February 14, 2005

N.C. Department of Transportation
Geotechnical Engineering Unit
1589 Mail Service Center
Raleigh, North Carolina 27699-1589

Attn: Mr. Njoroge W. Wainaina, P.E.

Ref: Geotechnical Structure Subsurface Investigation Report

State Project No.:	33335.1.1
Tip No.:	B-3899
County:	Rockingham County
Description:	Bridge # 21 on SR 1001 (Woolen Store Rd) over Troublesome Creek
Tierra, Inc. Project No.:	6211-04-070

Dear Mr. Wainaina,

As authorized, Tierra, Inc has completed the geotechnical subsurface investigation of the proposed structure along a new alignment for SR 1001 over Troublesome Creek located in Rockingham County, North Carolina. The purpose of this report is to present subsurface conditions and general notes to the designer for consideration during design of the planned structure. Field and laboratory test results, site and boring location plans, and profile/cross sections depicting subsurface conditions may be found in the appendix of this report.

Our professional services for this project have been performed in accordance with generally accepted engineering practices. No other warranty expressed or implied is made. Tierra, Inc. appreciates this opportunity to provide you with geotechnical engineering services for this project. If you have any questions regarding this report, please contact our office.

Sincerely,
TIERRA, INC.

Matthew A. Korn, E.I.
Staff Professional

Brian D. Keaney, P.E.
Geotechnical Services Manager

for Margaret A. Robertson, L.G.
Contract Manager

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1.0 PROJECT DESCRIPTION

Based on information obtained from the North Carolina Department of Transportation (NCDOT) Bridge Survey & Hydraulic Design Report dated February 25, 2004, a 3-span 4-bent structure is proposed to replace the existing 7-span, 8-bent, concrete deck and steel girder bridge. The proposed structure will be a 135 feet long by 40 feet wide, cored slab bridge. The replacement structure will be located over Troublesome Creek, upstream from the existing structure along a new alignment. The proposed skew angle for all bents is 120 degrees. Proposed grades will require 13 to 15 feet of embankment fill at the approaches of the new alignment.

2.0 SITE DESCRIPTION AND GEOLOGY

The project site is located along SR 1001 (Woolen Store Road) in a rural area outside the city limits of Reidsville, North Carolina in Rockingham County. Troublesome Creek flows east beneath Woolen Store Road into Lake Reidsville approximately 3 miles downstream.

Topographically, the site is relatively flat, ascending in elevation along the east side as it approaches existing roadway embankment. Troublesome Creek was approximately 35 feet wide and 3 feet deep during our investigation. The existing floodplain is approximately 300 feet wide. Floodplain cover consists of shrubs, grass, and moderate to old growth trees.

The project site is located in the Piedmont Physiographic Province of North Carolina, in Reidsville, North Carolina. ***The Geologic Map of North Carolina*** (1985) shows the bridge site to be located within the Milton Belt. Specifically the site is within the Biotite Gneiss and Schists Formation (**€Zbg**). Rocks of this formation are Late Proterozoic to Cambrian in age and contain biotite gneiss interlayered with calc-silicate rock, mica schist and amphibolite. The rocks encountered at the site consisted of biotite gneiss and schists with garnet. No rock outcropping was observed within the project limits.

3.0 FIELD EVALUATION PROCEDURE

Subsurface conditions were evaluated for the proposed structure by advancing eight soil test borings. Two borings per bent were drilled near proposed bent centerlines in December 2004 and January 2005. Borings B2B and EB2B were offset due to existing slopes and overhead utilities. Soil test borings were drilled utilizing a track-mounted Diedrich D-50 track rig with an automatic hammer. Borings were drilled using a 2-inch and a 3-inch tricone mud rotary method. Standard penetration tests were performed at regular intervals, in accordance with American Association of State Highway Transportation Officials (AASHTO T-206-03), and North Carolina Department of Transportation (NCDOT) latest Geotechnical Guidelines and Procedures Manual. Rock coring was conducted beneath all interior bent locations and was performed in accordance with (AASHTO T-225-83 (2000) procedure utilizing a 2.5-inch diameter HQ size core barrel.

In addition to our subsurface investigation, a visual scour evaluation was performed along the channel and banks of Troublesome Creek to determine scour impact for foundation design purposes. The field scour report was electronically submitted January 28, 2005.