North Carolina Department of Transportation

Preliminary Site Assessment, Revised
State Project: R-2707E
WBS Element: 34497.1.2
Cleveland County

Parcel 613
James Lawson Thompson, Bobby Ray Horne, Et al.
5105 East Dixon Boulevard
Kings Mountain, North Carolina
May 17, 2019
Revised July 9, 2019

Wood Environment and Infrastructure Solutions, Inc.
Project: 1883R2707

John Maas, LG
Senior Geologist

NORTH CAROLINA LICENSED SEAL 2399 GEOLOGIST JOHN R. MAAS

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Andrew J. Frantz, REM
Senior Scientist

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1.0 INTRODUCTION

In response to the North Carolina Department of Transportation (NCDOT) Request for Proposal, dated March 27, 2019, Wood Environment & Infrastructure Solutions, Inc. (Wood) has performed a Preliminary Site Assessment (PSA) for Parcel 613. The investigation was conducted in accordance with Wood's Technical and Cost proposal dated April 5, 2019 and revised April 11, 2019. NCDOT contracted Wood to perform the PSA at the parcel, within the area to be affected by future road construction activities, in order to identify potential impacts from the former use of the property.

The parcel is located at 5105 East Dixon Boulevard along the northern side of East Dixon Boulevard as shown on the Vicinity Map, **Figure 1**. At the time of this PSA, the parcel was occupied by Foggy Bob's Vaping Shack. It is identified as Parcel 613, the James Lawson Thompson, Bobby Ray Horne, Et al. property, (Site) within the NCDOT R-2707E design file. The parcel is in Kings Mountain of Cleveland County, North Carolina. The area of investigation within the parcel is shown on **Figure 2**.

A limited PSA report was submitted on May 17, 2019 describing our April 2019 site reconnaissance and geophysical survey at the Site. No subsurface samples were collected during the limited April 2019 PSA activities as Mr. James Thompson (Site owner) did not grant access to the Site for soil sample collection.

On May 29, 2019 Wood was informed that the NCDOT had received permission from the Site owner to collect soil samples. The following report is a revised version of the May 17, 2019 report including the June 2019 soil sampling activities.

1.1 Site History

Based on our historical review, the building at the Site was constructed in 1966 and based on the building's architecture, is suspected to have possibly operated as a gasoline station in the past. Wood interviewed the Site owner and current Site tenant and neither had knowledge of a gasoline station formerly operating at the property. Reportedly, prior to operating as a retail business (Foggy Bob's Vaping Shack), the site was occupied by a residence. The Site is not identified on the North Carolina Department of Environmental Quality (NCDEQ) Underground Storage Tank (UST) Facility Database registry and no known

groundwater incidents are identified at the Site. No files associated with the Site were available for review on the NCDEQ Laserfiche website.

1.2 Site Description

The Site is located in a mixed-use commercial and residential area of Kings Mountain in Cleveland County and covers approximately 0.2 acres. The Site is occupied by an approximately 576-square foot commercial building (Foggy Bob's Vaping Shack). Remaining portions of the Site are grass and gravel-covered. A photographic log of the property is included as **Appendix A**.

2.0 GEOLOGY

2.1 Regional Geology

The Site is located within the Inner Piedmont Belt of the Piedmont Physiographic Province of North Carolina. According to the 1985 State Geologic Map of North Carolina, the area is underlain by Cherryville granite.

2.2 Site Geology

Site geology was observed through the advancement of 10 soil borings (P613-SB1 to P613-SB10). Figure 2 presents the boring locations and site layout. Boring depth targeted a total depth of 10 feet below ground surface (bgs) for the borings at the Site with refusal encountered at one foot bgs in boring P613-SB10. Soils encountered in the borings consisted mostly of red to brown sandy clays and tan silty sands. Petroleum odor and staining was not observed and groundwater was not encountered in the 10 borings. Based on observations of topography of the Site vicinity, the groundwater flow direction is inferred to be generally to the northwest. Boring logs are presented in **Appendix B**.

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 created including the Site-specific health and safety information necessary for the field activities. North Carolina 811 was contacted on April 9, 2019 and again on June 5, 2019 to report the proposed sampling activities and subsequently notify affected utilities for the parcel. Probe Utility Locating (PUL) was retained by Wood to perform utility locating at the Site and GEL Solutions (GEL) was procured by wood to perform a geophysical survey of the area of investigation. South Atlantic Environmental Drilling and Construction Company, Inc. (SAEDACCO) from Fort Mill, South Carolina was retained by Wood to perform the direct-push sampling and RED Lab instrumentation was scheduled for the use in UVF analysis.

Wood understands that acquisition of the right-of-way is necessary for the construction of the US 74 – Shelby Bypass. Boring locations were strategically placed within the parcel to maximize the opportunity to encounter potential contaminated soil resulting from previous activities and materials storage relating to possible former Site operations (gasoline station).

3.2 Site Reconnaissance

Wood personnel performed a Site reconnaissance with property owner notification on April 9, 2019. Mr. James Thompson (Site owner) was contacted via phone and did not grant access to the Site for soil sample collection. Mr. Thompson's contact information was provided to the NCDOT, and access for soil sampling was subsequently obtained. During the Site reconnaissance, the area was visually examined for the presence of areas/obstructions that could potentially affect the subsurface investigation. A commercial building was observed at the Site along with a water-supply well. A gravel-covered area was located along the southern exterior of the building and grass-covered areas were located along the eastern exterior.

3.3 Geophysical Survey Results

The geophysical survey of the Site occurred between April 15 and 18, 2019. GEL performed a time-domain electromagnetic (TDEM) survey of the Site with a ground penetrating radar (GPR) survey conducted across select EM anomalies. The GEL geophysical report is presented as **Appendix C**. GEL reported eight anomalies within the area of investigation with four attributed to visible cultural features at the ground surface including a vehicle and surficial metal. The remaining anomalies were suspected buried debris and designated no confidence anomalies. No subsurface geophysical anomalies indicating the presence of USTs were detected by GEL within the limits of the area of investigation at the Site.

3.4 Soil Sampling

In advance of drilling activities, PUL performed utility locating at the Site on June 9, 2019. On June 11, 2019, Wood and SAEDACCO mobilized to the Site to advance 10 soil borings at the Site across the area of investigation. The borings were advanced via direct-push technology to an approximate depth of 10 feet bgs. Boring P613-SB10 encountered refusal at approximately one foot bgs on concrete. The boring was offset twice and each time refusal was encountered at approximately one foot bgs on concrete. Boring P613-SB10 was located in the vicinity of an EM anomaly identified during the geophysical survey which was attributed to buried debris. It is likely buried concrete debris caused the probe refusal at this location. Due to shallow probe refusal, no soil screening was performed and no soil sample was collected from boring P613-SB10. The remaining borings were advanced in locations targeting likely areas where suspected former gasoline station fuel storage and operations may have occurred.

The purpose of the soil sampling was to determine if a release had impacted the Site and if so, to estimate the volume of impacted soil that might require special handling during NCDOT construction activities. To minimize potential for cross-contamination between boring locations with the direct-push rig, a new PVC liner (tube) was inserted into the sampler for each soil interval. Soil sampling was accompanied by field screening. Wood conducted field screening for volatile organic compounds (VOCs) of the soil borings with a photoionization detector (PID). The direct-push soil borings were screened with the PID at two-foot intervals. A portion of the interval of the soil boring exhibiting the highest PID reading was retained for analysis of total petroleum hydrocarbons (TPH), diesel range organics (DRO), gasoline range organics (GRO), benzene, toluene, ethylbenzene, and xylene (BTEX), total aromatics, and polycyclic aromatic hydrocarbons (PAH) soil via on-site

ultraviolet fluorescence (UVF). Fourteen total samples were collected from the Site from the borings for UVF on-site analysis.

4.0 SOIL SAMPLING RESULTS

Based on PID field screening and UVF hydrocarbon analysis on June 11, 2019, evidence of petroleum hydrocarbon impacts was not identified.

4.1 Soil Screening and UVF Analyses

The majority of PID readings for the 10 borings did not exceed 0.0 parts per million (ppm) with the exception of 0.3 ppm in sample P613-SB9-8-10 collected from 8 to 10 feet bgs and 1.8 ppm in sample P613-SB7-4-6 collected from four to six feet bgs. The PID field screening results are summarized in **Table 1** and provided on the boring logs in Appendix B.

Results from the on-site UVF petroleum soil analyses are presented in **Table 2**, with instrument generated tables in **Appendix C**. Several categories of analyses were measured such as: DRO, GRO, TPH, PAHs, and total aromatics. **Figure 3** presents the GRO and DRO results at each boring.

Elevated TPH values above the NCDEQ Action Limit of 50 milligrams per kilogram (mg/kg) for GRO or 100 mg/kg for DRO were not detected in the 14 samples collected from the borings advanced at the Site. GRO was detected in one sample (P613-SB6-6-8) at a concentration of 0.82 mg/kg. The hydrocarbon results from the QED QROS Hydrocarbon Analyzer are provided in Appendix C.

5.0 CONCLUSIONS

Based on the Site observations, UVF analysis, and laboratory analysis, petroleum-impacted soil contamination was not identified and as a result the NCDEQ Action level of 100 mg/kg for DRO and 50 mg/kg for GRO were not exceeded. No subsurface geophysical anomalies indicating the presence of USTs were detected during the geophysical survey. Wood interviewed the Site owner and current site tenant and neither had knowledge of a gasoline

station formerly operating on the property. Evidence of a past gasoline station operating at the Site was not observed during the sampling activities.

6.0 RECOMMENDATIONS

Based on these PSA results, Wood does not recommend further assessment in the area of investigation or special soil handling during construction.

TABLES

Table 1: Summary of PID Screening Results
Parcel 613 - James Lawson Thompson, Bobby Ray Horne, Et al.
Kings Mountain, North Carolina
Wood Project: 1883R2707E

Boring ID	Depth of Sample Interval	PID Reading
P613-SB1	2-4	0.0
P613-SB2	0-2	0.0
P613-SB2	8-10	0.0
P613-SB3	2-4	0.0
P613-SB4	2-4	0.0
P613-SB5	0-2	0.0
P613-SB5	6-8	0.0
P613-SB6	0-2	0.0
P613-SB6	6-8	0.0
P613-SB7	0-2	0.0
P613-SB7	4-6	1.8
P613-SB8	2-4	0.0
P613-SB9	0-2	0.0
P613-SB9	8-10	0.3

Notes:

1. Samples collected on June 11, 2019
2. Depths shown in feet below ground surface (bgs)
3. PID = Photoionization Detector
4. PID readings shown in parts per million (ppm)

Prepared By/Date: RPD 6/13/2019

Checked By/Date: JRM 6/26/2019

Table 2: Summary of UVF Petroleum Soil Results
Parcel 613 - James Lawson Thompson, Bobby Ray Horne, Et al.
Kings Mountain, North Carolina
Wood Project: 1883R2707E

Sample ID Number	Sample Depth	BTEX	GRO	DRO	PAHs
P613-SB1-2-4	2-4	<0.33	<0.33	<0.33	<0.11
P613-SB2-0-2	0-2	<0.29	<0.29	<0.29	<0.09
P613-SB2-8-10	8-10	<0.46	<0.46	<0.46	<0.15
P613-SB3-2-4	2-4	<0.59	<0.59	<0.59	<0.19
P613-SB4-2-4	2-4	<0.28	<0.28	0.28	<0.09
P613-SB5-0-2	0-2	<0.36	<0.36	<0.36	<0.12
P613-SB5-6-8	6-8	<0.40	0.82	<0.40	<0.13
P613-SB6-0-2	0-2	<0.21	<0.21	<0.21	<0.07
P613-SB6-6-8	6-8	<0.34	<0.34	<0.34	<0.11
P613-SB7-0-2	0-2	<0.38	<0.38	<0.38	<0.12
P613-SB7-4-6	4-6	<0.33	<0.33	<0.33	<0.1
P613-SB8-2-4	2-4	<0.36	<0.36	<0.36	<0.12
P613-SB9-0-2	0-2	<0.46	<0.46	<0.46	<0.15
P613-SB9-8-10	8-10	<0.42	<0.42	<0.42	<0.13
NC State Action Level		**N/A**	**50**	**100**	**N/A**

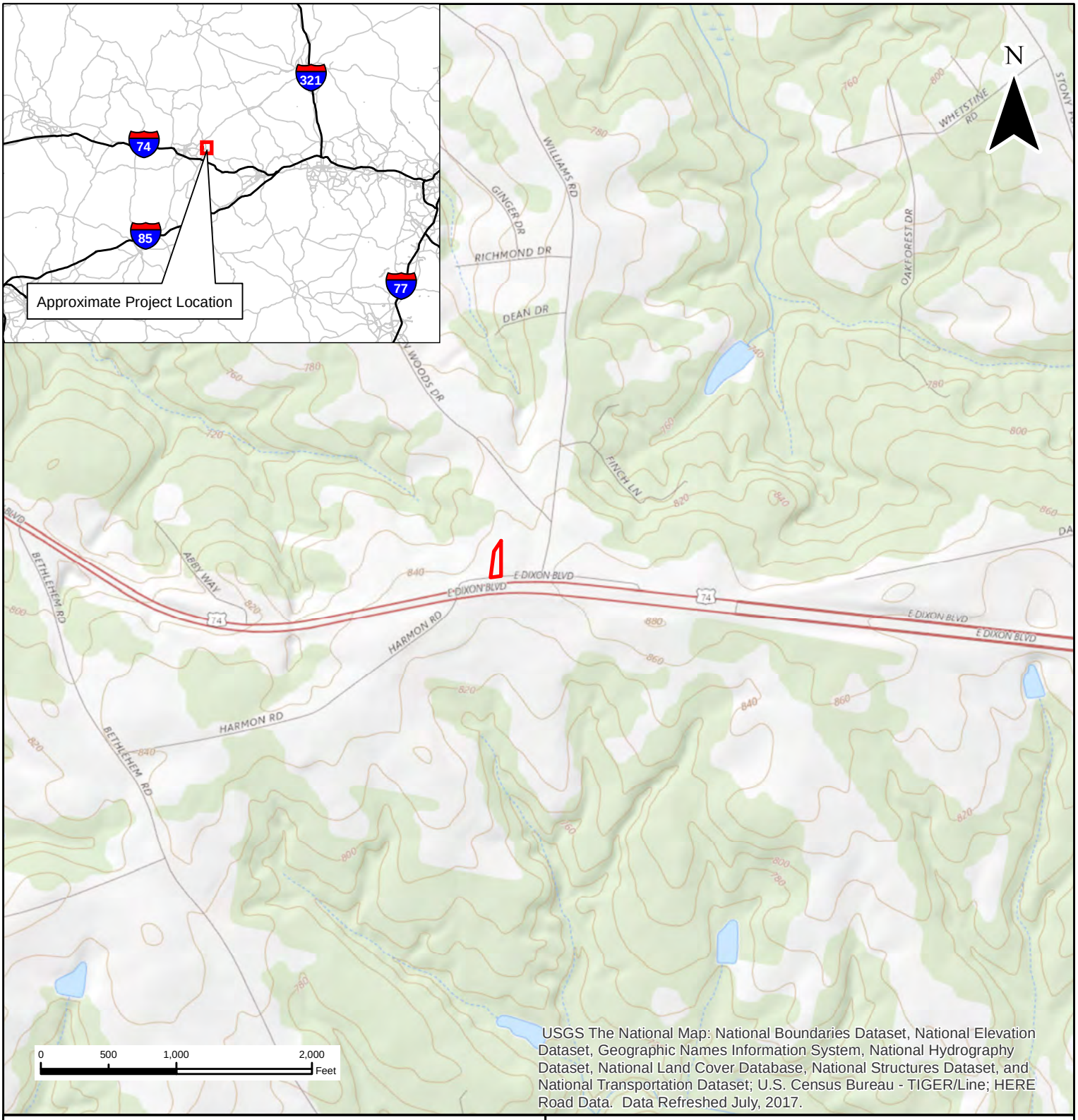
Notes:

1. Samples collected on June 11, 2019
2. Depths shown in feet below ground surface (bgs)
3. Concentrations shown in milligrams per kilogram (mg/kg)
4. BTEX = Benzene, toluene, ethylbenzene, xylene
5. GRO = Gasoline Range Organics
6. DRO = Diesel Range Organics
7. PAHs = Polycyclic aromatic hydrocarbons
8. N/A = Not applicable

Prepared By/Date: RPD 6/13/2019

Checked By/Date: JRM 6/26/2019

FIGURES

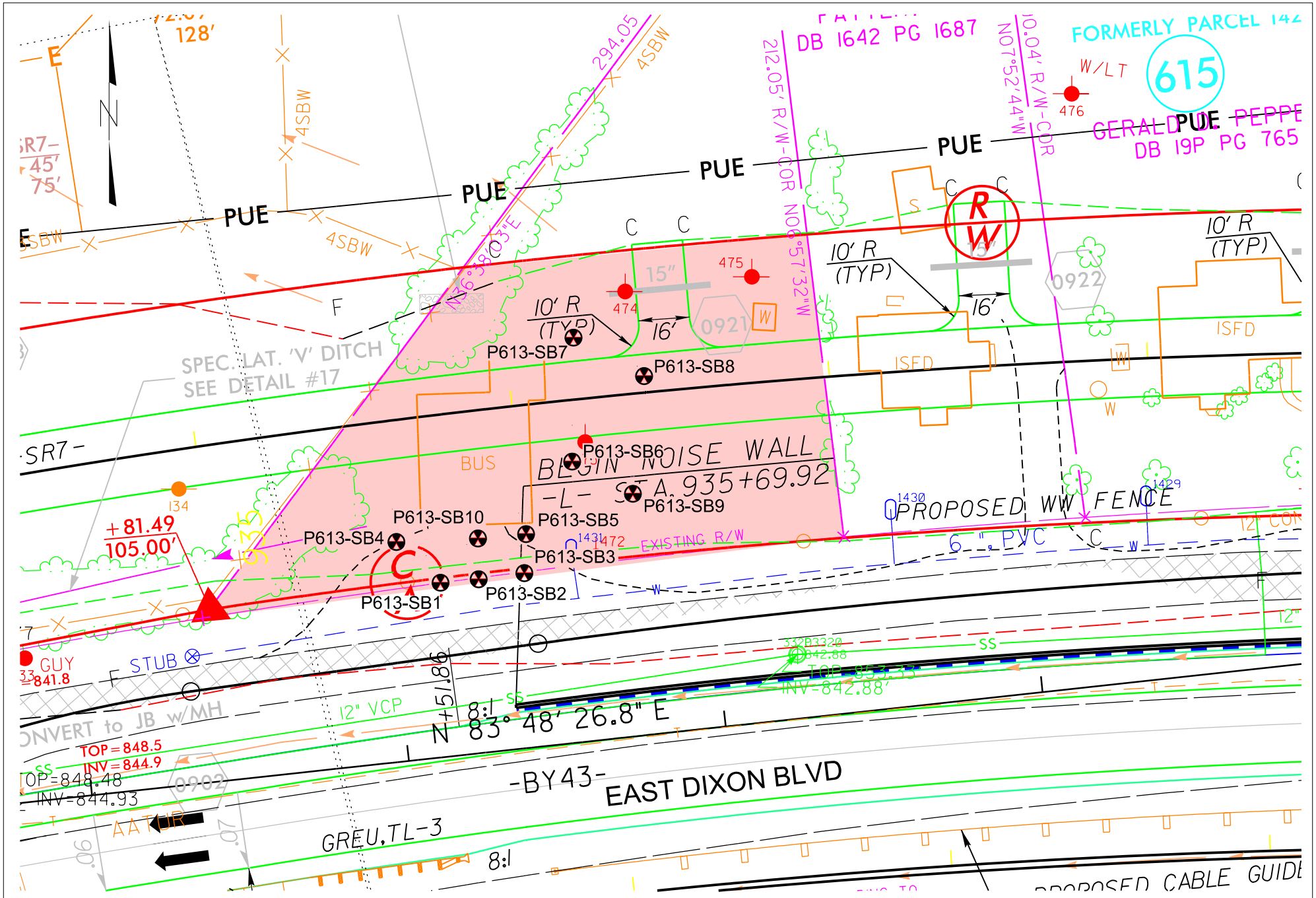


wood.

SITE VICINITY
R2707E - Parcel 613
James L. Thompson & Bobby Ray Horne
5105 East Dixon Boulevard
Kings Mountain, North Carolina 28086

Site Boundary

Prepared By: LMM Date: 4/4/2019	Checked By: AJF Date: 4/4/2019	Project No.: 1883R2707	Figure No.: 1



BORING LOCATION

AREA OF INVESTIGATION

20' 0' 20' 40'

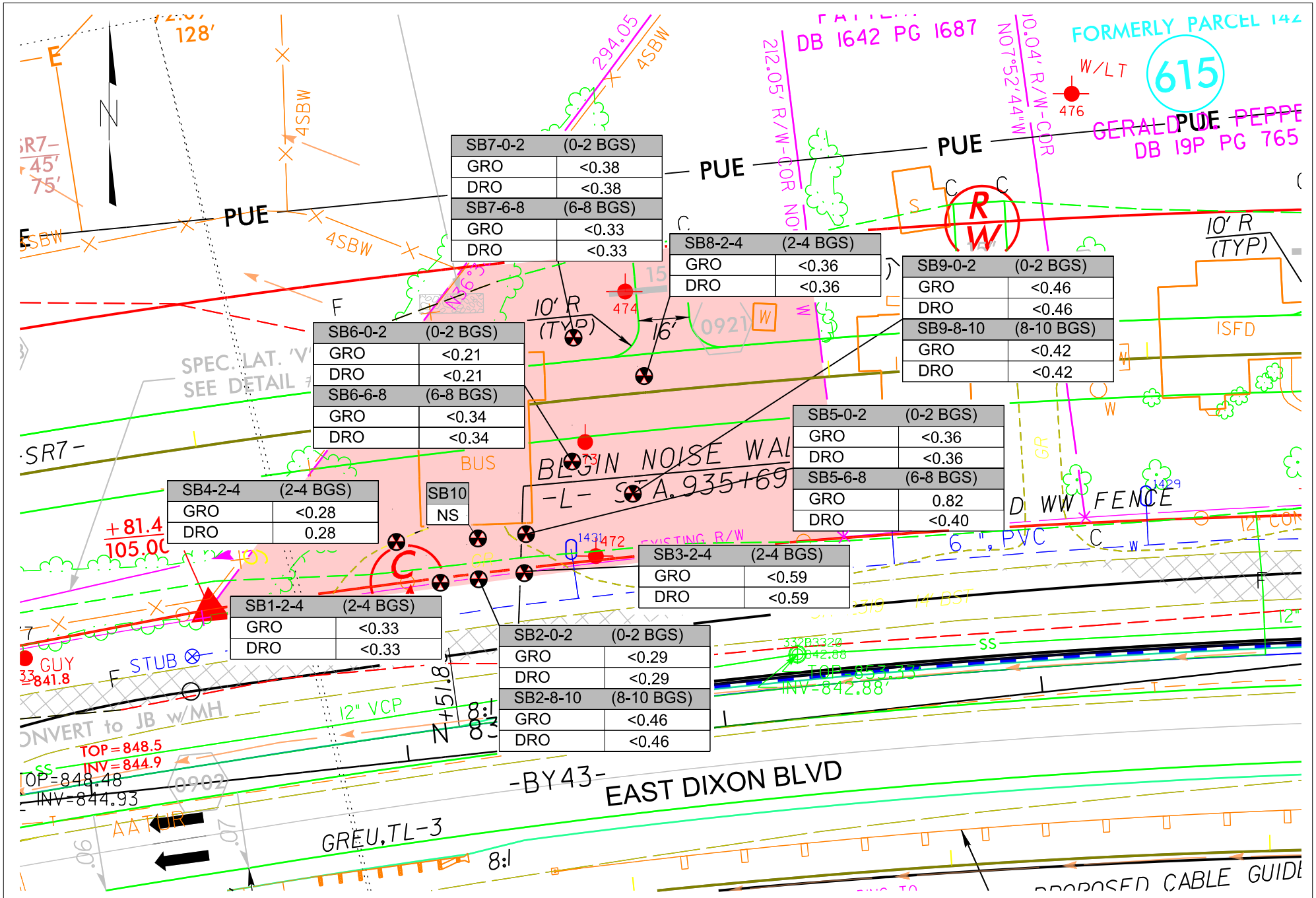
10'

(ENGLISH)

wood.

AREA OF INVESTIGATION WITH SOIL BORING LOCATIONS - PARCEL 613
JAMES L. THOMPSON & BOBBY RAY HORNE - 5105 E. DIXON BLVD
STATE PROJECT: R-2707E
WBS ELEMENT: 34497.1.2
CLEVELAND COUNTY, KINGS MOUNTAIN, NORTH CAROLINA

PREPARED BY:	DATE:	CHECKED BY:	DATE:	JOB NUMBER	FIGURE
LMM	6/25/19	HPC	6/25/19	188322707	2



BORING LOCATION
AREA OF INVESTIGATION
NS=SAMPLE NOT COLLECTED DUE TO REFUSAL
GRO=GASOLINE RANGE ORGANICS
DRO=DIESEL RANGE ORGANICS
CONCENTRATIONS SHOWN IN MILLIGRAMS PER KILOGRAM (mg/kg)
SHADED CONCENTRATIONS EXCEED NCDEQ STATE ACTION LIMITS
BGS=FEET BELOW GROUND SURFACE

20' 0' 20' 40'
10'
(ENGLISH)

wood.

UVF PETROLEUM RESULTS - PARCEL 613
JAMES L. THOMPSON & BOBBY RAY HORNE - 5105 E. DIXON BLVD
STATE PROJECT: R-2707E
WBS ELEMENT: 34497.1.2
CLEVELAND COUNTY, KINGS MOUNTAIN, NORTH CAROLINA

PREPARED BY:	DATE:	CHECKED BY:	DATE:	JOB NUMBER	FIGURE
LMM	6/25/19	HPC	6/25/19	188322707	3

APPENDIX A

PHOTOGRAPHIC LOG

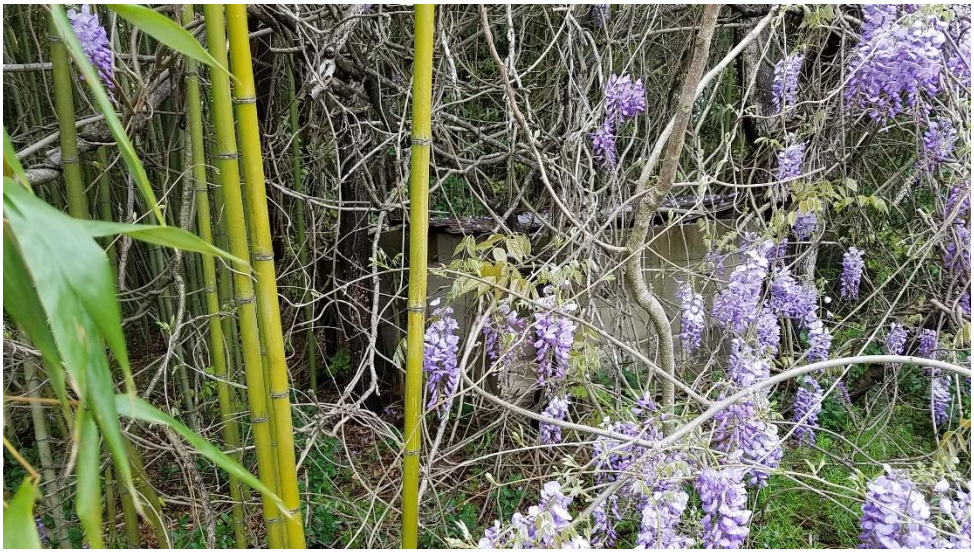


PHOTO 1:

View of a water supply well house on Site.

Photo date: 4/9/2019

PHOTO 2:

View west of the eastern side of the Site building.

Photo date: 4/9/2019

PHOTO 3:

View north of the south side of the Site building.

Photo date: 4/9/2019

PHOTO 4:

View of drilling on Site.

Photo date: 6/11/2019

APPENDIX B

BORING LOGS

wood.

SOIL BORING FIELD WORKSHEET

BORING #	**P613-SB1**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**1883R2707**			PROJECT NAME	**NCDOT Shelby R-2707E**
DATE DRILLED	**6/11/2019**			WEATHER CONDITIONS	**82˚F Sunny**
DRILLING SUB-CONTRACTOR	**SAEDACCO**			DRILL RIG	**Geoprobe 54DT**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1		Red brown silty SAND	
2	0.0		
3		Tan silty SAND	
4	0.0		
5			
6	0.0		
7			
8	0.0		
9			
10	0.0		
11		Boring terminated at 10ft. UVF sample taken at 2-4ft.	
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			

Log Completed By: **RPD**

wood.

SOIL BORING FIELD WORKSHEET

BORING #	**P613-SB2**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**1883R2707**			PROJECT NAME	**NCDOT Shelby R-2707E**
DATE DRILLED	**6/11/2019**			WEATHER CONDITIONS	**82˚F Sunny**
DRILLING SUB-CONTRACTOR	**SAEDACCO**			DRILL RIG	**Geoprobe 54DT**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1		Red brown silty SAND w/gravel	
2	0.0		
3			
4	0.0	Tan brown sandy SILT	
5			
6	0.0		
7		Tan brown orange silty SAND	
8	0.0		
9			
10	0.0		
11		Boring terminated at 10ft. UVF sample taken at 0-2 and 8-10ft.	
12			
13			
14			
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16			
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21			

Log Completed By: **RPD**

wood.

SOIL BORING FIELD WORKSHEET

BORING #	**P613-SB3**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**1883R2707**			PROJECT NAME	**NCDOT Shelby R-2707E**
DATE DRILLED	**6/11/2019**			WEATHER CONDITIONS	**82˚F Sunny**
DRILLING SUB-CONTRACTOR	**SAEDACCO**			DRILL RIG	**Geoprobe 54DT**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1		Brown silty SAND	
2	0.0		
3			
4	0.0	Brown red sandy CLAY with silt	
5			
6	0.0	Brown tan silty SAND	
7			
8	0.0		
9			
10	0.0		
11		Boring terminated at 10ft. UVF sample taken at 2-4ft.	
12			
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Log Completed By: **RPD**

wood.

SOIL BORING FIELD WORKSHEET

BORING #	**P613-SB4**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**1883R2707**			PROJECT NAME	**NCDOT Shelby R-2707E**
DATE DRILLED	**6/11/2019**			WEATHER CONDITIONS	**82˚F Sunny**
DRILLING SUB-CONTRACTOR	**SAEDACCO**			DRILL RIG	**Geoprobe 54DT**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1		Red brown silty SAND	
2	0.0		
3		Tan silty SAND	
4	0.0		
5			
6	0.0		
7			
8	0.0		
9			
10	0.0		
11		Boring terminated at 10ft. UVF sample taken at 2-4ft.	
12			
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21			

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wood.

SOIL BORING FIELD WORKSHEET

BORING #	**P613-SB5**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**1883R2707**			PROJECT NAME	**NCDOT Shelby R-2707E**
DATE DRILLED	**6/11/2019**			WEATHER CONDITIONS	**82˚F Sunny**
DRILLING SUB-CONTRACTOR	**SAEDACCO**			DRILL RIG	**Geoprobe 54DT**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1		Brown silty SAND with gravel, topsoil	
		Red sandy CLAY with silt and quartz	
2	0.0		
		Gray sandy SILT	
3			
4	0.0		
5		Red tan sandy CLAY	
6	0.0		
7			
8	0.0		
9		Tan silty SAND	
10	0.0		
11		Boring terminated at 10ft. UVF sample taken at 0-2 and 8-10ft.	
12			
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Log Completed By: **RPD**

wood.

SOIL BORING FIELD WORKSHEET

BORING #	**P613-SB6**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**1883R2707**			PROJECT NAME	**NCDOT Shelby R-2707E**
DATE DRILLED	**6/11/2019**			WEATHER CONDITIONS	**82˚F Sunny**
DRILLING SUB-CONTRACTOR	**SAEDACCO**			DRILL RIG	**Geoprobe 54DT**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1		Brown silty SAND, organic, topsoil	
2	0.0	Tan orange silty SAND	
3			
4	0.0		
5			
6	0.0		
7			
8	0.0		
9			
10	0.0		
11		Boring terminated at 10ft. UVF sample taken at 0-2 and 6-8ft.	
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Log Completed By: **RPD**

wood.

SOIL BORING FIELD WORKSHEET

BORING #	**P613-SB7**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**1883R2707**			PROJECT NAME	**NCDOT Shelby R-2707E**
DATE DRILLED	**6/11/2019**			WEATHER CONDITIONS	**82˚F Sunny**
DRILLING SUB-CONTRACTOR	**SAEDACCO**			DRILL RIG	**Geoprobe 54DT**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1		Brown silty SAND, organic, topsoil	
2	0.0	Orange tan sandy CLAY with silt	
3			
4	0.0	Tan sandy clay with silt	
5			
6	1.8	Tan silty SAND	
7			
8	0.4		
9			
10	1.3		
11		Boring terminated at 10ft. UVF sample taken at 0-2 and 4-6ft.	
12			
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Log Completed By: **RPD**

wood.

SOIL BORING FIELD WORKSHEET

BORING #	**P613-SB8**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**1883R2707**			PROJECT NAME	**NCDOT Shelby R-2707E**
DATE DRILLED	**6/11/2019**			WEATHER CONDITIONS	**82˚F Sunny**
DRILLING SUB-CONTRACTOR	**SAEDACCO**			DRILL RIG	**Geoprobe 54DT**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1		Organic, topsoil	
2	0.0	Tan sandy SILT	
3			
4	0.0	Tan silty SAND	
5			
6	0.0		
7			
8	0.0		
9			
10	0.0		
11		Boring terminated at 10ft. UVF sample taken at 2-4ft.	
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Log Completed By: **RPD**

wood.

SOIL BORING FIELD WORKSHEET

BORING #	**P613-SB9**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**1883R2707**			PROJECT NAME	**NCDOT Shelby R-2707E**
DATE DRILLED	**6/11/2019**			WEATHER CONDITIONS	**82˚F Sunny**
DRILLING SUB-CONTRACTOR	**SAEDACCO**			DRILL RIG	**Geoprobe 54DT**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1		Brown, organic, topsoil	
2	0.0	Orange tan sandy CLAY with silt	
3			
4	0.0		
5		Orange tan silty SAND	
6	0.0		
7			
8	0.0	White SAND with quartz	
9			
10	0.3		
11		Boring terminated at 10ft. UVF sample taken at 0-2 and 8-10ft.	
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Log Completed By: **RPD**

wood.

SOIL BORING FIELD WORKSHEET

BORING #	**P613-SB10**	BORING DEPTH (ft)	**1**	NUMBER OF PAGES	**1**
PROJECT #	**1883R2707**			PROJECT NAME	**NCDOT Shelby R-2707E**
DATE DRILLED	**6/11/2019**			WEATHER CONDITIONS	**82˚F Sunny**
DRILLING SUB-CONTRACTOR	**SAEDACCO**			DRILL RIG	**Geoprobe 54DT**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1		Topsoil Red brown sandy CLAY with gravel, concrete	
2		Boring refusal on concrete at 1 ft at three attempted locations. No PID readings taken. No UVF samples taken	
3			
4			
5			
6			
7			
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Log Completed By: **RPD**

APPENDIX C

GEOPHYSICAL REPORT

GEL Engineering of NC, Inc. DBA
GEL Solutions

55 Shiloh Road, Suite 6
Asheville, NC 28803
P 828.782.3523

www.gel-solutions.com

April 29, 2019

Mr. John Maas, PG
Wood, PLC
2801 Yorkmont Road, Suite 100
Charlotte, NC 28208

Re: Report for Geophysical Survey to Identify Underground Storage Tanks
Parcel #613
5105 E. Dixon Blvd.
Kings Mountain, North Carolina

Dear Mr. Maas,

GEL Solutions appreciates the opportunity to provide Wood with this report of our geophysical investigation for the referenced project. This investigation was designed to determine the potential presence of underground storage tanks (USTs) at the site and underground utilities that would obstruct drilling activities at the site. The geophysical field investigation was successfully performed on April 15, 2019 through April 18, 2019.

1.0 Summary of Results

Four subsurface anomalies were identified in the geophysical data. Figure 1 depicts the approximate location and size of the anomalies. The anomalies were denoted as "No Confidence" with respect to the UST level of confidence rating. Any anomalies not denoted with the UST level of confidence rating in post processed data (Figure 1) are consistent with known metallic surface objects, utilities, and/or cultural interference. Although geophysical methods provide a high level of assurance for the location of subsurface objects, the possibility exists that not all features can or will be identified. Therefore, due caution should be used when performing any subsurface excavation, and GEL Solutions, LLC will not be liable for any damages that may occur. Descriptions of the technologies employed during this geophysical investigation are provided below.

2.0 Overview of Geophysical Investigation

The geophysical evaluation included the deployment of ground penetrating radar (GPR) and time-domain electromagnetic (TDEM) technologies to the site. These technologies were used in concert with one another in order to identify the presence of potential USTs at the site. A brief description of each technology is presented in the following paragraphs.

Ground Penetrating Radar Methodology

An Impulse Radar digital radar control system configured with a 160-Megahertz and 600-Megahertz (MHz) antenna array was used in this investigation. GPR is an electromagnetic geophysical method that detects interfaces between subsurface materials with differing dielectric constants. The GPR system consists of an antenna which houses the transmitter and receiver, a digital control unit which both generates and digitally records the GPR data, and a color video monitor to view data as it is collected in the field.

The transmitter radiates repetitive short-duration electromagnetic waves (at radar frequencies) into the earth from an antenna moving across the ground surface. These radar waves are reflected back to the receiver from the interface of materials with different dielectric constants. The intensity of the reflected signal is a function of the contrast in the

dielectric constant between the materials, the conductivity of the material through which the wave is traveling, and the frequency of the signal.

Subsurface features that commonly cause such reflections are: 1) natural geologic conditions, such as changes in sediment composition, bedding, and cementation horizons and voids; or 2) unnatural changes to the subsurface such as disturbed soils, soil backfill, buried debris, tanks, pipelines, and utilities. The digital control unit processes the signal from the receiver and produces a continuous cross-section of the subsurface interface reflection events.

GPR data profiles were collected along transects covering the entire rights of ways. Depth of investigation of the GPR signal is highly site-specific and is limited by signal attenuation (absorption) in the subsurface materials. Signal attenuation is dependent upon the electrical conductivity of the subsurface materials. Signal attenuation is greatest in materials with relatively high electrical conductivities such as clays, brackish groundwater, or groundwater with a high dissolved solid content from natural or manmade sources. Signal attenuation is lowest in relatively low conductivity materials such as dry sand or rock. Depth of investigation is also dependent on the antenna's transmitting frequency. Depth of investigation generally increases as transmitting frequency decreases; however, the ability to resolve smaller subsurface features is diminished as frequency is decreased. The average depth of penetration at this site was approximately 2-5 feet below the surface.

The GPR antenna used at this site is internally shielded from aboveground interference sources. Accordingly, the GPR response is not affected by overhead power lines, metallic buildings, or nearby objects.

Time Domain Electromagnetic Methodology

TDEM methods measure the electrical conductivity of subsurface materials. The conductivity is determined by inducing (from a transmitter) a time or frequency-varying magnetic field and measuring (with a receiver) the amplitude and phase shift of an induced secondary magnetic field. The secondary magnetic field is created by subsurface conductive materials behaving as an inductor as the primary magnetic field is passed through them.

The Geonics EM-61 system used in this investigation operates within these principles. However, the EM-61 TDEM system can discriminate between moderately conductive earth materials and very conductive metallic targets. The EM-61 consists of a portable coincident loop time domain transmitter and receiver with a 1.0-meter by 0.5-meter coil system. The EM-61 generates 150 pulses per second and measures the response from the ground after transmission or between pulses. The secondary EM responses from metallic targets are of longer duration than those created by conductive earth materials. By recording the later time EM arrivals, only the response from metallic targets is measured, rather than the field generated by the earth material.

3.0 Field Procedures and Results

The geophysical field investigation was successfully performed on April 15 through April 18, 2019 at the referenced site located in the immediate vicinity of E. Dixon Blvd. in Kings Mountain, NC. Interpretation of the GPR data was conducted in the field and any potential anomalies were marked in the field. TDEM was also used to scan the project site with a spacing of 2.5 feet. Any electromagnetic anomalies detected during field activities that were indicative of buried metallic objects were also marked in the field.

Four subsurface geophysical anomalies were detected during the investigation of Parcel #613 as depicted in Figure 1. The anomalies were indicative of a "No Confidence" with respect to the UST level of confidence rating system based on TDEM and GPR investigation. Figure 1 depicts the approximate location and size of the anomalies as well as the known metallic surface objects present at the time of the investigation. Known metallic surface objects in Figure 1 are noted with a brief identifiable description.

The UST level of confidence rating system was developed by NCDOT in May 2009 ("Known UST," "Probable UST," "Possible UST," or "No Confidence") and was used in the interpretation and presentation of this report.

Additional TDEM responses were present in the data but correlated to surface metallic debris and/or above ground metal structures and are not considered to be representative of potential USTs.

4.0 Closing

GEL Solutions appreciates the opportunity to assist Wood with this project. If you have any questions or need further information regarding the project, please do not hesitate to call me at (828) 782-3523.

Yours very truly,

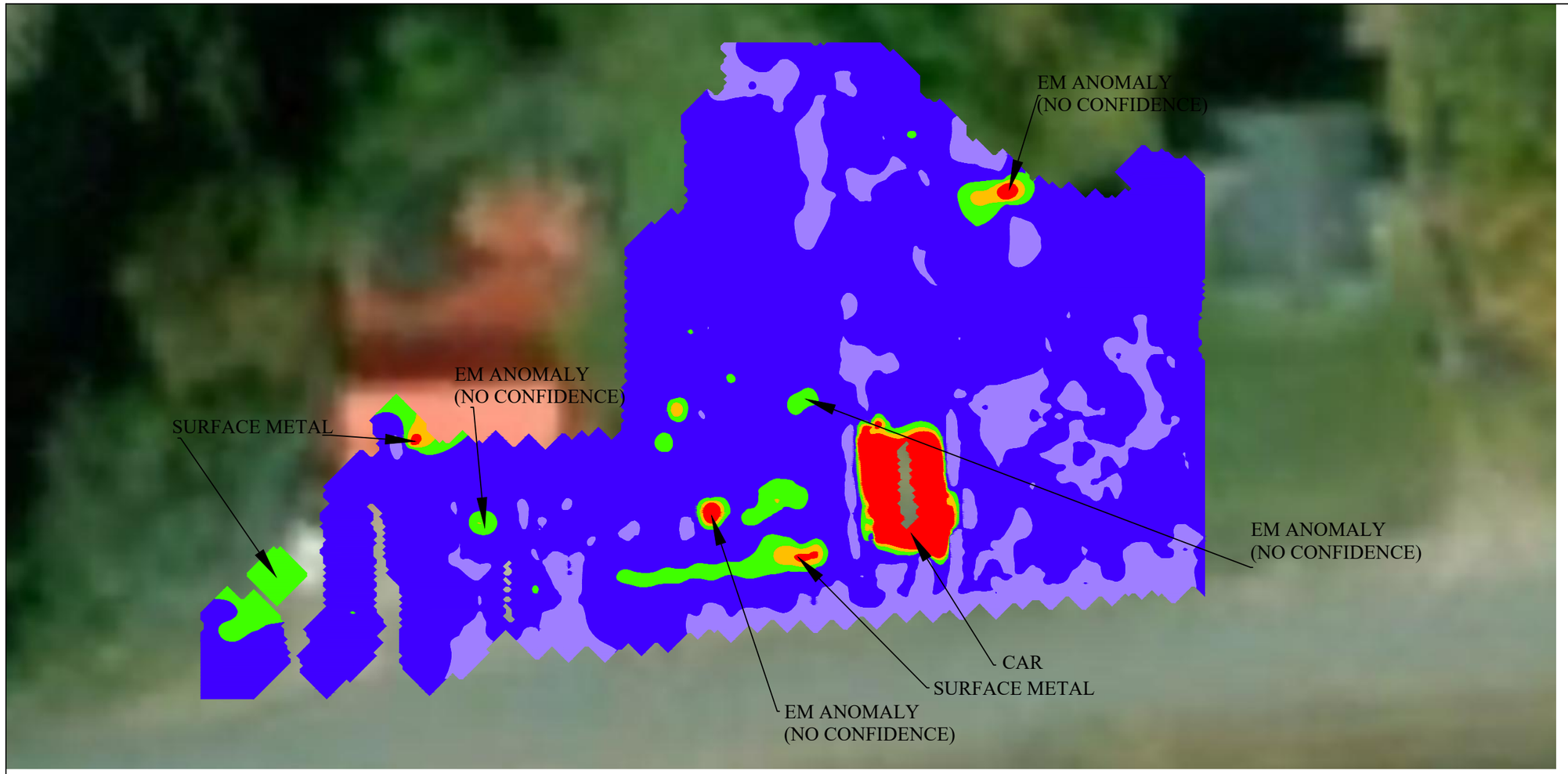
Jeff Tallent
Director of Western NC Operations

Enclosures
fc: 613.AMEC00419.Report.pdf

Site Photos

Photo 1: EM Anomaly – No Confidence

Photo 2: EM Anomalies – No Confidence



NOTES

1) UNDERGROUND FEATURES WERE LOCATED USING VISUAL EVIDENCE, GROUND PENETRATING RADAR (GPR), AND TIME DOMAIN ELECTROMAGNETIC (TDEM) METHODS. OTHER BURIED FEATURES MAY EXIST BUT WERE NOT DETECTED DUE TO LIMITATIONS OF THE GEOPHYSICAL METHODS, SITE ACCESS, AUTHORIZED SCOPE-OF-WORK, AND/OR HIGH TARGET CONGESTION. THEREFORE, DUE CAUTION SHOULD BE USED WHEN PERFORMING SUBSURFACE EXCAVATION ACTIVITIES WHERE POTENTIAL CONFLICTS EXIST. GEL SOLUTIONS IS NOT RESPONSIBLE FOR DAMAGES THAT MAY OCCUR. IDENTIFYING THE LOCATION OF SOME FEATURES MAY ONLY BE POSSIBLE WITH VACUUM OR OTHER EXCAVATION METHODS.
2) FIELD SURVEY CONDUCTED ON 04.15.2019 - 04.18.2019.
3) GEOPHYSICAL DATA GENERATED USING AN IMPULSE RADAR CROSSOVER GPR SYSTEM CONFIGURED WITH A 170MHZ AND 600MHZ ANTENNA AND A GEONICS EM-61 TDEM SYSTEM. APPROXIMATE POSITIONING WAS PROVIDED USING TRIMBLE RTK/GPS.
4) GEL SOLUTIONS IS NOT LIABLE FOR ACCURACY OF BASE MAP PROVIDED BY WOOD.

GRAPHIC SCALE

20' 0' 10' 20' 40' 80'

(IN FEET)
1 inch = 20 ft.

GEL ENGINEERING OF NC, INC. DBA
GEL SOLUTIONS
an Affiliate of THE GEL GROUP, INC.
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ASHEVILLE, NC 28803
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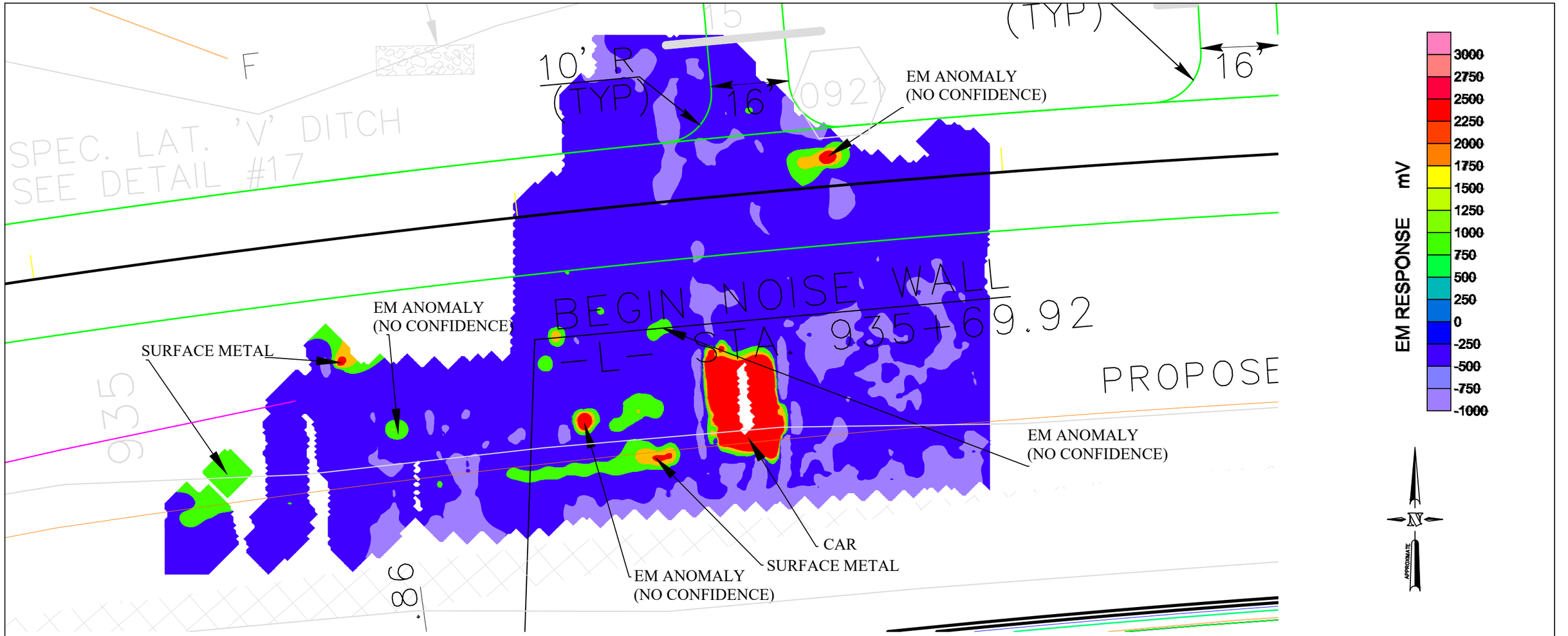
WWW.GEL-SOLUTIONS.COM

PROJECT: AMEC00419		
GEOPHYSICAL INVESTIGATION FOR USTs PARCEL 613 5105 E. DIXON BLVD. KINGS MOUNTAIN, NORTH CAROLINA	RESULTS OF GEOPHYSICAL INVESTIGATION	FIGURE 1
DATE: 4/25/19	DRAWN BY: JAT APPRV. BY: WRA	



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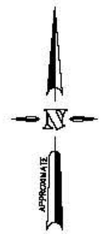
DATE: 4/25/19	DRAWN BY: JAT APPRV. BY: WRA	



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GEOPHYSICAL INVESTIGATION FOR USTs PARCEL 613 5105 E. DIXON BLVD. KINGS MOUNTAIN, NORTH CAROLINA	RESULTS OF GEOPHYSICAL INVESTIGATION	FIGURE 2
DATE: 4/25/19	DRAWN BY: JAT APPRV. BY: WRA	

APPENDIX D

RESULTS FROM UVF SOIL ANALYSES

QED

REDLAB™ RAPID ENVIRONMENTAL DIAGNOSTICS

AQROS

Hydrocarbon Analysis Results

Client: Wood
Address: 2801 Yorkmont Rd
Charlotte, NC

Samples taken Tuesday, June 11, 2019
Samples extracted Tuesday, June 11, 2019
Samples analysed Tuesday, June 11, 2019

Contact: Helen Corley

Operator Derick Haydin

Project: NCDOT Shelby

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	P613-SB1-2-4	13.3	<0.33	<0.33	<0.33	<0.33	<0.07	<0.11	<0.013	0	100	0	Residual HC
s	P613-SB2-0-2	11.7	<0.29	<0.29	<0.29	0.24	0.24	<0.09	<0.012	0	51.2	48.8	Residual HC,(P)
s	P613-SB2-8-10	18.3	<0.46	<0.46	<0.46	<0.46	<0.09	<0.15	<0.018	0	100	0	PHC not detected,(P)
s	P613-SB3-2-4	23.4	<0.59	<0.59	<0.59	<0.59	<0.12	<0.19	<0.023	0	100	0	PHC not detected
s	P613-SB4-2-4	11.3	<0.28	<0.28	0.28	0.28	0.22	<0.09	<0.011	0	57	43	V.Deg.PHC 90.8%,(FCM),(P)
s	P613-SB5-0-2	14.5	<0.36	<0.36	<0.36	<0.36	<0.07	<0.12	<0.015	0	100	0	,(FCM)
s	P613-SB5-6-8	16.0	<0.4	0.82	<0.4	0.82	<0.08	<0.13	<0.016	98	2	0	PHC not detected

Initial Calibrator QC check OK Final FCM QC Check OK 92.7 %

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) = Modifed Result.

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

QED

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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	P613-SB6-0-2	8.4	<0.21	<0.21	<0.21	<0.21	<0.04	<0.07	<0.008	0	56.9	43.1	Residual HC
s	P613-SB6-6-8	13.5	<0.34	<0.34	<0.34	<0.34	<0.07	<0.11	<0.013	0	0	0	,(FCM),(BO)
s	P613-SB7-4-6	13.1	<0.33	<0.33	<0.33	<0.33	<0.07	<0.1	<0.013	0	0	0	,(FCM),(BO)
s	P613-SB7-0-2	15.0	<0.38	<0.38	<0.38	<0.38	<0.08	<0.12	<0.015	0	0	0	PHC not detected,(BO)
s	P613-SB8-2-4	14.5	<0.36	<0.36	<0.36	<0.36	<0.07	<0.12	<0.015	0	0	0	,(FCM)
s	P613-SB9-0-2	18.6	<0.46	<0.46	<0.46	<0.46	<0.09	<0.15	<0.019	0	0	0	PHC not detected,(BO)
s	P613-SB9-8-10	16.7	<0.42	<0.42	<0.42	<0.42	<0.08	<0.13	<0.017	0	0	0	PHC not detected

Initial Calibrator QC check OK Final FCM QC Check OK 97.7 %

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) = Modifed Result.

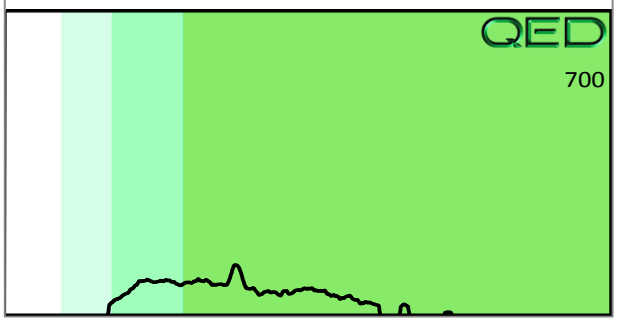
% Ratios estimated aromatic carbon number proportions : HC = Hydrocarbon : PHC = Petroleum HC : FP = Fingerprint only. **Data generated by HC-1 Analyser**

QED Hydrocarbon Fingerprints

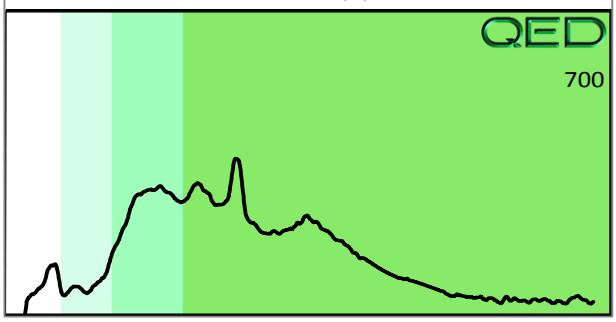
Project: NCDOT Shelby

6/11/2019

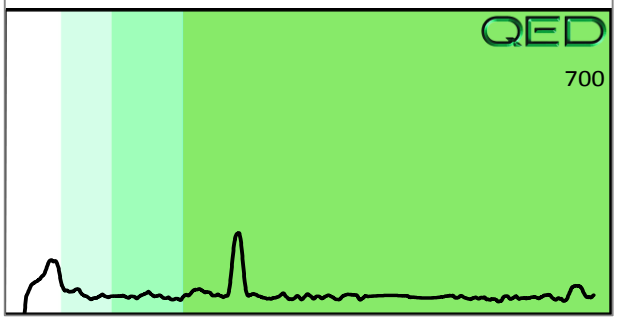
P613-SB1-2-4 : Residual HC



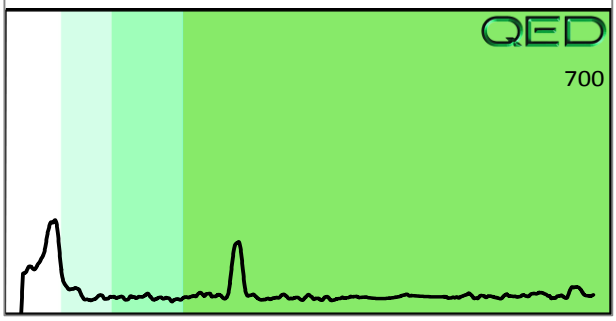
P613-SB2-0-2 : Residual HC,(P)



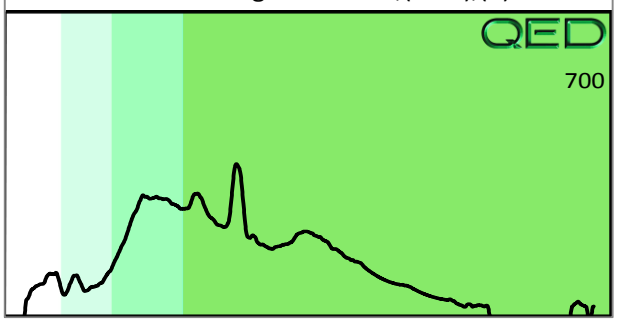
P613-SB2-8-10 : PHC not detected,(P)



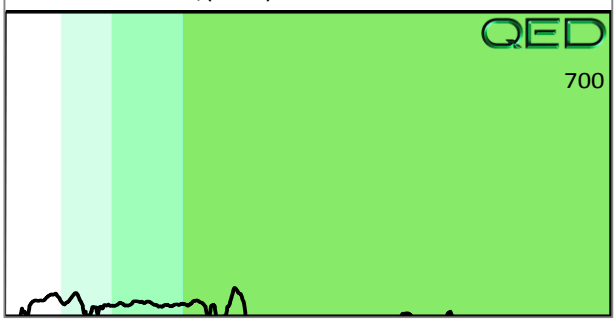
P613-SB3-2-4 : PHC not detected



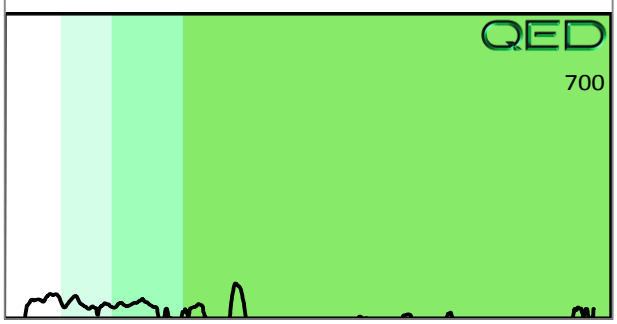
P613-SB4-2-4 : V.Deg.PHC 90.8%,(FCM),(P)



P613-SB5-0-2 : ,(FCM)



P613-SB5-6-8 : PHC not detected

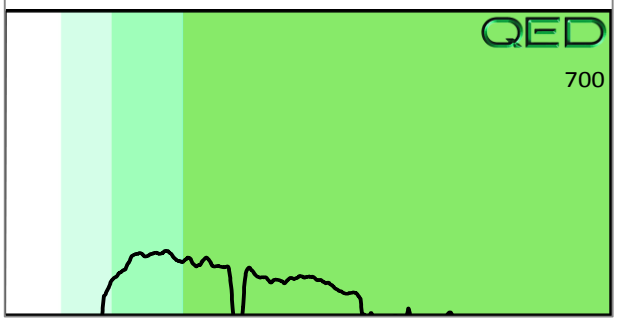


QED Hydrocarbon Fingerprints

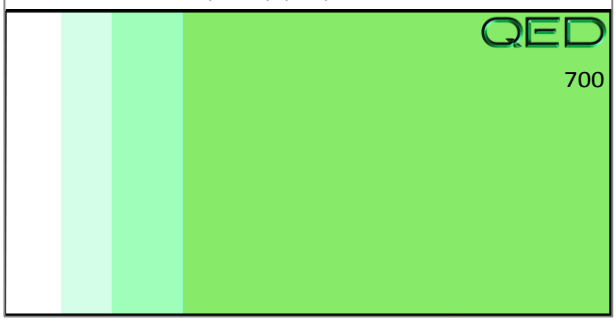
Project: NCDOT Shelby

6/11/2019

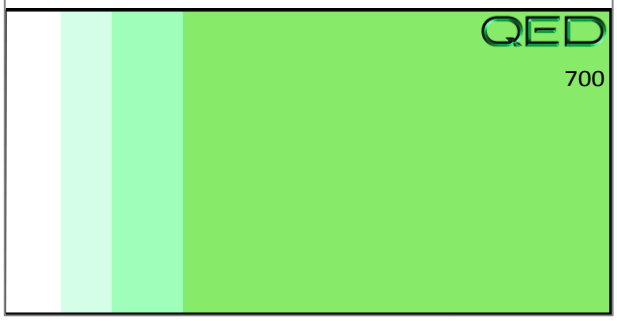
P613-SB6-0-2 : Residual HC



P613-SB6-6-8 : ,(FCM),(BO)



P613-SB7-4-6 : ,(FCM),(BO)



P613-SB7-0-2 : PHC not detected,(BO)

P613-SB8-2-4 : ,(FCM)

P613-SB9-0-2 : PHC not detected,(BO)

P613-SB9-8-10 : PHC not detected