



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

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STATE PROJECT: 8.2406201 (B-3375)
FEDERAL PROJECT: BRSTP-1375(2)
COUNTY: Wake

DESCRIPTION: Bridge No. 471 on -L- (SR 1375) over Lake Wheeler Spillway

SUBJECT: Geotechnical Report – Structure Inventory

Project Description

This project consists of a 170-foot long single span bridge to be constructed over the Lake Wheeler spillway on -L- along a new location just east of existing Lake Wheeler Road. The proposed bridge has a 130° skew and will replace the existing 116-foot long structure. The project is located approximately 5 miles south of Raleigh.

The geotechnical field investigation was conducted in February, 2003. Borings were advanced using a CME 550 ATV-mounted drill machine with automatic hammer. All borings were advanced to until crystalline rock was encountered. Boring EB1-B was cored using NXWL core equipment to recover rock samples from crystalline rock. Standard Penetration Tests were performed at selected locations and additional borings were advanced using continuous flight augers. Representative soil samples were collected for visual classification in the field and for laboratory analysis by the Materials and Tests Unit. Two rock core samples were sent to the Materials and Test Unit to determine Unit Weight, Compressive Strength, and Young's Modulus.

Physiography and Geology

The project is located in gently rolling terrain of the central Piedmont Physiographic Province. Lake Wheeler Road (-L-) is located at the base of the Lake Wheeler dam, which was constructed on Swift Creek by the Army Corps of Engineers in 1956. The Swift Creek alluvial floodplain was approximately 450 feet wide at the base of the dam. The concrete spillway appears to have been constructed on a cut into the residual hillside adjacent to the floodplain. The southern approach to Bridge No. 471 includes the existing roadway and the adjacent wooded areas. The entrance to the City of Raleigh's Lake Wheeler Recreational Park is located 150 feet north of the spillway bridge. Scattered homes and businesses are located on Lake Wheeler Road from the

park entrance northward to the end of the project. The project occurs within the Raleigh Belt geologic province. The underlying bedrock consists of gneiss and granitic intrusions.

Soil Properties

Soils encountered at the project site include residual, alluvial, artificial fill, and roadway embankment soil.

The residual soil consists of silty sand derived from the in-place weathering of the underlying gneiss and granite bedrock. These soils include loose to very dense silty fine and coarse sand (A-2-4). The residual soils grade into weathered rock with depth.

Approximately 11 feet of alluvial soil was encountered in the EB1-B boring. The alluvial soil underlies 4 feet of artificial fill soil. The alluvial soil consists of loose, moist silty sand and coarse sand (A-2-4). The alluvial soil overlies residual soil.

The artificial fill soil on this project was placed during the construction of the concrete spillway. The fill soil at End Bent 1 consists of loose silty sand (A-2-4), clayey sand (A-2-6), and very stiff sandy clay (A-6). Scattered cobble- to boulder-size rocks occur in the artificial fill in the vicinity of the spillway retaining wall at End Bent 1. A small area of artificial fill soil occurs as backfill adjacent to the spillway retaining wall on the right side of End Bent 2. Fill soil adjacent to the retaining wall consists of loose silty sand (A-2-4) mixed with gravel-size rocks and concrete debris.

The roadway embankment fill soil consists of very soft to very stiff, moist silty sandy clay (A-6) and stiff, sandy silt (A-4).

Rock Properties

Weathered rock was derived from the underlying gneiss and granitic bedrock. The weathered rock ranges in thickness from 1.0 foot at EB1-B to as much as 12.5 feet at EB2-A.

Crystalline rock was encountered at each boring. Rock core recovered from the EB1-B boring consisted primarily of pink-gray, fresh, very hard granite. The rock is characterized by wide fracture-spacing with slight iron-staining on the fracture surfaces. Core recovery ranged from 95% to 98%. Rock Quality Designation (RQD) values ranged from 85% to 98%. Ultimate compressive strength of the rock samples ranged from 21.3 to 23.6 ksi. More detailed rock descriptions can be found in the Core Boring Report.

Groundwater

Groundwater was encountered at each bent location. Groundwater elevations ranged from 268 feet at boring EB2-A to 259 feet at boring EB1-B.