



PRELIMINARY SITE ASSESSMENT

**TUMBAPURA 1, LLC (PARCEL #27)
915 Capital Boulevard
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 #27 – Tumbapura 1, LLC (Atlas Motor & Auto Sales)**
915 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 Tumbapura 1, LLC property 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.....	6
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
Tumbapura 1, LLC Property (Parcel #27)
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 Tumbapura 1, LLC Property addressed as 915 Capital Boulevard in Raleigh, Wake County, North Carolina. The site is located on the west side of Capital Boulevard approximately 375 feet north of the Dortch Street intersection, as shown in Appendix I, Figures 1 and 2. As indicated in the Request for Technical and Cost Proposal (RFTCP), the site originally operated as a Gulf Service Station. The property currently operates as Atlas Motor & Auto Sales. According to the owner, there are three USTs on the site, and are outside of the proposed right-of-way. The property does not appear on the NCDENR UST Section registry, and no groundwater incidents are assigned to the facility.

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.

As outlined by the NCDOT in 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 concrete masonry unit (CMU) block with wood framing. Two roll-up garage doors and a canopy are located on the eastern side of the building. The majority of the site consists of an asphalt and concrete paved parking lot, and a pump island footprint is located in the parking lot. Pigeon House Branch is located on the western portion of the property. The site is bordered to the north by Phantasm Motorsport; to the south by Green Taxi; to the east by Capital Boulevard; and to the west by North West Street. Access to the site is gained from Capital Boulevard to the east. 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.

The geophysical investigation consisted of electromagnetic (EM) induction surveys using a Geonics EM61 instrument. Ground-penetrating radar (GPR) investigations 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 (from the existing edge of pavement into the proposed right-of-way). Isolated EM anomalies were identified on the site, including suspected reinforced concrete, utilities, light poles, and vehicles. The GPR survey of the UST bed indicated the presence of three probable USTs (approximately 6 feet in diameter, 25 feet in length each). Each UST is approximately 4 feet below ground surface (bgs). Pyramid did not detect USTs in the proposed right-of-way.

The complete geophysical report is attached as Appendix II.

3.0 Site Assessment Activities

F&R visited the site on July 29, 2015 to perform the Preliminary Site Assessment. The assessment consisted of advancing 3 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, and were advanced on the eastern portion of the site adjacent to Capital Boulevard. Boring B-1 was advanced adjacent to the northern property boundary, and Boring B-3 was advanced adjacent to the southern property boundary. Boring B-2 was centrally located between Borings B-1 and B-3 (Appendix I, Figure 3). The borings were advanced to the proposed depth of 10 feet bgs.

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 to wet, brown to red-tan, silty sandy micaceous clay and sandy silty micaceous clay (USCS – CL). The borings were terminated at the proposed depth of 10 feet bgs.

Petroleum odors were observed in Boring B-2 from 2 to 10 feet bgs. In addition, wet soils were observed in Boring B-2 from 6 to 10 feet bgs, and B-3 from 8 to 10 feet bgs. Based upon the proximity of Pigeon House Branch, it is possible these wet soils may be indicative of the groundwater table elevation at the site.

Of the samples screened, PID readings generally did not exceed 0.9 ppm; however, elevated PID readings were recorded in Boring B-2 from 2 to 10 feet bgs.

F&R also encountered a void beneath the sidewalk at Boring B-1, extending from just beneath the sidewalk to a depth of approximately 1.5 feet bgs.



5.0 Analytical Results

As shown in the following table, petroleum hydrocarbons identified as DRO were encountered in the soil samples at the three boring locations advanced at the site (B-1 through B-3), at depths from two feet bgs (B-2) to 10 feet bgs (B-1). At boring locations B-1 through B-3, the laboratory results indicate the DRO concentrations ranged from 0.34 mg/kg (B-1) to 126.8 mg/kg (B-3). The DRO concentrations at Borings B-2 and B-3 (126.8 and 70.4 mg/kg, respectively) exceeded the NCDENR Action Level of 10 mg/kg. In addition, a GRO concentration of 24.2 mg/kg was detected in the sample collected from Boring B-2, which is above the NCDENR Action Level of 10 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-1 through B-3. In addition, Benzo(a)pyrene (BaP) was detected in sample B-2 and B-3 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	7/29/15	9-10	1.0	< 0.57	0.34	0.34	< 1.1	0.34	0.04	< 0.011
B-2		2-3	815	24.2	126.8	151	< 12.5	64.1	2.4	0.13
B-3		7-8	0.9	< 6	70.4	70.4	< 11.9	64.4	12.4	0.33
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 Tumbapura 1, LLC Property located at 915 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 USTs were not present within the proposed right-of-way; however, Pyramid detected three probable USTs on the property outside of the proposed right-of-way, north of the site structure.

Three 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 and B-3. 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 ten feet below existing ground surface in the vicinity of Borings B-2 and B-3.

No below grade utilities appear on the proposed improvement plans. However, driveway reconstruction and curblin realignment 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 3,907.6 square feet, extending to a depth of ten 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 existing 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)
Vicinity of B-2 and B-3	L x W varies (3,907.6 SF) X 10' depth	39,076	2,344.6
Soil Volume (assuming a soil density of 120 pcf)		Total	2,344.6



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 possibly 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

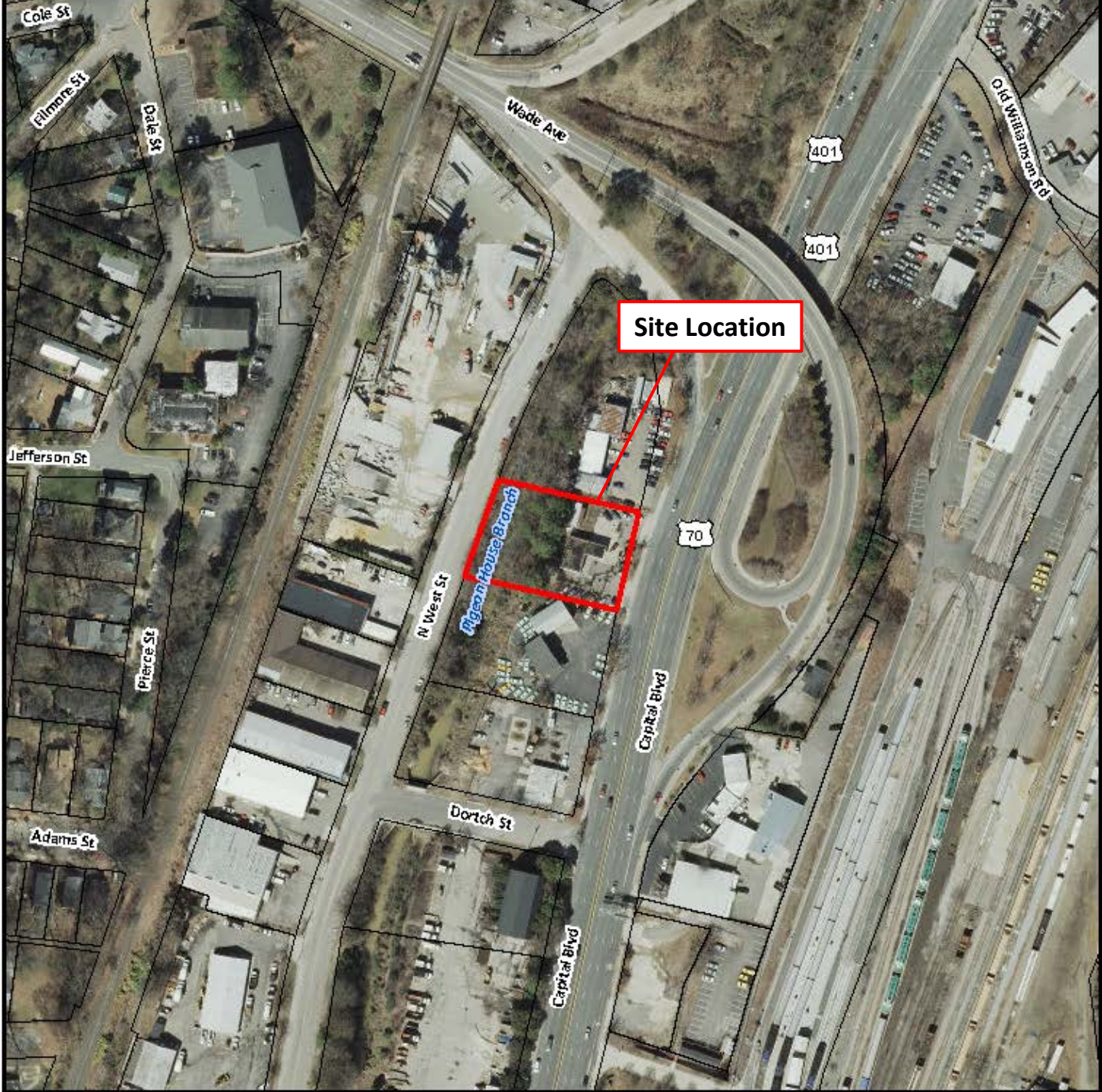
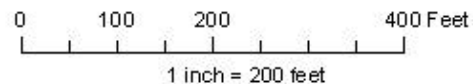


Image Courtesy of Wake County iMaps



SITE VICINITY MAP

North

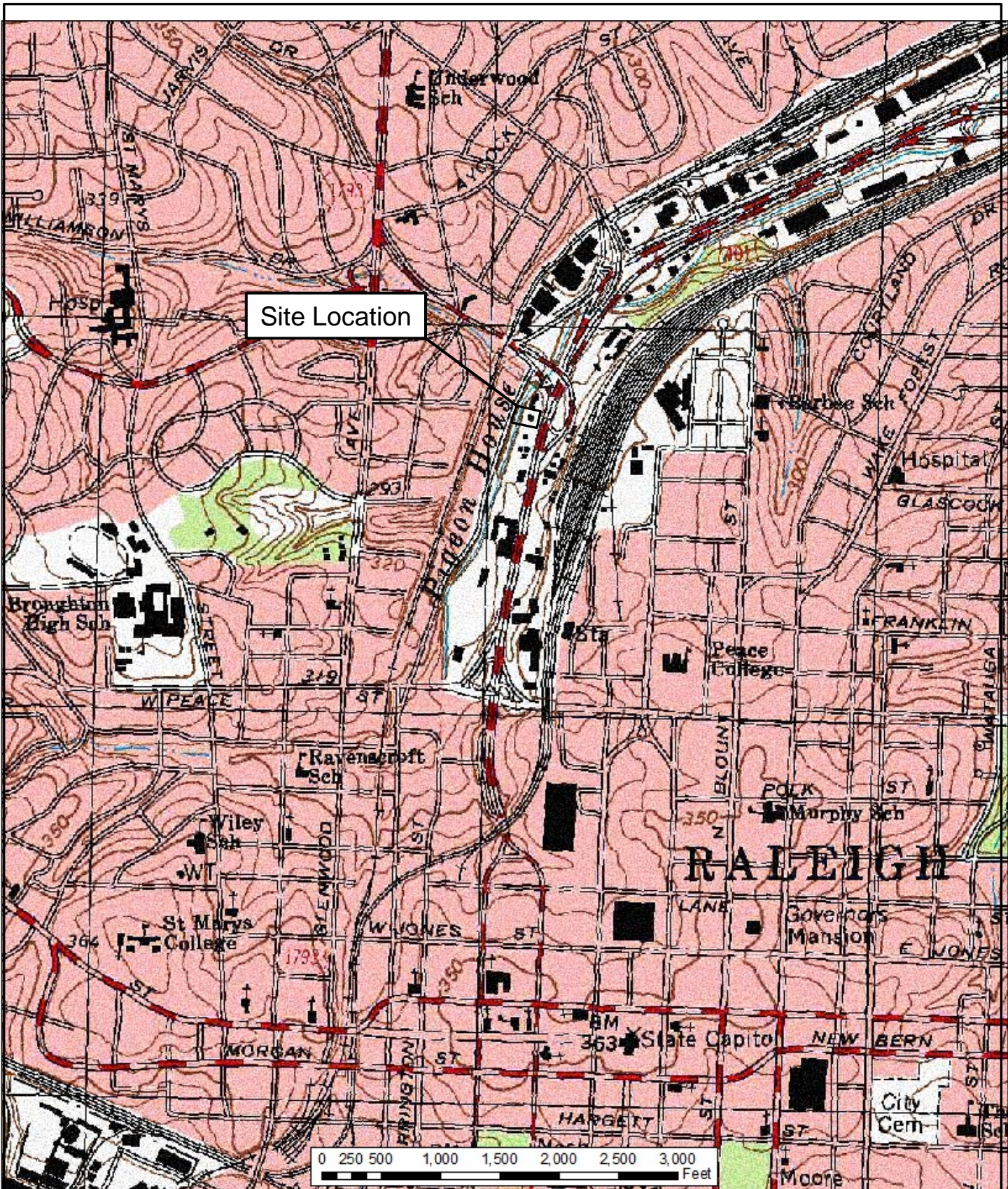


FROEHLING & ROBERTSON, INC.
 Engineering • Environmental • Geotechnical
 310 Hubert Street
 Raleigh, North Carolina 27603-2302 | USA
 T 919.828.3441 | F 919.828.5751
 www.fandr.com

CLIENT: NCDOT
 PROJECT: B-5121 & B-5317, Tumbapura 1, LLC Property, Parcel #27
 LOCATION: Raleigh, Wake County, North Carolina
 F&R PROJECT No.: 66T-0097
 DRAWN BY: B. Whitley
 DATE: August 2015

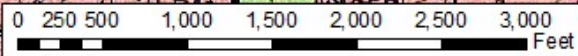
SCALE: 1" = 200'

FIGURE No.: **1**



Site Location

RALEIGH



TOPOGRAPHIC MAP – RALEIGH, NC

North

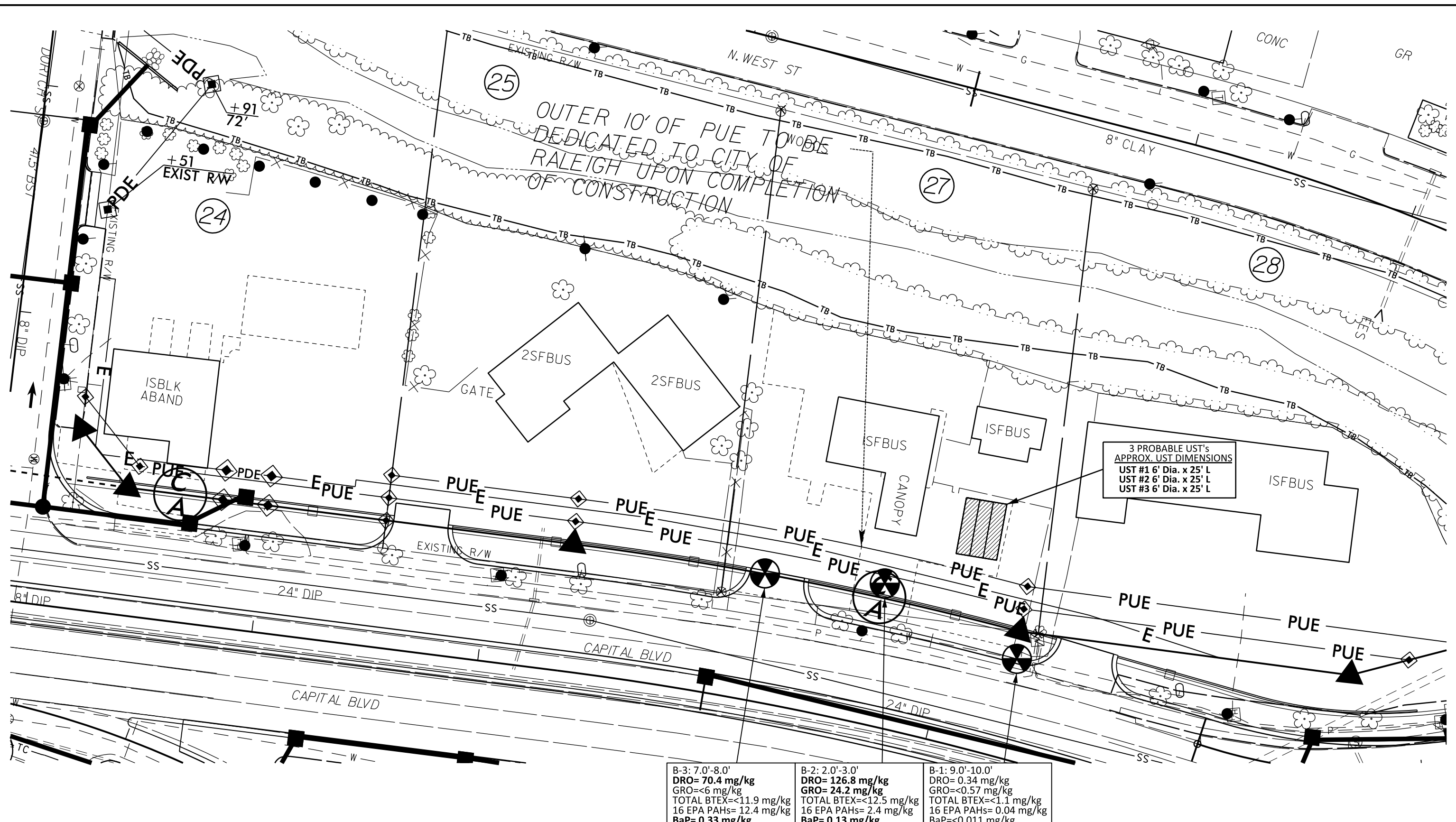
SINCE

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

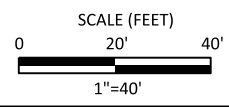
CLIENT: NCDOT
 PROJECT: B-5121 & B-5317, Tumbapura 1, LLC Property, Parcel #27
 LOCATION: Raleigh, Wake County, North Carolina
 F&R PROJECT No.: 66T-0097
 DRAWN BY: B. Whitley
 DATE: August 2015

FIGURE
 No.: **2**

SCALE: As Shown



B-3: 7.0'-8.0' DRO= 70.4 mg/kg GRO=<6 mg/kg TOTAL BTEX=<11.9 mg/kg 16 EPA PAHs= 12.4 mg/kg BaP= 0.33 mg/kg	B-2: 2.0'-3.0' DRO= 126.8 mg/kg GRO= 24.2 mg/kg TOTAL BTEX=<12.5 mg/kg 16 EPA PAHs= 2.4 mg/kg BaP= 0.13 mg/kg	B-1: 9.0'-10.0' DRO= 0.34 mg/kg GRO=<0.57 mg/kg TOTAL BTEX=<1.1 mg/kg 16 EPA PAHs= 0.04 mg/kg BaP=<0.011 mg/kg
---	--	---



NAD 83/NSRS 2007

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

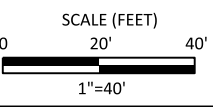
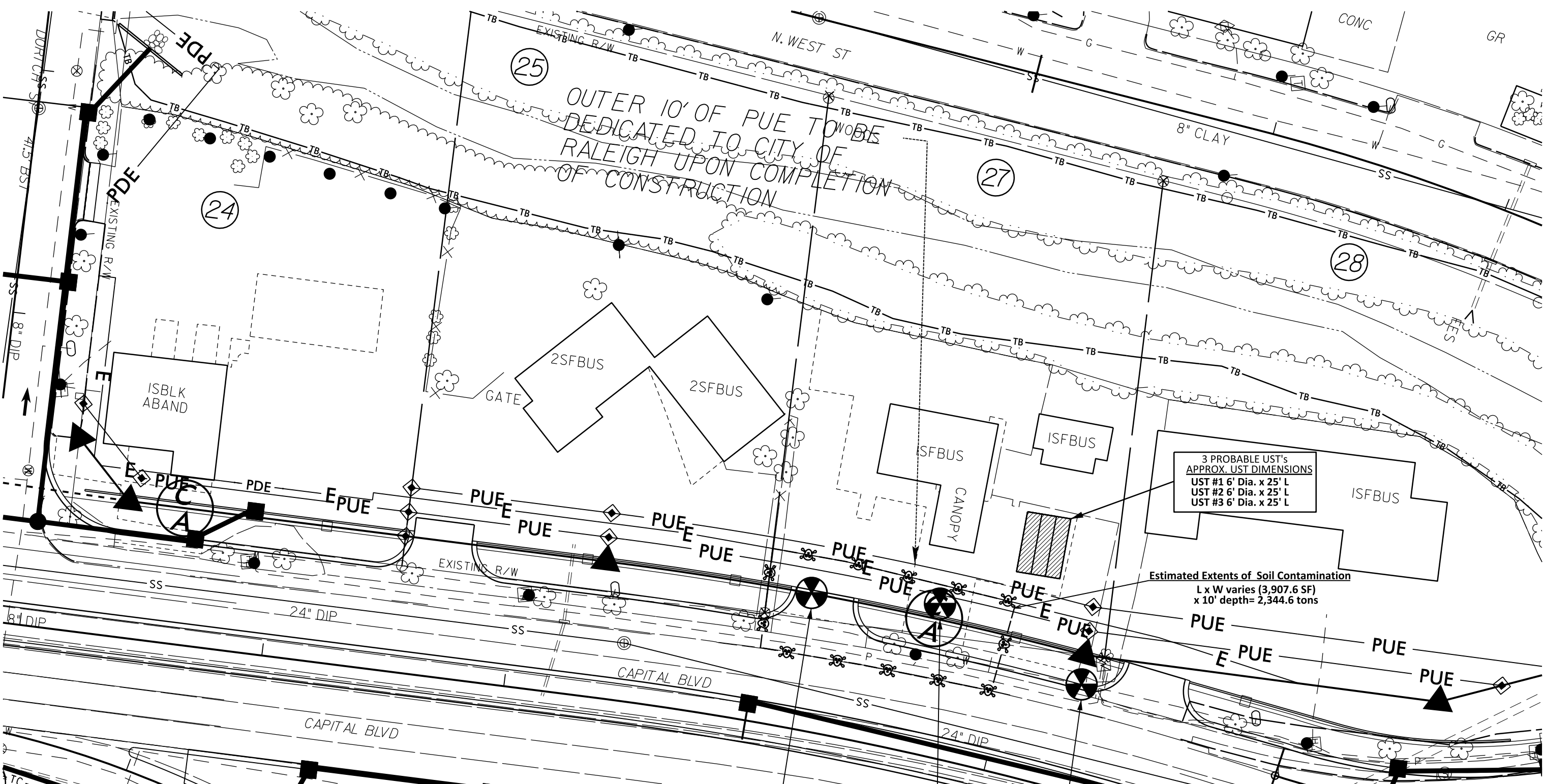
Samples Shown in Bold Exceed the NCDENR Action Level as Outlined in the NCDENR, DWM, UST Section Guideline

LABORATORY RESULTS & BORING LOCATION PLAN

CLIENT: NCDOT
 PROJECT: B-5121/B-5317 Tumbapura 1, LLC (Parcel #27)
 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"=40'

FIGURE No.: **3**





NAD 83/NSRS 2007

B-3: 7.0'-8.0' DRO= 70.4 mg/kg GRO=<6 mg/kg TOTAL BTEX=<11.9 mg/kg 16 EPA PAHs= 12.4 mg/kg BaP= 0.33 mg/kg	B-2: 2.0'-3.0' DRO= 126.8 mg/kg GRO= 24.2 mg/kg TOTAL BTEX=<12.5 mg/kg 16 EPA PAHs= 2.4 mg/kg BaP= 0.13 mg/kg	B-1: 9.0'-10.0' DRO= 0.34 mg/kg GRO=<0.57 mg/kg TOTAL BTEX=<1.1 mg/kg 16 EPA PAHs= 0.04 mg/kg BaP=<0.011 mg/kg
---	--	---

3 PROBABLE UST's
APPROX. UST DIMENSIONS
UST #1 6' Dia. x 25' L
UST #2 6' Dia. x 25' L
UST #3 6' Dia. x 25' L

Estimated Extents of Soil Contamination
L x W varies (3,907.6 SF)
x 10' depth= 2,344.6 tons

<p>SINCE 1881</p>  <p>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</p>	<p>LEGEND</p> <p> Approximate Geoprobe Boring Location</p> <p>Samples Shown in Bold Exceed the NCDENR Action Level as Outlined in the NCDENR, DWM, UST Section Guideline</p>	<p>ESTIMATED EXTENTS OF SOIL CONTAMINATION</p> <p>CLIENT: NCDOT PROJECT: B-5121/B-5317 Tumbapura 1, LLC (Parcel #27) LOCATION: Raleigh, Wake, County, North Carolina F&R PROJECT No.: 66T-0097</p>	
		<p>DRAWN BY: T. T. Walker DATE: August 2015</p>	<p>CHECKED BY: M. Sabodish, P.E. SCALE: 1"=40'</p>



APPENDIX II

GEOPHYSICAL REPORT PREPARED BY PYRAMID



PYRAMID ENVIRONMENTAL & ENGINEERING
(PROJECT 2015-176)

GEOPHYSICAL SURVEY

**METALLIC UST INVESTIGATION:
PARCEL 27 – TUMBAPURA 1, LLC
NCDOT PROJECT B-5121/B5317
(WBS 42263.1.1)**

915 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 27 – Tumbapura 1, LLC
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 27 Geophysical Survey Boundaries and Site Photographs
- Figure 2 – Parcel 27 EM61 Results Contour Map
- Figure 3 – Parcel 27 GPR Transect Locations & Select Images
- Figure 4 – Parcel 27 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 27, located at 915 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: Three fill ports were observed in the ground, outside of the NCDOT proposed ROW to the northwest of the survey area. This location was included in the GPR survey. The majority of the EM anomalies were directly attributed to cultural features at the ground surface. Suspected reinforced concrete was located at two areas on the east portion of the site. GPR scans verified the presence of reinforcement within the concrete on the east side of the property. The GPR survey recorded evidence of three probable metallic USTs in the area where the fill ports were observed to the northwest of the survey area. The three probable USTs were approximately 6 feet wide, 25 feet long at a depth of approximately 4 feet below the ground surface. The three probable USTs were located outside of the NCDOT proposed ROW. Collectively, the geophysical data recorded evidence of three probable metallic USTs at the property. These three USTs were outside of the proposed NCDOT ROW, directly northwest of the main survey area boundary.

INTRODUCTION

Pyramid Environmental conducted a geophysical investigation for Froehling & Robertson (F&R) at Parcel 27, located at 915 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 an automotive sales/repair shop building surrounded by concrete and an asphalt pavement. A significant portion of the center of the survey area was inaccessible due to the number of parked vehicles. A series of apparent fill ports were observed directly adjacent to the northwest boundary of the survey area, outside of the proposed ROW/easements. Documentation provided by the NCDOT indicated that the owner of the property stated that three USTs were located on the parcel. Pyramid included a GPR survey of this area regardless of its location outside of the proposed ROW due to its proximity to the NCDOT roadwork plans. 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 July 1, 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	Vehicles	
2	Probable UST Bed	☑
3	Group of vehicles	
4	Vehicle	
5	Reinforced Concrete	☑
6	Light pole	
7	Reinforced Concrete	☑
8	Utility/sign base	

The majority of the EM features detected by the survey were associated with visible cultural features at the ground surface, including vehicles, light poles, and utilities.

Suspected reinforced concrete was located at two areas on the east portion of the survey area (Anomalies 5 and 7) that was further investigated with the GPR. Additionally, an EM anomaly was identified on the west boundary of the survey area adjacent to the fill ports where a suspected UST bed was located (Anomaly #2). A GPR survey was conducted across this area, although it was outside of the NCDOT proposed ROW, in order to delineate the suspected UST bed.

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 7 formal GPR transects were performed at the property. Transects 1-6 were performed across accessible portions of the areas suspected to contain reinforced concrete. These scans verified the presence of reinforcement within the concrete at the property.

GPR transect 7, as well as additional reconnaissance scans, was performed across the area containing three apparent fill ports on the northwest side of the survey area. Transect 7 recorded three distinct hyperbolic reflectors that are characteristic of USTs. Reconnaissance scans also verified the approximate lengths of these tanks. The combined visual confirmation of fill ports and the GPR data resulted in a classification of three probable metallic USTs at this location. The three tanks were approximately 6 feet wide and 25 feet long at a depth of approximately 4 feet below the ground surface.

Collectively, the geophysical data recorded evidence of three probable metallic USTs at the property. These three USTs were outside of the proposed NCDOT ROW, directly northwest of the main survey area boundary.

SUMMARY & CONCLUSIONS

Our evaluation of the EM61 and GPR data collected at Parcel 27 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.
- Three fill ports were observed in the ground, outside of the NCDOT proposed ROW to the northwest of the survey area. This location was included in the GPR survey.
- The majority of the EM anomalies were directly attributed to cultural features at the ground surface.
- Suspected reinforced concrete was located at two areas on the east portion of the site.
- GPR scans verified the presence of reinforcement within the concrete on the east side of the property.
- The GPR survey recorded evidence of three probable metallic USTs in the area where the fill ports were observed to the northwest of the survey area.
- The three probable USTs were approximately 6 feet wide, 25 feet long at a depth of approximately 4 feet below the ground surface.
- The three probable USTs were located outside of the NCDOT proposed ROW.
- Collectively, the geophysical data recorded evidence of three probable metallic USTs at the property. These three USTs were outside of the proposed NCDOT ROW, directly northwest of the main survey area boundary.

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 Main Survey Area
(Facing Approximately Northwest)



View of Supplemental Survey Area
(Facing Approximately North)

TITLE	PARCEL 27 - 915 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 27 - EM61 Differential Results

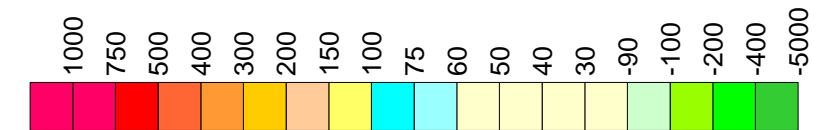



Locations of metallic anomalies detected by the EM61 survey. Numbers correspond to descriptive Table in report.

EVIDENCE OF THREE PROBABLE METALLIC USTs OBSERVED (OUTSIDE OF ROW)

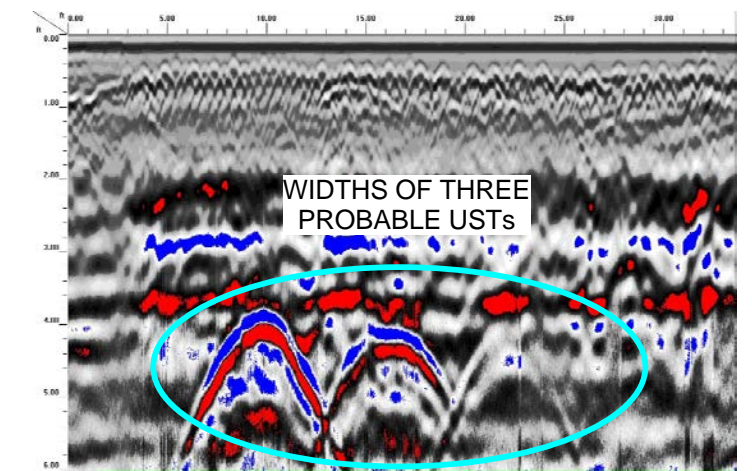
The contour plot shows the differential results of the EM61 instrument in millivolts (mV). The EM61 data were collected on June 29, 2015, using a Geonics EM61 instrument. Ground penetrating radar (GPR) data were acquired on July 1, 2015, using a GSSI UtilityScan DF unit with a dual frequency 300/800 MHz antenna.

EM61 Metal Detection Response (millivolts)

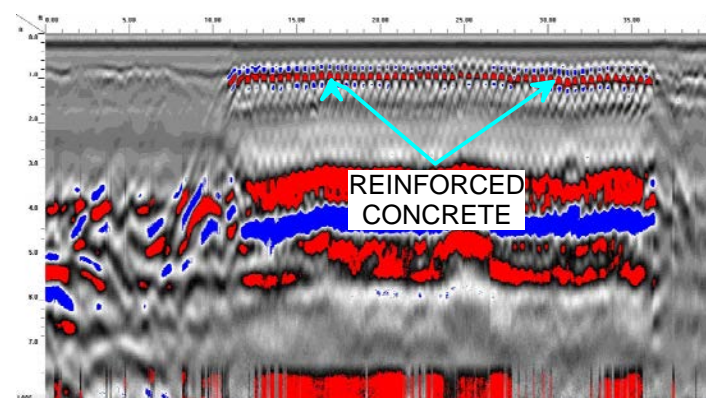


TITLE	PARCEL 27 - 915 CAPITAL BLVD. EM 61 RESULTS CONTOUR MAP	
PROJECT	METALLIC UST INVESTIGATION NCDOT PROJECT B-5121/B-5317 (42263.1.1)	
	 503 INDUSTRIAL AVENUE GREENSBORO, NC 27460 (336) 335-3174 (p) (336) 691-0648 (f) License # C1251 Eng. / License # C257 Geology	
DATE	7/6/2015	CLIENT FROEHLING & ROBERTSON
PYRAMID PROJECT #:	2015-176	FIGURE 2

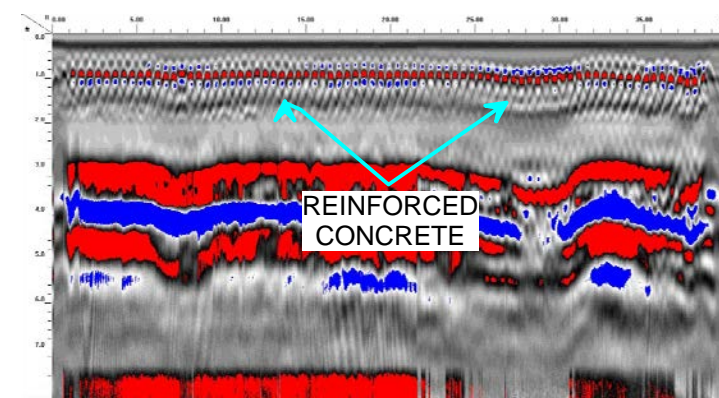
Parcel 27 - Approximate Locations of GPR Transects




GPR TRANSECT 7 (T7)



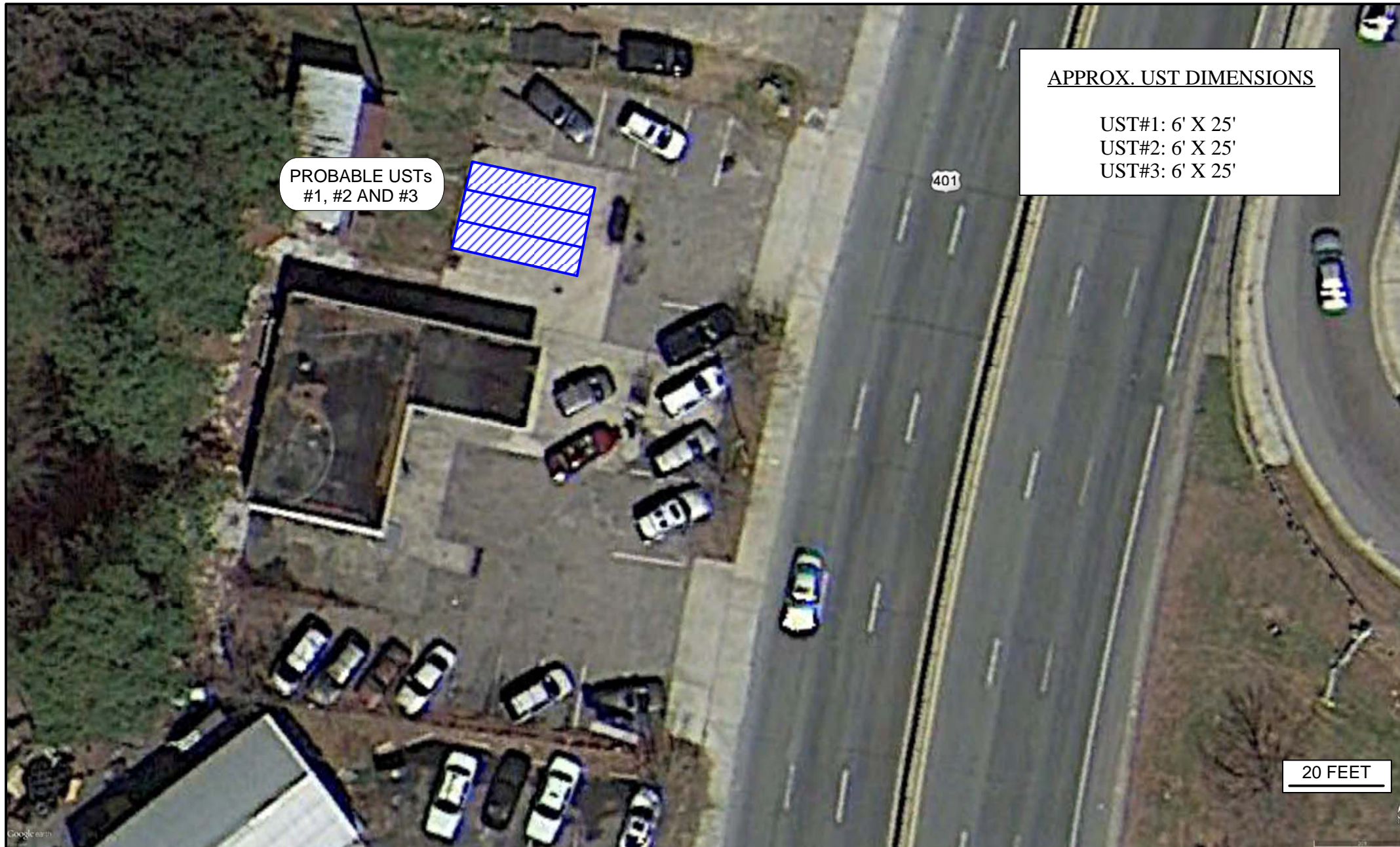
GPR TRANSECT 1 (T1)



GPR TRANSECT 5 (T5)

TITLE	PARCEL 27 - 915 CAPITAL BLVD. GPR TRANSECT LOCATIONS AND SELECT IMAGES	
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 ↑



PROBABLE USTs
#1, #2 AND #3

APPROX. UST DIMENSIONS


UST#1: 6' X 25'
UST#2: 6' X 25'
UST#3: 6' X 25'

20 FEET

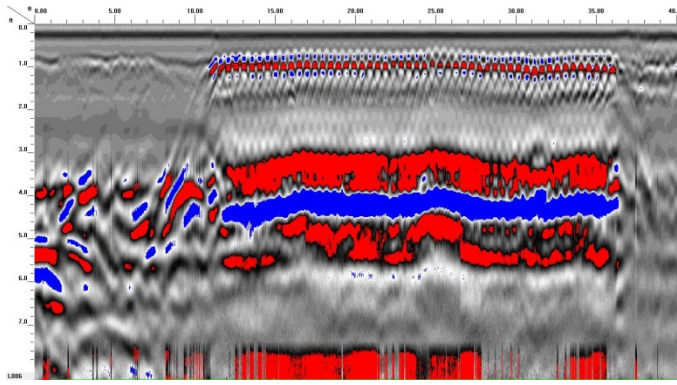
APPROXIMATE LOCATIONS OF PROBABLE METALLIC USTs.



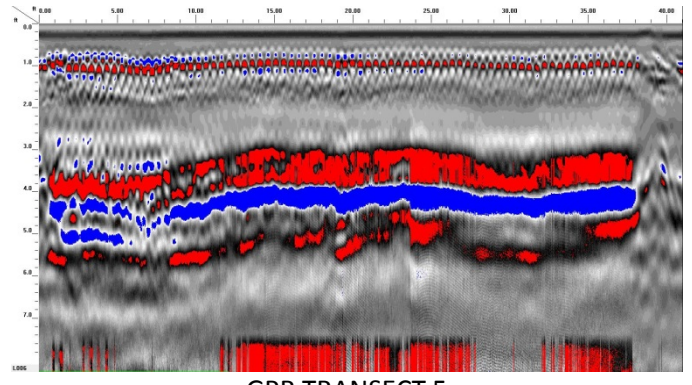
Approximate Locations of Probable USTs

TITLE	PARCEL 27 - 915 CAPITAL BLVD. APPROXIMATE LOCATIONS OF PROBABLE USTs	
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

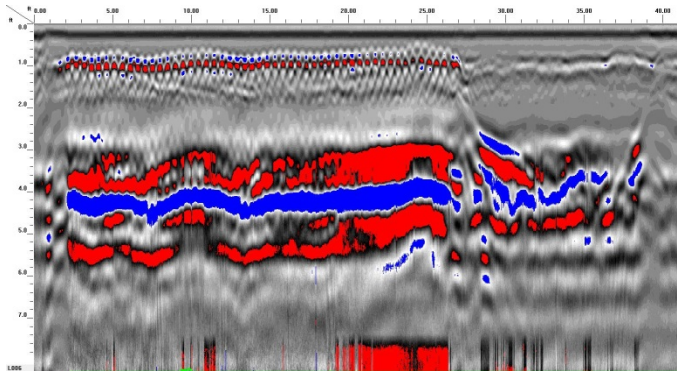
Appendix A – GPR Transects



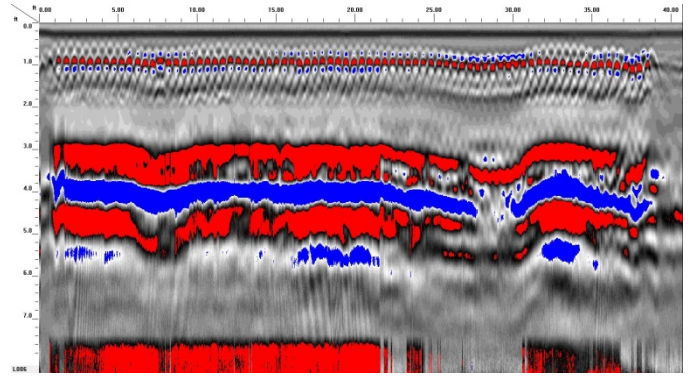
GPR TRANSECT 1



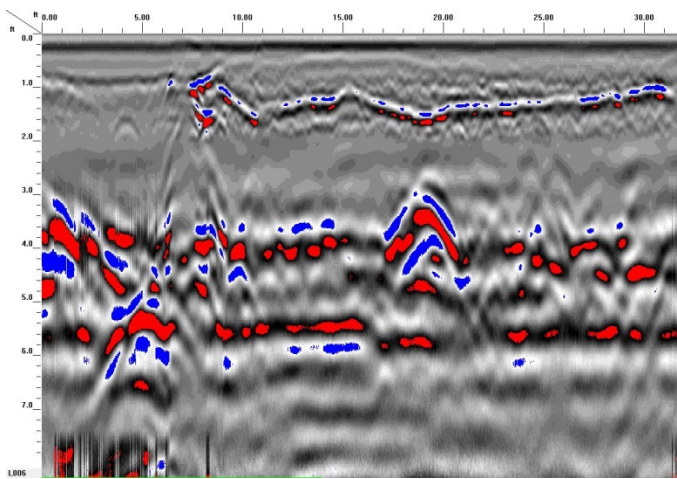
GPR TRANSECT 5



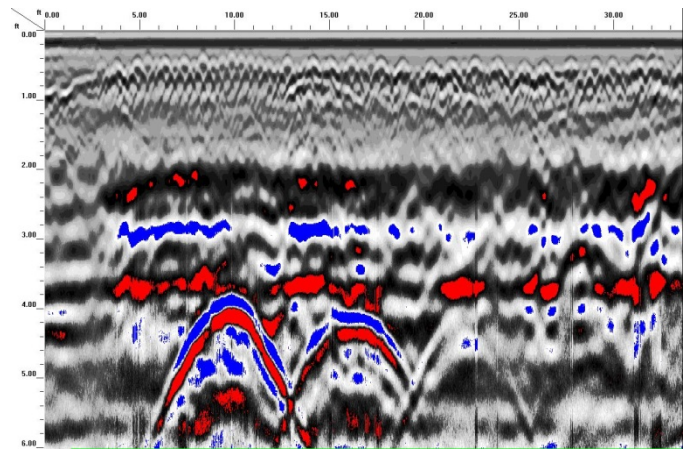
GPR TRANSECT 2



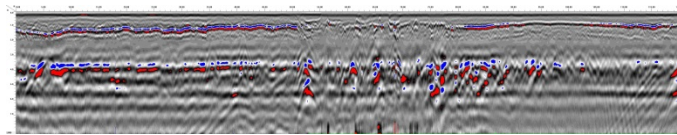
GPR TRANSECT 6



GPR TRANSECT 3



GPR TRANSECT 7



GPR TRANSECT 4



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-5121/5317 Tumbapura 1, LLC(Parcel #27) **Boring Location:** See Plan

Date Drilled: 7/29/15

City/State: Raleigh, NC

Driller: Regional Probing Services

Elevation	Depth	Description of Materials (Classification)	*Sample Depth (feet)	PID (ppm)	Remarks
	0.3	Concrete			Petroleum Odors not Observed in Boring
		VOID			
	1.5	Moist, Red-Brown, Sandy Silty CLAY with Mica (CL)	1.5	0.5	
			3.0	0.5	
			4.0	0.3	
			5.0	0.3	
			6.0	0.4	
			7.0	0.4	
			8.0	0.5	
			9.0	1.0*	
	10.0	Geoprobe Boring Terminated at 10 feet.	10.0		

GEOPROBE_LOG_B5121_GEOENV_GEOPROBEBORELOGS_PARCEL27.GPJ_F&R.GDT_8/18/15

*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-5121/5317 Tumbapura 1, LLC(Parcel #27) **Boring Location:** See Plan

Date Drilled: 7/29/15

City/State: Raleigh, NC

Driller: Regional Probing Services

Elevation	Depth	Description of Materials (Classification)	*Sample Depth (feet)	PID (ppm)	Remarks
	0.2	Concrete	0.0	0.4	
		Moist, Red-Orange, Sandy Silty CLAY with Mica (CL)	1.0	2.7	
	2.0	Moist to Wet, Brown, Sandy Silty CLAY (CL)	2.0	81.5*	*Sample Submitted for Laboratory Analysis for TPH, DRO/GRO, Total BTEX, 16 PAHs, and BaP Petroleum Odor Observed from 2'-10'
			3.0	92.4	
		Moist to Wet, Brown, Sandy Silty CLAY with Mica (CL)	4.0	64.7	
			5.0	51.7	
		Moist to Wet, Brown, Sandy Silty CLAY with Mica (CL) and Moist, Gray, Medium Sand with Organics (SP)	6.0	24.2	
	7.0	Moist, Red-Tan, Sandy Silty CLAY (CL)	7.0	24.7	
	8.0	Wet, Brown, Sandy Silty CLAY (CL)	8.0	17.3	
	9.0	Wet, Brown, Sandy Silty CLAY with Mica (CL)	9.0	28.8	
	10.0	Geoprobe Boring Terminated at 10 feet.	10.0		

GEOPROBE_LOG_B5121_GEOENV_GEOPROBEBORELOGS_PARCEL27.GPJ_F&R.GDT_8/18/15

*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-5121/5317 Tumbapura 1, LLC(Parcel #27) **Boring Location:** See Plan

Date Drilled: 7/29/15

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-Red, Sandy Silty CLAY with Mica (CL)			
	1.0	Moist, Red-Brown, Sandy Silty CLAY (CL)	1.0	0.5	
			2.0	0.5	
			3.0	0.8	
	4.0	Moist, Tan-Brown, Silty Sandy CLAY with Mica (CL)	4.0	0.7	
	5.0	Moist, Red-Brown, Silty Sandy CLAY with Mica (CL)	5.0	0.8	
	6.0	Moist, Brown, Sandy CLAY (CL)	6.0	0.8	
			7.0	0.9*	*Sample Submitted for Laboratory Analysis for TPH, DRO/GRO, Total BTEX, 16 PAHs, and BaP
	8.0	Moist to Wet, Red-Brown, Silty CLAY with Mica (CL)	8.0	0.5	
	9.0	Moist to Wet, Red-Brown, Silty Sandy CLAY with Mica (CL)	9.0	0.4	
	10.0	Geoprobe Boring Terminated at 10 feet.	10.0		

GEOPROBE_LOG_B5121_GEOENV_GEOPROBEBORELOGS_PARCEL27.GPJ_F&R.GDT_8/18/15

*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

B-1



Photo #1: A view of Boring B-1, facing south from the northern property boundary.



B-2

Photo #2: A view of Boring B-2 and the former pump island footprint, facing north.

B-3



Photo #3: Boring location B-3, facing west.



Photo #4: A view of the UST bed identified during the GPR survey, facing west.



APPENDIX V

LABORATORY ANALYTICAL RESULTS

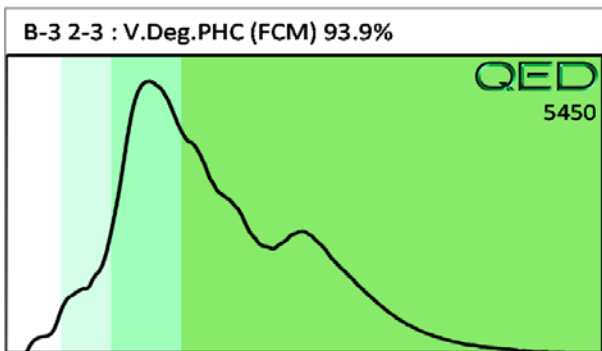
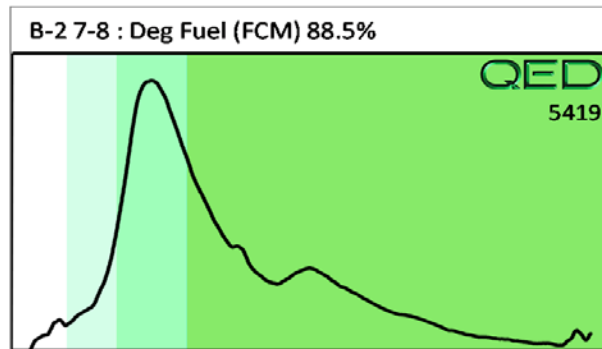
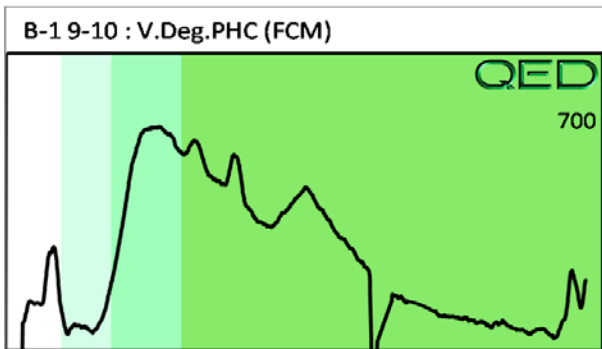


Hydrocarbon Analysis Results

Client: F&R Address:	Samples taken Samples extracted Samples analysed	Wednesday, July 29, 2015 Wednesday, July 29, 2015 Monday, August 03, 2015
Contact: Ben Whitley Project: NCDOT B-5121/B-5317	Operator	King

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 9-10	22.6	<1.1	<0.57	0.34	0.34	0.34	0.04	<0.011	0	69.1	30.9	V.Deg.PHC (FCM)
s	B-2 2-3	250.4	<12.5	24.2	126.8	151	64.1	2.4	0.13	26.5	67.8	5.7	Deg Fuel (FCM) 88.5%
s	B-3 7-8	238.0	<11.9	<6	70.4	70.4	64.4	12.4	0.33	6.3	84.7	8.9	V.Deg.PHC (FCM) 93.9%
Initial Calibrator QC check			OK			Final FCM QC Check			OK			107.1%	

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 23 B-4	6-7	7-29-15	1620	BKW	13.2	20
Parcel 27 B-1	9-10	↓	955		11.5	
B-2	7-8		1015		13.5	
B-3	2-3		1035		14.2	
Parcel 25 B-1	7-8	↓	1110		12.7	
B-2	8-10		1120		9.8	
B-3	8-9		1150		12.8	
Parcel 24 B-1	7-8	↓	1255		12.7	
B-2	7-8		1315		11.0	
B-3	5-6		1350		13.0	
B-4	5-6		1415		12.6	
B-5	8-9		1445		12.2	
B-6	5-6		1500		11.6	
B-7	8-9		1530		13.3	
B-8	6-7		1540		11.9	

Client: FER

Contact: Ben Whitley

Phone: 919-630-5661

Email: bwhitley@fandr.com

Project Reference: NCDO# 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.

Relinquished by	<u>FER</u>	Date/Time	<u>7-31-15</u>	Accepted by	<u>UPS overnight</u>	Date/Time	<u>7-31-15</u>
Relinquished by		Date/Time		Accepted by	<u>[Signature]</u>	Date/Time	<u>8/1/15</u>
Relinquished by		Date/Time		Accepted by		Date/Time	

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

Hannah King
hannahk@grosllc.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.

* test results on separate spreadsheets for each parcel please

SINCE



1881

®