



STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION

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July 16, 2003

STATE PROJECT: 8.2301501 B-4134  
FEDERAL PROJECT: BRZ-1105(8)  
COUNTY: Halifax  
DESCRIPTION: Bridge No. 77 on SR 1105 over Tributary of Deep Creek  
SUBJECT: Geotechnical Report - Bridge Foundation Investigation for Bridge No. 77 on SR 1105 over Tributary of Deep Creek at -L- Station 14+23

Site Description

The proposed project is located at the existing SR 1105 bridge over Tributary of Deep Creek approximately 2.5 miles west of Scotland Neck. The replacement structure will be constructed along the existing alignment. Based on the proposed design, the new structure will have three spans having a total length of 96 feet. The bents will have a skew of 65 degrees.

One Standard Penetration Test (SPT) boring was typically made at/or near each proposed bent location to provide subsurface information relative to foundation design. However, due to the variations in SPT blow counts which resulted in a significant deviation of pile tip elevations along the eastern end of the structure, additional borings were made at Bent 2 and End Bent 2 to more adequately define the bearing strata. The borings were made with ATV mounted CME-45B and truck mounted Mobile B-47 drill machines and advanced by rotary drilling methods using bentonite drilling fluid.

The bridge site is located in the Coastal Plain Physiographic Province and is underlain by Recent alluvial sediments, Pliocene age deposits of the Yorktown Formation and Cretaceous age soils of the Cape Fear Formation. Tributary of Deep Creek is a slow flowing stream 30 to 35 feet wide and typically 3 to 9 feet deep. Topography along the project is nearly flat to gently sloping. Elevations at the site range from 72± feet along the stream bed and 86 to 89 feet along the existing SR 1105 embankment. The existing approach embankments are bordered by a 650± foot wide flood plain lying at an elevation of 84± feet. During this investigation, water levels within the bore holes and the surface of Tributary to Deep Creek were measured near an elevation of 84± feet

Foundation Description

Subsurface soil strata at the site is relatively uniform. However, some variation in SPT blow counts was noted within the same boundaries along the proposed structure. Surficial alluvial soils typically consist of 5 to 9 feet of interlayered very soft to medium stiff sandy silt (A-4), silty clay (A-7-6) and loose to medium dense silty sand (A-2-4, A-3) underlain by 2 to 9 feet of fine to coarse sand with gravel (A-1-b). Soils of the Pliocene age Yorktown Formation underlie the alluvium at elevations of 66± to 72± feet. Sediments within the Yorktown Formation generally consist of 40 to 45 feet of very loose to medium dense fine to coarse sand (A-1-b, A-2-4) with some shell fragments. The Yorktown deposits are underlain at elevations ranging from 31± to 35± feet by the Cape Fear Formation. Soils within the Cape Fear formation primarily consist of 10 to 20 feet of medium stiff to hard silty clay (A-7-5, A-7-6) underlain by medium dense to very dense clayey sand (A-2-6) and fine to coarse sand (A-1-b, A-2-4, A-3). Moisture contents of tested clay samples range from 34 to 38 percent. A very stiff to hard silty clay (A-7-6) layer was encountered near an elevation of -4 feet in boring EB2-B beneath the granular deposits.

Based on the proposed design, the existing grade will be raised 1± foot. The existing roadway embankment noted within the bridge construction limits is approximately 3 to 7.5 feet thick and constructed of loose to medium dense silty fine to coarse sand (A-2-4). The proposed end bent slopes will mainly constructed be within the existing embankment. However, some additional fill will be required for construction of the end bent and side slopes. Borrow meeting Coastal Plain criteria is available in nearby areas.

The Geotechnical foundation report is based on the bridge survey report for Tributary of Deep Creek dated September 13, 2002. 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,

Fred M. Wescott III  
Project Geologist

FMW