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ENGINEERING

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 76, Tony M. & Veneta Honeycutt 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 17, and 18, and February 1, and 2, 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 west of the intersection of Newdale Church Road and on the south side of US 19 E (6750 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 76 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 on the north side of the easternmost building indicate the presence of four known USTs, as shown on Figures 3 and 4. Example GPR images showing the reflections from the possible UST are shown on Figures 3, 4, and 5. The GPR data indicate that known UST No. 1 is buried approximately 2.0 to 3.0 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 No. 2 is buried approximately 2.5 to 3.5 feet below ground surface, and is also 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 No. 3 is buried approximately 2.5 to 3.5 feet below ground surface, and is about 5.5 feet in diameter and about 24 feet long, equivalent to a capacity of about 4000 gallons. The GPR data indicate that known UST No. 4 is buried approximately 4.5 to 5.5 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 limits of known UST Nos. 1 and 2 were estimated based on tank sizes from the NCDENR UST Registry because the building immediately south of the tank pit did not allow the southern limits of known UST Nos. 1 and 2 to be delineated using GPR. Photographs of the approximate locations of the known USTs that were marked in the field are included on Figures 6 and 7.

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 76. Known UST No. 1 is about 8000-gallon capacity and is buried about 2.0 to 3.0 feet below ground surface. Known UST No. 2 is about 8000-gallon capacity and is buried about 2.5 to 3.5 feet below ground surface. Known UST No. 3 is about 4000-gallon capacity and is buried 2.5 to 3.5 feet below ground surface. Known UST No. 4 is about 2000-gallon capacity and is buried 4.5 to 5.5 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. Known UST No. 3 was marked as 6 feet by 28 feet but our office review indicated it was about 5.5 feet diameter by 24 feet long. Known UST No. 4 was marked as 4 feet by 8 feet in the field but our office review indicated that they were about 5.5 feet diameter by 12 feet long.

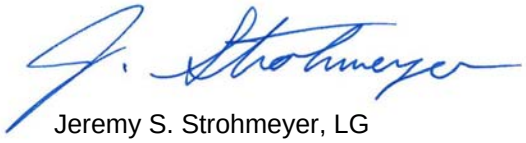
LIMITATIONS

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 (7)
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 76\SCHNABEL GEOPHYSICAL REPORT ON PARCEL 76 (R-2519B).DOCX

Parcel 76 (Tony and Veneta Honeycutt Property), looking southwest

Parcel 76 (Tony and Veneta Honeycutt Property), looking south

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PARCEL 76
SITE PHOTOS

FIGURE 1

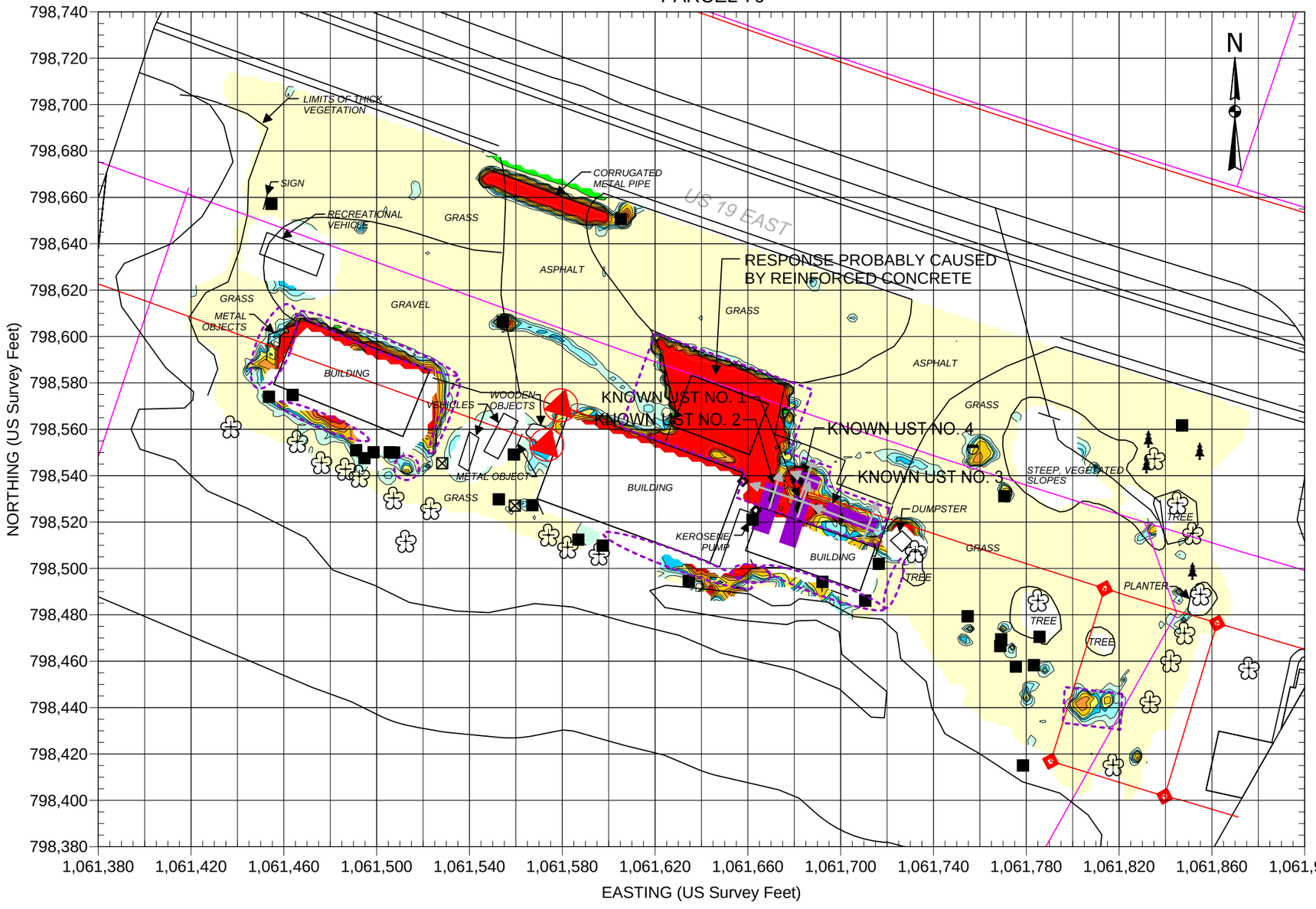
Geonics EM61-MK2 Metal Detector with Trimble DGPS Unit

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

Note: Stock photographs – not taken on site.

Schnabel ENGINEERING	STATE PROJECT R-2519B NC DEPT. OF TRANSPORTATION YANCEY COUNTY, NC PROJECT NO. 11821014.07	PHOTOS OF GEOPHYSICAL EQUIPMENT USED FIGURE 2

PARCEL 76

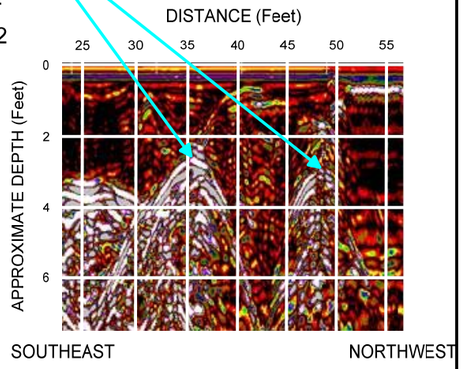


EXPLANATION

- SIGN
- FILLPORT
- POSSIBLE FILLPORT
- VENT PIPE
- MISCELLANEOUS METALLIC OBJECT
- UTILITY MANHOLE, METER, BOX, ETC.
- STORMSEWER INLET
- UST LID
- GUY WIRE
- EDGE OF NCDOT PROPOSED R/W
- 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 RESPONSE FROM THE SHORT AXES OF KNOWN UST NOS. 1 & 2



EM61 Early Time Gate Response (mV)

-15000 -100 0 50 100 150 200 300 500 750 1000 2000

Scale in US Survey Feet

0 50 100 150

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 17 and 18 and February 1, 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, 2012, using a Geophysical Survey Systems SIR 3000 equipped with a 400 MHz antenna.

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EM61 EARLY TIME GATE RESPONSE AND EXAMPLE GPR DATA

FIGURE 3

PARCEL 76

NORTHING (US Survey Feet)

798,740
798,720
798,700
798,680
798,660
798,640
798,620
798,600
798,580
798,560
798,540
798,520
798,500
798,480
798,460
798,440
798,420
798,400
798,380

1,061,380 1,061,420 1,061,460 1,061,500 1,061,540 1,061,580 1,061,620 1,061,660 1,061,700 1,061,740 1,061,780 1,061,820 1,061,860 1,061,900

EASTING (US Survey Feet)

N

LIMITS OF THICK VEGETATION
SIGN
RECREATIONAL VEHICLE
GRASS
CORRUGATED METAL PIPE
US 19 EAST
ASPHALT
RESPONSE PROBABLY CAUSED BY REINFORCED CONCRETE
GRAVEL
METAL OBJECTS
BUILDING
WOODEN OBJECTS
VEHICLES
KNOWN UST NO. 1
KNOWN UST NO. 2
KNOWN UST NO. 4
KNOWN UST NO. 3
METAL OBJECT
STEEP, VEGETATED SLOPES
DUMPSTER
TREE
KEROSENE PUMP
PLANTER

EXPLANATION

- SIGN
- FILLPORT
- POSSIBLE FILLPORT
- VENT PIPE
- MISCELLANEOUS METALLIC OBJECT
- UTILITY MANHOLE, METER, BOX, ETC.
- STORMSEWER INLET
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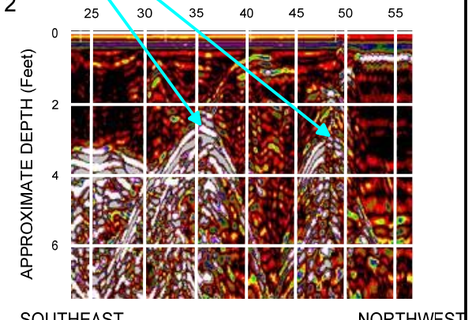
REF.: NCDOT FILE: r2519b_rdy_psh_s16.dgn
(FOR SOME SITE FEATURES)

EXAMPLE GPR RESPONSE FROM THE SHORT AXES OF KNOWN UST NOS. 1 & 2



EM61 Differential Response (mV)

-20000 -100 0 40 60 80 100 120 140 160 200

Scale in US Survey Feet

0 50 100 150

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 17 and 18 and February 1, 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, 2012, using a Geophysical Survey Systems SIR 3000 equipped with a 400 MHz antenna.

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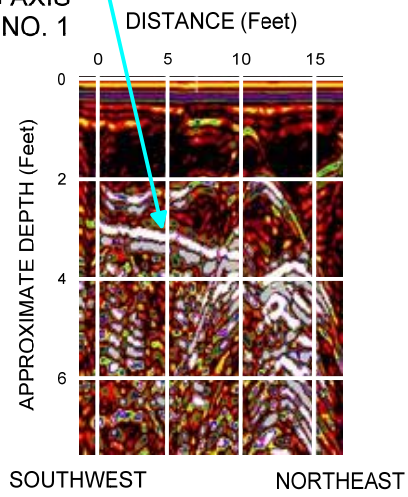
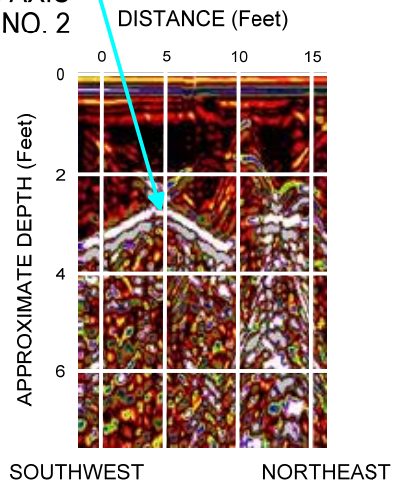
EM61 DIFFERENTIAL RESPONSE AND EXAMPLE GPR DATA

FIGURE 4

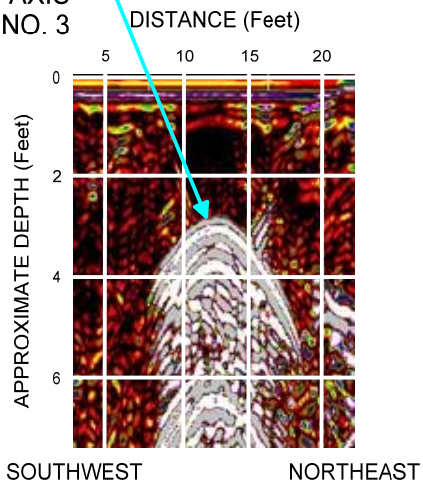
EXAMPLE GPR RESPONSE FROM THE LONG AXIS OF KNOWN UST NO. 1



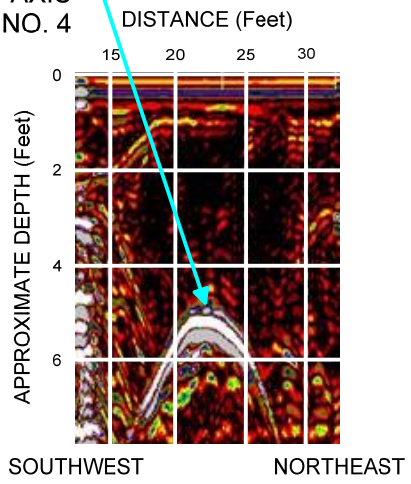
EXAMPLE GPR RESPONSE FROM THE LONG AXIS OF KNOWN UST NO. 2



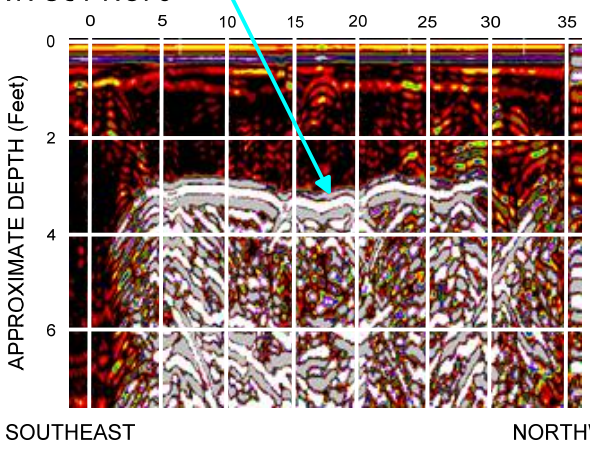
EXAMPLE GPR RESPONSE FROM THE SHORT AXIS OF KNOWN UST NO. 3



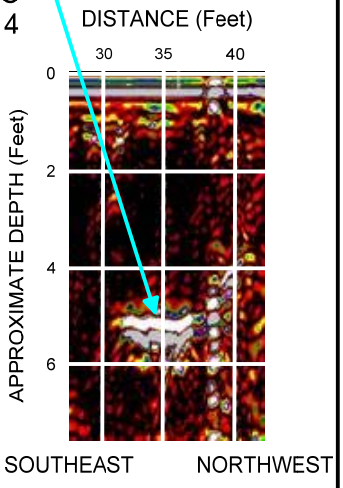
EXAMPLE GPR RESPONSE FROM THE SHORT AXIS OF KNOWN UST NO. 4



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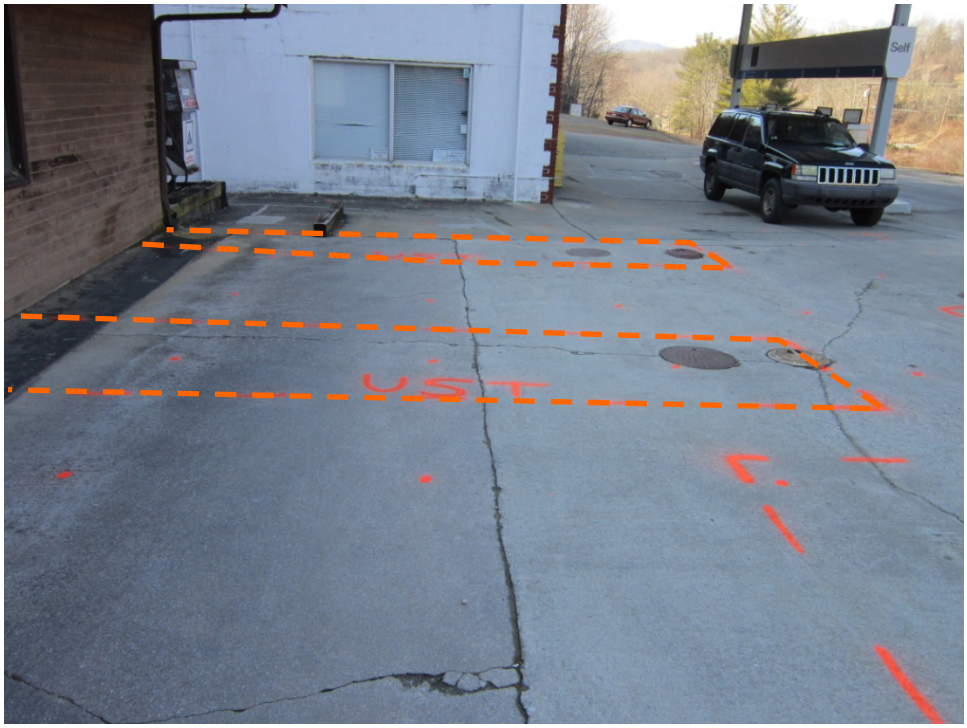
EXAMPLE GPR IMAGES OF KNOWN UST NUMBERS 1, 2, 3, & 4

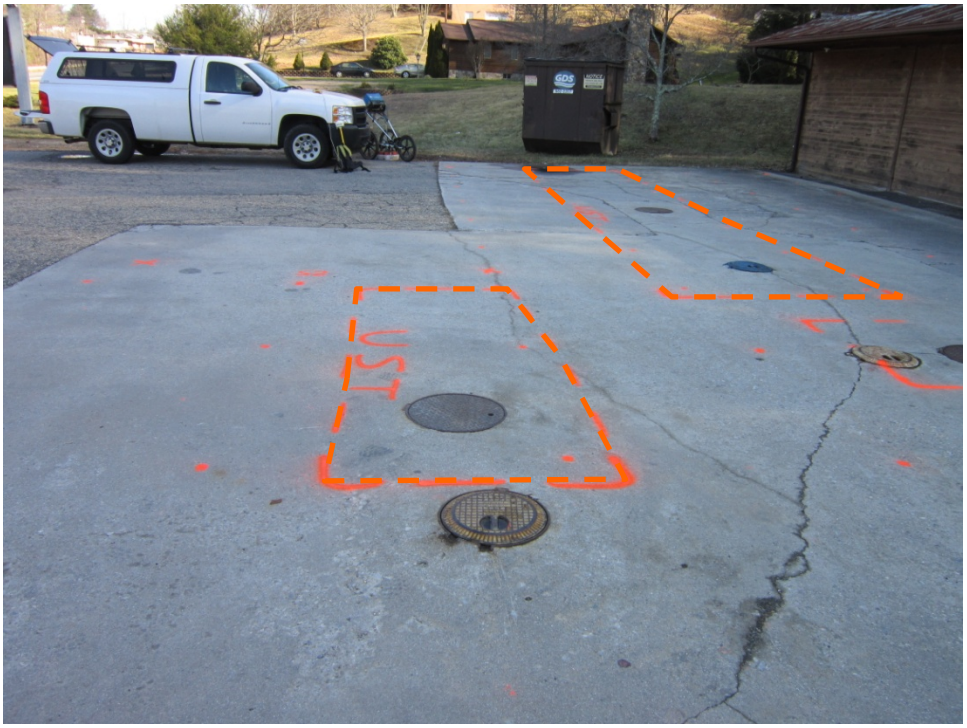
FIGURE 5

Parcel 76 (Tony and Veneta Honeycutt Property), looking south. Photo shows approximate marked locations of known UST Nos. 1 through 4 near the vacant building on the eastern side of the site.

Parcel 76 (Tony and Veneta Honeycutt Property), looking southwest. Photo shows approximate marked locations of known UST Nos. 1 through 4 near the vacant building on the eastern side of the site.



Parcel 76 (Tony and Veneta Honeycutt Property), looking northwest. Photo shows approximate marked locations of known UST Nos. 1 and 2 near the vacant building on the eastern side of the site.



Parcel 76 (Tony and Veneta Honeycutt Property), looking southeast. Photo shows approximate marked locations of known UST Nos. 3 and 4 near the vacant building on the eastern side of the site.

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PHOTOS OF
UST LOCATIONS

FIGURE 7