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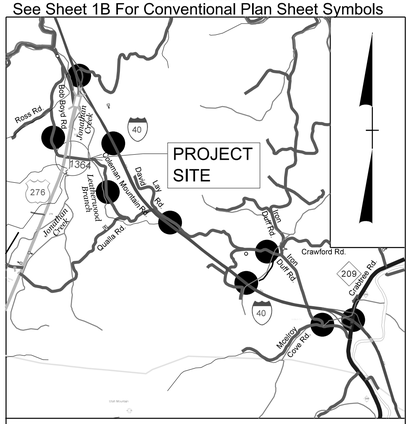
09/08/99

CONTRACT: DN01098 BRIDGE PROJECT: DF18314.2044188

See Sheet 1A For Index of Sheets
See Sheet 1B For Conventional Plan Sheet Symbols



VICINITY MAP (NTS)

DETOUR ROUTE

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

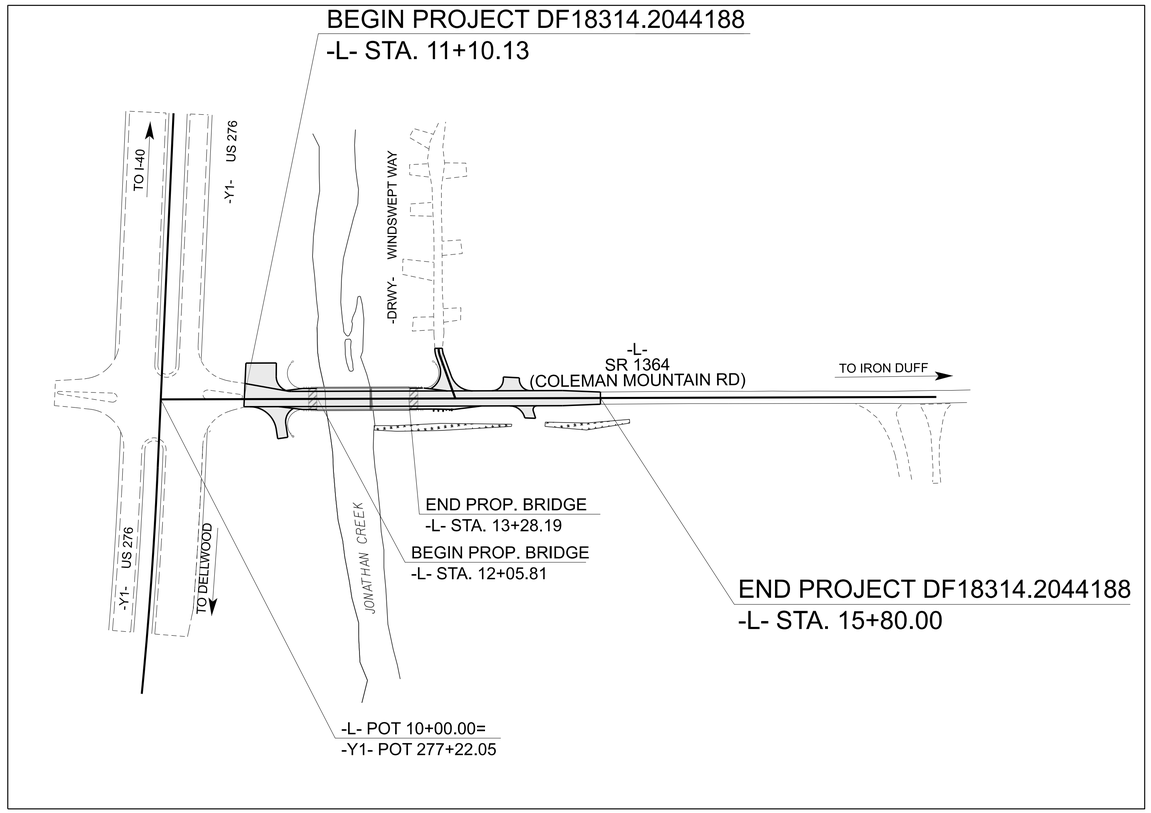
HAYWOOD COUNTY

LOCATION: *REPLACE BRIDGE #430046 ON SR 1364 (COLEMAN MOUNTAIN ROAD) OVER JONATHAN CREEK*

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	DF18314.2044188	1	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
DF18314.2044188	N/A	PE
DF18314.2044188	N/A	ROW & UTILITY
DF18314.2044188	N/A	CONSTRUCTION



DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DESIGN DATA

ADT 2019 = 650
ADT 2025 = 650
--
--
--
V = 35 MPH
* TTST =-- DUAL --
FUNC CLASS =
LOCAL
SUBREGIONAL TIER

PROJECT LENGTH

PROJECT LENGTHS FOR BRIDGE PROJECT DF18314.2044188:

LENGTH ROADWAY PROJECT DF18314.2044188 = 0.066 MILES

LENGTH STRUCTURES PROJECT DF18314.2044188 = 0.023 MILES

TOTAL LENGTH PROJECT DF18314.2044188 = 0.089 MILES

NCDOT Contact: ZACH SHULER, P.E.

Prepared in the Office of: vhb — VHB Engineering NC, P.C. (C-3705) 940 Main Campus Drive, Suite 500 Raleigh, NC 27606

2024 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: JANUARY 13, 2025

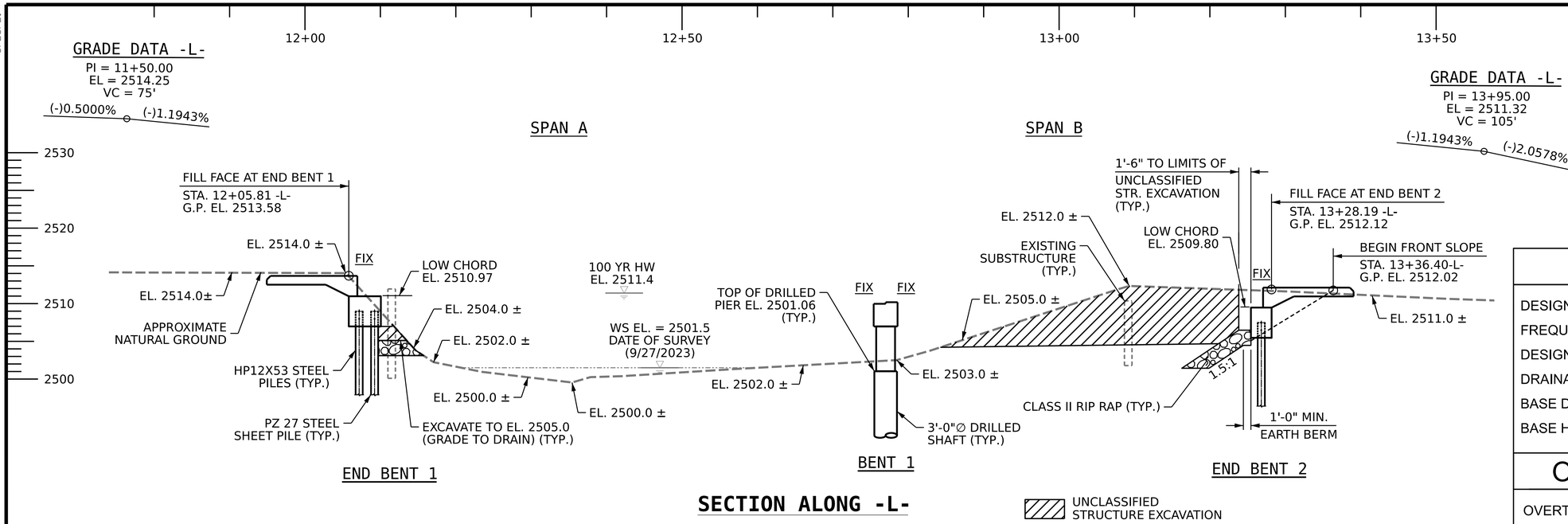
LETTING DATE: AUGUST 12, 2025

ELIZABETH PHELPS, PE
PROJECT ENGINEER

STRUCTURES ENGINEER

W. KEVIN FISCHER, PE
SIGNATURE:

8/26/21



SECTION ALONG -L-

I HEREBY CERTIFY THESE PLANS
ARE THE AS-BUILT PLANS

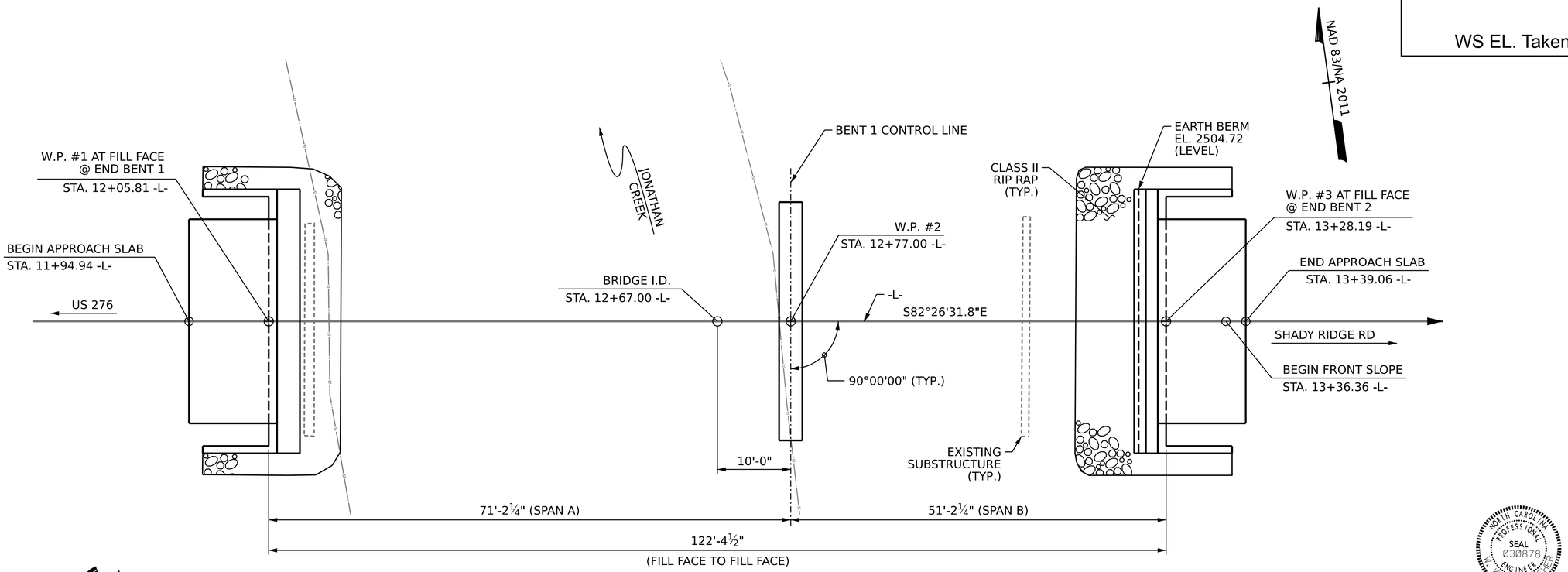
HYDRAULIC DATA

DESIGN DISCHARGE	= 4200 C.F.S.
FREQUENCY OF DESIGN FLOOD	= 5 YR.
DESIGN HIGH WATER ELEVATION	= 2508.6
DRAINAGE AREA	= 54.3 SQ. MI.
BASE DISCHARGE (Q100)	= 9900 C.F.S.
BASE HIGH WATER ELEVATION	= 2511.4

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE	= 4968 C.F.S.
FREQUENCY OF OVERRTOPPING FLOOD	= 5+ YR.
OVERTOPPING FLOOD ELEVATION	= 2508.8

WS EL. Taken @ River Station 20522



PLAN

(PILES NOT SHOWN FOR CLARITY)

vhb
VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

PROJECT NO. DF18314.2044188

HAYWOOD COUNTY

STATION: 12+67.00 -L-

SHEET 1 OF 3 REPLACES BRIDGE NO. 430046

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR BRIDGE OVER
JONATHAN CREEK ON SR 1364
(COLEMAN MOUNTAIN RD)
BETWEEN US 276 AND
SHADY RIDGE RD

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

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 030878 KEVIN K. FISCHER
Docusigned by: kevin fischer 12/20/2024 | 12/20/2025
339FA2D658AB4DC...

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DRAWN BY : D.B. HINNANT DATE : 10/2024
CHECKED BY : E.C. PHELPS DATE : 10/2024
DESIGN ENGINEER OF RECORD: W.K. FISCHER DATE : 12/2024

1/20/2025
c:\bims\vhb-pw-01\d0193294\401_001_BP14R030_SMU_GD01_S1-01_430046.dgn
ephelps

SUMMARY OF PILE INFORMATION/INSTALLATION

(Blank entries indicate item is not applicable to structure)

End Bent / Bent No, Pile(s) #(-#) (e.g., "Bent 1, Piles 1-5")	Number of Piles per Line	Factored Resistance per Pile KIPS	Pile Cut-Off (Top of Pile) Elevation FT	Estimated Pile Length per Pile FT	Scour Critical Elevation FT	Driven Piles			Predrilling for Piles **			Drilled-In Piles		
						Minimum Pile Tip (Tip No Higher Than) Elevation FT	Required Driving Resistance (RDR)* per pile KIPS	Pile Redrives Quantity EACH	Predrilling Length per Pile LIN FT	Predrilling Elevation (Elevation Not To Predrill Below) FT	Maximum Predrilling Diameter INCHES	Pile Excavation (Bottom of Hole) Elevation FT	Pile Excavation Not In Soil per Pile LIN FT	Pile Excavation In Soil per Pile LIN FT
End Bent 1, Piles 1-5	5	195		35			325							
End Bent 2, Piles 1-5	5	162		15			270							
TOTAL QUANTITY:														

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

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

PILE DESIGN INFORMATION

(Blank entries indicate item is not applicable to structure)

End Bent / Bent No, Pile(s) #(-#) (e.g., "Bent 1, Piles 1-5")	Factored Axial Load per Pile KIPS	Factored Drag Load per Pile KIPS	Factored Dead Load * per Pile KIPS	Dynamic Resistance Factor	Nominal Drag Resistance per Pile KIPS	Nominal Scour Resistance per Pile KIPS
End Bent 1, Piles 1-5	194			0.6		
End Bent 2, Piles 1-5	162			0.6		

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

SUMMARY OF PILE ACCESSORIES

(Blank entries indicate item is not applicable to structure)

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

DRILLED PIER PILOT BORING

(Blank entries indicate item is not applicable to structure)

End Bent / Bent No, Pier(s) #(-#) (e.g., "Bent 1, Piers 1-3")	Pilot Boring EACH	Pilot Boring Minimum Penetration Into Rock per Boring LIN FT
Bent 1	3	15
TOTAL QUANTITY:	3	45

SUMMARY OF DRILLED PIER INFORMATION/INSTALLATION

(Blank entries indicate item is not applicable to structure)

End Bent / Bent No, Pier(s) #(-#) (e.g., "Bent 1, Piers 1-3")	Number of Piers per Line	Factored Resistance per Pier KIPS	Estimated Required Drilled Pier Tip Elevation FT ***	Required Tip Resistance per Pier KSF	Scour Critical Elevation FT ***	Minimum Drilled Pier Penetration Into Rock per Pier LIN FT	Estimated Drilled Pier Length* per Pier LIN FT ***	Drilled Pier Length Not In Soil* per Pier LIN FT	Drilled Pier Length In Soil* per Pier LIN FT	Permanent Steel Casing Required? YES	Permanent Steel Casing Tip Elevation (Elevation Not To Extend Casing Below) FT	Permanent Steel Casing Length** per Pier LIN FT
Bent 1, Piers 1-3	3	800	2470	0		7	31					
TOTAL QUANTITY:							93					

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

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

*** For bid purposes only. Pilot borings are required at each drilled pier location to determine the required tip no higher than elevation, scour critical elevation, and total drilled pier length. See Drilled Pier Pilot Boring Special Provision for details.

NOTES:

1. The Pile Foundation Tables are based on the bridge substructure design and foundation recommendations sealed by a North Carolina Professional Engineer (Shiping Yang, #031361) on 012-9-2024.
2. Total Pile Driving Equipment Setup quantity (not shown in Pile Foundation Tables) equals the number of driven piles, i.e., the number of piles with a Required Driving Resistance.
3. The Engineer may adjust the quantity for DPT Testing, Pipe Pile Plates, Permanent Steel Casing, SPTs, TIPs, CSL Testing, SID Inspections and PITs when necessary.

PROJECT NO. I44188

Haywood COUNTY

STATION: 12+67.00 -L-

Bridge #46

DocuSigned by: Kevin Fischer 1/22/2025 SIGNATURE DATE

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

PILE AND DRILLED PIER FOUNDATION TABLES

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

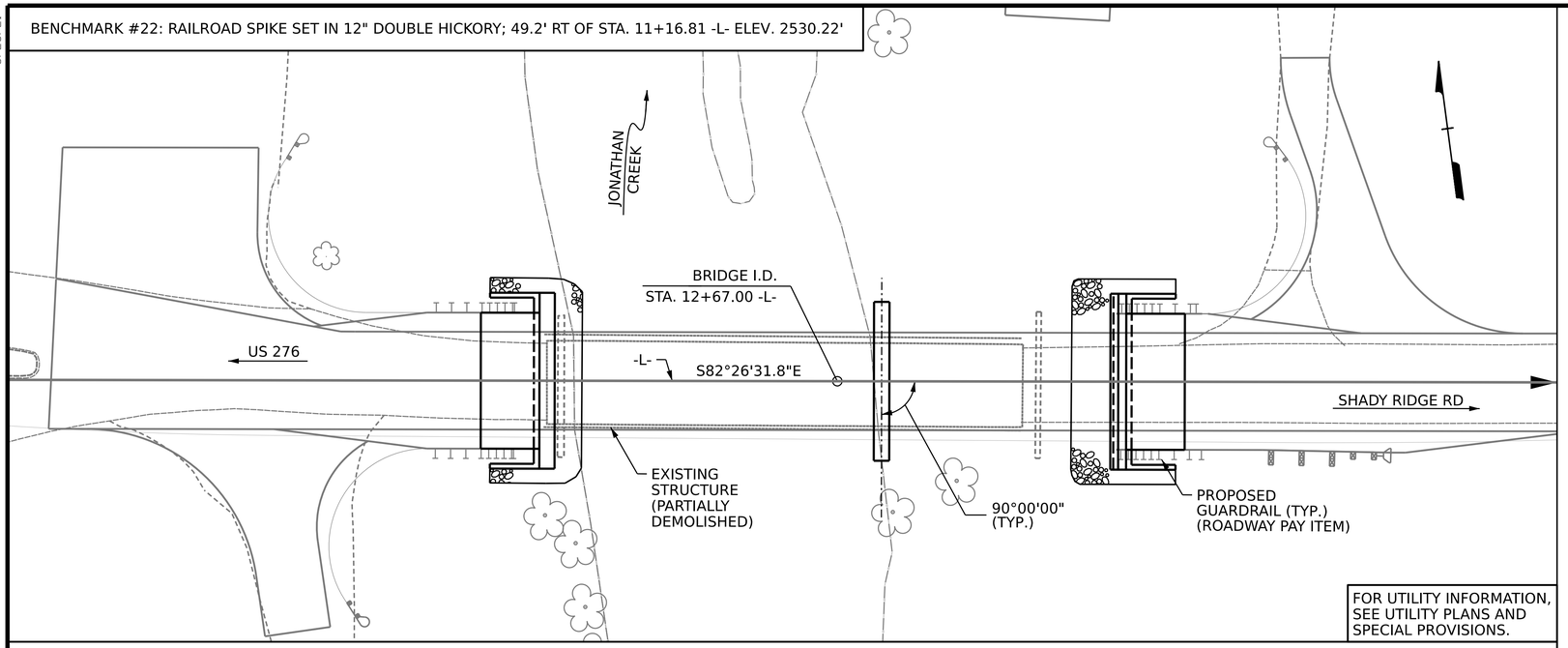
REVISIONS

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

SHEET NO. S-2

TOTAL SHEETS 21

8/26/21



- LOCATION SKETCH -

TOTAL BILL OF MATERIAL

	REMOVAL OF EXISTING STRUCTURE	ASBESTOS ASSESSMENT	3'-0" DIA. DRILLED PIERS IN SOIL	3'-0" DIA. DRILLED PIERS NOT IN SOIL	PERMANENT STEEL CASING FOR 3'-0" ∅ DRILLED PIER	SID INSPECTIONS	CSL TESTING	UNCLASSIFIED STRUCTURE EXCAVATION	CLASS A CONCRETE	BRIDGE APPROACH SLABS	REINFORCING STEEL
	LUMP SUM	LUMP SUM	LIN. FT	LIN. FT	LIN. FT	EACH	EACH	LUMP SUM	CU. YDS.	LUMP SUM	LBS
SUPERSTRUCTURE										LUMP SUM	
END BENT 1								LUMP SUM	26.9		2,611
BENT 1			72.2	21	72.2	1	1		15.2		10,254
END BENT 2								LUMP SUM	20.0		2,449
TOTAL	LUMP SUM	LUMP SUM	72.2	21	72.2	1	1	LUMP SUM	62.1	LUMP SUM	15,314

TOTAL BILL OF MATERIAL

	SPIRAL COLUMN REINFORCING STEEL	PILE DRIVING EQUIPMENT SETUP FOR HP 12X53 STEEL PILES	HP 12X53 STEEL PILES		SHEET PILE RETAINING WALLS	VERTICAL CONCRETE BARRIER RAIL	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE	ELASTOMERIC BEARINGS	3'-0" x 1'-9" PRESTRESSED CORED SLAB UNITS		3'-0" x 2'-0" PRESTRESSED CORED SLAB UNITS	
	LBS	EACH	NO.	LIN. FT.	SQ. FT.	LIN. FT.	TONS	SQ. YDS.	LUMP SUM	NO.	LIN. FT.	NO.	LIN. FT.
SUPERSTRUCTURE						240.5			LUMP SUM	10	500	10	700
END BENT 1		5	5	175	2,042		31	46					
BENT 1	1,979												
END BENT 2		5	5	75			70	77					
TOTAL	1,979	10	10	250	2,042	240.5	101	123	LUMP SUM	10	500	10	700

vhb
VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

DRAWN BY : E.C. PHELPS DATE : 11/2024
CHECKED BY : W.K. FISCHER DATE : 11/2024
DESIGN ENGINEER OF RECORD: W.K. FISCHER DATE : 12/2024

1/21/2025
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chonigman

NOTES

1. ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.
2. THIS BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.
3. THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.
4. FOR OTHER DESIGN DATA AND GENERAL NOTES, SEE SHEET SN.
5. FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.
6. THE SUBSTRUCTURES 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 SUBSTRUCTURES SHOWN ON THE PLANS AND ACTUAL CONDITIONS AT THE PROJECT SITE.
7. REMOVAL OF THE EXISTING BRIDGE SHALL BE PERFORMED IN A MANNER THAT PREVENTS DEBRIS FROM FALLING INTO THE WATER. THE CONTRACTOR SHALL SUBMIT DEMOLITION PLANS FOR REVIEW AND REMOVE THE BRIDGE IN ACCORDANCE WITH ARTICLE 402-2 OF THE STANDARD SPECIFICATIONS. ALL EXISTING BRIDGE ELEMENTS CURRENTLY IN THE WATER SHALL BE REMOVED.
8. THE EXISTING STRUCTURE #430046 IS CLOSED AND NOT ACCESSIBLE DUE TO THE STRUCTURE FAILING DURING SEVERE FLOOD.
9. FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.
10. FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.
11. FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.
12. FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.
13. THIS STRUCTURE HAS BEEN DESIGNED IN ACCORDANCE WITH "HEC 18-EVALUATING SCOUR AT BRIDGES".
14. 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".
15. THE MATERIAL SHOWN IN THE CROSS-HATCHED AREA ON SHEET S-1 SHALL BE EXCAVATED FOR A DISTANCE 30 FT± (LEFT) AND 33 FT ± (RIGHT) AT THE END BENTS OF THE 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.
16. ASPHALT WEARING SURFACE IS INCLUDED IN ROADWAY QUANTITY ROADWAY PLANS.
17. FOR ASBESTOS ASSESSMENT, SEE SPECIAL PROVISIONS.
18. FOR SHEET PILE RETAINING WALLS, SEE SECTION 452 OF THE STANDARD SPECIFICATIONS.

FOUNDATION NOTES

1. FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.
2. FOR DRILLED PIERS, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.
3. PZ27 SHEETING ARE TO BE DRIVEN IN FRONT OF HP12X53 (STREAM SIDE) AND ALONG THE BRIDGE WINGS AT END BENT NO. 1 AS SHOWN IN THE PLANS.
4. SHEET PILES FOR THE VERTICAL WALLS SHOULD BE DRIVEN TO REFUSAL AT AN ELEVATION OF APPROXIMATELY 2474 FT FOR END BENT NO. 1.
5. THE SCOUR CRITICAL ELEVATION FOR THE SHEET PILES AT END BENT NO. 1 IS 2492 FT. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.
6. DRILLED PIERS AT BENT NO. 1 HAVE AN ESTIMATED TIP NO HIGHER THAN ELEVATION OF 2470 FT FOR BID PURPOSES ONLY.
7. DRILLED PIERS AT BENT NO. 1 REQUIRE PILOT BORINGS THAT WILL BE USED TO DETERMINE THE REQUIRED TIP NO HIGHER THAN ELEVATION. THE ENGINEER WILL REVIEW THE RESULTS INCLUDING ROCK CORES TO DETERMINE THE TIP ELEVATION FOR EACH DRILLED PIER. SEE GEOTECHNICAL SPECIAL PROVISION FOR PILOT BORINGS.
8. THE SCOUR CRITICAL ELEVATIONS FOR BENT NO. 1 WILL BE DETERMINED AFTER PILOT BORINGS ARE DRILLED. THE SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURES.

PROJECT NO. DF18314.2044188
HAYWOOD COUNTY
STATION: 12+67.00 -L-
SHEET 3 OF 3

NORTH CAROLINA PROFESSIONAL SEAL 030878 ENGINEER WILLIAM K. FISCHER
Docusigned by: Kevin Fischer 12/2025
339FA2D658AB4DC...

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR BRIDGE OVER
JONATHANS CREEK ON SR 1364
(COLEMAN MOUNTAIN RD)
BETWEEN US 276 AND
SHADY RIDGE RD

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

8/26/21

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	1.006	--	1.75	0.273	1.03	70'	EL	34.5	0.507	1.32	70'	EL	6.9	0.80	0.273	1.01	70'	EL	34.5	
		HL-93 (OPERATING)	N/A		1.341	--	1.35	0.273	1.34	70'	EL	34.5	0.507	1.72	70'	EL	6.9	N/A	--	--	--	--	--	
		HS-20 (INVENTORY)	36.000	2	1.306	47.02	1.75	0.273	1.34	70'	EL	34.5	0.507	1.65	70'	EL	6.9	0.80	0.273	1.31	70'	EL	34.5	
		HS-20 (OPERATING)	36.000		1.740	62.64	1.35	0.273	1.74	70'	EL	34.5	0.507	2.14	70'	EL	6.9	N/A	--	--	--	--	--	
LEGAL LOAD	SINGLE VEHICLE (SV)	SNSH	13.500		2.917	39.379	1.4	0.273	3.75	70'	EL	34.5	0.507	4.87	70'	EL	6.9	0.80	0.273	2.92	70'	EL	34.5	
		SNGARBS2	20.000		2.187	43.741	1.4	0.273	2.81	70'	EL	34.5	0.507	3.47	70'	EL	6.9	0.80	0.273	2.19	70'	EL	34.5	
		SNAGRIS2	22.000		2.077	45.690	1.4	0.273	2.67	70'	EL	34.5	0.507	3.23	70'	EL	6.9	0.80	0.273	2.08	70'	EL	34.5	
		SNCOTTS3	27.250		1.452	39.565	1.4	0.273	1.87	70'	EL	34.5	0.507	2.43	70'	EL	6.9	0.80	0.273	1.45	70'	EL	34.5	
		SNAGGRS4	34.925		1.218	42.554	1.4	0.273	1.57	70'	EL	34.5	0.507	2.03	70'	EL	6.9	0.80	0.273	1.22	70'	EL	34.5	
		SNS5A	35.550		1.191	42.346	1.4	0.273	1.53	70'	EL	34.5	0.507	2.06	70'	EL	6.9	0.80	0.273	1.19	70'	EL	34.5	
		SNS6A	39.950		1.095	43.747	1.4	0.273	1.41	70'	EL	34.5	0.507	1.88	70'	EL	6.9	0.80	0.273	1.10	70'	EL	34.5	
		SNS7B	42.000		1.043	43.801	1.4	0.273	1.34	70'	EL	34.5	0.507	1.85	70'	EL	6.9	0.80	0.273	1.04	70'	EL	34.5	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.336	44.087	1.4	0.273	1.72	70'	EL	34.5	0.507	2.23	70'	EL	6.9	0.80	0.273	1.34	70'	EL	34.5	
		TNT4A	33.075		1.342	44.401	1.4	0.273	1.72	70'	EL	34.5	0.507	2.17	70'	EL	6.9	0.80	0.273	1.34	70'	EL	34.5	
		TNT6A	41.600		1.100	45.746	1.4	0.273	1.41	70'	EL	34.5	0.507	1.98	70'	EL	6.9	0.80	0.273	1.10	70'	EL	34.5	
		TNT7A	42.000		1.106	46.462	1.4	0.273	1.42	70'	EL	34.5	0.507	1.94	70'	EL	6.9	0.80	0.273	1.11	70'	EL	34.5	
		TNT7B	42.000		1.147	48.180	1.4	0.273	1.47	70'	EL	34.5	0.507	1.80	70'	EL	6.9	0.80	0.273	1.15	70'	EL	34.5	
		TNAGRIT4	43.000		1.089	46.838	1.4	0.273	1.40	70'	EL	34.5	0.507	1.74	70'	EL	6.9	0.80	0.273	1.09	70'	EL	34.5	
		TNAGT5A	45.000		1.026	46.175	1.4	0.273	1.32	70'	EL	34.5	0.507	1.74	70'	EL	6.9	0.80	0.273	1.03	70'	EL	34.5	
		TNAGT5B	45.000	3	1.013	45.579	1.4	0.273	1.30	70'	EL	34.5	0.507	1.66	70'	EL	6.9	0.80	0.273	1.01	70'	EL	34.5	
EMERGENCY VEHICLE (EV)		EV2	28.750		1.816	52.212	1.3	0.273	2.11	70'	EL	34.5	0.507	2.59	70'	EL	6.9	0.80	0.273	1.82	70'	EL	34.5	
		EV3	43.000	4	1.188	51.068	1.3	0.273	1.38	70'	EL	34.5	0.507	1.75	70'	EL	6.9	0.80	0.273	1.19	70'	EL	34.5	

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.

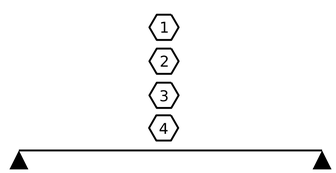
(#) CONTROLLING LOAD RATING

1. DESIGN LOAD RATING (HL-93)
2. DESIGN LOAD RATING (HS-20)
3. LEGAL LOAD RATING * *
4. EMERGENCY VEHICLE LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

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



LRFR SUMMARY
FOR SPAN "A"

VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

DRAWN BY : E.C. PHELPS DATE : 11/2024
CHECKED BY : W.K. FISCHER DATE : 11/2024
DESIGN ENGINEER OF RECORD: W.K. FISCHER DATE : 12/2024

1/20/2025
c:\bms\vhb-pw-01\d0193294\401_005_BP14R030_SMU_LRFR01_S1-04_430046.dgn
ephelps

NORTH CAROLINA PROFESSIONAL SEAL 030878 ENGINEER WILLIAM K FISCHER
Kevin F Fischer 12/2025
338FA2D658AB4DC...

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT NO. DF18314.2044188
HAYWOOD COUNTY
STATION: 12+67.00 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD
LRFR SUMMARY FOR 70' CORED SLAB UNIT 90° SKEW
(NON-INTERSTATE TRAFFIC)

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

STD. NO. 24LRFR1_90S_70L

8/26/21

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⟩	1.394	--	1.75	0.276	1.57	50'	EL	24.5	0.531	1.39	50'	EL	2.45	0.80	0.276	1.44	50'	EL	24.5	
		HL-93 (OPERATING)	N/A		1.807	--	1.35	0.276	2.03	50'	EL	24.5	0.531	1.81	50'	EL	2.45	N/A	--	--	--	--	--	
		HS-20 (INVENTORY)	36.000	⟨2⟩	1.667	60.007	1.75	0.276	1.95	50'	EL	24.5	0.531	1.67	50'	EL	2.45	0.80	0.276	1.79	50'	EL	24.5	
		HS-20 (OPERATING)	36.000		2.161	77.787	1.35	0.276	2.52	50'	EL	24.5	0.531	2.16	50'	EL	2.45	N/A	--	--	--	--	--	
LEGAL LOAD	SINGLE VEHICLE (SV)	SNSH	13.500		3.635	49.079	1.4	0.276	4.95	50'	EL	24.5	0.531	4.70	50'	EL	2.45	0.80	0.276	3.64	50'	EL	24.5	
		SNGARBS2	20.000		2.871	57.420	1.4	0.276	3.91	50'	EL	24.5	0.531	3.42	50'	EL	2.45	0.80	0.276	2.87	50'	EL	24.5	
		SNAGRIS2	22.000		2.778	61.109	1.4	0.276	3.78	50'	EL	19.6	0.531	3.21	50'	EL	2.45	0.80	0.276	2.78	50'	EL	24.5	
		SNCOTTS3	27.250		1.814	49.418	1.4	0.276	2.47	50'	EL	24.5	0.531	2.36	50'	EL	2.45	0.80	0.276	1.81	50'	EL	24.5	
		SNAGGRS4	34.925		1.577	55.063	1.4	0.276	2.15	50'	EL	24.5	0.531	2.01	50'	EL	2.45	0.80	0.276	1.58	50'	EL	24.5	
		SNS5A	35.550		1.537	54.657	1.4	0.276	2.09	50'	EL	24.5	0.531	2.07	50'	EL	2.45	0.80	0.276	1.54	50'	EL	24.5	
		SNS6A	39.950		1.438	57.430	1.4	0.276	1.96	50'	EL	24.5	0.531	1.91	50'	EL	2.45	0.80	0.276	1.44	50'	EL	24.5	
		SNS7B	42.000		1.370	57.540	1.4	0.276	1.87	50'	EL	24.5	0.531	1.91	50'	EL	2.45	0.80	0.276	1.37	50'	EL	24.5	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.761	58.118	1.4	0.276	2.40	50'	EL	24.5	0.531	2.25	50'	EL	2.45	0.80	0.276	1.76	50'	EL	24.5	
		TNT4A	33.075		1.777	58.759	1.4	0.276	2.42	50'	EL	24.5	0.531	2.17	50'	EL	2.45	0.80	0.276	1.78	50'	EL	24.5	
		TNT6A	41.600		1.480	61.558	1.4	0.276	2.01	50'	EL	24.5	0.531	2.08	50'	EL	2.45	0.80	0.276	1.48	50'	EL	24.5	
		TNT7A	42.000		1.502	63.087	1.4	0.276	2.05	50'	EL	24.5	0.531	1.94	50'	EL	2.45	0.80	0.276	1.50	50'	EL	24.5	
		TNT7B	42.000		1.566	65.773	1.4	0.276	2.13	50'	EL	24.5	0.531	1.84	50'	EL	2.45	0.80	0.276	1.57	50'	EL	24.5	
		TNAGRIT4	43.000		1.486	63.902	1.4	0.276	2.02	50'	EL	24.5	0.531	1.77	50'	EL	2.45	0.80	0.276	1.49	50'	EL	24.5	
		TNAGT5A	45.000		1.388	62.470	1.4	0.276	1.89	50'	EL	24.5	0.531	1.80	50'	EL	2.45	0.80	0.276	1.39	50'	EL	24.5	
		TNAGT5B	45.000	⟨3⟩	1.360	61.206	1.4	0.276	1.85	50'	EL	24.5	0.531	1.68	50'	EL	2.45	0.80	0.276	1.36	50'	EL	24.5	
EMERGENCY VEHICLE (EV)		EV2	28.750		2.154	61.929	1.3	0.276	2.97	50'	EL	24.5	0.531	2.50	50'	EL	5.50	0.80	0.276	2.15	50'	EL	24.5	
		EV3	43.000	⟨4⟩	1.392	59.852	1.3	0.276	1.92	50'	EL	24.5	0.531	1.69	50'	EL	5.50	0.80	0.276	1.39	50'	EL	24.5	

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.

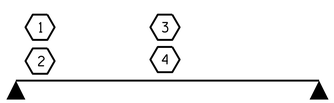
⟨#⟩ CONTROLLING LOAD RATING

- ⟨1⟩ DESIGN LOAD RATING (HL-93)
- ⟨2⟩ DESIGN LOAD RATING (HS-20)
- ⟨3⟩ LEGAL LOAD RATING * *
- ⟨4⟩ EMERGENCY VEHICLE LOAD RATING * *

* * SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

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



LRFR SUMMARY

FOR SPAN " B "

VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

DRAWN BY : E.C. PHELPS DATE : 10/2024
CHECKED BY : W.K. FISCHER DATE : 11/2024
DESIGN ENGINEER OF RECORD: W.K. FISCHER DATE : 12/2024

1/20/2025
c:\pmss\vhb-pw-01\d0193294\401_007_BP14R030_SMU_LRFR02_S1-05_430046.dgn
ephelps

NORTH CAROLINA PROFESSIONAL SEAL 030878 ENGINEER WILLIAM K FISCHER
Docusigned by: Kevin Fischer 12/2025
339FA2D698AB4DC...

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT NO. DF18314.2044188
HAYWOOD COUNTY
STATION: 12+67.00 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD

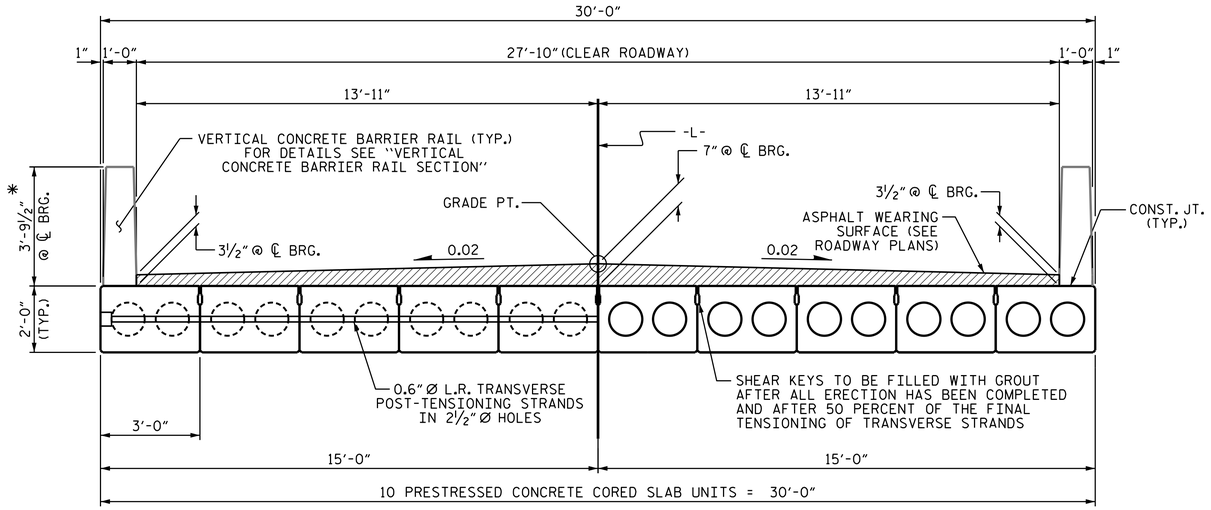
LRFR SUMMARY FOR 50' CORED SLAB UNIT 90° SKEW

(NON-INTERSTATE TRAFFIC)

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

STD. NO. 21LRFR1_90S_50L

8/26/21

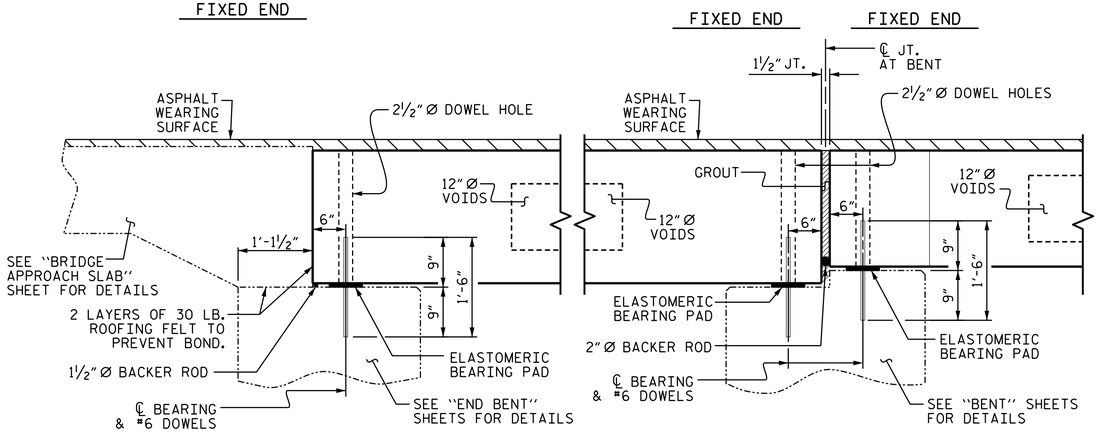


HALF SECTION AT INTERMEDIATE DIAPHRAGMS

HALF SECTION THROUGH VOIDS

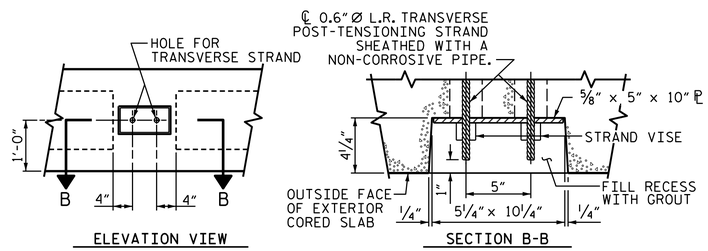
TYPICAL SECTION

* - 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.

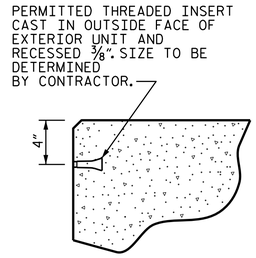


SECTION AT END BENT 1

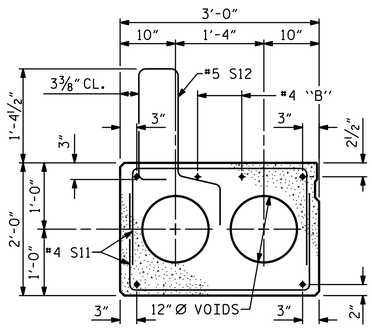
SECTION AT BENT 1



GROUTED RECESS AT END OF POST-TENSIONED STRAND CORED SLABS

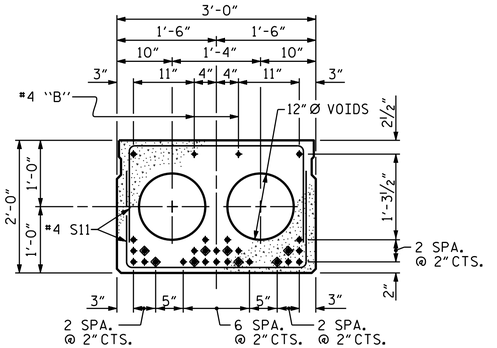


THREADED INSERT DETAIL



EXTERIOR SLAB SECTION

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



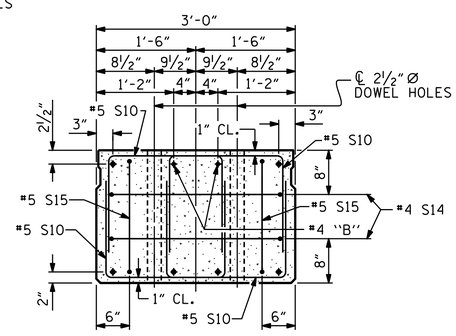
INTERIOR SLAB SECTION (70' UNIT)

(28 STRANDS REQUIRED)

0.6" Ø LOW RELAXATION STRAND LAYOUT

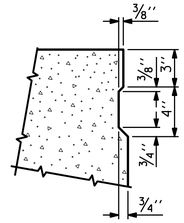
◈ BOND SHALL BE BROKEN ON THESE STRANDS FOR A DISTANCE OF 12'-0" FROM END OF CORED SLAB UNIT. SEE STANDARD SPECIFICATIONS, ARTICLE 1078-7.

DEBONDING LEGEND



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.



SHEAR KEY DETAIL

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

PROJECT NO. DF18314.2044188

HAYWOOD COUNTY

STATION: 12+67.00 -L-

SHEET 1 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

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

NORTH CAROLINA PROFESSIONAL SEAL 030878 ENGINEER KEVIN W. FISCHER

Kevin Fischer 12/22/2025

339FA2D658AB40C...

VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

DRAWN BY :	E.C. PHELPS	DATE :	10/2024
CHECKED BY :	W.K. FISCHER	DATE :	11/2024
DESIGN ENGINEER OF RECORD:	W.K. FISCHER	DATE :	12/2024

1/20/2025
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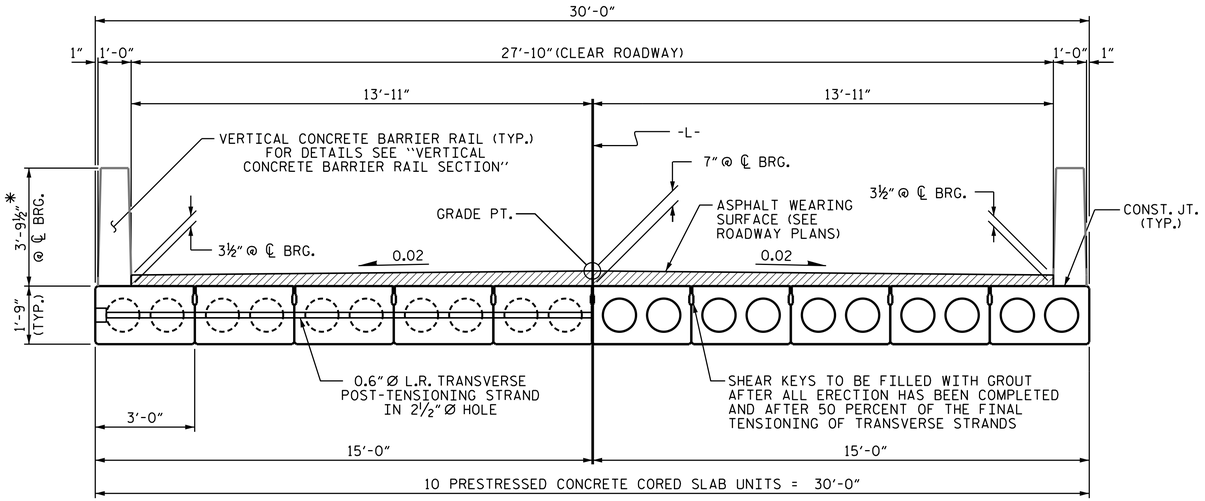
ephelps

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

STD. NO. 24PCS4_30_90S

8/26/21



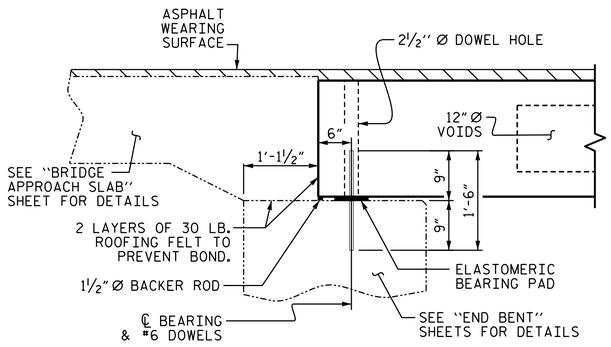
HALF SECTION
AT INTERMEDIATE DIAPHRAGMS

HALF SECTION
THROUGH VOIDS

TYPICAL SECTION

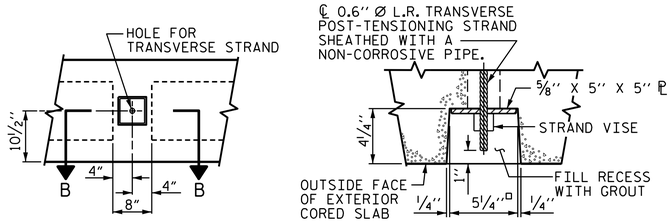
* - THE MAXIMUM BARRIER RAIL HEIGHT AND ASPHALT THICKNESS IS SHOWN. THE HEIGHT OF THE BARRIER RAIL AND ASPHALT THICKNESS VARIES WHILE THE TOP OF THE BARRIER RAIL FOLLOWS THE PROFILE OF THE GUTTERLINE. FOR RAIL HEIGHT DETAILS AND ASPHALT THICKNESS SEE THE "VERTICAL CONCRETE BARRIER RAIL SECTION" DETAIL.

FIXED END



SECTION AT END BENT 2

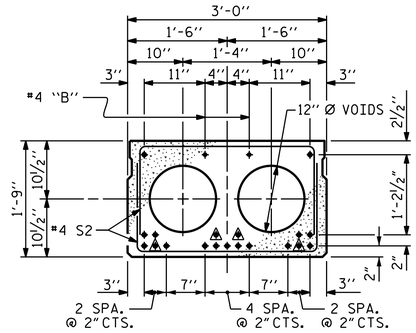
FOR SECTION AT BENT 1, SEE SHEET S-6



ELEVATION VIEW

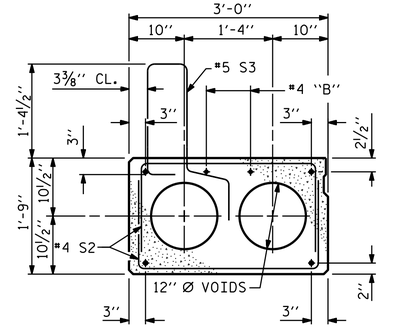
SECTION B-B

GROUTED RECESS AT END OF POST-TENSIONED STRAND OF CORED SLABS



INTERIOR SLAB SECTION
(50' UNIT)
(19 STRANDS REQUIRED)

0.6" Ø LOW RELAXATION STRAND LAYOUT

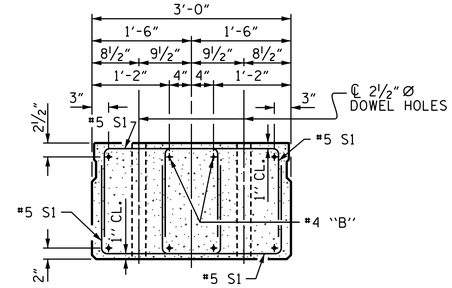


EXT. SLAB SECTION

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

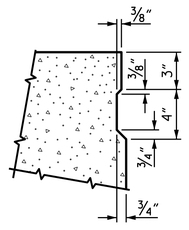
▲ BOND SHALL BE BROKEN ON THESE STRANDS FOR A DISTANCE OF 6'-0" FROM END OF CORED SLAB UNIT. SEE STANDARD SPECIFICATIONS, ARTICLE 1078-7.

DEBONDING LEGEND



END ELEVATION

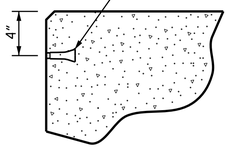
SHOWING PLACEMENT OF DOUBLE STIRRUPS AND LOCATION OF DOWEL HOLES. (STRAND LAYOUT NOT SHOWN.) INTERIOR SLAB UNIT SHOWN-EXTERIOR SLAB UNIT SIMILAR EXCEPT SHEAR KEY LOCATION.



SHEAR KEY DETAIL

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

PERMITTED THREADED INSERT CAST IN OUTSIDE FACE OF EXTERIOR UNIT AND RECESSED ⅜". SIZE TO BE DETERMINED BY CONTRACTOR.



THREADED INSERT DETAIL

PROJECT NO. DF18314.2044188

HAYWOOD COUNTY

STATION: 12+67.00 -L-

SHEET 2 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

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

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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL SEAL 030878 ENGINEER WESLEY KEVIN FISCHER
Docusigned by: Kevin Fischer 12/22/2025
339FA2D658AB4DC...

vhb
VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

DRAWN BY : E.C. PHELPS DATE : 10/2024
CHECKED BY : W.K. FISCHER DATE : 11/2024
DESIGN ENGINEER OF RECORD: W.K. FISCHER DATE : 12/2024

1/20/2025
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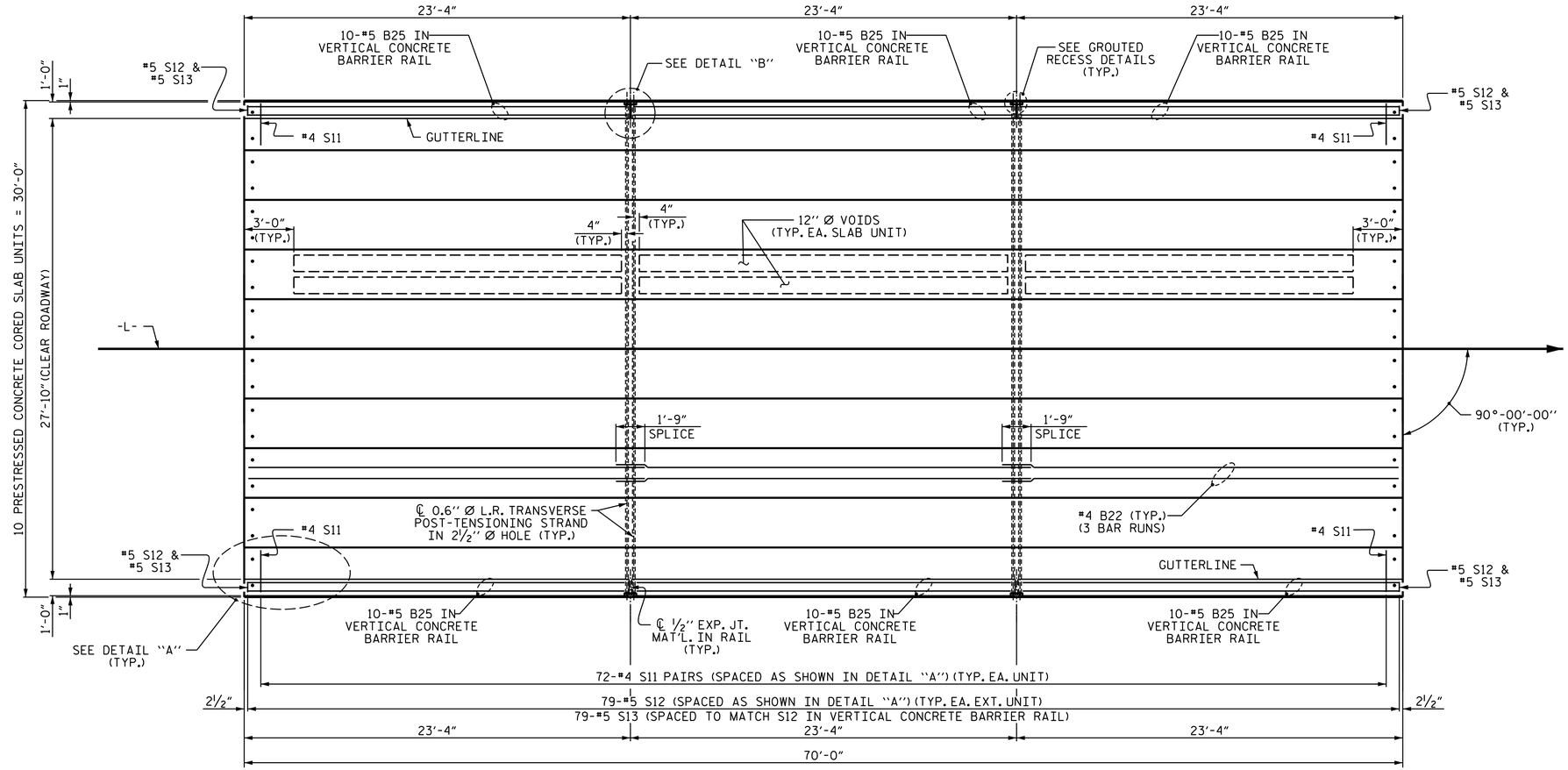
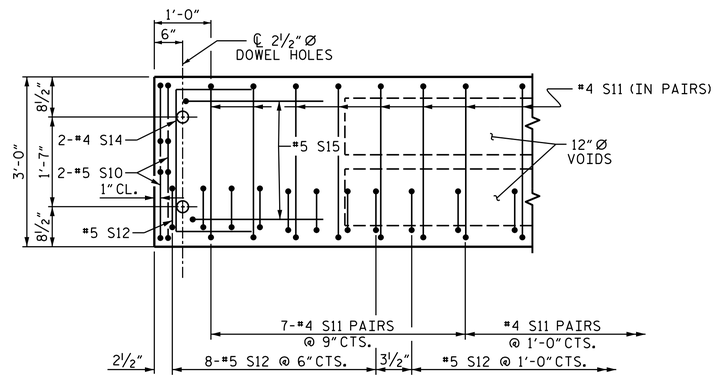
ephelps

STD. NO. 21"PCS2_30_90S

8/26/21

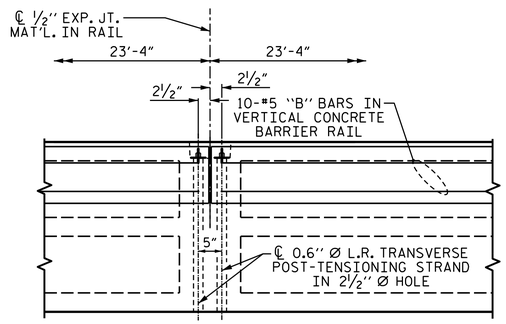


PLAN OF UNIT



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

vhb
VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

DRAWN BY : E.C. PHELPS DATE : 10/2024
CHECKED BY : W.K. FISCHER DATE : 11/2024
DESIGN ENGINEER OF RECORD: W.K. FISCHER DATE : 12/2024

1/20/2025
c:\bms\vhb-pw-01\d0193294\401_013_BP14R030_SMU_CS01_S1-08_430046.dgn
ephelps

NORTH CAROLINA PROFESSIONAL SEAL 030878 ENGINEER KEVIN S. FISCHER
Kevin Fischer 12/22/2025
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PROJECT NO. DF18314.2044188
HAYWOOD COUNTY
STATION: 12+67.00 -L-
SHEET 3 OF 6

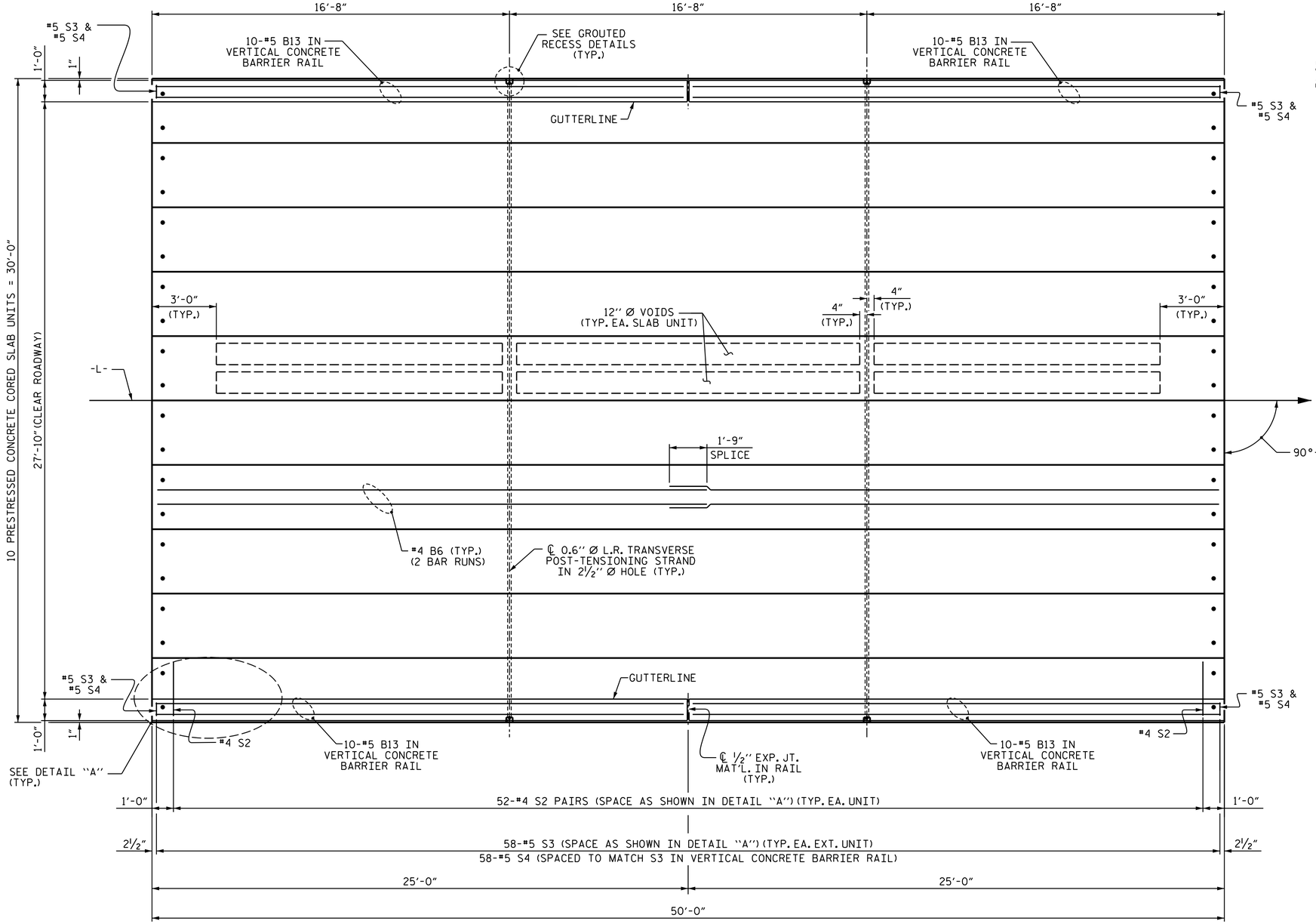
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

PLAN OF 70' UNIT 27'-10" CLEAR ROADWAY 90° SKEW

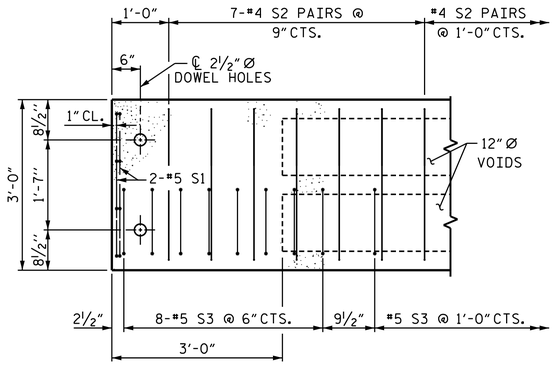
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-8
1			3			TOTAL SHEETS
2			4			21

STD. NO. 24PCS_30_90S_70L

8/26/21



PLAN OF UNIT



DETAIL "A"

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

PROJECT NO. **DF18314.2044188**

HAYWOOD COUNTY

STATION: **12+67.00 -L-**

SHEET 4 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

PLAN OF 50' UNIT 27'-10" CLEAR ROADWAY 90° SKEW

REVISIONS						SHEET NO.
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2			4			21

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 030878 REGISTERED
Kevin Fischer 1/22/2025
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DRAWN BY : E.C. PHELPS DATE : 10/2024
CHECKED BY : W.K. FISCHER DATE : 11/2024
DESIGN ENGINEER OF RECORD: W.K. FISCHER DATE : 12/2024

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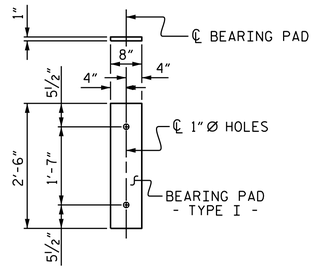
STD. NO. 21"PCS_30_90S_50L

8/26/21

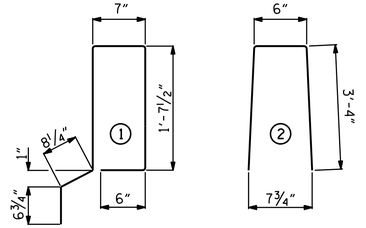


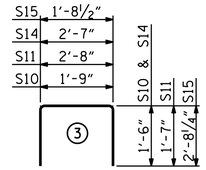
FIXED END
(TYPE I - 40 REQ'D)

ELASTOMERIC BEARING DETAILS

ELASTOMER IN ALL BEARINGS SHALL BE 60 DUROMETER HARDNESS.

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 2½"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, ½" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE BARRIER RAIL AND IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. 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.

THE #4 S11 STIRRUPS MAY BE SHIFTED AS NECESSARY TO MAINTAIN 1" CLEAR TO THE GROUTED RECESS.

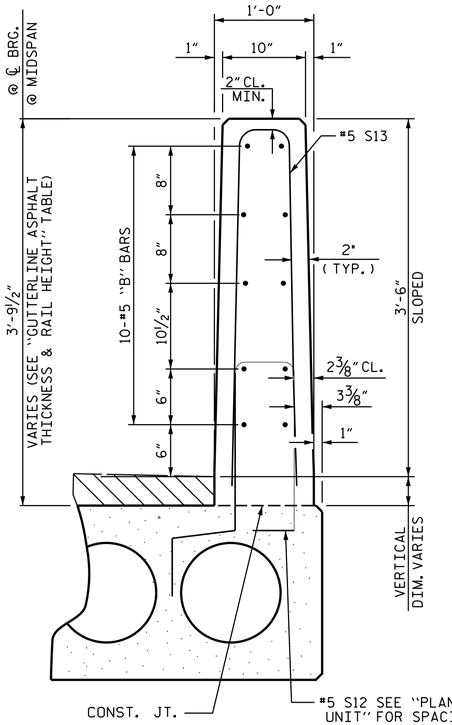
FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

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

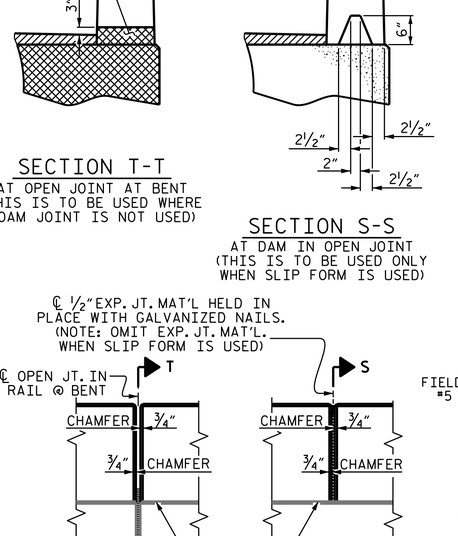
THE PERMITTED THREADED INSERTS IN THE EXTERIOR UNITS SHALL BE SIZED BY THE CONTRACTOR, SPACED AT 4'-0" CENTERS AND GALVANIZED IN ACCORDANCE WITH SECTION 1076 OF THE STANDARD SPECIFICATIONS. STAINLESS STEEL THREADED INSERTS MAY BE USED AS AN ALTERNATE.

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.



SECTION THRU RAIL

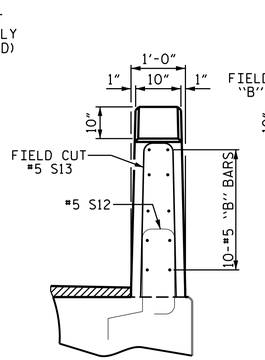


SECTION T-T
AT OPEN JOINT AT BENT
(THIS IS TO BE USED WHERE FOAM JOINT IS NOT USED)

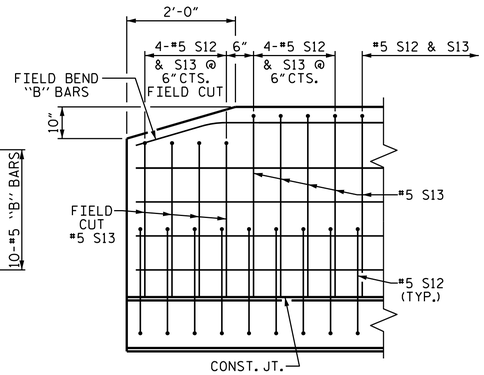
SECTION S-S
AT DAM IN OPEN JOINT
(THIS IS TO BE USED ONLY WHEN SLIP FORM IS USED)

ELEVATION AT EXPANSION JOINTS

VERTICAL CONCRETE BARRIER RAIL DETAILS



END VIEW



SIDE VIEW

END OF RAIL DETAILS

PROJECT NO. DF18314.2044188
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SHEET 5 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD

PRESTRESSED CONCRETE CORED SLAB UNIT

NORTH CAROLINA PROFESSIONAL SEAL 030878 ENGINEER KEVIN F. FISCHER
Docusigned by: Kevin Fischer 12/5/2025
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STD. NO. 24PCS3_30_90S

8/26/21

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 VERTICAL CONCRETE BARRIER RAIL

BAR	BARS PER PAIR OF EXTERIOR UNITS	TOTAL NO.	SIZE	TYPE	LENGTH	WEIGHT
	50' UNIT					
✳B13	40	40	#5	STR	24'-7"	1026
✳S4	116	116	#5	2	7'-2"	867
✳EPOXY COATED REINFORCING STEEL				LBS.		1893
CLASS AA CONCRETE				CU.YDS.		12.8
TOTAL VERTICAL CONCRETE BARRIER RAIL				LN. FT.		100.25

GUTTERLINE ASPHALT THICKNESS & RAIL HEIGHT

	ASPHALT OVERLAY THICKNESS @ MID-SPAN	RAIL HEIGHT @ MID-SPAN
70' UNITS	2"	3'-8"

GUTTERLINE ASPHALT THICKNESS & RAIL HEIGHT

	ASPHALT OVERLAY THICKNESS @ MID-SPAN	RAIL HEIGHT @ MID-SPAN
50' UNITS	2⅜"	3'-8⅜"

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		
7000 P.S.I. CONCRETE			CU. YDS.		11.8		11.8
0.6" Ø L.R. STRANDS			No.		28		28

BILL OF MATERIAL FOR ONE 50' CORED SLAB UNIT

				EXTERIOR UNIT		INTERIOR UNIT	
BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT	LENGTH	WEIGHT
B6	4	#4	STR	25'-9"	69	25'-9"	69
S1	8	#5	3	4'-3"	35	4'-3"	35
S2	104	#4	3	5'-4"	371	5'-4"	371
✳S3	58	#5	1	5'-7"	338		
REINFORCING STEEL			LBS.		475		475
✳EPOXY COATED REINFORCING STEEL			LBS.		338		
6500 P.S.I. CONCRETE			CU. YDS.		7.1		7.1
0.6" Ø L.R. STRANDS			No.		19		19

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)	2¼" ↑
DEFLECTION DUE TO SUPERIMPOSED DEAD LOAD✳✳	¾" ↓
FINAL CAMBER	1½" ↑

✳✳ INCLUDES FUTURE WEARING SURFACE

DEAD LOAD DEFLECTION AND CAMBER

	3'-0" x 1'-9"
50' CORED SLAB UNIT	0.6" Ø L.R. STRAND
CAMBER (SLAB ALONE IN PLACE)	1½" ↑
DEFLECTION DUE TO SUPERIMPOSED DEAD LOAD✳✳	⅜" ↓
FINAL CAMBER	1⅛" ↑

✳✳ INCLUDES FUTURE WEARING SURFACE

CONCRETE RELEASE STRENGTH

UNIT	PSI
70' UNITS	5500

CONCRETE RELEASE STRENGTH

UNIT	PSI
50' UNITS	4900

CORED SLABS REQUIRED

	NUMBER	LENGTH	TOTAL LENGTH
70' UNIT			
EXTERIOR C.S.	2	70'-0"	140'-0"
INTERIOR C.S.	8	70'-0"	560'-0"
TOTAL	10	-	700'-0"

CORED SLABS REQUIRED

	NUMBER	LENGTH	TOTAL LENGTH
50' UNIT			
EXTERIOR C.S.	2	50'-0"	100'-0"
INTERIOR C.S.	8	50'-0"	400'-0"
TOTAL	10	-	500'-0"

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

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Docusigned by: Kevin Fischer 12/2025
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SHEET 6 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD

PRESTRESSED CONCRETE CORED SLAB UNIT

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

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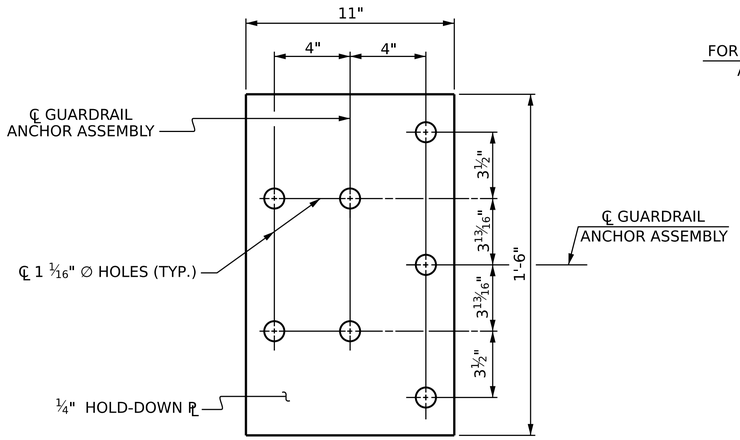
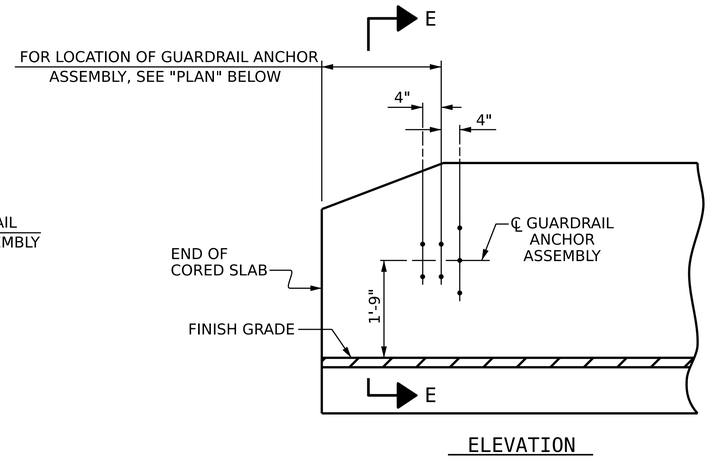
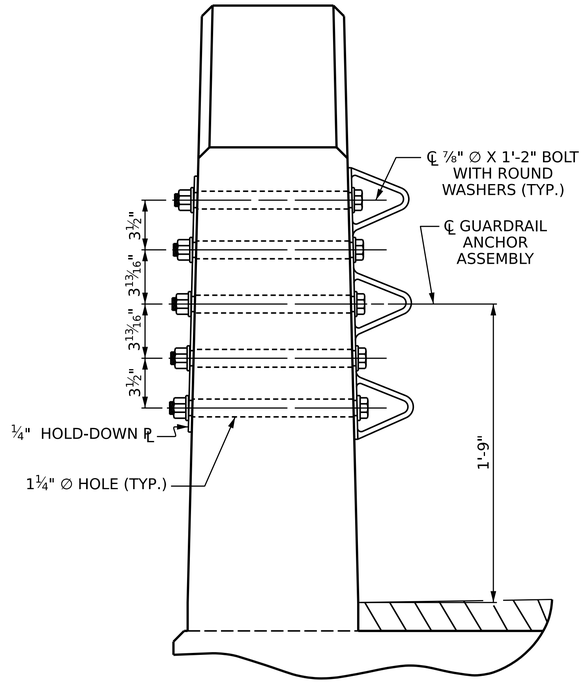


PLAN

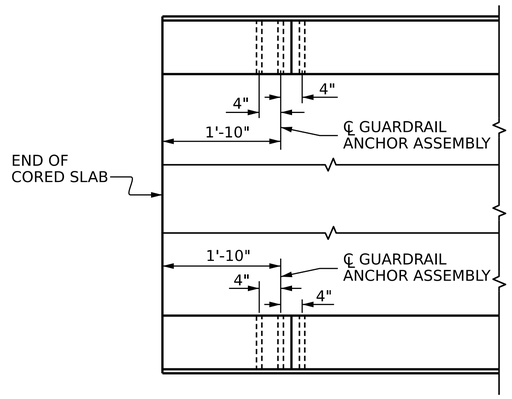


ELEVATION



SECTION E-E

GUARDRAIL ANCHOR ASSEMBLY DETAILS



PLAN

LOCATION OF ANCHORS FOR GUARDRAIL

NOTES

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

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

BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307 AND NUTS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M291. BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED. (AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLTS, NUTS AND WASHERS MAY BE USED AS AN ALTERNATE FOR THE ⅞'' ∅ 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.)

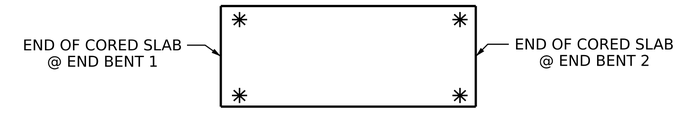
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF BARRIER RAIL. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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 ¼'' ∅ HOLES SHALL BE FORMED OR DRILLED WITH A CORE BIT. IMPACT TOOLS WILL NOT BE PERMITTED. ANY CONCRETE DAMAGED BY THIS WORK SHALL BE REPAIRED TO THE SATISFACTION OF THE ENGINEER.



SKETCH SHOWING POINTS OF ATTACHMENT

* DENOTES GUARDRAIL ANCHOR ASSEMBLY

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HAYWOOD COUNTY
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SHEET 2 OF 3

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:	S-12
1			3			TOTAL SHEETS
2			4			21

SEAL Ø30878 ENGINEER WILLIAM K. FISCHER
Docusigned by: Kevin F Fischer 12/27/2025
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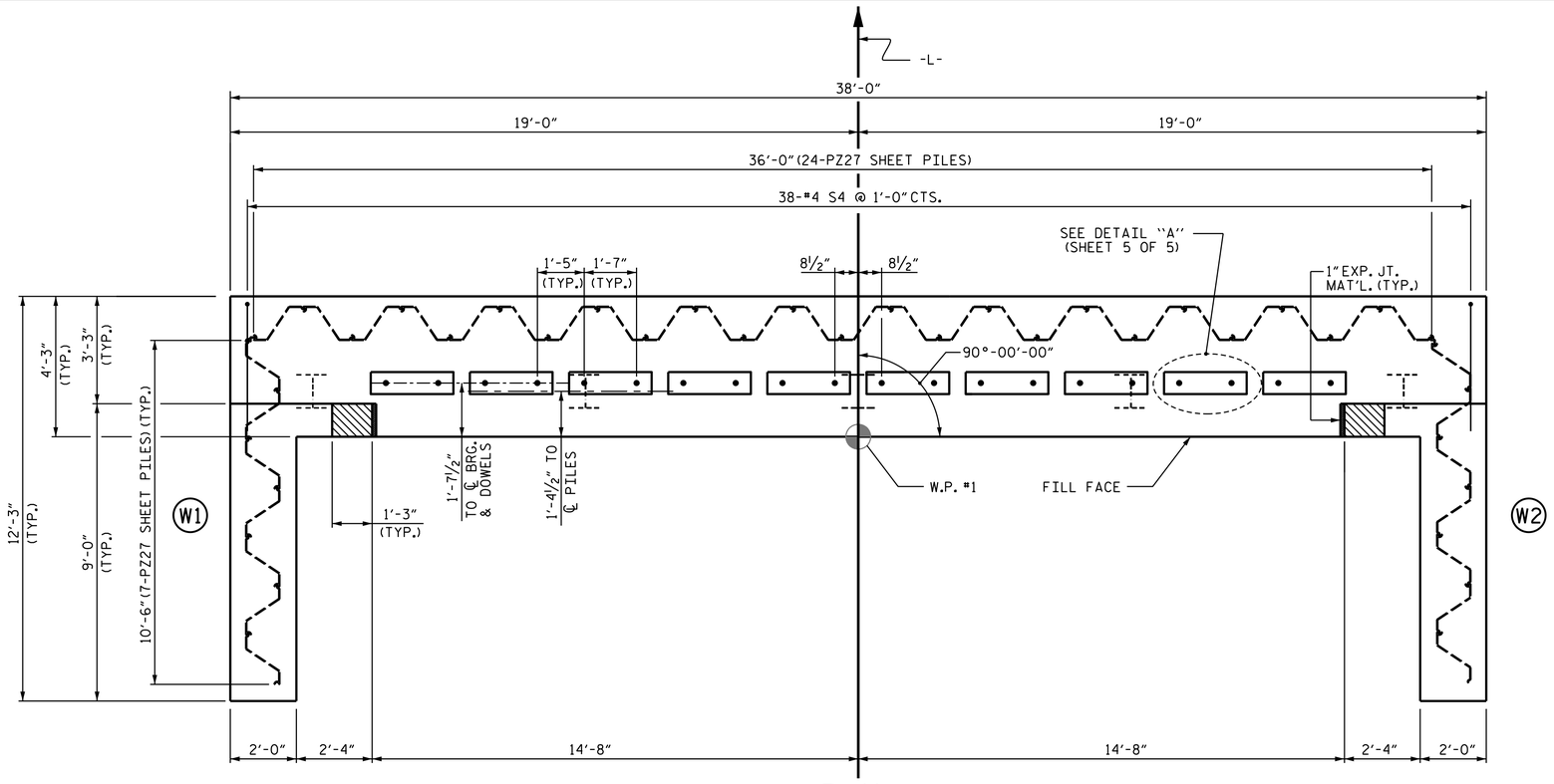
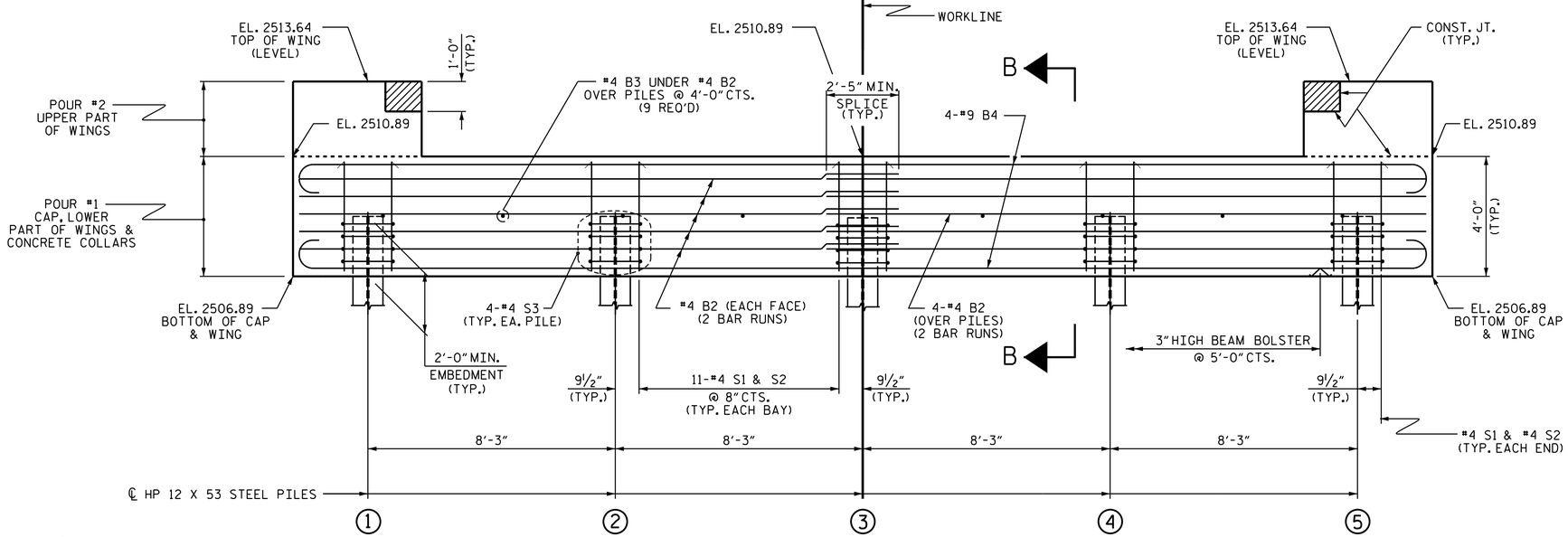


PLAN



ELEVATION

WINGS NOT SHOWN FOR CLARITY.
FOR SECTION B-B, SEE SHEET 5 OF 5.
CONCRETE COLLARS FOR STEEL PILES NOT SHOWN IN PLAN AND ELEVATION VIEWS FOR CLARITY.
SEE "CORROSION PROTECTION FOR STEEL PILES DETAIL", SHEET 5 OF 5.

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 5 OF 5.

FOR WING DETAILS, SEE SHEET 4 OF 5.

FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

PZ27 SHEETING IS TO BE DRIVEN IN FRONT OF HP 12X53 (STREAM SIDE) AND ALONG THE BRIDGE WINGS AT END BENT NO.1 AS SHOWN IN STRUCTURE PLANS.

SHEET PILES FOR THE VERTICAL WALLS SHOULD BE DRIVEN TO REFUSAL AT AN ELEVATION OF APPROXIMATELY 2474 FT FOR END BENT NO.1.

THE SCOUR CRITICAL ELEVATION FOR THE SHEET PILES AT END BENT NO.1 IS 2492 FT. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.

CONTRACTOR'S ATTENTION IS CALLED TO THE USE OF REINFORCING STRAPS ON END BENT 1 BACKWALL IN ACCORDANCE WITH ROADWAY STANDARD DRAWING 423.03.

DESIGN REINFORCEMENT CONNECTED TO END BENT CAP FOR FACTORED LOAD AND LENGTH OF REINFORCEMENT IN ACTIVE ZONE. CAST REINFORCEMENT OR CONNECTORS INTO CAP FOR END BENT NO.1 LOCATED AT STA. 12+05.81 -L-. MAINTAIN A CLEARANCE OF AT LEAST 3" BETWEEN REINFORCEMENT OR CONNECTORS AND REINFORCING STEEL IN CAP.

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SHEET 1 OF 5

STATE OF NORTH CAROLINA
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SUBSTRUCTURE

END BENT 1

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NO.	BY:	DATE:	NO.	BY:	DATE:	S-13
1			3			TOTAL SHEETS
2			4			21

1/21/2025
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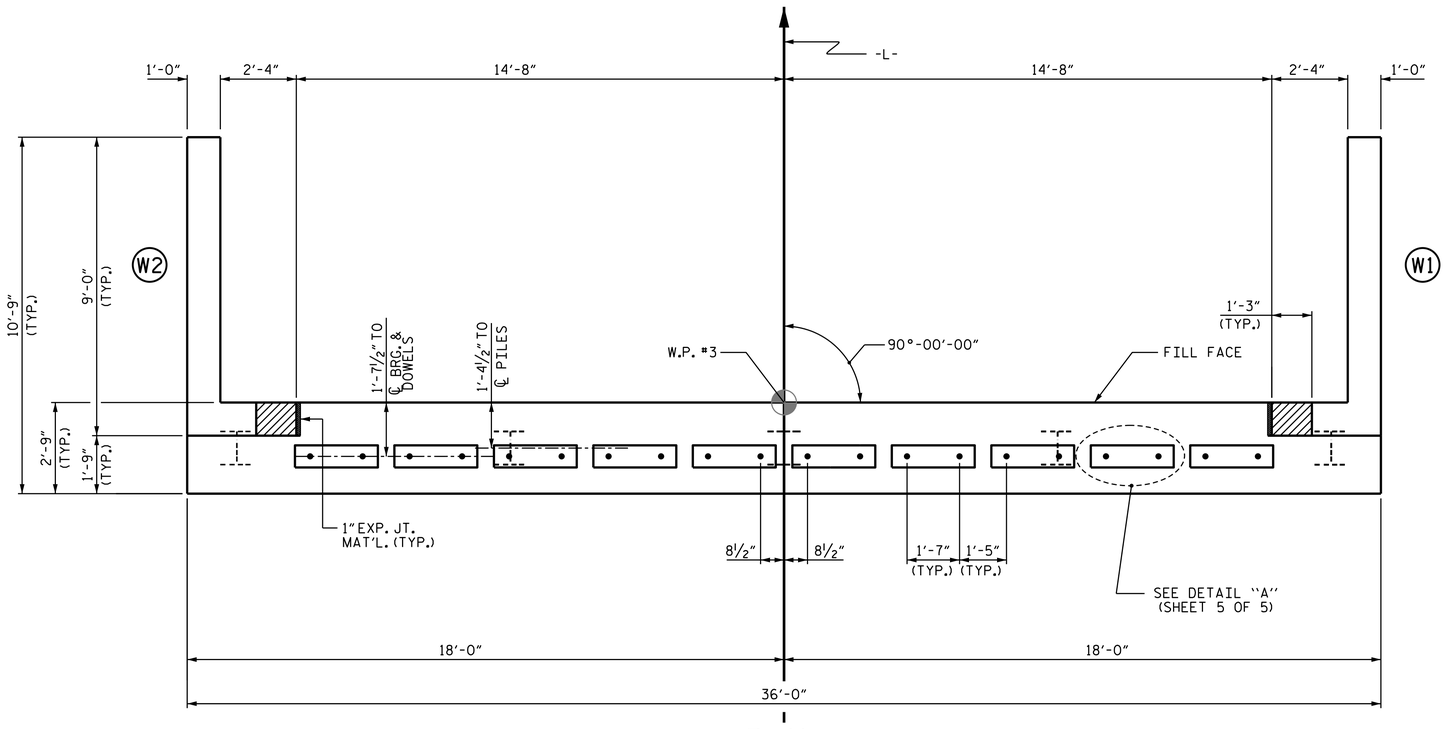
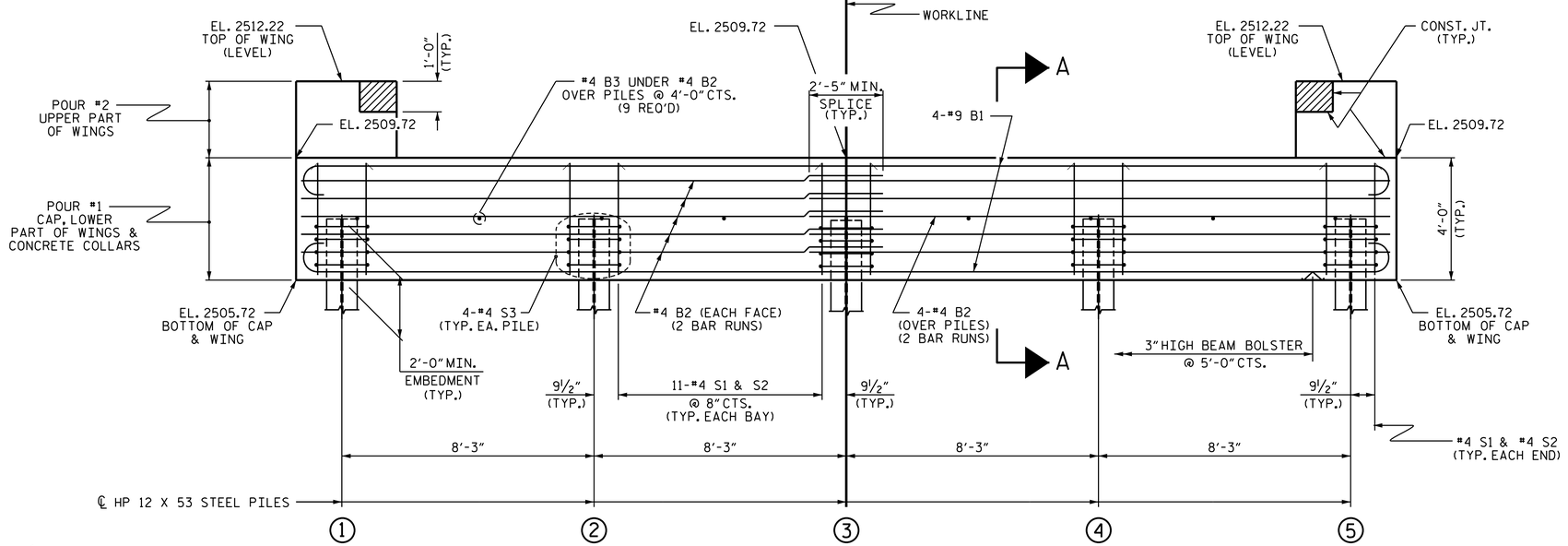
chonlgman

STD. NO. EB_30_90S4

8/26/21



PLAN



ELEVATION

WINGS NOT SHOWN FOR CLARITY.
FOR SECTION A-A, SEE SHEET 5 OF 5.
CONCRETE COLLARS FOR STEEL PILES NOT SHOWN IN PLAN AND ELEVATION VIEWS FOR CLARITY.
SEE "CORROSION PROTECTION FOR STEEL PILES DETAIL", SHEET 5 OF 5.

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 5 OF 5.

FOR WING DETAILS, SEE SHEET 3 OF 5.

PROJECT NO. DF18314.2044188
HAYWOOD COUNTY
STATION: 12+67.00 -L-

SHEET 2 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2

VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 030878 KEVIN FISCHER
Docusigned by: Kevin Fischer 1/22/2025
339FA2D658AB4DC...

DRAWN BY :	E.C. PHELPS	DATE :	11/2024
CHECKED BY :	W.K. FISCHER	DATE :	11/2024
DESIGN ENGINEER OF RECORD:	W.K. FISCHER	DATE :	12/2024

1/20/2025
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ephelps

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REVISIONS						SHEET NO.
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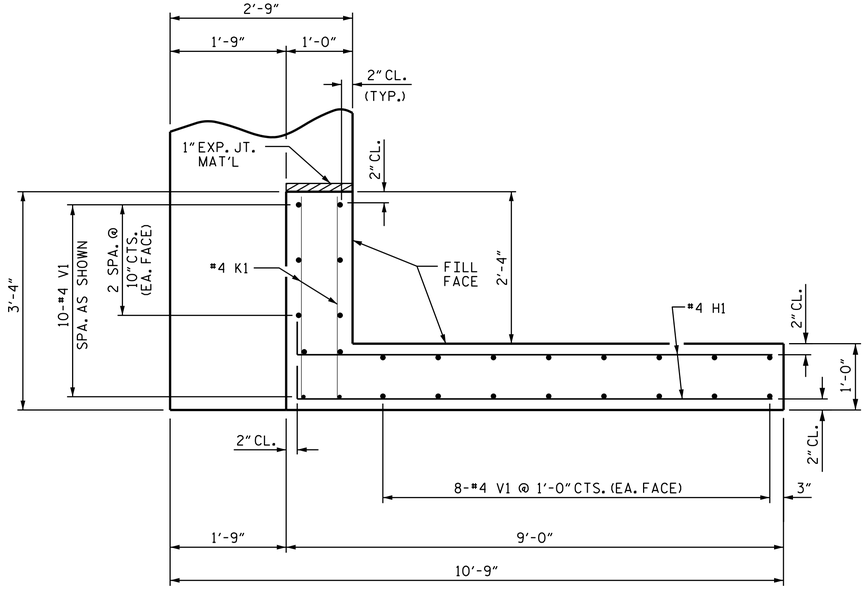
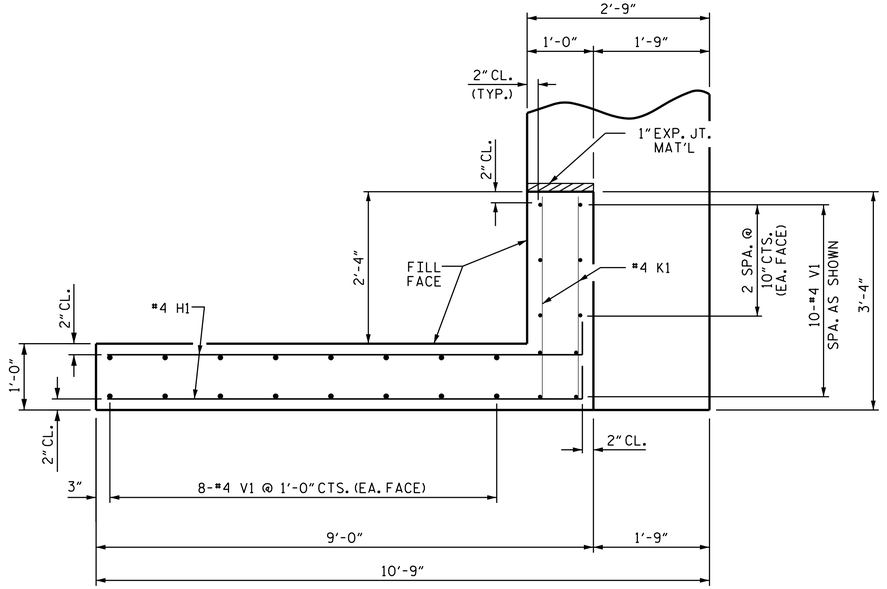
1			3			TOTAL SHEETS
2			4			21

STD. NO. EB_30_90S4

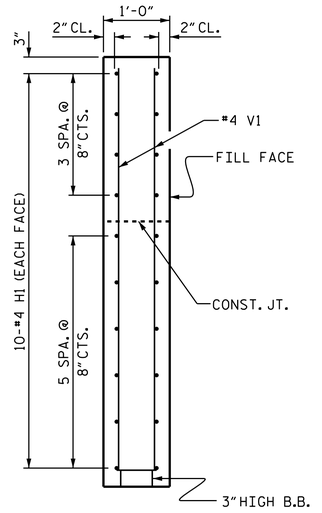
8/26/21



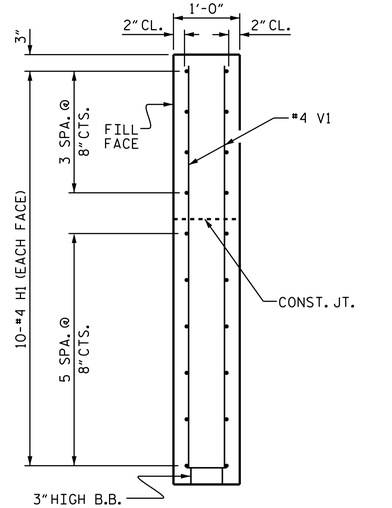
PLAN OF WING (W1)



PLAN OF WING (W2)

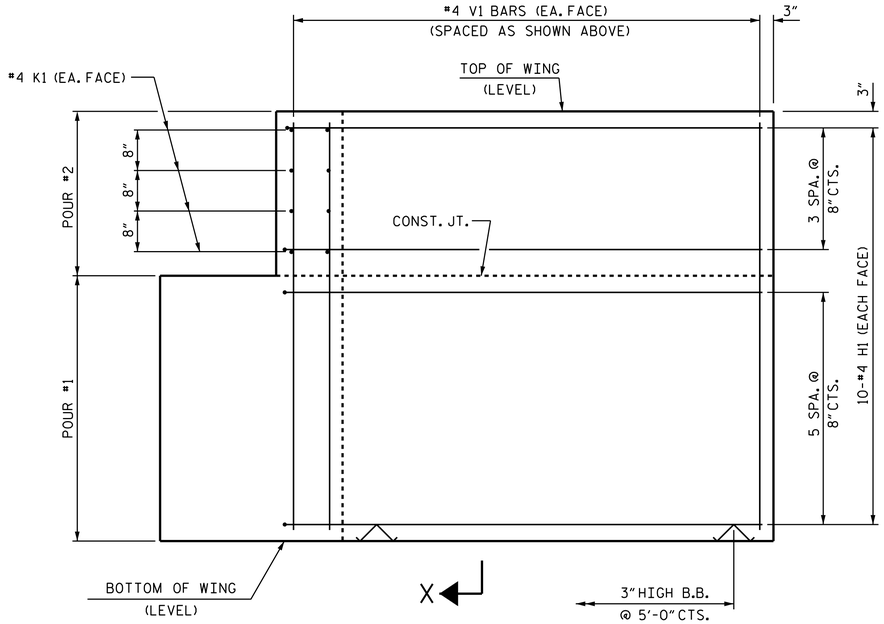


SECTION X-X

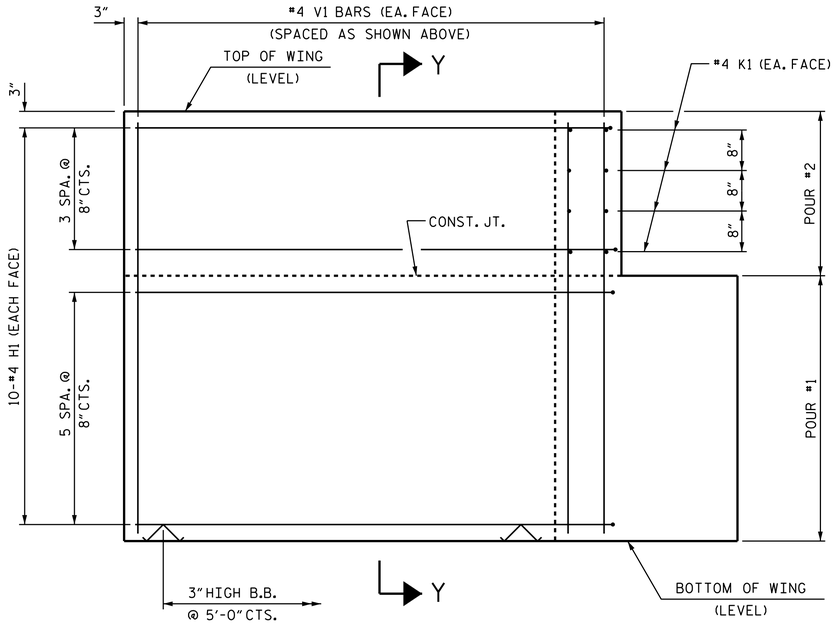


SECTION Y-Y

X



ELEVATION OF WING (W1)



ELEVATION OF WING (W2)

WING DETAILS

VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

PROJECT NO. DF18314.2044188
HAYWOOD COUNTY
STATION: 12+67.00 -L-

SHEET 3 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2
WING DETAILS

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

DRAWN BY : E.C. PHELPS DATE : 10/2024
CHECKED BY : W.K. FISCHER DATE : 11/2024
DESIGN ENGINEER OF RECORD: W.K. FISCHER DATE : 12/2024

SEAL 030878 NORTH CAROLINA PROFESSIONAL ENGINEER KEVIN K. FISCHER
Docusigned by: Kevin Fischer 1/22/2025
339FA2D658AB4DC...

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1/20/2025
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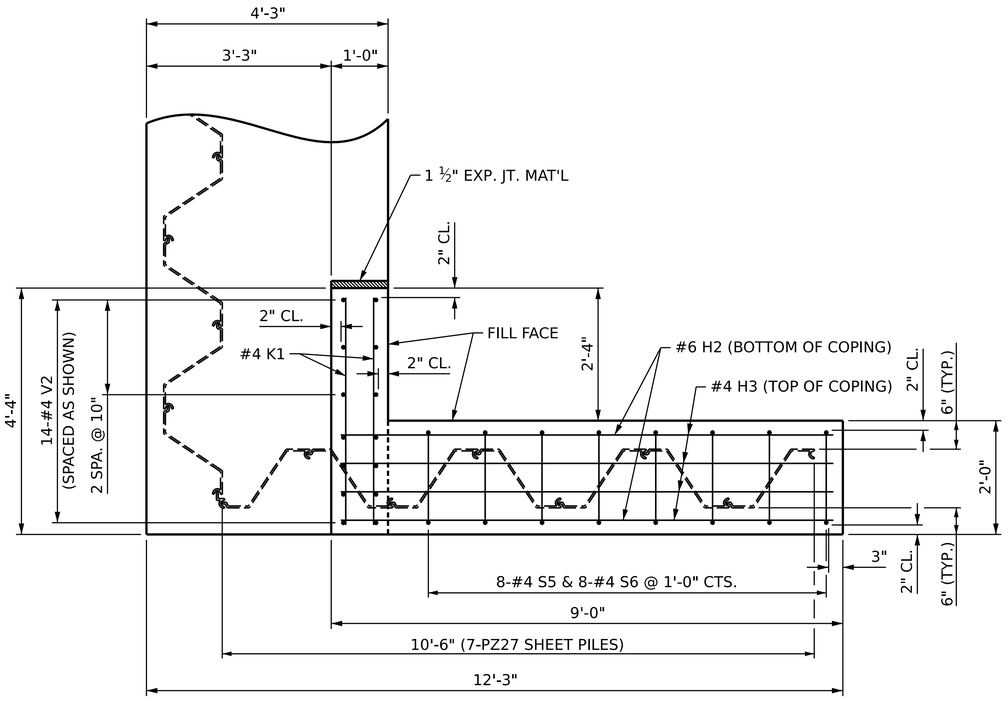
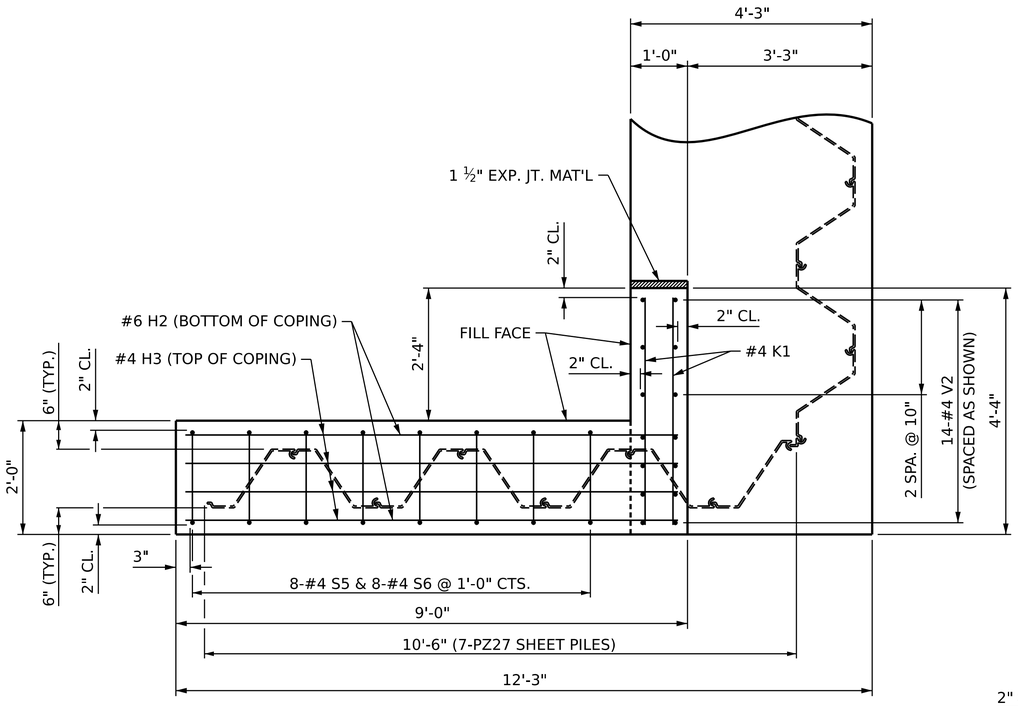
ephelps

STD. NO. EB_30_90S4

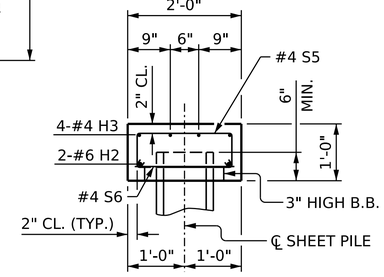
8/26/21



PLAN OF WING (W1)

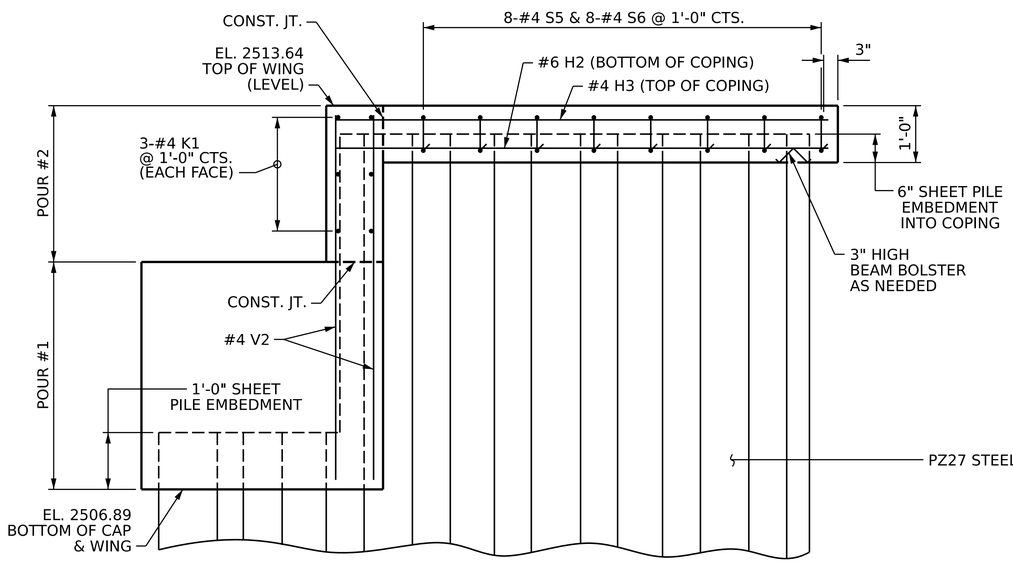


PLAN OF WING (W2)

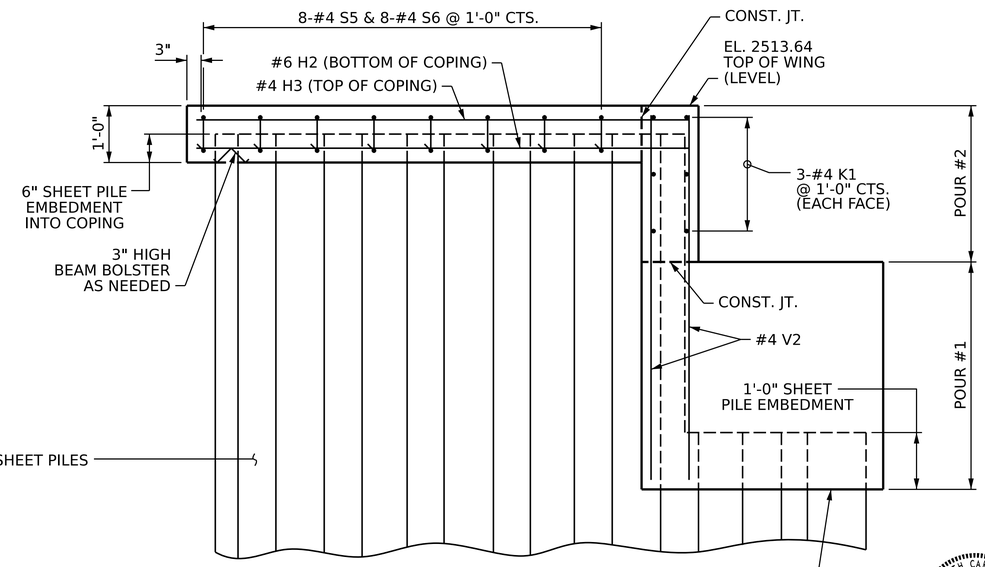


SECTION THRU COPING

BURN 1½" ∅ MAX. HOLE IN SHEET PILE FOR #4 S6 BARS (TYP.)



ELEVATION OF WING (W1)



ELEVATION OF WING (W2)

WING DETAILS

VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

PROJECT NO. DF18314.2044188

HAYWOOD COUNTY

STATION: 12+67.00 -L-

SHEET 4 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1
WING DETAILS

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

DRAWN BY : D.B. HINNANT DATE : 11/2024
CHECKED BY : W.K. FISCHER DATE : 11/2024
DESIGN ENGINEER OF RECORD: W.K. FISCHER DATE : 12/2024

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NORTH CAROLINA PROFESSIONAL SEAL 030878 ENGINEER WILLIAM KEVIN FISCHER
Docusigned by: Kevin Fischer 12/20/2025
339FA2D658AB4DC...

1/20/2025
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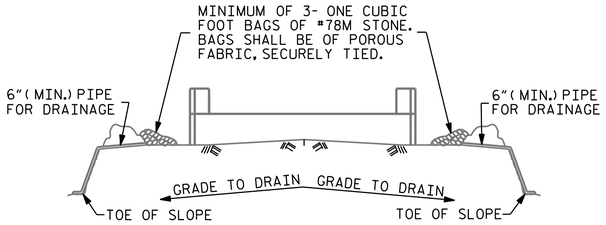
ephelps

8/26/21

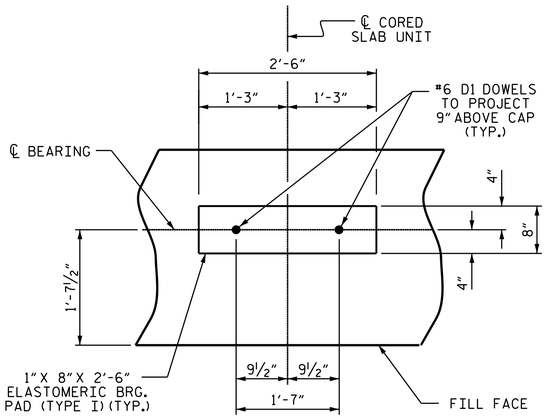


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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.

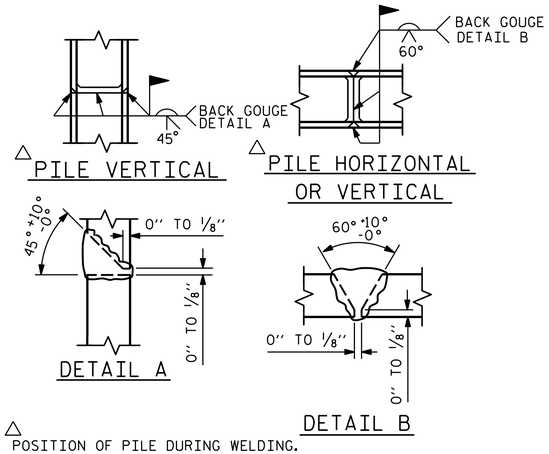
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

TEMPORARY DRAINAGE AT END BENT



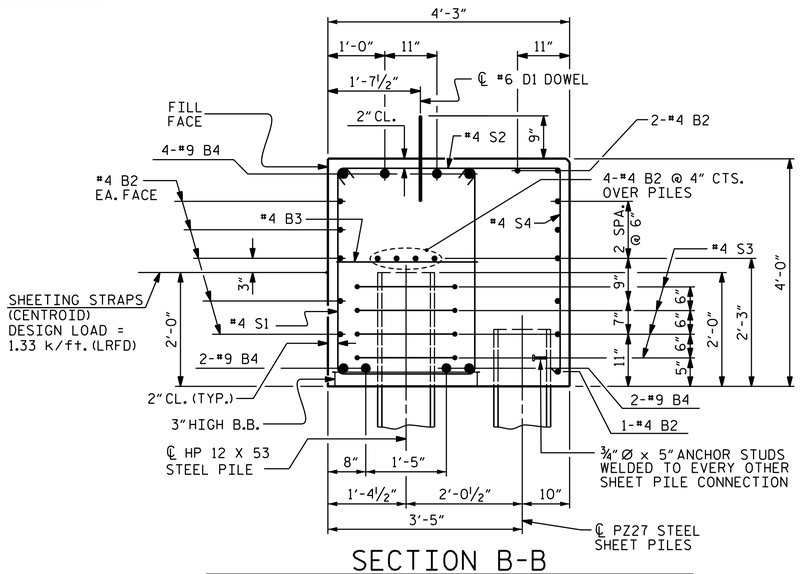
DETAIL "A"

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



△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS



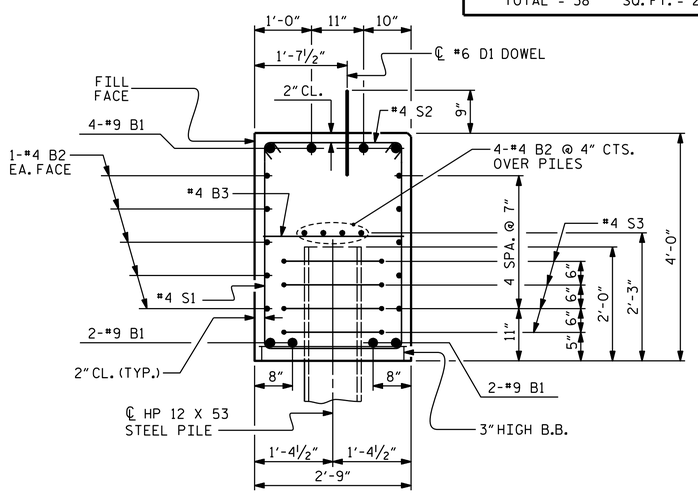
SECTION B-B

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

BAR TYPES

ALL BAR DIMENSIONS ARE OUT TO OUT.

18" GALVANIZED STEEL SHEET PILES
No. PZ27 = 38
TOTAL = 38 SQ. FT. = 2042



SECTION A-A

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

BILL OF MATERIAL

END BENT 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B2	34	*4	STR	19'-1"	433
B3	9	*4	STR	2'-5"	15
B4	8	*9	1	40'-0"	1088
D1	20	*6	STR	1'-6"	45
H2	4	*6	STR	8'-8"	52
H3	8	*4	STR	8'-8"	46
K1	12	*4	STR	3'-11"	31
S1	46	*4	3	10'-5"	320
S2	46	*4	4	3'-2"	97
S3	20	*4	5	6'-6"	87
S4	38	*4	6	8'-4"	212
S5	16	*4	3	3'-8"	39
S6	16	*4	4	2'-5"	26
V2	28	*4	STR	6'-5"	120

REINFORCING STEEL (FOR ONE END BENT) 2611 LBS.

CLASS A CONCRETE BREAKDOWN

POUR *1 CAP & COLLARS 24.8 C.Y.

POUR *2 BACKWALL & COPING 2.1 C.Y.

TOTAL CLASS A CONCRETE 26.9 C.Y.

END BENT 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	*9	1	38'-0"	1034
B2	28	*4	STR	19'-1"	357
B3	9	*4	STR	2'-5"	15
D1	20	*6	STR	1'-6"	45
H1	40	*4	2	9'-4"	249
K1	16	*4	STR	2'-11"	31
S1	46	*4	3	10'-5"	320
S2	46	*4	4	3'-2"	97
S3	20	*4	5	6'-6"	87
V1	52	*4	STR	6'-2"	214

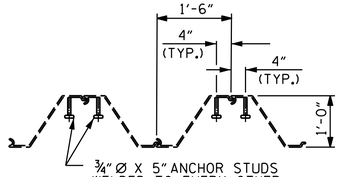
REINFORCING STEEL (FOR ONE END BENT) 2449 LBS.

CLASS A CONCRETE BREAKDOWN

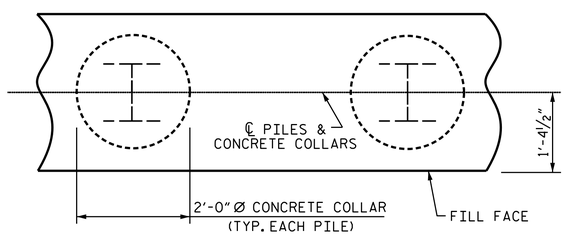
POUR *1 CAP, LOWER PART OF WINGS & COLLARS 17.9 C.Y.

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

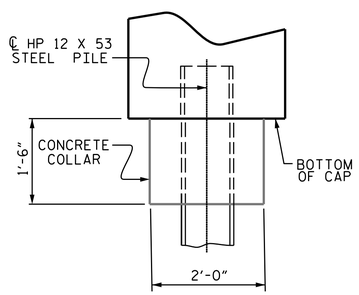
TOTAL CLASS A CONCRETE 20.0 C.Y.



ANCHOR STUD DETAIL



PLAN



ELEVATION

CORROSION PROTECTION FOR STEEL PILES DETAIL

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

VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

DRAWN BY : E.C. PHELPS DATE : 10/2024
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DESIGN ENGINEER OF RECORD: W.K. FISCHER DATE : 12/2024

1/21/2025
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chonigman

PROJECT NO. DF18314.2044188
HAYWOOD COUNTY
STATION: 12+67.00 -L-

SHEET 5 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT No. 1 & 2 DETAILS

NORTH CAROLINA PROFESSIONAL SEAL 030878 ENGINEER WILLIAM K. FISCHER
Kevin Fischer 12/12/2025
339FA2D658AB4DC...

REVISIONS						SHEET NO.
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1			3			TOTAL SHEETS
2			4			21

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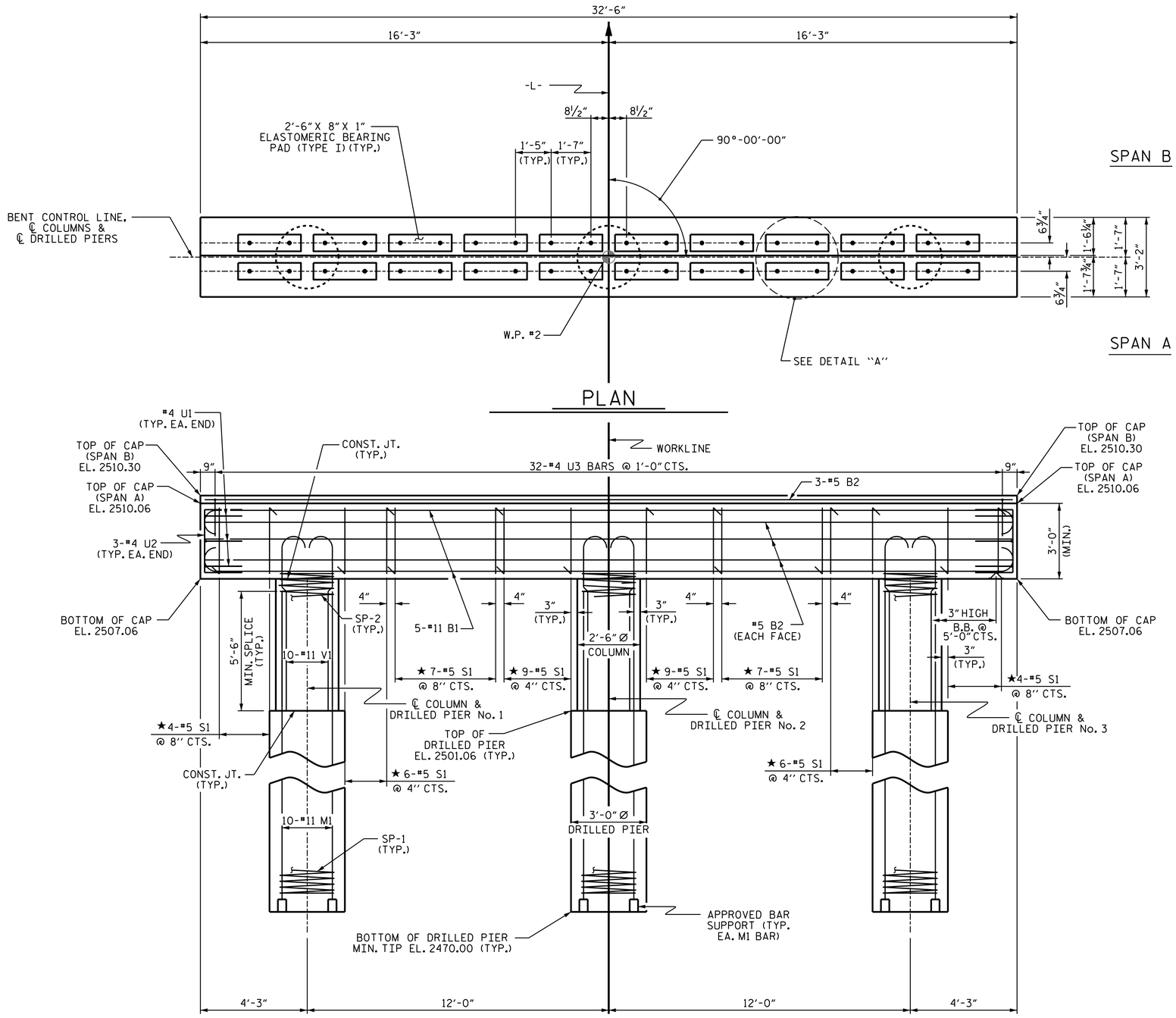


ELEVATION

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.

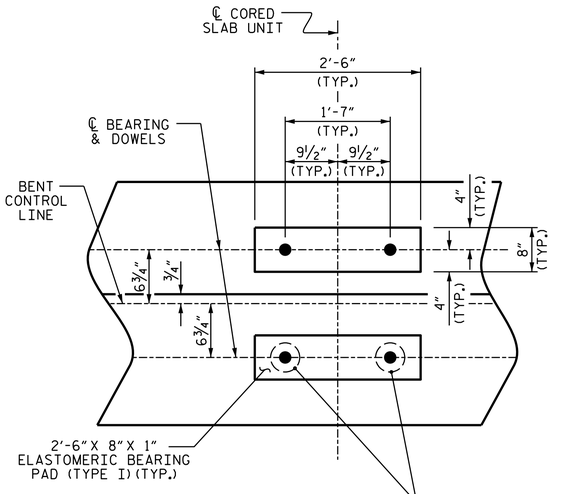
ALL STEEL IN THE DRILLED PIERS IS INCLUDED IN THE PAY ITEMS FOR "REINFORCING STEEL" AND "SPIRAL COLUMN REINFORCING STEEL."

★ 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. DF18314.2044188

HAYWOOD COUNTY

STATION: 12+67.00 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
BENT 1

NORTH CAROLINA PROFESSIONAL SEAL 030878 ENGINEER KEVIN FISCHER
Kevin Fischer 12/2025
339FA2D658AB4DC...

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-18
1			3			TOTAL SHEETS
2			4			21

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VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

DRAWN BY : E.C. PHELPS DATE : 10/2024
CHECKED BY : W.K. FISCHER DATE : 11/2024
DESIGN ENGINEER OF RECORD: W.K. FISCHER DATE : 12/2024

1/20/2025
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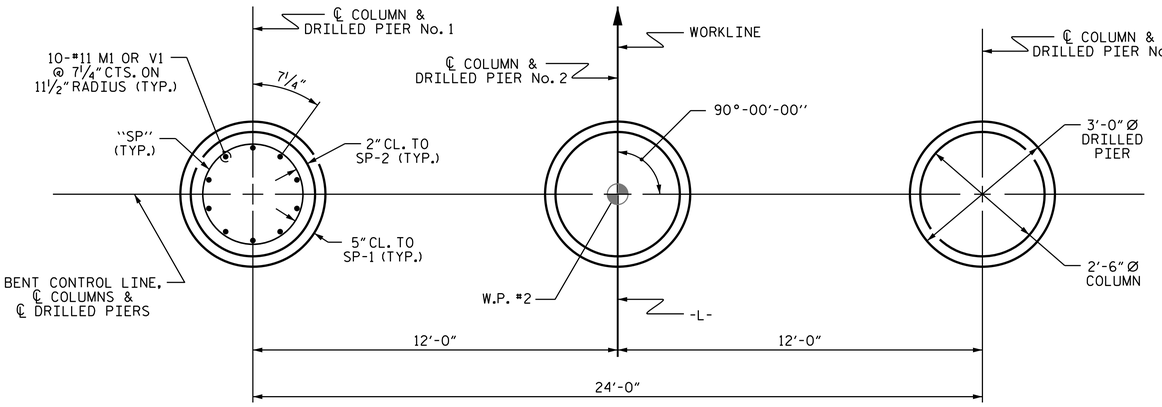
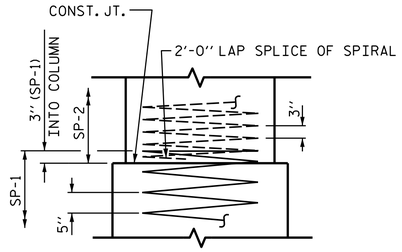
STD. NO. DP_BT_30_90S_<50'

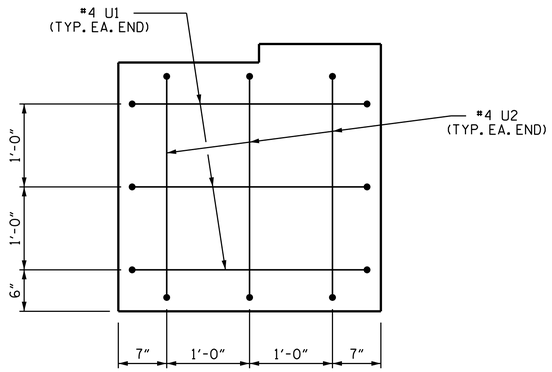
8/26/21



PLAN OF DRILLED PIERS & COLUMNS

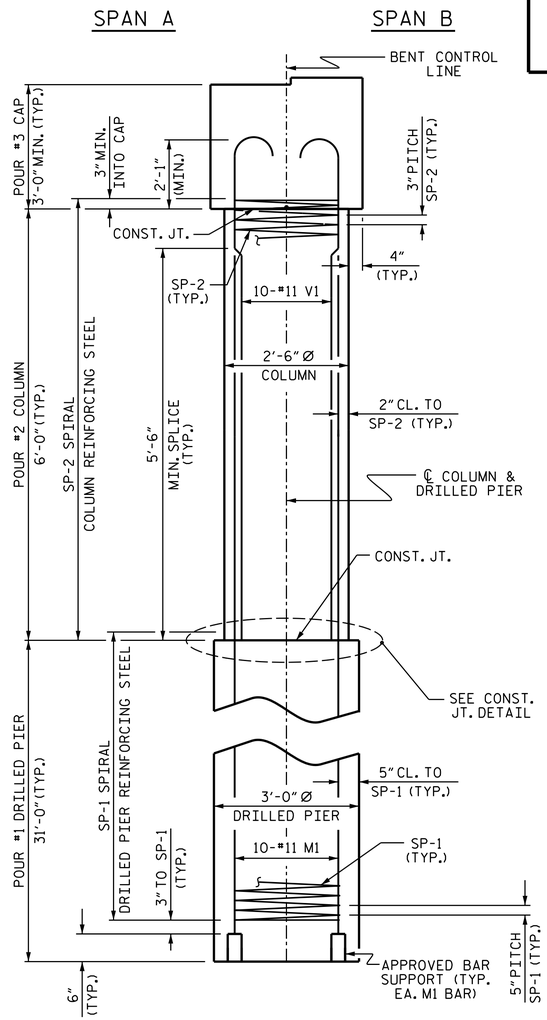


CONSTRUCTION JOINT DETAIL



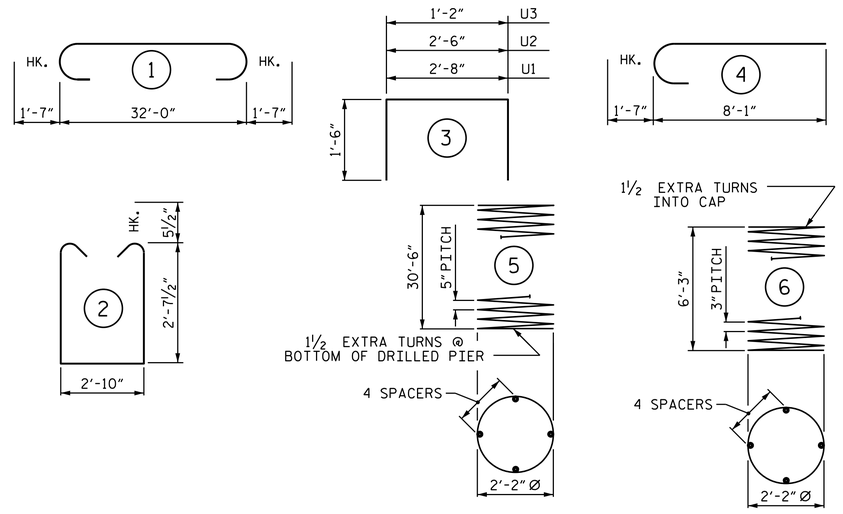
END OF CAP VIEW

(TYPICAL BOTH ENDS)

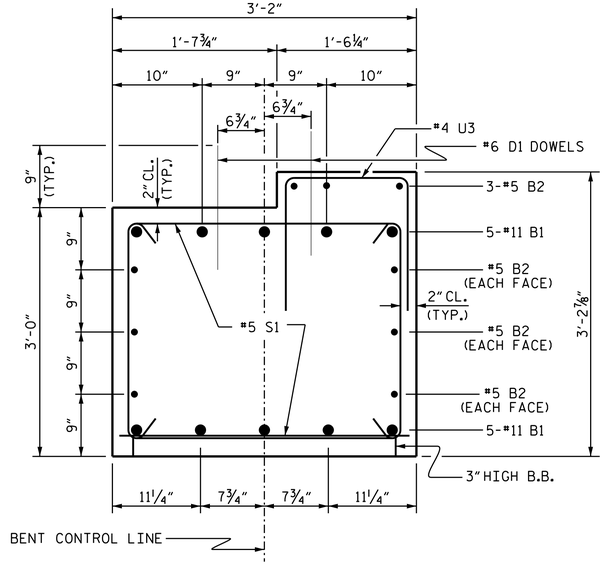


END ELEVATION

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	35'-2"	1868
B2	9	#5	STR	32'-2"	302
D1	40	#6	STR	1'-6"	90
M1	30	#11	STR	36'-7"	5831
S1	52	#5	2	9'-0"	488
U1	6	#4	3	5'-8"	23
U2	6	#4	3	5'-6"	22
U3	32	#4	3	4'-2"	89
V1	30	#11	4	9'-8"	1541

REINFORCING STEEL (FOR ONE BENT) 10254 LBS.

SP-1	3	*	5	512'-6"	1604
SP-2	3	**	6	187'-1"	375

SPIRAL COLUMN REINFORCING STEEL (FOR ONE BENT) 1979 LBS.

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

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

CLASS A CONCRETE BREAKDOWN (FOR ONE BENT)

POUR #2 (COLUMNS)	3.3 C.Y.
POUR #3 (CAP)	11.9 C.Y.
TOTAL CLASS A CONCRETE	15.2 C.Y.

DRILLED PIERS: (FOR ONE BENT)

DRILLED PIER CONCRETE POUR #1 (DRILLED PIERS)	26.8 C.Y.

PROJECT NO. DF18314.2044188

HAYWOOD COUNTY

STATION: 12+67.00 -L-

SHEET 2 OF 2

vhb
VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

DRAWN BY : E.C. PHELPS DATE : 10/2024
CHECKED BY : W.K. FISCHER DATE : 11/2024
DESIGN ENGINEER OF RECORD: W.K. FISCHER DATE : 12/2024

1/20/2025
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ephelps

NORTH CAROLINA PROFESSIONAL SEAL 030878 ENGINEER WILLIAM KEVIN FISCHER
Kevin Fischer 1/20/2025

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

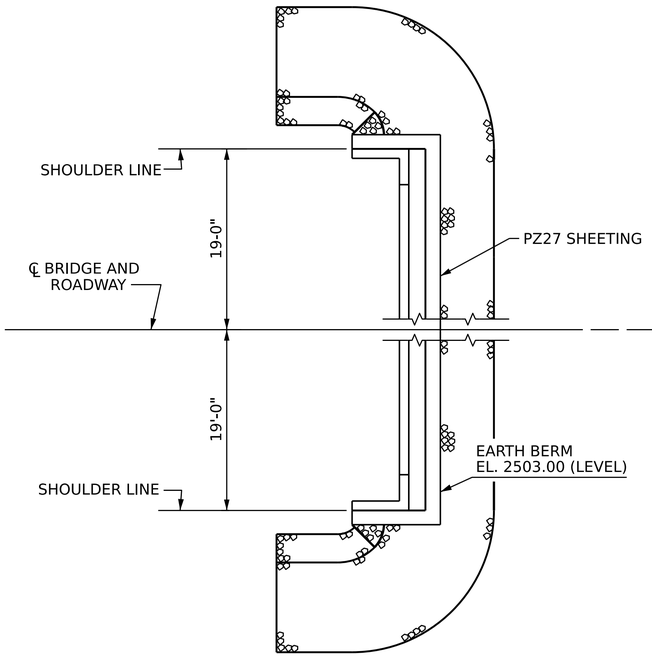
SUBSTRUCTURE

BENT 1

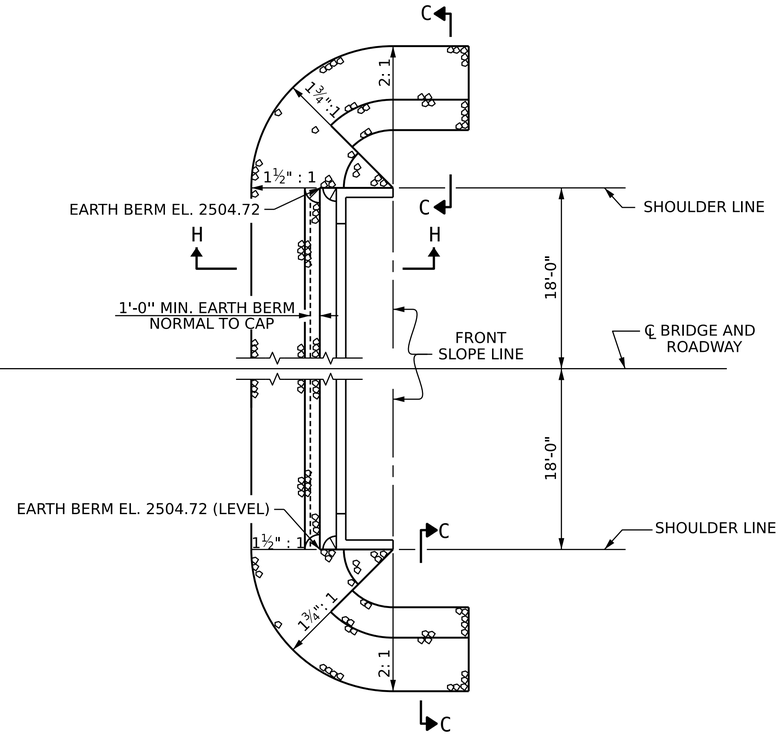
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-19
1			3			TOTAL SHEETS
2			4			21

STD. NO. DP_BT_30_90S_<50'

8/26/21



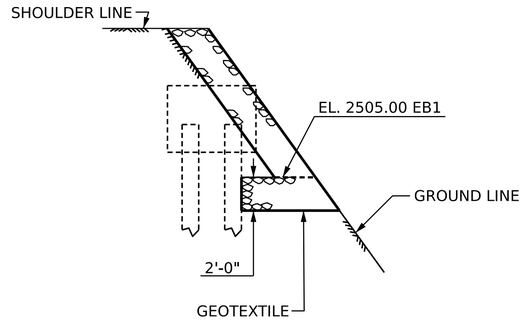
END BENT 1



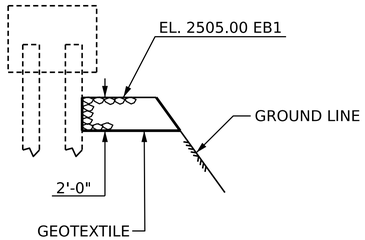
END BENT 2

NOTES :

FOR BERM WIDTH DIMENSIONS, SEE GENERAL DRAWING.



SECTION H-H @ END BENT 1



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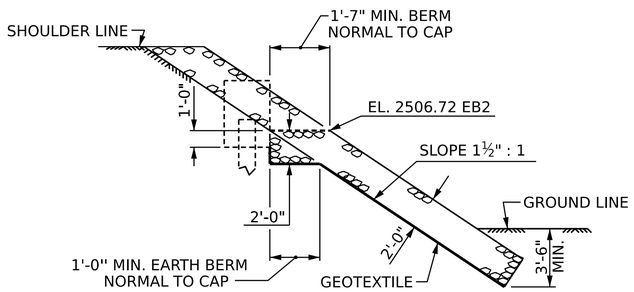

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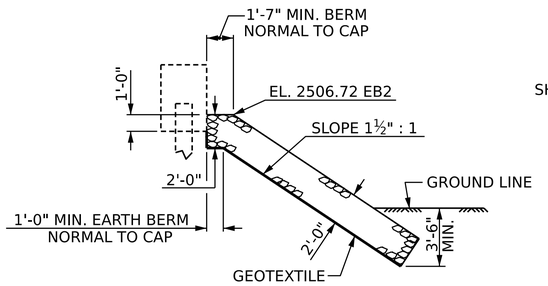

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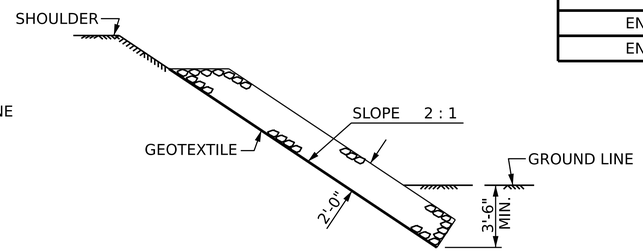

SECTION C-C

BERM RIP RAPPED

ESTIMATED QUANTITIES		
BRIDGE @ STA. 12+67.00 -L-	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE
	TONS	SQUARE YARDS
END BENT 1	31	46
END BENT 2	70	77

PROJECT NO. DF18314.2044188

HAYWOOD COUNTY

STATION: 12+67.00 -L-

VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 030878 KEVIN T. FISCHER

Kevin Fischer 12/22/2025

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

RIP RAP DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-20
1			3			TOTAL SHEETS
2			4			21

DRAWN BY : E.C. PHELPS DATE : 11/2024
CHECKED BY : W.K. FISCHER DATE : 11/2024
DESIGN ENGINEER OF RECORD: W.K. FISCHER DATE : 12/2024

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1/20/2025
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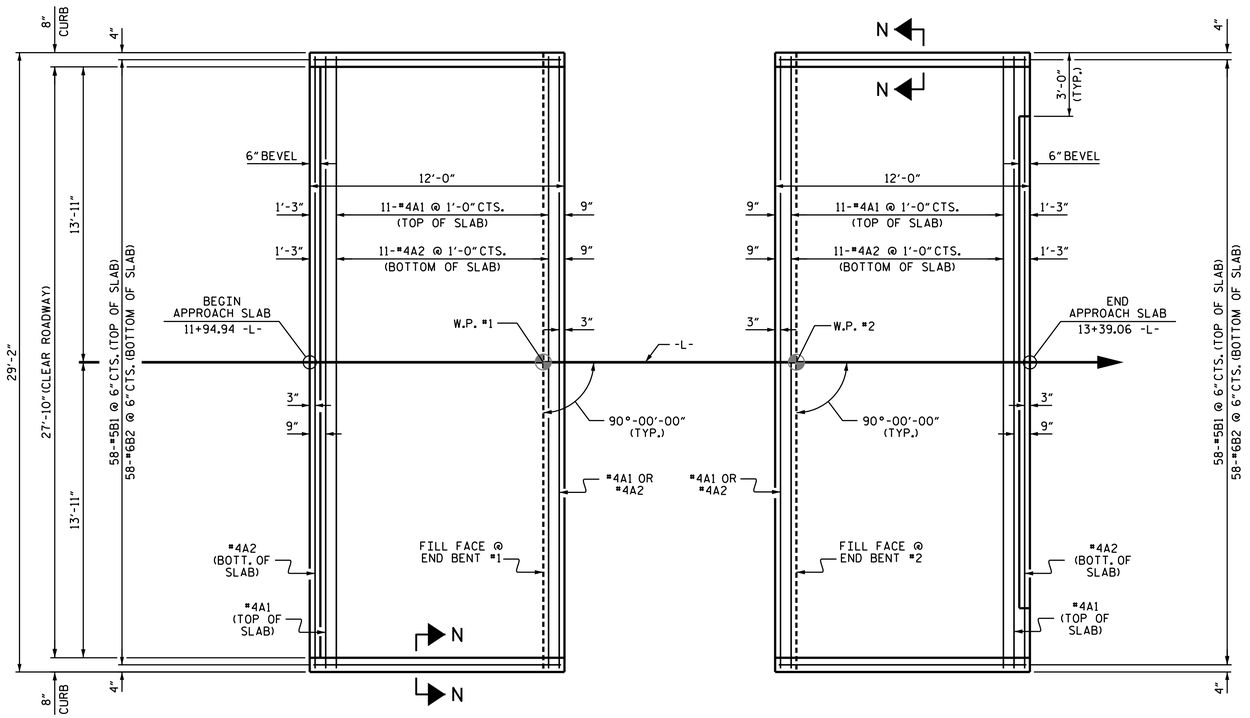
ephelps

STD. NO. RR1 Sht. 2

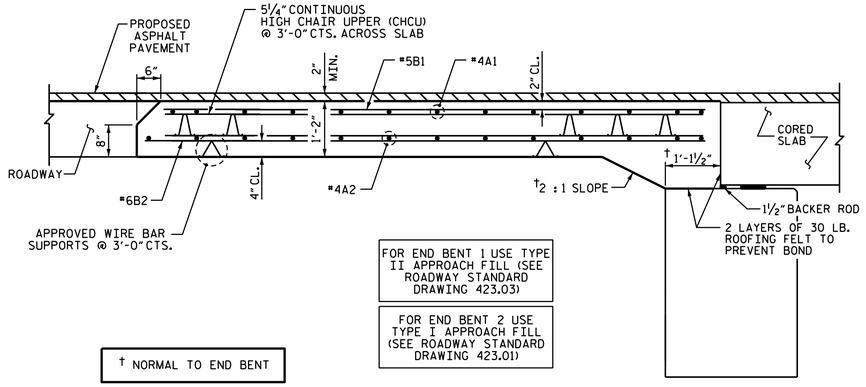
8/26/21



PLAN @ END BENT #1

PLAN @ END BENT #2

DIMENSIONS SHOWN ARE TYPICAL FOR BOTH APPROACH SLABS



FOR END BENT 1 USE TYPE II APPROACH FILL (SEE ROADWAY STANDARD DRAWING 423.03)

FOR END BENT 2 USE TYPE I APPROACH FILL (SEE ROADWAY STANDARD DRAWING 423.01)

† NORMAL TO END BENT

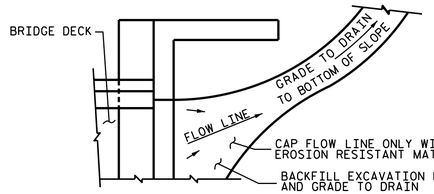
SECTION THRU SLAB

NOTES

FOR BRIDGE APPROACH FILL, SEE ROADWAY PLANS.

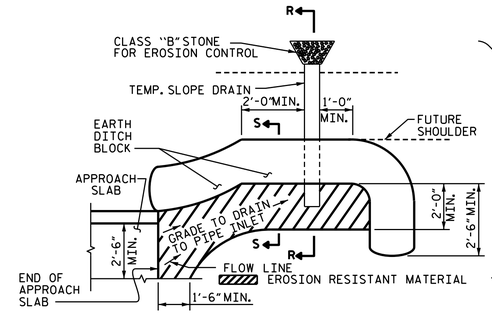
AREA BETWEEN THE WINGWALL AND APPROACH SLAB SHALL BE GRADED TO DRAIN THE WATER AWAY FROM THE FILL FACE OF THE BRIDGE AND SHALL BE PAVED. SEE ROADWAY PLANS.

APPROACH SLAB GROOVING IS NOT REQUIRED.



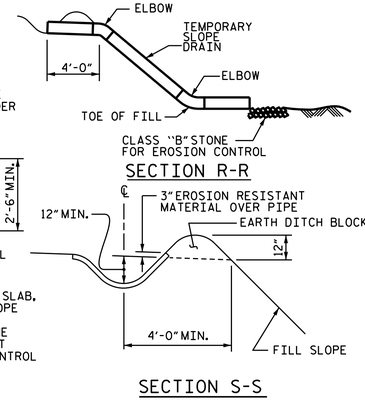
NOTE: IF THE APPROACH SLAB IS NOT CONSTRUCTED IMMEDIATELY AFTER THE BACKFILLING OF THE END BENT EXCAVATION, GRADE TO DRAIN TO THE BOTTOM OF THE SLOPE AND PROVIDE EROSION RESISTANT MATERIAL, SUCH AS FIBERGLASS ROVING OR AS DIRECTED BY THE ENGINEER TO PREVENT SOIL EROSION AND TO PROTECT THE AREA ADJACENT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

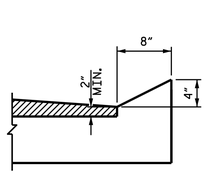
PLAN VIEW



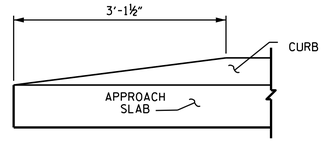
SECTION S-S

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

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

BILL OF MATERIAL

APPROACH SLAB AT EB #1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱ A1	13	#4	STR	28'-10"	250
A2	13	#4	STR	28'-10"	250
✱ B1	58	#5	STR	11'-2"	676
B2	58	#6	STR	11'-8"	1016
REINFORCING STEEL				LBS.	1266
✱ EPOXY COATED REINFORCING STEEL				LBS.	926
CLASS AA CONCRETE				C.Y.	17.7

APPROACH SLAB AT EB #2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱ A1	13	#4	STR	28'-10"	250
A2	13	#4	STR	28'-10"	250
✱ B1	58	#5	STR	11'-2"	676
B2	58	#6	STR	11'-8"	1016
REINFORCING STEEL				LBS.	1266
✱ EPOXY COATED REINFORCING STEEL				LBS.	926
CLASS AA CONCRETE				C.Y.	16.7

PROJECT NO. DF18314.2044188

HAYWOOD COUNTY

STATION: 12+67.00 -L-

vhb
VHB Engineering NC, P.C. (C-3705)
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Raleigh, NC 27606

DRAWN BY : E.C. PHELPS DATE : 11/2024
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1/20/2025
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ephelps

NORTH CAROLINA PROFESSIONAL SEAL 030878 ENGINEER KEVIN FISCHER
Docusigned by: Kevin Fischer 1/20/2025
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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

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

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

STD. NO. BAS_30_90S

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

DOWELS:

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

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

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

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

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

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

REINFORCING STEEL:

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

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

STRUCTURAL STEEL:

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

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

WITH THE SOLE EXCEPTION OF EDGES AT SURFACES WHICH BEAR ON OTHER SURFACES, ALL SHARP EDGES AND ENDS OF SHAPES AND PLATES SHALL BE SLIGHTLY ROUNDED BY SUITABLE MEANS TO A RADIUS OF APPROXIMATELY $\frac{1}{16}$" 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.