



STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION

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STATE PROJECT: 33234.1.1 (B-3694)
 FEDERAL PROJECT: BRZ-1138(9)
 COUNTY: Rockingham
 DESCRIPTION: Bridge No. 55 over Belews Lake Spillway on SR 1138 (Lindsey Bridge Road)
 SUBJECT: Geotechnical Report – Inventory

PROJECT DESCRIPTION

This project consists of the approaches to a proposed replacement bridge over Belews Creek to be located approximately 70 feet upstream of the existing bridge. The project is approximately 0.3 miles in length. A concrete retaining wall is proposed in the cut section right of -L- Sta. 12+00 to 15+00.

Duke Power, owner of the bridge site property, operates the Belews Creek Steam Generation Plant several miles southeast of the site. The spillway from the Belews Lake dam empties into Belews Creek directly upstream of the project site. The plant regulates the amount of water released into the spillway depending upon their power generation needs.

The primary geotechnical field investigation was conducted in November 2003. This initial survey consisted of hand auger borings and rod soundings. Two SPT borings from the bridge foundation investigation, conducted in May 2004, have been included in this report. Four additional rod soundings were conducted in July, 2004 to determine the extent of any rock in the area to be excavated for the proposed retaining wall. A single SPT boring from earlier investigation (October, 1992) has also been incorporated into this report. Representative soil samples were collected for visual classification in the field and for laboratory analysis by the Materials and Tests Unit.

AREAS OF SPECIAL GEOTECHNICAL INTEREST

1) Highly Plastic Clay Soils: An area containing plastic clay soil (plasticity index greater than 25) is noted below:

<u>Alignment</u>	<u>Station/Offset</u>
-L-	23+50 /RT

A discussion of this highly plastic clay soil is located below in the section titled: "Soil Properties".

2) Hard Rock: Hard rock was encountered at the following location:

<u>Alignment</u>	<u>Station</u>	<u>Offset</u>
-L-	12+00 to 14+45	RT

PHYSIOGRAPHY AND GEOLOGY

The project is located at the western limits of the Piedmont physiographic province. The site is situated adjacent to the floodplain the Dan River, which is located approximately 1200 feet to the west. The area is rural, with scattered single-family homes located along Lindsey Bridge Road. The floodplain area west of the site is generally level and is used for cultivation. The area east and north of the site is wooded.

Geologically, the project is located within the Milton Belt, and is situated adjacent to the Dan River Triassic Basin. The geologic boundary between rocks of the Milton Belt and the Triassic-age rock, is covered by the alluvial floodplain soils just west of the site. Soils are derived from the weathering of the underlying metamorphic bedrock which is composed of gneiss and schist. These units are well-foliated, and trend in a northeasterly direction.

SOIL PROPERTIES

Roadway Embankment Soils: Embankment fill soil occurs at both ends of the existing bridge, as well as in two small areas north of the bridge (see Profile Sheet No. 6 and Cross-section Sheet Nos. 9 through 15). The fill soil consists of medium stiff, dry to moist, sandy silt (AASHTO classification of A-4). The fill soil overlies both the alluvial soil directly adjacent to Belews Creek, as well as the residual soils north and south of the bridge.

Alluvial Soils: Alluvial soils occur within, and directly adjacent to the creek. The alluvial soils range from 3 to 12 feet in thickness and consist primarily of loose coarse sand (A-2-4) mixed with cobbles and boulders. Just north of the creek, three to five feet of alluvial, medium stiff, silty sandy clay (A-6) overlies the alluvial sand. (see Profile Sheet No. 6 and Cross-section Sheet No. 11). The alluvial coarse sand and boulders overlie residual soils.

Residual Soils: The residual soils are derived from the in-place weathering of the underlying gneiss and schist bedrock. Interbedded sandy silt, sandy silty clay, and silty sand are the most common residual soils in the project area. These silty soils are generally soft to medium stiff, and consist of sandy silt (A-4) and sandy silty clay (primarily A-6). Minor amounts of medium dense silty sand (A-2-4) are also present. The residual soils grade into weathered rock with depth. A small area of residual highly plastic "cap" clay occurs at the ground surface in the cut section right of -L- Sta. 23+50 (see Cross-section Sheet No. 14).

ROCK PROPERTIES

Weathered rock occurs beneath, and behind, the proposed retaining wall right of -L- Sta. 12+00 to 15+00 (see Cross-section Sheet Nos. 7 through 10). Boulder-size weathered rocks outcrop in the existing slope right of -L- Sta. 12+00 to 13+00. Bridge rod refusal, accompanied by a dull