PYRAMID ENVIRONMENTAL & ENGINEERING, P.C.

PYRAMID ENVIRONMENTAL & ENGINEERING
(PROJECT 2013-149)

NCDOT PROJECT U-5305 (WBS 47025.1.1)

GEOPHYSICAL SURVEYS OF PARCEL 8 – UNDERGROUND STORAGE TANK INVESTIGATION

ASHEBORO, RANDOLPH COUNTY, NC

JUNE 28, 2013

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GEOPHYSICAL INVESTIGATION REPORT
NCDOT ROW GEOPHYSICAL SURVEY
PARCEL 8 – AMERICAN CLASSIC MOTORCYCLES, U.S. 64
Asheboro, Randolph County, North Carolina

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EXECUTIVE SUMMARY

- EM61 and GPR surveys were performed within the areas directed by the NCDOT.
- The majority of the EM61 anomalies detected could be attributed to visible objects at the ground surface such as signs and utilities. The GPR surveys across remaining areas at the property indicated that the non-cultural anomalies were likely due to minor buried metallic debris or utilities.
- The geophysical investigation did not record any evidence of metallic USTs within the directed survey area.

INTRODUCTION

Pyramid Environmental conducted a geophysical investigation for the North Carolina Department of Transportation (NCDOT) at Parcel 8 (American Classic Motorcycles), located on the northwest quadrant of U.S. 64 and Fisher Circle, Asheboro, NC. The NCDOT provided Pyramid with their requested geophysical survey boundaries. The survey area extended across the south and east sides of the parcel, with a maximum east/west distance of 280 feet and a maximum north/south distance of 80 feet. Conducted on June 17 and 24, 2013, the geophysical investigation was performed to determine if unknown, metallic underground storage tanks (USTs) were present beneath the survey area.

The site was relatively open, and consisted of a combination of asphalt/gravel parking space and grassy medians. Aerial photographs showing the survey area boundaries and ground-level photographs are shown in **Figure 1**.

FIELD METHODOLOGY

Prior to conducting the geophysical investigation, a 20-foot by 10-foot survey grid was established across the geophysical survey area using measuring tapes and water-based marking paint. These grid marks were used as X-Y coordinates for location control when collecting the geophysical data and establishing base maps for the geophysical results

The geophysical investigation consisted of electromagnetic (EM) induction-metal detection and ground penetrating radar (GPR) surveys. The EM survey was performed on June 17, 2013, using a Geonics EM61 metal detection instrument. According to the instrument specifications, the EM61 can detect a metal drum down to a maximum depth of approximately 8 feet. Smaller objects (1-foot or less in size) can be detected to a maximum depth of 4 to 5 feet. All of the EM61 data were digitally collected at approximately 0.8 foot intervals along north-south trending or east-west trending, parallel survey lines spaced five feet apart. All of the data were downloaded to a computer and reviewed in the field and office using the Geonics DAT61 and Surfer for Windows Version 11.0 software programs.

GPR data were acquired on June 24, 2013, across selected EM61 differential anomalies using a GSSI SIR-2000 unit equipped with a 400 MHz antenna. Data were collected generally from east to west and north to south across specific EM61 anomalies. All of the GPR data were viewed in real time using a vertical scan of 512 samples, at a rate of 48 scans per second. GPR data were viewed down to a maximum depth of approximately 8 feet, based on an estimated two-way travel time of 8 nanoseconds per foot. GPR transect and image files were saved to the hard drive of the SIR unit.

DISCUSSION OF RESULTS

Contour plots of the EM61 bottom coil and differential results obtained across the survey area at the property are presented in **Figure 2**. The bottom coil results represent the most sensitive component of the EM61 instrument and detect metal objects regardless of size. The bottom coil response can be used to delineate metal conduits or utility lines, small, isolated metal objects, and areas containing insignificant metal debris. The differential results are obtained from the difference between the top and bottom coils of the EM61 instrument. The differential results focus on the larger metal objects such as drum and UST-size objects and ignore the smaller insignificant metal objects.

Discussion of EM Anomalies: The EM anomaly at X=20, Y=60 was the result of a steel cover and piping associated with a well system at the west boundary of the survey. The EM anomaly at X=90, Y=55 was the result of a storm drain. The EM anomalies at X=135 and X=145 at Y=40 were the result of metal stakes. The EM anomaly at X=142, Y=45 was the result of a power pole. The EM anomaly at X=162, Y=45 was the result of a guy wire. The EM anomaly at X=220, Y=55 was the result of large sign posts. The EM anomaly at X=285, Y=65 was the result of a mailbox. The EM anomalies at X=250, Y=25, at X=280, Y=30, and at X=285, Y=40 were the result of street signs. The remaining anomalies could not be attributed to objects at the ground surface.

Anomalies that could not be directly attributed to visible objects at the ground surface were investigated further with the GPR. Specifically, the feature centered at X=255, Y=65 that extended south to Y=45 was examined with multiple GPR scans.

The GPR data were viewed in real time as the equipment was surveyed across the anomalies. Transects across EM anomalies were saved to the hard drive for post-processing in the office. **Figure 3** presents an aerial photograph showing the location of the GPR transects performed across the unexplained EM anomalies as well as the GPR images that were collected.

GPR Transects 1 and 2 were oriented north/south and east/west, respectively, across the anomaly at X=255, Y=65. GPR Transect 3 was oriented from north to south across the anomaly at X=255, Y=45. The three transects did not record any evidence of subsurface structures, utilities, or clear evidence of debris. The lack of structure in the GPR transects and the low amplitude of the signal associated with these anomalies suggests that they are due to either isolated buried metallic debris or possible utilities that may be below the depth of GPR penetration into the subsurface. No evidence was recorded that would suggest the anomalies are associated with USTs.

The geophysical investigation did not record any evidence of metallic USTs within the directed survey area.

SUMMARY & CONCLUSIONS

Our evaluation of the EM61 and GPR data collected across Parcel 8, Asheboro, North Carolina provides the following summary and conclusions:

- The EM61 and GPR surveys provided reliable results for the detection of metallic USTs within the geophysical survey area.
- The majority of the EM61 anomalies detected could be attributed to visible objects at the ground surface such as signs and utilities. The GPR surveys across remaining areas at the property indicated that the non-cultural anomalies were likely due to minor buried metallic debris or utilities.
- The geophysical investigation did not record any evidence of metallic USTs within the directed survey area.

LIMITATIONS

Geophysical surveys have been performed and this report prepared for the NCDOT in accordance with generally accepted guidelines for EM61 and GPR surveys. It is generally

recognized that the results of the EM61 and GPR surveys are non-unique and may not represent actual subsurface conditions. The EM61 and GPR results obtained for this project have not conclusively determined that metallic USTs do not lie within the survey area of the Randolph County property, but that none were detected, other than those discussed above outside of the formal survey grid. Additionally, it should be understood that areas containing vehicles or other restrictions to the accessibility of the geophysical instruments could not be investigated.

Aerial Photograph Showing Approximate Geophysical Survey Boundaries

View of Main Building
(Facing Approximately Northeast)

View of Geophysical Survey Area
(Facing Approximately East)

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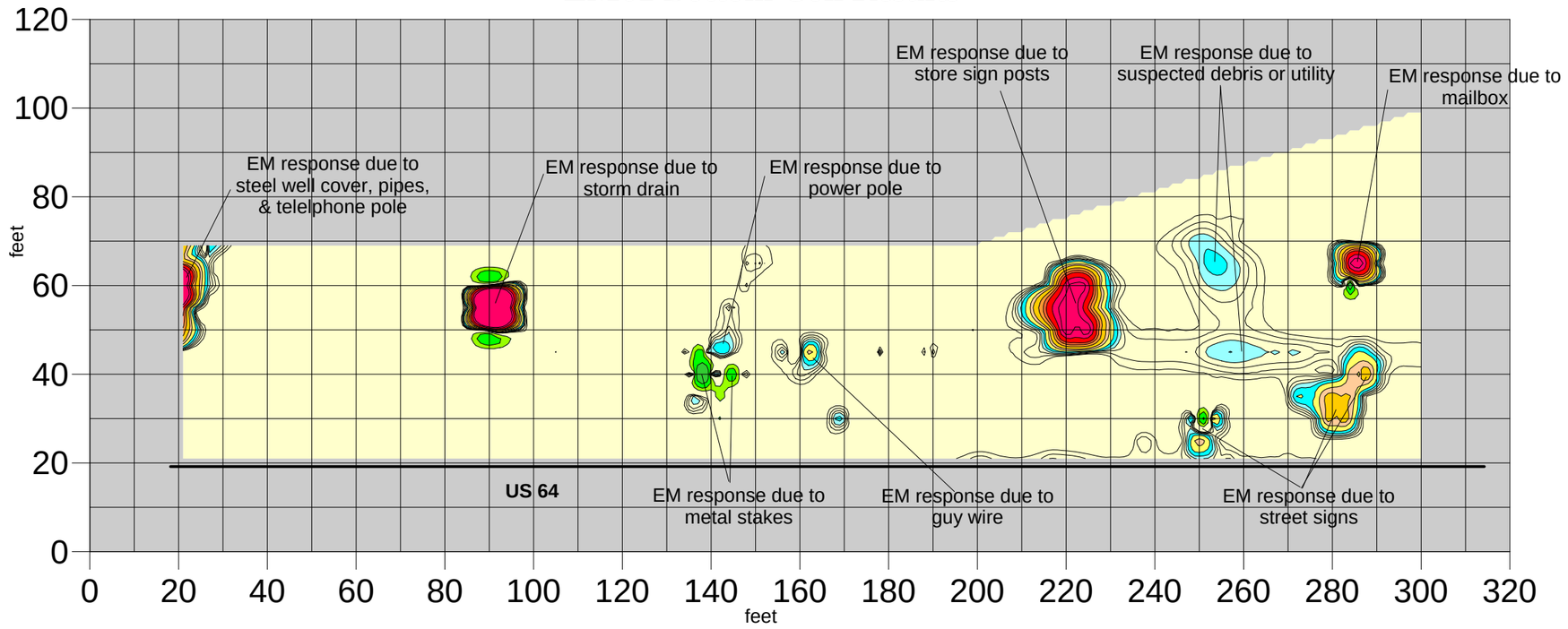
CLIENT	NC DEPARTMENT OF TRANSPORTATION		DATE	06/26/13	DRWN ECC
SITE	PARCEL 8, RANDOLPH COUNTY (DOT ROW PROJECT)		LAY		CHKD
CITY	ASHEBORO	STATE NORTH CAROLINA	DWG		
TITLE	GEOPHYSICAL RESULTS		JNO.	2013-131	FIGURE

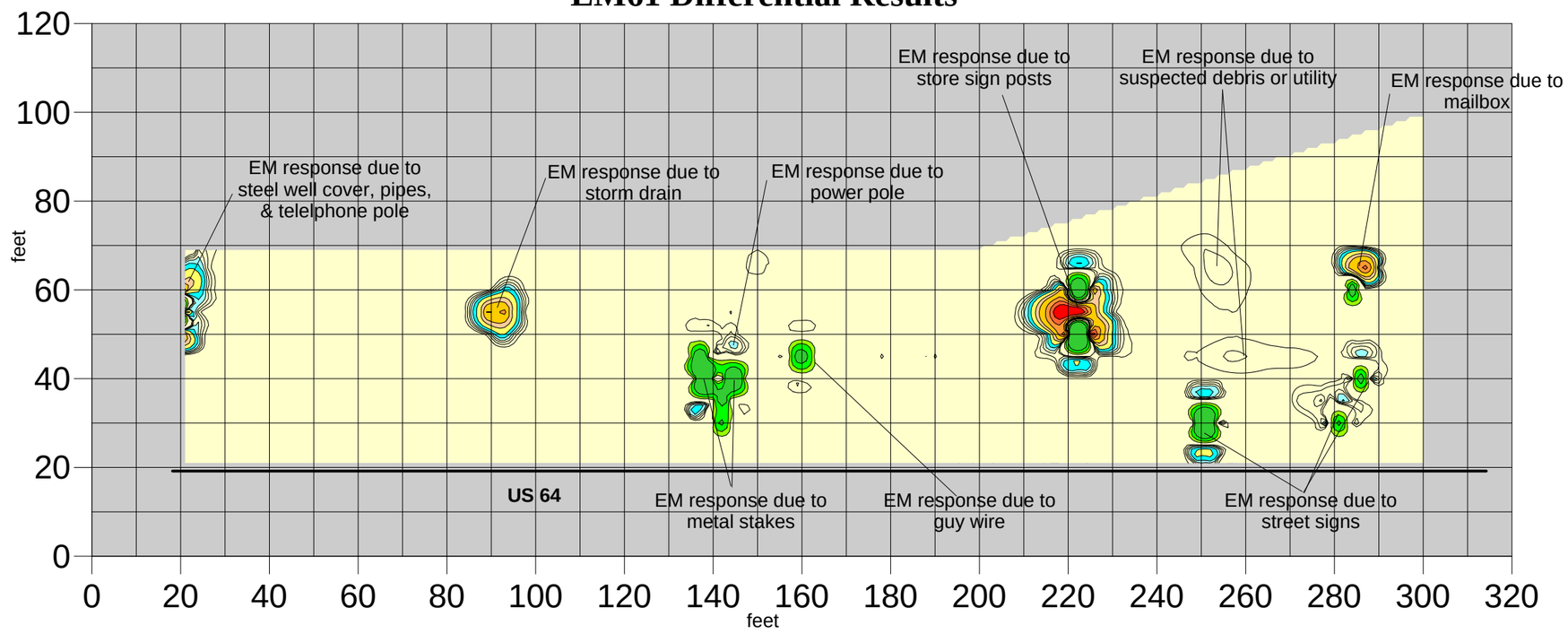
SURVEY BOUNDARIES &
SITE PHOTOGRAPHS

FIGURE 1

EM61 Bottom Coil Results



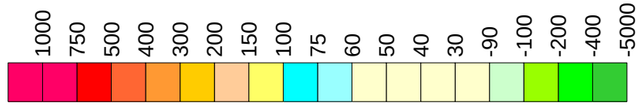
EM61 Differential Results



NO EVIDENCE OF METALLIC USTs OBSERVED

The contour plots show the bottom coil (most sensitive) and differential results of the EM61 instrument in millivolts (mV). The bottom coil response shows buried metallic objects regardless of size. The differential response focuses on larger, buried metallic objects such as drums and USTs and ignores smaller miscellaneous buried, metal debris.The EM61 data were collected on May 16, 2013 using a Geonics EM61 instrument. Ground penetrating radar (GPR) data were not required because all EM features were attributed to cultural objects at the ground surface.

EM61 Metal Detection Response (millivolts)



N

TITLE
PARCEL 8 - EM61 BOTTOM COIL & DIFFERENTIAL RESULTS CONTOUR MAP

PROJECT
NC DEPARTMENT OF TRANSPORTATION
ROW IMPROVEMENT PROJECT
ASHEBORO, RANDOLPH COUNTY, NC

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DATE 06/25/2013

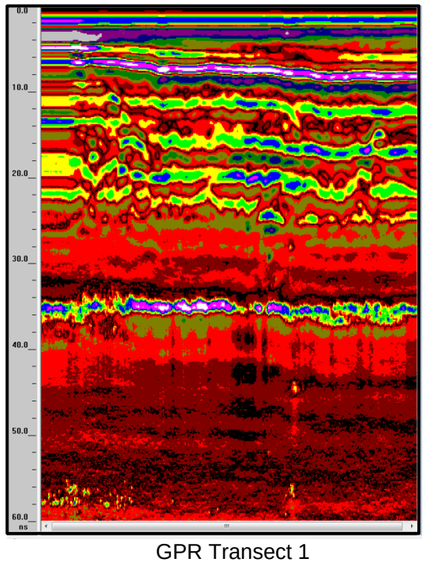
CLIENT NCDOT

PYRAMID PROJECT #: 2013-149

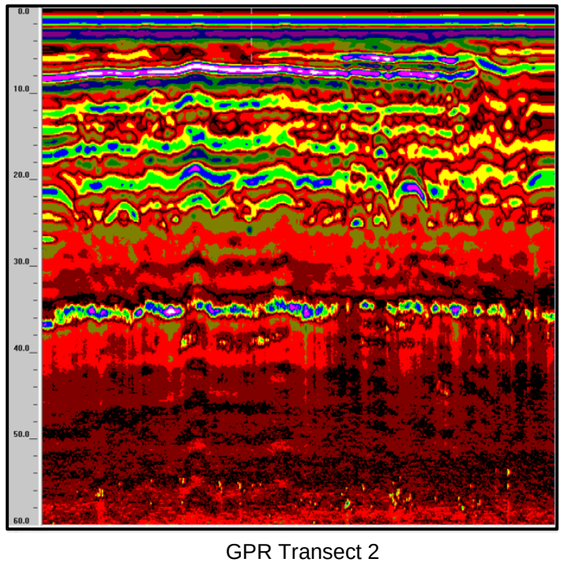
FIGURE 2

Photograph of steel well cover and well sytem at west end of survey area.

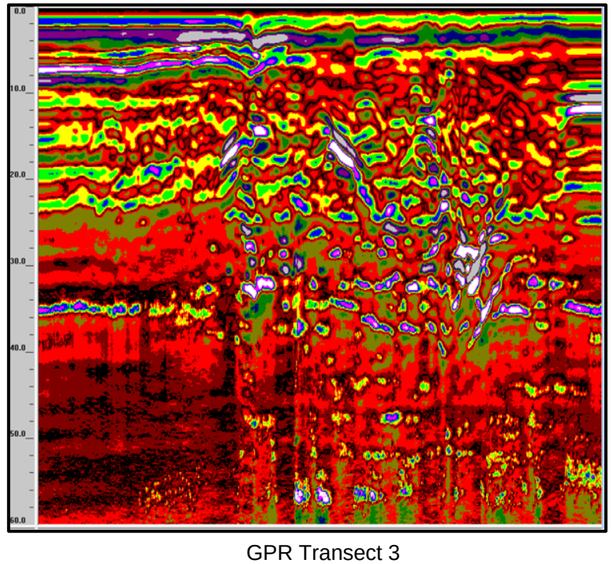
No clear evidence of any subsurface structures, suspected debris or utility



GPR Transect 1



GPR Transect 2



GPR Transect 3

N

TITLE

PARCEL 8 - GPR TRANSECT LOCATIONS AND IMAGES

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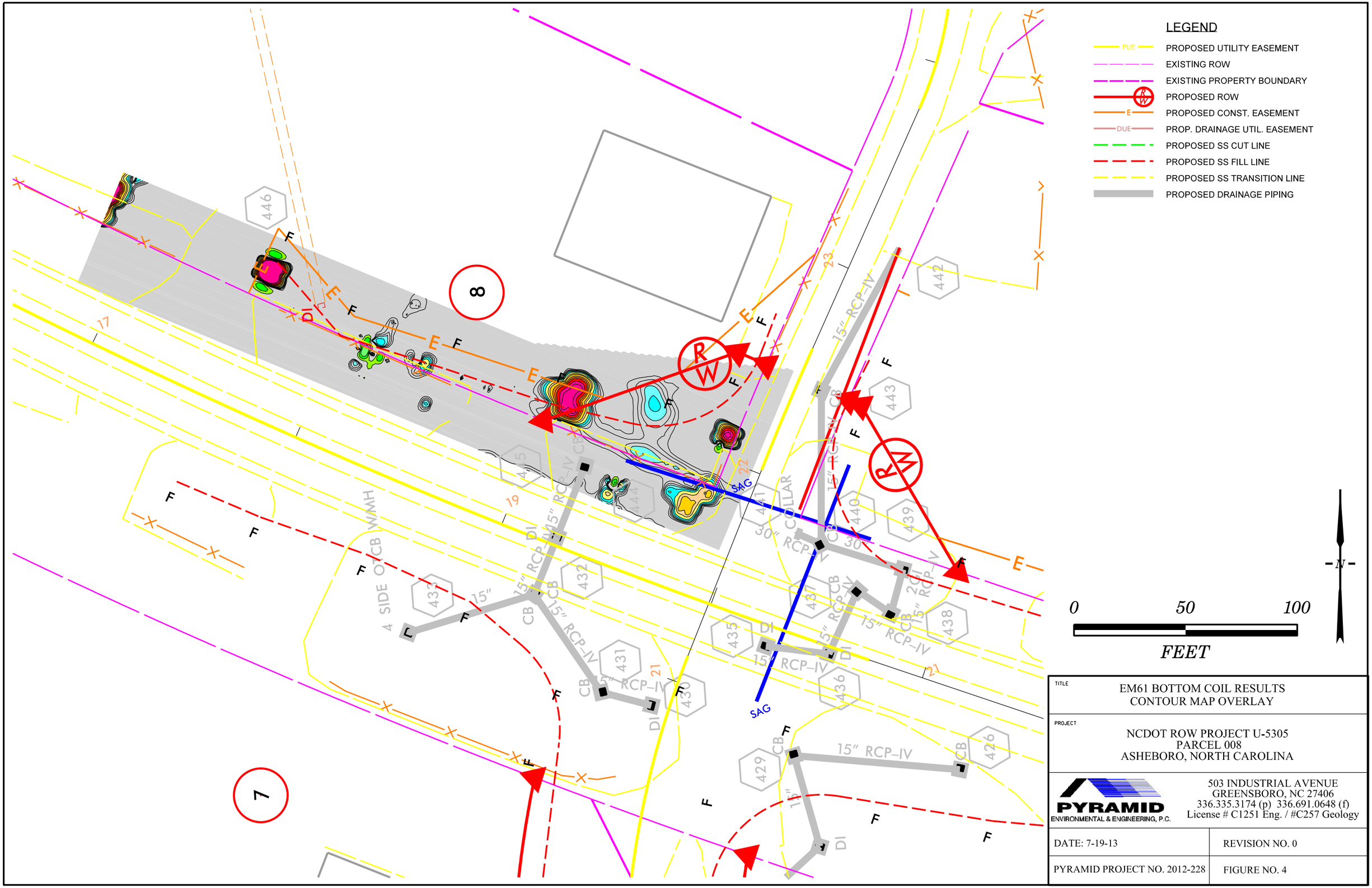
DATE	06/25/2013	CLIENT	NCDOT
PYRAMID PROJECT #:	2013-149		**FIGURE 3**



TITLE	EM61 BOTTOM COIL RESULTS CONTOUR MAP OVERLAY
PROJECT	NCDOT ROW PROJECT U-5305 PARCEL 008 ASHEBORO, NORTH CAROLINA
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DATE: 7-19-13	REVISION NO. 0
PYRAMID PROJECT NO. 2012-228	FIGURE NO. 4