

**WBS ELEMENT (TIP):** 33602.1.1 (B-4260)

**FEDERAL PROJECT:** BRZ-1352(5)

**COUNTY:** Rutherford

**DESCRIPTION:** Bridge No. 350 over West Branch Mountain Creek on SR 1352

**SUBJECT:** Geotechnical Report of Subsurface Exploration

**Project Description:**

Geoscience Group, Inc. (Geoscience) has completed the authorized geotechnical investigation for the above referenced project in Rutherford County, North Carolina. The bridge will be located in northern Rutherford County, near the town of Gilkey. More precisely, the bridge will be located on SR 1352 (Hampton Road) at its crossing of West Branch Mountain Creek. A Site Vicinity Map is included in the following pages. The project will consist of the construction of a three-span cored concrete slab bridge with an overall length of 100 feet, a width of 33 feet (out-to-out), and a skew angle of 120°. Minimal fill is proposed at the end bents. Minimal excavation is 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 September 13 and 21, 2004. This exploration consisted of the execution of eight (8) soil test borings. Geoscience personnel surveyed the proposed boring locations. If borings were offset, the actual boring locations were measured from the stakes 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 the creek. Drilling mud slurry was not utilized during the investigation. Core samples of the underlying weathered rock and bedrock were obtained from each of the interior bent 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. Rock core specimens were selected for laboratory testing of unconfined compressive strength. These tests were performed in general accordance with ASTM Method D 2938. 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 Inner Piedmont 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 migmatitic granitic gneiss of Ordovician to Cambrian in age. The bedrock is foliated to massive and granitic to quartz dioritic. In general, the crystalline rock samples obtained on-site consist of grey-black and grey-black-white slightly weathered, very hard migmatitic granitic gneiss with close and moderately close fractures. The overlying soils are the residual product of the physical and chemical weathering of the underlying bedrock. Site topography slopes downward from the north and south toward the creek.

**Foundation Materials:**

The foundation materials present in the borings consist of roadway embankment fill, alluvial and residual soils, weathered rock, and crystalline rock. Subsurface conditions will be described across the site.

Roadway embankment fill is present in the end bent borings to elevations ranging between 866 and 864 feet. The roadway embankment fill consists of moist and wet, very loose and loose micaceous silty coarse to fine sand (A-2-4). Blow counts in the roadway embankment fill range between 2 and 8 blows per foot (bpf).

Alluvial soils are present below the fill at the end bents and are present from the ground surface at the interior bents. The alluvial soils consist of wet and saturated, very loose and loose silty coarse to fine sand (A-2-4) and silty coarse to fine sand with quartz gravel (A-1-b). Blow counts in the alluvial soils range between weight-of-hammer (WOH) and 9 bpf.

With the exception of EB1-B, residual soil is present below the alluvium in each of the borings. The residual soils begin at elevations ranging between 854 and 852 feet. The residual soil consists of saturated to wet, very loose to very dense micaceous silty coarse to fine sand (A-2-4), with some zones containing rock fragments. Blow counts in the residual soils range between 2 and 83 bpf.

Weathered rock is present below the alluvium in EB1-B and is present below the residual soils in the remaining borings. The weathered rock begins at elevations ranging between 853 and 826 feet. The weathered rock consists of grey-white and brown-white weathered migmatitic granitic gneiss. In boring B2-B, weathered rock was cored, but recovery was not successful.

Crystalline rock is present below the weathered rock in each boring, beginning at elevations ranging between 852 and 824 feet. The crystalline rock generally consists of grey-white and grey-black-white slightly weathered very hard migmatitic granitic gneiss with close and moderately close fractures. Zones of moderately and moderately severely weathered crystalline rock are present along bent-2. Additionally,