

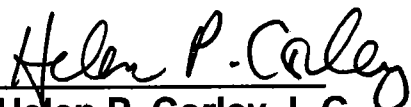


**NC Department of Transportation  
Preliminary Site Assessment  
State Project: R-4047  
WBS Element: 34599.1.1**

**Michael Daggy Property  
Site #4  
October 23, 2009**

**AMEC Earth and Environmental, Inc. of North Carolina  
AMEC Project: 562114047**

  
**Troy L. Holzschuh  
Engineering Technician**

  
**Helen P. Corley, L.G.  
Program Manager**

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## **1.0 INTRODUCTION**

In accordance with the North Carolina Department of Transportation (NCDOT) Notice to Proceed dated August 24, 2009, AMEC Earth and Environmental, Inc. of North Carolina (AMEC) has performed a Preliminary Site Assessment (PSA) for the Michael Daggy Property (the Site) to be acquired for a road widening project along Hwy 209 (Crabtree Road). Michael Daggy owns the property, which is identified as Site #4 within the NCDOT R-4047 design project. The property is located on Old Clyde Road in Waynesville, Haywood County, North Carolina. The investigation was conducted in accordance with AMEC's Technical and Cost proposal dated August 24, 2009.

NCDOT contracted AMEC to perform a PSA on the Michael Daggy Property due to usage of Underground Storage Tanks (UST) on the property. The property currently operates as Clear View Glass and Mirror (the Site). The PSA was performed to determine if soils have been impacted by petroleum compounds as a result of past or present uses of the property within the proposed expanded right-of-way (ROW). The investigation was specifically completed to estimate the volume of petroleum hydrocarbons in soil within the proposed ROW.

The following report describes our field investigations and results of chemical analyses. It includes the evaluation of the analytical data with regards to the presence or absence of soil contamination within the proposed right-of-way (ROW) and estimates the extent of soil contamination.

### **1.1 Site Location and History**

The Michael Daggy Property is located on the east side of Hwy 209 (Crabtree Road) at the intersection of Old Clyde Rd in Waynesville, Haywood County, North Carolina. It is located within the Sedimentary and Metamorphic sediments of the Blue Ridge Belt Physiographic Province of western North Carolina. Figure 1 shows the site location and vicinity.

AMEC studied the NCDENR UST Database for Incident Management and Registered Facilities and discovered groundwater incident #7217 associated with this property. According to the UST Database, the property formerly operated as a gas station and the incident has not been closed. However, no recent assessment activities are evident.

## **1.2 Site Description**

One single story building with a basement level occupies the Site. The proposed road widening will traverse the length of Site #4. Figure 2 presents the Site Location Map. Appendix 1 includes a photo log for the Site. During reconnaissance, AMEC observed one monitoring well and from it recorded a total depth of 20.35 feet below ground surface (bgs) and a depth to groundwater of 13.3 feet bgs. A strong petroleum odor was evident during the measurements taking in this well, located on the east side of the building. Based on the report provided by Schnabel Engineering South of Greensboro, North Carolina, an anomaly was discovered near the southern corner of the building, suspected to be a UST, with a capacity of approximately 550 gallons.

The Property east of the Site is a residential property. The property to the south, across Old Clyde Road, is a commercial property occupied by Biller Automotive. The property to the west, across Hwy 209 is an office building. The property to the north is an empty lot.

## **2.0 GEOLOGY**

### **2.1 Regional Geology**

The Michael Daggy Property is located within the Biotite Gneiss group of the Blue Ridge Belt Physiographic Province of western North Carolina. The Biotite Gneiss group is migmatic, interlayered and gradational with biotite garnet gneiss and amphibolite.

### **2.2 Site Geology**

Site geology was observed through the sampling of 12 shallow direct push probe borings onsite. Borings extended to total depths ranging from 10 to 15 feet below ground surface (bgs). Soils generally consisted of yellow-orange to brown, micaceous clayey silt. Boring logs are presented in Appendix 2.

Saturated conditions in soil were first encountered in 10 of the 12 borings at a depth ranging from 10 to 15 feet bgs.

## **3.0 FIELD ACTIVITIES**

### **3.1 Preliminary Activities**

Prior to commencing field activities at the site, several tasks were accomplished in preparation for the subsurface investigation. The Health and Safety Plan (HSP) was modified to include the site-specific health and safety information necessary for the field activities. North Carolina-1-Call was contacted to facilitate the location of underground utilities in the vicinity of selected boring locations. Priority Underground Locating Services of Huntersville, North Carolina was coordinated by AMEC for utility locating services. SAEDACCO (South Atlantic Environmental Drilling and Construction Co.) of Fort Mill, South Carolina was retained by AMEC to perform the direct push sampling for soil borings. AMEC coordinated with Schnabel Engineering South (Schnabel) who performed two geophysical surveys (electromagnetic and ground penetrating radar) onsite during August. The geophysical results were reviewed and discussed at the completion of each survey. Prism Laboratories, Inc. was contacted for acquisition of sample bottles. Soil boring locations were focused around the UST bed, with additional borings placed to delineate contamination.

### **3.2 Site Reconnaissance**

AMEC personnel completed site reconnaissance on August 5, 2009. The area was visually examined for the presence of any UST or areas/obstructions that could potentially affect the subsurface investigation and the geophysical subcontractor was met in the field. Marking of boring locations occurred on September 1, 2009.

### **3.3 Well Survey**

No well survey was performed as part of this PSA and no water supply wells were observed by AMEC on the site.

### **3.4 Soil Sampling**

Soil boring occurred on September 1, 2009 at Site #4. Four direct push soil borings were located at the intersection of two corridors (Hwy 209 and Old Clyde Road) on Site #4. Figure 2 presents the Site Map with sample locations. Five borings were spread toward the northeast, in front of the existing building and three borings were spread toward the end of

the eastern corridor. These samples were staggered to optimize the likelihood of intercepting any potential soil contamination. Borings could not be located any more closely to the possible UST at the southernmost building corner due to a large sewer main in the subsurface that ran along the building front from northeast to southwest and a nearby above ground power pole.

The first five soil borings, SB-1 through SB-5, did not show any signs of staining, odor or significant Photo Ionization Detector (PID) reading. Soil borings SB-6 and SB-7 produced a slightly elevated PID reading, warranting a second sampling for each boring. Soil boring SB-7 was located northeast of SB-6, approximately 10 feet away. SB-6 produced the highest PID readings of 1,713 parts per million (ppm). These soil borings are just north of the tank bed of the possible UST and they flank the one onsite monitoring well. SB-8 through SB-12 did not indicate significant readings on the PID, nor show signs of petroleum staining or have noticeable petroleum odors.

Overall for the Site, evidence of potential soil contamination was identified by field observations (i.e. petroleum odors, petroleum staining, PID response) in two of the borings. PID screening results are incorporated in Table 1. No groundwater or surface water samples were collected.

Soil samples were collected in accordance with EPA protocols in laboratory-supplied containers. The soil samples for Total Petroleum Hydrocarbons (TPH) –Gasoline Range Organics (GRO) analysis were collected using the 5030 prep method with methanol preservation. Samples for TPH-Diesel Range Organics (DRO) analysis were collected in 4oz. glass containers. Once placed in the containers, the samples were labeled with the sample number, time of collection, date of collection, name of the collector, and the requested analysis. The samples were packed on ice, and then hand delivered to Prism Laboratories, a North Carolina Certified Laboratory following proper chain-of-custody procedures.

## **4.0 RESULTS**

### **4.1 Soil Sampling Results**

AMEC conducted soil sampling at the Site on September 1, 2009. The purpose of the sampling was to determine if releases of petroleum hydrocarbons had occurred, and if so, to estimate the volume of soil that might require special handling during construction

activities. The sampling was accomplished using direct push methods accompanied by field screening for organic vapors with a PID. The laboratory results are tabulated in Table 1 and shown on Figure 3.

A minimum of one soil sample was collected from each of the 12 soil borings from Site #4. If impacted soil was identified, additional soil samples were obtained. PID readings warranted that two additional samples be acquired.

Analyses of soil samples for DRO indicated two locations with concentrations above the 10 mg/kg NCDENR Initial Action Level for TPH in soil. The deeper samples from SB-6 and SB-7 had values of 330 mg/kg from 10-12 foot bgs and 48 mg/kg from 13-14 foot bgs, respectively.

Laboratory analyses indicated that at Site #4 GRO exceeded the 10 mg/kg NCDENR Initial Action Level for TPH in soil in just the same two soil samples. Samples SB-6-1 and SB-7-1 had values of 540 mg/kg and 130 mg/kg, respectively. Copies of the original laboratory report and chain-of-custody documentation are included as Appendix 3.

## 4.2 Extent of Impacted Soils

This investigation and analytical program were implemented to determine the presence or absence of petroleum hydrocarbons and, if possible, to estimate the volume of impacted soil present within the proposed expanded ROW. For the purposes of this PSA it was assumed that soil excavation activities would not extend to groundwater.

The only area of confirmed GRO/DRO contamination in soil was centered on borings SB-6 and SB-7. This is also the area with the existing monitoring well. The shallower samples in both borings did not indicate petroleum impact. The soil impact was identified within, on average, a 4 foot vertical section of soil located near the water table. However, the soil impact observed in boring SB-6 began at a shallower depth than in SB-7. This suggests that the source would be closer to SB-6 than SB-7 and could be the possible UST identified near the southern corner of the building. Existing underground and above ground utilities prevented drilling more borings closer to the UST. The area of the footprint of soil contamination based on soil borings done to date is shown on Figure 4, and is estimated to be 527 square feet. Assuming a 4 foot thickness, this volume of potentially impacted soil equates to 2,108 cubic feet or 78 cubic yards. This area, as drawn, is beyond the cut line and the proposed ROW, thus may not affect any roadway construction.



## 5.0 CONCLUSIONS

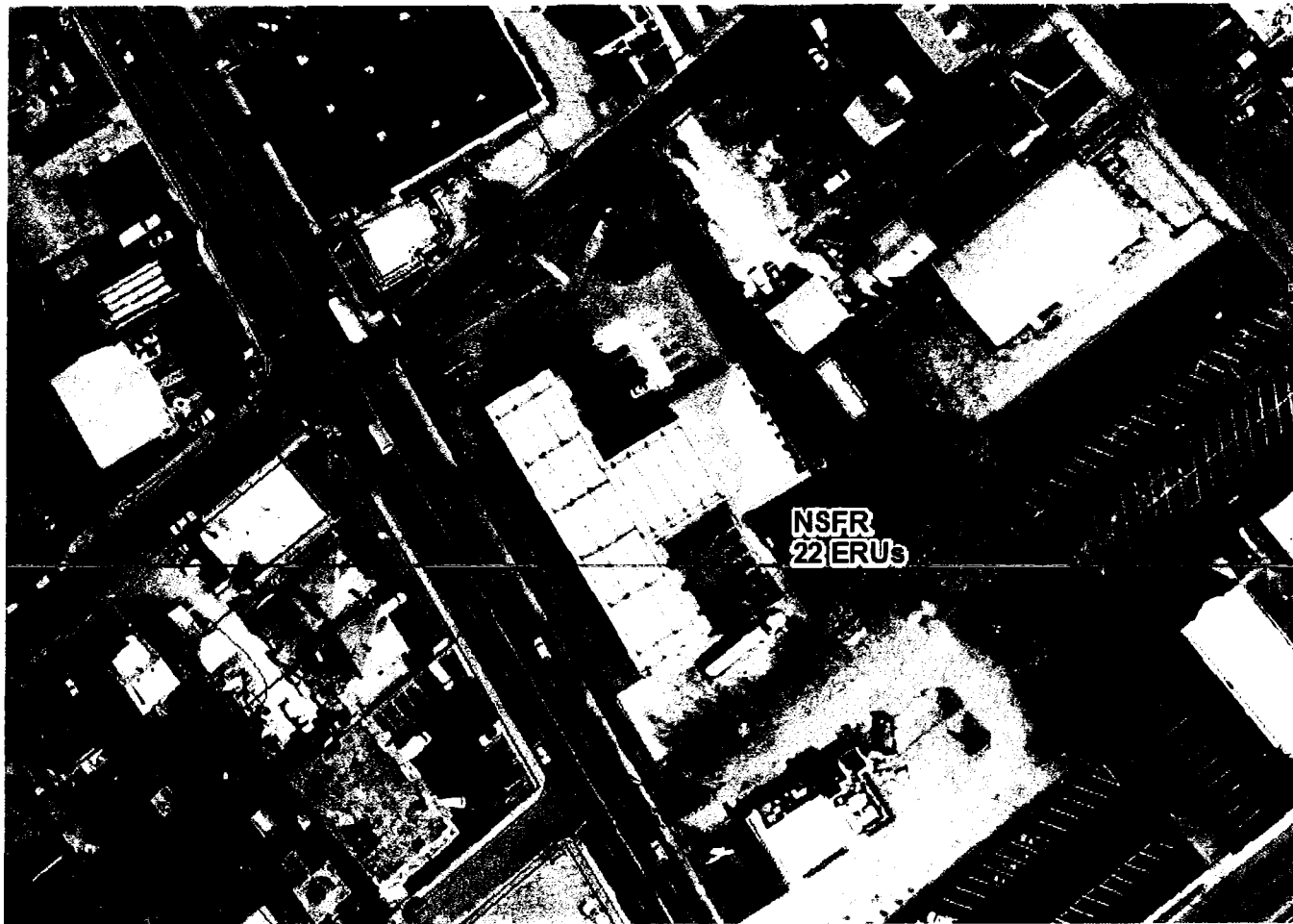
The following conclusions are based upon AMEC's evaluation of field observations and laboratory analyses of samples collected from the Site on September 1, 2009.

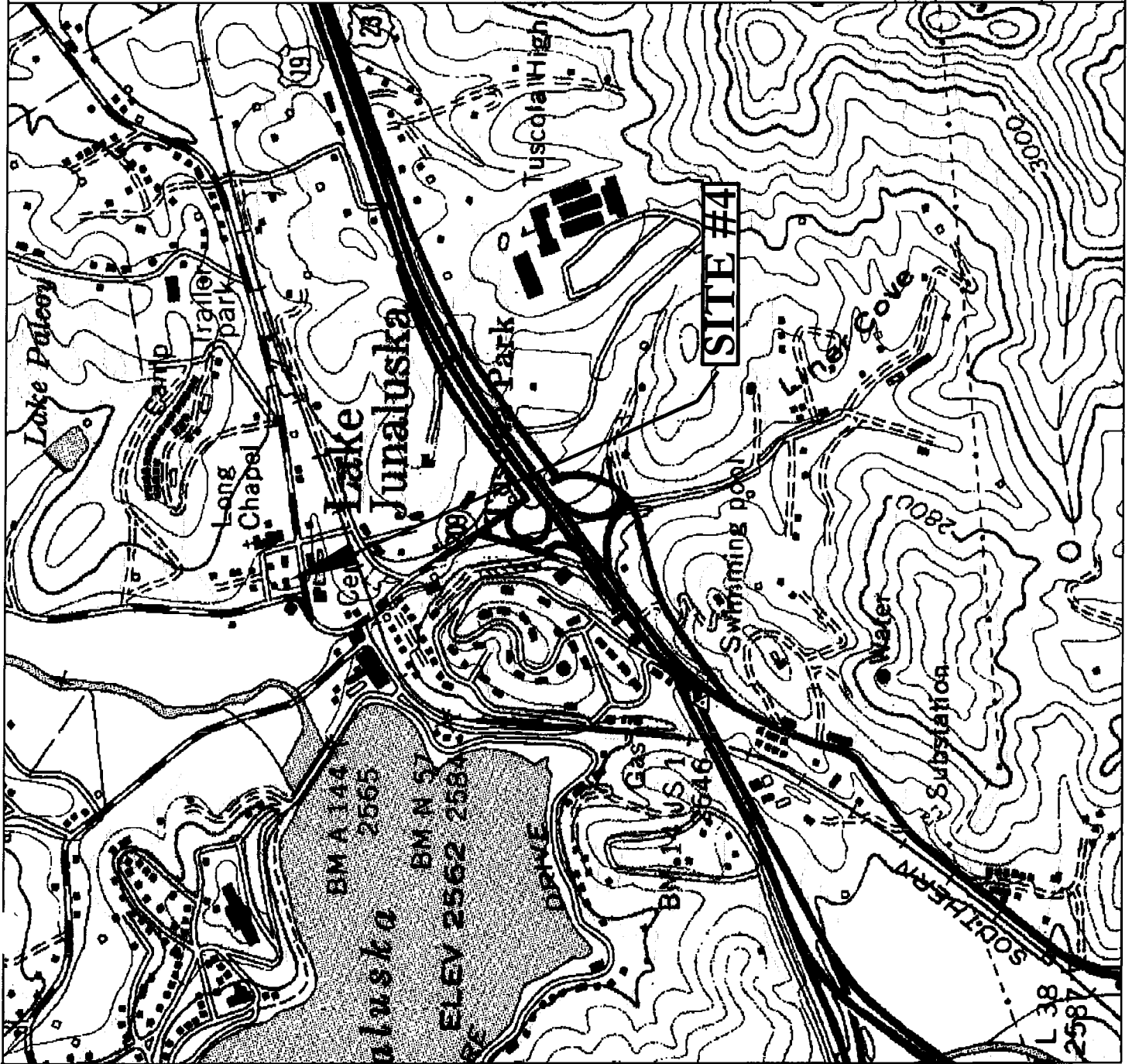
- The property operates as Clear View Glass and Mirror but formerly operated as a gas station. One UST is possibly located on the property, within the proposed ROW and near the southern corner of the building.
- High PID readings indicated the possibility of petroleum contaminants in two of fourteen soil samples.
- Laboratory analyses of soil samples confirmed DRO detection of >10 mg/kg NC Action Level in two samples (SB-6-1, SB-7-1), as well as GRO detection of >10 mg/kg in the same two samples. These samples were collected within a few feet of the depth to groundwater.
- The source area appears to be closer to boring SB-6 based on shallower identified soil impact in that boring. This soil boring is not within the proposed ROW. An estimated 78 cubic yards of impacted soil was calculated. However, the edge of this soil impact could possibly extend farther to the southeast into the proposed ROW in the area around the probable UST where drilling wasn't feasible due to utilities.

## 6.0 RECOMMENDATIONS

If the final design still requires a cut section along the southern property edge then, AMEC recommends the following action:

- The UST must be removed per the current UST guidelines, which will require additional soil sampling for closure. Excavation and proper disposal of petroleum-impacted soil may be necessary in conjunction with the UST removal.





SCALE



1000 FT 0 1000 FT

7.5 Minute Quadrangle  
North Carolina, 1983  
Photorevised 1993

### VICINITY MAP

Site #4, Michael Daggy Property  
15 Old Clyde Road  
Haywood County, NC

DRAWING NAME: J:\NCDDOT\Haywood\FIG1 DATE: 9/25/93  
CH: TJSV

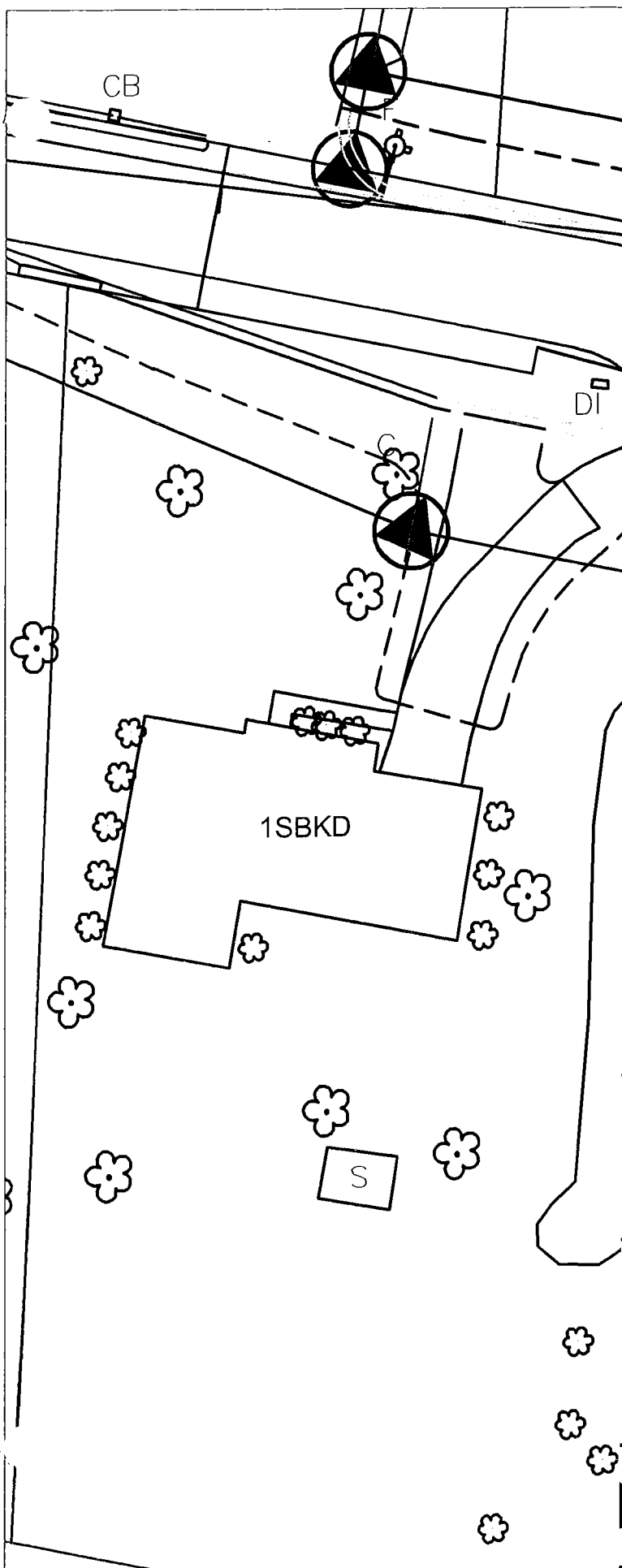
SCALE: 1 INCH = 1,000 FEET DF: TEL HFC  
PREPARED FOR:

NC Department of Transportation  
Geotechnical Unit  
WBS Element: 34599.1.1  
TIP# R-4047

Prepared By: Figure:

**AMECO**  
101 West Friendly Ave.  
Carrboro, NC 27401  
(919) 691-6388

Figure 1



## LEGEND

- Proposed Right of Way
- Existing Right of Way
- Cut Line
- Fill Line
- Storm Drain
- City Water Line
- Soil Boring Location  
September 2009
- Existing Monitoring Well

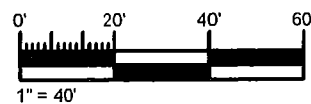
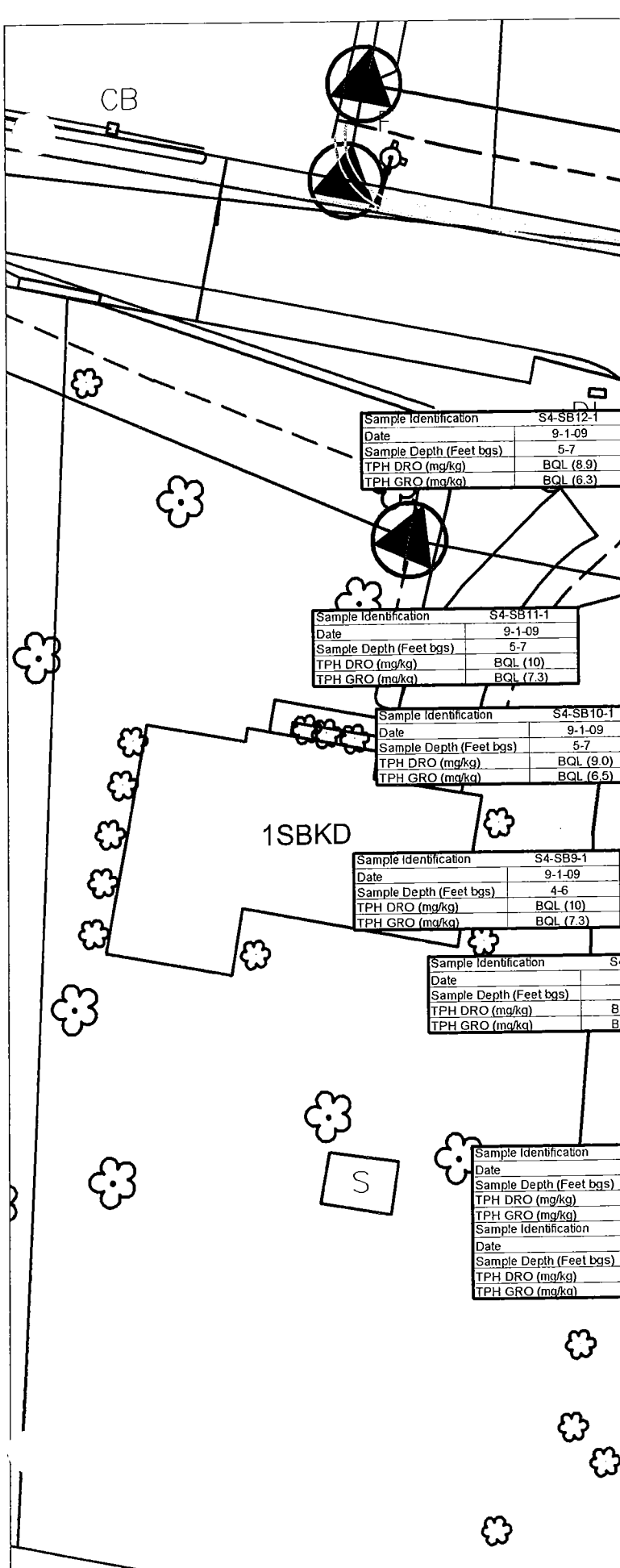


Figure 2  
 Site #4 Michael E. Daggy Property  
 Site Map

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 Greensboro, NC 27401  
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## LEGEND

- Proposed Right of Way
- Existing Right of Way
- Cut Line
- Fill Line
- Storm Drain
- City Water Line
- Soil Boring Location August 2009
- Existing Monitoring Well

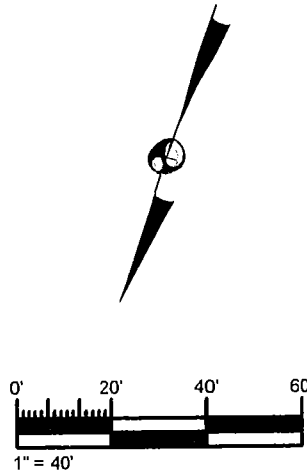
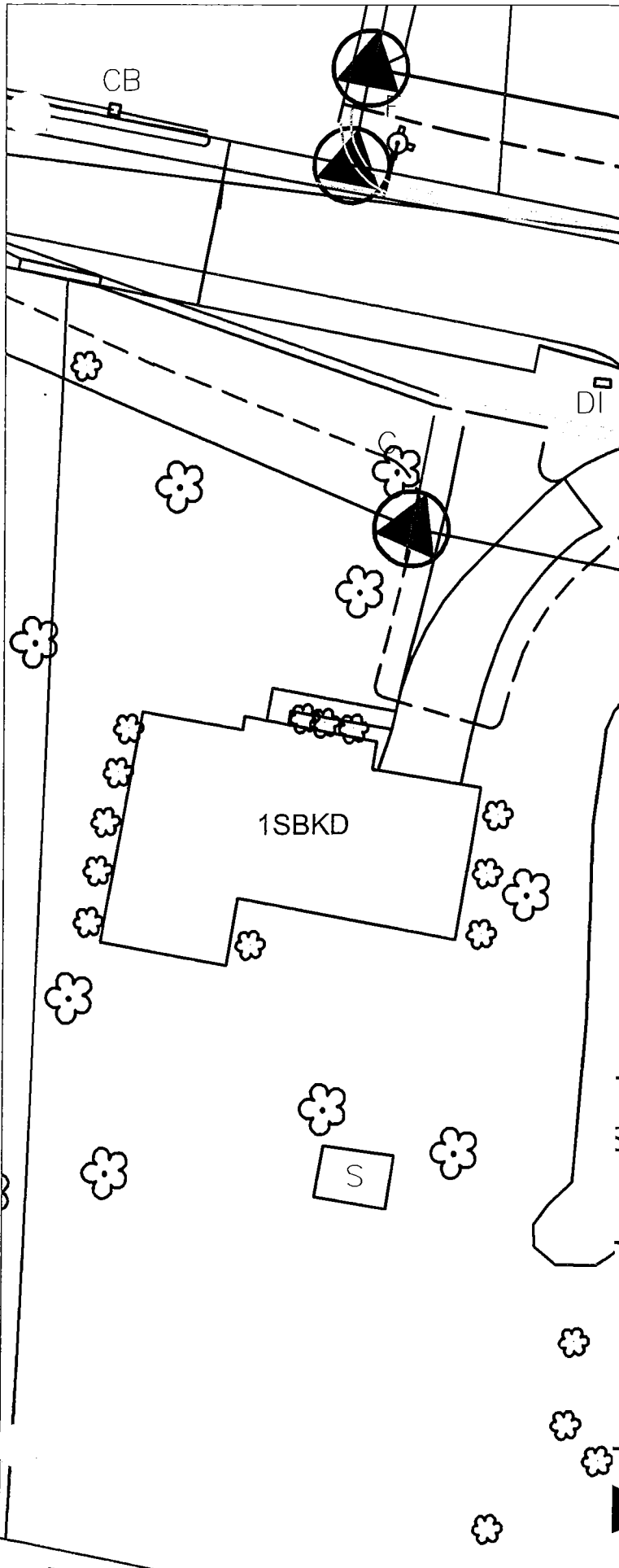


Figure 3

Site #4 Michael E. Daggy Property  
Site Map With Analytical Data

NC Department of Transportation  
Geotechnical Unit  
WBS Element: 34599.1.1  
TIP# R-4047

**mec** EARTH & ENVIRONMENTAL, INC.  
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Greensboro, NC 27401  
(336) 691-5398



## LEGEND

- Proposed Right of Way
- Existing Right of Way
- Cut Line
- Fill Line
- Potential Area of Soil Contamination
- Storm Drain
- City Water Line
- Soil Boring Location August 2009
- Existing Monitoring Well

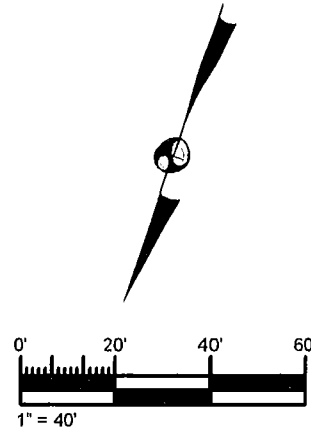


Figure 4  
 Site #4 Michael E. Daggy Property  
 Site Map With Potential Area  
 Of Soil Contamination

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 Geotechnical Unit  
 WBS Element: 34599.1.1  
 TIP# R-4047



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Table 1  
 Soil Sampling Analytical Results, DRO-GRO  
 Site # 4, Michael Daggy Property  
 Waynesville, North Carolina

NC Action Levels				10	10
S4-SB1-1	9/1/2009	3 - 5	0	<9.2	<6.6
S4-SB2-1	9/1/2009	3 - 6	0	<9.0	<6.4
S4-SB3-1	9/1/2009	3 - 4	0	<8.8	<6.2
S4-SB4-1	9/1/2009	5 - 8	0	<10	<7.1
S4-SB5-1	9/1/2009	3 - 4.5	1.4	<8.4	<6.0
S4-SB6-1	9/1/2009	10 - 12	1713	<b>330</b>	<b>540</b>
S4-SB6-2	9/1/2009	6 - 7	8.4	<9.9	<7.1
S4-SB7-1	9/1/2009	5 - 7	0	<10	<7.4
S4-SB7-2	9/1/2009	13 - 14	190	<b>48</b>	<b>130</b>
S4-SB8-1	9/1/2009	5 - 7	0	<8.8	<6.3
S4-SB9-1	9/1/2009	4 - 6	0	<10	<7.3
S4-SB10-1	9/1/2009	5 - 7	0	<9.0	<6.5
S4-SB11-1	9/1/2009	5 - 7	0	<10	<7.3
S4-SB12-1	9/1/2009	5 - 7	0	<8.9	<6.3

**NOTES:**  
 bgs = below ground surface  
**Bold Concentrations Exceed Action Levels**  
 DRO = Diesel Range Organics  
 GRO = Gasoline Range Organics  
 ppm = parts per million  
 J = Estimated value between the reporting limit and the method detection limit.  
 Standards derived from the North Carolina UST Section Guidelines for Assessment and Corrective Action

**APPENDIX 1**

**PHOTO LOG**



# Photo Log

PAGE 1 of 2



<b>Photo No.</b> 1	<b>Date:</b> 08/5/09	
<b>Direction Photo Taken:</b> South		
<b>Description:</b> View of front parking lot.		

<b>Photo No.</b> 2	<b>Date:</b> 08/5/09	
<b>Direction Photo Taken:</b> West		
<b>Description:</b> View of bay door and primary area of contamination		

**Photo Log**

PAGE 2 of 2



<b>Photo No.</b> 3	<b>Date:</b> 08/5/09	
<b>Direction Photo Taken:</b> Northwest		
<b>Description:</b> View of back yard		

<b>Photo No.</b> 4	<b>Date:</b> 08/5/09	
<b>Direction Photo Taken:</b> West		
<b>Description:</b> View of second bay door and secondary area of contamination		



**APPENDIX 2**  
**BORING LOGS**

















September 4, 2009

Ms. Helen Corley, LG, Project Manager  
AMEC Earth and Environmental of North Carolina, Inc.  
101 W. Friendly Avenue, Suite 603  
Greensboro, NC 27401

Via email (pdf)

cc: Mr. Ethan Caldwell, NCDOT

RE: State Project: R-4047  
WBS Element: 34599.1.1  
County: Haywood  
Description: NC 209 From US 19-23-74 to SR 1523

SUBJECT: Report on Geophysical Surveys of Site 4  
Schnabel Engineering Project No. 09210013.01

Dear Ms. Corley:

This letter contains our report on the geophysical surveys we conducted on the subject property. The report includes one 8.5x11 color figure and two 11x17 color figures.

## 1.0 INTRODUCTION

Schnabel Engineering conducted geophysical surveys on August 3 through August 6 and on August 12 and August 13, 2009, in the accessible areas of Site 4 (Michael D. Daggy Property, Clear View Glass & Mirror) under our 2009 contract with the NCDOT. Site 4 is located on the north side of Old Clyde Road approximately 130 feet east of Crabtree Road. The work was conducted in the accessible portions of the entire site as indicated by the NCDOT to support their environmental assessment of the subject parcel. The purpose of the geophysical surveys was to locate possible metal underground storage tanks (UST's) within the accessible areas of the site.

## **2.0 FIELD METHODOLOGY**

Locations of geophysical data points were obtained using a sub-meter Trimble Pro-XRS DGPS system. 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. The locations of existing site features (building, curbs, signs, etc.) were recorded for later correlation with the geophysical data and for location references to the NCDOT drawings. The geophysical investigation consisted of an electromagnetic (EM) induction survey using a Geonics EM61-MK2 instrument, and a Ground-Penetrating Radar (GPR) survey using a Geophysical Survey Systems SIR-3000 system equipped with a 400 MHz antenna.

The EM61 data were collected along parallel survey lines spaced about 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 one to two feet apart in orthogonal directions over areas of reinforced concrete and anomalous EM readings not attributed to known metallic features. Two possible UST's were located and marked on the ground at this site. Pictures of the locations of the possible UST's as marked in the field are shown in Figure 1.

Preliminary results were sent to Helen Corley of AMEC on August 21, 2009.

## **3.0 DISCUSSION OF RESULTS**

The contoured EM61 data are shown on Figures 2 and 3. The EM61 early time gate results are plotted on Figure 2. The early time gate data provide the more sensitive detection of metal object targets. Figure 3 shows the difference between the response of the top and bottom coils of the EM61 instrument (differential response). The difference is taken to remove the effect of surface and very shallowly buried metallic objects. Typically, the differential response emphasizes anomalies from deeper and larger objects such as UST's.

The early time gate and differential results show anomalies probably caused by buried utilities, reinforced concrete, and anomalies caused by known site features (Figures 2 and 3). GPR surveys near the southern corner of the building indicated the presence of two possible UST's. After further analysis of the GPR data, the western possible UST was determined to be more likely caused by a utility. Example GPR images showing the reflections from the eastern possible UST and the probable utility are included on Figures 2 and 3. Figures 2 and 3 also show the location of the possible UST as marked in the field. The GPR data indicate that the possible UST is buried about 2 to 3 feet below ground surface. The possible UST is about 3.5 feet in diameter and about 7.5 feet long, equivalent to a capacity of approximately 550 gallons.

#### **4.0 CONCLUSIONS**

Our evaluation of the geophysical data collected on Site 4 of Project R-4047 in Lake Junaluska, NC indicates the following:

- The geophysical data indicate the presence of one possible UST within the accessible portions of Site 4 near the southern corner of the building. The possible UST is about 550-gallon capacity and is buried about 2 to 3 feet below ground surface.
- A second possible UST was marked in the field but later interpretation of the data indicates that this is more likely to be a buried utility line.

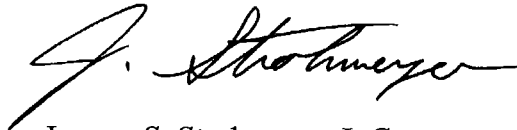
## 5.0 LIMITATIONS

These services have been performed and this report prepared for AMEC and 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.

Thank you for the opportunity to serve you on this project. Please call if you need additional information or have any questions.

Sincerely,

SCHNABEL ENGINEERING SOUTH, P.C.



Jeremy S. Strohmeyer, L.G.  
Project Manager

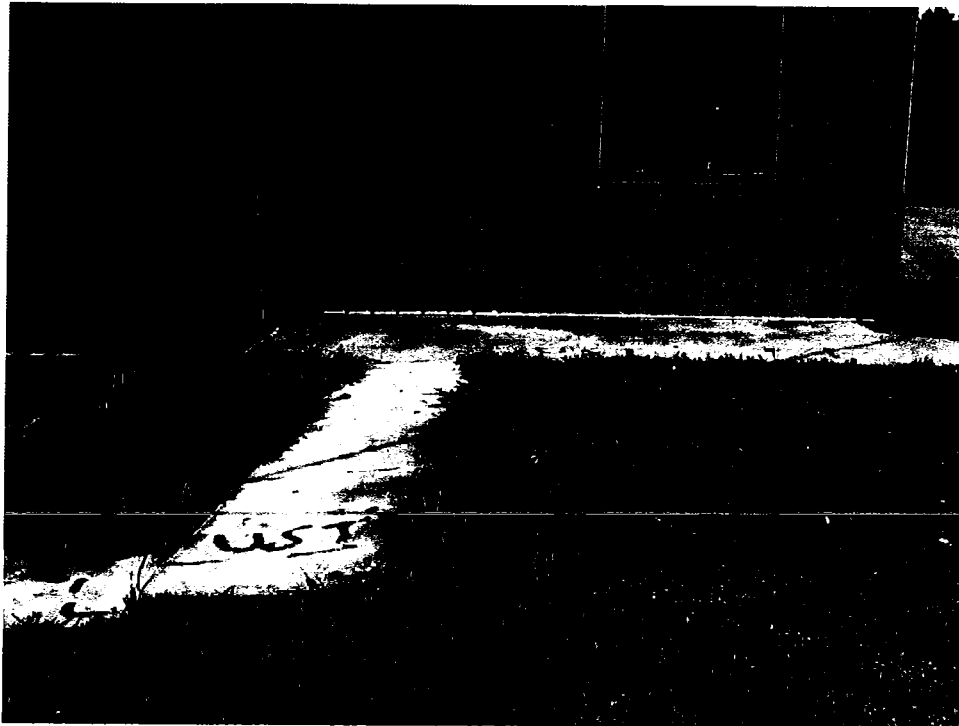


Edward D. Billington, L.G.  
Senior Vice President

JW/JS/NB

Attachment: Figures (3)

FILE: G:\2009 PROJECTS\09210013 (NCDOT 2009 GEOTECH UNIT SERVICES)\09210013.01 (R4047, HAYWOOD COUNTY GEOPHYSICS)\REPORT\REPORT ON SITE 4.DOC



Photograph of Site 4 (Daggy Property) looking north and showing the marked locations of a possible UST (background) and a probable utility (foreground, marked as UST in field).



Photograph of Site 4 (Daggy Property) looking northwest and showing the marked locations of a possible UST (on right) and a probable utility (on left, marked as UST in field).



NC Department of Transportation  
Geotechnical Engineering Unit

State Project No. R-4047  
Haywood County, North Carolina

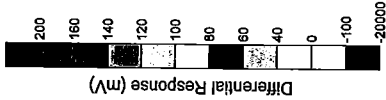
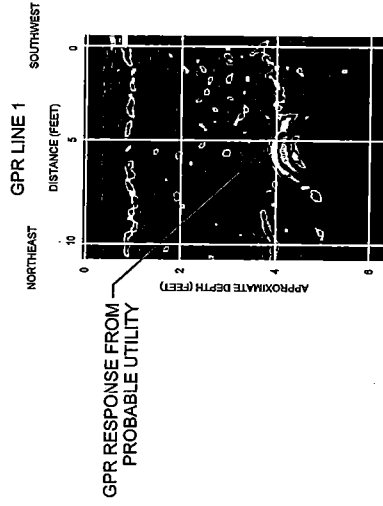
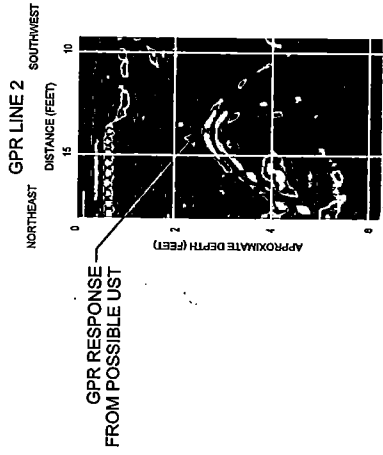
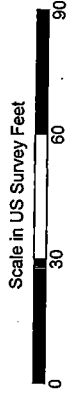
**SITE 4**  
**PHOTOS OF MARKED**  
**UST LOCATIONS**

FIGURE 1





Site 4 - Michael D. Daggy Property



EXPLANATION	
	EM61 SURVEY AREA - DATA ACQUIRED ALONG PARALLEL SURVEY LINES SPACED APPROXIMATELY 2.5 FEET APART
	METALLIC OBJECT
	LIGHT POLE
	UTILITY POLE
	STORMWATER GRATE
	GPR SURVEY AREA
	GUY WIRE
	UTILITY MANHOLE OR BOX
	MONITORING WELL
	SIGN
	LOCATION OF GPR SURVEY LINE SHOWN (AS MARKED IN THE FIELD)

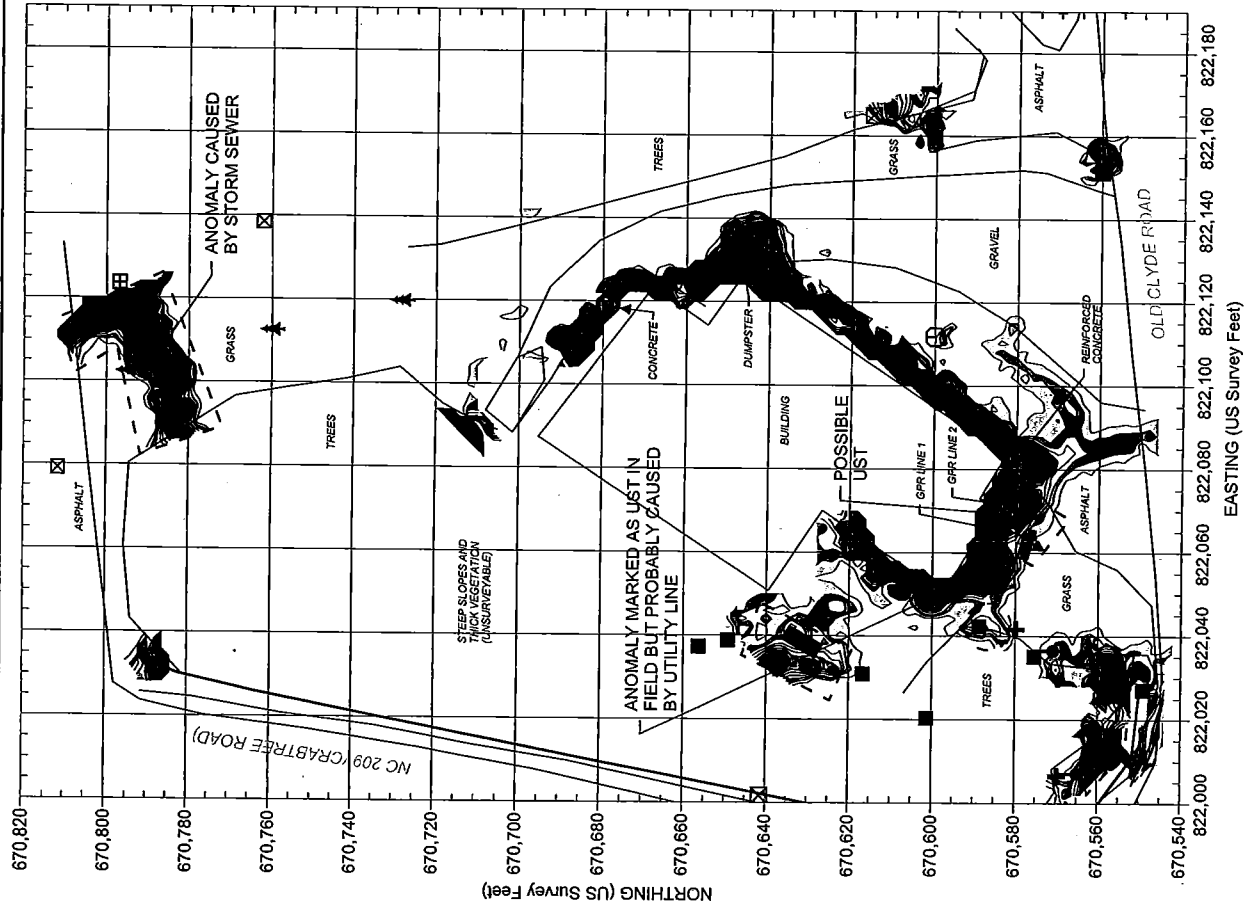
Note: The contour plot shows the difference, in millivolts (mV), between the readings from the top and bottom coils of the EM61. The difference is taken to reduce the effect of shallow metal objects and emphasize anomalies caused by deeper metallic objects, such as drums and tanks. The EM data were collected on August 3 through August 6, 2009, 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 August 12 and 13, 2009, using a Geophysical Survey Systems SIR 3000 equipped with a 400 MHz antenna.



NC Department of Transportation  
Geotechnical Engineering Unit  
State Project No. R-4047  
Haywood County, North Carolina

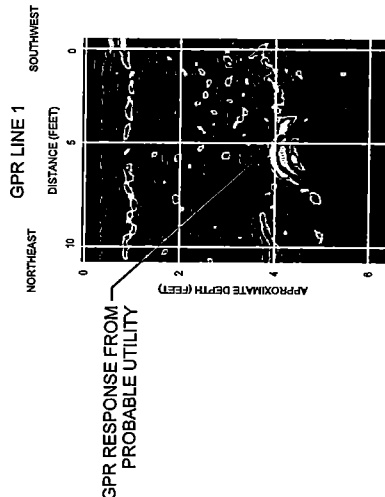
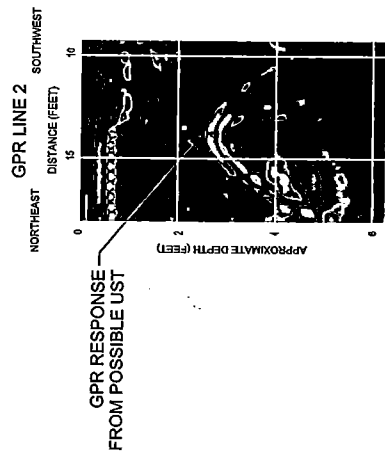
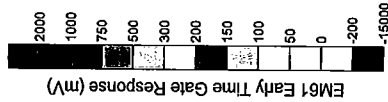
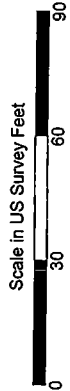
SITE 4  
EM61 DIFFERENTIAL  
RESPONSE

FIGURE 3



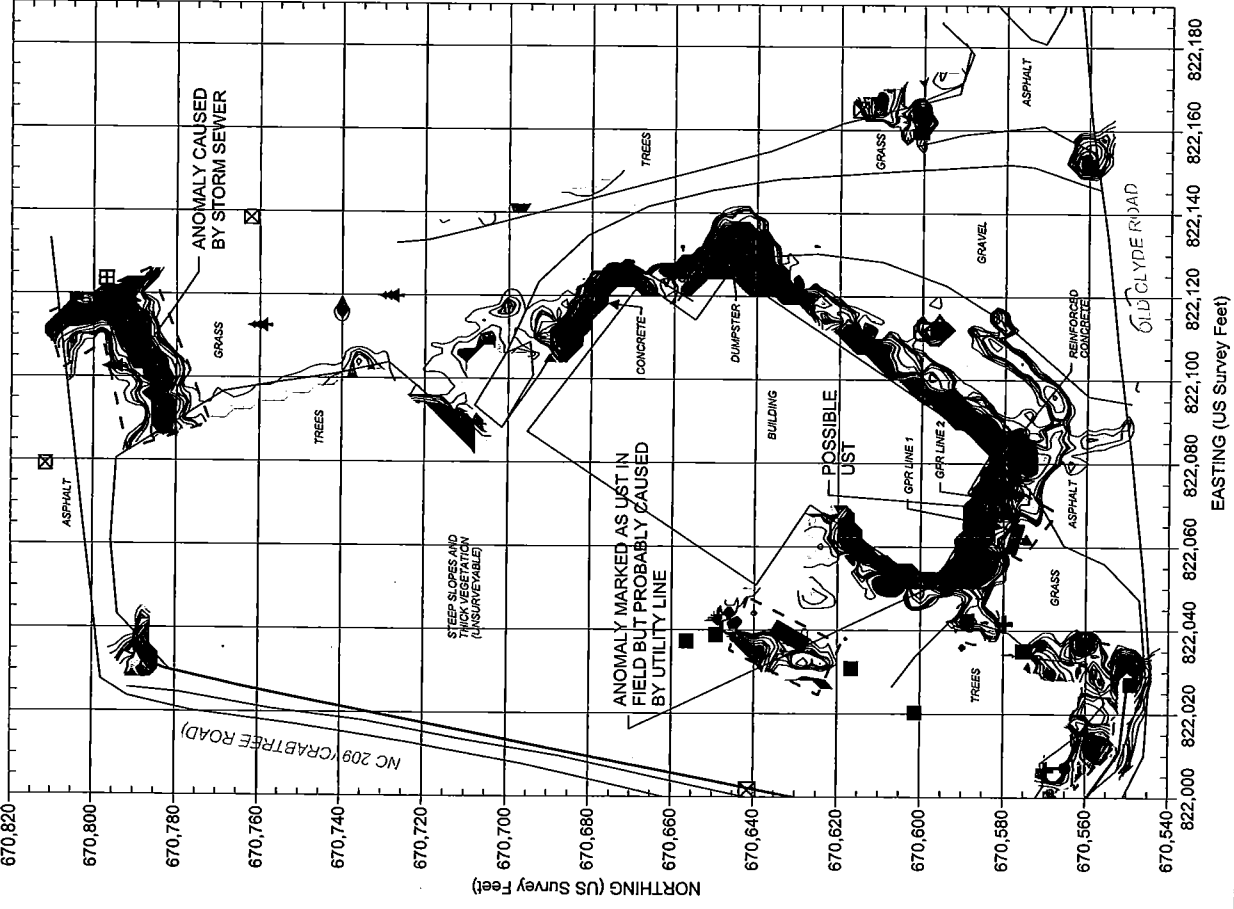


Site 4 - Michael D. Daggy Property



EXPLANATION	
	EM61 SURVEY AREA - DATA ACQUIRED ALONG PARALLEL SURVEY LINES SPACED APPROXIMATELY 2.5 FEET APART
	METALLIC OBJECT
	LIGHT POLE
	UTILITY POLE
	STORMWATER GRATE
	GPR SURVEY AREA
	GUY WIRE
	UTILITY MANHOLE OR BOX
	MONITORING WELL
	SIGN
	LOCATION OF POSSIBLE UST (AS MARKED IN THE FIELD)
	LOCATION OF GPR SURVEY LINE SHOWN

Note: The contour plot shows the earliest and most sensitive time gate of the EM61 bottom coil/channel in millivolts (mV). The EM data was collected on August 3 through August 6, 2009, 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 Zone 3200, using the NAD 1983 datum. GPR data were acquired on August 12 and August 13, 2009, using a Geophysical Survey Systems SIR 3000 equipped with a 400 MHz antenna.



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**SITE 4**  
**EM61 EARLY TIME**  
**GATE RESPONSE**

FIGURE 2