



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

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October 23, 2003

STATE PROJECT: 8.T540402 (R-2417BB)
FEDERAL PROJECT: STP-NHF-421(2)
COUNTY: Lee
DESCRIPTION: US 421/NC 87 (Sanford Bypass) from east of SR 1521 (Kelly Drive) to east of NC 42

SUBJECT: Geotechnical Report - Bridge Foundation Investigation for Dual Bridges on -L- (US 421 Bypass) over -Y3- (NC 42) and -RXX- (A&W Railway) at -L- Station 565+49.40

Project Description

Dual bridges will be constructed to carry proposed -L- (US 421 Bypass) over existing -Y3- (NC 42) and -RXX- (A&W Railway). The bridges will be located approximately 3 miles southeast of downtown Sanford. Each bridge will consist of three spans with a total length of 240 feet for each bridge. Bents will be on a 90° skew.

The site was investigated in September 2003, using a CME-850 drill machine with an automatic hammer. Borings were advanced through soil, weathered rock, and rock using a rotary drill string and mud. Standard Penetration Tests were performed and representative soil and rock samples were submitted to the Materials and Tests Unit laboratory for analysis.

Physiography and Geology

The project is in very gently rolling terrain, along the western edge of the Coastal Plain Physiographic Province. Foundation materials at the site include Coastal Plain soils, residual soils, weathered rock, and crystalline rock. Coastal Plain deposits are present at the surface. They overlie residual soils, weathered rock, and metamorphic rock of the Raleigh Belt. Surface drainage at the site is good. Topographic relief is about 10 feet, with elevations ranging between 426 and 436 feet. End Bent 1 is located in the yard of an unoccupied, rural residence. Bent 1 and End Bent 2 fall within an undeveloped, cleared area surrounded by pine trees.

Foundation Description

Soil Properties

Coastal Plain soils are present from the ground surface to a depth of 24 to 39 feet. Thickness increases from End Bent 1 to End Bent 2. Very soft to stiff, moist to wet, moderately to highly plastic, sandy and silty clay (A-6, A-7-6) overlie loose to medium dense, wet, slightly to highly plastic, clayey sand (A-2-6, A-2-7). At boring EB1-B, 14 feet of loose to medium dense, wet sand (A-1-b) were encountered between the clayey sand and deeper, residual soils. Plasticity indices range to a maximum of 51 in the clays and to 37 in the clayey sands. Coastal Plain soils rest unconformably on residual soils.

Residual soils were encountered in all borings, at elevations ranging between 395.5 and 402.5 feet. Thickness of the residual soil column varies between 8.5 and 16.5 feet. Typically, medium stiff to very stiff, wet, highly plastic, silty clay (A-7-5, A-7-6) overlies either medium dense to very dense, wet, silty sand (A-2-4, A-2-5), clayey sand (A-2-6), and sand (A-1-b), or stiff to very stiff, wet, clayey silt (A-5). Maximum plasticity index for the silty clay is 68.

Rock Properties

The residual soils are derived from in-place weathering of deeper metamorphic rocks of the Raleigh Belt. Material from the borings indicates the rock type is gneiss. Weathered rock was encountered in all borings, ranging in elevation between 380.0 and 394.5 feet. All borings except B1-B terminated on or in crystalline rock. Thickness of weathered rock in these borings varies between 1 and 13 feet. Boring B1-B was terminated after penetrating 8 feet of weathered rock.

Groundwater

Depth to groundwater varies between 5 and 15 feet, placing the groundwater table within the upper half of the Coastal Plain soil column. Elevations range between 415.5 and 428.5 feet.

Notice

This Geotechnical Engineering Unit foundation report is based on the "Preliminary General Drawing", with a drawn date of April 2003. If significant changes are made in the design or location of the proposed structures, the subsurface information should be reviewed and modified as necessary.

Respectfully submitted,

A handwritten signature in cursive script that reads "Steve P. Brown".

Steve P. Brown, LG
Project Engineering Geologist