

Pyramid Environmental & Engineering, P.C. Project # 2018-242  
Preliminary Site Assessment (PSA) – Parcel 014 – MURPHY OIL, USA

**PRELIMINARY SITE ASSESSMENT**  
**PARCEL 014 – MURPHY OIL, USA**  
**1310 MEBANE OAKS ROAD**  
**MEBANE, ALAMANCE COUNTY, NORTH CAROLINA**  
**STATE PROJECT: I-5711**  
**WBS ELEMENT: 50401.1.FS1**  
**OCTOBER 22, 2018**


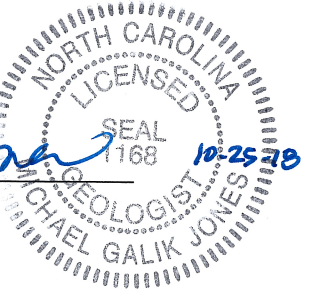
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C-257 – Geology  
C-1251 – Engineering

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## *Acronyms*

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BLS .....	Below Land Surface
BTEX .....	Benzene, Toluene, Ethylbenzene, & Xylenes
CADD .....	Computer Aided Design and Drafting
COC .....	Chain of Custody
CSA.....	Comprehensive Site Assessment
DEQ .....	Department of Environmental Quality
DRO .....	Diesel Range Organics
DWM .....	Division of Waste Management
EM.....	Electromagnetic (as with EM-61)
EPA.....	Environmental Protection Agency
GRO .....	Gasoline Range Organics
GCLs.....	Gross Contaminant Levels
GPR.....	Ground Penetrating Radar
HASP .....	Health & Safety Plan
MSCC .....	Maximum Soil Contaminant Concentration
MTBE .....	Methyl Tertiary Butyl Ether
µg/L.....	Micrograms per Liter
mg/kg .....	Milligram per kilogram
NPDES.....	National Pollution Discharge Elimination System
NCAC .....	North Carolina Administrative Code
NCDOT.....	North Carolina Department of Transportation
OSHA.....	Occupational Safety and Health Administration
OVA.....	Organic Vapor Analyzer
PPM.....	Parts Per Million
PID .....	Photo-ionization Detector
PSA .....	Preliminary Site Assessment
PVC.....	Poly-vinyl Chloride
RFP .....	Request for Proposal
ROW .....	Right of Way
SVOCs .....	Semi-Volatile Organic Compounds
TW .....	Temporary Well
TPH.....	Total Petroleum Hydrocarbons
UVF.....	Ultraviolet Fluorescence (UVF) QED Analyzer
UST.....	Underground Storage Tank
US EPA.....	United States Environmental Protection Agency
VOCs.....	Volatile Organic Compounds

**PRELIMINARY SITE ASSESSMENT  
PARCEL 014 – MURPHY OIL, USA  
1310 MEBANE OAKS ROAD  
MEBANE, ALAMANCE COUNTY, NORTH CAROLINA**

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## **EXECUTIVE SUMMARY OF RESULTS**

Pyramid Environmental & Engineering P.C. (Pyramid) has prepared this Preliminary Site Assessment (PSA) report documenting background information, field activities, assessment activities, findings, conclusions, and recommendations for Parcel 014, owned by MURPHY OIL, USA. The property currently contains an active gas station surrounded by asphalt and grass medians at 1310 Mebane Oaks Road, Mebane, NC. This PSA was conducted on behalf of the North Carolina Department of Transportation (NCDOT) in accordance with Pyramid's August 9, 2018, technical proposal. This PSA is a part of State Project I-5711.

The purpose of this assessment was to determine the presence or absence of underground storage tanks (USTs) and impacted soils between the existing edge of pavement and the proposed Right-Of-Way (ROW) and/or easements, whichever distance was greater. The PSA was conducted with particular attention to the areas to be cut as indicated by slope stake lines and cross-sections or to be excavated for the installation of drainage features.

The following statements summarize the results of the PSA:

- **Site History:** Pyramid interviewed DEQ personnel, interviewed property owners, and reviewed aerial photographs to assess past uses of the property. Pyramid reviewed historical aerial photographs obtained from Google Earth dating back to 1993. Historical information reviewed as part of the PSA indicated that the property contained a small building of unknown use as early as 1993. This building appears to have been demolished between 1998 and 2005, and the current gas station building was constructed between 2005 and 2006. Visual observations and the NCDOT documents indicate that three known USTs are currently operating at the facility. Records review provided the following Facility ID information for the property: Facility ID 00-0-0000036764.

On August 31, 2018, Pyramid emailed the Alamance County parcel address (1310 Mebane Oaks Road, Mebane, NC) to Ms. Mindy Leopard, Hydrogeologist with the Department of Environmental Quality (DEQ), UST Section, with a request to investigate any environmental incidents associated with the parcel. Ms. Leopard responded to the email and indicated that there were not any reported environmental incidents associated with the property.

On September 10, 2018, Pyramid Project Manager Eric Cross performed a site investigation at the property. Mr. Cross did not observe any significant environmental risks on the property at the time of the investigation. The three known USTs were observed to be outside of the NCDOT proposed ROW and/or easements.

- **Geophysical Survey:** The geophysical investigation consisted of electromagnetic (EM) induction-metal detection and ground penetrating radar (GPR) surveys. A total of seven EM anomalies were identified. The majority of the EM anomalies were directly attributed to visible cultural features at the ground surface. An extensive zone of suspected reinforced concrete was located across the majority of the survey area and was further investigated with GPR. GPR verified the presence of metal reinforcement in the concrete. No evidence of larger structures, such as USTs, was observed. Collectively, the geophysical data did not record evidence of unknown metallic USTs at Parcel 14. Known, active tanks were located outside of the survey area.
- **Limited Soil Assessment:** A total of five soil borings were performed across the property. Soil samples were screened in the field using an organic vapor analyzer (OVA) and select soil samples were analyzed for Diesel Range Organics (DRO) and Gasoline Range Organics (GRO) using a QED Analyzer. The DEQ action level for TPH-GRO is 50 milligrams per kilogram (mg/kg) and the action level for TPH-DRO is 100 mg/kg. Soil samples were screened with an OVA and select soil samples were analyzed for DRO and GRO using a QED Analyzer. None of the soil samples analyzed exhibited DRO or GRO concentrations above DEQ action levels.
- **Limited Groundwater Assessment:** The water table was not encountered in the upper 8 feet of the soil column that was sampled during this PSA. Review of the NCDOT engineering plans for this parcel indicate that groundwater will not be encountered during construction activities, based on shallow excavations and a water table depth greater than 8 feet below the ground surface. Therefore, it was not necessary to collect a groundwater sample.
- **Contaminated Soil Volumes:** No evidence of petroleum-impacted soils (DRO/GRO > DEQ Action Levels) was observed during this investigation. Therefore, no recommendations for the treatment, handling, or disposal of such materials are warranted.

It should be noted that, if impacted soil is encountered during road construction outside of the area analyzed by this investigation, the impacted soil should be managed according to NC DEQ Division of Waste Management (DWM) guidelines and disposed of at a permitted facility.

# 1.0 INTRODUCTION

Pyramid Environmental & Engineering P.C. (Pyramid) has prepared this Preliminary Site Assessment (PSA) report documenting background information, field activities, assessment activities, findings, conclusions, and recommendations for Parcel 014, owned by MURPHY OIL, USA. The property currently contains an active gas station surrounded by asphalt and grass medians at 1310 Mebane Oaks Road, Mebane, NC. This PSA was conducted on behalf of the North Carolina Department of Transportation (NCDOT) in accordance with Pyramid's August 9, 2018, technical proposal. This PSA is a part of State Project I-5711.

The purpose of this assessment was to determine the presence or absence of underground storage tanks (USTs) and impacted soils between the existing edge of pavement and the proposed Right-Of-Way (ROW) and/or easements, whichever distance was greater. The PSA was conducted with particular attention to the areas to be cut as indicated by slope stake lines and cross-sections or to be excavated for the installation of drainage features. The location of the subject site is shown on **Figure 1**.

## **1.1 Background Information**

Based on the NCDOT's August 1, 2018, *Request for Technical and Cost Proposal (RFP)*, the PSA was conducted between the existing edge of pavement and the proposed ROW and/or easement lines (whichever distance was greater), with emphasis on the areas to be cut as indicated by slope stake lines and cross-sections or to be excavated for the installation of drainage features and/or other utilities, in accordance with the CADD files provided to Pyramid by the NCDOT. The PSA included the following:

- Research the properties for past uses and possible releases.
- Conduct a preliminary geophysical site assessment and limited soil assessment across the entire parcel with emphasis on the areas to be cut as indicated by slope stake lines and cross-sections or to be excavated for the installation of drainage features and/or other utilities.
- If groundwater is likely to be encountered by subsequent excavation required by construction, then Pyramid will attempt to obtain a groundwater sample from the parcel.

## **1.2 Project Information**

Prior to field activities, a Health and Safety Plan was prepared. Prior to drilling activities, the public underground utilities were located and marked by the North Carolina One-Call Service. Pyramid's geophysical staff provided additional private utility locating services to mark the on-site private, buried utilities.

## 2.0 SITE HISTORY

The NCDOT Pre-Scope comments for Parcel 014 in the RFP documents provided to Pyramid on August 1, 2018, provided the following background information related to the site:

*“Currently convenience store/gas station. 3 tanks currently in use.”*

Pyramid interviewed DEQ personnel, interviewed property owners, and reviewed aerial photographs to assess past uses of the property. Pyramid reviewed historical aerial photographs obtained from Google Earth dating back to 1993. Aerial photographs ranging from 1993 to 2017 are included in **Appendix A**. Historical information reviewed as part of the PSA indicated that the property contained a small building of unknown use as early as 1993. This building appears to have been demolished between 1998 and 2005, and the current gas station building was constructed between 2005 and 2006. Visual observations and the NCDOT documents indicate that three known USTs are currently operating at the facility. Records review provided the following Facility ID information for the property: Facility ID 00-0-0000036764.

On August 31, 2018, Pyramid emailed the Alamance County parcel address (1310 Mebane Oaks Road, Mebane, NC) to Ms. Mindy Lepard, Hydrogeologist with the Department of Environmental Quality (DEQ), UST Section, with a request to investigate any environmental incidents associated with the parcel. Ms. Lepard responded to the email and indicated that there were not any reported environmental incidents associated with the property.

On September 10, 2018, Pyramid Project Manager Eric Cross performed a site investigation at the property. Mr. Cross did not observe any significant environmental risks on the property at the time of the investigation. The three known USTs were observed to be outside of the NCDOT proposed ROW and/or easements.

## 3.0 GEOPHYSICAL INVESTIGATION

Pyramid’s classifications of USTs for the purposes of this PSA 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
<b>Known UST</b> Active tank - spatial location, orientation, and approximate depth determined by geophysics.	<b>Probable UST</b> 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.	<b>Possible UST</b> 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.

The geophysical investigation consisted of electromagnetic (EM) induction-metal detection and ground penetrating radar (GPR) surveys. A total of seven EM anomalies were identified. The majority of the EM anomalies were directly attributed to visible cultural features at the ground surface. An extensive zone of suspected reinforced concrete was located across the majority of the survey area and was further investigated with GPR. GPR verified the presence of metal reinforcement in the concrete. No evidence of larger structures, such as USTs, was observed. Collectively, the geophysical data did not record evidence of unknown metallic USTs at Parcel 14. Known, active tanks were located outside of the survey area.

The full details of the geophysical investigation are documented in Pyramid's Geophysical Investigation Report, dated September 17, 2018, which is included as **Appendix B**.

## 4.0 SOIL SAMPLING ACTIVITIES & RESULTS

### **4.1 Soil Assessment Field Activities**

On October 3, 2018, Pyramid mobilized to the site, drilled soil borings and collected the proposed soil samples for the PSA. Five (5) soil borings (14-1 through 14-5) were advanced on the subject property. The soil borings were completed using a truck-mounted Geoprobe drill rig. The selected locations were chosen to avoid public utilities along the adjacent roads and private utilities associated with the business while remaining in the proposed ROW and/or easement, or within other areas of concern such as proposed drainage features and areas designated for soil removal as indicated by the NCDOT engineering plans. The locations of the borings are shown on **Figure 2**.

Soil samples were continuously collected in four-foot long disposable sleeves from each boring for geologic description and visual examination for signs of contamination. Soil

recovered from each sleeve was screened in the field using an Organic Vapor Analyzer (OVA) approximately every 2 feet, depending on the soil recovery. In general, the soil sample with the highest OVA reading was selected from each boring for QED Ultra-Violet Fluorescence (UVF) laboratory analysis. If field screening detected multiple elevated readings, then additional soil samples from each boring were selectively chosen for UVF analysis. The soil boring logs with the soil descriptions, visual examination, and OVA screening results are included in **Appendix C**. The OVA field screening results are summarized in **Table 1**. To prevent cross-contamination, new disposable nitrile gloves were worn by the sampling technician during the sampling activities and were changed between samples. Petroleum odor was not detected in any of the boring samples during the field screening.

The soil samples selected for total petroleum hydrocarbon (TPH) analyses were analyzed utilizing the QED UVF HC-1 Analyzer system from RED Lab. The DEQ & NCDOT now accept this instrument as an analytical method to provide total petroleum hydrocarbon (TPH) results for soil analysis for PSA projects. Pyramid preserved the samples for UVF analysis in methanol-filled containers provided by RED Lab, an approved laboratory for performing the UVF screening. The samples were analyzed in the field in real-time when possible by a Pyramid employee who has been certified by RED Lab to perform the QED analyses. The soil samples selected for analysis using the QED Analyzer were analyzed for TPH as diesel range organics (DRO) and TPH as gasoline range organics (GRO).

#### **4.2 Soil Sample Analytical Results**

##### *QED Results*

The DEQ action level for TPH-GRO is 50 milligrams per kilogram (mg/kg) and the action level for TPH-DRO is 100 mg/kg. Soil samples were screened with an OVA and select soil samples were analyzed for DRO and GRO using a QED Analyzer. None of the soil samples analyzed exhibited DRO or GRO concentrations above DEQ action levels. The soil sample QED results are summarized in **Table 2**. A copy of the QED analysis report is included in **Appendix D**.

#### **4.3 Temporary Monitoring Well Installation**

The water table was not encountered in the upper 8 feet of the soil column that was sampled during this PSA. Review of the NCDOT engineering plans for this parcel indicate that groundwater will not be encountered during construction activities, based on shallow excavations and a water table depth greater than 8 feet below the ground surface. Therefore, it was not necessary to collect a groundwater sample.

## 5.0 CONCLUSIONS AND RECOMMENDATIONS

As requested by the NCDOT, Pyramid has completed a PSA at Parcel 014 (MURPHY OIL, USA) located at 1310 Mebane Oaks Road, Mebane, NC. The following is a summary of the assessment activities and results.

### **5.1 Geophysical Investigation**

The geophysical investigation consisted of electromagnetic (EM) induction-metal detection and ground penetrating radar (GPR) surveys. A total of seven EM anomalies were identified. The majority of the EM anomalies were directly attributed to visible cultural features at the ground surface. An extensive zone of suspected reinforced concrete was located across the majority of the survey area and was further investigated with GPR. GPR verified the presence of metal reinforcement in the concrete. No evidence of larger structures, such as USTs, was observed. Collectively, the geophysical data did not record evidence of unknown metallic USTs at Parcel 14. Known, active tanks were located outside of the survey area.

### **5.2 Limited Soil Assessment**

The DEQ action level for TPH-GRO is 50 milligrams per kilogram (mg/kg) and the action level for TPH-DRO is 100 mg/kg. Soil samples were screened with an OVA and select soil samples were analyzed for DRO and GRO using a QED Analyzer. None of the soil samples analyzed exhibited DRO or GRO concentrations above DEQ action levels.

### **5.3 Limited Groundwater Assessment**

The water table was not encountered in the upper 8 feet of the soil column that was sampled during this PSA. Review of the NCDOT engineering plans for this parcel indicate that groundwater will not be encountered during construction activities, based on shallow excavations and a water table depth greater than 8 feet below the ground surface. Therefore, it was not necessary to collect a groundwater sample.

### **5.4 Recommendations**

#### *Petroleum-Impacted Soils*

No evidence of petroleum-impacted soils (DRO/GRO > DEQ Action Levels) was observed during this investigation. Therefore, no recommendations for the treatment, handling, or disposal of such materials are warranted.

It should be noted that, if impacted soil is encountered during road construction outside of the area analyzed by this investigation, the impacted soil should be managed according to NC DEQ Division of Waste Management (DWM) guidelines and disposed of at a permitted facility.

## **6.0 LIMITATIONS**

The results of this preliminary investigation are limited to the boring locations completed during this limited assessment and presented in this report. The laboratory results only reflect the current conditions at the locations sampled on the date this PSA was performed.

## **7.0 CLOSURE**

This report was prepared for, and is available solely for use by, the NCDOT and their designees. The contents thereof may not be used or relied upon by any other person without the express written consent and authorization of Pyramid Environmental & Engineering, P.C. (Pyramid). The observations, conclusions, and recommendations documented in this report are based on site conditions and information reviewed at the time of Pyramid's investigation. Pyramid appreciates the opportunity to provide this environmental service.

## **FIGURES**

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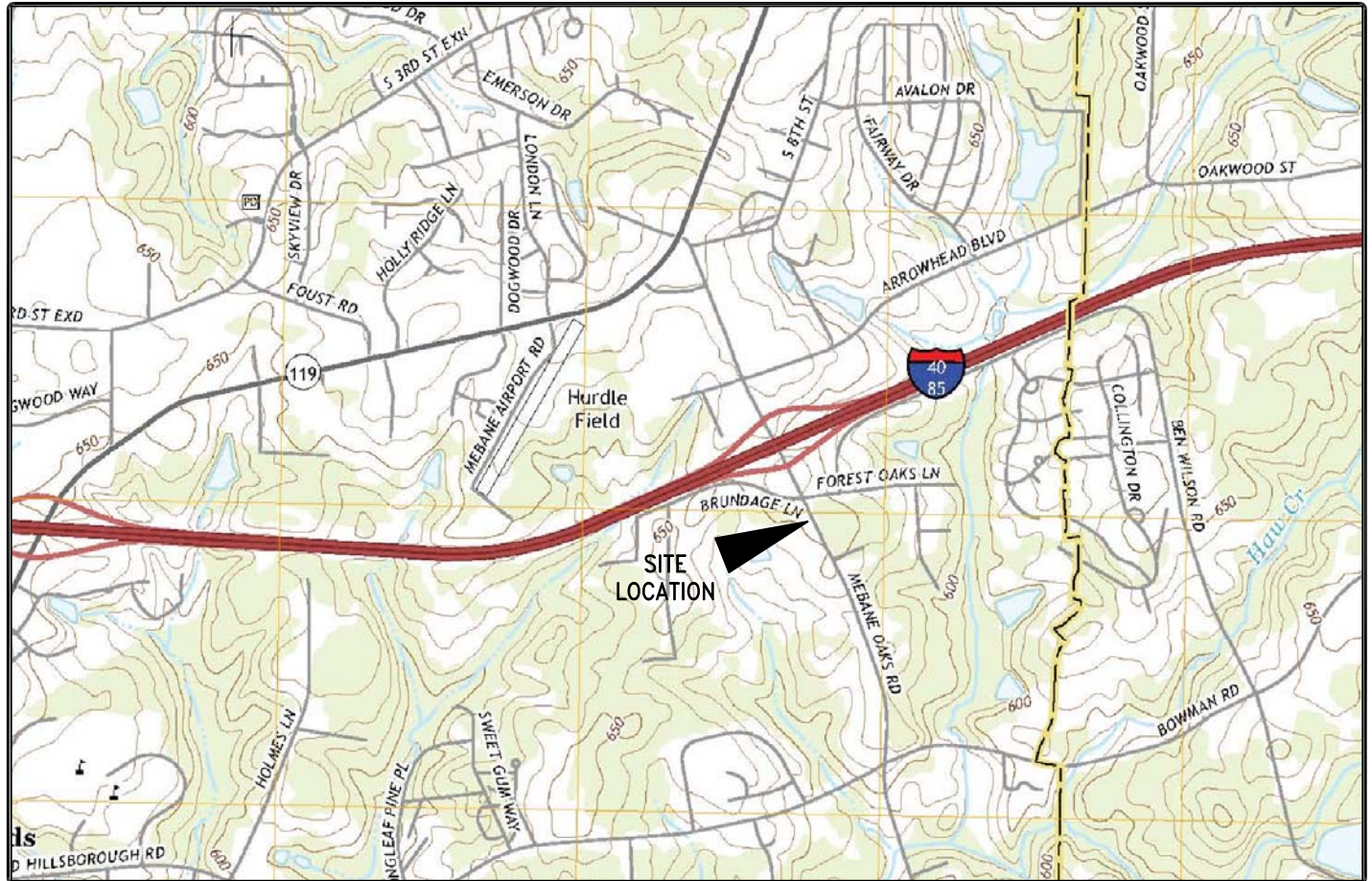
# USGS TOPOGRAPHIC MAP

SITE:

PARCEL 014

LOCATION:

MEBANE, NORTH CAROLINA



## USGS IDENTIFICATION

## SCALES

USGS 7.5  
MINUTE MAP

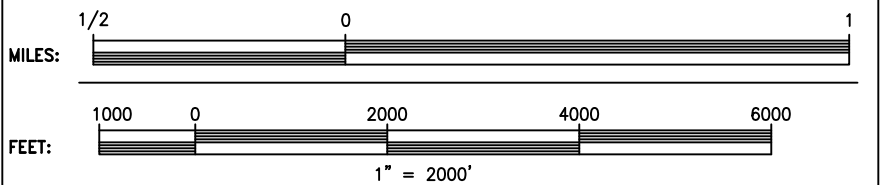
MEBANE, N.C.

ORIGINAL DATE:

1969

PHOTOREVISION  
DATE:

2016

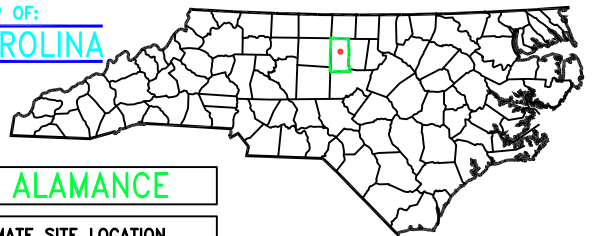


	PRIMARY HIGHWAY, HARD SURFACE
	SECONDARY HIGHWAY, HARD SURFACE
	LIGHT-DUTY ROAD HARD OR IMPROVED SURFACE
	UNIMPROVED ROAD
	STATE ROAD
	U.S. ROUTE
	INTERSTATE ROUTE

NOTES: ► TOPOGRAPHICAL CONTOUR INTERVAL = 10 FEET  
► PHOTOREVISIONS DENOTED IN PURPLE



COUNTY MAP OF:  
**NORTH CAROLINA**



COUNTY: **ALAMANCE**

APPROXIMATE SITE LOCATION



CLIENT: NCDOT I-5711

PROPERTY NAME: 1310 MEBANE OAKS RD.

CITY: MEBANE

STATE: NORTH CAROLINA

TITLE: TOPOGRAPHIC MAP

SCALE:

1" = 2000'

DATE:

10/10/18

DRAWING NAME:

USGSTOPO

DRAWN BY: KAM

CHECK BY: TDL

JOB NO.: 2018-242

TYPE: PSA

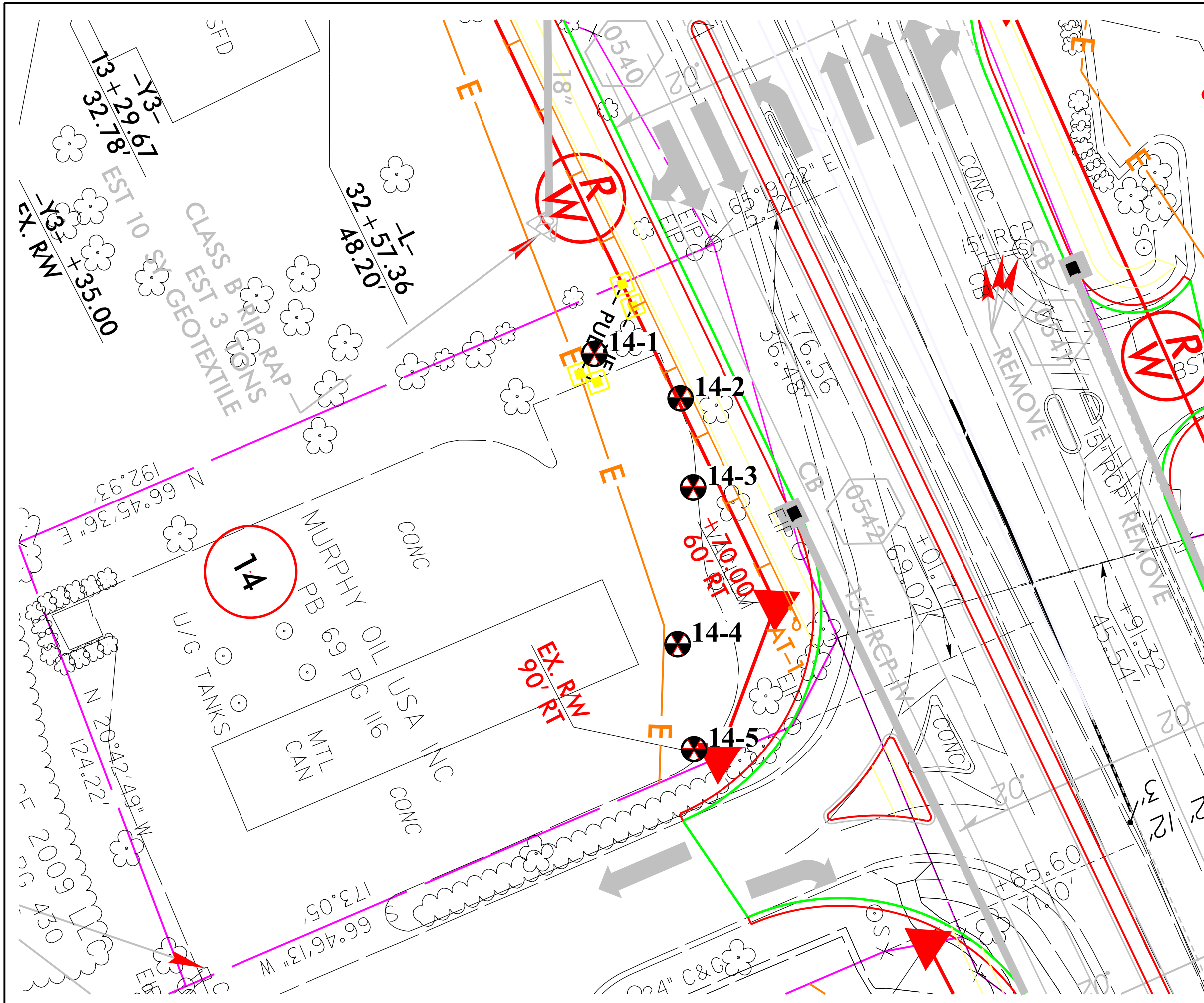
FIGURE NUMBER:

1

### NOTES

TOPOGRAPHIC MAP USED IN THIS GRAPHIC IS MAPPED, EDITED, AND PUBLISHED BY THE UNITED STATES GEOLOGIC SURVEY, DEPARTMENT OF THE INTERIOR, RESTON VIRGINIA.

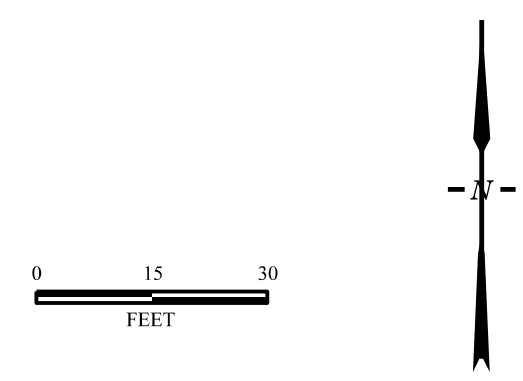
THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS.



**LEGEND**

- EXISTING ROW
- EXISTING PROPERTY BOUNDARY
- PROPOSED ROW LINE
- E TEMPORARY CONSTRUCTION EASEMENT
- PDE PROPOSED PERMANENT DRAINAGE
- PUE PROPOSED PERMANENT UTILITY
- - - PROPOSED SS CUT LINE
- - - PROPOSED SS FILL LINE
- PROPOSED DRAINAGE PIPING
- SOIL BORING LOCATION

Analytical results are presented in Table 2 of PSA Report



TITLE	LOCATIONS OF SOIL BORINGS	
PROJECT	PARCEL 14 MEBANE, NORTH CAROLINA NCDOT PROJECT I-5711	
	503 INDUSTRIAL AVENUE GREENSBORO, NC 27406 336.335.3174 (p) 336.691.0648 (f) License # C1251 Eng. / #C257 Geology	
DATE: 10-10-2018	REVISION NO. 0	
PYRAMID PROJECT NO. 2018-242	FIGURE NO. 2	

## **TABLES**

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**TABLE 1**  
**Summary of Soil Field Screening Results**  
**NCDOT Project I-5711**  
**Parcel 014 - Murphy Oil**  
**1310 Mebane Oaks Road**  
**Mebane, Alamance County, North Carolina**

SOIL BORING 10/3/2018	SAMPLE ID	DEPTH (feet bgs)	PID READINGS (PPM)
14-1	14-1(0-2)	0 to 2	1.5
	14-1(2-4)	2 to 4	5.3
	14-1(4-6)	4 to 6	1.6
	14-1(6-8)	6 to 8	3.0
14-2	14-2(0-2)	0 to 2	2.1
	14-2(2-4)	2 to 4	1.3
	14-2(4-6)	4 to 6	1.0
	14-2(6-8)	6 to 8	0.8
14-3	14-3(0-2)	0 to 2	1.8
	14-3(2-4)	2 to 4	1.5
	14-3(4-6)	4 to 6	1.5
	14-3(6-8)	6 to 8	1.1
14-4	14-4(0-2)	0 to 2	1.7
	14-4(2-4)	2 to 4	1.9
	14-4(4-6)	4 to 6	2.1
	14-4(6-8)	6 to 8	2.0
14-5	14-5(0-2)	0 to 2	35.7
	14-5(2-4)	2 to 4	6.4
	14-5(4-6)	4 to 6	7.0
	14-5(6-8)	6 to 8	3.3

bgs= below ground surface

PID= photo-ionization detector

PPM= parts-per-million

☐ = sampled for lab analysis &/or QROS-QED analysis

OVA= Organic Vapor Analyzer

**TABLE 2**  
**Summary of Soil Sample QED Analytical Results for GRO/DRO**  
**NCDOT State Project I-5711**  
**Parcel 14 (Murphy Oil) - 1310 Mebane Oaks Road**  
**Mebane, Alamance County, North Carolina**

SAMPLE ID	DATE	DEPTH (feet)	PID (ppm)	QROS - QED Analysis		
				GRO (mg/kg) (C5-C10)	DRO (mg/kg) (C10-C35)	TPH (mg/kg) (C5-C35)
14-1(2-4)	10/3/2018	2-4	5.3	<0.57	<0.57	<0.57
14-1(6-8)	10/3/2018	6-8	3.0	<0.6	<0.6	<0.6
14-2(0-2)	10/3/2018	0-2	2.1	<0.35	<0.35	<0.35
14-2(2-4)	10/3/2018	2-4	1.3	<0.63	<0.63	<0.63
14-3(0-2)	10/3/2018	0-2	1.8	0.94	2.8	3.7
14-4(4-6)	10/3/2018	4-6	2.1	<0.64	<0.64	<0.64
14-4(6-8)	10/3/2018	6-8	2.0	<0.59	<0.59	<0.59
14-5(0-2)	10/3/2018	0-2	35.7	<0.35	0.35	0.35
14-5(4-6)	10/3/2018	4-6	7.0	<0.36	<0.36	<0.36
<b>NC Initial Action Level - UST Section for 5035/5030-GRO; 3550-DRO</b>				50	100	NA

PID= photo-ionization detector  
PPM= parts-per-million

GRO= Gasoline Range Organics  
DRO= Diesel Range Organics  
mg/kg= milligrams-per-kilogram

TPH= Total Petroleum  
Hydrocarbons (GRO + DRO)

NA= Not Applicable

\* Bold values indicate concentrations above initial action levels

## **APPENDIX A**

---

**1993 Aerial Photograph**  
Parcel 14

**Legend**  
★ Parcel 14



★ Parcel 14

1007

Mebane Oaks Rd

Forest Oaks Ln

↑  
N  
100 ft

**1998 Aerial Photograph**  
Parcel 14

**Legend**  
★ Parcel 14



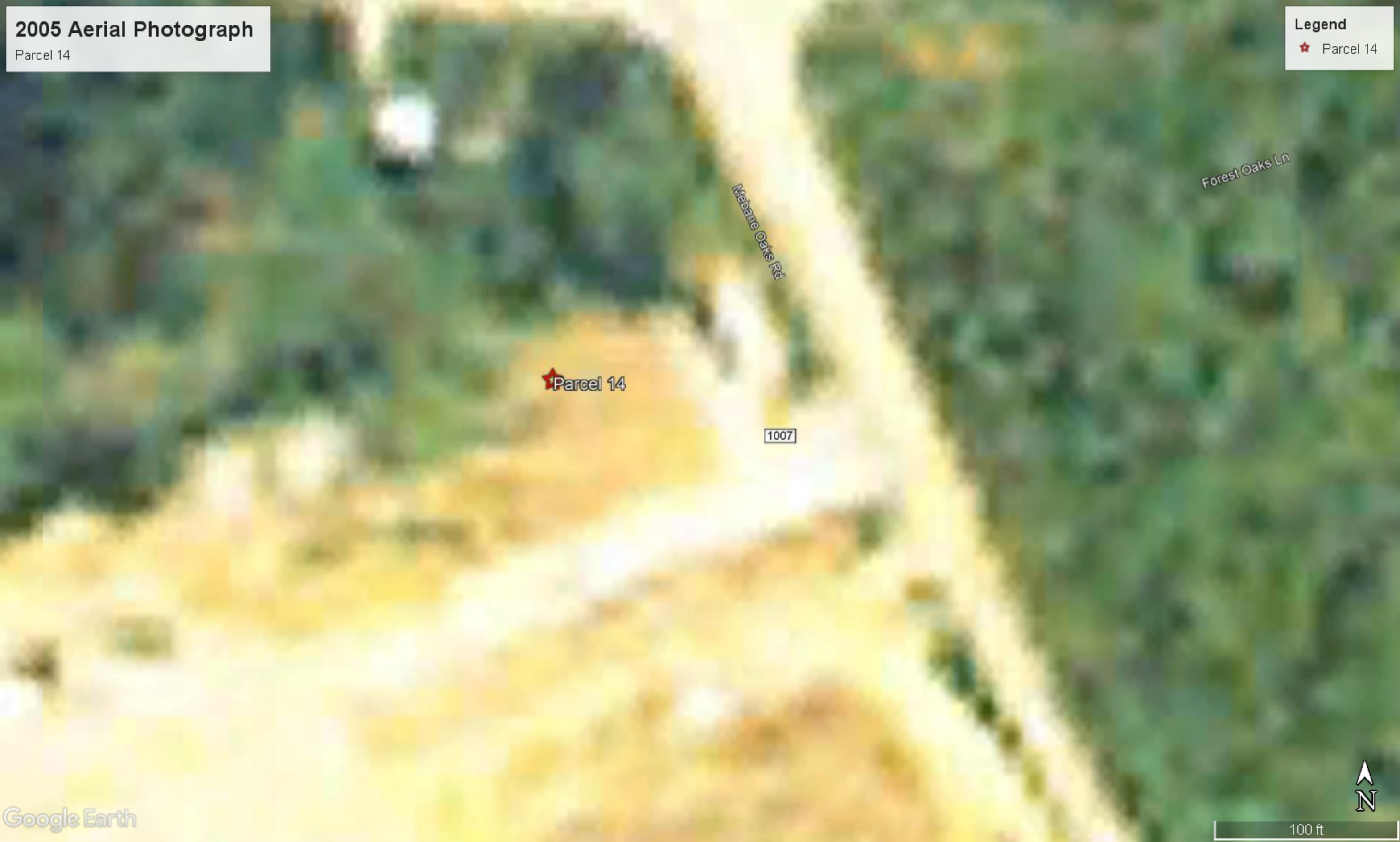
*Mebane Oaks Rd*

*Forest Oaks Ln*

★ Parcel 14

1007

↑  
N  
100 ft



★ Parcel 14

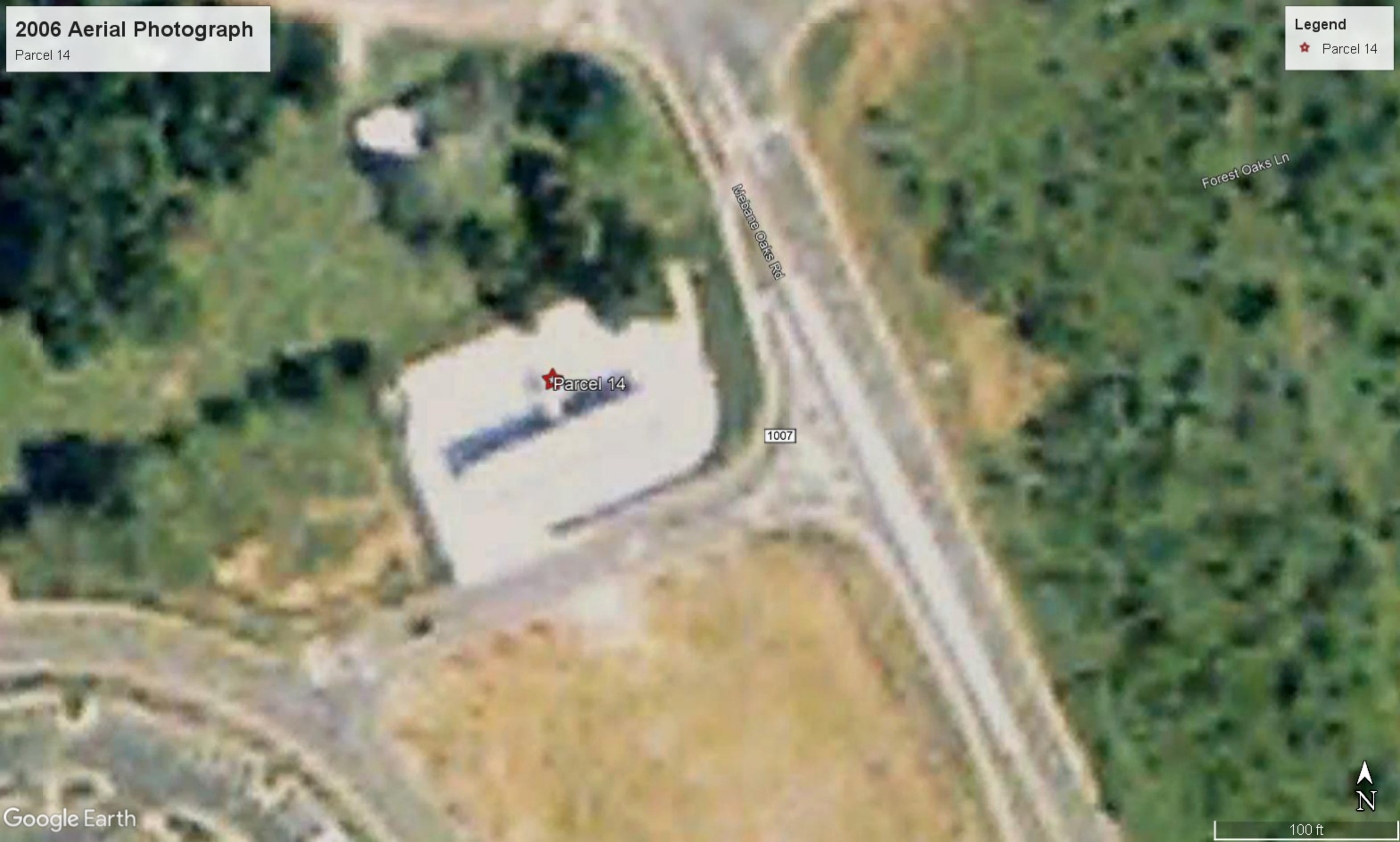
1007

Mebane Oaks Rd

Forest Oaks Ln

2006 Aerial Photograph  
Parcel 14

Legend  
★ Parcel 14



★ Parcel 14

1007

Mebane Oaks Rd

Forest Oaks Ln





## **APPENDIX B**

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PYRAMID GEOPHYSICAL SERVICES  
(PROJECT 2018-242)


# GEOPHYSICAL SURVEY


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## METALLIC UST INVESTIGATION: PARCEL 14 NCDOT PROJECT I-5711 (50401.1.FS1)

1310 MEBANE OAKS ROAD, MEBANE, NC  
SEPTEMBER 17, 2018

Report prepared for: Gordon Box  
NCDOT Geotechnical Engineering Unit  
1020 Birch Ridge Drive  
Raleigh, NC 27610

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NC License #1066

**GEOPHYSICAL INVESTIGATION REPORT**  
**Parcel 14 – 1310 Mebane Oaks Road**  
**Mebane, Alamance County, North Carolina**

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## 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

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**Project Description:** Pyramid Environmental conducted a geophysical investigation for the North Carolina Department of Transportation (NCDOT) at Parcel 14, located at 1310 Mebane Oaks Road, in Mebane, NC. The survey was part of an NCDOT Right-of-Way (ROW) investigation (NCDOT Project I-5711). 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 September 10-11, 2018, the geophysical investigation was performed to determine if unknown, metallic underground storage tanks (USTs) were present beneath the survey area. It should be noted that construction/utility work and steep slopes prevented comprehensive coverage of the grass areas surrounding the perimeter of the survey area.

**Geophysical Results:** The geophysical investigation consisted of electromagnetic (EM) induction-metal detection and ground penetrating radar (GPR) surveys. A total of seven EM anomalies were identified. The majority of the EM anomalies were directly attributed to visible cultural features at the ground surface. An extensive zone of suspected reinforced concrete was located across the majority of the survey area and was further investigated with GPR. GPR verified the presence of metal reinforcement in the concrete. No evidence of larger structures, such as USTs, was observed. Collectively, the geophysical data did not record evidence of unknown metallic USTs at Parcel 14. Known, active tanks were located outside of the survey area.

## INTRODUCTION

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Pyramid Environmental conducted a geophysical investigation for the North Carolina Department of Transportation (NCDOT) at Parcel 14, located at 1310 Mebane Oaks Road, in Mebane, NC. The survey was part of an NCDOT Right-of-Way (ROW) investigation (NCDOT Project I-5711). 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 September 10-11, 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, asphalt, and grass surfaces. The known, active tanks supplying fuel to the gas station pumps were located outside of the geophysical survey area. It should be noted that construction/utility work and steep slopes prevented comprehensive coverage of the grass areas surrounding the perimeter of the survey area. An aerial photograph showing the survey area boundaries and ground-level photographs are shown in **Figure 1**.

## FIELD METHODOLOGY

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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-MK2 (EM61) metal detector integrated with a Geode External GPS/GLONASS receiver. 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 September 11, 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
<b>Known UST</b> Active tank - spatial location, orientation, and approximate depth determined by geophysics.	<b>Probable UST</b> 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.	<b>Possible UST</b> 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

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### *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**

<b>Metallic Anomaly #</b>	<b>Cause of Anomaly</b>	<b>Investigated with GPR</b>
1	Sign	
2	Metal Posts	
3	Utilities/Guy Wire	
4	Sign	
5	Reinforced Concrete	✓
6	Sign	
7	Hydrant	

The majority of the EM anomalies were directly attributed to visible cultural features at the ground surface, including signs, metal posts, utilities, a guy wire, and a hydrant. GPR scans were performed in a grid-like fashion across the suspected reinforced concrete (Anomaly 5) 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 ten GPR transects were performed at the site. All of the transect images are included in **Appendix A**. GPR Transects 1-10 were performed across the suspected reinforced concrete associated with EM Anomaly 5. These transects verified the presence of metal reinforcement in the concrete. No evidence of larger structures, such as USTs, was observed.



Collectively, the geophysical data did not record evidence of unknown metallic USTs at Parcel 14. Known, active tanks were located outside of the survey area. **Figure 4** provides an overlay of the geophysical survey area onto the NCDOT MicroStation engineering plans for reference.

## SUMMARY & CONCLUSIONS

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Pyramid's evaluation of the EM61 and GPR data collected at Parcel 14 in Mebane, North Carolina, provides the following summary and conclusions:

- The EM61 and GPR surveys provided reliable results for the detection of metallic USTs within the accessible portions of the geophysical survey area.
- The majority of the EM anomalies were directly attributed to visible cultural features at the ground surface. An extensive zone of suspected reinforced concrete was located across the majority of the survey area and was further investigated with GPR.
- GPR verified the presence of metal reinforcement in the concrete. No evidence of larger structures, such as USTs, was observed.
- Collectively, the geophysical data did not record evidence of unknown metallic USTs at Parcel 14. Known, active tanks were located outside of the survey area.

## LIMITATIONS

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Geophysical surveys have been performed and this report was prepared for the NCDOT 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 South)



View of Survey Area  
(Facing Approximately West)

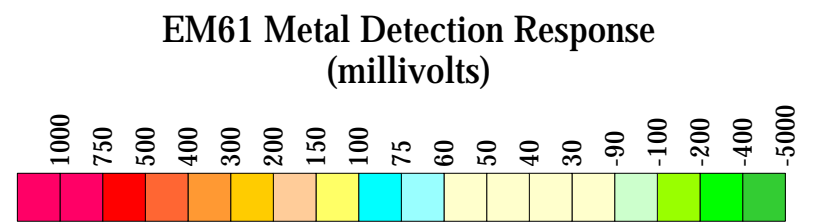
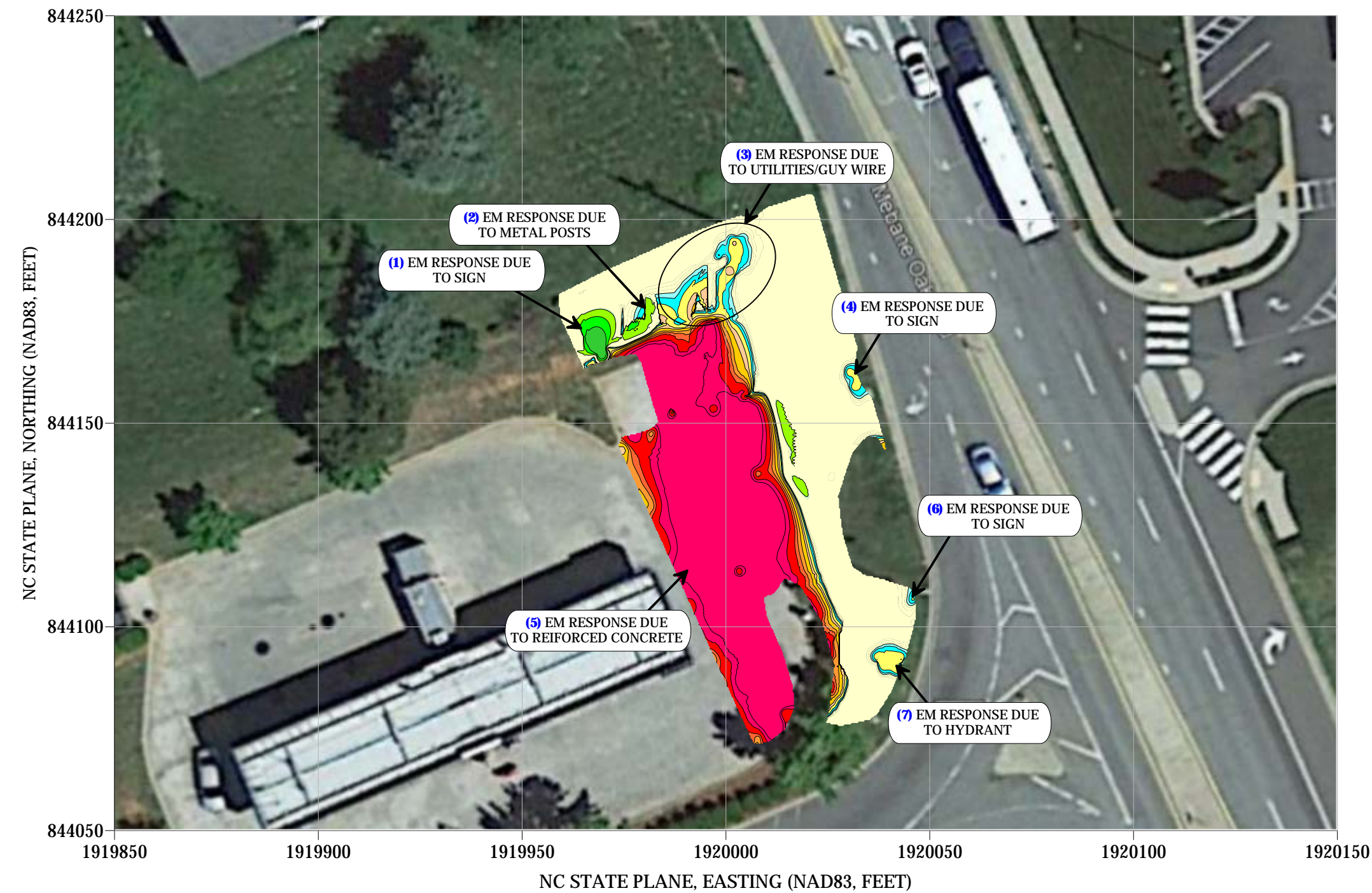


<p>503 INDUSTRIAL AVENUE GREENSBORO, NC 27460 (336) 335-3174 (p) (336) 691-0648 (f) License # C1251 Eng. / License # C257 Geology</p>	<p>PROJECT</p> <p>PARCEL 14 MEBANE, NORTH CAROLINA NCDOT PROJECT I-5711</p>	<p>TITLE</p> <p>PARCEL 14 - GEOPHYSICAL SURVEY BOUNDARIES AND SITE PHOTOGRAPHS</p>	<p>DATE</p> <p>9/10/2018</p>	<p>CLIENT</p> <p>NCDOT</p>
			<p>PYRAMID PROJECT #:</p> <p>2018-242</p>	<p><b>FIGURE 1</b></p>

# EM61 METAL DETECTION RESULTS

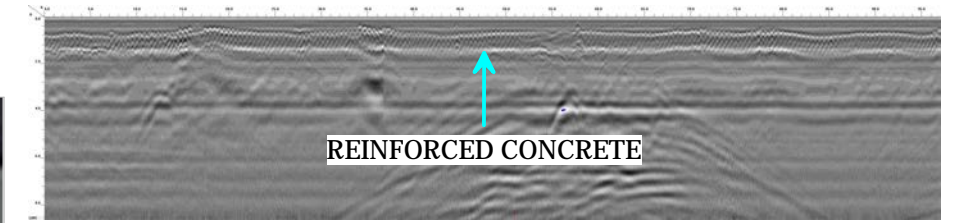
**NO EVIDENCE OF UNKNOWN METALLIC USTs OBSERVED.**

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 September 10, 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 September 11, 2018.

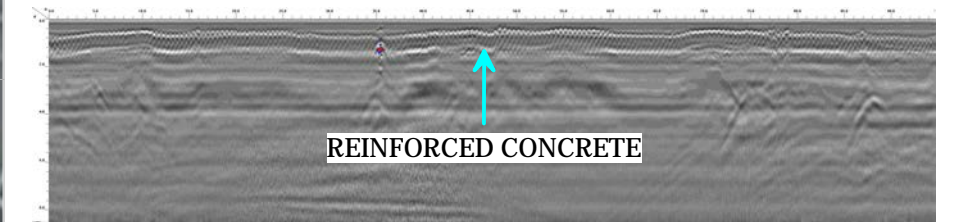


<p>503 INDUSTRIAL AVENUE GREENSBORO, NC 27460 (336) 335-3174 (p) (336) 691-0648 (f) License # C1251 Eng. / License # C257 Geology</p>	<p>PROJECT</p> <p>PARCEL 14 MEBANE, NORTH CAROLINA NCDOT PROJECT I-5711</p>	<p>TITLE</p> <p>PARCEL 14 - EM61 METAL DETECTION CONTOUR MAP</p>	<p>DATE</p> <p>9/10/2018</p>	<p>CLIENT</p> <p>NCDOT</p>
			<p>PYRAMID PROJECT #:</p> <p>2018-242</p>	<p><b>FIGURE 2</b></p>

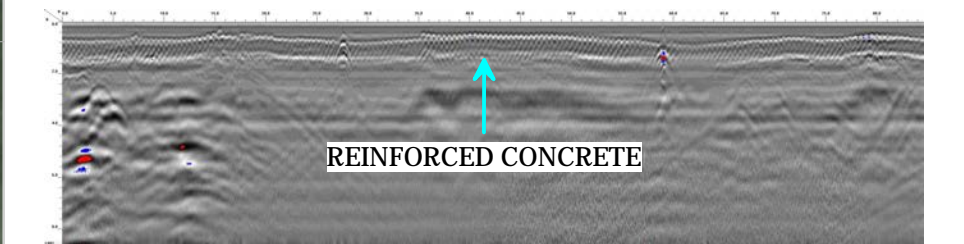
# LOCATIONS OF GPR TRANSECTS



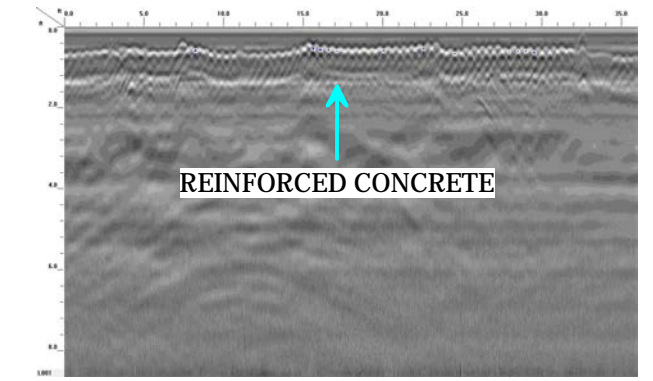
GPR TRANSECT 1 (T1)



GPR TRANSECT 2 (T2)




GPR TRANSECT 3 (T3)

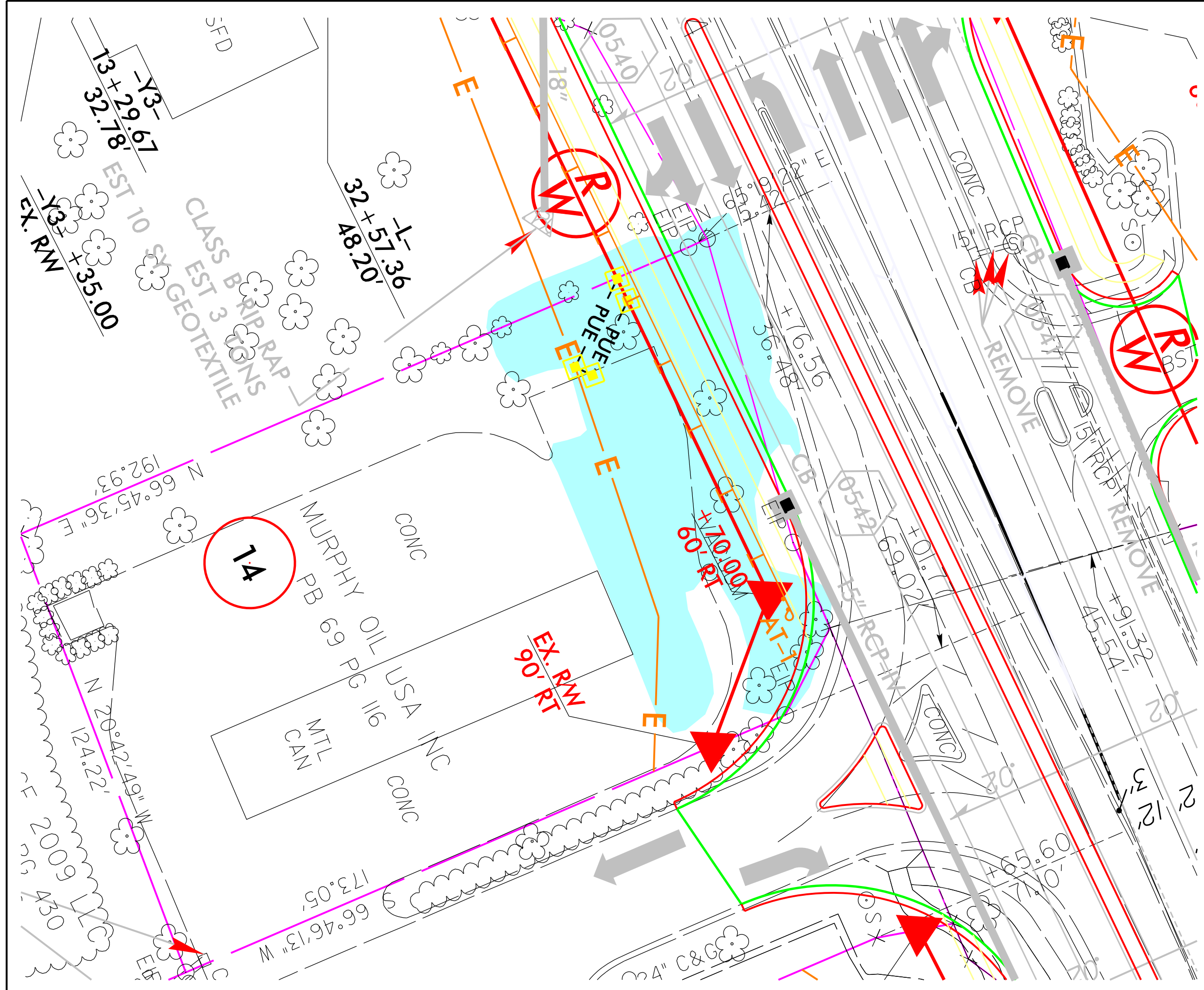


GPR TRANSECT 5 (T5)

\*EXTENSIVE GPR SCANS WERE CONDUCTED OVER THE ENTIRE SITE. TRANSECT LINES ON THE MAP ABOVE INDICATE LOCATIONS WHERE DATA WERE SAVED. THESE LOCATIONS WERE CHOSEN TO HIGHLIGHT STRUCTURES IDENTIFIED IN THE SUBSURFACE OR TRANSECTS THAT ARE REPRESENTATIVE OF GENERAL SUBSURFACE CONDITIONS.

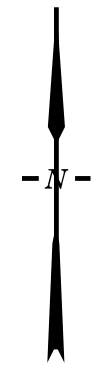
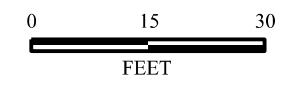


 503 INDUSTRIAL AVENUE GREENSBORO, NC 27460 (336) 335-3174 (p) (336) 691-0648 (f) License # C1251 Eng. / License # C257 Geology	PROJECT <b>PARCEL 14</b> <b>MEBANE, NORTH CAROLINA</b> <b>NCDOT PROJECT I-5711</b>	TITLE <b>PARCEL 14 - GPR TRANSECT LOCATIONS</b> <b>AND SELECT IMAGES</b>	DATE 9/11/2018	CLIENT NCDOT
			PYRAMID PROJECT #: 2018-242	<b>FIGURE 3</b>



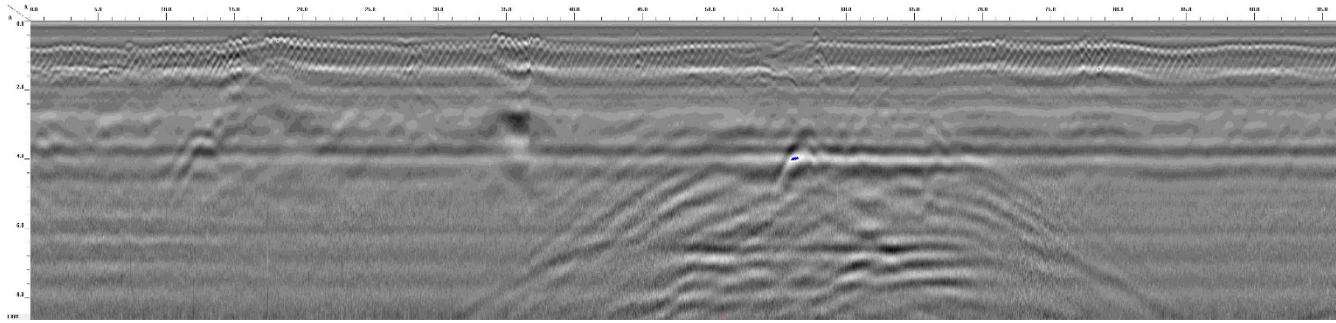
**LEGEND**

- EXISTING ROW
- EXISTING PROPERTY BOUNDARY
- PROPOSED ROW LINE
- E — TEMPORARY CONSTRUCTION EASEMENT
- PDE PROPOSED PERMANENT DRAINAGE
- PUE PROPOSED PERMANENT UTILITY
- - - PROPOSED SS CUT LINE
- - - PROPOSED SS FILL LINE
- PROPOSED DRAINAGE PIPING
- GEOPHYSICAL SURVEY AREA

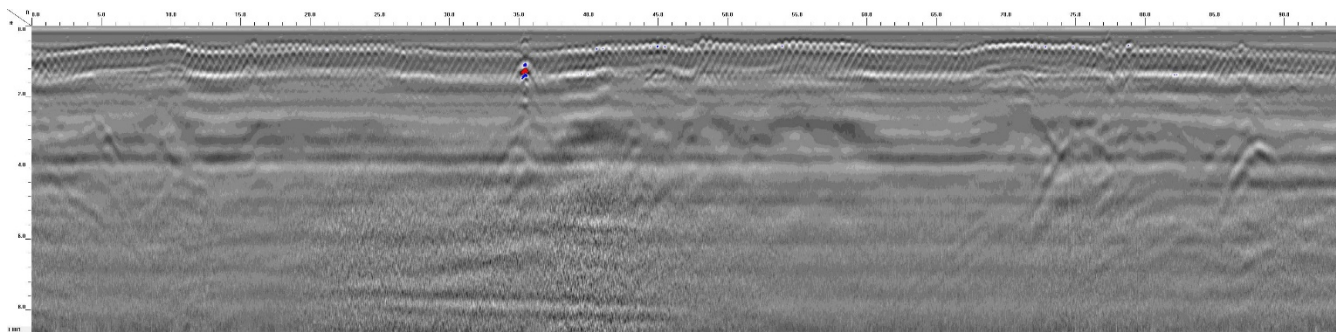


TITLE OVERLAY OF GEOPHYSICAL SURVEY BOUNDARIES ON NCDOT ENGINEERING PLANS	
PROJECT PARCEL 14 MEBANE, NORTH CAROLINA NCDOT PROJECT I-5711	
503 INDUSTRIAL AVENUE GREENSBORO, NC 27406 336.335.3174 (p) 336.691.0648 (f) License # C1251 Eng. / #C257 Geology	
DATE: 09-18-2018	REVISION NO. 0
PYRAMID PROJECT NO. 2018-242	FIGURE NO. 4

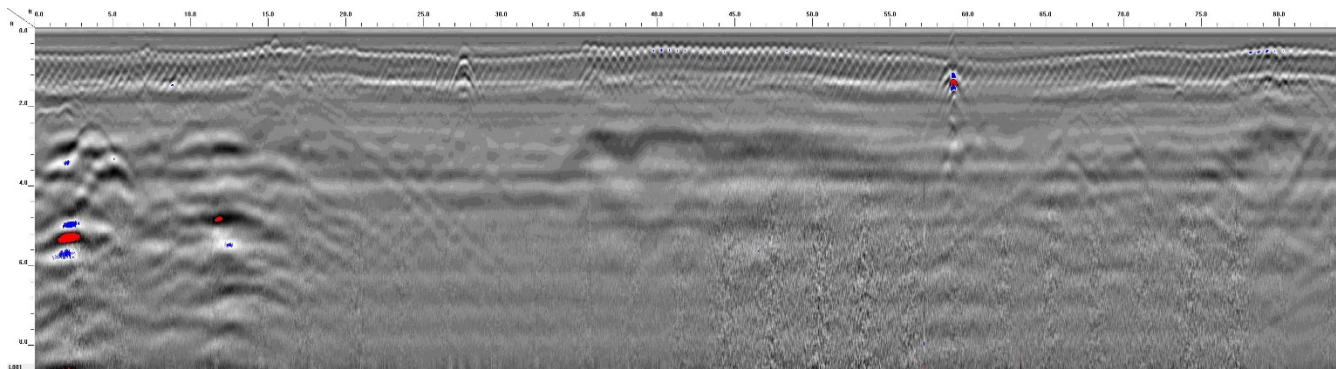
## **Appendix A – GPR Transect Images**



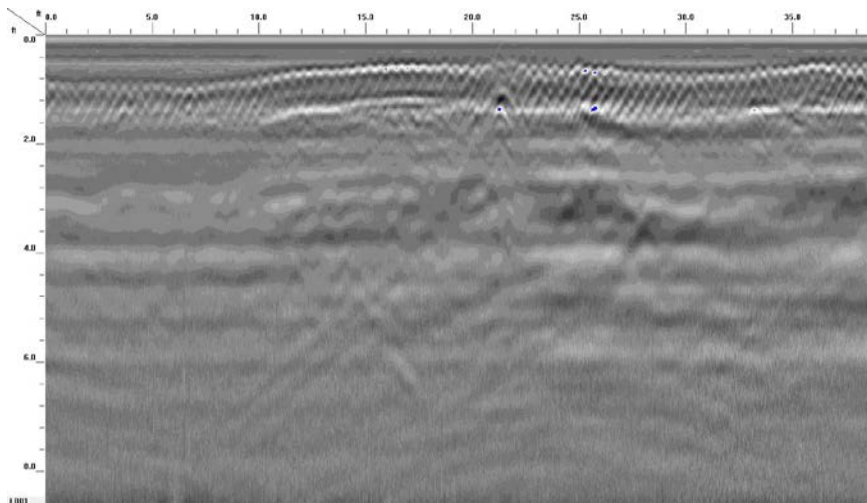
Transect 1



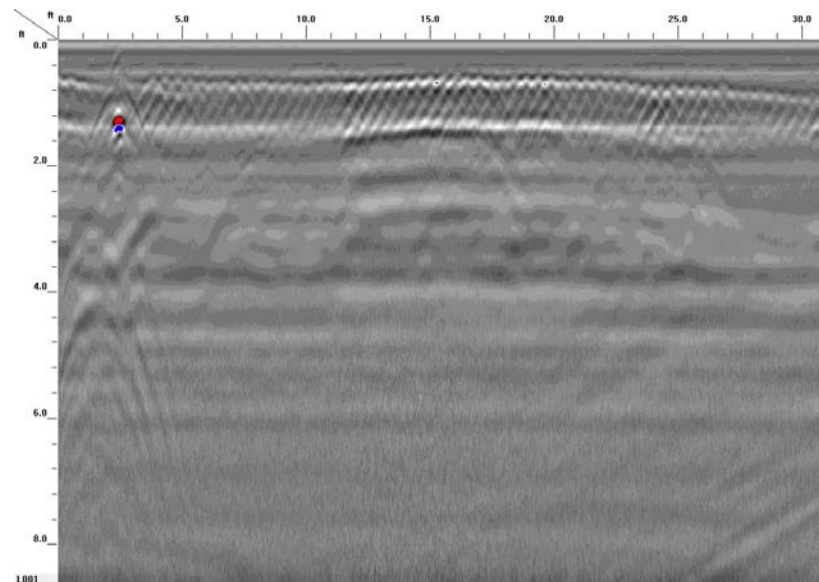
Transect 2



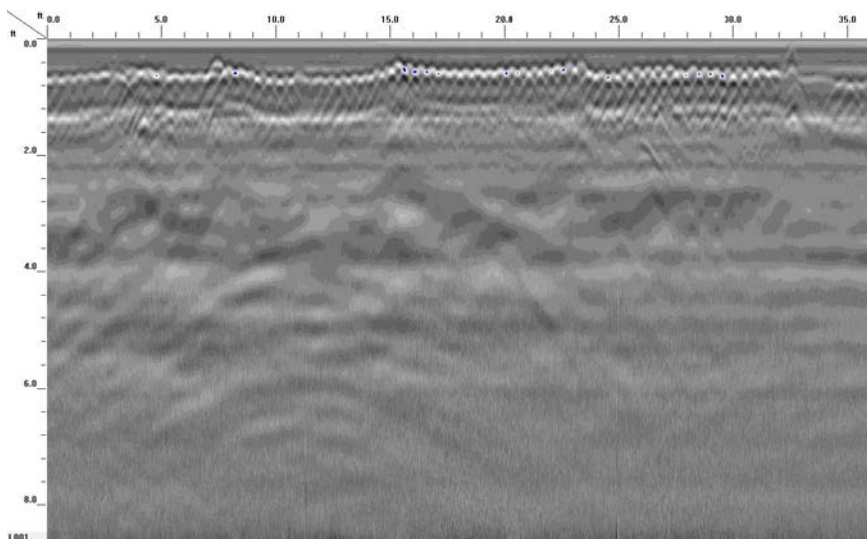
Transect 3



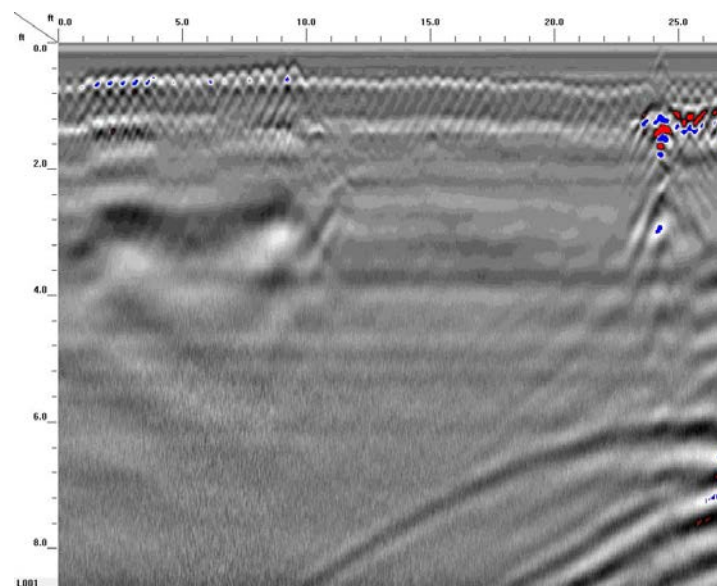
Transect 4



Transect 6

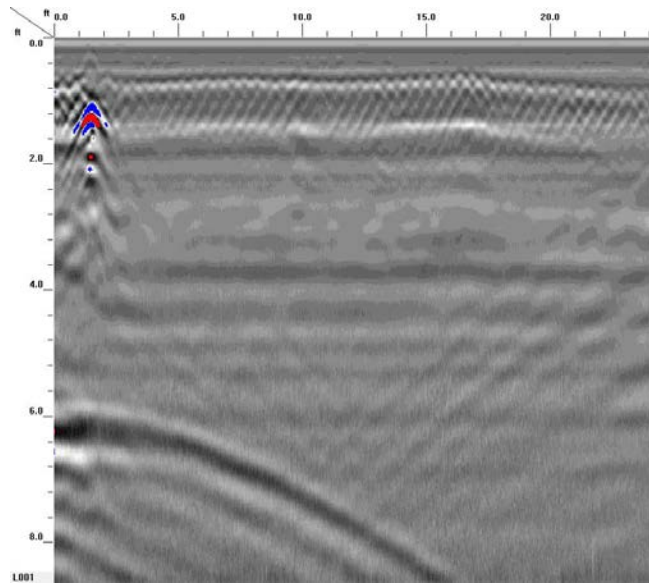


Transect 5

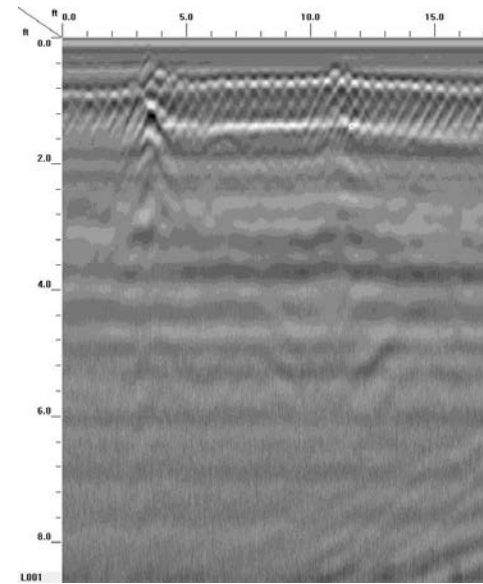


Transect 7

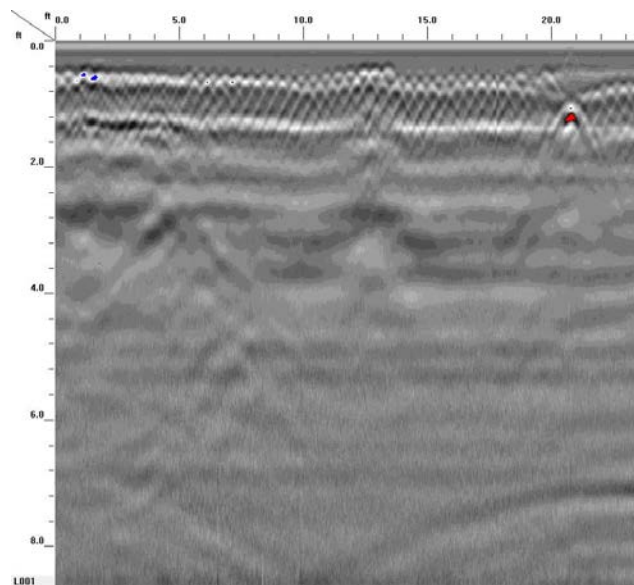




Transect 8



Transect 10



Transect 9

## APPENDIX C

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# Pyramid Environmental & Engineering, P.C.

## FIELD DRILLING RECORD

<b>PROJECT NAME: PROJECT NUMBER:</b>	NC DOT I-5711, Parcel 014, Mebane, NC (2018-242)	<b>BORING/WELL NO:</b>	14-1
<b>SITE LOCATION:</b>	Alamance County, NC	<b>BORING/WELL LOCATION:</b>	Parcel 014, North portion
<b>START DATE:</b>	10/03/18	<b>COMPLETED:</b>	10/03/18
<b>GEOLOGIST:</b>	M. Trifunovic / T. Leatherman	<b>DRILLER:</b>	Solutions-IES
<b>DRILL METHOD:</b>	Geoprobe	<b>SAMPLE METHOD:</b>	Macro-core
<b>BORING DIA:</b>	2-inch	<b>CASING DIA:</b>	N/A
<b>TOTAL DEPTH:</b>	8 feet	<b>CASING DEPTH:</b>	N/A

DEPTH (ft.)	VISUAL MANUAL SOIL CLASSIFICATION COLOR, TEXTURE, STRUCTURE, CONSISTENCY, ODOR, ETC.	OVA RESULTS PERCENT RECOVERY BLOW COUNTS
----------------	---	--

DEPTH (ft.)	VISUAL MANUAL SOIL CLASSIFICATION COLOR, TEXTURE, STRUCTURE, CONSISTENCY, ODOR, ETC.	OVA RESULTS PERCENT RECOVERY BLOW COUNTS
		Core Sample Depths
0-2	Reddish-brown, silty-clay (ML), moist, no odor	PID= 1.5 PPM
2-4	Reddish-brown, silty-clay (ML), moist, no odor	PID= 5.3 PPM
4-6	Reddish-brown, silty-clay (ML), moist, no odor	PID= 1.6 PPM
6-8	Reddish-brown, silty-clay (ML), moist, no odor	PID= 3.0 PPM
	Water table not encountered	

### MONITORING WELL INFORMATION (IF APPLICABLE)

RISER LENGTH (ft) \_\_\_      DEPTH (ft) \_\_\_\_\_      DIAMETER (in) \_\_\_      MATERIAL \_\_\_\_\_.  
 SCREEN LENGTH (ft) \_\_\_      DEPTH (ft) \_\_\_\_\_      DIAMETER (in) \_\_\_      MATERIAL \_\_\_\_\_.  
 DEPTH TO TOP OF SAND \_\_\_\_\_      BAGS OF SAND \_\_\_\_\_.  
 DEPTH TO TOP SEAL \_\_\_\_\_      BENTONITE USED \_\_\_\_\_      BAGS OF CEMENT USED 0.







# Pyramid Environmental & Engineering, P.C.

## FIELD DRILLING RECORD

<b>PROJECT NAME: PROJECT NUMBER:</b>	NC DOT I-5711, Parcel 014, Mebane, NC (2018-242)	<b>BORING/WELL NO:</b>	14-5
<b>SITE LOCATION:</b>	Alamance County, NC	<b>BORING/WELL LOCATION:</b>	Parcel 014, South portion
<b>START DATE:</b>	10/03/18	<b>COMPLETED:</b>	10/03/18
<b>GEOLOGIST:</b>	M. Trifunovic / T. Leatherman	<b>DRILLER:</b>	Solutions-IES
<b>DRILL METHOD:</b>	Geoprobe	<b>SAMPLE METHOD:</b>	Macro-core
<b>BORING DIA:</b>	2-inch	<b>CASING DIA:</b>	N/A
<b>TOTAL DEPTH:</b>	8 feet	<b>CASING DEPTH:</b>	N/A

DEPTH (ft.)	VISUAL MANUAL SOIL CLASSIFICATION COLOR, TEXTURE, STRUCTURE, CONSISTENCY, ODOR, ETC.	OVA RESULTS PERCENT RECOVERY BLOW COUNTS
----------------	---	--

		Core Sample Depths
0-2	Reddish-brown, silty-clay (ML), moist, no odor	PID= 35.7 PPM
2-4	Reddish-brown, silty-clay (ML), moist, no odor	PID= 6.4 PPM
4-6	Reddish-brown, silty-clay (ML), moist, no odor	PID= 7.0 PPM
6-8	Reddish-brown, silty-clay (ML), moist, no odor	PID= 3.3 PPM
	Water table not encountered	

### MONITORING WELL INFORMATION (IF APPLICABLE)

RISER LENGTH (ft) \_\_\_      DEPTH (ft) \_\_\_\_\_      DIAMETER (in) \_\_\_      MATERIAL \_\_\_\_\_.  
 SCREEN LENGTH (ft) \_\_\_      DEPTH (ft) \_\_\_\_\_      DIAMETER (in) \_\_\_      MATERIAL \_\_\_\_\_.  
 DEPTH TO TOP OF SAND \_\_\_\_\_      BAGS OF SAND \_\_\_\_\_.  
 DEPTH TO TOP SEAL \_\_\_\_\_      BENTONITE USED \_\_\_\_\_      BAGS OF CEMENT USED 0.

## **APPENDIX D**

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### Hydrocarbon Analysis Results

**Client:** NCDOT Alamance - Mebane Parcel 014  
**Address:** Mebane Oaks Rd. - Murphy Station

**Samples taken** Nine  
**Samples extracted** Nine  
**Samples analysed** Nine

**Contact:** **Operator** Tim Leatherman

**Project:** NCDOT Alamance - Mebane Parcel 014

H09382

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
										C5 - C10	C10 - C18	C18	
s	14-1(2-4)	22.8	<0.57	<0.57	<0.57	<0.57	<0.11	<0.18	<0.023	0	0	100	PHC not detected,(BO)
s	14-1(6-8)	24.1	<0.6	<0.6	<0.6	<0.6	<0.12	<0.19	<0.024	0	0	100	Residual HC,(BO)
s	14-2(0-2)	13.9	<0.35	<0.35	<0.35	<0.35	<0.07	<0.11	<0.014	0	0	100	,(FCM),(BO)
s	14-2(2-4)	25.0	<0.63	<0.63	<0.63	<0.63	<0.13	<0.2	<0.025	0	0	0	PHC not detected,(BO)
s	14-3(0-2)	26.0	<1.3	0.94	2.8	3.7	2.9	<0.21	<0.026	68.4	23.8	7.8	Deg.Fuel 64.7%,(FCM)
s	14-4(4-6)	25.7	<0.64	<0.64	<0.64	<0.64	<0.13	<0.21	<0.026	0	0	100	PHC not detected,(BO)
s	14-4(6-8)	23.6	<0.59	<0.59	<0.59	<0.59	<0.12	<0.19	<0.024	0	0	0	Residual HC,(BO)
s	14-5(0-2)	14.0	<0.35	<0.35	0.35	0.35	0.28	<0.11	<0.014	0	70.7	29.3	V.Deg.PHC 75.4%,(FCM)
s	14-5(4-6)	14.3	<0.36	<0.36	<0.36	<0.36	<0.07	<0.11	<0.014	0	79.7	20.3	Residual HC

Initial Calibrator QC check **OK**

Final FCM QC Check **OK**

95.6 %

Concentration values in mg/kg for soil samples and mg/L for water samples. Soil values uncorrected for moisture or stone content. Fingerprints provide a tentative hydrocarbon identification.

Abbreviations :- FCM = Results calculated using Fundamental Calibration Mode : % = confidence of hydrocarbon identification : (PFM) = Poor Fingerprint Match : (T) = Turbid : (P) = Particulate detected

B = Blank Drift : (SBS)/(LBS) = Site Specific or Library Background Subtraction applied to result : (BO) = Background Organics detected : (OCR) = Outside cal range : (M) = Modified Result.

% Ratios estimated aromatic carbon number proportions : HC = Hydrocarbon : PHC = Petroleum HC : FP = Fingerprint only. **Data generated by HC-1 Analyser**

