



April 26, 2010

Mr. Robert Miller, PE, Senior Principal Engineer
Mactec Engineering and Consulting, Inc
3301 Atlantic Avenue
Raleigh, NC 27604

RE: State Project: U-2550B
 WBS Element: 34831.1.1
 County: Burke
 Description: Morganton – NC 18 (Sterling Street) and I-40 Interchange

**Subject: Report on Geophysical Surveys for Parcel 2, Morganton, NC
 Schnabel Engineering Project 09210013.19**

Dear Mr. Miller:

Schnabel Engineering South, P.C. (Schnabel) is pleased to present this report on the geophysical surveys we conducted on the subject property. We understand this letter report will be included as an appendix in your report to the NCDOT. The report includes two 11x17 color figures and three 8.5x11 color figures.

1.0 INTRODUCTION

The work described in this report was conducted on March 25 and 31, 2010, by Schnabel under our 2009 contract with the NCDOT. The work was conducted within the accessible areas of the proposed right-of-way and/or easement as indicated by the NCDOT to support their environmental assessment of Parcel 2 (Jerry and Steve Issacs Property, NC Express). Photographs of the parcel are included on Figure 1. The purpose of the geophysical surveys was to locate possible metal underground storage tanks (UST's) and associated metal product lines in the accessible areas of the right-of-way and/or easement.

The geophysical investigation consisted of electromagnetic (EM) induction surveys using a Geonics EM61-MK2 instrument. The EM61 metal detector is used to locate metal objects buried up to about eight feet below ground surface. Ground-penetrating radar (GPR) investigations of selected EM61 anomalies, including areas of reinforced concrete, were conducted using a Geophysical Survey Systems SIR-3000 system equipped with a 400 MHz antenna. Photographs of the equipment used are shown on Figure 2.

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 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 two 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 UST's. The GPR data also were recorded digitally and later transferred to a desktop computer for further review.

Preliminary results for Parcel 2 were sent to Robert Miller and Matt Gillis of Mactec and Terry Fox of the NCDOT on April 1, 2010.

3.0 DISCUSSION OF RESULTS

The contoured EM61 data for Parcel 2 are shown on Figures 3 and 4. The EM61 early time gate results are plotted on Figure 3. The early time gate data provide the more sensitive detection of metal objects, regardless of size. Figure 4 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 apparently caused by buried utilities, buried metal, or known site features (Figures 3 and 4). The GPR data collected near the westernmost canopy corner on Parcel 2 indicated the presence of a known UST located approximately 10 feet northwest of the westernmost canopy corner. The UST is outside the limits of the planned right-of way and/or easement. An example GPR image showing the reflection from the known UST on Parcel 2 is shown on Figures 3 and 4. Figures 3 and 4 also include the location of the known UST as marked in the field. The GPR data indicate that the known UST on Parcel 2 is buried approximately 2.5 to 3.5 feet below ground surface and is about 5 feet in diameter and about 18 feet long, equivalent to a capacity of about 3000 gallons. Photographs of the known UST location, as marked in the field, are included on Figure 5.

4.0 CONCLUSIONS

Our evaluation of the geophysical data collected on Parcel 2 on Project U-2550B in Morganton, NC indicates the following:

The geophysical data indicate the presence of a known UST on Parcel 2 located approximately 10 feet northwest of the westernmost canopy corner. The UST is outside the planned right-of-way and/or easement. The known UST is about 270-gallon capacity and is buried about 2.5 to 3.5 feet below ground surface.

5.0 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.

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, PC



James W. Whitt
Staff Geophysicist



Edward D. Billington, LG
Senior Vice President

JW:NB

Attachment: Figures (5)

FILE: G:\2009 PROJECTS\09210013 (NCDOT 2009 GEOTECH UNIT SERVICES)\09210013.19 (U-2550B, BURKE CO.)\REPORT\PARCEL 2\PARCEL 2 (U-2550B).DOC



Parcel 2 – Jerry & Steve Issacs Property, looking northeast



Parcel 2 – Jerry & Steve Issacs Property, looking north



Geonics EM61-MK2



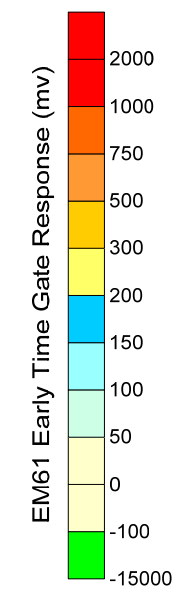
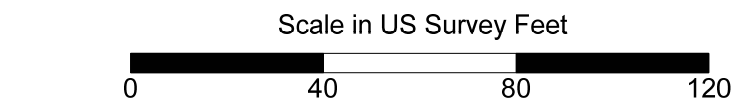
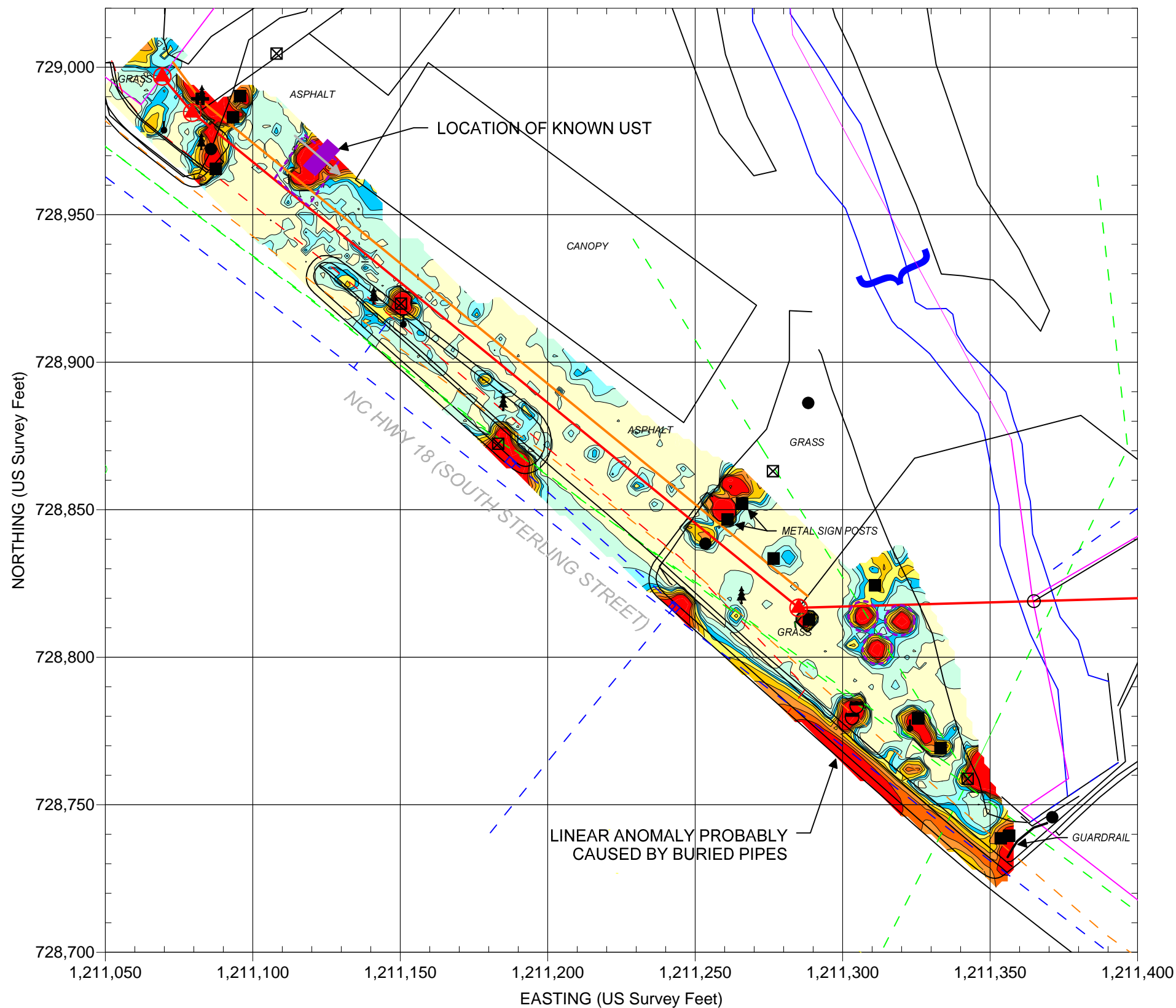
GSSI SIR-3000



STATE PROJECT U-2550B
BURKE CO., NORTH CAROLINA
NC DEPT. OF TRANSPORTATION
PROJECT NO. 09210013.19

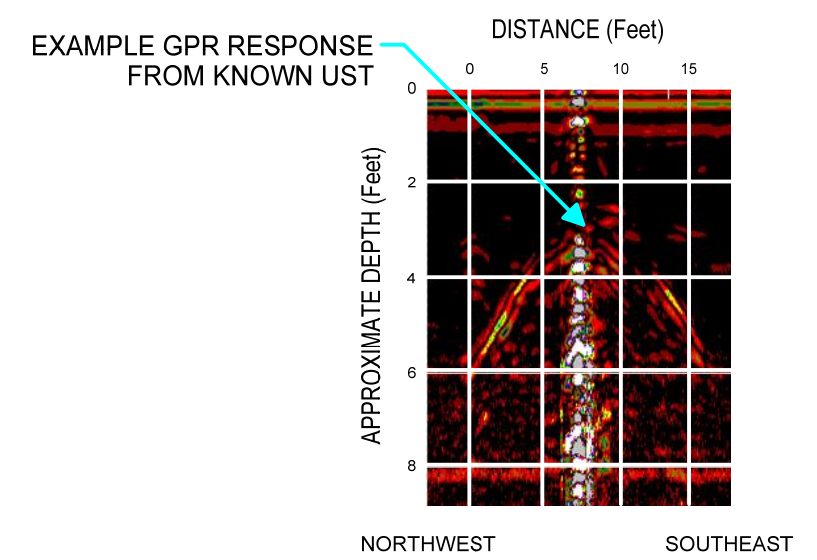
PHOTOS OF
GEOPHYSICAL
EQUIPMENT USED

FIGURE 2



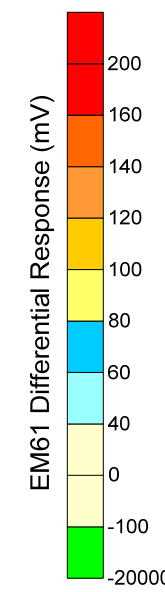
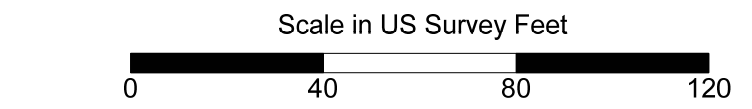
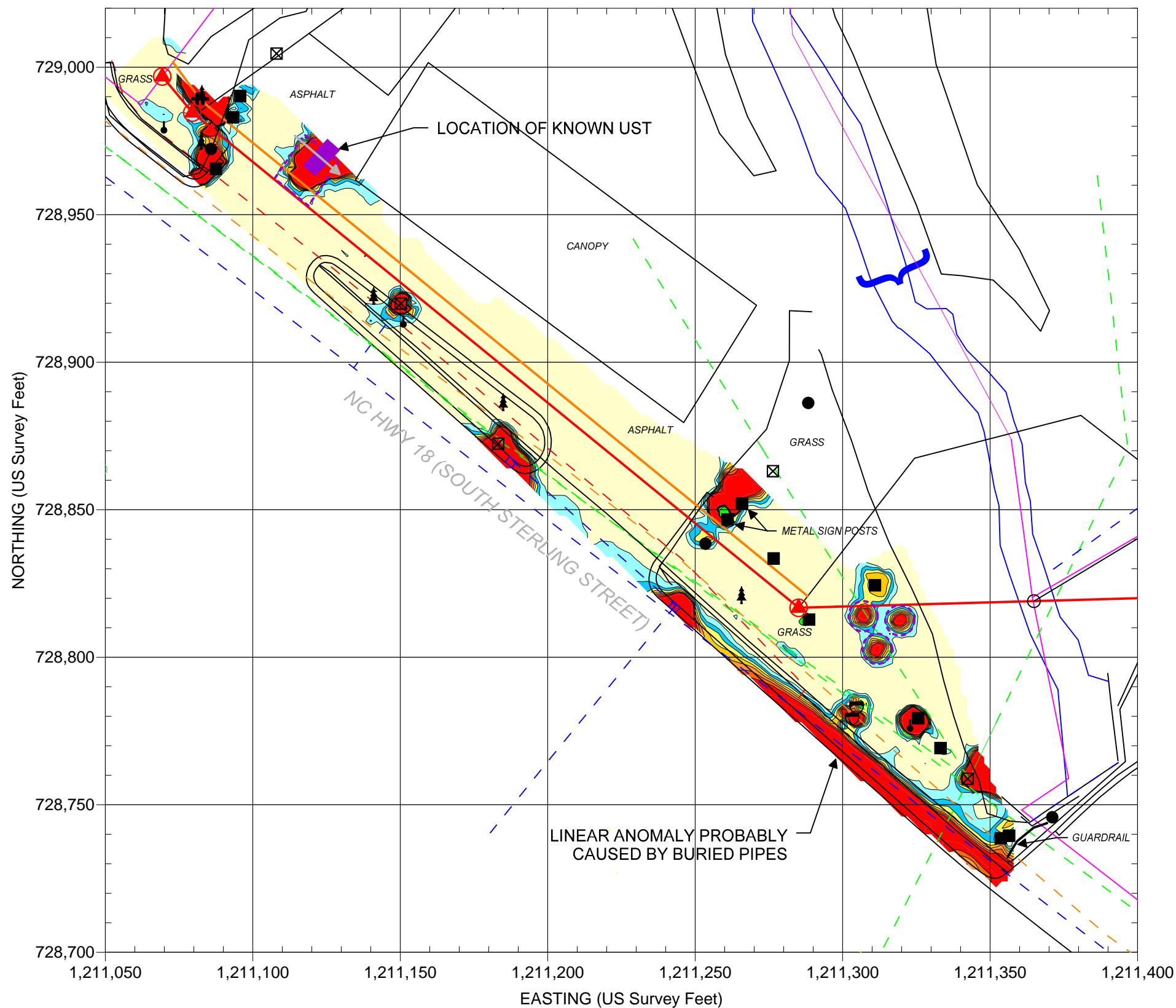
EXPLANATION	
	SIGN
	UTILITY POLE
	GUY WIRE
	MISCELLANEOUS METALLIC OBJECT
	UTILITY MANHOLE, METER, BOX, ETC.
	LIGHT POLE
	STORM SEWER INLET
	UST LID
	DOT PROPOSED RW
	DOT PROPOSED UTILITY EASEMENT
	PROPERTY LINE
	UTILITY (AS MARKED BY OTHERS OR AS PROVIDED BY NCDOT [VARIOUS COLORS])
	EXAMPLE GPR LINE LOCATION
	GPR SURVEY AREA
	LOCATION OF SUSPECT UST MARKED ON SITE

REF.: NCDOT FILE: u2550b_rdy_psh04.dgn
(FOR SOME SITE FEATURES)



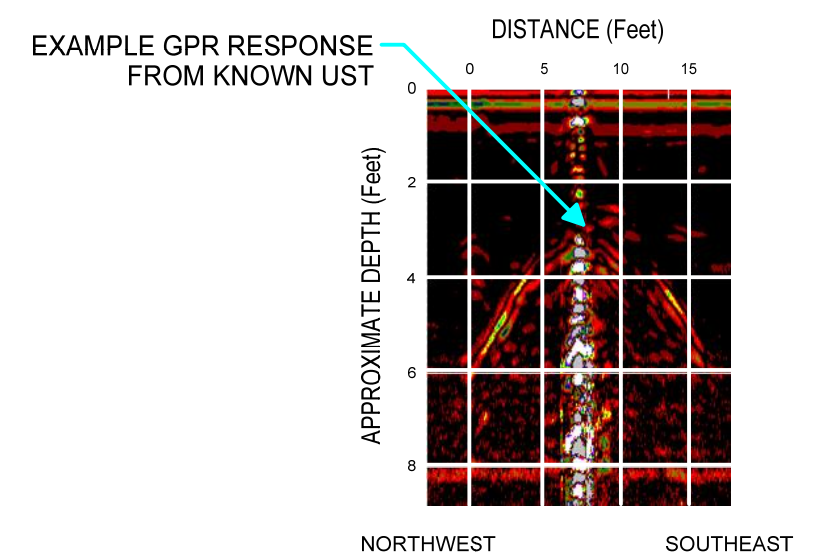
Note: The contour plot shows the earliest and most sensitive time gate of the EM61 bottom coil/channel in millivolts (mV). The EM data were collected on March 25, 2010, using a Geonics EM61-MK2 instrument. Positioning for the EM61 survey was provided using a submeter Trimble ProXRS DGPS system. Coordinates are in the US State Plane 1983 System, North Carolina Zone 3200, using the NAD 1983 datum. GPR data were acquired on March 31, 2010, using a Geophysical Survey Systems SIR 3000 equipped with a 400 MHz antenna.

	STATE PROJECT U-2550B BURKE COUNTY, NORTH CAROLINA NC DEPARTMENT OF TRANSPORTATION PROJECT NO. 09210013.19	PARCEL 2 EM61 EARLY TIME GATE RESPONSE
	FIGURE 3	



EXPLANATION	
	SIGN
	UTILITY POLE
	GUY WIRE
	MISCELLANEOUS METALLIC OBJECT
	UTILITY MANHOLE, METER, BOX, ETC.
	LIGHT POLE
	STORM SEWER INLET
	UST LID
	DOT PROPOSED R/W
	DOT PROPOSED UTILITY EASEMENT
	PROPERTY LINE
	UTILITY (AS MARKED BY OTHERS OR AS PROVIDED BY NCDOT [VARIOUS COLORS])
	EXAMPLE GPR LINE LOCATION
	GPR SURVEY AREA
	LOCATION OF SUSPECT UST MARKED ON SITE

REF.: NCDOT FILE: u2550b_rdy_psh04.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 March 25, 2010, 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 March 31, 2010, using a Geophysical Survey Systems SIR 3000 equipped with a 400 MHz antenna.

	STATE PROJECT U-2550B	PARCEL 2
	BURKE COUNTY, NORTH CAROLINA	EM61 DIFFERENTIAL
	NC DEPARTMENT OF TRANSPORTATION	RESPONSE
	PROJECT NO. 09210013.19	FIGURE 4



Parcel 2 – Jerry & Steve Issacs Property, looking northeast. Photo shows approximate marked location of the known UST near the westernmost corner of the canopy.



Parcel 2 – Jerry & Steve Issacs Property, looking northwest. Photo shows approximate marked location of the known UST near the westernmost corner of the canopy.



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PHOTOS OF
 KNOWN
 UST LOCATION

FIGURE 5