



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

BEVERLY EAVES PERDUE
GOVERNOR

EUGENE A. CONTI, JR.
SECRETARY

February 7, 2012

MEMORANDUM TO: C. E. (Neil) Lassiter, Jr., P.E.
Division 2 Engineer

ATTENTION: Lang Jones
Division Design Engineer

FROM: *CAK* K. J. Kim, Ph.D., P.E.
Eastern Regional Geotechnical Manager

STATE PROJECT: 45348.1.8 (BD-5102H)
FEDERAL PROJECT: BRZ-1315(12)
COUNTY: Jones

DESCRIPTION: Bridge No. 60 on SR 1315 (Taylor Rd.) between Middle Rd. and
Wise Fork Rd. over Beaver Creek

SUBJECT: Bridge Foundation Recommendations

The Geotechnical Engineering Unit has completed the subsurface investigation and has prepared the foundation design recommendations for the above structure and presents the following project data:

- Bridge Inventory (6) pages
- Foundation Design Recommendations (3) pages
- Design Calculations () pages
- Special Provisions () pages

Please call Majid Khazaei, P.E. or Chris Kreider, P.E. at (919) 662-4710 if there are any questions concerning this memorandum.

KJK/CAK/MK
Attachment

MAILING ADDRESS:
EASTERN REGIONAL OFFICE
GEOTECHNICAL ENGINEERING UNIT
1570 MAIL SERVICE CENTER
RALEIGH NC 27699-1570

TELEPHONE: 919-662-4710
FAX: 919-662-3095

WEBSITE: WWW.DOH.DOT.STATE.NC.US

LOCATION:
3301 JONES SAUSAGE RD., SUITE 100
GARNER, NC 27529-9489

FOUNDATION RECOMMENDATIONS

WBS: 45348.1.8

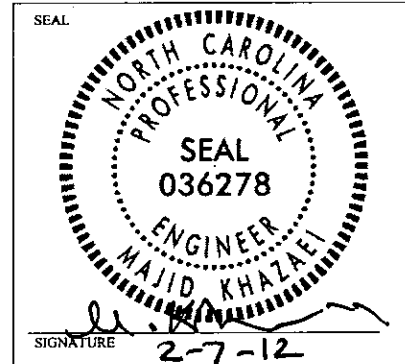
DESCRIPTION : Bridge No. 60 on SR 1315 (Taylor Rd.) between

T.I.P. NO.: BD-5102H

Middle Rd. and Wise Fork Rd. over Beaver Creek

COUNTY: Jones

STATION: 14+14.00 -L-



	INITIALS	DATE
DESIGN	MK	2/6/12
CHECK	CAK	2/7/12
APPROVAL	CAK	2/7/12

BENT	STATION	FOUNDATION TYPE	FACTORED RESISTANCE	MISCELLANEOUS DETAILS
END BENT 1	13+57.75 -L-	Cap on HP 12x53 Steel Piles	65 tons/pile	Bottom of Cap El. = 34.5 ft ± Estimated Length of Pile = 50.0 ft ± Number of Piles = 5
BENT 1	13+88.94 -L-	Cap on HP 14x73 Steel Piles	90 tons/pile	Bottom of Cap El. = 34.5 ft ± Point of Fixity = 10 ft ± Tip Elevation No Higher than = 2.5 ft Estimated Length of Pile = 55 ft ± Number of Piles = 7
BENT 2	14+39.06 -L-	Cap on HP 14x73 Steel Piles	90 tons/pile	Bottom of Cap El. = 34.5 ft ± Point of Fixity = 10 ft ± Tip Elevation No Higher than = 2.5 ft Estimated Length of Pile = 55 ft ± Number of Piles = 7
END BENT 2	14+70.25 -L-	Cap on HP 12x53 Steel Piles	65 tons/pile	Bottom of Cap El. = 34.5 ft ± Estimated Length of Pile = 50.0 ft ± Number of Piles = 5

NOTES ON PLANS & COMMENTS

See Following Pages

FOUNDATION RECOMMENDATION NOTES ON PLANS

- 1) FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.
- 2) PILES AT END BENT NO. 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 65 TONS PER PILE.
- 3) DRIVE PILES AT END BENT NO. 1 TO A REQUIRED DRIVING RESISTANCE OF 110 TONS PER PILE.
- 4) PILES AT BENT NO. 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 90 TONS PER PILE.
- 5) DRIVE PILES AT BENT NO. 1 TO A REQUIRED DRIVING RESISTANCE OF 170 TONS PER PILE.
THIS REQUIRED DRIVING RESISTANCE INCLUDES ADDITIONAL RESISTANCE FOR DOWNDRAW OR SCOUR.
- 6) PILES AT BENT NO. 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 90 TONS PER PILE.
- 7) DRIVE PILES AT BENT NO. 2 TO A REQUIRED DRIVING RESISTANCE OF 170 TONS PER PILE.
THIS REQUIRED DRIVING RESISTANCE INCLUDES ADDITIONAL RESISTANCE FOR DOWNDRAW OR SCOUR.
- 8) PILES AT END BENT NO. 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 65 TONS PER PILE.
- 9) DRIVE PILES AT END BENT NO. 2 TO A REQUIRED DRIVING RESISTANCE OF 110 TONS PER PILE.
- 10) INSTALL PILES AT BOTH BENT NO. 1 AND BENT NO. 2 TO A TIP ELEVATION NO HIGHER THAN 2.5 FT.
- 11) STEEL H PILE POINTS ARE REQUIRED FOR STEEL H PILES AT END BENT NO. 1, END BENT NO. 2,
BENT NO. 1 AND BENT NO. 2. FOR STEEL PILE POINTS, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.
- 12) THE SCOUR CRITICAL ELEVATION FOR BOTH BENT NO. 1 AND BENT NO. 2 IS ELEVATION 22.0 FT. SCOUR
CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.
- 13) IT HAS BEEN ESTIMATED THAT A HAMMER WITH AN EQUIVALENT RATED ENERGY IN THE RANGE OF
30 to 50 FT-KIPS 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.
- 14) IT HAS BEEN ESTIMATED THAT A HAMMER WITH AN EQUIVALENT RATED ENERGY IN THE RANGE OF
40 to 70 FT-KIPS PER BLOW WILL BE REQUIRED TO DRIVE PILES AT BENT NO. 1 AND 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.
- 15) TESTING THE FIRST PRODUCTION PILE WITH THE PDA DURING DRIVING, RESTRIKING OR REDRIVING
IS REQUIRED AT BENT NO. 1. FOR PDA TESTING, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

FOUNDATION RECOMMENDATION COMMENTS

- 1) 1½:1 (H:V) SLOPE AT THE END BENTS ARE OK WITH SLOPE PROTECTION.
- 2) REINFORCED BRIDGE APPROACH FILLS ARE REQUIRED AT EACH END BENT.
- 3) USE BRACE PILES AT BOTH END BENT NO. 1 AND END BENT NO. 2.
- 4) THE DESIGN SCOUR ELEVATION FOR BENT NO. 1 IS 24.5 FT.
- 5) THE DESIGN SCOUR ELEVATION FOR BENT NO. 2 IS 24.5 FT.
- 6) NO WAITING PERIOD IS REQUIRED BEFORE BEGINNING ANY WORK FOR END BENT CONSTRUCTION
AFTER COMPLETION OF THE EMBANKMENT AT EACH END BENT.
- 7) SPUDDING MAY BE REQUIRED TO INSTALL PILES AT BENT NO. 1 AND BENT NO. 2.
THE ENGINEER WILL DETERMINE THE NEED FOR SPUDDING.

PILE PAY ITEMS

(For 2012 Lettings and Later - Revised 4/18/11)

WBS ELEMENT	45348.1.8		DATE	2/6/2012
TIP NO.	BD-5102H		DESIGNED BY	MK
COUNTY	Jones		CHECKED BY	AK
STATION	14+14.00 -L-			

DESCRIPTION Bridge No. 60 on SR 1315 (Taylor Rd.) between
Middle Rd. and Wise Fork Rd. over Beaver Creek

NUMBER OF BENTS WITH PILES		} Only required for "Predrilling for Piles" & "Pile Excavation" pay items
NUMBER OF PILES PER BENT		
NUMBER OF END BENTS WITH PILES		
NUMBER OF PILES PER END BENT		

Bent # or End Bent #	PILE PAY ITEM QUANTITIES						
	Steel Pile Points (yes/no)	Pipe Pile Plates (yes/no/maybe)	Predrilling For Piles (per linear ft)	Pile Redrives (per each)	Pile Excavation (per linear ft)		PDA Testing (per each)
					In Soil	Not In Soil	
End Bent #1	yes			3			
Bent #1	yes			4			1
Bent #2	yes			4			
End Bent #2	yes			3			
TOTALS			0	14	0	0	1

Notes:
Blanks or "no" represent quantity of zero.
If steel pile points are required, calculate quantity of "Steel Pile Points" as equal to the number of steel piles.
If pipe pile plates are or may be required, calculate the quantity of "Pipe Pile Plates" as equal to the number of pipe piles.
If PDA testing may be required, show quantities of "PDA Testing" on the substructure plans as totals only. If PDA testing is required, show quantities of "PDA Testing" on the substructure plans for each bent or end bent.

STATE	PROJECT REFERENCE NO.	SHEET	TOTAL SHEETS
N.C.	BD-5102H	1	6

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

STRUCTURE
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 45348.1.8 (BD-5102H) F. A. PROJ. BRZ-1315(12)
 COUNTY JONES
 PROJECT DESCRIPTION BRIDGE NO. 60 ON SR 1315 OVER BEAVER
CREEK AT -L- STA. 14+14

SHEET	DESCRIPTION
1	TITLE SHEET
2	LEGEND
3	SITE PLAN
4	PROFILE
5-6	BORE LOGS

CAUTION NOTICE

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PERSONNEL
 D.N. ARGENBRIGHT
 J.R. SPARTLEY
 J.M. EDMONDSON
 CATLIN

INVESTIGATED BY D.N. ARGENBRIGHT
 CHECKED BY D.N. ARGENBRIGHT
 SUBMITTED BY D.N. ARGENBRIGHT
 DATE FEBRUARY 2012

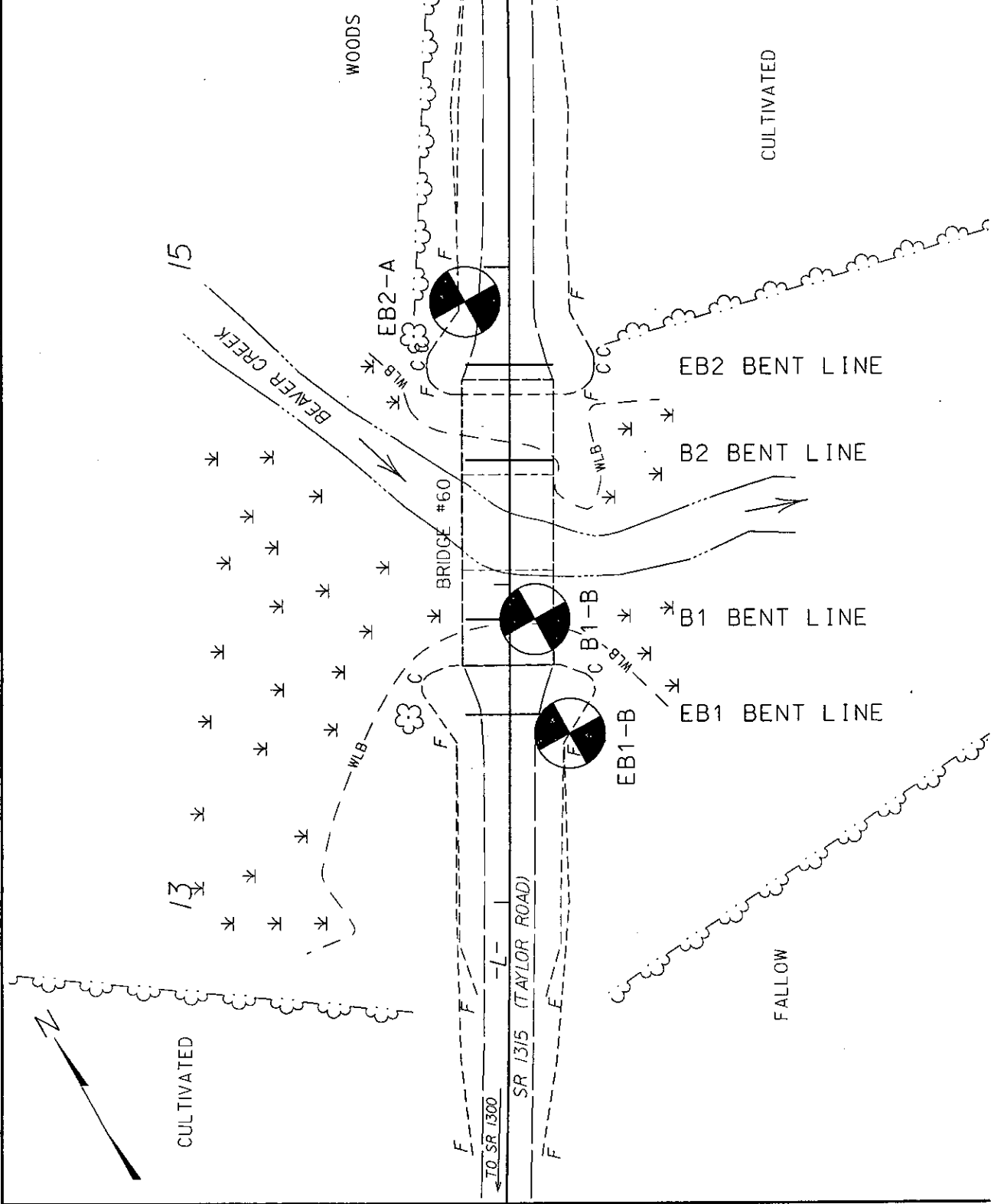


PROJECT: 45348.1.8
ID: BD-5102H

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DRAWN BY: C.P. TURNER

SKREW = 90°



INCOMPLETE PLANS
 PRELIMINARY PLANS
 NO PART USE FOR CONSTRUCTION

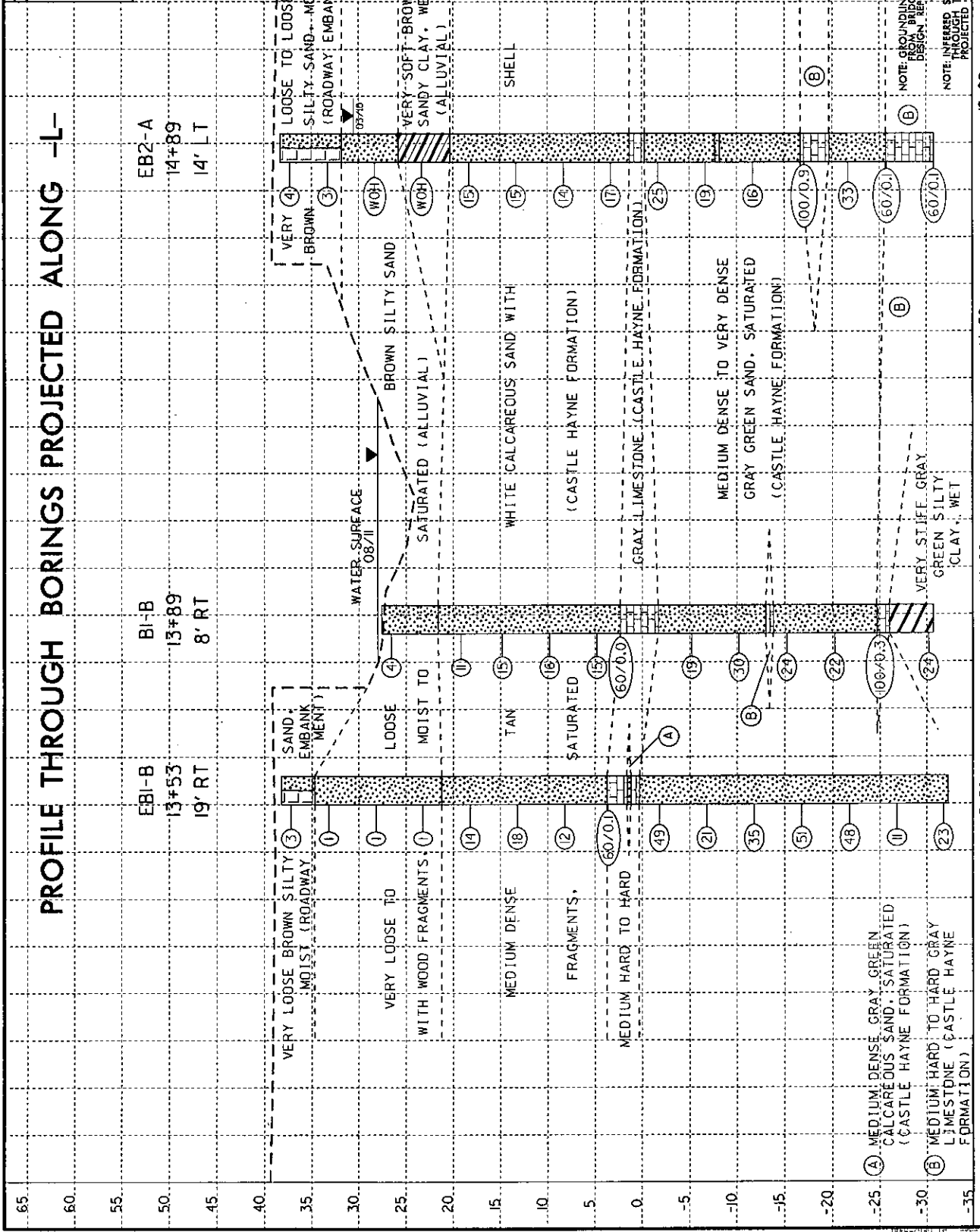
PROFILE THROUGH BORINGS PROJECTED ALONG -L-

VE = 2.0

EB2-A
 14+89
 14' LT

BI-B
 13+89
 8' RT

EB1-B
 13+53
 19' RT



NOTE: GROUNDLINE PROFILE ALONG -L- TAKEN FROM BRIDGE SURVEY AND HYDRAULIC DESIGN REPORT DATED 10/14/2011.

NOTE: INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED GROUND PROFILE.



**NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT**

WBS 45348.1.8		COUNTY JONES		GEOLOGIST STETLER, T.		
SITE DESCRIPTION BRIDGE ON L. (SR 1315) OVER BEAVER CREEK						
BORING NO. B1-B		STATION 13+89		ALIGNMENT -L-		
COLLAR ELEV. 27.6 R		TOTAL DEPTH 58.3 R		EASTING 2,463,005		
DRILL RIG/HAMMER EFF./DATE		GFO0082 CNE-458 96% 9/27/2011		DRILL METHOD Mud Rotary		
DRILLER Edmondson, J. M.		START DATE 01/24/12		COMP. DATE 01/24/12		
SURFACE WATER DEPTH 0.9R		SURFACE WATER DEPTH 0.9R		SURFACE WATER DEPTH 0.9R		
DEPTH (ft)	DRIVE ELEV (ft)	BLOW COUNT	BLOWS PER FOOT	SOIL AND ROCK DESCRIPTION	SAMP. NO.	GROUND WTR (ft)
30	27.6	1	3	WATER SURFACE (01/24/12) GROUND SURFACE		0 HR. N/A
25	27.6	1	3	BROWN SILTY SAND WITH WOOD FRAGMENTS, SAT		24 HR. N/A
20	20.2	4	7	COASTAL PLAIN TAN WHITE CALCAREOUS SAND WITH SHELL FRAGMENTS, SAT (CASTLE HAYNE FORMATION)		
15	15.8	7	9			
10	10.8	7	9			
5	5.8	5	9			
0	2.3	5	9	COASTAL PLAIN GRAY LIMESTONE (CASTLE HAYNE FORMATION)		
-5	-4.2	8	11	COASTAL PLAIN GRAY LIMESTONE (CASTLE HAYNE FORMATION)		
-10	-8.2	38	14	COASTAL PLAIN GRAY LIMESTONE (CASTLE HAYNE FORMATION)		
-15	-14.2	10	14	COASTAL PLAIN GRAY LIMESTONE (CASTLE HAYNE FORMATION)		
-20	-19.2	5	15	COASTAL PLAIN GRAY LIMESTONE (CASTLE HAYNE FORMATION)		
-25	-24.2	10	10000	COASTAL PLAIN GRAY LIMESTONE (CASTLE HAYNE FORMATION)		
-30	-29.2	15	13	COASTAL PLAIN GRAY LIMESTONE (CASTLE HAYNE FORMATION)		

WBS 45348.1.8		COUNTY JONES		GEOLOGIST STETLER, T.		
SITE DESCRIPTION BRIDGE ON L. (SR 1315) OVER BEAVER CREEK						
BORING NO. B1-B		STATION 13+53		ALIGNMENT -L-		
COLLAR ELEV. 38.2 R		TOTAL DEPTH 70.5 R		EASTING 2,463,997		
DRILL RIG/HAMMER EFF./DATE		CAT16394 CNE-458 91% 02/19/2010		DRILL METHOD Mud Rotary		
DRILLER Contract Driller		START DATE 03/03/10		COMP. DATE 03/03/10		
SURFACE WATER DEPTH N/A		SURFACE WATER DEPTH N/A		SURFACE WATER DEPTH N/A		
DEPTH (ft)	DRIVE ELEV (ft)	BLOW COUNT	BLOWS PER FOOT	SOIL AND ROCK DESCRIPTION	SAMP. NO.	GROUND WTR (ft)
40	38.2	2	1	GROUND SURFACE ROADWAY EMBANKMENT BROWN SILTY SAND, MOIST		0 HR. N/A
35	34.2	1	0	ALLUVIAL BROWN SILTY SAND WITH WOOD FRAGMENTS, MOIST TO SAT.		24 HR. FAD
30	29.2	1	0			
25	24.2	1	0			
20	19.2	5	7	COASTAL PLAIN TAN WHITE CALCAREOUS SAND WITH SHELL FRAGMENTS, SAT. (CASTLE HAYNE FORMATION)		
15	14.2	7	8			
10	9.2	8	8			
5	4.2	5	8000.1	GRAY LIMESTONE (CASTLE HAYNE FORMATION)		
0	-0.8	6	24	GRAY LIMESTONE (CASTLE HAYNE FORMATION)		
-5	-5.8	6	11	GRAY LIMESTONE (CASTLE HAYNE FORMATION)		
-10	-10.8	6	22	GRAY LIMESTONE (CASTLE HAYNE FORMATION)		
-15	-15.8	31	23	GRAY LIMESTONE (CASTLE HAYNE FORMATION)		
-20	-20.8	6	20	GRAY LIMESTONE (CASTLE HAYNE FORMATION)		
-25	-25.8	5	6	GRAY LIMESTONE (CASTLE HAYNE FORMATION)		
-30	-30.8	22	13	GRAY LIMESTONE (CASTLE HAYNE FORMATION)		

Boring Terminated at Elevation -32.3 ft in medium dense sand

Boring Terminated at Elevation -30.7 ft in very stiff clay

**NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT**

WBS 45348.1.8		TIP BD-5102H		COUNTY JONES		GEOLOGIST STETLER, T.		
SITE DESCRIPTION BRIDGE ON -L- (SR 1315) OVER BEAVER CREEK								
BORING NO. EB2-A		STATION 14+89		OFFSET 14 R LT		ALIGNMENT -L-		
COLLAR ELEV. 38.3 R		TOTAL DEPTH 69.1 R		NORTHING 506,425		EASTING 2,464,034		
DRILL RIG/HAMMER EFF. DATE CAT3394 CME-558 91% 02/19/2010		DRILL METHOD Mod Rotary		HAMMER TYPE Automatic		SURFACE WATER DEPTH N/A		
DRILLER Contract Driller		START DATE 03/03/10		COMP. DATE 03/03/10		SURFACE WATER DEPTH N/A		
ELEV. (ft)	DEPTH (ft)	BLOW COUNT	BLOWS PER FOOT			SAMP. NO.	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0-5 ft	5-10 ft	10-15 ft			
49	0.0	2					GROUND SURFACE	0.0
35	14.0	2					ROADWAY EMBANKMENT BROWN SILTY SAND, MOIST	14.0
30	19.0	2					BROWN SILTY SAND WITH WOOD FRAGMENTS, MOIST TO SAT.	19.0
25	24.0	2					ALLUVIAL BROWN SANDY CLAY, WET	24.0
20	29.0	2					COASTAL PLAIN TAN WHITE CALCAREOUS SAND WITH SILT FRAGMENTS, SAT. (CASTLE HAYNE FORMATION)	29.0
15	34.0	2					COASTAL PLAIN GRAY LIMESTONE (CASTLE HAYNE FORMATION)	34.0
10	39.0	2					COASTAL PLAIN GRAY LIMESTONE (CASTLE HAYNE FORMATION)	39.0
5	44.0	2					COASTAL PLAIN GRAY LIMESTONE (CASTLE HAYNE FORMATION)	44.0
0	49.0	2					COASTAL PLAIN GRAY LIMESTONE (CASTLE HAYNE FORMATION)	49.0
-5	54.0	2					COASTAL PLAIN GRAY LIMESTONE (CASTLE HAYNE FORMATION)	54.0
-10	59.0	2					COASTAL PLAIN GRAY LIMESTONE (CASTLE HAYNE FORMATION)	59.0
-15	64.0	2					COASTAL PLAIN GRAY LIMESTONE (CASTLE HAYNE FORMATION)	64.0
-20	69.0	2					COASTAL PLAIN GRAY LIMESTONE (CASTLE HAYNE FORMATION)	69.0

Boring Terminated at Elevation -30.8 ft in hard limestone