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DEPARTMENT OF TRANSPORTATION

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January, 28, 2004

NCDOT
Geotechnical Unit
12033-D Independence Blvd.
Matthews, NC 28105

STATE PROJECT	WBS: 33527.1.1
I.D. NUMBER	B-4180
COUNTY	Macon
DESCRIPTION	Bridge No. 323 On SR 1611 Over Clear Creek,
SUBJECT:	Geotechnical Report – Bridge Foundation Investigation

PROJECT DESCRIPTION

This is a Bridge Foundation Investigation report in English units, for a permanent replacement bridge at the existing location.

LOCATION:

The site is in the southeast corner of Macon County, about 5 miles south of Highlands, just north of the border with South Carolina. This investigation was based on the structure and location portrayed on the Bridge Survey and Hydraulic Design Report signed and sealed on 09/12/03.

PROPOSED STRUCTURE (S):

The bent of the new permanent bridge will be on a 90^0 skew. The footprint of the new bridge will include the footprint of the existing bridge. The new bridge is 15' longer and about 10' wider than the old bridge. One span @ 50' is planned. The bridge centerline station is at -L- 17+02, elevation 2516.27'. The benchmark is: "**NCDOT STATION B4180 GPS 102, ELEV. 2518.3.**"

DRILLING:

A Mobiledrill B-57 truck-mounted drill rig with automatic hammer was used on this project. One boring was drilled at each end bent with hollow stem augers to refusal, and one boring at each end bent was drilled to refusal with NW casing, followed by core, for a total of four borings. All of the borings were drilled from the road elevation. Core drilling was done to eliminate the possibility that either of the first borings had landed on a boulder.

PHYSIOGRAPHY and GEOLOGY

PHYSIOGRAPHY

The project is in the Blue Ridge Physiographic Province. The bridge crosses Clear Creek, a second order stream, below the confluence with Covefield Creek. Clear Creek, which originates about 5 miles to the north, is classified as "B Trout" and is a tributary of the Savannah River. It drains 2.4 square miles of rural Macon County. The ridgetops within 1.5 miles of the project are at an elevation of 3200' while the bridge location is at an elevation of 2510'. The stream is at an elevation of 2520 a little more

than a mile upstream, and at 2480 feet at a little less than a mile downstream. At the bridge location, the valley is becoming U-shaped with a little bottomland, and the gradient has dramatically decreased from the "v-shaped" valley, just two miles up stream. This headwaters stream is part of a dendritic drainage system flowing generally south from a east – west drainage divide. At the bridge location, the stream is flowing to the southeast.

GEOLOGY

Soil Geology

Alluvial Soil: The alluvial soil was consistent across the two bents, at 3' and 6' thick, (and, different from bent to bent).

Residual Soil: Reflecting the alluvial soil thickness, the top of the residual soil surface is flat across the bent and varies from bent to bent. Residual soil is A-1 or A-2 and variable in thickness.

Bedrock Geology

The 1985 Geologic Map of North Carolina shows the project area is located near the contact between Zata unit, amphibolite, and, Zatb, biotite gneiss. The rock core from this project was consistent with the description of the Zatb. It is interlayered biotite gneiss, with biotite garnet and feldspar muscovite gneiss. The core is un weathered, with wide spaced fractures. Joints are developed on the bedding or foliation plane, and may be mechanical breakage. RQD and recovery is high.

Variation and Predictability of the Subsurface

The subsurface was somewhat predictable in that the top of residual soil is flat across the bents. Residual soil thickness is variable. RQD and Recovery are both consistently high.

FOUNDATION MATERIALS

SUMMARY

All of the borings were drilled from the road elevation. The endbents found fill to be 5 to 6 feet thick. The Alluvium thickness was variable, but the top of residual was fairly flat. Elevation of refusal, weathered rock, and crystalline rock are variable and show the effects of variation in rock and variable resistance to drilling. A chart of some of the subsurface conditions appears below.

Table of Contacts and Depths

Bent	Boring	Collar Elevation	Fill Thick	Water Elevation	Alluv Thck	Alluv. Soil Type	Elevation top of Residual	Res. Soil Thkness	Res. Soil Type	Depth to Wthrd. Rock	Elev. TopOf Wthred Rock	thk of w thrd rock	Depth of Top of Xline Rock	elev of top Xline rock	Depth to Ref	Elev. of Ref
EB1	A	2514.8	5.5	2507.81	6.5	A-1	2502.8	1.6	A-2	13.6	2501	1.9	15.5	2499	22.3	2493
EB1	B	2514.7	6	2507.71	6	A-1	2502.7	5.3	A-1	17.3	2497	1	18.3	2496	18.3	2496
EB2	B	2515.7	5	2508.7	3.4	A-1	2507.3	2.3	A-1	10.7	2505	0	10.7	2505	11.9	2504
EB2	C	2515.6	5	2508.61	3	A-1	2507.6	11.7	A-2	19.7	2496	0.3	20	2496	20	2496

SOIL SECTION:

Roadway Fill:

The roadway fill seems to have been built of the locally available alluvium: loose sand and gravel, either A-1 or A-2 material.

Alluvial Soil:

Alluvial soil was found over residual soil in all of the bridge borings.

Coarse Sand, A-1-B: All alluvial soil was coarse slightly micaceous tan to gray sand.

Residual Soil:

The residual soil unit was the most variable in terms of thickness. Even though some of the rock is weak, there was a gradient of hardness at the top of residual as blow counts increased from 20 to the