



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 49 (William E. and Helen McKinney 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 two 8.5x11 color figures.

INTRODUCTION

The work described in this report was performed on January 18, and February 2, and 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. Parcel 49 is located in the northeast quadrant of NC 80 N and US 19 E (5401 US 19 E) in Micaville, NC. The purpose of the geophysical surveys was to investigate 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 49 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 buried utilities or known site features (Figures 3 and 4). The GPR data indicate that the EM anomalies of unknown cause are probably caused by cultural features. The GPR data collected at the site do not indicate the presence of metallic USTs within the areas surveyed.

CONCLUSIONS

Our evaluation of the geophysical data collected on the subject property on Project R-2519B in Micaville, NC indicates that metallic USTs are unlikely to be encountered within 8 feet of the ground surface in the areas surveyed on the subject property.

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 (4)

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_49\SCHNABEL_GEOPHYSICAL_REPORT_ON_PARCEL_49 (R-2519B).DOCX



Parcel 49 (William E. and Helen McKinney Property), looking north



Parcel 49 (William E. and Helen McKinney Property), looking northeast



Geonics EM61-MK2 Metal Detector with Trimble DGPS Unit



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

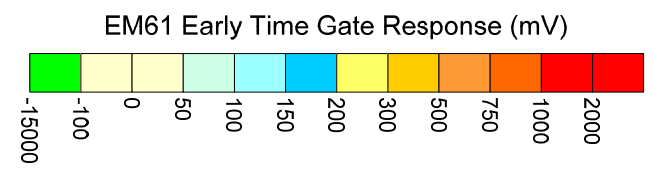
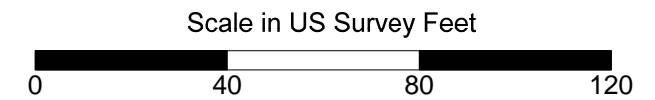
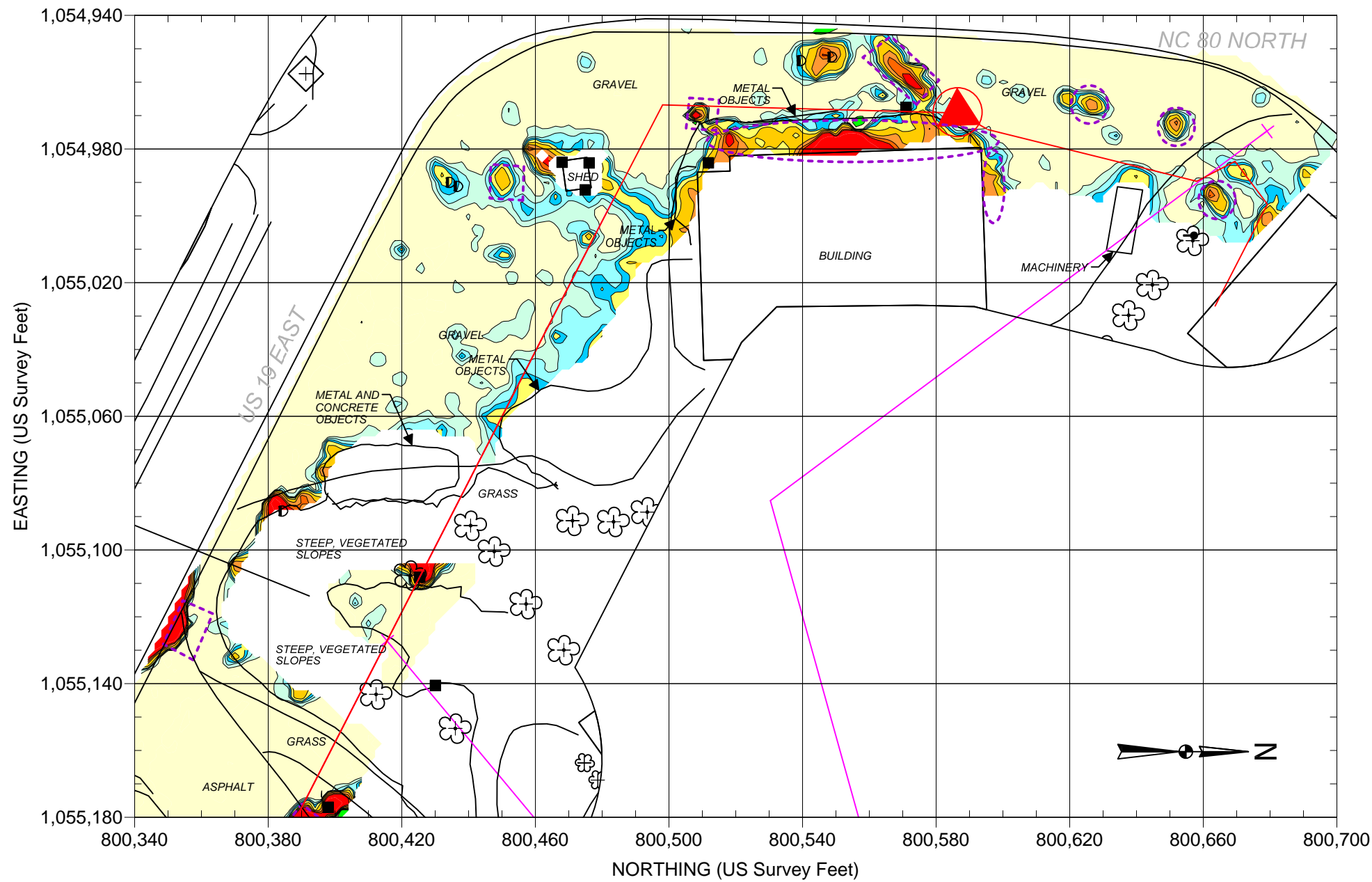
Note: Stock photographs – not taken on site.



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YANCEY COUNTY, NC
PROJECT NO. 11821014.07

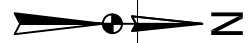
PHOTOS OF
GEOPHYSICAL
EQUIPMENT USED

FIGURE 2



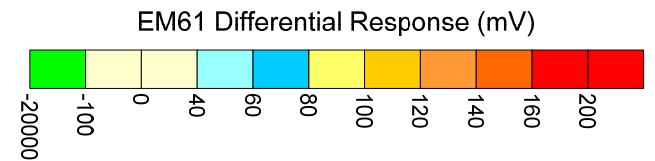
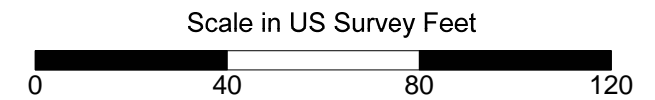
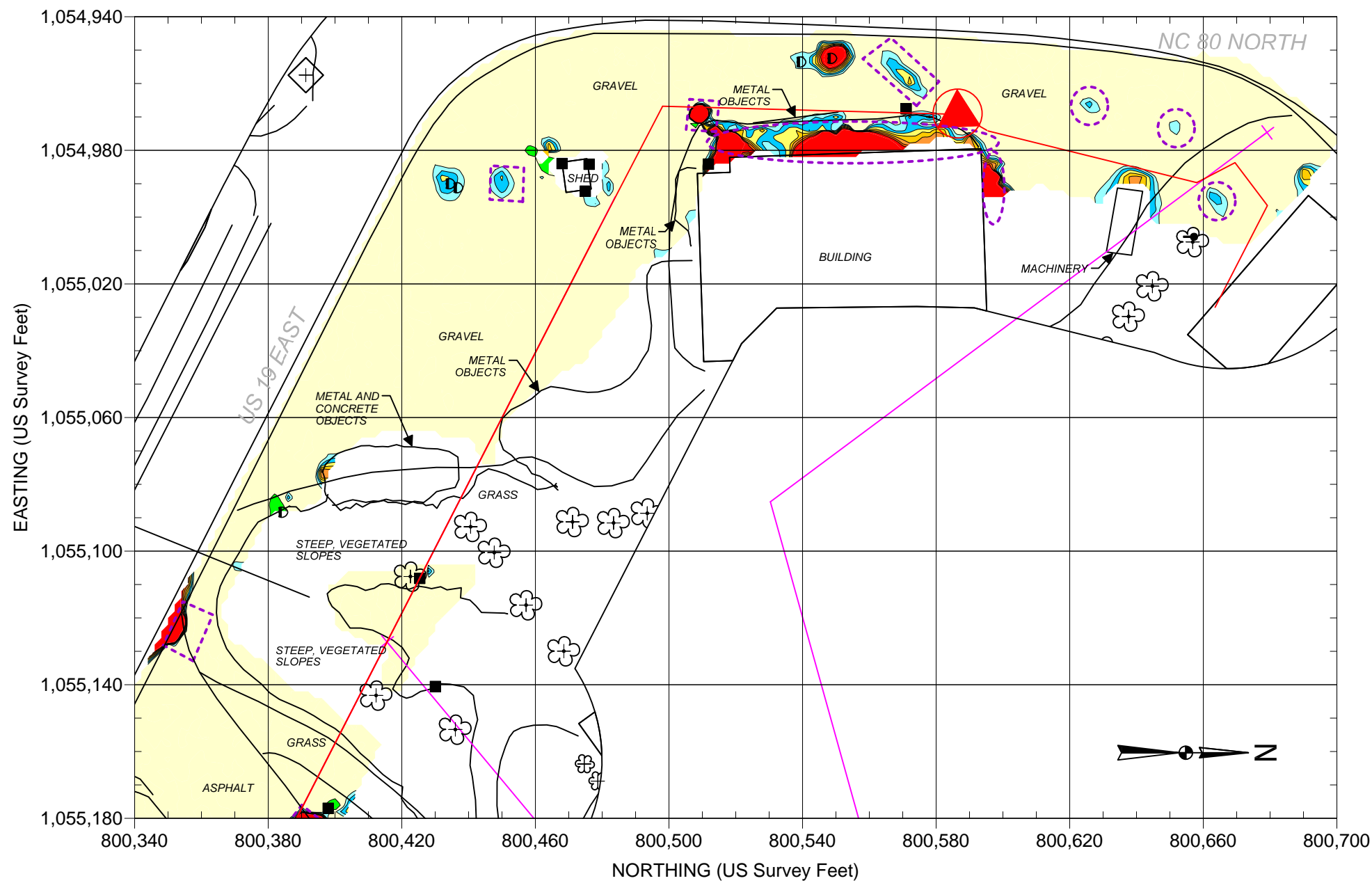
EXPLANATION	
	EDGE OF NCDOT PROPOSED RW
	PROPERTY LINE
	MISCELLANEOUS METALLIC OBJECT
	UTILITY POLE

REF.: NCDOT FILE: r2519b_rdy_psh_s11.dgn
(FOR SOME SITE FEATURES)



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 18, 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 2 and 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	PARCEL 49 EM61 EARLY TIME GATE RESPONSE
	FIGURE 3	



EXPLANATION	
	EDGE OF NCDOT PROPOSED RW
	PROPERTY LINE
	MISCELLANEOUS METALLIC OBJECT
	UTILITY POLE

REF.: NCDOT FILE: r2519b_rdy_psh_s11.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 18, 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 2 and 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	PARCEL 49 EM61 DIFFERENTIAL RESPONSE FIGURE 4
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