

SUBJECT: GEOTECHNICAL REPORT

**DESCRIPTION: DUAL BRIDGES ON NC 87 OVER
REEDY MEADOW SWAMP
STATE PROJECT: 34467.1.1
TIP: R-2562C
F.A. NUMBER: N/A**

1.0 PROJECT DESCRIPTION

1.1 Background

The purpose of this investigation was to obtain geotechnical information for foundation design and construction of proposed dual bridges and approach embankments on Highway NC 87 over Reedy Meadow Swamp. Our understanding of the project site, bridge design and layout comes from documents and drawings provided by the NCDOT Geotechnical Unit, including a Request for Proposal dated March 31, 2004; Bridge Survey and Hydraulic Report dated March 22, 2004; electronic files on the NCDOT ftp site; bore log and laboratory soil-test data; and a conversation with Mr. David Hering of the Geotechnical Unit. The project was completed in metric units.

The proposed project consists of dual bridges on highway NC 87 over Reedy Meadow Swamp in Bladen County, approximately three kilometers north of Dublin, North Carolina. A site location and topographic site map are provided as Drawings 1 and 2 in this report. The proposed dual bridge will consist of two structures, each three spans approximately 21.33 meters long. Each bridge will be approximately 12 meters wide. The bents are skewed 90° to the alignment (-L-Rev). All bents are located within a lowland area containing Reedy Meadow Swamp or on an existing embankment. The main channel of Reedy Meadow Swamp is located between Bents 1 and 2.

This geotechnical report describes the results of our investigation performed during April 2004.

1.2 Field Testing

We proposed to complete between eight to 16 borings, depending on our findings. The soils were found to be generally consistent across the site and a total of nine borings were completed. This report also incorporates the data from two borings, EBX and BX, completed by the NCDOT in January 2004. All borings completed by MACTEC and the NCDOT are shown on the Boring Location Plan (Drawings 3 and 9). Our borings were drilled with a CME-45 Marsh Buggy-mounted drill rig using wash/mud-rotary drilling techniques. The NCDOT borings were drilled with a CME-45B. Our borings were drilled to depths based on NCDOT guidelines for ultimate pile capacity for 310mm steel piles.

We determined proposed boring location coordinates, relative to the North Carolina Grid, from the electronic plan-view file. We established proposed boring locations in the field using our Pathfinder Pro XL GPS equipment. We proposed to locate borings near the ends of the proposed bents. Some actual boring locations required an offset from proposed locations due to uneven terrain, soft ground and buried and overhead utilities. Actual boring location coordinates were captured with our GPS equipment and subsequently post-processed. Conventional survey techniques were used to establish the collar elevations at boring locations and selected ground

surface points along the profile and cross sections. Our survey referenced -BL- 62, elevation 41.910m mean sea level (MSL).

Standard penetration tests (SPT) were conducted and soil samples collected at approximately 1.52-meter intervals within the soil profile using a split-spoon sampler and a 63.5-kg manual hammer in accordance with procedures described in ASTM D 1586.

1.3 Laboratory Testing

We performed AASHTO classification and grain-size distribution tests on 16 split-spoon samples, SS-1 through SS-16, and one bulk sample collected from the channel bed of Reedy Meadow Swamp, S-1. Organic content tests were performed on two split-spoon samples, SS-17 and SS-18, and one bulk sample collected from the channel bank of Reedy Meadow Swamp, S-2. Moisture content tests were performed on seven samples that were either cohesive or organic, SS-6, SS-8, SS-9, SS-16, SS-17, SS-18 and S-2.

This report also incorporates laboratory soil-test data from the two NCDOT borings (EBX and BX), split-spoon samples SS-1 through SS-25 and MS-1.

Laboratory testing was performed in accordance with applicable ASTM/AASHTO/NCDOT specifications. Test results for AASHTO classification, moisture content and organics for soils collected in both MACTEC and NCDOT borings are included in this report.

2.0 PHYSIOGRAPHY AND GEOLOGY

2.1 Site Description

The project site is located in a lowland area. The natural ground surface slopes gently downward, from higher ground north and south, to the existing bridge on Highway NC 87 over the main channel of Reedy Meadow Swamp. There is approximately five meters of relief between high and low ground in the surrounding area. Highway NC 87 is built on an embankment, elevated approximately 2 meters above the swamp at the end-bents of the existing bridge. Reedy Meadow Swamp is vegetated with small to large trees, bushes, grasses and ferns.

Surface water appears to weave its way through the swamp vegetation upstream and downstream of the existing bridge. A main channel is more defined at the existing bridge. The swamp contained surface water during the period of our investigation, but flow velocities appeared to be negligible.

Photographs included in this report show site conditions during our field investigation.

2.2 Geology

The project site is located within the Carolina Coastal Plain Physiographic Province. Sediments of the Carolina Coastal Plain were deposited during depositional cycles caused by fluctuating sea-levels, and the processes in existence today. The 1985 Geologic Map of North Carolina, compiled by the N.C. Geologic Survey, shows the site is underlain by the Black Creek Formation. The Black Creek Formation consists of lignitic clay containing thin to thick lenses of micaceous sand.