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June 15, 2020

Mr. Craig Haden
North Carolina Department of Transportation
Geotechnical Engineering Unit
1589 Mail Service Center
Raleigh, North Carolina 27699-1589

Reference: **Geophysical Survey for The Bryanna Company, Limited Partnership
Property (Parcel 79)
700 Western Boulevard
Tarboro, Edgecombe County, North Carolina
State Project: U-4424
WBS Element 39062.1.2
DAA Project No. 20080204-010103**

Dear Mr. Haden:

Draper Aden Associates (DAA) was assigned a Preliminary Site Assessment at the above-referenced property; however, during the site walkover it was determined that soil and groundwater sampling would be difficult because of the steep slopes in the proposed right-of-way/easement (ROW/easement). Based on these observations, the NCDOT was contacted and DAA was advised to conduct the geophysical survey. DAA performed the work in accordance with the Technical and Cost proposal dated April 22, 2020, and the North Carolina Department of Transportation's (NCDOT's) Notice to Proceed dated April 23, 2019.

On April 29 and May 4, 2020, DAA traveled to the property and conducted the geophysical survey. The survey consisted of an electromagnetic survey using a Geonics EM61 time-domain electromagnetic (EM) induction meter to locate buried metallic objects, and ground penetrating radar (GPR) using a Noggin 250 with 250 MHz antennae specifically to locate USTs.

The geophysical team laid out a survey grid along the proposed right-of-way with the X-axis oriented approximately parallel to W Wilson Street and the Y-axis oriented approximately parallel to Western Boulevard. **Figure 1** of the geophysical survey report in **Attachment A** shows the EM survey area.

The EM survey lines were spaced five feet apart and the instruments collected magnetic data continuously along each survey line with a data logger. After collection, DAA reviewed the data

in the field with graphical user interface computer software. Following the electromagnetic survey, a GPR survey was conducted to further evaluate any notable metallic anomalies. GPR transects are shown on **Figures 5 and 6 of Attachment A**.

DAA detected several anomalies in those areas accessible to the study area. The survey attributed all the anomalies to visible cultural features or underground utilities. None of the anomalies exhibited electromagnetic or GPR responses indicative of USTs. **Attachment A** presents DAA's detailed report of findings and interpretations.

Conclusions and Recommendations

DAA conducted a geophysical survey to evaluate the NCDOT proposed ROW/easement on The Bryanna Company, Limited Partnership Property (Parcel #79) located at 700 Western Boulevard in Tarboro, Edgecombe County, North Carolina. The survey did not indicate the presence of a UST within the proposed ROW/easement.

DAA appreciates the opportunity to work with the NCDOT on this project. If you have any questions, please contact us at (919) 827-0864.

Sincerely,

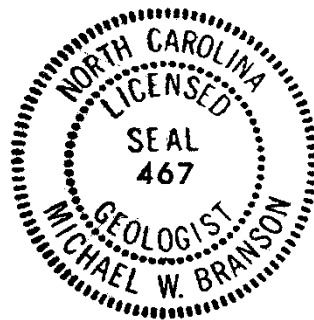
Draper Aden Associates

DocuSigned by:
Mike Branson
942B7ACDE09841E...

Michael W. Branson
6/25/2020

Michael W. Branson, P.G.
Project Manager

Attachments



ATTACHMENT A

Geophysical Study For Possible USTs 700 Western Boulevard Tarboro, North Carolina



North Carolina Department of Transportation
1589 Mail Service Center
Raleigh, NC 27699-1589 37918

May 28, 2020

DAA Project Number: 20080204-010203



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May 28, 2020

Mr. John Pilipchuck, P.E
Geotechnical Engineering Unit
N.C. Department of Transportation
1589 Mail Service Center
Raleigh, NC 27699-1589 37918

RE: Geophysical Study for Possible USTs
700 Western Boulevard, Tarboro, North Carolina
Draper Aden Associates Project No. 20080204-010203

Dear Mr. Pilipchuck:

Draper Aden Associates has completed the geophysical study at 700 Western Boulevard in Tarboro, North Carolina. The objective of this study was to assist in determining if any underground storage tanks (USTs) may be present beneath the study area. To meet this objective, a combination of ground penetrating radar (GPR) and electromagnetic induction (EM) techniques were utilized. The following report documents our methodologies and findings.

We value our professional relationship with N.C. Department of Transportation and hope that you will contact us with any similar needs in the future. If you have any questions regarding this report, or if we can be of any further service to you please do not hesitate to contact us.

Sincerely,
Draper Aden Associates

A handwritten signature in blue ink, appearing to read "Johanna Vaughan".

Johanna Vaughan, P.G.
Geologist



A handwritten signature in blue ink, appearing to read "F. Doug Pinckney".

Francis Douglas Pinckney, P.E.
Team Leader/Senior Project Engineer
Geotechnical and Construction Services

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1.0 EXECUTIVE SUMMARY

Draper Aden Associates (DAA) was retained by N.C. Department of Transportation to conduct a geophysical study at 700 Western Boulevard near Tarboro, North Carolina. The objective of this study was to assist in determining if any underground storage tanks (USTs) may be present beneath the study area. To meet this objective, a combination of ground penetrating radar (GPR) and electromagnetic induction (EM) techniques were utilized.

The EM61 data were collected on April 29 and May 4, 2020 in grid fashion with sub-parallel traverses spaced approximately four feet apart.

The contoured results from the EM61 data do not clearly reveal the occurrence of any possible UST locations, but rather the occurrence of numerous "hotspots" interpreted as metallic surface features such as drain grates, or manhole covers. The GPR data were collected on April 29, 2020 utilizing the same grid as the EM61 data collection, but with sub-parallel traverses spaced approximately two feet apart.

The combined analysis of the EM61 and GPR data reveals numerous anomalies which are likely the geophysical response to manmade features such as manholes, drain grates, utility poles, fire hydrants, buried utilities, and other similar features. However, the geophysical data do not reveal any anomalies within the study area which can be confidently interpreted as possible USTs.

2.0 INTRODUCTION

Draper Aden Associates (DAA) was retained by N.C. Department of Transportation to conduct a geophysical study at 700 Western Boulevard near Tarboro, North Carolina (Figure 1). The objective of this study was to assist in determining if any underground storage tanks (USTs) may be present beneath the study area. To meet this objective, a combination of ground penetrating radar (GPR) and electromagnetic induction (EM) techniques were utilized. The following report documents our methodologies and findings.

The tasks involved in this study included:

1. Collection, processing, and interpretation of EM61 data;
2. Collection, processing, and interpretation of GPR data;
3. Preparation of this document to detail our methods and findings.

3.0 ELECTROMAGNETIC INDUCTION (EM) STUDY

3.1 EM Field Methods

The instrument used for this investigation was the EM61 manufactured by Geonics, LTD. The EM61 data were collected on April 29 and May 4, 2020 in grid fashion with sub-parallel traverses spaced approximately four feet apart (Figure 2). The distribution of the EM61 data was tracked by a global positioning system (GPS) unit capable of sub-foot accuracy. The collected data were subsequently contoured laterally and analyzed for evidence of any possible USTs.

3.2 EM61 Results

The contoured results from the EM61 data are presented in Figure 3, overlain onto Google Earth aerial imagery. The EM61 results reveal many anomalies that are coincident with manmade features at the ground surface such as drain grates, manholes, utility poles, etc. None of the EM61 anomalies can be conclusively interpreted as a possible UST

4.0 GPR STUDY

4.1 GPR Field Methods

The instrument used for this investigation was the Noggin 250 manufactured by Sensors and Software, Inc. in Ontario, Canada, which utilizes a 250 MHz antenna mounted on a moveable

Geophysical Study for Possible USTs at 700 Western Boulevard, Tarboro, North Carolina

DAA Project No. 20080204-010203

cart. GPR data were collected on April 29, 2020 utilizing the same grid as the EM61 data collection, with sub-parallel traverses spaced approximately two feet apart, tracked by a GPS unit capable of sub-foot accuracy (Figure 4).

4.2 GPR Results

The GPR data were analyzed as vertical cross-sections and as depth slices, or plan-view maps of the GPR response from various depth intervals for evidence of possible USTs. Analysis of the GPR data in cross-section revealed numerous hyperbolic reflectors which likely represented buried utilities, as their signature continued for substantial distances across numerous adjacent GPR traverses. However, no broad hyperbolic reflectors consistent with possible USTs were identified within the GPR cross-sections that would indicate a possible UST.

Figures 5 and 6 illustrate the plan-view GPR response in 6-inch-thick depth intervals spanning from 1.0 to 6.0 feet depth. Numerous areas of elevated GPR response are observed throughout the depth slices which are interpreted to represent miscellaneous buried objects or materials such as buried utilities, or varying soil conditions, such as intermittent clay layers or zones of wet soil.

5.0 CONCLUSIONS

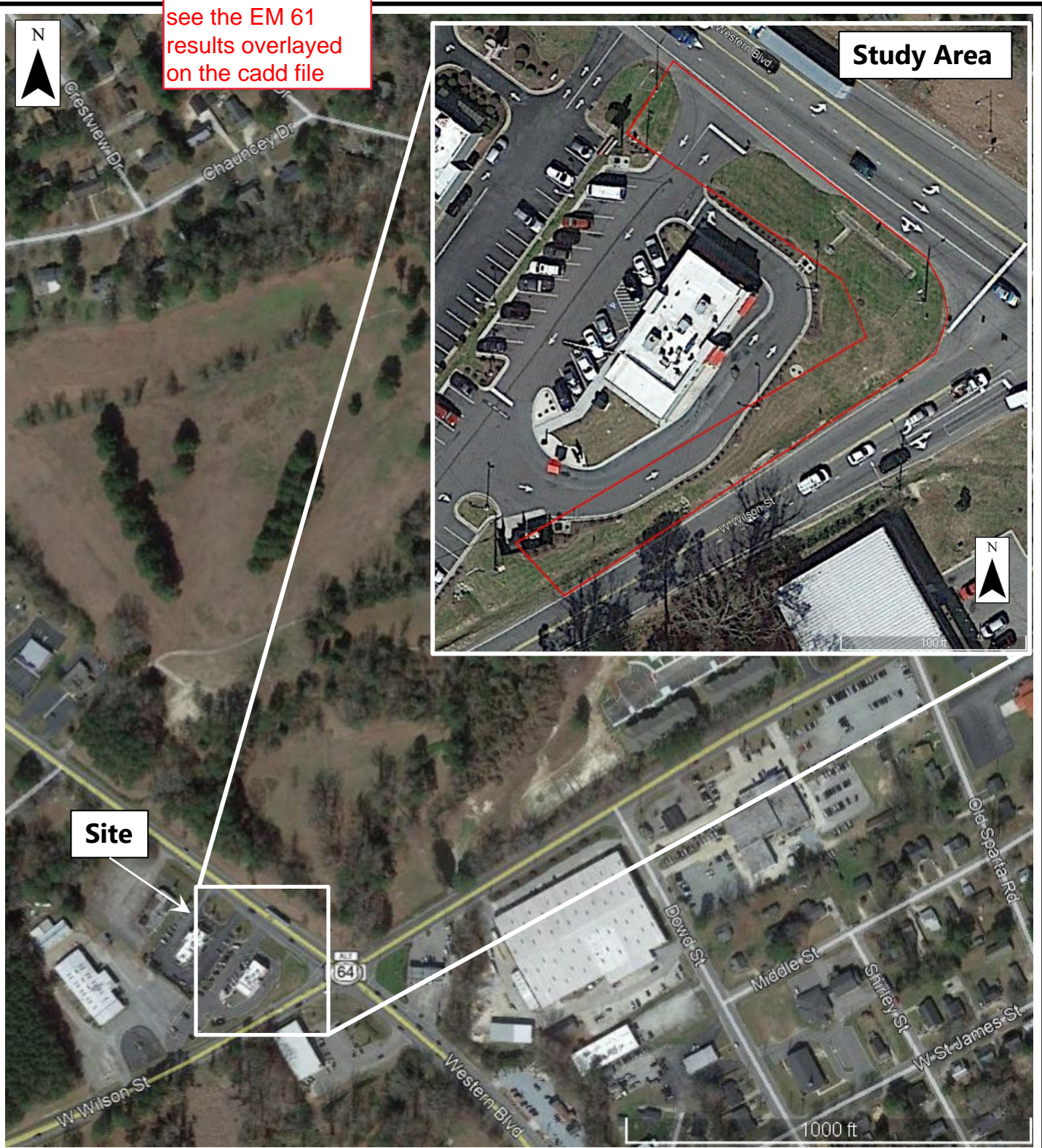
The combined analysis of the EM61 and GPR data reveals numerous anomalies which are likely the geophysical response to manmade features such as manholes, drain grates, utility poles, hydrants, buried utilities, and other similar features. However, the geophysical data do not reveal any anomalies within the study area which can be confidently interpreted as possible USTs.

6.0 LIMITATIONS

This study was conducted by registered professional geologists with extensive experience in the collection, processing, and interpretation of geophysical data. It should be noted, however, that all geophysical methods are interpretive, and additional invasive exploration would be required to verify or refute the interpretations within this report.

7.0 FIGURES

Would also like to see the EM 61 results overlaid on the cadd file



Study Area

Site

64

1000 ft

100 ft

Site Location

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700 Western Boulevard, Tarboro, NC

PROJECT: 20080204-010203



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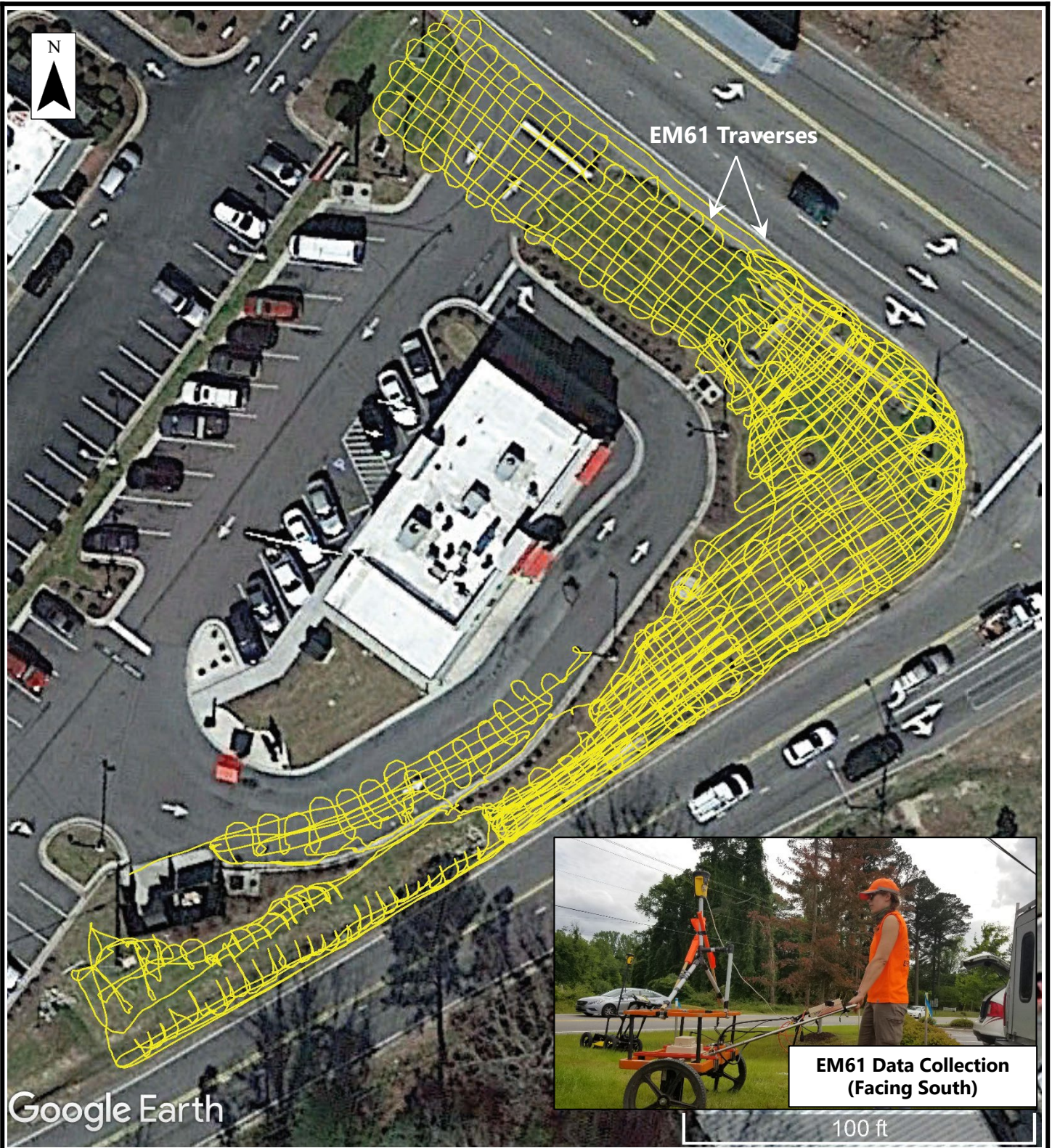
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FIGURE

1



EM61 Traverse Map

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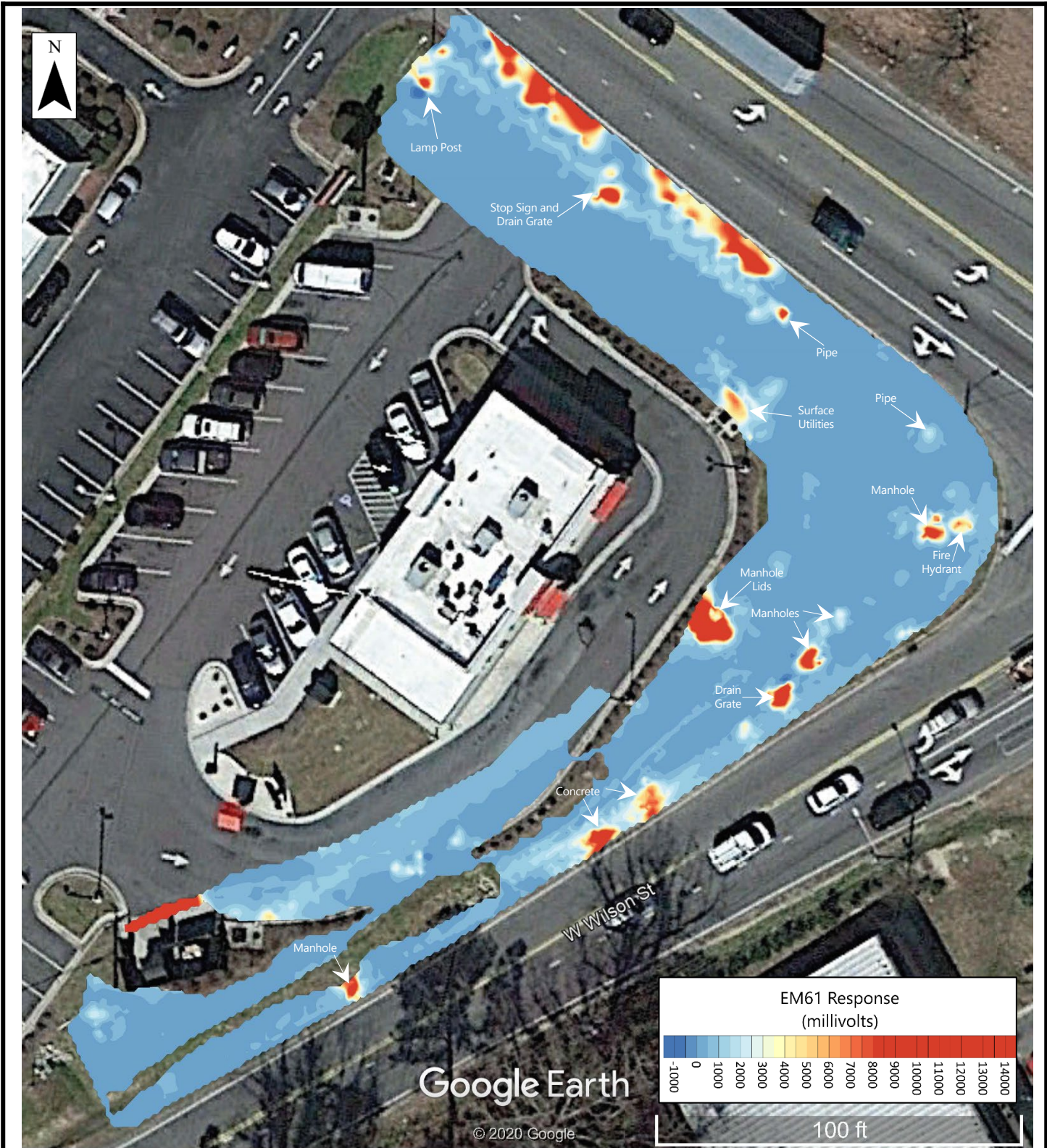
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FIGURE
2



Contoured EM61 Results

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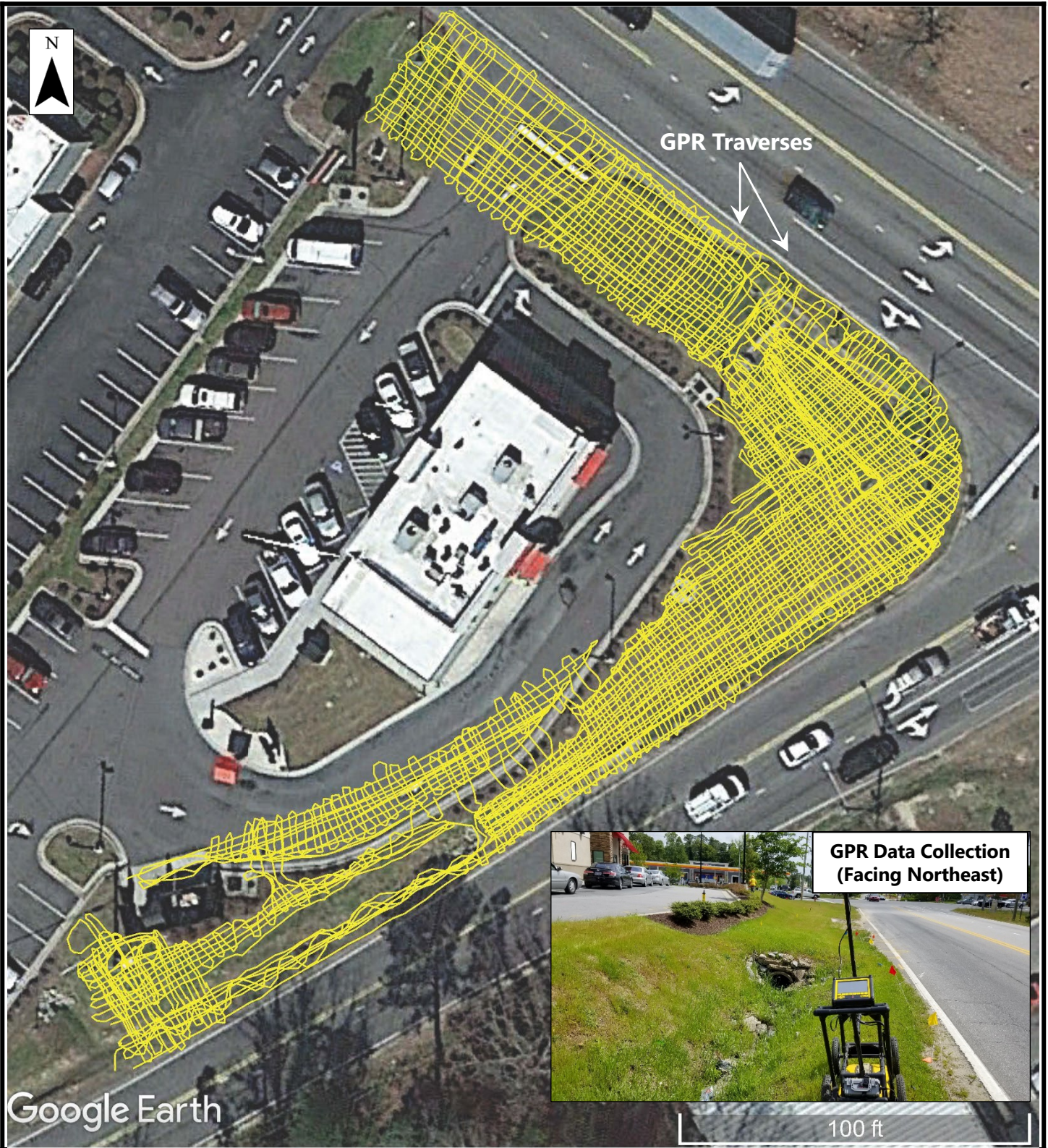
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FIGURE

3



GPR Traverse Map

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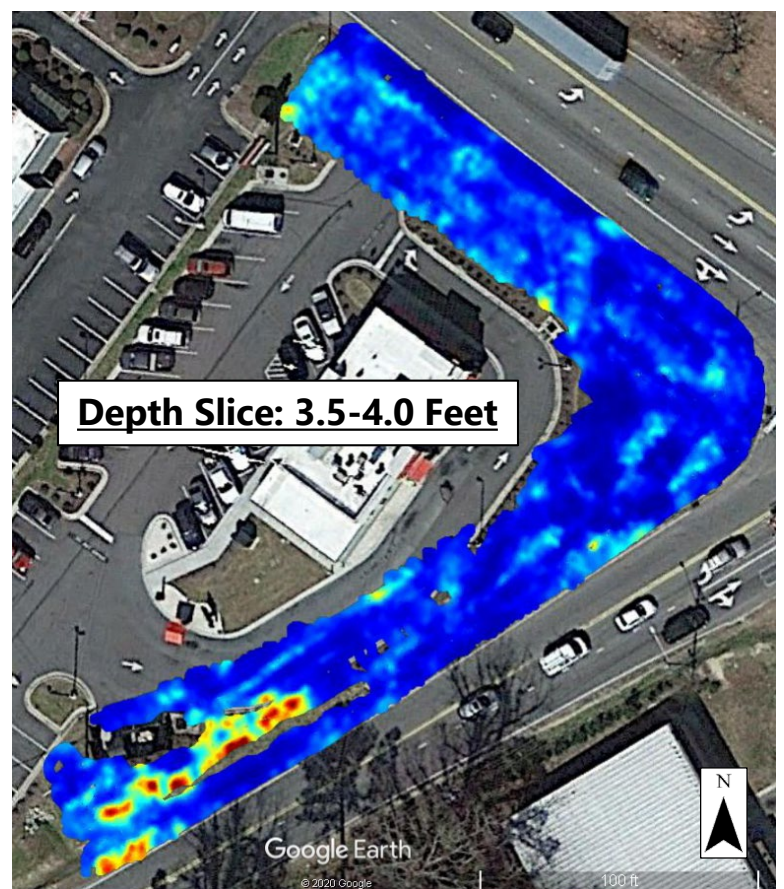
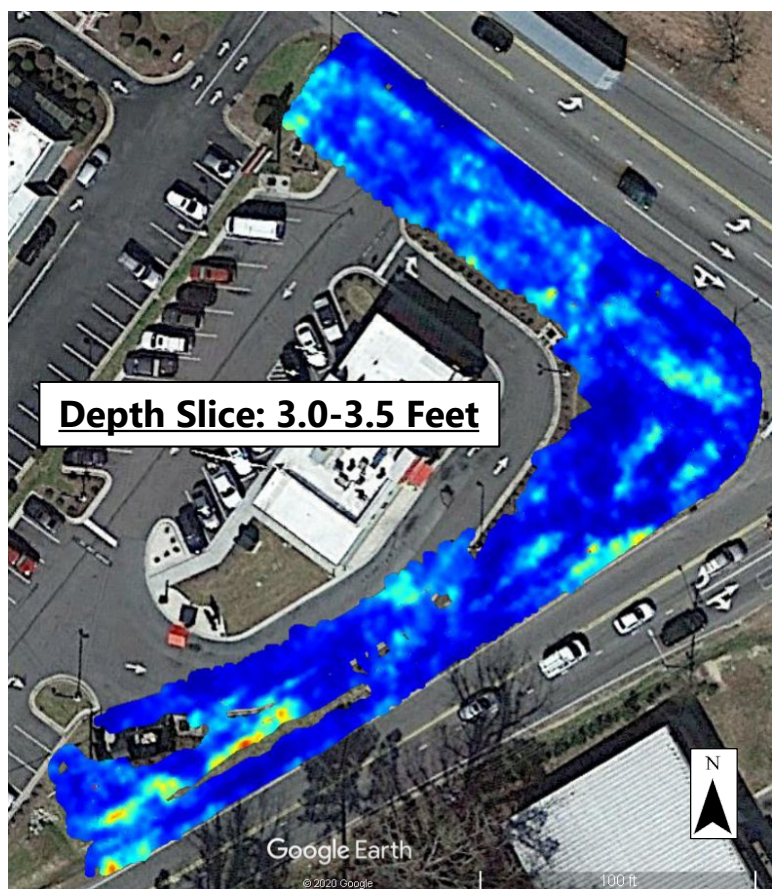
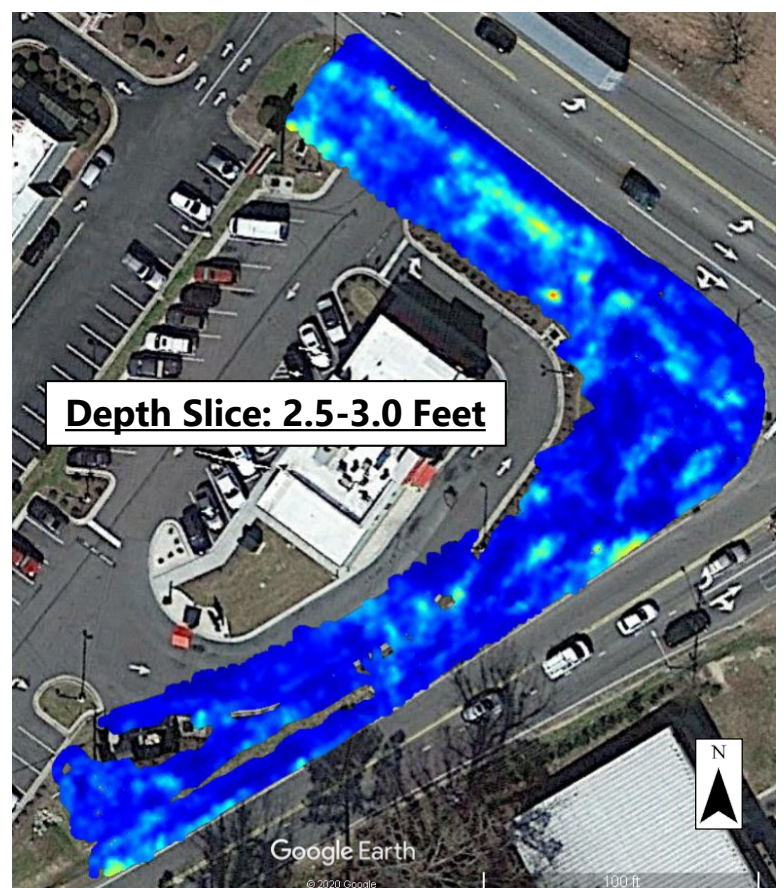
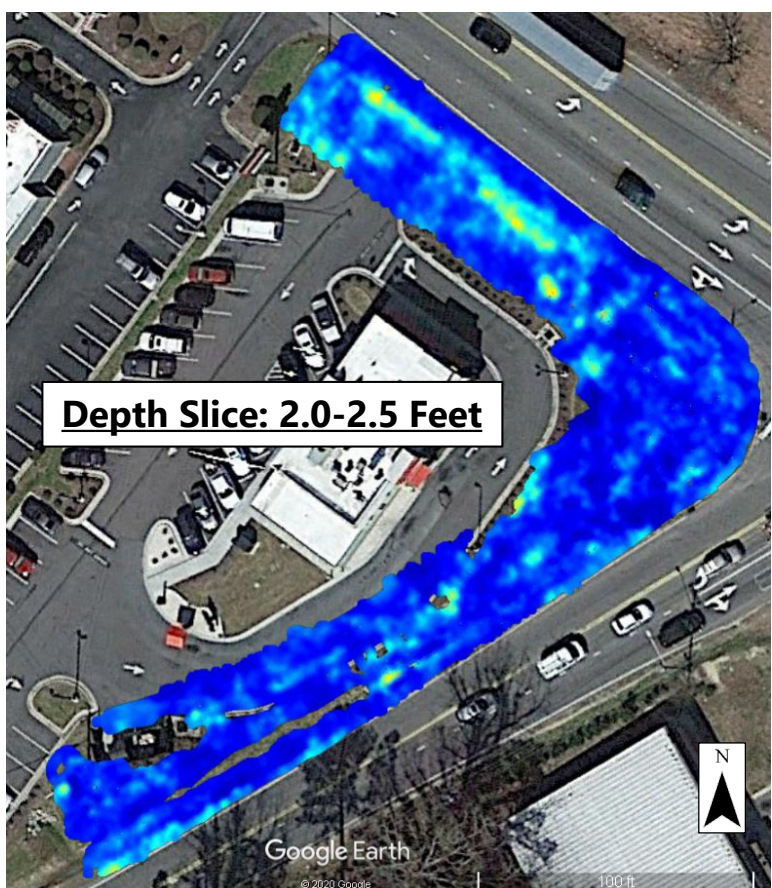
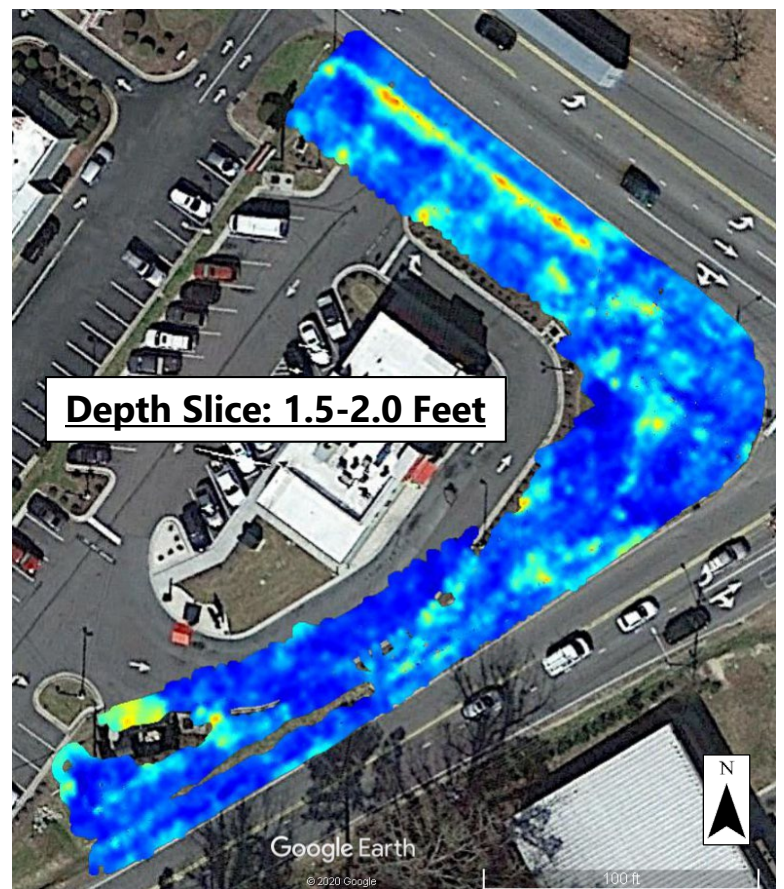
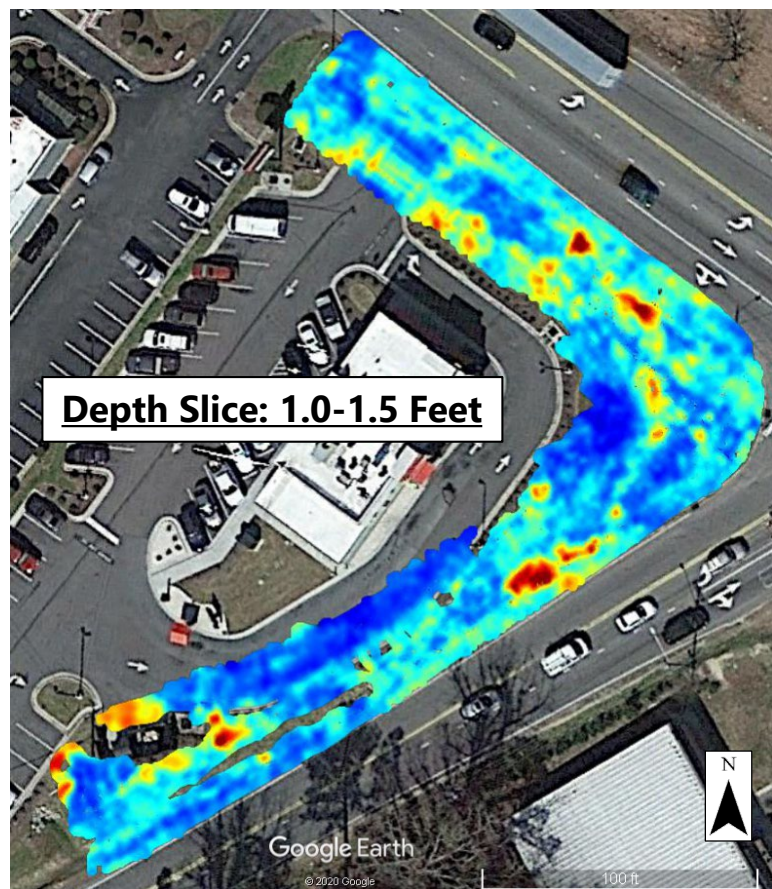
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FIGURE
4



Geophysical Study for Possible USTs
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GPR Depth Slices from 1.0 Feet to 4.0 Feet Depth

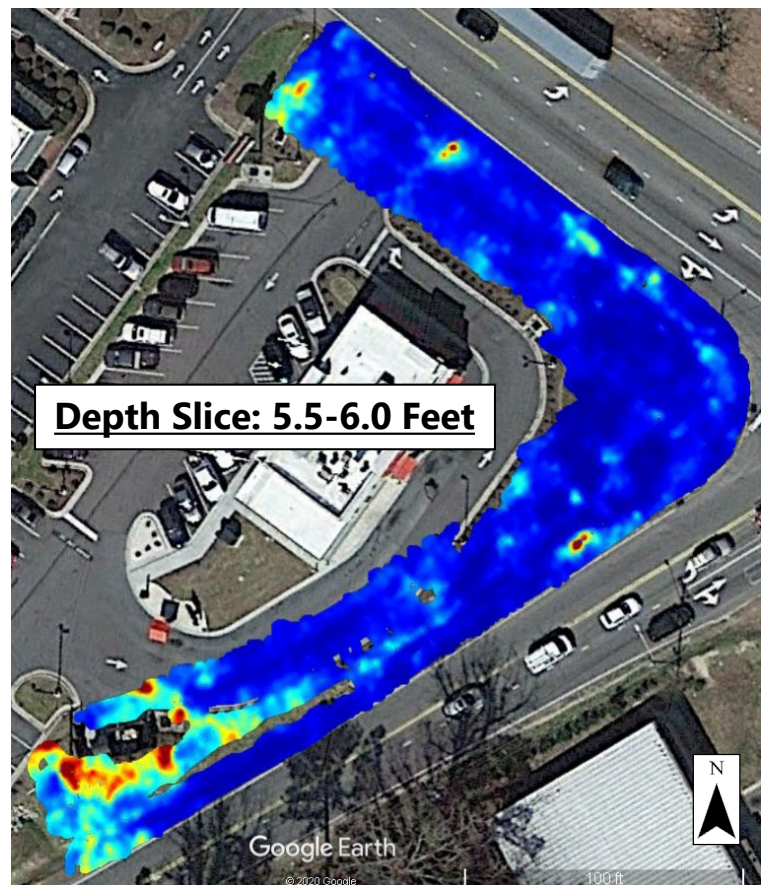
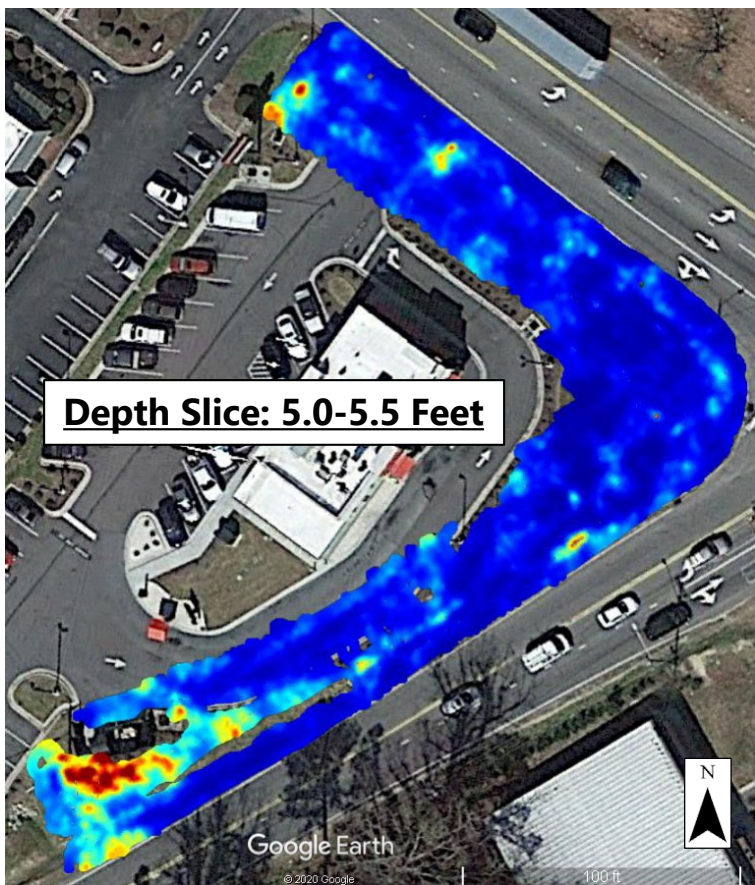
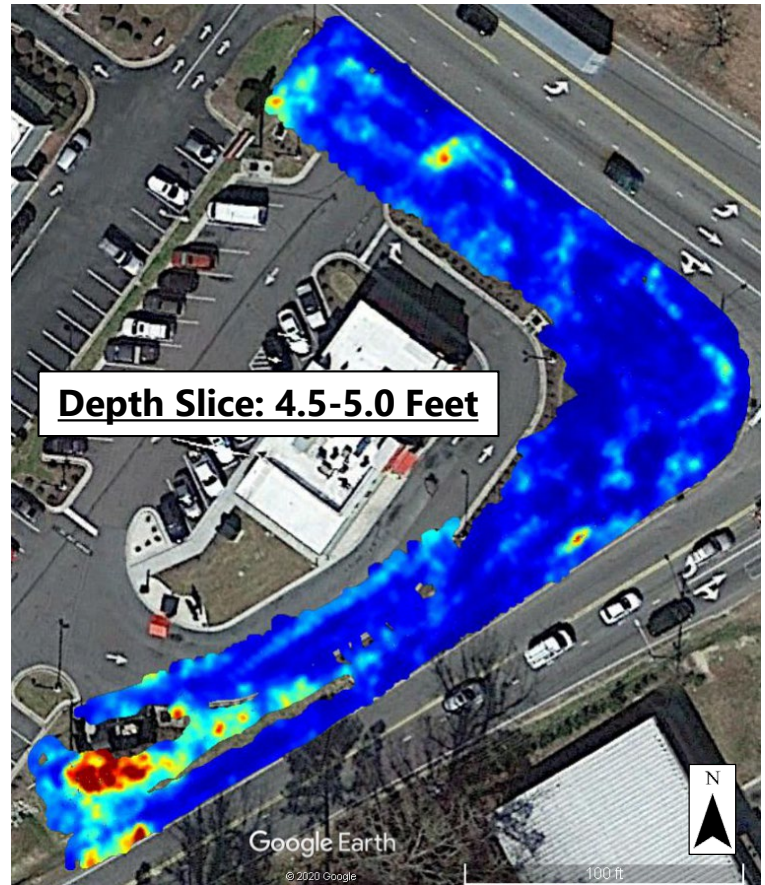
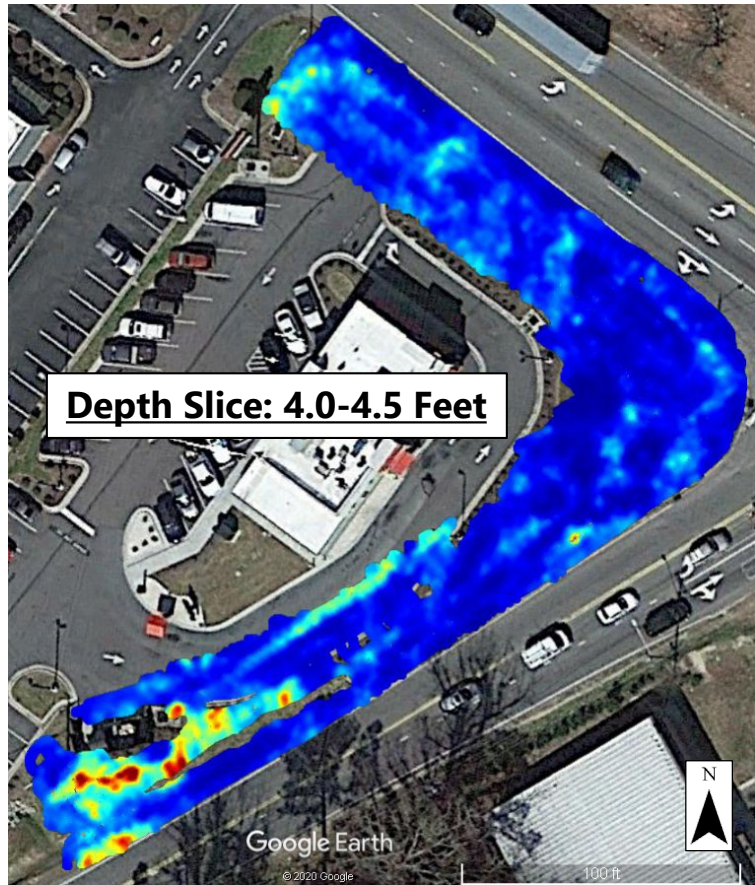
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FIGURE
5



Geophysical Study for UST Investigation
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GPR Depth Slices from 4.0 Feet to 6.0 Feet Depth



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FIGURE

6