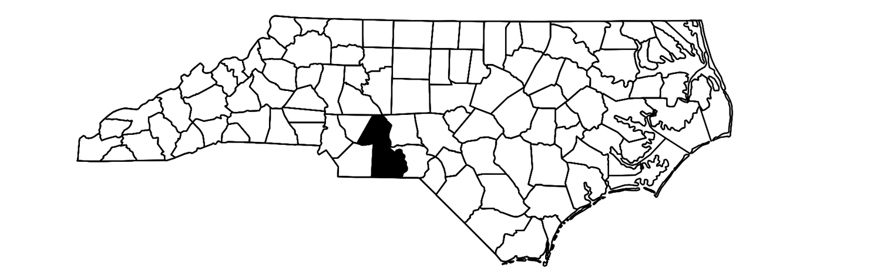
TIP PROJECT: B-4407

CONTRACT: C204469

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4407		

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
38356.1.2	NA	PE
38356.2.2	NA	R/W & UTILITIES
38356.3.2	NA	CONST.

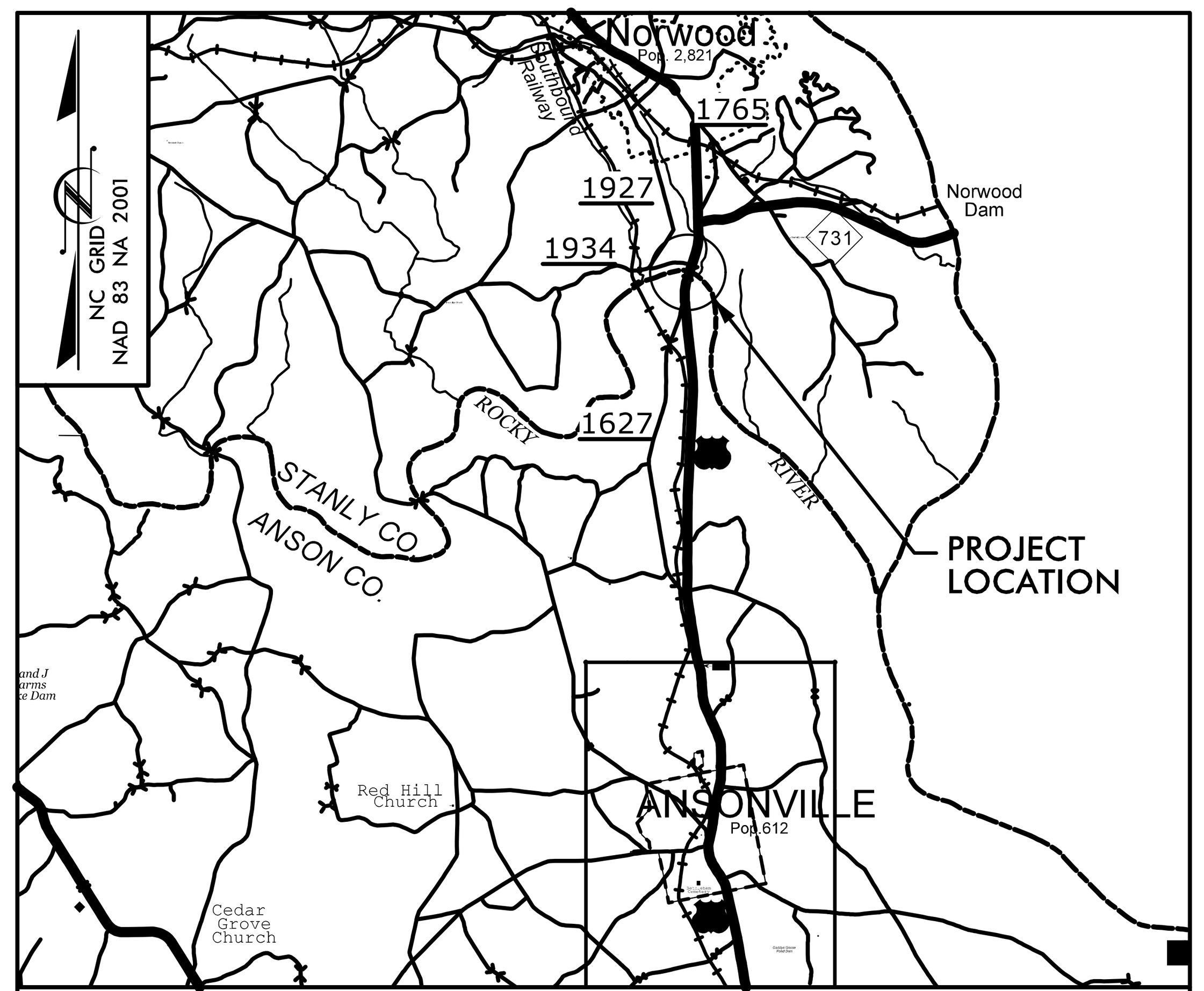


STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

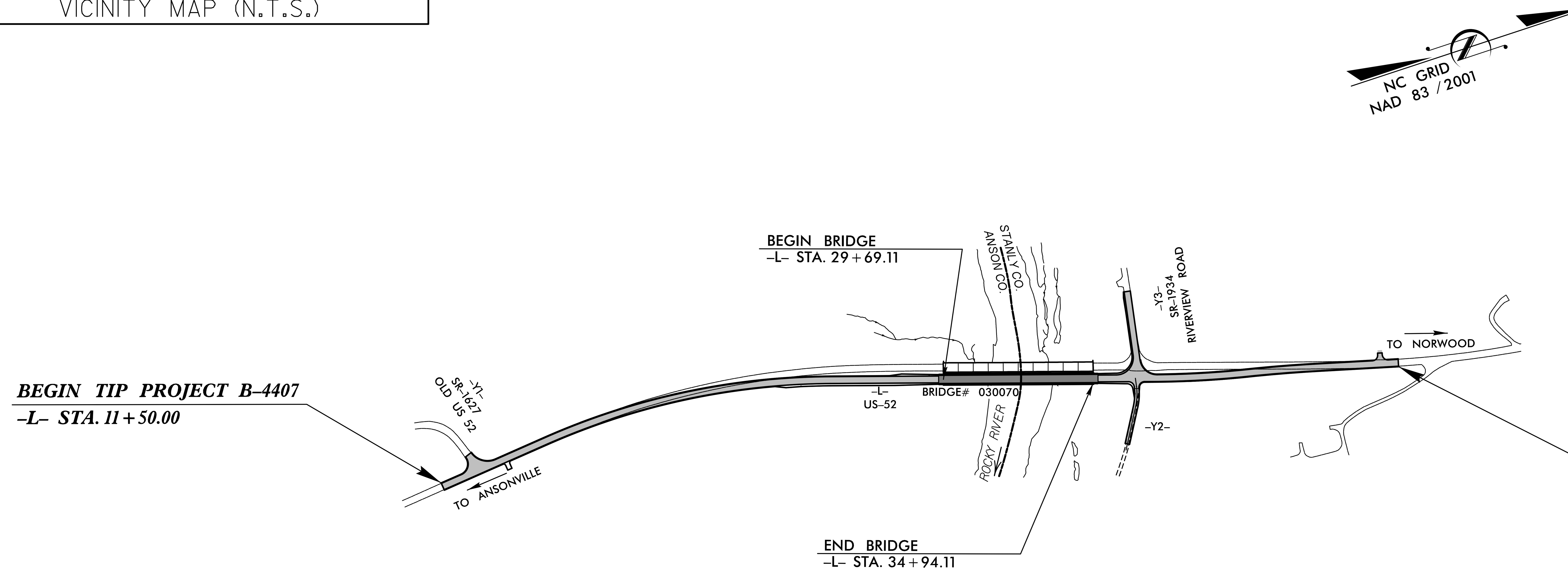
ANSON / STANLY COUNTIES

LOCATION: REPLACE BRIDGE 70 OVER ROCKY RIVER ON US-52

TYPE OF WORK: GRADING, DRAINAGE, PAVING, AND STRUCTURE



VICINITY MAP (N.T.S.)



V&M
Vaughn & Melton
Consulting Engineers
Asheville, North Carolina 828-253-2796
Raleigh, NC 919-977-9455
Charlotte, NC 704-357-0488
Boone, NC 828-355-9933
Tri-Cities, TN 423-467-8401
Knoxville, TN 865-546-5800
Spartanburg, SC 864-574-4775
Charleston, SC 843-974-5650
Middlesboro, KY 606-248-6600
Atlanta, GA 770-627-3590

STRUCTURE

DESIGN DATA

ADT 2020 = 4100
ADT 2040 = 4900
D = 60%
K = 9%
T = 22%
V = 60 MPH
*TTST = 8% DUAL = 14%
FUNCT. CLASS = PRINCIPAL ARTERIAL REGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT B-4407 =	0.548 MI
LENGTH STRUCTURE TIP PROJECT B-4407 =	0.099 MI
TOTAL LENGTH OF TIP PROJECT B-4407 =	0.647 MI

Prepared In the Office of:
VAUGHN & MELTON
3509 HAWORTH DR. SUITE 100
RALEIGH, NC 27609
FOR THE NORTH CAROLINA DIVISION OF HIGHWAYS

2018 STANDARD SPECIFICATIONS

LETTING DATE:
MAY 18, 2021

HARDY WILLIS, PE
PROJECT ENGINEER

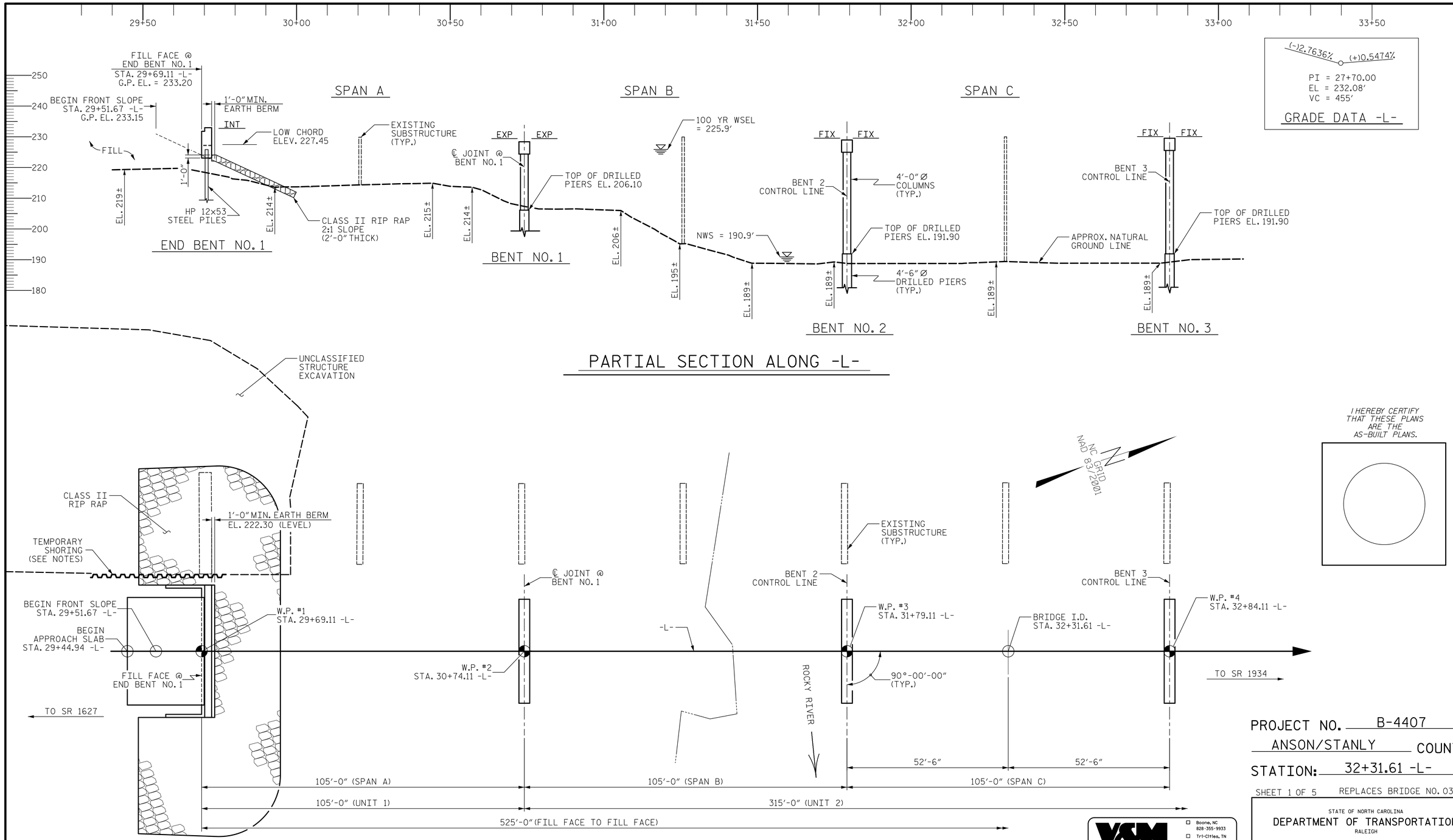
PATRICK GALLAGHER, PE
PROJECT DESIGN ENGINEER

DAVID STUTTS, PE
NCDOT CONTACT

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 042890 PATRICK R. GALLAGHER
3/18/2021

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION



PARTIAL SECTION ALONG -L-

PARTIAL PLAN ALONG -L-

(PILES AND DRILLED PIERS NOT SHOWN FOR CLARITY)

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

PROJECT NO. B-4407

ANSON/STANLY COUNTY

STATION: 32+31.61 -L-

SHEET 1 OF 5 REPLACES BRIDGE NO. 030070

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

BRIDGE ON US-52 OVER ROCKY RIVER BETWEEN SR-1627 (OLD US-52) AND SR-1934 (RIVERVIEW RD.)

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 042890 PATRICK R. GALLAGHER 3/18/2021

Vaughn & Melton
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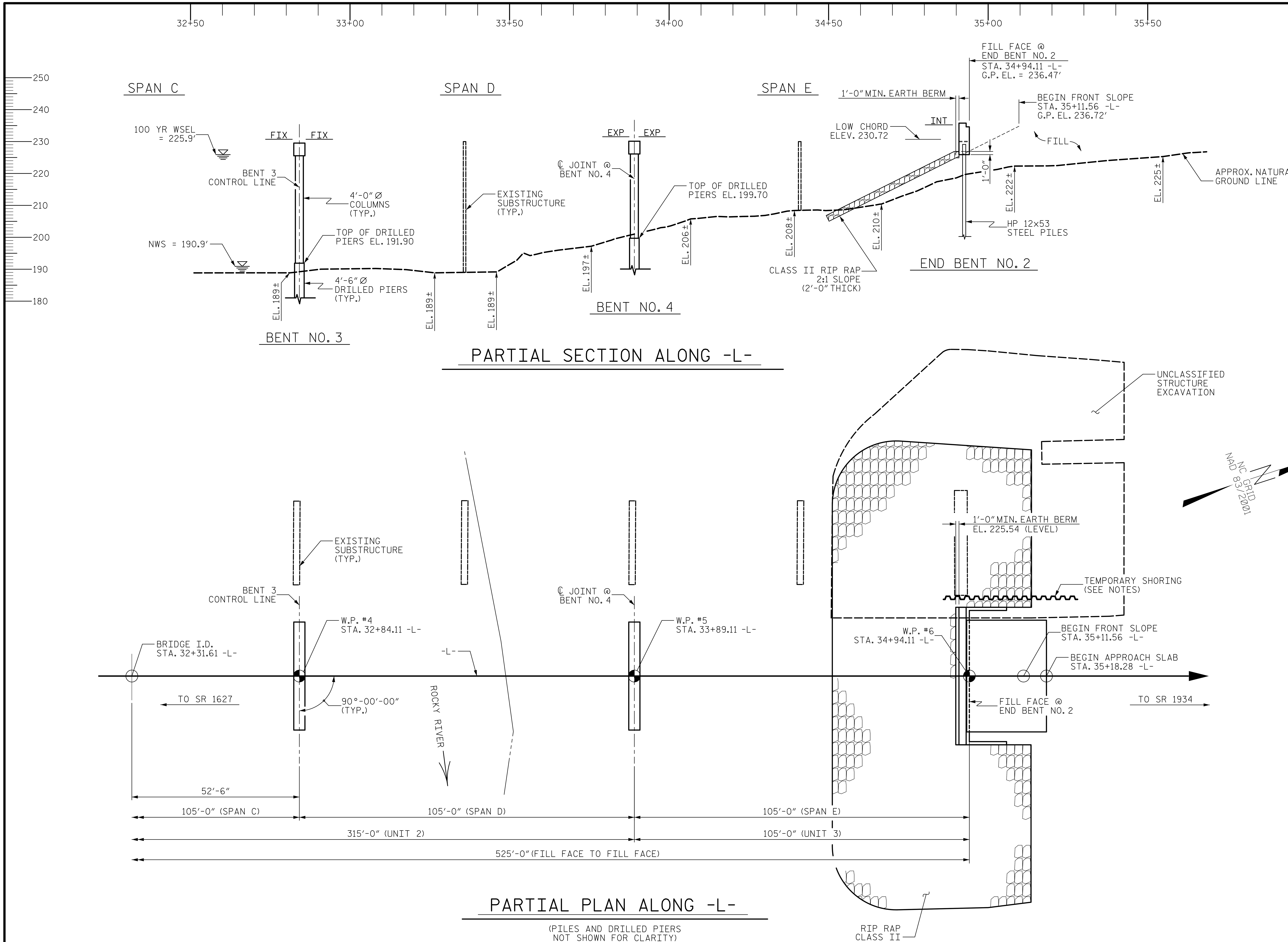
Middlesboro, KY 606-248-6600
Atlanta, GA 770-627-3590

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DWN. BY: WDC DATE: 10/2020
CHKD. BY: PRG DATE: 10/2020
DES. EGR. OF RECORD: PRG DATE: 10/2020

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-1
1			3			TOTAL SHEETS
2			4			45

wdcrutcher
DGN: V:\NCT transportation\03\7.30-09 B4407\Structures\Final Plans\40_L00_B-4407_SMU_G001_S01.dgn
TIME: 02:30 PM on Wednesday, March 17, 2021



GRADE DATA -L-

(+)0.5474%　(+)4.8438%

PI = 36+45.00
EL = 236.87′
VC = 500′

NORTH CAROLINA PROFESSIONAL SEAL 042890 ENGINEER PATRICK R. GALLAGHER 3/18/2021

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V&M Vaughn & Melton Consulting Engineers
Asheville, North Carolina 828-253-2796
Raleigh, NC 919-977-9455 · Charlotte, NC 704-357-0488 · Boone, NC 828-355-9933 · Tri-Cities, TN 423-467-8401 · Knoxville, TN 865-546-5800 · Spartanburg, SC 864-574-4775 · Charleston, SC 843-974-5650 · Middlesboro, KY 606-248-6600 · Atlanta, GA 770-627-3590

PROJECT NO. B-4407
ANSON/STANLY COUNTY
STATION: 32+31.61 -L-

SHEET 2 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

BRIDGE ON US-52
OVER ROCKY RIVER
BETWEEN SR-1627 (OLD US-52)
AND SR-1934 (RIVERVIEW RD.)

DWN. BY: WDC　DATE: 10/2020
CHKD. BY: PRG　DATE: 10/2020
DES. EGR. OF RECORD: PRG　DATE: 10/2020

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-2
1			3			TOTAL SHEETS
2			4			45

SECTION ALONG -L-

PLAN

NOTE: NO MORE THAN ONE TEMPORARY CAUSEWAY WILL BE IN PLACE AT ANY GIVEN TIME OR NO MORE THAN 50% OF RIVER CHANNEL CAN BE IMPACTED AT ANY GIVEN TIME WITH A CAUSEWAY.

PROJECT NO. B-4407

ANSON/STANLY COUNTY

STATION: 32+31.61 -L-

SHEET 3 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

TEMPORARY ROCK CAUSEWAY

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 042890 PATRICK R. GALLAGHER
3/18/2021

V&M Vaughn & Melton Consulting Engineers
Asheville, North Carolina 828-253-2796
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DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DWN. BY: WDC	DATE: 10/2020	REVISIONS					SHEET NO.
CHKD. BY: PRG	DATE: 10/2020	NO.	BY:	DATE:	NO.	BY: DATE:	S-3
DES. EGR. OF RECORD: PRG	DATE: 10/2020	1			3		TOTAL SHEETS 45
		2			4		

wdcrutcher
DGN: V:\NC\Transportation\031730-09 B4407\Structures\Final Plans\401_005_B-4407_SMU_TA01_S03.dgn
TIME: 10:54 AM on Thursday, February 18, 2021

FOUNDATION NOTES

FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

PILES AT END BENT NO. 1 AND END BENT NO. 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 137.5 TONS PER PILE.

DRIVE PILES AT END BENT NO. 1 AND END BENT NO. 2 TO A REQUIRED DRIVING RESISTANCE OF 230 TONS PER PILE.

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

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

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

DRILLED PIERS AT BENT NO. 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 515 TONS PER PIER. CHECK FIELD CONDITIONS FOR THE REQUIRED TIP RESISTANCE OF 20 TSF.

INSTALL DRILLED PIERS AT BENT NO. 1 TO A TIP ELEVATION NO HIGHER THAN 175 FT (LT), 164.0 FT (CT) AND 164 FT (RT) WITH THE REQUIRED TIP RESISTANCE AND A PENETRATION OF AT LEAST 15 FT INTO WEATHERED ROCK AND ROCK AS DEFINED BY ARTICLE 411-1 OF THE STANDARD SPECIFICATIONS.

THE SCOUR CRITICAL ELEVATION FOR BENT NO. 1 IS ELEVATION 187 FT (LT), 180 FT (CT), AND 180 FT (RT). SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.

DRILLED PIERS AT BENT NO. 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 505 TONS PER PIER.

INSTALL DRILLED PIERS AT BENT NO. 2 TO A TIP ELEVATION NO HIGHER THAN 171.5 FT WITH THE REQUIRED TIP RESISTANCE AND A PENETRATION OF AT LEAST 13 FT INTO WEATHERED ROCK AND ROCK AS DEFINED BY ARTICLE 411-1 OF THE STANDARD SPECIFICATIONS.

PERMANENT STEEL CASINGS ARE REQUIRED FOR DRILLED PIERS AT BENT NO. 2. DO NOT EXTEND PERMANENT CASINGS BELOW ELEVATION 184.5 FT WITHOUT PRIOR APPROVAL FROM THE ENGINEER.

THE SCOUR CRITICAL ELEVATION FOR BENT NO. 2 IS ELEVATION 182.0 FT. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.

DRILLED PIERS AT BENT NO. 3 ARE DESIGNED FOR A FACTORED RESISTANCE OF 470 TONS PER PIER. CHECK FIELD CONDITIONS FOR THE REQUIRED TIP RESISTANCE OF 20 TSF.

INSTALL DRILLED PIERS AT BENT NO. 3 TO A TIP ELEVATION NO HIGHER THAN 172.5 FT WITH THE REQUIRED TIP RESISTANCE AND A PENETRATION OF AT LEAST 15 FT INTO WEATHERED ROCK AND ROCK AS DEFINED BY ARTICLE 411-1 OF THE STANDARD SPECIFICATIONS.

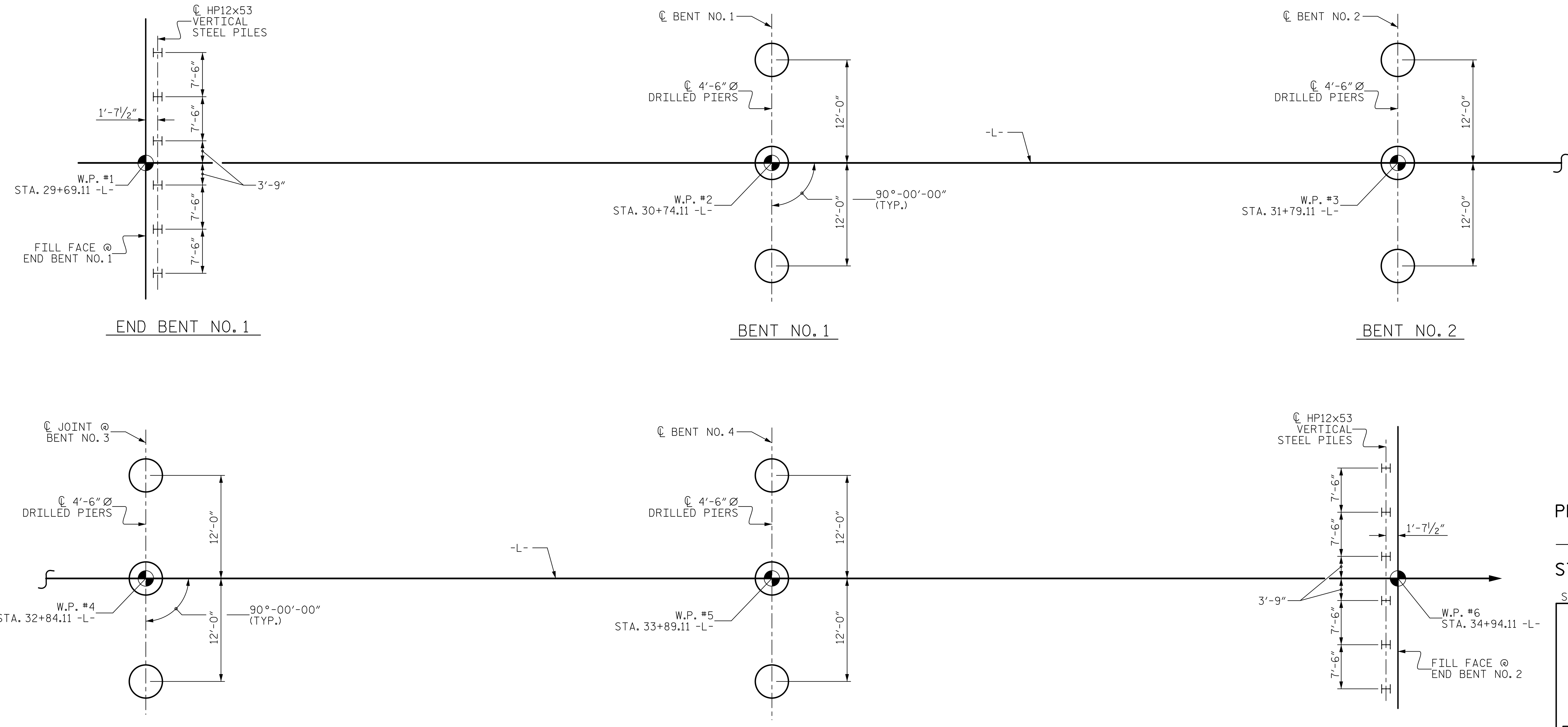
PERMANENT STEEL CASINGS ARE REQUIRED FOR DRILLED PIERS AT BENT NO. 3. DO NOT EXTEND PERMANENT CASINGS BELOW ELEVATION 187.5 FT WITHOUT PRIOR APPROVAL FROM THE ENGINEER.

THE SCOUR CRITICAL ELEVATION FOR BENT NO. 3 IS ELEVATION 182.0 FT. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.

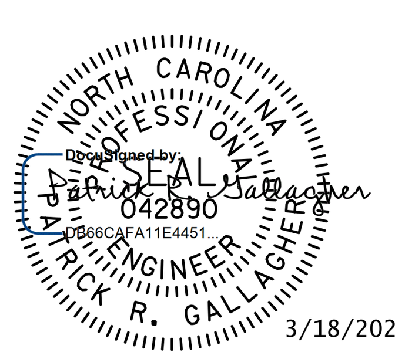
DRILLED PIERS AT BENT NO. 4 ARE DESIGNED FOR A FACTORED RESISTANCE OF 520 TONS PER PIER. CHECK FIELD CONDITIONS FOR THE REQUIRED TIP RESISTANCE OF 35 TSF.

INSTALL DRILLED PIERS AT BENT NO. 4 TO A TIP ELEVATION NO HIGHER THAN 163 FT WITH THE REQUIRED TIP RESISTANCE AND A PENETRATION OF AT LEAST 18 FT INTO WEATHERED ROCK AND ROCK AS DEFINED BY ARTICLE 411-1 OF THE STANDARD SPECIFICATIONS.

THE SCOUR CRITICAL ELEVATION FOR BENT NO. 4 IS ELEVATION 183.0 FT. (LT), 179.0 FT. (CT), AND 179.0 FT. (RT). SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.



FOUNDATION LAYOUT



DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Vaughn & Melton
Consulting Engineers
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Raleigh, NC 919-977-9455 · Charlotte, NC 704-357-0488
Boone, NC 828-355-9933 · Tri-Cities, TN 423-467-8401 · Knoxville, TN 865-546-5800 · Spartanburg, SC 864-574-4775 · Charleston, SC 843-974-5650 · Middlesboro, KY 606-248-6600 · Atlanta, GA 770-627-3590

PROJECT NO. B-4407
ANSON/STANLY COUNTY
STATION: 32+31.61 -L-

SHEET 4 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

BRIDGE ON US-52 OVER ROCKY RIVER BETWEEN SR-1627 (OLD US-52) AND SR-1934 (RIVERVIEW RD.)

DWN. BY: WDC	DATE: 10/2020
CHKD. BY: PRG	DATE: 10/2020
DES. EGR. OF RECORD: PRG	DATE: 10/2020

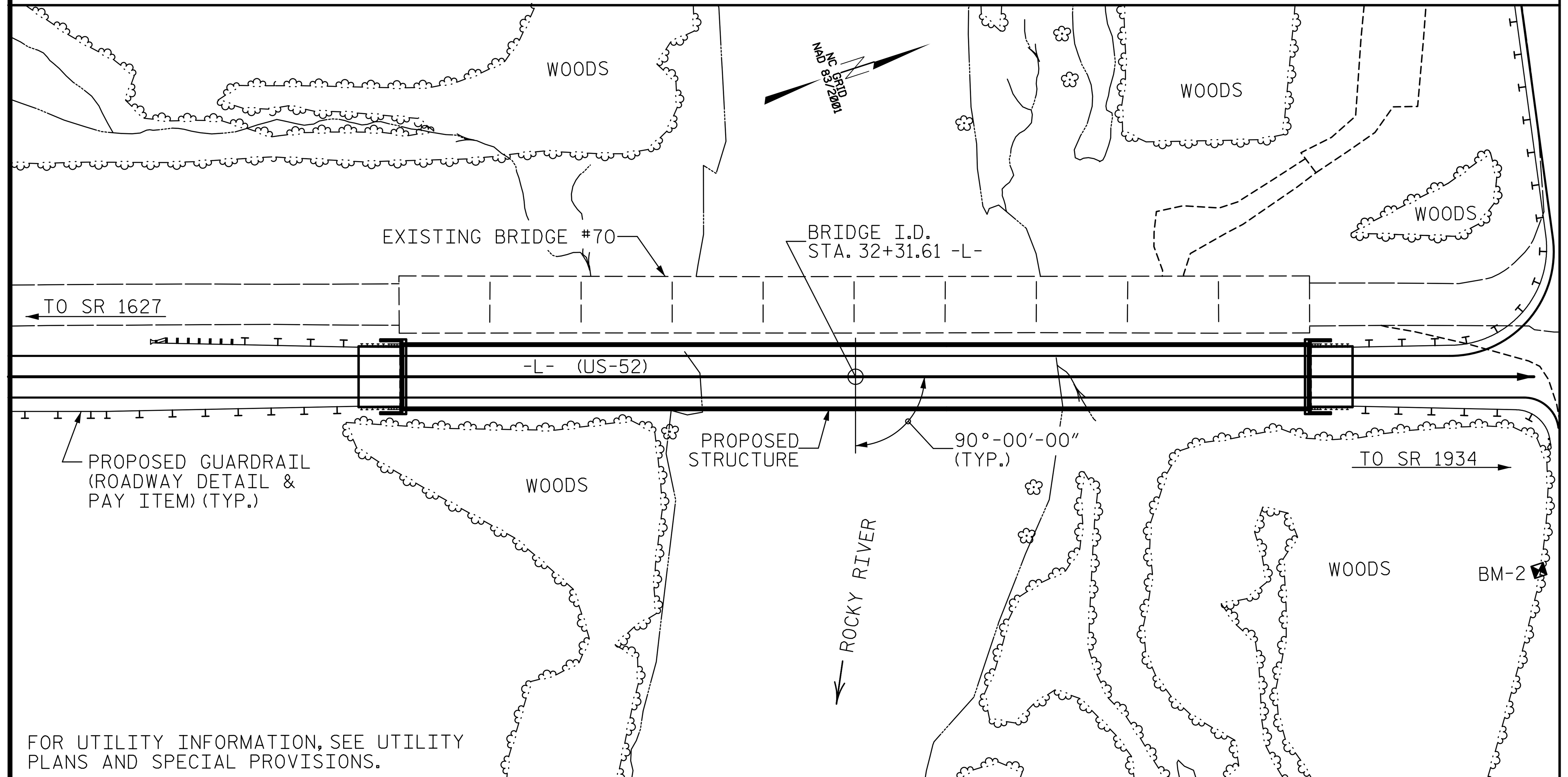
REVISIONS

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

SHEET NO. S-4
TOTAL SHEETS 45

wdcruther
DGN: V:\NCI\Transportation\0317\30-09_B4407\Structures\Final Plans\401_007_B-4407_SMU_F103_S04.dgn
TIME: 09:48 AM on Tuesday, January 12, 2021

BM#2: BENCH TIE IN 22" BIRCH N 527,745 E 1,667,683 -L- STA. 36+25.82 111.71' RT. ELEV. 222.78'



LOCATION SKETCH

GENERAL NOTES

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.

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

THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.

FOR OTHER DESIGN DATA AND GENERAL NOTES, SEE SHEET SN.

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

AFTER SERVING AS A TEMPORARY STRUCTURE, THE EXISTING STRUCTURE CONSISTING OF SPANS OF 4 @ 52'-5", 2 @ 52'-7", 3 @ 52'-6", & 1 @ 52'-8" ON 8 LINES OF REINF CONC DECK GIRDERS WITH 7" REINF CONC DECK AND 5" AWS, WITH A CLEAR RDWY WIDTH OF 26'-3", ON REINF CONC SPILL THRU END BENTS ON STEEL PILES, AND REINF CONC POST AND WEB BENTS, LOCATED AT THE PROPOSED SITE, SHALL BE REMOVED. THE EXISTING BRIDGE IS PRESENTLY NOT POSTED FOR LOAD LIMIT. SHOULD THE STRUCTURAL INTEGRITY OF THE BRIDGE DETERIORATE DURING CONSTRUCTION OF THE PROPOSED BRIDGE, A LOAD LIMIT MAY BE POSTED AND MAY BE REDUCED AS FOUND NECESSARY DURING THE LIFE OF THE PROJECT.

REMOVAL OF THE EXISTING BRIDGE SHALL BE PERFORMED SO AS NOT TO ALLOW DEBRIS TO FALL INTO THE WATER. THE CONTRACTOR SHALL REMOVE THE BRIDGE AND SUBMIT PLANS FOR DEMOLITION IN ACCORDANCE WITH ARTICLE 402-2 OF THE STANDARD SPECIFICATIONS.

THE CLASS AA CONCRETE IN THE BRIDGE DECK SHALL CONTAIN FLY ASH OR GROUND GRANULATED BLAST FURNACE SLAG AT THE SUBSTITUTION RATE SPECIFIED IN ARTICLE 1024-1 AND IN ACCORDANCE WITH ARTICLES 1024-5 AND 1024-6 OF THE STANDARD SPECIFICATIONS. NO PAYMENT WILL BE MADE FOR THIS SUBSTITUTION AS IT IS CONSIDERED INCIDENTAL TO THE COST OF THE REINFORCED CONCRETE DECK SLAB.

THE MATERIAL SHOWN IN THE CROSS-HATCHED AREA ON SHEETS S-1 AND S-2 SHALL BE EXCAVATED AS DIRECTED BY THE ENGINEER. SEE ROADWAY PLANS FOR LIMITS OF EXCAVATION. THIS WORK WILL BE PAID FOR AT THE CONTRACT LUMP SUM PRICE FOR UNCLASSIFIED STRUCTURE EXCAVATION. SEE SECTION 412 OF THE STANDARD SPECIFICATIONS.

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

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

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.

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

REMOVABLE FORMS MAY BE USED IN LIEU OF METAL STAY-IN-PLACE FORMS IN ACCORDANCE WITH ARTICLE 420-3 OF THE STANDARD SPECIFICATIONS.

NEEDLE BEAMS WILL NOT BE ALLOWED UNLESS OTHERWISE CALLED FOR ON THE PLANS OR APPROVED BY THE ENGINEER.

AT THE CONTRACTOR'S OPTION, AND UPON REMOVAL OF THE CAUSEWAY, THE CLASS II RIP RAP USED IN THE CAUSEWAY MAY BE PLACED AS RIP RAP SLOPE PROTECTION AND BANK STABILIZATION. SEE SPECIAL PROVISIONS FOR CONSTRUCTION, MAINTENANCE AND REMOVAL OF TEMPORARY ACCESS AT STATION 32+31.61 -L-.

FOR BANK STABILIZATION, REFER TO ROADWAY PLAN SHEET NO. 5.

PRESTRESSED CONCRETE DECK PANELS MAY BE USED IN LIEU OF METAL STAY-IN-PLACE FORMS IN ACCORDANCE WITH ARTICLE 420-3 OF THE STANDARD SPECIFICATIONS.

FOR LIMITS OF TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC, SEE TRAFFIC CONTROL PLANS. FOR PAY ITEM FOR TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC, SEE ROADWAY PLANS.

TOTAL BILL OF MATERIAL

	CONST, MAINT, & REMOVAL OF TEMPORARY ACCESS	REMOVAL OF EXISTING STRUCTURE	ASBESTOS ASSESSMENT	4'-6" Ø DRILLED PIERS IN SOIL	4'-6" Ø DRILLED PIERS NOT IN SOIL	PERMANENT STEEL CASING FOR 4'-6" Ø DRILLED PIERS	PDA TESTING	SID INSPECTIONS	CSL TESTING	UNCLASSIFIED STRUCTURE EXCAVATION	REINFORCED CONCRETE DECK SLAB	GROOVING BRIDGE FLOORS	CLASS A CONCRETE
	LUMP SUM	LUMP SUM	LUMP SUM	LIN. FT.	LIN. FT.	LIN. FT.	EACH	EACH	EACH	LUMP SUM	SQ.FT.	SQ.FT.	CU.YDS.
SUPERSTRUCTURE											19,469	17,586	
END BENT NO. 1										LUMP SUM			40.4
BENT NO. 1				60.30	55.00								51.1
BENT NO. 2				13.20	48.00	22.20							71.7
BENT NO. 3				11.20	47.00	13.20							72.5
BENT NO. 4				52.10	58.00								62.4
END BENT NO. 2										LUMP SUM			40.7
TOTAL	LUMP SUM	LUMP SUM	LUMP SUM	136.80	208.00	35.40	2	12	4	LUMP SUM	19,469	17,586	338.8

HYDRAULIC DATA

DESIGN DISCHARGE = 75000 CFS.
DESIGN FREQUENCY = 50 YRS.
DESIGN HW ELEVATION = 224.7 FT.
BASE DISCHARGE (Q100) = 82000 CFS.
BASE HW ELEVATION = 225.9 FT.
DRAINAGE AREA = 1410 SQ. MI.

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE = 128200 CFS.
OVERTOPPING FREQUENCY = 500+ YRS.
OVERTOPPING ELEVATION = 233.2 FT.

OVERTOPPING AT SAG POINT STA. 29+22.72 -L- ℄ ELEV. 233.2'

TOTAL BILL OF MATERIAL

	BRIDGE APPROACH SLABS	REINFORCING STEEL	SPIRAL COLUMN REINFORCING STEEL	54" PRESTRESSED CONCRETE GIRDERS		PILE DRIVING EQUIPMENT SETUP FOR HP 12 X 53 STEEL PILES	HP 12 X 53 STEEL PILES		CONCRETE BARRIER RAIL	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE	ELASTOMERIC BEARINGS	STRIP SEAL EXPANSION JOINTS
	LUMP SUM	LBS.	LBS.	NO.	LIN.FT.	EACH	NO.	LIN.FT.	LIN.FT.	TONS	SQ. YARDS	LUMP SUM	LUMP SUM
SUPERSTRUCTURE	LUMP SUM			25	2,604.17				1046.67			LUMP SUM	LUMP SUM
END BENT NO. 1		6,601				6	6	180		630	700		
BENT NO. 1		14,436	4,943										
BENT NO. 2		13,883	4,493										
BENT NO. 3		13,815	4,719										
BENT NO. 4		15,461	5,578										
END BENT NO. 2		6,890				6	6	210		1110	1233		
TOTAL	LUMP SUM	71,086	19,733	25	2,604.17	12	12	390	1046.67	1740	1933	LUMP SUM	LUMP SUM

PROJECT NO. B-4407
ANSON/STANLY COUNTY
STATION: 32+31.61 -L-

SHEET 5 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

BRIDGE ON US-52
OVER ROCKY RIVER
BETWEEN SR-1627 (OLD US-52)
AND SR-1934 (RIVERVIEW RD.)

Vaughn & Melton Consulting Engineers
Asheville, North Carolina 828-253-2796
Boone, NC 828-355-9933 · Tri-Cities, TN 423-467-8401 · Knoxville, TN 865-546-5800 · Spartanburg, SC 864-574-4775 · Charleston, SC 843-974-5650 · Middlesboro, KY 606-248-6600 · Raleigh, NC 919-977-9455 · Charlotte, NC 704-357-0488 · Atlanta, GA 770-627-3590

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 042890 PATRICK R. GALLAGHER 4/8/2021

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DWN. BY: WDC DATE: 10/2020
CHKD. BY: PRG DATE: 10/2020
DES. EGR. OF RECORD: PRG DATE: 10/2020

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

SHEET NO. S-5
TOTAL SHEETS 45

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

LEVEL		VEHICLE	WEIGHT (W) (TONS)	⟨#⟩ CONTROLLING LOAD RATING	MINIMUM RATING FACTORS (RF)	TONS = W × RF	STRENGTH I LIMIT STATE											SERVICE III LIMIT STATE						COMMENT NUMBER
								MOMENT					SHEAR						MOMENT						
							LIVE-LOAD FACTORS (γ_{LL})	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	LIVE-LOAD FACTORS (γ_{LL})	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING		HL-93 (INVENTORY)	N/A	⟨1⟩	1.04	--	1.75	0.719	1.27	B	E	51.50	0.783	1.18	A	I	10.25	0.80	0.719	1.04	B	E	51.50	
		HL-93 (OPERATING)	N/A		1.57	--	1.35	0.719	1.64	B	E	51.50	0.783	1.57	A	I	10.25	N/A	--	--	--	--	--	
		HS-20 (INVENTORY)	36.000	⟨2⟩	1.47	52.92	1.75	0.719	1.79	B	E	51.50	0.783	1.64	A	I	10.25	0.80	0.719	1.47	B	E	51.50	
		HS-20 (OPERATING)	36.000		2.16	77.76	1.35	0.719	2.32	B	E	51.50	0.783	2.16	A	I	10.25	N/A	--	--	--	--	--	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		3.51	47.39	1.40	0.719	5.36	B	E	51.50	0.783	5.33	A	I	10.25	0.80	0.719	3.51	B	E	51.50	
		SNGARBS2	20.000		2.53	50.60	1.40	0.719	3.86	B	E	51.50	0.783	3.69	A	I	10.25	0.80	0.719	2.53	B	E	51.50	
		SNAGRIS2	22.000		2.36	51.92	1.40	0.719	3.60	B	E	51.50	0.783	3.39	A	I	10.25	0.80	0.719	2.36	B	E	51.50	
		SNCOTTS3	27.250		1.74	47.42	1.40	0.719	2.66	B	E	51.50	0.783	2.58	A	I	10.25	0.80	0.719	1.74	B	E	51.50	
		SNAGGRS4	34.925		1.42	49.59	1.40	0.719	2.17	B	E	51.50	0.783	2.08	A	I	10.25	0.80	0.719	1.42	B	E	51.50	
		SNS5A	35.550		1.39	49.41	1.40	0.719	2.13	B	E	51.50	0.783	2.08	A	I	10.25	0.80	0.719	1.39	B	E	51.50	
		SNS6A	39.950		1.26	50.34	1.40	0.719	1.93	B	E	51.50	0.783	1.87	A	I	10.25	0.80	0.719	1.26	B	E	51.50	
		SNS7B	42.000		1.20	50.40	1.40	0.719	1.84	B	E	51.50	0.783	1.81	B	I	10.30	0.80	0.719	1.20	B	E	51.50	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.54	50.82	1.40	0.719	2.35	B	E	51.50	0.783	2.27	A	I	10.25	0.80	0.719	1.54	B	E	51.50	
		TNT4A	33.075		1.54	50.94	1.40	0.719	2.35	B	E	51.50	0.783	2.23	A	I	10.25	0.80	0.719	1.54	B	E	51.50	
		TNT6A	41.600		1.25	52.00	1.40	0.719	1.90	B	E	51.50	0.783	1.90	A	I	10.25	0.80	0.719	1.25	B	E	51.50	
		TNT7A	42.000		1.25	52.50	1.40	0.719	1.91	B	E	51.50	0.783	1.86	A	I	10.25	0.80	0.719	1.25	B	E	51.50	
		TNT7B	42.000		1.27	53.34	1.40	0.719	1.95	B	E	51.50	0.783	1.78	A	I	10.25	0.80	0.719	1.27	B	E	51.50	
		TNAGRIT4	43.000		1.22	52.46	1.40	0.719	1.87	B	E	51.50	0.783	1.73	A	I	10.25	0.80	0.719	1.22	B	E	51.50	
		TNAGT5A	45.000		1.16	52.20	1.40	0.719	1.77	B	E	51.50	0.783	1.70	A	I	10.25	0.80	0.719	1.16	B	E	51.50	
		TNAGT5B	45.000	⟨3⟩	1.15	51.75	1.40	0.719	1.76	B	E	51.50	0.783	1.64	A	I	10.25	0.80	0.719	1.15	B	E	51.50	

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)

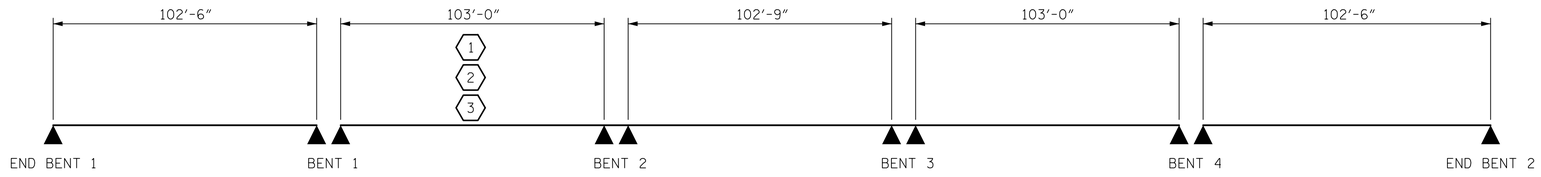
⟨3⟩ LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

I - INTERIOR GIRDER

E - EXTERIOR GIRDER



LRFR SUMMARY

PROJECT NO. B-4407

ANSON/STANLY COUNTY

STATION: 32+31.61 -L-

3/18/2021

Vaughn & Melton
Consulting Engineers
Asheville, North Carolina
828-253-2796
Raleigh, NC 919-977-9455
Charlotte, NC 704-357-0488
Boone, NC 828-355-9933
Tri-Cities, TN 423-467-8401
Knoxville, TN 865-546-5800
Spartanburg, SC 864-574-4775
Charleston, SC 843-974-5650
Middlesboro, KY 606-248-6600
Atlanta, GA 770-627-3590

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD

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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DRAWN BY : MAA 1/08
CHECKED BY : GM/DI 2/08

REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:

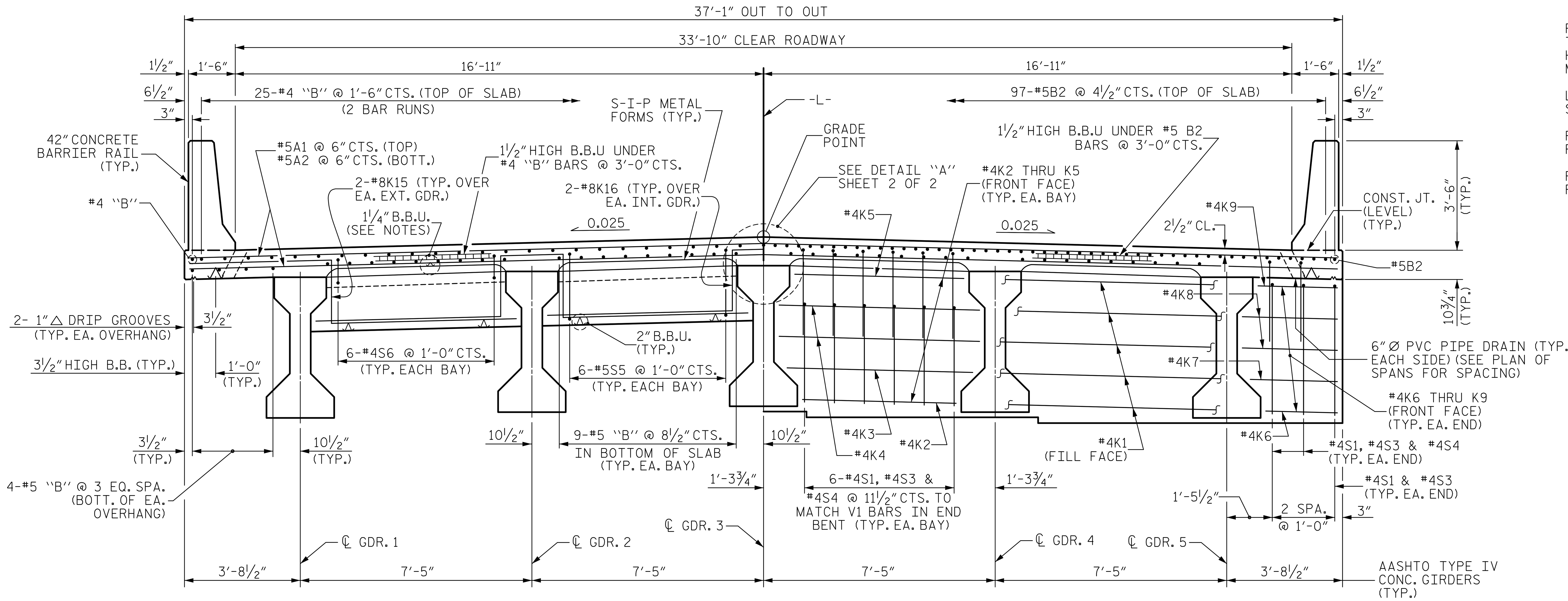
REV. 11/12/08RR MAA/GM
REV. 10/1/11 MAA/GM
REV. 12/17 MAA/THC

DWN. BY: WDC DATE: 10/2020
CHKD. BY: PRG DATE: 10/2020
DES. EGR. OF RECORD: PRG DATE: 10/2020

SHEET NO. S-6

TOTAL SHEETS 45

STD. NO. LRFR1

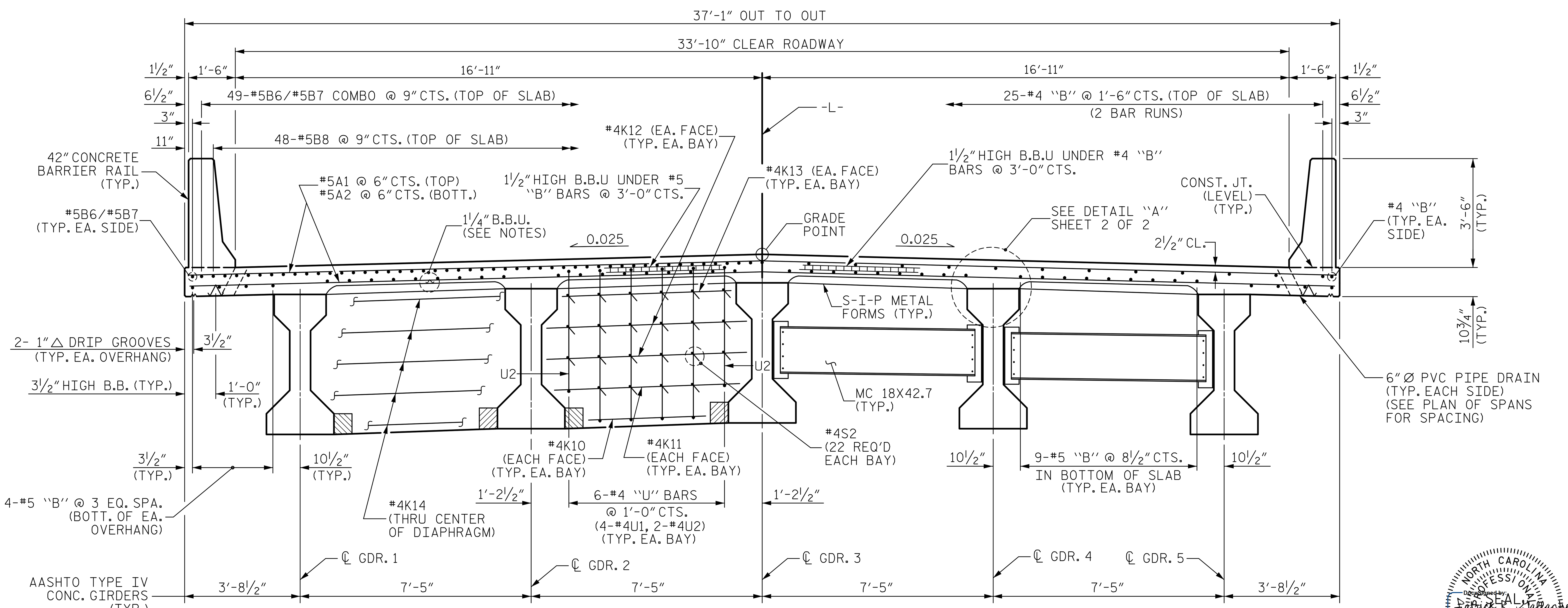


TYPICAL HALF-SECTION AT BENT DIAPHRAGM

(BENTS 1 & 4)

TYPICAL HALF-SECTION AT END BENT DIAPHRAGM

TYPICAL SECTION



TYPICAL HALF-SECTION AT BENT DIAPHRAGM

(BENTS 2 & 3)

TYPICAL HALF-SECTION AT INTERMEDIATE DIAPHRAGM

TYPICAL SECTION

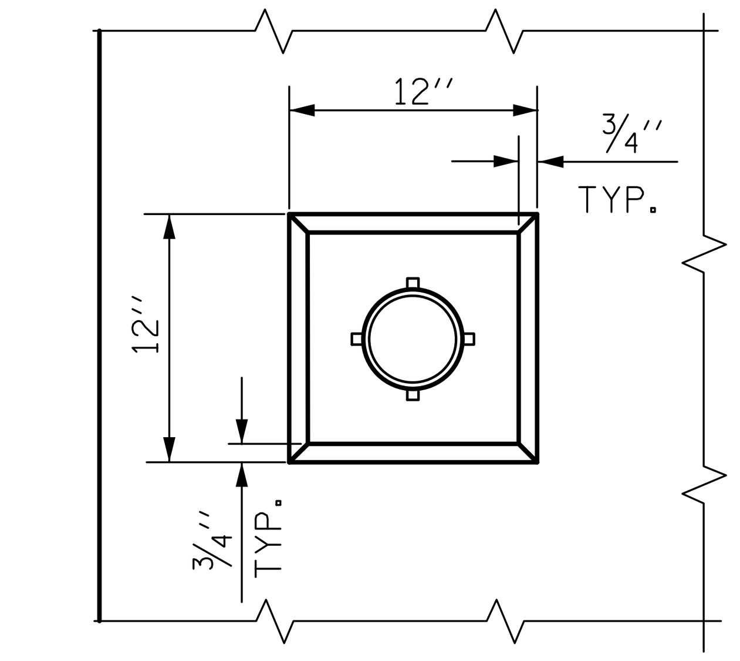
NOTES

PROVIDE 1¼" HIGH BEAM BOLSTERS UPPER AT 4'-0" CTS. ATOP THE METAL STAY-IN-PLACE FORMS TO SUPPORT THE BOTTOM MAT OF 'A' BARS. WHEN USING REMOVABLE FORMS, PROVIDE CONTINUOUS HIGH CHAIRS FOR METAL DECK (C.H.C.M.) @ 4'-0" CTS. WITH A HEIGHT TO SUPPORT THE BOTTOM MAT OF 'A' BARS A CLEAR DISTANCE OF 2½" ABOVE THE TOP OF THE REMOVABLE FORM.

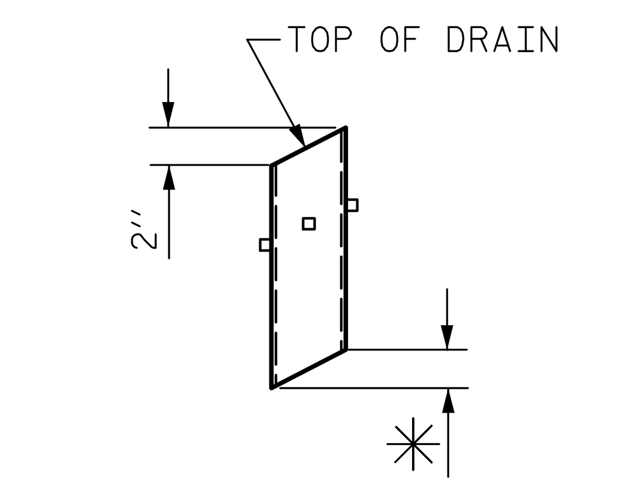
LONGITUDINAL STEEL MAY BE SHIFTED SLIGHTLY, AS NECESSARY, TO AVOID INTERFERENCE WITH STIRRUPS IN PRESTRESSED CONCRETE GIRDERS.

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

FOR 42" CONCRETE BARRIER RAIL REINFORCING STEEL AND DETAILS, SEE "CONCRETE BARRIER RAIL" SHEET.

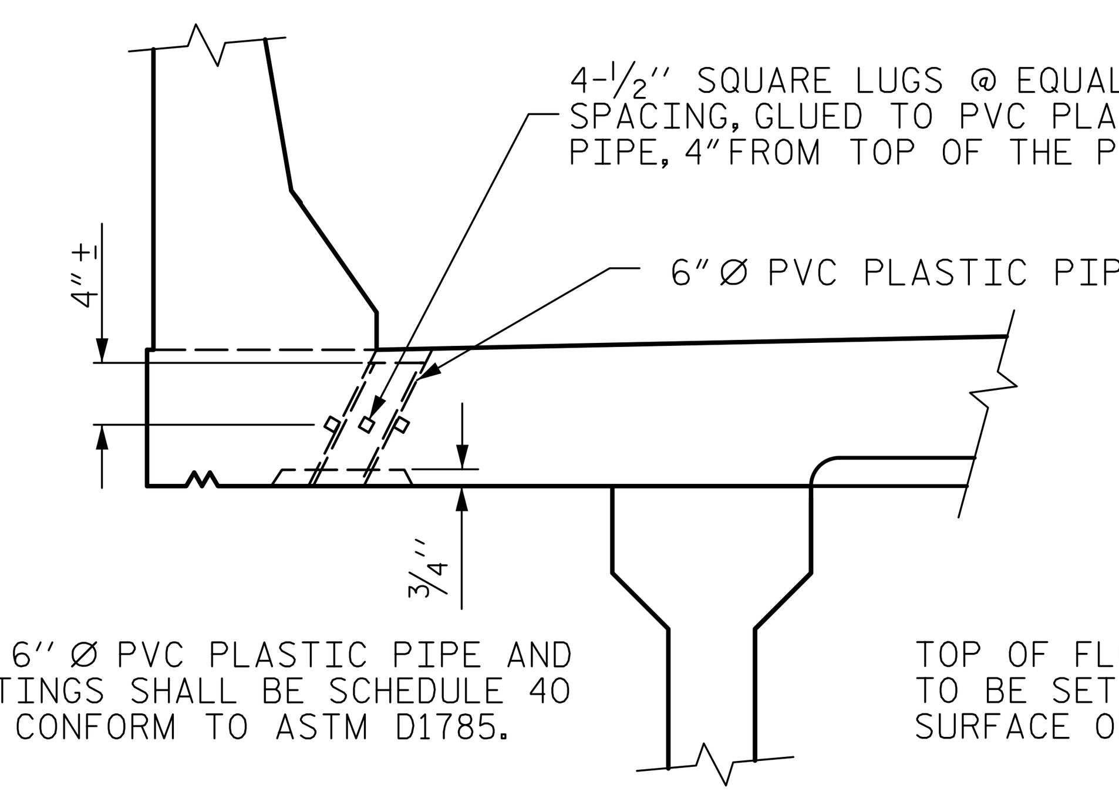


PLAN OF RECESS



✳ TO BE SET TO MATCH SLOPE OF BOTTOM OF OVERHANG (48 DRAINS REQUIRED)

PIPE DETAIL



THE 6" Ø PVC PLASTIC PIPE AND FITTINGS SHALL BE SCHEDULE 40 AND CONFORM TO ASTM D1785.

TOP OF FLOOR DRAINS TO BE SET ⅜" BELOW SURFACE OF SLAB.

ELEVATION

DRAIN DETAILS

NOTE: ALL DRAIN FEATURES SHOWN HERE SHALL BE INCIDENTAL TO THE PRICE BID FOR "REINFORCED CONCRETE DECK SLAB".

PROJECT NO. B-4407

ANSON/STANLY COUNTY

STATION: 32+31.61 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
TYPICAL SECTION

V&M Vaughn & Melton Consulting Engineers — Asheville, North Carolina 828-253-2796; Boone, NC 828-355-9933; Tri-Cities, TN 423-467-8401; Knoxville, TN 865-546-5800; Spartanburg, SC 864-574-4775; Charleston, SC 843-974-5650; Middlesboro, KY 606-248-6600; Atlanta, GA 770-627-3590; Raleigh, NC 919-977-9455; Charlotte, NC 704-357-0488

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 042890 PATRICK R. GALLAGHER 3/18/2021

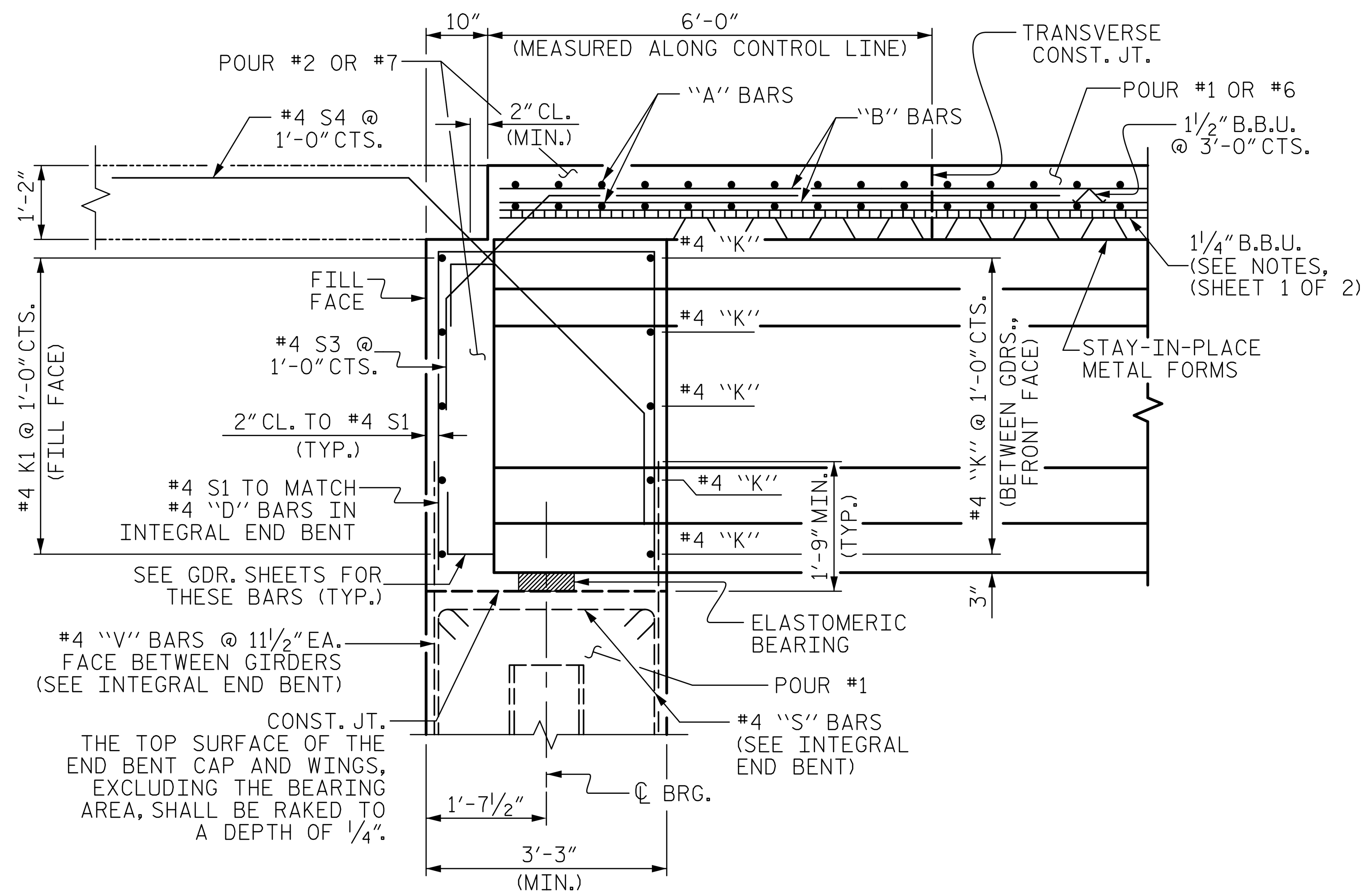
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DWN. BY: WDC DATE: 10/2020
CHKD. BY: PRG DATE: 10/2020
DES. EGR. OF RECORD: PRG DATE: 10/2020

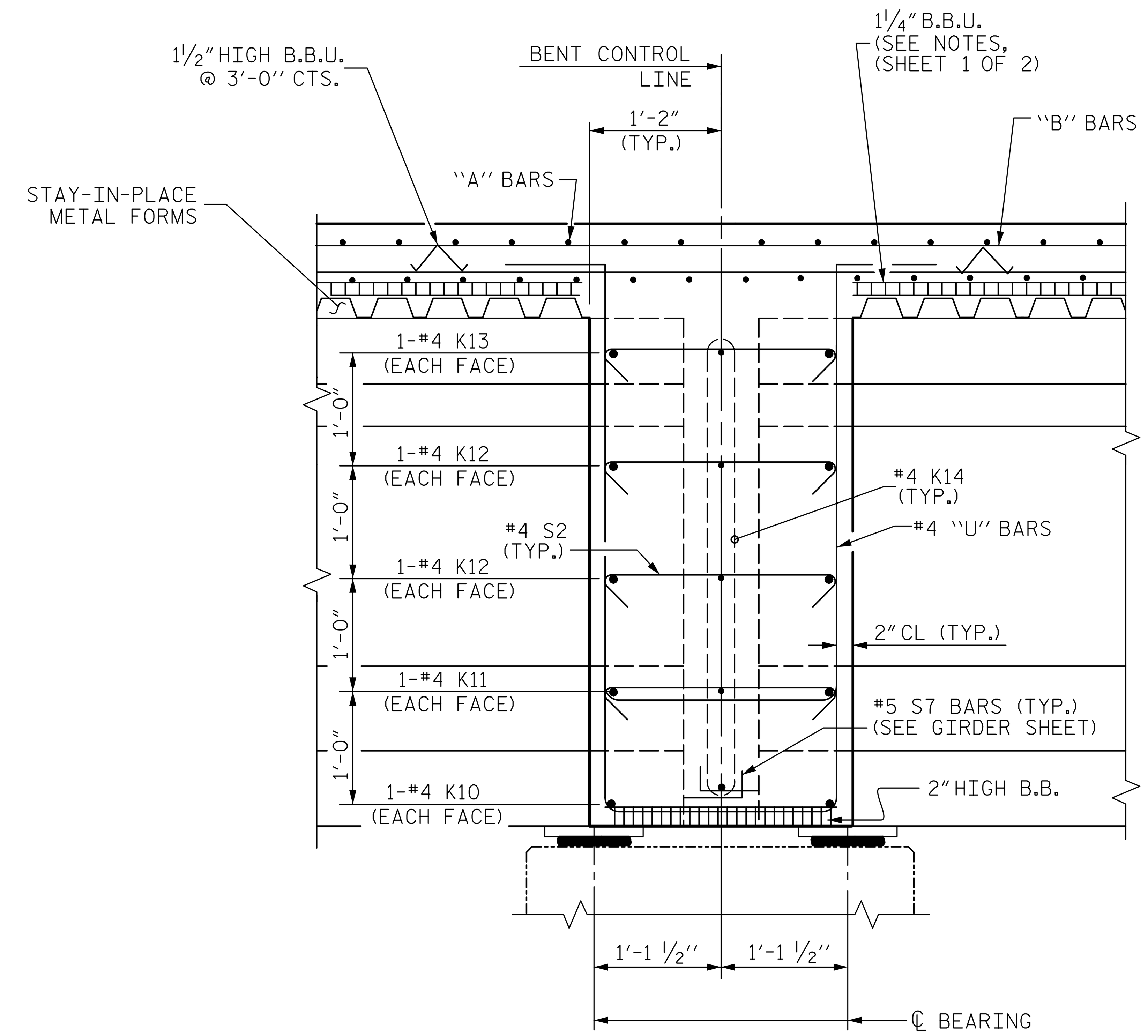
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

SHEET NO. S-7

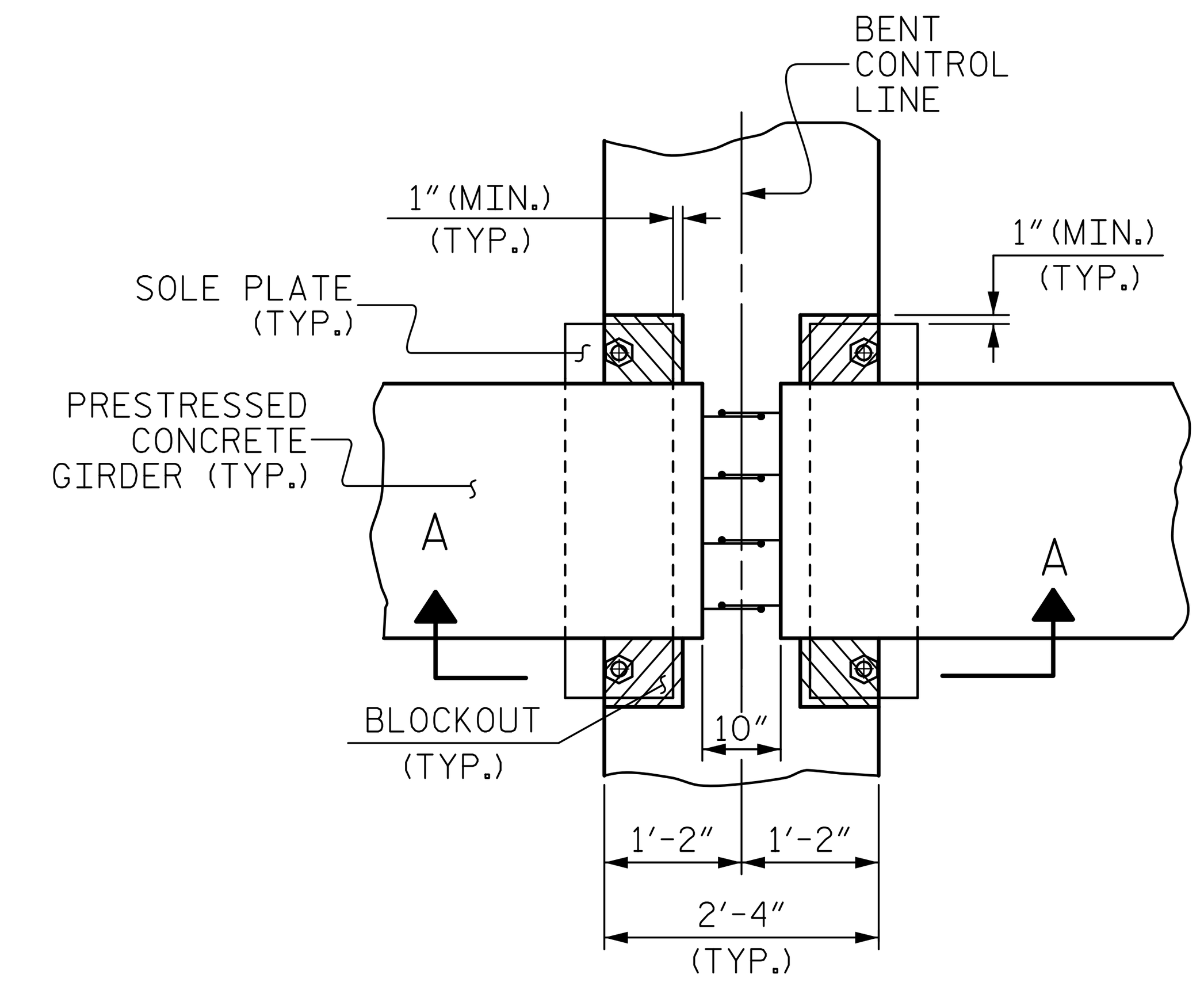
TOTAL SHEETS 45



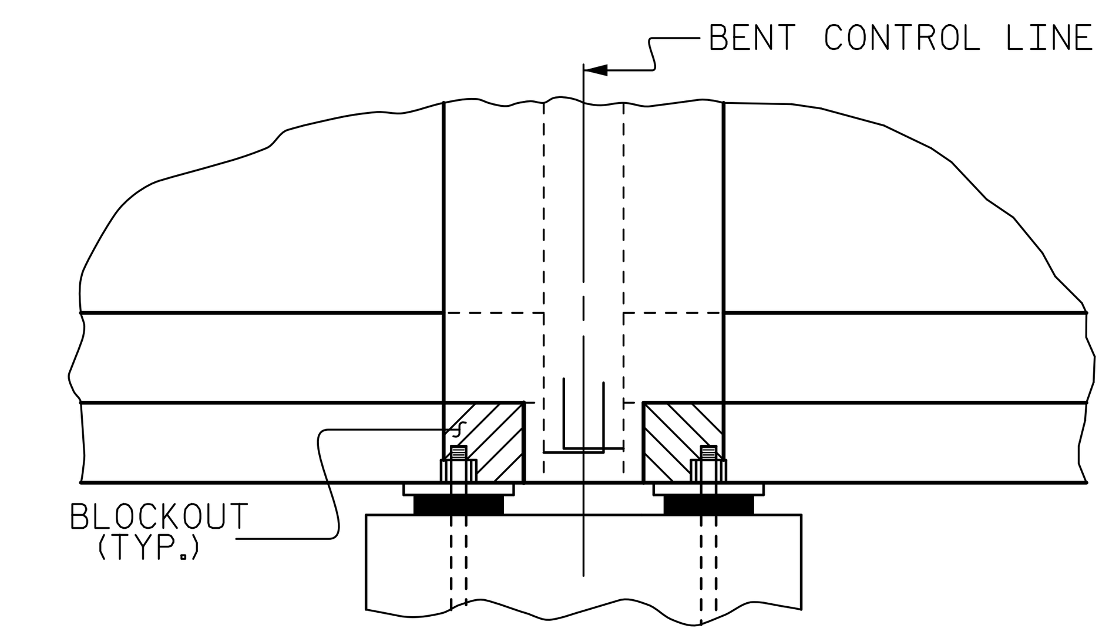
SECTION @ END BENTS



SECTION @ BENTS 2 & 3



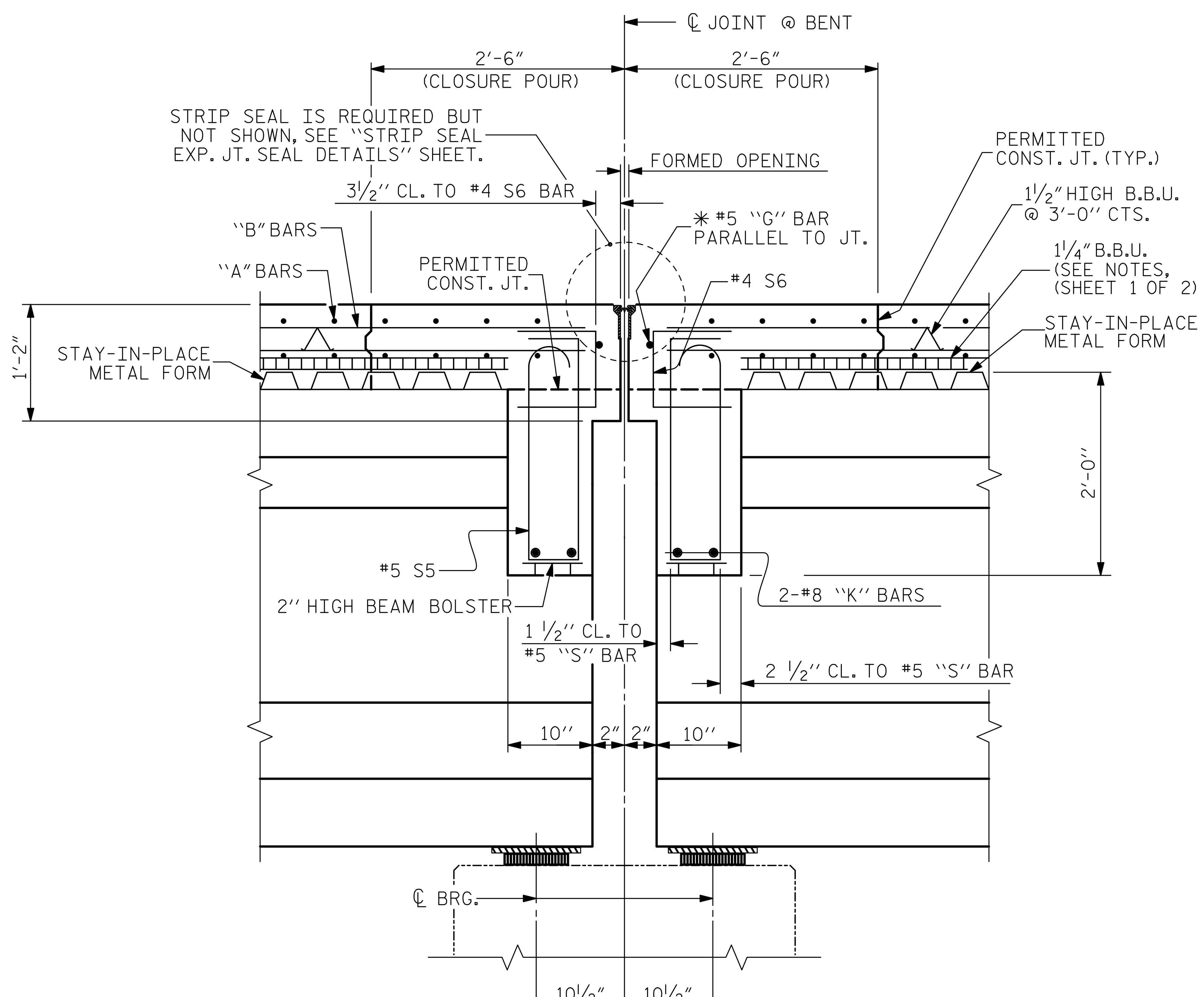
PLAN VIEW



SECTION A-A

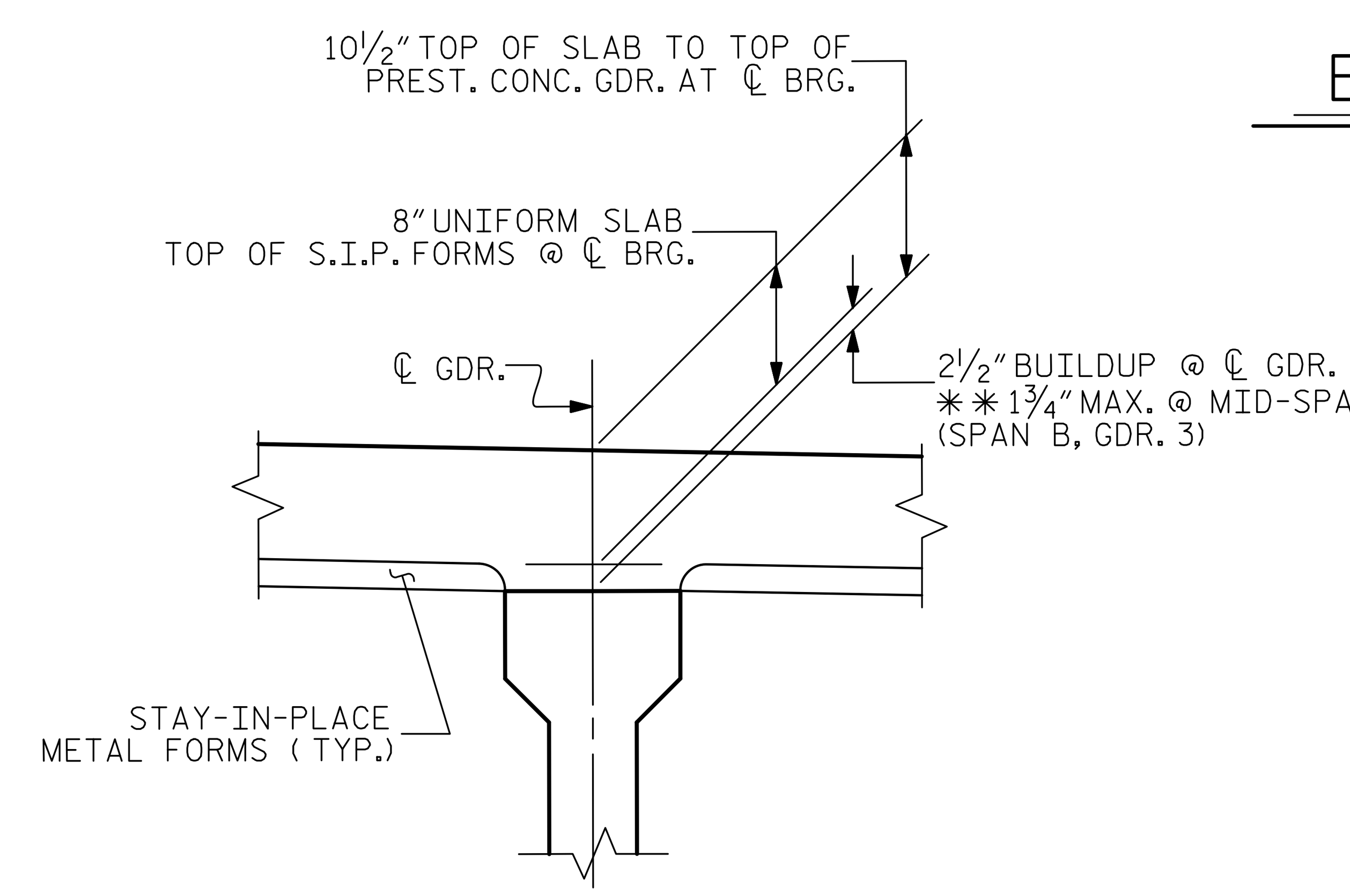
BENT DIAPHRAGM BLOCKOUT DETAIL

(TYP. @ BENTS 2 & 3)



SECTION @ BENTS 1 & 4

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



DETAIL "A"

✻✻ BASED ON PREDICTED FINAL CAMBER AND THEORETICAL GRADE LINE ELEVATIONS.

PROJECT NO. B-4407

ANSON/STANLY COUNTY

STATION: 32+31.61 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
TYPICAL SECTION DETAILS

Vaughn & Melton Consulting Engineers
Asheville, North Carolina 828-253-2796
Raleigh, NC 919-977-9455 · Charlotte, NC 704-357-0488
Boone, NC 828-355-9933 · Tri-Cities, TN 423-467-8401 · Knoxville, TN 865-546-5800 · Spartanburg, SC 864-574-4775 · Charleston, SC 843-974-5650 · Middlesboro, KY 606-248-6600 · Atlanta, GA 770-627-3590

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 042890 PATRICK R. GALLAGHER 3/18/2021

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DWN. BY: WDC DATE: 10/2020
CHKD. BY: PRG DATE: 10/2020
DES. EGR. OF RECORD: PRG DATE: 10/2020

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

SHEET NO. S-8
TOTAL SHEETS 45

wdcrutcher
DGN: V:\NCV\Transportation\031730-09 B4407\Structures\Final Plans\400_015_B-4407_SMU_T502_S08.dgn
TIME: 03:12 PM on Wednesday, February 03, 2021

525'-0" TOTAL LENGTH OF BRIDGE (FILL FACE TO FILL FACE)

315'-0" UNIT 1 (FILL FACE TO ℄ JOINT @ BENT 1)

105'-0" (SPAN A)

315'-0" UNIT 2 (℄ JOINT @ BENT 1 TO ℄ JOINT @ BENT 4)

21'-0"

6'-10"

#5B2 (TYP. EA. SIDE)

1'-11" SPLICE (TYP.)

#4B3 (TYP. EA. SIDE) (3 BAR RUNS)

℄ JOINT @ BENT NO. 1

1'-6"

1½"

6½" (TYP.)

3"

10" BLOCKOUT

97-#5B2 @ 4½" CTS. (TOP OF SLAB)

25-#4B3 @ 1'-6" CTS. (TOP OF SLAB)

1'-3¾" (TYP.)

℄ GDR. A1

GUTTERLINE

10" BENT DIAPHRAGM (TYP. EA. BAY)

#5G1

6-#4S1, #4S3, & #4S4 @ 11½" CTS. TO MATCH #4V1 IN CAP (TYP. EACH BAY)

℄ GDR. A2

6-#4S6 @ 1'-0" CTS. (TYP. EA. BAY)

37'-1" OUT TO OUT

33'-10" CLEAR ROADWAY

16'-11"

35'-2" (APPROACH SLAB BLOCKOUT)

-L-

10½" (TYP.)

W.P. #1

W.P. #2

℄ GDR. A3

90°00'00" (TYP.)

9-#5B1 @ 8½" CTS. (BOTT. OF SLAB) (TYP. EA. BAY) (2 BAR RUNS)

6-#5S5 @ 1'-0" CTS. (TYP. EA. BAY)

TRANSVERSE CONST. JT.

5-#4K1

FILL FACE @ END BENT NO. 1

#4K2 THRU K5 (TYP. EA. BAY)

℄ GDR. A4

2-#8K16 (TYP. OVER EA. INT. GDR.)

GUTTERLINE

℄ GDR. A5

2-#8K15 (TYP. OVER EA. EXT. GDR.)

SEE DETAIL "A"

3½" (TYP.)

4-#5B1 @ 3 EQ. SPA. (BOTT. OF SLAB) (TYP. EA. OVERHANG) (2 BAR RUNS)

PERMITTED TRANSVERSE CONST. JT.

2'-6"

#4K6 THRU K9 (TYP. EA. END)

1'-2"

208-#5A1 BARS @ 6" CTS. (TOP OF SLAB) (UNIT 1)

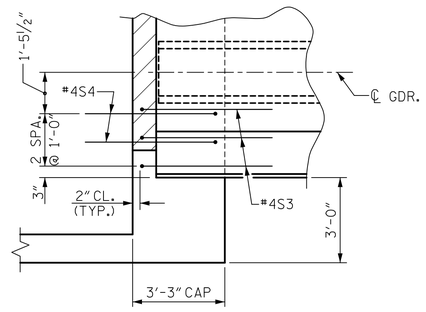
208-#5A2 BARS @ 6" CTS. (BOTT. OF SLAB) (UNIT 1)

4"

4'-0"

9- 6" Ø PIPE DRAINS @ 12'-0" CTS. (IN SPAN A) (TYP. EACH SIDE)

PLAN OF SPAN A



DETAIL "A"

(TYPICAL FOR EACH DECK CORNER)
(S1 BARS NOT SHOWN FOR CLARITY)

PROJECT NO. B-4407

ANSON/STANLY COUNTY

STATION: 32+31.61 -L-

SHEET 1 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
PLAN OF SPAN A

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 042890 PATRICK R. GALLAGHER
3/18/2021

Vaughn & Melton
Consulting Engineers
Asheville, North Carolina 828-253-2796
Boone, NC 828-355-9933
Tri-Cities, TN 423-467-8401
Knoxville, TN 865-546-5800
Spartanburg, SC 864-574-4775
Charleston, SC 843-974-5650
Middlesboro, KY 606-248-6600
Raleigh, NC 919-977-9455
Charlotte, NC 704-357-0488
Atlanta, GA 770-627-3590

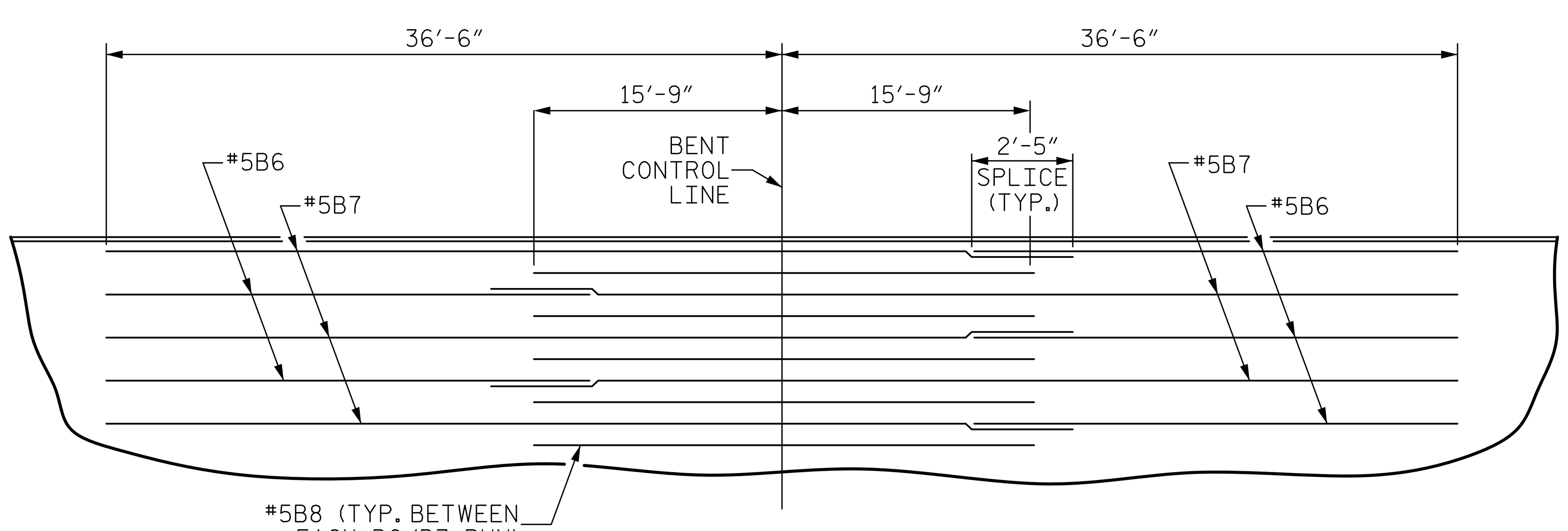
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DWN. BY: WDC DATE: 10/2020
CHKD. BY: PRG DATE: 10/2020
DES. EGR. OF RECORD: PRG DATE: 10/2020

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-9
1			3			TOTAL SHEETS
2			4			45

w/crutcher
DGN: V:\NCT\transportation\3170-09 B4407\Structures\Final Plans\400_DIT_B-4407_SMU_PS01_SD9.dgn
TIME: 10:04 PM on Wednesday, February 03, 2021

PLAN OF SPAN B



DETAIL "B"

ALTERNATE THE PLACEMENT OF B6 AND B7 BARS AT EACH SPACING TO STAGGER THE SPLICES ON EACH SIDE OF THE BENT CONTROL LINE

PROJECT NO. B-4407

ANSON/STANLY COUNTY

STATION: 32+31.61 -L-

SHEET 2 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
PLAN OF SPAN B

Vaughn & Melton Consulting Engineers, Asheville, North Carolina 828-253-2796; Raleigh, NC 919-977-9455; Charlotte, NC 704-357-0488; Boone, NC 828-355-9933; Tri-Cities, TN 423-467-8401; Knoxville, TN 865-546-5800; Spartanburg, SC 864-574-4775; Charleston, SC 843-974-5650; Middlesboro, KY 606-248-6600; Atlanta, GA 770-627-3590

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 042890 PATRICK R. GALLAGHER 3/18/2021

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DWN. BY: WDC	DATE: 10/2020							
CHKD. BY: PRG	DATE: 10/2020							
DES. EGR. OF RECORD: PRG	DATE: 10/2020							

REVISIONS							SHEET NO.
NO.	BY:	DATE:		NO.	BY:	DATE:	S-10
1				3			TOTAL SHEETS
2				4			45

wdcrutcher
DGN: V:\NC\Transportation\03\130-09 B4407\Structures\Final Plans\40_09_B-4407_SMU_PS02_S10.dgn
TIME: 05:22 PM on Friday, February 05, 2021

PLAN OF SPAN C

(NO PIPE DRAINS IN SPAN C)

PROJECT NO. B-4407

ANSON/STANLY COUNTY

STATION: 32+31.61 -L-

SHEET 3 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
PLAN OF SPAN C

Vaughn & Melton Consulting Engineers — Asheville, North Carolina

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 042890 PATRICK R. GALLAGHER 3/18/2021

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DWN. BY: WDC DATE: 10/2020
CHKD. BY: PRG DATE: 10/2020
DES. EGR. OF RECORD: PRG DATE: 10/2020

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

SHEET NO. S-11
TOTAL SHEETS 45

PLAN OF SPAN D

PROJECT NO. B-4407

ANSON/STANLY COUNTY

STATION: 32+31.61 -L-

SHEET 4 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
PLAN OF SPAN D

NORTH CAROLINA PROFESSIONAL SEAL 042890 ENGINEER PATRICK R. GALLAGHER 3/18/2021

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

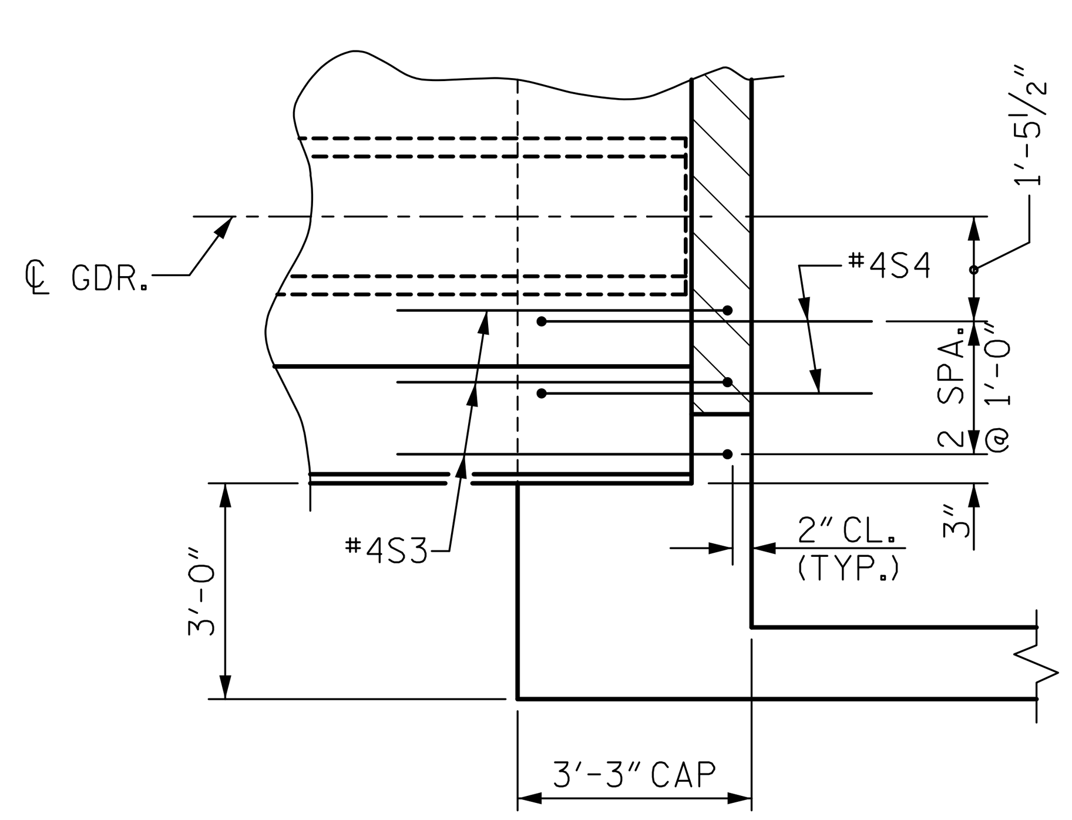
DWN. BY: WDC DATE: 10/2020
CHKD. BY: PRG DATE: 10/2020
DES. EGR. OF RECORD: PRG DATE: 10/2020

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-12
1			3			TOTAL SHEETS
2			4			45

wdcrutcher
DGN: V:\NCV\Transportation\031130-09 B4407\Structures\Final Plans\40_023_B-4407_SMU_PS04_S12.dgn
TIME: 05:23 PM on Friday, February 05, 2021


525'-0" TOTAL LENGTH OF BRIDGE (FILL FACE TO FILL FACE)
315'-0" UNIT 2 (℄ JOINT @ BENT 1 TO ℄ JOINT @ BENT 4)
315'-0" UNIT 3 (℄ JOINT @ BENT 4 TO FILL FACE)
105'-0" (SPAN E)
21'-0"
6'-10"
#4B3 (TYP. EA. SIDE) (3 BAR RUNS)
1'-11" SPLICE (TYP.)
#5B2 (TYP. EA. SIDE)
3"
6½" (TYP.)
1½"
1'-6"
℄ JOINT @ BENT NO. 1
10" BENT DIAPHRAGM (TYP. EA. BAY)
#5G1
GUTTERLINE
℄ GDR. E1
10" BLOCKOUT
25-#4B3 @ 1'-6" CTS. (TOP OF SLAB) (3 BAR RUNS)
97-#5B2 @ 4½" CTS. (TOP OF SLAB)
1'-3¾" (TYP.)
16'-11"
6-#4S6 @ 1'-0" CTS. (TYP. EA. BAY)
℄ GDR. E2
6-#4S1, #4S3, & #4S4 @ 11½" CTS. TO MATCH #4V1 IN CAP (TYP. EACH BAY)
W.P. #4
-L-
10½" (TYP.)
W.P. #6
35'-2" (APPROACH SLAB BLOCKOUT)
33'-10" CLEAR ROADWAY
37'-1" OUT TO OUT
6-#5S5 @ 1'-0" CTS. (TYP. EA. BAY)
9-#5B1 @ 8½" CTS. (BOTT. OF SLAB) (TYP. EA. BAY) (2 BAR RUNS)
℄ GDR. E3
90°00'00" (TYP.)
5-#4K1
2-#8K16 (TYP. OVER EA. INT. GDR.)
℄ GDR. E4
TRANSVERSE CONST. JT.
FILL FACE @ END BENT NO. 2
2-#8K15 (TYP. OVER EA. EXT. GDR.)
GUTTERLINE
℄ GDR. E5
#4K2 THRU K5 (TYP. EA. BAY)
SEE DETAIL "A"
PERMITTED TRANSVERSE CONST. JT.
2'-6"
4-#5B1 @ 3 EQ. SPA. (BOTT. OF SLAB) (TYP. EA. OVERHANG) (2 BAR RUNS)
3½" (TYP.)
#4K6 THRU K9 (TYP. EA. END)
4"
208-#5A1 BARS @ 6" CTS. (TOP OF SLAB) (UNIT 3)
208-#5A2 BARS @ 6" CTS. (BOTT. OF SLAB) (UNIT 3)
1'-2"
9- 6"Ø PIPE DRAINS @ 12'-0" CTS. (IN SPAN E) (TYP. EACH SIDE)
4'-0"

PLAN OF SPAN E



DETAIL "A"

(TYPICAL FOR EACH DECK CORNER)
(S1 BARS NOT SHOWN FOR CLARITY)

PROJECT NO. B-4407
ANSON/STANLY COUNTY
STATION: 32+31.61 -L-

SHEET 5 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
PLAN OF SPAN E

Vaughn & Melton
Consulting Engineers
Asheville, North Carolina 828-253-2796
Raleigh, NC 919-977-9455
Charlotte, NC 704-357-0488
Boone, NC 828-355-9933
Tri-Cities, TN 423-467-8401
Knoxville, TN 865-546-5800
Spartanburg, SC 864-574-4775
Charleston, SC 843-974-5650
Middlesboro, KY 606-248-6600
Atlanta, GA 770-627-3590

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 042890 PATRICK R. GALLAGHER
3/18/2021

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DWN. BY: WDC DATE: 10/2020
CHKD. BY: PRG DATE: 10/2020
DES. EGR. OF RECORD: PRG DATE: 10/2020

REVISIONS								SHEET NO.
NO.	BY:	DATE:		NO.	BY:	DATE:		S-13
1				3				TOTAL SHEETS
2				4				45

wdcrutcher
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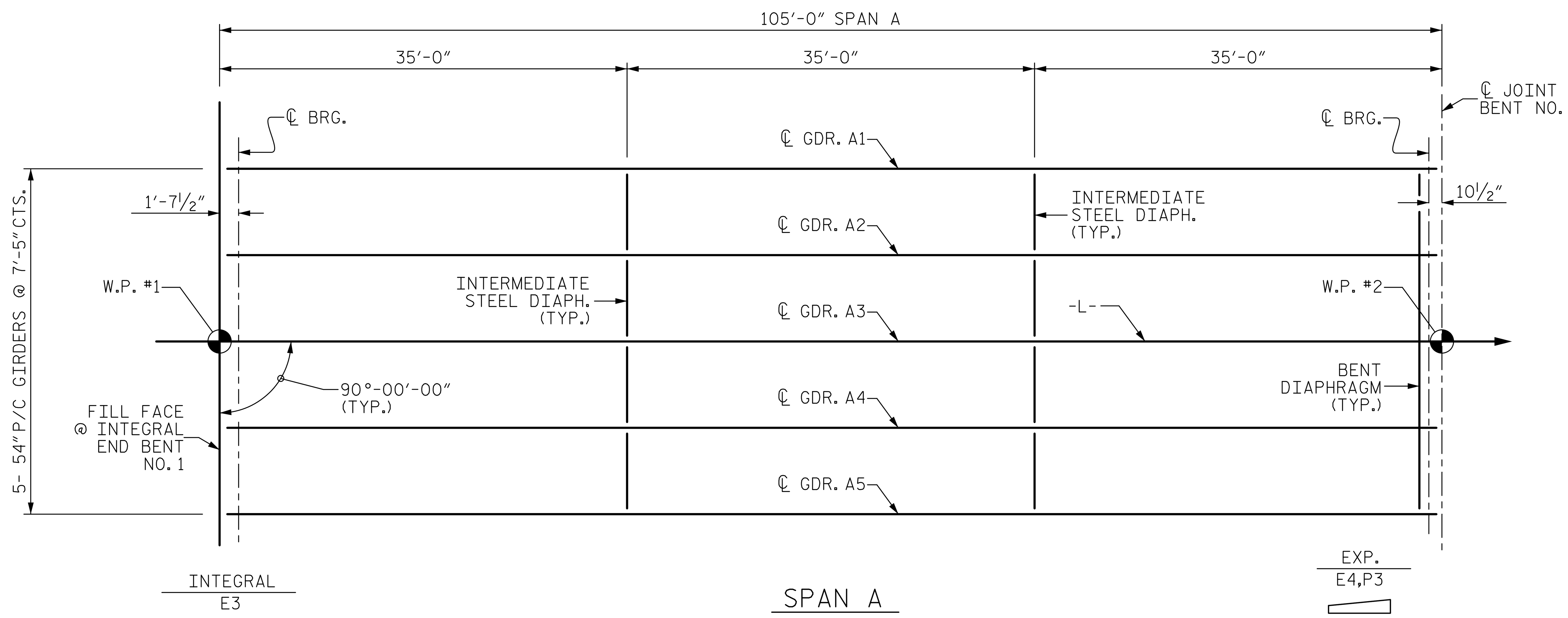
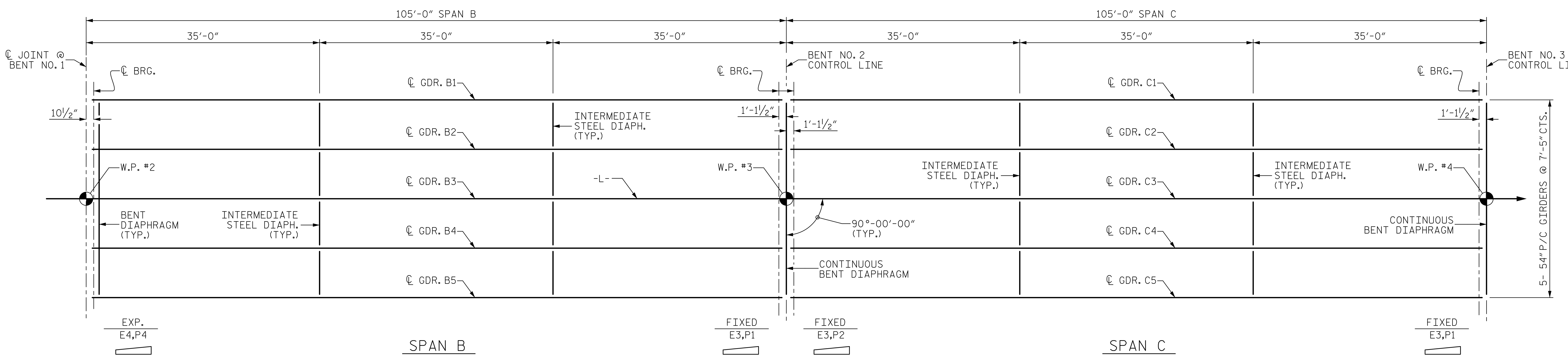


SPAN A



SPAN B

SPAN C

GIRDER LAYOUT

PROJECT NO. B-4407

ANSON/STANLY COUNTY

STATION: 32+31.61 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

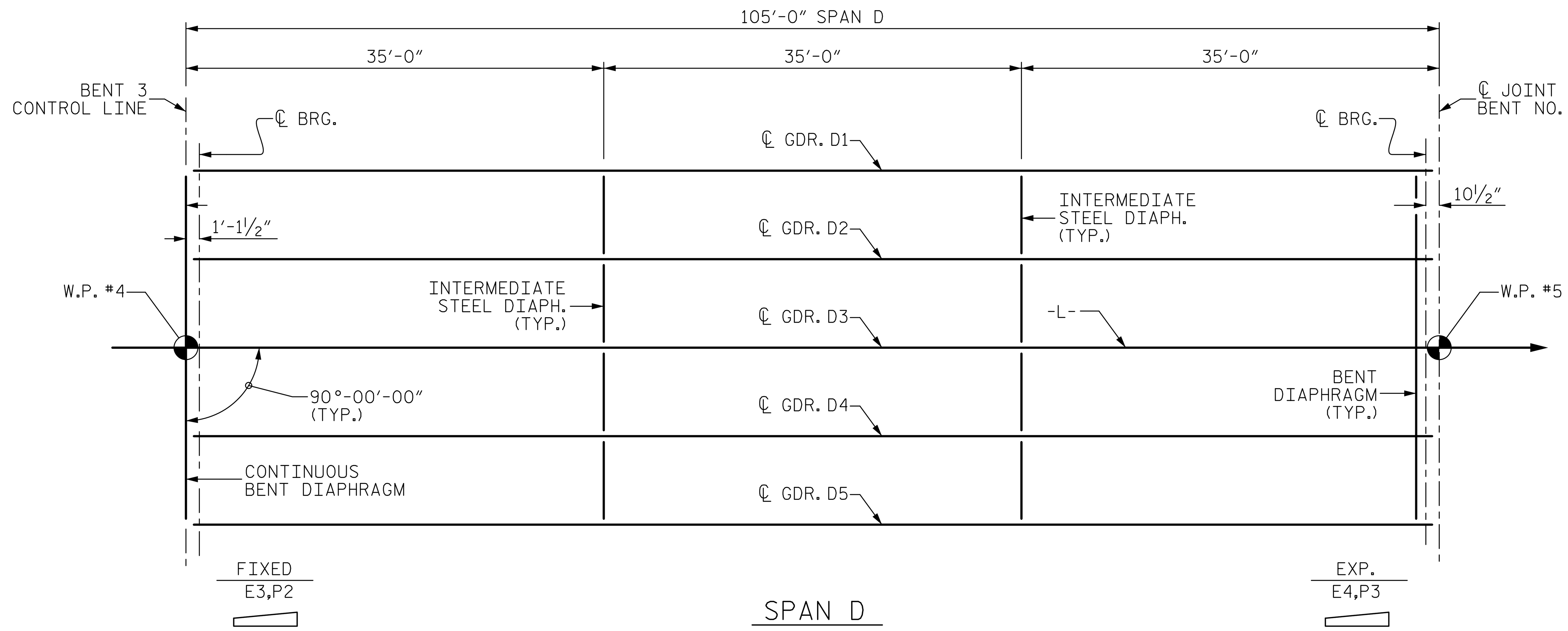
SUPERSTRUCTURE
GIRDER LAYOUT

(SPANS A THRU C)

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 042890 PATRICK R. GALLAGHER
3/18/2021

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DWN. BY: WDC	DATE: 10/2020	REVISIONS						SHEET NO.
CHKD. BY: PRG	DATE: 10/2020	NO.	BY:	DATE:	NO.	BY:	DATE:	S-14
DES. EGR. OF RECORD: PRG	DATE: 10/2020	1			3			TOTAL SHEETS
		2			4			45



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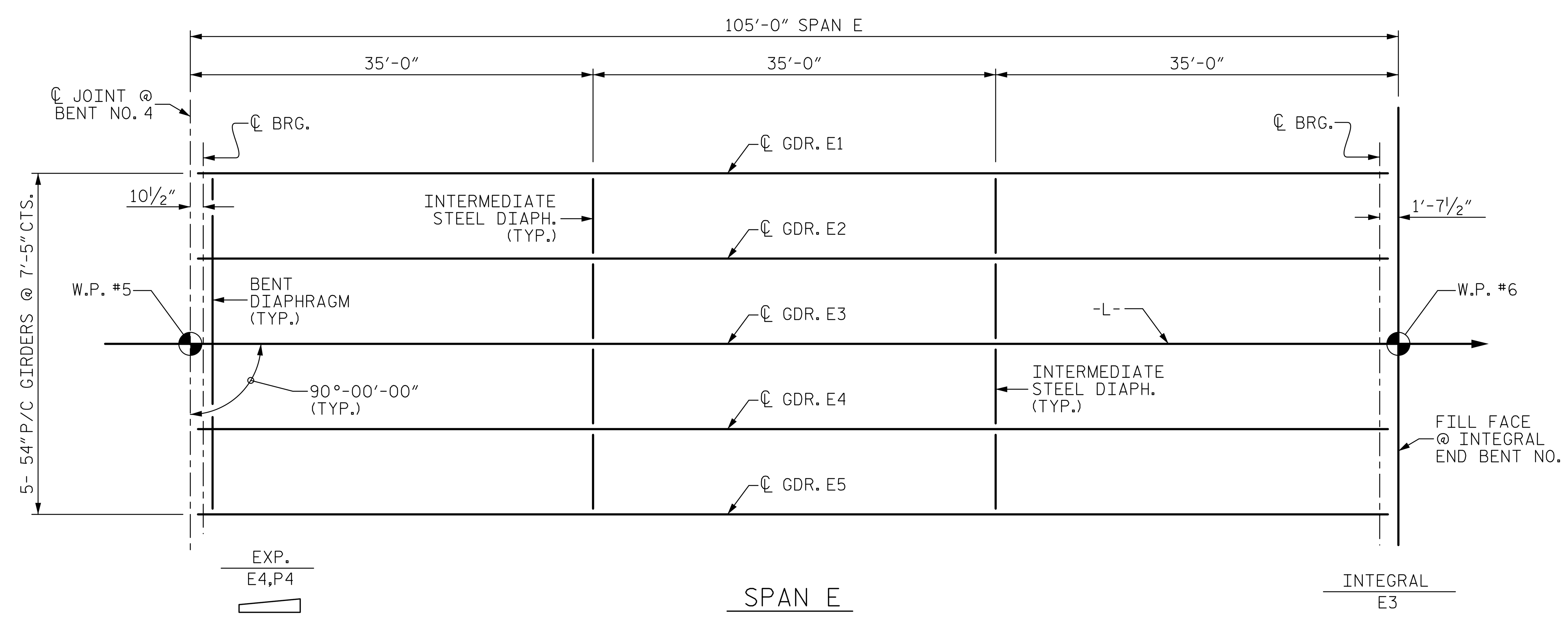

SPAN E

GIRDER LAYOUT

PROJECT NO. B-4407

ANSON/STANLY COUNTY

STATION: 32+31.61 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
GIRDER LAYOUT
(SPANS D AND E)

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 042890 PATRICK R. GALLAGHER
DocuSigned by: Patrick R. Gallagher
DB66CAFA11E4451...
3/18/2021

V&M Vaughn & Melton Consulting Engineers
Asheville, North Carolina 828·253·2796
Raleigh, NC 919·977·9455
Charlotte, NC 704·357·0488
Boone, NC 828·355·9933
Tri-Cities, TN 423·467·8401
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Spartanburg, SC 864·574·4775
Charleston, SC 843·974·5650
Middlesboro, KY 606·248·6600
Atlanta, GA 770·627·3590

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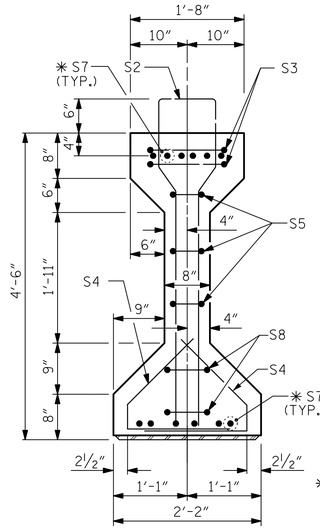
DWN. BY: WDC DATE: 10/2020
CHKD. BY: PRG DATE: 10/2020
DES. EGR. OF RECORD: PRG DATE: 10/2020

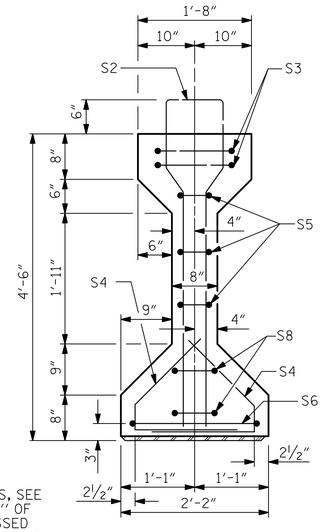
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

SHEET NO. S-15
TOTAL SHEETS 45

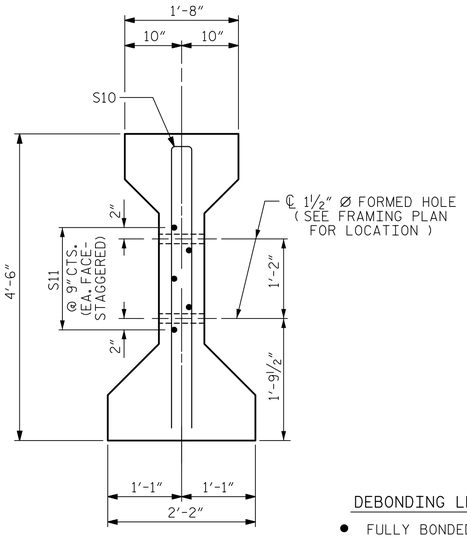


SECTION A-A

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

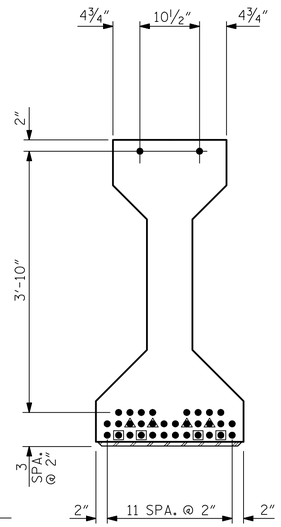


SECTION C-C

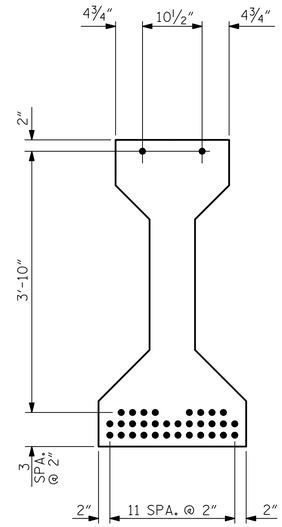


SECTION D-D

(S1 BARS NOT SHOWN)



AT END OF GIRDER

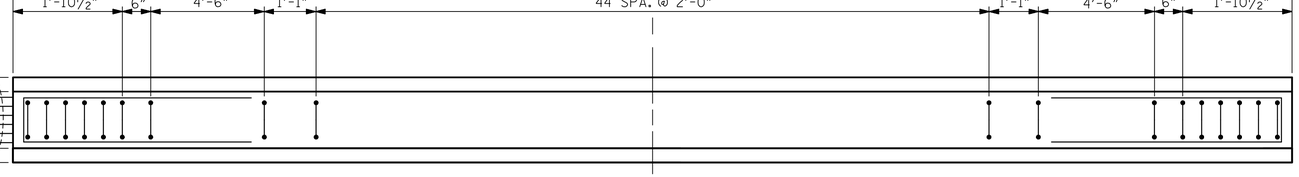


AT ℄ OF GIRDER

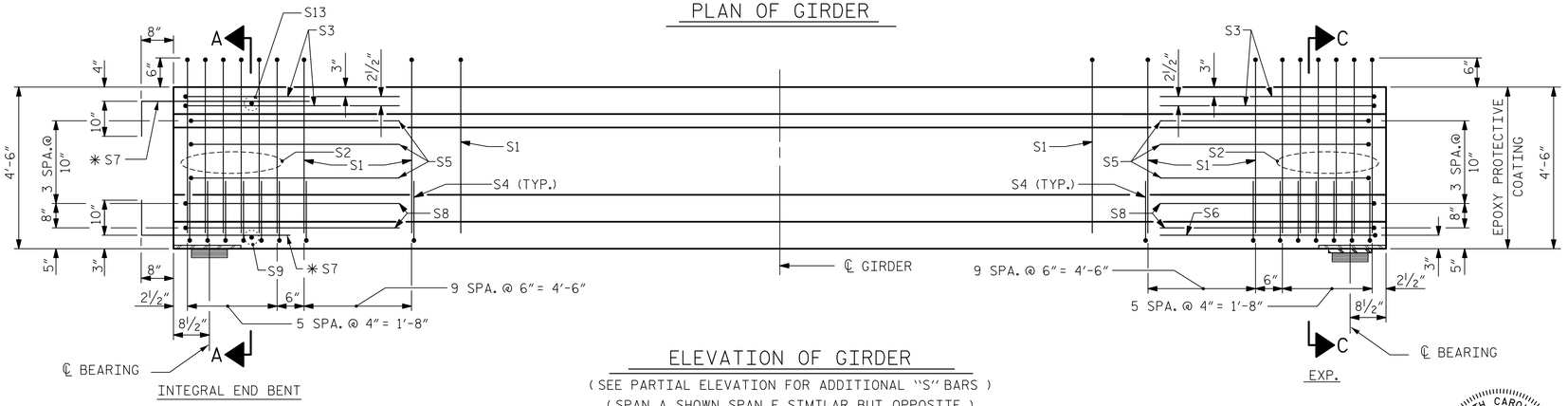
DEBONDING LEGEND

- ● FULLY BONDED STRANDS
- △ STRANDS DEBONDED FOR 10'-0" FROM END OF GIRDER
- ⊡ STRANDS DEBONDED FOR 12'-0" FROM END OF GIRDER

0.6" Ø LOW RELAXATION STRAND LAYOUT



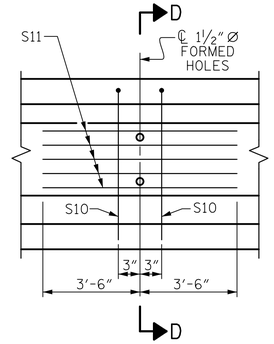
PLAN OF GIRDER



ELEVATION OF GIRDER

(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS)

(SPAN A SHOWN, SPAN E SIMILAR BUT OPPOSITE)



PARTIAL ELEVATION

SHOWING INTERMEDIATE DIAPHRAGM REINFORCING STEEL FOR GIRDERS

0.6" Ø L. R. GRADE 270 STRANDS

AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

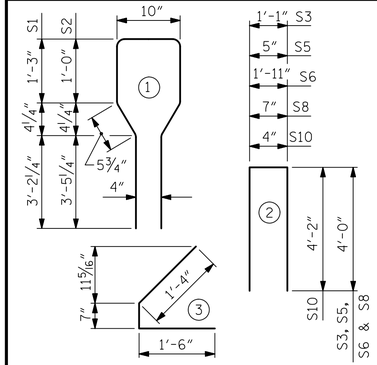
REINFORCING STEEL FOR ONE GIRDER

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	65	#4	1	10'-8"	463
S2	12	#6	1	10'-8"	192
S3	4	#4	2	9'-1"	24
S4	64	#4	3	3'-5"	146
S5	6	#4	2	8'-5"	34
S6	1	#4	2	9'-11"	7
* S7	12	#5	STR	3'-8"	46
S8	4	#4	2	8'-7"	23
S9	1	#3	STR	1'-10"	1
S10	2	#5	2	8'-8"	18
S11	5	#4	STR	7'-0"	23
S13	1	#3	STR	1'-4"	1

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

BAR TYPES

ALL BAR DIMENSIONS ARE OUT-TO-OUT



QUANTITIES FOR ONE GIRDER

	REINFORCING STEEL	8500 PSI CONCRETE	0.6" Ø L.R. STRANDS
	LB.	C.Y.	No.
	978	21.1	34

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
10	103'-11"	1039'-2"

PROJECT NO. B-4407

ANSON/STANLY COUNTY

STATION: 32+31.61 -L-

SHEET 1 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

AASHTO TYPE IV
PRESTRESSED CONCRETE GIRDER
CONTINUOUS FOR LIVE LOAD

(SPANS A AND E)

Vaughn & Melton
Consulting Engineers
Asheville, North Carolina
828-253-2796
Raleigh, NC 919-977-9455 · Charlotte, NC 704-357-0488
Boone, NC 828-355-9933 · Tri-Cities, TN 423-467-8401 · Knoxville, TN 865-546-5800 · Spartanburg, SC 864-574-4775 · Charleston, SC 843-974-5650 · Middlesboro, KY 606-248-6600 · Atlanta, GA 770-627-3590

PRELIMINARY
Patrick R. Gallagher
042890
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL
3/18/2021

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DRAWN BY :	ELR	8/91
CHECKED BY :	GRP	8/91

REV. 10/1/11	MAA/GM
REV. 1/15	MAA/TMG
REV. 12/17	MAA/THC

DWN. BY: WDC DATE: 10/2020
CHKD. BY: PRG DATE: 10/2020
DES. EGR. OF RECORD: PRG DATE: 10/2020

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-16
1			3			TOTAL SHEETS
2			4			45

STD. NO. PCG6

wdcrutcher
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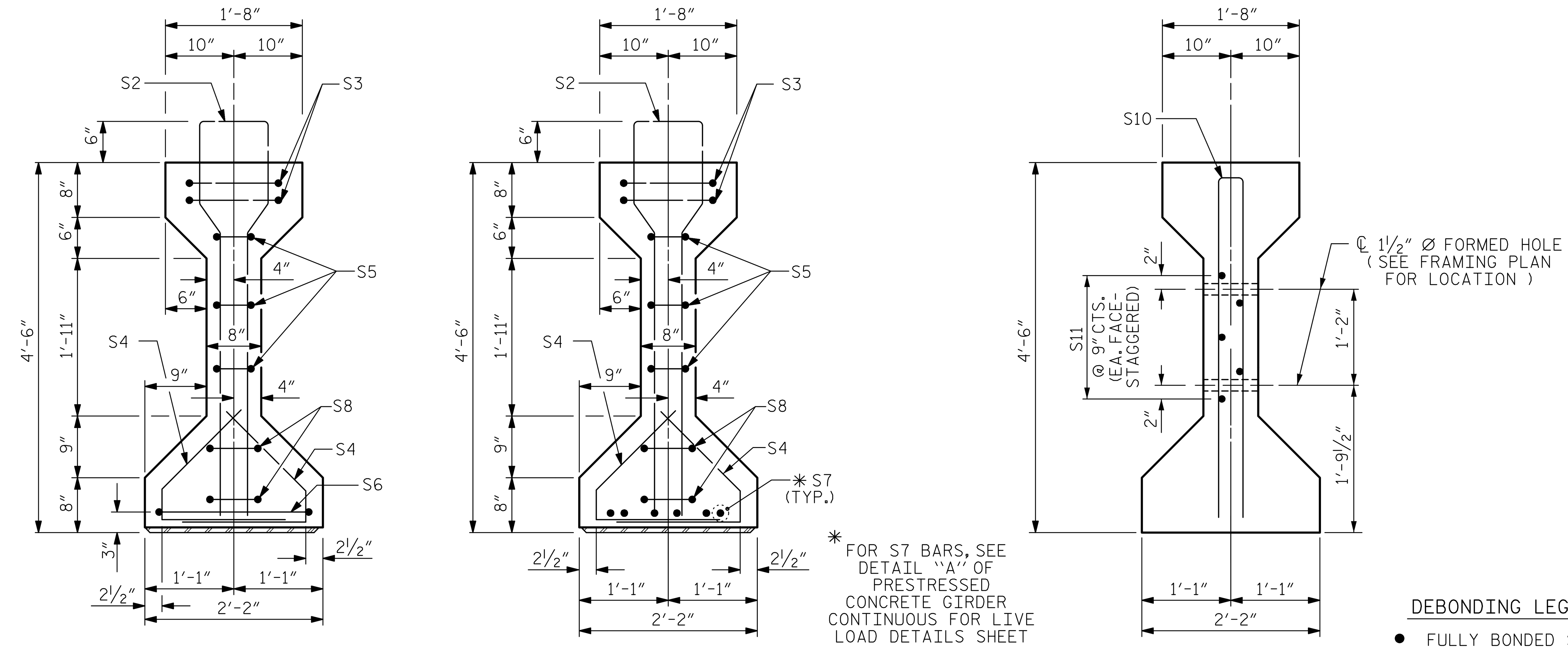


SECTION C-C

SECTION B-B

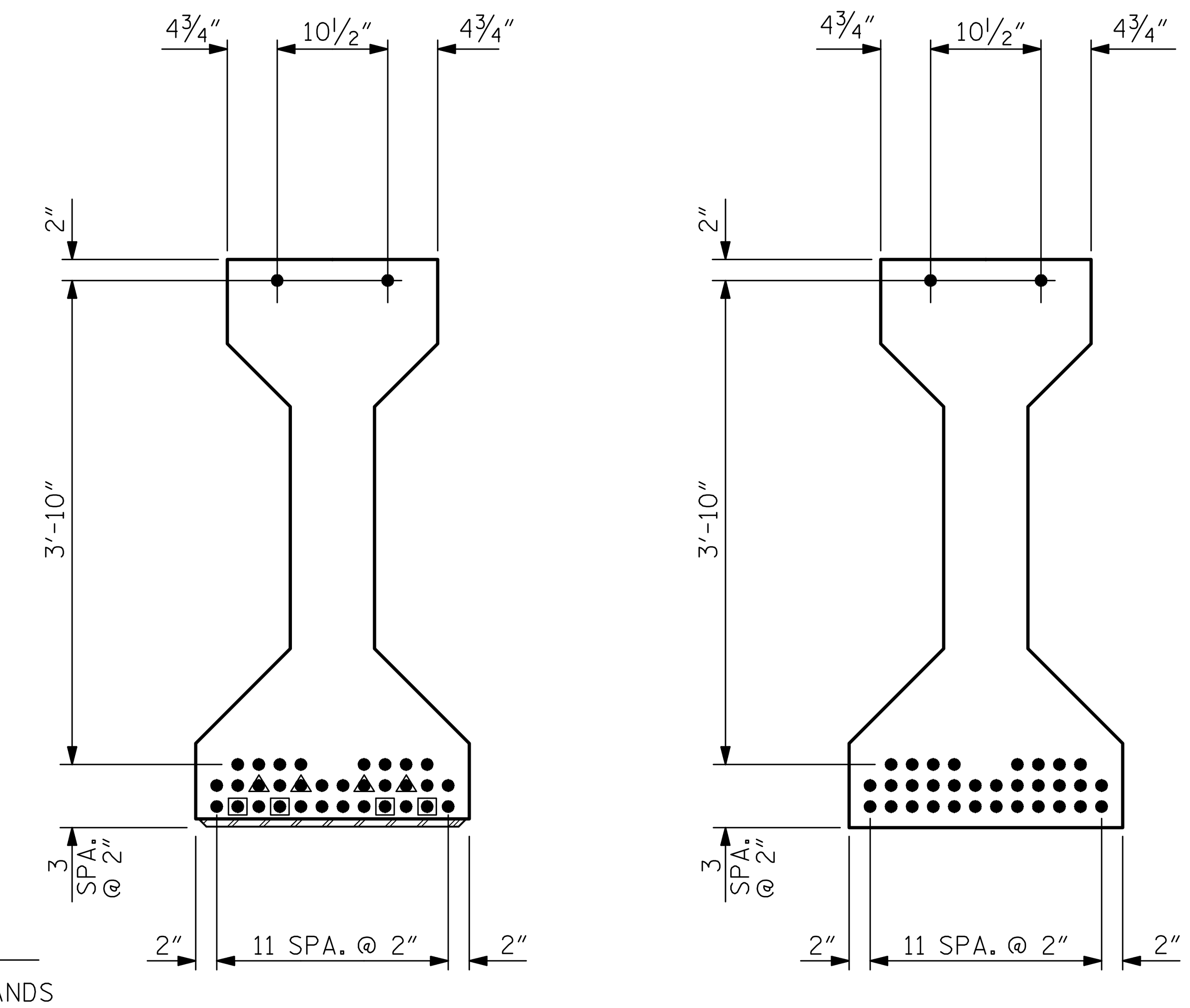
* FOR S7 BARS, SEE DETAIL "A" OF PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS SHEET

SECTION D-D

(S1 BARS NOT SHOWN)

DEBONDING LEGEND

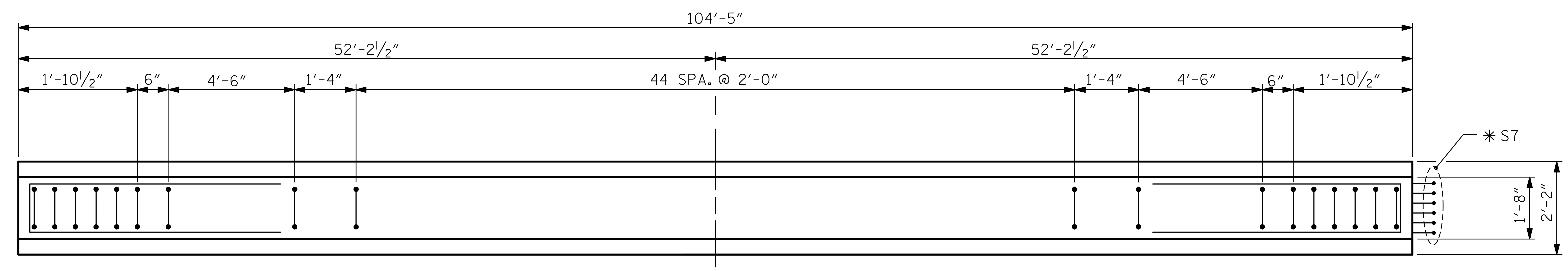
- FULLY BONDED STRANDS
- STRANDS DEBONDED FOR 10'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 12'-0" FROM END OF GIRDER



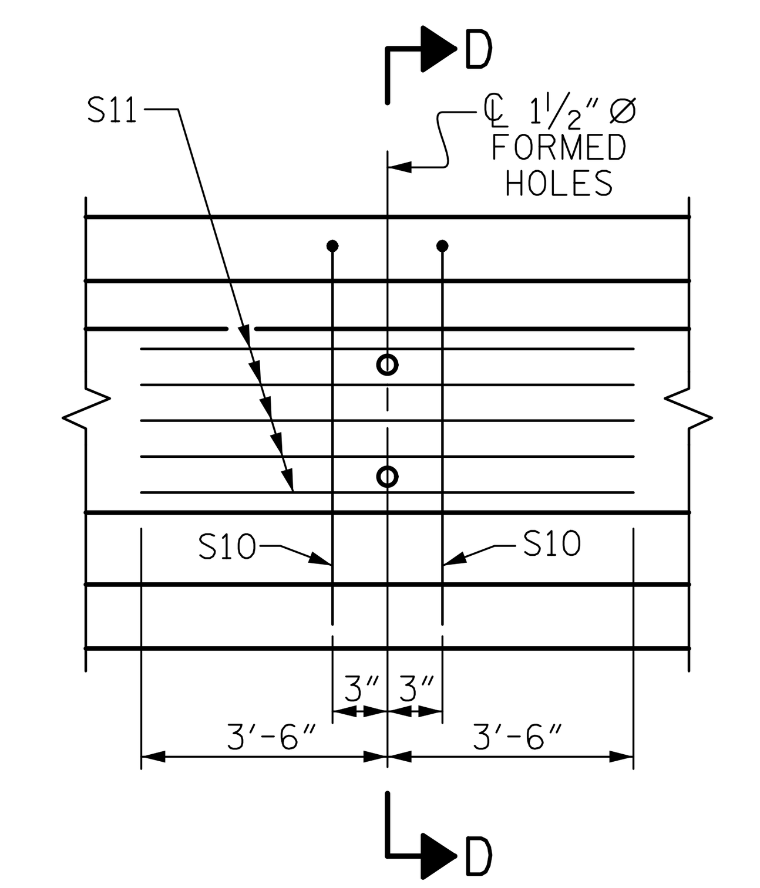
AT END OF GIRDER

AT ℄ OF GIRDER

0.6" Ø LOW RELAXATION STRAND LAYOUT

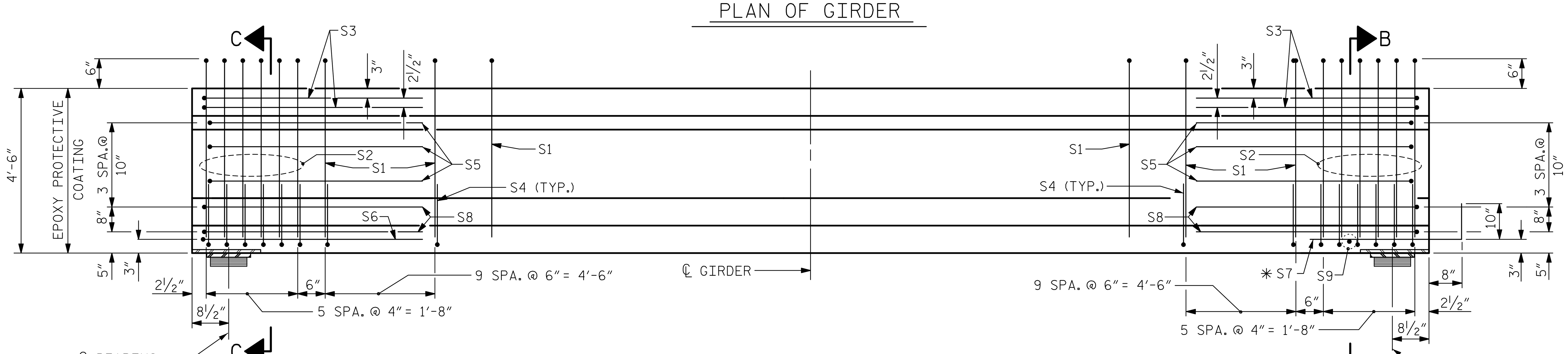


PLAN OF GIRDER



PARTIAL ELEVATION

SHOWING INTERMEDIATE DIAPHRAGM REINFORCING STEEL FOR GIRDERS



ELEVATION OF GIRDER

(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS)

(SPAN B SHOWN, SPAN D SIMILAR BUT OPPOSITE)

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

REINFORCING STEEL FOR ONE GIRDER

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	65	#4	1	10'-8"	463
S2	12	#6	1	10'-8"	192
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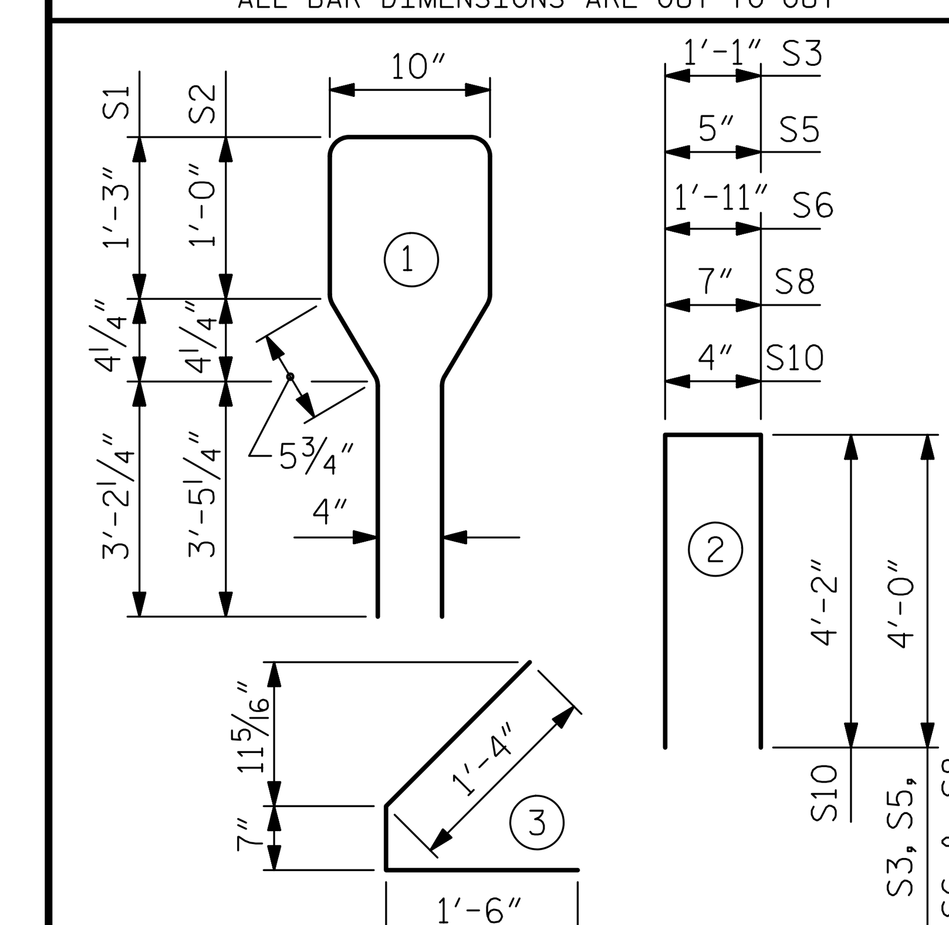
S5	6	#4	2	8'-5"	34
S6	1	#4	2	9'-11"	7
* S7	6	#5	STR	3'-8"	23
S8	4	#4	2	8'-7"	23
S9	1	#3	STR	1'-10"	1
S10	2	#5	2	8'-8"	18
S11	5	#4	STR	7'-0"	23

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

BAR TYPES

ALL BAR DIMENSIONS ARE OUT-TO-OUT



QUANTITIES FOR ONE GIRDER

	REINFORCING STEEL	8500 PSI CONCRETE	0.6" Ø L. R. STRANDS
	LB.	C.Y.	No.
	954	21.2	34

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
10	104'-5"	1044'-2"

PROJECT NO. B-4407

ANSON/STANLY COUNTY

STATION: 32+31.61 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

AASHTO TYPE IV
PRESTRESSED CONCRETE GIRDER
CONTINUOUS FOR LIVE LOAD

(SPANS B AND D)

REVISIONS							SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:		S-17
1			3				TOTAL SHEETS
2			4				45

DWN. BY: WDC DATE: 10/2020
CHKD. BY: PRG DATE: 10/2020
DES. EGR. OF RECORD: PRG DATE: 10/2020

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Vaughn & Melton
Consulting Engineers
Asheville, North Carolina 828-253-2796
Raleigh, NC 919-977-9455
Charlotte, NC 704-357-0488
Boone, NC 828-355-9933
Tri-Cities, TN 423-467-8401
Knoxville, TN 865-546-5800
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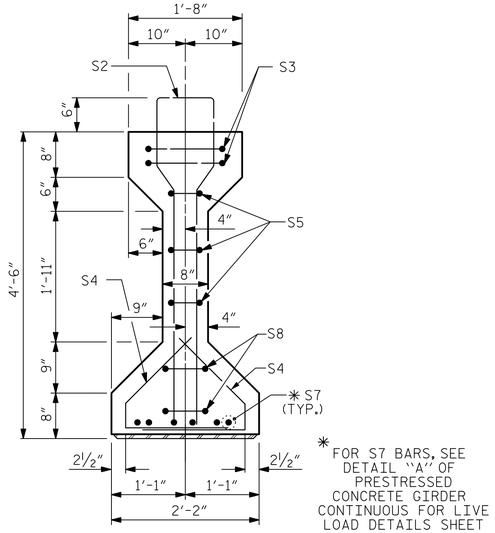
Charleston, SC 843-974-5650
Middlesboro, KY 606-248-6600
Atlanta, GA 770-627-3590

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 042890 PATRICK R. GALLAGHER
3/18/2021

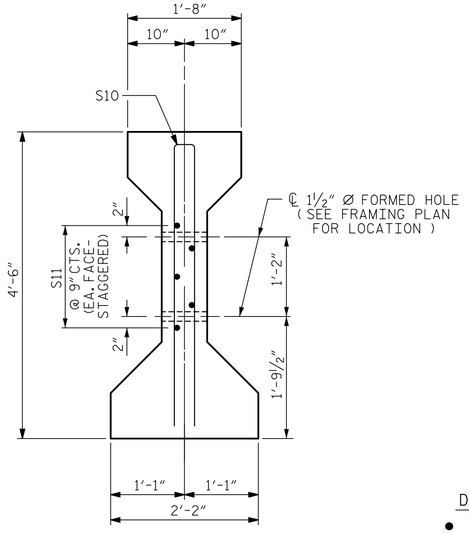
DRAWN BY : ELR 8/91	REV. 10/1/11	MAA/GM
CHECKED BY : GRP 8/91	REV. 1/15	MAA/TMG
	REV. 12/17	MAA/THC

STD. NO. PCG6



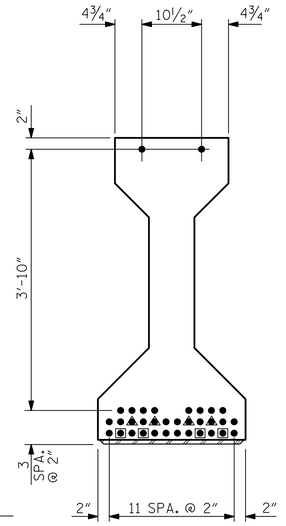
SECTION B-B

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

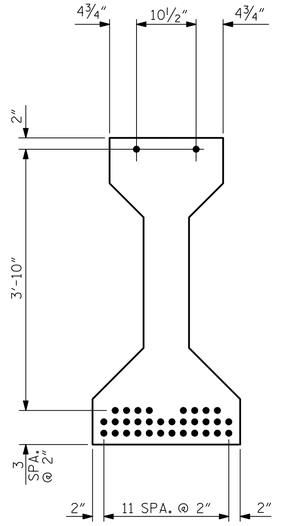


SECTION D-D

(S1 BARS NOT SHOWN)



AT END OF GIRDER

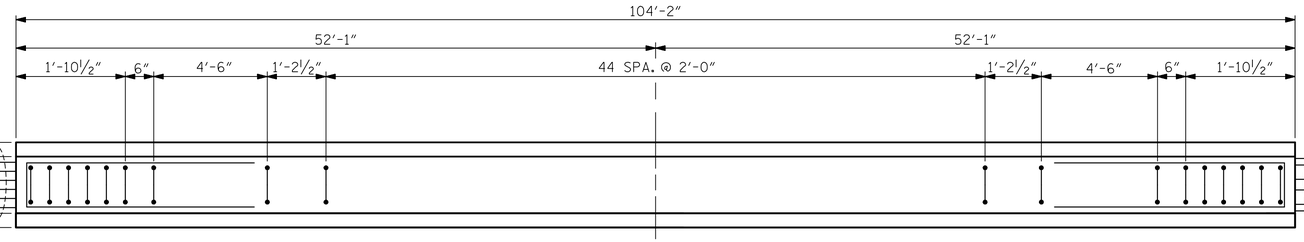


AT ℄ OF GIRDER

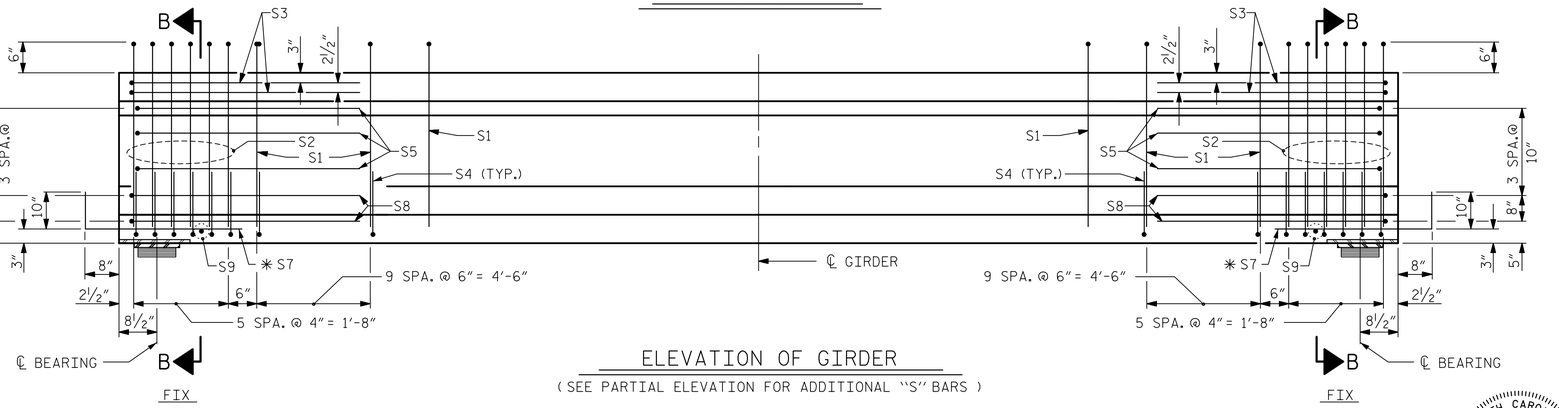
DEBONDING LEGEND

- ● FULLY BONDED STRANDS
- △ STRANDS DEBONDED FOR 10'-0" FROM END OF GIRDER
- ⊡ STRANDS DEBONDED FOR 12'-0" FROM END OF GIRDER

0.6" Ø LOW RELAXATION STRAND LAYOUT

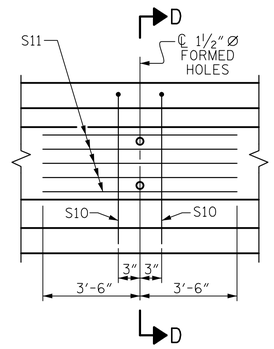


PLAN OF GIRDER



ELEVATION OF GIRDER

(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS)



PARTIAL ELEVATION

SHOWING INTERMEDIATE DIAPHRAGM REINFORCING STEEL FOR GIRDERS

0.6" Ø L. R. GRADE 270 STRANDS

AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

REINFORCING STEEL FOR ONE GIRDER

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	65	#4	1	10'-8"	463
S2	12	#6	1	10'-8"	192
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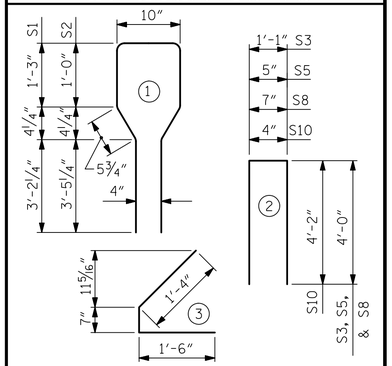
S5	6	#4	2	8'-5"	34
✳ S7	12	#5	STR	3'-8"	46
S8	4	#4	2	8'-7"	23
S9	2	#3	STR	1'-10"	1
S10	2	#5	2	8'-8"	18
S11	5	#4	STR	7'-0"	23

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

BAR TYPES

ALL BAR DIMENSIONS ARE OUT-TO-OUT



QUANTITIES FOR ONE GIRDER

	REINFORCING STEEL	8500 PSI CONCRETE	0.6" Ø L.R. STRANDS
	LB.	C.Y.	No.
	970	21.1	34

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
5	104'-2"	520'-10"

PROJECT NO. B-4407

ANSON/STANLY COUNTY

STATION: 32+31.61 -L-

SHEET 3 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

AASHTO TYPE IV
PRESTRESSED CONCRETE GIRDER
CONTINUOUS FOR LIVE LOAD

(SPAN C)

V&M Vaughn & Melton
Consulting Engineers
Asheville, North Carolina
828-253-2796
Raleigh, NC 919-977-9455
Charlotte, NC 704-357-0488
Boone, NC 828-355-9933
Tri-Cities, TN 423-467-8401
Knoxville, TN 865-546-5800
Spartanburg, SC 864-574-4775
Charleston, SC 843-974-5650
Middlesboro, KY 606-248-6600
Atlanta, GA 770-627-3590

NORTH CAROLINA PROFESSIONAL SEAL 042890 ENGINEER PATRICK R. GALLAGHER
REGISTERED
SEAL
Patrick Gallagher
3/18/2021

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DRAWN BY :	ELR	8/91
CHECKED BY :	GRP	8/91

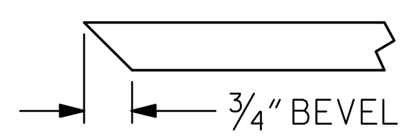
REV.	10/1/11	MAA/GM
REV.	1/15	MAA/TMG
REV.	12/17	MAA/THC

DWN. BY: WDC DATE: 10/2020
CHKD. BY: PRG DATE: 10/2020
DES. EGR. OF RECORD: PRG DATE: 10/2020

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-18
1			3			TOTAL SHEETS
2			4			45

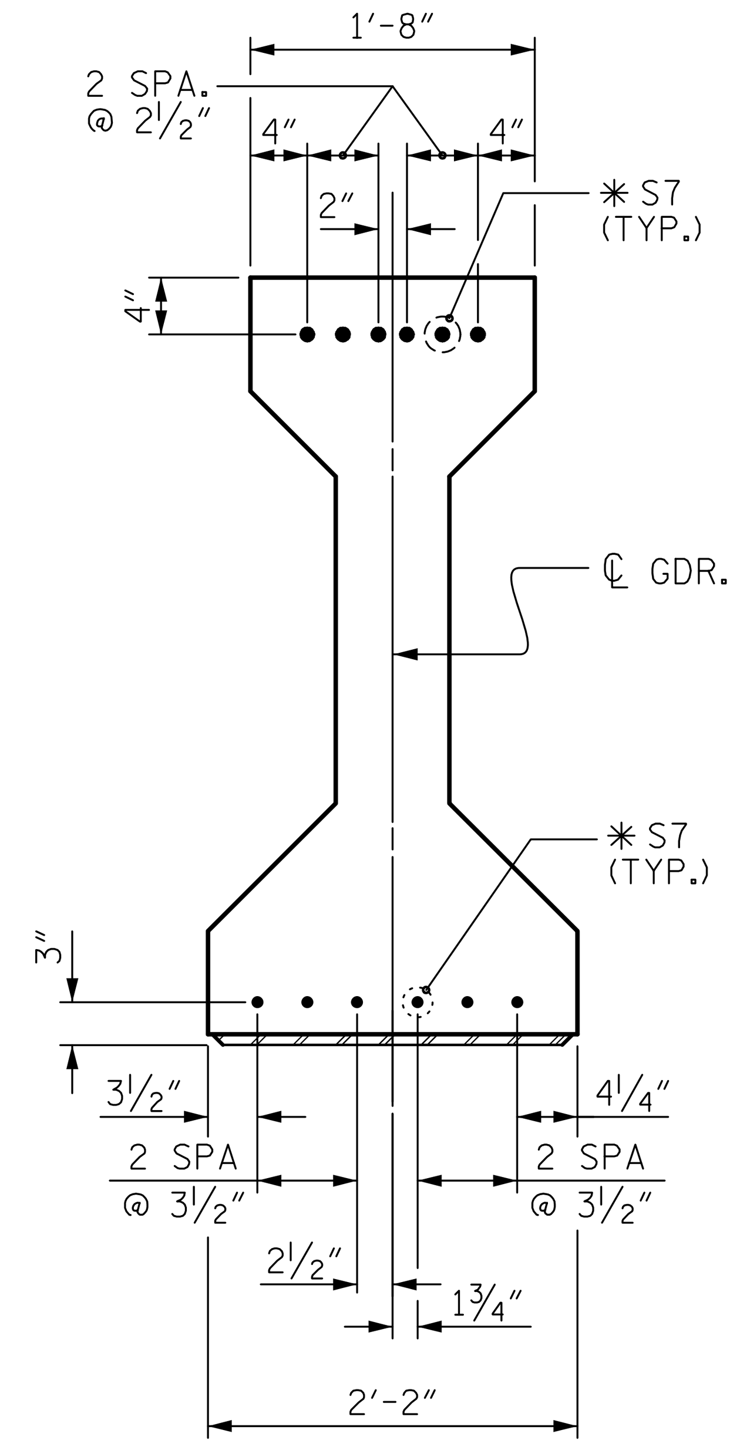
STD. NO. PCG6

wdrdutcher
DGN: V:\NCT\transportation\03730-09 B4407\Structures\Final Plans\401_035_B-4407_SMU_GDR3_SB.dgn
TIME: 05:57 AM on Thursday, February 04, 2021



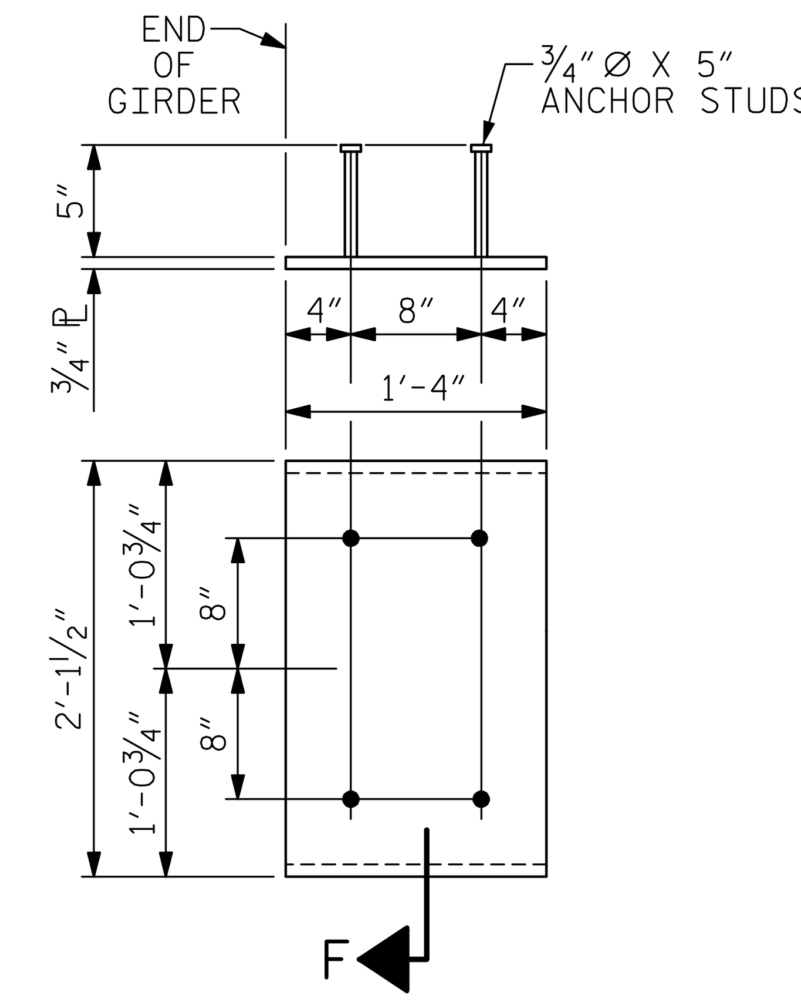
SECTION "F"

(SEE NOTES)



DETAIL "A"

(FOR AASHTO TYPE IV GIRDERS)



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

(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.

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 6000 PSI.

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

THE TOP SURFACE OF THE GIRDER, EXCLUDING THE OUTSIDE 4″, SHALL BE RAKED TO A DEPTH OF ¼″.

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

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

0.6″ Ø LOW RELAXATION	GIRDERS A1, A5 & E1, E5																				
	BRG.	1/40	2/40	3/40	4/40	5/40	6/40	7/40	8/40	9/40	10/40	11/40	12/40	13/40	14/40	15/40	16/40	17/40	18/40	19/40	20/40
CAMBER (GIRDER IN PLACE) ↑	0	0.016	0.033	0.049	0.065	0.080	0.095	0.109	0.123	0.136	0.148	0.158	0.169	0.177	0.185	0.191	0.197	0.201	0.205	0.206	0.207
✱ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0	0.012	0.024	0.037	0.049	0.060	0.072	0.083	0.095	0.104	0.113	0.122	0.131	0.137	0.143	0.149	0.155	0.156	0.158	0.160	0.162
FINAL CAMBER ↑	0	1/16″	1/8″	1/8″	3/16″	1/4″	5/16″	5/16″	5/16″	3/8″	7/16″	7/16″	7/16″	1/2″	1/2″	1/2″	1/2″	9/16″	9/16″	9/16″	9/16″

0.6″ Ø LOW RELAXATION	21/40	22/40	23/40	24/40	25/40	26/40	27/40	28/40	29/40	30/40	31/40	32/40	33/40	34/40	35/40	36/40	37/40	38/40	39/40	BRG.
CAMBER (GIRDER IN PLACE) ↑	0.206	0.205	0.201	0.197	0.191	0.185	0.177	0.169	0.158	0.148	0.136	0.123	0.109	0.095	0.080	0.065	0.049	0.033	0.016	0
✱ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.160	0.158	0.156	0.155	0.149	0.143	0.137	0.131	0.122	0.113	0.104	0.095	0.083	0.072	0.060	0.049	0.037	0.024	0.012	0
FINAL CAMBER ↑	9/16″	9/16″	9/16″	1/2″	1/2″	1/2″	1/2″	7/16″	7/16″	7/16″	3/8″	5/16″	5/16″	5/16″	1/4″	3/16″	1/8″	1/8″	1/16″	0

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

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

0.6″ Ø LOW RELAXATION	GIRDERS A2, A3, A4 & E2, E3, E4																				
	BRG.	1/40	2/40	3/40	4/40	5/40	6/40	7/40	8/40	9/40	10/40	11/40	12/40	13/40	14/40	15/40	16/40	17/40	18/40	19/40	20/40
CAMBER (GIRDER IN PLACE) ↑	0	0.016	0.033	0.049	0.065	0.080	0.095	0.109	0.123	0.136	0.148	0.158	0.169	0.177	0.185	0.191	0.197	0.201	0.205	0.206	0.207
✱ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0	0.012	0.023	0.035	0.047	0.058	0.069	0.080	0.091	0.099	0.108	0.117	0.125	0.131	0.136	0.142	0.147	0.149	0.151	0.153	0.155
FINAL CAMBER ↑	0	1/16″	1/8″	3/16″	1/4″	1/4″	5/16″	3/8″	3/8″	7/16″	1/2″	1/2″	1/2″	9/16″	9/16″	9/16″	5/8″	5/8″	5/8″	5/8″	5/8″

0.6″ Ø LOW RELAXATION	21/40	22/40	23/40	24/40	25/40	26/40	27/40	28/40	29/40	30/40	31/40	32/40	33/40	34/40	35/40	36/40	37/40	38/40	39/40	BRG.
CAMBER (GIRDER IN PLACE) ↑	0.206	0.205	0.201	0.197	0.191	0.185	0.177	0.169	0.158	0.148	0.136	0.123	0.109	0.095	0.080	0.065	0.049	0.033	0.016	0
✱ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.153	0.151	0.149	0.147	0.142	0.136	0.131	0.125	0.117	0.108	0.099	0.091	0.080	0.069	0.058	0.047	0.035	0.023	0.012	0
FINAL CAMBER ↑	5/8″	5/8″	5/8″	5/8″	9/16″	9/16″	9/16″	1/2″	1/2″	1/2″	7/16″	3/8″	3/8″	5/16″	1/4″	1/4″	3/16″	1/8″	1/16″	0

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

PROJECT NO. B-4407
ANSON/STANLY COUNTY
STATION: 32+31.61 -L-

SHEET 4 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS

Vaughn & Melton
Consulting Engineers
Asheville, North Carolina 828-253-2796
Raleigh, NC 919-977-9455
Charlotte, NC 704-357-0488
Boone, NC 828-355-9933
Tri-Cities, TN 423-467-8401
Knoxville, TN 865-546-5800
Spartanburg, SC 864-574-4775
Charleston, SC 843-974-5650
Middlesboro, KY 606-248-6600
Atlanta, GA 770-627-3590

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 042890 PATRICK R. GALLAGHER 3/18/2021

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DWN. BY: WDC DATE: 10/2020
CHKD. BY: PRG DATE: 10/2020
DES. EGR. OF RECORD: PRG DATE: 10/2020

REVISIONS								SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:			S-19
1			3					TOTAL SHEETS 45
2			4					

DRAWN BY : ELR 11/91 REV. 1/15 MAA/TMG
CHECKED BY : GRP 11/91 REV. 2/15 MAA/TMG
REV. 12/17 MAA/THC

STD. NO. PCG9

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

0.6″Ø LOW RELAXATION	GIRDERS B1, B5 & D1, D5																																									
	BRG.	1/40	2/40	3/40	4/40	5/40	6/40	7/40	8/40	9/40	10/40	11/40	12/40	13/40	14/40	15/40	16/40	17/40	18/40	19/40	20/40	21/40	22/40	23/40	24/40	25/40	26/40	27/40	28/40	29/40	30/40	31/40	32/40	33/40	34/40	35/40	36/40	37/40	38/40	39/40	BRG.
CAMBER (GIRDER IN PLACE) ↑	0	0.016	0.033	0.049	0.065	0.080	0.095	0.109	0.123	0.136	0.148	0.158	0.169	0.177	0.186	0.192	0.198	0.201	0.205	0.206	0.207	0.206	0.205	0.201	0.198	0.192	0.186	0.177	0.169	0.158	0.148	0.136	0.123	0.109	0.095	0.080	0.065	0.049	0.033	0.016	0
✳DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0	0.013	0.025	0.038	0.050	0.062	0.074	0.086	0.097	0.107	0.116	0.125	0.134	0.140	0.146	0.152	0.158	0.160	0.162	0.164	0.166	0.164	0.162	0.160	0.158	0.152	0.146	0.140	0.134	0.125	0.116	0.107	0.097	0.086	0.074	0.062	0.050	0.038	0.025	0.013	0
FINAL CAMBER ↑	0	1/16″	1/8″	1/8″	3/16″	1/4″	1/4″	5/16″	5/16″	3/8″	3/8″	3/8″	7/16″	7/16″	7/16″	7/16″	1/2″	1/2″	1/2″	1/2″	1/2″	1/2″	1/2″	1/2″	1/2″	7/16″	7/16″	7/16″	7/16″	3/8″	3/8″	3/8″	5/16″	5/16″	1/4″	1/4″	3/16″	1/8″	1/8″	1/16″	0

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

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

0.6″Ø LOW RELAXATION	GIRDERS B2, B3, B4 & D2, D3, D4																																									
	BRG.	1/40	2/40	3/40	4/40	5/40	6/40	7/40	8/40	9/40	10/40	11/40	12/40	13/40	14/40	15/40	16/40	17/40	18/40	19/40	20/40	21/40	22/40	23/40	24/40	25/40	26/40	27/40	28/40	29/40	30/40	31/40	32/40	33/40	34/40	35/40	36/40	37/40	38/40	39/40	BRG.
CAMBER (GIRDER IN PLACE) ↑	0	0.016	0.033	0.049	0.065	0.080	0.095	0.109	0.123	0.136	0.148	0.158	0.169	0.177	0.186	0.192	0.198	0.201	0.205	0.206	0.207	0.206	0.205	0.201	0.198	0.192	0.186	0.177	0.169	0.158	0.148	0.136	0.123	0.109	0.095	0.080	0.065	0.049	0.033	0.016	0
✳DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0	0.012	0.024	0.036	0.048	0.059	0.070	0.082	0.093	0.102	0.111	0.119	0.128	0.134	0.139	0.145	0.151	0.153	0.155	0.156	0.158	0.156	0.155	0.153	0.151	0.145	0.139	0.134	0.128	0.119	0.111	0.102	0.093	0.082	0.070	0.059	0.048	0.036	0.024	0.012	0
FINAL CAMBER ↑	0	1/16″	1/8″	1/8″	3/16″	1/4″	5/16″	5/16″	3/8″	3/8″	7/16″	7/16″	1/2″	1/2″	9/16″	9/16″	9/16″	9/16″	5/8″	5/8″	5/8″	5/8″	5/8″	9/16″	9/16″	9/16″	9/16″	1/2″	1/2″	7/16″	7/16″	3/8″	3/8″	5/16″	5/16″	1/4″	3/16″	1/8″	1/8″	1/16″	0

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

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

0.6″Ø LOW RELAXATION	GIRDERS C1 & C5																																									
	BRG.	1/40	2/40	3/40	4/40	5/40	6/40	7/40	8/40	9/40	10/40	11/40	12/40	13/40	14/40	15/40	16/40	17/40	18/40	19/40	20/40	21/40	22/40	23/40	24/40	25/40	26/40	27/40	28/40	29/40	30/40	31/40	32/40	33/40	34/40	35/40	36/40	37/40	38/40	39/40	BRG.
CAMBER (GIRDER IN PLACE) ↑	0	0.016	0.033	0.049	0.065	0.080	0.095	0.109	0.123	0.136	0.148	0.158	0.169	0.177	0.185	0.191	0.197	0.201	0.205	0.206	0.207	0.206	0.205	0.201	0.197	0.191	0.185	0.177	0.169	0.158	0.148	0.136	0.123	0.109	0.095	0.080	0.065	0.049	0.033	0.016	0
✳DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0	0.012	0.025	0.037	0.050	0.061	0.073	0.085	0.097	0.106	0.115	0.124	0.133	0.139	0.145	0.151	0.157	0.159	0.161	0.163	0.165	0.163	0.161	0.159	0.157	0.151	0.145	0.139	0.133	0.124	0.115	0.106	0.097	0.085	0.073	0.061	0.050	0.037	0.025	0.012	0
FINAL CAMBER ↑	0	1/16″	1/8″	1/8″	3/16″	1/4″	1/4″	5/16″	5/16″	3/8″	3/8″	7/16″	7/16″	7/16″	7/16″	1/2″	1/2″	1/2″	1/2″	1/2″	1/2″	1/2″	1/2″	1/2″	1/2″	1/2″	7/16″	7/16″	7/16″	7/16″	3/8″	3/8″	5/16″	5/16″	1/4″	1/4″	3/16″	1/8″	1/8″	1/16″	0

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

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

0.6″Ø LOW RELAXATION	GIRDERS C2, C3, C4																																									
	BRG.	1/40	2/40	3/40	4/40	5/40	6/40	7/40	8/40	9/40	10/40	11/40	12/40	13/40	14/40	15/40	16/40	17/40	18/40	19/40	20/40	21/40	22/40	23/40	24/40	25/40	26/40	27/40	28/40	29/40	30/40	31/40	32/40	33/40	34/40	35/40	36/40	37/40	38/40	39/40	BRG.
CAMBER (GIRDER IN PLACE) ↑	0	0.016	0.033	0.049	0.065	0.080	0.095	0.109	0.123	0.136	0.148	0.158	0.169	0.177	0.185	0.191	0.197	0.201	0.205	0.206	0.207	0.206	0.205	0.201	0.197	0.191	0.185	0.177	0.169	0.158	0.148	0.136	0.123	0.109	0.095	0.080	0.065	0.049	0.033	0.016	0
✳DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0	0.012	0.024	0.036	0.047	0.059	0.070	0.081	0.092	0.101	0.110	0.119	0.127	0.132	0.137	0.142	0.147	0.150	0.152	0.155	0.157	0.155	0.152	0.150	0.147	0.142	0.137	0.132	0.127	0.119	0.110	0.101	0.092	0.081	0.070	0.059	0.047	0.036	0.024	0.012	0
FINAL CAMBER ↑	0	1/16″	1/8″	3/16″	3/16″	1/4″	5/16″	3/8″	3/8″	7/16″	7/16″	1/2″	1/2″	9/16″	9/16″	9/16″	5/8″	5/8″	5/8″	5/8″	5/8″	5/8″	5/8″	5/8″	5/8″	9/16″	9/16″	9/16″	1/2″	1/2″	7/16″	7/16″	3/8″	3/8″	5/16″	1/4″	3/16″	3/16″	1/8″	1/16″	0

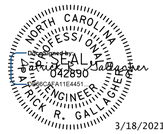
✳INCLUDES FUTURE WEARING SURFACE.
ALL VALUES ARE SHOWN IN FEET (DECIMAL FORM), EXCEPT "FINAL CAMBER", WHICH IS GIVEN IN INCHES (FRACTION FORM).

PROJECT NO. B-4407

ANSON/STANLY COUNTY

STATION: 32+31.61 -L-

SHEET 5 OF 6



Vaughn & Melton
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Raleigh, NC 919-977-9455
Charlotte, NC 704-357-0488
Boone, NC 828-355-9933
Tri-Cities, TN 423-467-8401
Knoxville, TN 865-546-5800
Spartanburg, SC 864-574-4775
Charleston, SC 843-974-5650
Middlesboro, KY 606-248-6600
Atlanta, GA 770-627-3590

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

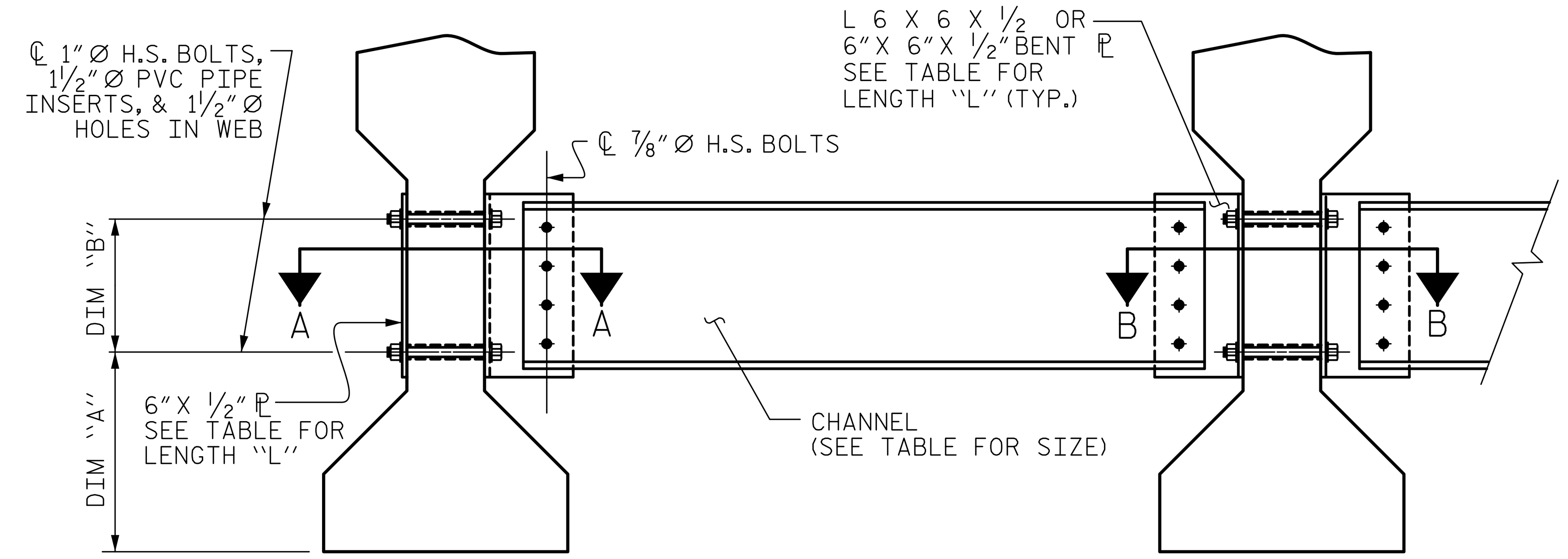
DRAWN BY : ELR 11/91
CHECKED BY : GRP 11/91

REV.		
REV.	1/15	MAA/TMG
REV.	2/15	MAA/TMG
REV.	12/17	MAA/THC

DWN. BY: WDC DATE: 10/2020
CHKD. BY: PRG DATE: 10/2020
DES. EGR. OF RECORD: PRG DATE: 10/2020

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-20
1			3			TOTAL SHEETS
2			4			45

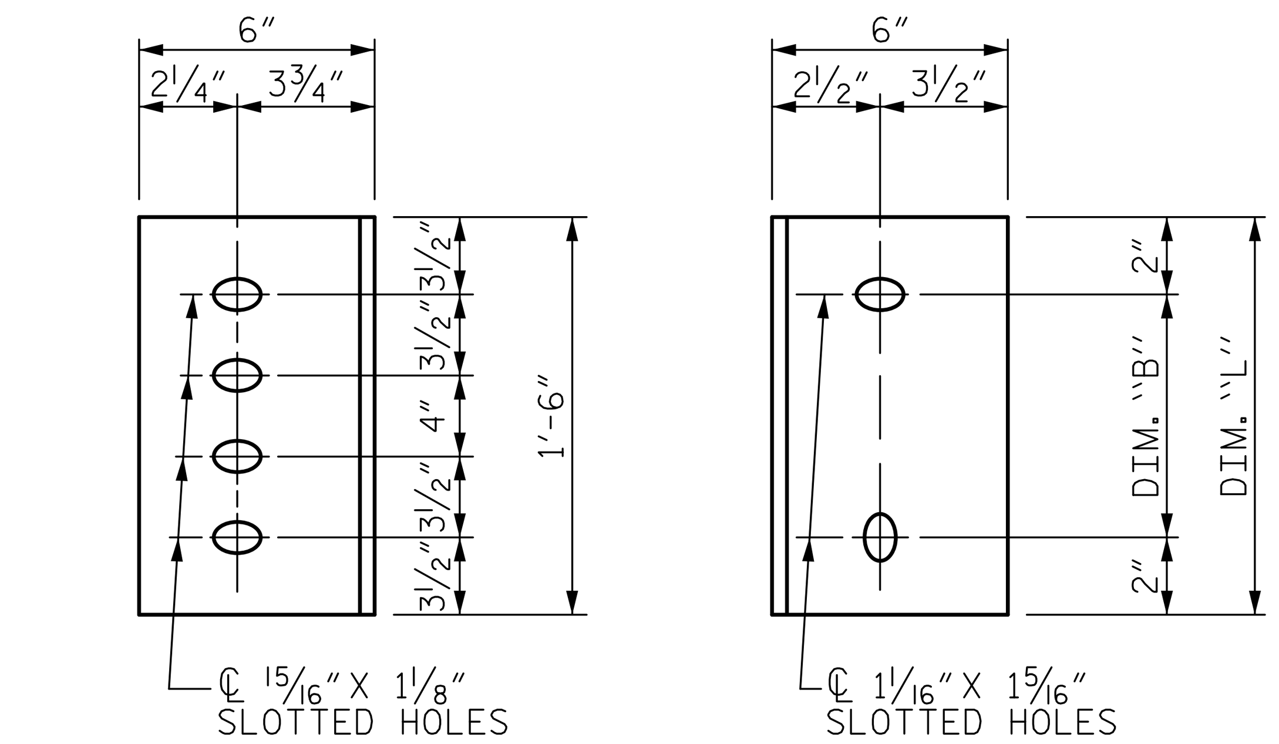
STD. NO. PCG9



EXTERIOR GIRDER

INTERIOR GIRDER

PART SECTION AT INTERMEDIATE DIAPHRAGM



DIAPHRAGM FACE

WEB FACE

CONNECTOR PLATE DETAILS

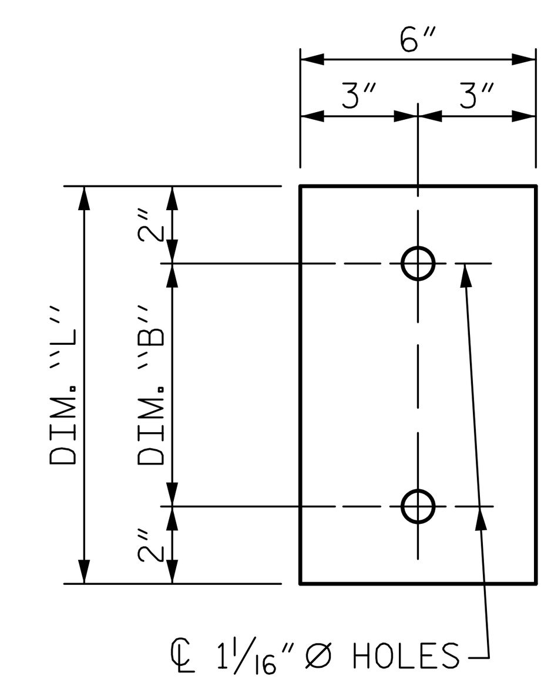
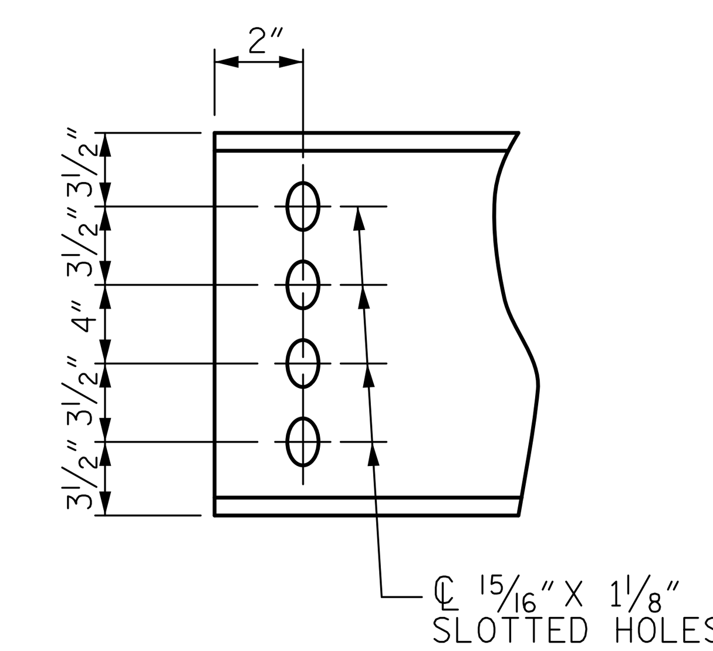


PLATE DETAILS



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 ¼ 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 ¼″PROJECTION BEYOND THE NUT.

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

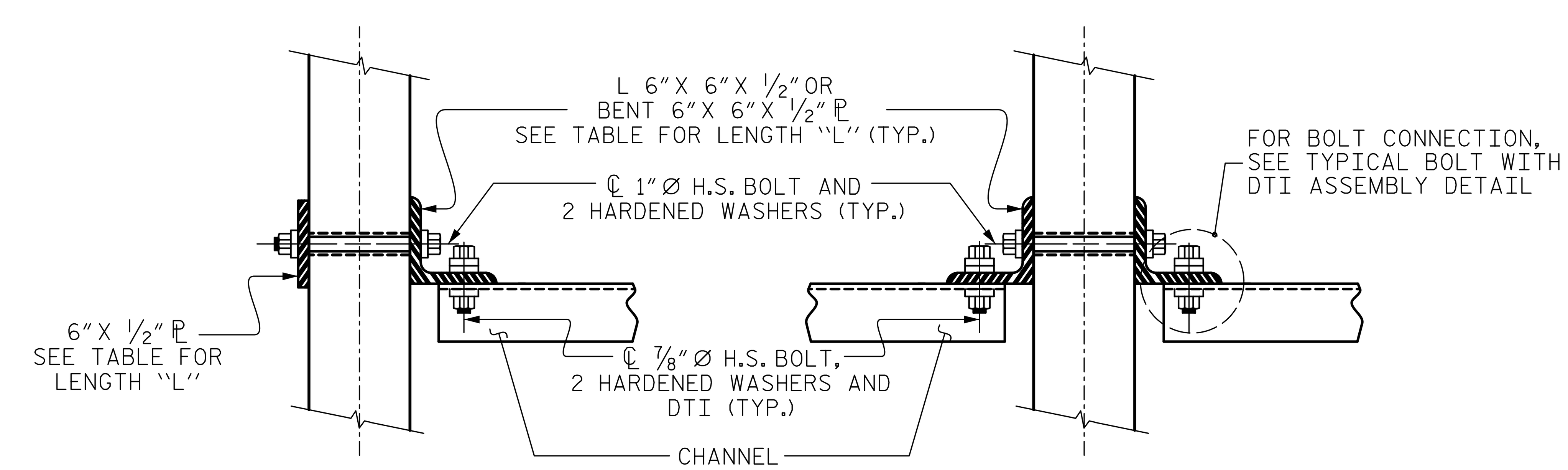
SUBMIT TWO SETS OF WORKING DRAWINGS FOR THE INTERMEDIATE DIAPHRAGM ASSEMBLY FOR REVIEW, COMMENTS AND ACCEPTANCE. AFTER REVIEW, COMMENTS, AND ACCEPTANCE, SUBMIT SEVEN SETS FOR DISTRIBUTION.

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

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

TABLE

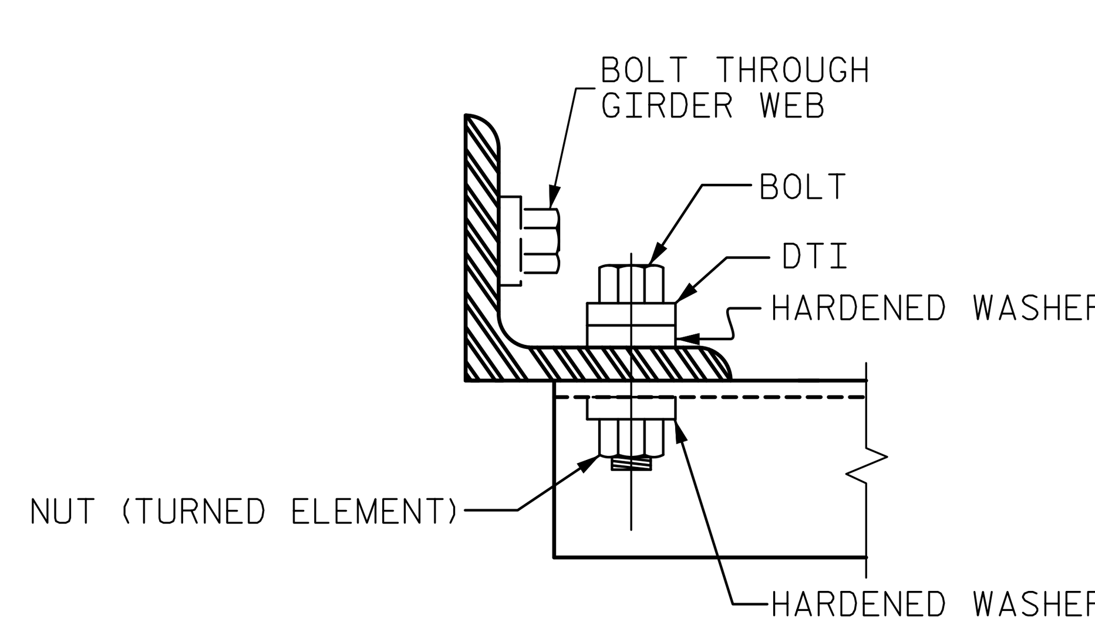
GIRDER TYPE	CHANNEL SIZE	DIM "A"	DIM "B"	DIM "L"
IV	MC 18 x 42.7	1′-9½″	1′-2″	1′-6″



SECTION A-A

SECTION B-B

CONNECTION DETAILS



BOLT WITH DTI ASSEMBLY DETAIL

PROJECT NO. B-4407

ANSON/STANLY COUNTY

STATION: 32+31.61 -L-

SHEET 6 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
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STANDARD

INTERMEDIATE STEEL DIAPHRAGMS FOR TYPE IV PRESTRESSED CONCRETE GIRDERS

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 042890 PATRICK R. GALLAGHER 3/18/2021

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CHECKED BY : VC 6/05	REV. 10/1/11	MAA/GM	
	REV. 12/17	MAA/THC	

DWN. BY: WDC DATE: 10/2020
CHKD. BY: PRG DATE: 10/2020
DES. EGR. OF RECORD: PRG DATE: 10/2020

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NO.	BY:	DATE:	NO.	BY:	DATE:	SHEET NO.	S-21
1			3			TOTAL SHEETS	45
2			4				

STD. NO. PCG10

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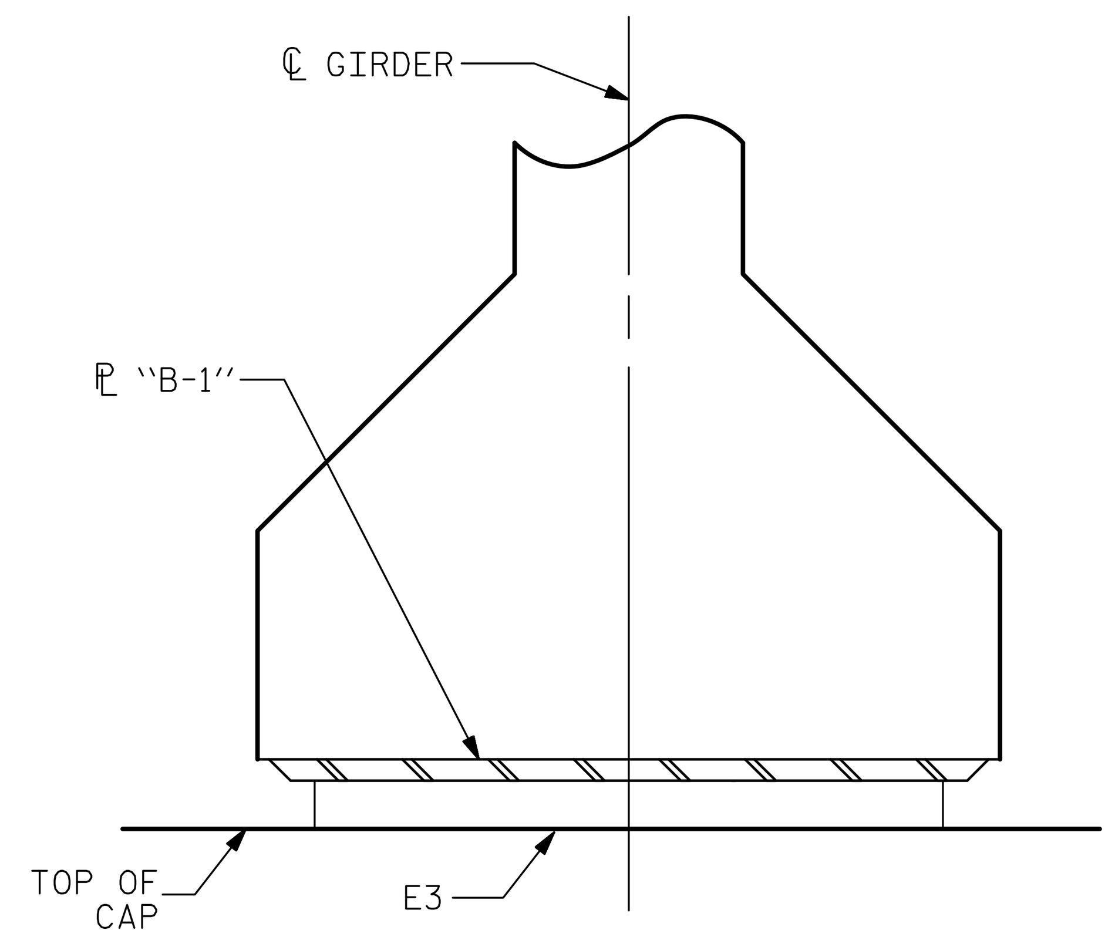
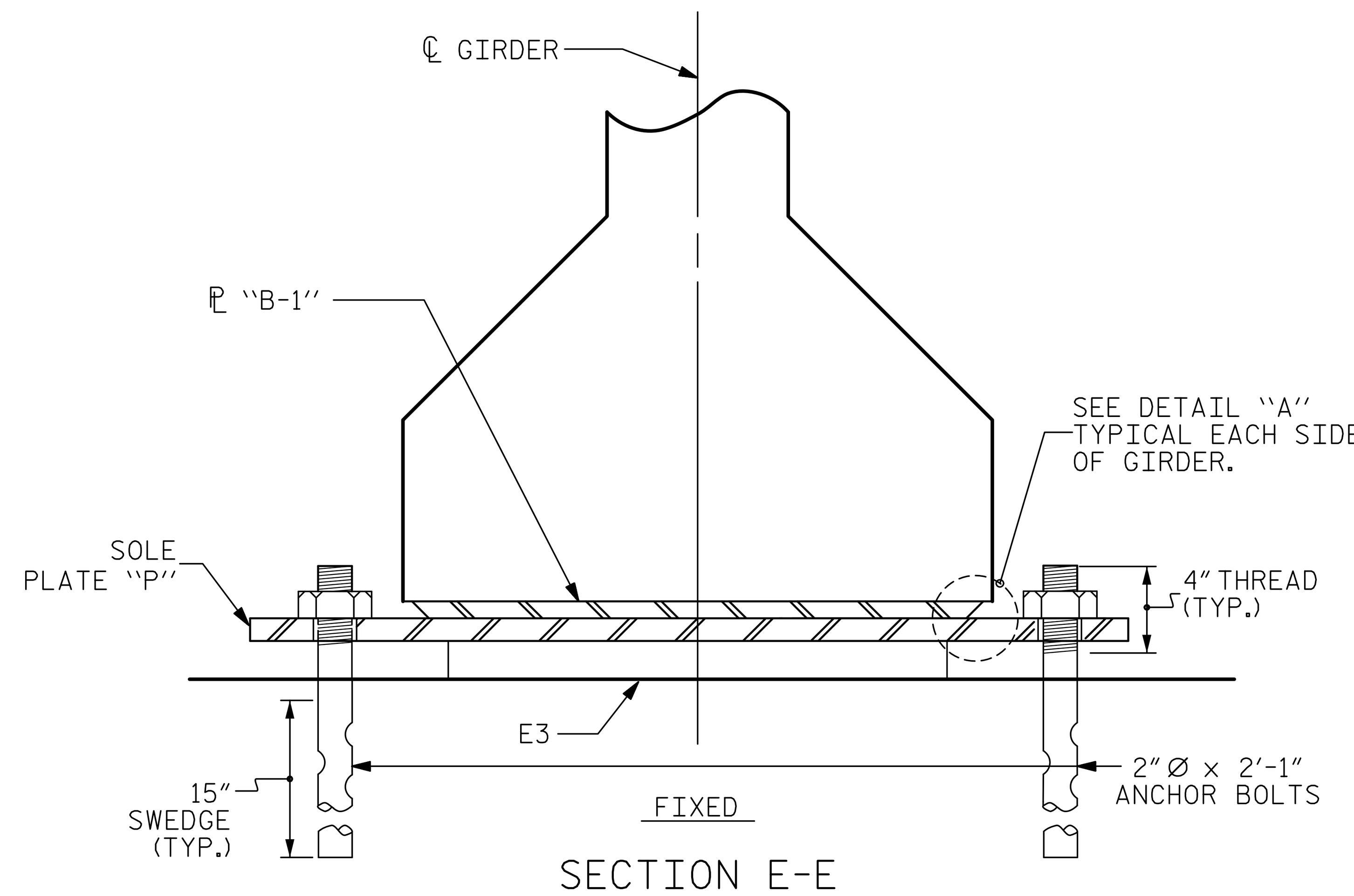
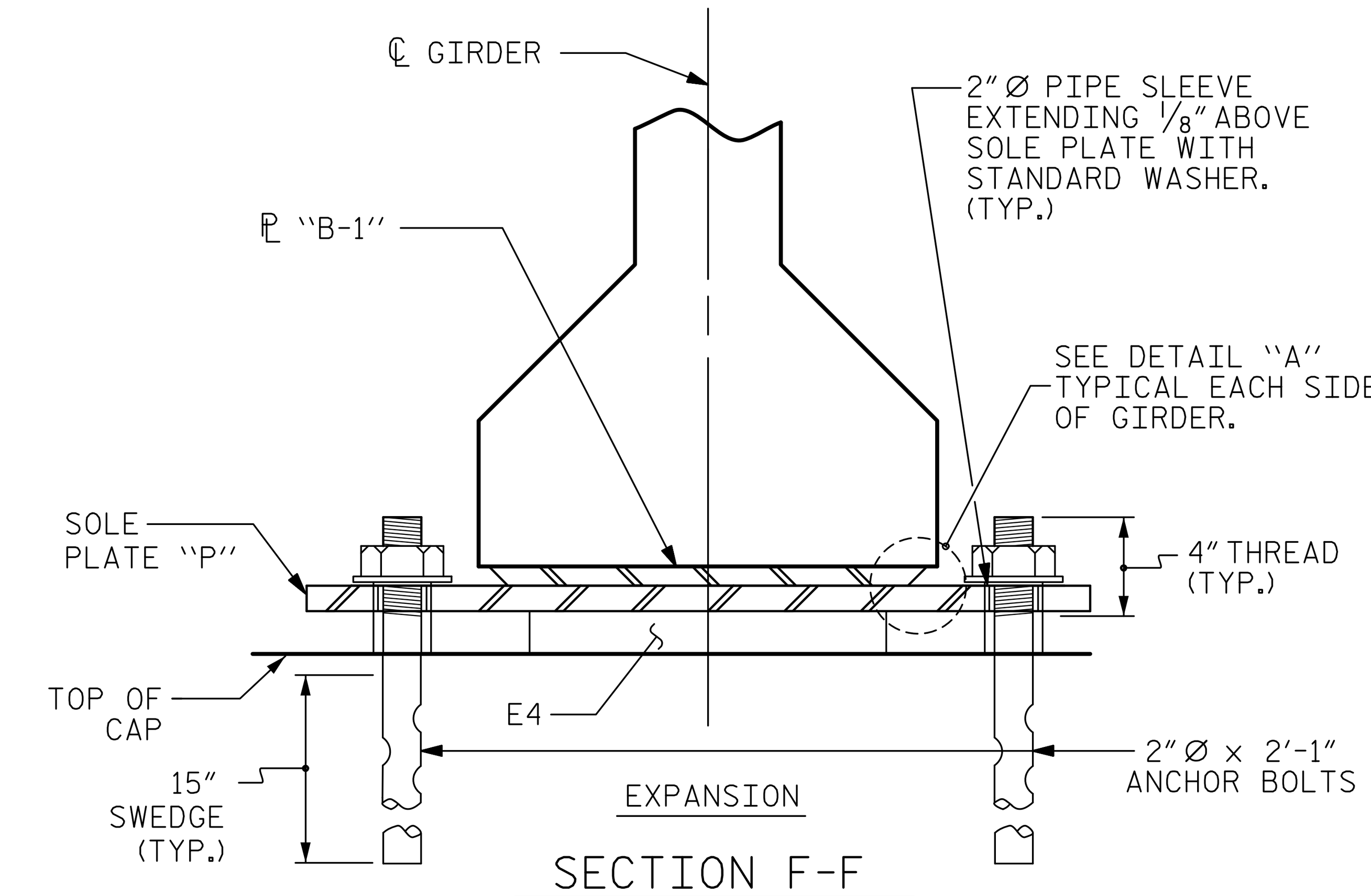


SECTION D-D
(SHOWING INTEGRAL END BENT)



SECTION E-E



SECTION F-F

NOTES

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

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

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

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

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

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

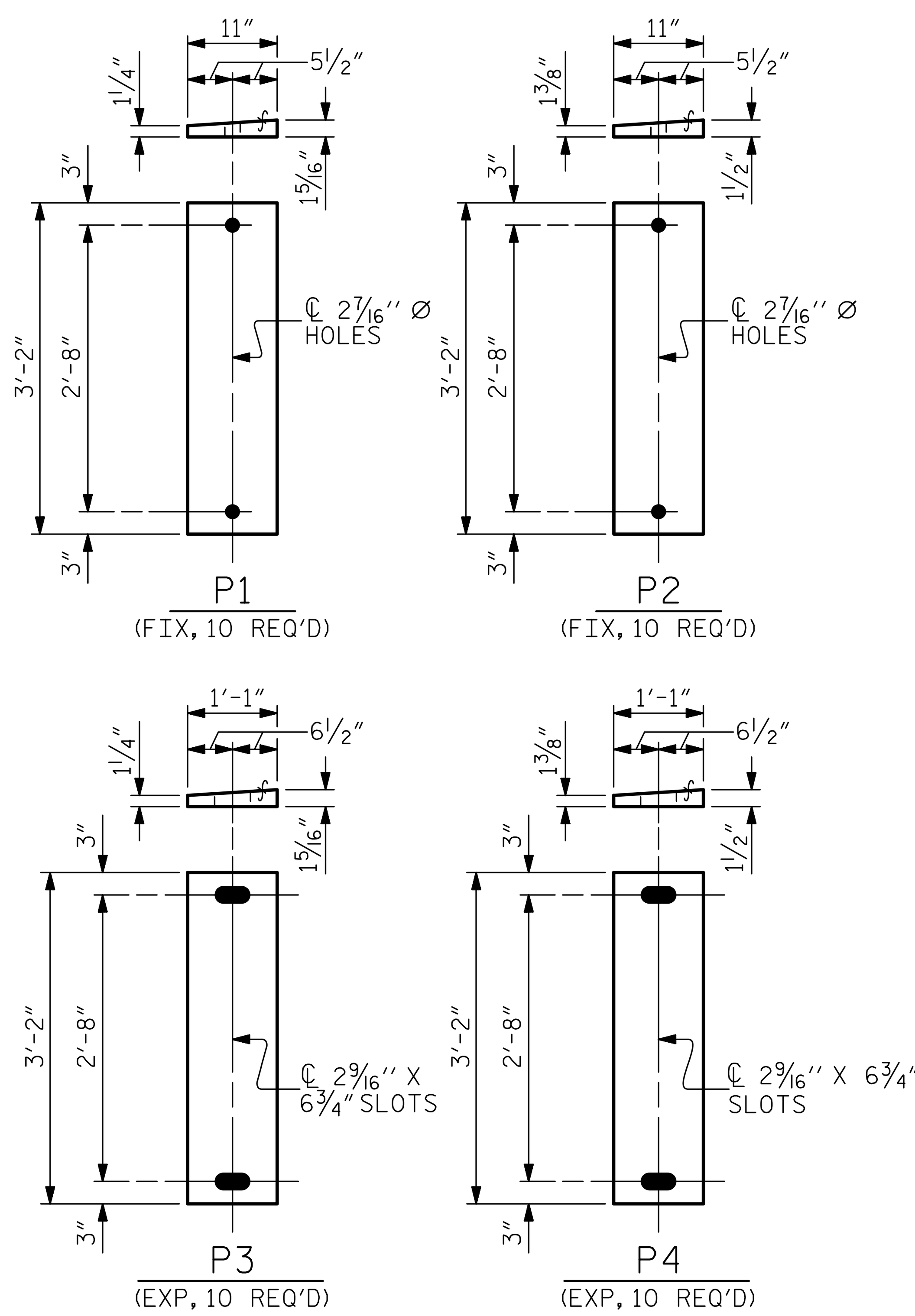
ANCHOR BOLTS SHALL MEET THE REQUIREMENTS OF ASTM A449. NUTS SHALL MEET THE REQUIREMENTS OF AASHTO M291-DH OR AASHTO M292-2H. WASHERS SHALL MEET THE REQUIREMENTS OF AASHTO M293. SHOP DRAWINGS ARE NOT REQUIRED FOR ANCHOR BOLT, NUTS AND WASHERS. SHOP INSPECTION IS REQUIRED.

ALL SURFACES OF BEARING PLATES SHALL BE SMOOTH AND STRAIGHT.

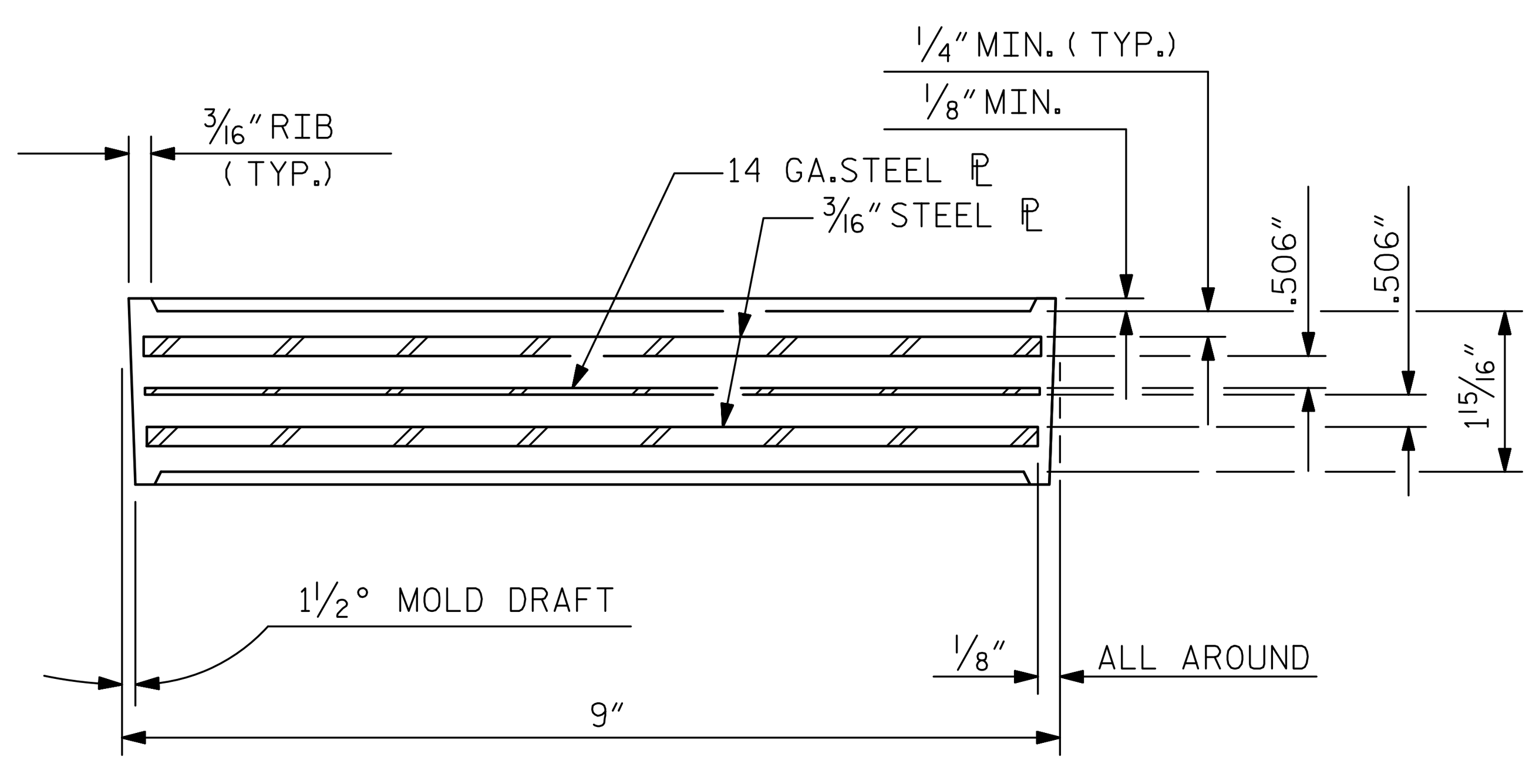
THE ELASTOMER IN THE STEEL REINFORCED BEARINGS SHALL HAVE A SHEAR MODULUS OF 0.160 KSI, IN ACCORDANCE WITH AASHTO M251.

FOR STEEL REINFORCED ELASTOMERIC BEARINGS, SEE SPECIAL PROVISIONS.

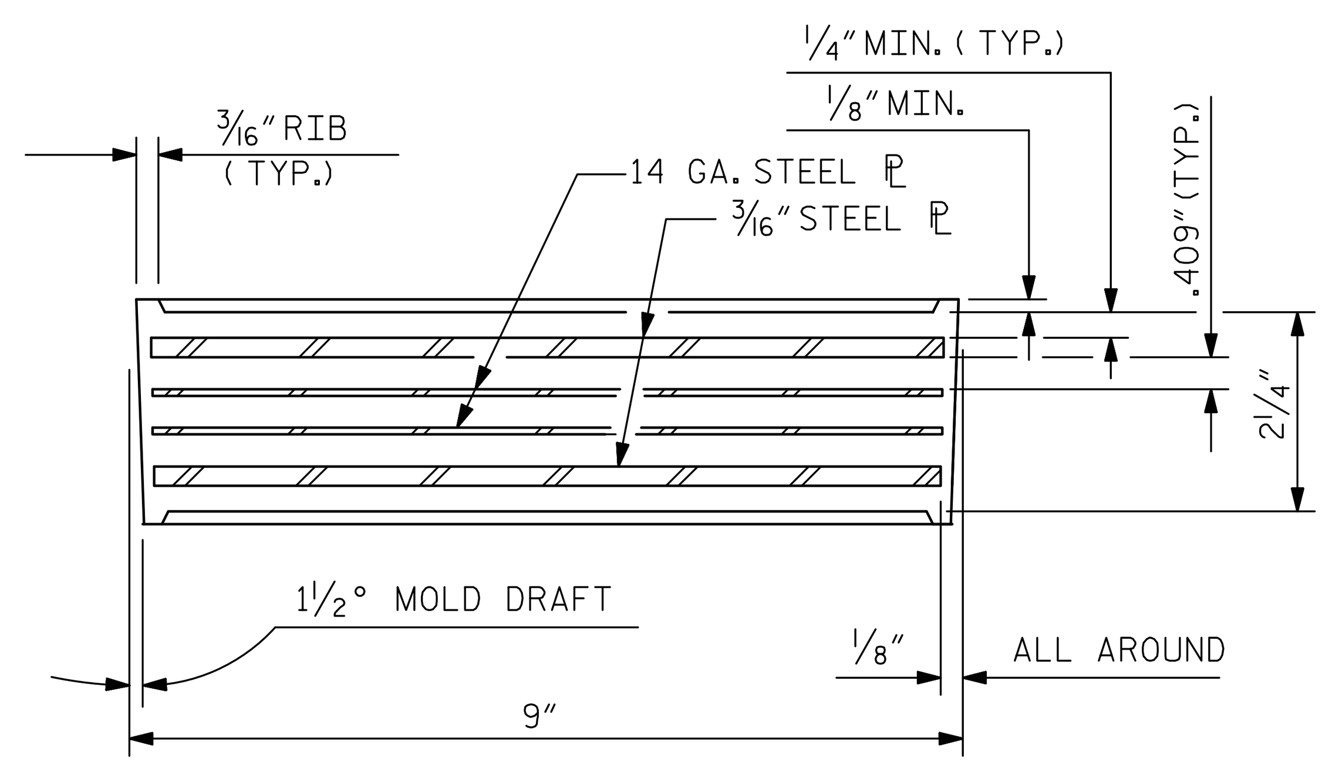
ALL SOLE PLATES SHALL BE AASHTO M270 GRADE 36.



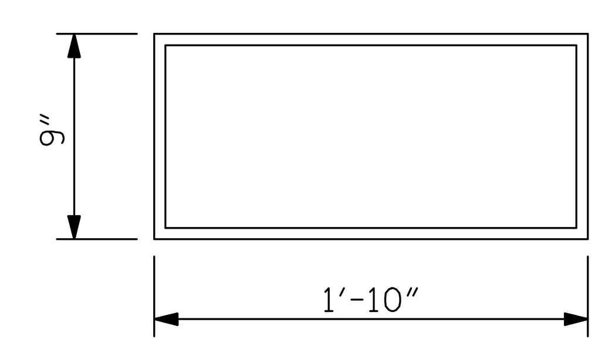
SOLE PLATE DETAILS ("P")



TYPICAL SECTION OF ELASTOMERIC BEARINGS



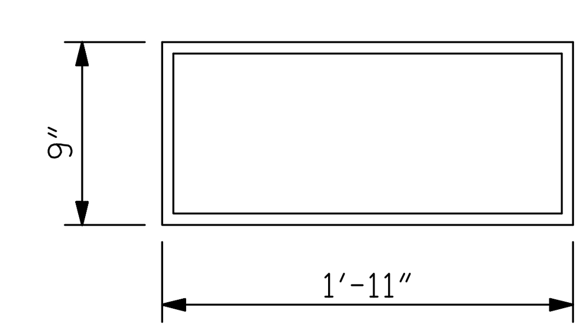
TYPICAL SECTION OF ELASTOMERIC BEARINGS



E3 (30 REQ'D)

PLAN VIEW OF ELASTOMERIC BEARING

TYPE IV

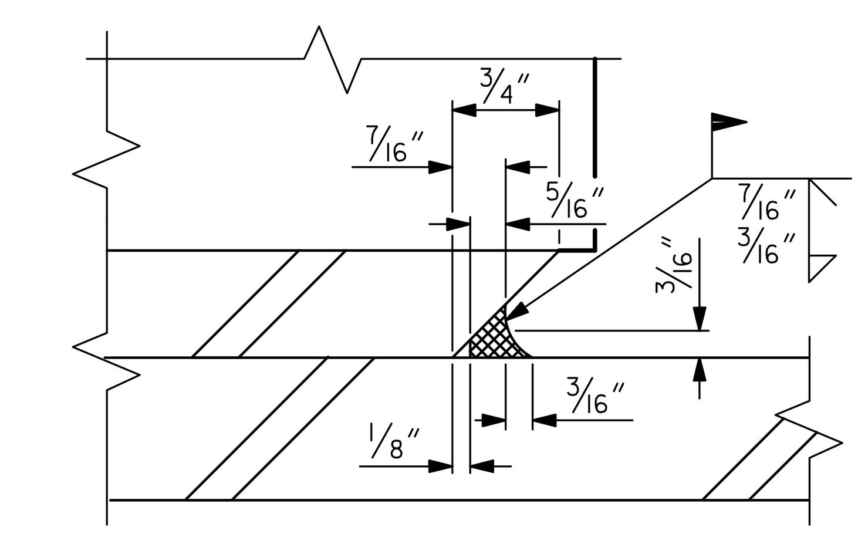


E4 (20 REQ'D)

PLAN VIEW OF ELASTOMERIC BEARING

TYPE V

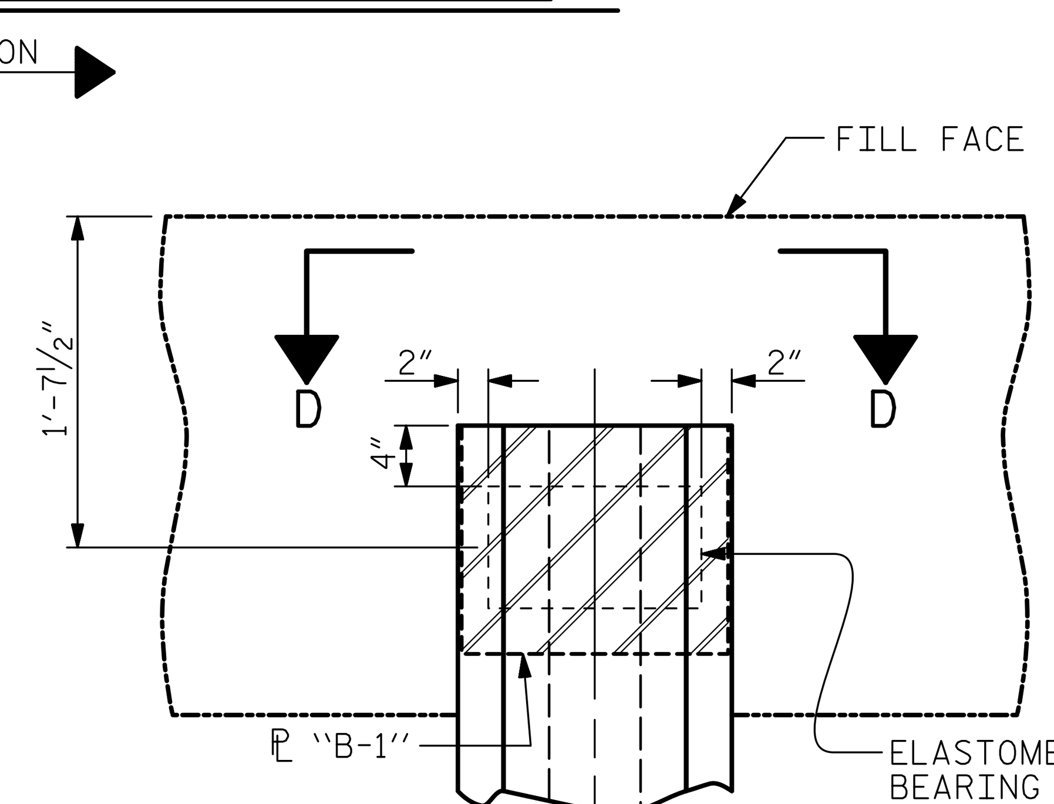
(BENTS 1 & 4 ONLY)



DETAIL "A"

MAXIMUM ALLOWABLE SERVICE LOADS	
D.L.+L.L. (NO IMPACT)	
TYPE IV	225 k
TYPE V	365 k

UP-STATION



TYPICAL PLAN
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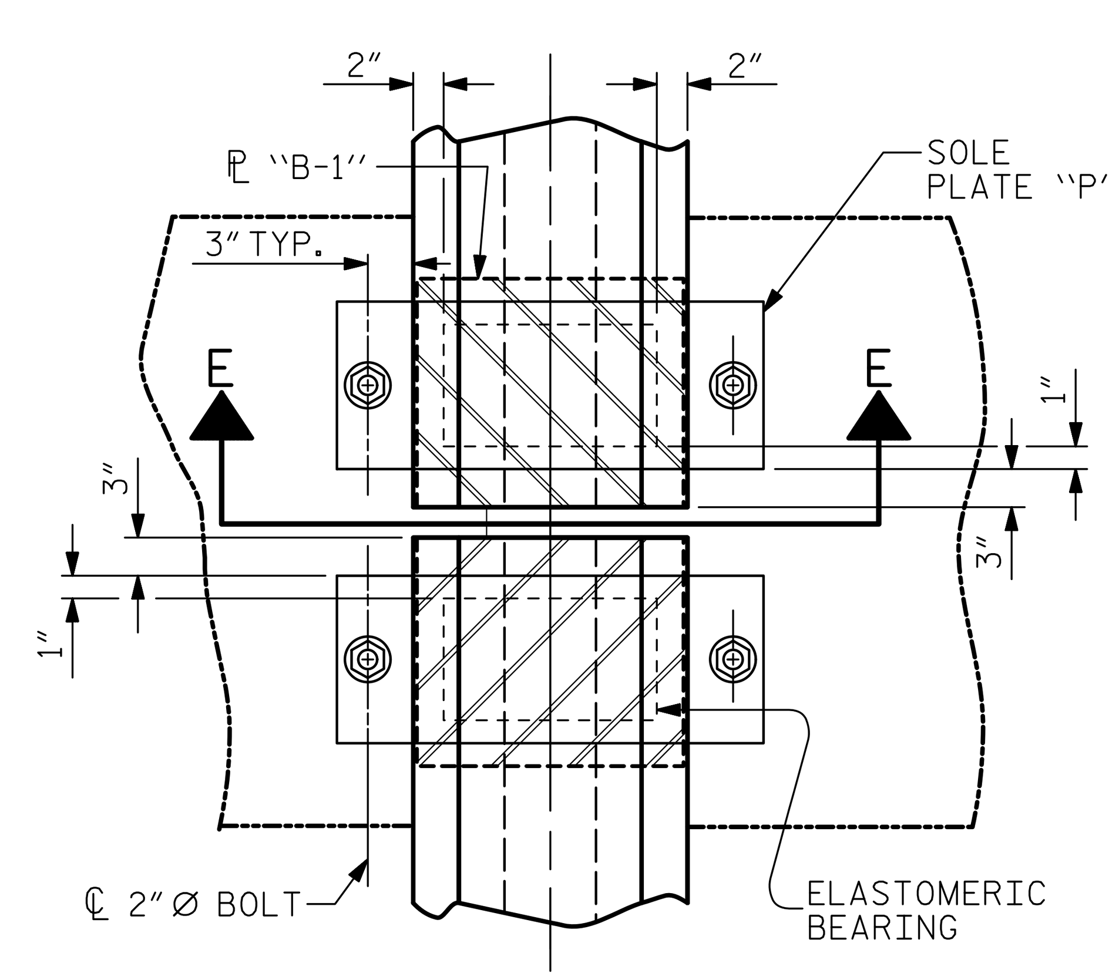

TYPICAL PLAN
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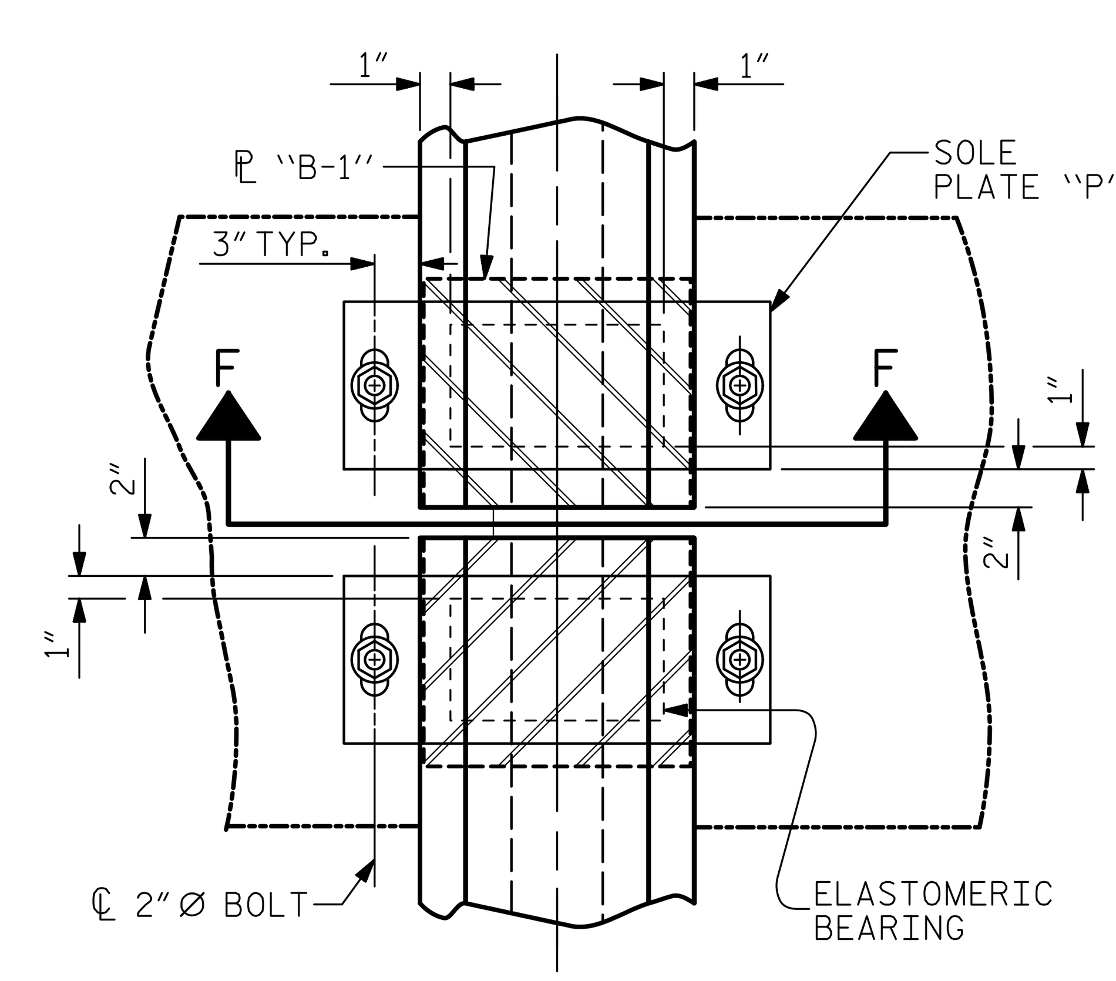
(@ BENTS 2 & 3)



TYPICAL PLAN
(SHOWING SIMPLE SPAN BENT)
(@ BENTS 1 & 4)

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PROJECT NO. B-4407
ANSON/STANLY COUNTY
STATION: 32+31.61 -L-

STATE OF NORTH CAROLINA
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ELASTOMERIC BEARING DETAILS

PRESTRESSED CONCRETE GIRDER SUPERSTRUCTURE

DWN. BY: WDC	DATE: 10/2020
CHKD. BY: PRG	DATE: 10/2020
DES. EGR. OF RECORD: PRG	DATE: 10/2020

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-22
1			3			TOTAL SHEETS
2			4			45

wdcrutcher
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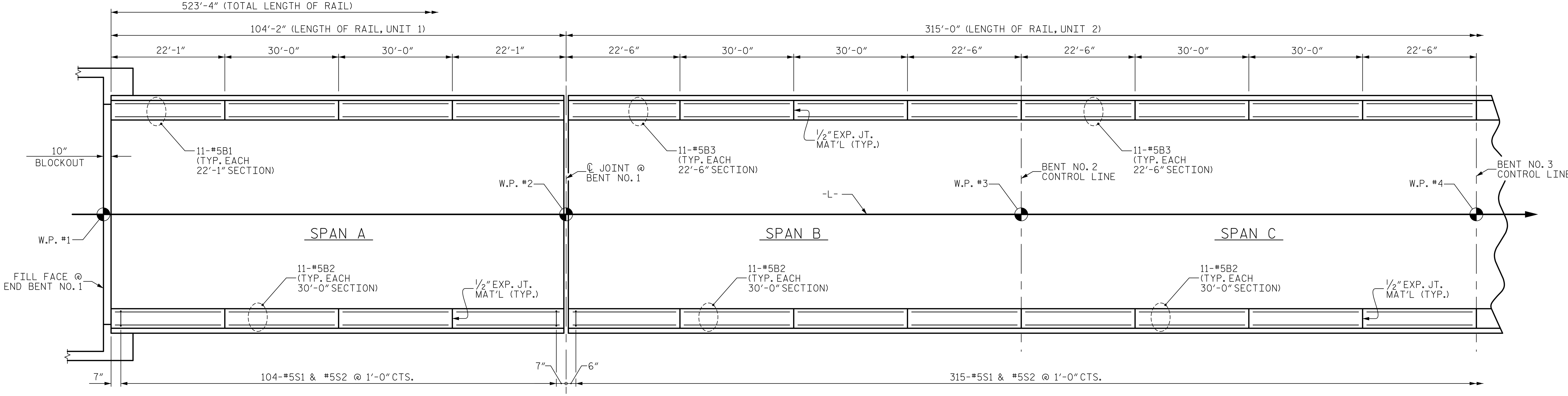
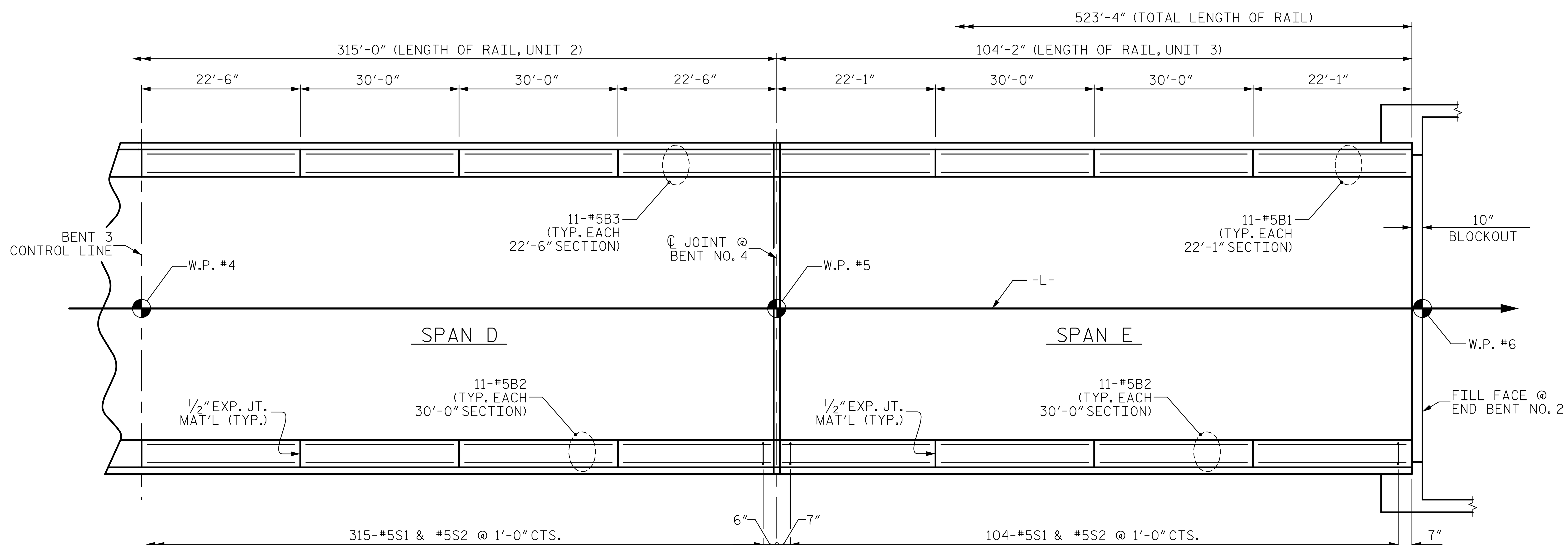


PLAN OF RAIL

DIMENSIONS AND INFORMATION SHOWN IS TYPICAL FOR BOTH LEFT AND RIGHT RAILS.



PLAN OF RAIL

PROJECT NO. B-4407
ANSON/STANLY COUNTY
STATION: 32+31.61 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
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STANDARD

CONCRETE BARRIER RAIL

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 042890 PATRICK R. GALLAGHER 3/18/2021

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Knoxville, TN 865-546-5800
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CHECKED BY : SJD 9/87	REV. 6/13 MAA/GM
	REV. 12/17 MAA/THC

DWN. BY: WDC	DATE: 10/2020
CHKD. BY: PRG	DATE: 10/2020
DES. EGR. OF RECORD: PRG	DATE: 10/2020

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

SHEET NO. S-23
TOTAL SHEETS 45

STD. NO. CBR1

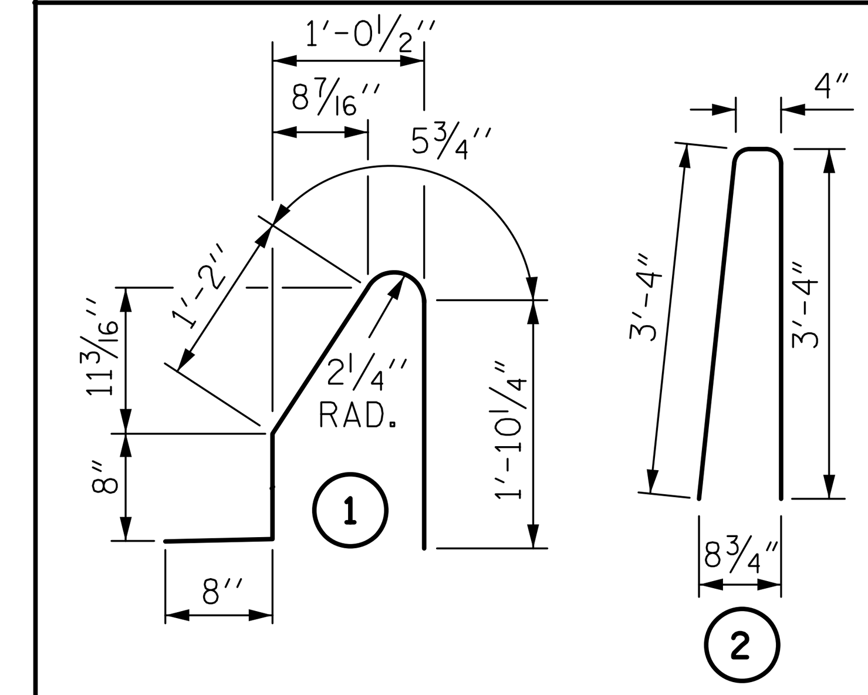
NOTES

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, ½″ 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.

BAR TYPES



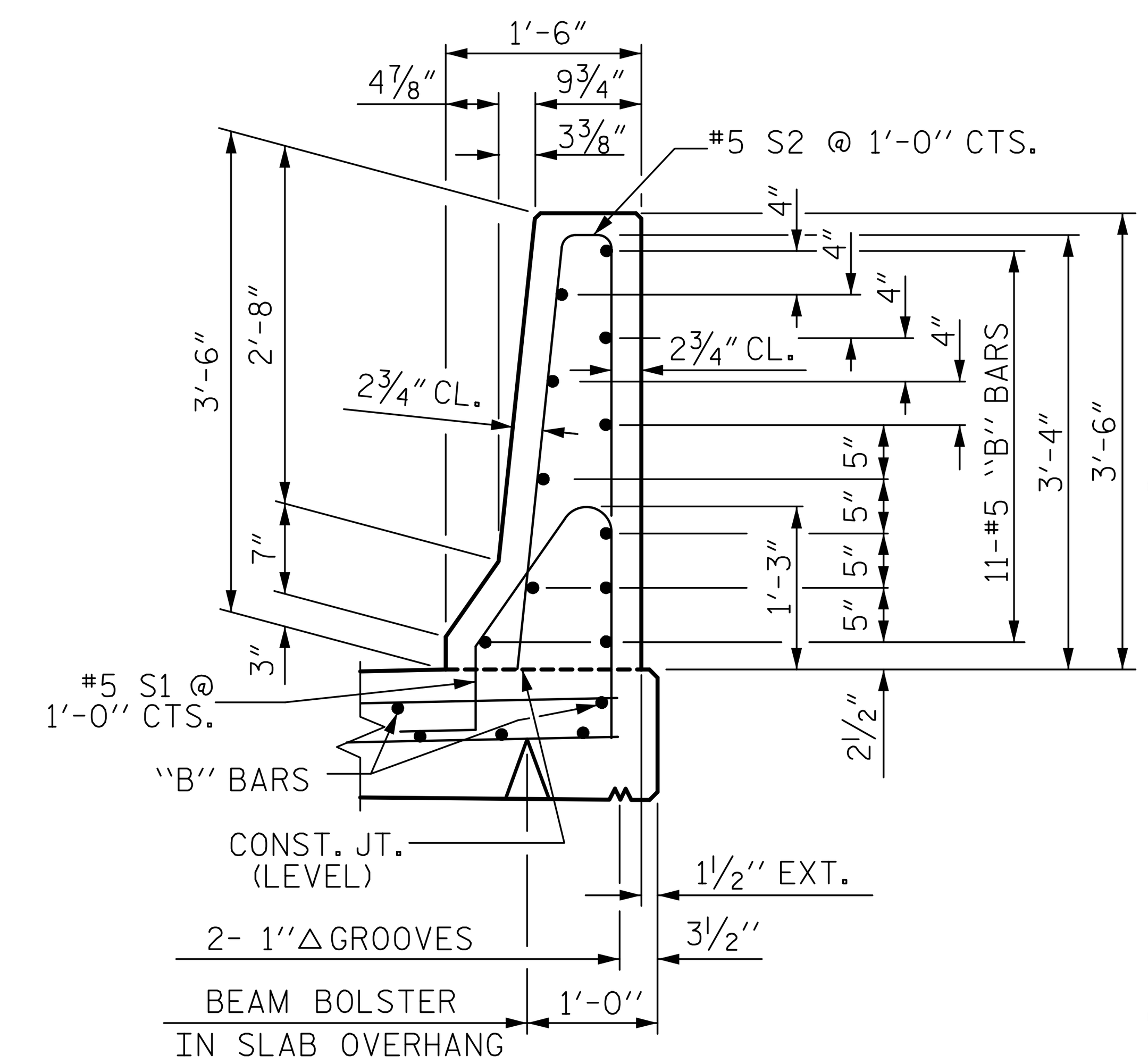
ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

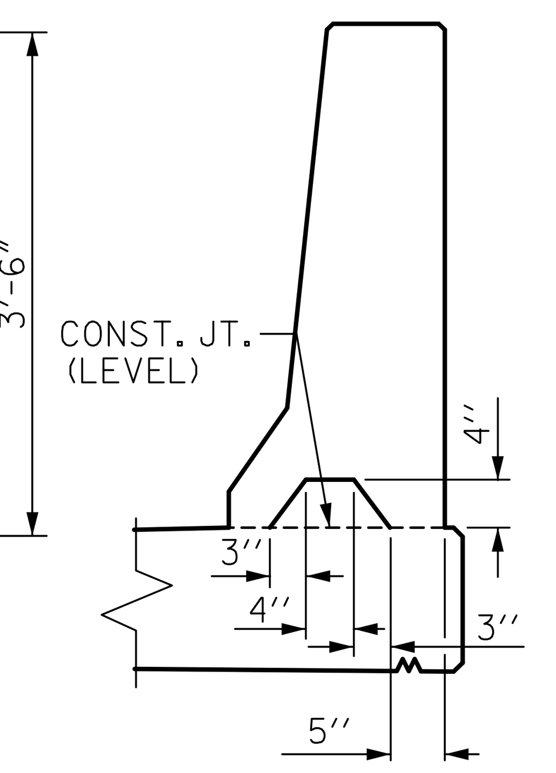
FOR CONCRETE BARRIER RAIL ONLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* B1	88	#5	STR	21′-9″	1,996
* B2	220	#5	STR	29′-8″	6,807
* B3	132	#5	STR	22′-2″	3,052
* S1	1046	#5	1	4′-10″	5,273
* S2	1046	#5	2	7′-0″	7,637

* EPOXY COATED REINFORCING STEEL	24,765 LBS.
CLASS AA CONCRETE	142.1 CU. YDS.
CONCRETE BARRIER RAIL	1046.67 LIN. FT.

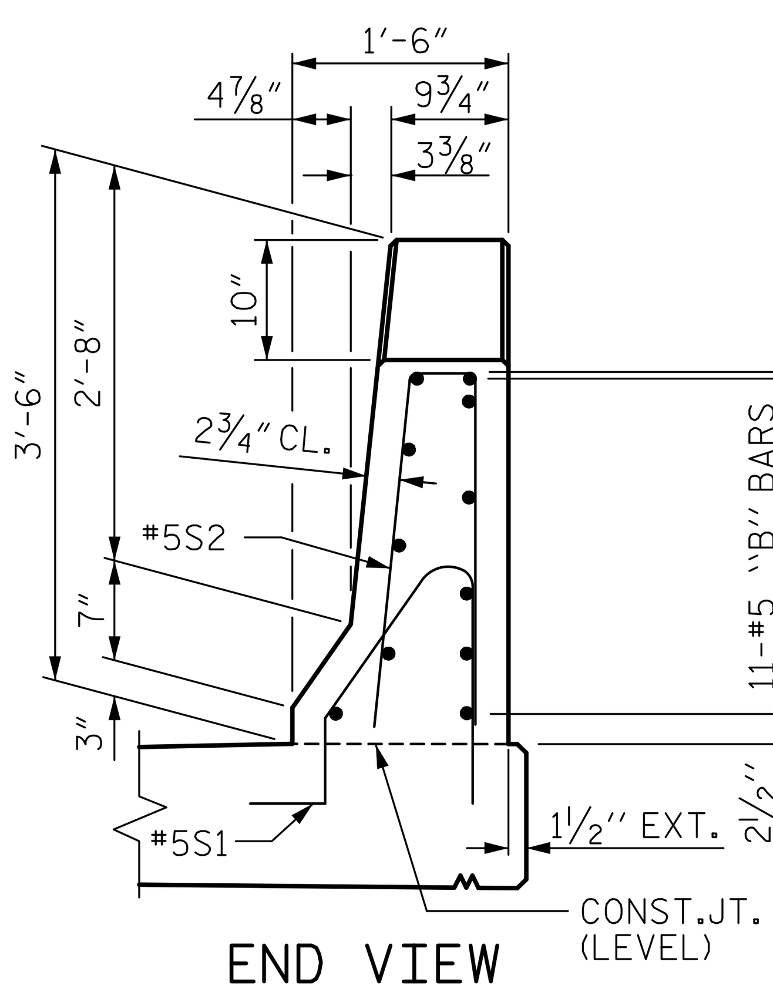


SECTION THRU RAIL

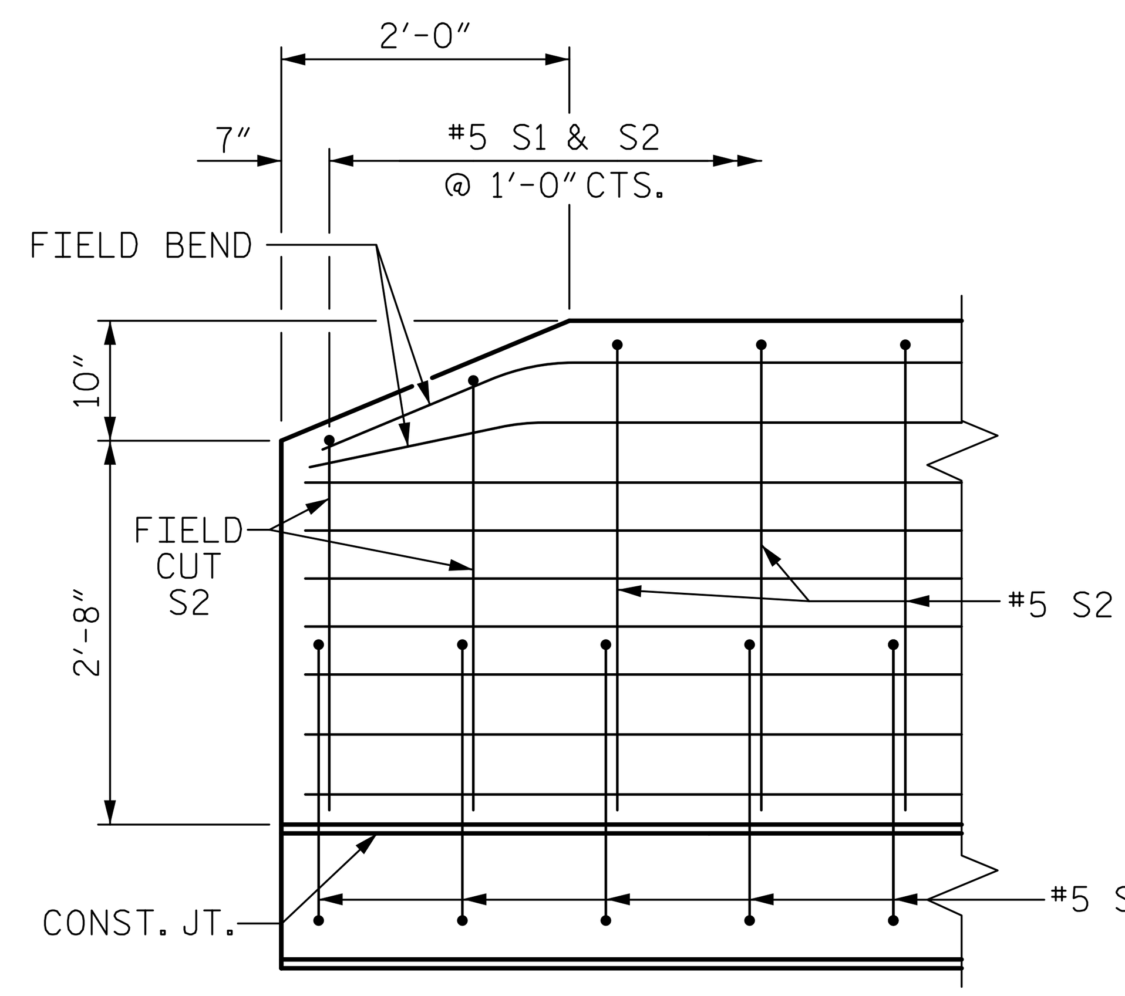


SECTION S-S

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

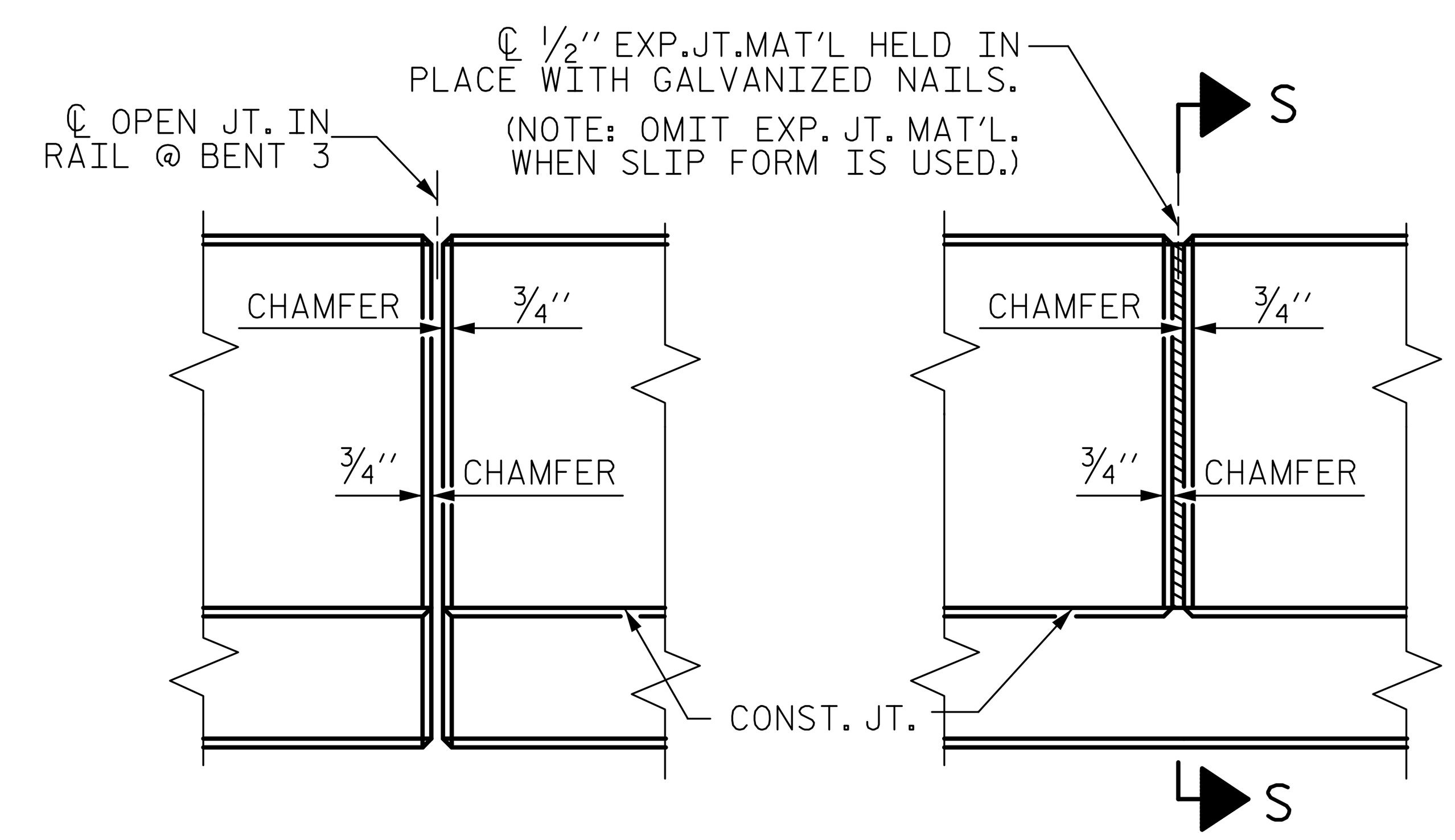


END VIEW



SIDE VIEW

END OF RAIL DETAILS



ELEVATION AT EXPANSION JOINTS

BARRIER RAIL DETAILS

PROJECT NO. B-4407

ANSON/STANLY COUNTY

STATION: 32+31.61 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

CONCRETE BARRIER RAIL

NORTH CAROLINA PROFESSIONAL SEAL 042890 ENGINEER PATRICK R. GALLAGHER 3/18/2021

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2			4		

SHEET NO. S-24

TOTAL SHEETS 45

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STD. NO. CBR1

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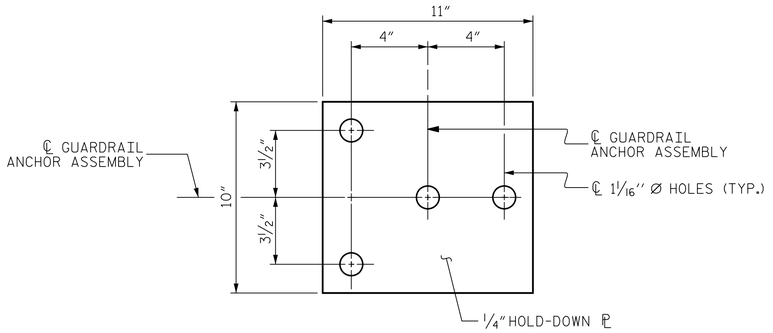
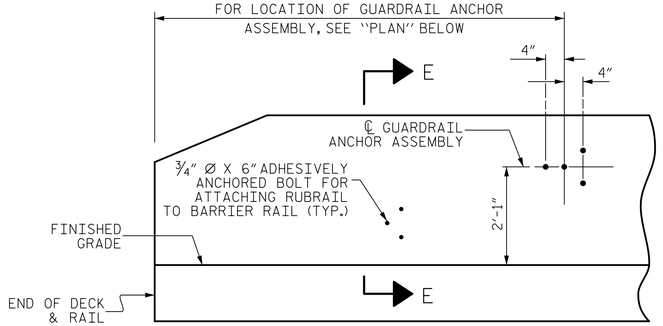
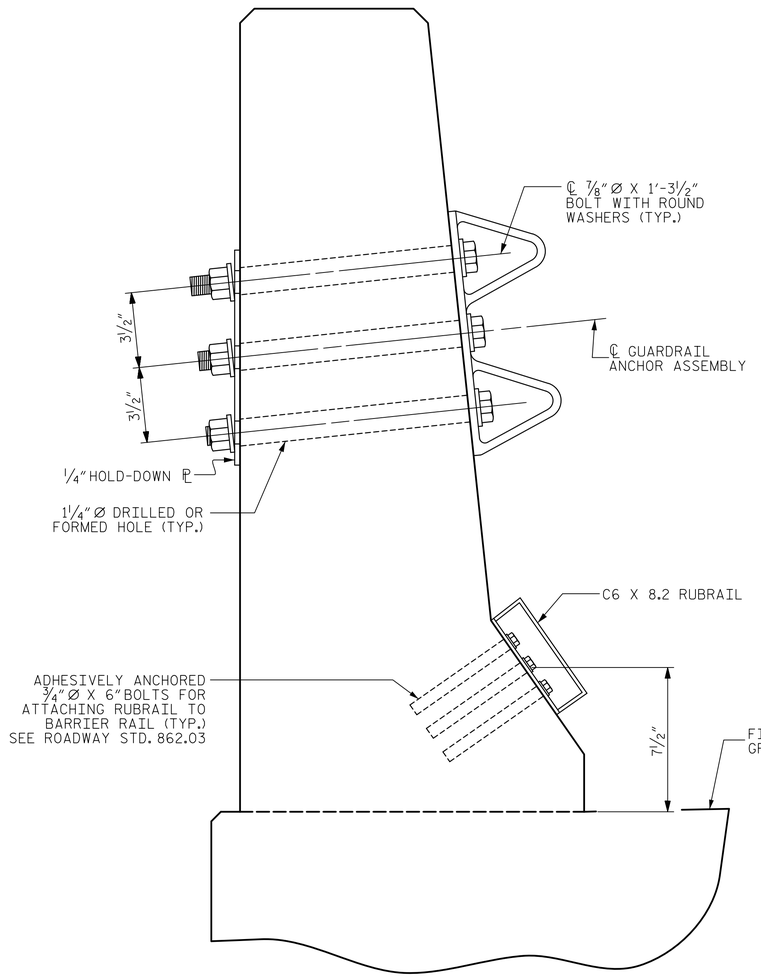


PLAN

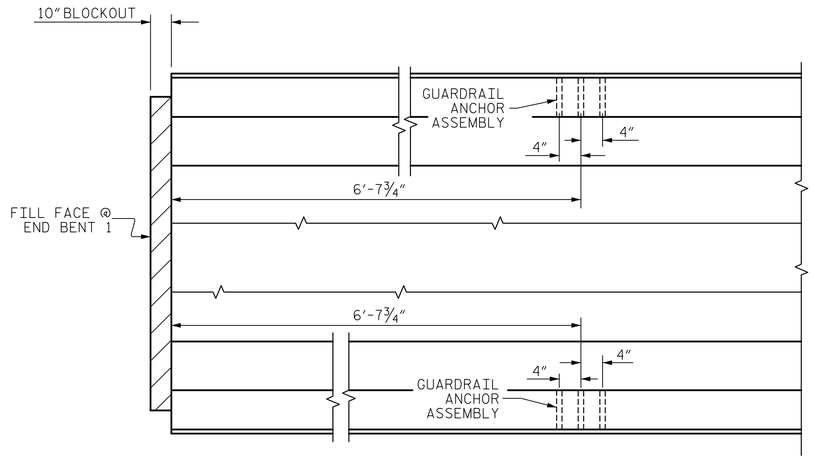


ELEVATION



SECTION E-E

GUARDRAIL ANCHOR ASSEMBLY DETAILS



PLAN

LOCATION OF ANCHORS FOR GUARDRAIL

END BENT 1 SHOWN, END BENT 2 SIMILAR.

NOTES

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

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

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

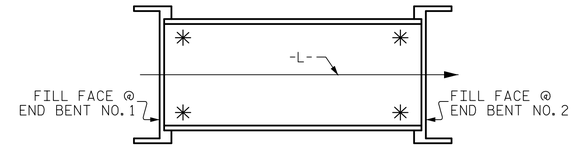
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF BARRIER RAIL. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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

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

THE 1 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.



SKETCH SHOWING POINTS OF ATTACHMENTS

✳ DENOTES GUARDRAIL ANCHOR ASSEMBLY

PROJECT NO. B-4407

ANSON/STANLY COUNTY

STATION: 32+31.61 -L-

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3/18/2021

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DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

GUARDRAIL ANCHORAGE FOR BARRIER RAIL

DRAWN BY : TLA 5/06	REV. 7/12 MAA/GM
CHECKED BY : GM 5/06	REV. 6/13 MAA/GM
	REV. 12/17 MAA/THC

DWN. BY: WDC	DATE: 10/2020
CHKD. BY: PRG	DATE: 10/2020
DES. EGR. OF RECORD: PRG	DATE: 10/2020

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-25
1			3			TOTAL SHEETS
2			4			45

STD. NO. GRA2

awilliams
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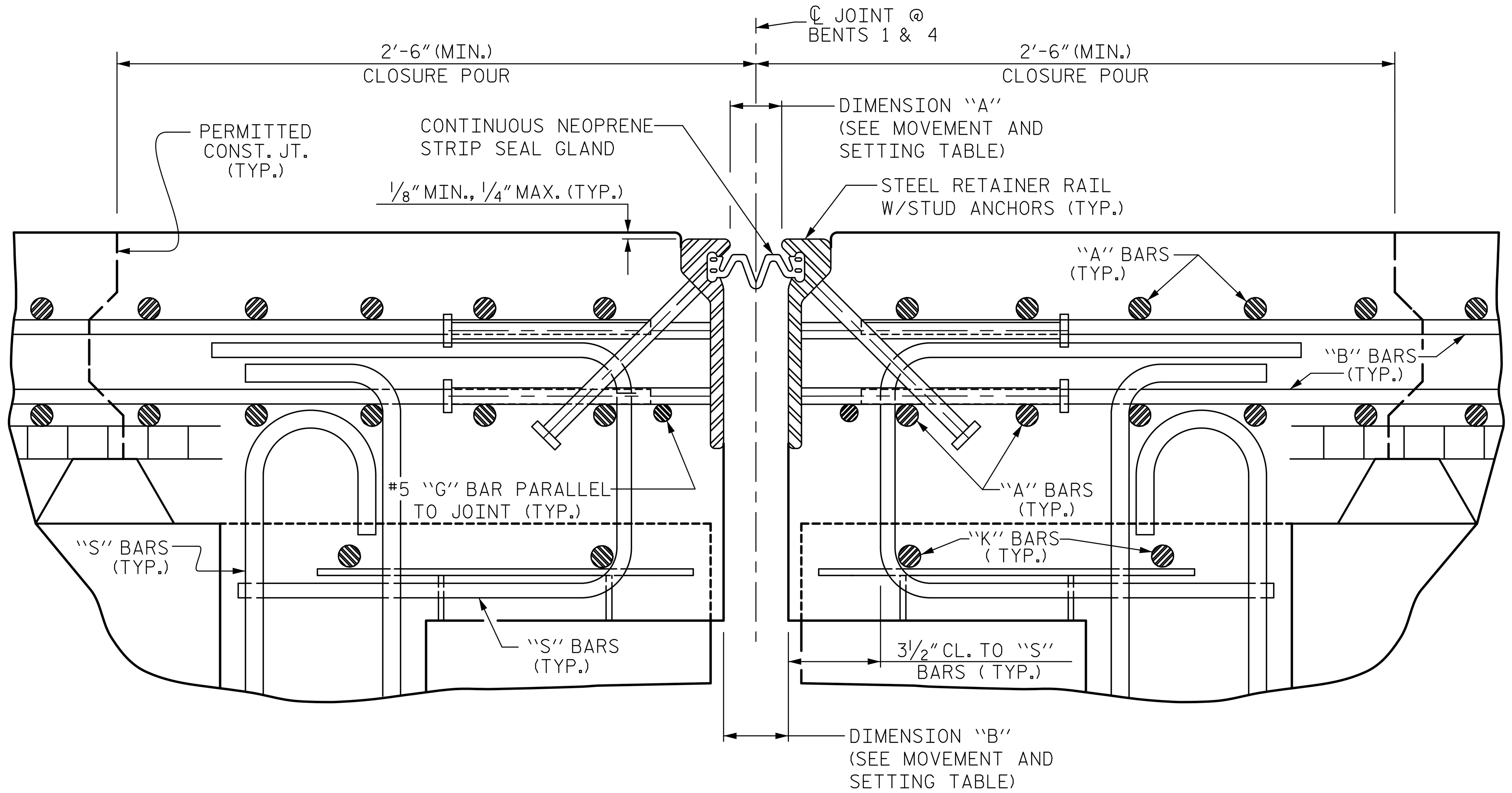
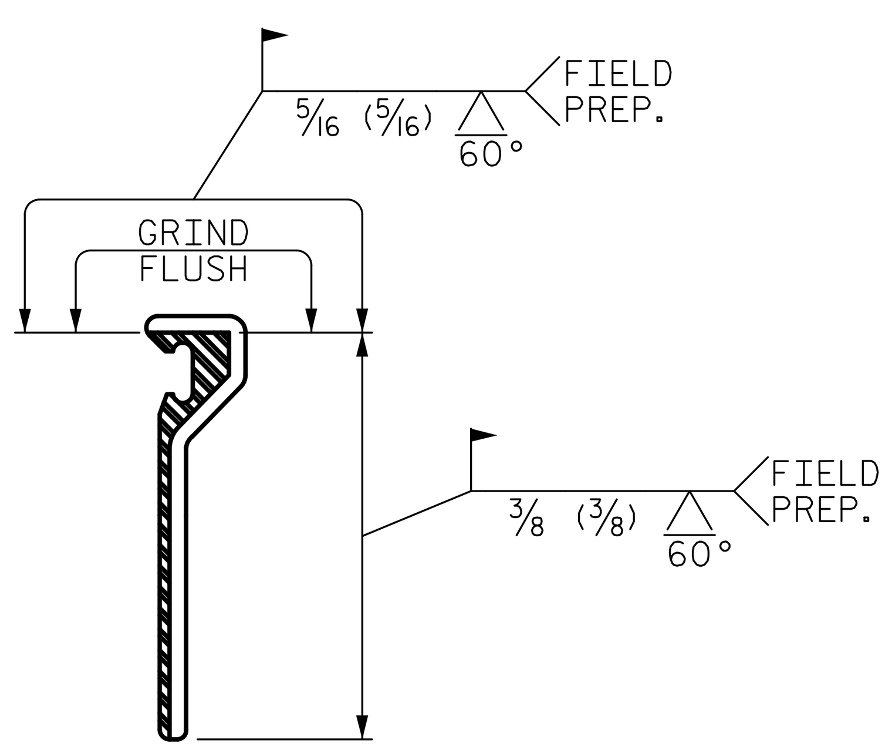
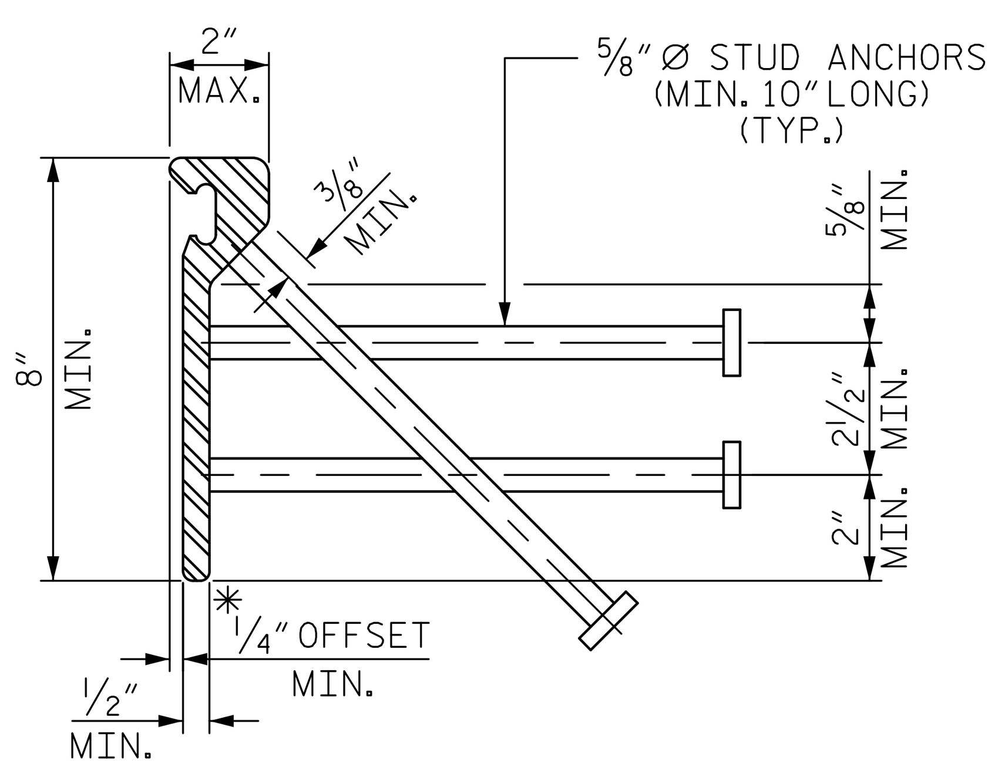


STRIP SEAL EXPANSION JOINT DETAILS

SECTION NORMAL TO JOINT -- PRESTRESSED GIRDER SUPERSTRUCTURE

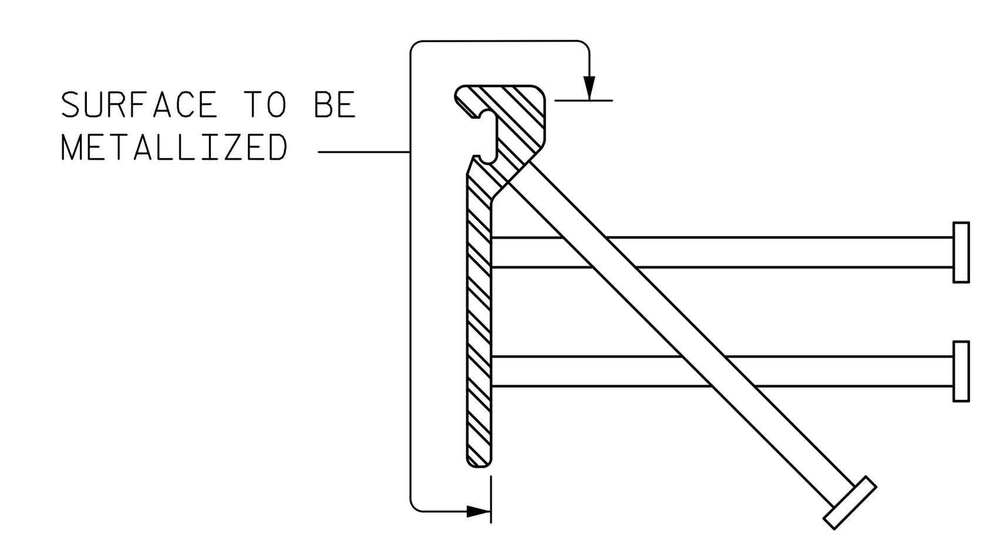


STEEL RETAINER RAIL (FIELD SPLICE DETAIL)



TYPICAL SECTION STEEL RETAINER RAIL

✳ DIMENSION "B" BASED ON STEEL RETAINER RAIL TOP OFFSET TO FACE OF RAIL OF 1/4" MINIMUM. IF ACTUAL OFFSET IS GREATER ADJUST DIMENSION "B" AS REQUIRED.



METALLIZING DETAIL

JOINT INSTALLATION PROCEDURE:

1. INSTALL THE STRIP SEAL EXPANSION JOINT AS RECOMMENDED BY THE MANUFACTURER.
2. A MANUFACTURER'S REPRESENTATIVE SHALL BE PRESENT DURING INSTALLATION OF THE JOINT.
3. PLACE STEEL RETAINER RAILS IN JOINT OPENING. PROPERLY ALIGN THE RAILS BOTH HORIZONTALLY AND VERTICALLY. DO NOT WELD SUPPORT SYSTEM TO THE METALLIZED SURFACES OF THE STEEL RETAINER RAILS.
4. CONFLICTING REINFORCING STEEL MAY BE SHIFTED SLIGHTLY WHEN NECESSARY.
5. DECK SLAB CONCRETE PLACEMENT OPERATIONS SHALL COMMENCE PER THE POURING SEQUENCE AFTER FINAL JOINT ALIGNMENT IS SET.
6. PROTECT THE STEEL RETAINER RAILS FROM BEING FOULED BY CONCRETE SPILLOVER DURING THE DECK POUR.
7. LOOSEN THE STEEL RETAINER RAIL SUPPORT SYSTEM TO ALLOW MOVEMENT WHILE CONCRETE CURES.
8. RE-LEVEL AND RE-ALIGN STEEL RETAINER RAIL AS REQUIRED ON OPPOSITE SIDE OF JOINT.
9. PLACE DECK SLAB CONCRETE.
10. ONCE THE CONCRETE HAS HARDENED SUFFICIENTLY ON BOTH SIDES OF JOINT, STEEL RETAINER RAILS SHALL BE CLEANED THOROUGHLY AND SEAL CHANNELS SHALL BE INSPECTED TO ASCERTAIN THE ABSENCE OF CONCRETE AND DEBRIS.
11. COAT THE STRIP SEAL LUGS WITH LUBRICANT-ADHESIVE AND INSTALL THE NEOPRENE STRIP SEAL GLAND AS RECOMMENDED BY THE STRIP SEAL EXPANSION JOINT MANUFACTURER.

GENERAL NOTES

FOR STRIP SEAL EXPANSION JOINTS, SEE SPECIAL PROVISIONS.

STEEL RETAINER RAILS AND COVER PLATES SHALL CONFORM TO AASHTO M270 GRADE 36 OR GRADE 50 STEEL. ALL STUD ANCHORS SHALL CONFORM TO AASHTO M169, GRADES 1010 THRU 1020 OR APPROVED EQUAL. ALL CONCRETE INSERTS SHALL BE CLOSED END AND SHALL CONFORM TO AASHTO M169, GRADE 12L14. TENSILE CAPACITY SHALL BE 3000 LBS. MIN.

ONLY STEEL RETAINER RAILS OF ONE-PIECE CONSTRUCTION ARE PERMITTED. STEEL RETAINER RAILS CONSISTING OF TWO OR MORE COMPONENTS WELDED TOGETHER TO OBTAIN THEIR FINAL CROSS-SECTIONAL SHAPE ARE NOT PERMITTED.

STUD ANCHORS SHALL BE SHOP WELDED AND SHALL BE ELECTRIC ARC END WELDED WITH COMPLETE FUSION.

SURFACES COMING IN CONTACT WITH STRIP SEAL GLAND SHALL BE GROUND SMOOTH PRIOR TO METALLIZING.

UPON COMPLETION OF SHOP FABRICATION, THE STEEL RETAINER RAILS SHALL BE METALLIZED AS SHOWN IN THE "METALLIZING DETAIL". SEE SPECIAL PROVISIONS FOR THERMAL SPRAYED COATINGS (METALLIZATION).

INSTALLED STEEL RETAINER RAILS SHALL FOLLOW THE ROADWAY SLOPE.

FIELD SPLICES OF THE RETAINER RAILS SHALL BE KEPT TO A MINIMUM. CONTRACTOR SHALL FURNISH DETAILED PLANS SHOWING PROPOSED SPLICE LOCATIONS FOR APPROVAL. FINISHED WELDS SHALL BE REPAIRED IN ACCORDANCE WITH THE SPECIAL PROVISION FOR THERMAL SPRAYED COATINGS (METALLIZATION).

NEOPRENE STRIP SEAL GLAND SHALL BE CONTINUOUS THROUGHOUT THE JOINT AND SHALL BE COMPATIBLE WITH THE STEEL RETAINER RAILS. FIELD SPLICING THE GLAND IS NOT PERMITTED.

NO ALTERNATE JOINT DETAILS SHALL BE PERMITTED IN LIEU OF THOSE SHOWN ON THESE PLANS.

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

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.

MOVEMENT AND SETTING AT JOINT								
LOCATION	SKEW ANGLE	TOTAL MOVEMENT (ALONG ℄ RDWY)	DIMENSION "A"			DIMENSION "B"		
			PERPENDICULAR JOINT OPENING AT 45° F	PERPENDICULAR JOINT OPENING AT 60° F	PERPENDICULAR JOINT OPENING AT 90° F	PERPENDICULAR JOINT OPENING AT 45° F	PERPENDICULAR JOINT OPENING AT 60° F	PERPENDICULAR JOINT OPENING AT 90° F
BENTS 1 & 4	90°	1 1/4"	2 5/16"	2"	1 5/16"	2 13/16"	2 1/2"	1 13/16"

PROJECT NO. B-4407
ANSON/STANLY COUNTY
STATION: 32+31.61 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

STRIP SEAL EXPANSION JOINT DETAILS

NORTH CAROLINA PROFESSIONAL SEAL 042890 ENGINEER PATRICK R. GALLAGHER
3/18/2021

Vaughn & Melton Consulting Engineers
Asheville, North Carolina 828-253-2796
Raleigh, NC 919-977-9455 | Charlotte, NC 704-357-0488 | Boone, NC 828-355-9933 | Tri-Cities, TN 423-467-8401 | Knoxville, TN 865-546-5800 | Spartanburg, SC 864-574-4775 | Charleston, SC 843-974-5650 | Middlesboro, KY 606-248-6600 | Atlanta, GA 770-627-3590

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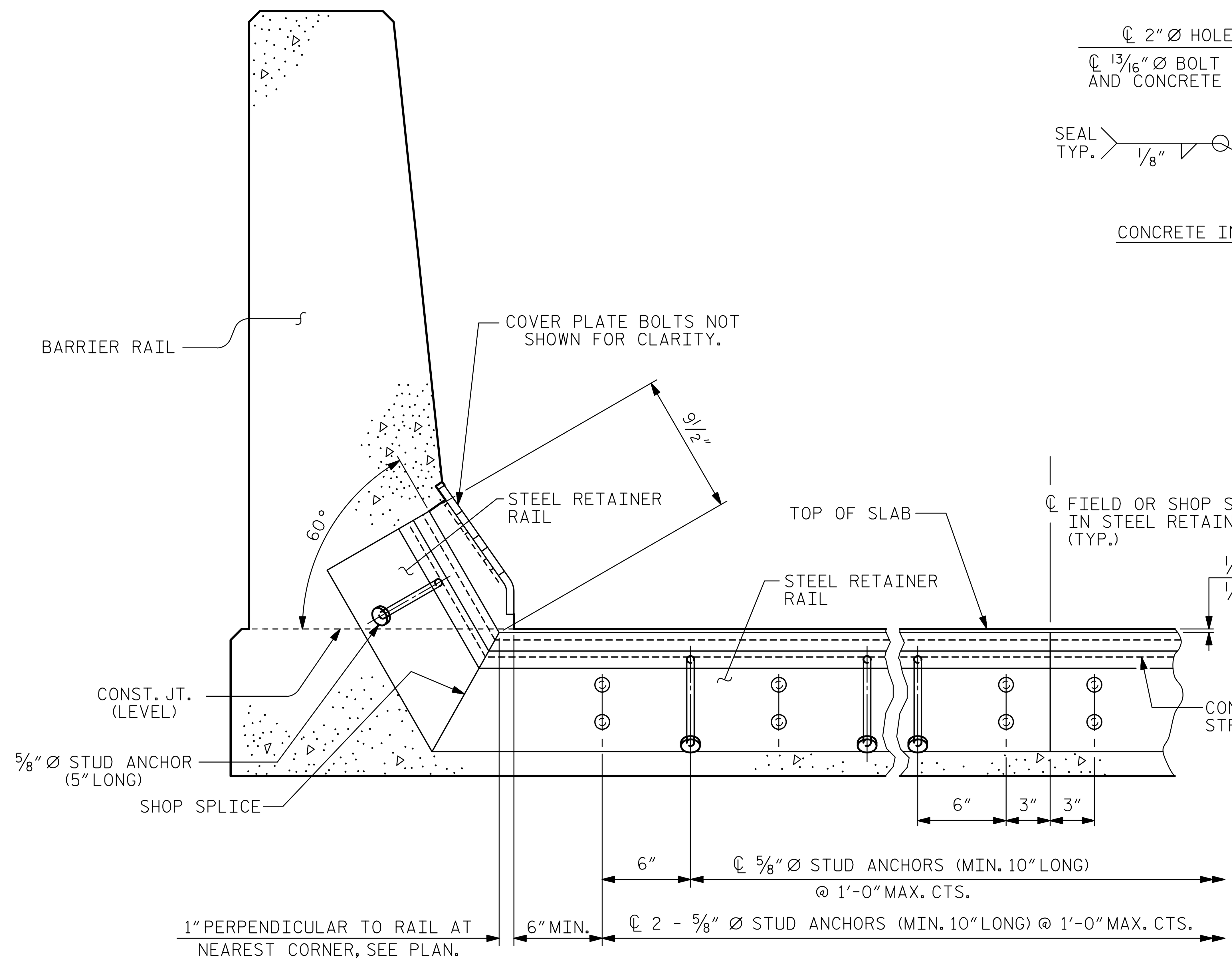
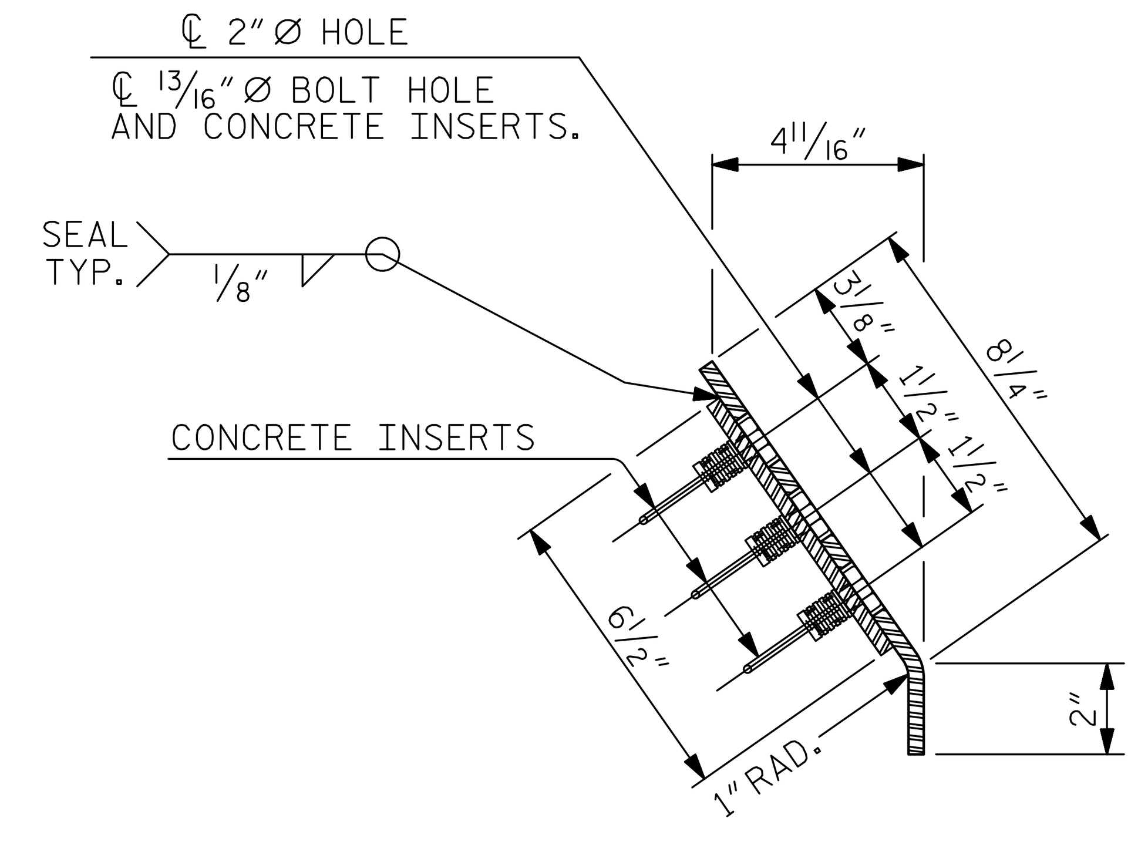
SHEET NO. S-26
TOTAL SHEETS 45

DRAWN BY : MAA 6/20
CHECKED BY : BNB 6/20

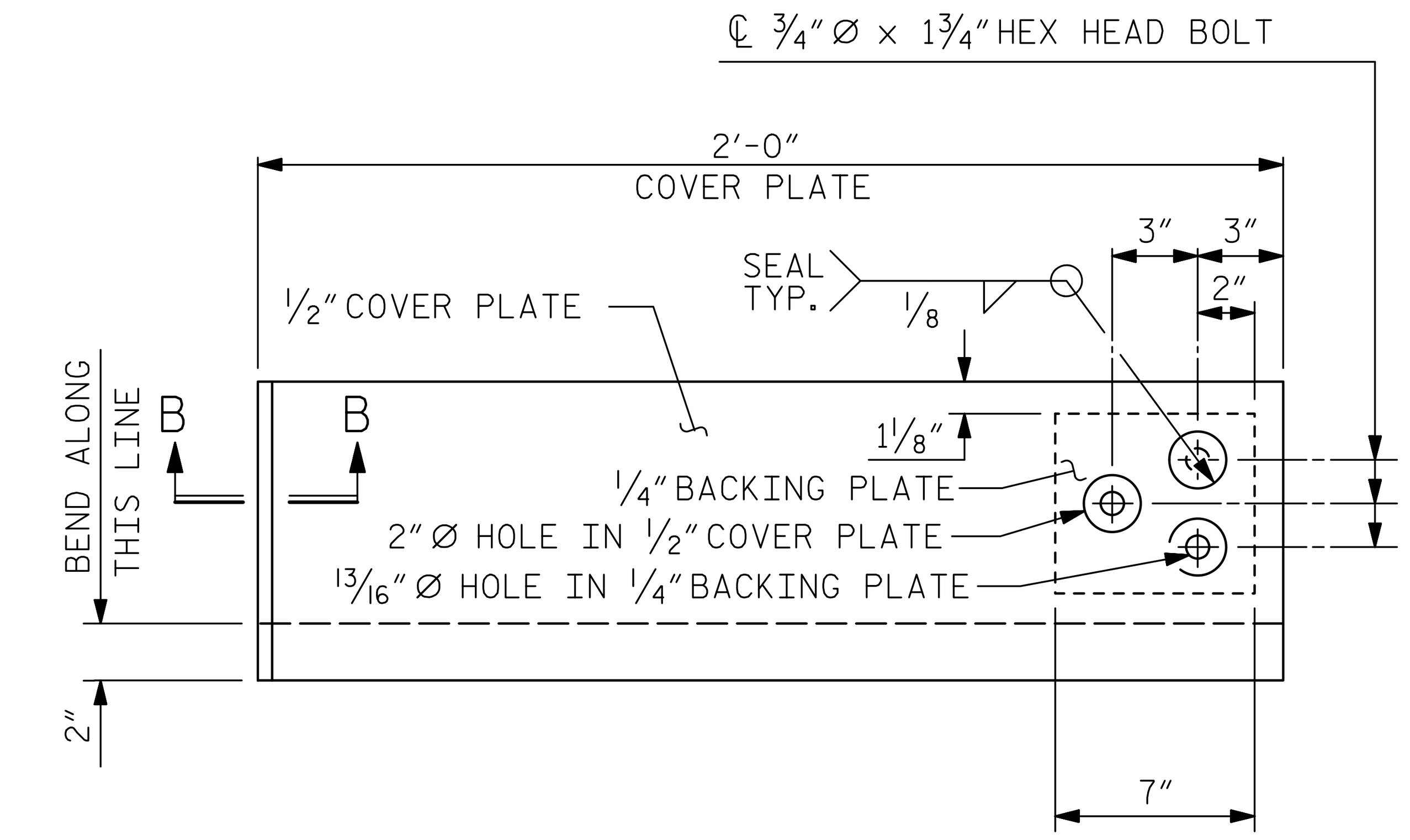
STD. NO. SSEJ1



SECTION THRU RAIL NORMAL TO JOINT

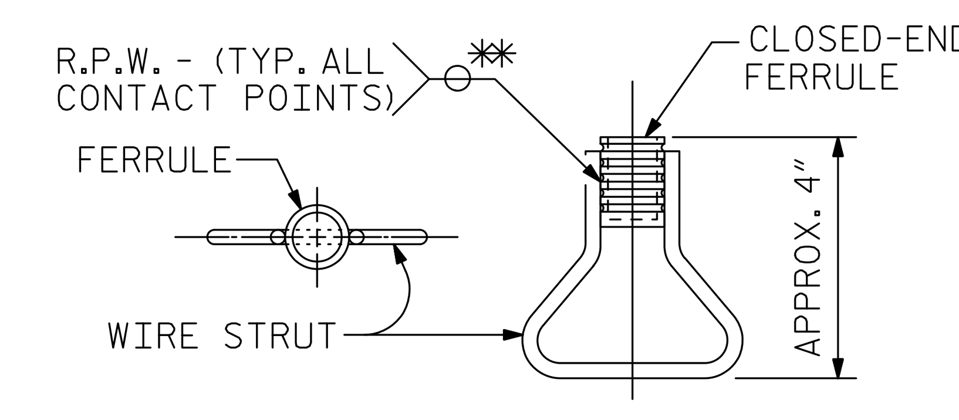


END VIEW



TYPE II - ELEVATION VIEW

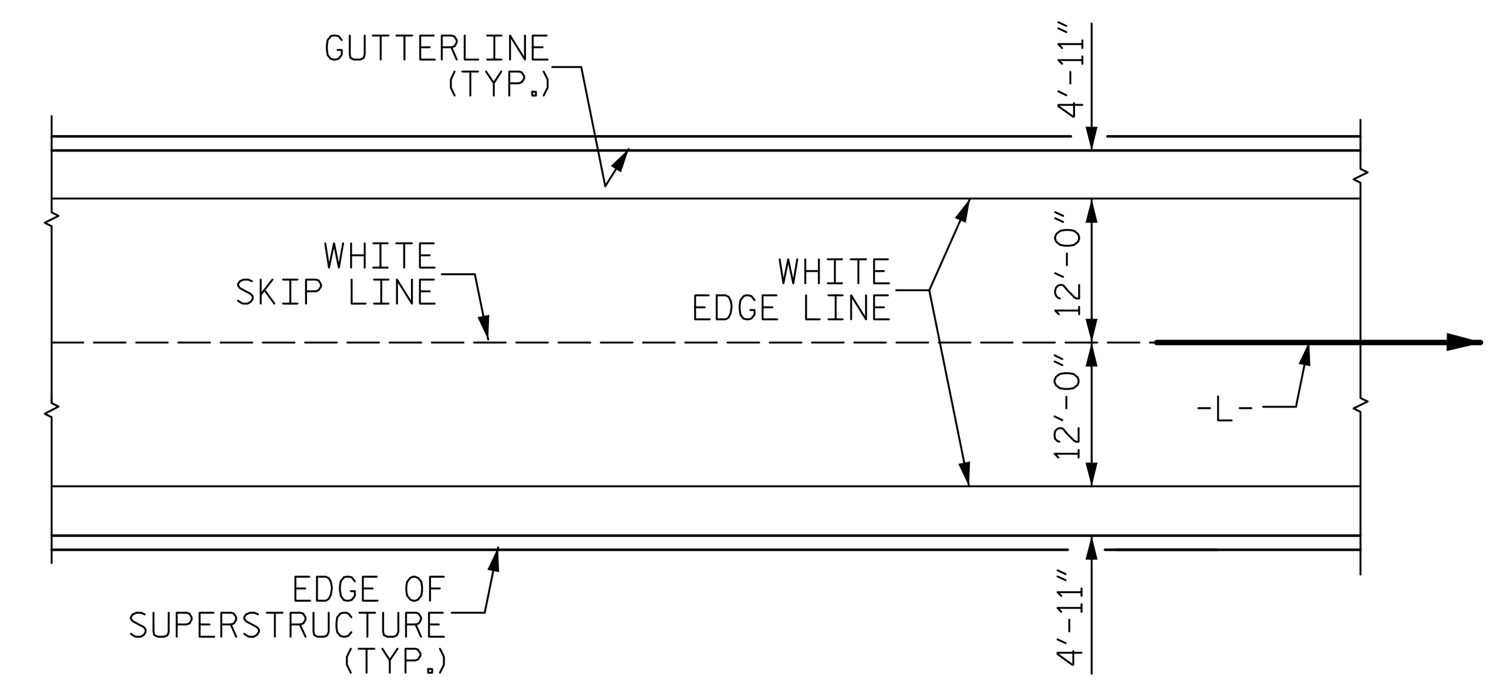
COVER PLATE DETAILS



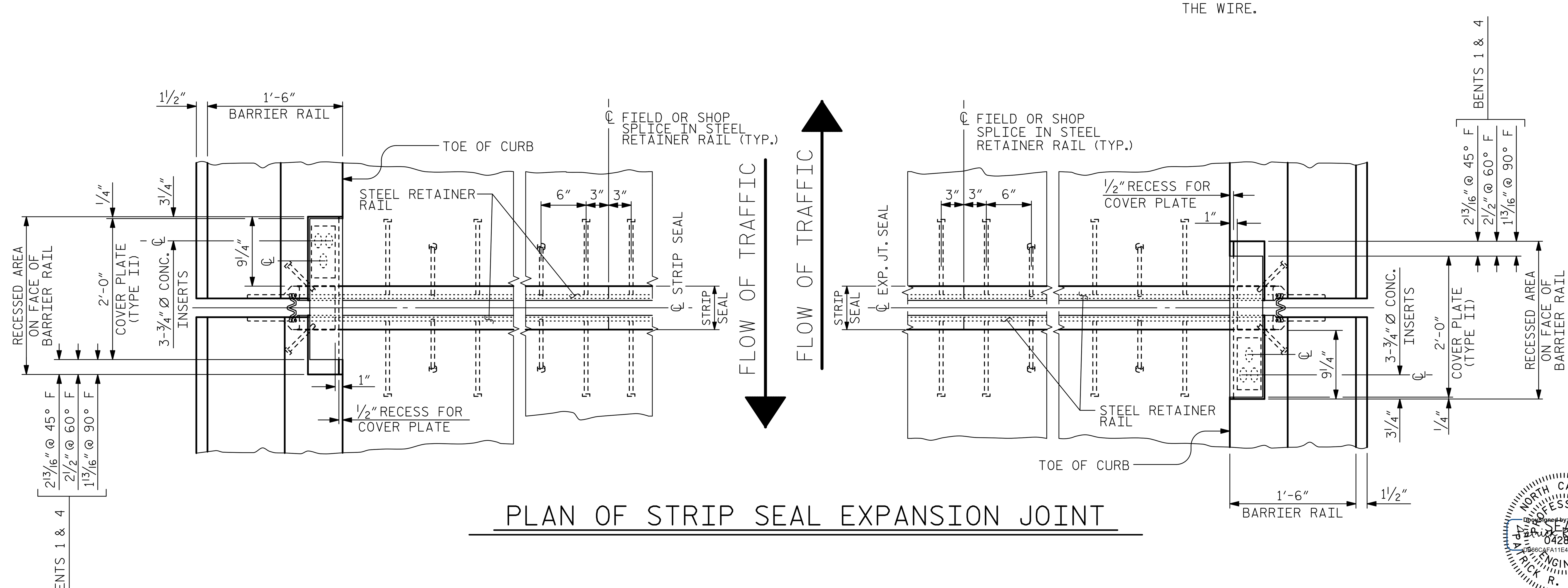
PLAN ELEVATION

CONCRETE INSERT

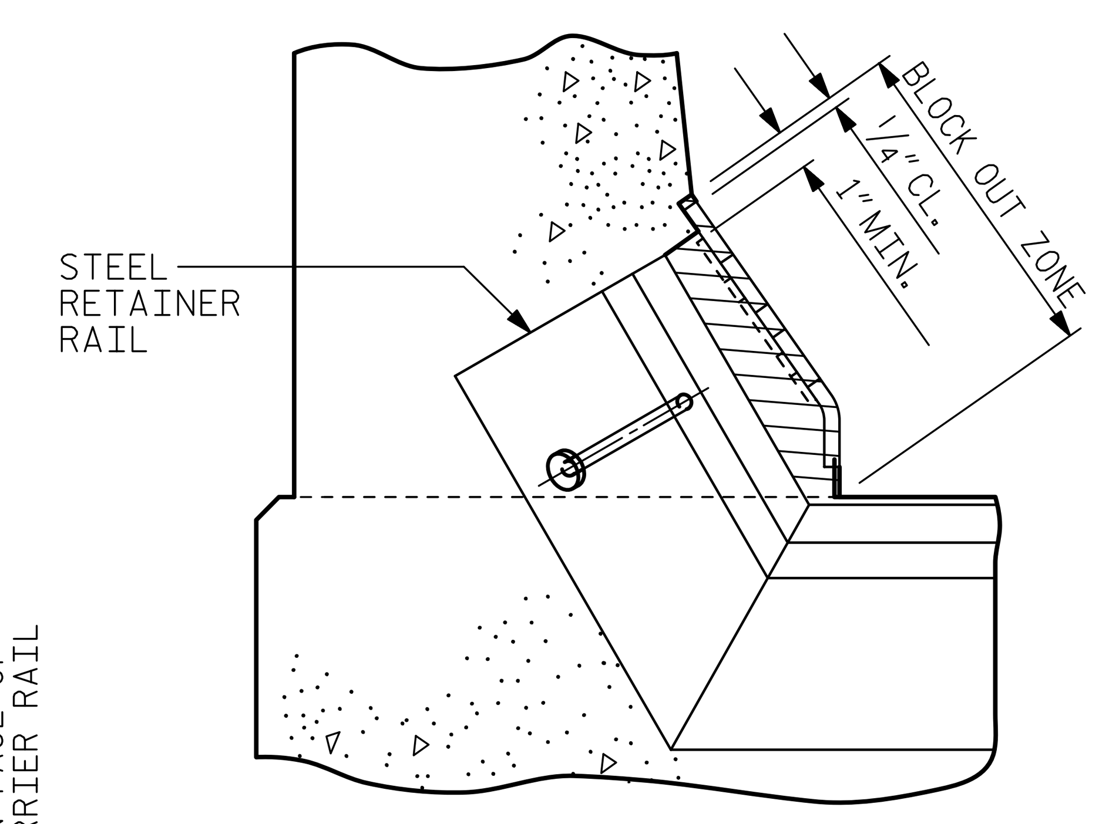
✱✱ EACH WELDED ATTACHMENT OF WIRE TO FERRULE SHALL DEVELOP THE TENSILE STRENGTH OF THE WIRE.



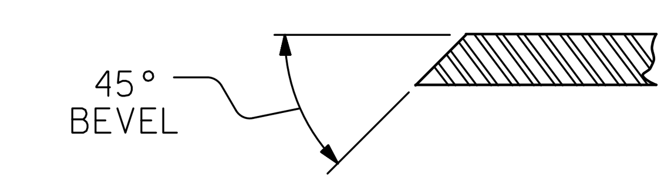
PAVEMENT MARKING ALIGNMENT



PLAN OF STRIP SEAL EXPANSION JOINT



BLOCK OUT DETAIL



SECTION B - B

PROJECT NO. B-4407

ANSON/STANLY COUNTY

STATION: 32+31.61 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

STRIP SEAL EXPANSION JOINT DETAILS FOR BARRIER RAIL

Vaughn & Melton Consulting Engineers
Asheville, North Carolina 828-253-2796
Raleigh, NC 919-977-9455 · Charlotte, NC 704-357-0488
Boone, NC 828-355-9933 · Tri-Cities, TN 423-467-8401 · Knoxville, TN 865-546-5800 · Spartanburg, SC 864-574-4775 · Charleston, SC 843-974-5650 · Middlesboro, KY 606-248-6600 · Atlanta, GA 770-627-3590

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 042890 PATRICK R. GALLAGHER 3/18/2021

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SHEET NO. S-27
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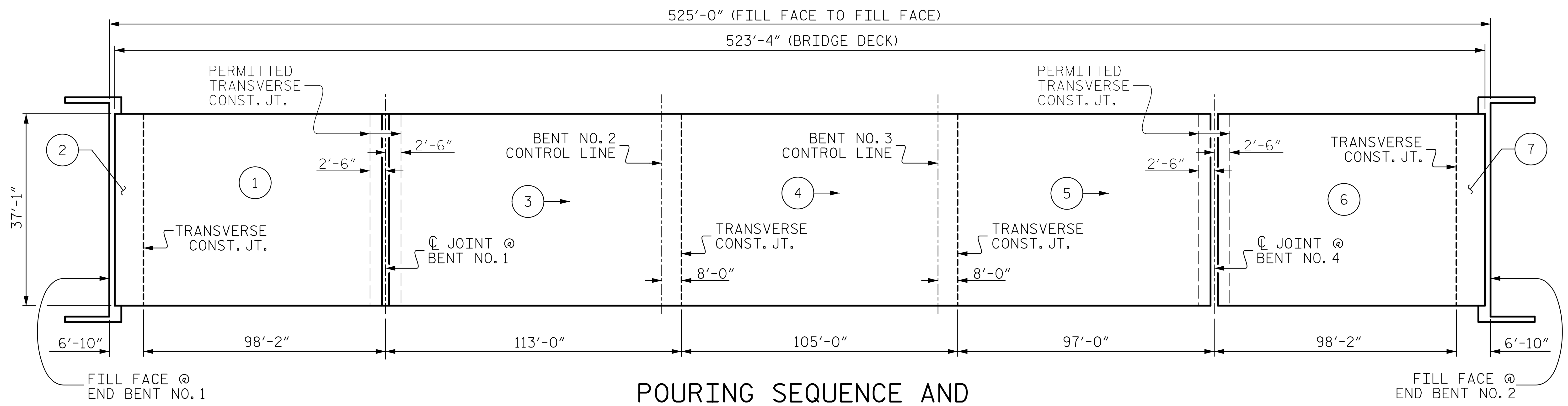
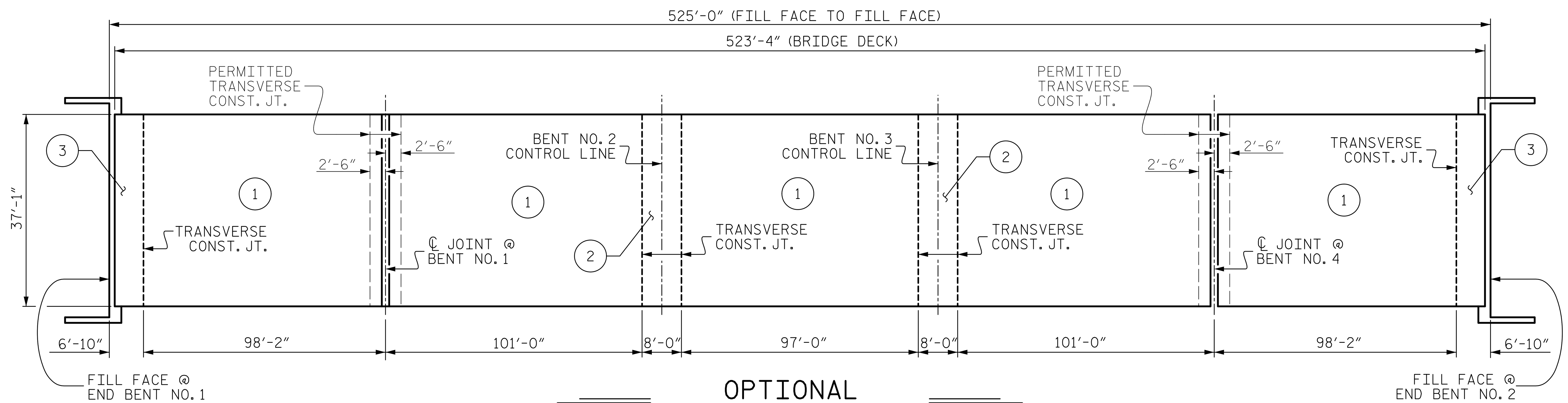
STD. NO. SSEJ2



POURING SEQUENCE AND LAYOUT FOR COMPUTING AREA OF REINFORCED CONCRETE DECK SLAB

(TOTAL = 19,469 SQ. FT.)



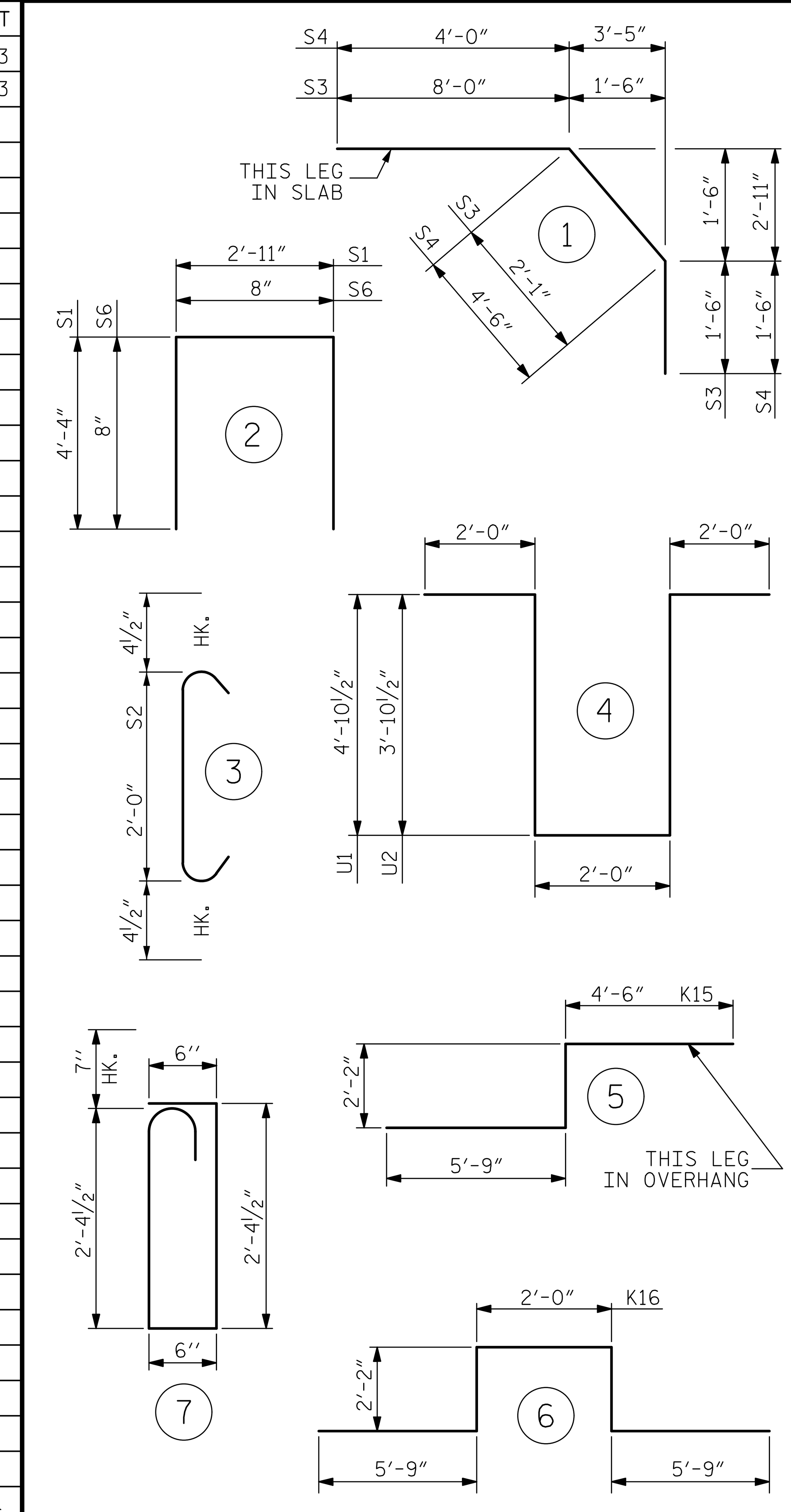
OPTIONAL POURING SEQUENCE

POURS ② AND ③ SHALL NOT BE STARTED UNTIL BOTH ADJACENT POUR ① REACH A MINIMUM OF 3000 PSI.

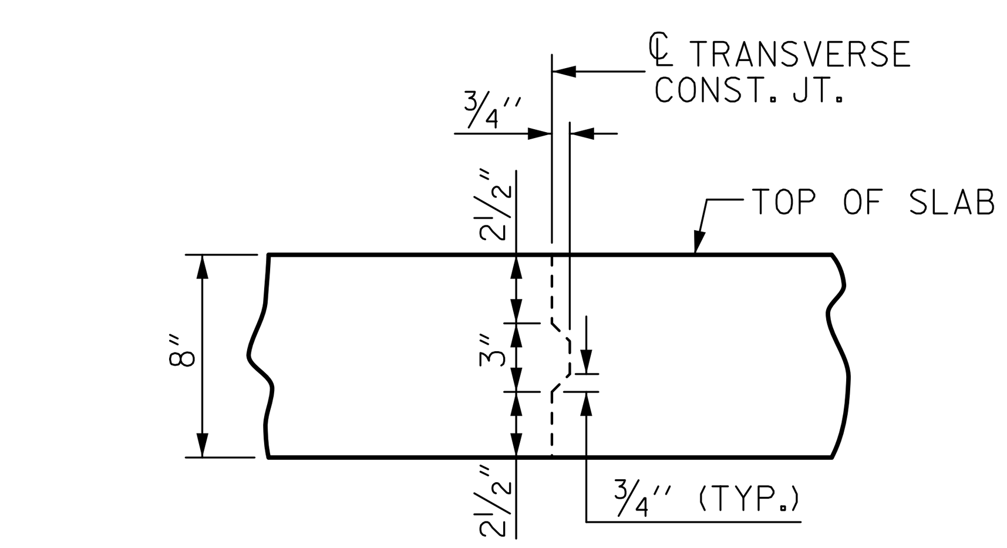
BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
∗ A1	1046	#5	STR	36'-9"	40,093
A2	1046	#5	STR	36'-9"	40,093
B1	176	#5	STR	52'-11"	9,714
∗ B2	198	#5	STR	20'-10"	4,302
∗ B3	162	#4	STR	29'-7"	3,201
B4	264	#5	STR	54'-2"	14,915
∗ B5	108	#4	STR	36'-4"	2,621
∗ B6	102	#5	STR	28'-6"	3,032
∗ B7	102	#5	STR	47'-0"	5,000
∗ B8	96	#5	STR	31'-6"	3,154
∗ B9	27	#4	STR	35'-10"	646
G1	4	#5	STR	36'-9"	224
K1	10	#4	STR	36'-9"	245
K2	8	#4	STR	4'-11"	26
K3	8	#4	STR	5'-11"	32
K4	16	#4	STR	6'-5"	69
K5	8	#4	STR	5'-5"	29
K6	4	#4	STR	2'-3"	6
K7	4	#4	STR	2'-9"	7
K8	8	#4	STR	3'-0"	16
K9	4	#4	STR	2'-6"	7
K10	16	#4	STR	3'-9"	40
K11	16	#4	STR	5'-11"	63
K12	32	#4	STR	6'-5"	137
K13	16	#4	STR	5'-5"	58
K14	10	#4	STR	29'-8"	198
K15	16	#8	5	12'-5"	530
K16	24	#8	6	17'-10"	1,143
S1	60	#4	2	11'-7"	464
S2	176	#4	3	2'-9"	323
∗ S3	60	#4	1	11'-7"	464
∗ S4	56	#4	1	10'-0"	374
∗ S5	96	#5	7	6'-4"	634
∗ S6	96	#4	2	2'-0"	128
U1	32	#4	4	15'-9"	337
U2	16	#4	4	13'-9"	147
REINFORCING STEEL					68,823 LBS.
∗ EPOXY COATED REINF. STEEL					63,649 LBS.

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT



TRANSVERSE CONSTRUCTION JOINT DETAIL

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

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
	EPOXY COATED	UNCOATED	EPOXY COATED	UNCOATED	
#4	1'-11"	1'-7"	1'-11"	1'-7"	2'-6"
#5	2'-5"	2'-0"	2'-5"	2'-0"	3'-1"
#6	2'-10"	2'-5"	3'-7"	2'-5"	3'-8"
#7	4'-2"	2'-9"			
#8	4'-9"	3'-2"			

SUPERSTRUCTURE BILL OF MATERIAL

	CLASS AA CONCRETE	REINFORCING STEEL	EPOXY COATED REINFORCING STEEL
	(CU. YDS.)	(LBS.)	(LBS.)
POUR 1	109.8	——	——
POUR 2	24.7	——	——
POUR 3	137.5	——	——
POUR 4	126.8	——	——
POUR 5	108.6	——	——
POUR 6	109.8	——	——
POUR 7	24.7	——	——
TOTALS∗∗	641.9	68,823	63,649

∗∗ QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED

GROOVING BRIDGE FLOORS

APPROACH SLABS	1,491	SQ.FT.
BRIDGE DECK	16,095	SQ.FT.
TOTAL	17,586	SQ.FT.

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 042890 PATRICK R. GALLAGHER
3/18/2021

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PROJECT NO. B-4407
ANSON/STANLY COUNTY
STATION: 32+31.61 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
SUPERSTRUCTURE BILL OF MATERIAL

DRAWN BY :	JMB	5/87	REV. 10/1/11	MAA/GM
CHECKED BY :	SJD	9/87	REV. 12/17	MAA/THC
			REV. 06/19	BNB/THC

DWN. BY: WDC DATE: 10/2020
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SHEET NO. S-28
TOTAL SHEETS 45

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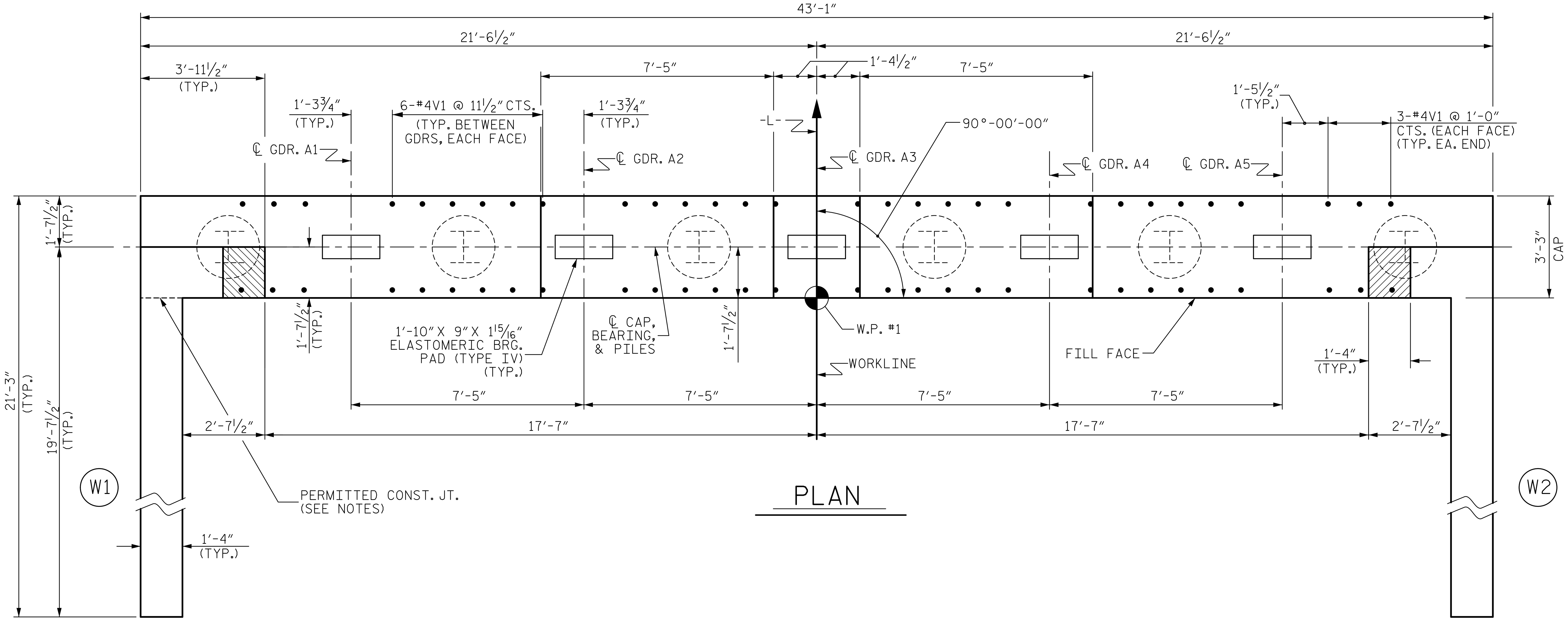

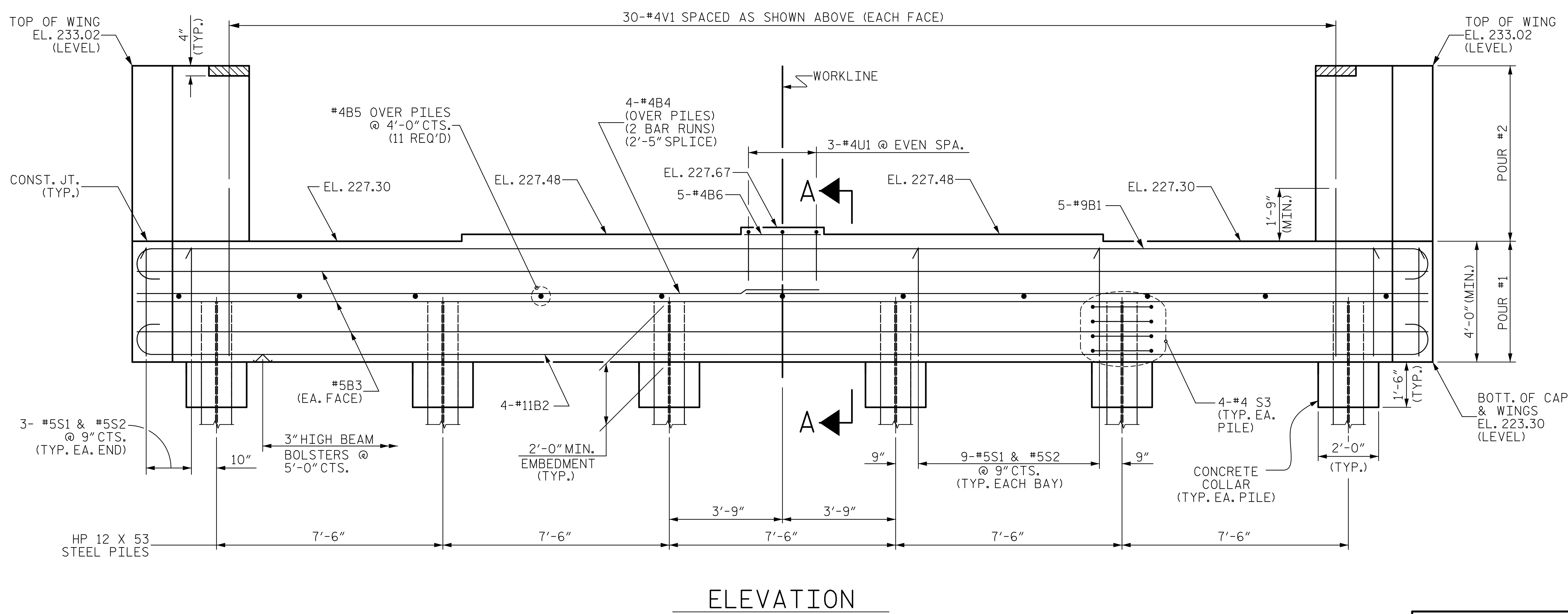

NOTES

THE TOP SURFACE OF THE END BENT CAP, EXCEPT THE BEARING AREA, SHALL BE RAKED TO A DEPTH OF ¼".

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

FOR SECTION A-A, SEE SHEET 5 OF 6.

AT THE CONTRACTOR'S OPTION, THE WINGWALL MAY BE BUILT USING STAGED CONSTRUCTION WITH MECHANICAL COUPLERS. NO ADDITIONAL COMPENSATION WILL BE MADE FOR THE PERMITTED CONSTRUCTION JOINT INCLUDING ADDITIONAL WORK FOR THE REINFORCED FILL.

IF STAGED CONSTRUCTION OF THE WINGWALL IS USED, PORTABLE CONCRETE BARRIER MAY BE REQUIRED IF ROOM DOES NOT ALLOW FOR DRIVING OF THE GUARDRAIL POSTS. FOR PORTABLE CONCRETE BARRIER PAY ITEM, SEE ROADWAY PLANS.

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 042890 PATRICK R. GALLAGHER 3/18/2021

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PROJECT NO. B-4407
ANSON/STANLY COUNTY
STATION: 32+31.61 -L-

SHEET 1 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
END BENT NO. 1

DWN. BY: AW	DATE: 10/2020
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DES. EGR. OF RECORD: PRG	DATE: 10/2020

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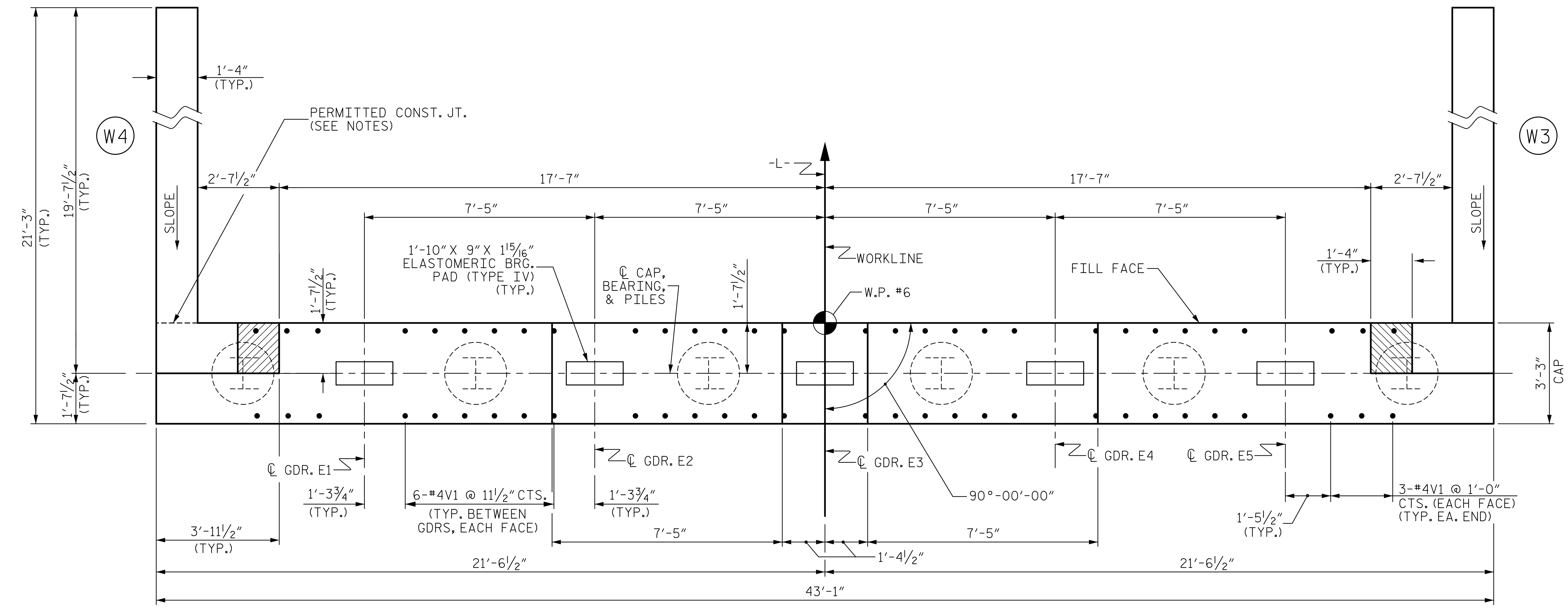
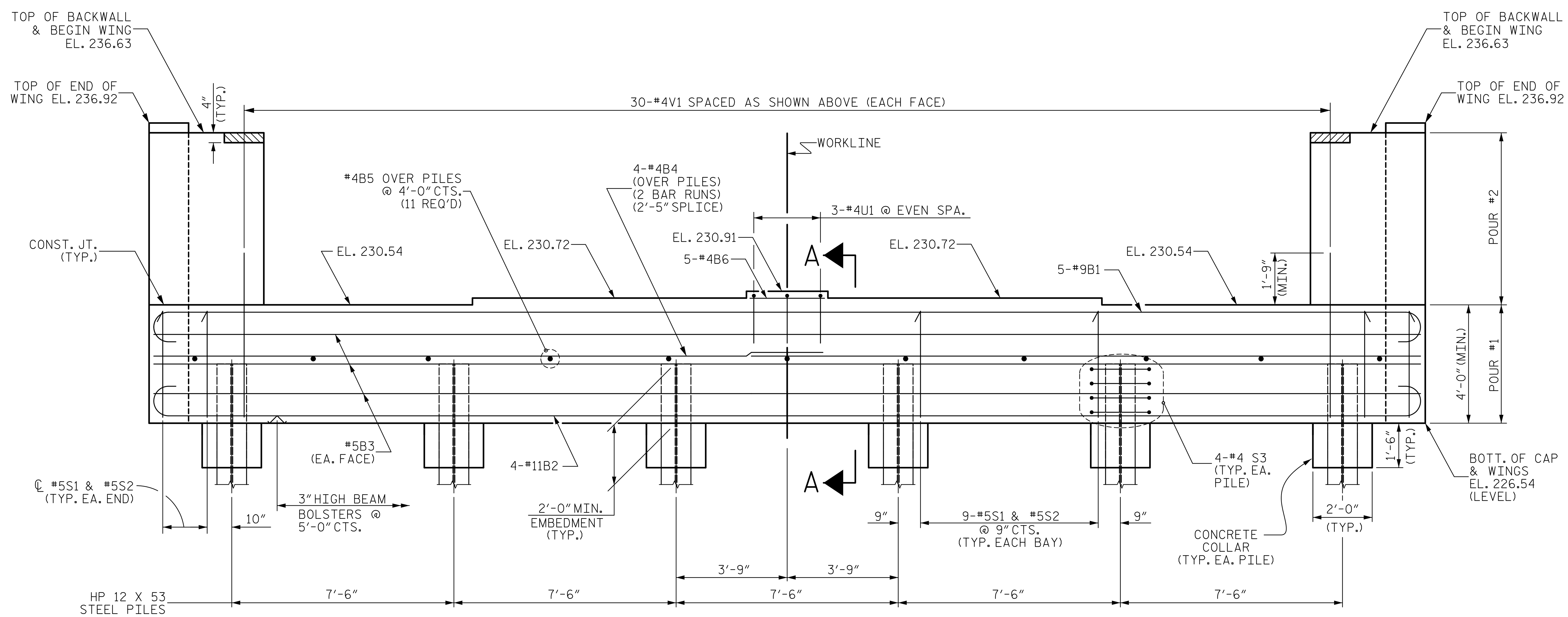


PLAN



ELEVATION

NOTES

THE TOP SURFACE OF THE END BENT CAP, EXCEPT THE BEARING AREA, SHALL BE RAKED TO A DEPTH OF ¼".

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

FOR SECTION A-A, SEE SHEET 5 OF 6.

AT THE CONTRACTOR'S OPTION, THE WINGWALL MAY BE BUILT USING STAGED CONSTRUCTION WITH MECHANICAL COUPLERS. NO ADDITIONAL COMPENSATION WILL BE MADE FOR THE PERMITTED CONSTRUCTION JOINT INCLUDING ADDITIONAL WORK FOR THE REINFORCED FILL.

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 042890 PATRICK R. GALLAGHER
3/18/2021

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PROJECT NO. B-4407
ANSON/STANLY COUNTY
STATION: 32+31.61 -L-

SHEET 2 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
END BENT NO. 2

DWN. BY: AW	DATE: 10/2020
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DES. EGR. OF RECORD: PRG	DATE: 10/2020

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NO.	BY:	DATE:	NO.	BY:	DATE:
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2			4		

SHEET NO. S-30
TOTAL SHEETS 45

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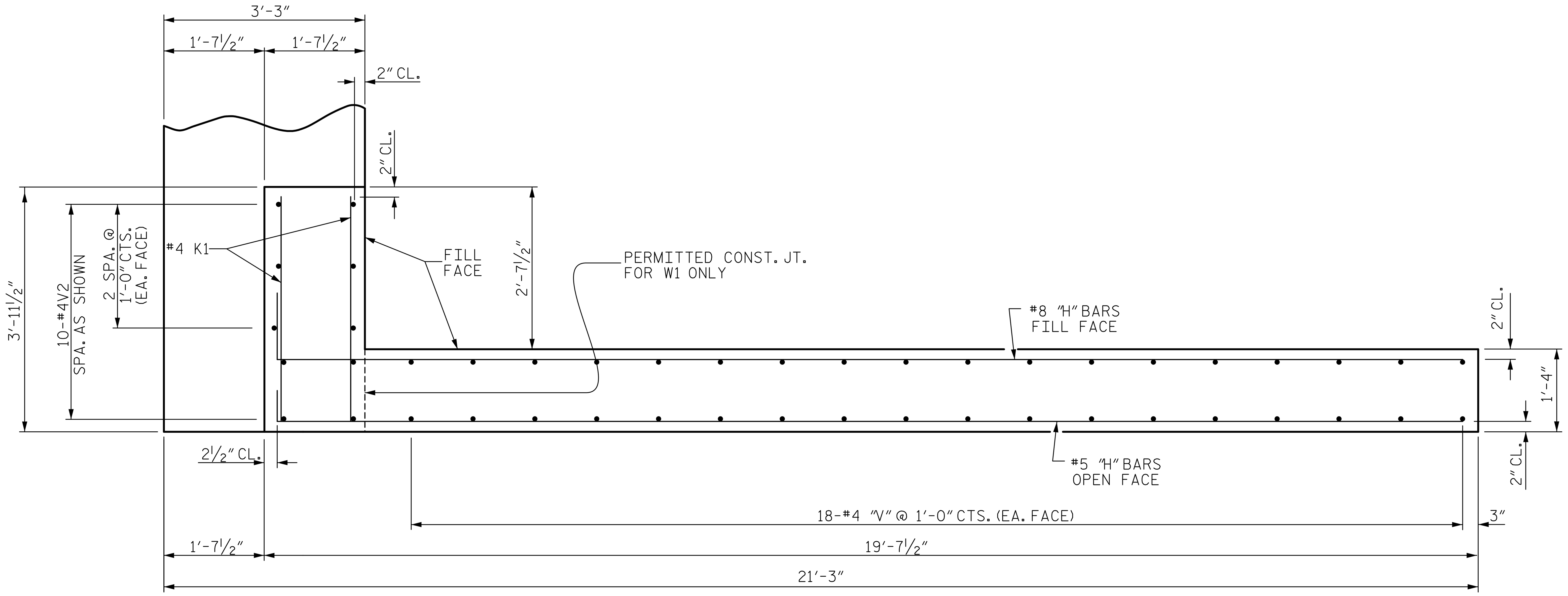
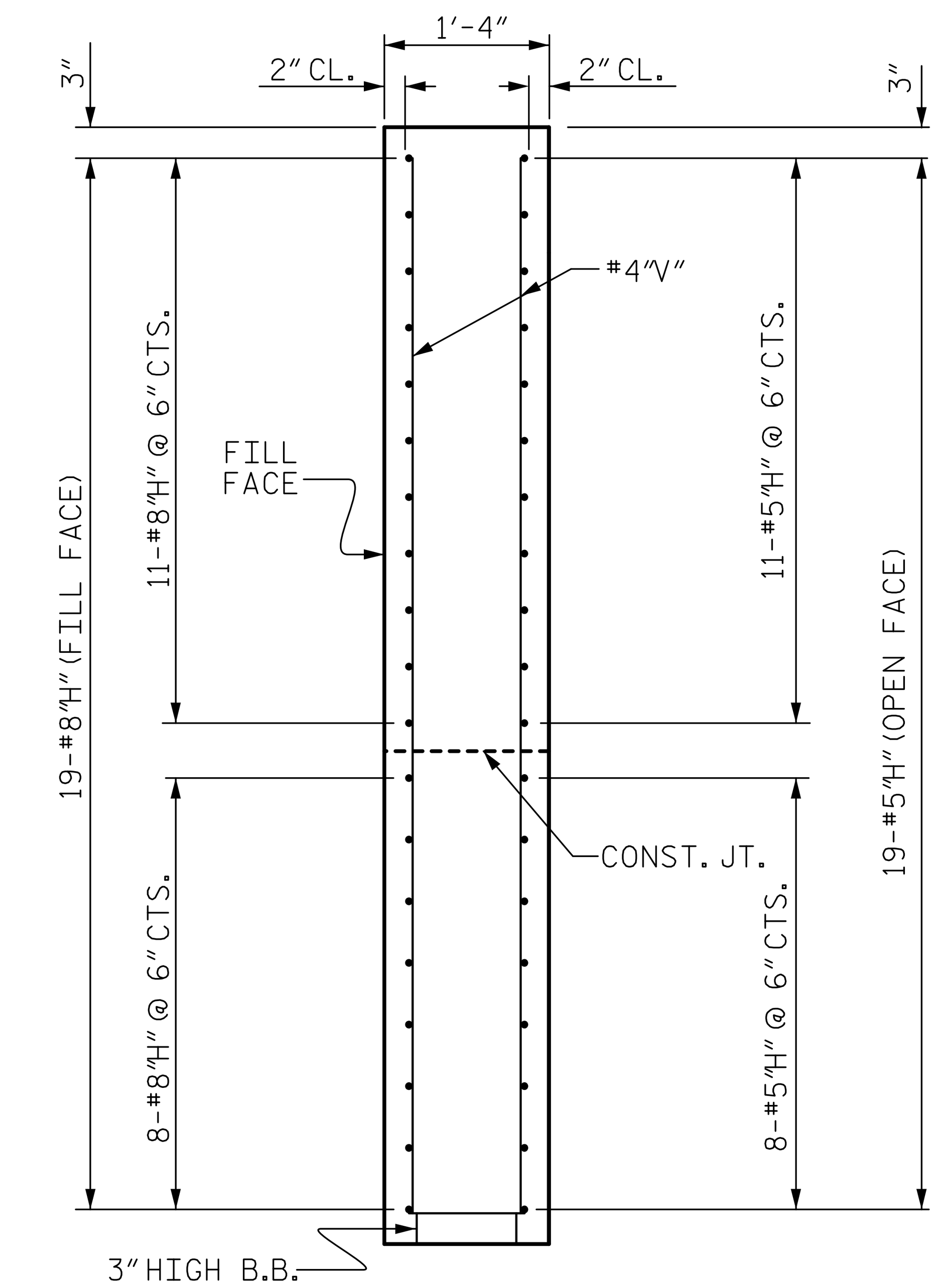
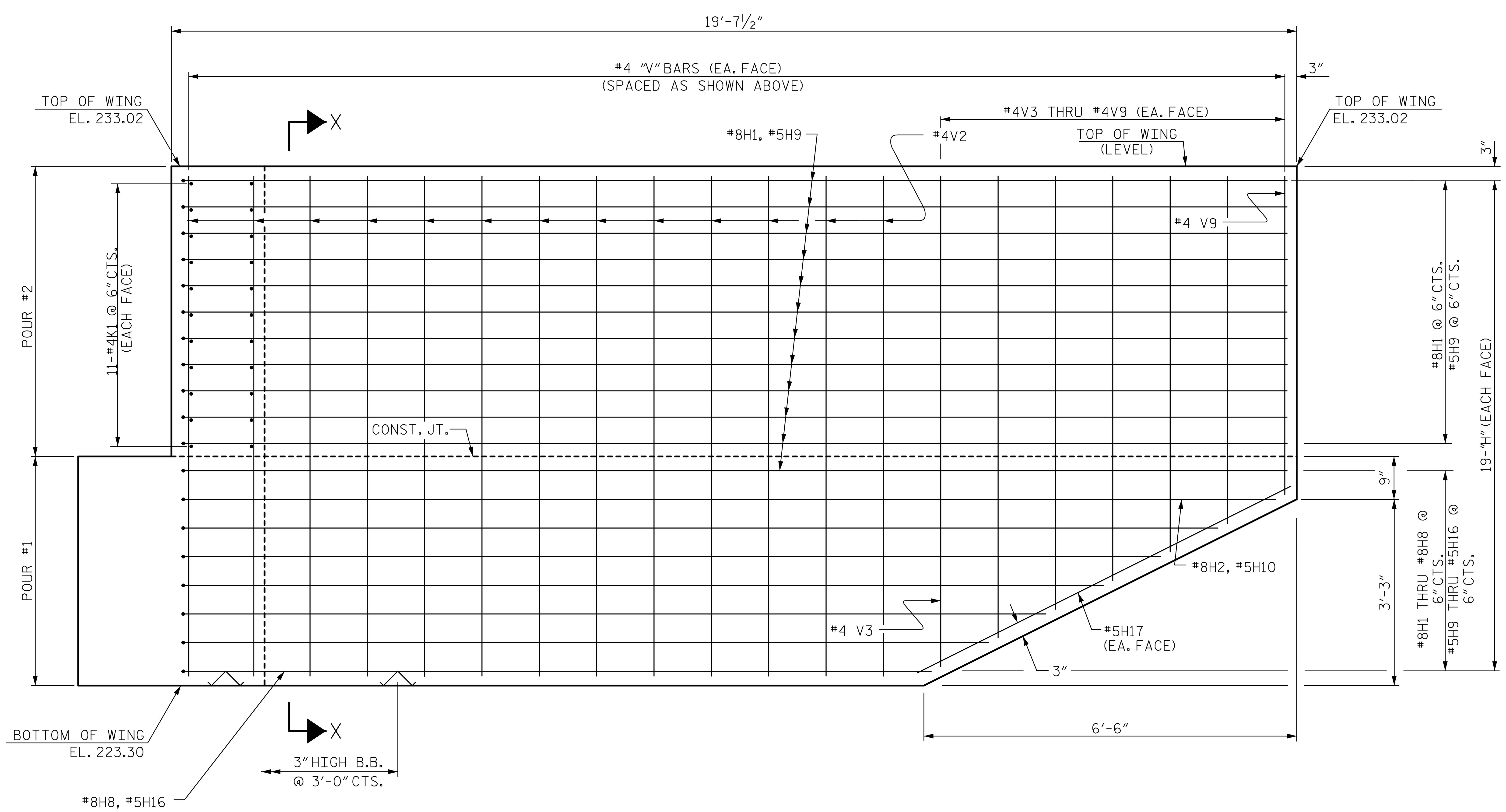


PLAN OF WING (W1)

(WING (W2) SIMILAR)

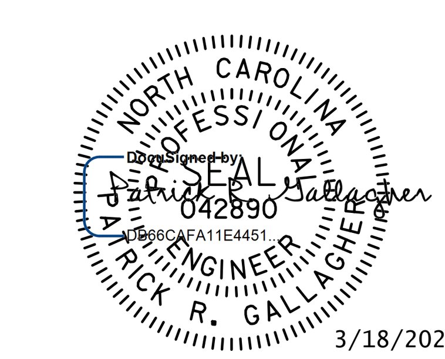


SECTION X-X



ELEVATION OF WING (W1)

(WING (W2) SIMILAR)



DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Vaughn & Melton
Consulting Engineers
Asheville, North Carolina 828-253-2796
Raleigh, NC 919-977-9455
Charlotte, NC 704-357-0488
Boone, NC 828-355-9933
Tri-Cities, TN 423-467-8401
Knoxville, TN 865-546-5800
Spartanburg, SC 864-574-4775
Charleston, SC 843-974-5650
Middlesboro, KY 606-248-6600
Atlanta, GA 770-627-3590

PROJECT NO. B-4407

ANSON/STANLY COUNTY

STATION: 32+31.61 -L-

SHEET 3 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT NO. 1
WING DETAILS

DWN. BY: AW	DATE: 10/2020
CHKD. BY: RTS	DATE: 10/2020
DES. EGR. OF RECORD: PRG	DATE: 10/2020

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

SHEET NO. S-31

TOTAL SHEETS 45

wtdraftvar
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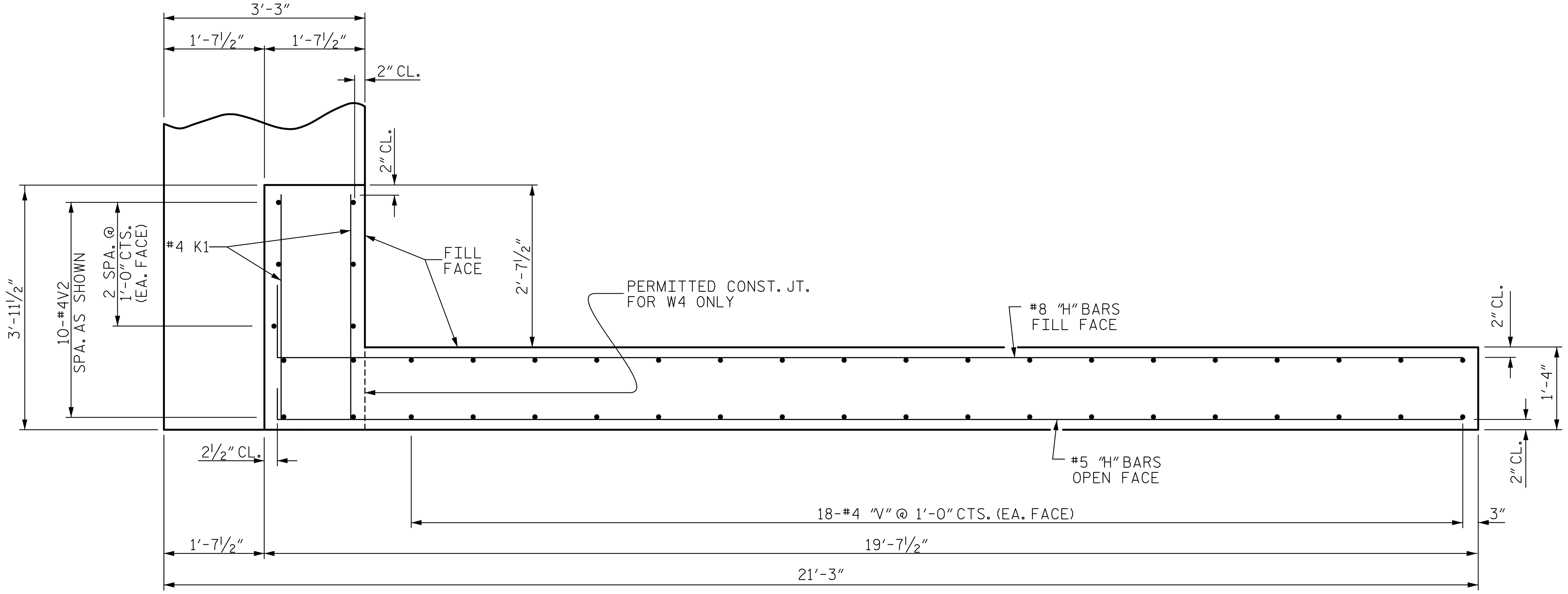
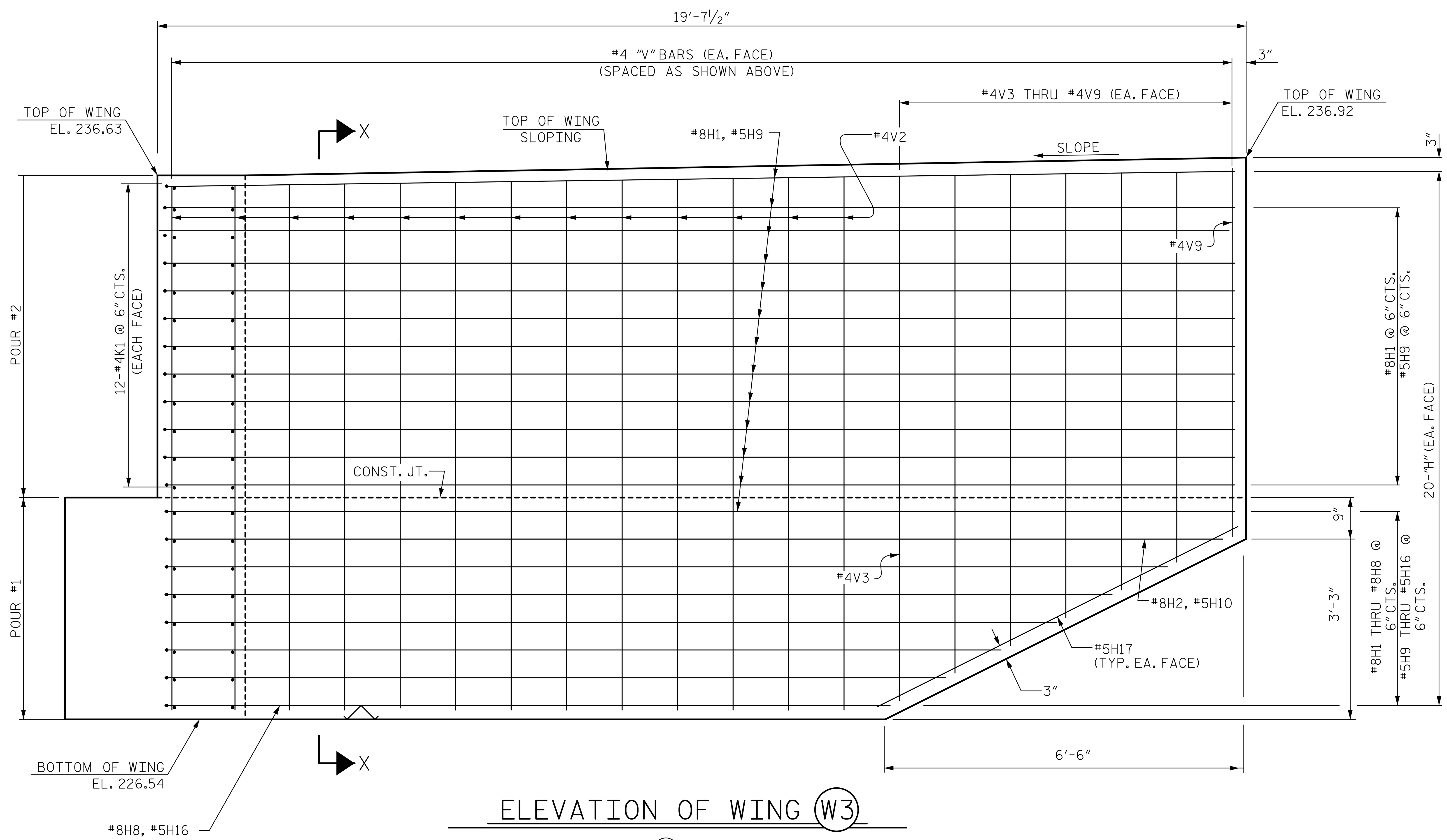
TIME: 11:28 AM on Monday, February 22, 2021



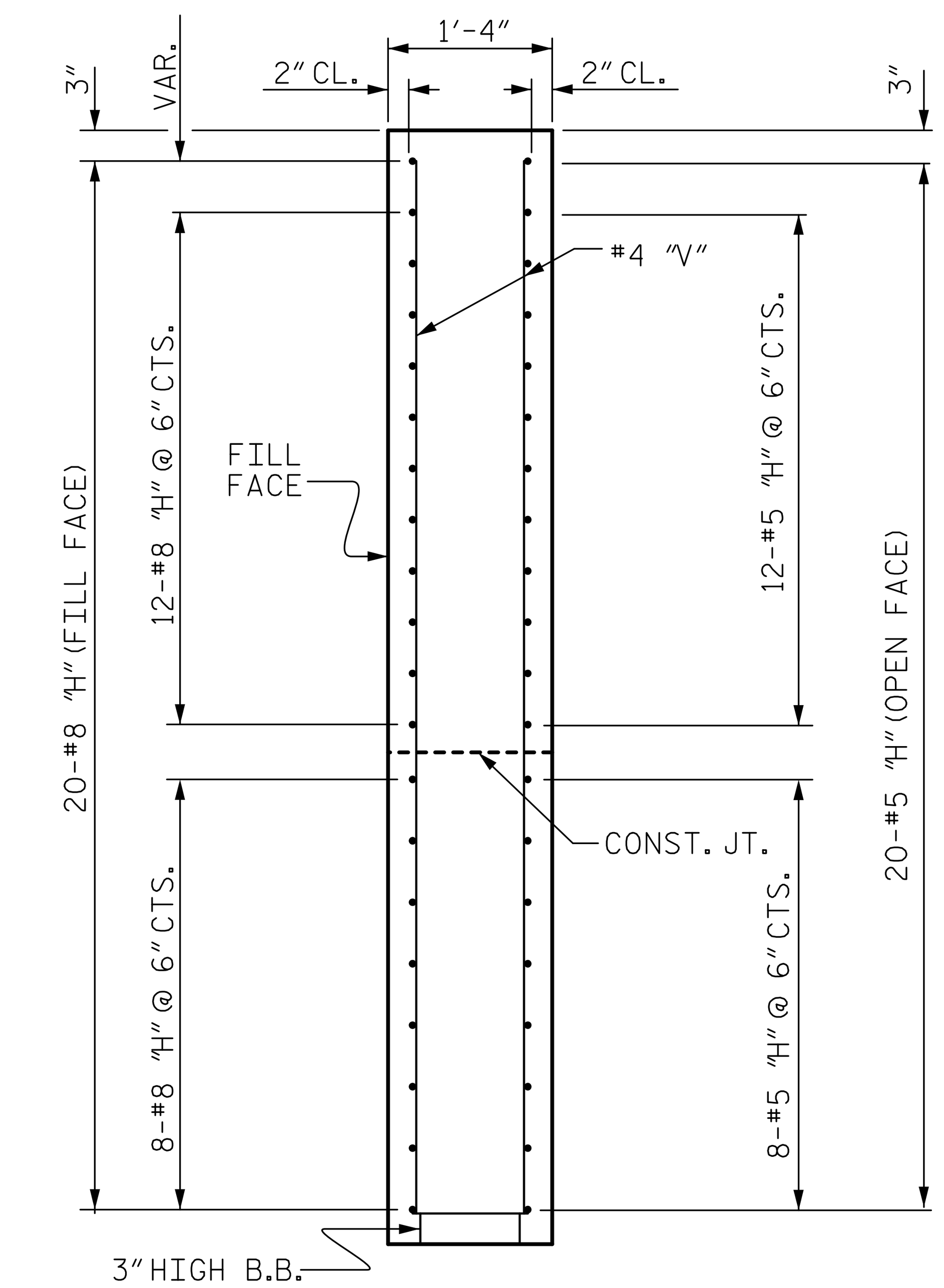
PLAN OF WING W3

(WING W4 SIMILAR)



ELEVATION OF WING W3

(WING W4 SIMILAR)



SECTION X-X

3/18/2021

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Vaughn & Melton
Consulting Engineers
Asheville, North Carolina 828-253-2796
Raleigh, NC 919-977-9455
Charlotte, NC 704-357-0488
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Tri-Cities, TN 423-467-8401
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PROJECT NO. B-4407

ANSON/STANLY COUNTY

STATION: 32+31.61 -L-

SHEET 4 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT NO. 2
WING DETAILS

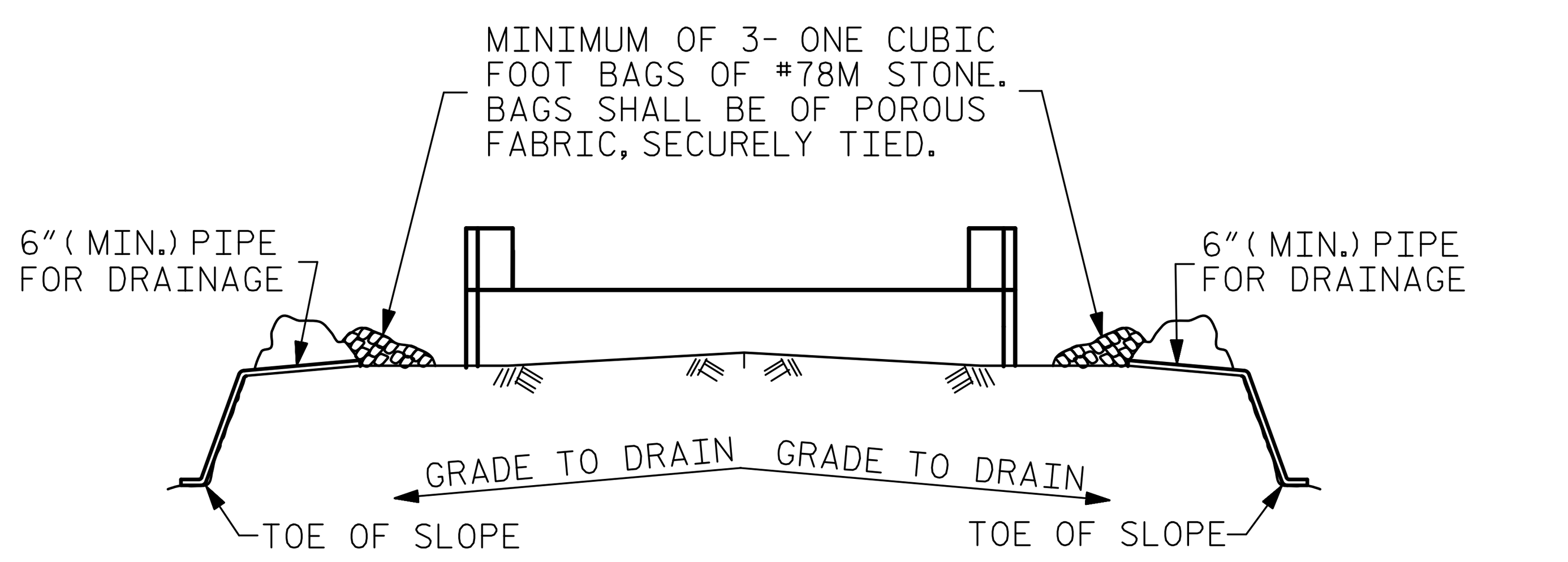
DWN. BY: AW	DATE: 10/2020
CHKD. BY: RTS	DATE: 10/2020
DES. EGR. OF RECORD: PRG	DATE: 10/2020

REVISIONS

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

SHEET NO. S-32

TOTAL SHEETS 45

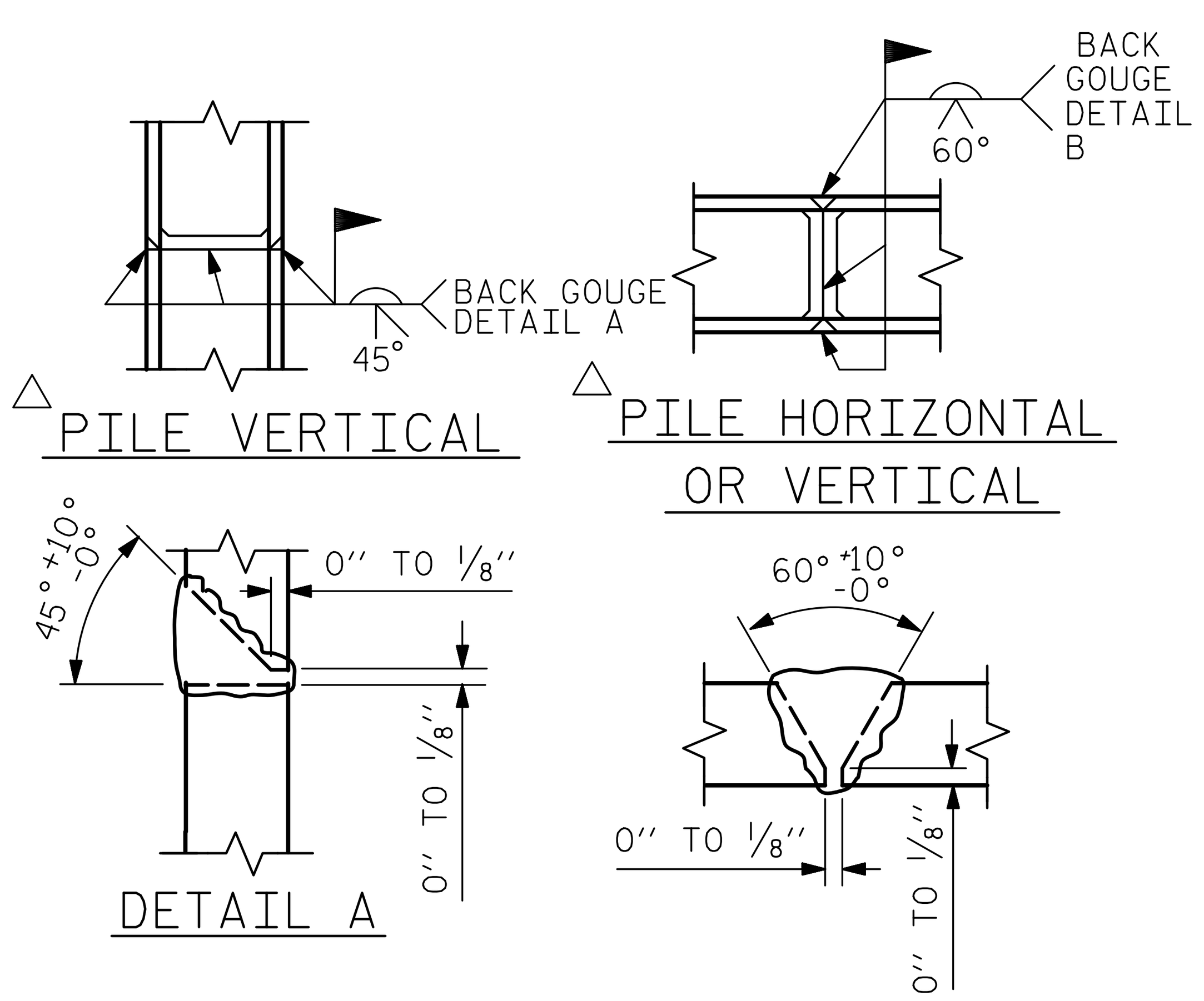


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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

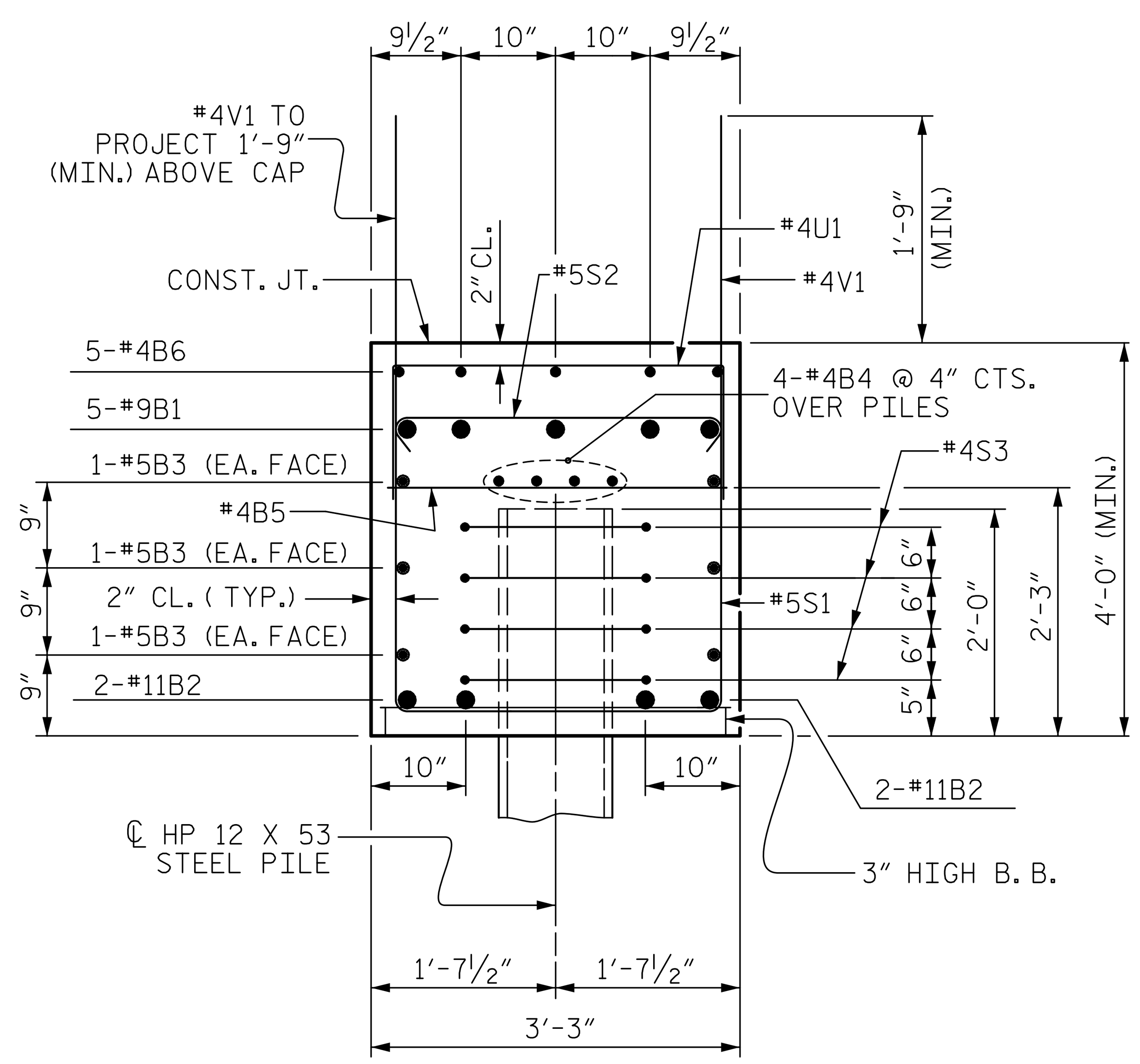
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

TEMPORARY DRAINAGE AT END BENT



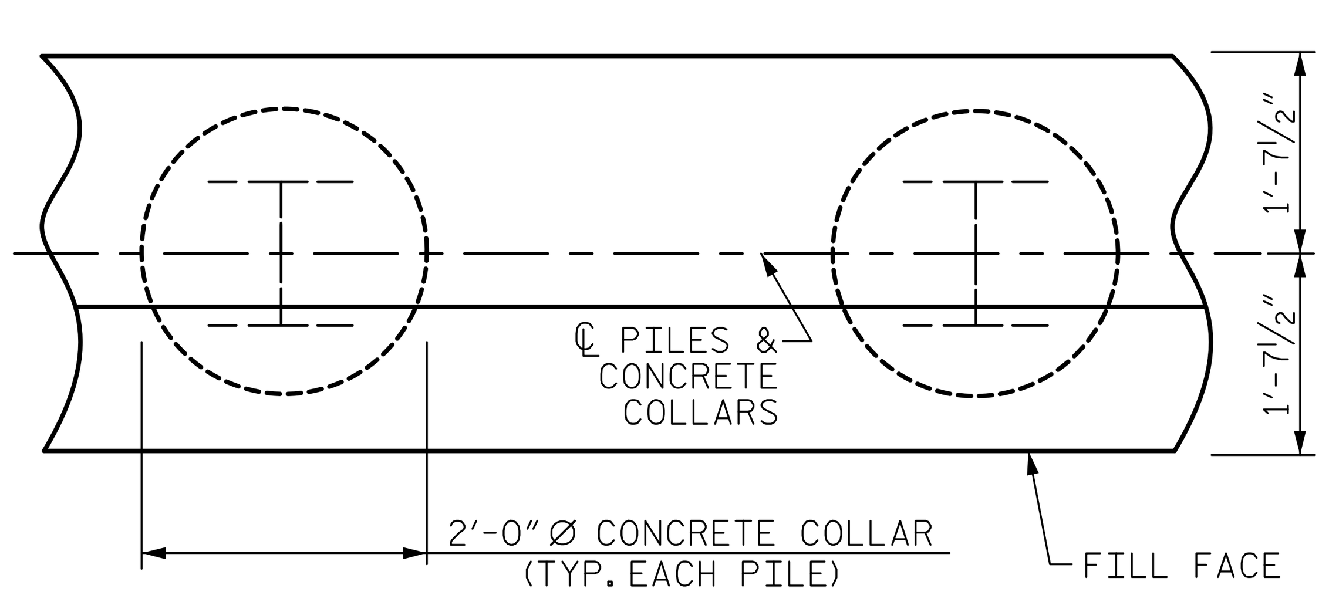
△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS

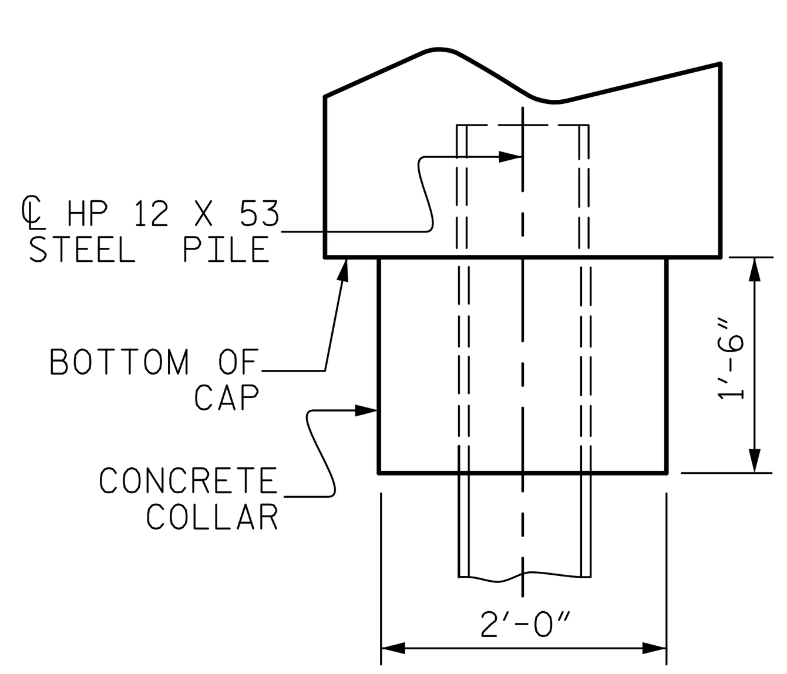


SECTION A-A

(PILE COLLAR NOT SHOWN FOR CLARITY)



PLAN



ELEVATION

CORROSION PROTECTION FOR STEEL PILES DETAIL

PROJECT NO. B-4407

ANSON/STANLY COUNTY

STATION: 32+31.61 -L-

SHEET 5 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT DETAILS

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 042890 PATRICK R. GALLAGHER
3/18/2021

V&M Vaughn & Melton Consulting Engineers
Asheville, North Carolina 828-253-2796
Raleigh, NC 919-977-9455
Charlotte, NC 704-357-0488
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Atlanta, GA 770-627-3590

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DES. EGR. OF RECORD: PRG	DATE: 10/2020

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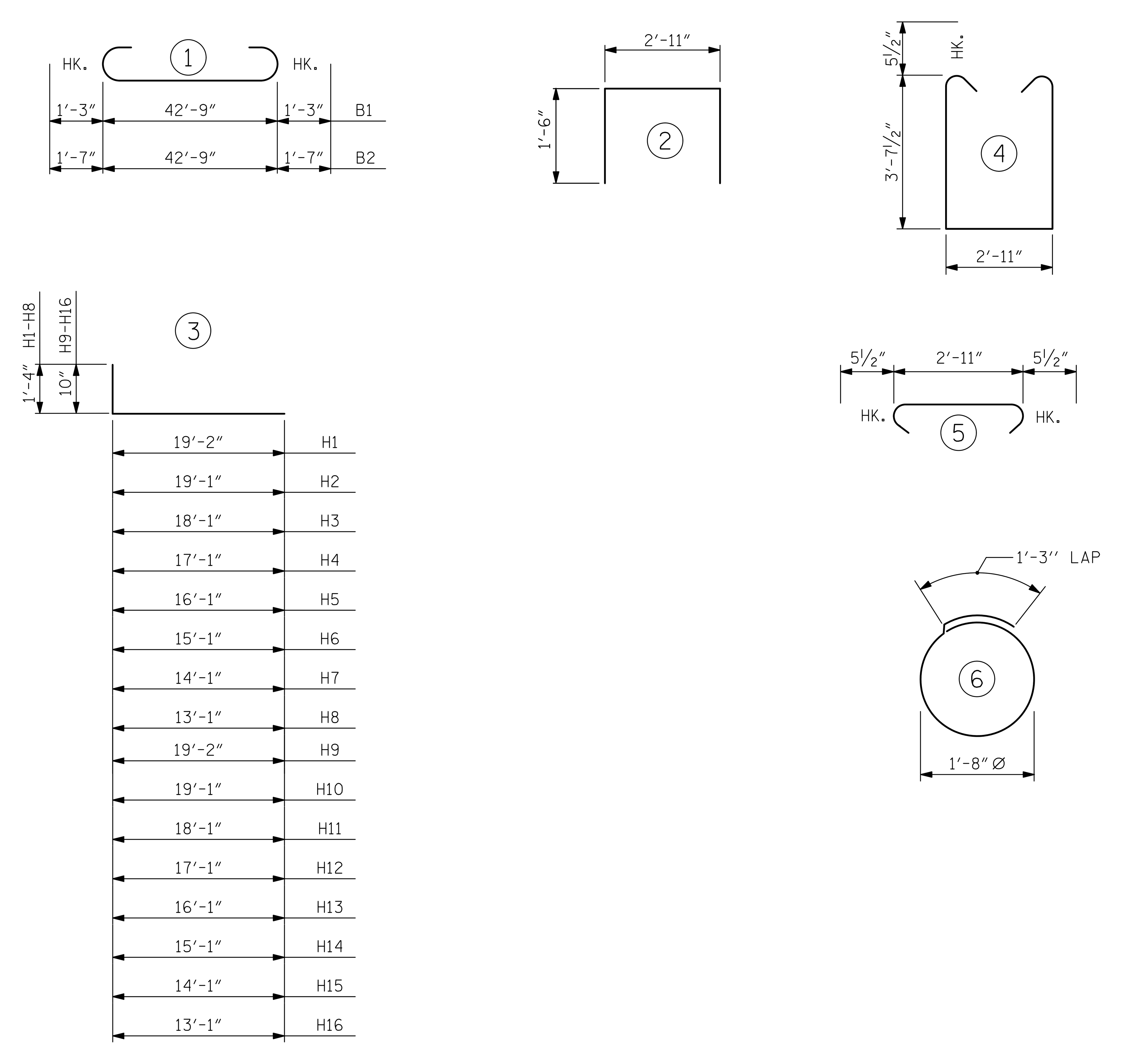
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

SHEET NO. S-33

TOTAL SHEETS 45

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

END BENT NO. 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	5	#9	1	45'-3"	769	K1	44	#4	STR	3'-7"	105
B2	4	#11	1	45'-11"	976						
B3	6	#5	STR	42'-9"	268	S1	51	#5	4	11'-1"	590
B4	8	#4	STR	22'-7"	121	S2	51	#5	5	3'-10"	204
B5	11	#4	STR	2'-11"	21	S3	24	#4	6	6'-6"	104
B6	5	#4	STR	2'-5"	8						
						U1	3	#4	2	5'-11"	12
H1	24	#8	3	20'-6"	1,314	V1	60	#4	STR	6'-2"	247
H2	2	#8	3	20'-5"	109	V2	64	#4	STR	9'-3"	296
H3	2	#8	3	19'-5"	104	V3	4	#4	STR	9'-0"	24
H4	2	#8	3	18'-5"	98	V4	4	#4	STR	8'-6"	23
H5	2	#8	3	17'-5"	93	V5	4	#4	STR	8'-0"	21
H6	2	#8	3	16'-5"	88	V6	4	#4	STR	7'-6"	20
H7	2	#8	3	15'-5"	82	V7	4	#4	STR	7'-0"	19
H8	2	#8	3	14'-5"	77	V8	4	#4	STR	6'-6"	17
H9	24	#5	3	20'-0"	501	V9	4	#4	STR	6'-0"	16
H10	2	#5	3	19'-11"	41						
H11	2	#5	3	18'-11"	39						
H12	2	#5	3	17'-11"	37						
H13	2	#5	3	16'-11"	35						
H14	2	#5	3	15'-11"	33						
H15	2	#5	3	14'-11"	31						
H16	2	#5	3	13'-11"	28						
H17	4	#5	STR	7'-3"	30						

REINFORCING STEEL 6,601

CLASS A CONCRETE BREAKDOWN

POUR #1 CAP, LOWER PART OF WINGS, & PILE COLLARS 27.8 C.Y.

POUR #2 UPPER PART OF WINGS 12.6 C.Y.

TOTAL CLASS A CONCRETE 40.4 C.Y.

HP 12 X 53 STEEL PILES
NO: 6 LIN. FT.= 180

PILE DRIVING EQUIPMENT SETUP FOR HP 12 X 53 STEEL PILES NO: 6

END BENT NO. 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	5	#9	1	45'-3"	769	K1	48	#4	STR	3'-7"	115
B2	4	#11	1	45'-11"	976						
B3	6	#5	STR	42'-9"	268	S1	51	#5	4	11'-1"	590
B4	8	#4	STR	22'-7"	121	S2	51	#5	5	3'-10"	204
B5	11	#4	STR	2'-11"	21	S3	24	#4	6	6'-6"	104
B6	5	#4	STR	2'-5"	8						
						U1	3	#4	2	5'-11"	12
H1	26	#8	3	20'-6"	1,423	V1	60	#4	STR	6'-2"	247
H2	2	#8	3	20'-5"	109	V2	64	#4	STR	9'-8"	413
H3	2	#8	3	19'-5"	104	V3	4	#4	STR	9'-7"	26
H4	2	#8	3	18'-5"	98	V4	4	#4	STR	9'-1"	24
H5	2	#8	3	17'-5"	93	V5	4	#4	STR	8'-7"	23
H6	2	#8	3	16'-5"	88	V6	4	#4	STR	8'-1"	22
H7	2	#8	3	15'-5"	82	V7	4	#4	STR	7'-7"	20
H8	2	#8	3	14'-5"	77	V8	4	#4	STR	7'-2"	19
H9	26	#5	3	20'-0"	542	V9	4	#4	STR	6'-8"	18
H10	2	#5	3	19'-11"	41						
H11	2	#5	3	18'-11"	39						
H12	2	#5	3	17'-11"	37						
H13	2	#5	3	16'-11"	35						
H14	2	#5	3	15'-11"	33						
H15	2	#5	3	14'-11"	31						
H16	2	#5	3	13'-11"	28						
H17	4	#5	STR	7'-3"	30						

REINFORCING STEEL 6,890 LBS.

CLASS A CONCRETE BREAKDOWN

POUR #1 CAP, LOWER PART OF WINGS, & PILE COLLARS 27.7 C.Y.

POUR #2 UPPER PART OF WINGS 13.0 C.Y.

TOTAL CLASS A CONCRETE 40.7 C.Y.

HP 12 X 53 STEEL PILES
NO: 6 LIN. FT.= 210

PILE DRIVING EQUIPMENT SETUP FOR HP 12 X 53 STEEL PILES NO: 6

PROJECT NO. B-4407

ANSON/STANLY COUNTY

STATION: 32+31.61 -L-

SHEET 6 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT DETAILS

3/18/2021

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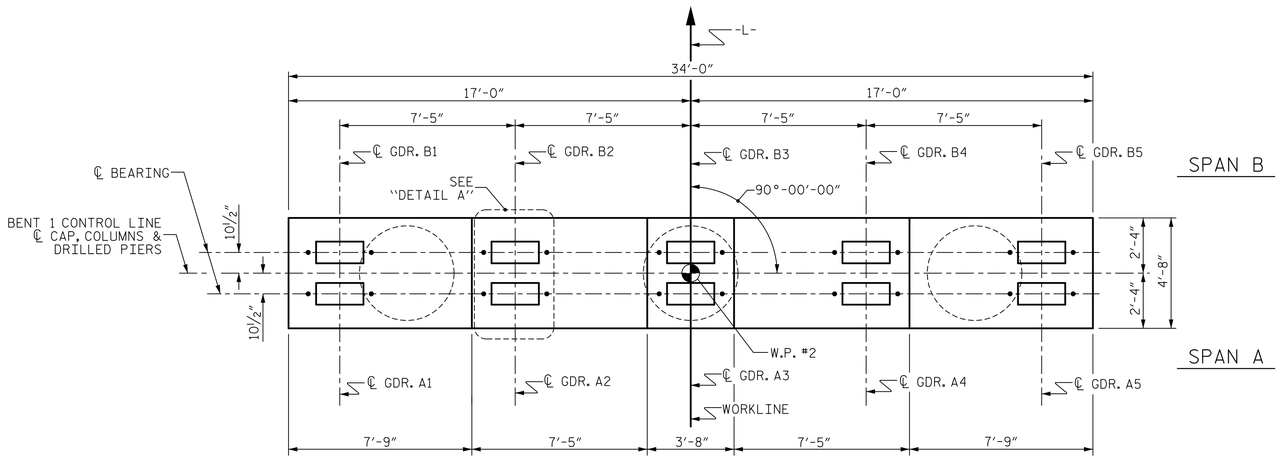
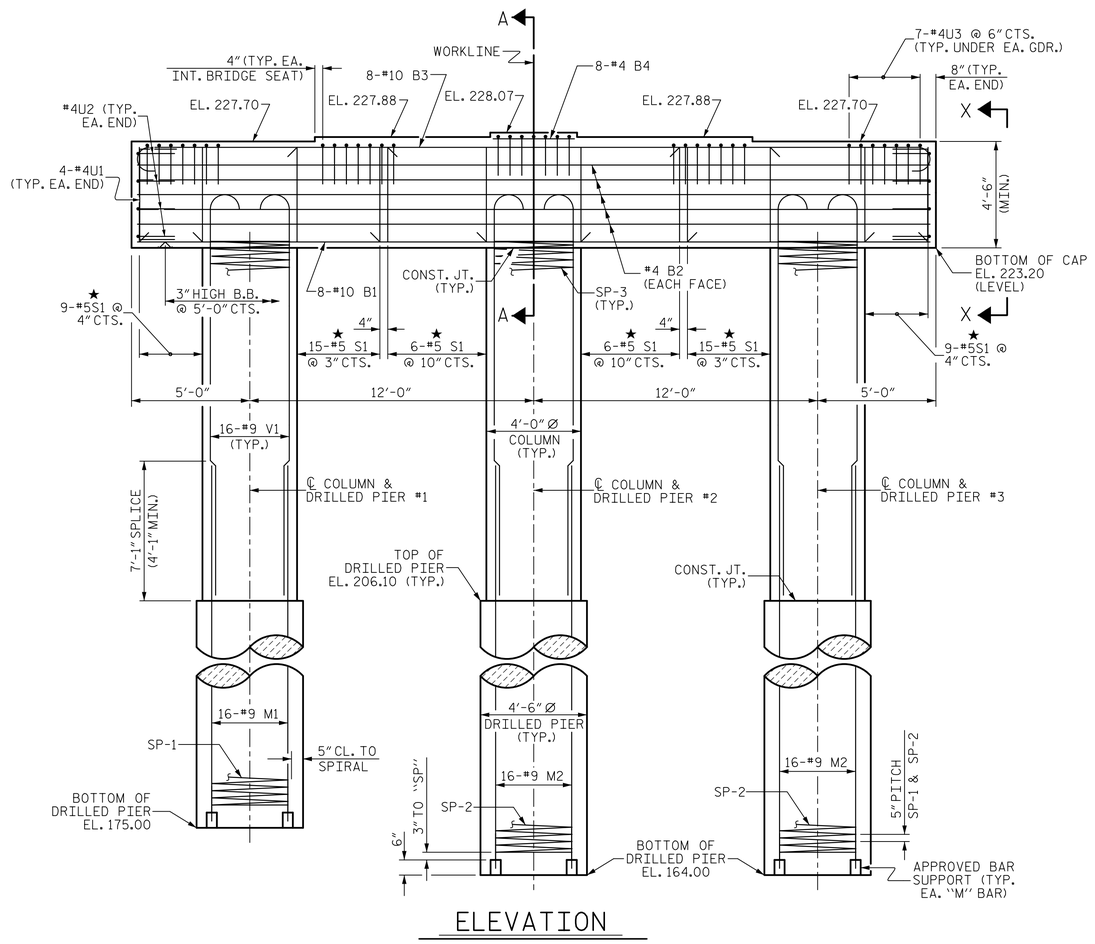
REVISIONS							
NO.	BY:	DATE:	NO.	BY:	DATE:		
1			3				
2			4				

SHEET NO. S-34

TOTAL SHEETS 45



PLAN



ELEVATION

NOTES

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

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

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

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

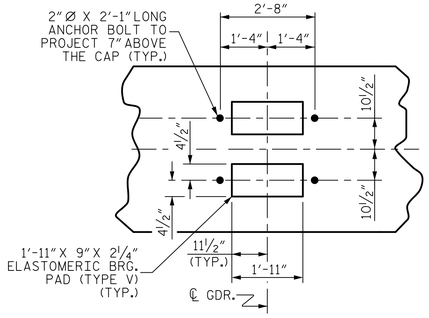
★ INVERT ALTERNATE STIRRUPS.

THE LOCATION OF THE CONSTRUCTION JOINT IN THE DRILLED PIERS IS BASED ON AN APPROXIMATE GROUND LINE ELEVATION. IF THE CONSTRUCTION JOINT IS ABOVE THE ACTUAL GROUND ELEVATION, THE CONTRACTOR SHALL PLACE THE CONSTRUCTION JOINT 1 FT. BELOW THE GROUND LINE.

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

SPLICING OF THE LONGITUDINAL BARS IN THE DRILLED PIER WILL NOT BE PERMITTED.

SEE SHEET 2 OF 2 FOR SECTIONS "A-A" AND "X-X".



DETAIL A

PROJECT NO. B-4407

ANSON/STANLY COUNTY

STATION: 32+31.61 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
BENT NO. 1

NORTH CAROLINA PROFESSIONAL SEAL 042890 ENGINEER PATRICK R. GALLAGHER
3/18/2021

Vaughn & Melton
Consulting Engineers
Asheville, North Carolina
828-253-2796
Boone, NC 828-355-9933
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DWN. BY: WDC DATE: 10/2020
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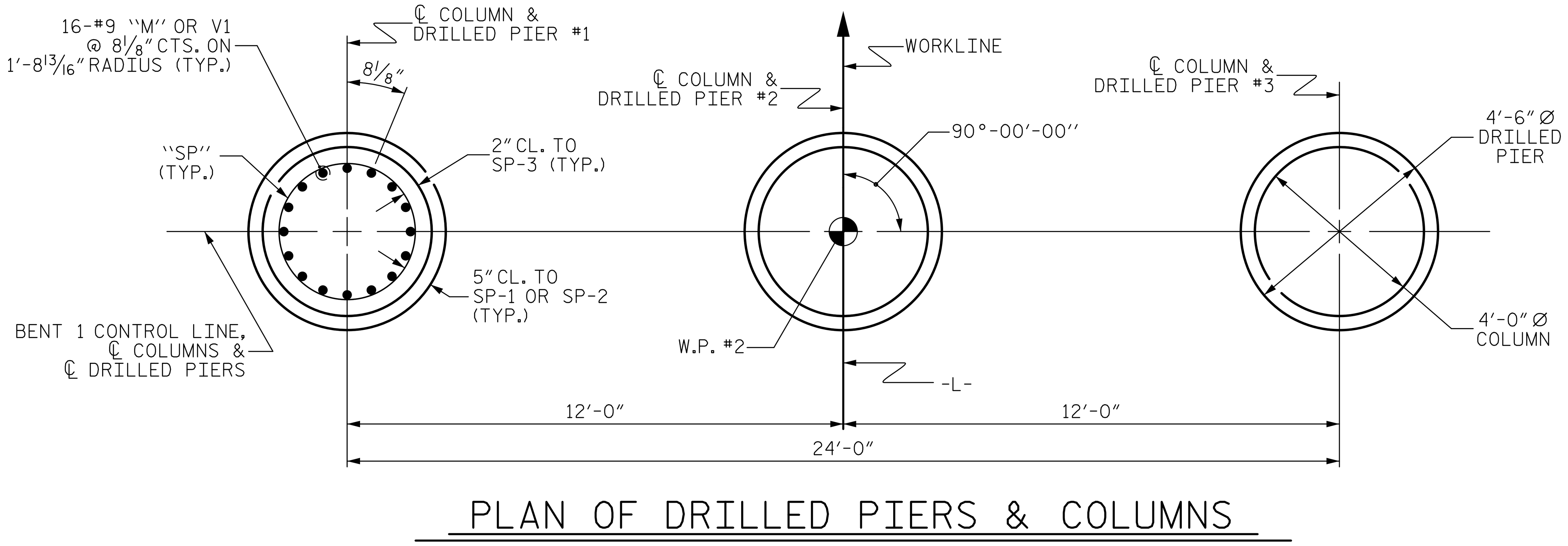
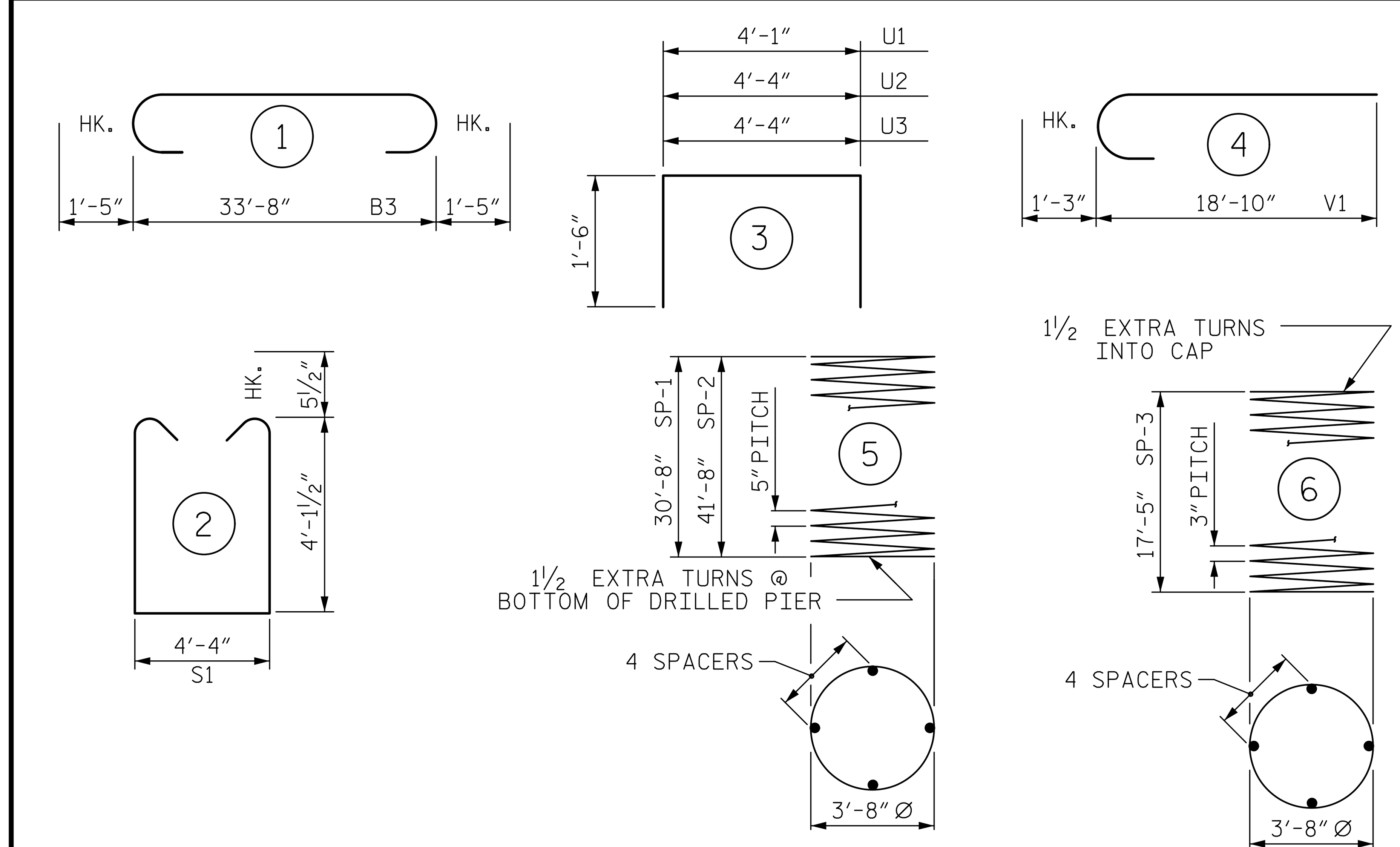
DES. EGR. OF RECORD: PRG DATE: 10/2020

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-35
1			3			TOTAL SHEETS
2			4			45



PLAN OF DRILLED PIERS & COLUMNS

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

BENT NO. 1

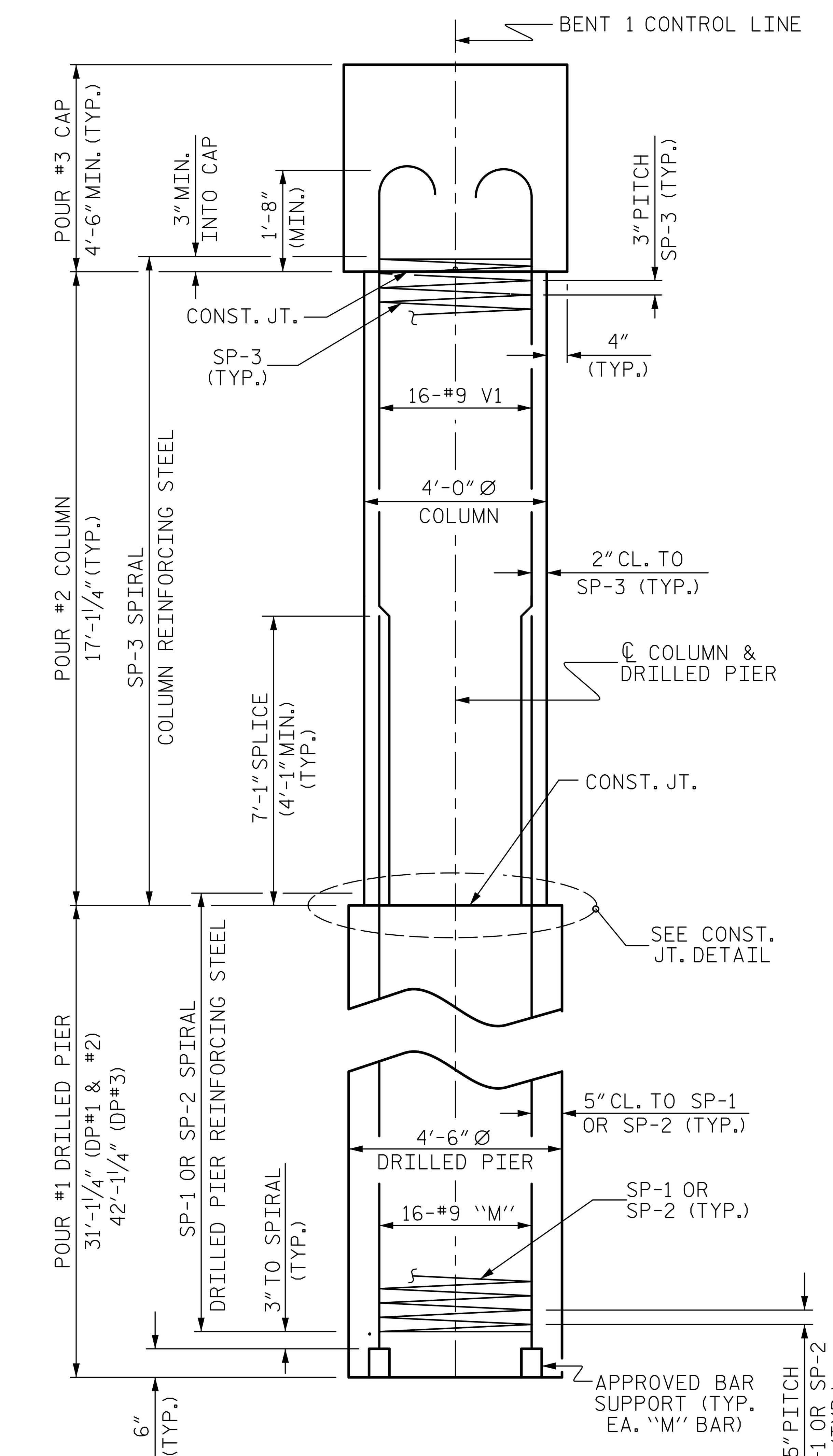
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#10	STR	33'-8"	1159
B2	10	#4	STR	33'-8"	225
B3	8	#10	1	36'-6"	1256
B4	8	#4	STR	3'-4"	18
M1	16	#9	STR	38'-0"	2067
M2	32	#9	STR	49'-1"	5340
S1	60	#5	2	13'-6"	845
U1	8	#4	3	7'-1"	38
U2	8	#4	3	7'-4"	39
U3	35	#4	3	7'-4"	171
V1	48	#9	4	20'-1"	3278
REINFORCING STEEL					14,436 LBS.
SP-1	1	*	5	860'-6"	898
SP-2	2	*	5	1156'-9"	2413
SP-3	3	**	6	814'-6"	1632
SPIRAL COLUMN REINFORCING STEEL					4,943 LBS.

* THE SP-1 & SP-2 SPIRAL REINFORCING STEEL SHALL BE W31 OR D-31 COLD DRAWN WIRE OR #5 PLAIN OR DEFORMED BAR

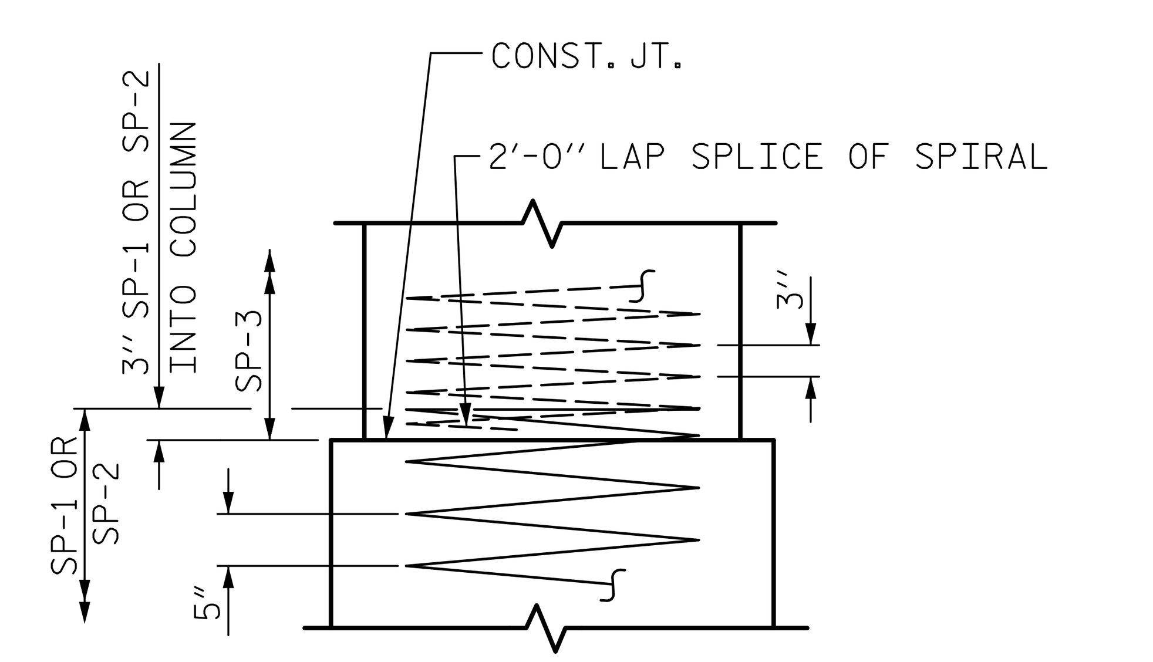
** THE SP-3 SPIRAL REINFORCING STEEL SHALL BE W20 OR D-20 COLD DRAWN WIRE OR #4 PLAIN OR DEFORMED BAR

CLASS A CONCRETE BREAKDOWN	
POUR #2 (COLUMNS)	23.9 C.Y.
POUR #3 (CAP)	27.2 C.Y.
TOTAL CLASS A CONCRETE	51.1 C.Y.

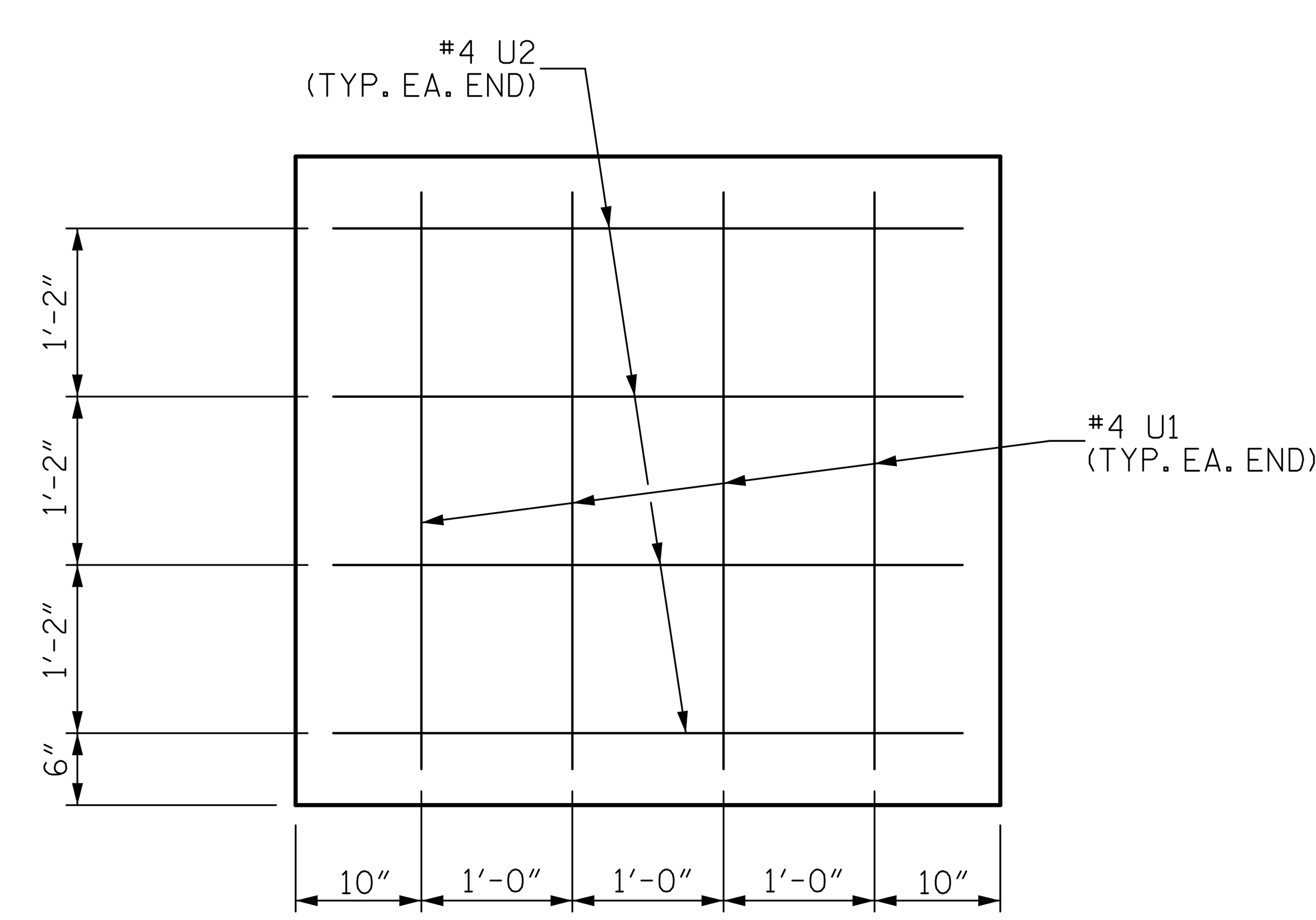
DRILLED PIERS:	
DRILLED PIER CONCRETE POUR #1 (DRILLED PIERS)	67.9 C.Y.
4'-6" Ø DRILLED PIER NOT IN SOIL	55.00 LIN. FT.
4'-6" Ø DRILLED PIER IN SOIL	60.30 LIN. FT.
CSL TUBES	479.2 LIN. FT.



END ELEVATION

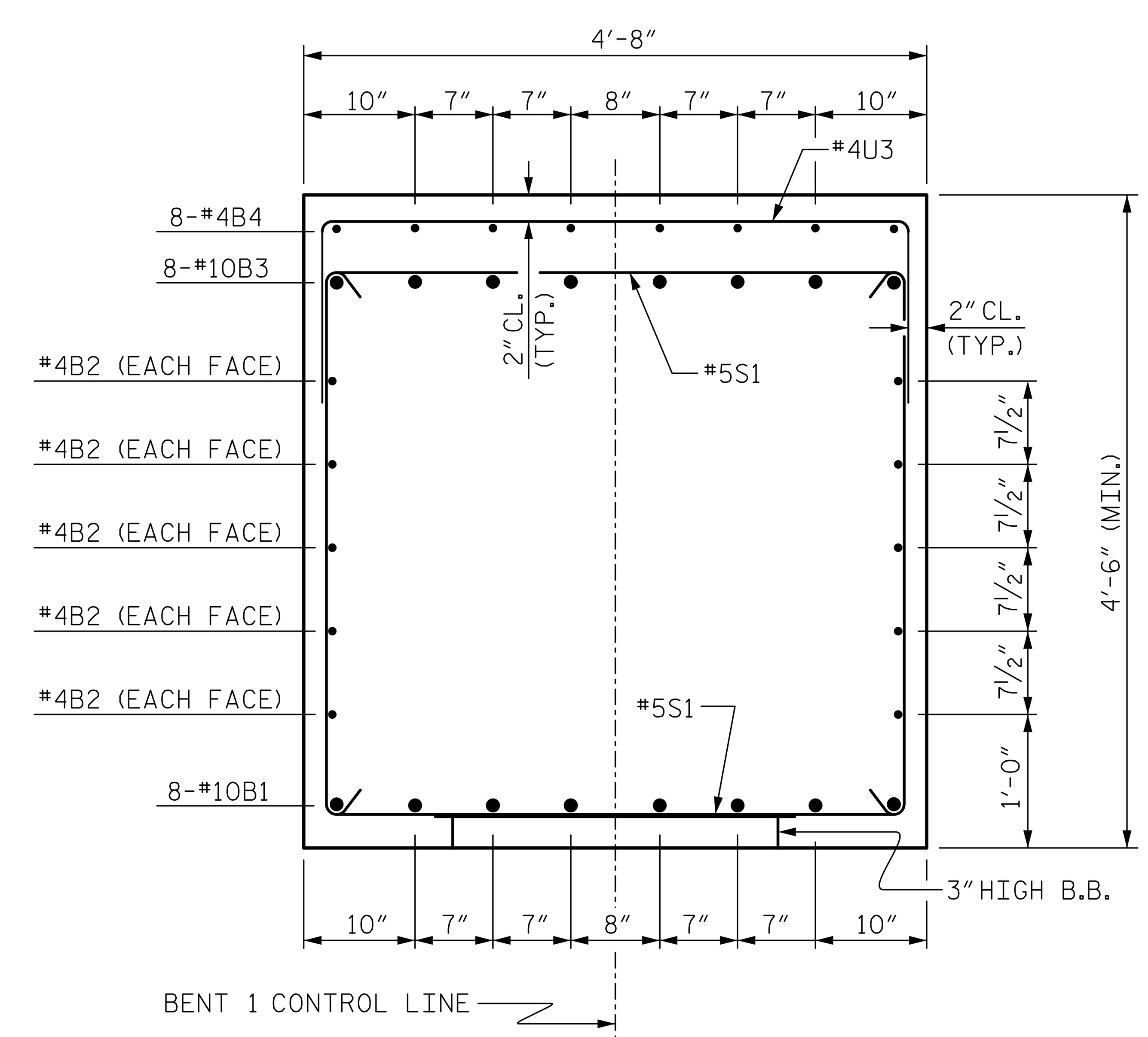


CONSTRUCTION JOINT DETAIL



SECTION X-X

(TYPICAL EACH END)



SECTION A-A

PROJECT NO. B-4407

ANSON/STANLY COUNTY

STATION: 32+31.61 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
BENT NO. 1

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 042890 PATRICK R. GALLAGHER
3/18/2021

V&M Vaughn & Melton Consulting Engineers
Asheville, North Carolina 828-253-2796
Raleigh, NC 919-977-9455 | Charlotte, NC 704-357-0488
Boone, NC 828-355-9933 | Tri-Cities, TN 423-467-8401 | Knoxville, TN 865-546-5800 | Spartanburg, SC 864-574-4775 | Charleston, SC 843-974-5650 | Middlesboro, KY 606-248-6600 | Atlanta, GA 770-627-3590

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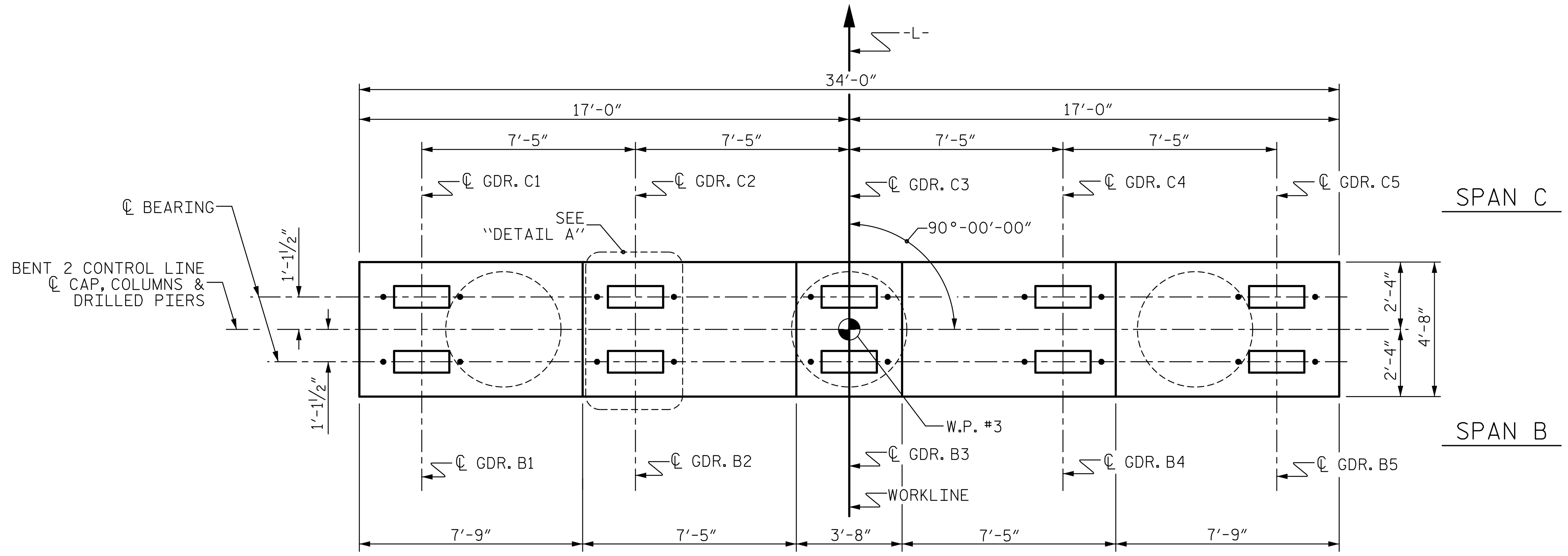
CHKD. BY: PRG	DATE: 10/2020
DES. EGR. OF RECORD: PRG	DATE: 10/2020

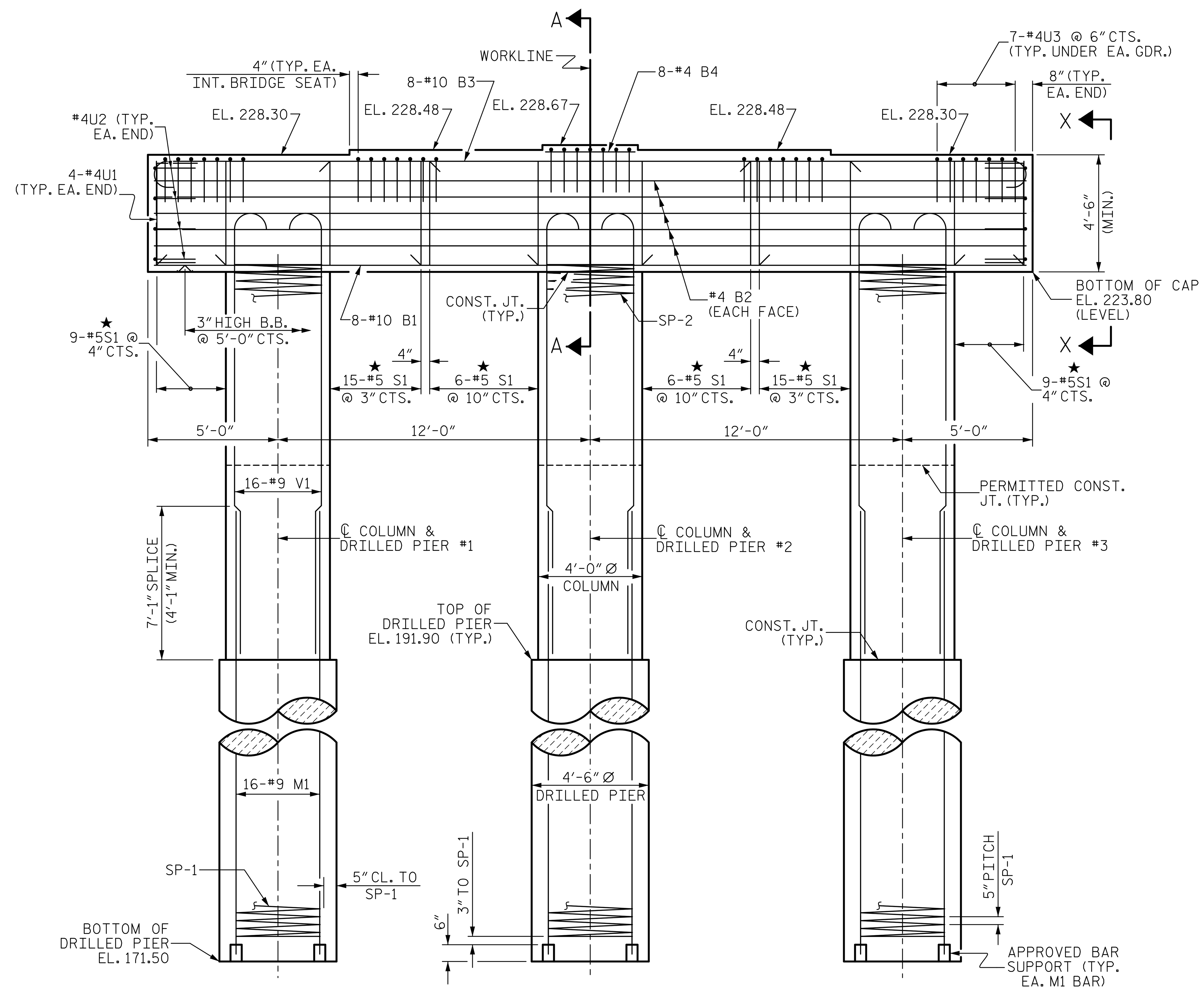
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

SHEET NO. S-36

TOTAL SHEETS 45



PLAN



ELEVATION

(INFORMATION SHOWN IS TYPICAL FOR EACH COLUMN AND DRILLED PIER)

NOTES

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

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

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

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

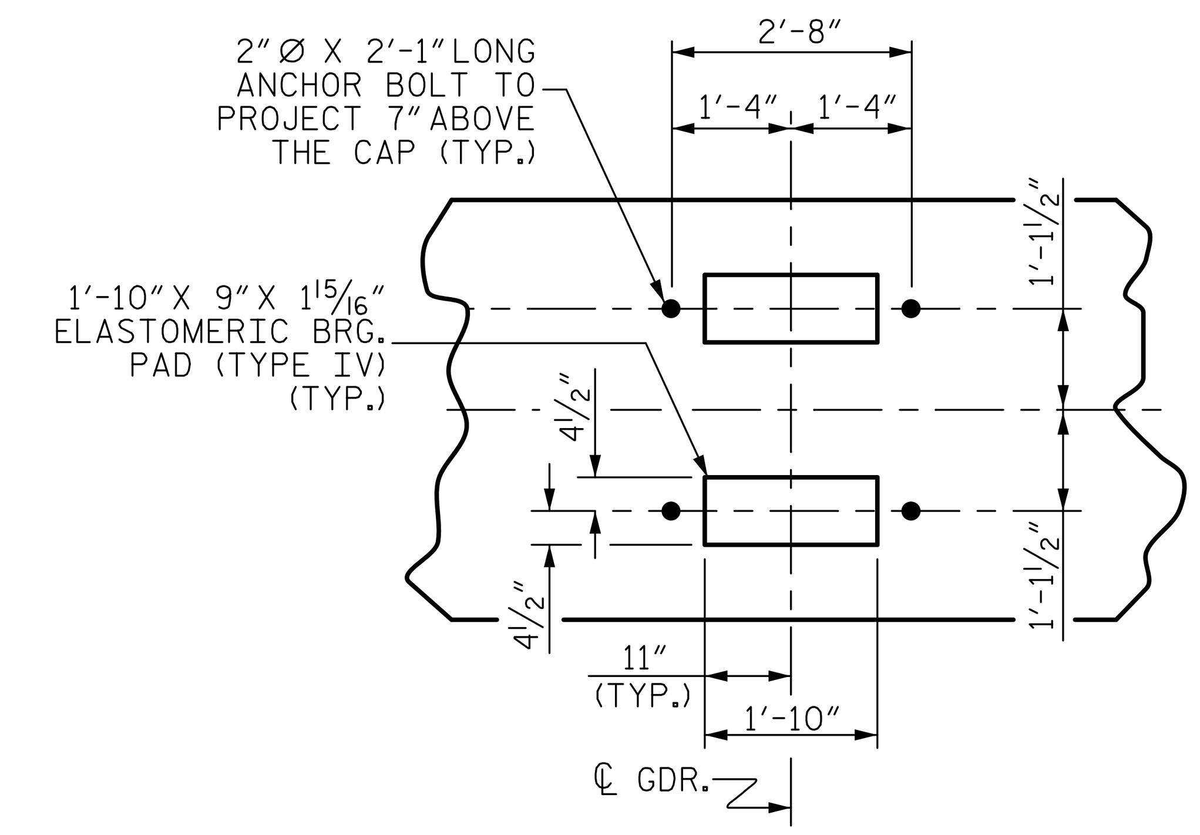
★ INVERT ALTERNATE STIRRUPS.

DRILLED PIERS SHALL BE TERMINATED ONE FOOT ± ABOVE NORMAL WATER SURFACE ELEVATION FOR SHAFTS LOCATED IN WATER.

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

SPLICING OF THE LONGITUDINAL BARS IN THE DRILLED PIER WILL NOT BE PERMITTED.

SEE SHEET 2 OF 2 FOR SECTIONS "A-A" AND "X-X".



DETAIL A

PROJECT NO. B-4407
ANSON/STANLY COUNTY
STATION: 32+31.61 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
BENT NO. 2

Vaughn & Melton Consulting Engineers
Asheville, North Carolina 828-253-2796
Raleigh, NC 919-977-9455 · Charlotte, NC 704-357-0488
Boone, NC 828-355-9933 · Tri-Cities, TN 423-467-8401 · Knoxville, TN 865-546-5800 · Spartanburg, SC 864-574-4775 · Charleston, SC 843-974-5650 · Middlesboro, KY 606-248-6600 · Atlanta, GA 770-627-3590

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 042890 PATRICK R. GALLAGHER
3/18/2021

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DWN. BY: WDC	DATE: 10/2020
CHKD. BY: PRG	DATE: 10/2020
DES. EGR. OF RECORD: PRG	DATE: 10/2020

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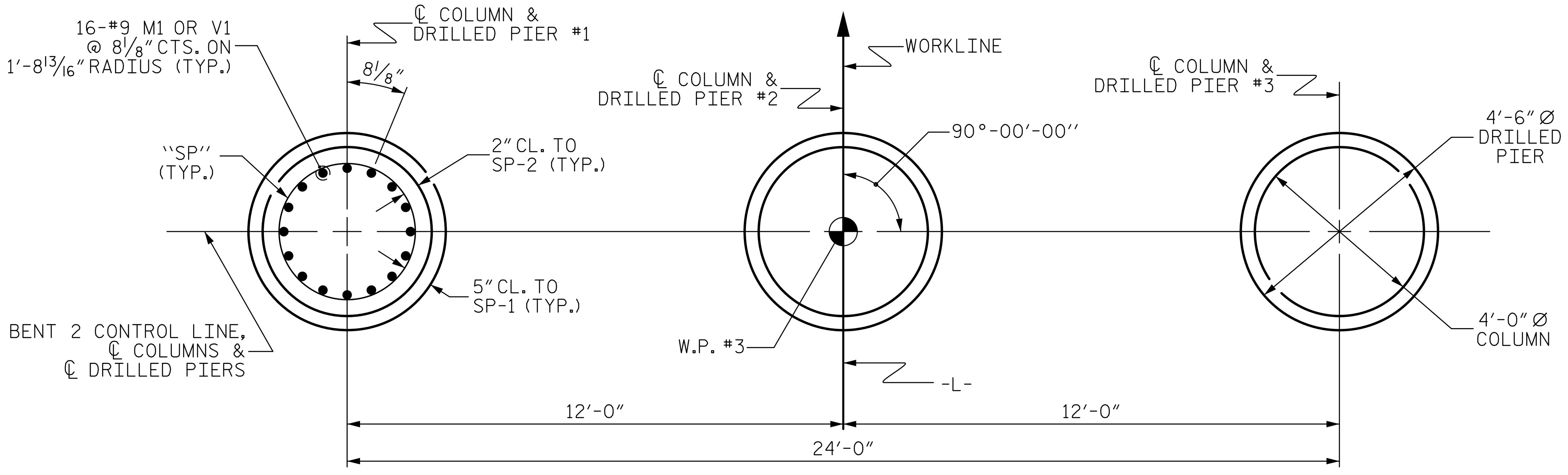
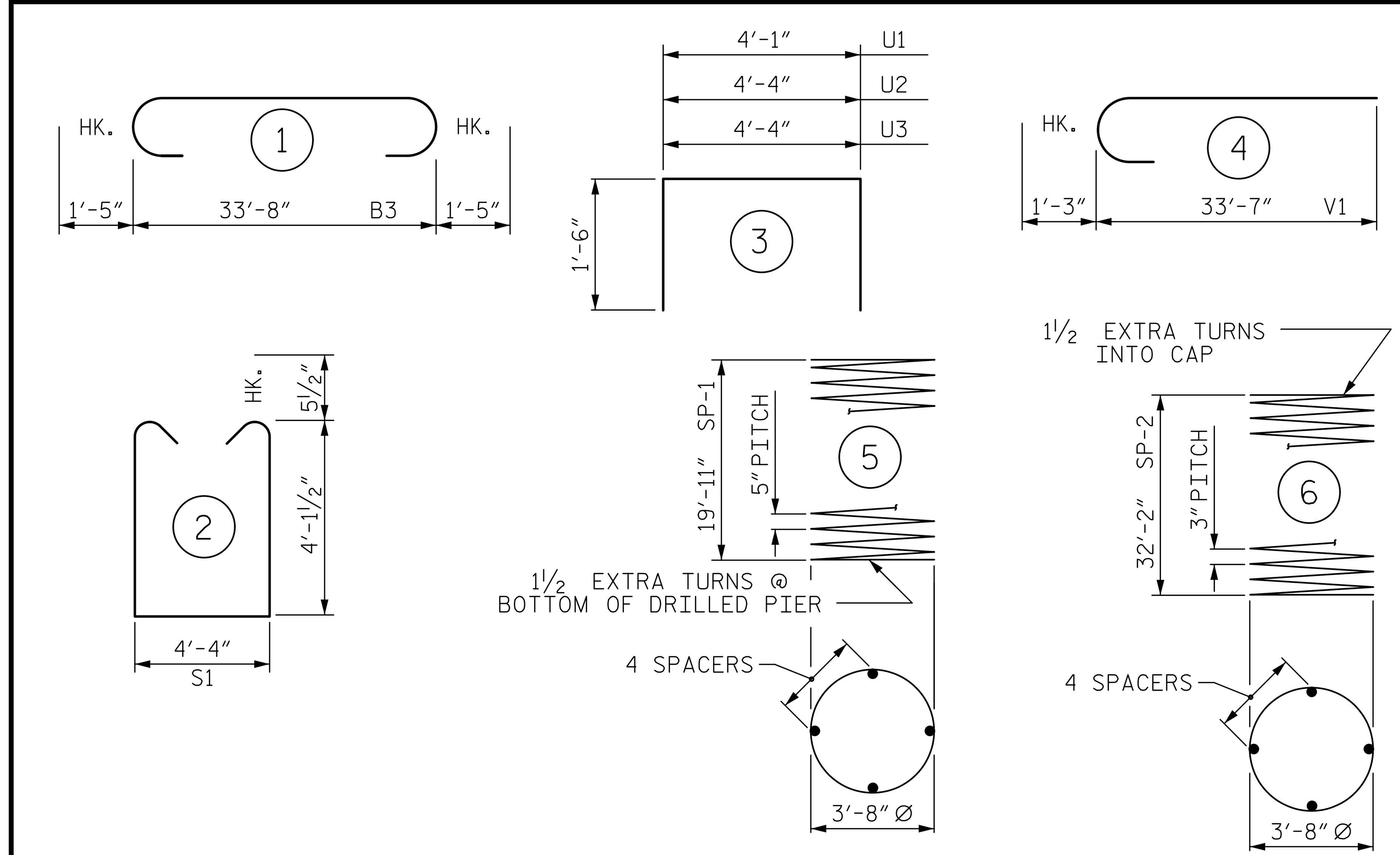
2			4				

SHEET NO. S-37
TOTAL SHEETS 45



PLAN OF DRILLED PIERS & COLUMNS

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

BENT NO. 2

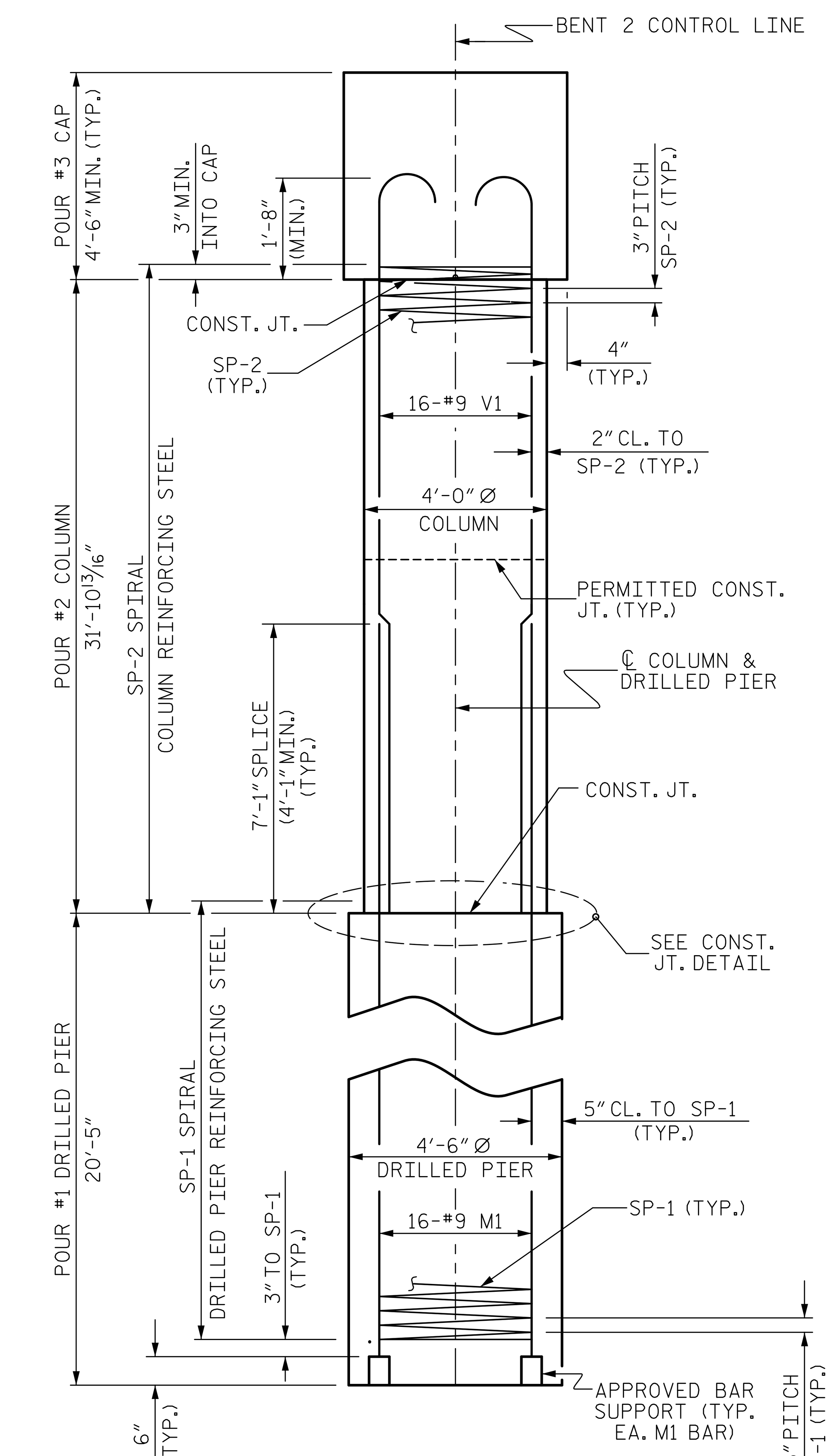
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#10	STR	33′-8″	1159
B2	10	#4	STR	33′-8″	225
B3	8	#10	1	36′-6″	1256
B4	8	#4	STR	3′-4″	18
M1	48	#9	STR	27′-3″	4447
S1	60	#5	2	13′-6″	845
U1	8	#4	3	7′-1″	38
U2	8	#4	3	7′-4″	39
U3	35	#4	3	7′-4″	171
V1	48	#9	4	34′-10″	5685
REINFORCING STEEL					13,883 LBS.
SP-1	3	*	5	564′-2″	1764
SP-2	3	**	6	1486′-6″	2729
SPIRAL COLUMN REINFORCING STEEL					4,493 LBS.

* THE SP-1 SPIRAL REINFORCING STEEL SHALL BE W31 OR D-31 COLD DRAWN WIRE OR #5 PLAIN OR DEFORMED BAR

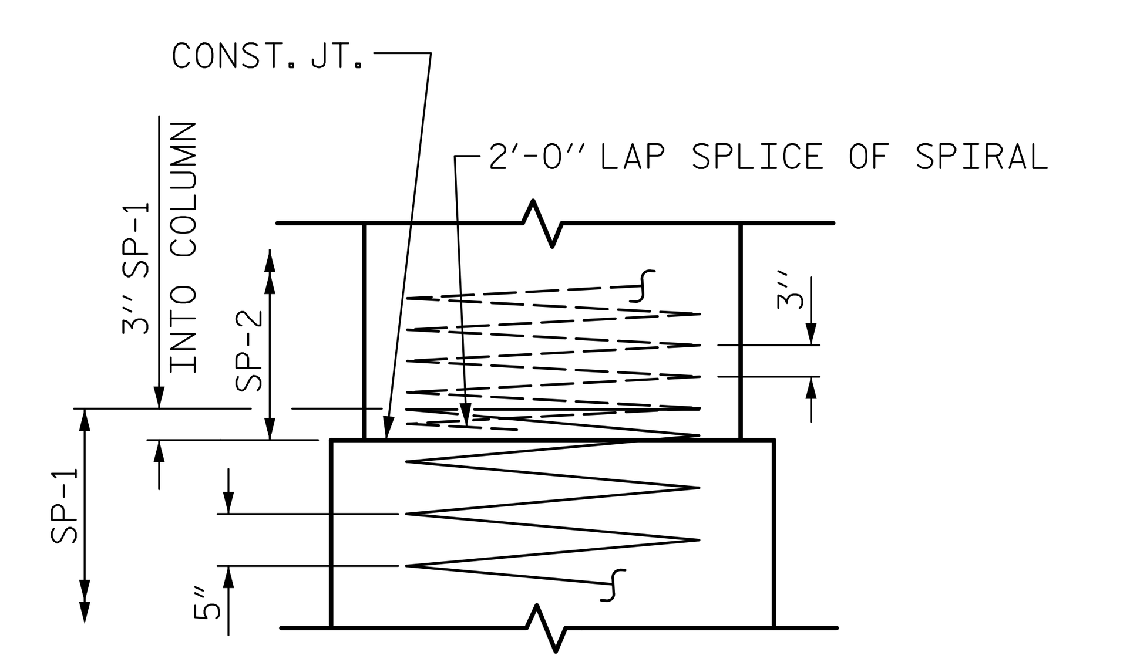
** THE SP-2 SPIRAL REINFORCING STEEL SHALL BE W20 OR D-20 COLD DRAWN WIRE OR #4 PLAIN OR DEFORMED BAR

CLASS A CONCRETE BREAKDOWN	
POUR #2 (COLUMNS)	44.5 C.Y.
POUR #3 (CAP)	27.2 C.Y.
TOTAL CLASS A CONCRETE	71.7 C.Y.

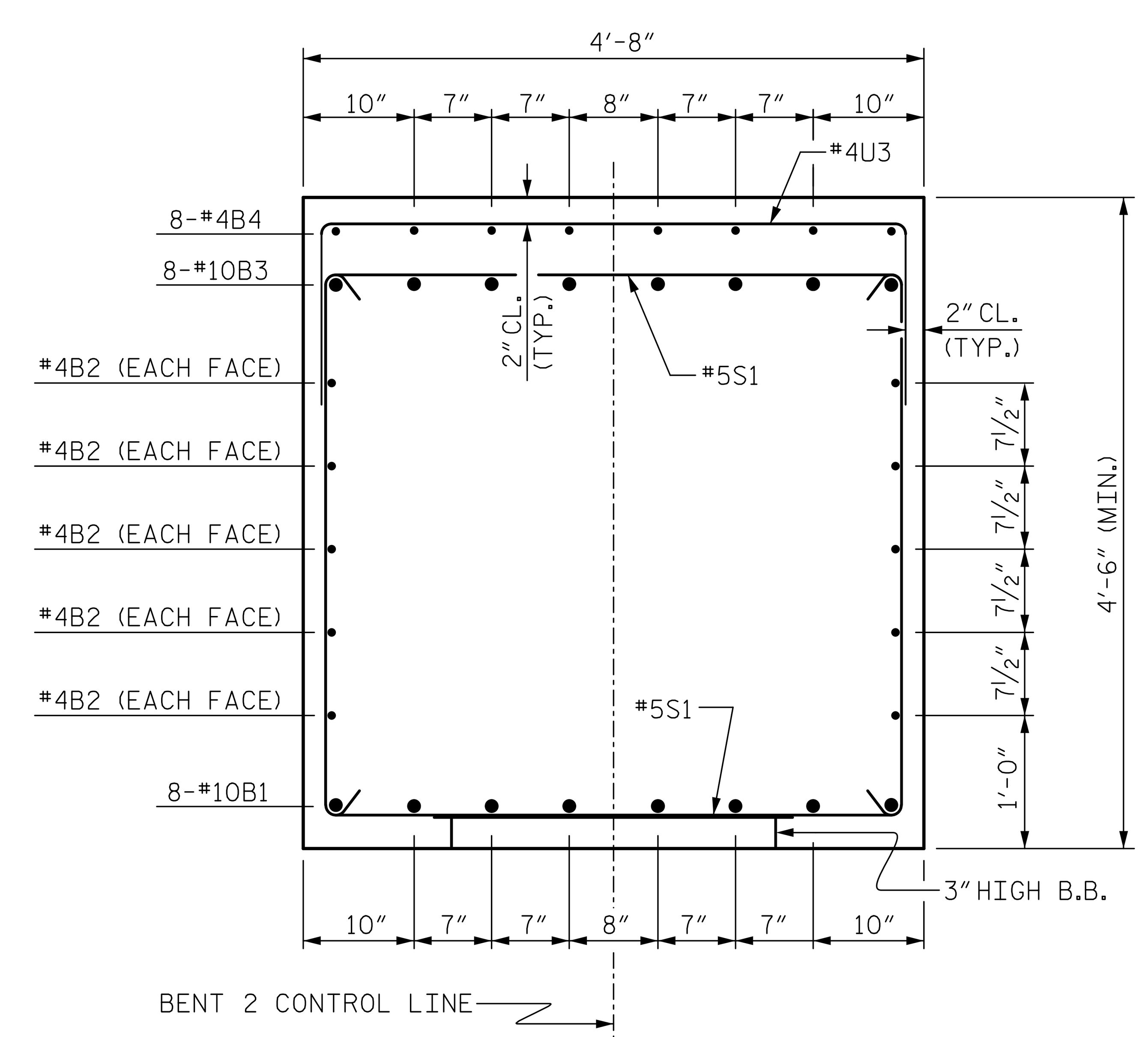
DRILLED PIERS:	
DRILLED PIER CONCRETE POUR #1 (DRILLED PIERS)	36.0 C.Y.
4′-6″Ø DRILLED PIER NOT IN SOIL	48.00 LIN. FT.
4′-6″Ø DRILLED PIER IN SOIL	13.20 LIN. FT.
PERMANENT STEEL CASING FOR 4′-6″Ø DRILLED PIERS	22.20 LIN. FT.
CSL TUBES	244.8 LIN. FT.



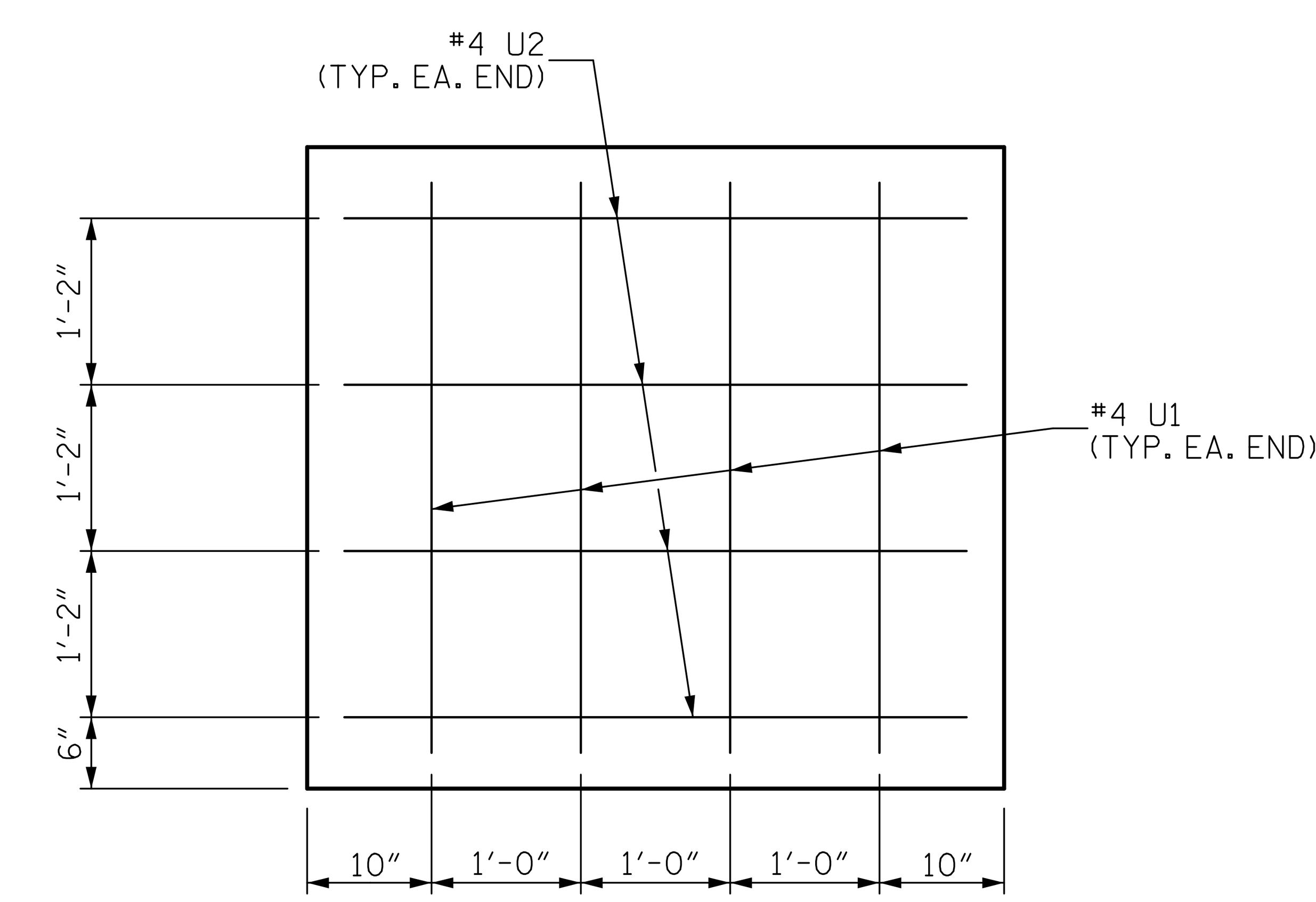
END ELEVATION



CONSTRUCTION JOINT DETAIL



SECTION A-A



SECTION X-X

(TYPICAL EACH END)

PROJECT NO. B-4407

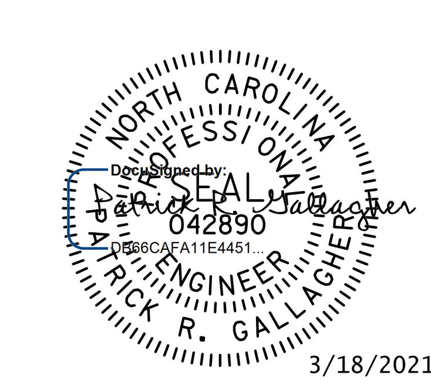
ANSON/STANLY COUNTY

STATION: 32+31.61 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
BENT NO. 2



Vaughn & Melton
Consulting Engineers
Asheville, North Carolina 828-253-2796
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Charlotte, NC 704-357-0488
Boone, NC 828-355-9933
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Charleston, SC 843-974-5650
Middlesboro, KY 606-248-6600
Atlanta, GA 770-627-3590

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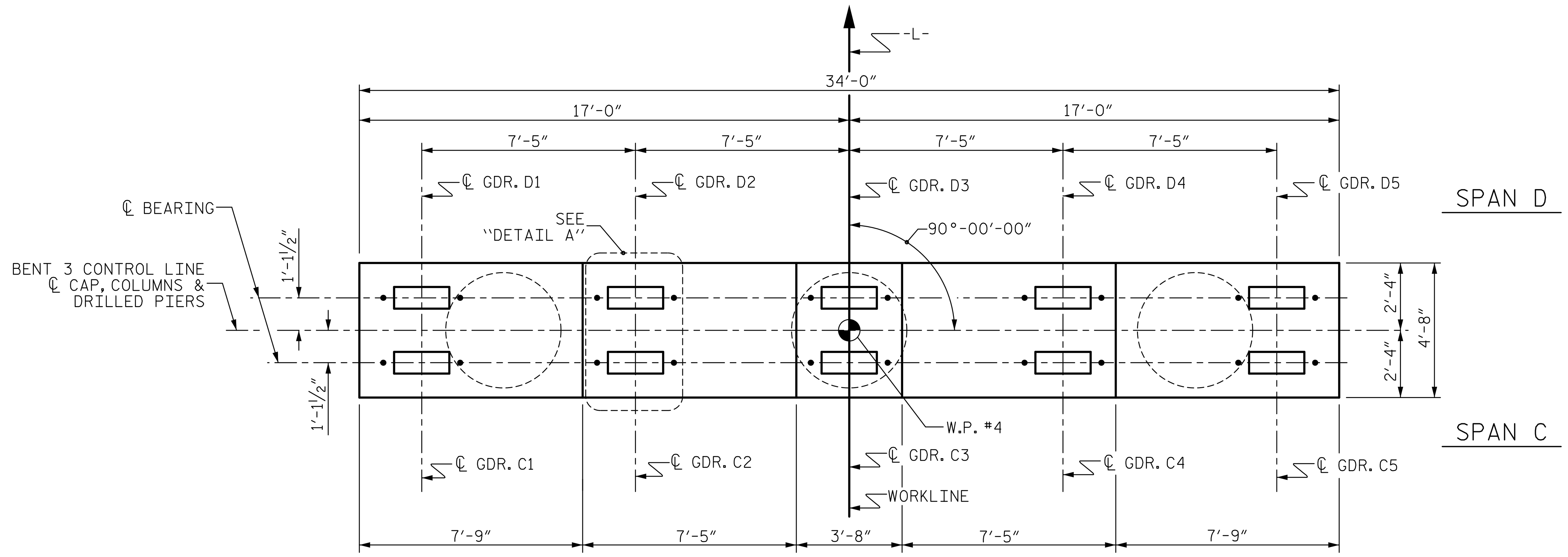
DWN. BY: WDC	DATE: 10/2020
CHKD. BY: PRG	DATE: 10/2020
DES. EGR. OF RECORD: PRG	DATE: 10/2020

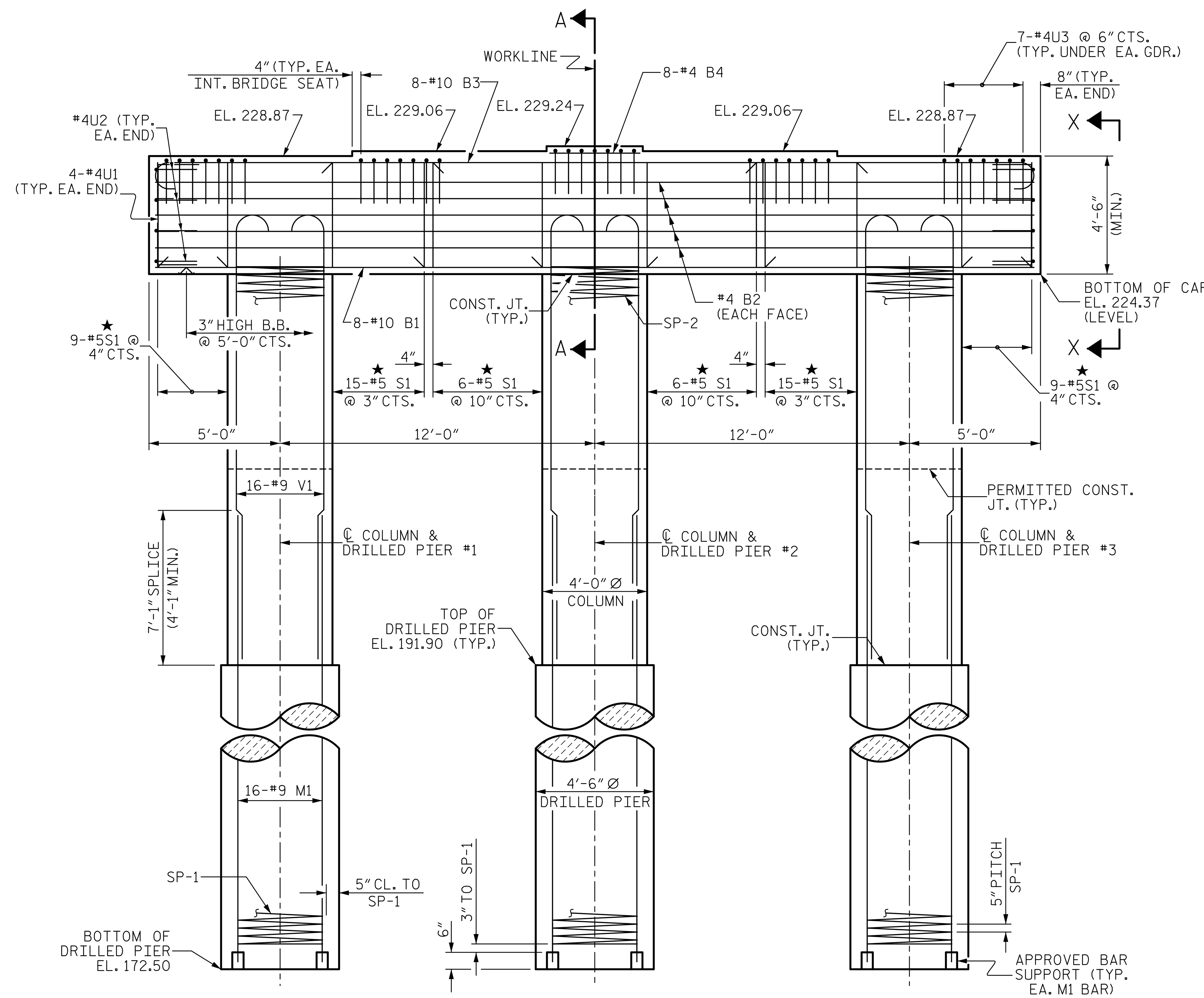
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

SHEET NO. S-38

TOTAL SHEETS 45



PLAN



ELEVATION

(INFORMATION SHOWN IS TYPICAL FOR EACH COLUMN AND DRILLED PIER)

NOTES

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

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

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

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

★ INVERT ALTERNATE STIRRUPS.

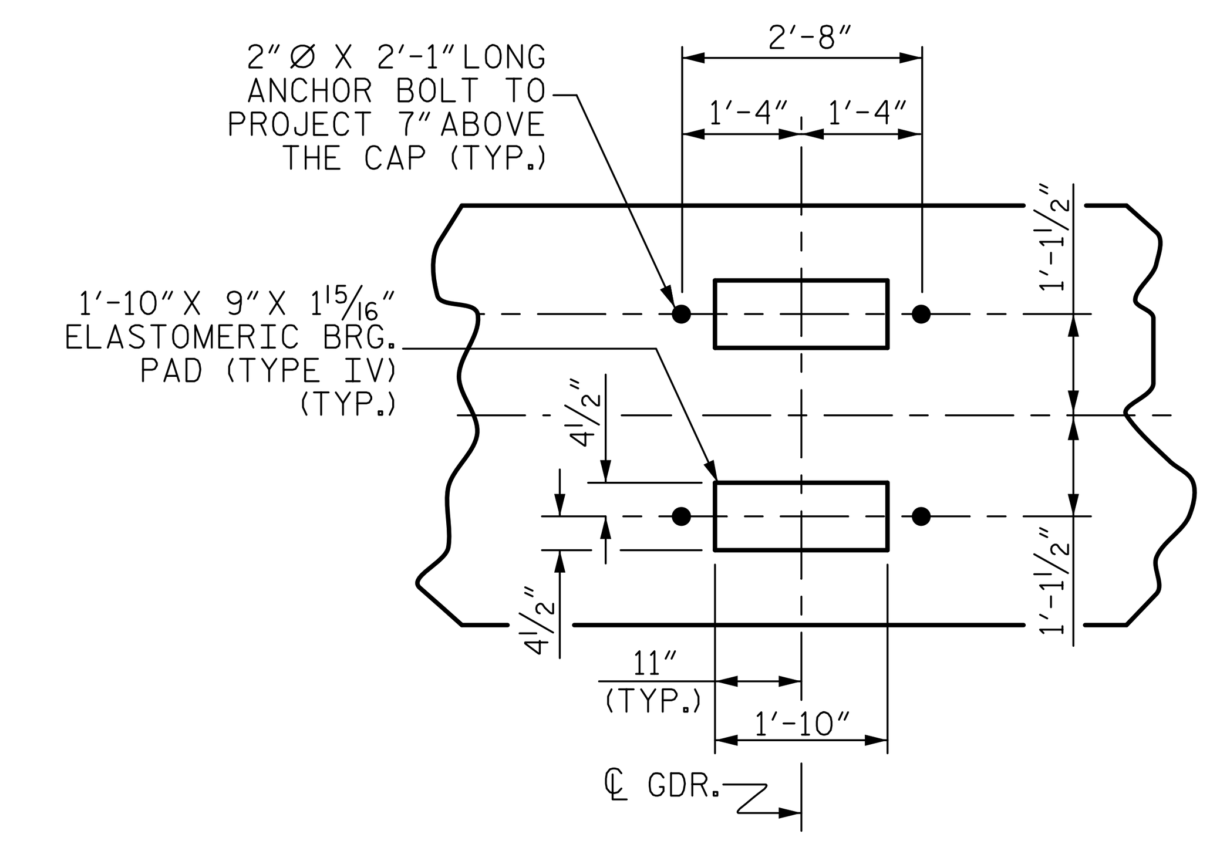
DRILLED PIERS SHALL BE TERMINATED ONE FOOT ± ABOVE NORMAL WATER SURFACE ELEVATION FOR SHAFTS LOCATED IN WATER.

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

SPLICING OF THE LONGITUDINAL BARS IN THE DRILLED PIER WILL NOT BE PERMITTED.

THE TOP SURFACE AREAS OF THE BENT CAP SHALL BE CURED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS EXCEPT THE MEMBRANE CURING COMPOUND METHOD SHALL NOT BE USED.

SEE SHEET 2 OF 2 FOR SECTIONS "A-A" AND "X-X".



DETAIL A

PROJECT NO. B-4407

ANSON/STANLY COUNTY

STATION: 32+31.61 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
BENT NO. 3

Vaughn & Melton Consulting Engineers — Asheville, North Carolina 828-253-2796; Raleigh, NC 919-977-9455; Charlotte, NC 704-357-0488; Boone, NC 828-355-9933; Tri-Cities, TN 423-467-8401; Knoxville, TN 865-546-5800; Spartanburg, SC 864-574-4775; Charleston, SC 843-974-5650; Middlesboro, KY 606-248-6600; Atlanta, GA 770-627-3590

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 042890 PATRICK R. GALLAGHER 3/18/2021

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DES. EGR. OF RECORD: PRG DATE: 10/2020

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

SHEET NO. S-39
TOTAL SHEETS 45

wdcrutcher
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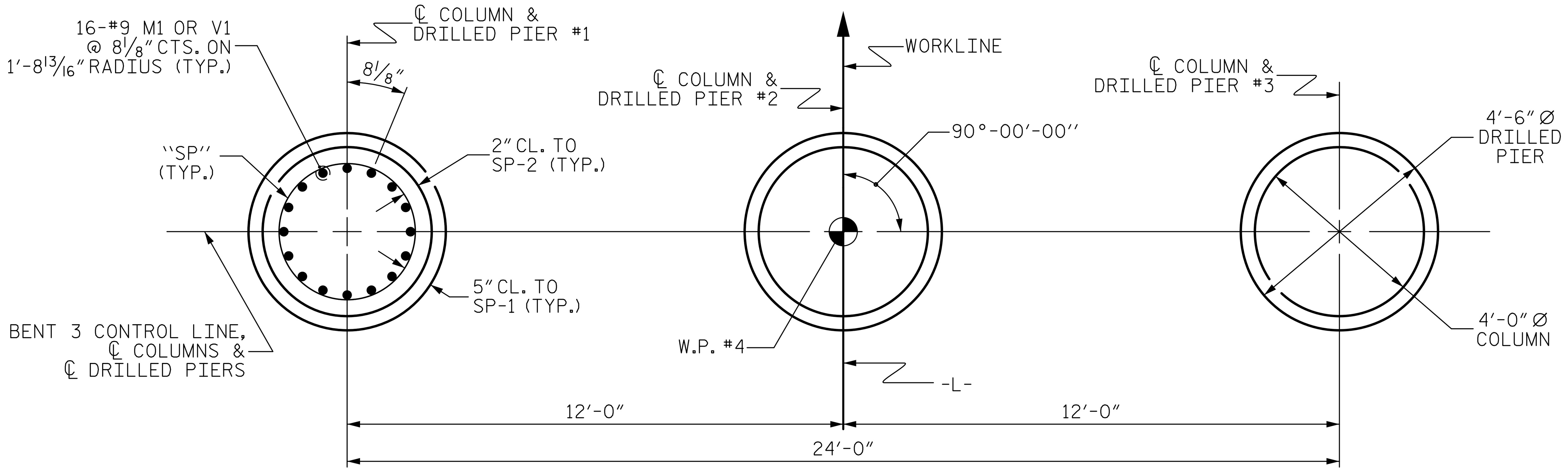
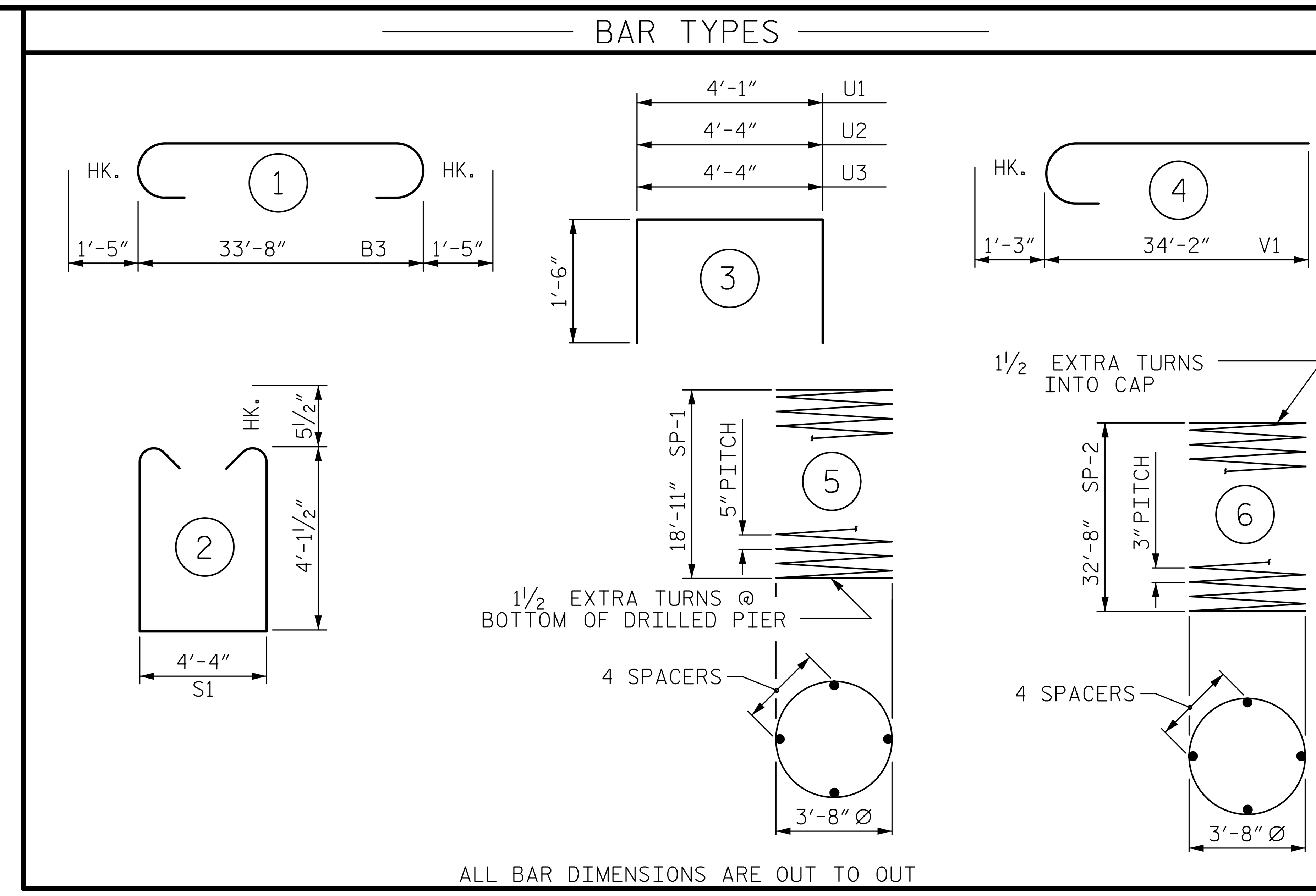


PLAN OF DRILLED PIERS & COLUMNS



BILL OF MATERIAL

BENT NO. 3

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#10	STR	33'-8"	1159
B2	10	#4	STR	33'-8"	225
B3	8	#10	1	36'-6"	1256
B4	8	#4	STR	3'-4"	18
M1	48	#9	STR	26'-3"	4284
S1	60	#5	2	13'-6"	845
U1	8	#4	3	7'-1"	38
U2	8	#4	3	7'-4"	39
U3	35	#4	3	7'-4"	171
V1	48	#9	4	35'-5"	5780
REINFORCING STEEL					13,815 LBS.

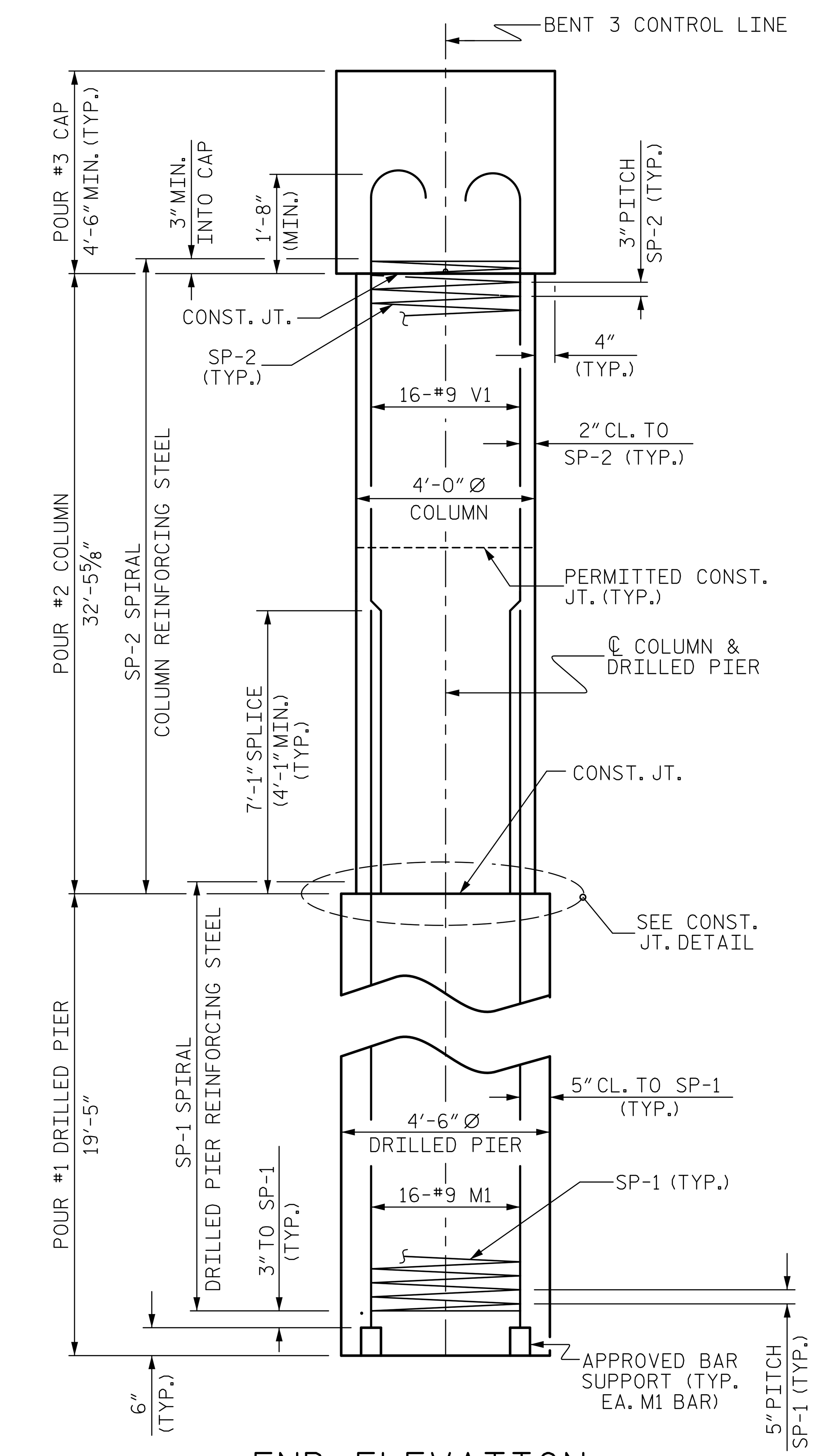
SP-1	3	*	5	541'-6"	1694
SP-2	3	**	6	1509'-6"	3025
SPIRAL COLUMN REINFORCING STEEL					4,719 LBS.

* THE SP-1 SPIRAL REINFORCING STEEL SHALL BE W31 OR D-31 COLD DRAWN WIRE OR #5 PLAIN OR DEFORMED BAR

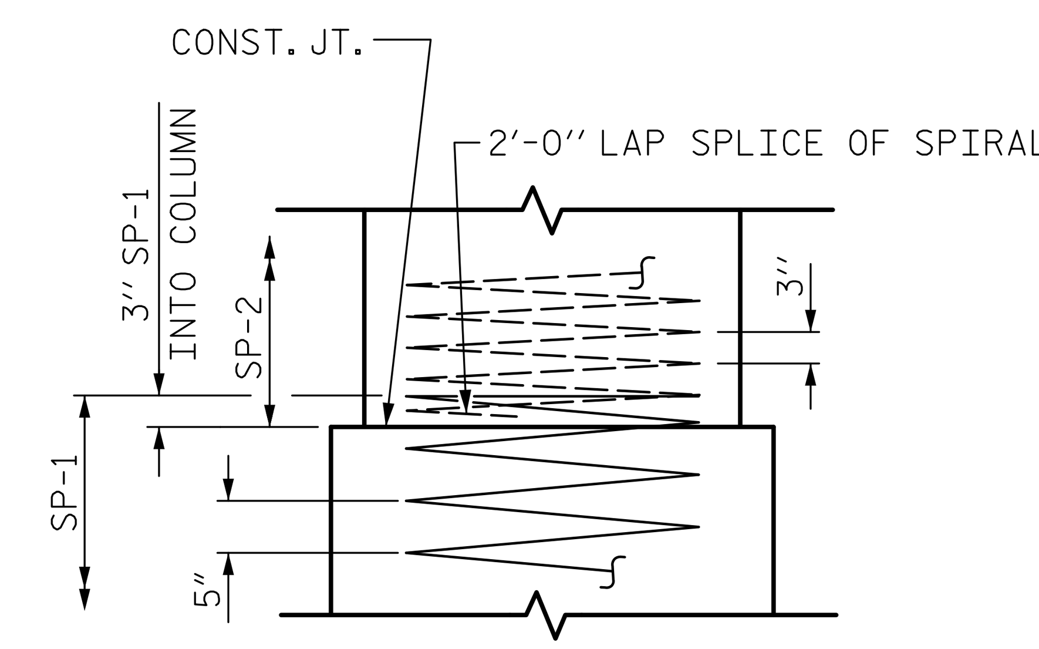
** THE SP-2 SPIRAL REINFORCING STEEL SHALL BE W20 OR D-20 COLD DRAWN WIRE OR #4 PLAIN OR DEFORMED BAR

CLASS A CONCRETE BREAKDOWN	
POUR #2 (COLUMNS)	45.3 C.Y.
POUR #3 (CAP)	27.2 C.Y.
TOTAL CLASS A CONCRETE	72.5 C.Y.

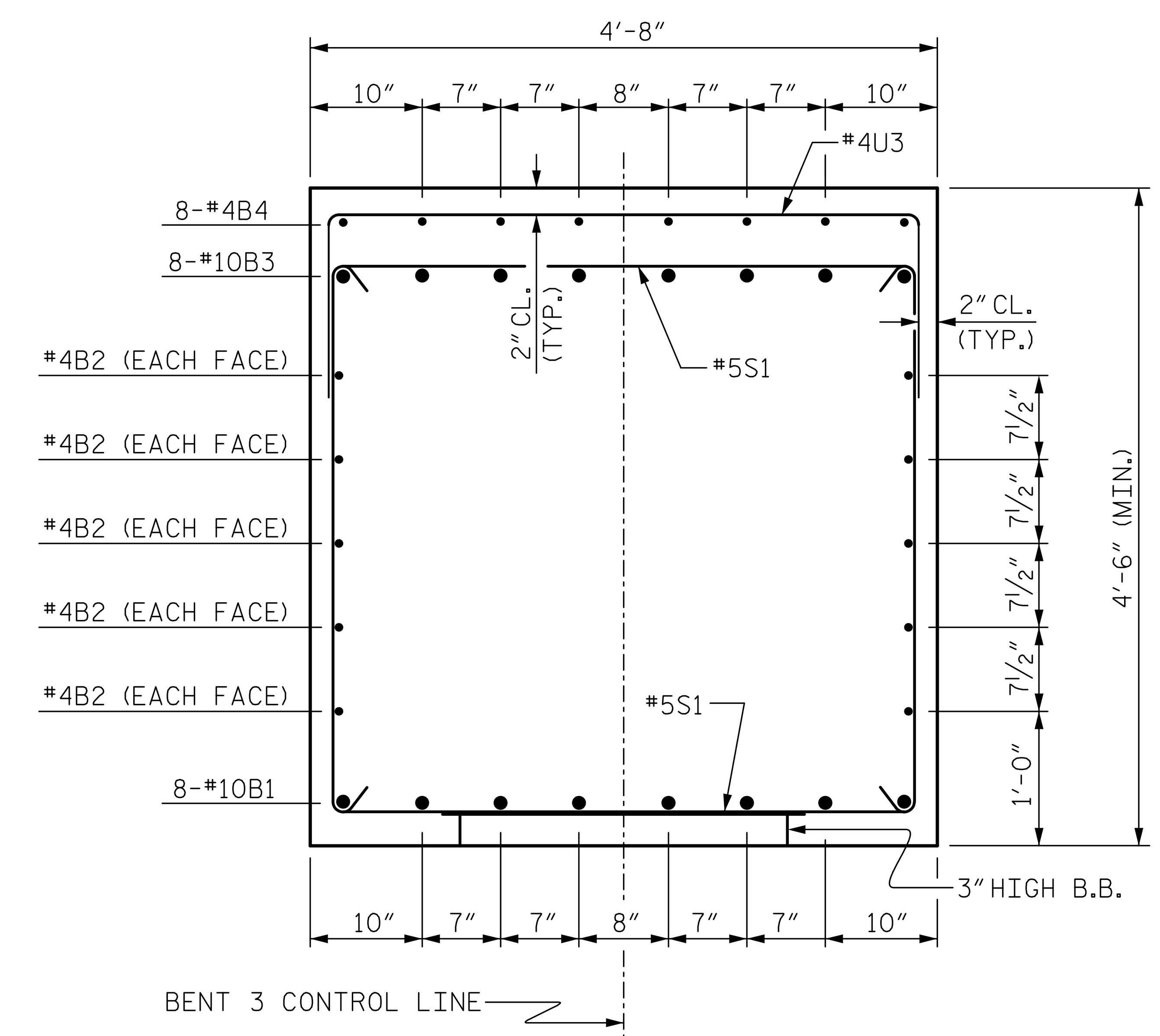
DRILLED PIERS:	
DRILLED PIER CONCRETE POUR #1 (DRILLED PIERS)	34.2 C.Y.
4'-6" Ø DRILLED PIER NOT IN SOIL	47.00 LIN. FT.
4'-6" Ø DRILLED PIER IN SOIL	11.20 LIN. FT.
PERMANENT STEEL CASING FOR 4'-6" Ø DRILLED PIERS	13.20 LIN. FT.
CSL TUBES	250.8 LIN. FT.



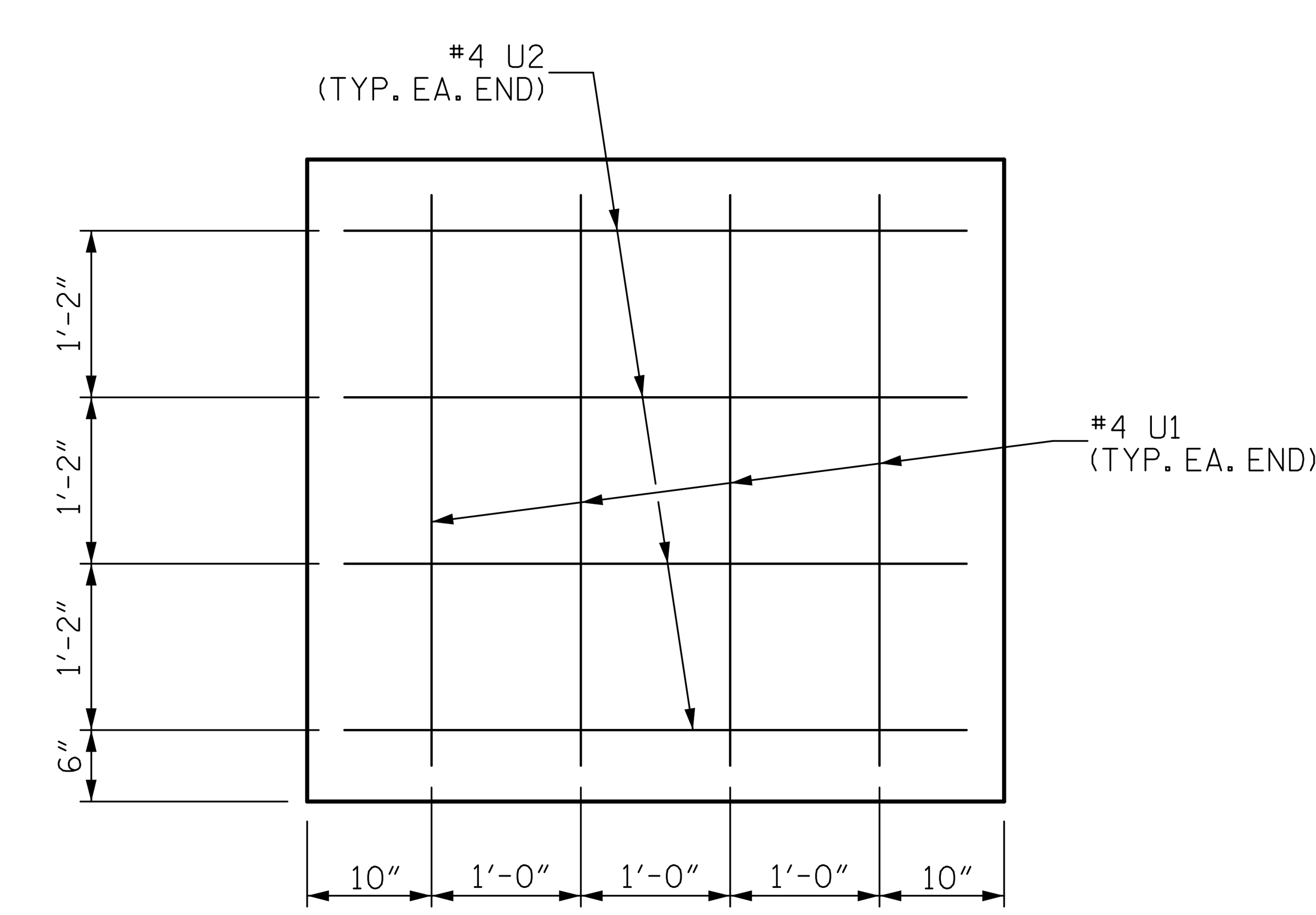
END ELEVATION



CONSTRUCTION JOINT DETAIL



SECTION A-A



SECTION X-X

(TYPICAL EACH END)

PROJECT NO. B-4407

ANSON/STANLY COUNTY

STATION: 32+31.61 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
BENT NO. 3

Vaughn & Melton
Consulting Engineers
Asheville, North Carolina 828-253-2796
Raleigh, NC 919-977-9455
Charlotte, NC 704-357-0488
Boone, NC 828-355-9933
Tri-Cities, TN 423-467-8401
Knoxville, TN 865-546-5800
Spartanburg, SC 864-574-4775
Charleston, SC 843-974-5650
Middlesboro, KY 606-248-6600
Atlanta, GA 770-627-3590

NORTH CAROLINA PROFESSIONAL SEAL 042890 ENGINEER PATRICK R. GALLAGHER
3/18/2021

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CHKD. BY: PRG DATE: 10/2020
DES. EGR. OF RECORD: PRG DATE: 10/2020

REVISIONS						
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2			4			

SHEET NO. S-40
TOTAL SHEETS 45

wdcrutcher
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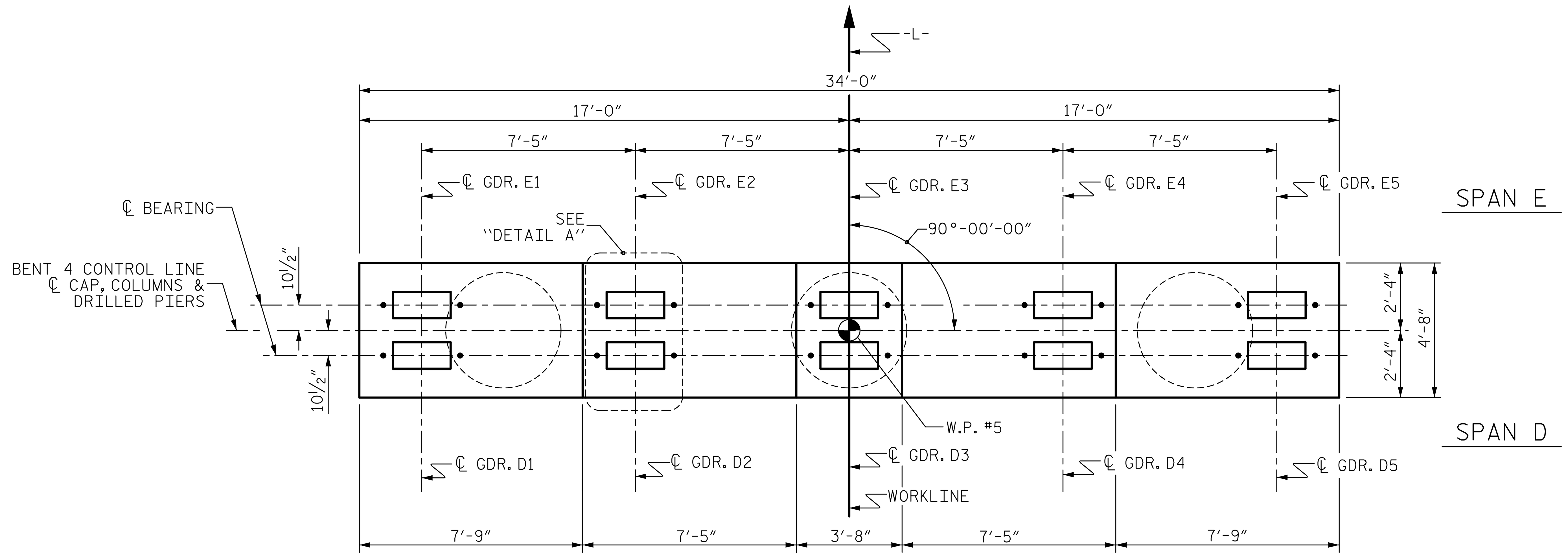
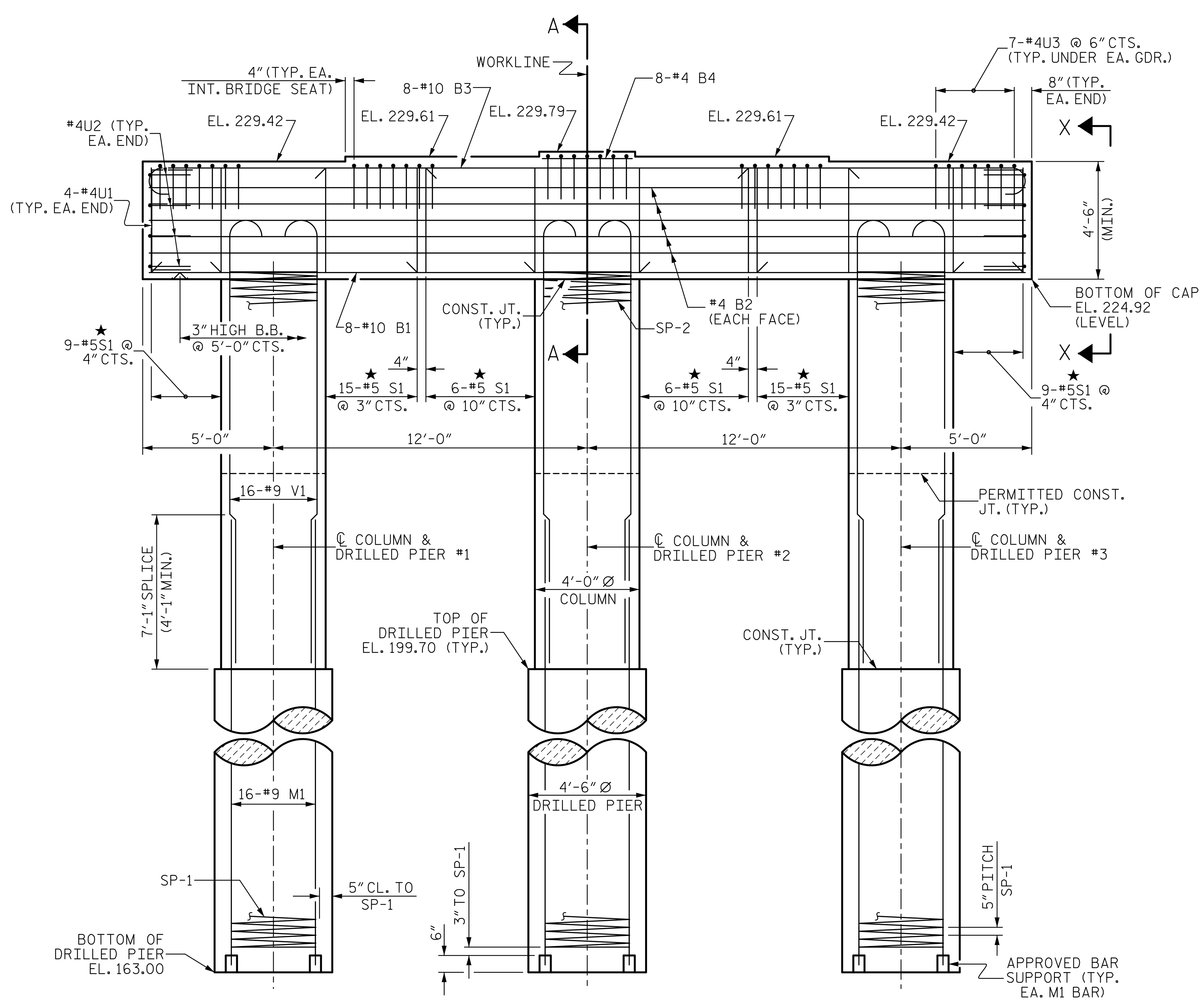


PLAN



ELEVATION

(INFORMATION SHOWN IS TYPICAL FOR EACH COLUMN AND DRILLED PIER)

NOTES

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

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

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

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

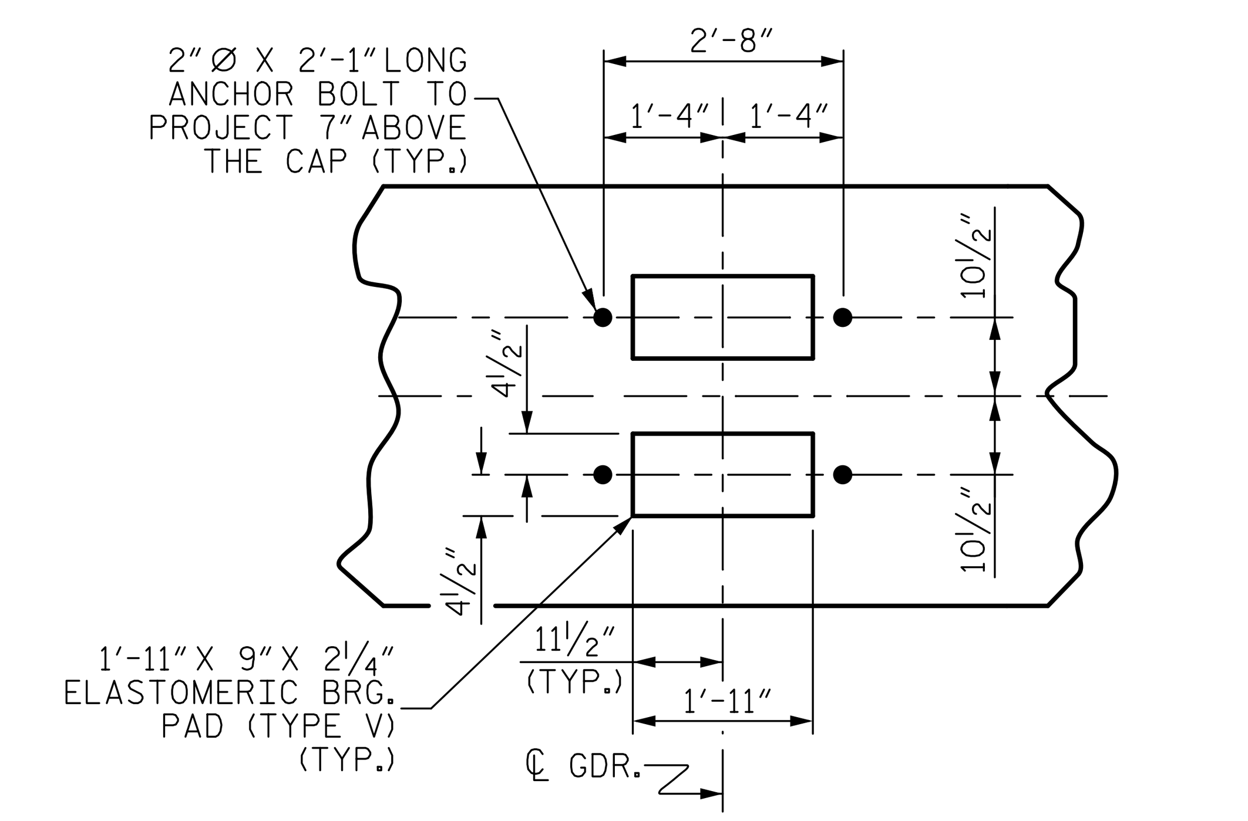
★ INVERT ALTERNATE STIRRUPS.

THE LOCATION OF THE CONSTRUCTION JOINT IN THE DRILLED PIERS IS BASED ON AN APPROXIMATE GROUND LINE ELEVATION. IF THE CONSTRUCTION JOINT IS ABOVE THE ACTUAL GROUND ELEVATION, THE CONTRACTOR SHALL PLACE THE CONSTRUCTION JOINT 1 FT. BELOW THE GROUND LINE.

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

SPLICING OF THE LONGITUDINAL BARS IN THE DRILLED PIER WILL NOT BE PERMITTED.

SEE SHEET 2 OF 2 FOR SECTIONS "A-A" AND "X-X".



DETAIL A

PROJECT NO. B-4407

ANSON/STANLY COUNTY

STATION: 32+31.61 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
BENT NO. 4

3/18/2021

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DWN. BY: WDC DATE: 10/2020
CHKD. BY: PRG DATE: 10/2020
DES. EGR. OF RECORD: PRG DATE: 10/2020

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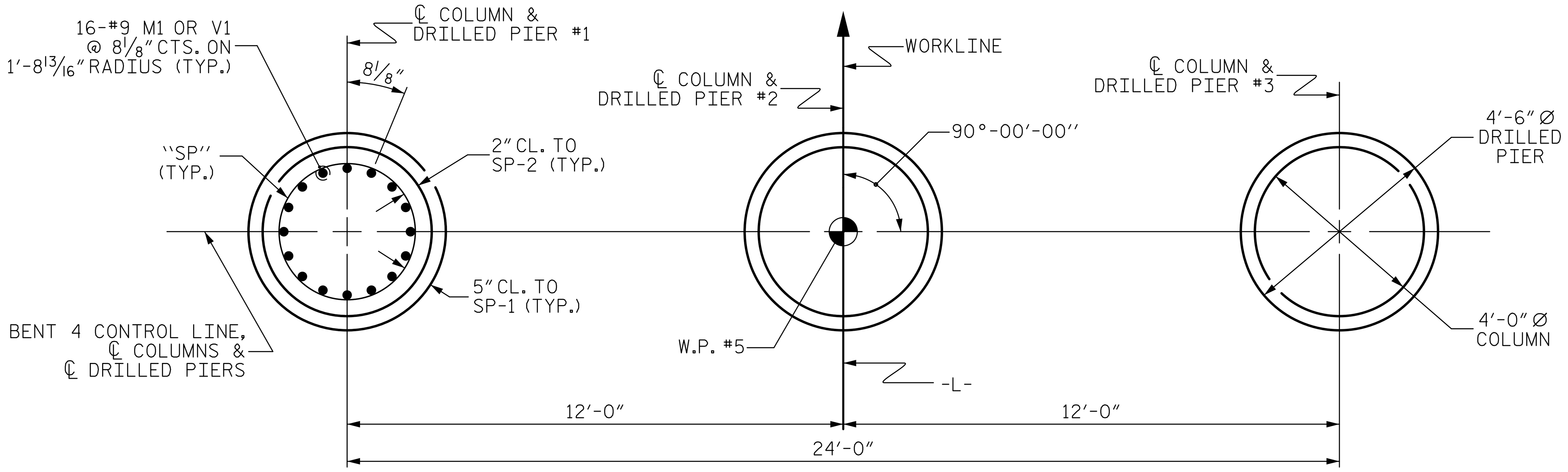
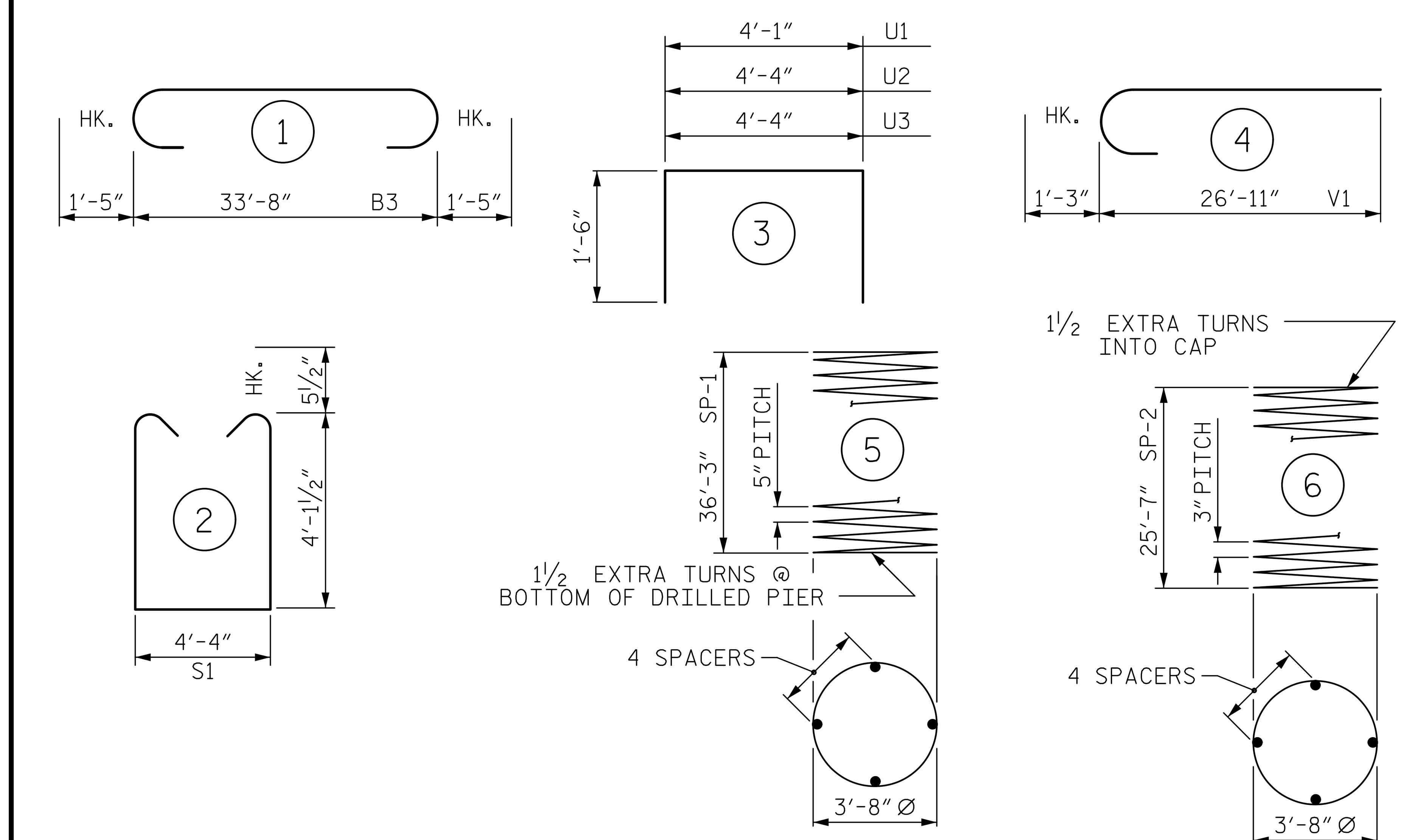
2				4			

SHEET NO. S-41
TOTAL SHEETS 45



PLAN OF DRILLED PIERS & COLUMNS

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

BENT NO. 4

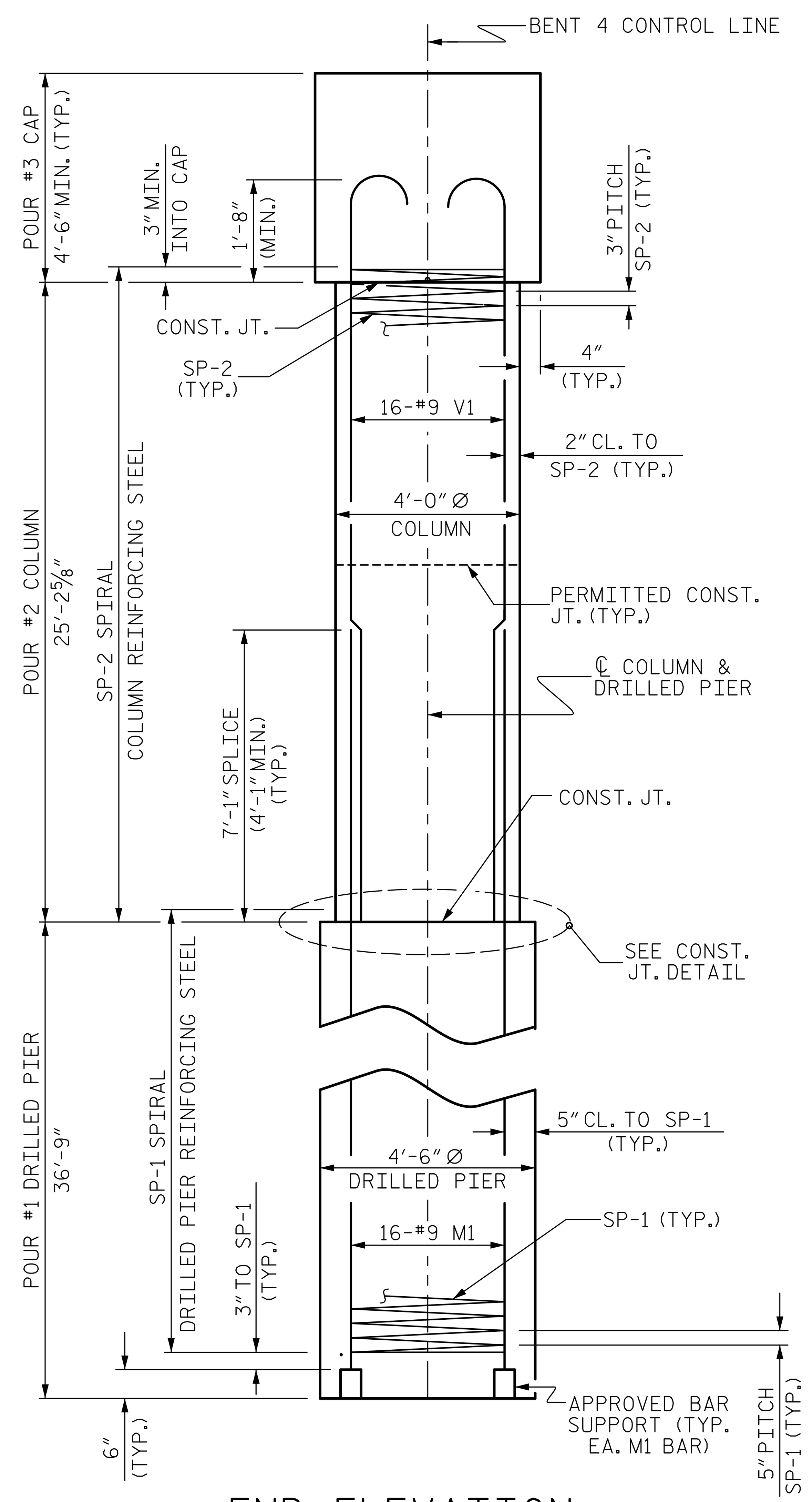
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#10	STR	33'-8"	1159
B2	10	#4	STR	33'-8"	225
B3	8	#10	1	36'-6"	1256
B4	8	#4	STR	3'-4"	18
M1	48	#9	STR	43'-7"	7113
S1	60	#5	2	13'-6"	845
U1	8	#4	3	7'-1"	38
U2	8	#4	3	7'-4"	39
U3	35	#4	3	7'-4"	171
V1	48	#9	4	28'-2"	4597
REINFORCING STEEL					15,461 LBS.
SP-1	3	*	5	1020'-0"	3192
SP-2	3	**	6	1190'-6"	2386
SPIRAL COLUMN REINFORCING STEEL					5578 LBS.

* THE SP-1 SPIRAL REINFORCING STEEL SHALL BE W31 OR D-31 COLD DRAWN WIRE OR #5 PLAIN OR DEFORMED BAR

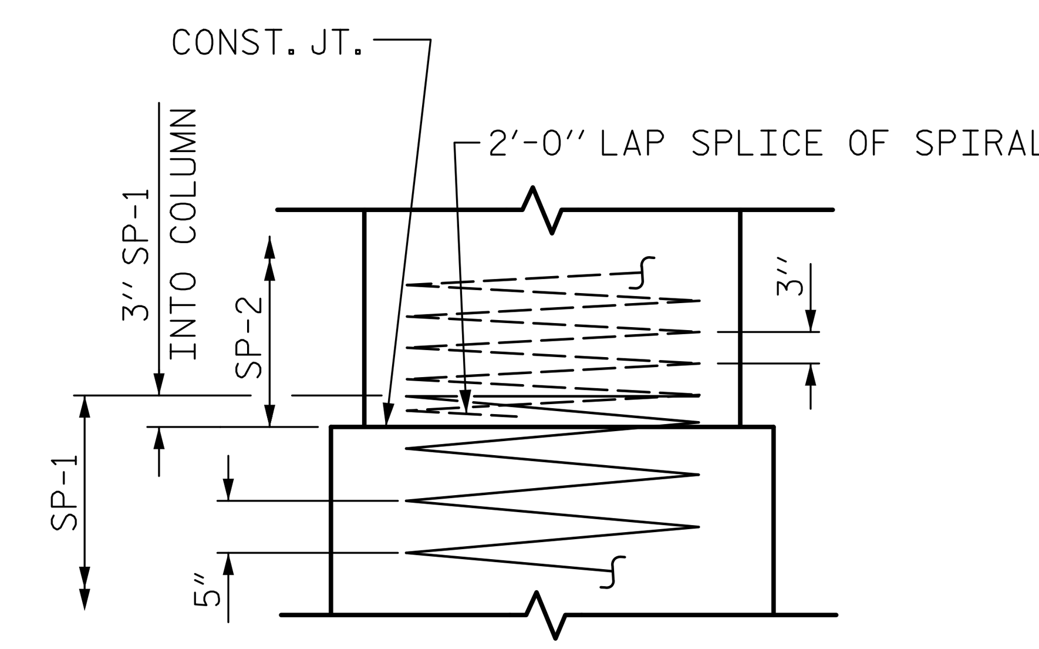
** THE SP-2 SPIRAL REINFORCING STEEL SHALL BE W20 OR D-20 COLD DRAWN WIRE OR #4 PLAIN OR DEFORMED BAR

CLASS A CONCRETE BREAKDOWN	
POUR #2 (COLUMNS)	35.2 C.Y.
POUR #3 (CAP)	27.2 C.Y.
TOTAL CLASS A CONCRETE	62.4 C.Y.

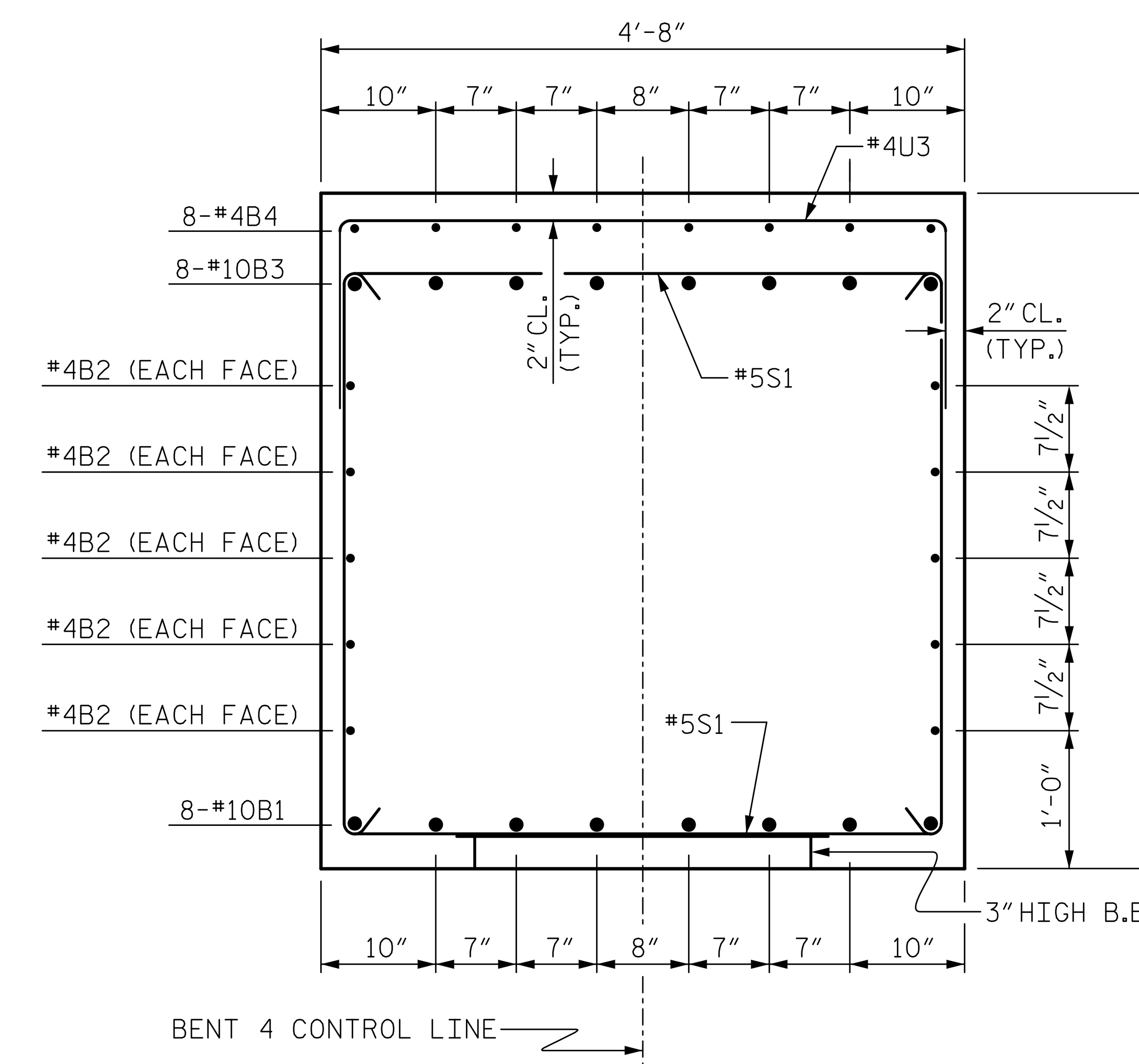
DRILLED PIERS:	
DRILLED PIER CONCRETE POUR #1 (DRILLED PIERS)	64.8 C.Y.
4'-6" Ø DRILLED PIER NOT IN SOIL	58.00 LIN. FT.
4'-6" Ø DRILLED PIER IN SOIL	52.10 LIN. FT.
CSL TUBES	458.4 LIN. FT.



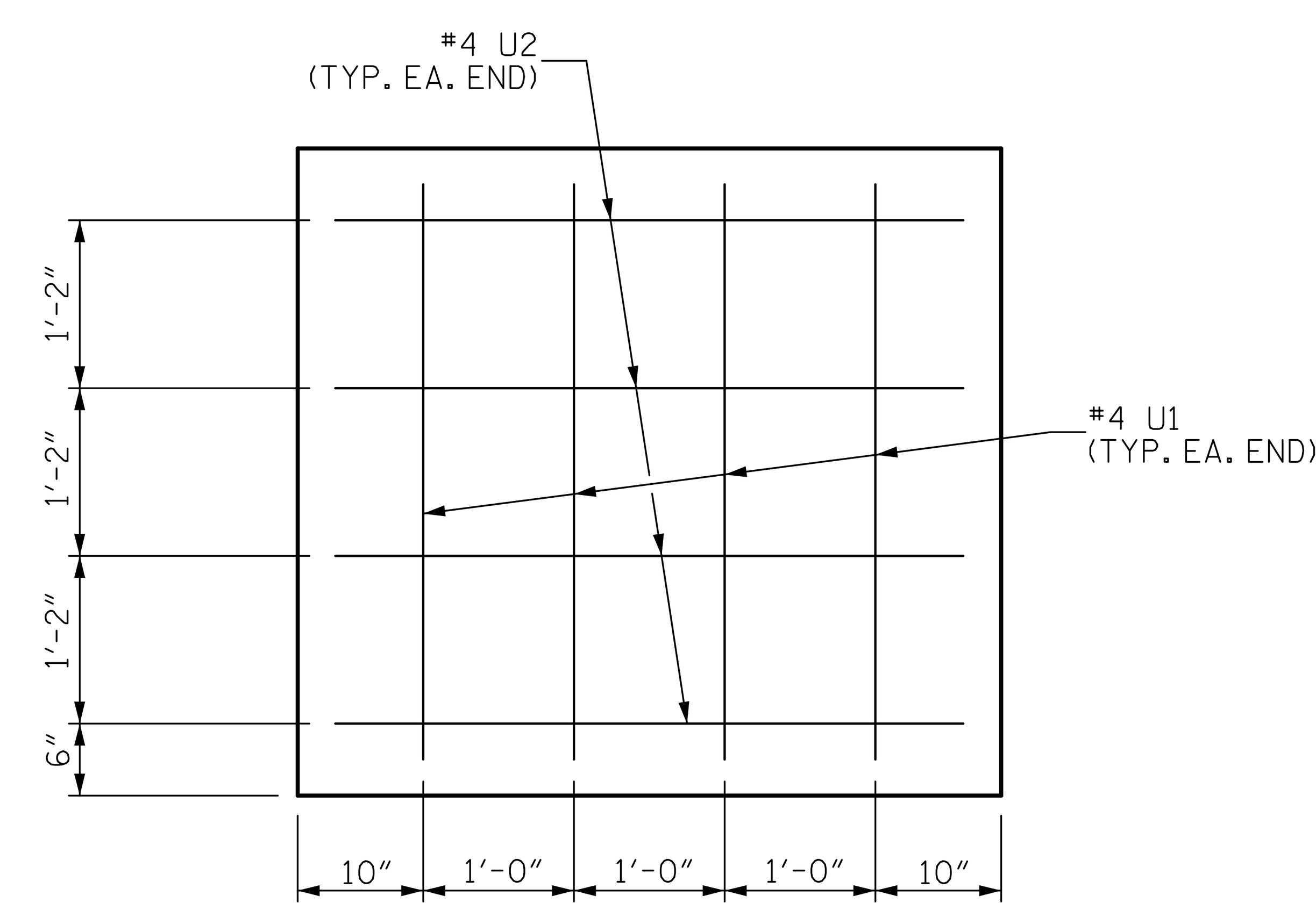
END ELEVATION



CONSTRUCTION JOINT DETAIL



SECTION A-A



SECTION X-X

(TYPICAL EACH END)

PROJECT NO. B-4407

ANSON/STANLY COUNTY

STATION: 32+31.61 -L-

SHEET 2 OF 2

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 042890 PATRICK R. GALLAGHER
3/18/2021

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

V&M Vaughn & Melton Consulting Engineers
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Atlanta, GA 770-627-3590

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
BENT NO. 4

DWN. BY: WDC	DATE: 10/2020
CHKD. BY: PRG	DATE: 10/2020
DES. EGR. OF RECORD: PRG	DATE: 10/2020

REVISIONS						
NO.	BY:	DATE:	NO.	BY:	DATE:	
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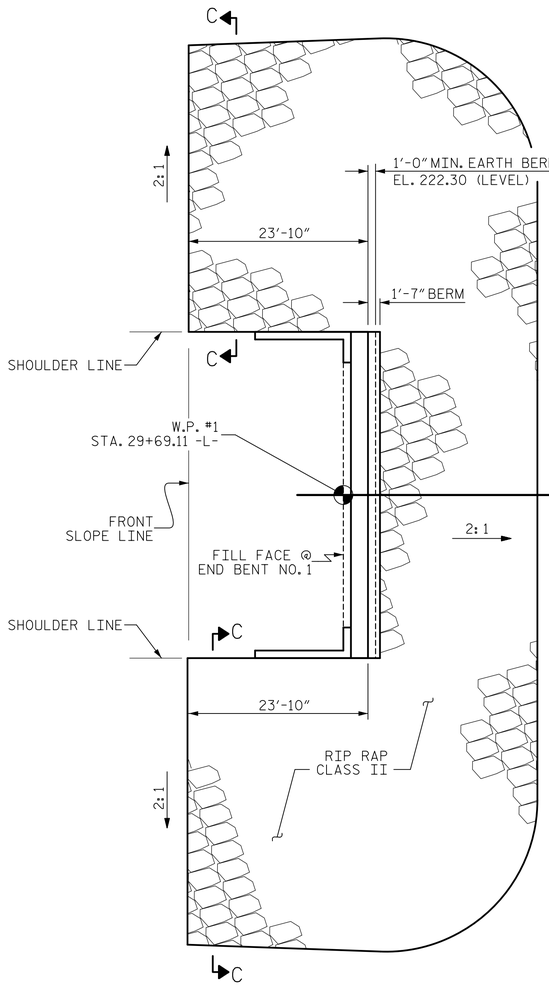
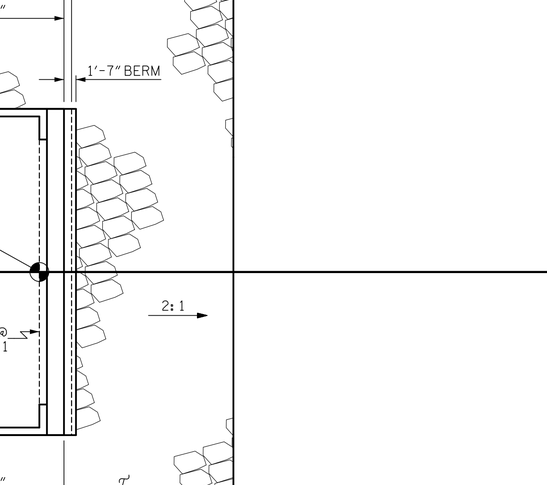
SHEET NO. S-42

TOTAL SHEETS 45

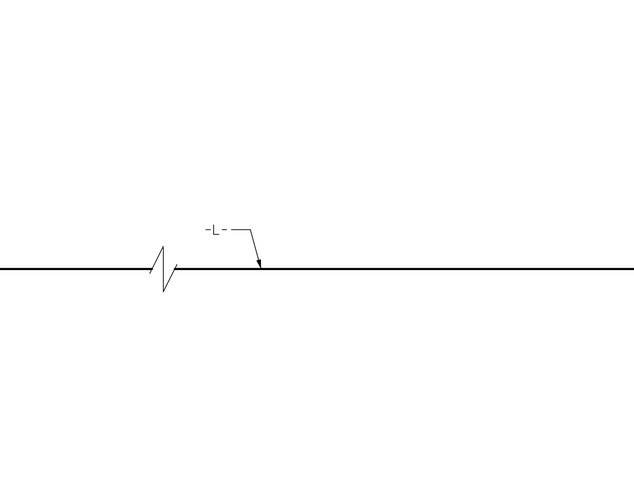


PLAN @ END BENT NO. 1

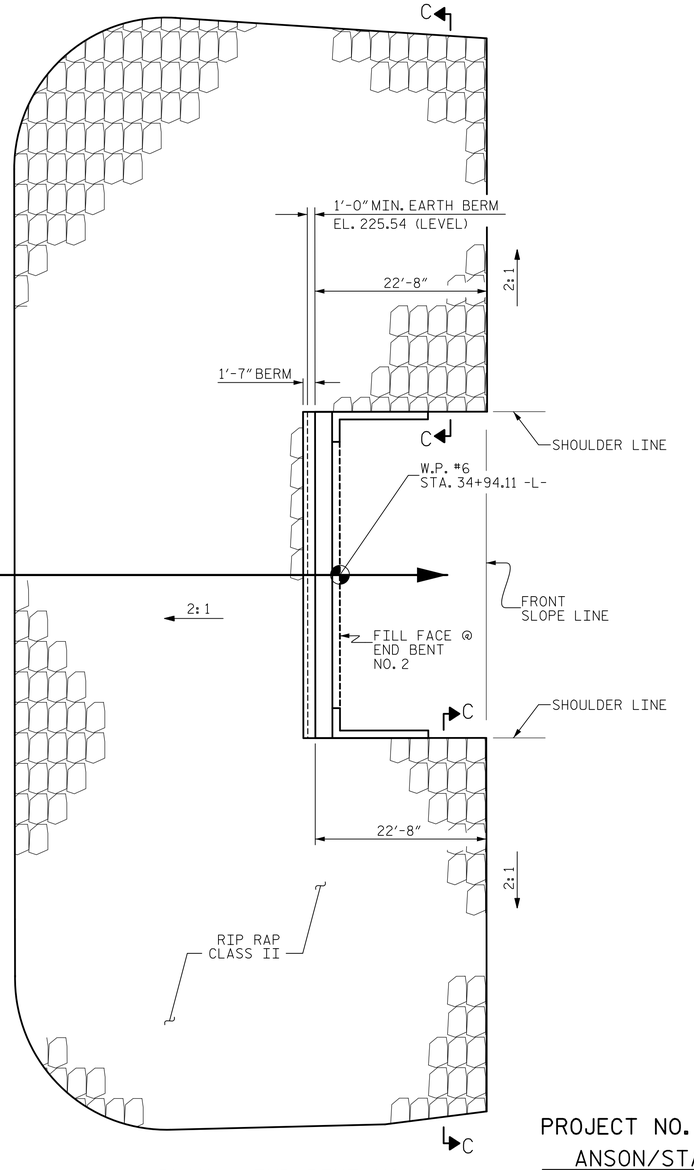
ESTIMATED QUANTITIES		
BRIDGE @ STA. 32+31.61 -L-	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE
	TONS	SQUARE YARDS
END BENT 1	630	700
END BENT 2	1110	1233
TOTAL	1740	1933



℄ SECTION
BERM RIP RAPPED



SECTION C-C



PLAN @ END BENT NO. 2

PROJECT NO. B-4407
ANSON/STANLY COUNTY
STATION: 32+31.61 -L-

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 042890 PATRICK R. GALLAGHER
3/18/2021

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Charleston, SC 843-974-5650
Middlesboro, KY 606-248-6600
Raleigh, NC 919-977-9455
Charlotte, NC 704-357-0488
Atlanta, GA 770-627-3590

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

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

DWN. BY: WDC DATE: 10/2020
CHKD. BY: PRG DATE: 10/2020
DES. EGR. OF RECORD: PRG DATE: 10/2020

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-43
1			3			TOTAL SHEETS
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STD. NO. RR1

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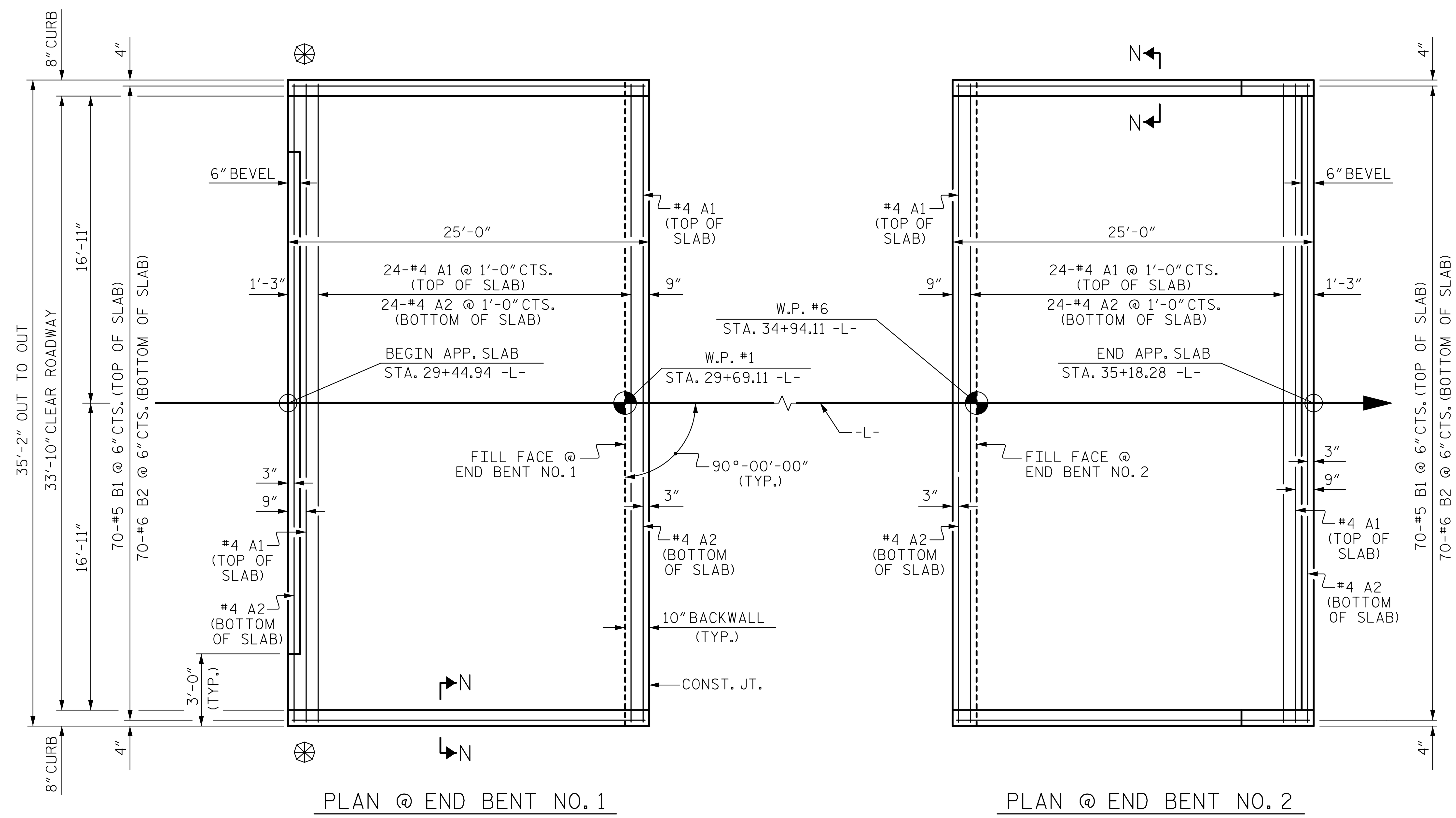


PLAN @ END BENT NO. 1

PLAN @ END BENT NO. 2

DIMENSIONS SHOWN ARE TYPICAL FOR BOTH APPROACH SLABS

NOTES

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

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

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

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

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

FOR THE 6″Ø DRAINAGE PIPE OUTLET(S), SEE ROADWAY STANDARD DRAWINGS.

AREA BETWEEN THE WINGWALL AND APPROACH SLAB SHALL BE GRADED TO DRAIN THE WATER AWAY FROM THE FILL FACE OF THE BRIDGE AND SHALL BE PAVED. SEE ROADWAY PLANS.

THE JOINT OPENING AT THE APPROACH SLAB/DECK INTERFACE SHALL BE SAWED NO MORE THAN 12 HOURS AFTER THE APPROACH SLAB IS CAST. THE JOINT SHALL BE CLEANED OF ALL DEBRIS BEFORE THE SEALANT IS APPLIED. THE JOINT SEALER MATERIAL SHALL CONFORM TO THE REQUIREMENTS OF SECTION 1028-3 OF THE STANDARD SPECIFICATIONS.

AT THE CONTRACTORS OPTION, "TYPE A - ALTERNATE APPROACH FILL" IN LIEU OF "TYPE I - STANDARD APPROACH FILL" MAY BE CONSTRUCTED AT NO ADDITIONAL COST TO THE DEPARTMENT. SEE SHEET 2 OF 2 FOR DETAILS AND NOTES.

BILL OF MATERIAL

APPROACH SLAB AT EB 1

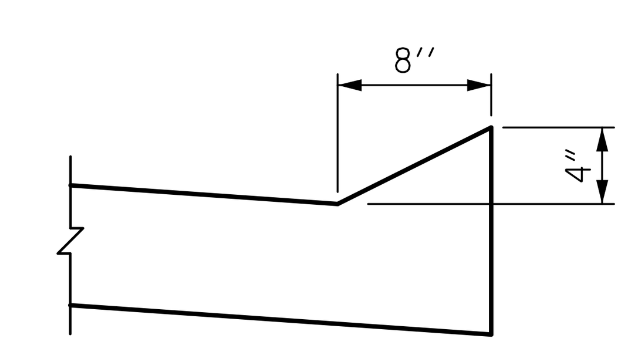
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	26	#4	STR	34′-10″	605
A2	26	#4	STR	34′-10″	605
* B1	70	#5	STR	24′-2″	1764
B2	70	#6	STR	24′-8″	2593
REINFORCING STEEL				LBS.	3198
* EPOXY COATED REINFORCING STEEL				LBS.	2369
CLASS AA CONCRETE				C.Y.	37.8

APPROACH SLAB AT EB 2

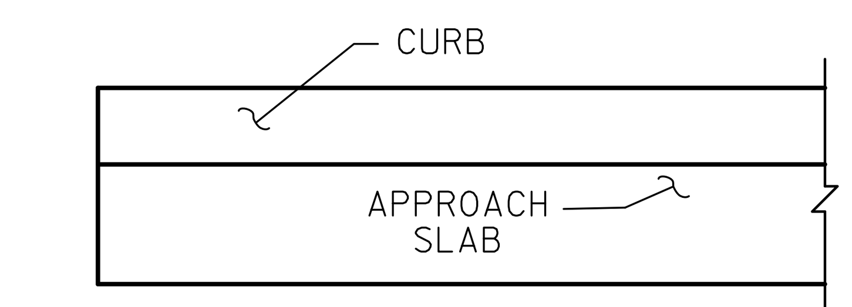
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	26	#4	STR	34′-10″	605
A2	26	#4	STR	34′-10″	605
* B1	70	#5	STR	24′-2″	1764
B2	70	#6	STR	24′-8″	2593
REINFORCING STEEL				LBS.	3198
* EPOXY COATED REINFORCING STEEL				LBS.	2369
CLASS AA CONCRETE				C.Y.	37.8

SPLICE LENGTHS

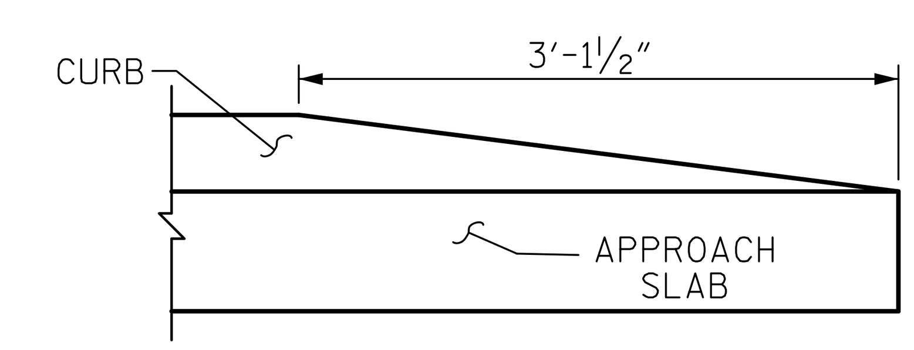
BAR SIZE	EPOXY COATED	UNCOATED
#4	1′-11″	1′-7″
#5	2′-5″	2′-0″
#6	3′-7″	2′-5″



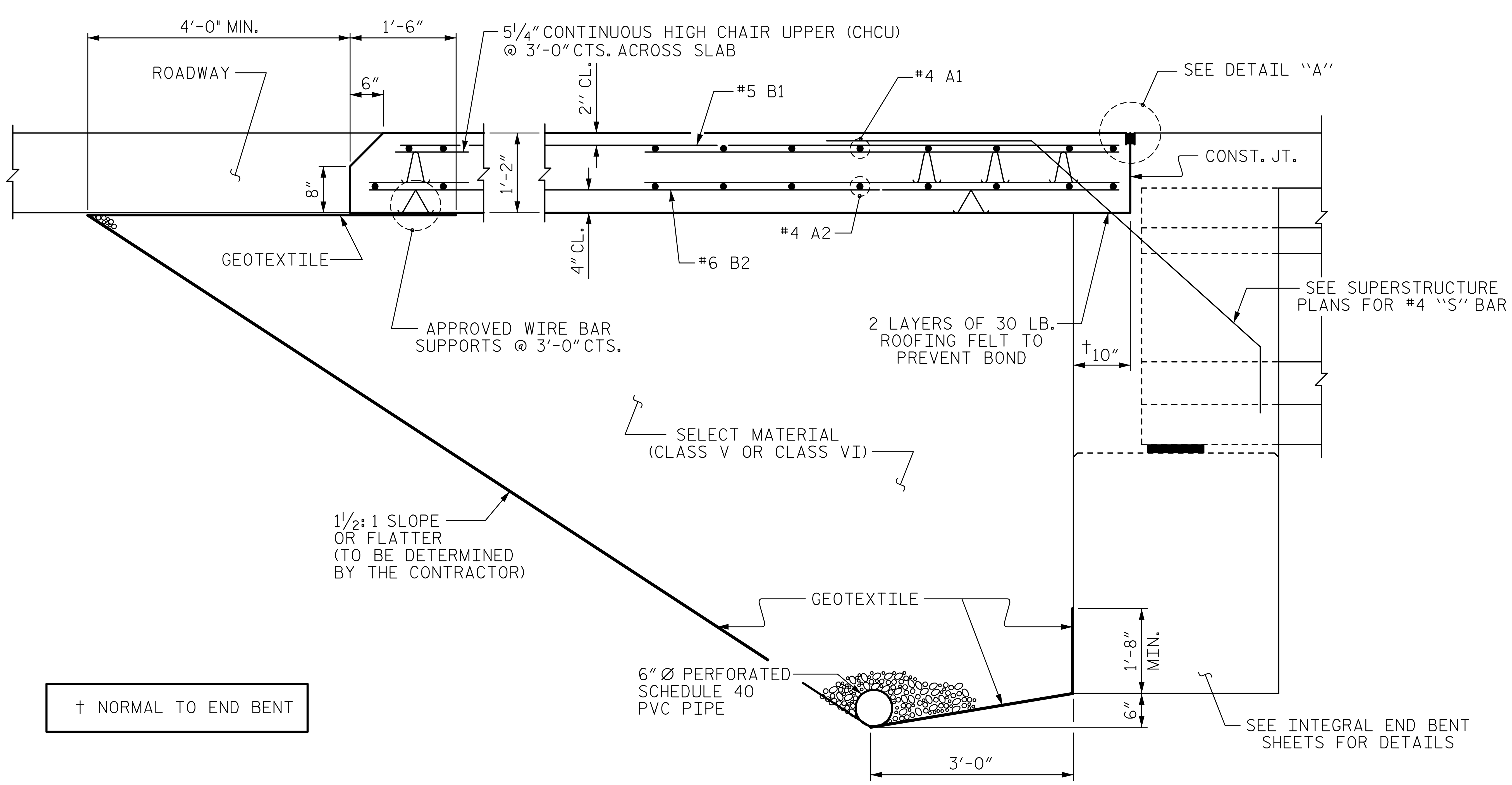
SECTION N-N



END OF CURB WITH SHOULDER BERM GUTTER



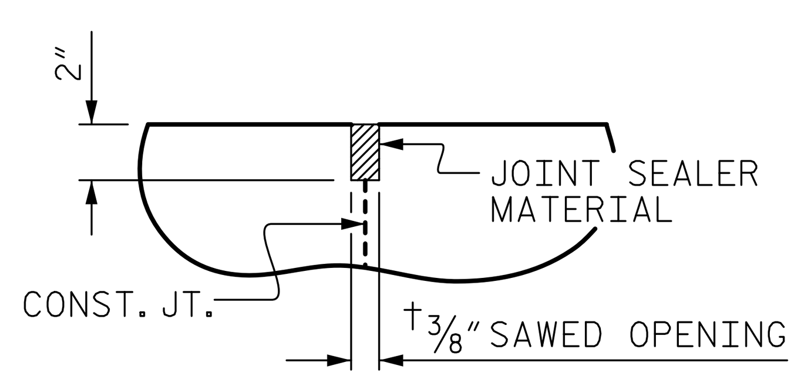
END OF CURB WITHOUT SHOULDER BERM GUTTER



† NORMAL TO END BENT

SECTION THRU SLAB

(TYPE I - STANDARD APPROACH FILL)



DETAIL "A"

PROJECT NO. B-4407

ANSON/STANLY COUNTY

STATION: 32+31.61 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB FOR INTEGRAL ABUTMENT WITH FLEXIBLE PAVEMENT

V&M Vaughn & Melton Consulting Engineers
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Boone, NC 828-355-9933 | Tri-Cities, TN 423-467-8401 | Knoxville, TN 865-546-5800 | Spartanburg, SC 864-574-4775 | Charleston, SC 843-974-5650 | Middlesboro, KY 606-248-6600 | Atlanta, GA 770-627-3590

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 042890 PATRICK R. GALLAGHER 3/18/2021

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DRAWN BY : TLA 10/05	REV. 6/13 MAA/GM	DWN. BY: WDC	DATE: 10/2020
CHECKED BY : GM 5/06	REV. 12/17 MAA/THC	CHKD. BY: PRG	DATE: 10/2020
	REV. 06/19 BNB/THC	DES. EGR. OF RECORD: PRG	DATE: 10/2020

REVISIONS

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SHEET NO. S-44
TOTAL SHEETS 45

STD. NO. BAS5

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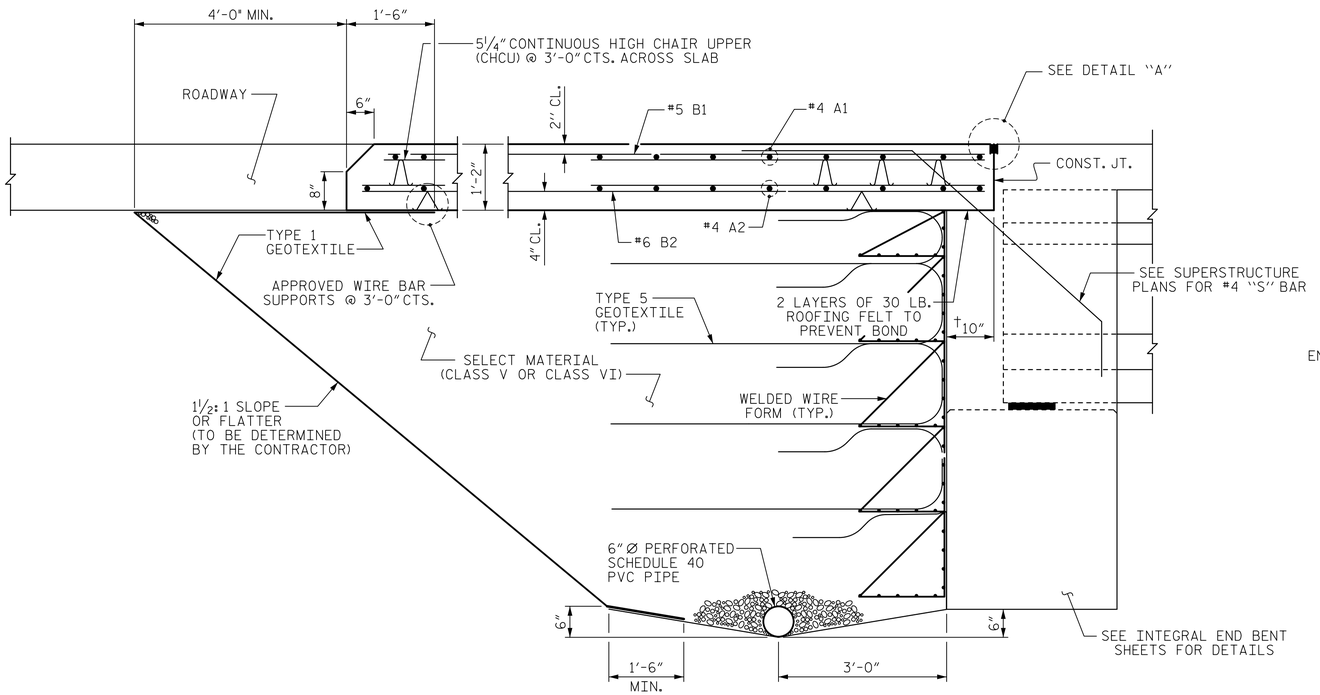
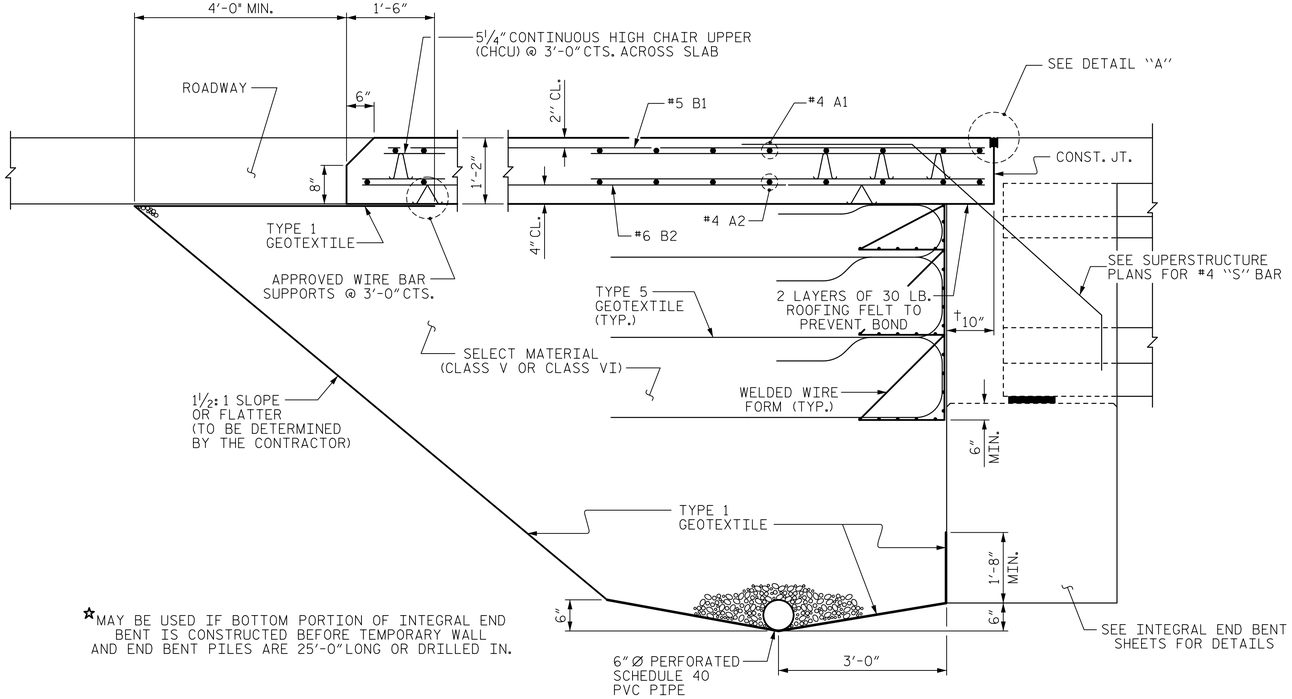


SECTION THRU SLAB

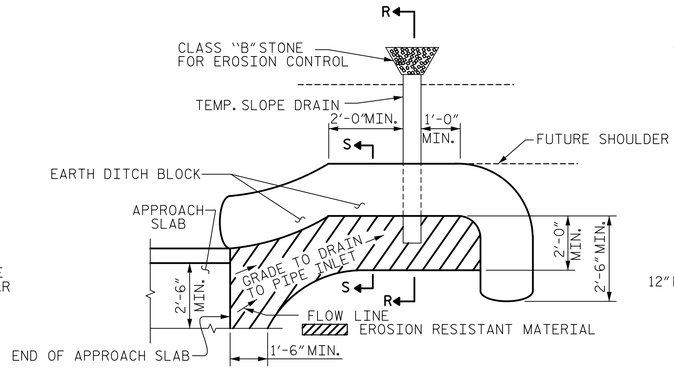
(TYPE A - ALTERNATE APPROACH FILL)



☆MAY BE USED IF BOTTOM PORTION OF INTEGRAL END BENT IS CONSTRUCTED BEFORE TEMPORARY WALL AND END BENT PILES ARE 25'-0" LONG OR DRILLED IN.

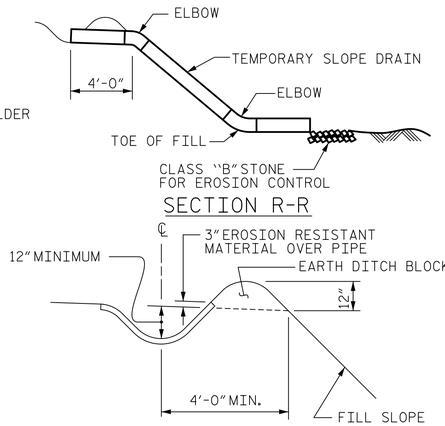
SECTION THRU SLAB

☆(TYPE A - ALTERNATE APPROACH FILL)



NOTE: IMMEDIATELY AFTER THE CONSTRUCTION OF THE APPROACH SLAB, THE CONTRACTOR SHALL PROVIDE TEMPORARY BERM AND SLOPE DRAIN. CONTRACTOR SHALL GRADE TO PIPE INLET AND PROVIDE EROSION RESISTANT MATERIAL AS SHOWN. THE EROSION RESISTANT MATERIAL SHALL BE EITHER 1) ASPHALT PLANT MIX, TYPE 1 OR TYPE 2, MIN. 2" DEPTH, 2) EROSION CONTROL MAT, OR 3) CONCRETE, AS DIRECTED BY THE ENGINEER. THE SLOPE DRAIN SHALL CONSIST OF A NON-PERFORATED TEMPORARY DRAINAGE PIPE, 12 INCHES IN DIAMETER.

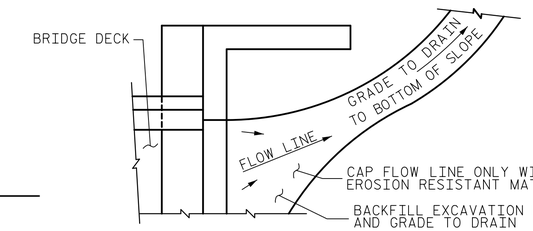
PLAN VIEW



SECTION S-S

TEMPORARY BERM AND SLOPE DRAIN DETAILS

(TO BE USED WHEN SHOULDER BERM GUTTER IS REQUIRED)



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

TEMPORARY DRAINAGE DETAIL

NOTES

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

FOR TEMPORARY GEOTEXTILE WALL INCLUDING GEOTEXTILE, 6" Ø DRAINAGE PIPE, WELDED WIRE FORM, AND SELECT MATERIAL, SEE ROADWAY PLANS.

GEOTEXTILE (TYPE 1 OR TYPE 5) SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS SECTION 1056.

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

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

FOR THE 6" Ø DRAINAGE PIPE OUTLET(S), SEE ROADWAY STANDARD DRAWINGS.

AREA BETWEEN THE WINGWALL AND APPROACH SLAB SHALL BE GRADED TO DRAIN THE WATER AWAY FROM THE FILL FACE OF THE BRIDGE AND SHALL BE PAVED. SEE ROADWAY PLANS.

THE JOINT OPENING AT THE APPROACH SLAB/DECK INTERFACE SHALL BE SAWED NO MORE THAN 12 HOURS AFTER THE APPROACH SLAB IS CAST. THE JOINT SHALL BE CLEANED OF ALL DEBRIS BEFORE THE SEALANT IS APPLIED. THE JOINT SEALER MATERIAL SHALL CONFORM TO THE REQUIREMENTS OF SECTION 1028-3 OF THE STANDARD SPECIFICATIONS.

PROJECT NO. B-4407

ANSON/STANLY COUNTY

STATION: 32+31.61 -L-

SHEET 2 OF 2

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

NORTH CAROLINA PROFESSIONAL SEAL 042590 ENGINEER PATRICK R. GALLAGHER
3/18/2021

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DRAWN BY : TLA 10/05	REV. 12/21/11	MAA/GM
CHECKED BY : GM 5/06	REV. 6/13	MAA/GM
	REV. 12/17	MAA/THC

DWN. BY: WDC	DATE: 10/2020
CHKD. BY: PRG	DATE: 10/2020
DES. EGR. OF RECORD: PRG	DATE: 10/2020

REVISIONS						SHEET NO.
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1			3			TOTAL SHEETS
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STD. NO. BAS5

wdcruden
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TIME: 08:08 AM on Thursday, February 04, 2021

STANDARD NOTES

DESIGN DATA:

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

MATERIAL AND WORKMANSHIP:

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

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

CONCRETE:

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

CONCRETE CHAMFERS:

UNLESS OTHERWISE NOTED ON THE PLANS, ALL EXPOSED CORNERS ON STRUCTURES SHALL BE CHAMFERED ¾" WITH THE FOLLOWING EXCEPTIONS: TOP CORNERS OF CURBS MAY BE ROUNDED TO 1½" RADIUS WHICH IS BUILT INTO CURB FORMS; CORNERS OF TRANSVERSE FLOOR EXPANSION JOINTS SHALL BE ROUNDED WITH A ¼" 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 ¼" 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 ⅞" Ø SHEAR STUDS FOR THE ¾" Ø STUDS SPECIFIED ON THE PLANS. THIS SUBSTITUTION SHALL BE MADE AT THE RATE OF 3 - ⅞" Ø STUDS FOR 4 - ¾" Ø STUDS, AND STUD SPACING CHANGES SHALL BE MADE AS NECESSARY TO PROVIDE THE SAME EQUIVALENT NUMBER OF ⅞" Ø STUDS ALONG THE BEAM AS SHOWN FOR ¾" Ø STUDS BASED ON THE RATIO OF 3 - ⅞" Ø STUDS FOR 4 - ¾" Ø 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 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 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. FINS AND OTHER DEFORMATIONS RESULTING FROM CASTING OR OTHERWISE SHALL BE REMOVED IN A MANNER SO THAT A UNIFORM COLORING OF THE COMPLETED CASTING SHALL BE OBTAINED. CASTINGS WITH DISCOLORATIONS OR OF NON-UNIFORM COLORING WILL NOT BE ACCEPTED. CERTIFIED MILL REPORTS ARE REQUIRED FOR METAL RAILS AND POSTS.

SPECIAL NOTES:

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

ENGLISH

JANUARY, 1990

STD. NO. SN

REV. 6-16-95 EEM (/) RGW
REV. 8-16-99 RWW (/) LES
REV. 5-7-03 RWW (/) JTE
REV. 5-1-06 TLA (/) GM
REV. 10-1-11 MAA (/) GM
REV. 12-17 MAA (/) THC