DESCRIPTION: **BRIDGE FOUNDATION INVESTIGATION**

SUBJECT: **REVISED GEOTECHNICAL REPORT**
SITE 1: DUAL STRUCTURES ON CLAYTON BYPASS (-L-) OVER WHITE OAK CREEK (AUSTIN POND)
STATE PROJECT: 8.T311002
TIP: R-2552AB
F.A. NUMBER: NHF-60-1(9)

1.0 PROJECT DESCRIPTION

1.1 Background

The purpose of this investigation was to obtain geotechnical information for foundation design and construction of the proposed dual structures on Clayton Bypass (-L-) over White Oak Creek. MACTEC Engineering and Consulting, Inc. (MACTEC), formerly Law Engineering and Environmental Services, Inc., completed a subsurface investigation for the above-referenced project in 2001. Design changes by NCDOT lengthened the structures by one additional span at End Bent 1. We subsequently completed two additional borings, EB1-A LL REV and EB1-B RL REV, in September 2003 for the redesign.

Our understanding of the bridge design and layout comes from documents and drawings provided in 2001 by the N.C.DOT Geotechnical Unit including Preliminary General Drawings dated April 2000, Reference Survey Request dated May 22, 2001, roadway boring data, and electronic files on the N.C.DOT ftp site. In September 2003, the N.C.DOT Geotechnical Unit provided revised, Preliminary General Drawings depicting the proposed, new End Bent 1 locations.

The new bridges will be constructed approximately three miles west of Clayton, North Carolina, in Johnston County. A site location and topographic site maps are provided as Drawing Nos. 1 and 2 in the Appendix. The proposed structures will follow a curved (radius = 2,500 meters) alignment (-L-). The left-lane (outside) structure will be 12.94 meters wide and approximately 243 meters long along the control line arc and will be constructed with 11 bents. The right-lane (inside) structure will be 12.94 meters wide and approximately 220 meters long along the control line arc and will be constructed with 10 bents. With the exception of the additional span at End Bent 1 Revised, each span will be approximately 25 meters long. The span from End Bent 1 Revised is approximately 18 meters long. The bents are skewed 60^0 tangent to the -L- curve at station 40+80.0 and 40+96.0 for the left- and right-lane structures, respectively.

This geotechnical report describes the results of our investigations performed during July through September 2001, and September 2003.

1.2 Field Testing

We advanced 42 borings at the site. Test locations are shown on the Boring Location Plan (Drawing No. 3). We drilled the End Bent 2 and End Bent 1 Revised borings with a Dietrich D-50 ATV rig using $2^1/_4$-inch (internal diameter) hollow-stem auger (HSA) drilling techniques. We drilled the interior bent borings and borings EB1-Aa LL (upper part) and EB1-B LL with a marsh buggy-mounted CME 45 rig using mud-rotary and NQ coring techniques. We used a drilling subcontractor, Mid-Atlantic Drilling, to perform borings EB1-Aa LL (lower part), EB1-Ab LL, EB1-Aa RL, EB1-Ab RL and EB1-B RL using mud rotary and NQ coring techniques. The end-bent borings were drilled to depths based on N.C.DOT ultimate pile capacity for 12-inch steel piles whereas the interior-bent borings were drilled to depths based on N.C.DOT requirements for drilled shafts.

We conducted standard penetration tests (SPT) and collected soil samples at 1.52-m intervals within the soil profile using a split-spoon sampler and a 63.5-kilogram manual hammer in accordance with procedures described in ASTM D 1586. We cored weathered to hard rock using N-size core equipment.

N.C.DOT personnel staked reference locations in the field for the investigation completed in 2001 and provided northing and easting coordinates, station and offsets and elevations at these locations. We used the reference locations to locate the borings in the field.

In 2003, we located EB1-A LL REV and EB1-B RL REV in the field with our Trimble Pro XR GPS equipment. The northing and easting coordinates at proposed boring locations were determined from electronic plan drawings provided by NCDOT. Prior to establishing proposed boring locations, we navigated to the NCDOT staked location at EB1-A RL with known coordinates. We collected northing and easting coordinates at drilled boring locations and at the NCDOT staked location. The collected coordinates were corrected using post-processing differential correction.

We used conventional survey techniques and the elevations at the reference locations to determine collar elevations for the borings and elevations at key points along profiles and cross sections.

1.3 Laboratory Testing

Our laboratory conducted AASHTO classification, moisture content, and/or organic content tests on 31 split-spoon samples, Nos. SS-1 through SS-3, SS-10 through SS-21, SS-30 through SS-41, and SS-50 through SS-57. We performed a triaxial shear test on the undisturbed sample ST-3 and consolidation testing on the undisturbed samples ST-1 and ST-4. We performed rock strength testing including unconfined compression with and without Young's Modulus and splitting tensile tests on four rock samples, Nos. RS-1 through RS-4.

We conducted laboratory testing in accordance with applicable ASTM/AASHTO/NC.DOT specifications. Test results for the split-spoon samples are included in the Appendix. Laboratory results for triaxial shear and consolidation testing and rock strength testing are included in the Laboratory Results Report supplement.