

WBS ELEMENT (TIP): 33295.1.1 (B-3847)

FEDERAL PROJECT: BRZ-1850(1)

COUNTY: Guilford

DESCRIPTION: Bridge No. 63 over the Deep River on SR 1850 (Sandy Ridge Road)

SUBJECT: Geotechnical Report of Subsurface Exploration

Project Description:

Geoscience Group, Inc. (Geoscience) has completed the authorized geotechnical investigation for the above referenced project in Guilford County, North Carolina. The bridge will be located in western Guilford County, west of Greensboro, near the Guilford-Forsyth County line. More precisely, the bridge will be located along SR 1850 (Sandy Ridge Road) over the Deep River. A Site Vicinity Map is included in the following pages. The project will consist of the construction of a two-span, prestressed concrete core slab bridge with an overall length of 98.0 feet, a width of 39 feet and a skew angle of 90° 00' 00". No or minimal fill is proposed at end bent-1 and end bent-2. 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 May 23 and 27, 2005. This exploration consisted of the execution of six (6) soil test borings. Using the surveyed points provided by our firm and NCDOT, 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 Geoscience personnel. 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 Deep River. Drilling mud slurry was not utilized during the investigation. Core samples of the underlying crystalline rock were obtained from the two interior bent borings, B1-A and B1-B. 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 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 Charlotte Belt, but very near 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 granitic rock and metamorphosed granitic rock of Cambrian to Ordovician in age. An area containing biotite gneiss is present in the vicinity of the subject site. The core samples obtained on-site consist of metamorphosed granite and biotite gneiss. The overlying soils are the residual product of the physical and chemical weathering of the underlying bedrock. Site topography slopes downward from the east and west towards the Deep River.

Foundation Materials:

The foundation materials encountered at the site consist of roadway embankment fill, alluvium, residual soils, weathered rock, and crystalline rock. Subsurface conditions will be described across the site.

Roadway embankment fill is present at end bents 1 and 2 in each boring, beginning at the ground surface. The roadway embankment fill soil consists of moist very loose to loose silty coarse to fine sand (A-2-4), medium stiff micaceous medium to fine sandy silty clay (A-6), and soft micaceous medium to fine sandy silty clay (A-7). Blow counts range between 3 and 6 bpf.

Alluvial soil is present underlying the roadway embankment fill at the end bent borings and beginning from the top of the creek bed in at the interior bent borings. The alluvium soil consists of moist and saturated very loose silty coarse to fine sand (A-2-4), micaceous medium to fine sandy silty clay (A-6), and silty medium to fine sand (A-3). Blow counts in the alluvial soils range between weight of hammer (WOH) to 6 bpf.

Residual soil is present below the alluvium in each boring. The residual soil consists of moist to saturated loose to very dense silty coarse to fine sand (A-2-4). Blow counts in the residual soils range between 8 and 91 bpf.

Weathered rock is present below the residual soil at each boring along each bent. The top of weathered rock elevation ranges between 798 and 767 feet. The weathered rock generally consists of tan-orange-grey weathered metamorphosed granite. The end bent borings were terminated in weathered rock. Zones of weathered rock were cored for this project in each of the interior bent borings. Recovery of the weathered rock was 0 percent. The RQD values measured for the weathered rock was also 0 percent.

Crystalline rock is present at the interior bent in each boring. We would consider the crystalline rock line to range between 770 and 751 feet at the interior bents. The majority of the crystalline rock consists of severely weathered to moderately weathered, soft to hard metamorphosed granite and biotite gneiss with very close to close fracture spacing. Strata Recovery values of the crystalline rock (excluding zones of cored weathered rock) ranges between 77 and 100 percent. The strata RQD values measured for the