



PRELIMINARY SITE ASSESSMENT

**Second District Religious Educational Charitable Dev., Inc. (Parcel #6)
AME Church Incentive Shelter
412 Capital Blvd
Raleigh, North Carolina
State Project: B-5121 & B-5317
WBS Element: 42263.1.1
F&R Project #66T-0097**

August 21, 2015

Prepared for:

**North Carolina Department of Transportation
Geotechnical Engineering Unit
1020 Birch Ridge Drive
Raleigh, NC 27610**



FROEHLING & ROBERTSON, INC.

Engineering Stability Since 1881

310 Hubert Street
Raleigh, North Carolina 27603-2302
T 919.828.3441 | F 919.828.5751
NC License #F-0266

August 21, 2015

**North Carolina Department of Transportation
Geotechnical Engineering Unit**
1020 Birch Ridge Drive
Raleigh, North Carolina 27610

Attn.: Mr. Terry Fox, L.G.
GeoEnvironmental Project Manager

Re: State Project: B-5121 & B-5317
WBS Element: 42263.1.1
BR 277 on US 70/US 401/NC 50 (Capital Blvd.) over Peace Street and
BR 213 on US 70/NC 50 (Wade Ave.) over US 401 (Capital Blvd.)

**Subject: Preliminary Site Assessment
Parcel #6 – 2nd District Religious Educational Charitable Dev., Inc. (AME Church)**
412 Capital Blvd
Raleigh, North Carolina
F&R Project #66T-0097

Dear Mr. Fox:

Froehling and Robertson, Inc. (F&R) has completed the authorized Preliminary Site Assessment at the Second District Religious Educational Charitable Developments, Inc. property located in Raleigh, North Carolina. The work was performed in general accordance with F&R’s Proposal No. 1666-00058, dated May 19, 2015. Notice to Proceed was issued to F&R on June 25, 2015. This report documents our field activities, presents the results of laboratory analysis and provides estimated quantities of petroleum impacted soils.

Please do not hesitate to contact us if you should have any questions regarding this report.

Sincerely,

FROEHLING & ROBERTSON, INC.

DocuSigned by:
Benjamin A. Whitley
E425D6E8C23545B...

Benjamin A. Whitley, P.E.
Project Engineer



DocuSigned by:
Michael Sabodish
B4FED45203C345C...

Michael S. Sabodish, Jr., Ph.D, P.E.
Engineering and Remediation Services Manager



TABLE OF CONTENTS

	<u>PAGE</u>
1.0 INTRODUCTION.....	1
2.0 GEOPHYSICAL SURVEY	2
3.0 SITE ASSESSMENT ACTIVITIES.....	2
4.0 SUBSURFACE CONDITIONS	3
5.0 ANALYTICAL RESULTS.....	4
6.0 CONCLUSIONS AND RECOMMENDATIONS.....	5
7.0 LIMITATIONS	7
APPENDIX I	
FIGURE No. 1 – Site Vicinity Map	
FIGURE No. 2 – Topographic Map	
FIGURE No. 3 – Laboratory Results & Boring Location Plan	
FIGURE No. 4 – Estimated Extents of Soil Contamination	
APPENDIX II	
GEOPHYSICAL REPORT PREPARED BY PYRAMID	
APPENDIX III	
GEOPROBE LOGS	
APPENDIX IV	
SITE PHOTOS	
APPENDIX V	
LABORATORY ANALYTICAL RESULTS	



**Preliminary Site Assessment Report
2nd District Religious Educational Charitable Dev., Inc. Property (Parcel #6)
Raleigh, Wake County, North Carolina
F&R Project No. 66T-0097**

1.0 Introduction

Froehling and Robertson, Inc. (F&R) has prepared this Preliminary Site Assessment (PSA) Report to document soil assessment activities performed at the 2nd District Religious Educational Charitable Dev., Inc. Property addressed as 412 Capital Boulevard in Raleigh, Wake County, North Carolina. The site is located in the southeast quadrant of the Capital Boulevard access road and West Johnson Street intersection as shown in Appendix I, Figures 1 and 2. As indicated in the Request for Technical and Cost Proposal (RFTCP), the site operates as an existing church shelter (AME Church). According to the NCDENR UST Section Registry, one (1) UST was removed in January 1993. The UST was used to store Varsol, a petroleum solvent, until 1980. Ground Water Incident-UST # RA-4272 was assigned to this facility in 1993.

The PSA was performed in general accordance with F&R's Proposal No. 1666-00058, dated May 19, 2015 with Notice to Proceed issued to F&R by the NCDOT on June 25, 2015. The purpose of this report is to document field activities, present the results of laboratory analysis, and provide estimated quantities of petroleum impacted soils.

According to the NCDOT within their RFTCP, acquisition of right-of-way is necessary for the Peace Street Bridge, Wade Avenue Bridge and Capital Boulevard improvements in Raleigh (See Figure No. 3). As such, the NCDOT requested a PSA be performed to assess the possibility of encountering petroleum impacted soil from known or unknown USTs which may exist/existed at the project site.

The existing on-site structure is one-story in height and is constructed of brick and concrete masonry unit (CMU) block with steel framing. A roll-up garage door is located on the northern side of the building. The remainder of the site consists of an asphalt paved parking lot. The site is bordered to the north by West Johnson Street; to the south by several commercial stores (including ABZ Custom Upholstery); to the east by Tiger's Automotive Service; and to the west by Capital Boulevard. Access to the site is gained from Capital Boulevard to the west and West Johnson Street to the north. Photos detailing existing site features are attached as Appendix IV of this report.



2.0 Geophysical Survey

Prior to F&R's soil assessment activities, Pyramid Environmental & Engineering, P.C. (Pyramid) conducted a geophysical survey to locate suspect metal underground storage tanks (USTs). The geophysical work was conducted from June 26 to July 1, 2015, and was performed within the proposed right-of-way of Capital Boulevard.

The geophysical investigation consisted of electromagnetic (EM) induction surveys using a Geonics EM61 instrument. Ground-penetrating radar (GPR) investigations of selected EM61 anomalies were investigated using a Geophysical Survey Systems UtilityScan DF unit equipped with a dual frequency 300/800 MHz antenna. The EM61 data was collected along parallel survey lines spaced approximately 5 feet apart. The data was reviewed in the field to evaluate the possible presence of USTs and later transferred to a desktop computer for further review. Data was collected over most of the planned survey site with the exception of areas immediately adjacent to metallic objects and other obstacles. Isolated EM anomalies were identified on the site, including a hydrant, a light pole, a metal fence and a dumpster. In addition, one possible metallic UST was identified at the southern portion of the parking lot. The GPR data suggest that the top of the possible UST is approximately two feet below ground surface (bgs). Pyramid estimated the possible UST is 6 feet in diameter and 10 feet long, which is approximately 2,000 gallons in size.

Based on the results of the EM and GPR geophysical data, Pyramid observed anomalies that were interpreted to be the results of a metallic UST. However, the location of the Possible UST was outside of the proposed right-of-way on Parcel #6. The complete geophysical report is attached as Appendix II.

3.0 Site Assessment Activities

F&R visited the site on July 22, 2015 to perform the Preliminary Site Assessment. The assessment consisted of advancing 6 borings into the soils at the project site using direct-push technology (Geoprobe). The boring locations were determined by F&R staff based on the results of the geophysical survey, site features and proposed construction activities. Three of the borings (B-1 through B-3) were advanced on the western portion of the site adjacent to the Capital Boulevard access road. Boring B-4 was advanced on the site, near the intersection of the Capital Boulevard access road and West Johnson Street. Borings B-5 and B-6 were advanced on the northern portion of the site adjacent to West Johnson Street. The Possible UST identified by Pyramid was located outside of the proposed right-of-way adjacent to the site structure;



therefore, F&R did not assess the area immediately surrounding the Possible UST (Appendix I, Figure 3). The borings were generally advanced to the proposed depth of 10 feet bgs. However, Boring B-6 was terminated at 3 feet bgs, where Geoprobe refusal was encountered due to very dense sands.

Soil sample cores from the borings were collected in disposable, 4-foot long acetate sleeves. The soil samples were visually/manually classified and screened in the field using a photo-ionization detector (PID) for evidence of petroleum hydrocarbons. Evaluation of VOC concentrations were performed using a MiniRae 2000 PID which produces results in parts per million (ppm). A representative soil sample was collected from one foot sections of each sleeve and placed in a re-sealable plastic bag. The vapors were then allowed to equilibrate in the headspace of the bag for approximately ten minutes prior to measurement with the PID. The measurements were collected by placing the probe tip into the headspace of the bag. PID measurements can be found in the Geoprobe Logs in Appendix III, as well as in Table 1 in Section 5.0 below.

Generally, the soil sample which exhibited the highest PID concentration was submitted for laboratory analysis for diesel range organics (DRO), gasoline range organics (GRO), Total BTEX (benzene, toluene, ethylbenzene and xylenes), 16 PAHs (polycyclic aromatic hydrocarbons) and BaP (Benzo(a)pyrene) by Ultraviolet Fluorescence (UVF) technology (QROS QED Hydrocarbon Analyzer).

The samples were collected in laboratory-supplied sample containers, placed in a cooler with ice, and shipped via UPS to QROS in Wilmington, North Carolina following standard chain-of-custody procedures.

4.0 Subsurface Conditions

As indicated in the attached Geoprobe Logs (Appendix III), subsurface conditions from existing ground surface to boring termination primarily included various layers of moist, orange-tan to red-brown, sandy silty micaceous clay (USCS – CL), sandy silt (USCS – ML), and/or silty fine to coarse sand (USCS – SM). The borings were generally terminated at the proposed depth of 10 feet bgs. However, Boring B-6 was terminated at approximately 3 feet bgs in a layer of very dense sand. PID readings generally did not exceed 1.8 ppm, and petroleum odors and/or groundwater were not observed during field screening or sample collection activities.



5.0 Analytical Results

As shown in the following table, petroleum hydrocarbons identified as DRO were encountered in the soil samples at the six boring locations advanced at the site (B-1 through B-6), at depths from existing ground surface (B-6) to 9 feet bgs (B-5). At boring locations B-2 through B-6, the laboratory results indicate the DRO concentrations ranged from 23 mg/kg (B-2) to 241.1 mg/kg (B-6), which are above the NCDENR Action Level of 10 mg/kg. DRO was also detected at Boring B-1, 7-8 feet bgs, at a concentration of 1.6 mg/kg.

The laboratory analytical results indicate concentrations of the sum of 16 EPA PAHs above the method detection limit, but below the NCDENR Action Level of 7,041.14 mg/kg at Borings B-2 through B-6. In addition, Benzo(a)pyrene (BaP) was detected in samples B-2 through B-4 at concentrations above the NCDENR Soil-to-Water MSCC of 0.096 mg/kg.

The soil analytical results are summarized in Table 1 below. The laboratory analytical results can also be found in the attached Appendix V of this report.

Table 1
Soil Sampling Analytical Results

Sample ID	Sample Date	Sample Depth (ft bgs)	PID Reading (ppm)	GRO (mg/kg)	DRO (mg/kg)	TPH (mg/kg)	Total BTEX (mg/kg)	Total Aromatics (mg/kg)	16 EPA PAHs (mg/kg)	BaP (mg/kg)
B-1	7/22/15	7-8	1.8	< 0.5	1.6	1.6	< 0.99	0.64	< 0.02	< 0.01
B-2		5-6	1.1	< 0.53	23	23	< 1.1	21.8	3.8	0.099
B-3		7-8	0.6	< 6.6	36.7	36.7	< 13.1	35	1.6	0.13
B-4		3-4	0.9	< 7.3	41.7	41.7	< 1.1	39.9	1.8	0.15
B-5		8-9	0.8	< 0.55	34.9	34.9	< 1.1	30.5	4.4	0.092
B-6		0-1.5	1.1	< 7.5	241.1	241.1	< 15	221.7	10.7	0.071
NCDENR Action Level				10	10	10	13.8	NSE	7,041.41	0.096

Samples shown in bold exceed the NCDENR Action Level as outlined in the NCDENR, DWM, UST Section Guidelines
 ppm = parts per million
 GRO = Gasoline Range Organics
 DRO = Diesel Range Organics
 TPH = Total Petroleum Hydrocarbons
 BTEX = Benzene, Toluene, Ethylbenzene and Xylenes
 NSE = No Standard Exists



6.0 Conclusions and Recommendations

F&R conducted a PSA at the 2nd District RECD, Inc. Property located at 412 Capital Boulevard in Raleigh, Wake County, North Carolina. A geophysical investigation was performed by Pyramid Environmental & Engineering to investigate the existence of unknown/known USTs in the proposed right-of-way. Based on the results of the geophysical survey, it was determined that one possible UST was likely present at the site, located at the southern portion of the parking lot. However, the possible UST was identified outside of the proposed right-of-way.

Six Geoprobe borings were advanced during the assessment within the proposed right-of-way, where grading activities are proposed in association with the Peace Street Bridge, Wade Avenue Bridge and Capital Boulevard improvements. Based on the results of laboratory testing and observed PID readings, petroleum impacted soils were found at concentrations above the NCDENR Action Level of 10 mg/kg at boring locations B-2 through B-6. Therefore, it is estimated that petroleum impacted soils, at concentrations above the NCDENR Action Level, are present from existing ground surface to a depth of at least nine feet below existing ground surface in the vicinity of Borings B-2 through B-6.

No below grade utilities appear on the proposed improvement plans. However, a realignment of the Capital Boulevard access road is depicted, which will likely require re-grading of the existing ground surface during the construction. For the purpose of this assessment, we have estimated an average petroleum-impacted area of 4,601.8 square feet, extending to a depth of nine feet bgs. This area accounts for impacted soils that may be generated during re-grading activities and for unknown below grade utilities that may be installed during construction. The area was determined by averaging distances between the proposed right-of-way and the proposed edge of pavement on the construction drawings (Appendix I, Figure 4).

Table 2
Approximate Volume of Petroleum Impacted Soil

Excavation Location (As Shown on Figure 4)	L x W x D (feet)	Soil Volume (cubic feet)	Soil Volume (tons)
Property frontage from B-2 to B-6	L x W varies (4,601.8 SF) X 9' depth	41,416.2	2,485
Soil Volume (assuming a soil density of 120 pcf)		Total	2,485



It should be noted that a delineation of the soil contamination was not performed, as this was not included in the proposed scope of work. The above estimates are based on interpretations of soil analytical results, PID readings and our experience with petroleum UST releases. In order to generate estimated quantities of petroleum impacted soils, we have inferred that the contamination has occurred between the existing ground surface and the sample collection depth. The amount of impacted soil can only be determined after excavation or by advancing additional borings and performing additional laboratory analysis to delineate the extents (horizontal and vertical) of contamination.

7.0 Limitations

These services have been performed, under authorization of the North Carolina Department of Transportation for specific application on this project. These services have been performed in accordance with generally accepted environmental and hydrogeological practices. No other warranty, expressed or implied is made. As with any subsurface investigation, actual conditions exist only at the precise locations from which samples were taken. Certain inferences are based on the results of sampling and related testing to form a professional opinion of conditions in areas beyond those from which samples were taken. Our conclusions and recommendations are based upon information provided to us by others, our sampling and testing results and our site observations. We have not verified the completeness or accuracy of the information provided by others, unless otherwise noted. Our observations are based upon conditions readily visible at the site at the time of our site visits.

Froehling & Robertson, Inc. by virtue of providing the services described in this report, does not assume the responsibility of the person(s) in charge of the site, or otherwise undertake responsibility for reporting to any local, state or federal public agencies any conditions at the site that may present a potential danger to public health, safety or the environment. In areas that require notification of local, state, or federal public agencies as required by law, it is the Client's responsibility to so notify.



APPENDIX I

Figure No. 1 – SITE VICINITY MAP

Figure No. 2 – TOPOGRAPHIC MAP

Figure No. 3 – LABORATORY RESULTS & BORING LOCATION PLAN

Figure No. 4 – ESTIMATED EXTENTS OF SOIL CONTAMINATION

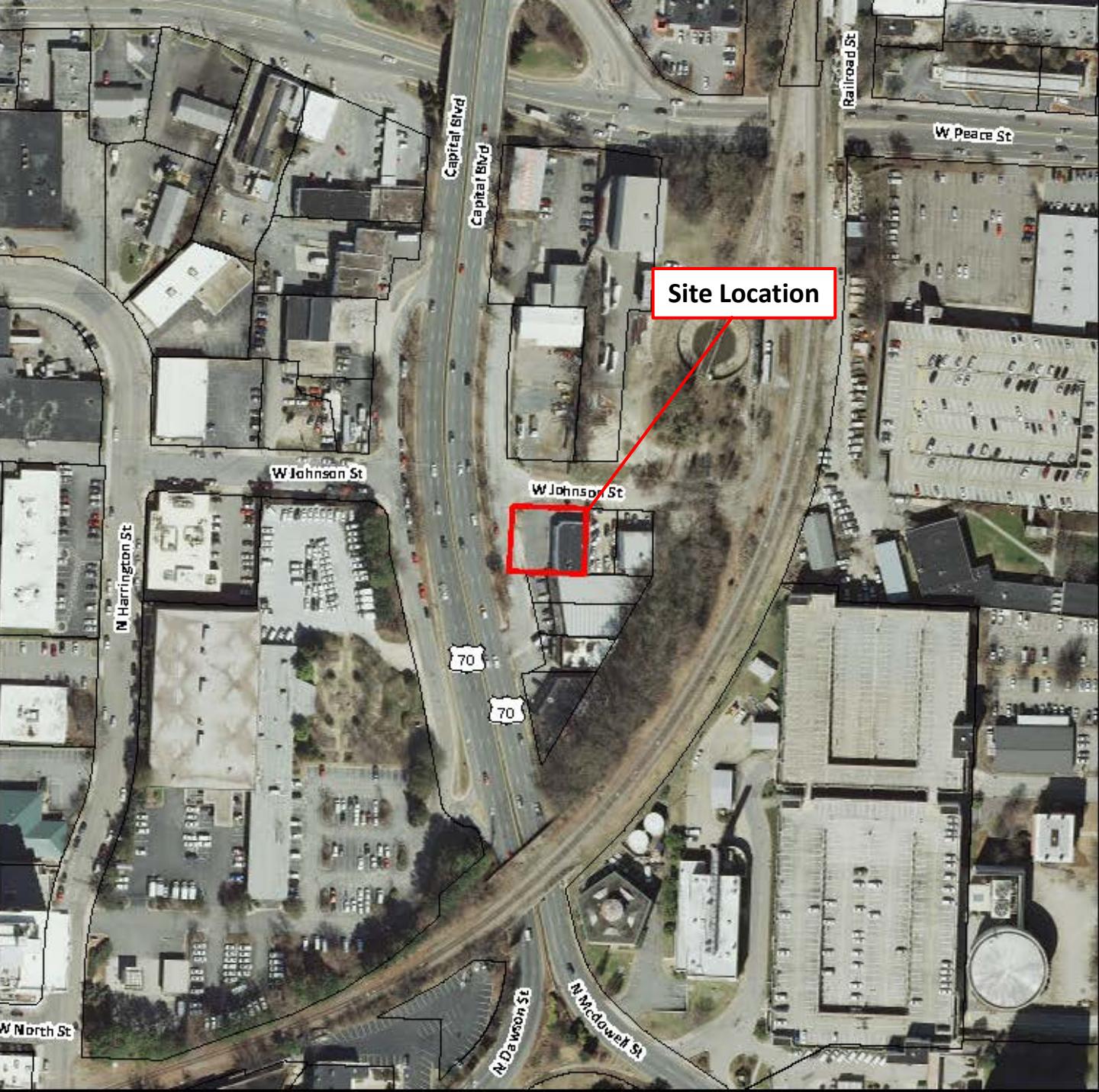
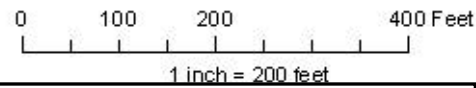


Image Courtesy of Wake County iMaps



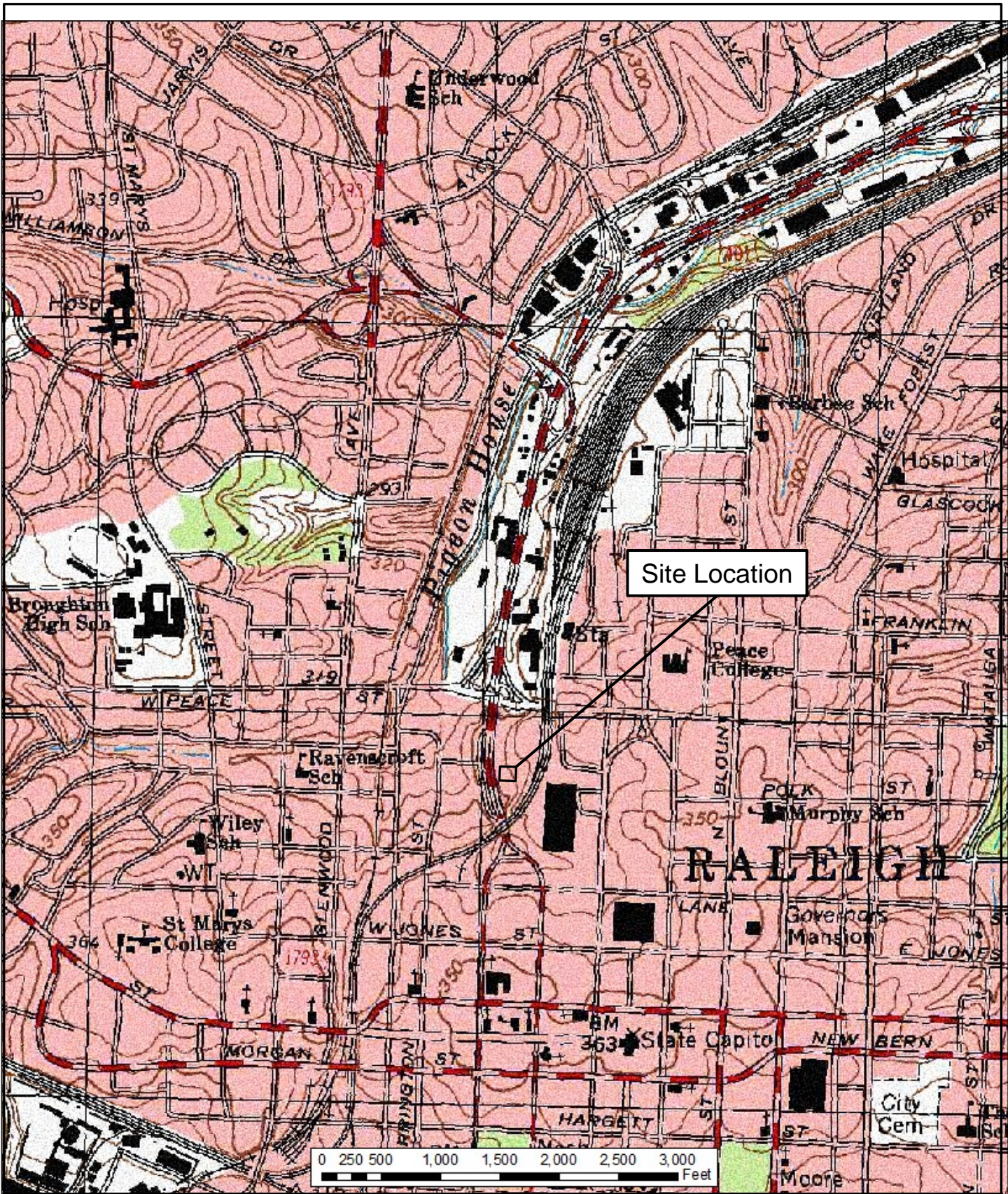
SITE VICINITY MAP

North ▲



FROEHLING & ROBERTSON, INC.
 Engineering • Environmental • Geotechnical
 310 Hubert Street
 Raleigh, North Carolina 27603-2302 | USA
 T 919.828.3441 | F 919.828.5751
 www.fandr.com

CLIENT: NCDOT		FIGURE No.: 1
PROJECT: B-5121 & B-5317, 2nd District RECD, Inc. Property, NCDOT Parcel #6		
LOCATION: Raleigh, Wake County, North Carolina		
F&R PROJECT No.: 66T-0097		
DRAWN BY: B. Whitley		
DATE: August 2015	SCALE: 1" = 200'	



TOPOGRAPHIC MAP – RALEIGH, NC

North

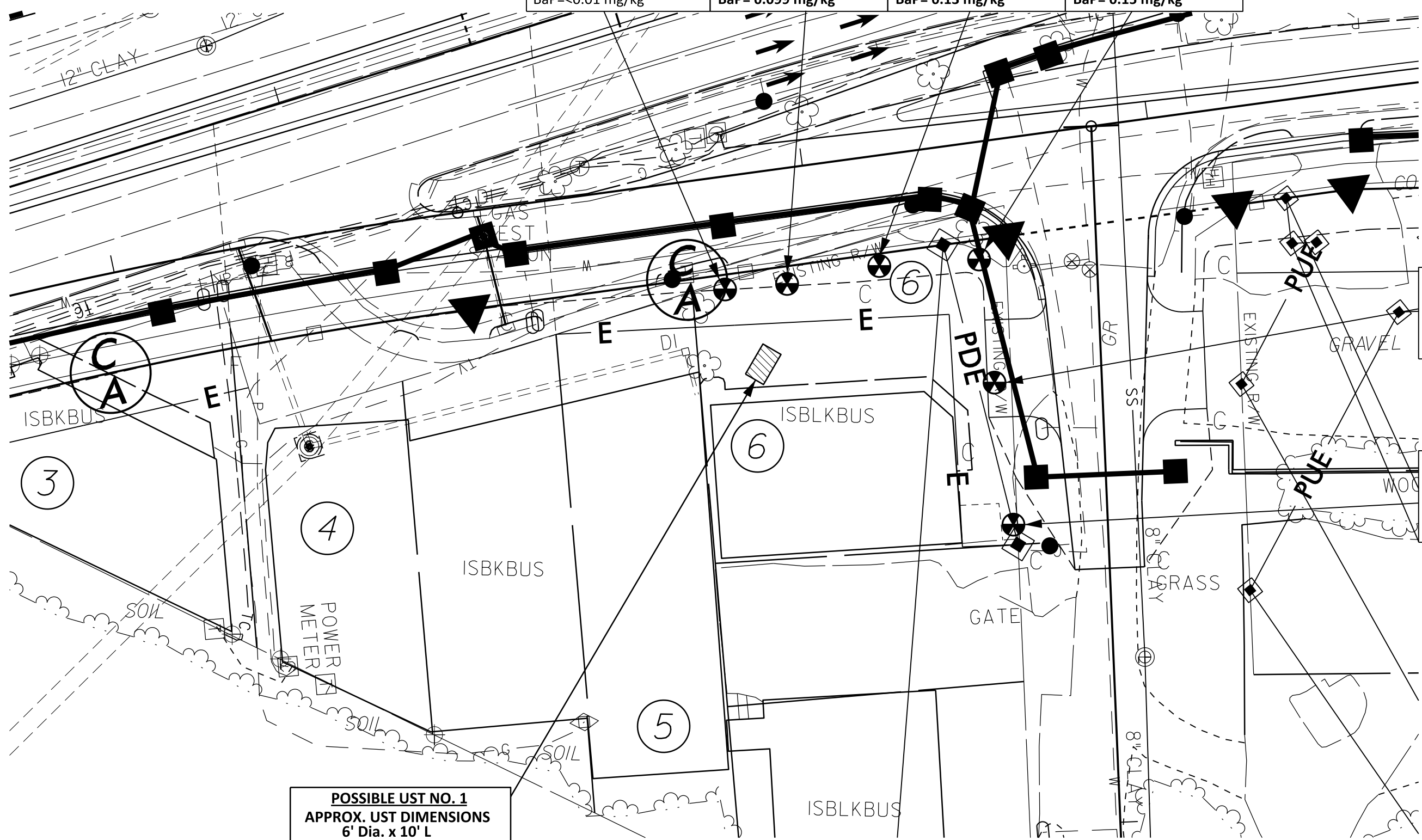


FROEHLING & ROBERTSON, INC.
 Engineering • Environmental • Geotechnical
 310 Hubert Street
 Raleigh, North Carolina 27603-2302 | USA
 T 919.828.3441 | F 919.828.5751
 www.fandr.com

CLIENT: NCDOT		FIGURE No.: 2
PROJECT: B-5121/B-5317, 2 nd District RECD, Inc. Property, NCDOT Parcel #6		
LOCATION: Raleigh, Wake County, North Carolina		
F&R PROJECT No.: 66T-0097		
DRAWN BY: B. Whitley		
DATE: August 2015	SCALE: As Shown	

NAD 83/NSRS 2007

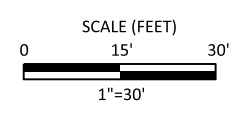
<p>B-1: 7.0'-8.0' DRO= 1.6 mg/kg GRO=<0.5 mg/kg TOTAL BTEX=<0.99 mg/kg 16 EPA PAHs=<0.02 mg/kg BaP=<0.01 mg/kg</p>	<p>B-2: 5.0'-6.0' DRO= 23 mg/kg GRO=<0.53 mg/kg TOTAL BTEX=<1.1 mg/kg 16 EPA PAHs= 3.8 mg/kg BaP= 0.099 mg/kg</p>	<p>B-3: 7.0'-8.0' DRO= 36.7 mg/kg GRO=<6.6 mg/kg TOTAL BTEX=<13.1 mg/kg 16 EPA PAHs= 1.6 mg/kg BaP= 0.13 mg/kg</p>	<p>B-4: 3.0'-4.0' DRO= 41.7 mg/kg GRO=<7.3 mg/kg TOTAL BTEX=<1.1 mg/kg 16 EPA PAHs= 1.8 mg/kg BaP= 0.15 mg/kg</p>
---	--	---	--



B-5: 8.0'-9.0'
DRO= 34.9 mg/kg
GRO=<0.55 mg/kg
TOTAL BTEX=<1.1 mg/kg
16 EPA PAHs= 4.4 mg/kg
BaP= 0.092 mg/kg

B-6: 0.0'-1.5'
DRO= 241.1 mg/kg
GRO=<7.5 mg/kg
TOTAL BTEX=<15 mg/kg
16 EPA PAHs= 10.7 mg/kg
BaP= 0.071 mg/kg

POSSIBLE UST NO. 1
APPROX. UST DIMENSIONS
6' Dia. x 10' L




SINCE 1881 **FROEHLING & ROBERTSON, INC.**
Engineering Stability Since 1881



310 Hubert Street
Raleigh, North Carolina 27603-2302 | USA
T 919.828.3441 | F 919.828.5751
www.fandr.com

LEGEND

 Approximate Geoprobe Boring Location

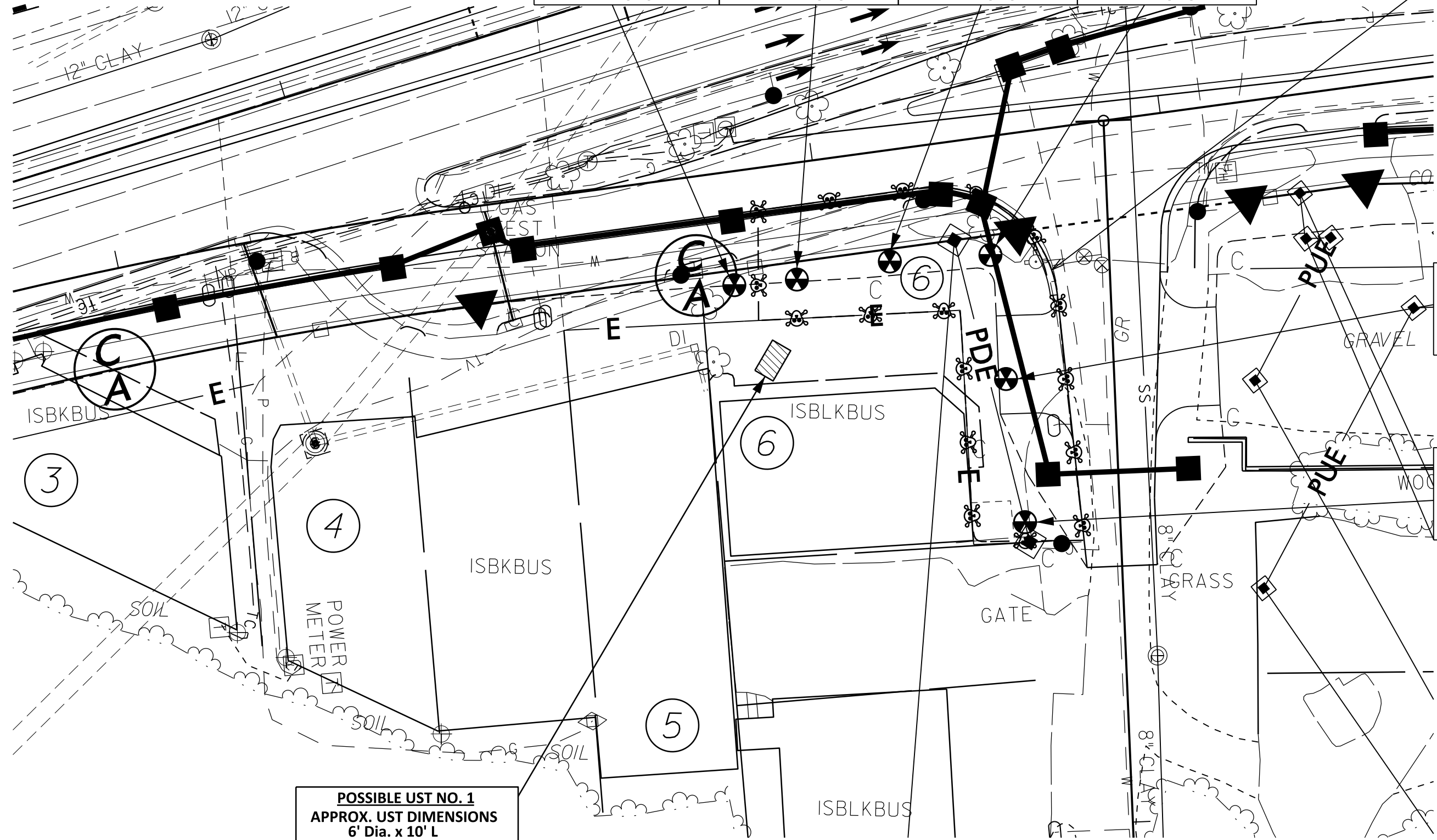
Samples Shown in Bold Exceed the NCDENR Action Level as Outlined in the NCDENR, DWM, UST Section Guideline

LABORATORY RESULTS & BORING LOCATION PLAN	
CLIENT: NCDOT	
PROJECT: B-5121/B-5317 2nd District Religious Educational Charitable Dev., Inc. (Parcel #6)	
LOCATION: Raleigh, Wake County, North Carolina	
F&R PROJECT No.: 66T-0097	
DRAWN BY: T. T. Walker	CHECKED BY: M. Sabodish, P.E.
DATE: August 2015	SCALE: 1"=30'
FIGURE No.:	3

NAD 83/NSRS 2007

<p>B-1: 7.0'-8.0' DRO= 1.6 mg/kg GRO=<0.5 mg/kg TOTAL BTEX=<0.99 mg/kg 16 EPA PAHs=<0.02 mg/kg BaP=<0.01 mg/kg</p>	<p>B-2: 5.0'-6.0' DRO= 23 mg/kg GRO=<0.53 mg/kg TOTAL BTEX=<1.1 mg/kg 16 EPA PAHs= 3.8 mg/kg BaP= 0.099 mg/kg</p>	<p>B-3: 7.0'-8.0' DRO= 36.7 mg/kg GRO=<6.6 mg/kg TOTAL BTEX=<13.1 mg/kg 16 EPA PAHs= 1.6 mg/kg BaP= 0.13 mg/kg</p>	<p>B-4: 3.0'-4.0' DRO= 41.7 mg/kg GRO=<7.3 mg/kg TOTAL BTEX=<1.1 mg/kg 16 EPA PAHs= 1.8 mg/kg BaP= 0.15 mg/kg</p>
---	--	---	--

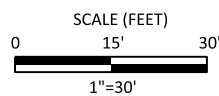
Estimated Extents of Soil Contamination
L x W varies (4,601.8 SF)
x 9' depth= 2,485 tons



B-5: 8.0'-9.0'
DRO= 34.9 mg/kg
GRO=<0.55 mg/kg
TOTAL BTEX=<1.1 mg/kg
16 EPA PAHs= 4.4 mg/kg
BaP= 0.092 mg/kg

B-6: 0.0'-1.5'
DRO= 241.1 mg/kg
GRO=<7.5 mg/kg
TOTAL BTEX=<15 mg/kg
16 EPA PAHs= 10.7 mg/kg
BaP= 0.071 mg/kg

POSSIBLE UST NO. 1
APPROX. UST DIMENSIONS
6' Dia. x 10' L




SINCE 1881 **FROEHLING & ROBERTSON, INC.**
Engineering Stability Since 1881



310 Hubert Street
Raleigh, North Carolina 27603-2302 | USA
T 919.828.3441 | F 919.828.5751
www.fandr.com

LEGEND

 Approximate Geoprobe Boring Location

Samples Shown in Bold Exceed the NCDENR Action Level as Outlined in the NCDENR, DWM, UST Section Guideline

ESTIMATED EXTENTS OF SOIL CONTAMINATION	
CLIENT: NCDOT	
PROJECT: B-5121/B-5317 2nd District Religious Educational Charitable Dev., Inc. (Parcel #6)	
LOCATION: Raleigh, Wake County, North Carolina	
F&R PROJECT No.: 66T-0097	
DRAWN BY: T. T. Walker	CHECKED BY: M. Sabodish, P.E.
DATE: August 2015	SCALE: 1"=30'
FIGURE No.: 4	



APPENDIX II

GEOPHYSICAL REPORT PREPARED BY PYRAMID



PYRAMID ENVIRONMENTAL & ENGINEERING
(PROJECT 2015-176)

GEOPHYSICAL SURVEY

METALLIC UST INVESTIGATION:
PARCEL 6 – 2ND DIST. RELIGIOUS
EDUCATIONAL CHARITABLE
DEVELOPMENTS, INC.
NCDOT PROJECT B-5121/B5317
(WBS 42263.1.1)

412 CAPITAL BLVD., RALEIGH, WAKE COUNTY, NC
JULY 17, 2015

Report prepared for: Michael Sabodish Jr., Ph.D., P.E.
Froehling and Robertson
310 Hubert Street
Raleigh, North Carolina 27603

Prepared by: _____

Eric C. Cross, P.G.
NC License #2181

Reviewed by: _____

Douglas A. Canavello, P.G.
NC License #1066

503 INDUSTRIAL AVENUE, GREENSBORO, NC 27406
P: 336.335.3174 F: 336.691.0648
C257: GEOLOGY C1251: ENGINEERING

GEOPHYSICAL INVESTIGATION REPORT
Parcel 6 – 2nd Dist. Religious Educational Charitable Developments, Inc.
Raleigh, Wake County, North Carolina

Table of Contents

Executive Summary	1
Introduction.....	2
Field Methodology.....	2
Discussion of Results.....	4
Summary and Conclusions	6
Limitations	6

Figures

- Figure 1 – Parcel 6 Geophysical Survey Boundaries and Site Photographs
- Figure 2 – Parcel 6 EM61 Results Contour Map
- Figure 3 – Parcel 6 GPR Transect Locations & Select Images
- Figure 4 – Parcel 6 Approximate Locations of Probable/Possible Metallic USTs

Appendices

- Appendix A – GPR Transect Images

LIST OF ACRONYMS

CADD	Computer Assisted Drafting and Design
DF	Dual Frequency
EM.....	Electromagnetic
GPR.....	Ground Penetrating Radar
GPS	Global Positioning System
NCDOT.....	North Carolina Department of Transportation
ROW	Right-of-Way
SVE.....	Soil Vapor Extraction
UST	Underground Storage Tank

EXECUTIVE SUMMARY

Project Description: Pyramid Environmental conducted a geophysical investigation for Froehling & Robertson (F&R) at Parcel 6, located at 412 Capital Blvd., Raleigh, NC. The survey was part of a North Carolina Department of Transportation (NCDOT) Right-of-Way (ROW) investigation (NCDOT Project B-5121/B-5317). F&R directed Pyramid as to the geophysical survey boundaries at the project site, which were designed to extend from the existing edge of pavement into the proposed ROW line and/or proposed easements, whichever distance was greater. Conducted from June 26 to July 1, 2015, the geophysical investigation was performed to determine if unknown, metallic underground storage tanks (USTs) were present beneath the survey area.

Geophysical Results: The majority of the EM anomalies recorded at the parcel were associated with visible cultural features such as poles, fences, hydrants, a dumpster, the building, and scattered debris. One unknown EM anomaly was observed at the south end of the parking lot. GPR scans were performed across this area. The GPR provided evidence of laterally distinct reflectors that were suggestive of a structure such as a UST. The combined metal detection data and GPR results were not conclusive, but resulted in the classification of this anomaly as a possible metallic UST. The possible UST was approximately 6 feet wide and 10 feet long at a depth of approximately 2 feet below the ground surface. Additional GPR scans verified the presence of a utility on the north side of the building. No evidence of additional USTs was observed. Collectively, the geophysical data recorded evidence of one possible metallic UST at the property.

INTRODUCTION

Pyramid Environmental conducted a geophysical investigation for Froehling & Robertson (F&R) at Parcel 6, located at 412 Capital Blvd., Raleigh, NC. The survey was part of a North Carolina Department of Transportation (NCDOT) Right-of-Way (ROW) investigation (NCDOT Project B-5121/B-5317). F&R directed Pyramid as to the geophysical survey boundaries at the project site, which were designed to extend from the existing edge of pavement into the proposed ROW line and/or proposed easements, whichever distance was greater. Conducted from June 26 to July 1, 2015, the geophysical investigation was performed to determine if unknown, metallic underground storage tanks (USTs) were present beneath the survey area.

The site included a charitable shelter building surrounded by asphalt parking areas. Aerial photographs showing the survey area boundaries and ground-level photographs are shown in **Figure 1**.

FIELD METHODOLOGY

The geophysical investigation consisted of electromagnetic (EM) induction-metal detection and ground penetrating radar (GPR) surveys. Pyramid collected the EM data using a Geonics EM61 metal detector integrated with a Trimble AG-114 GPS antenna. The integrated GPS system allows the location of the instrument to be recorded in real-time during data collection, resulting in an EM data set that geo-referenced and can be overlain on aerial photographs and CADD drawings. A boundary grid was established around the perimeter of the site with marks every 10 feet to maintain orientation of the instrument throughout the survey and assure complete coverage of the area.

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. The EM61 data were digitally collected at

approximately 0.8 foot intervals along north-south trending or east-west trending, generally parallel survey lines spaced five feet apart. The data were downloaded to a computer and reviewed in the field and office using the Geonics NAV61 and Surfer for Windows Version 11.0 software programs.

GPR data were acquired across select EM anomalies on June 30, 2015, using a Geophysical Survey Systems, Inc. (GSSI) UtilityScan DF unit equipped with a dual frequency 300/800 MHz antenna. Data were collected both in reconnaissance fashion as well as along formal transect lines across EM features. 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 10 feet, based on dielectric constants calculated by the DF unit in the field during the reconnaissance scans. GPR transects across specific anomalies were saved to the hard drive of the DF unit for post-processing and figure generation.

Pyramid’s classifications of USTs for the purposes of this report are based directly on the geophysical UST ratings provided to us by the NCDOT. These ratings are as follows:

Geophysical Surveys for Underground Storage Tanks on NCDOT Projects			
High Confidence	Intermediate Confidence	Low Confidence	No Confidence
Known UST Active tank - spatial location, orientation, and approximate depth determined by geophysics.	Probable UST Sufficient geophysical data from both magnetic and radar surveys that is characteristic of a tank. Interpretation may be supported by physical evidence such as fill/vent pipe, metal cover plate, asphalt/concrete patch, etc.	Possible UST Sufficient geophysical data from either magnetic or radar surveys that is characteristic of a tank. Additional data is not sufficient enough to confirm or deny the presence of a UST.	Anomaly noted but not characteristic of a UST. Should be noted in the text and may be called out in the figures at the geophysicist’s discretion.

DISCUSSION OF RESULTS

Discussion of EM Results

A contour plot of the EM61 results obtained across the survey area at the property is presented in **Figure 2**. Each EM anomaly is numbered for reference to the figure. The following table presents the list of EM anomalies and the cause of the metallic response, if known:

LIST OF METALLIC ANOMALIES IDENTIFIED BY EM SURVEY

Metallic Anomaly #	Cause of Anomaly	Investigated with GPR
1	Hydrant	
2	Street Sign	
3	1 Possible UST	☑
4	Metal Fence	
5	Building foundation/siding	
6	Ladder/cycles/chair	
7	Water meter and line	☑
8	Dumpster	

Isolated EM anomalies located around the northwest corner of the survey area (Anomaly #1 and #2) were the result of a hydrant and light pole near the roadway. A metal fence was located along the south boundary of the survey area, resulting in Anomaly #4. The EM response surrounding the perimeter of the building (Anomaly #5) was likely the result of the siding and/or reinforcement in the building foundation. A collection of metal items at the northeast corner of the survey area resulted in an EM response (Anomaly #6), and a suspected metal water line and adjacent dumpster resulted in Anomaly #7 and #8.

One unknown EM feature was recorded near the south boundary of the survey area in the asphalt parking lot that was not associated with any visible cultural features (Anomaly #3). This feature was investigated further with the GPR.

Discussion of GPR Results

Figure 3 presents the locations of the formal GPR transects performed at the property, as well as select transect images. A total of 8 formal GPR transects were performed at the property. GPR transects 1-2 were performed across the EM anomaly #7 on the north side of the survey area that was suspected to be associated with a utility. These GPR scans verified the presence of a conduit/utility extending from north to south across the area. The utility was traced to a water meter, indicating it was likely a water line.

GPR transects 3-8 were performed in the vicinity of the unknown EM feature (Anomaly #3) near the south boundary of the survey area. These GPR scans recorded an area containing laterally distinct reflectors that were suggestive of a subsurface structure such as a UST. GPR transect 7 recorded an apparent, but not well-defined, hyperbolic reflector that is characteristic of the width of a UST. The combination of the metallic anomaly detected by the EM survey and the apparent structure evidenced by the GPR survey results in the classification of this feature as a possible metallic UST. This possible UST was approximately 6 feet wide and 10 feet long at a depth of approximately 2 feet below the ground surface. No evidence of additional USTs was observed at the site.

Collectively, the geophysical data recorded evidence of one possible metallic UST at the property.

SUMMARY & CONCLUSIONS

Our evaluation of the EM61 and GPR data collected at Parcel 6 in Raleigh, Wake County, North Carolina, provides the following summary and conclusions:

- The EM61 and GPR surveys provided reliable results for the detection of metallic USTs within the accessible portions of the geophysical survey area.
- The majority of the EM features recorded at the parcel were associated with visible cultural features such as poles, fences, hydrants, a dumpster, the building, and scattered debris.
- One unknown EM anomaly was observed at the south end of the parking lot. GPR scans were performed across this area.
- The GPR provided evidence of laterally distinct reflectors that were suggestive of a structure such as a UST. The combined metal detection data and GPR results were not conclusive, but resulted in the classification of this anomaly as a possible metallic UST.
 - The possible UST was approximately 6 feet wide and 10 feet long at a depth of approximately 2 feet below the ground surface.
- Additional GPR scans verified the presence of a utility on the north side of the building. No evidence of additional USTs was observed.
- Collectively, the geophysical data recorded evidence of one possible metallic UST at the property.

LIMITATIONS

Geophysical surveys have been performed and this report prepared for F&R 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 the definitive presence or absence of

metallic USTs, but that the evidence collected is sufficient to result in the conclusions made in this report. Additionally, it should be understood that areas containing extensive vegetation, reinforced concrete, or other restrictions to the accessibility of the geophysical instruments could not be fully investigated.

N ↑




APPROXIMATE BOUNDARIES OF GEOPHYSICAL SURVEY AREAS.



View of Survey Area
(Facing Approximately East)

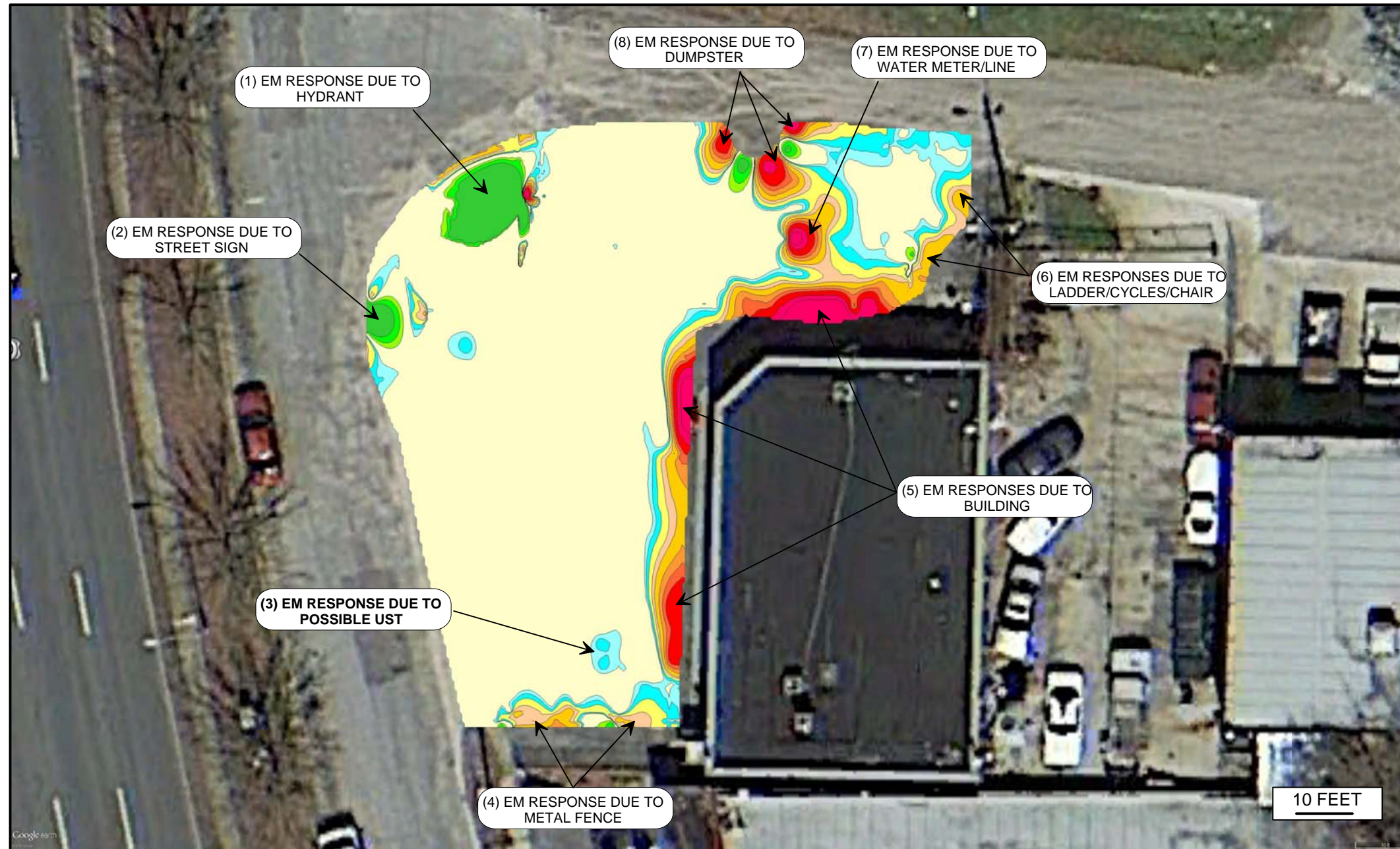


View of Survey Area
(Facing Approximately East)

TITLE	PARCEL 6 - 412 CAPITAL BLVD. GEOPHYSICAL SURVEY BOUNDARIES AND SITE PHOTOGRAPHS	
PROJECT	METALLIC UST INVESTIGATION NCDOT B-5121/B-5317, RALEIGH, NC	
	 503 INDUSTRIAL AVENUE GREENSBORO, NC 27460 (336) 335-3174 (p) (336) 691-0648 (f) License # C1251 Eng. / License # C257 Geology	
DATE	7/6/2015	CLIENT FROEHLING & ROBERTSON
PYRAMID PROJECT #:	2015-176	FIGURE 1



Parcel 6 - EM61 Differential Results

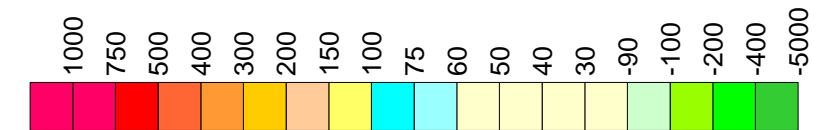



Locations of metallic anomalies detected by the EM61 survey. Numbers correspond to descriptive Table in report.

EVIDENCE OF ONE POSSIBLE METALLIC UST OBSERVED

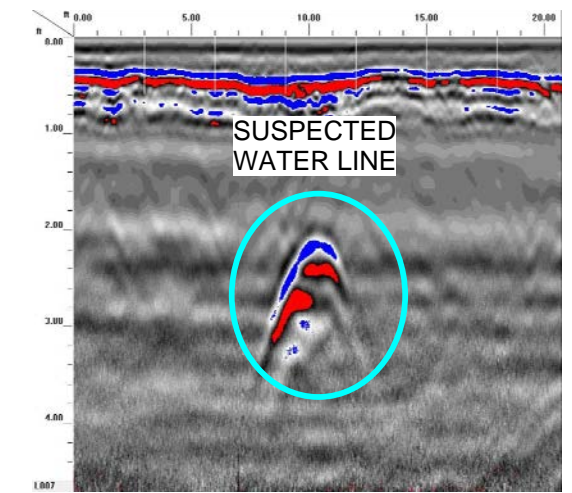
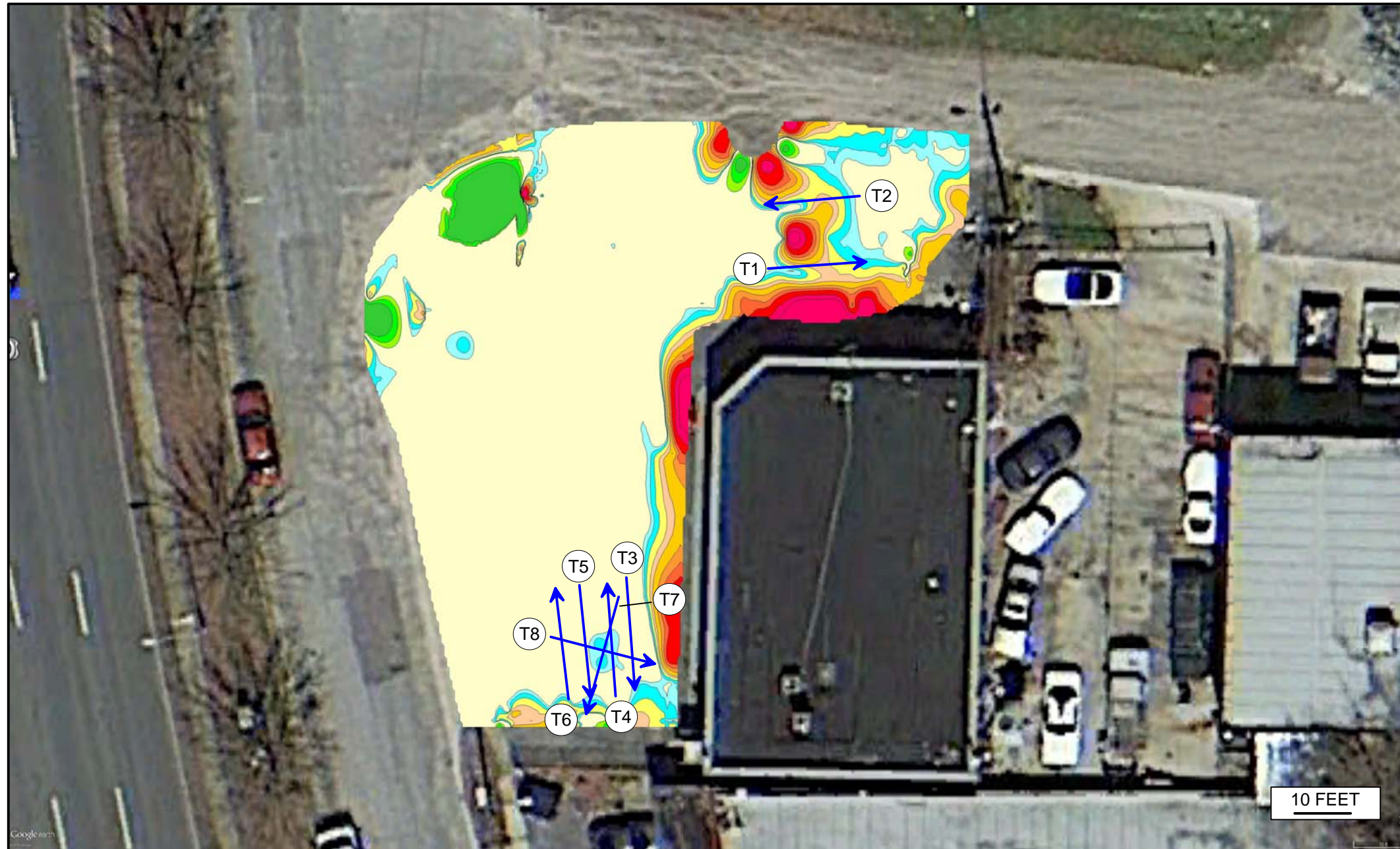
The contour plot shows the differential results of the EM61 instrument in millivolts (mV). The EM61 data were collected on June 26, 2015, using a Geonics EM61 instrument. Ground penetrating radar (GPR) data were collected on June 30, 2015, using a GSSI UtilityScan DF unit with a dual frequency 300/800 MHz antenna.

EM61 Metal Detection Response (millivolts)

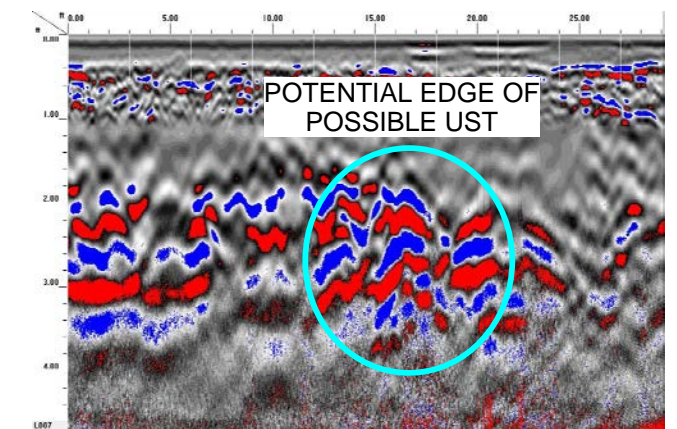


TITLE	PARCEL 6 - 412 CAPITAL BLVD. EM 61 RESULTS CONTOUR MAP	
PROJECT	METALLIC UST INVESTIGATION NCDOT PROJECT B-5121/B-5317 (42263.1.1)	
	 503 INDUSTRIAL AVENUE GREENSBORO, NC 27460 (336) 335-3174 (p) (336) 691-0648 (f) License # C1251 Eng. / License # C257 Geology	
DATE	7/6/2015	CLIENT FROEHLING & ROBERTSON
PYRAMID PROJECT #:	2015-176	FIGURE 2

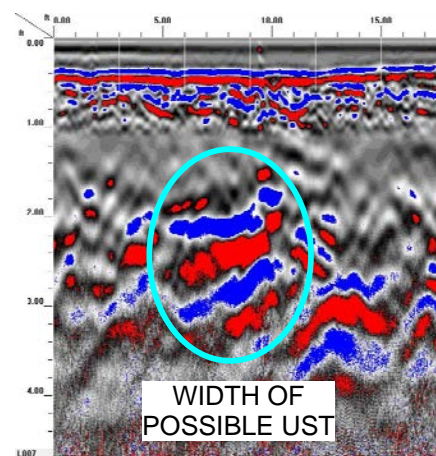
Parcel 6 - Approximate Locations of GPR Transects



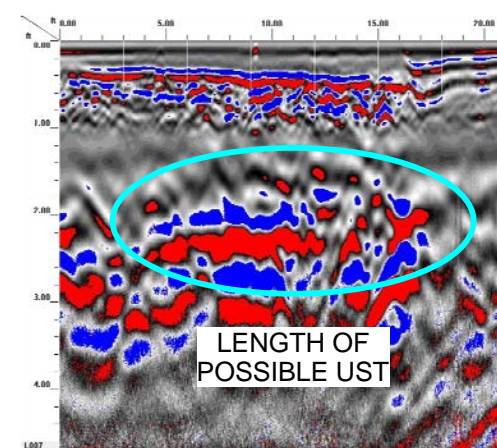
GPR TRANSECT 1 (T1)



GPR TRANSECT 3 (T3)




GPR TRANSECT 7 (T7)



GPR TRANSECT 8 (T8)



TITLE		PARCEL 6 - 412 CAPITAL BLVD. EM 61 RESULTS CONTOUR MAP	
PROJECT		METALLIC UST INVESTIGATION NCDOT PROJECT B-5121/B-5317 (42263.1.1)	
		503 INDUSTRIAL AVENUE GREENSBORO, NC 27460 (336) 335-3174 (p) (336) 691-0648 (f) License # C1251 Eng. / License # C257 Geology	
DATE	7/6/2015	CLIENT FROEHLING & ROBERTSON	
PYRAMID PROJECT #:	2015-176	FIGURE 3	


N ↑



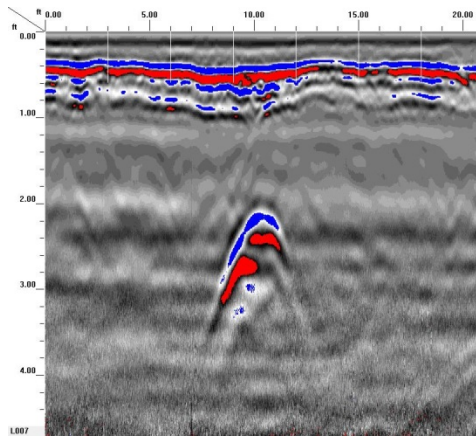
APPROXIMATE LOCATION OF POSSIBLE METALLIC UST.



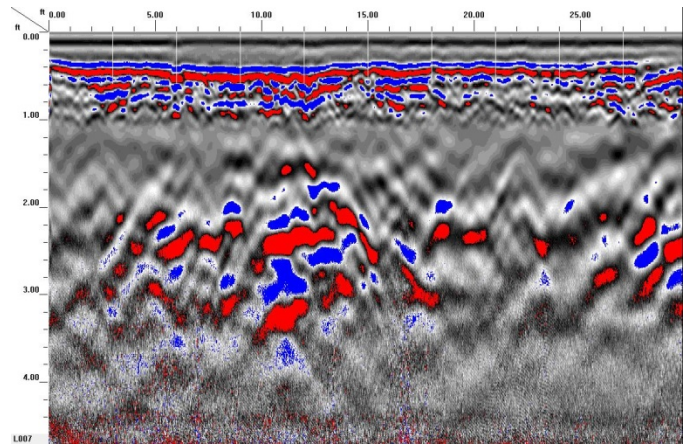
Approximate Location of Possible UST

TITLE	PARCEL 6 - 412 CAPITAL BLVD. APPROXIMATE LOCATION OF POSSIBLE UST	
PROJECT	METALLIC UST INVESTIGATION NCDOT B-5121/B-5317, RALEIGH, NC	
	 503 INDUSTRIAL AVENUE GREENSBORO, NC 27460 (336) 335-3174 (p) (336) 691-0648 (f) License # C1251 Eng. / License # C257 Geology	
DATE	7/6/2015	CLIENT FROEHLING & ROBERTSON
PYRAMID PROJECT #:	2015-176	FIGURE 4

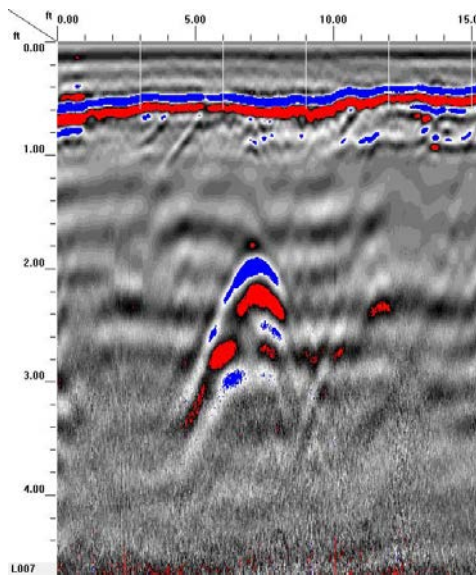
Appendix A – GPR Transects



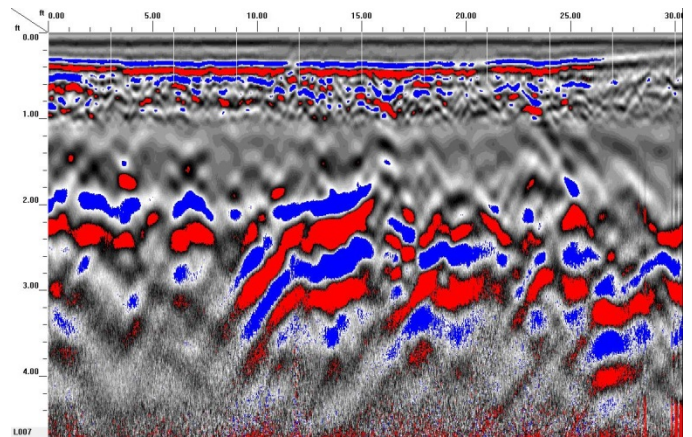
GPR TRANSECT 1



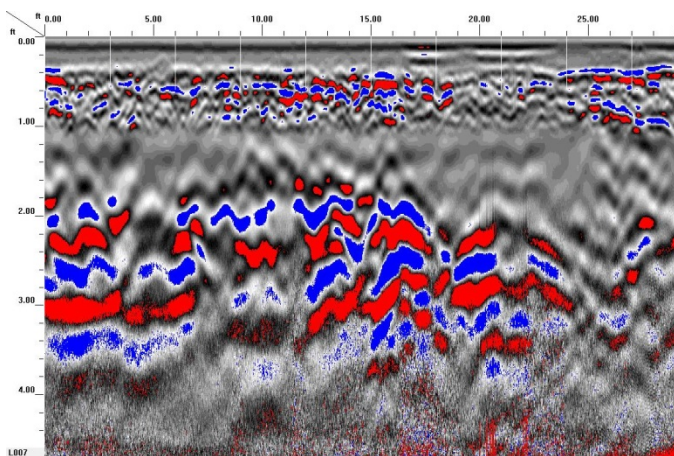
GPR TRANSECT 4



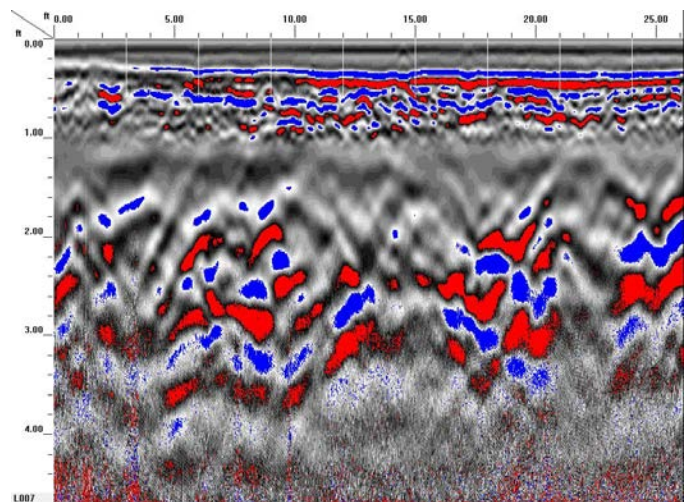
GPR TRANSECT 2



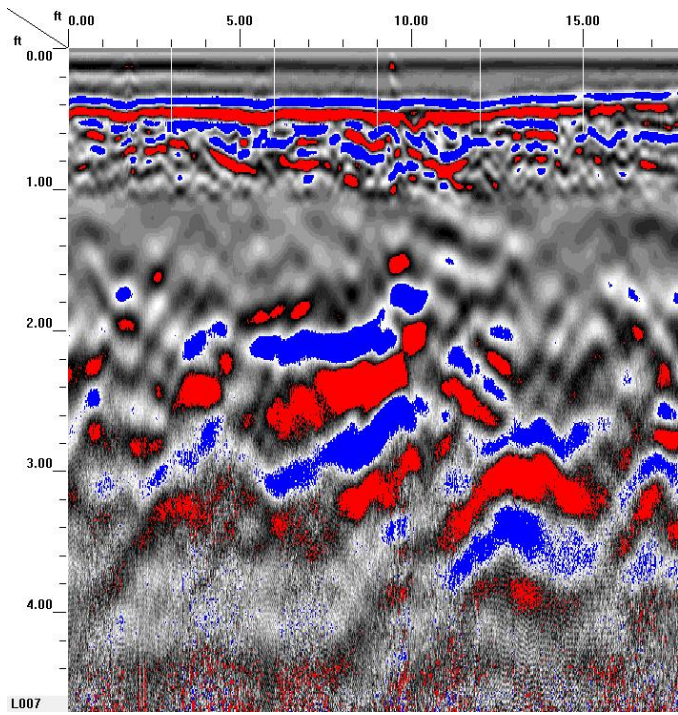
GPR TRANSECT 5



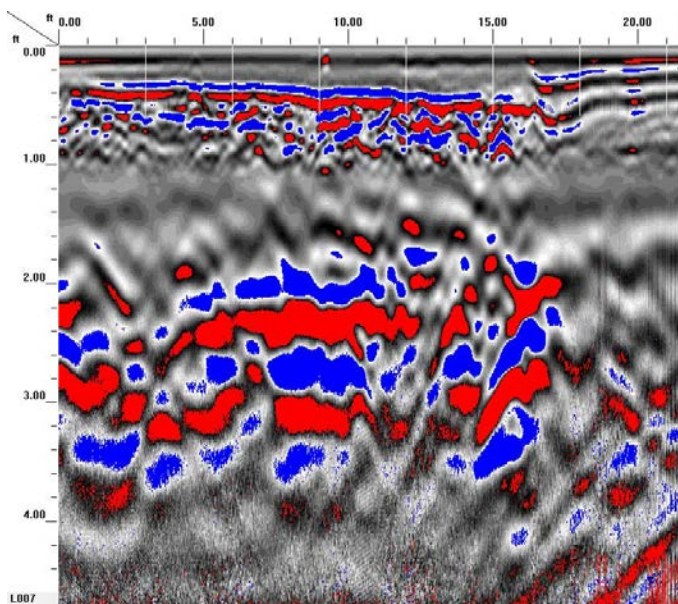
GPR TRANSECT 3



GPR TRANSECT 6



GPR TRANSECT 7



GPR TRANSECT 8



APPENDIX III
GEOPROBE LOGS



Project No: 66T-0097

Elevation: Existing Ground Surface

Drilling Method: Geoprobe

Client: NCDOT

Total Depth: 10.0'

Hammer Type: N/A

Project: B-5121/B-5317 2nd DRECD, Inc. (Parcel #6) **Boring Location:** See Plan

Date Drilled: 7/22/15

City/State: Raleigh, NC

Driller: Regional Probing Services

Elevation	Depth	Description of Materials (Classification)	*Sample Depth (feet)	PID (ppm)	Remarks
	0.2	Asphalt	0.0	0.6	Petroleum Odors not Observed in Boring
		Moist, Red-Brown, Silty CLAY with Mica (CL)	1.0	0.4	
	2.0	Moist, Red-Brown, Sandy Silty CLAY with Mica (CL)	2.0	0.5	
			3.0	0.6	
			4.0	0.7	
			5.0	0.6	
	5.0	Moist, Red-Brown and Gray, Sandy Silty CLAY with Mica (CL)	5.0	0.6	
			6.0	0.7	
			7.0	1.8*	
			8.0	0.4	
	6.0	Moist, Tan-Gray, Sandy CLAY (CL)	6.0	0.7	
			7.0	1.8*	
			8.0	0.4	
	8.0	Moist, Tan-Gray, Silty CLAY (CL)	8.0	0.4	
			9.0	0.4	
	10.0	Geoprobe Boring Terminated at 10 feet.	10.0		

*Geoprobe soil samples were collected by continuous push of a 2 inch ID stainless steel barrel containing a 4 foot long acetate collection sleeve. The 4 foot long soil sample sleeves were cut open and the soil was separated into 1 foot long sample intervals.

GEOPROBE_LOG_B5121_GEOENV_GEOPROBEBORELOG_PARCEL6.GPJ F&R.GDT 8/21/15



Project No: 66T-0097

Elevation: Existing Ground Surface

Drilling Method: Geoprobe

Client: NCDOT

Total Depth: 10.0'

Hammer Type: N/A

Project: B-5121/B-5317 2nd DRECD, Inc. (Parcel #6) **Boring Location:** See Plan

Date Drilled: 7/22/15

City/State: Raleigh, NC

Driller: Regional Probing Services

Elevation	Depth	Description of Materials (Classification)	*Sample Depth (feet)	PID (ppm)	Remarks
	0.2	Asphalt	0.0	0.8	Petroleum Odors not Observed in Boring
		Moist, Tan-Brown, Sandy Silty CLAY with Mica (CL)			
	1.0	Moist, Brown, Sandy Silty CLAY with Mica (CL)	1.0	1.1	
	2.0	Moist, Black-Gray, Sandy CLAY with Mica (CL)	2.0	1.0	
	3.0	Moist, Gray, Medium to Coarse SAND (SP)	3.0	0.9	
	4.0	Moist, Gray-Tan, Medium Sandy CLAY (CL)	4.0	1.0	
	5.0	Moist, Orange, Tan, and Gray, Medium Sandy CLAY (CL)	5.0	1.1*	*Sample Submitted for Laboratory Analysis for TPH, DRO/GRO, Total BTEX, 16 PAHs, and BaP
	6.0	Moist, Orange-Tan, Medium Sandy CLAY (CL)	6.0	0.8	
	7.0	Moist, Orange-Gray, Medium Sandy CLAY (CL)	7.0	0.5	
	8.0	Moist, Gray-Tan, Sandy Silty CLAY with Mica (CL)	8.0	0.6	
			9.0	0.8	
	10.0	Geoprobe Boring Terminated at 10 feet.	10.0		

GEOPROBE_LOG_B5121_GEOENV_GEOPROBEBORELOG_PARCEL6.GPJ_F&R.GDT_8/21/15

*Geoprobe soil samples were collected by continuous push of a 2 inch ID stainless steel barrel containing a 4 foot long acetate collection sleeve. The 4 foot long soil sample sleeves were cut open and the soil was separated into 1 foot long sample intervals.



Project No: 66T-0097

Elevation: Existing Ground Surface

Drilling Method: Geoprobe

Client: NCDOT

Total Depth: 10.0'

Hammer Type: N/A

Project: B-5121/B-5317 2nd DRECD, Inc. (Parcel #6) **Boring Location:** See Plan

Date Drilled: 7/22/15

City/State: Raleigh, NC

Driller: Regional Probing Services

Elevation	Depth	Description of Materials (Classification)	*Sample Depth (feet)	PID (ppm)	Remarks
	0.2	Asphalt	0.0	0.4	Petroleum Odors not Observed in Boring
		Moist, Brown-Black, Sandy SILT with Mica (ML)			
	1.0	Moist, Brown-Black, Silty Sandy CLAY with Mica and Organics (CL)	1.0	0.7	
	2.0	Moist, Gray, Silty Fine to Medium SAND (SM)	2.0	0.6	
	3.0	Moist, Orange-Tan, Sandy CLAY (CL)	3.0	0.6	
	4.0		4.0	0.4	
	5.0	Moist, Orange-Tan, Silty CLAY (CL)	5.0	0.5	
	6.0	Moist, Tan, Sandy CLAY (CL)	6.0	0.3	
	7.0	Moist, Tan-Black, Fine Sandy SILT (ML)	7.0	0.6*	*Sample Submitted for Laboratory Analysis for TPH, DRO/GRO, Total BTEX, 16 PAHs, and BaP
	8.0		8.0	0.4	
	9.0	Moist, Orange-Tan-Black, Fine Sandy SILT (ML)	9.0	0.5	
	10.0	Geoprobe Boring Terminated at 10 feet.	10.0		

GEOPROBE_LOG_B5121_GEOENV_GEOPROBEBORELOG_PARCEL6.GPJ_F&R.GDT_8/21/15

*Geoprobe soil samples were collected by continuous push of a 2 inch ID stainless steel barrel containing a 4 foot long acetate collection sleeve. The 4 foot long soil sample sleeves were cut open and the soil was separated into 1 foot long sample intervals.



Project No: 66T-0097

Elevation: Existing Ground Surface

Drilling Method: Geoprobe

Client: NCDOT

Total Depth: 10.0'

Hammer Type: N/A

Project: B-5121/B-5317 2nd DRECD, Inc. (Parcel #6) **Boring Location:** See Plan

Date Drilled: 7/22/15

City/State: Raleigh, NC

Driller: Regional Probing Services

Elevation	Depth	Description of Materials (Classification)	*Sample Depth (feet)	PID (ppm)	Remarks
	0.2	Asphalt	0.0	0.8	Petroleum Odors not Observed in Boring
		Moist, Tan-Brown, Sandy Silty CLAY with Mica (CL)			
	1.0	Moist, Orange-Tan and Black, Sandy Silty CLAY with Mica and Organics (CL)	1.0	0.6	
	2.0	Moist, Orange, Silty Fine SAND (SM)	2.0	0.7	
	3.0	Moist, Tan-Black, Silty Fine SAND with Mica (SM)	3.0	0.9*	*Sample Submitted for Laboratory Analysis for TPH, DRO/GRO, Total BTEX, 16 PAHs, and BaP
			4.0	0.9	
	5.0	Moist, Orange-Tan, Fine Sandy SILT with Mica (ML)	5.0	0.9	
	6.0	Moist, Orange-Tan, Fine Sandy SILT (ML)	6.0	0.9	
			7.0	0.7	
			8.0	0.9	
	9.0	Moist, Tan- Black, Fine Sandy SILT with Mica (ML)	9.0	0.7	
	10.0	Geoprobe Boring Terminated at 10 feet.	10.0		

GEOPROBE_LOG_B5121_GEOENV_GEOPROBEBORELOG_PARCEL6.GPJ F&R.GDT 8/21/15

*Geoprobe soil samples were collected by continuous push of a 2 inch ID stainless steel barrel containing a 4 foot long acetate collection sleeve. The 4 foot long soil sample sleeves were cut open and the soil was separated into 1 foot long sample intervals.



Project No: 66T-0097

Elevation: Existing Ground Surface

Drilling Method: Geoprobe

Client: NCDOT

Total Depth: 10.0'

Hammer Type: N/A

Project: B-5121/B-5317 2nd DRECD, Inc. (Parcel #6) **Boring Location:** See Plan

Date Drilled: 7/22/15

City/State: Raleigh, NC

Driller: Regional Probing Services

Elevation	Depth	Description of Materials (Classification)	*Sample Depth (feet)	PID (ppm)	Remarks
	0.2	Asphalt	0.0	0.4	Petroleum Odors not Observed in Boring
		Moist, Orange-Tan, Fine Sandy SILT (ML)			
	1.0	Moist, Red-Brown, Fine Sandy SILT (ML)	1.0	0.6	
	2.0	Moist, Brown-Black, Fine Sandy SILT (ML)	2.0	0.6	
	3.0		3.0	0.7	
	4.0	Moist, Tan-Black, Fine to Coarse Sandy SILT (ML)	4.0	0.6	
	5.0	Moist, Orange-Tan, Sandy Silty CLAY (CL)	5.0	0.6	
	6.0	Moist, Dark Brown, Sandy SILT (ML)	6.0	0.7	
	7.0		7.0	0.8	
	8.0	Dry, Tan and Brown, Silty Fine to Medium SAND (SM)	8.0	0.8*	*Sample Submitted for Laboratory Analysis for TPH, DRO/GRO, Total BTEX, 16 PAHs, and BaP
	9.0		9.0	0.7	
	10.0	Geoprobe Boring Terminated at 10 feet.	10.0		

GEOPROBE_LOG_B5121_GEOENV_GEOPROBEBORELOG_PARCEL6.GPJ F&R.GDT 8/21/15

*Geoprobe soil samples were collected by continuous push of a 2 inch ID stainless steel barrel containing a 4 foot long acetate collection sleeve. The 4 foot long soil sample sleeves were cut open and the soil was separated into 1 foot long sample intervals.



Project No: 66T-0097

Elevation: Existing Ground Surface

Drilling Method: Geoprobe

Client: NCDOT

Total Depth: 3.0'

Hammer Type: N/A

Project: B-5121/B-5317 2nd DRECD, Inc. (Parcel #6) **Boring Location:** See Plan

Date Drilled: 7/22/15

City/State: Raleigh, NC

Driller: Regional Probing Services

Elevation	Depth	Description of Materials (Classification)	*Sample Depth (feet)	PID (ppm)	Remarks
	0.2	Asphalt	0.0	1.1*	Petroleum Odors not Observed in Boring *Sample Submitted for Laboratory Analysis for TPH, DRO/GRO, Total BTEX, 16 PAHs, and BaP
		Dry, Tan-Dark Brown, Silty Fine to Coarse SAND (SM)			
	1.5	Dry, Tan, Silty Fine to Coarse SAND (SM)	1.5	0.9	
	3.0	Geoprobe Refusal on Very Dense SANDS at 3 feet.	3.0		

GEOPROBE_LOG_B5121_GEOENV_GEOPROBEBORELOG_PARCEL6.GPJ_F&R.GDT_8/21/15

*Geoprobe soil samples were collected by continuous push of a 2 inch ID stainless steel barrel containing a 4 foot long acetate collection sleeve. The 4 foot long soil sample sleeves were cut open and the soil was separated into 1 foot long sample intervals.



APPENDIX IV

SITE PHOTOS

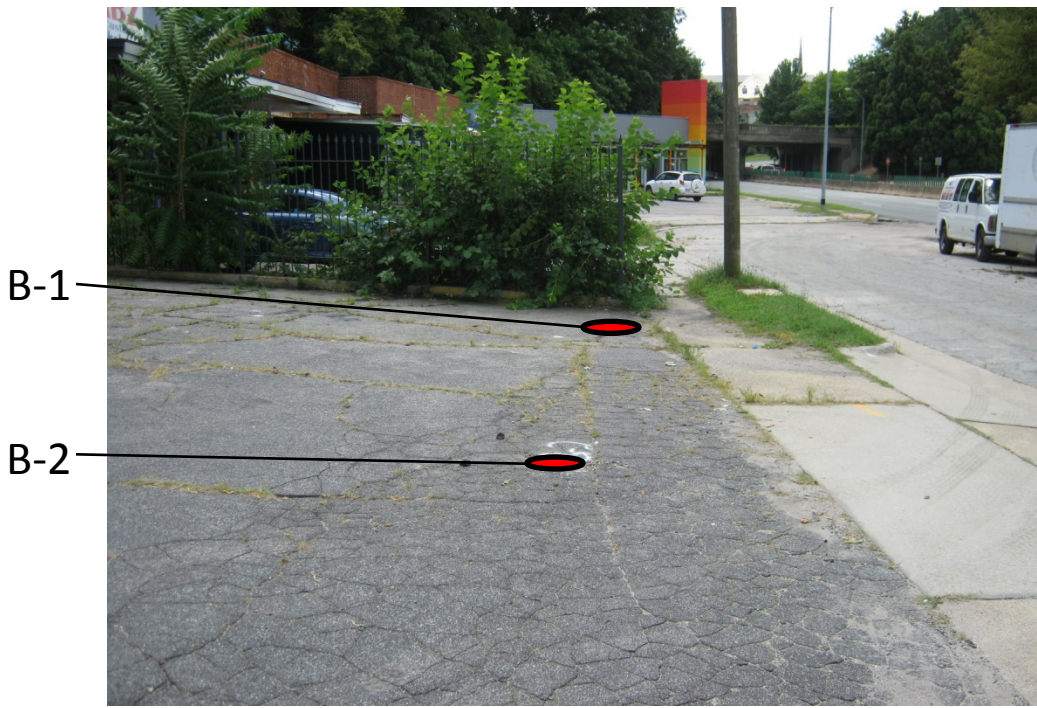


Photo #1: A view of Borings B-1 and B-2, facing south.

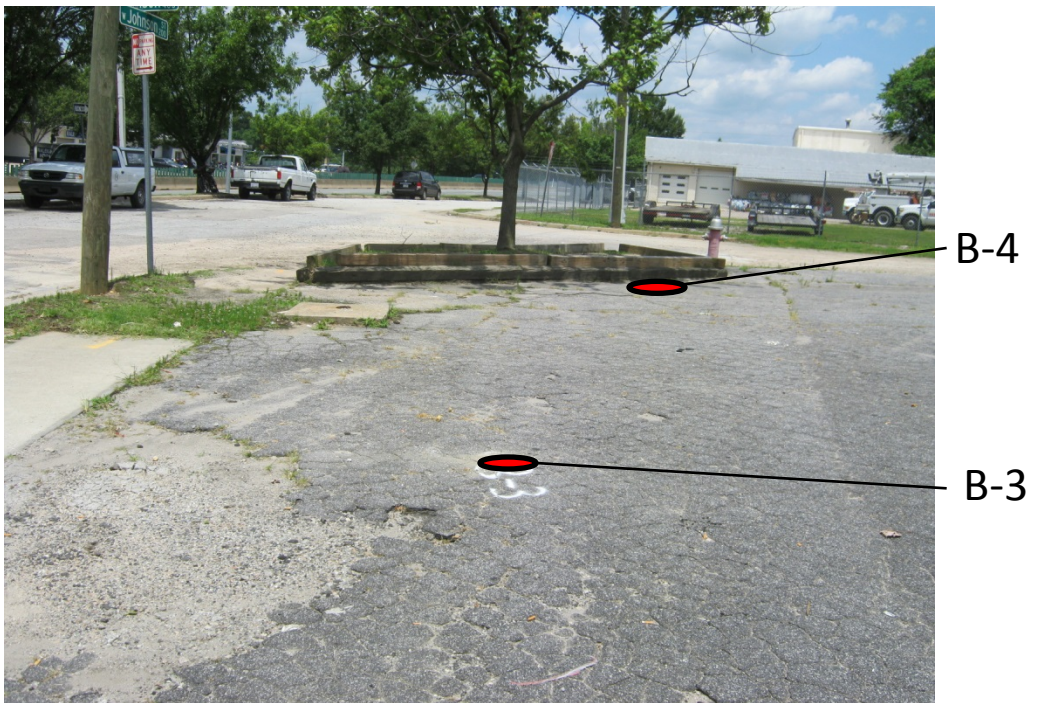


Photo #2: A view of Borings B-3 and B-4, facing north.



Photo #3: Boring locations B-5 and B-6, facing east.



Photo #4: A view of the Possible UST location adjacent to the structure, facing east.



APPENDIX V

LABORATORY ANALYTICAL RESULTS



Hydrocarbon Analysis Results

Client: F & R
Address: Raleigh, NC

Samples taken Thursday, July 23, 2015
Samples extracted Thursday, July 23, 2015
Samples analysed Friday, July 24, 2015

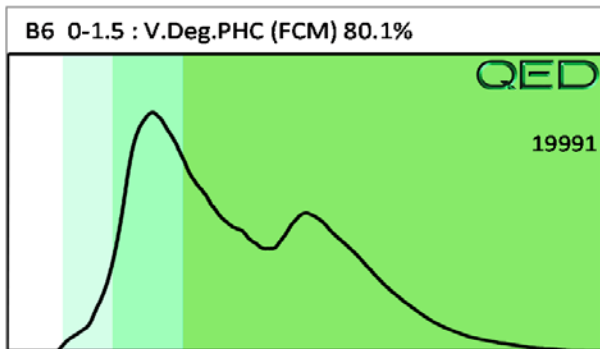
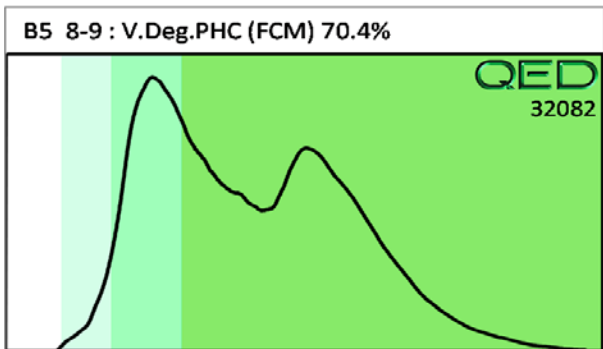
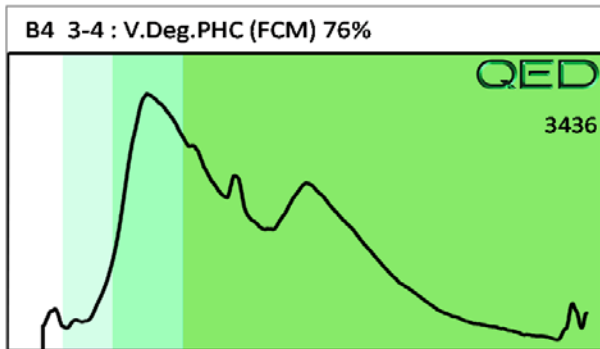
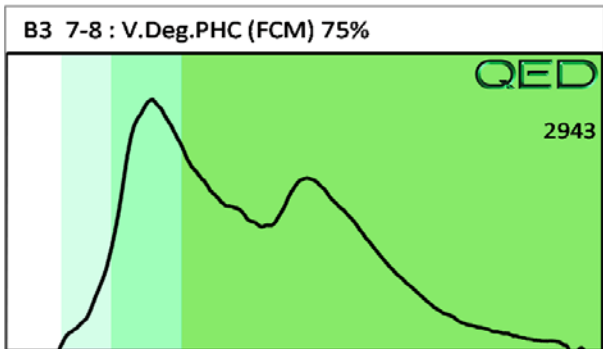
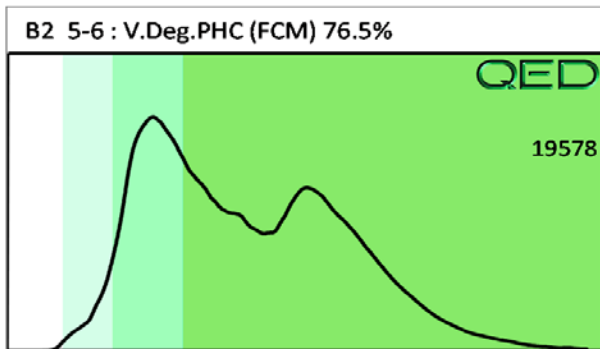
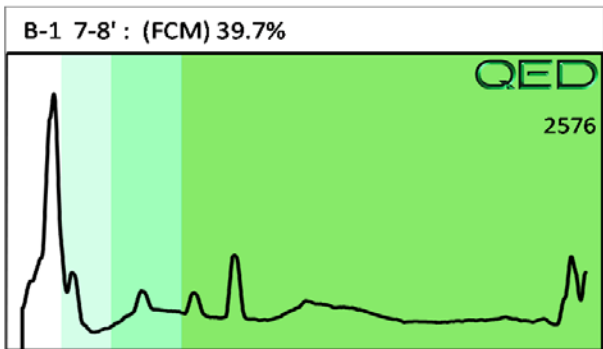
Contact: Ben Whitley

Operator F. Owen

Project: NC DOT Parcel 6 B-5121/ B-5317

Fingerprints Only													
Matrix	Sample ID	Dilution used	BTEX (C6 - C9)	GRO (C5 - C10)	DRO (C10 - C35)	TPH (C5 - C35)	Total Aromatics (C10-C35)	16 EPA PAHs	BaP	Ratios			HC Fingerprint Match
										% light	% mid	% heavy	
s	B-1 7-8'	19.8	<0.99	<0.5	1.6	1.6	0.64	<0.02	<0.01	0	61.9	38.1	(FCM) 39.7%
s	B2 5-6	21.1	<1.1	<0.53	23	23	21.8	3.8	0.099	0	85.3	14.7	V.Deg.PHC (FCM) 76.5%
s	B3 7-8	262.0	<13.1	<6.6	36.7	36.7	35	1.6	0.13	0	85.1	14.9	V.Deg.PHC (FCM) 75%
s	B4 3-4	291.4	<14.6	<7.3	41.7	41.7	39.9	1.8	0.15	0	83.5	16.5	V.Deg.PHC (FCM) 76%
s	B5 8-9	21.8	<1.1	<0.55	34.9	34.9	30.5	4.4	0.092	0	84.4	15.6	V.Deg.PHC (FCM) 70.4%
s	B6 0-1.5	301.0	<15	<7.5	241.1	241.1	221.7	10.7	0.071	0	87	13	V.Deg.PHC (FCM) 80.1%
Initial Calibrator QC check			OK			Final FCM QC Check			OK			108.8%	

Results generated by a QED HC-1 analyser. Concentration values in mg/kg for soil samples and mg/L for water samples. Soil values are not corrected for moisture or stone content
 Fingerprints provide a tentative hydrocarbon identification. The abbreviations are:- FCM = Results calculated using Fundamental Calibration Mode : % = confidence for sample fingerprint match to library
 (SBS) or (LBS) = Site Specific or Library Background Subtraction applied to result : (PFM) = Poor Fingerprint Match : (T) = Turbid : (P) = Particulate present





Chain of Custody Record and Analytical Request Form

Sample ID	Sample Collection		Initials	TAT Requested		
	QED UVF	Date		Time	24 Hour	48 Hour
Parcel 6 B-1	7-8°	7-22-15	1000	PAW		X
B-2	5-6°		1050			
B-3	7-8°		1015			
B-4	3-4		1040			
B-5	8-9°		1100			
B-6	0-1.5°		1115			
Parcel 10 B-1	4-6°		1200			
B-2	6-7°		1210			
B-3	5-6°		1330			
B-4	8-10°		1350			
B-5	1-2°		1405			
B-6	8-9°		1430			
B-7	7-8°		1445			
B-8	9-10°		1505			
B-9	4-5°		1520			
B-10	6-7°		1545			

Client: F&F

Contact: Ben Whitley

Phone: 919-630-5661

Email: bwhitley@fandr.com

Project Reference:
NC DOT B-5121 / B-5317

Each sample will be analyzed for total
BTEX, GRO, DRO, TPH and PAH

Each sample will generate a fingerprint representative of the petroleum product within the samples. Electronic data will be submitted to the email above.

FR	7-23-15	1800	UPS	7-23-15	1800
Relinquished by	Date/Time		Accepted by	Date/Time	
			<i>[Signature]</i>	7-24-15 10:30	
Relinquished by	Date/Time		Accepted by	Date/Time	
Relinquished by	Date/Time		Accepted by	Date/Time	

SHIP TO:
QROS, LLC
420 Raleigh Street, Suite E
Wilmington, NC 28412

Hannah King
hannahk@qrosllc.com
(704)-654-7391

ATTENTION

When shipping, please DO NOT submerge sample vials in ice or water. This is to avoid dilution errors and contamination. To keep the samples cool we suggest using a freezer pack or a bag of ice sealed that will not leak.

* Please send results for Parcels 6 and 10 on separate spreadsheets

SINCE



1881

