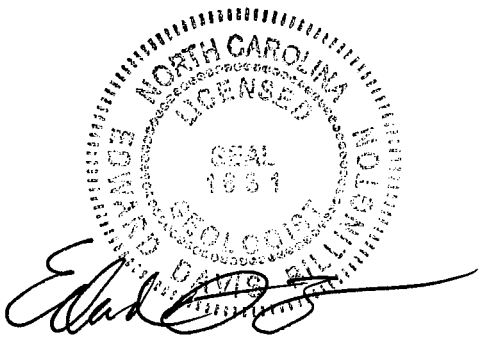
North Carolina Department of Transportation

GEOPHYSICAL SURVEYS FOR RIGHT-OF-WAY PROPERTIES

State Project 9.9080100 (P-3800), Mecklenburg County
John Mac Clements et al Property (Parcel 24B)
Charlotte, North Carolina



January 14, 2003
Project Number 01211005.01-15

Schnabel Engineering Associates, Inc.

405-A Parkway Drive, Greensboro, North Carolina 27401-1693
Phone (336) 274-9456; Fax (336) 274-9486

North Carolina Department of Transportation
GEOPHYSICAL SURVEYS FOR RIGHT-OF-WAY PROPERTIES
State Project 9.9080100 (P-3800), Mecklenburg County

TABLE OF CONTENTS

FIGURES

1.0 INTRODUCTION

Schnabel Engineering Associates, Inc. provided geophysical surveys on December 12, 2002 and January 8, 2003, to locate possible underground storage tanks (UST's) on the John Mac Clements et al property (Parcel 24B) located at 301 North Smith Street in Charlotte, North Carolina. Hearn Place and North Smith Street lie along the southern and eastern perimeters of the property, respectively. A concrete embankment wall, 7th Street, and Parcel 12 border the western, northern and northeastern perimeters of the property, respectively. Railroad tracks lie on the other side of the embankment wall. The 1.46-acre property is currently used by Carolina Rim and Wheel, an automotive parts distributor that operates out of an approximate 25,000 square foot warehouse located in the southern portion of the property. Photos of the site are shown in Figure 4.

The geophysical investigation consisted of electromagnetic (EM) induction surveys using a Geonics EM-61 instrument. Ground penetrating radar (GPR) surveys were performed across selected EM-61 anomalies and steel-reinforced concrete pavement using a SIR-2000 GPR system equipped with a 400 MHz antenna.

2.0 FIELD METHODOLOGY

2.1 Survey Area

The geophysical survey area was based on maps provided by the NCDOT and discussions with NCDOT representative Mr. Tommy Douglas on December 3, 2002. . The EM-61 survey area included the asphalt-covered loading area along Hearn Place, the asphalt-covered parking area along North Smith Avenue, and the grass-covered lot between the warehouse and 7th Street. Because the property line between Parcel 12 and Parcel 24B was not clearly identified, the geophysical survey area may have extended onto the southern and western edges of Parcel 12.

A portion of the grass-covered lot along the embankment wall covering approximately 2,400 square feet could not be surveyed due to fallen trees and brush. The strip of property between the concrete

embankment wall and the warehouse could not be surveyed due to limited space, trees and piles of miscellaneous supplies and equipment.

2.2 Location Control

A 10-foot by 10-foot survey grid was set up on the site as location control for the geophysical surveys. References to direction and location in this report are based on this X-Y coordinate grid system in footage increments. The grid system was established by measuring an X=250 base line along the western edge of North Smith Street. A Y=0 base line was established near the center of Hearn Place and perpendicular to the X-axis base line.

Grid marks were placed on the ground every 10 feet using water-based marking paint. These marks were used as location control when collecting the EM-61, GPR, and hand auger probe data. The locations of existing site features (building, streets, vehicles, fence lines, etc.) were recorded for later correlation with the geophysical data and for location references to the NCDOT drawings.

2.3 Data Collection

The majority of the EM-61 data were collected along northeast-southwest survey lines oriented parallel to the X-axis and spaced 2.5 feet apart covering approximately 27,500 square feet (0.63 acres). The EM-61 data were recorded digitally using a field computer and later transferred to a desktop computer for data processing. Preliminary EM-61 results were emailed to NCDOT representatives Mr. Tommy Douglas and Mr. Cyrus Parker and to Solutions Industrial & Environmental Services representative Mr. Gary Birk on December 24, 2002.

GPR surveys were performed across selected EM-61 differential anomalies and steel-reinforced concrete pavement on January 8, 2003. The GPR data were digitally recorded and reviewed in the field to determine the approximate location and depth of objects. The GPR data were later transferred to a desktop computer for further review and plotting.

3.0 DISCUSSION OF RESULTS

Figure 1 shows the EM-61 early time gate results, which provide the most sensitive detection of metal targets regardless of size. Three linear anomalies parallel to 7th Street and centered near coordinates X=120 Y=333, are probably in response to utility lines. A northeast-southwest trending, linear, early time gate anomaly, beginning from approximately X=115 Y=237, and extending to X=123 Y=320, is probably in response to a utility line. This probable utility line may connect to one of the utility lines that run parallel to 7th Street. The high amplitude anomalies (contours shaded in red) located along the warehouse walls are probably in response to steel reinforced concrete sidewalks and/or the building.

The anomaly centered near coordinates X=245 Y=69, is probably in response to the water meters and the surface metal covers. A number of randomly scattered early time gate anomalies recorded across the grass lot and the area adjacent to the loading dock, appear to be in response to small, miscellaneous, metal debris.

The EM-61 differential plot (Figure 2) shows the difference between the response of the top and bottom coils of the EM-61. The differential response is taken to remove the effect of surface and very shallowly buried, insignificant metallic objects. Normally, this differential response indicates anomalies from deeper or larger objects such as UST's. Similar to the early time gate results, the linear differential anomalies recorded along 7th Street are probably in response to utility lines. The high amplitude anomalies along the building (contours shaded in red) are probably in response to the steel-reinforced concrete sidewalks and/or the building.

Three differential anomalies were recorded near grid coordinates X=121 Y=270, X=220 Y=166, and X=237 Y=96, respectively. The linear geometry of the early time anomaly at X=121 Y=270, and the narrow (2 feet) GPR responses over the anomaly, suggest the probably presence of a utility line. A portion of this utility line, from Y=265 to 275, appears to be buried approximately 1.7 below surface, whereas the segment of line from Y=277 to 287, appears to be buried approximately 2.4 feet deep (refer to Figure 3 for GPR images). Hand auger probing did not encounter the probable utility line.

Based on the early time gate results, the utility line may continue and possibly connect to a utility line that runs along 7th Street.

Similarly, the linear EM anomaly at X=220 Y=166, which may be located on Parcel 12, yielded narrow GPR responses. The linear geometry of the EM anomaly and the GPR responses suggest the probably presence of a utility line buried approximately 1.5 below surface. Due to its location to the road and warehouse, this probable utility line may still be active. Therefore, auger probing was not performed at this location. GPR results also suggest that the anomaly near X=237 Y=96, is in response to a small, miscellaneous metal object. The EM-61 differential results and GPR surveys suggest that the remaining portion of the survey area is free of large metal objects such as UST's or drums.

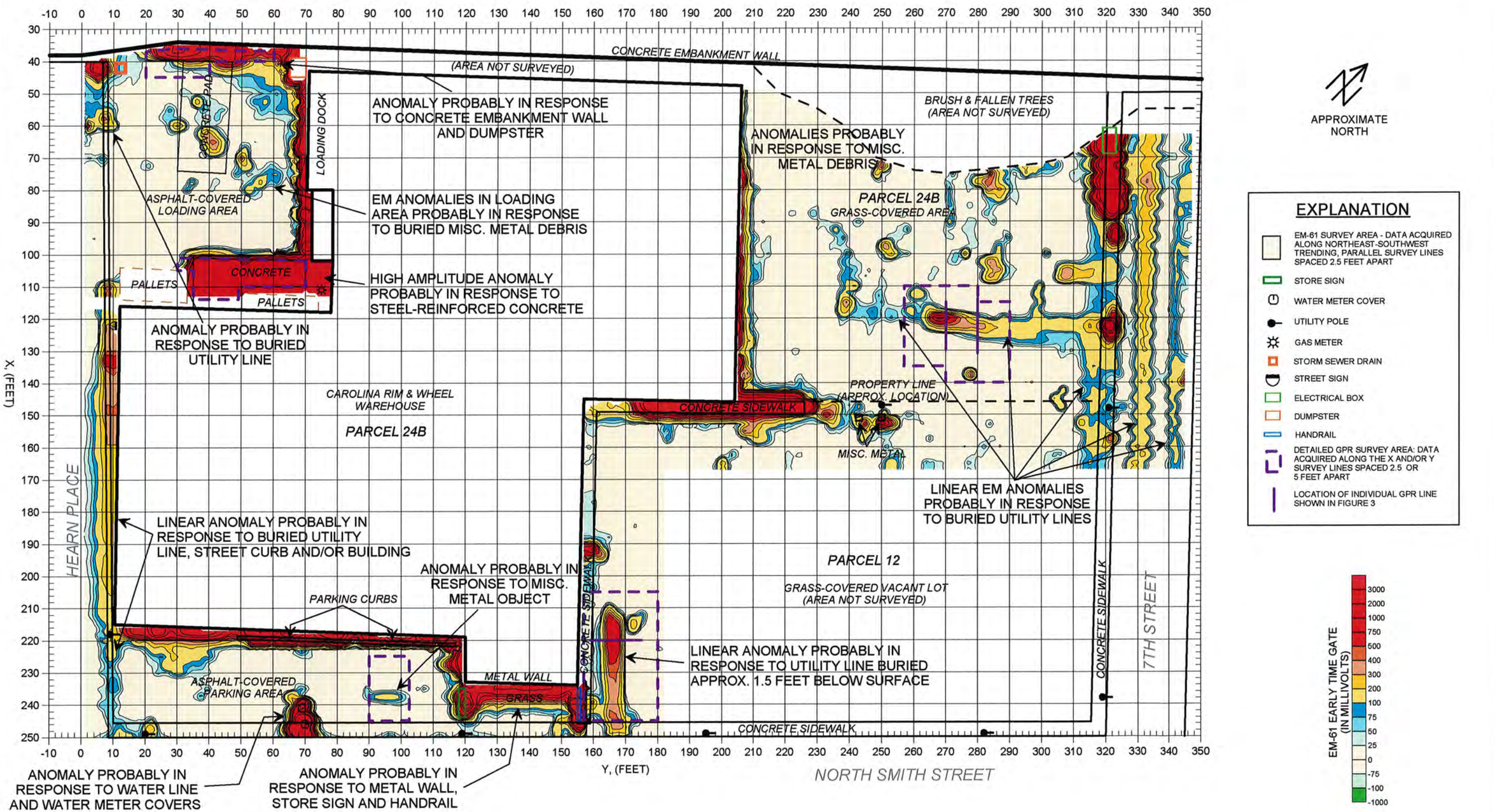
4.0 CONCLUSIONS

Our evaluation of the EM-61, GPR, and auger probe data collected across the John Mac Clements property, provides the following conclusions:

- A portion of the grass-covered lot along the embankment wall, covering approximately 2,400 square feet, could not be surveyed due to fallen trees and brush.
- Three linear EM-61 anomalies running parallel to 7th Street and centered near coordinates X=120 Y=333, are probably in response to utility lines.
- EM-61 and GPR data suggest the probably presence of a utility line beginning near X=115 Y=237, and extending to X=123 Y=320. This probable utility line may connect to one of the utility lines that run parallel to 7th Street.
- EM-61 and GPR data suggest the probably presence of a utility line running from the edge of North Smith Street at X=250 Y=167, and extending to X=212 Y=165. This probable utility line appears to be buried approximately 1.5 feet below surface and may not be located on the Mac Clements property.
- The EM-61 differential results and GPR surveys suggest that the remaining portion of the survey area is free of large metal objects such as UST's or drums.

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.



Note: The contour plot shows the earliest and most sensitive time gate of the EM-61 bottom coil/channel in millivolts (mV). The EM data were collected on December 12, 2002 using a Geonics EM-61MK2 instrument. GPR data were acquired on January 8, 2003.

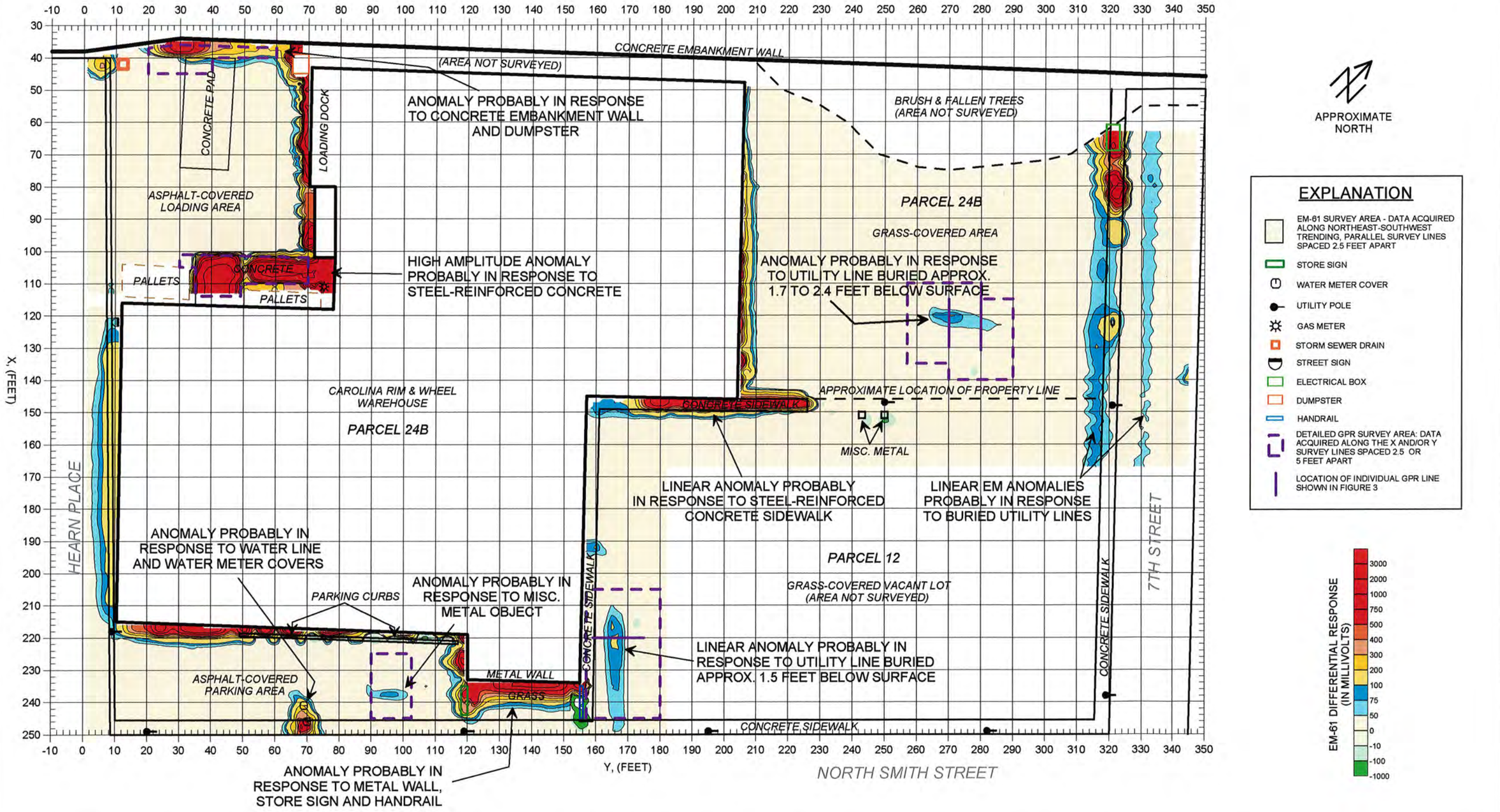
Schnabel Engineering Associates, Inc.

NC Department of Transportation
Geotechnical Unit

John Mac Clements et al Property
Charlotte, North Carolina

EM-61 EARLY TIME GATE RESPONSE

FIGURE 1



Note: The contour plot shows the difference, in millivolts (mV), between the readings from the top and bottom coils of the EM-61. The difference is taken to reduce the effect of shallow metal objects and emphasize anomalies caused by deeper metallic objects, such as pipes and tanks. The EM data were collected on December 12, 2002 using a Geonics EM-61 MK2 instrument. GPR data were acquired on January 8, 2003.

Schnabel Engineering Associates, Inc.

NC Department of Transportation
Geotechnical Unit

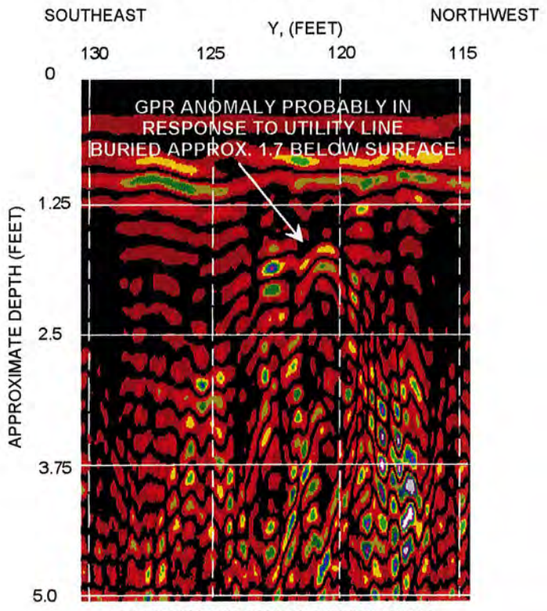
John Mac Clements et al Property
Charlotte, North Carolina

EM-61 DIFFERENTIAL RESPONSE

FIGURE 2

EM ANOMALY CENTERED NEAR X=121 Y=270

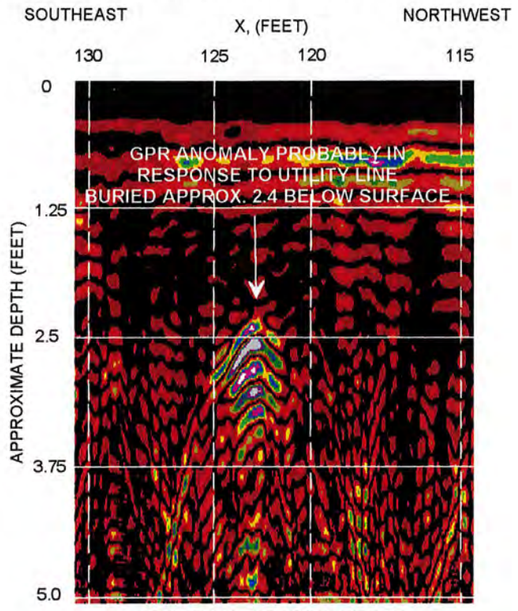
GPR LINE Y=270



ANOMALY PROBABLY IN RESPONSE TO UTILITY LINE. HAND AUGER PROBING DID NOT ENCOUNTER UTILITY LINE.

EM ANOMALY CENTERED NEAR X=121 Y=270

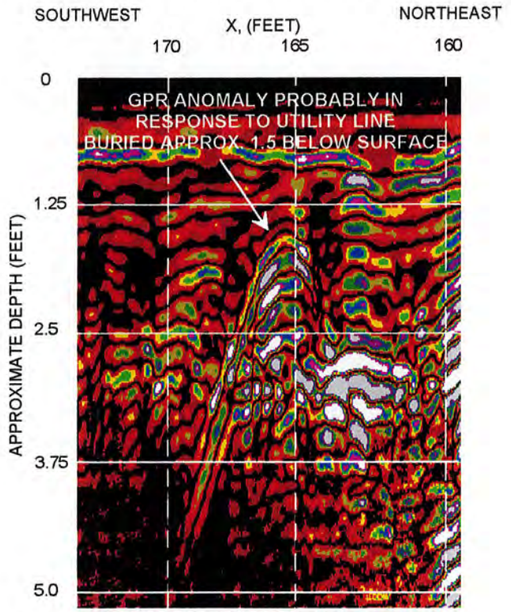
GPR LINE Y=280



HAND AUGER PROBING DID NOT ENCOUNTER UTILITY LINE.

EM ANOMALY CENTERED NEAR X=220 Y=166

GPR LINE X=220



FOR SAFETY RESONS, HAND AUGER PROBING WAS NOT PERFORMED AT THIS LOCATION.

Schnabel Engineering Associates, Inc.

NC Department of Transportation
Geotechnical Unit

John Mac Clements et al Property
Charlotte, North Carolina

GPR IMAGES

FIGURE 3

(VIEWING WESTWARD) PHOTO SHOWS THE AREA NOT SURVEYED BY THE EM-61 DUE TO THE FALLEN TREES AND BRUSH. THE TREELINE IS ADJACENT AND PARALLEL TO THE CONCRETE EMBANKMENT WALL.

(WESTWARD VIEW) PHOTO SHOWS THE OPEN GRASS-COVERED LOT OF PARCEL 24B LOCATED NORTHEAST OF THE WAREHOUSE BUILDING. AREA OF FALLEN TRESS AND BRUSH ARE SHOWN IN THE BACKGROUND.

NORTHEASTWARD VIEW) PHOTO SHOWS THE LOADING DOCK AREA LOCATED ALONG HEARN PLACE.

NORTHEASTWARD VIEW) PHOTO SHOWS THE FRONT PORTION OF PARCEL 24B LOCATED ALONG NORTH SMITH STREET.

Schnabel Engineering Associates, Inc.

NC Department of Transportation
Geotechnical Unit

John Mac Clements et al Property
Charlotte, North Carolina

SITE PHOTOS

FIGURE 4