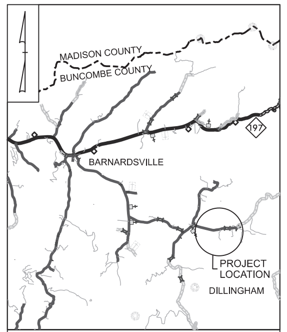
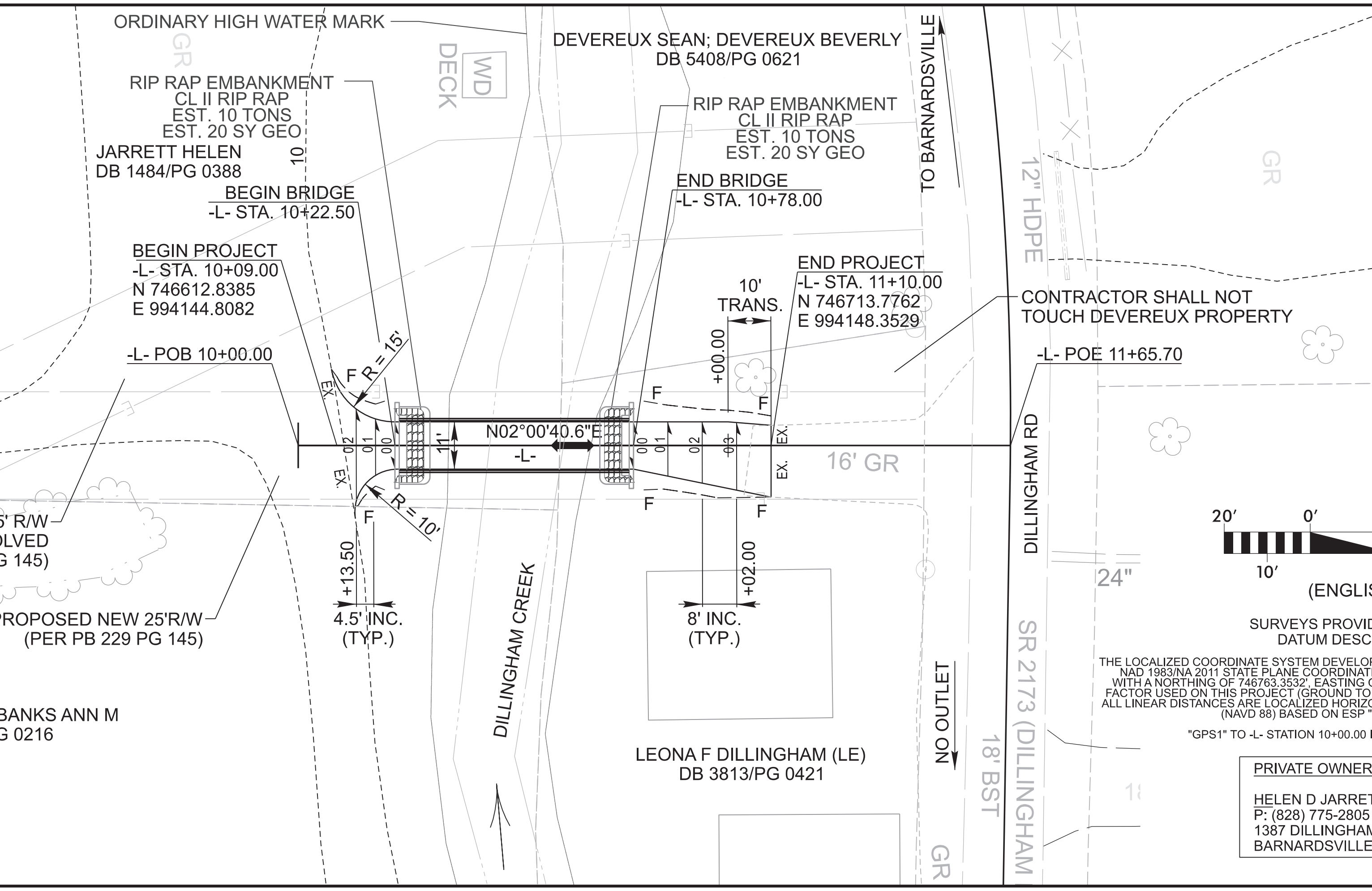
Site # 011-01-cbdee
Private Drive off 1387 Dillingham Road (SR 2173)
over Dillingham Creek
Buncombe County

11/14/23

NORTH CAROLINA DEPARTMENT OF EMERGENCY MANAGEMENT - PRIVATE ROADS AND BRIDGES
BUNCOMBE COUNTY



VICINITY MAP (NTS)

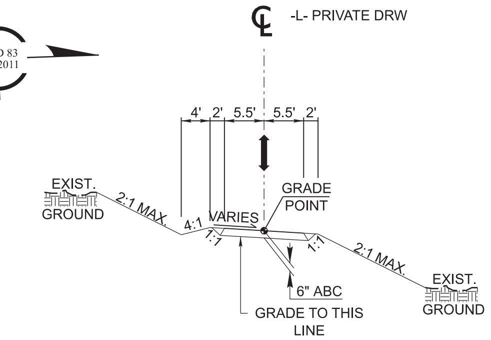


20' 0' 20' 40'
10'
(ENGLISH)

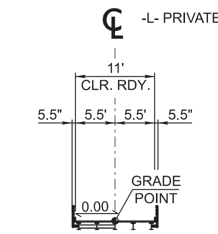
SURVEYS PROVIDED BY: ESP
DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE NAD 1983/NA 2011 STATE PLANE COORDINATES FOR THE ESP CONTROL POINT GPS1" WITH A NORTHING OF 746763.3532', EASTING OF 993949.8619'. THE AVERAGE COMBINED FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS 0.9997944501 (1/X = 1.0002055922). ALL LINEAR DISTANCES ARE LOCALIZED HORIZONTAL DISTANCES. THE VERTICAL DATUM IS (NAVD 88) BASED ON ESP "GPS1" (ELEV. 2534.83').

"GPS1" TO -L- STATION 10+00.00 IS S50°39'49.3"E 251.64 (ft)



TYPICAL SECTION NO. 1
-L- STA. 10+00.00 TO STA. 10+22.50 (BEGIN BRIDGE)
-L- STA. 10+78.00 (END BRIDGE) TO STA. 11+10.00



TYPICAL SECTION NO. 2
-L- STA. 10+22.50 (BEGIN BRIDGE) TO STA. 10+78.00 (END BRIDGE)

ROADWAY DESIGN ENGINEER
12/11/2025
NORTH CAROLINA PROFESSIONAL SEAL 039234 ENGINEER NIKKI T. HONEYCUTT
Signed by: Nikki Honeycutt

HYDRAULICS ENGINEER
12/11/2025
NORTH CAROLINA PROFESSIONAL SEAL 049338 ENGINEER ERIK P. AADLAND
Signed by: Erik P. Aadland

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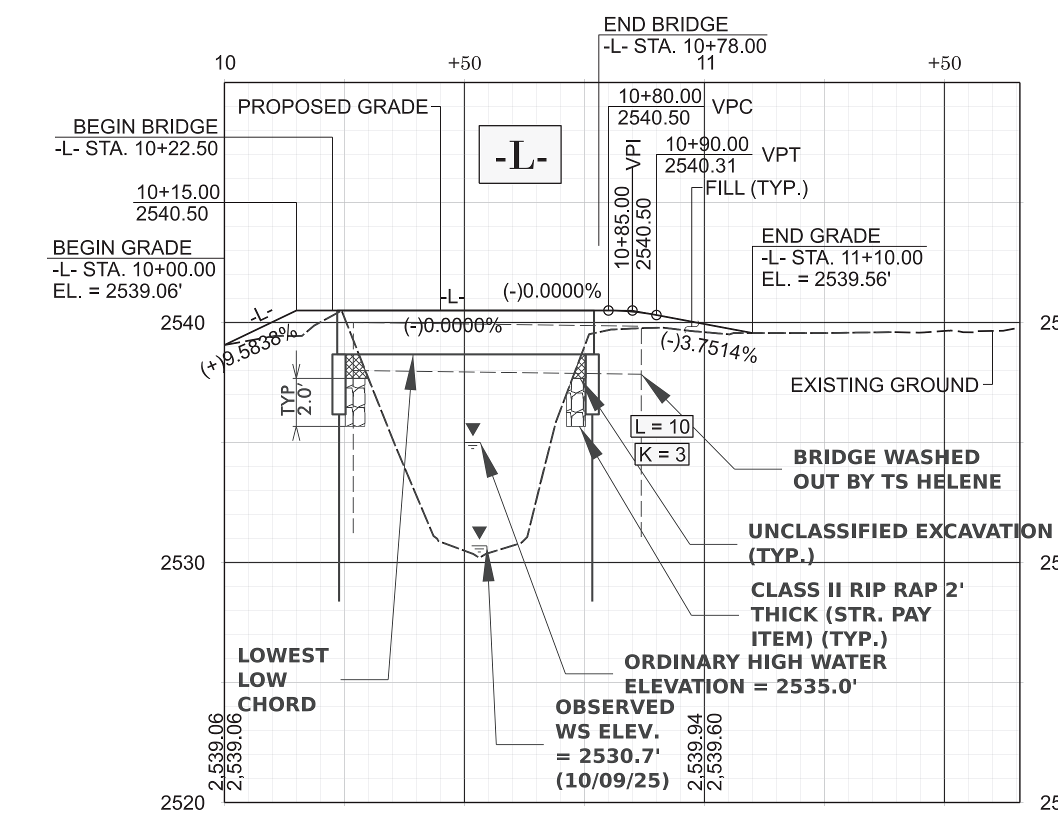
PREPARED BY
KCA
KISINGER CAMPO & ASSOCIATES
NC FIRM LICENSE No: C-1506
301 Fayetteville St., Suite 1500
Raleigh, NC 27601
(919)882-7839

PRIVATE OWNER CONTACT:

HELEN D JARRETT
P: (828) 775-2805
1387 DILLINGHAM RD
BARNARDSVILLE, NC 28709

POINT	-L- STA.	-L- OFFSET	ELEVATION	NORTH	EAST
BM1 (10001)	10+55.28	248.21' LT	2533.62'	746667.8050	993898.3797
GPS1 (1)	11+52.58	200.11' LT	2534.83'	746763.3532	993949.8619
GPS2 (2)	11+77.54	258.77' RT	2548.16'	746772.1878	994409.3374



HYDRAULIC DATA BLOCK

EXISTING:
CALCULATED CONVEYANCE OPENING: = 232 +/- SQ. FT.

PROPOSED:
CALCULATED CONVEYANCE OPENING: = 261 +/- SQ. FT.

GENERAL NOTES AND STANDARD DRAWINGS

NCDOT'S 2024 STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES
EFFECTIVE: 01-16-2024

GRADE LINE:
GRADING AND SURFACING:

THE GRADE LINES SHOWN DENOTE THE FINISHED ELEVATION OF THE PROPOSED SURFACING AT GRADE POINTS SHOWN ON THE TYPICAL SECTIONS. GRADE LINES MAY BE ADJUSTED AT THEIR BEGINNING AND ENDING AND AT STRUCTURES AS DIRECTED BY THE ENGINEER IN ORDER TO SECURE A PROPER TIE-IN.

SUPERELEVATION:

ALL CURVES ON THIS PROJECT SHALL BE SUPERELEVATED IN ACCORDANCE WITH STD. NO. 225.04 USING THE RATE OF SUPERELEVATION AND RUNOFF SHOWN ON THE PLANS. SUPERELEVATION IS TO BE REVOLVED ABOUT THE GRADE POINTS SHOWN ON THE TYPICAL SECTIONS.

SHOULDER CONSTRUCTION:

ASPHALT, EARTH, AND CONCRETE SHOULDER CONSTRUCTION ON THE HIGH SIDE OF SUPERELEVATED CURVES SHALL BE IN ACCORDANCE WITH STD. NO. 560.01

SUBSURFACE PLANS:

NO SUBSURFACE PLANS ARE AVAILABLE ON THIS PROJECT. THE CONTRACTOR SHOULD MAKE HIS OWN INVESTIGATION AS TO THE SUBSURFACE CONDITIONS. F&R WILL PROVIDE INVENTORIES FROM SITE BORINGS.

END BENTS:

THE ENGINEER SHALL CHECK THE STRUCTURE END BENT PLANS, DETAILS, AND CROSS-SECTION PRIOR TO SETTING OF THE SLOPE STAKES FOR THE EMBANKMENT OR EXCAVATION APPROACHING A BRIDGE.

NOTES

PROPERTY LINES AND OWNERS ARE TAKEN FROM BUNCOMBE COUNTY GIS PAGE.

DESIGNED IN GUIDANCE WITH PRB DESIGN CRITERIA.

BASED ON UTILITY COORDINATION, THERE ARE NO KNOWN UTILITY CONFLICTS. THE CONTRACTOR SHALL INVESTIGATE THE PRESENCE OF UTILITIES BEFORE COMMENCING WORK.

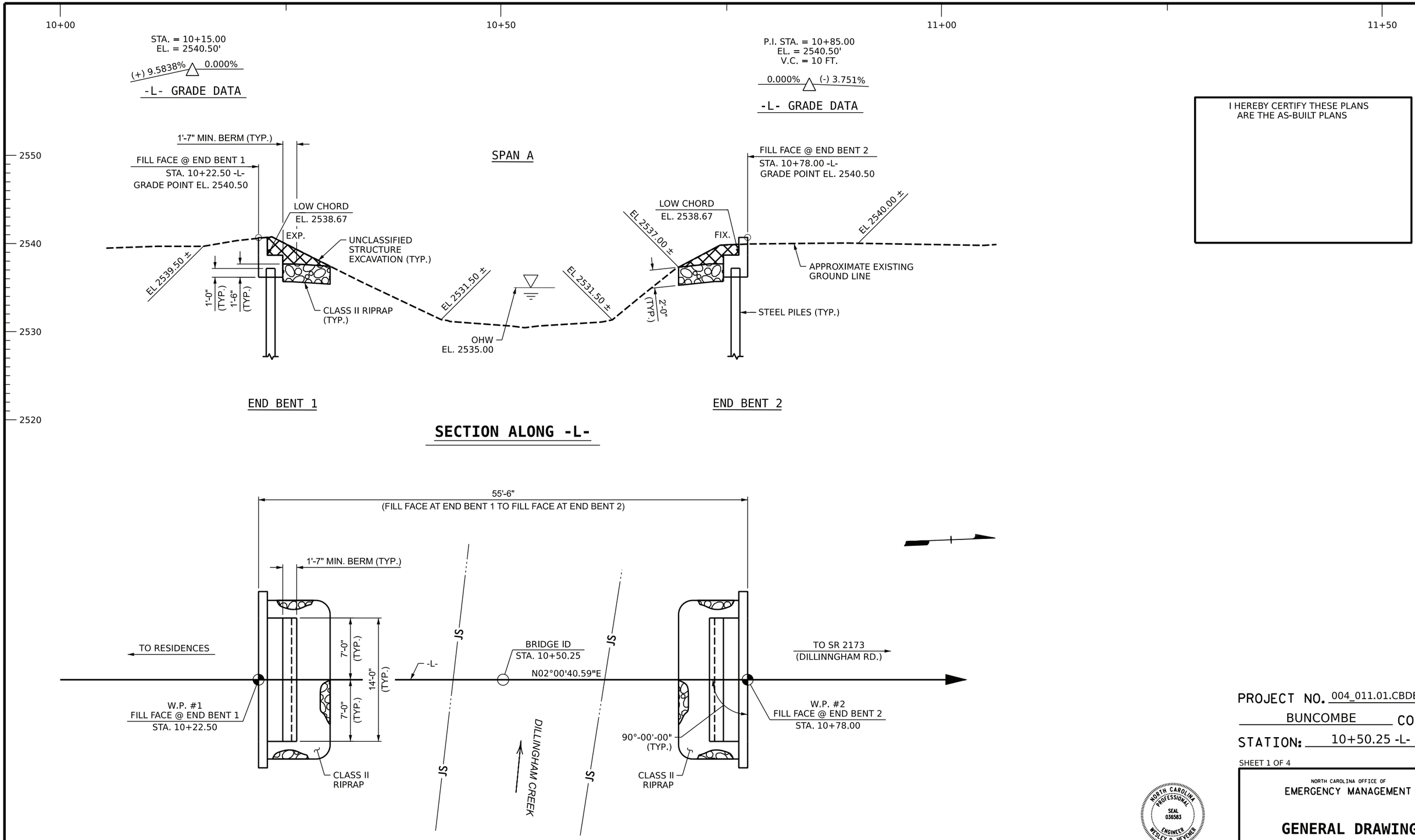
ROADWAY QUANTITIES

DESCRIPTION	QUANTITY	UNIT
UNCLASSIFIED EXCAVATION	10	CY
AGGREGATE BASE COURSE	30	TONS

20' 0' 20' 40'
10'
HORIZONTAL (ENGLISH)

4' 0' 4' 8'
2'
VERTICAL (ENGLISH)

REVISIONS



SECTION ALONG -L-

PLAN

(PILES NOT SHOWN FOR CLARITY)

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS

PROJECT NO. 004_011.01.CBDEE

BUNCOMBE COUNTY

STATION: 10+50.25 -L-

SHEET 1 OF 4

NORTH CAROLINA OFFICE OF
EMERGENCY MANAGEMENT

GENERAL DRAWING

FOR BRIDGE OVER
DILLINGHAM CREEK
RESIDENCES & SR 173

NORTH CAROLINA PROFESSIONAL SEAL 036583 ENGINEER WESLEY D. HEVENER

12/11/2025

Signed by: Wes Hevener

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A. MORTON THOMAS AND ASSOCIATES, INC.
900 RIDGEFIELD DRIVE, SUITE 325 • RALEIGH, NC 27609
(919) 855-9989 • NC LICENSE NO. F-1049
WWW.AMTENGINEERING.COM

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

DRAWN BY : HRB DATE : 12/25
CHECKED BY : DAC DATE : 12/25
DESIGN ENGINEER OF RECORD: WDH DATE : 12/25

12/11/2025
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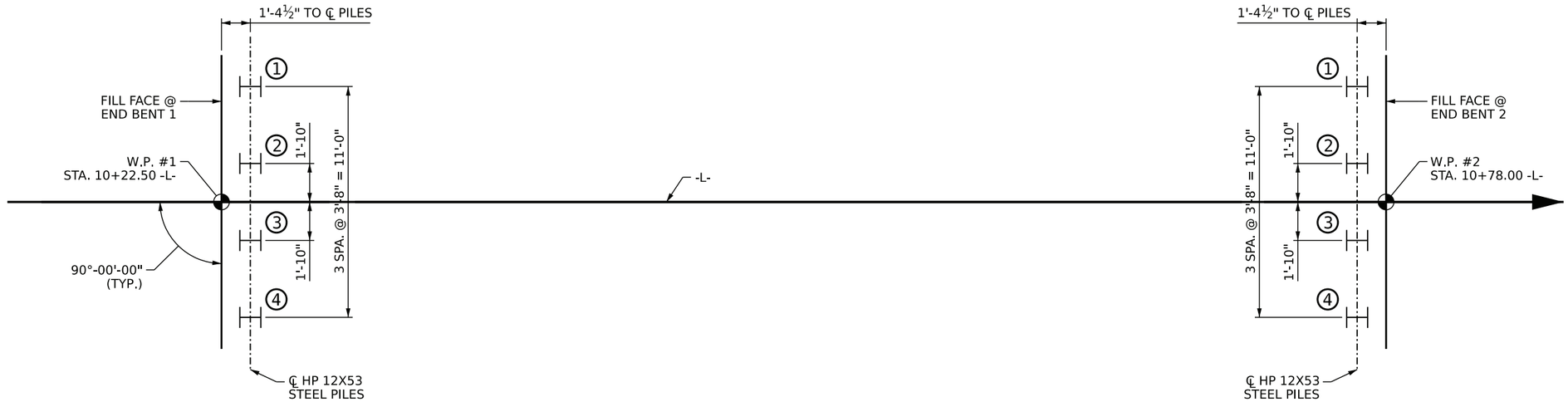
hbollinsky



END BENT 1

END BENT 2

LEGEND

HP 12x53 VERTICAL STEEL PILE

FOUNDATION LAYOUT

DIMENSIONS LOCATING PILES ARE SHOWN TO THE CENTERLINE OF PILES.

FOUNDATION NOTES

FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

PILES AT END BENT NO. 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 55 KIPS PER PILE.

PILE EXCAVATION IS REQUIRED TO INSTALL PILES AT END BENT NO. 1 AND END BENT NO. 2. EXCAVATE HOLES TO AN ESTIMATED ELEVATION OF 2,516 FT.

AFTER PILE EXCAVATION HAS BEEN COMPLETED, DRIVE PILES THROUGH THE EXCAVATED HOLES AT END BENT NO. 1 AND END BENT NO. 2 TO A REQUIRED DRIVING RESISTANCE OF 95 KIPS PER PILE. THE REQUIRED DRIVING RESISTANCE IS EQUAL TO THE FACTORED RESISTANCE DIVIDED BY A DRIVING RESISTANCE FACTOR OF 0.6.

THE ESTIMATED PILE LENGTH IS 50 FEET AT END BENT 1 AND 60 FEET AT END BENT 2 WHICH INCLUDES 1-FOOT OF EMBEDMENT INTO THE CAP.

FILL HOLES FOR PILE EXCAVATION AT END BENT NO. 1 AND END BENT NO. 2 WITH CONCRETE, GROUT OF FLOWABLE FILL.

IT HAS BEEN ESTIMATED THAT A HAMMER WITH AN EQUIVALENT RATED ENERGY IN THE RANGE OF 10,000 TO 20,000 FT-LBS PER BLOW WILL BE REQUIRED TO DRIVE PILES AT END BENT NO. 1 AND END BENT NO. 2. THIS ESTIMATED ENERGY RANGE DOES NOT RELEASE THE CONTRACTOR FROM PROVIDING DRIVING EQUIPMENT IN ACCORDANCE WITH SUBARTICLE 450-3(D)(2) OF THE STANDARD SPECIFICATIONS.

IT IS ASSUMED THAT SCOUR WILL NOT IMPACT THE BRIDGE END BENTS.

PROJECT NO. 004_011.01.CBDEE

BUNCOMBE COUNTY

STATION: 10+50.25 -L-

SHEET 2 OF 4

NORTH CAROLINA PROFESSIONAL SEAL 036583 ENGINEER WESLEY D. HEVENER

12/11/2025

Signed by: Wes Hevener

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NORTH CAROLINA OFFICE OF
EMERGENCY MANAGEMENT

GENERAL DRAWING

FOR BRIDGE OVER
DILLINGHAM CREEK
RESIDENCES & SR 2173

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

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CHECKED BY : DAC DATE : 12/25
DESIGN ENGINEER OF RECORD: WDH DATE : 12/25

12/11/2025
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hbollinsky

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 1-4	4	55	2537.00	50			95					2516.00	4	17
End Bent 2, Piles 1-4	4	55	2537.00	60			95					2516.00	10	11
TOTAL QUANTITY:													58	112

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

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

PILE DESIGN INFORMATION

(Blank entries indicate item is not applicable to structure)

End Bent / Bent No, Pile(s) #(-#) (e.g., "Bent 1, Piles 1-5")	Factored Axial Load per Pile KIPS	Factored Drag Load per Pile KIPS	Factored Dead Load * per Pile KIPS	Dynamic Resistance Factor	Nominal Drag Resistance per Pile KIPS	Nominal Scour Resistance per Pile KIPS
End Bent 1, Piles 1-4	55			0.60		
End Bent 2, Piles 1-4	55			0.60		

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

NOTES:

1. The Pile Foundation Tables are based on the bridge substructure design and foundation recommendations sealed by a North Carolina Professional Engineer (Cheng Wang, #048123) on 11-20-2025.
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.

PROJECT NO. 011-01-CBDEE

Buncombe COUNTY

STATION: 10+50.25 -L-

NORTH CAROLINA PROFESSIONAL SEAL 036583 ENGINEER WESLEY D. HEVNER

Signed by: Wes Hevner 12/11/2025

SIGNATURE DATE

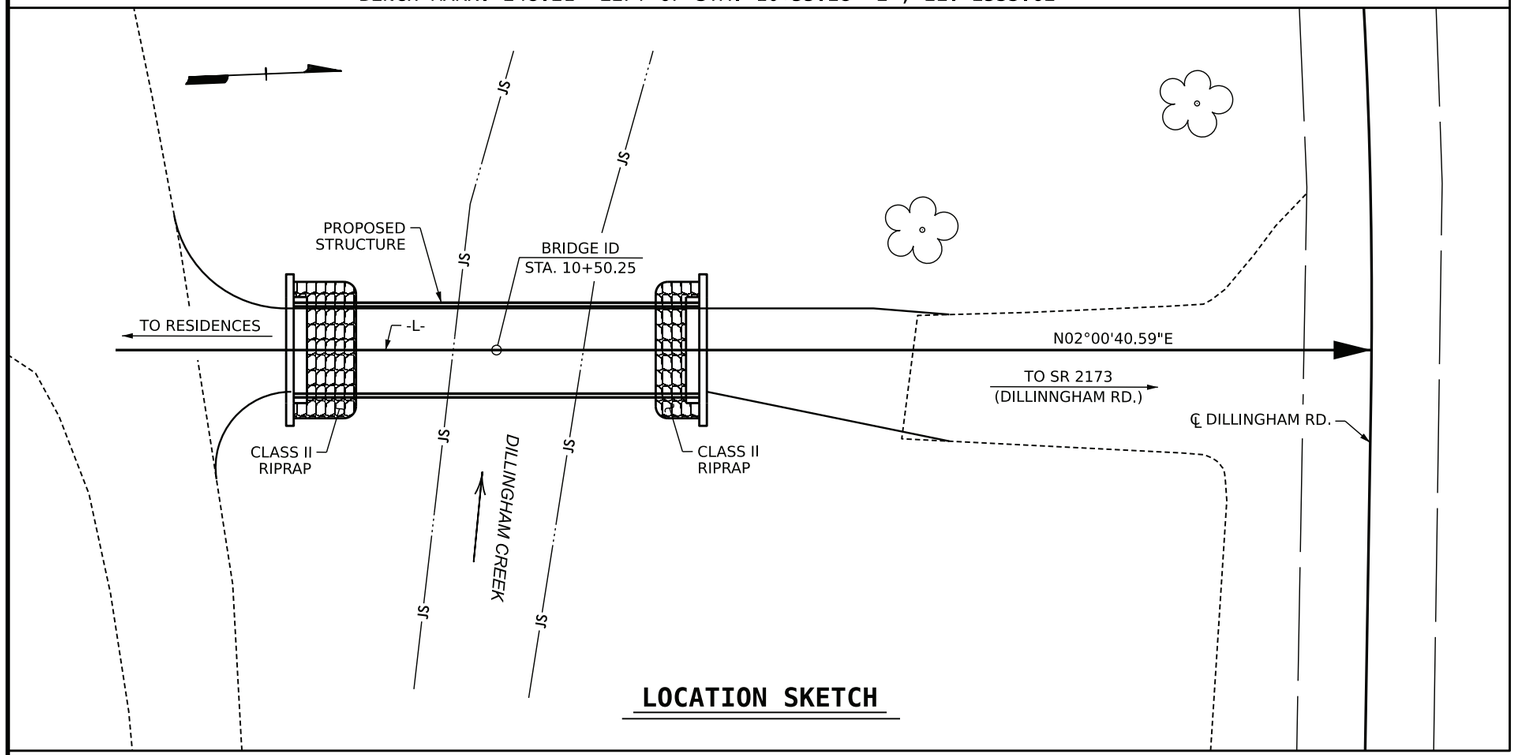
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

PILE FOUNDATION TABLES

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

BENCH MARK: 248.21' LEFT OF STA. 10+55.28 -L-, EL. 2533.62



LOCATION SKETCH

FOUNDATION NOTES

FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

PILES AT END BENT NO. 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 55 KIPS PER PILE.

PILE EXCAVATION IS REQUIRED TO INSTALL PILES AT END BENT NO. 1 AND END BENT NO. 2. EXCAVATE HOLES TO AN ESTIMATED ELEVATION OF 2,516 FT.

AFTER PILE EXCAVATION HAS BEEN COMPLETED, DRIVE PILES THROUGH THE EXCAVATED HOLES AT END BENT NO. 1 AND END BENT NO. 2 TO A REQUIRED DRIVING RESISTANCE OF 95 KIPS PER PILE. THE REQUIRED DRIVING RESISTANCE IS EQUAL TO THE FACTORED RESISTANCE DIVIDED BY A DRIVING RESISTANCE FACTOR OF 0.6.

THE ESTIMATED PILE LENGTH IS 50 FEET AT END BENT 1 AND 60 FEET AT END BENT 2 WHICH INCLUDES 1-FOOT OF EMBEDMENT INTO THE CAP.

FILL HOLES FOR PILE EXCAVATION AT END BENT NO. 1 AND END BENT NO. 2 WITH CONCRETE, GROUT OF FLOWABLE FILL.

IT HAS BEEN ESTIMATED THAT A HAMMER WITH AN EQUIVALENT RATED ENERGY IN THE RANGE OF 10,000 TO 20,000 FT-LBS PER BLOW WILL BE REQUIRED TO DRIVE PILES AT END BENT NO. 1 AND END BENT NO. 2. THIS ESTIMATED ENERGY RANGE DOES NOT RELEASE THE CONTRACTOR FROM PROVIDING DRIVING EQUIPMENT IN ACCORDANCE WITH SUBARTICLE 450-3(D)(2) OF THE STANDARD SPECIFICATIONS.

IT IS ASSUMED THAT SCOUR WILL NOT IMPACT THE BRIDGE END BENTS.

TOTAL BILL OF MATERIAL

	UNCLASSIFIED STRUCTURE EXCAVATION	CLASS A CONCRETE	REINFORCING STEEL	APPROX. 38,838 LBS. STRUCTURAL STEEL	PILE EXCAVATION NOT IN SOIL	PILE EXCAVATION IN SOIL	PILE DRIVING EQUIPMENT SETUP FOR HP 12x53 STEEL PILES	HP 12 X 53 STEEL PILES		RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE	ELASTOMERIC BEARINGS	TIMBER DECK SYSTEM	TIMBER BRIDGE RAIL SYSTEM
	LUMP SIM	CU. YDS.	LBS.	LUMP SUM	LIN. FT.	LIN. FT.	No.	No.	LIN. FT.	TONS	SQ. YDS.	LUMP SUM	LUMP SUM	LIN. FT.
SUPERSTRUCTURE														53.5
END BENT 1		6.4	806		16	68	4	4	200	11	12			
END BENT 2		6.4	806		40	44	4	4	240	10	12			
TOTAL	LUMP SIM	12.8	1612	LUMP SUM	56	112	8	8	440	21	24	LUMP SUM	LUMP SUM	53.5

NOTES

ASSUMED LIVE LOAD = HS-20

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

THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.

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

THE MATERIAL SHOWN IN THE CROSS-HATCHED AREA SHALL BE EXCAVATED FOR A DISTANCE OF 9 FT EACH SIDE OF CENTERLINE ROADWAY AS DIRECTED BY THE ENGINEER. THIS WORK WILL BE PAID FOR AT THE CONTRACT LUMP SUM PRICE FOR UNCLASSIFIED STRUCTURE EXCAVATION. SEE SECTION 412 OF THE STANDARD SPECIFICATIONS.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

ALL STRUCTURAL STEEL SHALL BE AASHTO M270 GRADE 50 AND PAINTED IN ACCORDANCE WITH SYSTEM 1 OR GALVANIZED OF THE STRUCTURAL STEEL SHOP 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 TIMBER AND LUMBER MEMBERS SHALL BE TREATED SOUTHERN PINE AND CONFORM TO SECTION 1082 OF THE STANDARD SPECIFICATIONS.

ALL TIMBER DIMENSIONS SHOWN ON THE PLANS ARE NOMINAL DIMENSIONS.

WHEN FIELD CUTTING TIMBER MEMBERS, TREAT NEWLY EXPOSED SURFACES WITH EITHER A BITUMINOUS ASPHALT-BASED ROOFING CEMENT, COPPER NAPHTHENATE PASTE, OR APPROVED PRESERVATIVE SYSTEM BEFORE INSTALLING.

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.

PRE-DRILL HOLES IN TIMBER AND LUMBER MEMBERS ACCEPTING BOLTS TO ELIMINATE SPLITTING.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

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 PROVIDE SUFFICIENT LENGTH SO THAT SCREW SHANK WILL PENETRATE RECEIVING MEMBERS.

FOR TIMBER BRIDGE RAIL SYSTEM INCLUDING LUMBER, DELINEATORS, HARDWARE FOR BOLT CONNECTIONS, HARDWARE FOR SCREW CONNECTIONS AND ALUMINUM DRIP EDGE, SEE TIMBER BRIDGE SUPERSTRUCTURE ON STEEL BEAMS SPECIAL PROVISION.

FOR TIMBER BRIDGE DECK SYSTEM INCLUDING HARDWARE FOR BOLT CONNECTIONS AND HARDWARE FOR SCREW CONNECTIONS,SEE TIMBER BRIDGE SUPERSTRUCTURE ON STEEL BEAMS SPECIAL PROVISION.

HYDRAULIC NOTES

NO MODEL DEVELOPED FOR THIS BRIDGE SITE.

PROJECT NO. 004_011.01.CBDEE

BUNCOMBE COUNTY

STATION: 10+50.25 -L-

SHEET 4 OF 4

NORTH CAROLINA OFFICE OF
EMERGENCY MANAGEMENT

GENERAL DRAWING

FOR BRIDGE OVER
DILLINGHAM CREEK
RESIDENCES & SR 2173

NORTH CAROLINA PROFESSIONAL SEAL 036583 ENGINEER WESLEY D. HEVENER

12/11/2025

Signed by: Wes Hevener

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

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12/11/2025
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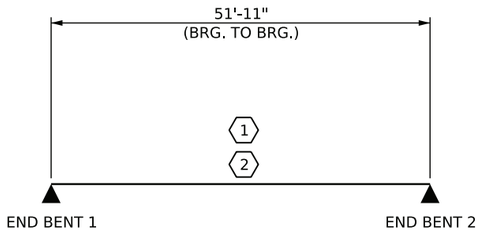
hbollinsky

LOAD AND RESISTANCE FACTOR RATING (LRFR) STEEL GIRDERS (W 14 X 145)

LOAD TYPE	VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING (#)	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE											SERVICE II LIMIT STATE						COMMENT NUMBER
							MOMENT					SHEAR						MOMENT					
						LIVE-LOAD FACTORS (γ LL)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	LIVE-LOAD FACTORS (γ LL)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD	HS-20 (INVENTORY)	36.000	1	1.33	47.88	1.75	0.373	1.33	A	I	25.96	0.373	12.03	A	I	0.00	1.30	0.373	1.63	A	I	20.77	
	HS-20 (OPERATING)	36.000		1.72	61.92	1.35	0.373	1.72	A	I	25.96	0.373	9.28	A	I	0.00	N/A	--	--	--	--	--	
EMERGENCY VEHICLE (EV)	EV2	28.750		2.08	59.84	1.30	0.373	2.08	A	I	25.96	0.373	13.92	A	I	0.00	N/A	--	--	--	--	--	
	EV3	43.000	2	1.36	58.35	1.30	0.373	1.36	A	I	25.96	0.373	9.49	A	I	0.00	N/A	--	--	--	--	--	



LRFR SUMMARY

LOAD FACTORS:

DESIGN LOAD RATING FACTORS	LIMIT STATE	γ DC	γ DW
	STRENGTH I	1.25	1.50
	SERVICE II	1.00	1.00

NOTES:

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

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

COMMENTS:

1.

2.

3.

4.

(#) CONTROLLING LOAD RATING

(1) DESIGN LOAD RATING (HS-20)

(2) EMERGENCY VEHICLE LOAD RATING

** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

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

PROJECT NO. 004_011.01.CBDEE

BUNCOMBE COUNTY

STATION: 10+50.25 -L-

NORTH CAROLINA PROFESSIONAL SEAL 036583 ENGINEER WESLEY D. HEVENER

12/11/2025

Signed by: Wes Hevener /E3EA4688/424bb...

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NORTH CAROLINA OFFICE OF
EMERGENCY MANAGEMENT

STANDARD

LRFR SUMMARY FOR STEEL GIRDERS

(NON-INTERSTATE TRAFFIC)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-5
1			3			TOTAL SHEETS
2			4			17

DRAWN BY : HRB DATE : 12/25
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12/11/2025
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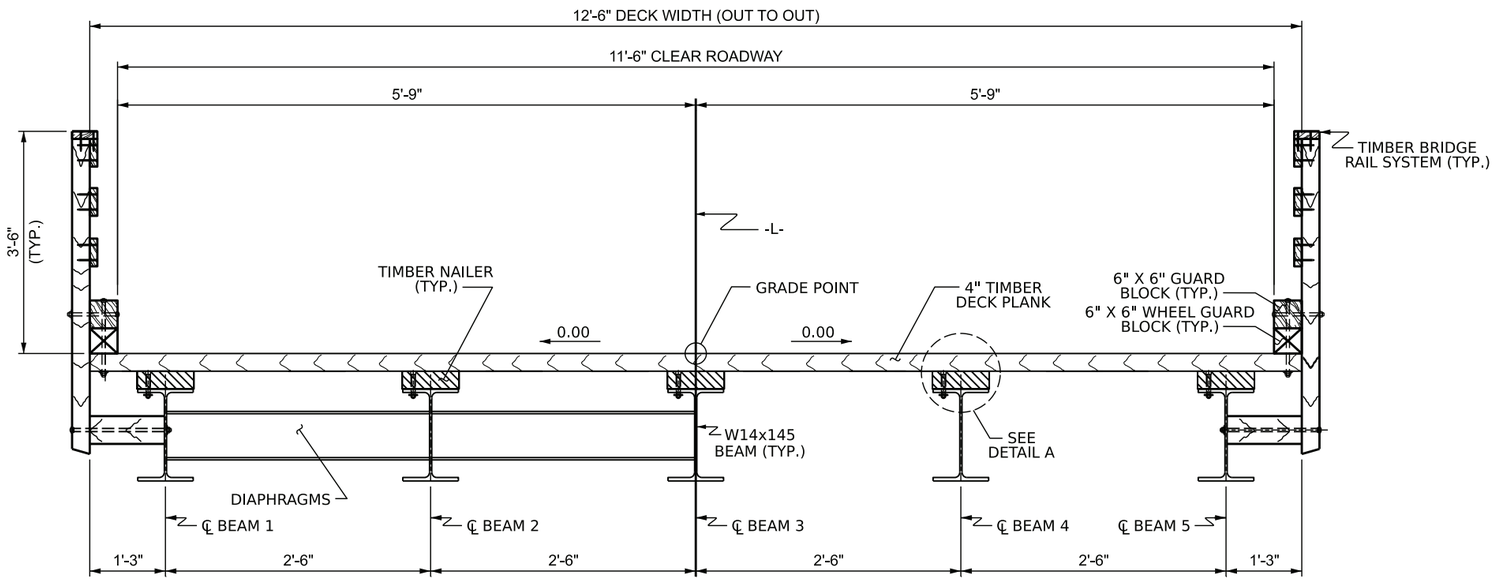
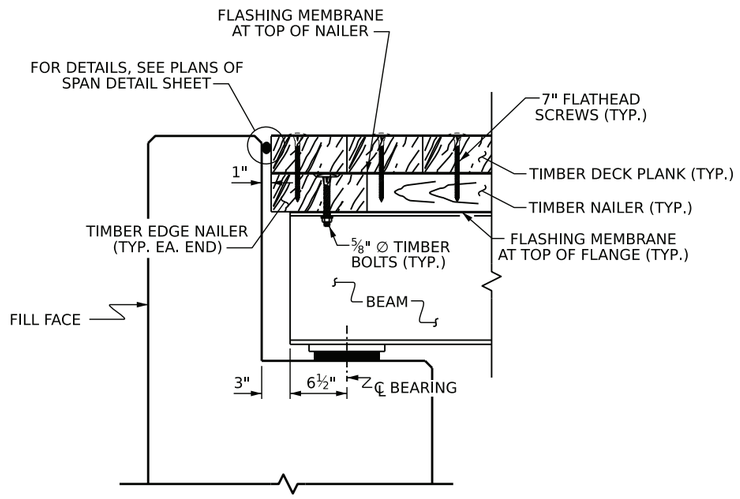
hbollinsky



TYPICAL SECTION



SECTION AT END BENT

NOTES

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

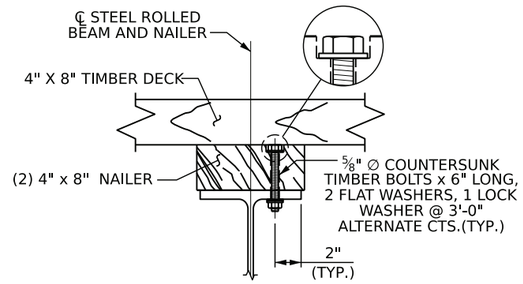
FOR TIMBER BRIDGE RAIL SYSTEM DETAILS, SEE TIMBER BRIDGE RAIL SYSTEM PLAN SHEET.

PRIOR TO PLACING TIMBER BEAM NAILER AND EDGE NAILER MEMBERS, PLACE A FLASHING MEMBRANE ON THE TOP SIDE OF THE STEEL BEAMS.

PRIOR TO PLACING TIMBER PLANK MEMBERS, PLACE A SELF-ADHERING FLASHING MEMBRANE ON THE TOP SIDE OF THE TIMBER NAILERS.

FOR BEAM AND DIAPHRAGM DETAILS, SEE FRAMING PLAN SHEET.

FOR SECTION A-A, SEE "PLAN OF SPAN DETAILS" SHEET



DETAIL A

PROJECT NO. 004_011.01.CBDEE

BUNCOMBE COUNTY

STATION: 10+50.25 -L-

NORTH CAROLINA PROFESSIONAL SEAL 036583 ENGINEER WESLEY D. HEVENER

12/11/2025

Signed by: Wes Hevener

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NORTH CAROLINA OFFICE OF EMERGENCY MANAGEMENT

STANDARD

SUPERSTRUCTURE

TYPICAL SECTION

DRAWN BY : HRB	DATE : 12/25				
CHECKED BY : DAC	DATE : 12/25				
DESIGN ENGINEER OF RECORD: WDH	DATE : 12/25				

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-6
1			3			TOTAL SHEETS
2			4			17

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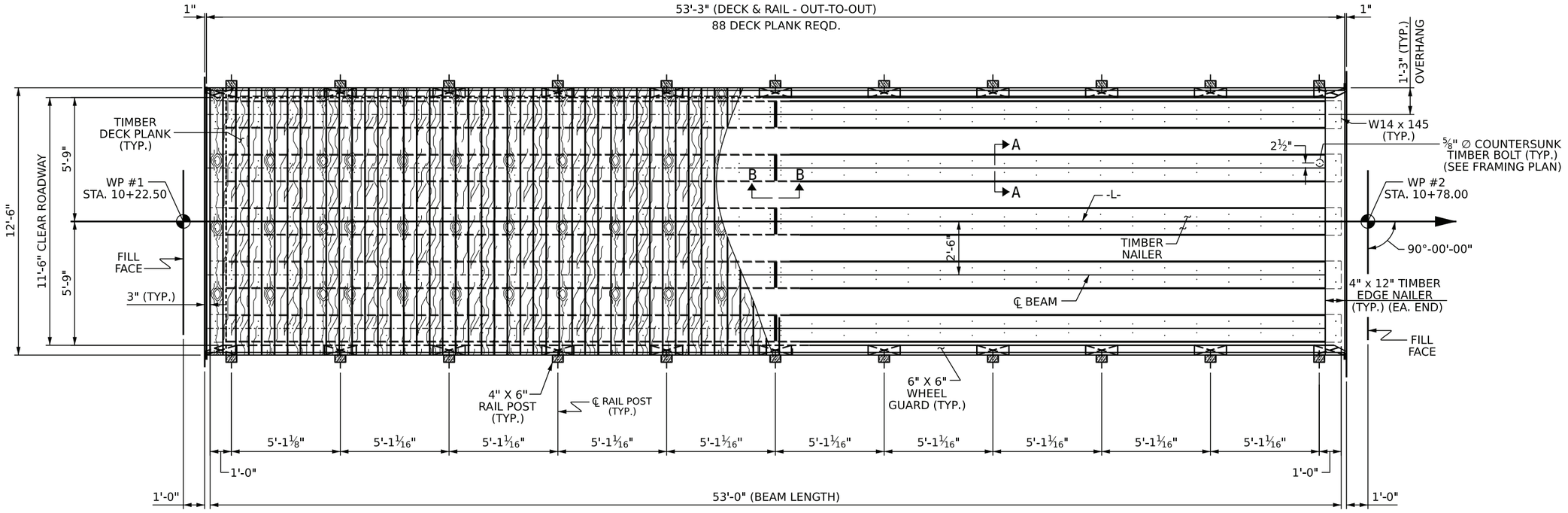

END BENT 1

END BENT 2

DECK LAYOUT

PROJECT NO. 004_011.01.CBDEE

BUNCOMBE COUNTY

STATION: 10+50.25 -L-

NORTH CAROLINA PROFESSIONAL SEAL 036583 ENGINEER WESLEY D. HEVENER

12/11/2025

Signed by: Wes Hevener

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NORTH CAROLINA OFFICE OF EMERGENCY MANAGEMENT

SUPERSTRUCTURE

PLAN OF 53'-0" BEAM 11'-6" CLEAR ROADWAY 90° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-7
1			3			TOTAL SHEETS
2			4			17

DRAWN BY : HRB DATE : 12/25

CHECKED BY : DAC DATE : 12/25

DESIGN ENGINEER OF RECORD: WDH DATE : 12/25

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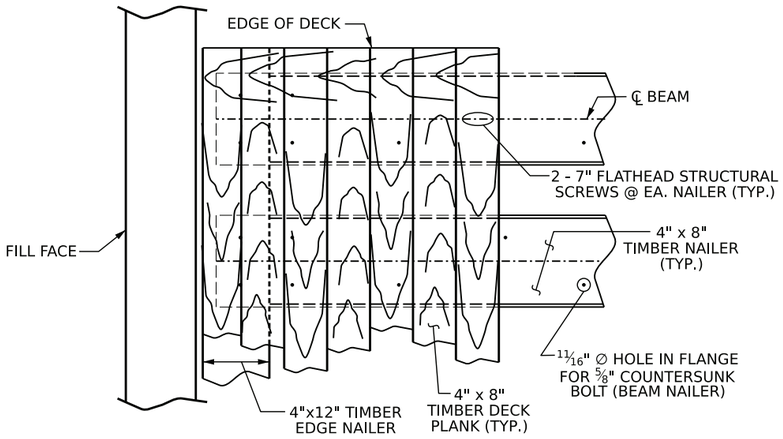
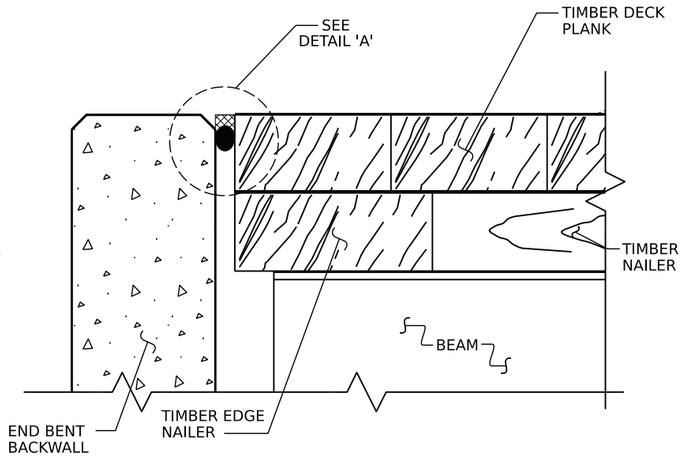
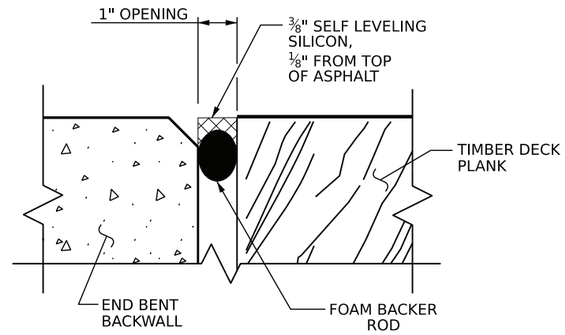
hbollinsky



TYPICAL DECK DETAIL AT ABUTMENT



PROPOSED POURABLE SILICONE JOINT DETAIL



DETAIL 'A'

BILL OF MATERIAL FOR 52'-11" FT. SPAN

TREATED LUMBER

ITEM	SIZE	LIN. FT.
TIMBER DECK PLANKS	4"x8"	1101.8
TIMBER NAILERS	4"x8"	513.8
TIMBER EDGE NAILERS	4"x12"	25.0

TOTAL TREATED LUMBER _____ 1640.6 LIN. FT.

FLASHING MEMBRANE

ITEM	SIZE	LIN. FT.
TOP OF BEAM	25 MILS	265.0
TOP OF TIMBER NAILERS	25 MILS	513.8
TOP OF TIMBER EDGE NAILERS	25 MILS	25.0

FLASHING MEMBRANE _____ 803.8 LIN. FT.

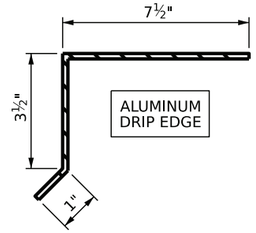
HARDWARE

ITEM	Nos.	SIZE	LBS.
5/8" ∅ TIMBER BOLTS	760	5/8"	560.0
HEAVY HEX NUTS	760	5/8"	48.0
STANDARD WASHER	760	5/8"	31.0
LOCK WASHER	760	5/8"	31.0
FLAT HEAD STR. SCREWS	3360	7"	17.7

HARDWARE FOR CONNECTIONS _____ 687.7 LBS.

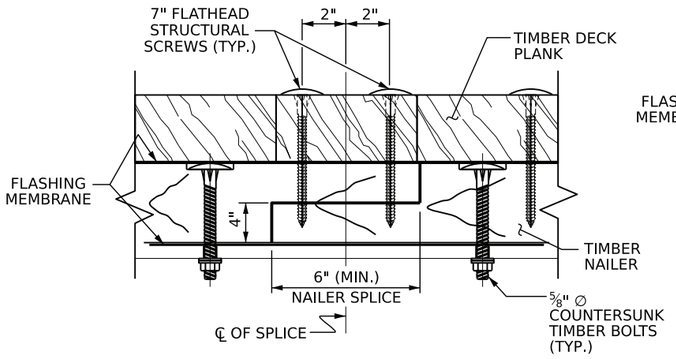
DRIP EDGE

	SIZE	LIN. FT.
22 GA. ALUMINUM DRIP EDGE	1'-0"	53.50

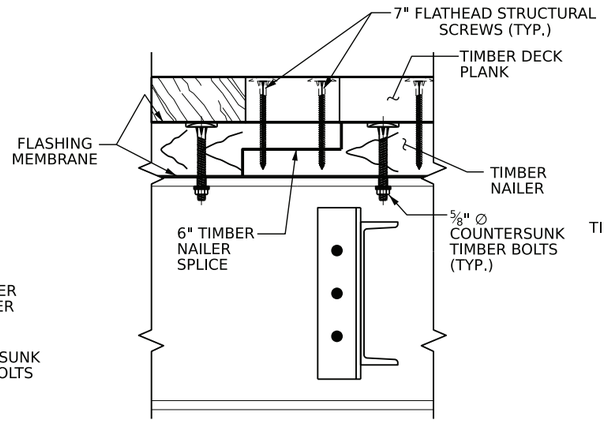


DRIP EDGDE DETAILS

POST AND BOLTS NOT SHOWN FOR CLARITY

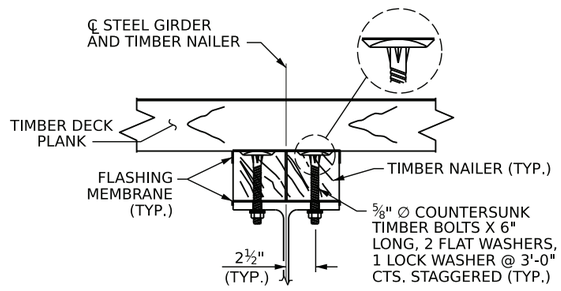


NAILER SPLICE DETAILS



SECTION B-B

NAILER SPLICE & TIMBER PLANK ATTACHMENT DETAILS



SECTION C-C

DOUBLE TIMBER NAILER ATTACHMENT DETAILS

PROJECT NO. 004_011.01.CBDEE

BUNCOMBE COUNTY

STATION: 10+50.25 -L-

NORTH CAROLINA OFFICE OF
EMERGENCY MANAGEMENT

STANDARD
SUPERSTRUCTURE

PLAN OF SPAN DETAILS

NORTH CAROLINA PROFESSIONAL SEAL 036583 ENGINEER WESLEY D. HEVENER

12/11/2025

Signed by: Wes Hevener

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ASSEMBLED BY :	HRB	DATE :	12/2025			
CHECKED BY :	DAC	DATE :	12/2025			
DESIGN ENGINEER OF RECORD:	WDH	DATE :	12/2025			
DRAWN BY :	BNB	4/24				
CHECKED BY :	JDH	10/24				

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-8
1			3			TOTAL SHEETS
2			4			17

12/11/2025
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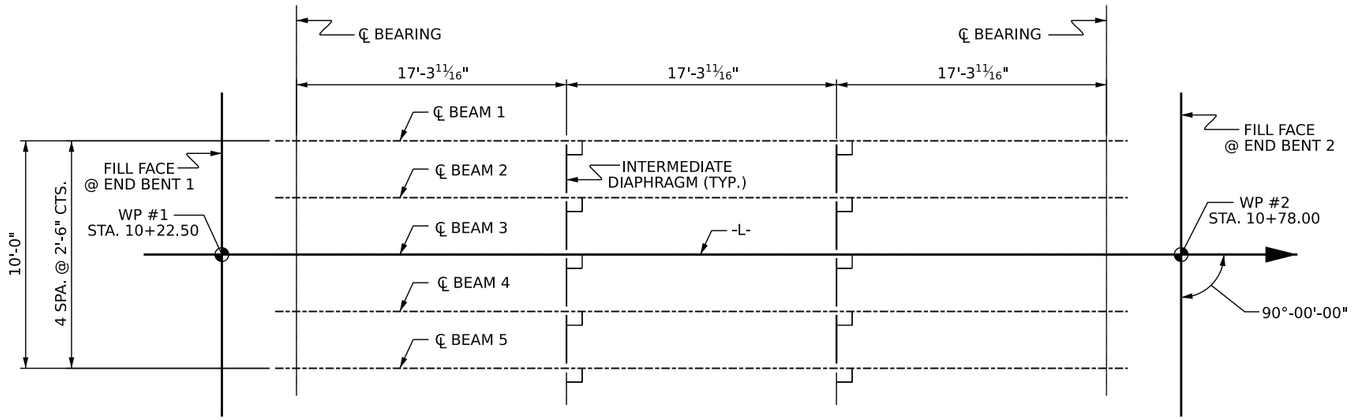
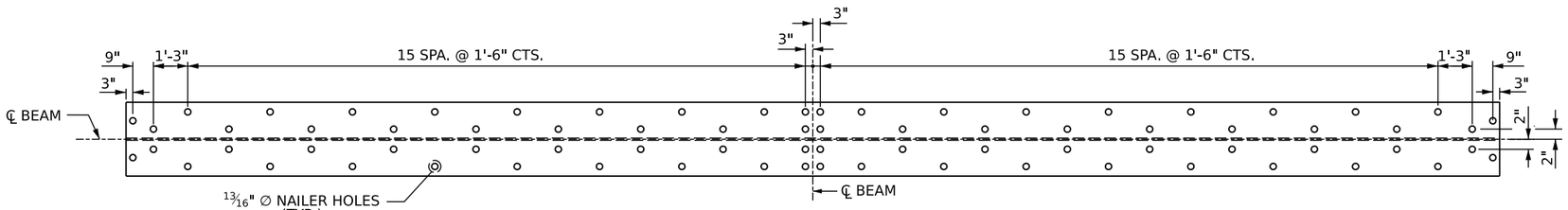
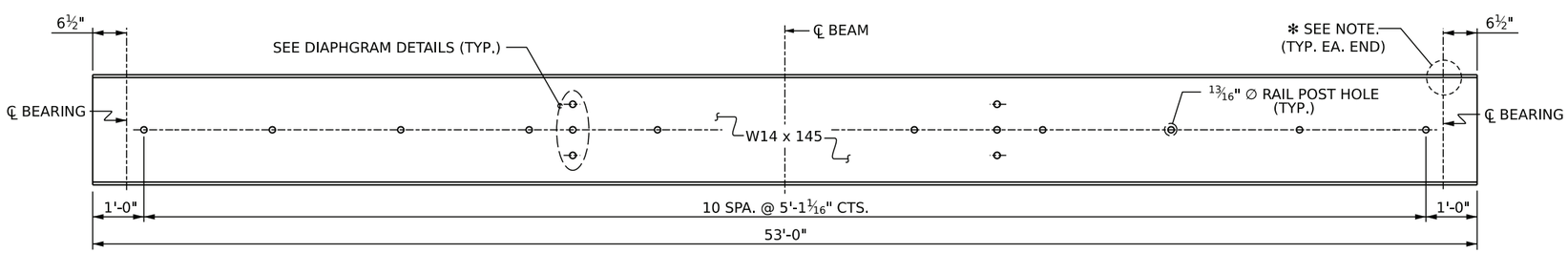


FRAMING PLAN



TOP FLANGE



ELEVATION

(SHOWING RAIL POST HOLES FOR EXTERIOR BEAMS
INTERIOR BEAMS ARE SIMILAR BUT WITHOUT RAIL POST HOLES)

BEAM DETAILS

NOTES

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

NO SHOP CAMBER REQUIRED, TURN NATURAL MILL CAMBER UP.

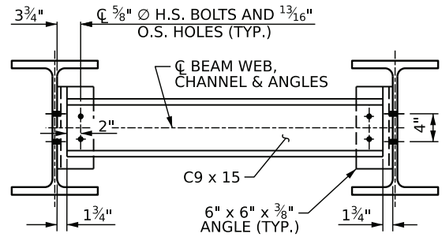
ALL STRUCTURAL STEEL FIELD CONNECTIONS SHALL BE 5/8" DIA. GALVANIZED HIGH STRENGTH BOLTS UNLESS OTHERWISE NOTED.

BEAMS SHALL BE PLACED PARALLEL TO THE CHORD.

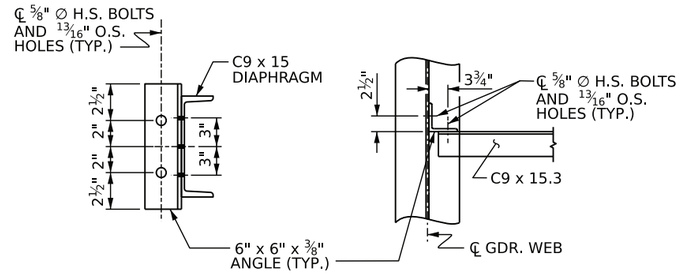
CONTRACTORS OPTION TO WELD CONNECTOR TO BEAM PRIOR TO SHOP COATING.

SEE GENERAL DRAWING NOTES FOR COATING.

✻ FOR SIZE AND LOCATION OF OPTIONAL BOLTED SOLE PLATE, SEE BEARING DETAILS SHEET.



INTERIOR DIAPHRAGM DETAIL



ANGLE DETAIL

PROJECT NO. 004_011.01.CBDEE

BUNCOMBE COUNTY

STATION: 10+50.25 -L-

NORTH CAROLINA PROFESSIONAL SEAL 036583 ENGINEER WESLEY D. HEVENER

12/11/2025

Signed by: Wes Hevener

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NORTH CAROLINA OFFICE OF
EMERGENCY MANAGEMENT

STANDARD
SUPERSTRUCTURE

FRAMING PLAN FOR 53'-0" BEAM LENGTH 90° SKEW

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

SHEET NO. S1-9

TOTAL SHEETS 17

DRAWN BY : HRB DATE : 12/25
CHECKED BY : DAC DATE : 12/25
DESIGN ENGINEER OF RECORD: WDH DATE : 12/25

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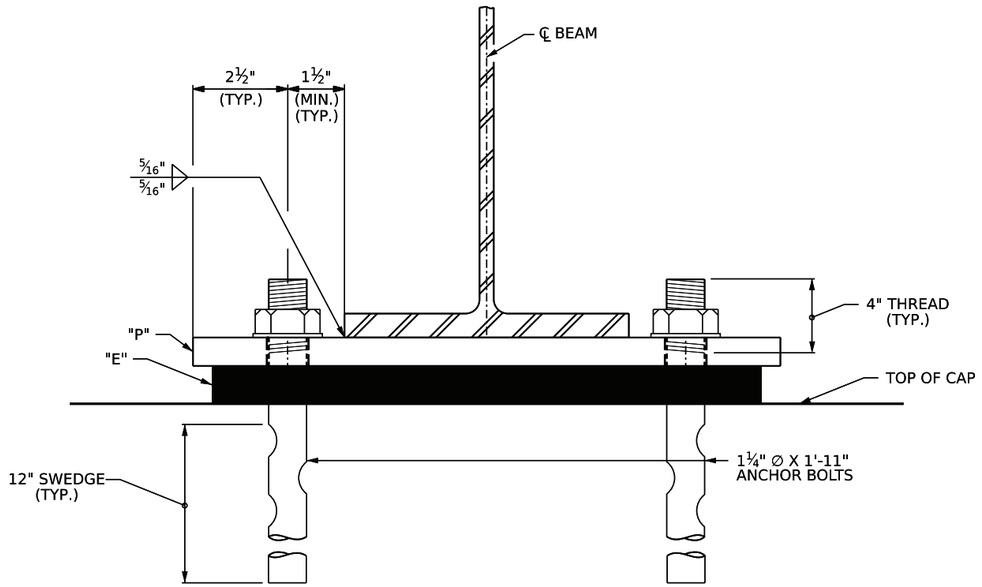
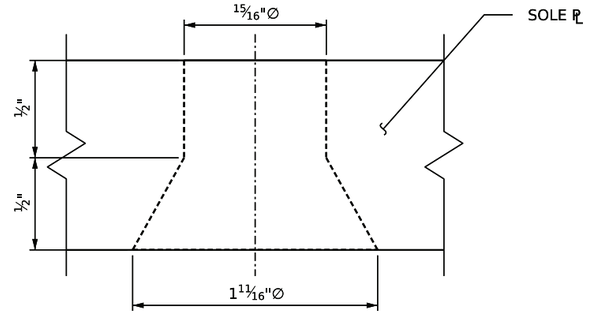
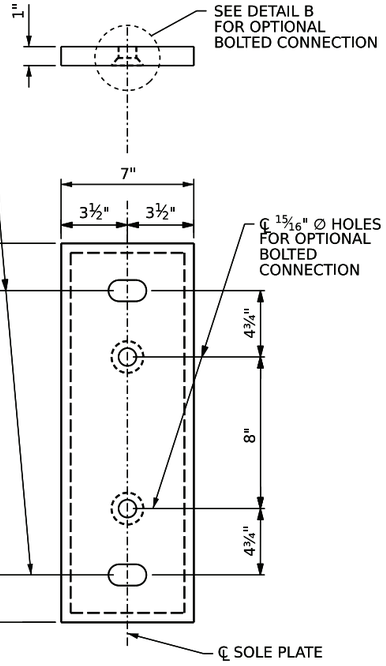


END VIEW

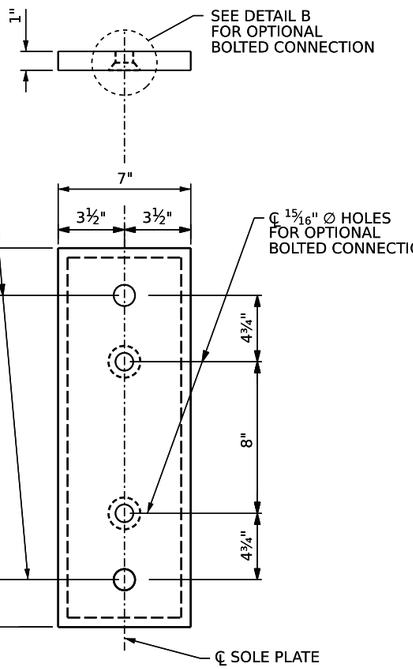
WELDED



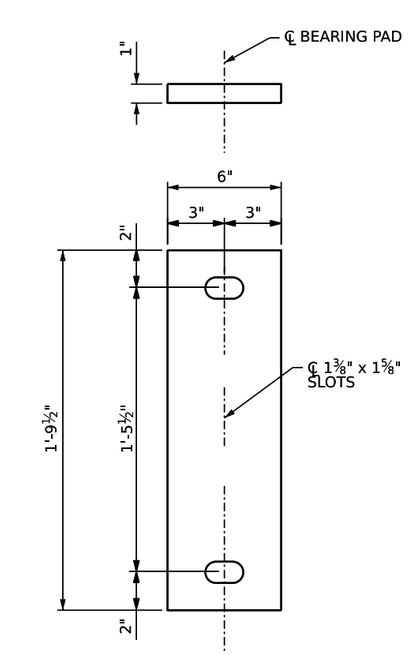
DETAIL B



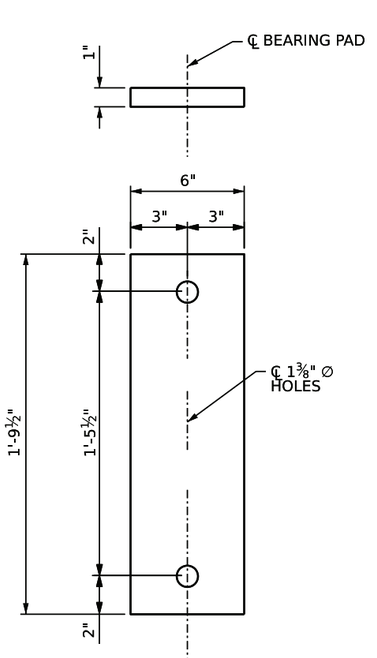
P1 SOLE PLATE DETAILS
(5 REQ'D)
EXPANSION



P2 SOLE PLATE DETAILS
(5 REQ'D)
FIXED



E1 ELASTOMERIC BEARING DETAILS
(5 REQ'D)
EXPANSION



E2 ELASTOMERIC BEARING DETAILS
(5 REQ'D)
FIXED

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 TO THE DEPARTMENT, 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.

AT THE APPROVAL OF THE ENGINEER, THE OPTIONAL BOLTED SOLE PLATE MAY BE USED AT NO ADDITIONAL COST TO THE DEPARTMENT.

PROJECT NO. 004_011.01.CBDEE

BUNCOMBE COUNTY

STATION: 10+50.25 -L-

ASSEMBLED BY :	HRB	DATE :	12/2025
CHECKED BY :	DAC	DATE :	12/2025
DESIGN ENGINEER OF RECORD:	WDH	DATE :	12/2025
DRAWN BY : GA 10/2024			
CHECKED BY : JDH 11/2024			

NORTH CAROLINA PROFESSIONAL SEAL 036583 ENGINEER WESLEY D. HEVENER

12/11/2025

Signed by: Wes Hevener

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STANDARD

BEARING DETAILS TYPE IV

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-10
1			3			TOTAL SHEETS
2			4			17

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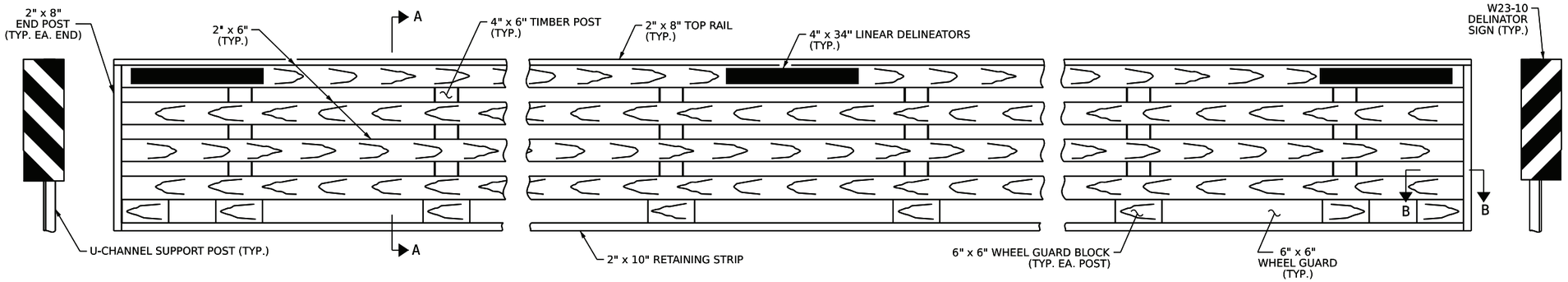
STD. TB_BRG_TYPEIV



BILL OF MATERIAL
FOR ONE RAIL 52'-11" (2 REQ.D)

TREATED LUMBER

ITEM	SIZE	LIN. FT.
RAILS	2"x 6"	150.75
RAIL POSTS	4"x6"	66.00
TOP RAIL	2"x8"	52.92
WHEEL GUARD	6"x6"	52.92
WHEEL GUARD BLOCK	6"x6"	16.50
END POSTS	2"x8"	12.00
SPACER BLOCK	6"x6"	11.00

HARDWARE

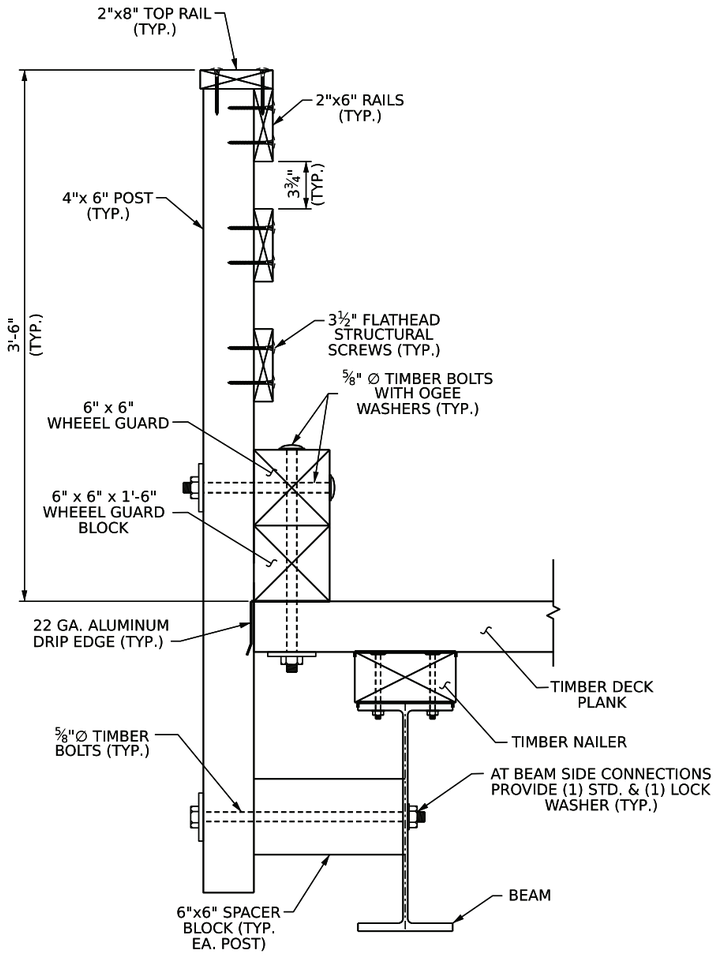
ITEM	Nos.	SIZE	LBS.
TIMBER BOLTS (WHEEL GUARD)	11	⅝" ∅	15.40
TIMBER BOLTS (SPACE BLOCK)	11	⅝" ∅	15.40
TIMBER BOLTS (RAIL)	11	⅝" ∅	25.30
HEAVY HEX NUTS	33	⅝" ∅	3.96
FLATHEAD STR. SCREWS	278	3½"	3.26
STANDARD WASHER	11	⅝" ∅	1.00
LOCK WASHER	11	⅝" ∅	1.00
OGEE WASHERS	22	⅝" ∅	13.64

HARDWARE FOR CONNECTIONS_____ APPROX. 78.96 LBS.

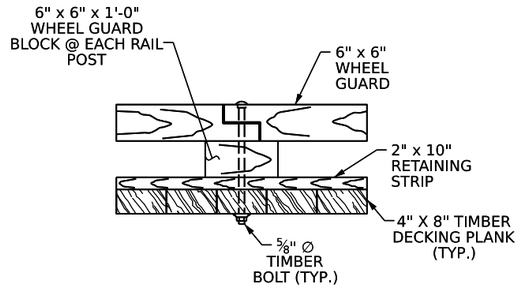
ACCESSORIES

ITEM	Nos.
4 X 34 LINEAR DELINEATOR	6
W23-10 12x36 DELINEATOR	2
U-CHANNEL SUPPORT POST	2

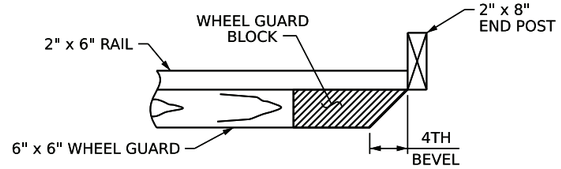
PAY LENGTH = 53.417 LIN. FT.

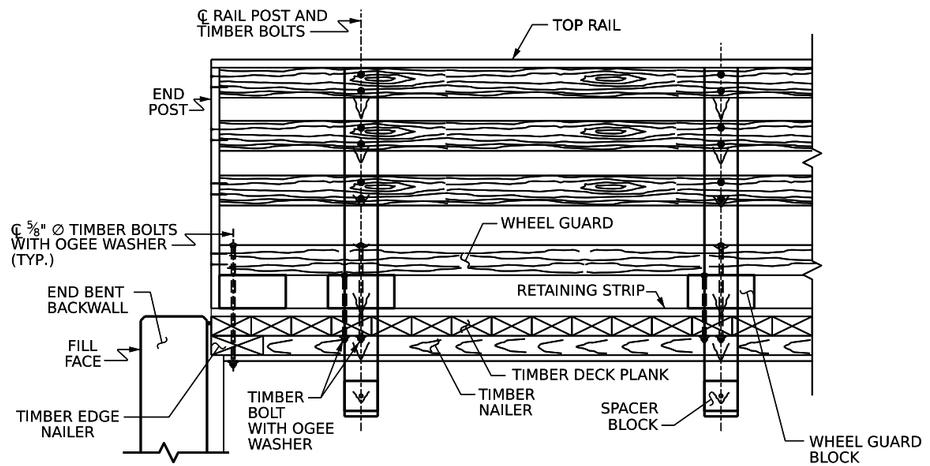


WHEEL GUARD SPLICE DETAIL



VIEW B-B





RAIL DETAIL AT END BENTS

NOTES

THE TIMBER BRIDGE RAIL SYSTEM SHALL NOT BE ATTACHED TO THE TIMBER BRIDGE DECK SYSTEM PRIOR TO THE TIMBER DECK WATERPROOFING MEMBRANE BEING INSTALLED.

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.

PROJECT NO. 004_011.01.CBDEE

BUNCOMBE COUNTY

STATION: 10+50.25 -L-

NORTH CAROLINA PROFESSIONAL SEAL 036583 ENGINEER WESLEY D. HEWNER

12/11/2025

Signed by: Wes Hewner /E38A4888/4245b...

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NORTH CAROLINA OFFICE OF
EMERGENCY MANAGEMENT

STANDARD

TIMBER BRIDGE RAIL SYSTEM

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-11
1			3			TOTAL SHEETS
2			4			17

ASSEMBLED BY :	HRB	DATE :	12/2025
CHECKED BY :	DAC	DATE :	12/2025
DESIGN ENGINEER OF RECORD:	WDH	DATE :	12/2025
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NOTES

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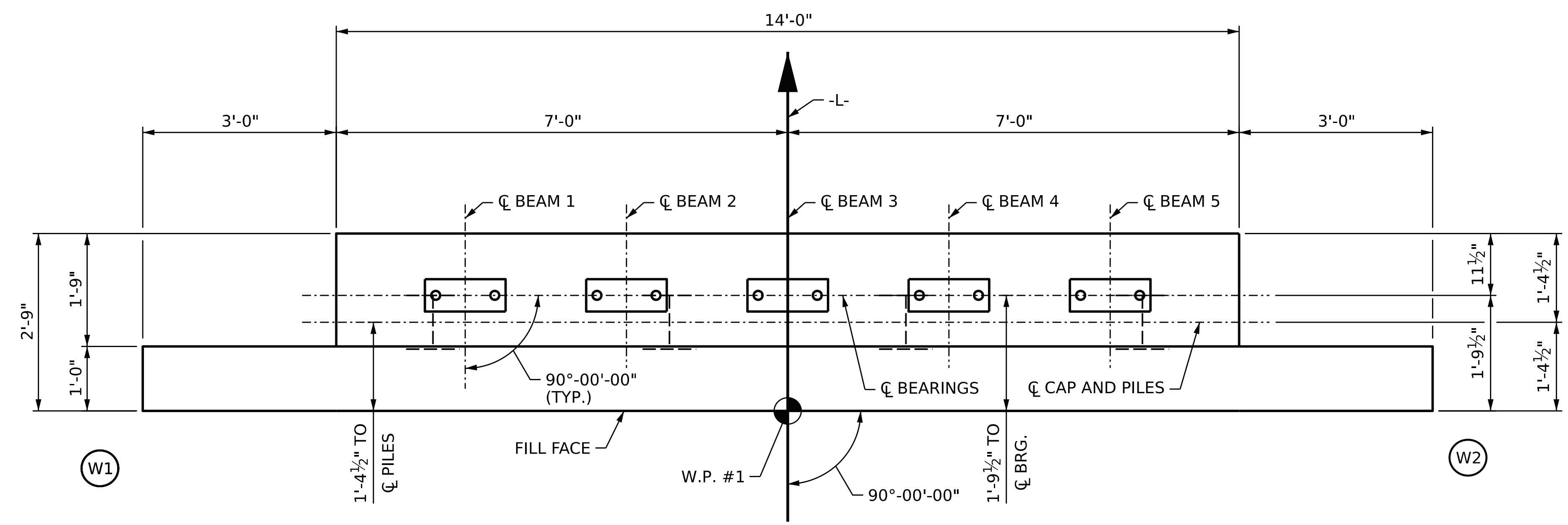
FOR PILE SPLICE DETAILS, SEE SHEET 4 OF 4.

FOR WING DETAILS, SEE SHEET 3 OF 4.



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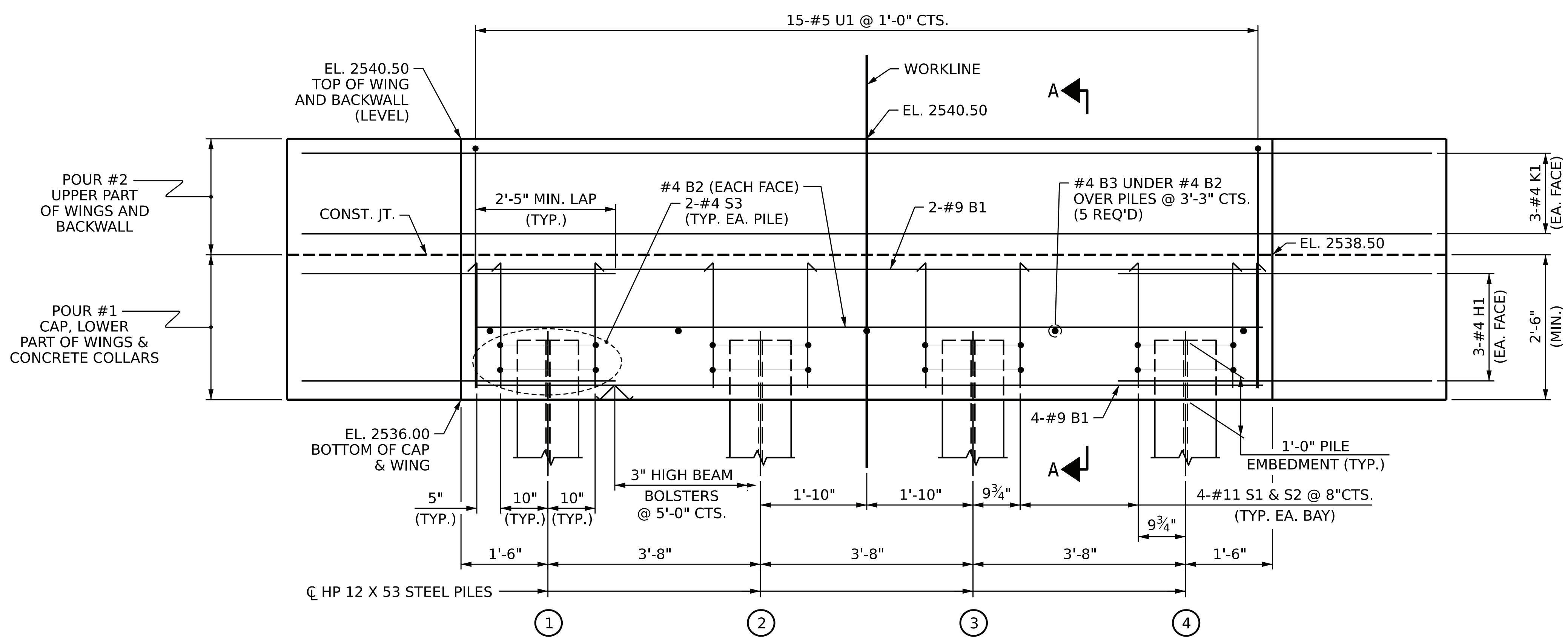

ELEVATION

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

PROJECT NO. 004_011.01.CBDEE
BUNCOMBE COUNTY
STATION: 10+50.25 -L-

SHEET 1 OF 4

NORTH CAROLINA OFFICE OF
EMERGENCY MANAGEMENT

SUBSTRUCTURE

END BENT NO. 1

NORTH CAROLINA PROFESSIONAL SEAL 036583 ENGINEER WESLEY D. HEVENER
12/11/2025
Signed by: Wes Hevener

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NO.	BY:	DATE:	NO.	BY:	DATE:	S1-12
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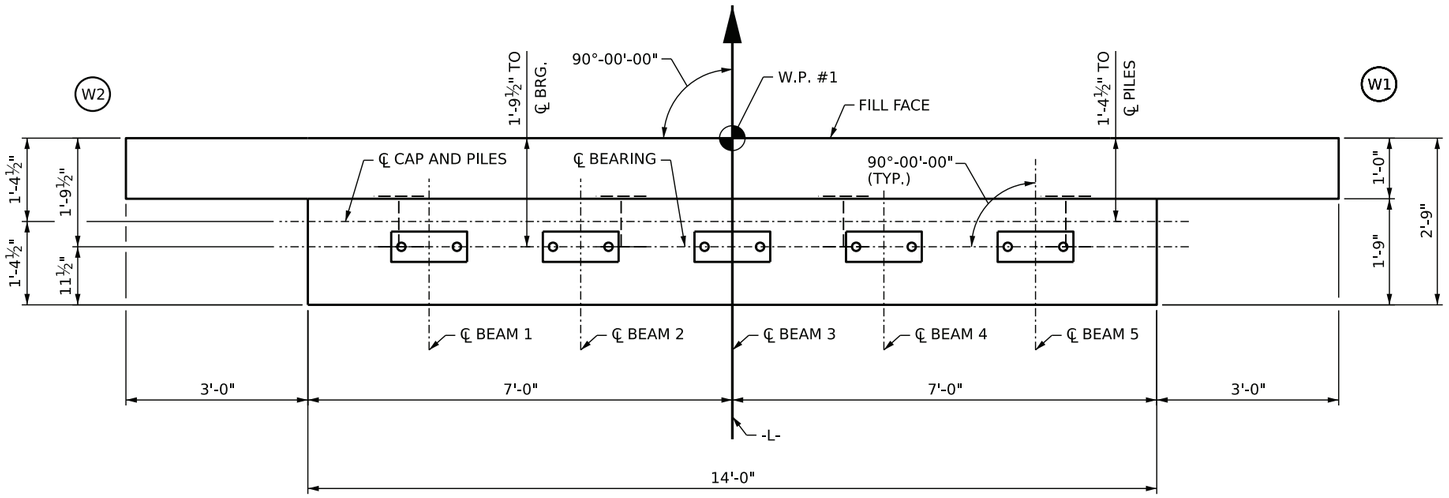

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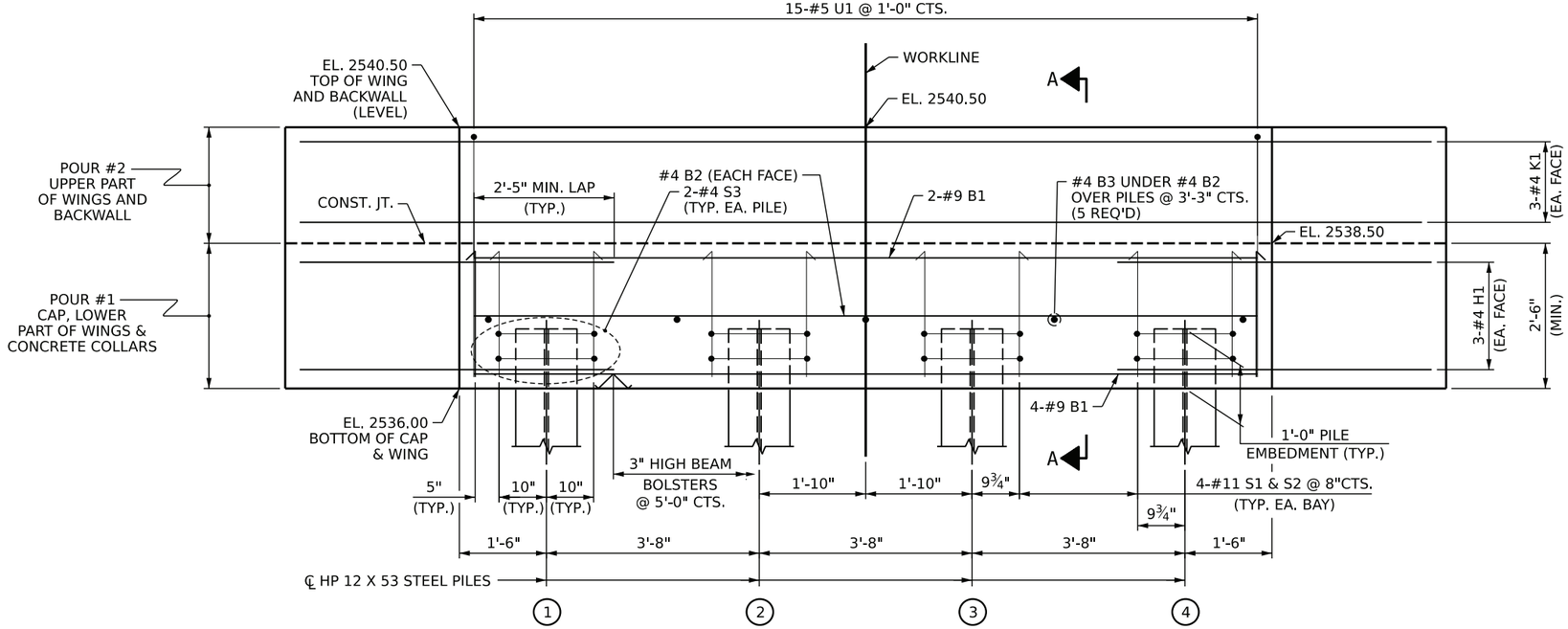

ELEVATION

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FOR PILE SPLICE DETAILS, SEE SHEET 4 OF 4.

FOR WING DETAILS, SEE SHEET 3 OF 4.

PROJECT NO. 004_011.01.CBDEE

BUNCOMBE COUNTY

STATION: 10+50.25 -L-

SHEET 2 OF 4

NORTH CAROLINA OFFICE OF
EMERGENCY MANAGEMENT

SUBSTRUCTURE

END BENT NO. 2

NORTH CAROLINA PROFESSIONAL SEAL 036583 ENGINEER WESLEY D. HEVENER

12/11/2025

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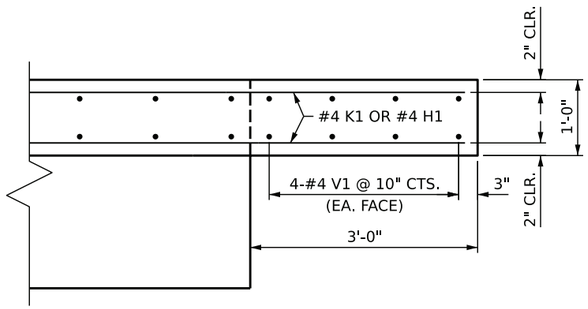
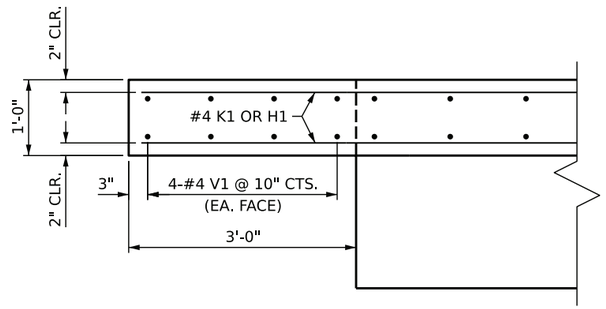


PLAN OF WING W1



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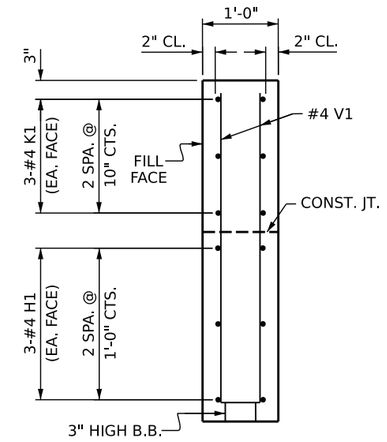
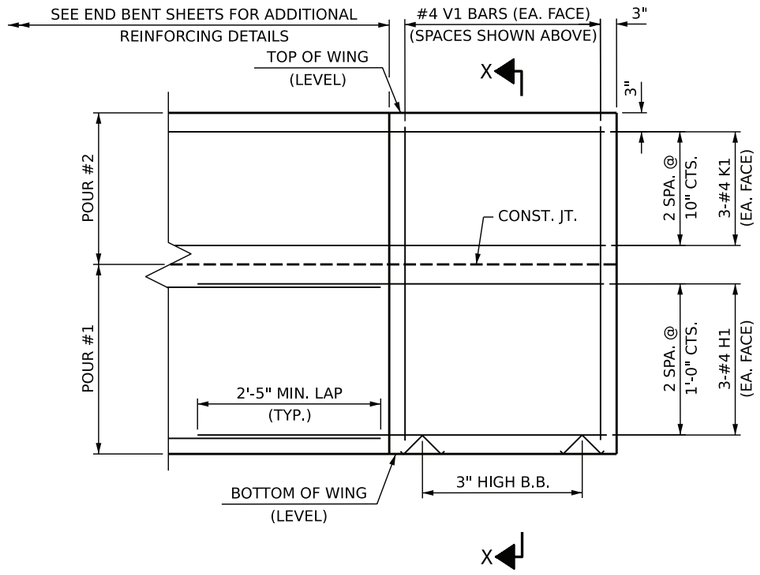
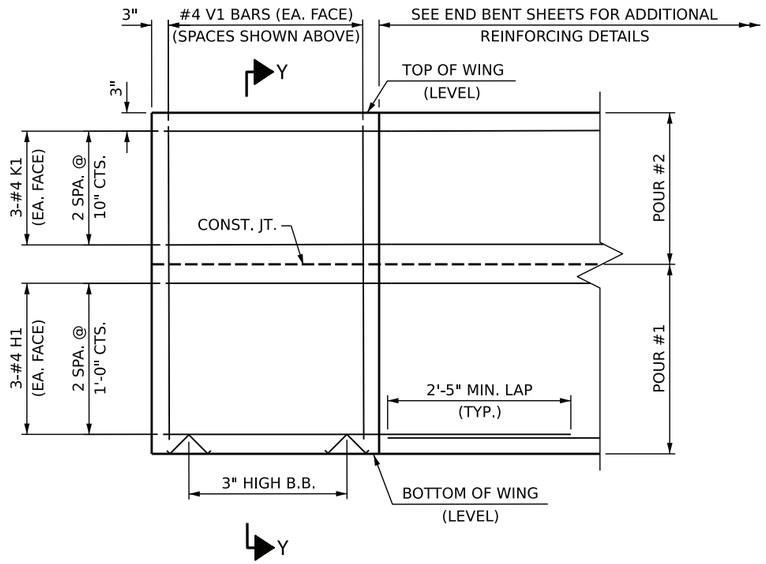


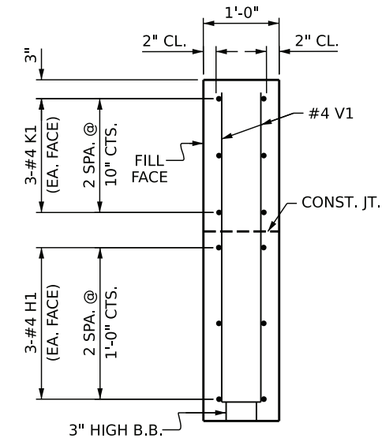
SECTION X-X



ELEVATION OF WING W1



ELEVATION OF WING W2



SECTION Y-Y

PROJECT NO. 004_011.01.CBDEE

BUNCOMBE COUNTY

STATION: 10+50.25 -L-

SHEET 3 OF 4

NORTH CAROLINA OFFICE OF
EMERGENCY MANAGEMENT

SUBSTRUCTURE

END BENT
WING DETAILS

NORTH CAROLINA PROFESSIONAL SEAL 036583 ENGINEER WESLEY D. HEVENER

12/11/2025

Signed by: Wes Hevener

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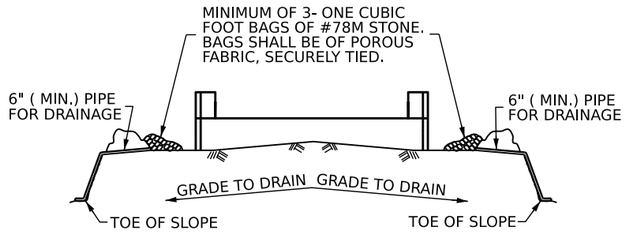
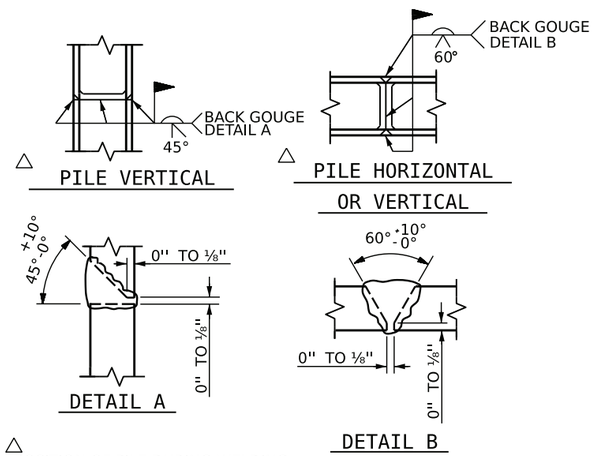


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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.

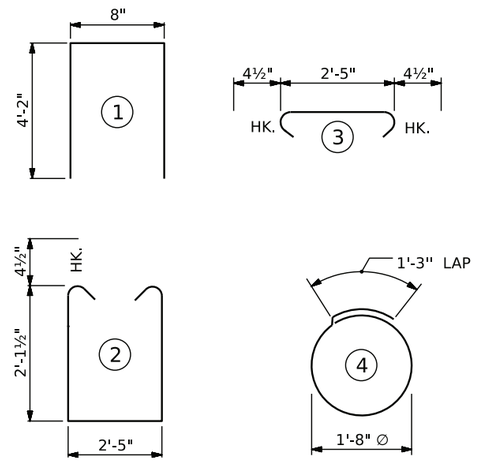
TEMPORARY DRAINAGE AT END BENT



△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

END BENT No. 1	END BENT No. 2
HP 12 X 53 STEEL PILES NO: 4 LIN. FT.= 200	HP 12 X 53 STEEL PILES NO: 4 LIN. FT.= 240
PILE DRIVING EQUIPMENT SETUP FOR HP 12 X 53 STEEL PILES NO: 4	PILE DRIVING EQUIPMENT SETUP FOR HP 12 X 53 STEEL PILES NO: 4
PILE REDRIVES NO: 4	PILE REDRIVES NO: 4

BILL OF MATERIAL

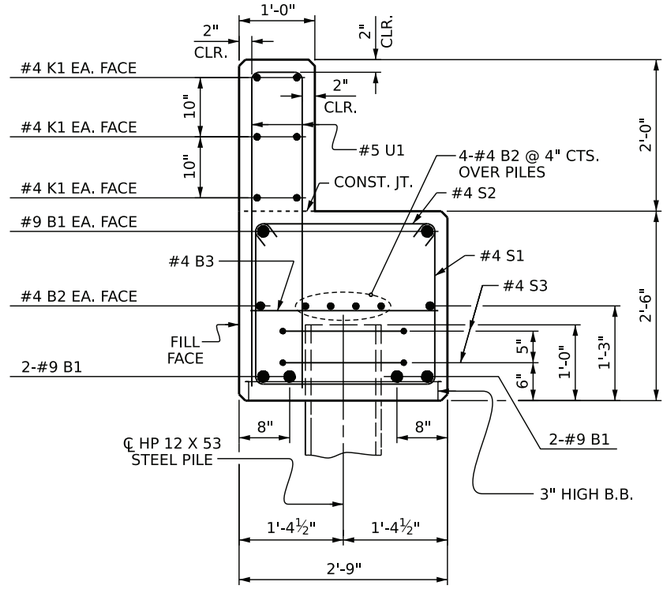
FOR ONE END BENT

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	6	9	STR	13'-6"	275
B2	6	4	STR	13'-6"	54
B3	5	4	STR	13'-6"	45
H1	6	4	STR	5'-5"	22
K1	6	4	STR	19'-6"	78
S1	16	4	2	3'-2"	34
S2	16	4	3	7'-5"	79
S3	8	4	4	6'-6"	35
U1	15	5	1	9'-0"	141
V1	16	4	STR	4'-0"	43

REINFORCING STEEL (FOR ONE END BENT) 806 LBS.

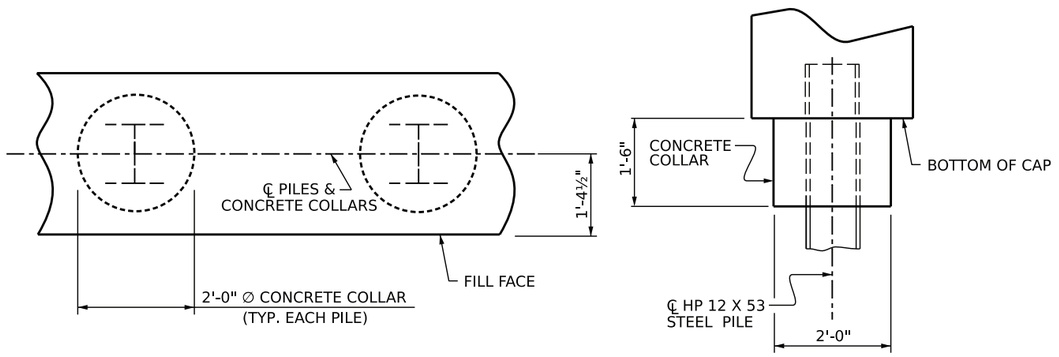
CLASS A CONCRETE BREAKDOWN (FOR ONE END BENT)

POUR #1	CAP, LOWER PART OF WINGS & COLLARS	4.9 C.Y.
POUR #2	UPPER PART OF WINGS & BACKWALL	1.5 C.Y.
	TOTAL CLASS A CONCRETE	6.4 C.Y.



SECTION A-A

(CONCRETE COLLAR NOT SHOWN FOR CLARITY. SEE "CORROSION PROTECTION FOR STEEL PILE DETAILS".)



PLAN ELEVATION

CORROSION PROTECTION FOR STEEL PILES DETAIL

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

PROJECT NO. 004_011.01.CBDEE

BUNCOMBE COUNTY

STATION: 10+50.25 -L-

SHEET 4 OF 4

NORTH CAROLINA OFFICE OF EMERGENCY MANAGEMENT

SUBSTRUCTURE

END BENT NO. 1 & 2 DETAILS

NORTH CAROLINA PROFESSIONAL SEAL 036583 ENGINEER WESLEY D. HEVENER

12/11/2025

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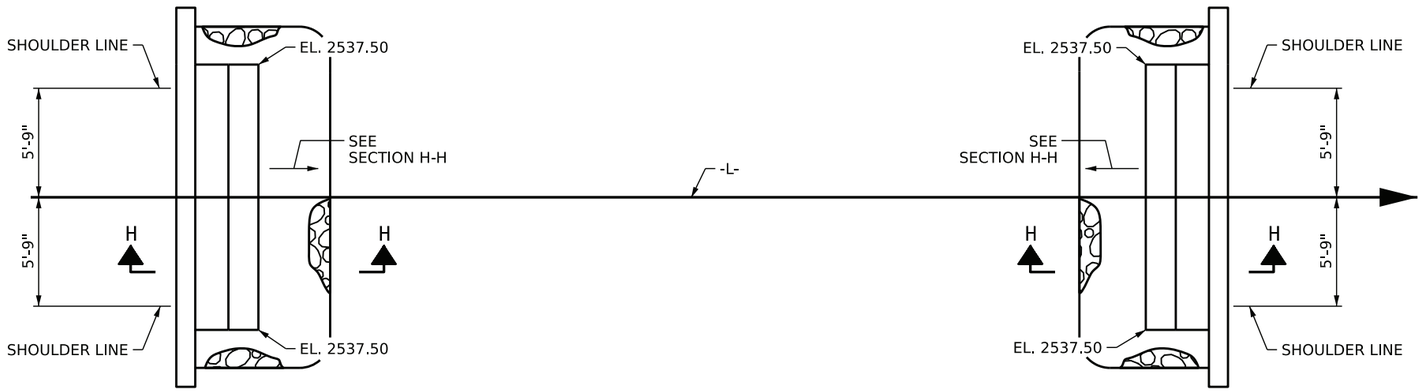
SHEET NO. S1-15

TOTAL SHEETS 17

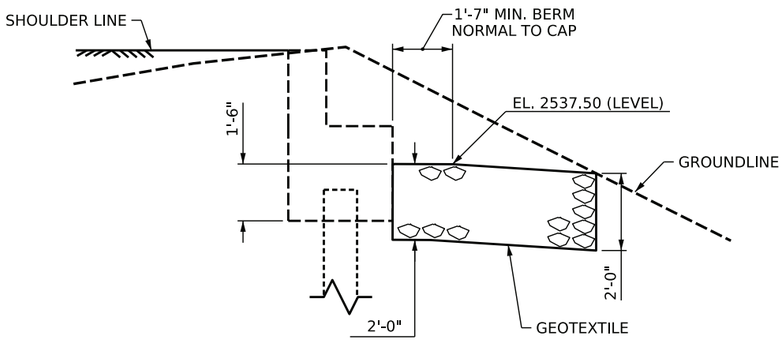
NOTES

FOR BERM WIDTH DIMENSIONS, SEE GENERAL DRAWING

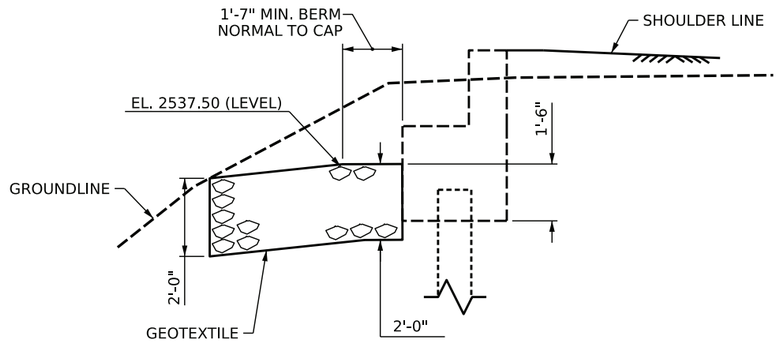
ESTIMATED QUANTITIES		
BRIDGE @ STA. 10+50.25 -L-	RIP RAP CLASS II (2'-0" THICK) (GRANITE)	GEOTEXTILE FOR DRAINAGE
	TONS	SQUARE YARDS
END BENT 1	11	12
END BENT 2	10	12



PLAN



SECTION H-H
END BENT 1



SECTION H-H
END BENT 2

PROJECT NO. 004_011.01.CBDEE

BUNCOMBE COUNTY

STATION: 10+50.25 -L-

NORTH CAROLINA PROFESSIONAL SEAL 036583 ENGINEER WESLEY D. HEVENER

12/11/2025

Signed by: Wes Hevener /E38A4889/4245b...

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NORTH CAROLINA OFFICE OF EMERGENCY MANAGEMENT

RIP RAP DETAILS

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DISCLAIMER

THESE RECOMMENDATIONS ARE NOT TO BE CONSTRUED AS A WARRANTY. ONCE FINAL INSPECTION IS COMPLETED BY THE PRIVATE ROADS AND BRIDGES PROGRAM, THE BRIDGE BECOMES THE SOLE RESPONSIBILITY OF THE PROPERTY OWNER(S). THE PROPERTY OWNER IS RESPONSIBLE FOR ALL MAINTENANCE AND SAFETY RESPONSIBILITIES RELATED TO THEIR PRIVATE ROAD AND BRIDGE.

THESE RECOMMENDATIONS ARE INTENDED AS A GENERAL GUIDE FOR PRIVATE BRIDGE OWNERS. IT IS NOT A COMPREHENSIVE CHECKLIST AND DOES NOT REPLACE EVALUATION BY A QUALIFIED ENGINEER. IF YOU OBSERVE UNUSUAL MOVEMENT, DEFLECTION, CRACKING, OR DETERIORATION, CLOSE YOUR BRIDGE TO TRAFFIC IMMEDIATELY AND CONTACT A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF NORTH CAROLINA.

THE MAINTENANCE PRACTICES OUTLINED HEREIN ARE INTENDED AS GENERAL RECOMMENDATIONS FOR PRIVATE BRIDGE OWNERS. THEY DO NOT REPLACE INSPECTION OR REPAIR GUIDANCE FROM A QUALIFIED ENGINEER. FOR ANY STRUCTURAL CONCERNS OR SAFETY RELATED ISSUES, CONSULT A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF NORTH CAROLINA.

INTRODUCTION

THESE RECOMMENDATIONS PROVIDE GUIDANCE FOR PRIVATE BRIDGE OWNERS WITH A BRIDGE CONSTRUCTED USING STEEL BEAMS, TIMBER DECK, TIMBER WHEEL GUARD SYSTEM, BEARINGS, AND REINFORCED CONCRETE CAPS ON STEEL PILES SUBSTRUCTURE. REGULAR INSPECTION AN MAINTENANCE ARE ESSENTIAL TO ENSURE THE BRIDGE REMAINS SAFE AND SERVICEABLE FOR YEARS TO COME

SAFETY

DO NOT EXCEED THE BRIDGE'S INTENDED LOAD CAPACITY.

KEEP THE BRIDGE FREE OF DEBRIS, SNOW, AND ICE. WARNING: DO NOT APPLY SALT OR DE-ICING CHEMICALS TO REMOVE SNOW AND ICE. THESE CHEMICALS ARE EXTREMELY CORROSIVE TO METALS.

INSPECT THE BRIDGE REGULARLY TO IDENTIFY EARLY SIGNS OF DETERIORATION, DAMAGE, EXCESSIVE DEFLECTION OR MOVEMENT. SEE RECOMMENDED IN THE "ROUTINE INSPECTIONS" SECTION.

DO NOT MODIFY, WELD, OR CUT ANY STRUCTURAL ELEMENTS WITHOUT CONSULTING A QUALIFIED ENGINEER.

MAKE SURE THE WHEEL GUARD SYSTEM IS WELL-MAINTAINED, SECURE AND REINSTALLED OR REPLACED.

THE TIMBER WHEEL GUARD IS INTENDED ONLY TO MARK THE EDGE OF THE BRIDGE AND IS NOT DESIGNED TO STOP VEHICLES OR PREVENT THEM FROM DRIVING OFF THE BRIDGE. DRIVERS SHOULD USE EXTRA CAUTION WHEN CROSSING THE BRIDGE. TAKE MEASURES TO PROVIDE SAFE EDGE PROTECTION FOR PEDESTRIANS AND TO PREVENT FALLS.

BRIDGE COMPONENTS

DECK

TIMBER DECK

THE TIMBER DECKING IS COMPOSED OF PRESSURE-TREATED OR STRUCTURAL-GRADE WOOD PLANKS, INCLUDING RUNNING BOARDS, DECKING BOARDS, AND NAILERS.

THE TIMBER DECKING SERVES AS THE PRIMARY DRIVING SURFACE OF THE BRIDGE AND SUPPORTS THE VEHICLE LOADS BY DISTRIBUTING THE WEIGHT ACROSS THE BRIDGE STRUCTURE.

TIMBER DECKING IS SUBJECT TO WEATHERING, DECAY, AND DETERIORATION FROM TRAFFIC AND ENVIRONMENTAL EXPOSURE. OVER TIME BOARDS MAY LOOSEN, CRACK, WARP OR SPLINTER, FASTENERS MAY CORRODE, LOOSEN, OR BREAK, AND BIOLOGICAL GROWTH SUCH AS MOLD, MOSS, OR ALGAE MAY DEVELOP.

TIMBER WHEEL GUARD SYSTEM

THE TIMBER WHEEL GUARD RUNS ALONG THE EDGES OF THE DECK TO PROVIDE A VISUAL AND PHYSICAL BOUNDARY, IT HELPS PREVENT VEHICLES FROM DRIFTING OFF THE DECK AND ASSISTS IN CHANNELING WATER RUNOFF AWAY FROM THE BRIDGE. THIS MUST BE KEPT FREE OF DEBRIS TO ENSURE PROPER DRAINAGE AND SAFETY.

THE WHEEL GUARD SYSTEM CONSISTS OF TIMBER WHEEL GUARDS AND TIMBER WHEEL GUARD BLOCKS. IT IS CONSTRUCTED FROM PRESSURE-TREATED OR STRUCTURAL-GRADE WOOD.

TIMBER WHEEL GUARD SYSTEMS ARE SUBJECT TO WEATHERING, DECAY, AND DETERIORATION FROM ENVIRONMENTAL EXPOSURE AND GENERAL WEAR. OVER TIME, COMPONENTS MAY LOOSEN, WARP, OR SPLIT, AND BIOLOGICAL GROWTH SUCH AS MOLD OR MILDEW MAY DEVELOP.

ROUTINE MAINTENANCE REQUIRES REGULAR CLEANING, INSPECTION, AND TIMELY REPAIR OR REPLACEMENT OF DETERIORATED OR LOOSE COMPONENTS TO ENSURE CONTINUED SAFETY AND APPEARANCE.

SUPERSTRUCTURE

STEEL BEAMS

THE SUPERSTRUCTURE IS MADE OF STEEL I-BEAMS AND CROSSMEMBERS, FORMING A RIGID SUPPORT SYSTEM. IT SERVES AS THE PRIMARY LOAD-CARRYING ELEMENT AND TRANSFERS LOAD FROM THE DECK TO THE BEARINGS AND SUBSTRUCTURE. THE SUPERSTRUCTURE IS PROTECTED BY A COATING SYSTEM, BUT IT REMAINS SUSCEPTIBLE TO CORROSION AND MECHANICAL WEAR DUE TO ENVIRONMENTAL EXPOSURE, MOISTURE, AND TRAFFIC LOADS OVER TIME. ADDITIONALLY, WELDS MAY DEGRADE OVER TIME FROM FATIGUE AND VIBRATION.

REGULAR INSPECTION MUST BE CONDUCTED OF THE PROTECTIVE COATING FOR SIGNS OF CORROSION AND PITTING, INSPECTING FOR ANY CRACKING AT WELDS, AND CLEARING DEBRIS TO PREVENT MOISTURE RETENTION AND ENSURE CONTINUED STRUCTURAL PERFORMANCE. INSPECTIONS MUST BE PERFORMED BY A QUALIFIED PERSON AND USING A CERTIFIED BRIDGE INSPECTOR IS RECOMMENDED.

IF THE INSPECTION DETECTS ANY CRACKING IN THE STEEL BEAMS, THE OWNER SHOULD CLOSE THE BRIDGE IMMEDIATELY TO VEHICULAR TRAFFIC AND CONTACT A LICENSED STRUCTURAL ENGINEER FOR REPAIR SOLUTION.

BEARINGS

BEARINGS MAY INCLUDE COMPONENTS SUCH AS STEEL PLATES, ELASTOMERIC PADS, AND SHIMS THAT ARE POSITIONED BETWEEN THE STEEL BEAMS AND THE TOP OF THE SUBSTRUCTURE CAPS OR ABUTMENTS, THE BEARINGS ACCOMMODATE CONTROLLED MOVEMENT CAUSED BY THERMAL EXPANSION, LOADING, AND SETTLING.

BEARINGS ARE SUSCEPTIBLE TO CORROSION, WEAR, MATERIAL DEGRADATION, AND LOSS OF FUNCTIONALITY DUE TO ACCUMULATED DEBRIS, AND MISALIGNMENT.

ROUTINE MAINTENANCE INCLUDES REGULAR INSPECTION FOR CORROSION, WEAR, MATERIAL DEGRADATION, AND DEBRIS BUILDUP, AS WELL AS ENSURING THAT BEARINGS REMAIN PROPERLY ALIGNED AND ARE NOT OBSTRUCTED BY DIRT OR SHIFTING MATERIALS.

SUBSTRUCTURE

REINFORCED CONCRETE CAPS ON STEEL PILES

THE SUBSTRUCTURE FEATURES A REINFORCED CONCRETE CAP SUPPORTED BY STRUCTURAL STEEL H-PILES, FORMING AN INTEGRATED CAP SYSTEM. THE SUBSTRUCTURE IS INTENDED TO TRANSFER ALL IMPOSED LOADS FROM THE SUPERSTRUCTURE TO THE FOUNDATION SYSTEM, ENSURING STRUCTURAL STABILITY.

THE SUBSTRUCTURE COMPONENTS ARE SUSCEPTIBLE TO CORROSION, CRACKING, BENDING, LOOSE CONNECTIONS, AND UNEVEN SETTLING.

ROUTINE MAINTENANCE INCLUDES REMOVING RUST, SEALING/REPAIRING CRACKS, STRAIGHTENING ANY BENT OR TIGHTENING ANY LOOSE COMPONENTS, AND LEVELING UNEVEN SETTLING DETECTED.

ROUTINE INSPECTIONS

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INSPECTION FREQUENCY

INSPECTIONS ARE TO BE PREFORMED EVERY 6 MONTHS FOR THE FIRST 2 YEARS, THEN ANNUALLY AFTER THAT.

PERFORM ADDITIONAL INSPECTIONS AFTER SEVERE STORMS, FLOODING, SEISMIC EVENTS, OR AFTER VEHICULAR IMPACTS.

INSPECTION CHECKLIST

TIMBER DECK AND TIMBER WHEEL GUARD SYSTEM

CHECK DECK AND WHEEL GUARD SYSTEM FOR DECAY, CRACKING, SPLITTING, OR IMPACT DAMAGE.

INSPECT CONNECTIONS BETWEEN WHEEL GUARDS AND WHEEL GUARD BLOCKS FOR LOOSENESS, RUSTED FASTENERS, OR DETERIORATION,

ENSURE ALL BOARDS AND WHEEL GUARD SYSTEM COMPONENTS ARE SECURELY FASTENED WITH NO MISSING FASTENERS.

LOOK FOR PROTRUDING OR CORRODED FASTENERS THAT COULD POSE A SAFETY HAZARD.

VERIFY THAT WHEEL GUARDS ARE UPRIGHT, STABLE, AND NOT SHIFTING OR LEANING.

ENSURE THE ENTIRE DECK AND WHEEL GUARD SYSTEM, ESPECIALLY THE CURB LINE, IS CLEAN AND FREE OF ORGANIC DEBRIS SUCH AS LEAVES, SOIL, OR MOSS BUILDUP.

SUPERSTRUCTURE

INSPECT FOR RUST PEELING PAINT, DEFORMATION, LOOSE BOLTS OR CRACKED WELDS.

ENSURE COATING IS INTACT AND MOISTURE IS NOT ACCUMULATING ON STEEL SURFACES.

LOOK FOR SIGNS OF SHIFTING OR UNEVEN BEARING CONTACT.

BEARINGS

CONFIRM THAT ALL BEARINGS SURFACES ARE CLEAN AND FREE OF DEBRIS.

ENSURE THE BEARINGS ARE FREE TO MOVE AS INTENDED.

LOOK FOR CORROSION, WORN PADS, OR DETERIORATED SHIMS.

CHECK FOR ANY SIGNS OF SETTLEMENT OR ROTATION.

CAPS AND FOUNDATIONS

INSPECT FOR CRACKS, LOOSE CONNECTIONS, BENDING, SETTLEMENT, LEANING, OR EROSION.

CONFIRM THAT WATER IS BEING DIRECTED AWAY FROM THE BRIDGE SUPPORTS.

MONITOR CHANGES OVER TIME AND TAKE PHOTOS TO DOCUMENT CONDITION.

INSPECT EXPOSED STEEL FOR SIGNS OF RUST OR PAINT DETERIORATION.

EXAMINE STEEL PILE CAPS FOR DEFLECTION, CORROSION, OR PHYSICAL DAMAGE.

LOOK FOR SIGNS OF SCOUR. SCOUR REFERS TO THE EROSION OR REMOVAL OF SOIL AROUND THE FOUNDATION OR PILES, TYPICALLY CAUSED BY FLOWING WATER. IT CAN UNDERMINE SUPPORT AND LEAD TO STRUCTURAL INSTABILITY.

ROUTINE MAINTENANCE

DISCLAIMER: THE MAINTENANCE PRACTICES OUTLINE IN THIS SECTION ARE INTENDED AS GENERAL RECOMMENDATIONS FOR PRIVATE BRIDGE OWNERS. THEY DO NOT REPLACE INSPECTION OR REPAIR GUIDANCE FROM A QUALIFIED ENGINEER. FOR ANY STRUCTURAL CONCERNS OR SAFETY-RELATED ISSUES, CONSULT A PROFESSIONAL ENGINEER REGISTERED IN TEH STATE OF NORTH CAROLINA.

KEEP A MAINTENANCE LOG TO TRACK INSPECTION DATES, OVSERCATIONS, AND ANY WORK PERFORMED.

ADDRESS MINOR ISSUES EARLY TO PREVENT COSTYLY REPAIRS LATER.

PROMPTLY ADDRESS ANY FINDINGS FROM INSPECTIONS TO MAINTAIN SAFETY AND FUNCTIONALITY.

TIMBER DECK AND TIMBER WHEEL GUARD

REMOVE DEBRIS AND ORGANIC MATERIAL BUILDUP REGULARLY.

APPLY WOOD SEALER OR PRESERVATICE EVERY 23 YEARS. CONSIDER USING REFLECTIVE PAINT ON BRIDGE WHEEL GUARDS FOR AN EXTRA SAFETY MEASYRE. REPLACE DAMAGED, CRACKED, OR ROTTED BAORDS AND WHEEL GUARD COMPONENTS PROMPTLY.

TIGHTEN OR REPLACE LOOSE FASTENERS AND CONNECTIONS.

REPAIR OR REPLACE LEANING OR UNSTABLE WHEEL GUARDS TO MAINTAIN SAFETY.

SUPERSTRUCTURE

REMOVE SURFACE RUST USING WIRE BRUSHING AND APPLY RUST-INHIBITING PRMER AND TOUCH-UP PAINT.

RECOAT ENTIRE STEEL SURFACES EVERY 5 YEARS, OR AS NEEDED BASED ON INSPECTION FINDINGS.

KEEP DRAINAGE PATHWAYS CLEAR TO PREVENT WATER ACCUMULATION ON STEEL MEMBERS.

BEARINGS

REMOVE ANY DEBRIS, VEGETATION, OR SEDIMENT BUILDUP NEAR OR AROUND THE BEARING POINTS.

INSPECT AND MAINTAIN BEARING PADS, PLATES, OR SHIMS TO ENSURE THEY FUNCTION PROPERLY.

ENSURE NO BINDING, JAMMING, OR CORROSION THAT COULD RESTRICT MOVEMENT.

REPLACE DETERIORATED COMPONENTS AS NEEDED, UNDER THE GUIDANCE OF A PROFESSIONAL ENGINEER.

CAPS AND FOUNDATIONS

MAINTAIN PROPER SITE GRADING AND DRAINAGE TO PREVENT EROSION OR WATER DAMAGE.

BACKFILL OR RENFORCE AREAS SHOWING SIGNS OF SCOUR OR SETTLEMENT.

REPAINT ANY EXPOSED STEEL SURFACES EVERY 5 YEARS TO PREVENT CORROSION.

AFTER SEVERE STORMS AND UPON INSPECTION, USE STONE TO FILL BACK SCOUR HOLES AROUND THE SUBSTRUCTURE AND GRADE AS SHOWN ON THE PLANS.

PROJECT NO. 004_011.01.CBDEE

BUNCOMBE COUNTY

STATION: 10+50.25 -L-

NORTH CAROLINA PROFESSIONAL SEAL 036583 ENGINEER WESLEY D. HEVENER

12/11/2025

Signed by: Wes Hevener /E36A4888/4245b...

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA OFFICE OF EMERGENCY MANAGEMENT

MAINTENANCE

RECOMMENDATION NOTES

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

DRAWN BY : HRB DATE : 12/25

CHECKED BY : DAC DATE : 12/25

DESIGN ENGINEER OF RECORD: WDH DATE : 12/25

12/11/2025
c:\pww\hcq_prod\d0180919\499_003_MN.dgn
hbollnsky

AMT
A. MORTON THOMAS AND ASSOCIATES, INC.
900 RIDGEFIELD DRIVE, SUITE 325•RALEIGH, NC 27609
(919) 855-9989•NC LICENSE NO. F-1049
WWW.AMTENGINEERING.COM

STANDARD NOTES

DESIGN DATA:

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

MATERIAL AND WORKMANSHIP:

EXCEPT AS MAY OTHERWISE BE SPECIFIED ON PLANS OR IN THE SPECIAL PROVISIONS, ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE 2024 "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES" OF THE N. C. DEPARTMENT OF TRANSPORTATION.

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

CONCRETE:

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

CONCRETE CHAMFERS:

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

DOWELS:

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

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

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

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

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

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

REINFORCING STEEL:

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

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

STRUCTURAL STEEL:

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

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

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

HANDRAILS AND POSTS:

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

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

SPECIAL NOTES:

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

PROJECT REFERENCE NO.	SHEET NO.
011-01-CBDEE	EC-01

Prepared in the Office of:
NC FIRM LICENSE NO: C-1506
301 FAYETTEVILLE ST.,
SUITE 1100
RALEIGH, NC 27601
(919) 882-7839
Designed by:
John McNulty 4263
NAME LEVEL III CERTIFICATION NO.

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.
011-01-CBDEE	EC-2
R/W SHEET NO.	

Prepared In the Office of:
NC FIRM LICENSE NO: C-1506
301 FAYETTEVILLE ST.,
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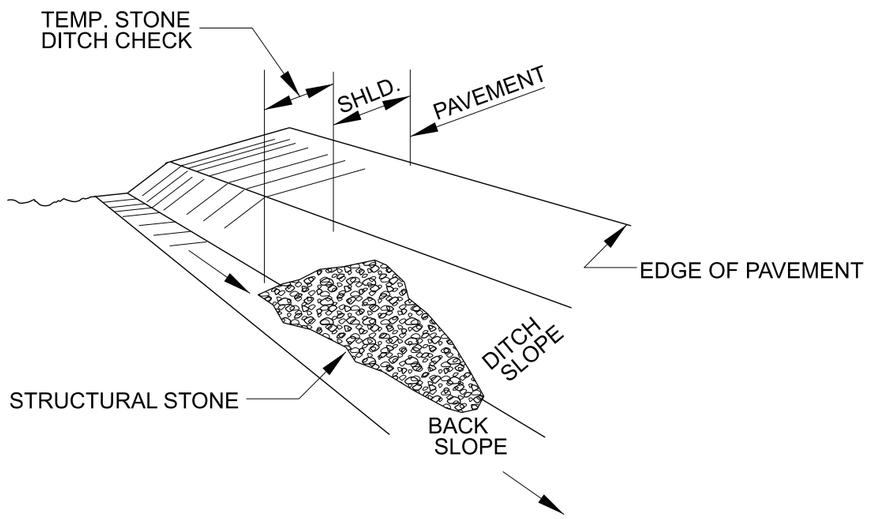
Designed by:
John McNulty — NAME
4263 — LEVEL III CERTIFICATION NO.

TEMPORARY ROCK SILT CHECK TYPE 'B' DETAIL

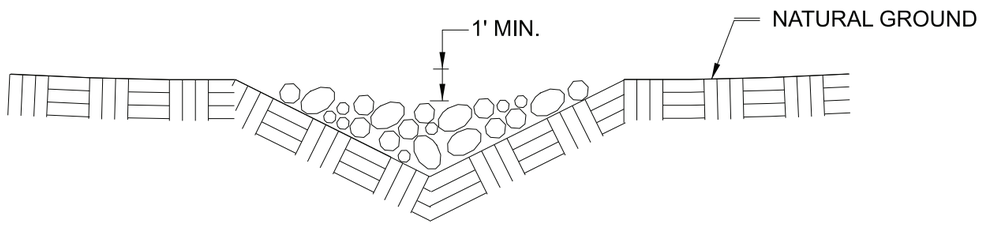


ISOMETRIC VIEW

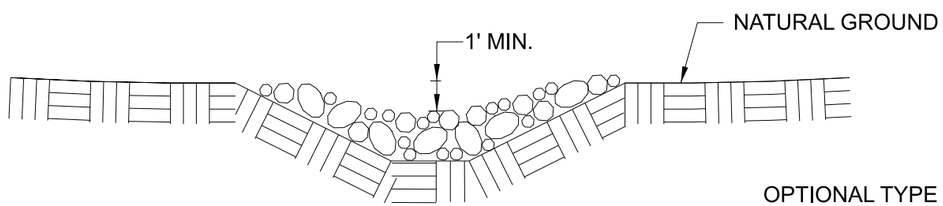
NOTES:

USE CLASS 'B' EROSION CONTROL STONE FOR STRUCTURAL STONE.

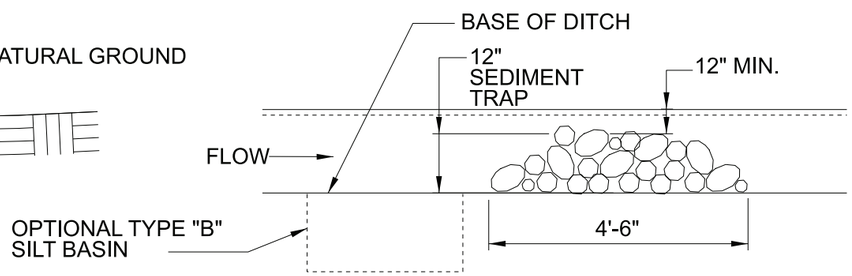
THE ENGINEER MAY DIRECT THE OPTION OF CLASS "A" STONE FOR SITES HAVING LESS THAN ONE (1) ACRE DRAINAGE AREA AND A DITCH GRADE LESS THAN 3%.



CROSS SECTION
VEE DITCH



CROSS SECTION
TRAPEZOIDAL DITCH



ELEVATION VIEW

PROJECT REFERENCE NO.	SHEET NO.
011-01-CBDEE	EC-2A

Prepared in the Office of:

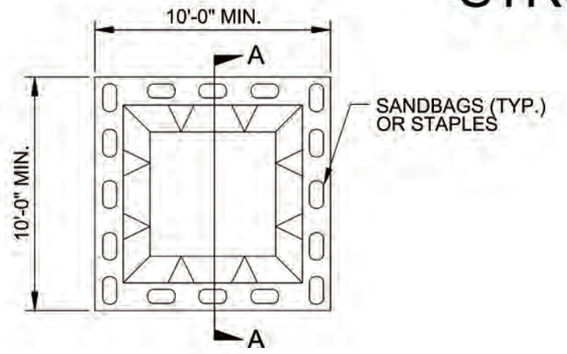
NC FIRM LICENSE NO: C-1506

301 FAYETTEVILLE ST.,
SUITE 1500
RALEIGH, NC 27601
(919) 882-7839

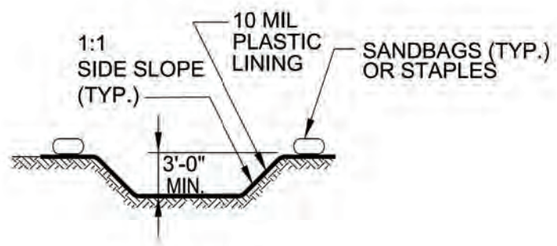
Designed by:

John McNulty — NAME
4263 — LEVEL III CERTIFICATION NO.

ONSITE CONCRETE WASHOUT STRUCTURE WITH LINER



PLAN



SECTION A-A

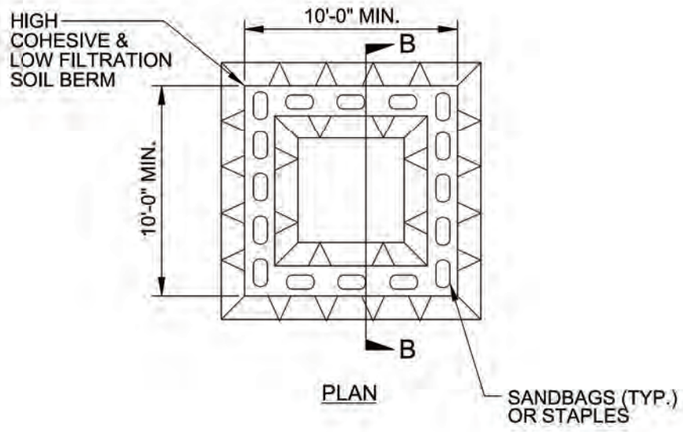
NOTES:
1. ACTUAL LOCATION DETERMINED IN FIELD

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.

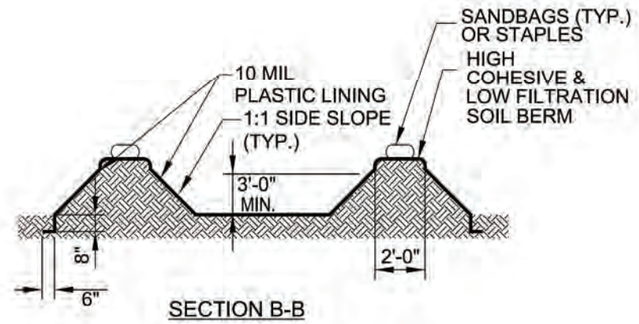
3.CONCRETE WASHOUT STRUCTURE NEEDS TO BE CLEARY MARKED WITH SIGNAGE NOTING DEVICE.

BELOW GRADE WASHOUT STRUCTURE

NOT TO SCALE



PLAN



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 CLEARY MARKED WITH SIGNAGE NOTING DEVICE.

ABOVE GRADE WASHOUT STRUCTURE

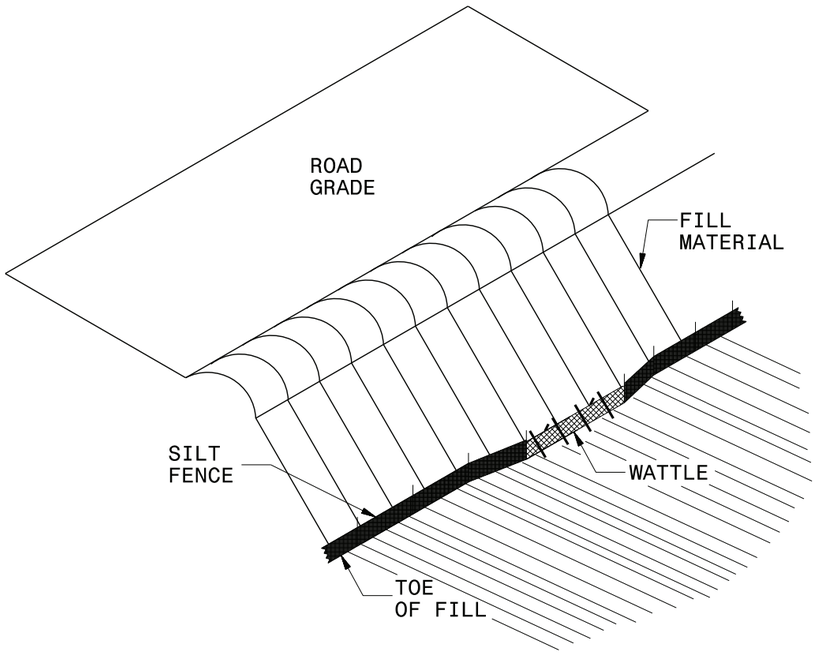
NOT TO SCALE

5/26/20

SILT FENCE COIR FIBER WATTLE BREAK DETAIL

PROJECT REFERENCE NO.	SHEET NO.
011-01-CBDEE	EC-2B
R/W SHEET NO.	

Prepared In the Office of:
NC FIRM LICENSE NO: C-1506
301 FAYETTEVILLE ST.,
SUITE 1500
RALEIGH, NC 27601
(919) 882-7839
Designed by:
John McNulty — NAME
4263 — LEVEL III CERTIFICATION NO.



ISOMETRIC VIEW

NOTES:

USE MINIMUM 12 IN. DIAMETER COIR FIBER (COCONUT FIBER) WATTLE AND LENGTH OF 10 FT.

EXCAVATE A 1 TO 2 INCH TRENCH FOR WATTLE TO BE PLACED.

DO NOT PLACE WATTLE ON TOE OF SLOPE.

USE 2 FT. WOODEN STAKES WITH A 2 IN. BY 2 IN. NOMINAL CROSS SECTION.

INSTALL A MINIMUM OF 2 UPSLOPE STAKES AND 4 DOWNSLOPE STAKES AT AN ANGLE TO WEDGE WATTLE TO GROUND.

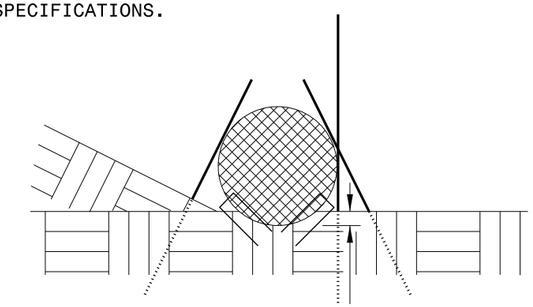
PROVIDE STAPLES MADE OF 11 GUAGE STEEL WIRE FORMED INTO A U SHAPE NOT LESS THAN 6″ IN LENGTH.

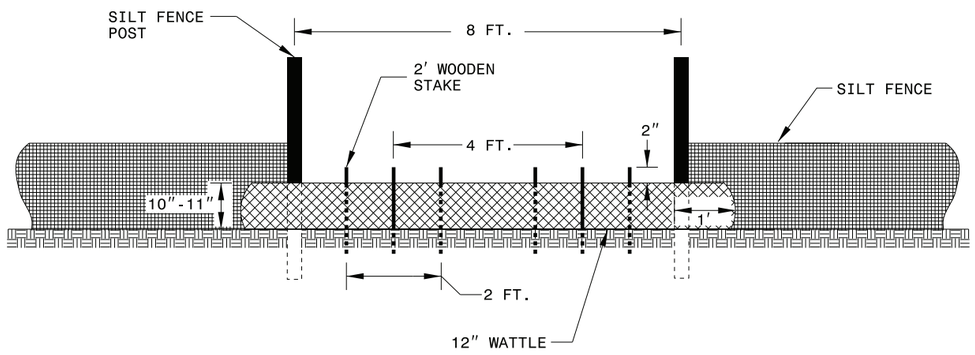
INSTALL STAPLES APPROXIMATELY EVERY 1 LINEAR FOOT ON BOTH SIDES OF WATTLE AND AT EACH END TO SECURE IT TO THE SOIL.

WATTLE INSTALLATION CAN BE ON OUTSIDE OF THE SILT FENCE AS DIRECTED.

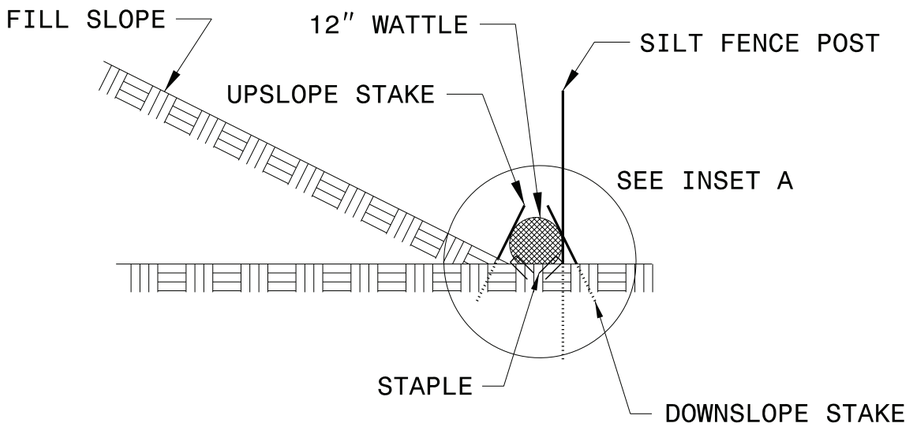
INSTALL TEMPORARY SILT FENCE IN ACCORDANCE WITH SECTION 1605 OF THE STANDARD SPECIFICATIONS.

INSET A





VIEW FROM SLOPE



SIDE VIEW

PROJECT REFERENCE NO.	SHEET NO.
011-01-CBDEE	EC-3

Prepared In the Office of:

NC FIRM LICENSE NO: C-1506

301 FAYETTEVILLE ST.,
SUITE 1500
RALEIGH, NC 27601
(919) 882-7839

Designed by:

John McNulty — NAME

4263 — LEVEL III CERTIFICATION NO.

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

THIS PROJECT HAS BEEN DESIGNED TO SENSITIVE WATERSHED STANDARDS.

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

THESE EROSION AND SEDIMENT CONTROL PLANS COMPLY WITH THE REGULATIONS SET FORTH BY THE NCG–010000 GENERAL CONSTRUCTION PERMIT ISSUED BY THE NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES DIVISION OF ENERGY, MINERAL AND LAND RESOURCES

Roadway Standard Drawings

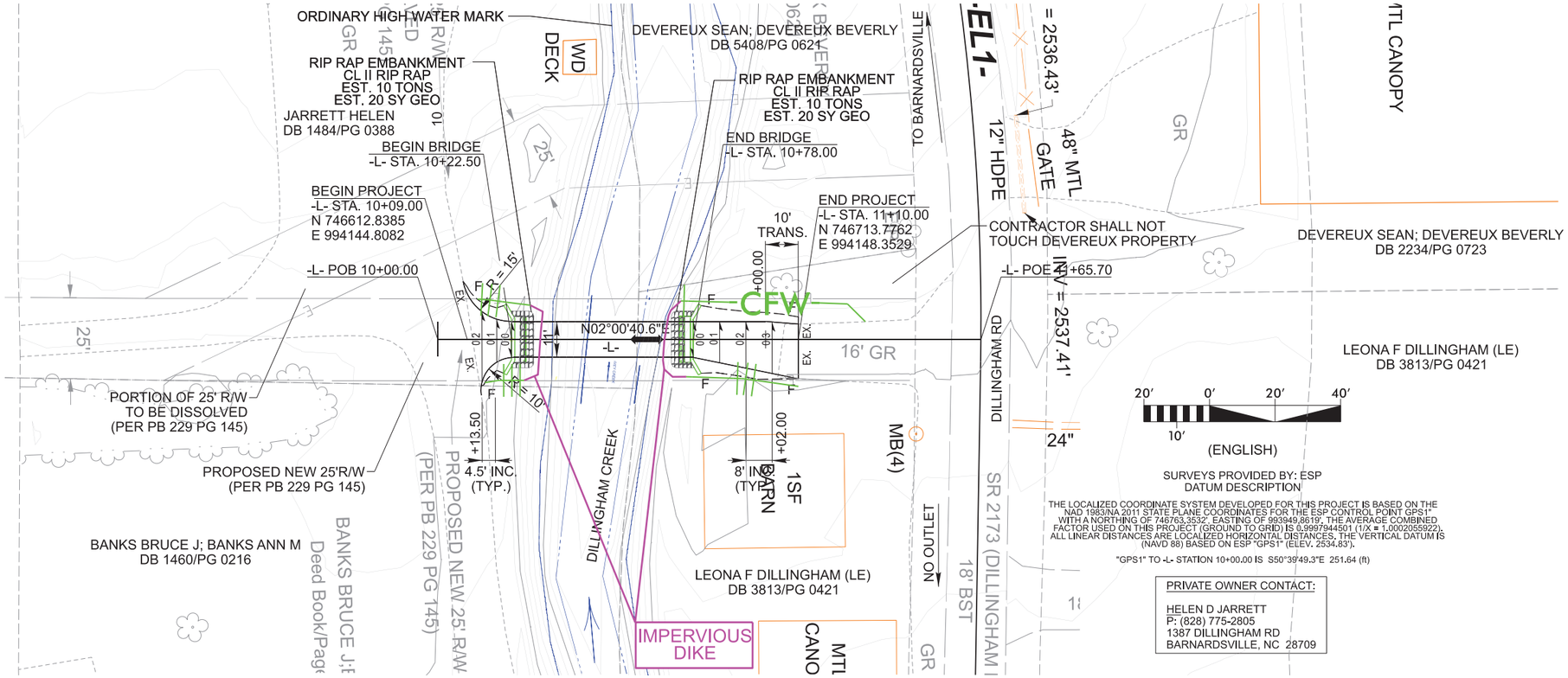
The "Roadway Standard Drawings"- Roadway Design Unit - N. C. Department of Transportation - Raleigh, N. C., dated January 2024 and the latest revision thereto are applicable to this project and by reference hereby are considered a part of these plans.

ENVIRONMENTALLY SENSITIVE AREA(S) EXIST ON THIS PROJECT

Refer To E. C. Special Provisions for Special Considerations.

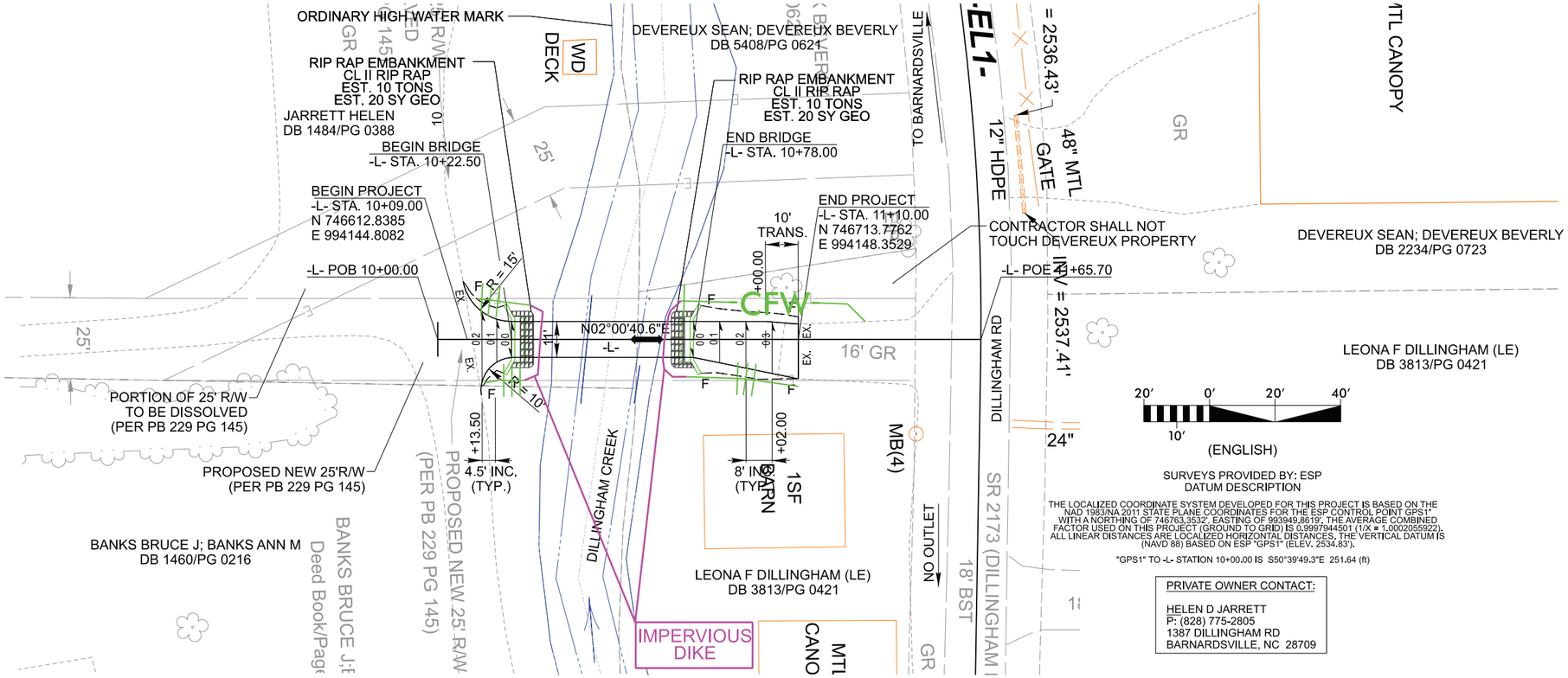
HIGH QUALITY WATER(S) EXIST ON THIS PROJECT

High Quality Water Zone(s) Exist
From Sta. PROJECT START
to Sta. PROJECT END
Refer To E. C. Special Provisions for Special Considerations.



11/14/23

011-01-CBDEE
EC-5 / CONST-4



SURVEYS PROVIDED BY: ESP
DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE NAD 1983/NA 2011 STATE PLANE COORDINATES FOR THE ESP CONTROL POINT GPS1" WITH A NORTHING OF 746763.3532', EASTING OF 993949.8619', THE AVERAGE COMBINED FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS 0.9997944501 (1/X = 1.0002055922). ALL LINEAR DISTANCES ARE LOCALIZED HORIZONTAL DISTANCES. THE VERTICAL DATUM IS (NAVD 88) BASED ON ESP "GPS1" (ELEV. 2534.83').

"GPS1" TO -L- STATION 10+00.00 IS S50°39'49.3"E 251.64 (ft)

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STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	011-01-CBDEE	1	

PROJECT: N/A

REFERENCE: N/A

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *BUNCOMBE*

PROJECT DESCRIPTION *NORTH CAROLINA EMERGENCY MANAGEMENT–PRIVATE ROADS, BRIDGE REPAIR AND REPLACEMENT PROGRAM*

SITE DESCRIPTION *1387 DILLINGHAM RD FOR BRIDGE OVER IVY CREEK ADJACENT TO SR 2173*

CONTENTS

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INVESTIGATED BY *F&R, Inc.*

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DATE *NOVEMBER 2025*

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SINCE 1881

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SIGNATURE DATE

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PROJECT REFERENCE NO.	SHEET NO.
011–01–CBDEE	2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS
(PAGE 1 OF 2)

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	50 MX											GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
#40	30 MX	50 MX	51 MN											
#200	15 MX	25 MX	10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN			
MATERIAL PASSING #40 LL	—		—	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
PI	6 MX		NP	10 MX	10 MX	11 MN	11 MN	10 MX	10 MX	11 MN	11 MN			
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 ($TONS/FT^2$)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	< 4 4 TO 10 10 TO 30 30 TO 50 > 50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30	< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 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	26 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, VST, PMT — 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:
- [ ] CME-45C
- [ ] CME-55
- [ ] CME-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [X] CME-750X
- [ ] _____

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

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B _____ [ ] -H _____
- [X] -N 03

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

PROJECT REFERENCE NO.	SHEET NO.
011-01-CBDEE	2A

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
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SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS
(PAGE 2 OF 2)

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 (ROD) - 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 (SROD) - 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: GPS-1= N: 746,676.3532, E: 993,949.8619
-L- STATION 11+52.58, 200.11' LT
ELEVATION: 2,534.83 FEET

NOTES:

FIAD= FILLED IMMEDIATELY AFTER DRILLING

NM= NOT MEASURED

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
011-01-CBDEE	2B

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 (PAGE 1 OF 2)

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

SURFACE CONDITIONS

VERY GOOD — Very rough, fresh unweathered surfaces

GOOD — Rough, slightly weathered, iron stained surfaces

FAIR — Smooth, moderately weathered and altered surfaces

POOR — Slickensided, highly weathered surfaces with compact coatings or fillings or angular fragments

VERY POOR — Slickensided, highly weathered surfaces with soft clay coatings or fillings

DECREASING SURFACE QUALITY ⇨

DECREASING INTERLOCKING OF ROCK PIECES ⇩

STRUCTURE	VERY GOOD	GOOD	FAIR	POOR	VERY POOR
INTACT OR MASSIVE - intact rock specimens or massive in situ rock with few widely spaced discontinuities	90	80	70	N/A	N/A
BLOCKY - well interlocked undisturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets	80	70	60	50	40
VERY BLOCKY - interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets	70	60	50	40	30
BLOCKY/DISTURBED/SEAMY - folded with angular blocks formed by many intersecting discontinuity sets. Persistence of bedding planes or schistosity	60	50	40	30	20
DISINTEGRATED - poorly interlocked, heavily broken rock mass with mixture of angular and rounded rock pieces	50	40	30	20	10
LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes	N/A	N/A	20	10	

PROJECT REFERENCE NO.	SHEET NO.
011–01–CBDEE	2C

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 (PAGE 2 OF 2)

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

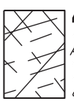
GSI FOR HETEROGENEOUS ROCK MASSES SUCH AS FLYSCH (Marinos. P and Hoek E., 2000)

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

SURFACE CONDITIONS OF DISCONTINUITIES (Predominantly bedding planes)

VERY GOOD - Very Rough, fresh unweathered surfaces	GOOD - Rough, slightly weathered surfaces	FAIR - Smooth, moderately weathered and altered surfaces	POOR - Very smooth, occasionally slickensided surfaces with compact coatings or fillings with angular fragments	VERY POOR - Very smooth, slickensided or highly weathered surfaces with soft clay coatings or fillings



A. *Thick bedded, very blocky sandstone The effect of pelitic coatings on the bedding planes is minimized by the confinement of the rock mass. In shallow tunnels or slopes these bedding planes may cause structurally controlled instability.*

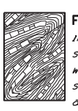
B. *Sandstone with thin interlayers of siltstone*

C. *Sandstone and siltstone in similar amounts*

D. *Siltstone or silty shale with sandstone layers*

E. *Weak siltstone or clayey shale with sandstone layers*

C, D, E, and **G** - may be more or less folded than illustrated but this does not change the strength. Tectonic deformation, faulting and loss of continuity moves these categories to **F** and **H.**



F. *Tectonically deformed, intensively folded/faulted, sheared clayey shale or siltstone with broken and deformed sandstone layers forming an almost chaotic structure*

G. *Undisturbed silty or clayey shale with or without a few very thin sandstone layers*

H. ***Tectonically deformed silty or clayey shale forming a chaotic structure with pockets of clay. Thin layers of sandstone are transformed into small rock pieces.***

Means deformation after tectonic disturbance

DATE: 8-19-16

PROJECT REFERENCE NO.	SHEET NO.
011-01-CBDEE	3

SITE PLAN

0 50 100

FEET

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 011-01-CBDEE	**TIP** N/A	**COUNTY** BUNCOMBE	**GEOLOGIST** J. Baskin	
SITE DESCRIPTION 1387 Dillingham Rd. for Bridge over Ivy Creek Adjacent to SR 2173				**GROUND WTR (ft)**
BORING NO. EB1	**STATION** 10+19	**OFFSET** 22 ft LT	**ALIGNMENT** -L-	**0 HR.** 7.0
COLLAR ELEV. 2,539.1 ft	**TOTAL DEPTH** 50.7 ft	**NORTHING** 746,624	**EASTING** 994,123	**24 HR.** 7.5
DRILL RIG/HAMMER EFF./DATE F&R7348 CME-750X 87% 12/20/2024		**DRILL METHOD** NW Casing w/ Advancer	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 10/08/25	**COMP. DATE** 10/08/25	**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)
2540											
	2,539.1	0.0								2,539.1 GROUND SURFACE	0.0
			2	3	6	9		M		2,537.1 **ARTIFICIAL FILL** Brown, Clayey Fine to Coarse Sandy SILT (A-4) with Trace Gravel and Roots	2.0
2535	2,535.6	3.5	14	16	15	31		M		**ALLUVIAL** Brown-Red, Silty Fine to Coarse SAND (A-2-4) with Trace Gravel	
2530	2,530.6	8.5	51	35	37	72		M			
2525	2,525.6	13.5	25	29	22	51		M			
	2,523.3	15.8	60/0.0			60/0.0		M		2,523.3 **ALLUVIAL** Gray-Brown, Sandy COBBLES REC=29%	15.8
2520	2,518.6	20.5	100/0.3			100/0.3				2,517.1 **RESIDUAL**	22.0
2515	2,513.6	25.5	15	11	13	24		Sat.		2,513.6 Brown-Black, Fine to Coarse Sandy SILT (A-4) with Trace Rock Fragments and Mica	25.5
2510	2,509.8	29.3	9	9	10	19		Sat.			
2505	2,504.8	34.3	18	17	14	31		M			
2500	2,499.8	39.3	9	12	16	28		M			
2495	2,494.8	44.3	12	16	24	40		M			
2490	2,489.8	49.3	12	14	100/0.4	100/0.4				2,488.8	50.3
	2,488.4	50.7	60/0.0			60/0.0				2,488.4 **WEATHERED ROCK** Black-Green (MICA SCHIST)	50.7

Boring Terminated with Standard Penetration Test Refusal at Elevation 2,488.4 ft on CRYSTALLINE ROCK (MICA SCHIST)

Notes:
1. Surficial Organic Soils= 0.0'-0.1'
2. Auger Refusal at 15.8'
3. Start Coring at 15.8'

NCDOT BORE SINGLE SITE 011-01-CBDEE BUNCOMBE COUNTY BORING LOGS.GPJ NC_DOT.GDT 11/18/25

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 011-01-CBDEE	**TIP** N/A	**COUNTY** BUNCOMBE	**GEOLOGIST** J. Baskin	
SITE DESCRIPTION 1387 Dillingham Rd. for Bridge over Ivy Creek Adjacent to SR 2173				**GROUND WTR (ft)**
BORING NO. EB1	**STATION** 10+19	**OFFSET** 22 ft LT	**ALIGNMENT** -L-	**0 HR.** 7.0
COLLAR ELEV. 2,539.1 ft	**TOTAL DEPTH** 50.7 ft	**NORTHING** 746,624	**EASTING** 994,123	**24 HR.** 7.5
DRILL RIG/HAMMER EFF./DATE F&R7348 CME-750X 87% 12/20/2024		**DRILL METHOD** NW Casing w/ Advancer	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 10/08/25	**COMP. DATE** 10/08/25	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ3	**TOTAL RUN** 9.4 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
2523.3											Begin Coring @ 15.8 ft
	2,523.3	15.8	4.7	N=60/0.0 1:26/0.7 0:47/1.0 1:20/1.0 1:41/1.0 1:15/1.0	(1.8) 38%	(0.0) 0%		(1.8) 29%	(0.0) 0%		2,523.3 **ALLUVIAL** 15.8 Gray-Brown, Sandy COBBLES
2520	2,518.6	20.5									
	2,518.3	20.8	4.7	N=100/0.3 1:09/0.7 0:25/1.0 0:09/1.0 0:12/1.0 0:14/1.0	(0.0) 0%	(0.0) 0%		(0.0) 0%	(0.0) 0%		2,517.1 22.0 **RESIDUAL**
2515	2,513.6	25.5		N=24							2,513.6 25.5 Brown-Black, Fine to Coarse Sandy SILT (A-4) with Trace Rock Fragments and Mica
2510				N=19							
2505				N=31							
2500				N=28							
2495				N=40							
2490				N=100/0.4							2,488.8 50.3
				N=60/0.0							2,488.4 50.7 **WEATHERED ROCK** Black-Green (MICA SCHIST) Boring Terminated with Standard Penetration Test Refusal at Elevation 2,488.4 ft on CRYSTALLINE ROCK (MICA SCHIST)

Notes:
1. Surficial Organic Soils= 0.0'-0.1'
2. Auger Refusal at 15.8'
3. Start Coring at 15.8'

NCDOT CORE SINGLE SITE 011-01-CBDEE BUNCOMBE COUNTY BORING LOGS.GPJ NC_DOT.GDT 11/18/25

CORE PHOTOGRAPHS (EB1)

Begin Run 1
15.8 feet

Begin Run 2
20.8 feet

End Run 1
20.5 feet &
SPT N=100/0.3

End Run 2
25.5 feet &
SPT N=24

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 011-01-CBDEE	**TIP** N/A	**COUNTY** BUNCOMBE	**GEOLOGIST** J. Baskin	
SITE DESCRIPTION 1387 Dillingham Rd. for Bridge over Ivy Creek Adjacent to SR 2173				**GROUND WTR (ft)**
BORING NO. EB2	**STATION** 10+88	**OFFSET** 3 ft RT	**ALIGNMENT** -L-	**0 HR.** 7.9
COLLAR ELEV. 2,539.9 ft	**TOTAL DEPTH** 14.9 ft	**NORTHING** 746,692	**EASTING** 994,151	**24 HR.** NM
DRILL RIG/HAMMER EFF./DATE F&R7348 CME-750X 87% 12/20/2024		**DRILL METHOD** SPT Core Boring		**HAMMER TYPE** Automatic
DRILLER S. Davis	**START DATE** 10/08/25	**COMP. DATE** 10/09/25	**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
2540										2,539.9 GROUND SURFACE 0.0
	2,539.9	0.0	3	4	12	16		M		**ARTIFICIAL FILL** Tan, Fine to Coarse Sandy SILT (A-4) with Trace Gravel
	2,536.4	3.5								
2535			20	12	13	25		M		
										2,532.9 7.0
	2,531.4	8.5								**ALLUVIAL** Sandy COBBLES
2530			65	29	13	42		D		
	2,526.4	13.5								
2525			24	37	63/0.4	100/0.9				2,525.0 14.9
										Boring Terminated at Elevation 2,525.0 ft in ALLUVIAL (BOULDERS)

Notes:
1. Surficial Organic Soils= 0.0'-0.1'
2. Boring Terminated and Offset to EB2(A) due to Property Owner Conflicts

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 011-01-CBDEE	**TIP** N/A	**COUNTY** BUNCOMBE	**GEOLOGIST** J. Baskin	
SITE DESCRIPTION 1387 Dillingham Rd. for Bridge over Ivy Creek Adjacent to SR 2173				**GROUND WTR (ft)**
BORING NO. EB2(A)	**STATION** 10+86	**OFFSET** 1 ft LT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 2,539.9 ft	**TOTAL DEPTH** 60.0 ft	**NORTHING** 746,690	**EASTING** 994,147	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R7348 CME-750X 87% 12/20/2024		**DRILL METHOD** NW Casing w/ Advancer	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 10/20/25	**COMP. DATE** 10/21/25	**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)
2540											
	2,539.9	0.0	4	27	19	46		M		2,539.9 GROUND SURFACE	0.0
	2,537.4	2.5	26	27	21	48		D		**ARTIFICIAL FILL** 2,537.9 Brown, Fine to Coarse Sandy SILT (A-4) with Trace Roots and Gravel	2.0
2535										2,537.1 **ALLUVIAL** Gray-Brown, Sandy COBBLES REC=44%	2.8
2530	2,529.1	10.8	15	16	20	36		Sat.		2,529.9 2,529.1 Brown-Black, Clayey Silty Fine to Coarse SAND (A-2-4) with Trace Mica and Rock Fragments	10.0 10.8
2525	2,525.6	14.3	30	52	48/0.3	100/0.8		M		2,525.1 Gray-Brown, Sandy COBBLES REC=50%	14.8
2520	2,520.6	19.3	60/0.1			60/0.1				2,520.5	19.4
2515	2,514.5	25.4	8	10	14	24		M		2,516.9 **RESIDUAL** 2,514.5 Brown-Black, Fine to Coarse Sandy SILT (A-4) with Trace Rock Fragments	23.0 25.4
2510	2,510.6	29.3	9	11	12	23		M			
2505	2,505.6	34.3	38	15	17	32		M			
2500	2,500.6	39.3	20	13	15	28		M			
2495	2,495.6	44.3	29	24	18	42		M			
2490	2,490.6	49.3	2	15	67	82		M			
2485	2,485.6	54.3	6	10	8	18		M			
2480	2,480.0	59.9	60/0.1			60/0.1				2,480.0 2,479.9 **CRYSTALLINE ROCK** Brown-Black (MICA SCHIST)	59.9 60.0

Boring Terminated with Standard Penetration Test Refusal at Elevation 2,479.9 ft in CRYSTALLINE ROCK (MICA SCHIST)

Notes:
1. Surficial Organic Soils= 0.0'-0.1'
2. Start Coring at 2.8' and 19.4'
3. 0 HR: Dry, Caved at 7.0'

NCDOT BORE SINGLE SITE 011-01-CBDEE BUNCOMBE COUNTY BORING LOGS.GPJ NC_DOT.GDT 11/18/25

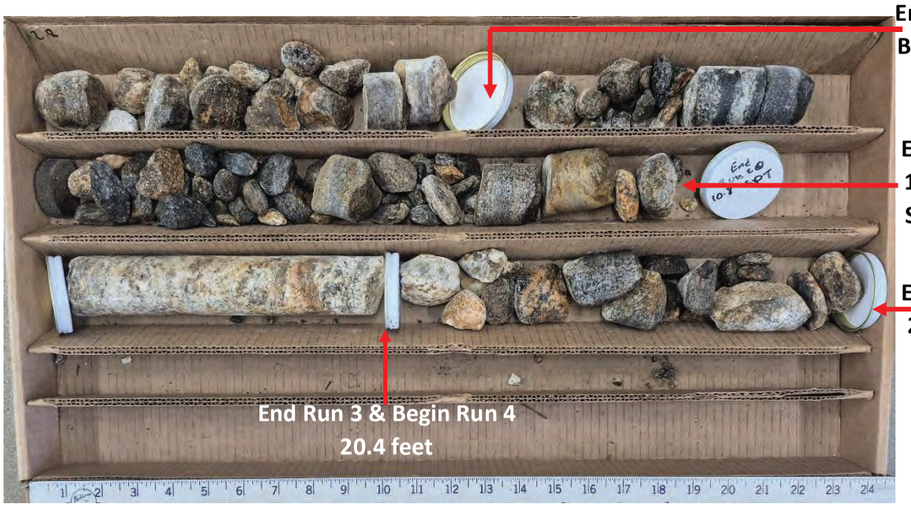
GEOTEBCHNBI L AORNHG REPORT
BORE LOG

. PS 288d28dL w4 c c	**HIM** AD	**WCUOHT** wUAL E mwc	**FECLCFISH** J5w- Ti tS
SIHE DESWRIMHICO 87. : 4 tIktSHR- P MC5YnywytCHe nKeyfKB L yeei (Q- FeSssn CM 18: 7			**FRCUOD . HR (ft)**
PCRIOF OCB c w1)(h	**SHAHICO** 82+. r	**CNNSEH** 8 Ys l g / **ALIF OGEOH** d o	**2 0 RB** 4 yB
WCLLAR ELEVB 1dG735 Ys	**HCHAL DEMH0** r 252 Ys	**OCRH0 IOF** : 0r d 32 / **EASHIOF** 330d80:	**4Y 0 RB** l f(4
DRILL RIG/HAMMER EFF./DATE F&R7348 CME-750X 87% 12/20/2024		**DRILL METHOD** NW Casing w/ Advancer	**HAMMER TYPE** Automatic
DRILLER C54 - KtT	**SHARH DAHE** 82D12D1G	**WCGMBDAHE** 82D18D1G	**SURNAWE . AHER DEMH0** AD
WCRE SIZE AQ7	**HCHAL RUO** 8052 Ys		

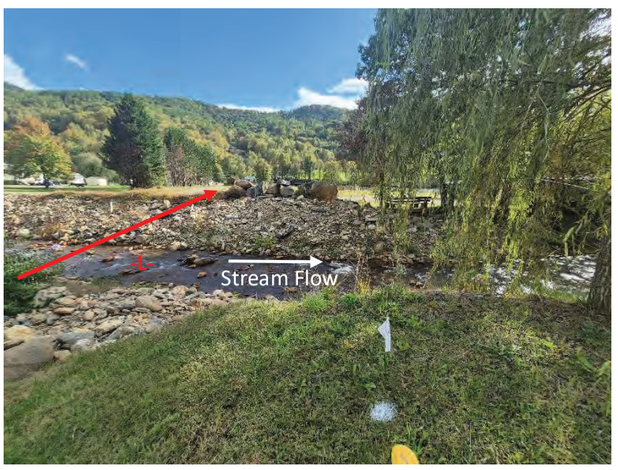
cl cV)Ysh	MUA cl cV)Ysh	4 c v g u)Ysh	MUA)Ysh	4 Mfl l M(gc)mtSDsh	MUA McL5)Ysh /	MUA MQ4)Ysh /	C(mv5 AE5	CgM(g(McL5)Ysh /	CgM(g(MQ4)Ysh /	l E a	cl c V5)Ysh — 4cCLMfvgfEA (A4 Mcm(M' C — 4 c v g u)Ysh
1G7: 58											weHtS L nytSH @ 15 Ys
1G7G	1dG7: 58 / 1dG7058	15 / G5	752 / G52	2612D352 2631D352 8622D352 8627D352 2618D352 868: D352 866. D352 261r D352 N=36	)852h 77/ ;)151h 00/	)252h 2/ ;)252h 2/		)751h 00/	)252h 2/		1dG7: 58 **ALLUVIAL** a y- Bowyn, SdC- SOB L Ewwl c C — 15
1G72	1dG1358	825						)252h 2/	)252h 2/		1dG1353 — 8252 ; 1dG1358 wyn, Sowk- Fi dLk BeBCtkeBl tSe sn Ln- yTe C(A4)(o1o0h, tsRgy- Fe mtF- - SO MnFi l y- HP eSsT — 825
1G1G				N=100/0.8							1dG1G8 — 805 a y- Bowyn, SdC- SOB L Ewwl c C
1G12	1dG125G / 1dG835G	8350 / 1250	852 / G52	N=60/0.1/ 863D352 8681D352 1622D352 868: D352 261: D352 2672D352 N=24	)25 h : 2/ ;)858h 11/	)252h 2/ ;)252h 2/		)85 h G2/ ;)252h 2/	)252h 2/ ;)252h 2/		1dG125G — 8350 ; 1dG8r 58 **RESIDUAL** — 1752
1G8G	1dG805G	1G50									1dG805G wyn, Sowk- Fi dl tSe sn Ln- yTe C- SOBCfl g)(o0h, tsRgy- Fe MnFi l y- HP eSsT — 1G50
1G82				N=23							
1G2G				N=32							
1G22				N=28							
103G				N=42							
1032				N=82							
10. G				N=18							
10. 2				N=60/0.1							1d0. 252 ; 1d0: 358 **WRTSHALLIOE RCWK** wyn, Sowk- Fi)mfL (CL u fCgh wnytSH gey P tS- seO, tsRCs- SO- yO v eSesy- stnS ge TsMeYNT- k- scleK- stnS 1d0: 358 YstS L M=Cg(l l fAc MEL')mfL (CL u fCgh — G358 ; r 252

AnseT6
85CNytR- kEyH- StF CntKT%2529259
15Cs- ysL nytSH - s15 9- SO83509
752 u M64 yBdL - KeO- s: 529

CORE PHOTOGRAPHS (EB2 (A))



SITE PHOTOGRAPHS:
1387 Dillingham Rd. for Bridge over Ivy Creek Adjacent to SR 2173



Photograph No. 1: View looking south along previous driveway alignment

Photograph No. 2: View looking east at previous driveway alignment