



STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION

BEVERLY EAVES PERDUE  
GOVERNOR

EUGENE A. CONTI, JR.  
SECRETARY

May 17, 2010

MEMORANDUM TO: William (Bill) T. Goodwin, PE  
Project Development – Bridge Unit – Unit Head  
Project Development and Environmental Analysis Branch

FROM: Njoroge W. Wainaina, P.E.  
State Geotechnical Engineer  
Geotechnical Engineering Unit

TIP NO: B-4686  
WBS: 38468.1.1  
COUNTY: Yadkin  
DESCRIPTION: Bridge # 10 over South Deep Creek on SR 1710 (Old Stage Rd)

SUBJECT: **Geotechnical Report**

The Geotechnical Engineering Unit has performed a limited assessment of the above referenced project to assist in developing the scope of work necessary to provide early identification of hazardous material and geotechnical issues that could impact the project's planning, design, or construction.

**HAZARDOUS MATERIALS EVALUATION**

**Purpose**

This section presents the results of a hazardous material evaluation conducted along the above referenced project. The main purpose of this investigation is to identify properties within the project study area that are or may be contaminated and therefore result in increased project costs and future liability if acquired by the Department. Hazardous material impacts may include, but are not limited to, active and abandoned underground storage tank (UST) sites, hazardous waste sites, regulated landfills and unregulated dumpsites.

**MAILING ADDRESS:**  
NC DEPARTMENT OF TRANSPORTATION  
GEOTECHNICAL ENGINEERING UNIT  
GEOENVIRONMENTAL SECTION  
1589 MAIL SERVICE CENTER  
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TELEPHONE: 919-250-4088  
FAX: 919-250-4237

[www.ncdot.gov/doh/preconstruct/highway/geotech](http://www.ncdot.gov/doh/preconstruct/highway/geotech)

**LOCATION:**  
CENTURY CENTER COMPLEX  
BUILDING B  
1020 BIRCH RIDGE DRIVE  
RALEIGH NC 27610

**Techniques/Methodologies**

The Geographical Information System (GIS) was consulted to identify known sites of concern in relation to the project corridor. Geotechnical Engineering Unit personnel conducted a field reconnaissance along the project corridor on January 12, 2010. A search of appropriate environmental agencies' databases was performed to assist in evaluating sites identified during this study.

**Anticipated Impacts**

The Geotechnical Engineering Unit observed no contaminated properties during the field reconnaissance and regulatory agencies' records search. Please note that discovery of additional sites not recorded by regulatory agencies and not reasonably discernable during the project reconnaissance may occur. The Geotechnical Engineering Unit should be notified immediately after discovery of such sites so their potential impact(s) may be assessed. See Appendices A and B for an area map and site photograph.

If there are questions regarding the geoenvironmental issues, please contact Ethan J Caldwell, LG, EI, at 919-250-4088.

**GEOTECHNICAL IMPACT EVALUATION****Techniques/Methodologies**

The geotechnical investigation consisted of a field reconnaissance, review of available mapping, aerial photography and bridge maintenance records, and three Standard Penetration Test borings.

**Findings**

The existing bridge has five spans of approximately 30' each. The existing foundations are timber piles. Pier 2 has been shored. The bridge deck grade is about 20' above the streambed elevation. Water depth (on 4-13-2010) was about three feet.

The generalized boring logs follow:

Boring One (Southeast Quadrant, 90' back from bridge)

0-3' Roadway embankment fill, red silty clay, med. stiff

3-5.2' weathered rock / auger refusal

Boring Two: (Northwest quadrant, between existing Bents 3 & 4)

0-16' Alluvial sand & gravel, loose

16-23' residual soil, silty sand, v. dense

23-39' weathered rock

Boring Three: (Northwest quadrant, near existing end bent)

0-12' Alluvial sand & gravel, loose

12-16.5' residual soil, very dense, grading to weathered rock and auger refusal

Based on Boring Two, residual soil is about ten feet below the streambed. The soil grades rapidly to weathered rock and poor quality crystalline rock. Rock type is biotite gneiss.

### **Anticipated Impacts/Recommendations**

The Geotechnical Unit would prefer replacement in-place with an off-site detour. An on-site detour or relocation downstream would have less impact on floodplain, but might require a cut into the hillside in the southeast quadrant. The test boring in that area encountered rock at a depth of five feet.

Foundations for the proposed bridge: it appears that driven piles would not have sufficient penetration but depth to a foundation layer is too great for a shallow foundation. This would imply a drilled shaft or similar design.

If there are any questions regarding these Geotechnical comments, please contact Clint Little at (704) 455-8902.

cc:

Art McMillan, PE, State Highway Design Engineer

Jay Bennett, PE, State Roadway Design Engineer

Tom Koch, PE, Assistant State Bridge Design Engineer

D.R. Henderson, PE, State Hydraulics Engineer

Charles W. Brown, PE, PLS, State Location & Surveys Engineer

**Appendix A**  
**Location of USTs, Landfills, & Other Potentially Contaminated Sites**



Project 38468.1.1 (TIP # B-4686)  
 Bridge # 10 over South Deep Creek on  
 SR 1710 ( Old Stage Rd)  
 Yadkin County

0 250 500 1,000 Feet



NC Department of Transportation  
 Geotechnical Engineering Unit  
 GeoEnvironmental Section





Bridge # 10. View to the north.



Bridge # 10. View to the south.



Bridge # 10. Upstream view



Bridge # 10. Downstream view