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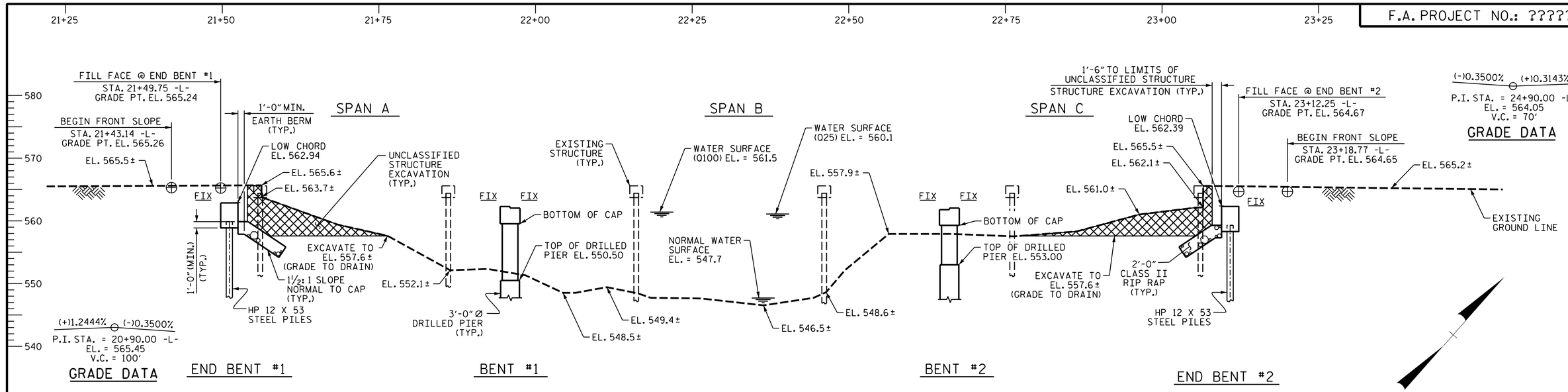
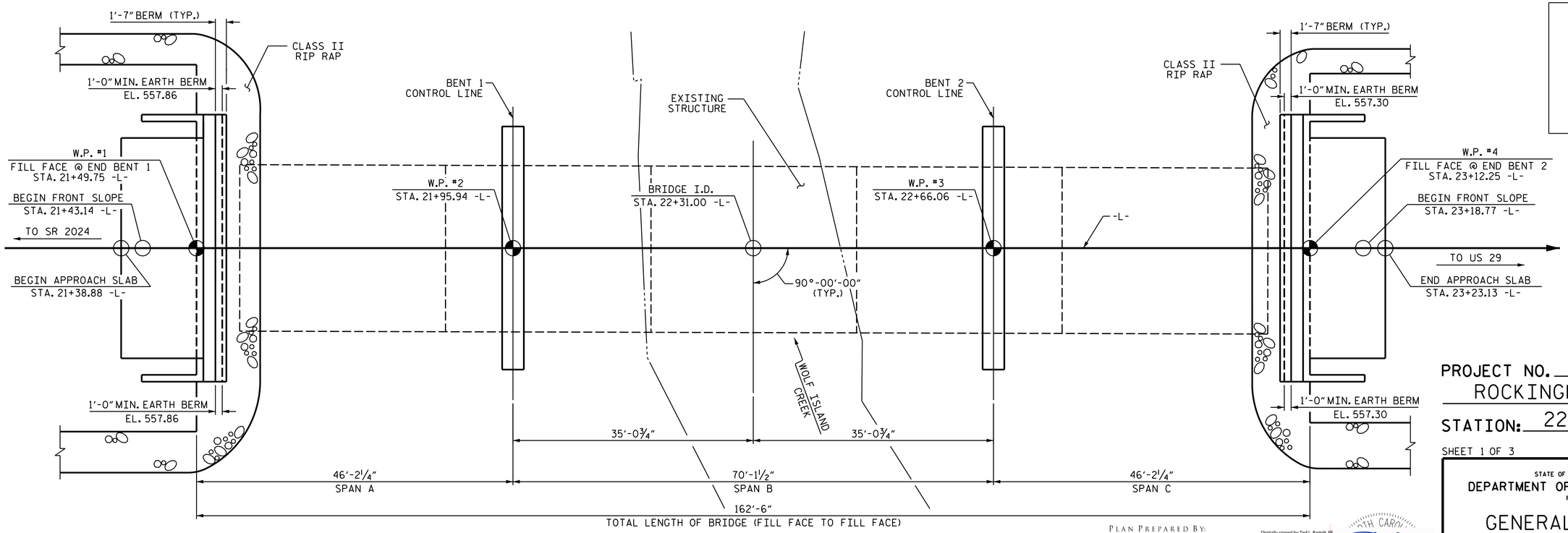
F.A. PROJECT NO.: ??????



SECTION ALONG -L-



PLAN
(PILES NOT SHOWN FOR CLARITY)

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

PROJECT NO. 17BP.7.R.123

ROCKINGHAM COUNTY

STATION: 22+31.00 -L-

SHEET 1 OF 3 REPLACES BRIDGE NO. 80

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
FOR BRIDGE OVER
WOLF ISLAND CREEK ON
SR 1929 (ESTES ROAD)
BETWEEN SR 2024 AND US 29

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-1
1			3			TOTAL SHEETS
2			4			21

DRAWN BY : S.G.S. DATE : 09/15/17
CHECKED BY : S.K.C. DATE : 10/23/17
DESIGN ENGINEER OF RECORD: T.L.B. DATE : 10/25/17

PLAN PREPARED BY:

ALPHA & OMEGA GROUP
CIVIL & STRUCTURAL ENGINEERS
4601 Lake Boone Trail, Ste. 3C Raleigh, NC 27607
Phone 919 981 0310 Fax 919 981 0451
Firm License No. C-1684 www.aogroup.com
A&O PROJECT NO. 2016.063

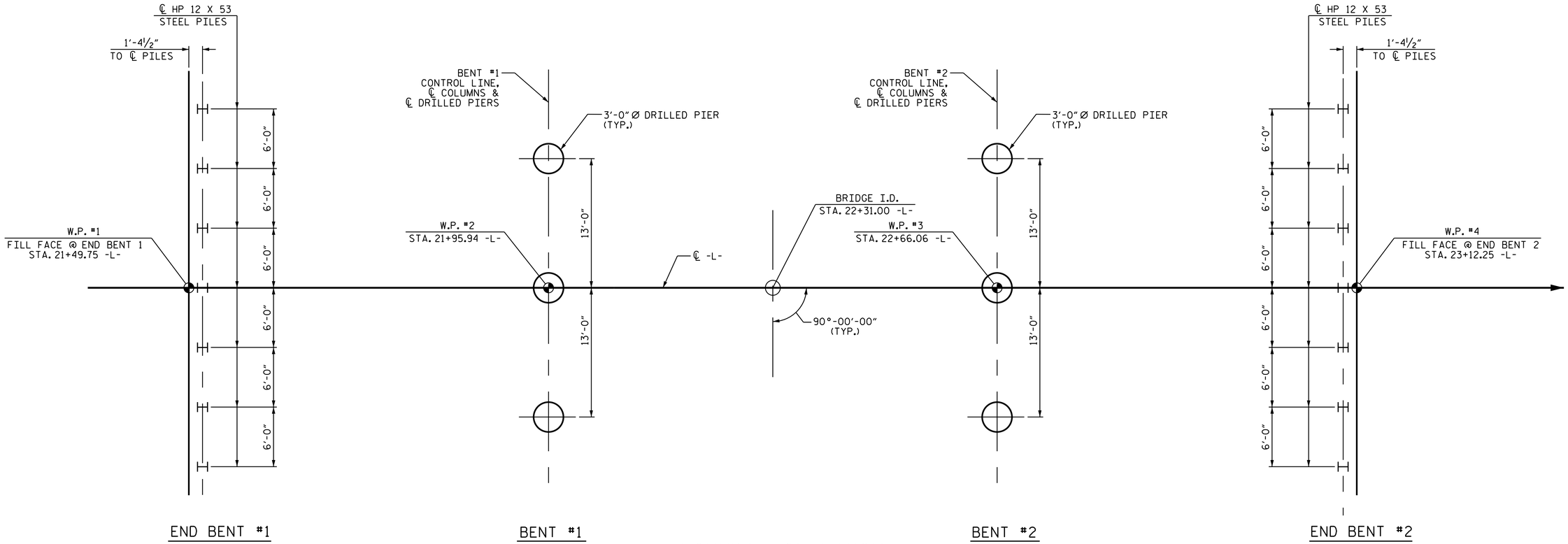
Digitally signed by Ted L. Bartelt, PE
DN: cn=Ted L. Bartelt, PE, o=Alpha & Omega Group, ou, email=tlbartelt@aogroup.com, c=US
Date: 2019.09.26 14:58:17 -04'00'

NORTH CAROLINA
SEAL
14455
ENGINEER
TED L. BARTELT

REFERENCE NO. 1-1

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

$$$$$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$



FOUNDATION LAYOUT

DIMENSIONS LOCATING PILES ARE SHOWN TO PILE CENTERLINE.

NOTES

FOR PILES, SEE GEO TECHNICAL SPECIAL PROVISIONS AND SECTION 450 OF THE STANDARD SPECIFICATIONS.

PILES AT END BENT 1 AND END BENT 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 65 TONS PER PILE.

DRIVE PILES AT END BENT 1 AND END BENT 2 TO A REQUIRED DRIVING RESISTANCE OF 110 TONS PER PILE.

STEEL H-PILE POINTS ARE REQUIRED FOR STEEL H-PILES AT END BENT NO. 1 AND END BENT NO. 2. FOR STEEL PILE POINTS, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

IT HAS BEEN ESTIMATED THAT HAMMER WITH AN EQUIVALENT RATED ENERGY IN THE RANGE OF 20000 TO 35000 FT-LBS PER BLOW WILL BE REQUIRED TO DRIVE PILES AT END BENT NO. 1 AND END BENT NO. 2. THIS ESTIMATED ENERGY RANGE DOES NOT RELEASE THE CONTRACTOR FROM PROVIDING DRIVING EQUIPMENT IN ACCORDANCE WITH SUBARTICLE 450-3(D)(2) OF THE STANDARD SPECIFICATIONS.

TESTING PILES WITH THE PDA DURING DRIVING, RESTRIKING OR REDRIVING MAY BE REQUIRED. THE ENGINEER WILL DETERMINE THE NEED FOR PDA TESTING. FOR PDA TESTING, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

FOR DRILLED PIERS, SEE GEOTECHNICAL SPECIAL PROVISIONS AND SECTION 411 OF THE STANDARD SPECIFICATIONS.

DRILLED PIERS AT BENT 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 435 TONS PER PIER. CHECK FIELD CONDITIONS FOR THE REQUIRED TIP RESISTANCE OF 15 TSF.

PERMANENT STEEL CASINGS ARE REQUIRED FOR DRILLED PIERS AT BENT 1. IF REQUIRED, DO NOT EXTEND PERMANENT CASINGS BELOW ELEVATION 546 FT WITHOUT PRIOR APPROVAL FROM THE ENGINEER. THE ENGINEER WILL DETERMINE THE NEED FOR PERMANENT CASINGS.

INSTALL DRILLED PIERS AT BENT 1 TO A TIP ELEVATION NO HIGHER THAN 527 FT WITH THE REQUIRED TIP RESISTANCE.

DRILLED PIERS AT BENT 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 435 TONS PER PIER. CHECK FIELD CONDITIONS FOR THE REQUIRED TIP RESISTANCE OF 90 TSF.

PERMANENT STEEL CASINGS ARE REQUIRED FOR DRILLED PIERS AT BENT 2. IF REQUIRED, DO NOT EXTEND PERMANENT CASINGS BELOW ELEVATION 545 FT WITHOUT PRIOR APPROVAL FROM THE ENGINEER. THE ENGINEER WILL DETERMINE THE NEED FOR PERMANENT CASINGS.

INSTALL DRILLED PIERS AT BENT 2 TO A TIP ELEVATION NO HIGHER THAN 527 FT WITH THE REQUIRED TIP RESISTANCE.

SPT IS REQUIRED FOR DRILLED PIERS AT BENT 1. FOR SPT TESTING, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.

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

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

THE SCOUR CRITICAL ELEVATIONS FOR BENT 1 IS ELEVATION 544 FT. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.

THE SCOUR CRITICAL ELEVATIONS FOR BENT 2 IS ELEVATION 543 FT. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.

PROJECT NO. 17BP.7.R.123

ROCKINGHAM COUNTY

STATION: 22+31.00 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
FOR BRIDGE OVER
WOLF ISLAND CREEK ON
SR 1929 (ESTES ROAD)
BETWEEN SR 2024 AND US 29

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-2
1			3			TOTAL SHEETS
2			4			21

PLAN PREPARED BY:

ALPHA & OMEGA GROUP
CIVIL | STRUCTURAL | WATER RESOURCES
4601 Lake Boone Trail, Ste. 3C Raleigh, NC 27607
Phone 919 981 0310 Fax 919 981 0451
Firm License No. C-1684 www.aogroup.com
A&O PROJECT NO. 2016.063

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 14455 TED L. BARTLETT
DocuSigned by: Ted L Bartlett D794597C456A4F7...
1/13/2018

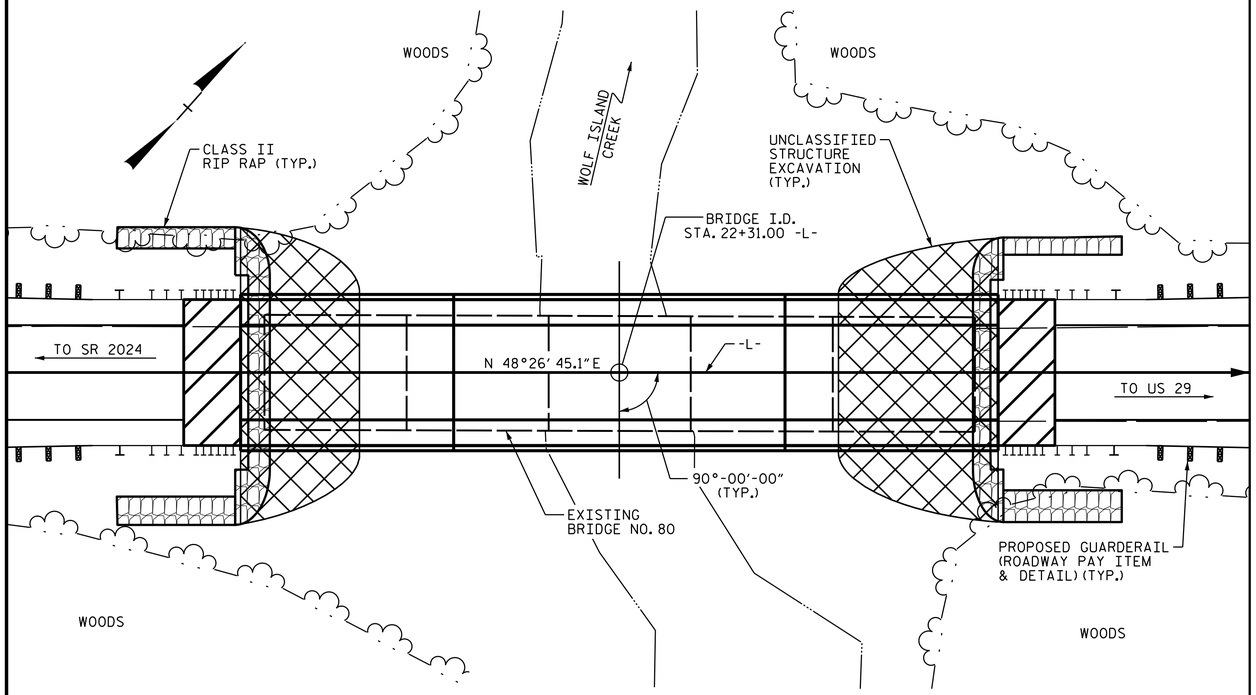
REFERENCE NO. 1-2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DRAWN BY : S.G.S. DATE : 09/15/17
CHECKED BY : S.K.C DATE : 10/23/17
DESIGN ENGINEER OF RECORD: T.L.B. DATE : 10/25/17

$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

BM #1: RAILROAD SPIKE SET IN BASE OF 27" GUM TREE; 85' LT. STA. 23+57 -L-, ELEV.=558.50, NAVD 88



FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

LOCATION SKETCH

NOTES:

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.

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

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

ASPHALT WEARING SURFACE IS INCLUDED IN ROADWAY QUANTITY ON ROADWAY PLANS.

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

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

THE EXISTING STRUCTURE CONSISTING OF PRECAST PRESTRESSED CONCRETE CHANNELS, 5 SPANS @ 30'-0" WITH A CLEAR ROADWAY WIDTH OF 24'-4", PRECAST PRESTRESSED CONCRETE END BENT CAPS ON TIMBER PILES, PRECAST PRESTRESSED CONCRETE BENT CAPS ON STEEL & TIMBER PILES AND 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, A LOAD LIMIT MAY BE POSTED AND MAY BE REDUCED AS FOUND NECESSARY DURING THE LIFE OF THE PROJECT.

CONTRACOTR SHALL CUT STEEL AND TIMBER PILES FLUSH WITH TOP OF CONCRETE SILLS. WHERE NO SILLS ARE LOCATED, CONTRACTOR SHALL REMOVE PILES TO A MINIMUM OF 1-FT BELOW MUD LINE.

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

THE SUBSTRUCTURE OF THE EXISTING BRIDGE INDICATED ON THE PLANS IS FROM THE BEST INFORMATION AVAILABLE SINE 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.

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

AT THE CONTRACTOR'S OPTION, PRESTRESSED CONCRETE END BENT AND BENT CAPS MAY BE SUBSTITUTED IN PLACE OF THE CAST IN PLACE CAPS. THE CONTRACTOR SHALL COORDINATE WITH THE RESIDENT ENGINEER TO RECEIVE REVISED PLANS AND DETAILS FROM THE STRUCTURES MANAGEMENT UNIT. THE REDESIGN AND ANY ADDITIONAL MATERIALS NEEDED WILL BE AT NO ADDITIONAL COST TO THE CONTRACTOR.

THE CONTRACTOR SHALL PROVIDE INDEPENDENT ASSURANCE SAMPLES OF REINFORCING STEEL AS FOLLOWS: FOR PROJECTS REQUIRING UP TO 400 TONS OF REINFORCING STEEL, ONE 30 INCH SAMPLE OF EACH SIZE BAR USED, AND FOR PROJECTS REQUIRING OVER 400 TONS OF REINFORCING STEEL, TWO 30 INCH SAMPLES OF EACH SIZE BAR USED. THE BARS FROM WHICH THE SAMPLES ARE TAKEN MUST THEN BE SPLICED WITH REPLACEMENT BARS OF THE SIZE AND LENGTH OF THE SAMPLE PLUS A MINIMUM LAP SPLICE OF THIRTY BAR DIAMETERS. PAYMENT FOR THE SAMPLES OF REINFORCING STEEL SHALL CONSIDERED INCIDENTAL TO VARIOUS PAY ITEMS.

THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

THE MATERIAL SHOWN IN THE CROSS-HATCHED AREA SHALL BE EXCAVATED FOR A DISTANCE OF 30 FT LEFT SIDE AND 30 FT RIGHT SIDE OF CENTERLINE ROADWAY AS DIRECTED BY THE ENGINEER. THIS WORK WILL BE PAID FOR AT THE CONTRACT LUMP SUM PRICE FOR UNCLASSIFIED STRUCTURE EXCAVATION. SEE SECTION 412 OF THE STANDARD SPECIFICATIONS.

HYDRAULIC DATA

DESIGN DISCHARGE	= 4100 C.F.S.
FREQUENCY OF DESIGN FLOOD	= 25 YR.
DESIGN HIGH WATER ELEVATION	= 560.10
DRAINAGE AREA	= 28.5 SQ. MI.
BASE DISCHARGE (Q100)	= 5700 C.F.S.
BASE HIGH WATER ELEVATION	= 561.46

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE	= 8300 C.F.S.
FREQUENCY OF OVERTOPPING FLOOD	= 500+ YR.
OVERTOPPING FLOOD ELEVATION	= 562.30 *

* SAG @ ± 16+50 -L-

TOTAL BILL OF MATERIAL

	REMOVAL OF EXISTING STRUCTURE	ASBESTOS ASSESSMENT	3'-0" Ø DRILLED PIERS IN SOIL	3'-0" Ø DRILLED PIERS NOT IN SOIL	PERMANENT STEEL CASING FOR 3'-0" Ø DRILLED PIERS	PDA TESTING	SID INSPECTIONS	SPT TESTING	CSL TESTING	UNCLASSIFIED STRUCTURE EXCAVATION	CLASS A CONCRETE	BRIDGE APPROACH SLABS	REINFORCING STEEL	SPIRAL COLUMN REINFORCING STEEL	PILE DRIVING EQUIPMENT SETUP FOR HP 12 X 53 STEEL PILES	HP 12 X 53 STEEL PILES		STEEL PILE POINTS
	LUMP SUM	LUMP SUM	LIN. FT.	LIN. FT.	LIN. FT.	EACH	EACH	EACH	EACH	LUMP SUM	CU. YDS.	LUMP SUM	LBS.	LBS.	EACH	NO.	LIN. FT.	EACH
SUPERSTRUCTURE																		
END BENT 1											21.6		2636		7	7	140	7
BENT 1			10.5	60.0	13.5			3			18.0		9966	1690				
BENT 2			21.0	57.0	24.0						16.5		9235	1668				
END BENT 2											21.6		2636		7	7	105	7
TOTAL	LUMP SUM	LUMP SUM	31.5	117.0	37.5	1	1	3	1	LUMP SUM	77.7	LUMP SUM	24473	3358	14	14	245	14

TOTAL BILL OF MATERIAL

	VERTICAL CONCRETE BARRIER RAIL	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE	ELASTOMERIC BEARINGS	3'-0" x 1'-9" PRESTRESSED CONCRETE CORED SLABS		3'-0" x 2'-0" PRESTRESSED CONCRETE CORED SLABS	
	LIN. FT.	TONS	SQ. YDS.	LUMP SUM	NO.	LIN. FT.	NO.	LIN. FT.
SUPERSTRUCTURE	320.75				22	990.0	11	770.0
END BENT 1		240	266					
BENT 1								
BENT 2								
END BENT 2		223	248					
TOTAL	320.75	463	514	LUMP SUM	22	990.0	11	770.0

PROJECT NO. 17BP.7.R.123

ROCKINGHAM COUNTY

STATION: 22+31.00 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
FOR BRIDGE OVER
WOLF ISLAND CREEK ON
SR 1929 (ESTES ROAD)
BETWEEN SR 2024 AND US 29

DRAWN BY : S.G.S. DATE : 09/15/17
CHECKED BY : S.K.C. DATE : 10/23/17
DESIGN ENGINEER OF RECORD: T.L.B. DATE : 10/25/17

$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

PLAN PREPARED BY:

Digitally signed by Ted L. Bartelt, PE
DN: cn=Ted L. Bartelt, PE, o=Alpha & Omega Group, ou, email=tlbartelt@aogroup.com, c=US
Date: 2019.09.26 15:01:13 -04'00'

SEAL 14455 ENGINEER TED L. BARTELT

ALPHA & OMEGA GROUP
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4601 Lake Boone Trail, Ste. 3C Raleigh, NC 27607
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A&O PROJECT NO. 2016.063

REFERANCE NO. 1-3

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-3
1			3			TOTAL SHEETS
2			4			21

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

LEVEL		VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING	MINIMUM RATING FACTORS (RF)	TONS = W X RF	STRENGTH I LIMIT STATE											SERVICE III LIMIT STATE						COMMENT NUMBER
								MOMENT					SHEAR						MOMENT						
							LIVELOAD FACTORS	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)	LIVELOAD FACTORS	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING		HL-93(Inv)	N/A	1	2.010	--	1.75	0.240	2.26	45'	EL	22	0.540	**2.01**	45'	EL	1.9	0.80	0.240	2.70	45'	EL	**22**	
		HL-93(Opr)	N/A	--	2.690	--	1.35	0.240	2.93	45'	EL	22	0.540	2.69	45'	EL	1.9	N/A	--	--	--	--	--	
		HS-20(Inv)	36.000	2	2.440	87.840	1.75	0.240	2.78	45'	EL	22	0.540	**2.44**	45'	EL	1.9	0.80	0.240	3.34	45'	EL	**22**	
		HS-20(Opr)	36.000	--	3.200	115.200	1.35	0.240	3.60	45'	EL	22	0.540	3.20	45'	EL	1.9	N/A	--	--	--	--	--	
LEGAL LOAD RATING	SV	SNSH	13.500	--	6.470	87.345	1.4	0.240	6.79	45'	EL	22	0.540	6.91	45'	EL	1.9	0.80	0.240	6.47	45'	EL	22	
		SNGARBS2	20.000	--	5.050	101.000	1.4	0.240	5.48	45'	EL	22	0.540	5.05	45'	EL	1.9	0.80	0.240	5.23	45'	EL	22	
		SNAGRIS2	22.000	--	4.750	104.500	1.4	0.240	5.31	45'	EL	17.5	0.540	4.75	45'	EL	1.9	0.80	0.240	5.10	45'	EL	17.5	
		SNCOTTS3	27.250	--	3.230	88.017	1.4	0.240	3.39	45'	EL	22	0.540	3.42	45'	EL	1.9	0.80	0.240	3.23	45'	EL	22	
		SNAGGRS4	34.925	--	2.850	99.536	1.4	0.240	2.99	45'	EL	22	0.540	2.94	45'	EL	1.9	0.80	0.240	2.85	45'	EL	22	
		SNS5A	35.500	--	2.780	98.690	1.4	0.240	2.91	45'	EL	22	0.540	3.04	45'	EL	1.9	0.80	0.240	2.78	45'	EL	22	
		SNS6A	39.950	--	2.620	104.669	1.4	0.240	2.74	45'	EL	22	0.540	2.82	45'	EL	1.9	0.80	0.240	2.62	45'	EL	22	
		SNS7B	42.000	--	2.490	104.580	1.4	0.240	2.62	45'	EL	22	0.540	2.84	45'	EL	1.9	0.80	0.240	2.49	45'	EL	22	
	TTST	TNAGRIT3	33.000	--	3.210	105.930	1.4	0.240	3.37	45'	EL	22	0.540	3.31	45'	EL	1.9	0.80	0.240	3.21	45'	EL	22	
		TNT4A	33.075	--	3.190	105.509	1.4	0.240	3.40	45'	EL	22	0.540	3.19	45'	EL	1.9	0.80	0.240	3.25	45'	EL	22	
		TNT6A	41.600	--	2.720	113.152	1.4	0.240	2.86	45'	EL	22	0.540	3.10	45'	EL	1.9	0.80	0.240	2.72	45'	EL	22	
		TNT7A	42.000	--	2.780	116.760	1.4	0.240	2.91	45'	EL	22	0.540	2.84	45'	EL	1.9	0.80	0.240	2.78	45'	EL	22	
		TNT7B	42.000	--	2.720	114.240	1.4	0.240	3.03	45'	EL	22	0.540	2.72	45'	EL	1.9	0.80	0.240	2.89	45'	EL	22	
		TNAGRIT4	43.000	--	2.610	112.230	1.4	0.240	2.89	45'	EL	22	0.540	2.61	45'	EL	1.9	0.80	0.240	2.75	45'	EL	22	
		TNAGT5A	45.000	--	2.560	115.200	1.4	0.240	2.69	45'	EL	22	0.540	2.67	45'	EL	1.9	0.80	0.240	2.56	45'	EL	22	
		TNAGT5B	45.000	3	2.470	111.150	1.4	0.240	2.62	45'	EL	22	0.540	**2.47**	45'	EL	1.9	0.80	0.240	2.50	45'	EL	**22**	

LOAD FACTORS:

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

NOTES:

MINIMUM RATING FACTORS ARE BASED ON THE STRENGTH I AND SERVICE III LIMIT STATES.

ALLOWABLE STRESSES FOR SERVICE III LIMIT STATE ARE AS REQUIRED FOR DESIGN.

COMMENTS:

1.
2.
3.
4.

(#) CONTROLLING LOAD RATING

(1) DESIGN LOAD RATING (HL-93)

(2) DESIGN LOAD RATING (HS-20)

(3) LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

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

LRFR SUMMARY

FOR SPAN 'A' AND 'C'

PROJECT NO. 17BP.7.R.123

ROCKINGHAM COUNTY

STATION: 22+31.00 -L-

PLAN PREPARED BY:

ALPHA & OMEGA GROUP
CIVIL | STRUCTURAL | WATER RESOURCES
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Phone 919 981 0310 Fax 919 981 0451
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A&O PROJECT NO. 2016.063

NEW CAROLINA PROFESSIONAL SEAL 14455 ENGINEER TED L BARTLETT

DocuSigned by: Ted L Bartlett D794597C456A4F7...

1/13/2018

REFERENCE NO. 1-4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

LRFR SUMMARY FOR 45' CORED SLAB UNIT 90° SKEW (NON-INTERSTATE TRAFFIC)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-4
1			3			TOTAL SHEETS
2			4			21

DRAWN BY : S.G.S. DATE : 09/15/17
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$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

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

LEVEL		VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING	MINIMUM RATING FACTORS (RF)	TONS = W X RF	STRENGTH I LIMIT STATE										SERVICE III LIMIT STATE						COMMENT NUMBER
								MOMENT					SHEAR					MOMENT						
							LIVELOAD FACTORS	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)	LIVELOAD FACTORS	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING		HL-93(Inv)	N/A	**1**	1.770	--	1.75	0.220	1.77	70′	EL	34.5	0.510	1.88	70′	EL	6.5	0.80	0.220	**2.08**	70′	EL	**34.5**	
		HL-93(Opr)	N/A	--	2.300	--	1.35	0.220	2.30	70′	EL	34.5	0.510	2.48	70′	EL	6.5	N/A	--	--	--	--	--	
		HS-20(Inv)	36.000	**2**	2.300	82.800	1.75	0.220	2.30	70′	EL	34.5	0.510	2.38	70′	EL	6.5	0.80	0.220	**2.70**	70′	EL	**34.5**	
		HS-20(Opr)	36.000	--	2.980	107.28	1.35	0.220	2.98	70′	EL	34.5	0.510	3.13	70′	EL	6.5	N/A	--	--	--	--	--	
LEGAL LOAD RATING	SV	SNSH	13.500	--	6.020	81.270	1.4	0.220	6.43	70′	EL	34.5	0.510	7.29	70′	EL	6.5	0.80	0.220	6.02	70′	EL	34.5	
		SNGARBS2	20.000	--	4.520	91.400	1.4	0.220	4.82	70′	EL	34.5	0.510	5.20	70′	EL	6.5	0.80	0.220	4.52	70′	EL	34.5	
		SNAGRIS2	22.000	--	4.290	94.380	1.4	0.220	4.57	70′	EL	34.5	0.510	4.83	70′	EL	6.5	0.80	0.220	4.29	70′	EL	34.5	
		SNCOTTS3	27.250	--	3.000	81.750	1.4	0.220	3.20	70′	EL	34.5	0.510	3.62	70′	EL	6.5	0.80	0.220	3.00	70′	EL	34.5	
		SNAGGRS4	34.925	--	2.520	88.011	1.4	0.220	2.68	70′	EL	34.5	0.510	3.35	70′	EL	6.5	0.80	0.220	2.52	70′	EL	34.5	
		SNS5A	35.500	--	2.460	87.330	1.4	0.220	2.62	70′	EL	34.5	0.510	3.01	70′	EL	6.5	0.80	0.220	2.46	70′	EL	34.5	
		SNS6A	39.950	--	2.260	90.287	1.4	0.220	2.41	70′	EL	34.5	0.510	2.75	70′	EL	6.5	0.80	0.220	2.26	70′	EL	34.5	
		SNS7B	42.000	--	2.150	90.300	1.4	0.220	2.30	70′	EL	34.5	0.510	2.71	70′	EL	6.5	0.80	0.220	2.15	70′	EL	34.5	
	TTST	TNAGRIT3	33.000	--	2.760	91.080	1.4	0.220	2.94	70′	EL	34.5	0.510	3.31	70′	EL	6.5	0.80	0.220	2.76	70′	EL	34.5	
		TNT4A	33.075	--	2.770	91.618	1.4	0.220	2.96	70′	EL	34.5	0.510	3.21	70′	EL	6.5	0.80	0.220	2.77	70′	EL	34.5	
		TNT6A	41.600	--	2.270	94.432	1.4	0.220	2.42	70′	EL	34.5	0.510	2.89	70′	EL	6.5	0.80	0.220	2.27	70′	EL	34.5	
		TNT7A	42.000	--	2.280	95.760	1.4	0.220	2.44	70′	EL	34.5	0.510	2.82	70′	EL	6.5	0.80	0.220	2.28	70′	EL	34.5	
		TNT7B	42.000	--	2.370	99.540	1.4	0.220	2.53	70′	EL	34.5	0.510	2.62	70′	EL	6.5	0.80	0.220	2.37	70′	EL	34.5	
		TNAGRIT4	43.000	--	2.250	96.750	1.4	0.220	2.40	70′	EL	34.5	0.510	2.55	70′	EL	6.5	0.80	0.220	2.25	70′	EL	34.5	
		TNAGT5A	45.000	--	2.120	95.400	1.4	0.220	2.26	70′	EL	34.5	0.510	2.54	70′	EL	6.5	0.80	0.220	2.12	70′	EL	34.5	
		TNAGT5B	45.000	**3**	2.090	94.050	1.4	0.220	2.23	70′	EL	34.5	0.510	2.41	70′	EL	6.5	0.80	0.220	**2.09**	70′	EL	**34.5**	

LOAD FACTORS:

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

NOTES:

MINIMUM RATING FACTORS ARE BASED ON THE STRENGTH I AND SERVICE III LIMIT STATES.

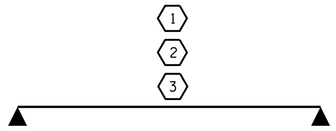
ALLOWABLE STRESSES FOR SERVICE III LIMIT STATE ARE AS REQUIRED FOR DESIGN.

COMMENTS:

1.
2.
3.
4.

(#) CONTROLLING LOAD RATING
(1) DESIGN LOAD RATING (HL-93)
(2) DESIGN LOAD RATING (HS-20)
(3) LEGAL LOAD RATING **
** SEE CHART FOR VEHICLE TYPE

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



LRFR SUMMARY
FOR SPAN 'B'

PROJECT NO. 17BP.7.R.123
ROCKINGHAM COUNTY
STATION: 22+31.00 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

LRFR SUMMARY FOR 70′ CORED SLAB UNIT 90° SKEW
(NON-INTERSTATE TRAFFIC)

PLAN PREPARED BY:

ALPHA & OMEGA GROUP
CIVIL | STRUCTURAL | WATER RESOURCES
4601 Lake Boone Trail, Ste. 3C Raleigh, NC 27607
Phone 919 981 0310 Fax 919 981 0451
Firm License No. C-1684 www.aogroup.com
A&O PROJECT NO. 2016.063

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 14455 TED L BARTELL
DocuSigned by: Ted L Bartell D794597C456A4F7...
1/13/2018

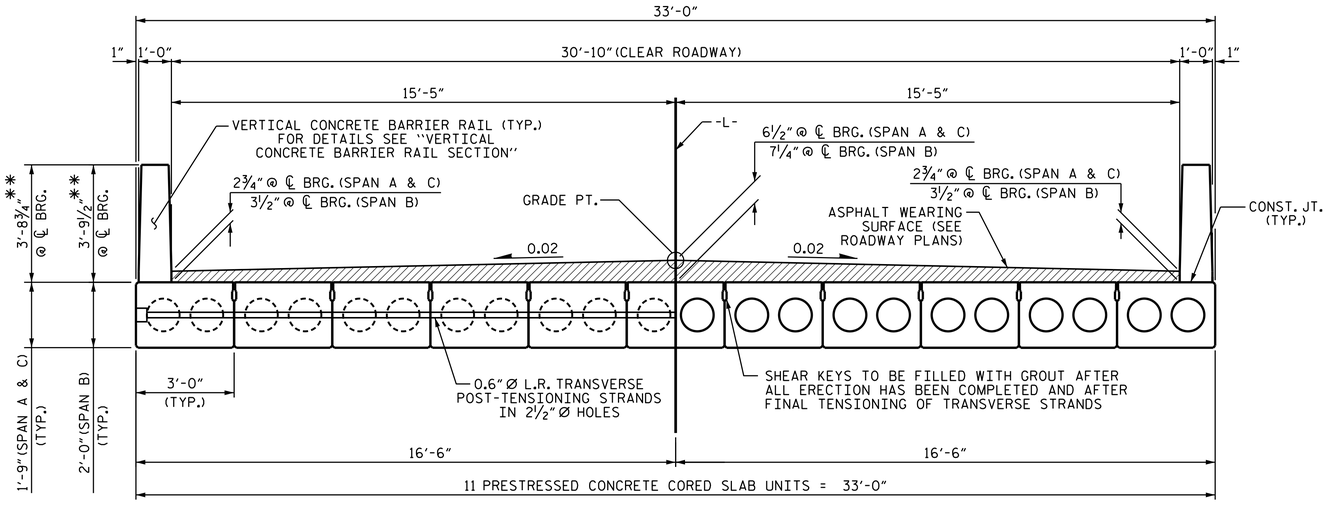
REFERENCE NO. 1-5

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-5
1			3			TOTAL SHEETS
2			4			21

DRAWN BY : S.G.S. DATE : 09/15/17
CHECKED BY : S.K.C. DATE : 10/23/17
DESIGN ENGINEER OF RECORD: T.L.B. DATE : 10/25/17

$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

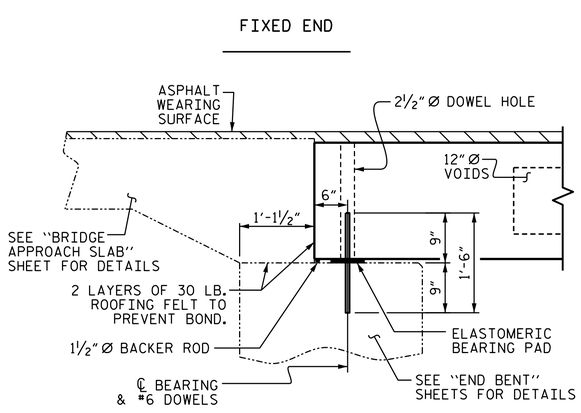


HALF SECTION
AT INTERMEDIATE DIAPHRAGMS

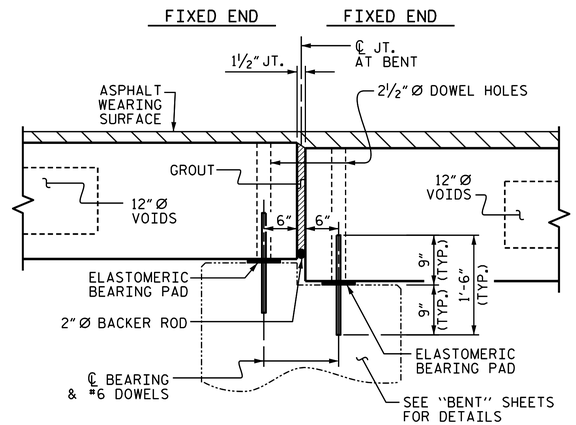
HALF SECTION
THROUGH VOIDS

TYPICAL SECTION

** - THE MAXIMUM BARRIER RAIL HEIGHT AND ASPHALT THICKNESS IS SHOWN. THE HEIGHT OF THE BARRIER RAIL AND ASPHALT THICKNESS VARIES WHILE THE TOP OF THE BARRIER RAIL FOLLOWS THE PROFILE OF THE GUTTERLINE. FOR RAIL HEIGHT DETAILS AND ASPHALT THICKNESS, SEE THE "VERTICAL CONCRETE BARRIER RAIL SECTION" DETAIL.

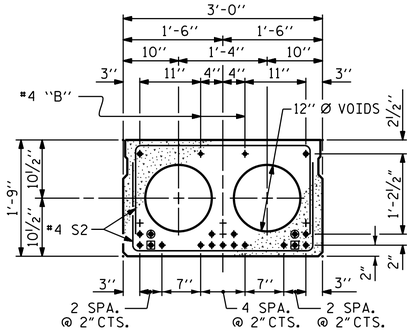


SECTION AT END BENT



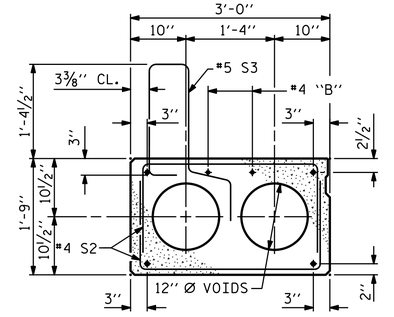
SECTION AT BENT No. 1

(BENT No. 2 SIM.)



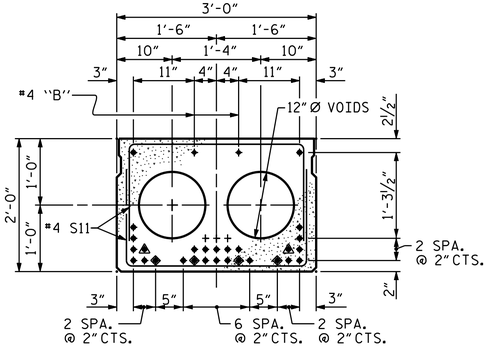
INTERIOR SLAB SECTION (45' UNIT)

(17 STRANDS REQUIRED)



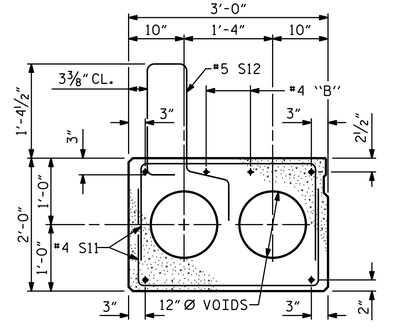
EXT. SLAB SECTION

(FOR PRESTRESSED STRAND LAYOUT, SEE INTERIOR SLAB SECTION.)



INTERIOR SLAB SECTION (70' UNIT)

(28 STRANDS REQUIRED)



EXTERIOR SLAB SECTION

(FOR PRESTRESSED STRAND LAYOUT, SEE INTERIOR SLAB SECTION.)

0.6" Ø LOW RELAXATION STRAND LAYOUT

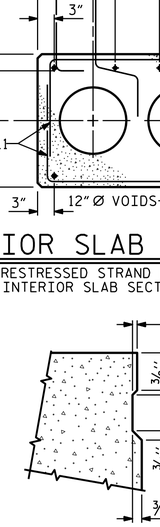
◆ BOND SHALL BE BROKEN ON THESE STRANDS FOR A DISTANCE OF 6'-0" FROM END OF CORED SLAB UNIT. SEE STANDARD SPECIFICATIONS, ARTICLE 1078-7.

◆ BOND SHALL BE BROKEN ON THESE STRANDS FOR A DISTANCE OF 4'-0" FROM END OF CORED SLAB UNIT. SEE STANDARD SPECIFICATIONS, ARTICLE 1078-7.

◉ BOND SHALL BE BROKEN ON THESE STRANDS FOR A DISTANCE OF 2'-0" FROM END OF CORED SLAB UNIT. SEE STANDARD SPECIFICATIONS, ARTICLE 1078-7.

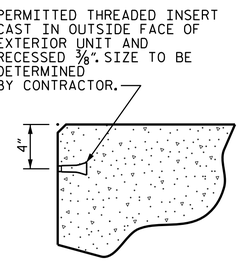
◉ OPTIONAL FULL LENGTH DEBONDED STRANDS. THESE STRANDS ARE NOT REQUIRED. IF THE FABRICATOR CHOOSES TO INCLUDE THESE STRANDS IN THE CORED SLAB UNIT, THE STRANDS SHALL BE DEBONDED FOR THE FULL LENGTH OF THE UNIT AT NO ADDITIONAL COST. SEE STANDARD SPECIFICATIONS, ARTICLE 1078-7.

DEBONDING LEGEND

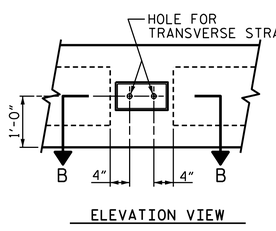


SHEAR KEY DETAIL

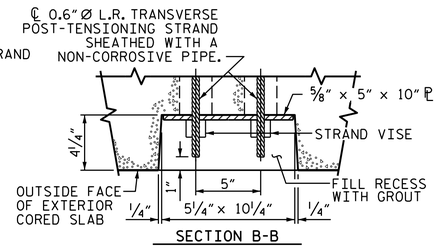
NOTE: OMIT SHEAR KEY ON OUTSIDE FACE OF EXTERIOR CORED SLABS.



THREADED INSERT DETAIL

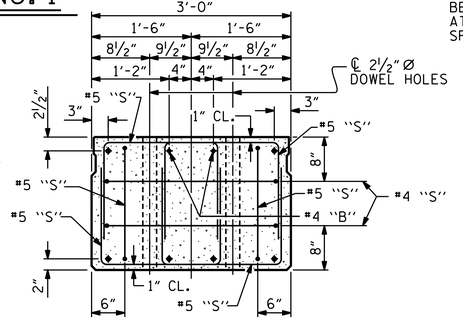


ELEVATION VIEW



SECTION B-B

GROUTED RECESS AT END OF POST-TENSIONED STRAND CORED SLABS



END ELEVATION

SHOWING PLACEMENT OF DOUBLE STIRRUPS AND LOCATION OF DOWEL HOLES. (STRAND LAYOUT NOT SHOWN.) INTERIOR SLAB UNIT SHOWN-EXTERIOR SLAB UNIT SIMILAR EXCEPT SHEAR KEY LOCATION.

PROJECT NO. 17BP.7.R.123

ROCKINGHAM COUNTY

STATION: 22+31.00 -L-

SHEET 1 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

3'-0" X 1'-9" 3'-0" X 2'-0" PRESTRESSED CONCRETE CORED SLAB UNIT

PLAN PREPARED BY:

ALPHA & OMEGA GROUP
CIVIL | STRUCTURAL | WATER RESOURCES
4601 Lake Boone Trail, Ste. 3C Raleigh, NC 27607
Phone 919 981 0310 Fax 919 981 0451
Firm License No. C-1684 www.aogroup.com
A&O PROJECT NO. 2016.063

DocuSigned by: Ted L Bartlett, SEAL 14455, NORTH CAROLINA, ENGINEER, TED L. BARTLETT, D794597C456A4F7...
1/13/2018

REFERENCE NO. 1-6

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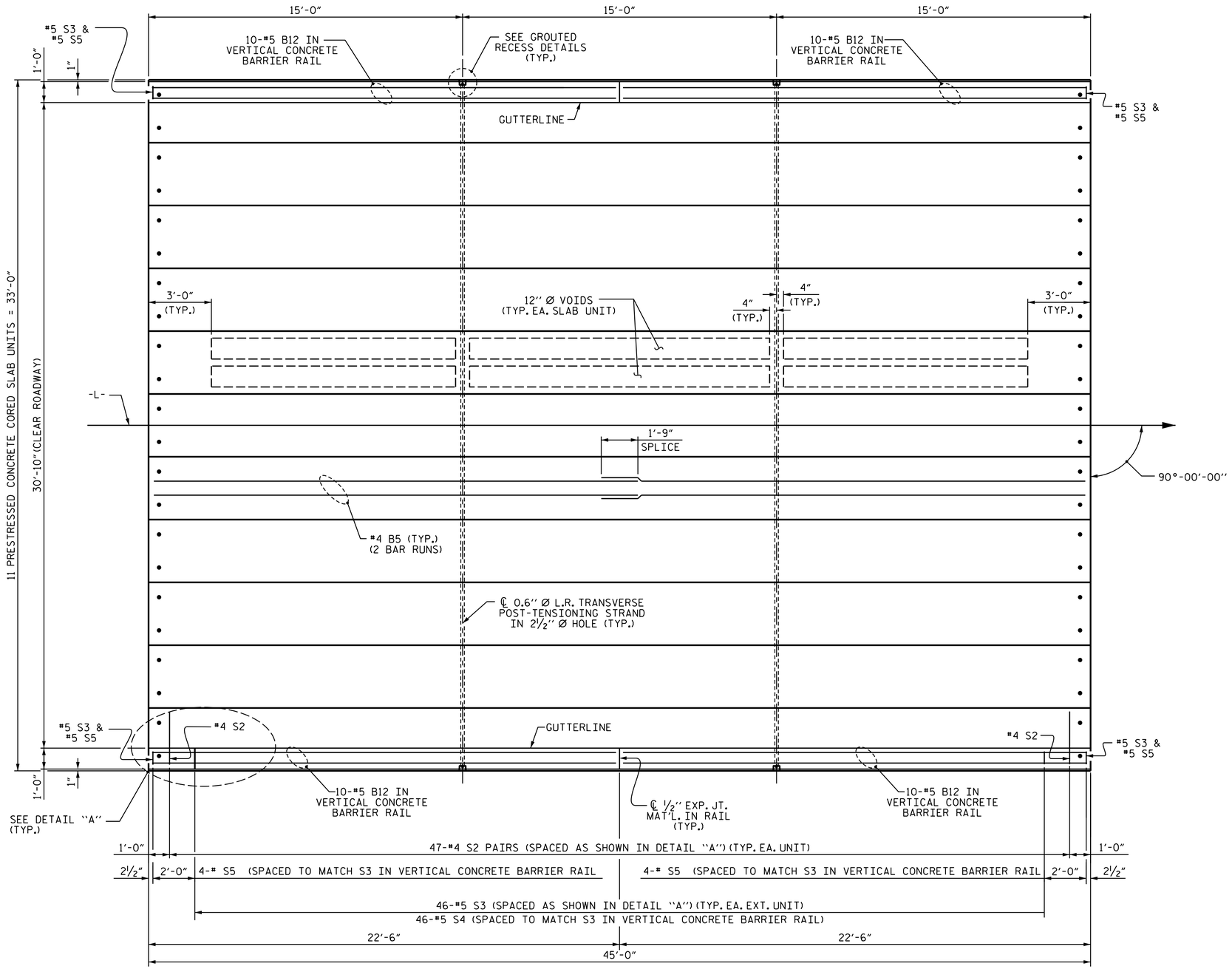
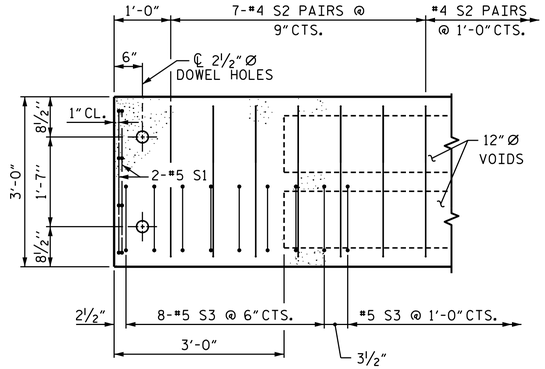
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-6
1			3			TOTAL SHEETS
2			4			21

DRAWN BY : S.G.S DATE : 08/15/17
CHECKED BY : S.K.C. DATE : 10/13/17
DESIGN ENGINEER OF RECORD: T.L.B. DATE : 10/25/17

$$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$$$$$
$$$$$USERNAME$$$$



PLAN OF UNIT



DETAIL "A"

(TYPICAL EACH END OF UNIT)
NOTE: EXTERIOR UNIT SHOWN - INTERIOR UNIT SIMILAR EXCEPT OMIT #5 S3 BARS.

PROJECT NO. 17BP.7.R.123

ROCKINGHAM COUNTY

STATION: 22+31.00 -L-

SHEET 2 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

PLAN OF 45' UNIT 30'-10" CLEAR ROADWAY 90° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-7
1			3			TOTAL SHEETS
2			4			21

DRAWN BY : S.G.S. DATE : 08/15/17
CHECKED BY : S.K.C. DATE : 10/23/17
DESIGN ENGINEER OF RECORD: T.L.B. DATE : 10/25/17

$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

PLAN PREPARED BY:

ALPHA & OMEGA GROUP
CIVIL | STRUCTURAL | WATER RESOURCES
4601 Lake Boone Trail, Ste. 3C Raleigh, NC 27607
Phone 919 981 0310 Fax 919 981 0451
Firm License No. C-1684 www.aogroup.com
A&O PROJECT NO. 2016.063

DocuSigned by:
Ted L. Bartlett
D794597C456A4E7...
1/13/2018
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 14455 TED L. BARTLETT

REFERENCE NO. 1-7

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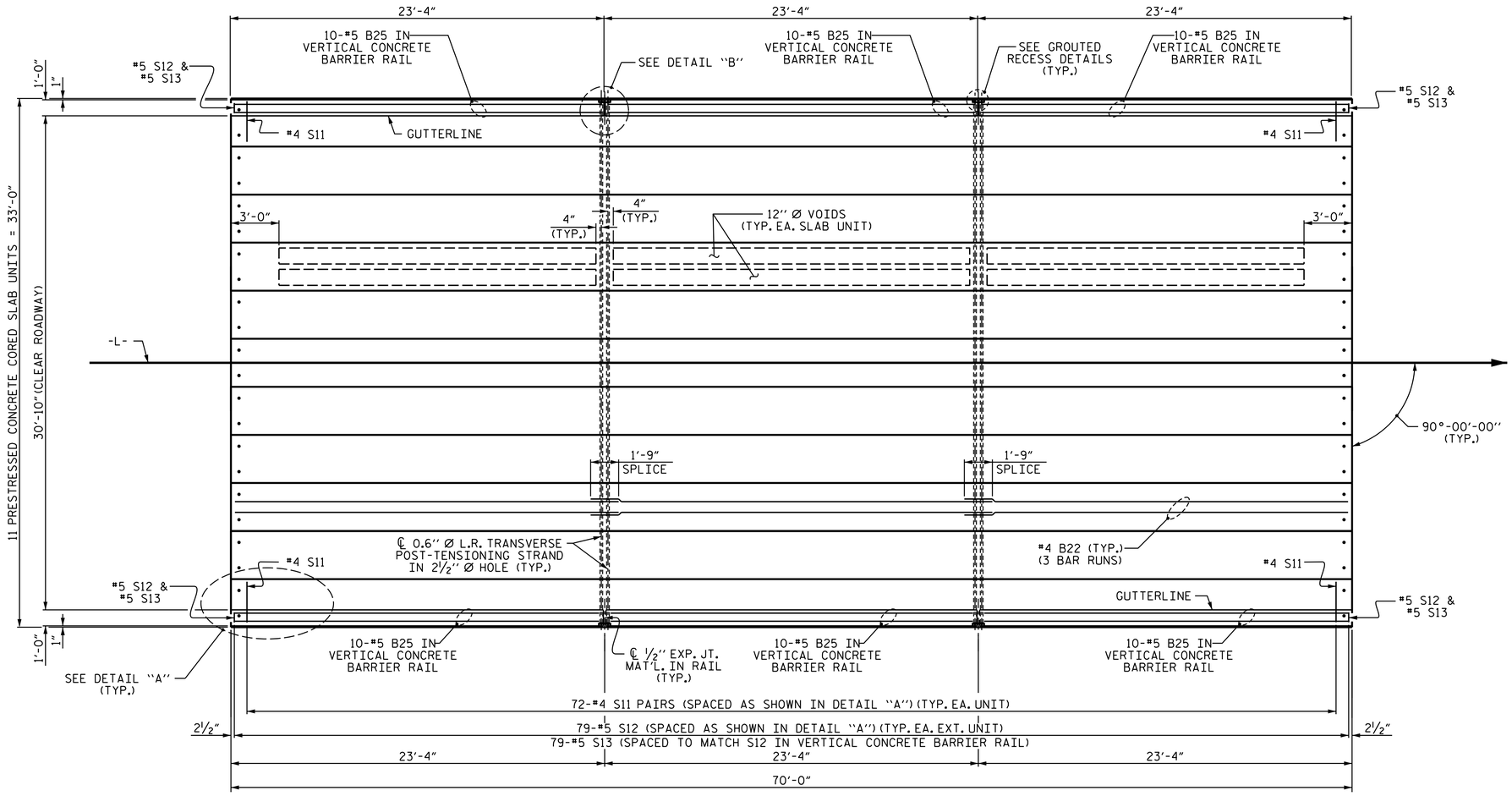
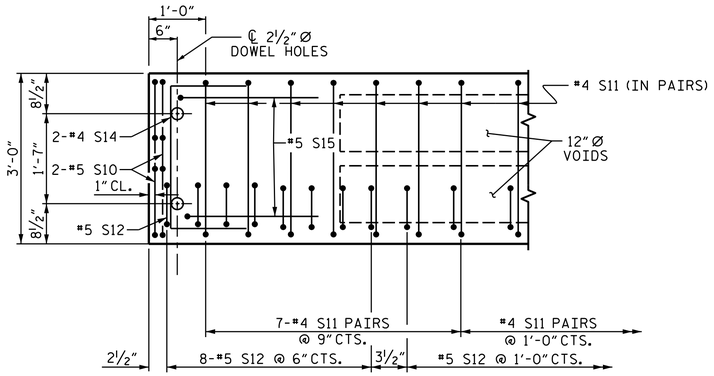
STD. NO. 21"PCS_33_90S_45L

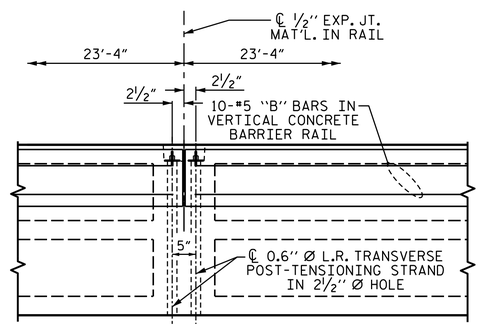


PLAN OF UNIT



DETAIL "A"

(TYPICAL EACH END OF UNIT)
NOTE: EXTERIOR UNIT SHOWN - INTERIOR UNIT SIMILAR EXCEPT OMIT #5 S12 BARS.



DETAIL "B"

#4 S11 BARS MAY BE SHIFTED AS NECESSARY TO MAINTAIN 1" CLEAR TO GROUTED RECESS AND 2½" Ø TRANSVERSE POST-TENSIONING STRAND HOLES

PROJECT NO. 17BP.7.R.123
ROCKINGHAM COUNTY
STATION: 22+31.00 -L-

SHEET 3 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

PLAN OF 70' UNIT 30'-10" CLEAR ROADWAY 90° SKEW

PLAN PREPARED BY:

ALPHA & OMEGA GROUP
CIVIL | STRUCTURAL | WATER RESOURCES
4601 Lake Boone Trail, Ste. 3C Raleigh, NC 27607
Phone 919 981 0310 Fax 919 981 0451
Firm License No. C-1684 www.aogroup.com
A&O PROJECT NO. 2016.063

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 14455 TED L. BARTLETT
DocuSigned by: Ted L Bartlett D794597C456A4F7...
1/13/2018

REFERENCE NO. 1-8

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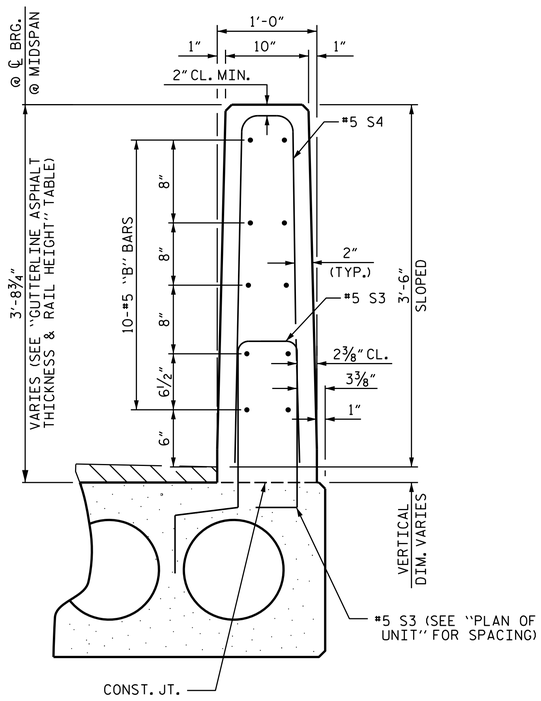
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-8
1			3			TOTAL SHEETS
2			4			21

DRAWN BY : S.G.S. DATE : 08/15/17
CHECKED BY : S.K.C. DATE : 10/23/17
DESIGN ENGINEER OF RECORD: T.L.B. DATE : 10/25/17

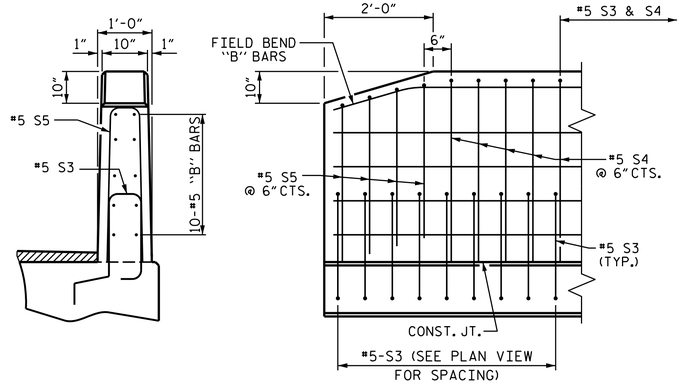
$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

STD. NO. 24PCS_33_90S_70L



SECTION THRU VERTICAL CONCRETE BARRIER RAIL

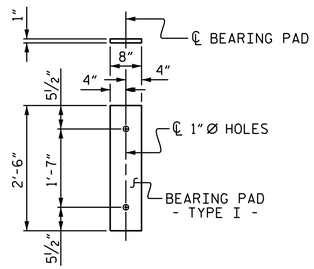
(SPAN A & C)



END VIEW SIDE VIEW

END OF RAIL DETAILS

(SPAN A & C)

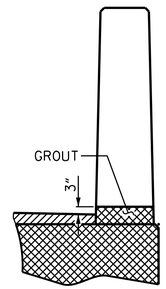


FIXED END

(TYPE I - 66 REQ'D)

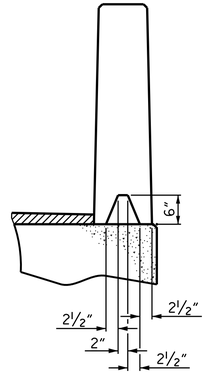
ELASTOMERIC BEARING DETAILS

ELASTOMER IN ALL BEARINGS SHALL BE 60 DUROMETER HARDNESS.



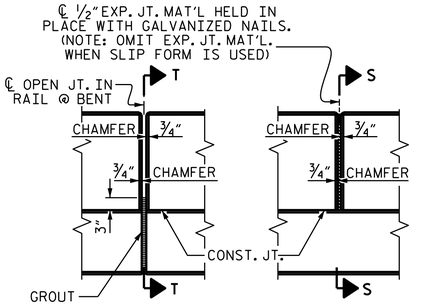
SECTION T-T

AT OPEN JOINT AT BENT
(THIS IS TO BE USED WHERE FOAM JOINT IS NOT USED)

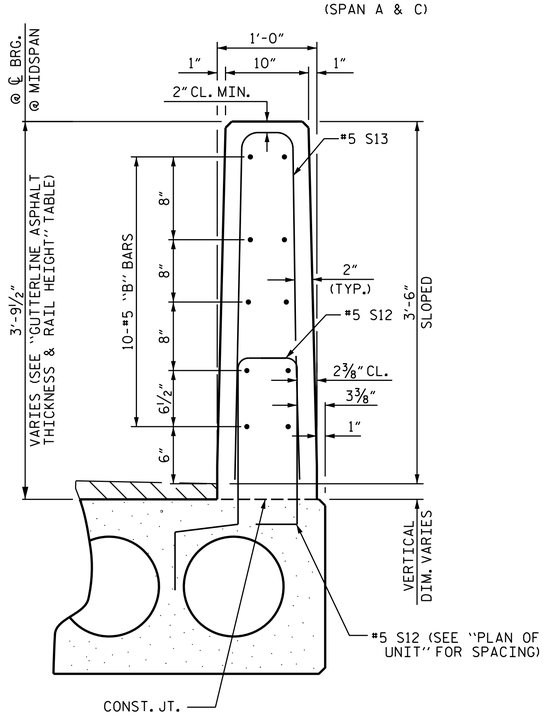


SECTION S-S

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

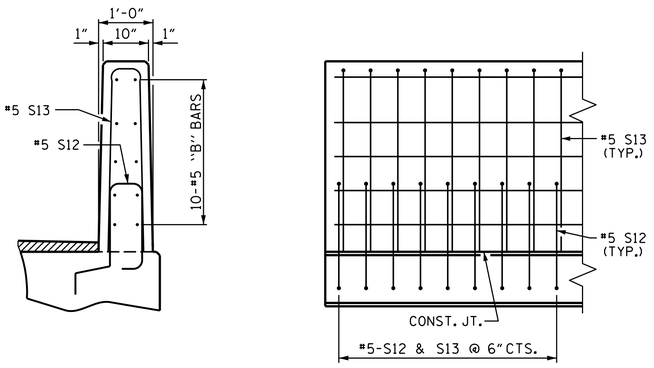


ELEVATION AT EXPANSION JOINTS



SECTION THRU VERTICAL CONCRETE BARRIER RAIL

(SPAN B)



END VIEW SIDE VIEW

END OF RAIL DETAILS

(SPAN B)

PROJECT NO. 17BP.7.R.123

ROCKINGHAM COUNTY

STATION: 22+31.00 -L-

SHEET 4 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

3'-0" X 1'-9"
3'-0" X 2'-0"
PRESTRESSED CONCRETE CORED SLAB UNIT
90° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-9
1			3			TOTAL SHEETS
2			4			21

REFERENCE NO. 1-9

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DocuSigned by: Ted L Bartels
D794597C456A4F7...
1/15/2018

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 14455 TED L. BARTELS

PLAN PREPARED BY:

ALPHA & OMEGA GROUP
CIVIL | STRUCTURAL | WATER RESOURCES
4601 Lake Boone Trail, Ste. 3C Raleigh, NC 27607
Phone 919 981 0310 Fax 919 981 0451
Firm License No. C-1684 www.aogroup.com
A&O PROJECT NO. 2016.063

DRAWN BY : S.G.S. DATE : 08/15/17
CHECKED BY : S.K.C. DATE : 10/23/17
DESIGN ENGINEER OF RECORD: T.L.B. DATE : 10/25/17

$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

CORED SLABS REQUIRED

	NUMBER	LENGTH	TOTAL LENGTH
45′ UNIT			
EXTERIOR C.S.	4	45′-0″	180′-0″
INTERIOR C.S.	18	45′-0″	810′-0″
TOTAL	22		990′-0″

CORED SLABS REQUIRED

	NUMBER	LENGTH	TOTAL LENGTH
70′ UNIT			
EXTERIOR C.S.	2	70′-0″	140′-0″
INTERIOR C.S.	9	70′-0″	630′-0″
TOTAL	11		770′-0″

DEAD LOAD DEFLECTION AND CAMBER

	3′-0″ x 1′-9″
45′ CORED SLAB UNIT	0.6″ Ø L.R. STRAND
CAMBER (SLAB ALONE IN PLACE)	1 3/16″ ↑
DEFLECTION DUE TO SUPERIMPOSED DEAD LOAD**	1/4″ ↓
FINAL CAMBER	15/16″ ↑

** INCLUDES FUTURE WEARING SURFACE

DEAD LOAD DEFLECTION AND CAMBER

	3′-0″ x 2′-0″
70′ CORED SLAB UNIT	0.6″ Ø L.R. STRAND
CAMBER (SLAB ALONE IN PLACE)	2 1/4″ ↑
DEFLECTION DUE TO SUPERIMPOSED DEAD LOAD**	7/8″ ↓
FINAL CAMBER	1 3/8″ ↑

** INCLUDES FUTURE WEARING SURFACE

CONCRETE RELEASE STRENGTH

UNIT	PSI
45′ UNITS	5500
70′ UNITS	6500

GRADE 270 STRANDS

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

BILL OF MATERIAL FOR VERTICAL CONCRETE BARRIER RAIL

BAR	BARS PER PAIR OF EXTERIOR UNITS	TOTAL NO.	SIZE	TYPE	LENGTH	WEIGHT
	45′ UNIT					
✱B12	40	80	#5	STR	22′-1″	1843
✱ S4	92	184	#5	2	7′-2″	1375
✱ S5	16	32	#5	2	5′-8″	189
✱EPOXY COATED REINFORCING STEEL				LBS.		3407
CLASS AA CONCRETE				CU.YDS.		23.0
TOTAL VERTICAL CONCRETE BARRIER RAIL				LN. FT.		180.5

BILL OF MATERIAL FOR VERTICAL CONCRETE BARRIER RAIL

BAR	BARS PER PAIR OF EXTERIOR UNITS	TOTAL NO.	SIZE	TYPE	LENGTH	WEIGHT
	70′ UNIT					
✱B25	60	60	#5	STR	22′-11″	1434
✱S13	158	158	#5	2	7′-2″	1181
✱EPOXY COATED REINFORCING STEEL				LBS.		2615
CLASS AA CONCRETE				CU.YDS.		18.1
TOTAL VERTICAL CONCRETE BARRIER RAIL				LN. FT.		140.25

BILL OF MATERIAL FOR ONE 45′ CORED SLAB UNIT

				EXTERIOR UNIT		INTERIOR UNIT	
BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT	LENGTH	WEIGHT
B5	4	#4	STR	23′-3″	62	23′-3″	62
S1	8	#5	3	4′-3″	35	4′-3″	35
S2	94	#4	3	5′-4″	335	5′-4″	335
✱ S3	54	#5	1	5′-7″	314		
REINFORCING STEEL		LBS.			432		432
✱EPOXY COATED REINFORCING STEEL		LBS.			314		
7000 P.S.I. CONCRETE		CU. YDS.			6.5		6.5
0.6″ Ø L.R. STRANDS		No.			17		17

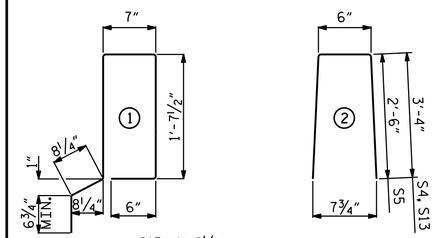
BILL OF MATERIAL FOR ONE 70′ CORED SLAB UNIT

				EXTERIOR UNIT		INTERIOR UNIT	
BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT	LENGTH	WEIGHT
B22	6	#4	STR	24′-6″	98	24′-6″	98
S10	8	#5	3	4′-9″	40	4′-9″	40
S11	144	#4	3	5′-10″	561	5′-10″	561
✱S12	79	#5	1	5′-7″	460		
S14	4	#4	3	5′-7″	15	5′-7″	15
S15	4	#5	3	7′-1″	30	7′-1″	30
REINFORCING STEEL		LBS.			744		744
✱EPOXY COATED REINFORCING STEEL		LBS.			460		
8500 P.S.I. CONCRETE		CU. YDS.			11.8		11.8
0.6″ Ø L.R. STRANDS		No.			28		28

GUTTERLINE ASPHALT THICKNESS & RAIL HEIGHT

	ASPHALT OVERLAY THICKNESS @ MID-SPAN	RAIL HEIGHT @ MID-SPAN
70′ UNITS	2 1/8″	3′-8 1/8″
45′ UNITS	1 13/16″	3′-7 13/16″

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

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 CAST WITH THE CORED SLAB SECTIONS SHALL BE GRADE 60 AND SHALL BE INCLUDED IN THE UNIT PRICE BID FOR PRESTRESSED CONCRETE CORED SLABS.

RECESSES FOR TRANSVERSE STRANDS SHALL BE GROUTED AFTER THE TENSIONING OF THE STRANDS.

THE 2 1/2″ Ø DOWEL HOLES AT FIXED ENDS OF SLAB SECTIONS SHALL BE FILLED WITH NON-SHRINK GROUT.

THE BACKER RODS SHALL CONFORM TO THE REQUIREMENTS OF TYPE M BOND BREAKER. SEE SECTION 1028 OF THE STANDARD SPECIFICATIONS.

WHEN CORED SLABS ARE CAST, AN INTERNAL HOLD-DOWN SYSTEM SHALL BE EMPLOYED TO PREVENT VOIDS FROM RISING OR MOVING SIDEWAYS. AT LEAST SIX WEEKS PRIOR TO CASTING CORED SLABS, THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER FOR REVIEW AND COMMENT, DETAILED DRAWINGS OF THE PROPOSED HOLD-DOWN SYSTEM. IN ADDITION TO STRUCTURAL DETAILS, LOCATION AND SPACING OF THE HOLD-DOWNS SHALL BE INDICATED.

THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE CORED SLAB UNIT SHALL BE DONE WHEN THE CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN THE REQUIRED STRENGTH SHOWN IN THE "CONCRETE RELEASE STRENGTH" TABLE.

ALL REINFORCING STEEL IN VERTICAL CONCRETE BARRIER RAILS SHALL BE EPOXY COATED.

PRESTRESSING STRANDS SHALL BE CUT FLUSH WITH THE CORED SLAB UNIT ENDS.

APPLY EPOXY PROTECTIVE COATING TO CORED SLAB UNIT ENDS.

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

FLAME CUTTING OF THE TRANSVERSE POST-TENSIONING STRAND IS NOT ALLOWED.

MAINTAIN A SYMMETRIC TENSION FORCE BETWEEN EACH PAIR OF TRANSVERSE POST TENSIONING STRANDS IN THE DIAPHRAGM OF SPAN B.

THE #4 S2 AND #4 S11 STIRRUPS MAY BE SHIFTED AS NECESSARY TO MAINTAIN 1″ LEAR TO THE GROUTED RECESS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

THE PERMITTED THREADED INSERTS ARE DETAILED AS AN OPTION FOR THE CONTRACTOR TO ATTACH FALSEWORK AND FORMWORK DURING CONSTRUCTION.

THE PERMITTED THREADED INSERTS IN THE EXTERIOR UNITS SHALL BE SIZED BY THE CONTRACTOR, SPACED AT 4′-0″ CENTERS AND GALVANIZED IN ACCORDANCE WITH SECTION 1076 OF THE STANDARD SPECIFICATIONS. STAINLESS STEEL THREADED INSERTS MAY BE USED AS AN ALTERNATE.

THE PERMITTED THREADED INSERTS SHALL BE GROUTED BY THE CONTRACTOR IMMEDIATELY FOLLOWING REMOVAL OF THE FALSEWORK.

THE COST OF THE PERMITTED THREADED INSERTS SHALL BE INCLUDED IN THE PRICE BID FOR THE PRECAST UNITS.

PROJECT NO. 17BP.7.R.123

ROCKINGHAM COUNTY

STATION: 22+31.00 -L-

SHEET 5 OF 5

DRAWN BY : S.G.S. DATE : 07/10/17
CHECKED BY : S.K.C. DATE : 10/23/17
DESIGN ENGINEER OF RECORD: T.L.B. DATE : 10/25/17

PLAN PREPARED BY:

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A&O PROJECT NO. 2016.063

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 14455 TED L. BARTELT

DocuSigned by: Ted L Bartelt D794597C456A4F7...

1/13/2018

REFERENCE NO. 1-10

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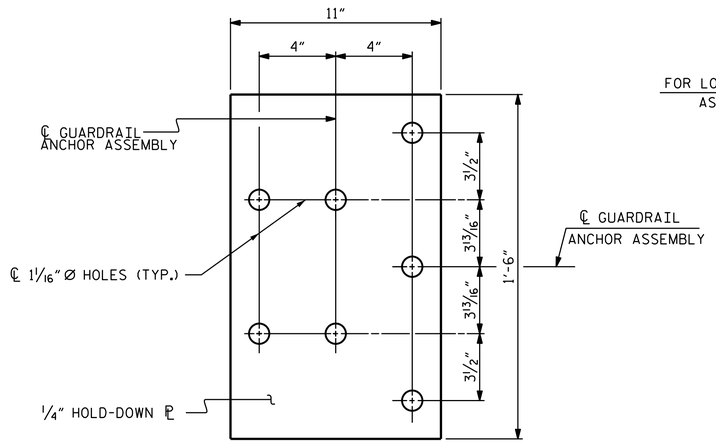
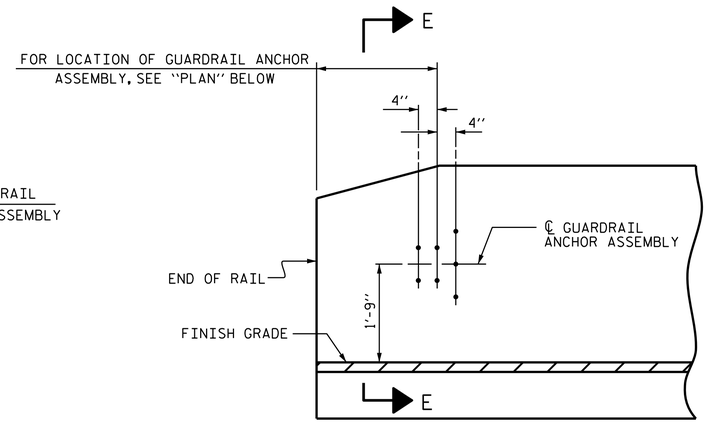
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

3′-0″ X 1′-9″ 3′-0″ X 2′-0″ PRESTRESSED CONCRETE CORED SLAB UNIT 90° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-10
1			3			TOTAL SHEETS
2			4			21



PLAN



ELEVATION

NOTES

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

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

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

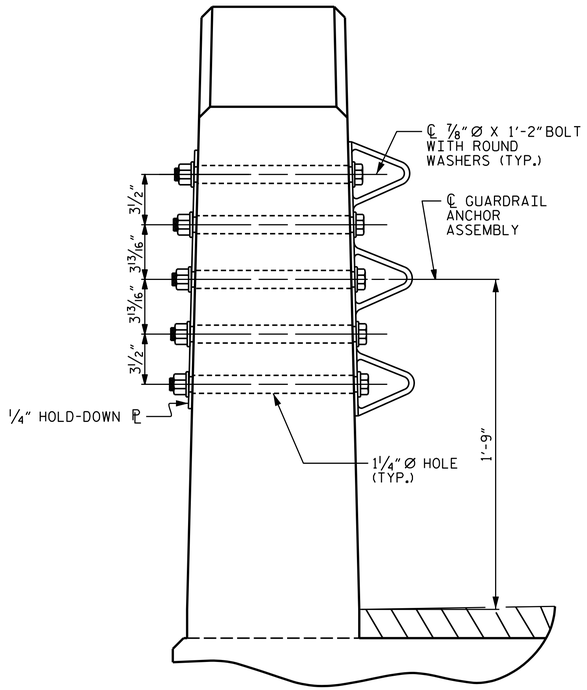
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF BARRIER RAIL. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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

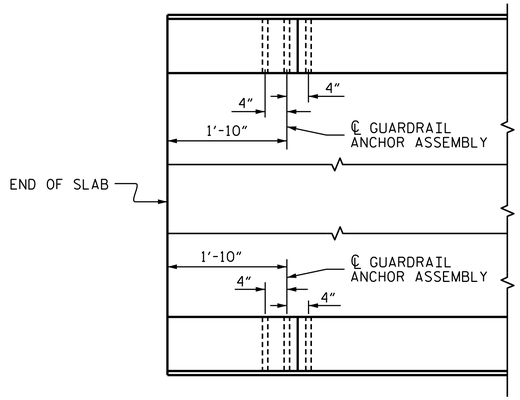
THE COST OF THE GUARDRAIL ANCHOR ASSEMBLY SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR VERTICAL CONCRETE BARRIER RAIL.

THE VERTICAL REINFORCING BARS MAY BE SHIFTED SLIGHTLY IN THE VERTICAL CONCRETE BARRIER RAIL TO CLEAR ASSEMBLY BOLTS.

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



SECTION E-E



PLAN

SKETCH SHOWING POINTS OF ATTACHMENT

✳ DENOTES GUARDRAIL ANCHOR ASSEMBLY

GUARDRAIL ANCHOR ASSEMBLY DETAILS

LOCATION OF ANCHORS FOR GUARDRAIL

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

PROJECT NO. 17BP.7.R.123

ROCKINGHAM COUNTY

STATION: 22+31.00 -L-

DRAWN BY : S.G.S. DATE : 08/15/17

CHECKED BY : S.K.C. DATE : 10/13/17

DESIGN ENGINEER OF RECORD: T.L.B. DATE : 10/25/17

PLAN PREPARED BY:

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 14455 TED L. BARTLETT

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1/13/2018

REFERENCE NO. 1-11

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
GUARDRAIL ANCHORAGE DETAILS FOR VERTICAL CONCRETE BARRIER RAIL

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-11
1			3			TOTAL SHEETS
2			4			21

STD. NO. GRA3

$$$$$$SYSTIME$$$$$
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$$$$USERNAME$$$$

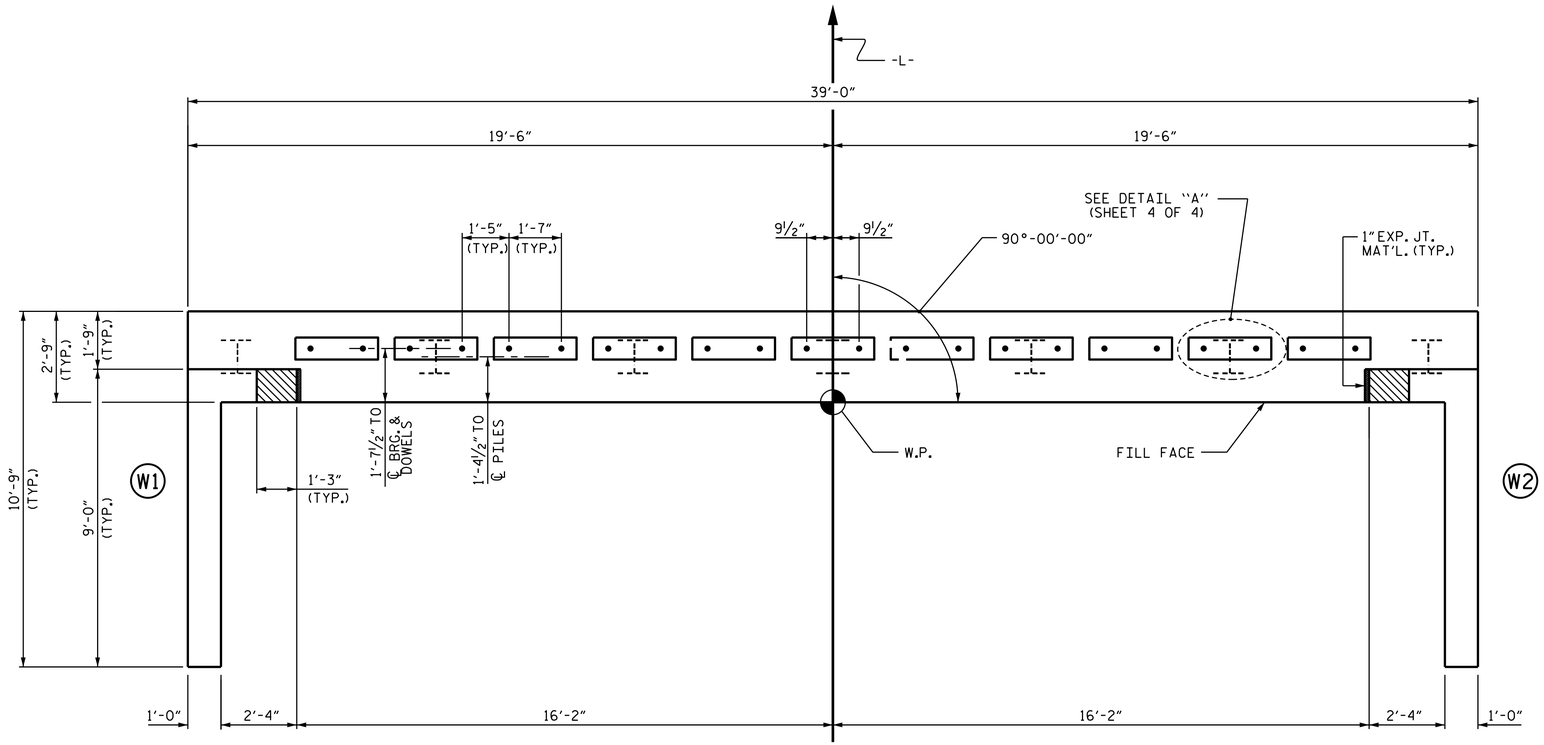
NOTES

STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR DOWELS.

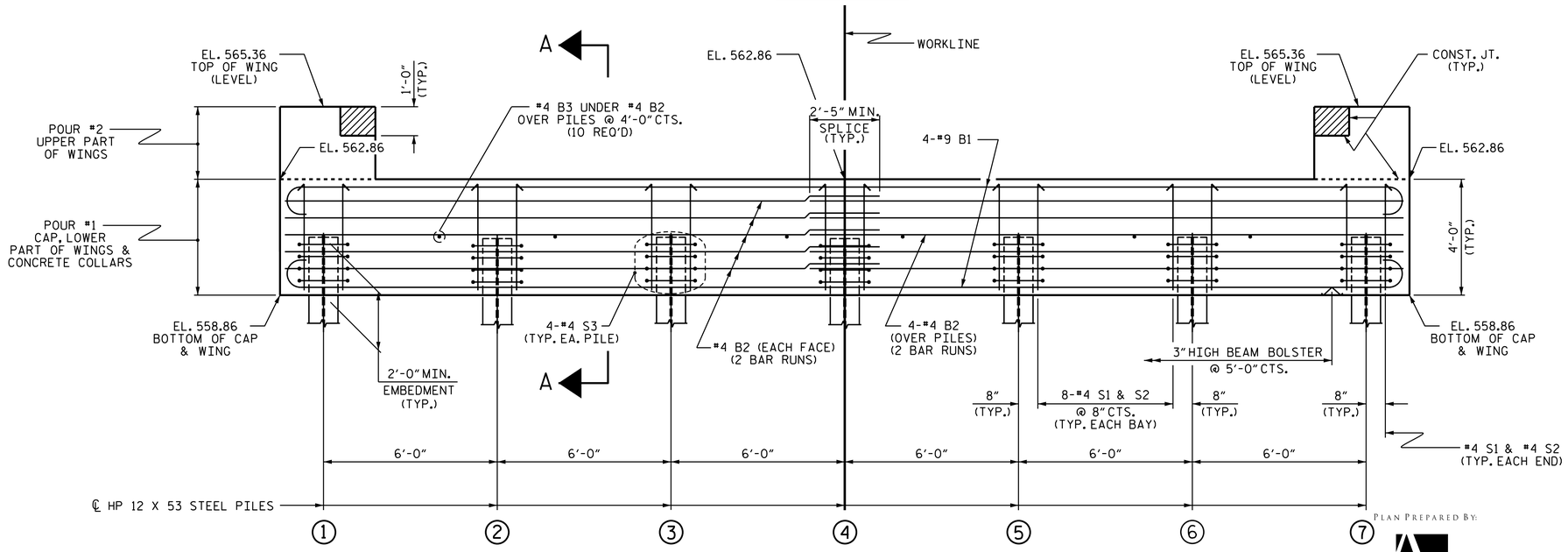
THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE VERTICAL CONCRETE BARRIER RAIL IS CAST IF SLIP FORMING IS USED.

FOR PILE SPLICE DETAILS, SEE SHEET 4 OF 4.

FOR WING DETAILS, SEE SHEET 3 OF 4.



PLAN



ELEVATION

WINGS NOT SHOWN FOR CLARITY.
FOR SECTION A-A, SEE SHEET 4 OF 4.
CONCRETE COLLARS FOR STEEL PILES NOT SHOWN IN PLAN AND ELEVATION VIEWS FOR CLARITY.
SEE "CORROSION PROTECTION FOR STEEL PILES DETAIL", SHEET 4 OF 4.

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1/13/2018

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DESIGN ENGINEER OF RECORD: T.L.B. DATE : 10/25/17

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PROJECT NO. 17BP.7.R.123
ROCKINGHAM COUNTY
STATION: 22+31.00 -L-

SHEET 1 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT No. 1

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-12
1			3			TOTAL SHEETS
2			4			21

STD. NO. EB_33_90S4

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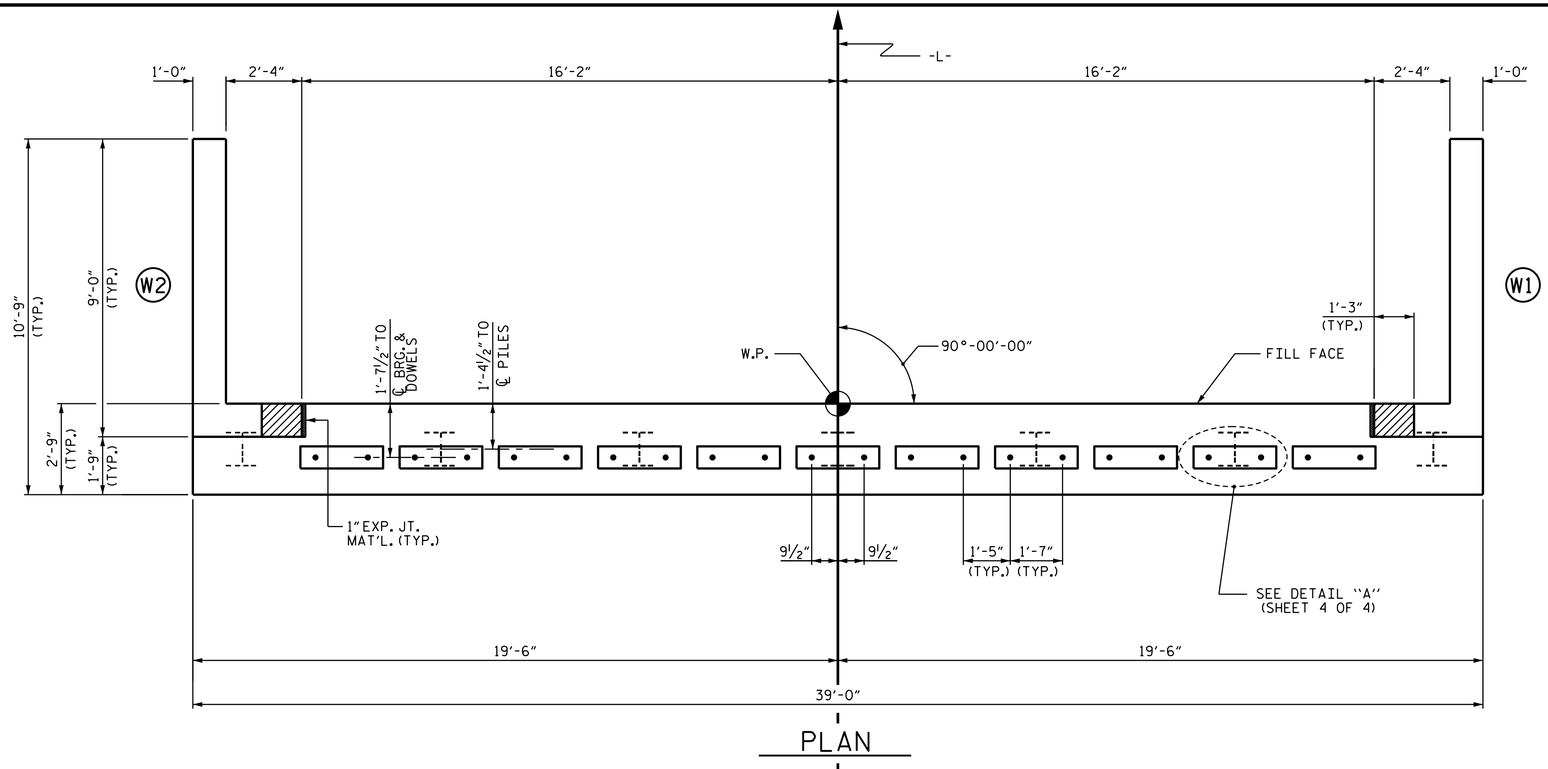
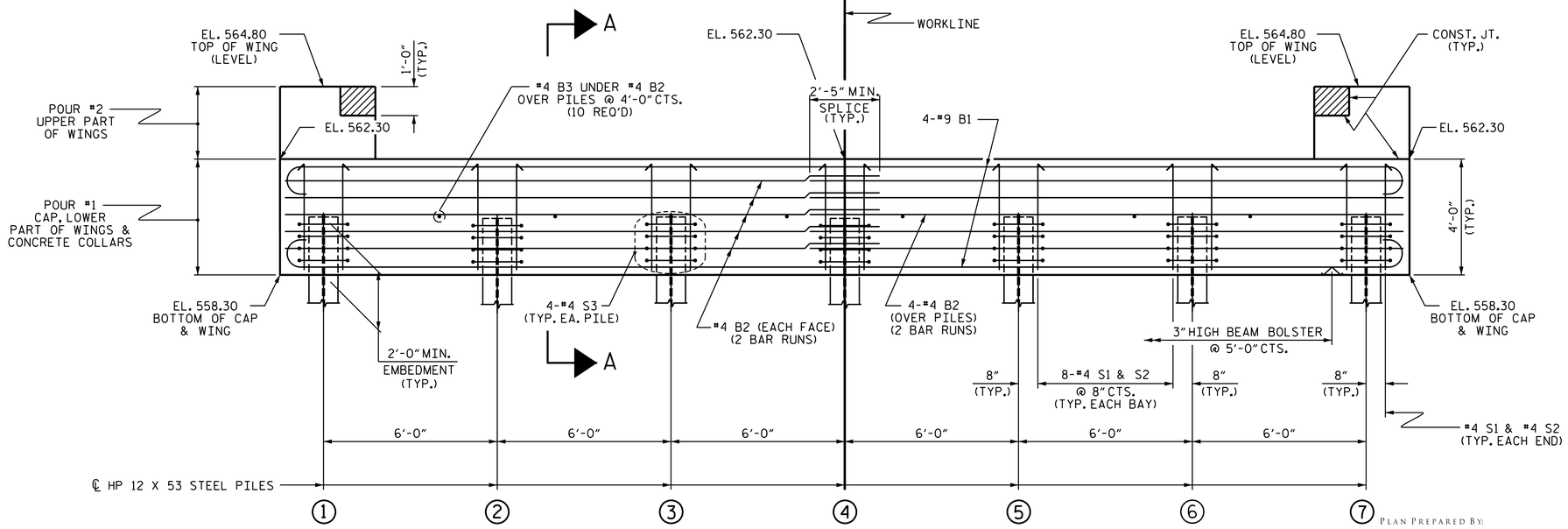


PLAN



ELEVATION

WINGS NOT SHOWN FOR CLARITY.
FOR SECTION A-A, SEE SHEET 4 OF 4.
CONCRETE COLLARS FOR STEEL PILES NOT SHOWN IN PLAN AND ELEVATION VIEWS FOR CLARITY.
SEE "CORROSION PROTECTION FOR STEEL PILES DETAIL", SHEET 4 OF 4.

NOTES

STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR DOWELS.

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

FOR PILE SPLICE DETAILS, SEE SHEET 4 OF 4.

FOR WING DETAILS, SEE SHEET 3 OF 4.

PROJECT NO. 17BP.7.R.123
ROCKINGHAM COUNTY
STATION: 22+31.00 -L-

SHEET 2 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT No. 2

DRAWN BY : S.G.S. DATE : 08/15/17
CHECKED BY : S.K.C. DATE : 10/23/17
DESIGN ENGINEER OF RECORD: T.L.B. DATE : 10/25/17

PLAN PREPARED BY:

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NORTH CAROLINA PROFESSIONAL ENGINEER TED L. BARTLETT
1/13/2018

REFERENCE NO. 1-13

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-13
1			3			TOTAL SHEETS
2			4			21

$$$$$$SYSTIME$$$$$
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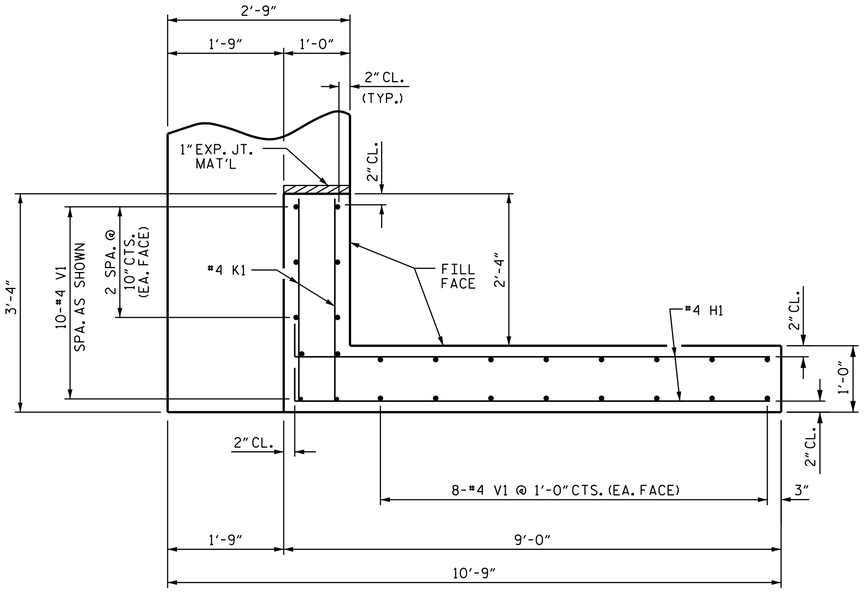
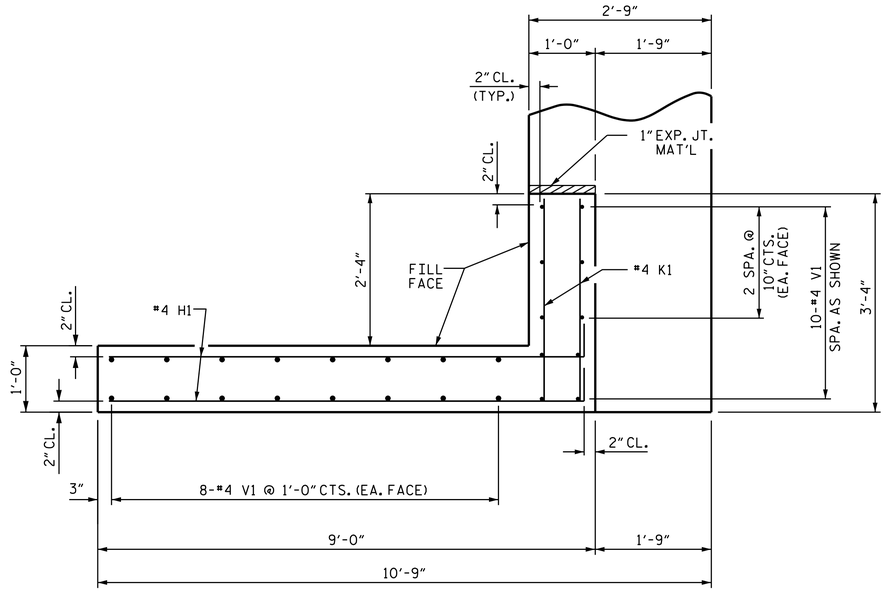
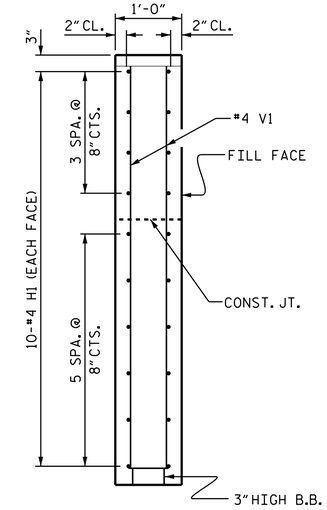
STD. NO. EB_33_90S4



PLAN OF WING (W1)

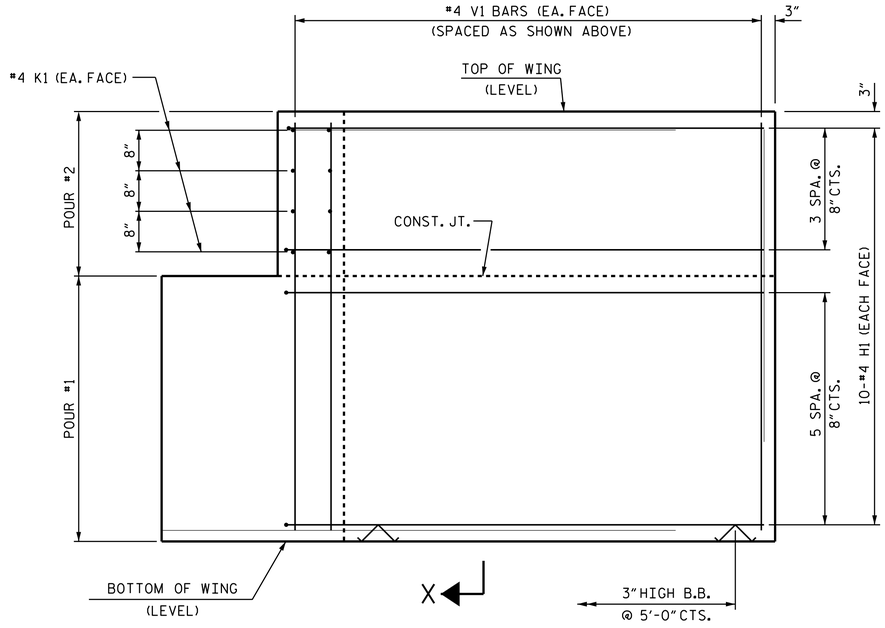


PLAN OF WING (W2)

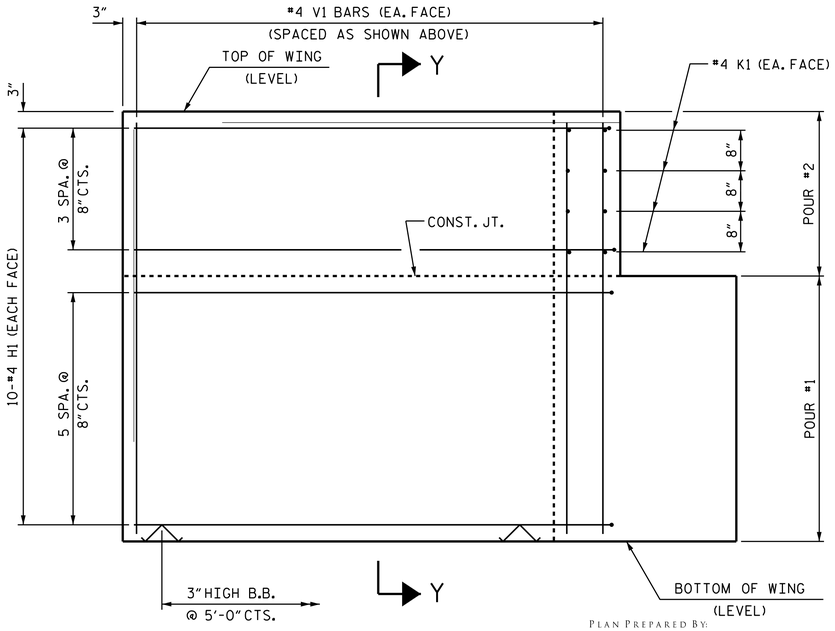


SECTION X-X

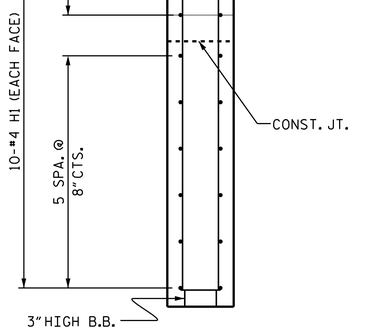
X



ELEVATION OF WING (W1)



ELEVATION OF WING (W2)



SECTION Y-Y

PROJECT NO. 17BP.7.R.123

ROCKINGHAM COUNTY

STATION: 22+31.00 -L-

SHEET 3 OF 4

PLAN PREPARED BY:

ALPHA & OMEGA GROUP
CIVIL | STRUCTURAL | WATER RESOURCES
4601 Lake Boone Trail, Ste. 3C Raleigh, NC 27607
Phone 919 981 0310 Fax 919 981 0451
Firm License No. C-1684 www.aogroup.com
A&O PROJECT NO. 2016.063

DocuSigned by:
Ted L Bartlett
D794597C456A4F7...
1/13/2018

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT
WING DETAILS

WING DETAILS

DRAWN BY : S.G.S. DATE : 08/15/17
CHECKED BY : S.K.C. DATE : 10/23/17
DESIGN ENGINEER OF RECORD: T.L.B. DATE : 10/25/17

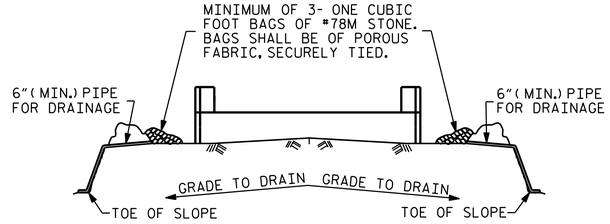
$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

REFERENCE NO. 1-14

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-14
1			3			TOTAL SHEETS
2			4			21

STD. NO. EB_33_90S4

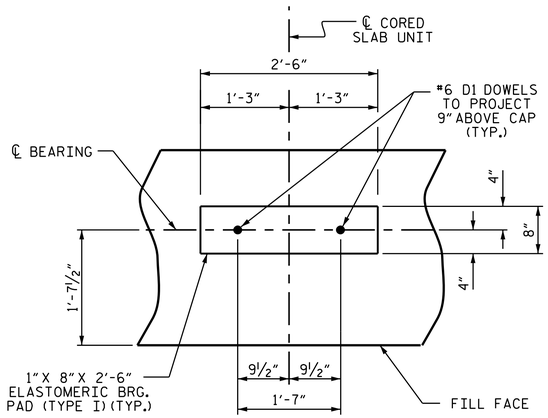


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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.

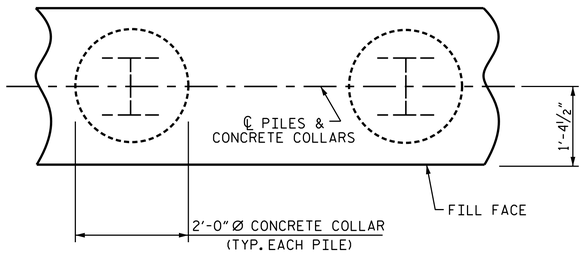
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

TEMPORARY DRAINAGE AT END BENT

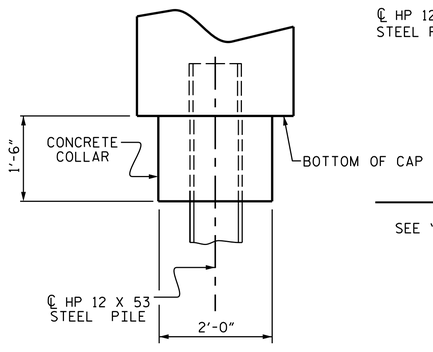


DETAIL "A"

(END BENT No. 1 SHOWN, END BENT No. 2 SIMILAR BY ROTATION)



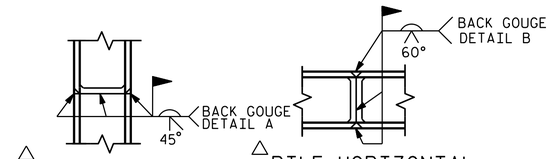
PLAN



ELEVATION

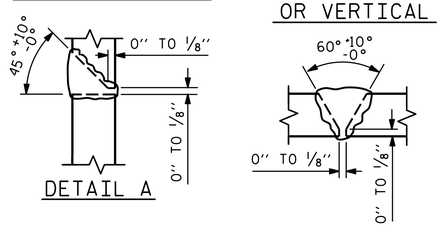
CORROSION PROTECTION FOR STEEL PILES DETAIL

(END BENT No. 1 SHOWN, END BENT No. 2 SIMILAR BY ROTATION)



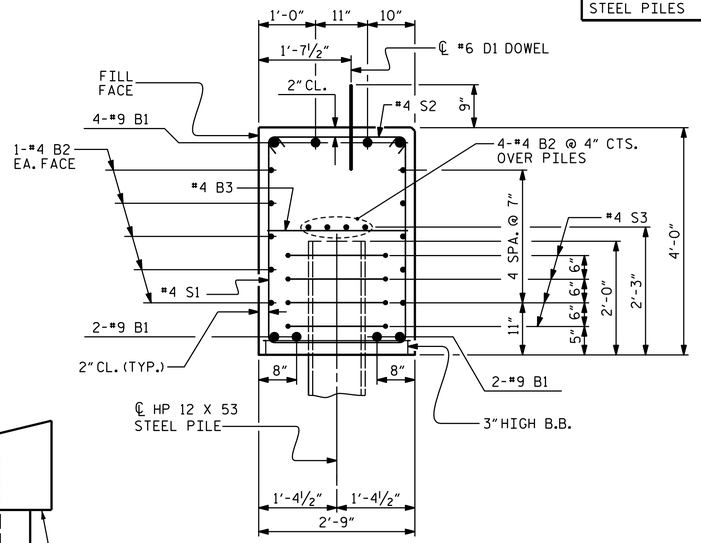
△ PILE VERTICAL

△ PILE HORIZONTAL OR VERTICAL



△ POSITION OF PILE DURING WELDING.

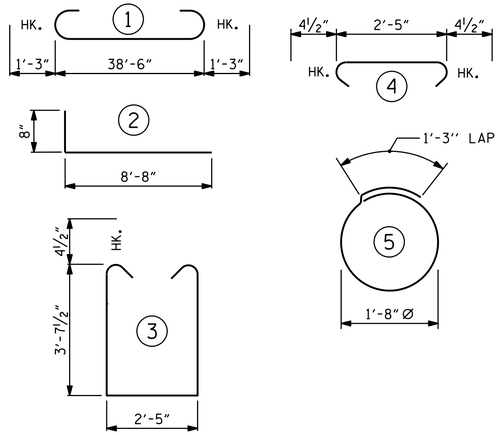
PILE SPLICE DETAILS



SECTION A-A

(CONCRETE COLLAR NOT SHOWN FOR CLARITY. SEE "CORROSION PROTECTION FOR STEEL PILES DETAIL.")

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

END BENT No. 1	END BENT No. 2
HP 12 X 53 STEEL PILES	HP 12 X 53 STEEL PILES
NO: 7 LIN. FT.= 140	NO: 7 LIN. FT.= 105
STEEL PILE POINTS 7	STEEL PILE POINTS 7
PILE DRIVING EQUIPMENT SETUP FOR HP 12 X 53 STEEL PILES 7 EACH	PILE DRIVING EQUIPMENT SETUP FOR HP 12 X 53 STEEL PILES 7 EACH

BILL OF MATERIAL

FOR ONE END BENT

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#9	1	41'-0"	1115
B2	28	#4	STR	20'-7"	385
B3	10	#4	STR	2'-5"	16
D1	22	#6	STR	1'-6"	50
H1	40	#4	2	9'-4"	249
K1	16	#4	STR	2'-11"	31
S1	50	#4	3	10'-5"	348
S2	50	#4	4	3'-2"	106
S3	28	#4	5	6'-6"	122
V1	52	#4	STR	6'-2"	214

REINFORCING STEEL (FOR ONE END BENT) 2636 LBS.

CLASS A CONCRETE BREAKDOWN (FOR ONE END BENT)

POUR #1 CAP, LOWER PART OF WINGS & COLLARS 19.5 C.Y.

POUR #2 UPPER PART OF WINGS 2.1 C.Y.

TOTAL CLASS A CONCRETE 21.6 C.Y.

PROJECT NO. 17BP.7.R.123

ROCKINGHAM COUNTY

STATION: 22+31.00 -L-

SHEET 4 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT No. 1 & 2 DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-15
1			3			TOTAL SHEETS
2			4			21

DRAWN BY : S.G.S. DATE : 08/15/17
CHECKED BY : S.K.C. DATE : 10/23/17
DESIGN ENGINEER OF RECORD: T.L.B. DATE : 10/25/17

$$$$$$SYSTIME$$$$$
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PLAN PREPARED BY:

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Phone 919 981 0310 Fax 919 981 0451
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A&O PROJECT NO. 2016.063

REFERENCE NO. 1-15

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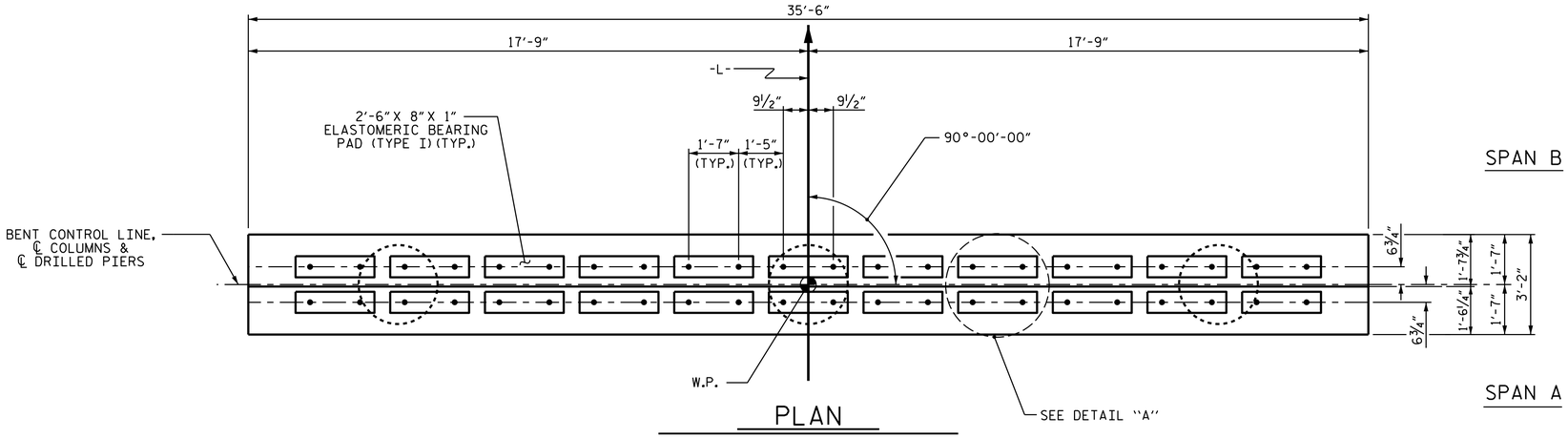
NORTH CAROLINA PROFESSIONAL SEAL 14455 ENGINEER TED L. BARTLETT

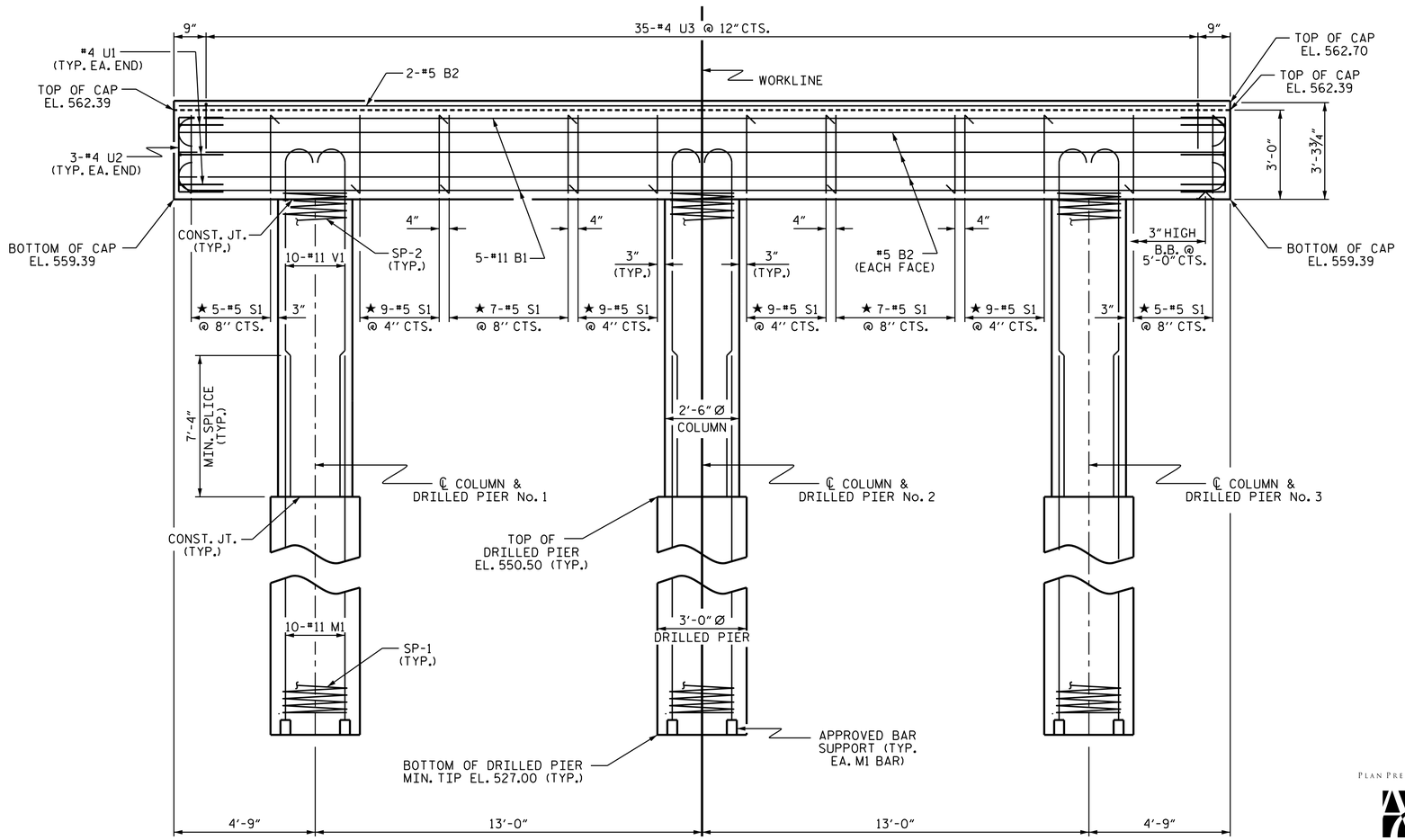
DocuSigned by: Ted L Bartlett DZ94597C456A4F7...

1/13/2018

STD. NO. EB_33_90S4



PLAN



ELEVATION

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

NOTES

STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR DOWELS.

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

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

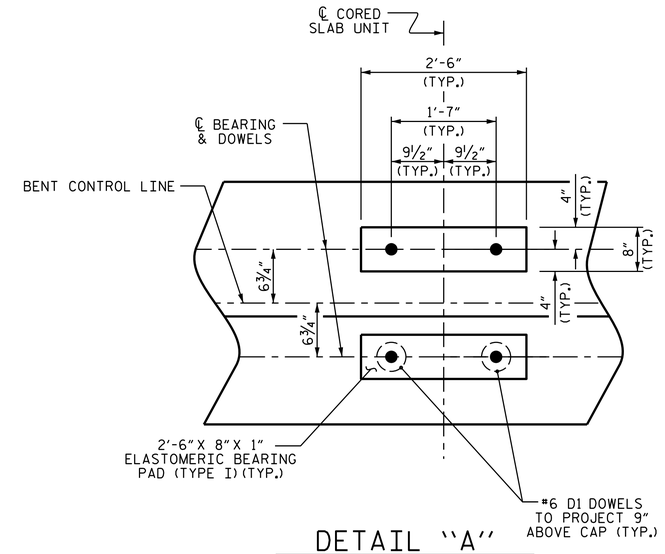
ALL STEEL IN THE DRILLED PIERS IS INCLUDED IN THE PAY ITEMS FOR "REINFORCING STEEL" AND "SPIRAL COLUMN REINFORCING STEEL."

★ INVERT ALTERNATE STIRRUPS.

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

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

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



DETAIL "A"

(DIMENSIONS ARE TYPICAL EACH BEARING)

PROJECT NO. 17BP.7.R.123

ROCKINGHAM COUNTY

STATION: 22+31.00 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
BENT No. 1

DRAWN BY : S.G.S. DATE : 08/15/17
CHECKED BY : S.K.C. DATE : 10/23/17
DESIGN ENGINEER OF RECORD: T.L.B. DATE : 10/25/17

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A&O PROJECT NO. 2016.063

DocuSigned by:
Ted L. Bartlett
D794597C456A4F7...
1/13/2018
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 14455 TED L. BARTLETT

REFERENCE NO. 1-16

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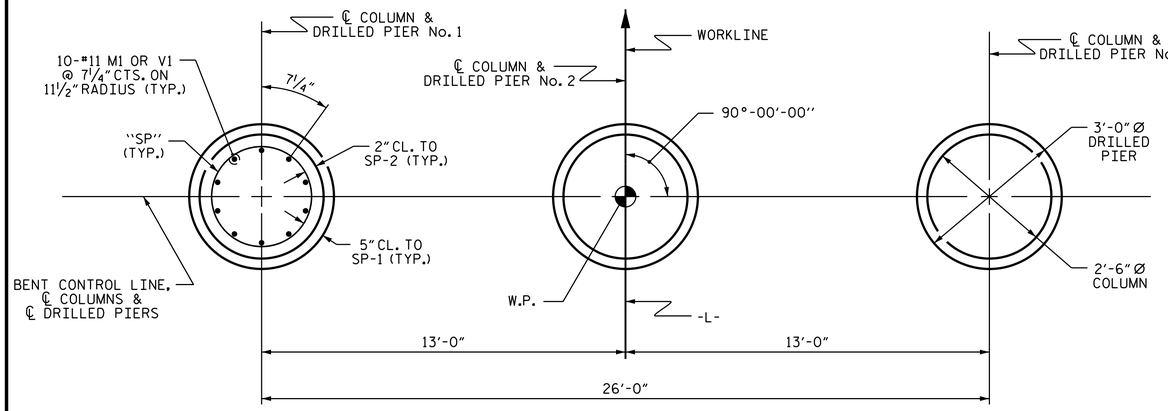
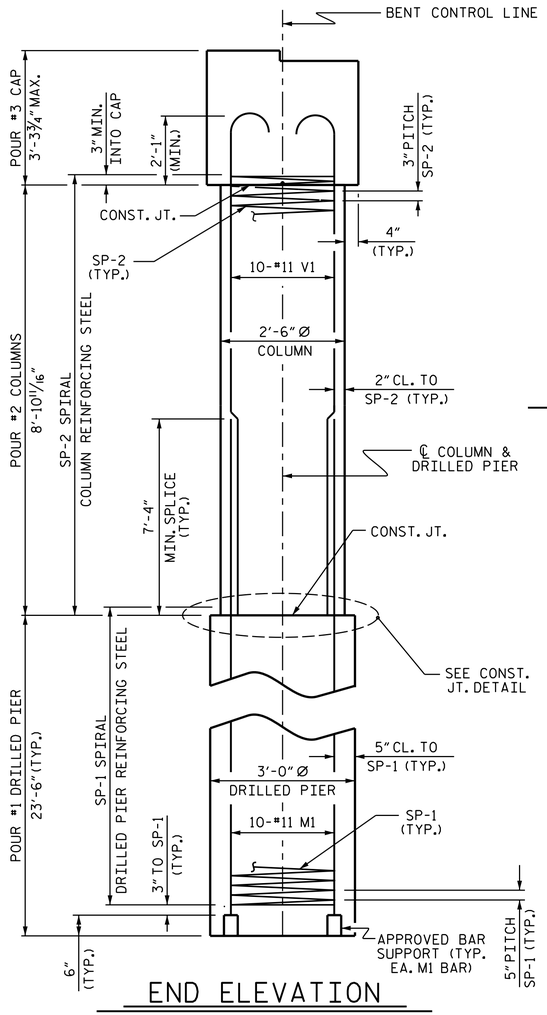
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-16
1			3			TOTAL SHEETS
2			4			21

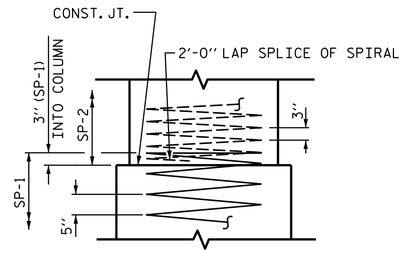
STD. NO. DP_BT_33_90S_<50'



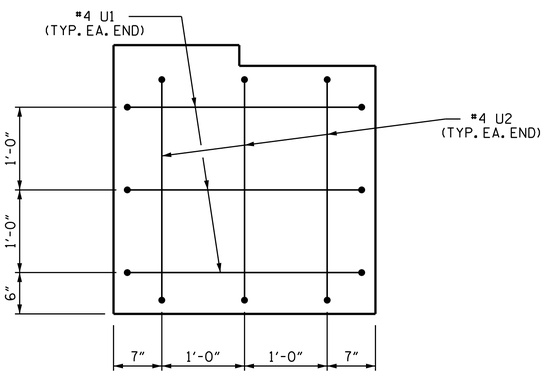
PLAN OF DRILLED PIERS & COLUMNS



END ELEVATION

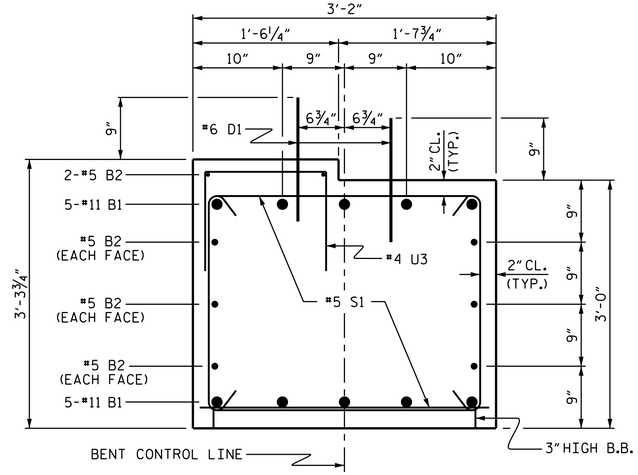


CONSTRUCTION JOINT DETAIL



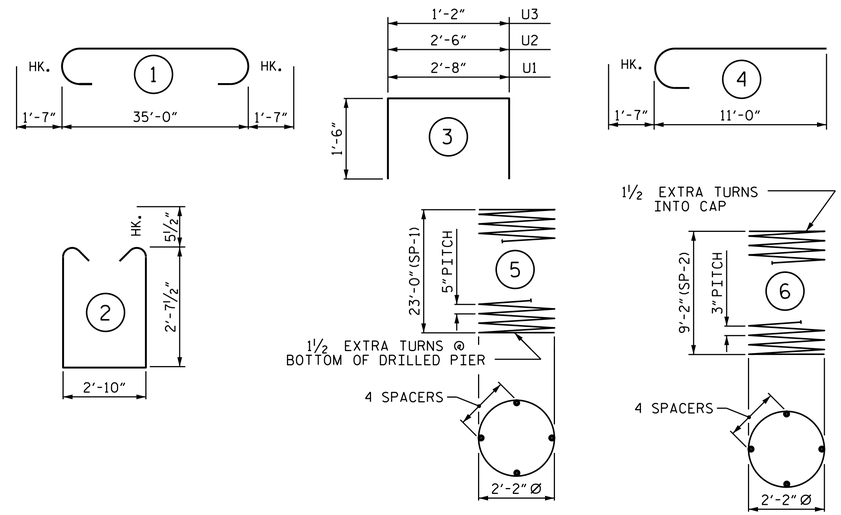
END OF CAP VIEW

(TYPICAL BOTH ENDS)



SECTION THRU CAP

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

FOR ONE BENT

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	10	#11	1	38'-2"	2028
B2	8	#5	STR	35'-2"	293
D1	44	#6	STR	1'-6"	99
M1	30	#11	STR	30'-4"	4835
S1	60	#5	2	9'-0"	563
U1	6	#4	3	5'-8"	23
U2	6	#4	3	5'-6"	22
U3	35	#4	3	4'-2"	97
V1	30	#11	4	12'-7"	2006

REINFORCING STEEL (FOR ONE BENT) 9966 LBS.

SP-1	3	*	5	376'-10"	1179
SP-2	3	**	6	254'-11"	511

SPIRAL COLUMN REINFORCING STEEL (FOR ONE BENT) 1690

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

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

CLASS A CONCRETE BREAKDOWN (FOR ONE BENT)

POUR #2 (COLUMNS)	4.9 C.Y.
POUR #3 (CAP)	13.1 C.Y.
TOTAL CLASS A CONCRETE	18.0 C.Y.

DRILLED PIERS: (FOR ONE BENT)

DRILLED PIER CONCRETE POUR #1 (DRILLED PIERS)	18.5 C.Y.
3'-0" Ø DRILLED PIER NOT IN SOIL	60 LIN. FT.
3'-0" Ø DRILLED PIER IN SOIL	10.5 LIN. FT.
PERMANENT STEEL CASING FOR 3'-0" Ø DRILLED PIER	13.5 LIN. FT.
CSL TUBES	300 LIN. FT.

PROJECT NO. 17BP.7.R.123

ROCKINGHAM COUNTY

STATION: 22+31.00 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT No. 1

DRAWN BY :	S.G.S.	DATE :	08/15/17
CHECKED BY :	S.K.C.	DATE :	10/23/17
DESIGN ENGINEER OF RECORD:	T.L.B.	DATE :	10/25/17

$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

PLAN PREPARED BY:

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A&O PROJECT NO. 2016.063

DocuSigned by: Ted L. Bartell
D794597C456A4F7...
1/13/2018

REFERENCE NO. 1-17

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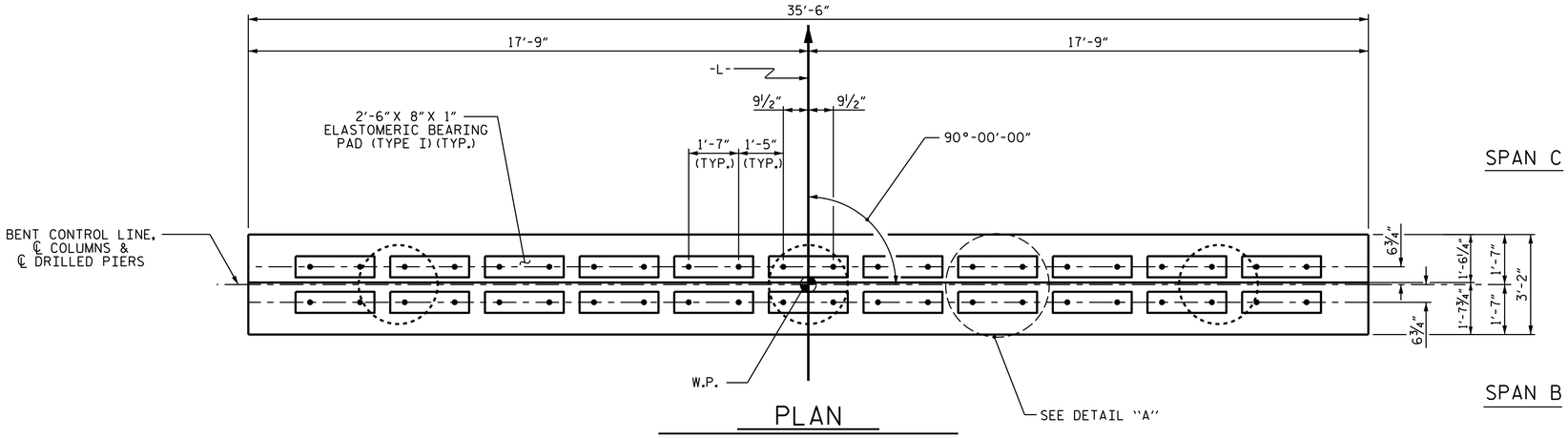
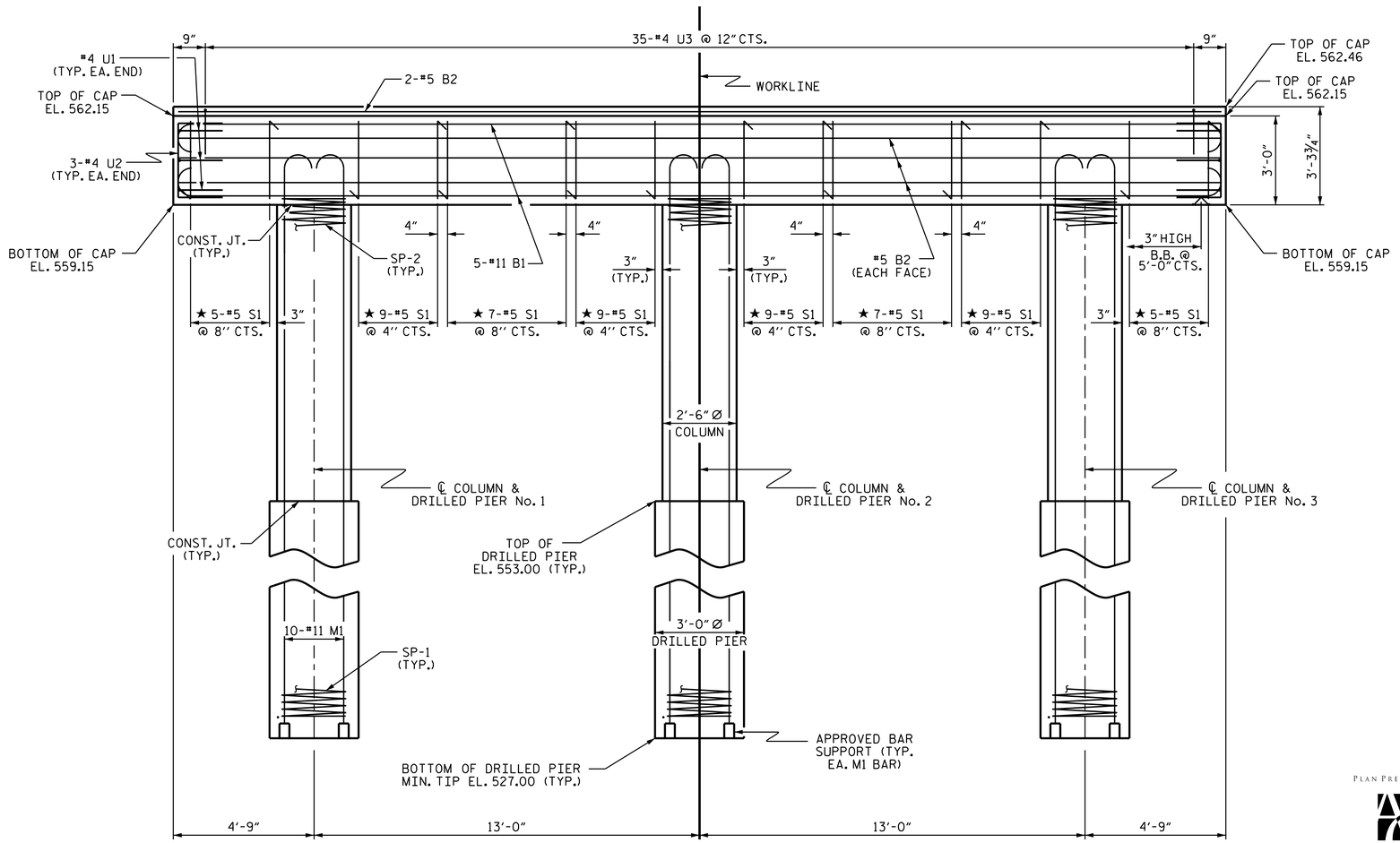
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-17
1			3			TOTAL SHEETS
2			4			21

STD. NO. DP_BT_33_90S_<50'



PLAN



ELEVATION

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

NOTES

STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR DOWELS.

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

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

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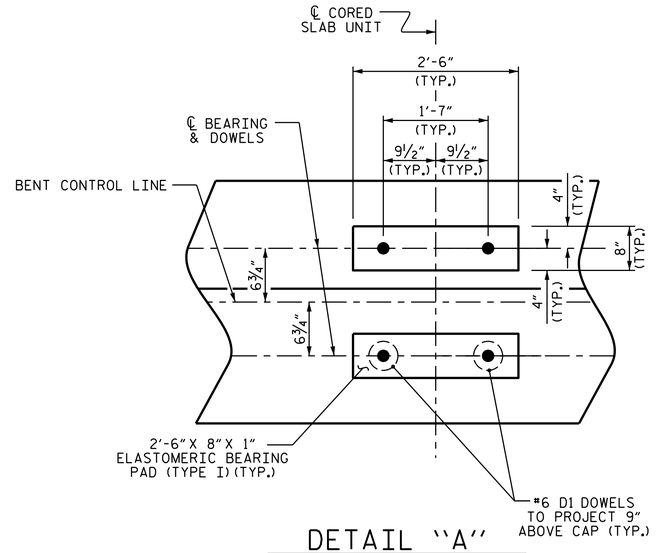

DETAIL "A"

(DIMENSIONS ARE TYPICAL EACH BEARING)

PROJECT NO. 17BP.7.R.123

ROCKINGHAM COUNTY

STATION: 22+31.00 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
BENT No. 2

DRAWN BY : S.G.S. DATE : 08/15/17
CHECKED BY : S.K.C. DATE : 10/23/17
DESIGN ENGINEER OF RECORD: T.L.B. DATE : 10/25/17

$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

PLAN PREPARED BY:

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 14455 TED L. BARTELT
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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-18
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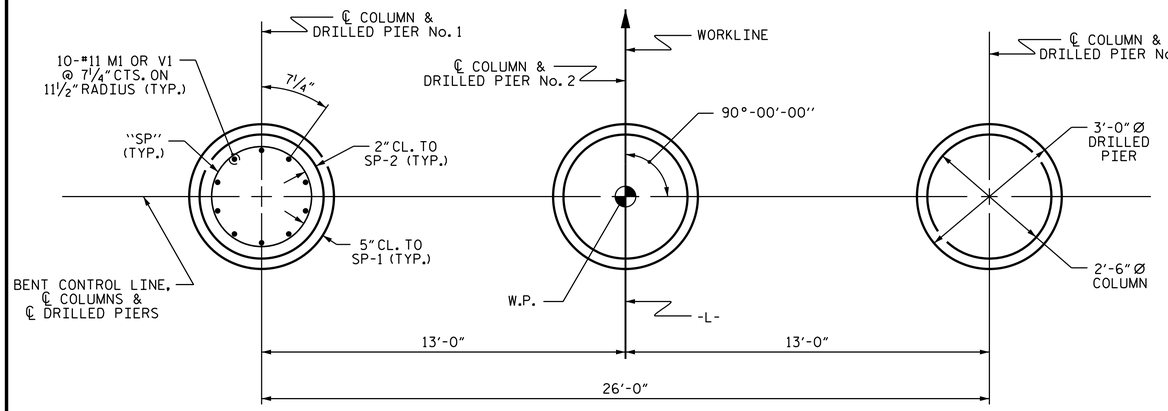
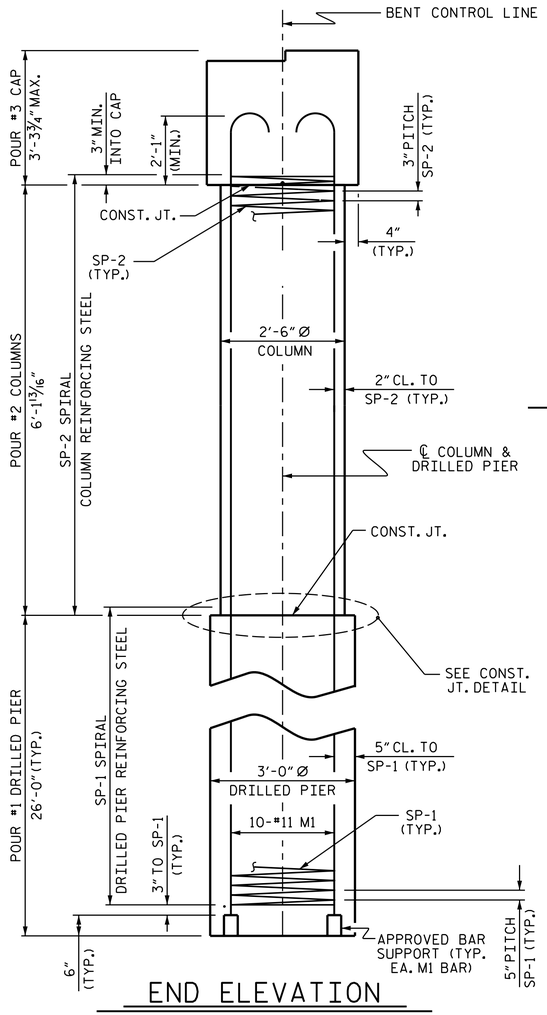
2			4			21

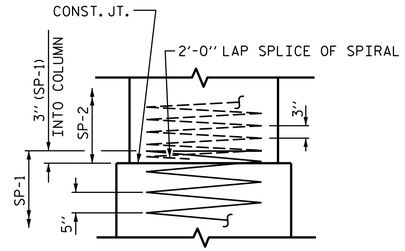
STD. NO. DP_BT_33_90S_<50'



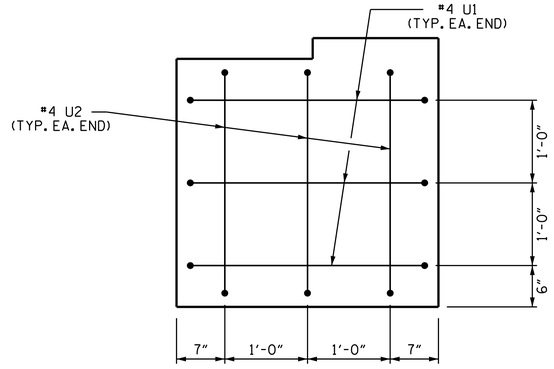
PLAN OF DRILLED PIERS & COLUMNS



END ELEVATION



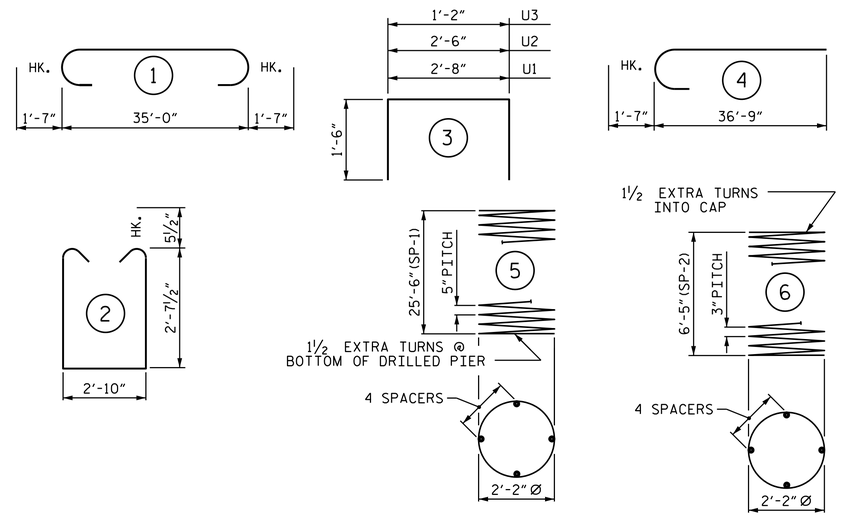
CONSTRUCTION JOINT DETAIL



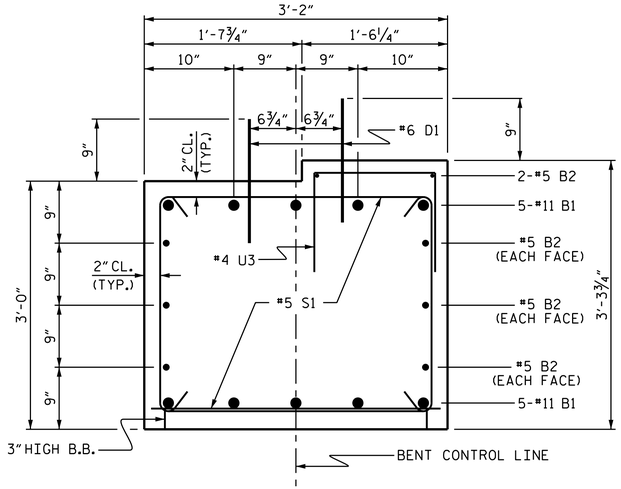
END OF CAP VIEW

(TYPICAL BOTH ENDS)

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT



SECTION THRU CAP

BILL OF MATERIAL

FOR ONE BENT

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	10	#11	1	38'-2"	2028
B2	8	#5	STR	35'-2"	293
D1	44	#6	STR	1'-6"	99
M1	30	#11	4	38'-4"	6110
S1	60	#5	2	9'-0"	563
U1	6	#4	3	5'-8"	23
U2	6	#4	3	5'-6"	22
U3	35	#4	3	4'-2"	97

REINFORCING STEEL (FOR ONE BENT) 9235 LBS.

SP-1	3	*	5	416'-8"	1304
SP-2	3	**	6	181'-8"	364

SPIRAL COLUMN REINFORCING STEEL (FOR ONE BENT) 1668

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

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

CLASS A CONCRETE BREAKDOWN (FOR ONE BENT)

POUR #2 (COLUMNS)	3.4 C.Y.
POUR #3 (CAP)	13.1 C.Y.
TOTAL CLASS A CONCRETE	16.5 C.Y.

DRILLED PIERS: (FOR ONE BENT)

DRILLED PIER CONCRETE POUR #1 (DRILLED PIERS)	20.4 C.Y.
3'-0" Ø DRILLED PIER NOT IN SOIL	57 LIN. FT.
3'-0" Ø DRILLED PIER IN SOIL	21 LIN. FT.
PERMANENT STEEL CASING FOR 3'-0" Ø DRILLED PIER	24 LIN. FT.
CSL TUBES	330 LIN. FT.

PROJECT NO. 17BP.7.R.123

ROCKINGHAM COUNTY

STATION: 22+31.00 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT No. 2

DRAWN BY : S.G.S. DATE : 08/15/17
CHECKED BY : S.K.C. DATE : 10/23/17
DESIGN ENGINEER OF RECORD: T.L.B. DATE : 10/25/17

$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

PLAN PREPARED BY:

ALPHA & OMEGA GROUP
CIVIL | STRUCTURAL | WATER RESOURCES
4601 Lake Boone Trail, Ste. 3C Raleigh, NC 27607
Phone 919 981 0310 Fax 919 981 0451
Firm License No. C-1684 www.aogroup.com
A&O PROJECT NO. 2016.063

DocuSigned by: Ted L. Bartlett D784597C456A4F7...
NORTH CAROLINA PROFESSIONAL SEAL 14455 ENGINEER TED L. BARTLETT
1/13/2018

REFERENCE NO. 1-19

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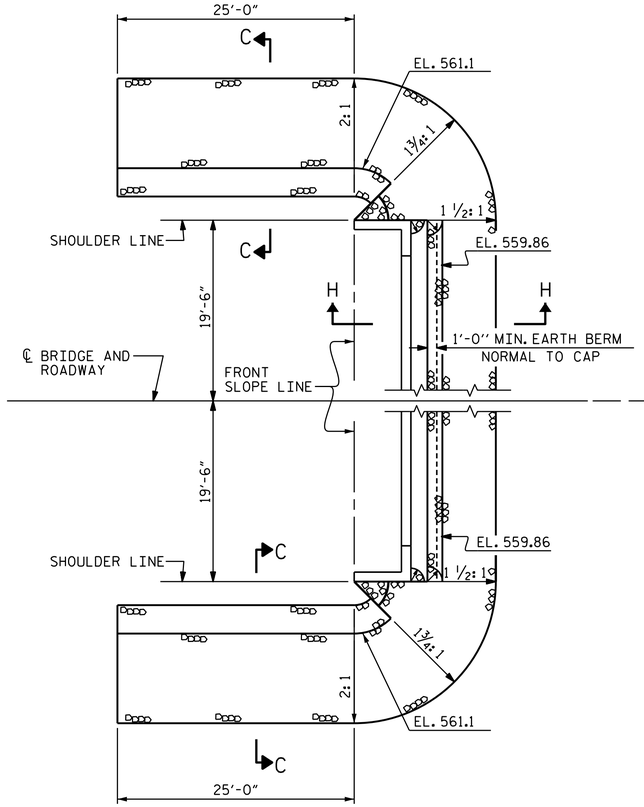
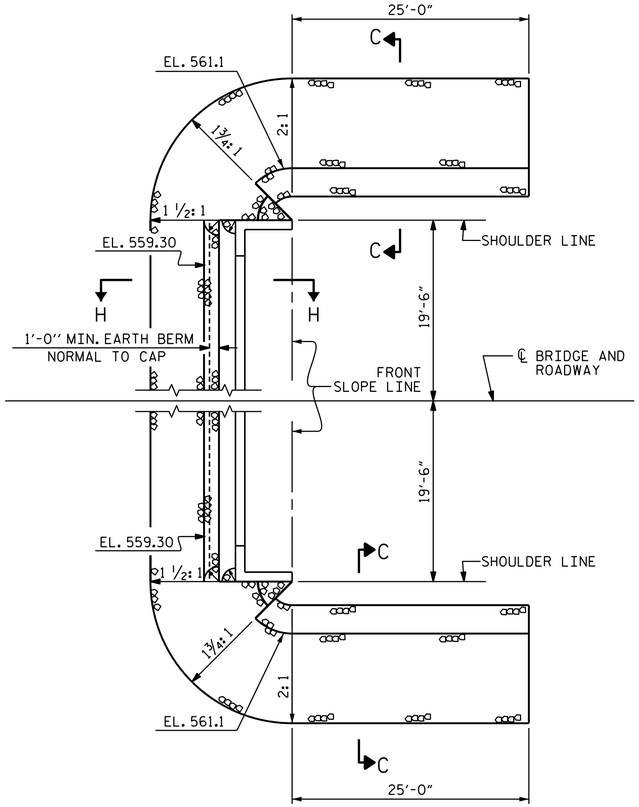
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-19
1			3			TOTAL SHEETS
2			4			21

STD. NO. DP_BT_33_90S_<50'



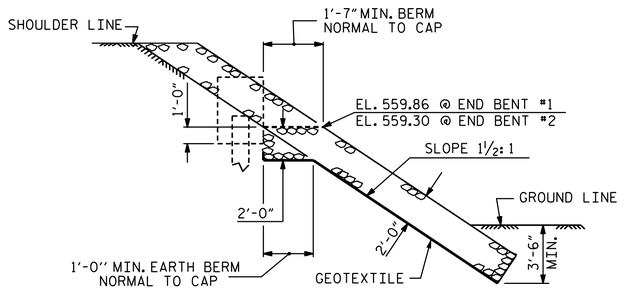
END BENT 1



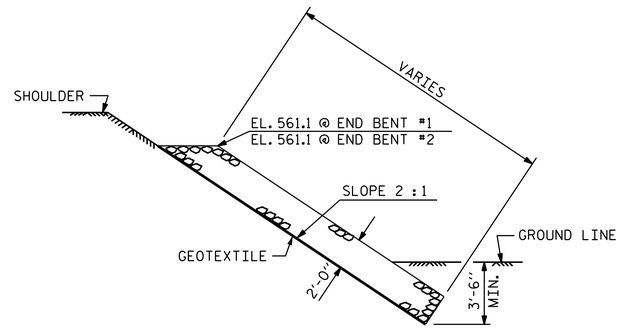
END BENT 2

PLAN

ESTIMATED QUANTITIES		
BRIDGE @ STA. 22+31.00 -L-	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE
	TONS	SQUARE YARDS
END BENT 1	240	266
END BENT 2	223	248



SECTION H-H



SECTION C-C

PROJECT NO. 17BP.7.R.123

ROCKINGHAM COUNTY

STATION: 22+31.00 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

RIP RAP DETAILS

PLAN PREPARED BY:

ALPHA & OMEGA GROUP
CIVIL | STRUCTURAL | WATER RESOURCES

4601 Lake Boone Trail, Ste. 3C Raleigh, NC 27607
Phone 919 981 0310 Fax 919 981 0451
Firm License No. C-1684 www.aogroup.com
A&O PROJECT NO. 2016.063

DocuSigned by:
Ted L Bartlett
D794597C456A4F7...
1/13/2018

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 14455 TED L. BARTLETT

REFERENCE NO. 1-20

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REVISIONS						SHEET NO.
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1			3			TOTAL SHEETS
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DRAWN BY : S.G.S. DATE : 08/15/17
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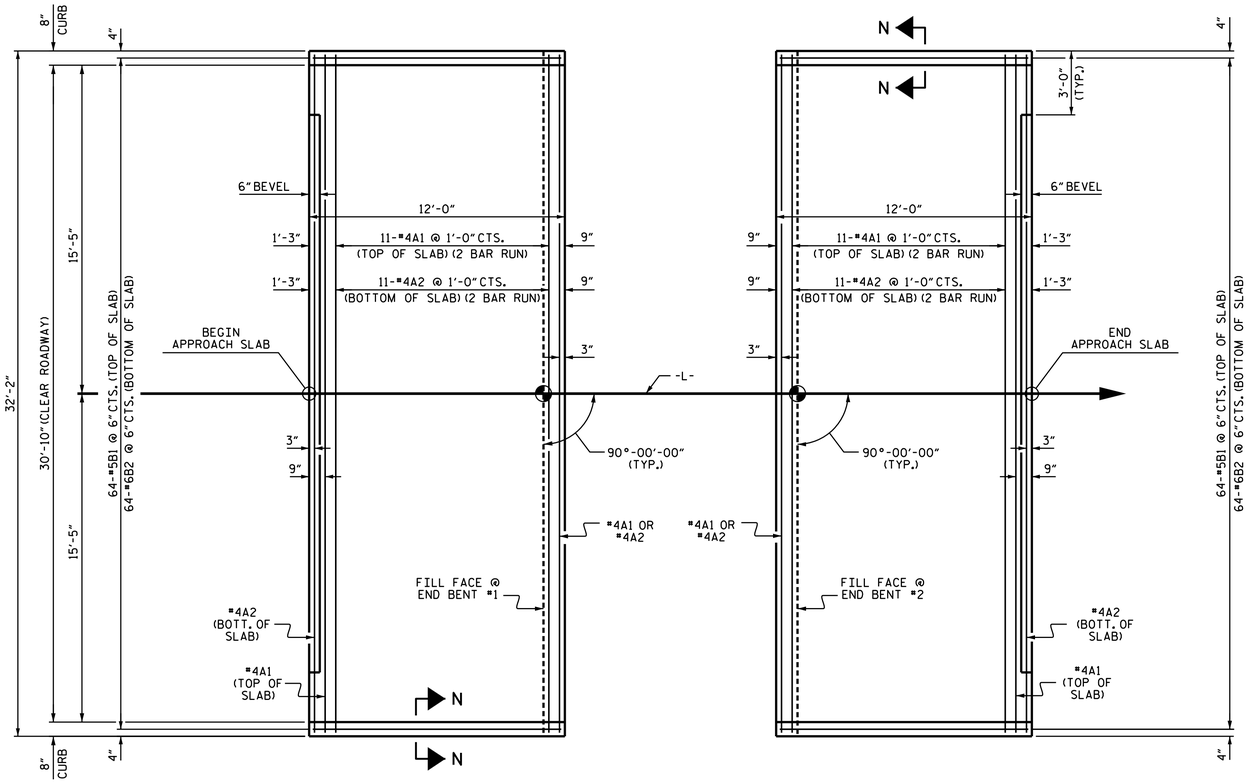
$$$$USERNAME$$$$

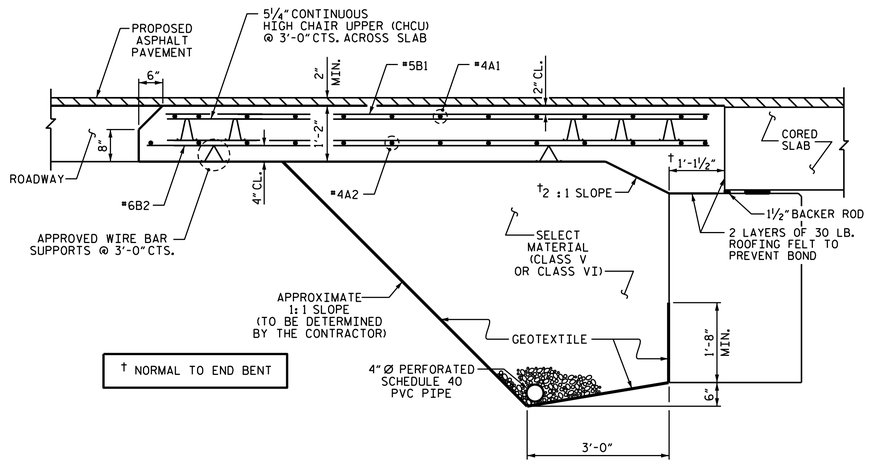
STD. NO. RR1 (Sht 2)



PLAN @ END BENT #1

PLAN @ END BENT #2

DIMENSIONS SHOWN ARE TYPICAL FOR BOTH APPROACH SLABS



SECTION THRU SLAB

(TYPE II - MODIFIED APPROACH FILL)

NOTES

FOR BRIDGE APPROACH FILL INCLUDING GEOTEXTILE, 4" Ø DRAINAGE PIPE, AND SELECT MATERIAL BACKFILL, SEE ROADWAY PLANS.

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

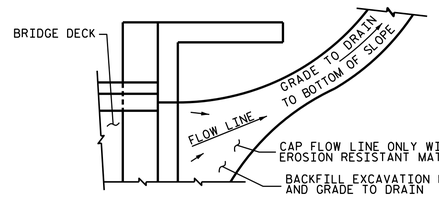
SELECT MATERIAL BACKFILL (CLASS V OR CLASS VI) SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATIONS SECTION 1016.

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

FOR THE 4" Ø DRAINAGE PIPE OUTLET(S), SEE ROADWAY STANDARD DRAWINGS.

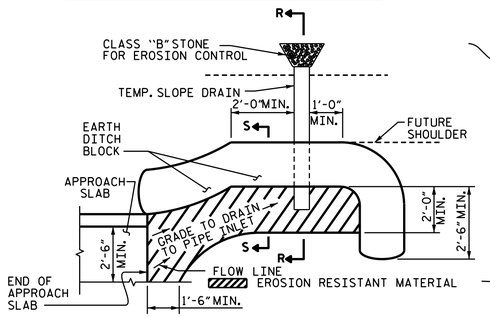
AREA BETWEEN THE WINGWALL AND APPROACH SLAB SHALL BE GRADED TO DRAIN THE WATER AWAY FROM THE FILL FACE OF THE BRIDGE AND SHALL BE PAVED. SEE ROADWAY PLANS.

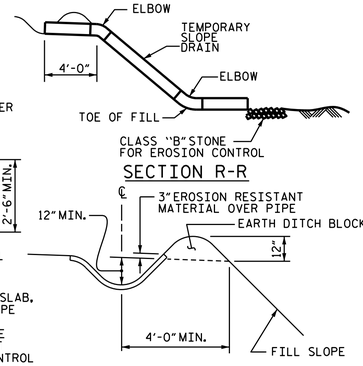
APPROACH SLAB GROOVING IS NOT REQUIRED.



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





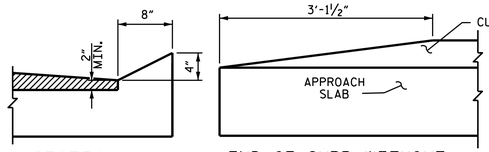
NOTE: IMMEDIATELY AFTER THE CONSTRUCTION OF THE APPROACH SLAB, THE CONTRACTOR SHALL PROVIDE TEMPORARY BERM AND SLOPE DRAIN. CONTRACTOR SHALL GRADE TO PIPE INLET AND PROVIDE EROSION RESISTANT MATERIAL AS SHOWN. THE EROSION RESISTANT MATERIAL SHALL BE EITHER 1) ASPHALT PLANT MIX, TYPE 1 OR TYPE 2, MIN.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

PLAN VIEW

SECTION S-S

TEMPORARY BERM AND SLOPE DRAIN DETAILS

(TO BE USED WHEN SHOULDER BERM GUTTER IS REQUIRED)



SECTION N-N

END OF CURB WITHOUT SHOULDER BERM GUTTER

CURB DETAILS

BILL OF MATERIAL

APPROACH SLAB AT EB #1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	26	#4	STR	16'-11"	294
A2	26	#4	STR	16'-9"	291
* B1	64	#5	STR	11'-2"	745
B2	64	#6	STR	11'-8"	1121
REINFORCING STEEL				LBS.	1412
* EPOXY COATED REINFORCING STEEL				LBS.	1039
CLASS AA CONCRETE				C. Y.	18.4

APPROACH SLAB AT EB #2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	26	#4	STR	16'-11"	294
A2	26	#4	STR	16'-9"	291
* B1	64	#5	STR	11'-2"	745
B2	64	#6	STR	11'-8"	1121
REINFORCING STEEL				LBS.	1412
* EPOXY COATED REINFORCING STEEL				LBS.	1039
CLASS AA CONCRETE				C. Y.	18.4

SPLICE LENGTHS

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

PROJECT NO. 17BP.7.R.123

ROCKINGHAM COUNTY

STATION: 22+31.00 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD BRIDGE APPROACH SLAB FOR PRESTRESSED CONCRETE CORED SLAB UNIT (SUB-REGIONAL TIER) 90° SKEW

PLAN PREPARED BY:

ALPHA & OMEGA GROUP
CIVIL | STRUCTURAL | WATER RESOURCES
4601 Lake Boone Trail, Ste. 3C Raleigh, NC 27607
Phone 919 981 0310 Fax 919 981 0451
Firm License No. C-1684 www.aogroup.com
A&O PROJECT NO. 2016.063

DocuSigned by:
Ted L. Bartlett
D794597C456A4F7...
1/13/2018
NORTH CAROLINA PROFESSIONAL SEAL 14455 ENGINEER TED L. BARTLETT

REFERENCE NO. 1-21

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1			3			TOTAL SHEETS
2			4			21

DRAWN BY : S.G.S. DATE : 08/15/17
CHECKED BY : S.K.C. DATE : 10/23/17
DESIGN ENGINEER OF RECORD: T.L.B. DATE : 10/25/17

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$$$$USERNAME$$$$

STD. NO. BAS_33_90S

STANDARD NOTES

DESIGN DATA:

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

MATERIAL AND WORKMANSHIP:

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

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

CONCRETE:

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

CONCRETE CHAMFERS:

UNLESS OTHERWISE NOTED ON THE PLANS, ALL EXPOSED CORNERS ON STRUCTURES SHALL BE CHAMFERED ¾" WITH THE FOLLOWING EXCEPTIONS: TOP CORNERS OF CURBS MAY BE ROUNDED TO 1½" RADIUS WHICH IS BUILT INTO CURB FORMS; CORNERS OF TRANSVERSE FLOOR EXPANSION JOINTS SHALL BE ROUNDED WITH A ¼" FINISHING TOOL UNLESS OTHERWISE REQUIRED ON PLANS; AND CORNERS OF EXPANSION JOINTS IN THE ROADWAY FACES AND TOPS OF CURBS AND SIDEWALKS SHALL BE ROUNDED TO A ¼" RADIUS WITH A FINISHING STONE OR TOOL UNLESS OTHERWISE REQUIRED ON PLANS.

DOWELS:

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

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

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

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

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

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

REINFORCING STEEL:

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

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

STRUCTURAL STEEL:

AT THE CONTRACTOR'S OPTION, HE MAY SUBSTITUTE ⅞" Ø SHEAR STUDS FOR THE ¾" Ø STUDS SPECIFIED ON THE PLANS. THIS SUBSTITUTION SHALL BE MADE AT THE RATE OF 3 - ⅞" Ø STUDS FOR 4 - ¾" Ø STUDS, AND STUD SPACING CHANGES SHALL BE MADE AS NECESSARY TO PROVIDE THE SAME EQUIVALENT NUMBER OF ⅞" Ø STUDS ALONG THE BEAM AS SHOWN FOR ¾" Ø STUDS BASED ON THE RATIO OF 3 - ⅞" Ø STUDS FOR 4 - ¾" Ø STUDS. STUDS OF THE LENGTH SPECIFIED ON THE PLANS MUST BE PROVIDED. THE MAXIMUM SPACING SHALL BE 2'-0".

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

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

HANDRAILS AND POSTS:

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

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

SPECIAL NOTES:

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

ENGLISH

JANUARY, 1990

STD. NO. SN

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

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