Prepared for:

North Carolina Department of Transportation
Geotechnical Engineering Unit
GeoEnvironmental Section
1589 Mail Service Center
Raleigh, North Carolina, 27699-1589

Preliminary Site Assessment Report

Yam City Oil Co. Property
Parcel # 65
270 Washington Street
Whiteville, Columbus County, North Carolina
US 701 Bypass from SR 1437 to US 74/76
TIP Number: R-5020B
WBS Element: 41499.1.3

Apex Companies, LLC
(dba Apex Engineering, PC)
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November 21, 2018 *not considered final unless all signatures are completed*

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1.0 INTRODUCTION

This report presents the results of a Preliminary Site Assessment (PSA) for the North Carolina Department of Transportation (NCDOT) Yam City Oil Co. Property performed by Apex Companies, LLC (Apex) (dba Apex Engineering, PC) on behalf of the NCDOT. The subject site of this PSA report will be affected by the widening of the US 701 Bypass from SR 1437 to US 74/76. The Site is comprised of one parcel and is located at 270 Washington Street and is identified as Parcel 65, Yam City Oil Co. Property, within the NCDOT R-5020B design project. The property is located northwest of the Washington Street and N. JK Powell Boulevard intersection in Whiteville, Columbus County, North Carolina, as shown in the attached Site Location Map (**Figure 1)**. The site investigation was conducted in accordance with Apex Company's Technical and Cost proposal dated May 15, 2018.

NCDOT contracted Apex to perform the PSA within the existing right-of-way (ROW) and/or easement of the Parcel 65, Yam City Oil Company property due to the potential presence of contamination at the site and because excavation and grading may occur within the area. The PSA was performed to evaluate if soils have been impacted as a result of past and present uses of the property within the proposed investigation area, if buried underground storage tanks (USTs) are present in the area of investigation, and if groundwater is impacted.

The following report presents the results of an electromagnetic (EM) and ground penetrating radar (GPR) evaluation to identify USTs in the investigation area and describes the subsurface field investigation at the site. The report includes the evaluation of field screening, as well as field and laboratory analyses with regards to the presence or absence of soil and groundwater contamination within the area of investigation across Yam City Oil Company property. **Appendix A** includes a Photograph log for the site.

1.1 Site History

The Yam City Oil Company property has been identified with the address of 270 Washington Street. Based on a search of the North Carolina Department of Environmental Quality (NCDEQ) UST database registry, five active tanks were identified for the 270 Washington Street site associated with Facility ID Number 0-011608. One 3,000-gallon capacity kerosene UST, one 10,000-gallon capacity diesel UST, and three 10,000-gallon capacity gasoline/gasoline mixture USTs. The USTs were installed on April 21, 1983. Apex personnel also reviewed the NCDEQ Incident Management Database and no groundwater incidents are associated with this parcel.

1.2 Site Description

The site is located in a mixed commercial and residential area of Whiteville in Columbus bordered to the north by a commercial property and to the east by S. JK Powell Boulevard followed by a commercial building. Washington Street followed by commercial properties border the site to the south, and commercial properties followed by residential properties are located to the west. Parcel 65 appears on the NCDEQ UST database registry and is identified with five known USTs on site. The property is currently operating as a Shell gas station and Jimmy G's Time Saver #1 convenience store and is developed with a one-story brick structure located in the north central portion of the parcel. In the central portion of the property, a canopy is present which covers three fuel dispenser islands. An additional kerosene dispenser is located near the southeastern corner of the convenience store building. The rest of the parcel is covered with paved asphalt and concrete. The geophysical surveyor, Pyramid Environmental & Engineering, PC, (Pyramid) verified the location of the four known USTs which are present in the investigation area.

2.0 GEOLOGY

2.1 Regional Geology

Parcel 65, the Yam City Oil Company property, is located within the Coastal Plain Physiographic Province. The Coastal Plain is the largest physiographic province in the state, covering about 45% of the land area. According to the US Geological Survey Hydrogeological framework of the North Carolina Coastal Plain, the geology consists of eastward-dipping and eastward-thickening series of sedimentary strata which range in age from Holocene to Cretaceous. The most common type of sediment types are sand and clay, although a significant amount of limestone occurs in the southern part of the coastal plain. The Site overlies surficial sediments (to approximately 30 to 40 feet bls), the PeeDee Confining unit (approximately 10 feet thick in this area), and the Late Cretaceous age Peedee Formation. The Peedee Formation is named for exposures along the great Peedee River, it preserves belemnites and foraminifera fossils dating from the Late Cretaceous. It generally consists of marine sand, clayey sand and clay (M.D. Winner Jr. and R.W. Coble, 1996, *Hydrogeologic Framework of the North Carolina Coastal Plain, Regional Aquifer-System Analysis – Northern Atlantic Coastal Plain*, USGS Professional Paper 1404-I).

2.2 Site Geology

Site geology was observed through the drilling and sampling of six direct push technology (DPT) soil borings (SB) onsite. **Figure 2** presents the boring locations and site layout. Borings did not exceed a total depth of five feet below ground surface (bgs) since this is a fill area of the design project and water was encountered as shallow as 3.5 feet bgs. Soil consisting predominantly of

tan sand was observed across the parcel (see Boring logs included in **Appendix B**). The soils were unconsolidated and as a result the borings often collapsed. According to the topographical maps found on the Columbus County Geographic Information System (GIS) site, the parcel is located in an area of little topographic relief. Although groundwater does not always follow topographic changes, based on the topographic of surrounding parcels, groundwater flow may be toward Mobile Branch located to the west.

3.0 FIELD ACTIVITIES

3.1 Preliminary Activities

Prior to commencing field sampling activities at the site, several tasks were accomplished in preparation for the subsurface investigation. A Health and Safety Plan (HASP) was prepared to include the site-specific health and safety information necessary for the field activities. North Carolina-One Call was contacted on May 25, 2018 to report the proposed drilling activities and notify affected utilities. Apex subcontracted Pyramid to locate subsurface utilities and other subsurface drilling hazards as well as to perform a geophysical survey. Carolina Soil Investigations, LLC (CSI) of Olin, North Carolina was retained by Apex to perform DPT borings for soil sampling. REDLAB, LLC (REDLAB) provided an ultraviolet fluorescence (UVF) Hydrocarbon Analyzer and Eastern Solutions provided a calibrated Flame Ionization/Photoionization Detector (FID/PID). Boring locations were strategically placed in a pattern within the area of investigation to maximize the opportunity to encounter potentially contaminated soil.

3.2 Site Reconnaissance

Apex personnel performed a site reconnaissance on June 4, 2018. During the site reconnaissance, the area was visually examined for the presence of USTs or areas/obstructions that could potentially affect the subsurface investigation. The proposed boring locations were marked based on the site inspection and geophysical survey results. Apex personnel also used the site visit as an opportunity to contact the property manager/owner to inform them of upcoming field activities.

3.3 Geophysics Survey Results

The geophysical survey of the site was conducted from May 30, 2018 to June 1, 2018. Pyramid performed an EM induction metal survey followed by a GPR survey. A copy of the Geophysical Report is presented in **Appendix C**. A total of four EM anomalies were identified. These areas were associated with reinforced concrete, possible utilities, signs and known USTs. Two of the anomies were investigated further with the GPR method. Results of GPR scans indicated the presence of reinforced concrete and the presence and orientation of the four USTs. Results of

GPR scans verified four known USTs are located in the southwest portion of the parcel in a tank bed 38 feet long and 30 feet wide. The UST locations are depicted on **Figure 2.**

3.4 Well Survey

No water supply wells or monitoring wells were observed on site.

3.5 Soil Sampling

Apex conducted drilling activities at the site on June 5, 2018. The purpose of soil sampling was to determine if a petroleum release had occurred within the investigation area, and if so, to estimate the volume of impacted soil that might require special handling during construction activities. Apex drilling subcontractor, CSI, advanced six direct push soil borings within the proposed investigation area. These six boring locations were placed in a pattern to maximize the likelihood of identifying potential soil contamination. **Figure 2** presents the Site Map with boring locations and site structures.

Soil sampling was performed utilizing hand auger and direct push methods accompanied by field screening of volatile organic vapors with the FID/PID unit and onsite quantitative analyses with the UVF Hydrocarbon Analyzer. One to two intervals of the soil boring, exhibiting the most elevated FID/PID readings, were selected for onsite quantitative analysis of total petroleum hydrocarbons (TPH) in soil using the REDLAB UVF Hydrocarbon Analyzer. The analysis was performed onsite by Mr. Troy Holzschuh, a certified REDLAB UVF technician with Apex. The UVF results were generated concurrent with soil boring activities so that rapid assessment could be utilized for strategic boring placement.

3.6 Groundwater Sampling

Groundwater was encountered on site at a depth ranging from 3.5 to four feet bgs. Groundwater impact was not evident based UVF hydrocarbon analysis of soil samples collected within the smear zone. There is no evidence of significant petroleum hydrocarbon contamination of groundwater onsite, within the area of investigation.

4.0 SAMPLING RESULTS

Based on FID/PID field screening and onsite UVF hydrocarbon analysis from the June 2018 soil sampling there is no significant evidence of petroleum hydrocarbon contamination onsite, within the area of investigation.

Elevated FID/PID readings, above ten parts per million (ppm), were not observed in the borings conducted at the site above the smear zone. The FID readings above the smear zone ranged

from non-detectable to 4.1 ppm. The PID readings above the smear zone ranged from non-detectable to 2.7 ppm. The FID/PID field screening results are provided on the boring logs in **Appendix B**.

Soil concentrations of TPH gasoline range organics (GRO) and diesel range organics (DRO) measured using the onsite UVF unit are presented in **Table 1**, with instrument generated tables and chromatographs in **Appendix D**. **Figure 3** presents the GRO and DRO results at each boring.

Based on the UVF analyses, TPH-GRO was not detected at concentrations above the detection limits in soils on the Yam City Oil Company Property. TPH-DRO was detected in several soil samples but at concentrations less than one milligram per kilogram (mg/Kg). TPH-GRO and the TPH-DRO concentrations did not exceed their regulatory action levels of 50 mg/kg and 100 mg/kg respectively.

5.0 CONCLUSIONS

The following bulleted summary is based upon Apex's evaluation of field observations and onsite quantitative analyses of samples collected from the Site on June 7, 2018.

- Results of the geophysical survey produced evidence of anomalies characteristic of USTs. The four USTs lie within the investigation area and are associated with the fuel station located on the property.

- Six soil borings were advanced onsite. Soil samples collected from each boring were analyzed in the field using a REDLAB UVF Hydrocarbon Analyzer.

- Soil samples that were analyzed using the UVF contained TPH-DRO and TPH-GRO concentrations below their respective NCDEQ Action levels of 100 mg/kg and 50 mg/kg.

6.0 RECOMMENDATIONS

The subject property is designed as a fill area. The known UST bed which contains four UST is partially located within the ROW. Should construction activities need to excavate in that area the USTs should be removed prior to excavation. Based on these PSA results, NCDOT will not need to manage any soil and groundwater encountered during excavation activities.

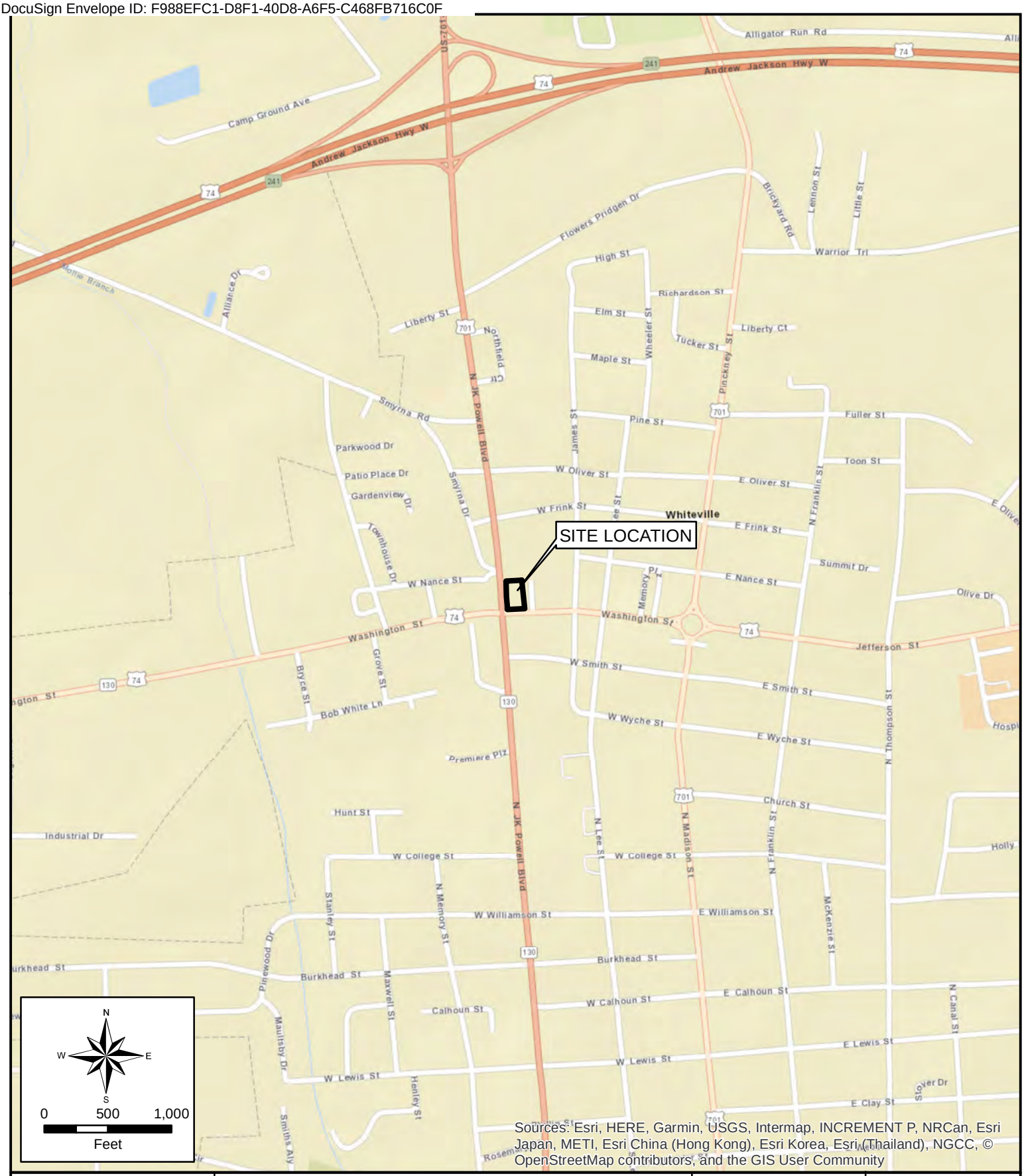
TABLES

Table 1
UVF Onsite Hydrocarbon Analytical Soil Data from June 2018
R-5020B, Parcel 65, Yam City Oil Co. Property
Whiteville, Columbus County, North Carolina

Sample ID Number	Sample Date	Sample Depth (ft bgs)	GRO (mg/kg) (C5-C10)	DRO (mg/kg) (C10-C35)
SOIL				
NCDEQ Action Level in mg/kg			**50**	**100**
P-65-SB-1	6/5/2018	2 - 3	<0.53	<0.53
P-65-SB-1	6/5/2018	4 - 5	<0.69	0.69
P-65-SB-2	6/5/2018	2 - 3	<0.71	0.71
P-65-SB-2*	6/5/2018	4 - 5	<0.65	10.2
P-65-SB-3	6/5/2018	2 - 3	<0.64	<0.64
P-65-SB-3	6/5/2018	4 - 5	<0.62	<0.62
P-65-SB-4	6/5/2018	1 - 2	<0.53	1.9
P-65-SB-4	6/5/2018	4 - 5	<0.53	<0.53
P-65-SB-5	6/5/2018	2 - 3	<0.57	<0.57
P-65-SB-5	6/5/2018	4 - 5	<0.51	<0.51
P-65-SB-6	6/5/2018	2 - 3	<0.52	<0.52
P-65-SB-6	6/5/2018	4 - 5	<0.64	<0.64
P-65-DUP	6/5/2018	---	<0.65	10.5

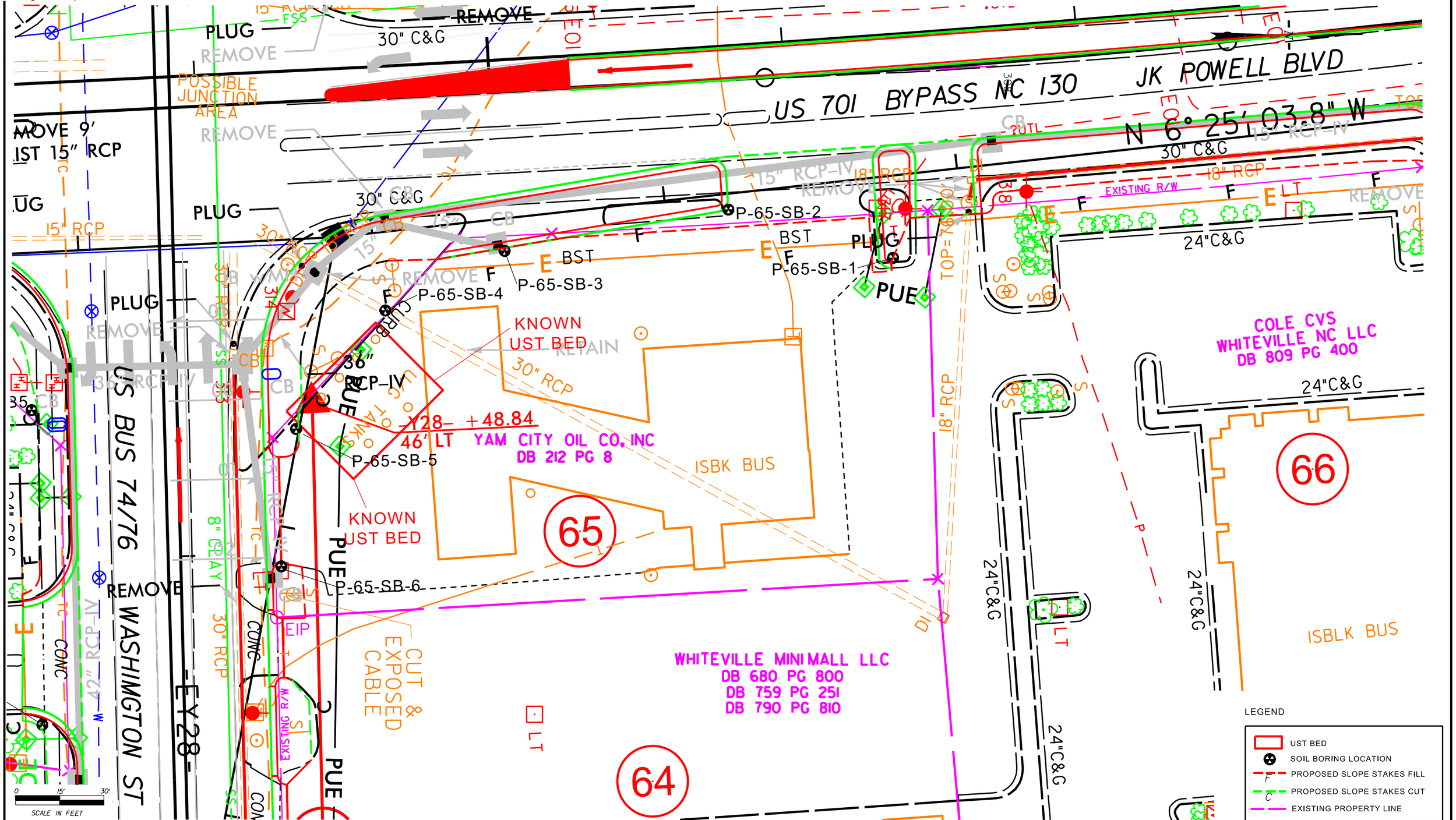
NOTES:
(mg/kg) = Milligrams per kilogram
* = Duplicate sample was collected
GRO = Gasoline Range Organics
DRO = Diesel Range Organics
ft bgs = feet below ground surface
TPH - GRO values in exceedance of NCDEQ Action Level of 50 mg/kg are shown in Bold
TPH - DRO values in exceedance of NCDEQ Action Level of 100 mg/kg are shown in Bold

FIGURES



Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, © OpenStreetMap contributors, and the GIS User Community

CHECK BY: TH	SITE LOCATION MAP	APEX	FIGURE
DRAWN BY: SP			1
DATE: 7/6/2018	PARCEL #65		
SCALE: AS SHOWN	270 WASHINGTON STREET		
CAD NO:. NCDOT-001	WHITEVILLE, NORTH CAROLINA		
PRJ NO.: NCDOT-001			



APEX COMPANIES, LLC
10610 METROMONT PARKWAY
SUITE 206
CHARLOTTE, NC 28117
PHONE: (704) 799-6390

FIGURE 2
PARCEL 065
270 WASHINGTON STREET
SITE MAP WITH SOIL BORING LOCATIONS

Date: 6/6/18	R-5020B US 701 BYPASS COLUMBUS COUNTY
Proj. # NCDOT-001	
CAD File: pc_065_fig 2.dgn	Project Title:
Approx. Scale: 1" = 30'	Drawn by: MJO
	Client: NC DOT

Sample Identification	P65-SB4
Sample Depth (Feet bgs)	1-2
TPH GRO (mg/kg)	<0.53
THP DRO (mg/kg)	1.9
Sample Depth (Feet bgs)	4-5
TPH GRO (mg/kg)	<0.53
THP DRO (mg/kg)	<0.53

Sample Identification	P65-SB3
Sample Depth (Feet bgs)	2-3
TPH GRO (mg/kg)	<0.64
THP DRO (mg/kg)	<0.64
Sample Depth (Feet bgs)	4-5
TPH GRO (mg/kg)	<0.62
THP DRO (mg/kg)	<0.62

Sample Identification	P65-SB2
Sample Depth (Feet bgs)	2-3
TPH GRO (mg/kg)	<0.71
THP DRO (mg/kg)	0.71
Sample Depth (Feet bgs)	4-5
TPH GRO (mg/kg)	<0.65
THP DRO (mg/kg)	10.2

Sample Identification	P65-SB1
Sample Depth (Feet bgs)	2-3
TPH GRO (mg/kg)	<0.53
THP DRO (mg/kg)	<0.53
Sample Depth (Feet bgs)	4-5
TPH GRO (mg/kg)	<0.69
THP DRO (mg/kg)	0.69

Sample Identification	P65-SB6
Sample Depth (Feet bgs)	2-3
TPH GRO (mg/kg)	<0.52
THP DRO (mg/kg)	<0.52
Sample Depth (Feet bgs)	4-5
TPH GRO (mg/kg)	<0.64
THP DRO (mg/kg)	<0.64

Sample Identification	P65-SB5
Sample Depth (Feet bgs)	2-3
TPH GRO (mg/kg)	<0.57
THP DRO (mg/kg)	<0.57
Sample Depth (Feet bgs)	4-5
TPH GRO (mg/kg)	<0.51
THP DRO (mg/kg)	<0.51

US 701 BYPASS NC 130 JK POWELL BLVD

N 6°25'03.8" W

US 701 BUS

WASHINGTON ST

KNOWN UST BED

YAM CITY OIL CO. INC
DB 212 PG 8

WHITEVILLE MINI MALL LLC
DB 680 PG 800
DB 759 PG 251
DB 790 PG 810

COLE CVS
WHITEVILLE NC LLC
DB 809 PG 400

ISBK BUS

ISBLK BUS

EXISTING R/W

65

66

64

0 15' 30'
SCALE IN FEET

LEGEND

- UST BED
- SOIL BORING LOCATION
- PROPOSED SLOPE STAKES FILL
- PROPOSED SLOPE STAKES CUT
- EXISTING PROPERTY LINE

APEX COMPANIES, LLC
10610 METROMONT PARKWAY
SUITE 206
CHARLOTTE, NC 28117
PHONE: (704) 799-6390

FIGURE 3
PARCEL 065
270 WASHINGTON STREET
ONSITE UVF HYDROCARBON ANALYSIS RESULTS - SOIL
6/5/18

Date: 7/24/18	R-5020B US 701 BYPASS COLUMBUS COUNTY
Proj. # NCDOT-001	
CAD File: pc_065_fig 3.dgn	Project Title:
Approx. Scale: 1" = 30'	Drawn by: MJO
	Client: NC DOT

APPENDIX A

PHOTOGRAPH LOG

Photo 1

Overview of site prior to preliminary site assessment activities.

Photo 2

View of CSI clearing for utilities to a depth of 5 feet bgs.

10610 Metromont Pkwy
Suite 206
Charlotte, NC 28269

APEX

NCDOT Project R-5020B
PROCESSED TLH
DATE June 2018

PHOTOGRAPHIC LOG
PSA Field Activities
Parcel 65
Yam City Oil Co. Property
Whiteville, NC

APPENDIX B

BORING LOGS

Apex Companies, LLC

Boring Log

Boring/Well No.: P-65-SB-1	**Site Name: Parcel 65**
Date: 6/5/2018	**Location: Whiteville, Columbus County, NC**
Job No.: NCDOT-001	**Sample Method: Hand Auger and Direct Push**
Apex Rep: Troy Holzschuh	**Drilling Method: Hand Auger and Direct Push**
Drilling Company: Carolina Soil Investigations	**Driller Name/Cert #: Danny Summers/2579**
Remarks:	

Depth (ft BLS)	FID Reading (ppm)	PID Reading (ppm)	Lab Sample ID	Soil/Lithologic Description
	<0.1	1.9		0-5' Tan **SAND,** saturated at 3.5'.
1				
2				
	2.0	1.95		
3				
4				
	3.2	2.1		
5				
				Boring terminated at 5 feet
6				
7				
8				
9				
10				
11				
12				
13				
14				

WELL CONSTRUCTION DETAILS (If Applicable)

Well Type/Diameter:	Outer Casing Interval:
Total Depth:	Outer Casing Diameter:
Screen Interval:	Bentonite Interval:
Sand Interval:	Slot Size:
Grout Interval:	Static Water Level:

Apex Companies, LLC

Boring Log

Boring/Well No.: P-65-SB-2	**Site Name: Parcel 65**
Date: 6/5/2018	**Location: Whiteville, Columbus County, NC**
Job No.: NCDOT-001	**Sample Method: Hand Auger and Direct Push**
Apex Rep: Troy Holzschuh	**Drilling Method: Hand Auger and Direct Push**
Drilling Company: Carolina Soil Investigations	**Driller Name/Cert #: Danny Summers/2579**
Remarks:	

Depth (ft BLS)	FID Reading (ppm)	PID Reading (ppm)	Lab Sample ID	Soil/Lithologic Description
1	--	--		0-5' Tan medium **SAND**.
2	0	1.1		
3	1.5	2.1		
4	75	2		
5				
				Boring terminated at 5 feet.
6				
7				
8				
9				
10				
11				
12				
13				
14				

WELL CONSTRUCTION DETAILS (If Applicable)

Well Type/Diameter: 1"	Outer Casing Interval: NA
Total Depth: 15	Outer Casing Diameter: NA
Screen Interval: 5'-10'	Bentonite Interval: NA
Sand Interval: NA	Slot Size: 0.010" slot
Grout Interval: NA	Static Water Level: 5'

Apex Companies, LLC

Boring Log

Boring/Well No.: P-65-SB-3	**Site Name: Parcel 65**
Date: 6/5/2018	**Location: Whiteville, Columbus County, NC**
Job No.: NCDOT-001	**Sample Method: Hand Auger and Direct Push**
Apex Rep: Troy Holzschuh	**Drilling Method: Hand Auger and Direct Push**
Drilling Company: Carolina Soil Investigations	**Driller Name/Cert #: Danny Summers/2579**
Remarks:	

Depth (ft BLS)	FID Reading (ppm)	PID Reading (ppm)	Lab Sample ID	Soil/Lithologic Description
1	--	--		0-5' Tan **SAND** saturated at 4 feet.
2	2	0.3		
3	2.9	1.7		
4	2.7	1.3		
5				
				Boring terminated at 5 feet
6				
7				
8				
9				
10				
11				
12				
13				
14				

WELL CONSTRUCTION DETAILS (If Applicable)

Well Type/Diameter:	Outer Casing Interval:
Total Depth:	Outer Casing Diameter:
Screen Interval:	Bentonite Interval:
Sand Interval:	Slot Size:
Grout Interval:	Static Water Level:

Apex Companies, LLC

Boring Log

Boring/Well No.: P-65-SB-4	**Site Name: Parcel 65**
Date: 6/5/2018	**Location: Whiteville, Columbus County, NC**
Job No.: NCDOT-001	**Sample Method: Hand Auger and Direct Push**
Apex Rep: Troy Holzschuh	**Drilling Method: Hand Auger and Direct Push**
Drilling Company: Carolina Soil Investigations	**Driller Name/Cert #: Danny Summers/2579**
Remarks:	

Depth (ft BLS)	FID Reading (ppm)	PID Reading (ppm)	Lab Sample ID	Soil/Lithologic Description
1	--	--		0-5' Tan **SAND** saturated at 4 feet.
2	4.1	2.7		
3	1.9	1.3		
4	5.1	1.9		
5				
				Boring terminated at 5 feet
6				
7				
8				
9				
10				
11				
12				
13				
14				

WELL CONSTRUCTION DETAILS (If Applicable)

Well Type/Diameter:	Outer Casing Interval:
Total Depth:	Outer Casing Diameter:
Screen Interval:	Bentonite Interval:
Sand Interval:	Slot Size:
Grout Interval:	Static Water Level:

Apex Companies, LLC

Boring Log

Boring/Well No.: P-65-SB-5	**Site Name: Parcel 65**
Date: 6/5/2018	**Location: Whiteville, Columbus County, NC**
Job No.: NCDOT-001	**Sample Method: Hand Auger and Direct Push**
Apex Rep: Troy Holzschuh	**Drilling Method: Hand Auger and Direct Push**
Drilling Company: Carolina Soil Investigations	**Driller Name/Cert #: Danny Summers/2579**
Remarks:	

Depth (ft BLS)	FID Reading (ppm)	PID Reading (ppm)	Lab Sample ID	Soil/Lithologic Description
1	--	--		0-5' Tan **SAND** saturated at 4 feet.
2	1.07	1.2		
3	2.63	1.9		
4	22.7	2.9		
5				
				Boring terminated at 5 feet.
6				
7				
8				
9				
10				
11				
12				
13				
14				

WELL CONSTRUCTION DETAILS (If Applicable)

Well Type/Diameter:	Outer Casing Interval:
Total Depth:	Outer Casing Diameter:
Screen Interval:	Bentonite Interval:
Sand Interval:	Slot Size:
Grout Interval:	Static Water Level:

Apex Companies, LLC

Boring Log

Boring/Well No.: P-65-SB-6	**Site Name: Parcel 65**
Date: 6/5/2018	**Location: Whiteville, Columbus County, NC**
Job No.: NCDOT-001	**Sample Method: Hand Auger and Direct Push**
Apex Rep: Troy Holzschuh	**Drilling Method: Hand Auger and Direct Push**
Drilling Company: Carolina Soil Investigations	**Driller Name/Cert #: Danny Summers/2579**
Remarks:	

Depth (ft BLS)	FID Reading (ppm)	PID Reading (ppm)	Lab Sample ID	Soil/Lithologic Description
1	--	--		0-5' Tan **SAND** saturated at 4 feet.
2	<0.1	<0.1		
3	<0.1	0.3		
4	0.5	0.3		
5				
				Boring terminated at 5 feet.
6				
7				
8				
9				
10				
11				
12				
13				
14				

WELL CONSTRUCTION DETAILS (If Applicable)

Well Type/Diameter:	Outer Casing Interval:
Total Depth:	Outer Casing Diameter:
Screen Interval:	Bentonite Interval:
Sand Interval:	Slot Size:
Grout Interval:	Static Water Level:

APPENDIX C

GEOPHYSICAL REPORT

PYRAMID GEOPHYSICS

PYRAMID GEOPHYSICAL SERVICES
(PROJECT 2018-139)

GEOPHYSICAL SURVEY

METALLIC UST INVESTIGATION:
PARCEL 65
NCDOT PROJECT R-5020B (41499.1.3)

270 WASHINGTON ST., WHITEVILLE, NC

JUNE 22, 2018

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GEOPHYSICAL INVESTIGATION REPORT
Parcel 65 – 270 Washington St.
Whiteville, Columbus County, North Carolina

Table of Contents

Figures

Appendices

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
UST .....Underground Storage Tank

EXECUTIVE SUMMARY

Project Description: Pyramid Environmental conducted a geophysical investigation for Apex Companies, LLC at Parcel 65, located at 270 Washington St., in Whiteville, NC. The survey was part of an NCDOT Right-of-Way (ROW) investigation (NCDOT Project R-5020B). The survey was designed to extend from the existing edge of pavement into the proposed ROW and/or easements, whichever distance was greater. Conducted from May 29 – June, 4, 2018, the geophysical investigation was performed to determine if unknown, metallic underground storage tanks (USTs) were present beneath the survey area.

Geophysical Results: The site was an active service station with a known UST pit located within the survey area, suspected to contain four known USTs. The geophysical investigation consisted of electromagnetic (EM) induction-metal detection and ground penetrating radar (GPR) surveys. A total of ten EM anomalies were identified. The majority of the EM anomalies were directly attributed to visible cultural features at the ground surface. Several EM anomalies were associated with suspected reinforced concrete and were further investigated with GPR. GPR was performed across the known UST pit to verify the size and orientation of the known tanks. GPR verified the presence of metal reinforcement in the concrete. GPR also recorded four distinct hyperbolic reflectors and four isolated lateral reflectors within the known UST pit that are characteristic of USTs. These features verified the presence of four known, active USTs. The USTs are in an area that is 38 feet long and 30 feet wide. Collectively, the geophysical data recorded evidence of four known metallic USTs at Parcel 65. No evidence of unknown USTs was recorded.

INTRODUCTION

Pyramid Environmental conducted a geophysical investigation for Apex Companies, LLC at Parcel 65, located at 270 Washington St., in Whiteville, NC. The survey was part of an NCDOT Right-of-Way (ROW) investigation (NCDOT Project R-5020B). The survey was designed to extend from the existing edge of pavement into the proposed ROW and/or easements, whichever distance was greater. Conducted from May 29 – June, 4, 2018, 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 gas station surrounded by concrete surfaces and grass medians. The UST pit containing the active tanks supplying fuel to the pups at the service station was located within the survey area, south of the pump island. Field observations of fill ports suggested that four known USTs were located within the UST pit. An aerial photograph 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 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 15.0 software programs.

GPR data were acquired across select EM anomalies on June 4, 2018, 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 6 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 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	Signs/Guy Wires	
2	Sign	
3	Reinforced Concrete	☑
4	Drop Inlet	
5	**4 Known USTs**	☑
6	Reinforced Concrete	☑
7	Storm Drain	
8	Utilities/Signs	
9	Drop Inlet	
10	Signs	

Several of the EM anomalies were directly attributed to visible cultural features at the ground surface, including signs, guy wires, drop inlets, storm drains, and utilities. EM Anomalies 3 and 6 were associated with suspected reinforced concrete and EM Anomaly 5 was associated with the known UST pit. These areas were also investigated with GPR. GPR scans were performed in a grid-like fashion across the suspected reinforced concrete to verify the presence of metal reinforcement and confirm that no other metal structures were present beneath the reinforcement.

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 sixteen GPR transects were performed at the site. All of the transect images are included in **Appendix A**. GPR Transects 1-15 were performed across the suspected reinforced concrete surrounding the site (Anomalies 3 and 6). These transects verified the presence of metal reinforcement in the concrete. No evidence of larger structures such as USTs was observed.

Additionally, GPR performed across Anomaly 5 (GPR Transect 16) recorded four discreet hyperbolic reflectors and four isolated high-amplitude lateral reflectors that are characteristic of metallic USTs. These reflectors were recorded over the four known, active USTs. The four tanks are located in an area that is 38 feet long and 30 feet wide. **Figure 4** provides the location and area of the known metallic USTs overlain on an aerial, along with ground-level photographs.

Collectively, the geophysical data recorded evidence of four known metallic USTs at Parcel 65. No evidence of unknown USTs was recorded. **Figure 5** provides an overlay of the geophysical survey area and the locations of the known USTs onto the NCDOT MicroStation engineering plans for reference.

SUMMARY & CONCLUSIONS

Pyramid's evaluation of the EM61 and GPR data collected at Parcel 65 in Whiteville, 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 site was an active service station with a known UST pit located within the survey area, suspected to contain four known USTs. The majority of the EM anomalies were directly attributed to visible cultural features at the ground surface.
- Several EM anomalies were associated with suspected reinforced concrete and were further investigated with GPR.
- GPR was performed across the known UST pit to verify the size and orientation of the known tanks.
- GPR verified the presence of metal reinforcement in the concrete.
- GPR also recorded four distinct hyperbolic reflectors and four isolated lateral reflectors within the known UST pit that are characteristic of USTs. These features verified the presence of four known, active USTs.
- The USTs are in an area that is 38 feet long and 30 feet wide.

- Collectively, the geophysical data recorded evidence of four known metallic USTs at Parcel 65. No evidence of unknown USTs was recorded.

LIMITATIONS

Geophysical surveys have been performed and this report was prepared for Apex Companies, LLC 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 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.

APPROXIMATE BOUNDARIES OF GEOPHYSICAL SURVEY AREA

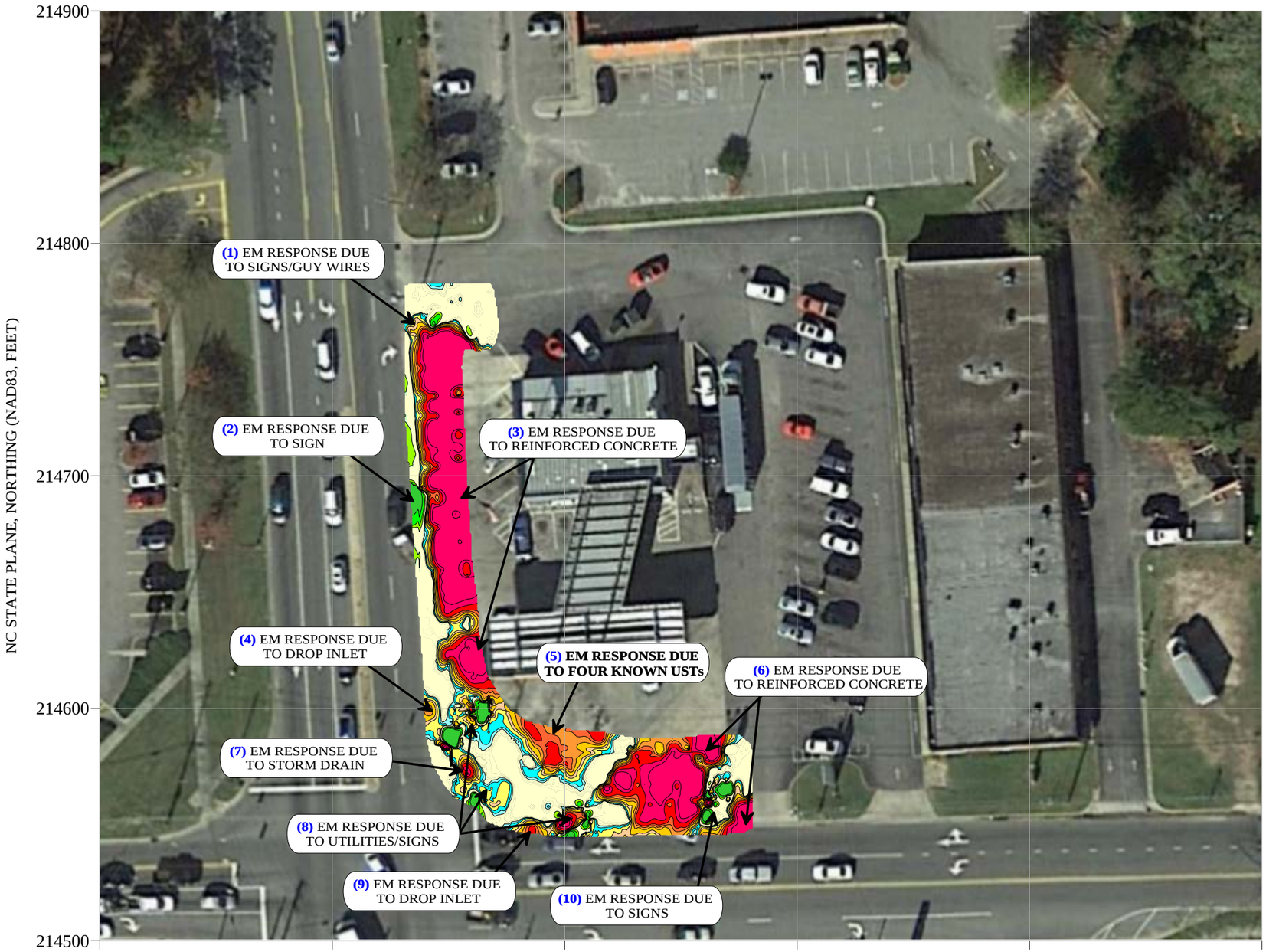
View of Survey Area
(Facing Approximately East)

View of Survey Area
(Facing Approximately North)

N

PYRAMID GEOPHYSICS 503 INDUSTRIAL AVENUE GREENSBORO, NC 27460 (336) 335-3174 (p) (336) 691-0648 (f) License # C1251 Eng. / License # C257 Geology	PROJECT PARCEL 65 WHITEVILLE, NORTH CAROLINA NCDOT PROJECT R-5020B	TITLE PARCEL 65 - GEOPHYSICAL SURVEY BOUNDARIES AND SITE PHOTOGRAPHS	DATE 5/29/2018 PYRAMID PROJECT #: 2018-139	CLIENT Apex Companies, LLC **FIGURE 1**

EM61 METAL DETECTION RESULTS



EVIDENCE OF FOUR KNOWN 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 May 29, 2018, using a Geonics EM61 instrument. Verification GPR data were collected using a GSSI UtilityScan DF instrument with a dual frequency 300/800 MHz antenna on June 4, 2018.

EM61 Metal Detection Response (millivolts)

N

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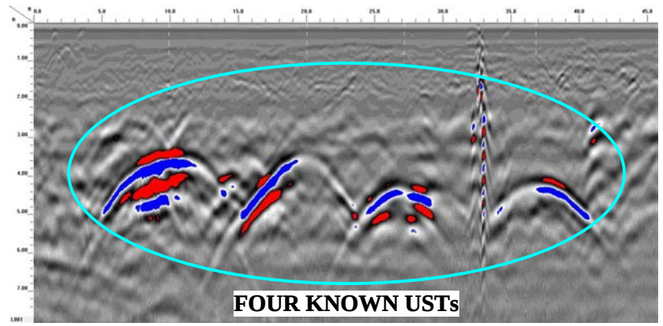
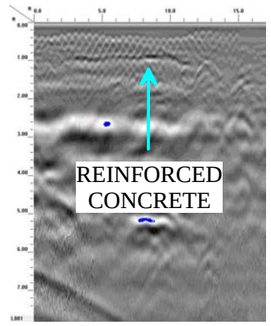
PROJECT	PARCEL 6 WHITEVILLE, NORTH CAROLINA NCDOT PROJECT R-5020B
TITLE	PARCEL 6 - EM61 METAL DETECTION CONTOUR MAP
DATE	5/29/2018
PYRAMID PROJECT #:	2018-139
CLIENT	Apex Companies, LLC
	FIGURE 2

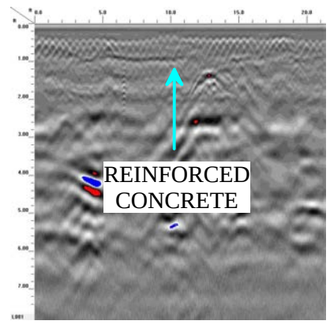
LOCATIONS OF GPR TRANSECTS



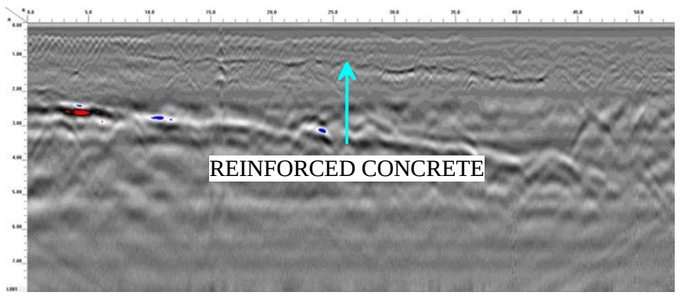
GPR TRANSECT 16 (T16)



GPR TRANSECT 4 (T4)



GPR TRANSECT 8 (T8)

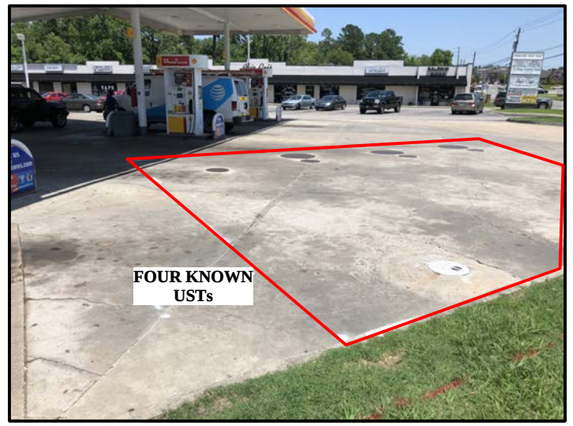


GPR TRANSECT 12 (T12)

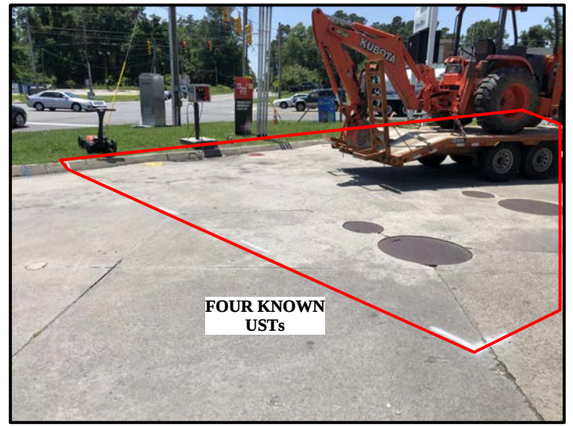
N

PYRAMID GEOPHYSICS 503 INDUSTRIAL AVENUE GREENSBORO, NC 27460 (336) 335-3174 (p) (336) 691-0648 (f) License # C1251 Eng. / License # C257 Geology	PROJECT PARCEL 65 WHITEVILLE, NORTH CAROLINA NCDOT PROJECT R-5020B	TITLE PARCEL 65 - GPR TRANSECT LOCATIONS AND SELECT IMAGES	DATE 6/4/2018 PYRAMID PROJECT #: 2018-139	CLIENT Apex Companies, LLC **FIGURE 3**

LOCATION OF FOUR KNOWN USTs



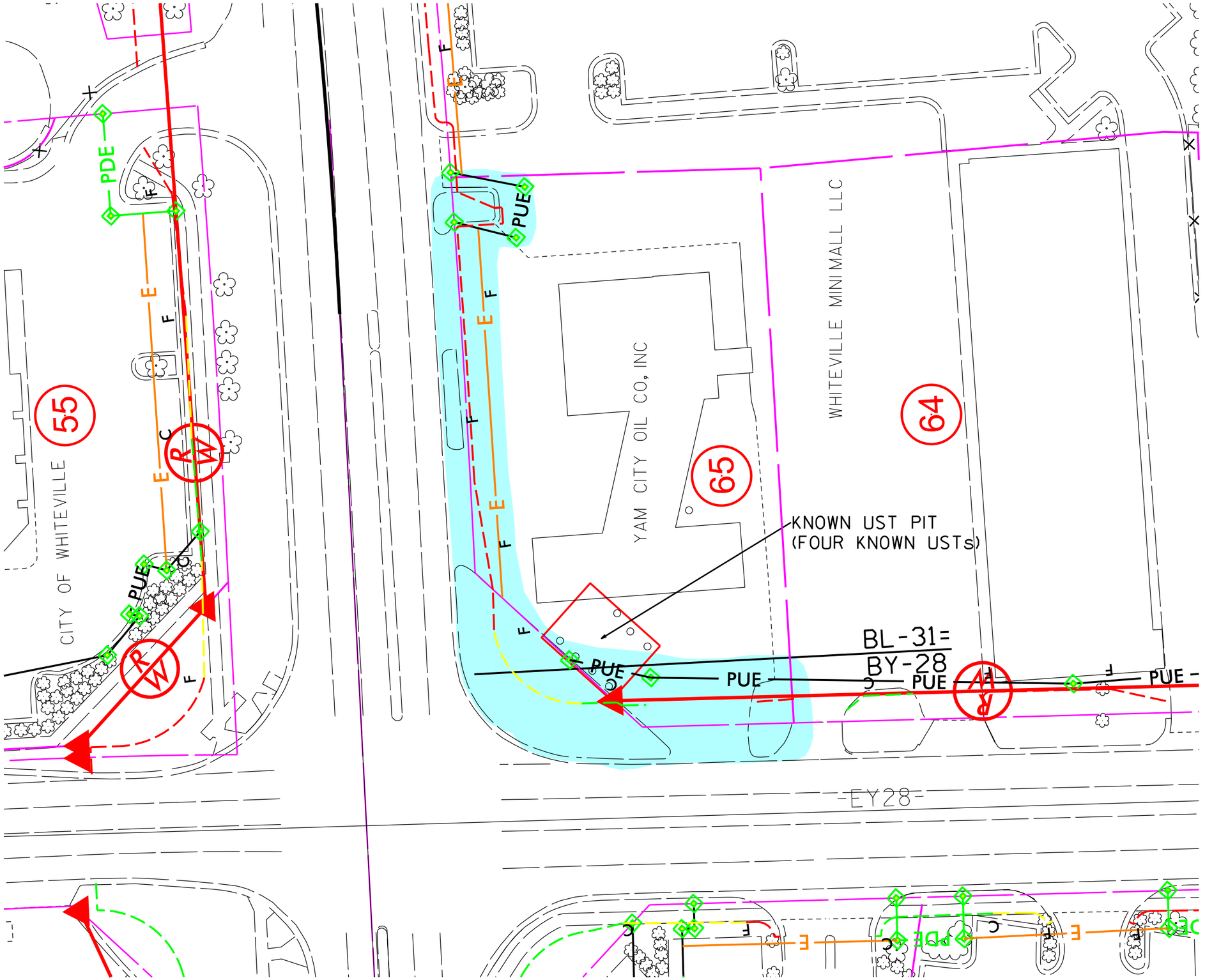
View of Known UST Area Facing Approximately East



View of Known UST Area Facing Approximately West

N

PYRAMID GEOPHYSICS 503 INDUSTRIAL AVENUE GREENSBORO, NC 27460 (336) 335-3174 (p) (336) 691-0648 (f) License # C1251 Eng. / License # C257 Geology	PROJECT PARCEL 65 WHITEVILLE, NORTH CAROLINA NCDOT PROJECT R-5020B	TITLE PARCEL 65 - LOCATION AND AREA OF FOUR KNOWN USTs	DATE 6/4/2018 PYRAMID PROJECT #: 2018-139	CLIENT Apex Companies, LLC **FIGURE 4**



TITLE: OVERLAY OF GEOPHYSICAL SURVEY BOUNDARIES AND FOUR KNOWN USTs ON NCDOT ENGINEERING PLANS

PROJECT: PARCEL 65
WHITEVILLE, NORTH CAROLINA
NCDOT PROJECT W-5020B

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503 INDUSTRIAL AVENUE
GREENSBORO, NC 27406
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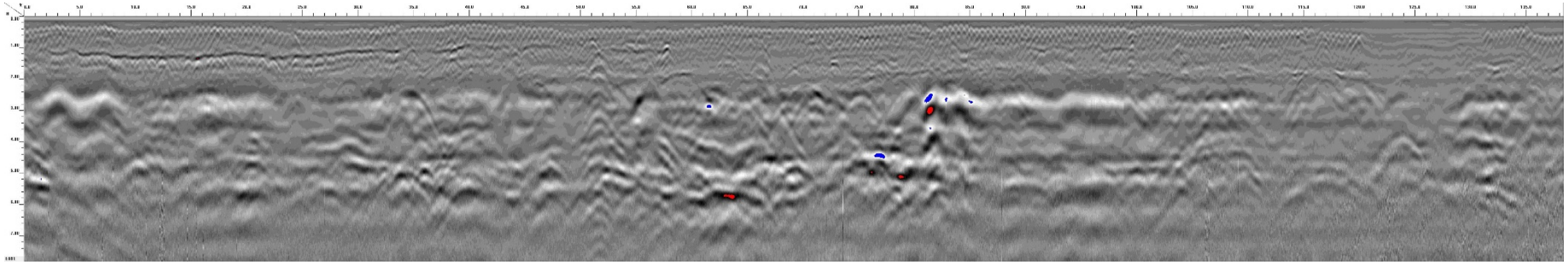
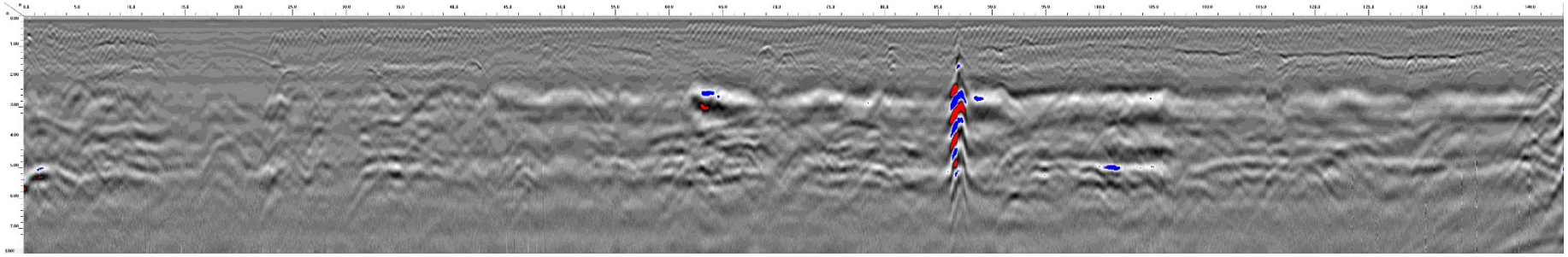
License # C1251 Eng. / #C257 Geology

DATE: 06-26-2018	REVISION NO. 0
PYRAMID PROJECT NO. 2018-139	FIGURE NO. 5

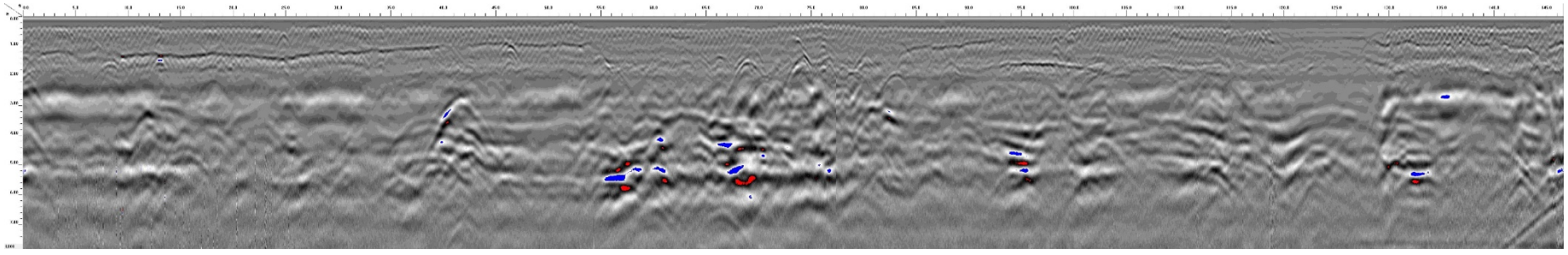
Appendix A – GPR Transect Images



Transect 1



Transect 2



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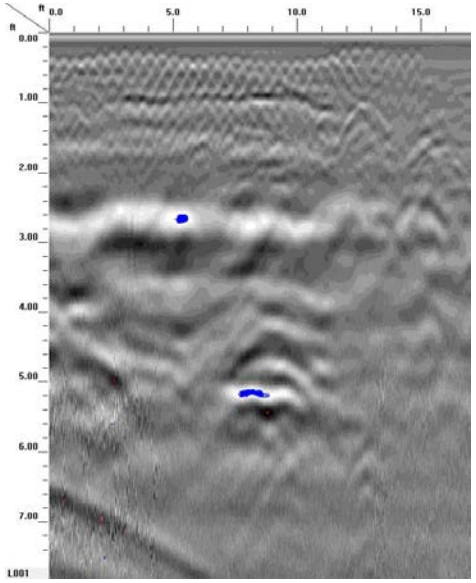

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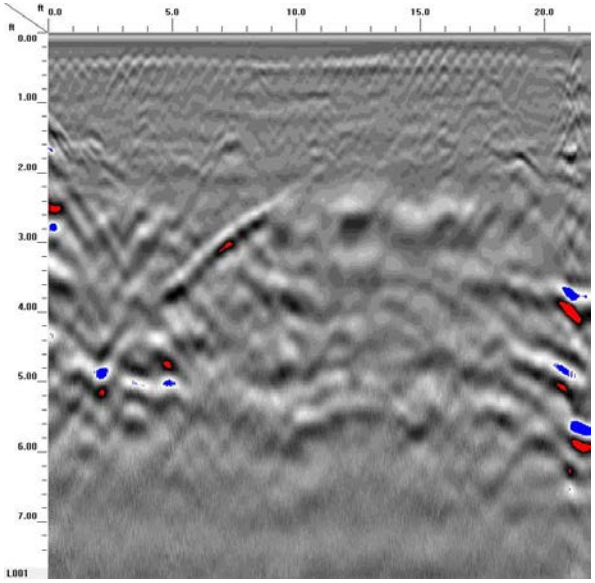
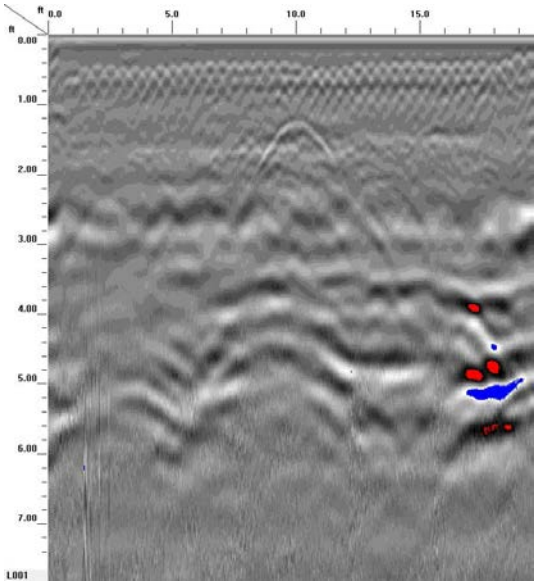
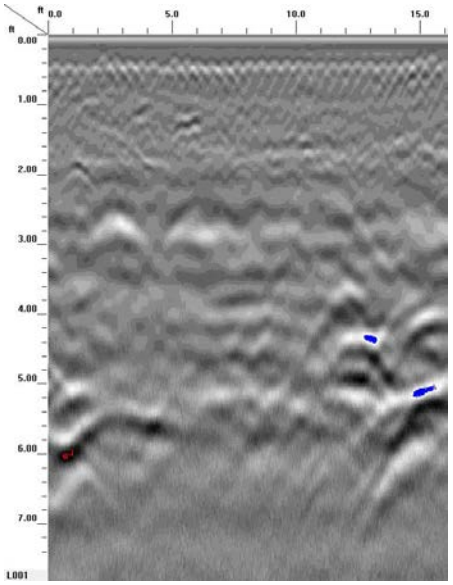


Transect 6



Transect 5



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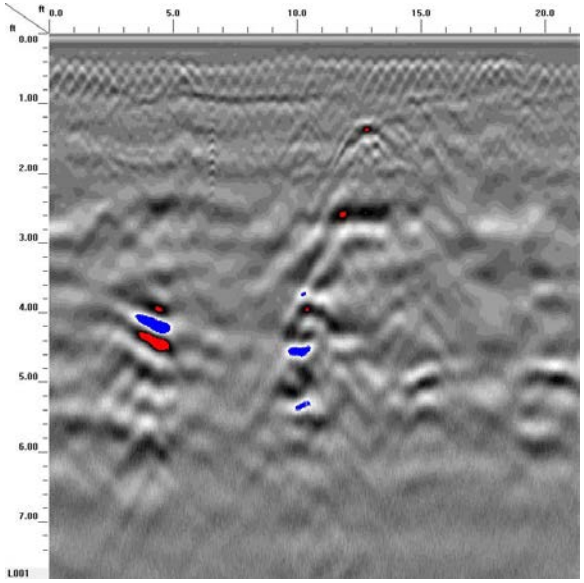

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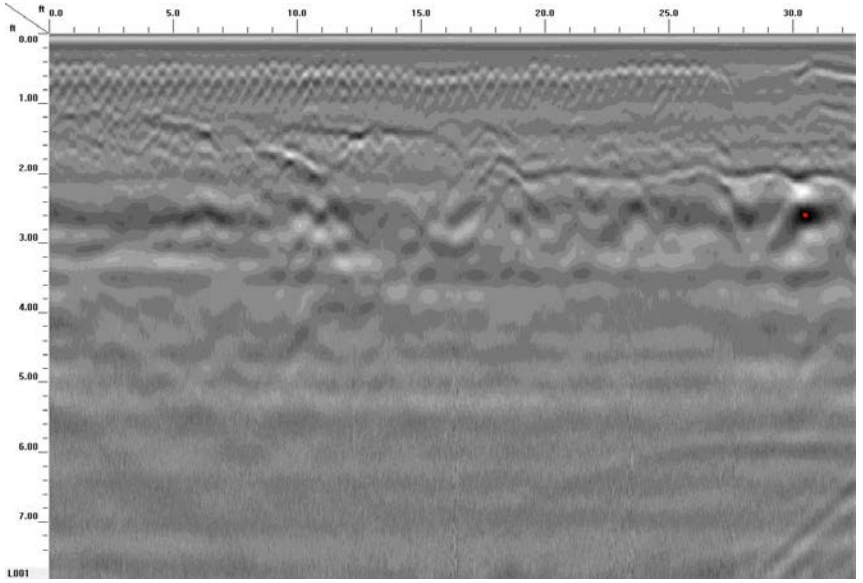

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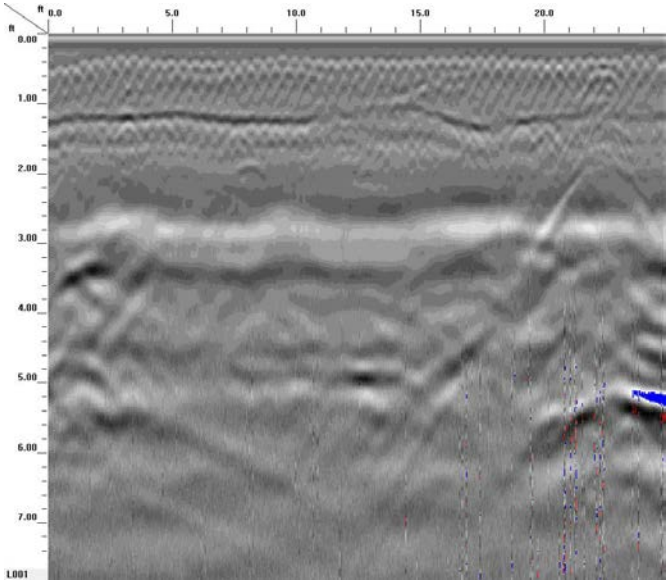

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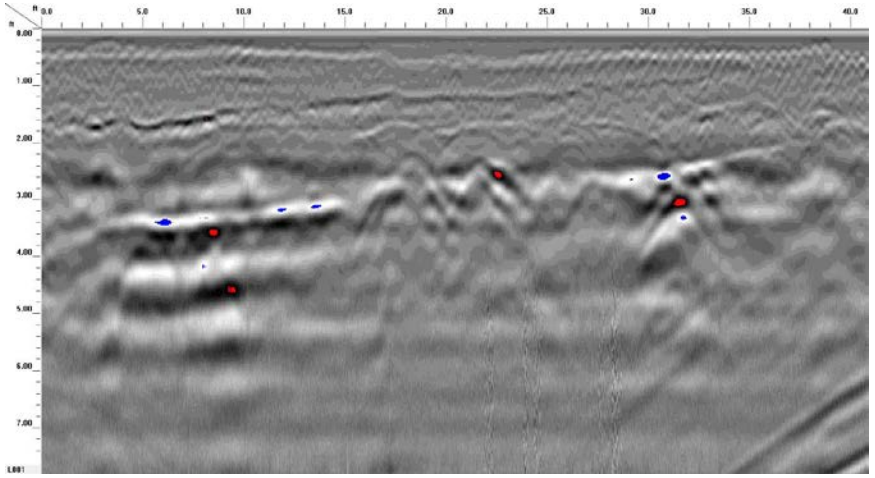

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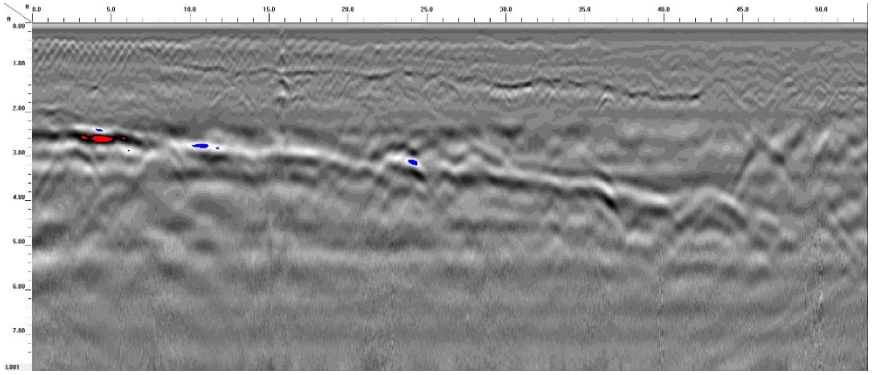

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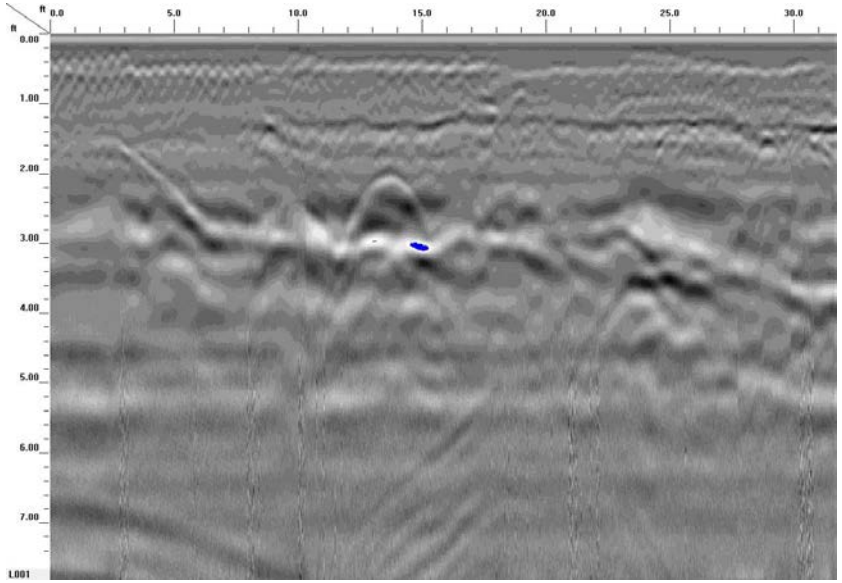

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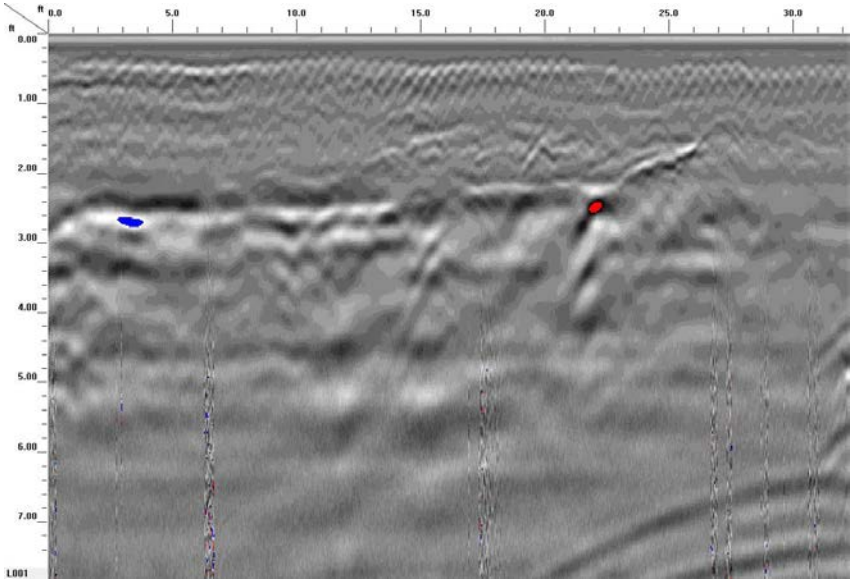

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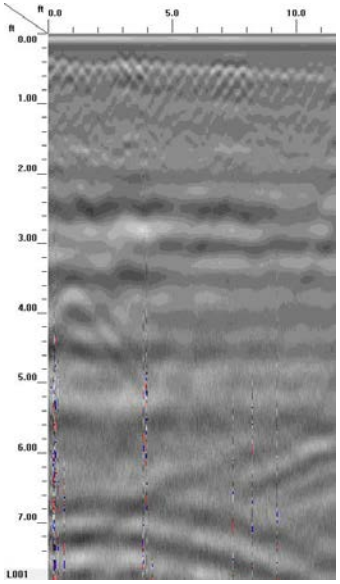

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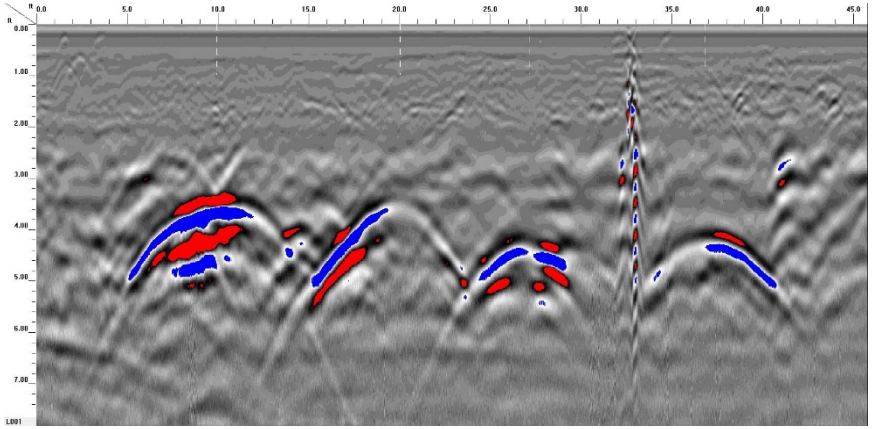


Transect 16

APPENDIX D
UVF HYDROCARBON ANALYSIS RESULTS AND PACE ANALYTICAL LABORATORY REPORT

QED REDLAB RAPID ENVIRONMENTAL DIAGNOSTICS QROS

Hydrocarbon Analysis Results

Client: NCDOT
Address: Parcel 65

Samples taken Tuesday, June 5, 2018
Samples extracted Tuesday, June 5, 2018
Samples analysed Tuesday, June 5, 2018

Contact: Craig Haden

Operator Thomas Fisher

Project: R-5020B Whiteville

F03640

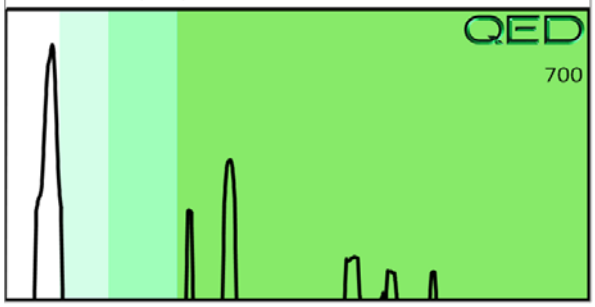
Matrix	Sample ID	Dilution used	BTEX (C6 - C9)	GRO (C5 - C10)	DRO (C10 - C35)	TPH (C5 - C35)	Total Aromatics (C10-C35)	16 EPA PAHs	BaP	Ratios			HC Fingerprint Match
										% light	% mid	% heavy	
s	P-65-SB-1 (2-3)	21.1	<0.53	<0.53	<0.53	<0.53	<0.11	<0.17	<0.021	0	0	0	PHC not detected
s	P-65-SB-1 (4-5)	27.7	<0.69	<0.69	0.69	0.69	0.63	<0.22	<0.028	0	68.3	31.7	Residual HC
s	P-65-SB-2 (2-3)	28.6	<0.71	<0.71	0.71	0.71	0.41	<0.23	<0.029	0	77.8	22.2	Residual HC
s	P-65-SB-2 (4-5)	26.0	<0.65	<0.65	10.2	10.2	4.9	0.57	<0.026	0	92.6	7.4	Road Tar 70.4%,(FCM)
s	P-65-DUP	26.0	<0.65	<0.65	10.5	10.5	5	0.57	<0.026	0	81.5	18.5	Road Tar 69.7%,(FCM)
s	P-65-SB-3 (2-3)	25.5	<0.64	<0.64	<0.64	<0.64	<0.13	<0.2	<0.025	0	0	0	PHC not detected
s	P-65-SB-3 (4-5)	24.7	<0.62	<0.62	<0.62	<0.62	<0.12	<0.2	<0.025	0	0	0	PHC not detected
s	P-65-SB-4 (1-2)	21.3	<0.53	<0.53	1.9	1.9	1.3	<0.17	<0.021	0	64.9	35.1	V.Deg.PHC 76.8%,(FCM)
s	P-65-SB-4 (4-5)	21.3	<0.53	<0.53	<0.53	<0.53	<0.11	<0.17	<0.021	0	0	0	PHC not detected

Initial Calibrator QC check OK Final FCM QC Check OK 102.7 %

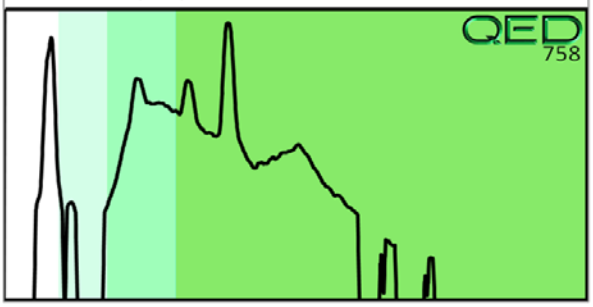
Results generated by a QED HC-1 analyser. Concentration values in mg/kg for soil samples and mg/L for water samples. Soil values are not corrected for moisture or stone content

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

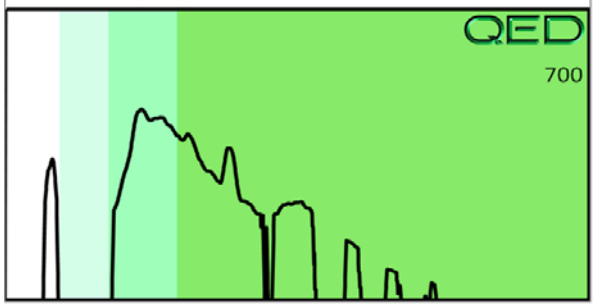
P-65-SB-1 (2-3) : PHC not detected



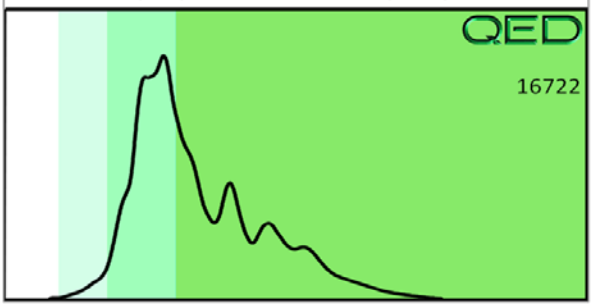
P-65-SB-1 (4-5) : Residual HC



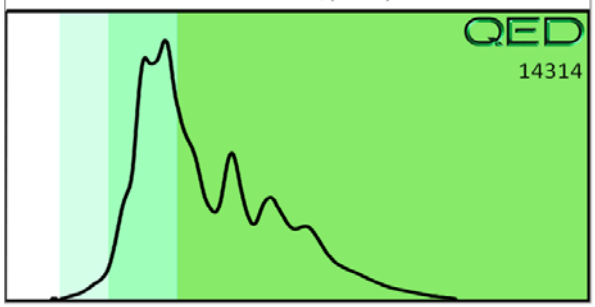
P-65-SB-2 (2-3) : Residual HC



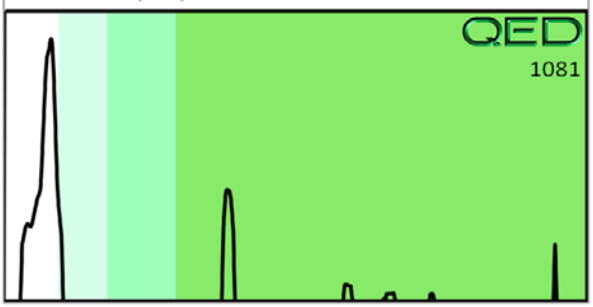
P-65-SB-2 (4-5) : Road Tar 70.4%,(FCM)



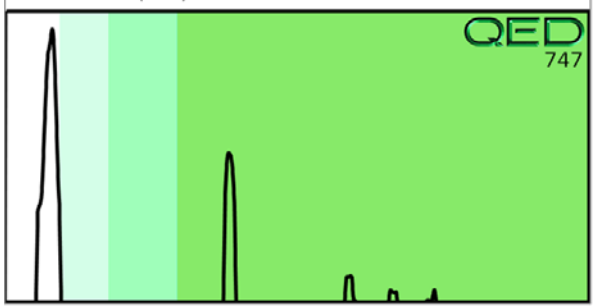
P-65-DUP : Road Tar 69.7%,(FCM)



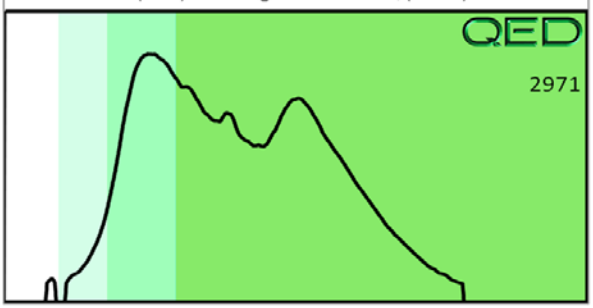
P-65-SB-3 (2-3) : PHC not detected



P-65-SB-3 (4-5) : PHC not detected



P-65-SB-4 (1-2) : V.Deg.PHC 76.8%,(FCM)



P-65-SB-4 (4-5) : PHC not detected

QED REDLAB RAPID ENVIRONMENTAL DIAGNOSTICS QROS

Hydrocarbon Analysis Results

Client: NCDOT
Address: Parcel 65

Samples taken Tuesday, June 5, 2018
Samples extracted Tuesday, June 5, 2018
Samples analysed Tuesday, June 5, 2018

Contact: Craig Haden

Operator Thomas Fisher

Project: R-5020B Whiteville

F03640

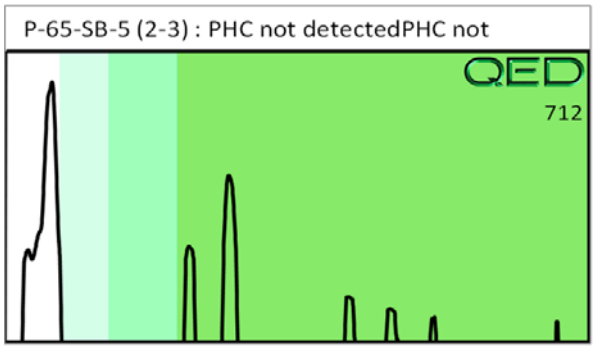
Matrix	Sample ID	Dilution used	BTEX (C6 - C9)	GRO (C5 - C10)	DRO (C10 - C35)	TPH (C5 - C35)	Total Aromatics (C10-C35)	16 EPA PAHs	BaP	Ratios			HC Fingerprint Match
										% light	% mid	% heavy	
s	P-65-SB-5 (2-3)	22.7	<0.57	<0.57	<0.57	<0.57	<0.11	<0.18	<0.023	0	0	0	PHC not detectedPHC not detected,(PFM),(P)
s	P-65-SB-5 (4-5)	20.3	<0.51	<0.51	<0.51	<0.51	<0.1	<0.16	<0.02	0	0	100	PHC not detected
s	P-65-SB-6 (2-3)	21.0	<0.52	<0.52	<0.52	<0.52	<0.1	<0.17	<0.021	0	0	0	PHC not detected
s	P-65-SB-6 (4-5)	25.7	<0.64	<0.64	<0.64	<0.64	<0.13	<0.21	<0.026	0	0	0	PHC not detected,(BO)

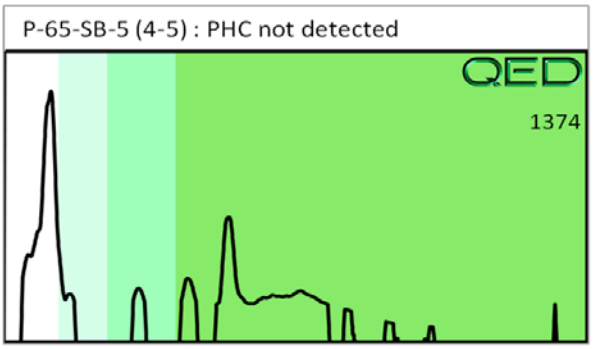
Initial Calibrator QC check OK Final FCM QC Check OK 99.8 %

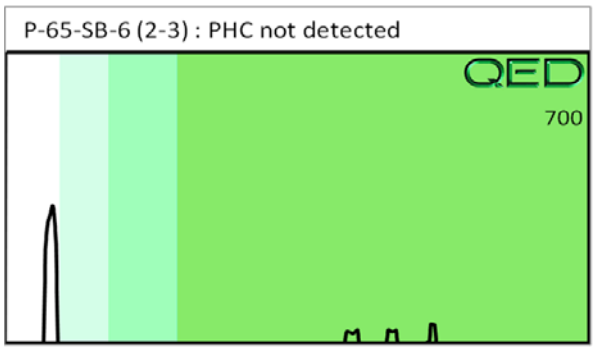
Results generated by a QED HC-1 analyser. Concentration values in mg/kg for soil samples and mg/L for water samples. Soil values are not corrected for moisture or stone content

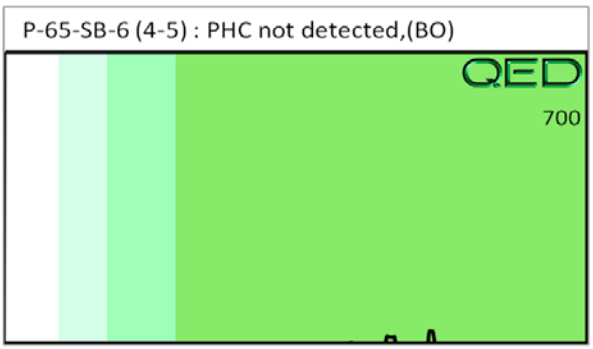
Fingerprints provide a tentative hydrocarbon identification. The abbreviations are:- FCM = Results calculated using Fundamental Calibration Mode : % = confidence for sample fingerprint match to library

(SBS) or (LBS) = Site Specific or Library Background Subtraction applied to result : (PFM) = Poor Fingerprint Match : (T) = Turbid : (P) = Particulate present


P-65-SB-5 (2-3) : PHC not detectedPHC not
QED
712


P-65-SB-5 (4-5) : PHC not detected
QED
1374


P-65-SB-6 (2-3) : PHC not detected
QED
700


P-65-SB-6 (4-5) : PHC not detected,(BO)
QED
700