



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

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Geotechnical Unit
12033-D Independence Blvd.
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STATE PROJECT WBS: 33177.1.1
I.D. NUMBER B-3629
COUNTY Caswell
DESCRIPTION Bridge No. 11 On SR 1565 Over Country Line Creek, and Detour
Culvert at Sta.15+91-L- On SR 1565 at Prong of Country Line Creek, w/ Detour
SUBJECT: Geotechnical Report – Bridge Foundation Investigation

PROJECT DESCRIPTION

This is a Bridge Foundation Investigation report in English units, for a project that includes a permanent replacement bridge, a temporary detour and a temporary detour bridge, a culvert replacing a bridge, also with a detour and detour culvert. We received the project late in the planning stage as a rush job.

LOCATION:

The site is in north central Caswell County, northeast of Yanceyville. This investigation was based on the structure and location portrayed on the Bridge Survey and Hydraulic Design Report sheets signed and sealed on 08/26/03.

PROPOSED STRUCTURE (S):

The bents of the new permanent bridge will be on a 90° skew. The footprint of the new bridge will include the footprint of the existing bridge. The new bridge is 19' longer and about 6' wider than the old bridge. Five spans, 1@35', 3@50', 1@35' are planned. The bridge centerline station is at -L-26+65, elevation 395.10.0'. The benchmark is: "BM # 3 -BL-STA.22+00 R/R SPIKE SET IN 16" OAK, 274' RT." The supporting documents for this project included sketches for detours for both the bridge and the proposed culvert. Unfortunately, these detours fall on a floodplain that was flooded at the time of the investigation. We believe that for planning purposes, the alluvial soil conditions found at the bridge and culvert are consistent and represent what would be found at the detour bridge location.

DRILLING:

A CME 550 drill rig with automatic hammer was used on this project. For the permanent bridge, two borings were drilled with NW casing to bearing at each endbent location, on the shoulder. Because of access problems, all of the interior bent borings were drilled through the deck. Two holes were drilled at interior bent three and one hole was drilled at each of the other interior bent locations. NW casing with advancer was utilized, followed by NX wireline core.

PHYSIOGRAPHY and GEOLOGY

PHYSIOGRAPHY

The project is in the Piedmont Physiographic Province. The bridge crosses Country Line Creek, a third order stream that originates in the southwest corner of Caswell County and flows into Virginia as a tributary of the Dan River. It drains 120 square miles of the mostly rural Caswell County. The ridgetops within 1 mile of the project are at an elevation of 550' while the bridge location is at an elevation of 390'. The stream bottom gains 5 feet in a mile upstream, and drops 5 feet in a mile downstream. The stream channel meanders, and changes from an east-west channel just upstream of the project to nearly north-south at the project. Subsurface conditions at the bridge do not indicate that the stream channel location was determined by geologic variation.

GEOLOGY

The soil and the bedrock geologic conditions will be discussed separately below.

Soil Geology

Alluvial Soil: The residual soil surface is fairly flat beneath the alluvium as indicated by blow counts of N= 0 to 2 abruptly increasing to N= 50 or 100. Most of the alluvial soil is soft to very soft, fine grained, either A-4 silt or A-6 clay. The silt interval at B1-B may represent an old channel cut into the A-6 clay layer seen in EB-1B and B2-A. The only alluvial sand interval is in B4-B and probably represents down cutting and replacement by the current channel.

Residual Soil: As noted above, the residual soil is considerably harder than the alluvial soil. The contact between residual soil and rock or weathered rock surface is irregular, with a depression across bents 2, 3 and 4. The severe weathering, characteristic of residual soil, occurs down hole in borings B2-a and B4-B below intervals of rock or weathered rock.

Bedrock Geology

The 1985 Geologic Map of North Carolina shows the project area is located within the Czbg unit, biotite gneiss. The rock core from this project was almost universally moderately to moderately severely weathered. Joints were developed on the bedding or foliation plane, and 2 or three additional fracture sets with dips from 30 to 90 degrees. RQD was low throughout. It is likely that the rock originally contained some iron pyrite that contributed to the deep weathering.

Most of the core samples are from a light greenish gray to brown feldspar- quartz- biotite gneiss. Some of the rock, particularly the Bent 4-B core is darker: biotite – quartz-feldspar and may represent a muddier sediment. In places the original rock was clearly sedimentary, and in places it may have been a fragmental volcanic. A foliation with a persistent 15 to 25 degree dip probably reflects original bedding.

Variation and Predictability of the Subsurface

The subsurface was somewhat predictable in that by elevation 370 residual soil or weathered rock had been encountered and bearing capacity was rapidly accumulated with depth from there, in spite of almost universally low RQD values. The rock was interpreted to be gneiss of variable composition metamorphosed from a mixed section of mostly sedimentary rock. The weathered rock – crystalline rock boundary appears to drop from EB-1 to EB-2.