

**STATE PROJECT:** 8.2572301 (B-3504)

**FEDERAL PROJECT:** BRZ-1331(4)

**COUNTY:** Randolph

**DESCRIPTION:** Bridge 363 over Caraway Creek on SR 1331

**SUBJECT:** Geotechnical Report of Subsurface Exploration

**Project Description:**

Geoscience Group, Inc. (Geoscience) has completed the authorized geotechnical investigation for the above referenced project in Randolph County, North Carolina. The bridge will be located in southwestern Randolph County, near Asheboro. More precisely, the bridge will be located on SR 1331 at its crossing of Caraway Creek. A Site Vicinity Map is included in the following pages. The project will consist of the construction of a three-span, cored slab bridge with an overall length of 105 feet, a width of 33 feet, and a skew angle of 105°. Fill depths of 3 to 7 feet are proposed at end bent-1 and end bent-2, respectively. Grading is not proposed at the interior bents. The 1.5H:1V end bent slopes are to be protected with rip rap.

The purpose of this exploration was to investigate the subsurface conditions at the proposed bridge bent locations. The subsurface exploration was conducted between December 17 and 19, 2003. This exploration consisted of the execution of eight (8) soil test borings. Using the points surveyed by Geoscience personnel, the actual boring locations were measured for location using a tape measure and approximate right angles. Using an NCDOT provided benchmark, the boring locations were surveyed for elevation by the project engineer. Drilled boring locations are shown on the Boring Identification Diagram included in the following pages.

The soil test borings were advanced using a CME 550x drilling machine utilizing hollow-stem auger and rotary drilling techniques. In each boring, Standard Penetration tests were performed in general accordance with NCDOT guidelines. In conjunction with this testing, split-barrel soil samples were recovered for visual classification in the field. The split-barrel soil samples were returned to our laboratory for testing. Water for drilling purposes was obtained from Caraway Creek. Drilling mud slurry was not utilized during the investigation. Core samples of the underlying crystalline rock were obtained from three (3) of the borings. The core samples were obtained using an HQ wireline barrel. The core samples were returned to our laboratory for review and classification as well as laboratory testing.

Laboratory testing was performed on representative split-barrel samples to aid in the assessment of AASHTO soil classification and to refine data for evaluation of engineering properties. The laboratory testing consisted of natural moisture content determinations, Atterberg Limits tests, and grain size analyses with hydrometer. The soil laboratory tests performed were in general accordance with AASHTO and

NCDOT specifications. Three (3) rock core specimens were selected for laboratory testing of unconfined compressive strength. These tests were performed in general accordance with ASTM Method D 3148. The results of the soil laboratory tests and a rock core test summary are included in the following pages. Complete rock core testing results are provided in Appendix C under separate cover.

**Physiography and Geology:**

The project site is located in the Carolina Slate Belt of the Piedmont Physiographic Province of North Carolina. According to the 1985 Geologic Map of North Carolina, the site is located in an area consisting of meta-argillite of Cambrian to Late Proterozoic in age. The core samples obtained on-site consist of blue-grey very slightly and slightly weathered, very hard and hard, thinly bedded and extremely indurated meta-argillite. The overlying soils are the residual product of the physical and chemical weathering of the underlying bedrock. Site topography slopes downward from the east towards the west. A rock outcrop dipping at 70°, 290° is present just downstream of the proposed bridge location.

**Foundation Materials:**

The foundation materials encountered consist of roadway embankment fill, alluvial and residual soils, weathered rock, and crystalline rock.

Roadway embankment fill is present in borings EB1-A, EB2-A, and EB2-B and extends to elevations ranging between 437 and 436 feet. The embankment fill consists of wet silty coarse to fine sand with cobbles (A-1-a), wet fine sandy silt (A-4), and boulders and cobbles placed in alluvial coarse to fine sand (A-2-4). Blow counts ranged between 2 and 100 blows per foot (bpf), with the higher blow counts being influenced by cobbles.

Alluvial soil is present along end bent-1, bent-1, and bent-2, extending to elevations ranging between 429 and 425 feet. The alluvial soils consist of saturated silty coarse to fine sand with gravel and wood (A-2-4) and wet fine sandy silt (A-4). Cobbles are present in the alluvial soil at B2-B. Blow counts ranged between WOH (weight of hammer) and 11 bpf.

Residual soil is present along end bent-1, bent-2, and end bent-2. The residual soils begin at elevations ranging between 438 and 427 feet and extend to elevations ranging between 428 and 425 feet. The residual soils consist of moist to saturated silty coarse to fine sand with rock fragments (A-1-a, A-1-b) and moist and wet fine sandy silt (A-4). Blow counts in the residual soils ranged between 4 and 16 bpf.

Based upon the performance of the drill rig, weathered rock is present in EB1-B and along end bent-2. The weathered rock begins at elevations ranging between 428 and 426 feet. The weathered rock consists of blue-tan and blue-grey weathered meta-argillite.

Crystalline rock is present in each boring beginning at elevations ranging between 428 and 425 feet. The crystalline rock mainly consists of blue-grey very slightly weathered, hard and very hard meta-argillite with close fracture spacing. Strata recovery values in the crystalline rock zone range between 36 and 100 percent, with most being greater than 90 percent. Strata RQD values range between 0 and 77 percent. Recovery and RQD values were generally consistent in the interior bent borings. Three crystalline rock samples, B1-A at 25.1 feet and B2-B at 16.6 and 25.4 feet, were tested for unconfined