



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

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STATE PROJECT: 8.1711301 (B-3300)
COUNTY: Ashe
DESCRIPTION: Bridge No. 57 on NC-88 over Buffalo Creek – Approaches
SUBJECT: Geotechnical Report – Inventory

Physiography and Land Use

Bridge No. 57 on NC-88 is located in central Ashe County approximately 2.5 miles west of the town of Jefferson. The approaches on NC-88 lie between floodplain topography on the Right Side and hill slopes on the Left Side, except where the highway crosses the narrow valley of Buffalo Creek. The creek flows northeast beneath NC-88 as a bold, swift stream with a 20-foot channel. It then turns west and runs parallel with the highway. A tributary, Little Buffalo Creek, runs north along the Right Side of the highway until it intersects Buffalo Creek at a point about 40 feet downstream of the bridge.

A few residential sites lie along the grassy floodplain on the Right. The Left Side is steep to moderate slopes principally covered with forest, but construction will encroach on part of a Christmas tree farm and a mobile home. Topographic relief in the vicinity of the proposed construction is about 150 feet.

Two secondary roads make an intersection with NC-88 about 50 feet south of the bridge: SR-1131 (Buffalo Rd.) on the Left Side, and SR-1508 (Elliot Hollow Rd.) on the Right Side.

Plans call for construction of a new bridge with approaches on new alignment -L-, approximately 50 feet Left of the existing bridge. The principal concern of this project will be two large, Left Side cuts. Those cuts will be about 25 and 40 feet deep, respectively, at the ditch line; with cut slope exposures more than 120 feet in height. A retaining wall is to be constructed for a driveway on new alignment -DR1-. An additional 450 feet of driveway is to be constructed on

new alignment -DR2-, which will traverse one of the large cut slopes for access to a house at the top of the slope.

A subsurface investigation was carried out in March 2003. A contractor, F and H Engineering, of Paducah, Kentucky, made 5 rock core borings and 8 auger borings under the supervision of a DOT Project Geologist. Borings were made with a track mounted CME-45 power-drilling machine, equipped with 8-inch, hollow stem augers and NXWL diamond bit coring tools. The drillers conducted Standard Penetration Tests (SPT's) at 5-foot intervals in all borings in soil and weathered rock. Soil samples were submitted to a DOT laboratory for tests of quality and moisture content.

A Schmidt Net analysis for rock slope stability was made with numerous strike and dip readings of rock fractures exposed in outcrops at the site.

Soil and Rock Characteristics

Soil and rock were investigated in the areas of proposed cuts along the Left Side, and at the site of a proposed retaining wall on -DR1-. Colluvial, residual, saprolite, and alluvial soils were encountered as well as weathered rock and hard rock. The existing roadway embankments and the floodplain soils along the Right Side of -L- were not investigated.

Alluvial soils were investigated in borings for the proposed retaining wall on -DR1-. Those soils, which lie on the narrow floodplain of Buffalo Creek, comprise about 4 feet of very soft, sandy silt (A-4) overlying 5 feet of loose, silty sand and gravel to boulders (A-1-b).

The proposed cuts will encounter highly variable thicknesses of residual and saprolitic soils and weathered rock overlying hard rock. The depth to hard rock varies from 0 feet to more than 47 feet, and it is common to find seams of hard rock and weathered rock within the saprolite soil strata, and to find weathered rock and even saprolite in layers or pockets below the rock line.

A surficial layer of colluvial soil about 3 feet thick covers the lower half of the slope beyond Station 19+00. It is composed of brown to yellow-orange, soft, sandy silt (A-4) with embedded small rock fragments and a few widely scattered cobbles.

Residual soils are composed of orange-brown to orange, soft to medium stiff silt and clay (A-4, A-5, A-7-5, A-7-6). They are generally present as a surface layer about 3 to 8 feet thick on gently sloping natural ground near the ridge tops, but they are absent from the steeper slopes.

Saprolite may be found beneath a cap of residual silt or clay or a thin cover of colluvium, or it may be present at ground surface. It is generally less than 15 feet thick, but has been found at more than twice that thickness in one boring. It is composed of brown to yellow or very dark gray, stiff to hard, sandy silt (A-4) and loose to very dense silty sand (A-2-4, A-2-5).

A weathered rock layer up to 10 feet thick may be found between the saprolite and hard rock. In some borings however, there was little or no weathered rock. The weathered rock consists of a dark gray, friable, sandy material.

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