



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

P.O. BOX 25201,
RALEIGH, N.C. 27611-5201

LYNDO TIPPETT
SECRETARY

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NCDOT
Geotechnical Unit
12033-D Independence Blvd.
Matthews, NC 28105
STATE PROJECT 8.2625001
I.D. NUMBER U-3837
COUNTY Forsyth
DESCRIPTION Bridge 436 over I-40 on Hanes Mall Blvd
SUBJECT: Geotechnical Report – Bridge Foundation Investigation

PROJECT DESCRIPTION

This is a Bridge Foundation Investigation report of an English units bridge project of the Hanes Mall Boulevard crossing of I-40 in Winston-Salem. The existing 5 bent bridge over part of the 421-I-40 interchange will be widened and a new twin bridge will be built 14', 9" to the south of the existing bridge. Because access to most of the site was blocked, old data archived in Raleigh and Matthews was retrieved and incorporated in the new project. The drilling plan was completed with the participation and direction of the Design Engineer.

LOCATION:

The site is in central Forsyth County, on the southwestern side of Winston-Salem. This investigation was based on the structure and location portrayed on the Preliminary General Drawing transmitted to us May 15, 2003. The proposed new bridge foundations fall either in traffic islands or on the present embankment side slopes of I-40 and Hanes Mall Blvd.

PROPOSED STRUCTURE (S):

The left-hand bridge will be widened about 20 feet to the north on the same skew as the old work: 105° 18', 46", and will have a bike lane, a sidewalk and two travel lanes. The new right hand bridge, also at a skew of 105° 18', 46" will have a sidewalk and two travel lanes. The bridge reference station for both structures is -L-21+64.07, no elevation given. The benchmark is BM #10 -BL- Sta. 5+44, 428' Rt., El. 838.49. (RR spike set in joint on top of C&G in entrance to Movie Theater on Kester Mill Rd.)

DRILLING:

We do not know the specifics of the 1984 drill rig, but SPT drives were completed on a 5 foot increment to soft weathered rock or hard weathered rock. We used a CME 550 with automatic hammer NW casing and a tricone advancer. At EB-1, left bridge, A and B borings were completed through the post 1984 fill to residual. At Bent 1, no new borings were drilled, but the 1984 B1-A & B borings were recovered. At bent 2, A & B borings were completed at the right bridge location and 1984 borings were recovered at the left bridge location. At Bent 3, the right bridge bent location was inaccessible, but the 1984 B1-A & B borings were recovered. At left side, endbent 2, the A boring was completed near the 1984 A boring, but through the Hanes Mall fill. The right bridge location falls on the fill slope, and was inaccessible.

PHYSIOGRAPHY and GEOLOGY

PHYSIOGRAPHY

The project is in the Piedmont Physiographic Province.

GEOLOGY

Soil Geology

Sections of micaceous fill soil up to 60' thick, of various vintage, were traversed to a micaceous residual soil interval up to 40' over weathered rock. Buried sandy alluvial soil marks the site of Little Creek, (now in a culvert).

Bedrock Geology

The 1985 Geologic Map of North Carolina shows the project area is located within the Czbg unit, biotite gneiss. The residual soil and the weathered rock were both micaceous to very micaceous, probably highly weathered pegmatite material. I-40 is parallel to the strike of the regional metamorphic grain at this point. Hanes Mall Boulevard travels in the direction of maximum regional geologic change, across the metamorphic grain.

Variation and Predictability of the Subsurface

The subsurface was generally consistent along the plane of each cross section. The change in the subsurface between cross sections is illustrated in the profile. The weathered rock contact drops 25' from endbent 1 to bent 2 then rises about 10 feet to endbent 2.

FOUNDATION MATERIALS

SOIL SECTION:

The roadway fill and the residual soil are similar, and should be, since one was the source of the other. The great difference is that each sample from an embankment only represents the truckload of soil that it arrived in. A residual soil sample may stand for a soil horizon or a soil stratum. We "dotted in" roadway fill layers but they are just lettering guides. The dotted in residual boundaries represent geologically accepted principles. In terms of confidence, the alluvial soil boundaries fall in the middle.

Roadway Fill:

The roadway fill samples returned values of A-7, A-5, A-2, and A-4, in order of frequency. The A-7 is more commonly at the base of the fill, and the A-5 is usually at the top of the fill. Most of the A-4 soil was from the old drilling which was lightly sampled. The A-4 from the old drilling may be equivalent to the more recent A-7, see bent 2 cross section).

Alluvial Soil:

The soil within the buried Little Creek floodplain, at Bent 3 and EB-2 is A-2-4 sand and A-1 gravel. At the top of the new borings for Bent 2, 5' to 10' of A-7 clay was described as alluvial. This interval is almost entirely above the alluvium of Bent 3 and EB-2 and as a structureless clay, may be residual.

Residual Soil:

The residual soil is A-7 cap clay over micaceous sand. The borings at EB-1 are a good illustration of the soil horizon sequence.

ROCK AND WEATHERED ROCK:

Weathered Rock:

In most cases weathered rock is the bottom horizon of significant weathering. In B1-B and B3-B intervals of weathered rock were followed by softer material, which was followed by weathered rock or rock. Either a residual boulder was "floating" in the residual soil, or an island of softer material was within a rock section.

Rock:

No core drilling was done at this bridge investigation. The endbent borings and bent 3 borings met the criteria for crystalline rock at termination, (auger or dragbit refusal). The borings for bent 1 and two were stopped in weathered rock.