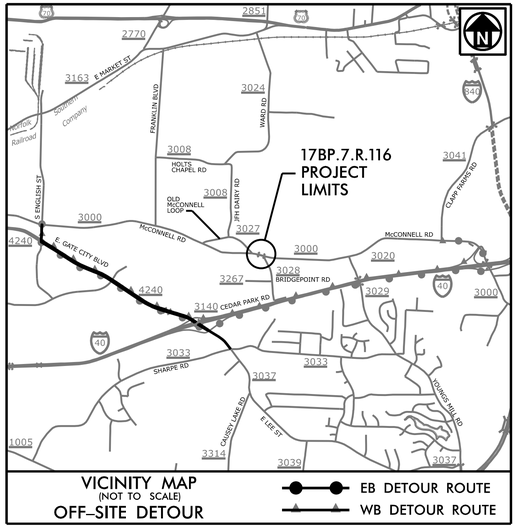
PROJECT: 17BP.7.R.116

CONTRACT: C205061



STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

GUILFORD COUNTY

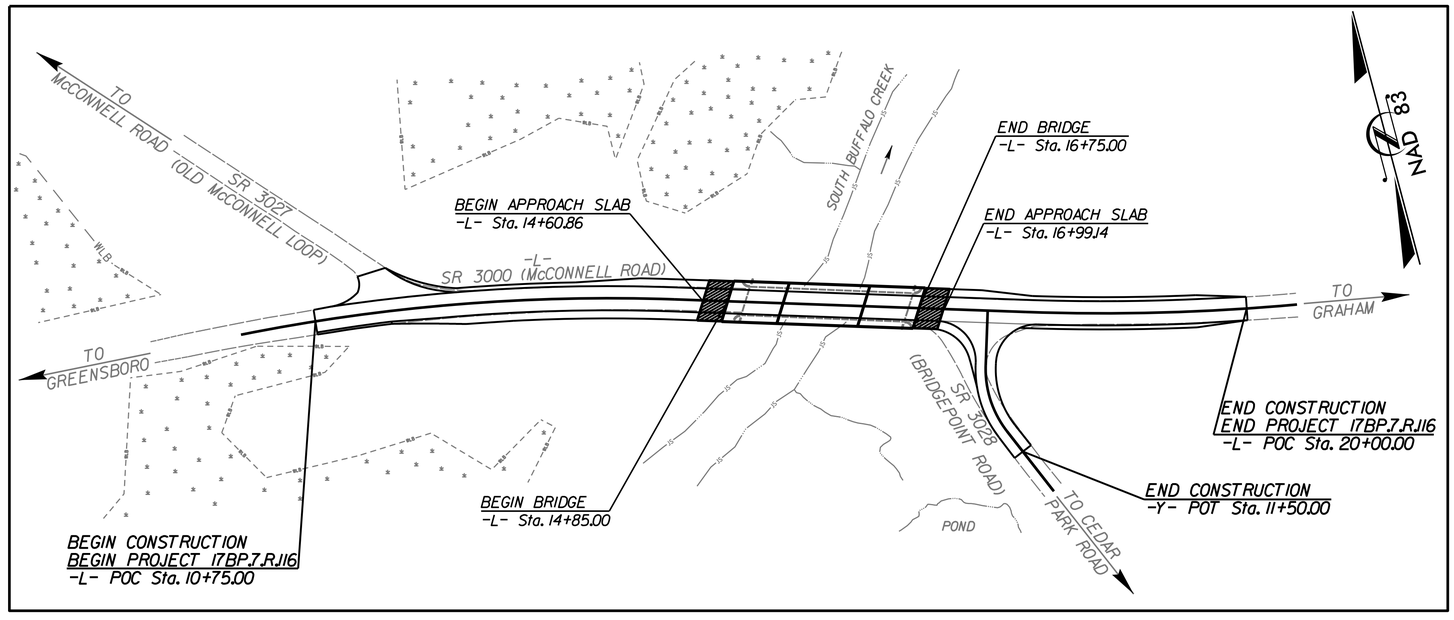
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	17BP.7.R.116		

STATE PROJECT NO.	F. A. PROJ. NO.	DESCRIPTION
17BP.7.PE.116	N/A	PE
17BP.7.ROW.116	N/A	RW/UTL
17BP.7.R.116	N/A	CONST.

LOCATION: BRIDGE #400224 OVER SOUTH BUFFALO CREEK ON SR 3000 (McCONNELL ROAD)

TYPE OF WORK: GRADING, DRAINAGE, PAVING AND STRUCTURE

STRUCTURE PLANS



DESIGN DATA

ADT 2025 = 6,300
ADT 2040 = 9,800

D = 50 %
T = 7 % *
V = 45 MPH

* TTST = 3 % DUAL = 4 %

FUNC CLASS = COLLECTOR

SUB REGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY PROJECT = 0.139 MILES

LENGTH STRUCTURE PROJECT = 0.036 MILES

TOTAL LENGTH PROJECT = 0.175 MILES

Structure Plans Prepared In the Office of:

WGI
5640 Dillard Drive, Suite 200, Cary, N.C. 27518
Licensure Number: C-4434

2024 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: MAY 25, 2018

LETTING DATE: APRIL 15, 2025

TIM JORDAN, PE
PROJECT ENGINEER

JOSHUA MASSROCK, PE
HYDRAULIC ENGINEER

NCDOT CONTACT: DANIEL DAGENHART
DIVISION BRIDGE PROGRAM MANAGER

STRUCTURE DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 023908 ENGINEER MARK A. AVERETTE

2/25/2025 | 7:45 AM PST

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

15+00 16+00 17+00

SPAN A SPAN B SPAN C

BEGIN BRIDGE
FILL FACE @ END BENT 1
STA. 14+85.00 -L-
G.P. EL. 712.44

BEGIN FRONT SLOPE
STA. 14+74.00 -L-
G.P. EL. 712.33

END BRIDGE
FILL FACE @ END BENT 2
STA. 16+75.00 -L-
G.P. EL. 714.37

BEGIN FRONT SLOPE
STA. 16+86.40 -L-
G.P. EL. 714.48

INT. FIX. FIX. FIX. FIX. INT.

1'-7" BERM NORMAL TO CAP (TYP.)

1'-0" MIN. EARTH BERM NORMAL TO CAP (TYP.)

LOW CHORD @ END BENT 1
EL. 707.31

LOW CHORD @ END BENT 2
EL. 709.20

APPROXIMATE NATURAL GROUND LINE

UNCLASSIFIED STRUCTURE EXCAVATION (TYP.)

TOP OF DRILLED PIER
EL. 697.09

TOP OF DRILLED PIER
EL. 694.40

BASE DISCHARGE (Q100)
EL. 707.3

EXISTING SUBSTRUCTURE (TYP.)

N.W.S.
EL. 693.4
11-9-2017

720
710
700
690
680

EL. 711 ± EL. 711 ± EL. 707 ± EL. 702 ± EL. 701 ± EL. 691 ± EL. 691 ± EL. 692 ± EL. 694 ± EL. 692 ± EL. 701 ± EL. 704 ± EL. 711 ± EL. 712 ±

2'-0" MIN. PILE EMBED. (TYP.)

HP 12 X 53 STEEL PILES (TYP. EA. END BENT)

SLOPE TO DRAIN (TYP.)

EXCAVATE TO EL. 702.0 ±

BANK STABILIZATION (ROADWAY DETAIL AND PAY ITEM)

3'-0" Ø COLUMN (TYP.)

3'-6" Ø DRILLED PIER (TYP.)

SLOPE TO DRAIN (TYP.)

EXCAVATE TO EL. 702.0 ±

BANK STABILIZATION (ROADWAY DETAIL AND PAY ITEM)

1'-0" MIN. (TYP.)

SLOPE 1½:1 (TYP.)

CLASS II RIP RAP (TYP.)

* 1'-6" TO UNCLASSIFIED STRUCTURE EXCAVATION (TYP.)

END BENT 1 BENT 1 BENT 2 END BENT 2

SECTION ALONG ℄ SURVEY -L-

(SECTIONS @ END BENTS AND BENTS ARE @ RIGHT ANGLES)

TOTAL BRIDGE LENGTH = 190'-0" (FILL FACE TO FILL FACE)

55'-0" (SPAN A) 80'-0" (SPAN B) 55'-0" (SPAN C)

40'-0"

EARTH BERM
EL. 702.14
(LEVEL)

EARTH BERM
EL. 704.03
(LEVEL)

NAD 83

W.P. #1
STA. 14+85.00 -L-
FILL FACE @ END BENT 1

W.P. #3
STA. 16+20.00 -L-
BENT 2 CONTROL LINE

W.P. #4
STA. 16+75.00 -L-
FILL FACE @ END BENT 2

EXISTING SUBSTRUCTURE (TYP.)

℄ BRIDGE
STA. 15+80.00 -L-

BEGIN APPROACH SLAB
STA. 14+60.86 -L-

TO SR 3027

END APPROACH SLAB
STA. 16+99.14 -L-

℄ SURVEY -L-

TO SR 3028

105°-00'-00" (TYP.)

BEGIN FRONT SLOPE
STA. 14+74.00 -L-

W.P. #2
STA. 15+40.00 -L-
BENT 1 CONTROL LINE

BEGIN FRONT SLOPE
STA. 16+86.40 -L-

CLASS II RIP RAP (TYP.)

1'-7" BERM NORMAL TO CAP (TYP.)

SOUTH BUFFALO CREEK

BANK STABILIZATION (ROADWAY DETAIL AND PAY ITEM)

1'-0" MIN. EARTH BERM NORMAL TO CAP (TYP.)

PLAN

(PILES AND DRILLED PIERS NOT SHOWN IN PLAN VIEW)

(+)0.6600% (+)1.0133%

PVI STA. 12+50.00
EL. = 710.06
VC = 100'

(+)1.0133% (+)2.9900%

PVI STA. 18+50.00
EL. = 716.14
VC = 200'

GRADE DATA -L-

HYDRAULIC DATA:

DESIGN DISCHARGE	= 5360 CFS
FREQUENCY OF DESIGN FLOOD	= 25 YEAR
DESIGN HIGH WATER ELEVATION	= 705.6
DRAINAGE AREA	= 33.9 SQ. MI.
BASE DISCHARGE (Q 100)	= 7950 CFS
BASE HIGH WATER ELEVATION	= 707.3

OVERTOPPING FLOOD DATA:

OVERTOPPING DISCHARGE	= 10500 CFS
FREQUENCY OF OVERTOPPING FLOOD	= 500- YEAR
OVERTOPPING FLOOD ELEVATION	= 707.6 **

** OVERTOPPING OCCURS AT ROADWAY SHOULDER AT STA. 10+97.00 -L- RT.

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS

PROJECT NO. 17BP.7.R.116

GUILFORD COUNTY

STATION: 15+80.00 -L-

SHEET 1 OF 4 REPLACES BRIDGE #224

DRAWN BY: T. BANKOVICH DATE: 1-22
CHECKED BY: B.S. COX DATE: 1-22
DESIGN ENGINEER OF RECORD: M.A. AVERETTE DATE: 11-24

WGI
5640 Dillard Drive, Suite 200
Cary, NC 27518
LICENSURE NO. C-4434

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 023908 MARK A. AVERETTE
2/25/2025 | 7:45 AM PST

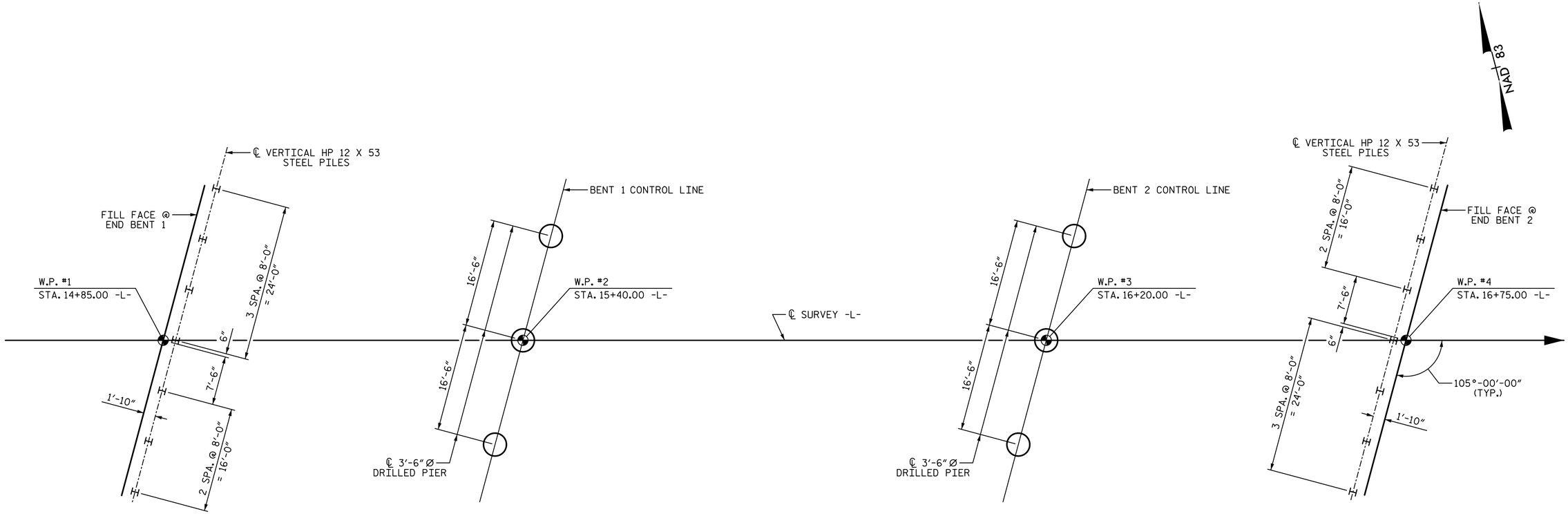
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR BRIDGE ON SR 3000 (MCCONNELL RD)
OVER SOUTH BUFFALO CREEK
BETWEEN SR 3027 AND SR 3028
40'-0" CLEAR ROADWAY - 105° SKEW

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



FOUNDATION LAYOUT

FOUNDATION NOTES:

FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

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

INSTALL PERMANENT STEEL CASING AT BENT 1 BY VIBRATING, SCREWING, OR DRIVING PERMANENT CASINGS BEFORE EXCAVATING OR DISTURBING ANY MATERIAL ABOVE ELEVATION 686.0 FEET.

PROJECT NO. 17BP.7.R.116

GUILFORD COUNTY

STATION: 15+80.00 -L-

SHEET 2 OF 4

WGI
5640 Dillard Drive, Suite 200
Cary, NC 27518
LICENSURE NO. C-4434

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 023908 MARK A. AVERETTE

2/17/2025 | 12:54 PM EST

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR BRIDGE ON SR 3000
(MCCONNELL RD)
OVER SOUTH BUFFALO CREEK
BETWEEN SR 3027 AND SR 3028
40'-0" CLEAR ROADWAY - 105° SKEW

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

DRAWN BY:	T. BANKOVICH	DATE: 1-22
CHECKED BY:	B.S. COX	DATE: 1-22
DESIGN ENGINEER OF RECORD:	M.A. AVERETTE	DATE: 11-24

SUMMARY OF PILE INFORMATION/INSTALLATION

(Blank entries indicate item is not applicable to structure)

End Bent / Bent No, Pile(s) #(-#) (e.g., "Bent 1, Piles 1-5")	Number of Piles per Line	Factored Resistance per Pile KIPS	Pile Cut-Off (Top of Pile) Elevation FT	Estimated Pile Length per Pile FT	Scour Critical Elevation FT	Driven Piles			Predrilling for Piles **			Drilled-In Piles		
						Minimum Pile Tip (Tip No Higher Than) Elevation FT	Required Driving Resistance (RDR)* per pile KIPS	Pile Redrives Quantity EACH	Predrilling Length per Pile LIN FT	Predrilling Elevation (Elevation Not To Predrill Below) FT	Maximum Predrilling Diameter INCHES	Pile Excavation (Bottom of Hole) Elevation FT	Pile Excavation Not In Soil per Pile LIN FT	Pile Excavation In Soil per Pile LIN FT
End Bent No. 1	7	190	See Substructure Plans	25			320							
End Bent No. 2	7	190	See Substructure Plans	15			320							
TOTAL QUANTITY:														

$$* RDR = \frac{Factored\ Resistance + Factored\ Drag\ Load + Factored\ Dead\ Load}{Dynamic\ Resistance\ Factor} + Nominal\ Drag\ Load\ Resistance + Nominal\ Resistance\ from\ Scourable\ Material$$

** Predrilling for Piles is required for end bents/bents with a predrilling length and at the Contractor's option for end bents/bents with predrilling information but no predrilling length.

PILE DESIGN INFORMATION

(Blank entries indicate item is not applicable to structure)

End Bent / Bent No, Pile(s) #(-#) (e.g., "Bent 1, Piles 1-5")	Factored Axial Load per Pile KIPS	Factored Drag Load per Pile KIPS	Factored Dead Load * per Pile KIPS	Dynamic Resistance Factor	Nominal Drag Resistance per Pile KIPS	Nominal Scour Resistance per Pile KIPS
End Bent No. 1	189			0.6		
End Bent No. 2	189			0.6		

* Factored Dead Load is factored weight of pile above the ground line.

SUMMARY OF PILE ACCESSORIES

(Blank entries indicate item is not applicable to structure)

End Bent / Bent No, Pile(s) #(-#) (e.g., "Bent 1, Piles 1-5")	Pipe Pile Plates EACH	Steel Pile Points		
		Pipe Pile Cutting Shoes EACH	Pipe Pile Conical Points EACH	H-Pile Points EACH
End Bent No. 1				
End Bent No. 2				7
TOTAL QUANTITY:				7

SUMMARY OF DRILLED PIER INFORMATION/INSTALLATION

(Blank entries indicate item is not applicable to structure)

End Bent / Bent No, Pier(s) #(-#) (e.g., "Bent 1, Piers 1-3")	Number of Piers per Line	Factored Resistance per Pier KIPS	Required Drilled Pier Tip Elevation FT	Required Tip Resistance per Pier KSF	Scour Critical Elevation FT	Minimum Drilled Pier Penetration Into Rock per Pier LIN FT	Drilled Pier Length* per Pier LIN FT	Drilled Pier Length Not In Soil* per Pier LIN FT	Drilled Pier Length In Soil* per Pier LIN FT	Permanent Steel Casing Required? YES	Permanent Steel Casing Tip Elevation (Elevation Not To Extend Casing Below) FT	Permanent Steel Casing Length** per Pier LIN FT
Bent No. 1	3	700	678.60	160	683.00	4	22.40	4.00	18.4	YES	682.60	18.40
Bent No. 2	3	740	690.40	160	694.10	4	7.60	4.60	3	YES	694.10	3.90
TOTAL QUANTITY:							90	25.8	64.2			66.9

* Drilled Pier Length, Drilled Pier Length Not in Soil and Drilled Pier Length in Soil represent estimated drilled pier quantities and are measured and paid for as either "____ Dia. Drilled Piers" or "____ Dia. Drilled Piers Not in Soil" and "____ Dia. Drilled Piers in Soil" in accordance with Article 411-7 of the NCDOT Standard Specifications. For bents with a not in soil pay item, drilled piers through air or water will be paid at the contract unit price for "__Dia. Drilled Piers in Soil."

** Permanent Steel Casing Length equals the difference between the ground line or top of drilled pier elevation, whichever is higher, and the permanent casing tip elevation and is measured and paid for as "Permanent Steel Casing for ____ Dia. Drilled Pier" in accordance with Article 411-7 of the NCDOT Standard Specifications.

SUMMARY OF DRILLED PIER TESTING

(Blank entries indicate item is not applicable to structure)

End Bent / Bent No, Pier(s) #(-#) (e.g., "Bent 1, Piers 1-3")	Standard Penetration Test (SPT) EACH	Crosshole Sonic Logging (CSL) EACH	Thermal Integrity Profiler (TIP) EACH	Shaft Inspection Device (SID) EACH	Pile Integrity Test (PIT) EACH
Bent No. 1		1		1	
Bent No. 2		1		1	
TOTAL QUANTITY:		2		2	

PROJECT NO. 17BP.7.R.116

GUILFORD COUNTY

STATION: 15+80.00 -L-

NOTES:

1. The Pile Foundation Tables are based on the bridge substructure design and foundation recommendations sealed by a North Carolina Professional Engineer (Jeremy R. Hamm, #039779) on 12-3-2024.
2. Total Pile Driving Equipment Setup quantity (not shown in Pile Foundation Tables) equals the number of driven piles, i.e., the number of piles with a Required Driving Resistance.
3. The Engineer may adjust the quantity for DPT Testing, Pipe Pile Plates, Permanent Steel Casing, SPTs, TIPs, CSL Testing, SID Inspections and PITs when necessary.

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 023908 ENGINEER MARK A. AVERETTE

2/17/2025 | 12:54 PM PST

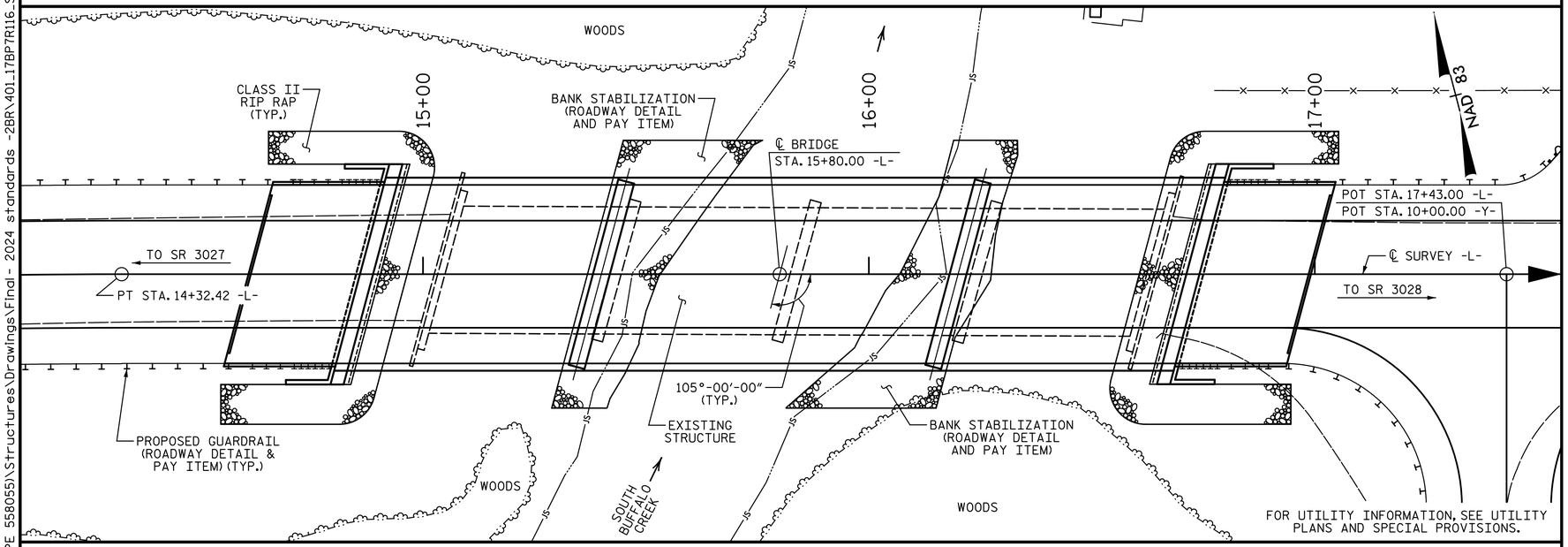
SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

PILE AND DRILLED PIER FOUNDATION TABLES

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



LOCATION SKETCH

TOTAL BILL OF MATERIAL

	REMOVAL OF EXISTING STRUCTURE	ASBESTOS ASSESSMENT	3'-6"DIA. DRILLED PIER IN SOIL	3'-6"DIA. DRILLED PIER NOT IN SOIL	PERMANENT STEEL CASING FOR 3'-6"DIA. DRILLED PIERS	SID INSPECTIONS	CSL TESTING	UNCLASSIFIED STRUCTURE EXCAVATION	REINFORCED CONCRETE DECK SLAB	GROOVING BRIDGE FLOORS	CLASS A CONCRETE	BRIDGE APPROACH SLABS
	LS	LS	LF	LF	LF	EA	EA	LS	SF	SF	CY	LS
SUPERSTRUCTURE									8,217.50	8,739		LS
END BENT 1								LS			35.4	
BENT 1			43.5	12.0	55.2						30.3	
BENT 2			0.0	13.5	11.7						32.7	
END BENT 2								LS			35.0	
TOTAL	LS	LS	43.5	25.5	66.9	2	2	LS	8,217.50	8,739	133.4	LS

TOTAL BILL OF MATERIAL

	REINFORCING STEEL	SPIRAL COLUMN REINFORCING STEEL	45" PRESTRESSED CONCRETE GIRDER		PILE DRIVING EQUIPMENT SETUP FOR HP 12 X 53 STEEL PILES	HP 12 X 53 STEEL PILES		TWO BAR METAL RAIL	1'-2"X 2'-6" CONCRETE PARAPET	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE	ELASTOMERIC BEARINGS
	LB	LB	NO.	LF	EA	NO.	LF	LF	LF	TON	SY	LS
SUPERSTRUCTURE			15	934.38				360.93	376.60			LS
END BENT 1	4,792				7	7	175			160	180	
BENT 1	8,972	1,637										
BENT 2	8,029	987										
END BENT 2	4,778				7	7	105			155	175	
TOTAL	26,571	2,624	15	934.38	14	14	280	360.93	376.60	315	355	LS

NOTES:

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.

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

THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.

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

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

REMOVAL OF THE EXISTING BRIDGE SHALL BE PERFORMED IN A MANNER THAT PREVENTS DEBRIS FROM FALLING INTO THE WATER. THE CONTRACTOR SHALL SUBMIT DEMOLITION PLANS FOR REVIEW AND REMOVE THE BRIDGE IN ACCORDANCE WITH ARTICLE 402-2 OF THE STANDARD SPECIFICATIONS.

THE MATERIAL SHOWN IN THE CROSS-HATCHED AREA SHALL BE EXCAVATED FOR A DISTANCE OF 35 FT. LEFT AND RIGHT OF CENTERLINE ROADWAY AS DIRECTED BY THE ENGINEER. THIS WORK WILL BE PAID FOR AT THE CONTRACT LUMP SUM PRICE FOR UNCLASSIFIED STRUCTURE EXCAVATION. SEE SECTION 412 OF THE STANDARD SPECIFICATIONS.

THE EXISTING STRUCTURE CONSISTS OF 4 SPANS, 1 SPAN @ 40'-9", 2 @ 40'-5½", AND 1 @ 40'-6½". THE SUPERSTRUCTURE HAS A CLEAR ROADWAY WIDTH OF 28'-1" WITH REINFORCED CONCRETE DECK ON STEEL I-BEAMS. THE END BENTS AND INTERIOR BENTS CONSIST OF REINFORCED CONCRETE CAPS ON PRESTRESSED PRECAST CONCRETE PILES. THE EXISTING STRUCTURE, WHICH IS LOCATED AT THE SITE OF THE PROPOSED STRUCTURE, SHALL BE REMOVED. THE EXISTING BRIDGE IS PRESENTLY POSTED FOR LOAD LIMIT. SHOULD THE STRUCTURAL INTEGRITY OF THE BRIDGE DETERIORATE DURING CONSTRUCTION OF THE PROPOSED BRIDGE, THE LOAD LIMIT MAY BE REDUCED AS FOUND NECESSARY DURING THE LIFE OF THE PROJECT.

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

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.

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

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

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

FOR ASBESTOS ASSESSMENT, SEE SPECIAL PROVISIONS.

INASMUCH AS THE PAINT SYSTEM ON THE EXISTING STRUCTURAL STEEL CONTAINS LEAD, THE CONTRACTOR'S ATTENTION IS DIRECTED TO ARTICLE 107-1 OF THE STANDARD SPECIFICATIONS. ANY COSTS RESULTING FROM COMPLIANCE WITH APPLICABLE STATE OR FEDERAL REGULATIONS PERTAINING TO HANDLING OF MATERIALS CONTAINING LEAD BASED PAINT SHALL BE INCLUDED IN THE BID PRICE FOR "REMOVAL OF EXISTING STRUCTURE AT STATION 15+80.00 -L-."

PROJECT NO. 17BP.7.R.116

GUILFORD COUNTY

STATION: 15+80.00 -L-

SHEET 4 OF 4

DRAWN BY: T. BANKOVICH DATE: 1-22
CHECKED BY: B.S. COX DATE: 1-22
DESIGN ENGINEER OF RECORD: M.A. AVERETTE DATE: 11-24

WGI
5640 Dillard Drive, Suite 200
Cary, NC 27518
LICENSURE NO. C-4434

STATE OF NORTH CAROLINA
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 023908 ENGINEER MARK A. AVERETTE
2/17/2025 | 12:54 PM PST

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR BRIDGE ON SR 3000 (MCCONNELL RD) OVER SOUTH BUFFALO CREEK BETWEEN SR 3027 AND SR 3028
40'-0" CLEAR ROADWAY - 105° SKEW

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

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

LOAD TYPE		VEHICLE	WEIGHT (W) (TONS)	⬡ # CONTROLLING LOAD RATING	MINIMUM RATING FACTORS (RF)	TONS = W × RF	STRENGTH I LIMIT STATE											SERVICE III LIMIT STATE						COMMENT NUMBER
							LIVE-LOAD FACTORS (γ_{LL})	MOMENT					SHEAR					LIVE-LOAD FACTORS (γ_{LL})	MOMENT					
								DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)		DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD		HL-93 (INVENTORY)	N/A	⬡ 1	**1.19**	- -	1.75	0.789	1.52	B	EL	39.167	0.957	**1.19**	B	I	**7.833**	0.80	0.744	1.29	B	I	38.917	
		HL-93 (OPERATING)	N/A		1.71	- -	1.35	0.789	1.97	B	EL	39.167	0.957	1.71	B	I	7.833	N/A	N/A					
		HS-20 (INVENTORY)	36.000	⬡ 2	**1.66**	59.8	1.75	0.789	2.01	B	EL	39.167	0.957	**1.66**	B	I	**7.833**	0.80	0.744	1.71	B	I	38.917	
		HS-20 (OPERATING)	36.000		2.36	85.0	1.35	0.789	2.61	B	EL	39.167	0.957	2.36	B	I	7.833	N/A	N/A					
LEGAL LOAD	SINGLE VEHICLE (SV)	SNSH	13.500		3.90	52.7	1.40	0.789	5.75	B	EL	39.167	0.957	5.81	B	I	7.833	0.80	0.744	3.90	B	I	38.917	
		SNGARBS2	20.000		2.89	57.8	1.40	0.789	4.26	B	EL	39.167	0.957	4.08	B	I	7.833	0.80	0.744	2.89	B	I	38.917	
		SNAGRIS2	22.000		2.73	60.1	1.40	0.789	4.02	B	EL	39.167	0.957	3.77	B	I	7.833	0.80	0.744	2.73	B	I	38.917	
		SNCOTTS3	27.250		1.94	52.9	1.40	0.789	2.86	B	EL	39.167	0.957	2.82	B	I	7.833	0.80	0.744	1.94	B	I	38.917	
		SNAGGRS4	34.925		1.61	56.2	1.40	0.789	2.38	B	EL	39.167	0.957	2.21	B	I	7.833	0.80	0.744	1.61	B	I	38.917	
		SNS5A	35.550		1.58	56.2	1.40	0.789	2.33	B	EL	39.167	0.957	2.24	B	I	7.833	0.80	0.744	1.58	B	I	38.917	
		SNS6A	39.950		1.45	57.9	1.40	0.789	2.13	B	EL	39.167	0.957	1.96	B	I	7.833	0.80	0.744	1.45	B	I	38.917	
		SNS7B	42.000		1.38	58.0	1.40	0.789	2.03	B	EL	39.167	0.957	1.91	B	I	7.833	0.80	0.744	1.38	B	I	38.917	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.76	58.1	1.40	0.789	2.60	B	EL	39.167	0.957	2.50	B	I	7.833	0.80	0.744	1.76	B	I	38.917	
		TNT4A	33.075		1.77	58.5	1.40	0.789	2.61	B	EL	39.167	0.957	2.42	B	I	7.833	0.80	0.744	1.77	B	I	38.917	
		TNT6A	41.600		1.44	59.9	1.40	0.789	2.13	B	EL	39.167	0.957	2.09	B	I	7.833	0.80	0.744	1.44	B	I	38.917	
		TNT7A	42.000		1.45	60.9	1.40	0.789	2.14	B	EL	39.167	0.957	2.02	B	I	7.833	0.80	0.744	1.45	B	I	38.917	
		TNT7B	42.000		1.49	62.6	1.40	0.789	2.20	B	EL	39.167	0.957	1.86	B	I	7.833	0.80	0.744	1.49	B	I	38.917	
		TNAGRIT4	43.000		1.42	61.1	1.40	0.789	2.10	B	EL	39.167	0.957	1.79	B	I	7.833	0.80	0.744	1.42	B	I	38.917	
		TNAGT5A	45.000		1.34	60.3	1.40	0.789	1.98	B	EL	39.167	0.957	1.77	B	I	7.833	0.80	0.744	1.34	B	I	38.917	
		TNAGT5B	45.000	⬡ 3	**1.33**	59.9	1.40	0.789	1.96	B	EL	39.167	0.957	1.68	B	I	7.833	0.80	0.744	**1.33**	B	I	**38.917**	
EMERGENCY VEHICLE (EV)		EV2	28.750		2.04	58.7	1.30	0.789	3.24	B	EL	39.167	0.957	3.03	B	I	7.833	0.80	0.744	2.04	B	I	39.167	
		EV3	43.000	⬡ 4	**1.34**	57.6	1.30	0.789	2.12	B	EL	39.167	0.957	1.85	B	I	7.833	0.80	0.744	**1.34**	B	I	**39.167**	

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. DISTANCE FROM LEFT END OF SPAN IS MEASURED FROM ℄ BEARING.
2. BEARING TO BEARING LENGTH OF SPAN B GIRDERS = 77′-10″

⬡ # CONTROLLING LOAD RATING

⬡ 1 DESIGN LOAD RATING (HL-93)

⬡ 2 DESIGN LOAD RATING (HS-20)

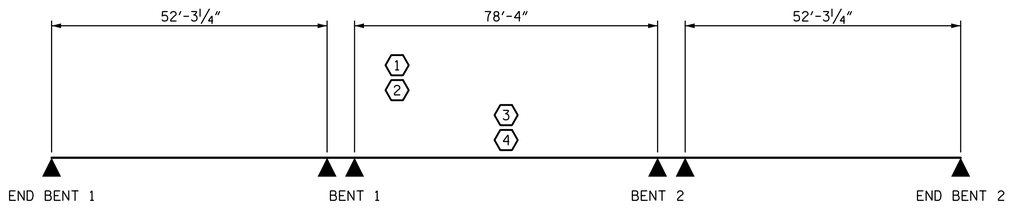
⬡ 3 LEGAL LOAD RATING **

⬡ 4 EMERGENCY VEHICLE LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

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



LRFR SUMMARY

PROJECT NO. 17BP.7.R.116

GUILFORD COUNTY

STATION: 15+80.00 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

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

DRAWN BY: T. BANKOVICH DATE: 1-22
CHECKED BY: B.S. COX DATE: 1-22
DESIGN ENGINEER OF RECORD: M.A. AVERETTE DATE: 11-24

WGI
5640 Dillard Drive, Suite 200
Cary, NC 27518
LICENSURE NO. C-4434

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 023908 MARK A. AVERETTE
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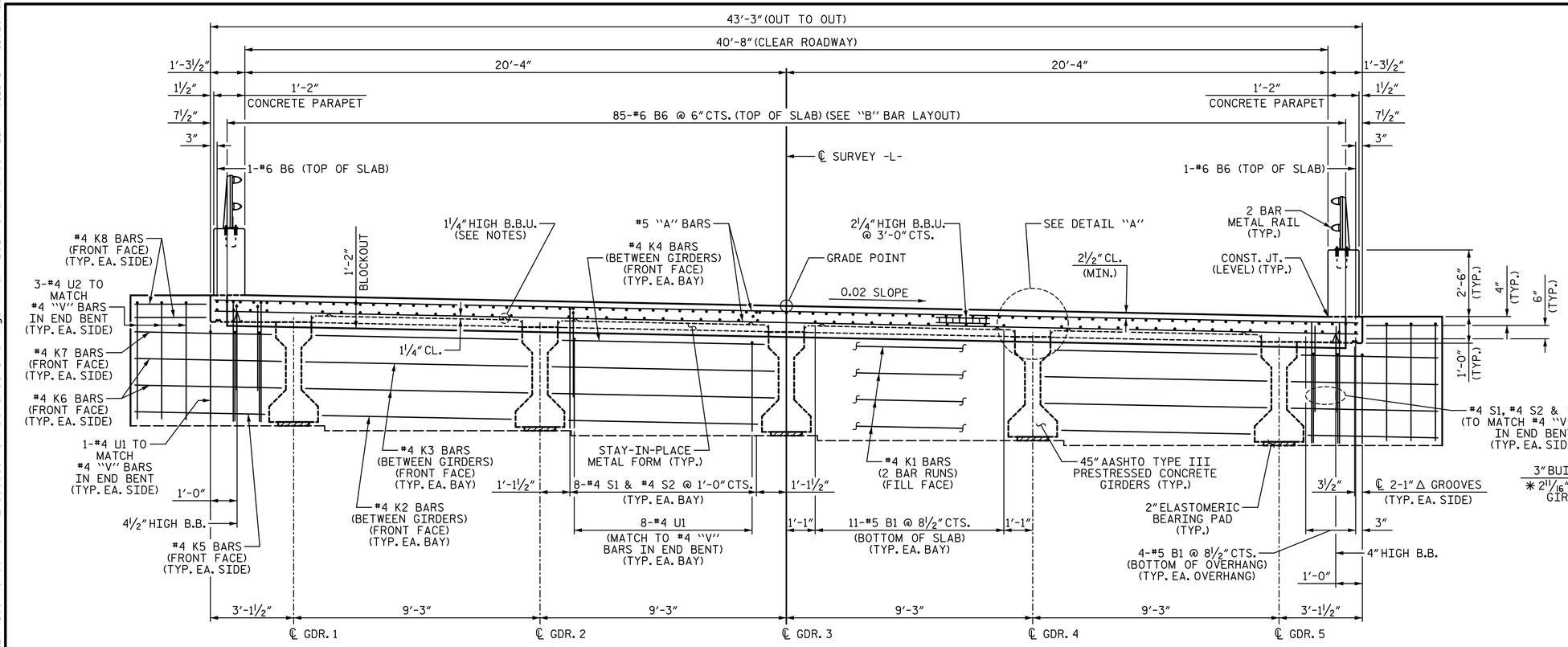
1			3			TOTAL SHEETS
2			4			40



TYPICAL SECTION

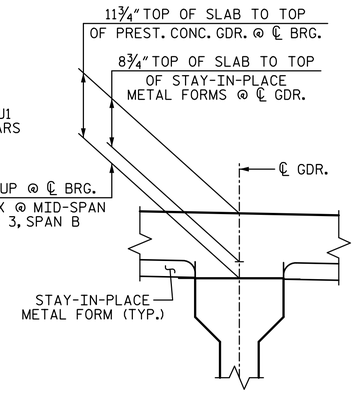
NOTES:

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.

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

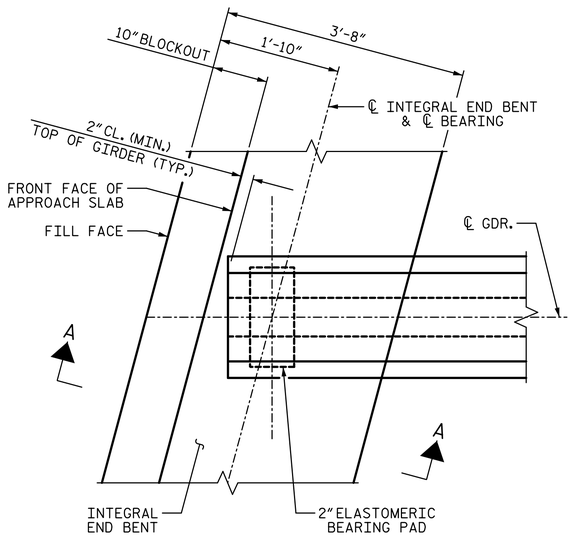
PREVIOUSLY CAST CONCRETE IN A CONTINUOUS UNIT SHALL HAVE ATTAINED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI BEFORE ADDITIONAL CONCRETE IS CAST IN THE UNIT.



DETAIL "A"

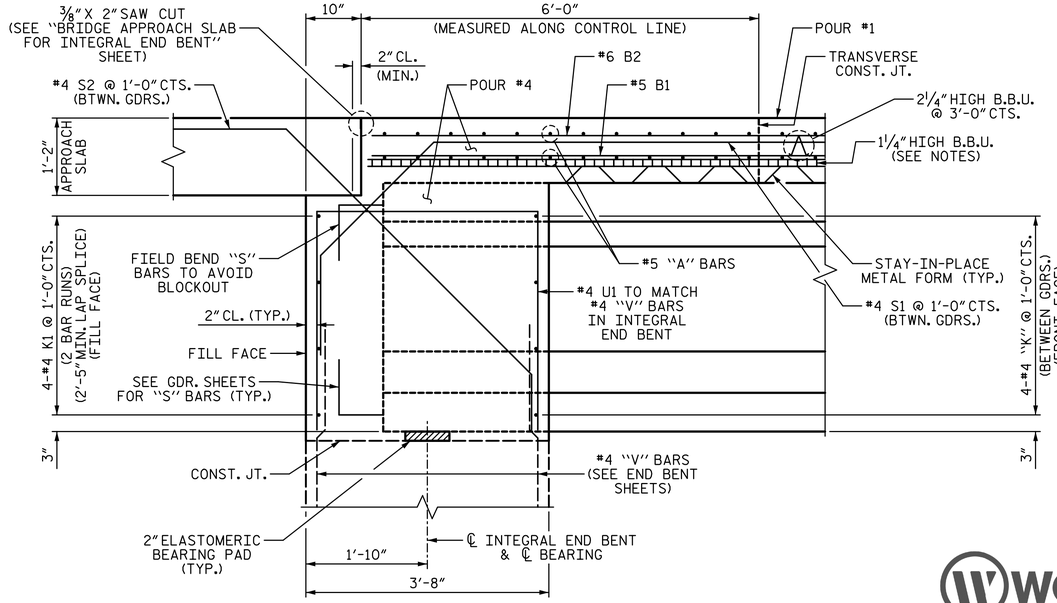
(TYP. EA. GDR.)

(✱ BASED ON PREDICTED FINAL CAMBER AND THEORETICAL GRADE LINE ELEVATIONS)



PLAN DETAIL OF END BENT

(END BENT 1 SHOWN, END BENT 2 SIMILAR)
("S" BARS IN GIRDER NOT SHOWN FOR CLARITY)



SECTION A-A

SECTION THROUGH END BENT DIAPHRAGM

(SEE END BENT SHEETS FOR INTEGRAL END BENT REINFORCING DETAILS)
(DIMENSIONS SHOWN ARE NORMAL TO THE END BENT)
(END BENT 1 SHWON, END BENT 2 SIMILAR)

PROJECT NO. 17BP.7.R.116
GUILFORD COUNTY
STATION: 15+80.00 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

TYPICAL SECITON

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-6
1			3			TOTAL SHEETS
2			4			40

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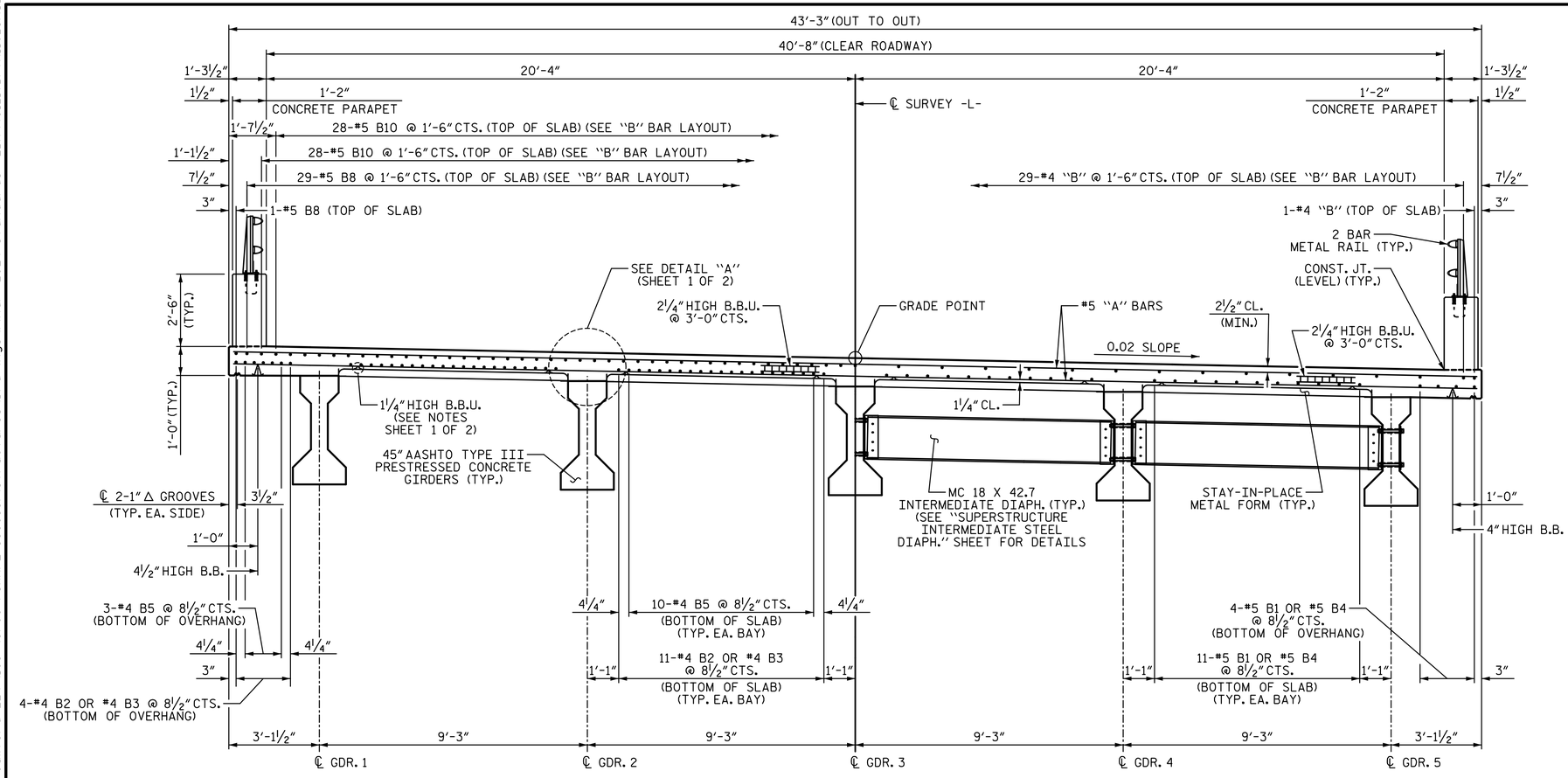


PARTIAL TYPICAL SECTION

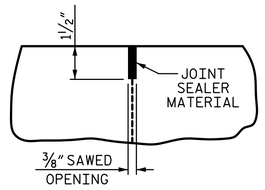
(SHOWING LINK SLAB REGION AT INTERIOR BENTS)

NOTES:

✱✱ MEASURED ALONG ℄ GIRDER.

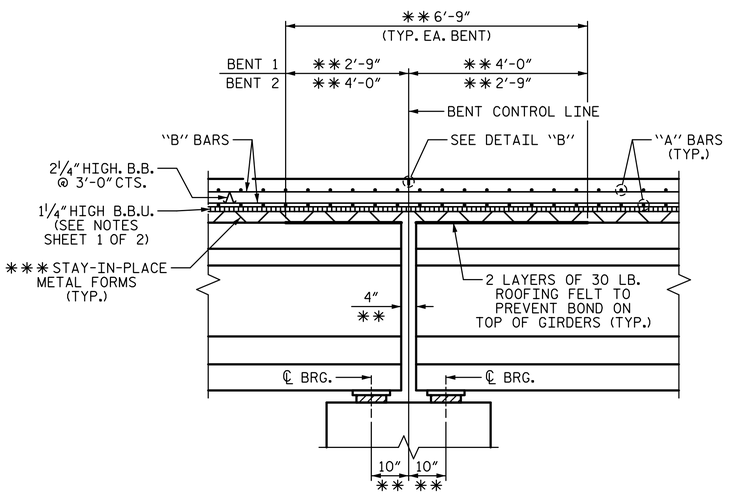
✱✱✱ METAL STAY-IN-PLACE FORMS SHALL NOT BE WELDED TO THE GIRDER FLANGES IN THE REGION OF THE LINK SLAB.

THE TOP OF THE GIRDER IN THE REGION OF THE LINK SLAB SHALL BE SMOOTH (NOT RAKED) AND FREE OF STIRRUPS, ANCHOR BOLTS, DECK FORMWORK ATTACHMENT, AND OVERHANG FALSEWORK/FORMWORK ATTACHMENTS.



DETAIL "B"

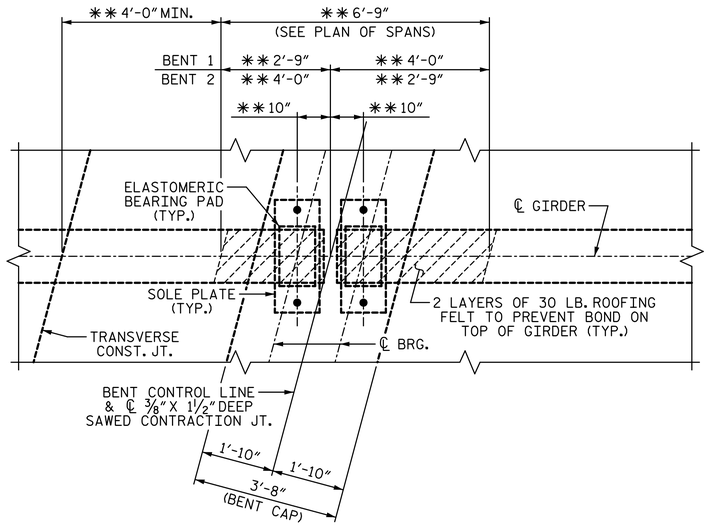
A 1½″ DEEP, ⅜″ WIDE CONTRACTION JOINT AT BENT CONTROL LINE SHALL BE SAWN WITHIN 24 HOURS OF POURING THE DECK. THE JOINT SHALL BE FILLED WITH JOINT SEALER MATERIAL. THE JOINT SEALER MATERIAL SHALL CONFORM TO THE REQUIREMENTS OF SECTION 1028-3 OF THE STANDARD SPECIFICATIONS.



SECTION B-B

PARTIAL TYPICAL SECTION

(SHOWING INTERMEDIATE DIAPHRAGM)



PLAN OF GIRDER AT BENT

PROJECT NO. 17BP.7.R.116

GUILFORD COUNTY

STATION: 15+80.00 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

TYPICAL SECTION

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2			4			40

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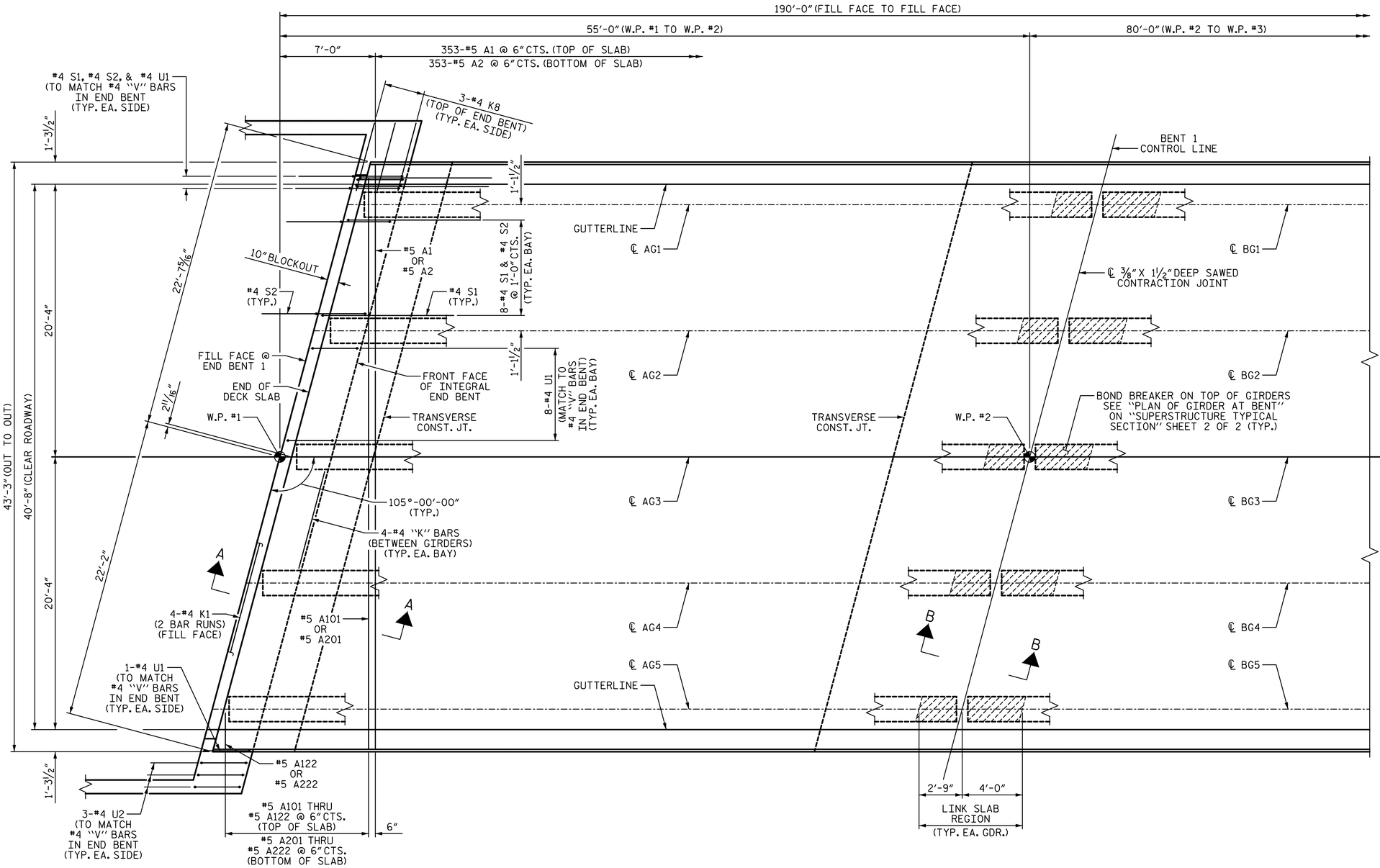

SPAN A

SPAN B

PART PLAN - SPAN A AND SPAN B

"B" BARS NOT SHOWN, FOR "B" BARS IN DECK, SEE "B" BAR LAYOUT" SHEET.

NOTES:

FOR SECTION A-A, SEE "TYPICAL SECTION" SHEET 1 OF 2.

FOR SECTION B-B, SEE "TYPICAL SECTION" SHEET 2 OF 2.

FOR POUR SEQUENCE AND LOCATION OF TRANSVERSE CONSTRUCTION JOINTS, SEE "POUR SEQUENCE" SHEET.

SEE "CONCRETE PARAPET" SHEETS FOR ADDITIONAL REINFORCING STEEL IN SLAB AND CONCRETE PARAPET.

FOR LOCATION OF INTERMEDIATE DIAPHRAGMS, SEE "FRAMING PLAN" SHEET.

PROJECT NO. 17BP.7.R.116

GUILFORD COUNTY

STATION: 15+80.00 -L-

SHEET 1 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

PLAN OF SPANS

DRAWN BY: T. BANKOVICH DATE: 1-22
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NO.	BY:	DATE:	NO.	BY:	DATE:	S-8
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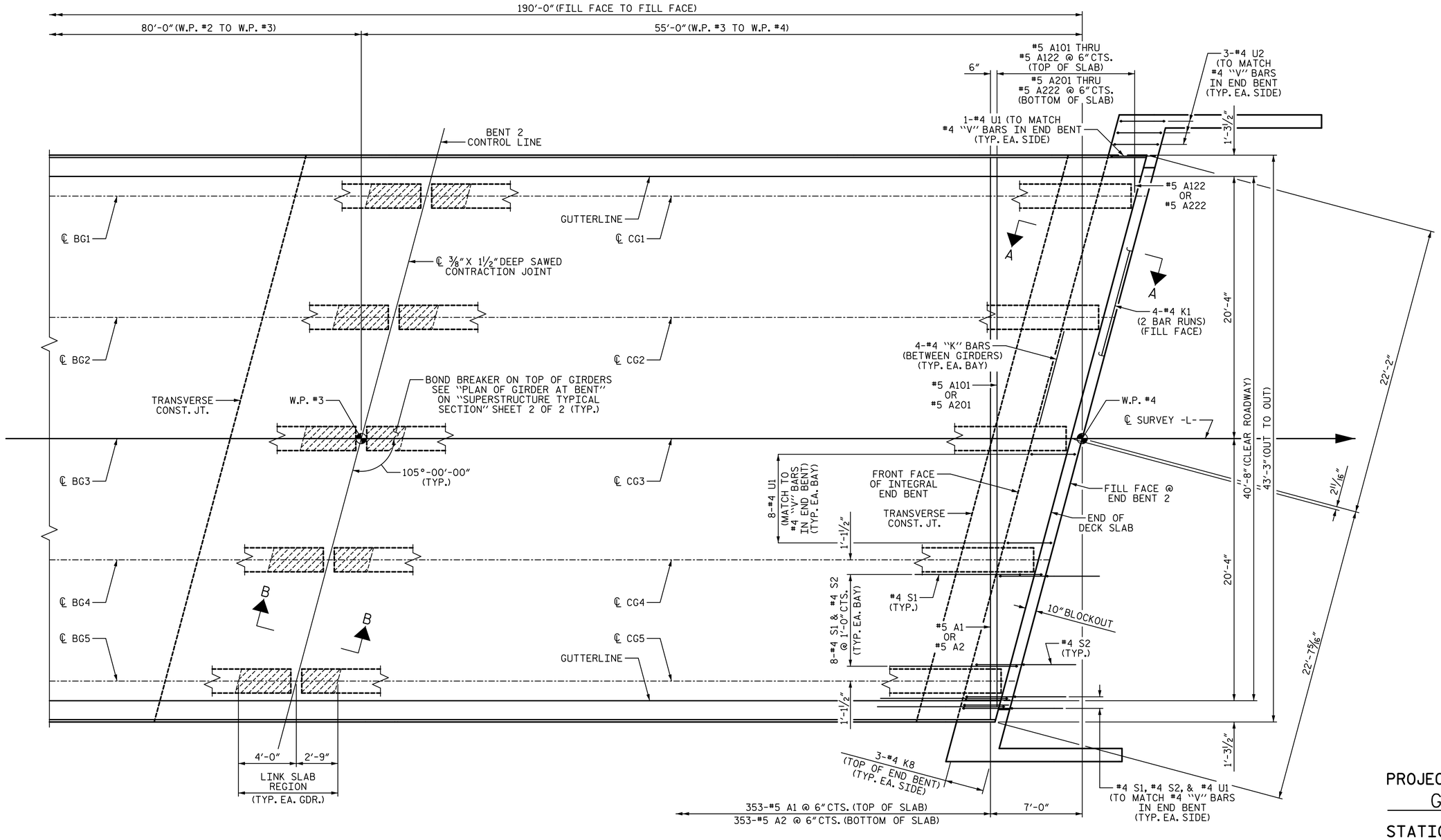

SPAN B

SPAN C

PART PLAN - SPAN B AND SPAN C

"B" BARS NOT SHOWN, FOR "B" BARS IN DECK, SEE "B" BAR LAYOUT" SHEET.

NOTES:

FOR SECTION A-A, SEE "TYPICAL SECTION" SHEET 1 OF 2.

FOR SECTION B-B, SEE "TYPICAL SECTION" SHEET 2 OF 2.

FOR POUR SEQUENCE AND LOCATION OF TRANSVERSE CONSTRUCTION JOINTS, SEE "POUR SEQUENCE" SHEET.

SEE "CONCRETE PARAPET" SHEETS FOR ADDITIONAL REINFORCING STEEL IN SLAB AND CONCRETE PARAPET.

FOR LOCATION OF INTERMEDIATE DIAPHRAGMS, SEE "FRAMING PLAN" SHEET.

PROJECT NO. 17BP.7.R.116

GUILFORD COUNTY

STATION: 15+80.00 -L-

SHEET 2 OF 5

STATE OF NORTH CAROLINA
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RALEIGH
SUPERSTRUCTURE

PLAN OF SPANS

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NO.	BY:	DATE:	NO.	BY:	DATE:	S-9
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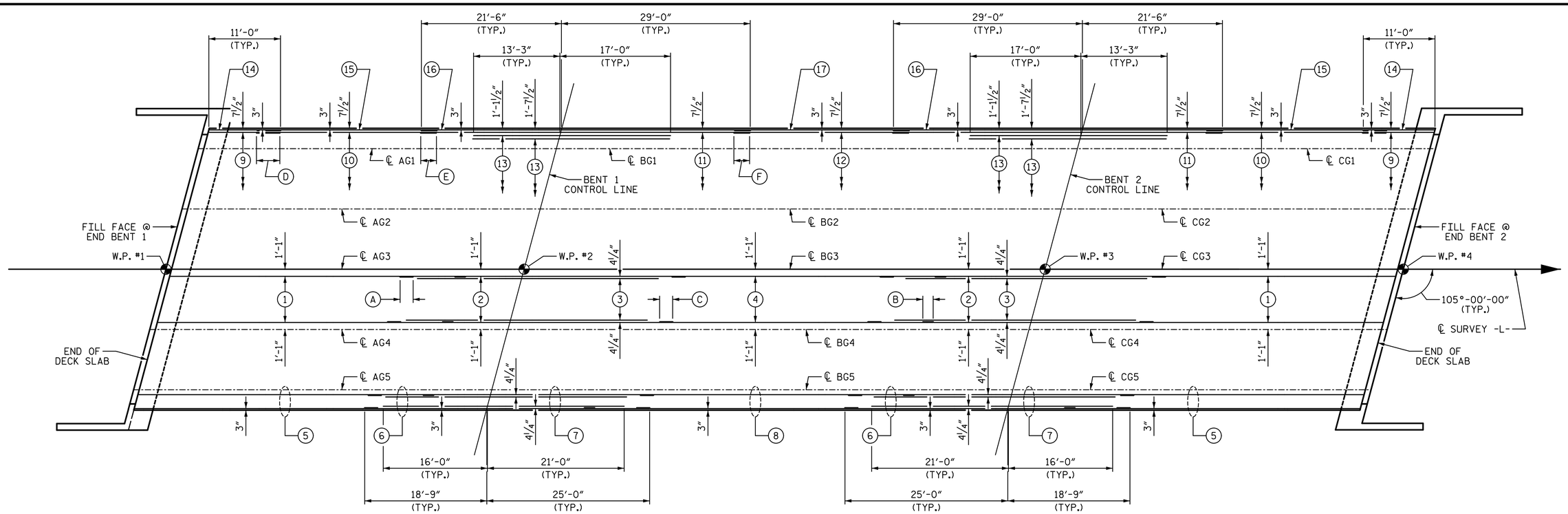
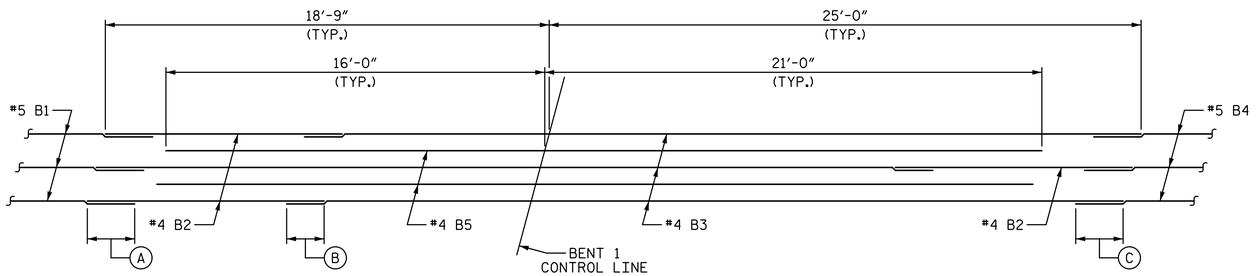


''B'' BAR LAYOUT



BOTTOM OF DECK ''B'' BARS PLACEMENT

(BENT 1 SHOWN, BENT 2 SIMIAR)

1. 11-#5 B1 @ 8½" CTS. (BOTTOM OF SLAB) (TYP. EA. BAY)
2. 11-#4 B2 OR #4 B3 @ 8½" CTS. (BOTTOM OF SLAB) (TYP. EA. BAY)
3. 10-#4 B5 @ 8½" CTS. (BOTTOM OF SLAB) (TYP. EA. BAY)
4. 11-#5 B4 @ 8½" CTS. (BOTTOM OF SLAB) (TYP. EA. BAY)
5. 4-#5 B1 @ 8½" CTS. (BOTTOM OF OVERHANG) (TYP. EA. OVERHANG)
6. 4-#4 B2 OR #4 B3 @ 8½" CTS. (BOTTOM OF OVERHANG) (TYP. EA. OVERHANG)
7. 3-#4 B5 @ 8½" CTS. (BOTTOM OF OVERHANG) (TYP. EA. OVERHANG)
8. 4-#5 B4 @ 8½" CTS. (BOTTOM OF OVERHANG) (TYP. EA. OVERHANG)
9. 85-#6 B6 @ 6" CTS. (TOP OF SLAB)
10. 29-#4 B7 @ 1'-6" CTS. (TOP OF SLAB)
11. 29-#5 B8 @ 1'-6" CTS. (TOP OF SLAB)
12. 29-#4 B9 @ 1'-6" CTS. (TOP OF SLAB)
13. 28-#5 B10 @ 1'-6" CTS. (TOP OF SLAB)
14. 1-#6 B6 (TOP OF SLAB) (TYP. EA. SIDE)
15. 1-#4 B7 (TOP OF SLAB) (TYP. EA. SIDE)
16. 1-#5 B8 (TOP OF SLAB) (TYP. EA. SIDE)
17. 1-#4 B9 (TOP OF SLAB) (TYP. EA. SIDE)

A. 2'-0" MIN. SPLICE (TYP. #5 B1 TO #4 B2 OR #4 B3)
B. 1'-7" MIN. SPLICE (TYP. #4 B2 TO #4 B3)
C. 2'-0" MIN. SPLICE (TYP. #5 B4 TO #4 B2 OR * B3)
D. 2'-10" MIN. SPLICE (TYP. #6 B6 TO #4 B7)
E. 2'-5" MIN. SPLICE (TYP. #4 B7 TO #5 B8)
F. 2'-5" MIN. SPLICE (TYP. #4 B9 TO #5 B8)

DRAWN BY: T. BANKOVICH DATE: 1-22
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DESIGN ENGINEER OF RECORD: M.A. AVERETTE DATE: 11-24

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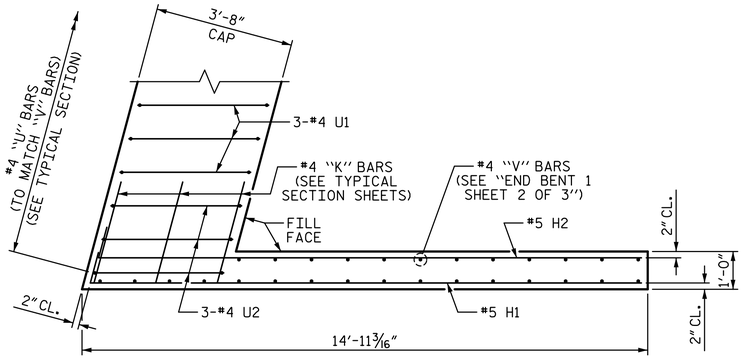
GUILFORD COUNTY
STATION: 15+80.00 -L-

SHEET 3 OF 5

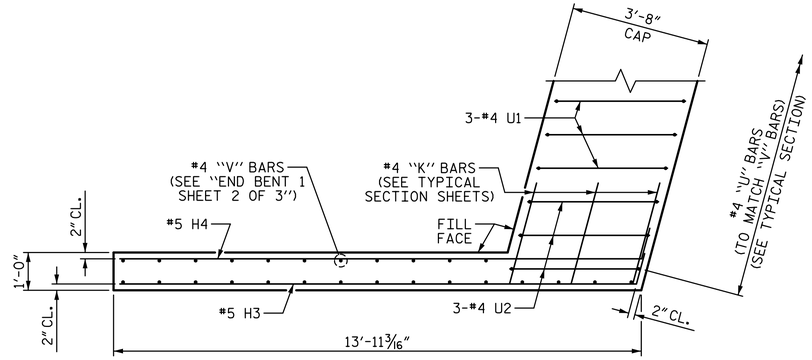
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

PLAN OF SPANS
''B'' BAR LAYOUT

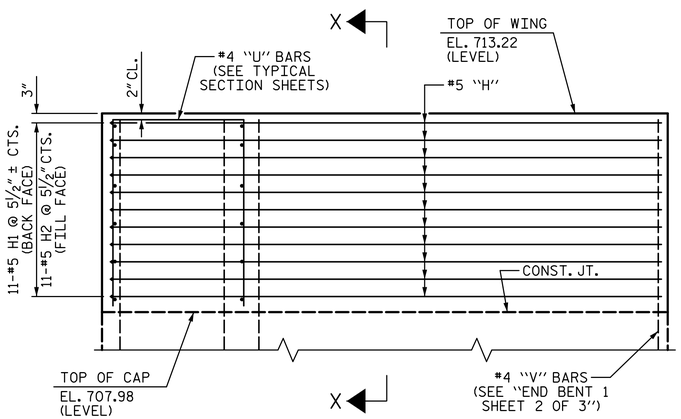
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-10
1			3			TOTAL SHEETS
2			4			40



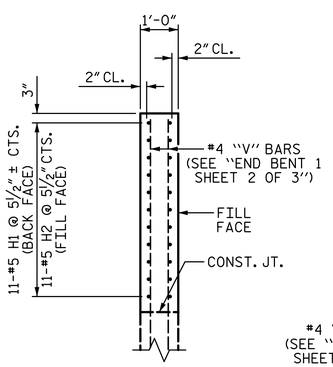
PLAN OF WING (W1)



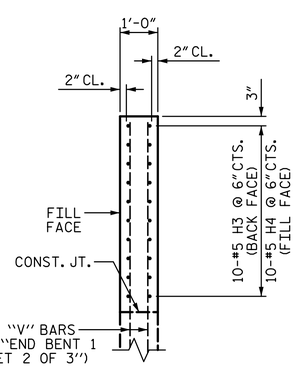
PLAN OF WING (W2)



ELEVATION OF WING (W1)



SECTION X-X



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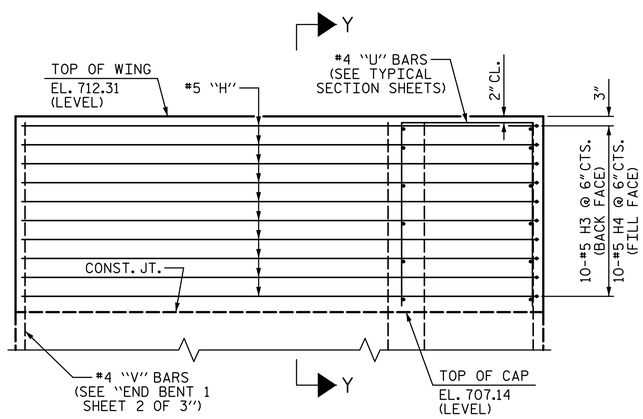

ELEVATION OF WING (W2)

PROJECT NO. 17BP.7.R.116

GUILFORD COUNTY

STATION: 15+80.00 -L-

SHEET 4 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

PLAN OF SPANS DETAILS @ END BENT 1

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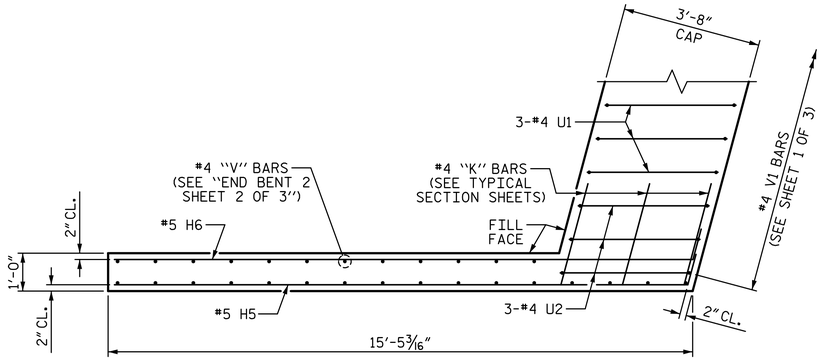
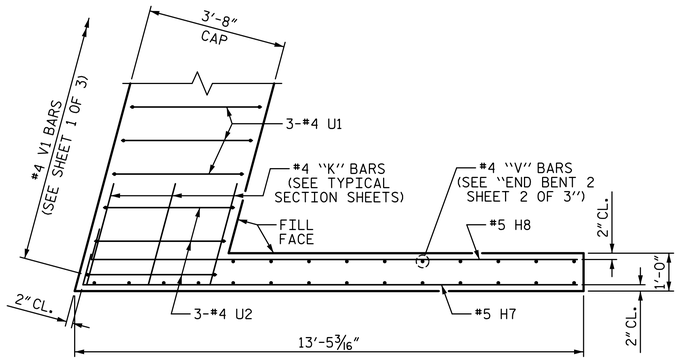
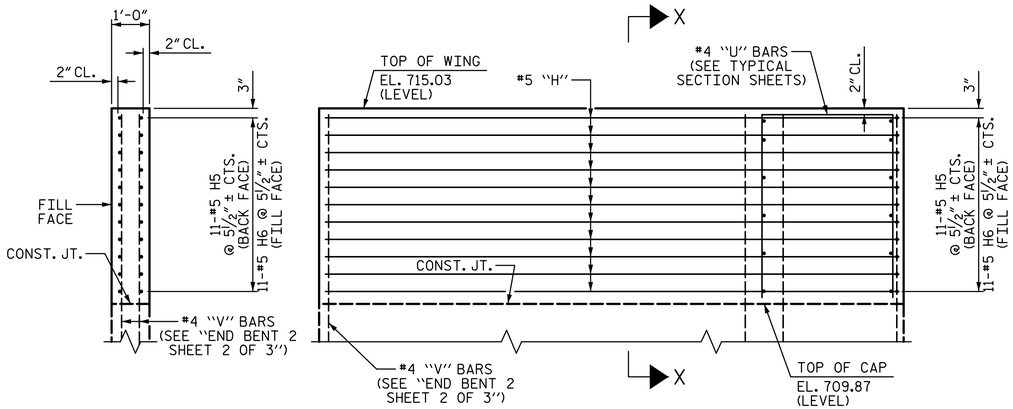
1			3			TOTAL SHEETS
2			4			40



PLAN OF WING (W3)

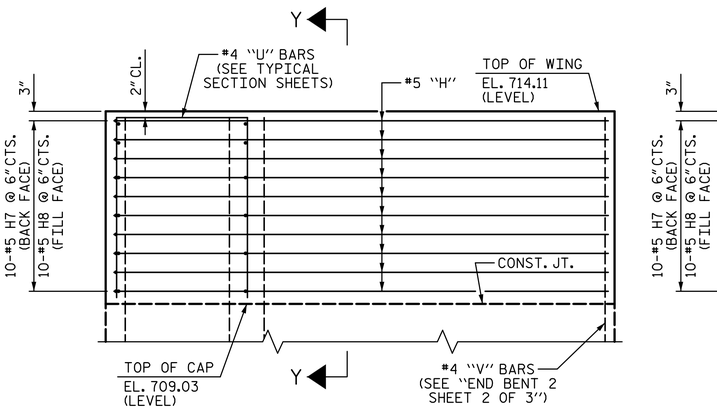


PLAN OF WING (W4)

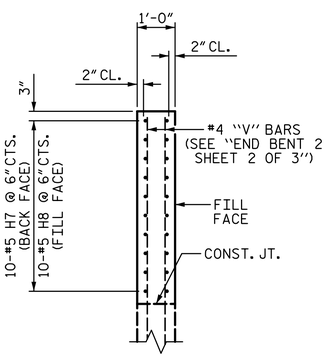


SECTION X-X

ELEVATION OF WING (W3)



ELEVATION OF WING (W4)



SECTION Y-Y

PROJECT NO. 17BP.7.R.116

GUILFORD COUNTY

STATION: 15+80.00 -L-

SHEET 5 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

PLAN OF SPANS DETAILS @ END BENT 2

WGI
5640 Dillard Drive, Suite 200
Cary, NC 27518
LICENSURE NO. C-4434

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 023908 MARK A. AVERETTE
2/17/2025 | 12:54 PM EST

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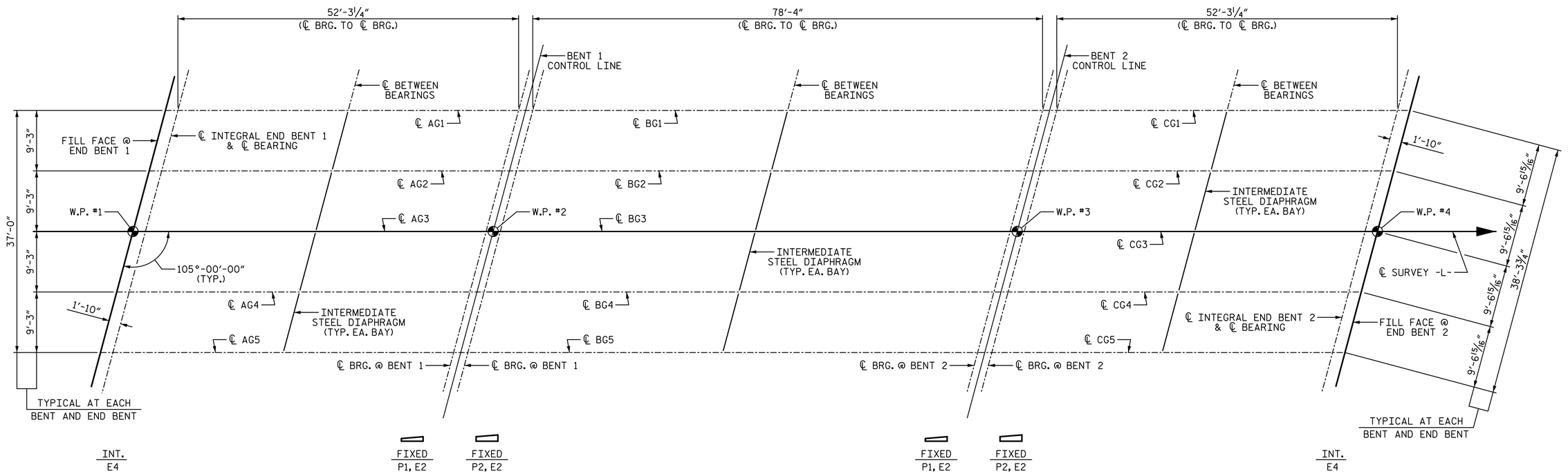
DRAWN BY:	T. BANKOVICH	DATE:	1-22			
CHECKED BY:	B.S. COX	DATE:	1-22			
DESIGN ENGINEER OF RECORD:	M.A. AVERETTE	DATE:	11-24			

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-12
1			3			TOTAL SHEETS
2			4			40

NOTES:

FOR DIAPHRAGM DETAILS, SEE "INTERMEDIATE STEEL DIAPHRAGM FOR TYPE III PRESTRESSED CONCRETE GIRDERS" SHEET.



SPAN A SPAN B SPAN C

FRAMING PLAN

PROJECT NO. 17BP.7.R.116

GUILFORD COUNTY

STATION: 15+80.00 -L-

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5640 Dillard Drive, Suite 200
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LICENSURE NO. C-4434

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 023908 MARK A. AVERETTE

2/17/2025 | 12:54 PM ET

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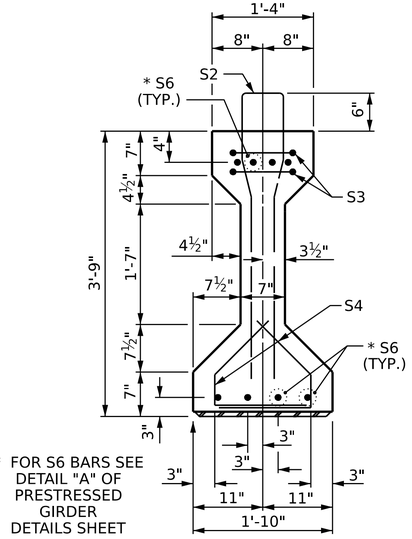
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

FRAMING PLAN

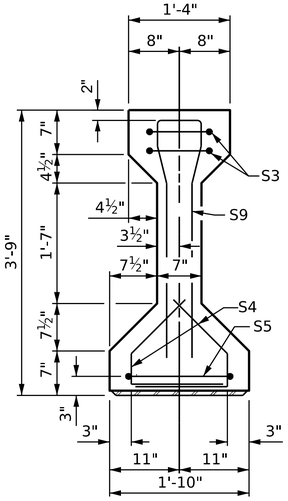
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-13
1			3			TOTAL SHEETS
2			4			40

DRAWN BY: T. BANKOVICH DATE: 1-22
CHECKED BY: B.S. COX DATE: 1-22
DESIGN ENGINEER OF RECORD: M.A. AVERETTE DATE: 11-24

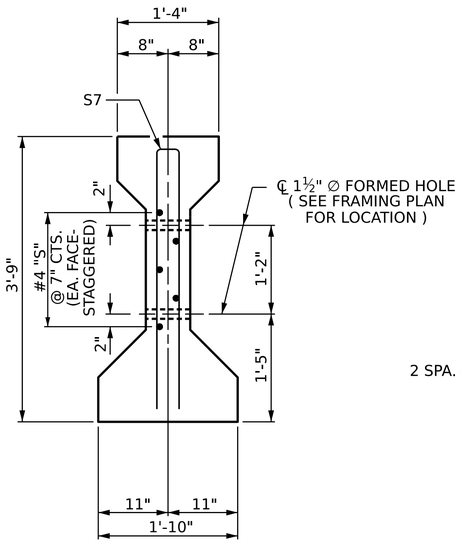


* FOR S6 BARS SEE DETAIL "A" OF PRESTRESSED GIRDER DETAILS SHEET

SECTION A-A

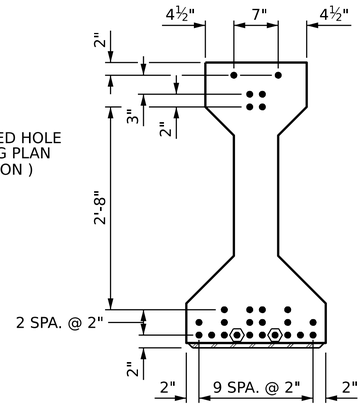


SECTION B-B

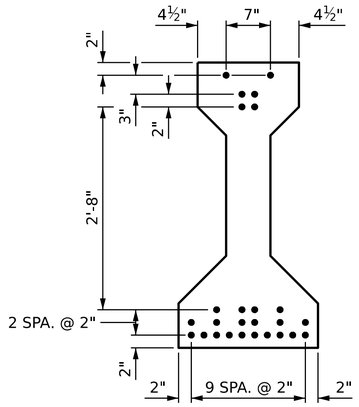


SECTION C-C

(S1 BARS NOT SHOWN)

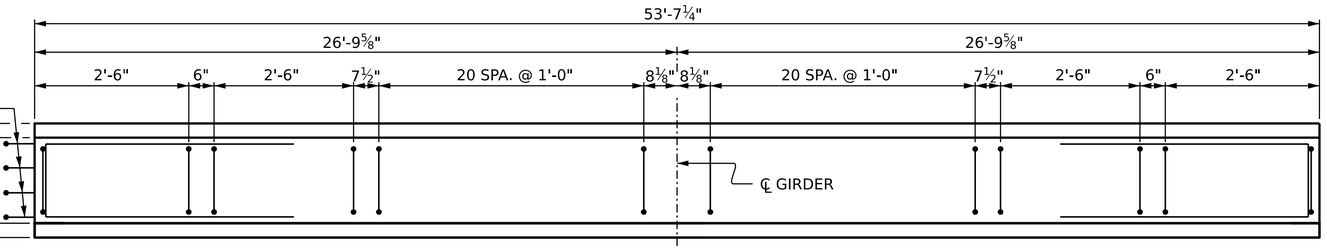


AT END OF GIRDER

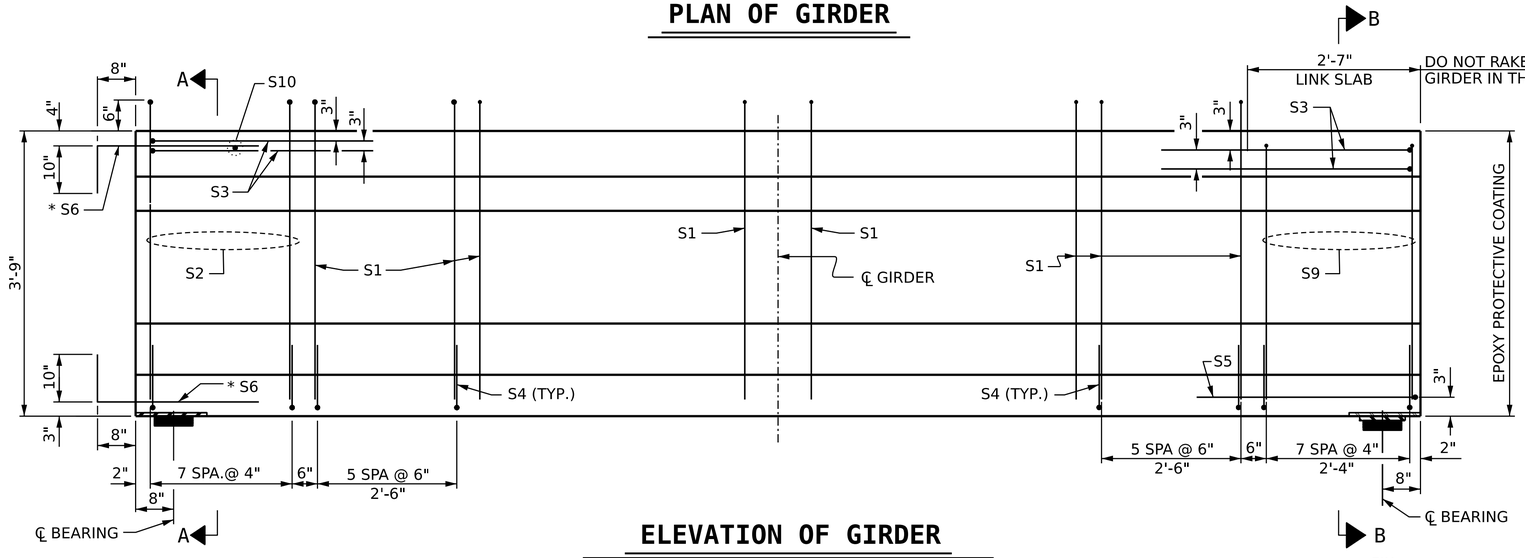


AT ℄ OF GIRDER

0.6" ⌀ LOW RELAXATION STRAND LAYOUT



PLAN OF GIRDER



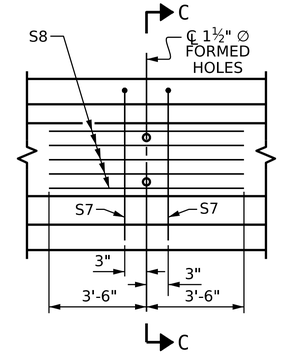
INTEGRAL END BENT

ELEVATION OF GIRDER

(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS)

DEBONDING LEGEND

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



PARTIAL ELEVATION

SHOWING INTERMEDIATE DIAPHRAGM REINFORCING STEEL FOR ALL GIRDER

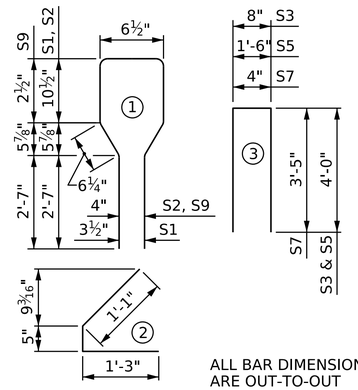
0.6"⌀ L.R. GRADE 270 STRANDS

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	54	#4	1	8'-6"	307
S2	8	#6	1	8'-6"	102
S3	4	#4	3	8'-8"	23
S4	56	#4	2	2'-9"	103
S5	1	#4	3	9'-6"	6
* S6	8	#5	STR	3'-8"	31
S7	2	#5	3	7'-2"	15
S8	5	#4	STR	7'-0"	23
S9	8	#6	1	7'-2"	86
S10	1	#3	STR	1'-0"	1

BAR TYPES



ALL BAR DIMENSIONS ARE OUT-TO-OUT

QUANTITIES FOR ONE GIRDER

	REINFORCING STEEL	6,500 PSI CONCRETE	0.6" ∅ L. R. STRANDS
	LB.	C.Y.	No.
SPAN A & C	697	7.7	26

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
10	53'-7¼"	536'-0½"

PROJECT NO. 17BP.7.R.116

GUILFORD COUNTY

STATION: 15+80.00 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

AASHTO TYPE III

SPAN A & C

DRAWN BY : T. BANKOVICH DATE : 2-25
CHECKED BY : M.A. AVERETTE DATE : 2-25
DESIGN ENGINEER OF RECORD: M.A. AVERETTE DATE : 2-25

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5640 Dillard Drive, Suite 200
Cary, NC 27518
LICENSURE NO. C-4434

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 023908 MARK A. AVERETTE

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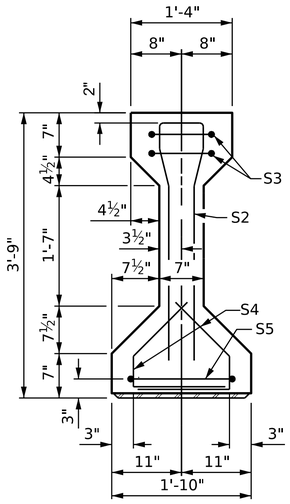
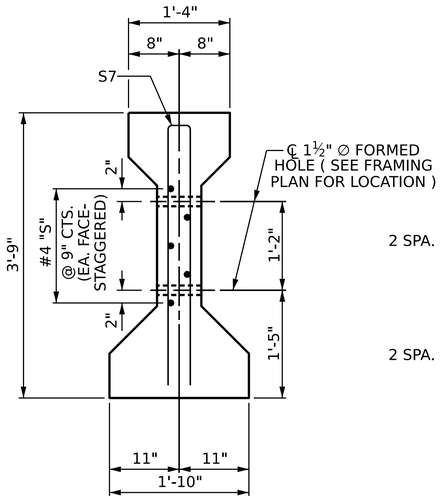
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-14
1			3			TOTAL SHEETS
2			4			40

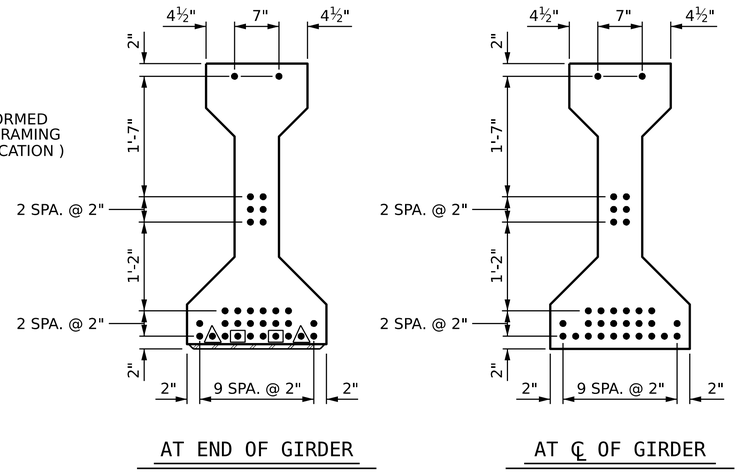


SECTION B-B



SECTION C-C

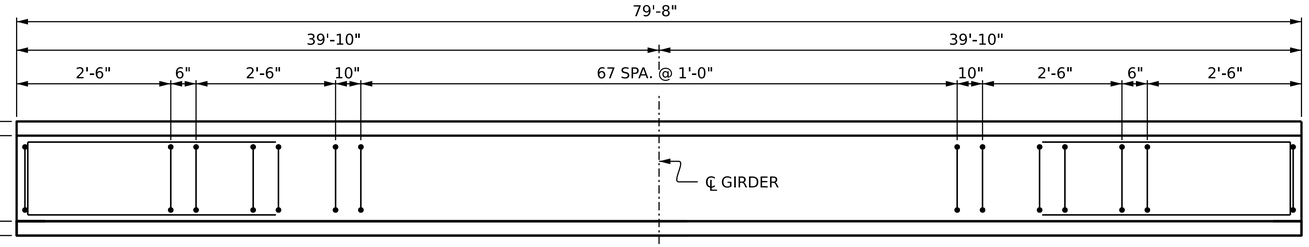
(S1 BARS NOT SHOWN)



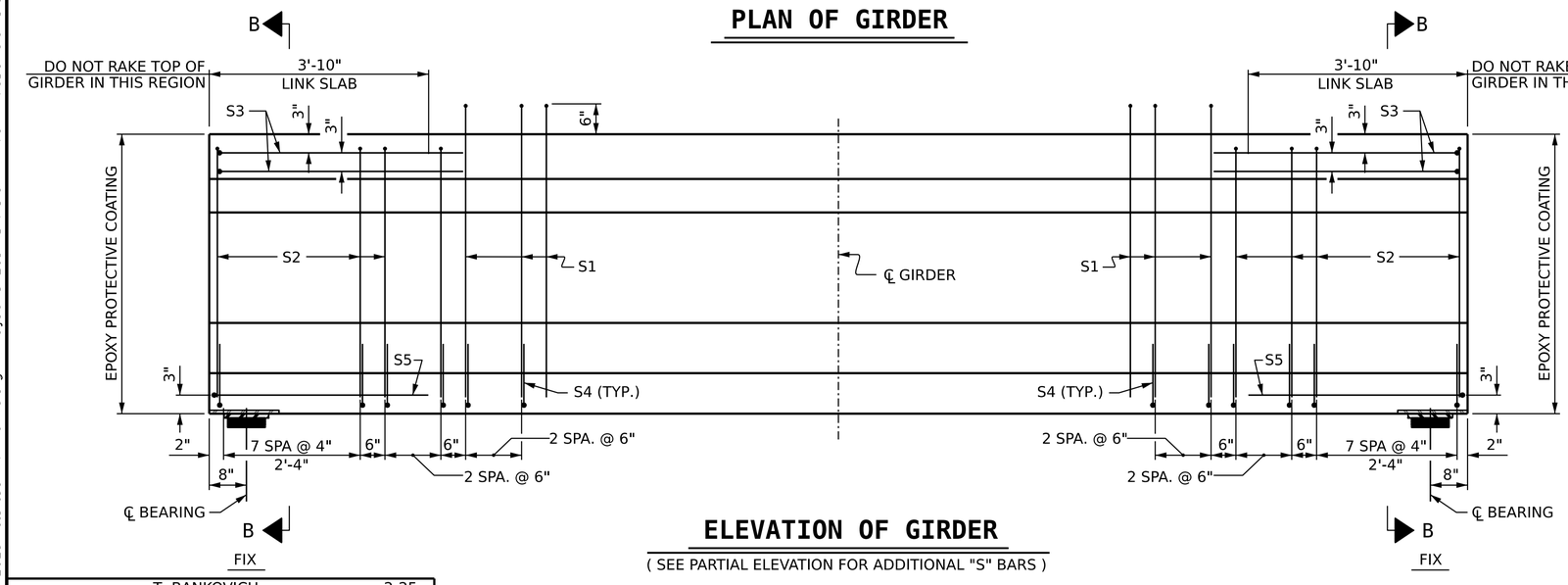
0.6" ⌀ LOW RELAXATION STRAND LAYOUT

DEBONDING LEGEND

- • FULLY BONDED STRANDS
- △ STRANDS DEBONDED FOR 8'-0" FROM END OF GIRDER
- ⊡ STRANDS DEBONDED FOR 16'-0" FROM END OF GIRDER

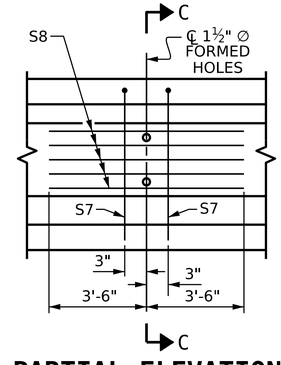


PLAN OF GIRDER



ELEVATION OF GIRDER

(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS)



PARTIAL ELEVATION

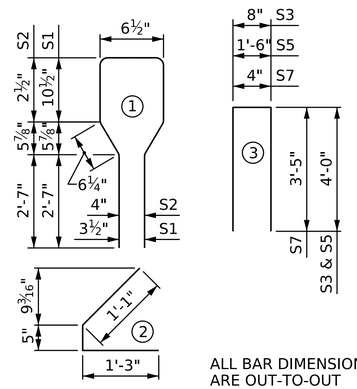
SHOWING INTERMEDIATE DIAPHRAGM REINFORCING STEEL FOR ALL GIRDER

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

REINFORCING STEEL FOR ONE GIRDER

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	74	#4	1	8'-6"	420
S2	22	#6	1	7'-2"	237
S3	4	#4	3	8'-8"	23
S4	56	#4	2	2'-9"	103
S5	2	#4	3	9'-6"	13
S7	2	#5	3	7'-2"	15
S8	5	#4	STR	7'-0"	23

BAR TYPES



ALL BAR DIMENSIONS ARE OUT-TO-OUT

QUANTITIES FOR ONE GIRDER

	REINFORCING STEEL	8,500 PSI CONCRETE	0.6" ∅ L. R. STRANDS
	LB.	C.Y.	No.
SPAN B	834	11.5	32

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
5	79'-8"	398'-4"

PROJECT NO. 17BP.7.R.116

GUILFORD COUNTY

STATION: 15+80.00 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

AASHTO TYPE III PRESTRESSED CONCRETE GIRDER

SPAN B

WGI
5640 Dillard Drive, Suite 200
Cary, NC 27518
LICENSURE NO. C-4434

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 023908 MARK A. AVERETTE
2/17/2025 | 12:54 PM PST

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-15
1			3			TOTAL SHEETS
2			4			40

DRAWN BY : T. BANKOVICH DATE : 2-25
CHECKED BY : M.A. AVERETTE DATE : 2-25
DESIGN ENGINEER OF RECORD: M.A. AVERETTE DATE : 2-25

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

	SPAN A & C																				
0.6″Ø LOW RELAXATION	GIRDER 1 & 5																				
TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	1.0
CAMBER (GIRDER ALONE IN PLACE) ↑	0	0.010	0.020	0.029	0.038	0.046	0.052	0.057	0.061	0.063	0.064	0.063	0.061	0.057	0.052	0.046	0.038	0.029	0.020	0.010	0
✳DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0	0.004	0.008	0.013	0.017	0.021	0.024	0.026	0.028	0.029	0.029	0.029	0.028	0.026	0.024	0.021	0.017	0.013	0.008	0.004	0
FINAL CAMBER ↑	0	1/16″	1/8″	3/16″	1/4″	5/16″	5/16″	3/8″	3/8″	7/16″	7/16″	7/16″	3/8″	3/8″	5/16″	5/16″	1/4″	3/16″	1/8″	1/16″	0
	SPAN A & C																				
0.6″Ø LOW RELAXATION	GIRDER 2, 3, & 4																				
TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	1.0
CAMBER (GIRDER ALONE IN PLACE) ↑	0	0.010	0.020	0.029	0.038	0.046	0.052	0.057	0.061	0.063	0.064	0.063	0.061	0.057	0.052	0.046	0.038	0.029	0.020	0.010	0
✳DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0	0.004	0.009	0.014	0.019	0.023	0.026	0.029	0.031	0.032	0.033	0.032	0.031	0.029	0.026	0.023	0.019	0.014	0.009	0.004	0
FINAL CAMBER ↑	0	1/16″	1/8″	3/16″	1/4″	1/4″	5/16″	5/16″	3/8″	3/8″	3/8″	3/8″	3/8″	5/16″	5/16″	1/4″	1/4″	3/16″	1/8″	1/16″	0
	SPAN B																				
0.6″Ø LOW RELAXATION	GIRDER 1 & 5																				
TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	1.0
CAMBER (GIRDER ALONE IN PLACE) ↑	0	0.027	0.053	0.077	0.100	0.120	0.137	0.150	0.160	0.166	0.168	0.166	0.160	0.150	0.137	0.120	0.100	0.077	0.053	0.027	0
✳DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0	0.017	0.038	0.057	0.075	0.090	0.104	0.114	0.122	0.127	0.129	0.127	0.123	0.115	0.104	0.091	0.075	0.057	0.038	0.017	0
FINAL CAMBER ↑	0	1/8″	3/16″	1/4″	5/16″	3/8″	3/8″	7/16″	7/16″	1/2″	1/2″	7/16″	7/16″	7/16″	3/8″	3/8″	5/16″	1/4″	3/16″	1/8″	0
	SPAN B																				
0.6″Ø LOW RELAXATION	GIRDER 2, 3, & 4																				
TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	1.0
CAMBER (GIRDER ALONE IN PLACE) ↑	0	0.027	0.053	0.077	0.100	0.120	0.137	0.150	0.160	0.166	0.168	0.166	0.160	0.150	0.137	0.120	0.100	0.077	0.053	0.027	0
✳DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0	0.027	0.046	0.065	0.083	0.100	0.115	0.127	0.134	0.141	0.143	0.141	0.136	0.127	0.115	0.100	0.083	0.065	0.046	0.026	0
FINAL CAMBER ↑	0	0	1/16″	1/8″	3/16″	1/4″	1/4″	1/4″	5/16″	5/16″	5/16″	5/16″	5/16″	1/4″	1/4″	1/4″	3/16″	1/8″	1/16″	0	0

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

NOTES:

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

ALL REINFORCING STEEL SHALL BE GRADE 60.

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

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

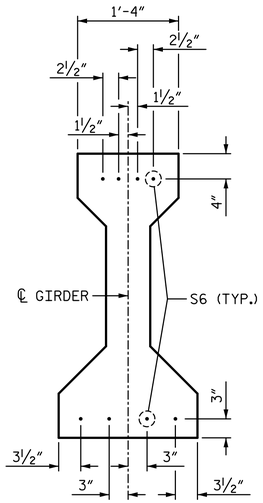
AT ENDS OF GIRDERS TO BE EMBEDDED IN CONCRETE DIAPHRAGMS OR END WALLS, PRESTRESSING STRANDS MAY EXTEND A MAXIMUM OF 2" BEYOND THE GIRDER ENDS. OTHERWISE, PRESTRESSING STRANDS SHALL BE CUT FLUSH WITH THE GIRDER ENDS.

THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE GIRDER SHALL BE DONE WHEN CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN 5000 PSI FOR SPANS A & C AND 6500 PSI FOR SPAN B.

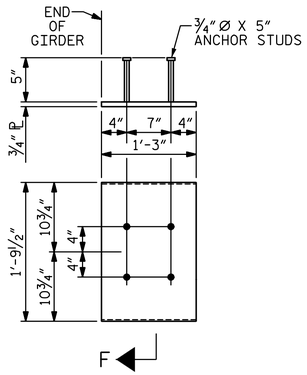
DEPENDING ON THE TYPE OF SYSTEM USED TO SUPPORT THE DECK SLAB FORMS, PRESET ANCHORS MAY BE NECESSARY IN THE PRESTRESSED CONCRETE GIRDER.

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

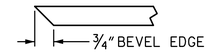
THE CONTRACTOR HAS THE OPTION TO PROVIDE, AT NO ADDITIONAL COST TO THE DEPARTMENT, 2 ADDITIONAL STRANDS AT THE TOP OF THE GIRDER TO FACILITATE TYING OF THE REINFORCING STEEL. THESE STRANDS SHALL BE PULLED TO A LOAD OF 4500 lbs.



DETAIL "A"
@ INTEGRAL END BENT



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



SECTION "F"
(SEE NOTES)

PROJECT NO. 17BP.7.R.116
GUILFORD COUNTY
STATION: 15+80.00 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

PRESTRESSED CONCRETE GIRDER DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-16
1			3			TOTAL SHEETS
2			4			40

DRAWN BY: T. BANKOVICH DATE: 1-22
CHECKED BY: B.S. COX DATE: 1-22
DESIGN ENGINEER OF RECORD: M.A. AVERETTE DATE: 11-24

WGI
5640 Dillard Drive, Suite 200
Cary, NC 27518
LICENSURE NO. C-4434

2/17/2025 | 12:54 PM EST

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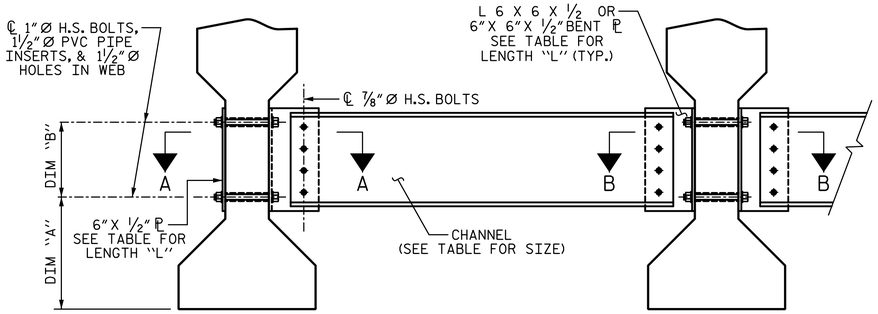
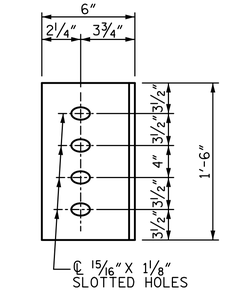
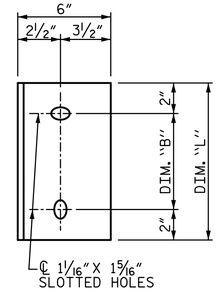


EXTERIOR GIRDER INTERIOR GIRDER

PART SECTION AT INTERMEDIATE DIAPHRAGM



DIAPHRAGM FACE



WEB FACE

CONNECTOR PLATE DETAILS

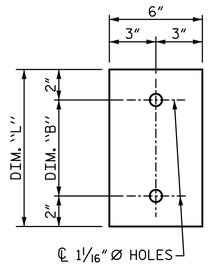
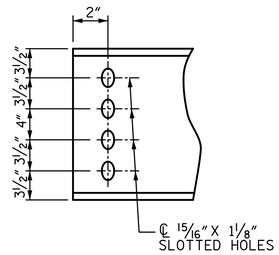


PLATE DETAILS



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.

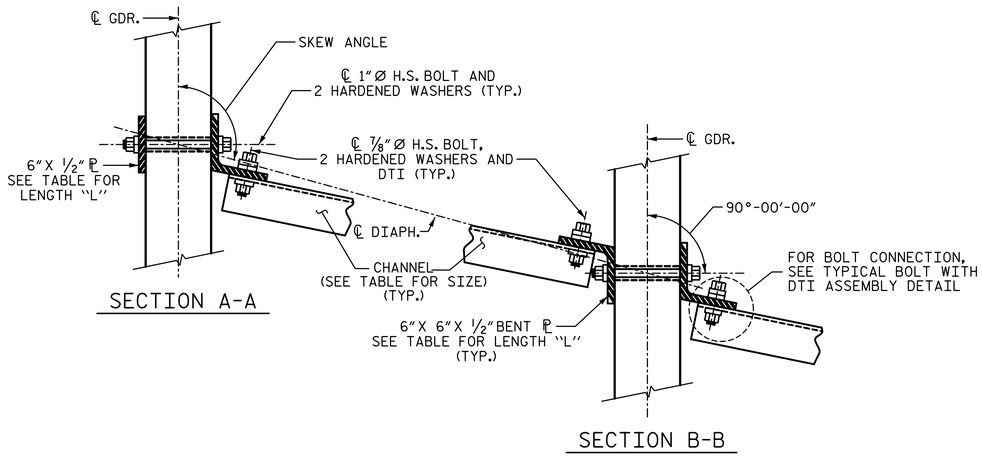
FOR BOLTS THROUGH THE GIRDER WEB, PROVIDE SUFFICIENT LENGTH OF THREADS ON ALL BOLTS TO ACCOMMODATE WASHERS AND THE THICKNESS OF CONNECTING MEMBER PLUS AT LEAST ¼" PROJECTION BEYOND THE NUT.

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.

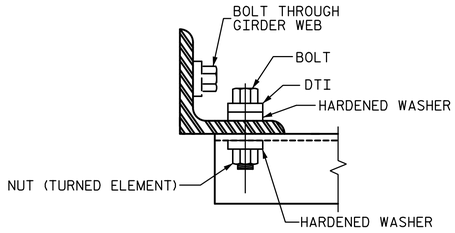
THE COST OF THE STEEL DIAPHRAGMS AND ASSEMBLIES SHALL BE INCLUDED IN THE UNIT PRICE BID FOR PRESTRESSED CONCRETE GIRDERS.



SECTION A-A

SECTION B-B

CONNECTION DETAILS



BOLT WITH DTI ASSEMBLY DETAIL

TABLE

GIRDER TYPE	CHANNEL SIZE	DIM "A"	DIM "B"	DIM "L"
III	MC 18 x 42.7	1'-5"	1'-2"	1'-6"

PROJECT NO. 17BP.7.R.116

GUILFORD COUNTY

STATION: 15+80.00 -L-

DRAWN BY: T. BANKOVICH DATE: 1-22
CHECKED BY: B.S. COX DATE: 1-22
DESIGN ENGINEER OF RECORD: M.A. AVERETTE DATE: 11-24

WGI
5640 Dillard Drive, Suite 200
Cary, NC 27518
LICENSURE NO. C-4434

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 023908 MARK A. AVERETTE
2/17/2025 | 12:54 PM EST

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
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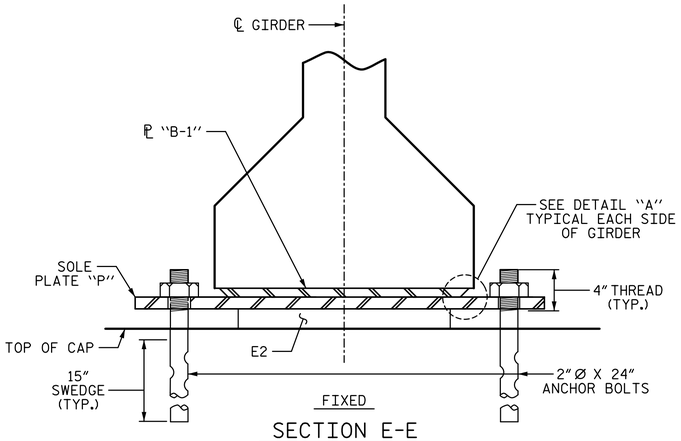
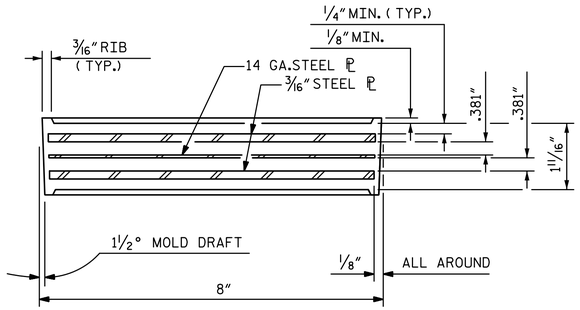
INTERMEDIATE STEEL DIAPHRAGMS FOR TYPE III PREST. CONCRETE GIRDERS

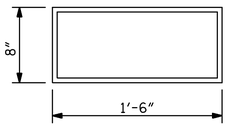
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-17
1			3			TOTAL SHEETS
2			4			40



SECTION E-E



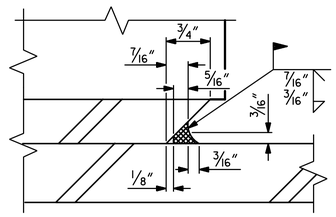
TYPICAL SECTION OF ELASTOMERIC BEARINGS



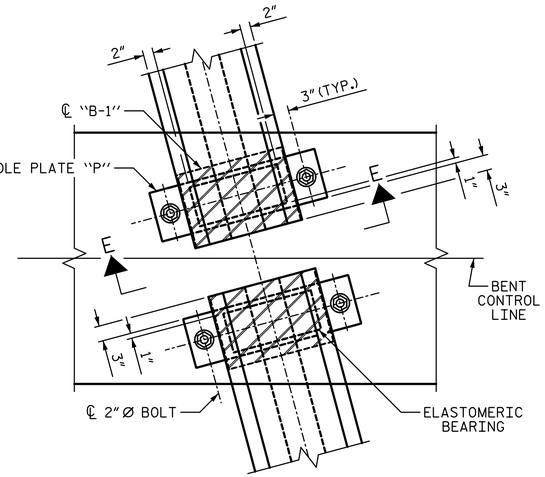
E2 (20 REQ'D)

PLAN VIEW OF ELASTOMERIC BEARING

TYPE III

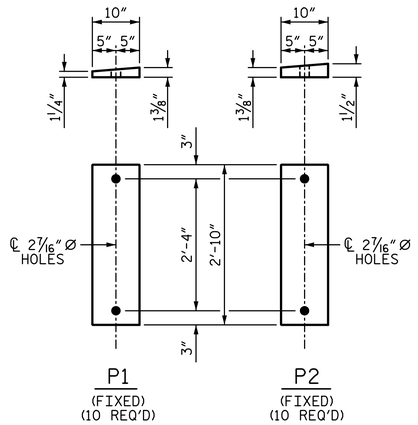


DETAIL "A"

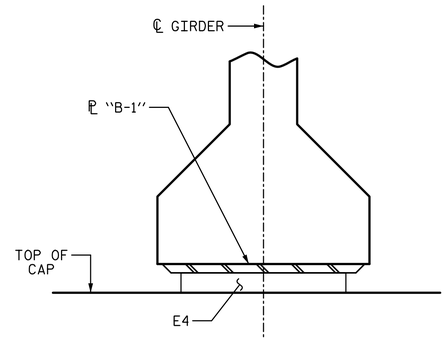


TYPICAL PLAN

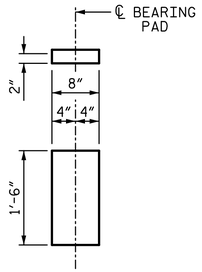
(SHOWING CONTINUOUS BENT)



SOLE PLATE DETAILS ("P")



SECTION AT INTEGRAL END BENT



E4 (10 REQ'D)

TYPICAL SECTION OF ELASTOMERIC BEARING PAD

NOTES:

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

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

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

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

SOLE PLATE "P", BOLTS, NUTS, 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.

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

PROJECT NO. 17BP.7.R.116

GUILFORD COUNTY

STATION: 15+80.00 -L-

DRAWN BY: T. BANKOVICH DATE: 1-22
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DESIGN ENGINEER OF RECORD: M.A. AVERETTE DATE: 11-24

WGI
5640 Dillard Drive, Suite 200
Cary, NC 27518
LICENSURE NO. C-4434

STATE OF NORTH CAROLINA SEAL 023908 ENGINEER MARK A. AVERETTE
2/17/2025 | 12:54 PM

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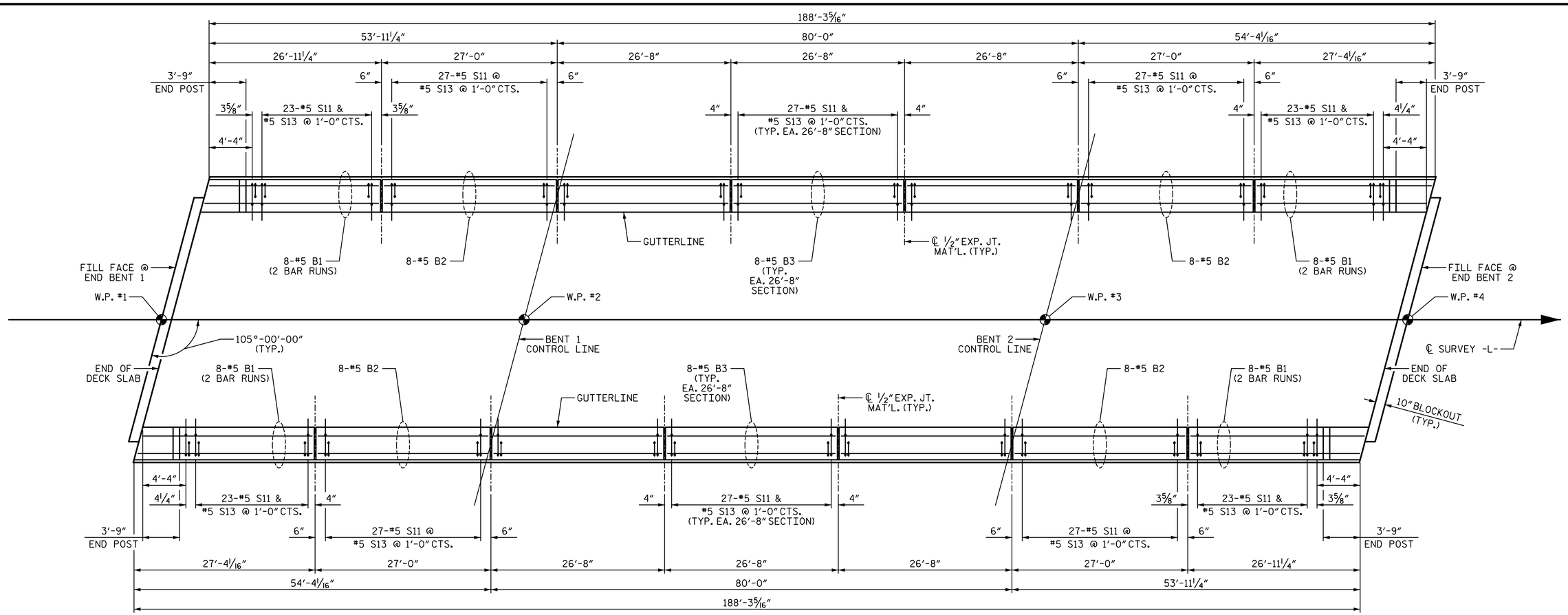
ELASTOMERIC BEARING DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-18
1			3			TOTAL SHEETS
2			4			40



PLAN OF BARRIER RAIL

DIMENSIONS SHOWN ARE ALONG BACK FACE OF BARRIER RAIL

GROOVED CONTRACTION JOINTS SHOWN SHOWN FOR CLARITY, SEE "RAIL POST SPACINGS AND END OF RAIL DETAILS" SHEET FOR LOCATION.

PROJECT NO. 17BP.7.R.116

GUILFORD COUNTY

STATION: 15+80.00 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
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CONCRETE PARAPET

WGI
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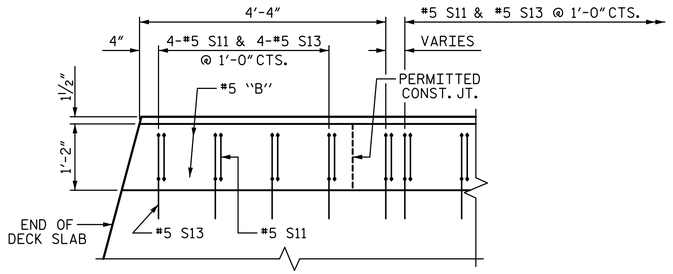
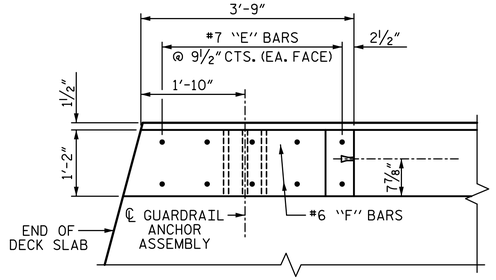
DESIGN ENGINEER OF RECORD:	M.A. AVERETTE	DATE:	11-24		

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-19
1			3			TOTAL SHEETS
2			4			40



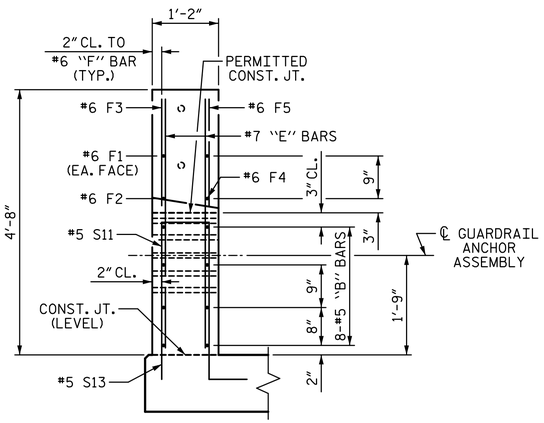
PLAN OF PARAPET @ END BENT 1

END BENT 2 SIMILAR

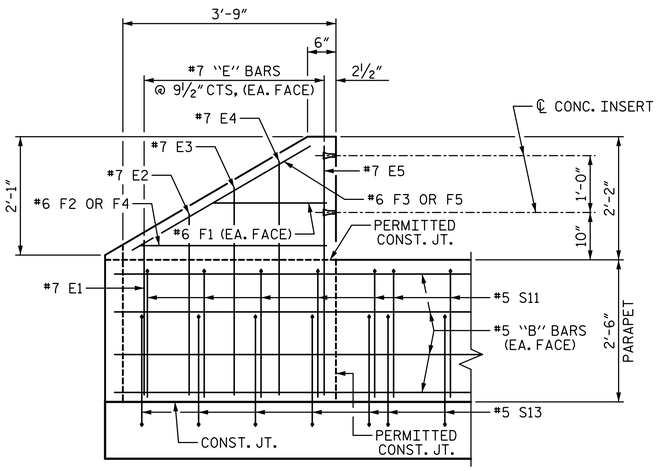


PLAN OF END POST @ END BENT 1

END BENT 2 SIMILAR



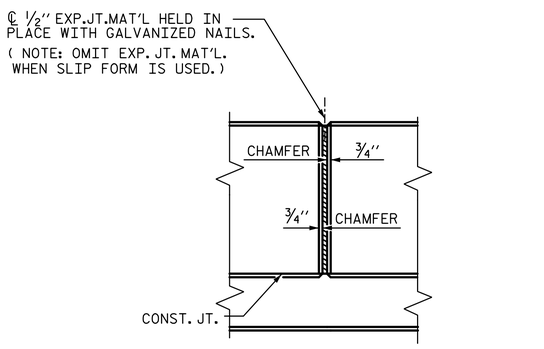
END VIEW



ELEVATION

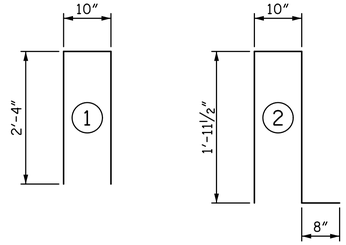
PARAPET AND END POST FOR TWO BAR METAL RAIL

END BENT 1 SHOWN, END BENT 2 SIMILAR



ELEVATION AT EXPANSION JOINTS

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

CONCRETE BARRIER RAIL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳B1	64	#5	STR	15′-3″	1018
✳B2	32	#5	STR	26′-7″	887
✳B3	48	#5	STR	26′-2″	1310
✳E1	8	#7	STR	2′-8″	44
✳E2	8	#7	STR	3′-2″	52
✳E3	8	#7	STR	3′-7″	59
✳E4	8	#7	STR	4′-1″	67
✳E5	8	#7	STR	4′-4″	71
✳F1	8	#6	STR	2′-0″	24
✳F2	4	#6	STR	3′-5″	21
✳F3	4	#6	STR	3′-7″	22
✳F4	4	#6	STR	3′-7″	22
✳F5	4	#6	STR	3′-11″	24
✳S11	382	#5	1	5′-6″	2191
✳S13	382	#5	2	5′-5″	2158

EPOXY COATED REINFORCING STEEL	7970 LB
CLASS AA CONCRETE	41.5 CY
1′-2″ X 2′-6″ CONCRETE PARAPET	376.6 LF

NOTES:

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

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

THE #5 S11 AND #5 S13 BARS MAY BE SHIFTED SLIGHTLY IN ORDER TO MAINTAIN A 2″ MINIMUM CLEARANCE TO THE ½″ EXPANSION JT. MATERIAL IN PARAPET.

FOR DETAILS OF CONCRETE INSERTS IN END POSTS, SEE ″RAIL POST SPACINGS AND END OF RAIL DETAILS″ SHEET.

GROOVED CONTRACTION JOINTS, ½″ IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE PARAPET IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. A CONTRACTION JOINT SHALL BE LOCATED AT EACH THIRD POINT BETWEEN PARAPET EXPANSION JOINTS. ONLY ONE CONTRACTION JOINT IS REQUIRED AT MIDPOINT OF PARAPET SEGMENTS LESS THAN 20 FEET IN LENGTH AND NO CONTRACTION JOINTS ARE REQUIRED FOR THOSE SEGMENTS LESS THAN 10 FEET IN LENGTH.

FOR DETAILS AND LOCATION OF GUARDRAIL ANCHOR ASSEMBLIES, SEE ″GUARDRAIL ANCHORAGE DETAILS FOR METAL RAILS″ SHEET.

DRAWN BY: T. BANKOVICH DATE: 1-22
CHECKED BY: B.S. COX DATE: 1-22
DESIGN ENGINEER OF RECORD: M.A. AVERETTE DATE: 11-24

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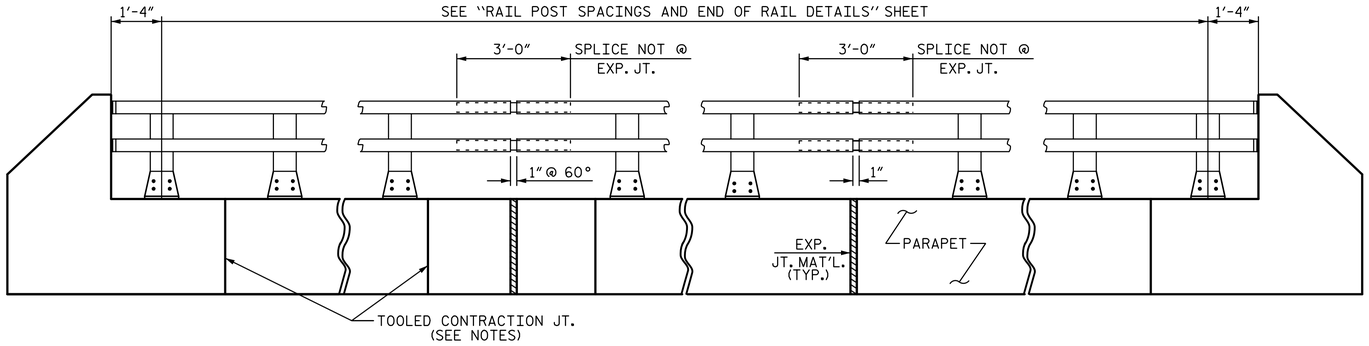
PROJECT NO. 17BP.7.R.116
GUILFORD COUNTY
STATION: 15+80.00 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

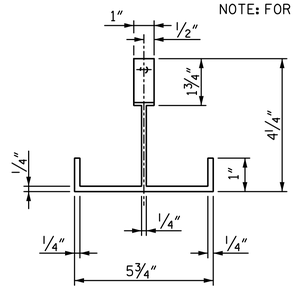
CONCRETE BARRIER RAIL

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-20
1			3			TOTAL SHEETS
2			4			40

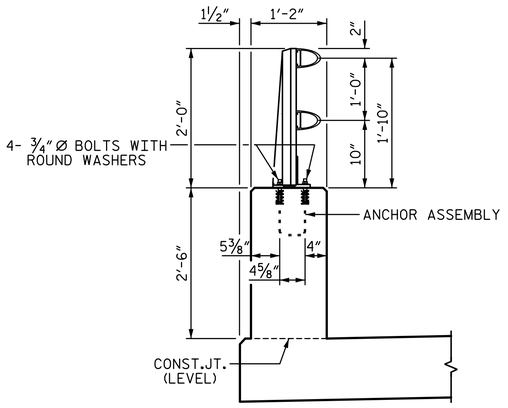


ELEVATION

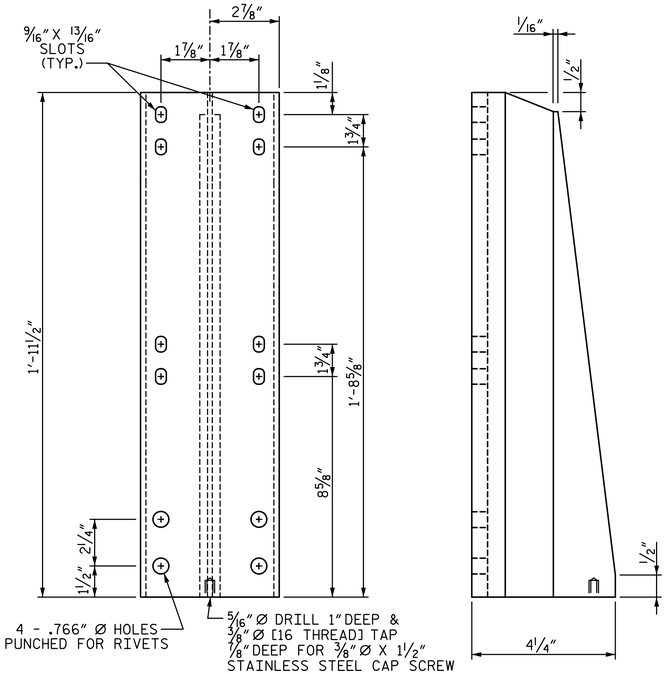
NOTE: FOR ATTACHMENT OF METAL RAIL TO END POST, SEE "RAIL POST SPACINGS AND END OF RAIL DETAILS" SHEET



PLAN



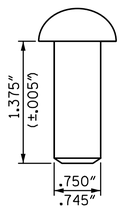
SECTION THRU PARAPET AND RAIL



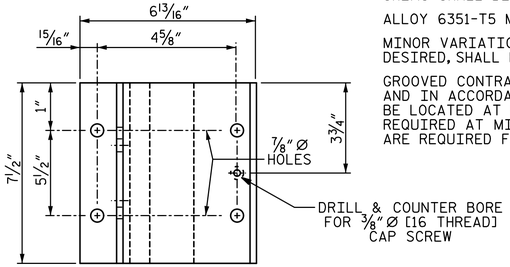
FRONT ELEVATION

SIDE ELEVATION

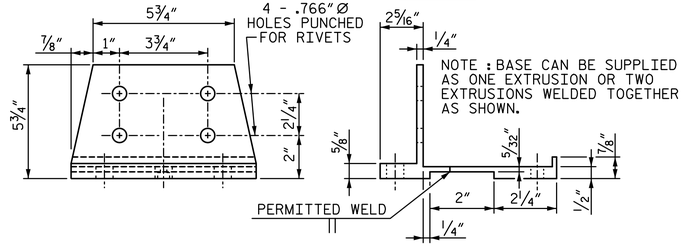
DETAILS OF POST



RIVET DETAIL



PLAN



FRONT ELEVATION

SIDE ELEVATION

POST BASE DETAILS

NOTES:

AT THE CONTRACTOR'S OPTION, METAL RAIL MAY BE EITHER ALUMINUM OR GALVANIZED STEEL IN ACCORDANCE WITH THE REQUIREMENTS OF THE GENERAL NOTES AND THE FOLLOWING SPECIFICATIONS FOR THE ALTERNATE MATERIALS; HOWEVER, THE CONTRACTOR WILL BE REQUIRED TO USE THE SAME RAIL MATERIAL ON ALL STRUCTURES ON THE PROJECT FOR WHICH METAL RAIL IS DESIGNATED.

UNLESS OTHERWISE REQUIRED IN THE CONTRACT DOCUMENTS, THE CONTRACTOR HAS THE OPTION TO USE AN ALTERNATE TO THE 2 BAR METAL RAIL. THE ALTERNATE RAIL SHALL MEET THE REQUIREMENTS OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS AND MUST BE LISTED ON THE DEPARTMENT'S APPROVED PRODUCTS LIST (APL) UNDER "2 BAR METAL RAIL ALTERNATE". ADJUSTMENTS TO THE CONCRETE PARAPET WILL NOT BE ALLOWED.

ALUMINUM RAILS

MATERIAL FOR POSTS, BASES AND RAILS, EXPANSION BARS AND CLAMP BARS SHALL BE ASTM B-221 ALLOY 6061-T6.

MATERIAL FOR RIVETS SHALL BE ASTM B316 ALLOY 6061-T6. RIVETS SHALL BE STANDARD BUTTON HEAD AND CONE POINT COLD DRIVEN AS PER DRAWING.

THE BASE OF RAIL POSTS, OR ANY OTHER ALUMINUM SURFACE IN CONTACT WITH CONCRETE SHALL BE THOROUGHLY COATED WITH AN ALUMINUM IMPREGNATED CAULKING COMPOUND OF APPROVED QUALITY.

MATERIAL FOR SHIMS TO BE ASTM B209 ALLOY 6061-T6.

GALVANIZED STEEL RAILS

MATERIAL AND GALVANIZING ARE TO CONFORM TO THE FOLLOWING SPECIFICATIONS:

POST, POST BASES, RAILS, EXPANSION BARS AND CLAMP BARS: AASHTO M270 GRADE 36 STRUCTURAL STEEL - GALVANIZED TO AASHTO M111.

RIVETS: RIVETS SHALL MEET THE REQUIREMENTS OF ASTM A502 FOR GRADE 1 RIVETS.

THE CUT ENDS OF GALVANIZED STEEL RAILING, AFTER GRINDING SMOOTH SHALL BE GIVEN TWO COATS OF ZINC RICH PAINT MEETING THE REQUIREMENTS OF FEDERAL SPECIFICATION MIL-P-26915 USAF TYPE 1, OR OF FEDERAL SPECIFICATIONS TT-P-641.

SHIMS: SHIMS SHALL MEET THE REQUIREMENTS OF ASTM A570 FOR GRADE 33 OR A611 FOR GRADE C AND SHALL BE GALVANIZED IN ACCORDANCE WITH AASHTO M111.

RAIL CAPS: RAIL CAPS SHALL MEET THE REQUIREMENTS OF ASTM A570 FOR GRADE 33 OR A611 FOR GRADE C AND SHALL BE GALVANIZED IN ACCORDANCE WITH AASHTO M111.

GENERAL NOTES

RAILING SHALL BE CONTINUOUS FROM END POST TO END POST OF BRIDGE. EACH JOINT IN RAIL LENGTH SHALL BE SPLICED AS DETAILED. PANEL LENGTHS OF RAIL SHALL BE ATTACHED TO A MINIMUM OF THREE POSTS.

FOR END OF RAIL TO CLEAR FACE OF CONCRETE END POST DIMENSION, SEE "RAIL POST SPACINGS AND END OF RAIL DETAILS" SHEET.

CAP SCREWS SHALL BE ASTM F593 ALLOY 305 STAINLESS STEEL. WASHERS SHALL MEET THE REQUIREMENTS OF ASTM F844 EXCEPT THEY SHALL BE MADE FROM ALLOY 304 STAINLESS STEEL.

CERTIFIED MILL REPORTS ARE REQUIRED FOR RAILS AND POSTS. SHOP INSPECTION IS NOT REQUIRED.

METAL RAIL POSTS SHALL BE SET NORMAL TO CURB GRADE.

METHOD OF MEASUREMENT FOR METAL RAILS: FOR LENGTH OF METAL RAILS TO BE PAID FOR, SEE THE STANDARD SPECIFICATIONS.

CURVED RAIL USAGE: WHERE RAILS ARE TO BE USED ON BRIDGES ON HORIZONTAL AND/OR VERTICAL CURVATURE THE CONTRACTOR MAY, AT HIS OPTION, HAVE THE REQUIRED CURVATURE IN THE RAIL FORMED IN THE SHOP OR IN THE FIELD. IN EITHER EVENT, THE RAIL SHALL CONFORM WITHOUT BUCKLING OR KINKING TO THE REQUIRED CURVATURE IN A UNIFORM MANNER ACCEPTABLE TO THE ENGINEER.

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

SHIMS SHALL BE USED AS NECESSARY FOR POST ALIGNMENT.

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

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

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

PAY LENGTH = 360.93 LF

PROJECT NO. 17BP.7.R.116

GUILFORD COUNTY

STATION: 15+80.00 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

2 BAR METAL RAIL

DRAWN BY: T. BANKOVICH DATE: 1-22
CHECKED BY: B.S. COX DATE: 1-22
DESIGN ENGINEER OF RECORD: M.A. AVERETTE DATE: 11-24

WGI
5640 Dillard Drive, Suite 200
Cary, NC 27518
LICENSURE NO. C-4434

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 023908 MARK A. AVERETTE
2/17/2025 | 12:54 PM EST

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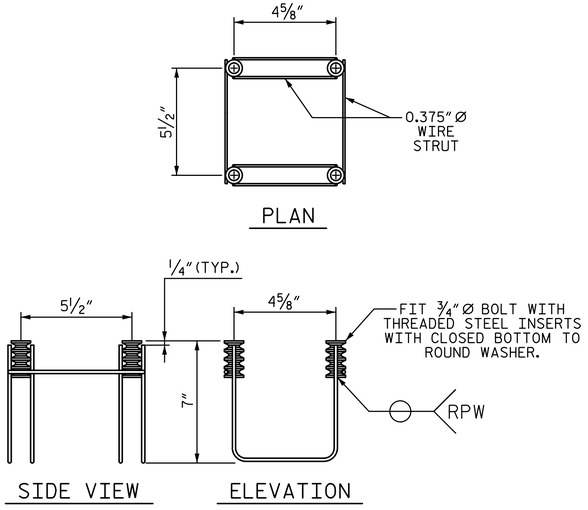
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-21
1			3			TOTAL SHEETS
2			4			40



4-BOLT METAL RAIL ANCHOR ASSEMBLY

(94 ASSEMBLIES REQUIRED)

NOTES:

STRUCTURAL CONCRETE ANCHOR ASSEMBLY

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

A. FERRULES SHALL BE MADE FROM STEEL MEETING THE REQUIREMENTS OF AASHTO M169, GRADE 12L14 AND SHALL HAVE A MINIMUM LENGTH OF THREADS OF 2″ FOR ¾″ FERRULES.

B. 4 - ¾″Ø X 2½″ BOLTS WITH WASHERS. BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307. BOLTS AND WASHERS SHALL BE GALVANIZED. AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLTS AND WASHERS MAY BE USED AS AN ALTERNATE FOR THE ¾″Ø X 2½″ GALVANIZED BOLTS AND WASHERS. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.

C. WIRE STRUT SHOWN IN THE CONCRETE ANCHOR ASSEMBLY DETAIL IS THE MINIMUM ALLOWABLE SIZE AND SHALL HAVE A MINIMUM TENSILE STRENGTH OF 100,000 PSI. AS AN OPTION, A 7/16″Ø WIRE STRUT WITH A MINIMUM TENSILE STRENGTH OF 90,000 PSI IS ACCEPTABLE.

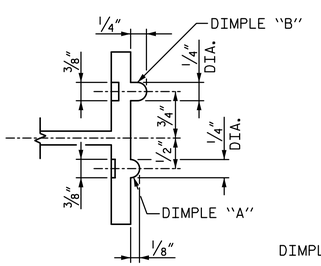
D. THE METAL RAIL ANCHOR ASSEMBLIES TO BE HOT DIPPED GALVANIZED TO CONFORM TO REQUIREMENTS OF AASHTO M111.

E. THE COST OF THE METAL RAIL ANCHOR ASSEMBLY WITH BOLTS AND WASHERS COMPLETE IN PLACE SHALL BE INCLUDED IN THE PRICE BID FOR LINEAR FEET OF METAL RAIL.

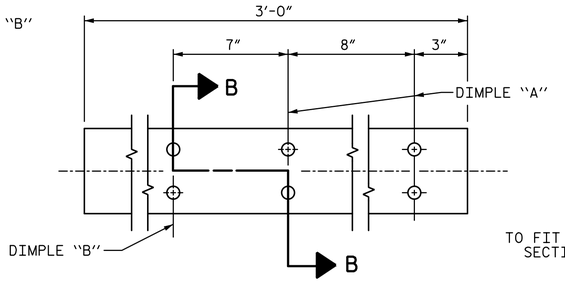
F. BOLTS TO BE TIGHTENED ONE-HALF TURN WITH A WRENCH FROM A FINGER-TIGHT POSITION.

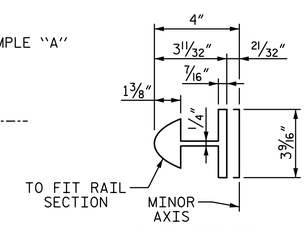
THE CONTRACTOR MAY USE ADHESIVELY ANCHORED ANCHOR BOLTS IN PLACE OF THE METAL RAIL ANCHOR ASSEMBLY. LEVEL ONE FIELD TESTING IS REQUIRED, AND THE YIELD LOAD OF THE ¾″Ø BOLT IS 10 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE THE STANDARD SPECIFICATIONS.

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



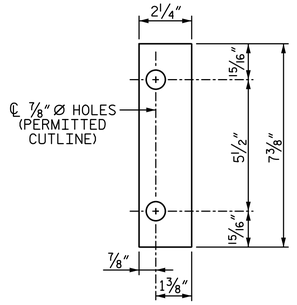
SECTION B-B



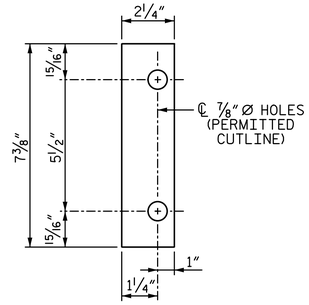


BAR SECTION

EXPANSION BAR DETAILS



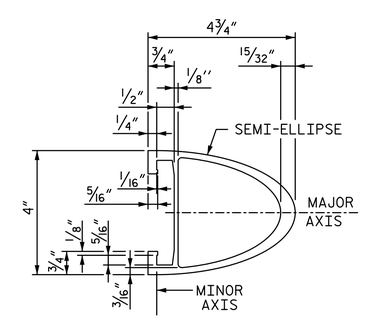
FRONT PLATE



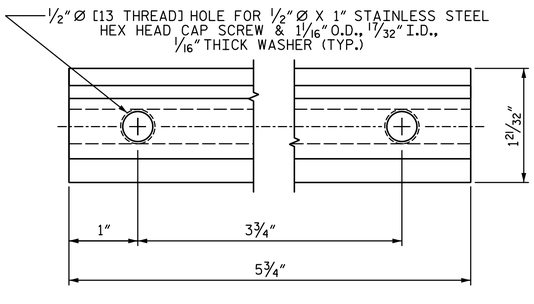
REAR PLATE

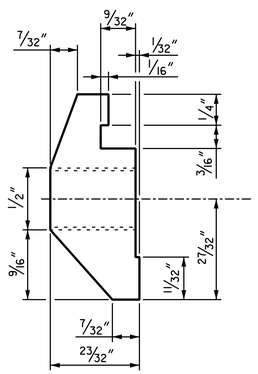
SHIM DETAILS

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



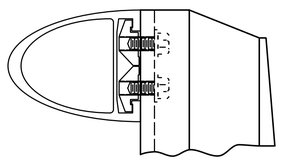
RAIL SECTION



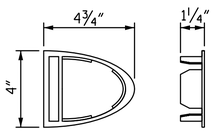


CLAMP BAR DETAIL

(4 REQUIRED PER POST)



CLAMP ASSEMBLY



RAIL CAP

PROJECT NO. 17BP.7.R.116

GUILFORD COUNTY

STATION: 15+80.00 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

2 BAR METAL RAIL

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-22
1			3			TOTAL SHEETS
2			4			40

DRAWN BY: T. BANKOVICH DATE: 1-22
CHECKED BY: B.S. COX DATE: 1-22
DESIGN ENGINEER OF RECORD: M.A. AVERETTE DATE: 11-24

WGI
5640 Dillard Drive, Suite 200
Cary, NC 27518
LICENSURE NO. C-4434

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 023908 ENGINEER MARK A. AVERETTE

2/17/2025 | 12:54 PM EST

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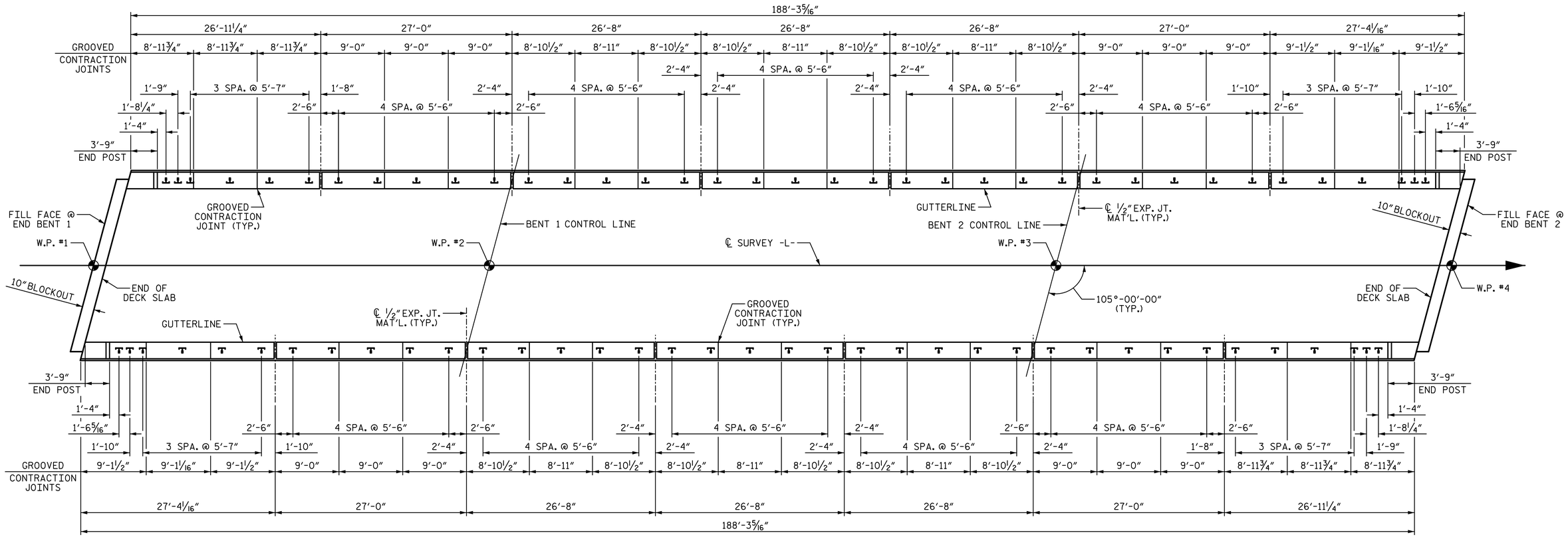

PLAN OF RAIL POST SPACING

NOTE: ALL DIMENSIONS ARE MEASURED ALONG OUTSIDE FACE OF CONCRETE PARAPET

PROJECT NO. 17BP.7.R.116

GUILFORD COUNTY

STATION: 15+80.00 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

RAIL POST SPACINGS

WGI
5640 Dillard Drive, Suite 200
Cary, NC 27518
LICENSURE NO. C-4434

2/17/2025 | 12:54 PM EST

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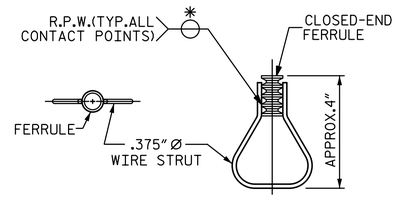
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-23
1			3			TOTAL SHEETS
2			4			40



STRUCTURAL CONCRETE INSERT

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

NOTES:

STRUCTURAL CONCRETE INSERT

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

A. FERRULES SHALL BE MADE FROM STEEL MEETING THE REQUIREMENTS OF AASHTO M169, GRADE 12L14 AND SHALL HAVE A MINIMUM LENGTH OF THREADS OF 1½".

B. 1 - ¾"Ø X 1⅝" BOLT WITH WASHER. BOLT SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307. BOLT AND WASHER SHALL BE GALVANIZED. (AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLT AND WASHER MAY BE USED AS AN ALTERNATE FOR THE ¾"Ø X 1⅝" GALVANIZED BOLT AND WASHER. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.)

C. WIRE STRUT SHOWN IN THE CONCRETE INSERT ASSEMBLY DETAIL IS THE MINIMUM ALLOWABLE SIZE AND SHALL HAVE A MINIMUM TENSILE STRENGTH OF 100,000 PSI. AS AN OPTION, A 7/16"Ø WIRE STRUT WITH A MINIMUM TENSILE STRENGTH OF 90,000 PSI IS ACCEPTABLE.

METAL RAIL TO END POST CONNECTION

THE METAL RAIL TO END POST CONNECTION SHALL CONSIST OF THE FOLLOWING COMPONENTS:

A. ½" PLATES SHALL CONFORM TO AASHTO M270 GRADE 36 AND SHALL BE GALVANIZED AFTER FABRICATION.

B. ¾" STRUCTURAL CONCRETE INSERT SHALL HAVE A WORKING LOAD SHEAR CAPACITY OF 4800 LBS. THE FERRULES SHALL ENGAGE A ¾"Ø X 1⅝" BOLT WITH 2" O.D. WASHER IN PLACE. THE ¾"Ø X 1⅝" BOLT SHALL HAVE N. C. THREADS.

C. CAP SCREWS FOR RAIL ATTACHMENT TO ANGLE SHALL CONFORM TO THE REQUIREMENTS OF ASTM F593 ALLOY 305 STAINLESS STEEL. CAP SCREWS TO BE CENTERED IN SLOTS AT 60°F.

D. STANDARD CLAMP BARS (SEE METAL RAIL SHEET).

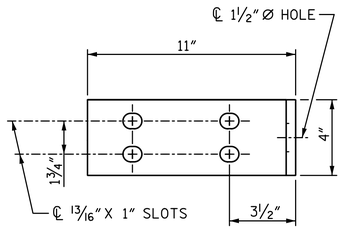
E. ½"Ø PIPE SLEEVES (IF REQUIRED) TO BE GALVANIZED.

THE COST OF THE STANDARD CLAMP BARS AND CAP SCREWS USED IN THE METAL RAIL TO END POST CONNECTION SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR LINEAR FEET OF 2 BAR METAL RAILS.

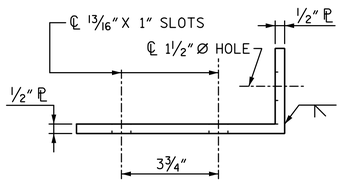
THE ¾" STRUCTURAL CONCRETE INSERT WITH BOLT SHALL BE ASSEMBLED IN THE SHOP.

THE COST OF THE ¾" STRUCTURAL CONCRETE INSERT ASSEMBLY, AND THE ½" PLATES COMPLETE IN PLACE SHALL BE INCLUDED IN THE VARIOUS PAY ITEMS.

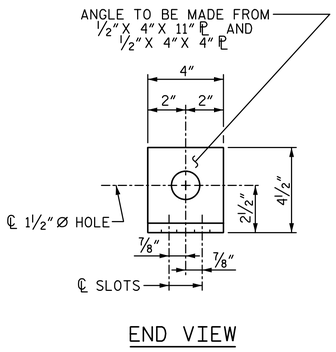
THE CONTRACTOR, AT HIS OPTION, MAY USE AN ADHESIVE BONDING SYSTEM IN LIEU OF THE STRUCTURAL CONCRETE INSERT EMBEDDED IN THE END POST. IF THE ADHESIVE BONDING SYSTEM IS USED, THE ¾"Ø X 1⅝" BOLT WITH WASHER SHALL BE REPLACED WITH A ¾"Ø X 6½" BOLT AND 2" O.D. WASHER. ALL SPECIFICATIONS THAT APPLY TO THE ¾"Ø X 1⅝" BOLT SHALL APPLY TO THE ¾"Ø X 6½" BOLT. FIELD TESTING OF THE ADHESIVE BONDING SYSTEM IS NOT REQUIRED.



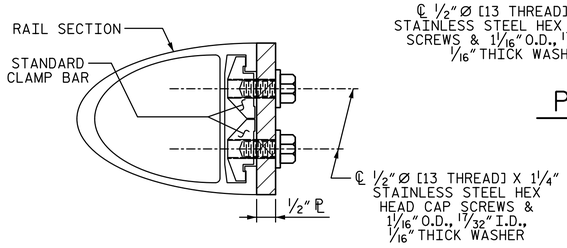
ELEVATION



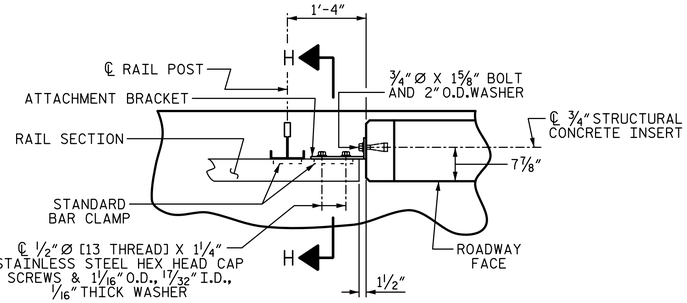
TOP VIEW



END VIEW



SECTION H-H



PLAN - RAIL AND END POST

DETAILS FOR ATTACHING METAL RAIL TO END POST

FIXED

DRAWN BY:	T. BANKOVICH	DATE:	1-22
CHECKED BY:	B.S. COX	DATE:	1-22
DESIGN ENGINEER OF RECORD:	M.A. AVERETTE	DATE:	11-24

WGI
5640 Dillard Drive, Suite 200
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LICENSURE NO. C-4434

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 023908 MARK A. AVERETTE
2/17/2025 | 12:54 PM ET

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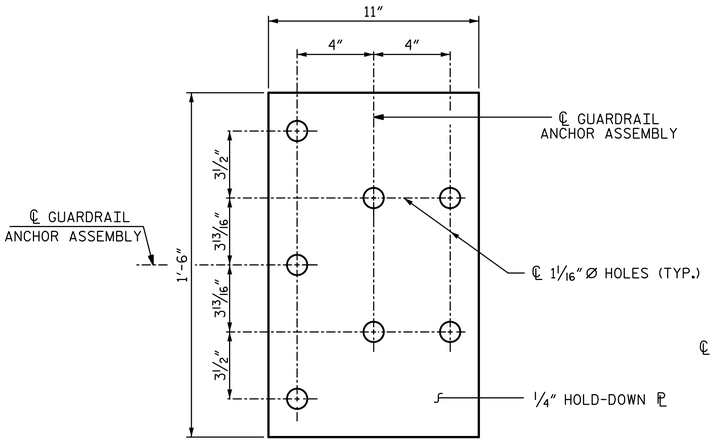
PROJECT NO. 17BP.7.R.116
GUILFORD COUNTY
STATION: 15+80.00 -L-

SHEET 2 OF 2

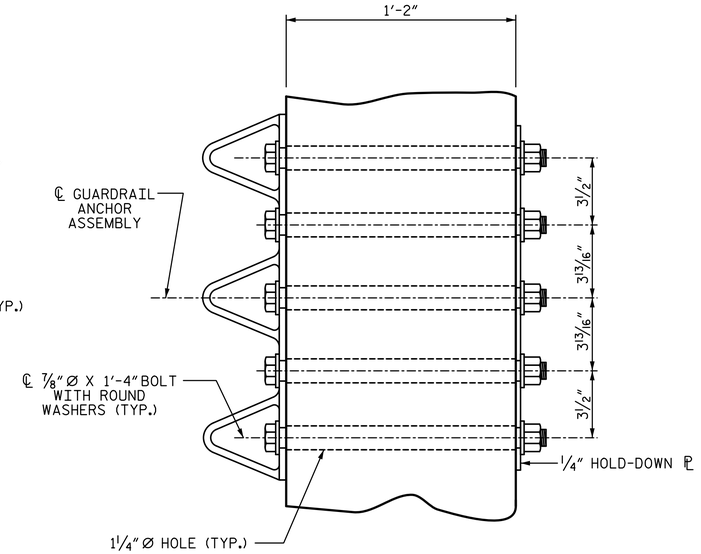
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

END OF RAIL DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-24
1			3			TOTAL SHEETS
2			4			40



PLAN



END VIEW

GUARDRAIL ANCHOR ASSEMBLY DETAILS

NOTES:

THE GUARDRAIL ANCHOR ASSEMBLY SHALL CONSIST OF A ¼″HOLD DOWN PLATE AND 7 - ⅞″Ø BOLTS WITH NUTS AND WASHERS.

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

BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307 AND NUTS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M291. BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED. AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLTS, NUTS AND WASHERS MAY BE USED AS AN ALTERNATE FOR THE ⅞″Ø GALVANIZED BOLTS, NUTS AND WASHERS. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.

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

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

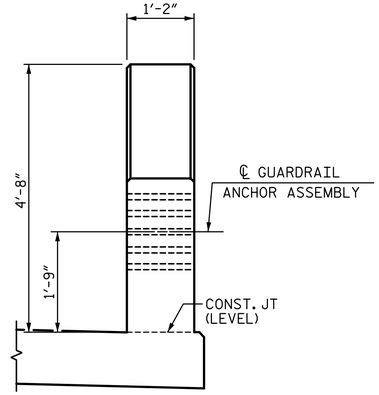
THE COST OF THE GUARDRAIL ANCHOR ASSEMBLIES WITH BOLTS, NUTS AND WASHERS COMPLETE IN PLACE, SHALL BE INCLUDED IN THE VARIOUS PAY ITEMS.

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

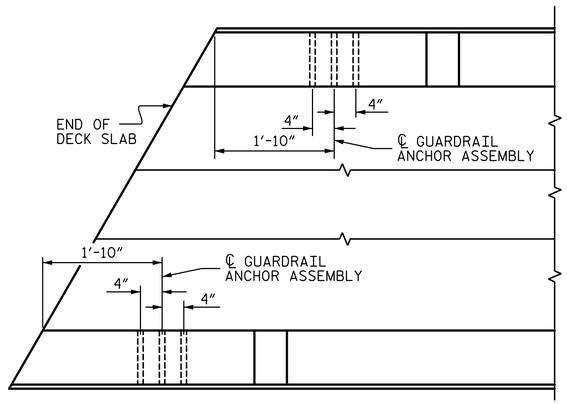
THE 1¼″Ø HOLES SHALL BE FORMED OR DRILLED WITH A CORE BIT. IMPACT TOOLS WILL NOT BE PERMITTED. ANY CONCRETE DAMAGED BY THIS WORK SHALL BE REPAIRED TO THE SATISFACTION OF THE ENGINEER.

SKETCH SHOWING POINTS OF ATTACHMENTS

✳ DENOTES GUARDRAIL ANCHOR ASSEMBLY



END VIEW
(TWO BAR METAL RAIL)



PLAN

LOCATION OF GUARDRAIL ANCHOR AT END POST

PROJECT NO. 17BP.7.R.116
GUILFORD COUNTY
STATION: 15+80.00 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

GUARDRAIL ANCHORAGE DETAILS FOR METAL RAIL

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-25
1			3			TOTAL SHEETS
2			4			40

DRAWN BY: T. BANKOVICH DATE: 1-22
CHECKED BY: B.S. COX DATE: 1-22
DESIGN ENGINEER OF RECORD: M.A. AVERETTE DATE: 11-24

WGI
5640 Dillard Drive, Suite 200
Cary, NC 27518
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2/17/2025 | 12:54 PM PST

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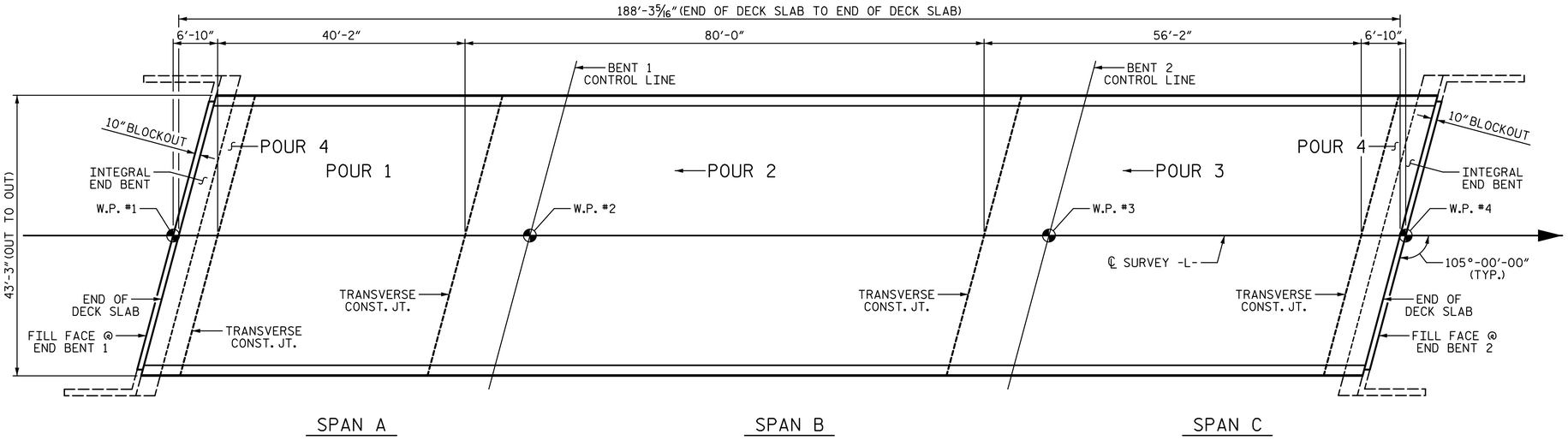
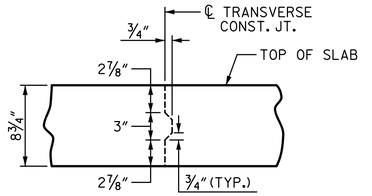
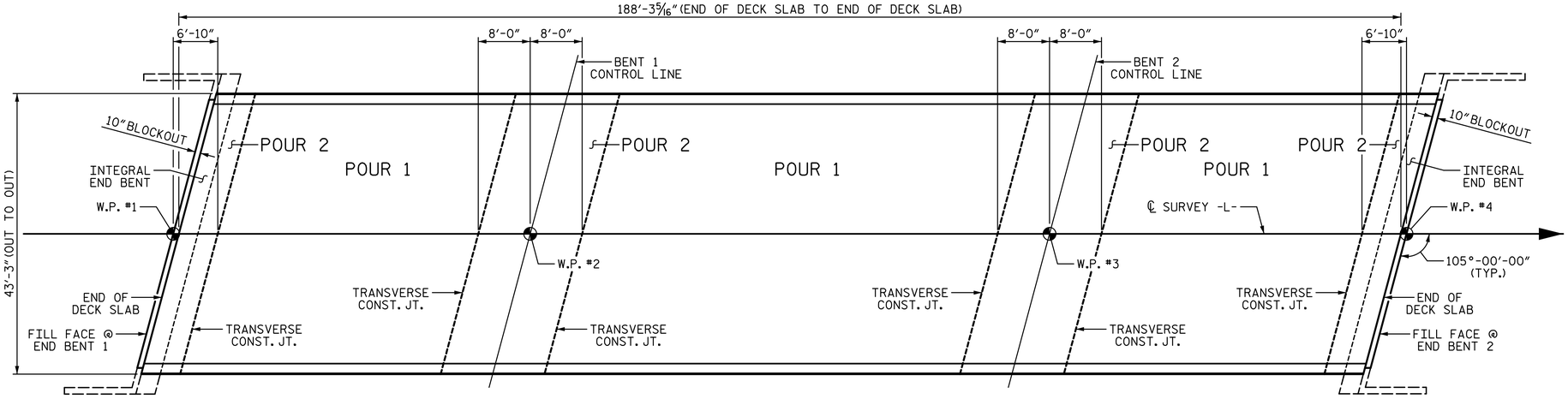


LAYOUT FOR COMPUTING AREA OF REINFORCED CONCRETE DECK SLAB & POUR SEQUENCE
SQ. FT. = 8,217.5



TRANSVERSE CONSTRUCTION JOINT DETAIL

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



OPTIONAL POUR SEQUENCE

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

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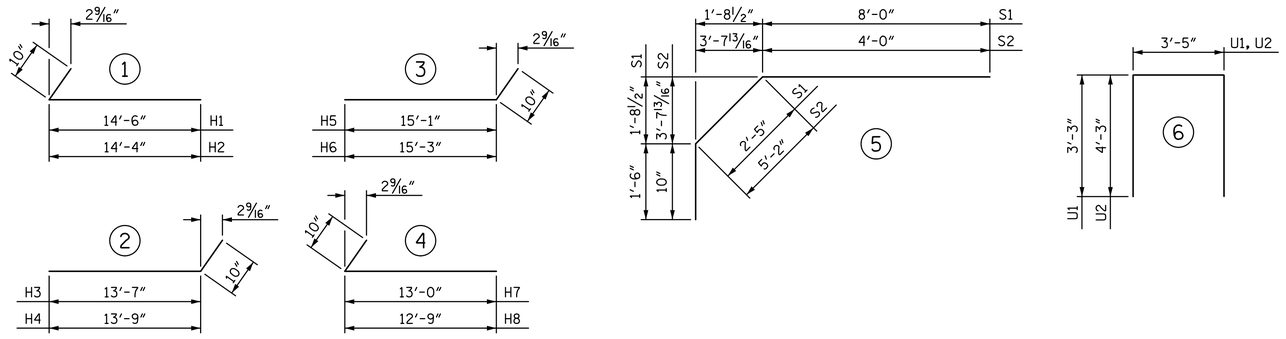
POUR SEQUENCE

DRAWN BY:	T. BANKOVICH	DATE:	1-22
CHECKED BY:	B.S. COX	DATE:	1-22
DESIGN ENGINEER OF RECORD:	M.A. AVERETTE	DATE:	11-24

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-26
1			3			TOTAL SHEETS
2			4			40

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

GROOVING BRIDGE FLOORS

APPROACH SLABS	1,786	SQ. FT.
BRIDGE DECK	6,953	SQ. FT.
TOTAL	8,739	SQ. FT.

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

BAR SIZE	SUPERSTRUCTURE EXCEPT APPROACH SLABS, PARAPET, AND BARRIER RAIL		APPROACH SLABS		PARAPET AND BARRIER RAIL
	EPOXY COATED	UNCOATED	EPOXY COATED	UNCOATED	
#4	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
	CY	LB	LB
POUR 1	55.1	--	--
POUR 2	109.7	--	--
POUR 3	77.2	--	--
POUR 4	68.8	--	--
TOTAL ✳✳	311.8	41,899	17,874

✳✳QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED

BILL OF MATERIAL

SPANS A, B, C

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳A1	353	#5	STR	42'-11"	15801	A222	2	#5	STR	2'-7"	5
A2	353	#5	STR	42'-11"	15801						
						B1	104	#5	STR	37'-3"	4041
✳A101	2	#5	STR	41'-10"	87	B2	104	#4	STR	10'-0"	695
✳A102	2	#5	STR	39'-11"	83	B3	104	#4	STR	35'-4"	2455
✳A103	2	#5	STR	38'-1"	79	B4	52	#5	STR	34'-0"	1844
✳A104	2	#5	STR	36'-3"	76	B5	92	#4	STR	37'-0"	2274
✳A105	2	#5	STR	34'-4"	72	✳B6	174	#6	STR	10'-10"	2831
✳A106	2	#5	STR	32'-6"	68	✳B7	62	#4	STR	27'-8"	1146
✳A107	2	#5	STR	30'-7"	64	✳B8	62	#5	STR	50'-6"	3266
✳A108	2	#5	STR	28'-9"	60	✳B9	31	#4	STR	26'-10"	556
✳A109	2	#5	STR	26'-11"	56	✳B10	112	#5	STR	30'-3"	3534
✳A110	2	#5	STR	25'-0"	52						
✳A111	2	#5	STR	23'-2"	48	H1	11	#5	1	15'-4"	176
✳A112	2	#5	STR	21'-3"	44	H2	11	#5	1	15'-2"	174
✳A113	2	#5	STR	19'-5"	41	H3	10	#5	2	14'-5"	150
✳A114	2	#5	STR	17'-7"	37	H4	10	#5	2	14'-7"	152
✳A115	2	#5	STR	15'-8"	33	H5	11	#5	3	15'-11"	183
✳A116	2	#5	STR	13'-10"	29	H6	11	#5	3	16'-1"	185
✳A117	2	#5	STR	11'-11"	25	H7	10	#5	4	13'-10"	144
✳A118	2	#5	STR	10'-1"	21	H8	10	#5	4	13'-7"	142
✳A119	2	#5	STR	8'-3"	17						
✳A120	2	#5	STR	6'-4"	13	K1	16	#4	STR	26'-7"	284
✳A121	2	#5	STR	4'-6"	9	K2	8	#4	STR	7'-4"	39
✳A122	2	#5	STR	2'-7"	5	K3	16	#4	STR	8'-7"	92
						K4	8	#4	STR	7'-10"	42
A201	2	#5	STR	41'-10"	87	K5	4	#4	STR	5'-0"	13
A202	2	#5	STR	39'-11"	83	K6	8	#4	STR	5'-8"	30
A203	2	#5	STR	38'-1"	79	K7	4	#4	STR	5'-3"	14
A204	2	#5	STR	36'-3"	76	K8	10	#4	STR	2'-9"	18
A205	2	#5	STR	34'-4"	72						
A206	2	#5	STR	32'-6"	68	✳S1	72	#4	5	11'-11"	573
A207	2	#5	STR	30'-7"	64	✳S2	72	#4	5	10'-0"	481
A208	2	#5	STR	28'-9"	60						
A209	2	#5	STR	26'-11"	56	U1	76	#4	6	9'-11"	503
A210	2	#5	STR	25'-0"	52	U2	12	#4	6	11'-11"	96
A211	2	#5	STR	23'-2"	48						
A212	2	#5	STR	21'-3"	44	REINFORCING STEEL					41899 LB
A213	2	#5	STR	19'-5"	41						
A214	2	#5	STR	17'-7"	37	EPOXY COATED					
A215	2	#5	STR	15'-8"	33	REINFORCING STEEL					17874 LB
A216	2	#5	STR	13'-10"	29						
A217	2	#5	STR	11'-11"	25	✳INDICATES EPOXY COATED REINFORCING STEEL					
A218	2	#5	STR	10'-1"	21						
A219	2	#5	STR	8'-3"	17						
A220	2	#5	STR	6'-4"	13						
A221	2	#5	STR	4'-6"	9						

PROJECT NO. 17BP.7.R.116

GUILFORD COUNTY

STATION: 15+80.00 -L-

WGI
5640 Dillard Drive, Suite 200
Cary, NC 27518
LICENSURE NO. C-4434

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 023908 MARK A. AVERETTE

2/17/2025 | 12:54 PM PST

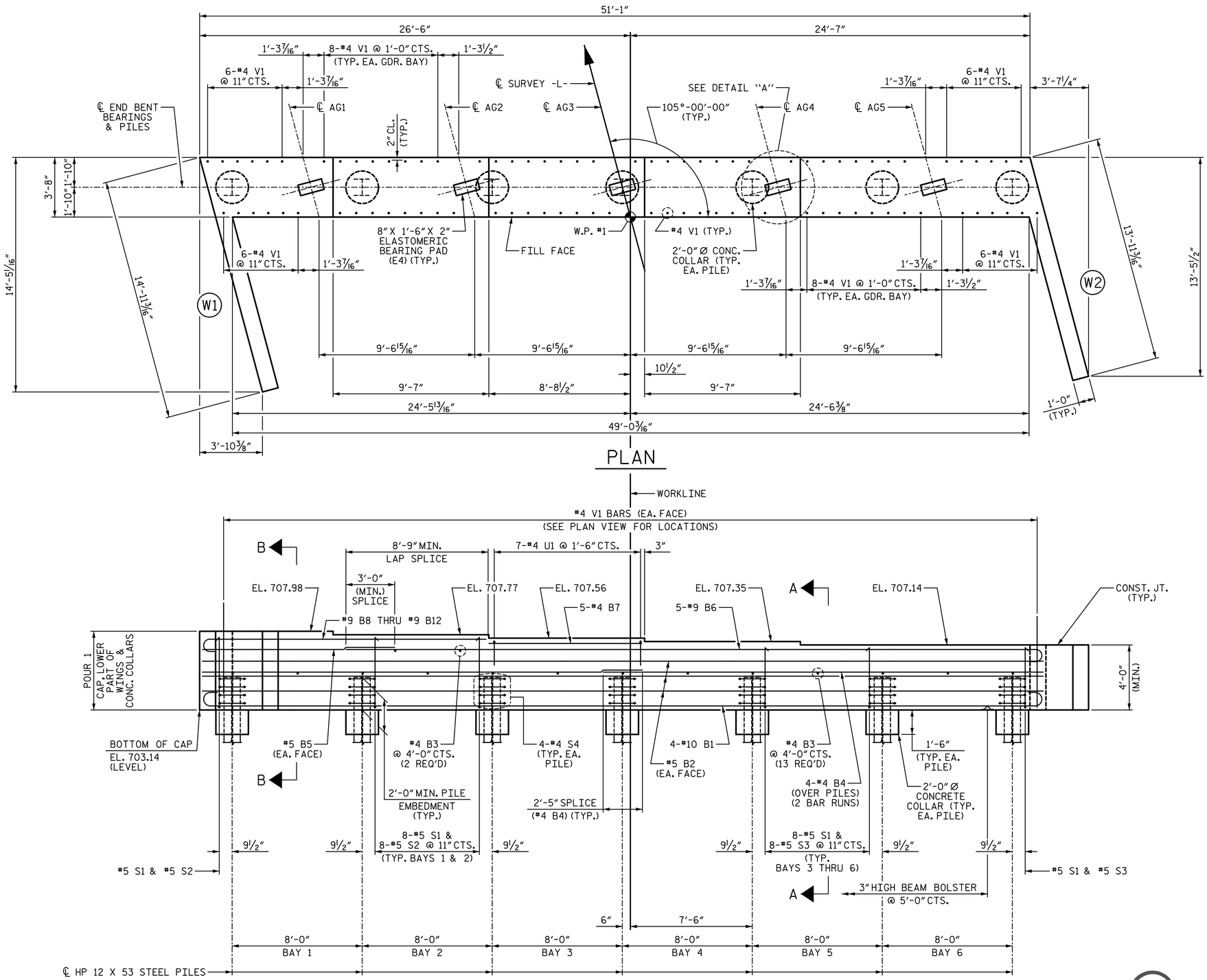
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

BILL OF MATERIAL

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-27
1			3			TOTAL SHEETS
2			4			40

DRAWN BY: T. BANKOVICH DATE: 1-22
CHECKED BY: B.S. COX DATE: 1-22
DESIGN ENGINEER OF RECORD: M.A. AVERETTE DATE: 11-24



PLAN

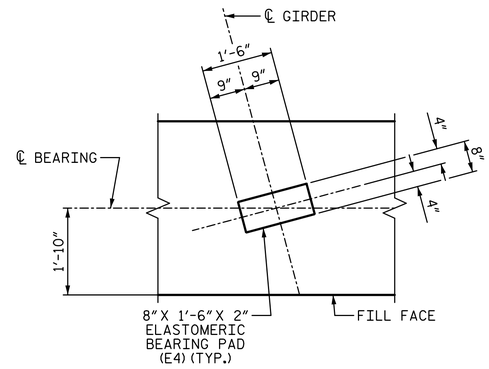
ELEVATION

NOTES:

#4 V1 BARS MAY BE SHIFTED SLIGHTLY TO AVOID STIRRUPS IN CAP.

FOR SECTION A-A AND B-B, SEE SHEET 3 OF 3.

THE TOP SURFACE OF THE END BENT CAP AND WINGS (POUR 1), EXCLUDING THE BEARING AREA, SHALL BE RAKED TO A DEPTH OF 1/4".



DETAIL "A"

(TYP. EA. GIRDER)

PROJECT NO. 17BP.7.R.116

GUILFORD COUNTY

STATION: 15+80.00 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-28
1			3			TOTAL SHEETS
2			4			40

DRAWN BY: T. BANKOVICH DATE: 1-22
CHECKED BY: B.S. COX DATE: 1-22
DESIGN ENGINEER OF RECORD: M.A. AVERETTE DATE: 11-24

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5640 Dillard Drive, Suite 200
Cary, NC 27518
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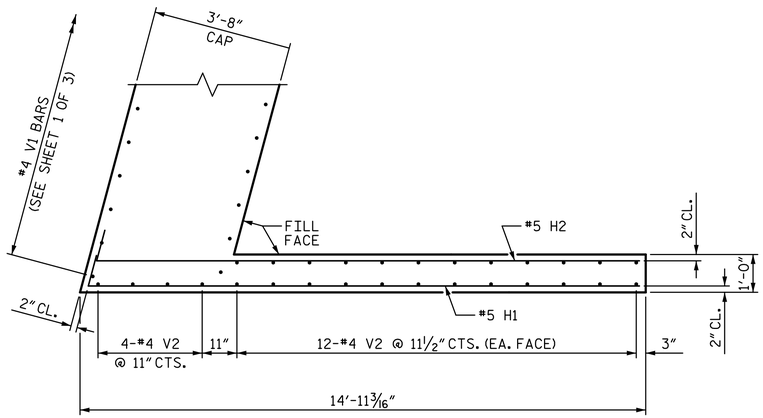
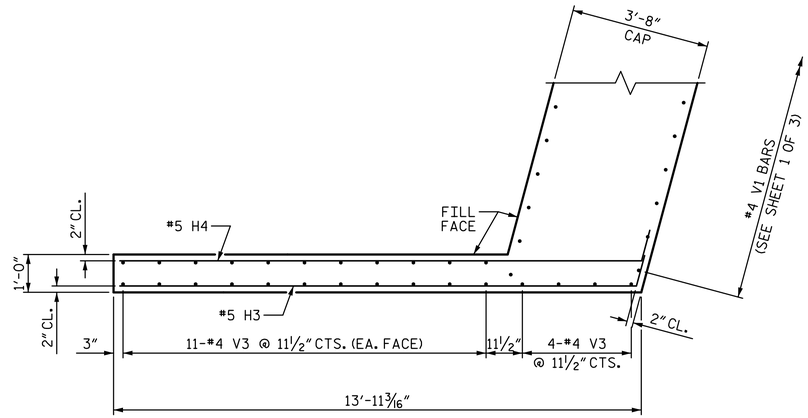
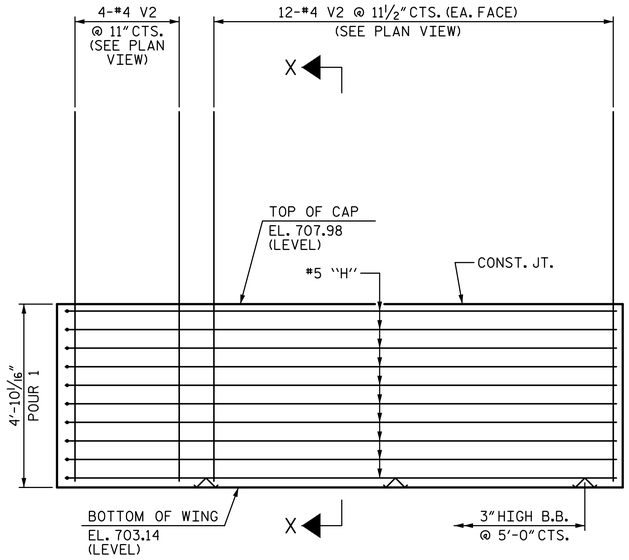


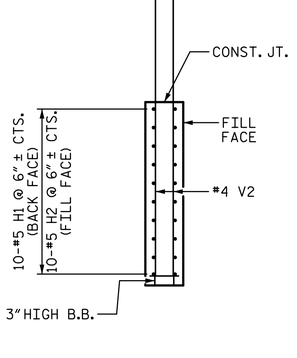
PLAN OF WING (W1)



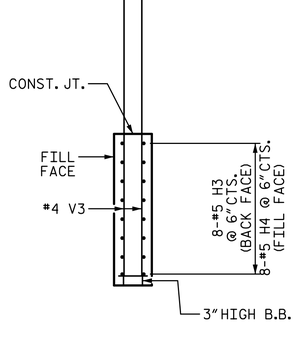
PLAN OF WING (W2)



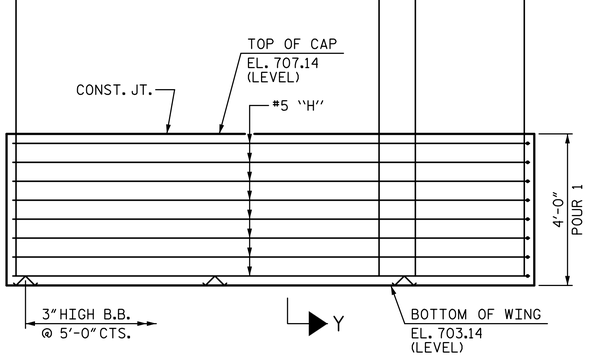
ELEVATION OF WING (W1)



SECTION X-X



SECTION Y-Y



ELEVATION OF WING (W2)

PROJECT NO. 17BP.7.R.116

GUILFORD COUNTY

STATION: 15+80.00 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1

WGI
5640 Dillard Drive, Suite 200
Cary, NC 27518
LICENSURE NO. C-4434

NORTH CAROLINA PROFESSIONAL SEAL 023908 ENGINEER MARK A. AVERETTE

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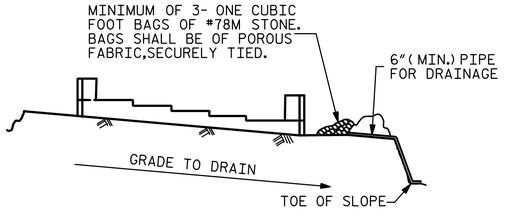
CHECKED BY:	B.S. COX	DATE:	1-22		
DESIGN ENGINEER OF RECORD:	M.A. AVERETTE	DATE:	11-24		

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-29
1			3			TOTAL SHEETS
2			4			40

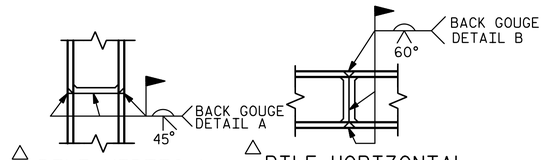


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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

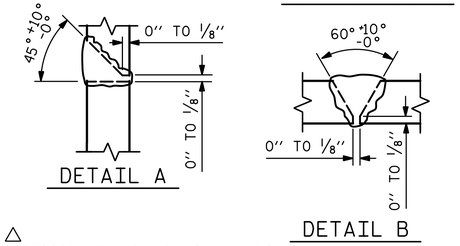
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

TEMPORARY DRAINAGE AT END BENT



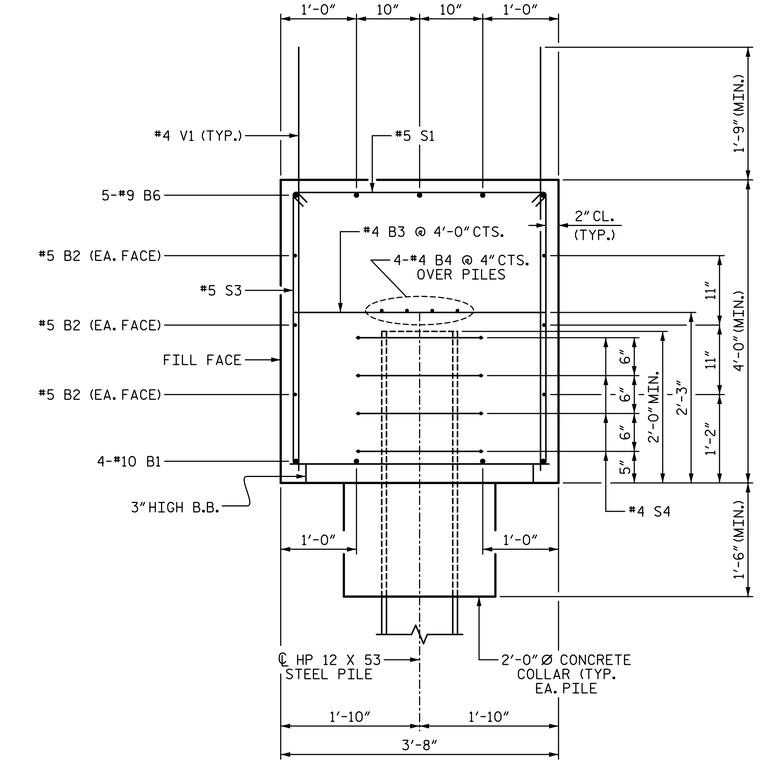
△ PILE VERTICAL

△ PILE HORIZONTAL OR VERTICAL

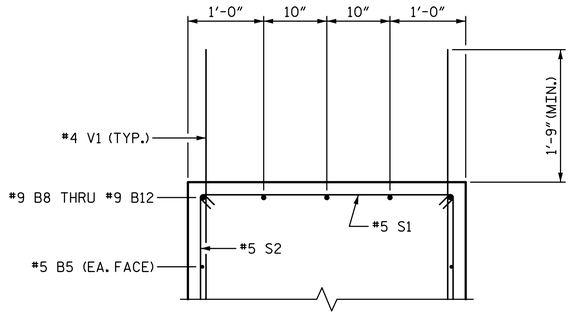


△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS

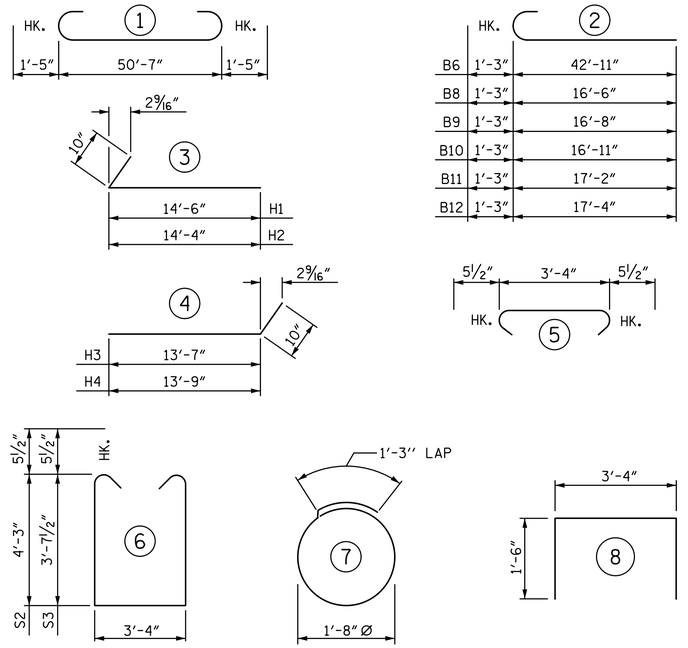


SECTION A-A



PARTIAL SECTION B-B

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

END BENT 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	4	#10	1	53'-5"	919
B2	6	#5	STR	50'-8"	317
B3	15	#4	STR	3'-4"	33
B4	8	#4	STR	26'-7"	142
B5	2	#5	STR	10'-8"	22
B6	5	#9	2	44'-2"	751
B7	5	#4	STR	9'-5"	31
B8	1	#9	2	17'-9"	60
B9	1	#9	2	17'-11"	61
B10	1	#9	2	18'-2"	62
B11	1	#9	2	18'-5"	63
B12	1	#9	2	18'-7"	63
H1	10	#5	3	15'-4"	160
H2	10	#5	3	15'-2"	158
H3	8	#5	4	14'-5"	120
H4	8	#5	4	14'-7"	122
S1	50	#5	5	4'-3"	222
S2	17	#5	6	12'-9"	226
S3	33	#5	6	11'-6"	396
S4	28	#4	7	6'-6"	122
U1	7	#4	8	6'-4"	30
V1	88	#4	STR	6'-5"	377
V2	28	#4	STR	9'-9"	182
V3	26	#4	STR	8'-10"	153
TOTAL REINFORCING STEEL					4792 LB

CLASS A CONCRETE BREAKDOWN	
POUR 1	
(CAP, COLLARS, & LOWER WINGS)	35.4 CY
TOTAL CLASS A CONCRETE	35.4 CY

DRAWN BY: T. BANKOVICH DATE: 1-22
CHECKED BY: B.S. COX DATE: 1-22
DESIGN ENGINEER OF RECORD: M.A. AVERETTE DATE: 11-24

WGI
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Cary, NC 27518
LICENSURE NO. C-4434

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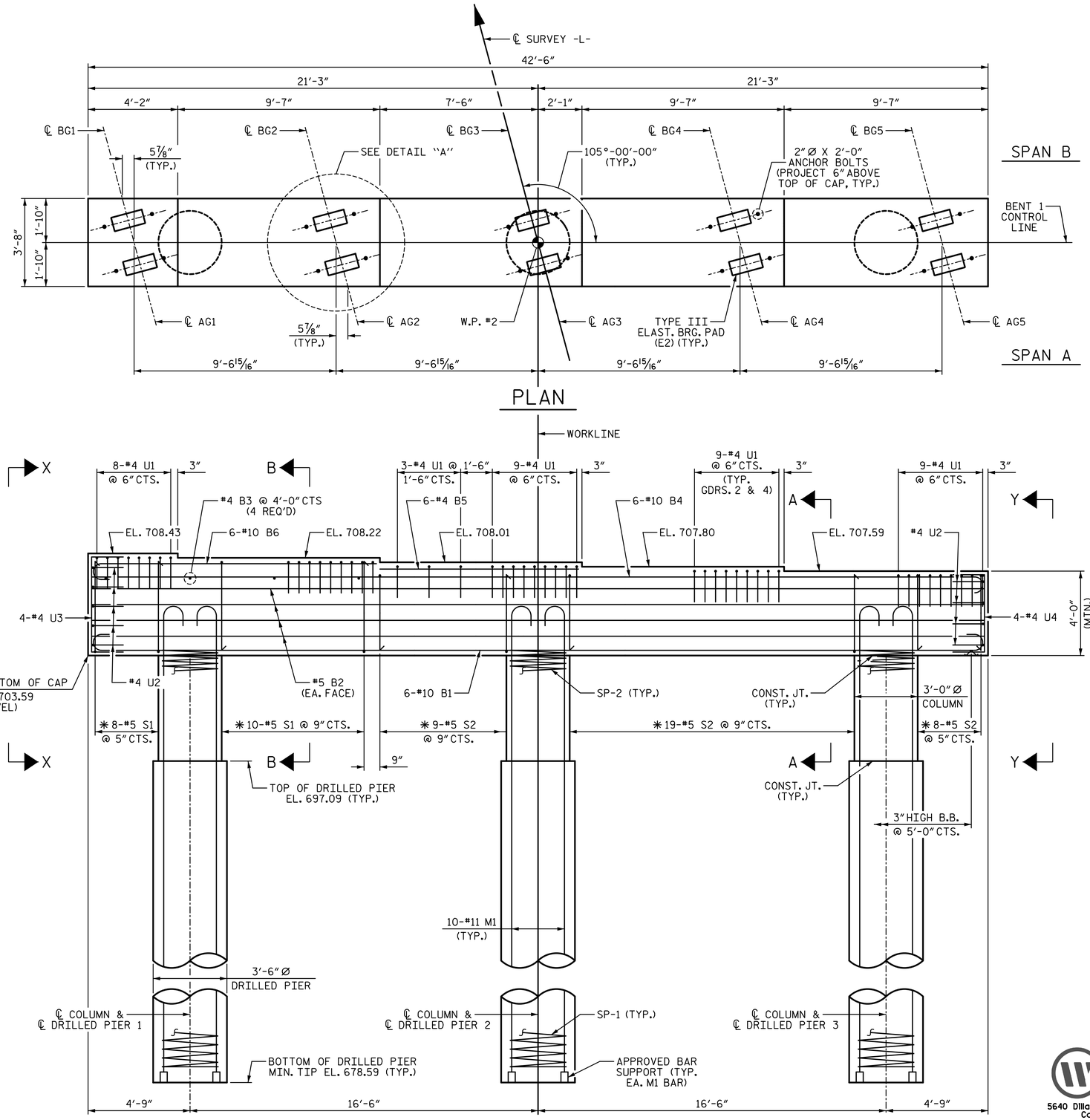
PROJECT NO. 17BP.7.R.116
GUILFORD COUNTY
STATION: 15+80.00 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUBSTRUCTURE

END BENT 1

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-30
1			3			TOTAL SHEETS
2			4			40



ELEVATION

(DIMENSIONS & REINFORCING STEEL ARE TYPICAL FOR EACH COLUMN & DRILLED PIER UNLESS OTHERWISE NOTED)

NOTES:

STIRRUPS AND "U" BARS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

HOOKS ON M1 BARS MAY BE TURNED AS NECESSARY FOR PLACING REINFORCING STEEL.

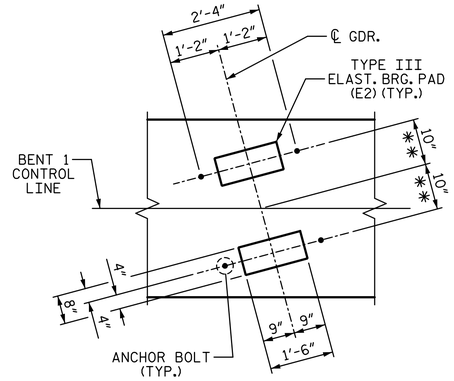
✳ INVERT ALTERNATE STIRRUPS.

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

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

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

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



DETAIL "A"

(TYP. EA. GIRDER)
(✳✳ MEASURED ALONG ℄ GIRDER)

DRAWN BY: T. BANKOVICH DATE: 1-22
CHECKED BY: B.S. COX DATE: 1-22
DESIGN ENGINEER OF RECORD: M.A. AVERETTE DATE: 11-24

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LICENSURE NO. C-4434

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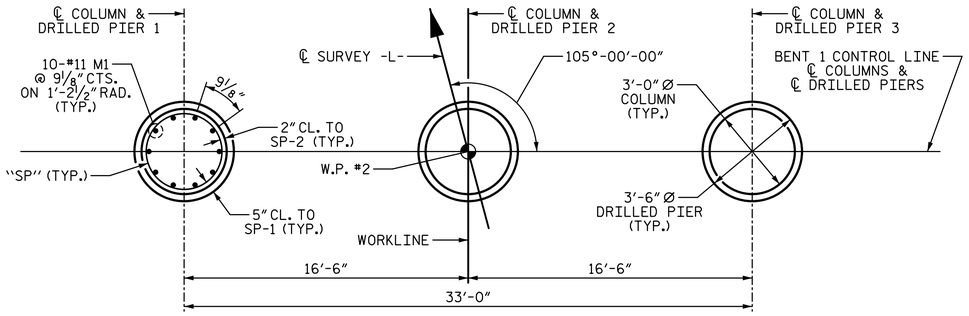
GUILFORD COUNTY
STATION: 15+80.00 -L-

SHEET 1 OF 2

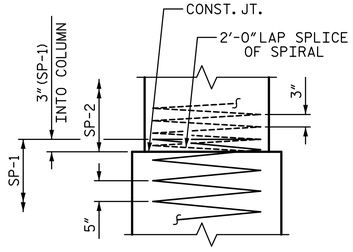
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUBSTRUCTURE

BENT 1

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-31
1			3			TOTAL SHEETS
2			4			40

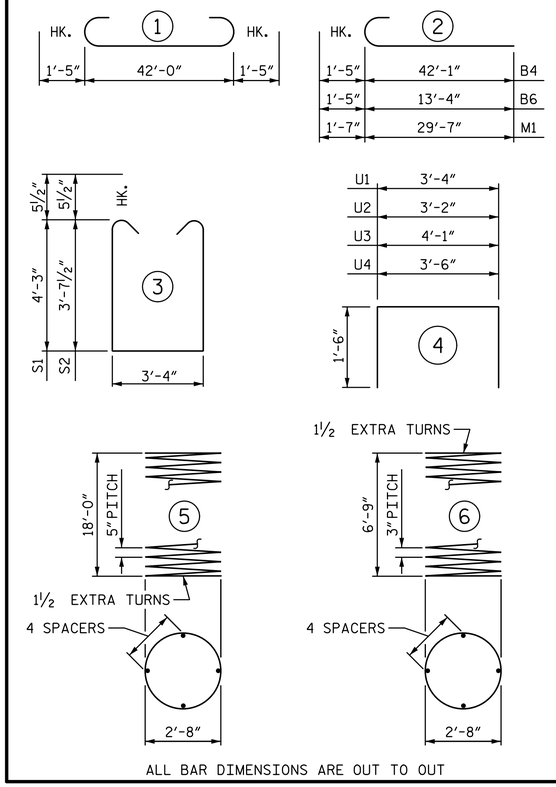


PLAN OF DRILLED PIERS & COLUMNS



CONSTRUCTION JOIN DETAIL

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

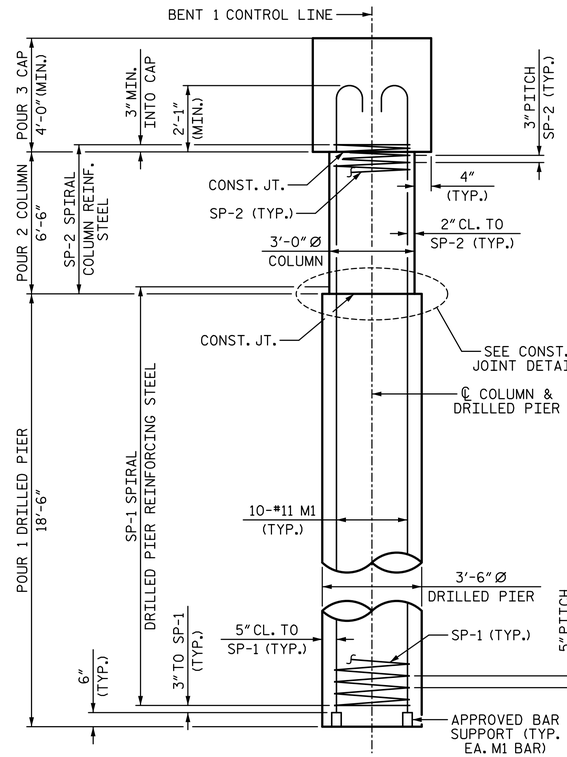
BENT 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	6	#10	1	44'-10"	1158
B2	8	#5	STR	42'-2"	352
B3	4	#4	STR	3'-4"	9
B4	6	#10	2	43'-6"	1123
B5	6	#4	STR	9'-5"	38
B6	6	#10	2	14'-9"	381
M1	30	#11	2	31'-2"	4968
S1	18	#5	3	12'-9"	239
S2	36	#5	3	11'-6"	432
U1	47	#4	4	6'-4"	199
U2	9	#4	4	6'-2"	37
U3	4	#4	4	7'-1"	19
U4	4	#4	4	6'-6"	17
SP-1	3	**	5	370'-2"	1158
SP-2	3	*	6	239'-2"	479

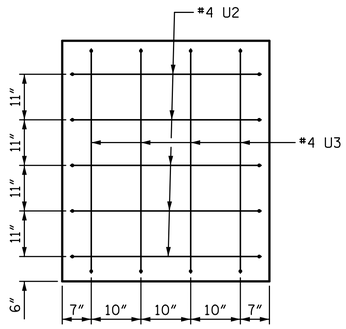
REINFORCING STEEL	8972 LB
SPIRAL COL. REINF. STEEL	1637 LB
CLASS A CONCRETE BREAKDOWN	
POUR 2 (COLUMNS)	5.1 CY
POUR 3 (CAP)	25.2 CY
TOTAL	30.3 CY
DRILLED PIERS:	
DRILLED PIER CONCRETE	
POUR 1 (DRILLED PIERS)	19.8 CY

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

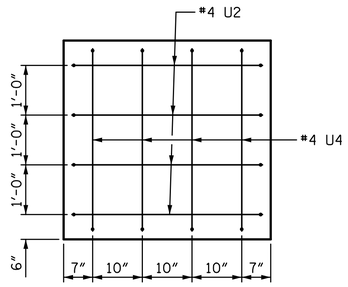
* THE SP-2 SPIRAL REINFORCING STEEL SHALL BE W20 OR D-20 COLD DRAWN WIRE OR #4 PLAIN OR DEFORMED BAR



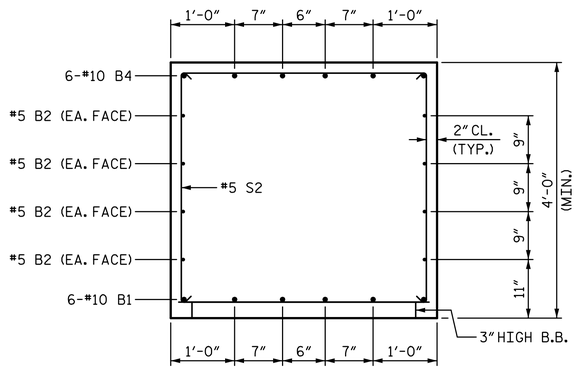
END ELEVATION



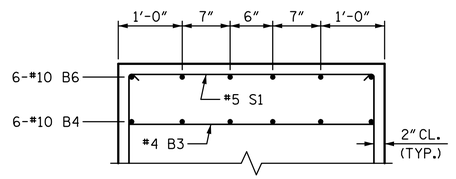
VIEW X-X



VIEW Y-Y



SECTION A-A



PARTIAL SECTION B-B

PROJECT NO. 17BP.7.R.116

GUILFORD COUNTY

STATION: 15+80.00 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT 1

WGI
5640 Dillard Drive, Suite 200
Cary, NC 27518

LICENSURE NO. C-4434

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 023908 MARK A. AVERETTE

2/17/2025 | 12:54 PM

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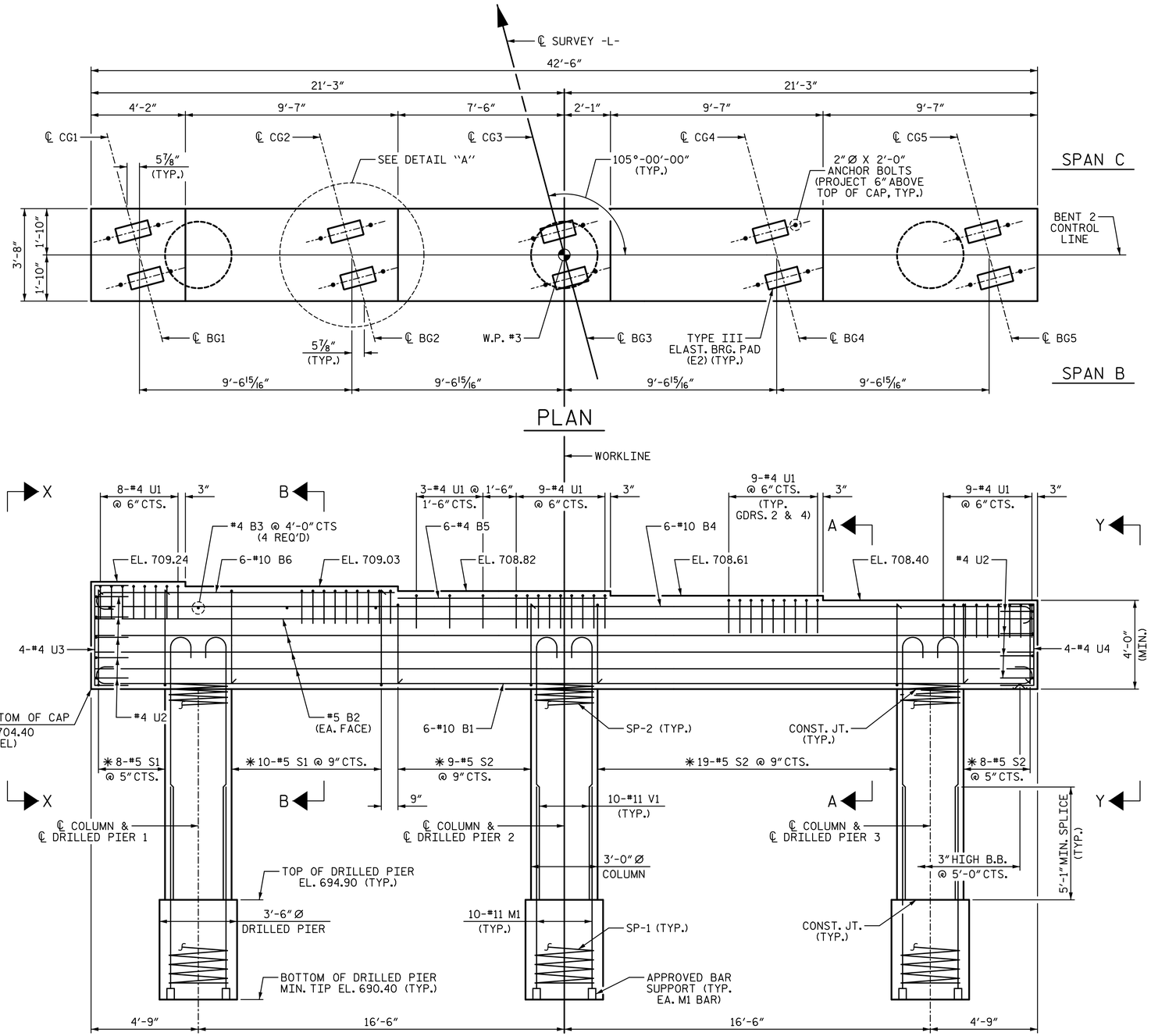
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-32
1			3			TOTAL SHEETS
2			4			40

DRAWN BY: T. BANKOVICH DATE: 1-22
CHECKED BY: B.S. COX DATE: 1-22
DESIGN ENGINEER OF RECORD: M.A. AVERETTE DATE: 11-24



ELEVATION

(DIMENSIONS & REINFORCING STEEL ARE TYPICAL FOR EACH COLUMN & DRILLED PIER UNLESS OTHERWISE NOTED)

NOTES:

STIRRUPS AND ″U″ BARS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

HOOKS ON M1 BARS MAY BE TURNED AS NECESSARY FOR PLACING REINFORCING STEEL.

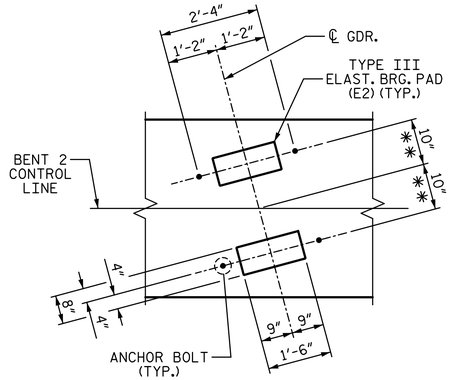
✳ INVERT ALTERNATE STIRRUPS.

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

THE LOCATION OF THE CONSTRUCTION JOINT IN THE DRILLED PIER IS BASED ON AN APPROXIMATE GROUND LINE ELEVATION. IF CONSTRUCTION JOINT IS ABOVE THE ACTUAL GROUND LINE ELEVATION, THE CONTRACTOR SHALL PLACE THE CONSTRUCTION JOINT ONE FOOT BELOW THE GROUND LINE. EXCEPT THE TOP OF DRILLED PIER SHALL BE A MINIMUM OF 1.0 FT. ABOVE WATER SURFACE ELEVATION.

THE CONTACTOR′S ATTENTION IS CALLED TO THE FACT THAT THE LONGITUDINAL REINFORCING FOR DRILLED PIERS IS DETAILED WITH 3 FEET OF EXTRA LENGTH.

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



DETAIL ″A″

(TYP. EA. GIRDER)
(✳✳ MEASURED ALONG ℄ GIRDER)

PROJECT NO. 17BP.7.R.116

GUILFORD COUNTY

STATION: 15+80.00 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT 2

WGI
5640 Dillard Drive, Suite 200
Cary, NC 27518
LICENSURE NO. C-4434

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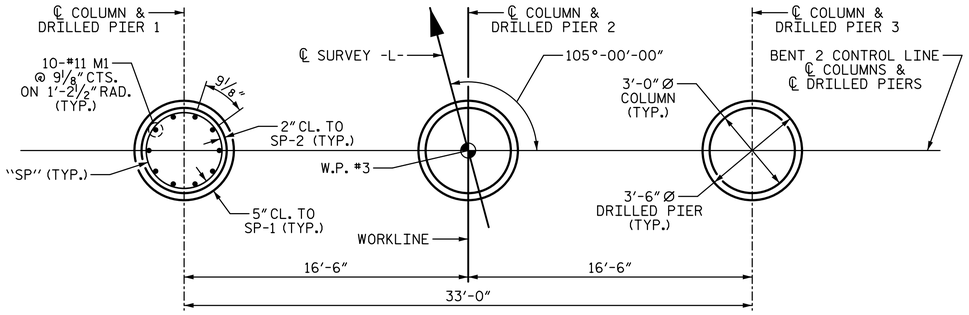
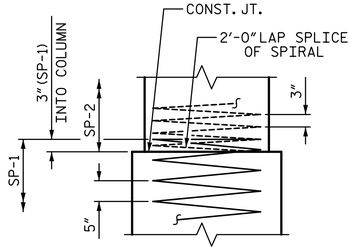
CHECKED BY: B.S. COX DATE: 1-22
DESIGN ENGINEER OF RECORD: M.A. AVERETTE DATE: 11-24

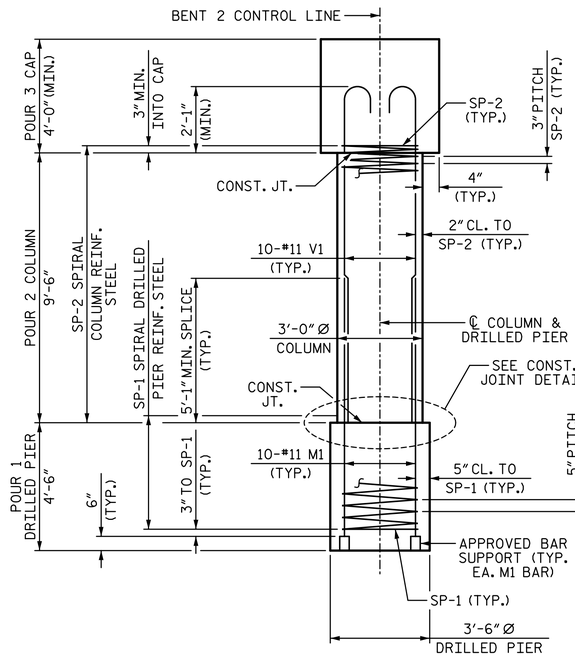
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-33
1			3			TOTAL SHEETS
2			4			40



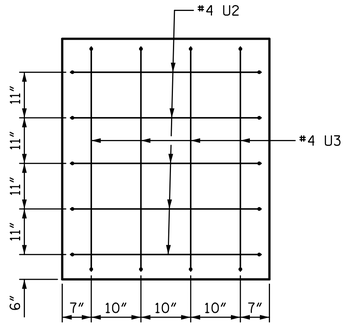
PLAN OF DRILLED PIERS & COLUMNS



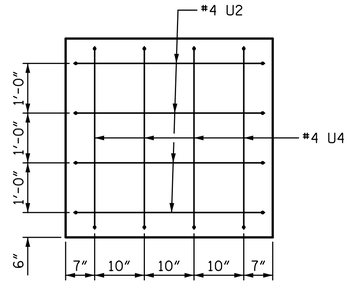
CONSTRUCTION JOINT DETAIL



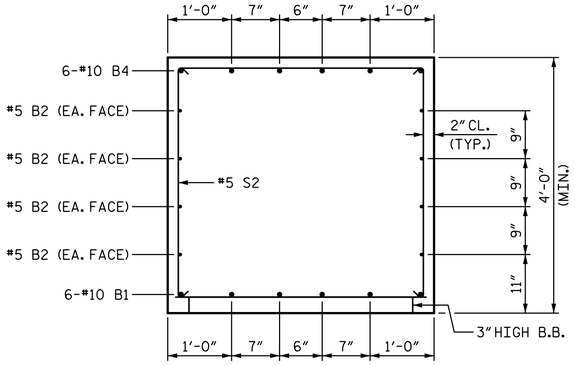
END ELEVATION



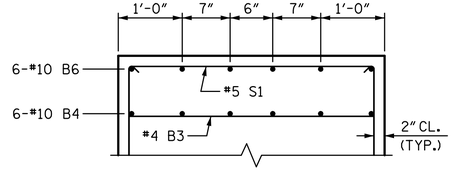
VIEW X-X



VIEW Y-Y

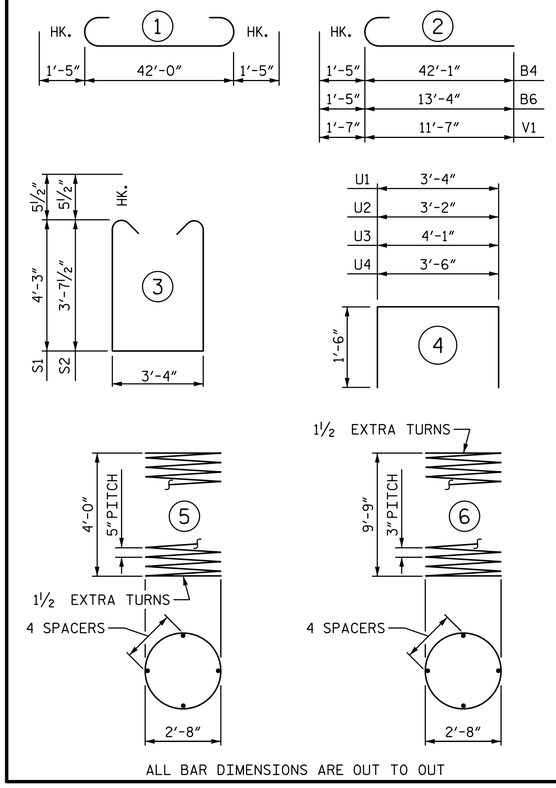


SECTION A-A



PARTIAL SECTION B-B

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

BENT 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	6	#10	1	44'-10"	1158
B2	8	#5	STR	42'-2"	352
B3	4	#4	STR	3'-4"	9
B4	6	#10	2	43'-6"	1123
B5	6	#4	STR	9'-5"	38
B6	6	#10	2	14'-9"	381
M1	30	#11	STR	12'-1"	1926
S1	18	#5	3	12'-9"	239
S2	36	#5	3	11'-6"	432
U1	47	#4	4	6'-4"	199
U2	9	#4	4	6'-2"	37
U3	4	#4	4	7'-1"	19
U4	4	#4	4	6'-6"	17
V1	30	#11	2	13'-2"	2099
SP-1	3	✱✱	5	98'-9"	309
SP-2	3	✱	6	338'-4"	678

REINFORCING STEEL	8029 LB
SPIRAL COL. REINF. STEEL	987 LB

CLASS A CONCRETE BREAKDOWN	
POUR 2 (COLUMNS)	7.5 CY
POUR 3 (CAP)	25.2 CY
TOTAL	32.7 CY

DRILLED PIERS:	
DRILLED PIER CONCRETE	
POUR 1 (DRILLED PIERS)	4.9 CY

✱✱ THE SP-1 SPIRAL REINFORCING STEEL SHALL BE W31 OF 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

PROJECT NO. 17BP.7.R.116

GUILFORD COUNTY

STATION: 15+80.00 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUBSTRUCTURE

BENT 2

DRAWN BY: T. BANKOVICH DATE: 1-22
CHECKED BY: B.S. COX DATE: 1-22
DESIGN ENGINEER OF RECORD: M.A. AVERETTE DATE: 11-24

WGI
5640 Dillard Drive, Suite 200
Cary, NC 27518
LICENSURE NO. C-4434

2/17/2025 | 12:54 PM ET

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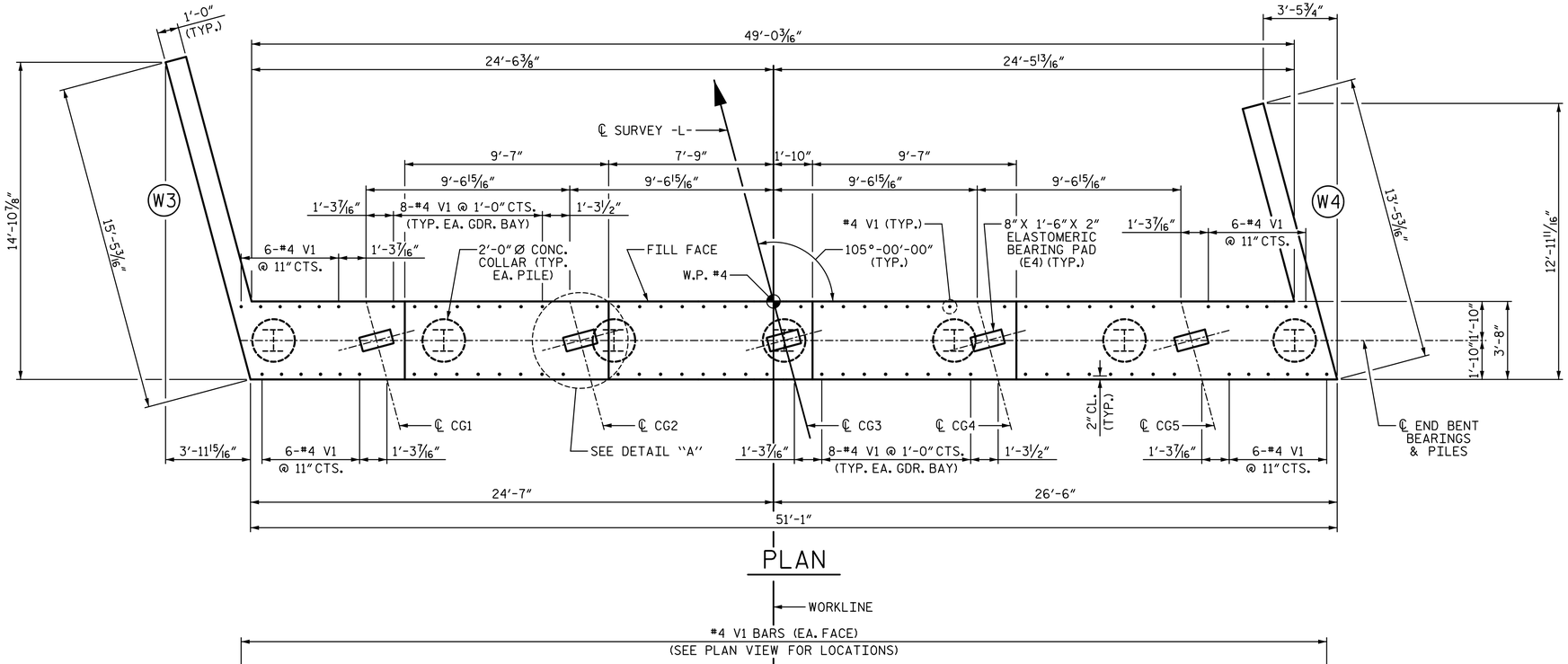
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-34
1			3			TOTAL SHEETS
2			4			40

NOTES:

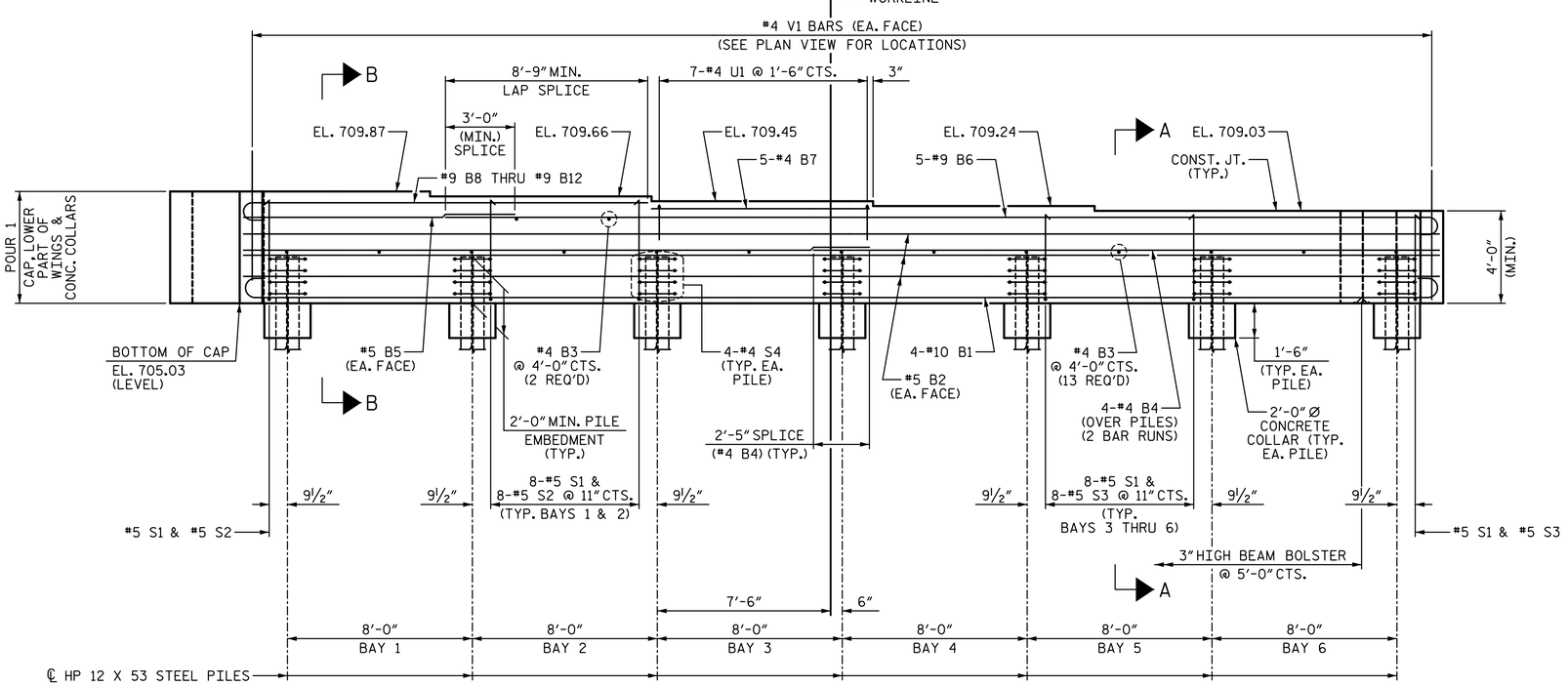
#4 V1 BARS MAY BE SHIFTED SLIGHTLY TO AVOID STIRRUPS IN CAP.

FOR SECTION A-A AND B-B, SEE SHEET 3 OF 3.

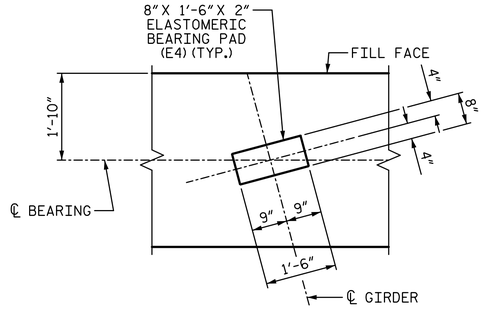
THE TOP SURFACE OF THE END BENT CAP AND WINGS (POUR 1), EXCLUDING THE BEARING AREA, SHALL BE RAKED TO A DEPTH OF 1/4".



PLAN



ELEVATION



DETAIL "A"

(TYP. EA. GIRDER)

PROJECT NO. 17BP.7.R.116

GUILFORD COUNTY

STATION: 15+80.00 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUBSTRUCTURE

END BENT 2

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-35
1			3			TOTAL SHEETS
2			4			40

DRAWN BY: T. BANKOVICH DATE: 1-22
CHECKED BY: B.S. COX DATE: 1-22
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Cary, NC 27518
LICENSURE NO. C-4434

2/17/2025 | 12:54 PM PST

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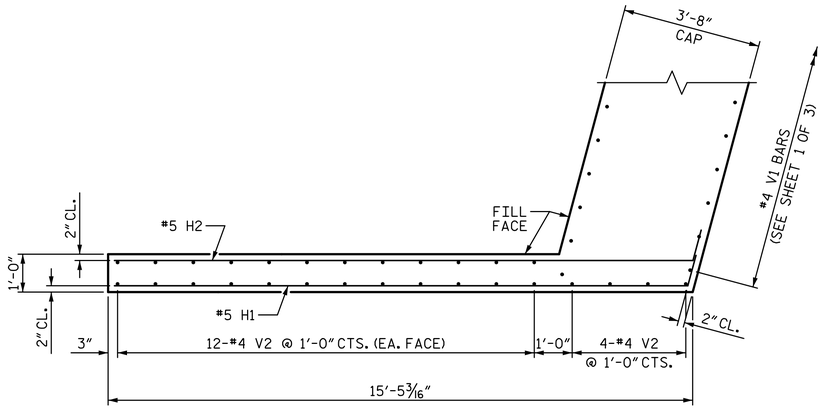
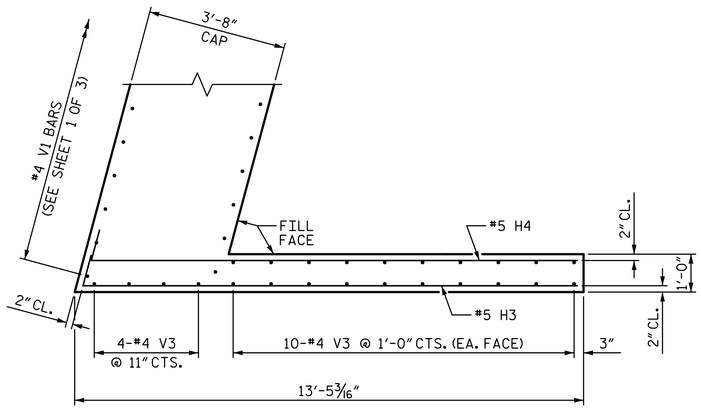
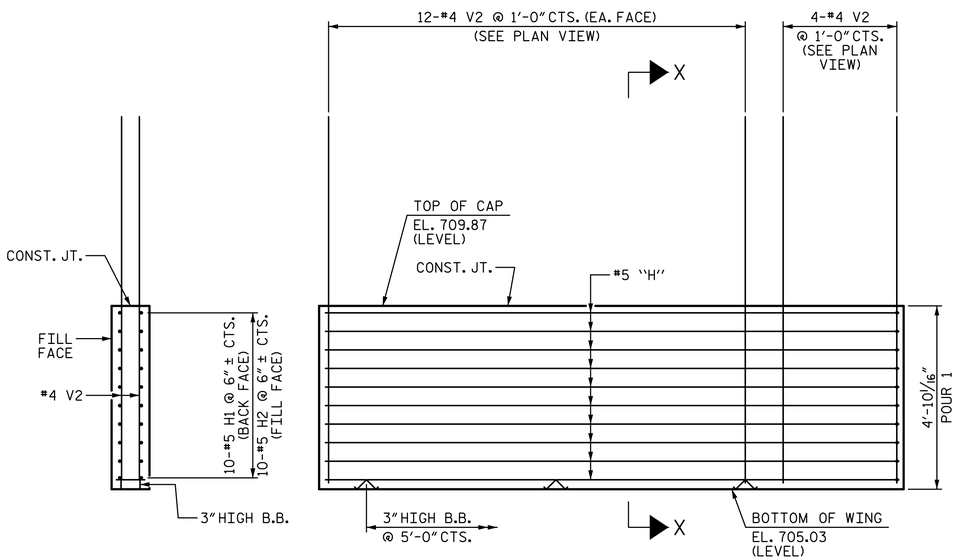


PLAN OF WING (W3)

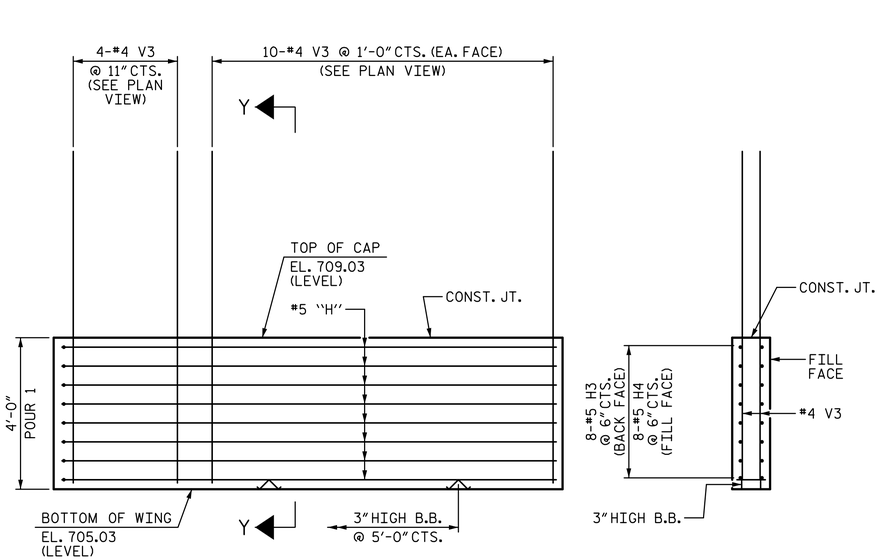


PLAN OF WING (W4)



SECTION X-X

ELEVATION OF WING (W3)



ELEVATION OF WING (W4)

SECTION Y-Y

PROJECT NO. 17BP.7.R.116

GUILFORD COUNTY

STATION: 15+80.00 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUBSTRUCTURE

END BENT 2

WGI
5640 Dillard Drive, Suite 200
Cary, NC 27518
LICENSURE NO. C-4434

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 023908 MARK A. AVERETTE

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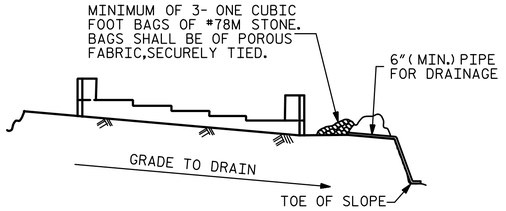
DRAWN BY:	T. BANKOVICH	DATE:	1-22		
CHECKED BY:	B.S. COX	DATE:	1-22		
DESIGN ENGINEER OF RECORD:	M.A. AVERETTE	DATE:	11-24		

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-36
1			3			TOTAL SHEETS
2			4			40

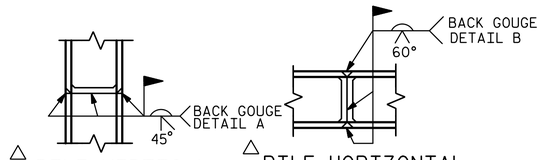


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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

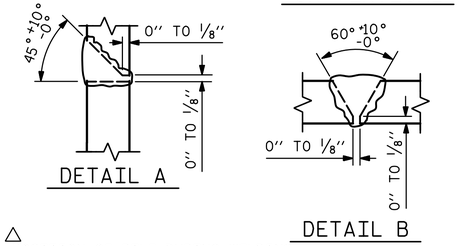
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

TEMPORARY DRAINAGE AT END BENT



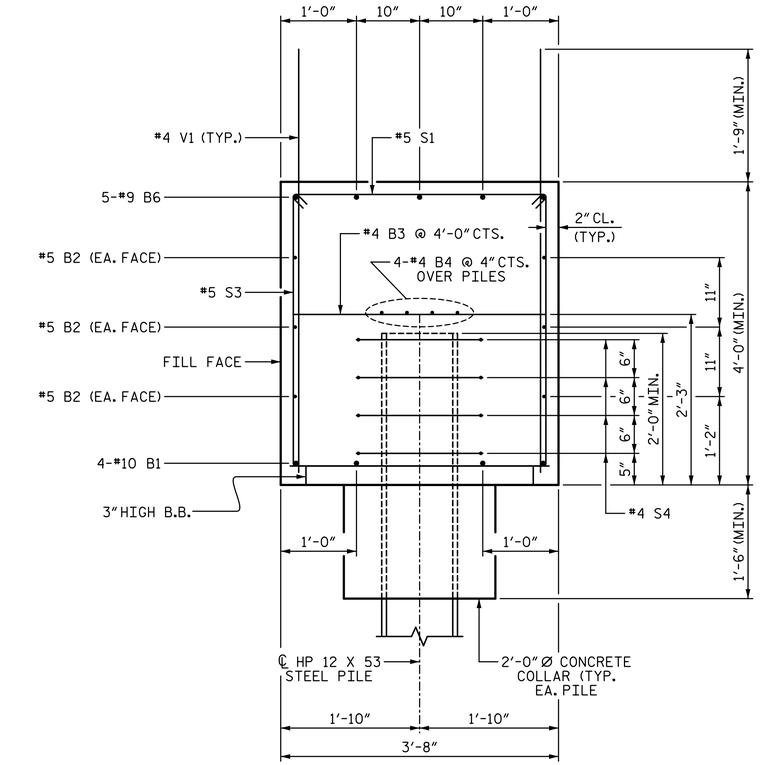
△ PILE VERTICAL

△ PILE HORIZONTAL OR VERTICAL

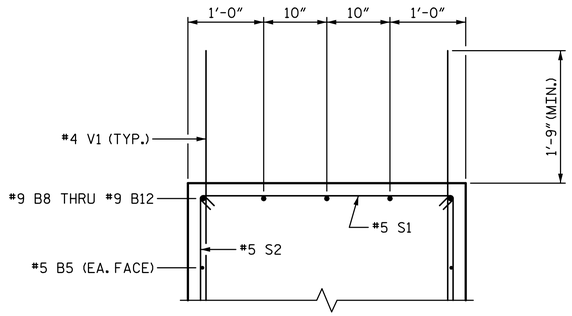


△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS

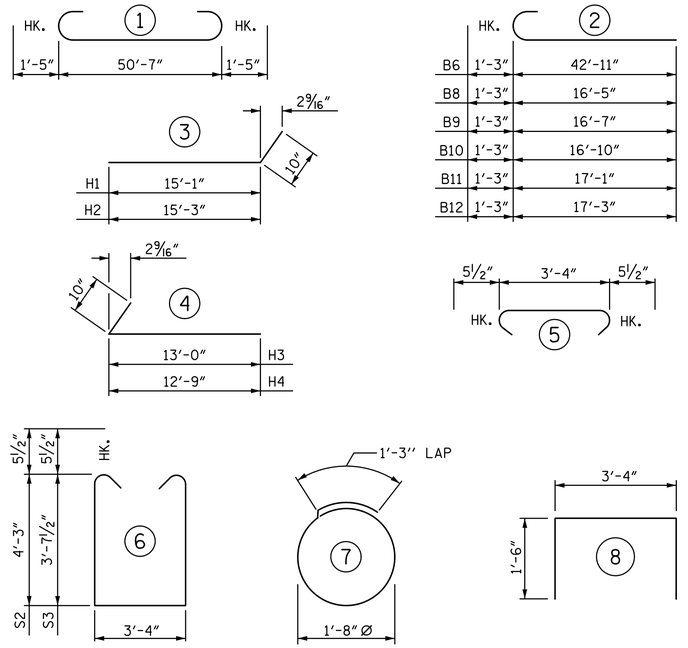


SECTION A-A



PARTIAL SECTION B-B

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

END BENT 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	4	#10	1	53'-5"	919
B2	6	#5	STR	50'-8"	317
B3	15	#4	STR	3'-4"	33
B4	8	#4	STR	26'-7"	142
B5	2	#5	STR	10'-8"	22
B6	5	#9	2	44'-2"	751
B7	5	#4	STR	9'-5"	31
B8	1	#9	2	17'-8"	60
B9	1	#9	2	17'-10"	61
B10	1	#9	2	18'-1"	61
B11	1	#9	2	18'-4"	62
B12	1	#9	2	18'-6"	63
H1	10	#5	3	15'-11"	166
H2	10	#5	3	16'-1"	168
H3	8	#5	4	13'-10"	115
H4	8	#5	4	13'-7"	113
S1	50	#5	5	4'-3"	222
S2	17	#5	6	12'-9"	226
S3	33	#5	6	11'-6"	396
S4	28	#4	7	6'-6"	122
U1	7	#4	8	6'-4"	30
V1	88	#4	STR	6'-5"	377
V2	28	#4	STR	9'-8"	181
V3	24	#4	STR	8'-9"	140
TOTAL REINFORCING STEEL					4778 LB

CLASS A CONCRETE BREAKDOWN	
POUR 1	
(CAP, COLLARS, & LOWER WINGS)	35.0 CY
TOTAL CLASS A CONCRETE	35.0 CY

PROJECT NO. 17BP.7.R.116

GUILFORD COUNTY

STATION: 15+80.00 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUBSTRUCTURE

END BENT 2

DRAWN BY:	T. BANKOVICH	DATE:	1-22
CHECKED BY:	B.S. COX	DATE:	1-22
DESIGN ENGINEER OF RECORD:	M.A. AVERETTE	DATE:	11-24

WGI
5640 Dillard Drive, Suite 200
Cary, NC 27518
LICENSURE NO. C-4434

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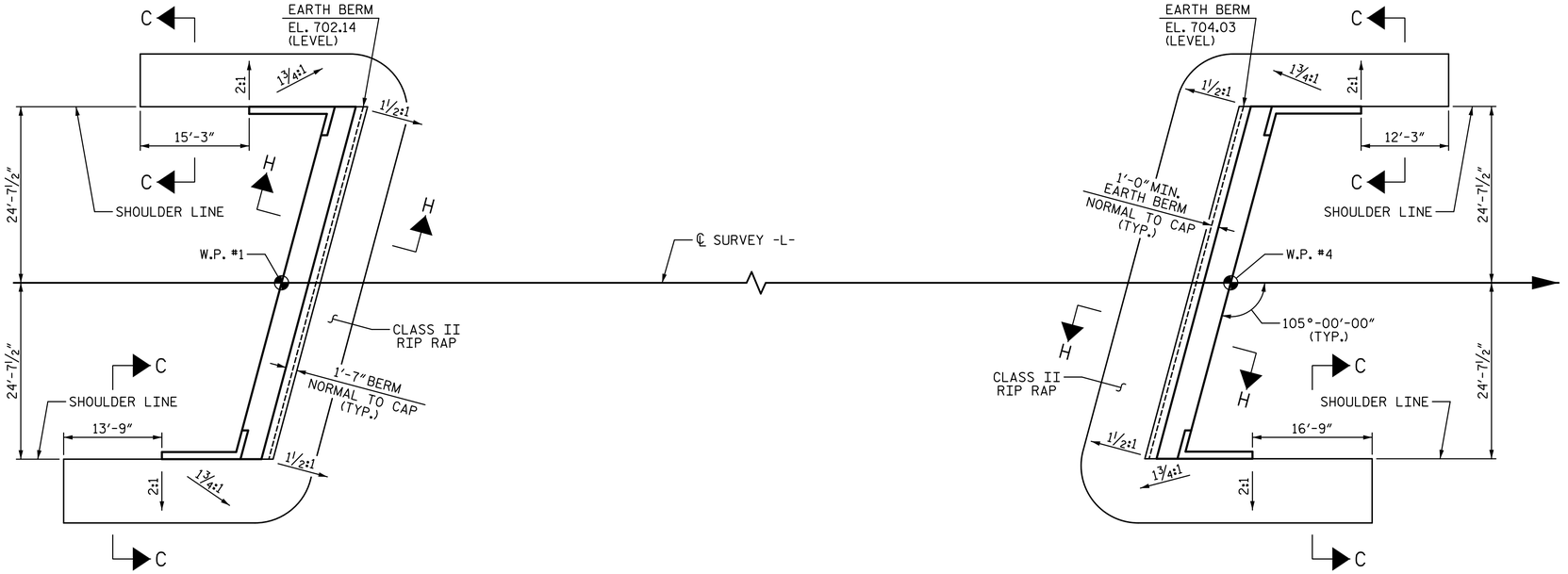
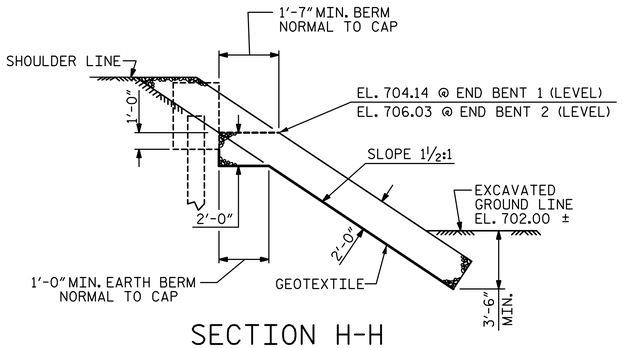
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-37
1			3			TOTAL SHEETS
2			4			40

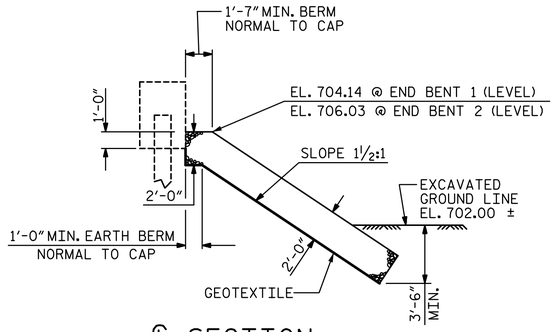


PLAN OF RIP RAP

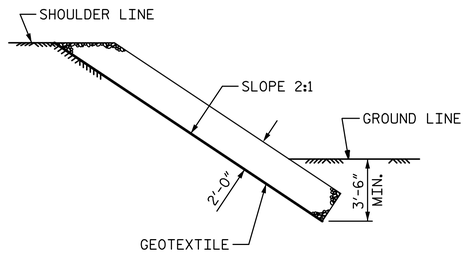
ESTIMATED QUANTITIES		
BRIDGE @ STA. 15+80.00 -L-	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE
	TONS	SQUARE YARDS
END BENT 1	160	180
END BENT 2	155	175



SECTION H-H



℄ SECTION
BERM RIP RAPPED



SECTION C-C

PROJECT NO. 17BP.7.R.116

GUILFORD COUNTY

STATION: 15+80.00 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

RIP RAP DETAILS

DRAWN BY:	T. BANKOVICH	DATE:	1-22
CHECKED BY:	B.S. COX	DATE:	1-22
DESIGN ENGINEER OF RECORD:	M.A. AVERETTE	DATE:	11-24

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 023908 MARK A. AVERETTE

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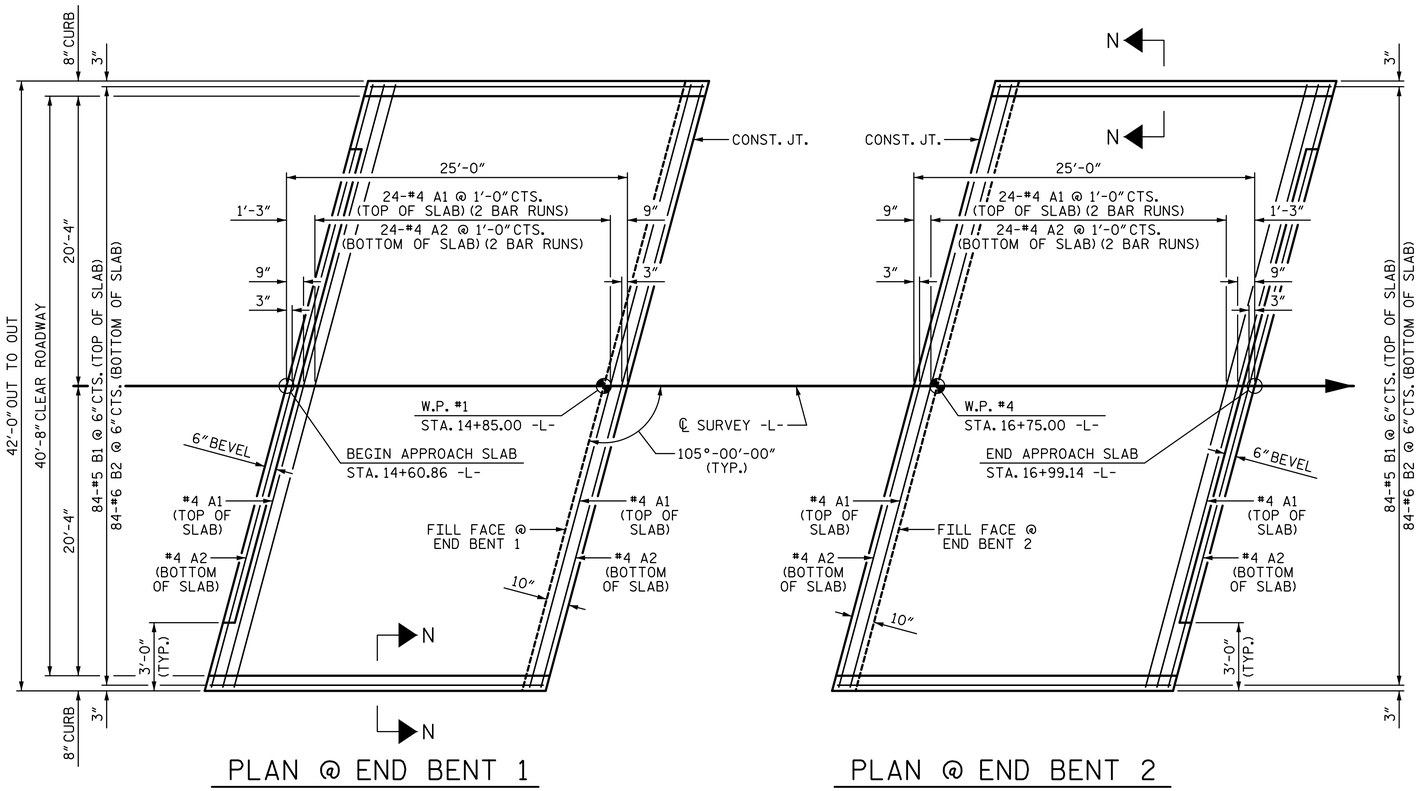
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

SHEET NO. S-38

TOTAL SHEETS 40



PLAN @ END BENT 1

PLAN @ END BENT 2

DIMENSIONS SHOWN ARE TYPICAL FOR BOTH APPROACH SLABS

NOTES

FOR BRIDGE APPROACH FILL, SEE ROADWAY PLANS.

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

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

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 1A - ALTERNATE APPROACH FILL" (ROADWAY STD. 423.02) MAY BE CONSTRUCTED AT NO ADDITIONAL COST TO THE DEPARTMENT IN LIEU OF "TYPE 1 - APPROACH FILL".

BILL OF MATERIAL

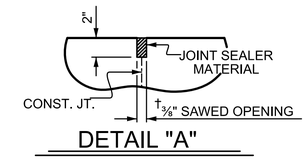
FOR ONE APPROACH SLAB (2 REQUIRED)

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳ A1	52	#4	STR	22'-7"	784
A2	52	#4	STR	22'-5"	779
✳ B1	84	#5	STR	24'-4"	2132
B2	84	#6	STR	24'-8"	3112
REINFORCING STEEL					3891 LB
EPOXY COATED REINFORCING STEEL					2916 LB
CLASS AA CONCRETE					45.4 CY

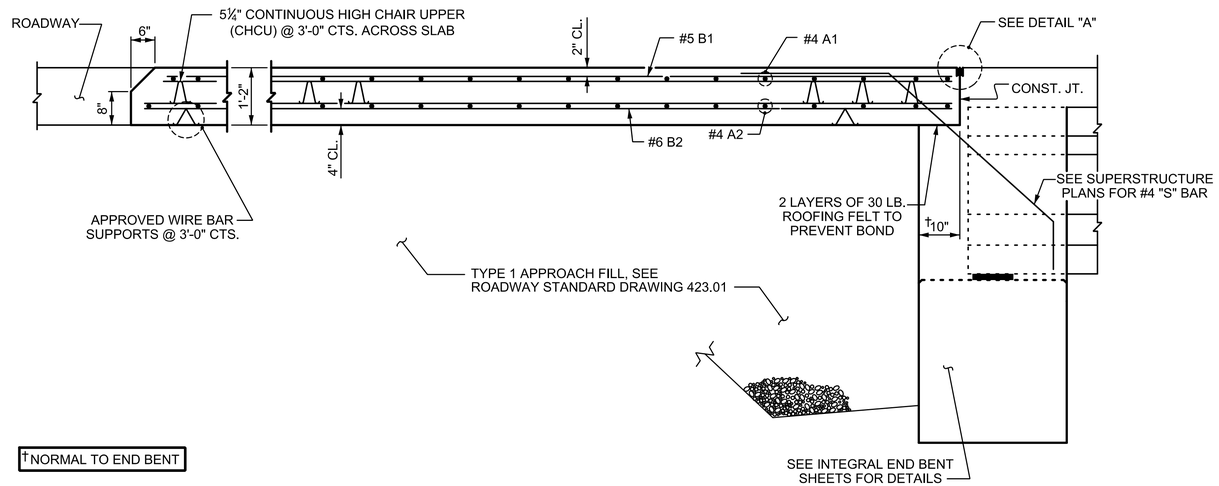
✳ INDICATES EPOXY COATED REINFORCING STEEL

SPLICE CHART

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

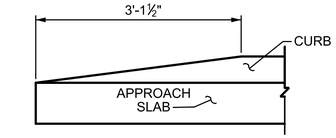


DETAIL "A"

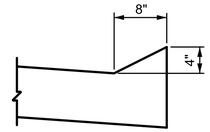


†NORMAL TO END BENT

SECTION THRU SLAB



END OF CURB WITHOUT SHOULDER BERM GUTTER



SECTION N-N

PROJECT NO. 17BP.7.R.116

GUILFORD COUNTY

STATION: 15+80.00 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

BRIDGE APPROACH SLAB FOR INTEGRAL ABUTMENT WITH FLEXIBLE PAVEMENT

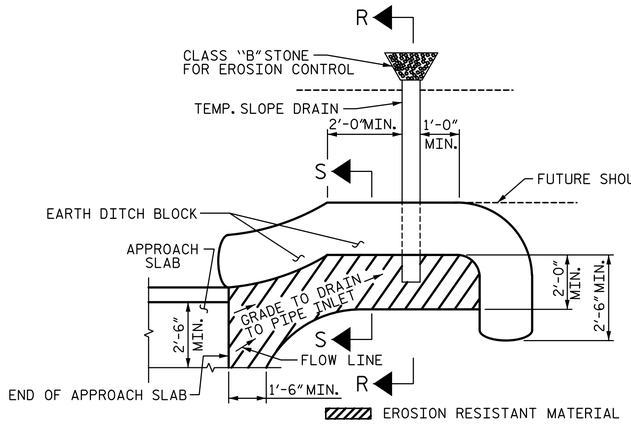
DRAWN BY:	T. BANKOVICH	DATE:	1-22
CHECKED BY:	B.S. COX	DATE:	1-22
DESIGN ENGINEER OF RECORD:	M.A. AVERETTE	DATE:	11-24

WGI
5640 Dillard Drive, Suite 200
Cary, NC 27518
LICENSURE NO. C-4434

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 023908 MARK A. AVERETTE
2/17/2025 | 12:54 PM

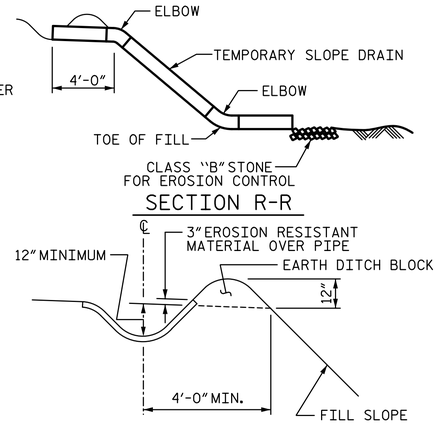
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-39
1			3			TOTAL SHEETS
2			4			40



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

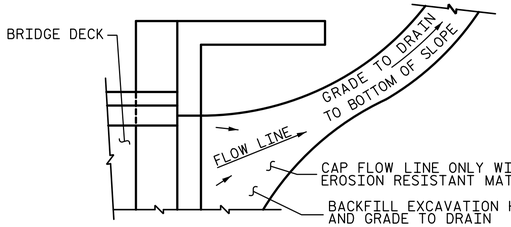


SECTION R-R

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

PROJECT NO. 17BP.7.R.116

GUILFORD COUNTY

STATION: 15+80.00 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

BRIDGE APPROACH SLAB DETAILS

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

WGI
5640 Dillard Drive, Suite 200
Cary, NC 27518
LICENSURE NO. C-4434

NORTH CAROLINA PROFESSIONAL SEAL 023908 ENGINEER MARK A. AVERETTE

2/17/2025 | 12:54 PM EST

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DRAWN BY: T. BANKOVICH DATE: 1-22
CHECKED BY: B.S. COX DATE: 1-22
DESIGN ENGINEER OF RECORD: M.A. AVERETTE DATE: 11-24

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 2024 "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 3/4" WITH THE FOLLOWING EXCEPTIONS: TOP CORNERS OF CURBS MAY BE ROUNDED TO 1-1/2" RADIUS WHICH IS BUILT INTO CURB FORMS; CORNERS OF TRANSVERSE FLOOR EXPANSION JOINTS SHALL BE ROUNDED WITH A 1/4" FINISHING TOOL UNLESS OTHERWISE REQUIRED ON PLANS; AND CORNERS OF EXPANSION JOINTS IN THE ROADWAY FACES AND TOPS OF CURBS AND SIDEWALKS SHALL BE ROUNDED TO A 1/4" RADIUS WITH A FINISHING STONE OR TOOL UNLESS OTHERWISE REQUIRED ON PLANS.

DOWELS:

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

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

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

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

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

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

REINFORCING STEEL:

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

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

STRUCTURAL STEEL:

AT THE CONTRACTOR'S OPTION, HE MAY SUBSTITUTE 7/8" Ø SHEAR STUDS FOR THE ¾" Ø STUDS SPECIFIED ON THE PLANS. THIS SUBSTITUTION SHALL BE MADE AT THE RATE OF 3 - 7/8" Ø STUDS FOR 4 - 3/4" Ø STUDS, AND STUD SPACING CHANGES SHALL BE MADE AS NECESSARY TO PROVIDE THE SAME EQUIVALENT NUMBER OF 7/8" Ø STUDS ALONG THE BEAM AS SHOWN FOR 3/4" Ø STUDS BASED ON THE RATIO OF 3 - 7/8" Ø STUDS FOR 4 - 3/4" 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.