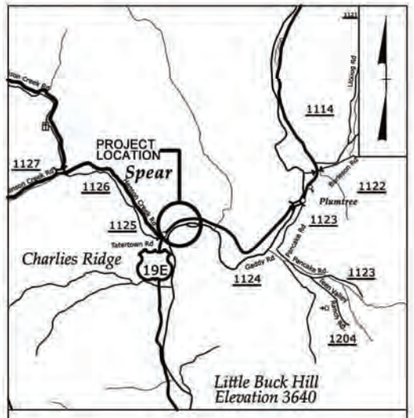
01/16/24

TIP PROJECT: 006-01-ef443



VICINITY MAP (NTS)

NORTH CAROLINA DEPARTMENT OF EMERGENCY MANAGEMENT

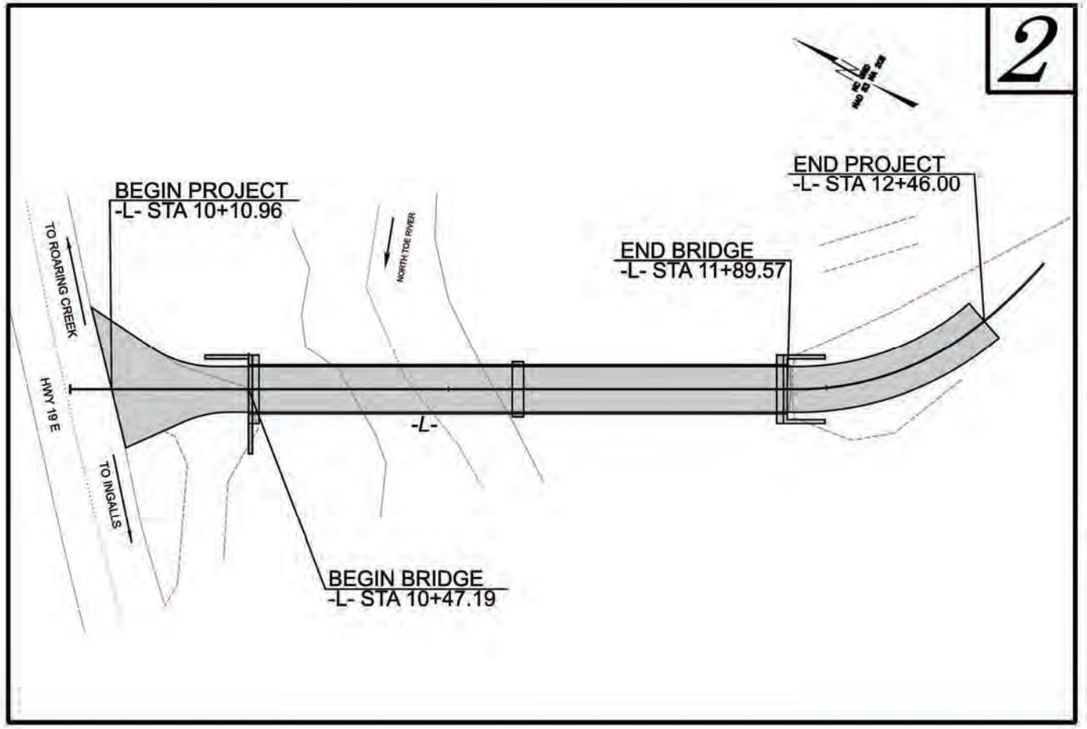
AVERY COUNTY

LOCATION: *PRIVATE BRIDGE REPLACEMENT LOCATED AT 5631 US 19E NEWLAND, NC 28657*

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	006-01-ef443	1	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION



INDEX OF SHEETS

SHEET NUMBER	SHEET
1	TITLE SHEET
2	ROADWAY TYP.SECTION, PLAN AND PROFILE
S-1 THRU S-16	STRUCTURE PLANS
EC-1 THRU EC-4	EROSION CONTROL PLANS
RF-1	REFORESTATION DETAIL

GRAPHIC SCALES

PLANS: 20 10 0 20 40

PROFILE (HORIZONTAL): 20 10 0 20 40

PROFILE (VERTICAL): 20 10 0 20 40

DESIGN DATA

FUNC CLASS = PRIVATE ROAD

ADT = >20 AND <2000

MIN R = 40' (<10% GRADE)
80' (>10% GRADE)

e = 0.04 MIN, 0.06 MAX (UNPAVED)
0.02 MIN, 0.06 MAX (PAVED)

MAX GRADE = 12% (UNPAVED)
25% (PAVED)

K = 2 (CREST & SAG)

PROJECT LENGTH

LENGTH OF ROADWAY PROJECT 006-01-ef443 = 0.018 MILES
LENGTH OF STRUCTURE PROJECT 006-01-ef443 = 0.027 MILES
TOTAL LENGTH OF TIP PROJECT 006-01-ef443 = 0.045 MILES

PLANS PREPARED BY:
5430 Wade Park Blvd., Suite 410
Raleigh, NC 27606
Tel. 919-854-0344 Fax. 919-854-0355
NC License No. F-0795
VOLKERT

2024 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: N/A

LETTING DATE: N/A

EMILY E MURRAY, PE
PROJECT ENGINEER

CHRISTOPHER H. LEE, PE
PROJECT DESIGN ENGINEER

CHRIS WERNER, PE
PRIVATE ROAD AND BRIDGE PROGRAM MANAGER

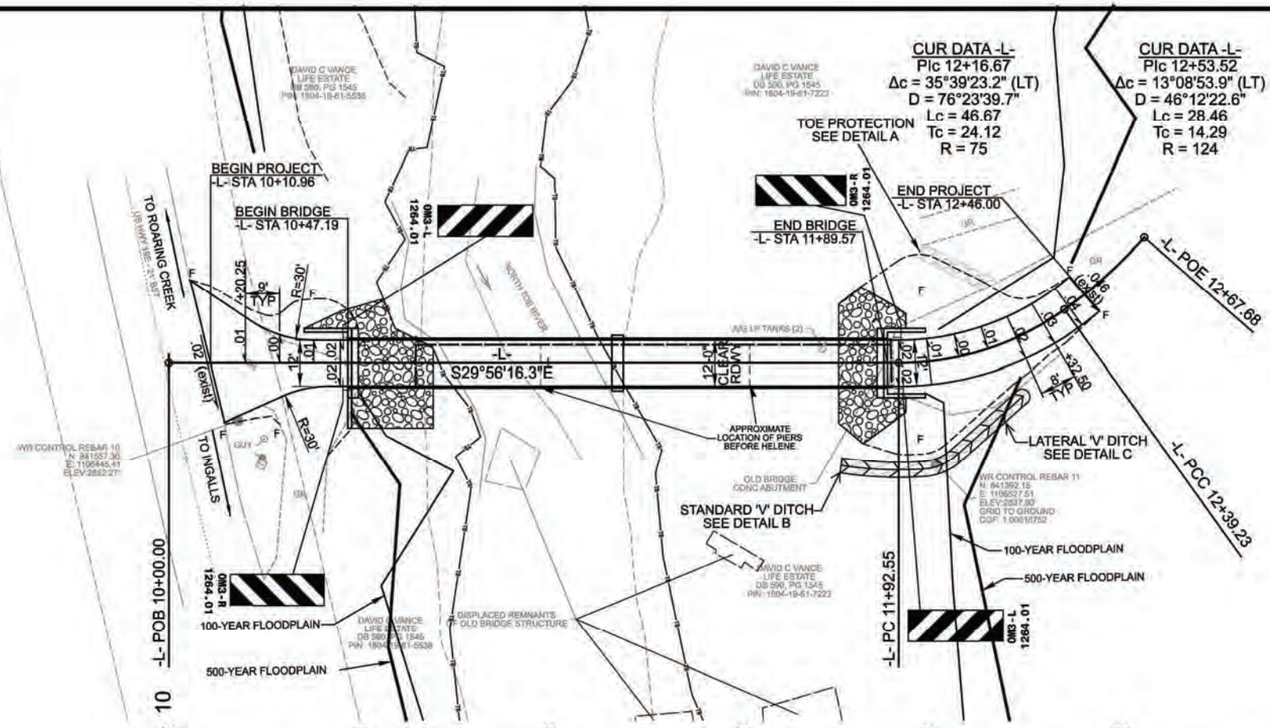
HYDRAULICS ENGINEER

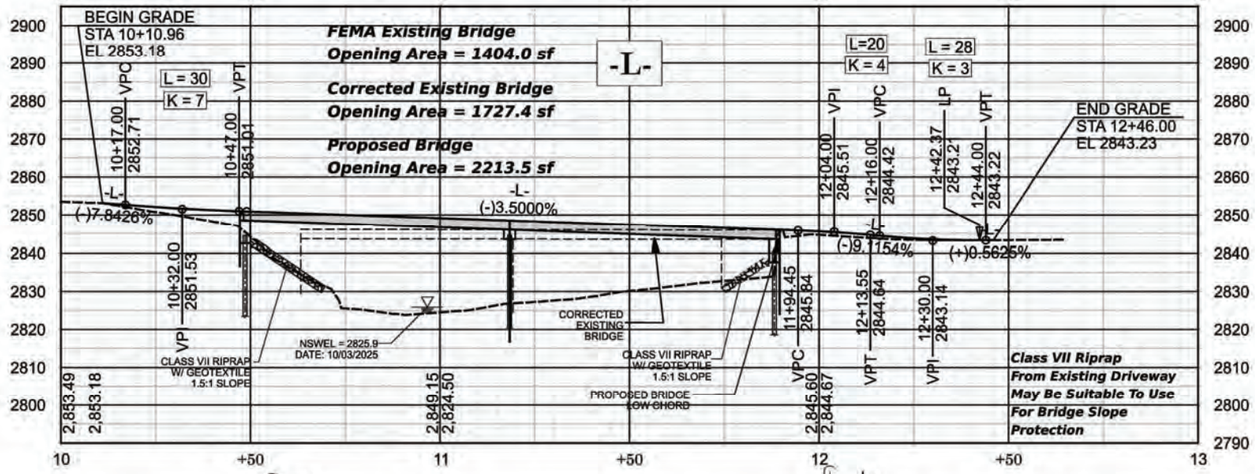
ANA M. PASSMAN P.E. 11/26/2025
SIGNATURE

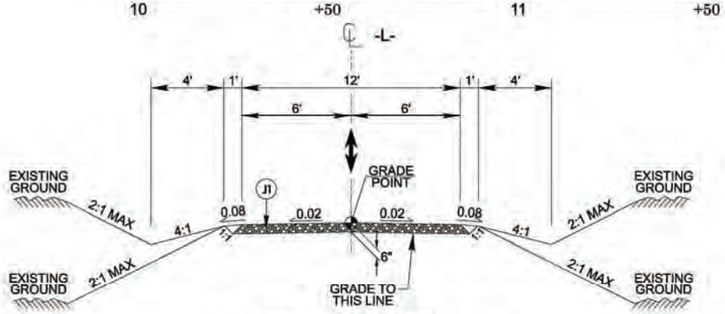
ROADWAY DESIGN ENGINEER

CHRISTOPHER H. LEE P.E. 11/26/2025
SIGNATURE

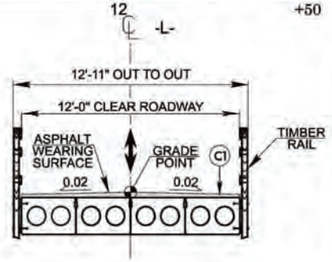
EMERGENCY MANAGEMENT NORTH CAROLINA







TYPICAL SECTION NO. 1
-L- STA. 10+10.96 TO 10+47.19 (BEGIN BRIDGE)
-L- STA. 11+89.57 (END BRIDGE) TO 12+46.00

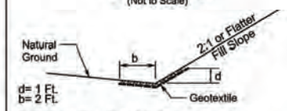


BRIDGE SKETCH NO. 1
-L- STA. 10+47.19 (BEGIN BRIDGE) TO
-L- STA. 11+89.57 (END BRIDGE)

ROADWAY QUANTITIES

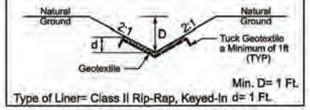
DESCRIPTION	QUANTITY	UNIT
BORROW EXCAVATION	135	CY
SUPPLEMENTARY CLEARING AND GRUBBING	1	ACRES
FINE GRADING	170	SY
AGGREGATE BASE COURSE	60	TON

DETAIL A
TOE PROTECTION
(Not to Scale)



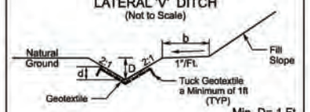
Type of Liner= Class I Rip-Rap
FROM -L- STA. 12+00 TO STA. 12+24 LT

DETAIL B
STANDARD 'V' DITCH
(Not to Scale)



Type of Liner= Class II Rip-Rap, Keyed-In d= 1 Ft.
FROM -L- STA. 11+77 TO STA. 11+93 RT

DETAIL C
LATERAL 'V' DITCH
(Not to Scale)



Type of Liner= Class II Rip-Rap, Keyed-In b= 2 Ft.
FROM -L- STA. 11+93 TO STA. 12+22 RT

PAVEMENT SCHEDULE	
C1	PROP. VAR. DEPTH ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 110 LBS. PER SQ. YD. PER 1" DEPTH TO BE PLACED IN LAYERS NOT LESS THAN 1" OR GREATER THAN 1½" IN DEPTH
J1	PROP. 6' AGGREGATE BASE COURSE

PRB_006-01-ef443

SHEET NO.	TOTAL SHEETS
2	X

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Raleigh, NC 27606
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NC License No. F-0755

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 047089 CHRISTOPHER H. LEE
1/26/2025

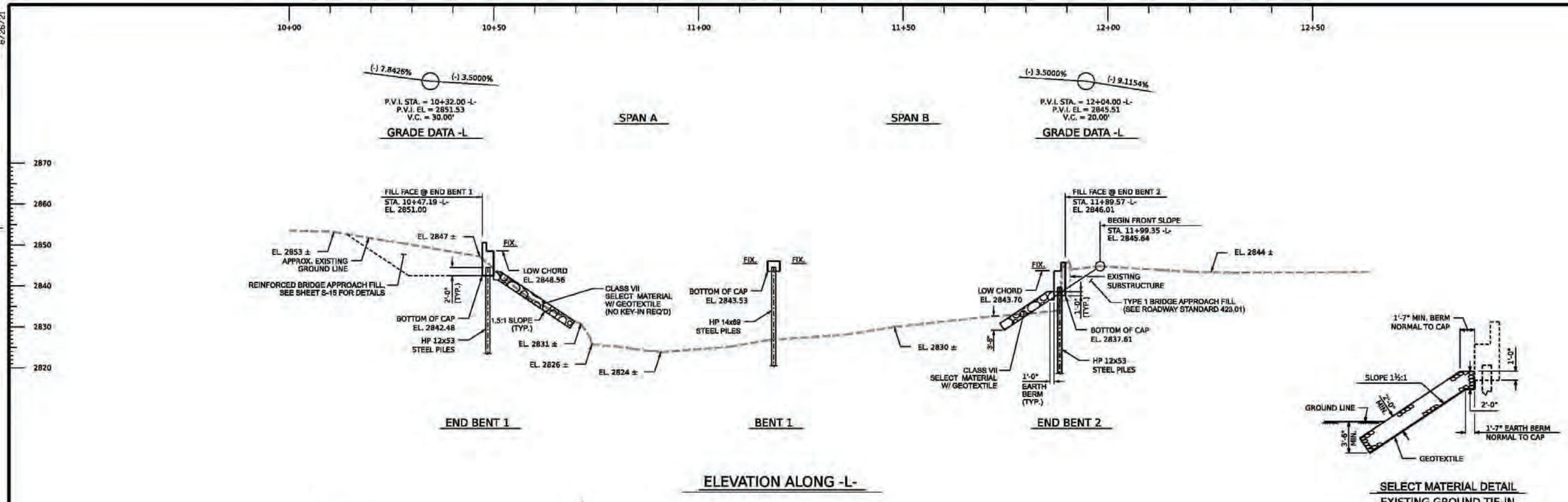
HYDRAULIC DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 026306 ANNA M. PASSMAN
11/26/2025

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
AVERY COUNTY

BRIDGE AT 5631 US 19E NEWLAND, NC 28657
AVERY COUNTY
12'-0" CLEAR ROADWAY AND 90° SKEW

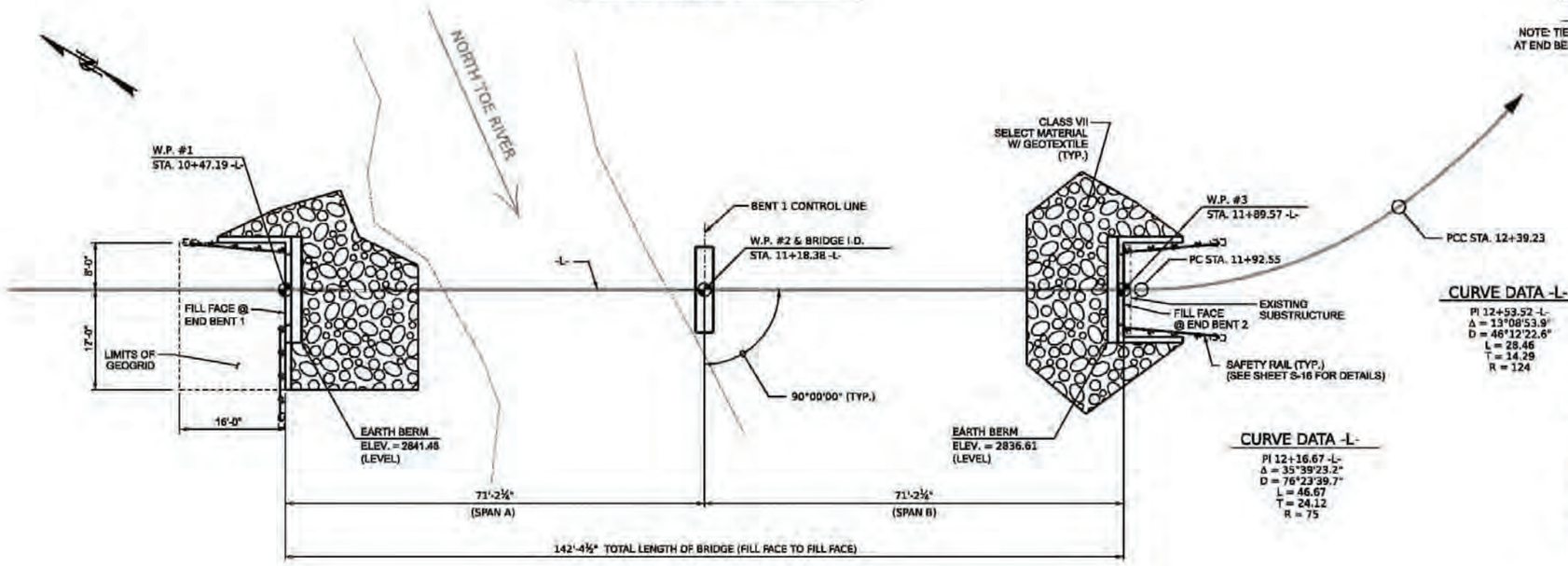
5/26/21



ELEVATION ALONG -L-

SELECT MATERIAL DETAIL
EXISTING GROUND TIE-IN

NOTE: TIE-IN DEPTH IN EXISTING GROUND IS NOT REQUIRED AT END BENT 1, WHERE SELECT MATERIAL WILL TERMINATE AT LOCATIONS OF EXISTING BOULDERS



PLAN

CURVE DATA -L-

PI 12+53.52 -L-
Δ = 13°08'53.9"
D = 46°12'22.6"
L = 28.46
T = 14.29
R = 124

CURVE DATA -L-

PI 12+16.67 -L-
Δ = 35°39'23.2"
D = 76°23'39.7"
L = 46.67
T = 24.12
R = 75

PROJECT NO. 006-01-EF443

AVERY COUNTY

STATION: 11+18.38 -L-

SHEET 1 OF 3

NORTH CAROLINA
OFFICE OF EMERGENCY MANAGEMENT

GENERAL DRAWING

BRIDGE AT 5598 S US19E
OVER N. TOE RIVER

DRAWN BY :	J. LOFTUS	DATE :	11/2025			
CHECKED BY :	P. JACOB	DATE :	11/2025			
DESIGN ENGINEER OF RECORD:	J. LOFTUS	DATE :	12/2025			

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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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NORTH CAROLINA PROFESSIONAL SEAL 049425 ENGINEER JEFFREY M. LOFTUS

12/5/2025
X:\Projects\NCD\NCD25009\NCD25009_01\04-Production\Transportation\Structures\03 - CADD\02 - FinalDrawings\401_001_PRBG050IEF443_NCEM_G01_001.dgn
loftus

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	240	2844.48	20	2829.80							2824.80	5	15
Bent 1, Piles 1-4	4	340	2844.53	25	2823.40							2813.40	10	5
End Bent 2, Piles 1-5	5	220	2839.61	25	2824.60							2818.40	6	19
TOTAL QUANTITY:													95	190

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

** 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.

PROJECT NO. 011.01.00403

Avery COUNTY

STATION: -L- 11+18.38

NOTES:

1. The Pile Foundation Tables are based on the bridge substructure design and foundation recommendations sealed by a North Carolina Professional Engineer (Hratch Antoine Agopian, #057984) on 11-18-2025.
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 and Pipe Pile Plates when necessary.

NORTH CAROLINA PROFESSIONAL SEAL 057984 ENGINEER JEFFREY M. LOVING 12-04-25

SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

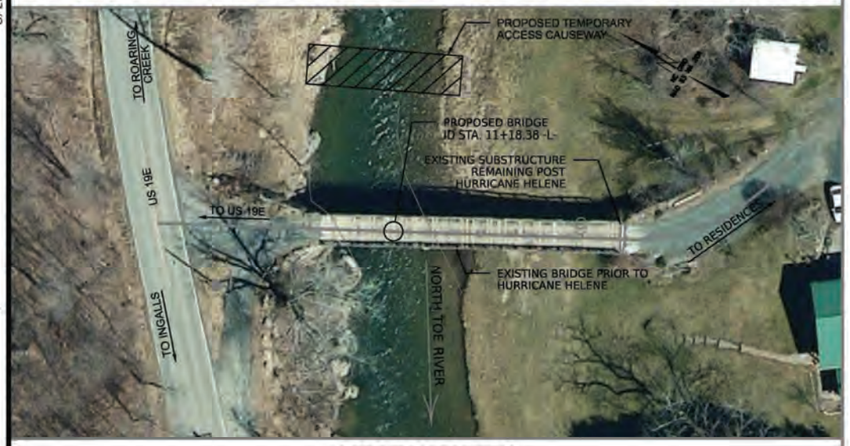
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

PILE FOUNDATION TABLES

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

8/26/21

BM #1, REBAR, STA. 10+18.25, OFFSET 14.98' RIGHT, ELEV. 2852.27, N 841557.30, E 1106445.41



LOCATION SKETCH

NOTES

ASSUMED LIVE LOAD = HS-20.

IMPACT ALLOWANCE = 15%.

A MOMENT DISTRIBUTION FACTOR OF 0.34 WAS USED FOR DESIGN OF THE CORED SLAB UNITS.

THIS BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH AASHTO LRFD DESIGN SPECIFICATIONS EXCEPT AS NOTED.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

FOR CORED SLAB AND BOX BEAM POST TENSIONING, SEE SPECIAL PROVISIONS.

FOR TIMBER BRIDGE RAIL, SEE SPECIAL PROVISIONS.

FOR SAFETY RAIL, SEE SPECIAL PROVISIONS.

FOR SELECT MATERIAL, CLASS VII (2'-0" MIN. THICK), SEE SPECIAL PROVISIONS.

FOR REINFORCED BRIDGE APPROACH FILL, SEE SPECIAL PROVISIONS.

FOR TYPE 1 BRIDGE APPROACH FILL, SEE SPECIAL PROVISIONS.

FOR CONSTRUCTION, MAINTENANCE, AND REMOVAL OF TEMPORARY ACCESS, SEE SPECIAL PROVISIONS. FOR DETAILS OF CONSTRUCTION, MAINTENANCE, AND REMOVAL OF TEMPORARY ACCESS, SEE EROSION CONTROL PLANS.

FOR EROSION CONTROL, SEE EROSION CONTROL PLANS.

EXISTING BRIDGE REMNANTS SHALL BE REMOVED.

REMOVAL OF THE EXISTING BRIDGE REMNANTS AND WORK ON THE PROPOSED BRIDGE SHALL BE PERFORMED IN A MANNER THAT PREVENTS DEBRIS FROM FALLING INTO THE WATER.

IN AS MUCH 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."

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.

UNLESS OTHERWISE REQUIRED ON PLANS, CLASS A CONCRETE SHALL BE USED FOR ALL PORTIONS OF ALL STRUCTURES.

UNLESS OTHERWISE NOTED ON THE PLANS, ALL EXPOSED CORNERS ON STRUCTURES SHALL BE CHAMFERED ¾".

THE BRIDGE SHALL BE BUILT ON THE GRADE OR VERTICAL CURVE SHOWN ON PLANS.

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.

THE TIMBER BRIDGE RAIL IS NOT DESIGNED ACCORDING TO THE MANUAL FOR ASSESSING SAFETY HARDWARE (MASH) TEST LEVELS. THE TIMBER BRIDGE RAIL WAS DESIGNED FOR LOADINGS FOR SAFETY RAIL ACCORDING TO THE 2024 NORTH CAROLINA STATE BUILDING CODE.

AT THE CONTRACTOR'S OPTION, THE EXISTING STONE MATERIAL ON THE THE END BENT 2 APPROACH CAN BE USED FOR THE CLASS VII SELECT MATERIAL PROPOSED FOR END BENT 2. CONTRACTOR SHALL VERIFY THAT THE EXISTING MATERIAL ADHERES TO CLASS VII SELECT MATERIAL QUALIFICATIONS.

ASPHALT WEARING SURFACE SHALL UTILIZE VARIABLE DEPTH ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, PLACED AT AN AVERAGE RATE OF 110 LBS. PER SQ. YD. PER 1" DEPTH. TO BE PLACED IN LAYERS NOT TO EXCEED 2" IN DEPTH.

RECOMMENDED INSPECTION AND MAINTENANCE

BRIDGE INSPECTION PERFORMED BY A CERTIFIED BRIDGE INSPECTOR IS RECOMMENDED ON THE FOLLOWING SCHEDULE:

YEARS 0-10:	INSPECT EVERY 5 YEARS
YEARS 10-20:	INSPECT EVERY 4 YEARS
YEARS 20-30:	INSPECT EVERY 3 YEARS
YEARS 30+:	INSPECT EVERY 2 YEARS

REPAIR ANY PRIORITY MAINTENANCE ITEMS NOTED DURING BRIDGE INSPECTIONS.

IF DETERIORATION IS NOTED IN INSPECTIONS, ACCELERATE SCHEDULE AND INSPECT EVERY 2 YEARS THEREAFTER.

OBSERVE BETWEEN INSPECTIONS FOR CRACKS RUST OR SPALLING IN CONCRETE OR STEEL COMPONENTS, SIGNS OF EROSION OR SCOURING AROUND ABUTMENTS AND PIERS, DECK SURFACE WEAR, DAMAGE OR DETERIORATION OF SAFETY RAIL.

REMOVE DEBRIS AND SEDIMENT FROM THE DECK AND UNDERNEATH THE BRIDGE TO PREVENT PONDING AND EROSION.

STRUCTURAL MAINTENANCE SHOULD INCLUDE TIGHTENING LOOSE BOLTS AND FASTENERS, SEALING CRACKS IN CONCRETE, PATCHING SPALLS IN CONCRETE, MILLING AND REPLACING ASPHALT ON BRIDGE DECK TAKING CARE NOT TO DAMAGE THE CORED SLAB UNITS.

MAINTAIN ASPHALT WEARING SURFACE IN GOOD CONDITION ENSURING ANY MILLING ASSOCIATED WITH REPAVING DOES NOT DAMAGE CORED SLAB UNITS.

FOUNDATION NOTES

FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

FILL THE BOTTOM 5 FT OF HOLES FOR PILE EXCAVATION AT END BENT NO. 1 AND END BENT NO. 2 WITH CONCRETE OR GROUT AND THE REST OF HOLES WITH CLASS II OR III SELECT MATERIAL THAT MEETS SECTION 1016 OF THE STANDARD SPECIFICATIONS.

FILL THE BOTTOM 10 FT OF HOLES FOR PILE EXCAVATION AT BENT NO. 1 WITH CONCRETE OR GROUT AND THE REST OF HOLES WITH CLASS II OR III SELECT MATERIAL THAT MEETS SECTION 1016 OF THE STANDARD SPECIFICATIONS.

SET HP12X53 PILES AT END BENT NO. 1 AND END BENT NO. 2 AND HP14X89 PILES AT BENT NO. 1 IN THE PREDRILLED HOLES AND FILL THE ANNULUS WITH CEMENTITIOUS CONCRETE/GROUT AS FOLLOWS:

1. DRY CONDITIONS: WHEN THE HOLE IS STABLE AND FREE OF STANDING WATER, PLACE CONCRETE OR GROUT FROM THE BOTTOM UP USING A TREMIE OR FLEXIBLE HOSE AND ALLOW CONCRETE OR GROUT TO FLOW FREELY AROUND THE PILE. KEEP PLACEMENT CONTINUOUS TO THE TOP OF ROCK ELEVATION.

2. WET CONDITIONS: WHEN WATER OR SLURRY IS PRESENT, USE AN APPROVED TREMIE PIPE KEPT EMBEDDED IN THE FRESH CONCRETE OR GROUT AT LEAST 5 FT. CLEAN THE BOTTOM OF EXCAVATIONS WITH A SUBMERSIBLE PUMP OR AN AIRLIFT. PLACE CONCRETE OR GROUT FROM THE BOTTOM UP TO PREVENT SEGREGATION OR WASHOUT. MAINTAIN POSITIVE HEAD OF CONCRETE OR GROUT UNTIL THE ROCK SOCKET IS COMPLETELY FILLED.

3. CASING USE: TEMPORARY CASING MAY BE USED AS REQUIRED TO MAINTAIN A CLEAN AND STABLE HOLE. CASING MAY BE TELESCOPIC OR SEGMENTAL. MAINTAIN CASING TIGHT TO PREVENT CONCRETE OR GROUT LOSS. CASING MAY BE WITHDRAWN AFTER CONCRETE OR GROUT HAS REACHED SUFFICIENT STABILITY, PROVIDED THE CONCRETE OR GROUT LEVEL IS MAINTAINED AT OR ABOVE THE BOTTOM OF THE CASING DURING WITHDRAWAL. LEAVE CASING IN PLACE IF CONCRETE OR GROUT STABILITY OR WATER CONDITIONS REQUIRE IT.

BRIDGE COORDINATES	
LATITUDE	LONGITUDE
36° - 01' - 29.0"	-82° - 01' - 19.2"

TOTAL BILL OF MATERIAL

	CONSTRUCTION, MAINTENANCE AND REMOVAL OF TEMPORARY ACCESS	REMOVAL OF EXISTING STRUCTURE	CLASS A CONCRETE	REINFORCING STEEL	HP 12 X 53 STEEL PILES		HP 14 X 89 GALVANIZED STEEL PILES		PILE EXCAVATION NOT IN SOIL	PILE EXCAVATION IN SOIL	ELASTOMERIC BEARINGS	SELECT MATERIAL CLASS VII (2'-0" MIN. THICK)	GEOTEXTILE FOR DRAINAGE	3'-0" X 2'-0" PRESTRESSED CONCRETE CORED SLABS		TIMBER BRIDGE RAIL	SAFETY RAIL	REINFORCED BRIDGE APPROACH FILL, STA. 10+47.19 -L-	TYPE 1 BRIDGE APPROACH FILL, STA. 11+89.57 -L-	ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B	ASPHALT BINDER FOR PLANT MIX
	LUMP SUM	LUMP SUM	CU. YDS.	LBS.	NO.	LIN.FT.	NO.	LIN.FT.	LIN.FT.	LIN.FT.	LUMP SUM	TONS	SQ.YDS.	NO.	LIN.FT.	LIN.FT.	EACH	LUMP SUM	LUMP SUM	TON	TON
SUPERSTRUCTURE											LUMP SUM			8	560.00	284.75	4			35	3
END BENT NO. 1			19.2	2,457	5	100			25	75		87	97					LUMP SUM			
BENT NO. 1			4.2	906			4	100	40	20											
END BENT NO. 2			19.4	2,459	5	125			30	95		102	113						LUMP SUM		
TOTAL	LUMP SUM	LUMP SUM	42.8	5,822	10	225	4	100	95	190	LUMP SUM	189	210	8	560.00	284.75	4	LUMP SUM	LUMP SUM	35	3

PROJECT NO. 006-01-EF443

AVERY COUNTY

STATION: 11+18.38 -L-

SHEET 3 OF 3

NORTH CAROLINA
OFFICE OF EMERGENCY MANAGEMENT

GENERAL DRAWING

BRIDGE AT 5598 S US19E
OVER N. TOE RIVER

The John R. McAdams Company, Inc.
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Suite 500
Raleigh, NC 27603

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fax 919. 361. 2269
license number: C-0293, C-187

www.mcadamsco.com

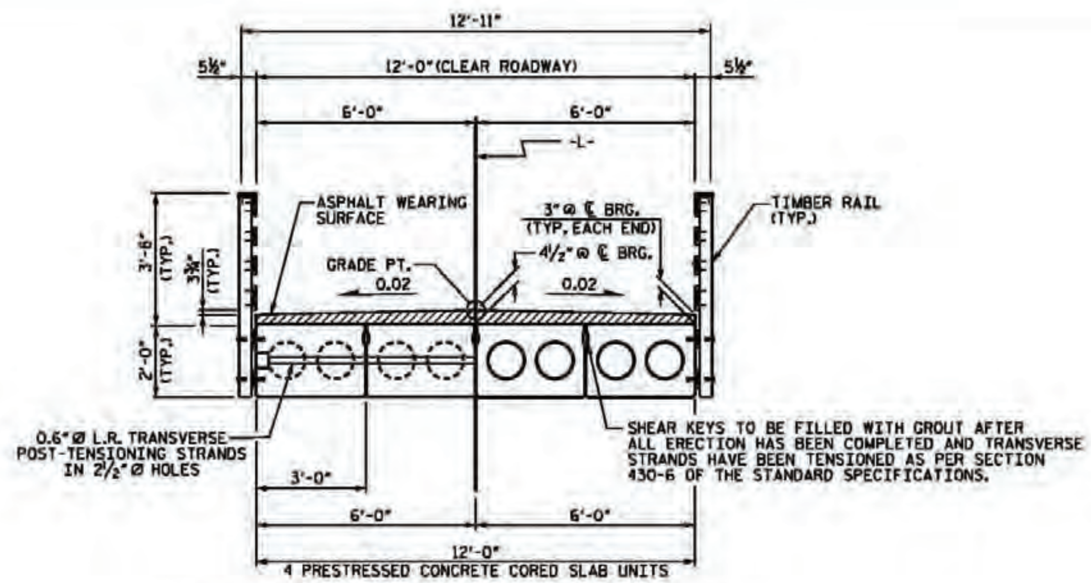
NORTH CAROLINA PROFESSIONAL SEAL 042511 ENGINEER JEFFREY M. LOFTUS 12-04-25

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DRAWN BY :	J. LOFTUS	DATE :	11/2025		
CHECKED BY :	P. JACOB	DATE :	11/2025		
DESIGN ENGINEER OF RECORD:	J. LOFTUS	DATE :	12/2025		

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

1/6/2026
loftus
X:\Projects\NCD\NCD25009\NCD25009_01\04-Production\Transportation\Structures\03 - CADD\02 - Final Drawings\401_005_PRB00601EF443_NCEM_GD3_003.dgn

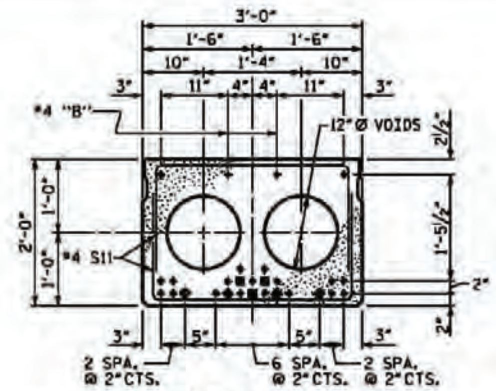


TYPICAL SECTION

THE MAXIMUM ASPHALT THICKNESS IS SHOWN. THE THICKNESS OF THE ASPHALT THICKNESS VARIES.

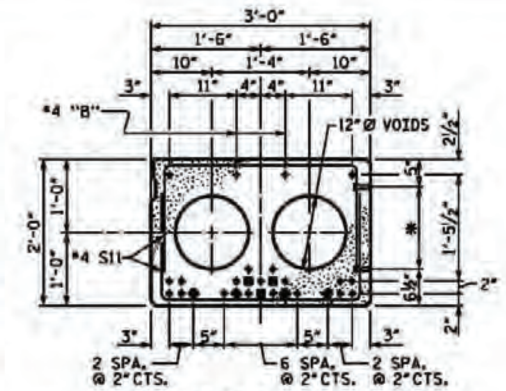
SHEAR KEY DETAIL

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



INTERIOR SLAB SECTION

(26 STRANDS REQUIRED)



EXTERIOR SLAB SECTION

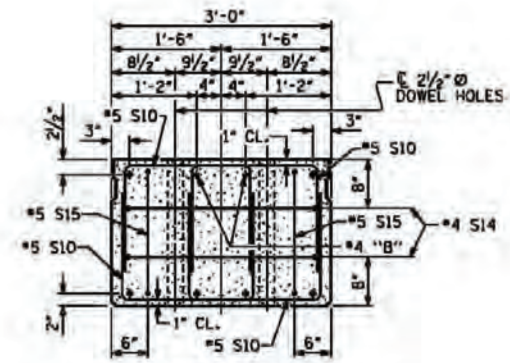
(26 STRANDS REQUIRED)
(RIGHT EXTERIOR SHOWN, LEFT EXTERIOR SLAB MIRRORED)
✱ (2) THREADED INSERTS CAST IN OUTSIDE FACE OF EXTERIOR UNIT

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.

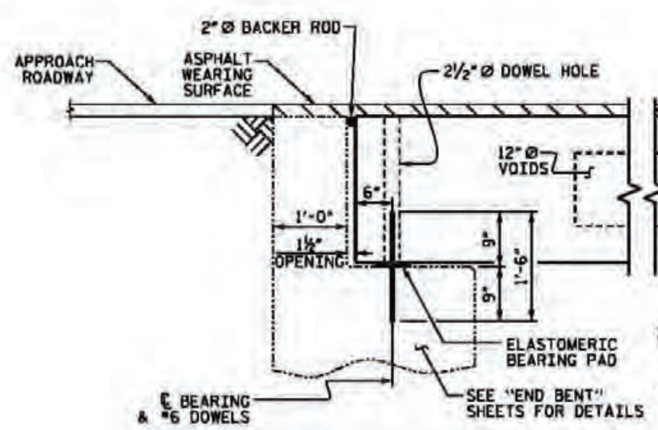
▣ BOND SHALL BE BROKEN ON THESE STRANDS FOR A DISTANCE OF 8'-0" FROM END OF CORED SLAB UNIT. SEE STANDARD SPECIFICATIONS, ARTICLE 1078-7.

DEBONDING LEGEND

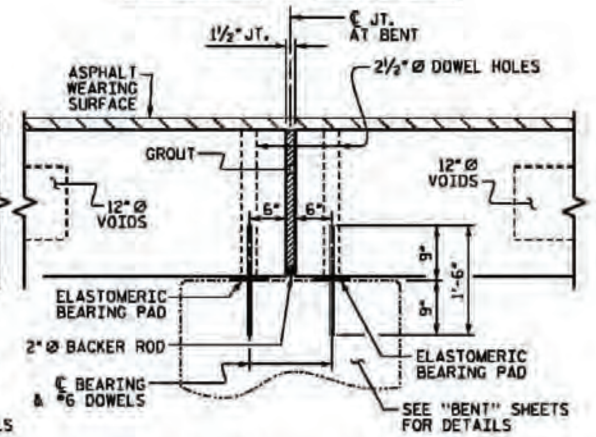


END ELEVATION

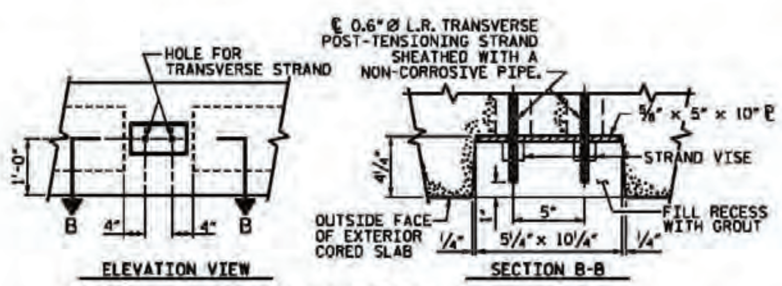
SHOWING PLACEMENT OF DOUBLE STIRRUPS AND LOCATION OF DOWEL HOLES. (STRAND LAYOUT NOT SHOWN.) INTERIOR SLAB UNIT SHOWN-EXTERIOR SLAB UNIT SIMILAR EXCEPT SHEAR KEY LOCATION.



SECTION AT END BENT



SECTION AT BENT



GROUTED RECESS AT END OF POST-TENSIONED STRAND CORED SLABS

PROJECT NO. 006-01-EF443

AVERY COUNTY

STATION: 11+18.38 -L-

SHEET 1 OF 3

NORTH CAROLINA
OFFICE OF EMERGENCY MANAGEMENT

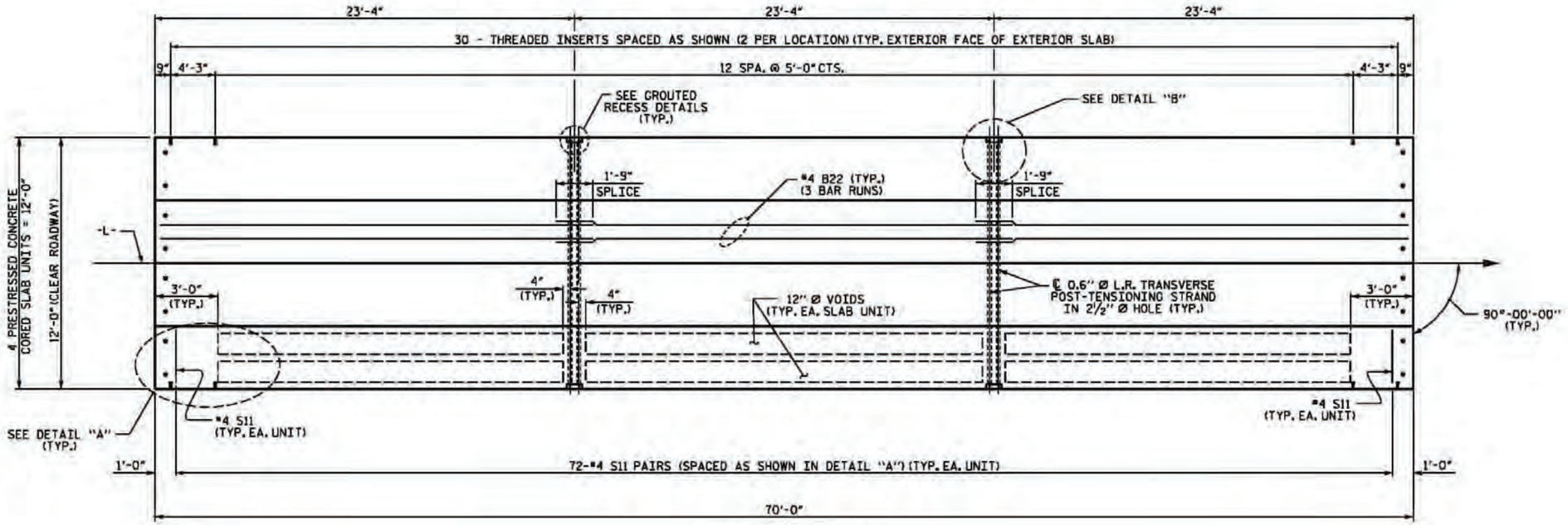
3'-0" X 2'-0" PRESTRESSED CONCRETE CORED SLAB UNIT

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

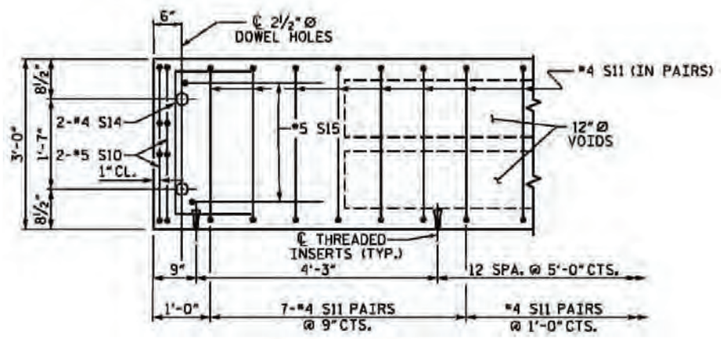
McADAMS

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

DRAWN BY: J. LOFTUS DATE: 11/2025
CHECKED BY: P. JACOB DATE: 11/2025
DESIGN ENGINEER OF RECORD: J. LOFTUS DATE: 12/2025

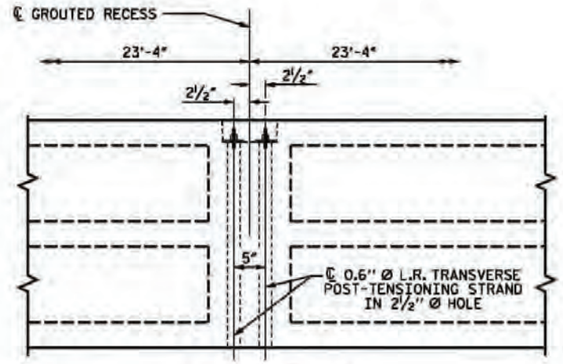


PLAN OF UNIT



DETAIL "A"

(TYPICAL EACH END OF UNIT)
NOTE: EXTERIOR UNIT SHOWN - INTERIOR UNIT SIMILAR EXCEPT OMIT THREADED INSERTS.
NOTE: #4 S11 BARS CAN BE SHIFTED SLIGHTLY TO AVOID THREADED INSERTS



DETAIL "B"

PROJECT NO. 006-01-EF443
AVERY COUNTY
STATION: 11+18.38 -L-
SHEET 2 OF 3

NORTH CAROLINA
OFFICE OF EMERGENCY MANAGEMENT

PLAN OF 70' UNIT 24'-10" CLEAR ROADWAY 90° SKEW

SPANS A & B

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-5
1			3			TOTAL SHEETS
2			4			16

DRAWN BY : J. LOFTUS DATE : 11/2025
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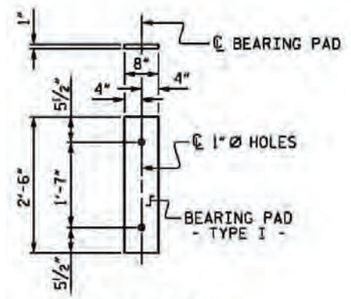
loftus

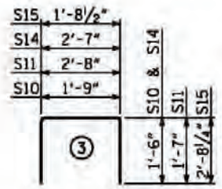


FIXED END
(TYPE I - 16 REQ'D)

ELASTOMERIC BEARING DETAILS

ELASTOMER IN ALL BEARINGS SHALL BE 60 DUROMETER HARDNESS.

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

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
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
7000 P.S.I. CONCRETE			CU. YDS.		11.8		11.8
0.6"Ø L.R. STRANDS			No.		24		24

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

CONCRETE RELEASE STRENGTH

UNIT	PSI
70' UNITS	5500

DEAD LOAD DEFLECTION AND CAMBER

	3'-0" x 2'-0"
70' CORED SLAB UNIT	0.6"Ø L.R. STRAND
CAMBER (SLAB ALONE IN PLACE)	2"
DEFLECTION DUE TO SUPERIMPOSED DEAD LOAD**	⅜"
FINAL CAMBER	1⅝"

** INCLUDES FUTURE WEARING SURFACE

CORED SLABS REQUIRED

	NUMBER	LENGTH	TOTAL LENGTH
70' UNIT			
EXTERIOR C.S.	4	70'-0"	280'-0"
INTERIOR C.S.	4	70'-0"	280'-0"
TOTAL	8		560'-0"

TIMBER BRIDGE RAIL

	TOTAL LENGTH
TIMBER BRIDGE RAIL	284'-9"

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"* 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 W 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.

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

APPLY EPOXY PROTECTIVE COATING TO CORED SLAB UNIT ENDS.

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.

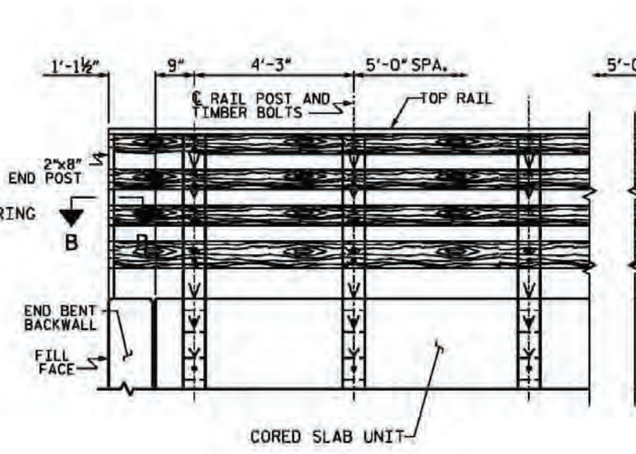
FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

THE THREADED INSERTS IN THE EXTERIOR UNITS SHALL BE SPACED AS SHOWN AND GALVANIZED IN ACCORDANCE WITH SECITON 1076 OF THE STANDARD SPECIFICATIONS. STAINLESS STEEL THREADED INSERTS MAY BE USED AS AN ALTERNATIVE.

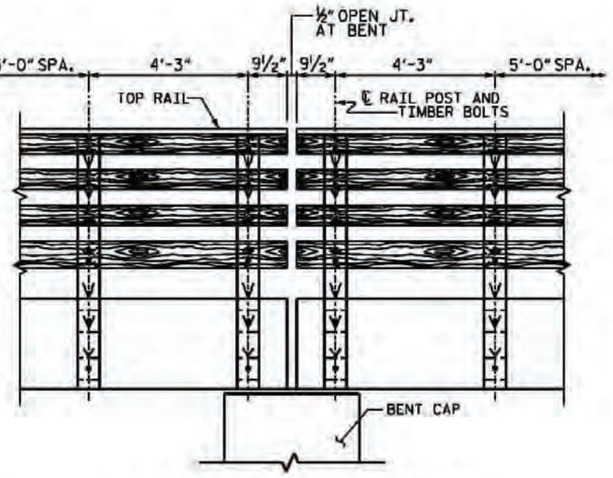
THE COST OF THE THREADED INSERTS SHALL BE INCLUDED IN THE PRICE BID FOR THE PRECAST UNITS.

THREADED INSERTS SHALL HAVE A MINIMUM FACTORED WORKING LOAD OF 4000 LBS.

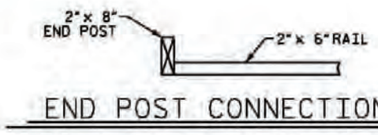
RAIL POST DETAIL



RAIL DETAIL AT END BENTS
(SPAN A SHOWN, SPAN B SIMILAR BUT MIRRORED)



RAIL DETAIL AT BENTS
(SPAN A SHOWN, SPAN B SIMILAR BUT MIRRORED)



END POST CONNECTION

PROJECT NO. 006-01-EF443
AVERY COUNTY
STATION: 11+18.38 -L-
SHEET 3 OF 3

NORTH CAROLINA
OFFICE OF EMERGENCY MANAGEMENT

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

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-6
1			3			TOTAL SHEETS
2			4			16

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DESIGN ENGINEER OF RECORD:	J. LOFTUS	DATE : 12/2025

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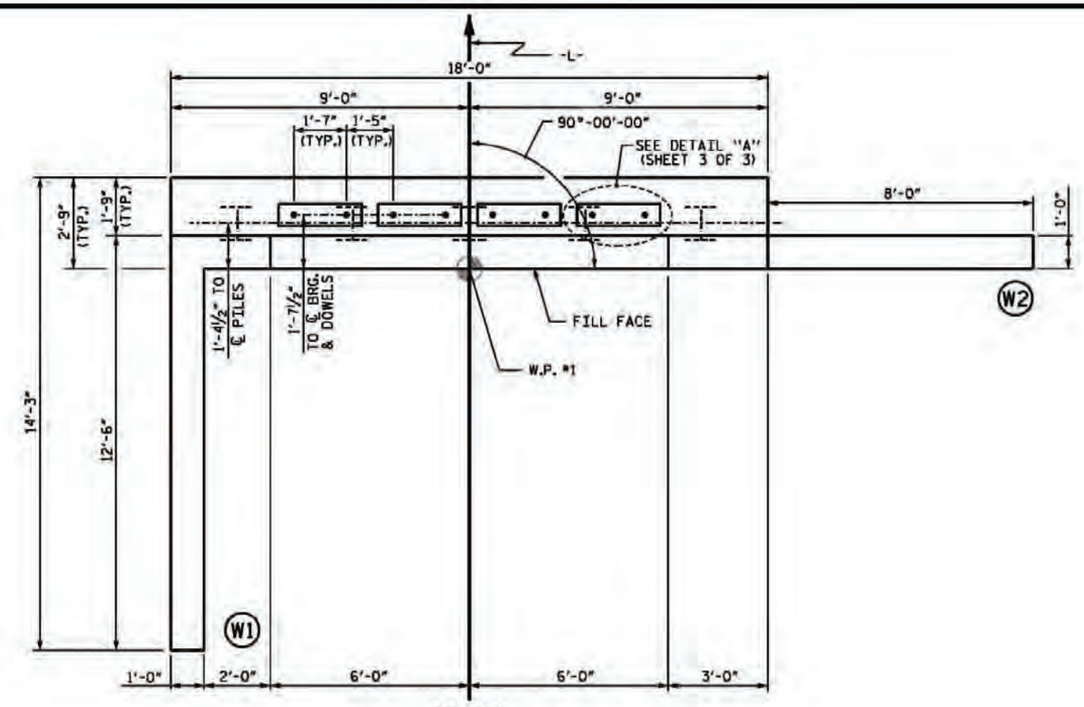
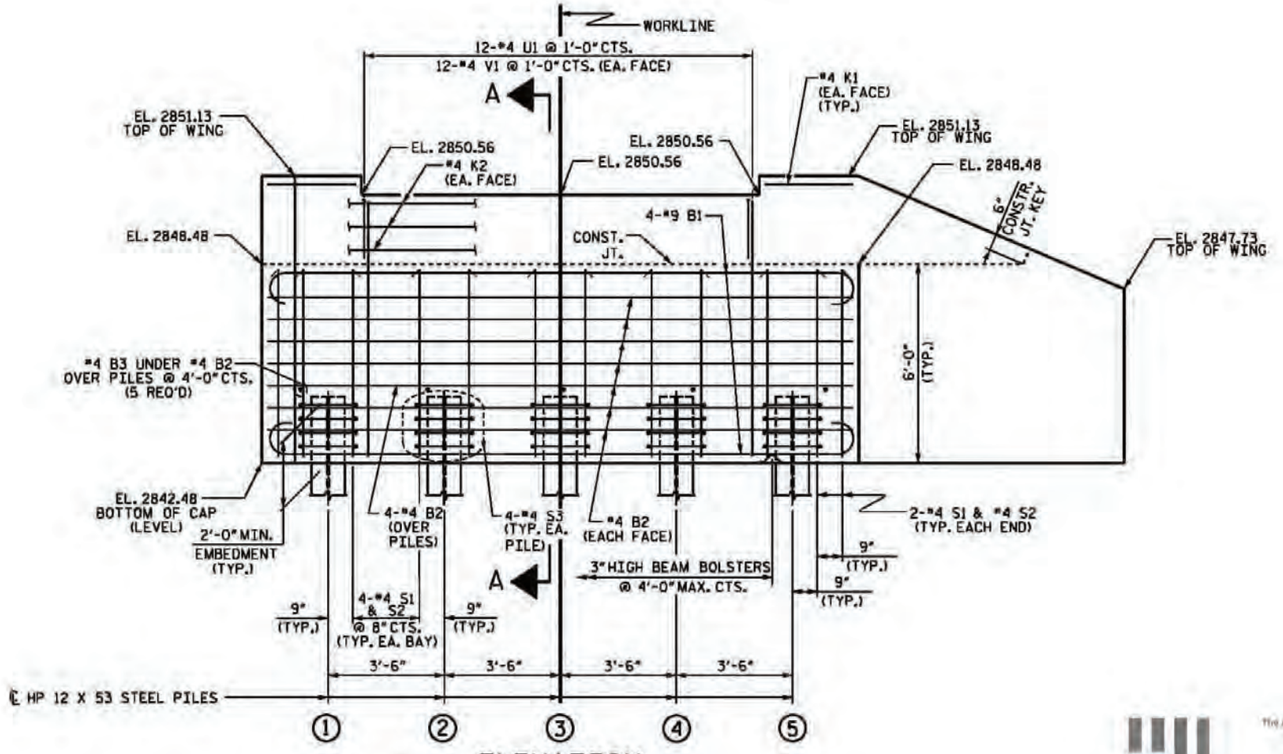
8/26/21



PLAN



ELEVATION

WING REINFORCEMENT NOT SHOWN FOR CLARITY.
FOR SECTION A-A, SEE SHEET 3 OF 3.
CONCRETE COLLARS FOR STEEL PILES NOT SHOWN IN PLAN AND ELEVATION VIEWS FOR CLARITY.
SEE "CORROSION PROTECTION FOR STEEL PILES DETAIL", SHEET 3 OF 3.

NOTES

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

FOR PILE SPLICE DETAILS, SEE SHEET 3 OF 3.

FOR WING DETAILS, SEE SHEET 2 OF 3.

PROJECT NO. 006-01-EF443

AVERY COUNTY

STATION: 11+18.38 -L-

SHEET 1 OF 3

NORTH CAROLINA
OFFICE OF EMERGENCY MANAGEMENT

SUBSTRUCTURE

END BENT No. 1

DRAWN BY :	J. LOFTUS	DATE :	11/2025
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DESIGN ENGINEER OF RECORD:	J. LOFTUS	DATE :	12/2025

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-7
1			3			TOTAL SHEETS
2			4			16

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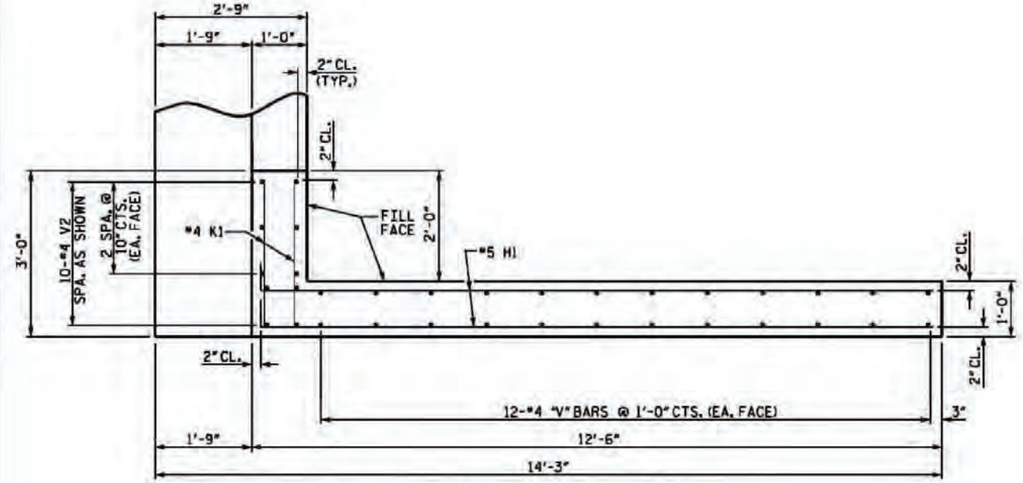
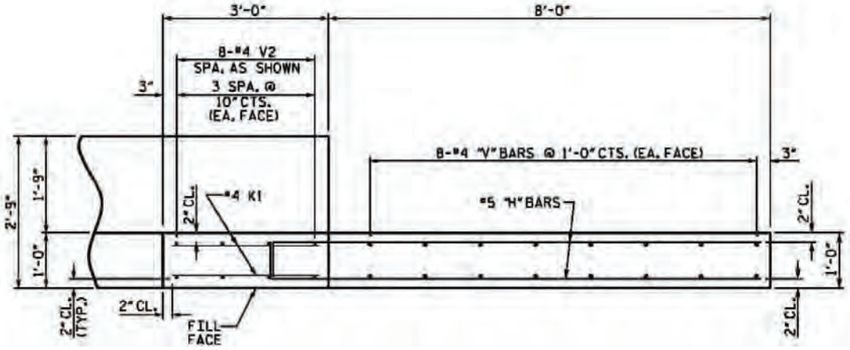
loftus

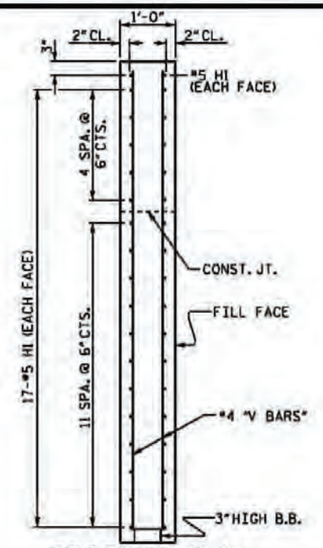
8/26/21



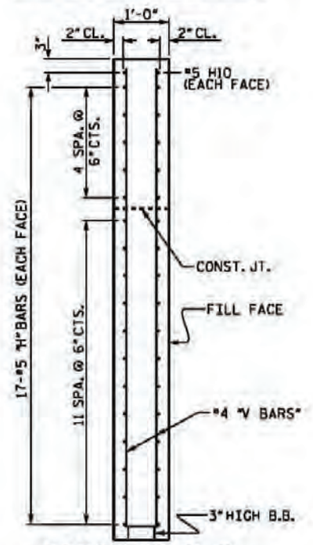
PLAN OF WING (W1)



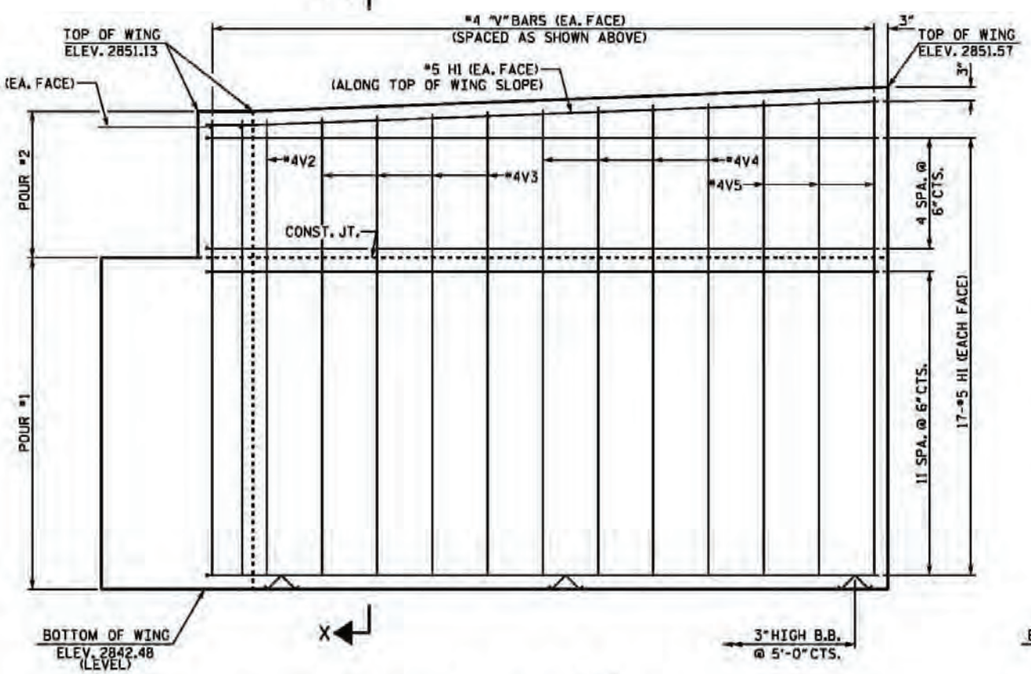
PLAN OF WING (W2)



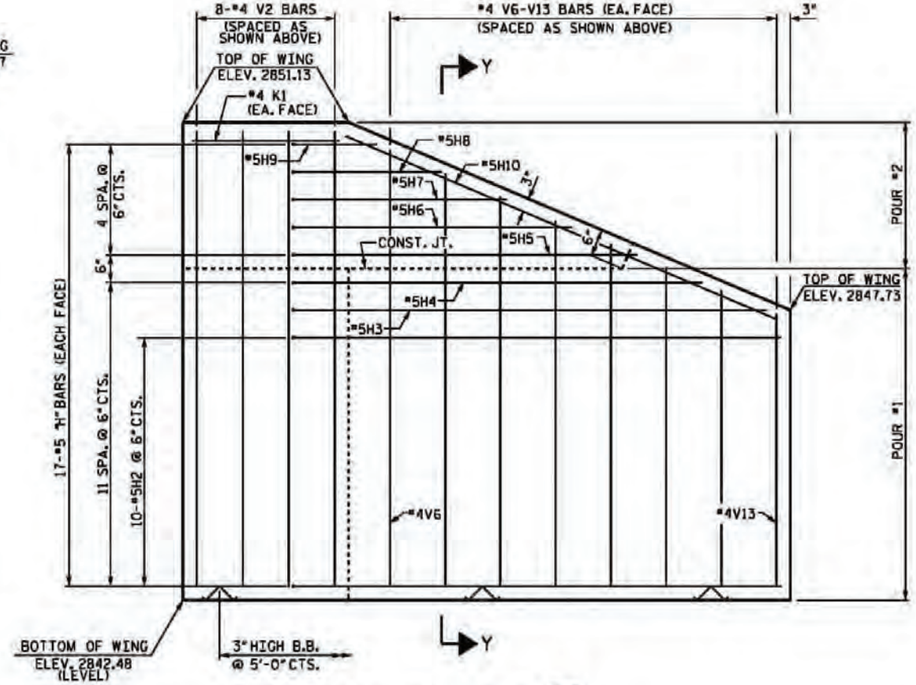
SECTION X-X



SECTION Y-Y



ELEVATION OF WING (W1)



ELEVATION OF WING (W2)

WING DETAILS

PROJECT NO. 006-01-EF443

AVERY COUNTY

STATION: 11+18.38 -L-

SHEET 2 OF 3

NORTH CAROLINA
OFFICE OF EMERGENCY MANAGEMENT

SUBSTRUCTURE

END BENT No.1
WING DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-8
1			3			TOTAL SHEETS
2			4			16

DRAWN BY : J. LOFTUS DATE : 11/2025
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DESIGN ENGINEER OF RECORD: J. LOFTUS DATE : 12/2026

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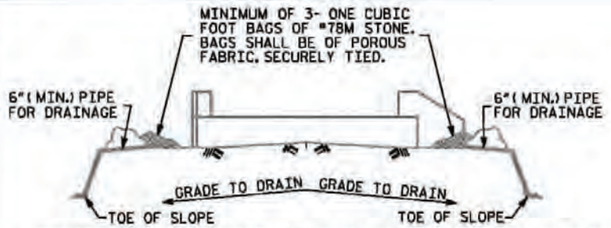
8/26/21

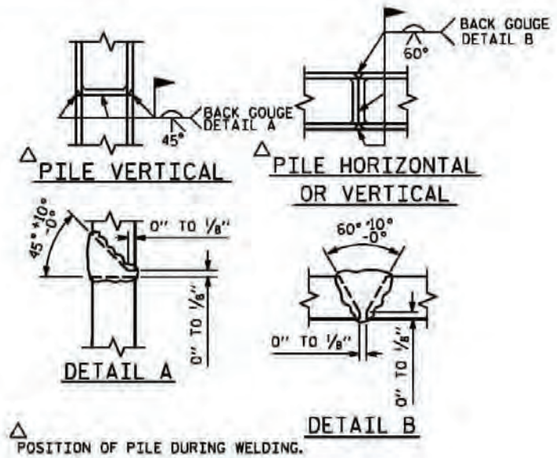


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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.

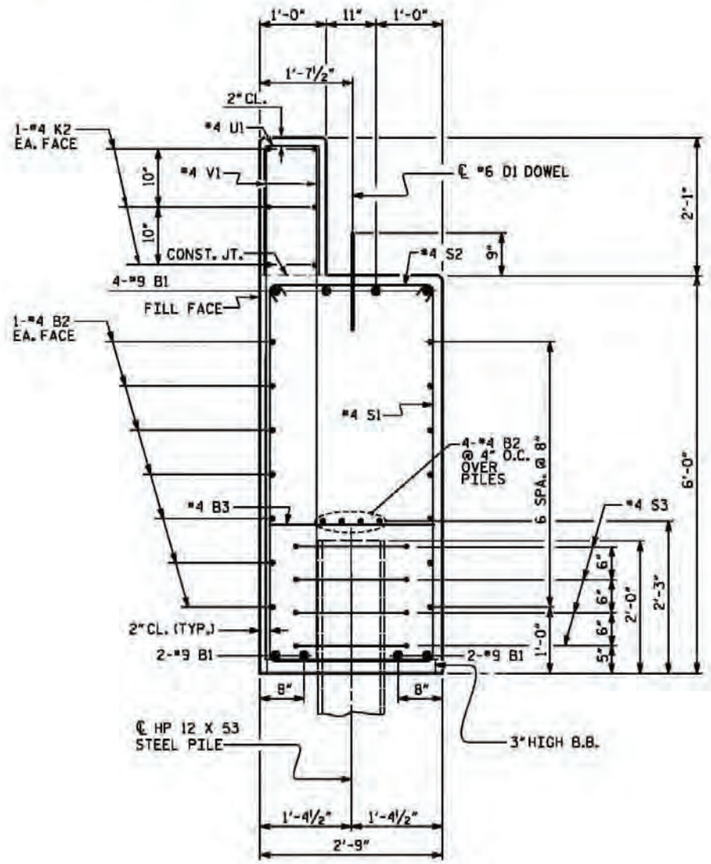
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

TEMPORARY DRAINAGE AT END BENT



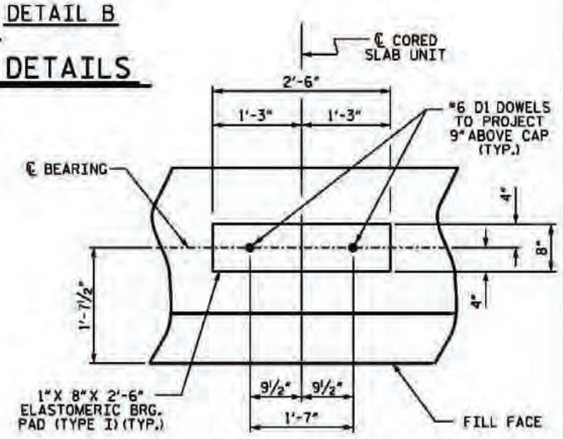
△POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS

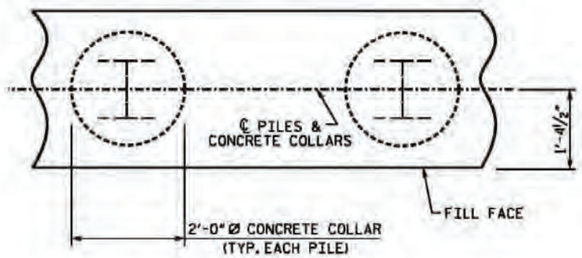


SECTION A-A

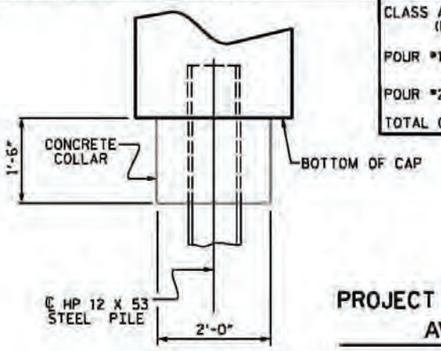
(CONCRETE COLLAR NOT SHOWN FOR CLARITY. SEE "CORROSION PROTECTION FOR STEEL PILES DETAIL.")



DETAIL "A"



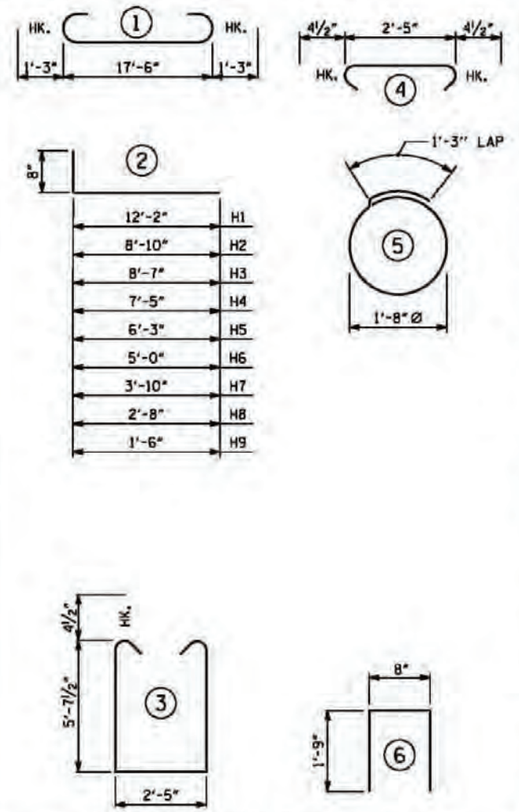
PLAN



ELEVATION

CORROSION PROTECTION FOR STEEL PILES DETAIL

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL FOR END BENT 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#9	1	20'-0"	544
B2	18	#4	STR	17'-8"	212
B3	5	#4	STR	2'-5"	8
D1	8	#6	STR	1'-6"	18
H1	36	#5	2	12'-10"	482
H2	20	#5	2	9'-6"	198
H3	2	#5	2	9'-3"	19
H4	2	#5	2	8'-1"	17
H5	2	#5	2	6'-11"	14
H6	2	#5	2	5'-8"	12
H7	4	#5	2	4'-6"	19
H8	4	#5	2	3'-4"	14
H9	4	#5	2	2'-2"	9
H10	4	#5	STR	8'-5"	35
K1	4	#4	STR	2'-8"	7
K2	6	#4	STR	17'-8"	71
S1	20	#4	3	14'-5"	193
S2	20	#4	4	3'-2"	42
S3	20	#4	5	6'-6"	87
U1	12	#4	6	4'-2"	33
V1	24	#4	STR	7'-8"	123
V2	20	#4	STR	8'-2"	109
V3	8	#4	STR	8'-3"	44
V4	8	#4	STR	8'-5"	45
V5	6	#4	STR	8'-7"	34
V6	2	#4	STR	7'-10"	10
V7	2	#4	STR	7'-5"	10
V8	2	#4	STR	7'-0"	9
V9	2	#4	STR	6'-7"	9
V10	2	#4	STR	6'-2"	8
V11	2	#4	STR	5'-9"	8
V12	2	#4	STR	5'-4"	7
V13	2	#4	STR	4'-11"	7

REINFORCING STEEL (END BENT 1) 2,457 LBS.

CLASS A CONCRETE BREAKDOWN (FOR END BENT 1)

POUR #1	CAP, LOWER PART OF WINGS & COLLARS	16.1 C.Y.
POUR #2	BACKWALL & WINGS	3.1 C.Y.
TOTAL CLASS A CONCRETE		19.2 C.Y.

PROJECT NO. 006-01-EF443

AVERY COUNTY

STATION: 11+18.38 -L-

SHEET 3 OF 3

NORTH CAROLINA
OFFICE OF EMERGENCY MANAGEMENT

SUBSTRUCTURE

END BENT No. 1 DETAILS

DRAWN BY :	J. LOFTUS	DATE :	11/2025
CHECKED BY :	P. JACOB	DATE :	11/2025
DESIGN ENGINEER OF RECORD:	J. LOFTUS	DATE :	12/2025

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SEAL 040425 ENGINEER JEREMY W. LOFTUS

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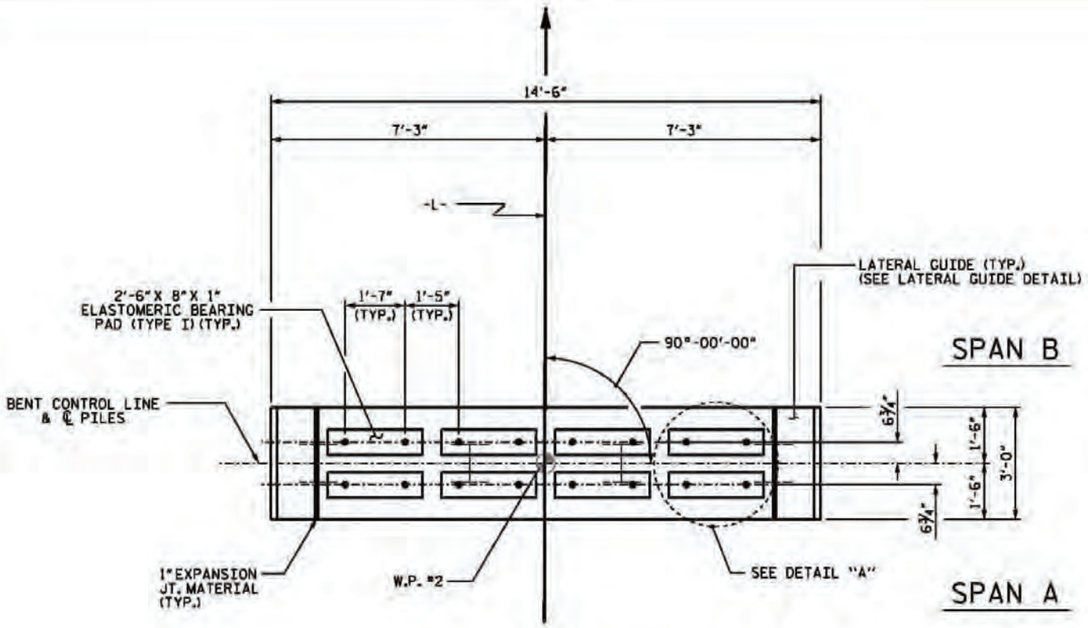
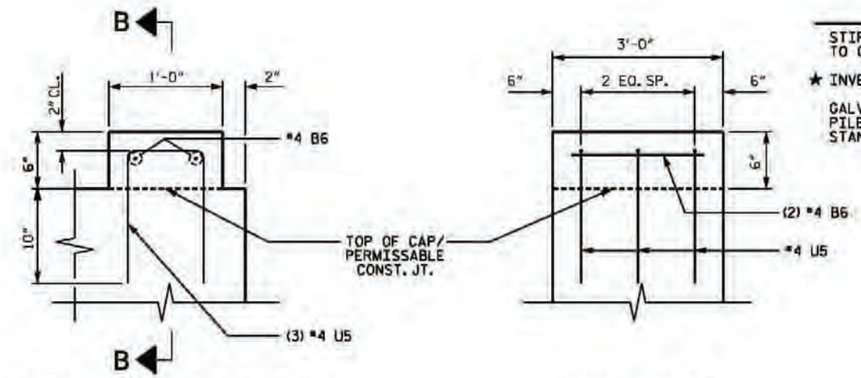


PLAN



LATERAL GUIDE ELEVATION

SECTION B-B

NOTES

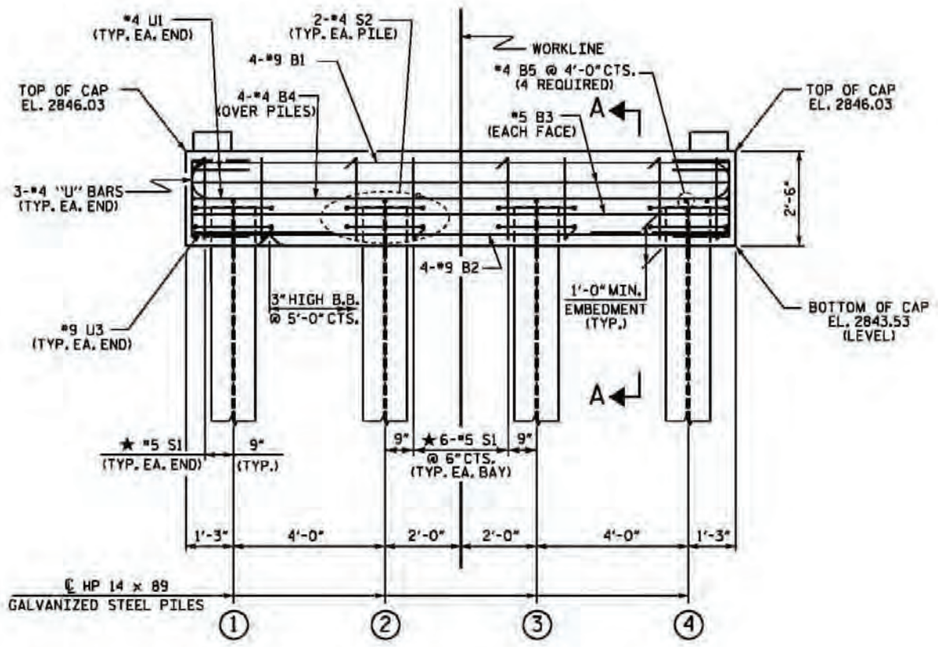
STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR DOWELS.

★ INVERT ALTERNATE STIRRUPS.

GALVANIZE THE FULL LENGTH OF EACH INTERIOR BENT PILE IN ACCORDANCE WITH SECTION 1076 OF THE STANDARD SPECIFICATIONS.

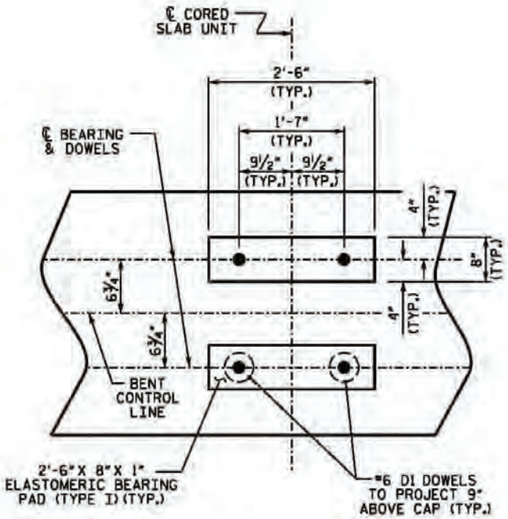
LATERAL GUIDE DETAIL

NOTE: LATERAL GUIDES MAY BE CAST IN SECONDARY POUR



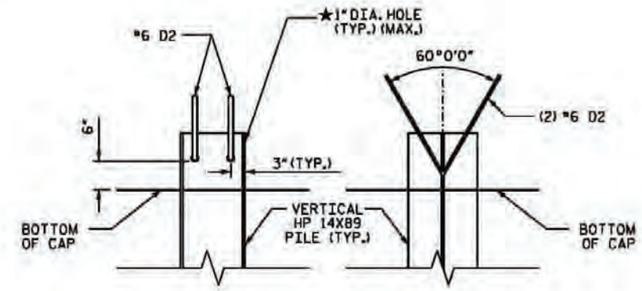
ELEVATION

FOR SECTION A-A, SEE SHEET 2 OF 2



DETAIL "A"

(DIMENSIONS ARE TYPICAL EACH BEARING)



HP-PILE ANCHORAGE DETAIL

★ HOLE DIAMETER SHALL BE A MINIMUM OF 1" AND A MAXIMUM OF 1½". DRILL OR FLAME CUT THE HOLES, GRIND AREA. AROUND HOLES TO REMOVE BURRS, TIE OR WEDGE TIGHTLY THE REINFORCING AGAINST THE TOP OF THE HOLE

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AVERY COUNTY

STATION: 11+18.38 -L-

SHEET 1 OF 2

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BENT No. 1

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NORTH CAROLINA PROFESSIONAL SEAL 042521 ENGINEER JEFFREY M LOFTUS

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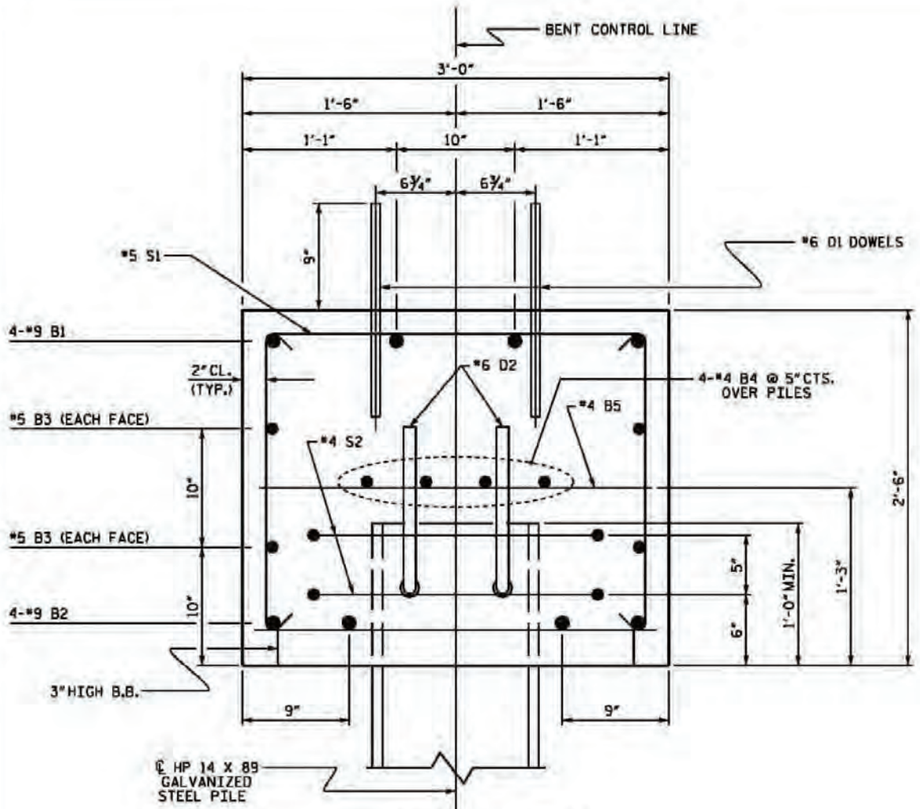
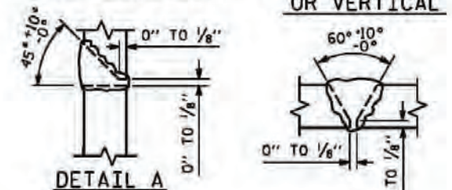


SECTION A-A

△PILE VERTICAL

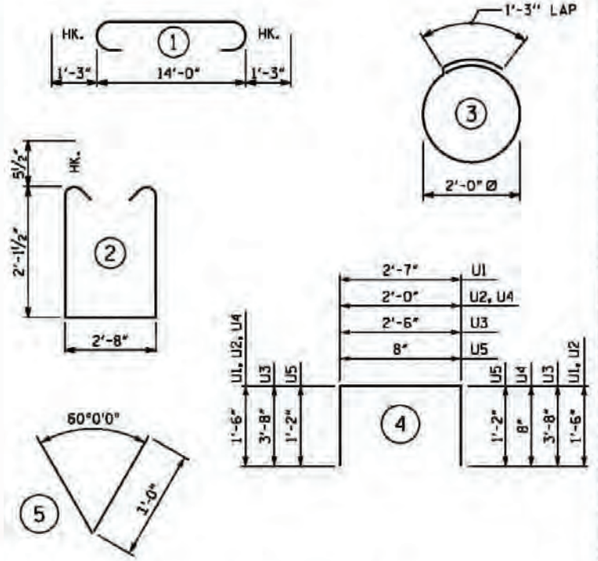
△PILE HORIZONTAL OR VERTICAL



△POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

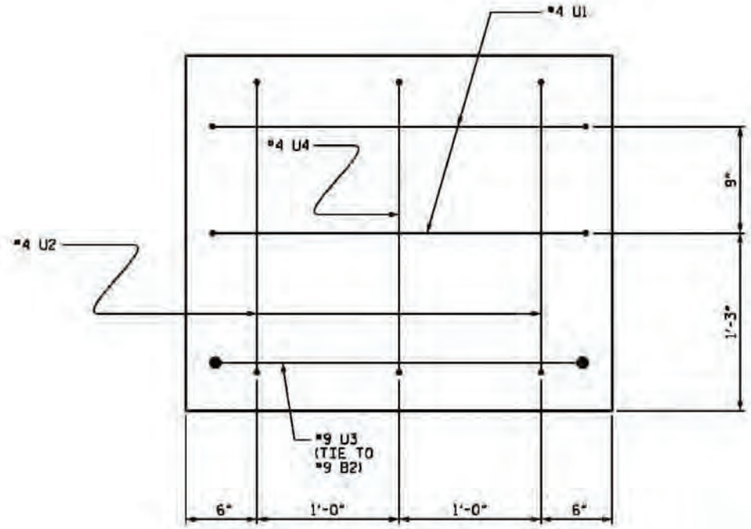
FOR ONE BENT

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	4	#9	1	16'-6"	224
B2	4	#9	STR	14'-2"	193
B3	4	#5	STR	14'-2"	59
B4	4	#4	STR	14'-2"	38
B5	5	#4	STR	2'-8"	7
B6	4	#4	STR	2'-8"	7
D1	16	#6	STR	1'-6"	36
D2	8	#6	5	2'-0"	24
S1	20	#5	2	7'-10"	163
S2	8	#4	3	7'-7"	42
U1	4	#4	4	5'-7"	15
U2	4	#4	4	5'-0"	13
U3	2	#9	4	9'-10"	67
U4	2	#4	4	4'-2"	6
U5	6	#4	4	3'-0"	12

REINFORCING STEEL (FOR ONE BENT) 906 LBS

CLASS A CONCRETE BREAKDOWN (FOR ONE BENT)

TOTAL CLASS A CONCRETE 4.2 C.Y.



END OF CAP VIEW

(TYPICAL BOTH ENDS)

PROJECT NO. 006-01-EF443

AVERY COUNTY

STATION: 11+18.38 -L-

SHEET 2 OF 2

NORTH CAROLINA
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BENT No.1 DETAILS

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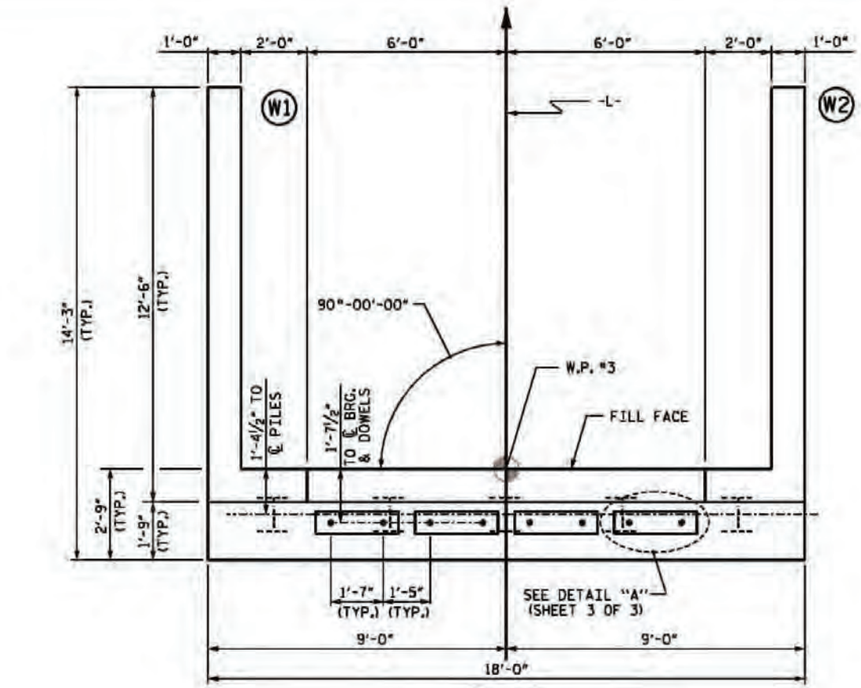
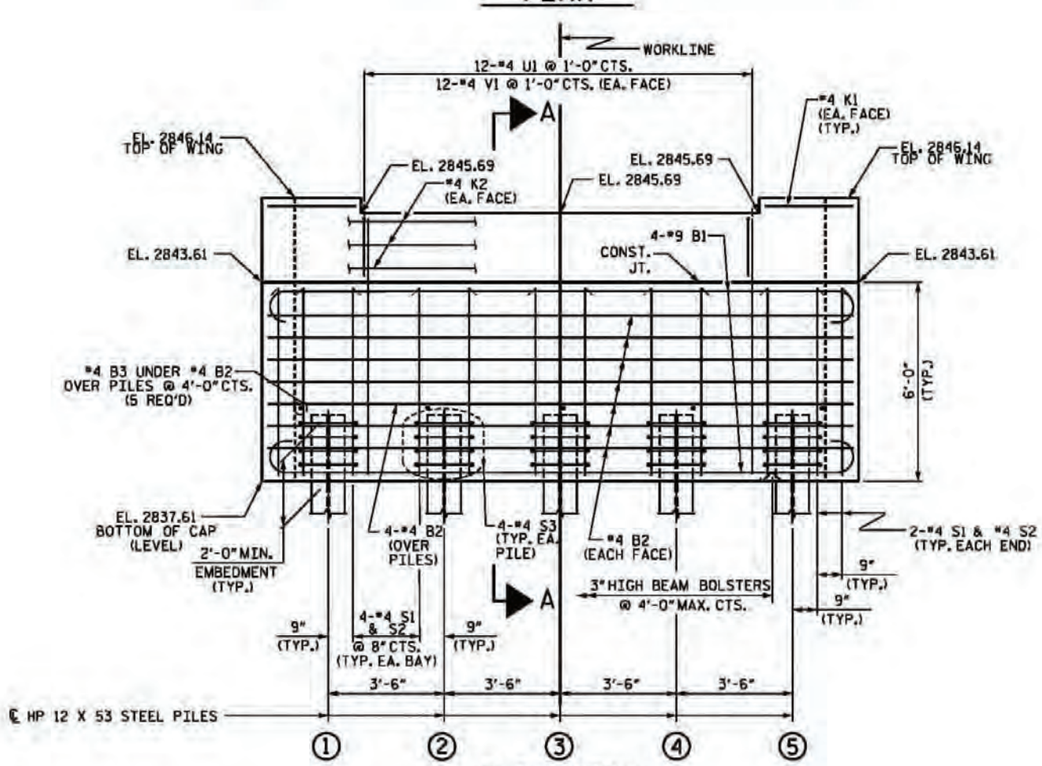


PLAN



ELEVATION

WING REINFORCEMENT NOT SHOWN FOR CLARITY.
FOR SECTION A-A, SEE SHEET 3 OF 3.
CONCRETE COLLARS FOR STEEL PILES NOT SHOWN IN PLAN AND ELEVATION VIEWS FOR CLARITY.
SEE "CORROSION PROTECTION FOR STEEL PILES DETAIL", SHEET 3 OF 3.

NOTES

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

FOR PILE SPLICE DETAILS, SEE SHEET 3 OF 3.

FOR WING DETAILS, SEE SHEET 2 OF 3.

PROJECT NO. 006-01-EF443

AVERY COUNTY

STATION: 11+18.38 -L-

SHEET 1 OF 3

NORTH CAROLINA
OFFICE OF EMERGENCY MANAGEMENT

SUBSTRUCTURE

END BENT No. 2

REVISIONS						SHEET NO.
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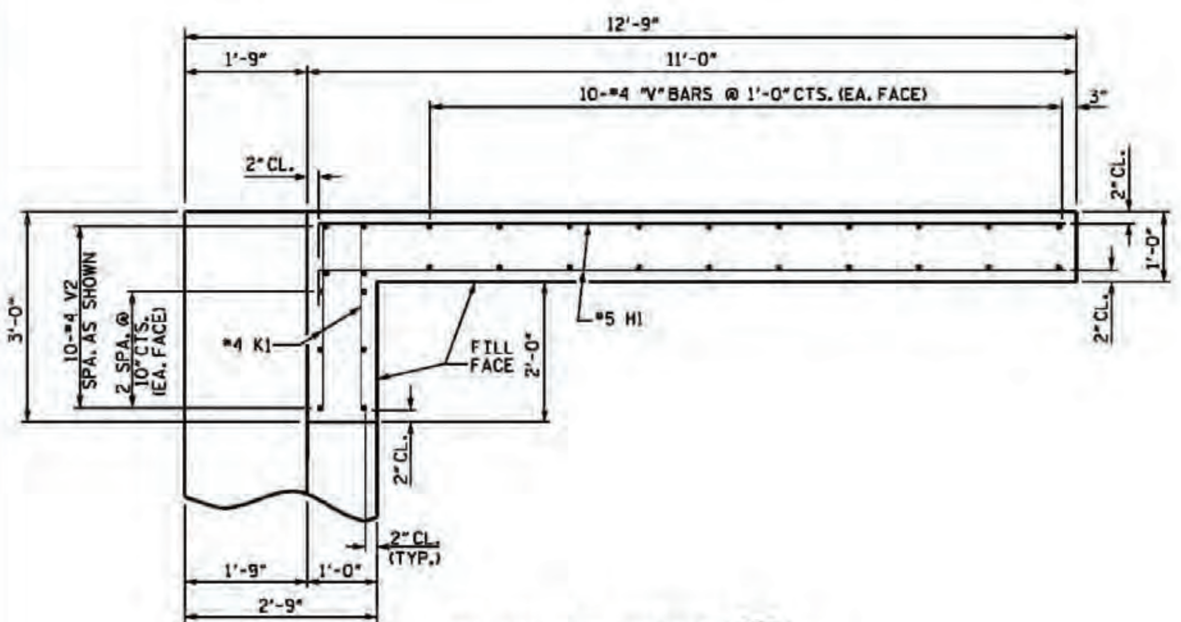
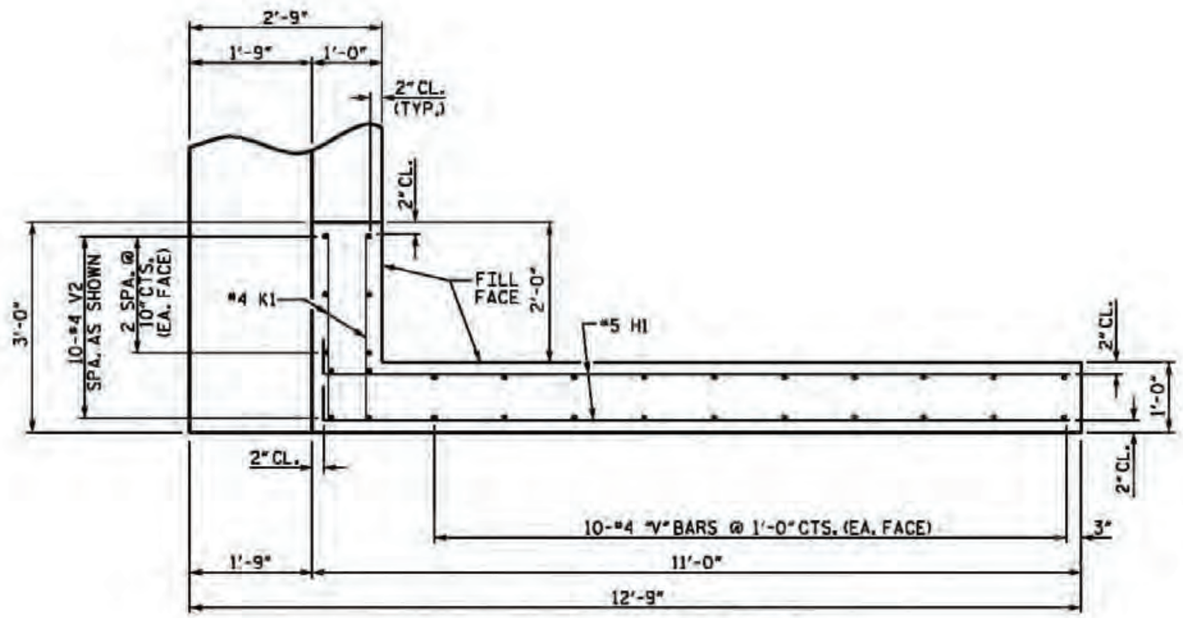
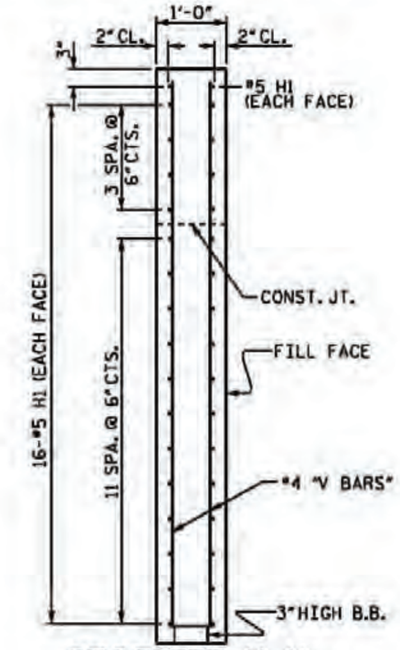


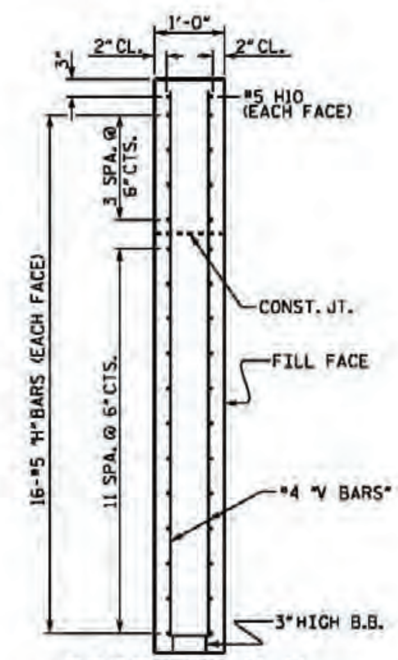
PLAN OF WING (W1)



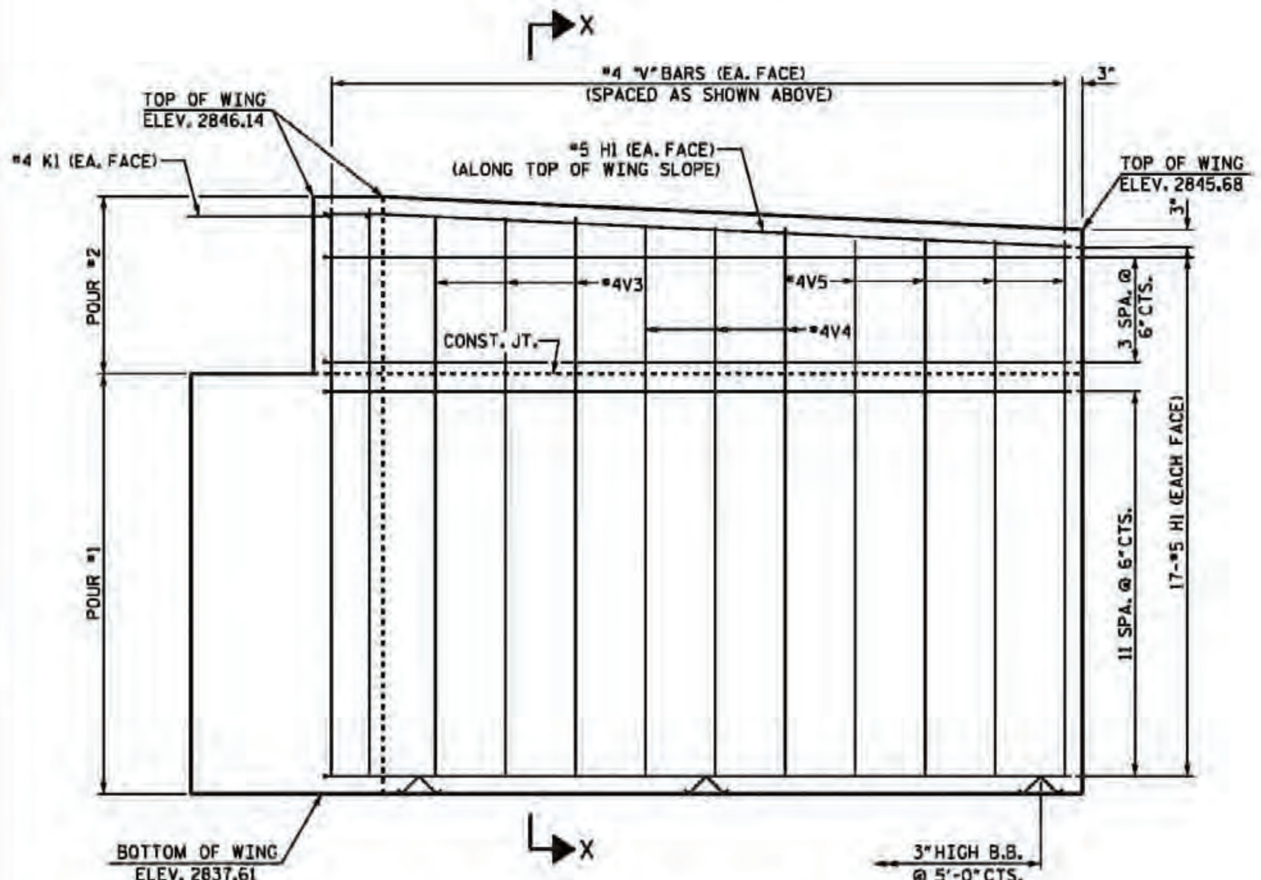
PLAN OF WING (W2)



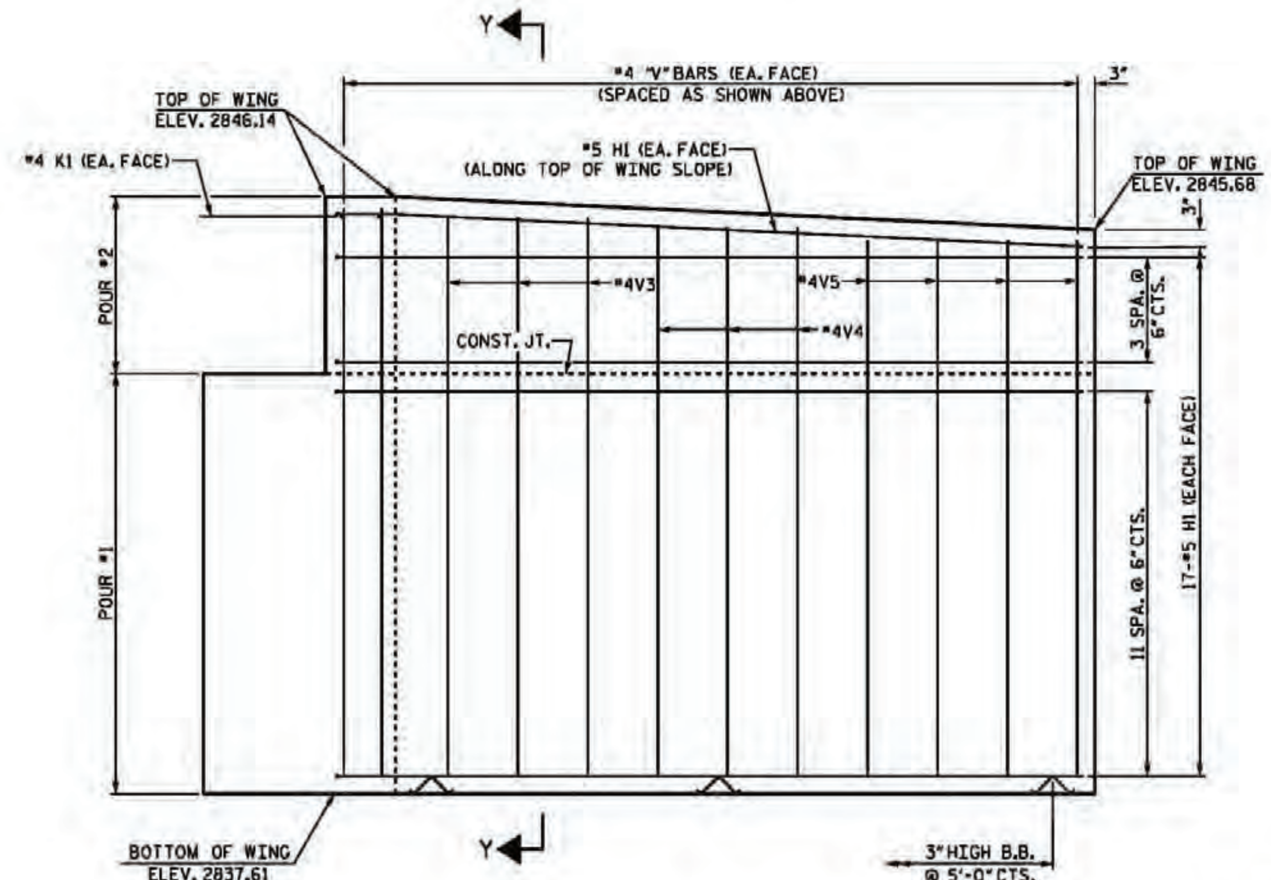
SECTION X-X



SECTION Y-Y



ELEVATION OF WING (W1)



ELEVATION OF WING (W2)

WING DETAILS

PROJECT NO. 006-01-EF443

AVERY COUNTY

STATION: 11+18.38 -L-

SHEET 2 OF 3

NORTH CAROLINA
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SUBSTRUCTURE

END BENT No.2
WING DETAILS

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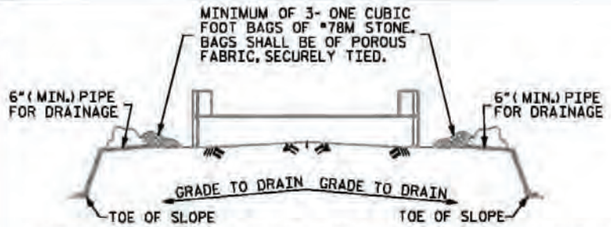
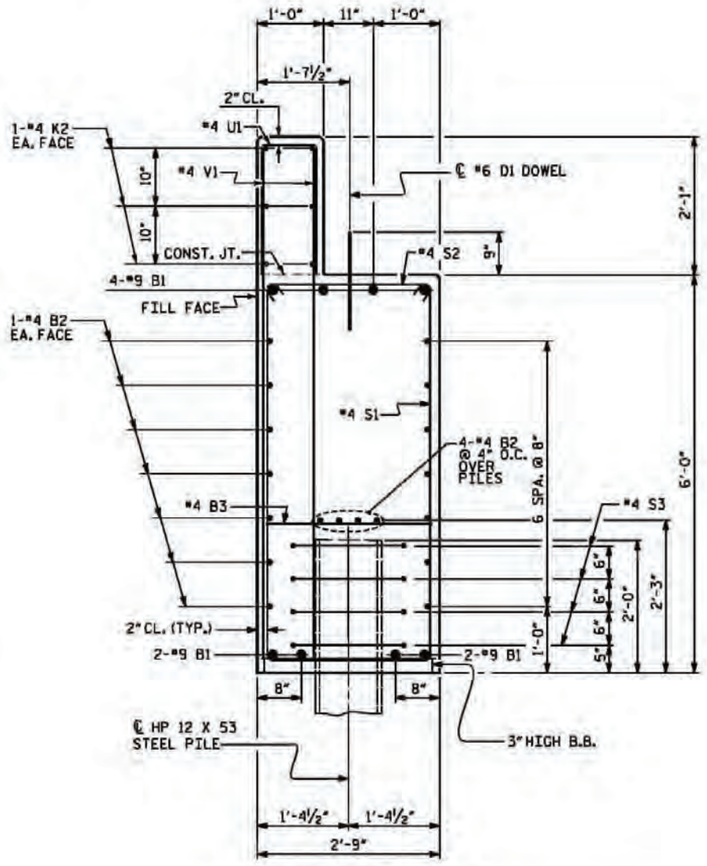


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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.

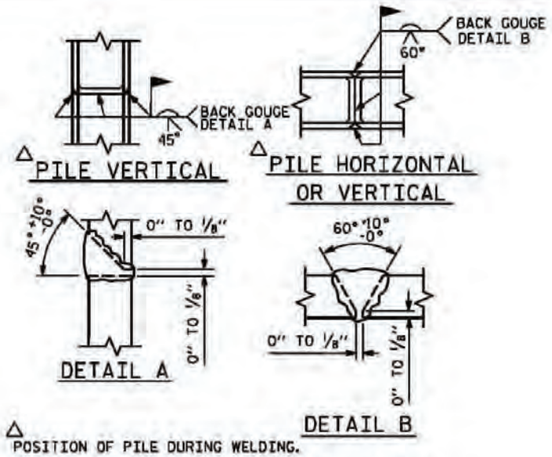
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

TEMPORARY DRAINAGE AT END BENT



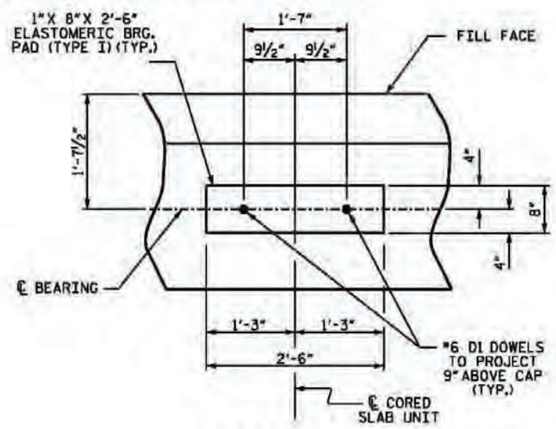
SECTION A-A

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

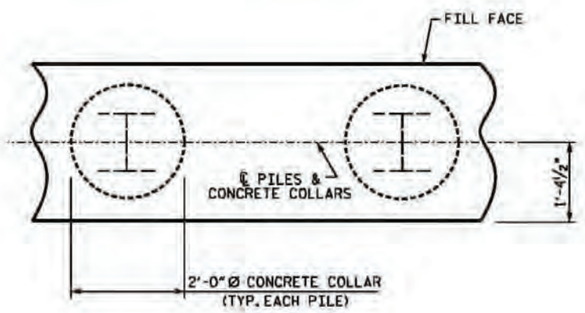


△ POSITION OF PILE DURING WELDING.

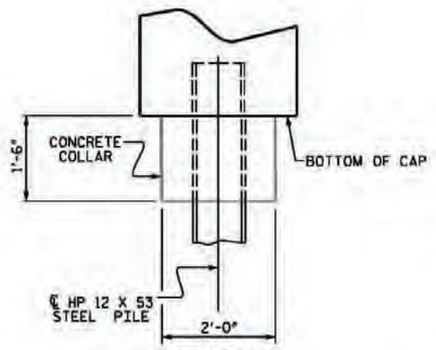
PILE SPLICE DETAILS



DETAIL "A"



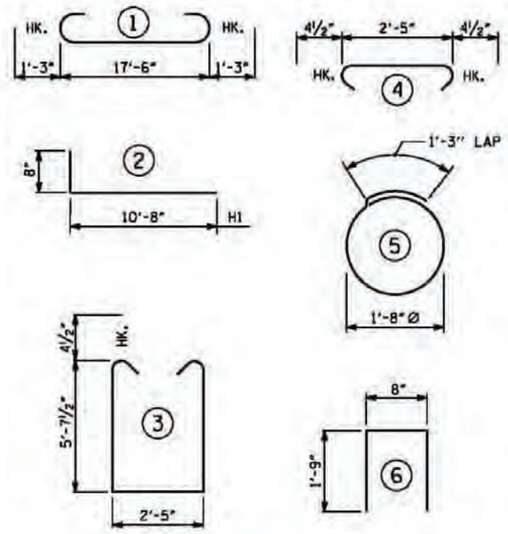
PLAN



ELEVATION

CORROSION PROTECTION FOR STEEL PILES DETAIL

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL
FOR END BENT 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#9	1	20'-0"	544
B2	18	#4	STR	17'-8"	212
B3	5	#4	STR	2'-5"	8
D1	8	#6	STR	1'-6"	18
H1	68	#5	2	11'-4"	804
K1	4	#4	STR	2'-8"	7
K2	6	#4	STR	17'-8"	71
S1	20	#4	3	14'-5"	193
S2	20	#4	4	3'-2"	42
S3	20	#4	5	6'-6"	87
U1	12	#4	6	4'-2"	33
V1	24	#4	STR	7'-8"	123
V2	20	#4	STR	8'-1"	108
V3	12	#4	STR	8'-0"	64
V4	12	#4	STR	7'-10"	63
V5	16	#4	STR	7'-8"	82

REINFORCING STEEL (END BENT 2) 2,459 LBS.

CLASS A CONCRETE BREAKDOWN (FOR END BENT 2)

POUR #1	CAP, LOWER PART OF WINGS & COLLARS	16.2 C.Y.
POUR #2	BACKWALL & WINGS	3.2 C.Y.
TOTAL CLASS A CONCRETE		19.4 C.Y.

PROJECT NO. 006-01-EF443

AVERY COUNTY

STATION: 11+18.38 -L-

SHEET 3 OF 3

NORTH CAROLINA
OFFICE OF EMERGENCY MANAGEMENT

SUBSTRUCTURE

END BENT No. 2 DETAILS

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8/26/21

NOTES

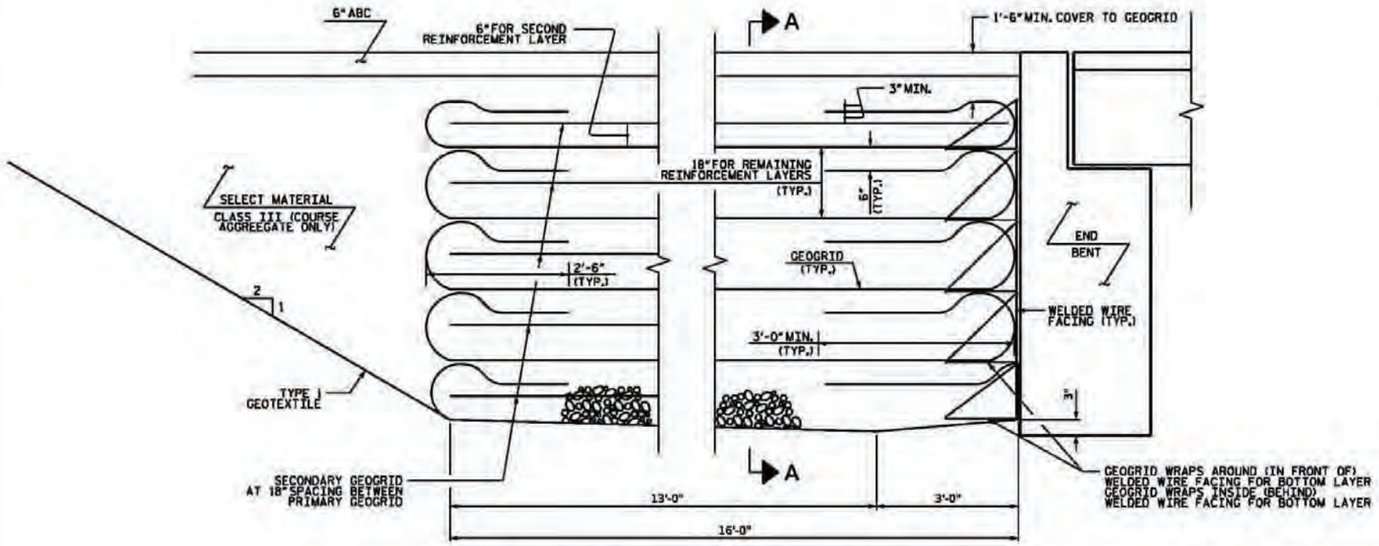
GEOGRID IN THIS APPLICATION MUST COME FROM NCDOT'S LIST OF GEOTECHNICAL QUALIFIED PRODUCTS FOR GEOSYNTHETIC REINFORCEMENT.

THESE PLANS DETAIL THE USE OF UNIAXIAL GEOGRID PLACED BEHIND THE END BENT AND WINGWALL IN AN OVERLAPPING FASHION, AT THE CONTRACTOR'S OPTION AND AT NO EXTRA COST TO THE OWNER, BI-AXIAL GEOGRID MAY BE USED TO PROVIDE REINFORCEMENT. BI-AXIAL GEOGRID MUST ALSO COME FROM NCDOT'S LIST OF GEOTECHNICAL QUALIFIED PRODUCTS FOR GEOSYNTHETIC REINFORCEMENT.

TYPE I SEPARATION GEOTEXTILE SHALL EXTEND ALONG EXCAVATION SLOPE AND TO THE END BENT/WINGWALL FILL FACE.

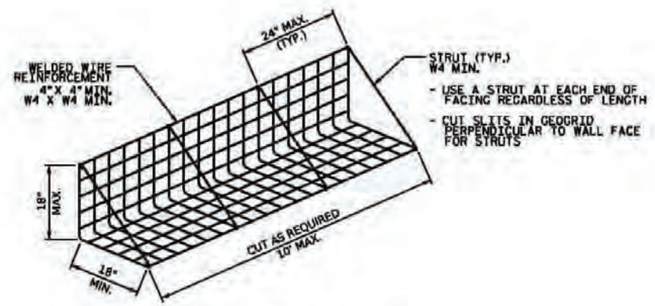
THE PRIMARY GEOGRID FOR THIS APPLICATION SHALL HAVE A LONG TERM DESIGN STRENGTH OF 1000 LBS/FT AND A DESIGN LIFE OF 100 YEARS.

THE CONTRACTOR MAY USE WELDED WIRE FACING OR SECONDARY GEOSYNTHETIC AT THE TERMINATION OF THE PRIMARY GEOGRID.

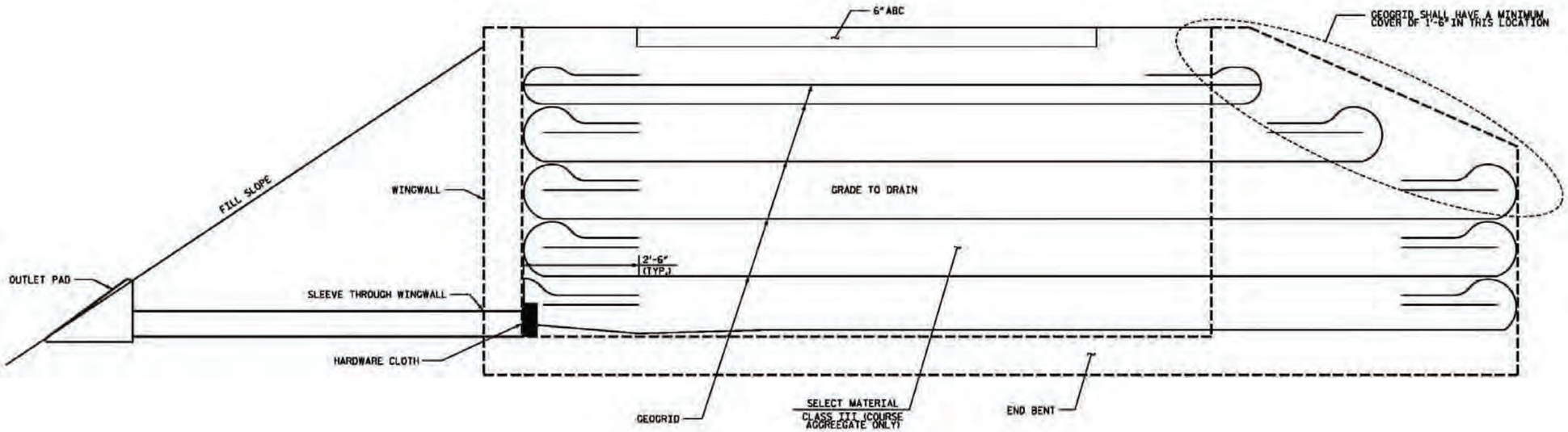


SHOWING SECONDARY GEOGRID SHOWING WELDED WIRE FACING

REINFORCED APPROACH FILL DETAIL



WELDED WIRE FACING



SECTION A-A

SHOWING SECONDARY GEOGRID AS PIMARY GRID TERMINATION. WELDED WIRE FACING MAY BE USED AS WELL.

PROJECT NO. 006-01-EF443

AVERY COUNTY

STATION: 11+18.38 -L-

NORTH CAROLINA
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END BENT No.1
REINFORCED
APPROACH FILL

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Firm number: C-0293, C-187
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1/6/2026
X:\Projects\NCD\NCD25009\NCD25009_01\04-Production\Transportation\Structures\03 - CADD\02 - FinalDrawings\401_029_PR80060EF443_NCEM_AFD1_015.dgn
loftus

8/26/21

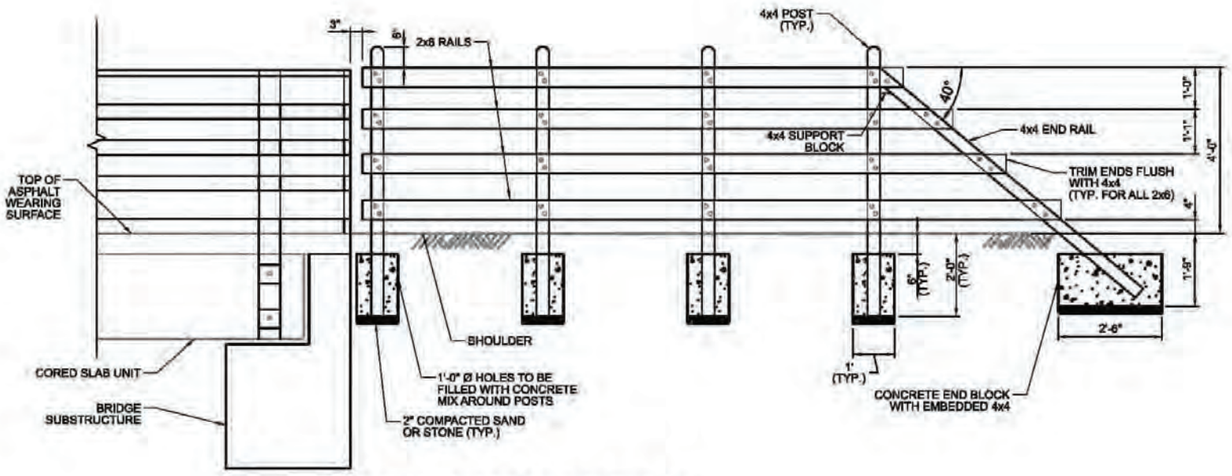
NOTES:

ALL TREATED LUMBER FOR THE SAFETY RAIL SHALL MEET THE REQUIREMENTS OF SECTION 1082 OF THE 2024 NCDOT STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES.

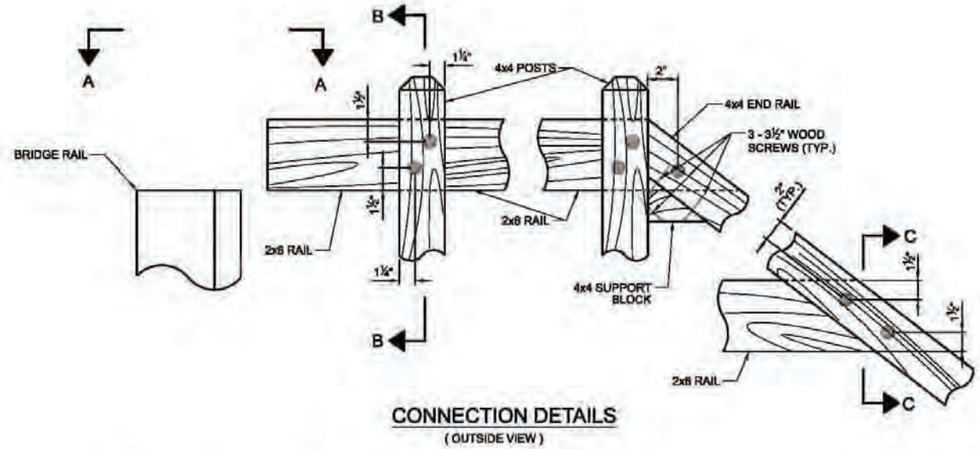
ALL SCREWS, BOLTS, NUTS AND WASHERS ARE TO BE HOT DIPPED GALVANIZED.

THE LOCATION OF POST FOOTINGS AND END BLOCKS ARE TO BE FIELD VERIFIED. DEVIATIONS FROM PLAN DIMENSIONS ARE TO BE APPROVED BY THE ENGINEER.

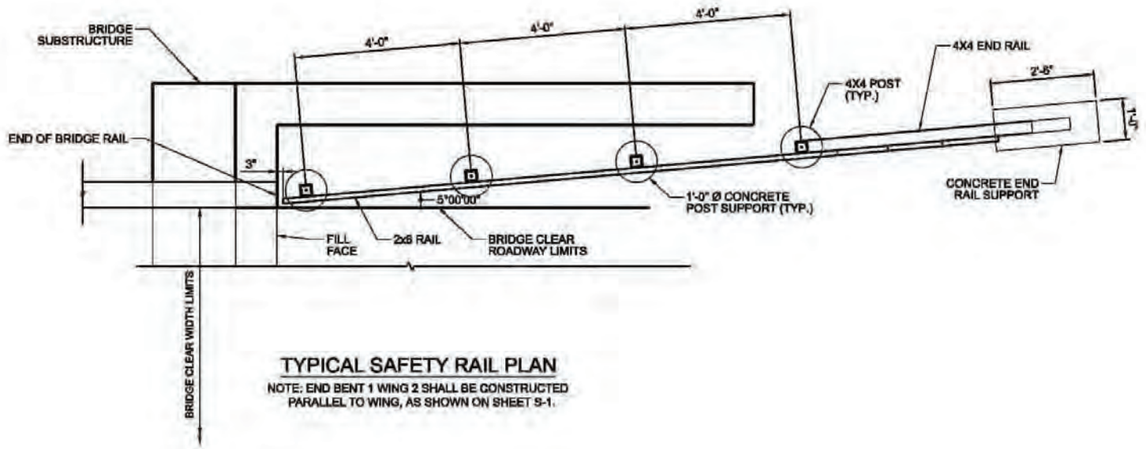
CONTRACTOR TO CONFIRM ANY POTENTIAL CONFLICTS WITH CONCRETE POST SUPPORTS AND WINGWALLS. ADJUST ANGLE OF APPROACH RAIL ROTATION AS NECESSARY.



TYPICAL SAFETY RAIL ELEVATION

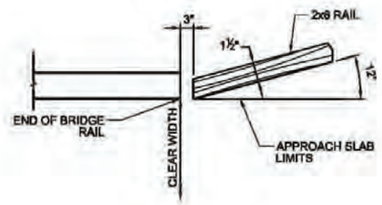


CONNECTION DETAILS
(OUTSIDE VIEW)

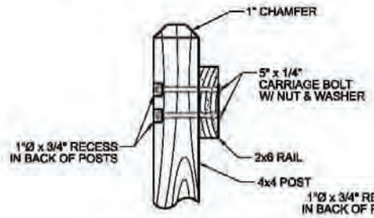


TYPICAL SAFETY RAIL PLAN

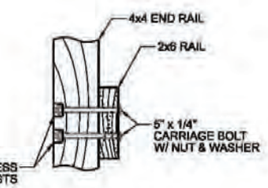
NOTE: END BENT 1 WING 2 SHALL BE CONSTRUCTED PARALLEL TO WING, AS SHOWN ON SHEET S-1.



SECTION A-A



SECTION B-B



SECTION C-C

PROJECT NO. 006-01-EF443

AVERY COUNTY

STATION: 11+18.38 -L-

NORTH CAROLINA
OFFICE OF EMERGENCY MANAGEMENT

SAFETY RAIL DETAILS

DRAWN BY :	J. LOFTUS	DATE :	11/2025
CHECKED BY :	P. JACOB	DATE :	11/2025
DESIGN ENGINEER OF RECORD:	J. LOFTUS	DATE :	12/2025

McADAMS
The John R. McAdams Company, Inc.
621 Hillsborough Road
Suite 100
Raleigh, NC 27603
phone 919.361.5000
fax 919.361.2269
license number: C-0293, C-0287
www.mcadamsco.com

NORTH CAROLINA PROFESSIONAL SEAL 049425 ENGINEER TIMOTHY M. LOFTUS

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

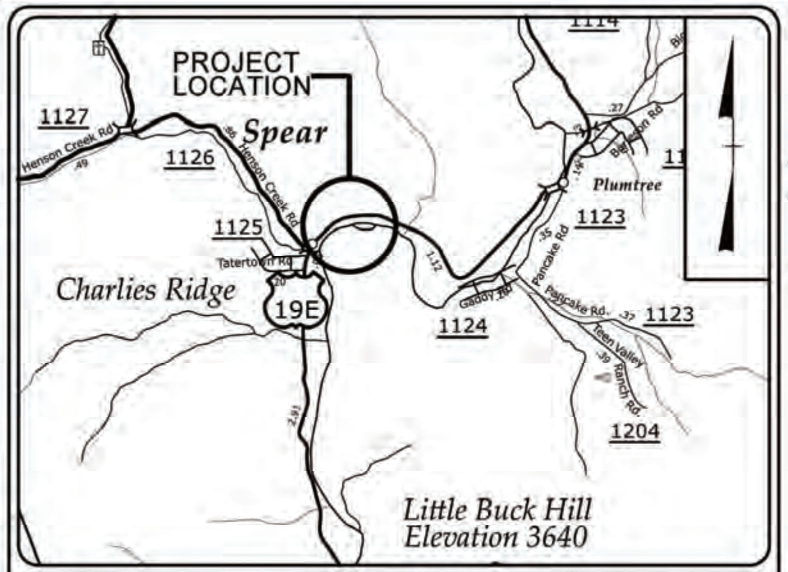
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-16
1			3			TOTAL SHEETS
2			4			16

1/6/2026
X:\Projects\NCD\NCD25009\NCD25009_01\04-Production\Transportation\Structures\03 - CADD\02 - FinalDrawings\401_031_PRB00601EF443_NCEM_SR01_016.dgn
loftus

TIP PROJECT: 006-01-ef443

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	006-01-ef443	EC-1	5

STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION



VICINITY MAP
NOT TO SCALE

STATE OF NORTH CAROLINA
DIVISION OF EMERGENCY MANAGEMENT

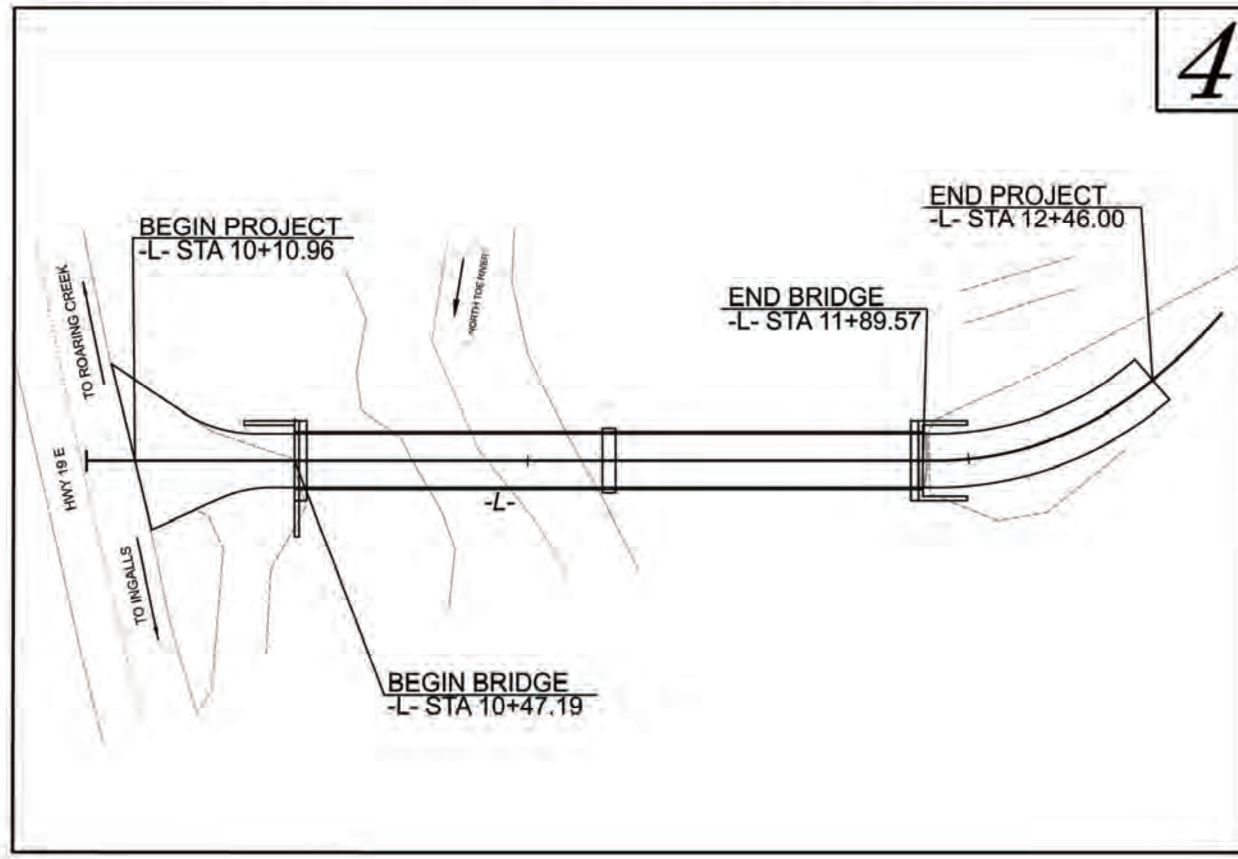
PLAN FOR PROPOSED
EROSION CONTROL

AVERY COUNTY

LOCATION: *PRIVATE BRIDGE REPLACEMENT LOCATED AT 5631 US 19E NEWFOUND, NC 28657*

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

NC GRID NAD 83 NA 2011



ENVIRONMENTALLY SENSITIVE AREA(S) EXIST ON THIS PROJECT
Refer To E. C. Special Provisions for Special Considerations.

THIS PROJECT CONTAINS EROSION CONTROL PLANS FOR CLEARING AND GRUBBING PHASE OF CONSTRUCTION.

GRAPHIC SCALE
40 20 0 40 80
PLANS

THESE EROSION AND SEDIMENT CONTROL PLANS COMPLY WITH THE REGULATIONS SET FORTH BY THE NCG-010000 GENERAL STORMWATER CONSTRUCTION PERMIT ISSUED BY THE NORTH CAROLINA DEPARTMENT OF ENVIRONMENTAL QUALITY DIVISION OF ENERGY, MINERAL, AND LAND RESOURCES.

VOLKERT
5430 Wade Park Blvd., Suite 410
Raleigh, NC 27606
Tel. 919-854-0344 Fax. 919-854-0355
NC License No. F-0765

Prepared In the Office of:
VOLKERT
5430 WADE PARK BLVD., SUITE 410
RALEIGH, NC 27606

Designed by:
ZACHARY THORNTON — 4365
NAME — LEVEL III CERTIFICATION NO.

EMERGENCY MANAGEMENT
NORTH CAROLINA

PROJECT REFERENCE NO.	SHEET NO.
006-01-ef443	EC-2

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

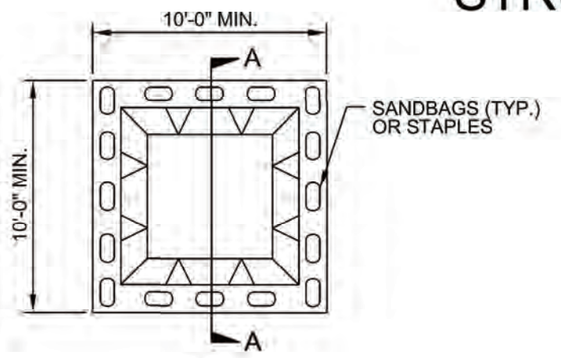
EROSION & SEDIMENT CONTROL LEGEND

Std. #	Description	Symbol
1605.01	Temporary Silt Fence	
1606.01	Special Sediment Control Fence	
1622.01	Temporary Berms and Slope Drains	
1630.02	Silt Basin Type B	
1630.03	Temporary Silt Ditch	TSD
1630.04	Stilling Basin	
1630.05	Temporary Diversion	TD
1630.06	Special Stilling Basin	
1630.07	Skimmer Basin	
1630.08	Tiered Skimmer Basin	
1630.09	Earthen Dam with Skimmer	
	Infiltration Basin	
	Rock Inlet Sediment Trap:	
1632.01	Type A	A
1632.02	Type B	B
1632.03	Type C	C

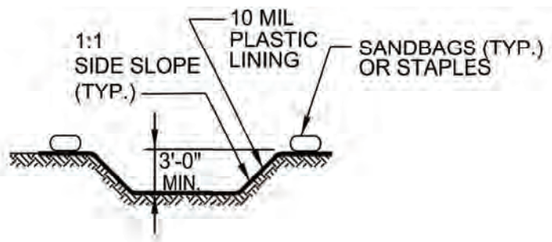
Std. #	Description	Symbol
1633.01	Temporary Rock Silt Check Type A	
1633.02	Temporary Rock Silt Check Type B	
1633.03	Temporary Rock Silt Check Type A with Excelsior Matting and Flocculant	
1634.01	Temporary Rock Sediment Dam Type A	
1634.02	Temporary Rock Sediment Dam Type B	
1635.01	Rock Pipe Inlet Sediment Trap Type A	A
1635.02	Rock Pipe Inlet Sediment Trap Type B	B
1636.01	Excelsior Wattle Check	
1636.01	Excelsior Wattle Check with Flocculant	
1636.01	Coir Fiber Wattle Check	
1636.01	Coir Fiber Wattle Check with Flocculant	
1636.02	Silt Fence Excelsior Wattle Break	EW
	Silt Fence Coir Fiber Wattle Break	CFW
1636.03	Excelsior Wattle Barrier	EW EW EW
1636.03	Coir Fiber Wattle Barrier	CFW CFW CFW

PROJECT REFERENCE NO.	SHEET NO.
006-01-ef443	EC-3
R/W SHEET NO.	

ONSITE CONCRETE WASHOUT STRUCTURE WITH LINER



PLAN



SECTION A-A

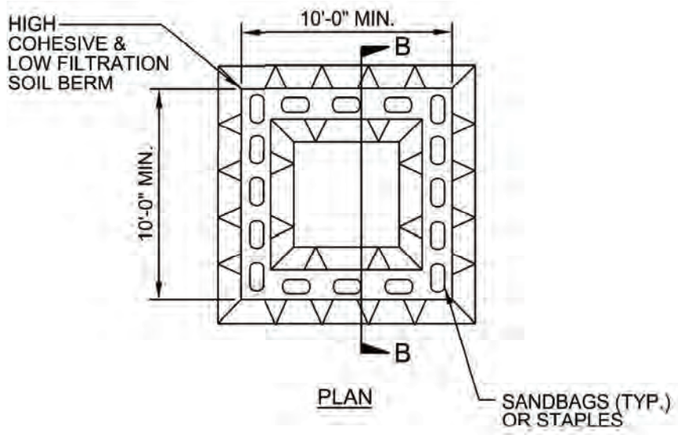
NOTES:
1. ACTUAL LOCATION DETERMINED IN FIELD

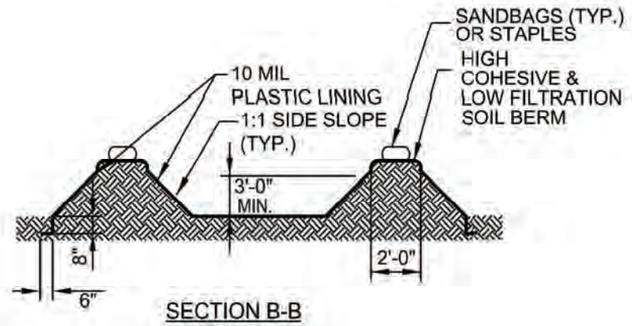
2. THE CONCRETE WASHOUT STRUCTURES SHALL BE MAINTAINED WHEN THE LIQUID AND/OR SOLID REACHES 75% OF THE STRUCTURES CAPACITY TO PROVIDE ADEQUATE HOLDING CAPACITY WITH A MINIMUM 12 INCHES OF FREEBOARD.

3.CONCRETE WASHOUT STRUCTURE NEEDS TO BE CLEARLY MARKED WITH SIGNAGE NOTING DEVICE.

BELOW GRADE WASHOUT STRUCTURE

NOT TO SCALE





SECTION B-B

NOTES:
1. ACTUAL LOCATION DETERMINED IN FIELD

2. THE CONCRETE WASHOUT STRUCTURES SHALL BE MAINTAINED WHEN THE LIQUID AND/OR SOLID REACHES 75% OF THE STRUCTURES CAPACITY TO PROVIDE ADEQUATE HOLDING CAPACITY WITH A MINIMUM 12 INCHES OF FREEBOARD.

3.CONCRETE WASHOUT STRUCTURE NEEDS TO BE CLEARLY MARKED WITH SIGNAGE NOTING DEVICE.

ABOVE GRADE WASHOUT STRUCTURE

NOT TO SCALE

PROJECT REFERENCE NO.	SHEET NO.
006-01-ef443	EC-3A

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

SOIL STABILIZATION TIMEFRAMES

SITE DESCRIPTION	STABILIZATION TIME	TIMEFRAME EXCEPTIONS
PERIMETER DIKES, SWALES, DITCHES AND SLOPES	7 DAYS	NONE
HIGH QUALITY WATER (HQW) ZONES	7 DAYS	NONE
SLOPES STEEPER THAN 3:1	7 DAYS	IF SLOPES ARE 10' OR LESS IN LENGTH AND ARE NOT STEEPER THAN 2:1, 14 DAYS ARE ALLOWED.
SLOPES 3:1 TO 4:1	14 DAYS	7 DAYS FOR SLOPES GREATER THAN 50' IN LENGTH WITH SLOPES STEEPER THAN 4:1. 7 DAYS FOR PERIMETER DIKES, SWALES, DITCHES PERIMETER SLOPES, AND HQW ZONES
ALL OTHER AREAS WITH SLOPES FLATTER THAN 4:1	14 DAYS	7 DAYS FOR PERIMETER DIKES, SWALES, DITCHES PERIMETER SLOPES, AND HQW ZONES

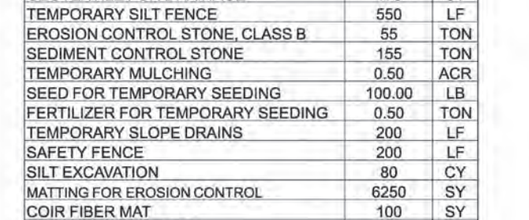
ENVIRONMENTALLY SENSITIVE AREA
SEE PROJECT SPECIAL PROVISIONS

TROUT STREAM
BUFFER ZONE WITHIN ESA BUFFER
(NOT SHOWN FOR CLARITY)

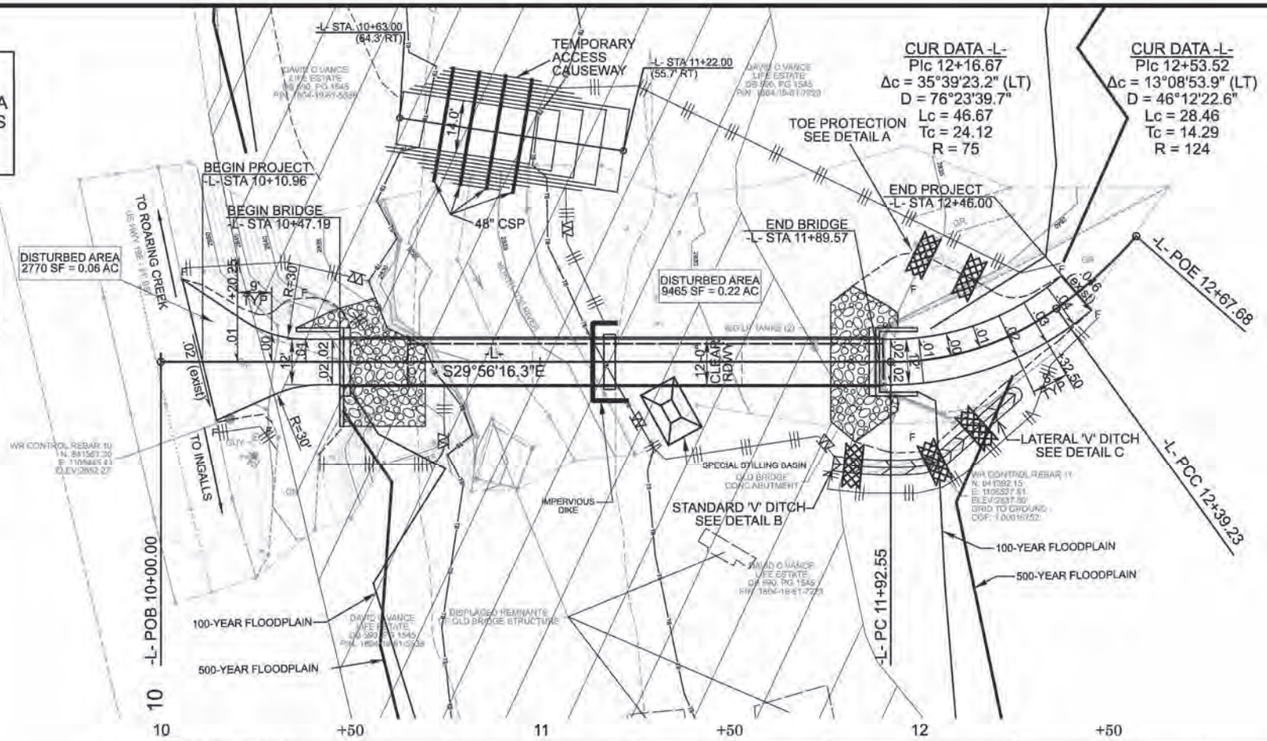
EROSION CONTROL QUANTITIES

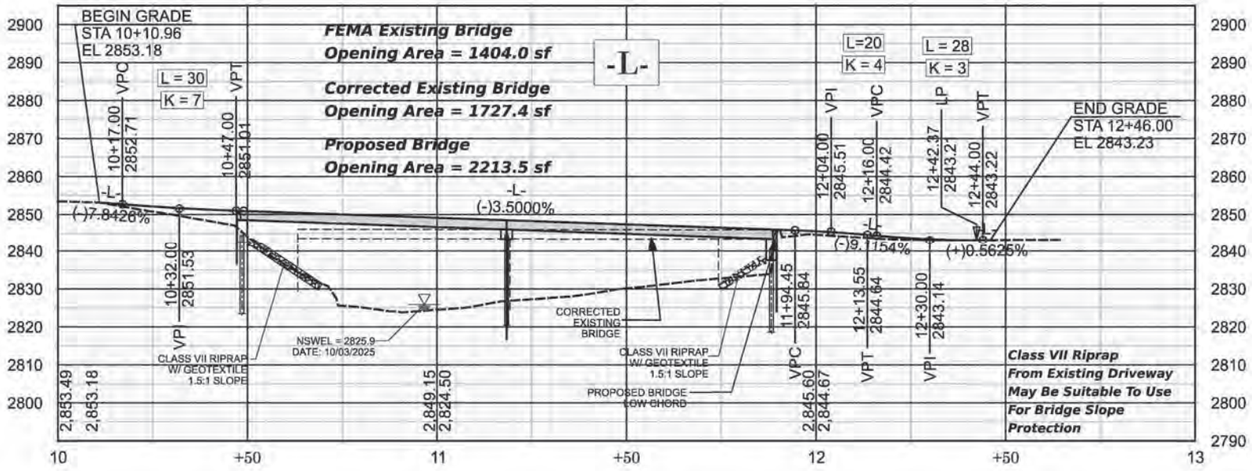
TRNS-PORT ITEM DESCRIPTION	QUANTITY	UNIT
GEOTEXTILE FOR DRAINAGE	170	SY
TEMPORARY SILT FENCE	550	LF
EROSION CONTROL STONE, CLASS B	55	TON
SEDIMENT CONTROL STONE	155	TON
TEMPORARY MULCHING	0.50	ACR
SEED FOR TEMPORARY SEEDING	100.00	LB
FERTILIZER FOR TEMPORARY SEEDING	0.50	TON
TEMPORARY SLOPE DRAINS	200	LF
SAFETY FENCE	200	LF
SILT EXCAVATION	80	CY
MATTING FOR EROSION CONTROL	6250	SY
COIR FIBER MAT	100	SY
1/4" HARDWARE CLOTH	410	LF
SPECIAL STILLING BASINS	3	EA
SEEDING AND MULCHING	0.50	ACR
MOWING	0.50	ACR
SEED FOR REPAIR SEEDING	50.00	LB
FERTILIZER FOR REPAIR SEEDING	0.25	TON
SEED FOR SUPPLEMENTAL SEEDING	50.00	LB
FERTILIZER TOPDRESSING	0.50	TON
IMPERVIOUS DIKE	36	LF
SPECIALIZED HAND MOWING	10	MHR
RESPONSE FOR EROSION CONTROL	13	EA
REFORESTATION	0.10	ACR
CONCRETE WASHOUT STRUCTURE	1	EA
GENERIC EROSION CONTROL ITEM - PREFABRICATED CONCRETE WASHOUT	2	EA

NOTE:
UTILIZE TEMPORARY SEDIMENT BASIN OR SPECIAL STILLING BASIN(S) AS STILLING BASIN WHERE APPLICABLE.

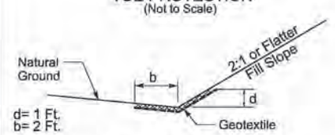


DETAIL OF CAUSEWAY
(NTS)





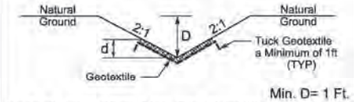
DETAIL A
TOE PROTECTION
(Not to Scale)



Type of Liner= Class I Rip-Rap

FROM -L- STA. 12+00 TO STA. 12+24 LT

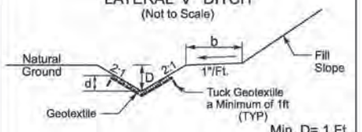
DETAIL B
STANDARD 'V' DITCH
(Not to Scale)



Min. D= 1 Ft.
Type of Liner= Class II Rip-Rap, Keyed-In d= 1 Ft.

FROM -L- STA. 11+77 TO STA. 11+93 RT

DETAIL C
LATERAL 'V' DITCH
(Not to Scale)



Min. D= 1 Ft.
d= 1 Ft.
Type of Liner= Class II Rip-Rap, Keyed-In b= 2 Ft.

FROM -L- STA. 11+93 TO STA. 12+22 RT

PRB_006-01-ef443
SHEET NO. EC-04
CONST.04

VOLKERT
5430 Wade Park Blvd., Suite 410
Raleigh, NC 27607
Tel. 919-854-0344 Fax. 919-854-0356
NC License No. F-0755

STATE OF NORTH CAROLINA
AVERY COUNTY

BRIDGE AT 5631 US 19E NEWLAND, NC 28657
AVERY COUNTY
12'-0" CLEAR ROADWAY AND 90° SKEW

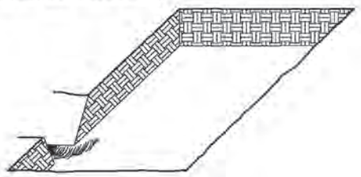
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	006-01-ef443	RF-1	1
STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION	

PLANTING DETAILS

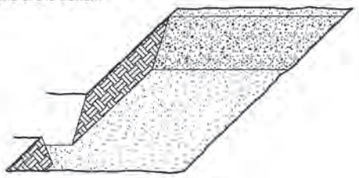
SEEDLING / LINER BAREROOT PLANTING DETAIL

HEALING IN

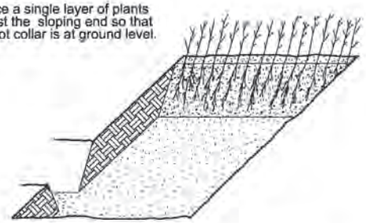
1. Locate a healing-in site in a shady, well protected area.
2. Excavate a flat bottom trench 12 inches deep and provide drainage.



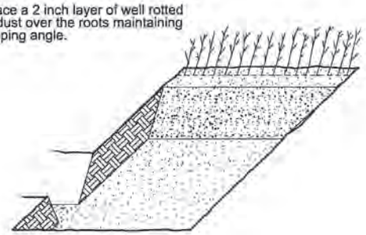
3. Backfill the trench with 2 inches well rotted sawdust. Place a 2 inch layer of well rotted sawdust at a sloping angle at one end of the trench.



4. Place a single layer of plants against the sloping end so that the root collar is at ground level.

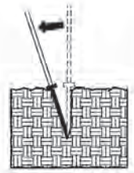


5. Place a 2 inch layer of well rotted sawdust over the roots maintaining a sloping angle.



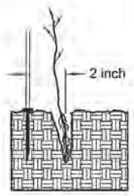
6. Repeat layers of plants and sawdust as necessary and water thoroughly.

DIBBLE PLANTING METHOD
USING THE KBC PLANTING BAR



1. Insert planting bar as shown and pull handle toward planter.

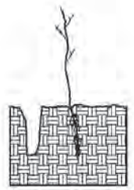
2. Remove planting bar and place seedling at correct depth.



3. Insert planting bar 2 inches toward planter from seedling.

4. Pull handle of bar toward planter, firming soil at bottom.

5. Push handle forward firming soil at top.



6. Leave compaction hole open. Water thoroughly.

PLANTING NOTES:

PLANTING BAG
During planting, seedlings shall be kept in a moist canvas bag or similar container to prevent the root systems from drying.

KBC PLANTING BAR
Planting bar shall have a blade with a triangular cross section, and shall be 12 inches long, 4 inches wide and 1 inch thick at center.

ROOT PRUNING
All seedlings shall be root pruned, if necessary, so that no roots extend more than 10 inches below the root collar.

REFORESTATION

☐ TREE REFORESTATION SHALL BE PLANTED 6 FT. TO 10 FT. ON CENTER, RANDOM SPACING, AVERAGING 8 FT. ON CENTER, APPROXIMATELY 680 PLANTS PER ACRE.

REFORESTATION

MIXTURE, TYPE, SIZE, AND FURNISH SHALL CONFORM TO THE FOLLOWING:

34% LIRIODENDRON TULIPIFERA	TULIP POPLAR	12 in - 18 in BR
33% PLATANUS OCCIDENTALIS	AMERICAN SYCAMORE	12 in - 18 in BR
33% BETULA NIGRA	RIVER BIRCH	12 in - 18 in BR

REFORESTATION DETAIL SHEET

N.C.D.O.T. - ROADSIDE ENVIRONMENTAL UNIT

REFERENCE: N/A

PROJECT: PRB_006-01-EF443

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	PRB_006-01-EF443	1	10

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *AVERY*

PROJECT DESCRIPTION *BRIDGE AT 5631 US 19E OVER NORTH TOE RIVER IN NEWLAND, NC*

SITE DESCRIPTION *BRIDGE STRUCTURE AT -L- STA. 11+18.38*

CONTENTS

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

NOTES:
1. THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.
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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,

VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5, A-7-6			
SYMBOL														
% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
MATERIAL PASSING #40 LL PI	— 6 MX		— NP	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	NO MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT²)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE	< 4	N/A
	LOOSE	4 TO 10	
	MEDIUM DENSE	10 TO 30	
	DENSE	30 TO 50	
	VERY DENSE	> 50	
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT	< 2	< 0.25
	SOFT	2 TO 4	0.25 TO 0.5
	MEDIUM STIFF	4 TO 8	0.5 TO 1.0
	STIFF	8 TO 15	1 TO 2
	VERY STIFF	15 TO 30	2 TO 4
	HARD	> 30	> 4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	4.76	2.00	0.42	0.25	0.075	0.053

BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)

GRAIN SIZE	MM	305	75	2.0	0.25	0.05	0.005
	IN.	12	3				

SOIL MOISTURE - CORRELATION OF TERMS

SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION
	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE
LL — LIQUID LIMIT		
PLASTIC RANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PL — PLASTIC LIMIT		
OM — OPTIMUM MOISTURE	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
SL — SHRINKAGE LIMIT		
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NON PLASTIC	0-5	VERY LOW
SLIGHTLY PLASTIC	6-15	SLIGHT
MODERATELY PLASTIC	16-25	MEDIUM
HIGHLY PLASTIC	25 OR MORE	HIGH

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY), MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

GRADATION

WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.
UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.

MINERALOGICAL COMPOSITION

MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LL < 31
MODERATELY COMPRESSIBLE	LL = 31 - 50
HIGHLY COMPRESSIBLE	LL > 50

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	1 - 10%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	10 - 20%
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	20 - 35%
HIGHLY ORGANIC	> 10%	> 20%	HIGHLY	35% AND ABOVE

GROUND WATER

- WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING
- STATIC WATER LEVEL AFTER 24 HOURS
- PW — PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA
- SPRING OR SEEP

MISCELLANEOUS SYMBOLS

- ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION
- SOIL SYMBOL
- ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT
- INFERRED SOIL BOUNDARY
- INFERRED ROCK LINE
- ALLUVIAL SOIL BOUNDARY
- 25/025 — DIP & DIP DIRECTION OF ROCK STRUCTURES
- SPT, CPT, DMT, PMT, OPT — TEST BORING
- AUGER BORING
- CORE BORING
- MW — MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- CONE PENETROMETER TEST
- SOUNDING ROD
- TEST BORING WITH CORE
- SPT N-VALUE

RECOMMENDATION SYMBOLS

- UNDERCUT
- SHALLOW UNDERCUT
- UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE
- UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK
- UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED, FRACTURES
FRAGS. - FRAGMENTS
HI. - HIGHLY
MED. - MEDIUM
MICA. - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
w - MOISTURE CONTENT
V - VERY
VST - VANE SHEAR TEST
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

SAMPLE ABBREVIATIONS

S - BULK
SS - SPLIT SPOON
ST - SHELBY TUBE
RS - ROCK
RT - RECOMPACTED TRIAXIAL
CBR - CALIFORNIA BEARING RATIO

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [X] CME-45C
- [ ] CME-55
- [ ] CME-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [ ] _____
- [ ] _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [X] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [X] CASING [ ] W/ ADVANCER
- [X] TRICONE 2 15/16 " STEEL TEETH
- [ ] TRICONE _____ " TUNG.-CARB.
- [X] CORE BIT
- [ ] _____

HAMMER TYPE:
- [X] AUTOMATIC
- [ ] MANUAL

CORE SIZE:
- [ ] -B ____
- [ ] -H ____
- [X] -N Q2

HAND TOOLS:
- [ ] POST HOLE DIGGER
- [ ] HAND AUGER
- [ ] SOUNDING ROD
- [ ] VANE SHEAR TEST
- [ ] _____

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.
ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:

WEATHERED ROCK (WR)	NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.
CRYSTALLINE ROCK (CR)	FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.
NON-CRYSTALLINE ROCK (NCR)	FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.
COASTAL PLAIN SEDIMENTARY ROCK (CP)	COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.

WEATHERING

FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
VERY SLIGHT (V SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY, ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.
SLIGHT (SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.
MODERATE (MOD.)	SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.
MODERATELY SEVERE (MOD. SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION, ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. *IF TESTED, WOULD YIELD SPT REFUSAL*
SEVERE (SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF*
VERY SEVERE (V SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF*
COMPLETE	ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.

ROCK HARDNESS

VERY HARD	CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.
HARD	CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.
MODERATELY HARD	CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.
MEDIUM HARD	CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.
SOFT	CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.
VERY SOFT	CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.

FRACTURE SPACING

TERM	SPACING
VERY WIDE	MORE THAN 10 FEET
WIDE	3 TO 10 FEET
MODERATELY CLOSE	1 TO 3 FEET
CLOSE	0.16 TO 1 FOOT
VERY CLOSE	LESS THAN 0.16 FEET

BEDDING

TERM	THICKNESS
VERY THICKLY BEDDED	4 FEET
THICKLY BEDDED	1.5 - 4 FEET
THINLY BEDDED	0.16 - 1.5 FEET
VERY THINLY BEDDED	0.03 - 0.16 FEET
THICKLY LAMINATED	0.008 - 0.03 FEET
THINLY LAMINATED	< 0.008 FEET

INDURATION

FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.

FRIABLE	RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.
MODERATELY INDURATED	GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.
INDURATED	GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.
EXTREMELY INDURATED	SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.

TERMS AND DEFINITIONS

ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.

AQUIFER - A WATER BEARING FORMATION OR STRATA.

ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.

ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.

ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.

CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.

COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.

CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.

DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.

DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.

FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.

FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.

FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.

FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.

FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.

JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.

LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.

LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.

MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.

PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.

RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.

ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.

SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.

SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.

STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.

STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.

STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: FILE "25-0274-Volkert NCDOT Program Mgmt.-5600 US HWY 19E-ORD-2023.dgn" WAS USED TO DETERMINE GROUND ELEVATION FOR ALL BORINGS. ELEVATION: FEET

NOTES:

F.I.A.D = FILLED IMMEDIATELY AFTER DRILLING

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
PRB_006-01-EF443	2A

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SUPPLEMENTAL LEGEND, GEOLOGICAL STRENGTH INDEX (GSI) TABLES FROM AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS

AASHTO LRFD Figure 10.4.6.4-1 — Determination of GSI for Jointed Rock Mass (Marinos and Hoek, 2000)

GEOLOGICAL STRENGTH INDEX (GSI) FOR JOINTED ROCKS (Hoek and Marinos, 2000)

From the lithology, structure and surface conditions of the discontinuities, estimate the average value of GSI. Do not try to be too precise. Quoting a range from 33 to 37 is more realistic than stating that GSI = 35. Note that the table does not apply to structurally controlled failures. Where weak planar structural planes are present in an unfavorable orientation with respect to the excavation face, these will dominate the rock mass behaviour. The shear strength of surfaces in rocks that are prone to deterioration as a result of changes in moisture content will be reduced if water is present. When working with rocks in the fair to very poor categories, a shift to the right may be made for wet conditions. Water pressure is dealt with by effective stress analysis.

STRUCTURE

INTACT OR MASSIVE - intact rock specimens or massive in situ rock with few widely spaced discontinuities

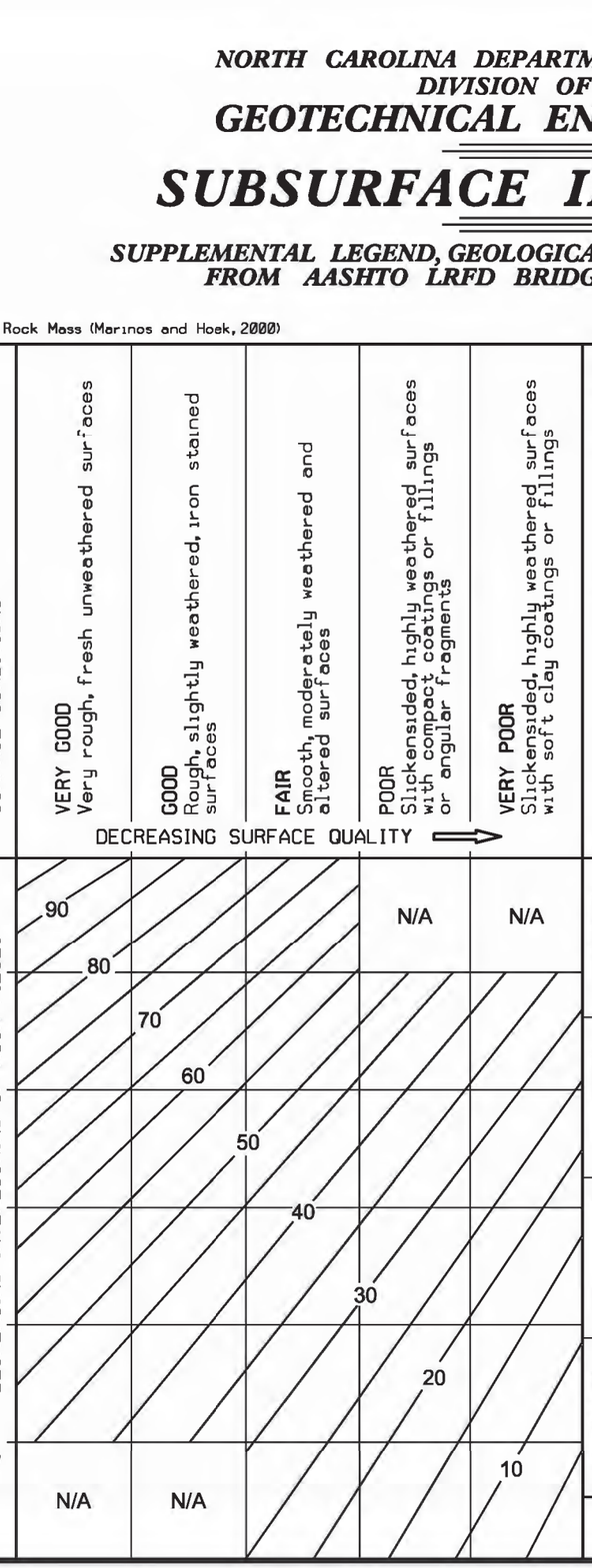
BLOCKY - well interlocked undisturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets

VERY BLOCKY - interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets

BLOCKY/DISTURBED/SEAMY - folded with angular blocks formed by many intersecting discontinuity sets. Persistence of bedding planes or schistosity

DISINTEGRATED - poorly interlocked, heavily broken rock mass with mixture of angular and rounded rock pieces

LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes

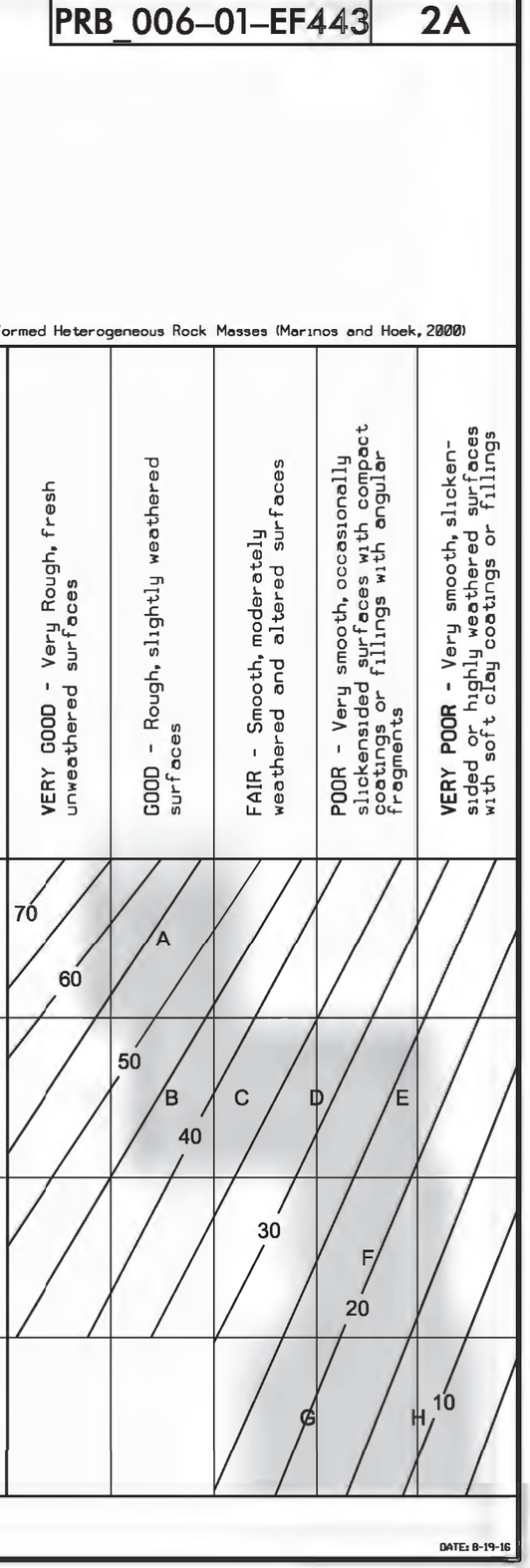


AASHTO LRFD Figure 10.4.6.4-2 — Determination of GSI for Tectonically Deformed Heterogeneous Rock Masses (Marinos and Hoek, 2000)

GSI FOR HETEROGENEOUS ROCK MASSES SUCH AS FLYSCH (Marinos. P and Hoek E., 2000)

From a description of the lithology, structure and surface conditions (particularly of the bedding planes), choose a box in the chart. Locate the position in the box that corresponds to the condition of the discontinuities and estimate the average value of GSI from the contours. Do not attempt to be too precise. Quoting a range from 33 to 37 is more realistic than giving GSI = 35. Note that the Hoek-Brown criterion does not apply to structurally controlled failures. Where unfavourably oriented continuous weak planar discontinuities are present, these will dominate the behaviour of the rock mass. The strength of some rock masses is reduced by the presence of groundwater and this can be allowed for by a slight shift to the right in the columns for fair, poor and very poor conditions. Water pressure does not change the value of GSI and it is dealt with by using effective stress analysis.

COMPOSITION AND STRUCTURE



DATE: 8-19-16

PROJECT REFERENCE NO.	SHEET NO.
PRB_006-01-EF443	3

SITE PLAN

0 20 40
FEET

DAVID C VANCE
LIFE ESTATE
DB 590, PG 1545
PIN: 1804-19-61-5538

DAVID C VANCE
LIFE ESTATE
DB 590, PG 1545
PIN: 1804-19-61-7223

CUR DATA -L-
PIc 12+16.67
Δc = 35°39'23.2" (LT)
D = 76°23'39.7"
Lc = 46.67
Tc = 24.12
R = 75

BEGIN PROJECT
-L- STA 10+10.96

END PROJECT
-L- STA 12+46.00

BEGIN BRIDGE
-L- STA 10+47.19

END BRIDGE
-L- STA 11+89.57

US HWY 19E - 21' BST

R=30'

.02

.02

12'

12'-0"
CLEAR
RDWY

.02

.02

12'

-L-
S29°56'16.3"E

NORTH TOE RIVER

B-1

B-2

B-3

EB2

EB1

A/C LP TANKS (2)

GR

GR

GR

GUY

R=30'

WR CONTROL REBAR 10
N: 841557.30
E: 1106445.41
ELEV:2852.27'

OLD BRIDGE
CONC ABUTMENT

WR CONTROL REBAR 11
N: 841392.15
E: 1106527.51
ELEV:2837.80'
GRID TO GROUND
CGF: 1.00016752

-L- START 10+00.00

10

DAVID C VANCE
LIFE ESTATE
DB 590, PG 1545
PIN: 1804-19-61-5538

DISPLACED REMNANTS
OF OLD BRIDGE STRUCTURE

DAVID C VANCE
LIFE ESTATE
DB 590, PG 1545
PIN: 1804-19-61-7223

-L- PC 11+92.55

GEOTECHNICAL BORING REPORT
BORE LOG

WBS PRB_006-01-EF443	**TIP** 0	**COUNTY** AVERY	**GEOLOGIST** Barrera, P.	
SITE DESCRIPTION Bridge at 5631 US 19E over North Toe River				**GROUND WTR (ft)**
BORING NO. EB1	**STATION** 10+40	**OFFSET** 11 ft RT	**ALIGNMENT** -L-	**0 HR.** 10.6
COLLAR ELEV. 2,848.3 ft	**TOTAL DEPTH** 30.0 ft	**NORTHING** 841,540	**EASTING** 1,106,460	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE BRI5104 CME-45C 96% 04/17/2024		**DRILL METHOD** Mud Rotary w/ Core	**HAMMER TYPE** Automatic	
DRILLER Eister, G.	**START DATE** 10/14/25	**COMP. DATE** 10/14/25	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
2850										2,848.3 GROUND SURFACE	0.0
	2,847.3	1.0	4	3	2	5		M		**ROADWAY EMBANKMENT** Brown with White and Orange, Loose, Clayey Coarse to Fine SAND (A-2-6), Trace Roots	
2845	2,844.8	3.5	2	2	2	4		M		2,845.3	3.0
	2,842.3	6.0	2	2	2	4		M		Brown and Gray, Soft to Medium Stiff, Coarse to Fine Sandy CLAY (A-6), Trace Rock Fragments 2,842.3	6.0
2840	2,839.8	8.5	1	2	2	4		W		**RESIDUAL** Brown and Orange, Soft to Medium Stiff, Coarse to Fine Sandy SILT (A-4), Trace Roots, Mica, and Rock Fragments Note: Hard Drilling From 18.0'-18.5'.	
2835	2,834.8	13.5	4	12	9	21		W			
2830	2,829.8	18.5	60/0.0			60/0.0				2,829.8 **CRYSTALLINE ROCK** Gray with White and Brown, Moderately Weathered to Fresh, Moderately Hard to Hard BIOTITE GNEISS interlayered with SCHIST, Closed to Wide Fracture Spacing, Variably Foliated	18.5
2825											
2820										2,818.3 Boring Terminated at Elevation 2,818.3 ft in Crystalline Rock: BIOTITE GNEISS	30.0

NCDOT BORE SINGLE 25-01592-B_PRB 5631 US 19E.GPJ NC_DOT.GDT 10/29/25

GEOTECHNICAL BORING REPORT
CORE LOG

WBS PRB_006-01-EF443	**TIP** 0	**COUNTY** AVERY	**GEOLOGIST** Barrera, P.	
SITE DESCRIPTION Bridge at 5631 US 19E over North Toe River				**GROUND WTR (ft)**
BORING NO. EB1	**STATION** 10+40	**OFFSET** 11 ft RT	**ALIGNMENT** -L-	**0 HR.** 10.6
COLLAR ELEV. 2,848.3 ft	**TOTAL DEPTH** 30.0 ft	**NORTHING** 841,540	**EASTING** 1,106,460	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE BRI5104 CME-45C 96% 04/17/2024		**DRILL METHOD** Mud Rotary w/ Core	**HAMMER TYPE** Automatic	
DRILLER Eister, G.	**START DATE** 10/14/25	**COMP. DATE** 10/14/25	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ	**TOTAL RUN** 11.5 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS ELEV. (ft)	DEPTH (ft)
2829.8											Begin Coring @ 18.5 ft	
	2,829.8	18.5	1.5	1:21/0.5	(1.2)	(0.3)		(11.0)	(8.6)		2,829.8 **CRYSTALLINE ROCK** Gray with White and Brown, Moderately Weathered to Fresh, Moderately Hard to Hard BIOTITE GNEISS interlayered with SCHIST, Closed to Wide Fracture Spacing, Variably Foliated GSI = 60-70	18.5
	2,828.3	20.0		N=60/0.0	80%	20%		96%	75%			
			5.0	1:21/0.5								
2825				4:27/1.0	(5.0)	(4.3)						
				1:57/1.0	100%	86%						
	2,823.3	25.0		1:02/1.0								
				1:02/1.0								
			5.0	1:00/1.0								
				1:17/1.0	(4.8)	(4.0)						
2820				1:42/1.0	96%	80%						
				1:08/1.0								
				1:05/1.0								
				1:06/1.0								
	2,818.3	30.0		1:08/1.0							2,818.3 Boring Terminated at Elevation 2,818.3 ft in Crystalline Rock: BIOTITE GNEISS	30.0

NCDOT CORE SINGLE 25-01592-B_PRB 5631 US 19E.GPJ NC_DOT.GDT 10/29/25

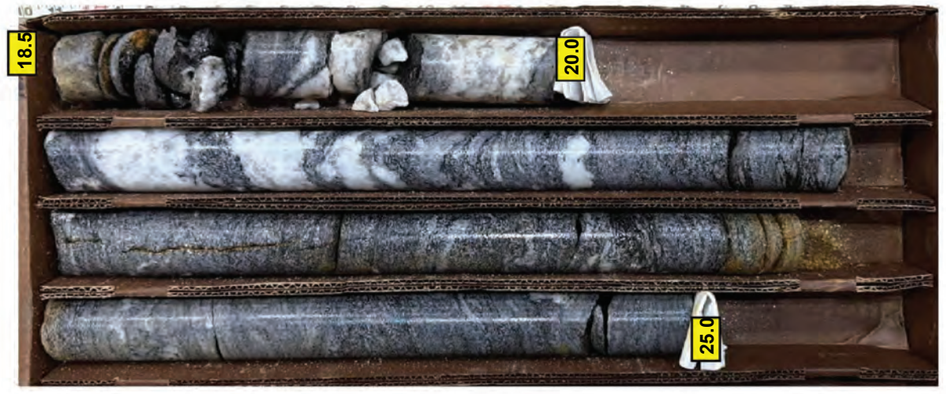
CORE PHOTOGRAPH

Project Description: PRB_006-01-EF443

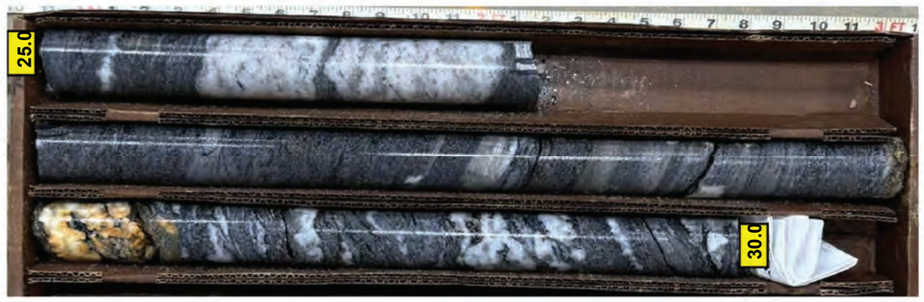
Site Description: Private Road Bridge Replacement (PRB Site #006-01-EF443) at 5631 US 19E Avery County, North Carolina

EB1

Box 1 and 2: 18.5 Feet to 25.0 Feet



Box 2 and 2: 25.0 Feet to 30.0 Feet



GEOTECHNICAL BORING REPORT
BORE LOG

WBS PRB_006-01-EF443	**TIP** 0	**COUNTY** AVERY	**GEOLOGIST** Barrera, P.	
SITE DESCRIPTION Bridge at 5631 US 19E over North Toe River				**GROUND WTR (ft)**
BORING NO. EB2	**STATION** 11+77	**OFFSET** 12 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 2,833.1 ft	**TOTAL DEPTH** 20.0 ft	**NORTHING** 841,433	**EASTING** 1,106,548	**24 HR.** 6.0
DRILL RIG/HAMMER EFF./DATE BRI5104 CME-45C 96% 04/17/2024		**DRILL METHOD** Mud Rotary w/ Core	**HAMMER TYPE** Automatic	
DRILLER Eister, G.	**START DATE** 10/14/25	**COMP. DATE** 10/14/25	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
2835										2,833.1 GROUND SURFACE	0.0
	2,832.1	1.0	2	2	2					**ALLUVIAL** Brown and Gray, Very Loose to Loose, Silty Coarse to Fine SAND (A-2-4), Trace Roots	
2830	2,829.6	3.5	1	4	4						
	2,827.1	6.0	14	86/0.4						2,826.6	6.5
2825	2,824.6	8.5	60/0.0			100/0.9 .60/0.0				**WEATHERED ROCK** MICA SCHIST Brown with White	
										2,824.6	8.5
2820										**CRYSTALLINE ROCK** Gray with White and Brown, Moderately Weathered to Fresh, Moderately Hard to Hard, BIOTITE GNEISS interlayered with SCHIST, Close to Moderately Close Fracture Spacing, Variably Foliated	
2815										2,813.1	20.0
										Boring Terminated at Elevation 2,813.1 ft in Crystalline Rock: BIOTITE GNEISS	

GEOTECHNICAL BORING REPORT
CORE LOG

WBS PRB_006-01-EF443	**TIP** 0	**COUNTY** AVERY	**GEOLOGIST** Barrera, P.	
SITE DESCRIPTION Bridge at 5631 US 19E over North Toe River				**GROUND WTR (ft)**
BORING NO. EB2	**STATION** 11+77	**OFFSET** 12 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 2,833.1 ft	**TOTAL DEPTH** 20.0 ft	**NORTHING** 841,433	**EASTING** 1,106,548	**24 HR.** 6.0
DRILL RIG/HAMMER EFF./DATE BRI5104 CME-45C 96% 04/17/2024		**DRILL METHOD** Mud Rotary w/ Core	**HAMMER TYPE** Automatic	
DRILLER Eister, G.	**START DATE** 10/14/25	**COMP. DATE** 10/14/25	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ	**TOTAL RUN** 11.5 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS ELEV. (ft)	DEPTH (ft)
2824.6											Begin Coring @ 8.5 ft	
	2,824.6	8.5	1.5	1:19/0.5 N=60/0.0 1:19/0.5	(1.5) 100%	(0.5) 33%		(11.3) 98%	(7.0) 61%		2,824.6 **CRYSTALLINE ROCK** Gray with White and Brown, Moderately Weathered to Fresh, Moderately Hard to Hard, BIOTITE GNEISS interlayered with SCHIST, Close to Moderately Close Fracture Spacing, Variably Foliated GSI=50-60	8.5
	2,823.1	10.0	5.0	1:37/1.0 1:23/1.0 1:17/1.0 1:02/1.0 1:01/1.0 1:03/1.0	(4.8) 96%	(2.5) 50%						
2820	2,818.1	15.0	5.0	1:09/1.0 0:52/1.0 0:51/1.0 0:58/1.0 1:02/1.0	(5.0) 100%	(4.0) 80%						
2815	2,813.1	20.0									2,813.1 Boring Terminated at Elevation 2,813.1 ft in Crystalline Rock: BIOTITE GNEISS	20.0

CORE PHOTOGRAPH

Project Description: PRB_006-01-EF443

Site Description: Private Road Bridge Replacement (PRB Site #006-01-EF443) at 5631 US 19E Avery County, North Carolina

EB2

Box 1 and 2: 8.5 Feet to 15.0 Feet

Box 2 and 2: 15.0 Feet to 20.0 Feet

GEOTECHNICAL BORING REPORT
BORE LOG

WBS PRB_006-01-EF443	**TIP** 0	**COUNTY** AVERY	**GEOLOGIST** Barrera, P.	
SITE DESCRIPTION Bridge at 5631 US 19E over North Toe River				**GROUND WTR (ft)**
BORING NO. B-1	**STATION** 11+18	**OFFSET** 8 ft LT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 2,826.9 ft	**TOTAL DEPTH** 3.5 ft	**NORTHING** 841,483	**EASTING** 1,106,515	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE BRI5104 CME-45C 96% 04/17/2024		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Eister, G.	**START DATE** 10/15/25	**COMP. DATE** 10/15/25	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
2830										ELEV. (ft) / DEPTH (ft)
										2,826.9 — 0.0 — GROUND SURFACE
2825								W		**ALLUVIAL** Brown, Coarse to Fine SAND with Abundant Cobbles and Pebbles
										2,823.4 — 3.5 — Boring Terminated by Auger Refusal at Elevation 2,823.4 ft

WBS PRB_006-01-EF443	**TIP** 0	**COUNTY** AVERY	**GEOLOGIST** Barrera, P.	
SITE DESCRIPTION Bridge at 5631 US 19E over North Toe River				**GROUND WTR (ft)**
BORING NO. B-2	**STATION** 11+48	**OFFSET** 8 ft LT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 2,830.5 ft	**TOTAL DEPTH** 5.5 ft	**NORTHING** 841,456	**EASTING** 1,106,530	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE BRI5104 CME-45C 96% 04/17/2024		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Eister, G.	**START DATE** 10/15/25	**COMP. DATE** 10/15/25	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
2835										ELEV (ft) / DEPTH (ft)
2830								M		2,830.5 — 0.0 — GROUND SURFACE **ALLUVIAL** Brown, Silty Coarse to Fine SAND (A-2-4)
2825										2,825.0 — 5.5 — Boring Terminated by Auger Refusal at Elevation 2,825.0 ft

GEOTECHNICAL BORING REPORT
BORE LOG

WBS PRB_006-01-EF443	**TIP** 0	**COUNTY** AVERY	**GEOLOGIST** Barrera, P.	
SITE DESCRIPTION Bridge at 5631 US 19E over North Toe River				**GROUND WTR (ft)**
BORING NO. B-3	**STATION** 11+90	**OFFSET** 24 ft LT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 2,833.5 ft	**TOTAL DEPTH** 5.0 ft	**NORTHING** 841,428	**EASTING** 1,106,565	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE BRI5104 CME-45C 96% 04/17/2024		**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
DRILLER Eister, G.	**START DATE** 10/15/25	**COMP. DATE** 10/15/25	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
2835										ELEV. (ft) DEPTH (ft)
										2,833.5 GROUND SURFACE 0.0
2830								M		**ALLUVIAL** Brown and Gray, Silty SAND (A-2-4)
										2,828.5 5.0
										Boring Terminated by Auger Refusal at Elevation 2,828.5 ft

SITE PHOTOGRAPHS

Project Description: PRB_006-01-EF443

Site Description: Private Road Bridge Replacement (PRB Site 006-01-EF443) at 5631 US 19E
Avery County, North Carolina

View Looking Upstation

View Looking Upstream

View Looking Downstation

View Looking Downstream

North Carolina Emergency Management – Private Roads and Bridges

Site Information Form

Site Number: 006-01-07045

Site Address: 85 Kay Jay Lane, Newland, NC

GPS Coordinates: 36.1073, -81.9957

County: Avery

Bridge Type: Steel I-beam with timber decking

Span Length: 40 feet

Bridge Width: 12'-0" out-to out, 11'-1" clear width

Substructure Type: Concrete Cap on Drilled in Piles

Geotechnical Information: See Standard Bridge Plans for Notes

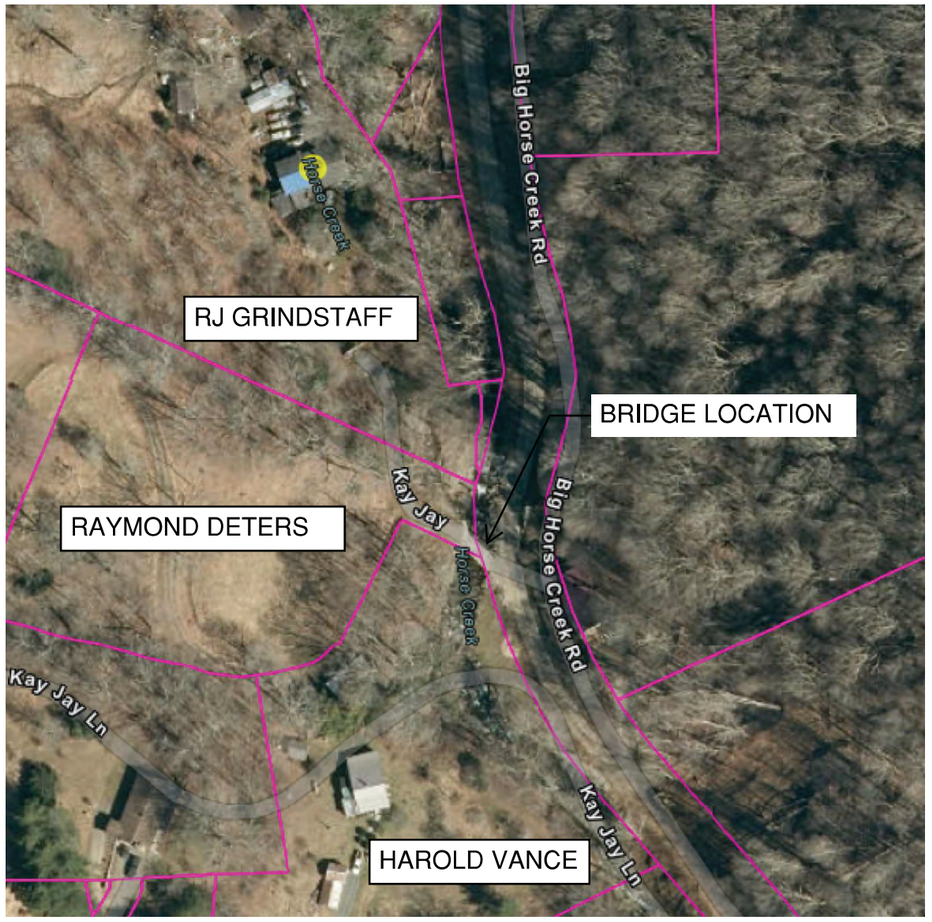
Additional Notes:

Timber bridge railing not required.

Wing walls not required.

The existing bridge is in place and must be removed prior to the start of construction.

The stream contains no debris or obstructions requiring removal.



SITE ID: 006-01-07045

SITE ADDRESS: 85 KAY JAY LANE
NEWLAND, NC 28657

BRIDGE SURVEY & HYDRAULIC DESIGN REPORT

NC DEPARTMENT OF EMERGENCY MANAGEMENT
PRIVATE ROADS AND BRIDGES PROGRAM

Site Number 006-01-07045 Latitude 36.106415 Longitude -81.995203

County Avery Address 85 Kay Jay Lane

City Newland Zip Code 28657

Recommended Structure 1 @ 40' Steel Girder Bridge with 2'-6" Pier Caps

Recommended Width of Roadway 12' Skew Match existing

Recommended Location is (At)/Upstream, Downstream) of Existing Crossing

Temporary Crossing

I hereby certify that I have reviewed the existing hydraulic conveyance at this site which was a ~35 ft existing bridge with the proposed conveyance provided by a 40 ft span bridge.

The proposed bridge low chord for the bridge shall be set in accordance with the FEMA Disaster Specific Guidance for the Replacement of Private Roads and Bridges issued on 14 February 2025, "to provide bridge/culvert design plans certified (sealed, signed, and dated) by a Professional Engineer licened in the State of North Carolina demonstrating that the newly designed and installed private bridge/culvert provides conveyance greater than or equal to the original destroyed crossing."

This certification demonstrates that the newly designed and installed private bridge/culvert provides conveyance greater than or equal to the original destroyed crossing. This is based on the best available data provided from the post-storm evaluations. Portions of the existing structures may have been destroyed, removed, modified, or shifted from their original location or elevation.

Designed by

Assisted by

Date

NORTH CAROLINA PROFESSIONAL SEAL 20646 ENGINEER MATTHEW D. FOSTER

Signed by: Matthew D Foster 7B19328FAFC8472...

3/27/2026 2:36:41 PM EDT

JMT Johnson, Mirmiran, & Thompson Inc.
108 Asheville Commerce Parkway
Candler, NC 28715
License No: C-397

Reviewed by Date

SITE DATA

Drainage Area 3.37 SQ MI Source USGS StreamStats

River Basin French Broad Character

Stream Classification (e.g., Trout, High Quality Water) WS-V; Tr

Debris Potential: Low ☐ Moderate ☒ High ☐

Existing Structure - Source of Available Data NCEM Private Roads and Bridges Inspection Team

Existing Structure - Description 11.5-ft wide skewed bridge, with two 20-ft spans (Total length 40-ft) per site assessment

Estimated Waterway Opening 99.6 ft²

Design Control Elev ft Source

Gage Station No Period of Records

Max Discharge cfs Date Frequency

Historical Flood Information:

Date Elev ft Est Freq yr Source Period of Knowledge yrs

Historical Scour Info: General ft Contraction ft Local ft

Channel Slope ft/ft Source Normal Water Surface Elev ft

Manning's n: Left OB Channel Right OB Source

Flood Study / Status No FEMA Study

Flood Study 100-yr Discharge N/A cfs WS Elev: With Floodway N/A ft Without Floodway N/A ft River Station N/A

DESIGN DATA

Hydrological Method

Hydraulic Design Method Disaster Specific Guidance for the Replacement of Private Roads and Bridges 2/14/2025

Floods Evaluated	Frequency (year)	Discharge (cfs)	Elevation (ft)	Backwater (ft)	Bridge Opening Velocity (fps)

Waterway Opening Provided Below: Design WS Elev sf 100-yr WS Elev sf Total 113.4 sf

Average Channel Velocity (Design) fps Average Overbank Velocity (Design) fps

Computed Scour: General ft Contraction ft Local ft

INFORMATION TO BE SHOWN ON PLANS

HYDRAULIC DATA

DESIGN DISCHARGE	= 720 C.F.S.
FREQUENCY OF DESIGN FLOOD	= 25 YRS.
DESIGN HIGH WATER ELEVATION	=
DRAINAGE AREA	= 3.37 SQ. MI.
BASIC DISCHARGE (Q100)	= 1110 C.F.S.
BASIC HIGH WATER ELEVATION	=

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE	= C.F.S.
FREQUENCY OF OVERTOPPING FLOOD	= YRS.
OVERTOPPING FLOOD ELEVATION	= *

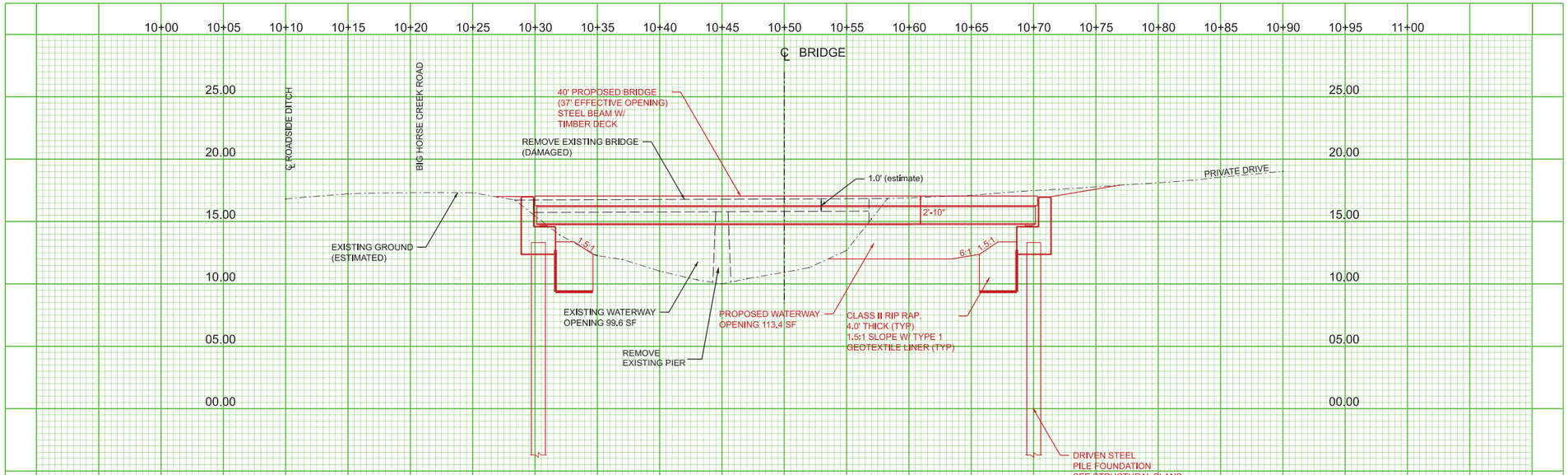
* NOTE LOCATION OF OVERTOPPING

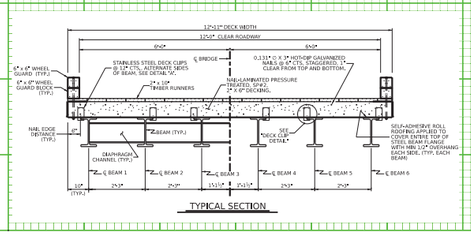
WS EL. Taken @ River Station ?

ADDITIONAL INFORMATION AND COMPUTATIONS

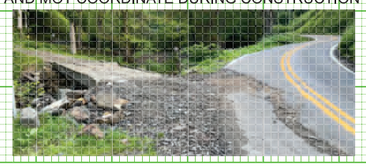
Emergency Vehicle Access Possible?	No	Expected Level of Effort	Replace
Number of Homes Confirmed	Yes	Other Level of Effort	
Number of Homes	2	Horizontal Curve	No
Churches Confirmed	No	Number of Travel Lanes (LOS)	1
Number of Churches	0	Inclination	No
Schools Confirmed	No	Roadway Divider	No
Number of Schools	0	Road/Bridge Width (ft)	11.50
Recreational/Business Areas Confirmed	No	Span/Gap Estimate (ft)	40.00
Number of Recreational/Business Areas	0	Surface to Water (ft)	5.67
General Description	Bridge at beginning of driveway is very damaged. Driveway serves two residents. Would not drive over it. Driveway was originally paved and was washed out. Temporary gravel was installed. Existing bridge is two span and skewed with stream. 20ft spans	Utility/Mechanical	No
		Utility Types	
		Pipe Needs Sizing	
		Depth of Pipe	
		Geotechnical	Erosion/scour
		Other Geotechnical	
Overall Condition	Damage		
Condition Other			
Site Repair Status	No Repair		

TOTAL STR. DIMENSION
24" [W24X76 I-BEAM]
+ 8" [NOMINAL 2"X8" DECKING]
+ 2" [NOMINAL 2"X10" TIMBER RUNNER]
= 34" [2'-10" TOTAL STR DEPTH]





THIS SITE IS TIGHTLY CONSTRAINED ON THE NCDOT ROADWAY SIDE. TRY TO MAINTAIN FACE (FRONT) OF ABUTMENT AT EXISTING LOCATION. COORDINATE WITH NCDOT LOCAL DISTRICT OFFICE FOR AN ENCROACHMENT AND MOT COORDINATE DURING CONSTRUCTION



Stationing and elevations shown are relative to the site.
Based on an assume datum.
No survey grade field work was performed.

NOTES

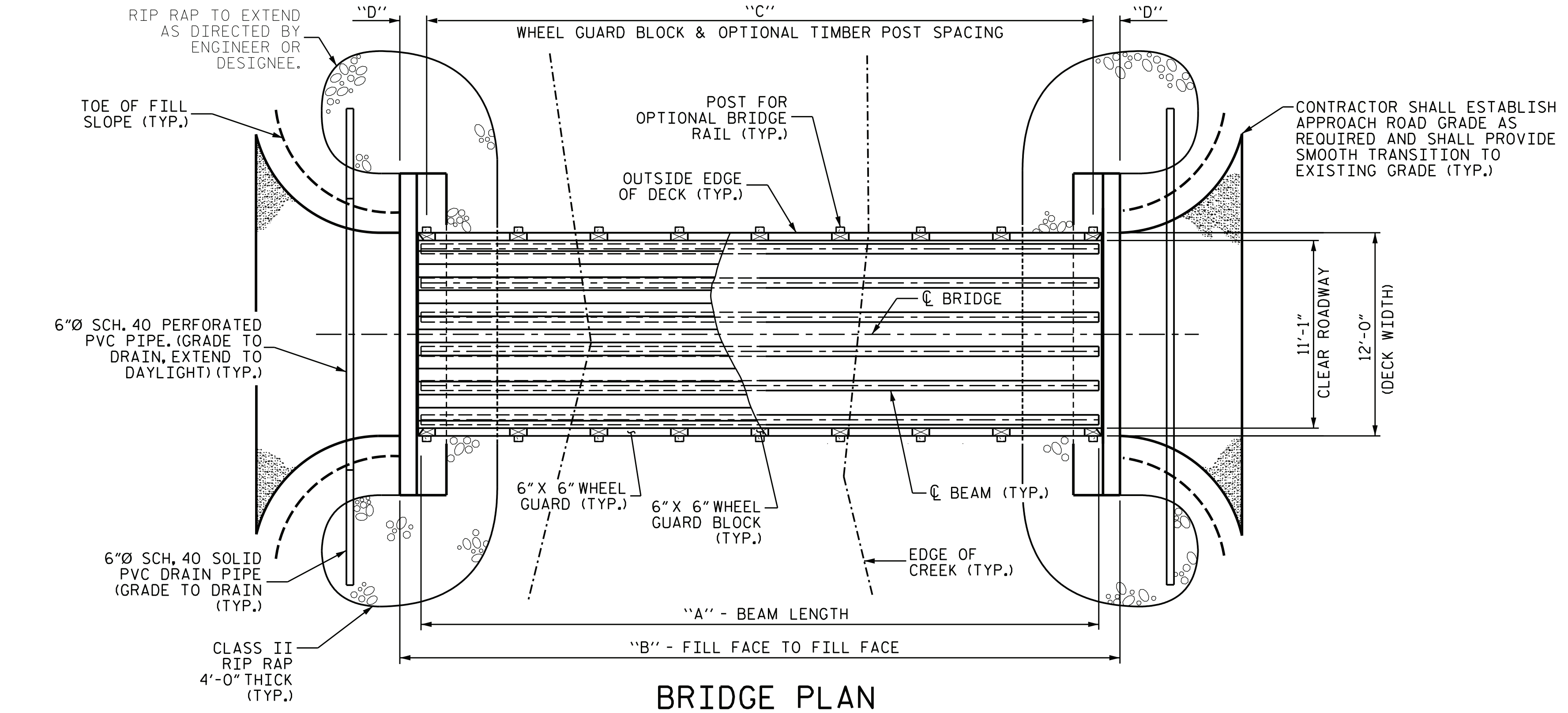
FOR OPTIONAL TIMBER BRIDGE RAIL DETAILS, SEE "OPTIONAL TIMBER BRIDGE RAIL" SHEET.

CONTRACTOR SHALL LOCATE THE EXPANSION BEARING ON THE "UPHILL" END OF THE BRIDGE. THERE WILL BE ONLY ONE EXPANSION BEARING PER BRIDGE.

CONTRACTOR SHALL PROVIDE EROSION CONTROL MEASURES, AS REQUIRED ACCORDING TO NCDOT STANDARD SPECIFICATIONS AND THE CONTRACT DOCUMENTS.

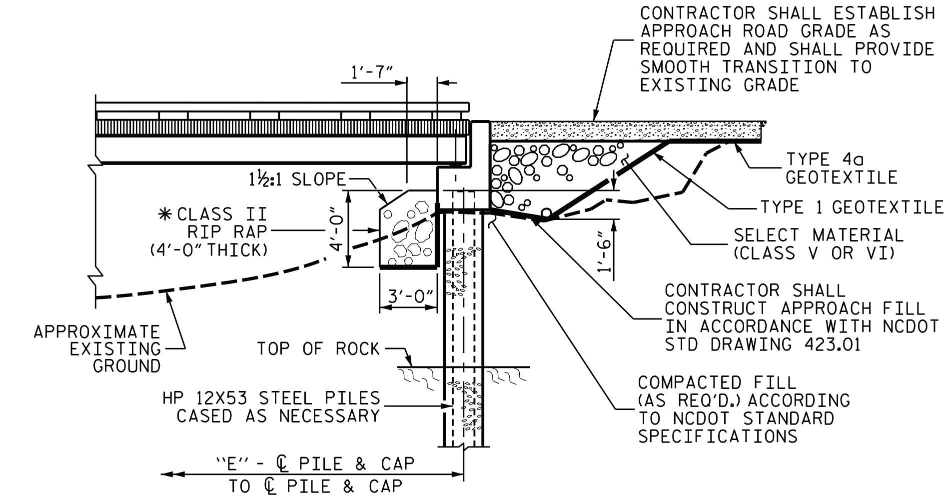
THE CONTRACTOR SHALL SET THE LOW-CHORD ELEVATION OF THE BRIDGE BASED ON EXISTING SITE CONDITIONS AND IN COORDINATION WITH THE ENGINEER, SUCH THAT THE NEW CROSSING PROVIDES CONVEYANCE GREATER THAN OR EQUAL TO THE ORIGINAL DESTROYED CROSSING. THE CONTRACTOR SHALL REFER TO THE BSR WHEN SETTING THE LOW-CHORD ELEVATION OF THE BRIDGE. NO CONSTRUCTION ACTIVITIES SHALL COMMENCE UNTIL ALL PARTIES HAVE AGREED UPON THE LOW-CHORD ELEVATION AND THE DATED PERMIT APPLICATION IS APPROVED.

TIMBER DECKING SHALL BE 2X8 BOARDS. 4X6 TIMBER DECKING (6" DIMENSION HORIZONTAL) MAY BE USED IN LIEU OF 2X8 DECKING; SEE OPTIONAL TYPICAL SECTION ON SHEET S-03 FOR DETAILS.



BRIDGE PLAN

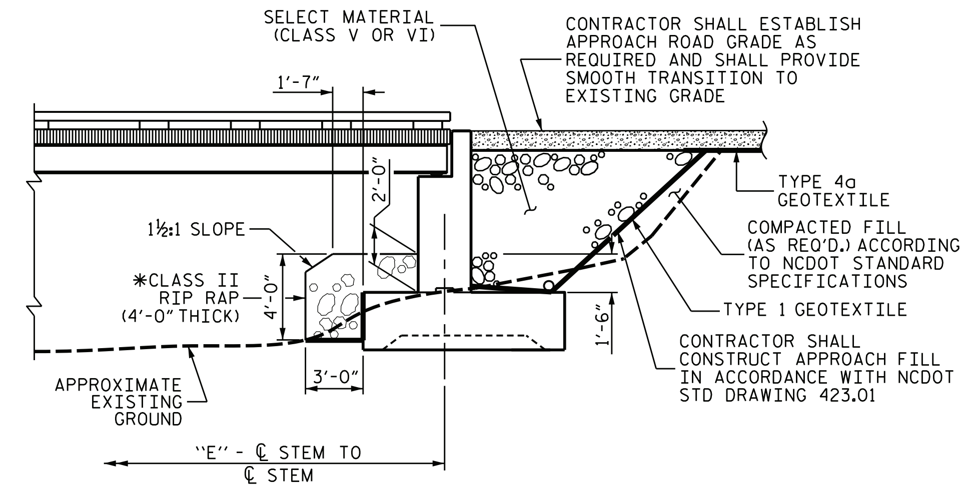
(FOUNDATION TYPE NOT SHOWN FOR CLARITY)



BRIDGE PARTIAL ELEVATION

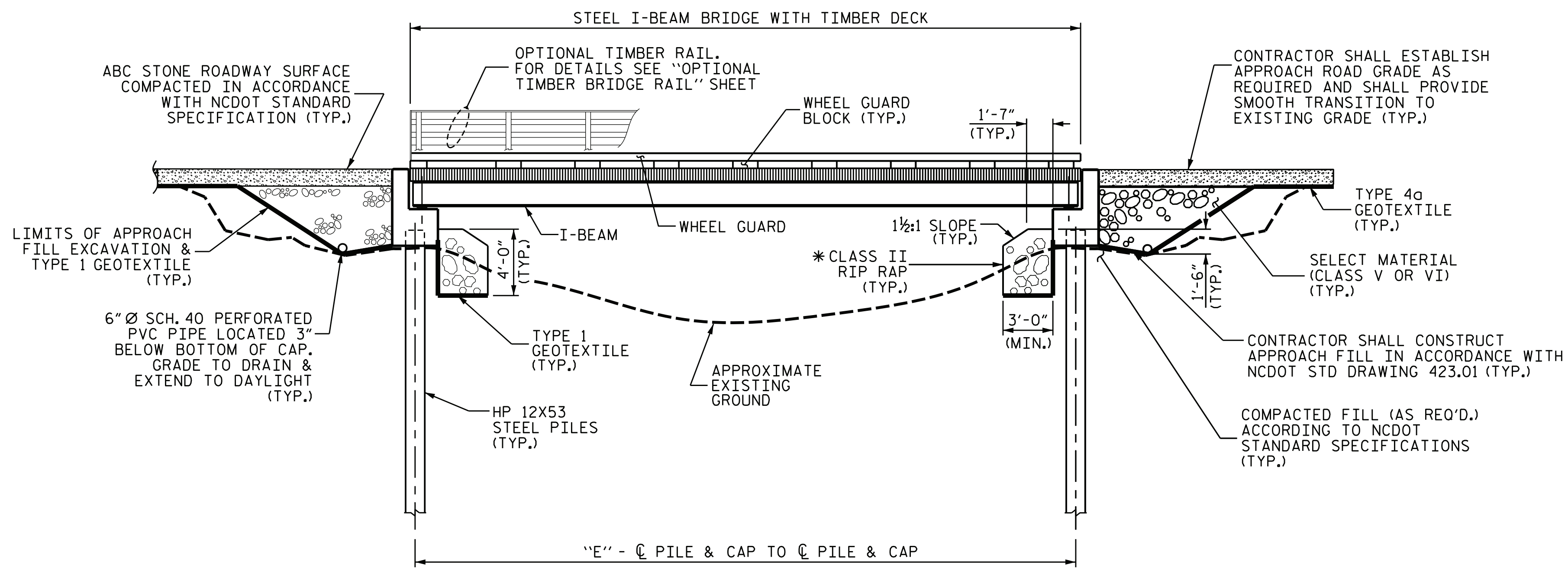
(SHOWING DRILLED-IN 12X53 STEEL PILES FOUNDATION)

DIMENSIONS TABLE					
SPAN	A	B	C	D	E
20'-0"	20'-0"	22'-6"	5 SPA. @ 3'-8"	2'-1"	19'-9"
30'-0"	30'-0"	32'-6"	7 SPA. @ 4'-0"	2'-3"	29'-9"
40'-0"	40'-0"	42'-6"	9 SPA. @ 4'-3"	2'-1½"	39'-9"
50'-0"	50'-0"	52'-6"	11 SPA. @ 4'-4"	2'-5"	49'-9"



BRIDGE PARTIAL ELEVATION

(SHOWING SPREAD FOOTING FOUNDATION)



BRIDGE ELEVATION

(SHOWING DRIVEN 12X53 STEEL PILES FOUNDATION)

✱SEE BSR FOR RIP RAP LIMITS

NORTH CAROLINA ENGINEER 045282 GWENDOLEN F. WILSON — DocuSigned by: Gwen Wilson — 04/06/2026

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA OFFICE OF EMERGENCY MANAGEMENT

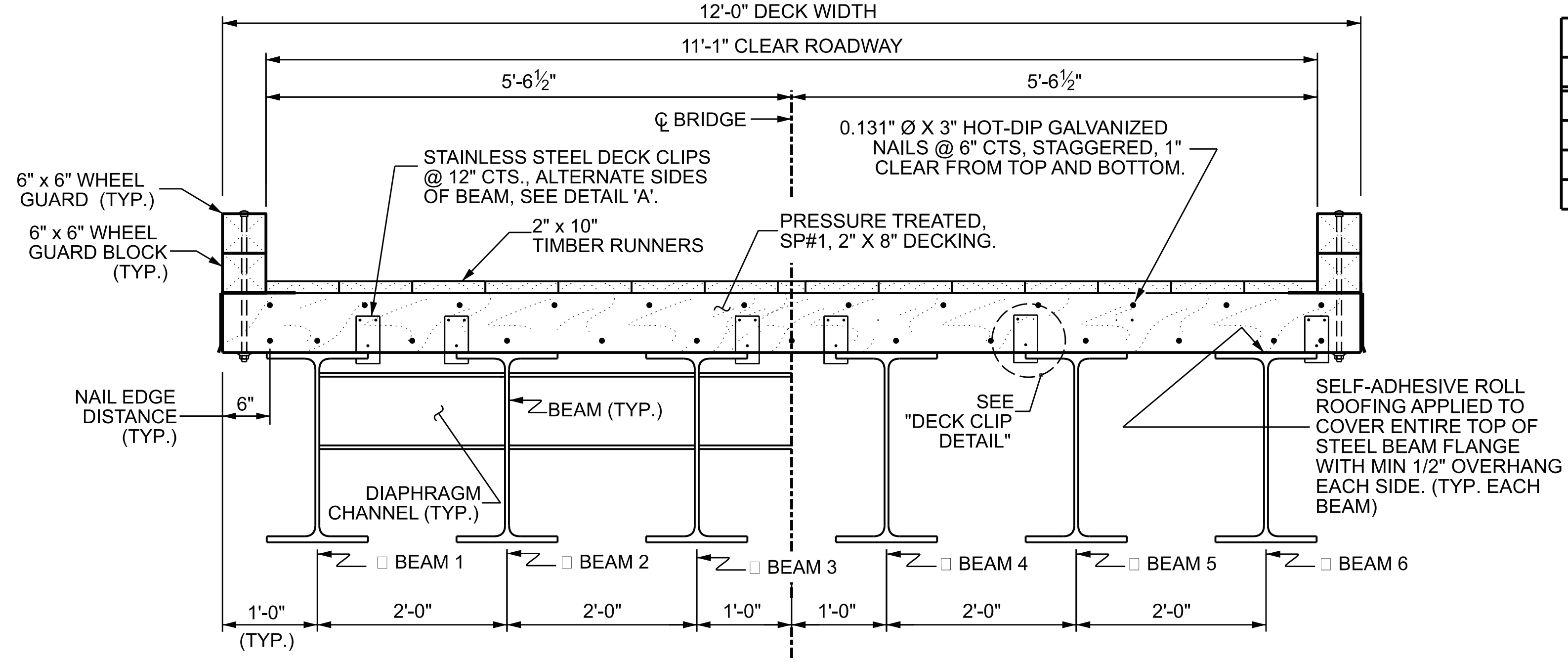
PRIVATE DRIVEWAY BRIDGE STANDARDS

SINGLE LANE STEEL BEAM BRIDGE TIMBER DECK

GENERAL DRAWING

JMT Johnson, Mirmiran, & Thompson Inc. 108 Asheville Commerce Parkway Candler, NC 28715 License No: C-3097

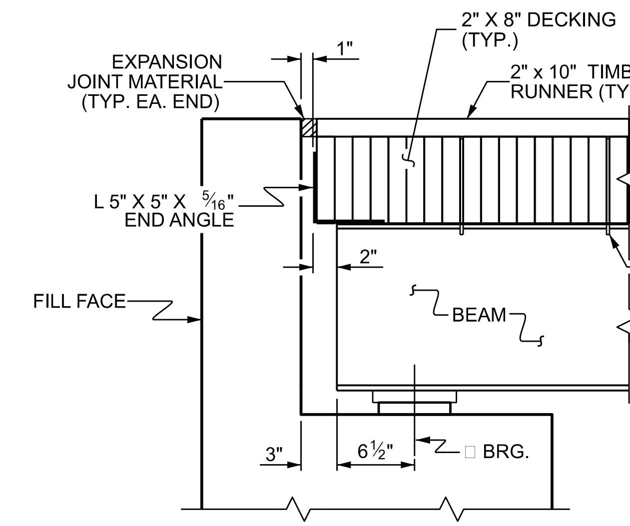
DWN. BY: BC	DATE: 04/2026	REVISIONS						SHEET NO. S-01
CHKD. BY: GFW	DATE: 04/2026	NO.	BY:	DATE:	NO.	BY:	DATE:	TOTAL SHEETS 13
DES. EGR. OF RECORD: GFW	DATE: 04/2026	1			3			
		2			4			



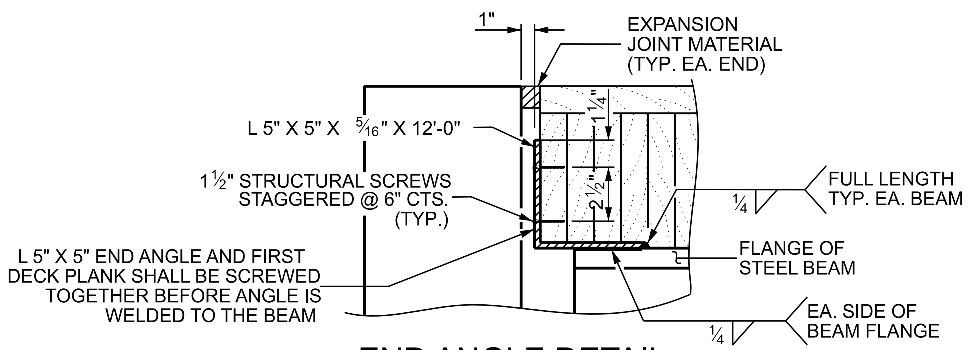
TYPICAL SECTION

MATERIALS TABLE

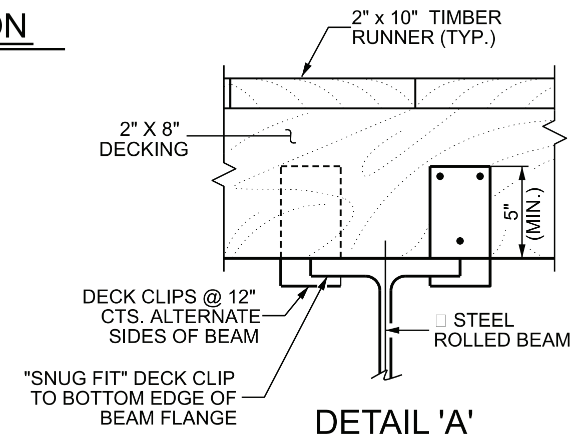
SPAN	BEAM	DIAPHRAGM CHANNEL	DECK PLANK	DECKING SQ. FT.
20'-0"	W16X36	C12X20.7	2X8	244
30'-0"	W21X48	C12X20.7	2X8	364
40'-0"	W24X76	C12X20.7	2X8	484
50'-0"	W24X104	C12X20.7	2X8	604



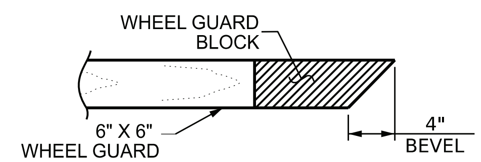
SECTION AT END BENT



END ANGLE DETAIL



DETAIL 'A'



VIEW B-B

DECK CLIP DIMENSIONS

SPAN	BEAM	*A
20'-0"	W16X36	½"
30'-0"	W21X48	½"
40'-0"	W24X76	¾"
50'-0"	W24X104	13⁄16"

* DIMENSION A IS FOR INFORMATION ONLY. IT IS BASED ON THE FLANGE THICKNESS PLUS A 1/16" TOLERANCE. THE CONTRACTOR SHALL VERIFY THIS DIMENSION WITH DECK CLIP SUPPLIER. THE DECK CLIP SHALL HAVE A SNUG FIT TO THE BEAM FLANGE.

NOTES

FOR TIMBER BRIDGE DECK SYSTEM DETAILS, SEE "PLAN OF SPAN" SHEET.

FOR OPTIONAL TIMBER RAILS, SEE "OPTIONAL TIMBER BRIDGE RAIL" SHEET.

FOR BEAM AND DIAPHRAGM DETAILS, SEE "FRAMING PLAN & BEAM DETAILS" SHEET.

TREAT ALL DRILLED OR NEWLY EXPOSED HOLES IN TIMBER MEMBERS BY PUMPING WITH BITUMINOUS ASPHALT-BASED ROOFING CEMENT, OR APPROVED PRESERVATIVE SYSTEM BEFORE INSTALLING HARDWARE.

SEE "PLAN OF SPAN" SHEET FOR NUMBER OF WHEEL GUARDS AND WHEEL GUARD SPACING.

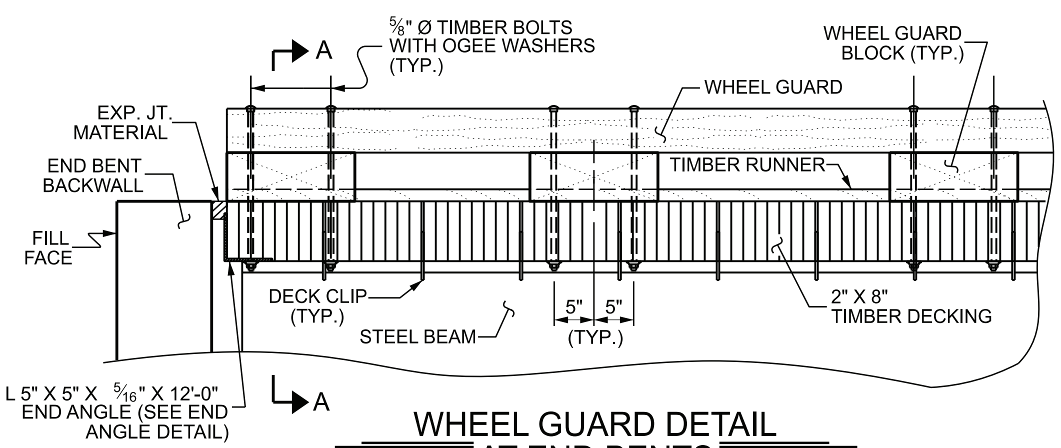
STAINLESS STEEL DECK CLIPS SHALL BE FABRICATED FROM 12-GAUGE STEEL.

THE 2"X10" TIMBER RUNNERS SHALL BE LAID OUT SYMMETRICALLY ABOUT THE CENTERLINE OF THE BRIDGE. ANY REQUIRED WIDTH ADJUSTMENT SHALL BE MADE AT THE CENTER RUNNER.

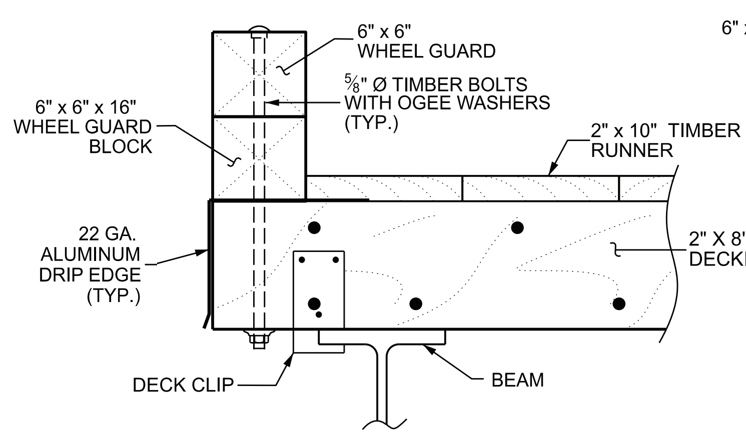
FIELD PRESERVATIVE TREATMENT (INTERFACE): PRIOR TO INSTALLING THE 2X10 WEARING SURFACE, THE TOP FACE OF THE 2X8 STRUCTURAL DECK AND THE UNDERSIDE OF THE 2X10 BOARDS SHALL BE FIELD-TREATED WITH TWO (2) COATS OF COPPER NAPHTHENATE (MINIMUM 2% COPPER METAL) IN ACCORDANCE WITH NCDOT STANDARD SPECIFICATION SECTION 1082 AND AWPA STANDARD M4.

PLACE 2X10 WEARING SURFACE BOARDS PARALLEL TO TRAFFIC WITH A UNIFORM ¼" CLEAR LONGITUDINAL GAP BETWEEN ADJACENT BOARDS. DO NOT BUTT BOARDS TIGHT. THIS GAP SHALL BE MAINTAINED TO FACILITATE SURFACE DRAINAGE AND PREVENT MOISTURE ENTRAPMENT AT THE INTERFACE OF THE STRUCTURAL DECK.

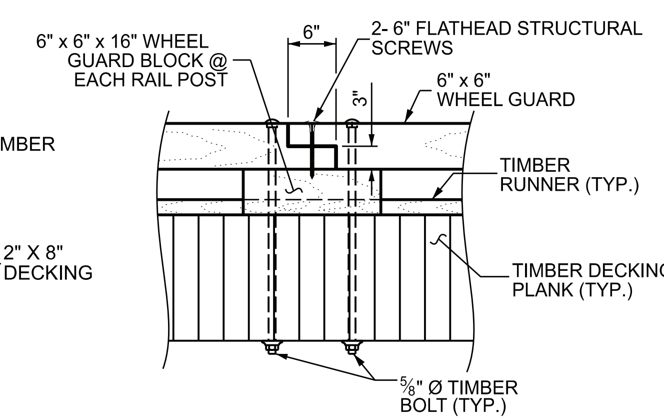
INSTALL 2X10 WEARING SURFACE BOARDS WITH GROWTH RINGS CURVING DOWNWARD TO PROMOTE DRAINAGE.



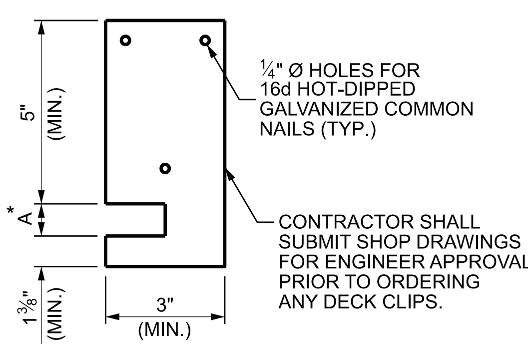
WHEEL GUARD DETAIL AT END BENTS



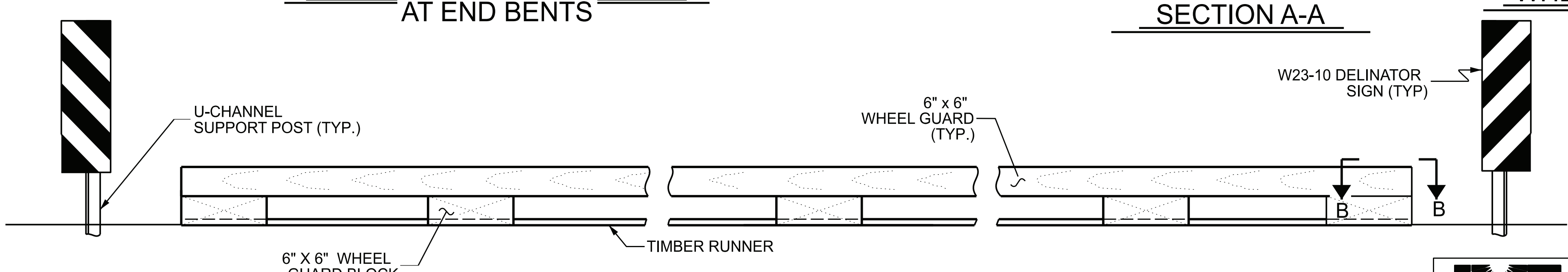
SECTION A-A



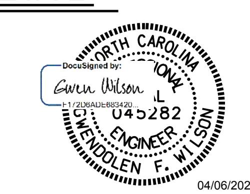
WHEEL GUARD SPLICE DETAIL



DECK CLIP DETAIL



WHEEL GUARD ELEVATION



04/06/2026

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA OFFICE OF EMERGENCY MANAGEMENT

PRIVATE DRIVEWAY BRIDGE STANDARDS

SINGLE LANE STEEL BEAM BRIDGE 2X8 TIMBER DECK

TYPICAL SECTION & RAIL DETAILS

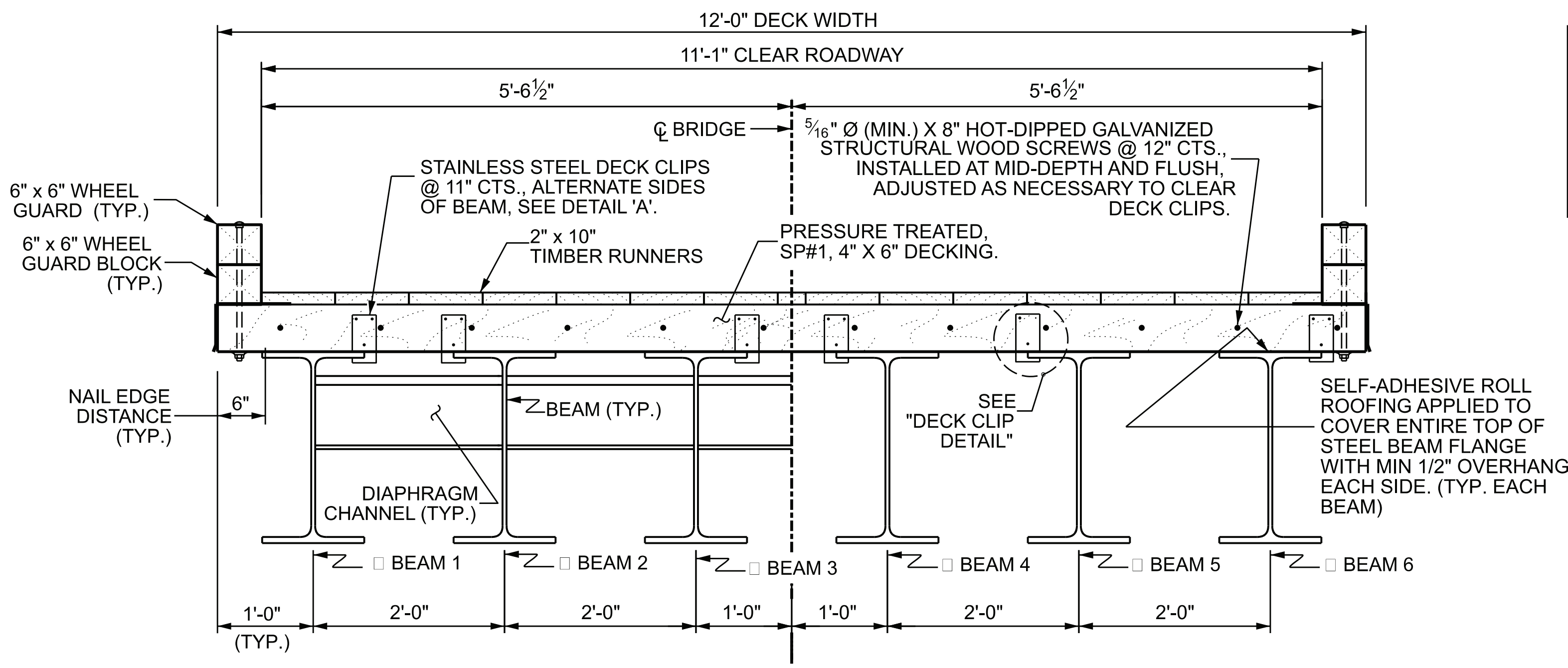
Johnson, Mirmiran, & Thompson, Inc.
108 Asheville Commerce Parkway
Candler, NC, 28715
License No: C-3097

DWN. BY: BC DATE: 04/2026
CHKD. BY: GFW DATE: 04/2026
DES. EGR. OF RECORD: GFW DATE: 04/2026

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

SHEET NO. S-02

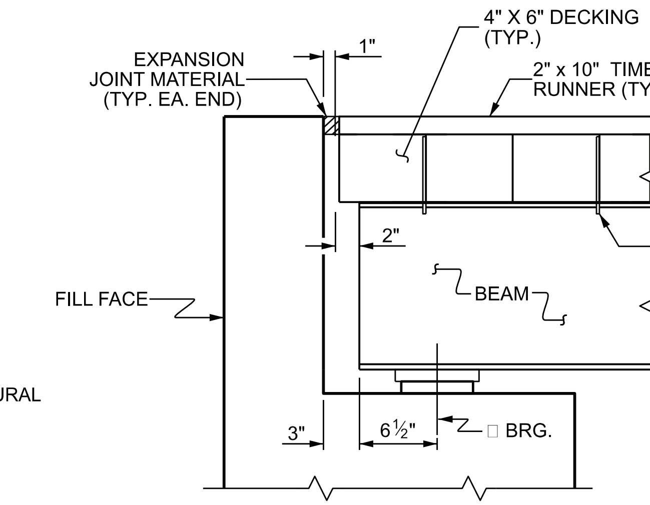
TOTAL SHEETS 13



TYPICAL SECTION

MATERIALS TABLE

SPAN	BEAM	DIAPHRAGM CHANNEL	DECK PLANK	DECKING SQ. FT.
20'-0"	W16X36	C12X20.7	4X6	244
30'-0"	W21X48	C12X20.7	4X6	364
40'-0"	W24X76	C12X20.7	4X6	484
50'-0"	W24X104	C12X20.7	4X6	604



SECTION AT END BENT

NOTES

FOR TIMBER BRIDGE DECK SYSTEM DETAILS, SEE "PLAN OF SPAN" SHEET.

FOR OPTIONAL TIMBER RAILS, SEE "OPTIONAL TIMBER BRIDGE RAIL" SHEET.

FOR BEAM AND DIAPHRAGM DETAILS, SEE "FRAMING PLAN & BEAM DETAILS" SHEET.

TREAT ALL DRILLED OR NEWLY EXPOSED HOLES IN TIMBER MEMBERS BY PUMPING WITH BITUMINOUS ASPHALT-BASED ROOFING CEMENT, OR APPROVED PRESERVATIVE SYSTEM BEFORE INSTALLING HARDWARE.

SEE "PLAN OF SPAN" SHEET FOR NUMBER OF WHEEL GUARDS AND WHEEL GUARD SPACING.

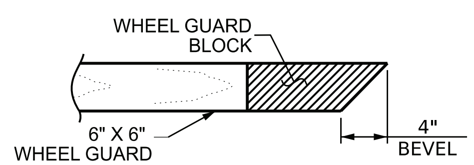
STAINLESS STEEL DECK CLIPS SHALL BE FABRICATED FROM 12 GAUGE STEEL.

THE 2"X10" TIMBER RUNNERS SHALL BE LAID OUT SYMMETRICALLY ABOUT THE CENTERLINE OF THE BRIDGE. ANY REQUIRED WIDTH ADJUSTMENT SHALL BE MADE AT THE CENTER RUNNER.

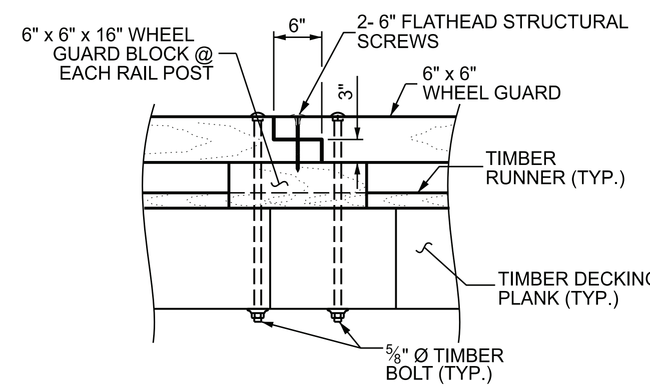
FIELD PRESERVATIVE TREATMENT (INTERFACE): PRIOR TO INSTALLING THE 2X10 WEARING SURFACE, THE TOP FACE OF THE 4X6 STRUCTURAL DECK AND THE UNDERSIDE OF THE 2X10 BOARDS SHALL BE FIELD-TREATED WITH TWO (2) COATS OF COPPER NAPHTHENATE (MINIMUM 2% COPPER METAL) IN ACCORDANCE WITH NCDOT STANDARD SPECIFICATION SECTION 1082 AND AWPA STANDARD M4.

PLACE 2X10 WEARING SURFACE BOARDS PARALLEL TO TRAFFIC WITH A UNIFORM ¼" CLEAR LONGITUDINAL GAP BETWEEN ADJACENT BOARDS. DO NOT BUTT BOARDS TIGHT. THIS GAP SHALL BE MAINTAINED TO FACILITATE SURFACE DRAINAGE AND PREVENT MOISTURE ENTRAPMENT AT THE INTERFACE OF THE STRUCTURAL DECK.

INSTALL 2X10 WEARING SURFACE BOARDS WITH GROWTH RINGS CURVING DOWNWARD TO PROMOTE DRAINAGE.



VIEW B-B

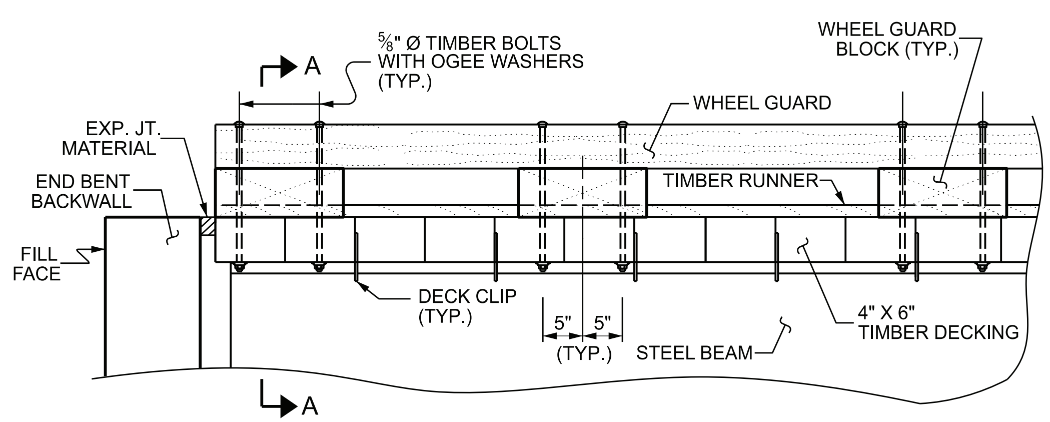


WHEEL GUARD SPLICE DETAIL

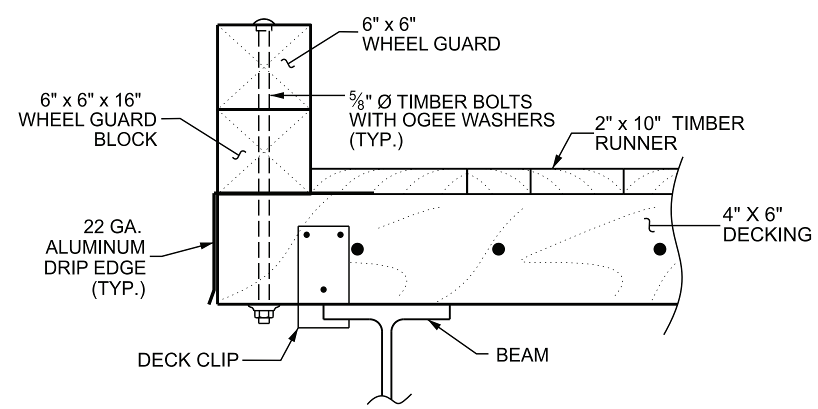
DECK CLIP DIMENSIONS

SPAN	BEAM	* A
20'-0"	W16X36	½"
30'-0"	W21X48	½"
40'-0"	W24X76	¾"
50'-0"	W24X104	13/16"

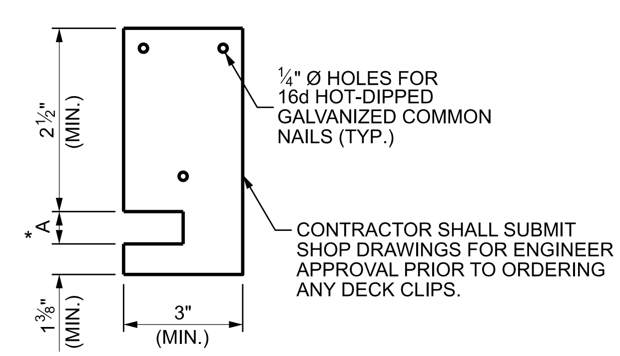
* DIMENSION A IS FOR INFORMATION ONLY. IT IS BASED ON THE FLANGE THICKNESS PLUS A 1/16" TOLERANCE. THE CONTRACTOR SHALL VERIFY THIS DIMENSION WITH DECK CLIP SUPPLIER. THE DECK CLIP SHALL HAVE A SNUG FIT TO THE BEAM FLANGE.



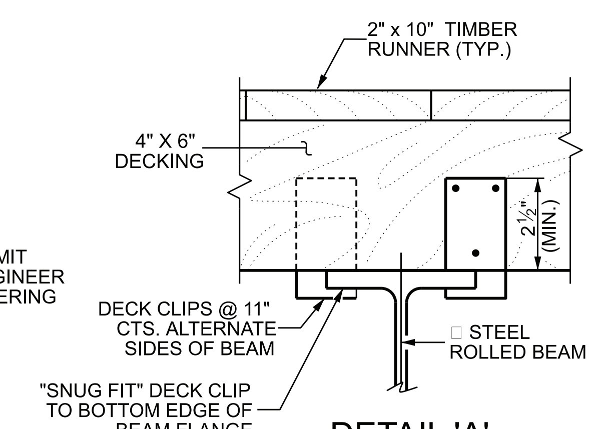
WHEEL GUARD DETAIL AT END BENTS



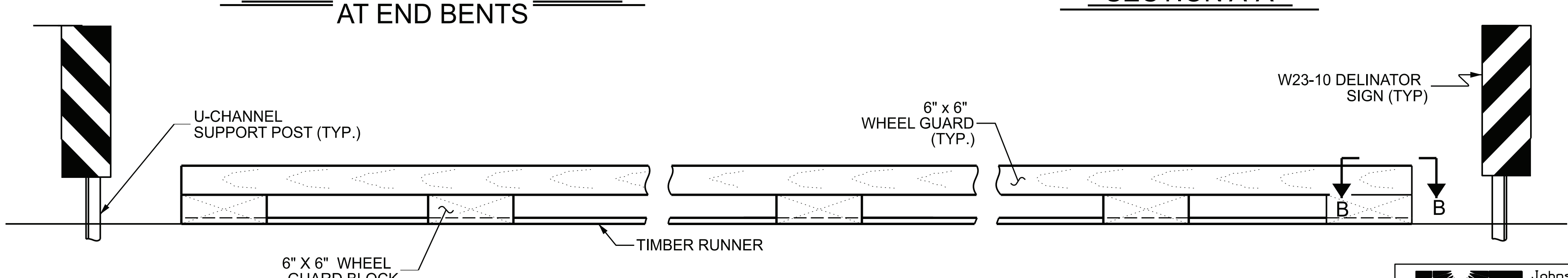
SECTION A-A



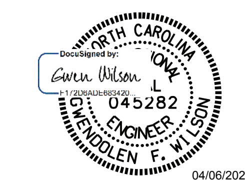
DECK CLIP DETAIL



DETAIL 'A'



WHEEL GUARD ELEVATION



DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA OFFICE OF
EMERGENCY MANAGEMENT

PRIVATE DRIVEWAY BRIDGE STANDARDS

SINGLE LANE STEEL BEAM BRIDGE
4X6 TIMBER DECK

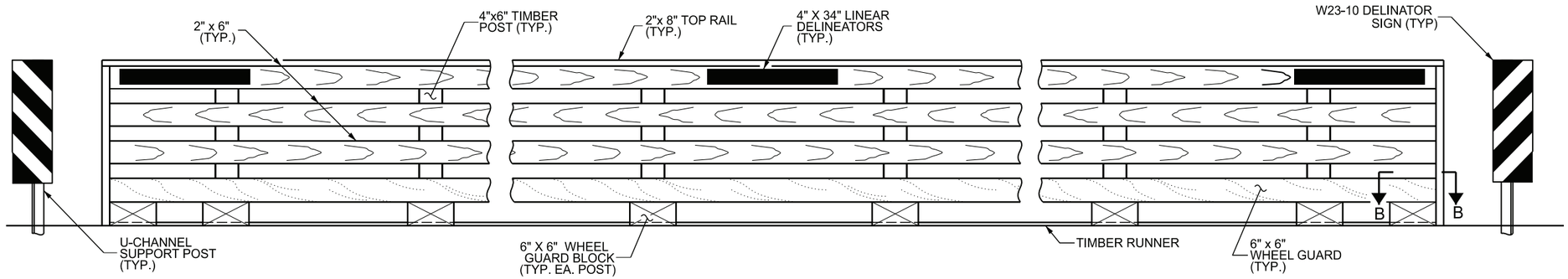
OPTIONAL TYPICAL SECTION & RAIL DETAILS

Johnson, Mirmiran, & Thompson, Inc.
108 Asheville Commerce Parkway
Candler, NC 28715
License No: C-3097

DWN. BY: BC DATE: 04/2026
CHKD. BY: GFW DATE: 04/2026
DES. EGR. OF RECORD: GFW DATE: 04/2026

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

SHEET NO. S-03
TOTAL SHEETS 13



ELEVATION OF OPTIONAL BRIDGE RAIL

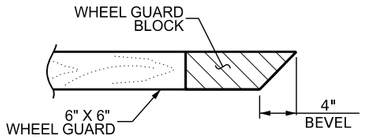
OPTIONAL BRIDGE RAIL NOTES

BRIDGE RAILS SHALL BE CONTINUOUS FROM END POST TO END POST WITH NO GAPS. RAIL LUMBER LENGTHS SHALL BE ATTACHED TO A MINIMUM OF THREE POSTS.

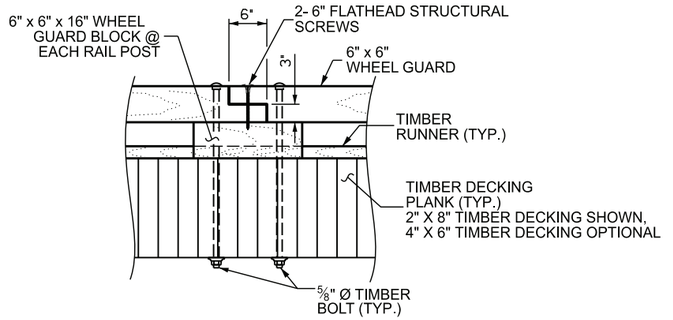
TREAT ALL DRILLED OR NEWLY EXPOSED HOLES IN TIMBER MEMBERS BY PUMPING WITH BITUMINOUS ASPHALT-BASED ROOFING CEMENT, OR APPROVED PRESERVATIVE SYSTEM BEFORE INSTALLING HARDWARE.

SEE "PLAN OF SPAN" SHEET FOR NUMBER OF POSTS AND POST SPACING.

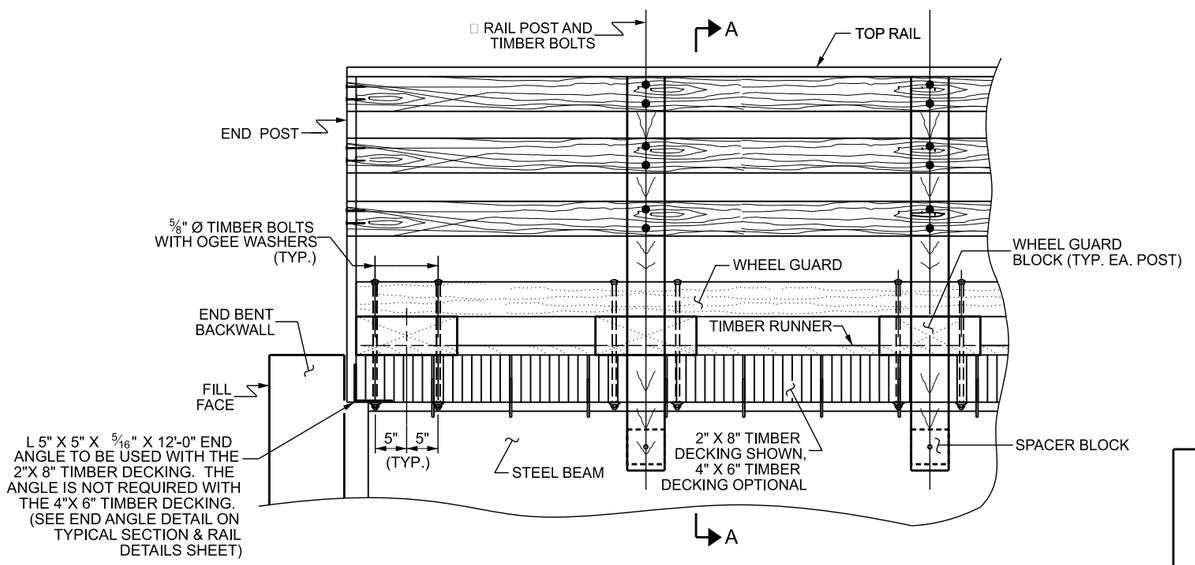
SECTION A-A



VIEW B-B



WHEEL GUARD SPLICE DETAIL



OPTIONAL RAIL DETAIL AT END BENTS

NORTH CAROLINA ENGINEER SEAL 045282 GWEN F. WILSON
Docusigned by: Gwen Wilson
04/06/2026

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA OFFICE OF
EMERGENCY MANAGEMENT

PRIVATE DRIVEWAY BRIDGE STANDARDS

SINGLE LANE STEEL BEAM BRIDGE
TIMBER DECK

OPTIONAL TIMBER BRIDGE RAIL

Johnson, Mirmiran, & Thompson, Inc.
108 Asheville Commerce Parkway
Candler, NC, 28715
License No: C-3097

DWN. BY: BC DATE: 04/2026
CHKD. BY: GFW DATE: 04/2026
DES. EGR. OF RECORD: GFW DATE: 04/2026

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-04
1			3			TOTAL SHEETS
2			4			13

BCordoso
DGN: pw://jmt.bentley.com/jmt-pw-01/Documents/Projects/2025/25-00529/25-00529-00/Design/Structures/NC PRB Steel Beam with Timber Deck Standards/Single Lane Steel Beam with Timber Deck Plans/2 Standard Drawings/20-70 FT - 12 FT DECK WIDTH/0004-54 Optional Bridge Raildgn
TIME: 4/6/2026

RIP ONE DECK BOARD (CLOSURE BOARD) AS NECESSARY TO PROVIDE A TIGHT, UNIFORM FIT.

PRESSURE TREATED (PT), SP#1, 2" X 8" DECKING SHOWN (8 BOARD CLUSTERS) 4" X 6" DECKING (2 BOARD CLUSTERS) MAY BE USED IN LIEU.

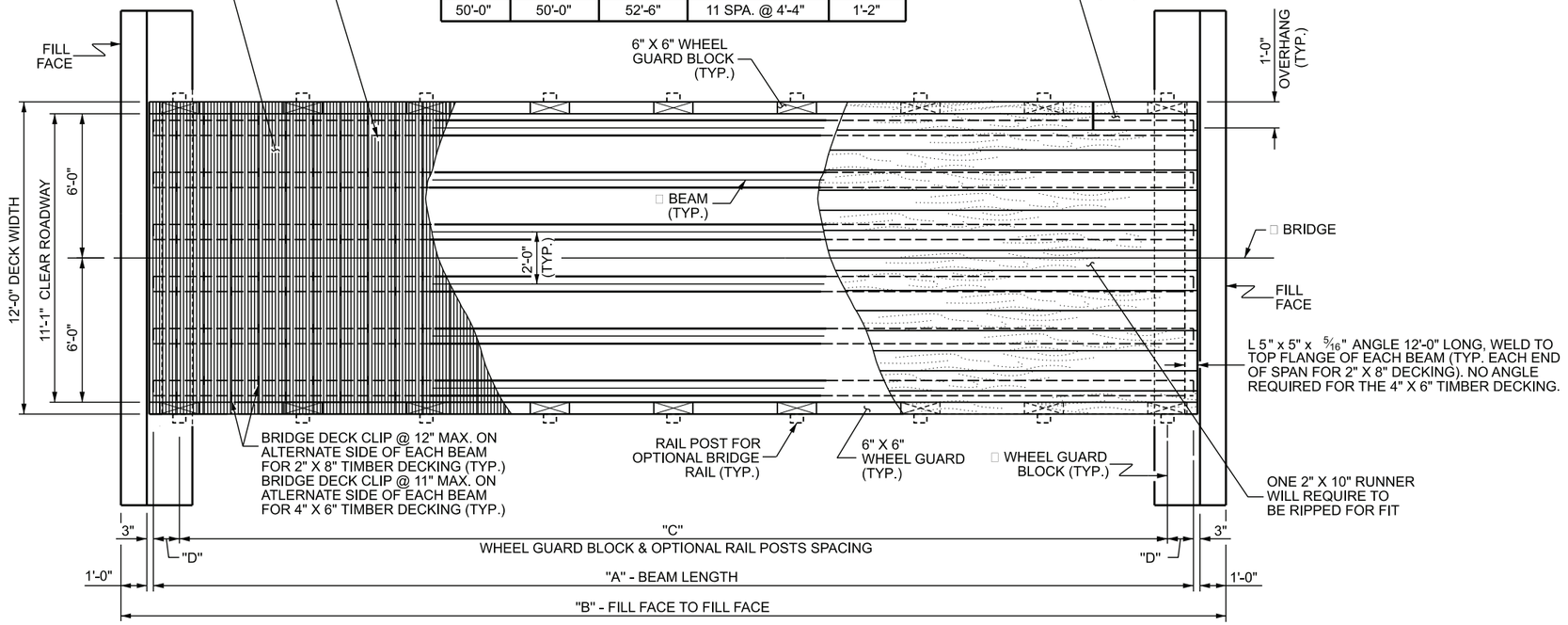
DIMENSIONS TABLE

SPAN	A	B	C	D
20'-0"	20'-0"	22'-6"	5 SPA. @ 3'-8"	10"
30'-0"	30'-0"	32'-6"	7 SPA. @ 4'-0"	1'-0"
40'-0"	40'-0"	42'-6"	9 SPA. @ 4'-3"	10 ½"
50'-0"	50'-0"	52'-6"	11 SPA. @ 4'-4"	1'-2"

NOTES

FOR ADDITIONAL NOTES, SEE "TYPICAL SECTION & RAIL DETAILS" SHEET, "OPTIONAL TYPICAL SECTION & RAIL DETAILS", AND "GENERAL NOTES" SHEET.

COUNTERSINK FLATHEAD STRUCTURAL TIMBER SCREW HEADS TO BE FLUSH WITH TIMBER SURFACE.

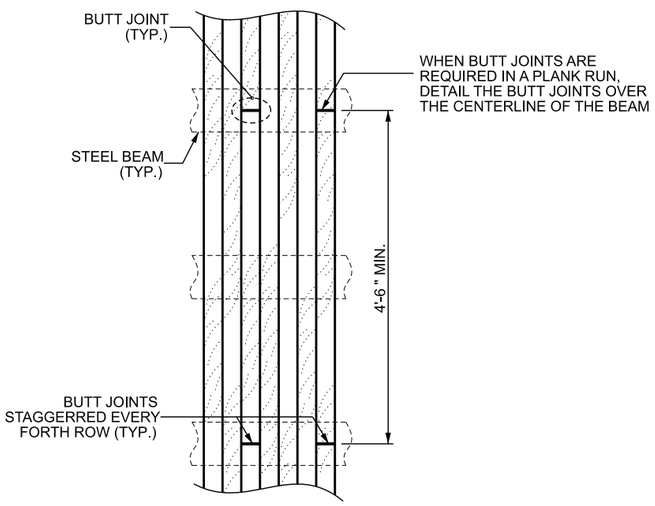


END BENT 1

END BENT 2

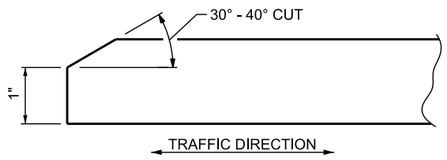
DECK LAYOUT

2" X 8" TIMBER DECKING SHOWN. 4" X 6" TIMBER DECKING (6" DIMENSION HORIZONTAL) MAY BE USED IN LIEU OF 2" X 8" DECKING.



DECKING BOARD BUTT JOINT DETAIL

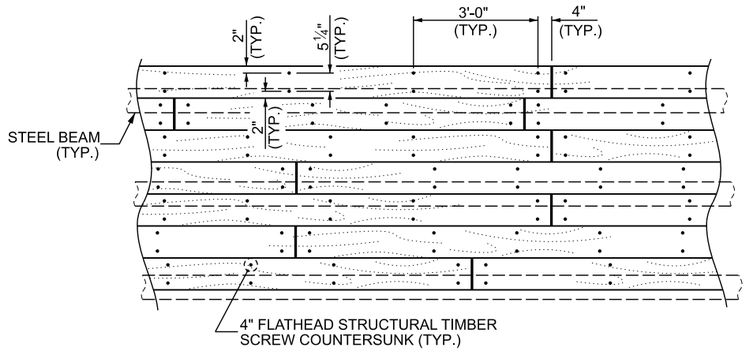
BUTT JOINTS SHALL BE OVER THE CENTERLINE OF A BEAM. JOINTS SHALL BE STAGGERED EVERY FOURTH DECK BOARD. NONE ALLOWED AT THE EXTERIOR BEAMS.



SIDE VIEW

TIMBER RUNNER BEVEL DETAIL

(TYP. AT EACH END OF BRIDGE)



TIMBER RUNNER BUTT JOINT DETAIL

NORTH CAROLINA PROFESSIONAL ENGINEER WENDOLEN F. WILSON
Docusigned by: Gwen Wilson
042282
04/06/2026

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA OFFICE OF
EMERGENCY MANAGEMENT

PRIVATE DRIVEWAY BRIDGE STANDARDS

SINGLE LANE STEEL BEAM BRIDGE
TIMBER DECK

PLAN OF SPAN

Johnson, Mirmiran, & Thompson
108 Asheville Commerce Parkway
Candler, NC, 28715
License No: C-3097

DRAWN BY: BC DATE: 04/2026
CHKD. BY: GFW DATE: 04/2026
DES. EGR. OF RECORD: GFW DATE: 04/2026

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-05
1			3			TOTAL SHEETS
2			4			13

NOTES

NO SALVAGED BEAMS SHALL BE USED, UNLESS OTHERWISE NOTED ON THE PLANS.

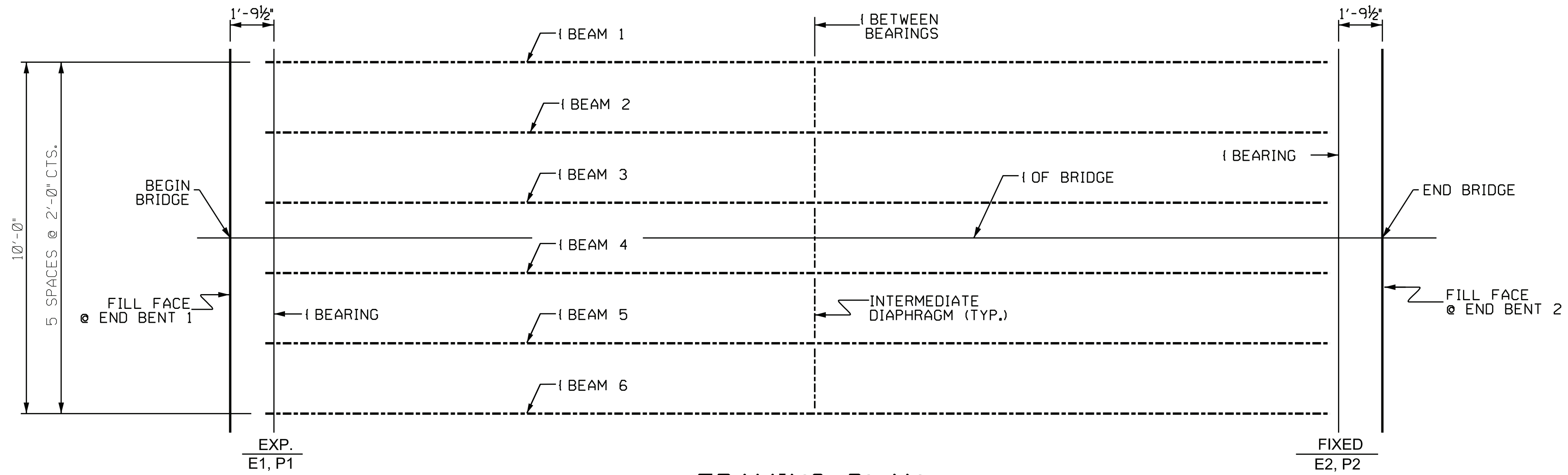
NO SHOP CAMBER REQUIRED, TURN NATURAL MILL CAMBER UP.

ALL STRUCTURAL STEEL FIELD CONNECTIONS SHALL BE ⅝" DIA. GALVANIZED HIGH STRENGTH BOLTS UNLESS OTHERWISE NOTED.

BEAMS SHALL BE PLACED PARALLEL TO THE CHORD.

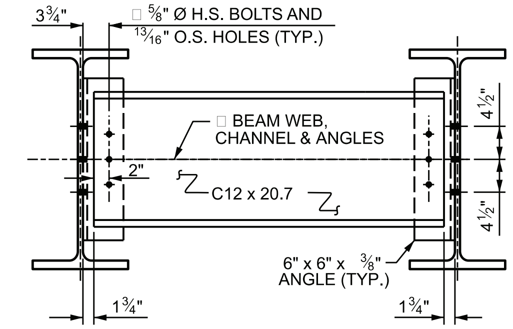
CONTRACTORS OPTION TO WELD CONNECTOR TO BEAM PRIOR TO SHOP COATING.

SEE "GENERAL NOTES" SHEET FOR COATING.

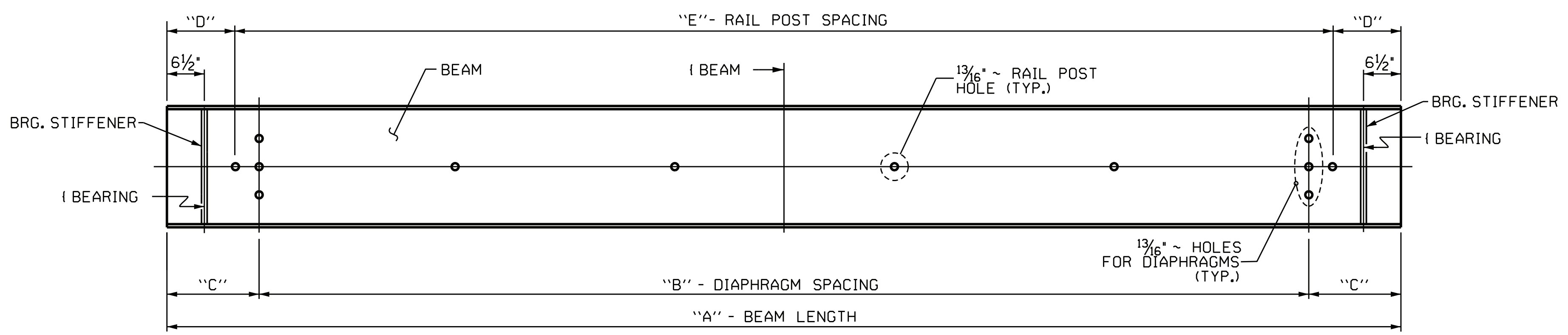


FRAMING PLAN

EXPANSION BEARING SHALL BE PLACED ON THE "UPHILL" END OF THE BRIDGE.

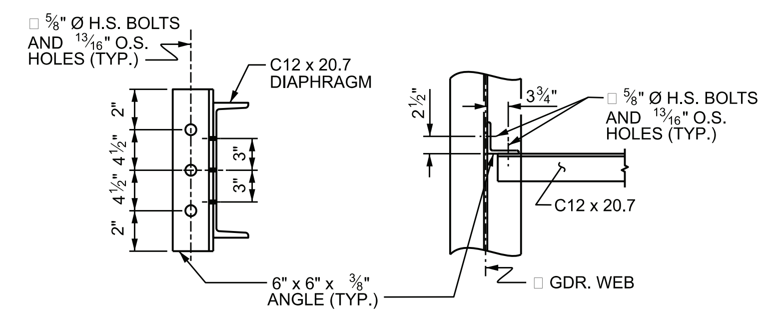


DIAPHRAGM DETAILS



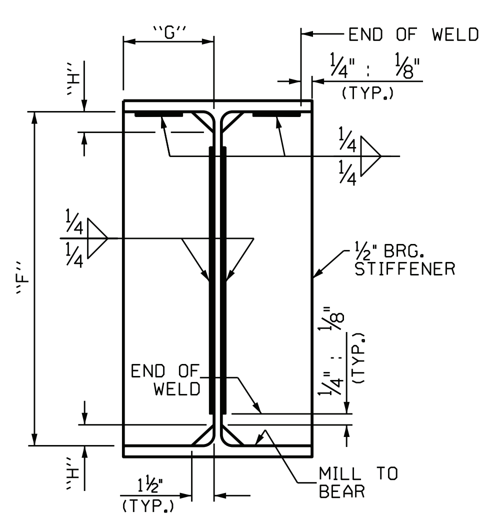
BEAM FLANGE ELEVATION

SHOWING DIAPHRAGM HOLES FOR ALL BEAMS. AND RAIL POST HOLES FOR EXTERIOR BEAMS.



ANGLE DETAILS

BEAM DIMENSION TABLE							
SPAN	BEAM	CHANNEL	A	B	C	D	E
20'-0"	W16X36	C12X20.7	20'-0"	2 SPA. @ 7'-0"	3'-0"	10"	5 SPA. @ 3'-8"
30'-0"	W21X48	C12X20.7	30'-0"	2 SPA @ 12'-0"	3'-0"	1'-0"	7 SPA. @ 4'-0"
40'-0"	W24X76	C12X20.7	40'-0"	2 SPA. @ 17'-0"	3'-0"	10 ½"	9 SPA. @ 4'-3"
50'-0"	W24X104	C12X20.7	50'-0"	2 SPA. @ 22'-0"	3'-0"	1'-2"	11 SPA. @ 4'-4"



SECTION VIEW - BRG. STIFFENER

STIFFENER DIMENSION			
BEAM	F	G	H
W16X36	1'-3"	3⅜"	2"
W21X48	1'-7 ¾"	3⅞"	2"
W24X76	1'-10 9/16"	4¼"	2 7/16"
W24X104	1'-10 9/16"	6⅛"	2¾"

NORTH CAROLINA PROFESSIONAL ENGINEER 045282 GWENDOLEN F. WILSON
Docusigned by: Gwen Wilson
04/06/2026

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NORTH CAROLINA OFFICE OF
EMERGENCY MANAGEMENT

PRIVATE DRIVEWAY BRIDGE STANDARDS

SINGLE LANE STEEL BEAM BRIDGE
TIMBER DECK

FRAMING PLAN & BEAM DETAILS

JMT
Johnson, Mirmiran, & Thompson, Inc.
108 Asheville Commerce Parkway
Candler, NC, 28715
License No: C-3097

DWN. BY: BC DATE: 04/2026
CHKD. BY: GFW DATE: 04/2026
DES. EGR. OF RECORD: GFW DATE: 04/2026

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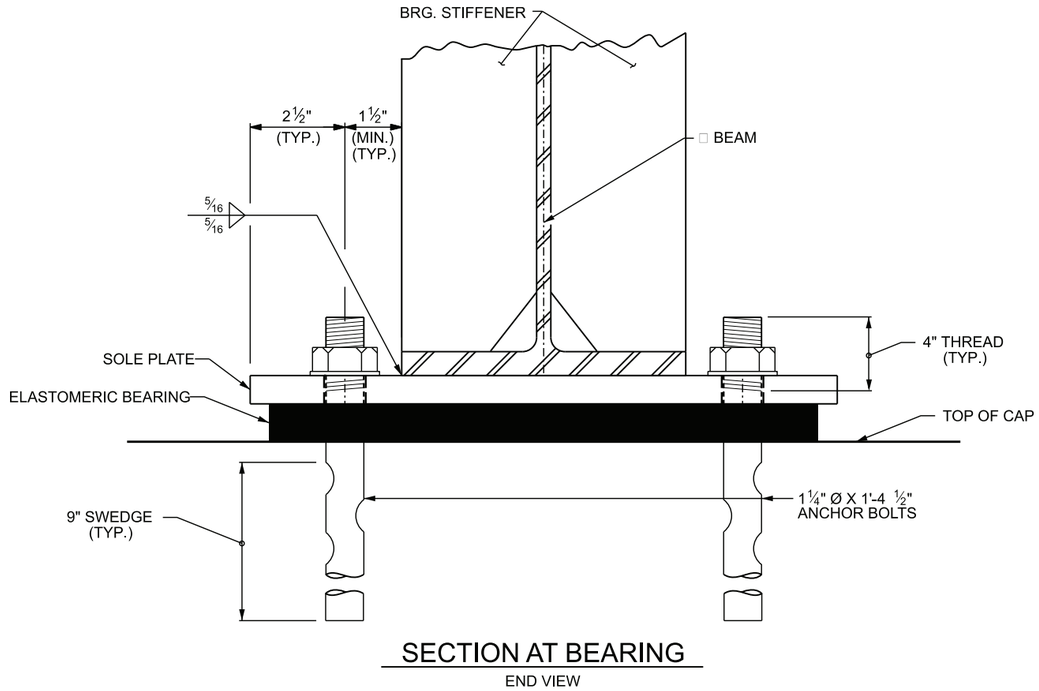
SHEET NO. S-06
TOTAL SHEETS 13



SECTION AT BEARING

END VIEW

NOTES

ELASTOMER IN ALL BEARINGS SHALL BE 50 DUROMETER HARDNESS IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

AT ALL SUPPORTS, NUTS FOR ANCHOR BOLTS ARE TO BE TIGHTENED FINGER TIGHT AND THEN BACKED OFF ½ TURN. THE THREAD OF THE NUT AND BOLT SHALL THEN BE BURRED WITH A SHARP POINTED TOOL.

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

ALL BEARING PLATES SHALL BE AASHTO M270 GRADE 36.

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

AT THE APPROVAL OF THE ENGINEER, SOLE PLATES AT THE EXPANSION END MAY BE FIELD WELDED.

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

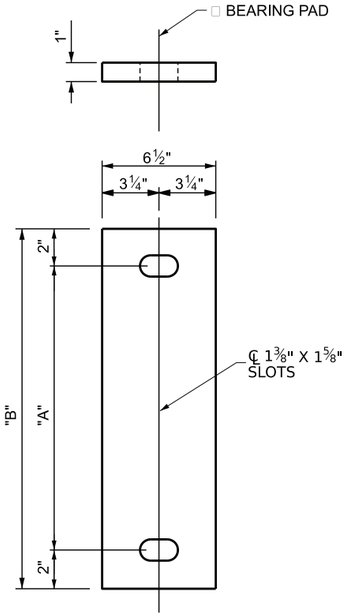
ALL SURFACES OF BEARING PLATES SHALL BE SMOOTH AND STRAIGHT.

AT NO ADDITIONAL COST, THE CONTRACTOR MAY USE ADHESIVELY ANCHORED ANCHOR BOLTS IN PLACE OF CAST-IN-PLACE ANCHORS. LEVEL 1 FIELD TESTING IS REQUIRED, AND THE YIELD LOAD OF THE ANCHOR BOLT IS 30 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE STANDARD SPECIFICATIONS.

ADHESIVELY ANCHORED ANCHOR BOLTS SHALL BE THREADED FULL LENGTH.

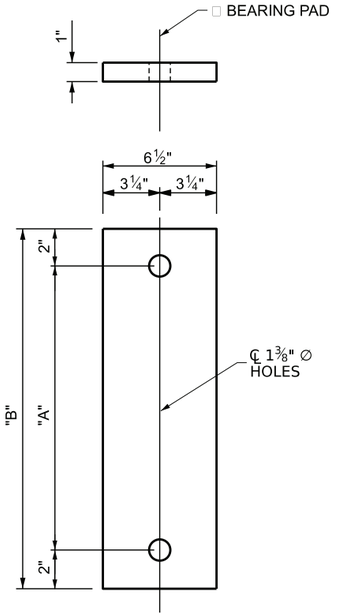
DIMENSIONS TABLE

SPAN	BEAM	FLANGE WIDTH	TYPE	A	B	C
20'-0"	W16X36	7"	I	11"	1'-3"	1'-4"
30'-0"	W21X48	8⅛"	II	1'-1"	1'-5"	1'-6"
40'-0"	W24X76	9"	II	1'-1 "	1'-5"	1'-6 "
50'-0"	W24X104	12¾"	III	1'-4"	1'-8"	1'-9"



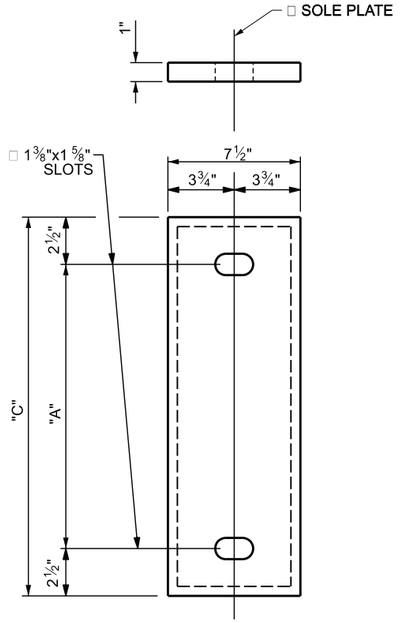
E1 ELASTOMERIC BEARING DETAILS

(6 REQ'D)
EXPANSION



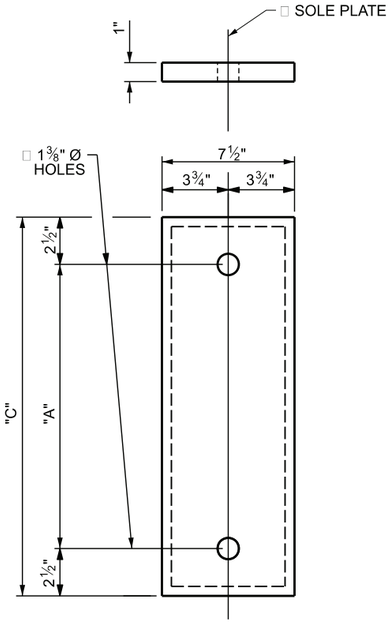
E2 ELASTOMERIC BEARING DETAILS

(6 REQ'D)
FIXED



P1 SOLE PLATE DETAILS

(6 REQ'D)
EXPANSION



P2 SOLE PLATE DETAILS

(6 REQ'D)
FIXED

DocuSigned by:
Gwen Wilson, PE
045282
ENGINEER
GWENDOLEN F. WILSON
04/06/2026

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA OFFICE OF
EMERGENCY MANAGEMENT

PRIVATE DRIVEWAY BRIDGE STANDARDS

SINGLE LANE STEEL BEAM BRIDGE
TIMBER DECK

BEARING DETAILS

Johnson, Mirmiran, & Thompson, Inc.
108 Asheville Commerce Parkway
Candler, NC, 28715
License No: C-3097

DWN. BY: BC DATE: 04/2026
CHKD. BY: GFW DATE: 04/2026
DES. EGR. OF RECORD: GFW DATE: 04/2026

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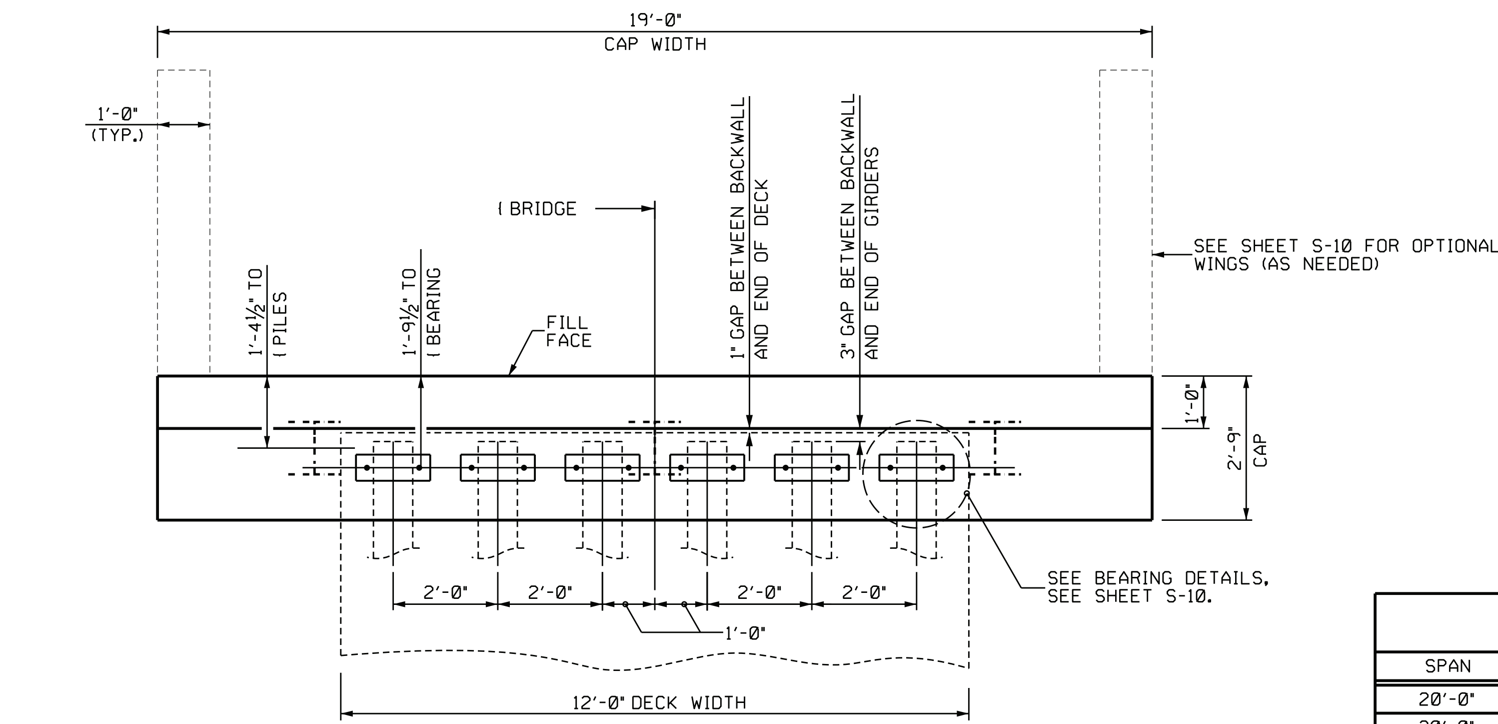
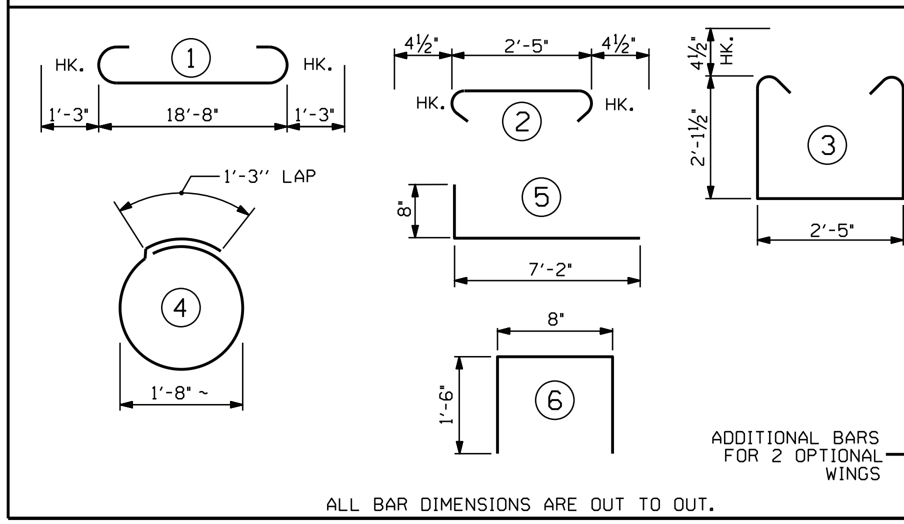
SHEET NO. S-07
TOTAL SHEETS 13



PLAN



BILL OF MATERIAL FOR ONE END BENT

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#9	1	21'-2"	576
B2	8	#4	STR	18'-8"	100
B3	5	#4	STR	2'-5"	8
H1	8	#4	STR	18'-8"	100
S1	20	#4	3	7'-5"	99
S2	20	#4	2	3'-2"	42
S3	6	#4	4	6'-6"	26
U1	19	#4	6	3'-8"	47
V1	38	#4	STR	4'-4"	110
H2	28	#4	5	7'-10"	147
V2	56	#4	STR	3'-2"	118

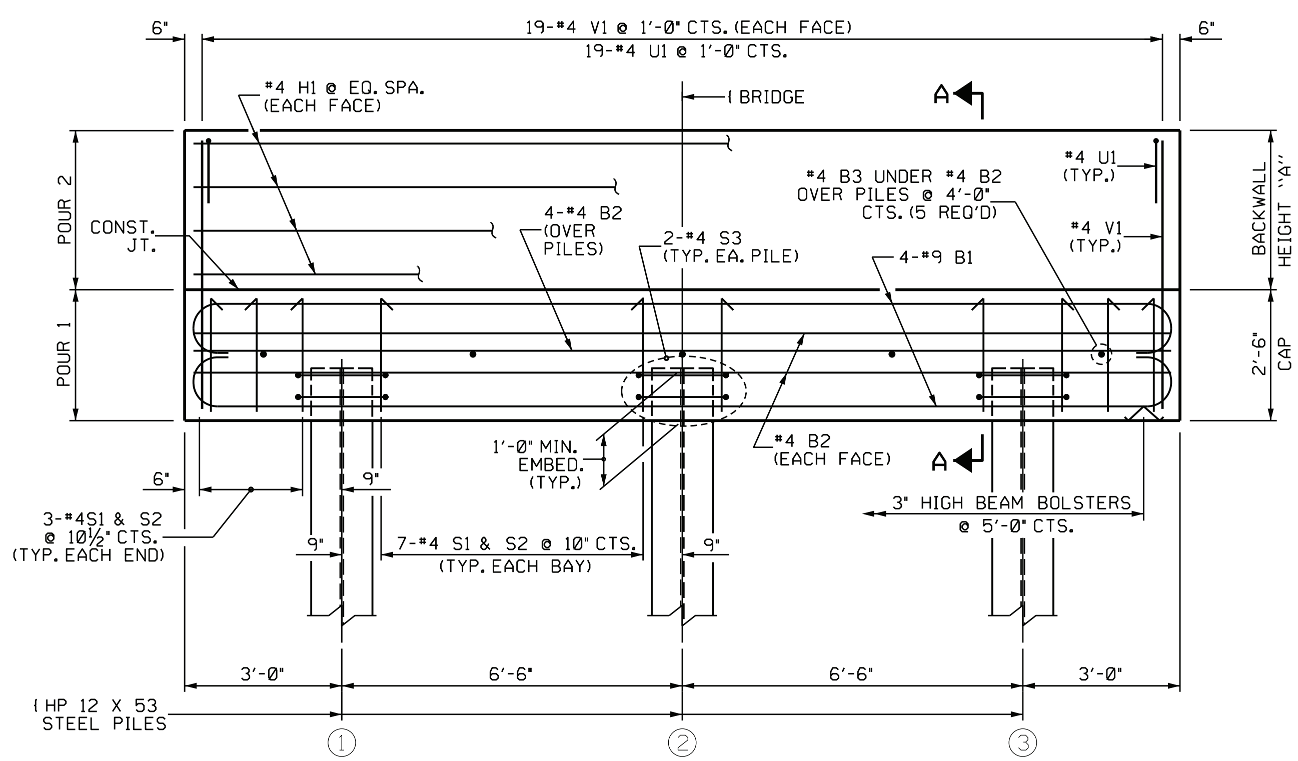
	W/O WINGS	WITH WINGS
REINFORCING STEEL (FOR ONE END BENT) (LBS.) *	1,108	1,373
CLASS A CONCRETE (FOR ONE END BENT) (C.Y.)		
POUR 1	4.8	6.0
POUR 2 *	1.7	2.8
TOTAL	6.5	8.8

* REINFORCING AND CONCRETE QUANTITIES ARE BASED ON THE SHORTEST BACKWALL HEIGHT USING 2X8 DECKING. CONTRACTOR SHALL ADJUST FOR 4X6 DECKING OR INCREASED BACKWALL HEIGHT.

BACKWALL HEIGHT

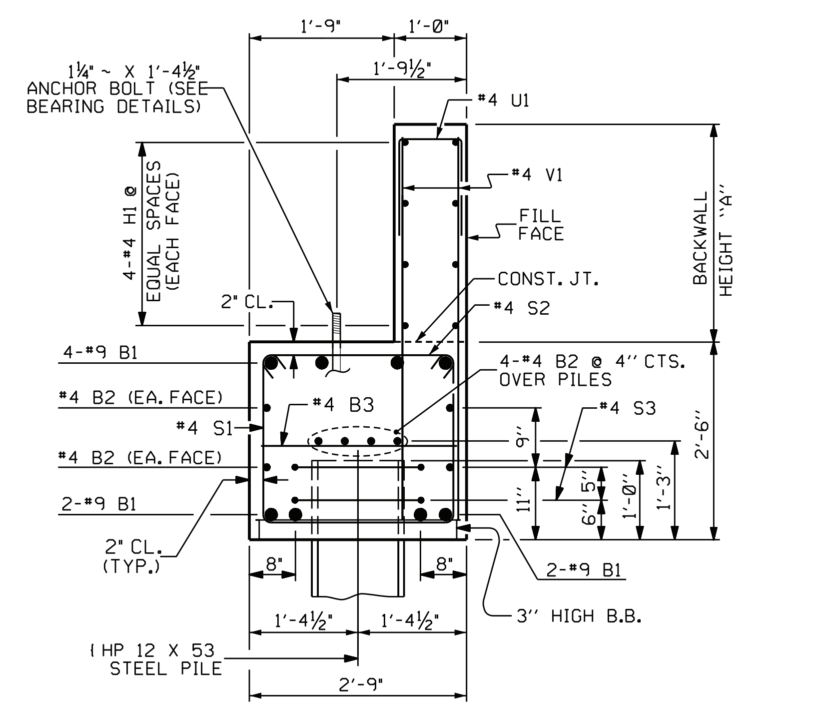
SPAN	BEAM	A (2X8 DECKING)	A (4X6 DECKING)
20'-0"	W16X36	2'-2⅝"	1'-10⅞"
30'-0"	W21X48	2'-7⅜"	2'-3⅝"
40'-0"	W24X76	2'-10⅝"	2'-6⅞"
50'-0"	W24X104	2'-10¾"	2'-7"

DIMENSION "A" (BACKWALL HEIGHT) VARIES BASED ON DECKING TYPE. USE VALUES CORRESPONDING TO SELECTED DECKING OPTION.



ELEVATION

(OPTIONAL WINGS NOT SHOWN FOR CLARITY)



SECTION A-A

GENERAL NOTES

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

CONTRACTOR SHALL SLOPE TOP OF CAP TO MATCH LONGITUDINAL GRADE OF THE BRIDGE. SLOPES SHALL MATCH ON BOTH END BENT 1 AND END BENT 2 CAPS.

WINGS MAY BE REQUIRED AT THE DIRECTION OF THE ENGINEER OR DESIGNEE.

FOR OPTIONAL WINGS FOR END BENT, SEE SHEET S-10.

FOR BEARING DETAILS, SEE SHEET S-10.

FOR PILE SPLICE DETAILS, SEE SHEET S-10.

"V" BARS BASED ON SHORTEST BACKWALL HEIGHT USING 2X8 DECKING. ADJUST LENGTH TO MAINTAIN REQUIRED MIN. CLEARANCE AT BOTTOM OF CAP AND TOP OF BACKWALL.

FOUNDATION NOTES

DRIVEN PILES

INSTALL PILES IN ACCORDANCE WITH SECTION 450 OF THE STANDARD SPECIFICATIONS.

DO NOT INSTALL PILES UNTIL FILL HAS BEEN PLACED.

DRIVE PILES TO A MINIMUM PENETRATION OF AT LEAST 10 FEET INTO NATURAL GROUND OR CHANNEL BOTTOM.

DRIVE ALL PILES TO "REFUSAL" BELOW MINIMUM PENETRATION.

PREDRILLING OR SPUDDING MAY BE REQUIRED TO ACHIEVE THE MINIMUM PILE PENETRATION.

SUBMIT THE PROPOSED PILE DRIVING METHODS AND EQUIPMENT FOR ACCEPTANCE BY THE ENGINEER.

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 045282 GWENDOLEN F. WILSON — DocuSigned by: Gwen Wilson — 04/06/2026

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA OFFICE OF EMERGENCY MANAGEMENT

PRIVATE DRIVEWAY BRIDGE STANDARDS

SINGLE LANE STEEL BEAM BRIDGE TIMBER DECK

END BENT

DRIVEN PILES

Johnson, Mirmiran, & Thompson, Inc.
108 Asheville Commerce Parkway
Candler, NC 28715
License No: C-3097

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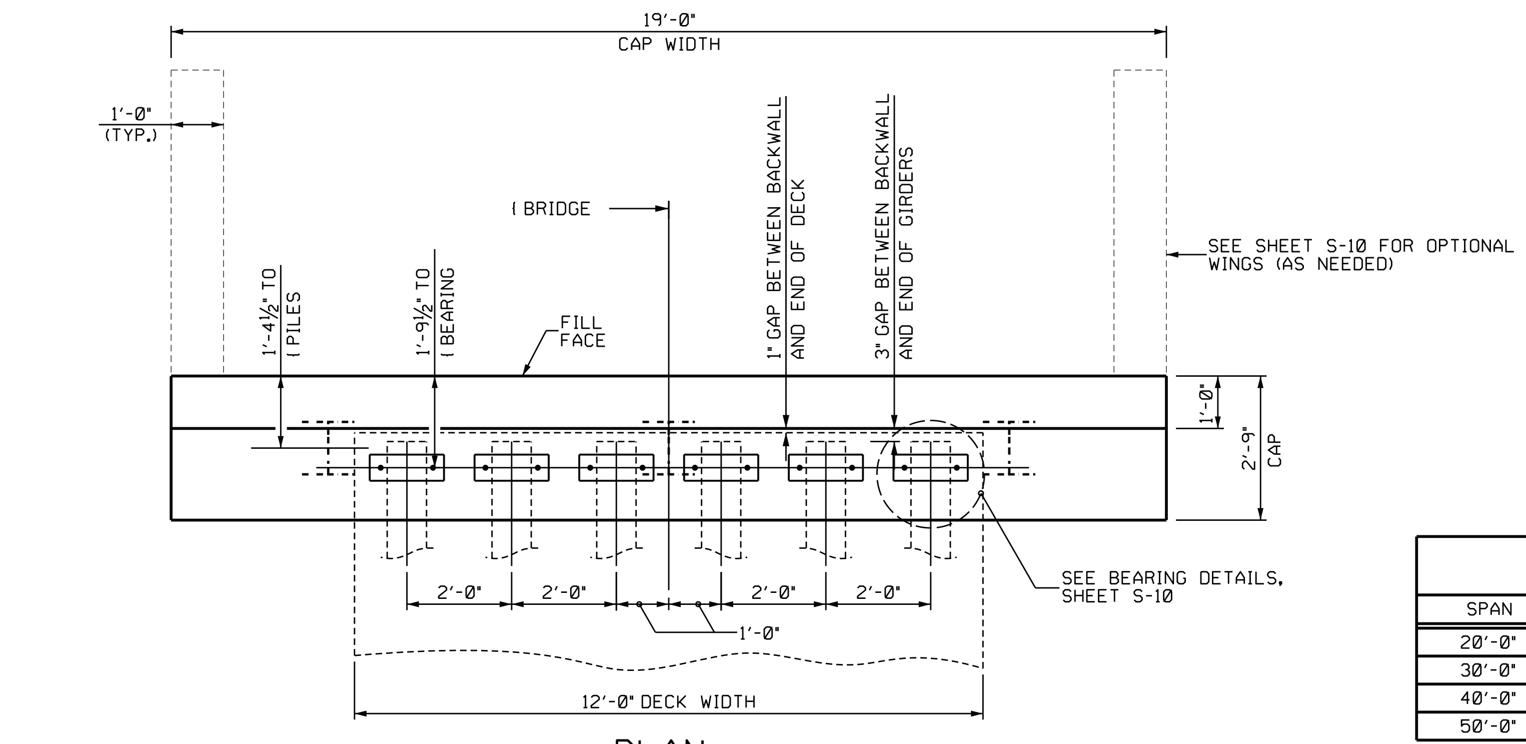
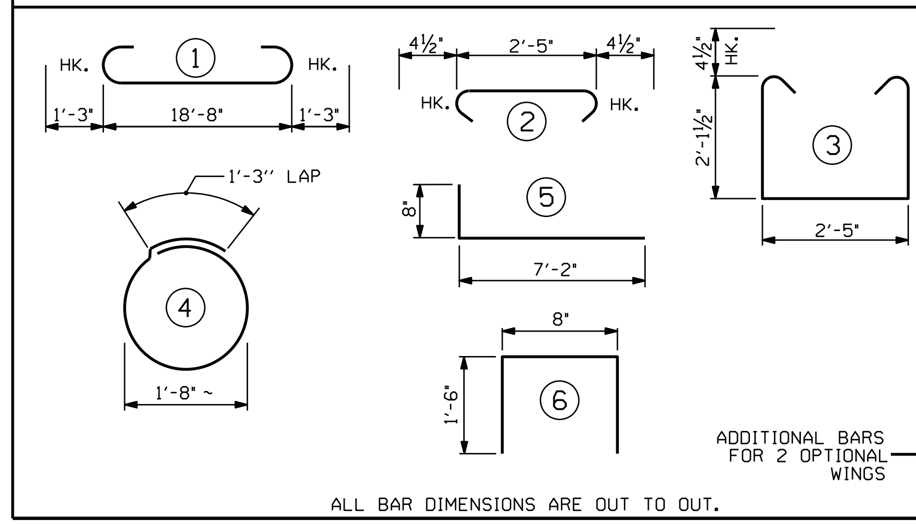
SHEET NO. S-08
TOTAL SHEETS 13



PLAN



BILL OF MATERIAL FOR ONE END BENT

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
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B3	5	#4	STR	2'-5"	8
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S1	20	#4	3	7'-5"	99
S2	20	#4	2	3'-2"	42
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U1	19	#4	6	3'-8"	47
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V2	56	#4	STR	3'-2"	118

	W/O WINGS	WITH WINGS
REINFORCING STEEL (FOR ONE END BENT) (LBS.) •	1,108	1,373
CLASS A CONCRETE (FOR ONE END BENT) (C.Y.)		
POUR 1	4.8	6.0
POUR 2 •	1.7	2.8
TOTAL	6.5	8.8

• REINFORCING AND CONCRETE QUANTITIES ARE BASED ON THE SHORTEST BACKWALL HEIGHT USING 2X8 DECKING. CONTRACTOR SHALL ADJUST FOR 4X6 DECKING OR INCREASED BACKWALL HEIGHT.

BACKWALL HEIGHT

SPAN	BEAM	A (2X8 DECKING)	A (4X6 DECKING)
20'-0"	W16X36	2'-2⅝"	1'-10⅞"
30'-0"	W21X48	2'-7⅜"	2'-3⅝"
40'-0"	W24X76	2'-10⅝"	2'-6⅞"
50'-0"	W24X104	2'-10¾"	2'-7"

DIMENSION "A" (BACKWALL HEIGHT) VARIES BASED ON DECKING TYPE. USE VALUES CORRESPONDING TO SELECTED DECKING OPTION.

GENERAL NOTES

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

CONTRACTOR SHALL SLOPE TOP OF CAP TO MATCH LONGITUDINAL GRADE OF THE BRIDGE. SLOPES SHALL MATCH ON BOTH END BENT 1 AND END BENT 2 CAPS.

WINGS MAY BE REQUIRED AT THE DIRECTION OF THE ENGINEER OR DESIGNEE.

FOR OPTIONAL WINGS FOR END BENT, SEE SHEET S-10.

FOR BEARING DETAILS, SEE SHEET S-10.

FOR PILE SPLICE DETAILS, SEE SHEET S-10.

"V" BARS BASED ON SHORTEST BACKWALL HEIGHT USING 2X8 DECKING. ADJUST LENGTH TO MAINTAIN REQUIRED MIN. CLEARANCE AT BOTTOM OF CAP AND TOP OF BACKWALL.

FOUNDATION NOTES

DRILLED-IN PILES

ROCK QUALITY DESIGNATION (RQD)
GEOLOGICAL STRENGTH INDEX (GSI)

INSTALL DRILLED-IN PILES IN ACCORDANCE WITH SECTION 450 OF THE STANDARD SPECIFICATIONS.

MINIMUM PILE PENETRATION OF 10-FT INTO NATURAL GROUND OR CHANNEL BOTTOM IS REQUIRED.

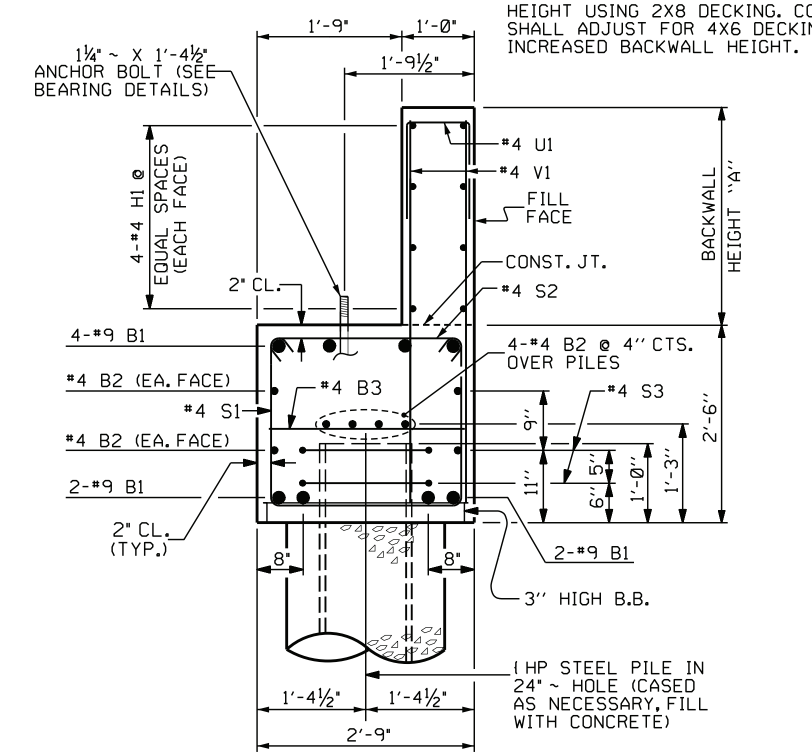
MINIMUM ROCK SOCKET DEPTHS, UNLESS OTHERWISE INDICATED ON PROJECT SPECIFIC DATA SHEET:

4' MINIMUM (RQD >70, GSI >50)
6' MINIMUM (RQD 30-70, GSI 30-50)
8' MINIMUM (RQD <30, GSI <30)

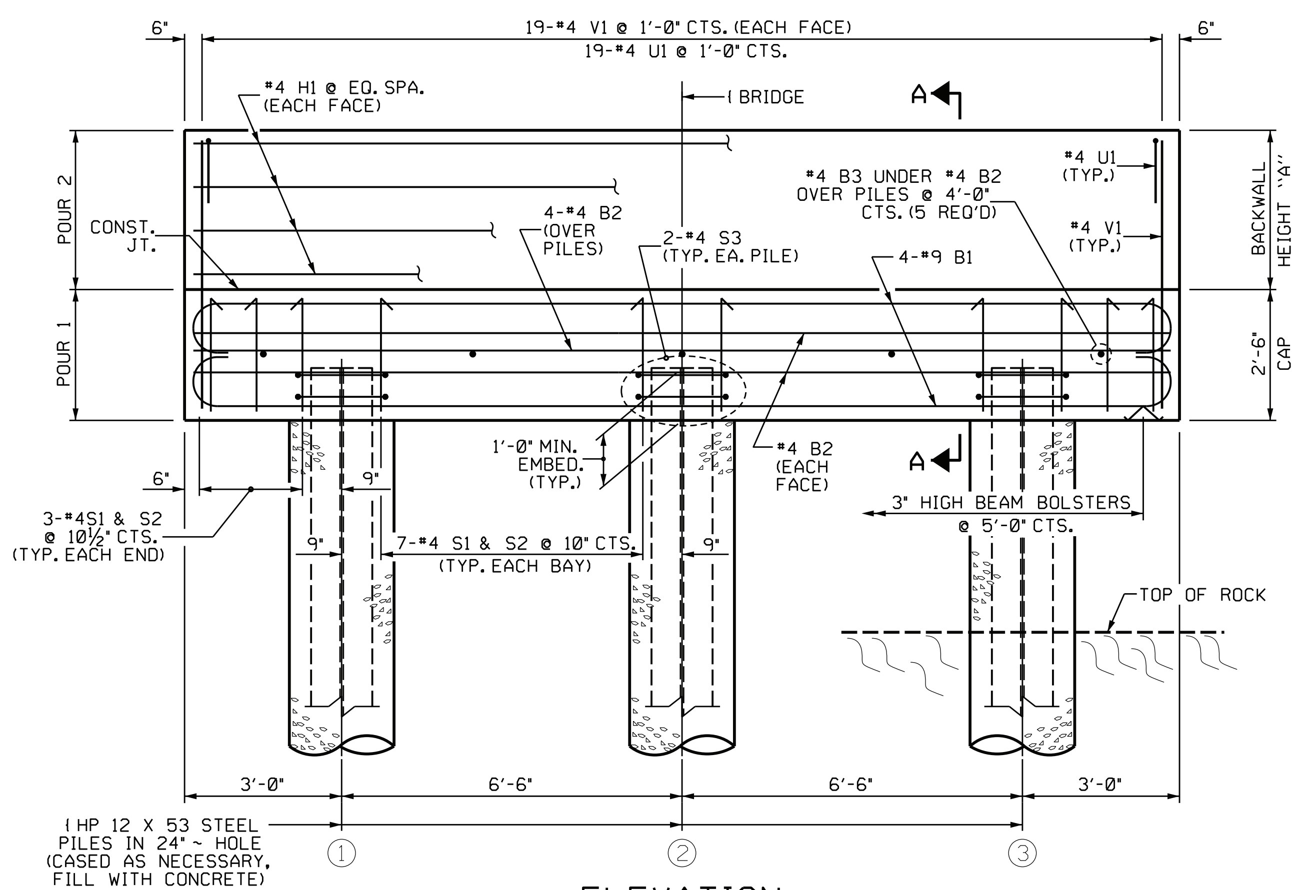
REFER TO BORING LOGS FOR RQD AND GSI DATA.

PILES SHALL BE SEATED IN THE BOTTOM OF THE EXCAVATION. PILE DRIVING IS NOT REQUIRED.

BACKFILL WITH CONCRETE ONLY. DO NOT PROCEED WITH CONSTRUCTION ACTIVITIES UNTIL THE 28 DAY STRENGTH IS ACHIEVED.



SECTION A-A



ELEVATION

(OPTIONAL WINGS NOT SHOWN FOR CLARITY)

SHEET 1 OF 2

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 045282 GWENDOLEN F. WILSON
DocuSigned by: Gwen Wilson
04/06/2026

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NORTH CAROLINA OFFICE OF EMERGENCY MANAGEMENT

PRIVATE DRIVEWAY BRIDGE STANDARDS

SINGLE LANE STEEL BEAM BRIDGE TIMBER DECK

END BENT DRILLED-IN PILES

JMT Johnson, Mirmiran, & Thompson, Inc. 108 Asheville Commerce Parkway Candler, NC. 28715 License No: C-3097

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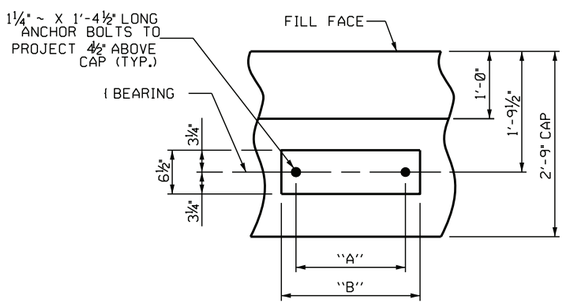
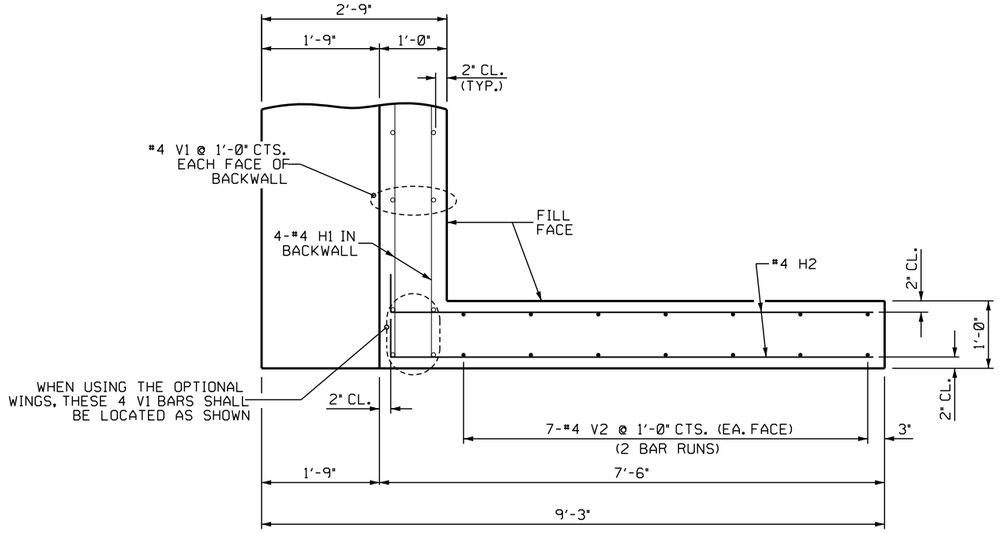
SHEET NO. S-09
TOTAL SHEETS 13



BEARING DETAIL

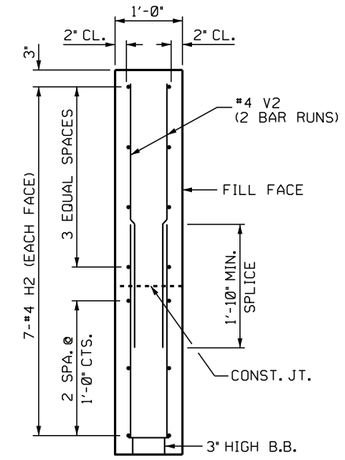
(TYP. EACH BEARING LOCATION)

REFER TO DIMENSIONS TABLE ON SHEET S-07 FOR DIMENSIONS A AND B.



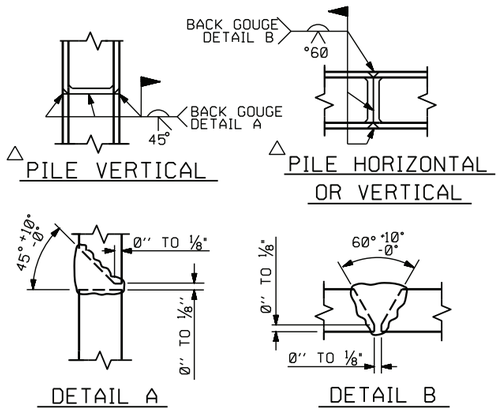
ELEVATION OF WING

(OPTIONAL)



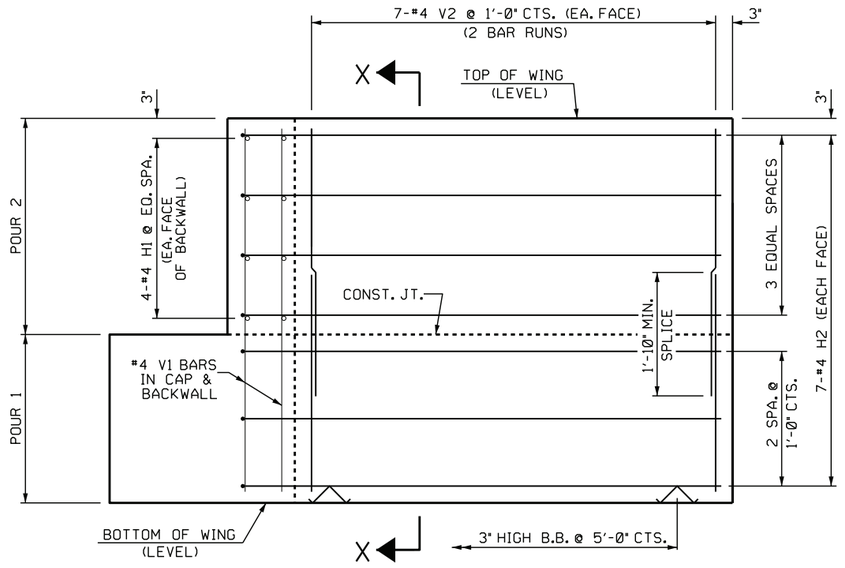
SECTION X-X

(OPTIONAL)



PILE SPLICE DETAILS

△ POSITION OF PILE DURING WELDING.



PLAN OF WING

(OPTIONAL)

RIGHT SIDE WING SHOWN, LEFT SIDE WING SIMILAR.

WING HEIGHT DEPENDENT ON BACKWALL HEIGHT.

NORTH CAROLINA PE SEAL 045282 ENGINEER GWENDOLEN F. WILSON
Docusigned by: Gwen Wilson
04/06/2026

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SHEET 2 OF 2

NORTH CAROLINA OFFICE OF
EMERGENCY MANAGEMENT

PRIVATE DRIVEWAY BRIDGE STANDARDS

SINGLE LANE STEEL BEAM BRIDGE
TIMBER DECK

OPTIONAL WINGS FOR DRIVEN OR DRILLED-IN PILES

Johnson, Mirmiran, & Thompson, Inc.
108 Asheville Commerce Parkway
Candler, NC, 28715
License No: C-3097

DWN. BY: BC DATE: 04/2026
CHKD. BY: GFW DATE: 04/2026
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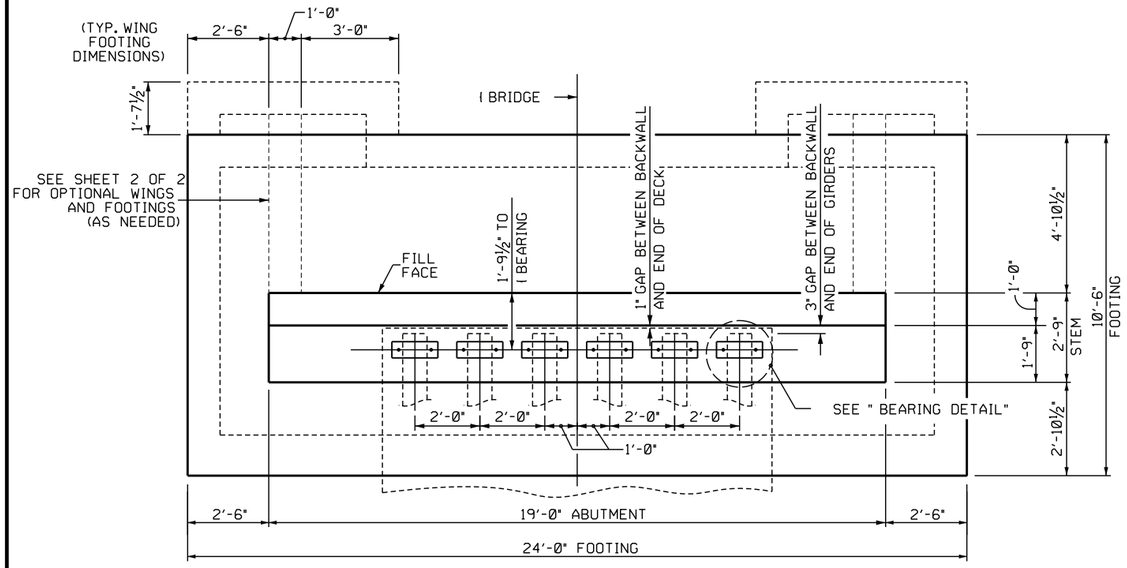
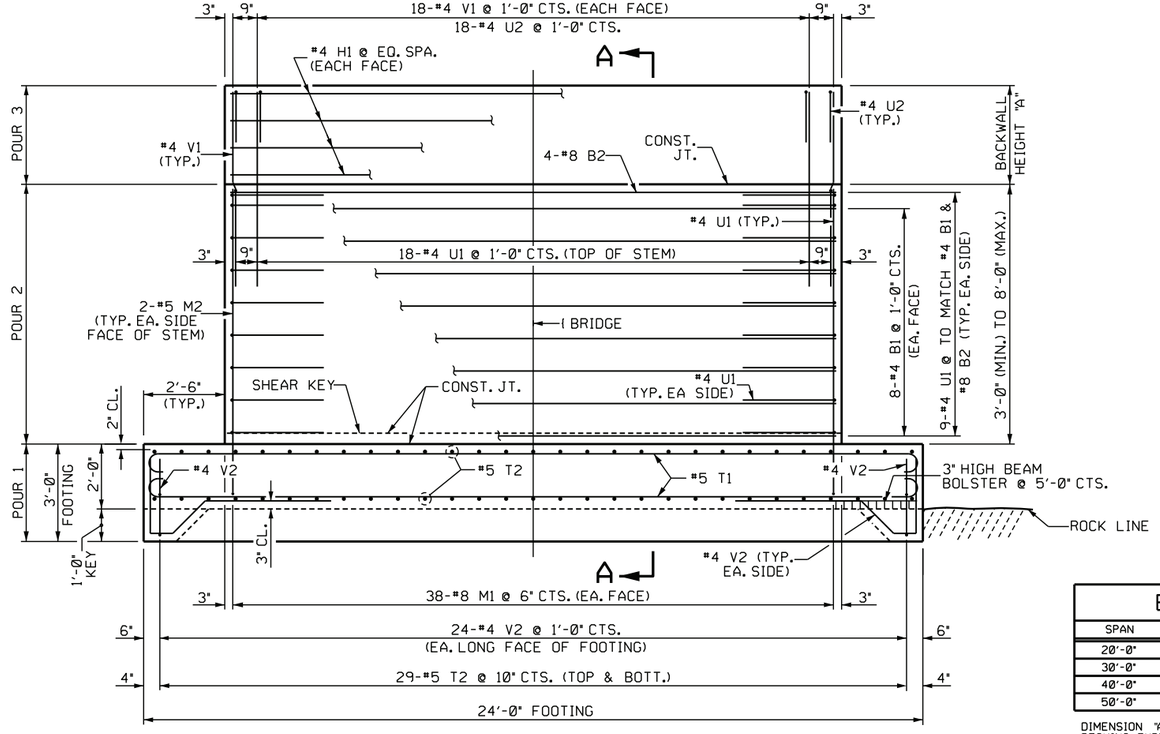


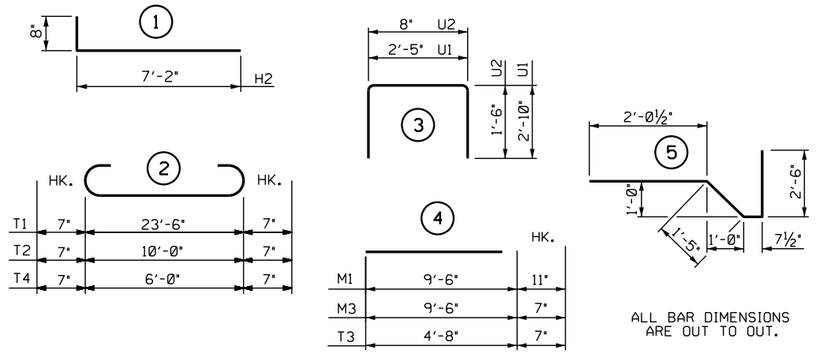
PLAN



ELEVATION

(OPTIONAL WINGS NOT SHOWN FOR CLARITY)

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

GENERAL NOTES

U1 BARS IN STEM MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

CONTRACTOR SHALL SLOPE TOP OF CAP TO MATCH LONGITUDINAL GRADE OF THE BRIDGE. SLOPES SHALL MATCH ON BOTH END BENT 1 AND END BENT 2 CAPS.

WINGS MAY BE REQUIRED AT THE DIRECTION OF THE ENGINEER OR DESIGNEE.

FOR OPTIONAL WINGS FOR END BENT, SEE SHEET 2 OF 2.

FOR SECTION A-A, SEE SHEET 2 OF 2.

THE FINAL STEM WALL HEIGHT SHALL BE DETERMINED IN THE FIELD BASED ON EXISTING ROCK ELEVATIONS. THE STEM WALL HEIGHT SHALL NOT BE LESS THAN 3'-0" OR GREATER THAN 8'-0.

END BENT REINFORCEMENT AND DETAILS ARE BASED ON A MAXIMUM STEM WALL HEIGHT OF 8'-0" AND THE SHORTEST BACKWALL HEIGHT USING 2X8 DECKING. CONTRACTOR SHALL ADJUST REINFORCEMENT FOR FIELD-VERIFIED STEM WALL HEIGHTS AND BACKWALL HEIGHTS WHILE MAINTAINING BAR SIZES, SPACING, SPLICE LENGTHS, AND OVERALL CONFIGURATION SHOWN.

FOUNDATION NOTES

SPREAD FOOTING

FOUNDATION EXCAVATIONS SHALL BE ACCOMPLISHED IN ACCORDANCE WITH SECTION 410 OF THE SPECIFICATIONS.

A GEOTECHNICAL ENGINEER LICENSED IN THE STATE OF NORTH CAROLINA SHALL OBSERVE THE BEARING SURFACE AND CONFIRM THE FOOTING IS CONSTRUCTED ON ROCK. THE ENGINEER SHALL PROVIDE A LETTER VERIFYING ACCEPTANCE OF THE BEARING SURFACE.

CLEAN ALL ROCK OF LOOSE MATERIAL AND CUT TO A FIRM SURFACE, AS DIRECTED BY THE ENGINEER AND FILL WITH CONCRETE, MORTAR OR GROUT. LEAVE ROCK SURFACE IN A ROUGH CONDITION.

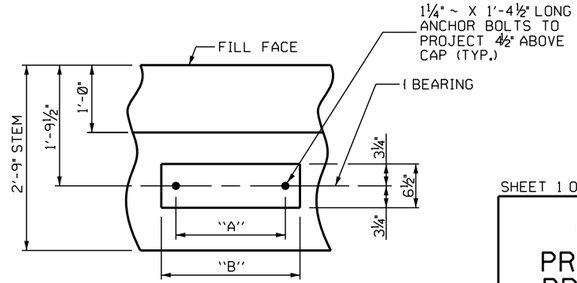
BEARING SURFACE MUST RESIST A MAXIMUM APPLIED BEARING PRESSURE OF 5.0 KSF.

KEY IN FOOTINGS AT LEAST 1 FT INTO ROCK.

BACKWALL HEIGHT

SPAN	BEAM	A (2X8 DECKING)	A (4X6 DECKING)
20'-0"	W16X36	2'-2⅝"	1'-10⅞"
30'-0"	W21X48	2'-7⅜"	2'-3⅝"
40'-0"	W24X76	2'-10⅝"	2'-6⅞"
50'-0"	W24X104	2'-10¾"	2'-7"

DIMENSION "A" (BACKWALL HEIGHT) VARIES BASED ON DECKING TYPE. USE VALUES CORRESPONDING TO SELECTED DECKING OPTION.



BEARING DETAIL

(TYP. EACH BEARING LOCATION)
REFER TO DIMENSIONS TABLE ON SHEET S-07 FOR DIMENSIONS A AND B.

** BILL OF MATERIAL FOR ONE END BENT

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	16	#4	STR	18'-8"	200
B2	4	#8	STR	18'-8"	199
H1	8	#4	STR	18'-8"	100
M1	76	#8	4	10'-5"	2,114
M2	4	#5	STR	7'-6"	31
T1	26	#5	2	24'-8"	669
T2	58	#5	2	11'-2"	676
U1	38	#4	3	8'-1"	205
U2	20	#4	3	3'-8"	49
V1	40	#4	STR	6'-0"	160
V2	70	#4	5	6'-7"	308
H2	52	#4	1	7'-10"	272
M3	40	#5	4	10'-1"	421
M4	40	#5	STR	5'-4"	223
T3	32	#5	4	5'-3"	175
T4	8	#5	2	7'-2"	60
V2	22	#4	5	6'-7"	97

ADDITIONAL BARS FOR 2 OPTIONAL WINGS WITH FOOTINGS

REINFORCING STEEL (W/O WINGS)	4711 LBS.
REINFORCING STEEL (WITH WINGS)	5959 LBS.

CLASS A CONCRETE BREAKDOWN		
POUR #1	FOOTING	22.5 C.Y.
POUR #2	END BENT STEM	15.5 C.Y.
POUR #3	BACKWALL	1.6 C.Y.
	WINGWALLS (OPTIONAL)	7.5 C.Y.
TOTAL CLASS A CONCRETE (W/O WINGS)		39.6 C.Y.
TOTAL CLASS A CONCRETE (WITH WINGS)		47.1 CY

** THE CONTRACTOR'S ATTENTION IS CALLED TO THE FACT THAT THE QUANTITIES AND REINFORCING BARS SHOWN IN THE BILL OF MATERIAL ARE BASED ON AN 8'-0" MAXIMUM STEM WALL HEIGHT AND THE SHORTEST BACKWALL HEIGHT USING 2X8 DECKING. THE CONTRACTOR IS RESPONSIBLE FOR THE FINAL QUANTITIES BASED ON THE ACTUAL STEM WALL AND BACKWALL HEIGHTS.

NORTH CAROLINA ENGINEER SEAL 045282 WENDOLEN F. WILSON
Docusigned by: Gwen Wilson
04/06/2026

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SHEET 1 OF 2

NORTH CAROLINA OFFICE OF EMERGENCY MANAGEMENT

PRIVATE DRIVEWAY BRIDGE STANDARDS

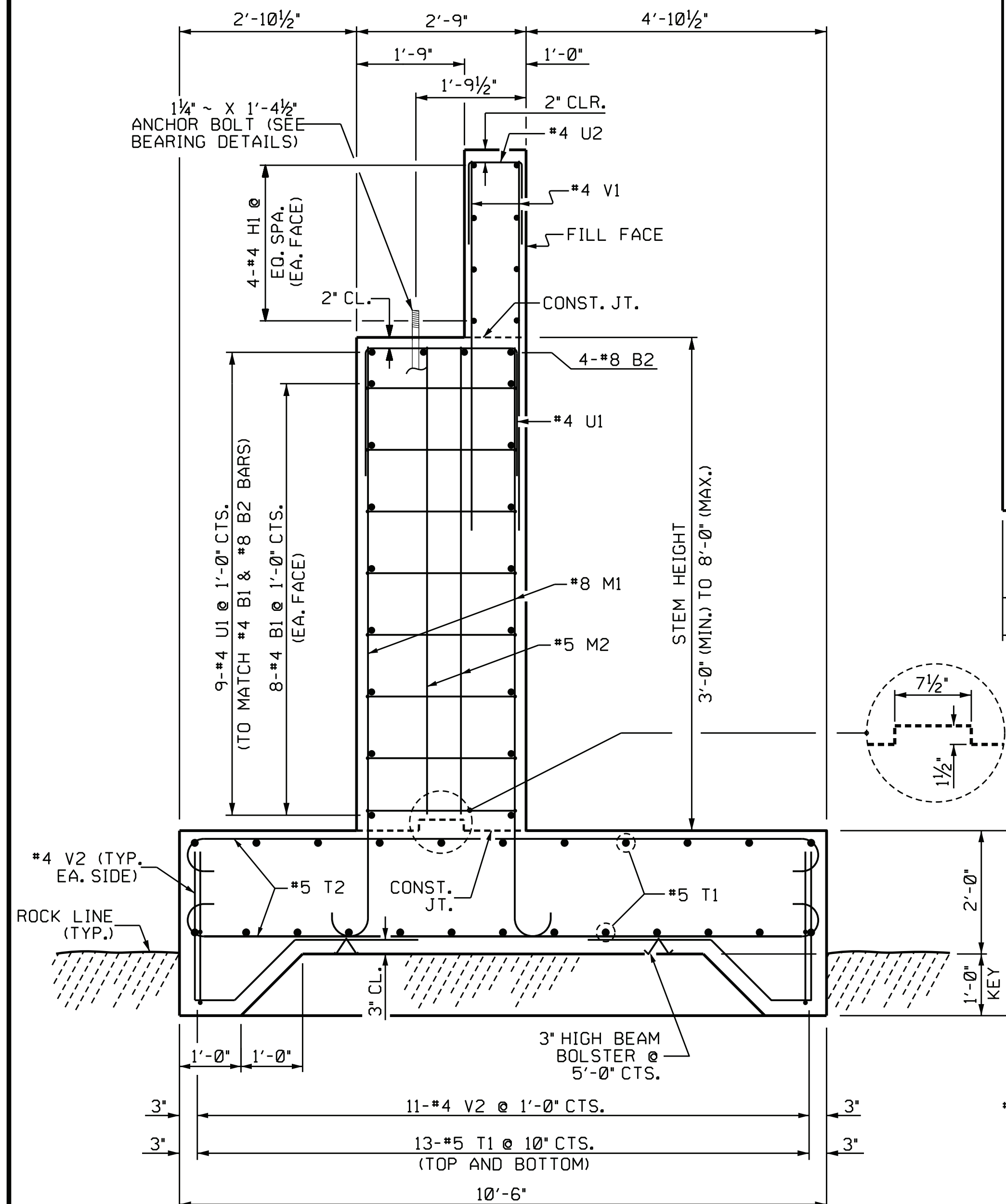
SINGLE LANE STEEL BEAM BRIDGE
TIMBER DECK

END BENT
SPREAD FOOTING

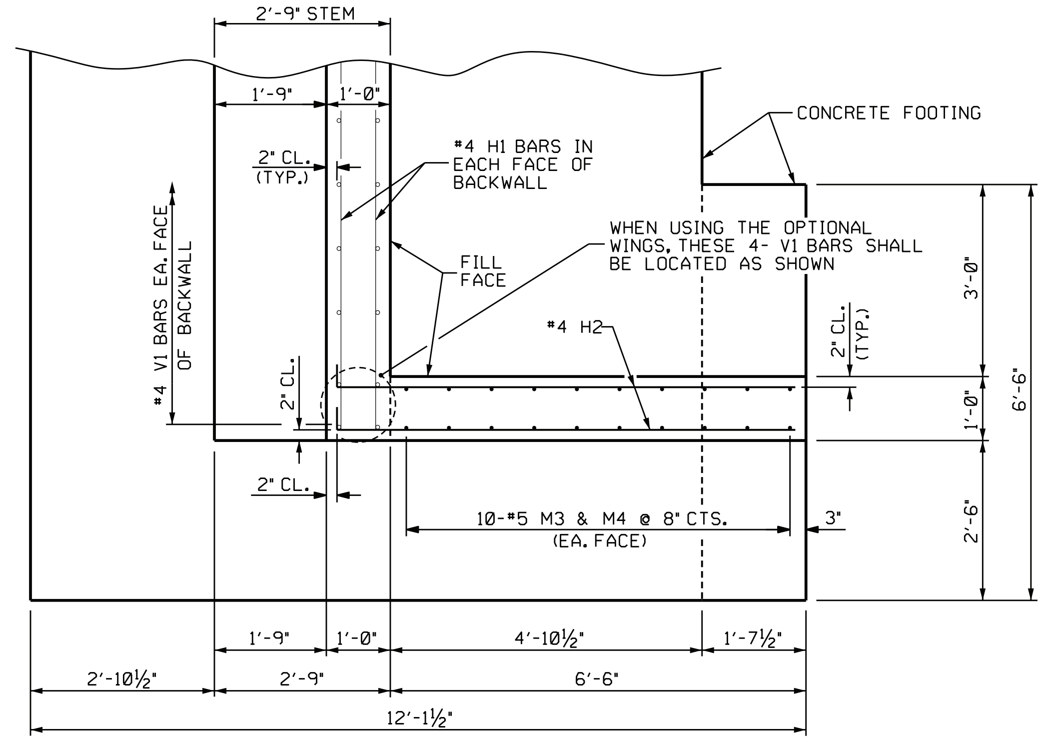
Johnson, Mirmiran, & Thompson, Inc.
108 Asheville Commerce Parkway
Candler, NC, 28715
License No: C-3097

DWN. BY: BC DATE: 04/2026
CHKD. BY: GFW DATE: 04/2026
DES. EGR. OF RECORD: GFW DATE: 04/2026

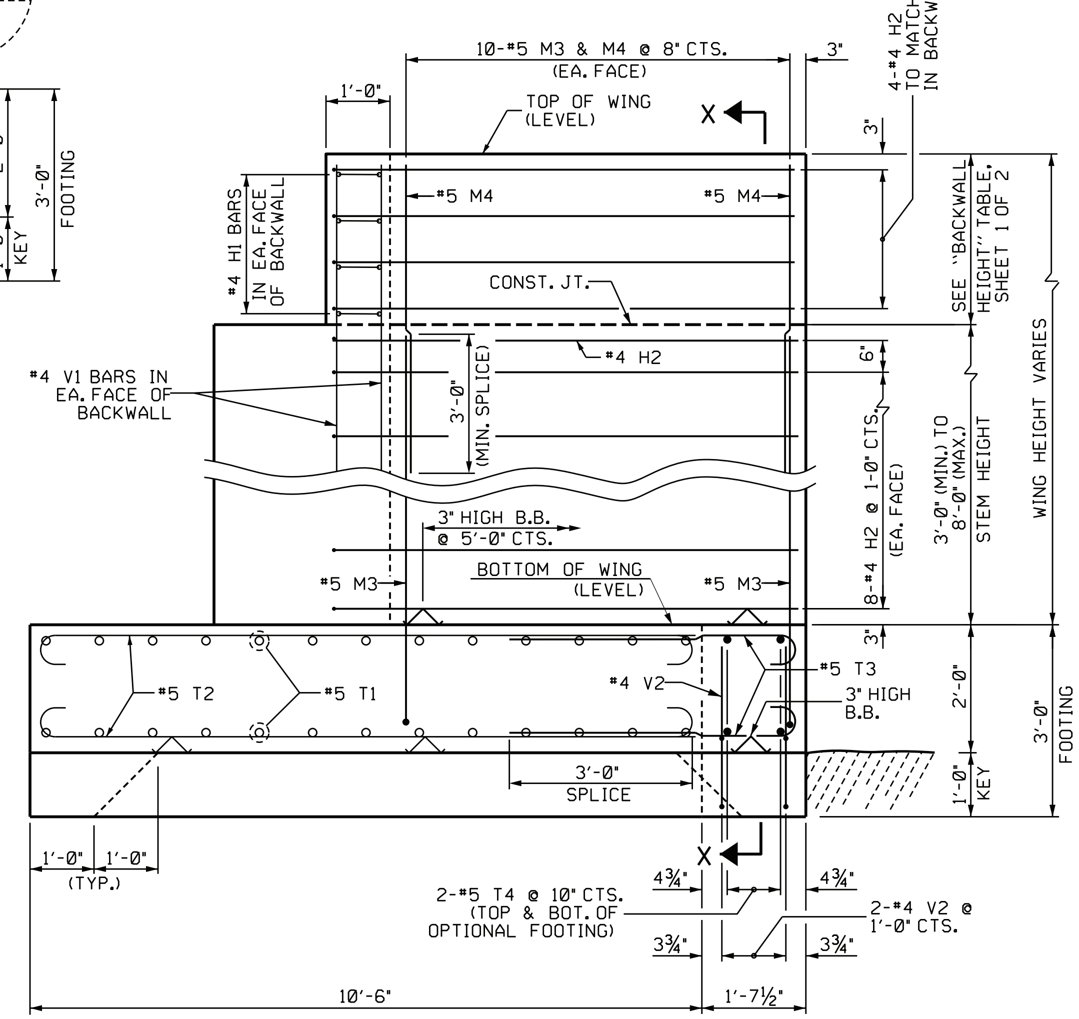
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-11
1			3			TOTAL SHEETS
2			4			13



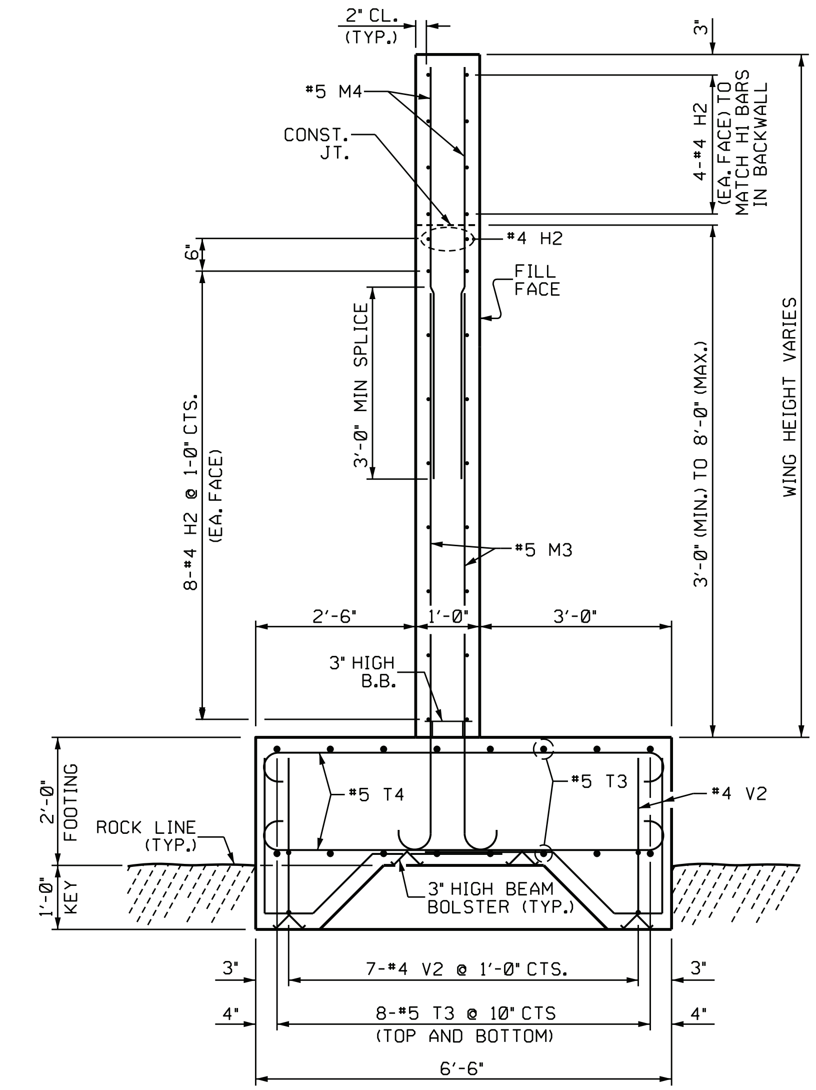
SECTION A-A



PLAN OF WING
(OPTIONAL)



ELEVATION OF WING
(OPTIONAL)



SECTION X-X
(OPTIONAL)

SHEET 2 OF 2

DocuSigned by: Gwen Wilson
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 045282 GWENDOLEN F. WILSON
04/06/2026

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA OFFICE OF EMERGENCY MANAGEMENT

PRIVATE DRIVEWAY BRIDGE STANDARDS

SINGLE LANE STEEL BEAM BRIDGE
TIMBER DECK

OPTIONAL WINGS & FOOTINGS

JMT
Johnson, Mirmiran, & Thompson, Inc.
108 Asheville Commerce Parkway
Candler, NC 28715
License No: C-3097

DWN. BY: BC	DATE: 04/2026
CHKD. BY: GFW	DATE: 04/2026
DES. EGR. OF RECORD: GFW	DATE: 04/2026

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

SHEET NO. S-12
TOTAL SHEETS 13

BCardosa
DGN: pw://jmt-pw.bentley.com:jmt-pw-01/Documents/Projects/2025/25-00529/25-00529-000/Design/Structures/NC PRB-Steel Beam with Timber Deck Standards/Single Lane Steel Beam with Timber Deck Plans/2 Standard Drawings/20-70 FT - 12 FT DECK WIDTH/02-S12_Optional Wings_Footing.dgn
TIME: 4/6/2026

STRUCTURAL STEEL / HARDWARE NOTES:

ALL STRUCTURAL STEEL SHALL BE AASHTO M270 GRADE 50 AND PAINTED IN ACCORDANCE WITH SYSTEM 1 OF THE STRUCTURAL STEEL COATING PROGRAM AND ARTICLE 442-8 OF THE STANDARD SPECIFICATIONS UNLESS OTHERWISE NOTED ON THE PLANS.

COATING APPLICATION FOR ALL STRUCTURAL STEEL SHALL NOT BE PERFORMED UNTIL SHOP FABRICATION INCLUDING CUTTING, DRILLING AND WELDING HAS BEEN COMPLETED.

ALL HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH SECTION 1076 OF THE STANDARD SPECIFICATION, UNLESS OTHERWISE NOTED ON THE PLANS.

DO NOT DRIVE LAG/STRUCTURAL SCREWS WITH A HAMMER, SCREW OR TORQUE LAG/STRUCTURAL SCREWS.

SCREWS SHALL BE OF SUFFICIENT LENGTH TO PROVIDE FULL THREAD ENGAGEMENT INTO RECEIVING MEMBERS.

REPAIR ANY DAMAGED GALVANIZED SURFACES IN ACCORDANCE WITH STANDARD SPECIFICATION ARTICLE 1076-7.

REPAIR ANY DAMAGED PAINTED SURFACES IN ACCORDANCE WITH SECTION 442 OF THE STANDARD SPECIFICATIONS.

STRUCTURAL WOOD SCREWS SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH SECTION 1076 OF THE STANDARD SPECIFICATION.

TIMBER / LUMBER NOTES:

ALL TIMBER AND LUMBER MEMBERS SHALL BE TREATED NO. 1 SOUTHERN PINE AND CONFORM TO SECTION 1082 OF THE STANDARD SPECIFICATIONS.

ALL TIMBER DIMENSIONS SHOWN ON THE PLANS ARE NOMINAL DIMENSIONS. DESIGN IS BASED ON ACTUAL DRESSED DIMENSIONS.

PRE-DRILL HOLES IN TIMBER MEMBERS RECEIVING BOLTS TO ELIMINATE SPLITTING. PRE-DRILL HOLES FOR SCREWS AS NECESSARY TO PREVENT SPLITTING IN TIMBER MEMBERS.

DESIGN LOADS:

LIVE LOAD:

TRUCK LOAD:

THIS BRIDGE WAS DESIGNED FOR:

HS20
GVWR = 72,000 LBS
NUMBER OF AXLES: 3
AXLE WEIGHTS:
GAWR FRONT = 8,000 LBS
GAWR INTERMEDIATE = 32,000 LBS
GAWR REAR = 32,000 LBS

EV2
GVWR = 57,500 LBS
NUMBER OF AXLES: 2
AXLE WEIGHTS:
GAWR FRONT = 24,000 LBS
GAWR REAR = 33,500 LBS

EV3
GVWR = 86,000 LBS
NUMBER OF AXLES: 3
AXLE WEIGHTS:
GAWR FRONT = 24,000 LBS
GAWR INTERMEDIATE = 31,000 LBS
GAWR REAR = 31,000 LBS

LIVE LOAD FACTORS:

HS-20 = 1.30
EV2 = 1.3
EV3 = 1.3

LIVE LOAD FACTORS LOAD RATING:

HS-20 = 1.35
EV2 = 1.0
EV3 = 1.0

MULTIPLE PRESENCE FACTOR:

MPF = 1.0

LANE LOAD:

NO LANE LOAD WAS APPLIED.

IMPACT:

DYNAMIC IMPACT FOR WOOD/TIMBER COMPONENTS IS ZERO. DYNAMIC IMPACT FACTOR FOR ALL OTHER COMPONENTS IS 33%.

DEAD LOADS:

WEARING SURFACES SHALL NOT BE ALLOWED.

WEIGHT OF TIMBER = 40 PCF.

DESIGN ASSUMPTIONS/PARAMETERS:

SUPERSTRUCTURE WILL BE SIX LINES OF I-BEAMS.

BRIDGE IS SINGLE SPAN.

BRIDGE WIDTH = 12'-0" OUT TO OUT.

REF.#	DESIGN VEHICLES SCHEMATIC
HS-20	8K, 32K, 32K; 14', 14', 28'; 72K 36 TON
EV2	24K, 33.5K; 15'; 57.5K 28.75 TON
EV3	24K, 31K, 31K; 15', 4', 19'; 86K 43 TONS

GENERAL NOTES:

THIS BRIDGE IS DESIGNED IN ACCORDANCE WITH THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION (NCDOT) "STRUCTURES MANAGEMENT UNIT MANUAL", DATED 6/15/23, 2024 NCDOT IN-KIND TIMBER BRIDGE REPLACEMENT PROGRAM, AND THE AASHTO "LRFD BRIDGE DESIGN SPECIFICATIONS ", 9th EDITION.

THESE DRAWINGS ARE INTENDED ONLY FOR USAGE IN THE INSTALLATION OF SINGLE SPAN I-BEAM BRIDGES FOR PRIVATE DRIVEWAYS IN COUNTIES AS LISTED IN THE CONTRACT DOCUMENTS BY NORTH CAROLINA OFFICE OF EMERGENCY MANAGEMENT IN RESPONSE TO THE DAMAGE CAUSED BY HURRICANE HELENE.

BRIDGE CONSTRUCTION, WORKMANSHIP, AND MATERIALS SHALL BE IN ACCORDANCE WITH THE NCDOT "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES", 2024 EDITION.

THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.

IT IS ASSUMED THAT THERE ARE NO UTILITY CONFLICTS. THE CONTRACTOR SHALL INVESTIGATE THE PRESENCE OF UTILITIES BEFORE COMMENCING WORK.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

FOR ASBESTOS ASSESSMENT, SEE SPECIAL PROVISIONS.

ALL DIMENSIONS SHOWN ARE HORIZONTAL OR VERTICAL, UNLESS OTHERWISE NOTED.

CONTRACTOR SHALL SET BRIDGE ELEVATIONS SUCH THAT WATER WILL DRAIN AND NOT POND ON THE BRIDGE DECK AND MINIMUM LONGITUDINAL GRADE SHALL BE 0.5% AND MAXIMUM GRADE SHALL BE 6%.

FOR PILE-SUPPORTED END BENTS, PLACE APPROACH EMBANKMENT (CORE MATERIAL) PRIOR TO PILE INSTALLATION.

THIS BRIDGE HAS BEEN DESIGNED FOR ADTT < 100.

EROSION AND SEDIMENT CONTROL MEASURES SHOWN ON SHEET EC-01 ARE FOR GENERAL GUIDANCE ONLY AND REPRESENT MINIMUM REQUIREMENTS. THE CONTRACTOR SHALL PROVIDE, INSTALL, AND MAINTAIN ALL REQUIRED EROSION AND SEDIMENT CONTROL MEASURES IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS, CONTRACT DOCUMENTS, AND APPLICABLE REGULATIONS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MODIFYING THESE MEASURES AND PROVIDING ANY ADDITIONAL DEVICES NECESSARY TO ACCOUNT FOR ACTUAL SITE CONDITIONS, INCLUDING GROUNDWATER CONDITIONS AND WEATHER EVENTS, AND TO PREVENT SEDIMENT FROM LEAVING THE PROJECT SITE.

ALL REFERENCES WITHIN THESE PLANS TO "STANDARD SPECIFICATIONS " OR "NCDOT SPECIFICATIONS " SHALL BE GOVERNED BY THE NCDOT "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES" DATED JANUARY 2024.

TRAFFIC CONTROL SHALL BE PROVIDED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS, INCLUDING THE SPECIAL PROVISIONS, AND IN CONFORMANCE WITH THE NCDOT STANDARD SPECIFICATIONS, NCDOT ROADWAY STANDARD DRAWINGS, AND THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD). THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING, INSTALLING, AND MAINTAINING ALL TRAFFIC CONTROL DEVICES NECESSARY TO SAFELY CONDUCT THE WORK AND PROTECT THE TRAVELING PUBLIC.

MATERIAL PROPERTIES:

CONCRETE: MINIMUM COMPRESSIVE STRENGTH, f'c = 3,000 psi (CLASS A)

STRUCTURAL STEEL: AASHTO M270, GRADE 50.

WELDS: SMAW, 70 KSI ELECTRODES PER NCDOT STANDARD SPECIFICATIONS.

ANCHOR BOLTS: ASTM F1554, GRADE 55.

BOLTS SHALL CONFORM TO ASTM F3125, GRADE A325. PROVIDE GALVANIZED NUTS AND WASHERS COMPATIBLE WITH THE BOLTS.

TIMBER: ALL TIMBER & DIMENSIONAL LUMBER SHALL BE NO. 1 VISUALLY GRADED, SOUTHERN PINE WITH REFERENCE DESIGN VALUES OF: F_{bo} = 1.35 ksi AND F_{vo} = 0.175 ksi OR GREATER.

ELASTOMER IN ALL BEARINGS SHALL BE 50 DUROMETER HARDNESS WITH A SHEAR MODULUS OF 0.110 KSI.

NORTH CAROLINA PE: 045282 ENGINEER GWENDOLEN F. WILSON
Docusigned by: Gwen Wilson
04/06/2026

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Johnson, Mirmiran, & Thompson, Inc.
108 Asheville Commerce Parkway
Candler, NC, 28715
License No: C-3097

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CHKD. BY: GFW DATE: 04/2026
DES. EGR. OF RECORD: GFW DATE: 04/2026

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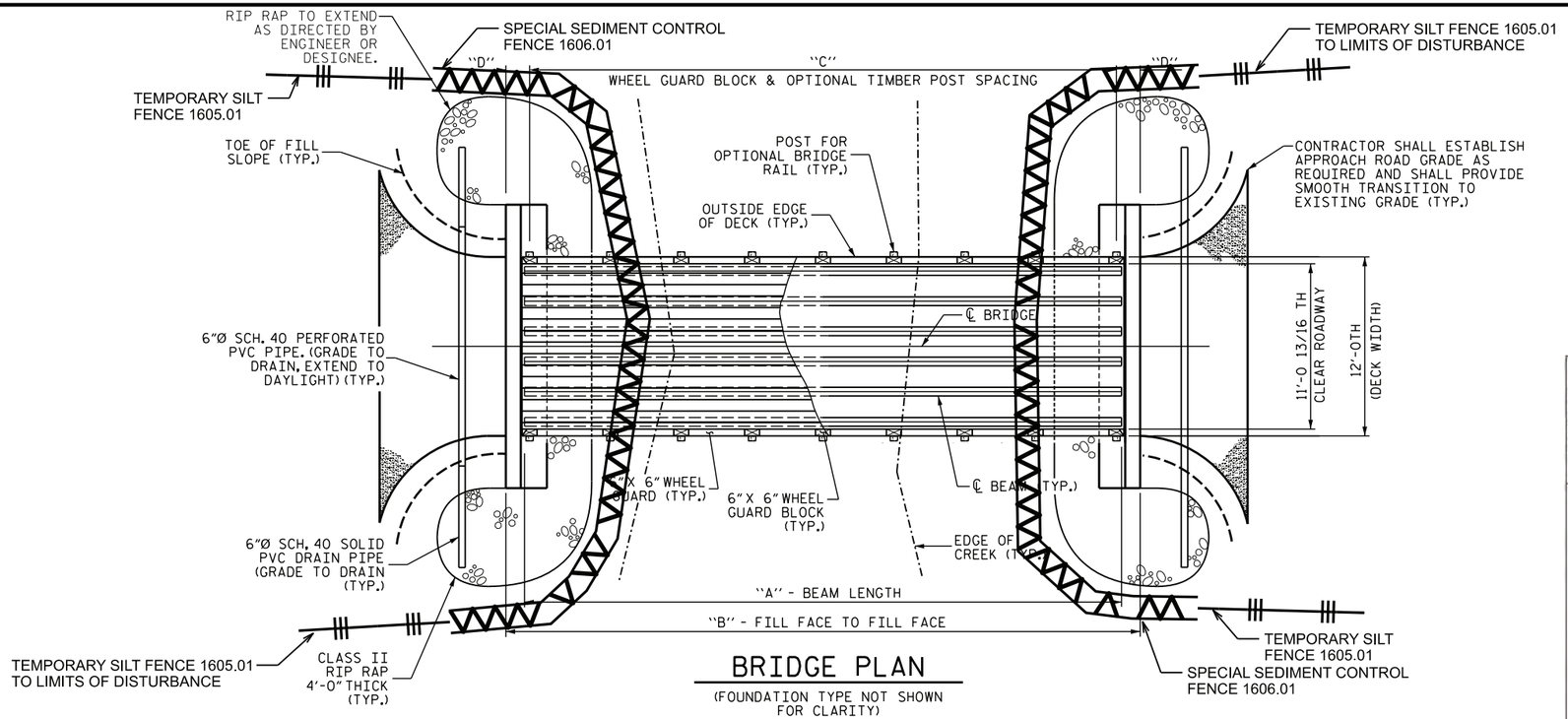
1			3			TOTAL SHEETS
2			4			13

NORTH CAROLINA OFFICE OF
EMERGENCY MANAGEMENT

PRIVATE DRIVEWAY BRIDGE STANDARDS

SINGLE LANE STEEL BEAM BRIDGE
TIMBER DECK

GENERAL NOTES



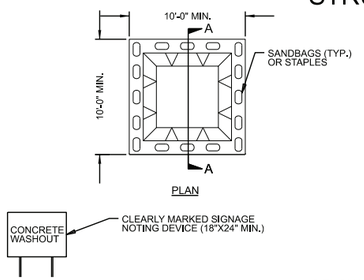
BRIDGE PLAN

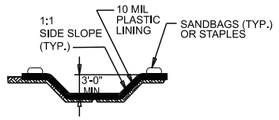
(FOUNDATION TYPE NOT SHOWN FOR CLARITY)

DIMENSIONS TABLE

SPAN	A	B	C	D	E
20'-0"	20'-0"	22'-6"	5 SPA. @ 3'-8"	2'-1"	19'-9"
30'-0"	30'-0"	32'-6"	7 SPA. @ 4'-0"	2'-3"	29'-9"
40'-0"	40'-0"	42'-6"	9 SPA. @ 4'-3"	2'-1½"	39'-9"
50'-0"	50'-0"	52'-6"	11 SPA. @ 4'-4"	2'-5"	49'-9"

ONSITE CONCRETE WASHOUT STRUCTURE WITH LINER



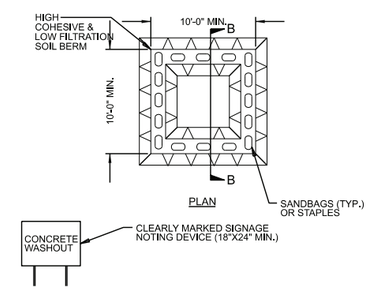


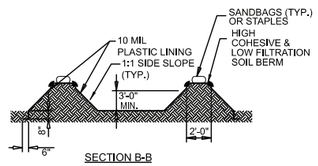
NOTES:
1. ACTUAL LOCATION DETERMINED IN FIELD

2. THE CONCRETE WASHOUT STRUCTURES SHALL BE MAINTAINED WHEN THE LIQUID AND/OR SOLID REACHES 75% OF THE STRUCTURES CAPACITY TO PROVIDE ADEQUATE HOLDING CAPACITY WITH A MINIMUM 12 INCHES OF FREEBOARD.

3.CONCRETE WASHOUT STRUCTURE NEEDS TO BE CLEARLY MARKED WITH SIGNAGE NOTING DEVICE.

BELOW GRADE WASHOUT STRUCTURE
NOT TO SCALE





NOTES:
1. ACTUAL LOCATION DETERMINED IN FIELD

2. THE CONCRETE WASHOUT STRUCTURES SHALL BE MAINTAINED WHEN THE LIQUID AND/OR SOLID REACH 75% OF THE STRUCTURES CAPACITY TO PROVIDE ADEQUATE HOLDING CAPACITY WITH A MINIMUM 12 INCHES OF FREEBOARD.

3.CONCRETE WASHOUT STRUCTURE NEEDS TO BE CLEARLY MARKED WITH SIGNAGE NOTING DEVICE.

ABOVE GRADE WASHOUT STRUCTURE
NOT TO SCALE

ESC LEGEND

Special Sediment Control Fence

Temporary Silt Fence

NOTES

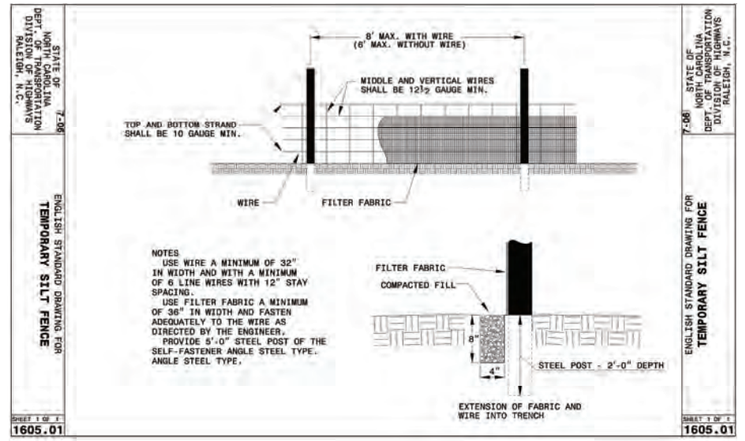
FOR OPTIONAL TIMBER BRIDGE RAIL DETAILS, SEE "OPTIONAL TIMBER BRIDGE RAIL" SHEET.

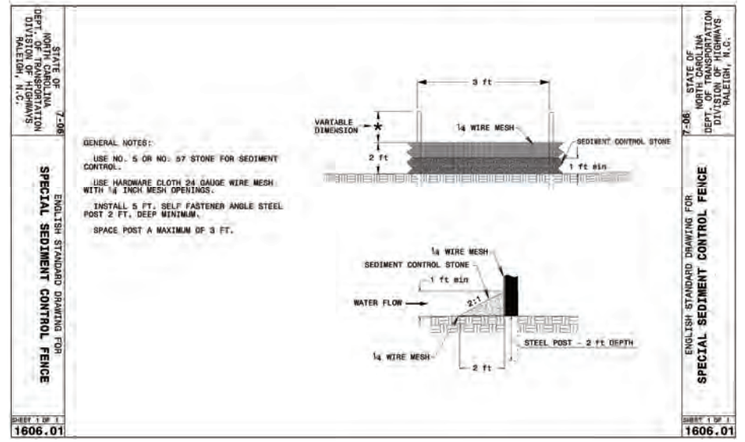
CONTRACTOR SHALL LOCATE THE EXPANSION BEARING ON THE "UPHILL" END OF THE BRIDGE. THERE WILL BE ONLY ONE EXPANSION BEARING PER BRIDGE.

CONTRACTOR SHALL PROVIDE EROSION CONTROL MEASURES, AS REQUIRED ACCORDING TO NCDOT STANDARD SPECIFICATIONS AND THE CONTRACT DOCUMENTS.

THE CONTRACTOR SHALL SET THE LOW-CHORD ELEVATION OF THE BRIDGE BASED ON EXISTING SITE CONDITIONS AND IN COORDINATION WITH THE ENGINEER, SUCH THAT THE NEW CROSSING PROVIDES CONVEYANCE GREATER THAN OR EQUAL TO THE ORIGINAL DESTROYED CROSSING. THE CONTRACTOR SHALL REFER TO THE BSR WHEN SETTING THE LOW-CHORD ELEVATION OF THE BRIDGE. NO CONSTRUCTION ACTIVITIES SHALL COMMENCE UNTIL ALL PARTIES HAVE AGREED UPON THE LOW-CHORD ELEVATION AND THE DATED PERMIT APPLICATION IS APPROVED.

TIMBER DECKING SHALL BE 2X8 BOARDS. 4X6 TIMBER DECKING (6" DIMENSION HORIZONTAL) MAY BE USED IN LIEU OF 2X8 DECKING; SEE OPTIONAL TYPICAL SECTION ON SHEET S-03 FOR DETAILS.





Signed by:
Matthew D Foster
7B1932BFAFC8472...
4/2/2026 | 6:30:17 PM EDT

NORTH CAROLINA PROFESSIONAL SEAL 20646 ENGINEER MATTHEW D. FOSTER

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NORTH CAROLINA OFFICE OF
EMERGENCY MANAGEMENT

PRIVATE DRIVEWAY BRIDGE STANDARDS

SINGLE LANE STEEL BEAM BRIDGE
TIMBER DECK

EROSION CONTROL

Johnson, Mirmiran, & Thompson Inc.
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SHEET NO. EC-01
TOTAL SHEETS 13

$$$$USERNAME$$$$
DGN: $$$DGN$$$
TIME: $$$$$$CSTTIME$$$$$

FOR INFORMATION ONLY

GEOTECHNICAL BORING REPORT
BORE LOG

SHEET

WBS 006-01-07045	**TIP** N/A	**COUNTY** AVERY	**GEOLOGIST** J, Baskin	
SITE DESCRIPTION 85 Kay Jay Lane for Bridge over Big Horse Creek				**GROUND WTR (ft)**
BORING NO. EB1	**STATION** N/A	**OFFSET** N/A	**ALIGNMENT** -L-	**0 HR.** 5.0
COLLAR ELEV. 0.0 ft	**TOTAL DEPTH** 19.3 ft	**NORTHING** 870,940	**EASTING** 1,115,336	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R7348 CME-750X 87% 12/20/2024		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 02/12/26	**COMP. DATE** 02/12/26	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
0										0.0 GROUND SURFACE	0.0
	0.0	0.0	1	14	16	30		M		**ARTIFICIAL FILL**	
										-2.0 Brown, Fine to Coarse Sandy Silty CLAY (A-6) with Trace Roots and Gravel	2.0
-5	-3.5	3.5	2	2	1	3				**ALLUVIAL** Dark Gray, Silty Clayey Fine to Coarse SAND (A-2-4) with Trace Gravel	
										-7.0	7.0
	-8.5	8.5	25	31	36	67		M		**RESIDUAL** Black-Green, Clayey Silty Fine to Coarse SAND (A-2-4) with Trace Rock Fragments	
-10										-12.0	12.0
	-13.5	13.5	100/0.5			100/0.5				**WEATHERED ROCK** Red-Tan BIOTITE HORNBLENDE GNEISS	
-15											
	-18.5	18.5	60/0.1			60/0.1				-18.5	18.5
	-19.3	19.3	60/0.1			60/0.1				-19.3 **CRYSTALLINE ROCK** White-Gray BIOTITE HORNBLENDE GNEISS	19.3
										Boring Terminated with Standard Penetration Test Refusal at Elevation -19.3 ft in CRYSTALLINE ROCK (GNEISS)	

Notes:
1. Surficial Organic Soil: 0.0'-0.2'

FOR INFORMATION ONLY

GEOTECHNICAL BORING REPORT
BORE LOG

SHEET

WBS 006-01-07045	**TIP** N/A	**COUNTY** AVERY	**GEOLOGIST** J, Baskin	
SITE DESCRIPTION 85 Kay Jay Lane for Bridge over Big Horse Creek				**GROUND WTR (ft)**
BORING NO. EB2	**STATION** N/A	**OFFSET** N/A	**ALIGNMENT** -L-	**0 HR.** 8.5
COLLAR ELEV. 0.0 ft	**TOTAL DEPTH** 10.0 ft	**NORTHING** 870,995	**EASTING** 1,115,300	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R7348 CME-750X 87% 12/20/2024		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 02/12/26	**COMP. DATE** 02/12/26	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
0										0.0 GROUND SURFACE	0.0
	0.0	0.0	6	12	5	17		M		**ARTIFICIAL FILL**	
										-2.0 Silty Fine to Coarse SAND (A-2-4) with Trace Gravel	2.0
-5	-3.5	3.5	2	2	4	6		M		Red-Tan, Fine to Coarse Sandy Silty CLAY (A-6)	
										-7.0	7.0
	-8.5	8.5						▽		**RESIDUAL**	
-10			20	19	28	47		M		-10.0 Blue-Green, Clayey Silty Fine to Coarse SAND (A-2-4) with Trace Rock Fragments	10.0
										Boring Terminated at Elevation -10.0 ft in RESIDUAL (SAND)	
										Note: Boring terminated at 10.0' due to crooked hole. Offset to EB2(A)	

FOR INFORMATION ONLY

SHEET

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 006-01-07045	**TIP** N/A	**COUNTY** AVERY	**GEOLOGIST** J, Baskin	
SITE DESCRIPTION 85 Kay Jay Lane for Bridge over Big Horse Creek				**GROUND WTR (ft)**
BORING NO. EB2(A)	**STATION** N/A	**OFFSET** N/A	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 0.0 ft	**TOTAL DEPTH** 12.2 ft	**NORTHING** 870,995	**EASTING** 1,115,302	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R7348 CME-750X 87% 12/20/2024		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 02/12/26	**COMP. DATE** 02/12/26	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
0										0.0 GROUND SURFACE	0.0
								M		-2.0 **ARTIFICIAL FILL** Silty Fine to Coarse SAND (A-2-4) with Trace Gravel	2.0
-5								M		Red-Tan, Fine to Coarse Sandy Silty CLAY (A-6)	
										-7.0	7.0
-10								M		**RESIDUAL** Black-Green, Clayey Silty Fine to Coarse SAND (A-2-4) with Trace Rock Fragments	
	-12.1	12.1	60/0.1			60/0.1				-12.1	12.1
										-12.2 **CRYSTALLINE ROCK** HORNBLENDE GNEISS	12.2
										Boring Terminated with Standard Penetration Test Refusal at Elevation -12.2 ft in CRYSTALLINE ROCK (HORNBLENDE GNEISS)	

Note:
1. Auger probe to 12.1 feet.
2. Auger refusal at 12.1 feet.