The subsurface exploration for the proposed bridge was conducted between April 14 and 30, 2004. This exploration consisted of eight soil test borings; two at each of the proposed bent locations. The borings for the proposed end bents were offset in towards the -L- centerline due to steep, inaccessible embankment slopes adjacent to the existing roadway. The Bent-2 borings were drilled from a platform lowered unto the existing embankment slopes using a crane.

The end bent borings and the borings at Bent-1 were drilled with a truck-mounted CME-55 drilling machine equipped with a 140-pound manual hammer. The Bent-2 borings were drilled with a skid-mounted CME 45 drilling machine equipped with a 140-pound manual hammer. All of the borings were advanced utilizing 0.33-foot tricone/wash-drilling techniques with either tap water alone, tap water plus polymer, or tap water plus bentonite as the drilling fluid. The mud density with bentonite or polymer additives ranged fro m 63 to 64 pounds per cubic foot.

Standard Penetration Tests were performed in the soil and weathered rock materials in general accordance with NCDOT guidelines. In conjunction with this testing, split-barrel soil and weathered rock samples were recovered for visual classification and potential laboratory testing.

Rock coring was not performed on this project.

3.2 LABORATORY TESTING

Laboratory soil testing was performed on eighteen representative split-barrel samples to aid in the assessment of AASHTO soil classification and to provide data for evaluation of engineering properties. The laboratory testing on the samples consisted of Natural Moisture Content, Atterberg Limit, and grain size analysis with hydrometer. Laboratory tests were performed in general accordance with AASHTO and NCDOT specifications. The results of the soil laboratory tests are included on Sheet 22.

3.3 SITE GEOLOGY

The site of the proposed project is located in the Kings Mountain Belt of the Piedmont Physiographic Province of North Carolina. According to The Geology of the Carolinas published by the Carolina Geological Society in 1991, the Kings Mountain Belt "includes metasedimentary sequences with interlayered quartzite, metaconglomerates, marble, schist derived from both sedimentary and volcanic protoliths", and several intrusive bodies which are mainly granitic in composition. The rocks of the Kings

Mountain Belt are intensely deformed, and are dominated by steeply dipping, northeast to north-northeast striking units "which are mainly a reflection of upright isoclinal folds". The High Shoals Granite, which is present at the subject site, is a porphyritic biotite granite, typically with strong foliation, forming a batholith-size pluton. The High Shoals Granite is typically coarse grained and strongly foliated. (Horton, J.W., and Zullo, V.A., *The Geology of the Carolinas*, 1991).

According to the 1985 Geologic Map of North Carolina, the site is located in an area generally consisting of megacrystic to equigranular, foliated to massive granitic rock of Pennsylvanian to Permian age. The weathered rock encountered in our test borings consisted granite. The overlying residual soils at the site are the product from the physical and chemical weathering of the underlying crystalline rock.

3.4 FOUNDATION MATERIALS

The generalized subsurface conditions indicated by the borings are described below. For soil descriptions and general stratification at a particular boring location, the respective Boring Log should be review ed. The Boring Identification Diagram and Boring Logs are included following this report. Representative subsurface cross-sections at each drilled bent location and a subsurface profile along the structure are also included following this report. The subsurface properties for the project site are described below.

Foundation materials encountered at the site included roadway embankment fill, residual soils, weathered rock, and crystalline rock.

Roadway embankment fill was encountered beginning at the existing ground surface at the End Bent-1, Bent-2, and End Bent-2 borings, and at Boring B1-A. Fill was not encountered at Boring B1-B. The fill extends to a depth of ±9m (Elevation ±257m) at End Bent-1, to a depth of ±2m (Elevation ±256m) at Boring B1-A, to a depth of ±1m (Elevation ±257m) at Bent-2, and to a depth of ±8m (Elevations ±258m to ±259m) at End Bent-2. The roadway embankment fill encountered generally consists of soft to very stiff, variably clayey, coarse to fine sandy silt (A-4) with a little mica. Approximately 1.4m of very loose, coarse to fine sand and gravel (A-1-b) was encountered underlying the pavement and overlying the A-4 fill material at Boring EB2-A. Standard Penetration Resistance values of 2 to 15 blows per foot (bpf) were encountered within the roadway embankment fill.

Residual soils were encountered underlying the roadway embankment fill at all of the borings drilled for this project with the exception of Boring B1-B at which the residual soil was encountered beginning at the existing