Schnabel ENGINEERING

November 23, 2012

Gordon Box, LG
NCDOT, Geotechnical Engineering Unit
1020 Birch Ridge Drive
Raleigh, NC 27610

RE:
State Project: U-3315
WBS Element: 35781.1.2
County: Pitt
Description: Stantonsburg Road/Tenth Street Connector from Memorial Drive (US 13) to Evans Street

Subject: **Project 11821014.17, Report on Geophysical Surveys**
Parcel 190, Louise Fink Duncan & Mary Ann Duncan Property, Greenville, North Carolina

Dear Mr. Box:

SCHNABEL ENGINEERING SOUTH, PC (Schnabel) is pleased to present this report on the geophysical surveys performed on the subject property. The report includes two 11x17 color figures and two 8.5x11 color figures with relevant data collected for this study. This study was performed in accordance with our proposal for Geophysical Surveys to Locate Possible USTs dated July 3, 2012, as approved by Cathy Houser on July 26, 2012, the subsequent approval via Gordon Box to add these properties to the scope described in our proposal, and our agreement dated June 2, 2011.

INTRODUCTION

The work described in this report was performed on October 30 and October 31, 2012, by Schnabel under our 2011 contract with the NCDOT. 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 and in the first adjacent roadway lane. We performed the surveys over the accessible areas of the sites as directed by the NCDOT. Photographs of the property are included on Figure 1. The property is located on the northwest quadrant of W. 12th Street and Evans Street in Greenville, NC.

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 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 more than 10 ft. The EM61 makes measurements by creating an electromagnetic pulse and then measuring the response from metallic objects with time after the pulse is generated. We recorded the response at several times after the pulse to help evaluate relative size and depth of metallic objects in the earth.

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 to further evaluate EM responses that could indicate a potential UST.

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-XRT 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, other metal objects, 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 190 and the GPR survey area locations are shown on Figures 3 and 4. Early time data are plotted on Figure 3 and differential data (a comparison of the response at two different elevations above the ground surface) are presented in Figure 4. The early time data provide a more sensitive detection of metal objects than later time data, which tends to highlight deeper and/or larger objects. Differential response between the top and bottom coils of the EM61 instrument tends 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.

The early time and differential results show anomalies (>1,000 mV on Figure 3 and >160 mV on Figure 4) of unknown cause, in addition to those apparently caused by known site features. The GPR data indicate that the EM anomalies of unknown cause are probably caused by a building, utilities, or reinforced concrete. The geophysical 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 and in the adjacent roadway on Project U-3315 in Greenville, 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 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, LG
Senior Staff Geophysicist

Nigel Miller, PE
Project Manager

JW:MHD:NM:GR
Attachments: Figures (4), Appendix (1)
FILE: G:\2011-SDE-JOBS\11821014_00_NCDOT_2011_GEOTECHNICAL_UNIT_SERVICES\11821014_17_U-3315_PITT_COUNTY\REPORT\PARCEL 190\SCHNABEL GEOPHYSICAL REPORT ON PARCEL 190 (U-3315).DOCX

Attachments:

- Figure 1 - Parcel 190 Site Photos
- Figure 2 - Photos of Geophysical Equipment Used
- Figure 3 - Parcel 190 Early Time Gate Response
- Figure 4 - Parcel 190 Differential Response
- Appendix A - Sanborn Map (1916 sanborn parcel 190 &87.pdf)

Parcel 190 (Louise Fink Duncan & Mary Ann Duncan Property), looking north

Parcel 190 (Louise Fink Duncan & Mary Ann Duncan Property), looking west

Schnabel ENGINEERING	STATE PROJECT U-3315 NC DEPT. OF TRANSPORTATION PITT COUNTY, NORTH CAROLINA PROJECT NO. 11821014.17	PARCEL 190 SITE PHOTOS FIGURE 1

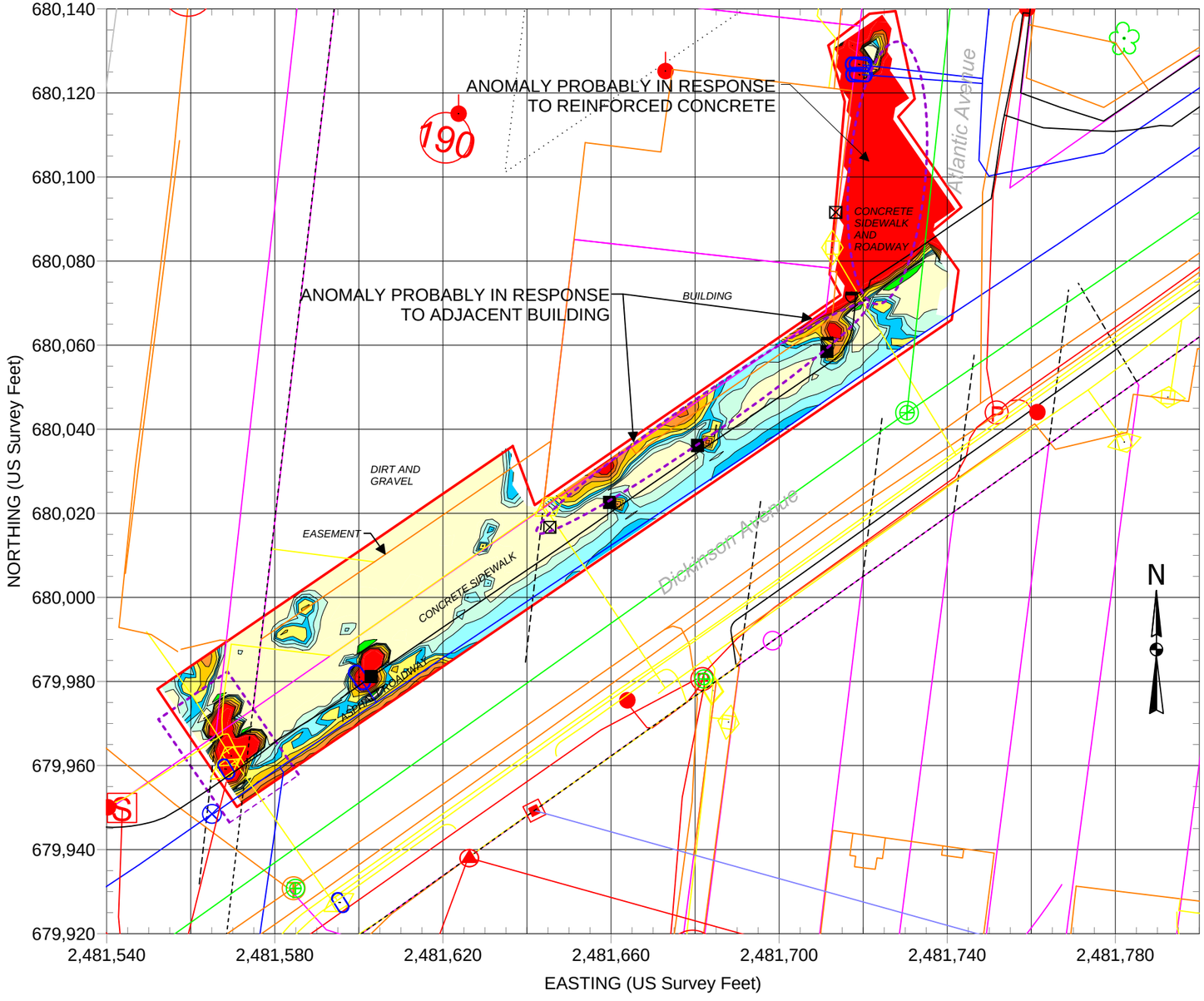
Geonics EM61-MK2 Metal Detector with Trimble DGPS Unit

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

Note: Stock photographs – not taken on site.

Schnabel ENGINEERING	STATE PROJECT U-3315 NC DEPT. OF TRANSPORTATION PITT COUNTY, NORTH CAROLINA PROJECT NO. 11821014.17	PHOTOS OF GEOPHYSICAL EQUIPMENT USED FIGURE 2

PARCEL 190



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

- SIGN
- MISCELLANEOUS METALLIC OBJECT
- UTILITY MANHOLE, METER, BOX, ETC.
- EDGE OF NCDOT PROPOSED R/W
- PROPERTY LINE
- GPR SURVEY AREA
- EM61 SURVEY AREA

BASE PLAN FROM NCDOT FILE:
u3315_rdy_psh09.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 30, 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 October 31, 2012, using a Geophysical Survey Systems SIR 3000 equipped with a 400 MHz antenna.

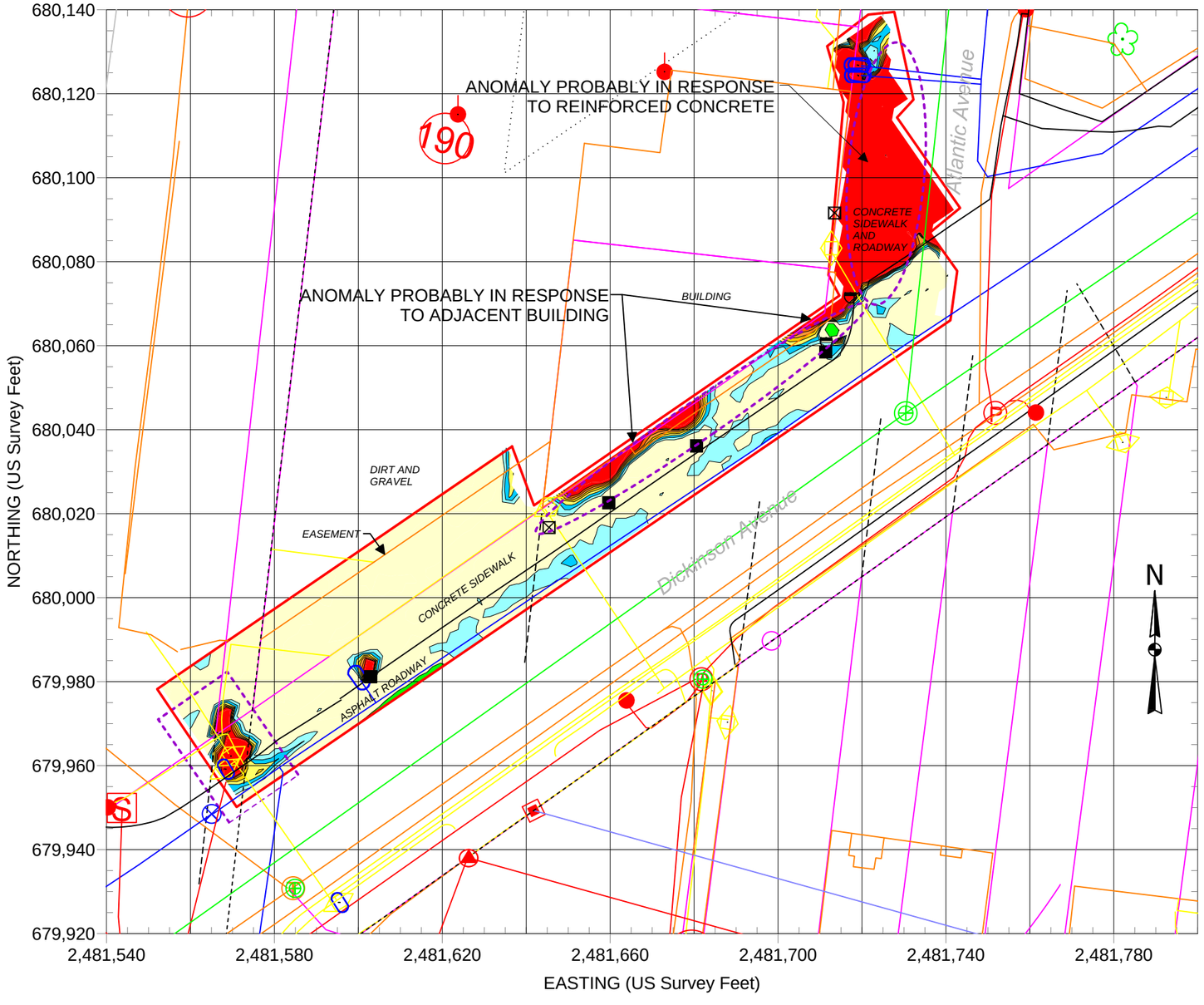
Schnabel ENGINEERING

STATE PROJECT U-3315
NC DEPARTMENT OF TRANSPORTATION
PITT COUNTY, NC
PROJECT NO. 11821014.17

PARCEL 190 EM61 EARLY TIME GATE RESPONSE & GPR SURVEY AREAS

FIGURE 3

PARCEL 190



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

- SIGN
- MISCELLANEOUS METALLIC OBJECT
- UTILITY MANHOLE, METER, BOX, ETC.
- EDGE OF NCDOT PROPOSED R/W
- PROPERTY LINE
- GPR SURVEY AREA
- EM61 SURVEY AREA

BASE PLAN FROM NCDOT FILE:
u3315_rdy_psh09.dgn
(FOR SOME SITE FEATURES)

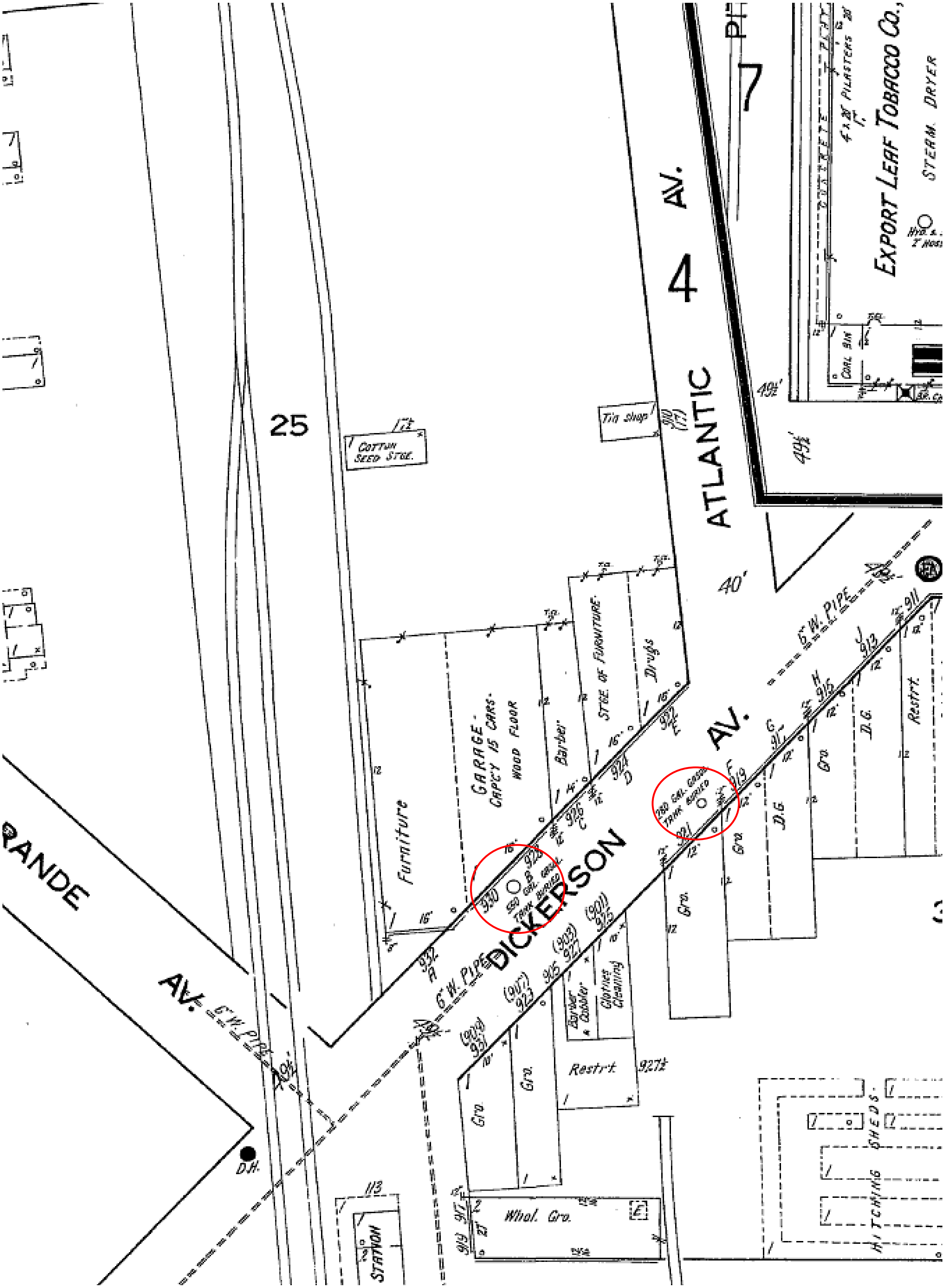
Note: The contour plot shows the difference, in millivolts (mV), between the readings from the top and bottom coils of the EM61. The difference is taken to reduce the effect of shallow metal objects and emphasize anomalies caused by deeper metallic objects, such as drums and tanks. The EM data were collected on October 30, 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 October 31, 2012, using a Geophysical Survey Systems SIR 3000 equipped with a 400 MHz antenna.

Schnabel ENGINEERING

STATE PROJECT U-3315
NC DEPARTMENT OF TRANSPORTATION
PITT COUNTY, NC
PROJECT NO. 11821014.17

PARCEL 190 EM61
DIFFERENTIAL RESPONSE
& GPR SURVEY AREAS
FIGURE 4

APPENDIX A


EXPORT LEAF TOBACCO CO.
STEAM DRYER
PILASTERS
COAL BIN
ATLANTIC
4
AV.
25
COTTON SEED STGE.
Tin shop
DICKERSON
AV.
RANDE
AV.
6" W. PIPE
Furniture
GARAGE CAP'CY 15 CARS
WOOD FLOOR
Barber
STGE. OF FURNITURE
Drugs
550 GAL. GASOL. TANK BURIED
280 GAL. GASOL. TANK BURIED
Gro.
D.G.
Restr't
Barber & Cobbler
Clothes Cleaning
Whol. Gro.
HITCHING SHEDS
STATION
D.H.