3.0 SCOPE OF INVESTIGATION

3.1 FIELD TESTING

The as-drilled locations for the soil test borings were located by personnel from Trigon using the existing bridge for reference. Elevations at the as-drilled boring locations, along the existing ground surface at the bent locations, and along the structure profile were surveyed by personnel from Trigon using the BL-3 benchmark elevation (Elevation 671.79 feet) established by an NCDOT survey crew as a reference point. As-drilled boring locations are shown on the Boring Identification Diagram (Drawing No. 2).

The subsurface exploration for the proposed bridge was conducted between February 18 and March 8, 2004. This exploration consisted of ten soil test borings; two at the proposed Bent-1 and End Bent-2 location, three in the vicinity of the proposed End Bent-1 location, and three at the proposed Bent-2 location. The borings for the proposed End Bent-1 could not be drilled at the top of the embankment along the proposed bent due to low-hanging overhead high-voltage power lines. In order to gather subsurface information for this bent, one boring (EB1-A) was drilled at the bottom of the existing embankment left along the proposed bent line, one boring (EB1-B1) was drilled through the embankment on the right side of the proposed bridge 40 feet downstation of the proposed bent location, and one boring (EB1-B) was drilled at the bottom of the existing embankment on the right side of the proposed bridge 48 feet upstation of the proposed bent location.

Borings EB1-A, EB1-B, EB2-A, the Bent-1 borings, and Borings B2-A and B2-B were drilled with a track-mounted CME 850 drilling machine equipped with a 140-pound automatic hammer. Boring EB1-B1 and EB2-B were drilled with an ATV-mounted CME 45 drilling machine equipped with a 140-pound manual hammer, while Boring B2-C was drilled with a truck-mounted CME 55 drilling machine equipped with a 140-pound manual hammer. Borings EB1-A, EB1-B, EB2-A, the Bent-1 borings, and the Bent-2 borings were advanced through soil utilizing 0.33-foot tricone/wash-drilling techniques with creek water plus bentonite as the drilling fluid. The mud density ranged from 64.5 to 65.2 pounds per cubic foot. Borings EB1-B1 and EB2-B utilized 0.5-foot (O.D.) continuous-flight hollow-stem augering drilling techniques to advance the borehole.

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. Three undisturbed (Shelby Tube) samples of representative potential scourable material were obtained from the interior bent borings, one each from Borings B1-A, B2-A, and B2-B, for EFA testing.

Rock coring was performed at the interior bent borings in order to evaluate the nature of the weathered rock/crystalline rock. The cored weathered rock/crystalline rock was returned to our laboratory for further classification and possible testing. The rock coring for all but Boring B2-C was performed with an HQ size hollow double-tube core barrel. The rock coring for Boring B2-C was performed with an NQ size hollow double-tube core barrel. Creek water alone was used as the drilling fluid during rock coring.

3.2 LABORATORY TESTING

Laboratory soil testing was performed on twenty-one representative split-barrel samples and two grab samples from the streambed 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. In addition, two Unconfined Compressive Strength (Qu only) tests were performed on selected samples of the recovered rock core. Laboratory tests were performed in general accordance with AASHTO and NCDOT specifications. The results of the soil laboratory tests are included on Sheet 32. A Summary of Rock Test Data table is also included on Sheet 32. Laboratory results of the rock testing are also included under separate cover in Appendix A.

3.3 SITE GEOLOGY

The site of the proposed project is located in the Charlotte Belt of the Piedmont Physiographic Province of North Carolina. According to The Geology of the Carolinas published by the Carolina Geological Society in 1991, Charlotte Belt rocks are Late Proterozoic to Cambrian mafic gneisses, amphibolites, metagabbros, and metavolcanic rocks interpreted to have formed as the leading edge of a late Proterozoic to middle Cambrian volcanic arc. This volcanic arc was located just off shore of the proto North American continent during the initial opening of the Atlantic Ocean. Between the late Cambrian and the end of the Ordovician, the volcanic island arc collided and was sutured to the North American continent. Metamorphic grade within the Charlotte Belt generally increases from east to west. (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 at the confluence of areas generally consisting of metamorphosed granitic rock, metavolcanic rock, and metamorphosed mafic rock. The crystalline rock encountered in our test borings generally consisted of moderately to very slightly weathered metadiorite. The crystalline rock cored ranged in quality from very poor to very good, with the majority of the crystalline rock recovered being very good in quality. The overlying residual soils at the site are the product from the physical and chemical weathering of the underlying crystalline rock.