# Structure Investigation Report
# Proposed Four Mile Creek Culvert Modification
# South Trade Street
# Mecklenburg County, North Carolina
# TIP Project No. U-5025
# S&ME Project No. 1351-08-001B

**Prepared For:**

The Town of Matthews
Public Works Department
1600 Tank Town Road
Matthews, North Carolina 28105

**Prepared By:**

S&ME, Inc.
9751 Southern Pine Blvd.
Charlotte, North Carolina 28273
NC PE Firm License No. F-0176

**April 19, 2010**

April 19, 2010

The Town of Matthews
Public Works Department
1600 Tank Town Road
Matthews, North Carolina 28105

Attention: Mr. Ralph Messera

Reference: **Structure Investigation Report**
Proposed Four Mile Creek Culvert Modification
South Trade Street
Mecklenburg County, North Carolina
TIP No.: U-5025
S&ME Project No. 1351-08-001B
NC PE Firm License No. F-0176

Dear Mr. Messera:

S&ME, Inc. has completed the subsurface exploration of the referenced project site. The purpose of this study was to determine the subsurface conditions along the proposed new culvert alignment, so that those conditions can be evaluated regarding the appropriate foundation and construction considerations for the culvert extension over Four Mile Creek.

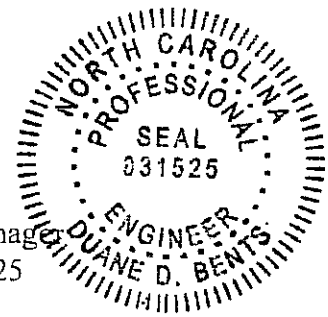
This report presents S&ME's findings of our investigation and foundation recommendations. Included in the Appendix are a Site Vicinity Map, Field Exploration Plan, Generalized Subsurface Profile along the west end of the proposed culvert structure, Generalized Subsurface Profile along the east end of the proposed culvert structure, Generalized Subsurface Profile along the proposed culvert extension, Generalized Subsurface Profile along the proposed pedestrian tunnel, Boring Logs, Rock Core Photographs, Site Photographs and a Field Scour Report.

S&ME appreciates the opportunity to assist you during this phase of the project. If you should have any questions concerning this report or if we may be of further assistance, please contact us.

Very truly yours,
S&ME, Inc.

Luis A. Campos, E.I.
Staff Professional

Duane D. Bents, P.E.
Geotechnical Services Manager
N.C. Registration No. 31525




Senior Review by: Kristen H. Hill, P.E., P.G.
Senior Geotechnical Engineer

LAC/DDB/KHH/cs

S/1351/Project/2008/08-001B

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# SECTION 1000

# GEOLOGIC INVENTORY REPORT

## 1010 Project Description

We understand that plans are to widen S. Trade Street (SR 3448) from a two-lane roadway to a four-lane roadway with a bicycle lane between its intersection with John Street (SR 1009) and Weddington Road (SR 3468) in Mecklenburg County, North Carolina. To facilitate the widening, the bottomless culvert at the crossing of Four Mile Creek must be modified and/or replaced.

Based on the most recent information provided to us by Kimley-Horn and Associates, Inc., we understand that the proposed structure will be lengthened to a total length of approximately 180 feet in the generally east and west directions. In addition, a pedestrian tunnel is proposed approximately 30 feet south of the existing culvert. The culvert extension will be cast-in-place concrete construction with an opening slightly larger than the existing structure. The structure will include concrete wing walls that will tie into the pedestrian tunnel wing walls.

## 1020 Site Description & Geology

The project site is located in Mecklenburg County, North Carolina, at the crossing of Four Mile Creek just south of Chaphyn Lane and north of Brenham Lane. At this crossing, Four Mile Creek runs approximately east-west and S. Trade Street runs approximately north-south. The subject bottomless arched culvert is about 90 feet in length with a width of about 24 feet and a height of about 15 feet. The roadway elevation is approximately 15 feet higher than the top of the culvert, resulting in an approach embankment height of about 30 feet. Based on topographic information in the culvert area provided to us, the embankment slope is approximately 1.2H:1V on both sides of Trade Street. Visual observations suggest a slightly steeper slope directly above the culvert. The embankment slopes are covered with underbrush and small trees.

The culvert site is located within the Charlotte Belt of the Piedmont Physiographic and Geologic Province of North Carolina. The Piedmont Province generally consists of well-rounded hills and ridges, which are dissected by a well-developed system of draws and streams. The Piedmont Province is predominantly underlain by metamorphic rock (formed by heat, pressure and/or chemical action) and igneous rock (formed directly from molten material), which were initially formed during the Precambrian and Paleozoic eras. The volcanic and sedimentary rocks deposited in the Piedmont Province during the Precambrian eras were the host for the metamorphism and were changed to gneiss and schist. The more recent Paleozoic era had periods of igneous emplacement, with at least several episodes of regional metamorphism resulting in the majority of the rock types seen today.

The topography and relief of the Piedmont Province have developed from differential weathering of the igneous and metamorphic rock. Because of the continued chemical and physical weathering, the rocks in the Piedmont Province are now generally covered with a mantle of soil that has weathered in place from the parent bedrock. These soils have variable thicknesses and are referred to as residuum or residual soils. The residuum is typically finer grained and has a higher clay content near the surface because of the advanced weathering. Similarly, the soils typically become coarser grained with increasing depth because of decreased weathering. As the degree of weathering decreases, the residual soils generally retain the overall appearance, texture, gradation and foliations of the parent rock. Alluvial soils, consisting of interbedded sands, silts, and clays, are common in the floodplain along rivers and creeks in the Piedmont.

## 1030 Field Testing

A combination of soil test borings, hand augers with Dynamic Cone Penetrometer (DCP) testing, and bridge rod soundings were used to determine the subsurface conditions in the vicinity of the existing culvert. The field exploration methods were performed in accordance with the "NCDOT Geotechnical Unit Guidelines and Procedures Manual", revised March 1994.

The soil test boring, hand auger boring and bridge rod sounding locations were determined in the field by S&ME staff professionals. The test locations are presented relative to corresponding stations and offsets from the -L- survey line. Ground surface elevations indicated on the test logs were determined through a differential level survey referenced to Benchmark (BM-242) with an elevation of 648.77 feet-MSL. The Benchmark was provided to us by Sanborn and is identified as a metal nail set into the sidewalk on the west side of S. Trade Street, south of the subject creek.

### *1031 Soil Test Borings*

Soil test borings were conducted from January 20 through 25, 2008 and from January 8 through 13, 2009. Fourteen borings (designated B-1 through B-8 and BB-1 through BB-6) were drilled by S&ME personnel along the existing roadway in the vicinity of the culvert, near the proposed culvert corners and along the proposed pedestrian walkway as shown on the Field Exploration Plan (Sheet No. 4). The borings were drilled with a CME-45B drill rig mounted on a truck carrier as well as a CME-550x and Mobile BK-51 drill rigs mounted on all-terrain vehicles. The borings were advanced to depths ranging from 2.4 to 37.5 feet (elevations 636.6 to 596.9 feet).

All of the borings were penetrated using hollow stem auger procedures (either 2-1/4 inch or 3-1/4 inch) onto crystalline rock or, in the case of Boring B-3, onto the concrete surface of the culvert arch. Standard penetration tests were performed in accordance with AASHTO T206-87 in all of the borings. Rock coring was performed in selected borings.

### *1032 Hand Auger Borings with DCP Testing*

On January 25, 2008, S&ME personnel performed six (6) hand auger borings (designated HA-1 through HA-6) with Dynamic Cone Penetrometer (DCP) testing at approximate locations shown on the Field Exploration Plan in the Appendix; no ground surface

penetration was possible at the hand auger boring location HA-3 due to the presence of rip rap. The hand auger borings were advanced to depths ranging between 1.2 and 5 feet below the existing ground surface. The DCP tests were performed at 1 foot intervals, beginning at the ground surface.

### *1033 Bridge Rod Soundings*

On February 5, 2008, S&ME personnel performed twelve (12) bridge rod soundings (designated BR-1 through BR-15) at approximate locations shown on the Field Exploration Plan. The bridge rod soundings were advanced to depths ranging between 0.7 and 5.7 feet below the existing ground surface except for BR-9 and BR-13 where no sounding rod penetration was possible.

## 1040 Laboratory Testing

One undisturbed soil sample was collected from Boring B-4 and a consolidated undrained (CU) triaxial compression test was planned, however, the sample did not remain intact during sample extrusion. Additional laboratory testing of representative soils samples was completed to determine the soil index properties and to verify field classifications. This samples were analyzed for grain size distribution (including hydrometer) (T88-90), determination of liquid limit (T89-90), plastic limit and plasticity index (T90-87) with NCDOT modifications. Laboratory test results are presented in the appendix.

## 1050 Subsurface Conditions

The test borings indicate relatively uniform subsurface conditions at the proposed culvert extension location with some non-conformity with respect to stratigraphic correlations along the proposed alignment as indicated on the attached Generalized Subsurface Profiles (see Sheet Nos. 5 through 8). The descriptions of the subsurface conditions in the following paragraphs are based on conditions encountered in the soil test borings. The Generalized Subsurface Profiles were developed by S&ME personnel utilizing surveying techniques referencing the benchmark provided and existing site features. In addition, detailed descriptions of the conditions encountered at the individual test boring location are presented on the attached Boring Logs.

### *1051 Fill Materials*

Roadway embankment fill and artificial fill materials were encountered in each of the borings, with the exception of Borings B-5 and B-6, to depths of about 2.4 to 32 feet (elevations 636.6 to 609.3 feet) beneath the collar elevations. The fill materials encountered consist of medium dense brown silty sand (A-2-4), soft to very stiff red brown tan fine sandy silt (A-4), stiff brown fine sandy silt (A-5), medium stiff to very stiff red brown clayey silt (A-7-5) and stiff tan silty clay (A-7-6). Standard penetration test (SPT) N-values in the fill soils ranged from 4 blows per foot (bpf) to 62 blows per 0.7 feet of penetration.

### *1052 Alluvial Deposits*

Alluvial deposits were encountered underlying roadway embankment and artificial fill soils in Borings B-2, B-4, BB-2, BB-3, BB-5 and BB-6 to depths ranging from about 6 to 37.5 feet (elevations 617.1 to 609.9 feet) beneath the collar elevations. The alluvial deposits encountered in the borings consist of medium stiff gray brown fine sandy silt (A-4), stiff brown clayey silt (A-6), very soft to soft gray brown sandy silty clay (A-7-6), very loose to medium dense gray brown silty fine to coarse sand (A-2-4) and very loose brown gray clayey fine sand (A-2-7). The SPT N-values in the alluvium ranged from Weight-of-Hammer (WOH) to 17 bpf.

### *1053 Residuum*

Residual materials exist beneath the topsoil in Boring B-5 as well as beneath alluvial deposits in Borings BB-2 and BB-5. The residuum generally consisted of very stiff red tan brown clayey silt (A-7-5) and dense to very dense white tan brown silty fine to coarse sand (A-2-4). The SPT N-values in the residuum ranged from 29 to 91 bpf.

Weathered rock was encountered beneath the alluvial deposits in Boring BB-5, beneath residual soils in Borings B-5 and BB-6, and beneath topsoil in Boring B-6. The surface of the weathered rock was encountered at depths of about 0.5 to 13 feet (elevations 636.9 to 609.9) feet beneath the collar elevations. The weathered rock materials were penetrated by hollow stem augers to depths of 0.3 to 14.3 feet (elevations 631.3 to 608.6 feet) beneath the collar elevations. The SPT N-values in the weathered rock materials ranged from 100 blows per 0.6 feet of penetration to 60 blows per 0.1 feet of penetration.

The weathered rock transitions to crystalline rock consisting of gray brown granodiorite. Crystalline rock exists directly beneath fill soils in Borings B-7, B-8, BB-1 and BB-4, directly beneath alluvial soils in Borings B-2, B-4 and BB-3, and directly beneath residual soils in Borings B-5, B-6, BB-2, BB-5 and BB-6. The surface of crystalline rock was encountered at depths ranging from 2.4 to 37.6 feet (elevations 631.3 to 608.6 feet) beneath the collar elevations. The crystalline rock was evaluated utilizing rock coring techniques by advancing an NQ-2 core barrel. The recovered core samples were generally classified as medium hard to hard, moderately weathered to very slightly weathered, brown gray, with close to very close fracture spacing. Core activities recovered 76 to 100 percent of to crystalline rock cored. Rock Quality Designations (RQD) values ranged from 10 to 87 percent. Borings BB-5 and BB-6 were terminated in hard granodiorite at elevations of 596.9 and 599.9 feet, respectively. Borings B-2, B-4 through B-8, BB-1, BB-3 and BB-4 were terminated on crystalline rock at elevations ranging from 631.3 to 609.3 feet.

## 1060 Groundwater

Groundwater was measured in Borings B-2, B-4, B-7, BB-5 and BB-6 at depths of 7 to 37 feet below the existing ground surface (approximate elevations of 611.8 to 616.2 feet-MSL) at the respective boring terminations. Water levels were measured after a stabilization period of at least 24 hours in Borings BB-3, BB-5 and BB-6 at depths of 3 to 8 feet below the existing ground surface (approximate elevations 614.9 to 617.5 feet-

MSL). The remainder of the borings performed for this study were either dry when water level measurements were attempted or backfilled due to safety concerns. All of the initial borings (Borings B-1 through B-8) were backfilled with soil cuttings on or before January 25, 2008. All of the secondary borings (Borings BB-1 through BB-6) were backfilled with soil cuttings on or before January 14, 2009. The creek level at the time of our exploration was at approximately elevation 614 feet-MSL.

Please note that groundwater levels tend to fluctuate with seasonal and climatic variations, as well as with some types of construction operations.

### 1070 Scour

A field scour report was conducted for the proposed culvert on S. Trade Street over the Four Mile Creek site as part of this phase of the project. The scour field observations were performed on March 27, 2008 and the scour report is included in the Appendix of this report.

## SECTION 2000

## FOUNDATION RECOMMENDATIONS

### 2010 Foundation Support

We understand that the culvert extensions will be approximately 18 foot by 16 foot cast-in-place bottomless structures. Based upon our subsurface exploration, the average elevation of the top of crystalline rock is at about an elevation of 613 feet on the downstream end, and at about elevation 613.5 feet on the upstream end of the proposed culvert alignment. Foundations for the culvert should bear on crystalline or weathered rock where present. The culvert shall be designed for an allowable bearing pressure of 4 tons per square (tsf), which should be verified in the field.

Total and differential settlements along the proposed culvert alignment are anticipated to be less than ¼ inch if constructed on weathered rock or crystalline rock.

Along the proposed pedestrian tunnel alignment, the elevations of the top of crystalline rock ranged from an elevation of about 616.4 feet to lower than 613.1 feet. Based on the provided plans, head wall and wing wall foundations for the pedestrian tunnel will bear at elevations ranging between 627.62 and 621.12 feet-MSL. In order to limit differential settlements, we recommend that foundation soils be undercut to a depth of 2 feet or an elevation of 623.5 feet-MSL, whichever is deeper. Isolated, deeper undercutting may be required to remove excessively soft foundation soils. Undercut material shall be replaced with material that meets the requirements of Select material Class III in accordance with Section 1016 of the Standard Specifications. The material shall be compacted to a minimum of 95% of the maximum dry density as determined by AASHTO T-99. Once the site improvements have been completed, the foundation soils for the head walls and wing walls shall be suitable for walls designed using a bearing pressure of 2 tsf.

Total settlements for the head walls and wing walls are anticipated to be less than 1 inch if the undercut recommendations are implemented. Differential settlements between adjacent head walls and wing walls should be less than ½ inch.

Depending upon the creek level, dewatering of up to 5 feet may be required for construction of the shallow foundation system. Foundation construction should be performed on one side of the creek at a given time. The existing creek should be temporarily dammed and water pumped away from the construction area. Cased sumps with submersible pumps may be required within the excavation. As the excavation to adequate and level bearing materials for the foundation proceeds, pumping from the cased sumps should be maintained to de-water the excavation.

The proposed roadway construction will require up to approximately 20 feet of fill placement in the subject culvert and pedestrian tunnel areas. Settlement resulting from the loading associated with fill placement is anticipated within newly placed embankment soils and underlying bearing soils where embankment construction will occur. It is anticipated that the majority of settlement of these materials will occur during placement of the new embankment fill. To reduce maintenance and repair of the approach fill, placement of roadway embankment shall be performed soon after construction has started to allow at least a 1-month waiting period for settlement of the embankment to occur prior to placement of the surface course. This will help to prevent delays in the completion of the project.

## SECTION 3000

## QUALIFICATIONS OF REPORT

This report has been prepared in accordance with generally accepted geotechnical engineering practice for specific application to this project. The conclusions contained in this report were based on the applicable standards of our profession at the time this report was prepared. No other warranty, expressed or implied, is made.

The conclusions submitted in this report are based, in part, upon the data obtained from the subsurface exploration. The nature and extent of subsurface variations between the borings may not become evident until construction. If variations appear evident, then the conclusions contained in this report may need to be re-evaluated. In the event that any changes in the nature, design, or location of the structure are planned, the conclusions contained in this report will not be considered valid unless the changes are reviewed by S&ME, and the conclusions of the report are modified or verified in writing.

## FOUNDATION RECOMMENDATION NOTES AND COMMENTS

**TIP No.** U-5025

**Description**: S. Trade Street Culvert over Four Mile Creek

**County:** Mecklenburg

**Station**: 102 + 90 -L- Reinforced Concrete Bottomless Culvert @ 90° Skew

**Design:** LAC/DDB

**Date:** 4/19/2010

| LOCATION NO. | STATION | FOUNDATION TYPE | ALLOWABLE LOAD | MISCELLANEOUS DETAILS |
|---|---|---|---|---|
| 1<br>West Side of Culvert | 102 + 90<br>-L- | Concrete Wall Footing | 4.0 tons/square ft. | Min. Culvert Bottom Elev.: 613 |
| 2<br>East Side of Culvert | 102 + 90<br>-L- | Concrete Wall Footing | 4.0 tons/square ft. | Min. Culvert Bottom Elev.: 613.5 |

**NOTES**:

1. The required bearing capacity of the culvert foundation along the length of the culvert is 4.0 tsf. Check field conditions for the required bearing capacity just prior to placing concrete.

2. Backfill with material that meets the requirements of Select Material Class VI in accordance with Section 1016 of the Standard Specifications.

3. The scour critical elevation for the culvert is the bottom of footing. The scour critical elevations are used to monitor possible scour problems during the life of the structure.

4. To provide protection from possible scour, do not construct culvert foundation along the length of the culvert at an elevation higher than shown on the plans.

## FOUNDATION RECOMMENDATION NOTES AND COMMENTS

**TIP No.** U-5025

**Description**: S. Trade Street Culvert over Four Mile Creek

**County:** Mecklenburg

**Station**: 102 + 52 -L- Pedestrian Tunnel @ 90° Skew

**Design:** LAC/DDB

**Date:** 4/19/2010

| LOCATION NO. | STATION | FOUNDATION TYPE | ALLOWABLE LOAD |
|---|---|---|---|
| 1<br>West Side of Tunnel | 102 + 52<br>-L- | Concrete Head Wall and Wing Wall Footing | 2.0 tons/square ft. |
| 2<br>East Side of Tunnel | 102 + 52<br>-L- | Concrete Head Wall and Wing Wall Footing | 2.0 tons/square ft. |

**NOTES**:

1. The required bearing capacity of the foundations bearing in soil is 2.0 tsf. Check field conditions for the required bearing capacity just prior to placing concrete.

2. Backfill with material that meets the requirements of Select Material Class III in accordance with Section 1016 of the Standard Specifications.

3. No work shall be done on the head walls and wing walls bearing on soil until the area of the head wall and wing wall foundations have been undercut to suitable bearing material and unsuitable/alluvial material replaced with suitable material properly compacted to the elevation of the bottom of the proposed head wall and wing wall foundations. The limits of this undercut excavation shall be to a depth of 2 feet or and elevation of 623.5 feet, whichever is deeper.

4. Scour protection consisting of rip rap in front of tunnel wing walls is required.

**General Comments**

1. Temporary shoring may be required for the culvert and wall construction.

2. Temporary cofferdams may be required for construction of culvert foundations.

3. No waiting period is required for the culvert or wall construction.

4. A 1-month waiting period after roadway embankment placement is required before the placement of the surface course.

# APPENDIX

| STATE | STATE PROJECT REFERENCE NO. | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|
| NC | U-5025 | 1A | 51 |
| WBS NO. | F.A. PROJ. NO. | DESCRIPTION | |
| | | P.E. | |
| | | CONST. | |

# *STATE OF NORTH CAROLINA*

*DEPARTMENT OF TRANSPORTATION*

*DIVISION OF HIGHWAYS*

*GEOTECHNICAL ENGINEERING UNIT*

# *STRUCTURE SUBSURFACE INVESTIGATION*

WBS No. _____ I.D. NO. U-5025

F.A. PROJECT _____

COUNTY MECKLENBURG

PROJECT DESCRIPTION S. TRADE STREET ROADWAY WIDENING – MATTHEWS, NC

SITE DESCRIPTION SITE 1: PROPOSED ARCHED BOTTOMLESS CULVERT EXTENSIONS OVER FOUR MILE CREEK AND PEDESTRIAN TUNNEL

## *CAUTION NOTICE*

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WAS MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL UNIT @ (919) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA IS PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THIS PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

NOTE – THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IT IS CONSIDERED TO BE PART OF THE PLANS, SPECIFICATIONS, OR CONTRACT FOR THE PROJECT.

NOTE – BY HAVING REQUESTED THIS INFORMATION THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

INVESTIGATED BY S&ME, INC. PERSONNEL D. BENTS

CHECKED BY DUANE D. BENTS Z. SCARBORO

SUBMITTED BY S&ME, INC. M. LONGSHORE

DATE 3/31/2010 L. CAMPOS

T. MILLER

C. ODOM

J. LITTLE

C. DEESE

NORTH CAROLINA PROFESSIONAL SEAL 031525 4-20-10 ENGINEER DUANE D. BENTS SEAL

SIGNATURE

| STATE | STATE PROJECT REFERENCE NO. | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|
| NC | U-5025 | 1B | 51 |
| WBS NO. | F.A. PROJ. NO. | DESCRIPTION | |
| | | P.E. | |
| | | CONST. | |

# *STATE OF NORTH CAROLINA*

*DEPARTMENT OF TRANSPORTATION*

*DIVISION OF HIGHWAYS*

*GEOTECHNICAL ENGINEERING UNIT*

# *STRUCTURE SUBSURFACE INVESTIGATION*

WBS No. _____ I.D. NO. U-5025

F.A. PROJECT _____

COUNTY MECKLENBURG

PROJECT DESCRIPTION S. TRADE STREET ROADWAY WIDENING – MATTHEWS, NC

SITE DESCRIPTION SITE 1: PROPOSED ARCHED BOTTOMLESS CULVERT EXTENSIONS OVER FOUR MILE CREEK AND PEDESTRIAN TUNNEL

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# NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
# DIVISION OF HIGHWAYS
# GEOTECHNICAL UNIT
# SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

## SOIL DESCRIPTION

SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED OR WEATHERED EARTH MATERIALS WHICH CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND WHICH YIELDS LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM AND BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:

VERY STIFF, GRAY SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

## SOIL LEGEND AND AASHTO CLASSIFICATION

| GENERAL CLASS. | GRANULAR MATERIALS (≤35% PASSING #200) | | | | | | | SILT-CLAY MATERIALS (>35% PASSING #200) | | | | ORGANIC MATERIALS | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GROUP CLASS. | A-1 | | A-3 | A-2 | | | | A-4 | A-5 | A-6 | A-7 | A-1, A-2, A-3 | A-4, A-5, A-6, A-7 | |
| | A-1-a | A-1-b | | A-2-4 | A-2-5 | A-2-6 | A-2-7 | | | | A-7-5, A-7-6 | | | |
| SYMBOL | | | | | | | | | | | | | | |
| % PASSING # 10 | 50 MX | | | | | | | | | | | GRANULAR SOILS | SILT-CLAY SOILS | MUCK, PEAT |
| # 40 | 30 MX | 50 MX | 51 MN | | | | | | | | | | | |
| # 200 | 15 MX | 25 MX | 10 MX | 35 MX | 35 MX | 35 MX | 35 MX | 36 MN | 36 MN | 36 MN | 36 MN | | | |
| LIQUID LIMIT / PLASTIC INDEX | 6 MX | | N.P. | 40 MX / 10 MX | 41 MN / 10 MX | 40 MX / 11 MN | 41 MN / 11 MN | 40 MX / 10 MX | 41 MN / 10 MX | 40 MX / 11 MN | 41 MN / 11 MN | SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER | | HIGHLY ORGANIC SOILS |
| GROUP INDEX | 0 | | 0 | 0 | | 4 MX | | 8 MX | 12 MX | 16 MX | No MX | | | |
| USUAL TYPES OF MAJOR MATERIALS | STONE FRAGS. GRAVEL AND SAND | | FINE SAND | SILTY OR CLAYEY GRAVEL AND SAND | | | | SILTY SOILS | | CLAYEY SOILS | | | | |
| GEN. RATING AS A SUBGRADE | EXCELLENT TO GOOD | | | | | | | FAIR TO POOR | | | | FAIR TO POOR | POOR | UNSUITABLE |

P.I. OF A-7-5 ≤ L.L. − 30 : P.I. OF A-7-6 ≥ L.L. − 30

## CONSISTENCY OR DENSENESS

| PRIMARY SOIL TYPE | COMPACTNESS OR CONSISTENCY | RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE) | RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT²) |
|---|---|---|---|
| GENERALLY GRANULAR MATERIAL (NON-COHESIVE) | VERY LOOSE | <4 | N/A |
| | LOOSE | 4 TO 10 | |
| | MEDIUM DENSE | 10 TO 30 | |
| | DENSE | 30 TO 50 | |
| | VERY DENSE | >50 | |
| GENERALLY SILT-CLAY MATERIAL (COHESIVE) | VERY SOFT | <2 | <0.25 |
| | SOFT | 2 TO 4 | 0.25 TO 0.5 |
| | MEDIUM STIFF | 4 TO 8 | 0.5 TO 1 |
| | STIFF | 8 TO 15 | 1 TO 2 |
| | VERY STIFF | 15 TO 30 | 2 TO 4 |
| | HARD | >30 | >4 |

## TEXTURE OR GRAIN SIZE

| U.S. STD. SIEVE SIZE | 4 | 10 | 40 | 60 | 200 | 270 |
|---|---|---|---|---|---|---|
| OPENING (MM) | 4.76 | 2.0 | 0.42 | 0.25 | 0.075 | 0.053 |

| BOULDER (BLDR.) | COBBLE (COB.) | GRAVEL (GR.) | COARSE SAND (CSE. SD.) | FINE SAND (F. SD.) | SILT (SL.) | CLAY (CL.) |
|---|---|---|---|---|---|---|

| GRAIN SIZE | MM | 305 | 75 | 2.0 | 0.25 | 0.05 | 0.005 |
|---|---|---|---|---|---|---|---|
| | IN. | 12" | 3" | | | | |

## SOIL MOISTURE - CORRELATION OF TERMS

| SOIL MOISTURE SCALE (ATTERBERG LIMITS) | FIELD MOISTURE DESCRIPTION | GUIDE FOR FIELD MOISTURE DESCRIPTION |
|---|---|---|
| | - SATURATED - (SAT.) | USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE |
| LL - LIQUID LIMIT | | |
| PLASTIC RANGE (PI) | - WET - (W) | SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE |
| PL - PLASTIC LIMIT | | |
| OM - OPTIMUM MOISTURE | - MOIST - (M) | SOLID; AT OR NEAR OPTIMUM MOISTURE |
| SL - SHRINKAGE LIMIT | | |
| | - DRY - (D) | REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE |

## PLASTICITY

| | PLASTICITY INDEX (PI) | DRY STRENGTH |
|---|---|---|
| NONPLASTIC | 0-5 | VERY LOW |
| LOW PLASTICITY | 6-15 | SLIGHT |
| MED. PLASTICITY | 16-25 | MEDIUM |
| HIGH PLASTICITY | 26 OR MORE | HIGH |

## COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YEL-BRN, BLUE-GRAY) MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

## GRADATION

WELL GRADED- INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE
UNIFORM- INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED)
GAP-GRADED- INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.

## ANGULARITY OF GRAINS

THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS ARE DESIGNATED BY THE TERMS; ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.

## MINERALOGICAL COMPOSITION

MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.

## COMPRESSIBILITY

| | |
|---|---|
| SLIGHTLY COMPRESSIBLE | LIQUID LIMIT LESS THAN 30 |
| MODERATELY COMPRESSIBLE | LIQUID LIMIT 31-50 |
| HIGHLY COMPRESSIBLE | LIQUID LIMIT GREATER THAN 50 |

## PERCENTAGE OF MATERIAL

| ORGANIC MATERIAL | GRANULAR SOILS | SILT-CLAY SOILS |
|---|---|---|
| TRACE OF ORGANIC MATTER | 2 - 3% | 3 - 5% |
| LITTLE ORGANIC MATTER | 3 - 5% | 5 - 12% |
| MODERATELY ORGANIC | 5 - 10% | 12 - 20% |
| HIGHLY ORGANIC | >10% | >20% |

| OTHER MATERIAL | |
|---|---|
| TRACE | 1 - 10% |
| LITTLE | 10 - 20% |
| SOME | 20 - 35% |
| HIGHLY | 35% AND ABOVE |

## GROUND WATER

- WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING.
- STATIC WATER LEVEL AFTER 24 HOURS.
- PW - PERCHED WATER, SATURATED ZONE OR WATER BEARING STRATA
- HC - HOLE CAVE
- SPRING OR SEEPAGE

## MISCELLANEOUS SYMBOLS

- ROADWAY EMBANKMENT WITH SOIL DESCRIPTION
- SOIL SYMBOL
- ARTIFICIAL FILL OTHER THAN ROADWAY EMBANKMENTS
- INFERRED SOIL BOUNDARIES
- INFERRED ROCK LINE
- ALLUVIAL SOIL BOUNDARY
- 25/025 - DIP/DIP DIRECTION OF ROCK STRUCTURES
- SOUNDING ROD
- SPT CPT DPT DMT VST PMT - TEST BORING
- AUGER BORING
- CORE BORING
- MW - MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- SPT N-VALUE

SAMPLE DESIGNATIONS

- S - BULK SAMPLE
- SS - SPLIT SPOON SAMPLE
- ST - SHELBY TUBE SAMPLE
- RS - ROCK SAMPLE
- RT - RECOMPACTED TRIAXIAL SAMPLE
- CBR - CBR SAMPLE

## ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F. - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED
FRAGS. - FRAGMENTS
MED. - MEDIUM
PMT - PRESSUREMETER TEST
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
$\gamma$ - UNIT WEIGHT
$\gamma_d$ - DRY UNIT WEIGHT
W - MOISTURE CONTENT
V. - VERY
VST - VANE SHEAR TEST

## EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- ☐ MOBILE B- ___
- ☐ DIEDRICH D-50
- ☒ CME-550x
- ☐ CME-750
- ☐ PORTABLE HOIST
- ☒ OTHER CME-45
- ☒ OTHER BK-51

ADVANCING TOOLS:
- ☐ 6" CONTINUOUS FLIGHT AUGER
- ☐ 8" HOLLOW AUGERS
- ☐ HARD FACED FINGER BITS
- ☐ TUNG.-CARBIDE INSERTS
- ☐ CASING ☐ W/ ADVANCER
- ☐ TRICONE _____" STEEL TEETH
- ☐ TRICONE _____" TUNG.-CARB.
- ☒ CORE BIT
- ☒ OTHER 2-1/4" H.S.A.
- ☒ OTHER 3-1/4" H.S.A.

HAMMER TYPE:
☒ AUTOMATIC ☒ MANUAL

CORE SIZE:
- ☐ -B_____
- ☒ -N 2"
- ☐ -H_____

HAND TOOLS:
- ☐ POST HOLE DIGGER
- ☒ HAND AUGER
- ☒ SOUNDING ROD
- ☐ VANE SHEAR TEST
- ☐ OTHER _____

REVISED 10/08/2009

# NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
# DIVISION OF HIGHWAYS
# GEOTECHNICAL UNIT
# SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

## ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WHEN TESTED, WOULD YIELD SPT REFUSAL. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.
ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLOWS:

| | | |
|---|---|---|
| WEATHERED ROCK (WR) |  | NON-COASTAL PLAIN MATERIAL THAT YIELDS SPT N VALUES > 100 BLOWS PER FOOT. |
| CRYSTALLINE ROCK (CR) |  | FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC. |
| NON-CRYSTALLINE ROCK (NCR) |  | FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC. |
| COASTAL PLAIN SEDIMENTARY ROCK (CP) |  | COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC. |

## WEATHERING

| | |
|---|---|
| FRESH | ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE. |
| VERY SLIGHT (V. SLI.) | ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE. |
| SLIGHT (SLI.) | ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS. |
| MODERATE (MOD.) | SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK. |
| MODERATELY SEVERE (MOD. SEV.) | ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. *IF TESTED, WOULD YIELD SPT REFUSAL* |
| SEVERE (SEV.) | ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. *IF TESTED, YIELDS SPT N VALUES > 100 BPF* |
| VERY SEVERE (V. SEV.) | ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, YIELDS SPT N VALUES < 100 BPF* |
| COMPLETE | ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE. |

## ROCK HARDNESS

| | |
|---|---|
| VERY HARD | CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGISTS PICK. |
| HARD | CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN. |
| MODERATELY HARD | CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGISTS PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS. |
| MEDIUM HARD | CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGISTS PICK. |
| SOFT | CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE. |
| VERY SOFT | CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL. |

## FRACTURE SPACING

| TERM | SPACING |
|---|---|
| VERY WIDE | MORE THAN 10 FEET |
| WIDE | 3 TO 10 FEET |
| MODERATELY CLOSE | 1 TO 3 FEET |
| CLOSE | 0.16 TO 1 FEET |
| VERY CLOSE | LESS THAN 0.16 FEET |

## BEDDING

| TERM | THICKNESS |
|---|---|
| VERY THICKLY BEDDED | > 4 FEET |
| THICKLY BEDDED | 1.5 – 4 FEET |
| THINLY BEDDED | 0.16 – 1.5 FEET |
| VERY THINLY BEDDED | 0.03 – 0.16 FEET |
| THICKLY LAMINATED | 0.008 – 0.03 FEET |
| THINLY LAMINATED | < 0.008 FEET |

## INDURATION

FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.

| | |
|---|---|
| FRIABLE | RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. |
| MODERATELY INDURATED | GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. |
| INDURATED | GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. |
| EXTREMELY INDURATED | SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS. |

## TERMS AND DEFINITIONS

ALLUVIUM (ALLUV.) – SOILS WHICH HAVE BEEN TRANSPORTED BY WATER.

AQUIFER – A WATER BEARING FORMATION OR STRATA.

ARENACEOUS – APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.

ARGILLACEOUS – APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC.

ARTESIAN – GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IS IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.

CALCAREOUS (CALC.) – SOILS WHICH CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.

COLLUVIUM – ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.

CORE RECOVERY (REC.) – TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

DIKE – A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.

DIP – THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.

DIP DIRECTION (DIP AZIMUTH) – THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.

FAULT – A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.

FISSILE – A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.

FLOAT – ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.

FLOOD PLAIN (F.P.) – LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.

FORMATION (FM.) – A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.

JOINT – FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.

LEDGE – A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.

LENS – A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.

MOTTLED (MOT.) – IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.

PERCHED WATER – WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.

RESIDUAL SOIL – SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.

ROCK QUALITY DESIGNATION (R.Q.D.) – A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

SAPROLITE (SAP.) – RESIDUAL SOIL WHICH RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.

SILL – AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, WHICH HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS

SLICKENSIDE – POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.

STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) – NUMBER OF BLOWS (N OR B.P.F.) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS LESS THAN 0.1 FOOT PENETRATION WITH 60 BLOWS.

STRATA CORE RECOVERY (SREC.) – TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.

STRATA ROCK QUALITY DESIGNATION (S.R.Q.D.) – A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

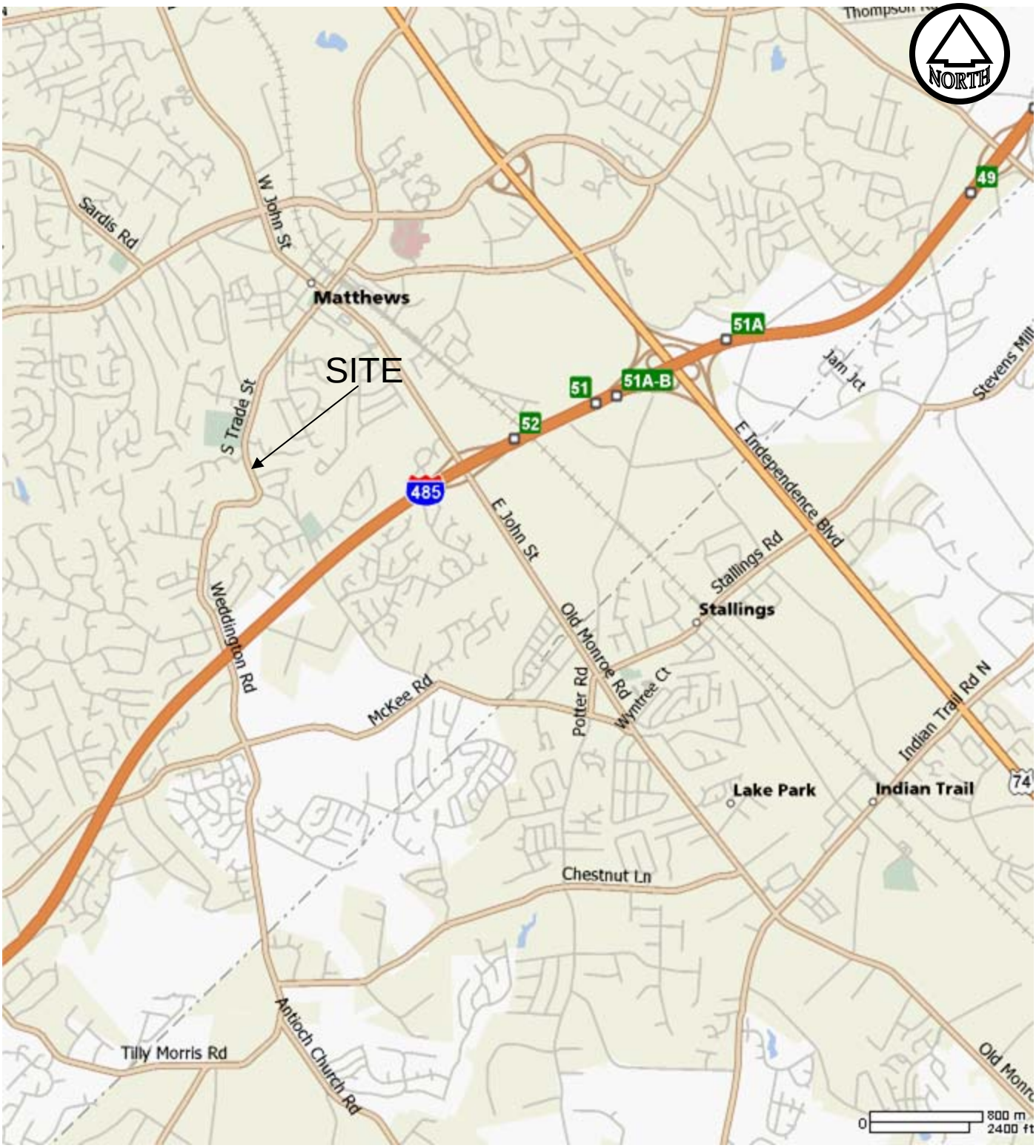
TOPSOIL (T.S.) – SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: PK NAIL 242

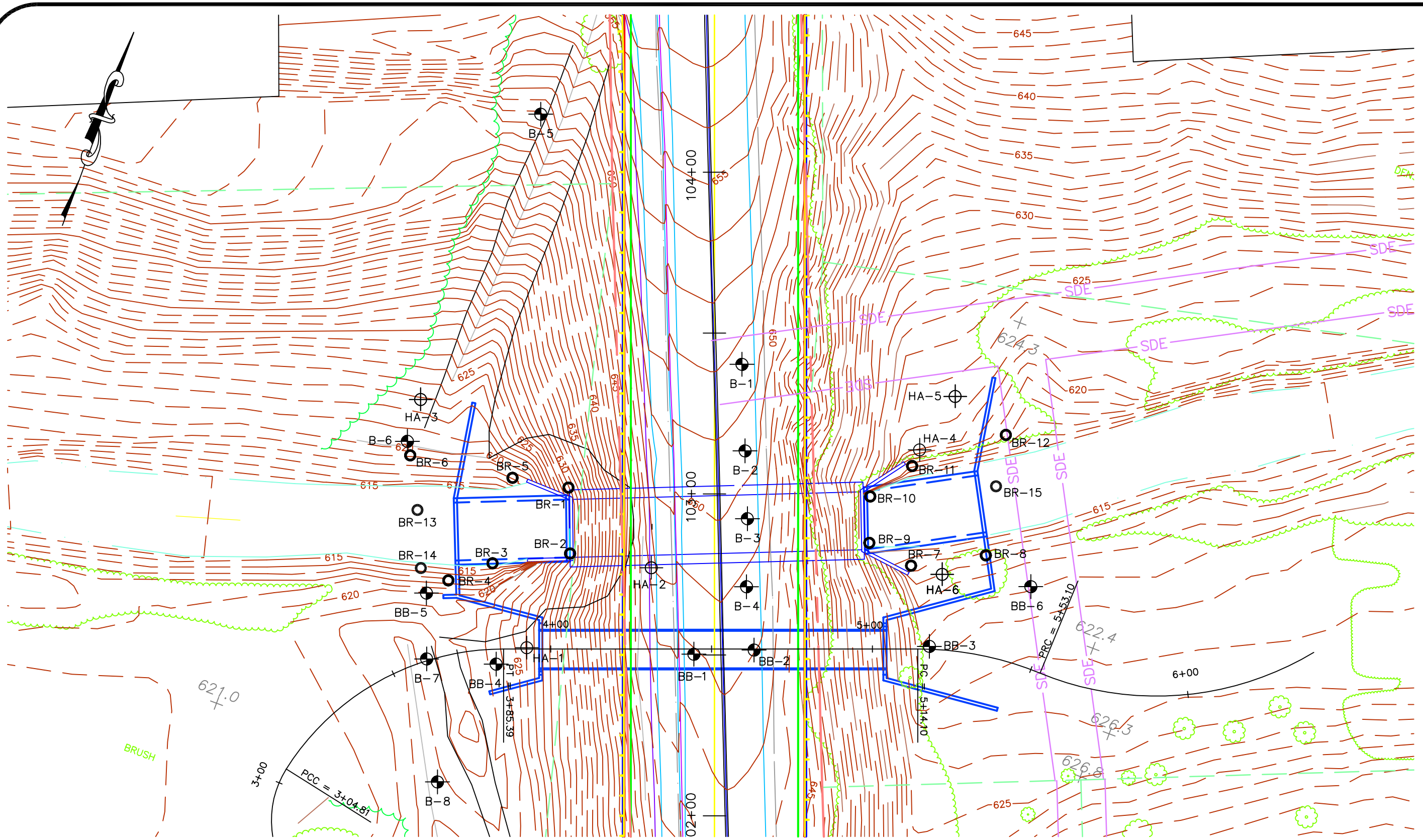
ELEVATION: 648.77'

NOTES:

REVISED 10/08/2009




| | | | |
|---|---|---|---|
| SCALE: AS SHOWN | S&ME ENGINEERING • TESTING ENVIRONMENTAL SERVICES | **SITE VICINITY MAP**<br>**FOUR MILE CREEK CULVERT**<br>S TRADE STREET<br>MATTHEWS, NORTH CAROLINA | SHEET NO. 3 |
| DRAWN BY: MBL | | | |
| CHECKED BY: DDB | | | |
| DATE: 4/19/2010 | | JOB NO.: 1351-08-001B | |




GRAPHIC SCALE

30 0 15 30 60

( IN FEET )
1 inch = 30 ft.

## LEGEND

- APPROXIMATE BORING LOCATION
- APPROXIMATE HAND AUGER LOCATION
- APPROXIMATE BRIDGE ROD LOCATION

| | |
|---|---|
| SCALE: | 1" = 30' |
| DATE: | 4/19/2010 |
| PROJECT NO. | 1351-08-001B |
| DRAWN BY: | LAC |
| ENGINEERING LICENSE NO: | F-0176 |
| CHECKED BY: | DDB |

S&ME
9751 SOUTHERN PINE BLVD.
CHARLOTTE, N.C. 28273
(704)523-4726
WWW.SMEINC.COM

# FIELD EXPLORATION PLAN
# FOUR MILE CREEK CULVERT
S. TRADE STREET
MATTHEWS, NORTH CAROLINA

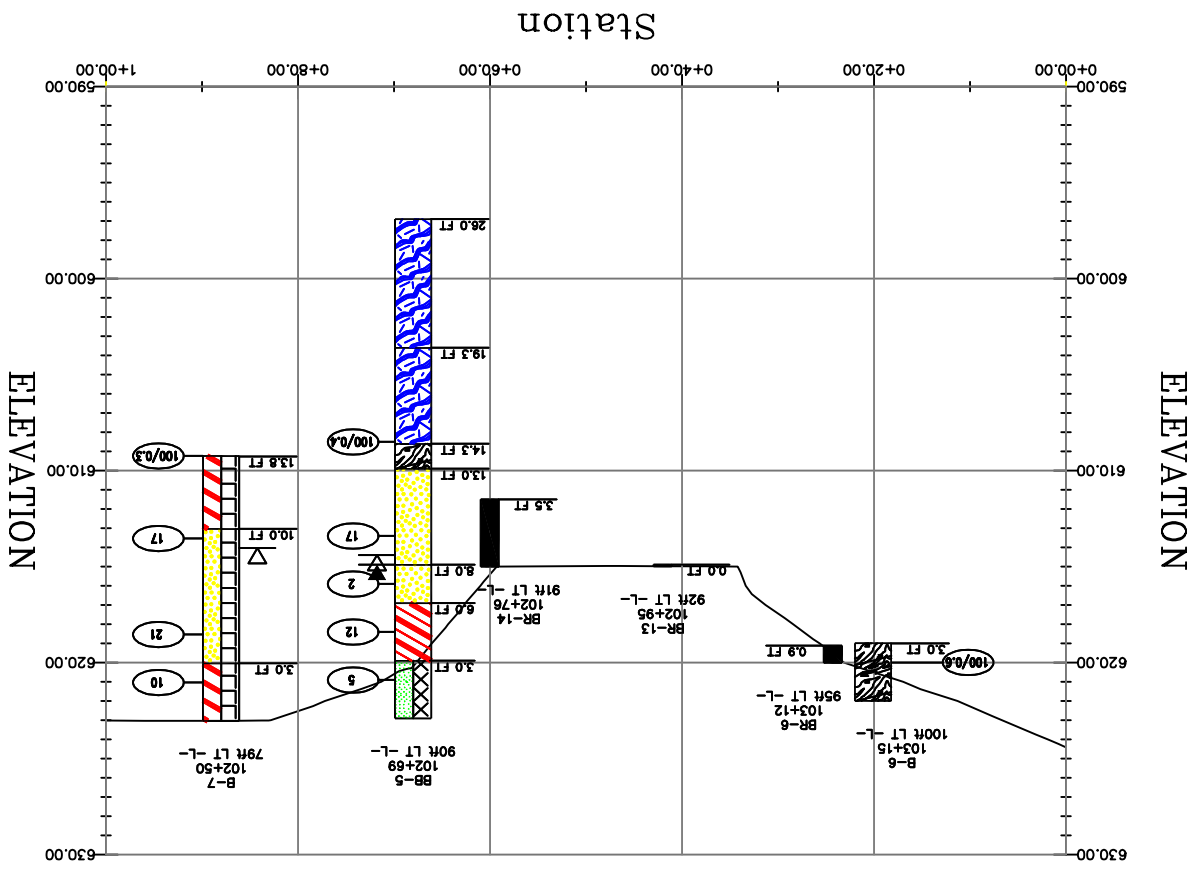
SHEET NO.
4

# GENERALIZED SUBSURFACE PROFILE

95 FEET LT –L–

S TRADE STREET ROADWAY WIDENING
MATTHEWS, NORTH CAROLINA

SHEET NO.
C7




VERTICAL SCALE
( IN FEET )
1 inch = 10 ft.
0 5 10 20

HORIZONTAL SCALE
( IN FEET )
1 inch = 20 ft.
0 10 20 40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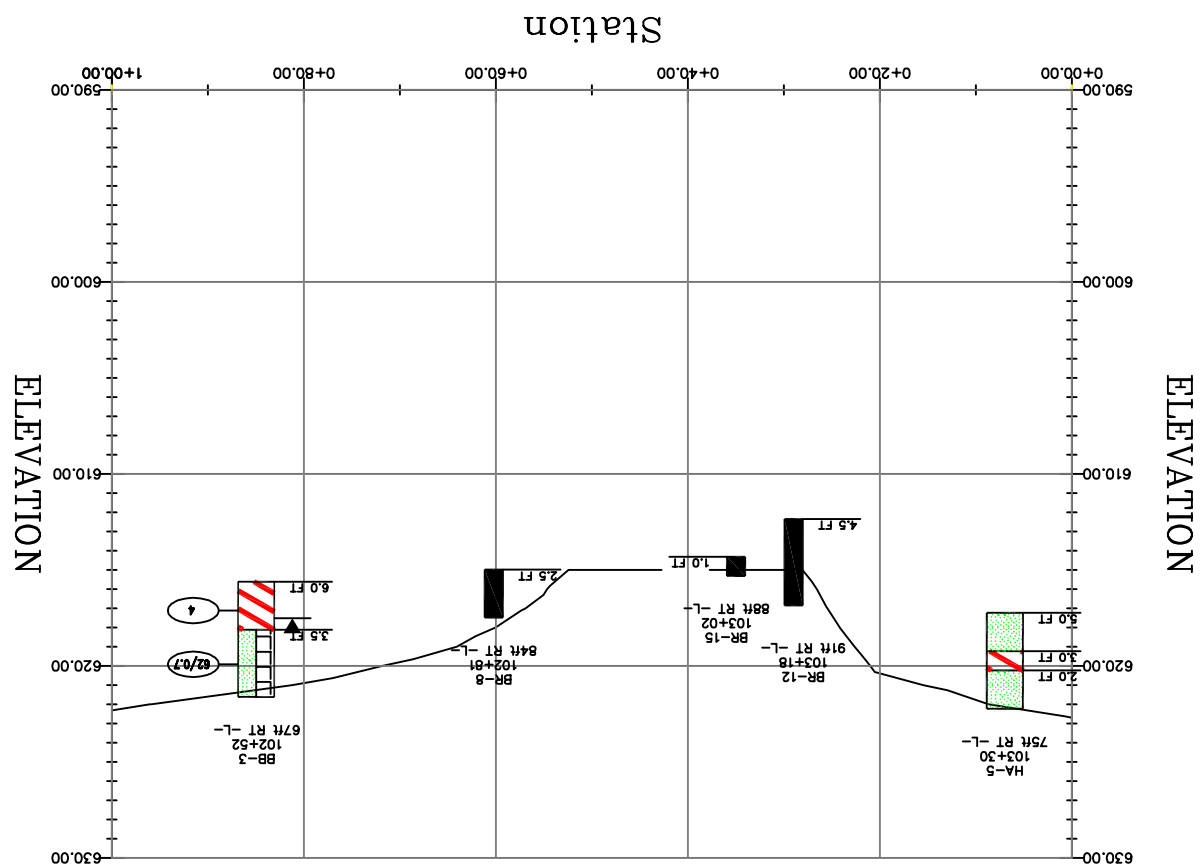
| | |
|---|---|
| SCALE: AS SHOWN | DATE: 4/19/2010 |
| PROJECT NO. 1351-08-001B | DRAWN BY: CD |
| ENGINEERING LICENSE NO: F-0176 | CHECKED BY: LAC |

# GENERALIZED SUBSURFACE PROFILE

80 FEET RT –L–

S TRADE STREET ROADWAY WIDENING
MATTHEWS, NORTH CAROLINA

SHEET NO.
6




VERTICAL SCALE
( IN FEET )
1 inch = 10 ft.
0 5 10 20

HORIZONTAL SCALE
( IN FEET )
1 inch = 20 ft.
0 10 20 40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| | |
|---|---|
| SCALE: AS SHOWN | DATE: 4/19/2010 |
| PROJECT NO. 1351-08-001B | DRAWN BY: CD |
| ENGINEERING LICENSE NO: F-0176 | CHECKED BY: LAC |

# GENERALIZED SUBSURFACE PROFILE
## ALONG CULVERT EXTENSION

S TRADE STREET ROADWAY WIDENING
MATTHEWS, NORTH CAROLINA

SHEET NO. 7


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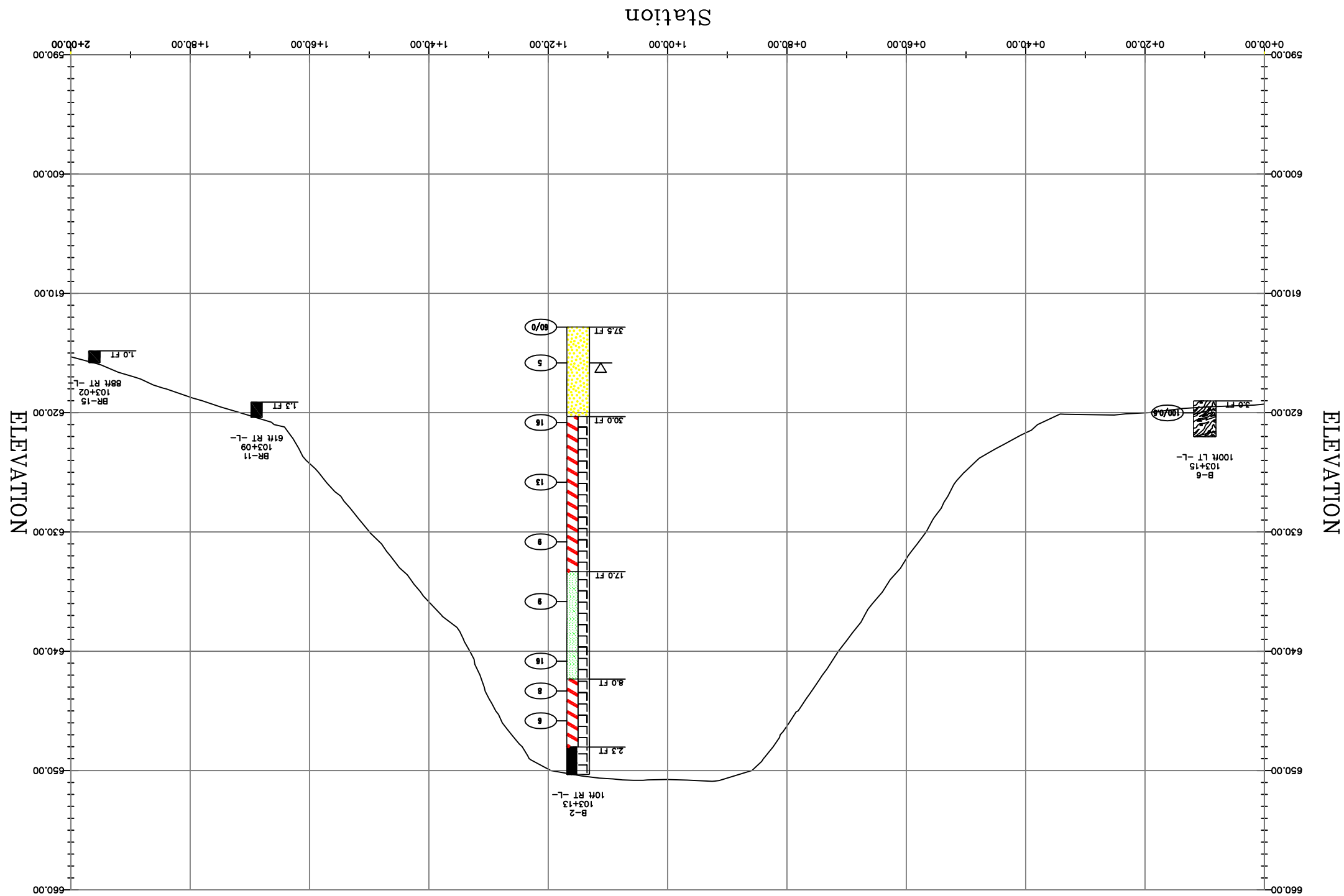
| | |
|---|---|
| SCALE: | AS SHOWN |
| PROJECT NO. | 1351-08-001B |
| ENGINEERING LICENSE NO: | F-0176 |
| DATE: | 4/19/2010 |
| DRAWN BY: | CD |
| CHECKED BY: | LAC |

VERTICAL SCALE
( IN FEET )
1 inch = 10 ft.
0 5 10 20

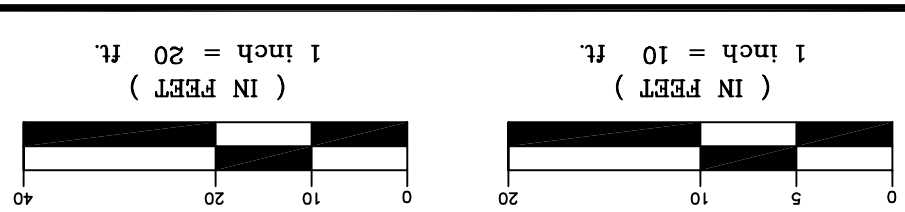
HORIZONTAL SCALE
( IN FEET )
1 inch = 20 ft.
0 10 20 40

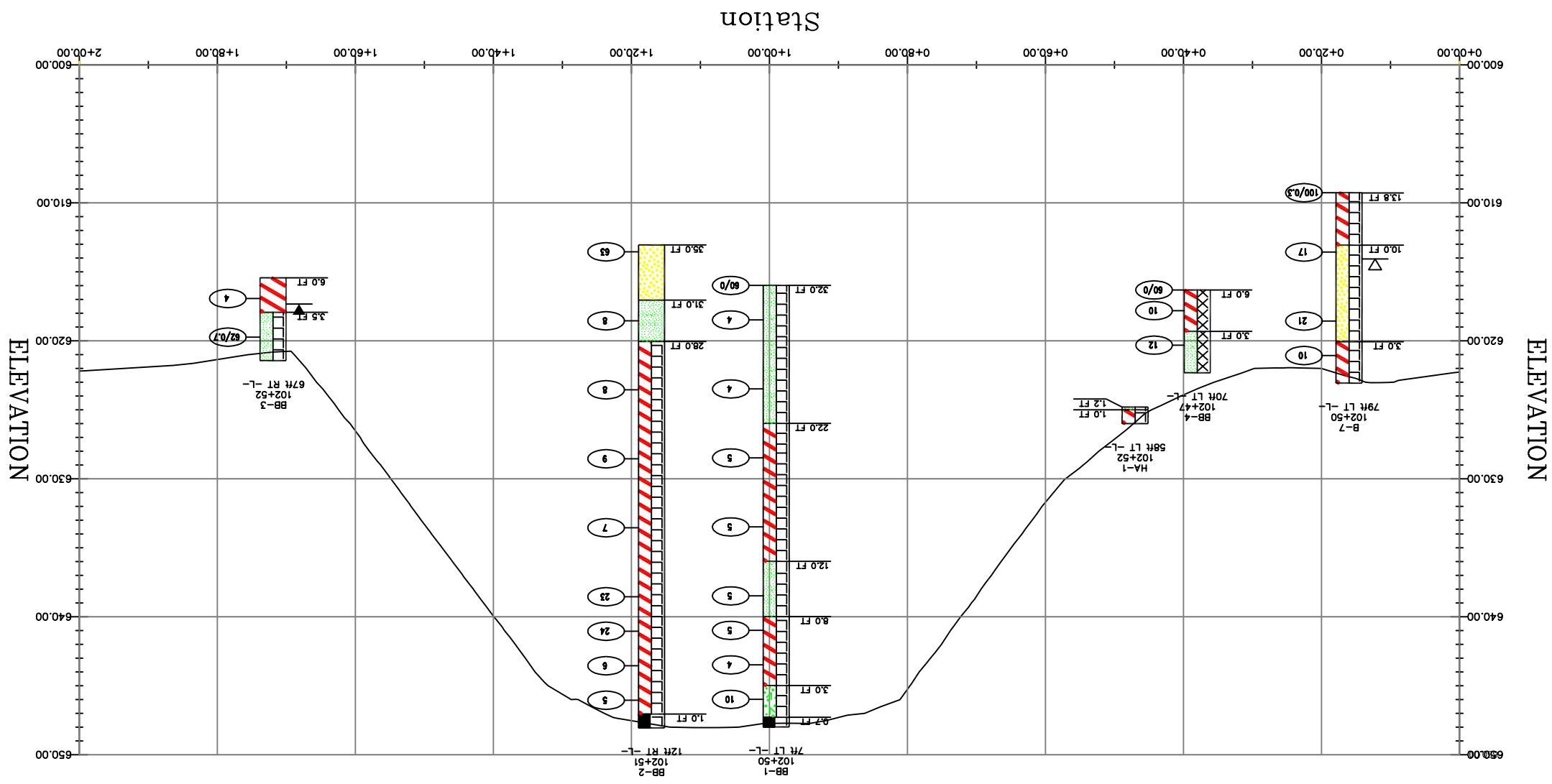


# GENERALIZED SUBSURFACE PROFILE ALONG PEDESTRIAN TUNNEL

S TRADE STREET ROADWAY WIDENING
MATTHEWS, NORTH CAROLINA

SHEET NO.
00





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| | |
|---|---|
| SCALE: AS SHOWN | DATE: 4/19/2010 |
| PROJECT NO. 1351-08-001B | DRAWN BY: CD |
| ENGINEERING LICENSE NO: F-0176 | CHECKED BY: LAC |

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | |
|---|---|---|---|
| **PROJECT NO.** 1351-08-001B | **ID.** U-5025 | **COUNTY** Mecklenburg | **GEOLOGIST** M. Longshore |
| **SITE DESCRIPTION** Four-Mile Creek Design Phase - S. Trade Street Culvert Extension | | | **GROUND WTR (ft)** |
| **BORING NO.** B-1 | **STATION** 103+40 | **OFFSET** 9ft RT | **ALIGNMENT** -L- | **0 HR.** Dry |
| **COLLAR ELEV.** 650.9 ft | **TOTAL DEPTH** 20.0 ft | **NORTHING** 496,694 | **EASTING** 1,482,661 | **24 HR.** N/A |
| **DRILL MACHINE** CME-45B | **DRILL METHOD** SPT Boring | | **HAMMER TYPE** Automatic |
| **START DATE** 01/20/08 | **COMP. DATE** 01/20/08 | **SURFACE WATER DEPTH** N/A | **DEPTH TO ROCK** N/A |

| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT 0.5ft | 0.5ft | 0.5ft | BLOWS PER FOOT 0 25 50 75 100 | SAMP. NO. | MOI | LOG | SOIL AND ROCK DESCRIPTION ELEV. (ft) | DEPTH (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 655 | | | | | | | | | | | |
| 650 | | | | | | | | | | 650.9 ROADWAY SURFACE | 0.0 |
| | | | | | | | | | | ASPHALT (2.3 FEET) | |
| | | | | | | | | | | 648.6 | 2.3 |
| | 647.4 | 3.5 | 3 | 2 | 3 | 5 | | | | **ROADWAY EMBANKMENT** MEDIUM STIFF RED BROWN CLAYEY SILT (A-7-5) | |
| 645 | 644.9 | 6.0 | 5 | 2 | 4 | 6 | | | | 645.9 | 5.0 |
| | 642.4 | 8.5 | 2 | 4 | 4 | 8 | | | | 642.9 | 8.0 |
| 640 | | | | | | | | | | **ROADWAY EMBANKMENT** MEDIUM STIFF BROWN FINE SANDY CLAYEY SILT (A-4) TRACE ROCK FRAGMENTS | |
| | 637.4 | 13.5 | 4 | 5 | 7 | 12 | | | | **ROADWAY EMBANKMENT** MEDIUM STIFF TO STIFF RED BROWN CLAYEY SILT (A-7-5) | |
| 635 | 632.4 | 18.5 | 2 | 4 | 5 | 9 | | | | 630.9 | 20.0 |
| 630 | | | | | | | | | | Boring Terminated at Elevation 630.9 ft IN ROADWAY EMBANKMENT FILL: STIFF RED BROWN CLAYEY SILT (A-7-5) | |
| 625 | | | | | | | | | | 1) ADVANCED 3-1/4" HOLLOW STEM AUGERS TO 18.5 FEET | |
| 620 | | | | | | | | | | | |
| 615 | | | | | | | | | | | |
| 610 | | | | | | | | | | | |
| 605 | | | | | | | | | | | |
| 600 | | | | | | | | | | | |
| 595 | | | | | | | | | | | |
| 590 | | | | | | | | | | | |
| 585 | | | | | | | | | | | |
| 580 | | | | | | | | | | | |
| 575 | | | | | | | | | | | |

NCDOT BORE SINGLE 08-001B 4-MILE CREEK MERGED NEW LIBRARY.GPJ NC_DOT.GDT 4/5/10

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | | |
|---|---|---|---|---|
| **PROJECT NO.** 1351-08-001B | **ID.** U-5025 | **COUNTY** Mecklenburg | **GEOLOGIST** M. Longshore | |
| **SITE DESCRIPTION** Four-Mile Creek Design Phase - S. Trade Street Culvert Extension | | | | **GROUND WTR (ft)** |
| **BORING NO.** B-2 | **STATION** 103+13 | **OFFSET** 10ft RT | **ALIGNMENT** -L- | **0 HR.** 34.5 |
| **COLLAR ELEV.** 650.7 ft | **TOTAL DEPTH** 37.5 ft | **NORTHING** 496,669 | **EASTING** 1,482,671 | **24 HR.** N/A |
| **DRILL MACHINE** CME-45B | **DRILL METHOD** SPT Boring | | **HAMMER TYPE** Automatic | |
| **START DATE** 01/22/08 | **COMP. DATE** 01/22/08 | **SURFACE WATER DEPTH** N/A | **DEPTH TO ROCK** 37.5 ft | |

| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT 0.5ft | 0.5ft | 0.5ft | BLOWS PER FOOT 0 25 50 75 100 | SAMP. NO. | MOI | LOG | SOIL AND ROCK DESCRIPTION ELEV. (ft) | DEPTH (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 655 | | | | | | | | | | | |
| 650 | | | | | | | | | | 650.7 ROADWAY SURFACE | 0.0 |
| | | | | | | | | | | ASPHALT (2.3 FEET) | |
| | | | | | | | | | | 648.4 | 2.3 |
| | 647.2 | 3.5 | 3 | 3 | 3 | 6 | | | | **ROADWAY EMBANKMENT** MEDIUM STIFF BROWN TO RED BROWN CLAYEY SILT (A-7-5) | |
| 645 | 644.7 | 6.0 | 4 | 4 | 4 | 8 | | | | 642.7 | 8.0 |
| | 642.2 | 8.5 | 6 | 8 | 8 | 16 | | | | **ROADWAY EMBANKMENT** STIFF TO VERY STIFF BROWN TO RED BROWN FINE SANDY SILT (A-4) TRACE ROCK FRAGMENTS FROM 13.5 TO 15 FEET | |
| 640 | | | | | | | | | | | |
| | 637.2 | 13.5 | 4 | 4 | 5 | 9 | | | | 633.7 | 17.0 |
| 635 | | | | | | | | | | **ROADWAY EMBANKMENT** STIFF TO VERY STIFF RED BROWN CLAYEY SILT (A-7-5) | |
| | 632.2 | 18.5 | 4 | 5 | 4 | 9 | | | | | |
| 630 | | | | | | | | | | | |
| | 627.2 | 23.5 | 5 | 6 | 7 | 13 | | | | | |
| 625 | | | | | | | | | | | |
| | 622.2 | 28.5 | 5 | 5 | 11 | 16 | | | | 620.7 | 30.0 |
| 620 | | | | | | | | | | **ALLUVIAL** LOOSE GRAY BROWN SILTY FINE TO MEDIUM SAND (A-2-4) TRACE ORGANICS | |
| | 617.2 | 33.5 | 2 | 3 | 2 | 5 | | ▽ | | | |
| 615 | | | | | | | | | | | |
| | 613.2 | 37.5 | 60/0 | | | 60/0 | | | | 613.2 | 37.5 |
| 610 | | | | | | | | | | Boring Terminated BY AUGER REFUSAL at Elevation 613.2 ft ON CRYSTALLINE ROCK: GRAY GRANODIORITE | |
| | | | | | | | | | | 1) ADVANCED 3-1/4" HOLLOW STEM AUGERS TO 37.5 FEET. | |
| 605 | | | | | | | | | | | |
| 600 | | | | | | | | | | | |
| 595 | | | | | | | | | | | |
| 590 | | | | | | | | | | | |
| 585 | | | | | | | | | | | |
| 580 | | | | | | | | | | | |
| 575 | | | | | | | | | | | |

NCDOT BORE SINGLE 08-001B 4-MILE CREEK MERGED NEW LIBRARY.GPJ NC_DOT.GDT 4/5/10

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | | |
|---|---|---|---|---|
| **PROJECT NO.** 1351-08-001B | **ID.** U-5025 | **COUNTY** Mecklenburg | **GEOLOGIST** M. Longshore | |
| **SITE DESCRIPTION** Four-Mile Creek Design Phase - S. Trade Street Culvert Extension | | | | **GROUND WTR (ft)** |
| **BORING NO.** B-3 | **STATION** 102+92 | **OFFSET** 10ft RT | **ALIGNMENT** -L- | **0 HR.** Dry |
| **COLLAR ELEV.** 649.8 ft | **TOTAL DEPTH** 13.2 ft | **NORTHING** 496,649 | **EASTING** 1,482,679 | **24 HR.** N/A |
| **DRILL MACHINE** CME-45B | **DRILL METHOD** SPT Boring | | **HAMMER TYPE** Automatic | |
| **START DATE** 01/21/08 | **COMP. DATE** 01/21/08 | **SURFACE WATER DEPTH** N/A | **DEPTH TO ROCK** N/A | |

| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT 0.5ft | 0.5ft | 0.5ft | BLOWS PER FOOT 0 25 50 75 100 | SAMP. NO. | MOI | LOG | SOIL AND ROCK DESCRIPTION ELEV. (ft) | DEPTH (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 650 | | | | | | | | | | 649.8 ROADWAY SURFACE | 0.0 |
| | | | | | | | | | | ASPHALT (4 FEET) | |
| | 645.8 | 4.0 | | | | | | | | 645.8 | 4.0 |
| 645 | | | 3 | 4 | 5 | 9 | | | | **ROADWAY EMBANKMENT** | |
| | 643.8 | 6.0 | | | | | | | | 643.8 STIFF | 6.0 |
| | | | 5 | 5 | 6 | 11 | | | | RED TAN | |
| | 641.3 | 8.5 | | | | | | | | CLAYEY FINE SANDY SILT | |
| 640 | | | 7 | 8 | 10 | 18 | | | | (A-4) | |
| | | | | | | | | | | TRACE ROOTS | |
| | | | | | | | | | | **ROADWAY EMBANKMENT** | |
| | | | | | | | | | | STIFF | |
| | | | | | | | | | | 636.6 TAN | 13.2 |
| 635 | | | | | | | | | | SILTY CLAY | |
| | | | | | | | | | | (A-7-6) | |
| | | | | | | | | | | **ROADWAY EMBANKMENT** | |
| 630 | | | | | | | | | | VERY STIFF | |
| | | | | | | | | | | RED BROWN | |
| | | | | | | | | | | FINE SANDY CLAYEY SILT | |
| | | | | | | | | | | (A-7-5) | |
| 625 | | | | | | | | | | Boring Terminated BY AUGER REFUSAL at Elevation 636.6 ft ON TOP OF CULVERT | |
| | | | | | | | | | | 1) ADVANCED 3-1/4" HOLLOW STEM AUGERS TO 13.2 FEET. | |
| 620 | | | | | | | | | | | |
| 615 | | | | | | | | | | | |
| 610 | | | | | | | | | | | |
| 605 | | | | | | | | | | | |
| 600 | | | | | | | | | | | |
| 595 | | | | | | | | | | | |
| 590 | | | | | | | | | | | |
| 585 | | | | | | | | | | | |
| 580 | | | | | | | | | | | |
| 575 | | | | | | | | | | | |
| 570 | | | | | | | | | | | |

NCDOT BORE SINGLE 08-001B 4-MILE CREEK MERGED NEW LIBRARY.GPJ NC_DOT.GDT 4/5/10

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | | |
|---|---|---|---|---|
| **PROJECT NO.** 1351-08-001B | **ID.** U-5025 | **COUNTY** Mecklenburg | **GEOLOGIST** M. Longshore | |
| **SITE DESCRIPTION** Four-Mile Creek Design Phase - S. Trade Street Culvert Extension | | | | **GROUND WTR (ft)** |
| **BORING NO.** B-4 | **STATION** 102+71 | **OFFSET** 10ft RT | **ALIGNMENT** -L- | **0 HR.** 37.0 |
| **COLLAR ELEV.** 648.8 ft | **TOTAL DEPTH** 37.5 ft | **NORTHING** 496,629 | **EASTING** 1,482,687 | **24 HR.** N/A |
| **DRILL MACHINE** CME-45B | **DRILL METHOD** SPT Boring | | **HAMMER TYPE** Automatic | |
| **START DATE** 01/21/08 | **COMP. DATE** 01/21/08 | **SURFACE WATER DEPTH** N/A | **DEPTH TO ROCK** 37.5 ft | |

| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT 0.5ft | 0.5ft | 0.5ft | BLOWS PER FOOT 0 25 50 75 100 | SAMP. NO. | MOI | LOG | SOIL AND ROCK DESCRIPTION ELEV. (ft) | DEPTH (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 650 | | | | | | | | | | 648.8 ROADWAY SURFACE | 0.0 |
| | | | | | | | | | | ASPHALT (3 FEET) | |
| 645 | 645.3 | 3.5 | | | | | | | | 645.8 | 3.0 |
| | | | 3 | 3 | 4 | 7 | | | | **ROADWAY EMBANKMENT** MEDIUM STIFF TO STIFF BROWN AND RED BROWN CLAYEY SILT (A-7-5) TRACE ROCK FRAGMENTS FROM 6 TO 7.5 FEET | |
| | 642.8 | 6.0 | | | | | | | | | |
| | | | 5 | 5 | 6 | 11 | | | | | |
| 640 | 640.3 | 8.5 | | | | | | | | | |
| | | | 1 | 5 | 9 | 14 | | | | | |
| 635 | 635.3 | 13.5 | | | | | | | | 633.8 | 15.0 |
| | | | 2 | 2 | 3 | 5 | | | | **ROADWAY EMBANKMENT** MEDIUM STIFF TO STIFF RED BROWN TO BROWN CLAYEY FINE SANDY SILT (A-4) | |
| 630 | 630.3 | 18.5 | | | | | | | | | |
| | | | 4 | 3 | 4 | 7 | | | | | |
| 625 | 625.3 | 23.5 | | | | | | | | | |
| | | | 4 | 4 | 5 | 9 | | | | | |
| 620 | 620.3 | 28.5 | | | | | | | | 622.8 | 26.0 |
| | | | 2 | 3 | 3 | 6 | | | | **ROADWAY EMBANKMENT** MEDIUM STIFF RED BROWN CLAYEY SILT (A-7-5) | |
| 615 | 615.3 | 33.5 | | | | | | | | 616.8 | 32.0 |
| | | | WOH | WOH | WOH | 0 | | | | **ALLUVIAL** VERY SOFT GRAY BROWN SILTY CLAY (A-7-6) TRACE ORGANICS | |
| | 611.3 | 37.5 | | | | | | | | 611.3 | 37.5 |
| 610 | | | 60/0.1 | | | 60/0.1 | | | | Boring Terminated BY AUGER REFUSAL at Elevation 611.3 ft ON CRYSTALLINE ROCK: GRAY GRANODIORITE | |
| 605 | | | | | | | | | | 1) ADVANCED 3-1/4" HOLLOW STEM AUGERS TO 37.5 FEET. | |
| 600 | | | | | | | | | | | |
| 595 | | | | | | | | | | | |
| 590 | | | | | | | | | | | |
| 585 | | | | | | | | | | | |
| 580 | | | | | | | | | | | |
| 575 | | | | | | | | | | | |
| 570 | | | | | | | | | | | |

NCDOT BORE SINGLE 08-001B 4-MILE CREEK MERGED NEW LIBRARY.GPJ NC_DOT.GDT 4/5/10

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | | |
|---|---|---|---|---|
| **PROJECT NO.** 1351-08-001B | **ID.** U-5025 | **COUNTY** Mecklenburg | **GEOLOGIST** M. Longshore | |
| **SITE DESCRIPTION** Four-Mile Creek Design Phase - S. Trade Street Culvert Extension | | | | **GROUND WTR (ft)** |
| **BORING NO.** B-5 | **STATION** 104+18 | **OFFSET** 54ft LT | **ALIGNMENT** -L- | **0 HR.** Dry |
| **COLLAR ELEV.** 644.9 ft | **TOTAL DEPTH** 13.6 ft | **NORTHING** 496,745 | **EASTING** 1,482,575 | **24 HR.** N/A |
| **DRILL MACHINE** BK-51 | **DRILL METHOD** SPT Boring | | **HAMMER TYPE** Manual | |
| **START DATE** 01/25/08 | **COMP. DATE** 01/25/08 | **SURFACE WATER DEPTH** N/A | **DEPTH TO ROCK** 13.6 ft | |

| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT 0.5ft | 0.5ft | 0.5ft | BLOWS PER FOOT 0 25 50 75 100 | SAMP. NO. | MOI | LOG | SOIL AND ROCK DESCRIPTION ELEV. (ft) | DEPTH (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 645 | | | | | | | | | | 644.9 GROUND SURFACE | 0.0 |
| | 643.9 | 1.0 | 4 | 5 | 24 | 29 | | | | **RESIDUAL** VERY STIFF RED TAN BROWN CLAYEY SILT (A-7-5) TRACE ROCK FRAGMENTS | |
| | 641.4 | 3.5 | | | | | | | | 641.9 | 3.0 |
| 640 | | | 5 | 46 | 45 | 91 | | | | | |
| | 638.9 | 6.0 | 23 | 29 | 39 | 68 | | | | | |
| | 636.4 | 8.5 | | | | | | | | **RESIDUAL** VERY DENSE WHITE TAN SILTY SAND (A-2-4) TRACE ROCK FRAGMENTS | |
| 635 | | | 27 | 20 | 100/0.25 | 100/0.25 | | | | 636.9 | 8.0 |
| | 631.4 | 13.5 | 60/0.1 | | | 60/0.1 | | | | **WEATHERED ROCK** GRAY METAVOLCANIC | |
| 630 | | | | | | | | | | 631.3 | 13.6 |
| | | | | | | | | | | Boring Terminated BY AUGER REFUSAL at Elevation 631.3 ft ON CRYSTALLINE ROCK: GRAY GRANODIORITE | |
| 625 | | | | | | | | | | 1) ADVANCED 2-1/4" HOLLOW STEM AUGERS TO 13.6 FEET. | |
| 620 | | | | | | | | | | | |
| 615 | | | | | | | | | | | |
| 610 | | | | | | | | | | | |
| 605 | | | | | | | | | | | |
| 600 | | | | | | | | | | | |
| 595 | | | | | | | | | | | |
| 590 | | | | | | | | | | | |
| 585 | | | | | | | | | | | |
| 580 | | | | | | | | | | | |
| 575 | | | | | | | | | | | |
| 570 | | | | | | | | | | | |
| 565 | | | | | | | | | | | |

NCDOT BORE SINGLE 08-001B 4-MILE CREEK MERGED NEW LIBRARY.GPJ NC_DOT.GDT 4/5/10

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | | |
|---|---|---|---|---|
| **PROJECT NO.** 1351-08-001B | **ID.** U-5025 | **COUNTY** Mecklenburg | | **GEOLOGIST** M. Longshore |
| **SITE DESCRIPTION** Four-Mile Creek Design Phase - S. Trade Street Culvert Extension | | | | **GROUND WTR (ft)** |
| **BORING NO.** B-6 | **STATION** 103+15 | **OFFSET** 100ft LT | **ALIGNMENT** -L- | **0 HR.** Dry |
| **COLLAR ELEV.** 622.2 ft | **TOTAL DEPTH** 3.0 ft | **NORTHING** 496,635 | **EASTING** 1,482,572 | **24 HR.** N/A |
| **DRILL MACHINE** BK-51 | **DRILL METHOD** SPT Boring | | | **HAMMER TYPE** Manual |
| **START DATE** 01/25/08 | **COMP. DATE** 01/25/08 | **SURFACE WATER DEPTH** N/A | | **DEPTH TO ROCK** 3.0 ft |

| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT 0.5ft | 0.5ft | 0.5ft | BLOWS PER FOOT 0 25 50 75 100 | SAMP. NO. | MOI | LOG | SOIL AND ROCK DESCRIPTION ELEV. (ft) | DEPTH (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 625 | | | | | | | | | | | |
| | | | | | | | | | | 622.2 GROUND SURFACE | 0.0 |
| | 621.2 | 1.0 | | | | | | | | **WEATHERED ROCK** BROWN METAVOLCANIC | |
| 620 | | | 5 | 60 | 40/0.1 | 100/0.6 | | | | 619.2 | 3.0 |
| | | | | | | | | | | Boring Terminated BY AUGER REFUSAL at Elevation 619.2 ft ON CRYSTALLINE ROCK: BROWN GRANODIORITE | |
| 615 | | | | | | | | | | 1) ADVANCED 2-1/4" HOLLOW STEM AUGERS TO 3 FEET. | |
| 610 | | | | | | | | | | | |
| 605 | | | | | | | | | | | |
| 600 | | | | | | | | | | | |
| 595 | | | | | | | | | | | |
| 590 | | | | | | | | | | | |
| 585 | | | | | | | | | | | |
| 580 | | | | | | | | | | | |
| 575 | | | | | | | | | | | |
| 570 | | | | | | | | | | | |
| 565 | | | | | | | | | | | |
| 560 | | | | | | | | | | | |
| 555 | | | | | | | | | | | |
| 550 | | | | | | | | | | | |
| 545 | | | | | | | | | | | |

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | | |
|---|---|---|---|---|
| **PROJECT NO.** 1351-08-001B | **ID.** U-5025 | **COUNTY** Mecklenburg | **GEOLOGIST** M. Longshore | |
| **SITE DESCRIPTION** Four-Mile Creek Design Phase - S. Trade Street Culvert Extension | | | | **GROUND WTR (ft)** |
| **BORING NO.** B-7 | **STATION** 102+50 | **OFFSET** 79ft LT | **ALIGNMENT** -L- | **0 HR.** 9.0 |
| **COLLAR ELEV.** 623.1 ft | **TOTAL DEPTH** 13.8 ft | **NORTHING** 496,574 | **EASTING** 1,482,601 | **24 HR.** N/A |
| **DRILL MACHINE** BK-51 | **DRILL METHOD** SPT Boring | | **HAMMER TYPE** Manual | |
| **START DATE** 01/25/08 | **COMP. DATE** 01/25/08 | **SURFACE WATER DEPTH** N/A | **DEPTH TO ROCK** 13.8 ft | |

| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT 0.5ft | 0.5ft | 0.5ft | BLOWS PER FOOT 0 25 50 75 100 | SAMP. NO. | MOI | LOG | SOIL AND ROCK DESCRIPTION ELEV. (ft) | DEPTH (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 625 | | | | | | | | | | 623.1 GROUND SURFACE | 0.0 |
| | 622.1 | 1.0 | | | | | | | | **ROADWAY EMBANKMENT** STIFF BROWN CLAYEY SILT (A-7-5) TRACE ROCK FRAGMENTS | |
| 620 | 619.6 | 3.5 | 2 | 3 | 7 | 10 | | | | 620.1 | 3.0 |
| | | | 7 | 10 | 11 | 21 | | | | **ROADWAY EMBANKMENT** MEDIUM DENSE BROWN SILTY SAND (A-2-4) TRACE ROCK FRAGMENTS FROM 3.5 TO 5 FEET LITTLE WOOD CHIP FRAGMENTS FROM 8.5 TO 10 FEET | |
| 615 | 614.6 | 8.5 | | | | | | | | 613.1 | 10.0 |
| | | | 2 | 6 | 11 | 17 | | | | **ROADWAY EMBANKMENT** STIFF TO VERY STIFF BROWN CLAYEY SILT (A-7-5) TRACE ROCK FRAGMENTS | |
| 610 | 609.6 | 13.5 | 100/0.3 | | | 100/0.3 | | | | 609.3 | 13.8 |
| 605 | | | | | | | | | | Boring Terminated BY AUGER REFUSAL at Elevation 609.3 ft ON CRYSTALLINE ROCK: GRAY GRANODIORITE | |
| 600 | | | | | | | | | | 1) ADVANCE 2-1/4" HOLLOW STEM AUGERS TO 13.8 FEET. | |
| 595 | | | | | | | | | | | |
| 590 | | | | | | | | | | | |
| 585 | | | | | | | | | | | |
| 580 | | | | | | | | | | | |
| 575 | | | | | | | | | | | |
| 570 | | | | | | | | | | | |
| 565 | | | | | | | | | | | |
| 560 | | | | | | | | | | | |
| 555 | | | | | | | | | | | |
| 550 | | | | | | | | | | | |
| 545 | | | | | | | | | | | |

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | | |
|---|---|---|---|---|
| **PROJECT NO.** 1351-08-001B | **ID.** U-5025 | **COUNTY** Mecklenburg | **GEOLOGIST** M. Longshore | |
| **SITE DESCRIPTION** Four-Mile Creek Design Phase - S. Trade Street Culvert Extension | | | | **GROUND WTR (ft)** |
| **BORING NO.** B-8 | **STATION** 102+11 | **OFFSET** 85ft LT | **ALIGNMENT** -L- | **0 HR.** Dry |
| **COLLAR ELEV.** 623.6 ft | **TOTAL DEPTH** 2.5 ft | **NORTHING** 496,539 | **EASTING** 1,482,618 | **24 HR.** N/A |
| **DRILL MACHINE** BK-51 | **DRILL METHOD** SPT Boring | | **HAMMER TYPE** Manual | |
| **START DATE** 01/25/08 | **COMP. DATE** 01/25/08 | **SURFACE WATER DEPTH** N/A | **DEPTH TO ROCK** 2.5 ft | |

| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT 0.5ft | 0.5ft | 0.5ft | BLOWS PER FOOT 0 25 50 75 100 | SAMP. NO. | MOI | LOG | SOIL AND ROCK DESCRIPTION ELEV. (ft) | DEPTH (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 625 | | | | | | | | | | | |
| | 622.6 | 1.0 | 8 | 17 | 12 | 29 | | | | 623.6 GROUND SURFACE | 0.0 |
| 620 | | | | | | | | | | **ROADWAY EMBANKMENT** MEDIUM DENSE BROWN SILTY SAND (A-2-4) TRACE ROCK FRAGMENTS CLAY POCKETS | |
| | | | | | | | | | | 621.1 | 2.5 |
| 615 | | | | | | | | | | Boring Terminated BY AUGER REFUSAL at Elevation 621.1 ft ON CRYSTALLINE ROCK: GRAY GRANODIORITE | |
| 610 | | | | | | | | | | 1) ADVANCED 2-1/4" HOLLOW STEM AUGERS TO 2.5 FEET. | |
| 605 | | | | | | | | | | | |
| 600 | | | | | | | | | | | |
| 595 | | | | | | | | | | | |
| 590 | | | | | | | | | | | |
| 585 | | | | | | | | | | | |
| 580 | | | | | | | | | | | |
| 575 | | | | | | | | | | | |
| 570 | | | | | | | | | | | |
| 565 | | | | | | | | | | | |
| 560 | | | | | | | | | | | |
| 555 | | | | | | | | | | | |
| 550 | | | | | | | | | | | |
| 545 | | | | | | | | | | | |

NCDOT BORE SINGLE 08-001B 4-MILE CREEK MERGED NEW LIBRARY.GPJ NC_DOT.GDT 4/5/10

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | | |
|---|---|---|---|---|
| **PROJECT NO.** 1351-08-001B | **ID.** U-5025 | **COUNTY** Mecklenburg | **GEOLOGIST** M. Longshore | |
| **SITE DESCRIPTION** Four-Mile Creek Design Phase - Proposed Pedestrian Tunnel | | | | **GROUND WTR (ft)** |
| **BORING NO.** BB-1 | **STATION** 102+50 | **OFFSET** 7ft LT | **ALIGNMENT** -L- | **0 HR.** Dry |
| **COLLAR ELEV.** 647.9 ft | **TOTAL DEPTH** 32.0 ft | **NORTHING** 496,604 | **EASTING** 1,482,679 | **24 HR.** Dry |
| **DRILL MACHINE** CME-45B | **DRILL METHOD** SPT Boring | | **HAMMER TYPE** Automatic | |
| **START DATE** 01/08/09 | **COMP. DATE** 01/08/09 | **SURFACE WATER DEPTH** N/A | **DEPTH TO ROCK** 32.0 ft | |

| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT 0.5ft | 0.5ft | 0.5ft | BLOWS PER FOOT 0 25 50 75 100 | SAMP. NO. | MOI | LOG | SOIL AND ROCK DESCRIPTION ELEV. (ft) | DEPTH (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 650 | | | | | | | | | | | |
| | | | | | | | | | | 647.9 ROADWAY SURFACE | 0.0 |
| | 646.9 | 1.0 | | | | | | | | 647.2 ASPHALT (2 INCHES), ABC STONE (6 INCHES) | 0.7 |
| 645 | | | 8 | 6 | 4 | 10 | | | | 644.9 **ROADWAY EMBANKMENT** STIFF BROWN FINE SANDY SILT (A-5) | 3.0 |
| | 644.4 | 3.5 | | | | | | | | | |
| | | | 2 | 2 | 2 | 4 | | | | | |
| | 641.9 | 6.0 | | | | | | | | | |
| 640 | | | 3 | 3 | 2 | 5 | | | | 639.9 **ROADWAY EMBANKMENT** MEDIUM STIFF BROWN TO RED BROWN CLAYEY SILT (A-7-5) | 8.0 |
| | 639.4 | 8.5 | | | | | | | | | |
| | | | 3 | 2 | 3 | 5 | | | | | |
| 635 | | | | | | | | | | 635.9 **ROADWAY EMBANKMENT** MEDIUM STIFF BROWN FINE SANDY SILT (A-4) | 12.0 |
| | 634.4 | 13.5 | | | | | | | | | |
| | | | 3 | 2 | 3 | 5 | | | | | |
| 630 | | | | | | | | | | | |
| | 629.4 | 18.5 | | | | | | | | | |
| | | | 3 | 3 | 2 | 5 | | | | 625.9 **ROADWAY EMBANKMENT** MEDIUM STIFF RED BROWN CLAYEY SILT (A-7-5) | 22.0 |
| 625 | | | | | | | | | | | |
| | 624.4 | 23.5 | | | | | | | | | |
| | | | 2 | 2 | 2 | 4 | | | | | |
| 620 | | | | | | | | | | **ROADWAY EMBANKMENT** MEDIUM STIFF RED BROWN TO BROWN FINE SANDY SILT (A-4) | |
| | 619.4 | 28.5 | | | | | | | | | |
| | | | 2 | 2 | 2 | 4 | | | | | |
| | 615.9 | 32.0 | | | | | | | | 615.9 | 32.0 |
| 615 | | | 60/0 | | | 60/0 | | | | Boring Terminated BY AUGER REFUSAL at Elevation 615.9 ft ON CRYSTALLINE ROCK: GRAY GRANODIORITE | |
| 610 | | | | | | | | | | 1) ADVANCED 2-1/4" HOLLOW STEM AUGERS TO 32 FEET. | |
| 605 | | | | | | | | | | | |
| 600 | | | | | | | | | | | |
| 595 | | | | | | | | | | | |
| 590 | | | | | | | | | | | |
| 585 | | | | | | | | | | | |
| 580 | | | | | | | | | | | |
| 575 | | | | | | | | | | | |
| 570 | | | | | | | | | | | |

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | | |
|---|---|---|---|---|
| **PROJECT NO.** 1351-08-001B | **ID.** U-5025 | **COUNTY** Mecklenburg | **GEOLOGIST** M. Longshore | |
| **SITE DESCRIPTION** Four-Mile Creek Design Phase - Proposed Pedestrian Tunnel | | | | **GROUND WTR (ft)** |
| **BORING NO.** BB-2 | **STATION** 102+51 | **OFFSET** 12ft RT | **ALIGNMENT** -L- | **0 HR.** Dry |
| **COLLAR ELEV.** 648.1 ft | **TOTAL DEPTH** 35.0 ft | **NORTHING** 496,612 | **EASTING** 1,482,696 | **24 HR.** Dry |
| **DRILL MACHINE** CME-45B | **DRILL METHOD** SPT Boring | | **HAMMER TYPE** Automatic | |
| **START DATE** 01/08/09 | **COMP. DATE** 01/08/09 | **SURFACE WATER DEPTH** N/A | **DEPTH TO ROCK** N/A | |

| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT 0.5ft | 0.5ft | 0.5ft | BLOWS PER FOOT 0 25 50 75 100 | SAMP. NO. | MOI | LOG | SOIL AND ROCK DESCRIPTION ELEV. (ft) | DEPTH (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 650 | | | | | | | | | | 648.1 ROADWAY SURFACE | 0.0 |
| | 647.1 | 1.0 | | | | | | | | 647.1 ASPHALT (6 INCHES), ABC STONE (6 INCHES) | 1.0 |
| 645 | 644.6 | 3.5 | 2 | 2 | 3 | 5 | | | | **ROADWAY EMBANKMENT** MEDIUM STIFF TO VERY STIFF BROWN TO RED BROWN CLAYEY SILT (A-7-5) TRACE QUARTZ ROCK FRAGMENTS FROM 6 TO 7.5 FEET | |
| | 642.1 | 6.0 | 3 | 3 | 3 | 6 | | | | | |
| 640 | 639.6 | 8.5 | 3 | 18 | 6 | 24 | | | | | |
| | | | 14 | 12 | 11 | 23 | | | | | |
| 635 | 634.6 | 13.5 | | | | | | | | | |
| | | | 2 | 3 | 4 | 7 | | | | | |
| 630 | 629.6 | 18.5 | | | | | | | | | |
| | | | 3 | 4 | 5 | 9 | | | | | |
| 625 | 624.6 | 23.5 | | | | | | | | | |
| | | | 3 | 4 | 4 | 8 | | | | | |
| 620 | 619.6 | 28.5 | | | | | | | | 620.1 | 28.0 |
| | | | 3 | 5 | 3 | 8 | | | | **ALLUVIAL** MEDIUM STIFF GRAY BROWN FINE SANDY SILT (A-4) | |
| 615 | 614.6 | 33.5 | | | | | | | | 617.1 | 31.0 |
| | | | 23 | 28 | 35 | 63 | | | | **RESIDUAL** VERY DENSE TAN BROWN SILTY COARSE TO FINE SAND (A-2-4) TRACE ROCK FRAGMENTS | |
| 610 | | | | | | | | | | 613.1 | 35.0 |
| 605 | | | | | | | | | | Boring Terminated at Elevation 613.1 ft IN RESIDUUM: VERY DENSE TAN BROWN SILTY COARSE TO FINE SAND (A-2-4) | |
| 600 | | | | | | | | | | 1) ADVANCED 2-1/4" HOLLOW STEM AUGERS TO 33.5 FEET. | |
| 595 | | | | | | | | | | | |
| 590 | | | | | | | | | | | |
| 585 | | | | | | | | | | | |
| 580 | | | | | | | | | | | |
| 575 | | | | | | | | | | | |
| 570 | | | | | | | | | | | |

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | | |
|---|---|---|---|---|
| **PROJECT NO.** 1351-08-001B | **ID.** U-5025 | **COUNTY** Mecklenburg | **GEOLOGIST** M. Longshore | |
| **SITE DESCRIPTION** Four-Mile Creek Design Phase - Proposed Pedestrian Tunnel | | | | **GROUND WTR (ft)** |
| **BORING NO.** BB-3 | **STATION** 102+52 | **OFFSET** 67ft RT | **ALIGNMENT** -L- | **0 HR.** N/A |
| **COLLAR ELEV.** 621.6 ft | **TOTAL DEPTH** 8.0 ft | **NORTHING** 496,632 | **EASTING** 1,482,746 | **24 HR.** 4.1 |
| **DRILL MACHINE** CME-550X | **DRILL METHOD** SPT Boring | | **HAMMER TYPE** Automatic | |
| **START DATE** 01/12/09 | **COMP. DATE** 01/12/09 | **SURFACE WATER DEPTH** N/A | **DEPTH TO ROCK** 8.0 ft | |

| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT 0.5ft | 0.5ft | 0.5ft | BLOWS PER FOOT 0 25 50 75 100 | SAMP. NO. | MOI | LOG | SOIL AND ROCK DESCRIPTION ELEV. (ft) | DEPTH (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 625 | | | | | | | | | | | |
| | | | | | | | | | | 621.6 | 0.0 |
| | | | | | | | | | | GROUND SURFACE | |
| 620 | 620.6 | 1.0 | | | | | | | | **ROADWAY EMBANKMENT** SOFT BROWN FINE SANDY SILT (A-4) TRACE ROCK FRAGMENTS | |
| | | | 2 | 60/0.2 | | 62/0.7 | | | | | |
| | 618.1 | 3.5 | | | | | | | | 618.1 | 3.5 |
| | | | 3 | 2 | 2 | 4 | | | | 615.6 | 6.0 |
| 615 | | | | | | | | | | **ALLUVIAL** SOFT GRAY BROWN SANDY SILTY CLAY (A-7-6) | |
| 610 | | | | | | | | | | Boring Terminated BY AUGER REFUSAL at Elevation 613.6 ft ON CRYSTALLINE ROCK: GRAY GRANODIORITE | |
| 605 | | | | | | | | | | 1) ADVANCED 2-1/4" HOLLOW STEM AUGERS TO 8 FEET. | |
| 600 | | | | | | | | | | | |
| 595 | | | | | | | | | | | |
| 590 | | | | | | | | | | | |
| 585 | | | | | | | | | | | |
| 580 | | | | | | | | | | | |
| 575 | | | | | | | | | | | |
| 570 | | | | | | | | | | | |
| 565 | | | | | | | | | | | |
| 560 | | | | | | | | | | | |
| 555 | | | | | | | | | | | |
| 550 | | | | | | | | | | | |
| 545 | | | | | | | | | | | |

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | |
|---|---|---|---|
| **PROJECT NO.** 1351-08-001B | **ID.** U-5025 | **COUNTY** Mecklenburg | **GEOLOGIST** L. Campos |
| **SITE DESCRIPTION** Four-Mile Creek Design Phase - Proposed Pedestrian Tunnel | | | **GROUND WTR (ft)** |
| **BORING NO.** BB-4 | **STATION** 102+47 | **OFFSET** 70ft LT | **ALIGNMENT** -L- | **0 HR.** Dry |
| **COLLAR ELEV.** 622.4 ft | **TOTAL DEPTH** 6.0 ft | **NORTHING** 496,580 | **EASTING** 1,482,622 | **24 HR.** Dry |
| **DRILL MACHINE** CME-550X | **DRILL METHOD** SPT Boring | | **HAMMER TYPE** Automatic | |
| **START DATE** 01/13/09 | **COMP. DATE** 01/13/09 | **SURFACE WATER DEPTH** N/A | **DEPTH TO ROCK** 6.0 ft | |

| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT 0.5ft | 0.5ft | 0.5ft | BLOWS PER FOOT 0 25 50 75 100 | SAMP. NO. | MOI | LOG | SOIL AND ROCK DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | ELEV. (ft) DEPTH (ft) |
| 625 | | | | | | | | | | |
| | | | | | | | | | | 622.4 GROUND SURFACE 0.0 |
| | 621.4 | 1.0 | | | | | | | | **ARTIFICIAL FILL** |
| 620 | | | 2 | 7 | 5 | 12 | | | | STIFF |
| | 618.9 | 3.5 | | | | | | | | DARK BROWN |
| | | | 9 | 6 | 4 | 10 | | | | FINE SANDY SILT |
| | | | | | | | | | | (A-4) |
| | 616.4 | 6.0 | | | | | | | | 619.4 3.0 |
| 615 | | | 60/0 | | | | | | | TRACE ROCK FRAGMENTS |
| | | | | | | | | | | 616.4 6.0 |
| | | | | | | | | | | **ARTIFICIAL FILL** |
| | | | | | | | | | | STIFF |
| | | | | | | | | | | BROWN TO RED BROWN |
| 610 | | | | | | | | | | CLAYEY SILT |
| | | | | | | | | | | (A-7-5) |
| | | | | | | | | | | TRACE ROOTLETS |
| | | | | | | | | | | Boring Terminated BY AUGER REFUSAL at Elevation 616.4 ft ON CRYSTALLINE ROCK: GRAY GRANODIORITE |
| 605 | | | | | | | | | | |
| | | | | | | | | | | 1) ADVANCED 2-1/4" HOLLOW STEM AUGERS TO 6 FEET. |
| 600 | | | | | | | | | | |
| 595 | | | | | | | | | | |
| 590 | | | | | | | | | | |
| 585 | | | | | | | | | | |
| 580 | | | | | | | | | | |
| 575 | | | | | | | | | | |
| 570 | | | | | | | | | | |
| 565 | | | | | | | | | | |
| 560 | | | | | | | | | | |
| 555 | | | | | | | | | | |
| 550 | | | | | | | | | | |
| 545 | | | | | | | | | | |

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | | |
|---|---|---|---|---|
| **PROJECT NO.** 1351-08-001B | **ID.** U-5025 | **COUNTY** Mecklenburg | **GEOLOGIST** L. Campos | |
| **SITE DESCRIPTION** Four-Mile Creek Design Phase - S. Trade Street Culvert Extension | | | | **GROUND WTR (ft)** |
| **BORING NO.** BB-5 | **STATION** 102+69 | **OFFSET** 90ft LT | **ALIGNMENT** -L- | **0 HR.** 8.5 |
| **COLLAR ELEV.** 622.9 ft | **TOTAL DEPTH** 26.0 ft | **NORTHING** 496,593 | **EASTING** 1,482,594 | **24 HR.** 8.0 |
| **DRILL MACHINE** CME-550X | **DRILL METHOD** SPT Boring | | **HAMMER TYPE** Automatic | |
| **START DATE** 01/13/09 | **COMP. DATE** 01/13/09 | **SURFACE WATER DEPTH** N/A | **DEPTH TO ROCK** 14.3 ft | |

| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT 0.5ft | 0.5ft | 0.5ft | BLOWS PER FOOT 0 25 50 75 100 | SAMP. NO. | MOI | LOG | SOIL AND ROCK DESCRIPTION ELEV. (ft) | DEPTH (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 625 | | | | | | | | | | 622.9 GROUND SURFACE | 0.0 |
| | 621.9 | 1.0 | 3 | 2 | 3 | 5 | | | | **ARTIFICIAL FILL** MEDIUM STIFF BROWN FINE SANDY SILT (A-4) | |
| 620 | 619.4 | 3.5 | 7 | 5 | 7 | 12 | | | | 619.9 | 3.0 |
| | 616.9 | 6.0 | 1 | 1 | 1 | 2 | | | | **ALLUVIAL** STIFF BROWN CLAYEY SILT (A-6) TRACE ROOTS | |
| 615 | 614.4 | 8.5 | 2 | 7 | 10 | 17 | | | | 616.9 | 6.0 |
| | | | | | | | | | | 614.9 | 8.0 |
| 610 | 609.4 | 13.5 | 40 | 100/0.4 | | 100/0.4 | | | | **ALLUVIAL** VERY LOOSE GRAY BROWN SILTY FINE SAND (A-2-4) | |
| | | | | | | | | | | 609.9 | 13.0 |
| 605 | | | | | | | | | | 608.6 | 14.3 |
| | | | | | | | | | | **ALLUVIAL** MEDIUM DENSE GRAY BROWN SILTY COARSE TO FINE SAND (A-2-4) TRACE ROCK FRAGMENTS | |
| 600 | | | | | | | | | | 603.6 | 19.3 |
| | | | | | | | | | | **WEATHERED ROCK** BROWN GRANODIORITE | |
| 595 | | | | | | | | | | 596.9 | 26.0 |
| | | | | | | | | | | **CRYSTALLINE ROCK** MEDIUM HARD MODERATELY WEATHERED BROWN GRANODIORITE WITH CLOSE TO VERY CLOSE FRACTURE SPACING | |
| 590 | | | | | | | | | | **CRYSTALLINE ROCK** HARD VERY SLIGHTLY WEATHERED GRAY GRANODIORITE WITH CLOSE FRACTURE SPACING | |
| 585 | | | | | | | | | | Boring Terminated at Elevation 596.9 ft IN CRYSTALLINE ROCK: GRAY GRANODIORITE | |
| 580 | | | | | | | | | | 1) ADVANCED 2-1/4" HOLLOW STEM AUGERS TO 14.3 FEET. 2) SET CASING TO 14.3 FEET BELOW GROUND SURFACE. 3) ADVANCED NQ-CORE BARREL FROM 14.3 TO 26 FEET. 4) CREEK WATER USED AS DRILLING FLUID. 5) DRILLING FLUID DENSITY APPROXIMATELY 62.4 PCF. | |
| 575 | | | | | | | | | | | |
| 570 | | | | | | | | | | | |
| 565 | | | | | | | | | | | |
| 560 | | | | | | | | | | | |
| 555 | | | | | | | | | | | |
| 550 | | | | | | | | | | | |
| 545 | | | | | | | | | | | |

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# BORELOG REPORT

| | | | | |
|---|---|---|---|---|
| **PROJECT NO.** 1351-08-001B | **ID.** U-5025 | **COUNTY** Mecklenburg | **GEOLOGIST** M. Longshore | |
| **SITE DESCRIPTION** Four-Mile Creek Design Phase - S. Trade Street Culvert Extension | | | | **GROUND WTR (ft)** |
| **BORING NO.** BB-6 | **STATION** 102+70 | **OFFSET** 99ft RT | **ALIGNMENT** -L- | **0 HR.** 7.0 |
| **COLLAR ELEV.** 620.2 ft | **TOTAL DEPTH** 20.3 ft | **NORTHING** 496,660 | **EASTING** 1,482,769 | **24 HR.** 3.0 |
| **DRILL MACHINE** CME-550X | **DRILL METHOD** SPT Boring | | **HAMMER TYPE** Automatic | |
| **START DATE** 01/12/09 | **COMP. DATE** 01/12/09 | **SURFACE WATER DEPTH** N/A | **DEPTH TO ROCK** 8.8 ft | |

| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT 0.5ft | 0.5ft | 0.5ft | BLOWS PER FOOT 0 25 50 75 100 | SAMP. NO. | MOI | LOG | SOIL AND ROCK DESCRIPTION ELEV. (ft) | DEPTH (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 625 | | | | | | | | | | | |
| 620 | | | | | | | | | | 620.2 GROUND SURFACE | 0.0 |
| | 619.2 | 1.0 | | | | | | | | **ARTIFICIAL FILL** STIFF BROWN FINE SANDY SILT (A-4) TRACE ROOTS | |
| | 616.7 | 3.5 | 4 | 5 | 4 | 9 | | | | 616.7 | 3.5 |
| 615 | | | WOH | WOH | 2 | 2 | | | | 614.2 | 6.0 |
| | 614.2 | 6.0 | 7 | 20 | 20 | 40 | | | | **ALLUVIAL** VERY LOOSE BROWN AND GRAY CLAYEY FINE SAND (A-2-7) TRACE ROOTS | |
| | 611.7 | 8.5 | 100/0.3 | | | 100/0.3 | | | | 612.2 | 8.0 |
| 610 | | | | | | | | | | 611.4 | 8.8 |
| 605 | | | | | | | | | | **RESIDUAL** DENSE BROWN SILTY FINE TO MEDIUM SAND (A-2-4) | |
| 600 | | | | | | | | | | **WEATHERED ROCK** 599.9 GRAY GRANODIORITE | 20.3 |
| 595 | | | | | | | | | | **CRYSTALLINE ROCK** HARD VERY SLIGHTLY WEATHERED GRAY GRANODIORITE WITH CLOSE FRACTURE SPACING | |
| 590 | | | | | | | | | | Boring Terminated at Elevation 599.9 ft IN CRYSTALLINE ROCK: GRAY GRANODIORITE | |
| 585 | | | | | | | | | | 1) ADVANCED 2-1/4" HOLLOW STEM AUGERS TO 8.8 FEET. 2) SET CASING TO 8.8 FEET BELOW GROUND SURFACE. 3) ADVANCED NQ-2 CORE BARREL FROM 8.8 TO 20.3 FEET. 4) CREEK WATER USED AS DRILLING FLUID. 5) DRILLING FLUID DENSITY APPROXIMATELY 62.4 PCF. | |
| 580 | | | | | | | | | | | |
| 575 | | | | | | | | | | | |
| 570 | | | | | | | | | | | |
| 565 | | | | | | | | | | | |
| 560 | | | | | | | | | | | |
| 555 | | | | | | | | | | | |
| 550 | | | | | | | | | | | |
| 545 | | | | | | | | | | | |

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# CORE BORING REPORT

| | | | |
|---|---|---|---|
| **PROJECT NO.** 1351-08-001B | **ID.** U-5025 | **COUNTY** Mecklenburg | **GEOLOGIST** L. Campos |
| **SITE DESCRIPTION** Four-Mile Creek Design Phase - S. Trade Street Culvert Extension | | | **GROUND WTR (ft)** |
| **BORING NO.** BB-5 | **STATION** 102+69 | **OFFSET** 90ft LT | **ALIGNMENT** -L- | **0 HR.** 8.5 |
| **COLLAR ELEV.** 622.9 ft | **TOTAL DEPTH** 26.0 ft | **NORTHING** 496,593 | **EASTING** 1,482,594 | **24 HR.** 8.0 |
| **DRILL MACHINE** CME-550X | **DRILL METHOD** SPT Boring | | **HAMMER TYPE** Automatic | |
| **START DATE** 01/13/09 | **COMP. DATE** 01/13/09 | **SURFACE WATER DEPTH** N/A | **DEPTH TO ROCK** 14.3 ft | |
| **CORE SIZE** NQ-2 | **TOTAL RUN** 11.7 ft | **DRILLER** J. LITTLE | | |

| ELEV (ft) | RUN ELEV (ft) | DEPTH (ft) | RUN (ft) | DRILL RATE (Min/ft) | RUN REC. (ft) % | RUN RQD (ft) % | SAMP. NO. | STRATA REC. (ft) % | STRATA RQD (ft) % | LOG |
|---|---|---|---|---|---|---|---|---|---|---|
| 608.58 | | | | | | | | | | |
| | 608.6 | 14.3 | 1.7 | | (0.9) 53% | (0.0) 0% | | (3.8) 76% | (0.5) 10% | |
| | 606.9 | 16.0 | 5.0 | | (4.8) 96% | (2.2) 44% | | | | |
| 605 | | | | | | | | | | |
| | 601.9 | 21.0 | 5.0 | | (5.0) 100% | (4.1) 82% | | (6.7) 100% | (5.5) 82% | |
| 600 | | | | | | | | | | |
| | 596.9 | 26.0 | | | | | | | | |
| 595 | | | | | | | | | | |
| 590 | | | | | | | | | | |
| 585 | | | | | | | | | | |
| 580 | | | | | | | | | | |
| 575 | | | | | | | | | | |
| 570 | | | | | | | | | | |
| 565 | | | | | | | | | | |
| 560 | | | | | | | | | | |
| 555 | | | | | | | | | | |
| 550 | | | | | | | | | | |
| 545 | | | | | | | | | | |
| 540 | | | | | | | | | | |
| 535 | | | | | | | | | | |
| 530 | | | | | | | | | | |

DESCRIPTION AND REMARKS

Begin Coring @ 14.3 ft

608.6 (ELEV. ft) / 14.3 (DEPTH ft)

**CRYSTALLINE ROCK**
MEDIUM HARD
MODERATELY WEATHERED
BROWN GRANODIORITE
WITH CLOSE TO VERY CLOSE FRACTURE SPACING
JOINTS INDISCERNIBLE

603.6 (ELEV. ft) / 19.3 (DEPTH ft)

**CRYSTALLINE ROCK**
HARD
VERY SLIGHTLY WEATHERED
GRAY GRANODIORITE
WITH CLOSE FRACTURE SPACING
5 JOINTS AT 5°-10°, 1 JOINT AT 30°, 1 JOINT AT 65°

596.9 (ELEV. ft) / 26.0 (DEPTH ft)

Boring Terminated at Elevation 596.9 ft IN CRYSTALLINE ROCK: GRAY GRANODIORITE

1) ADVANCED 2-1/4" HOLLOW STEM AUGERS TO 14.3 FEET.
2) SET CASING TO 14.3 FEET BELOW GROUND SURFACE.
3) ADVANCED NQ-CORE BARREL FROM 14.3 TO 26 FEET.
4) CREEK WATER USED AS DRILLING FLUID.
5) DRILLING FLUID DENSITY APPROXIMATELY 62.4 PCF.

# NCDOT GEOTECHNICAL ENGINEERING UNIT
# CORE BORING REPORT

| | | | |
|---|---|---|---|
| **PROJECT NO.** 1351-08-001B | **ID.** U-5025 | **COUNTY** Mecklenburg | **GEOLOGIST** M. Longshore |
| **SITE DESCRIPTION** Four-Mile Creek Design Phase - S. Trade Street Culvert Extension | | | **GROUND WTR (ft)** |
| **BORING NO.** BB-6 | **STATION** 102+70 | **OFFSET** 99ft RT | **ALIGNMENT** -L- | **0 HR.** 7.0 |
| **COLLAR ELEV.** 620.2 ft | **TOTAL DEPTH** 20.3 ft | **NORTHING** 496,660 | **EASTING** 1,482,769 | **24 HR.** 3.0 |
| **DRILL MACHINE** CME-550X | **DRILL METHOD** SPT Boring | | **HAMMER TYPE** Automatic | |
| **START DATE** 01/12/09 | **COMP. DATE** 01/12/09 | **SURFACE WATER DEPTH** N/A | **DEPTH TO ROCK** 8.8 ft | |
| **CORE SIZE** NQ-2 | **TOTAL RUN** 11.5 ft | **DRILLER** J. LITTLE | | |

| ELEV (ft) | RUN ELEV (ft) | DEPTH (ft) | RUN (ft) | DRILL RATE (Min/ft) | RUN REC. (ft) % | RUN RQD (ft) % | SAMP. NO. | STRATA REC. (ft) % | STRATA RQD (ft) % | LOG | DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 611.36 | | | | | | | | | | | Begin Coring @ 8.8 ft |
| 610 | 611.4 | 8.8 | 1.5 | | (1.5) 100% | (1.1) 73% | | (11.5) 100% | (8.0) 70% | | 611.4 **CRYSTALLINE ROCK** 8.8 |
| | 609.9 | 10.3 | 5.0 | | (5.0) 100% | (2.2) 44% | | | | | HARD<br>VERY SLIGHTLY WEATHERED<br>GRAY GRANODIORITE<br>WITH CLOSE FRACTURE SPACING<br>8 JOINTS AT 0°-10°, 20 JOINTS AT 20°-40°, 6 JOINTS AT 50°-65° |
| 605 | 604.9 | 15.3 | 5.0 | | (5.0) 100% | (3.1) 62% | | | | | |
| 600 | 599.9 | 20.3 | | | | | | | | | 599.9 20.3 |
| 595 | | | | | | | | | | | Boring Terminated at Elevation 599.9 ft IN CRYSTALLINE ROCK: GRAY GRANODIORITE<br><br>1) ADVANCED 2-1/4" HOLLOW STEM AUGERS TO 8.8 FEET.<br>2) SET CASING TO 8.8 FEET BELOW GROUND SURFACE.<br>3) ADVANCED NQ-2 CORE BARREL FROM 8.8 TO 20.3 FEET.<br>4) CREEK WATER USED AS DRILLING FLUID.<br>5) DRILLING FLUID DENSITY APPROXIMATELY 62.4 PCF. |
| 590 | | | | | | | | | | | |
| 585 | | | | | | | | | | | |
| 580 | | | | | | | | | | | |
| 575 | | | | | | | | | | | |
| 570 | | | | | | | | | | | |
| 565 | | | | | | | | | | | |
| 560 | | | | | | | | | | | |
| 555 | | | | | | | | | | | |
| 550 | | | | | | | | | | | |
| 545 | | | | | | | | | | | |
| 540 | | | | | | | | | | | |
| 535 | | | | | | | | | | | |

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*Charlotte, North Carolina 28723*
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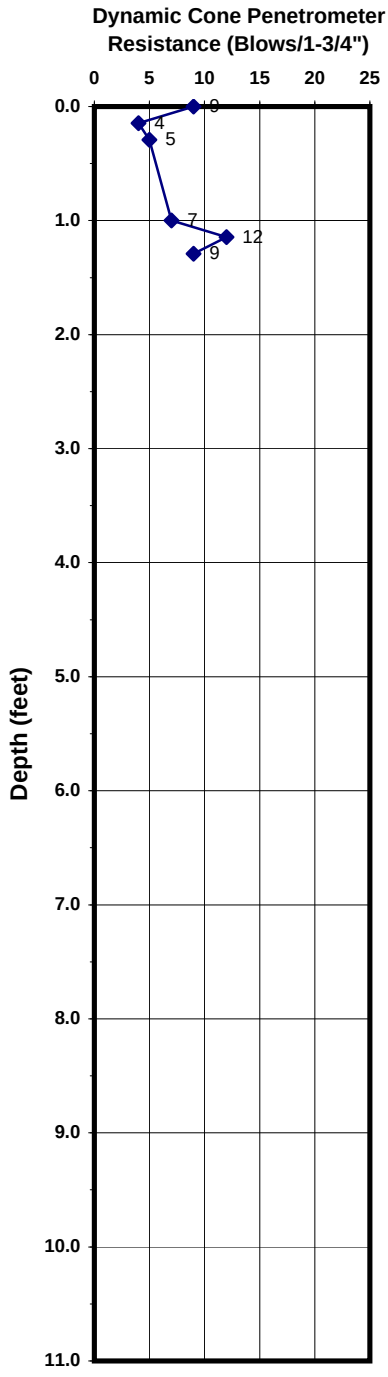
# HAND AUGER/DCP LOG

| DEPTH (FEET) | DESCRIPTION |
|---|---|
| 0 - 1.0 | **ROADWAY EMBANKMENT FILL:** Red Brown Clayey **SILT (A-7-5)** |
| 1.0 - 1.2 | **ROADWAY EMBANKMENT FILL:** Red Brown Fine Sandy **SILT (A-4)** |
| | |
| **Hand Auger Refusal at 1.2 feet** | **Groundwater Level: Not Encountered at Time of Augering**<br>**NOTE: Dynamic Cone Penetrometer Testing Performed in General Accordance with ASTM STP-399** |




| | |
|---|---|
| **PROJECT:** | **Four Mile Creek Culvert** |
| **PROJECT NO.:** | **1351-08-001** |
| **LOCATION:** | **S Trade Street - Matthews, NC** |
| **BORING NO.** | **HA-1** |
| **DATE PERFORMED:** | **1/25/2008** |
| **PERFORMED BY:** | **MBL/ZDS** |

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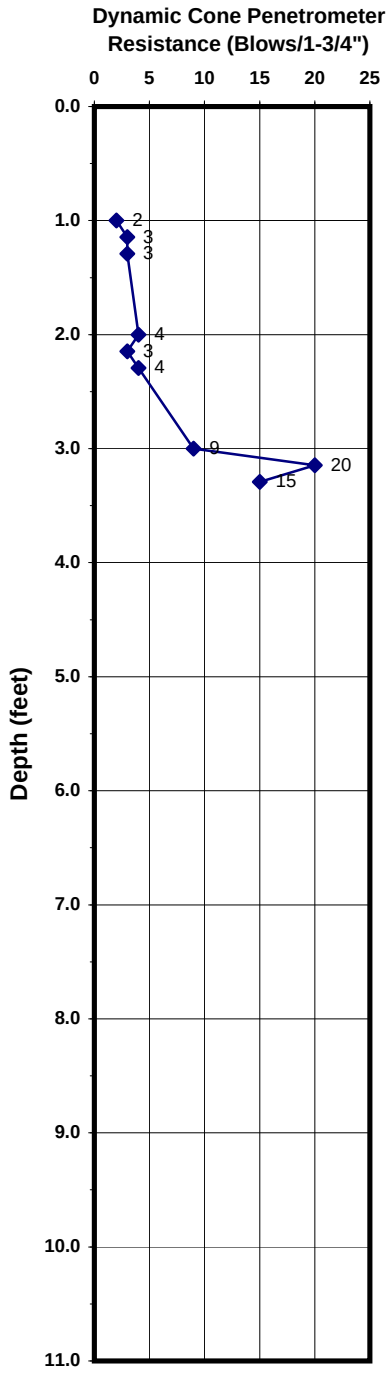
# HAND AUGER/DCP LOG

| DEPTH (FEET) | DESCRIPTION |
|---|---|
| 0 - 3.3 | **ROADWAY EMBANKMENT FILL:** Red Brown Clayey **SILT (A-7-5)** |
| | |
| **Hand Auger Refusal at 3.3 feet** | **Groundwater Level: Not Encountered at Time of Augering**<br>**NOTE: Dynamic Cone Penetrometer Testing Performed in General Accordance with ASTM STP-399** |




| | |
|---|---|
| **PROJECT:** | **Four Mile Creek Culvert** |
| **PROJECT NO.:** | **1351-08-001** |
| **LOCATION:** | **S Trade Street - Matthews, NC** |
| **BORING NO.** | **HA-2** |
| **DATE PERFORMED:** | **1/25/2008** |
| **PERFORMED BY:** | **MBL/ZDS** |

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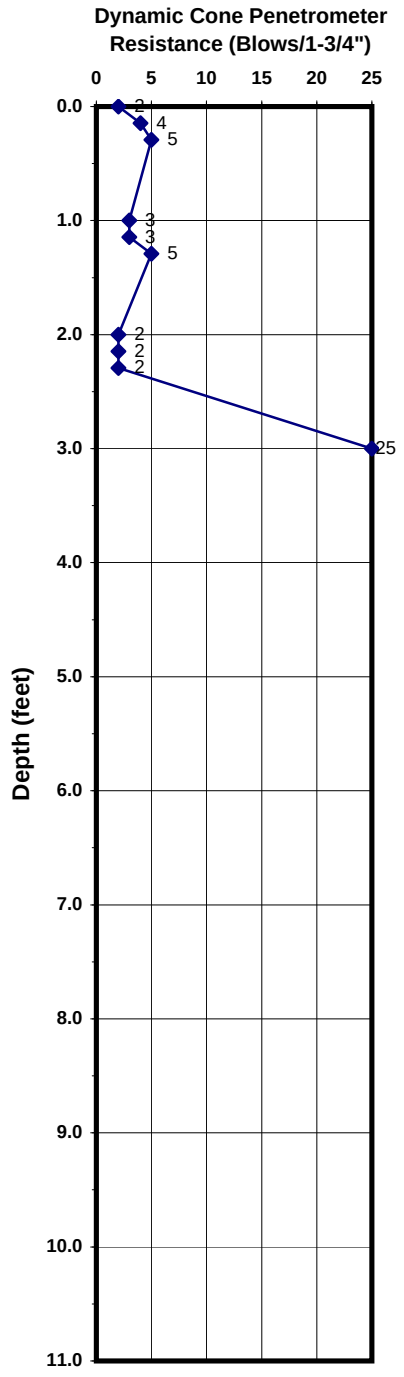
# HAND AUGER/DCP LOG

| DEPTH (FEET) | DESCRIPTION |
|---|---|
| 0 - 1.0 | **RESIDUUM:** Brown Fine Sandy **SILT (A-4)** |
| 1.0 - 2.0 | Red Brown Clayey **SILT (A-7-5)** with rock fragments and pockets of highly plastic clay |
| 2.0 - 3.0 | Red Brown and Gray Silty **CLAY (A-7-6)** |
| | |
| **Hand Auger Refusal at 3 feet** | **Groundwater Level: Not Encountered at Time of Augering**<br>**NOTE: Dynamic Cone Penetrometer Testing Performed in General Accordance with ASTM STP-399** |




| | |
|---|---|
| **PROJECT:** | **Four Mile Creek Culvert** |
| **PROJECT NO.:** | **1351-08-001** |
| **LOCATION:** | **S Trade Street - Matthews, NC** |
| **BORING NO.** | **HA-4** |
| **DATE PERFORMED:** | **1/25/2008** |
| **PERFORMED BY:** | **MBL/ZDS** |

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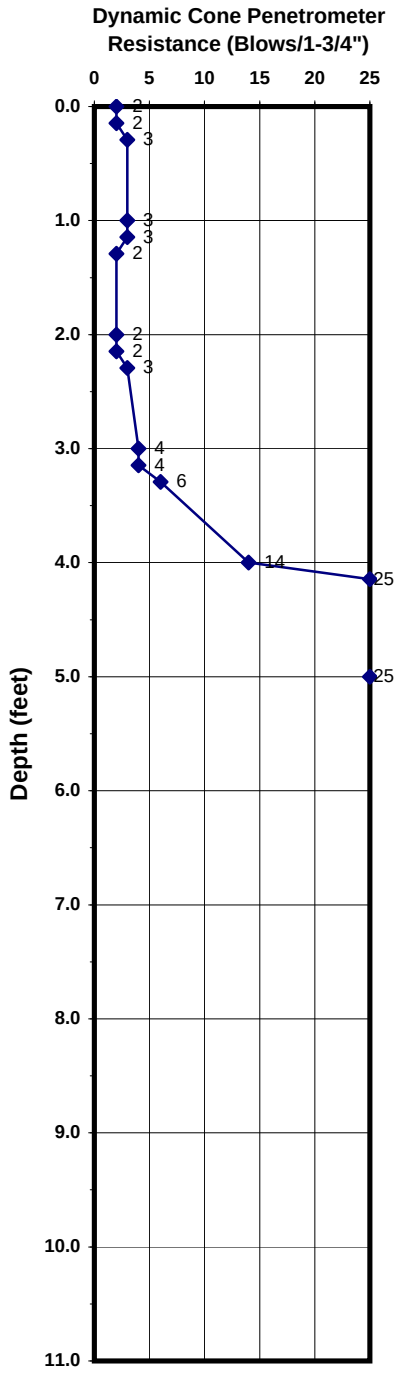
# HAND AUGER/DCP LOG

| DEPTH (FEET) | DESCRIPTION |
|---|---|
| 0 - 2.0 | **RESIDUUM:** Brown Fine Sandy **SILT (A-4)** |
| 2.0 - 3.0 | Brown Clayey **SILT (A-7-5)** |
| 3.0 - 4.0 | Brown Clayey Fine Sandy **SILT (A-4)** (saturated) |
| 4.0 - 5.0 | Tan Fine Sandy **SILT (A-4)** with rock fragments |
| | |
| **Hand Auger Refusal at 5 feet** | **Groundwater Level: Not Encountered at Time of Augering**<br>**NOTE: Dynamic Cone Penetrometer Testing Performed in General Accordance with ASTM STP-399** |




| | |
|---|---|
| **PROJECT:** | **Four Mile Creek Culvert** |
| **PROJECT NO.:** | **1351-08-001** |
| **LOCATION:** | **S Trade Street - Matthews, NC** |
| **BORING NO.** | **HA-5** |
| **DATE PERFORMED:** | **1/25/2008** |
| **PERFORMED BY:** | **MBL/ZDS** |

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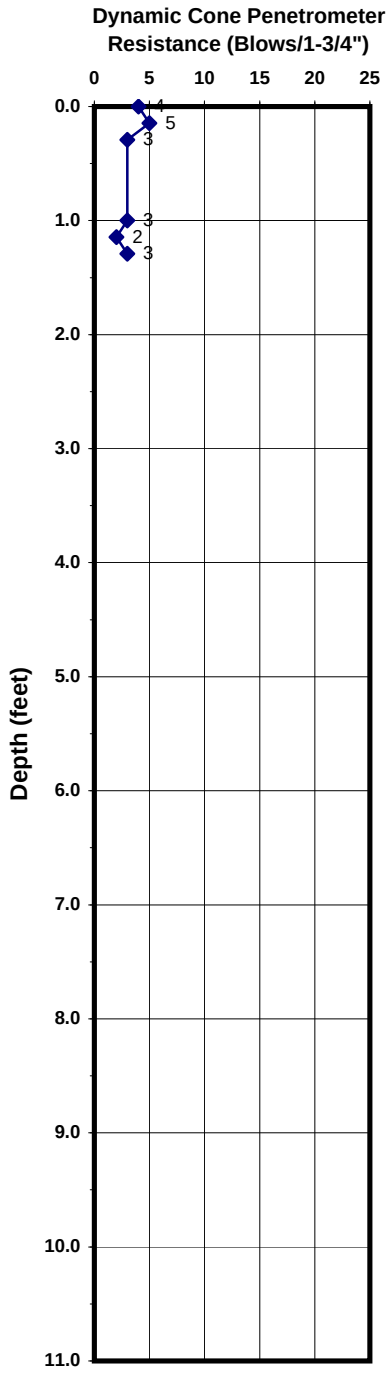
# HAND AUGER/DCP LOG

| DEPTH (FEET) | DESCRIPTION |
|---|---|
| 0 - 2.0 | **RESIDUUM:** Brown Clayey **SILT (A-7-5)** |
| | |
| **Hand Auger Refusal at 2.0 feet** | **Groundwater Level: Not Encountered at Time of Augering**<br>**NOTE: Dynamic Cone Penetrometer Testing Performed in General Accordance with ASTM STP-399** |




| | |
|---|---|
| **PROJECT:** | **Four Mile Creek Culvert** |
| **PROJECT NO.:** | **1351-08-001** |
| **LOCATION:** | **S Trade Street - Matthews, NC** |
| **BORING NO.** | **HA-6** |
| **DATE PERFORMED:** | **1/25/2008** |
| **PERFORMED BY:** | **MBL/ZDS** |

NCDOT GEOTECHNICAL ENGINEERING UNIT

# FIELD PENETROMETER LOG (ENGLISH)

| | | | | | |
|---|---|---|---|---|---|
| PROJECT NUMBER | 1351-08-001B | ID | U-5205 | CO | Mecklenburg |
| GEO | M. Longshore | | | | |
| SITE DESC | S. Trade Street Roadway Widening | | | | |
| BORING NUMBER | BR-1 | STA | | OFFSET FT | |
| ALIGN-MENT | | | | | |
| ELEVATION FT | | TOTAL DEPTH FT | | NORTH | |
| EAST | | | | | |
| DRILL METHOD | Bridge Rod | | | | |
| DRILLER | M. Longshore | | | | |
| START DATE | 01/25/08 | COMP DATE | 01/25/08 | SURFACE WTR DEPTH FT | |
| DEPTH TO ROCK FT | | | | | |

| DEPTH (ft) | BLOW COUNT 0.5 ft | 0.5 ft | TOTAL | BLOWS PER FOOT 0 25 50 75 100 | SAMPLE NO. & INTERVAL | MOI | ORIGIN | SOIL & ROCK DESCRIPTION (SOIL or ROCK NAME (w/ color, density/consistency, texture, plasticity, organics, other)) |
|---|---|---|---|---|---|---|---|---|
| | 1 | 0 | 1 | | | | | |
| | 2 | 8/3" | 10 | | | | | Bridge Rod Termination @ 1.8 Feet (Rock) |
| 5 | | | | | | | | |
| 10 | | | | | | | | |
| 15 | | | | | | | | |
| 20 | | | | | | | | |
| 25 | | | | | | | | |
| 30 | | | | | | | | |
| 35 | | | | | | | | |

NOTES

DECK TO DATUM DISTANCE FT

RED LINE

SIGNATURE DATE

NOTES

NCDOT GEOTECHNICAL ENGINEERING UNIT

# FIELD PENETROMETER LOG (ENGLISH)

| | | | | | |
|---|---|---|---|---|---|
| PROJECT NUMBER | 1351-08-001B | ID | U-5205 | CO | Mecklenburg |
| GEO | M. Longshore | | | | |
| SITE DESC | S. Trade Street Roadway Widening | | | | |
| BORING NUMBER | BR-2 | STA | | OFFSET FT | |
| ALIGN-MENT | | | | | |
| ELEVATION FT | | TOTAL DEPTH FT | | NORTH | |
| EAST | | | | | |
| DRILL METHOD | Bridge Rod | | | DRILLER | M. Longshore |
| START DATE | 01/25/08 | COMP DATE | 01/25/08 | SURFACE WTR DEPTH FT | |
| DEPTH TO ROCK FT | | | | | |

| DEPTH (ft) | BLOW COUNT 0.5 ft | 0.5 ft | TOTAL | BLOWS PER FOOT 0 25 50 75 100 | SAMPLE NO. & INTERVAL | MOI | ORIGIN | SOIL & ROCK DESCRIPTION (SOIL or ROCK NAME (w/ color, density/consistency, texture, plasticity, organics, other)) |
|---|---|---|---|---|---|---|---|---|
| | 1 | 0 | 1 | | | | | |
| | 0 | 3 | 3 | | | | | |
| | 10 | | 10 | | | | | |
| | | | | | | | | Bridge Rod Terminated @ 2.5 feet (Rock) |
| 5 | | | | | | | | |
| 10 | | | | | | | | |
| 15 | | | | | | | | |
| 20 | | | | | | | | |
| 25 | | | | | | | | |
| 30 | | | | | | | | |
| 35 | | | | | | | | |

NOTES

DECK TO DATUM DISTANCE FT

RED LINE

SIGNATURE DATE

NOTES

NCDOT GEOTECHNICAL ENGINEERING UNIT

# FIELD PENETROMETER LOG (ENGLISH)

| | | | | | |
|---|---|---|---|---|---|
| PROJECT NUMBER | 1351-08-001B | ID | U-5205 | CO | Mecklenburg |
| GEO | M. Longshore | | | | |
| SITE DESC | S. Trade Street Roadway Widening | | | | |
| BORING NUMBER | BR-3 | STA | | OFFSET FT | |
| ALIGN-MENT | | | | | |
| ELEVATION FT | | TOTAL DEPTH FT | | NORTH | |
| EAST | | | | | |
| DRILL METHOD | Bridge Rod | | | | |
| DRILLER | M. Longshore | | | | |
| START DATE | 01/25/08 | COMP DATE | 01/25/08 | SURFACE WTR DEPTH FT | |
| DEPTH TO ROCK FT | | | | | |

| DEPTH (ft) | BLOW COUNT 0.5 ft | 0.5 ft | TOTAL | BLOWS PER FOOT 0 25 50 75 100 | SAMPLE NO. & INTERVAL | MOI | ORIGIN | SOIL & ROCK DESCRIPTION (SOIL or ROCK NAME (w/ color, density/consistency, texture, plasticity, organics, other)) |
|---|---|---|---|---|---|---|---|---|
| | 1 | 0 | 1 | | | | | |
| | 1 | | 1 | | | | | Bridge Rod Terminated @ 1.4 feet (Rock) |
| 5 | | | | | | | | |
| 10 | | | | | | | | |
| 15 | | | | | | | | |
| 20 | | | | | | | | |
| 25 | | | | | | | | |
| 30 | | | | | | | | |
| 35 | | | | | | | | |

NOTES

DECK TO DATUM DISTANCE FT

RED LINE

SIGNATURE DATE

NOTES

NCDOT GEOTECHNICAL ENGINEERING UNIT

# FIELD PENETROMETER LOG (ENGLISH)

| | | | | | |
|---|---|---|---|---|---|
| PROJECT NUMBER | 1351-08-001B | ID | U-5205 | CO | Mecklenburg |
| GEO | M. Longshore | | | | |
| SITE DESC | S. Trade Street Roadway Widening | | | | |
| BORING NUMBER | BR-4 | STA | | OFFSET FT | |
| ALIGN-MENT | | | | | |
| ELEVATION FT | | TOTAL DEPTH FT | | NORTH | |
| EAST | | | | | |
| DRILL METHOD | Bridge Rod | | | DRILLER | M. Longshore |
| START DATE | 01/25/08 | COMP DATE | 01/25/08 | SURFACE WTR DEPTH FT | |
| DEPTH TO ROCK FT | | | | | |

| DEPTH (ft) | BLOW COUNT 0.5 ft | 0.5 ft | TOTAL | BLOWS PER FOOT 0 25 50 75 100 | SAMPLE NO. & INTERVAL | MOI | ORIGIN | SOIL & ROCK DESCRIPTION (SOIL or ROCK NAME (w/ color, density/consistency, texture, plasticity, organics, other)) |
|---|---|---|---|---|---|---|---|---|
| | 5 | 4 | 9 | | | | | |
| | 7 | 3 | 10 | | | | | |
| | 8 | 13 | 21 | | | | | Bridge Rod Terminated @ 3.2 feet (Rock) |
| 5 | | | | | | | | |
| 10 | | | | | | | | |
| 15 | | | | | | | | |
| 20 | | | | | | | | |
| 25 | | | | | | | | |
| 30 | | | | | | | | |
| 35 | | | | | | | | |

NOTES

DECK TO DATUM DISTANCE FT

RED LINE

SIGNATURE DATE

NOTES

NCDOT GEOTECHNICAL ENGINEERING UNIT

# FIELD PENETROMETER LOG (ENGLISH)

| | | | | | |
|---|---|---|---|---|---|
| PROJECT NUMBER | 1351-08-001B | ID | U-5205 | CO | Mecklenburg |
| GEO | M. Longshore | | | | |
| SITE DESC | S. Trade Street Roadway Widening | | | | |
| BORING NUMBER | BR-5 | STA | | OFFSET | FT |
| ALIGN-MENT | | | | | |
| ELEVATION | FT | TOTAL DEPTH | FT | NORTH | |
| EAST | | | | | |
| DRILL METHOD | Bridge Rod | | | | |
| DRILLER | M. Longshore | | | | |
| START DATE | 01/25/08 | COMP DATE | 01/25/08 | SURFACE WTR DEPTH | FT |
| DEPTH TO ROCK | FT | | | | |

| DEPTH (ft) | BLOW COUNT 0.5 ft | 0.5 ft | TOTAL | BLOWS PER FOOT 0 25 50 75 100 | SAMPLE NO. & INTERVAL | MOI | ORIGIN | SOIL & ROCK DESCRIPTION (SOIL or ROCK NAME (w/ color, density/consistency, texture, plasticity, organics, other)) |
|---|---|---|---|---|---|---|---|---|
| | 1 | 2/2" | 3 | | | | | Bridge Rod Terminated @ 0.7 feet (Rock) |
| 5 | | | | | | | | |
| 10 | | | | | | | | |
| 15 | | | | | | | | |
| 20 | | | | | | | | |
| 25 | | | | | | | | |
| 30 | | | | | | | | |
| 35 | | | | | | | | |

NOTES

DECK TO DATUM DISTANCE FT

RED LINE

SIGNATURE DATE

NOTES

NCDOT GEOTECHNICAL ENGINEERING UNIT

# FIELD PENETROMETER LOG (ENGLISH)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PROJECT NUMBER | 1351-08-001B | ID | U-5205 | CO | Mecklenburg | GEO | M. Longshore |
| SITE DESC | S. Trade Street Roadway Widening | | | | | | |
| BORING NUMBER | BR-6 | STA | | OFFSET | FT | ALIGN-MENT | |
| ELEVATION | FT | TOTAL DEPTH | FT | NORTH | | EAST | |
| DRILL METHOD | Bridge Rod | | | | | DRILLER | M. Longshore |
| START DATE | 01/25/08 | COMP DATE | 01/25/08 | SURFACE WTR DEPTH | FT | DEPTH TO ROCK | FT |

| DEPTH (ft) | BLOW COUNT 0.5 ft | 0.5 ft | TOTAL | BLOWS PER FOOT 0 25 50 75 100 | SAMPLE NO. & INTERVAL | MOI | ORIGIN | SOIL & ROCK DESCRIPTION (SOIL or ROCK NAME (w/ color, density/consistency, texture, plasticity, organics, other)) |
|---|---|---|---|---|---|---|---|---|
| | 1 | 4/4" | 5 | | | | | Bridge Rod Terminated @ 0.8 feet (Rock) |

NOTES

DECK TO DATUM DISTANCE FT

RED LINE

SIGNATURE DATE

NOTES

NCDOT GEOTECHNICAL ENGINEERING UNIT

# FIELD PENETROMETER LOG (ENGLISH)

| | | | | | |
|---|---|---|---|---|---|
| PROJECT NUMBER | 1351-08-001B | ID | U-5205 | CO | Mecklenburg |
| GEO | M. Longshore | | | | |
| SITE DESC | S. Trade Street Roadway Widening | | | | |
| BORING NUMBER | BR-7 | STA | | OFFSET | FT |
| ALIGN-MENT | | | | | |
| ELEVATION | FT | TOTAL DEPTH | FT | NORTH | |
| EAST | | | | | |
| DRILL METHOD | Bridge Rod | | | | |
| DRILLER | M. Longshore | | | | |
| START DATE | 01/25/08 | COMP DATE | 01/25/08 | SURFACE WTR DEPTH | FT |
| DEPTH TO ROCK | FT | | | | |

| DEPTH (ft) | BLOW COUNT 0.5 ft | 0.5 ft | TOTAL | BLOWS PER FOOT 0 25 50 75 100 | SAMPLE NO. & INTERVAL | MOI | ORIGIN | SOIL & ROCK DESCRIPTION (SOIL or ROCK NAME (w/ color, density/consistency, texture, plasticity, organics, other)) |
|---|---|---|---|---|---|---|---|---|
| | 1 | 4 | 5 | | BR-7 | | | |
| | 1 | | 1 | | | | | Bridge Rod Terminated @ 1.5 feet (Rock) |
| 5 | | | | | | | | |
| | 1 | 1 | 2 | | BR-7A | | | |
| | 2 | 1 | 3 | | | | | |
| | 2 | 4 | 6 | | | | | |
| | 5 | 8 | 13 | | | | | |
| ~~15~~ | 11 | 10 | 21 | | | | | |
| | 17 | 3/2" | 20 | | | | | Bridge Rod Terminated @ 5.7 feet (Rock) |
| 20 | | | | | | | | |
| 25 | | | | | | | | |
| 30 | | | | | | | | |
| 35 | | | | | | | | |

NOTES

DECK TO DATUM DISTANCE FT

RED LINE

SIGNATURE DATE

NOTES

NCDOT GEOTECHNICAL ENGINEERING UNIT

# FIELD PENETROMETER LOG (ENGLISH)

| | | | | | |
|---|---|---|---|---|---|
| PROJECT NUMBER | 1351-08-001B | ID | U-5205 | CO | Mecklenburg |
| GEO | M. Longshore | | | | |
| SITE DESC | S. Trade Street Roadway Widening | | | | |
| BORING NUMBER | BR-8 | STA | | OFFSET | FT |
| ALIGN-MENT | | | | | |
| ELEVATION | FT | TOTAL DEPTH | FT | NORTH | |
| EAST | | | | | |
| DRILL METHOD | Bridge Rod | | | | |
| DRILLER | M. Longshore | | | | |
| START DATE | 01/25/08 | COMP DATE | 01/25/08 | SURFACE WTR DEPTH | FT |
| DEPTH TO ROCK | FT | | | | |

| DEPTH (ft) | BLOW COUNT 0.5 ft | 0.5 ft | TOTAL | BLOWS PER FOOT 0 25 50 75 100 | SAMPLE NO. & INTERVAL | MOI | ORIGIN | SOIL & ROCK DESCRIPTION (SOIL or ROCK NAME (w/ color, density/consistency, texture, plasticity, organics, other)) |
|---|---|---|---|---|---|---|---|---|
| | 1 | 1 | 2 | | | | | |
| | 3 | 5 | 8 | | | | | |
| | 18 | | 18 | | | | | Bridge Rod Terminated @ 2.5 feet (Rock) |
| 5 | | | | | | | | |
| 10 | | | | | | | | |
| 15 | | | | | | | | |
| 20 | | | | | | | | |
| 25 | | | | | | | | |
| 30 | | | | | | | | |
| 35 | | | | | | | | |

NOTES

DECK TO DATUM DISTANCE FT

RED LINE

SIGNATURE DATE

NOTES

NCDOT GEOTECHNICAL ENGINEERING UNIT

# FIELD PENETROMETER LOG (ENGLISH)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PROJECT NUMBER | 1351-08-001B | ID | U-5205 | CO | Mecklenburg | GEO | M. Longshore |
| SITE DESC | S. Trade Street Roadway Widening | | | | | | |
| BORING NUMBER | BR-9 | STA | | OFFSET | FT | ALIGN-MENT | |
| ELEVATION | FT | TOTAL DEPTH | FT | NORTH | | EAST | |
| DRILL METHOD | Bridge Rod | | | | | DRILLER | M. Longshore |
| START DATE | 01/25/08 | COMP DATE | 01/25/08 | SURFACE WTR DEPTH | FT | DEPTH TO ROCK | FT |

| DEPTH (ft) | BLOW COUNT 0.5 ft | 0.5 ft | TOTAL | BLOWS PER FOOT 0 25 50 75 100 | SAMPLE NO. & INTERVAL | MOI | ORIGIN | SOIL & ROCK DESCRIPTION (SOIL or ROCK NAME (w/ color, density/consistency, texture, plasticity, organics, other)) |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Rock at Ground Surface. No Bridge Rod Penetration Possible. |
| 5 | | | | | | | | |
| 10 | | | | | | | | |
| 15 | | | | | | | | |
| 20 | | | | | | | | |
| 25 | | | | | | | | |
| 30 | | | | | | | | |
| 35 | | | | | | | | |

NOTES

DECK TO DATUM DISTANCE FT

RED LINE

SIGNATURE DATE

NOTES

NCDOT GEOTECHNICAL ENGINEERING UNIT

# FIELD PENETROMETER LOG (ENGLISH)

| | | | | | |
|---|---|---|---|---|---|
| PROJECT NUMBER | 1351-08-001B | ID | U-5205 | CO | Mecklenburg |
| GEO | M. Longshore | | | | |
| SITE DESC | S. Trade Street Roadway Widening | | | | |
| BORING NUMBER | BR-10 | STA | | OFFSET | FT |
| ALIGN-MENT | | | | | |
| ELEVATION | FT | TOTAL DEPTH | FT | NORTH | |
| EAST | | | | | |
| DRILL METHOD | Bridge Rod | | | | |
| DRILLER | M. Longshore | | | | |
| START DATE | 01/25/08 | COMP DATE | 01/25/08 | SURFACE WTR DEPTH | FT |
| DEPTH TO ROCK | FT | | | | |

| DEPTH (ft) | BLOW COUNT 0.5 ft | 0.5 ft | TOTAL | BLOWS PER FOOT 0 25 50 75 100 | SAMPLE NO. & INTERVAL | MOI | ORIGIN | SOIL & ROCK DESCRIPTION (SOIL or ROCK NAME (w/ color, density/consistency, texture, plasticity, organics, other)) |
|---|---|---|---|---|---|---|---|---|
| | 2 | 1 | 3 | | | | | |
| | 6 | 6 | 12 | | | | | |
| | | | | | | | | Bridge Rod Terminated @ 2.1 Feet (Rock) |
| 5 | | | | | | | | |
| 10 | | | | | | | | |
| 15 | | | | | | | | |
| 20 | | | | | | | | |
| 25 | | | | | | | | |
| 30 | | | | | | | | |
| 35 | | | | | | | | |

NOTES

DECK TO DATUM DISTANCE FT

RED LINE

SIGNATURE DATE

NOTES

NCDOT GEOTECHNICAL ENGINEERING UNIT

# FIELD PENETROMETER LOG (ENGLISH)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PROJECT NUMBER | 1351-08-001B | ID | U-5205 | CO | Mecklenburg | GEO | M. Longshore |
| SITE DESC | S. Trade Street Roadway Widening | | | | | | |
| BORING NUMBER | BR-11 | STA | | OFFSET | FT | ALIGN-MENT | |
| ELEVATION | FT | TOTAL DEPTH | FT | NORTH | | EAST | |
| DRILL METHOD | Bridge Rod | | | | | DRILLER | M. Longshore |
| START DATE | 01/25/08 | COMP DATE | 01/25/08 | SURFACE WTR DEPTH | FT | DEPTH TO ROCK | FT |

| DEPTH (ft) | BLOW COUNT 0.5 ft | 0.5 ft | TOTAL | BLOWS PER FOOT 0 25 50 75 100 | SAMPLE NO. & INTERVAL | MOI | ORIGIN | SOIL & ROCK DESCRIPTION (SOIL or ROCK NAME (w/ color, density/consistency, texture, plasticity, organics, other)) |
|---|---|---|---|---|---|---|---|---|
| | 1 | 0 | 1 | | | | | |
| | 3/3" | | 3 | | | | | Bridge Rod Terminated @ 1.3 feet (Rock) |
| 5 | | | | | | | | |
| 10 | | | | | | | | |
| 15 | | | | | | | | |
| 20 | | | | | | | | |
| 25 | | | | | | | | |
| 30 | | | | | | | | |
| 35 | | | | | | | | |

NOTES

DECK TO DATUM DISTANCE FT

RED LINE

SIGNATURE DATE

NOTES

NCDOT GEOTECHNICAL ENGINEERING UNIT

# FIELD PENETROMETER LOG (ENGLISH)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PROJECT NUMBER | 1351-08-001B | ID | U-5205 | CO | Mecklenburg | GEO | M. Longshore |
| SITE DESC | S. Trade Street Roadway Widening | | | | | | |
| BORING NUMBER | BR-12 | STA | | OFFSET | FT | ALIGN-MENT | |
| ELEVATION | FT | TOTAL DEPTH | FT | NORTH | | EAST | |
| DRILL METHOD | Bridge Rod | | | | | DRILLER | M. Longshore |
| START DATE | 01/25/08 | COMP DATE | 01/25/08 | SURFACE WTR DEPTH | FT | DEPTH TO ROCK | FT |

| DEPTH (ft) | BLOW COUNT 0.5 ft | 0.5 ft | TOTAL | BLOWS PER FOOT 0 25 50 75 100 | SAMPLE NO. & INTERVAL | MOI | ORIGIN | SOIL & ROCK DESCRIPTION (SOIL or ROCK NAME (w/ color, density/consistency, texture, plasticity, organics, other)) |
|---|---|---|---|---|---|---|---|---|
| | 1 | 0 | 1 | | | | | |
| | 4 | 0 | 4 | | | | | |
| | 3 | 4 | 7 | | | | | |
| | 4 | 10 | 14 | | | | | |
| 5 | 16 | | 16 | | | | | Bridge Rod Terminated @ 4.5 feet (Rock) |
| 10 | | | | | | | | |
| 15 | | | | | | | | |
| 20 | | | | | | | | |
| 25 | | | | | | | | |
| 30 | | | | | | | | |
| 35 | | | | | | | | |

NOTES

DECK TO DATUM DISTANCE FT

RED LINE

SIGNATURE DATE

NOTES

NCDOT GEOTECHNICAL ENGINEERING UNIT

# FIELD PENETROMETER LOG (ENGLISH)

| | | | | | |
|---|---|---|---|---|---|
| PROJECT NUMBER | 1351-08-001B | ID | U-5205 | CO | Mecklenburg | GEO | M. Longshore |
| SITE DESC | S. Trade Street Roadway Widening | | | | | | |
| BORING NUMBER | BR-13 | STA | | OFFSET | FT | ALIGN-MENT | |
| ELEVATION | FT | TOTAL DEPTH | FT | NORTH | | EAST | |
| DRILL METHOD | Bridge Rod | | | | | DRILLER | M. Longshore |
| START DATE | 01/25/08 | COMP DATE | 01/25/08 | SURFACE WTR DEPTH | FT | DEPTH TO ROCK | FT |

| DEPTH (ft) | BLOW COUNT 0.5 ft | 0.5 ft | TOTAL | BLOWS PER FOOT 0 25 50 75 100 | SAMPLE NO. & INTERVAL | MOI | ORIGIN | SOIL & ROCK DESCRIPTION (SOIL or ROCK NAME (w/ color, density/consistency, texture, plasticity, organics, other)) |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Bridge Rod Refusal at surface due to Rock Lined Stream Bed. |
| 5 | | | | | | | | |
| 10 | | | | | | | | |
| 15 | | | | | | | | |
| 20 | | | | | | | | |
| 25 | | | | | | | | |
| 30 | | | | | | | | |
| 35 | | | | | | | | |

NOTES

DECK TO DATUM DISTANCE FT

RED LINE

SIGNATURE DATE

NOTES

NCDOT GEOTECHNICAL ENGINEERING UNIT

# FIELD PENETROMETER LOG (ENGLISH)

| | | | | | |
|---|---|---|---|---|---|
| PROJECT NUMBER | 1351-08-001B | ID | U-5205 | CO | Mecklenburg |
| GEO | M. Longshore | | | | |
| SITE DESC | S. Trade Street Roadway Widening | | | | |
| BORING NUMBER | BR-14 | STA | | OFFSET | FT |
| ALIGN-MENT | | | | | |
| ELEVATION | FT | TOTAL DEPTH | FT | NORTH | EAST |
| DRILL METHOD | Bridge Rod | | | | DRILLER M. Longshore |
| START DATE | 01/25/08 | COMP DATE | 01/25/08 | SURFACE WTR DEPTH | FT |
| DEPTH TO ROCK | FT | | | | |

| DEPTH (ft) | BLOW COUNT 0.5 ft | 0.5 ft | TOTAL | BLOWS PER FOOT 0 25 50 75 100 | SAMPLE NO. & INTERVAL | MOI | ORIGIN | SOIL & ROCK DESCRIPTION (SOIL or ROCK NAME (w/ color, density/consistency, texture, plasticity, organics, other)) |
|---|---|---|---|---|---|---|---|---|
| | 1 | 9 | 10 | | | | | |
| | 7 | 13 | 20 | | | | | |
| | 10 | 15 | 25 | | | | | |
| | 18 | | 18 | | | | | |
| 5 | | | | | | | | Bridge Rod Terminated @ 3.5 Feet (Rock) |
| 10 | | | | | | | | |
| 15 | | | | | | | | |
| 20 | | | | | | | | |
| 25 | | | | | | | | |
| 30 | | | | | | | | |
| 35 | | | | | | | | |

NOTES

DECK TO DATUM DISTANCE FT

RED LINE

SIGNATURE DATE

NOTES

NCDOT GEOTECHNICAL ENGINEERING UNIT

# FIELD PENETROMETER LOG (ENGLISH)

| | | | | | |
|---|---|---|---|---|---|
| PROJECT NUMBER | 1351-08-001B | ID | U-5205 | CO | Mecklenburg |
| GEO | M. Longshore | | | | |
| SITE DESC | S. Trade Street Roadway Widening | | | | |
| BORING NUMBER | BR-15 | STA | | OFFSET | FT |
| ALIGN-MENT | | | | | |
| ELEVATION | FT | TOTAL DEPTH | FT | NORTH | |
| EAST | | | | | |
| DRILL METHOD | Bridge Rod | | | | |
| DRILLER | M. Longshore | | | | |
| START DATE | 01/25/08 | COMP DATE | 01/25/08 | SURFACE WTR DEPTH | FT |
| DEPTH TO ROCK | FT | | | | |

| DEPTH (ft) | BLOW COUNT 0.5 ft | 0.5 ft | TOTAL | BLOWS PER FOOT 0 25 50 75 100 | SAMPLE NO. & INTERVAL | MOI | ORIGIN | SOIL & ROCK DESCRIPTION (SOIL or ROCK NAME (w/ color, density/consistency, texture, plasticity, organics, other)) |
|---|---|---|---|---|---|---|---|---|
| | 15 | 10 | 25 | | | | | Bridge Rod Refusal @ 1 Foot (Rock) |
| 5 | | | | | | | | |
| 10 | | | | | | | | |
| 15 | | | | | | | | |
| 20 | | | | | | | | |
| 25 | | | | | | | | |
| 30 | | | | | | | | |
| 35 | | | | | | | | |

NOTES

DECK TO DATUM DISTANCE FT

SIGNATURE DATE

NOTES

RED LINE


**Core B-5**


**Core B-6**

**Photograph No. 1:**
This photograph was taken from the south creek bank on the west side of Trade Street looking north along the end of the proposed culvert extension.


**Photograph No. 2:**
This photograph was taken from the south creek bank on the west side of Trade Street looking upstream.

**Photograph No. 3:**
This photograph was taken from the south creek bank on the west side of Trade Street looking downstream.

**Photograph No. 4:**
This photograph was taken from the north creek bank on the west side of Trade Street looking south along the end of the proposed culvert extension.


**Photograph No. 5:**
This photograph was taken from the south creek bank on the east side of Trade Street looking downstream.


**Photograph No. 6:**
This photograph was taken from the south creek bank on the east side of Trade Street looking upstream.


**Photograph No. 7:**
This photograph was taken from the south creek bank on the east side of Trade Street looking north along the end of the proposed culvert extension.


**Photograph No. 8:**
This photograph was taken from the north creek bank on the east side of Trade Street looking south along the end of the proposed culvert extension.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING UNIT

# FIELD SCOUR REPORT

WBS: _____ TIP: U-5025 COUNTY: Mecklenburg

DESCRIPTION(1): Proposed arched, bottomless culvert extentions over Four Mile Creek in Matthews, North Carolina

## EXISTING BRIDGE

Information from: Field Inspection X Microfilm ____ (reel ____ pos: ____ )
Other (explain) _____

Bridge No.: N/A Length: N/A Total Bents: N/A Bents in Channel: N/A Bents in Floodplain: N/A
Foundation Type: N/A

**EVIDENCE OF SCOUR(2)**

Abutments or End Bent Slopes: N/A

Interior Bents: N/A

Channel Bed: None observed

Channel Bank: Relatively steep but appear stable; no scour observed

**EXISTING SCOUR PROTECTION**

Type(3): Riprap and boulders

Extent(4): Along creek banks and bed

Effectiveness(5): Highly effective

Obstructions(6): Two fallen trees laying across creek channel observed just west of Trade Street

**INSTRUCTIONS**

**1** Describe the specific site's location, including route number and body of water crossed.
**2** Note scour evidence at existing end bents or abutments (e.g. undermining, sloughing, degradations).
**3** Note existing scour protection (e.g. rip rap).
**4** Describe extent of existing scour protection.
**5** Describe whether or not the scour protection appears to be working.
**6** Note obstructions such as dams, fallen trees, debris at bents, etc.
**7** Describe the channel bed material based on observation and/or samples. Include any lab results with report.
**8** Describe the channel bank material based on observation and/or samples. Include any lab results with report.
**9** Describe the material covering the banks (e.g. grass, trees, rip rap, none).
**10** Determine the approximate floodplain width from field observation or a topographic map.
**11** Describe the material covering the floodplain (e.g. grass, trees, crops).
**12** Use professional judgement to specify if the stream is degrading, aggrading, or static.
**13** Describe potential and direction of the stream to migrate laterally during the bridge's life (approx. 100 years).
**14** Give the design scour elevation (DSE) expected over the life of the bridge (approx. 100 years). This elevation can be given as a range across the site, or for each bent. Discuss the relationship between the Hydraulics Unit theoritical scour and the DSE. If the DSE is dependent on scour counter measures, explain (e.g. rip rap armoring on slopes). The DSE is based on the erodability of materials, giving consideration to the influence of joints, foliation, bedding characteristics, % core recovery, % RQD, differential weathering, shear strength, observations at existing structures, other tests deemed appropriate, and overall geologic conditions at the site.

# DESIGN INFORMATION

Channel Bed Material(7): Brown and Tan Silty Fine to Coarse Sand (A-1-b)

Channel Bank Material(8): Brown Fine Sandy Silt (A-4) and Brown Silty Fine to Medium Sand (A-2-4/A-2-5)

Channel Bank Cover(9): Small to large trees and underbrush

Floodplain Width(10): 100+/- feet on north side of creek and 150+/- feet on south side of creek

Floodplain Cover(11): Fields and wooded areas

Stream is(12): Aggrading ____ Degrading X Static ____

Channel Migration Tendency(13): Migration tendency to the south

Observations and Other Comments: ____

**Reported by:** Matt Longshore / ops **Date:** 3/27/2008
Matt Longshore

**DESIGN SCOUR ELEVATIONS(14)** Feet ____ Meters ____

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

Comparison of DSE to Hydraulics Unit theoretical scour:

**DSE determined by:** ____ **Date:** ____

**SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL**

| Bed or Bank | Creek Bed | | | | | | |
|---|---|---|---|---|---|---|---|
| Sample No. | R-1 | | | | | | |
| Retained #4 | 2 | | | | | | |
| Passed #10 | 98 | | | | | | |
| Passed #40 | 17.2 | | | | | | |
| Passed #200 | 3.6 | | | | | | |
| Coarse Sand | 80.8 | | | | | | |
| Fine Sand | 13.6 | | | | | | |
| Silt | 2.6 | | | | | | |
| Clay | 1 | | | | | | |
| LL | NP | | | | | | |
| PI | NP | | | | | | |
| AASHTO | A-1-b | | | | | | |
| Station | 102+90 | | | | | | |
| Offset | L 65 | | | | | | |
| Depth | 0-1 | | | | | | |