



STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION

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STATE PROJECT: 34459.1.6 (R-2552C)  
F.A. PROJECT: NHF-60-1(9)  
COUNTY: Johnston  
DESCRIPTION: US 70 (Clayton Bypass) from east of SR 1560 to US 70 east of Clayton  
SUBJECT: Geotechnical Report – Foundation Investigation for New Structure on -L2RT-  
(US 70 Bypass) over Little Creek at Sta. 110+37

**Project Description**

This project consists of a 130-meter long four span bridge to be constructed over Little Creek. Proposed span lengths are two at 26 meters and two at 39 meters. The new bridge will be constructed on a 60° skew. The project is located in rural, northern Johnston County.

The subsurface investigation was conducted during July and August of 2004 using a Go-Tract track drill machine and a Mobile B-57 ATV mounted drill, both with a manual hammer. Standard Penetration Test borings were performed at each of the five proposed bent locations. All borings except for EB1-B, which terminated in residual sand, were advanced until weathered rock or hard rock was encountered. Borings were advanced using hollow stem augers, N-casing, and/or rotary drilling with and with out mud. Borings B2-B, B3-B, and EB2-A were cored using either NWD4 or NQ core equipment to recover hard rock samples. Representative soil samples were obtained for visual classification in the field and selected samples were sent to the Materials and Test Unit for laboratory analysis. Rock core samples were also sent to the Materials and Test Unit to determine Unit Weight, Compressive Strength, Young's Modulus, and Poisson's Ratio.

**Physiography and Geology**

The project is located in moderately hilly terrain at the eastern limits of the Piedmont Physiographic province. The area is located between Ranch Road (SR 1560) and Peele Road (SR 1571), with scattered single-family homes and abundant pastures and wooded areas. The site is heavily wooded on both sides of Little Creek, which has a meandering channel.

Geologically, the project is located within the Raleigh Belt. Soils are derived from the weathering of the underlying bedrock, which includes metamorphosed granite (meta-granite), biotite schist, and metamorphosed gabbro (meta-gabbro).

**Soil Properties**

Soils encountered at the project site include alluvial and residual soils.

Alluvial soils were encountered at all bent locations except End Bent 2. The alluvial soils range from 1.52 to 5.66 meters in thickness. The predominant alluvial soil is loose to medium dense, silty sand and sand with gravel lenses, (AASHTO Classifications, A-2-4, A-3, and A-1-b). Also, approximately 2.20 meters of very stiff, sandy silt (A-4) is present at the right side of Bent 3. The alluvial soils overlie residual soils at all bent locations, except for the right side of Bent 2, which goes from alluvial to soft weathered rock.

Residual soils range from 1.00 to 12.00 meters in thickness. These soils are representative of the type of underlying bedrock from which they were derived. Residual soils derived from the meta-granite occur at End Bent 1, Bent 1, Bent 2, and Bent 3. They consist of loose to very dense, silty and coarse sand (A-2-4) and stiff, sandy clay (A-7-6). Soils derived from the biotite schist at End Bent 1 are medium stiff, sandy silty clay (A-6) and medium dense, silty sand (A-2-4). Other residual soils present are related to meta-gabbro. These soils include stiff to very stiff, silty sandy clay (A-7-5) and very stiff, sandy silt (A-5) interspersed with boulder-size rocks. The boulder-size rocks result from the in-place weathering of the meta-gabbro bedrock. The boulders range in size from 0.30 to 0.91 meters.

**Rock Properties**

Weathered rock was derived from the underlying bedrock (meta-granite), and ranges in thickness from 1.00 meter at boring B1-B, to as much as 7.00 meters at boring B1-A. Weathered rock was encountered in each boring except for EB1-B and EB2-A.


Rock core was obtained from the interior bent borings (B2-B and B3-A) and one end bent boring (EB2-A). The rock at the Bent 2 location consists primarily of tan-orange-pink, moderately severely weathered to fresh, moderately fractured to sound, meta-granite. Rock from Bent 3 consists of tan-pink, slightly weathered to fresh, moderately fractured to sound, meta-granite. End Bent 2 core is dark green, slightly weathered to fresh, sound, meta-gabbro with some severely weathered clay and silt soil zones. Overall core recovery ranged from 7% to 100%. Rock Quality Designation (RQD) values ranged from 0% to 48%. Ultimate compressive strength of the rock samples ranged from 3.12 to 18.16 ksi. More detailed rock descriptions can be found in the Core Boring Reports.

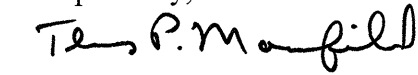
**Groundwater**

Groundwater was present at all bents except for End Bent 2, which is located out of the alluvial floodplain. The groundwater elevations ranged from 53.49 to 54.07 meters. Surface water in Little Creek was at elevation 53.29 meters (8-24-04).

**Notice**

This Geotechnical foundation report is based on the bridge survey report for Little Creek dated June 9, 2004. If significant changes are made in the design or location of the proposed structure, the subsurface information should be reviewed and modified as necessary.

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