STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

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March 19, 2004

STATE PROJECT: 33591.1.1 (B-4248)
FEDERAL PROJECT: BRZ-1101(8)
COUNTY: Robeson
DESCRIPTION: Bridge No. 170 on SR 1101 over Shoe Heel Creek

SUBJECT: Geotechnical Report - Bridge Foundation Investigation for Bridge No. 170 on -L- (SR 1101) over Shoe Heel Creek at -L- Station 16+67.50

Project Description

Project B-4248 provides for the replacement of existing Bridge No. 170 on SR 1101 over Shoe Heel Creek, approximately 6 miles northwest of Rowland. The replacement structure will be constructed right of the existing structure. It will consist of three spans with an overall length of 125 feet. Bents will be on a 90° skew. Traffic will be diverted to an offsite detour during construction of the proposed bridge.

The site was investigated in March 2004, using a CME-550, ATV drill machine with an automatic hammer. Borings were mud drilled through soil using a drag bit and N casing. Standard Penetration Tests were performed and representative soil samples were submitted to the Materials and Tests Unit laboratory for analysis.

Physiography and Geology

The project is in flat terrain of the Coastal Plain Physiographic Province. Surface water level in Shoe Heel Creek varied little during the investigation, with an average elevation of about 120.0 feet. Cyprus wooded swamps surround the project. Alluvial deposits of Shoe Heel Creek rest on Cretaceous age, Coastal Plain sediments. Foundation materials at the site include embankment, alluvial, and Coastal Plain soils.

Foundation Description

Soil Properties

Existing embankments are constructed of brown, very loose to loose, moist to wet, silty sand (A-2-4). Embankments are 6 to 9 feet high.

Modern, alluvial soils are light brown and light gray, very loose to medium dense, wet sand (A-3). Thickness varies from approximately 3 to 13 feet. The thickest deposits were encountered at End Bent 1. Encountered at Bent 1, within the alluvial column, was a thick timber (0.5 feet). Retrieved fragments of the timber included an old-style, square headed nail. The Bridge Survey and Hydraulic Design Report indicates the presence of mill ruins, suggesting that the timber is related to the mill. Additional timbers may be present within the alluvial column.

Coastal Plain sediments underlie the modern, alluvial soils. The contact climbs in elevation from End Bent 1 to End Bent 2, from 107.7 to 118.0 feet. The Coastal Plain sedimentary column consists of interbedded, sandy and silty clays (A-6, A-7-6), and clayey sands (A-2-6, A-2-7). All of these soils are below the water table. They are mostly light to medium gray, with gray-purple-brown mottling being common. The sandy clays are soft to hard, and slightly to moderately plastic. The silty clays are medium stiff to hard, and moderately to highly plastic. Clayey sands are medium dense to dense. All of the A-2-7 clayey sands are highly plastic. Based on color and mottling, these soils are interpreted to belong to the Middendorf Formation. However, regionally, the state "Geologic Map of North Carolina" (1985) shows the younger Black Creek Formation present at the surface.

Groundwater

Groundwater elevations range from 119.6 feet to 120.9 feet. These elevations are within one foot of the surface water elevation of Shoe Heel Creek, at 120.0 feet. The relationship indicates the highly permeable nature of the alluvial and embankment soils. Fluctuations in the groundwater table are anticipated to correspond to fluctuations in the surface water level of the creek.

Notice

This Geotechnical Engineering Unit foundation report is based on the Bridge Survey and Hydraulic Design Report for Shoe Heel Creek, dated October 21, 2003. If significant changes are made in the design or location of the proposed structure, the subsurface information should be reviewed and modified as necessary.

Respectfully submitted,

Steve P. Brown, LG
Project Engineering Geologist