

**PRELIMINARY SITE ASSESSMENT  
PARCEL 001, STATE PROJECT B-4490  
WBS ELEMENT 33727.1.1, CUMBERLAND COUNTY**

**REPLACE BRIDGE NO. 116 OVER CXS RAILROAD,  
NORTH SOUTH RAILROAD, AND HILLSBORO STREET  
ON NC 24-210, FAYETTEVILLE, NORTH CAROLINA**

Schnabel Project 11821014.33  
April 8, 2014





NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
PRELIMINARY SITE ASSESSMENT FOR PARCEL 001  
STATE PROJECT B-4490, WBS ELEMENT 33727.1.1,  
REPLACE BRIDGE NO. 116 OVER CSX RAILROAD,  
NORTH SOUTH RAILROAD, AND HILLSBORO STREET ON NC 24-210  
FAYETTEVILLE, CUMBERLAND COUNTY, NORTH CAROLINA

TABLE OF CONTENTS

1.0	INTRODUCTION.....	2
2.0	BACKGROUND AND SITE DESCRIPTION .....	2
3.0	FIELD METHODOLOGY .....	2
4.0	GROUNDWATER MONITORING WELLS OR REMEDIATION WELLS .....	3
5.0	DISCUSSION OF RESULTS.....	3
6.0	CONCLUSIONS.....	3
7.0	RECOMMENDATIONS.....	4
8.0	LIMITATIONS .....	4

LIST OF TABLES

Table 1, Field Volatile Measurements

LIST OF FIGURES

Figure 1, Vicinity Map  
Figure 2, Site Map  
Figure 3 and 3A, Boring Locations and Legend

APPENDICES

Appendix A, Photographs  
Appendix B, Geophysics Report  
Appendix C, Soil Boring Logs  
Appendix D, Soil Boring GPS Coordinates

## **1.0 INTRODUCTION**

The North Carolina Department of Transportation (NCDOT) is replacing a bridge over CSX Railroad, North South Railroad, and Hillsboro Street on Highway 24/210 (W. Rowan Street) in the town of Fayetteville, located in Cumberland County, North Carolina. Acquisition of properties within the right-of-way (ROW) is necessary prior to road and bridge construction. Schnabel Engineering conducted Preliminary Site Assessments (PSAs) on 10 sites (thirteen parcels) located within the proposed ROW that are of concern to the NCDOT.

This report summarizes the results of field activities conducted during the PSA for the proposed property acquisition area (Study Area) identified by NCDOT on Parcel 001. The property is located at 720 Bragg Boulevard and is occupied by M.A. Customs Auto Body, currently owned by Vail Family Limited Partnership (Figure 1). The property line and topography are shown on Figure 2. The approximate NCDOT project limits that delineate the property acquisition area are shown on Figure 3.

The scope of work executed at the site was performed in general accordance with our cost proposal dated January 23, 2014 and was initiated based on a Notice to Proceed issued by the NCDOT Geotechnical Engineering Unit on January 24, 2014 under contract 7000012208, dated June 2, 2011.

## **2.0 BACKGROUND AND SITE DESCRIPTION**

No structures are located on the ROW of Parcel 001. The surface of the ROW is covered with a paved sidewalk, an asphalt covered entrance driveway, and grassy medians. Overhead electric lines are located along the right-of-way. The information regarding prior site use provided to Schnabel Engineering by NCDOT was that the site was historically used as a car repair facility suggesting the usage of hazardous materials or petroleum products. This PSA is for the investigation of a portion of the parcel. Photographs of the Study Area are presented in Appendix A.

## **3.0 FIELD METHODOLOGY**

Prior to mobilizing to the site to conduct the field investigation, Schnabel Engineering contacted North Carolina One Call to locate underground utilities in the Study Area of the site. Schnabel Engineering mobilized a geophysical crew to the site on January 27, 2014 and performed an electromagnetic survey of the subsurface in the proposed ROW area within the parcel. The electromagnetic survey equipment (EM61-MK2) identified various magnetic anomalies within the Study Area. The Schnabel geophysical crew returned to the Study Area on February 10, 2014 to perform ground penetrating radar (GPR) survey with a Geophysical Survey Systems SIR 3000 equipped with a 400 MHz antenna. Results of the survey suggested the presence of buried utility lines or conduits within the Study Area.

After reviewing the background information and geophysical data, Schnabel returned to Parcel 001 to conduct field screening of soils within the Study Area. Three soil borings designated B-01-01 through B-01-03 were advanced by SAEDACCO of Fort Mill, SC along Bragg Boulevard on February 19, 2014. The location of the soil borings are shown on Figure 3. The borings were advanced to a total depth of 10 to 12 feet below ground surface (bgs). The borings drilled within the Study Area were advanced utilizing a track-mounted Geoprobe® (Model 7822-DT) with direct push probe technology. At the completion of the investigation activities, the borings were backfilled with soil removed from the boring during sampling and/or bentonite chips.

Soils for field screening were obtained from the borings using a MacroCore<sup>®</sup> sampler fitted with a new, single-use, five foot long disposable polyvinyl chloride (PVC) liner. A portion of each 2-foot interval was placed in a separate re-sealable plastic bag. These bags were sealed and placed at ambient temperature for field screening with a MiniRAE Plus photo ionization detector (PID). Volatiles were allowed to accumulate in the headspace of each bag for approximately 15 minutes, and then the headspace of each sealed bag was scanned with the PID. Headspace screening of the soil samples indicated concentrations that ranged from 0 to 4.4 parts per million (ppm) at the boring locations at intervals of two, four, six, eight, and ten feet bgs (Table 1, Field Volatile Measurements). The PID was calibrated on February 19, 2014 in general accordance with the manufacturer's recommended calibration procedures. The PID readings were recorded with the soil descriptions and indications of staining or odors, if present. Logs for each boring are presented in Appendix C.

Soil samples were not submitted for laboratory analysis and Ultra Violet Fluorescence (UVF) was not performed at this parcel because PID readings did not meet or exceed 10 ppm at the screened intervals noted above. Groundwater was not encountered in the proposed drainage easement (PDE) cut area at B-01-01 and B-01-03 at the final bored depth of 12 ft bgs, therefore, groundwater samples were not collected.

Soils collected from borings within the Study Area generally consisted of orangish brown Silty Sand with Clay (SM) or orangish brown Lean Clay with Sand (CL). GPS coordinates for each boring were obtained using a Trimble Pro-XRS DGPS system (Appendix D) with coordinates reported in US State Plane 1983 system, North Carolina 3200 zone, using the NAD 83 datum, with units in US survey feet.

#### **4.0 GROUNDWATER MONITORING WELLS OR REMEDIATION WELLS**

Groundwater monitoring wells and remediation wells were not observed within the proposed ROW or easement on this parcel.

#### **5.0 DISCUSSION OF RESULTS**

The geophysical survey conducted at the site did not indicate the presence of probable USTs on Parcel 001. The geophysical survey did indicate the presence of buried utility lines and conduits.

PID readings were not at or above 10 ppm at the screened intervals at the three borings advanced on this parcel. Staining, odor, and/or visual impact of the soil was not observed in the soil borings.

#### **6.0 CONCLUSIONS**

The EM data include responses from several visible metallic objects at grade (e.g. guy wires, utility meters, etc.). Anomalies were not observed in the EM or the GPR geophysical data at the subject property that we interpret to be the results of metallic USTs within about 6 feet of the ground surface.

Three soil borings B-01-01 through B-01-03 were advanced to evaluate potential petroleum impact within the Study Area, and to document soil conditions. Soil impact at Parcel 001 was not observed during the field investigation.

## **7.0 RECOMMENDATIONS**

Based on the currently available information presented in this report, additional assessment is not recommended.

## **8.0 LIMITATIONS**

This PSA was prepared for the use of the NCDOT. The scope of work performed at the site is limited to the tasks described in our cost proposal dated January 23, 2014. This report is not intended to represent an exhaustive research of all potential hazards that may exist. Schnabel makes no other declarations, or any express or implied warranty, as to the professional services provided under the terms of the agreement.

# TABLES

Table 1, Field Volatile Measurements

**TABLE 1  
FIELD VOLATILE MEASUREMENTS  
PARCEL 001  
NCDOT B-4490, CUMBERLAND COUNTY**

Depth Below Ground Surface	Soil Borings		
	B-01-01	B-01-02	B-01-03
0 - 2 feet	3.0	1.4	0.0
2 - 4 feet	3.1	2.5	0.0
4 - 6 feet	3.8	3.7	0.0
6 - 8 feet	3.7	2.4	0.0
8 - 10 feet	3.9	2.4	NS
10 - 12 feet	4.4	NS	NS

Notes:

NS: Not Screened

Field volatile measurements obtained with a MiniRae Photo Ionization Detector  
Readings in parts per million (ppm)

# FIGURES

Figure 1, Vicinity Map

Figure 2, Site Map

Figure 3 and 3A, Boring Locations and Legend



Source: 1. Cumberland County, NC, GIS Department  
[http://www.co.cumberland.nc.us/is\\_technology/gis.asp](http://www.co.cumberland.nc.us/is_technology/gis.asp)  
 Projection: NAD 1983 StatePlane North Carolina FIPS 3200 Feet

240 120 0 240 Feet  
 Scale: 1:3,000



SITE PROJECT B-4490, PSA PARCELS  
 CUMBERLAND COUNTY, NORTH CAROLINA  
 NC DEPARTMENT OF TRANSPORTATION  
 PROJECT NO. 11821014.33

VICINITY MAP

FIGURE 1

3/25/2014 10:11:52 AM G:\2011-SDE-Jobs\11821014\_00\_NC DOT\_2011\_Geotechnical\_Unit\_Services\11821014\_33\_B-4490\_Cumberland\_County\GIS\Parcel\_001\_Site\_Map.mxd bbradley



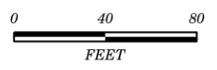
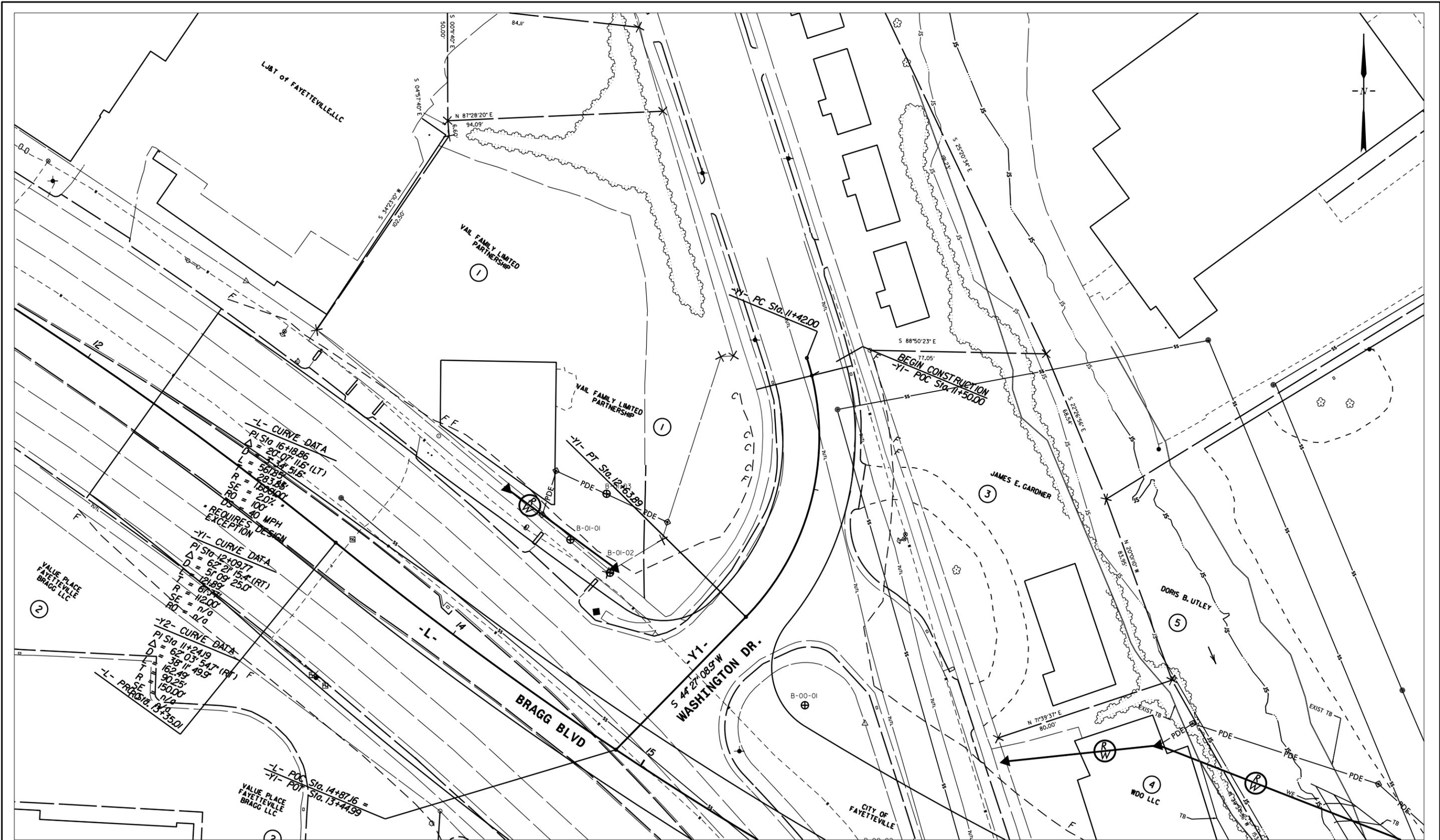
Source: 1. Cumberland County, NC, GIS Department  
[http://www.co.cumberland.nc.us/is\\_technology/gis.aspx](http://www.co.cumberland.nc.us/is_technology/gis.aspx)  
 Projection: NAD 1983 StatePlane North Carolina FIPS 3200 Feet



SITE PROJECT B-4490, PARCEL 001  
 CUMBERLAND COUNTY, NORTH CAROLINA  
 NC DEPARTMENT OF TRANSPORTATION  
 PROJECT NO. 11821014.33

SITE MAP  
 PARCEL 001

FIGURE 2



NC Department of Transportation  
 Geotechnical Engineering Unit  
 State Project No. B-4490  
 Cumberland County, North Carolina

**BORING LOCATIONS**  
 Parcel 001

Figure 3

04/16/11

Note: Not to Scale

\*S.U.E. = Subsurface Utility Engineering

STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

# CONVENTIONAL PLAN SHEET SYMBOLS

### BOUNDARIES AND PROPERTY:

State Line	-----
County Line	-----
Township Line	-----
City Line	-----
Reservation Line	-----
Property Line	-----
Existing Iron Pin	○ EP
Property Corner	-----
Property Monument	□ ECM
Parcel/Sequence Number	②③
Existing Fence Line	-x-x-x-
Proposed Woven Wire Fence	○
Proposed Chain Link Fence	□
Proposed Barbed Wire Fence	◇
Existing Wetland Boundary	-----
Proposed Wetland Boundary	-----
Existing Endangered Animal Boundary	-----
Existing Endangered Plant Boundary	-----
Known Soil Contamination: Boundary or Site	☠
Potential Soil Contamination: Boundary or Site	?

### BUILDINGS AND OTHER CULTURE:

Gas Pump Vent or U/G Tank Cap	○
Sign	○
Well	♀
Small Mine	⊗
Foundation	□
Area Outline	□
Cemetery	†
Building	□
School	□
Church	□
Dam	-----

### HYDROLOGY:

Stream or Body of Water	-----
Hydro, Pool or Reservoir	-----
Jurisdictional Stream	-----
Buffer Zone 1	-----
Buffer Zone 2	-----
Flow Arrow	←
Disappearing Stream	-----
Spring	○
Wetland	-----
Proposed Lateral, Tail, Head Ditch	-----
False Sump	-----

### RAILROADS:

Standard Gauge	-----
RR Signal Milepost	○ MILEPOST 35
Switch	□ SWITCH
RR Abandoned	-----
RR Dismantled	-----

### RIGHT OF WAY:

Baseline Control Point	◆
Existing Right of Way Marker	△
Existing Right of Way Line	-----
Proposed Right of Way Line	-----
Proposed Right of Way Line with Iron Pin and Cap Marker	-----
Proposed Right of Way Line with Concrete or Granite Marker	-----
Existing Control of Access	-----
Proposed Control of Access	-----
Existing Easement Line	-----
Proposed Temporary Construction Easement	-----
Proposed Temporary Drainage Easement	-----
Proposed Permanent Drainage Easement	-----
Proposed Permanent Drainage / Utility Easement	-----
Proposed Permanent Utility Easement	-----
Proposed Temporary Utility Easement	-----
Proposed Aerial Utility Easement	-----

### ROADS AND RELATED FEATURES:

Proposed Permanent Easement with Iron Pin and Cap Marker	◆
Existing Edge of Pavement	-----
Existing Curb	-----
Proposed Slope Stakes Cut	-----
Proposed Slope Stakes Fill	-----
Proposed Curb Ramp	○ CR
Curb Cut Future Ramp	○ CCFR
Existing Metal Guardrail	-----
Proposed Guardrail	-----
Existing Cable Guiderail	-----
Proposed Cable Guiderail	-----
Equality Symbol	⊕
Pavement Removal	-----

### VEGETATION:

Single Tree	○
Single Shrub	○
Hedge	-----
Woods Line	-----

Orchard	-----
Vineyard	-----

### EXISTING STRUCTURES:

MAJOR:	
Bridge, Tunnel or Box Culvert	-----
Bridge Wing Wall, Head Wall and End Wall	-----
MINOR:	
Head and End Wall	-----
Pipe Culvert	-----
Footbridge	-----
Drainage Box: Catch Basin, DI or JB	□ CB
Paved Ditch Gutter	-----
Storm Sewer Manhole	○ S
Storm Sewer	-----

### UTILITIES:

POWER:	
Existing Power Pole	●
Proposed Power Pole	○
Existing Joint Use Pole	●
Proposed Joint Use Pole	○
Power Manhole	○ P
Power Line Tower	⊗
Power Transformer	⊗
U/G Power Cable Hand Hole	-----
H-Frame Pole	-----
Recorded U/G Power Line	-----
Designated U/G Power Line (S.U.E.*)	-----

### TELEPHONE:

Existing Telephone Pole	●
Proposed Telephone Pole	○
Telephone Manhole	○ T
Telephone Booth	□ T
Telephone Pedestal	□ T
Telephone Cell Tower	⊗
U/G Telephone Cable Hand Hole	-----
Recorded U/G Telephone Cable	-----
Designated U/G Telephone Cable (S.U.E.*)	-----
Recorded U/G Telephone Conduit	-----
Designated U/G Telephone Conduit (S.U.E.*)	-----
Recorded U/G Fiber Optics Cable	-----
Designated U/G Fiber Optics Cable (S.U.E.*)	-----

### WATER:

Water Manhole	○ W
Water Meter	○
Water Valve	⊗
Water Hydrant	○ W
Recorded U/G Water Line	-----
Designated U/G Water Line (S.U.E.*)	-----
Above Ground Water Line	-----

### TV:

TV Satellite Dish	☑
TV Pedestal	□
TV Tower	⊗
U/G TV Cable Hand Hole	-----
Recorded U/G TV Cable	-----
Designated U/G TV Cable (S.U.E.*)	-----
Recorded U/G Fiber Optic Cable	-----
Designated U/G Fiber Optic Cable (S.U.E.*)	-----

### GAS:

Gas Valve	◇
Gas Meter	○
Recorded U/G Gas Line	-----
Designated U/G Gas Line (S.U.E.*)	-----
Above Ground Gas Line	-----

### SANITARY SEWER:

Sanitary Sewer Manhole	○ SS
Sanitary Sewer Cleanout	○ SS
U/G Sanitary Sewer Line	-----
Above Ground Sanitary Sewer	-----
Recorded SS Forced Main Line	-----
Designated SS Forced Main Line (S.U.E.*)	-----

### MISCELLANEOUS:

Utility Pole	●
Utility Pole with Base	□
Utility Located Object	○
Utility Traffic Signal Box	□
Utility Unknown U/G Line	-----
U/G Tank; Water, Gas, Oil	-----
Underground Storage Tank, Approx. Loc.	-----
A/G Tank; Water, Gas, Oil	-----
Geoenvironmental Boring	⊗
U/G Test Hole (S.U.E.*)	○
Abandoned According to Utility Records	-----
End of Information	-----

**APPENDIX A**  
**PHOTOGRAPHS**



Parcel 001, facing northeast toward B-01-01.



Parcel 001, facing southeast toward B-01-02 along Bragg Blvd.



Parcel 001, facing northeast toward B-01-01.

**APPENDIX B**  
**GEOPHYSICS REPORT**



March 27, 2014

Mr. Mohammed A. Mulla, P.E., CPM, MCE  
NCDOT, Geotechnical Engineering Unit  
1020 Birch Ridge Drive  
Raleigh, NC 27610

RE:           State Project:   B-4490  
              WBS Element:  33727.1.1  
              County:       Cumberland  
              Description:  Replace Bridge No. 116 over CSX Railroad, North South Railroad, and  
                                  Hillsboro Street on NC 24-210

**Subject:       Project 11821014.33, Report on Geophysical Surveys**  
**Parcel 001, Vail Family Limited Partnership, Fayetteville, North Carolina**

Dear Mr. Mulla:

**SCHNABEL ENGINEERING SOUTH, PC** (Schnabel) is pleased to present this report on the geophysical surveys we performed on the subject property. The report includes two 11x17 inch color figures and two 8.5x11 inch color figures. This study was performed in accordance with our proposal for Geophysical Surveys to Locate Possible USTs dated December 26, 2013, as approved by Terry Farr on January 24, 2014, and our existing agreement dated June 2, 2011. Gordon Box provided a verbal notice to proceed on January 23, 2014.

## **INTRODUCTION**

The field work described in this report was performed on January 27, 2014 and February 7, 2014, by Schnabel. The purpose of the geophysical surveys was to evaluate the potential presence of metal underground storage tanks (USTs) in the accessible areas of the NCDOT right-of-way and/or easement at Parcel 001. Photographs of the property are included on Figure 1. The property is located on the northeast side of the NC 24 (Bragg Boulevard) near the intersection with Washington Drive in Fayetteville, NC.

The geophysical surveys consisted of an electromagnetic (EM) induction survey and a ground penetrating radar (GPR) survey. The EM survey was performed using a Geonics EM61-MK2 (EM61) instrument. The EM61 is a time domain metal detector that stores data digitally for later processing and review. Sensitivity to metallic objects is dependent on the size, depth, and orientation of the buried object and the amount of

noise (i.e. response from spurious metallic objects) in the area. The EM61 can generally observe a single buried 55 gallon drum at a depth of 10 feet or less. The EM61 makes measurements by creating an electromagnetic pulse and then measuring the response from metallic objects over time after the pulse is generated. We measured and recorded the response at several time increments after the pulse to help evaluate relative size and depth of metallic objects in the subsurface.

The GPR survey was performed over selected EM61 anomalies- using a Geophysical Survey Systems SIR-3000 system equipped with a 400 MHz antenna to further investigate and evaluate EM responses that could indicate a potential UST. The depth penetration of the GPR signal, when using a 400 MHz antenna, is normally limited to 6 feet or less.

Photographs of the equipment used are shown on Figure 2.

## **FIELD METHODOLOGY**

We obtained locations of geophysical data points using a sub-meter Trimble Pro-XRS differential global positioning system (DGPS). References to direction and location in this report are based on the US State Plane 1983 System, North Carolina 3200 Zone, using the NAD 83 datum, with units in US survey feet. We also recorded the locations of existing site features (signs, concrete, etc.) with the DGPS for later correlation with the geophysical data and a site plan provided by the NCDOT. The Microstation data provided by the NCDOT appears to be offset from the DGPS data we collected. The amount (approximately 5 feet) and direction (WNW) of offset of the Microstation data appear to be consistent for all parcels where we collected data for this project.

The EM61 data were collected along parallel survey lines spaced approximately 2.5 feet apart. The EM61 and DGPS data were recorded digitally using a field computer and later transferred to a desktop computer for data processing. The GPR data were collected along survey lines spaced approximately one to two feet apart in orthogonal directions over anomalous EM readings not attributed to cultural features. The GPR data were reviewed in the field to evaluate the possible presence of USTs. The GPR data also were recorded digitally and later transferred to a desktop computer for further review.

## **DISCUSSION OF RESULTS**

The contoured EM61 data collected over Parcel 001 and the GPR survey area locations are shown on Figure 3, EM61 Early Time Gate Response, and Figure 4, EM61 Differential Response. Areas outside the colored, contoured EM61 data were not surveyed. Early time data refer to the response measured at a short time after the initial EM pulse is generated. Early time data typically contain responses from all metal objects, small or large and shallow or deep, within the sensitivity range of the instrument. Differential data represent the difference in response between the top and bottom coils of the EM61 instrument at a later time after the initial pulse than early time data. Differential data naturally tend to filter out the effect of surface and very shallowly buried metallic objects. Typically, the differential response emphasizes anomalies from deeper and larger objects such as USTs.

We were not able to access the northernmost portion of the planned survey area due to the presence of thick vegetation. The EM data contain multiple anomalies that we investigated with GPR (as shown on Figures 3 and 4), all of which appear to be the result of buried utilities, reinforced concrete, or other metal

objects at the ground surface or at shallow depths. The geophysical data collected at the site do not indicate the presence of metallic USTs within the areas surveyed.

## **CONCLUSIONS**

As shown in Figures 3 and 4, the EM data we collected over Parcel 001 did not cover portions of the planned survey area due to the presence of thick vegetation within the planned survey area. The EM data include responses from several visible metallic objects at grade (e.g. guy wires, utility meters, etc.). We did not observe anomalies in the EM or the GPR geophysical data at the subject property that we interpret to be the results of metallic USTs within about 6 feet of the ground surface.

## **LIMITATIONS**

These services have been performed and this report prepared for the North Carolina Department of Transportation in accordance with generally accepted guidelines for conducting geophysical surveys. It is generally recognized that the results of geophysical surveys are non-unique and may not represent actual subsurface conditions.

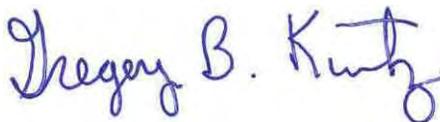
We appreciate the opportunity to have provided these services. Please call if you need additional information or have any questions.

Sincerely,

### **SCHNABEL ENGINEERING SOUTH, PC**



James W. Whitt, LG  
Senior Staff Geophysicist



Gregory B. Kuntz, LG  
Senior Associate

JWW:JCD:GBK

Attachments: Figures (4)

CC: NCDOT, Gordon Box

FILE: G:\2011-SDE-JOBS\11821014\_00\_NCDOT\_2011\_GEOTECHNICAL\_UNIT\_SERVICES\11821014\_33\_B-4490\_CUMBERLAND\_COUNTY\REPORT\GEOPHYSICS\PARCEL 01\SCHNABEL  
GEOPHYSICAL REPORT ON PARCEL 1 (B-4490) FINAL.DOCX

#### **Attachments:**

- Figure 1 - Parcel 001 Site Photos
- Figure 2 - Photos of Geophysical Equipment Used
- Figure 3 - EM61 Early Time Gate Response
- Figure 4 - EM61 Differential Response



Parcel 001 (Vail Family Limited Property), looking east



Parcel 001 (Vail Family Limited Property), looking northeast



Geonics EM61-MK2 Metal Detector with Trimble DGPS Unit



GSSI SIR-3000 Ground-Penetrating Radar with 400 MHz Antenna

Note: Stock photographs – not taken on site.

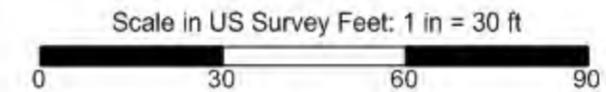
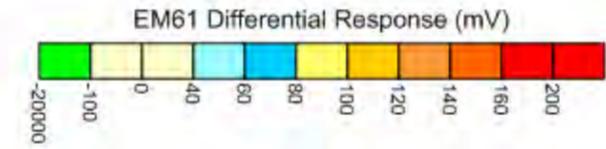
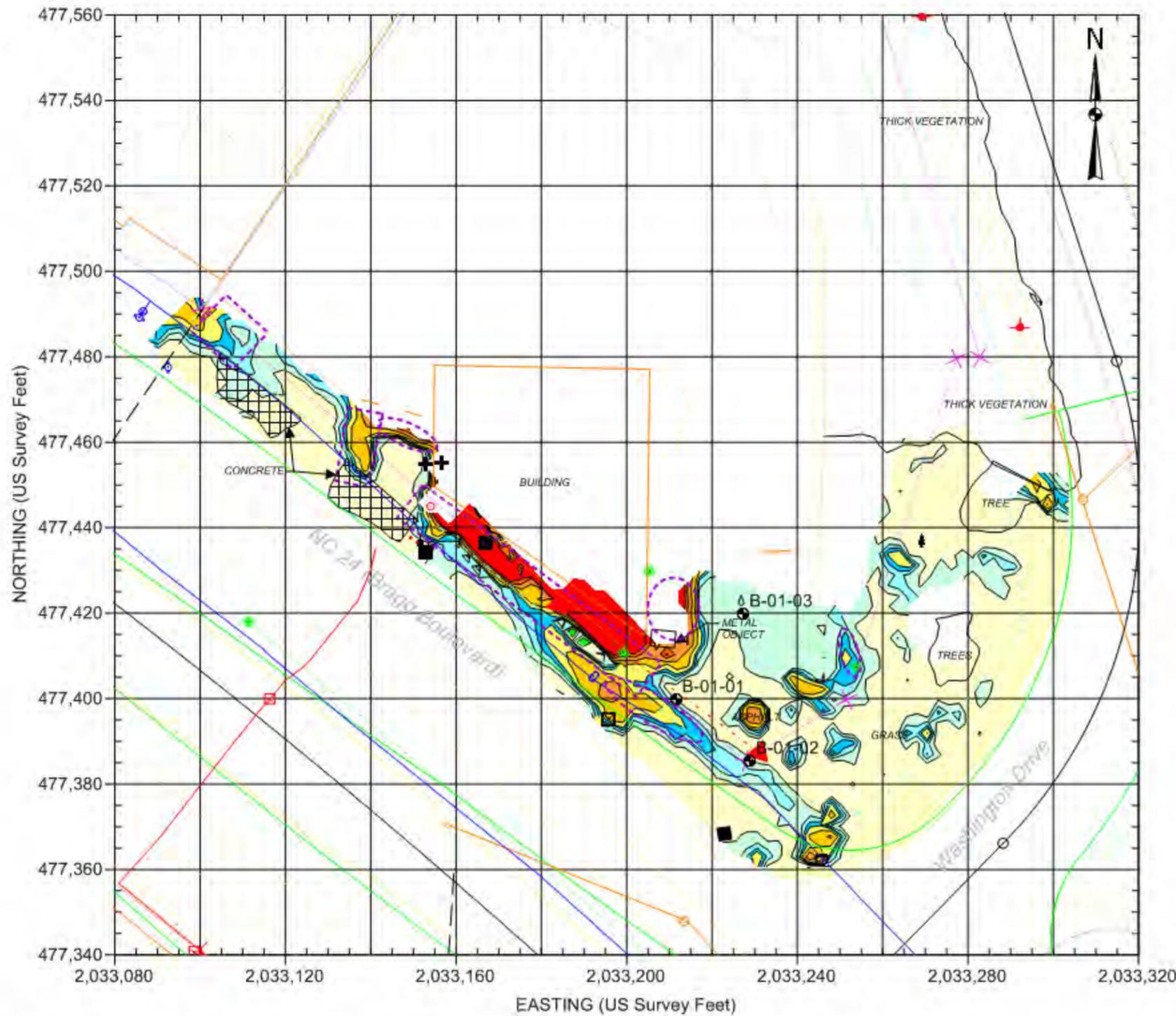


STATE PROJECT B-4490  
NC DEPT. OF TRANSPORTATION  
CUMBERLAND CO., NORTH CAROLINA  
PROJECT NO. 11821014.33

PHOTOS OF  
GEOPHYSICAL  
EQUIPMENT USED

FIGURE 2

PARCEL 001



EXPLANATION	
	SIGN
	MISCELLANEOUS METALLIC OBJECT
	UTILITY MANHOLE, METER, BOX, ETC.
	GUY WIRE
	UTILITY POLE
	EDGE OF NCDOT PROPOSED RW
	PROPERTY LINE
	GPR SURVEY AREA
	BORING LOCATION

BASE PLAN FROM NCDOT FILE:  
 B-4490\_rdy\_psh\_04.dgn &  
 B-4490\_rdy\_psh\_05.dgn  
 (FOR SOME SITE FEATURES)

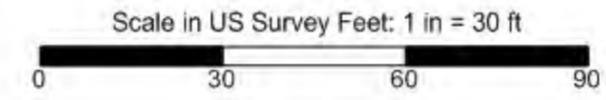
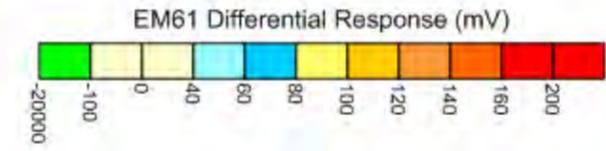
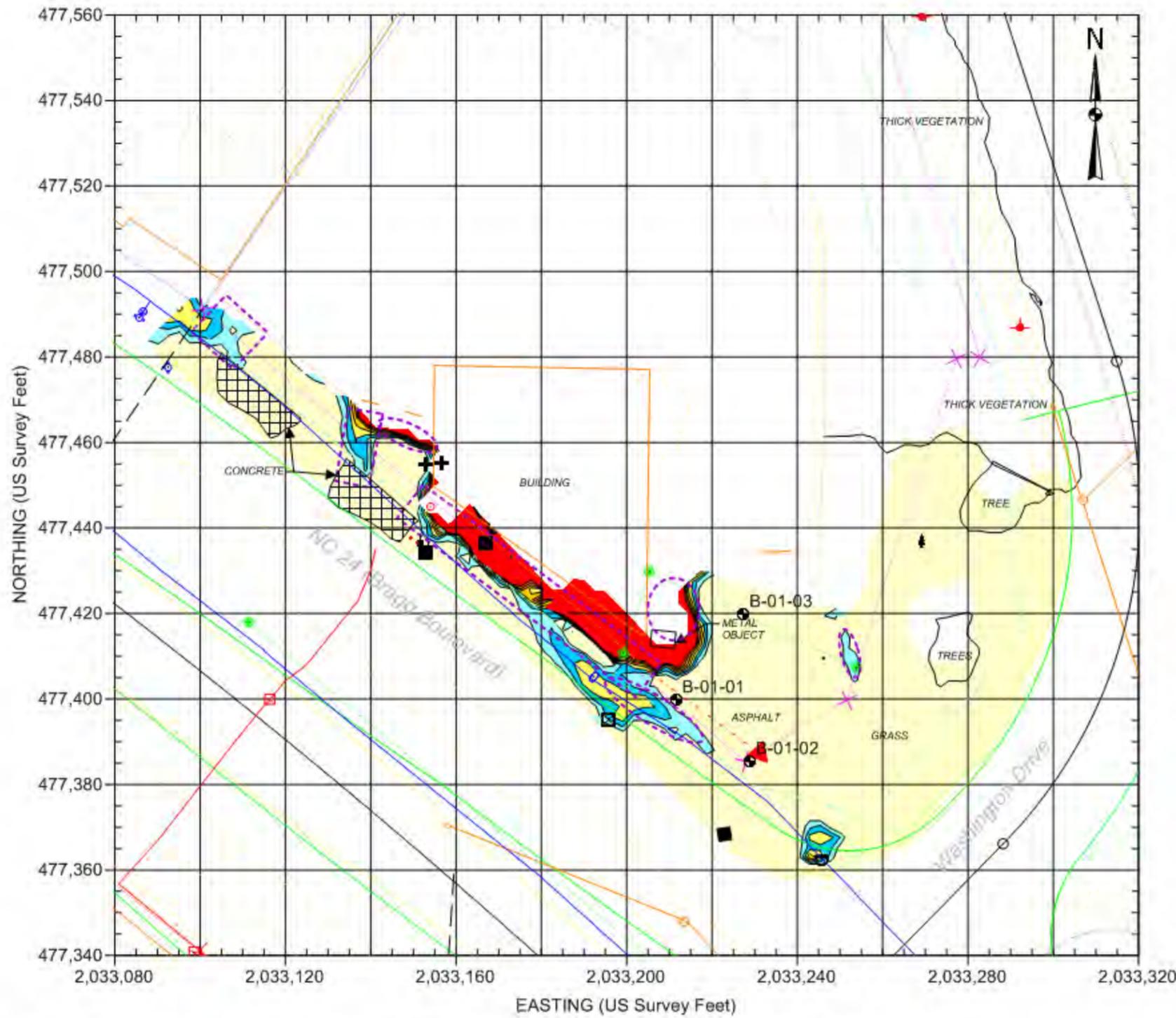
Note: The contour plot shows the difference, in millivolts (mV), between the readings from the top and bottom coils of the EM61. The difference is taken to reduce the effect of shallow metal objects and emphasize anomalies caused by deeper metallic objects, such as drums and tanks. The EM data were collected on January 27, 2014, using a Geonics EM61-MK2 instrument. Positioning for the EM61 survey was provided using a submeter Trimble ProXRS DGPS system. Coordinates are in the US State Plane 1983 System, North Carolina 3200 Zone, using the NAD 1983 datum. GPR data were acquired on February 7, 2014, using a Geophysical Survey Systems SIR 3000 equipped with a 400 MHz antenna.



STATE PROJECT B-4490  
 NC DEPARTMENT OF TRANSPORTATION  
 CUMBERLAND COUNTY, NC  
 PROJECT NO. 11821014.33

EM61  
 EARLY TIME GATE  
 RESPONSE

PARCEL 001



EXPLANATION	
	SIGN
	MISCELLANEOUS METALLIC OBJECT
	UTILITY MANHOLE, METER, BOX, ETC.
	GUY WIRE
	UTILITY POLE
	EDGE OF NCDOT PROPOSED RW
	PROPERTY LINE
	GPR SURVEY AREA
	BORING LOCATION

BASE PLAN FROM NCDOT FILE:  
 B-4490\_rdy\_psh\_04.dgn &  
 B-4490\_rdy\_psh\_05.dgn  
 (FOR SOME SITE FEATURES)

Note: The contour plot shows the difference, in millivolts (mV), between the readings from the top and bottom coils of the EM61. The difference is taken to reduce the effect of shallow metal objects and emphasize anomalies caused by deeper metallic objects, such as drums and tanks. The EM data were collected on January 27, 2014, using a Geonics EM61-MK2 instrument. Positioning for the EM61 survey was provided using a submeter Trimble ProXRS DGPS system. Coordinates are in the US State Plane 1983 System, North Carolina 3200 Zone, using the NAD 1983 datum. GPR data were acquired on February 7, 2014, using a Geophysical Survey Systems SIR 3000 equipped with a 400 MHz antenna.

	STATE PROJECT B-4490 NC DEPARTMENT OF TRANSPORTATION CUMBERLAND COUNTY, NC PROJECT NO. 11821014.33	EM61 DIFFERENTIAL RESPONSE FIGURE 4
--	---	--

**APPENDIX C**  
**SOIL BORING LOGS**



**GEO PROBE LOG**

**Project:** Preliminary Site Assessments  
Cumberland County  
Fayetteville, North Carolina

**Geo Probe Number:** **B-01-01**  
**Contract Number:** B-4490  
**Sheet:** 1 of 1

**Contractor:** Saedacco, Inc.  
Fort Mill, South Carolina  
**Contractor Foreman:** W. Hall  
**Schnabel Representative:** B. Bradley  
**Equipment:** Geoprobe 7822DT  
**Method:** 3-1/4" Probe Rod,  
Macrocore  
**Hammer Type:**  
**Dates Started:** 2/19/14 **Finished:** 2/19/14  
**X:** 477399.794 m **Y:** 2033211.533 m  
**Ground Surface Elevation:** **Total Depth:** 12.0 ft

Groundwater Observations					
	Date	Time	Depth	Casing	Caved
<b>Completion</b>	2/19	8:13 AM	Moist	---	---

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOL	ELEV (ft)	STRATUM	SAMPLING DATA		TESTS	REMARKS
					DEPTH	DATA		
0.2	Asphalt							
	PROBABLE FILL, sampled as silty sand with clay; moist, orangeish brown	FILL					PID = 3 ppm	
3.0	LEAN CLAY WITH SAND; moist, orangeish brown, estimated 5 - 10% fine grained sand	CL			5		PID = 3.1 ppm	
6.0	SILTY SAND WITH CLAY; moist, orangeish brown	SM					PID = 3.8 ppm	
							PID = 3.7 ppm	
10.0	SILTY SAND; moist, dark brownish gray, probable RESIDUAL material	SM			10		PID = 3.9 ppm	
12.0							PID = 4.4 ppm	

Bottom of Geo Probe at 12.0 ft.  
Boring terminated at selected depth.  
Boring backfilled with bentonite and cuttings upon completion.

TEST BORING LOG PSA.GPJ SCHNABEL DATA TEMPLATE 2008\_07\_06.GDT 3/27/14



**GEO PROBE LOG**

**Project:** Preliminary Site Assessments  
Cumberland County  
Fayetteville, North Carolina

**Geo Probe Number:** **B-01-02**  
**Contract Number:** B-4490  
**Sheet:** 1 of 1

**Contractor:** Saedacco, Inc.  
Fort Mill, South Carolina  
**Contractor Foreman:** W. Hall  
**Schnabel Representative:** B. Bradley  
**Equipment:** Geoprobe 7822DT  
**Method:** 3-1/4" Probe Rod,  
Macrocore  
**Hammer Type:**  
**Dates Started:** 2/19/14 **Finished:** 2/19/14  
**X:** 477385.381 m **Y:** 2033228.825 m  
**Ground Surface Elevation:** **Total Depth:** 10.0 ft

Groundwater Observations					
	Date	Time	Depth	Casing	Caved
<b>Completion</b>	2/19	8:01 AM	Moist	---	---

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOL	ELEV (ft)	STRATUM	SAMPLING DATA		TESTS	REMARKS
					DEPTH	DATA		
0.2	Asphalt							
	PROBABLE FILL, sampled as silty sand with clay; moist, orangeish brown	FILL					PID = 1.4 ppm	
3.0	LEAN CLAY WITH SAND; moist, orangeish brown, estimated 5 - 10% fine grained sand	CL			5		PID = 2.5 ppm	
6.0	SILTY SAND; moist, streaked orangeish brown, probable RESIDUAL material	SM					PID = 3.7 ppm	
7.5	LEAN CLAY WITH SAND; moist, orangeish brown, probable RESIDUAL material	CL					PID = 2.4 ppm	
9.0	SILTY SAND; moist, orangeish brown, probable RESIDUAL material	SM						
10.0	SILTY SAND; moist, orangeish brown, probable RESIDUAL material	SM			10		PID = 2.4 ppm	

Bottom of Geo Probe at 10.0 ft.  
Boring terminated at selected depth.  
Boring backfilled with bentonite and cuttings upon completion.

TEST BORING LOG PSA.GPJ SCHNABEL DATA TEMPLATE 2008\_07\_06.GDT 3/27/14



**Project:** Preliminary Site Assessments  
Cumberland County  
Fayetteville, North Carolina

**Geo Probe Number:** B-01-03  
**Contract Number:** B-4490  
**Sheet:** 1 of 1

**Contractor:** Saedacco, Inc.  
Fort Mill, South Carolina  
**Contractor Foreman:** W. Hall  
**Schnabel Representative:** B. Bradley  
**Equipment:** Geoprobe 7822DT  
**Method:** 3-1/4" Probe Rod,  
Macrocore  
**Hammer Type:**  
**Dates Started:** 2/19/14 **Finished:** 2/19/14  
**X:** 477419.804 m **Y:** 2033227.348 m  
**Ground Surface Elevation:** **Total Depth:** 10.0 ft

Groundwater Observations					
	Date	Time	Depth	Casing	Caved
<b>Completion</b>	2/19	8:18 AM	Moist	---	---

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOL	ELEV (ft)	STRATUM	SAMPLING DATA		TESTS	REMARKS
					DEPTH	DATA		
0.2	Asphalt							
	PROBABLE FILL, sampled as lean clay with sand; moist, orangeish brown, estimated 5 - 10% gravel, Gravel at 2.5 to 3.5 ft	FILL					PID = 0.0 ppm	
							PID = 0.0 ppm	
5.0	PROBABLE FILL, sampled as silty sand with clay; moist, orangeish brown, estimated 15 - 25% construction debris, Mortar, masonry, cinder block, wood from 8.5 to 9.8 ft	FILL			5		PID = 0.0 ppm	
							PID = 0.0 ppm	
9.8	SILTY SAND; moist, orangeish brown, probable RESIDUAL material	SM			10			
10.0								

Bottom of Geo Probe at 10.0 ft.  
Boring terminated at selected depth.  
Boring backfilled with bentonite and cuttings upon completion.

TEST BORING LOG PSA.GPJ SCHNABEL DATA TEMPLATE 2008\_07\_06.GDT 3/27/14

**APPENDIX D**  
**SOIL BORING GPS COORDINATES**

**SOIL BORING GPS COORDINATES  
NCDOT B-4490, CUMBERLAND COUNTY**

<b>Soil Boring GPS Coordinates</b>		
Boring Identification	Easting	Northing
	X	Y
B-01-01	2033211.533	477399.794
B-01-02	2033228.825	477385.381
B-01-03	2033227.348	477419.804

\* NC State Plane 1983 System, NC 3200 Zone,  
NAD 83 Datum, US Survey Feet