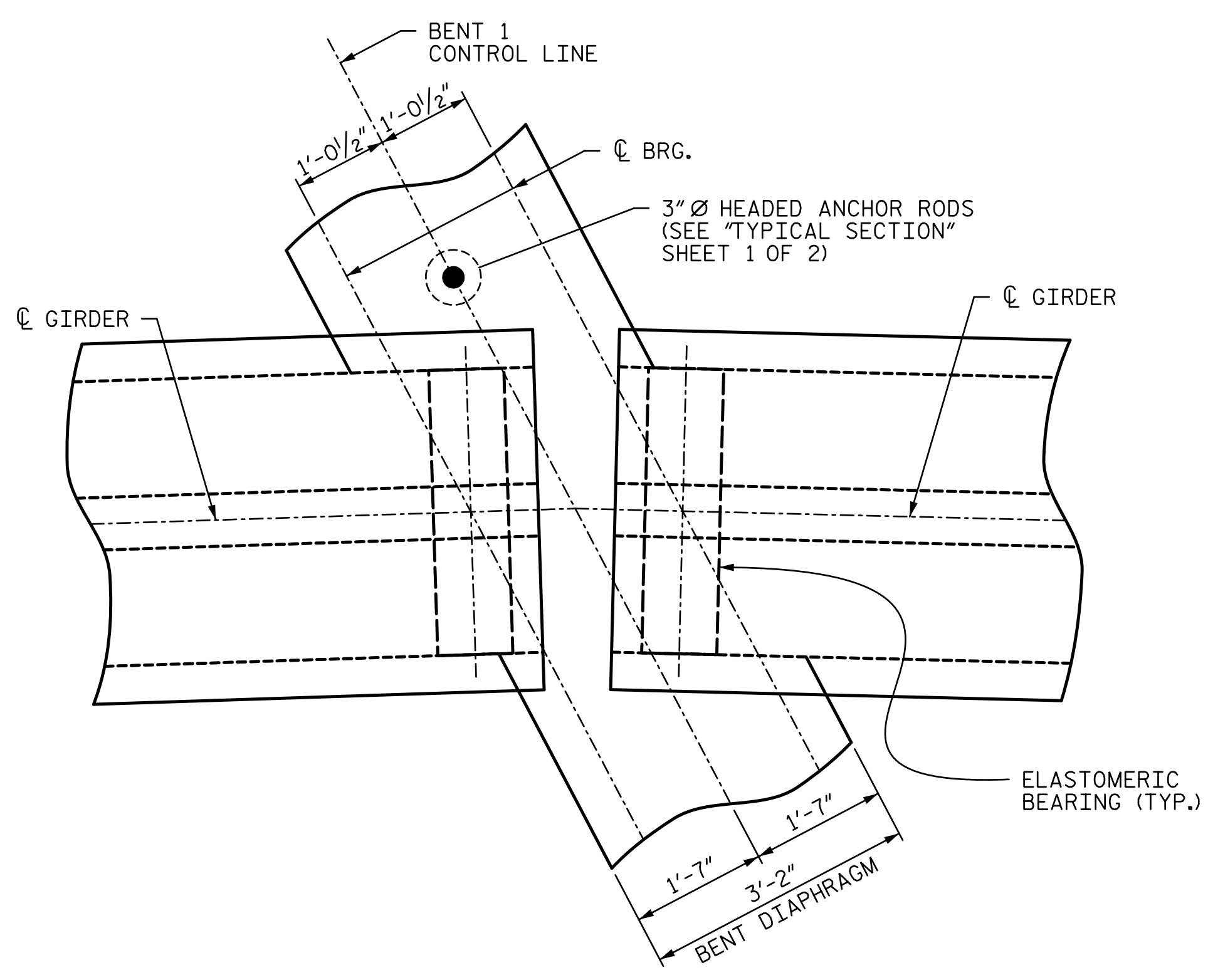
D1 BAR DETAIL

PROJECT NO. U2519AA-AB
CUMBERLAND/ROBESON COUNTY
 STATION: 16+64.84 -LPB-

SHEET 2 OF 2



PLAN AT END DIAPHRAGM
 (END BENT 1 SHOWN, END BENT 2 SIMILAR)



PLAN OF GIRDER AT BENT
 (BENT CAP NOT SHOWN FOR CLARITY)

DocuSign by: **STV ENGINEERS, INC.**
 PROFESSIONAL SEAL 40317
 ENGINEER
 CIVIL
 7/26/2018

STV 100 years
 STV ENGINEERS, INC.
 900 West Trade St., Suite 715
 Charlotte, NC 28202
 NC License Number F-0991

Balfour Beatty Infrastructure Inc. **BRANCH** CIVIL
 A Joint Venture

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
SUPERSTRUCTURE SUPERSTRUCTURE DETAILS					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
SHEET NO.					S1-7
TOTAL SHEETS					42

DRAWN BY : <u>MBC</u>	DATE : <u>3-18</u>	DESIGN ENGINEER OF RECORD: <u>T. LAWS</u>	DATE : <u>8-18</u>
CHECKED BY : <u>TRL</u>	DATE : <u>6-18</u>		

DATE: 9/25/2018 TIME: 2:33:25 PM
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DECK PANEL SUPPORTS

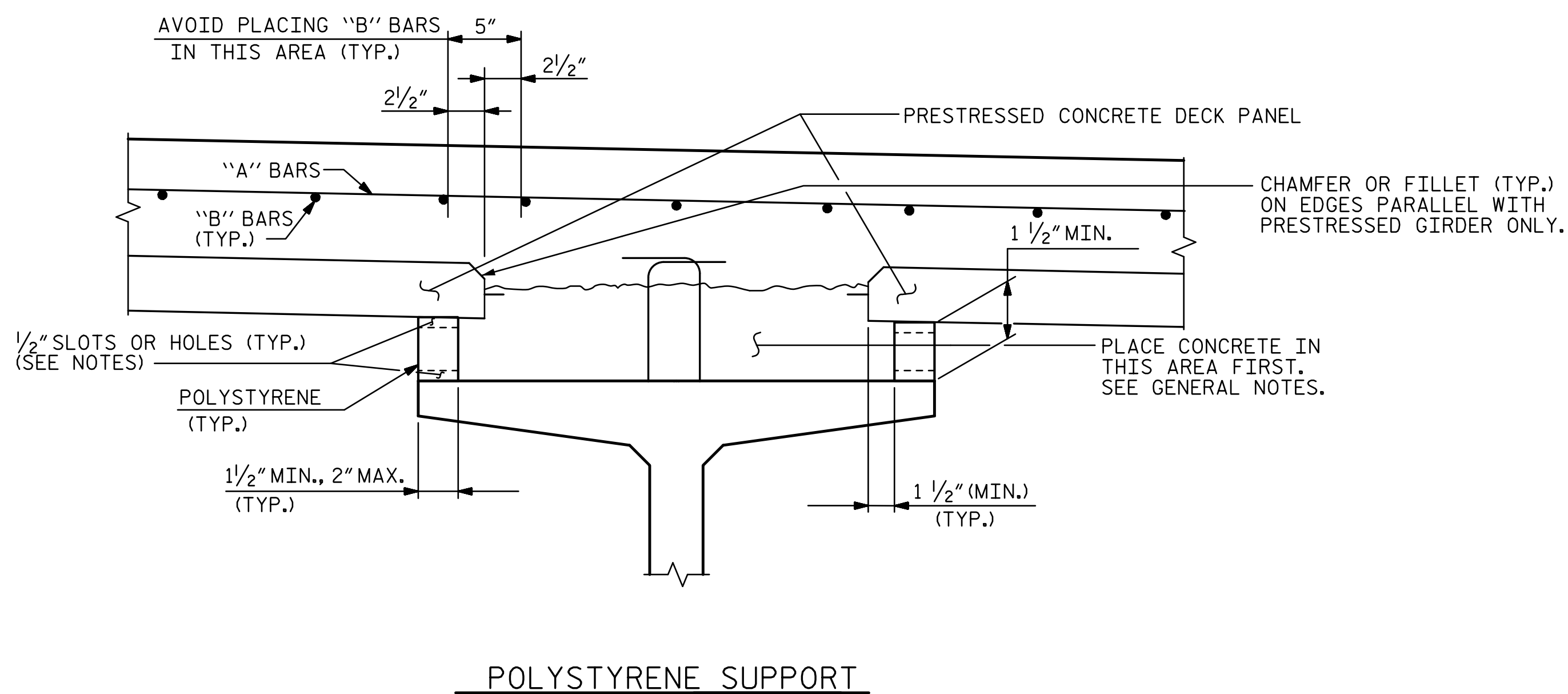
THE CONTRACTOR SHALL PROVIDE THE DECK PANEL SUPPORT SYSTEM SHOWN OR HE MAY SUBMIT A DECK PANEL SUPPORT SYSTEM OF HIS OWN DESIGN TO THE ENGINEER FOR APPROVAL.

POLYSTYRENE SUPPORT SYSTEM

1. ALL POLYSTYRENE SHALL BE DOW STYROFOAM 60 HIGH-LOAD, UC INDUSTRIES FOAMULAR 600 OR APPROVED EQUAL.
2. THE POLYSTYRENE SUPPORT SYSTEM SHALL CONSIST OF ONE LAYER WITH A MINIMUM WIDTH OF 1 1/2" AND A MAXIMUM WIDTH OF 2". THE POLYSTYRENE SHALL HAVE 1/2" X 1/2" WIDE SLOTS OR 1/2" DIAMETER HOLES AT 4'-0" CENTERS STAGGERED ALONG THE TOP AND BOTTOM.
3. THE POLYSTYRENE MAY BE CUT AND PLACED ON EDGE AS NECESSARY TO MATCH THE REQUIRED BUILDUP PROFILE ALONG THE GIRDER.
4. ADHESIVE, AS APPROVED BY THE ENGINEER, SHALL BE APPLIED TO THE TOP OF THE GIRDER IN A CONTINUOUS BEAD AND IN SUFFICIENT AMOUNT TO PREVENT THE POLYSTYRENE FROM BLOWING OUT AND TO PREVENT GAPS FROM FORMING BETWEEN THE POLYSTYRENE AND THE GIRDER. PRIOR TO PLACEMENT OF THE DECK PANELS, THE ADHESIVE SHALL ALSO BE APPLIED TO THE TOP OF THE POLYSTYRENE.
5. CONCRETE-FILLED BUCKETS, STACKS OF DECK PANELS, BUNDLED REINFORCING BARS OR OTHER HEAVY CONCENTRATED LOADS WILL NOT BE PERMITTED ON THE DECK PANEL ONCE THE PANEL HAS BEEN PLACED ON THE POLYSTYRENE SUPPORT SYSTEM.

GENERAL NOTES

1. THE DESIGN COMPRESSIVE STRENGTH (f'c) FOR THE CONCRETE IN PRESTRESSED PANELS SHALL BE 5000 PSI MINIMUM AT 28 DAYS. COMPRESSIVE STRENGTH OF CONCRETE AT TIME OF RELEASE OF STRANDS SHALL BE 4000 PSI MINIMUM.
2. THE PRECAST PRESTRESSED PANEL SHALL HAVE A THICKNESS OF 3/2" WITH THE PRESTRESSED STRANDS LOCATED AT HALF THE DEPTH OF THE PANEL.
3. FOR SKEWED SPANS, TRAPEZOIDAL CLOSURE PANELS SHALL HAVE A MINIMUM WIDTH OF 2 FEET ON THE SHORT SIDE.
4. ALL PRESTRESSING STRANDS SHALL EXTEND 2" BEYOND THE PANEL EDGES.
5. SHEAR REINFORCING OF 0.60 SQ. INCHES OF REINFORCING STEEL PER 10 SQ. FEET OF PANEL SURFACE SHALL BE PROVIDED IN THE PANEL TO ENSURE COMPOSITE ACTION BETWEEN PANEL AND THE CAST-IN-PLACE CONCRETE. SHEAR REINFORCEMENT SHALL BE MADE OF WELDED WIRE HAVING A MINIMUM YIELD STRENGTH OF 60 KSI.
6. SHEAR REINFORCEMENT AND LIFTING DEVICES SHALL BE CONSTRUCTED AND PLACED SO AS TO AVOID ANY INTERFERENCE WITH REINFORCING STEEL IN THE CAST-IN-PLACE DECK SLAB AND TO ALLOW FOR PROPER CONCRETE CONSOLIDATION IN THE DECK PANEL.
7. SHIFT LONGITUDINAL "B" BARS AS NECESSARY TO OBTAIN A MINIMUM CLEAR DISTANCE OF 2 1/2" TO THE RIGHT OR LEFT OF THE EDGE OF THE DECK PANEL. IF, IN SHIFTING TO OBTAIN THIS CLEARANCE, THE "B" BAR INTERFERES WITH THE STIRRUP IN THE TOP OF THE GIRDER THE "B" BAR MAY BE ELIMINATED.
8. WHEN CASTING THE DECK, PLACE CONCRETE FIRST OVER THE GIRDERS IN CONTINUOUS STRIPS A MINIMUM OF THREE PANEL LENGTHS AHEAD OF THE REST OF THE CONCRETE. CAREFULLY VIBRATE THE CONCRETE OVER THE GIRDERS SO THAT CONCRETE COMPLETELY FILLS THE AREA UNDER THE DECK PANEL OVERHANGS. THEN PLACE AND VIBRATE THE REMAINING DECK CONCRETE.

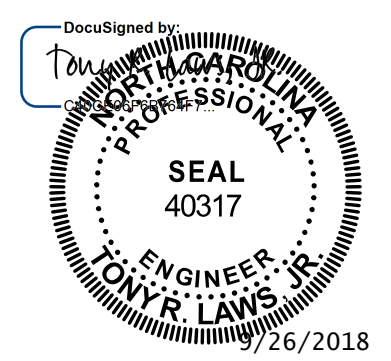




PROJECT NO. U2519AA-AB
CUMBERLAND/ROBESON COUNTY
 STATION: 16+64.84 -LPB-

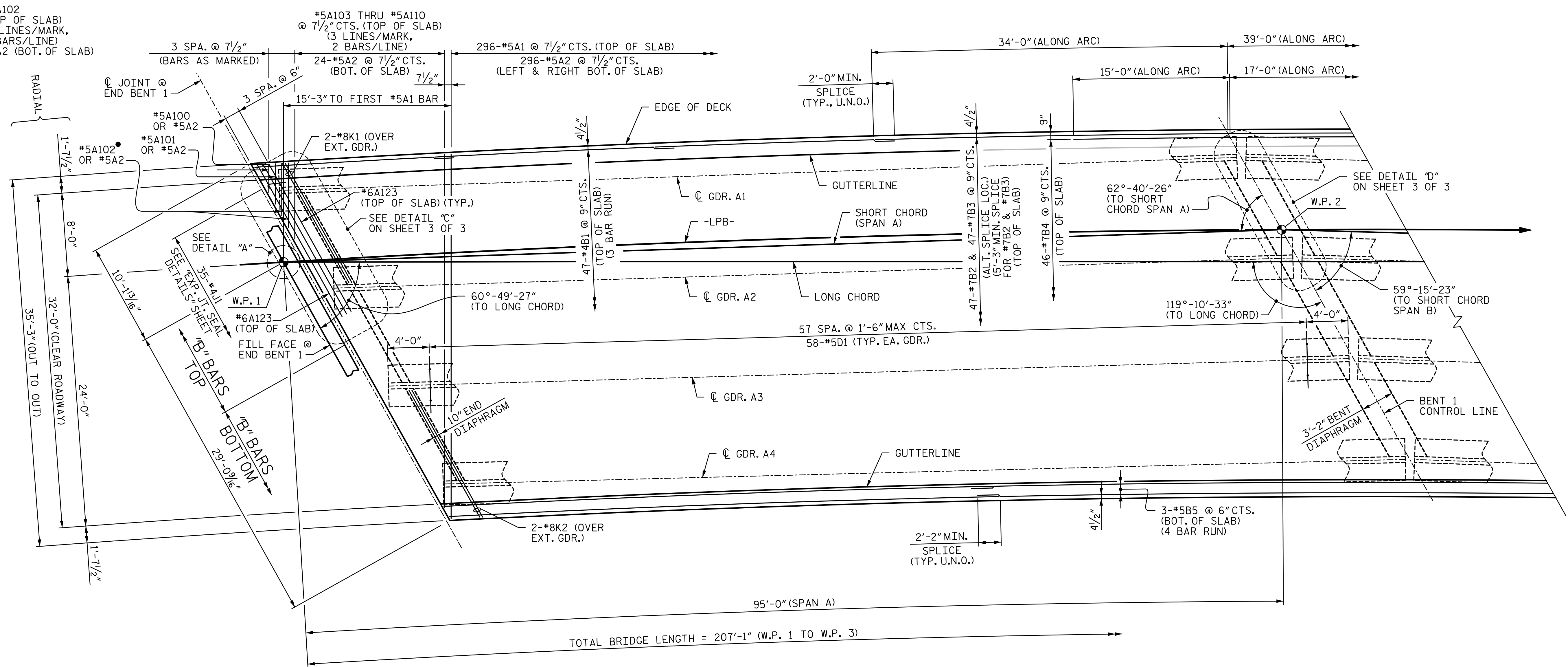
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DRAWN BY : MBC DATE : 6-18
 CHECKED BY : TRL DATE : 7-18

DESIGN ENGINEER OF RECORD: T. LAWS DATE : 8-18

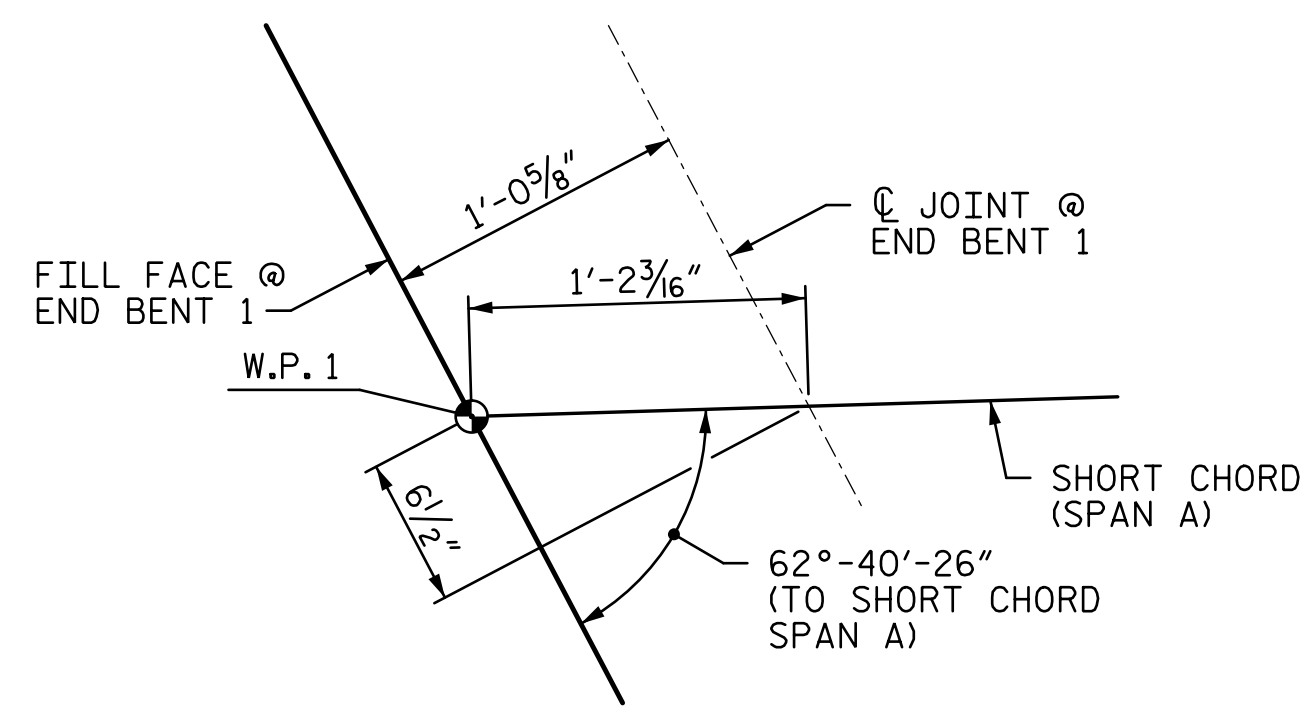
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED		STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH SUPERSTRUCTURE PRECAST PRESTRESSED CONCRETE DECK PANEL				SHEET NO. S1-8
	 STV ENGINEERS, INC. 900 West Trade St., Suite 715 Charlotte, NC 28202 NC License Number F-0991	REVISIONS				TOTAL SHEETS 42
		NO.	BY:	DATE:	NO.	BY:
	1			3		
	2			4		

• #5A102
(TOP OF SLAB)
(2 LINES/MARK,
2 BARS/LINE)
#5A2 (BOT. OF SLAB)



PLAN OF SPAN

("A" BARS ARE PLACED PERPENDICULAR TO LONG CHORD)



DETAIL "A"

NOTES:

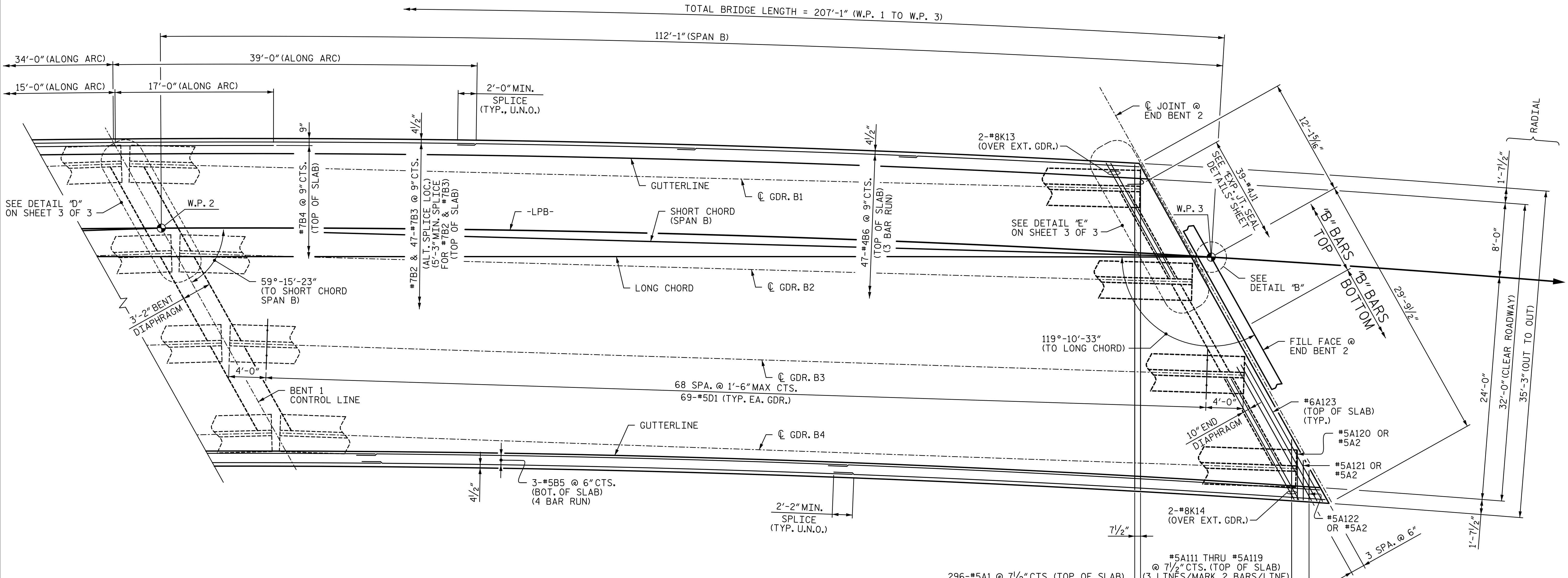
1. FOR CONCRETE BARRIER RAIL DIMENSIONS, REINFORCEMENT AND JOINT SPACING, SEE "CONCRETE BARRIER RAIL" SHEETS.
2. FOR POUR SEQUENCE AND TRANSVERSE CONSTRUCTION JOINT IN DECK SLAB, SEE "DECK POUR SEQUENCE" SHEET.
3. FOR SECTION VIEWS AND D1 BAR DETAIL, SEE "SUPERSTRUCTURE DETAILS" SHEET.
4. FOR ADDITIONAL "B" BAR SPACING AND LOCATION, SEE "TYPICAL SECTION" SHEET.
5. FOR MINIMUM SPLICE LENGTHS, SEE "SUPERSTRUCTURE BILL OF MATERIAL" SHEET.
6. FOR ADDITIONAL DETAILS, SEE SHEET 3 OF 3.

PROJECT NO. U2519AA-AB
CUMBERLAND/ROBESON COUNTY
 STATION: 16+64.84 -LPB-

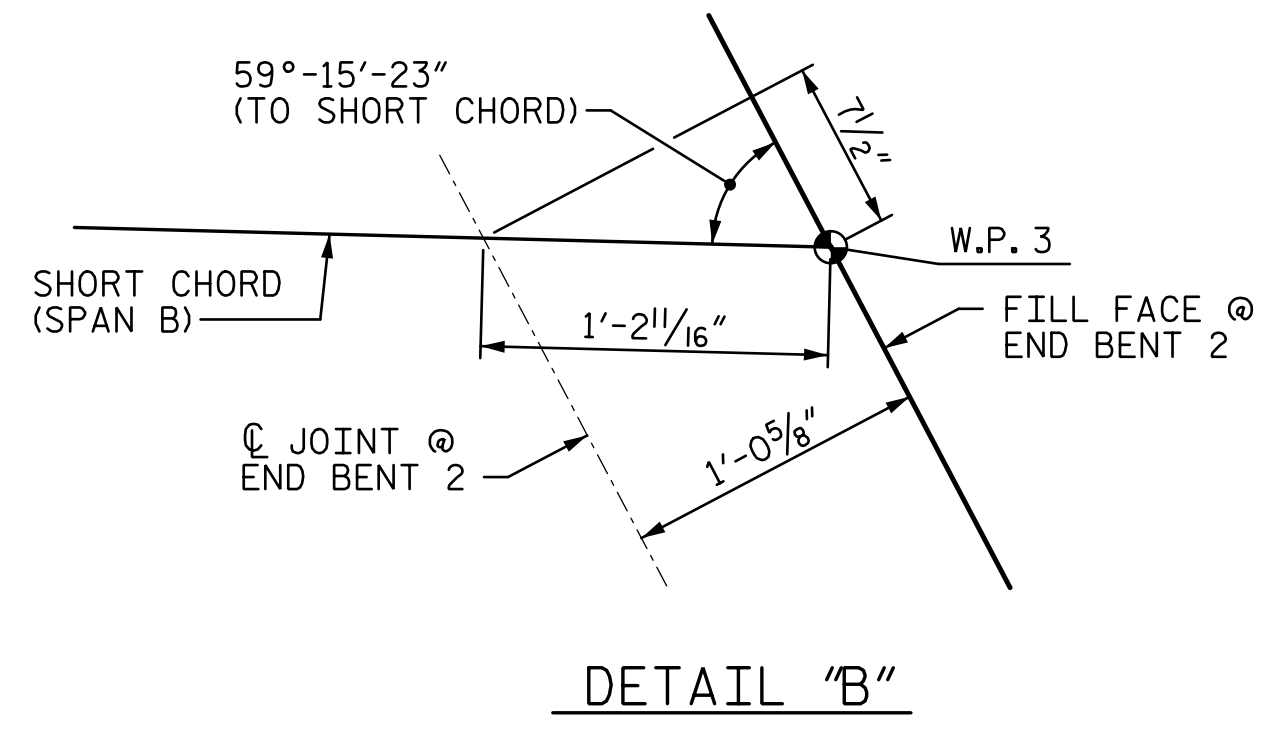
SHEET 1 OF 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED		STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH SUPERSTRUCTURE PLAN OF SPAN SPAN A		SHEET NO. S1-9
		REVISIONS		TOTAL SHEETS 42
	STV ENGINEERS, INC. 900 West Trade St., Suite 715 Charlotte, NC 28202 NC License Number F-0991	NO. 1 BY: TRL DATE: 7-18	NO. 2 BY: TRL DATE: 7-18	NO. 3 BY: TRL DATE: 7-18

DRAWN BY : <u>MBC</u>	DATE : <u>6-18</u>	DESIGN ENGINEER OF RECORD : <u>T. LAWS</u>	DATE : <u>8-18</u>
CHECKED BY : <u>TRL</u>	DATE : <u>7-18</u>		



PLAN OF SPAN
("A" BARS ARE PLACED PERPENDICULAR TO LONG CHORD)



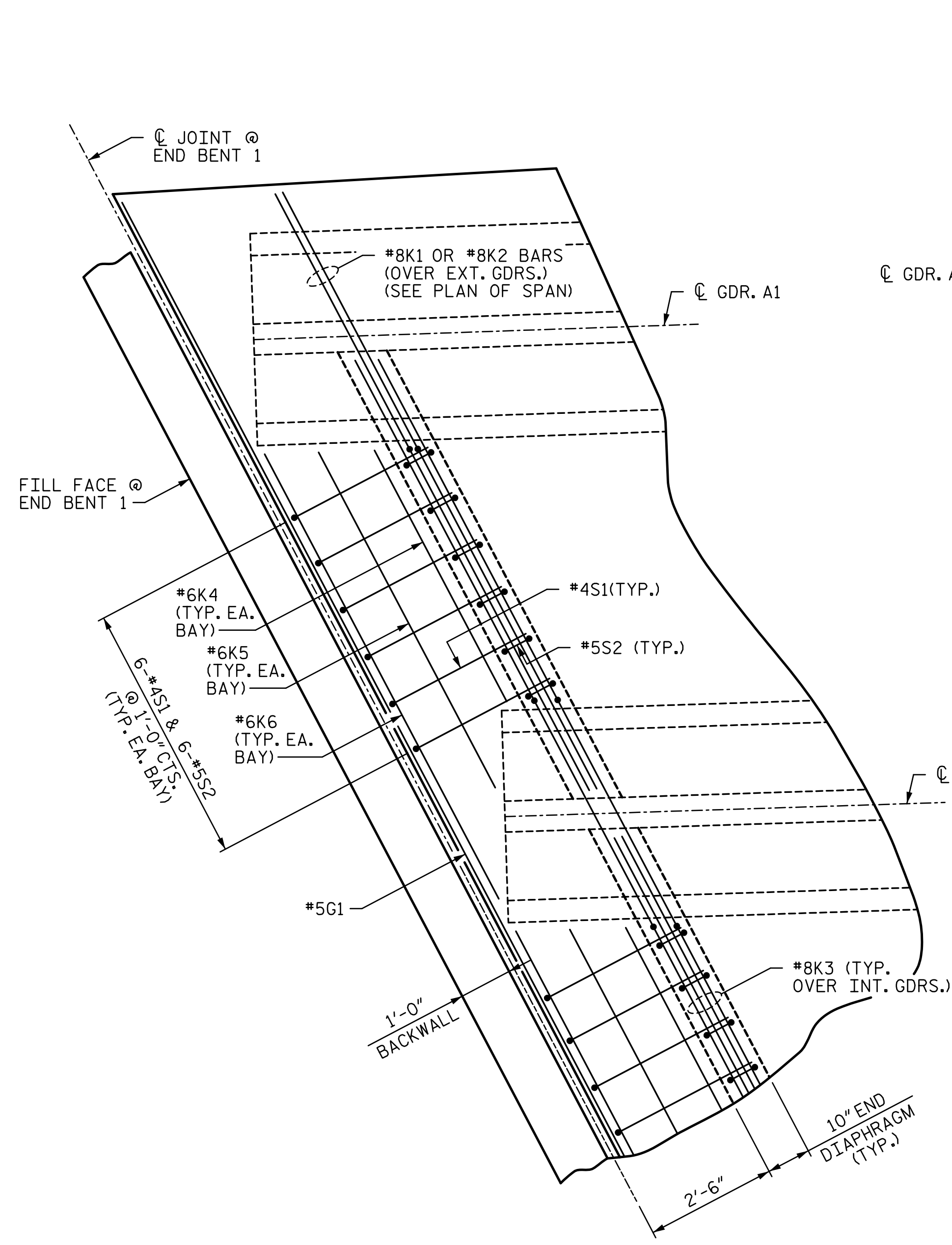
DETAIL "B"

PROJECT NO. U2519AA-AB
CUMBERLAND/ROBESON COUNTY
 STATION: 16+64.84 -LPB-
 SHEET 2 OF 3

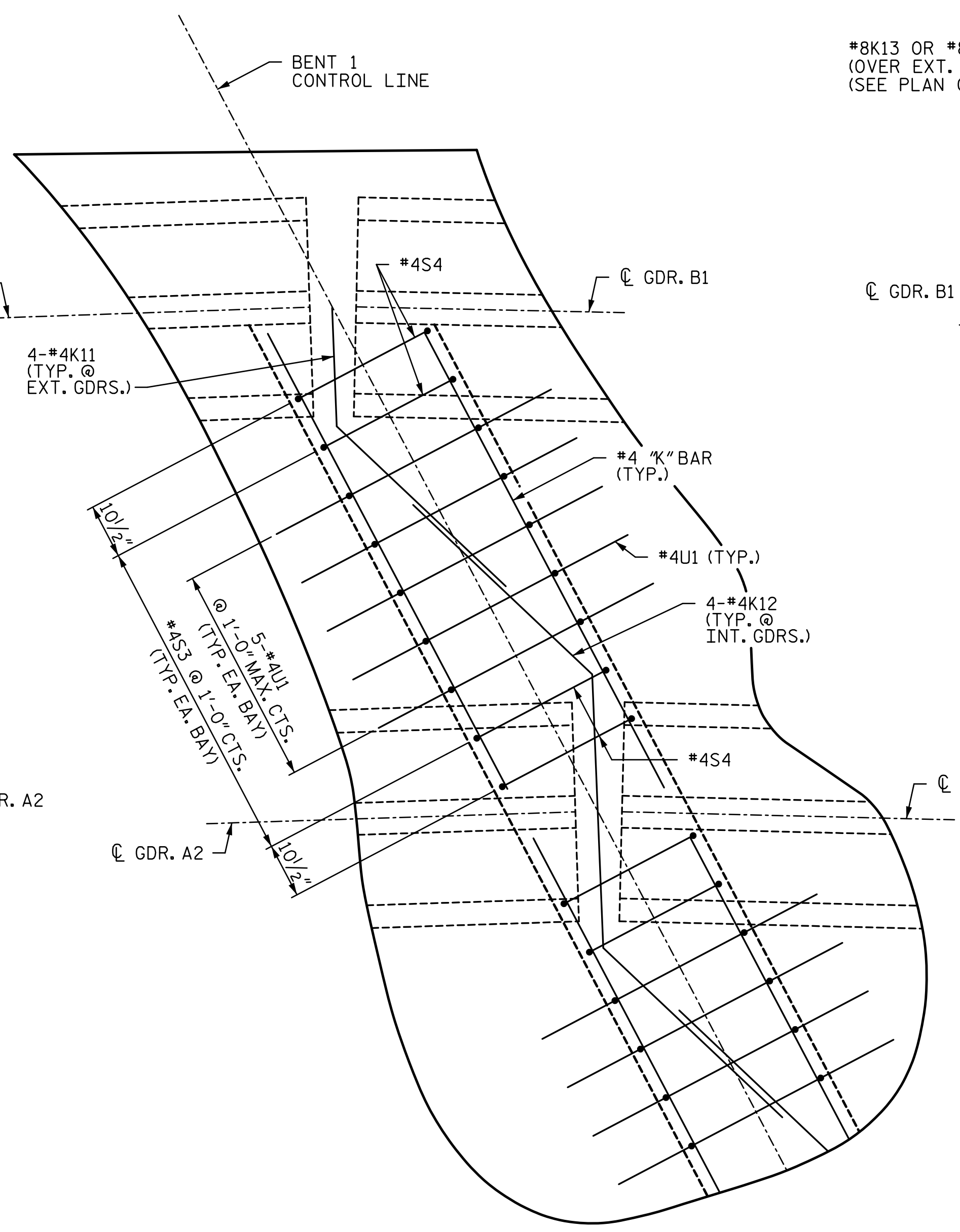
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			REVISIONS						
	STV ENGINEERS, INC. 900 West Trade St., Suite 715 Charlotte, NC 28202 NC License Number F-0991		NO.	BY:		DATE:	NO.	BY:	DATE:
			1				3		
2					4				

DRAWN BY : MBC DATE : 6-18
 CHECKED BY : TRL DATE : 7-18
 DESIGN ENGINEER OF RECORD: T. LAWS DATE : 8-18

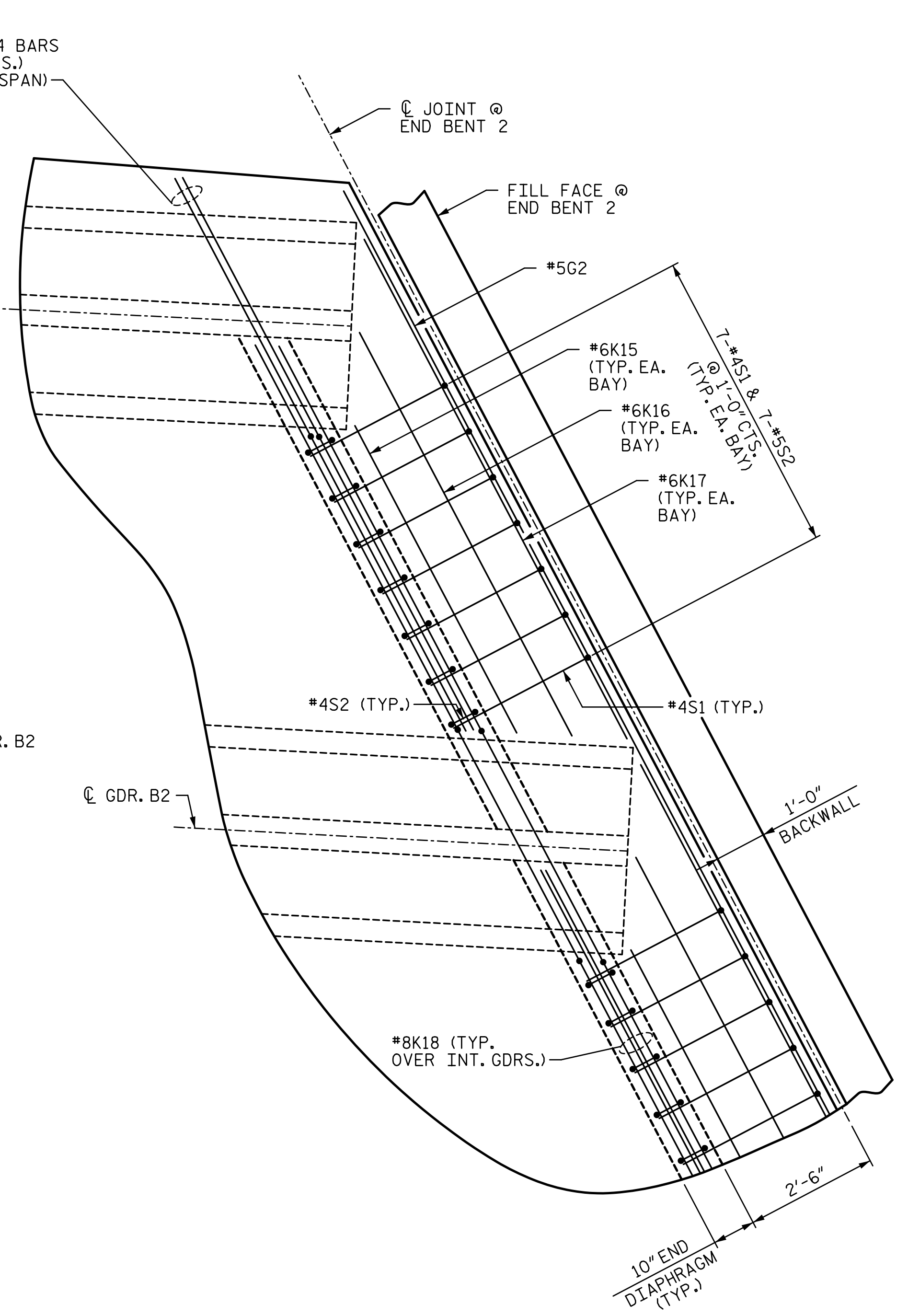
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DETAIL "C"



DETAIL "D"



DETAIL "E"

PROJECT NO. U2519AA-AB
CUMBERLAND/ROBESON COUNTY
 STATION: 16+64.84 -LPB-
 SHEET 3 OF 3

DATE: 9/25/2018 TIME: 2:33:33 PM
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CHECKED BY : <u>TRL</u>	DATE : <u>7-18</u>		

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STV 100 years
 STV ENGINEERS, INC.
 900 West Trade St., Suite 715
 Charlotte, NC 28202
 NC License Number F-0991

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A Joint Venture

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

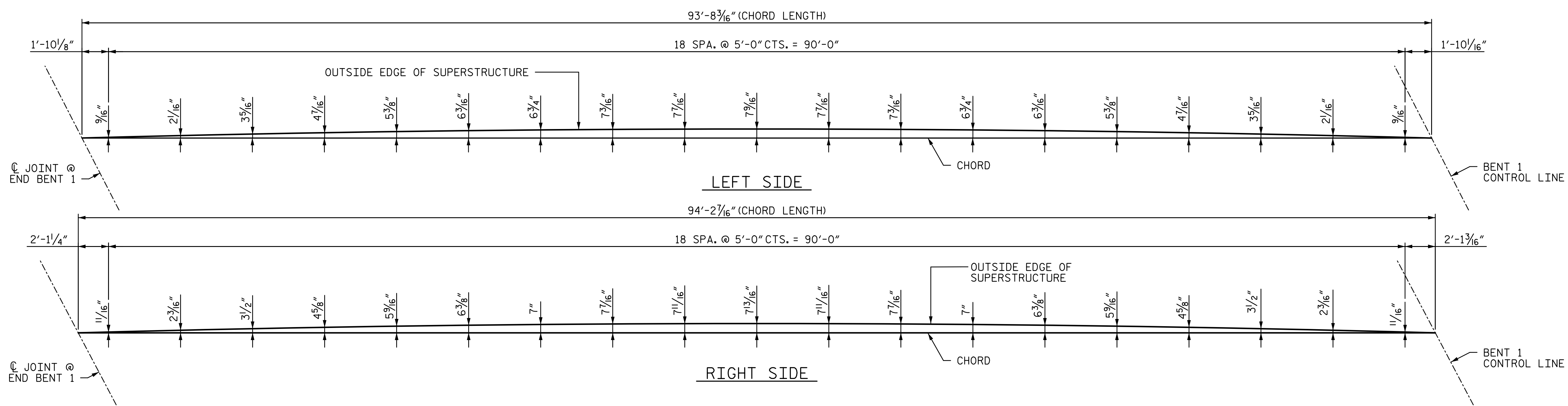
SUPERSTRUCTURE

PLAN OF SPAN DETAILS

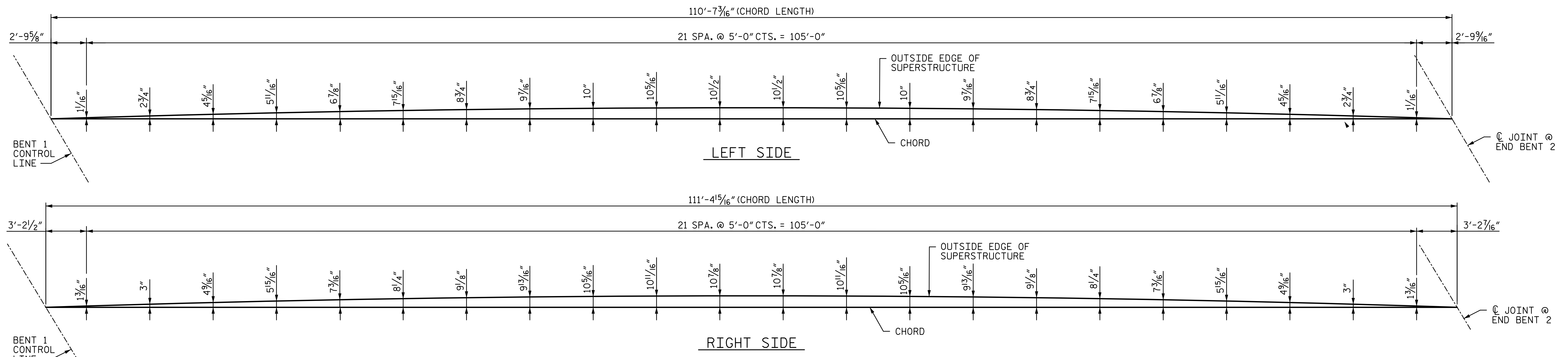
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

SHEET NO.
S1-11

TOTAL SHEETS
42



ARC OFFSETS - SPAN A



ARC OFFSETS - SPAN B

PROJECT NO. U2519AA-AB
 CUMBERLAND/ROBESON COUNTY
 STATION: 16+64.84 -LPB-

DATE: 9/25/2018 TIME: 2:33:35 PM
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STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

SUPERSTRUCTURE

ARC OFFSETS

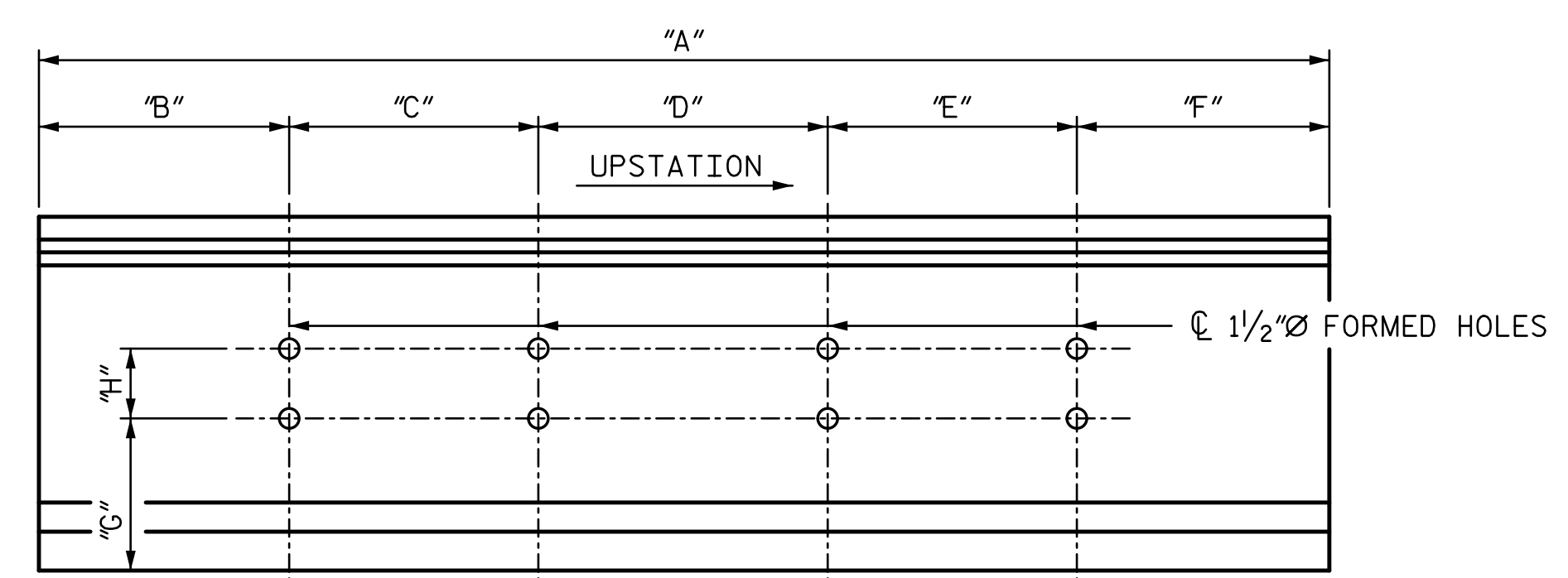
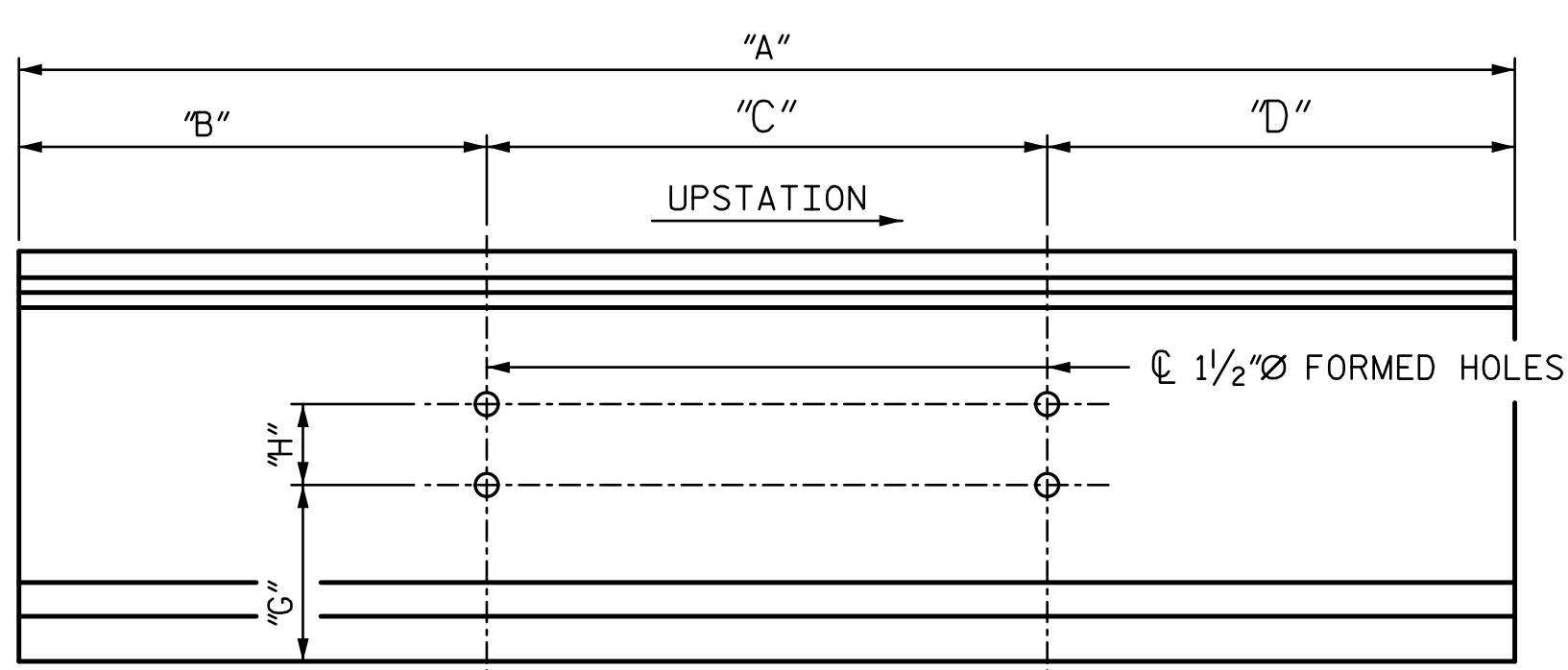
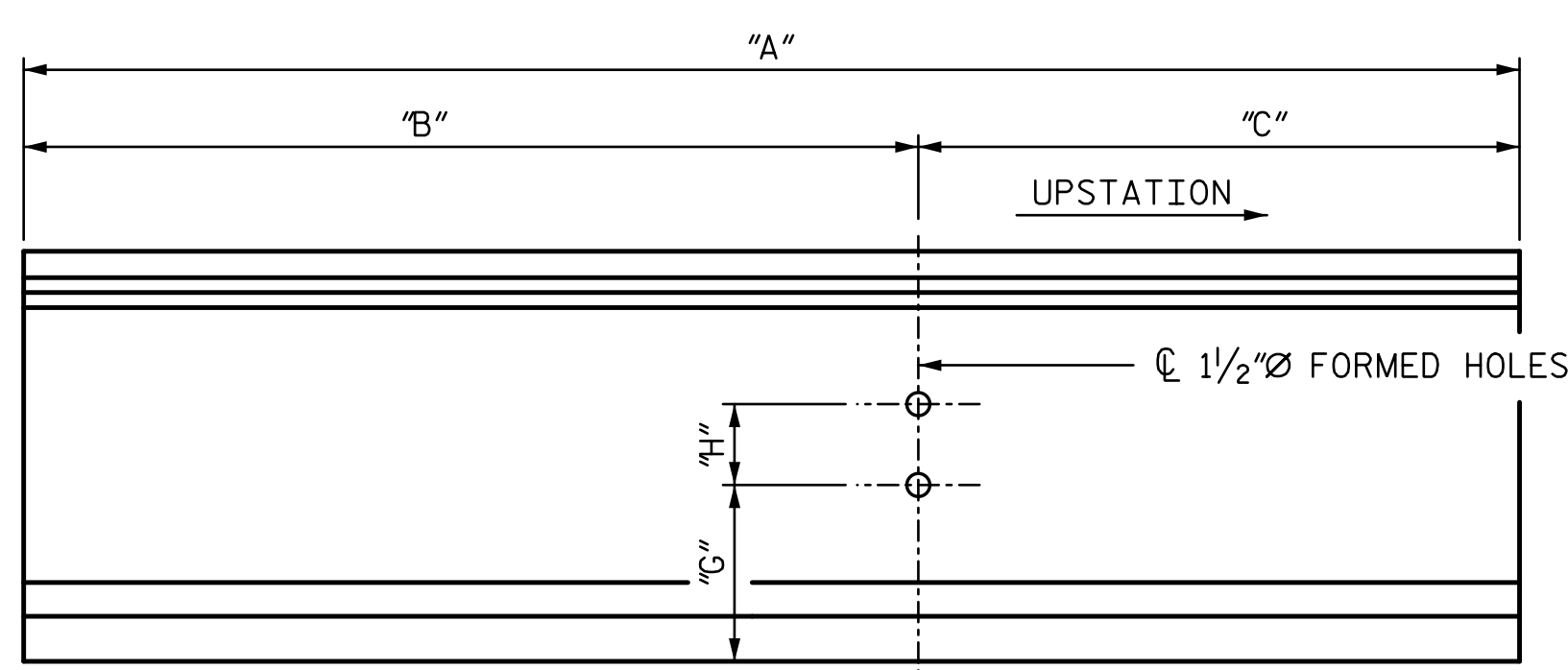
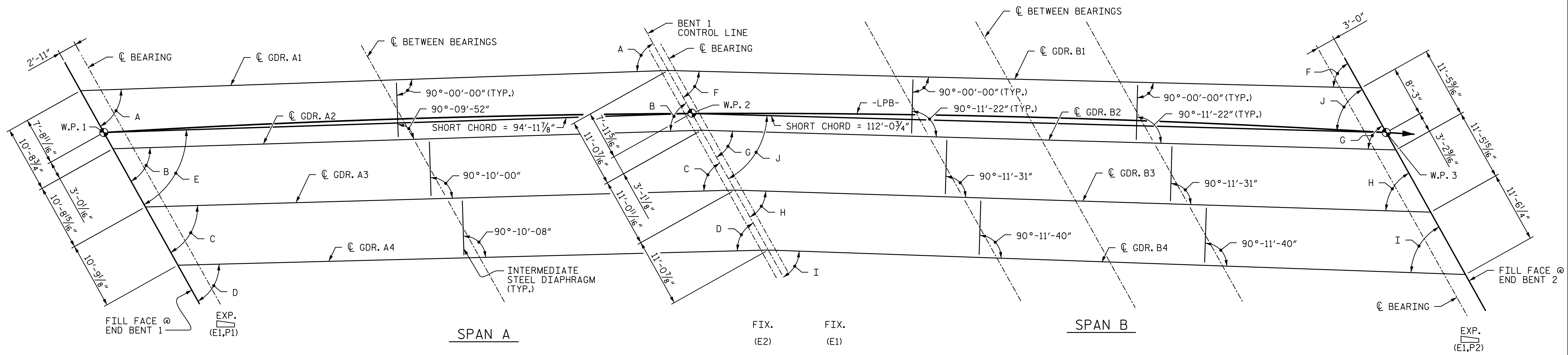
SHEET NO.
S1-12

TOTAL SHEETS
42

STV ENGINEERS, INC. 100 Years
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 Charlotte, NC 28202
 NC License Number F-0991

Balfour Beatty Infrastructure Inc. BRANCH
 A Joint Venture

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



GIRDER ELEVATIONS

ANGLES

A	62°-47'-31"	F	59°-23'-33"
B	62°-37'-39"	G	59°-12'-11"
C	62°-27'-39"	H	59°-00'-40"
D	62°-17'-31"	I	58°-49'-00"
E	62°-40'-26"	J	59°-15'-23"

GIRDER DIMENSIONS

GIRDER	"A" (FT)	"B" (FT)	"C" (FT)	"D" (FT)	"E" (FT)	"F" (FT)	"G" (FT)	"H" (FT)
A1	91'-11 1/4"	48'-5 1/2"	43'-5 3/4"	--	--	--	2'-2"	8"
A2	92'-0 7/8"	43'-6 9/16"	4'-11 5/16"	43'-6 3/8"	--	--	2'-2"	8"
A3	92'-2 1/2"	43'-7 3/16"	5'-0 3/8"	43'-6 1 5/16"	--	--	2'-2"	8"
A4	92'-4 1/4"	43'-7 7/8"	48'-8 3/8"	--	--	--	2'-2"	8"
B1	108'-8 1/2"	39'-1"	36'-3 1/4"	33'-4 1/4"	--	--	2'-2"	8"
B2	108'-11 1/8"	33'-5 1/2"	5'-8 9/16"	30'-6 1 1/16"	5'-9 7/16"	33'-4 7/8"	2'-2"	8"
B3	109'-1 5/8"	36'-6 1/8"	5'-9 1/16"	30'-7 1/16"	5'-9 1 5/16"	33'-5 7/16"	2'-2"	8"
B4	109'-4 1/4"	33'-6 3/4"	36'-5"	39'-4 1/2"	--	--	2'-2"	8"

PROJECT NO. U2519AA-AB
CUMBERLAND/ROBESON COUNTY
 STATION: 16+64.84 -LPB-

DATE: 9/25/2018 TIME: 2:33:37 PM FILE: R:\Structures\Str 1 LPB over Y\Ustation\RFCA\401.025.U2519.SMU.FP.013.770513.dgn

DRAWN BY : VKS DATE : 6-18 DESIGN ENGINEER OF RECORD: T. LAWS DATE : 8-18
 CHECKED BY : TRL DATE : 6-18

DocuSigned by:

SEAL 40317
 T. LAWS
 ENGINEER
 7/26/2018

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 SUPERSTRUCTURE
FRAMING PLAN

REVISIONS

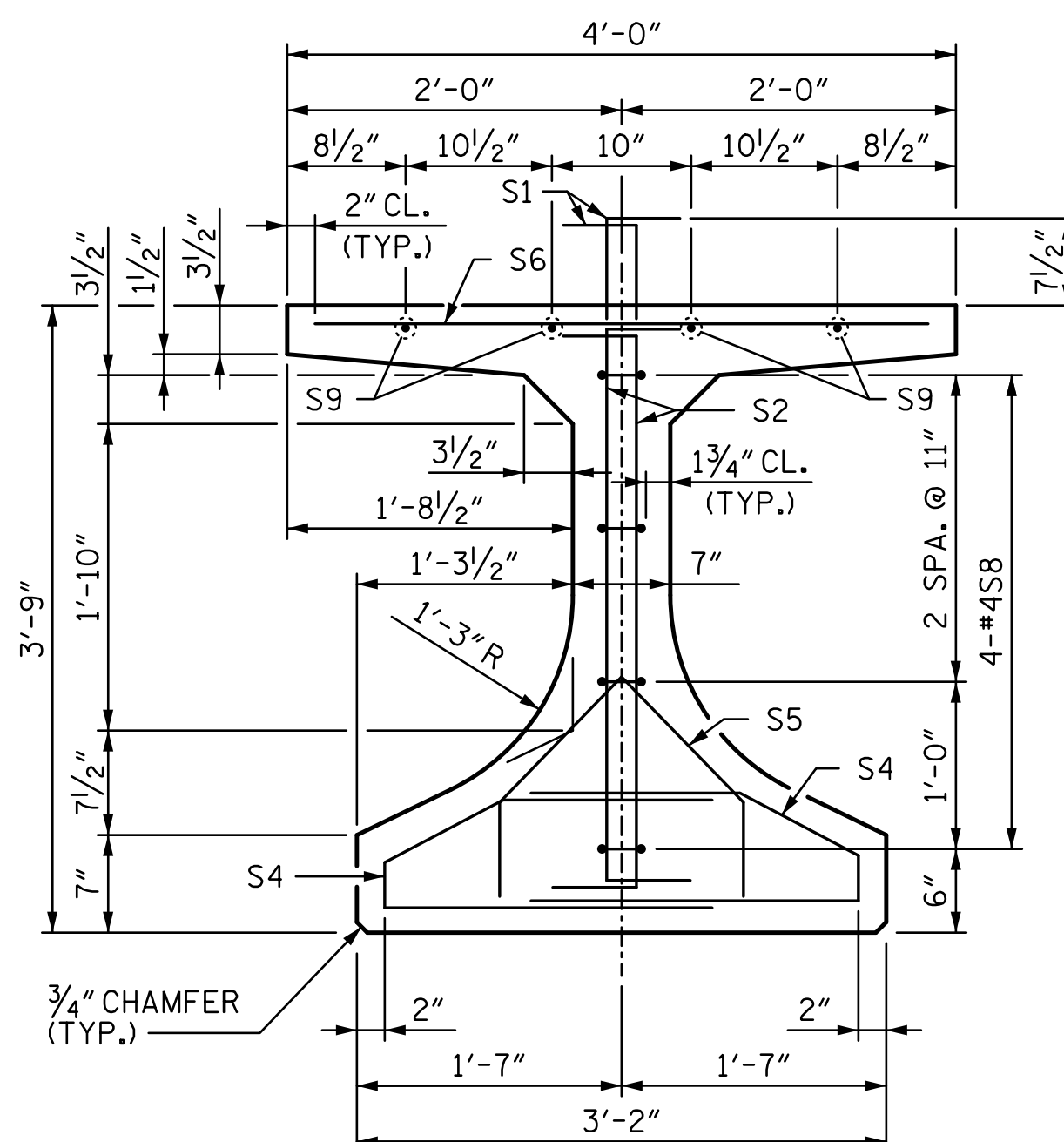
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

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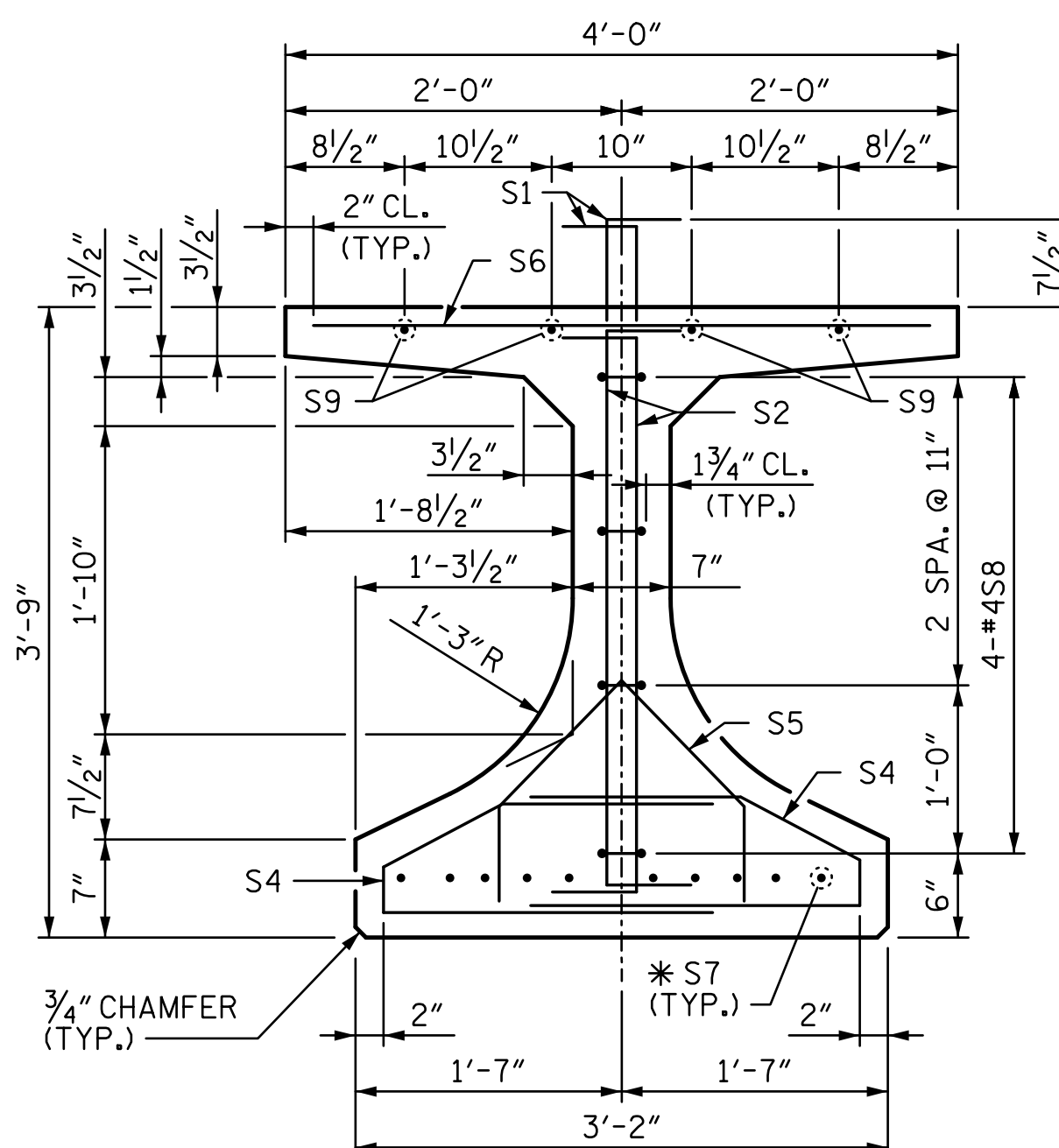
STV ENGINEERS, INC.
 900 West Trade St., Suite 715
 Charlotte, NC 28202
 NC License Number F-0991

Balfour Beatty Infrastructure Inc. CIVIL
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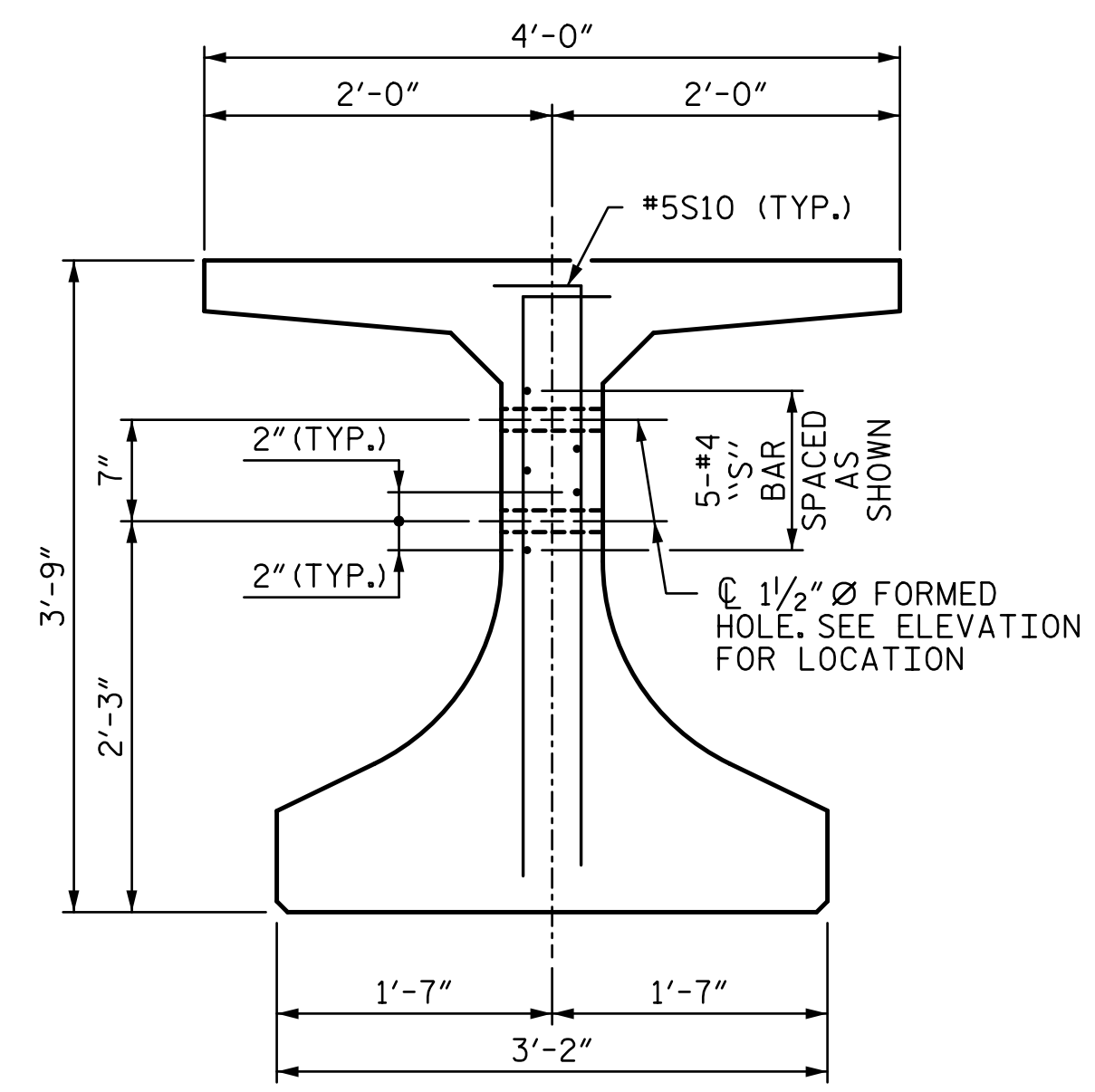
SHEET NO. **S1-13**
 TOTAL SHEETS 42



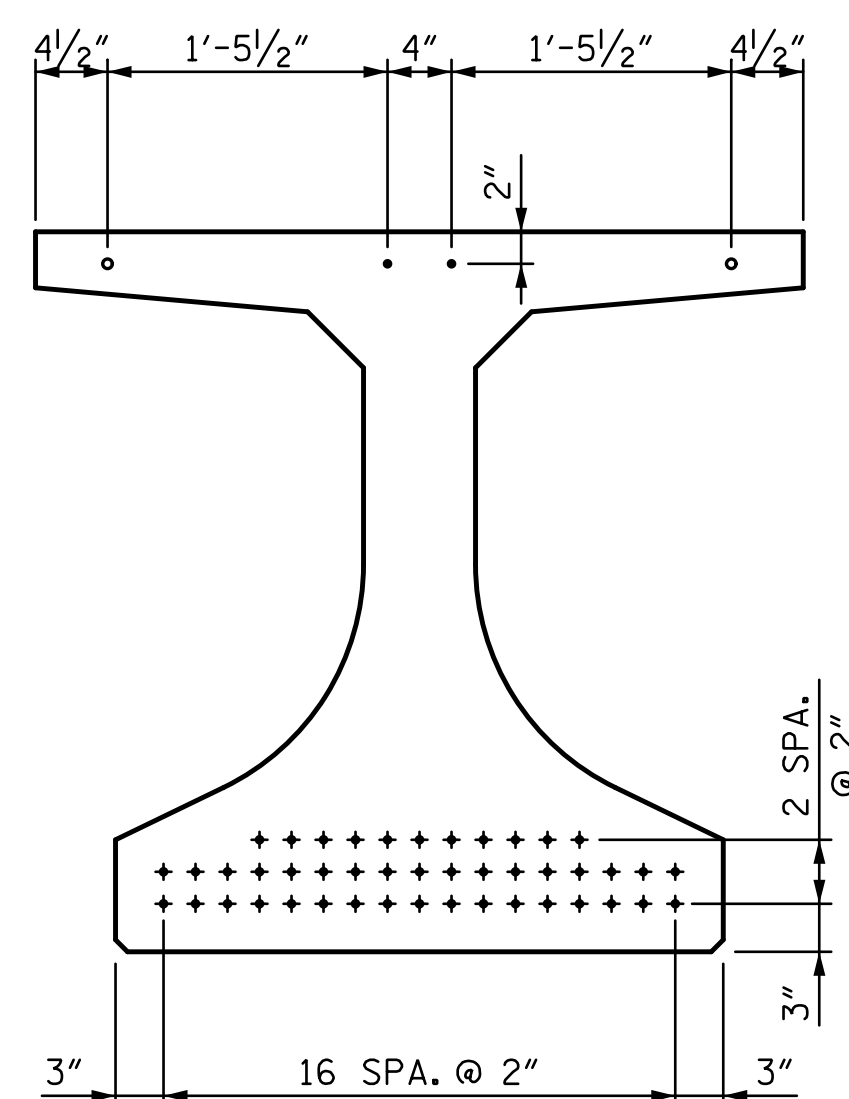
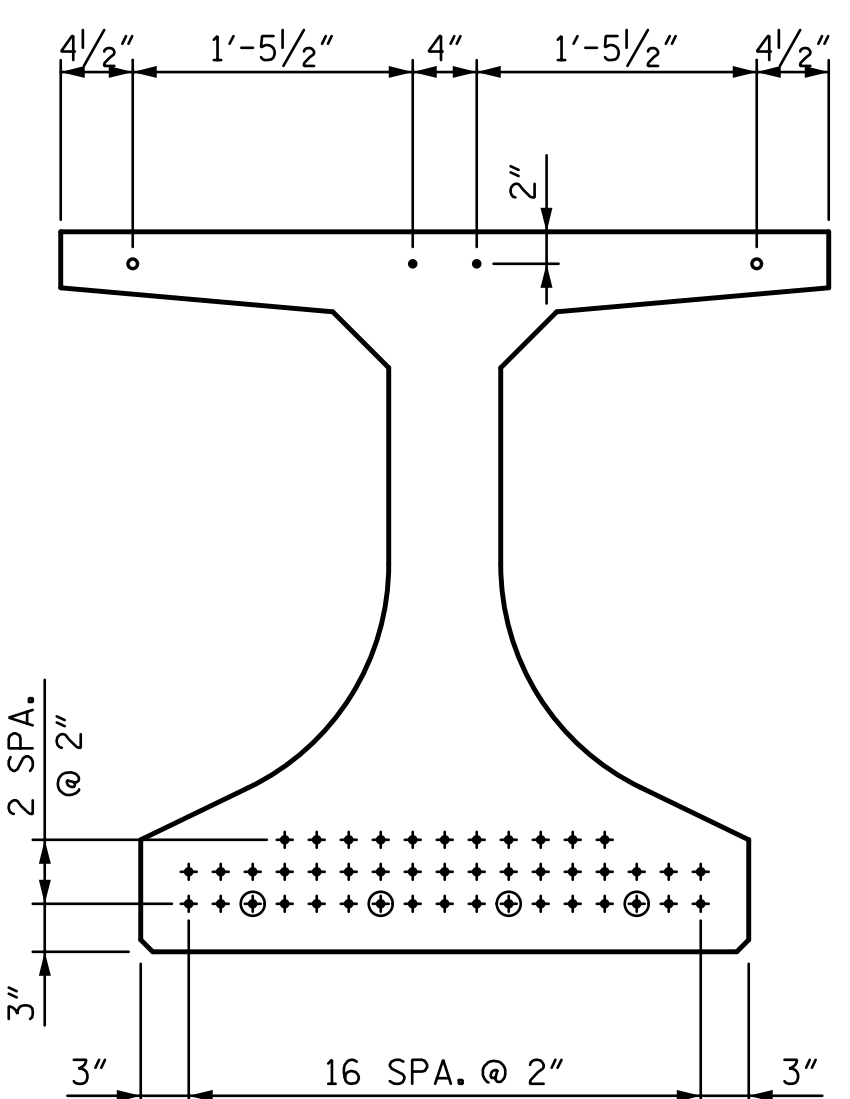
SECTION A-A
(S3 BAR NOT SHOWN FOR CLARITY)



SECTION B-B
(S3 BAR NOT SHOWN FOR CLARITY)



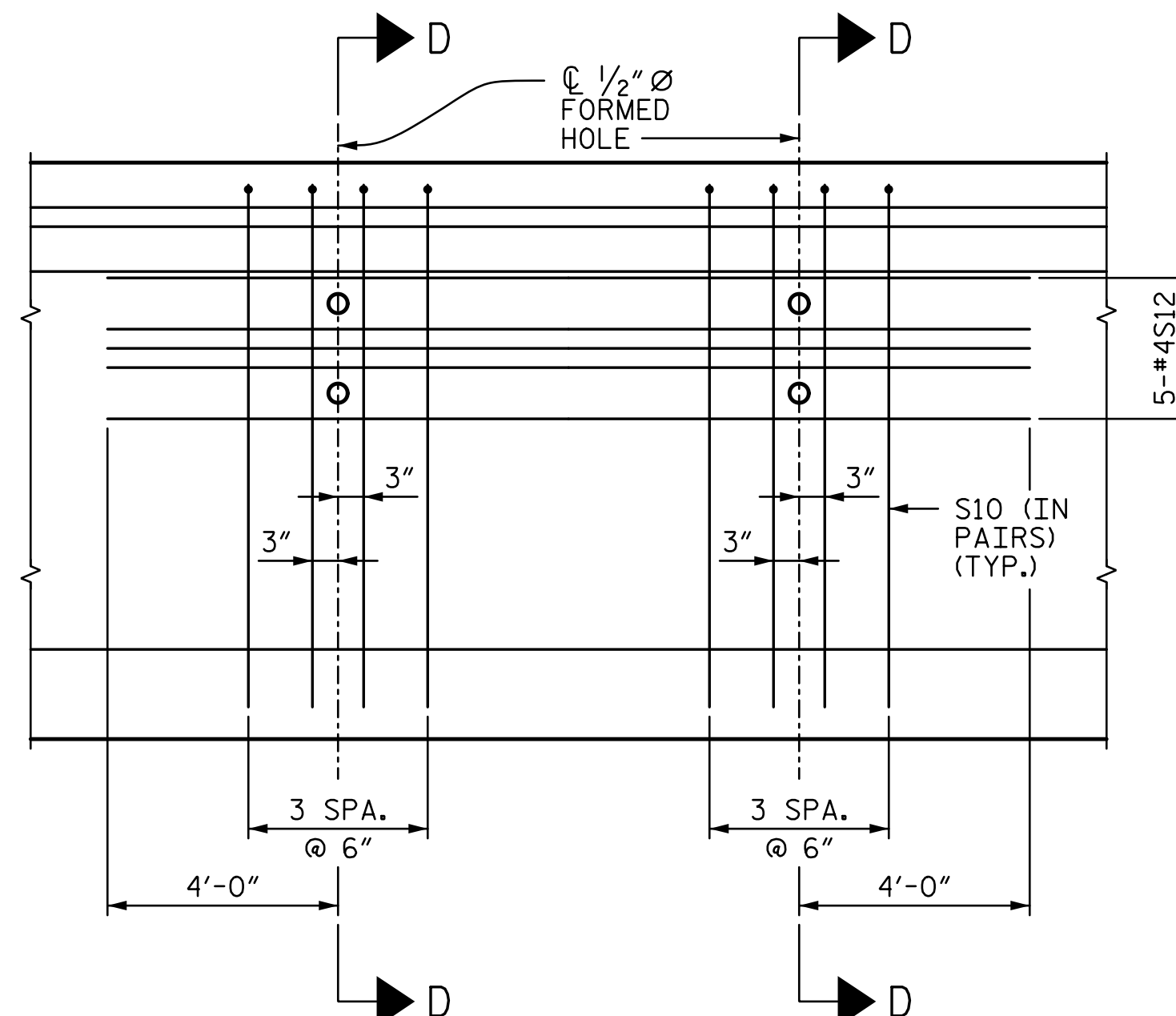
SECTION D-D



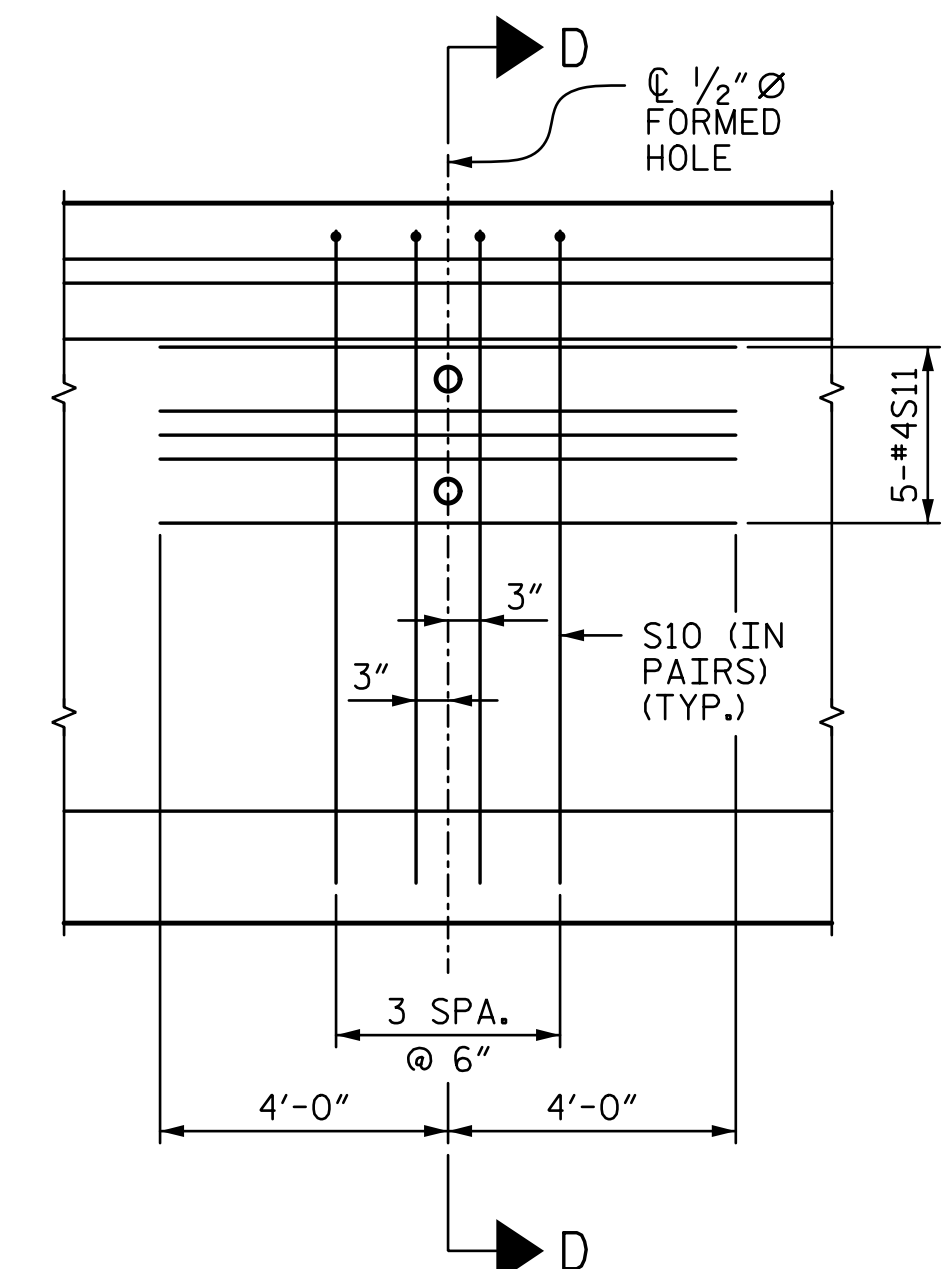
0.6" Ø LOW RELAXATION STRAND LAYOUT
(49 - 0.6" Ø STRANDS REQUIRED)

DEBONDING LEGEND

- - FULLY BONDED STRANDS
- - STRANDS PULLED TO 4,500 LBS.
- ⊙ - DEBONDED FOR 16'-0" FROM END OF GIRDER



PARTIAL ELEVATION
(SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR GIRDER A2 & A3)



PARTIAL ELEVATION
(SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR GIRDER A1 & A4)

PROJECT NO. U2519AA-AB
CUMBERLAND/ROBESON COUNTY
 STATION: 16+64.84 -LPB-

SHEET 2 OF 5

DATE: 9/25/2018 TIME: 2:33:42 PM FILE: R:\Structures\Str 1 LPB over Y:\station\RFC\401.029.U2519.SMU.G1.015.770513.dgn

DRAWN BY : TJT	DATE : 7-18	DESIGN ENGINEER OF RECORD: T. LAWS	DATE : 8-18
CHECKED BY : TRL	DATE : 7-18		

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STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

SUPERSTRUCTURE

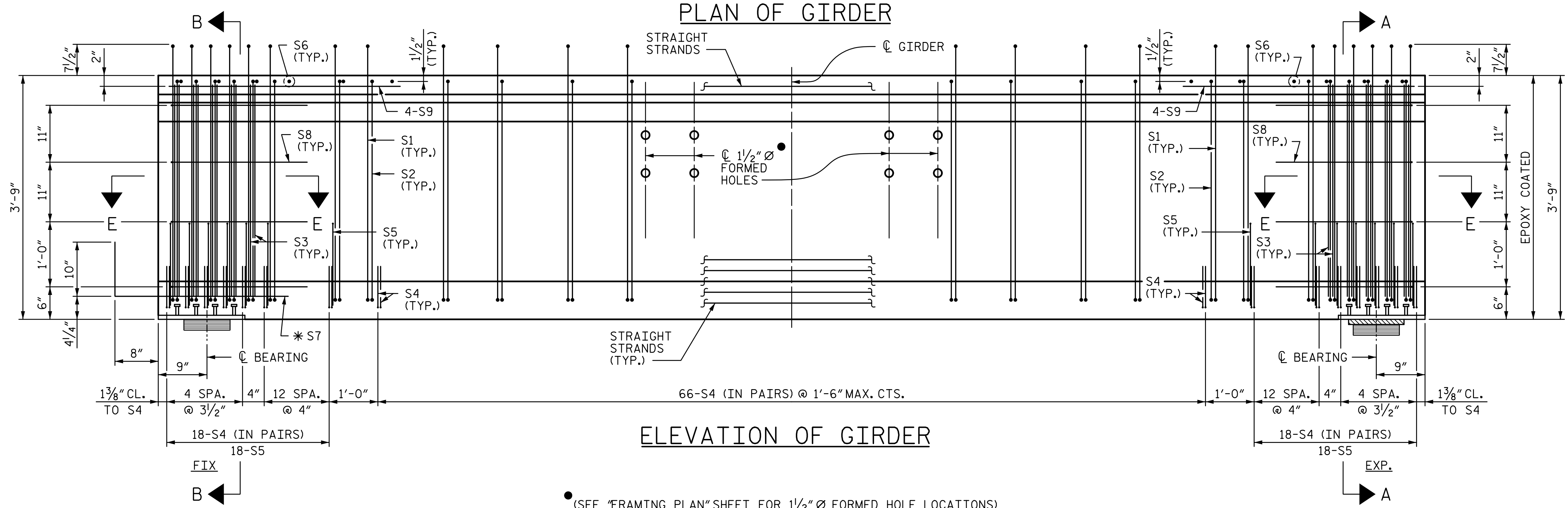
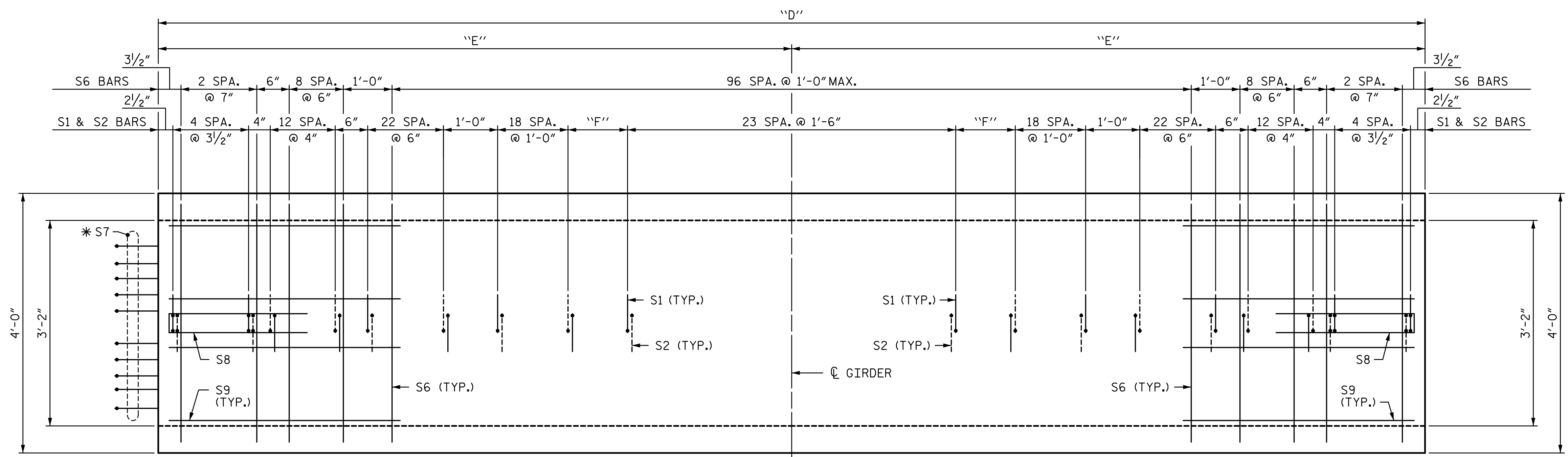
F.I.B. 45"
PRESTRESSED CONCRETE GIRDER
CONTINUOUS FOR LIVE LOAD
SPAN "A"

SHEET NO.
S1-15

REVISIONS			
NO.	BY:	DATE:	
1			
2			
3			
4			

STV ENGINEERS, INC.
 900 West Trade St., Suite 715
 Charlotte, NC 28202
 NC License Number F-0991

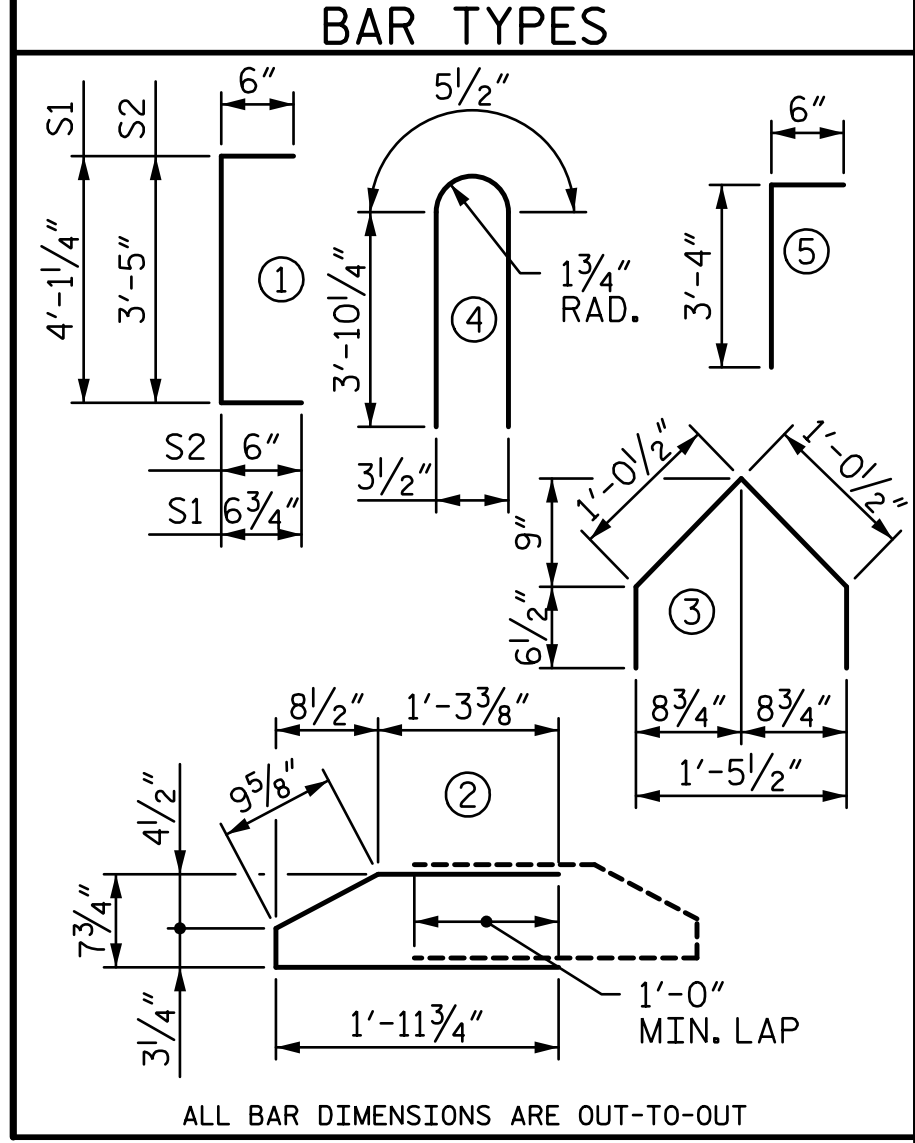
Balfour Beatty **BRANCH**
 Infrastructure Inc. **CIVIL**
A Joint Venture



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 GDR.					
BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	144	#5	1	5'-2"	776
S2	144	#5	1	4'-5"	663
S3	20	#7	STR	3'-3"	133
S4	204	#3	2	4'-4"	332
S5	36	#3	3	3'-2"	43
S6	121	#4	STR	3'-8"	296
*S7	10	#5	STR	3'-8"	38
S8	8	#4	4	8'-2"	44
S9	8	#5	STR	10'-0"	83
EXT. GDR. S10	16	#5	5	3'-10"	64
INT. GDR. S10	32	#5	5	3'-10"	128
EXT. GDR. S11	10	#4	STR	8'-0"	53
INT. GDR. S12	10	#4	STR	13'-10"	92

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



QUANTITIES FOR ONE GIRDER			
	REINFORCING STEEL	9,500 PSI CONCRETE	0.6" Ø L.R. STRANDS
	LB.	C.Y.	No.
GIRDER	SEE TABLE	SEE TABLE	67

GIRDERS REQUIRED		
NUMBER	LENGTH	TOTAL LENGTH
4	SEE TABLE	436'-1/2"

PROJECT NO. U2519AA-AB
CUMBERLAND/ROBESON COUNTY
 STATION: 16+64.84 -LPB-
 SHEET 3 OF 5

- NOTES:**
- FOR SECTIONS AND DETAILS, SEE SHEET 4 OF 5 AND 5 OF 5.
 - FOR ADDITIONAL NOTES, SEE SHEET 5 OF 5.
 - ALTERNATE DIRECTION OF #5S1 AND #5S2 BARS.

GIRDER DIMENSIONS				CONCRETE	REINFORCING STEEL
GDR.	D	E	F		
B1	108'-8 1/2"	54'-4 1/4"	10 3/4"	24.3 CY	2,525 LB
B2	108'-11 1/8"	54'-5 9/16"	1'-0 1/16"	24.4 CY	2,628 LB
B3	109'-1 5/8"	54'-6 13/16"	1'-1 15/16"	24.4 CY	2,628 LB
B4	109'-4 1/4"	54'-8 7/8"	1'-2 5/8"	24.5 CY	2,525 LB

DocuSigned by:

 T. LAWS
 ENGINEER
 CIVIL LAWS
 7/26/2018

STV 100 years
 STV ENGINEERS, INC.
 900 West Trade St., Suite 715
 Charlotte, NC 28202
 NC License Number F-0991

Balfour Beatty Infrastructure Inc. **BRANCH** CIVIL
 A Joint Venture

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

SUPERSTRUCTURE

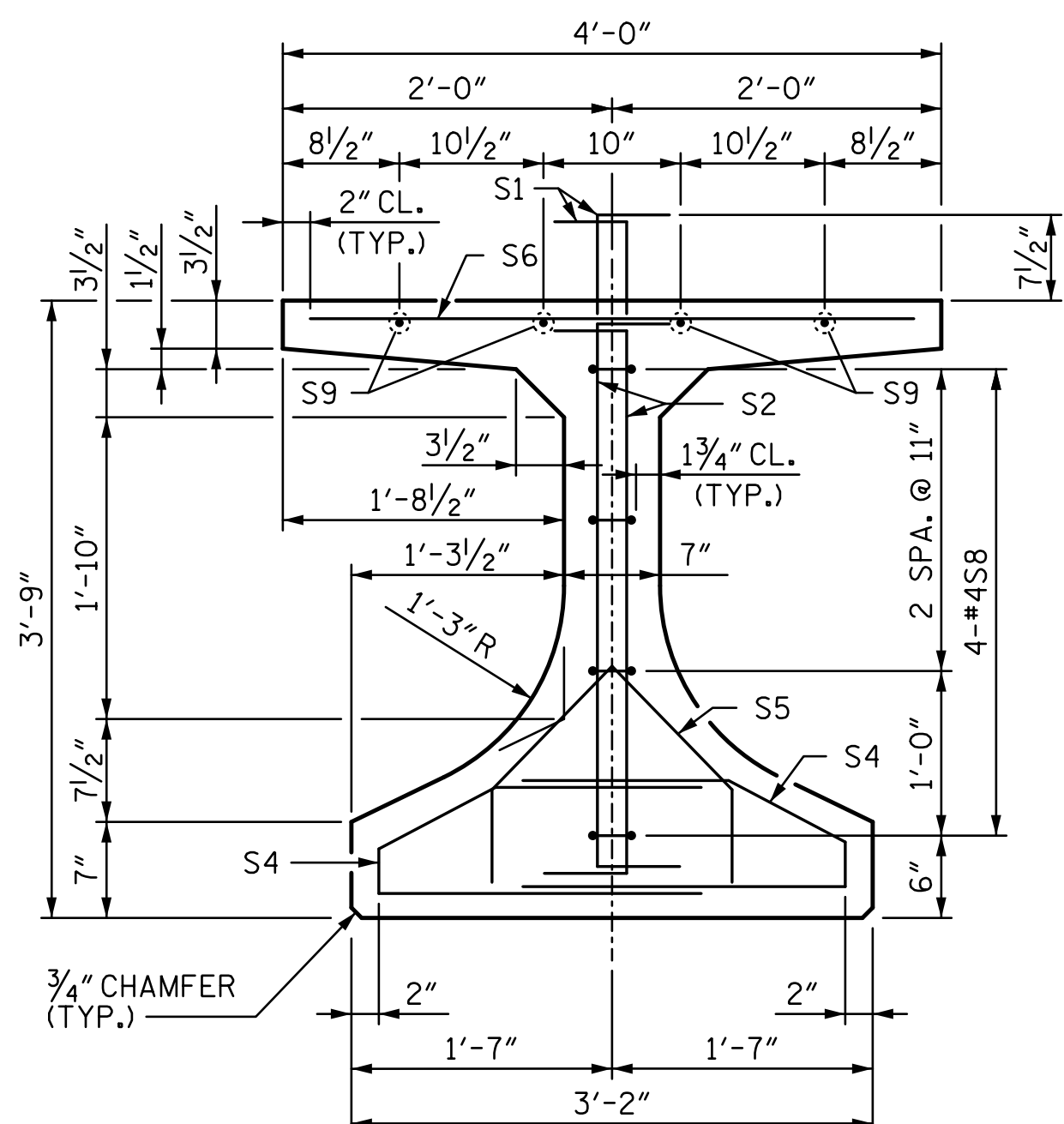
F.I.B. 45"
 PRESTRESSED CONCRETE GIRDER
 CONTINUOUS FOR LIVE LOAD
 SPAN "B"

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

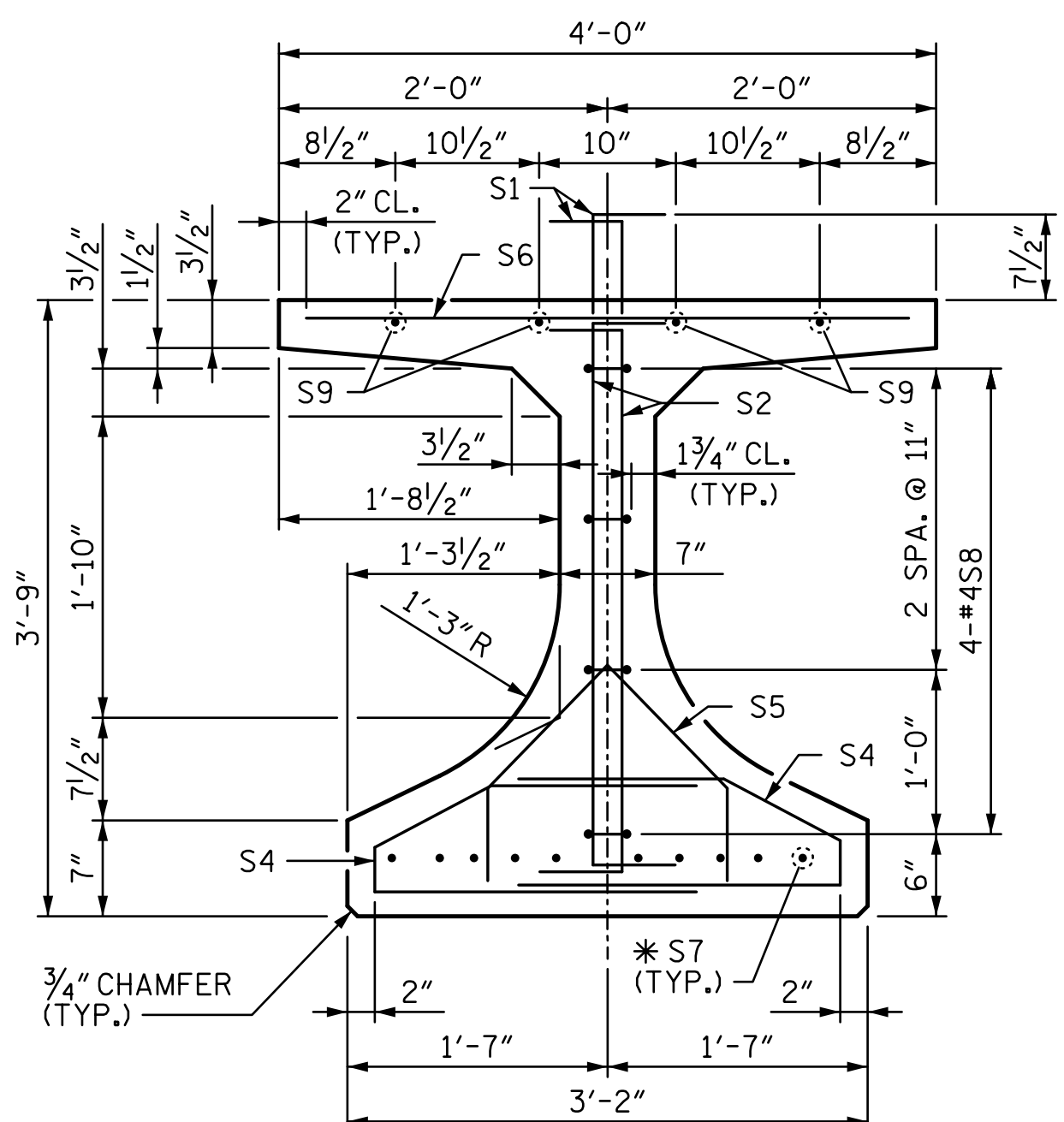
SHEET NO.	
S1-16	TOTAL SHEETS 42

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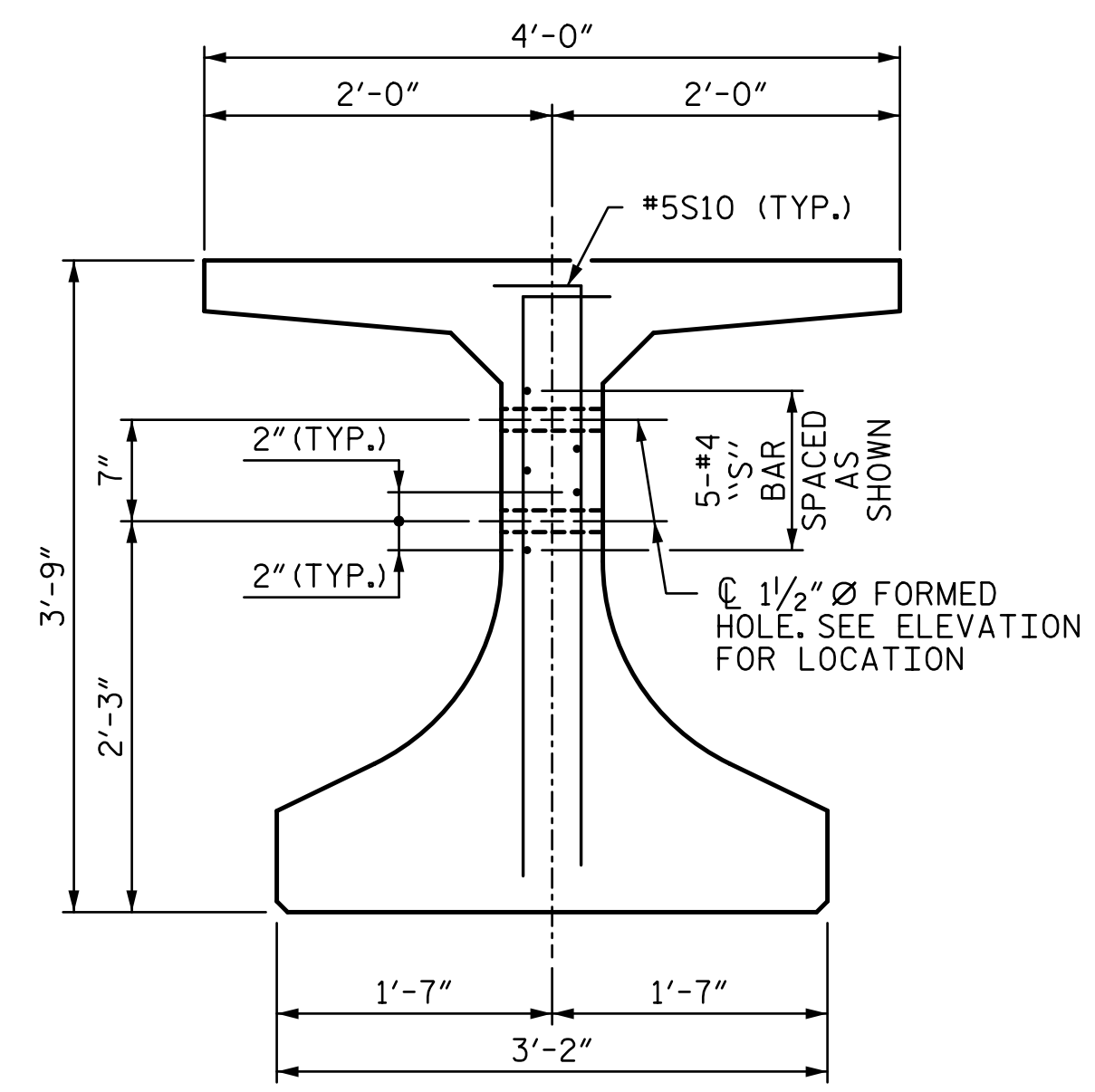
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CHECKED BY : TRL	DATE : 8-18		



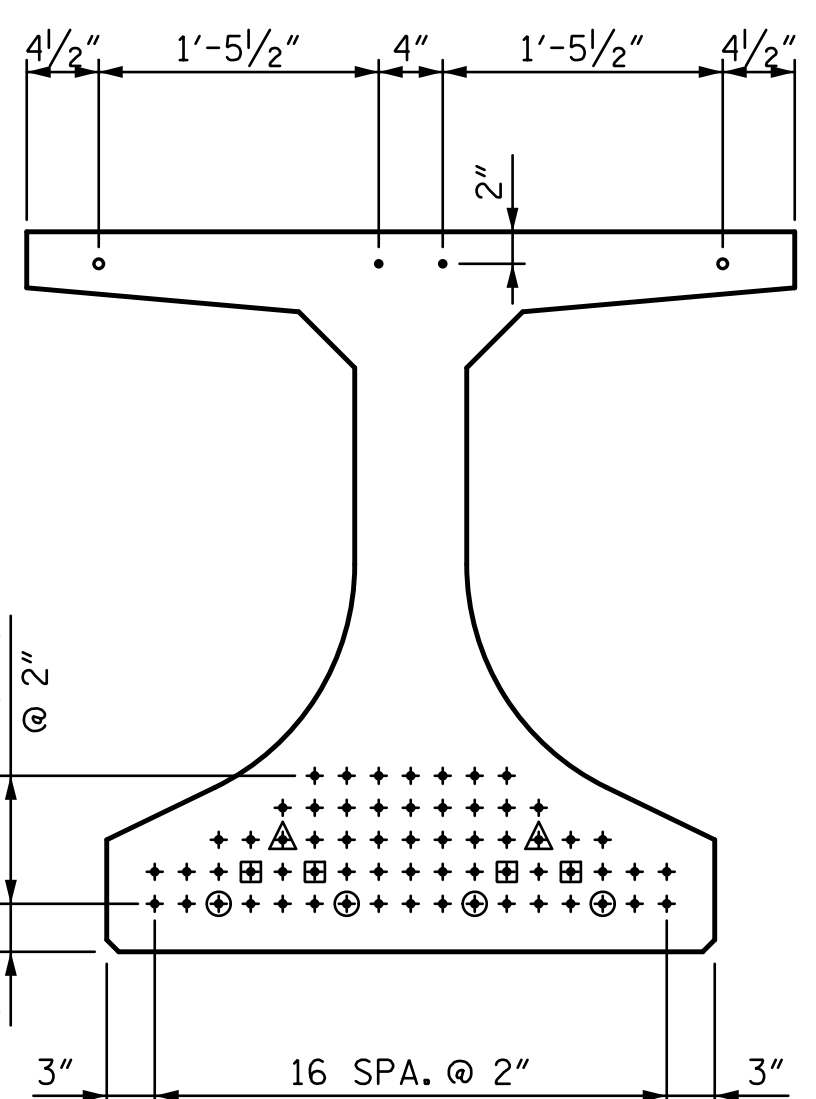
SECTION A-A
(S3 BAR NOT SHOWN FOR CLARITY)



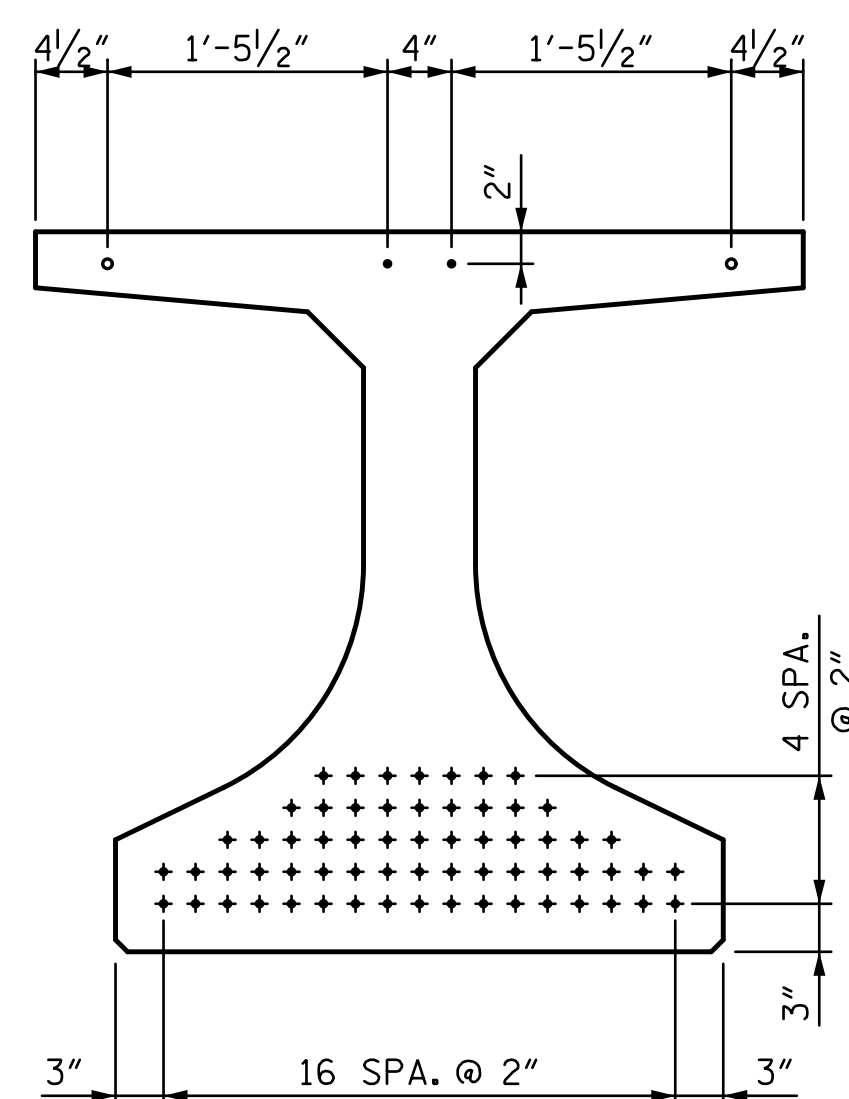
SECTION B-B
(S3 BAR NOT SHOWN FOR CLARITY)



SECTION D-D

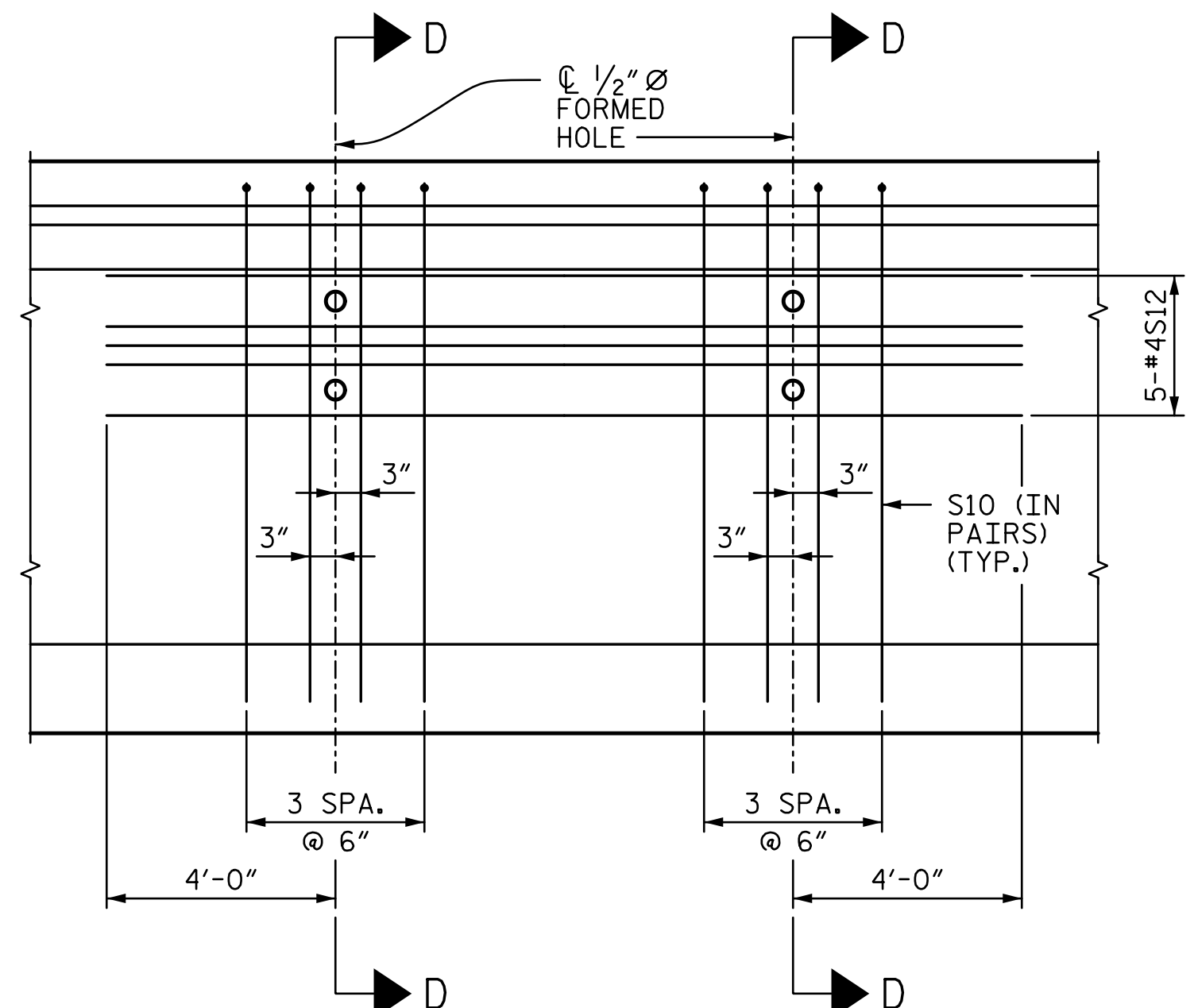


AT END OF GIRDER

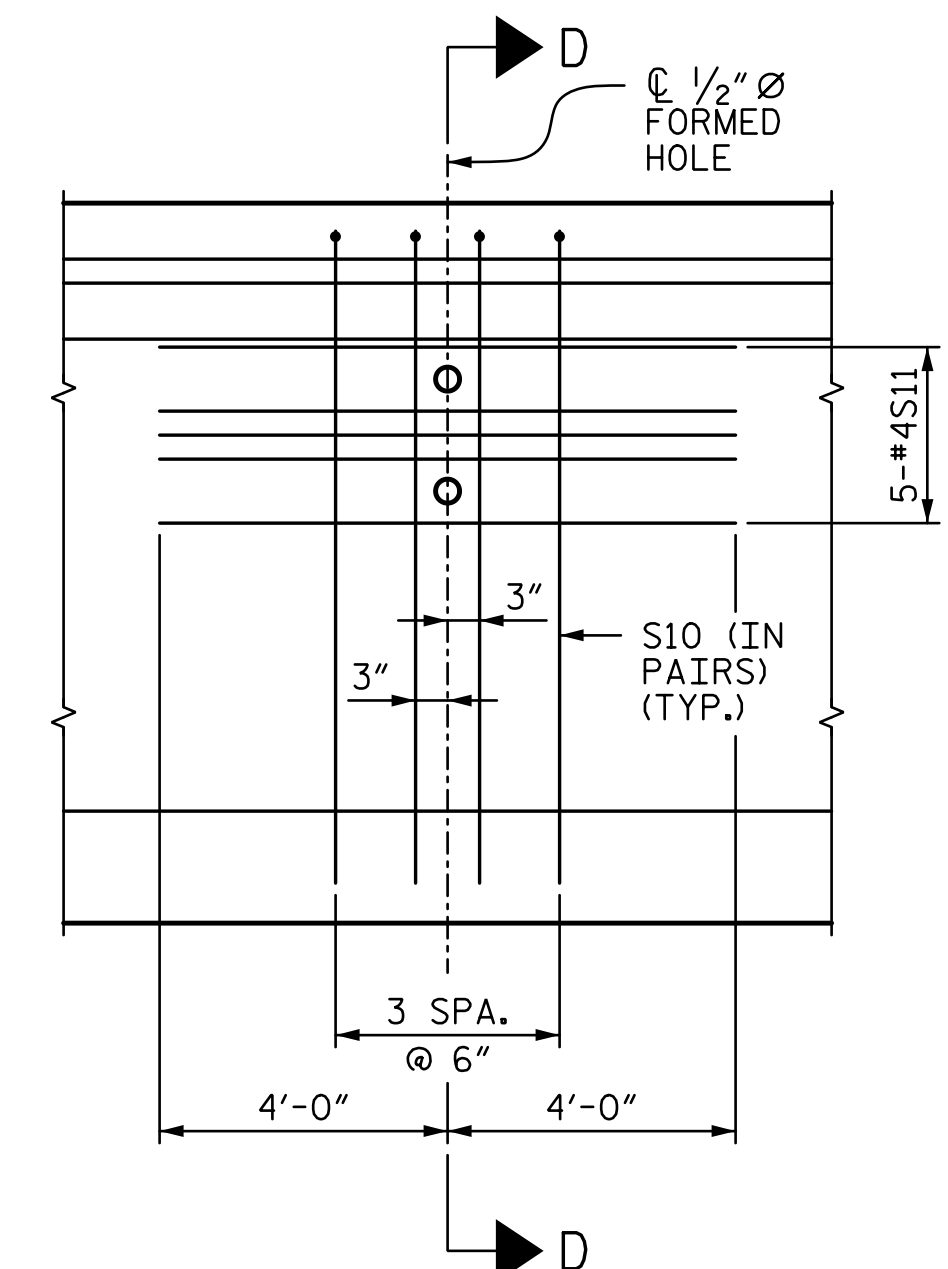


AT C OF GIRDER

0.6" Ø LOW RELAXATION STRAND LAYOUT
(67 - 0.6" Ø STRANDS REQUIRED)



PARTIAL ELEVATION
(SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL GIRDER NOS. 2 & 3)



PARTIAL ELEVATION
(SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR GIRDER NOS. 1 & 4)

DEBONDING LEGEND

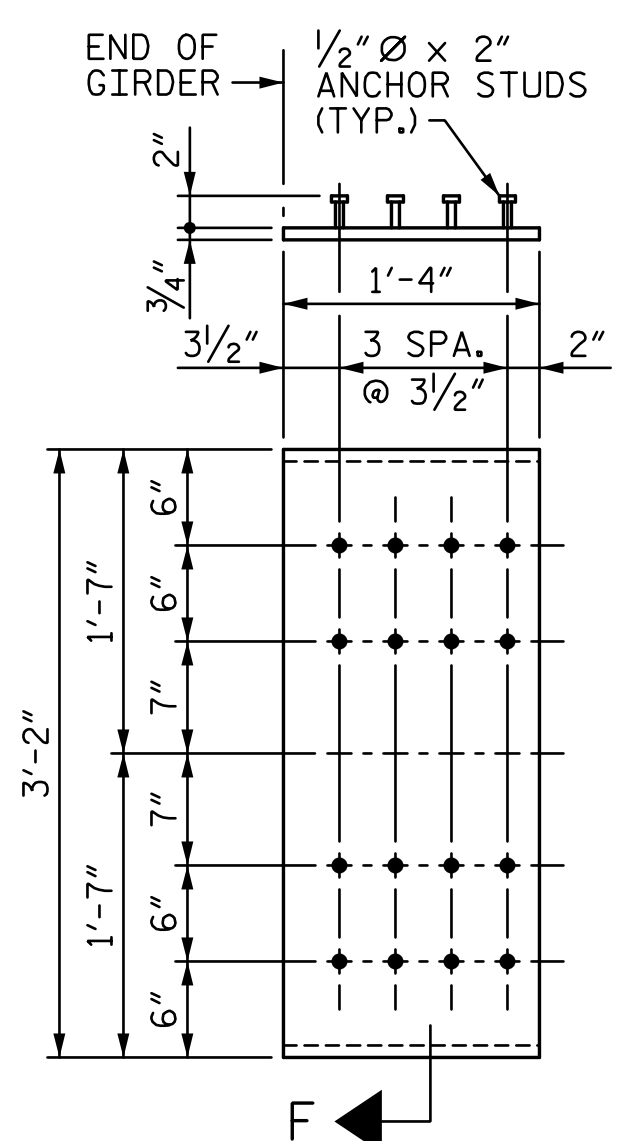
- - FULLY BONDED STRANDS
- - STRANDS PULLED TO 4,500 LBS.
- ⊙ - DEBONDED FOR 26'-0" FROM END OF GIRDER
- ⊠ - DEBONDED FOR 8'-0" FROM END OF GIRDER
- △ - DEBONDED FOR 4'-0" FROM END OF GIRDER

PROJECT NO. U2519AA-AB
CUMBERLAND/ROBESON COUNTY
 STATION: 16+64.84 -LPB-
 SHEET 4 OF 5

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED		STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH SUPERSTRUCTURE F.I.B. 45" PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD SPAN "B"																	
		REVISIONS																	
	STV ENGINEERS, INC. 900 West Trade St., Suite 715 Charlotte, NC 28202 NC License Number F-0991	<table border="1"> <tr> <th>NO.</th> <th>BY:</th> <th>DATE:</th> <th>NO.</th> <th>BY:</th> <th>DATE:</th> </tr> <tr> <td>1</td> <td></td> <td></td> <td>3</td> <td></td> <td></td> </tr> <tr> <td>2</td> <td></td> <td></td> <td>4</td> <td></td> <td></td> </tr> </table>	NO.	BY:	DATE:	NO.	BY:	DATE:	1			3			2			4	
NO.	BY:	DATE:	NO.	BY:	DATE:														
1			3																
2			4																

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CHECKED BY : <u>TRL</u>	DATE : <u>8-18</u>		

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EMBEDDED PLATE "B-1" DETAILS
(2 REQ'D PER GIRDER)

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.

TIE BARS S1 AND S2 TO THE FULLY BONDED STRANDS IN THE BOTTOM OR CENTER ROW.

AT THE CONTRACTOR'S OPTION, THE LENGTH OF THE BOTTOM LEGS OF BARS S1 AND S2 MAY BE EXTENDED TO FACILITATE TYING TO THE EXTERIOR STRANDS.

S4 BARS MAY BE FABRICATED AS A SINGLE BAR WITH A 1'-0" MINIMUM LAP SPLICE OF THE TOP LEGS, OR THE LENGTH OF THE BOTTOM LEGS MAY BE EXTENDED TO FACILITATE TYING TO THE EXTERIOR STRANDS.

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.

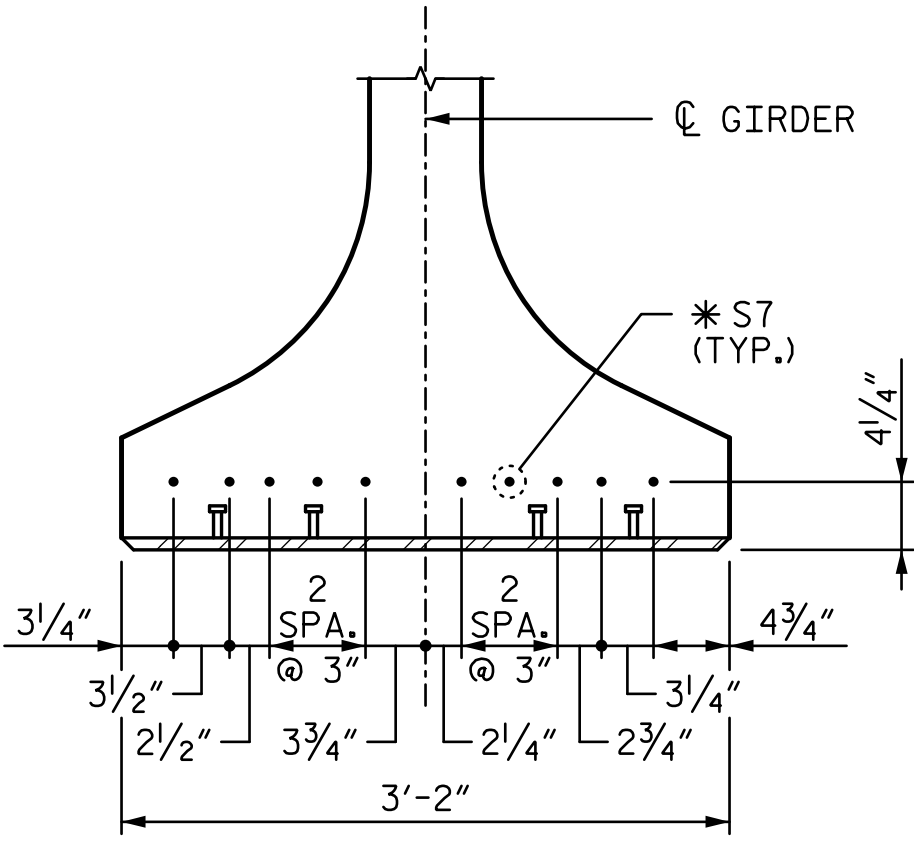
ANCHOR STUDS SHALL CONFORM TO AASHTO M169 GRADES 1010 THROUGH 1020 OR APPROVED EQUAL, AND SHALL MEET THE TYPE "B" REQUIREMENTS OF SUBSECTION 7.3 OF THE ANSI/AASHTO/AWS D1.5 BRIDGE WELDING CODE.

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.

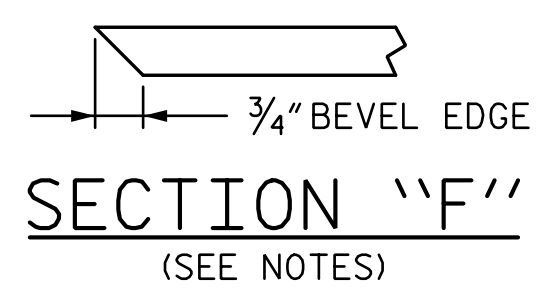
THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE GIRDER SHALL BE DONE WHEN CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN 6,400 AND 7,600 PSI FOR SPANS A AND B RESPECTIVELY.

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

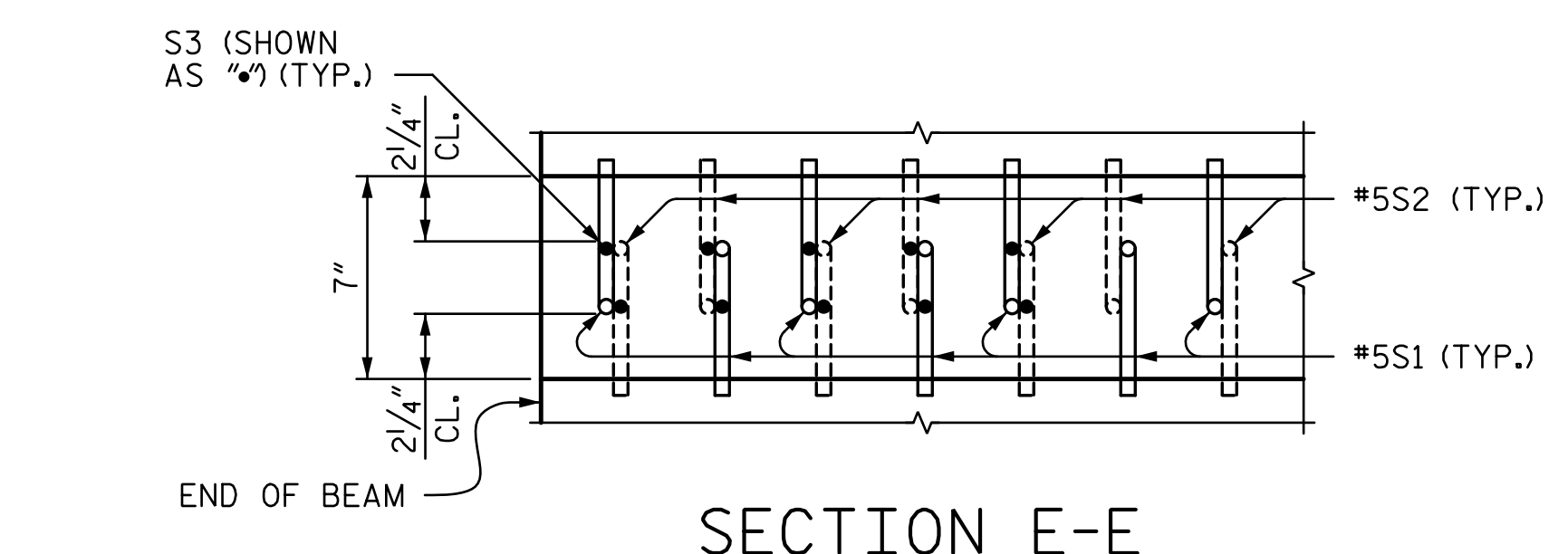
THE TOP SURFACE OF THE GIRDER, EXCLUDING THE OUTSIDE 4", SHALL BE RAKED TO A DEPTH OF 1/4".



DETAIL "C"



SECTION "F"
(SEE NOTES)



SECTION E-E

PROJECT NO. U2519AA-AB

CUMBERLAND/ROBESON COUNTY

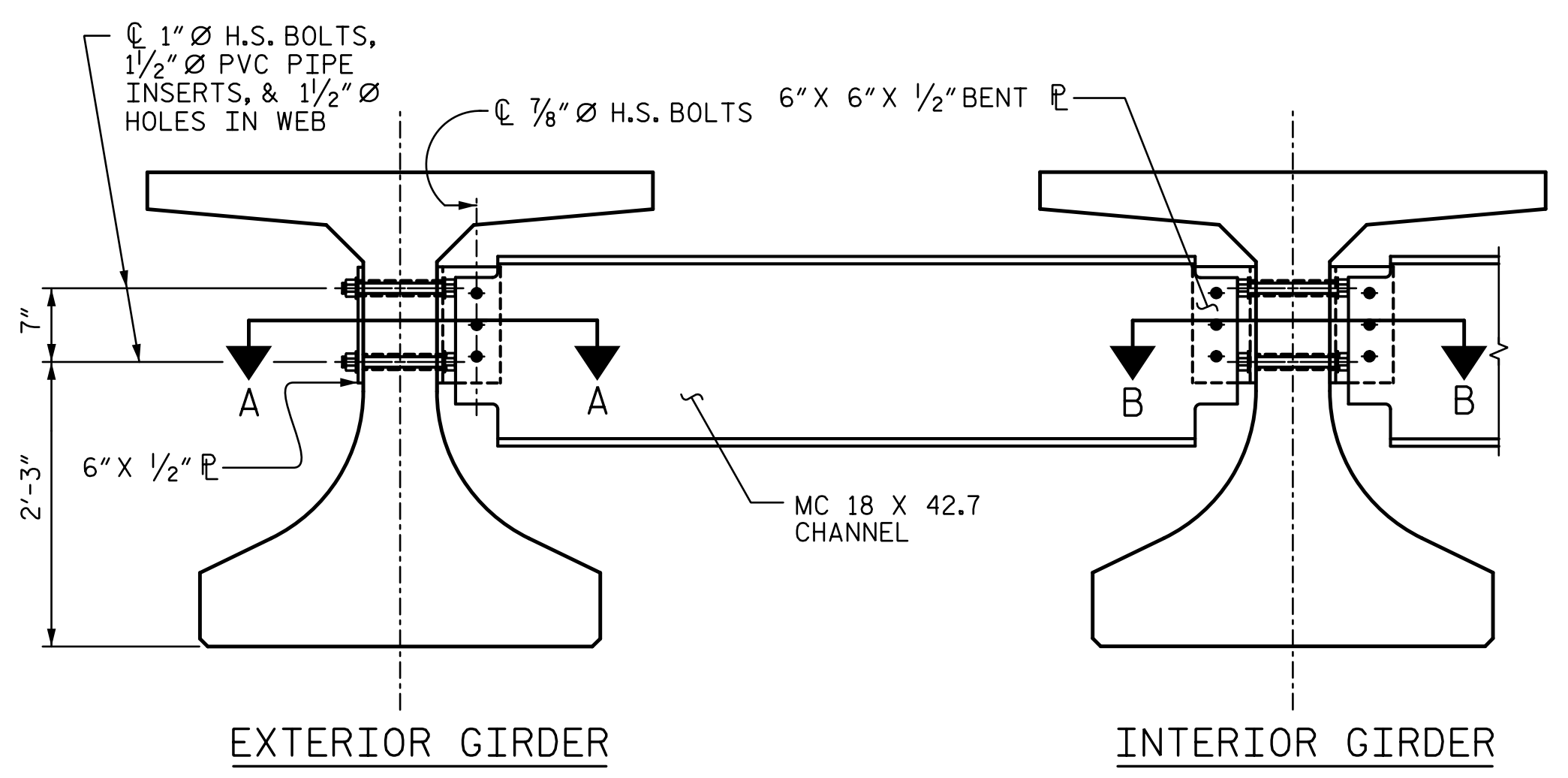
STATION: 16+64.84 -LPB-

SHEET 5 OF 5

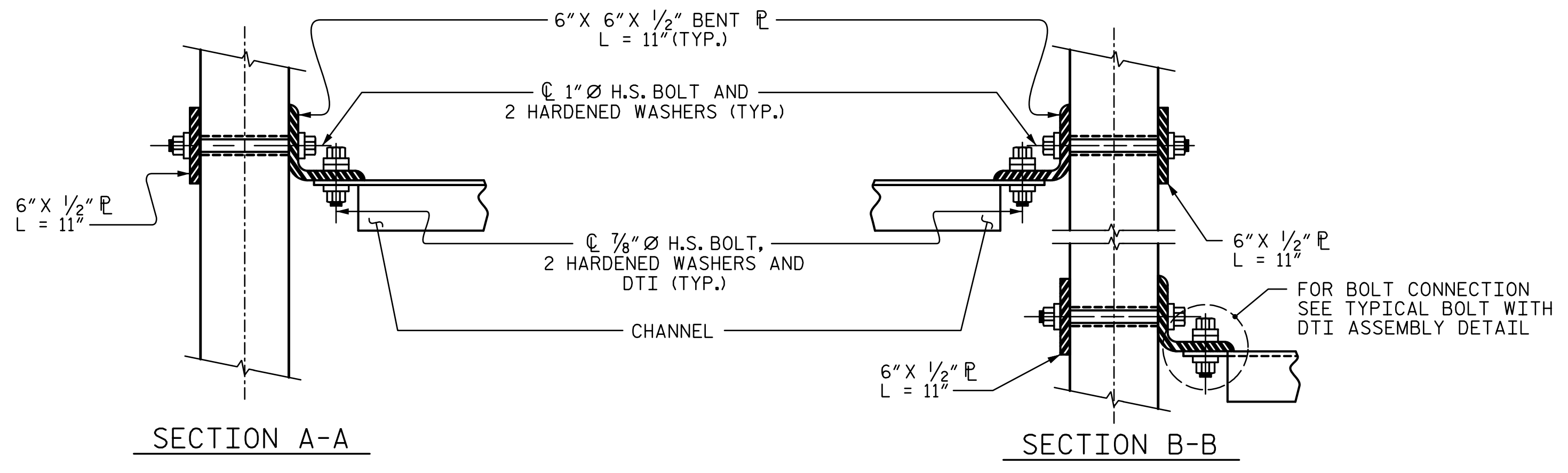
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED			STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH SUPERSTRUCTURE F.I.B. 45" PRESTRESSED CONCRETE GIRDER DETAILS		SHEET NO. S1-18
			STV ENGINEERS, INC. 900 West Trade St., Suite 715 Charlotte, NC 28202 NC License Number F-0991		TOTAL SHEETS 42
	REVISIONS				
	NO.	BY:	DATE:	NO.	BY:
1			3		
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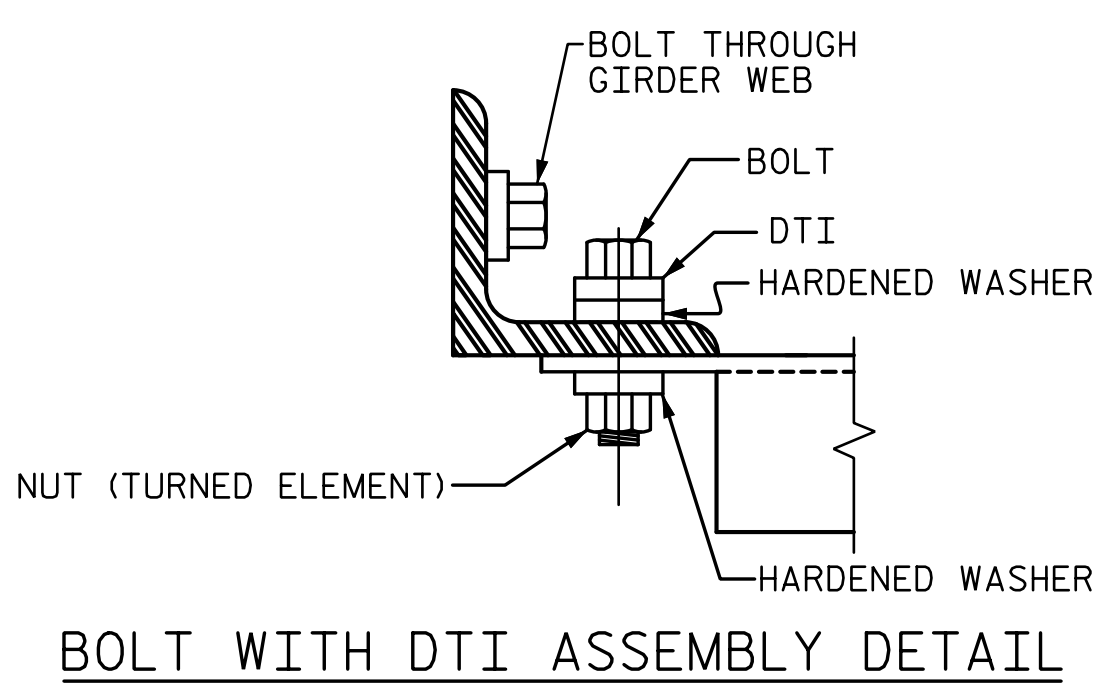
DRAWN BY : <u>TJT</u>	DATE : <u>7-18</u>	DESIGN ENGINEER OF RECORD: <u>T. LAWS</u>	DATE : <u>8-18</u>
CHECKED BY : <u>TRL</u>	DATE : <u>8-18</u>		



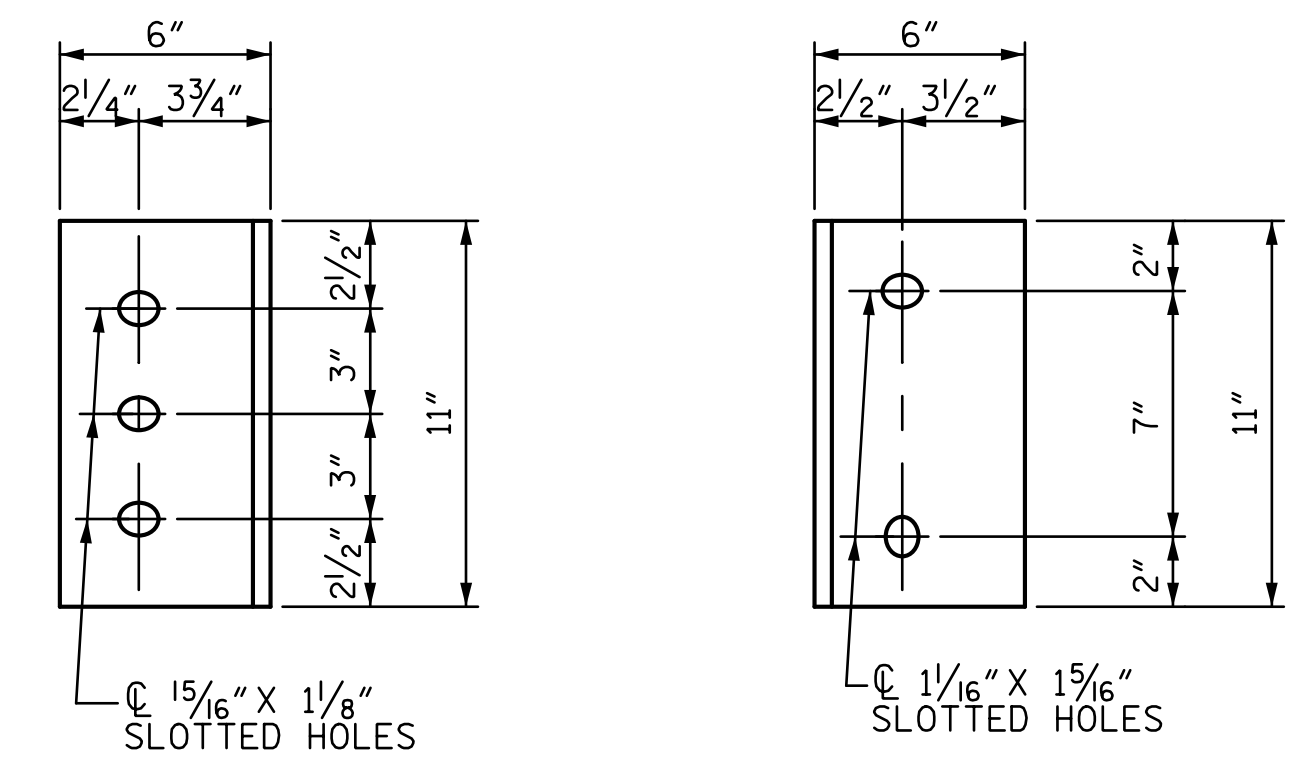
PART SECTION AT INTERMEDIATE DIAPHRAGM



CONNECTION DETAILS



BOLT WITH DTI ASSEMBLY DETAIL



CONNECTOR PLATE DETAILS

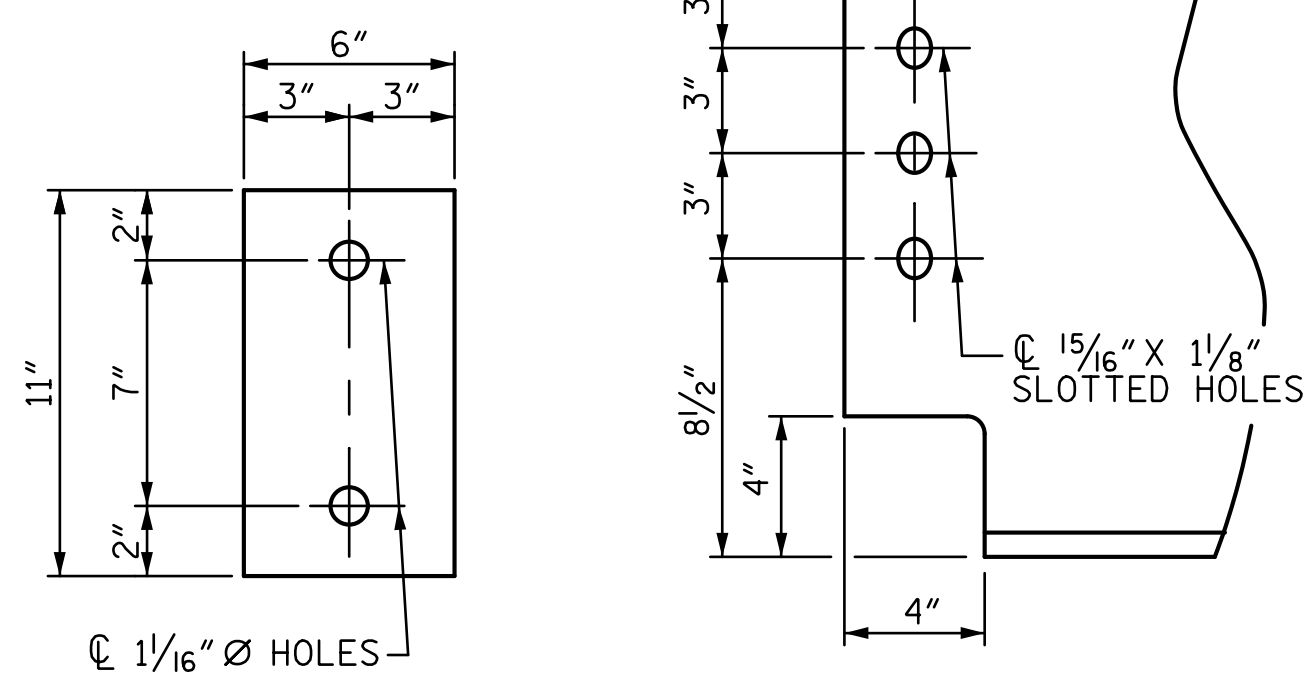


PLATE DETAILS CHANNEL END

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.

PROJECT NO. U2519AA-AB
CUMBERLAND/ROBESON COUNTY
 STATION: 16+64.84 -LPB-

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	INTERMEDIATE STEEL DIAPHRAGMS FOR F.I.B. 45" PRESTRESSED CONCRETE GIRDER		SHEET NO. S1-19
	STV ENGINEERS, INC. 900 West Trade St., Suite 715 Charlotte, NC 28202 NC License Number F-0991		REVISIONS
		NO. 1 BY: TRL DATE: 8-18 NO. 2 BY: TRL DATE: 8-18	NO. 3 BY: TRL DATE: 8-18 NO. 4 BY: TRL DATE: 8-18
		TOTAL SHEETS 42	

DRAWN BY : JMG	DATE : 8-18	DESIGN ENGINEER OF RECORD : T. LAWS	DATE : 8-18
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DATE: 9/25/2018 TIME: 2:33:53 PM FILE: R:\Structures\Str 1 LPB over Y:\station\RFCC\401.037_U2519_SMU.G1_019_770513.dgn

NOTES

MAXIMUM ALLOWABLE SERVICE LOADS	
D.L.+L.L. (NO IMPACT)	
E1 & E2	420 k

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

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.

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.

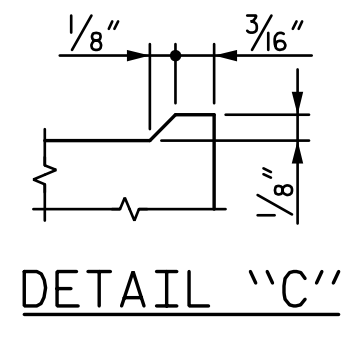
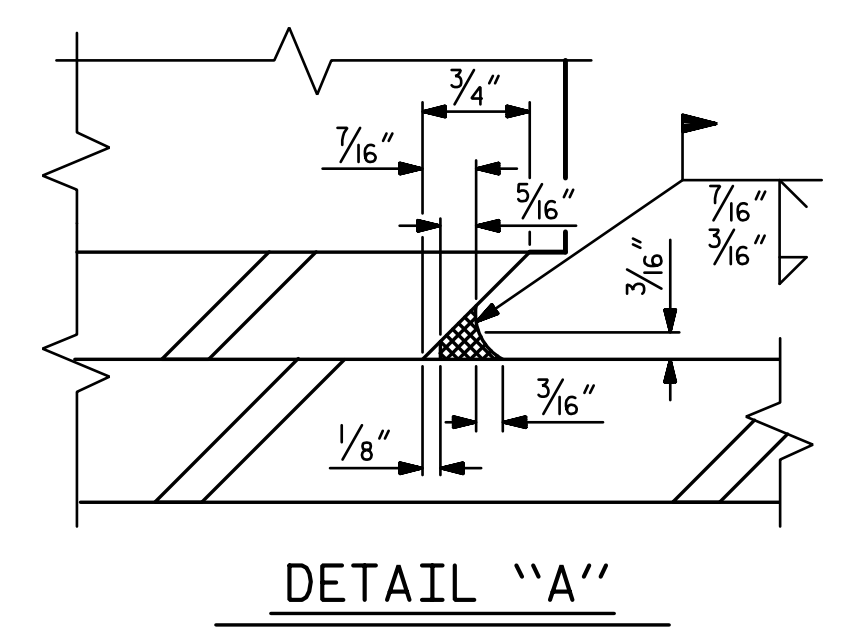
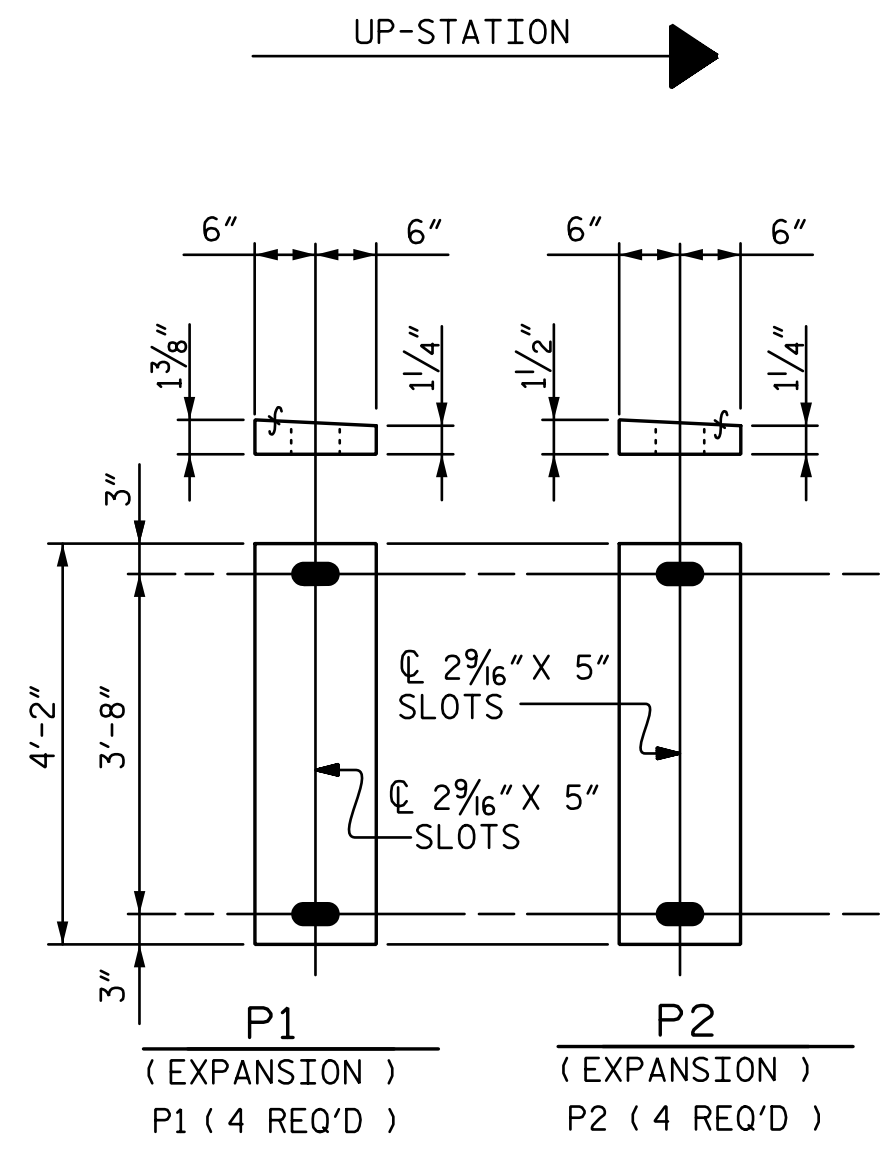
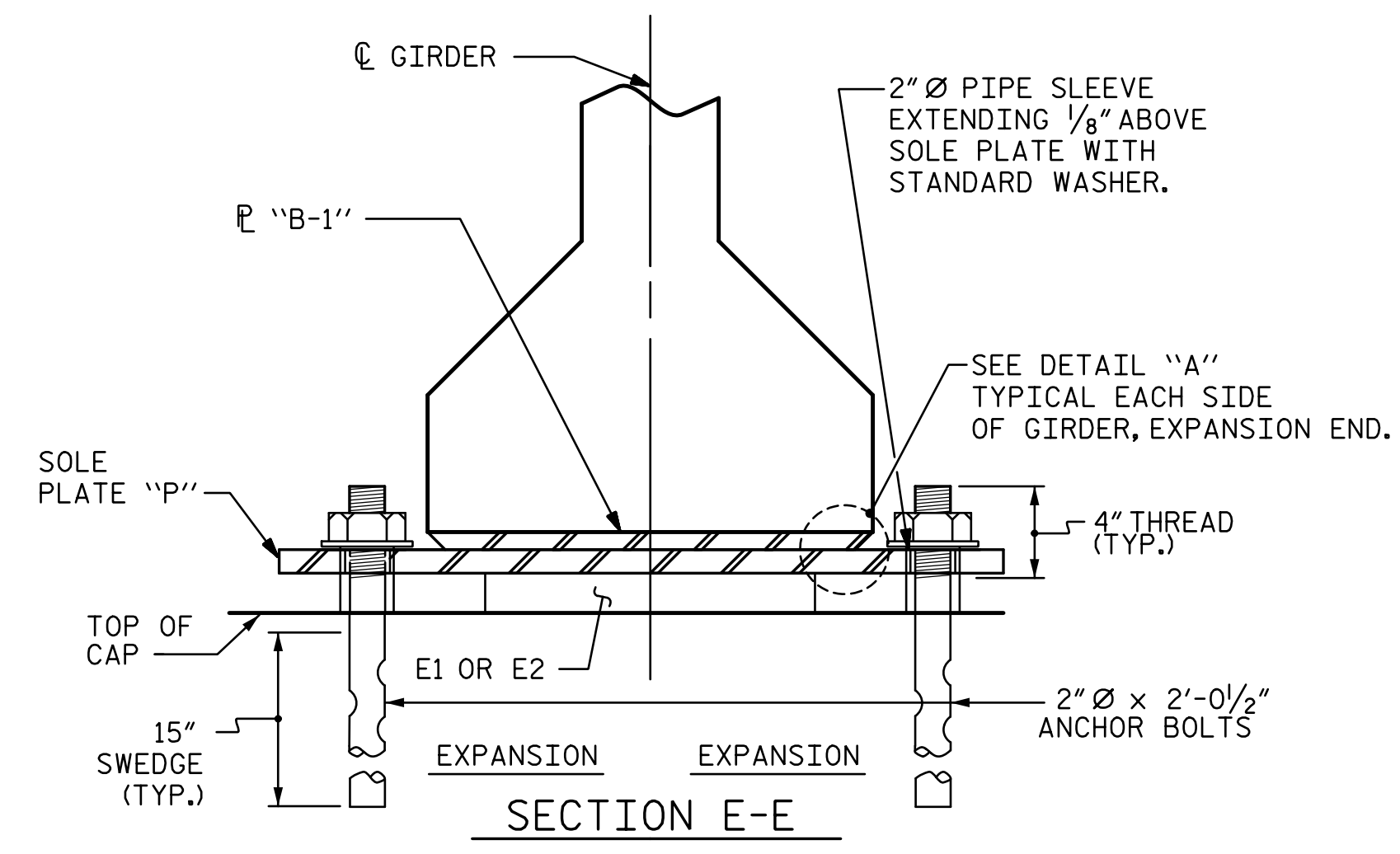
THE ELASTOMER IN THE STEEL REINFORCED BEARINGS SHALL HAVE A SHEAR MODULUS OF 0.150 KSI, IN ACCORDANCE WITH AASHTO M251.

FOR STEEL REINFORCED ELASTOMERIC BEARINGS, SEE SPECIAL PROVISIONS.

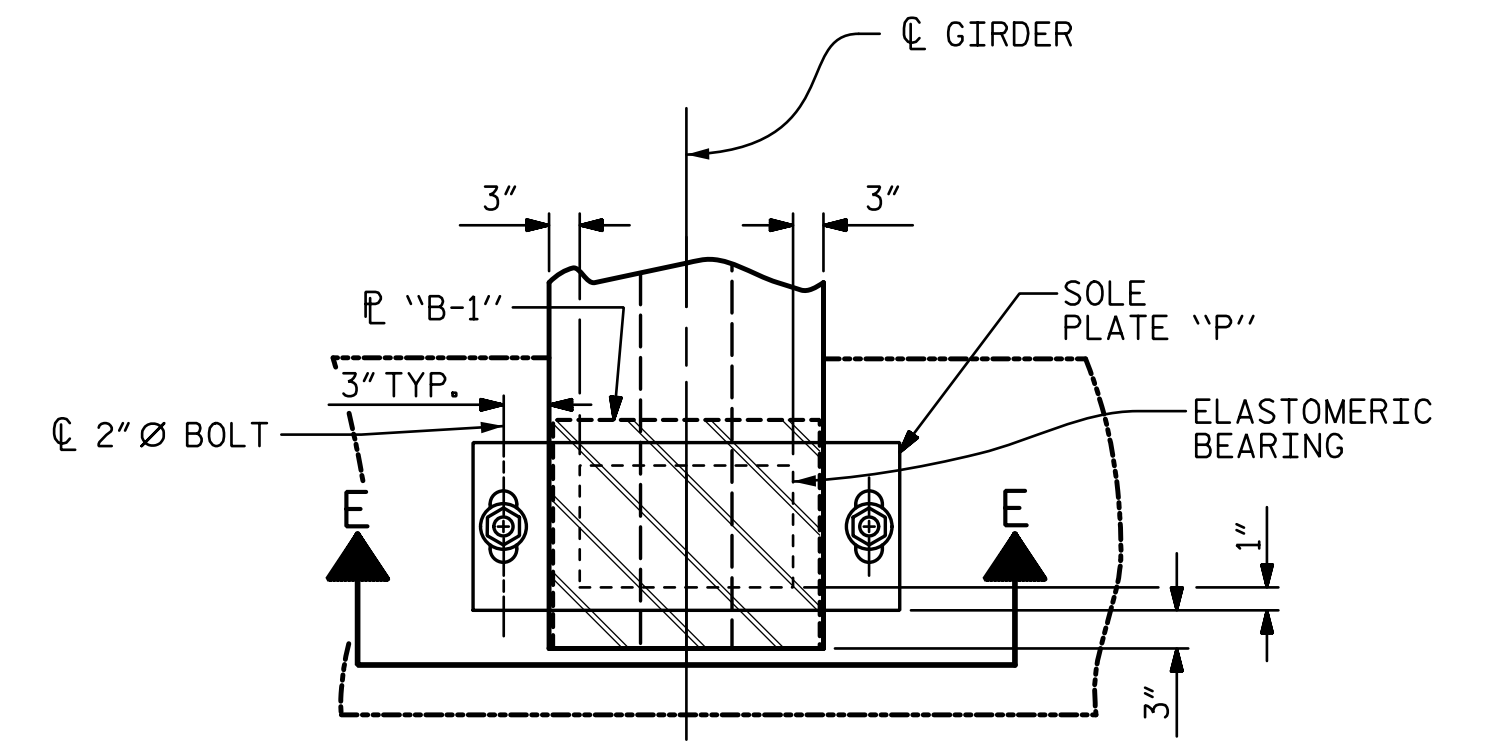
ALL BEARING PLATES SHALL BE AASHTO M270 GRADE 36.

ELASTOMER IN ALL BEARINGS SHALL BE 60 DUROMETER HARDNESS.

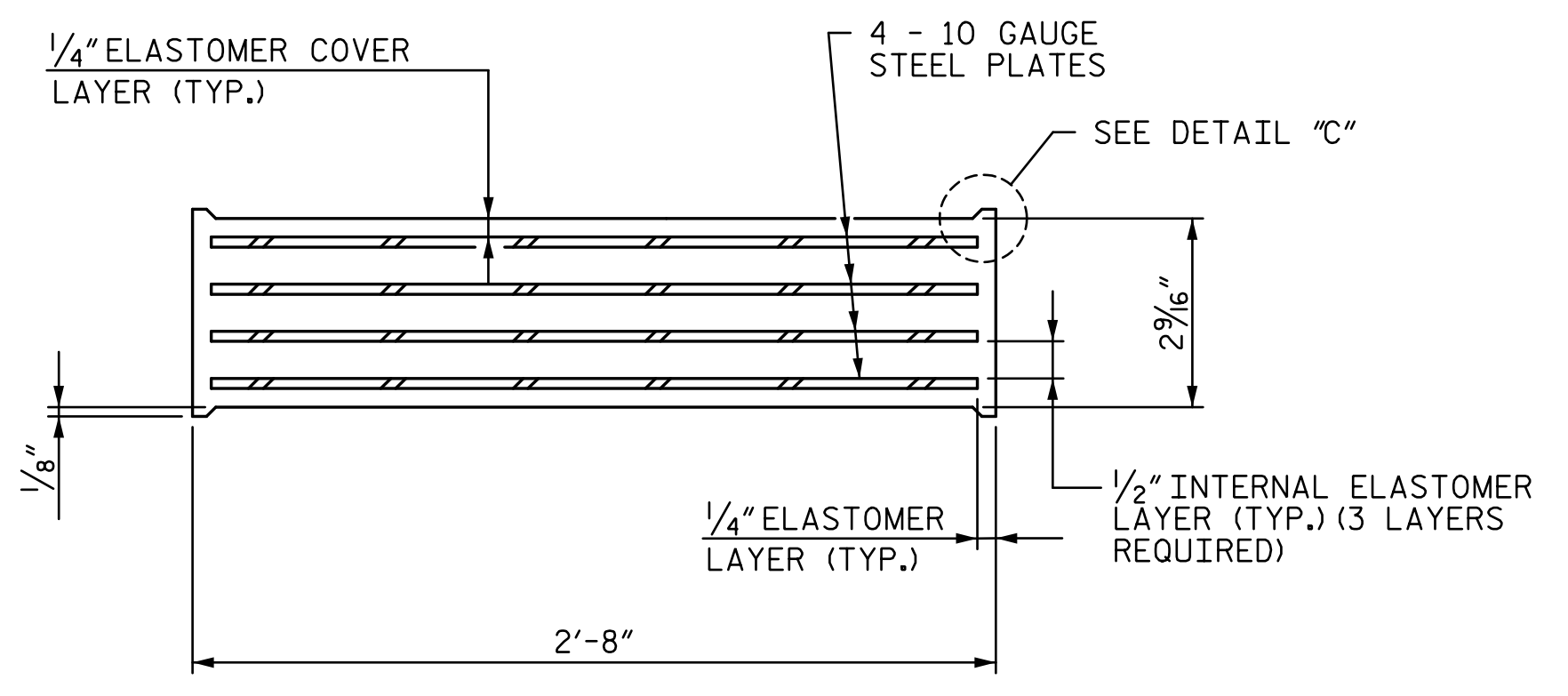
FABRICATOR MAY PROVIDE A 1/2° MOLD DRAFT ALONG THE PERIMETER OF THE BEARING.



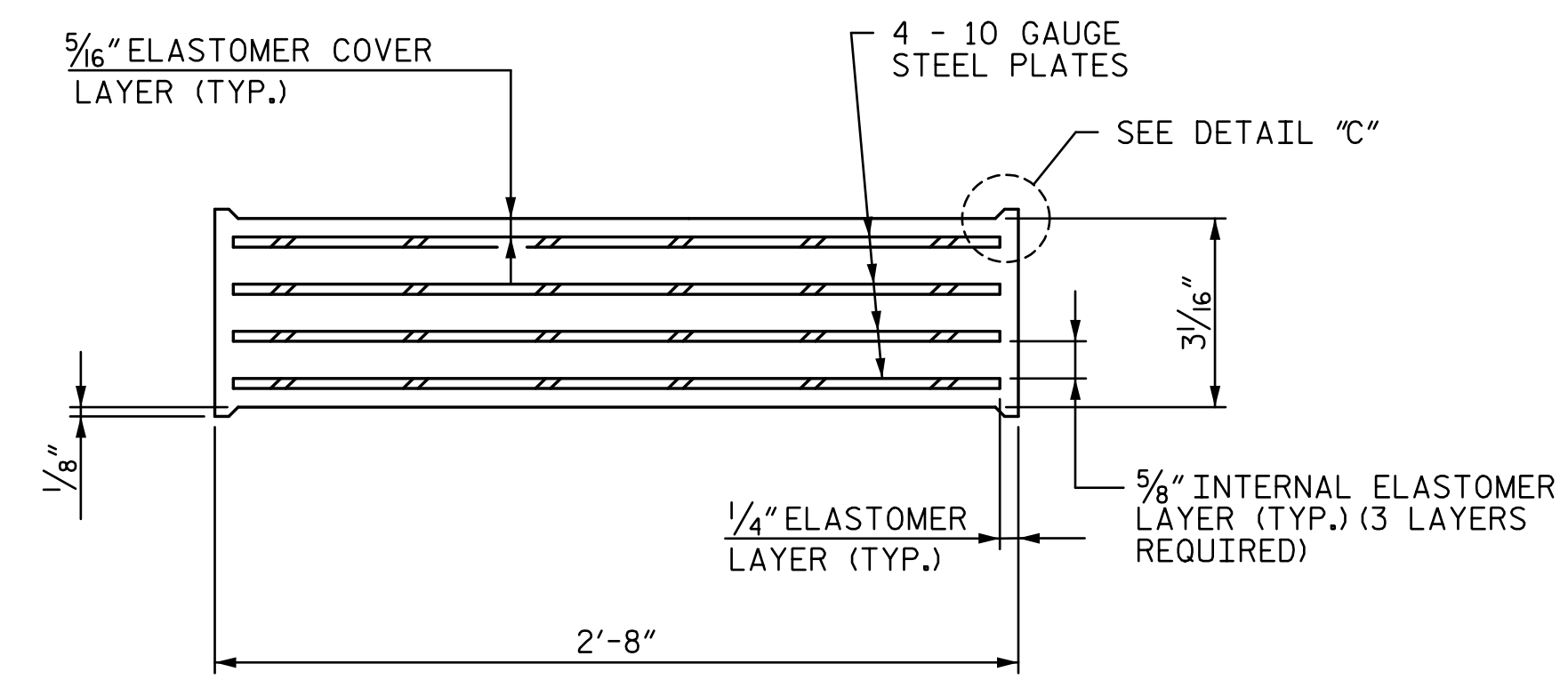
SOLE PLATE DETAILS ('P')



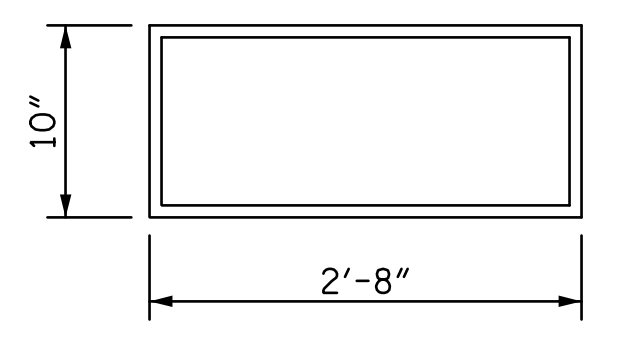
TYPICAL PLAN
(END BENT 1 SHOWN, END BENT 2 SIMILAR)



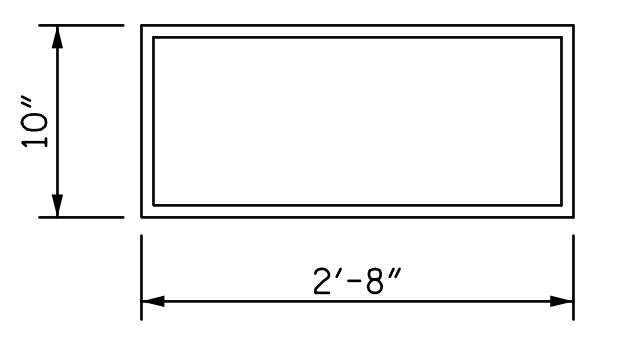
TYPICAL SECTION OF ELASTOMERIC BEARINGS (E1)



TYPICAL SECTION OF ELASTOMERIC BEARINGS (E2)



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



E2 (4 REQ'D)
PLAN VIEW OF ELASTOMERIC BEARING

PROJECT NO. U2519AA-AB
CUMBERLAND/ROBESON COUNTY
STATION: 16+64.84 -LPB-

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		REVISIONS		TOTAL SHEETS 42	
	STV ENGINEERS, INC. 900 West Trade St., Suite 715 Charlotte, NC 28202 NC License Number F-0991	Balfour Beatty Infrastructure Inc.	CIVIL BRANCH	NO. 1 BY: TRL DATE: 8-18	NO. 2 BY: TRL DATE: 8-18
	REVISIONS				NO. 3 BY: TRL DATE: 8-18

DATE: 9/25/2018 TIME: 2:33:55 PM FILE: R:\S\Structures\Str 1 LPB over Y:\Station\RFCA\401.039.LU2519.SMU.BG.020.L770513.dgn

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CHECKED BY : TRL	DATE : 8-18		

DEAD LOAD DEFLECTION TABLE FOR SPAN A											
GIRDER 1											
TENTH POINTS	0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00
CAMBER (GIRDER ALONE IN PLACE)	↑ 0.000	0.075	0.142	0.194	0.227	0.239	0.227	0.194	0.142	0.075	0.000
DEFLECTION DUE TO SUPERIMPOSED D.L.	↓ 0.000	0.038	0.076	0.106	0.124	0.131	0.125	0.106	0.076	0.039	0.000
FINAL CAMBER	↑ 0"	7/16"	13/16"	1 1/16"	1 1/4"	1 5/16"	1 1/4"	1 1/16"	1 3/16"	7/16"	0"

DEAD LOAD DEFLECTION TABLE FOR SPAN A											
GIRDER 2 AND 3											
TENTH POINTS	0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00
CAMBER (GIRDER ALONE IN PLACE)	↑ 0.000	0.075	0.142	0.194	0.227	0.239	0.227	0.194	0.142	0.075	0.000
DEFLECTION DUE TO SUPERIMPOSED D.L.	↓ 0.000	0.041	0.081	0.112	0.132	0.139	0.132	0.112	0.081	0.041	0.000
FINAL CAMBER	↑ 0"	7/16"	3/4"	1"	1 1/8"	1 3/16"	1 1/8"	1"	3/4"	3/8"	0"

DEAD LOAD DEFLECTION TABLE FOR SPAN A											
GIRDER 4											
TENTH POINTS	0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00
CAMBER (GIRDER ALONE IN PLACE)	↑ 0.000	0.075	0.142	0.194	0.227	0.239	0.227	0.194	0.142	0.075	0.000
DEFLECTION DUE TO SUPERIMPOSED D.L.	↓ 0.000	0.036	0.071	0.099	0.117	0.123	0.117	0.099	0.072	0.037	0.000
FINAL CAMBER	↑ 0"	7/16"	7/8"	1 1/8"	1 5/16"	1 3/8"	1 5/16"	1 1/8"	7/8"	7/16"	0"

DEAD LOAD DEFLECTION TABLE FOR SPAN B																					
GIRDER 1																					
TWENTIETH POINTS	0.00	.05	0.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	1.00
CAMBER (GIRDER ALONE IN PLACE)	↑ 0.000	0.059	0.116	0.169	0.219	0.263	0.299	0.329	0.351	0.364	0.368	0.364	0.351	0.329	0.299	0.263	0.219	0.169	0.116	0.059	0.000
DEFLECTION DUE TO SUPERIMPOSED D.L.	↓ 0.000	0.039	0.076	0.114	0.149	0.180	0.206	0.227	0.242	0.251	0.254	0.251	0.242	0.227	0.205	0.179	0.148	0.113	0.075	0.039	0.000
FINAL CAMBER	↑ 0.000	1/4"	1/2"	1 1/16"	1 3/16"	1"	1 1/8"	1 1/4"	1 5/16"	1 3/8"	1 3/8"	1 3/8"	1 5/16"	1 1/4"	1 1/8"	1"	7/8"	1 1/16"	1/2"	1/4"	0.000

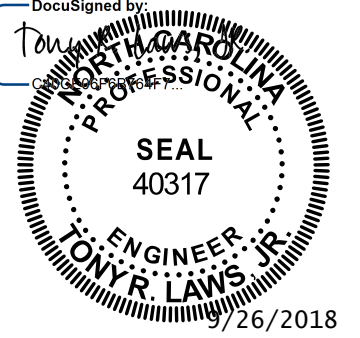



DEAD LOAD DEFLECTION TABLE FOR SPAN B																					
GIRDER 2 AND 3																					
TWENTIETH POINTS	0.00	.05	0.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	1.00
CAMBER (GIRDER ALONE IN PLACE)	↑ 0.000	0.059	0.116	0.169	0.219	0.263	0.299	0.329	0.351	0.364	0.368	0.364	0.351	0.329	0.299	0.263	0.219	0.169	0.116	0.059	0.000
DEFLECTION DUE TO SUPERIMPOSED D.L.	↓ 0.000	0.041	0.080	0.120	0.157	0.189	0.217	0.239	0.255	0.265	0.268	0.265	0.255	0.239	0.216	0.189	0.156	0.119	0.080	0.040	0.000
FINAL CAMBER	↑ 0.000	3/16"	7/16"	3/8"	3/4"	7/8"	1"	1 1/16"	1 1/8"	1 3/16"	1 3/16"	1 3/16"	1 1/8"	1 1/16"	1"	7/8"	3/4"	5/8"	7/16"	1/4"	0.000

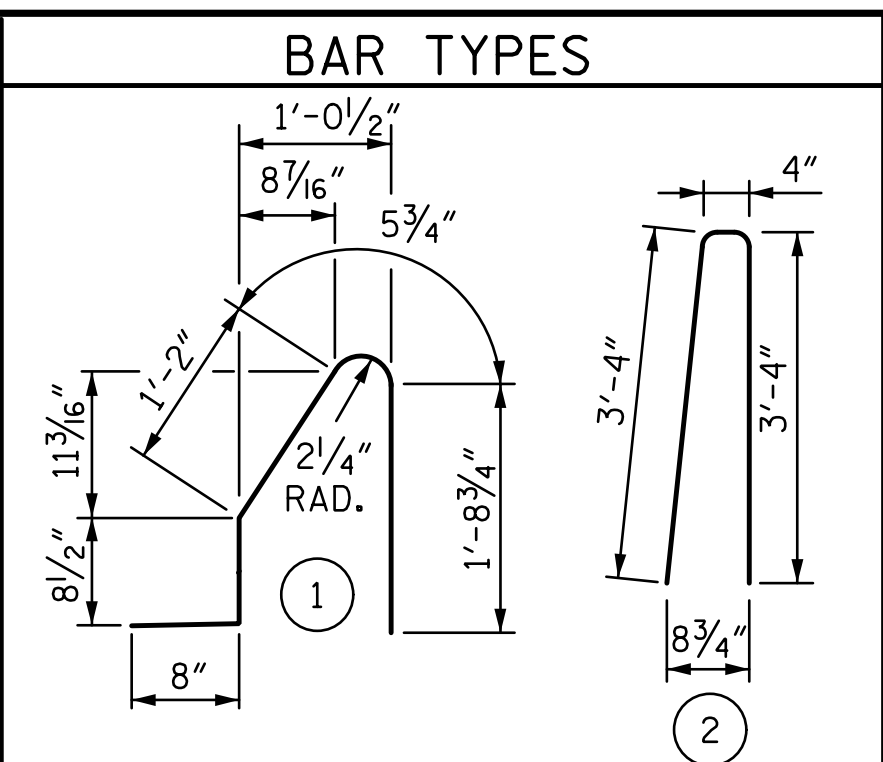
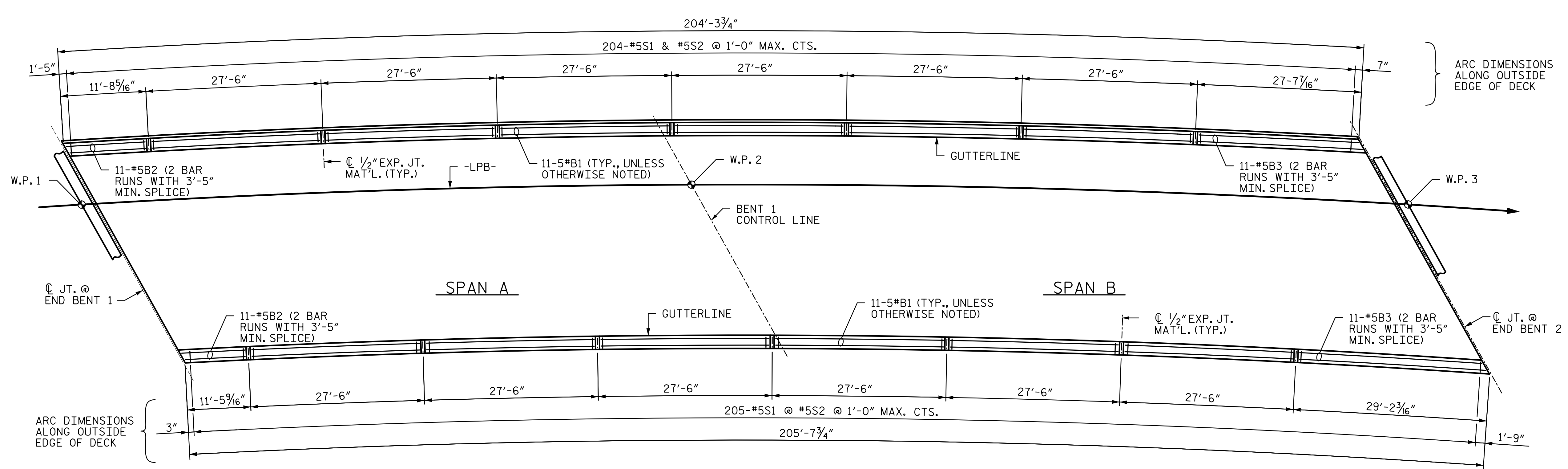
DEAD LOAD DEFLECTION TABLE FOR SPAN B																					
GIRDER 4																					
TWENTIETH POINTS	0.00	.05	0.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	1.00
CAMBER (GIRDER ALONE IN PLACE)	↑ 0.000	0.059	0.116	0.169	0.219	0.263	0.299	0.329	0.351	0.364	0.368	0.364	0.351	0.329	0.299	0.263	0.219	0.169	0.116	0.059	0.000
DEFLECTION DUE TO SUPERIMPOSED D.L.	↓ 0.000	0.036	0.071	0.106	0.138	0.167	0.191	0.211	0.225	0.234	0.236	0.233	0.225	0.211	0.191	0.167	0.138	0.105	0.070	0.035	0.000
FINAL CAMBER	↑ 0.000	1/4"	3/16"	3/4"	1 5/16"	1 1/8"	1 5/16"	1 7/16"	1 1/2"	1 3/16"	1 9/16"	1 9/16"	1 1/2"	1 7/16"	1 5/16"	1 1/8"	1 5/16"	3/4"	3/16"	1/4"	0.000

PROJECT NO. U2519AA-AB
CUMBERLAND/ROBESON COUNTY
 STATION: 16+64.84 -LPB-

DATE: 9/25/2018 TIME: 2:33:57 PM FILE: R:\Structures\Str 1 LPB over Y:\Station\RFCC\401_041_U2519_SML_DL_021_770513.dgn

DRAWN BY : JMG DATE : 8-18
 CHECKED BY : TRL DATE : 8-18
 DESIGN ENGINEER OF RECORD: T. LAWS DATE : 8-18

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	 SEAL 40317 ENGINEER T. LAWS 7/26/2018		STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH SUPERSTRUCTURE DEAD LOAD DEFLECTIONS		SHEET NO. S1-21 TOTAL SHEETS 42
	 STV ENGINEERS, INC. 900 West Trade St., Suite 715 Charlotte, NC 28202 NC License Number F-0991		REVISIONS		
	 Balfour Beatty Infrastructure Inc.	 BRANCH CIVIL A Joint Venture	NO. 1 BY: [] DATE: []	NO. 3 BY: [] DATE: []	
	NO. 2 BY: [] DATE: []	NO. 4 BY: [] DATE: []			

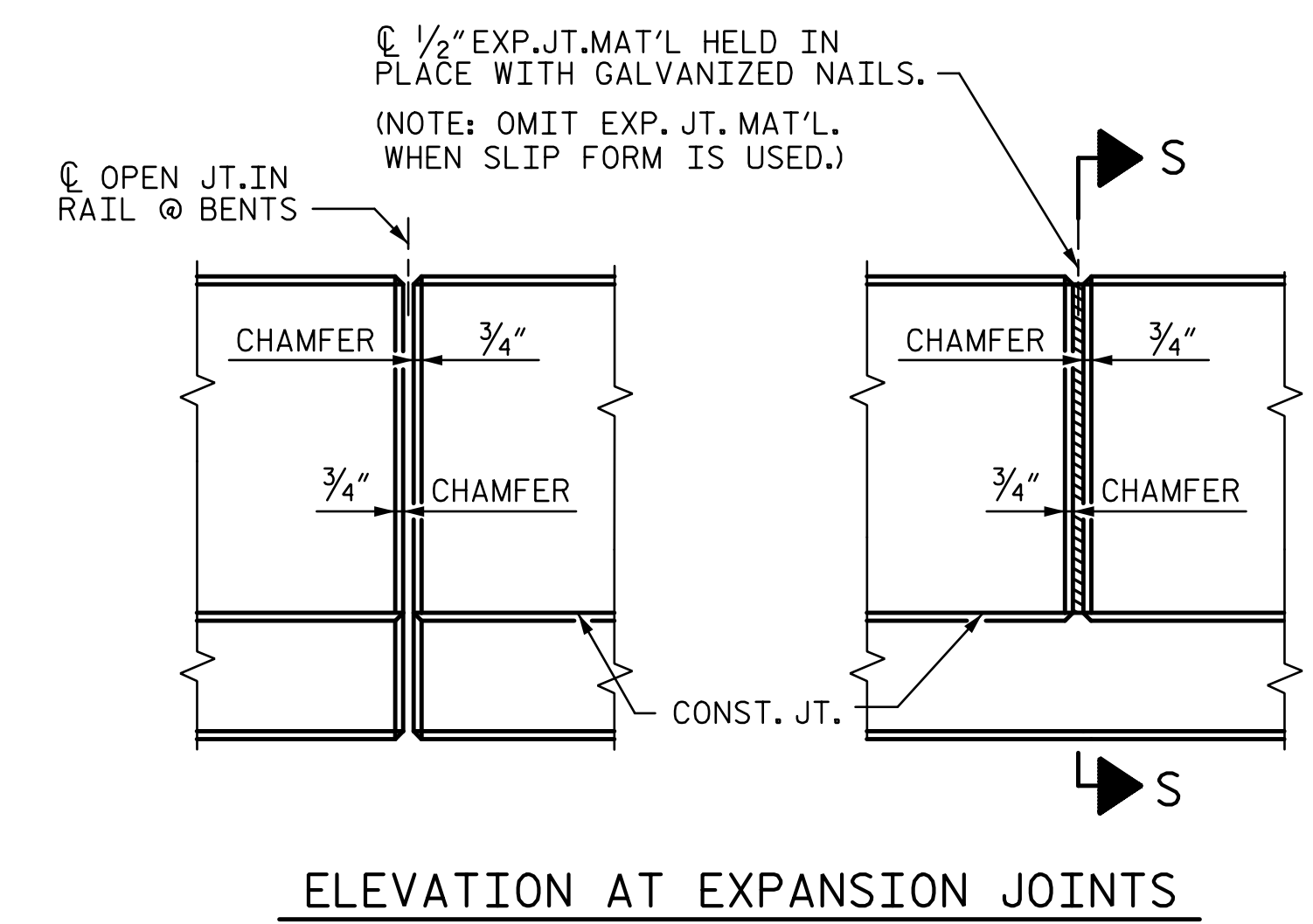
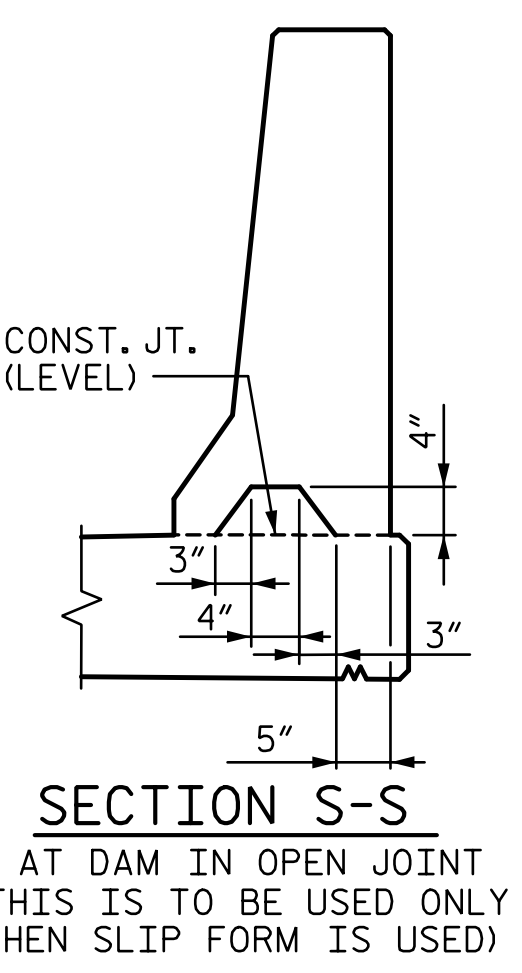
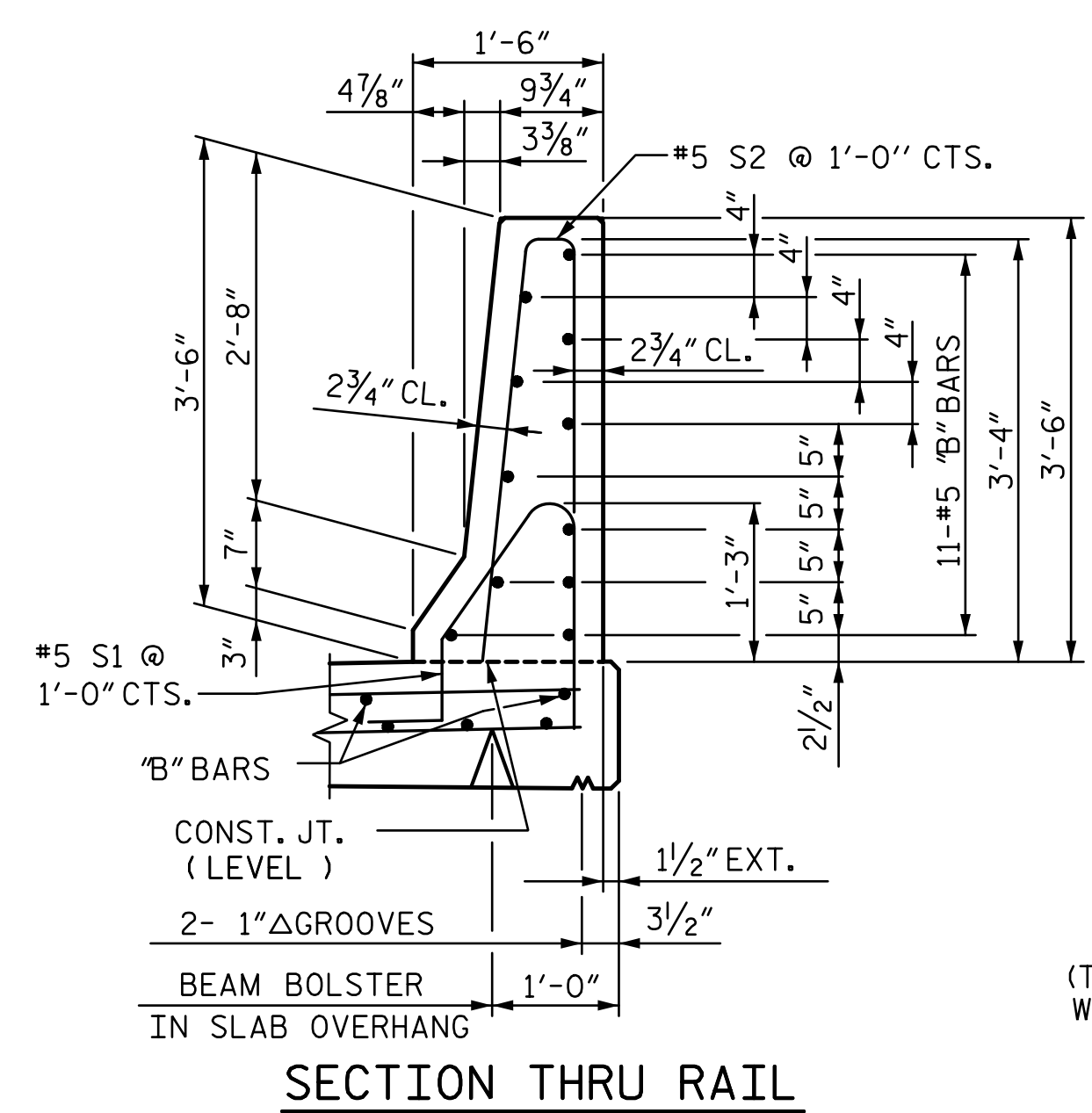


ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL
FOR CONCRETE BARRIER RAIL ONLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* B1	132	#5	STR	27'-0"	3,717
* B2	44	#5	STR	7'-4"	337
* B3	44	#5	STR	15'-11"	730
* S1	409	#5	1	4'-9"	2,026
* S2	409	#5	2	7'-0"	2,986
* EPOXY COATED REINFORCING STEEL					9,796 LBS.
CLASS AA CONCRETE					55.7 CU. YDS.
CONCRETE BARRIER RAIL					
SUPERSTRUCTURE					409.96 LIN. FT.
● APPROACH SLABS					41.85 LIN. FT.
TOTAL					451.81 LIN. FT.

● FOR EPOXY COATED REINFORCING STEEL AND CLASS AA CONCRETE IN THE BARRIER RAIL ON THE APPROACH SLABS, SEE "BRIDGE APPROACH SLAB DETAILS" SHEET.



NOTES:

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

ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

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

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

BARRIER RAIL DETAILS

PROJECT NO. U2519AA-AB
CUMBERLAND/ROBESON COUNTY
 STATION: 16+64.84 -LPB- =

DATE: 9/25/2018 TIME: 2:33:59 PM
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CHECKED BY : TRL	DATE : 6-18		

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STV 100 years
 STV ENGINEERS, INC.
 900 West Trade St., Suite 715
 Charlotte, NC 28202
 NC License Number F-0991

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

SUPERSTRUCTURE

CONCRETE BARRIER RAIL

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-22
1			3			TOTAL SHEETS
2			4			42

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.)

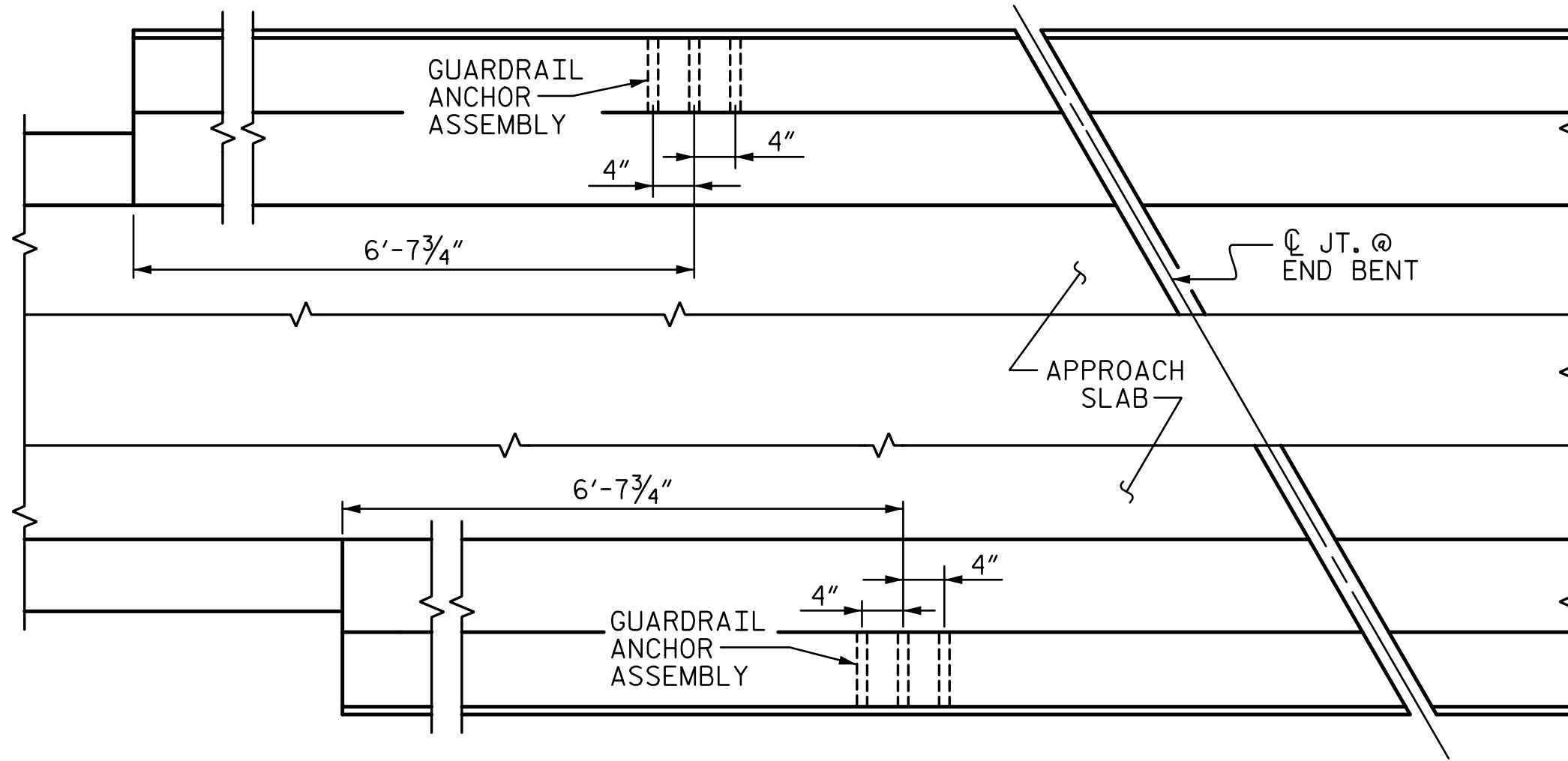
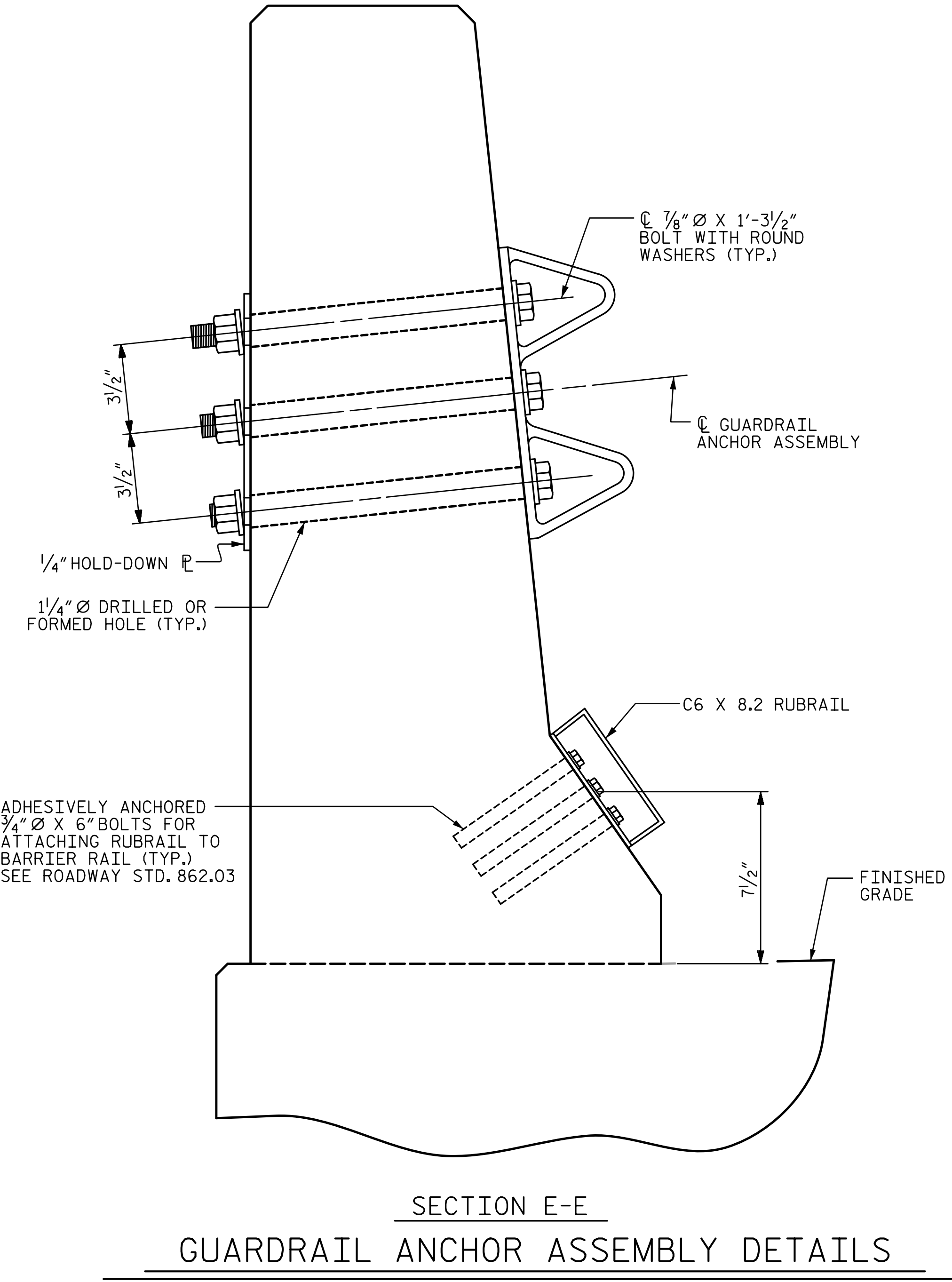
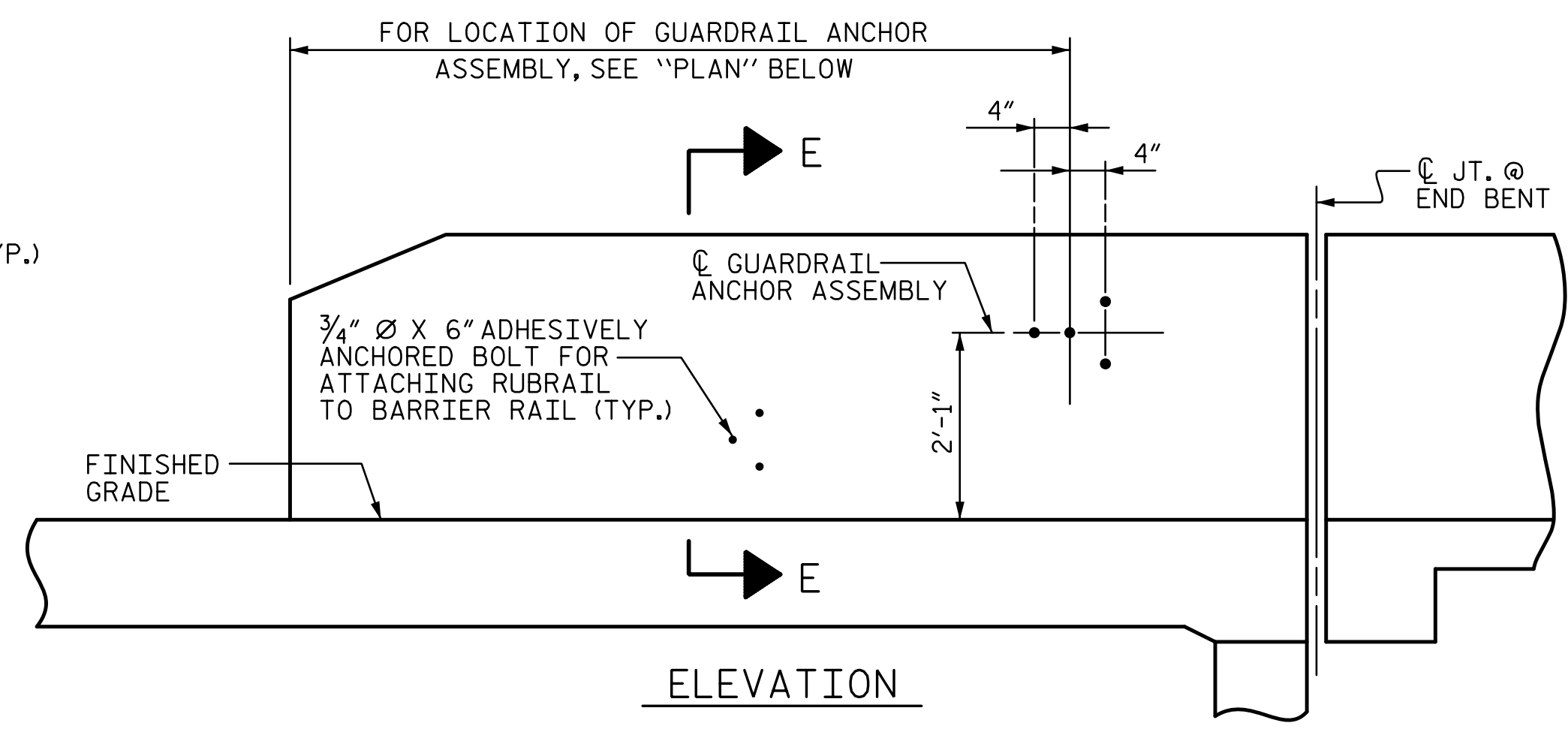
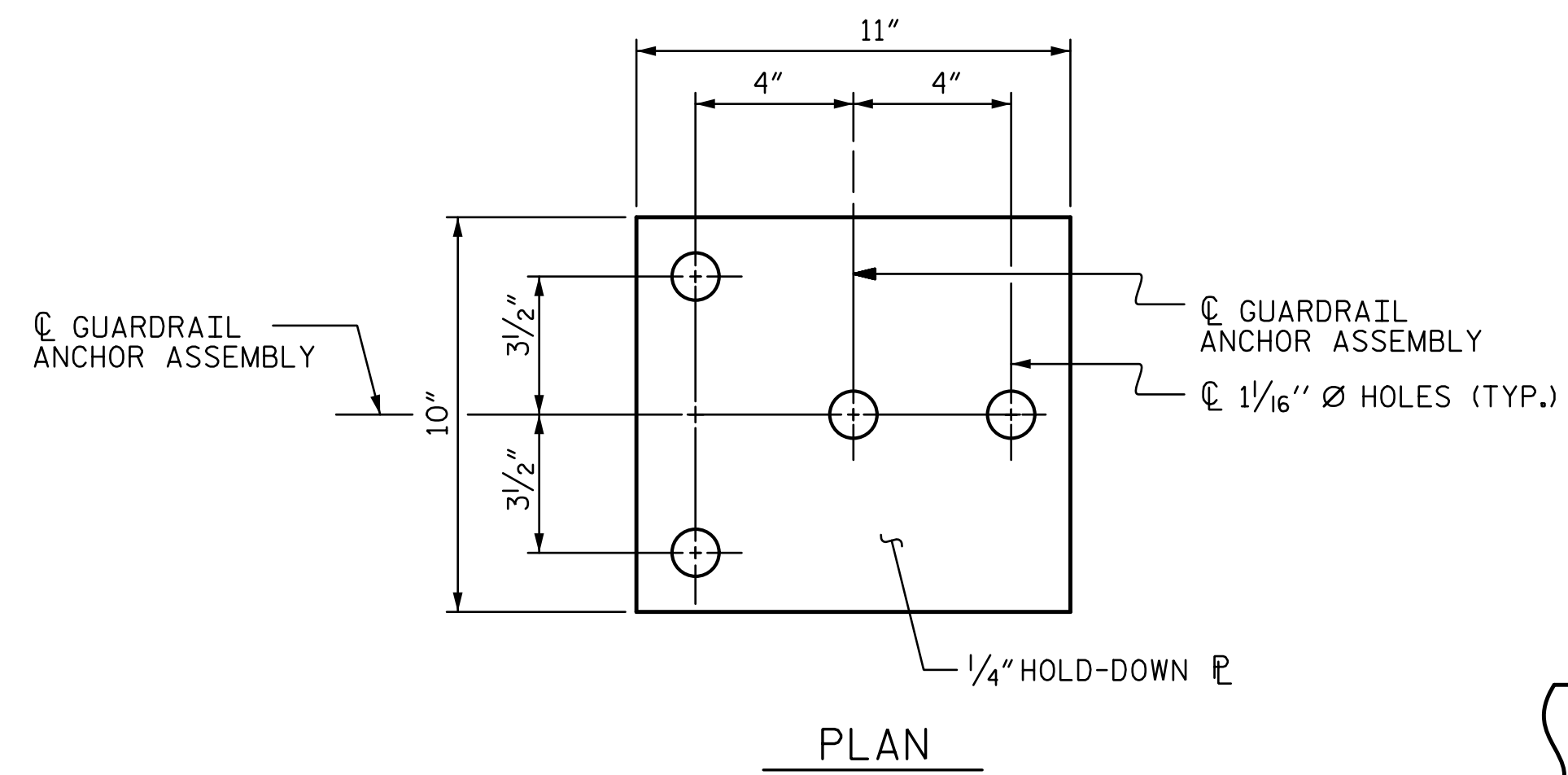
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF BARRIER RAIL. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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.

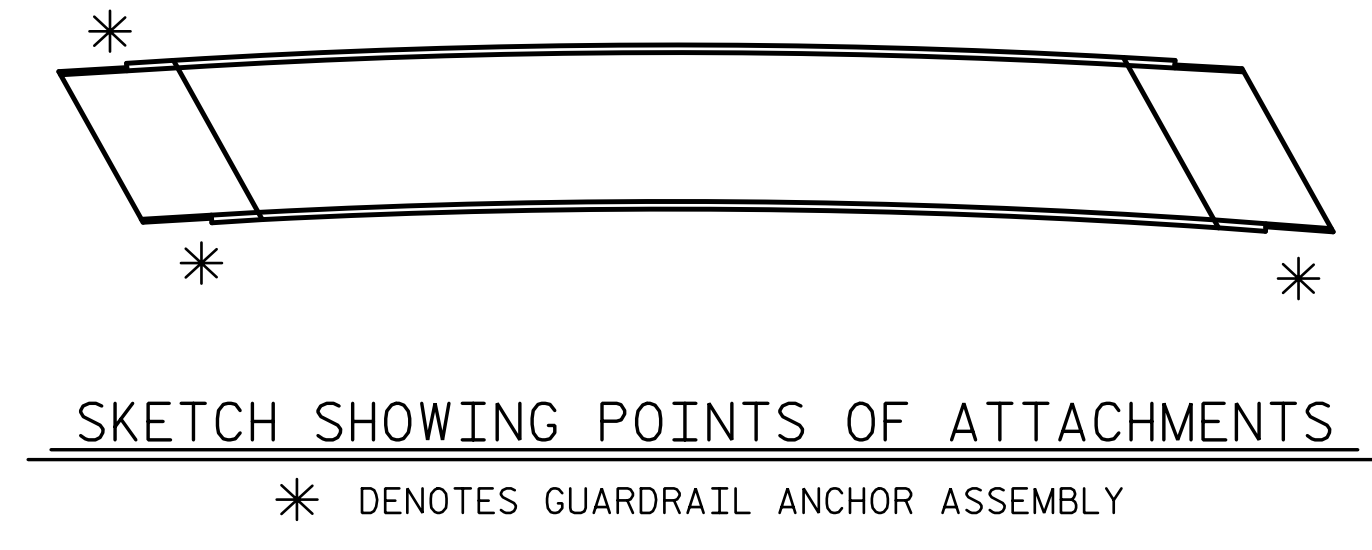
THE 1 1/4" Ø HOLES SHALL BE FORMED OR DRILLED WITH A CORE BIT. IMPACT TOOLS WILL NOT BE PERMITTED. ANY CONCRETE DAMAGED BY THIS WORK SHALL BE REPAIRED TO THE SATISFACTION OF THE ENGINEER.

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.



PROJECT NO. U2519AA-AB
CUMBERLAND/ROBESON COUNTY
 STATION: 16+64.84 -LPB- =

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED			STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH SUPERSTRUCTURE GUARDRAIL ANCHORAGE FOR BARRIER RAIL			
			STV ENGINEERS, INC. 900 West Trade St., Suite 715 Charlotte, NC 28202 NC License Number F-0991			
	Balfour Beatty Infrastructure Inc.		CIVIL A Joint Venture			
	REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:	SHEET NO.
1			3			S1-23
2			4			TOTAL SHEETS 42

DRAWN BY : <u>VKS</u>	DATE : <u>6-18</u>	DESIGN ENGINEER OF RECORD: <u>T. LAWS</u>	DATE : <u>8-18</u>
CHECKED BY : <u>TRL</u>	DATE : <u>6-18</u>		

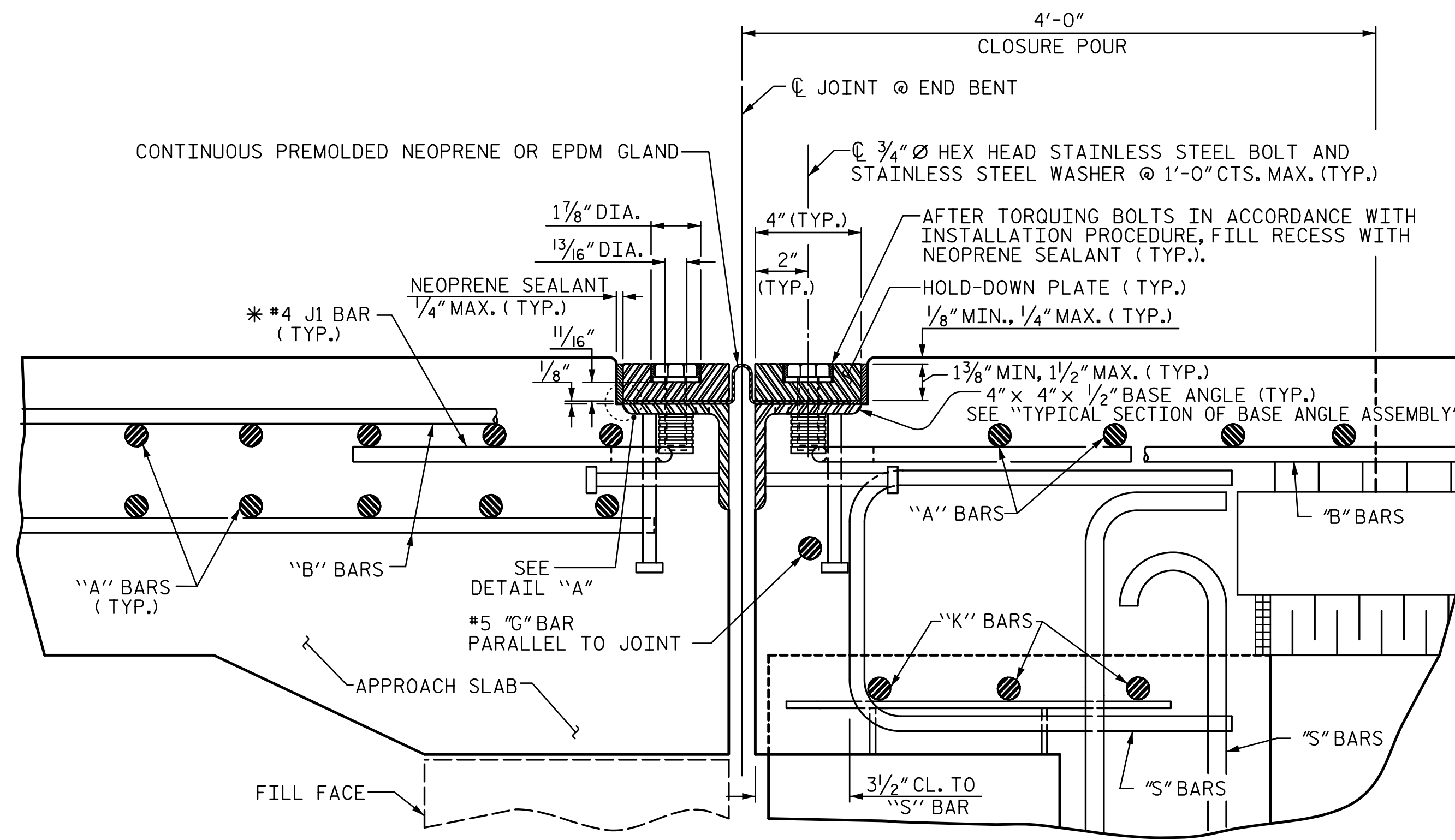
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INSTALLATION PROCEDURE

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

GENERAL NOTES

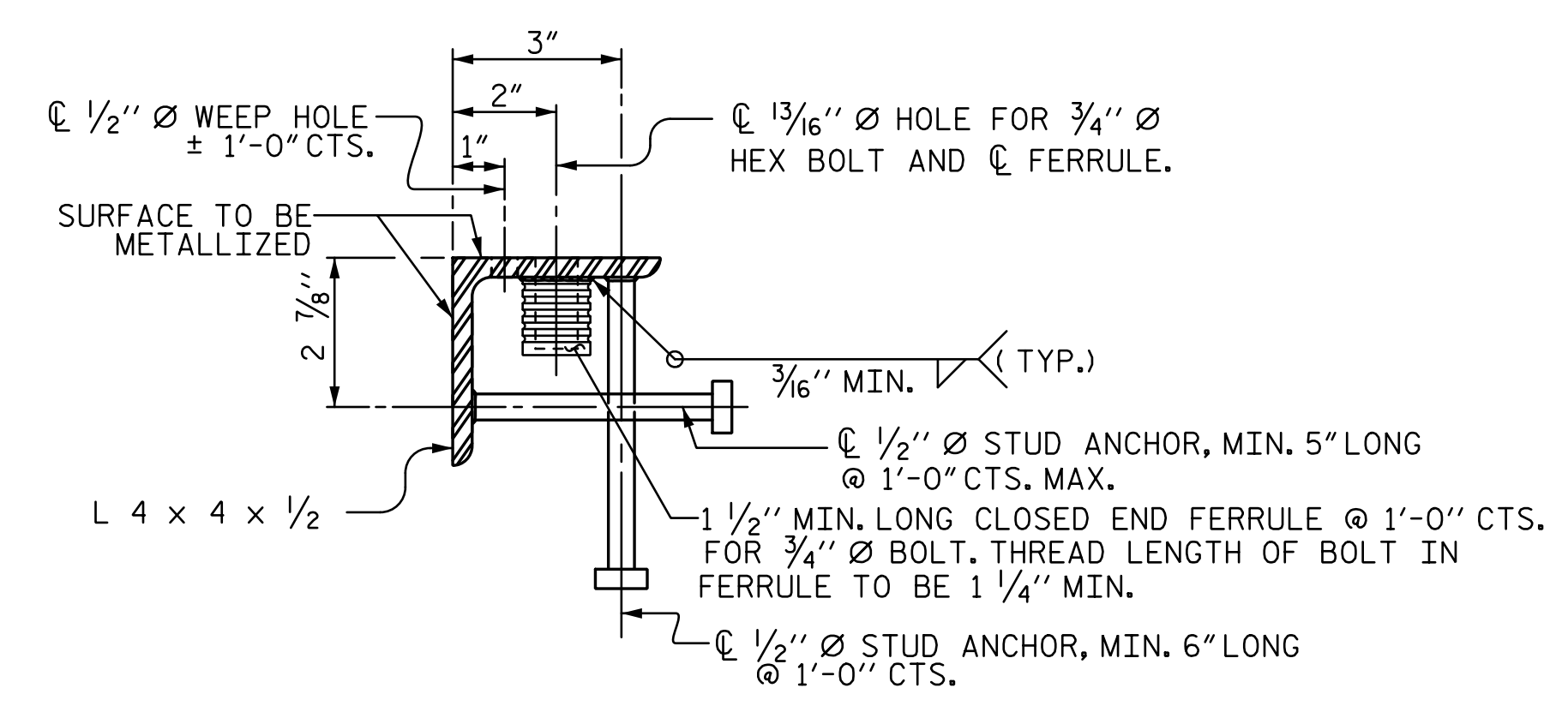
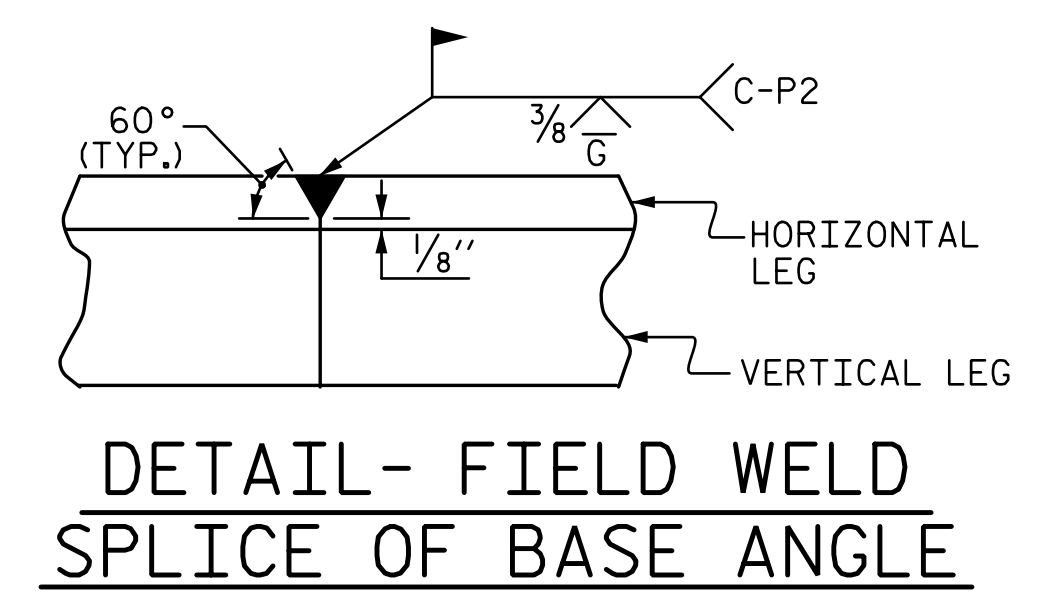
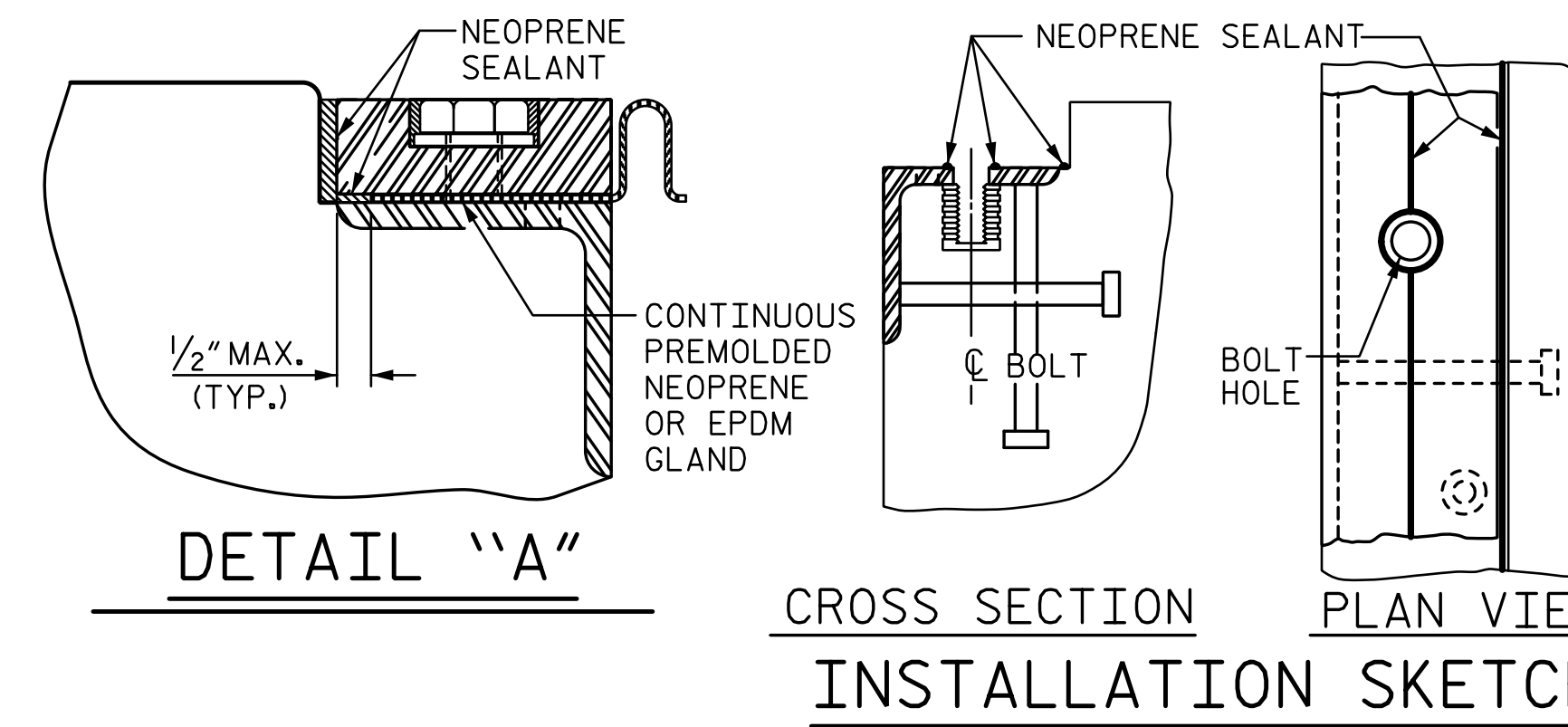
1. FOR EXPANSION JOINT SEALS, SEE SPECIAL PROVISIONS.
2. ALL PLATES AND ANGLES SHALL CONFORM TO AASHTO M270 GRADE 36 STEEL OR APPROVED EQUAL. ALL HOLD-DOWN BOLTS SHALL CONFORM TO ASTM F593 ALLOY 304 STAINLESS STEEL AND WASHERS SHALL CONFORM TO ASTM F844 EXCEPT THEY SHALL BE MADE FROM ALLOY 304 STAINLESS STEEL. ALL STUD ANCHORS SHALL CONFORM TO AASHTO M169, GRADES 1010 THRU 1020 OR APPROVED EQUAL. ALL CONCRETE INSERTS SHALL BE CLOSED END AND SHALL CONFORM TO AASHTO M169, GRADE 12L14. TENSILE CAPACITY SHALL BE 3000 LBS. MINIMUM.
3. A PREMOLDED CORRUGATED OR NON-CORRUGATED GLAND SHALL BE USED FOR JOINTS SKEWED BETWEEN 50° THRU 130°. FOR JOINTS SKEWED LESS THAN 50° OR MORE THAN 130°, ONLY A CORRUGATED GLAND SHALL BE USED.
4. CLOSED END FERRULES AND STUD ANCHORS SHALL BE SHOP WELDED AND ALL HOLES SHALL BE SHOP DRILLED AS SHOWN ON PLANS. STUD ANCHORS SHALL BE ELECTRIC ARC END WELDED WITH COMPLETE FUSION.
5. SURFACES COMING IN CONTACT WITH NEOPRENE SHALL BE GROUND SMOOTH PRIOR TO METALLIZING.
6. UPON COMPLETION OF SHOP FABRICATION, THE HOLD-DOWN PLATE AND BASE ANGLE ASSEMBLY, AS SHOWN IN THE "TYPICAL SECTION OF BASE ANGLE ASSEMBLY", SHALL BE METALLIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS. FOR THERMAL SPRAYED COATINGS (METALLIZATION), SEE SPECIAL PROVISIONS.
7. THE COVER PLATES SHALL BE GALVANIZED OR METALLIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS. FOR THERMAL SPRAYED COATINGS (METALLIZATION), SEE SPECIAL PROVISIONS.
8. BASE ANGLE ASSEMBLY SHALL BE CONTINUOUS FOR THE LENGTH OF THE JOINT. AT CROWN BREAKS, THE ENDS OF THE BASE ANGLE ASSEMBLY SHALL BE CUT PARALLEL TO THE BRIDGE CENTERLINE FOR SKEWS LESS THAN 80° AND GREATER THAN 100°. FINISHED WELD SHALL BE REPAIRED IN ACCORDANCE WITH THE SPECIAL PROVISION FOR THERMAL SPRAYED COATINGS (METALLIZATION).
9. FIELD SPLICES OF HOLD-DOWN PLATES SHALL BE KEPT TO A MINIMUM. CONTRACTOR SHALL FURNISH DETAILED PLANS SHOWING PROPOSED SPLICE LOCATIONS FOR APPROVAL. HOLD-DOWN PLATES SHALL NOT EXCEED 20' LENGTHS UNLESS APPROVED BY THE ENGINEER.
10. NO ALTERNATE JOINT DETAILS SHALL BE PERMITTED IN LIEU OF THOSE SHOWN ON THESE PLANS.
11. THE CONTRACTOR MAY, AT HIS OPTION, USE ADHESIVELY ANCHORED ANCHOR BOLTS IN PLACE OF CONCRETE INSERTS FOR COVER PLATES. THE YIELD LOAD OF THE 3/4" Ø BOLT IS 10 KIPS. FIELD TESTING OF THE ADHESIVE BONDING SYSTEM IS NOT REQUIRED.
12. THE FABRICATOR SHALL PROVIDE 1/2" Ø THREADED HOLES IN THE HOLD-DOWN PLATES TO ASSIST IN LIFTING AND PLACING. THE HOLES SHALL BE 3/4" DEEP AT 6'-0" MAXIMUM SPACING AND A MINIMUM OF TWO HOLES PER PLATE.



EXPANSION JOINT DETAILS

SECTION NORMAL TO JOINT -- PRESTRESSED GIRDER SUPERSTRUCTURE

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



TYPICAL SECTION OF BASE ANGLE ASSEMBLY

MOVEMENT AND SETTING AT JOINT					
END BENT NO.	SKEW ANGLE	TOTAL MOVEMENT (ALONG CL RDWY)	PERPENDICULAR JOINT OPENING AT 45° F	PERPENDICULAR JOINT OPENING AT 60° F	PERPENDICULAR JOINT OPENING AT 90° F
1	64°-14'-29"	9/16"	1 3/8"	1 1/4"	1 1/16"
2	57°-24'-25"	9/16"	1 5/16"	1 1/4"	1 1/16"

PROJECT NO. U2519AA-AB
 CUMBERLAND/ROBESON COUNTY
 STATION: 16+64.84 -LPB-
 SHEET 1 OF 2

DocuSigned by:

 T. LAWS
 ENGINEER
 NORTH CAROLINA
 7/26/2018

STV 100 years
 STV ENGINEERS, INC.
 900 West Trade St., Suite 715
 Charlotte, NC 28202
 NC License Number F-0991

Balfour Beatty Infrastructure Inc. **BRANCH** CIVIL
 A Joint Venture

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

SUPERSTRUCTURE

EXPANSION JOINT SEAL DETAILS

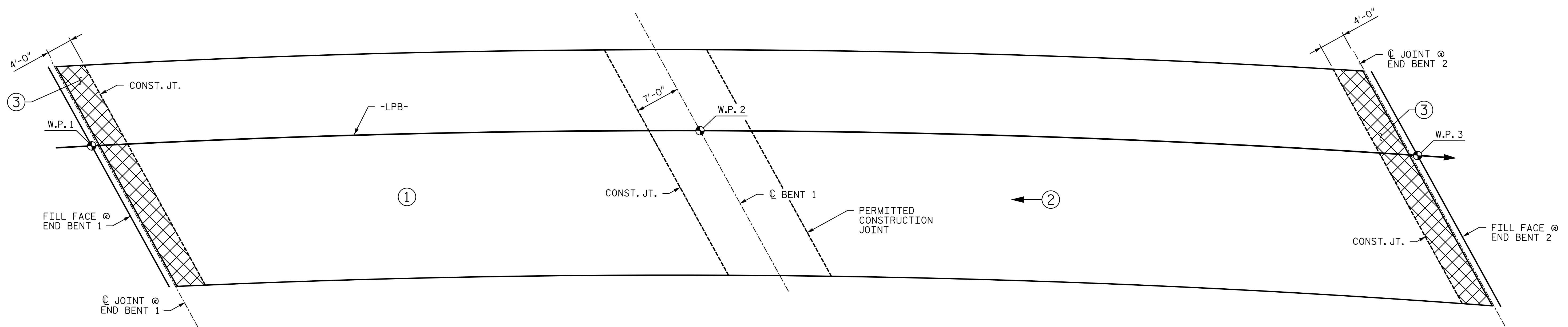
REVISIONS

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SHEET NO. S-24
 TOTAL SHEETS 42

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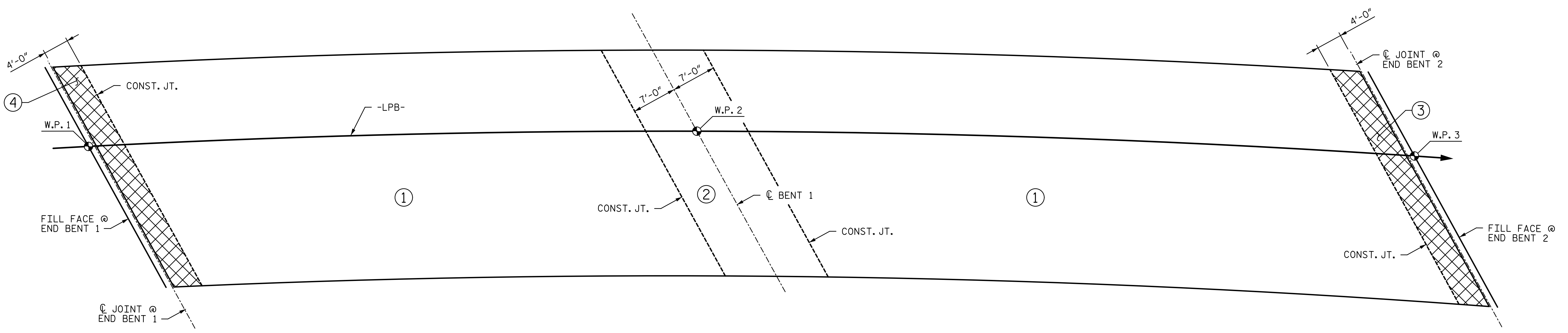


POUR SEQUENCE

← (#) = INDICATES POUR NUMBER AND DIRECTION OF POUR

LEGEND:

▨ DECK CLOSURE POUR AT JOINTS.



OPTIONAL POUR SEQUENCE

POUR (2) CAN NOT BE STARTED UNTIL THE CONCRETE STRENGTH IN BOTH ADJACENT (1) POURS REACH A MINIMUM OF 3000 PSI.

(#) = INDICATES POUR NUMBER AND DIRECTION OF POUR

PROJECT NO. U2519AA-AB
CUMBERLAND/ROBESON COUNTY
 STATION: 16+64.84 -LPB-

DATE: 9/25/2018 TIME: 2:34:08 PM
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 DESIGN ENGINEER OF RECORD: T. LAWS DATE : 8-18

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		REVISIONS	
	STV ENGINEERS, INC. 900 West Trade St., Suite 715 Charlotte, NC 28202 NC License Number F-0991	NO. 1 BY: <u>TRL</u> DATE: <u>6-18</u>	NO. 2 BY: <u>TRL</u> DATE: <u>6-18</u>

SHEET NO. S1-26
 TOTAL SHEETS 42

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	1,413	SQ.FT.
BRIDGE DECK	5,906	SQ.FT.
TOTAL	7,319	SQ.FT.

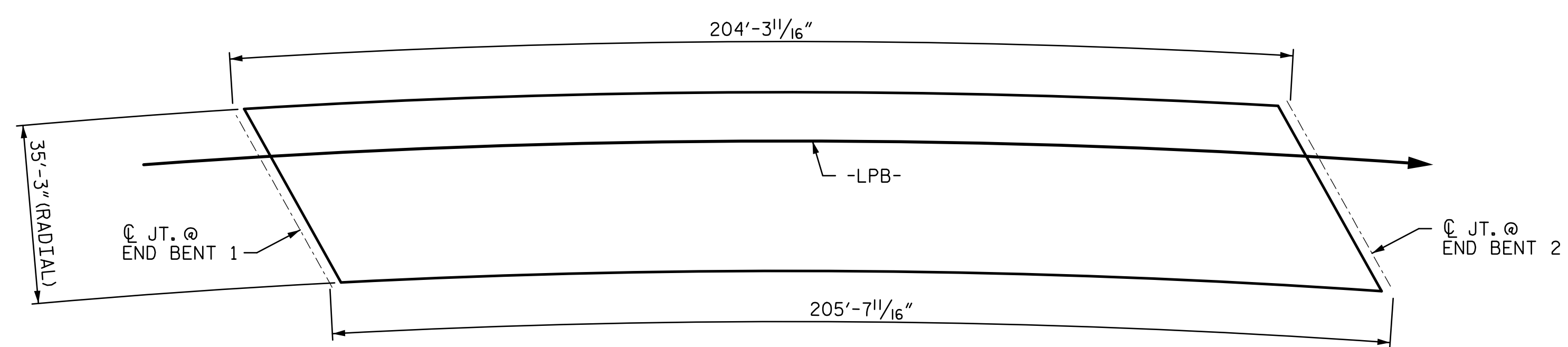
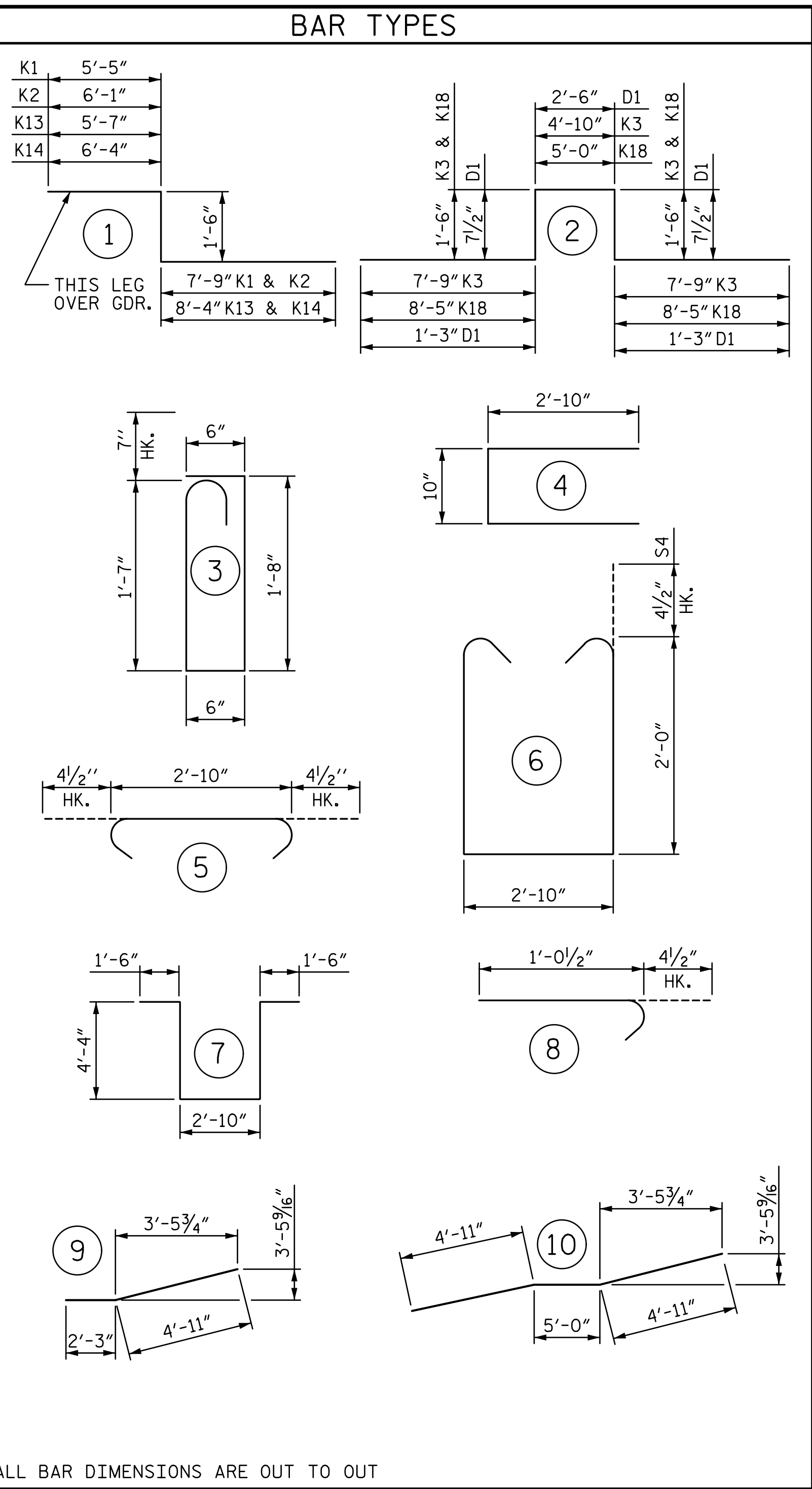
SUPERSTRUCTURE BILL OF MATERIAL

	CLASS AA CONCRETE (CU. YDS.)	REINFORCING STEEL (LBS.)	EPOXY COATED REINFORCING STEEL (LBS.)
POUR #1	63.9	--	--
POUR #2	112.7	--	--
POUR #3	13.4	--	--
TOTALS**	190.0	4,931	32,110

**QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED

BILL OF MATERIAL					BILL OF MATERIAL							
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	
* A1	296	#5	STR.	34'-11"	10,780	* D1	508	#5		6'-3"	3,312	
A2	650	#5	STR.	4'-0"	2,712							
*A100	1	#5	STR.	2'-8"	3	* G1	1	#5	STR.	38'-10"	41	
*A101	1	#5	STR.	3'-10"	4	* G2	1	#5	STR.	41'-6"	43	
*A102	2	#5	STR.	4'-4"	9	* J1	74	#4		1'-5"	70	
*A103	6	#5	STR.	6'-1"	38							
*A104	6	#5	STR.	7'-10"	49	* K1	2	#8		14'-8"	78	
*A105	6	#5	STR.	9'-6"	59	* K2	2	#8		15'-4"	82	
*A106	6	#5	STR.	11'-3"	70	* K3	4	#8		23'-4"	249	
*A107	6	#5	STR.	13'-0"	81	* K4	3	#6	STR.	5'-10"	26	
*A108	6	#5	STR.	14'-9"	92	K5	3	#6	STR.	7'-10"	35	
*A109	6	#5	STR.	16'-6"	103	K6	3	#6	STR.	10'-1"	45	
*A110	6	#5	STR.	18'-2"	114	K7	6	#4	STR.	9'-1"	36	
*A111	6	#5	STR.	18'-6"	116	K8	6	#4	STR.	9'-8"	39	
*A112	6	#5	STR.	16'-11"	106	K9	6	#4	STR.	9'-1"	36	
*A113	6	#5	STR.	15'-3"	95	K10	6	#4	STR.	5'-10"	23	
*A114	6	#5	STR.	13'-8"	86	K11	8	#4		9	7'-2"	38
*A115	6	#5	STR.	12'-0"	75	K12	8	#4		10	14'-10"	79
*A116	6	#5	STR.	10'-5"	65	* K13	2	#8		1	15'-5"	82
*A117	6	#5	STR.	8'-9"	55	* K14	2	#8		1	16'-2"	86
*A118	6	#5	STR.	7'-2"	45	K15	3	#6	STR.	6'-8"	30	
*A119	6	#5	STR.	5'-6"	34	K16	3	#6	STR.	8'-9"	39	
*A120	1	#5	STR.	5'-4"	6	* K17	3	#6	STR.	10'-11"	49	
*A121	1	#5	STR.	4'-3"	4	* K18	4	#8		2	24'-10"	265
*A122	1	#5	STR.	3'-2"	3							
*A123	6	#6	STR.	16'-0"	144	* S1	39	#4		4	6'-6"	169
						* S2	39	#5		3	4'-10"	197
* B1	141	#4	STR.	22'-0"	2,072	S3	75	#4		5	3'-7"	180
* B2	47	#7	STR.	60'-0"	5,764	S4	12	#4		6	7'-7"	61
* B3	47	#7	STR.	18'-3"	1,753	S5	20	#5		11	7'-7"	158
* B4	46	#7	STR.	32'-0"	3,009							
B5	24	#5	STR.	53'-0"	1,327	* U1	15	#4		7	14'-6"	145
* B6	141	#4	STR.	26'-1"	2,457	V1	16	#4	STR.	1'-8"	18	

REINFORCING STEEL 4,931 LBS.
* EPOXY COATED REINFORCING STEEL 32,110 LBS.



LAYOUT FOR COMPUTING AREA REINFORCED CONCRETE DECK SLAB (SQ. FT. = 7,221)

PROJECT NO. U2519AA-AB
CUMBERLAND/ROBESON COUNTY
STATION: 16+64.84 -LPB-

DocuSigned by:
T. LAWS
PROFESSIONAL SEAL
40317
ENGINEER
T. LAWS
7/26/2018

STV 100 years
STV ENGINEERS, INC.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

Balfour Beatty Infrastructure Inc. **BRANCH** CIVIL
A Joint Venture

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

**SUPERSTRUCTURE
BILL OF MATERIAL**

REVISIONS

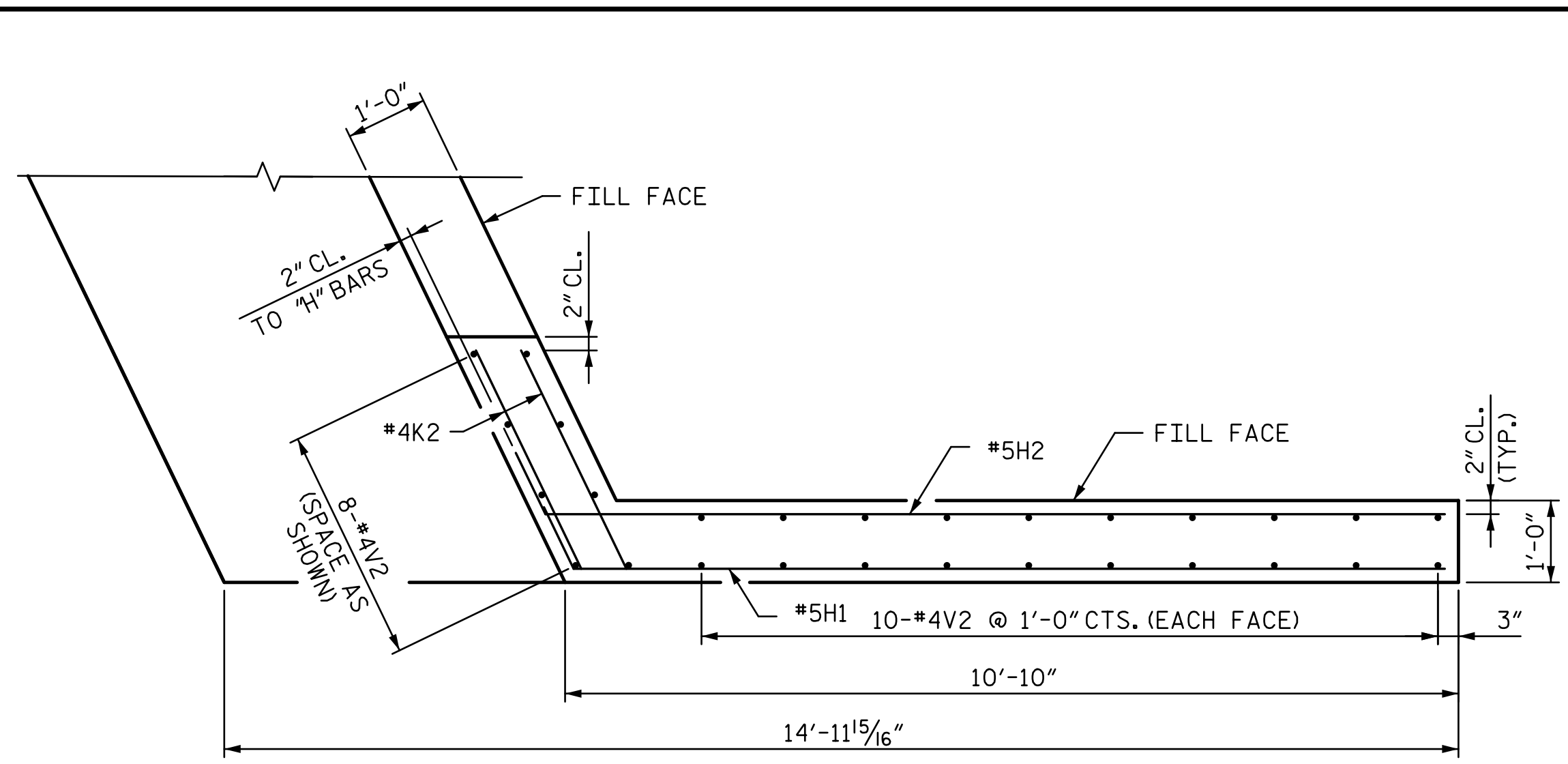
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2			4		

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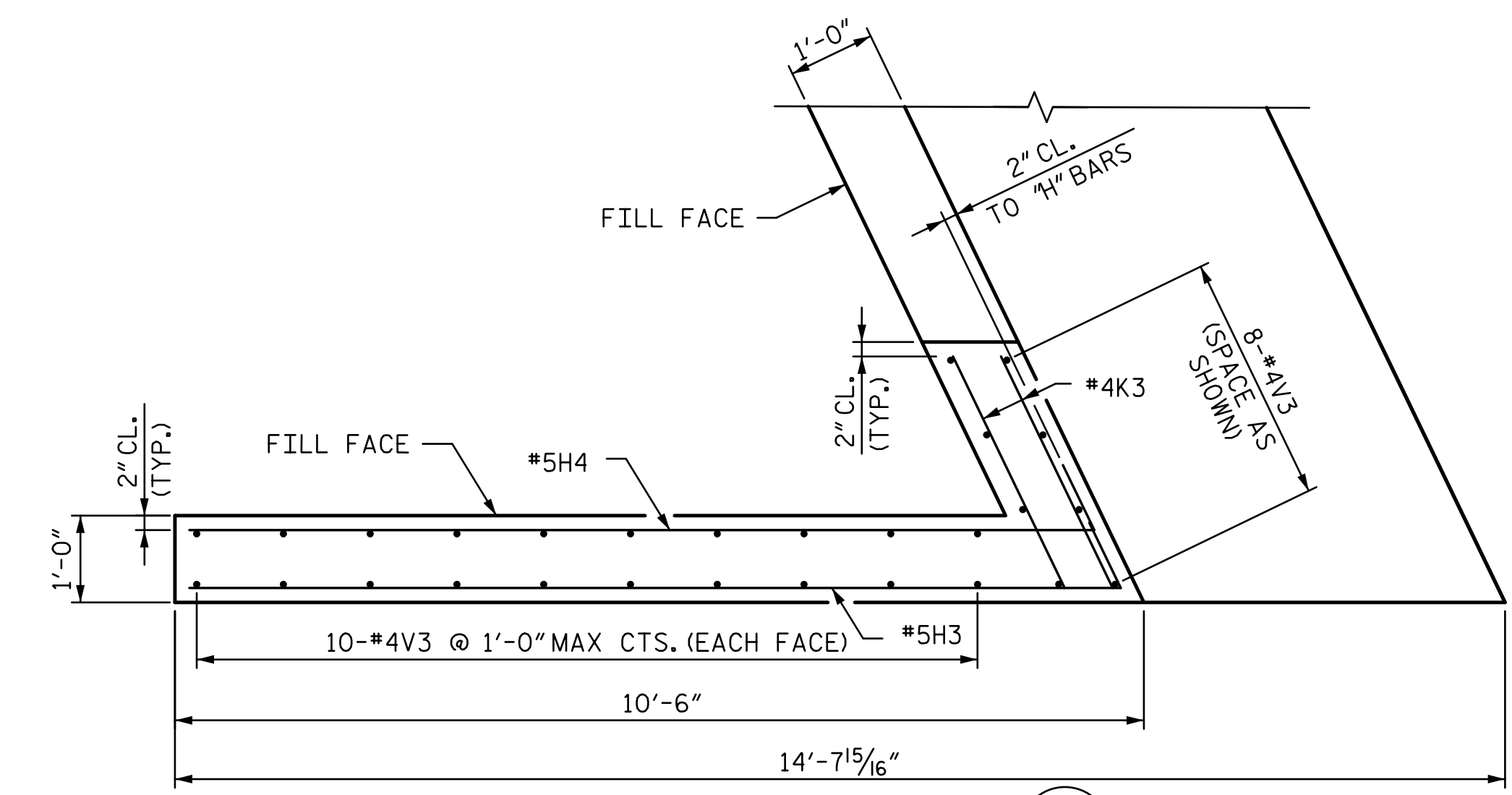
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TOTAL SHEETS 42

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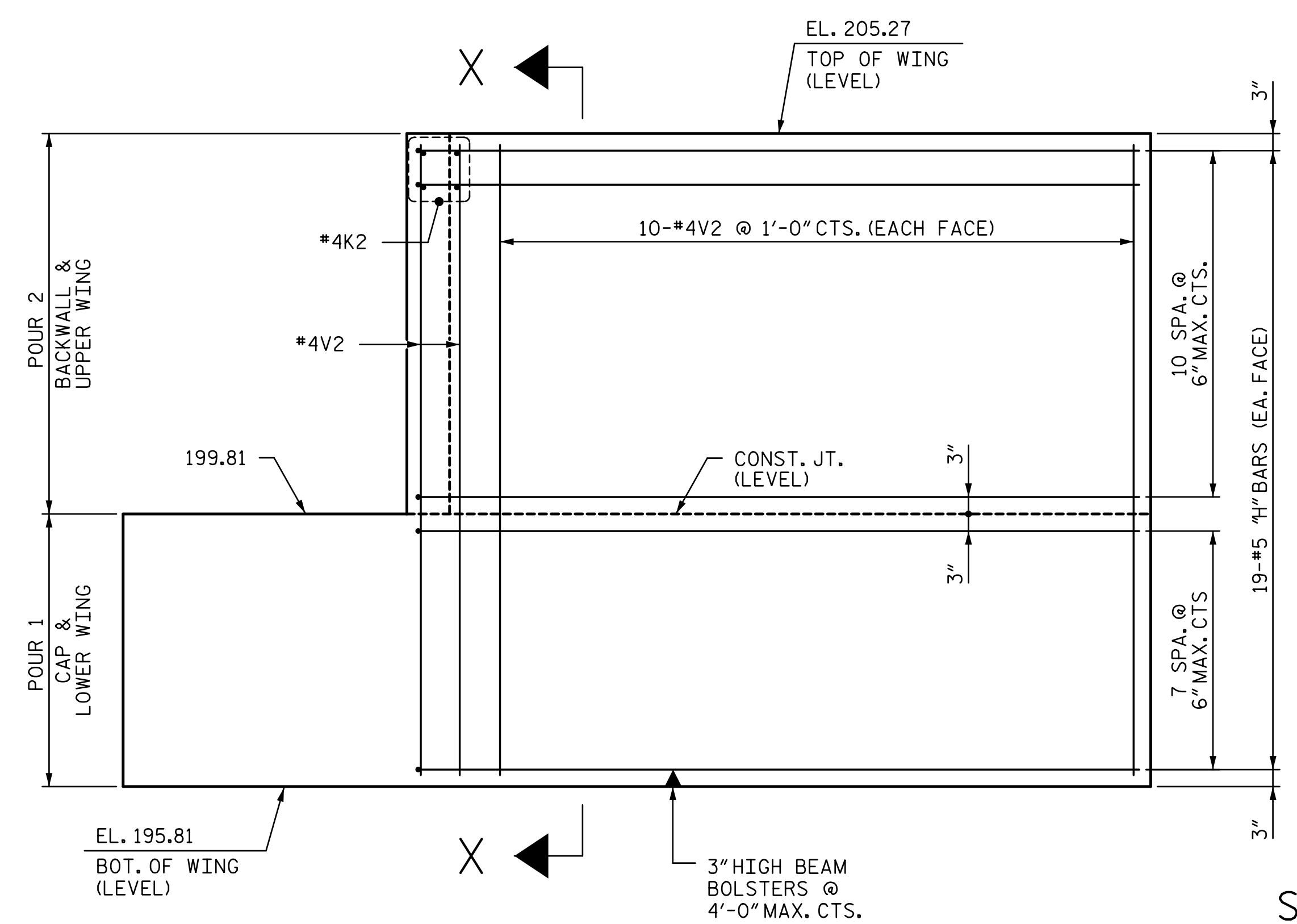
DRAWN BY : MBC DATE : 7-18 DESIGN ENGINEER OF RECORD: T. LAWS DATE : 8-18
CHECKED BY : TRL DATE : 7-18



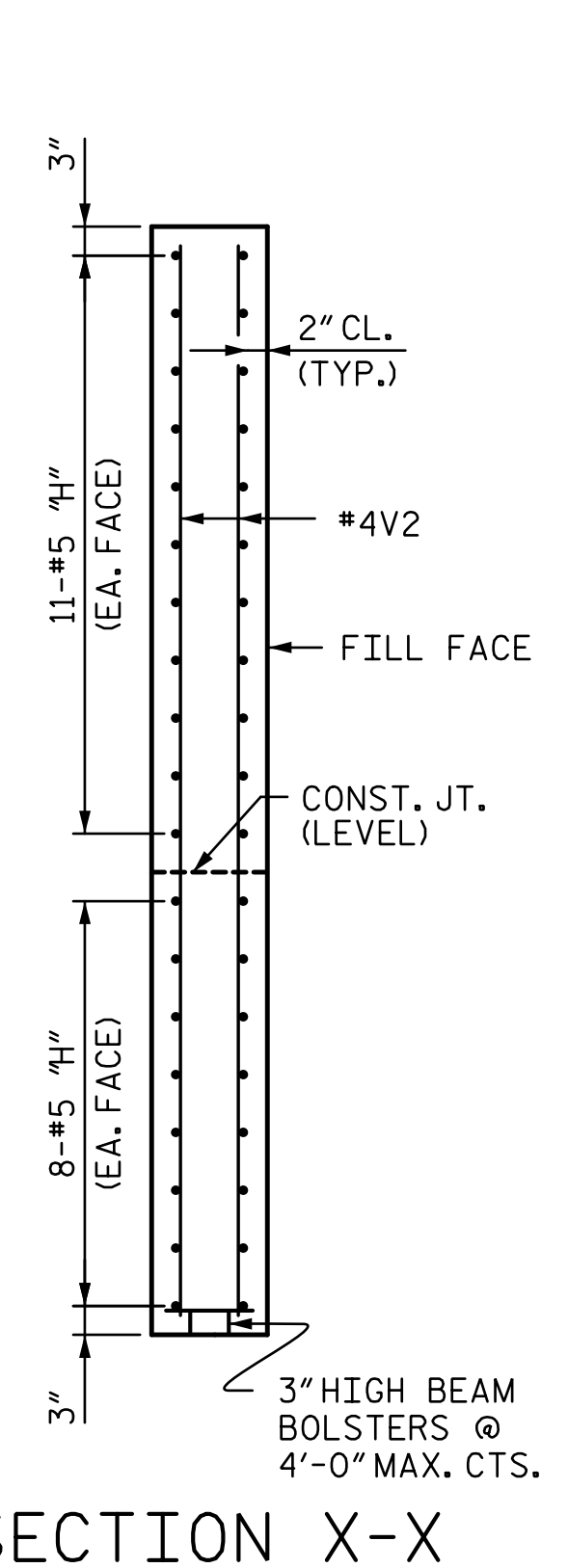
PLAN OF WING (W1)



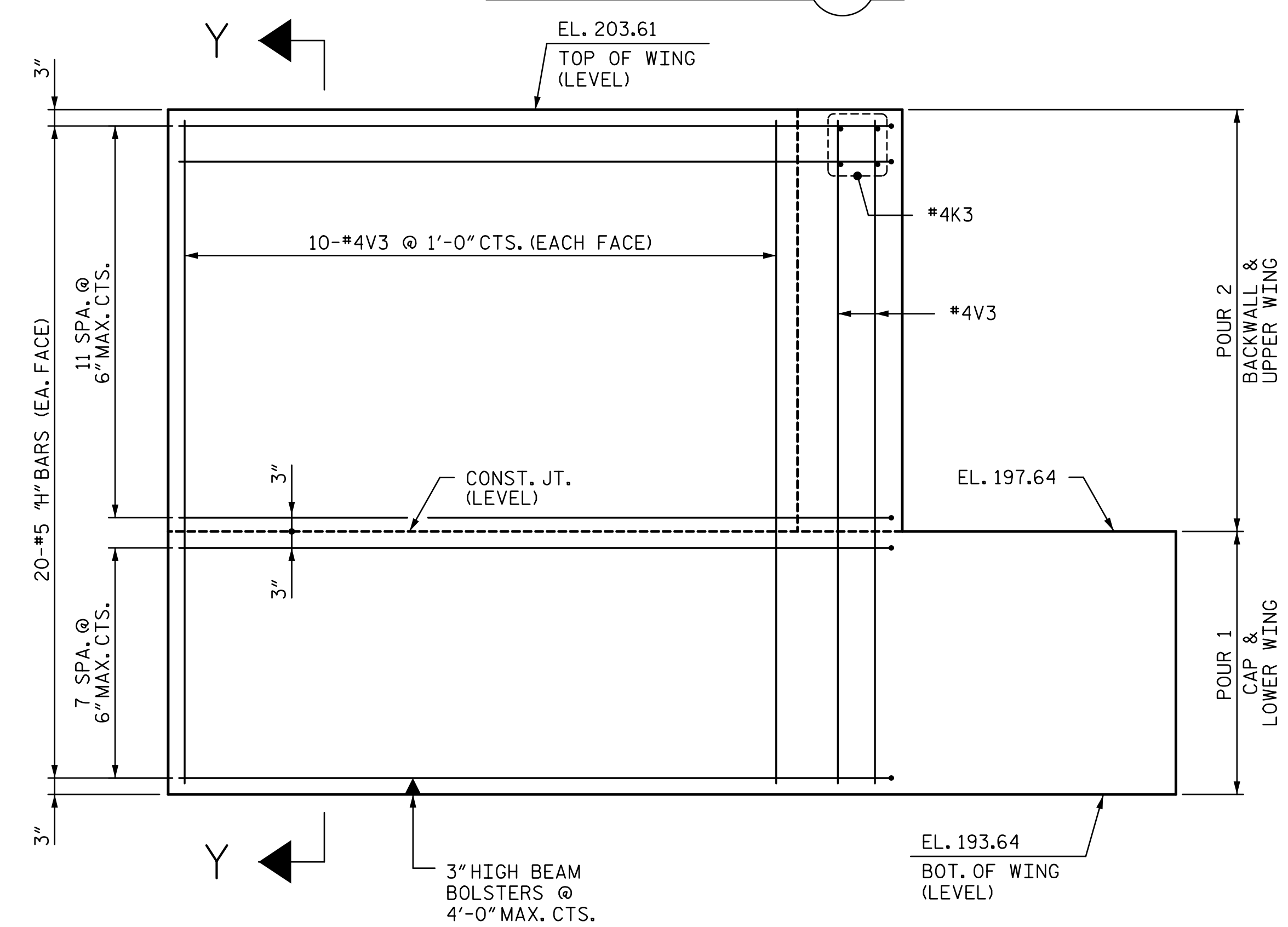
PLAN OF WING (W2)



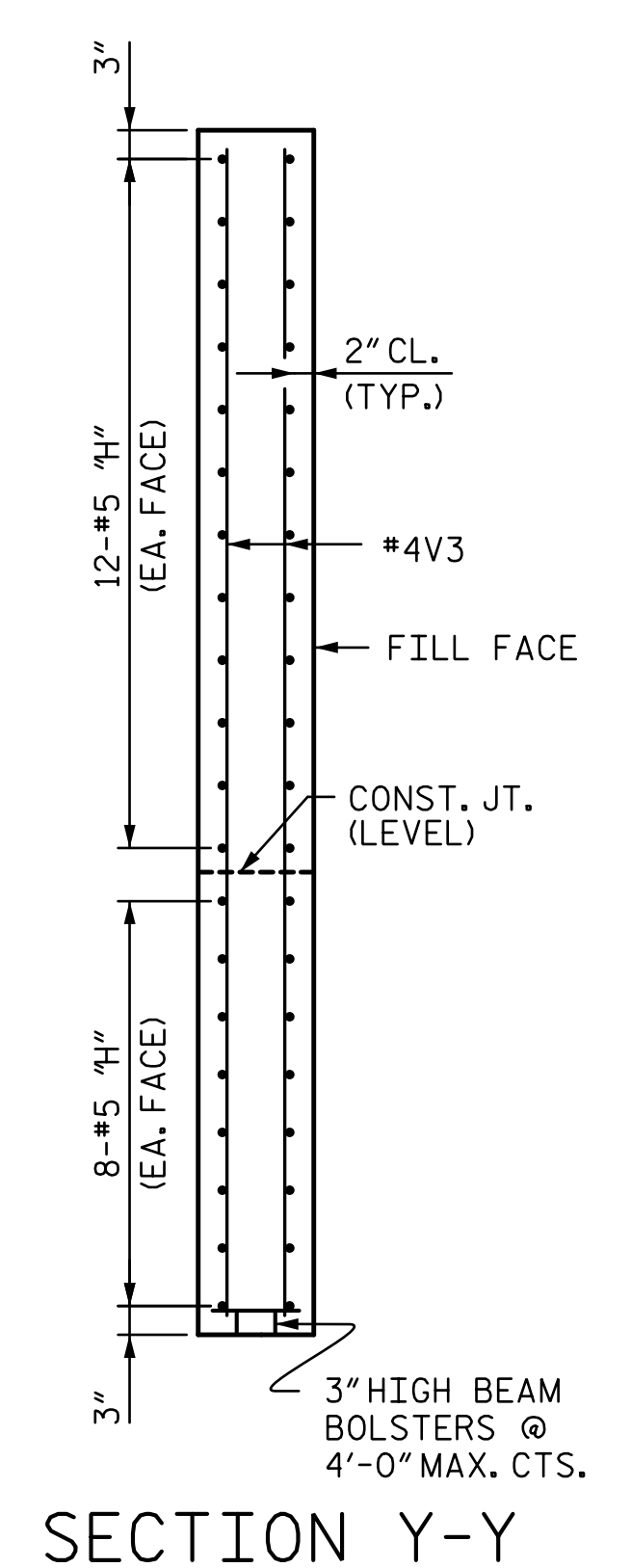
ELEVATION OF WING (W1)



SECTION X-X



ELEVATION OF WING (W2)



SECTION Y-Y

PROJECT NO. U2519AA-AB
CUMBERLAND/ROBESON COUNTY
 STATION: 16+64.84 -LPB-
 SHEET 2 OF 3

DATE: 9/25/2018 TIME: 2:34:14 PM FILE: R:\Structures\Str 1 LPB over Y\Station\RFC\401.057_U2519_SMU.El.029_770513.dgn

DRAWN BY : VKS	DATE : 7-18	DESIGN ENGINEER OF RECORD: T. LAWS	DATE : 8-18
CHECKED BY : TRL	DATE : 7-18		

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STV 100 years
 STV ENGINEERS, INC.
 900 West Trade St., Suite 715
 Charlotte, NC 28202
 NC License Number F-0991

Balfour Beatty Infrastructure Inc. **BRANCH** CIVIL
A Joint Venture

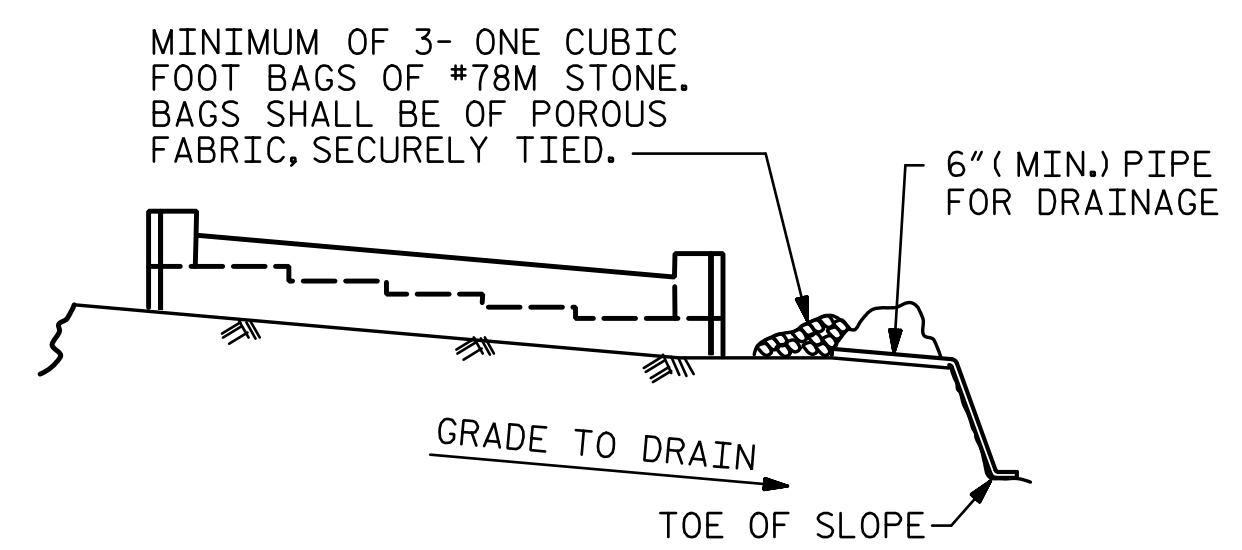
STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

SUBSTRUCTURE

END BENT 1

SHEET NO. S1-29
 TOTAL SHEETS 42

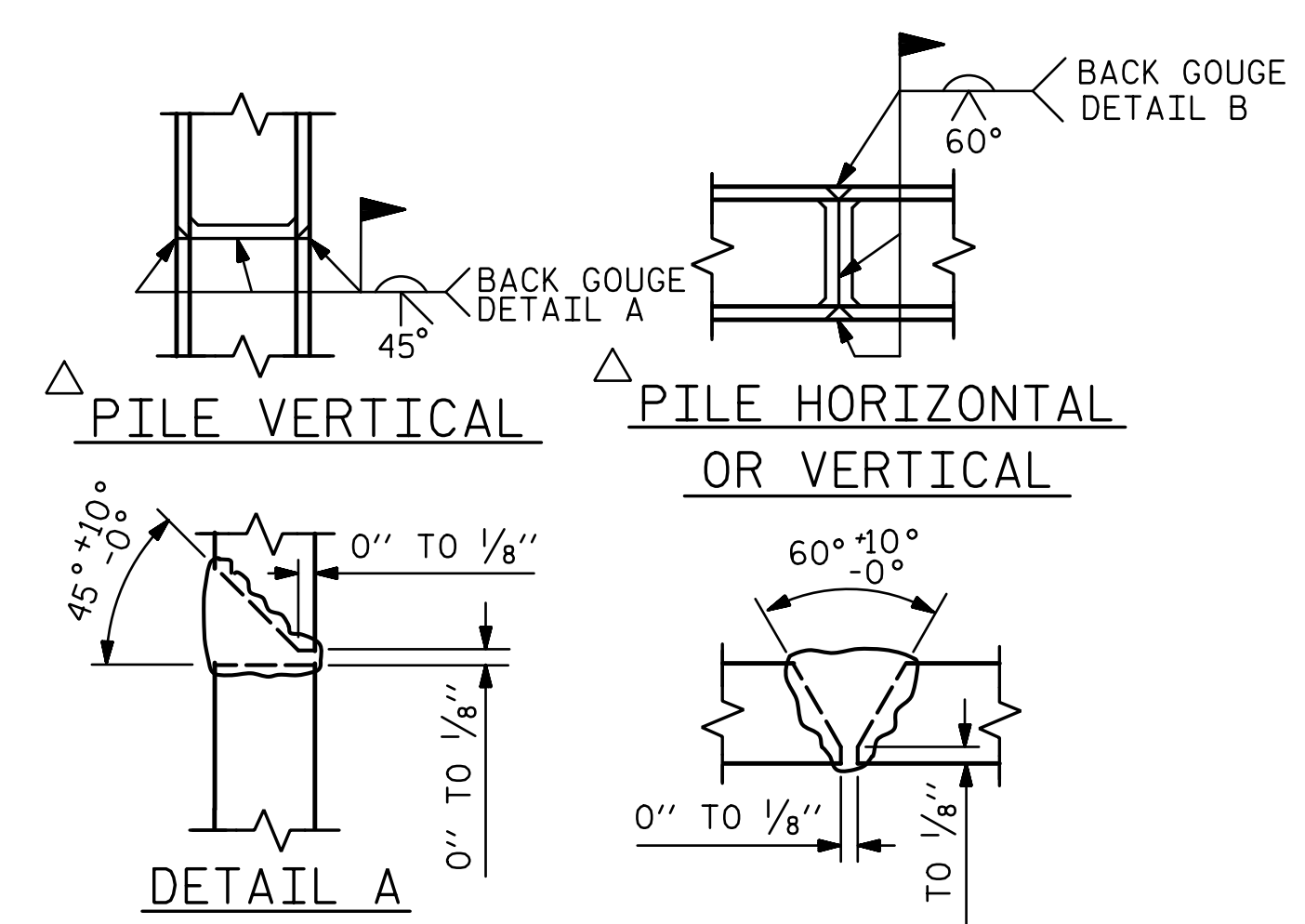
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BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

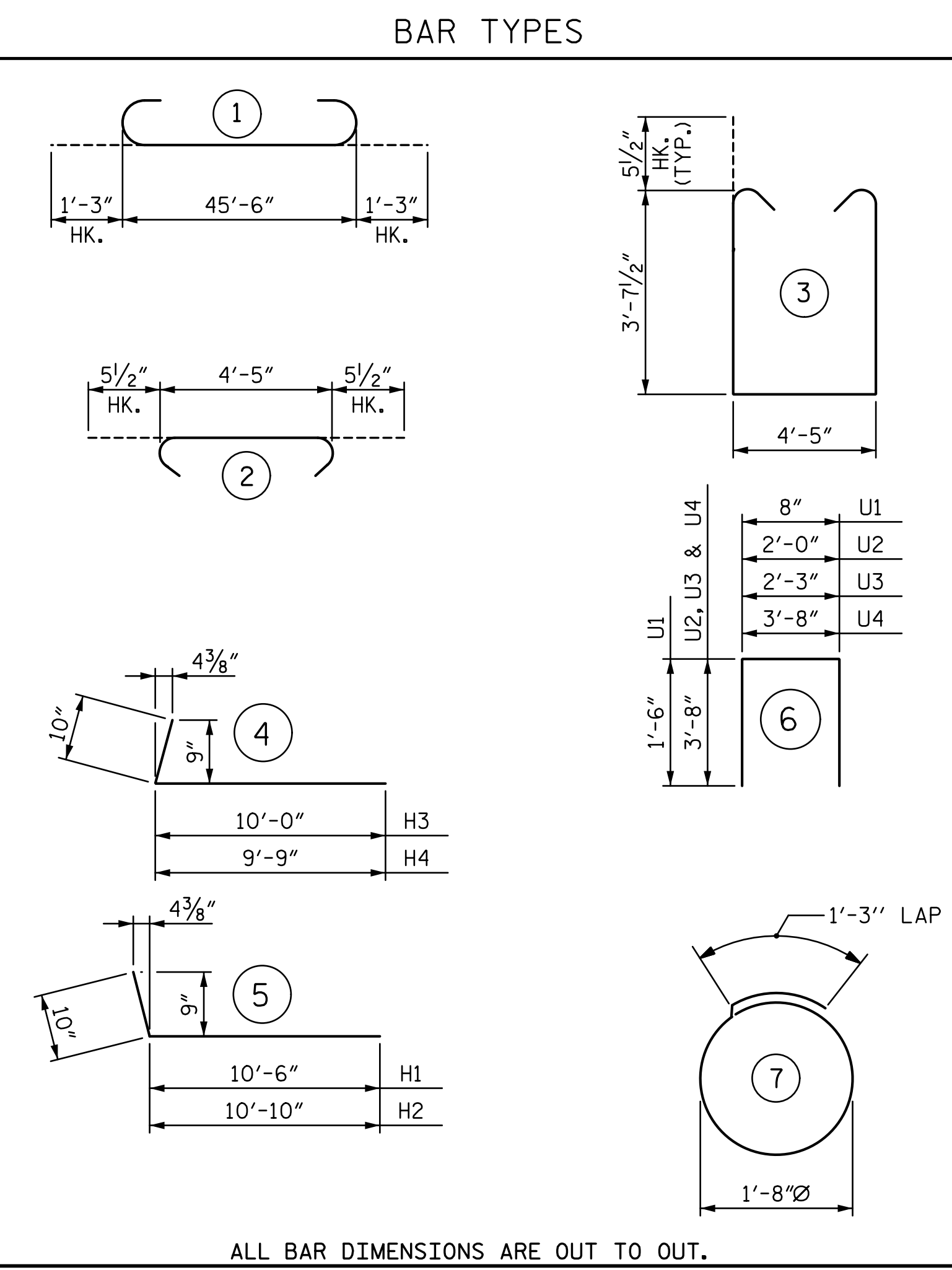
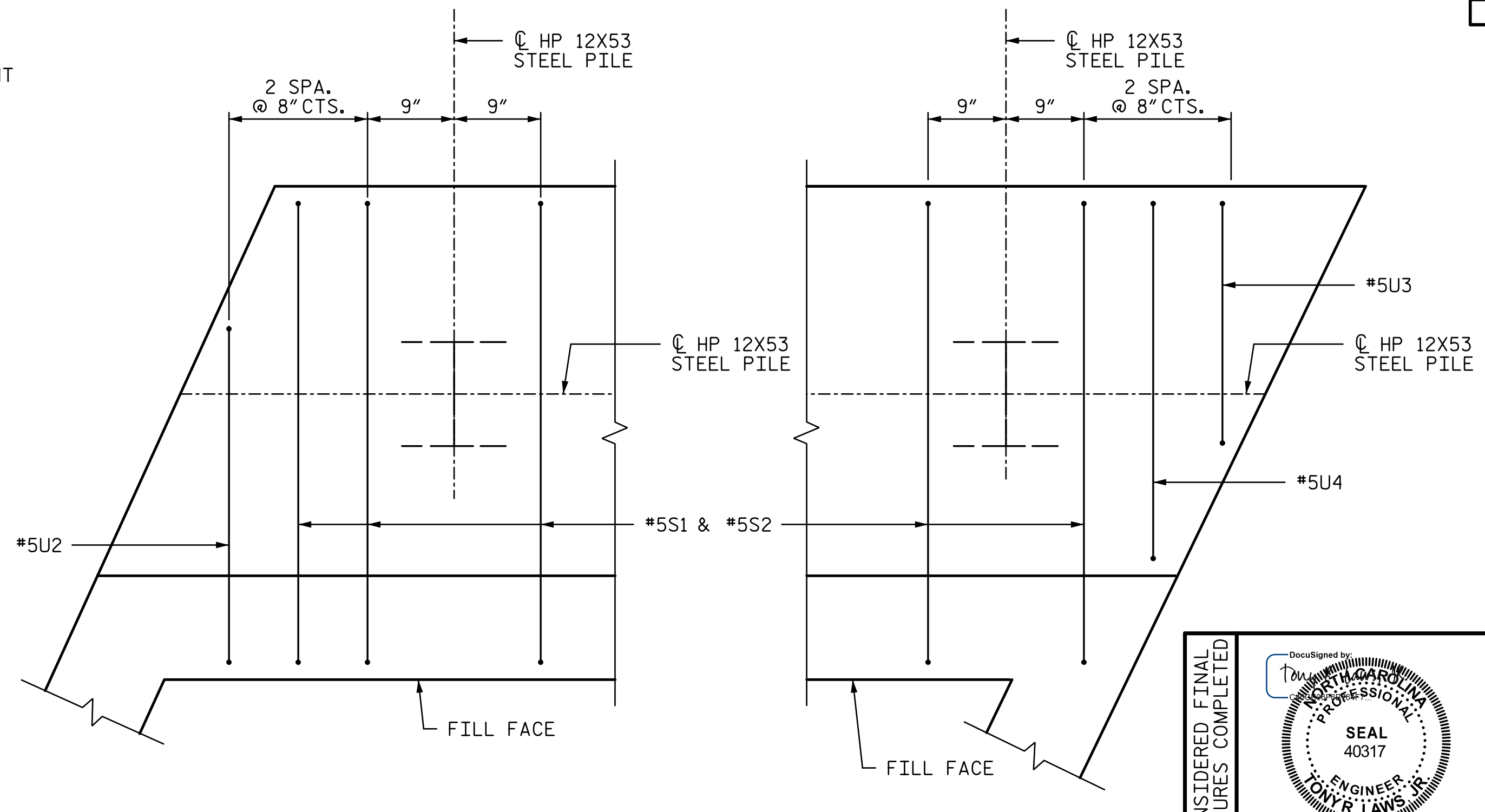
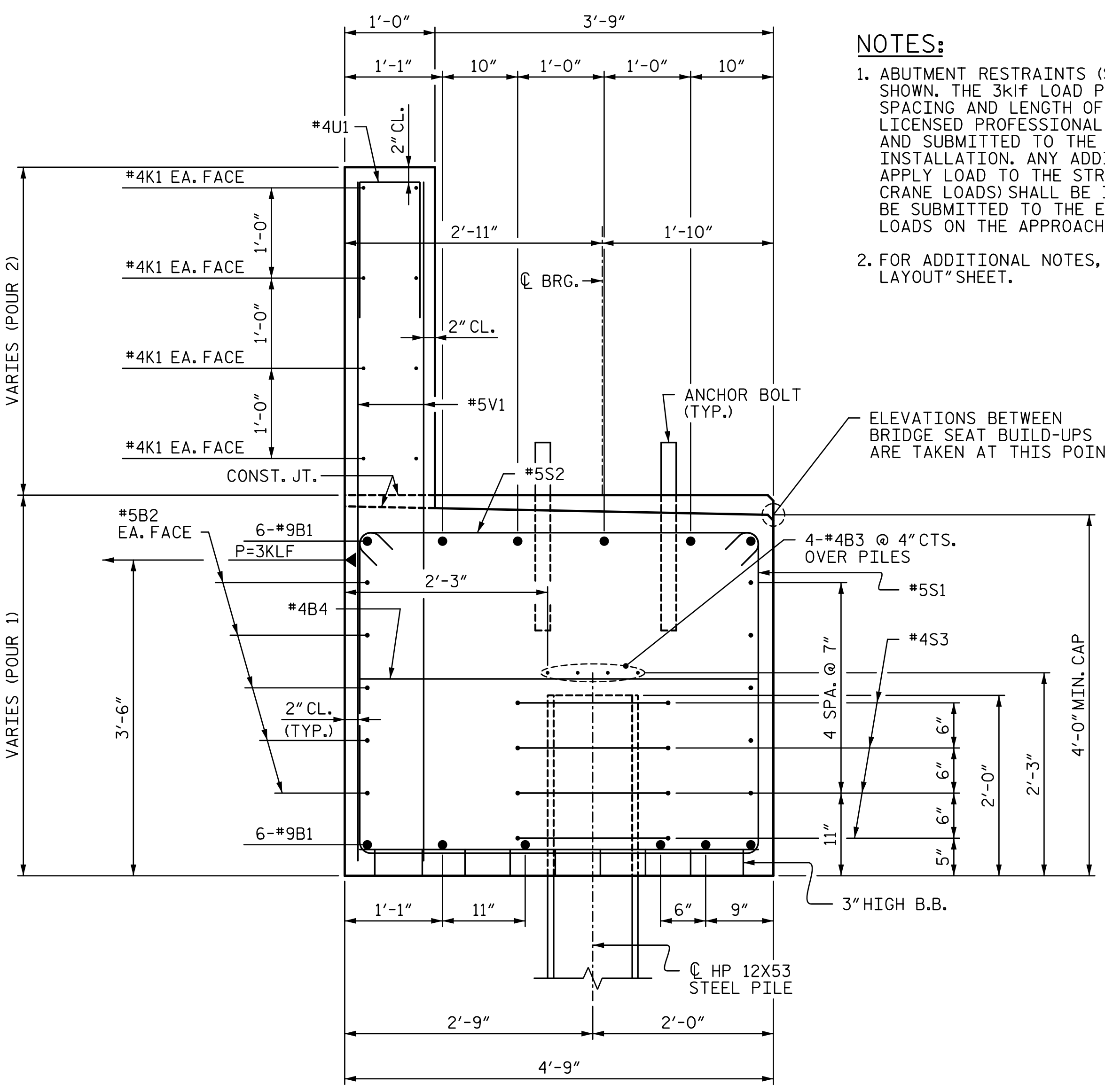
BAGGED STONE SHALL REMAIN IN PLACE UNTIL THE ENGINEER DIRECTS THAT IT BE REMOVED. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF SILT ACCUMULATIONS AT BAGGED STONE WHEN SO DIRECTED BY THE ENGINEER. BAGS SHALL BE REMOVED AND REPLACED WHENEVER THE ENGINEER DETERMINES THAT THEY HAVE DETERIORATED AND LOST THEIR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

TEMPORARY DRAINAGE AT END BENT



PILE SPLICE DETAILS

- NOTES:
- ABUTMENT RESTRAINTS (STRAPS) ARE REQUIRED ALONG THE CAP AS SHOWN. THE 3KIF LOAD PROVIDED IS A FACTORED LOAD. THE SPACING AND LENGTH OF STRAPS SHALL BE DETERMINED BY A LICENSED PROFESSIONAL ENGINEER REGISTERED IN NORTH CAROLINA AND SUBMITTED TO THE ENGINEER FOR REVIEW PRIOR TO INSTALLATION. ANY ADDITIONAL CONSTRUCTION LOADS THAT WILL APPLY LOAD TO THE STRAPS (INCLUDING BUT NOT LIMITED TO CRANE LOADS) SHALL BE INCLUDED IN THE STRAP DESIGN AND SHALL BE SUBMITTED TO THE ENGINEER PRIOR TO PLACING CONSTRUCTION LOADS ON THE APPROACH FILL.
 - FOR ADDITIONAL NOTES, SEE SHEET 1 OF 3 AND "FOUNDATION LAYOUT" SHEET.



BILL OF MATERIAL					
END BENT 1					
BAR	NO	SIZE	TYPE	LENGTH	WEIGHT
B1	12	#9		48'-0"	1,958
B2	10	#5	STR	45'-8"	476
B3	8	#4	STR	24'-1"	129
B4	12	#4	STR	4'-5"	35
H1	19	#5	5	11'-4"	225
H2	19	#5	5	11'-8"	231
H3	20	#5	4	10'-10"	226
H4	20	#5	4	10'-7"	221
K1	16	#4	STR	24'-1"	257
K2	4	#4	STR	2'-10"	8
K3	4	#4	STR	2'-11"	8
S1	57	#5	3	12'-7"	748
S2	57	#5	2	5'-4"	317
S3	28	#4	7	6'-6"	122
U1	40	#4	6	3'-8"	98
U2	1	#5	6	9'-4"	10
U3	1	#5	6	9'-7"	10
U4	1	#5	6	11'-0"	11
V1	80	#5	STR	7'-7"	633
V2	28	#4	STR	9'-2"	171
V3	28	#4	STR	9'-8"	181
QUANTITIES					
REINFORCING STEEL				LBS.	6,075
CLASS A CONCRETE:					
POUR 1:					
CAP & LOWER WINGS				C.Y.	35.9
POUR 2:					
BACKWALL & UPPER WING				C.Y.	11.3
TOTAL				C.Y.	47.2
HP 12x53 STEEL PILES				NO.	7
				LIN. FEET	630
PILE REDRIVES				EA.	7
PILE SETUP FOR HP 12x53 PILES				EA.	7

PROJECT NO. U2519AA-AB
CUMBERLAND/ROBESON COUNTY
 STATION: 16+64.84 -LPB-
 SHEET 3 OF 3

DocuSigned by:

 T. LAWS
 ENGINEER
 CIVIL
 7/26/2018

STV ENGINEERS, INC.
 900 West Trade St., Suite 715
 Charlotte, NC 28202
 NC License Number F-0991

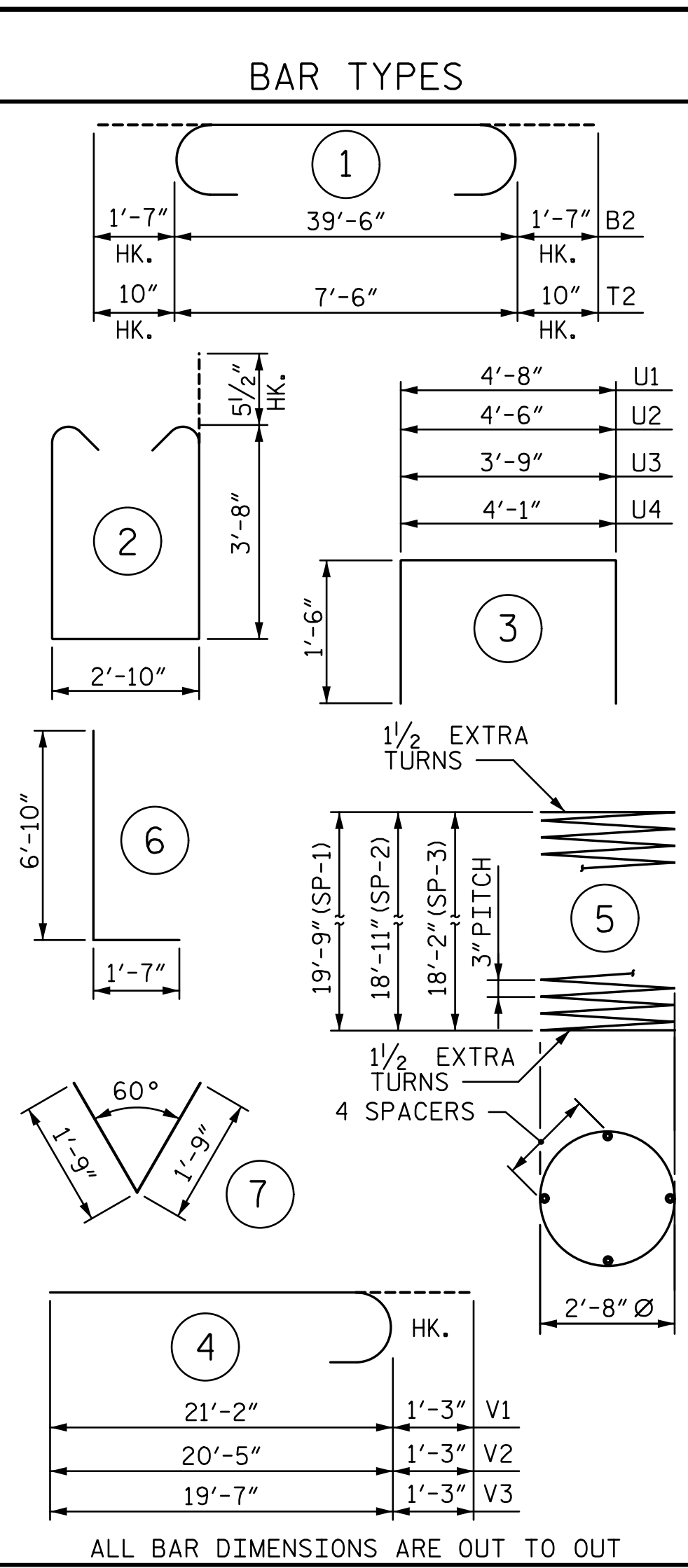
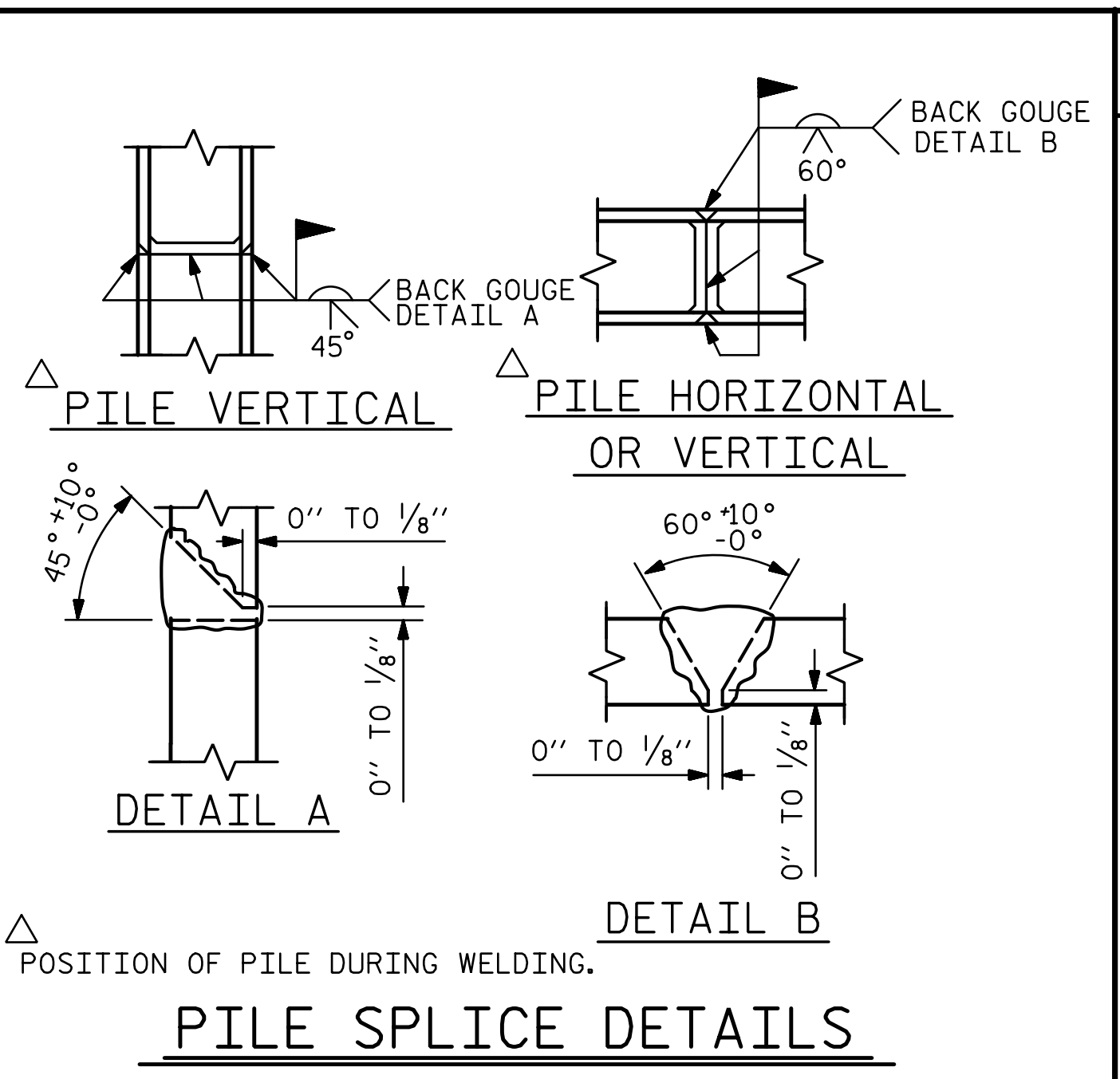
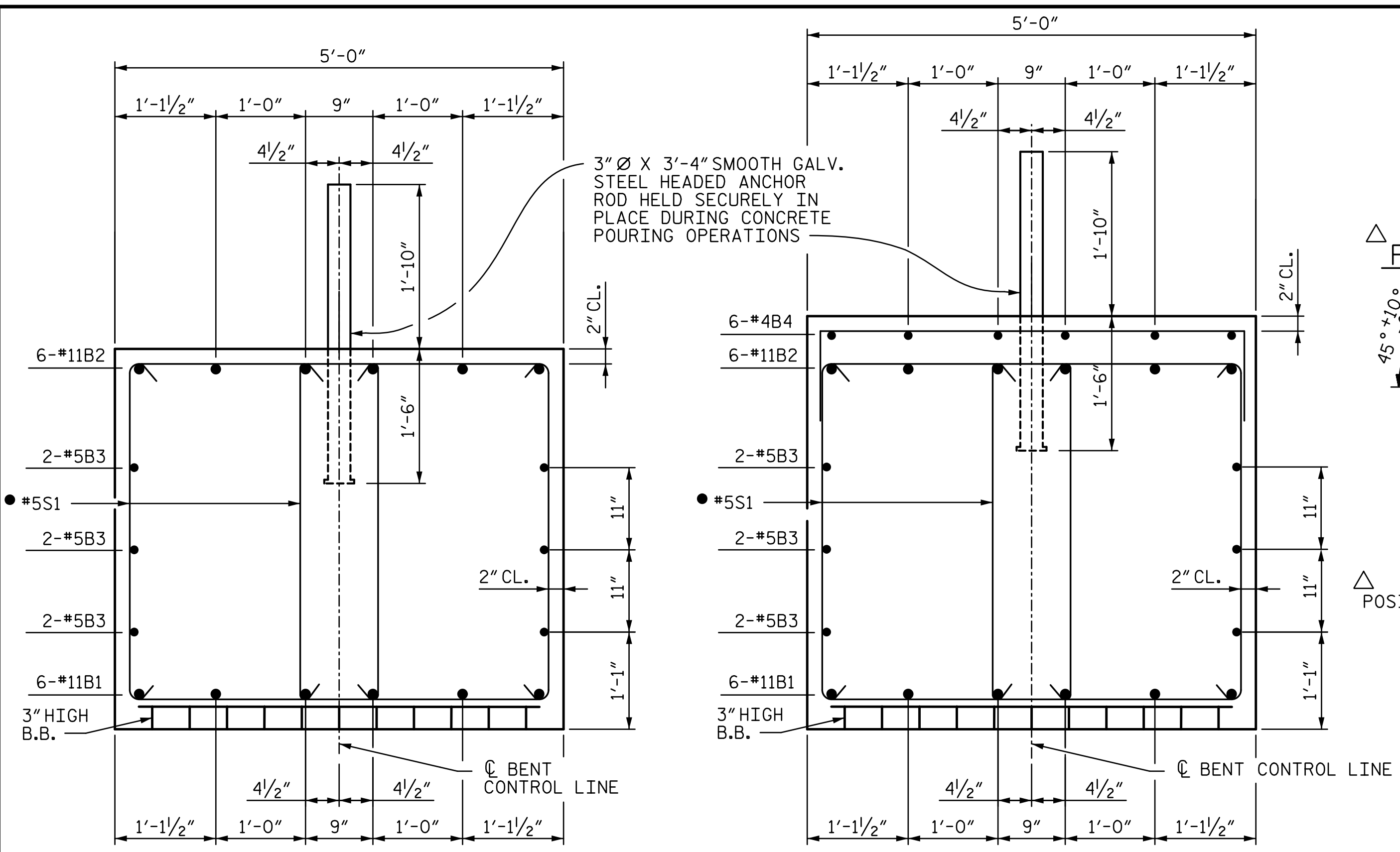
Balfour Beatty Infrastructure Inc. BRANCH

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
SUBSTRUCTURE END BENT 1					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

SHEET NO.		S1-30
TOTAL SHEETS		42

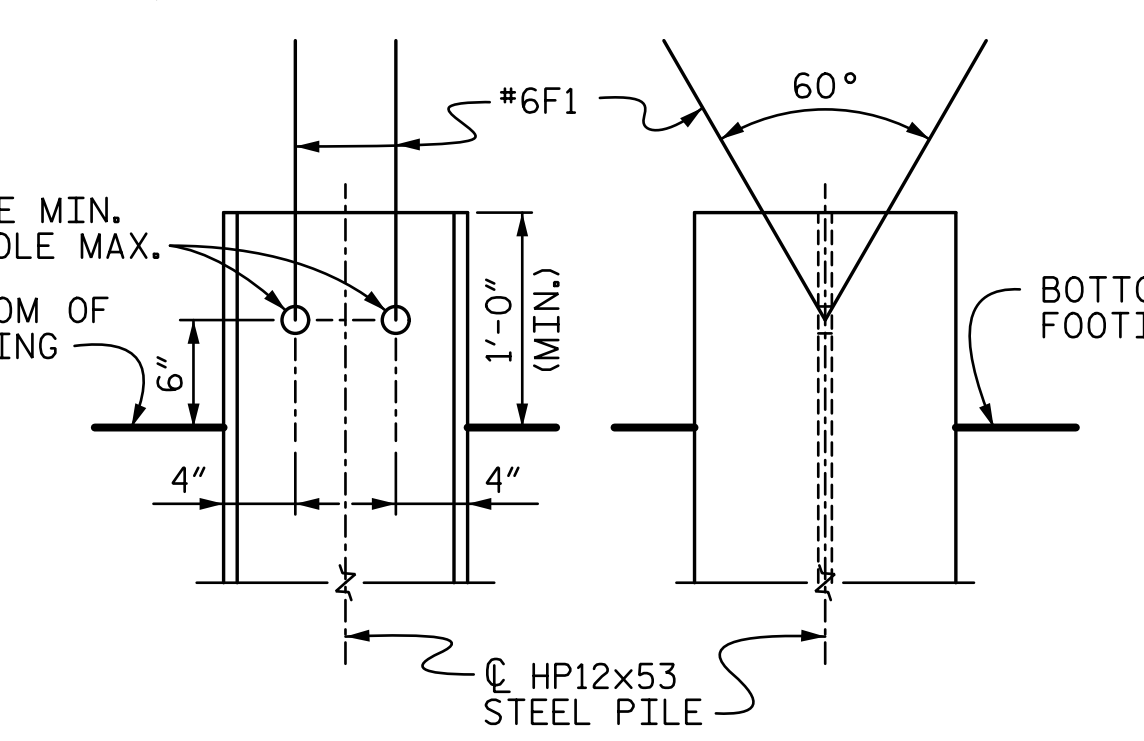
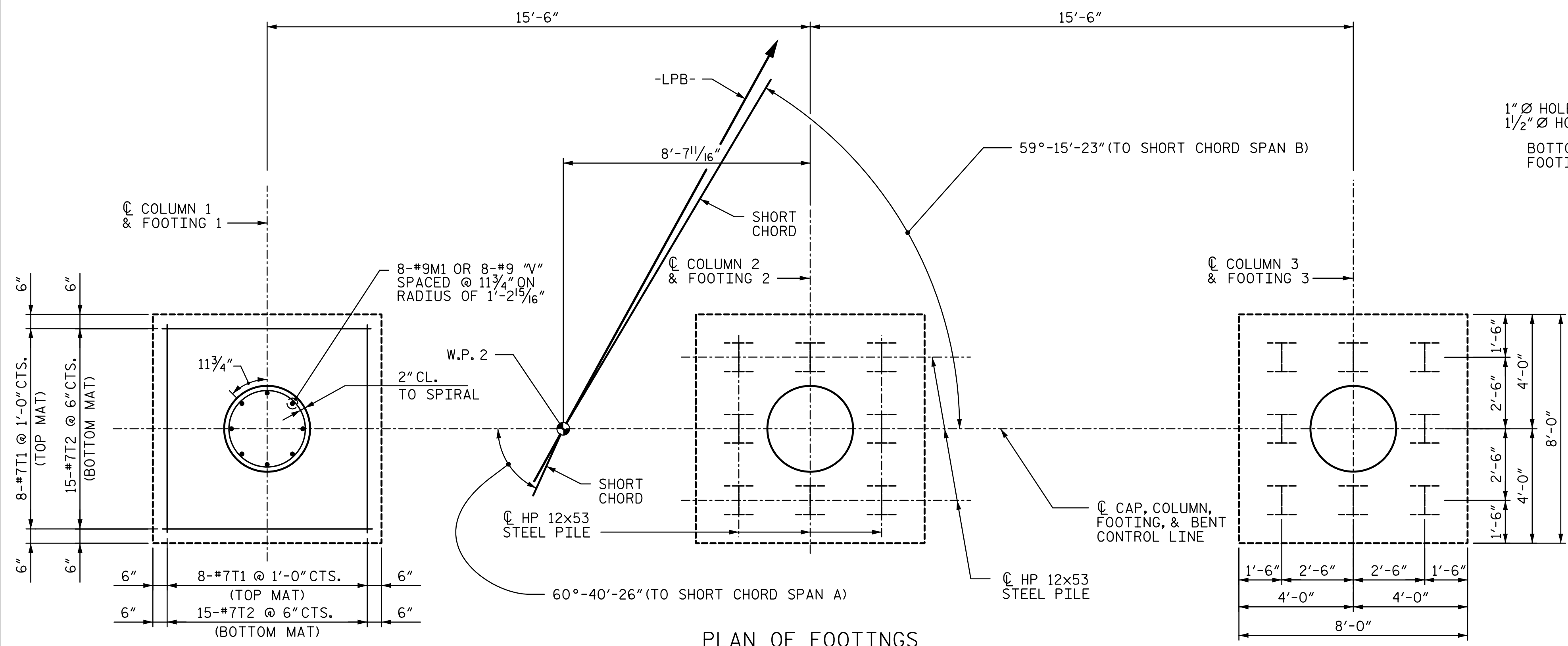
DRAWN BY : <u>MBC</u>	DATE : <u>7-18</u>	DESIGN ENGINEER OF RECORD: <u>T. LAWS</u>	DATE : <u>8-18</u>
CHECKED BY : <u>TRL</u>	DATE : <u>7-18</u>		

DATE: 9/25/2018 TIME: 2:34:16 PM
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BILL OF MATERIAL					
BAR NO.	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	6	#11	STR	39'-6"	1,264
B2	6	#11	1	42'-8"	1,360
B3	6	#5	STR	39'-8"	248
B4	18	#4	STR	8'-10"	106
B5	6	#4	STR	5'-10"	23
F1	48	#6	7	3'-6"	252
M1	24	#9	6	8'-5"	687
S1	100	#5	2	11'-1"	1,156
T1	48	#7	STR	7'-8"	752
T2	90	#7	1	9'-2"	1,686
U1	48	#4	3	7'-8"	246
U2	8	#4	3	7'-6"	40
U3	4	#4	3	6'-9"	18
U4	4	#4	3	7'-1"	19
V1	8	#9	4	22'-5"	610
V2	8	#9	4	21'-8"	589
V3	8	#9	4	20'-10"	567
SP-1	1	**	5	676'-7"	452
SP-2	1	**	5	649'-1"	434
SP-3	1	**	5	624'-4"	417

QUANTITIES		
REINFORCING STEEL	LBS.	9,623
SPIRAL COLUMN REINFORCING STEEL	LBS.	1,303
CLASS A CONCRETE:		
POUR 1 - FOOTINGS	CU. YDS	21.3
POUR 2 - COLUMNS	CU. YDS	14.7
POUR 3 - CAP	CU. YDS	31.9
TOTAL	CU. YDS	67.9
HP 12x53 STEEL PILES	EA.	24
	FT.	1,200
PILE REDRIVES	EA.	12
PILE DRIVING EQUIP. SETP FOR HP 12x53 STEEL PILES	EA.	24
FOUNDATION EXCAVATION	LUMP SUM	



PROJECT NO. U2519AA-AB
CUMBERLAND/ROBESON COUNTY
 STATION: 16+64.84 -LPB-
 SHEET 2 OF 2

DocuSigned by:
STV ENGINEERS, INC.
 SEAL 40317
 ENGINEER
 T. LAWS
 7/26/2018

STV ENGINEERS, INC.
 900 West Trade St., Suite 715
 Charlotte, NC 28202
 NC License Number F-0991

Balfour Beatty
 Infrastructure Inc. CIVIL
 A Joint Venture

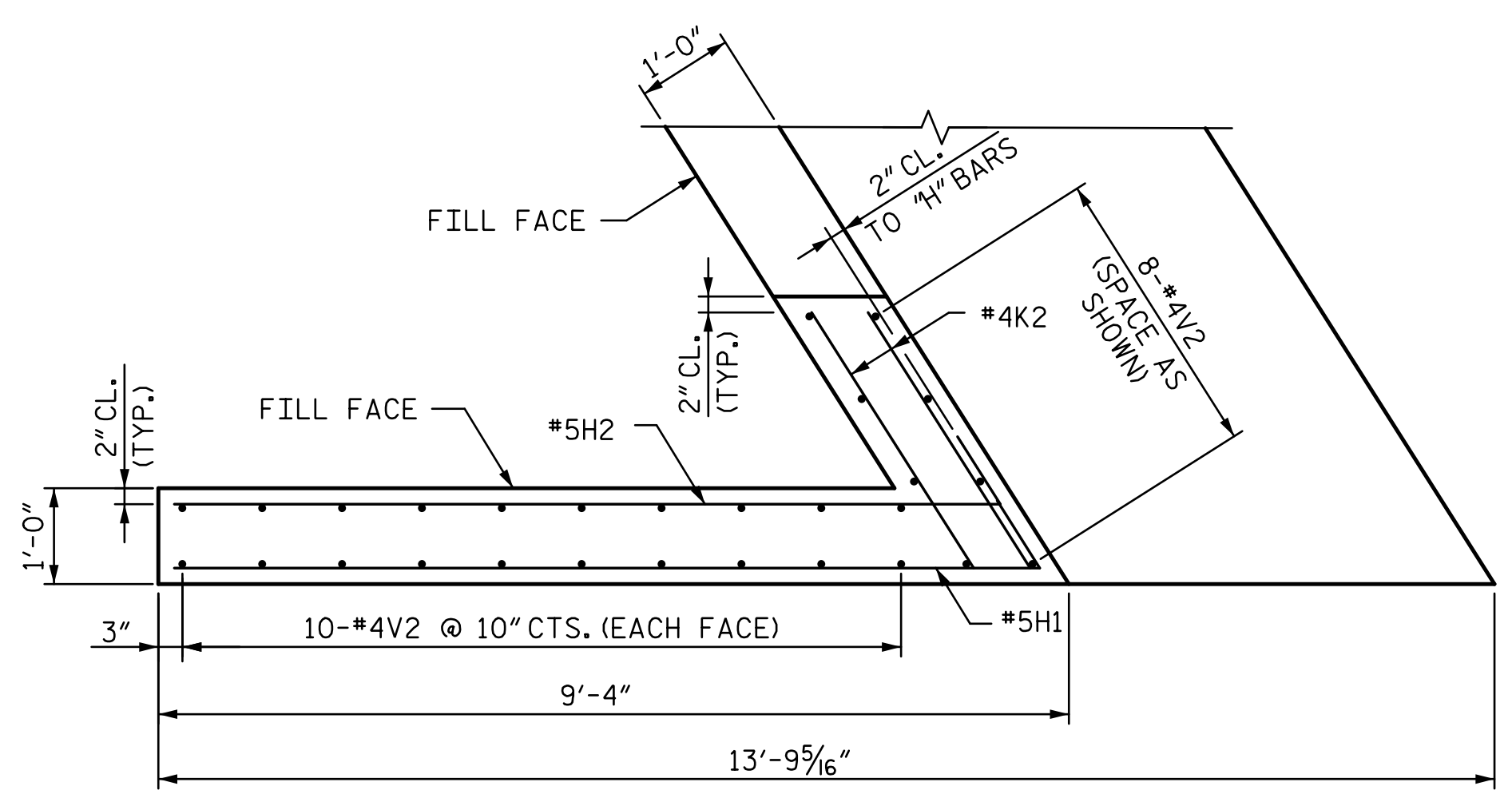
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
SUBSTRUCTURE					
BENT 1					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

SHEET NO.		S1-32
TOTAL SHEETS		42

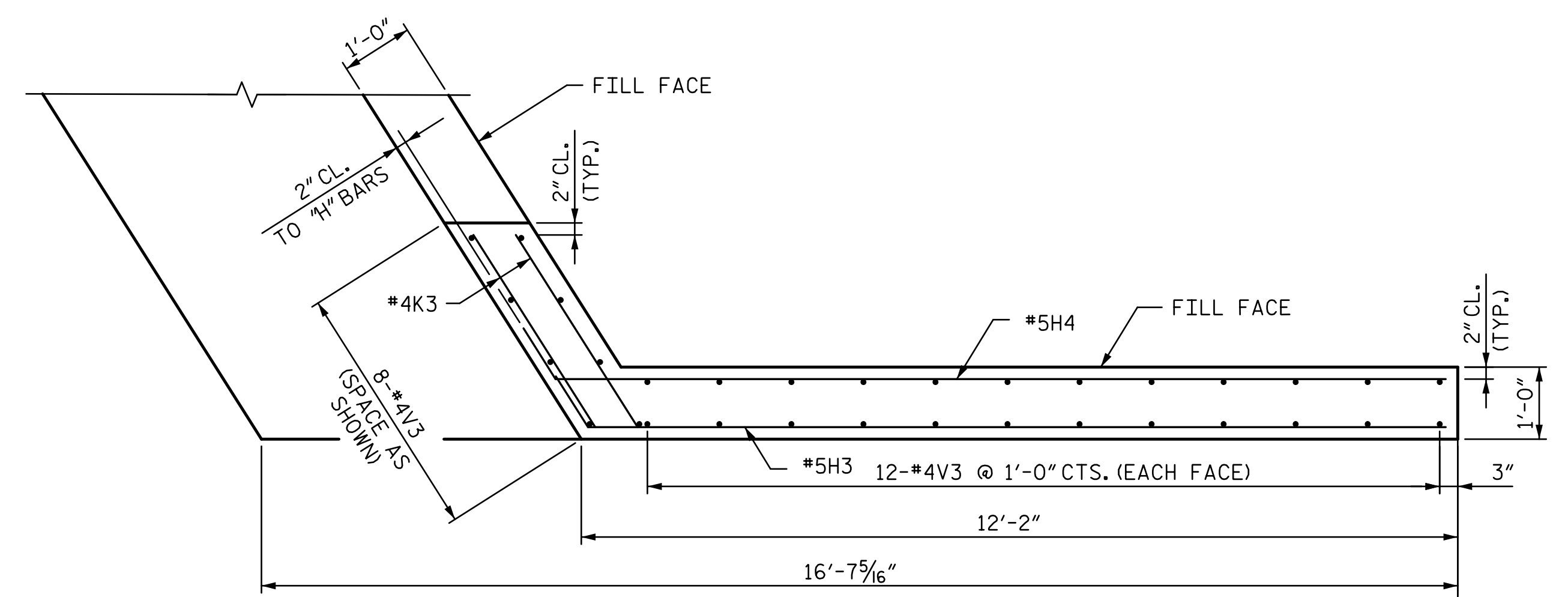
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 CHECKED BY: TRL DATE: 8-18

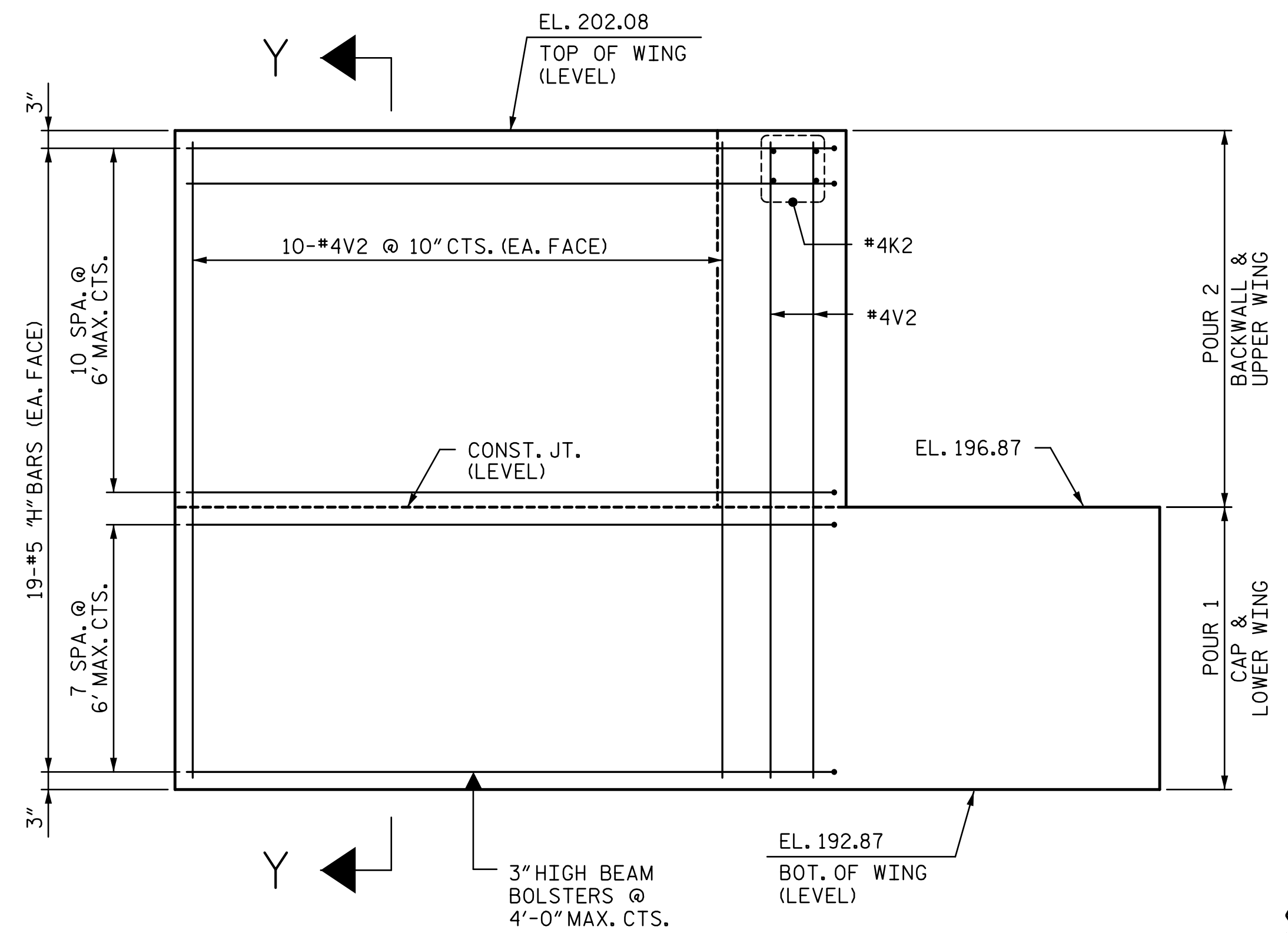
DESIGN ENGINEER OF RECORD: T. LAWS DATE: 8-18



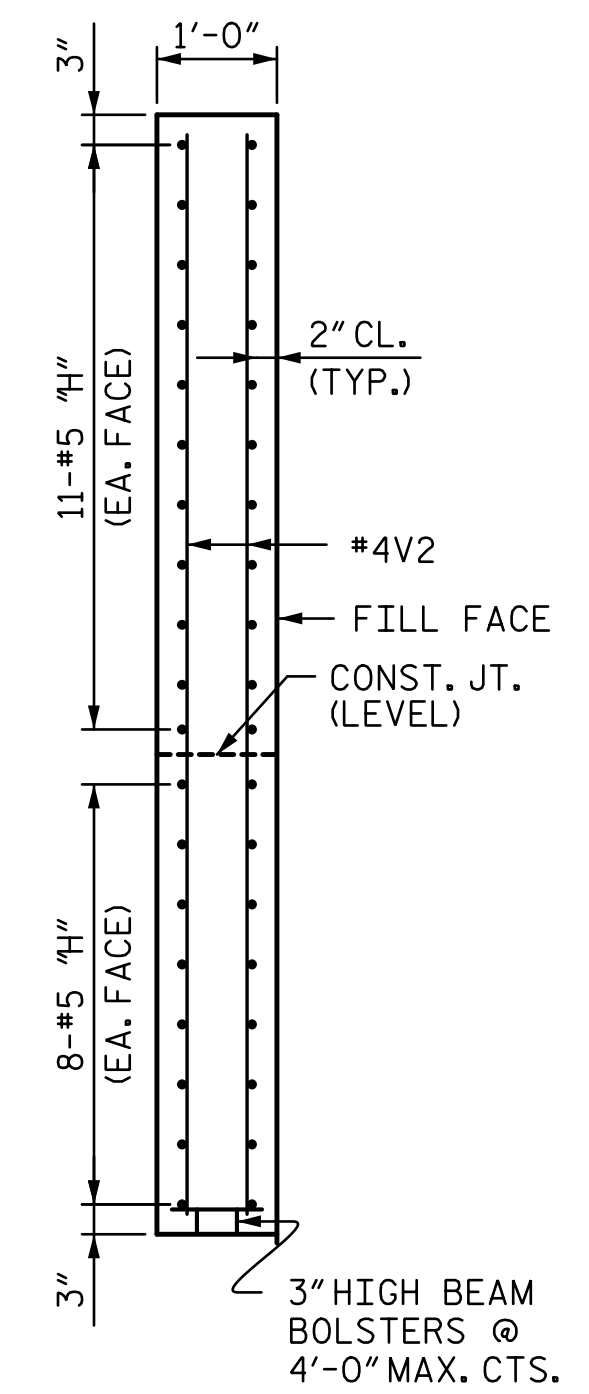
PLAN OF WING (W3)



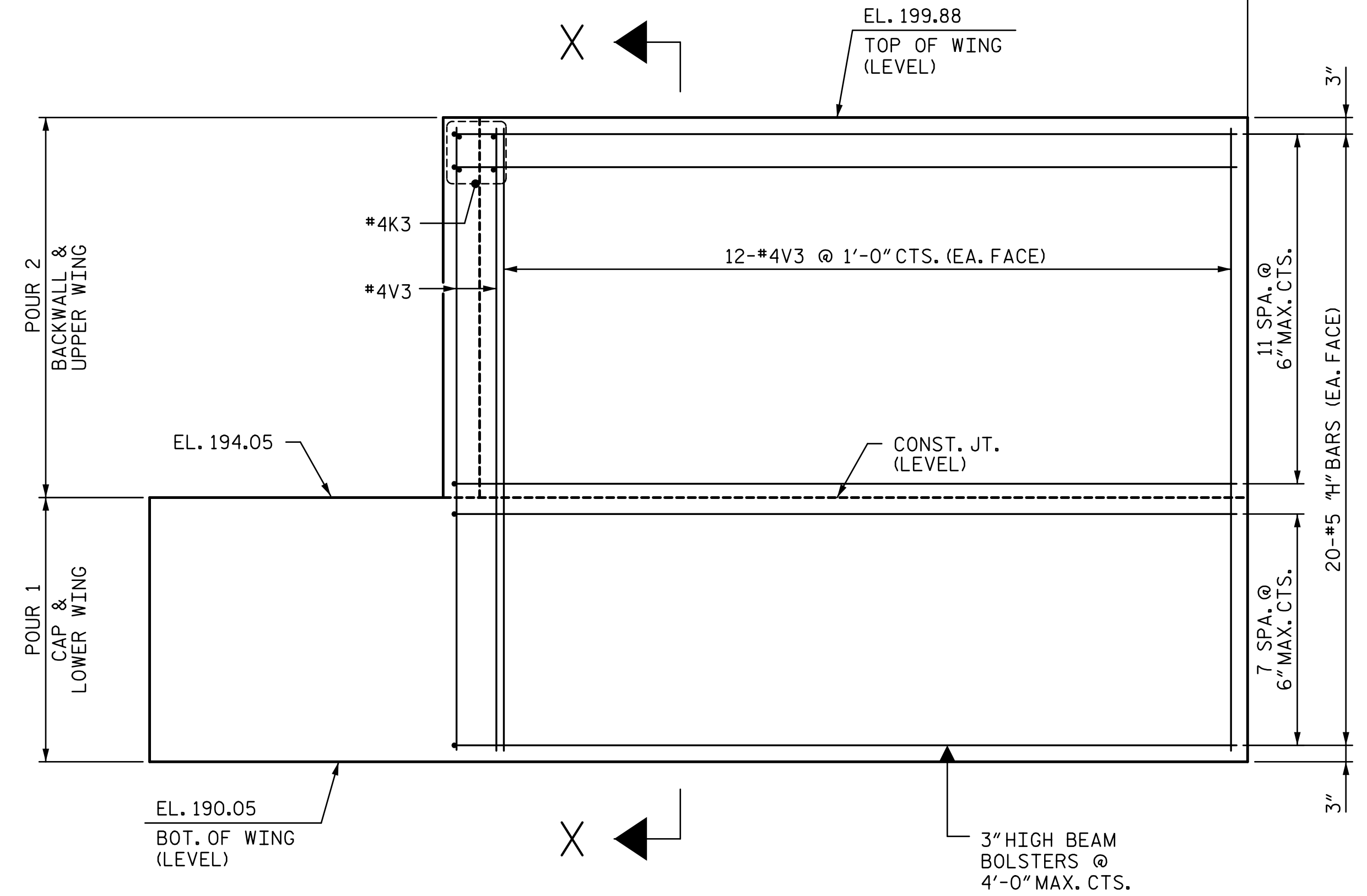
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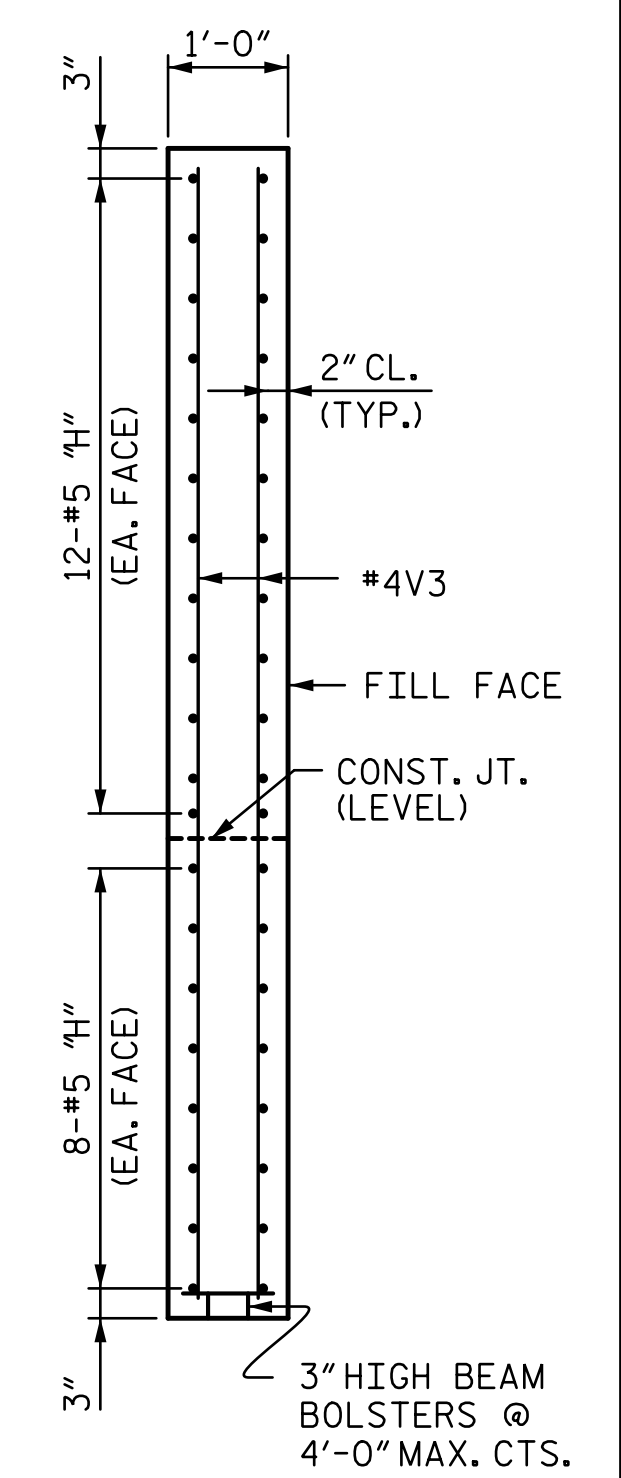
ELEVATION OF WING (W3)



SECTION Y-Y



ELEVATION OF WING (W4)



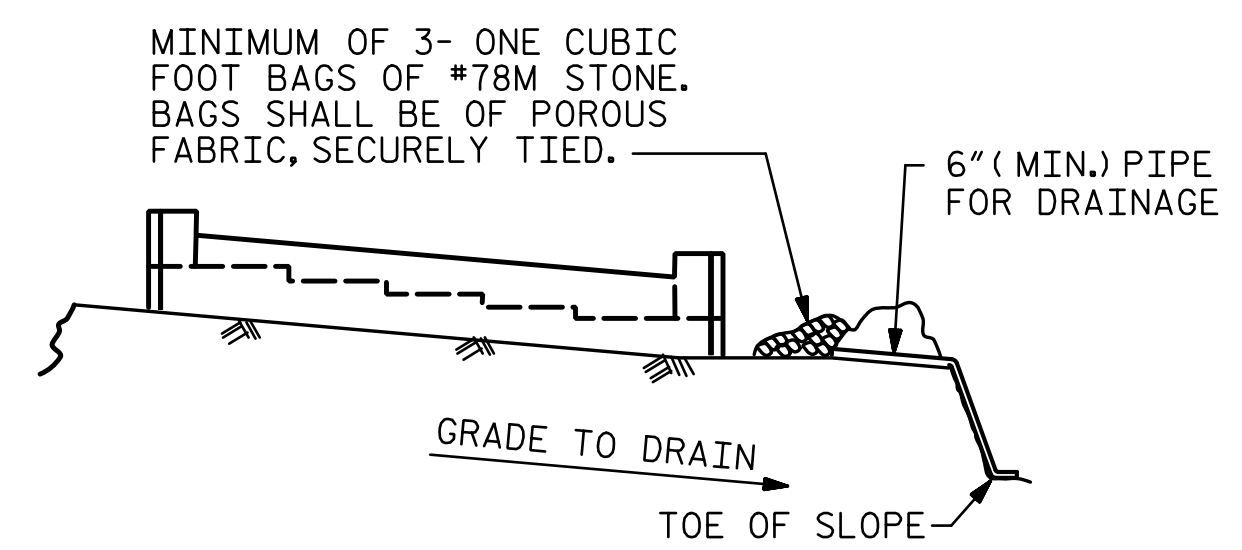
SECTION X-X

PROJECT NO. U2519AA-AB
CUMBERLAND/ROBESON COUNTY
 STATION: 16+64.84 -LPB-
 SHEET 2 OF 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED			STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH SUBSTRUCTURE END BENT 2					
			REVISIONS					
	STV ENGINEERS, INC. 900 West Trade St., Suite 715 Charlotte, NC 28202 NC License Number F-0991		NO.	BY:	DATE:	NO.	BY:	DATE:
			1			2		

DRAWN BY : <u>VKS</u>	DATE : <u>7-18</u>	DESIGN ENGINEER OF RECORD: <u>T. LAWS</u>	DATE : <u>8-18</u>
CHECKED BY : <u>TRL</u>	DATE : <u>7-18</u>		

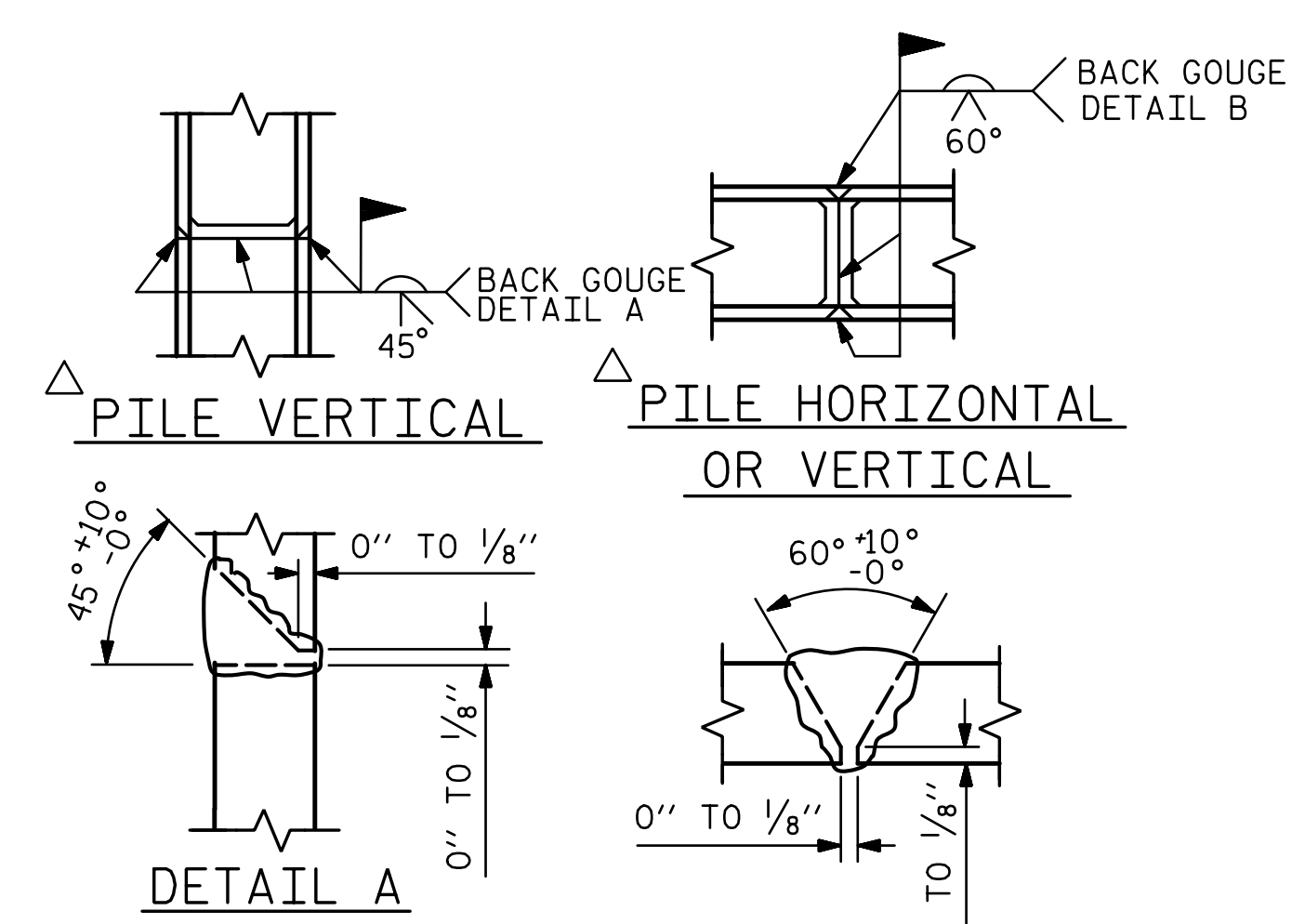
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BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

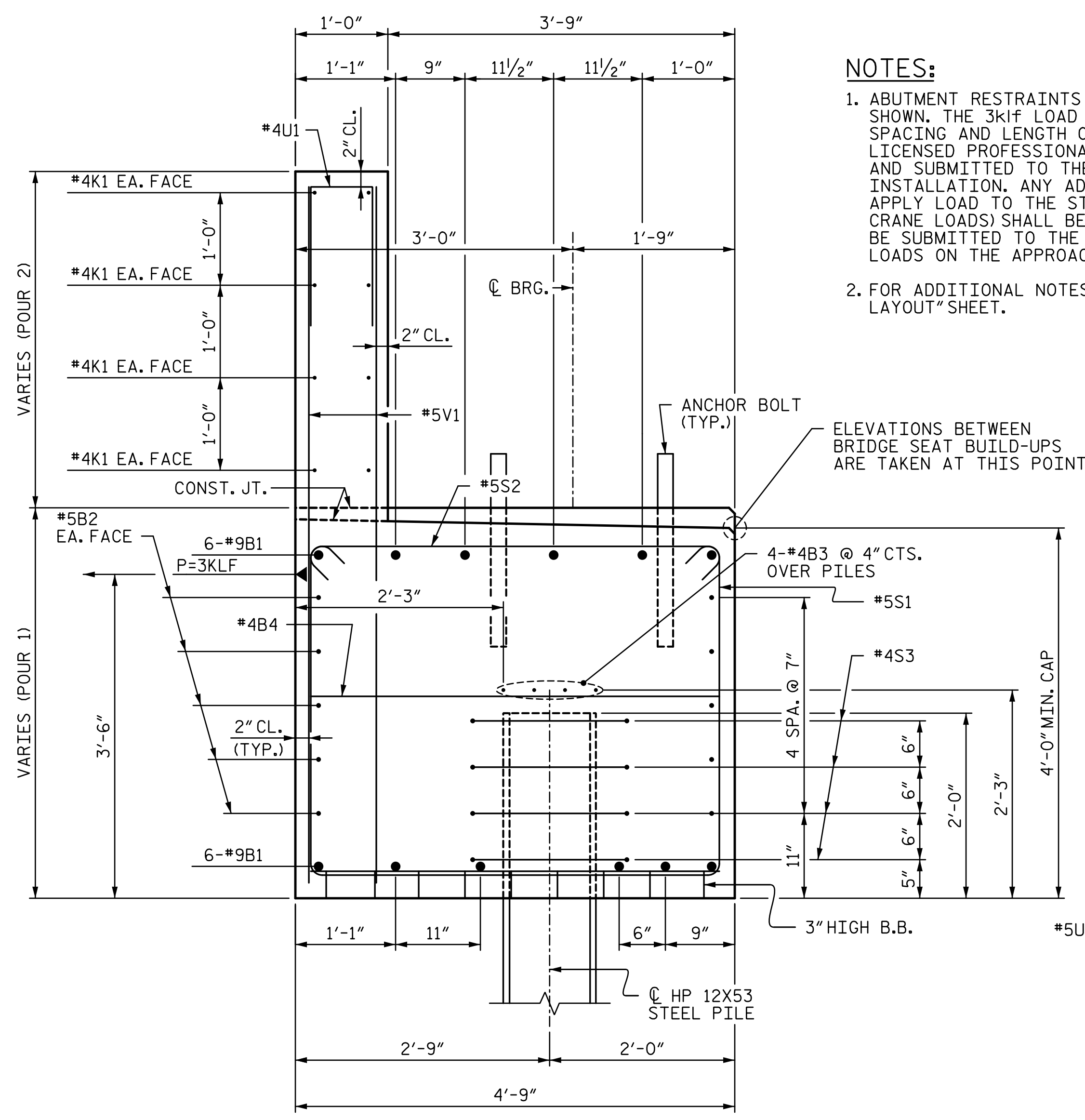
BAGGED STONE SHALL REMAIN IN PLACE UNTIL THE ENGINEER DIRECTS THAT IT BE REMOVED. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF SILT ACCUMULATIONS AT BAGGED STONE WHEN SO DIRECTED BY THE ENGINEER. BAGS SHALL BE REMOVED AND REPLACED WHENEVER THE ENGINEER DETERMINES THAT THEY HAVE DETERIORATED AND LOST THEIR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

TEMPORARY DRAINAGE AT END BENT

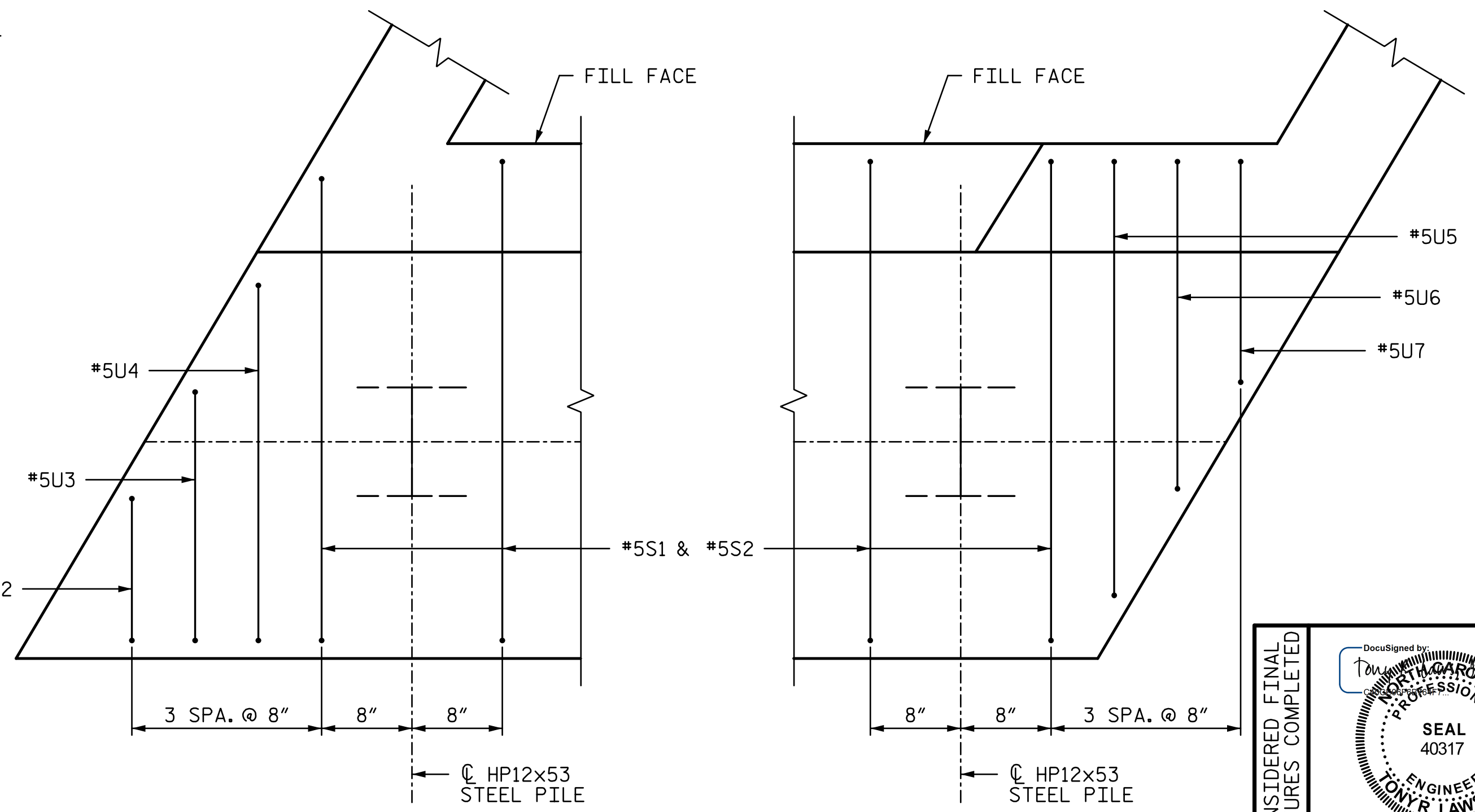


PILE SPLICE DETAILS

- NOTES:**
- ABUTMENT RESTRAINTS (STRAPS) ARE REQUIRED ALONG THE CAP AS SHOWN. THE 3klf LOAD PROVIDED IS A FACTORED LOAD. THE SPACING AND LENGTH OF STRAPS SHALL BE DETERMINED BY A LICENSED PROFESSIONAL ENGINEER REGISTERED IN NORTH CAROLINA AND SUBMITTED TO THE ENGINEER FOR REVIEW PRIOR TO INSTALLATION. ANY ADDITIONAL CONSTRUCTION LOADS THAT WILL APPLY LOAD TO THE STRAPS (INCLUDING BUT NOT LIMITED TO CRANE LOADS) SHALL BE INCLUDED IN THE STRAP DESIGN AND SHALL BE SUBMITTED TO THE ENGINEER PRIOR TO PLACING CONSTRUCTION LOADS ON THE APPROACH FILL.
 - FOR ADDITIONAL NOTES, SEE SHEET 1 OF 3 AND "FOUNDATION LAYOUT" SHEET.



SECTION A-A

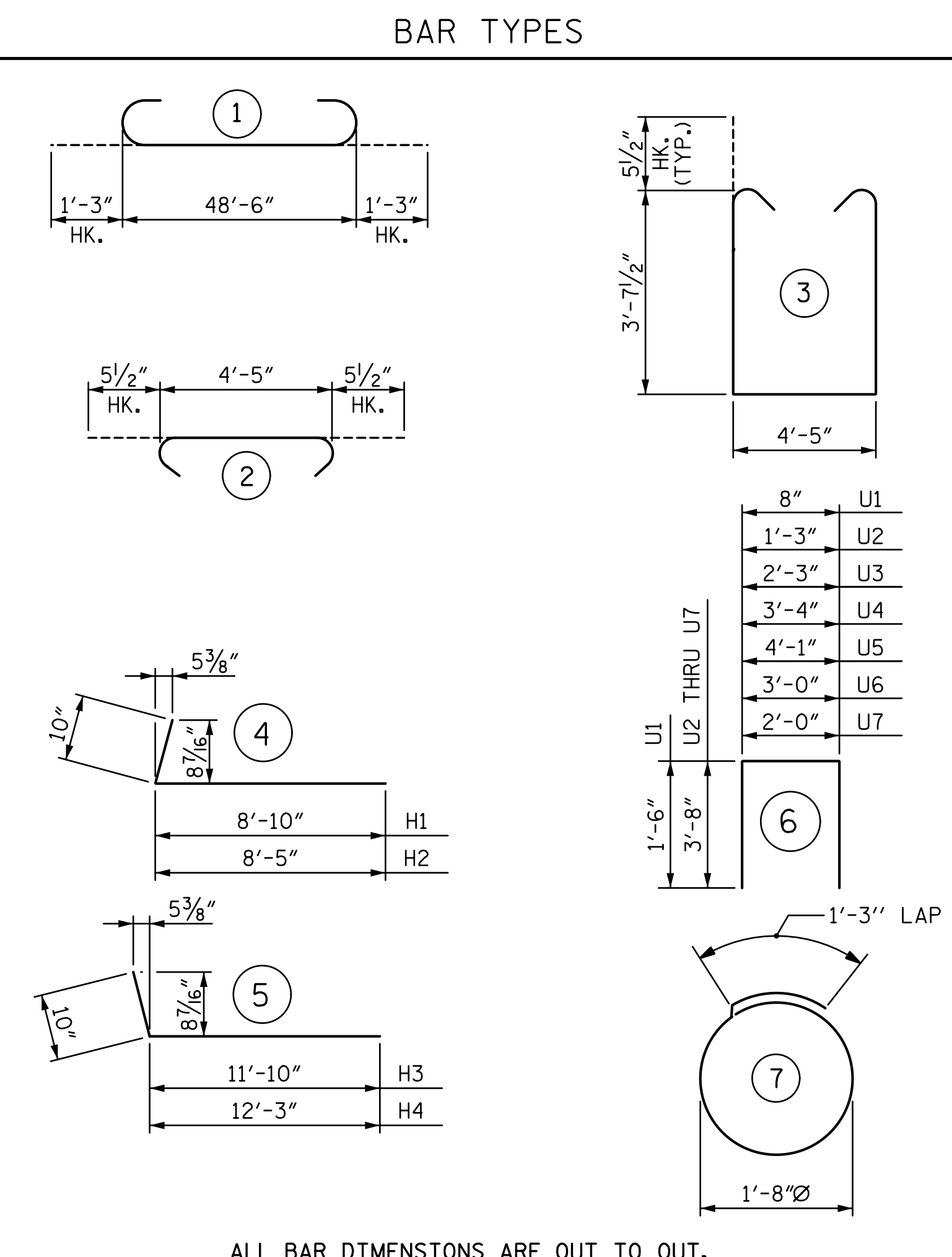


DETAIL "B"

("B", "H" & "V" BARS NOT SHOWN FOR CLARITY)

DETAIL "C"

("B", "H" & "V" BARS NOT SHOWN FOR CLARITY)



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

END BENT 2

BAR	NO	SIZE	TYPE	LENGTH	WEIGHT
B1	12	#9	1	51'-0"	2,081
B2	10	#5	STR	48'-8"	508
B3	8	#4	STR	25'-7"	137
B4	13	#4	STR	4'-5"	38
H1	19	#5	4	9'-8"	192
H2	19	#5	4	9'-3"	183
H3	20	#5	5	12'-8"	264
H4	20	#5	5	13'-1"	273
K1	16	#4	STR	25'-7"	273
K2	4	#4	STR	3'-0"	8
K3	4	#4	STR	3'-0"	8
S1	62	#5	3	12'-7"	814
S2	62	#5	2	5'-4"	345
S3	28	#4	7	6'-6"	122
U1	43	#4	6	3'-8"	105
U2	1	#5	6	8'-7"	9
U3	1	#5	6	9'-7"	10
U4	1	#5	6	10'-8"	11
U5	1	#5	6	11'-5"	12
U6	1	#5	6	10'-4"	11
U7	1	#5	6	9'-4"	10
V1	86	#5	STR	7'-8"	688
V2	28	#5	STR	8'-10"	165
V3	32	#5	STR	9'-6"	203

QUANTITIES

REINFORCING STEEL	LBS.	6,470
CLASS A CONCRETE:		
POUR 1:		
CAP & LOWER WINGS	C.Y.	38.1
POUR 2:		
BACKWALL & UPPER WINGS	C.Y.	11.6
TOTAL	C.Y.	49.7
HP 12x53 STEEL PILES	NO.	7
	LIN. FEET	595
PILE REDRIVES	EA.	4
PILE SETUP FOR HP 12x53 PILES	EA.	7

PROJECT NO. U2519AA-AB
CUMBERLAND/ROBESON COUNTY
 STATION: 16+64.84 -LPB-
 SHEET 3 OF 3

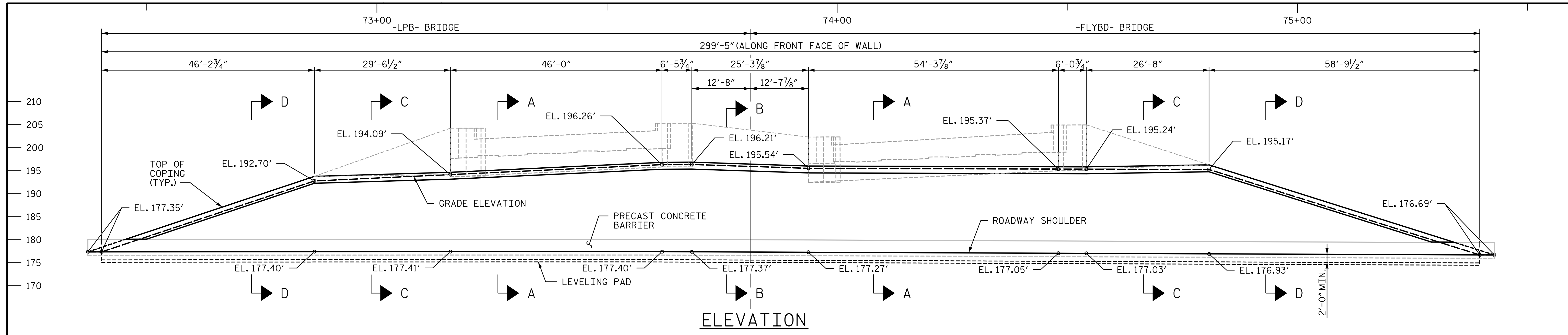
DocuSigned by:

STV 100 years
 STV ENGINEERS, INC.
 900 West Trade St., Suite 715
 Charlotte, NC 28202
 NC License Number F-0991

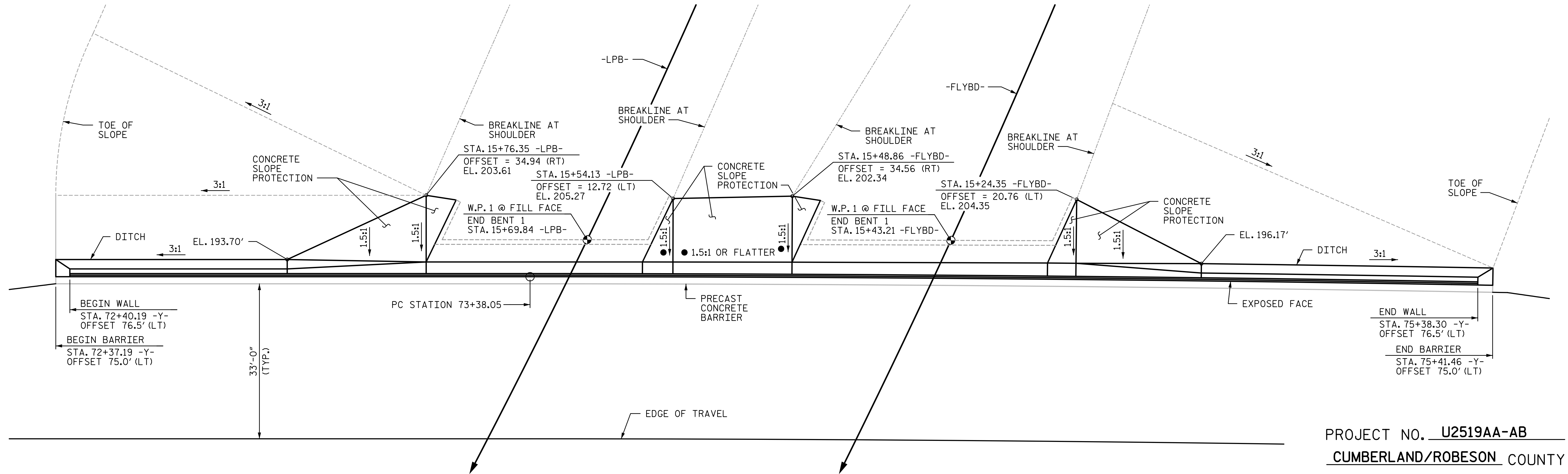
STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 SUBSTRUCTURE
 END BENT 2

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

TOTAL SHEETS: 42



ELEVATION



PLAN
(COPING NOT SHOWN FOR CLARITY)

PROJECT NO. U2519AA-AB
CUMBERLAND/ROBESON COUNTY
 STATION: 16+64.84 -LPB-
 SHEET 1 OF 4

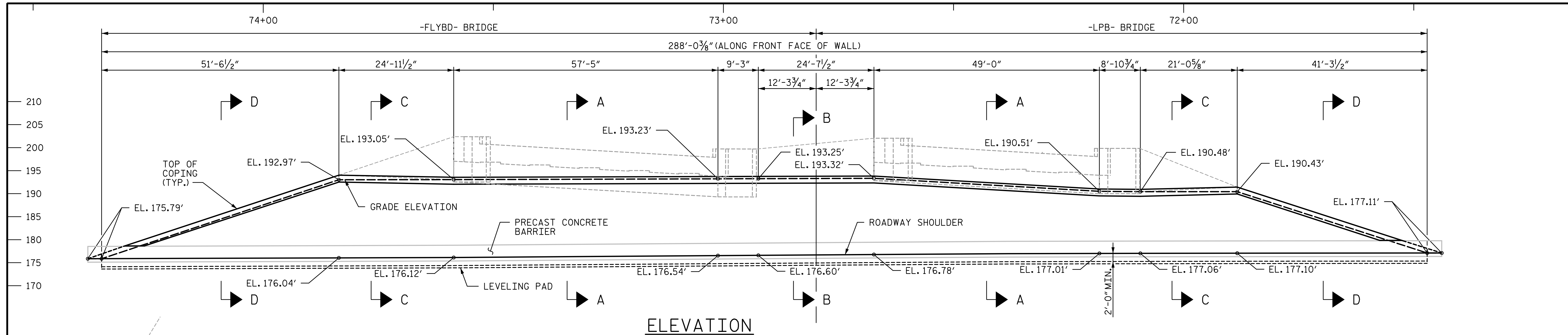
- NOTES:**
1. FOR SECTIONS AND DETAILS SEE MSE WALL AND CONCRETE SLOPE PROTECTION SHEET 3 OF 4.
 2. FOR NOTES AND QUANTITIES SEE MSE WALL AND CONCRETE SLOPE PROTECTION SHEET 4 OF 4.
 3. MSE WALL AND CONCRETE SLOPE PROTECTION QUANTITIES PROVIDED ARE FOR AREA INDICATED FOR -LPB- BRIDGE.

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED			STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH		
	MSE WALL AND CONCRETE SLOPE PROTECTION AT END BENT 1				
	REVISIONS				
	NO.	BY:	DATE:	NO.	BY:
1			3		
2			4		

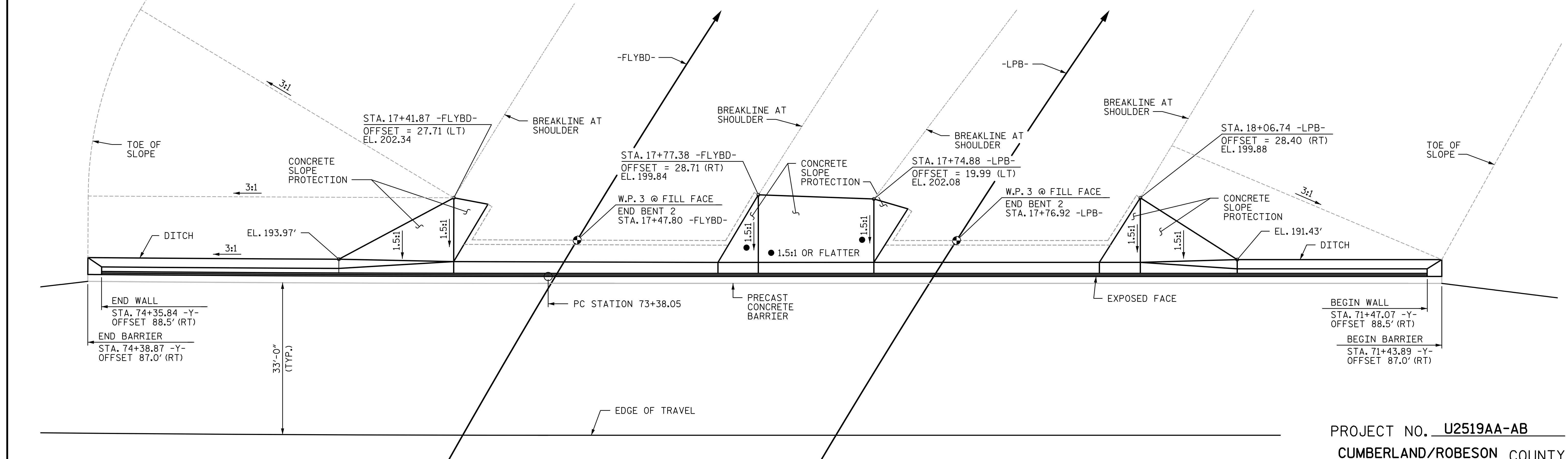
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CHECKED BY : <u>JTG</u>	DATE : <u>8-18</u>		

SHEET NO. S1-36
TOTAL SHEETS 42



ELEVATION



PLAN

(COPING NOT SHOWN FOR CLARITY)

PROJECT NO. U2519AA-AB
 CUMBERLAND/ROBESON COUNTY
 STATION: 16+64.84 -LPB-
 SHEET 2 OF 4

- NOTES:**
- FOR SECTIONS AND DETAILS SEE MSE WALL AND CONCRETE SLOPE PROTECTION SHEET 3 OF 4.
 - FOR NOTES AND QUANTITIES SEE MSE WALL AND CONCRETE SLOPE PROTECTION SHEET 4 OF 4.
 - MSE WALL AND CONCRETE SLOPE PROTECTION QUANTITIES PROVIDED ARE FOR AREA INDICATED FOR -LPB- BRIDGE.

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CHECKED BY : JTG	DATE : 8-18		

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

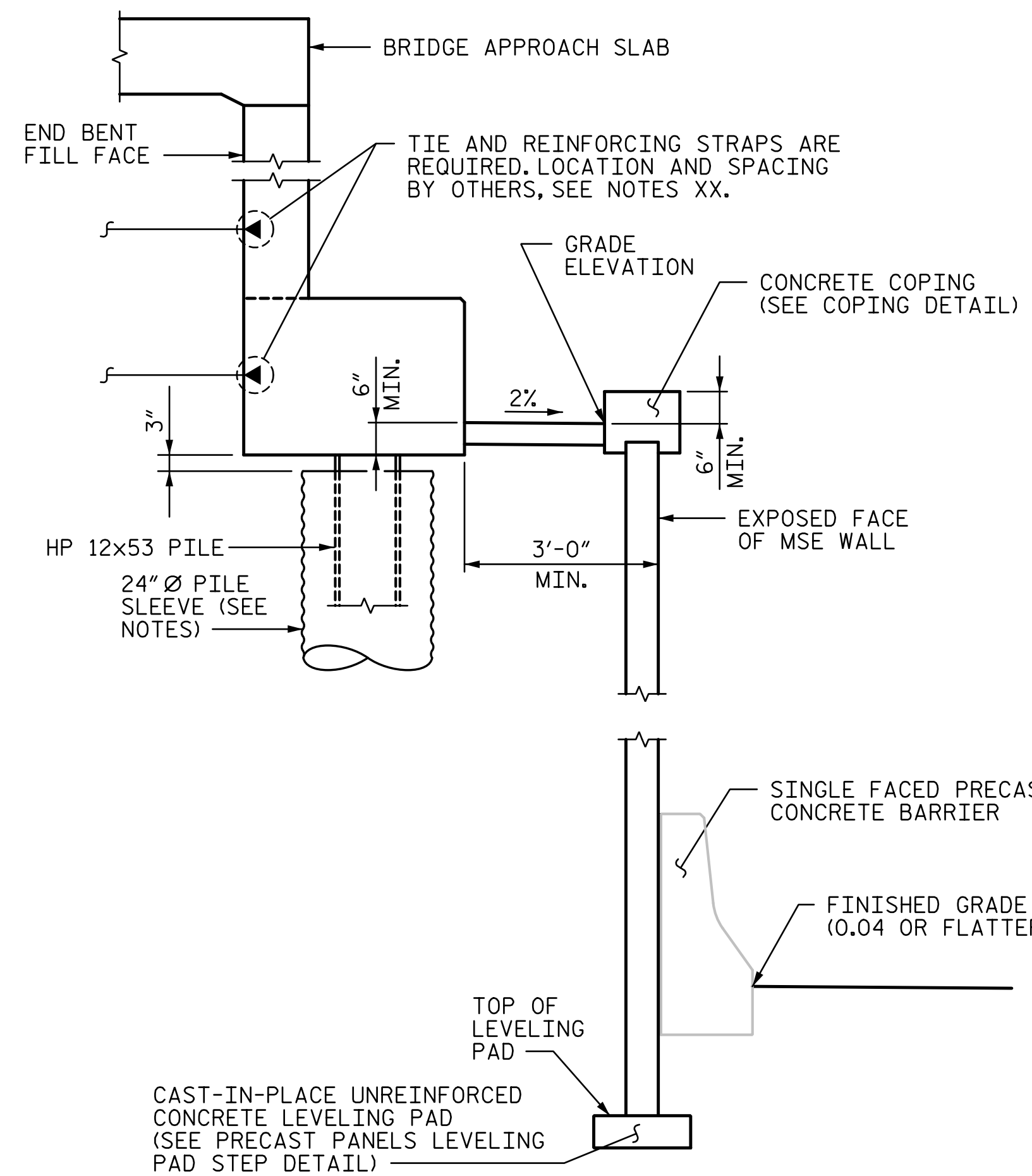
STV 100 years
 STV ENGINEERS, INC.
 900 West Trade St., Suite 715
 Charlotte, NC 28202
 NC License Number F-0991

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

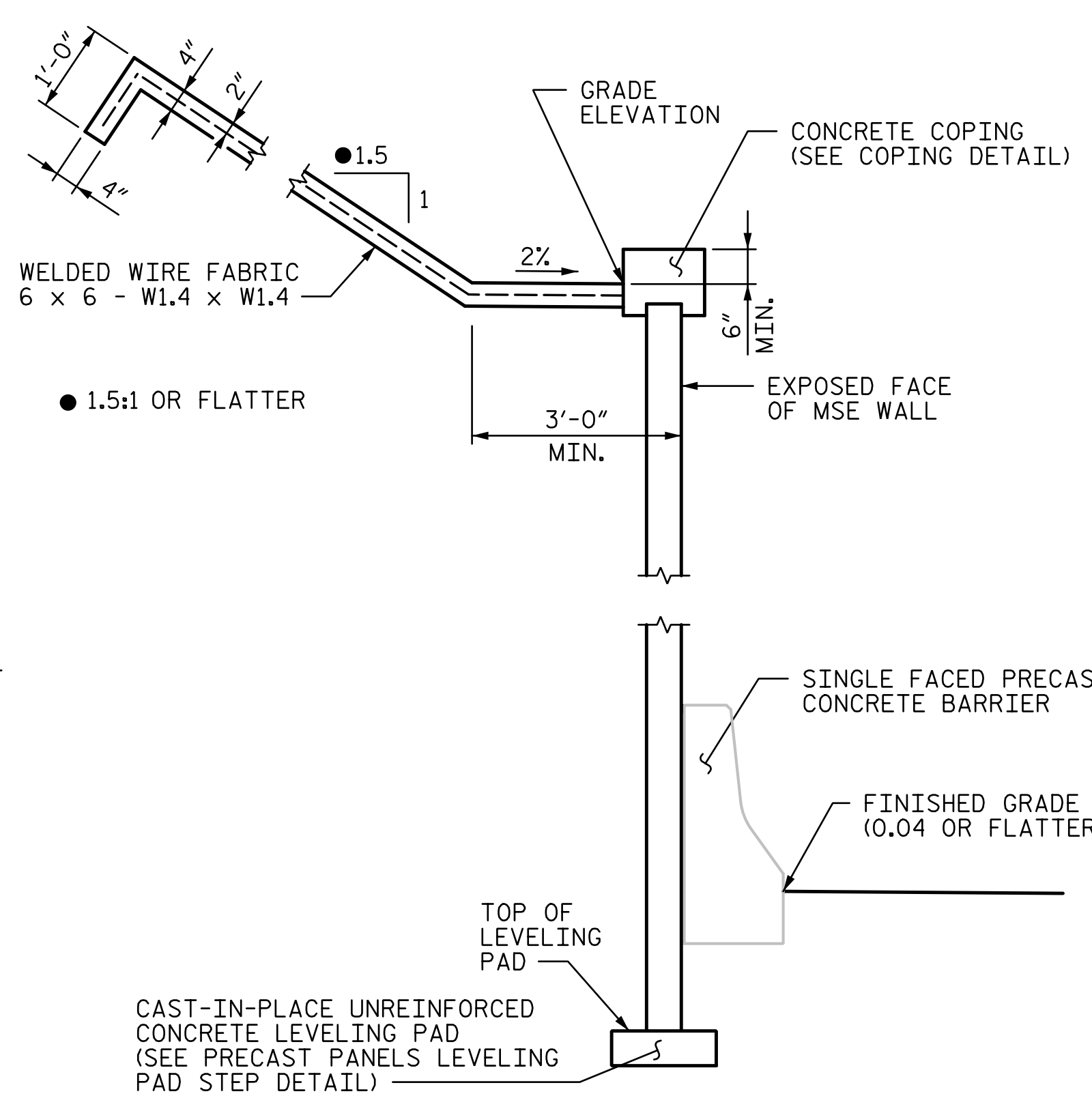
MSE WALL AND CONCRETE SLOPE PROTECTION AT END BENT 2

REVISIONS			
NO.	BY:	DATE:	
1			
2			
3			
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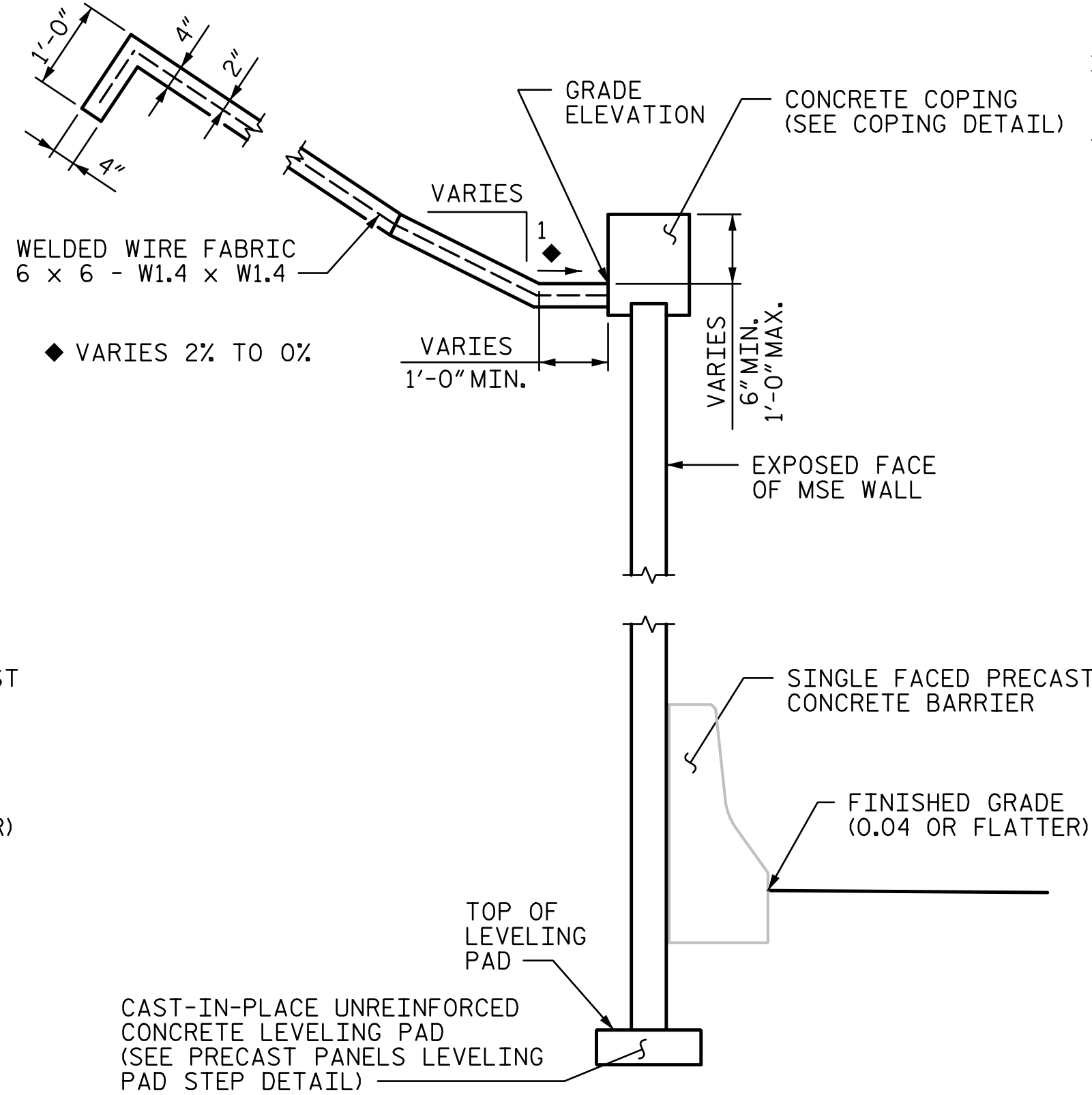
SHEET NO. S1-37	TOTAL SHEETS 42
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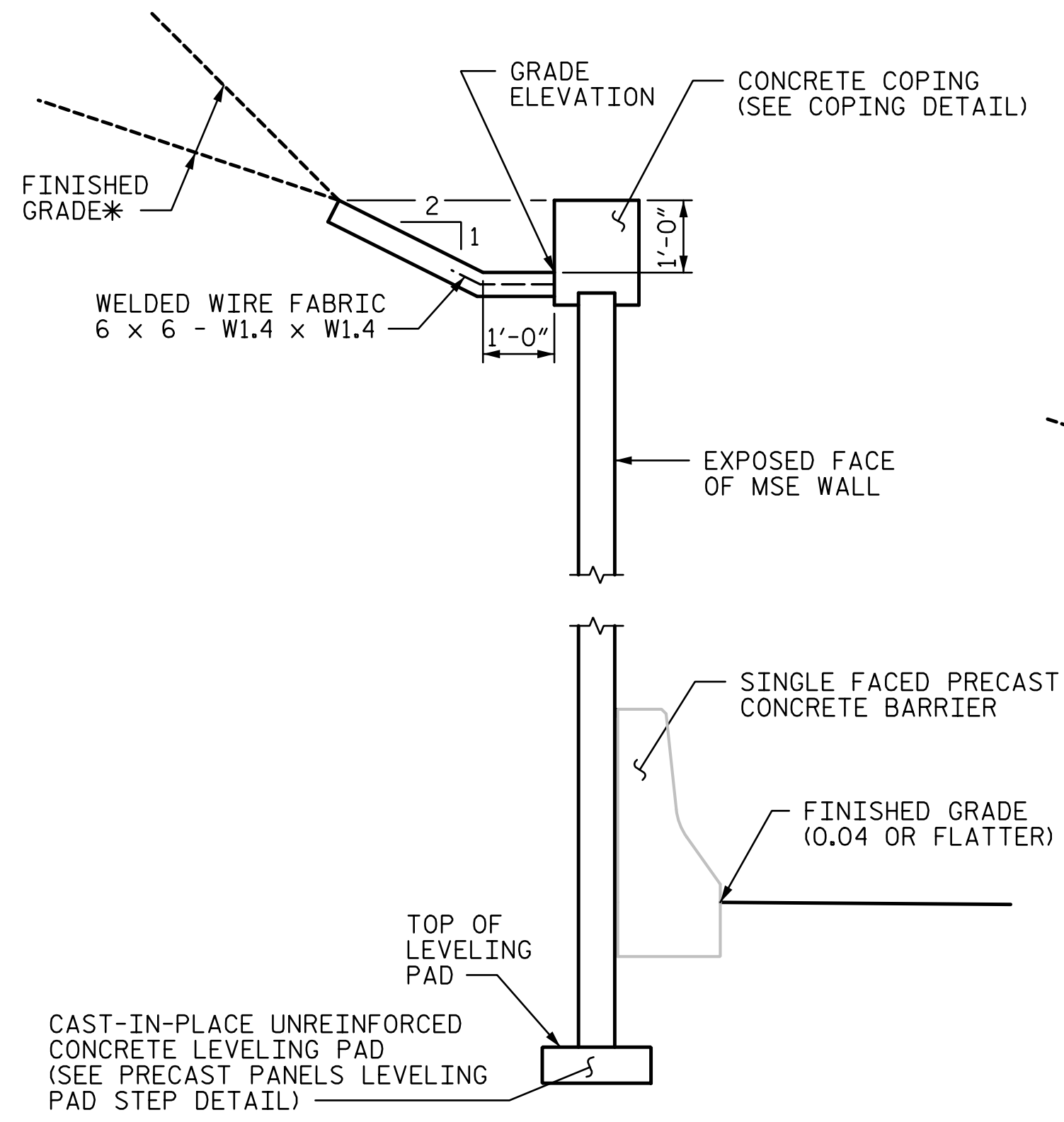
SECTION A-A



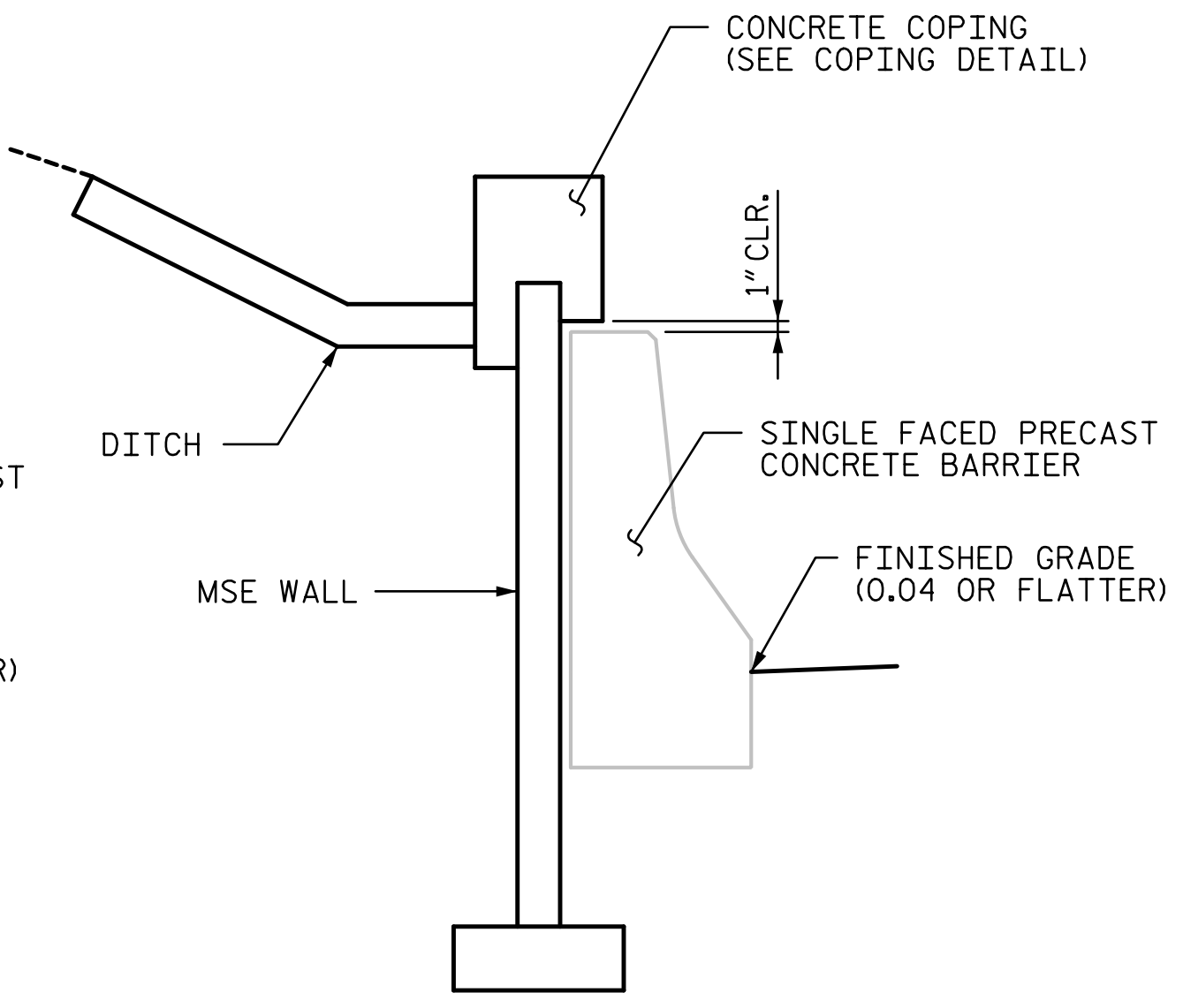
SECTION B-B



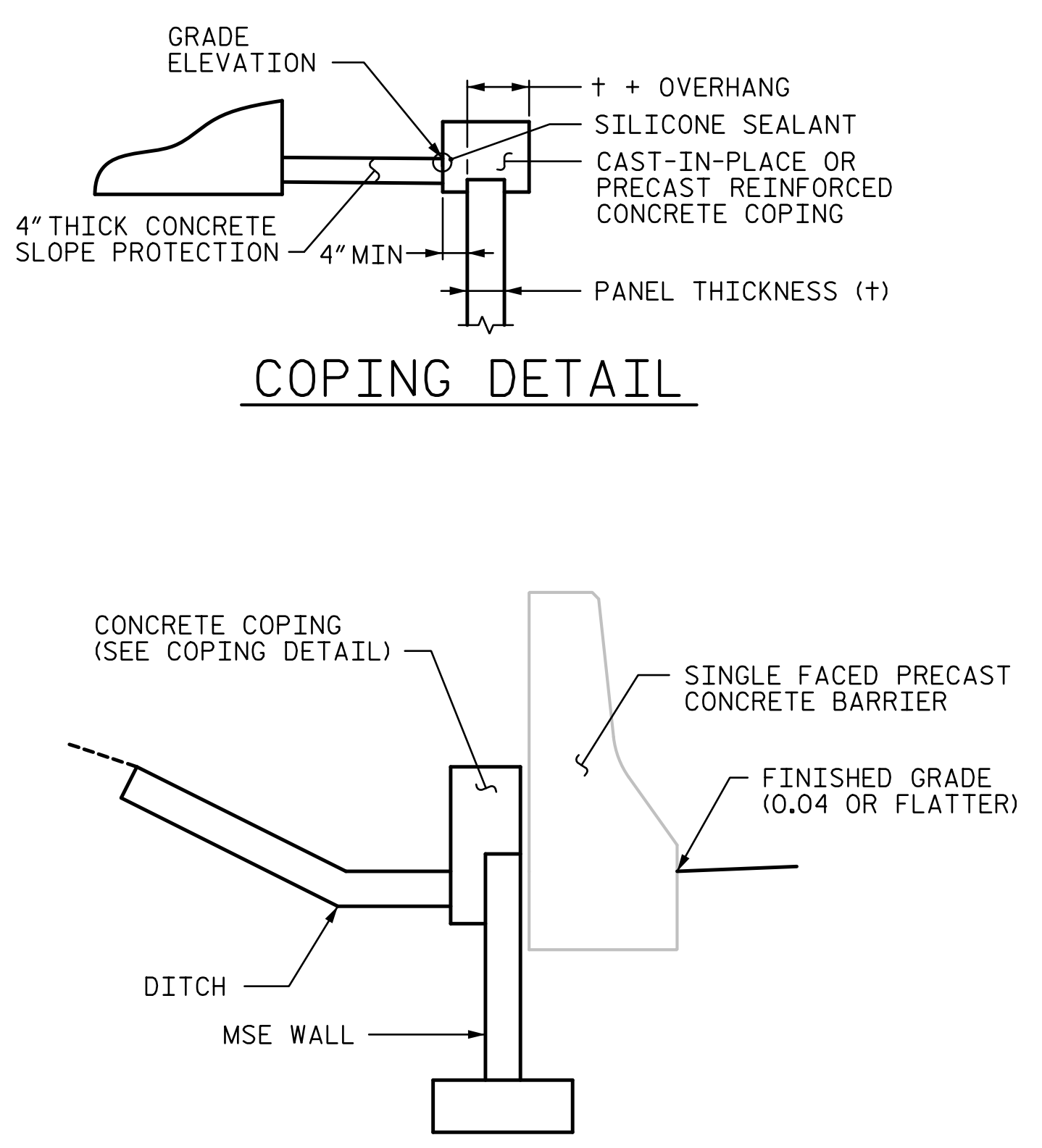
SECTION C-C



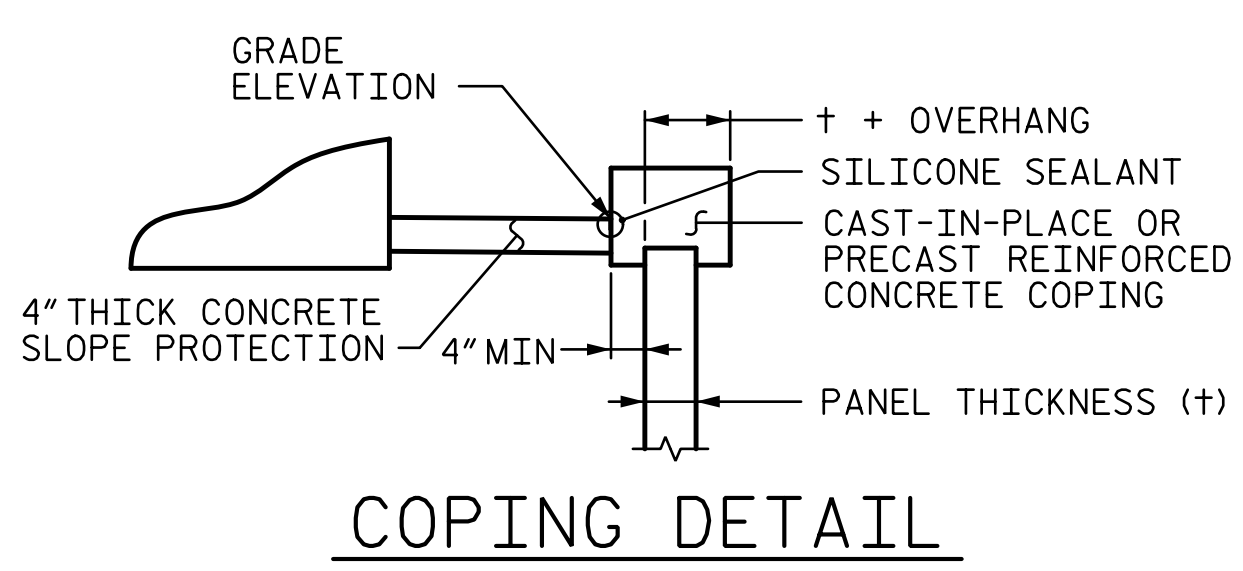
SECTION D-D



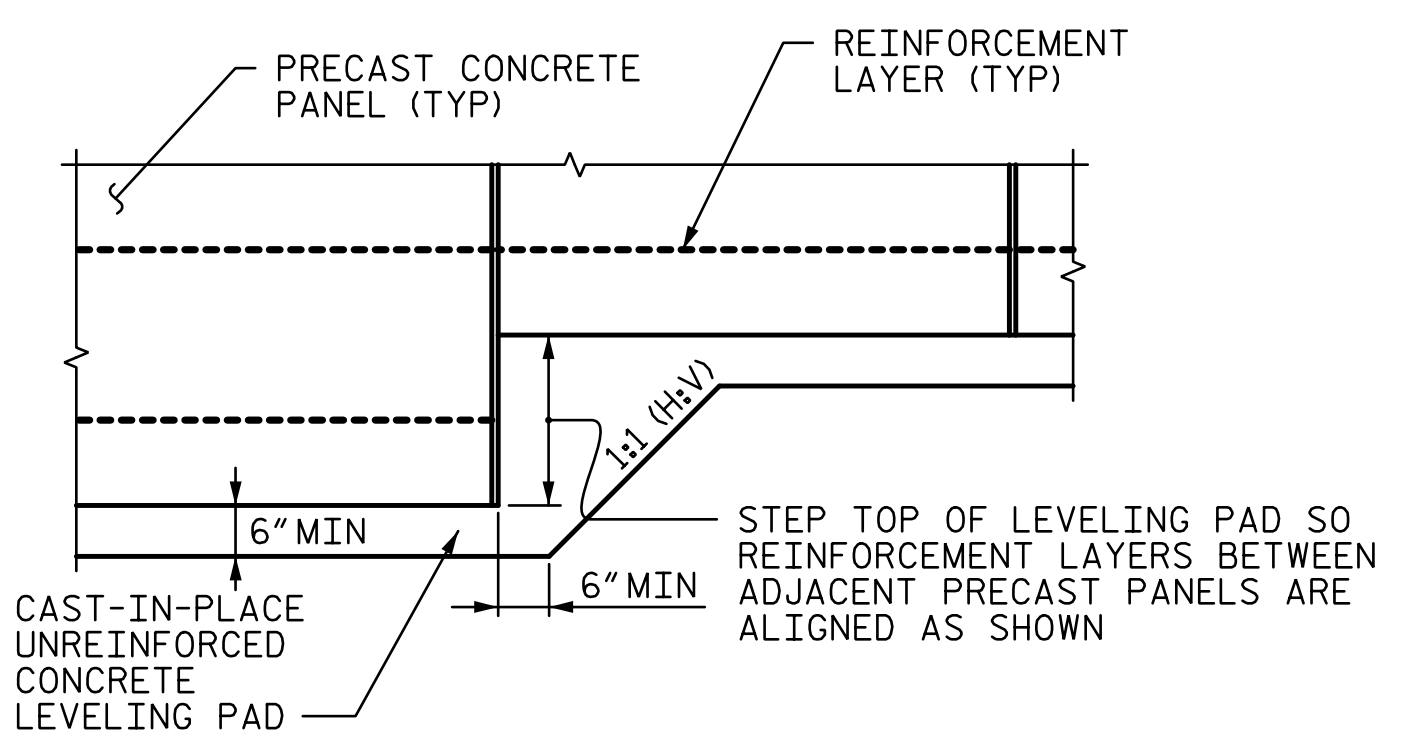
SECTION AT COPING TRANSITION



SECTION AT END OF WALL

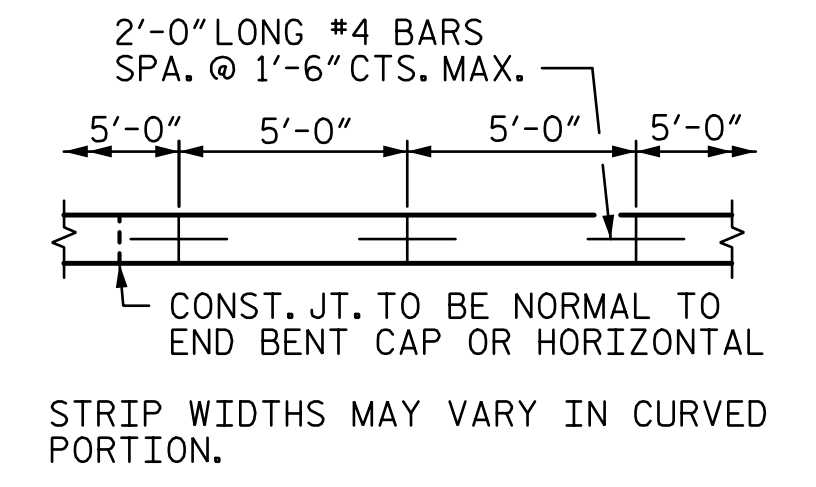


COPING DETAIL

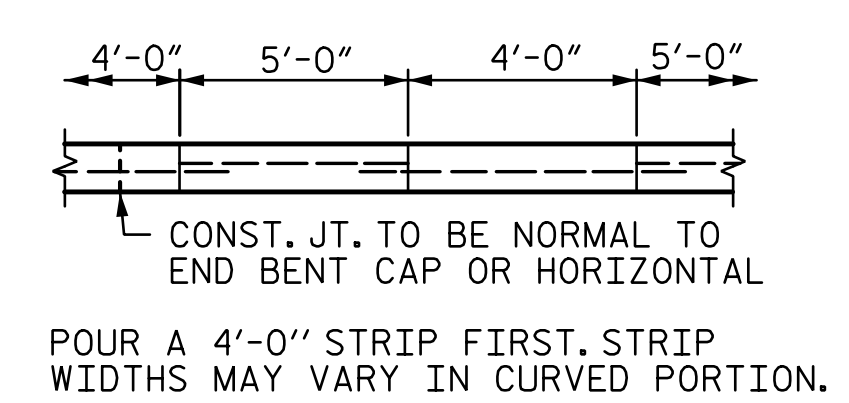


PRECAST PANELS LEVELING PAD STEP DETAIL

- NOTES:**
- FOR MSE WALL AND CONCRETE SLOPE PROTECTION PLAN AND ELEVATION, SEE SHEETS 1 OF 4 AND 2 OF 4.
 - EXTEND BOTTOM OF PIPE SLEEVE TO TOP OF LEVELING PAD ELEVATION.
 - PIPE SLEEVE SHALL BE 16 GAUGE GALVANIZED CORRUGATED STEEL PIPE FILLED WITH SAND.
 - FOR ADDITIONAL NOTES, SEE SHEET 4 OF 4.



POURING DETAIL



OPTIONAL POURING DETAIL

SLOPE PROTECTION DETAIL

PROJECT NO. U2519AA-AB
CUMBERLAND/ROBESON COUNTY
 STATION: 16+64.84 -LPB-
 SHEET 3 OF 4

DocuSigned by:

 SEAL 40317
 ENGINEER
 T. LAWS
 7/26/2018

STV 100 years
 STV ENGINEERS, INC.
 900 West Trade St., Suite 715
 Charlotte, NC 28202
 NC License Number F-0991

Balfour Beatty Infrastructure Inc. **BRANCH** CIVIL
 A Joint Venture

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
MSE WALL AND CONCRETE SLOPE PROTECTION DETAILS					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
					SHEET NO. S1-38
					TOTAL SHEETS 42

DATE: 9/25/2018 TIME: 2:34:34 PM
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DRAWN BY : TJT DATE : 8-18
 CHECKED BY : JTG DATE : 8-18
 DESIGN ENGINEER OF RECORD: T. LAWS DATE : 8-18

MSE WALL NOTES:

- FOR MECHANICALLY STABILIZED EARTH (MSE) RETAINING WALLS, SEE MECHANICALLY STABILIZED EARTH RETAINING WALLS PROVISION.
- USE AN MSE WALL SYSTEM WITH PRECAST CONCRETE PANELS THAT MEET SECTION 1077 OF THE STANDARD SPECIFICATIONS FOR RETAINING WALLS AT END BENT NO. 1 AND END BENT NO. 2.
- PILE SLEEVES ARE REQUIRED AROUND PILES FOR END BENT NO.1 AND END BENT NO. 2.
- BEFORE BEGINNING MSE WALL DESIGN, SURVEY WALL LOCATION AND SUBMIT A REVISED WALL PROFILE VIEW (WALL ENVELOPE) FOR REVIEW. DO NOT START WALL DESIGN OR CONSTRUCTION UNTIL THE REVISED WALL ENVELOPE IS ACCEPTED.
- DESIGN RETAINING WALLS AT END BENT NO.1 AND END BENT NO.2 FOR THE FOLLOWING:
 - H = DESIGN HEIGHT + EMBEDMENT
 - DESIGN LIFE = 100 YEARS
 - MAXIMUM FACTORED VERTICAL STRESS ON FOUNDATION MATERIAL = 5,800 PSF FOR END BENT NO.1 AND 5,300 PSF FOR END BENT NO. 2.
 - MINIMUM REINFORCEMENT LENGTH (L) = 0.7 *H FOR END BENT NO. 1. AND MINIMUM REINFORCEMENT LENGTH (L) = 0.75 *H FOR END BENT NO.2. THIS IS CONTROLLED BY THE GLOBAL STABILITY ANALYSIS.
 - REINFORCED ZONE AGGREGATE PARAMETERS:

AGGREGATE TYPE *	UNIT WEIGHT (γ) LB/CF	FRICTION ANGLE (φ) DEGREES	COHESION (c) LB/SF
COARSE	110	38	0
FINE	115	34	0
* SEE MSE RETAINING WALLS PROVISION FOR COARSE AND FINE AGGREGATE MATERIAL REQUIREMENTS.			

6) IN -SITU ASSUMED MATERIAL PARAMETERS:

MATERIAL TYPE	UNIT WEIGHT (γ) LB/CF	FRICTION ANGLE (φ) DEGREES	COHESION (c) LB/SF
BACKFILL	120	30	0
FOUNDATION	120	30	0

- DESIGN RETAINING WALLS FOR A LIVE LOAD (TRAFFIC) SURCHARGE.
- DO NOT PLACE LEVELING PAD CONCRETE, AGGREGATE OR REINFORCEMENT FOR RETAINING WALL UNTIL EXCAVATION DIMENSIONS AND FOUNDATION MATERIAL ARE APPROVED.
- MSE WALL CONSTRUCTION SEQUENCE WILL REQUIRE COORDINATION WITH PILE INSTALLATION FOR BRIDGE FOUNDATIONS. AFTER EXCAVATING WALL AREA TO BOTTOM OF WALL SUBGRADE ELEVATION, PILES SHALL BE DRIVEN TO SATISFACTORY BEARING.
- FOR MSE WALL STABILITY UNDERCUT TO ELEVATION 168 FT IS REQUIRED FOR END BENT NO.1 WALL AND UNDERCUT TO ELEVATION 166 FT FOR END BENT NO.2 WALL.
- OBSERVE A 1 MONTH WAITING PERIOD AFTER CONSTRUCTING THE MSE ABUTMENT WALL TO WITHIN 1 FT OF THE BOTTOM OF CAP ELEVATION.
- FOUNDATIONS FOR END BENT WILL INTERFERE WITH REINFORCEMENT FOR WALL. SEE "FOUNDATION LAYOUT" SHEET FOR FOUNDATION LOCATIONS. SUBMIT PROPOSED PILE OBSTRUCTION DETAIL FOR APPROVAL.
- JOINTS IN THE COPING SHALL BE CONSTRUCTED IN ACCORDANCE WITH ARTICLE 825-10 OF THE STANDARD SPECIFICATIONS. JOINTS SHALL BE LOCATED IN ALL FACES OF THE COPING AT 10 FEET MINIMUM CENTERS TO COINCIDE WITH PANEL JOINTS. EVERY THIRD JOINT SHALL BE AN EXPANSION JOINT. ALL OTHER JOINTS SHALL BE GROOVED CONTRACTION JOINTS 1/2" IN DEPTH. REINFORCING STEEL SHALL BE 2 INCHES CLEAR OF EXPANSION JOINTS.
- COPING WIDTH SHALL PROJECT FROM WALL FACE NO MORE THAN 4".
- ABUTMENT RESTRAINTS (STRAPS) ARE REQUIRED ALONG THE CAP AND/OR BACKWALL TO RESIST OVERTURNING. LOCATIONS AND SPACING OF ABUTMENT RESTRAINTS SHALL BE SHOWN ON THE MSE WALL PLANS. SEE END BENT 1 & 2 SHEETS FOR DETAILS. MAINTAIN A CLEARANCE OF AT LEAST 3" BETWEEN REINFORCEMENT OR CONNECTORS AND REINFORCING STEEL IN CAP.
- A SEPERATION GEOTEXTILE IS REQUIRED AT THE BACK OF THE REINFORCED ZONE FOR MSE WALLS 1 & 2.
- A DRAIN IS REQUIRED FOR MSE WALLS 1 & 2.

SLOPE PROTECTION NOTES:

SLOPE PROTECTION SHALL BE PLACED UNDER THE ENDS OF THE BRIDGE AS SHOWN IN THE DETAILS.

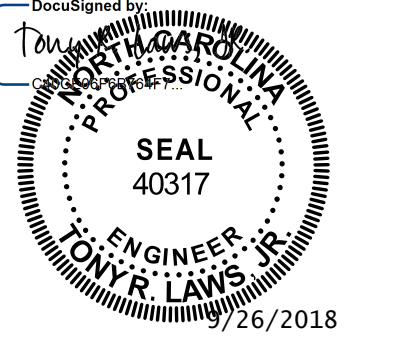


ALTERNATE "A" SHALL CONSIST OF 4" POURED-IN-PLACE CONCRETE PAVING AS SHOWN. CONCRETE SHALL BE CLASS "B". THE CONCRETE SURFACE SHALL BE FLOATED WITH A WOODEN FLOAT AND FINISHED. WELDED WIRE FABRIC REINFORCING SHALL BE 6 X 6 - W1.4 X W1.4, 60" WIDE. SLOPE PROTECTION SHALL BE POURED IN 5' STRIPS AS SHOWN IN THE DETAILS ON SHEETS 1 OF 4 AND 2 OF 4 WITH 2'-0" LONG #4 BARS PLACED ALONG THE SLOPE BETWEEN STRIPS AT 1'-6" MAXIMUM SPACING. SLOPE PROTECTION MAY BE POURED IN ALTERNATE 4' AND 5' STRIPS AS SHOWN IN THE "OPTIONAL POURING DETAIL" WITH ADJACENT RUNS OF WELDED WIRE FABRIC LAPPING AT LEAST 6".

BRIDGE @ STA. 16+64.84 -LPB-	4 INCH SLOPE PROTECTION	* WELDED WIRE FABRIC 60 INCHES WIDE
	SQUARE YARDS	APPROX. L.F.
END BENT 1	91.3	183
END BENT 2	83.5	168

* QUANTITY SHOWN IS BASED ON 5' POURS.

ESTIMATED MSE WALL QUANTITIES (SQUARE FEET)	
MSE RETAINING WALL AT EB 1	2,120 SF
MSE RETAINING WALL AT EB 2	1,730 SF

PROJECT NO. U2519AA-AB
CUMBERLAND/ROBESON COUNTY
 STATION: 16+64.84 -LPB-
 SHEET 4 OF 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	 SEAL 40317 ENGINEER T. LAWS 7/26/2018		STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH MSE WALL AND CONCRETE SLOPE PROTECTION NOTES AND QUANTITIES		SHEET NO. S1-39 TOTAL SHEETS 42
	 STV ENGINEERS, INC. 900 West Trade St., Suite 715 Charlotte, NC 28202 NC License Number F-0991		REVISIONS		
	NO. 1 BY: JTJ DATE: 8-18	NO. 3 BY: T.LAWS DATE: 8-18	NO. 4 BY: T.LAWS DATE: 8-18	NO. 2 BY: JTJ DATE: 8-18	
			BRANCH CIVIL A Joint Venture		

DRAWN BY : <u>TJT</u> DATE : <u>8-18</u>	DESIGN ENGINEER OF RECORD: <u>T. LAWS</u> DATE : <u>8-18</u>
CHECKED BY : <u>JTG</u> DATE : <u>8-18</u>	

DATE: 9/25/2018 TIME: 2:34:36 PM FILE: R:\Structures\Str 1 LPB over Y:\Infrastructure\RFCC\401.077_U2519_SMU_SF_039_770513.dgn

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

BILL OF MATERIAL					
APPROACH SLAB AT EB 1					
BAR NO.	NO.	SIZE	TYPE	LENGTH	WEIGHT
*A1	48	#4	STR	20'-4"	652
A2	50	#4	STR	20'-3"	676
*B1	67	#5	STR	23'-10"	1,666
B2	67	#6	STR	24'-8"	2,482
*B5	8	#5	STR	6'-5"	54
B6	8	#6	STR	6'-6"	78
*J1	36	#4	1	1'-5"	34

REINFORCING STEEL ** LBS. 3,236
 *EPOXY COATED REINFORCING STEEL ** LBS. 2,406

CLASS AA CONCRETE ** C. Y. 37.3

APPROACH SLAB AT EB 2					
BAR NO.	NO.	SIZE	TYPE	LENGTH	WEIGHT
*A3	42	#4	STR	21'-10"	613
A4	44	#4	STR	21'-8"	637
*B3	68	#5	STR	23'-8"	1,679
B4	68	#6	STR	24'-6"	2,502
*B7	8	#5	STR	6'-7"	55
B8	8	#6	STR	6'-7"	79
*B9	1	#5	STR	24'-0"	25
B10	1	#6	STR	24'-9"	37
*J1	38	#4	1	1'-5"	36

REINFORCING STEEL ** LBS. 3,255
 *EPOXY COATED REINFORCING STEEL ** LBS. 2,408

CLASS AA CONCRETE ** C. Y. 37.3

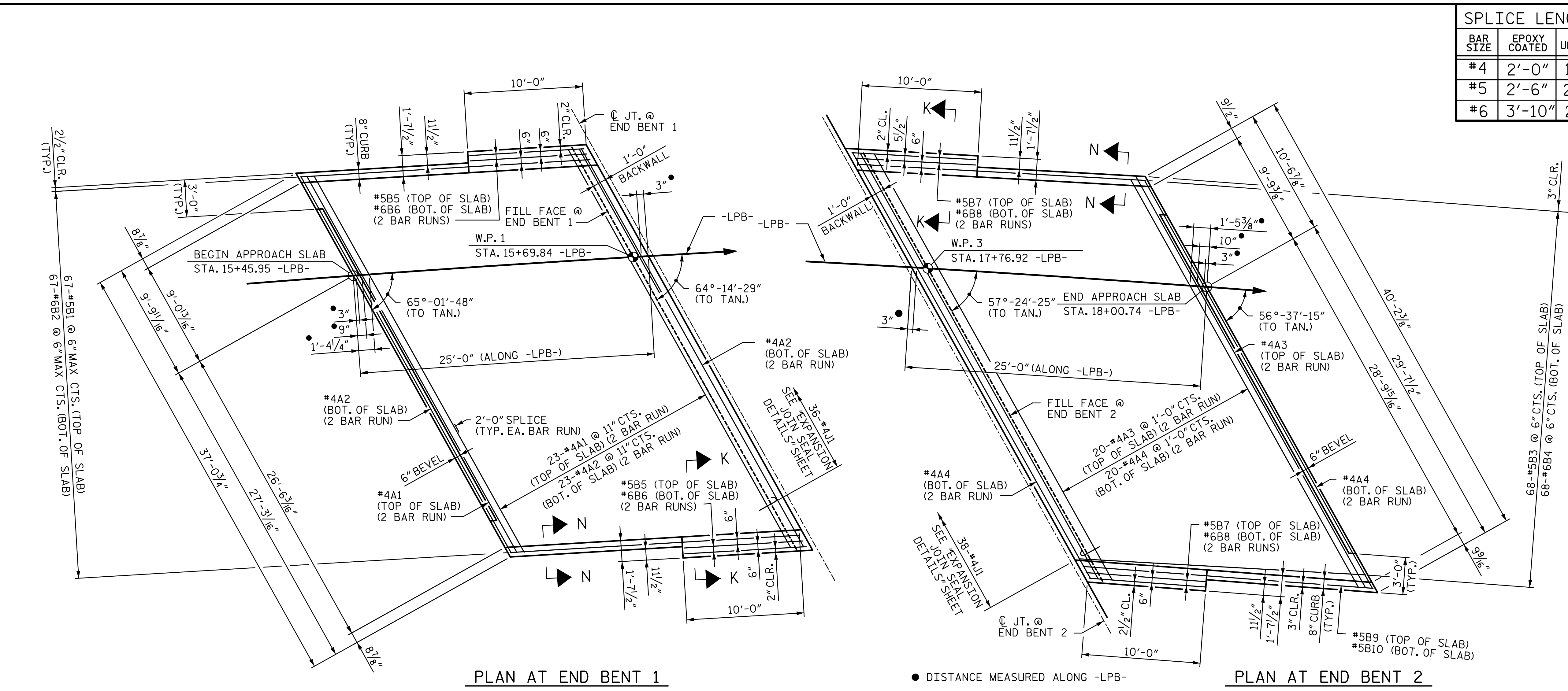
BAR TYPE

ALL BAR DIMENSIONS ARE OUT TO OUT
 ** QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED. SEE SHEET 2 OF 2.

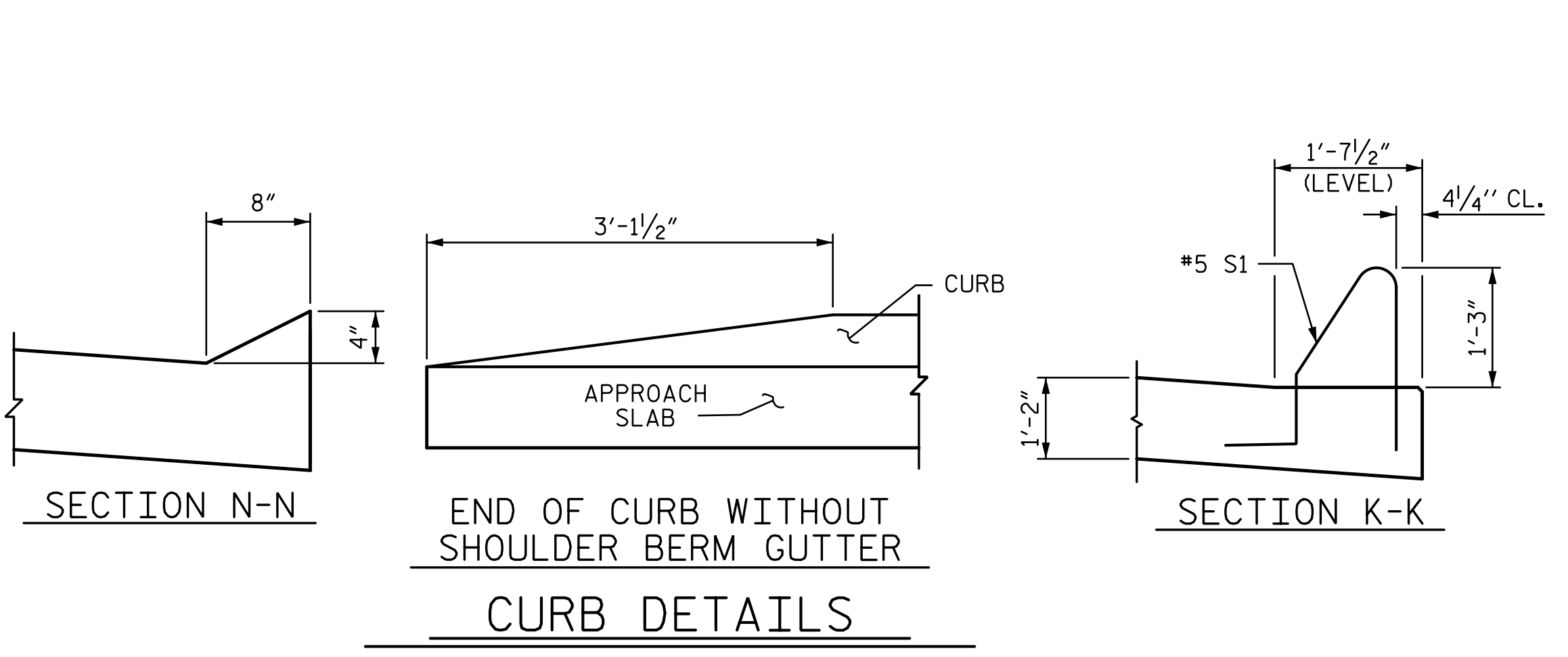
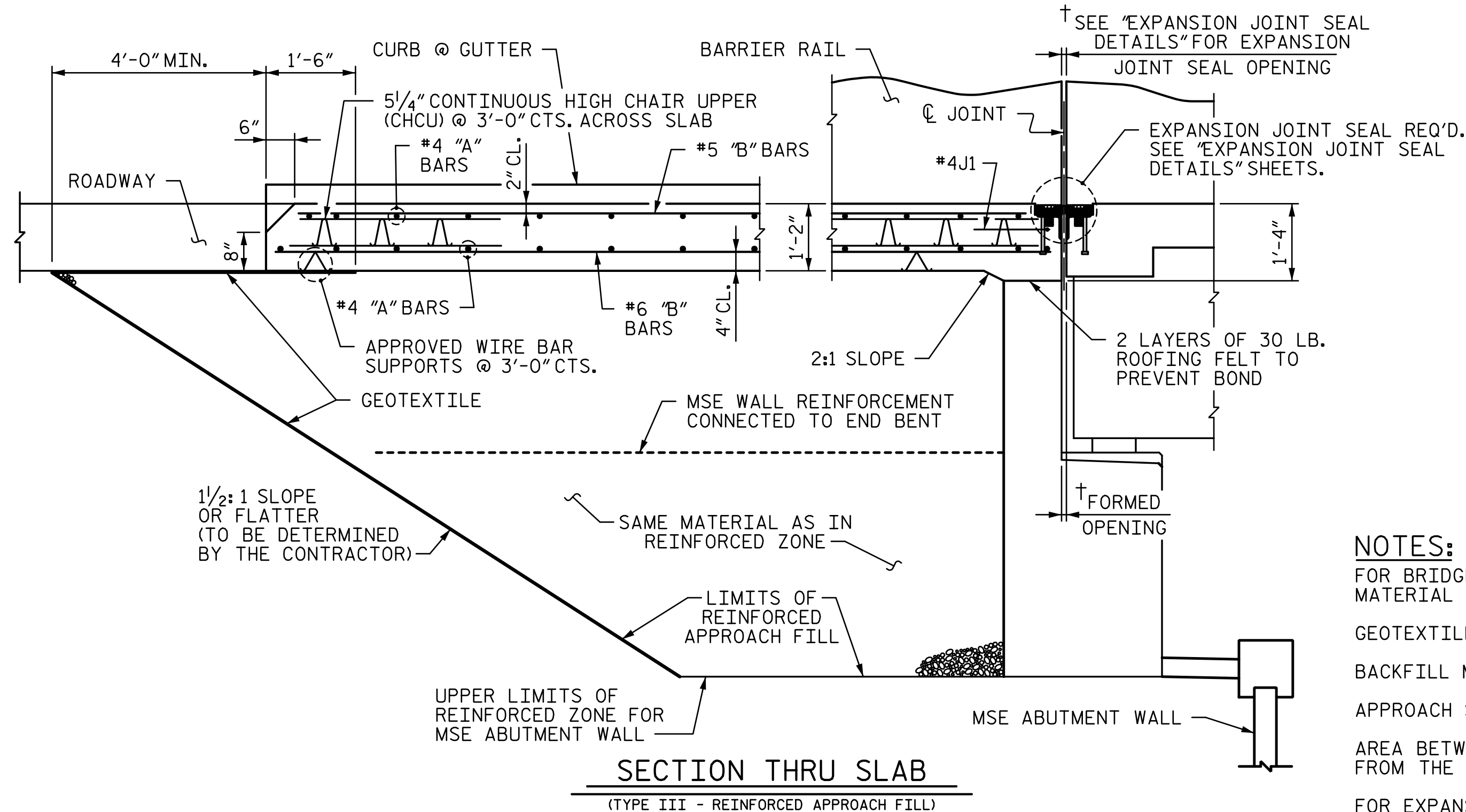
THE QUANTITY OF #4 J1 BARS ON THE BILL OF MATERIAL IS BASED ON 1'-0" CENTERS. J1 BARS SHALL BE PLACED AT EACH VERTICAL STUD ANCHOR BOLT. IN THE EVENT THAT THE NUMBER OF VERTICAL STUD ANCHORS EXCEEDS THE NUMBER OF J1 BARS SPECIFIED, ADDITIONAL J1 BARS WILL NOT BE REQUIRED.

PROJECT NO. U2519AA-AB
 CUMBERLAND/ROBESON COUNTY
 STATION: 16+64.84 -LPB-

SHEET 1 OF 2



● DISTANCE MEASURED ALONG -LPB-



NOTES:
 FOR BRIDGE APPROACH FILL INCLUDING GEOTEXTILE, MSE WALL REINFORCEMENT AND BACKFILL MATERIAL SEE ROADWAY PLANS.
 GEOTEXTILE SHALL BE TYPE 1 IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS SECTION 1056.
 BACKFILL MATERIAL SHALL BE THE SAME MATERIAL USED IN THE MSE REINFORCED ZONE.
 APPROACH SLAB SHALL NOT BE CONSTRUCTED PRIOR TO COMPLETION OF THE BRIDGE DECK.
 AREA BETWEEN THE WINGWALL AND APPROACH SLAB SHALL BE GRADED TO DRAIN THE WATER AWAY FROM THE FILL FACE OF THE BRIDGE AND SHALL BE PAVED. SEE ROADWAY PLANS.
 FOR EXPANSION JOINT SEALS, SEE SPECIAL PROVISIONS.
 FOR CONCRETE BARRIER RAIL ON APPROACH SLABS, BILL OF MATERIAL AND ADDITIONAL DETAILS, SEE SHEET 2 OF 2

DocuSigned by:

 T. LAWS
 ENGINEER
 F-0991
 7/26/2018

STV ENGINEERS, INC.
 900 West Trade St., Suite 715
 Charlotte, NC 28202
 NC License Number F-0991

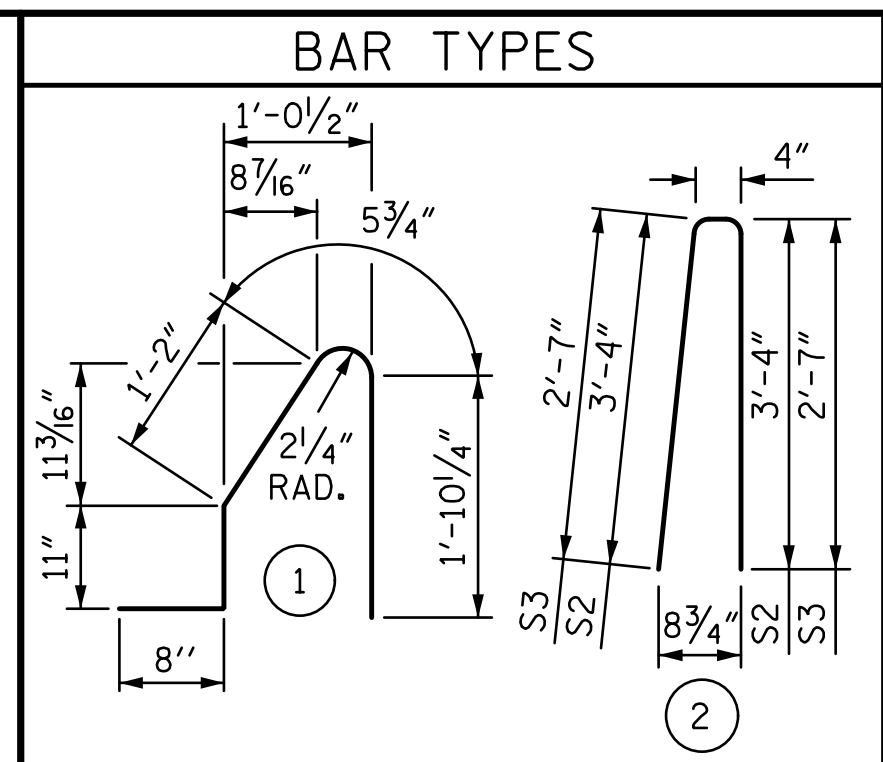
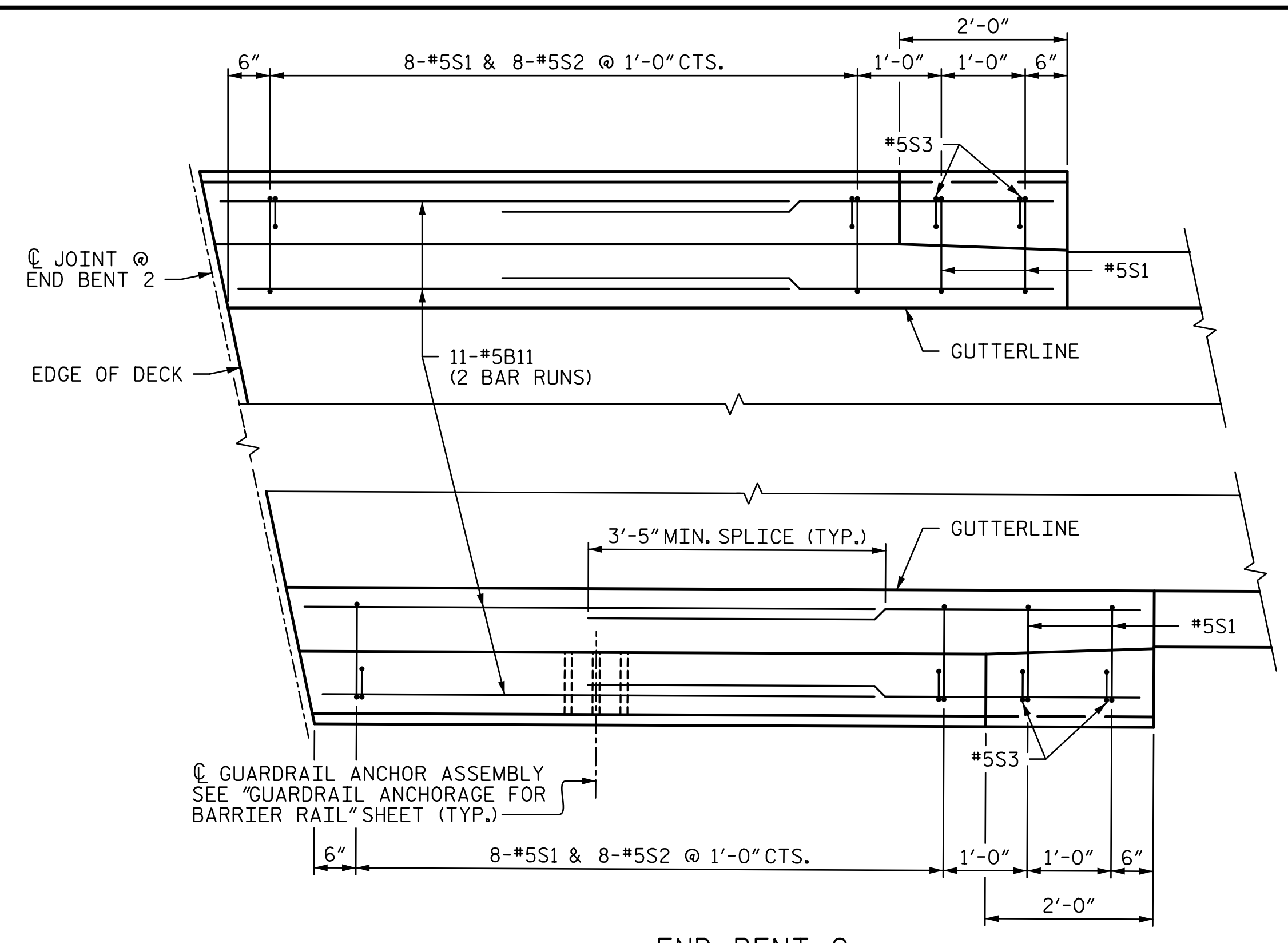
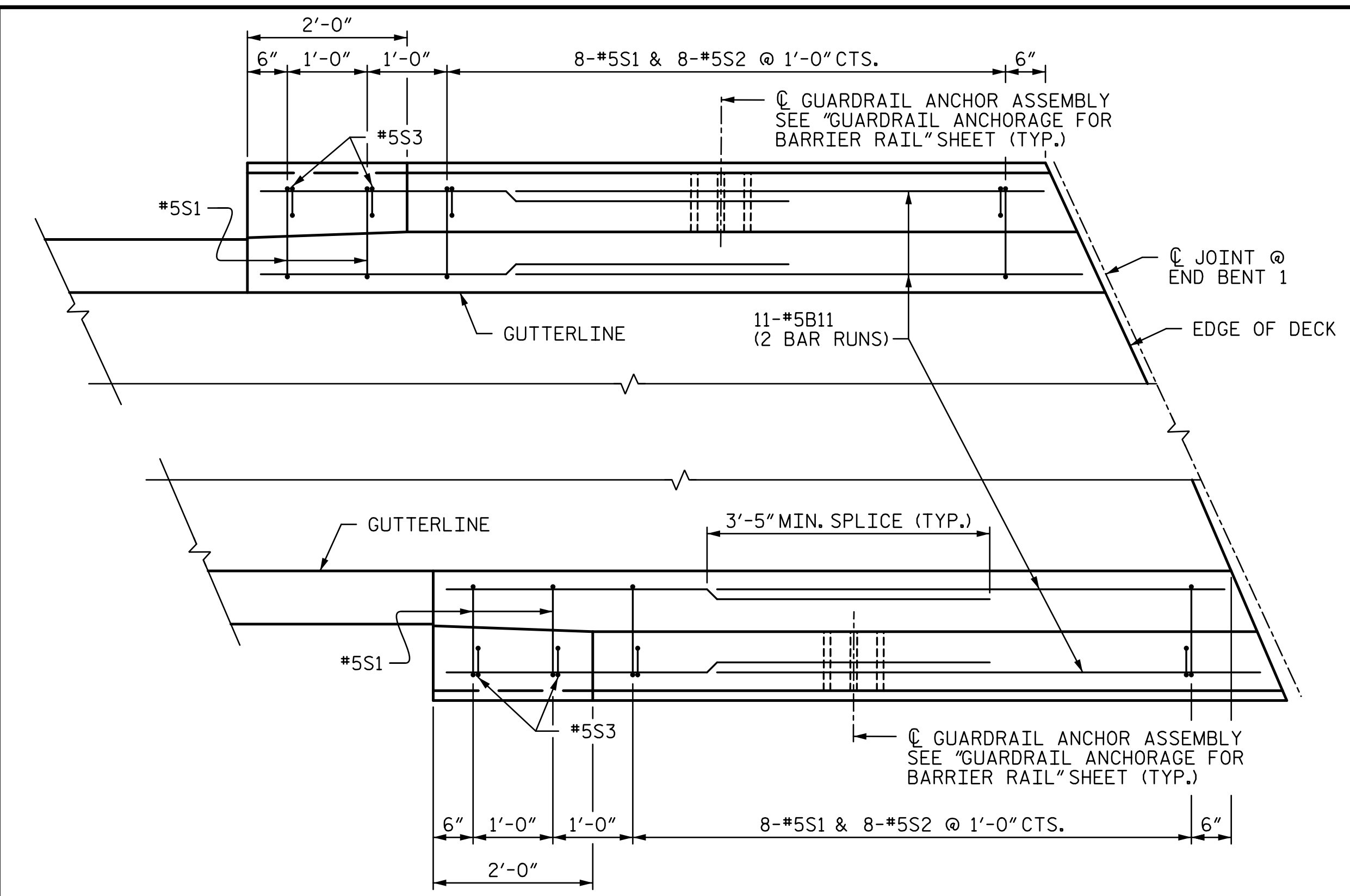
Balfour Beatty
 Infrastructure Inc. CIVIL
 A Joint Venture

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
BRIDGE APPROACH SLAB					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

SHEET NO. S1-40
 TOTAL SHEETS 42

DRAWN BY : VKS	DATE : 6-18	DESIGN ENGINEER OF RECORD : T. LAWS	DATE : 8-18
CHECKED BY : TRL	DATE : 6-18		

DATE: 9/25/2018 TIME: 2:34:38 PM
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ALL BAR DIMENSIONS ARE OUT TO OUT

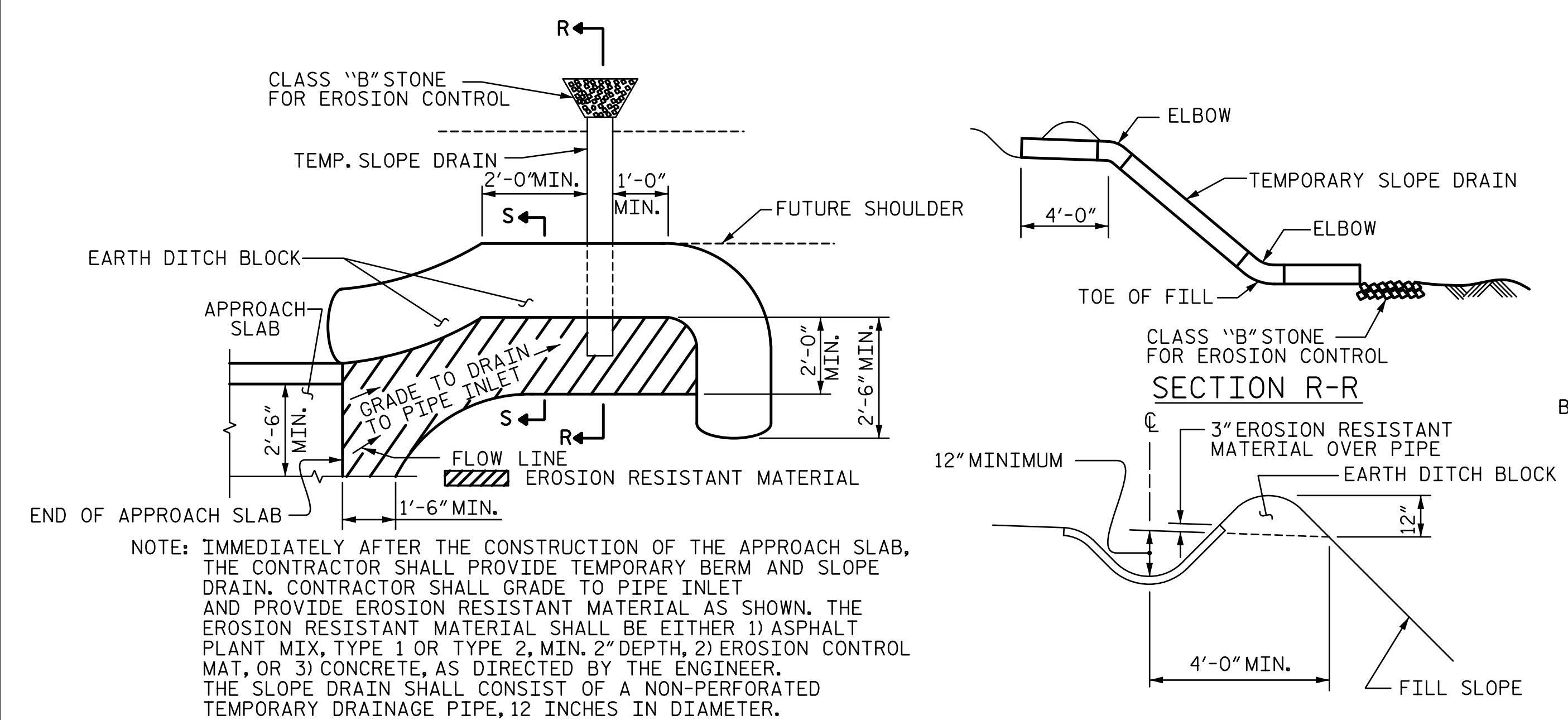
BILL OF MATERIAL					
BARRIER RAIL ONLY					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
*B11	88	#5	STR	7'-0"	643
*S1	40	#5	1	5'-1"	212
*S2	32	#5	2	7'-0"	234
*S3	8	#5	2	5'-6"	46
* EPOXY COATED REINFORCING STEEL				LBS.	1,135
CLASS AA CONCRETE				C. Y.	5.7

NOTES

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

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

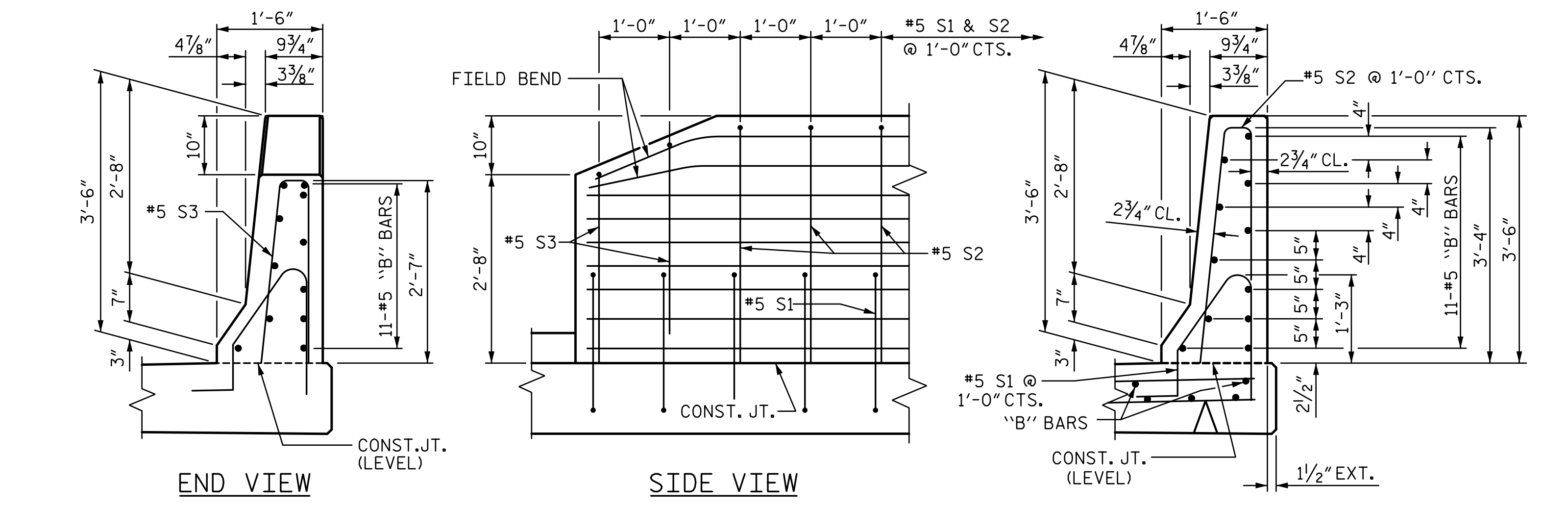
ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.



TEMPORARY BERM AND SLOPE DRAIN DETAILS

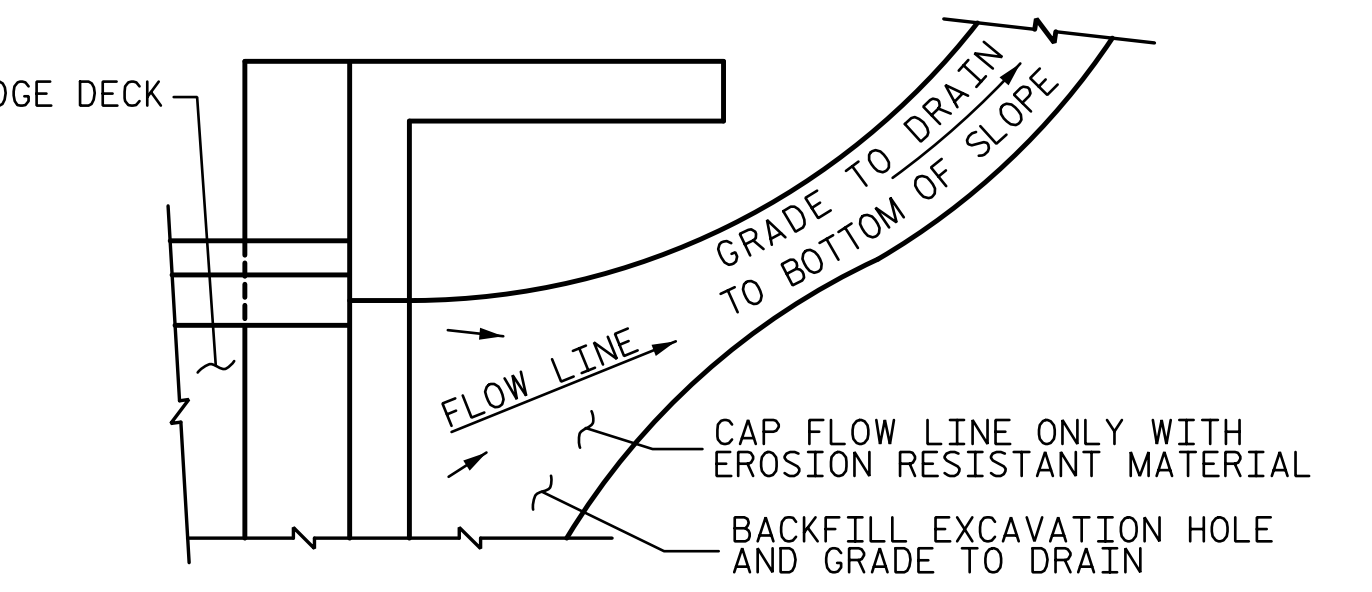
(TO BE USED WHEN SHOULDER BERM CUTTER IS REQUIRED)

DRAWN BY : MBC	DATE : 6-18	DESIGN ENGINEER OF RECORD : T. LAWS	DATE : 8-18
CHECKED BY : TRL	DATE : 6-18		



END OF RAIL DETAILS

SECTION THRU RAIL



TEMPORARY DRAINAGE DETAIL

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

PROJECT NO. **U2519AA-AB**
CUMBERLAND/ROBESON COUNTY
 STATION: **16+64.84 -LPB-**
 SHEET 2 OF 2

DocuSigned by:

T. LAWS
 ENGINEER
 CIVIL
 7/26/2018

STV 100 years
 STV ENGINEERS, INC.
 900 West Trade St., Suite 715
 Charlotte, NC 28202
 NC License Number F-0991

Balfour Beatty **BRANCH**
 Infrastructure Inc. **CIVIL**
 A Joint Venture

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
 RALEIGH

BRIDGE APPROACH SLAB DETAILS

REVISIONS

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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SHEET NO. S1-41
TOTAL SHEETS 42

DATE: 9/25/2018 TIME: 2:34:40 PM FILE: R:\Structure\Str 1 LPB over Y:\Information\RFC\401.081.U2519.SML_AS_041.770513.dgn

STANDARD NOTES

DESIGN DATA:

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

MATERIAL AND WORKMANSHIP:

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

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

CONCRETE:

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

CONCRETE CHAMFERS:

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

DOWELS:

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

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

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

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

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

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

REINFORCING STEEL:

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

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

STRUCTURAL STEEL:

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

EXCEPT AT THE INTERIOR SUPPORTS OF CONTINUOUS BEAMS WHERE THE COVER PLATE IS IN CONTACT WITH BEARING PLATE, THE CONTRACTOR MAY, AT HIS OPTION, SUBSTITUTE FOR THE COVER PLATES DESIGNATED ON THE PLANS COVER PLATES OF THE EQUIVALENT AREA PROVIDED THESE PLATES ARE AT LEAST $\frac{5}{16}$ " IN THICKNESS AND DO NOT EXCEED A WIDTH EQUAL TO THE FLANGE WIDTH LESS 2" OR A THICKNESS EQUAL TO 2 TIMES THE FLANGE THICKNESS. THE SIZE OF FILLET WELDS SHALL CONFORM TO THE REQUIREMENTS OF THE CURRENT ANSI/AASHTO/AWS "BRIDGE WELDING CODE". ELECTROSLAG WELDING WILL NOT BE PERMITTED.

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

HANDRAILS AND POSTS:

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

METAL HANDRAILS SHALL BE IN ACCORDANCE WITH THE PLANS. RAILS SHALL BE AS MANUFACTURED FOR BRIDGE RAILING. CASTINGS SHALL BE OF A UNIFORM APPEARANCE. 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.

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2			4		
					TOTAL SHEETS
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