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Docusign Envelope ID: 6EB0A136-41FC-8933-808B-013E80A18744

11+50 12+00 12+50 13+00 13+50

1970 1960 1950 1940 1930

(-)4.8171% (+)0.5000%

STA. = 11+45.00 -L-
EL. = 1954.92
VC = 91'

GRADE DATA -L-

(+)0.5000% (+)9.1525%

STA. = 13+12.00 -L-
EL. = 1955.75
VC = 90'

GRADE DATA -L-

SPAN A

EL. 1958±
1955±
1952±
EL. 1954±
FIX
FILL FACE @ END BENT 1
STA. 11+99.70 -L-
G.P. EL. 1955.19
BEGIN FRONT SLOPE
STA. 11+90.15 -L-
EL. 1955.14
LOW CHORD
EL. 1951.46 (LEFT EDGE)
EL. 1953±
EL. 1946±
EL. 1939±
EXCAVATE TO
EL. 1948.0 GRADE
TO DRAIN
EXISTING
STRUCTURE
(TYP.)
REMOVE EXISTING PILE
CUT OFF 1FT BELOW
GROUND LEVEL
Q100
EL. 1949.7
25YR WSEL
EL. 1947.7
NWS
EL. 1937.8
(08/24/16)
EL. 1939±
EL. 1937±
1½:1 SLOPE
(TYP.)
CLASS II RIP
RAP (2'-0" THICK)
EXCAVATE TO
EL. 1947.5
GRADE TO DRAIN
1'-6" TO UNCLASSIFIED
STRUCTURE EXCAVATION
(TYP.)
FILL FACE @ END BENT 2
STA. 12+91.95 -L-
G.P. EL. 1955.95
EL. 1953±
FIX
BEGIN FRONT SLOPE
STA. 13+01.33 -L-
EL. 1956.26
LOW CHORD
EL. 1952.14 (LEFT EDGE)
1'-0" MIN. (TYP.)
9.625" Ø MICROPILES (TYP.)
1'-0" MIN.
EARTH BERM (TYP.)
APPROXIMATE
GROUND LINE
EL. 1959±
UNCLASSIFIED STRUCTURE
EXCAVATION

END BENT 1

SECTION ALONG -L-

END BENT 2

HYDRAULIC DATA

DESIGN DISCHARGE	= 4100 CFS
FREQUENCY OF DESIGN FLOOD	= 25 YEARS
DESIGN HIGH WATER ELEVATION	= 1947.7
DRAINAGE AREA	= 25 SQ.MI.
BASE DISCHARGE (Q100)	= 5670 CFS
BASE HIGH WATER ELEVATION	= 1949.7

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE	= 10,000 CFS
FREQUENCY OF OVERTOPPING FLOOD	= >500 YEARS
OVERTOPPING FLOOD ELEVATION	= 1955.63

OVERTOPPING WOULD OCCUR
@ STA. 11+89.00-L-

N

NO OUTLET

W.P. #1
FILL FACE @ END BENT 1
STA. 11+99.70-L-

EARTH BERM
EL. 1946.35

EXISTING
STRUCTURE

PT STA. 11+95.75 -L-
BEGIN FRONT SLOPE
STA. 11+90.15 -L-
BEGIN APPROACH SLAB
STA. 11+88.81 -L-

EXTENDED
TANGENT

3 9/16"

-DR1- POT STA. 11+16.84

6'-11 3/16"

-DR1-

ALARKA
CREEK

BRIDGE I.D.
STA. 12+45.82-L-

-L- SR 1185
(LEE COCHRAN RD.)

1'-7" MIN. RIP
RAP BERM (TYP.)

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

EARTH BERM
EL. 1946.97

W.P. #2
FILL FACE @ END BENT 2
STA. 12+91.95-L-

BEGIN FRONT SLOPE
STA. 13+01.33 -L-

END APPROACH SLAB
STA. 13+02.82-L-

TEMPORARY
SHORING
(TYP.)

STAGE II

STAGE I

TO SR 1140
(ALARKA RD.)

90°-00'-00"

90°-00'-00"
(TYP.)

EARTH BERM
EL. 1947.43

EARTH BERM
EL. 1948.05

CLASS II RIP RAP
(2'-0" THICK)(TYP.)

46'-1½" 46'-1½"

TOTAL BRIDGE LENGTH = 92'-3"
(FILL FACE @ END BENT 1 TO FILL FACE @ END BENT 2)

PLAN

(FOR CLARITY, PILES ARE NOT SHOWN IN PLAN VIEW)

HORIZONTAL CURVE DATA

PI STA. 11+50.55 -L-
Δ = 80°-21'-07.9"(LT)
D= 70°-44'-07.9"
L= 113.60'
T = 68.39'
R = 81.00'

I HEREBY CERTIFY THESE PLANS
ARE THE AS-BUILT PLANS

PROJECT NO. BP14-R014

SWAIN COUNTY

STATION: 12+45.82 -L-

SHEET 1 OF 4 REPLACES BRIDGE NO. 860152

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR BRIDGE OVER ALARKA CREEK
ON SR 1185 (LEE COCHRAN RD)
BETWEEN DEAD END & SR 1140

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

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NORTH CAROLINA PROFESSIONAL SEAL 044167 7/20/2026 ENGINEER ELIZABETH F. LAWES

DocuSigned by: Elizabeth F. Lawes
935E84223CD547C...

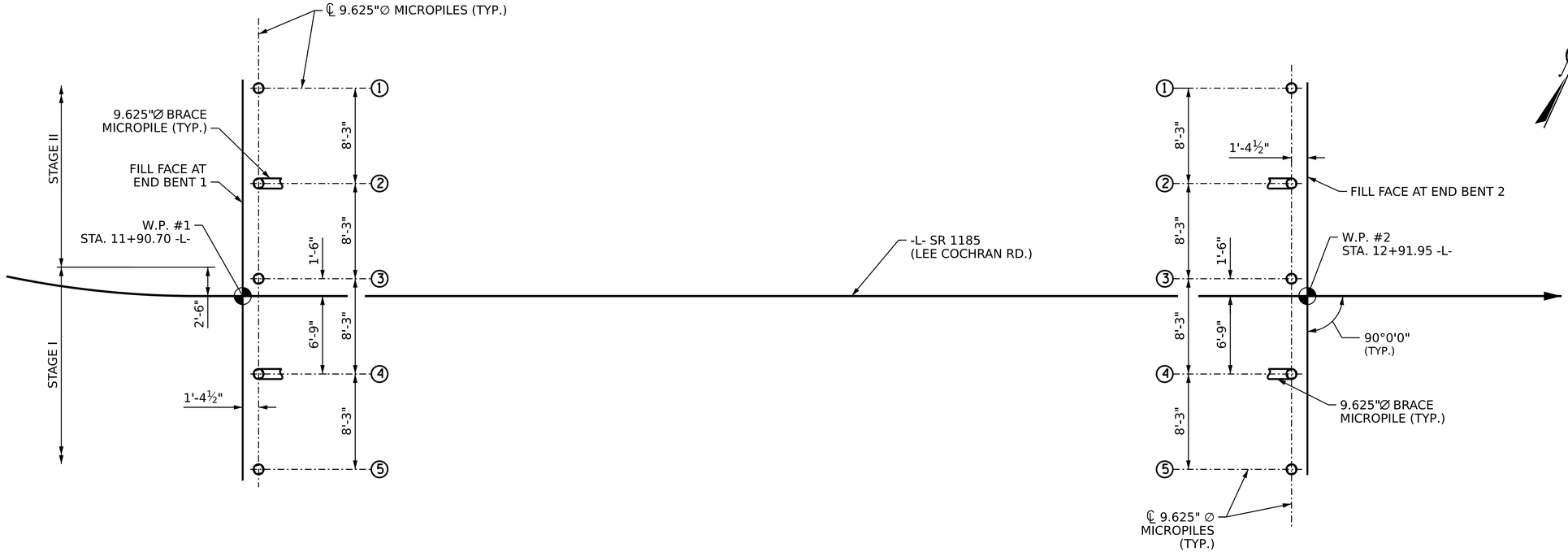
WSP USA Inc.
434 FAYETTEVILLE STREET
SUITE 1500
RALEIGH, NC 27601
TEL: 1.919.836.4040

LICENSE NO. F-0165

DESIGNED BY:	E. LAWES	DATE :	OCT 2024
DRAWN BY:	E. LAWES	DATE :	APR 2026
CHECKED BY:	P. GALLAGHER	DATE :	APR 2026
DESIGN ENGINEER OF RECORD:	E. LAWES	DATE :	APR 2026

7/17/2026
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END BENT 1

END BENT 2

FOUNDATION LAYOUT

NOTES

1. FOR MICROPILES, SEE MICROPILES PROVISION.
2. USE REINFORCING CASINGS WITH YIELD STRENGTHS OF AT LEAST 80 KSI FOR MICROPILES AT END BENT NO. 1 AND END BENT NO. 2.

PROJECT NO. BP14-R014

SWAIN COUNTY

STATION: 12+45.82 -L-

SHEET 2 OF 4

DESIGNED BY:	E. LAWES	DATE :	OCT 2024
DRAWN BY:	E. LAWES	DATE :	APR 2026
CHECKED BY:	P. GALLAGHER	DATE :	APR 2026
DESIGN ENGINEER OF RECORD:	E. LAWES	DATE :	APR 2026

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NORTH CAROLINA PROFESSIONAL SEAL 044167 7/20/2026 ENGINEER ELIZABETH F. LAWES

DocuSigned by: Elizabeth F. Lawes 935E84223CD547C...

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
FOR BRIDGE OVER ALARKA CREEK
ON SR 1185 (LEE COCHRAN RD)
BETWEEN DEAD END & SR 1140

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

7/20/2026
401.003.BP14.R014.SMU.G002.02.dgn

Docusign Envelope ID: 2B63E675-0A4E-80E8-80BD-02D07B80D9A5

SUMMARY OF MICROPILE INFORMATION/INSTALLATION

(Blank entries indicate item is not applicable to structure)

End Bent / Bent No, Pile(s) #(-#) (e.g., "Bent 1, Piles 1-5")	Factored Resistance per Pile KIPS	Minimum Reinforcing CasingTip (Tip No Higher Than) Elevation FT	Minimum Reinforcing Casing Penetration Into Rock per Pile LIN FT	Scour Critical Elevation FT	No Reinforcing Casing Joints Between Elevations FT - FT	Galvanizing Exposed Reinforcing Casing EACH
End Bent No. 1, Piles 1-5	255		10.0	1948.00		5
End Bent No. 2, Piles 1-5	255		10.0	1949.00		5

SUMMARY OF MICROPILE TESTING

(Blank entries indicate item is not applicable to structure)

End Bent / Bent No, Pile(s) #(-#) (e.g., "Bent 1, Piles 1-5")	Demonstration Micropile(s) EACH	Load Testing			
		Proof Load Test(s) EACH	Verification Load Test(s) EACH	Factored Design Load (FDL) KIPS	Permissible Total Vertical Movement at Top of Pile INCHES
End Bent No. 1, Piles 1-5		1		254	1.00
End Bent No. 2, Piles 1-5		1		254	1.00
TOTAL QTY:		2			

PROJECT NO. BP14.R014

SWAIN COUNTY

STATION: 12+45.82 -L-

NOTES:

1. The Micropile and Spread Footing Foundation Tables are based on the bridge substructure design and foundation recommendations sealed by a North Carolina Professional Engineer (Stephen C. Crockett, #048207) on 05-13-2026.

2 Exposed reinforcing casing is considered as the reinforcing casing above the geotechnically adjusted scour elevations of 1935.2 ft at End Bent No. 1 and 1939.6 ft at End Bent No. 2.

NORTH CAROLINA PROFESSIONAL SEAL 044167 ENGINEER ELIZABETH F LAWES

Signed by: Elizabeth F. Lawes 10/5/2026

SIGNATURE DATE

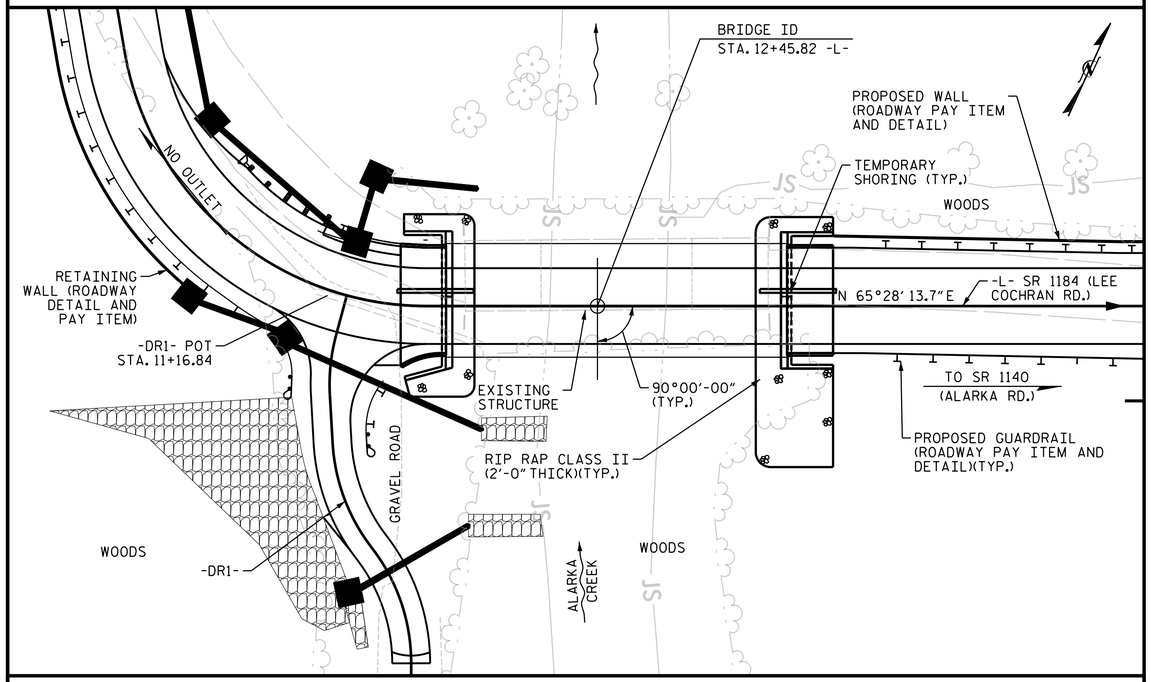
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

MICROPILE AND SPREAD FOOTING FOUNDATION TABLES

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	REVISIONS						SHEET NO. S-3
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	1			3			
	2			4			

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BM #1 STA. 14+65.00 -L-, OFFSET 145' RT., ELEV.= 1967.62', #5 REBAR 2.5' FROM EOP ON CLOER RD.



LOCATION SKETCH

FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

NOTES

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.

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

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

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

THE EXISTING STRUCTURE CONSISTING OF A THREE SPAN 20'-3", 40'-0", 20'-3" WITH A CLEAR ROADWAY WIDTH OF 19'-10½" TIMBER DECK WITH ASPHALT WEARING SURFACE ON STEEL I-BEAMS WITH TIMBER CAPS, TIMBER POSTS AND SILL END BENTS AND LOCATED AT PROPOSED STRUCTURE SHALL BE REMOVED. THE EXISTING BRIDGE IS PRESENTLY POSTED BELOW LOAD LIMIT. SHOULD THE STRUCTURAL INTEGRITY OF THE BRIDGE FURTHER DETERIORATE, THIS LOAD LIMITATION MAY BE REDUCED AS FOUND NECESSARY DURING THE LIFE OF THE PROJECT.

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

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

THE MATERIAL SHOWN IN THE CROSS-HATCHED AREA ON SHEET S-1 SHALL BE EXCAVATED FOR A DISTANCE OF 25 FT (LEFT) AND 20 FT. (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 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".

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

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.

THIS BRIDGE IS LOCATED IN SEISMIC PERFORMANCE ZONE 1.

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

TEMPORARY SHORING WILL BE REQUIRED IN THE AREA INDICATED IN THE PLAN VIEW.

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

FOR BOX BEAM POST-TENSIONING, SEE SPECIAL PROVISIONS.

FOR MICROPILES, SEE SPECIAL PROVISIONS.

TOTAL BILL OF MATERIAL

	REMOVAL OF EXISTING STRUCTURE @ STA. 12+45.82 -L-	ASBESTOS ASSESSMENT	UNCLASSIFIED STRUCTURE EXCAVATION	CLASS A CONCRETE	BRIDGE APPROACH SLABS	REINFORCING STEEL	VERTICAL CONCRETE BARRIER RAIL	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE	ELASTOMERIC BEARINGS	3'-0" X 2'-9" PRESTRESSED CONCRETE BOX BEAMS		9.625" X 0.5" Ø GALVANIZED MICROPILES	MICROPILE PROOF TEST
	LUMP SUM	LUMP SUM	LUMP SUM	CU. YDS.	LUMP SUM	LBS.	LIN. FT.	TONS	SQ. YDS.	LUMP SUM	No.	LIN. FT.	EA.	EA.
SUPERSTRUCTURE					LUMP SUM		180.0			LUMP SUM	10	900		
END BENT 1			LUMP SUM	23.0		3,432		78	87				5	1
END BENT 2			LUMP SUM	22.9		3,376		137	152				5	1
TOTAL	LUMP SUM	LUMP SUM	LUMP SUM	45.9	LUMP SUM	6,808	180.0	215	239	LUMP SUM	10	900	10	2

PROJECT NO. BP14-R014

SWAIN COUNTY

STATION: 12+45.82 -L-

SHEET 4 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR BRIDGE OVER ALARKA CREEK
ON SR 1185 (LEE COCHRAN RD)
BETWEEN DEAD END & SR 1140

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

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NORTH CAROLINA PROFESSIONAL SEAL 044167 7/20/2026 ENGINEER ELIZABETH F. LAWES

DocuSigned by: Elizabeth F. Lawes 935E84223CD547C...

WSP USA Inc.
434 FAYETTEVILLE STREET
SUITE 1500
RALEIGH, NC 27601
TEL: 1.919.836.4040

LICENSE NO. F-0165

DESIGNED BY:	E. LAWES	DATE :	OCT 2024
DRAWN BY:	E. LAWES	DATE :	APR 2026
CHECKED BY:	P. GALLAGHER	DATE :	APR 2026
DESIGN ENGINEER OF RECORD:	E. LAWES	DATE :	APR 2026

7/20/2026
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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 x RF	STRENGTH I LIMIT STATE										SERVICE III LIMIT STATE						COMMENT NUMBER
								MOMENT					SHEAR					MOMENT						
							LIVE-LOAD FACTORS (γ LL)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	LIVE-LOAD FACTORS (γ LL)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD		HL-93 (INVENTORY)	N/A	⟨1⟩	1.109	--	1.75	0.272	1.47	90'	EL	44.250	0.493	1.26	90'	EL	4.425	0.80	0.272	1.11	90'	EL	44.250	
		HL-93 (OPERATING)	N/A		1.633	--	1.35	0.272	1.90	90'	EL	44.250	0.493	1.63	90'	EL	4.425	N/A	--	--	--	--	--	
		HS-20 (INVENTORY)	36.000	⟨2⟩	1.507	54.255	1.75	0.272	1.99	90'	EL	44.250	0.493	1.65	90'	EL	4.425	0.80	0.272	1.51	90'	EL	44.250	
		HS-20 (OPERATING)	36.000		2.140	77.039	1.35	0.272	2.59	90'	EL	44.250	0.493	2.14	90'	EL	4.425	N/A	--	--	--	--	--	
LEGAL LOAD	SINGLE VEHICLE (SV)	SNSH	13.500		3.519	47.501	1.4	0.272	5.82	90'	EL	44.250	0.493	5.05	90'	EL	4.425	0.80	0.272	3.52	90'	EL	44.250	
		SNGARBS2	20.000		2.572	51.43	1.4	0.272	4.25	90'	EL	44.250	0.493	3.55	90'	EL	4.425	0.80	0.272	2.57	90'	EL	44.250	
		SNAGRIS2	22.000		2.415	53.122	1.4	0.272	4.00	90'	EL	44.250	0.493	3.27	90'	EL	4.425	0.80	0.272	2.41	90'	EL	44.250	
		SNCOTTS3	27.250		1.749	47.674	1.4	0.272	2.89	90'	EL	44.250	0.493	2.52	90'	EL	4.425	0.80	0.272	1.75	90'	EL	44.250	
		SNAGGRS4	34.925		1.443	50.381	1.4	0.272	2.39	90'	EL	44.250	0.493	2.06	90'	EL	4.425	0.80	0.272	1.44	90'	EL	44.250	
		SNS5A	35.550		1.412	50.195	1.4	0.272	2.34	90'	EL	44.250	0.493	2.07	90'	EL	4.425	0.80	0.272	1.41	90'	EL	44.250	
		SNS6A	39.950		1.287	51.435	1.4	0.272	2.13	90'	EL	44.250	0.493	1.88	90'	EL	4.425	0.80	0.272	1.29	90'	EL	44.250	
		SNS7B	42.000		1.226	51.483	1.4	0.272	2.03	90'	EL	44.250	0.493	1.83	90'	EL	4.425	0.80	0.272	1.23	90'	EL	44.250	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.568	51.733	1.4	0.272	2.59	90'	EL	44.250	0.493	2.24	90'	EL	4.425	0.80	0.272	1.57	90'	EL	44.250	
		TNT4A	33.075		1.572	52.007	1.4	0.272	2.60	90'	EL	44.250	0.493	2.20	90'	EL	4.425	0.80	0.272	1.57	90'	EL	44.250	
		TNT6A	41.600		1.278	53.170	1.4	0.272	2.11	90'	EL	44.250	0.493	1.92	90'	EL	4.425	0.80	0.272	1.28	90'	EL	44.250	
		TNT7A	42.000		1.281	53.782	1.4	0.272	2.12	90'	EL	44.250	0.493	1.89	90'	EL	4.425	0.80	0.272	1.28	90'	EL	44.250	
		TNT7B	42.000		1.315	55.229	1.4	0.272	2.18	90'	EL	44.250	0.493	1.79	90'	EL	4.425	0.80	0.272	1.31	90'	EL	44.250	
		TNAGRIT4	43.000		1.258	54.101	1.4	0.272	2.08	90'	EL	44.250	0.493	1.74	90'	EL	4.425	0.80	0.272	1.26	90'	EL	44.250	
		TNAGT5A	45.000		1.190	53.537	1.4	0.272	1.97	90'	EL	44.250	0.493	1.71	90'	EL	4.425	0.80	0.272	1.19	90'	EL	44.250	
		TNAGT5B	45.000	⟨3⟩	1.178	53.027	1.4	0.272	1.95	90'	EL	44.250	0.493	1.66	90'	EL	4.425	0.80	0.272	1.18	90'	EL	44.250	
EMERGENCY VEHICLE (EV)		EV2	28.750		2.296	66.005	1.3	0.272	3.25	90'	EL	44.250	0.493	2.49	90'	EL	4.425	0.80	0.272	2.30	90'	EL	44.250	
		EV3	43.000	⟨4⟩	1.510	64.924	1.3	0.272	2.14	90'	EL	44.250	0.493	1.67	90'	EL	4.425	0.80	0.272	1.51	90'	EL	44.250	

LOAD FACTORS:

DESIGN LOAD RATING FACTORS	LIMIT STATE	γDC	γDW
	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 * *

⟨4⟩ EMERGENCY VEHICLE LOAD RATING **

* * SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

I - INTERIOR GIRDER

EL - EXTERIOR LEFT GIRDER

ER - EXTERIOR RIGHT GIRDER

⟨1⟩
⟨2⟩
⟨3⟩
⟨4⟩

LRFR SUMMARY

FOR SPAN A

PROJECT NO. **BP14-R014**

SWAIN COUNTY

STATION: **12+45.82 -L-**

DESIGNED BY: E. LAWES DATE : SEPT 2024
DRAWN BY: M. HOBBS DATE : SEPT 2024
CHECKED BY: P. GALLAGHER DATE : APR 2026
DESIGN ENGINEER OF RECORD: E. LAWES DATE : APR 2026

DRAWN BY : TMG II/II
CHECKED BY : AAC II/II

REV. 06/23 AKP/AAI

7/20/2026
SSSSSSSSSSSSSSSSSSSSSSSDGNSSSSSSSSSSSSSSSSSSSSSSS
USEL722989

WSP USA Inc.
434 FAYETTEVILLE STREET
SUITE 1500
RALEIGH, NC 27601
TEL: 1.919.836.4040

LICENSE NO. F-0165

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NORTH CAROLINA PROFESSIONAL SEAL 044167 7/20/2026 ENGINEER ELIZABETH F. LAWES

DocuSigned by: Elizabeth F. Lawes 935E64223CD547C...

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

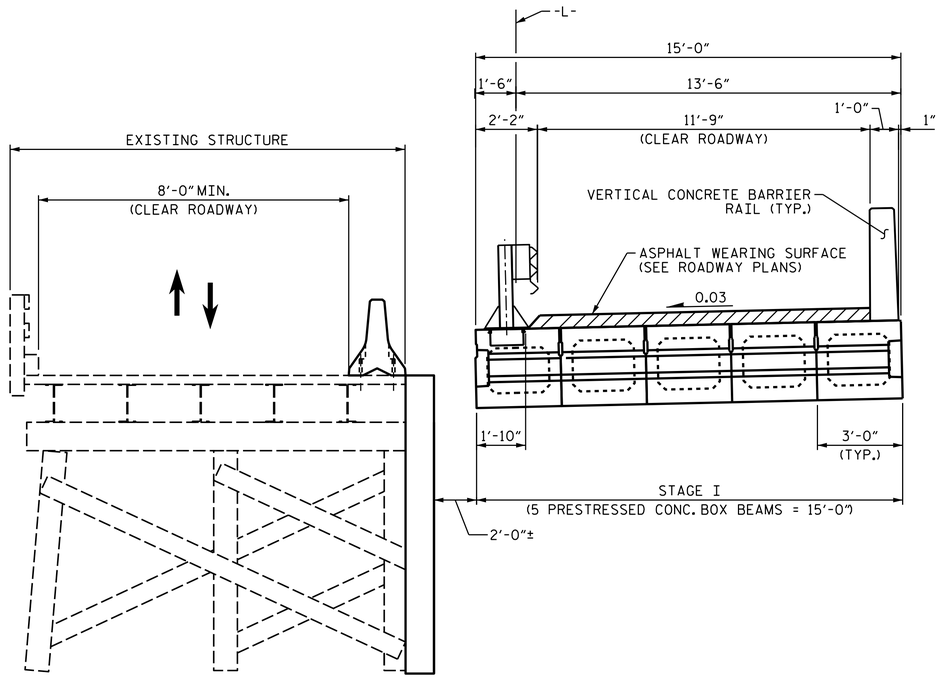
LRFR SUMMARY FOR 90' BOX BEAM UNIT 90° SKEW

(NON-INTERSTATE TRAFFIC)

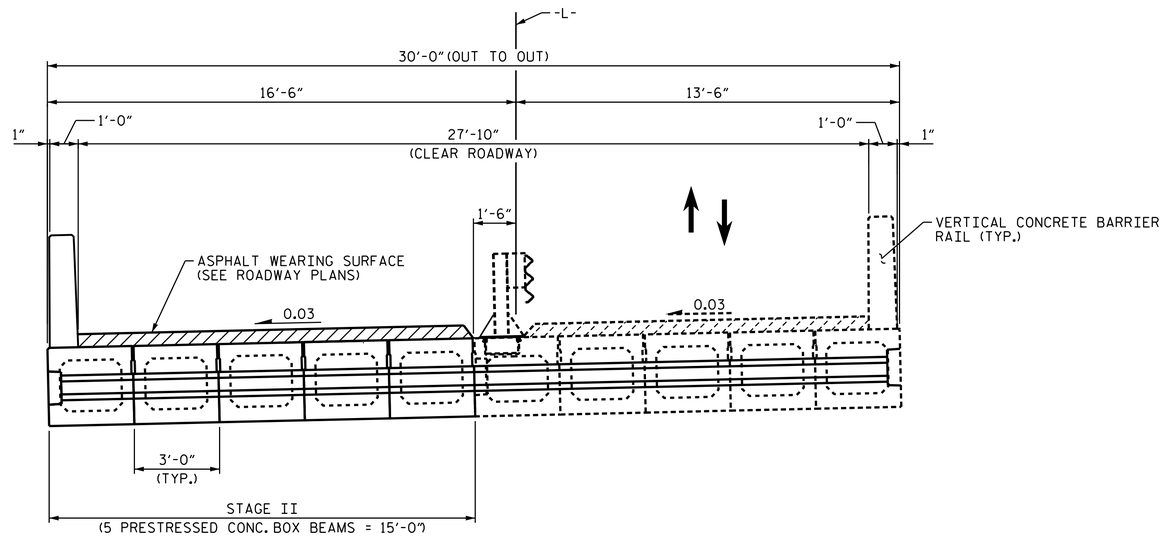
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-5
1			3			TOTAL SHEETS
2			4			25

STD. NO. 33LRFR1_90S_90L

Docusign Envelope ID: 6EB0A136-41FC-8933-808B-013E80A18744



STAGE I



STAGE II

STAGING SEQUENCE

NOTES

FOR TRAFFIC PHASING, SEE TRAFFIC CONTROL PLANS.

THE TEMPORARY GUARDRAIL ANCHORED TO DECK IS A TRAFFIC CONTROL PAY ITEM.

SEE TRAFFIC CONTROL PLANS FOR LOCATION AND PAY LIMITS OF THE TEMPORARY GUARDRAIL.

PROJECT NO. BP14-R014

SWAIN COUNTY

STATION: 12+45.82 -L-

DESIGNED BY:	E. LAWES	DATE :	OCT 2024
DRAWN BY:	E. LAWES	DATE :	APR 2026
CHECKED BY:	P. GALLAGHER	DATE :	APR 2026
DESIGN ENGINEER OF RECORD:	E. LAWES	DATE :	APR 2026

WSP USA Inc.
434 FAYETTEVILLE STREET
SUITE 1500
RALEIGH, NC 27601
TEL: 1.919.836.4040
LICENSE NO. F-0165

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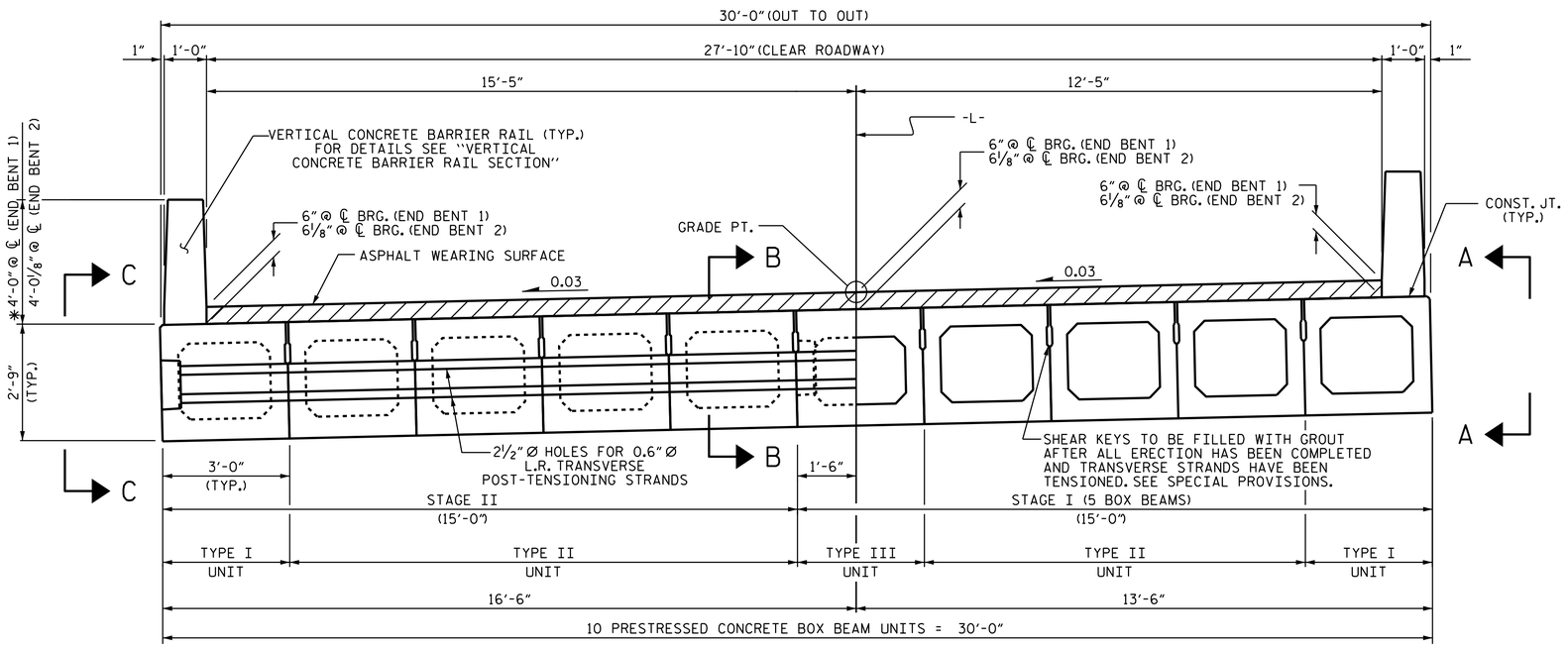
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CONSTRUCTION STAGING

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-6
1			3			TOTAL SHEETS
2			4			25

7/20/2026
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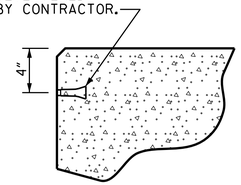
PARTIAL SECTION
AT INTERMEDIATE DIAPHRAGMS

PARTIAL SECTION
THROUGH VOIDS

TYPICAL SECTION

FOR SECTIONS A-A, B-B AND C-C, SEE SHEET 2 OF 6.
* 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.

PERMITTED THREADED INSERT CAST IN OUTSIDE FACE OF EXTERIOR UNIT AND RECESSED 3/8". SIZE TO BE DETERMINED BY CONTRACTOR.



THREADED INSERT DETAIL

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 BOX BEAM SECTIONS SHALL BE GRADE 60 AND SHALL BE INCLUDED IN THE UNIT PRICE BID FOR PRESTRESSED CONCRETE BOX BEAMS.

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

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

THE 2 1/2" Ø DOWEL HOLES AT FIXED ENDS OF BOX BEAM 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.

THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE BOX BEAM UNIT SHALL BE DONE WHEN THE CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN 6000 PSI.

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

PRESTRESSING STRANDS SHALL BE CUT FLUSH WITH THE BOX BEAM UNIT ENDS.

APPLY EPOXY PROTECTIVE COATING TO BOX BEAM UNIT ENDS.

VERTICAL 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 VERTICAL CONTRACTION JOINT SHALL BE LOCATED AT EACH THIRD POINT BETWEEN BARRIER RAIL EXPANSION JOINTS. ONLY ONE CONTRACTION JOINT IS REQUIRED AT MIDPOINT OF BARRIER RAIL SEGMENTS LESS THAN 20 FEET IN LENGTH AND NO CONTRACTION JOINTS ARE REQUIRED FOR THOSE SEGMENTS LESS THAN 10 FEET IN LENGTH.

THE LOCATION OF THE VOID DRAINS MAY BE SHIFTED SLIGHTLY WHERE NECESSARY TO CLEAR PRESTRESSING STRANDS OR TRANSVERSE REINFORCING STEEL.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

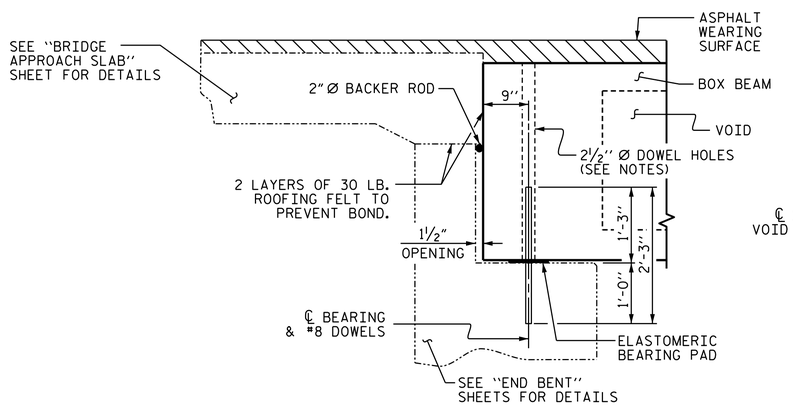
THE PERMITTED THREADED INSERTS ARE DETAILED AS AN OPTION FOR THE CONTRACTOR TO ATTACH FALSEWORK AND FORMWORK DURING CONSTRUCTION.

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.

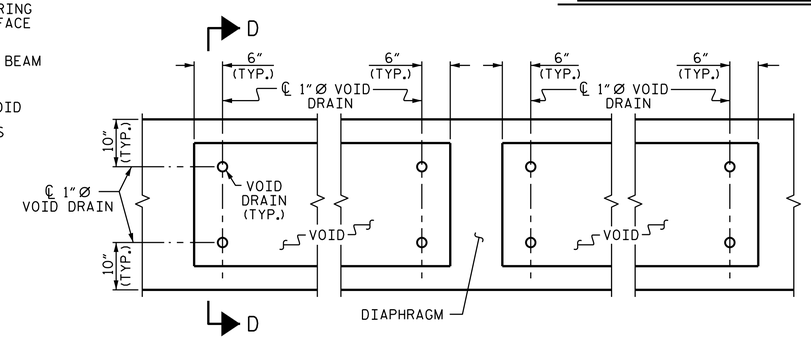
THE PERMITTED THREADED INSERTS SHALL BE GROUTED BY THE CONTRACTOR IMMEDIATELY FOLLOWING REMOVAL OF THE FALSEWORK.

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

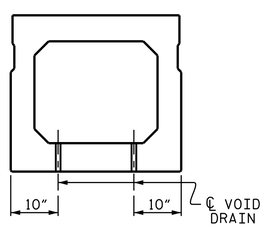
FIXED END



SECTION AT END BENT



PART PLAN



SECTION D-D

VOID DRAIN DETAILS

(DIMENSIONS SHOWN ARE TYPICAL FOR EACH VOID)

PROJECT NO. BP14-R014
SWAIN COUNTY
STATION: 12+45.82 -L-

SHEET 1 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

3'-0" X 2'-9" PRESTRESSED CONCRETE BOX BEAM UNIT

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-7
1			3			TOTAL SHEETS
2			4			25

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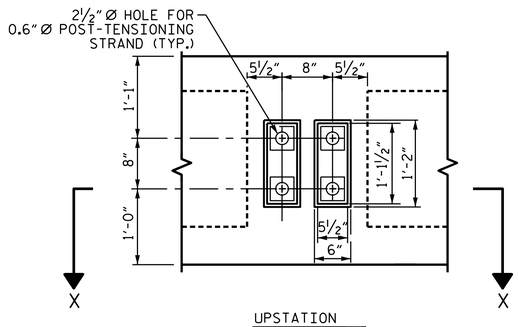
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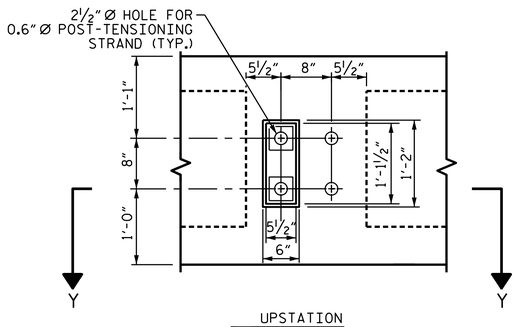
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STD. NO. STD.33PCBB1_30

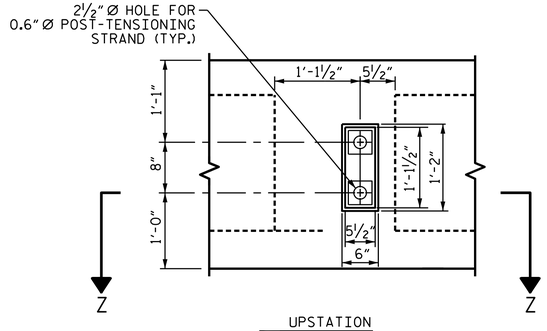
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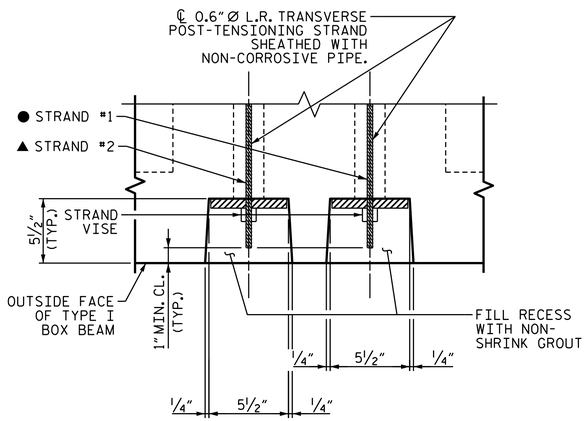
VIEW A-A
SEE SHEET 1 OF 6



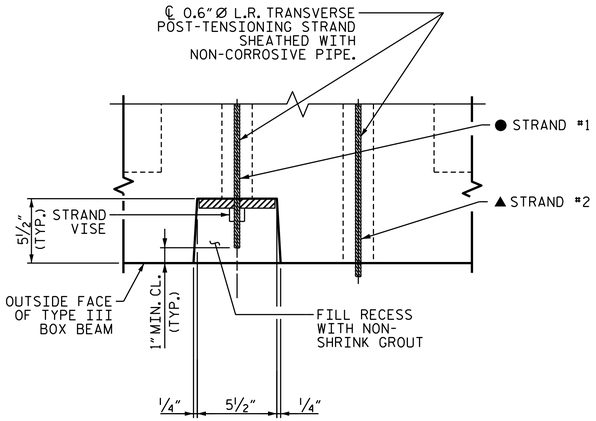
VIEW B-B
SEE SHEET 1 OF 6



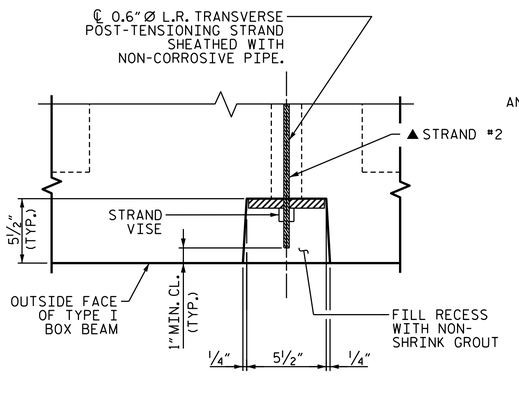
VIEW C-C
SEE SHEET 1 OF 6



SECTION X-X



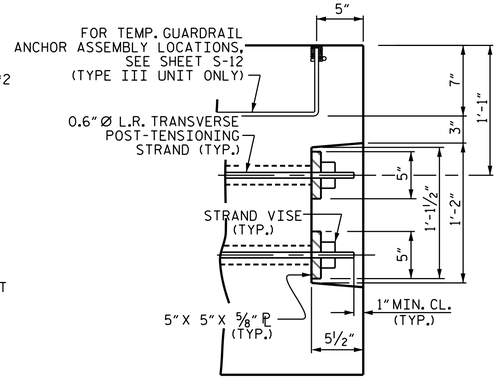
SECTION Y-Y



SECTION Z-Z

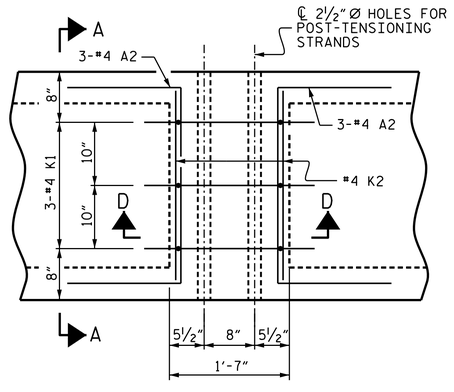
● STRAND #1 GOES THROUGH 5 BOX BEAM UNITS (TO BE TENSIONED DURING STAGE I CONSTRUCTION)

▲ STRAND #2 GOES THROUGH ALL 10 BOX BEAM UNITS (TO BE TENSIONED DURING STAGE II CONSTRUCTION)

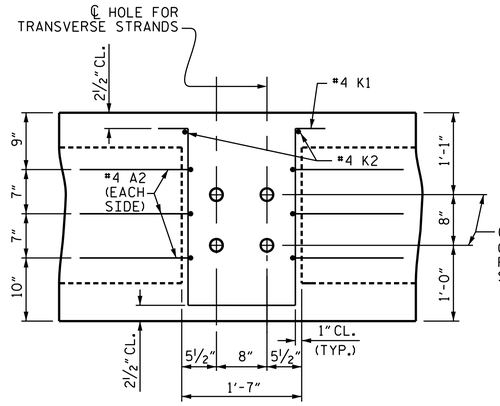


PART SECTION AT RECESS

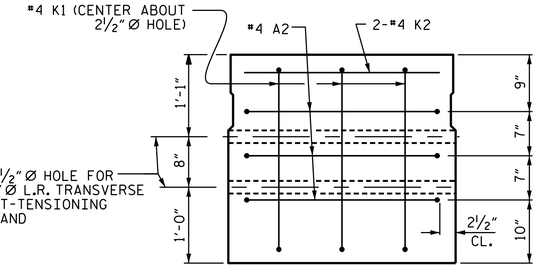
GROUTED RECESS AT END OF POST-TENSIONED STRAND OF BOX BEAMS



PLAN



SECTION D-D



SECTION A-A
VOIDS NOT SHOWN

DOUBLE DIAPHRAGM DETAILS

#4 "S" BARS NOT SHOWN. #4 "S" BARS MAY BE SHIFTED SLIGHTLY TO CLEAR 2½" Ø HOLE.
(STAGE II SHOWN; STAGE I SIMILAR)

PROJECT NO. BP14-R014
SWAIN COUNTY
STATION: 12+45.82 -L-

SHEET 2 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

3'-0" X 2'-9" PRESTRESSED CONCRETE BOX BEAM UNIT

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-8
1			3			TOTAL SHEETS
2			4			25

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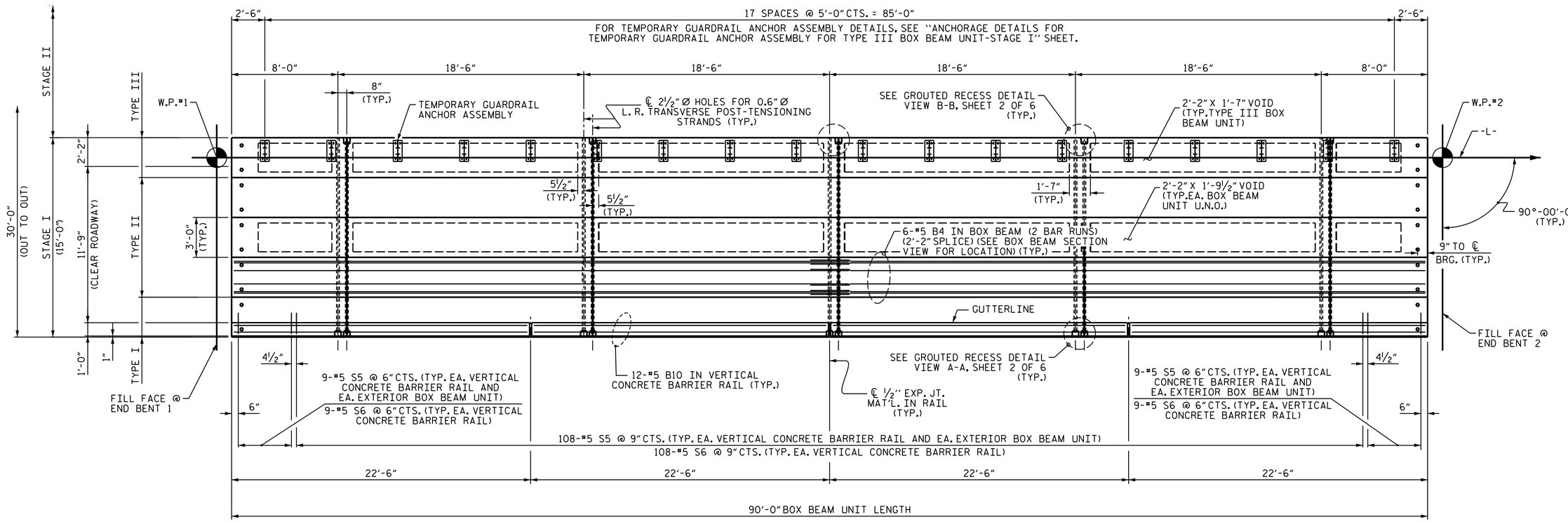
NORTH CAROLINA PROFESSIONAL SEAL 044167 ENGINEER ELIZABETH F. LAWES
7/20/2026
DocuSigned by: Elizabeth F. Lawes
935E64223CD547C...

WSP USA Inc.
434 FAYETTEVILLE STREET
SUITE 1500
RALEIGH, NC 27601
TEL: 1.919.836.4040
LICENSE NO. F-0165

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CHECKED BY:	P. GALLAGHER	DATE :	APR 2026
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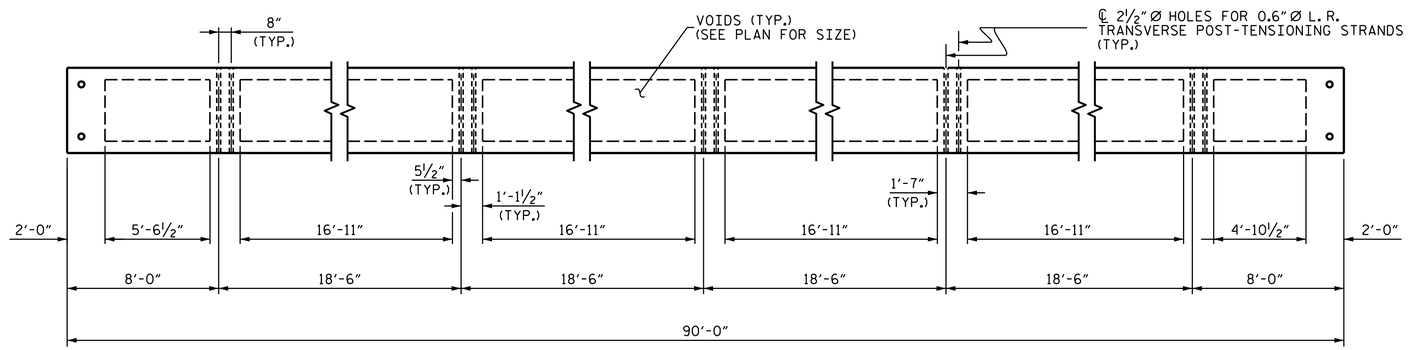
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PLAN OF SPAN A

(STAGE I CONSTRUCTION)



DIAPHRAGM AND VOID LAYOUT

DESIGNED BY:	E. LAWES	DATE :	OCT 2024
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PROJECT NO. BP14-R014
SWAIN COUNTY
STATION: 12+45.82 -L-

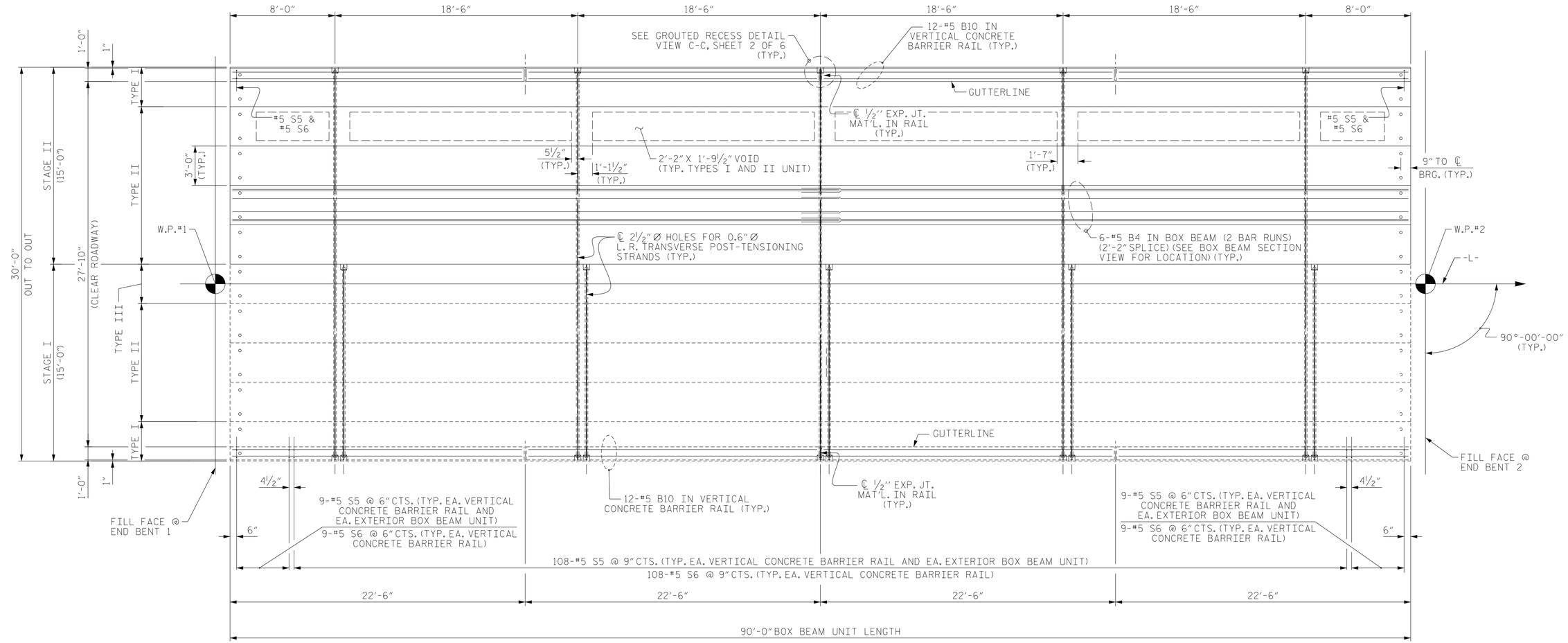
SHEET 3 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

PLAN OF 90' UNIT 27'-10" CLEAR ROADWAY 90° SKEW (STAGE I)

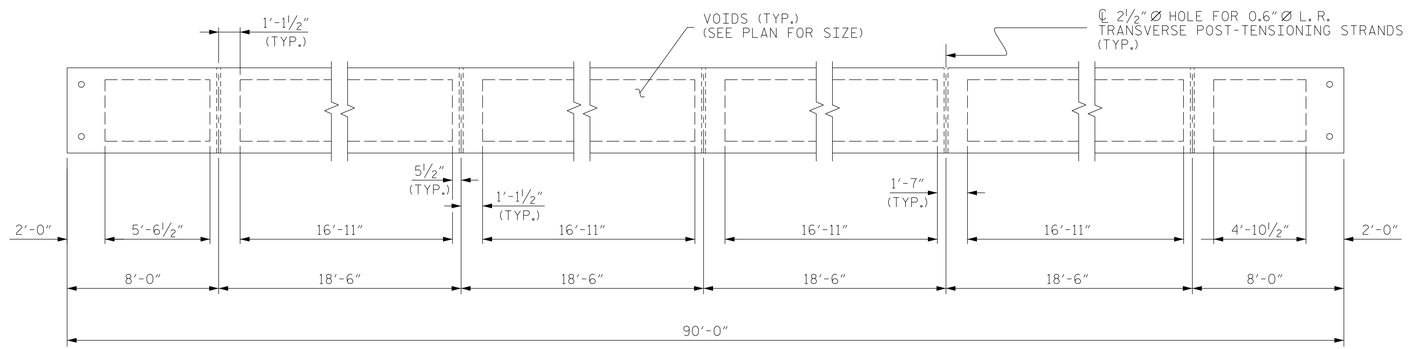
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NO.	BY:	DATE:	NO.	BY:	DATE:	S-9
1			3			TOTAL SHEETS
2			4			25

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PLAN OF SPAN A

(STAGE II CONSTRUCTION)



DIAPHRAGM AND VOID LAYOUT

PROJECT NO. BP14-R014

SWAIN COUNTY

STATION: 12+45.82 -L-

SHEET 4 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

PLAN OF 90' UNIT 27'-10" CLEAR ROADWAY 90° SKEW (STAGE II)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-10
1			3			TOTAL SHEETS
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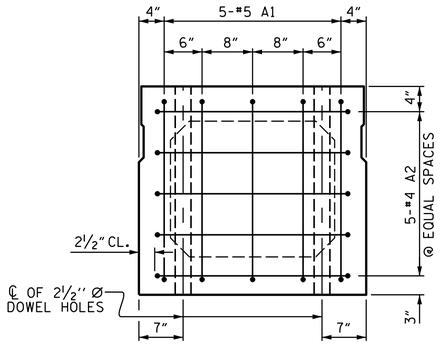
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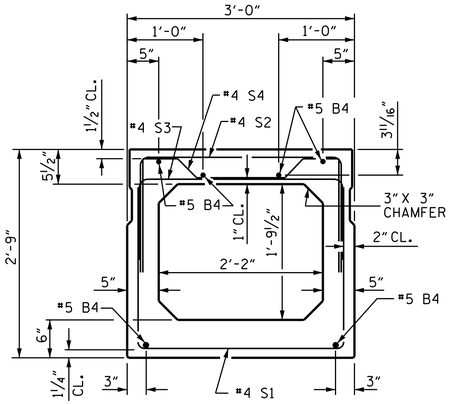
7/20/2026
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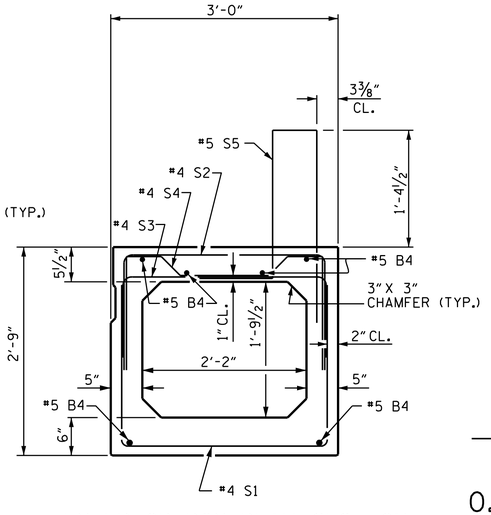
END ELEVATION

SHOWING PLACEMENT OF #5 & #4 "A" BARS AND LOCATION OF DOWEL HOLES. (INTERIOR BOX BEAM SECTION SHOWN-EXTERIOR SECTION SIMILAR EXCEPT SHEAR KEY LOCATION. STRAND LAYOUT NOT SHOWN.)



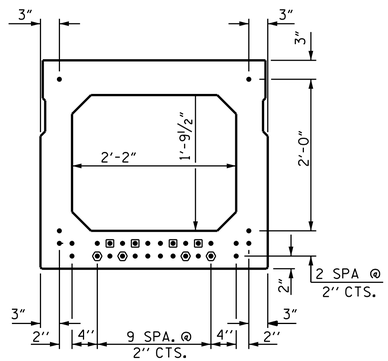
INTERIOR BOX BEAM SECTION

TYPE II
(STRAND LAYOUT NOT SHOWN)



EXTERIOR BOX BEAM SECTION

TYPE I
(FOR PRESTRESSED STRAND LAYOUT, SEE "TYPICAL STRAND LOCATION")

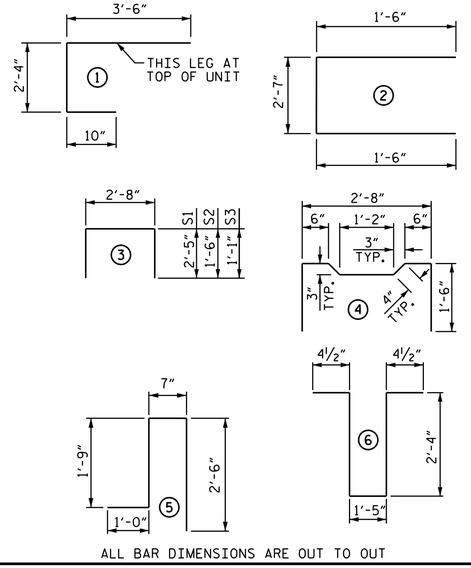


TYPICAL STRAND LOCATION

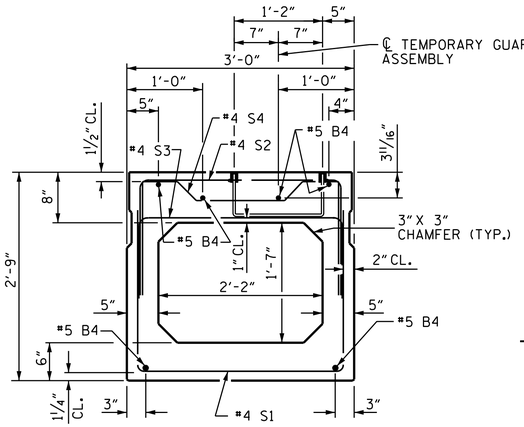
(30 STRANDS REQUIRED)

0.6" Ø LOW RELAXATION STRAND LAYOUT

BAR TYPES



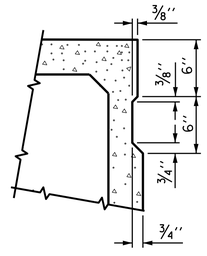
ALL BAR DIMENSIONS ARE OUT TO OUT



INTERIOR BOX BEAM SECTION

TYPE III
(FOR PRESTRESSED STRAND LAYOUT, SEE "TYPICAL STRAND LOCATION")

FOR TEMPORARY GUARDRAIL ANCHOR ASSEMBLY LOCATION, SEE SECTION OF ANCHOR ASSEMBLY LOCATION ON "ANCHORAGE DETAILS FOR TEMPORARY GUARDRAIL ANCHOR ASSEMBLY FOR TYPE III BOX BEAM SECTION" SHEET.



SHEAR KEY DETAIL

NOTE: OMIT SHEAR KEY ON OUTSIDE FACE OF EXTERIOR BOX BEAMS.

DEBONDING LEGEND

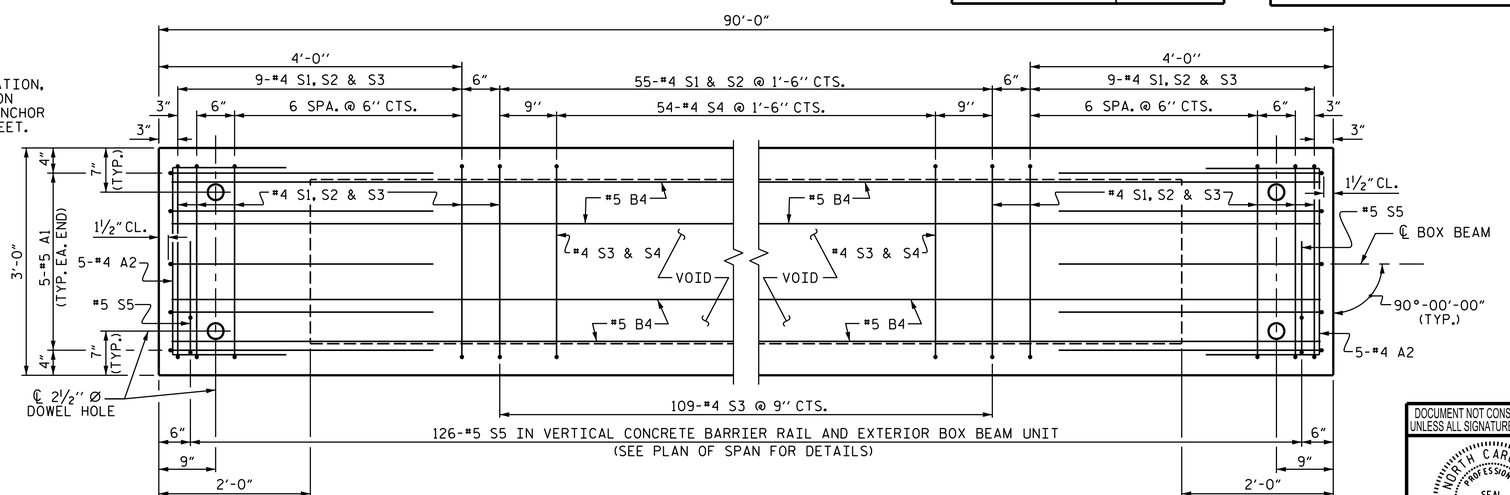
- ● FULLY BONDED STRANDS
- ◧ STRANDS DEBONDED FOR 4'-0" FROM END OF GIRDER
- ⬢ STRANDS DEBONDED FOR 12'-0" FROM END OF GIRDER

BOND SHALL BE BROKEN ON STRANDS AS SHOWN FOR THE SPECIFIED LENGTH FROM EACH END OF THE BOX BEAM. SEE STANDARD SPECIFICATIONS ARTICLE 1078-7.

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 ONE BOX BEAM SECTION

				TYPE I UNIT		TYPE II UNIT		TYPE III UNIT	
BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT	LENGTH	WEIGHT	LENGTH	WEIGHT
A1	10	#5	1	6'-8"	70	6'-8"	70	6'-8"	70
A2	40	#4	2	5'-7"	149	5'-7"	149	5'-7"	149
B4	12	#5	STR	45'-11"	575	45'-11"	575	45'-11"	575
K1	15	#4	6	7'-0"	70	7'-0"	70	7'-0"	70
K2	10	#4	STR	2'-7"	17	2'-7"	17	2'-7"	17
S1	73	#4	3	7'-6"	366	7'-6"	366	7'-6"	366
S2	73	#4	3	5'-8"	276	5'-8"	276	5'-8"	276
S3	127	#4	3	4'-10"	410	4'-10"	410	4'-10"	410
S4	54	#4	4	5'-10"	210	5'-10"	210	5'-10"	210
✱ S5	126	#5	5	5'-10"	767	--	--	--	--
REINFORCING STEEL					2143 LBS.		2143 LBS.		2143 LBS.
✱ EPOXY COATED REINF. STEEL					767 LBS.				
8000 P.S.I. CONCRETE					16.5 CU. YDS.		16.4 CU. YDS.		17.7 CU. YDS.
0.6" Ø L.R. STRANDS					No. 30		No. 30		No. 30



PLAN OF BOX BEAM

EXTERIOR UNIT SHOWN, INTERIOR UNIT SIMILAR EXCEPT OMIT #5 S5 BARS.
FOR LOCATION OF DIAPHRAGMS, SEE "PLAN OF SPAN".
FOR THREADED INSERTS, SEE "THREADED INSERT DETAIL".
FOR REINFORCING STEEL IN DIAPHRAGMS, SEE "DOUBLE DIAPHRAGM DETAILS" ON SHEET 2 OF 6.

PROJECT NO. BP14-R014
SWAIN COUNTY
STATION: 12+45.82 -L-

SHEET 5 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

3'-0" X 2'-9" PRESTRESSED CONCRETE BOX BEAM UNIT

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1			3			TOTAL SHEETS
2			4			25

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NORTH CAROLINA PROFESSIONAL SEAL 044167 7/20/2026 ENGINEER ELIZABETH F. LAWES
DocuSigned by: Elizabeth F. Lawes
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WSP USA Inc.
434 FAYETTEVILLE STREET
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DESIGNED BY:	E. LAWES	DATE :	OCT 2024
DRAWN BY:	E. LAWES	DATE :	APR 2026
CHECKED BY:	P. GALLAGHER	DATE :	APR 2026
DESIGN ENGINEER OF RECORD:	E. LAWES	DATE :	APR 2026

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BILL OF MATERIAL FOR VERTICAL CONCRETE BARRIER RAIL

BAR	BARS PER PAIR OF EXTERIOR UNITS	SIZE	TYPE	LENGTH	WEIGHT
	90′ UNIT				
✳B10	104	#5	STR	22′-1″	2211
✳ S6	252	#5	1	7′-2″	1884
✳ EPOXY COATED REINFORCING STEEL			LBS.		4095
CLASS AA CONCRETE			CU.YDS.		24.6
TOTAL VERTICAL CONCRETE BARRIER RAIL			LN. FT.		180.0

GUTTERLINE ASPHALT THICKNESS & RAIL HEIGHT

	ASPHALT OVERLAY THICKNESS @ MID-SPAN	RAIL HEIGHT @ MID-SPAN
85′ UNITS	1¾″	3′-7¾″

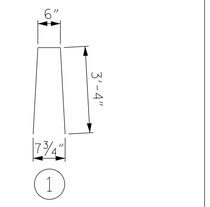
BOX BEAM UNITS REQUIRED

		NUMBER	LENGTH	TOTAL LENGTH
STAGE I	TYPE I	1	90′-0″	90′-0″
	TYPE II	3	90′-0″	270′-0″
	TYPE III	1	90′-0″	90′-0″
		NUMBER	LENGTH	TOTAL LENGTH
STAGE II	TYPE I	1	90′-0″	90′-0″
	TYPE II	4	90′-0″	360′-0″
	TOTAL	10	-	900′-0″

DEAD LOAD DEFLECTION AND CAMBER

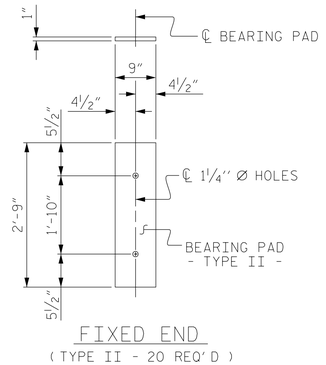
	3′-0″ x 2′-9″
90′ BOX BEAM UNIT	0.6″ Ø L.R. STRAND
CAMBER (SLAB ALONE IN PLACE)	2¾″ ↑
DEFLECTION DUE TO SUPERIMPOSED DEAD LOAD✳✳	¾″ ↓
FINAL CAMBER	2″ ↑

✳✳ INCLUDES FUTURE WEARING SURFACE



BAR TYPE

BAR DIMENSIONS ARE OUT TO OUT



FIXED END

(TYPE II - 20 REQ′D)

ELASTOMERIC BEARING DETAILS

ELASTOMER IN ALL BEARINGS SHALL BE 60 DUROMETER HARDNESS.

SECTION THRU RAIL

SECTION S-S

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

ELEVATION AT EXPANSION JOINTS

VERTICAL CONCRETE BARRIER RAIL DETAILS

END VIEW

SIDE VIEW

END OF RAIL DETAILS

PROJECT NO. BP14-R014

SWAIN COUNTY

STATION: 12+45.82 -L-

SHEET 6 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

3′-0″ X 2′-9″ PRESTRESSED CONCRETE BOX BEAM UNIT

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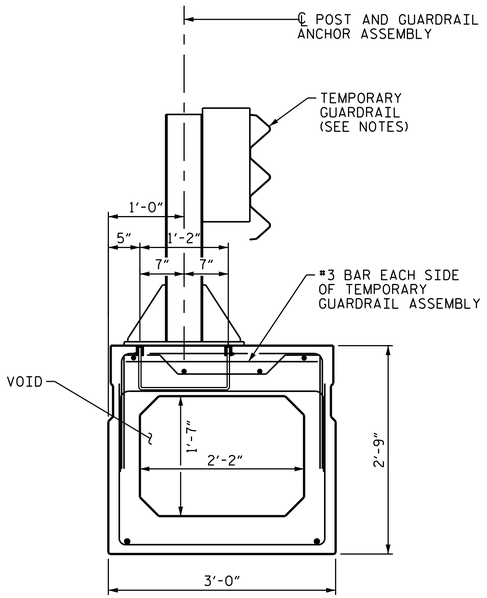
NORTH CAROLINA PROFESSIONAL SEAL 044167 ENGINEER ELIZABETH F. LAWLES

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434 FAYETTEVILLE STREET
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RALEIGH, NC 27601
TEL: 1.919.836.4040
LICENSE NO. F-0165

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DRAWN BY:	E. LAWES	DATE :	APR 2026
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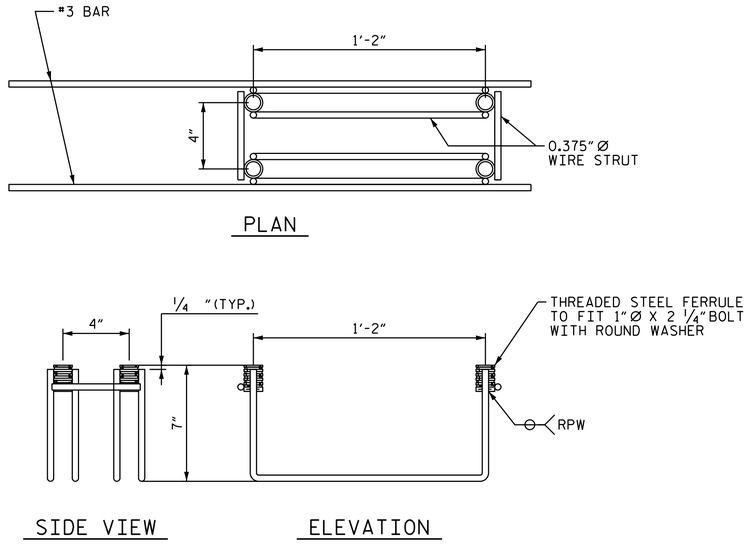
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SECTION OF ANCHOR ASSEMBLY LOCATION

(TYPE III UNIT)
THE #3 BARS ARE INCIDENTAL AND THEIR COST SHALL BE INCLUDED IN THE PRICE BID FOR THE PRESTRESSED CONCRETE BOX BEAMS.



TEMPORARY GUARDRAIL ANCHOR ASSEMBLY

(18 ASSEMBLIES REQUIRED IN THE TYPE III BOX BEAM UNIT)
(6 ASSEMBLIES REQUIRED IN THE APPROACH SLABS)

NOTES

THE TEMPORARY GUARDRAIL ANCHOR ASSEMBLY SHALL CONSIST OF THE FOLLOWING COMPONENTS:

A. FERRULES SHALL BE MADE FROM STEEL MEETING THE REQUIREMENTS OF ASSHTO M169, GRADE 12L14 AND SHALL HAVE A MINIMUM LENGTH OF THREADS OF 2½".

B. 4 - 1" @ X 2¼" BOLTS WITH WASHERS. BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307. BOLTS AND WASHERS SHALL BE GALVANIZED. AT HE CONTRACTOR'S OPTION, STAINLESS STEEL BOLTS AND WASHERS MAY BE USED AS AN ALTERNATE FOR THE 1" Ø X 2¼" 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 STRUTS SHOWN IN THE TEMPORARY GUARDRAIL ANCHOR ASSEMBLY DETAIL ARE THE MINIMUM ALLOWABLE SIZE AND SHALL HAVE A MINIMUM TENSILE STRENGTH OF 100,000 PSI.

TEMPORARY GUARDRAIL ANCHOR ASSEMBLY WITH BOLTS SHALL BE ASSEMBLED IN THE SHOP. BOLT THREADS MAY BE RECUT AS NECESSARY TO INSURE FIT.

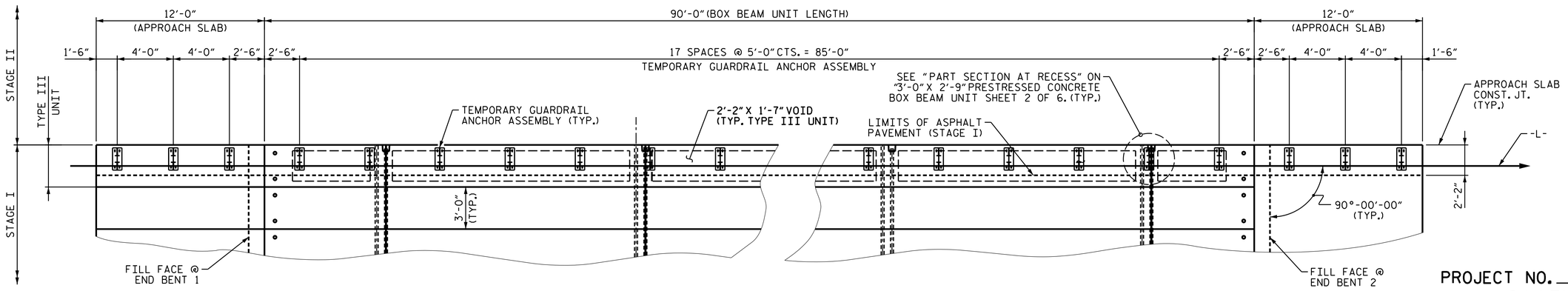
THE COST OF THE TEMPORARY GUARDRAIL ANCHOR ASSEMBLY COMPLETE IN PLACE, SHALL BE INCLUDED, AS APPLICABLE, IN THE UNIT CONTRACT PRICE BID FOR 3'-0" X 2'-9" PRESTRESSED CONCRETE BOX BEAM OR LUMP SUM PRICE BID FOR APPROACH SLABS.

FERRULES TO BE PLUGGED DURING THE CASTING OF THE CORED SLAB UNITS OR POURING OF APPROACH SLAB AS RECOMMENDED BY THE MANUFACTURER.

AT THE CONTRACTOR'S OPTION, FERRULES WITH OPEN OR CLOSED ENDS MAY BE USED.

PAYMENT FOR TEMPORARY GUARDRAIL, POST AND POST PLATES IS INCLUDED IN ROADWAY PAY ITEMS.

FOR APPROACH SLAB DETAILS, SEE SHEETS S-23 AND S-24.



RAIL POST SPACING FOR TEMPORARY GUARDRAIL - STAGE I

PROJECT NO. BP14-R014
SWAIN COUNTY
STATION: 12+45.82 -L-

DESIGNED BY:	E.LAWES	DATE :	OCT 2024
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CHECKED BY:	P.GALLAGHER	DATE :	APR 2026
DESIGN ENGINEER OF RECORD:	E.LAWES	DATE :	APR 2026

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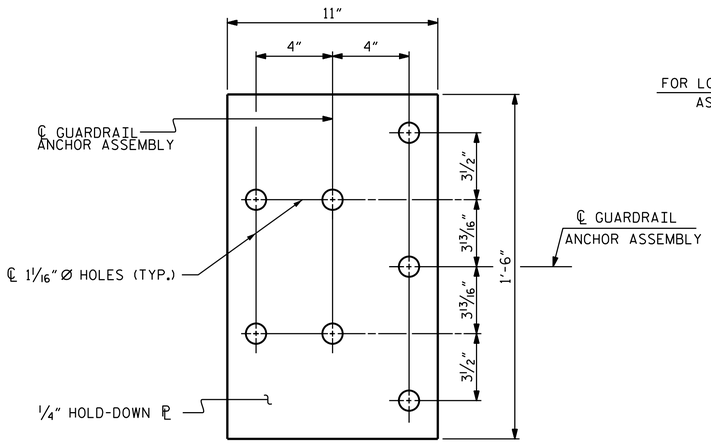
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DEPARTMENT OF TRANSPORTATION
RALEIGH

ANCHORAGE DETAILS FOR TEMPORARY GUARDRAIL ANCHOR ASSEMBLY FOR TYPE III - STAGE I

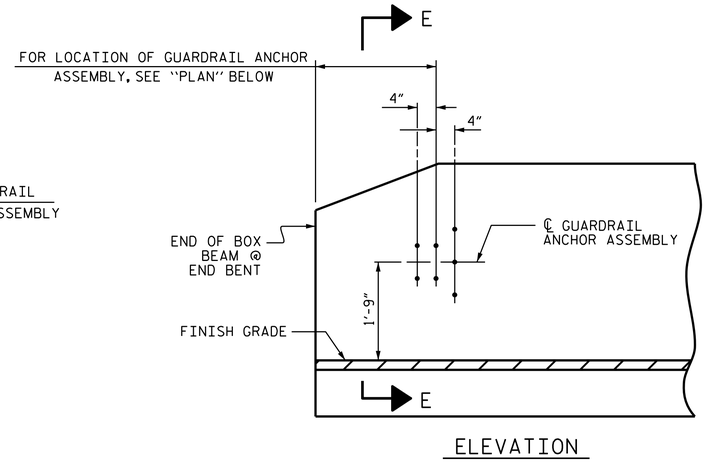
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PLAN



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.)

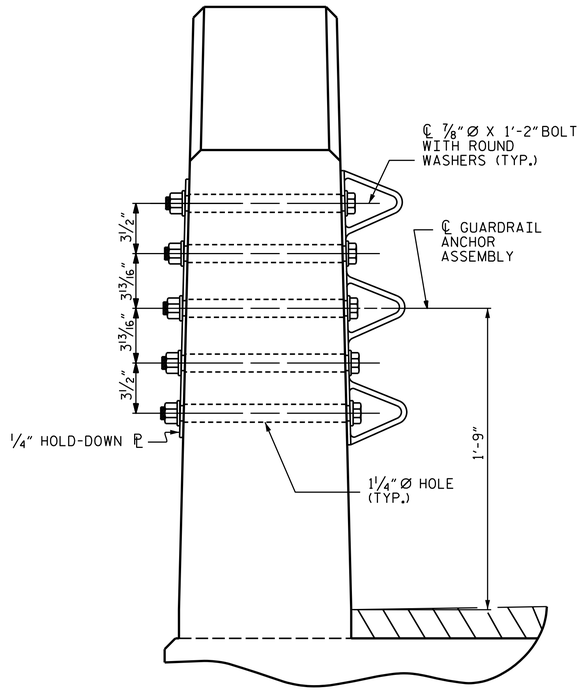
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF BARRIER RAIL. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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.

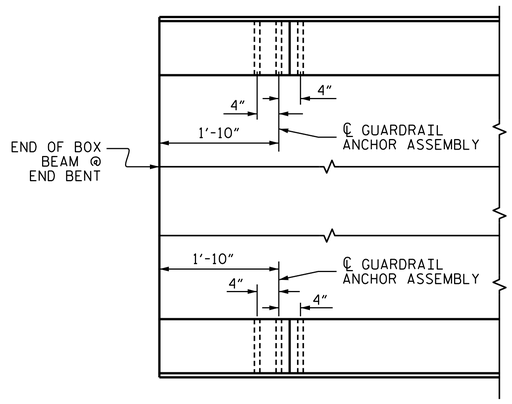
THE VERTICAL REINFORCING BARS MAY BE SHIFTED SLIGHTLY IN THE VERTICAL CONCRETE BARRIER RAIL TO CLEAR ASSEMBLY BOLTS.

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

GUARDRAIL ANCHOR ASSEMBLY DETAILS



PLAN

LOCATION OF ANCHORS FOR GUARDRAIL

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



SKETCH SHOWING POINTS OF ATTACHMENT

✳ DENOTES GUARDRAIL ANCHOR ASSEMBLY

PROJECT NO. BP14.R014

SWAIN COUNTY

STATION: 12+45.82 -L-

ASSEMBLED BY:	M. HOBBS	DATE :	SEPT 2023
CHECKED BY:	P. GALLAGHER	DATE :	APR 2026
DESIGN ENGINEER OF RECORD:	E. LAWES	DATE :	APR 2026

DRAWN BY :	MAA	5/10
CHECKED BY :	GM	5/10

REV.	1/15	MAA/TMG
REV.	12/17	MAA/THC
REV.	5/18	MAA/THC

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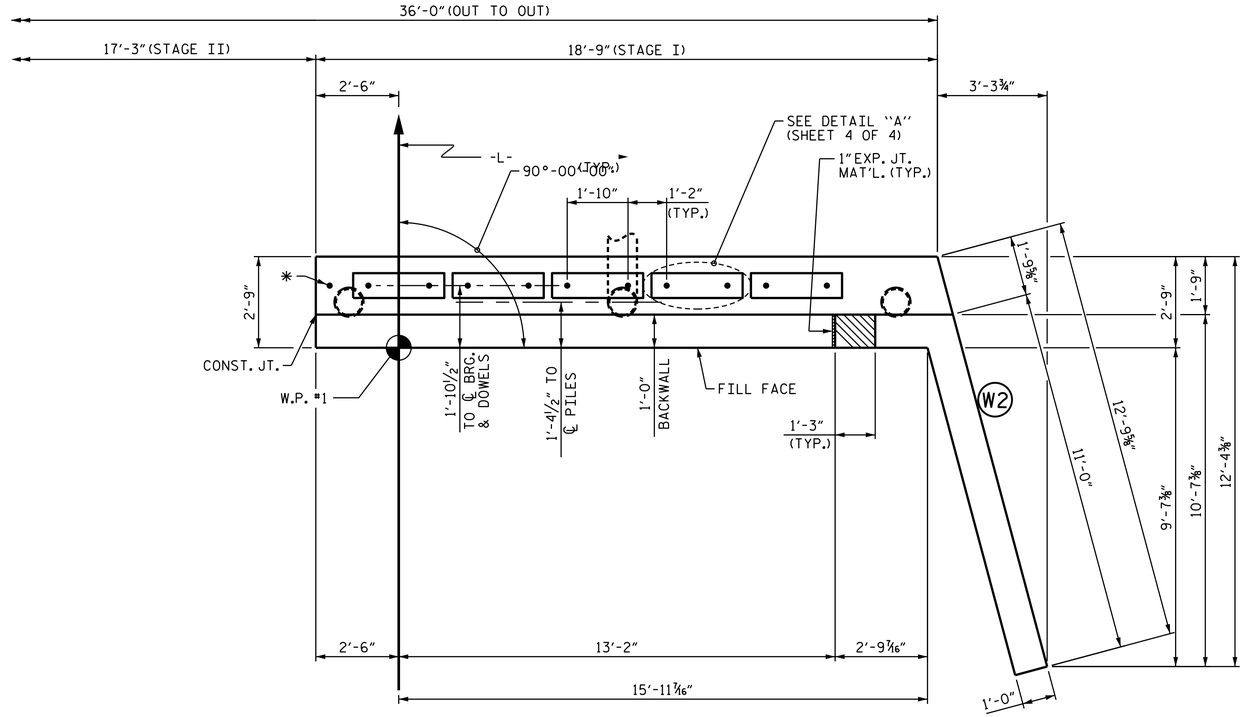
STANDARD
GUARDRAIL ANCHORAGE DETAILS FOR VERTICAL CONCRETE BARRIER RAIL

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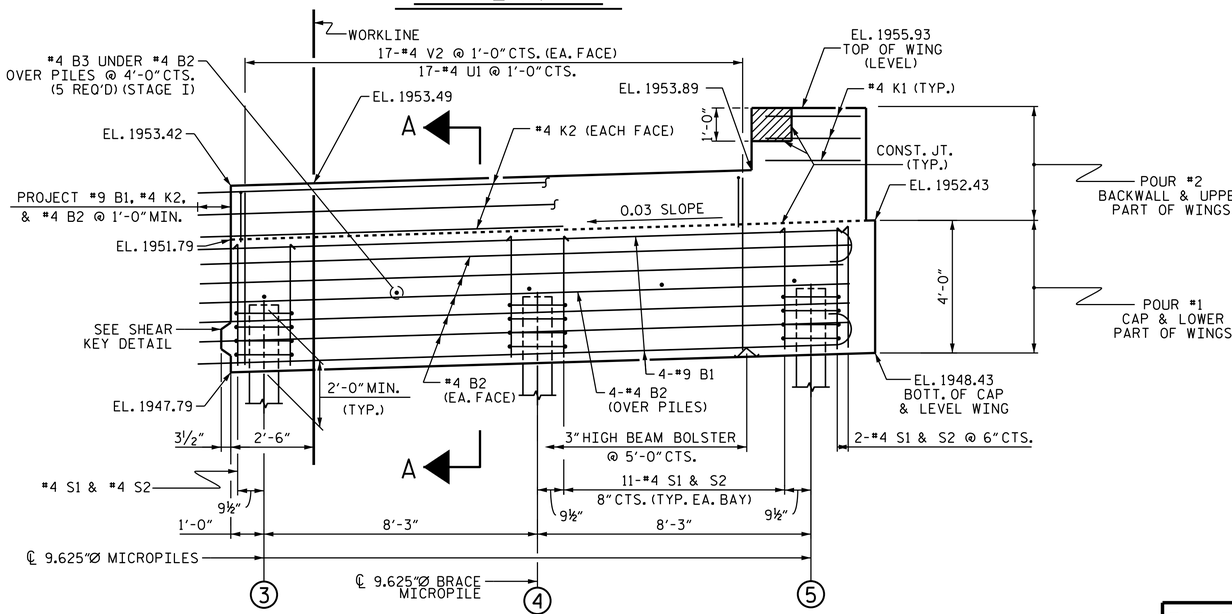
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PLAN



ELEVATION

WING NOT SHOWN FOR CLARITY.

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 WING DETAILS, SEE SHEET 3 OF 4.

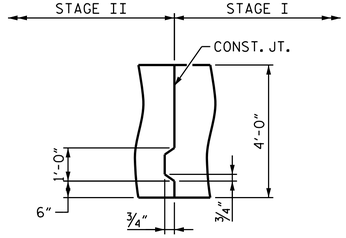
THE CONTRACTOR'S ATTENTION IS CALLED TO THE FACT THAT THE LENGTHS OF THE #9 AND #4 HORIZONTAL BARS AT THE CONSTRUCTION JOINT MAY NEED TO BE ADJUSTED DUE TO THE TYPE OF MECHANICAL BUTT SPLICE CHOSEN BY THE CONTRACTOR. NO ADDITIONAL PAYMENT WILL BE MADE FOR ANY ADJUSTMENTS.

MECHANICAL COUPLERS SHALL BE USED TO JOIN THE #9 AND #4 HORIZONTAL BARS IN STAGE I WITH THE #9 AND #4 HORIZONTAL BARS IN STAGE II IN BOTH THE END BENT CAPS AND BACKWALLS. THE LOCATION OF THE COUPLERS SHALL BE STAGGERED ON ALTERNATING BY 1 FOOT AND THE BARS SHALL BE CUT ACCORDINGLY TO ALLOW A MINIMUM OF 1'-0" INTO STAGE II CONSTRUCTION.

FOR MECHANICAL COUPLERS, SEE MECHANICAL BUTT SPLICES FOR REINFORCING STEEL IN STANDARD SPECIFICATIONS.

* THE CONTRACTOR'S ATTENTION IS CALLED TO THE FACE THAT THIS DOWEL MAY BE PLACED IN STAGE I OR DRILLED AND GROUTED IN STAGE II.

TOP OF PILE ELEVATIONS	
③	1949.91
④	1950.16
⑤	1950.41



SHEAR KEY DETAIL
(STAGE I)

PROJECT NO. BP14-R014
SWAIN COUNTY
STATION: 12+45.82 -L-

SHEET 1 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
END BENT 1
(STAGE I)

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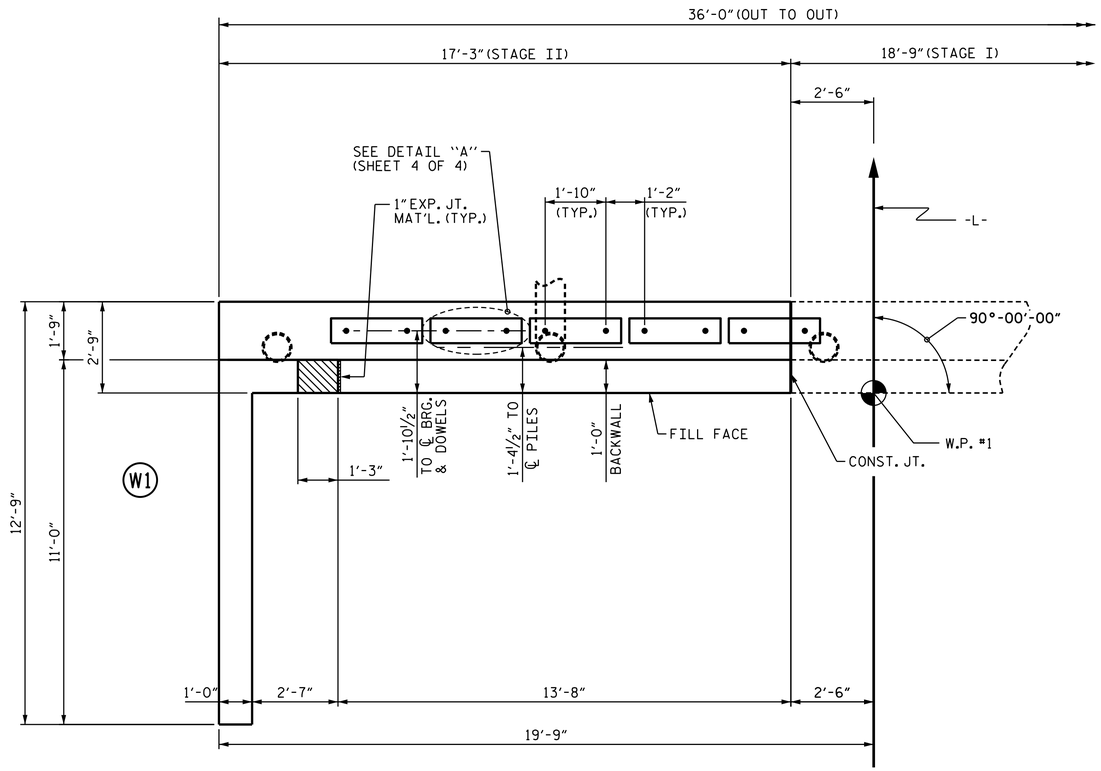
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CHECKED BY:	P. GALLAGHER	DATE : APR 2026
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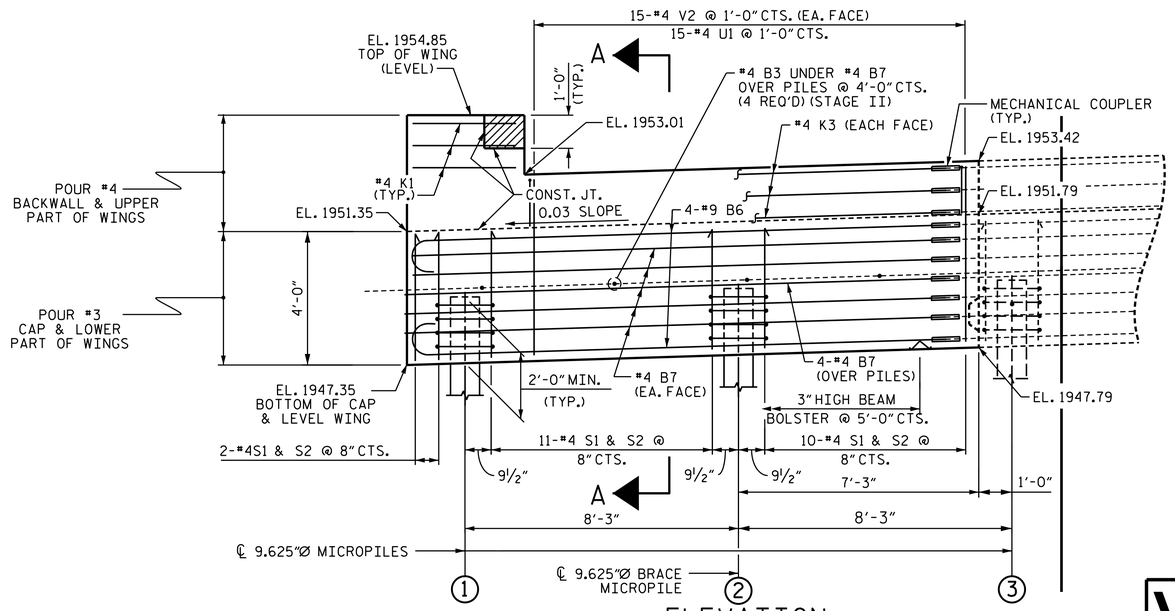
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NOTES

FOR NOTES, SEE SHEET 1 OF 4.



PLAN



ELEVATION

WING NOT SHOWN FOR CLARITY.

TOP OF PILE ELEVATIONS	
①	1949.42
②	1949.67

PROJECT NO. BP14-R014

SWAIN COUNTY

STATION: 12+45.82 -L-

SHEET 2 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
END BENT 1
(STAGE II)

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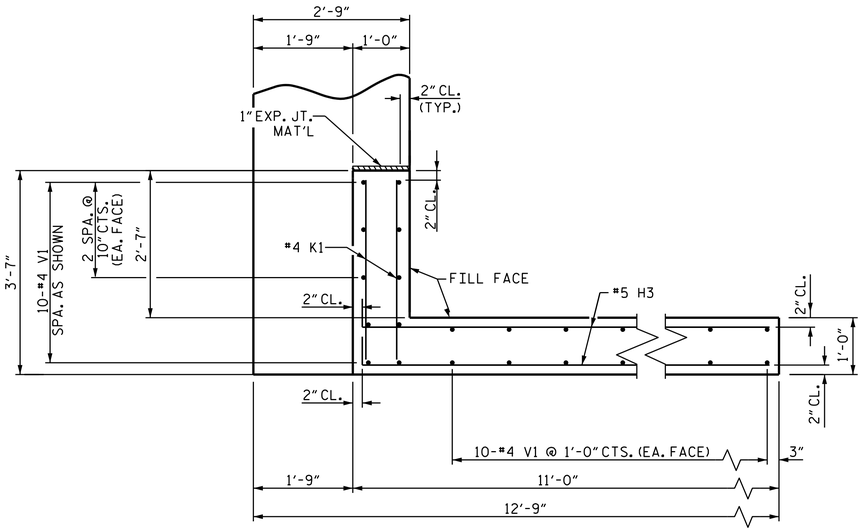
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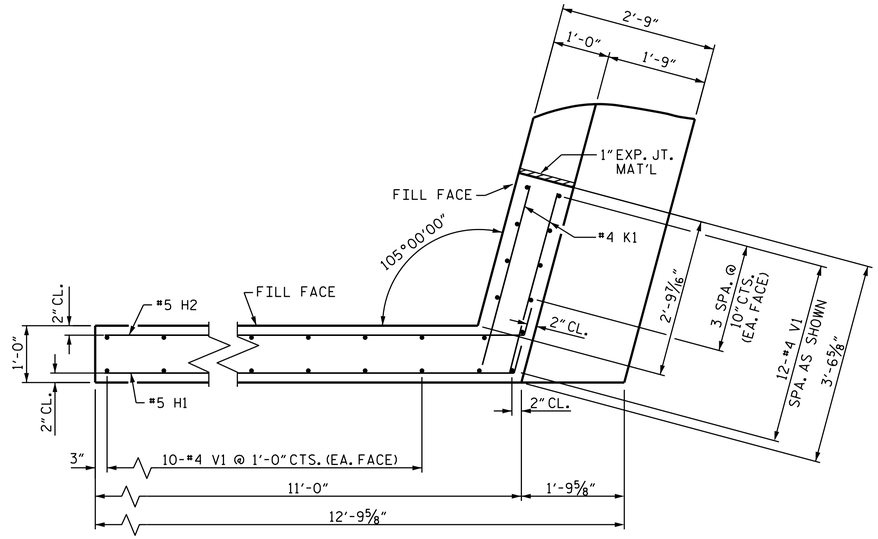
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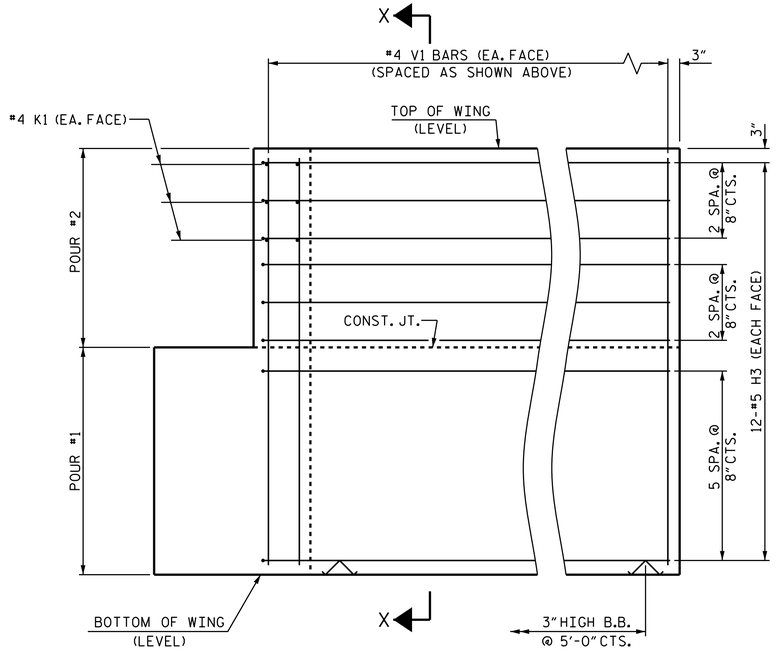
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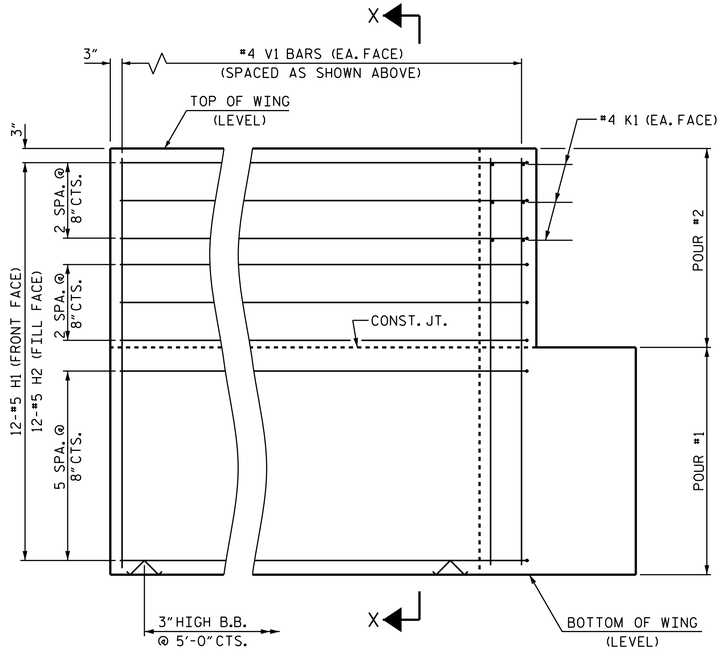
PLAN OF WING (W1)



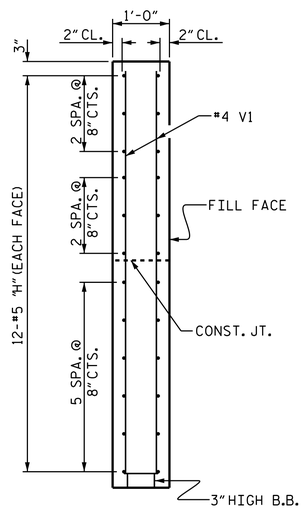
PLAN OF WING (W2)



ELEVATION OF WING (W1)



ELEVATION OF WING (W2)



SECTION X-X

WING DETAILS

DESIGNED BY:	E.LAWES	DATE :	OCT 2024
DRAWN BY:	E.LAWES	DATE :	APR 2026
CHECKED BY:	P.GALLAGHER	DATE :	APR 2026
DESIGN ENGINEER OF RECORD:	E.LAWES	DATE :	APR 2026

7/20/2026
401_031_BP14_R014_SMU_EB103_16.dgn

WSP USA Inc.
434 FAYETTEVILLE STREET
SUITE 1500
RALEIGH, NC 27601
TEL: 1.919.836.4040
LICENSE NO. F-0165

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NORTH CAROLINA PROFESSIONAL SEAL 044167 7/20/2026 ENGINEER ELIZABETH F. LAWES
DocuSigned by: Elizabeth F. Lawes 935E64223CD547C...

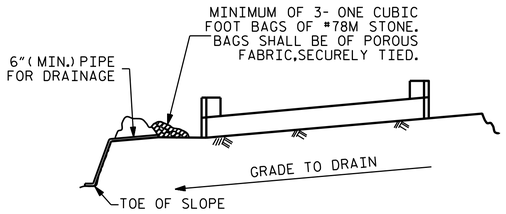
PROJECT NO. BP14-R014
SWAIN COUNTY
STATION: 12+45.82 -L-
SHEET 3 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
END BENT 1
WING DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-17
1			3			TOTAL SHEETS
2			4			25

Docusign Envelope ID: 6EB0A136-41FC-8933-808B-013E80A18744



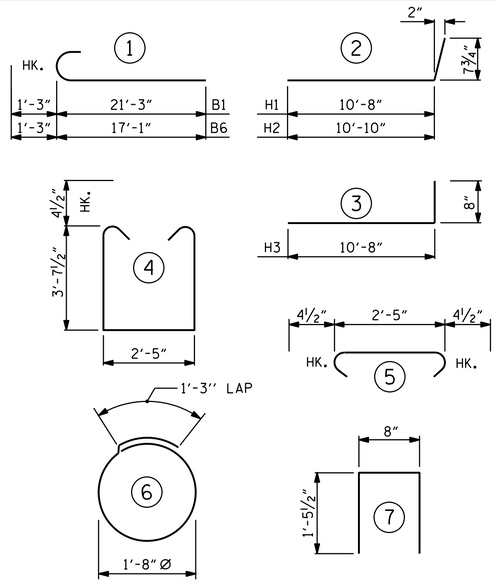
BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL — STAGE I

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#9	1	22'-6"	612
B2	14	#4	STR	21'-3"	199
B3	5	#4	STR	2'-5"	8
D1	10	#8	STR	2'-3"	60
H1	12	#5	2	11'-4"	142
H2	12	#5	2	11'-6"	144
K1	6	#4	STR	3'-3"	13
K2	6	#4	STR	21'-3"	85
S1	25	#4	4	10'-5"	174
S2	25	#4	5	3'-2"	53
S3	12	#4	6	6'-6"	52
U1	17	#4	7	3'-7"	41
V1	32	#4	STR	7'-2"	153
V2	34	#4	STR	5'-3"	119

REINFORCING STEEL (END BENT 1 - STAGE I) 1855 LBS.

CLASS A CONCRETE BREAKDOWN

POUR #1	CAP & LOWER PART OF WINGS	9.3 C.Y.
POUR #2	BACKWALL & UPPER PART OF WINGS	2.6 C.Y.
TOTAL CLASS A CONCRETE		11.9 C.Y.

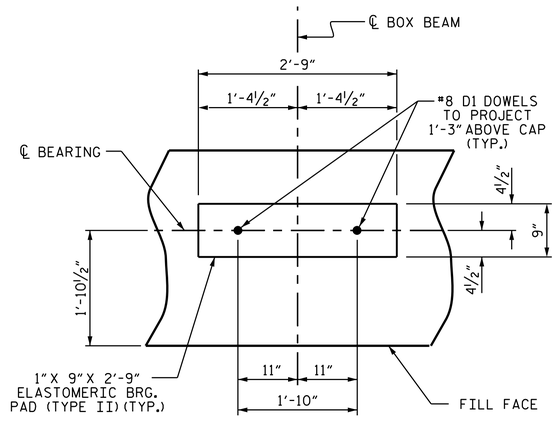
BILL OF MATERIAL — STAGE II

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B3	4	#4	STR	2'-5"	6
B6	8	#9	1	17'-4"	471
B7	14	#4	STR	16'-1"	150
D1	10	#8	STR	2'-3"	60
H3	24	#5	3	11'-4"	284
K1	6	#4	STR	3'-3"	13
K3	6	#4	STR	16'-1"	64
S1	23	#4	4	10'-5"	160
S2	23	#4	5	3'-2"	49
S3	8	#4	6	6'-6"	35
U1	15	#4	7	3'-7"	36
V1	30	#4	STR	7'-2"	144
V2	30	#4	STR	5'-3"	105

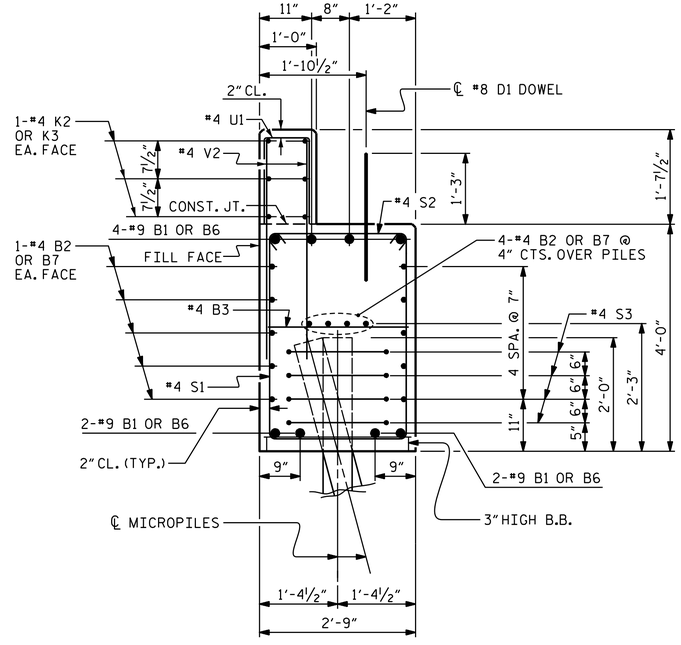
REINFORCING STEEL (END BENT 1 - STAGE II) 1577 LBS.

CLASS A CONCRETE BREAKDOWN

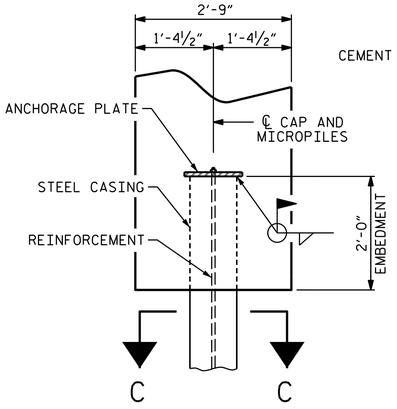
POUR #3	CAP & LOWER PART OF WINGS	8.5 C.Y.
POUR #4	BACKWALL & UPPER PART OF WINGS	2.6 C.Y.
TOTAL CLASS A CONCRETE		11.1 C.Y.



DETAIL "A"

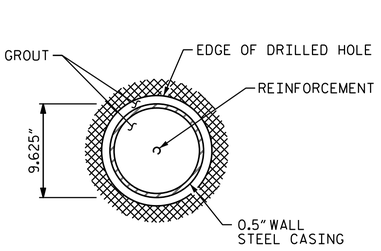


SECTION A-A



MICROPILE DETAIL

(TYP. EA. MICROPILE)



SECTION C-C

PROJECT NO. BP14-R014

SWAIN COUNTY

STATION: 12+45.82 -L-

SHEET 4 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1 DETAILS

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL SEAL 044167 7/20/2026 ENGINEER ELIZABETH F. LAWES

DocuSigned by: Elizabeth F. Lawes 935E64223CD547C...

WSP USA Inc.
434 FAYETTEVILLE STREET
SUITE 1500
RALEIGH, NC 27601
TEL: 1.919.836.4040

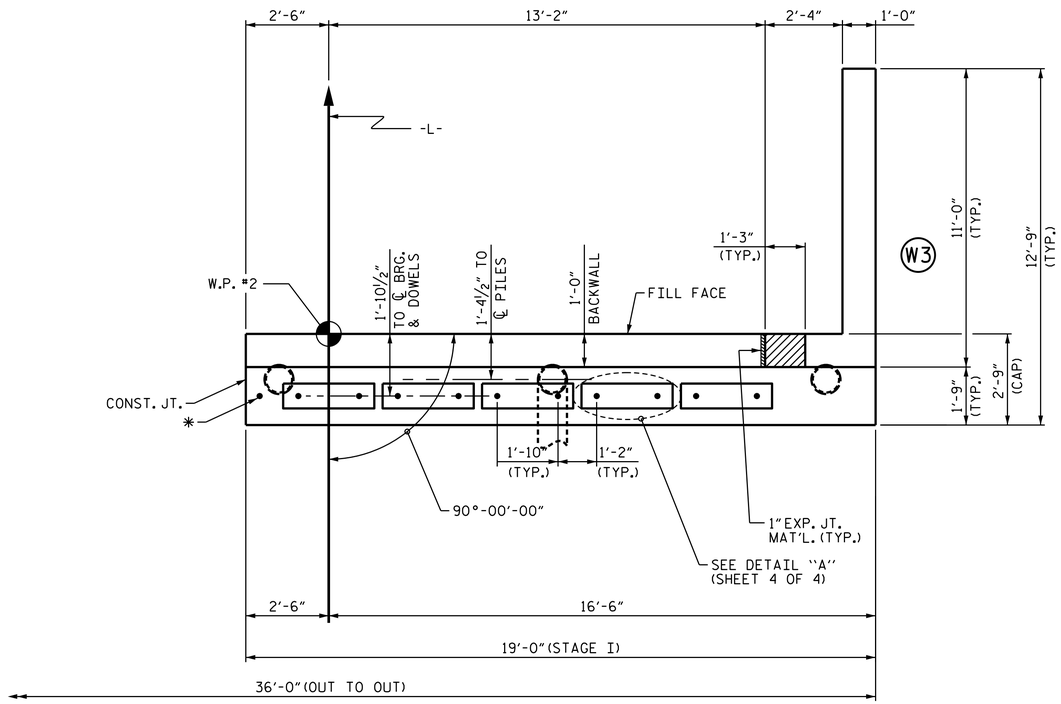
LICENSE NO. F-0165

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-18
1			3			TOTAL SHEETS
2			4			25

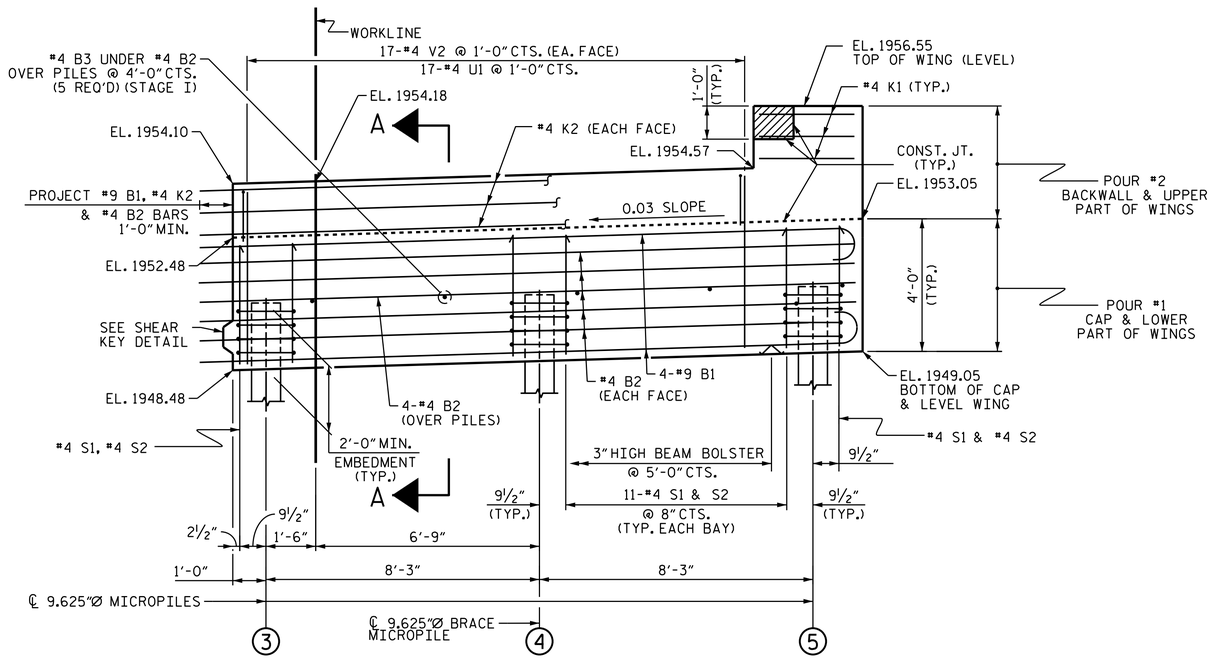
DESIGNED BY:	E.LAWES	DATE : OCT 2024
DRAWN BY:	E.LAWES	DATE : APR 2026
CHECKED BY:	P.GALLAGHER	DATE : APR 2026
DESIGN ENGINEER OF RECORD:	E.LAWES	DATE : APR 2026

7/20/2026
401_033_BP14_R014_SMU_EB104_17.dgn

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PLAN



ELEVATION

WINGS NOT SHOWN FOR CLARITY.
FOR SECTION A-A, SEE SHEET 2 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 WING DETAILS, SEE SHEET 3 OF 4.

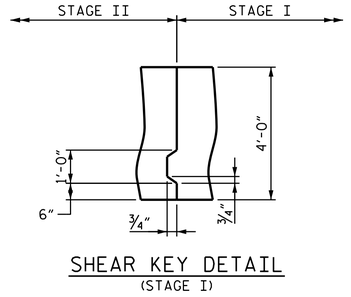
THE CONTRACTOR'S ATTENTION IS CALLED TO THE FACT THAT THE LENGTHS OF THE #9 AND #4 HORIZONTAL BARS AT THE CONSTRUCTION JOINT MAY NEED TO BE ADJUSTED DUE TO THE TYPE OF MECHANICAL BUTT SPLICE CHOSEN BY THE CONTRACTOR. NO ADDITIONAL PAYMENT WILL BE MADE FOR ANY ADJUSTMENTS.

MECHANICAL COUPLERS SHALL BE USED TO JOIN THE #9 AND #4 HORIZONTAL BARS IN STAGE I WITH THE #9 AND #4 HORIZONTAL BARS IN STAGE II IN BOTH THE END BENT CAPS AND BACKWALLS. THE LOCATION OF THE COUPLERS SHALL BE STAGGERED ON ALTERNATING BY 1 FOOT AND THE BARS SHALL BE CUT ACCORDINGLY TO ALLOW A MINIMUM OF 1'-0" INTO STAGE II CONSTRUCTION.

FOR MECHANICAL COUPLERS, SEE MECHANICAL BUTT SPLICES FOR REINFORCING STEEL IN STANDARD SPECIFICATIONS.

* THE CONTRACTOR'S ATTENTION IS CALLED TO THE FACT THAT THIS DOWEL MAY BE PLACED IN STAGE I OR DRILLED AND GROUTED IN STAGE II.

TOP OF PILE ELEVATIONS	
③	1950.52
④	1950.77
⑤	1951.02



SHEAR KEY DETAIL
(STAGE I)

PROJECT NO. BP14-R014
SWAIN COUNTY
STATION: 12+45.82 -L-

SHEET 1 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
END BENT 2
(STAGE I)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-19
1			3			TOTAL SHEETS
2			4			25

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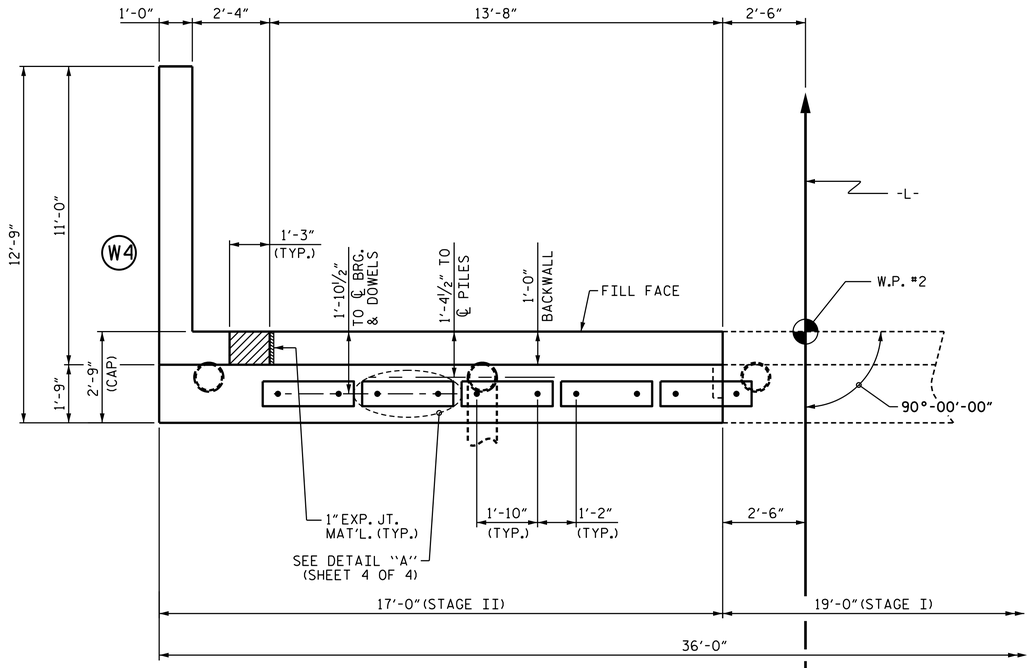
NORTH CAROLINA PROFESSIONAL SEAL 044167 7/20/2026 ENGINEER ELIZABETH F. LAWES
DocuSigned by: Elizabeth F. Lawes 935E84223CD547C...

WSP USA Inc.
434 FAYETTEVILLE STREET
SUITE 1500
RALEIGH, NC 27601
TEL: 1.919.836.4040
LICENSE NO. F-0165

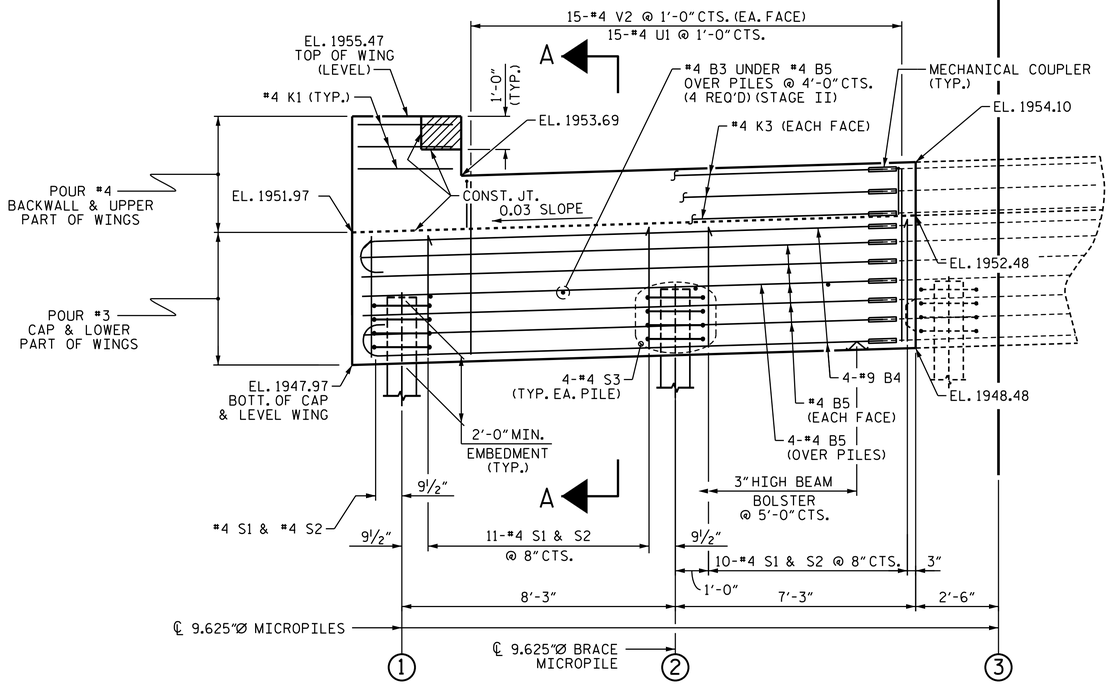
DESIGNED BY:	E.LAWES	DATE :	OCT 2024
DRAWN BY:	E.LAWES	DATE :	APR 2026
CHECKED BY:	P.GALLAGHER	DATE :	APR 2026
DESIGN ENGINEER OF RECORD:	E.LAWES	DATE :	APR 2026

7/20/2026
401_035_BP14_R014_SMU_EB201_18.dgn

Docusign Envelope ID: 6EB0A136-41FC-8933-808B-013E80A18744



PLAN

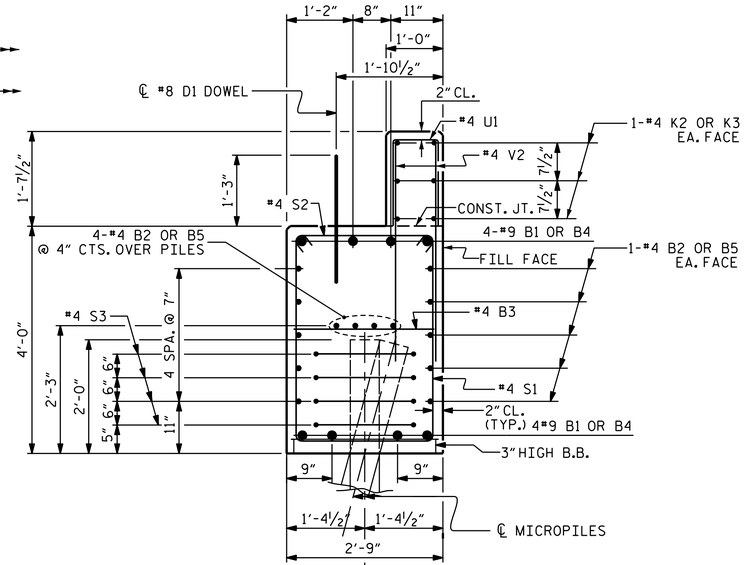


ELEVATION

WINGS NOT SHOWN FOR CLARITY.

NOTES

FOR NOTES, SEE SHEET 1 OF 4.



SECTION A-A

TOP OF PILE ELEVATIONS	
①	1950.03
②	1950.27

PROJECT NO. BP14-R014

SWAIN COUNTY

STATION: 12+45.82 -L-

SHEET 2 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2 (STAGE II)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL SEAL 044167 7/20/2026 ENGINEER ELIZABETH F. LAWES

DocuSigned by: Elizabeth F. Lawes 935E64223CD547C...

WSP USA Inc.
434 FAYETTEVILLE STREET
SUITE 1500
RALEIGH, NC 27601
TEL: 1.919.836.4040

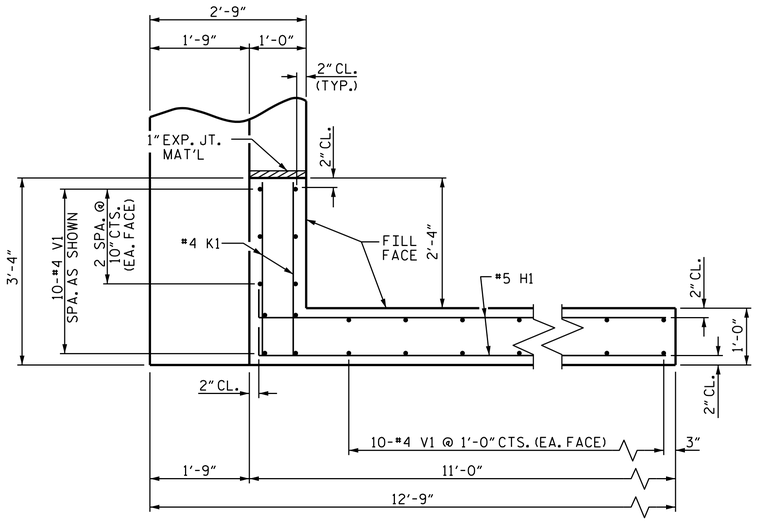
LICENSE NO. F-0165

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-20
1			3			TOTAL SHEETS
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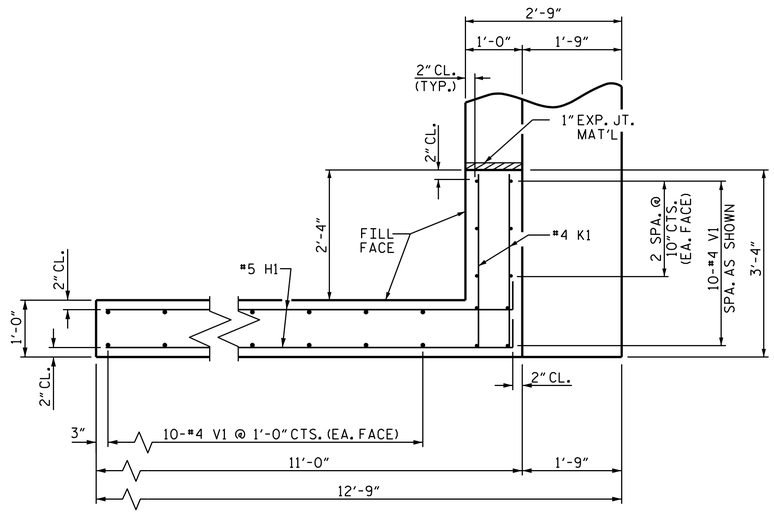
DESIGNED BY:	E. LAWES	DATE : OCT 2024
DRAWN BY:	E. LAWES	DATE : APR 2026
CHECKED BY:	P. GALLAGHER	DATE : APR 2026
DESIGN ENGINEER OF RECORD:	E. LAWES	DATE : APR 2026

7/20/2026
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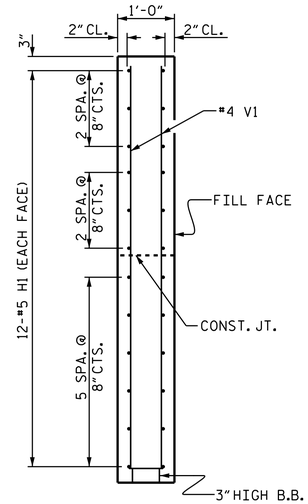
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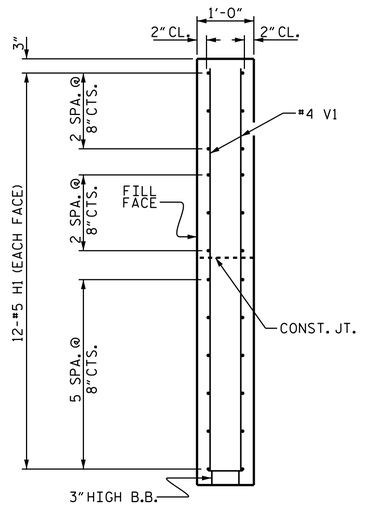
PLAN OF WING (W3)



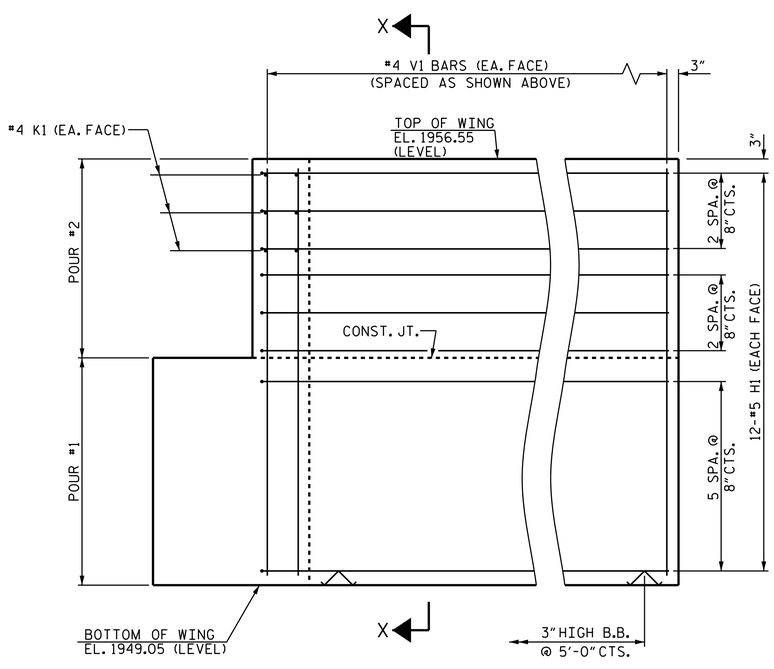
PLAN OF WING (W4)



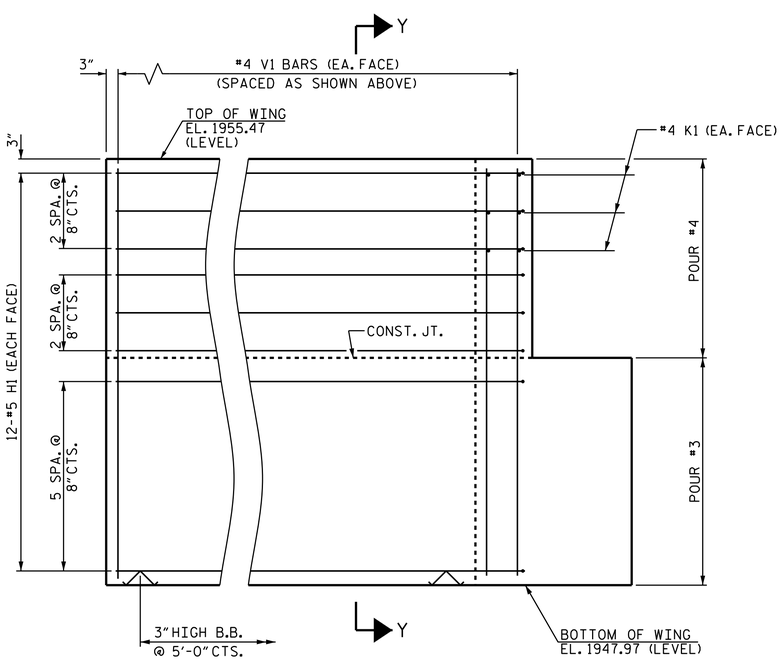
SECTION X-X



SECTION Y-Y



ELEVATION OF WING (W3)



ELEVATION OF WING (W4)

WING DETAILS

DRAWN BY : WJH 12/11	REV. 4/15	MAA/TMG	
CHECKED BY : AAC 12/11			
DESIGNED BY: E. LAWES	DATE : OCT 2024		
DRAWN BY: E. LAWES	DATE : APR 2026		
CHECKED BY: P. GALLAGHER	DATE : APR 2026		
DESIGN ENGINEER OF RECORD: E. LAWES	DATE : APR 2026		

7/20/2026
401.039_BP14_R014_SMU_EB203_20.dgn

WSP USA Inc.
434 FAYETTEVILLE STREET
SUITE 1500
RALEIGH, NC 27601
TEL: 1.919.836.4040
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NORTH CAROLINA PROFESSIONAL SEAL 044167 7/20/2026 ENGINEER ELIZABETH F. LAWES
DocuSigned by: Elizabeth F. Lawes 935E84223CD547C...

PROJECT NO. BP14-R014
SWAIN COUNTY
STATION: 12+45.82 -L-

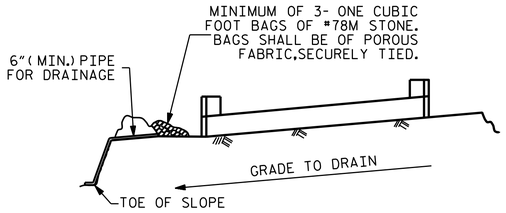
SHEET 3 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
END BENT 2
WING DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-21
1			3			TOTAL SHEETS
2			4			25

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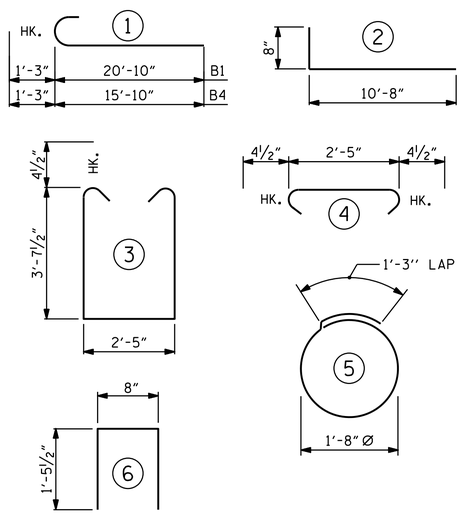
BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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

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

TEMPORARY DRAINAGE AT END BENT

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL — STAGE I

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#9	1	22'-1"	601
B2	14	#4	STR	20'-10"	195
B3	5	#4	STR	2'-5"	8
D1	10	#8	STR	2'-3"	60
H1	24	#5	2	11'-4"	284
K1	6	#4	STR	2'-11"	12
K2	6	#4	STR	20'-10"	84
S1	24	#4	3	10'-5"	167
S2	24	#4	4	3'-2"	51
S3	12	#4	5	6'-6"	52
U1	17	#4	6	3'-7"	41
V1	30	#4	STR	7'-2"	144
V2	34	#4	STR	5'-3"	119

REINFORCING STEEL (END BENT 2 - STAGE I) 1818 LBS.

CLASS A CONCRETE BREAKDOWN (STAGE I)

POUR #1	BACKWALL & UPPER PART OF WINGS	9.2 C.Y.
POUR #2	CAP, LOWER PART OF WINGS	2.7 C.Y.
TOTAL CLASS A CONCRETE		11.9 C.Y.

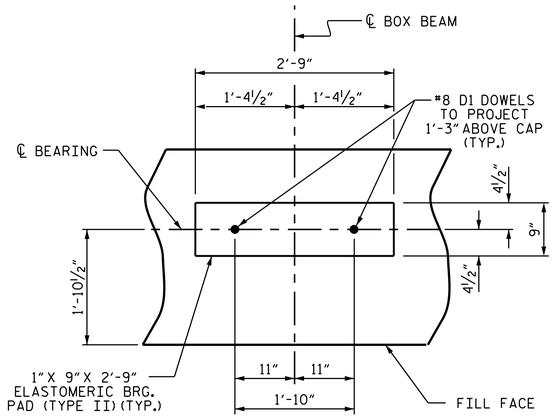
BILL OF MATERIAL — STAGE II

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B3	4	#4	STR	2'-5"	6
B4	8	#9	1	17'-1"	465
B5	14	#4	STR	15'-10"	148
D1	10	#8	STR	2'-3"	60
H1	24	#5	2	11'-4"	284
K3	6	#4	STR	15'-10"	63
S1	22	#4	3	10'-5"	153
S2	22	#4	4	3'-2"	47
S3	8	#4	5	6'-6"	35
U1	15	#4	6	3'-7"	36
V1	30	#4	STR	7'-2"	144
V2	30	#4	STR	5'-3"	105

REINFORCING STEEL (END BENT 2 - STAGE II) 1558 LBS.

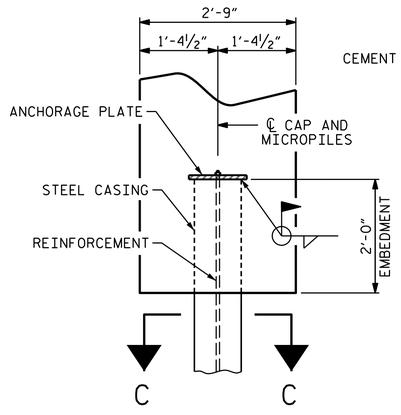
CLASS A CONCRETE BREAKDOWN (STAGE II)

POUR #3	BACKWALL & UPPER PART OF WINGS	8.4 C.Y.
POUR #4	CAP, LOWER PART OF WINGS	2.6 C.Y.
TOTAL CLASS A CONCRETE		11.0 C.Y.



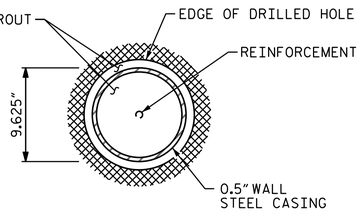
DETAIL "A"

(END BENT 1 SHOWN, END BENT 2 SIMILAR BY ROTATION)



MICROPILE DETAIL

(TYP. EA. MICROPILE)



SECTION C-C

PROJECT NO. BP14-R014

SWAIN COUNTY

STATION: 12+45.82 -L-

SHEET 4 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2 DETAILS

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL SEAL 044167 7/20/2026 ENGINEER ELIZABETH F. LAWES

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-22
1			3			TOTAL SHEETS
2			4			25

DESIGNED BY:	E. LAWES	DATE : OCT 2024
DRAWN BY:	E. LAWES	DATE : APR 2026
CHECKED BY:	P. GALLAGHER	DATE : APR 2026
DESIGN ENGINEER OF RECORD:	E. LAWES	DATE : APR 2026

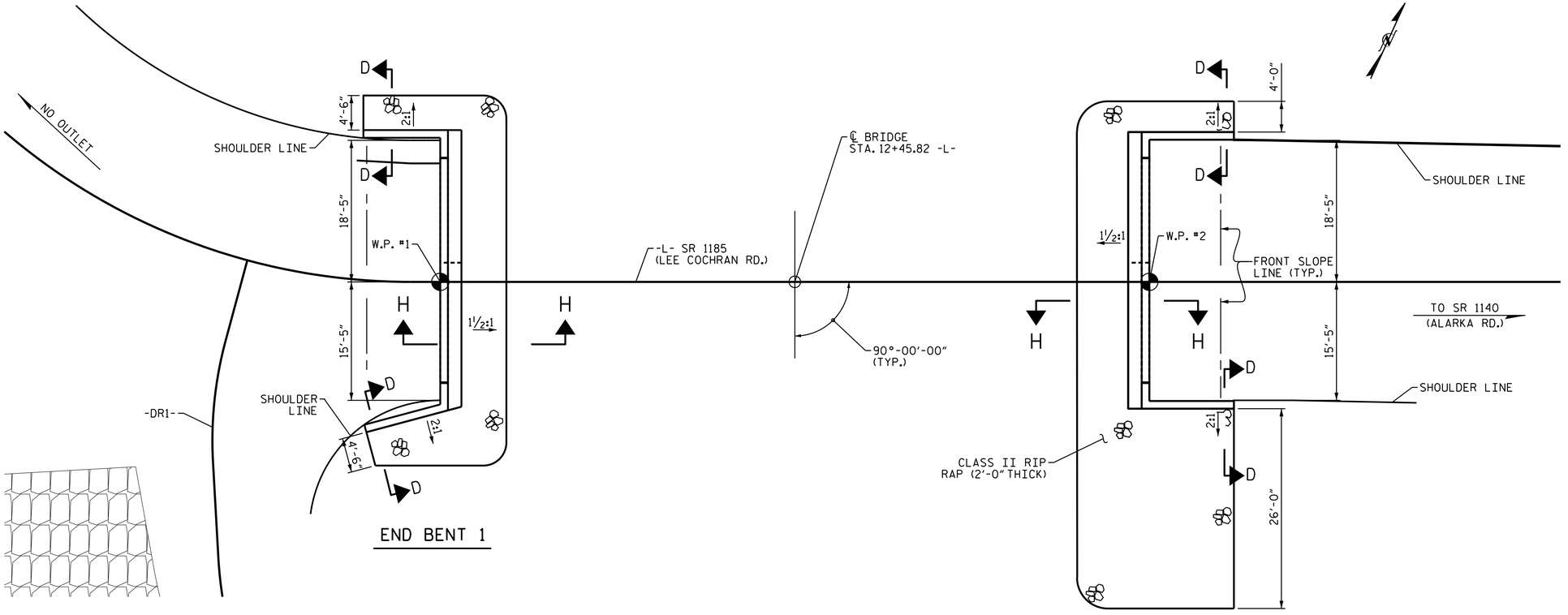
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RALEIGH, NC 27601
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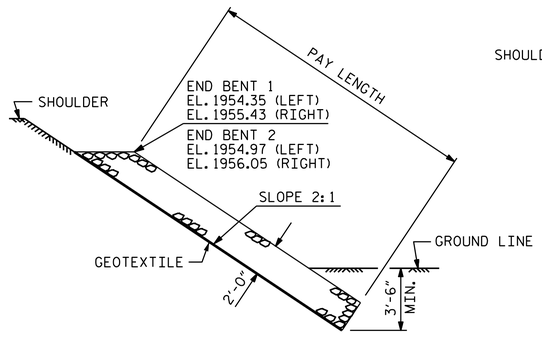
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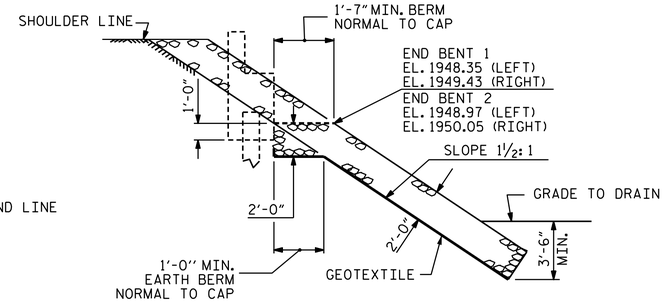
FOR BERM WIDTH DIMENSIONS, SEE GENERAL DRAWING.



PLAN



SECTION D-D



SECTION H-H

ESTIMATED QUANTITIES		
BRIDGE @ STA. 12+45.82 -L-	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE
	TONS	SQUARE YARDS
END BENT 1	78	87
END BENT 2	137	152

PROJECT NO. BP14-R014

SWAIN COUNTY

STATION: 12+45.82 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

RIP RAP DETAILS

DESIGNED BY:	E. LAWES	DATE :	OCT 2024
DRAWN BY:	E. LAWES	DATE :	APR 2026
CHECKED BY:	P. GALLAGHER	DATE :	APR 2026
DESIGN ENGINEER OF RECORD:	E. LAWES	DATE :	APR 2026

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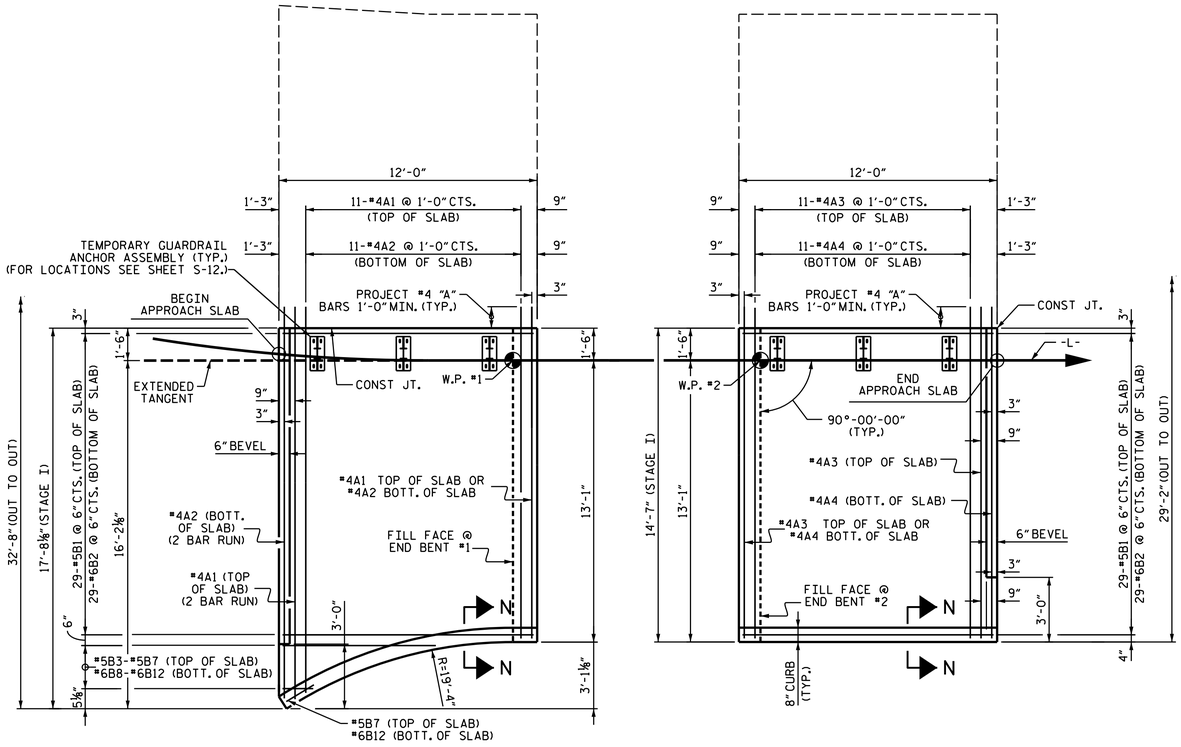
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 044167 7/20/2026 ELIZABETH F. LAWES

DocuSigned by: Elizabeth F. Lawes 935E64223CD547C...

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2			4			25

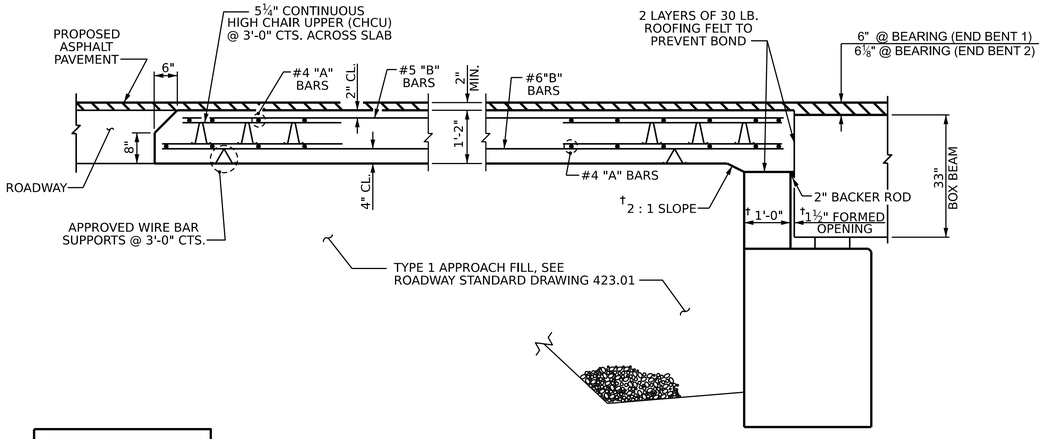
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PLAN @ END BENT 1 - STAGE I

PLAN @ END BENT 2 - STAGE I



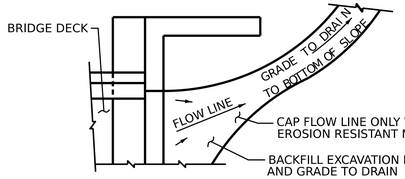
† NORMAL TO END BENT

SECTION THRU SLAB

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

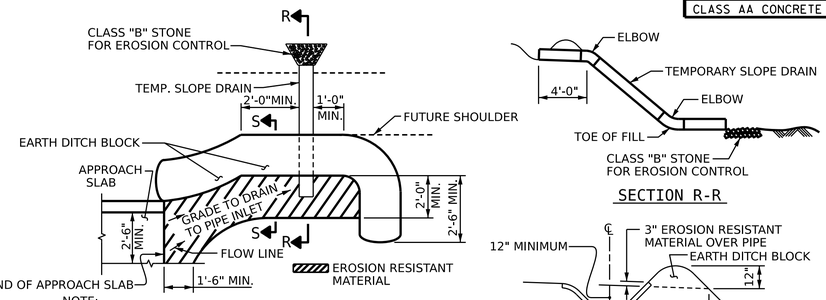
NOTES

FOR NOTES, SEE SHEET 2 OF 2.



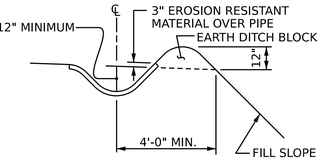
NOTE: IF THE APPROACH SLAB IS NOT CONSTRUCTED IMMEDIATELY AFTER THE BACKFILLING OF THE END BENT EXCAVATION, GRADE TO DRAIN TO THE BOTTOM OF THE SLOPE AND PROVIDE EROSION RESISTANT MATERIAL, SUCH AS FIBERGLASS ROVING OR AS DIRECTED BY THE ENGINEER TO PREVENT SOIL EROSION AND TO PROTECT THE AREA ADJACENT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

SECTION R-R

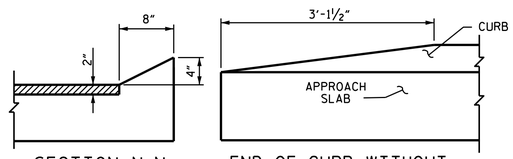


SECTION S-S

PLAN VIEW

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					
APP. SLAB AT EB 1 - STAGE I					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱ A1	13	#4	STR	19'-3"	167
A2	13	#4	STR	19'-3"	167
✱ B1	29	#5	STR	11'-2"	338
B2	29	#6	STR	11'-8"	508
✱ B3	1	#5	STR	7'-1"	7
✱ B4	1	#5	STR	5'-0"	5
✱ B5	1	#5	STR	3'-7"	4
✱ B6	1	#5	STR	2'-5"	3
✱ B7	2	#5	STR	1'-6"	3
B8	1	#6	STR	7'-1"	11
B9	1	#6	STR	5'-0"	8
B10	1	#6	STR	3'-7"	5
B11	1	#6	STR	2'-5"	4
B12	2	#6	STR	1'-6"	5
REINFORCING STEEL				LBS.	708
✱ EPOXY COATED REINFORCING STEEL				LBS.	527
CLASS AA CONCRETE				C.Y.	8.2
APP. SLAB AT EB 2 - STAGE I					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱ A3	13	#4	STR	16'-5"	143
A4	13	#4	STR	16'-5"	143
✱ B1	29	#5	STR	11'-2"	338
B2	29	#6	STR	11'-8"	508
REINFORCING STEEL				LBS.	651
✱ EPOXY COATED REINFORCING STEEL				LBS.	481
CLASS AA CONCRETE				C.Y.	7.7

PROJECT NO. BP14-R014

SWAIN COUNTY

STATION: 12+45.82 -L-

SHEET 1 OF 2

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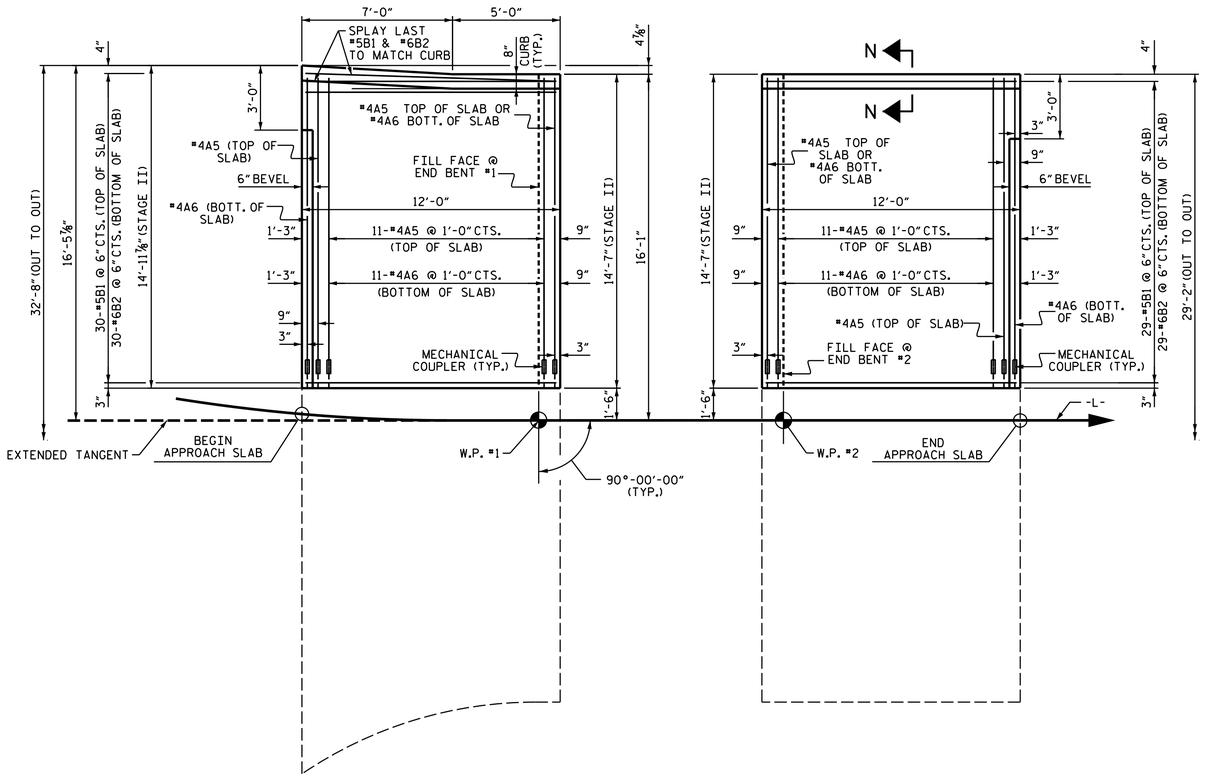
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

BRIDGE APPROACH SLAB FOR PRESTRESSED CONCRETE BOX BEAM UNIT (STAGE I) (SUB-REGIONAL TIER) 90° SKEW

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PLAN @ END BENT 1 - STAGE II

PLAN @ END BENT 2 - STAGE II

NOTES

FOR BRIDGE APPROACH FILL, SEE ROADWAY PLANS.

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.

THE CONTRACTOR'S ATTENTION IS CALLED TO THE FACT THAT THE LENGTHS OF THE #4 "A" BARS AT THE CONSTRUCTION JOINT MAY NEED TO BE ADJUSTED DUE TO THE TYPE OF MECHANICAL BUTT SPLICE CHOSEN BY THE CONTRACTOR. NO ADDITIONAL PAYMENT WILL BE MADE FOR ANY ADJUSTMENTS.

MECHANICAL COUPLERS SHALL BE USED TO JOIN THE #4 "A" BARS IN STAGE I WITH THE #4 "A" BARS IN STAGE II. THE LOCATION OF THE COUPLERS SHALL BE STAGGERED ON ALTERNATING BARS BY 1 FOOT AND THE BARS SHALL BE CUT ACCORDINGLY TO ALLOW A MINIMUM OF 1'-0" EXTENSION INTO STAGE II CONSTRUCTION.

FOR MECHANICAL COUPLERS, SEE MECHANICAL BUTT SPLICES FOR REINFORCING STEEL IN THE STANDARD SPECIFICATIONS.

FOR DETAILS, SEE SHEET 1 OF 2.

BILL OF MATERIAL

APP. SLAB AT EB 1 - STAGE II

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱ A5	13	#4	STR	13'-5"	117
A6	13	#4	STR	13'-5"	117
✱ B1	30	#5	STR	11'-2"	349
B2	30	#6	STR	11'-8"	526
REINFORCING STEEL				LBS.	643
✱ EPOXY COATED REINFORCING STEEL				LBS.	466
CLASS AA CONCRETE				C.Y.	8.0

APP. SLAB AT EB 2 - STAGE II

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱ A5	13	#4	STR	13'-5"	117
A6	13	#4	STR	13'-5"	117
✱ B1	29	#5	STR	11'-2"	338
B2	29	#6	STR	11'-8"	508
REINFORCING STEEL				LBS.	625
✱ EPOXY COATED REINFORCING STEEL				LBS.	455
CLASS AA CONCRETE				C.Y.	7.7

DESIGNED BY:	E. LAWES	DATE: OCT 2024
DRAWN BY:	E. LAWES	DATE: APR 2026
CHECKED BY:	P. GALLAGHER	DATE: APR 2026
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PROJECT NO. BP14-R014

SWAIN COUNTY

STATION: 12+45.82 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

BRIDGE APPROACH SLAB FOR PRESTRESSED CONCRETE BOX BEAM UNIT (STAGE II)
(SUB-REGIONAL TIER)
90° SKEW

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8/26/21

STANDARD NOTES

DESIGN DATA:

SPECIFICATIONS	AASHTO (CURRENT)
LIVE LOAD	SEE PLANS
IMPACT ALLOWANCE	SEE AASHTO
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 AASHTO
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 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" ∅ SHEAR STUDS FOR THE ¾" ∅ STUDS SPECIFIED ON THE PLANS. THIS SUBSTITUTION SHALL BE MADE AT THE RATE OF 3 - ⅞" ∅ STUDS FOR 4 - ¾" ∅ STUDS, AND STUD SPACING CHANGES SHALL BE MADE AS NECESSARY TO PROVIDE THE SAME EQUIVALENT NUMBER OF ⅞" ∅ STUDS ALONG THE BEAM AS SHOWN FOR ¾" ∅ STUDS BASED ON THE RATIO OF 3 - ⅞"∅ STUDS FOR 4 - ¾" ∅ 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" 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.