



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

BEVERLY EAVES PERDUE
GOVERNOR

EUGENE A. CONTI, JR.
SECRETARY

September 24, 2012

MEMORANDUM TO: J. Wally Bowman, P.E.
Division 5 Engineer

ATTENTION: Mark Craig, P.E.
Division Bridge Program Manager

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

STATE PROJECT: 17BP.5.R.30 (SF-340023)
FEDERAL PROJECT: N/A
COUNTY: Franklin

DESCRIPTION: Bridge No. 23 on SR 1105 over Cedar 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 (14) pages
- Foundation Design Recommendations (5) pages
- Design Calculations () pages
- Special Provisions () pages

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

KJK/CAK/NAA

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

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

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

FOUNDATION RECOMMENDATIONS

PROJECT 17BP.5.R.30

DESCRIPTION Bridge No. 23 on SR 1105

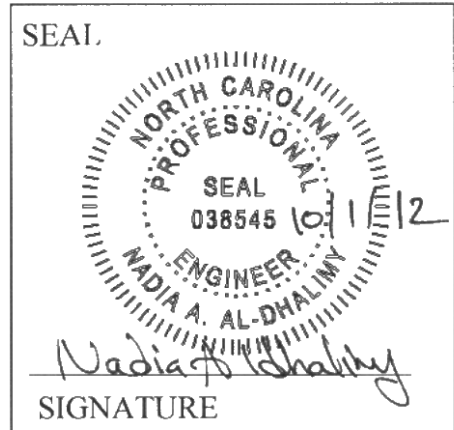
T.I.P. NO. SF-340023

Over Cedar Creek

COUNTY Franklin

STATION 14+00.00 -L-

	INITIALS	DATE
DESIGN	NAA	09/24/2012
CHECK	CAK	10/1/12
APPROVAL	CAK	10/1/12



BENT NO.	STATION	FOUNDATION TYPE	FACTORED RESISTANCE	MISCELLANEOUS DETAILS
END BENT 1	13+23.75 -L-	Cap on HP 12 x 53 Steel Piles with Steel H-Pile Points	67 Tons/Pile	Bottom of Cap Elevation = 258 ft. ± Estimated Pile Length = 10 ft. ± Number of Piles = 7
BENT 1	13+74.94 -L-	36 in. Diameter Drilled Piers	360 Tons/Pier	Bottom of Cap Elevation = 259 ft. ± Estimated Drilled Pier Top El. = 251 ft. ± Point of Fixity Elevation = 244 ft. ± Tip Elevation No Higher Than (L&C) = 237 ft. Tip Elevation No Higher Than (R) = 240 ft. Number of Piers = 3
BENT 2	14+25.06 -L-	36 in. Diameter Drilled Piers	360 Tons/Pier	Bottom of Cap Elevation = 259 ft. ± Estimated Drilled Pier Top El. = 252 ft. ± Point of Fixity Elevation (L) = 239 ft. ± Tip Elevation No Higher Than (L) = 235 ft. Point of Fixity Elevation (C&R) = 235 ft. ± Tip Elevation No Higher Than (C&R) = 232 ft. Number of Piers = 3
END BENT 2	14+76.25 -L-	Cap on HP 12 x 53 Steel Piles with Steel H-Pile Points	67 Tons/Pile	Bottom of Cap Elevation = 258 ft. ± Estimated Pile Length = 25 ft. ± Number of Piles = 7

COMMENTS & NOTES (See Following Page)

FOUNDATION RECOMMENDATION NOTES ON PLANS

1. FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.
2. PILES AT END BENT NO. 1 AND END BENT NO. 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 67 TONS PER PILE.
3. DRIVE PILES AT END BENT NO. 1 AND END BENT NO. 2 TO A REQUIRED DRIVING RESISTANCE OF 115 TONS PER PILE.
4. STEEL H-PILE POINTS ARE REQUIRED FOR STEEL H-PILES AT END BENT NO. 1 AND END BENT NO. 2. FOR STEEL PILE POINTS, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.
5. PILE EXCAVATION IS REQUIRED TO INSTALL PILES AT END BENT NO. 1. EXCAVATE HOLES AT PILE LOCATIONS TO ELEVATION 248 FT. FOR PILE EXCAVATION, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.
6. CONCRETE OR GROUT IS REQUIRED TO FILL HOLES FOR PILE EXCAVATION AT END BENT NO. 1.
7. FOR DRILLED PIERS, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.
8. DRILLED PIERS AT BENT NO. 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 360 TONS PER PIER. CHECK FIELD CONDITIONS FOR THE REQUIRED TIP RESISTANCE OF 40 TSF.
9. DRILLED PIERS AT BENT NO. 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 360 TONS PER PIER. CHECK FIELD CONDITIONS FOR THE REQUIRED TIP RESISTANCE OF 40 TSF.
10. INSTALL DRILLED PIERS AT BENT NO. 1 THAT EXTEND TO AN ELEVATION NO HIGHER THAN 237 FT (L&C) AND 240 FT (R) AND SATISFY THE REQUIRED TIP RESISTANCE.
11. INSTALL DRILLED PIERS AT BENT NO. 2 THAT EXTEND TO AN ELEVATION NO HIGHER THAN 235 FT (L) AND 232 FT (C&R) AND SATISFY THE REQUIRED TIP RESISTANCE.
12. PERMANENT STEEL CASINGS MAY BE REQUIRED FOR DRILLED PIERS AT BENT NO. 1. IF REQUIRED, DO NOT EXTEND PERMANENT CASINGS BELOW ELEVATION 247 FT WITHOUT PRIOR APPROVAL FROM THE ENGINEER. THE ENGINEER WILL DETERMINE THE NEED FOR PERMANENT CASINGS.
13. PERMANENT STEEL CASINGS MAY BE REQUIRED FOR DRILLED PIERS AT BENT NO. 2. IF REQUIRED, DO NOT EXTEND PERMANENT CASINGS BELOW ELEVATION 244 FT (L) AND 238 FT (C&R) WITHOUT PRIOR APPROVAL FROM THE ENGINEER. THE ENGINEER WILL DETERMINE THE NEED FOR PERMANENT CASINGS.

14. THE SCOUR CRITICAL ELEVATION FOR BENT NO. 1 IS ELEVATION 245 FEET. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.
15. THE SCOUR CRITICAL ELEVATION FOR BENT NO. 2 IS ELEVATION 242 FEET (L) AND 240 FEET (C&R). SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.
16. SPT MAY BE REQUIRED FOR DRILLED PIERS AT BENT NO. 1. AND BENT NO. 2 FOR SPT TESTING, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.
17. CSL TUBES ARE REQUIRED AND CSL TESTING MAY BE REQUIRED FOR DRILLED PIERS AT BENT NO.1 AND BENT NO. 2. FOR CSL TESTING, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.
18. SID INSPECTIONS MAY BE REQUIRED FOR DRILLED PIERS. THE ENGINEER WILL DETERMINE THE NEED FOR SID INSPECTIONS. FOR SID INSPECTIONS, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.

FOUNDATION RECOMMENDATION COMMENTS

1. 1.5:1 (H:V) SLOPES FOR END BENTS WITH SLOPE PROTECTION TO BERM ARE OK.
2. VERTICAL PILES SHOULD BE USED AT END BENT NO. 1 AND END BENT NO. 2.
3. USE APPROACH FILL DETAIL FOR SUB-REGIONAL TIER BRIDGES AT EACH END BENT.
4. DESIGN SCOUR ELEVATION FOR BENT NO. 1 IS 247.1 FEET.
5. DESIGN SCOUR ELEVATION FOR BENT NO. 2 IS 244.1 FEET.
6. FOR BENT NO. 1 AND BENT NO. 2 WITHOUT A NOT IN SOIL PAY ITEM SHOWN IN THE PLANS, DRILLED PIERS WILL BE PAID AS 36" DIAMETER DRILLED PIERS. THE CONTRACT UNIT PRICE FOR 36" DIAMETER DRILLED PIERS WILL BE FULL COMPENSATION FOR DRILLING THROUGH ANY MATERIALS ENCOUNTERED.
7. NO WAITING PERIOD IS REQUIRED BEFORE BEGINNING ANY WORK FOR END BENT CONSTRUCTION AFTER COMPLETION OF THE EMBANKMENT AT EACH END BENT.

PILE PAY ITEMS

(Revised 8/15/12)

WBS ELEMENT 17BP.5.R.30

TIP NO. SF-340023

COUNTY Franklin

STATION 14+00.00 -L-

DATE 9/24/2012

DESIGNED BY NAA

CHECKED BY CAH

DESCRIPTION Bridge No. 23 on SR 1105 over Cedar Creek

NUMBER OF BENTS WITH PILES _____

NUMBER OF PILES PER BENT _____

NUMBER OF END BENTS WITH PILES 1

NUMBER OF PILES PER END BENT 7

Only required for "Predrilling
for Piles" & "Pile
Excavation" pay items

	PILE PAY ITEM QUANTITIES							
	Bent # or End Bent #	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)		
						In Soil		Not In Soil
End Bent # 1	yes				46	24	X	
End Bent # 2	yes				0	0		
TOTALS			0	0	46	24	0	

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.

Show quantity of "PDA Testing" on the plans as total only.

If quantity of "PDA Testing" is 3 or less, reference "Pile Driving Criteria" provision in PDA notes on plans and include "Pile Driving Criteria" provision in the contract.

DRILLED PIER PAY ITEMS
(For LRFD Projects - Revised 4/18/11)

WBS ELEMENT 17BP.5.R.30 DATE 9/24/2012
 TIP NO. SF-340023 DESIGNED BY NAA
 COUNTY Franklin CHECKED BY LMK
 STATION 14+00.00 -L-
 DESCRIPTION Bridge No. 23 on SR 1105 over Cedar Creek

NUMBER OF BENTS WITH DRILLED PIERS 2
 NUMBER OF DRILLED PIERS PER BENT 3
 NUMBER OF END BENTS WITH DRILLED PIERS _____
 NUMBER OF DRILLED PIERS PER END BENT _____

Bent # or End Bent #	DRILLED PIER PAY ITEM QUANTITIES				
	36" Dia. Drilled Piers Not In Soil (per linear ft/m)	Permanent Steel Casing For 36" Dia. Drilled Pier (yes/no/maybe)	SID Inspections (per each)	SPT Testing (per each)	CSL Testing (per each)
Bent 1		maybe			
Bent 2		maybe			
TOTALS	0	 	1	1	1

Notes:

Blanks or "no" represent quantity of zero.

If drilled piers not in soil are required, calculate quantity of "36" Dia. Drilled Piers in Soil" as the difference between the total drilled pier length and the "36" Dia. Drilled Piers Not in Soil" from the table above. If there is none or zero quantity for drilled piers not in soil in the table above, calculate quantity of "36" Dia. Drilled Piers" as the total drilled pier length and do not use the "36" Dia. Drilled Piers in Soil" pay item.

If permanent steel casing is or may be required, calculate quantity of "Permanent Steel Casing for 36" Dia. Drilled Pier" as the difference between the ground line or top of drilled pier elevation, whichever is higher, and the elevation the permanent casing can not extend below from the foundation recommendations.

If "SID Inspections", "SPT Testing" or "CSL Testing" may be required, show quantities of these pay items on the substructure plans as totals only. If "SID Inspections", "SPT Testing" or "CSL Testing" is required, show quantities of these pay items on the substructure plans for each bent or end bent.

The number of CSL tubes required per drilled pier is equal to one tube per foot of design pier diameter with at least four tubes per pier. Calculate the length of each CSL tube as the total drilled pier length plus 1.5 ft.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

PROJECT REFERENCE NO.
17BP-5-R-30

SHEET NO.
2

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION		SOIL LEGEND AND ABBREVIATION		GRADEATION		MINERALOGICAL COMPOSITION		ANGULARITY OF GRAINS		ROCK DESCRIPTION		TERMS AND DEFINITIONS	
<p>SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED OR WEATHERED PARTS OF THE EARTH'S CRUST. SOILS ARE CLASSIFIED BY THE U.S. DEPARTMENT OF AGRICULTURE AND THE U.S. GEOLOGICAL SURVEY. SOILS ARE CLASSIFIED BY THE U.S. GEOLOGICAL SURVEY INTO CLAY, SILT, SAND, GRAVEL, AND ROCK. SOILS ARE CLASSIFIED BY THE U.S. GEOLOGICAL SURVEY INTO CLAY, SILT, SAND, GRAVEL, AND ROCK. SOILS ARE CLASSIFIED BY THE U.S. GEOLOGICAL SURVEY INTO CLAY, SILT, SAND, GRAVEL, AND ROCK.</p>		<p>GENERAL CLASS. (U.S. DEPT. OF AGRICULTURE)</p> <p>CLAY (CL) 0-0.002</p> <p>SILT (SI) 0.002-0.075</p> <p>SAND (SA) 0.075-2.0</p> <p>GRAVEL (GR) 2.0-60.0</p> <p>ROCK (R) 60.0-100.0</p>		<p>MINERALOGICAL COMPOSITION</p> <p>QUARTZ (Q) 1-100%</p> <p>ILLITE (I) 1-100%</p> <p>KAOLINITE (K) 1-100%</p> <p>MICA (M) 1-100%</p> <p>CLAY (C) 1-100%</p>		<p>ANGULARITY OF GRAINS</p> <p>WELL-SORTED (WS) 1-100%</p> <p>POORLY-SORTED (PS) 1-100%</p> <p>VERY POORLY-SORTED (VPS) 1-100%</p>		<p>ROCK DESCRIPTION</p> <p>CRYSTALLINE (CR) 1-100%</p> <p>NON-CRYSTALLINE (NC) 1-100%</p> <p>SEDIMENTARY (SE) 1-100%</p> <p>IGNEOUS (IG) 1-100%</p> <p>METAMORPHIC (ME) 1-100%</p>		<p>TERMS AND DEFINITIONS</p> <p>ALLUVIUM (AL) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.</p> <p>AGGREGATE - A WATER BEARING FORMATION ON STRATA.</p> <p>ANISOTROPIC - APPLIED TO ROCKS THAT HAVE BEEN DEFORMED FROM SAND OR THAT CONTAIN SAND.</p> <p>ARTICULATION - A WEATHERING SURFACE THAT HAS BEEN DEFORMED FROM SAND OR THAT CONTAINS SAND.</p> <p>ATTENUATION - A WEATHERING SURFACE THAT HAS BEEN DEFORMED FROM SAND OR THAT CONTAINS SAND.</p>			
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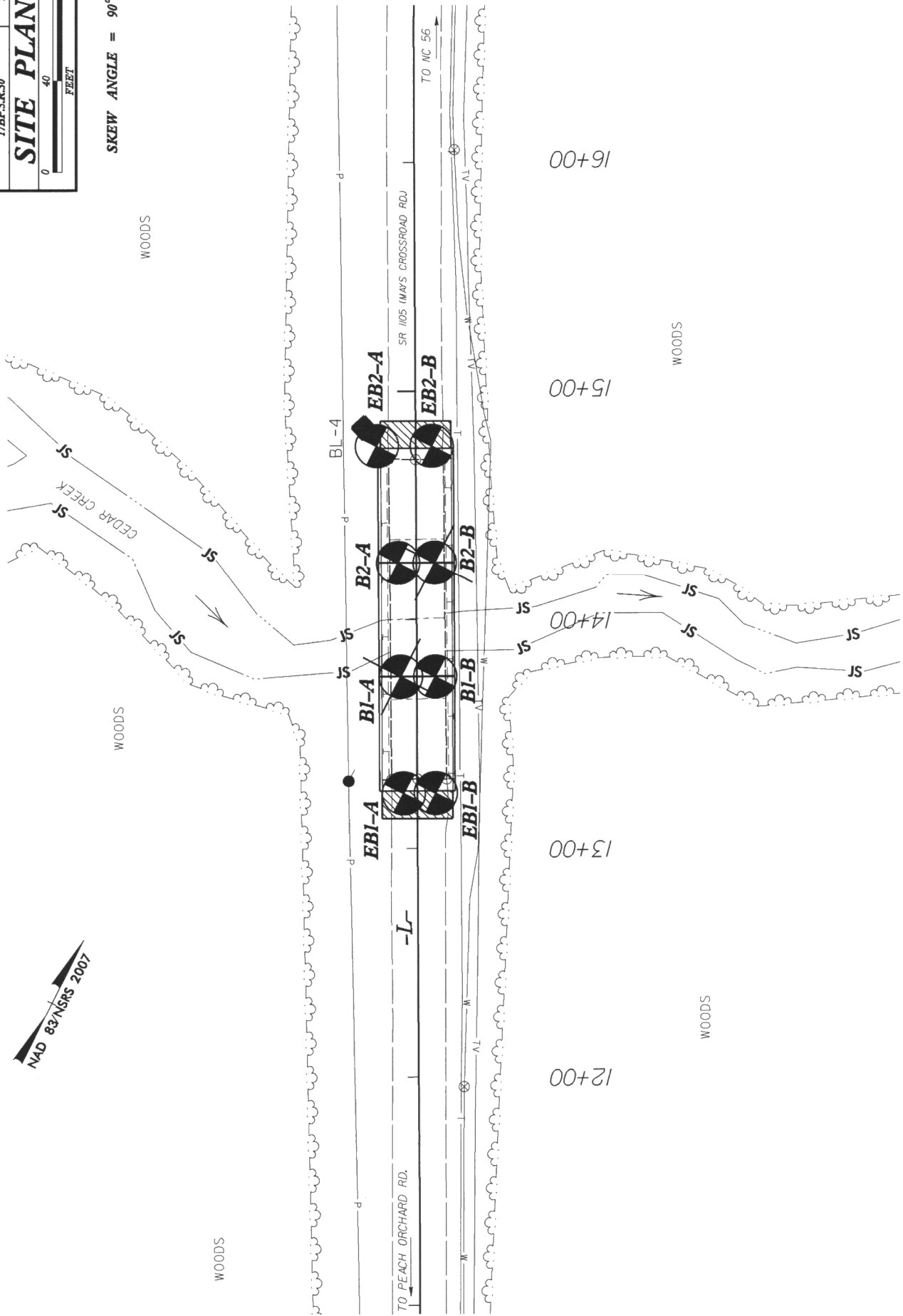
PROJECT REFERENCE NO. 17BF.S.R.30 SHEET 3

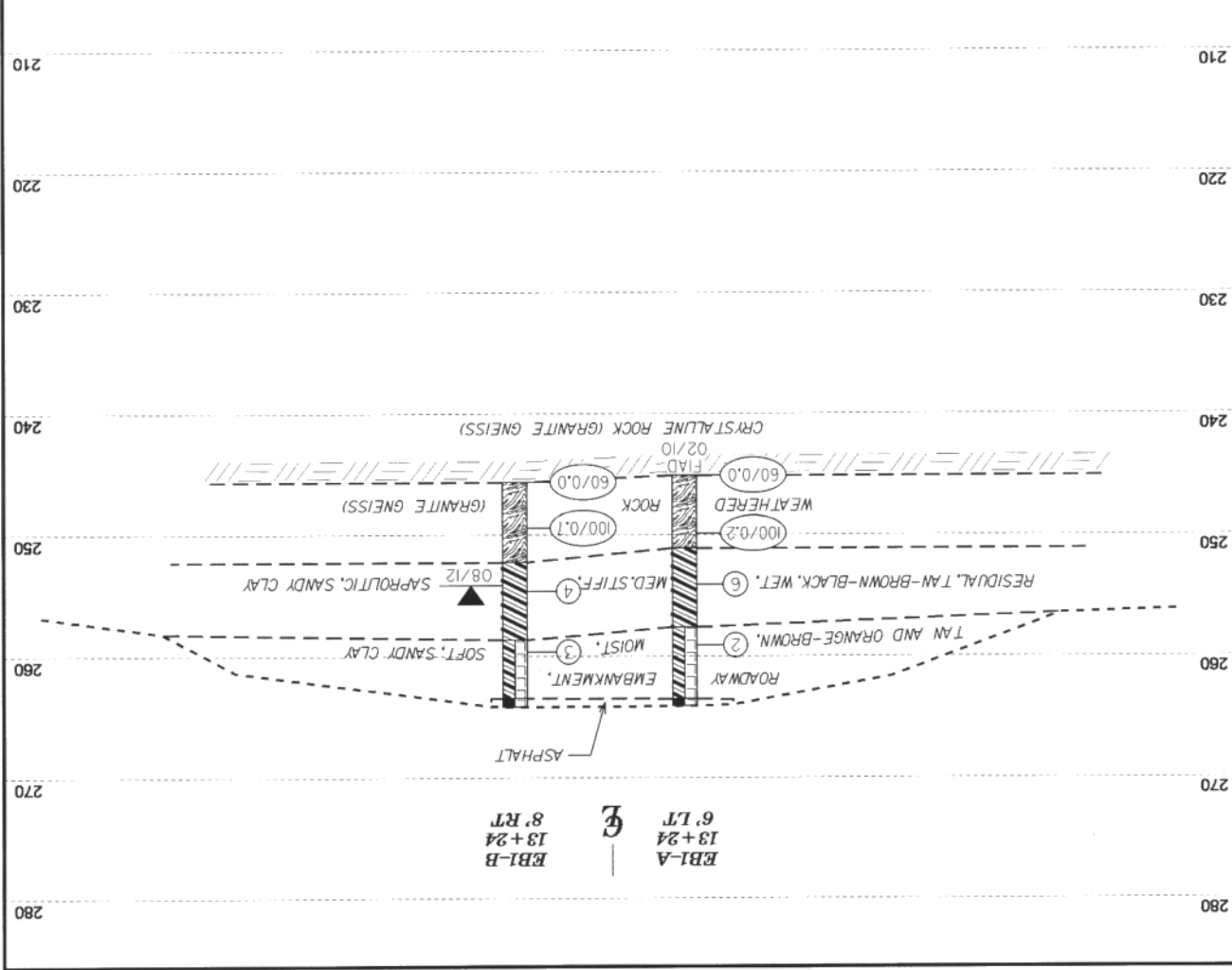
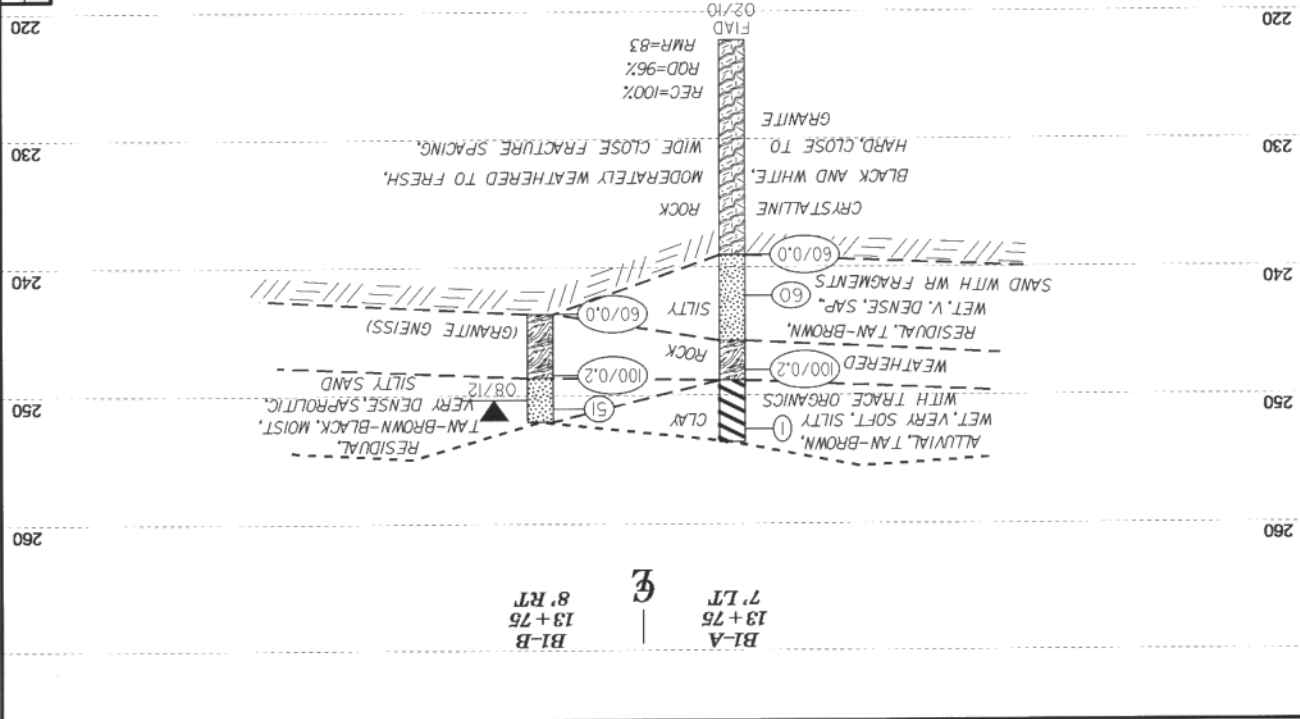
SITE PLAN

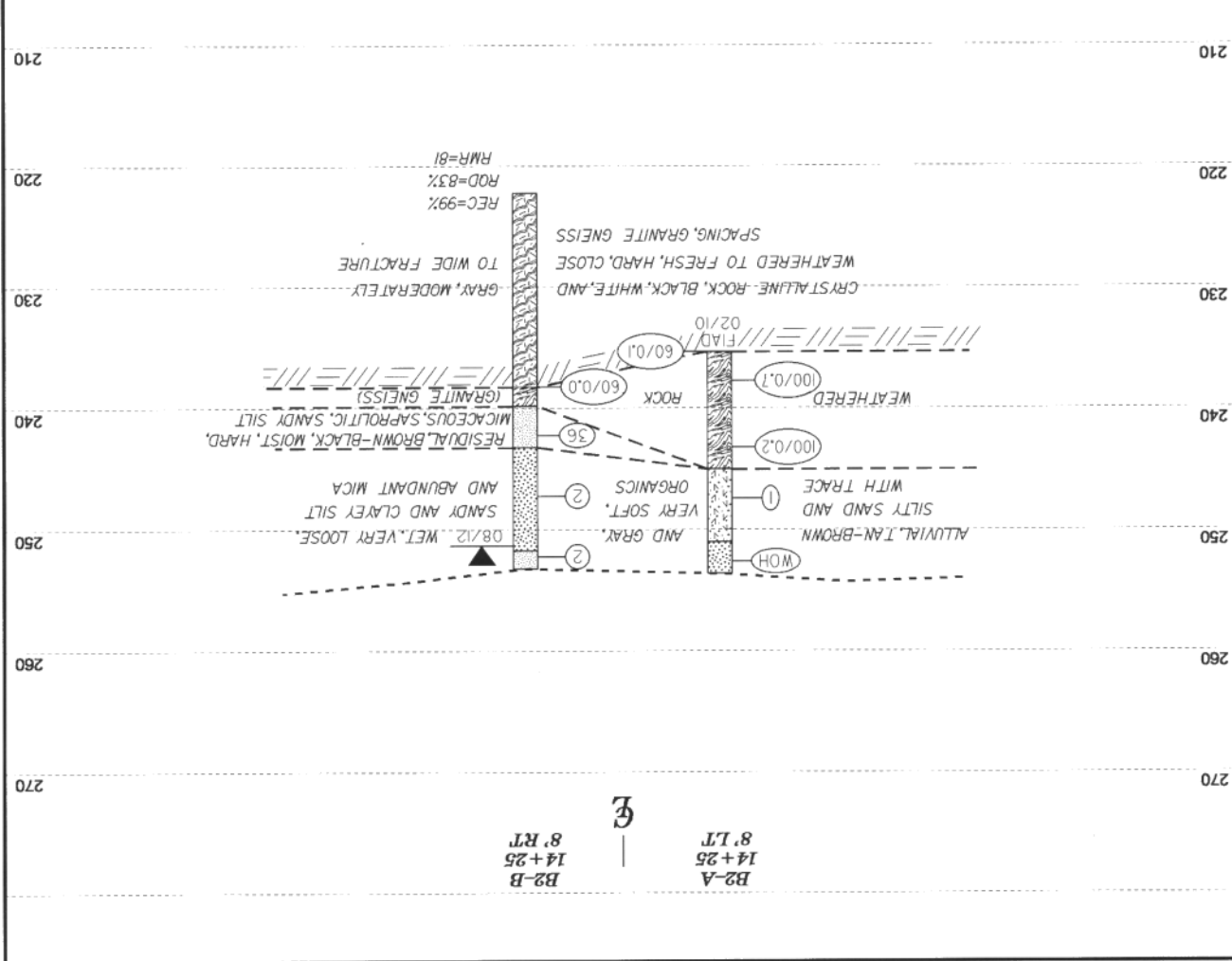
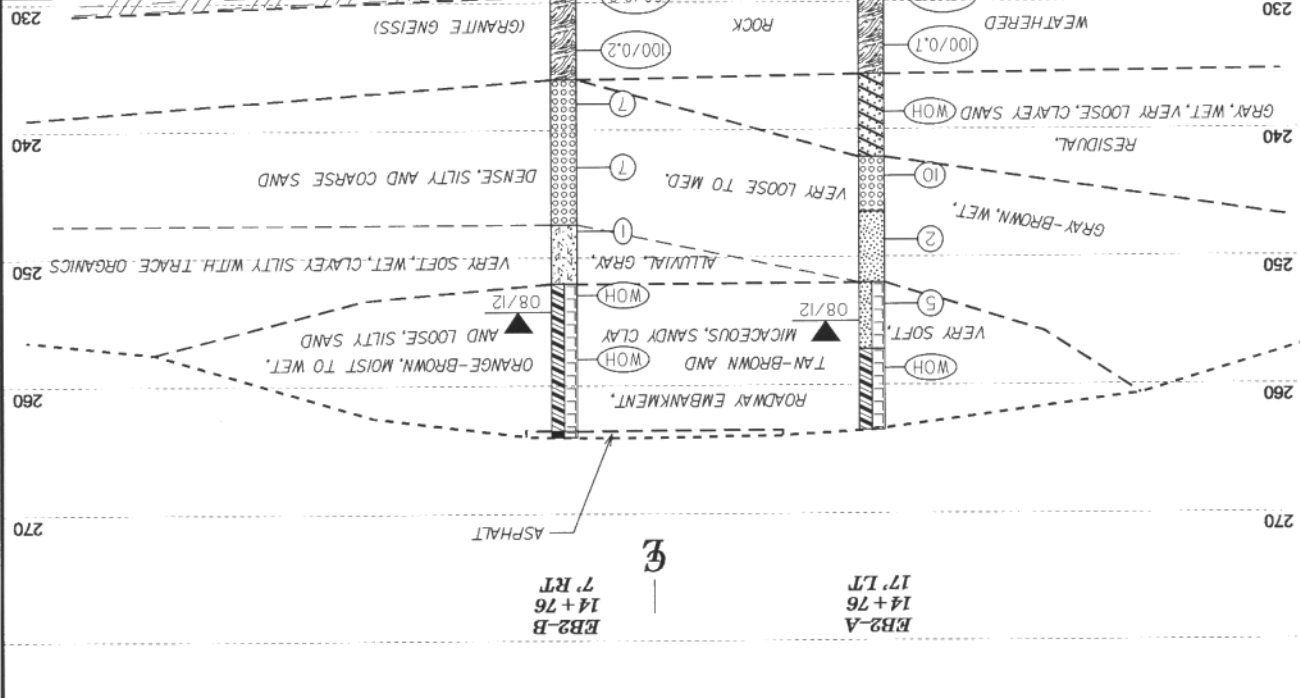


SKEW ANGLE = 90°

NAD 83/NGRS 2007









NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT

WBS 17BP.5 R.30		TIP SF-340023		COUNTY FRANKLIN		GEOLOGIST Milkovits, J. I.	
SITE DESCRIPTION BRIDGE NO. 23 ON -L- (SR 1105, MAYS CROSSROADS) OVER CEDAR CREEK		STATION 13+24		OFFSET 8 ft RT		ALIGNMENT -L-	
BORING NO. EB1-B		TOTAL DEPTH 18.5 ft		NORTHING 845.502		EASTING 2,174,729	
COLLAR ELEV. 264.1 ft		DRILL METHOD H.S. Augers		DRILL DATE 08/28/12		SURFACE WATER DEPTH N/A	
DRILL RIGHAMMER EFF./DATE SUM093 DIEDRICH D-50 82% 07/22/2011		START DATE 08/28/12		COMP. DATE 08/28/12		SOIL AND ROCK DESCRIPTION	
DRILLER Contract Driller		BLOW COUNT		SAMP NO.		L O M G	
DRIVE ELEV (ft)	DEPTH (ft)	0.5ft	0.5ft	0.5ft	0.5ft	0.5ft	0.5ft
265							
260	260.6	1	1	2			
255	255.6	1	2	2			
250	250.6	1	2	880			
	245.6	18.4	8000	0			
SOIL AND ROCK DESCRIPTION: 0.0 - 0.7: GROUND SURFACE ASPHALT 0.7 - 6.0: ROADWAY EMBANKMENT ORANGE-BROWN SANDY CLAY 6.0 - 11.9: RESIDUAL TAN-BROWN-BLACK SAPROLITIC SANDY CLAY 11.9 - 18.5: WEATHERED ROCK (GRANITE GNEISS)							
Boring Terminated with Standard Penetration Test Refusal at Elevation 245.6 ft on CRYSTALLINE ROCK (GRANITE GNEISS)							

WBS 17BP.5 R.30		TIP SF-340023		COUNTY FRANKLIN		GEOLOGIST Milkovits, J. I.	
SITE DESCRIPTION BRIDGE NO. 23 ON -L- (SR 1105, MAYS CROSSROADS) OVER CEDAR CREEK		STATION 13+24		OFFSET 6 ft LT		ALIGNMENT -L-	
BORING NO. EB1-A		TOTAL DEPTH 19.0 ft		NORTHING 845.496		EASTING 2,174,716	
COLLAR ELEV. 264.1 ft		DRILL METHOD H.S. Augers		DRILL DATE 08/27/12		SURFACE WATER DEPTH N/A	
DRILL RIGHAMMER EFF./DATE SUM093 DIEDRICH D-50 82% 07/22/2011		START DATE 08/27/12		COMP. DATE 08/27/12		SOIL AND ROCK DESCRIPTION	
DRILLER Contract Driller		BLOW COUNT		SAMP NO.		L O M G	
DRIVE ELEV (ft)	DEPTH (ft)	0.5ft	0.5ft	0.5ft	0.5ft	0.5ft	0.5ft
265							
260	260.1	1	1	2			
255	255.1	1	2	4			
250	250.1	1	2	1000			
	245.1	19.0	8000	0			
SOIL AND ROCK DESCRIPTION: 0.0 - 0.0: GROUND SURFACE ASPHALT 0.0 - 6.5: ROADWAY EMBANKMENT YELLOW-BROWN SANDY CLAY 6.5 - 13.0: RESIDUAL TAN-BROWN-BLACK SAPROLITIC SANDY CLAY 13.0 - 19.0: WEATHERED ROCK (GRANITE GNEISS)							
Boring Terminated with Standard Penetration Test Refusal at Elevation 245.1 ft on CRYSTALLINE ROCK (GRANITE GNEISS)							

**NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT**

WBS 17BP-5.R.30	TIP SF-340023	COUNTY FRANKLIN	GEOLOGIST Milkovits, J. I.
SITE DESCRIPTION BRIDGE NO. 23 ON L-L (SR 1105, MAYS CROSSROADS) OVER CEDAR CREEK			
BORING NO. B1-A	STATION 13+75	OFFSET 7 ft LT	ALIGNMENT -L-
COLLAR ELEV. 253.6 ft	TOTAL DEPTH 31.4 ft	NORTHING 845,541	EASTING 2,174,692
DRILL RIGHAMMER EFF./DATE	SUM0093 DIEDRICH D-50 87% 07/27/2012	DRILL METHOD NW Casing W/SPT & Core	HAMMER TYPE Automatic
DRILLER Contract Driller	START DATE 08/30/12	COMP. DATE 08/30/12	SURFACE WATER DEPTH N/A

WBS 17BP-5.R.30	TIP SF-340023	COUNTY FRANKLIN	GEOLOGIST Milkovits, J. I.
SITE DESCRIPTION BRIDGE NO. 23 ON L-L (SR 1105, MAYS CROSSROADS) OVER CEDAR CREEK			
BORING NO. B1-A	STATION 13+75	OFFSET 7 ft LT	ALIGNMENT -L-
COLLAR ELEV. 253.6 ft	TOTAL DEPTH 31.4 ft	NORTHING 845,541	EASTING 2,174,692
DRILL RIGHAMMER EFF./DATE	SUM0093 DIEDRICH D-50 87% 07/27/2012	DRILL METHOD NW Casing W/SPT & Core	HAMMER TYPE Automatic
DRILLER Contract Driller	START DATE 08/30/12	COMP. DATE 08/30/12	SURFACE WATER DEPTH N/A

ELEV (ft)	DEPTH (ft)	DRIVE ELEV (ft)	BLOW COUNT	BLOWS PER FOOT				SAMP NO.	L	O	MOL	G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	GROUND WTR (ft)
				0-25	25-50	50-75	75-100								
239	0.0	253.6	1									GROUND SURFACE	0.0	2.2	
235	5.4	248.2	1000/2									TAN-BROWN SILTY CLAY WITH TRACE ORGANICS	4.8	2.2	
230	10.4	243.2	31									WEATHERED ROCK (GRANITE GNEISS)	7.8	2.2	
225	14.6	238.0	600/0									RESIDUAL TAN-BROWN SAPROLITIC SILTY SAND WITH WEATHERED ROCK FRAGMENTS	14.6	2.2	
222.2	31.4	222.2										CRYSTALLINE ROCK (GRANITE GNEISS)	31.4	2.2	

ELEV (ft)	DEPTH (ft)	DRILL ELEV (ft)	DEPTH (ft)	DRILL REC. ROD (ft)	ROD %	SAMP NO.	L	O	G	STRATA REC. ROD (ft)	ROD %	TOTAL RUN (ft)	REC. ROD (ft)	ROD %	DESCRIPTION AND REMARKS	DEPTH (ft)	GROUND WTR (ft)
239	14.6	238.0	14.6	1.8	100%					(16.8)	100%	16.8	1.8	100%	Begin Coring @ 14.6 ft	14.6	2.2
235	16.4	236.2	16.4	5.0	100%					(16.2)	96%	16.2	5.0	96%	BLACK, WHITE, AND PINK, MODERATELY WEATHERED TO FRESH, MEDIUM HARD TO HARD, CLOSE TO WIDE FRACTURE SPACING, GRANITE GNEISS	14.6	2.2
230	21.4	231.2	21.4	5.0	100%					(5.0)	100%	21.4	5.0	100%		14.6	2.2
225	26.4	225.2	26.4	5.0	100%					(4.4)	88%	26.4	5.0	88%		14.6	2.2
222.2	31.4	222.2	31.4	1.4	100%					(1.4)	100%	31.4	1.4	100%	Boring Terminated at Elevation 222.2 ft in CRYSTALLINE ROCK (GRANITE GNEISS)	31.4	2.2

**NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT**

WBS 17BP-5.R.30	TIP SF-340023	COUNTY FRANKLIN	GEOLOGIST Milkovits, J. I.
SITE DESCRIPTION BRIDGE NO. 23 ON L-L (SR 1105, MAYS CROSSROADS) OVER CEDAR CREEK			
BORING NO. B1-A	STATION 13+75	OFFSET 7 ft LT	ALIGNMENT -L-
COLLAR ELEV. 253.6 ft	TOTAL DEPTH 31.4 ft	NORTHING 845,541	EASTING 2,174,692
DRILL RIGHAMMER EFF./DATE	SUM0093 DIEDRICH D-50 87% 07/27/2012	DRILL METHOD NW Casing W/SPT & Core	HAMMER TYPE Automatic
DRILLER Contract Driller	START DATE 08/30/12	COMP. DATE 08/30/12	SURFACE WATER DEPTH N/A

WBS 17BP-5.R.30	TIP SF-340023	COUNTY FRANKLIN	GEOLOGIST Milkovits, J. I.
SITE DESCRIPTION BRIDGE NO. 23 ON L-L (SR 1105, MAYS CROSSROADS) OVER CEDAR CREEK			
BORING NO. B1-A	STATION 13+75	OFFSET 7 ft LT	ALIGNMENT -L-
COLLAR ELEV. 253.6 ft	TOTAL DEPTH 31.4 ft	NORTHING 845,541	EASTING 2,174,692
DRILL RIGHAMMER EFF./DATE	SUM0093 DIEDRICH D-50 87% 07/27/2012	DRILL METHOD NW Casing W/SPT & Core	HAMMER TYPE Automatic
DRILLER Contract Driller	START DATE 08/30/12	COMP. DATE 08/30/12	SURFACE WATER DEPTH N/A

ELEV (ft)	DEPTH (ft)	DRIVE ELEV (ft)	BLOW COUNT	BLOWS PER FOOT				SAMP NO.	L	O	MOL	G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	GROUND WTR (ft)
				0-25	25-50	50-75	75-100								
255	0.0	253.6	1									GROUND SURFACE	0.0	2.2	
250	5.4	248.2	1000/2									TAN-BROWN SILTY CLAY WITH TRACE ORGANICS	4.8	2.2	
245	10.4	243.2	31									WEATHERED ROCK (GRANITE GNEISS)	7.8	2.2	
240	14.6	238.0	600/0									RESIDUAL TAN-BROWN SAPROLITIC SILTY SAND WITH WEATHERED ROCK FRAGMENTS	14.6	2.2	
235	16.4	236.2	16.4									CRYSTALLINE ROCK (GRANITE GNEISS)	14.6	2.2	
230	21.4	231.2	21.4									BLACK, WHITE, AND PINK, MODERATELY WEATHERED TO FRESH, MEDIUM HARD TO HARD, CLOSE TO WIDE FRACTURE SPACING, GRANITE GNEISS	14.6	2.2	
225	26.4	225.2	26.4									RYSTALLINE ROCK (GRANITE GNEISS)	31.4	2.2	

ELEV (ft)	DEPTH (ft)	DRILL ELEV (ft)	DEPTH (ft)	DRILL REC. ROD (ft)	ROD %	SAMP NO.	L	O	G	STRATA REC. ROD (ft)	ROD %	TOTAL RUN (ft)	REC. ROD (ft)	ROD %	DESCRIPTION AND REMARKS	DEPTH (ft)	GROUND WTR (ft)
255	0.0	253.6	0.0	1.8	100%					(16.8)	100%	16.8	1.8	100%	Begin Coring @ 14.6 ft	14.6	2.2
250	5.4	248.2	5.4	5.0	100%					(16.2)	96%	16.2	5.0	96%	BLACK, WHITE, AND PINK, MODERATELY WEATHERED TO FRESH, MEDIUM HARD TO HARD, CLOSE TO WIDE FRACTURE SPACING, GRANITE GNEISS	14.6	2.2
245	10.4	243.2	10.4	5.0	100%					(5.0)	100%	15.4	5.0	100%		14.6	2.2
240	14.6	238.0	14.6	5.0	100%					(4.4)	88%	20.2	5.0	88%		14.6	2.2
235	16.4	236.2	16.4	1.4	100%					(1.4)	100%	17.8	1.4	100%	Boring Terminated at Elevation 222.2 ft in CRYSTALLINE ROCK (GRANITE GNEISS)	31.4	2.2



NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT

WBS 17BP 5.R.30		TIP SF-340023		COUNTY FRANKLIN		GEOLOGIST Milkovits, J. I.	
SITE DESCRIPTION BRIDGE NO. 23 ON L- (SR 1105, MAYS CROSSROADS) OVER CEDAR CREEK							
BORING NO. B1-B		STATION 13+75		OFFSET 8 ft RT		ALIGNMENT -L-	
COLLAR ELEV. 252.0 ft		TOTAL DEPTH 8.4 ft		NORTHING 845,548		EASTING 2,174,705	
DRILL RIGHAMMER EFF./DATE		SUIM093 DIEDRICH D-50 82% 07/22/2011		DRILL METHOD NW Casing w/ Advance		HAMMER TYPE Automatic	
DRILLER Contract Driller		START DATE 08/29/12		COMP. DATE 08/29/12		SURFACE WATER DEPTH N/A	
DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT	BLOWS PER FOOT	SAMP NO.	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	GROUND WTR (ft)
255	0.0	9	1.1	1	GROUND SURFACE	0.0	N/A
250	3.4	1000	294	2	TAN-BROWN, SILTY SAND WITH TRACE ORGANICS	3.4	1.7
245	8.4	6000	714	3	WEATHERED ROCK (GRANITE GNEISS)	8.4	1.7

WBS 17BP 5.R.30		TIP SF-340023		COUNTY FRANKLIN		GEOLOGIST Milkovits, J. I.	
SITE DESCRIPTION BRIDGE NO. 23 ON L- (SR 1105, MAYS CROSSROADS) OVER CEDAR CREEK							
BORING NO. B2-A		STATION 14+25		OFFSET 8 ft LT		ALIGNMENT -L-	
COLLAR ELEV. 253.6 ft		TOTAL DEPTH 18.4 ft		NORTHING 845,585		EASTING 2,174,668	
DRILL RIGHAMMER EFF./DATE		SUIM093 DIEDRICH D-50 82% 07/22/2011		DRILL METHOD NW Casing w/ Advance		HAMMER TYPE Automatic	
DRILLER Contract Driller		START DATE 08/30/12		COMP. DATE 08/30/12		SURFACE WATER DEPTH N/A	
DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT	BLOWS PER FOOT	SAMP NO.	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	GROUND WTR (ft)
255	0.0	WOH	WOH	1	GROUND SURFACE	0.0	1.5
250	5.2	1000	192	2	TAN-BROWN, SILTY SAND WITH TRACE ORGANICS	5.2	1.5
245	10.2	1000	192	3	WEATHERED ROCK (GRANITE GNEISS)	10.2	1.5
240	15.2	38	250	4	WEATHERED ROCK (GRANITE GNEISS)	15.2	1.5
	18.2	600	330	5	WEATHERED ROCK (GRANITE GNEISS)	18.2	1.5

NCDOT BORE LOG DOUBLE 340023 GEO BH BRD0023 GPJ NC DOT GDT 9/18/12

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 17BP-5.R.30		TIP SF-340023		COUNTY FRANKLIN		GEOLOGIST Milkovits, J. I.	
SITE DESCRIPTION BRIDGE NO. 23 ON -L- (SR 1105, MAYS CROSSROADS) OVER CEDAR CREEK							
BORING NO. EB2-B		STATION 14+76		OFFSET 7 ft RT		ALIGNMENT -L-	
COLLAR ELEV. 264.0 ft		TOTAL DEPTH 34.6 ft		NORTHING 845,637		EASTING 2,174,658	
DRILL RIGHAMMER EFF./DATE SUM093 DIEDRICH D-50 82% 07/22/2011		DRILL METHOD NW Casing w/ Advancer		DRILL DATE 08/28/12		SURFACE WATER DEPTH N/A	
DRILLER Contract Driller		START DATE 08/28/12		COMP. DATE 08/28/12		SURFACE WATER DEPTH N/A	
DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT	START DATE	COMP. DATE	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	GROUND WTR (ft)
265					GROUND SURFACE ASPHALT	0.0	N/A
260	5.1	WOH WOH WOH			ROADWAY EMBANKMENT ORANGE-BROWN, MICACEOUS, SANDY CLAY	6.3	N/A
255	10.1	WOH WOH WOH			TAN-BROWN, SILTY SAND	11.5	8.5
250	15.1	WOH WOH WOH			ALLUVIAL GRAY-BROWN, SILTY SAND	17.0	
245	20.1	1 4 3			TAN-WHITE, COARSE SAND	21.3	
240	25.1	3 3 4			RESIDUAL GRAY, CLAYEY SAND	27.6	
235	30.1	1000/2			WEATHERED ROCK (GRANITE GNEISS)	38.6	
230	34.6	6000.0			Boring Terminated with Standard Penetration Test Refusal at Elevation 224.7 ft on CRYSTALLINE ROCK (GRANITE GNEISS)		

WBS 17BP-5.R.30		TIP SF-340023		COUNTY FRANKLIN		GEOLOGIST Milkovits, J. I.	
SITE DESCRIPTION BRIDGE NO. 23 ON -L- (SR 1105, MAYS CROSSROADS) OVER CEDAR CREEK							
BORING NO. EB2-A		STATION 14+76		OFFSET 17 ft LT		ALIGNMENT -L-	
COLLAR ELEV. 263.5 ft		TOTAL DEPTH 38.8 ft		NORTHING 845,626		EASTING 2,174,636	
DRILL RIGHAMMER EFF./DATE SUM093 DIEDRICH D-50 82% 07/22/2011		DRILL METHOD NW Casing w/ Advancer		DRILL DATE 08/27/12		SURFACE WATER DEPTH N/A	
DRILLER Contract Driller		START DATE 08/27/12		COMP. DATE 08/27/12		SURFACE WATER DEPTH N/A	
DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT	START DATE	COMP. DATE	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	GROUND WTR (ft)
265					GROUND SURFACE ASPHALT	0.0	N/A
260	3.8	WOH WOH WOH			ROADWAY EMBANKMENT TAN-BROWN, SANDY CLAY	6.3	N/A
255	8.8	1 2 3			TAN-BROWN, SILTY SAND	11.5	8.5
250	13.8	WOH WOH 2			ALLUVIAL GRAY-BROWN, SILTY SAND	17.0	
245	18.8	2 4 6			TAN-WHITE, COARSE SAND	21.3	
240	23.8	WOH WOH WOH			RESIDUAL GRAY, CLAYEY SAND	27.6	
235	28.8	26 36 6400.2			WEATHERED ROCK (GRANITE GNEISS)	38.6	
230	33.8	1000/2			Boring Terminated with Standard Penetration Test Refusal at Elevation 224.7 ft on CRYSTALLINE ROCK (GRANITE GNEISS)		
225	38.8	6000.0					

PROJ. NO. - 17BP.5.R.30
ID NO. - SF-340023
COUNTY - FRANKLIN

B1-A -I-

ROCK TEST RESULTS							
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	ROCK TYPE	UNIT WT LBF ³	UNCONFINED COMP. STRENGTH, KSI	SECTION MOD. @ 40% MPsi
RS-1	7 LT	13+75	21.9-22.4	GRANITE GNEISS	161.8	7.87	4.43

B2-B -I-

ROCK TEST RESULTS							
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	ROCK TYPE	UNIT WT LBF ³	UNCONFINED COMP. STRENGTH, KSI	SECTION MOD. @ 40% MPsi
RS-2	8 RT	14+25	17.9-18.4	GRANITE GNEISS	163.1	9.32	3.62

CORE PHOTOGRAPHS

B1-A

BOXES 1 & 2: 14.6 - 31.4 FEET



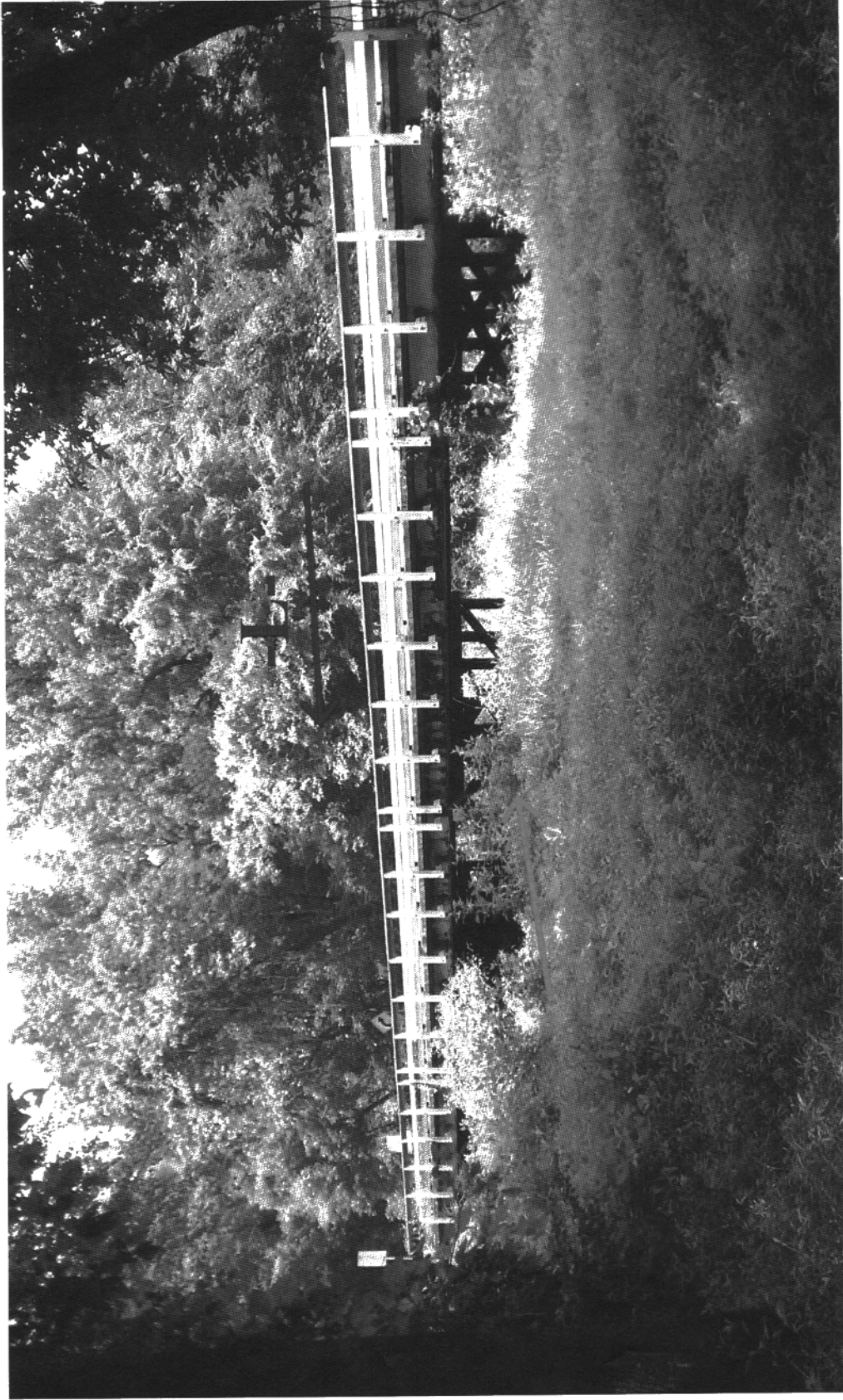
B2-B

BOXES 1 & 2: 15.0 - 31.0 FEET



SITE PHOTOGRAPH

Bridge No. 23 on -L- (SR 1105) over Cedar Creek



Looking North towards End Bent 2