Schnabel ENGINEERING

November 18, 2013

Mr. Mohammed A. Mulla, P.E., CPM, MCE
NCDOT, Geotechnical Engineering Unit
1020 Birch Ridge Drive
Raleigh, NC 27610

RE:	State Project:	P-5204
	WBS Element:	52400.1.STR02T2
	County:	Guilford
	Description:	SR 2819 (McLeansville Road) Grade Separation Over NS/NCRR Railroad from SR 2826 to north of SR 2746

Subject: **Project 11821014.32, Report on Geophysical Survey**
Parcel 17, Charles & Martha Terry Property, McLeansville, North Carolina

Dear Mr. Mulla:

SCHNABEL ENGINEERING SOUTH, PC (Schnabel) is pleased to present this report on the geophysical survey we performed on the subject property. The report includes two 11x17 color figures and two 8.5x11 color figures. This study was performed in accordance with our revised proposal for Geophysical Surveys to Locate Possible USTs dated October 10, 2013, as approved by Terry Farr on November 14, 2013, and our agreement dated June 2, 2011. Terry Fox provided a verbal notice to proceed on October 17, 2013.

INTRODUCTION

The field work described in this report was performed on October 18, 2013, by Schnabel under our 2011 contract with the NCDOT. The purpose of the geophysical survey was to evaluate the potential presence of metal underground storage tanks (USTs) in the accessible areas of the NCDOT right-of-way and/or easement at Parcel 17, as requested by Terry Fox. Photographs of the property are included on Figure 1. The property is located on the northwest quadrant of Frieden Church Road and McLeansville Road (5335 Frieden Church Road) in McLeansville, NC.

The geophysical survey consisted of an electromagnetic (EM) induction survey. The EM survey was performed using a Geonics EM61-MK2 (EM61) instrument. The EM61 is a time domain metal detector that stores data digitally for later processing and review. Sensitivity to metallic objects is dependent on the size, depth, and orientation of the buried object and the amount of noise (i.e. response from spurious metallic objects) in the area. The EM61 can generally observe a single buried 55 gallon drum at a depth

of 10 feet or less. The EM61 makes measurements by creating an electromagnetic pulse and then measuring the response from metallic objects over time after the pulse is generated. We measured and recorded the response at several time increments after the pulse to help evaluate relative size and depth of metallic objects in the subsurface.

A photograph of the equipment used is shown on Figure 2.

FIELD METHODOLOGY

We obtained locations of geophysical data points using a sub-meter Trimble Pro-XRS differential global positioning system (DGPS). 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 also recorded the locations of existing site features (signs, other metal objects, etc.) with the DGPS for later correlation with the geophysical data and a site plan 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.

DISCUSSION OF RESULTS

The contoured EM61 data collected over Parcel 17 are shown on Figure 3, EM61 Early Time Gate Response, and Figure 4, EM61 Differential Response. Areas outside the colored, contoured EM61 data were not surveyed. Early time data refer to the response measured at a short time after the initial EM pulse is generated. Early time data typically contain responses from all metal objects, small or large and shallow or deep, within the sensitivity range of the instrument. Differential data represent the difference in response between the top and bottom coils of the EM61 instrument at a later time after the initial pulse than early time data. Differential data naturally tend to filter 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.

We were able to access the planned survey area as requested by Terry Fox. GPR data were not collected at the site due to a lack of differential EM61 anomalies that would suggest a potential presence of USTs. The geophysical data collected at the site do not indicate the presence of metallic USTs within the areas surveyed.

CONCLUSIONS

As shown in Figures 3 and 4, the EM data we collected over Parcel 17 cover the planned survey area. The EM data include responses from several visible metallic objects at grade (e.g. signs, utility manhole, etc.). We did not observe anomalies in the EM geophysical data at the subject property that we interpret to be the results of metallic USTs within about 6 feet of the ground surface.

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.

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

James W. Whitt, PG
Senior Staff Geophysicist

Gary D. Rogers, PG
Senior Associate

JWW:JCD:GDR
Attachments: Figures (4)
CC: NCDOT, Terry Fox
FILE: G:\2011-SDE-JOBS\11821014_00_NCDOT_2011_GEOTECHNICAL_UNIT_SERVICES\11821014_32_P-5204_GUILFORD_COUNTY\REPORT\SCHNABEL GEOPHYSICAL REPORT ON PARCEL 17 (P-5204).DOCX

Attachments:

- Figure 1 - Parcel 17 Site Photos
- Figure 2 - Photo of Geophysical Equipment Used
- Figure 3 - Parcel 17 EM61 Early Time Gate Response
- Figure 4 - Parcel 17 EM61 Differential Response

Parcel 17 (Charles & Martha Terry Property), looking northwest

Parcel 17 (Charles & Martha Terry Property), looking west

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PARCEL 17
SITE PHOTOS

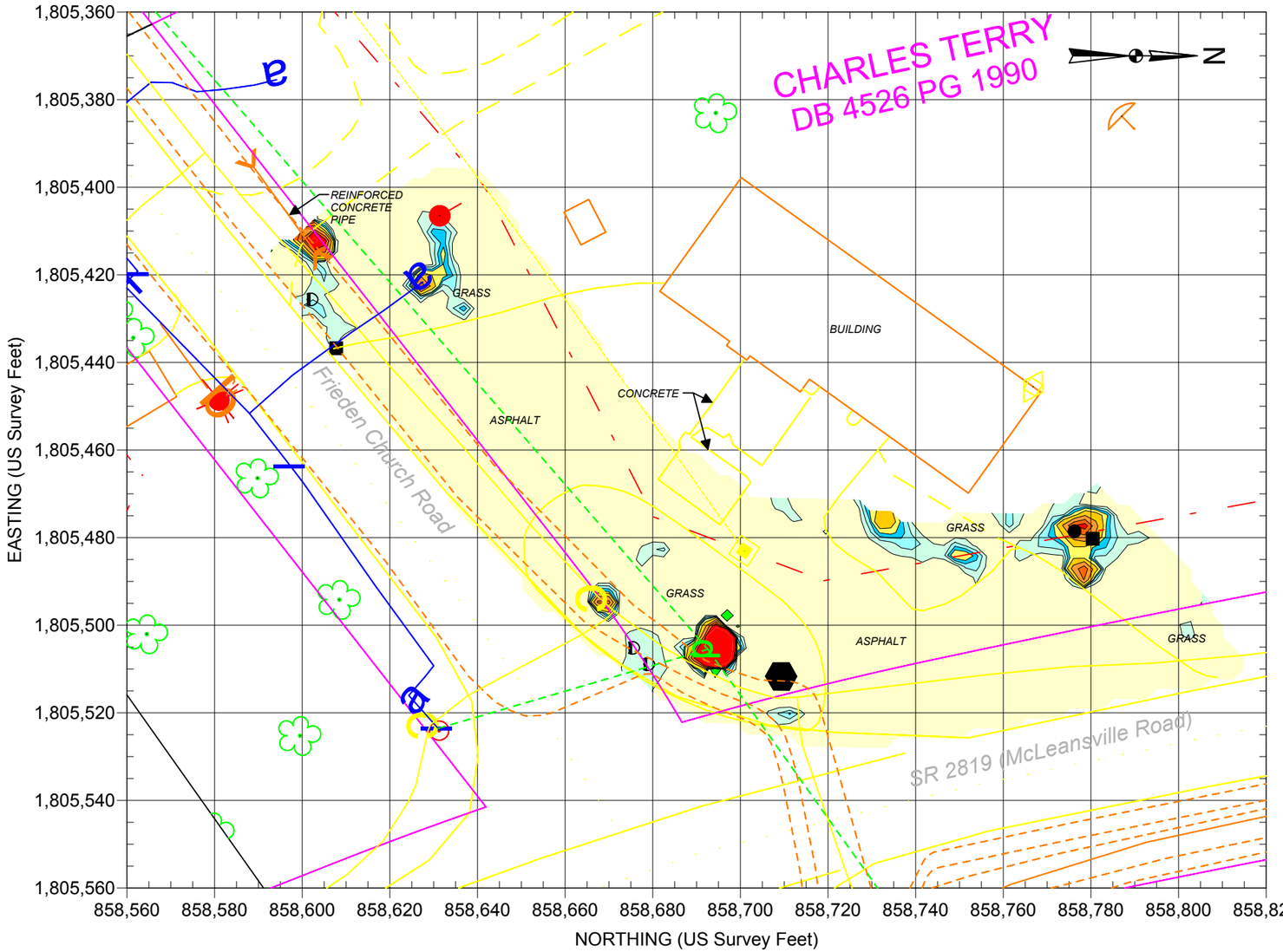
FIGURE 1

Geonics EM61-MK2 Metal Detector with Trimble DGPS Unit

Note: Stock photograph – not taken on site.

Schnabel ENGINEERING	STATE PROJECT P-5204 NC DEPT. OF TRANSPORTATION GUILFORD CO., NORTH CAROLINA PROJECT NO. 11821014.32	PHOTO OF GEOPHYSICAL EQUIPMENT USED FIGURE 2

PARCEL 17



EM61 Early Time Gate Response (mV)

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

Scale in US Survey Feet: 1 in = 30 ft

0 30 60 90

EXPLANATION

- LIGHT POLE
- MISCELLANEOUS METALLIC OBJECT
- SIGN
- EDGE OF NCDOT PROPOSED R/W
- PROPERTY LINE

BASE PLAN FROM NCDOT FILE:
P5204_rdy_row.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 October 18, 2013, 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.

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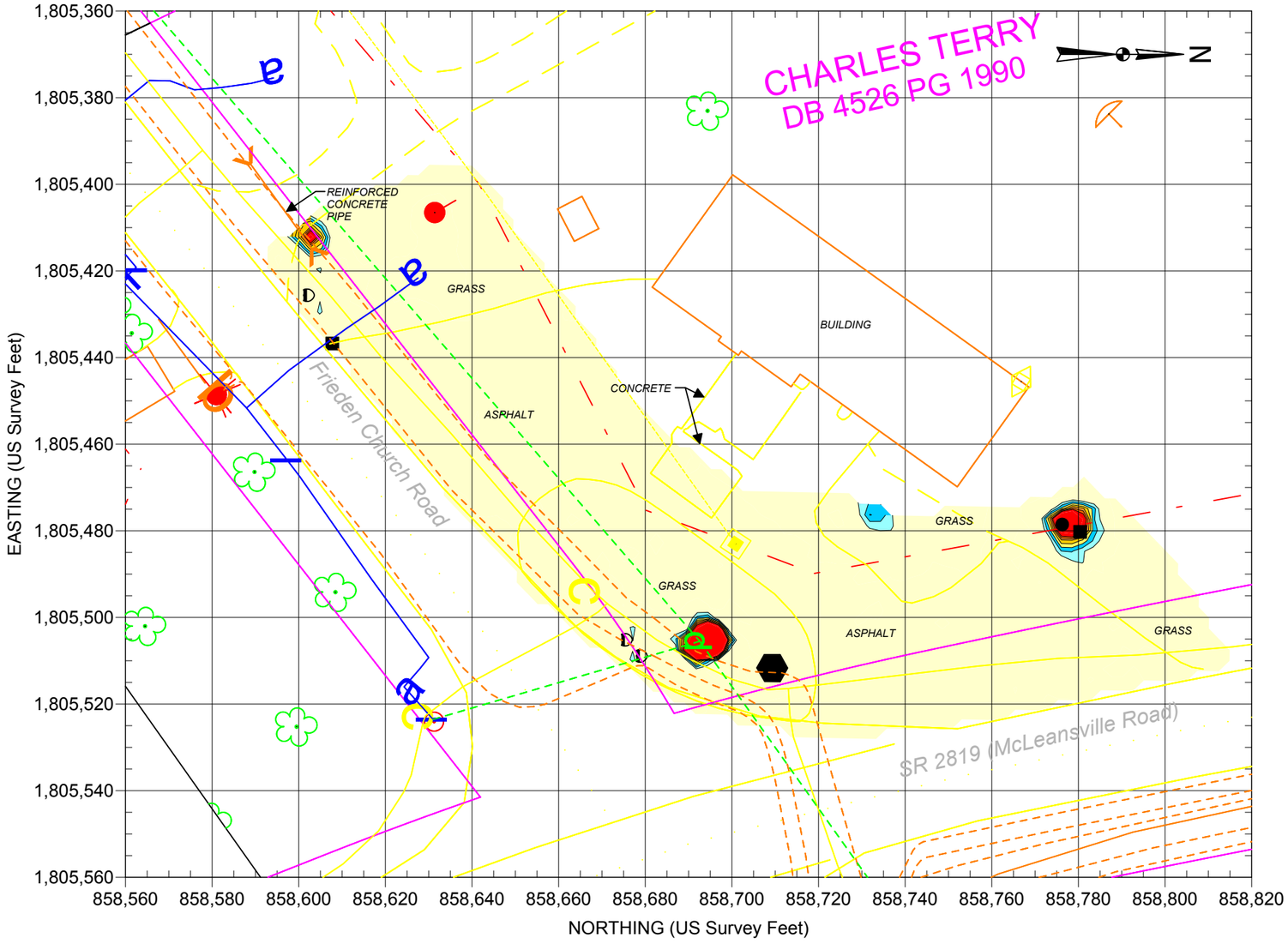
EM61
EARLY TIME GATE
RESPONSE

FIGURE 3

PARCEL 17



EM61 Differential Response (mV)

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

Scale in US Survey Feet: 1 in = 30 ft

0 30 60 90

EXPLANATION

- LIGHT POLE
- MISCELLANEOUS METALLIC OBJECT
- SIGN
- EDGE OF NCDOT PROPOSED R/W
- PROPERTY LINE

BASE PLAN FROM NCDOT FILE:
P5204_rdy_row.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 October 18, 2013, 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.

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EM61
DIFFERENTIAL
RESPONSE

FIGURE 4