

December 21, 2016

Mr. Terry Fox, L.G.
North Carolina Department of Transportation
Geotechnical Engineering Unit
1589 Mail Service Center
Raleigh, North Carolina 27699-1589

Reference: **Preliminary Site Assessment
John Taylor Property (Parcel #198)
5201 Raeford Road
Fayetteville, Cumberland County, North Carolina
State Project: U-4405
WBS Element 39049.1.1
SIES Project No. 2016.0054.NDOT**

Dear Mr. Fox:

Solutions-IES, Inc., (SIES) has completed the Preliminary Site Assessment conducted at the above-referenced property. The work was performed in accordance with the Technical and Cost proposal dated September 26, 2016, and the North Carolina Department of Transportation's (NCDOT's) Notice to Proceed dated September 26, 2016. Activities associated with the assessment consisted of conducting a geophysical investigation, collecting soil samples for analysis, and reviewing applicable North Carolina Department of Environmental Quality (NCDEQ) records. The purpose of this report is to document the field activities, present the laboratory analyses, and provide recommendations regarding the property.

Location and Description

The John Taylor Property (Parcel #198) is located at 5201 Raeford Road in Fayetteville, Cumberland County, North Carolina. The property is situated on the south side of Raeford Road in the southwest quadrant of the intersection of Raeford Road and Sandalwood Drive (**Figure 1**). The property consists of an active gas station and convenience store (Circle K 2723034). Based on a review of on-line UST registry information, three gasoline underground storage tanks (USTs) were reportedly installed on the property in 1987.

An asphalt parking area surrounds the building and extends almost to the property boundaries. A detached canopy with three dispensers is located in front of the building. The canopy is on a concrete pad that extends to the west of the canopy where the USTs are located (**Figure 2**). The proposed easement has not been marked at the site on the date of the field work, but NCDOT plan sheets show that the easement will affect the canopy.

The NCDOT requested a Preliminary Site Assessment for the right-of-way and proposed easement because of the site use as a gas station. The scope of work as defined in the Request for Technical and Cost Proposal was to evaluate the site with respect to the presence of known and unknown USTs and assess where contamination exists on the right-of-way/proposed easement. An estimate of the quantity of impacted soil was to be provided, should impacted soils be encountered.

SIES reviewed the on-line NCDEQ Incident Management database and no incident number was assigned to the site. SIES also examined the UST registration database to obtain UST ownership information. According to the database, the USTs on the property are operated under Facility Number 00-0-0000028887. The active USTs include three gasoline tanks, the sizes of which are not indicated. The owner and operator of the tanks are listed as follows:

Owner
Circle K Stores Inc.
2440 Whitehall Park Drive, Ste 800
Charlotte, NC 28273

Operator
Circle K 2723034
5201 Raeford Road
Fayetteville, NC 28304

Geophysical Survey

Prior to SIES' mobilization to the site, Pyramid Environmental & Engineering of Greensboro, NC (Pyramid) conducted a geophysical survey to confirm the presence of the known USTs and determine if additional USTs were present in the area of the right-of-way/proposed easement. The geophysical survey consisted of an electromagnetic (EM) survey using a Geonics EM61 time-domain electromagnetic induction meter to locate buried metallic objects, and specifically looking for USTs.

A survey grid was laid out along the right-of-way/proposed easement with the X-axis oriented approximately parallel to Raeford Road and the Y-axis oriented approximately perpendicular to Raeford Road. The grid was positioned to cover the entire right-of-way/proposed easement.

The survey lines were spaced five feet apart and magnetic data were collected continuously along each survey line with a data logger. After collection, the EM data were reviewed in the field with graphical computer software. Several anomalies were detected and all were directly attributed to visible cultural features and known utilities. For these reasons, a ground penetrating radar survey was not required to verify any unknown EM anomalies.

Access was available to all areas of the study area and several EM anomalies were detected with the geophysical survey. No unknown metallic USTs were detected within the geophysical survey area. Pyramid's detailed report of findings and interpretations is presented in **Attachment A**.

Site Assessment Activities

On October 25, 2016, SIES mobilized to the site to conduct a Geoprobe® direct-push investigation to evaluate subsurface soil conditions on the property. Eight direct-push holes (198-SB-1 through 198-SB-8) were drilled in the right-of-way/proposed easement (**Figure 2**). As directed by the NCDOT, the Geoprobe® borings were terminated at 10 feet below ground surface (ft bgs) unless the location was in the vicinity of a known or suspected UST, which resulted in a boring terminated at 12 ft bgs. Borings 198-SB-1, 198-SB-2, and 198-SB-3 were advanced to 12 ft bgs and borings 198-SB-4 through 198-SB-8 were advanced to ten ft bgs. The soil boring logs are included as **Attachment B**. Borings 198-SB-1 through 198-SB-3 were located to evaluate the subsurface conditions near the existing USTs. Borings 198-SB-5 and 198-SB-6 were placed to assess the conditions at the canopy and dispensers. Borings 198-SB-4, 198-SB-7, and 198-SB-8 were located to evaluate the subsurface along the proposed drainage structures within the right-of-way/proposed easement (see photos in **Attachment C**).

Continuous sampling using a Geoprobe® resulted in good recovery of soil samples from the direct-push holes. Soil samples were collected and contained in four-foot long acetate sleeves inside the direct-push Macro-Core® sampler. Each of the sleeves was divided into two-foot long sections for soil sample screening. Soil from each two-foot interval was placed in a resealable plastic bag and the bag was set aside for volatilization of organic compounds from the soil to the bag headspace. A photoionization detector (PID) probe was inserted into the bag and the reading was recorded.

If the PID concentrations in a boring were consistently low, one sample from the bottom interval was selected for analysis. If the PID concentrations were elevated, the sample from the interval with the highest field screening reading was selected for analyses. The PID results are summarized in **Table 1**.

The selected soil samples were submitted to an on-site mobile laboratory for analysis of total petroleum hydrocarbons (TPH) diesel range organics (DRO) and gasoline range organics (GRO) using ultraviolet fluorescence (UVF) methodology. Each boring was backfilled with bentonite and drill cuttings to the surface after completion.

The lithology encountered by the direct-push samples indicated the presence of two different lithologic units. One unit was present in borings 198-SB-3, 198-SB-5, and 198-SB-6, and described as a tab silty sand throughout the boring. The remaining borings encountered a mottled light brown and red silty clay to a depth of about four to nine ft bgs. Below this silty clay was a light brown soft clay. No groundwater or bedrock was noted in any of the borings. From the limited number of borings at the site, it is unclear as to whether the sand is lenticular and laterally discontinuous or a distinctly different stratigraphic unit.

According to the 1985 Geologic Map of North Carolina, the site is within of Coastal Plain Physiographic Province in North Carolina near the contact between the Cretaceous Black Creek and Middendorf Formations. The strata of the Black Creek Formation consist of gray to black clay, thin lenses of fine-grained sand and thick lenses of cross-bedded sand. The lithology may also include glauconite and fossils. In comparison, the Middendorf Formation consists of sand, sandstone, and mudstone that are laterally discontinuous. The soils observed at the site are consistent with the Middendorf Formation as the parent material.

Analytical Results

The laboratory data are summarized in **Table 1** and the complete report is presented in **Attachment D**. Eight soil samples, one from each soil bring, were submitted for analysis. Of these samples, three contained detectable GRO compounds and seven contained detectable DRO compounds. Detected GRO concentrations ranged from 0.40 to 2.0 milligrams per kilogram (mg/kg). Detected DRO concentrations ranged from 0.31 to 18.6 mg/kg. The action levels are 50 mg/kg for GRO and 100 mg/kg for DRO¹. None of the soil samples analyzed for this site contained DRO or GRO concentrations above their respective action levels.

Conclusions and Recommendations

A Preliminary Site Assessment was conducted to evaluate the John Taylor Property (Parcel #198) located at 5201 Raeford Road in Fayetteville, Cumberland County, North Carolina. A geophysical survey conducted at the site indicated that no unknown metallic USTs were present within the geophysical survey area of the site. Eight soil borings were advanced to evaluate the subsurface soil conditions along the right-of-way/proposed easement, from which eight soil samples were collected. Three of the eight soil samples analyzed had a GRO concentration above the detection limit, and seven of the eight soil samples had DRO concentrations were present above the detection limit. However, none of the DRO or GRO concentrations were above their respective action limits.

None of the soil samples had contaminant concentrations above applicable action levels (**Table 1**). Therefore, no estimate of the volume of soil requiring possible remediation was made.

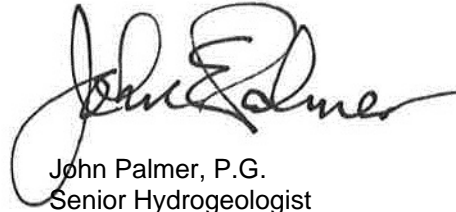
¹ NCDEQ, *Guidelines for North Carolina Action Limits for Total Petroleum Hydrocarbons (TPH)*, July 26, 2016,

SIES appreciates the opportunity to work with the NCDOT on this project. Because compounds were detected above the method detection limit in the soil samples, SIES recommends that a copy of this report be submitted to the Division of Waste Management, UST Section, in the Fayetteville Regional Office. If you have any questions, please contact us at (919) 873-1060.

Sincerely,



Michael W. Branson, P.G.
Project Manager



John Palmer, P.G.
Senior Hydrogeologist

Attachments



TABLE 1
SOIL FIELD SCREENING AND ANALYTICAL RESULTS
TAYLOR PROPERTY (PARCEL #198)
FAYETTEVILLE, CUMBERLAND COUNTY, NORTH CAROLINA
STATE PROJECT: U-4405
WBS ELEMENT 39049.1.1
SIES PROJECT NO. 2016.0054.NDOT

SAMPLE ID	DEPTH (ft)	PID READING (ppm)	SAMPLE ID	ANALYTICAL RESULTS (mg/kg)	
				UVF GRO	UVF DRO
Action Level (mg/kg)				50	100
198-SB-1	0 - 2	0.7			
	2 - 4	19.3			
	4 - 6	25.8			
	6 - 8	31.7	198-SB-1-6-8	<0.7	18.6
	8 - 10	0.9			
	10 - 12	8.2			
198-SB-2	0 - 2	0.0			
	2 - 4	0.3			
	4 - 6	28.7	198-SB-2-4-6	<0.65	1.3
	6 - 8	10.1			
	8 - 10	3.8			
	10 - 12	5.1			
198-SB-3	0 - 2	5.1			
	2 - 4	14.1			
	4 - 6	8.2			
	6 - 8	1.7			
	8 - 10	1.7			
	10 - 12	20.8	198-SB-3-10-12	<0.57	<0.57
198-SB-4	0 - 2	0.0			
	2 - 4	0.1			
	4 - 6	0.0			
	6 - 8	0.2			
	8 - 10	0.0	198-SB-4-8-10	0.46	0.33
198-SB-5	0 - 2	0.0			
	2 - 4	0.1			
	4 - 6	0.0			
	6 - 8	0.3			
	8 - 10	56.4	198-SB-5-8-10	0.40	0.31
198-SB-6	0 - 2	0.0			
	2 - 4	0.1			
	4 - 6	0.3			
	6 - 8	0.3			
	8 - 10	20.3	198-SB-6-8-10	<0.58	0.89
198-SB-7	0 - 2	0.1			
	2 - 4	0.0			
	4 - 6	0.1			
	6 - 8	0.0			
	8 - 10	0.2	198-SB-7-8-10	<0.15	0.66
198-SB-8	0 - 2	0.1			
	2 - 4	0.0			
	4 - 6	0.1			
	6 - 8	0.2			
	8 - 10	0.1	198-SB-8-8-10	2.0	4.2

- 1) ft - feet
- 2) ppm - parts per million
- 3) PID - photoionization ionization detector.
- 4) mg/kg - milligrams per kilogram
- 5) UVF DRO - Diesel range organics by UVF.
- 6) UVF GRO - Gasoline range organics by UVF.
- 7) Action level based upon NCDEQ memo *Guidelines for North Carolina Action Limits for Total Petroleum Hydrocarbons* - July 29, 2016.
- 8) Soil samples were collected on October 25, 2016.
- 9) **Bold** values are above the detection level.

FIGURES

PROJECT NUMBER
2016.0054.NDOT

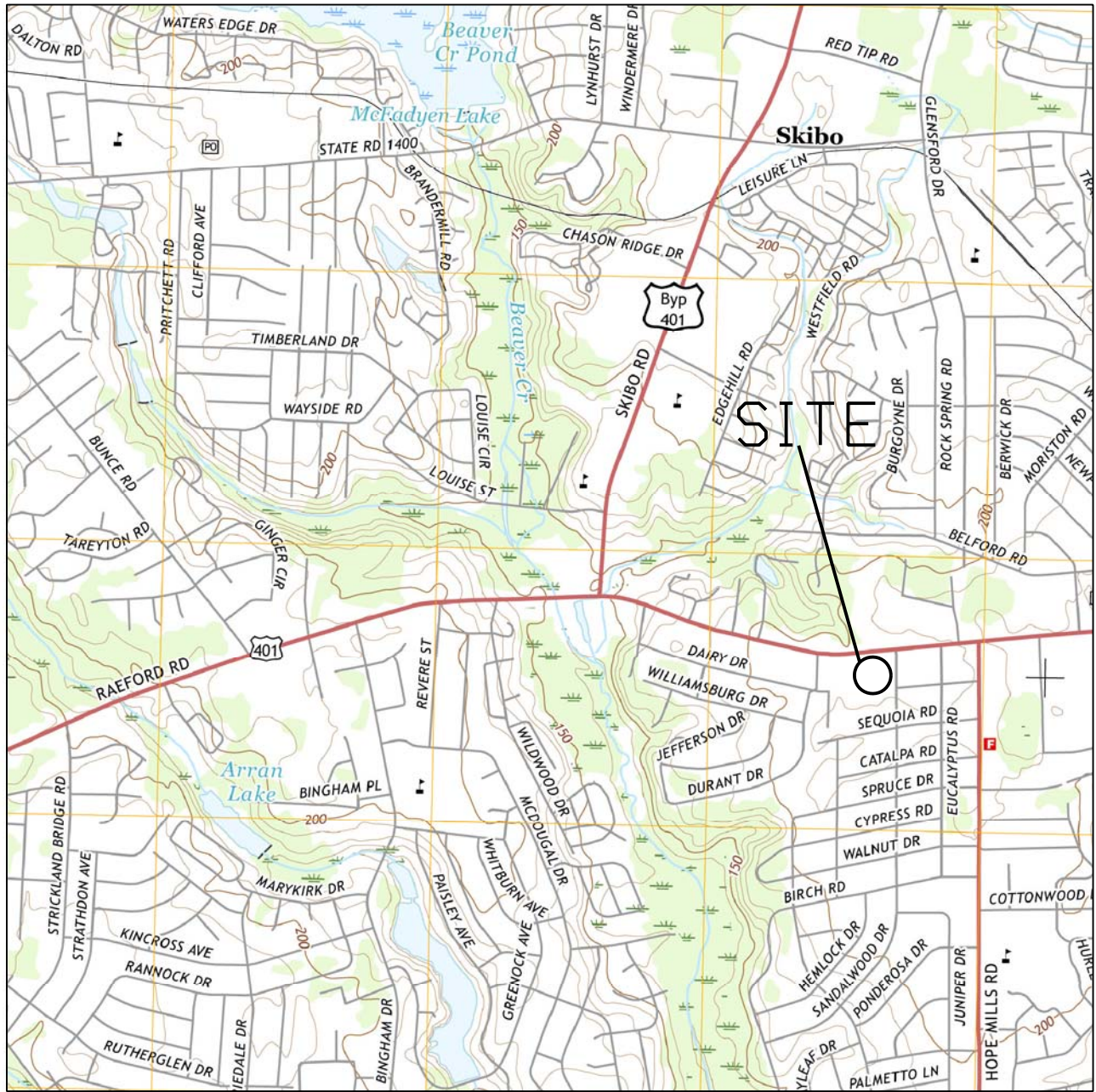
CHECKED BY
JEP

PROJECT MANAGER
MWB

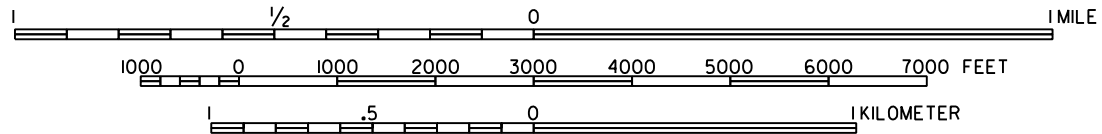
DATE
NOVEMBER 2016

FAYETTEVILLE PSAS

FILE



SCALE 1:24,000



SOURCE: U.S. GEOLOGICAL SURVEY 7.5 MIN QUADRANGLE: FAYETTEVILLE, NC (2016)



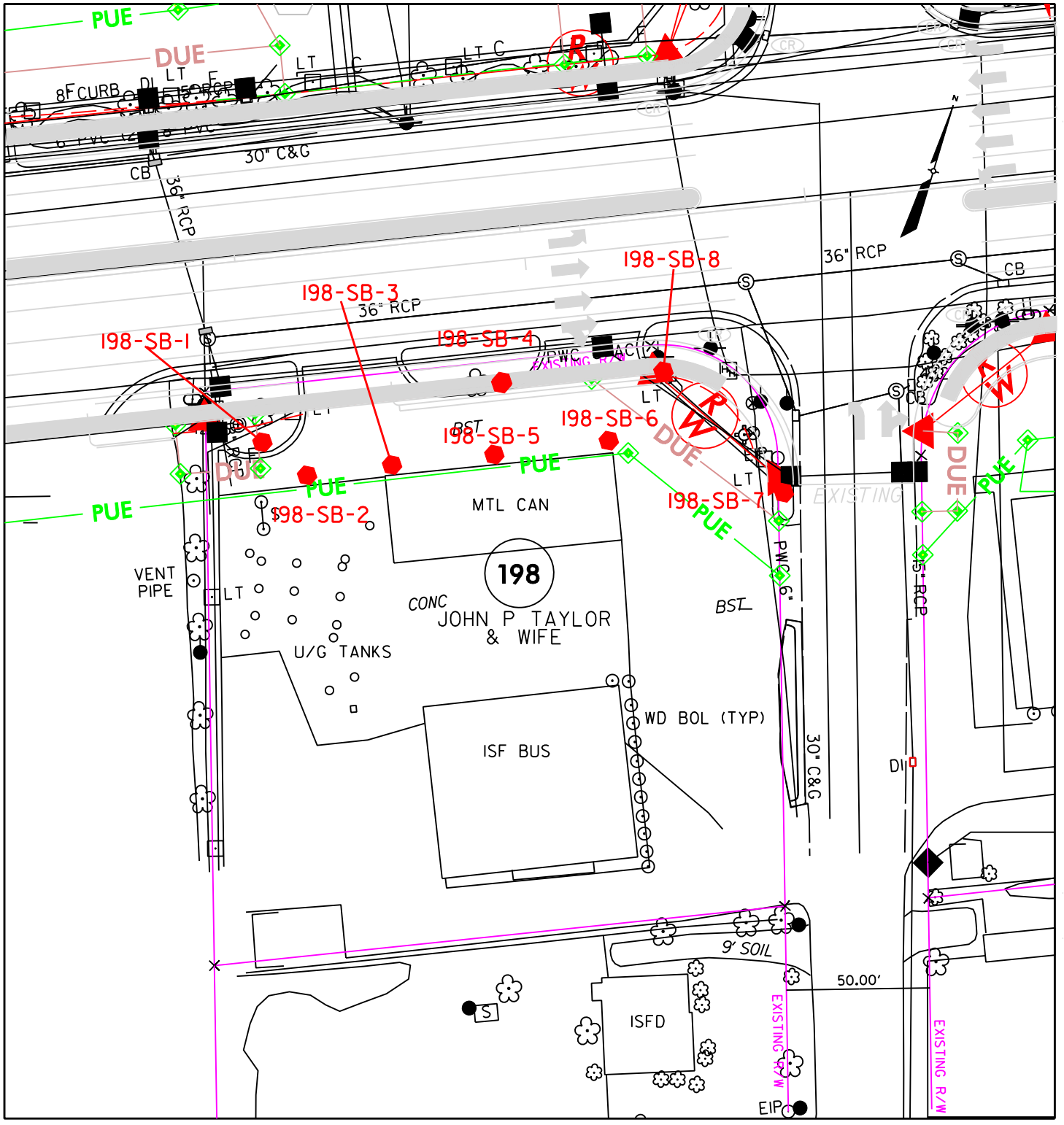
1101 NOWELL ROAD
 RALEIGH, NORTH CAROLINA 27607
 TEL: (919) 873-1060 FAX: (919) 873-1074

VICINITY MAP

TAYLOR PROPERTY (PARCEL #198)
 FAYETTEVILLE, CUMBERLAND COUNTY NORTH CAROLINA

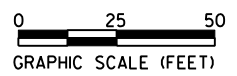
FIGURE

1



LEGEND

198-SB-1
 SOIL SAMPLE LOCATION AND IDENTIFICATION



ATTACHMENT A



PYRAMID GEOPHYSICAL SERVICES
(PROJECT 2016-265)


GEOPHYSICAL SURVEY


METALLIC UST INVESTIGATION: PARCEL 198 – JOHN TAYLOR NCDOT PROJECT U-4405

5201 RAEFORD RD., FAYETTEVILLE, CUMBERLAND COUNTY, NC

NOVEMBER 4, 2016

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C257: GEOLOGY C1251: ENGINEERING

GEOPHYSICAL INVESTIGATION REPORT
Parcel 198 – 5201 Raeford Road
Fayetteville, Cumberland County, North Carolina

Table of Contents

Executive Summary1
Introduction.....2
Field Methodology.....2
Discussion of Results.....3
Summary and Conclusions4
Limitations5

Figures

- Figure 1 – Parcel 198 Geophysical Survey Boundaries and Site Photographs
Figure 2 – Parcel 198 EM61 Results Contour Map

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 Solutions, IES (Solutions) at Parcel 198, located at 5201 Raeford Road, Fayetteville, NC. The survey was part of a North Carolina Department of Transportation (NCDOT) Right-of-Way (ROW) investigation (NCDOT Project U-4405). Solutions directed Pyramid as to the geophysical survey boundaries at the project site, which were designed to extend from the existing edge of pavement to the proposed ROW lines and/or easement lines within the property, whichever distance was greater. Conducted from October 12-17, 2016, the geophysical investigation was performed to determine if unknown, metallic underground storage tanks (USTs) were present beneath the survey area.

Geophysical Results: All EM anomalies were directly attributed to visible cultural features and known utilities. A GPR survey was not required. Collectively, the geophysical data did not show any evidence of unknown metallic USTs at Parcel 198.

INTRODUCTION

Pyramid Environmental conducted a geophysical investigation for Solutions, IES (Solutions) at Parcel 198, located at 5201 Raeford Road, Fayetteville, NC. The survey was part of a North Carolina Department of Transportation (NCDOT) Right-of-Way (ROW) investigation (NCDOT Project U-4405). Solutions directed Pyramid as to the geophysical survey boundaries at the project site, which were designed to extend from the existing edge of pavement to the proposed ROW lines and/or easement lines within the property, whichever distance was greater. Conducted from October 12-17, 2016, the geophysical investigation was performed to determine if unknown, metallic underground storage tanks (USTs) were present beneath the survey area.

The site included an active service station with a pump island and canopy surrounded by asphalt parking areas and grass medians. Aerial photographs showing the survey area boundaries and ground-level photographs are shown in **Figure 1**.

FIELD METHODOLOGY

The geophysical investigation consisted of an electromagnetic (EM) induction-metal detection survey. 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 is 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 not required at this property due to all EM anomalies being directly attributed to visible cultural features at the ground surface or known utilities (see Discussion of Results below).

Pyramid’s classifications of USTs for the purposes of this report are based directly on the geophysical UST ratings provided 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 in 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	Storm Drains	
2	Manhole	
3	Telephone Pole and Utility Box	
4	Storm Drain	
5	Water Meter	
6	Light Pole	
7	Guy Wire	
8	Fire Hydrant	
9	Vehicle	
10	Sign	

All of the EM anomalies recorded by the survey are directly attributed to visible cultural features such as storm drains, a manhole, utility poles, known utilities, a water meter, guy wires, a fire hydrant, vehicles and signs. For this reason, a GPR survey was not required to verify any unknown anomalies.

Collectively, the geophysical data did not show any evidence of unknown metallic USTs at Parcel 198.

SUMMARY & CONCLUSIONS

Pyramid’s evaluation of the EM61 data collected at Parcel 198 in Fayetteville, Cumberland County, North Carolina, provides the following summary and conclusions:

- The EM61 survey provided reliable results for the detection of metallic USTs within the accessible portions of the geophysical survey area.
- All EM anomalies were directly attributed to visible cultural features and known utilities. A GPR survey was not required.

- Collectively, the geophysical data did not show any evidence of unknown metallic USTs at Parcel 198.

LIMITATIONS

Geophysical surveys have been performed and this report was prepared for Solutions, IES in accordance with generally accepted guidelines for EM61 surveys. It is generally recognized that the results of the EM61 surveys are non-unique and may not represent actual subsurface conditions. The EM61 results obtained for this project have not conclusively determined the definitive presence or absence of metallic USTs, but 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 AREA



View of Survey Area
(Facing Approximately East)



View of Northeast Survey Area
(Facing Approximately West)

TITLE		PARCEL 198 - GEOPHYSICAL SURVEY BOUNDARIES AND SITE PHOTOGRAPHS	
PROJECT		5201 RAEFORD ROAD FAYETTEVILLE, NORTH CAROLINA NCDOT PROJECT U-4405	
		503 INDUSTRIAL AVENUE GREENSBORO, NC 27460 (336) 335-3174 (p) (336) 691-0648 (f) License # C1251 Eng. / License # C257 Geology	
DATE	10/19/16	CLIENT	SOLUTIONS, IES
PYRAMID PROJECT #:	2016-265	FIGURE 1	



EM61 METAL DETECTION RESULTS




NUMBERS IN BLUE (x) CORRESPOND TO ANOMALY TABLE INCLUDED IN THE REPORT

NO EVIDENCE OF UNKNOWN METALLIC USTs OBSERVED

The contour plot shows the differential results of the EM61 instrument in millivolts (mV). The differential results focus on larger metallic objects such as USTs and drums. The EM61 data were collected on October 12, 2016, using a Geonics EM61 instrument. GPR verification data were not required due to all EM anomalies being directly attributed to visible cultural features.

EM61 Metal Detection Response (millivolts)



TITLE	PARCEL 198 - EM61 RESULTS CONTOUR MAP	
PROJECT	5201 RAEFORD ROAD FAYETTEVILLE, NORTH CAROLINA NCDOT PROJECT U-265	
	 503 INDUSTRIAL AVENUE GREENSBORO, NC 27460 (336) 335-3174 (p) (336) 691-0648 (f) License # C1251 Eng. / License # C257 Geology	
DATE	10/19/2016	CLIENT SOLUTIONS, IES
PYRAMID PROJECT #:	2016-265	FIGURE 2

ATTACHMENT B

BORING LOCATION: Parcel #198, Fayetteville, NC	PROJECT NUMBER: 2016.0054.NDOT
DRILLING CONTRACTOR: Regional Probing Services	DATE STARTED: 10/25/2016 DATE FINISHED: 10/25/2016
DRILLING METHOD: Direct Push BOREHOLE DIAMETER: 2.25"	TOTAL DEPTH (ft bgs): 12 ft bgs SCREEN INTERVAL (ft bgs): NA
DRILLING EQUIPMENT: Geoprobe 5410	NORTHING: NA EASTING: NA
SAMPLING METHOD: Macro Core	INITIAL DTW: NA FINAL DTW: NA
LOGGED BY: Samuel McIntyre	CHECKED BY:

DEPTH (ftbgs)	SAMPLES			PID (ppm)	DESCRIPTION OF MATERIALS	DEPTH (ftbgs)
	Sample ID and Interval	Recovery				
0						0
1			0.7			1
2		100%				2
3			19.3			3
4					Light brown silty clay. Dry.	4
5			25.8			5
6	198-SB-1-6-8	100%				6
7			31.7			7
8						8
9			0.9			9
10		100%			Light brown soft clay. Dry.	10
11			8.2			11
12					End of Boring	12

BORING LOCATION: Parcel #198, Fayetteville, NC	PROJECT NUMBER: 2016.0054.NDOT
DRILLING CONTRACTOR: Regional Probing Services	DATE STARTED: 10/25/2016 DATE FINISHED: 10/25/2016
DRILLING METHOD: Direct Push BOREHOLE DIAMETER: 2.25"	TOTAL DEPTH (ft bgs): 12 ft bgs SCREEN INTERVAL (ft bgs): NA
DRILLING EQUIPMENT: Geoprobe 5410	NORTHING: NA EASTING: NA
SAMPLING METHOD: Macro Core	INITIAL DTW: NA FINAL DTW: NA
LOGGED BY: Samuel McIntyre	CHECKED BY:

DEPTH (ft bgs)	SAMPLES			DESCRIPTION OF MATERIALS	DEPTH (ft bgs)
	Sample ID and Interval	Recovery	PID (ppm)		
0				Asphalt	0
1			0.0		1
2		100%			2
3			0.3		3
4	198-SB-2-4-6			Light brown and red mottled silty clay. Dry.	4
5			28.7		5
6		100%			6
7			10.1		7
8					8
9			3.8	Light brown soft clay. Dry.	9
10	100%				10
11			5.1		11
12				End of Boring	12

BORING LOCATION: Parcel #198, Fayetteville, NC	PROJECT NUMBER: 2016.0054.NDOT
DRILLING CONTRACTOR: Regional Probing Services	DATE STARTED: 10/25/2016 DATE FINISHED: 10/25/2016
DRILLING METHOD: Direct Push BOREHOLE DIAMETER: 2.25"	TOTAL DEPTH (ft bgs): 12 ft bgs SCREEN INTERVAL (ft bgs): NA
DRILLING EQUIPMENT: Geoprobe 5410	NORTHING: NA EASTING: NA
SAMPLING METHOD: Macro Core	INITIAL DTW: NA FINAL DTW: NA
LOGGED BY: Samuel McIntyre	CHECKED BY:

DEPTH (ftbgs)	SAMPLES			PID (ppm)	DESCRIPTION OF MATERIALS	DEPTH (ftbgs)
	Sample ID and Interval	Recovery				
0					Asphalt	0
1		100%	5.1		Tan silty sand. Dry.	1
2		100%				2
3			14.1			3
4						4
5		100%	8.2			5
6						6
7			1.7			7
8						8
9		100%	1.7			9
10	198-SB-3-10-12					10
11			20.8		11	
12					End of Boring	12

BORING LOCATION: Parcel #198, Fayetteville, NC	PROJECT NUMBER: 2016.0054.NDOT
DRILLING CONTRACTOR: Regional Probing Services	DATE STARTED: 10/25/2016 DATE FINISHED: 10/25/2016
DRILLING METHOD: Direct Push BOREHOLE DIAMETER: 2.25"	TOTAL DEPTH (ft bgs): 10 ft bgs SCREEN INTERVAL (ft bgs): NA
DRILLING EQUIPMENT: Geoprobe 5410	NORTHING: NA EASTING: NA
SAMPLING METHOD: Macro Core	INITIAL DTW: NA FINAL DTW: NA
LOGGED BY: Samuel McIntyre	CHECKED BY:

DEPTH (ft bgs)	SAMPLES			PID (ppm)	DESCRIPTION OF MATERIALS	DEPTH (ft bgs)
	Sample ID and Interval	Recovery				
0						0
1				0.0	Light brown and red mottled silty clay. Dry.	1
2		100%				2
3				0.1		3
4						4
5				0.0	Light brown soft clay. Dry.	5
6		100%				6
7				0.2		7
8					Light brown soft clay. Dry.	8
9	198-SB-4-8-10	100%		0.0		9
10					End of Boring	10

BORING LOCATION: Parcel #198, Fayetteville, NC	PROJECT NUMBER: 2016.0054.NDOT
DRILLING CONTRACTOR: Regional Probing Services	DATE STARTED: 10/25/2016 DATE FINISHED: 10/25/2016
DRILLING METHOD: Direct Push BOREHOLE DIAMETER: 2.25"	TOTAL DEPTH (ft bgs): 10 ft bgs SCREEN INTERVAL (ft bgs): NA
DRILLING EQUIPMENT: Geoprobe 5410	NORTHING: NA EASTING: NA
SAMPLING METHOD: Macro Core	INITIAL DTW: NA FINAL DTW: NA
LOGGED BY: Samuel McIntyre	CHECKED BY:

DEPTH (ft bgs)	SAMPLES			PID (ppm)	DESCRIPTION OF MATERIALS	DEPTH (ft bgs)
	Sample ID and Interval	Recovery				
0					Asphalt	0
1		100%	0.0		Tan silty sand. Dry.	1
2		100%	0.1			
3		100%	0.0			
4		100%	0.3			
5		100%	0.0			5
6		100%	0.3			6
7		100%	0.0			7
8		100%	0.3			8
9	198-SB-5-8-10	100%	56.4			9
10					End of Boring	10

BORING LOCATION: Parcel #198, Fayetteville, NC	PROJECT NUMBER: 2016.0054.NDOT
DRILLING CONTRACTOR: Regional Probing Services	DATE STARTED: 10/25/2016 DATE FINISHED: 10/25/2016
DRILLING METHOD: Direct Push BOREHOLE DIAMETER: 2.25"	TOTAL DEPTH (ft bgs): 10 ft bgs SCREEN INTERVAL (ft bgs): NA
DRILLING EQUIPMENT: Geoprobe 5410	NORTHING: NA EASTING: NA
SAMPLING METHOD: Macro Core	INITIAL DTW: NA FINAL DTW: NA
LOGGED BY: Samuel McIntyre	CHECKED BY:

DEPTH (ft bgs)	SAMPLES			PID (ppm)	DESCRIPTION OF MATERIALS	DEPTH (ft bgs)
	Sample ID and Interval	Recovery				
0					Asphalt	0
1		100%	0.0		Tan silty sand. Dry.	1
2		100%	0.1			
3		100%	0.3			
4		100%	0.3			
5		100%	0.3			
6		100%	0.3			6
7		100%	0.3			7
8		100%	0.3			8
9	198-SB-6-8-10	100%	20.3			9
10					End of Boring	10

BORING LOCATION: Parcel #198, Fayetteville, NC	PROJECT NUMBER: 2016.0054.NDOT
DRILLING CONTRACTOR: Regional Probing Services	DATE STARTED: 10/25/2016 DATE FINISHED: 10/25/2016
DRILLING METHOD: Direct Push BOREHOLE DIAMETER: 2.25"	TOTAL DEPTH (ft bgs): 10 ft bgs SCREEN INTERVAL (ft bgs): NA
DRILLING EQUIPMENT: Geoprobe 5410	NORTHING: NA EASTING: NA
SAMPLING METHOD: Macro Core	INITIAL DTW: NA FINAL DTW: NA
LOGGED BY: Samuel McIntyre	CHECKED BY:

DEPTH (ft bgs)	SAMPLES			PID (ppm)	DESCRIPTION OF MATERIALS	DEPTH (ft bgs)
	Sample ID and Interval	Recovery				
0						0
1						1
2		100%			Light brown silty clay. Dry.	2
3			0.0			3
4						4
5		100%			Light brown soft clay. Dry.	5
6			0.0			6
7						7
8						8
9	198-SB-7-8-10	100%	0.2			9
10					End of Boring	10

BORING LOCATION: Parcel #198, Fayetteville, NC	PROJECT NUMBER: 2016.0054.NDOT
DRILLING CONTRACTOR: Regional Probing Services	DATE STARTED: 10/25/2016 DATE FINISHED: 10/25/2016
DRILLING METHOD: Direct Push BOREHOLE DIAMETER: 2.25"	TOTAL DEPTH (ft bgs): 10 ft bgs SCREEN INTERVAL (ft bgs): NA
DRILLING EQUIPMENT: Geoprobe 5410	NORTHING: NA EASTING: NA
SAMPLING METHOD: Macro Core	INITIAL DTW: NA FINAL DTW: NA
LOGGED BY: Samuel McIntyre	CHECKED BY:

DEPTH (ftbgs)	SAMPLES			PID (ppm)	DESCRIPTION OF MATERIALS	DEPTH (ftbgs)
	Sample ID and Interval	Recovery				
0						0
1						1
2		100%			Light brown silty clay. Dry.	2
3						3
4						4
5		100%				5
6						6
7					Light brown soft clay. Dry.	7
8						8
9	198-SB-8-8-10	100%				9
10					End of Boring	10

ATTACHMENT C



PHOTO 1 - VIEW OF SOIL BORING LOOKING WEST

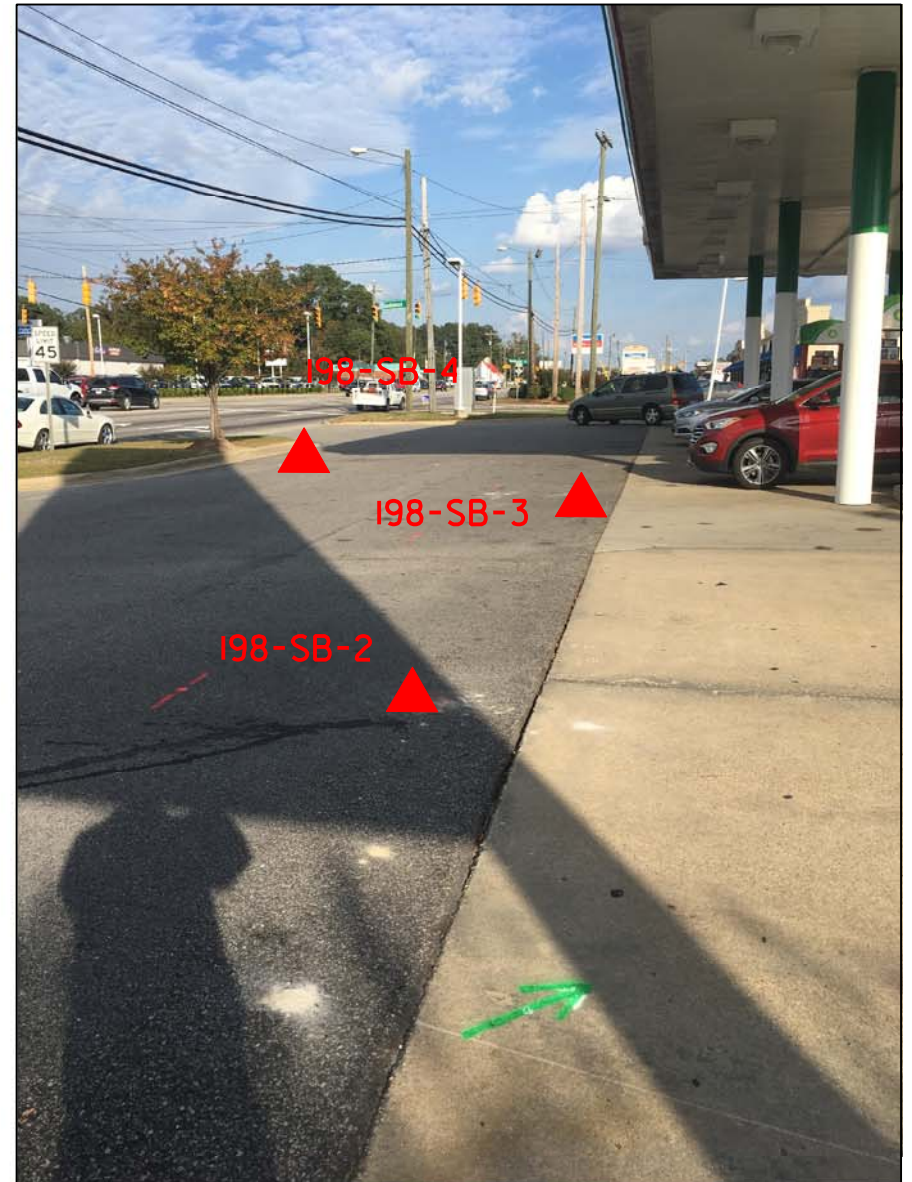


PHOTO 2 - VIEW OF SOIL BORING LOOKING EAST



PHOTO 3 - VIEW OF SOIL BORING LOOKING EAST



PHOTO 4 - VIEW OF SOIL BORING LOOKING SOUTHEAST



PHOTO 5 - VIEW OF SOIL BORING LOOKING EAST

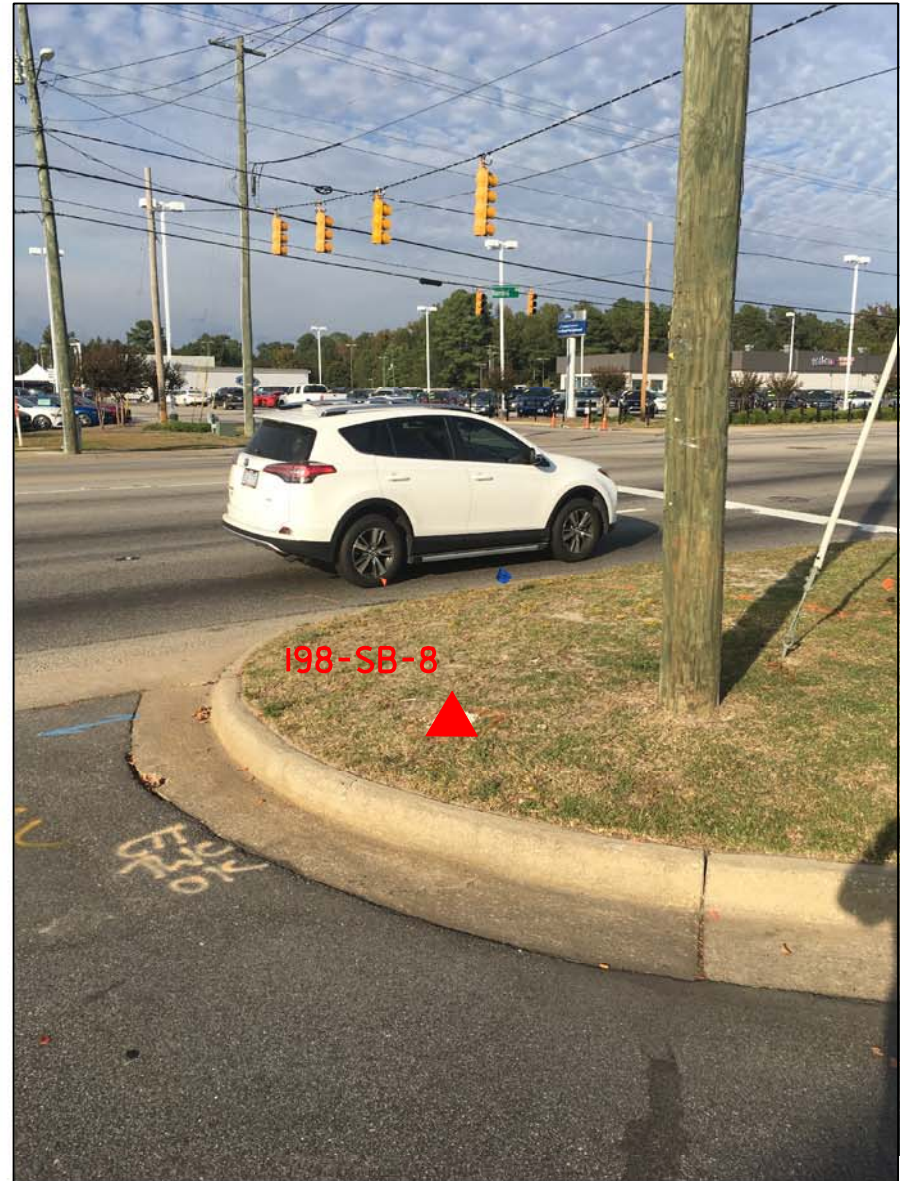


PHOTO 6 - VIEW OF SOIL BORING LOOKING NORTH

ATTACHMENT D



Hydrocarbon Analysis Results

Client: NCDOT
Address: Site 198: 5201 Raeford Road
 Fayetteville, NC

Samples taken 10/25/2016
Samples extracted 10/25/2016
Samples analysed 10/25/2016

Contact:

Operator Candy Elliott

Project: 2016.0054.NDOT

U04049

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	198-SB-1-6-8	27.8	<0.7	<0.7	18.6	18.6	9.7	0.43	0.005	0	85.6	14.4	V.Deg.PHC (FCM) 65.9%
s	198-SB-2-4-6	25.8	<0.65	<0.65	1.3	1.3	0.61	<0.02	<0.003	0	88.4	11.6	(FCM) (BO) 47.2%
s	198-SB-3-10-12	22.7	<1.1	<0.57	<0.57	<0.57	<0.11	<0.02	<0.002	0	57.3	42.7	Residual.PHC
s	198-SB-4-8-10	7.5	0.46	0.46	0.33	0.79	0.26	0.08	<0.001	66.7	25.6	7.8	Pyrogenic HC (FCM) (P) 36.8% B
s	198-SB-5-8-10	5.9	<0.15	0.4	0.31	0.71	0.2	0.01	<0.001	68.7	26	5.3	Deg Gas (FCM) 65.3%
s	198-SB-6-8-10	23.2	<0.58	<0.58	0.89	0.89	0.69	0.03	<0.002	0	85.9	14.1	V.Deg.PHC (FCM) 56.5%
s	198-SB-7-8-10	5.9	<0.29	<0.15	0.66	0.66	0.32	0.02	0.001	0	73.5	26.5	V.Deg.PHC (FCM) (P) 74.2%
s	198-SB-8-8-10	24.8	<0.62	2	4.2	6.2	1.7	0.09	0.002	56.8	32.1	11.1	V.Deg.PHC (FCM) 79.4%

Initial Calibrator QC check **OK**

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

QED Hydrocarbon Fingerprints

Project: 2016.0045.NDOT

10/25/2016

