



April 3, 2012

Mr. Michael Sabodish, Ph.D, PE
Froehling & Robertson, Inc.
310 Hubert Street
Raleigh, NC 27603-2302

RE: State Project: R-2519B
 WBS Element: 35609.1.1
 County: Yancey
 Description: Micaville – US 19 East from NC 90 in Yancey County to Multi-Lane
 Section West of Spruce Pine in Mitchell County

Subject: Project 11821014.07, Report on Geophysical Surveys
Parcel 12, William Young Property, Yancey County, North Carolina

Dear Mr. Sabodish:

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 color figures and four 8.5x11 color figures.

INTRODUCTION

The work described in this report was performed on January 31 and February 3, 2012, by Schnabel under our 2011 contract with the NCDOT. The surveys were performed over the accessible areas of the property as indicated by the NCDOT to support their environmental assessment of the subject property. Photographs of the property are included on Figure 1. The property is located at the intersection of Wyatt Town Road and on the north side of US 19 E (4075 US 19 E) in Micaville, NC. Four USTs were listed on the NCDENR UST Registry for the site. The purpose of the geophysical surveys was to investigate/confirm the presence of metal underground storage tanks (USTs) in the accessible areas of the right-of-way and/or easement.

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 instrument. The EM61 is a time domain metal detector that is used to locate metal objects buried up to about eight feet below ground surface. When collecting EM61 data, three or four time gates are recorded of the response decay rate. The GPR survey was performed over selected EM61 anomalies, including areas of reinforced

concrete, using a Geophysical Survey Systems SIR-3000 system equipped with a 400 MHz antenna. Photographs of the equipment used are shown on Figure 2.

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. We recorded the locations of existing site features (monitoring wells, signs, etc.) with the Trimble system for later correlation with the geophysical data and locations provided by the NCDOT.

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 one to two feet apart in orthogonal directions over areas of reinforced concrete and 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 12 are shown on Figures 3 and 4. The EM61 early time gate data are plotted on Figure 3. The early time gate data provide a more sensitive detection of metal objects than the later time gate data. Figure 4 shows the differential response between the top and bottom coils of the EM61 instrument. The differential response data filters 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.

The early time gate and differential results show anomalies of unknown cause, in addition to those apparently caused by reinforced concrete, buried utilities, or known site features (Figures 3 and 4). The GPR data collected near the southeast building corner indicate the presence of four known USTs in the tank pit area, as shown on Figures 3 and 4. Example GPR images showing the reflections from the possible USTs are shown on Figures 3, 4, and 5. The GPR data indicate that known UST No. 1 is buried approximately 3.5 to 4.5 feet below ground surface, and is about 5.5 feet in diameter and about 12 feet long, equivalent to a capacity of about 2000 gallons. The GPR data indicate that known UST No. 2 is buried approximately 3.0 to 4.0 feet below ground surface, and is about 8 feet in diameter and about 21.5 feet long, equivalent to a capacity of about 8000 gallons. The GPR data indicate that known UST Nos. 3 and 4 are buried approximately 3.0 to 4.0 feet below ground surface, and are about 18 feet in diameter and about 16 feet long, equivalent to capacities of about 6000 gallons. The limits of known UST No. 2 were estimated based on tank sizes from the NCDENR UST Registry because the trailer parked immediately west of the tank pit did not allow the western limit of known UST No. 2 to be delineated using GPR. Photographs of the approximate locations of the known USTs that were marked in the field are included on Figure 6.

CONCLUSIONS

Our evaluation of the geophysical data collected on the subject property on Project R-2519B in Micaville, NC indicates the following:

The geophysical data indicate the presence of four known USTs on Parcel 12. Known UST No. 1 is about 2000-gallon capacity and is buried about 3.5 to 4.5 feet below ground surface. Known UST No. 2 is about 8000-gallon capacity and is buried about 3.0 to 4.0 feet below ground surface. Known UST Nos. 3 & 4 are each about 6000-gallon capacity and are buried 3.0 to 4.0 feet below ground surface. No unknown USTs were identified.

Please note that the UST locations that were marked in the field with paint, as shown on Figure 6, are approximate, since the locations, lengths, and widths are subject to revision after review in the office. For this reason, we recommend that exploratory borings or excavations be located at least three feet away from the painted outline of the suspect USTs. Probable UST No. 1 was marked as 4 feet by 10.5 feet but our office review indicated it was about 5.5 feet diameter by 12 feet long. Probable UST Nos. 2, 3, and 4 were each marked as 5.5 feet by 18 feet in the field but our office review indicated that known UST No. 2 is more likely to be 8 feet diameter by 21.5 feet long and known UST Nos. 3 and 4 are more likely to be 8 feet diameter by 16 feet long.

LIMITATIONS

These services have been performed and this report prepared for Froehling & Robertson, Inc. 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.

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



Jeremy S. Strohmeyer, LG
Project Manager



Gerald C. Robblee, PE
Senior Associate

JW:JS:GR

Attachments: Figures (6)

CC: NCDOT, Terry Fox, LG

FILE: G:\2011-SDE-JOBS\11821014_00_NCDOT_2011_GEOTECHNICAL_UNIT_SERVICES\11821014_07_R-2519B_YANCEY_COUNTY\REPORT\PARCEL 12\SCHNABEL GEOPHYSICAL REPORT ON PARCEL 12 (R-2519B).DOCX



Parcel 12 (William Young Property), looking northeast



Parcel 12 (William Young Property), looking northwest



Geonics EM61-MK2 Metal Detector with Trimble DGPS Unit



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

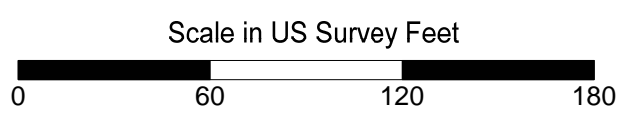
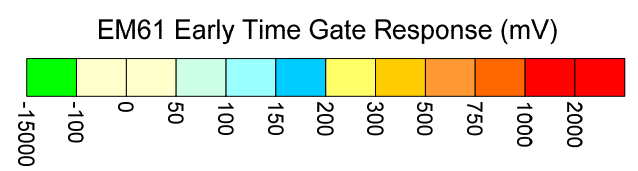
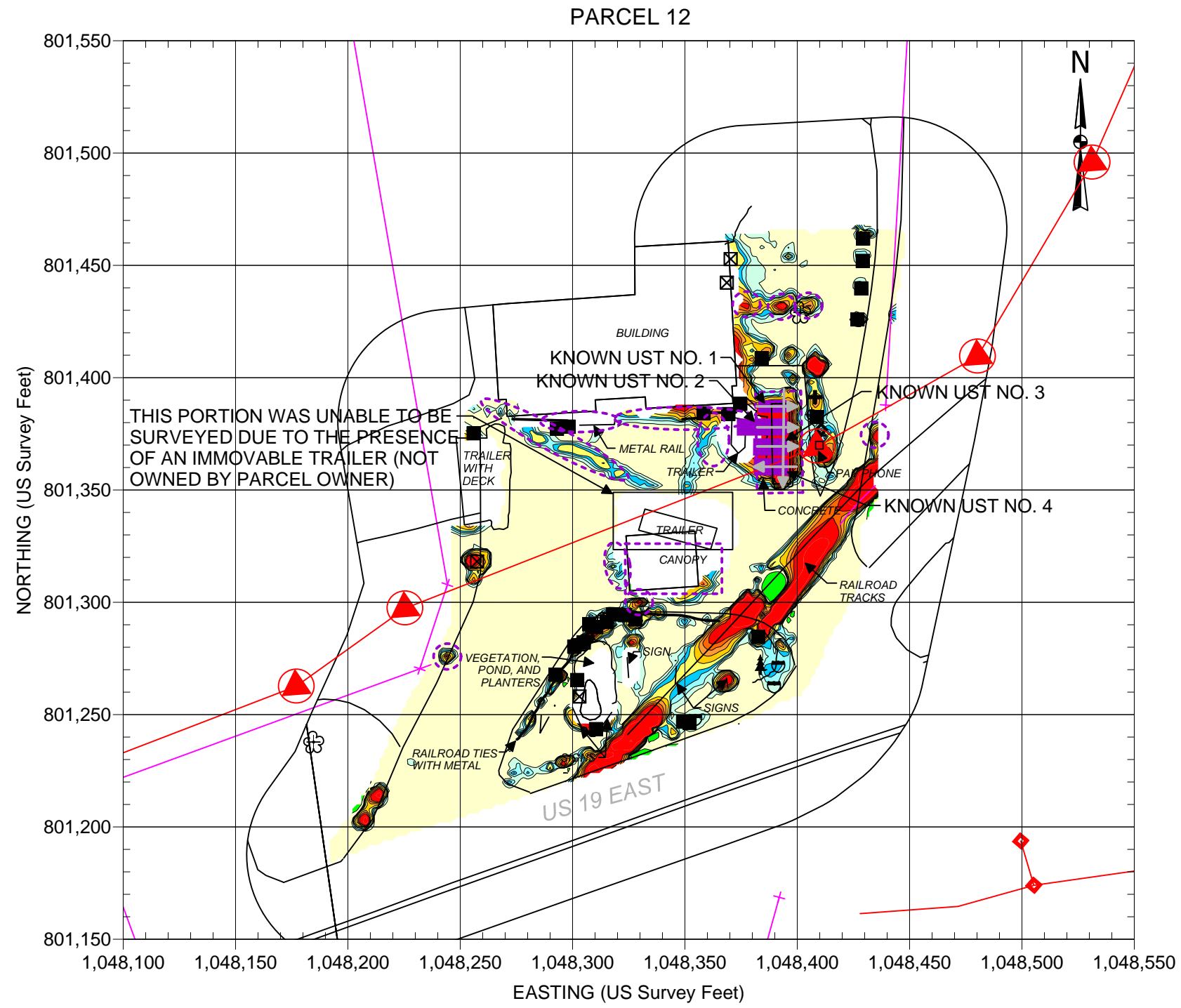
Note: Stock photographs – not taken on site.



STATE PROJECT R-2519B
NC DEPT. OF TRANSPORTATION
YANCEY COUNTY, NC
PROJECT NO. 11821014.07

PHOTOS OF
GEOPHYSICAL
EQUIPMENT USED

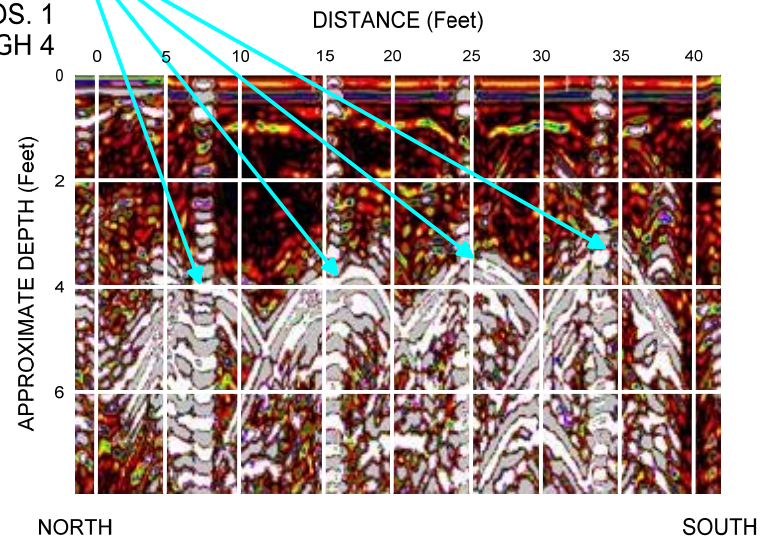
FIGURE 2



EXPLANATION	
	SIGN
	MISCELLANEOUS METALLIC OBJECT
	UTILITY MANHOLE, METER, BOX, ETC.
	STORMSEWER INLET
	VENT PIPE
	GUY WIRE
	EDGE OF NCDOT PROPOSED RW
	PROPERTY LINE
	EXAMPLE GPR LINE LOCATION
	GPR SURVEY AREA
	LOCATION OF KNOWN OR SUSPECT USTS MARKED ON SITE

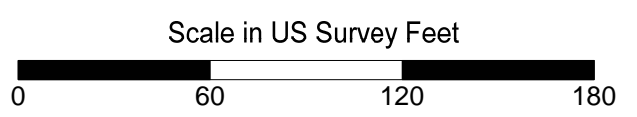
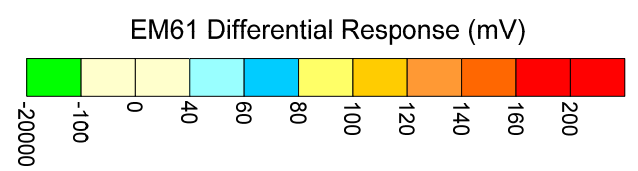
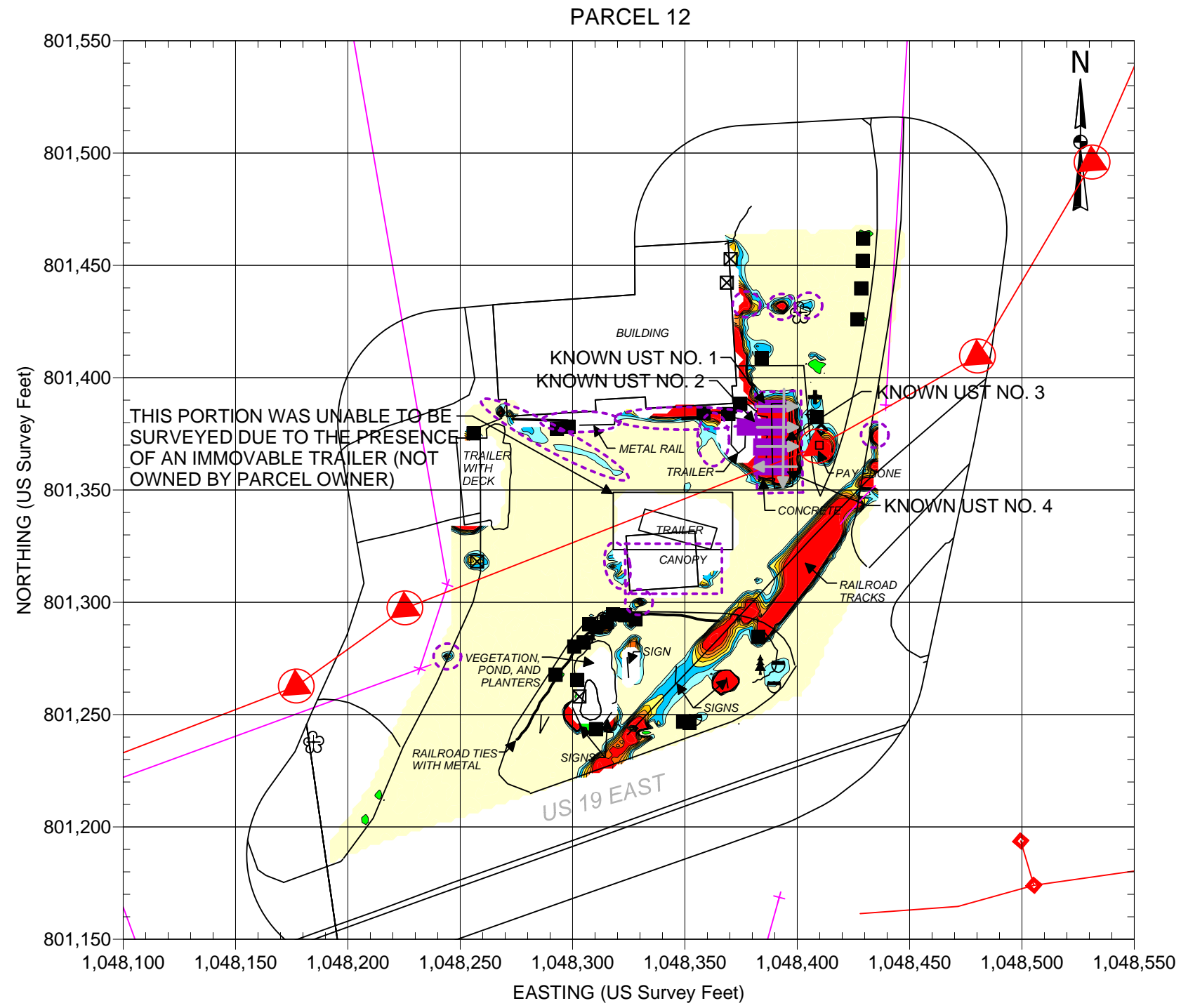
REF.: NCDOT FILE: r2519b_rdy_psh_s16.dgn
(FOR SOME SITE FEATURES)

EXAMPLE GPR RESPONSES FROM THE SHORT AXES OF KNOWN UST NOS. 1 THROUGH 4



Note: The contour plot shows the earliest and more sensitive time gate of the EM61 bottom coil/channel in millivolts (mV). The EM data were collected on January 31, 2012, 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 February 3, 2012, using a Geophysical Survey Systems SIR 3000 equipped with a 400 MHz antenna.

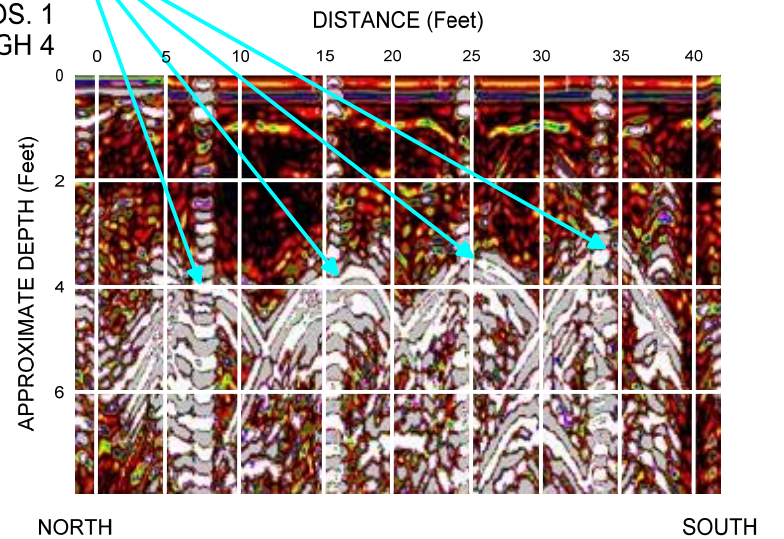
	STATE PROJECT R-2519B YANCEY COUNTY, NC NC DEPARTMENT OF TRANSPORTATION PROJECT NO. 11821014.07	EM61 EARLY TIME GATE RESPONSE AND EXAMPLE GPR DATA FIGURE 3
	© Schnabel Engineering 2012 All Rights Reserved	



EXPLANATION	
	SIGN
	MISCELLANEOUS METALLIC OBJECT
	UTILITY MANHOLE, METER, BOX, ETC.
	STORMSEWER INLET
	VENT PIPE
	GUY WIRE
	EDGE OF NCDOT PROPOSED RW
	PROPERTY LINE
	EXAMPLE GPR LINE LOCATION
	GPR SURVEY AREA
	LOCATION OF KNOWN OR SUSPECT USTS MARKED ON SITE

REF.: NCDOT FILE: r2519b_rdy_psh_s16.dgn
(FOR SOME SITE FEATURES)

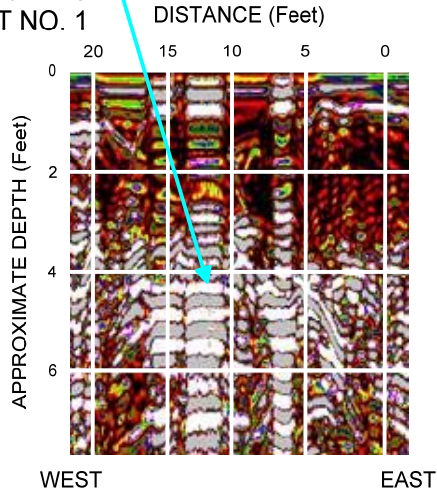
EXAMPLE GPR RESPONSES FROM THE SHORT AXES OF KNOWN UST NOS. 1 THROUGH 4



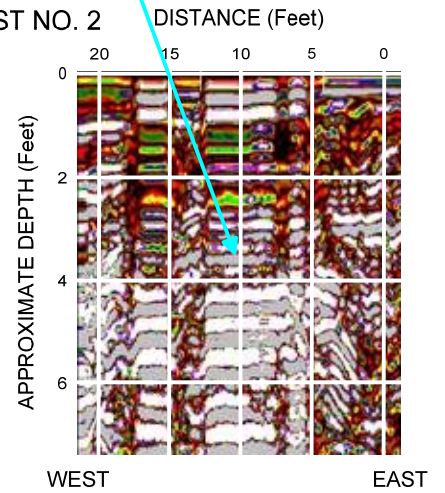
Note: The contour plot shows the difference, in millivolts (mV), between the readings from the top and bottom coils of the EM61. The difference is taken to reduce the effect of shallow metal objects and emphasize anomalies caused by deeper metallic objects, such as drums and tanks. The EM data were collected on January 31, 2012, 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 3, 2012, using a Geophysical Survey Systems SIR 3000 equipped with a 400 MHz antenna.

	<p>STATE PROJECT R-2519B YANCEY COUNTY, NC NC DEPARTMENT OF TRANSPORTATION PROJECT NO. 11821014.07</p>	<p>EM61 DIFFERENTIAL RESPONSE AND EXAMPLE GPR DATA FIGURE 4</p>
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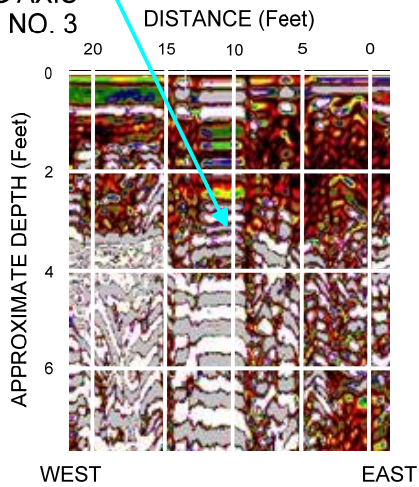
EXAMPLE GPR RESPONSE FROM THE LONG AXIS OF KNOWN UST NO. 1



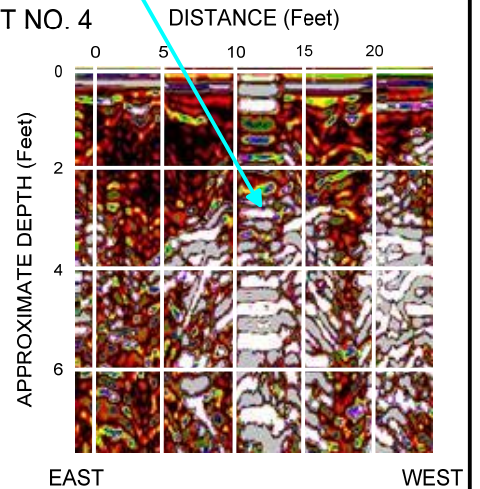
EXAMPLE GPR RESPONSE FROM THE LONG AXIS OF KNOWN UST NO. 2



EXAMPLE GPR RESPONSE FROM THE LONG AXIS OF KNOWN UST NO. 3



EXAMPLE GPR RESPONSE FROM THE LONG AXIS OF KNOWN UST NO. 4



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EXAMPLE GPR IMAGES
 OF KNOWN UST
 NUMBERS 1, 2, 3, & 4

FIGURE 5



Parcel 12 (William Young Property), looking north. Photo shows approximate marked locations of known UST Nos. 1 through 4 near the southeast corner of the building.



Parcel 12 (William Young Property), looking southwest. Photo shows approximate marked locations of known UST Nos. 1 through 4 near the southeast corner of the building.